HYDAC INTERNATIONAL

Filter Systems.
Product Catalogue.

EN 79.000.5/06.18

HYDAC FILTER SYSTEM...

HYDAC was founded in 1963 as a company for hydraulic accessories and is today an internationally active company group with over 9000 employees, 50 branch offices and 500 trade and service partners worldwide.

HYDAC stands for hydraulics, systems and fluid engineering.

From components to systems, HYDAC has for many years supplied reliable products to all sectors of industry and, as an experienced partner, has supported its customers in the field of fluid conditioning.

...more than just filter systems

Founded in 2008, HYDAC Filter Systems GmbH developed from the Filtration Technology division into an independent Business Unit.

Hand in hand with our customers and partners, we work tirelessly on new challenges to develop new solutions. Direct contact with our customers, proximity to the market and looking beyond our own horizons are fundamental to the continuous improvement and expansion of our product range.

As a versatile supplier of fluid conditioning products and services, finding a solution for the customer is our priority.

Our initial activities in fluid conditioning have over the years been extended by close cooperation with our customers and partners and have developed into the closely related areas of fluid monitoring and technical cleanliness.

NOTE

The information in this brochure relates to the operating conditions and applications described.
For applications or operating conditions not described please contact the relevant technical department.

Subject to technical modifications.

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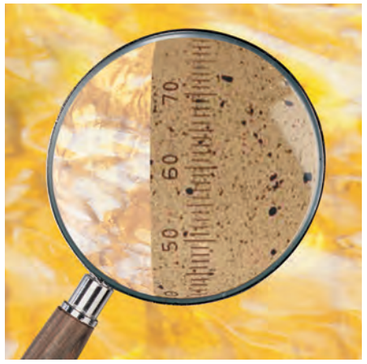
1. HYDAC FILTER SYSTEMS FOR...



Fluid condition monitoring

Monitoring of operating fluids to set up future-focused maintenance.

- Measured variables: particle count, contamination according to ISO/SAE/NAS, water saturation
- Solutions for permanent system integration, including hydraulic and electrical adaptation (online condition monitoring)
- Plug & play measuring equipment for short-term system analysis (offline condition monitoring)

Advantages:

- Extension of maintenance intervals
- Critical machine conditions are identified in good time
- Defence against unjustified complaints
- Basis of a guaranteed availability concept, maintenance scheduling, etc.
- Reduction in the life cycle cost (LCC)

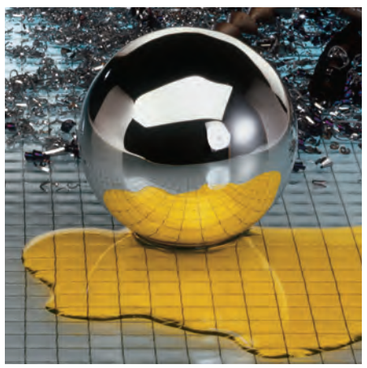
Fluid conditioning

Stationary and mobile fluid conditioning systems for filtering, dewatering, degassing and conditioning operating fluids.

- Removal of particle contamination, water, oil degradation products and gases
- Mobile and stationary conditioning systems
- Prepared for integration of fluid sensors
- Filter element technology especially for bypass flow
- High contamination retention capacity
- Low filtration rating

Advantages:

- Improvement in service life for components and system filters
- Increased machine availability
- Longer oil change intervals
- Reduction in the life cycle cost (LCC)



Technical cleanliness

Measurement devices for analyzing the technical cleanliness of components and systems.

- Extraction processes: spraying, flushing, ultrasonic (laboratory)
- Simple operation via PC-controlled sequence
- Indirect cleanliness analysis of the rinsing fluid via particle counter (end use simulation)
- Reliable/reproducible analysis results

Advantages:

- Cost reductions through lower production waste
- Identification and elimination of weak points
- Reduction in production-stage failures
- Optimisation of both internal and external handling processes
- Documentation of the technical cleanliness of components and systems according to standards ISO 16232 / ISO 18413 / VDA 19

2. INDUSTRIES AND APPLICATIONS

The wide range of uses for the products from HYDAC Filter Systems enables applications in numerous sectors of industry:

Steel industry

- Fluid condition monitoring and fluid conditioning in hydraulic circuits and lubrication systems e.g. of presses, rolling mills, central hydraulics

Paper industry

- Fluid condition monitoring and fluid conditioning on calenders, refiners, dryer section/wet-end

Plastics industry

- Fluid condition monitoring and fluid conditioning to increase machine availability

Power industry

- Fluid condition monitoring and fluid conditioning of lubrication systems on turbines, boiler feed pumps, transmissions etc.,
  Diesel: tank conditioning & transfer filtration and dewatering

Automotive

- Monitoring the technical cleanliness of components and systems.
- Process chain analysis
- Optimisation of part washers which are critical to cleanliness
- Fluid condition monitoring and fluid conditioning on hydraulic and lubrication systems of presses, machine tools, plastic injection moulding machines, test benches

Machine tools

- Fluid condition monitoring and fluid conditioning on hydraulic and lubrication systems

Mining

- Fluid conditioning of dismantling and conveying system,
  Diesel: monitoring, tank conditioning & transfer filtration and dewatering

Offshore

- Fluid condition monitoring and fluid conditioning on hydraulic and lubrication systems,
  Diesel: tank conditioning & transfer filtration and dewatering

Marine

- Fluid condition monitoring and fluid conditioning on hydraulic and lubrication systems,
  Diesel: tank conditioning & transfer filtration and dewatering

Aviation

- Fluid condition monitoring and fluid conditioning on hydraulic and lubrication systems on test benches, fluid conditioning on kerosene filling stations

Wind power

- Fluid condition monitoring on gearboxes and hydraulic systems
- Fluid conditioning on gearboxes

Mobile hydraulics

- Technical cleanliness including monitoring of the product delivery condition on flushing and function test benches
- Offline filtration and dewatering to condition biodegradable fluids and hydraulic oils

3. PRODUCT NAVIGATOR

3.1 MEASUREMENT AND ANALYSIS SYSTEMS

HYDAC offers a comprehensive range of easy-to-use measurement and analysis equipment. Whether it be solid particles or fluid contamination, for sporadic checking or as a permanent installation, under rough field conditions or in the laboratory. The right tool for every application:

- Fluid sensors (to measure solid particle contamination and water saturation)
- Sampling systems
- Laboratory equipment
- Analysis instrument to determine the technical cleanliness acc. to ISO 16232 / VDA 19

Advantages:

- Availability of systems and components is predictable
- Prevention of sudden downtimes
- Reduction of operating costs
- Prevention of catastrophic consequential damage to systems and subsequent supply shortages
- Preventative and condition-based maintenance

3.1.1 **Fluid sensors**
(to measure solid particle contamination and water saturation)

CS 1000 *Page 11*
ContaminationSensor
Compact visual particle counter

CS 2000 *Page 15*
ContaminationSensor
Visual particle counter

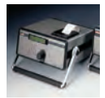
CSM 1000 *Page 19*
ContaminationSensor Module
Plug & play device to determine solid particle contamination and water saturation (optional) in oil

CSM 2000 *Page 23*
ContaminationSensor Module
Plug & play device to determine solid particle contamination and water saturation (optional) in oil

CSM-E 1000 *Page 27*
ContaminationSensor Module Economy
Plug & play unit for permanent monitoring of solid particle contamination and water saturation (optional) in oil

MCS 1000 *Page 33*
MetallicContamination Sensor
Inductive particle sensor

FCU 1000 *Page 41*
FluidControl Unit
Portable particle measuring device



FCU 2000 *Page 43*
FluidControl Unit
Portable particle measuring device

FCU 8000 *Page 49*
FluidControl Unit with BottleSampling Unit
Portable particle counter with bottle sample analysis device

AS 1000 *Page 53*
AquaSensor
Water sensor to detect dissolved water (water saturation in %)

AS 3000 *Page 55*
AquaSensor
Water sensor to detect dissolved water (water saturation in %) with integrated display

FMM *Page 57*
FluidMonitoring Module
Ready-to-connect module for determining levels of particle contamination, water saturation and the oil condition (version-dependent)

3.1.2 **Sampling systems and laboratory equipment**

ALPC 9000 *Page 65*
Automated Laboratory Particle Counter
Laboratory system for automatic analysis of sample bottles (500 oil samples/day)

FAS *Page 69*
FluidAnalysis Set
Test kit for analysing oil samples

FES *Page 71*
FluidSampling Set
Test kit for taking oil samples

MM *Page 73*
Measuring Microscopes
for laboratory applications

WTK *Page 77*
WaterTest Kit
Test kit for determining the water content in the oil

3.1.3 **Component analysis equipment/extraction equipment**

CTU 1000 *Page 79*
ContaminationTest Unit
Analysis equipment for determining the technical cleanliness of components and systems

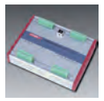
CTM-SC *Page 83*
ContaminationTest Module (Supply Control)
Module for fluid supply, control and data storage

CTM-EB *Page 87*
ContaminationTest Module (Extraction Box)
Extraction module for inspecting component cleanliness

CTM-EF *Page 91*
ContaminationTest Module (Extraction Flushing)
Extraction module for inspecting component cleanliness

3.1.4 **Software and controls**

SMU 1200 *Page 95*
SensorMonitoring Unit
Microcontroller to display, store and transfer measured values within a PC network



CSI-B-1 *Page 97*
ConditionSensor Interface
Interface converter
HSI → analogue

CSI-B-2 *Page 99*
ConditionSensor Interface
Interface converter
HSI → RS 232 / RS 485

CSI-B-7 *Page 101*
ConditionSensor Interface
Interface converter
HSI → Ethernet (LAN)

CSI-C-11 *Page 103*
ConditionSensor Interface
Data logger and interface converter
HSI → Ethernet (LAN & WLAN)

CSI-D-5 *Page 107*
ConditionSensor Interface
Interface converter
RS 485 → USB

FluMoS *Page 109*
FluidMonitoring Software
Software to transfer, display and process data from HYDAC fluid sensors with HSI interface

FluMoT *Page 111*
FluidMonitoring Toolkit
Driver package to link HYDAC fluid sensors to customer's own PC software

3.2 FLUID CONDITIONING SYSTEMS

3.2.1 **Mobile filter systems**

For performing service on multiple systems, convenient mobile units are available for removing solid particles:

- Portable filter units
- Mobile filtration devices

Advantages:

- Clean filling and flushing
- Flexible utilisation on different plants
- Relieved load on the in-line filter
- Increased system availability
- Reduction of life cycle cost

MFU 15 *Page 115*
MobileFiltration Unit
Portable offline filtration unit
up to 15 l/min

OF 5 Mobile *Page 119*
Filtromat
Mobile offline filtration unit
up to 40 l/min

OF 5 with FCU *Page 123*
Filtromat
Mobile offline filtration unit
up to 40 l/min with integrated particle counter

TW 5 *Page 127*
Oil Transport and Filtration Trolley
Mobile offline filtration unit
up to 40 l/min, tank volume: 200 l

FCC *Page 131*
FluidCarrier Compact
Mobile offline filtration unit
up to 15 l/min, tank volume: 70 l

FCM *Page 135*
FluidCleaner Mobil
Mobile offline filtration unit
up to 100 l/min

FT5 *Page 129*
Barrel Transportation and Filtration Trolley
up to 40 l/min; for standard 200 l drums

OFU *Page 143*
Filter Pump Transfer Unit
up to 100 l/min

3.2.2 **Stationary filter systems**

These units in their many versions are installed permanently offline. Stationary filter systems from HYDAC are designed to remove solid particles (with or without integrated fluid sensors)

Advantages:

- Bypass flow filters for working filtration
- Simple retrofitting on existing plants
- Relieved load on the in-line filter
- Increased system availability
- Reduction of life cycle cost

OF 5 *Page 149*
Filtromat
Stationary offline filtration unit
up to 40 l/min

OF 5 Mini *Page 153*
Filtromat
Stationary offline filtration unit
up to 15 l/min

MRF *Page 157*
MultiRheo Filter
Stationary offline filter
up to 2,000 l/min

AMRF *Page 169*
Automotive MultiRheo Filter
Stationary offline filter (automotive)
up to 1,500 l/min

OLF 5 *Page 177*
OffLine Filter
Compact, stationary offline filtration unit up to 15 l/min

OLF 15/30/45/60 *Page 185*
OffLine Filter
Stationary offline filtration unit
up to 60 l/min

OLFBD *Page 189*
OffLine Filter BiDirectional
Small, stationary filter without motor-pump unit for fine filtration up to 5 l/min, up to 25 bar

OLFP 1 / 3 / 6 *Page 191*
OffLine Filter Pressure
Stationary offline filter to eliminate oil ageing products, water and ultrafine contamination, up to 25 bar

WBF *Page 195*
WombatFilter
Filter housing for pre- and main filtration mainly in parts washers, coolant systems, hydraulics and lubrication systems

LVH-F *Page 199*
Low Viscosity Housing-Filter
Filter housing for filtering low-viscosity fluids (e.g. diesel)

3.2.3 **Dewatering/degassing and other fluid conditioning systems**

The HYDAC product range has both mobile and stationary fluid conditioning systems.

- Dewatering through vacuum or coalescence procedures
- Elimination of acids and oil degradation products
- Elimination of varnish
- Degassing and servicing and care of transformer oil
- Deoiling of water

FAM 5 *Page 209*
FluidAqua Mobil
Compact fluid conditioning unit for dewatering, degassing and filtration

FAM 10 *Page 215*
FluidAqua Mobil
Mobile or stationary unit for dewatering, degassing and filtration

FAM 25-95 *Page 221*
FluidAqua Mobil
Mobile or stationary unit for dewatering, degassing and filtration

FAM-E *Page 229*
FluidAqua Mobil Economy
Mobile or stationary unit for dewatering, degassing and filtration

OLS *Page 237*
OffLine Separator
Stationary unit for dewatering

OLSW *Page 241*
OffLine Separator Water
Oil separator unit for washing fluids of densities <900 kg/m³

TCU *Page 245*
TransformerCare Unit
Service unit for transformers online/onload

IXU *Page 249*
Ion eXchange Unit
Offline unit for servicing non-flam fluids up to 9 l/min

VEU-F *Page 255*
VarnishElimination Unit Filtration
Offline unit for fluid conditioning (removal of varnish) of mineral oils up to 20 l/min

OXS *Page 259*
OXiStop
Tank solution with integrated degassing and dewatering unit

OXS *Page 263*
OXiStop LID
Installation version of the OXS for installation in a customer-specific tank

LVU-CD-10 *Page 267*
Low Viscosity Unit
Offline filter unit for removing solid particle contamination and water from diesel fuels, 10 l/min

LVU-CD-40 *Page 271*
Low Viscosity Unit
Offline filter unit for removing solid particle contamination and water from diesel fuels, 40 l/min

3.3 FILTER ELEMENTS

For the numerous filters in the product range, there are different types of element for removing particles and water, as surface or depth filters.

Advantages:

- High filtration ratings
- Long life expectancies as a result of high contamination retention capacity
- Reduction of life cycle cost

FM-P *Page 277*
Flexmicron Premium
Pleated elements for use in MRF / AMRF and as Betafit® elements

FM-S *Page 281*
Flexmicron Standard
Depth filter elements for use in MRF / AMRF and as Betafit® elements

FM-E *Page 285*
Flexmicron Economy
Depth filter elements for use in MRF / AMRF and as Betafit® elements

N1TM, N3TM *Page 289*
Trimicron
Combined pleated and spun spray depth filter elements to eliminate oil ageing products, water and ultrafine contamination

Wombat *Page 291*
Pleated filter element for pre-filtration of fluids

N5DM, N10DM, N5AM, N10AM
Dimicron / Aquamicron
Elements for removing particles from oil, also water removal, as an option

N15DM
Dimicron
Elements with very high contamination retention capacity for removing particles

3.4 HYDRAULIC AND ELECTRICAL ACCESSORIES

A wide array of accessories is available for the simple and rapid hydraulic and electrical integration of HYDAC products in your system.

CM-RE *Page 297*
ConditioningModule-Reservoir Extraction
Gear pump up to 60 bar

REU *Page 303*
Reservoir Extraction Unit
Self-priming motor-pump unit for measuring oil cleanliness

SFK *Page 305*
Small Filtration Kit
Small filtration unit with motor-pump unit

Additional hydraulic and electrical accessories, with connection examples. *Page 307*

4. PRODUCTS

4.1. MEASUREMENT AND ANALYSIS SYSTEMS

ContaminationSensor
CS 1000 Series

Description

The Contamination Sensor CS 1000 series is an online fluid sensor for permanent monitoring of particle contamination in fluids.

The cleanliness results can either be given according to ISO/SAE or ISO/NAS classifications.

This instrument combines the latest materials and technologies with proven engineering and provides the user with a compact and robust stationary sensor.

The attractive price/performance ratio makes it particularly advantageous for OEM applications for Condition Monitoring.

Applications

- Industrial hydraulic and lubrication systems
- Mobile hydraulics

Advantages

- As an option, can be switched between ISO 4406:1999 / SAE AS 4059 and ISO 4406:1987 / NAS 1638
- Critical machine conditions are identified in early stages
- Continuous monitoring of oil conditions
- Condition-based maintenance planning

Techical specifications

General data	
Self diagnosis	Continuous with error display via status LED and display
Display (only with CS 1x2x)	LED, 6 digits, in 17 segment format
Measured variables	ISO 99 (ISO 4406:1999) SAE (SAE AS 4059) or ISO 87 (ISO4406:1987) NAS (NAS 1638)
Service parameters	Flow (status) Out (mA) or (VDC) Drive (%) Temp (°C) and (°F)
Installation position	Optional (Recommended: Vertical direction of flow)
Ambient temperature range	-30 °C to +80 °C / -22 °F to 176 °F
Storage temperature range	-40 °C to +80 °C / -40 °F to 176 °F
Relative humidity	max. 95%, non-condensing
Seal material	FPM for CS1xx0 / EPDM for CS1xx1
Protection class	III (safety extra-low voltage)
IP class	IP 67 (provided it is correctly connected)
Weight	1.3 kg
Hydraulic data	
Measuring range	Sensor measures from Class ISO 9/8/7 (MIN) to Class ISO 25/24/23 (MAX) Calibrated in the range ISO 13/11/10 to 23/21/18
Accuracy	+/- ½ ISO class in the calibrated range
Operating pressure	max. 350 bar / 5075 psi
Hydraulic connection	Inline or hose connection (A,B): thread G1/4, ISO 228 or flange connection (C,D): DN 4
Permitted measurement flow rate	30 to 500 ml/min
Permitted viscosity range	1 to 1000 mm²/s
Fluid temperature range	0 to +85°C, +32 to +185°F
Electrical data	
Connection, male	M12x1, 8-pole, to DIN VDE 0627 or IEC61984
Supply voltage	9 to 36 VDC, residual ripple < 10%
Power consumption	3 watts max.
Analogue output (2 conductor technique)	4 to 20 mA output (active): Max. ohmic resistance 330Ω or 2 to 10 V output (active): Min. load resistance 820Ω Calibration ± 1 % FS
Switch output	passive, n-switching Power MOSFET: max. current 1.5 A; normally open
RS485 interface	2-wire, half duplex to transfer the HSI protocol in conjunction with a PC
HSI (HYDAC Sensor Interface)	1 wire, half duplex

Model code

CS 1 2 2 0 - A - 0 - 0 - 0 - 0 / - 000

Type
CS = ContaminationSensor

Series
1 = 1000 series,
4 particle size channels

Contamination codes
2 = ISO 4406 : 1999;
SAE AS 4059 /
>4 µm$_{(c)}$ >6 µm$_{(c)}$
>14 µm$_{(c)}$ >21 µm$_{(c)}$
3 = ISO 4406 : 1987;
> 2 µm > 5 µm
> 15 µm > 25 µm
NAS 1638
2-5 µm; 5-15 µm; 15-25 µm;
> 25 µm
can be changed
ISO 4406 : 1999;
SAE AS 4059 / >4 µm$_{(c)}$
>6 µm$_{(c)}$ >14 µm$_{(c)}$
>21 µm$_{(c)}$ can be changed

Options
1 = without display
2 = with display (display can be rotated through 270°)

Media
0 = based on mineral oil
1 = phosphate ester

Analogue interfaces
A = 4 to 20 mA
B = 2 to 10 V

Switching output
0 = Switching output threshold

Digital interface
0 = RS485

Electrical connection type
0 = male M12x1, 8-pole, pin,
to VDE0627 or IEC61984

Hydraulic connection (see page 3)
0 = Inline or hose connection
1 = Flange connection

Modification number
000 = Standard

Items supplied

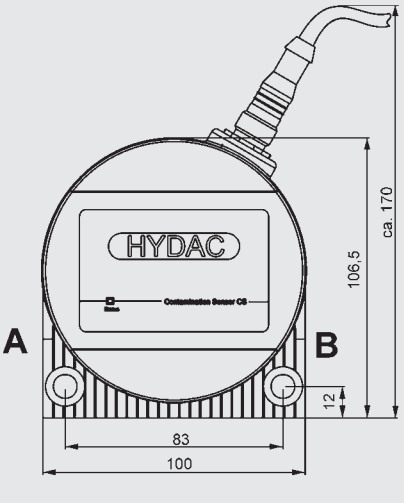
– ContaminationSensor
– Calibration certificate
– Quick start manual
(German / English / French)
– CD with FluMoS light
(fluid monitoring software to operate and parameterize the sensor)
– CD with detailed operating and maintenance instructions in different languages (PDF viewer software required)
– 2 x O-ring
(only for flange connection version)

Accessories

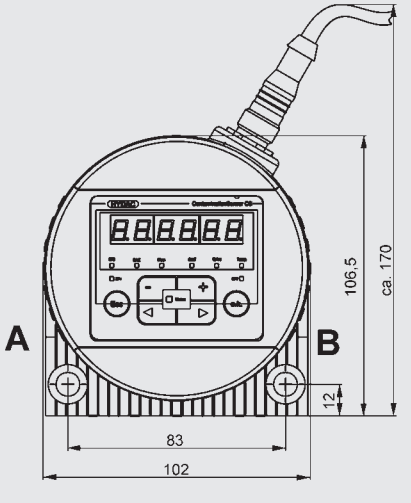
– Female connector with 2 m cable, screened, 8-pole, M12x1,
Part No.: 3281220
– Female connector with 5 m cable, screened, 8-pole, M12x1,
Part No.: 3281239
– Extension cable 5 m,
female connector 8-pole, M12x1 /
Male connector 8-pole, M12x1,
Part No.: 3281240
– Female connector with screw terminal,
8-pole, M12x1,
Part No.: 3281243

Dimensions

CS1x1x without display

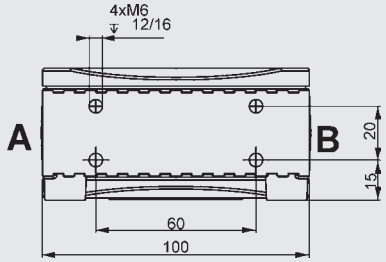


CS1x2x with display

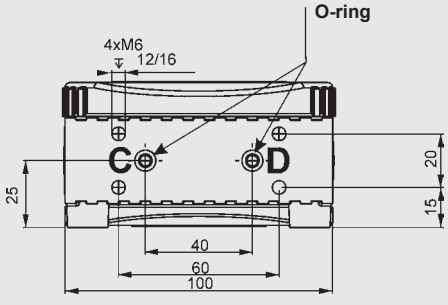


View of underside

Pipe or hose connection

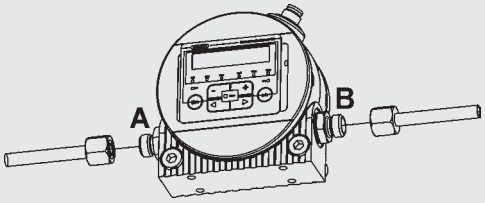


Flange connection

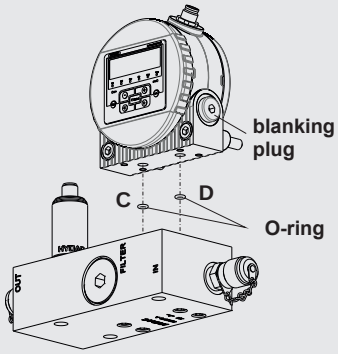


Hydraulic connection types

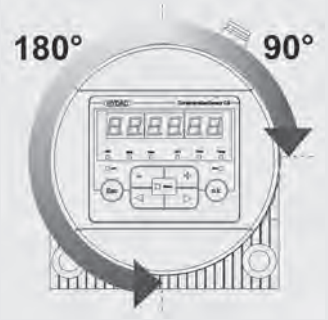
Pipe or hose connection



Flange connection

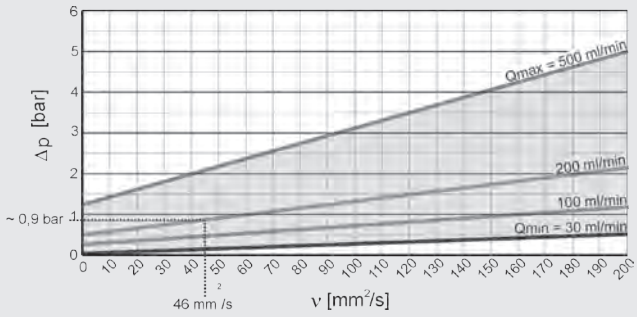


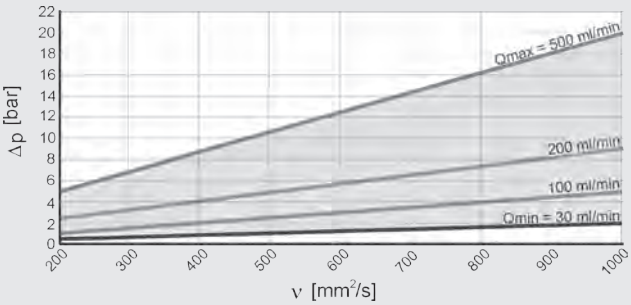
Display rotation



Pressure viscosity range

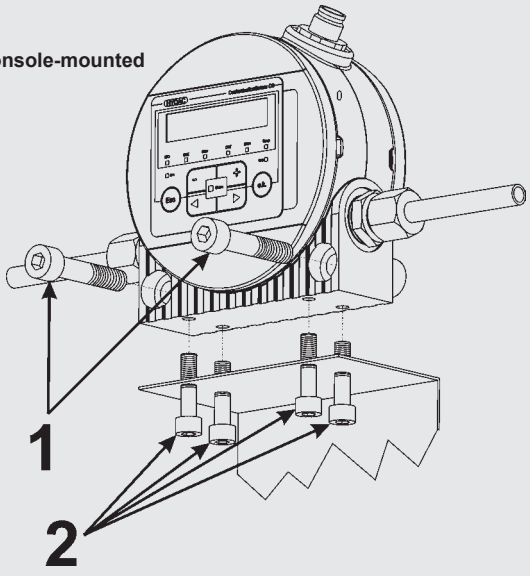
Δp : pressure
ν : viscosity





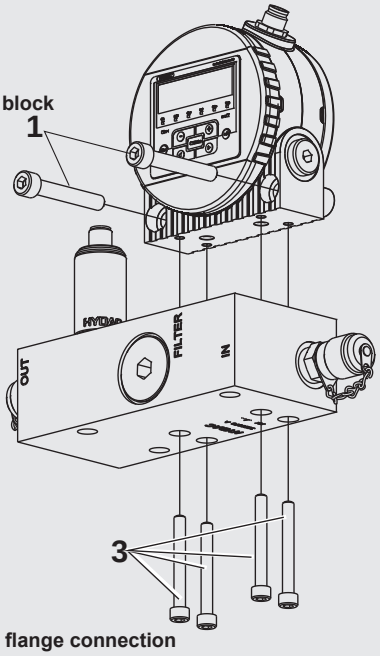
Types of installation (examples)

Wall-mounted or console-mounted



for inline or hose connection

Mounting on flange plate, connection plate or control block



for flange connection

1 : with 2 x M8 (ISO 4762) or
2, 3 : with 4 x M6

Note

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Subject to technical modifications.

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ContaminationSensor
CS 2000 series

Description

The ContaminationSensor CS 2000 series is a stationary sensor for the continuous recording of solid particle contamination in fluids.

It was developed for applications in testing facilities, lubrication systems and critical hydraulic systems in which a dynamic trend measurement of the contamination is required.

The ContaminationSensor CS 2000 series is equipped with the field-tested sensor technology of the FCU 2000 series.

It was developed for utilisation in conjunction with pressure connections of up to 40 bar (higher pressures with external pressure relief valve).

Applications

- Industrial hydraulic and lubrication systems
- Mobile hydraulics

Advantages

- Combined hydraulic and electronic compensation for pressure and viscosity fluctuations
- Continuous self-diagnostics
- Standard analogue output (4 to 20mA) or digital output (RS 485/RS 232/Ethernet)
- Standard PLC output
- Standard relay outputs (operation, warning, alarm)
- Standard RS 232 interface for ISO Code display

Technical details

Self diagnostics	Continuous with error indication via relays and serial interface
Measurement range (calibrated)	ISO 13/11/10 to 23/21/18. Sensor is calibrated within this range. Measures up to class ISO 25/23/21.
Operating pressure	INLET: depending on the model, max. 40 bar OUTLET: max. 10 bar, rated to 350 bar
Ports	INLET: Threaded G 1/4, ISO 228 OUTLET: Threaded G 1/4, ISO 228
Sensor flow rate	10 - 200 ml/min
Total flow rate (depending on model)	10 to 800 ml/min (depending on the pressure)
Fluid temperature range	0 to +70 °C
Supply voltage	24 V DC, ± 25%
Power consumption	25 watts max.
Electrical data	– Output for ContaminationSensor display – 3 relay outputs: – 1 x "ready" relay – 2 x "limit" relays – PLC output – Additional electrical output (see model code) – Ethernet
Ambient temperature range	0 to +55°C
Storage temperature range	-20 to +85°C
Relative humidity	Max. 90%, non-condensing
Protection class	III (safety extra-low voltage)
IP class	IP65
Weight	4 kg

Model code

CS 2 2 3 0 - 1 - U - 3 - 2 / -

Type
CS = ContaminationSensor

Resolution
2 = 4 particle size channels

Contamination codes
0 = ISO 4406 : 1987; NAS 1638 / >5 µm>15 µm >25 µm>50 µm
1 = ISO 4406 : 1991; NAS 1638 / >2 µm >5 µm >15 µm >25 µm
2 = ISO 4406 : 1999; SAE AS 4059 (D) / >4 $\mu m_{(c)}$ >6 $\mu m_{(c)}$ >14 $\mu m_{(c)}$>21 $\mu m_{(c)}$

Housing
3 = For stationary use

Fluids
0 = For standard mineral oils
1 = For phosphate esters

Options
1 = Standard, without options

Supply voltage
U = 24 VDC

Pressure/viscosity range
1
2
3
4
see "Pressure/viscosity range" graph

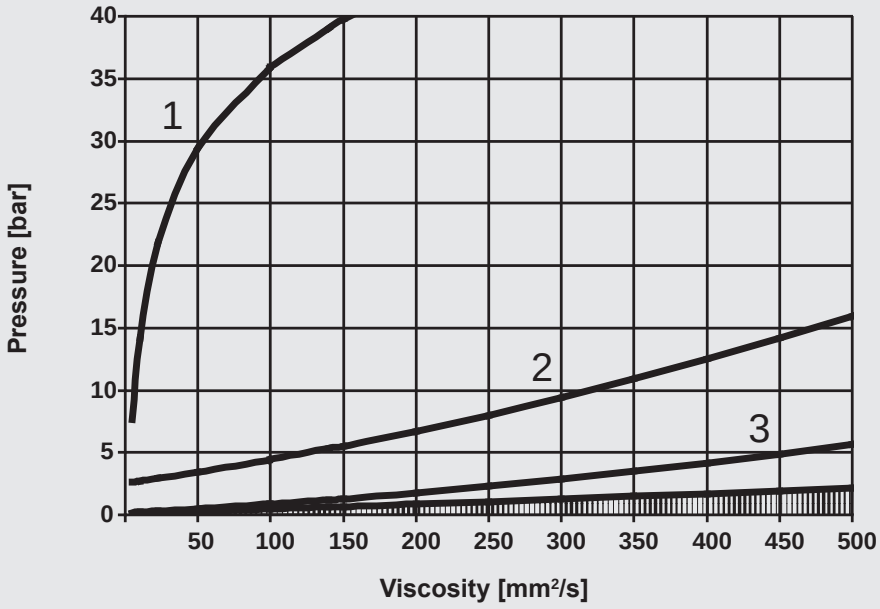
Electrical output
0 = RS232 (DIN-66348 protocol)
1 = Analogue output (only SAE/NAS and particle counts) (4-20 mA)
2 = RS485 (DIN-66348 protocol)
5 = Ethernet (IEEE 802.3TCP / IP)

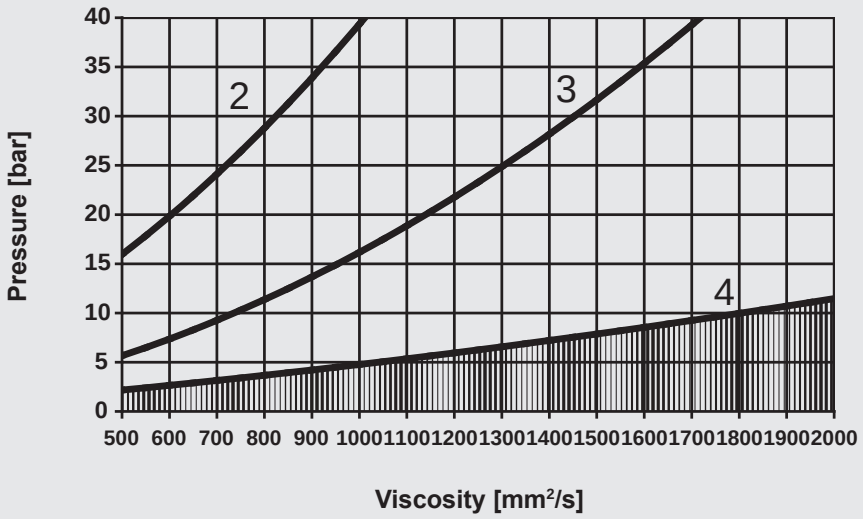
Supplementary details
Without details = standard

Items supplied

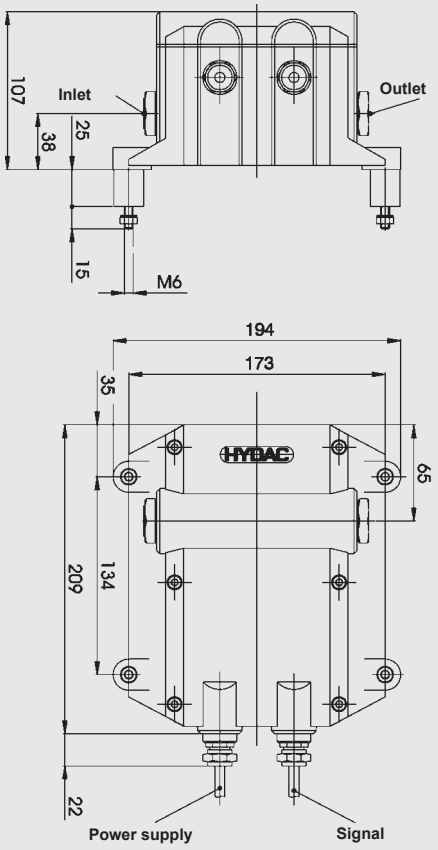
– CS 2000
– Programming cable
– Operating Instructions
– Calibration certificate

Pressure/viscosity range





Dimensions

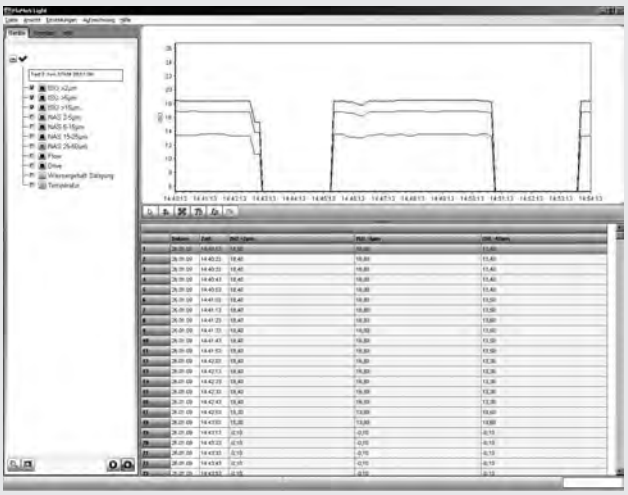


Accessories

FluMoS Professional, part no.: 3371637

FluMoS Light, part no.: 3355176

FluMoT, part no.: 3355177



ContaminationSensor Display CSD

CSD - 1 - U

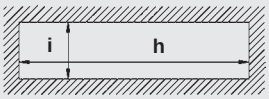
ContaminationSensor Display

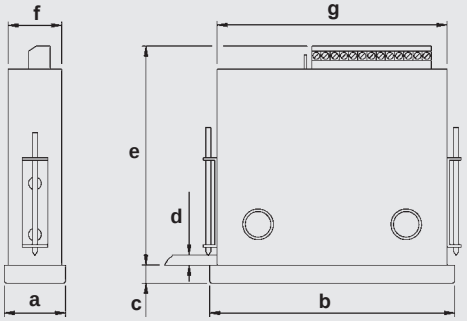
Display size
1 14 mm
2 57 mm

Supply voltage
U 24 VDC

	Part no.
CSD-1-U	3078272
CSD-2-U	3078273

Dimensions





	a	b	c	d	e	f	g	h	i
CSD-1-U	48	96	8	to 6	70	44	90	92	45
CSD-2-U	96	336	3	to 6	61	88	328	329	89

FluMoS

Fluid monitoring software for importing, displaying and processing data from HYDAC fluid sensors.

FluMoT

FluidMonitoring toolkit for linking HYDAC fluid sensors to customer's own PC software
(part no.: 3355177)

Note

The information in this brochure relates to the operating conditions and applications described.

For applications and operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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ContaminationSensor Module CSM 1000 Series

Description

The ContaminationSensor Module CSM 1000 is an online condition monitoring system for detecting particle contamination in hydraulic and lubrication fluids containing a high proportion of air bubbles.

Air bubble suppression is used to dissolve the air bubbles so that they are not detected as particles.

Furthermore, it is the perfect complete solution for examining a fluid for particulate contamination, independent from the overall hydraulic system.

As an option, other condition monitoring sensors such as the Hydac AquaSensor can be incorporated.

Applications

- Lubrication oil system in paper, steel and energy sectors
- For condition-based, pro-active maintenance
- Monitoring of component cleanliness on test rigs
- Monitoring of oil cleanliness in oil reservoirs

Advantages

- Cost-effective, complete solution
- Online monitoring of the oil cleanliness with alarm function to indicate:
  - ingress of and increase in contamination
  - increase in contamination as components start to wear
  - when there are filtration problems
- Verification of cleanliness on test rigs
- Verification of changes in the oil cleanliness as a result of inadequate servicing.

Technical details

	CSM-1xxx-1	CSM-1xxx-2	CSM-1xxx-4
Operating pressure			
P_{in} (INLET) P_{out} (OUTLET) P_{out} (LEAKAGE)	-0.4 to 0.5 bar max. 5 bar –	0.4 to 120 bar max. 5 bar max. 0.5 bar	-0.4 to 80 bar max. 5 bar –
Hydraulic connections			
INLET OUTLET LEAKAGE	G 1/4, ISO 228 G 1/4, ISO 228 –	G 1/4, ISO 228 G 1/4, ISO 228 G 1/4, ISO 228	G 1/4, ISO 228 G 1/4, ISO 228 –
Total flow rate	≈ 100 ml/min	≈ 180 ml/min	≈ 250 ml/min
Permissible operating viscosity	10 to 3000 mm²/s	10 to 3000 mm²/s	10 to 1000 mm²/s
Permitted operating viscosity range	10 to 1000 mm²/s	10 to 1000 mm²/s	10 to 800 mm²/s
Pump type	Gear pump		
Permitted fluids	Hydraulic and lubrication fluids based on mineral oil		
Power consumption (motor pump unit)	0.18 kW @ 50 Hz 0.21 kW @ 60 Hz		
Permitted fluid temperature	0 to +70°C		
Ambient temperature	0 to +40°C		
Storage temperature	-40 to +80°C		
Relative humidity	Max. 90%, non-condensing		
Protection class	IP55		
Weight when empty	≈ 18 kg		
ContaminationSensor:			
Self diagnostics	Continuously with error display via status LED		
Measurement range (calibrated)	Sensor measures from Class ISO 9/8/7 (MIN) to Class ISO 25/24/23 (MAX) Calibrated in the range ISO 13/11/10 to 23/21/18		
Supply voltage	9 to 36 VDC, residual ripple < 10%		
Power consumption	3 watts max.		
Electrical data	- Analogue output 4 to 20 mA or 2 to 10 V - RS485 interface - Switching output		

MODEL CODE

CSM 1 2 2 0 - 1 - 1 W/N/X60/O60 –

Type
CSM ContaminationSensor Module

Resolution of ContaminationSensor
1 = 4 particle size channels

Contamination codes
2 = ISO 4406:1999 + SAE AS 4059 (D) | >4 µm$_{(c)}$; >6 µm$_{(c)}$; >14 µm$_{(c)}$; >21 µm$_{(c)}$
3 = ISO 4406:1991| > 2 µm; > 5 µm; > 15 µm; > 25 µm
NAS 1638 | 2-5 µm; 5-15 µm; 15-25 µm; > 25 µm
switchable:
ISO 4406:1999 + SAE AS 4059 (D) | >4 µm$_{(c)}$; >6 µm$_{(c)}$; >14 µm$_{(c)}$; >21 µm$_{(c)}$

Options
1 = without display
2 = with display (display can be rotated through 270°)

Media
0 = based on mineral oil

Hydraulic version
1 = gear pump, standard
2 = gear pump, with increased inlet pressure, with leakage line
4 = gear pump, with increased inlet pressure, no leakage line, magnetic drive

Electrical output of ContaminationSensor
1 = 4 to 20 mA analogue output
2 = 2 to 10 V analogue output

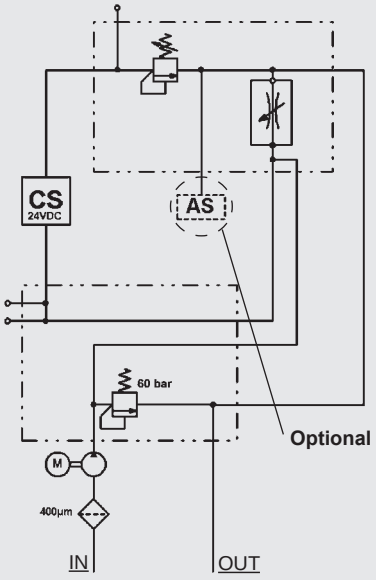
Supply voltage of motor pump unit
W/N/X60/O60 = 230 V, 50 Hz, 3Ph / 265 V, 60 Hz, 3Ph, delta connection
400 V, 50 Hz, 3Ph / 460 V, 60 Hz, 3Ph, star connection
N/AB/N60/AB60 = 400 V, 50 Hz, 3Ph / 400 V, 60 Hz, 3Ph, delta connection
690 V, 50 Hz, 3Ph / 690 V, 60 Hz, 3Ph, star connection
other voltages on request!

Supplementary details
no details = standard
AS = with AquaSensor AS 1000
PKZ = on/off switch with motor protection, 10m cable, male connector 3 phase 16A

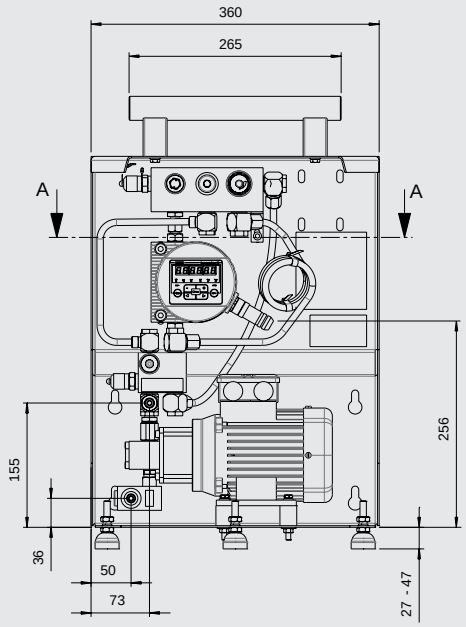
Items supplied

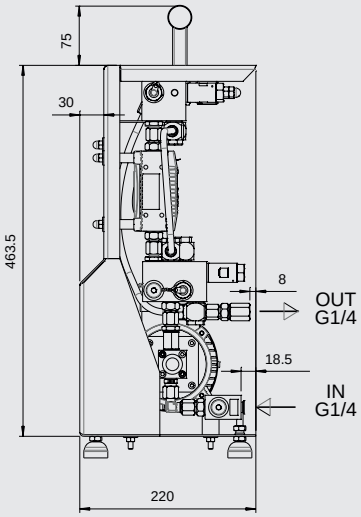
- CSM 1000
- Programming cable
- Pressure gauge with adapter
- Operating and maintenance instructions CSM 1000
- CE conformity or incorporation declaration CSM 1000 (depending on model)
- Operating and maintenance instructions CS 1000
- Calibration certificate CS 1000
- CD with FluMoS light (fluid monitoring software to operate and parameterize the sensor)
- Software Manual FluMoS

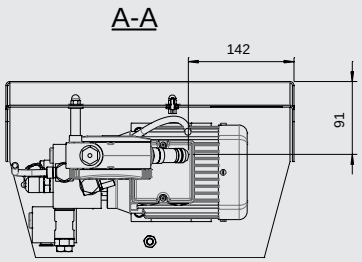
Hydraulic circuit diagram



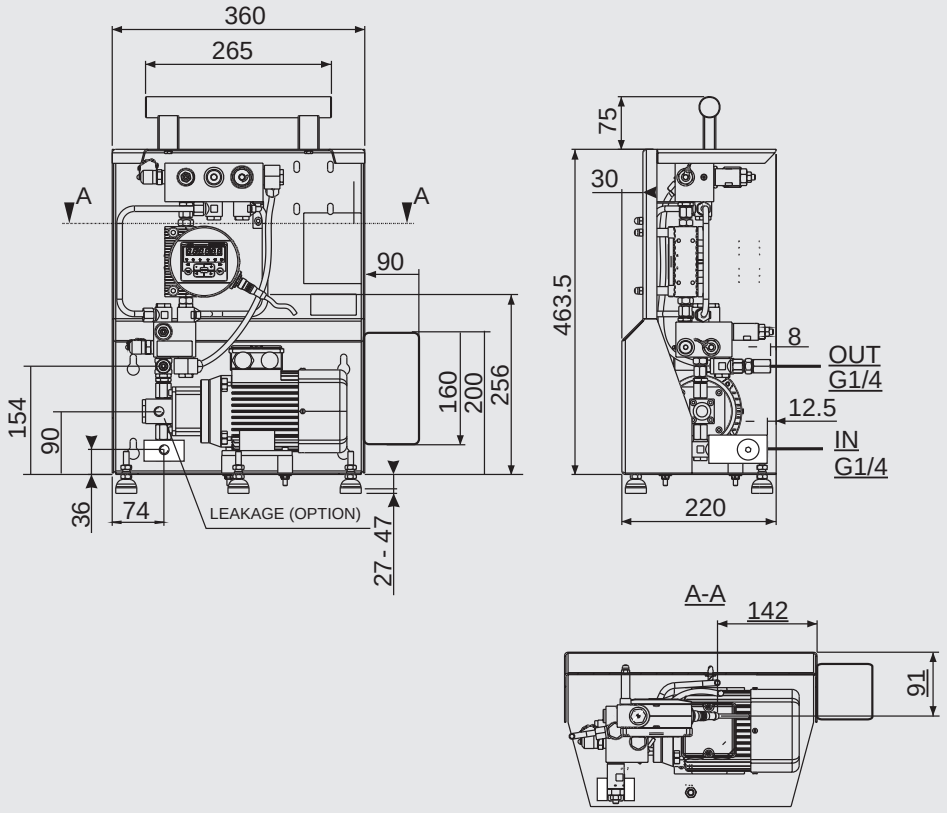
Dimensions (mm)





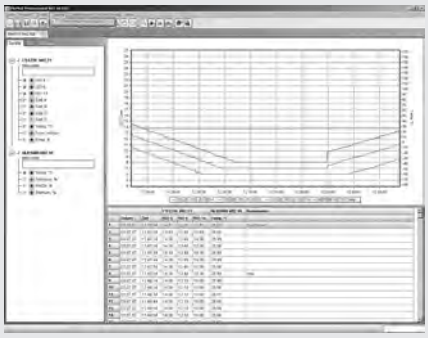


Dimensions with on/off switch (mm)



Accessories for CS 1000

- **PC Software Package FluMoS Professional, Part No.: 3141522**
- **PC Software Package FluMoS Light, Part No.: 3355176**
- **PC Driver Package FluMoS, Part No.: 3355177**

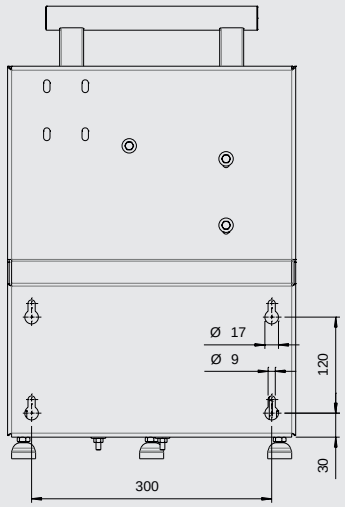


- **ContaminationSensor Interface CSI-D-5, Part No.: 3249563**
- **Female connector with 2 m cable, screened, 8-pole, M12x1, Part No.: 3281220**
- **Female connector with 5 m cable, screened, 8-pole, M12x1, Part No.: 3281239**
- **Extension cable 5 m, female connector, 8-pole, M12x1 / male connector, 8-pole, M12x1, Part No.: 3281240**
- **Female connector with screw terminal, screened, 8-pole, M12x1, Part No.: 3281243**

Accessories for AS 1000 option

- **ZBE 08 Female connector, right-angled, 5-pole, M12x1, Part No.: 6006786**
- **ZBE 08S-02 Female connector, right-angled, with 2 m cable, screened, 5-pole, Part No.: 6019455**
- **ZBE 08S-05 Female connector, right-angled, with 5 m cable, screened, 5-pole, M12x1, Part No.: 6019456**
- **ZBE 08S-10 Female connector, right-angled, with 10 m cable, screened, 5-pole, M12x1, Part No.: 6023102**

Hole pattern



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ContaminationSensor Module
CSM 2000 Series

Description

The ContaminationSensor Module CSM 2000 is an online condition monitoring system for recording solid particle contamination in hydraulic and lubrication fluids containing a high proportion of air bubbles.

Air bubble suppression is used to dissolve the air bubbles so that they are not detected as particles.

In addition, it is the ideal solution for analyzing the particle content of fluids, independently of the rest of the hydraulic system.

As an option, other condition monitoring sensors such as the Hydac AquaSensor can be incorporated.

Applications

- Lubrication oil system in paper, steel and energy sectors
- For preventive, pro-active maintenance
- Monitoring of component cleanliness on test rigs
- Monitoring of oil cleanliness in reservoirs

Advantages

- Cost-effective, system solution
- Numerous data interfaces provide, amongst other things, communication via WLAN, intranet or internet
- Online monitoring of the oil cleanliness with alarm function to indicate:
  - ingress of, and increase in, contamination
  - increase in contamination as components start to wear
  - when there are filtration problems
- Verification of cleanliness on test rigs
- Verification of changes in the oil cleanliness as a result of inadequate servicing.

Technical specifications

	CSM2xxx-1	CSM2xxx-2	CSM2xxx-4
Operating pressure P_{in} (INLET) P_{out} (OUTLET) P_{out} (leakage line)	 -0.4 to 0.5 bar max. 5 bar –	 -0.4 to 120 bar max. 5 bar max. 0.5 bar	 -0.4 to 80 bar max. 5 bar –
Hydraulic connections INLET OUTLET LEAKAGE	 G 1/4, ISO 228 G 1/4, ISO 228 –	 G 1/4, ISO 228 G 1/4, ISO 228 G 1/4, ISO 228	 G 1/4, ISO 228 G 1/4, ISO 228 –
Total flow rate	≈ 100 ml/min	≈ 180 ml/min	≈ 250 ml/min
Permissible operating viscosity	10 to 3,000 mm²/s	10 to 3,000 mm²/s	10 to 1,000 mm²/s
Permitted operating viscosity range	10 to 1,000 mm²/s	10 to 1,000 mm²/s	10 to 800 mm²/s
Pump type	Gear pump		
Permitted fluids	Hydraulic and lubrication fluids based on mineral oil		
Power consumption (motor pump unit)	0.18 kW @ 50 Hz 0.21 kW @ 60 Hz		
Permitted fluid temperature	0 to +70°C		
Ambient temperature	0 to +40°C		
Storage temperature	-40 to +80°C		
Relative humidity	max. 90%, non-condensing		
IP class	IP55		
Weight when empty	≈ 22 kg		
ContaminationSensor:			
Self diagnostics	Continuous with error display via relays and serial interface		
Measurement range (calibrated)	ISO 13/11/10 to 23/21/18. Display range is from class ISO 12/10/09 to class ISO 25/23/21.		
Supply voltage	24 V DC ± 25%		
Power consumption	25 watts max.		
Electrical data	- Output for Contamination Sensor Display - 3 relay outputs: 1 x "ready" relay 2 x "limit" relays - PLC output - Additional electrical output (see model code)		

Model code

CSM 2 2 3 0 - 1 - 1 W/N/X60/O60 –

Type
CSM ContaminationSensor Module

Resolution of ContaminationSensor
2 = 4 particle size channels

Contamination codes
0 = ISO 4406:1987 | >5 µm; >15 µm; >25 µm; >50 µm
NAS 1638 | 5-15 µm; 25-50 µm; 50 µm
1 = ISO 4406:1991 | >2 µm; >5 µm; >15 µm; >25 µm
NAS 1638 | 2-5 µm; 5-15 µm; 15-25 µm; >25 µm
2 = ISO 4406:1999 + SAE AS 4059 (D) | >4 $\mu m_{(c)}$; >6 $\mu m_{(c)}$; >14 $\mu m_{(c)}$; >21 $\mu m_{(c)}$

Housing of ContaminationSensor
3 = standard

Fluids
0 = for standard mineral oils

Hydraulic version
1 = gear pump, standard
2 = gear pump, with increased inlet pressure, with leakage line
4 = gear pump, with increased inlet pressure, no leakage line, magnetic drive

Electrical output of ContaminationSensor
0 = RS232 (DIN 66348 Protocol)
1 = Analogue output (4-20 mA)
2 = RS485 (DIN 66348 Protocol)
5 = Ethernet (IEEE 802.3 TCP/IP)

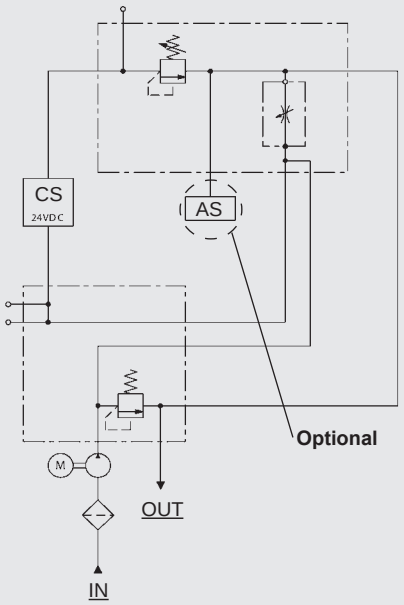
Supply voltage of motor pump unit
W/N/X60/O60 = 230 V, 50 Hz, 3Ph / 265 V, 60 Hz, 3Ph, delta connection
400 V, 50 Hz, 3Ph / 460 V, 60 Hz, 3Ph, star connection
N/AB/N60/AB60 = 400 V, 50 Hz, 3Ph / 400 V, 60 Hz, 3Ph, delta connection
690 V, 50 Hz, 3Ph / 690 V, 60 Hz, 3Ph, star connection
other voltages on request!

Supplementary details
no details = standard
AS = with AquaSensor AS 1000
PKZ = on/off switch with motor protection, 10m cable, male connector 3 phase 16A

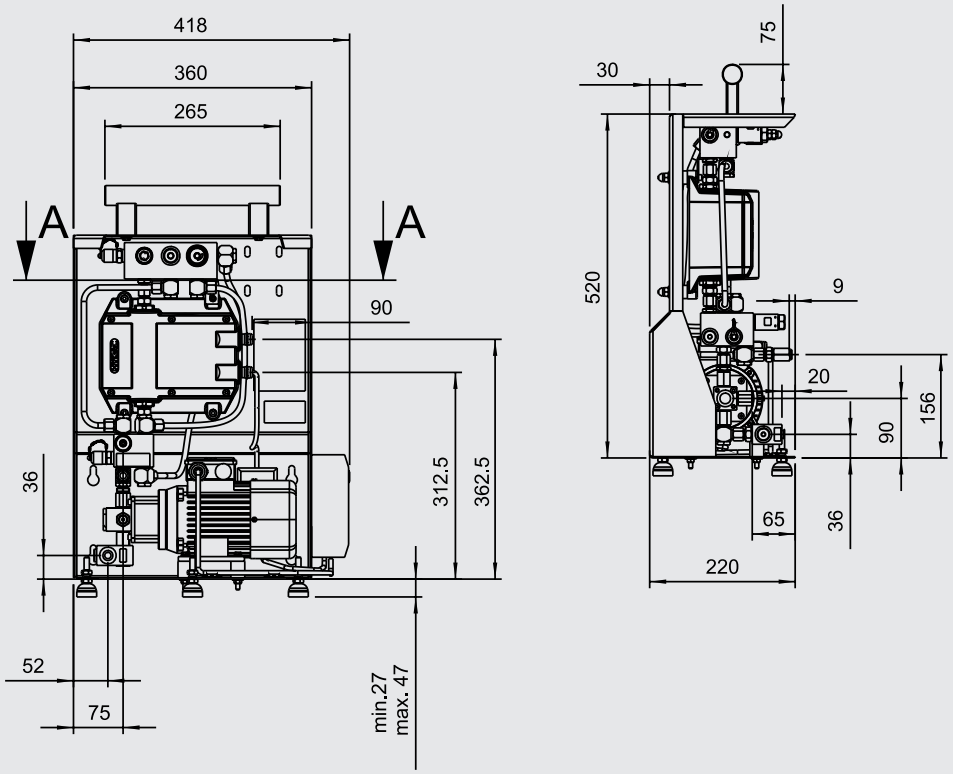
Items supplied

- CSM 2000
- Programming cable
- Pressure gauge with adapter
- Operating and maintenance instructions CSM 2000
- CE conformity or incorporation declaration CSM 2000 (depending on model)
- Operating and maintenance instructions CS 2000
- Calibration certificate CS 2000
- CD with FluMoS light (fluid monitoring software to operate and parameterize the sensor)
- Software Manual FluMoS

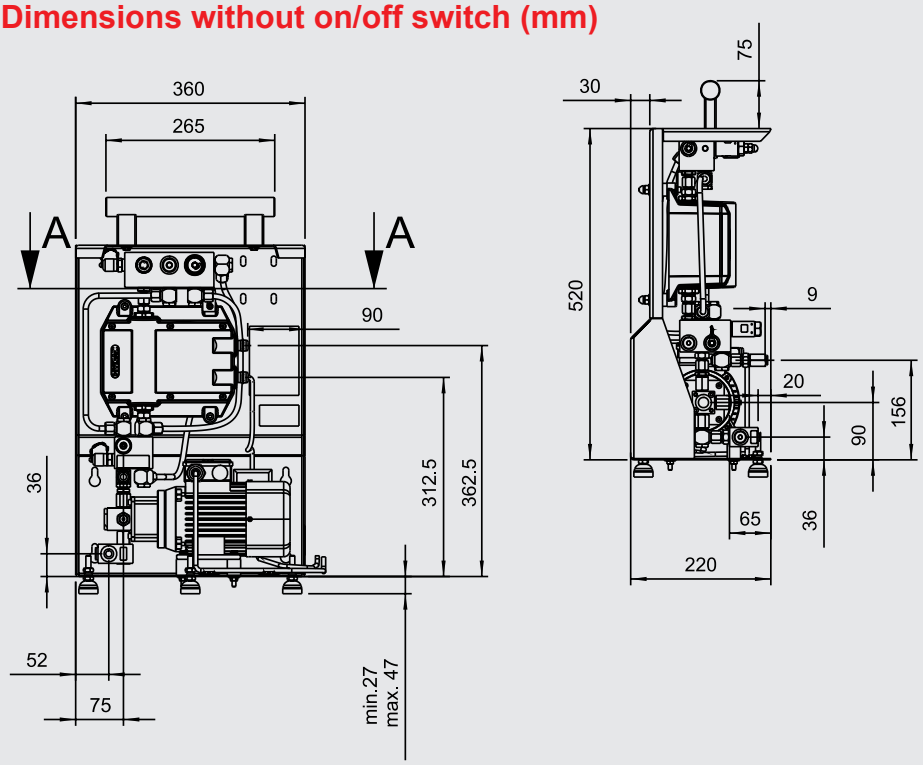
Hydraulic circuit diagram



Dimensions with on/off switch (mm)



Dimensions without on/off switch (mm)

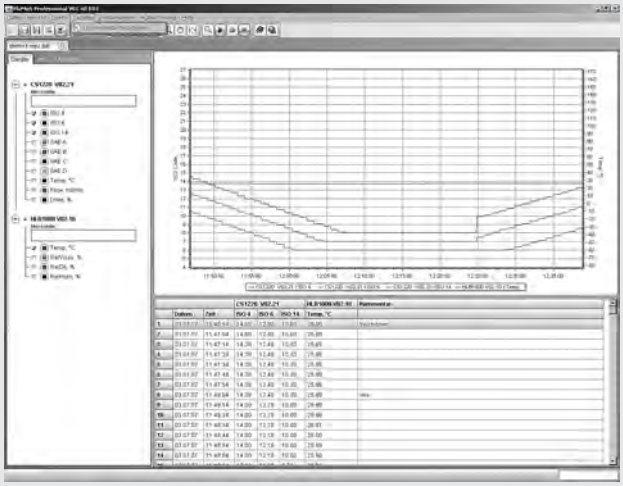


Accessories

PC Software Package FluMoS Professional, Part no.: 3141522

PC Software Package FluMoS Light, Part no.: 3355176

PC Driver Package FluMoS, Part no.: 3355177



ContaminationSensor Display CSD

CSD - 1 - U

ContaminationSensor Display

Display size
1 14 mm
2 57 mm

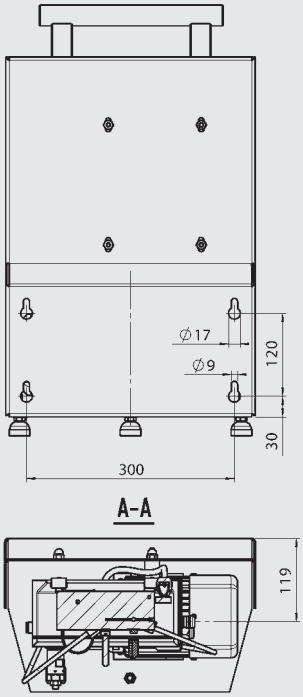
Supply voltage
U 24 VDC

	Part no.
CSD-1-U	3078272
CSD-2-U	3078273

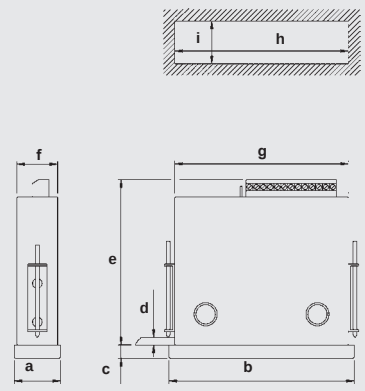
Accessories for AS 1000 option

- ZBE 08
  Female connector, right-angled, 5-pole, M12x1,
  Part No.: 6006786
- ZBE 08S-02
  Female connector, right-angled, 2 m cable, shielded, 5-pole,
  Part No.: 6019455
- ZBE 08S-05
  Female connector, right-angled, 5 m cable, shielded, 5-pole,
  M12x1, Part No.: 6019456
- ZBE 08S-10
  Female connector, right-angled, 10 m cable, shielded, 5-pole, M12x1,
  Part No.: 6023102

Hole pattern



Dimensions (mm)



	a	b	c	d	e	f	g	h	i
CSD-1-U	48	96	8	to 6	70	44	90	92	45
CSD-2-U	96	336	3	to 6	61	88	328	329	89

Note

The information in this brochure relates to the operating conditions and applications described.

For applications and operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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ContaminationSensor Module Economy 1000 CSM-E

Description

The ContaminationSensor Module CSM Economy 1000 is a compact and cost-effective online Condition Monitoring module for conditioning hydraulic and lubricating fluids and diesel fuels (CSM-E 1xxx-4). It is used together with the fluid sensors (available separately) to measure solid particle contamination, water saturation and oil ageing.

The CSM Economy consists of a motor, pump, air dissolving section and inline sensor installation and can also be combined with the fluid sensors of the series CS1000, AS1000 or AS3000 and HLB1400. Furthermore, the optionally available
data storage and network communication module CSI C-11 makes it possible to upgrade the CSM-E to form a compact condition monitoring solution for fluids.

Fields of application

- Monitoring lubrication systems in the paper, steel and energy industries
- Monitoring diesel in fuel reservoirs
- Component cleanliness monitoring in test benches
- Monitoring of oil cleanliness in tanks and pressure lines
- When no pressure is present at the measurement point
- As a tool for preventive and proactive maintenance strategies

Advantages

- Modular, cost-effective system for flexible combination with various fluid sensors
  - ContaminationSensor CS1000 for measuring the solid particle contamination
  - AquaSensor AS1000 or AS3000 for measuring the water saturation
  - HydacLab HLB1400 for determining the fluid condition
- Also available for pumps with raised inlet pressures

Technical data

Hydraulic specifications	CSM-E 1xxx-1	CSM-E 1xxx-2	CSM-E 1xxx-4
Operating pressure, maximum P_{IN} (INLET)	-0.4 to 0.5 bar	0.4 to 120 bar	-0.4 to 80 bar
P_{OUT} (OUTLET)	5 bar	5 bar	5 bar
Leakage oil (LEAK)	-	0.5 bar	-
Hydraulic connections P_{IN} (INLET)	G ¼ acc. ISO 228-1	G ¼ acc. ISO 228-1	G ¼ acc. ISO 228-1
P_{OUT} (OUTLET)	G ¼ acc. ISO 228-1	G ¼ acc. ISO 228-1	G ¼ acc. ISO 228-1
Leakage oil (LEAK)	-	G ¼ acc. ISO 228-1	-
Permissible viscosity range for operation	10–3000 mm²/s	10–3000 mm²/s	2–1000 mm²/s
Permitted viscosity range for measurement	10–1000 mm²/s	10–1000 mm²/s	2–800 mm²/s
Flow rate (for 1500 rpm)	~ 130 ml/min	~ 180 ml/min	~ 280 ml/min
Permitted fluids	Hydraulic and lubrication fluids based on mineral oil		
	-	-	Diesel fuels
Pump type	Gear pump		
Suction height	Maximum 0.5 m		
Fluid temperature range	0–85 °C		
Electrical data			
Power consumption	180 W @ 50 Hz 210 W @ 60 Hz		
Protection class	IP55		
General data			
Dimensions (without sensors and accessories)	256 x 262 x 189 mm (with inline installation for CS 1000 and AS 1000 / AS 3000)		
	259 x 268 x 189 mm (with inline installation for CS 1000 and HLB 1400)		
Weight when empty	~ 12 kg including sensors		
Ambient temperature range	0–40 °C		
Storage temperature range	-40–80 °C		
Relative humidity	Max. 90%, non-condensing		

Model code

CSM-E - 1 0 0 0 – 1 – Z – W/N/X60/O60 /-

Type
CSM-E = ContaminationSensor Module – Economy

Series
1 = for CS1000 with flange connection

Inline installation
0 = set up for AS1000 / AS3000
1 = set up for HydacLab HLB 1400

Version
0 = standard

Media
0 = mineral oil

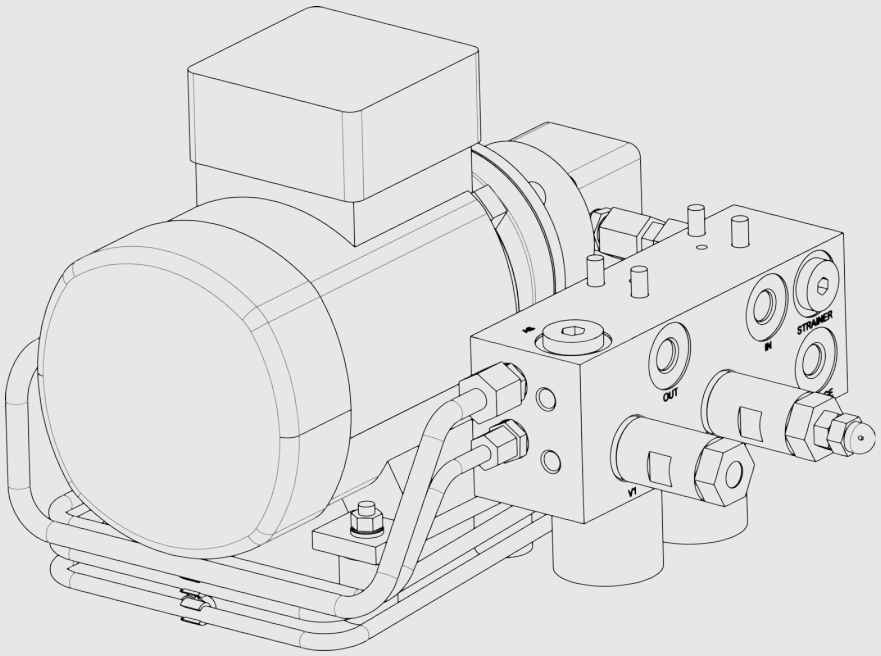
Hydraulic version
1 = gear pump, standard
2 = gear pump, inlet pressure-stability with drain line
4 = gear pump, magnetically coupled, inlet pressure-stability without drain line

Sensors
Z = none

Power supply
W/N/X60/O60 = 230V, 50 Hz, 3 Ph / 265V, 60 Hz, 3 Ph
400V, 50 Hz, 3 Ph / 460V, 60 Hz, 3 Ph

Supplementary details
- = none

Hydraulic connections



IN = inlet
OUT = outlet
LEAK = drain port (optional depending on the pump)

Sensors not included in scope of delivery;
Figure shows CSM-E without sensors and data communication module CSI-C-11

Scope of delivery

– CSM-E, ready for connection (without sensors)
– Installation and Maintenance Instructions
– 4 fastening screws for the CS

Suitable sensors

The following sensors are suitable for use on the CSM-E.

ContaminationSensor CS1000

Model code	Part no.
CS1210-A-x-x-x-1/-000	3314212
CS1210-B-x-x-x-1/-000	3308284
CS1220-A-x-x-x-1/-000	3237730
CS1220-B-x-x-x-1/-000	3313779
CS1310-A-x-x-x-1/-000	3336820
CS1320-A-x-x-x-1/-000	3332066
CS1320-B-x-x-x-1/-000	3381031

AquaSensor AS1000

Model code	Part no.
AS1008-C-000	909109

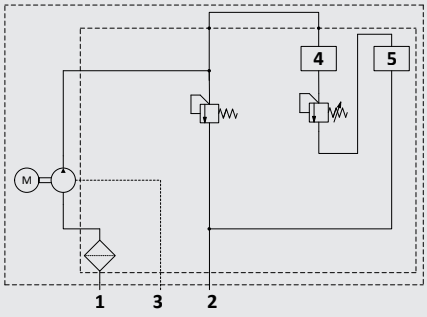
AquaSensor AS3000

Model code	Part no.
AS3008-5-000	922591

HydacLab HLB 1400

Model code	Part no.
HLB14J8-1C000-000	923684
HLB14J8-00S12-000	923685

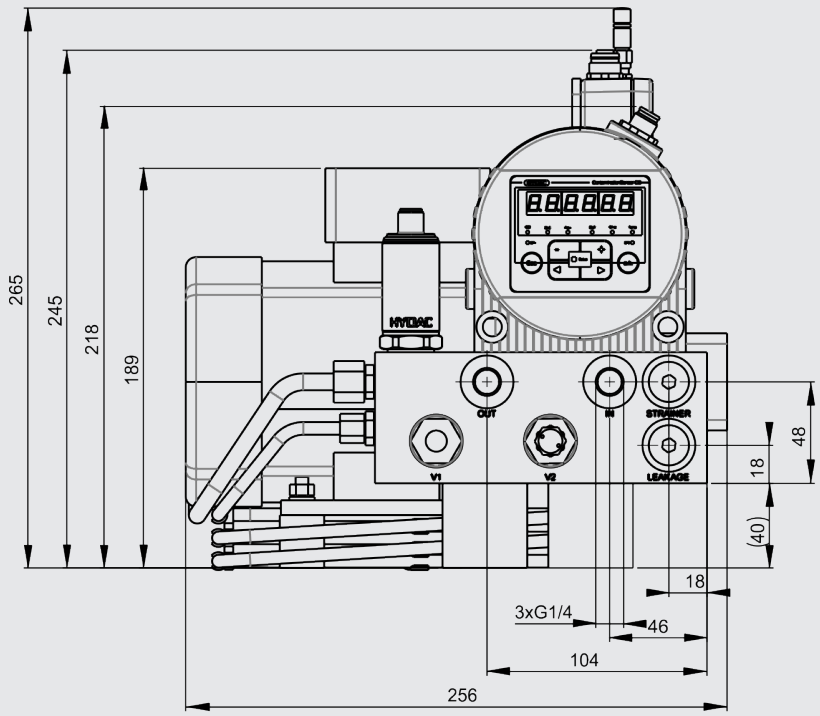
Hydraulic circuit diagram

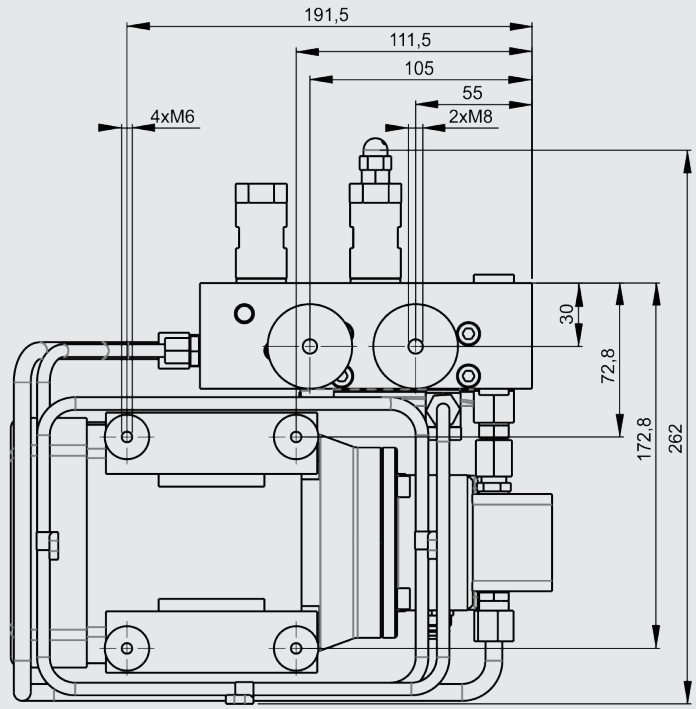


Item	Designation
1	Inlet (IN)
2	Outlet (OUT)
3	Leakage (LEAK)
4	ContaminationSensor CS
5	AquaSensor AS or HydacLab HLB

Dimensions

CSM-E with CS1000, AS1000 and CSI-C-11





All dimensions in mm

(sensors not included in scope of delivery)

Accessories (sensors)

ContaminationSensor CS1000

Designation	Part no.
CD FluMoS light	3141522
CD FluMoS Professional	3355176
CD FluMoT, driver package	3355177
ZBE42S-02 Mating connector 8-pin with cable, length = 2m	3281220
ZBE42S-05 Mating connector 8-pin with cable, length = 5m	3281239
ZBE43-05 extension cable, connector male/female 8-pin, length = 5m	3281240
ZBE43-10 extension cable, connector male/female 8-pin, length = 10m	3519768
ZBE44 Mating connector 8-pin, shielded, with screw terminals	3281243
ZBE43-005 connecting cable CSI-C-11, connector male/female 8-pin, length = 0.5 m	4193544

AquaSensor AS / HydacLab

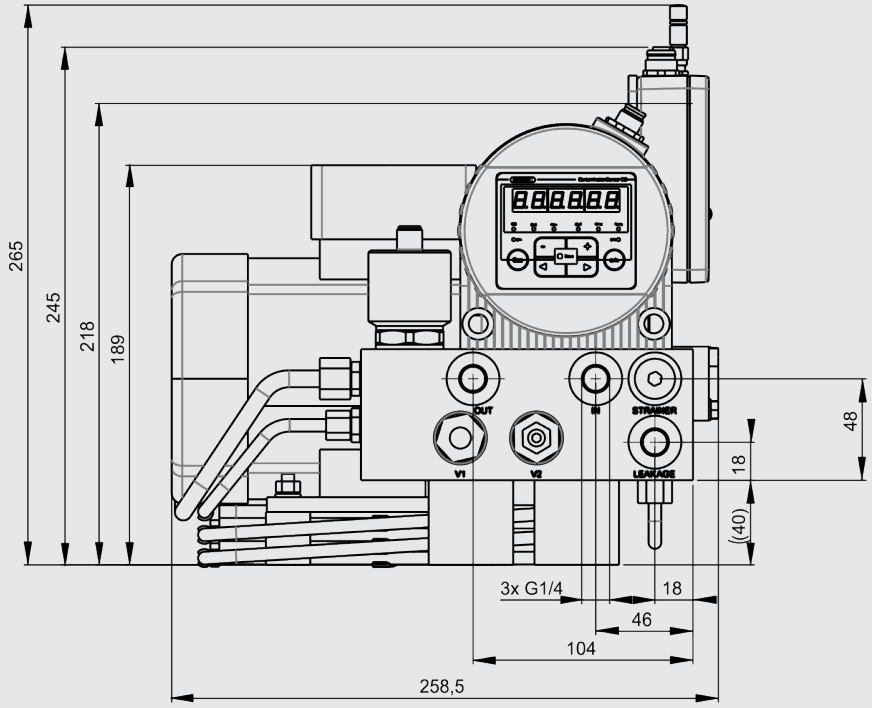
Designation	Part no.
ZBE08S-02 Mating connector, 5-pin, angled, with cable, length = 2m	6019455
ZBE08S-05 Mating connector, 5-pin, angled, with cable, length = 5m	6019456
ZBE08S-10 Mating connector, 5-pin, angled, with cable, length = 10m	6023102
ZBE08 Mating connector, 5-pin, angled, shielded with screw terminals	6006786
ZBE30-005 Connecting cable CSI-C-11 connector male/female 5-pin, length = 0.5 m	4193586

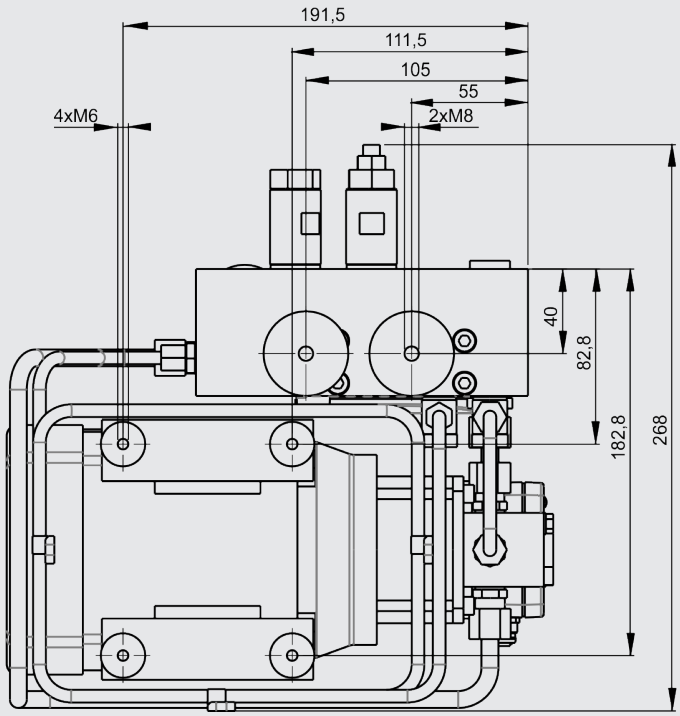
ManometerKit

Designation	Part no.
ManometerKit 0-60 bar	3942792

Dimensions

CSM-E with CS1000, HLB 1400 and CSI-C-11





All dimensions in mm

(sensors not included in scope of delivery)

Accessories
Data communication and measurement data storage

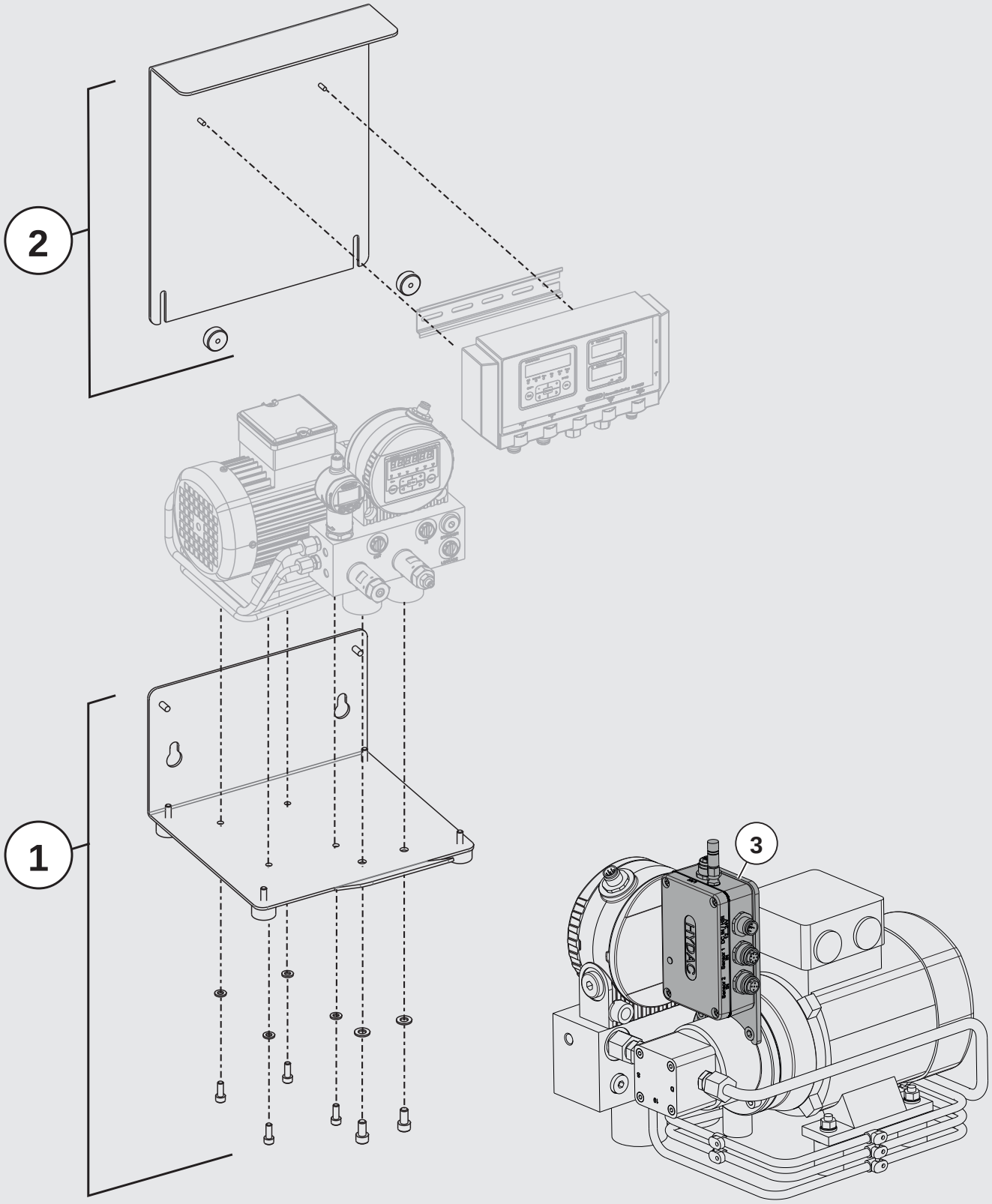
ContaminationSensor Interface CSI-C-11

Designation	Part no.
PS5 Power supply unit 100–240 V AC, 50–60 Hz, 1.1 A, IP40; Connector M12, 5-pin, female	3399939
ZBE47S-05 Connection cable, mating connector 5-pin with cable, length = 5m	3527626
ZBE47S-10 Connection cable mating connector 5-pin with cable, length = 10m	3527627
ZBE 45-05 Network cable (patch), mating connector, 4-pin, d-encoded / male connector RJ45, length = 5m	3346100
ZBE 45-10 Network cable (patch), mating connector, 4-pin, d-encoded / male connector RJ45, length = 10m	3346101

SensorMonitoring Unit SMU 1200

Designation	Part no.
SMU1260-TU-00	3467005
SMU1261-TU-00	3791708
SMU1270-TU-00	3704282
SMU1271-TU-00	3805688

Accessories



Item	Description	Part no.
1	Assembly kit CSM-E	3942869
2	Assembly kit SMU	3942870
3	CSI-C-11-0-0-0/-000	4066011

NOTE

The information in this brochure relates to the operating conditions and applications described.

For applications and operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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MetallicContamination Sensor
MCS 1000 Series

Description

The MetallicContamination Sensor MCS 1000 monitors metallic particle contamination in lubrication fluid. The particles are detected by inductive measurement whereby a coil system is the core element of the sensor. It detects metallic particles (ferromagnetic Fe and non-ferromagnetic nFe) in the > 70 µm size range.

The MCS 1000 continuously monitors the condition of the system and provides information on any early-stage damage.

The sensor is therefore a reliable tool for condition-based maintenance.

As an option the MCS 1000 series can be supplied with an Ethernet interface.
This means that the sensors can easily be connected to existing networks.

Certified by Germanischer Lloyd Industrial Service

GL Wind Order No. 4800/08/41043/254

Advantages

- Detection of early-stage damage, for example, in a gearbox, .
- Prevents costly turbine downtime
- The perfect complement to optical sensors
- Measurement of metallic particles (ferromagnetic Fe and non-ferromagnetic nFe) > 70 µm
- Condition monitoring systems in wind power turbines which have already been certified by GL do not lose their certification if the MCS 1000 is built into the system after certification, as the component itself is certified.

Technical specifications

Hydraulic data	**MCS 15xx**	**MCS 14xx**	**MCS 13xx**
Flow rate	10 to 200 l/min	2 to 40 l/min	0.4 to 8 l/min
Operating pressure	Maximum 20 bar		
Fluid temperature range	-40 to +85°C		
Inlet/outlet	Flange connection, SAE 4" to ISO 6162-1	Flange connection, SAE ¾" to ISO 6162-1	Flange connection, SAE ½" to ISO 6162-1
Electrical data			
Supply voltage	9 to 36 V DC, residual ripple < 10%		
Power consumption	Max. 5 W		
Electrical data			
2 configurable switch outputs (n-switching Power MOSFET, normally open)	1 x ferromagnetic particles (Fe) 1 x non ferromagnetic particles (nFe) or 1 x ferromagnetic (Fe) + non ferromagnetic (nFe) particles 1 x status signal		
Switching logic	Active Low or Active High		
Length of switching pulse	can be set from 5 to 200 ms		
Switch outputs	max. 1.5A		
RS485 interface	2 wire, half duplex		
HSI (**H**YDAC **S**ensor **I**nterface)	1 wire, half duplex		
Ethernet Interface	10 Base-T / 100 Base-Tx		
General data			
Environmental temperature	-40 to +70°C		
Diameter sensor cross-section	1"	½"	¼"
Protection class to DIN 40050	IP 67		
Weight	≈ 3.5 kg	≈ 2.5 kg	≈ 3.0 kg
Dimensions (L x W x H)	83 x 162 x 140 mm	83 x 120 x 120 mm	83 x 120 x 120 mm
Vibration 10 - 58 Hz 58 - 500 Hz	0.75 mm (amplitude) 10 g (acceleration)		
Shock	40 g		
Detection limits			
Ferromagnetic (Fe) particles	> 200 µm (particle with volume equivalent to that of a sphere of given Ø)	> 100 µm	> 70 µm
non-ferromagnetic (nFe) particles	> 550 µm (particle with volume equivalent to that of a sphere of given Ø)	> 300 µm	> 200 µm
Particle rate	> 25/s		

Items supplied

– MCS 1000 series
– O-rings (NBR and FPM)
– Installation and Maintenance Instructions

Accessories

– SAE 4" flange adapter set, for pipe or hose connection, 42L according to ISO 8431-1
Consisting of:
2x flange adapters
2x O-rings
8x hex. head screws
8x washers
8x spring washers
Part No.: 3435426
– SAE ¾" flange adapter set, for pipe or hose connection, ½" according to ISO 8431-1
Consisting of:
2x flange adapters
2x O-rings
8x hex. head screws
Part No.: 3588249
– Flange adapter plate, SAE 4" – SAE 1 ½"
Part No.: 3442518
– Female connector with 2 m cable, screened, 8-pole, M12x1,
Part No.: 3281220
– Female connector with 5 m cable, screened, 8-pole, M12x1,
Part No.: 3281239
– Extension cable 5 m, female connector 8-pole, M12x1 / male connector 8-pole, M12x1,
Part No.: 3281240
– Female connector with screw terminal, 8-pole, M12x1,
Part No.: 3281243

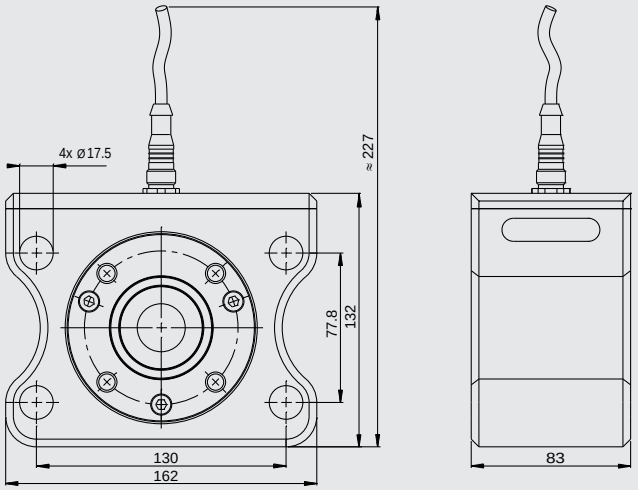
Model code

MCS 1 5 1 0 - 5 - 0 / 000

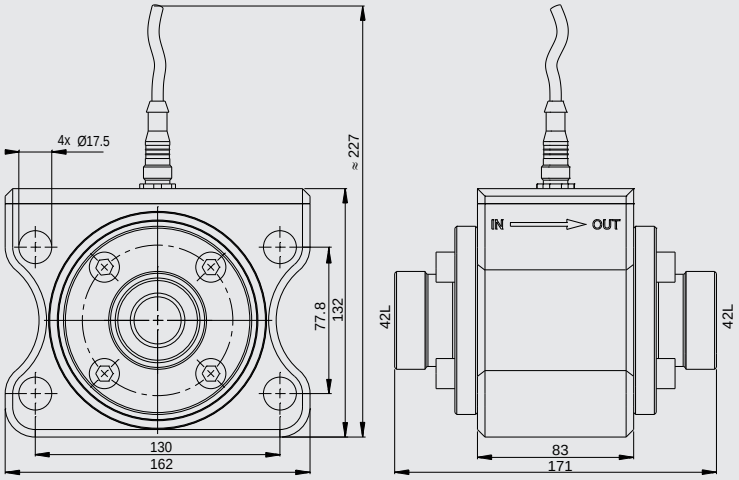
Type
MCS = MetallicContamination Sensor
Series
1 = 1000 Series
Contamination / Sensor cross section
3 = particles > 70 µm / ¼"
4 = particles > 100 µm / ½"
5 = particles > 200 µm / 1"
Signal technology
1 = 2x switch outputs/RS485 (HSI protocol)
2 = 2x switch outputs/RS485 (Modbus RTU)
7 = 2x switch outputs/RS485 (HSI protocol) ethernet (HSI TCP/IP/Modbus TCP)
Media
0 = mineral and synthetic oils (particularly those used in wind energy sector)
Hydraulic connection
1 = flange connection, SAE ½" to ISO 6162-1
2 = flange connection, SAE ¾" to ISO 6162-1
5 = flange connection, SAE 4" to ISO 6162-1
Electrical connection
0 = M12x1, 8-pole
1 = M12x1, 8-pole and ethernet M12x1, 4-pole, coding D to IEC61076-2-101
Modification number
000 = standard
TTV = external O-rings in low temperature FPM (Viton®)

Dimensions for MCS 15xx (in mm)

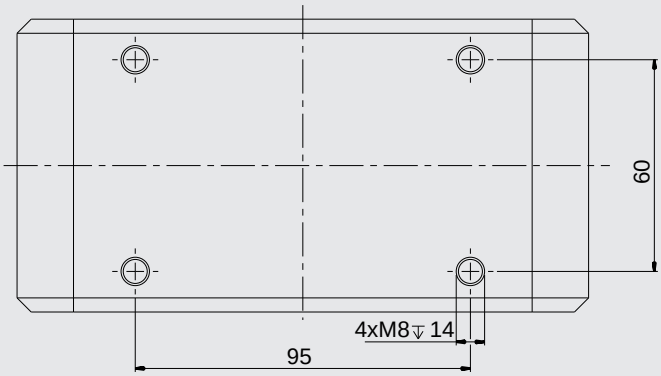
Flange connection, SAE 4" to ISO 6162-1



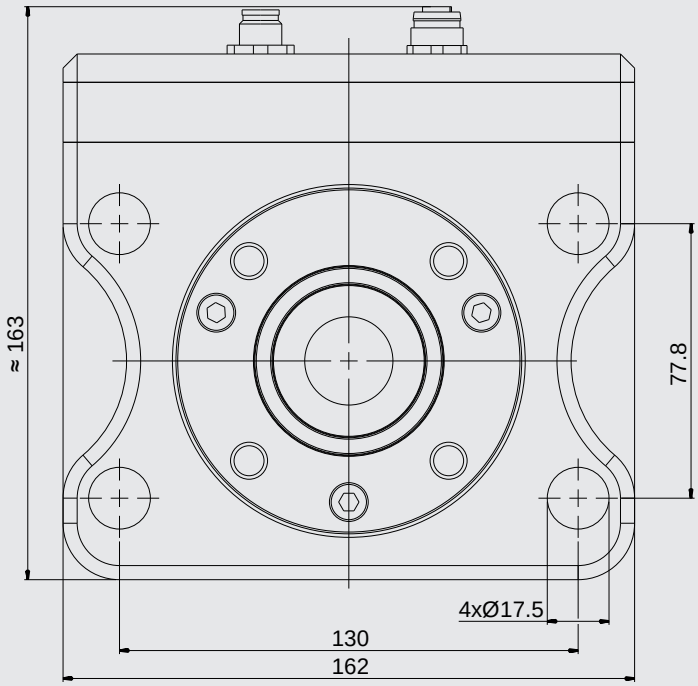
MCS with accessory flange adaptor
for pipe or hose connection 42L to ISO8431-1

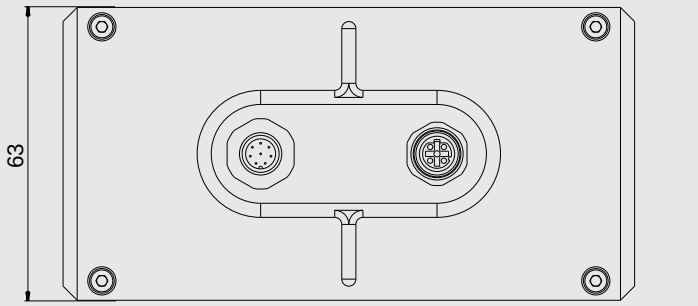


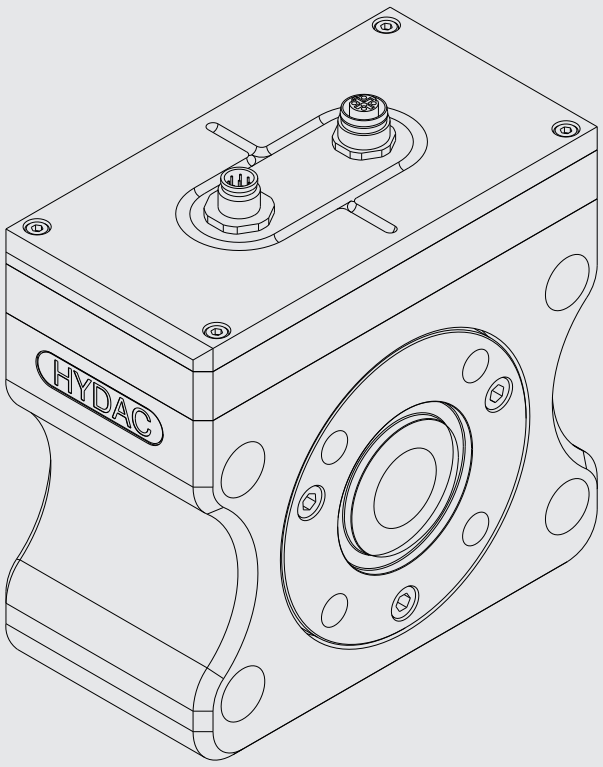
Mounting hole pattern



Dimensions with Ethernet connection for MCS 15xx (in mm)

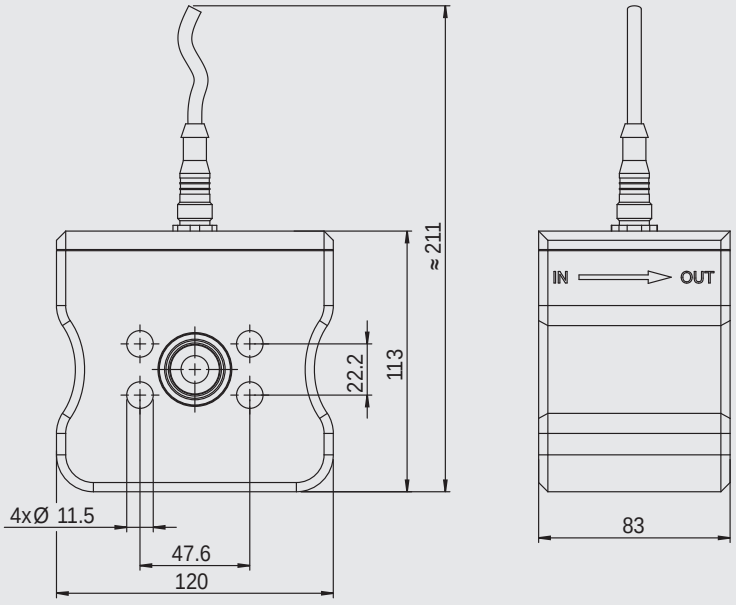




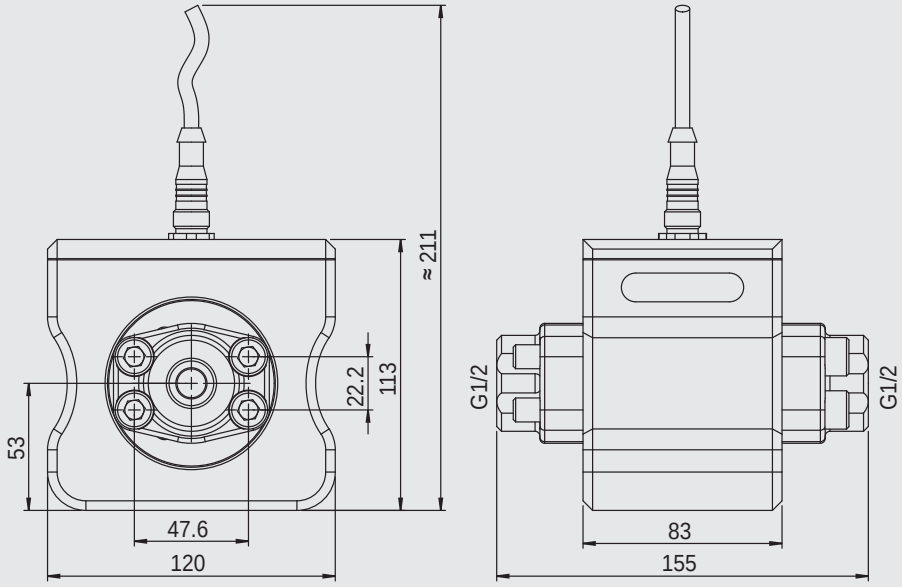


Dimensions for MCS 14xx (in mm)

Flange connection, SAE ¾" to ISO 6162-1



MCS with accessory flange adaptor
for pipe or hose connection ½" to ISO8431-1



Certified by Germanischer Lloyd Industrial Service

The Metallic Contamination Sensor was certified in February 2010 as an "add on" for condition monitoring systems in wind power turbines.

The certification was carried out by **Germanischer Lloyd Industrial Services GmbH.**

GL Renewables certification

GL is one of the leading certification authorities in the wind energy sector, performing tests, certification procedures and appraisals for wind power turbines and their components.

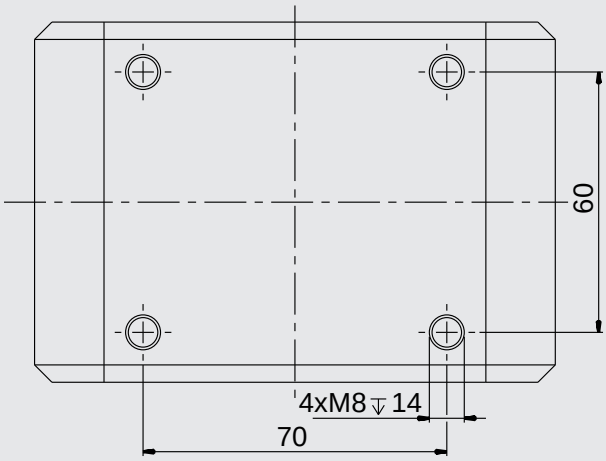
GL Wind Order No. 4800/08/41043/254

What is the basis of the certification?

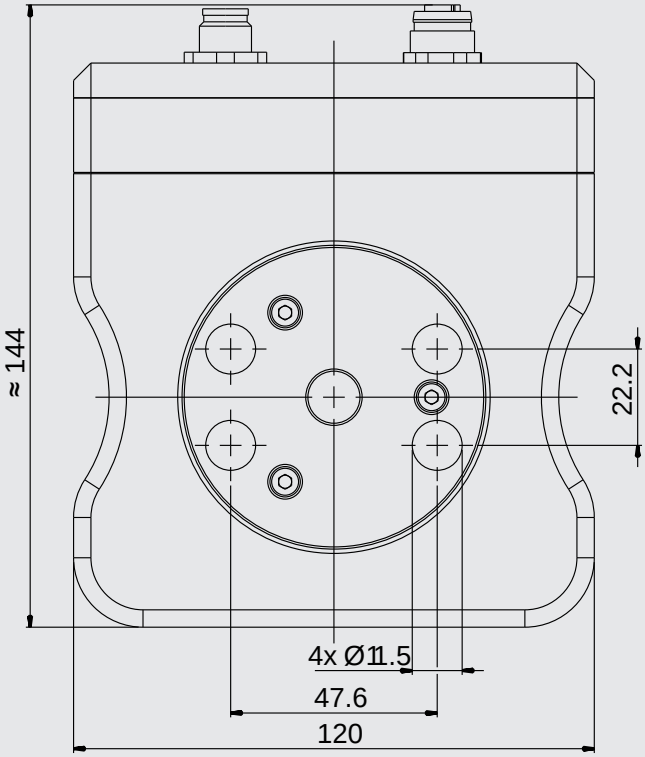
The Guideline for the Certification of Condition Monitoring Systems (CMS) for Wind Turbines, Edition 2007

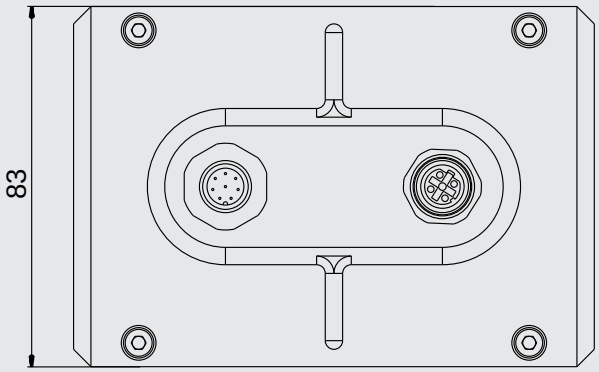
This guideline states that the sensors must be capable of distinguishing between ferromagnetic and non-ferromagnetic particles and that installation in the cooling filtration circuit must be upstream of the filter.

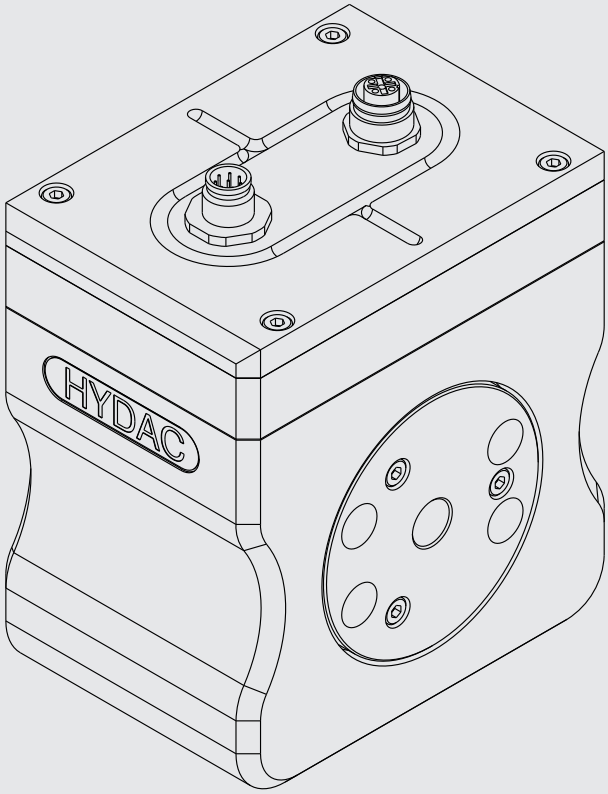
Mounting hole pattern



Dimensions with Ethernet connection for MCS 14xx (in mm)

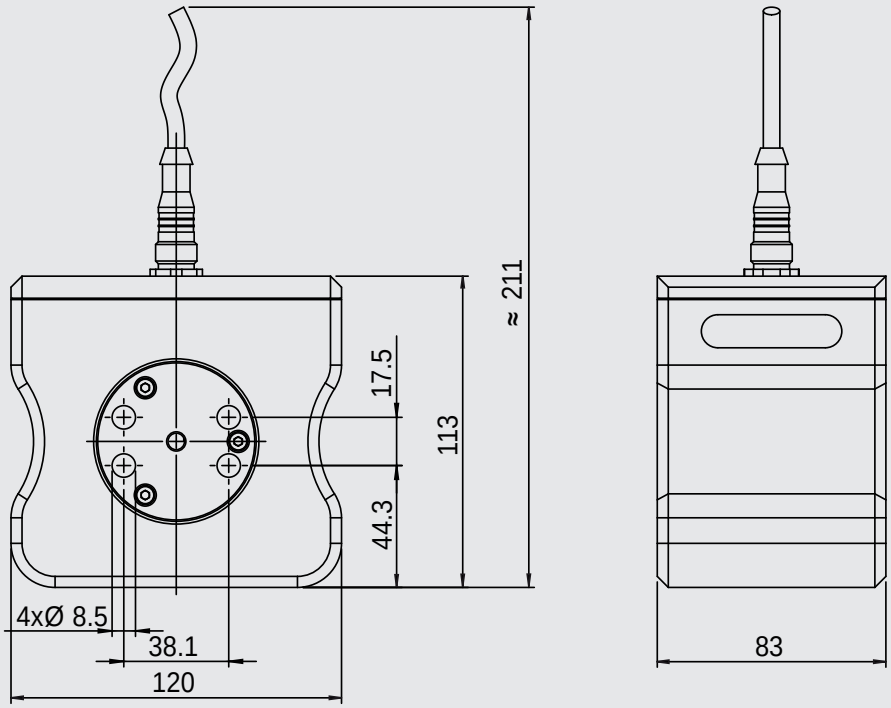


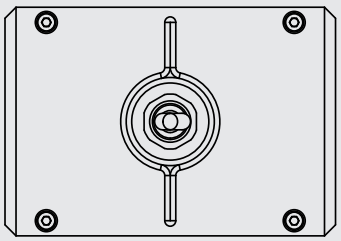




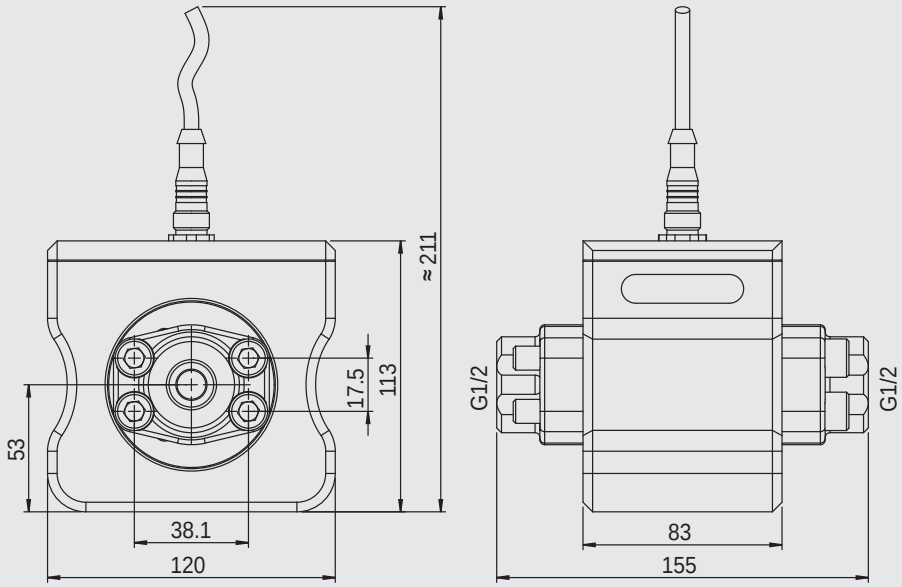
Dimensions MCS 13xx (in mm)

Flange connection, SAE ½" to ISO 6162-1

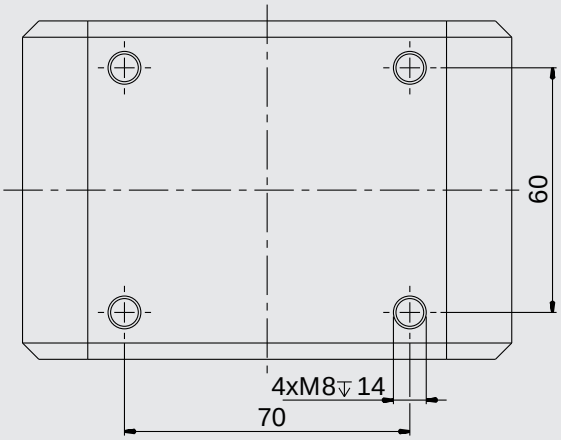




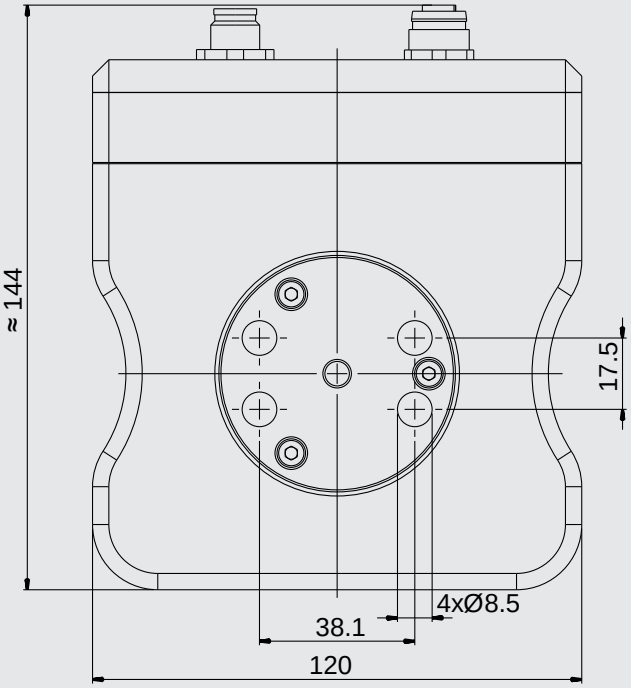
MCS with accessory flange adaptor
for pipe or hose connection ½" to ISO8431-1

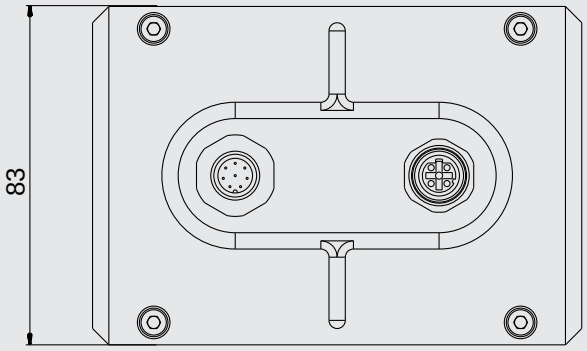


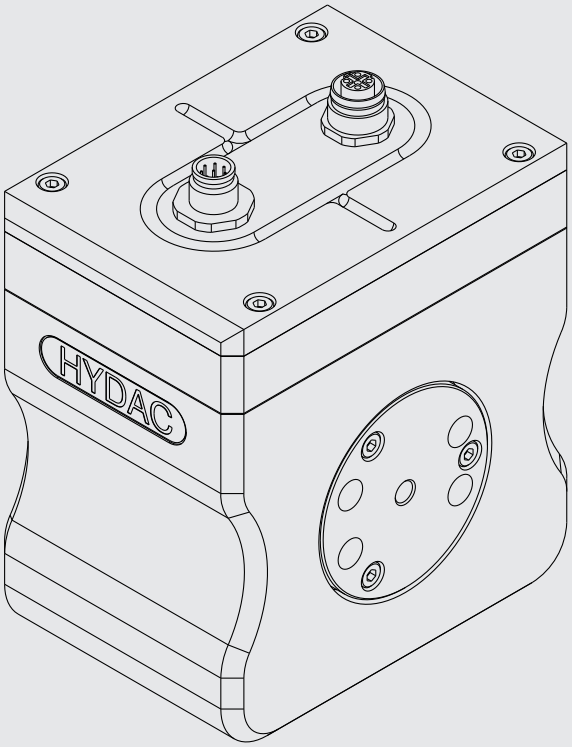
Mounting hole pattern



Dimensions with Ethernet for MCS 13xx (in mm)







Note

The information in this brochure relates to the operating conditions and applications described.

For applications and operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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FluidControl Unit
FCU 1000 Series

Description

The FluidControl Unit FCU 1000 is a portable service unit, designed for the temporary measurement of solid particle contamination, water saturation and fluid temperature in hydraulic systems as well as Diesel fuels.

The integrated pump and the hoses contained in the FCU 1000 series scope of delivery allow operation in

- control circuits
- pressure circuits and
- pressureless reservoirs

All measurement data are stored with time stamp in files (measurement value file) and folders (measurement points) in the internal data memory of the FCU 131X.

The measured values can be transmitted to a PC or mobile devices and analyzed using HYDAC's own FluidMonitoring Software FluMoS.

Applications

- Hydraulic systems
- Diesel storage, diesel transfer and diesel filling applications (e.g. mines, refineries, ports of transshipment, emergency power systems emergency power units, mobile machines, etc.)
- Service
- Maintenance

Advantages

- Suitable for hydraulic fluids up to 350 mm²/s
- Suitable for Diesel fuels according to DIN EN 590 and ASTM D975 4-D
- Cleanliness classes to ISO and SAE or NAS
- Integrated data interfaces (wireless and cable) for direct connection to HYDAC's FluidMonitoringSoftware FluMoS
- USB interface for data storage

Technical Details

			FCU 1210	FCU 1310	FCU 1315
General data					
Type of operation	Periodic intermittent operation, S3 Relative duty cycle 40 % (S3, to DIN EN 60034/VDE 0530)		x	x	x
Self diagnostics	Continuously with error display via status LED and display		x	x	x
Display	LED, 6 / 4 / 4-digit, each with 17 segments		–	x	x
	LED 6 with 17 segments		x	–	–
Measured variables	Solid Contamination	to ISO 4406, SAE AS 4059	x	x	x
		NAS 1638	–	x	x
	Water saturation	in %	–	x	x
	Temperature	°C / °F	–	x	x
Measurement ranges	Solid Contamination	ISO 9/8/7 to ISO 25/24/23	x	x	x
	Water saturation	0 to 100 %	–	x	x
	Temperature	-25 to 100°C	–	x	x
Calibration accuracy	Contamination	± ½ ISO code in calibrated range of ISO 13/11/10 to ISO 23/21/18	x	x	x
	Water saturation	± maximal 2% (Full scale)	–	x	x
	Temperature	± maximal 2% (Full scale)	–	x	x
Material of seal	FPM		x	x	x
Ambient temperature range:	0 to +45 °C / 32 to 113 °F		x	x	x
Storage temperature range	-40 to +80 °C / -40 to 176 °F		x	x	x
Protection class	IP50 in operation IP67 when closed		x	x	x
Weight (without accessories)	≈ 13 kg		–	x	x
	≈ 9 kg		x	–	–
Emission sound pressure level L_{PA}	< 70 db(A)		x	x	x
Hydraulic specifications					
- *With hydraulic fluids* Operating pressure	IN: OUT:	- 0.5 to 45 bar / -7.25 to 650 psi 0 to 0.5 bar / 0 to 7.5 psi	x	x	x
with adapter for pressure lines	IN: OUT:	15 to 345 bar / 217 to 5000 psi 0 to 0.5 bar / 0 to 7.5 psi	x	x	x
- *With Diesel* according to DIN EN 590 / ASTM D975 4-D	IN: OUT:	16 bar / 232 psi 0 to 0.5 bar / 0 to 7.5 psi	–	–	x
Pressure resistant up to max.	345 bar / 5000 psi		x	x	x
Sensor flow rate	≈ 180 ml/min (viscosity-dependent)		x	x	x
Max. suction height	0.5 m		x	x	x
Permitted viscosity range	2 to 350 mm²/s; 33 to 1622 Sus (for hydraulic oils up to ISO VG 68)		x	x	x
Temperature range of medium	0 to +70 °C / 32 to 158 °F, but T_{max} (Fluid) < T_{flash} (Fluid) - 10 °C		x	x	x
Electrical data					
Supply voltage	24 V DC ±20%, residual ripple < 10% The FCU must not be used with vehicle supply systems without load dump protection of maximum 30 V DC.		x	x	x
Max. power / current consumption	100 watts / 4000 mA		x	x	x
Interfaces	USB (A) for memory stick and 5 pole, M12x1, pin		–	x	x
	Bluetooth 1.2, Class 3 (only **H**YDAC **S**ensor **I**nterface - **HSI**)		–	x	x

Model code

FCU 1 3 1 5 – 4 – U – AS – 1

Type
FCU = FluidControl Unit

Series
1 = 1000 series, 4 particle size channels

Contamination codes
2 = ISO 4406:1999; SAE AS 4059 (D) / > 4 µm$_{(c)}$ > 6 µm$_{(c)}$ > 14 µm$_{(c)}$ > 21 µm$_{(c)}$
3 = ISO 4406:1987; NAS 1638 / 2-5 µm, 5-15 µm, 15-25 µm, > 25 µm
can be switched to
ISO 4406:1999; SAE AS 4059 (D) / > 4 µm$_{(c)}$ > 6 µm$_{(c)}$ > 14 µm$_{(c)}$ > 21 µm$_{(c)}$

Housing
1 = for mobile use (plastic case with attached pocket for hoses and cables)

Media
0 = Hydraulic- and Lubrication fluids based on mineral oils
5 = Hydraulic- and Lubrication fluids based on mineral oils as well as Diesel according to DIN EN 590 / ASTM D975 4-D

Options
4 = with integrated pump

Supply voltage
U = 24 V DC

Integral sensor
AS = AquaSensor AS 1000 (only 131X)
Z = without

Power supply adapter
1 = 100 ... 240 V AC / 50/60 Hz / 1 Phase / 5000 mA (Europe, USA/Canada, UK, Australia, Japan)

Items supplied

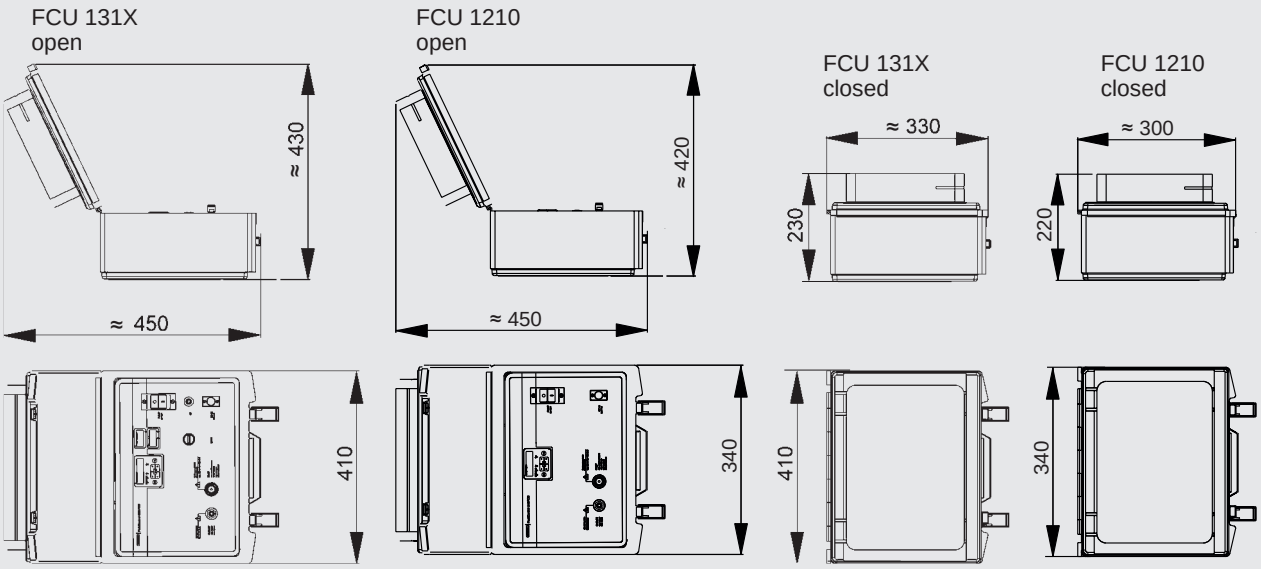
- FluidControl Unit FCU 1000
- mains adapter with power supply cable for Europe, USA/Canada, UK, Australia and Japan
- Adapter for pressure lines
- Adapter for suction hose (only FCU 1315)
- INLET pressure hose with threaded connection for measurement coupling type 1620, black, length = 2 m
- INLET suction hose, open end, transparent, length = 2 m (only FCU 1315)
- INLET suction hose, open end, transparent, length = 0,3 m (only FCU 1210 and FCU 1310)
- INLET Bottle Sampling suction pipe, angled
- OUTLET return hose, open end, transparent, length = 2 m
- Ground cable; ESD protection (only FCU 1315)
- operating and maintenance manual/calibration certificate
- USB memory stick (only FCU 131X) contains operating and maintenance manual in additional languages
  (PDF viewer software required for viewing)

Accessories

- BatteryPack (part no.: 350 4605)
- Field Verification Start-Up Kit (part no.: 344 3253)
- Field Verification Kit (part no.: 344 3249)
- Cable with universal plug (for cigarette lighter or on-board electrical system), length = 10 m (part no.: 330 6236)

Dimensions

(All dimensions in mm)



NOTE

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Subject to technical modifications.

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FCU 2210-4 FCU 2210-1

FluidControl Unit
FCU 2000 series

Description
The FluidControl Unit FCU 2000 is used as a portable service unit for the measurement of solid particle contamination in hydraulic and lubrication systems.

The measurement values are recorded by means of infrared technology and output in accordance with ISO 4406, SAE 4059 and NAS 1638.

Applications
- Hydraulic and lubrication systems
- Maintenance
- Test benches
- Sampling bottle analysis
- Tank analysis

Advantages
- Robust construction
- Cleanliness classes in accordance with ISO 4406, SAE 4059 and NAS 1638
- Integrated, graphics-capable printer
- Data output on the display or connection to a PC
- RS232 or RS485 interface

Technical details

	FCU 2xxx -1	FCU 2xxx -4
Continuous display of measured values with display screen (LCD)		
Self diagnostics	Continuous with error indication on display (LCD)	
Measurement range (calibrated)	ISO 12/10/9 to 23/21/18 Unit is calibrated within this range. Measures up to class ISO 25/23/21.	
Data memory (battery back-up)	3000 measurements	
Operating pressure: Pressure inlet Return port connection	 INLET: 1 to 350 bar, with clean filter element OUTLET: max. 3 bar	
Ports	INLET (pressure): Minimess test coupling type 1604; Connection to standard 1620 port via the supplied test hose is possible OUTLET: male coupling DN 7 INLET (suction): male shut-off coupling DN 6.4	
Sensor flow rate	50 to 150 ml/min	
Total flow rate	50 to 800 ml/min (depending on the pressure)	
Permitted viscosity range	1 to 1000 mm²/s	1 to 1000 mm²/s 1 to 150 mm²/s (Suction operation, continuous) 150 to 350 mm²/s (Suction operation, short-time)
Fluid temperature range	0 to +70°C	
Supply voltage FCU	24 VDC, ± 25%	
Power consumption	25 watts max.	100 watts max.
Integral printer	Dot-matrix printer	
Serial interface	Standard: RS 232 Optional: RS 485	
Ambient temperature range:	0 to +55°C	
Storage temperature range	-20 to +85°C	
Relative humidity	Max. 90%, non-condensing	
Protection class	III (safety extra-low voltage)	
IP class	IP40	
Weight	≈ 11.3 kg	≈ 15.8 kg
Operating time with rechargeable battery	≈ 6 hours	≈ 6 hours without pump ≈ 2 hours with pump

Model code

FCU 2 2 1 0 – 4 – M – /-BUS

Type
FCU = FluidControl Unit

Resolution
2 = 4 particle size channels

ISO Code format
0 = ISO 4406 : 1987; NAS 1638 / >5 µm >15 µm>25 µm>50 µm
1 = ISO 4406 : 1987; NAS 1638 / >2 µm >5 µm >15 µm >25 µm
2 = ISO 4406 : 1999; SAE AS 4059 (D) / >4 $\mu m_{(c)}$ >6 $\mu m_{(c)}$ >14 $\mu m_{(c)}$>21 $\mu m_{(c)}$

Housing
1 = for portable use

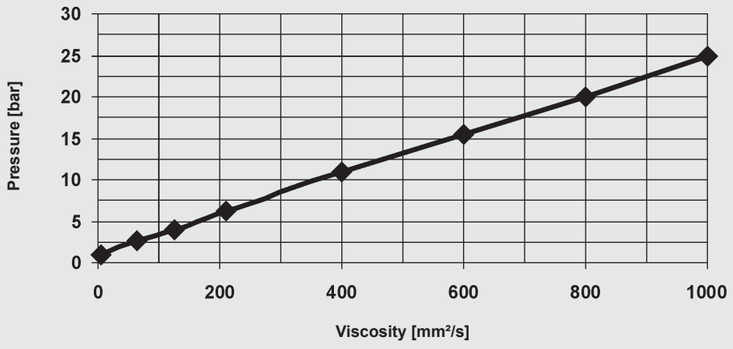
Fluids
0 = for standard mineral oils
1 = for phosphate esters (HFD-R)

Options
1 = standard, without options
4 = with integral pump (not for phosphate esters (HFD-R))

Supply voltage mains adapter
K = 120VAC / 60 Hz / 1 phase, USA/CDN
M = 230VAC / 50 Hz / 1 phase, Europe
N = 240VAC / 50 Hz / 1 phase, UK
O = 240VAC / 50 Hz / 1 phase, Australia
P = 100VAC / 50 Hz / 1 phase, Japan

Supplementary details
No details = standard
BUS = RS 485 interface instead of RS 232

Pressure required at FCU high-pressure port*



* For a flow rate of 100 ml/min, flow control valve fully open, new filter element

Items supplied

– FCU
– Power supply adapter
– High pressure inlet hose DN 4 (2m long)
– Low pressure outlet hose DN 7 (2m long)
– Operating Instructions
– Calibration certificate
– PC software package FluMoS Light
– Connection cable FCU/PC

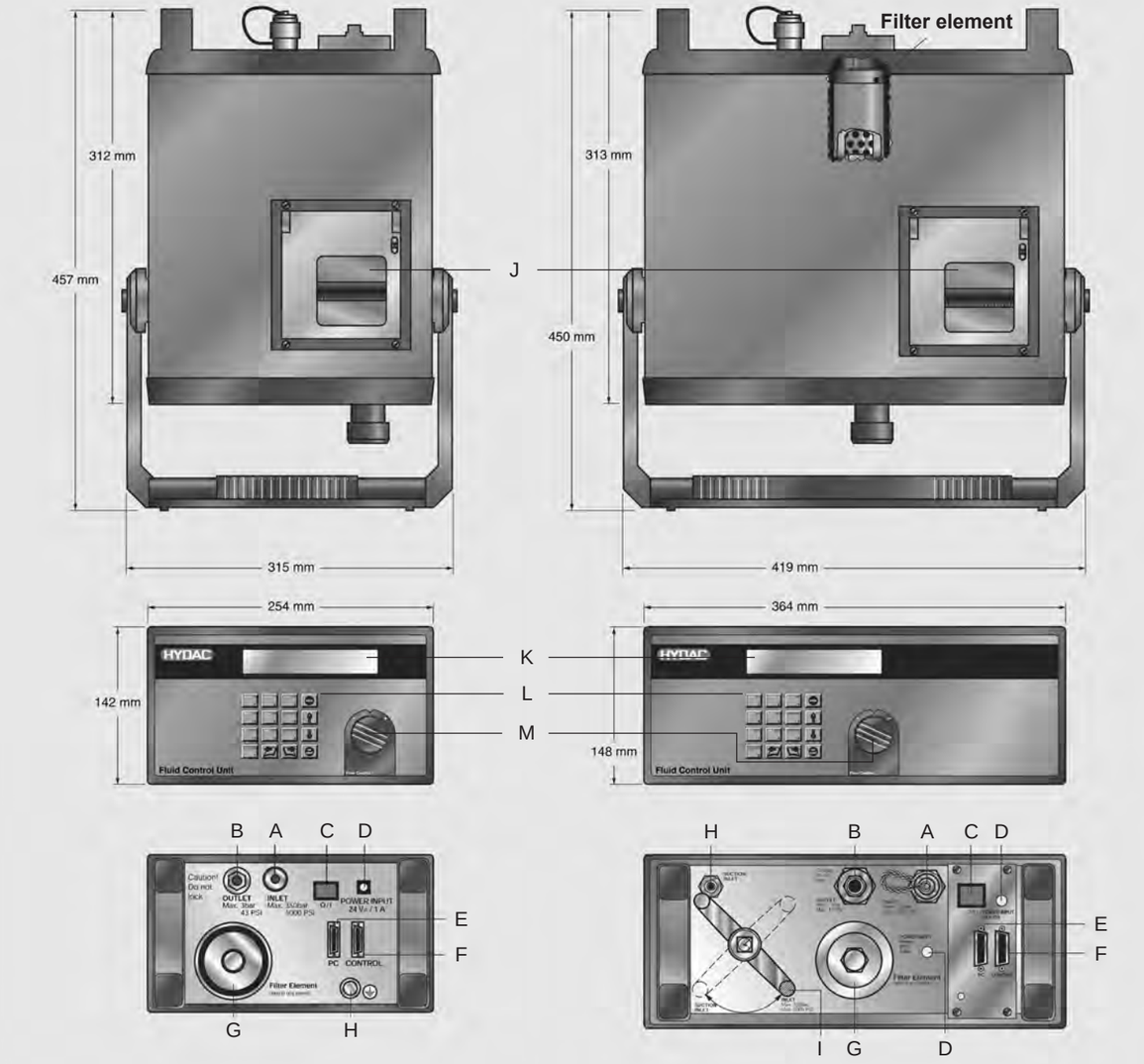
Additional for FCU 2xxx - 4

– Power supply adapter for integral pump
– Suction hose DN 6 (1m long)
– Suction hose DN 6 (0.2m long)

Accessories

– Reservoir Extraction Unit REU
– Inlet and outlet hoses 5 m long
– PC software package FluMoS Professional
– Aluminium transport case

DIMENSIONS



A = High pressure port
B = Outlet
C = On/off switch
D = Power input 24 volts
E = Serial port for PC connector
F = Control port
G = Cover for filter
H = Suction port
I = Change over ball valve high pressure port/suction port
J = Dot-matrix printer
K = LCD display
L = Keypad
M = Flow control valve

Note

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All technical details are subject to change.

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FluidControl Unit
FCU 2000 series
19" panel mounted models

Description
The FluidControl Unit FCU 2000 for 19" Panel Mounting is designed for measuring particle contamination in hydraulic and lubrication systems.

The measurement values are recorded by means of infrared technology and output in accordance with ISO 4406, SAE 4059 and NAS 1638.

Applications
- Hydraulic and lubrication systems

Advantages
- Cleanliness classes in accordance with ISO 4406, SAE 4059 and NAS 1638
- Data output in the display or connection to a PC
- RS232 or RS485 interface

Technical details

Continuous display of measured values with display screen (LCD)	
Self diagnostics	Continuous with error indication on display (LCD)
Measurement range (calibrated)	ISO 12/10/9 to 23/21/18 Unit is calibrated within this range. Measures up to class ISO 25/23/21.
Data memory (battery back-up)	3000 measurements
Operating pressure: Pressure inlet Return port connection	 INLET: 1 to 350 bar, with clean filter element OUTLET: max. 3 bar
Ports	INLET: Minimess test coupling type 1604 OUTLET: male coupling DN 7
Sensor flow rate	50 to 150 ml/min
Return flow rate	50 to 800 ml/min (depending on the pressure)
Permitted viscosity range	1 to 1000 mm²/s
Fluid temperature range	0 to +70°C
Power consumption	25 watts max.
Integral printer	Dot-matrix printer
Serial interface	Standard: RS 232 Option: RS 485
3 relay outputs	1x "ready" relay 2x "limit" relays
Ambient temperature range:	0 to +55°C
Storage temperature range	-20 to +85°C
Relative humidity	Max. 90%, non-condensing
Protection class	II (double insulated)
IP class	IP40
Weight	≈ 16 kg

Model code

FCU 2 1 3 0 – 1 – M / -BUS

Type
FCU = FluidControl Unit

Resolution
2 = 4 particle size channels

ISO Code format
0 = ISO 4406 : 1987; NAS 1638 / >5 µm >15 µm>25 µm>50 µm
1 = ISO 4406 : 1987; NAS 1638 / >2 µm >5 µm >15 µm >25 µm
2 = ISO 4406 : 1999 ; SAE AS 4059 (D) / >4 $\mu m_{(c)}$ >6 $\mu m_{(c)}$ >14 $\mu m_{(c)}$>21 $\mu m_{(c)}$

Housing
3 = for 19" panel mounting

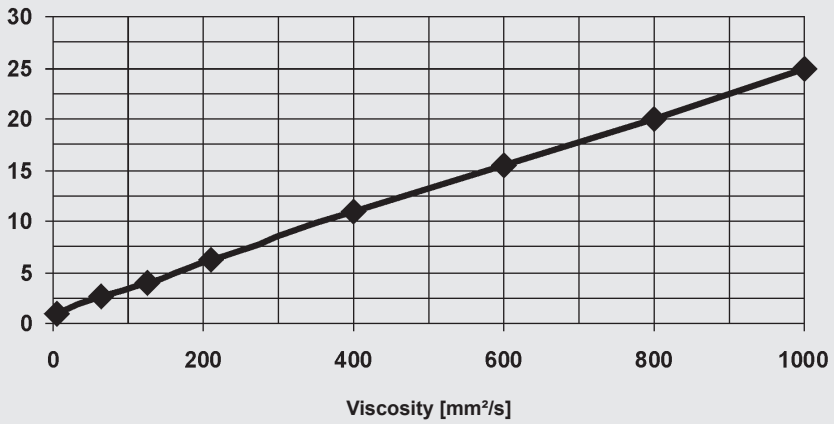
Fluids
0 = for standard mineral oils
1 = for phosphate esters (HFD-R)

Options
1 = standard, without options

Supply voltage
K = 120VAC / 60 Hz / 1 phase, USA/CDN
M = 230VAC / 50 Hz / 1 phase, Europe
N = 240VAC / 50 Hz / 1 phase, UK
O = 240VAC / 50 Hz / 1 phase, Australia
P = 100VAC / 50 Hz / 1 phase, Japan

Supplementary details
No details: standard
BUS = RS 485 interface instead of RS 232

Pressure required at FCU high-pressure port*



* For a flow rate of 100 ml/min, flow control valve fully open, new filter element

Items supplied

– FCU
– Power supply cable
– Operating Instructions
– Calibration certificate
– PC software package FluMoS Light

Accessories

– Reservoir Extraction Unit REU
– Inlet and outlet hoses 2 m and 5 m long
– PC software package FluMoS Professional

Note

The information in this brochure relates to the operating conditions and applications described.

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FluidControl Unit

FCU 8000 series

Portable laser particle counter

Description

The FluidControl Unit FCU 8000 is designed to measure particle contamination in hydraulic and lubrication systems. It can be used in the field as a portable laser particle measurement device or in connection with the BottleSampling Unit as a laboratory device for the investigation of oil samples.

Applications

- Field use
- In labs or at service bases

Advantages

- Evaluation and storage of the measurement data
- Cleanliness classes in accordance with ISO 4406, SAE 4059 and NAS 1638
- Integrated, graphics-capable printer
- RS232 or RS485 interface for data output
- Easy to operate

Technical details

Continuous display of measured values with display screen (LCD)	
Self diagnostics	Continuous with error indication on display (LCD)
Measurement range (calibrated, depending on version)	NAS 0 to 12 / ISO 0/0/0 to 23/21/18 / SAE 0 to 12 Unit is calibrated within this range. Will display up to class NAS 15 / ISO 25/23/21 / SAE 15
Data memory (battery back-up)	3000 measurements
Operating pressure: Pressure inlet Return port connection	 INLET: 1 - 350 bar, with clean filter element OUTLET: max. 3 bar
Ports (rear side)	INLET: Minimess test coupling type 1620 OUTLET: male coupling DN 7
Sensor flow rate	20 to 80 ml/min
Return flow rate	20 to 800 ml/min (depending on the pressure)
Permitted viscosity range	1 to 1000 mm²/s
Fluid temperature range	0 to +70°C
Mains voltage	24 V DC, ± 25%
Power consumption	25 watts max.
Operating time with rechargeable batteries	≈ 6 hours
Integral printer	Dot-matrix printer
Serial interface	Standard: RS232 Option: RS485
Ambient temperature range:	0 to +55°C
Storage temperature range	-20 to +85°C
Relative humidity	Max. 90%, non-condensing
Protection class	III (safety extra-low voltage)
IP class	IP40
Weight	≈ 14 kg

Model code

FCU 8 1 1 0 – 1 – M /-BUS

Type
FCU = FluidControl Unit

Resolution
8 = 6 particle size channels

ISO code format
1 = ISO code >2/>5/>15 µm,
NAS 2-5/5-15/15-25/25-50/50-100/>100 µm
2 = ISO code >4/>6/>14 $\mu m_{(c)}$,
SAE >4/>6/>14/>21/>38/>70 $\mu m_{(c)}$

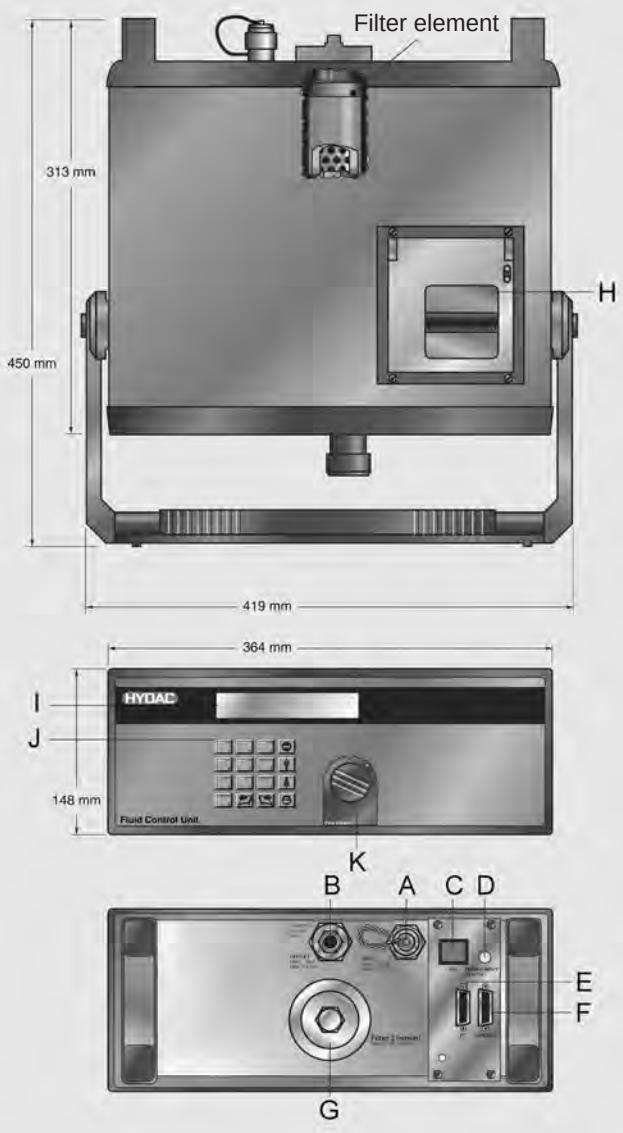
Housing
1 = for portable use

Fluids
0 = for standard mineral oils
1 = for phosphate esters (HFD-R)

Optionen
1 = Standard, without options

Supply voltage
K = 120VAC / 60 Hz / 1 phase, USA/CDN
M = 230VAC / 50 Hz / 1 phase, Europe
N = 240VAC / 50 Hz / 1 phase, UK
O = 240VAC / 50 Hz / 1 phase, Australia
P = 100VAC / 50 Hz / 1 phase, Japan

Supplementary details
- BUS = RS485 interface instead of RS232



A = High pressure port
B = Outlet
C = On/off switch
D = Power input 24 volts
E = Serial port for PC connector
F = Control port
G = Cover for filter
J = Dot-matrix printer
K = LCD
L = Keypad
M = Flow control valve

Items supplied

– FCU
– Power supply adapter
– High pressure inlet hose DN 2 (2m long)
– Low pressure outlet hose DN 7 (2m long)
– Operating Instructions
– Calibration certificate
– PC software package FluMoS Light
– Connection cable FCU/PC

Accessories

– Reservoir Extraction Unit REU
– Inlet and outlet hoses 5 m long
– Bottle Sampling Unit BSU
– Aluminium transport case
– PC software package FluMoS Professional

Note

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FluidControl Unit
FCU 8000 series
Accessories
BottleSampling Unit

Description
The BottleSampling Unit BSU is used in conjunction with the portable particle counter FluidControl Unit FCU 8000 to analyse oil sample bottles in the laboratory.

Applications
- Laboratory

Advantages
- This universal combination allows the user to use the FCU as both a portable field device (with the FCU removed from the BSU) and a bottle sampler (with the FCU placed on the BSU).

Technical details

Permitted viscosity range	1 to 120 mm^2/s
Permitted fluids	Mineral oils (or mineral-oil-based raffinates), others possible on request
Permitted rinsing fluid	Low-viscosity fluids, mineral oils or mineral-oil-based fluids (preferably kerosene), flash point >55 °C
Permitted fluid temperature range	0 to 70°C
Permitted ambient temperature range	10 to 40°C
Permitted storage temperature range	-20 to +85°C
Permitted ambient humidity	max. 70 %
Dimensions (H x D x W)	615 mm x 365 mm x 360 mm (without FCU)
IP class	IP40
Weight	27 kg
Provided by the machine owner *	
Compressed air supply	max. 6 bar, pre-filtered (min. 5 µm) and dry compressed air
Compressed air connection	Quick connector for hose DN6

***) not supplied**

Model code

BSU 8000 – 1 – M

Typ
BSU = BottleSampling Unit

Model
8000 = Suitable for FCU 8000 series

Optionen
1 = Standard, without options

Supply voltage
K = 120VAC / 60 Hz / 1 phase, USA/CDN
M = 230VAC / 50 Hz / 1 phase, Europe
N = 240VAC / 50 Hz / 1 phase, UK
O = 240VAC / 50 Hz / 1 phase, Australia
P = 100VAC / 50 Hz / 1 phase, Japan

BSU with FCU

Items supplied

– BSU
– FCU adapter
– Sample vessels
– Power supply cable
– Operating Instructions

Accessories

– CompressedAir Unit CAU

Note

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AquaSensor AS 1000

Description

The AquaSensor AS 1000 is the culmination of the continued development of the successful AS 2000 series for online detection of water in oils, particularly as an OEM sensor for condition monitoring.
It measures the water content relative to the saturation concentration (saturation point) and transmits the saturation level as a 4 ... 20 mA signal.

As an alternative, the AS 1000 is equipped with two parameterizable switch outputs. These are factory-set to switch at a saturation level of 60% (SP 2 - warning) and 80% (SP1 - alarm).

In addition the AS 1000 measures the temperature of the fluid and also transmits this as a 4 .. 20 mA signal.

The AS 1000 therefore enables hydraulic and lubrication oils to be monitored accurately, continuously and online.

Applications

- Mobile hydraulics
- Hydraulic and lubrication systems in industry

Advantages

- Reliable on account of its compact, rugged design
- Cost-effective sensor, also for use in OEM applications
- Not necessary to calibrate sensor to different types of oil
- Pressure-resistant, even with pulsations
- Wide fluid temperature range
- Early detection of water problems thus preventing faults and unnecessary interruption to operations.

Technical specifications

Input data	
Saturation level	0 to 100%
Temperature	-25 to 100 °C
Operating pressure	-0.5 to 50 bar
Pressure resistance	max. 630 bar
Flow velocity	max. 5 m/s
Parts in contact with fluid	Mechanical connection: Stainless steel / vacuum-metallized ceramic Seal: Viton or EPDM for each type
Output data	
Analogue output - Saturation level - Pin 2:	
Analogue signal	4 to 20 mA (corresponds to 0 to 100%) ohmic resistance ≤ 500 Ω
Calibration accuracy	≤ ± 2% Full Scale maximum
Accuracy when measuring in fluid	≤ ± 3% Full Scale typical
Pressure dependence	± 0.2% Full Scale bar
Analogue output - Temperature - Pin 4:	
Analogue signal	4 to 20 mA (corresponds to -25 to +100 °C) ohmic resistance ≤ 500 Ω
Calibration accuracy	≤ ± 2% Full Scale maximum
Switch output - Saturation level - Pin 2:	
Version (parameterisable)	PNP transistor output SP1 N/O / N/C Factory setting: N/C
Assignment (parameterisable)	Saturation level or temperature Factory setting: saturation level, alarm at 80%
Switch current	maximum 1 A
Switch output - Saturation level - Pin 4:	
Version (parameterisable)	PNP transistor output SP2 N/O / N/C Factory setting: N/C
Assignment (parameterisable)	Saturation level or temperature Factory setting: saturation level, alarm at 60%
Switch current	maximum 1 A
Digital output - Pin 5:	
HSI	**H**YDAC **S**ensor **I**nterface
Ambient conditions	
Nominal temperature range (saturation)	0 to +90°C
Storage temperature range	-40 to +100 °C
Flow velocity	< 5m/s
Fluid temperature range	-40 to +125 °C
Viscosity range	1 to 5000 mm²/s
Fluid compatibility:	mineral oil based fluids, synthetic and natural esters
CE mark	EN 61000-6-1 / 2 / 3 / 4
Protection class to DIN 40050	IP 67
Other data	
Supply voltage	12 to 32 V DC
Residual ripple of supply voltage	≤ 5%
Mechanical connection	G3/8 A DIN 3852
Torque value	25 Nm
Electrical connection	M 12x1, 5 pole
Weight:	≈ 145 g

Note: reverse polarity protection, short circuit protection provided.

Model Code

AS 1 X 0 8 – C – 000

Type
AS = AquaSensor

Measuring range
1 = 1000 Series

Medium
0 = Mineral oils
1 = Phosphate ester (HFD-R)

Mechanical connection
0 = G3/8 A DIN 3852

Electrical connection
8 = male connection M12x1, 5-pole
(connector not supplied)

Signal technology
C = Output 1 Pin 2 saturation level (4 .. 20 mA)
Output 2 Pin 4 temperature (4 .. 20 mA)
2 = 2 switching outputs

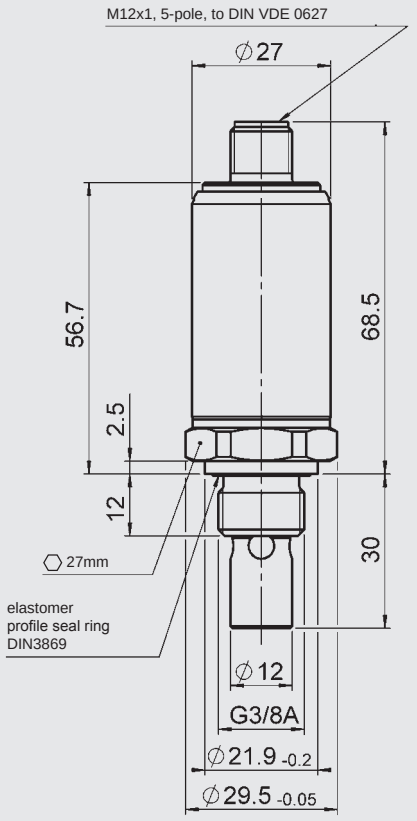
Modification number
000 = standard

Items supplied

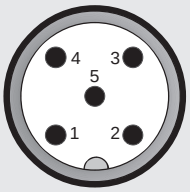
– AquaSensor
– Operating manual

NOTE
On units with a different modification number, please read the label or the technical amendment details supplied with the unit.

Dimensions



Pin connections



Pin	AS 1X08-C	AS 1X08-2
1	Voltage supply 12 .. 32 VDC	
2	Saturation level 4 .. 20 mA	SP1
3	GND supply voltage	
4	Temperature 4 .. 20 mA	SP2
5	HSI*	

* **HSI** = **H**YDAC **S**ensor **I**nterface

Accessories

ZBE 08
Female connector, right-angled, 5-pole, M12x1 → open end

ZBE 08S-02
Female connector, right-angled, with 2 m cable, screened, 5-pole, M12x1 → open end

ZBE 08S-05
Female connector, right-angled, with 5 m cable, screened, 5-pole, M12x1 → open end

ZBE 08S-10
Female connector, right-angled, with 10 m cable, screened, 5-pole, M12x1 → open end

ZBE 47S-05
Female connector, straight, with 5 m cable, screened, 5-pole, M12x1 → open end

ZBE 47S-10
Female connector, straight, with 10 m cable, screened, 5-pole, M12x1 → open end

Display and read-out options

The following interface adapters are available to interpret the AS1000:

- CSI-B-2 (Condition Sensor Interface)
- SMU1000 Series (Sensor Monitoring Unit)

The measured data can be evaluated and displayed as spreadsheets or graphically using:

- FluMoS (FluidMonitoring Software)
- FluMoT (FluidMonitoring Toolkit)

Information on other read-out options can be found on our website at www.hydac.com or please contact your HYDAC representative.

NOTE

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AquaSensor AS 3000

Description

The AquaSensor AS 3000 is the further development of the proven AS 1000 series for the online detection of water in oils, particularly as a sensor for condition monitoring.

It records the water saturation and the temperature of the operating fluid.

The current measured values are shown on the display, and all parameter settings are made there.

The measured values are output as a 4 ... 20 mA signal and are the basis for two parameterisable switching outputs.

The AS 3000 thus enables hydraulic and lubricating oils to be monitored accurately, continuously and online.

Applications

- Mobile hydraulics
- Hydraulic and lubrication systems in industry

Advantages

- 4 digit digital display, can be aligned in two axes
- User-friendly due to key programming
- Individual configuration
- Reliable on account of its compact, rugged design
- Economical sensor
- No calibration required for different oil types
- Pressure-resistant, even with pulsations
- Early detection of water problems thus preventing faults and unnecessary interruption to operations

Technical specifications

Input data	
Level of saturation	0 to 100 %
Temperature	-25 to 100 °C / -13 to 212 °F
Operating pressure	-0.5 to 50 bar / -7.25 to 725 psi
Pressure resistance	≤ 630 bar / 9136 psi
Flow velocity	max. 5 m/s
Parts in contact with fluid	Mechanical connection: stainless steel / vacuum-metallised ceramic Seal: FKM or EPDM per type
Output data	
Analogue output	
Output signal (parameterisable)	4 to 20 mA ohmic resistance ≤ 500 Ω or 0 to 10 V ohmic resistance ≥ 1 kΩ corresponds to the measurement range factory setting selected in each case: 4 to 20 mA
Calibration accuracy	≤ ± 2 % FS max.
Accuracy in media measurements	≤ ± 3 % FS typ.
Pressure dependence	± 0.2 % FS / bar
Switching outputs	
Version (parameterisable)	PNP transistor outputs Normally open or normally closed Factory setting: normally closed
Allocation (parameterisable)	Degree of saturation or temperature Factory setting: degree of saturation (alarm 80% (SP 1), warning 60% (SP 2), activation temperature: 30 °C / 86 °F)
Switch current	maximum 1.2 A per output
Switch cycles	> 100 million
Ambient conditions	
Nominal temperature range (saturation)	0 to +80 °C / 32 to 176 °F
Storage temperature range	-40 to +80 °C / -40 to 176 °F
Fluid temperature range	-40 to +80 °C / -40 to 176 °F
Viscosity range	1 to 5000 mm²/s
Fluid compatibility	mineral oil based fluids, synthetic and natural esters per type
CE-mark	EN 61000-6-1 / 2 / 3 / 4
Protection class to DIN 40050	IP 67
Other data	
Supply voltage	18 to 32 V DC
Residual ripple of supply voltage	≤ 5%
Electrical connection	M 12x1, 5 pole
Display	4-digit, LED, 7-segment, red, height of digits 7 mm
Mechanical connection	G3/8 A acc. to DIN 3852
Torque value	25 Nm
Weight	~ 110 g

Note: reverse polarity protection, short circuit protection provided.
FS (**F**ull **S**cale) = relative to the full measuring range

Order details

AS 3 0 0 8 – 5 – 000

Type
AS = AquaSensor

Measuring range
3 = 3000 Series

Medium
0 = Mineral oils
1 = Phosphate ester (HFD-R)

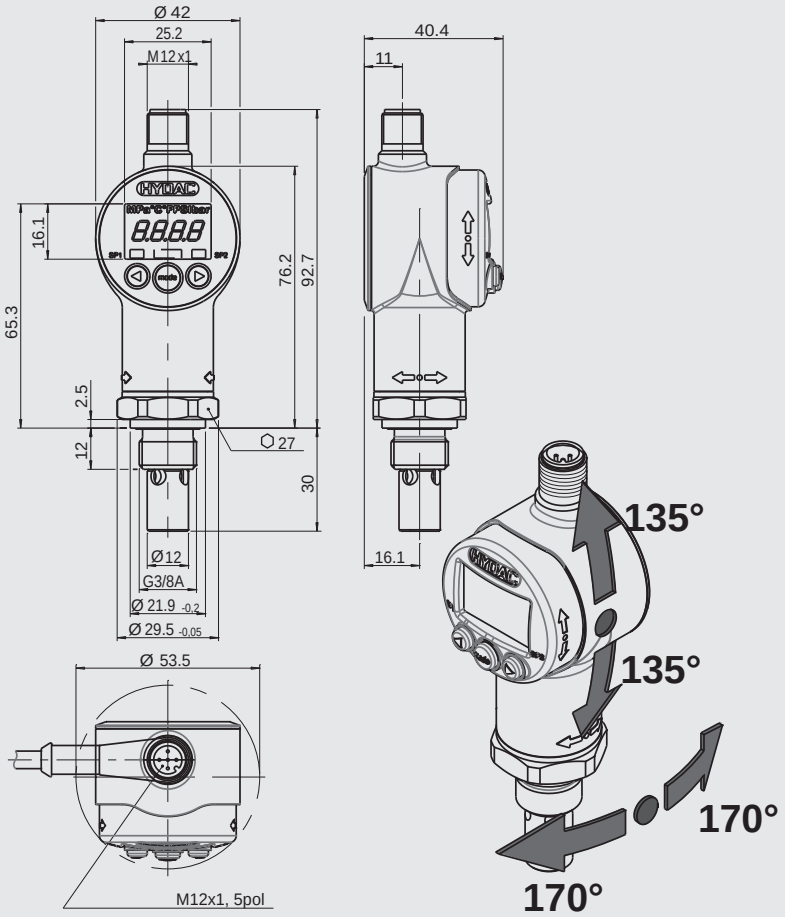
Mechanical connection
0 = G 3/8 A DIN 3852

Electrical connection
8 = Male connector M12x1, 5 pin
(female connector not supplied)

Signal technology
5 = 2 switch outputs / 1 analogue output

Modification number
000 = standard

Dimensions



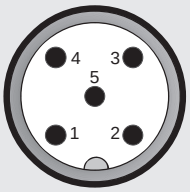
All dimensions in mm

Items supplied

– AquaSensor
– Operating manual

Pin connections

M12x1, 5 pole



Pin	Assignment
1	Voltage supply 18-35 VDC
2	Analogue output
3	GND supply voltage
4	SP 1 (alarm)
5	SP 2 (warning)

Accessories

ZBE 08
Female connector, bent, shielded, 5 pin, M12x1

Part no. 6006786

ZBE 08S-02
Female connector, right-angled, with 2 m cable, shielded, 5 pin, M12x1

Part no. 6019455

ZBE 08S-05
Female connector, right-angled, with 5 m cable, shielded, 5 pin, M12x1

Part no. 6019456

ZBE 47S-05
Female connector, straight, with 5 m lead, shielded, 5 pin, M12x1

Part no. 3484562

PS5
Power supply unit with socket plug (female), 5 pole, M12x1
Part. no. 3399939

NOTE

The information in this brochure relates to the operating conditions and applications described.
For applications and operating conditions not described, please contact the proper HYDAC department.
Subject to technical modifications.

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FluidMonitoring Module
FMM

Description

The FluidMonitoring Module FMM series combines two of HYDAC's condition monitoring products, the ContaminationSensor CS 1000 and the AquaSensor AS 1000 or HydacLab 1400, in one system.

It provides the user with a robust and stationary system for online measurement of

- Solid particle contamination
- water content (e.g. to detect leakage) in hydraulic and lubrication fluids.
- Oil condition (e.g. relative change in electrical conductivity and dielectric constant)

The FMM series of blocks have all the necessary connections and are therefore easy to install in existing hydraulic circuits.

Various models are available for use in filtration & cooler/heater circuits, pressure and high pressure applications.

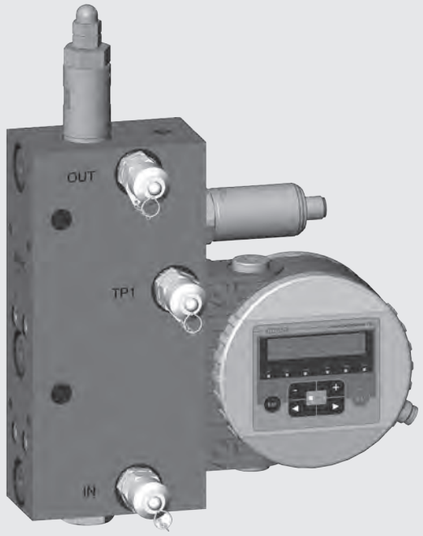
Advantages

- Cost-effective installation
- Early warning of critical machine states
- Continuous oil condition monitoring
- Condition-based maintenance planning

Technical data

General data	
FMM - O - M - ...	Offline circuits 6 ... 15 bar
FMM - P - S - ...	Pressure circuits 15 ... 300 bar
FMM - P - M - ...	Pressure circuits 15 ... 300 bar
FMM - P - L - ...	Pressure circuits 15 ... 250 / 300 bar
FMM - A - S - ...	Pressure circuits 15 ... 250 bar

FMM - O - M - ...
(previously known as: FMM)



Technical data

Installation position	vertical (flow from bottom to top)
Max. operating pressure	6 ... 15 bar / 87 ... 217 psi
Minimum differential pressure	6 bar / 87 psi (recommended)
Permitted viscosity range	1 ... 350 mm²/s
Hydraulic connection (IN, OUT)	Test point type 1604 or G 1/4" (ISO 228)
Seal material	FKM / EPDM
Fluid temperature range	0 ... +85 °C / +32 ... +185 °F
Ambient temperature range	-30 ... +80 °C / -22 ... +176 °F
Storage temperature range	-40 ... +80 °C / -40 ... +176 °F
Relative humidity	max. 95%, non-condensing
Weight	4.3 kg

Model code

See last page

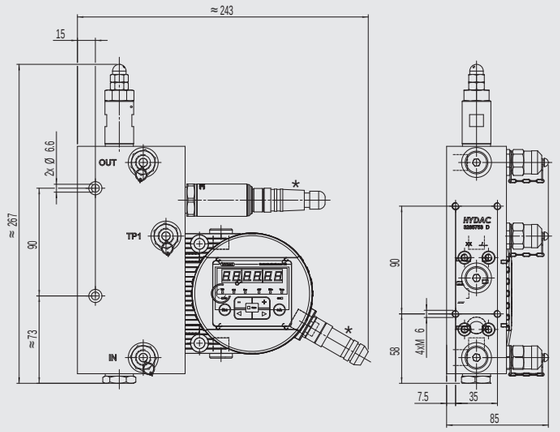
Items supplied

– 1 FMM - O - M - ...
– 1 Operating and Maintenance Manual for FMM-O-M
– 1 Manual for additional sensor (optional)
– 1 CD with Operating and Maintenance Manual for CS 1000 in different languages (PDF viewer software required)
– 1 CD with FluMoS light (fluid monitoring software to operate and parameterize the sensor)

Accessories

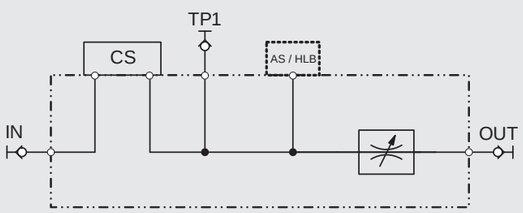
A wide range of accessories can be found in the brochure "Filter Systems Accessories" (E 7.623...).

Dimensions

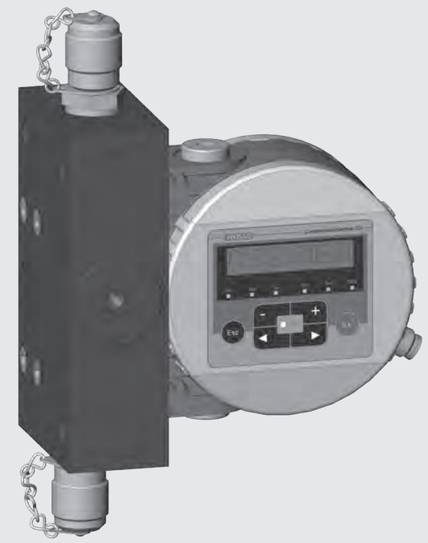


* not included in scope of delivery

Hydraulic circuit diagram



FMM - P - S - ...
(previously known as: FMMP)



Technical data

Installation position	vertical (flow from bottom to top)
Max. operating pressure	15 ... 300 bar / 217 ... 4350 psi
Minimum differential pressure	15 bar / 217 psi
Permitted viscosity range	1 ... 350 mm²/s
Hydraulic connection (IN, OUT)	Test point type 1604 or G 1/4" (ISO 228)
Seal material	FKM / EPDM
Fluid temperature range	0 ... +85 °C / +32 ... +185 °F
Ambient temperature range	-30 ... +80 °C / -22 ... +176 °F
Storage temperature range	-40 ... +80 °C / -40 ... +176 °F
Relative humidity	max. 95%, non-condensing
Weight	4.3 kg

Model code

See last page

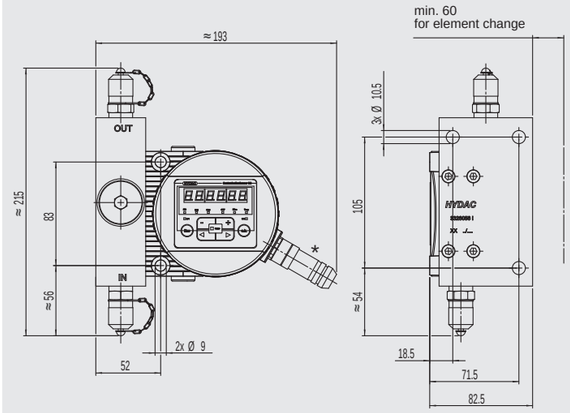
Items supplied

– 1 FMM - P - S - ...
– 1 Operating and Maintenance Manual for FMM-P-X
– 1 CD with Operating and Maintenance Manual for CS 1000 in different languages (PDF viewer software required)
– 1 CD with FluMoS light (fluid monitoring software to operate and parameterize the sensor)

Accessories

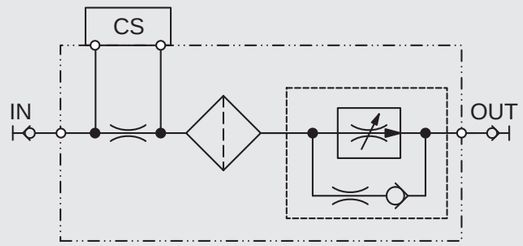
A wide range of accessories can be found in the brochure "Filter Systems Accessories" (E 7.623...).

Dimensions

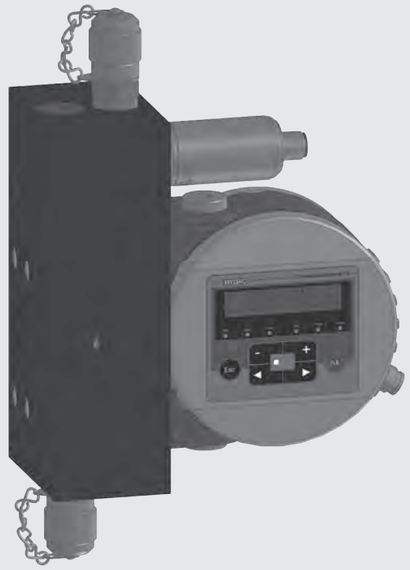


* not included in scope of delivery

Hydraulic circuit diagram



FMM - P - M - ...



Technical data

Installation position	vertical (flow from bottom to top)
Max. operating pressure	15 ... 300 bar / 217 ... 4350 psi
Minimum differential pressure	15 bar / 217 psi
Permitted viscosity range	1 ... 350 mm²/s
Hydraulic connection (IN, OUT)	Test point type 1604 or G 1/4" (ISO 228)
Seal material	FKM / EPDM
Fluid temperature range	0 ... +85 °C / +32 ... +185 °F
Ambient temperature range	-30 ... +80 °C / -22 ... +176 °F
Storage temperature range	-40 ... +80 °C / -40 ... +176 °F
Relative humidity	max. 95%, non-condensing
Weight	6.5 kg

Model code

See last page

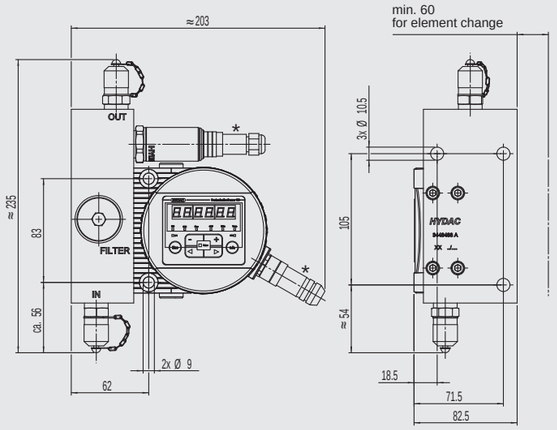
Items supplied

– 1 FMM - P - M - ...
– 1 Operating and Maintenance Manual for FMM-P-X
– 1 Manual for additional sensor (optional)
– 1 CD with Operating and Maintenance Manual for CS 1000 in different languages (PDF viewer software required)
– 1 CD with FluMoS light (fluid monitoring software to operate and parameterize the sensor)

Accessories

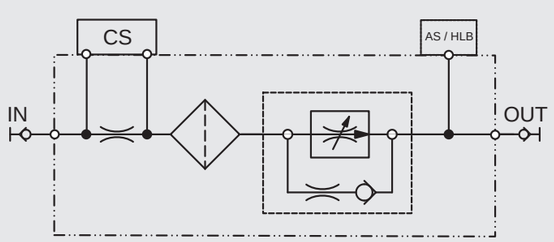
A wide range of accessories can be found in the brochure "Filter Systems Accessories" (E 7.623...).

Dimensions

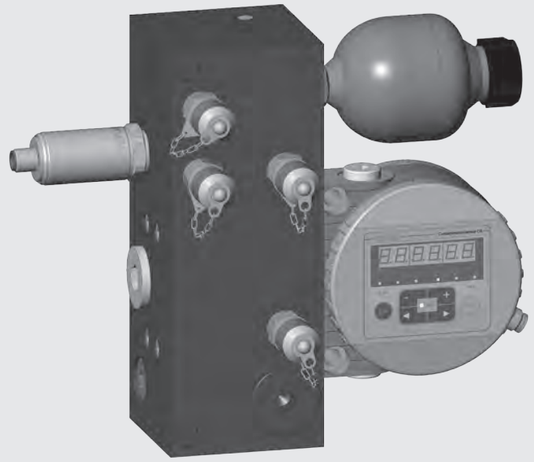


* not included in scope of delivery

Hydraulic circuit diagram



FMM - P - L - ...
(previously known as: FMMHP)



Technical data

Installation position	vertical (flow from bottom to top)
Max. operating pressure without hyd. accumulator with hydraulic accumulator	 15 ... 300 bar / 217 ... 4350 psi 15 ... 250 bar / 217 ... 3625 psi
Minimum differential pressure	15 bar / 217 psi
Permitted viscosity range	1 ... 350 mm²/s
Hydraulic connection (IN, OUT)	Test point type 1604 or G 1/4" (ISO 228)
Seal material	FKM / EPDM
Fluid temperature range	0 ... +85 °C / +32 ... +185 °F
Ambient temperature range	-30 ... +80 °C / -22 ... +176 °F
Storage temperature range	-40 ... +80 °C / -40 ... +176 °F
Relative humidity	max. 95%, non-condensing
Weight	12.5 kg

Model code

See last page

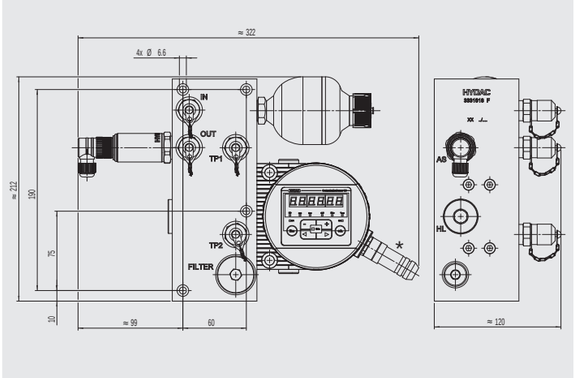
Items supplied

– 1 FMM - P - L - ...
– 1 Operating and Maintenance Manual for FMM-P-L
– 1 Manual for additional sensor (optional)
– 1 CD with Operating and Maintenance Manual for CS 1000 in different languages (PDF viewer software required)
– 1 CD with FluMoS light (fluid monitoring software to operate and parameterize the sensor)

Accessories

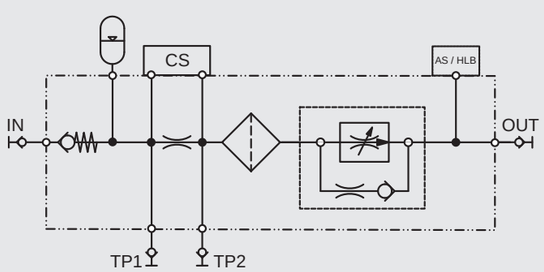
A wide range of accessories can be found in the brochure "Filter Systems Accessories" (E 7.623...).

Dimensions



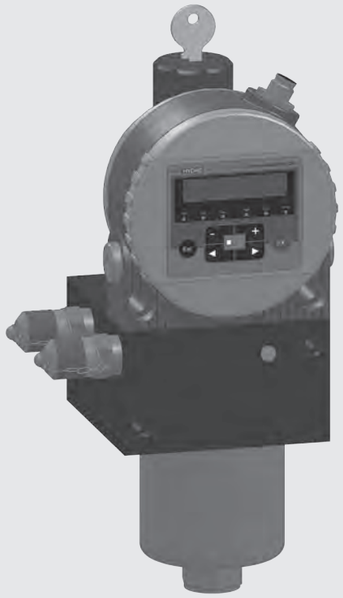
* not included in scope of delivery

Hydraulic circuit diagram

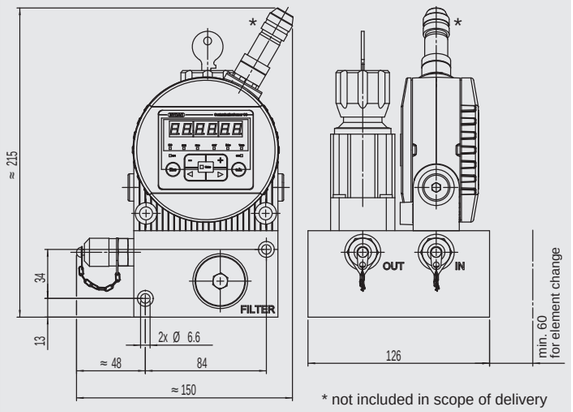


FMM - A - S - ... - 1 - ...

FMM - A - S - ... - 2 - ...

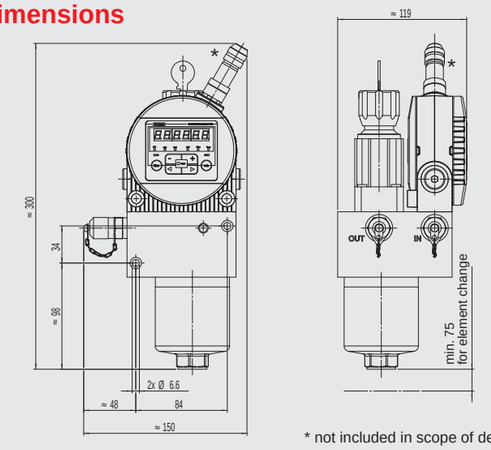


Dimensions



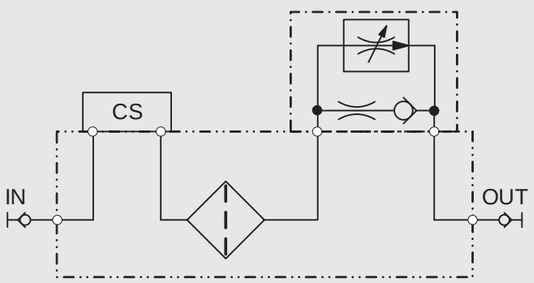
* not included in scope of delivery

Dimensions



* not included in scope of delivery

Hydraulic circuit diagram



Technical data

Installation position	horizontal
Max. operating pressure	15 ... 250 bar / 217 ... 3625 psi
Minimum differential pressure	15 bar / 217 psi
Permitted viscosity range	10 ... 800 mm²/s
Hydraulic connection (IN, OUT)	Test point type 1604 or G 1/4" (ISO 228)
Seal material	FKM / EPDM
Fluid temperature range	0 ... +85 °C / +32 ... +185 °F
Ambient temperature range	-30 ... +80 °C / -22 ... +176 °F
Storage temperature range	-40 ... +80 °C / -40 ... +176 °F
Relative humidity	max. 95%, non-condensing
Weight	8.0 kg FMM-A-S...-1-... 7.8 kg FMM-A-S...-2-...

Model code

See last page

Items supplied

– 1 FMM - A - S - ...
– 1 Operating and Maintenance Manual for FMM-A-S
– 1 CD with Operating and Maintenance Manual for CS 1000 in different languages (PDF viewer software required)
– 1 CD with FluMoS light (fluid monitoring software to operate and parameterize the sensor)

Accessories

A wide range of accessories can be found in the brochure "Filter Systems Accessories" (E 7.623...).

Model code

FMM - O - M - 0 - CS 1 2 2 0 - A - AS - 0 - 0 - 0 / -000

Type
FMM = Fluid Monitoring Module

Hydraulic application
O = offline (bypass flow circuit, < 15 bar) only sensor combination M
P = pressure line (pressure circuit, > 15 bar)
A = adjustable flow valve (pressure circuit, > 15 bar) only sensor combination S

Sensor combination
S = CS1000
M = CS1000 + AS1000 or CS1000 + AS3000 or CS1000 + HydacLab
L = CS1000 + AS1000 + HydacLab or CS1000 + AS3000 + HydacLab

Seal
0 = FKM (FPM/Viton®)
1 = EPDM (not for hydraulic accumulator)

Contamination Sensor CS1000 Series
CS 1210 = ISO / SAE, without display (FKM)
CS 1220 = ISO / SAE, with display (FKM)
CS 1310 = ISO / SAE / NAS, without display (FKM)
CS 1320 = ISO / SAE / NAS, with display (FKM)
CS 1211 = ISO / SAE, without display (EPDM)
CS 1221 = ISO / SAE, with display (EPDM)
CS 1311 = ISO / SAE / NAS, without display (EPDM)
CS 1321 = ISO / SAE / NAS, with display (EPDM)

Analogue interface of the CS1000
A = 4 to 20 mA
B = 2 to 10 VDC

Additional sensor
Z = without
AS = AS1000
AS3 = AS3000
HL = HydacLab 1400
Z(AS) = set up for AS1000 / AS3000
Z(HL) = set up for HydacLab

Hydraulic accumulator
0 = without accumulator
1 = diaphragm accumulator SBO 250-0.075 (40 bar gas pressure) [not available in EPDM]

Filter
0 = without filter (only for FMM-O)
1 = protective filter (25µm) (for FMM-P, optional for FMM-A)
2 = DF60 (5µm) (optional for FMM-A)

Options
0 = no options

Modification number
000 = modification number

Note

The information in this brochure relates to the operating conditions and applications described.

For applications and operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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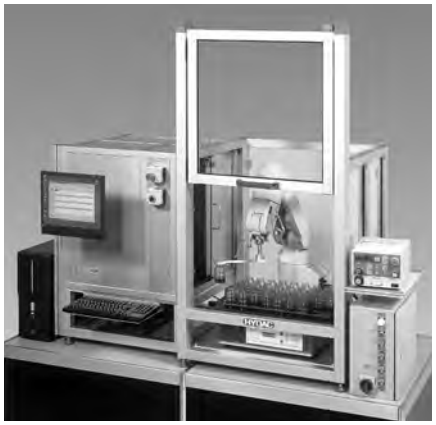


Automated Laboratory Particle Counter ALPC 9000 Series

Description

The Automated Laboratory Particle Counter ALPC 9000 is a fully automatic laboratory particle measurement system for hydraulic and lubrication oils.

Very short measuring times permit analysis of up to 500 samples per day.

Different versions of the ALPC offer either automatic sample feed by means of 5-axis robotic arm (batch processing) or manual sample feed of individual sample bottles.

Applications

- Laboratories

Advantages

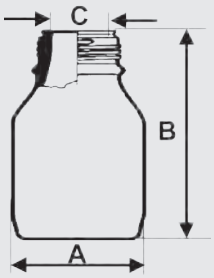
- Automatic and monitored processing of measurement and rinsing cycles.
- Rapid sample analysis due to very short cycle times for measurement and rinsing.
- Excellent repeatability of the measurement results by means of replicated testing.
- Only small sample quantities are required (≈ 50 ml).
- User-friendly operation and graphical evaluation of the results through the use of ALPC Desk software.
- Calibrated to ISO11171 and ISO4402: consequently analysis according to NAS 1638 is also possible.
- “All-in-one” system including PC, keyboard and monitor. Robotic arm available as an option.
- Bar code scanner compatible.

Technical specifications

Self diagnostics	Continuous display and error indication on the PC
Measurement range (calibrated)	ISO 0/0/0 to 23/21/18
Calibration ISO 4402 and ISO 11171	Particle size 5, 10, 15, 20, 25, 50, 75, 100 µm 4, 6, 10, 14, 18, 21, 38, 50 $\mu m_{(c)}$
Measured volume per sample bottle (2 to 5 individual measurements)	10 to 25 ml (min. sample bottle volume: 50 ml)
Sensor flow rate	30 ml/min
Measurement cycle time (measuring and rinsing; typically)	≈ 75 seconds (excluding sample feed)
Permitted fluids	Hydraulic and lubrication fluids based on mineral oil
Permitted rinsing fluid	See Page 2 "Services required on site"
Rinsing fluid consumption	≈ 50 ml / sample bottle
Permitted viscosity range	1 to 320 mm^2 / s
Permitted fluid temperature range	0 to 50 °C, 32 to 122 °F
Compressed air supply (provided by customer)	6.5 to 8 bar, 100 l/min
Power consumption	2000 W max. (230 V, max. 8.7 A)
Permitted ambient temperature range	10 to 45 °C, 50 to 113 °F Depending on rinsing fluid. Higher temperatures possible on request.
Permitted storage temperature range	0 to 70 °C, 32 to 158 °F
Permitted ambient humidity	Max. 90%, non-condensing
Weight:	ALPC 9000 -1: ≈ 100 kg ALPC 9000 -2: ≈ 160 kg

Equipment

	ALPC 9000-1	ALPC 9000-2
Automatic measurement	✔	✔
Automatic rinsing	✔	✔
PC/monitor/keyboard	✔	✔
Individual sample bottle feed	✔	✔
Multiple sample feed of up to 50 samples on pallet		✔
Sample bottle shaker		✔
5-axis robotic arm		✔
ALPC Desk software	✔	✔
Degassing function incorporated into robotic arm		✔
Prepared for upgrade to ALPC 9000-2	✔	
Bar code scanner compatible	✔	✔



Sample bottle dimensions (other dimensions on request)

$$A > \frac{B}{2}$$

A	B	C	ALPC 9000-1	ALPC 9000-2
< 52 mm	60 to 90 mm	25 to 35 mm		✔
< 75 mm	60 to 90 mm	25 to 35 mm	✔	

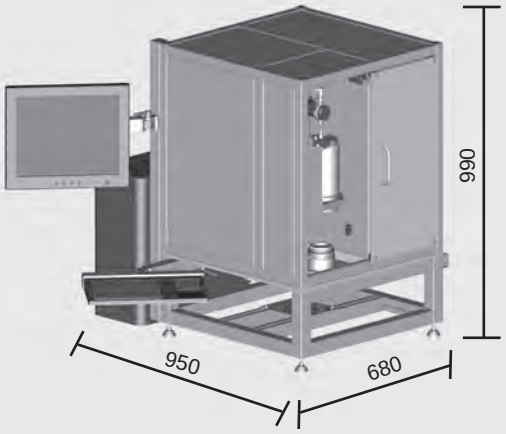
Services required on site *

– Supply voltage
– Dry, clean compressed air (see Page 1)
– Rinsing fluid: Mineral oil based fluids with flash point ≥ 56 °C (preferably kerosene). Cleanliness must be significantly better (by a factor of 2-3) than the expected sample cleanliness
– Reservoir for rinsing and waste fluids (min. 2 x 10 l)

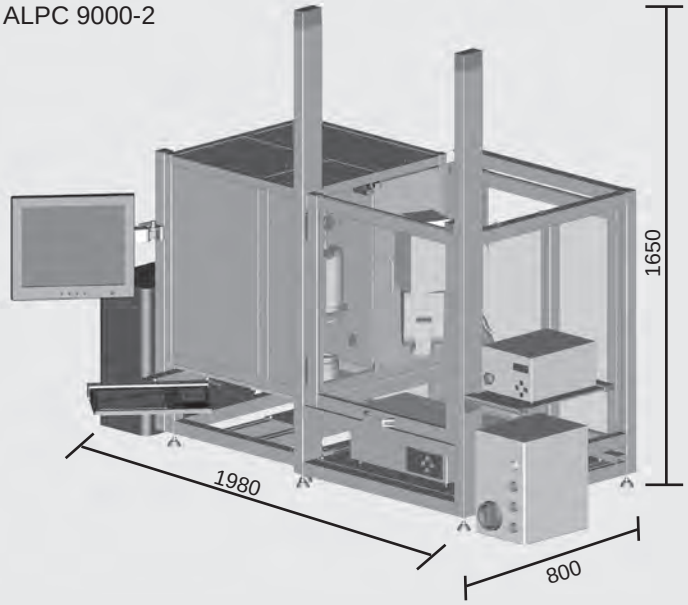
* not supplied

Dimensions (all dimensions approximate in mm)

ALPC 9000-1

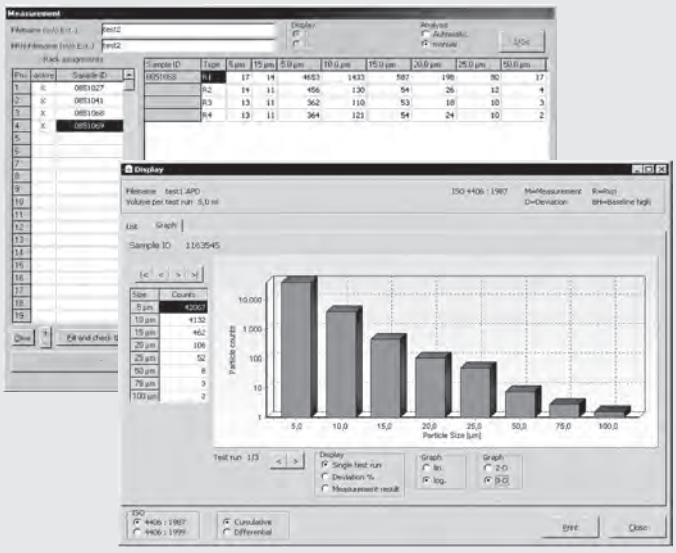


ALPC 9000-2



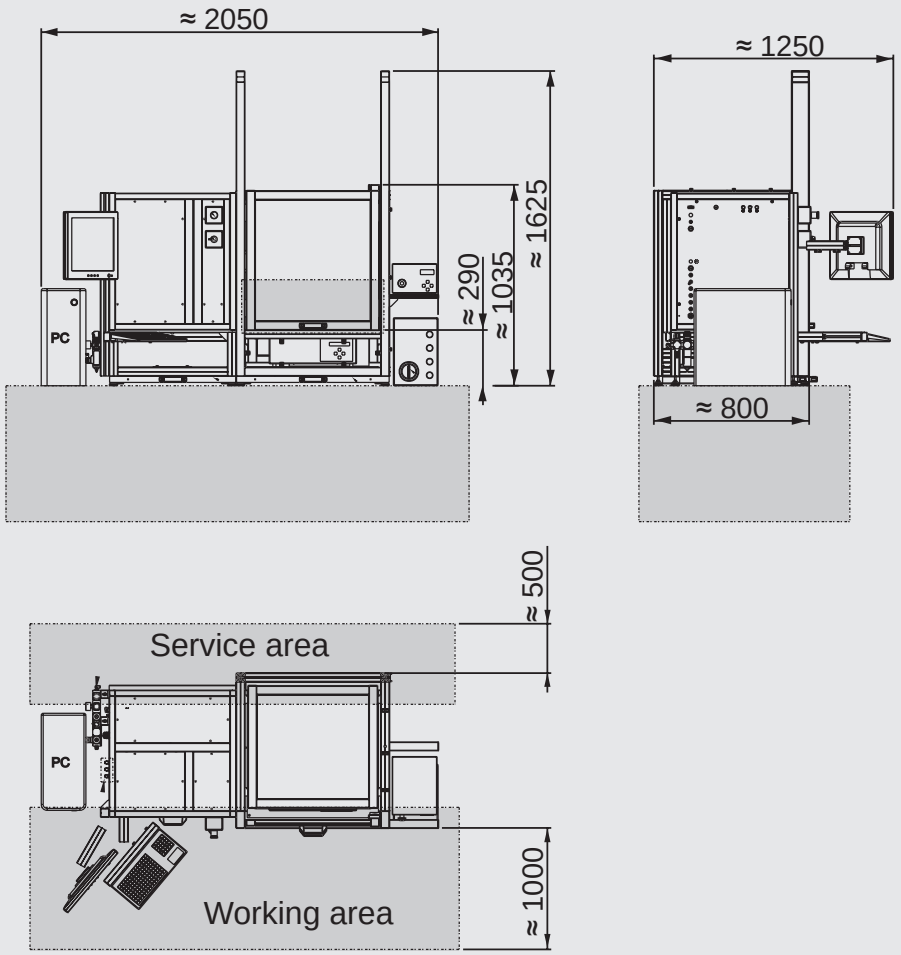
PC Software ALPC Desk

User-friendly processing and display of the measured data using ALPC Desk software



Dimensions (all dimensions approximate in mm)

ALPC



Model code

ALPC 9000 1 M W7 DE

Type
ALPC = Automatic Laboratory Particle Counter

Series
9000

Sample feed
1= manual
2= automatic

Supply voltage
M = 230 VAC, 50 / 60 Hz
Other voltage on request

PC operating system
W7 = Windows 7 (32-Bit)

Keyboard
BE = Belgium
CH = Switzerland
DE = Germany
DK = Denmark
ES = Spain
FR = France
GB = England
IT = Italy
NO = Norway
PO = Portugal
SF = Sweden, Finland
US = USA

Items supplied

- ALPC 9000-1 / 9000-2
- ALPC 9000-2 only: sample bottle shaker, robotic arm with transparent Makrolon® safety enclosure
- PC, 19" TFT monitor, keyboard with touchpad
- Software ALPC Desk installed on PC and on CD-ROM
- Calibration certificate
- Operating manual
- Service documentation installed on PC and on CD-ROM

NOTE

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Subject to technical modifications.

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FluidAnalysis Set FAS

Description

The FluidAnalysis Set is designed to produce contamination monitors from oil samples. These can be used to analyze samples taken from hydraulic and lubrication systems with regard to solid contamination. By comparing the microscopic evaluation with reference photographs, a rapid assessment of the fluid contamination (cleanliness class classification to ISO 4406, NAS 1638) can be made.

Advantages

- Simple fluid monitoring
- Confirmation of changes in oil cleanliness
- Support for condition-based maintenance

Applicable standards

- ISO 4405 / 4406 / 4407
- Gravimetric methods for determining the amount of contamination in hydraulic fluids.

Model code

FAS M 3

Basic type
FAS

Supply voltage, vacuum pump
K = 110 V / 60 Hz
M = 230 V / 50 Hz
Z = without (electric vacuum pump)
A manual vacuum pump is included in the scope of delivery.

Modification number
3 = The latest version is always supplied

Items supplied

Key to individual items:

1: Transport case
2: Silicone hose
3: Membrane filter discs
4: Electric vacuum pump
5: Tweezers
6: Vacuum filtration unit
7: Measuring cylinder 100 ml
8: Wide neck plastic bottle, 500 ml
9: Petri slides
10: Spray bottle with membrane filter
11: Contamination handbook (not shown)
12: Power supply for vacuum pump (not shown)

NOTE

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FluidSampling Set
FES

Description
The FluidSampling Set FES is used for the static and dynamic gathering of oil samples from hydraulic and lubrication systems.

Advantages
- Static and dynamic sampling possible
- Numerous accessories included

Applicable standards
- ISO 4021
- CETOP RP 95 H

Order no.
- 349 334

Items supplied

Part no.	Code
309 345	Manual vacuum pump with pressure gauge
309 349	Aluminum adapter
3143465	Set of 2 sample bottles
309 358	Spray bottle, 500 ml, with removable nozzle
309 371	Disposable membrane filter for spray bottle, 2 pieces
309 374	Plastic hose, length = 2 m
309 342	Telescopic pointer 90 cm
627 500	Cable ties, 20 pieces
309 348	Dynamic sampler
309 350	Minimess test hose (screw coupling / screw coupling)
309 351	Minimess test hose (screw coupling / push-in coupling)
309 360	Wide neck plastic bottle 500 ml
637 561	Case
349 339	Contamination handbook

Note

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Measuring Microscope

MM-S5-M

MM-S5-M-U

Description

These measuring microscopes are mainly used for the measurement of particles from oil samples on filter membranes.

The microscopes are supplied in a stable and sturdy version.

The optical apparatus achieves a maximum amount of light intensity and an even image sharpness in accordance with the requirements for oil analysis.

The lens tube adjustment by means of the coarse and fine drive, in addition to the cross table (equipped as standard), enables an easy adjustment of image sharpness and object position.

The mounted LED illumination with mains power supply ensures sufficient illumination, even with greater enlargements.

The microscope cabinet protects the microscope against impacts and dust.

The microscope MM-S5-M-U can be used with or without the CCD camera.

With the aid of the software provided, image processing is possible on either the computer or the laptop. The camera images can be embedded in many Windows® applications as files.

Applications

- Laboratory

Advantages

- Simple analysis of membranes (also on site)

Technical details

	MM-S5-M	MM-S5-M-U
DIN Huygens eyepiece	10 x M	
Achromatic lenses	4x, 10x, 20x	
Magnifications	40x, 100x, and 200x	
Supply voltage	230 V 50 Hz 1 phase	
Tube length	160 mm	
Total height	330 mm	
Image digitalization	–	CCD camera, 4,7 MPix
Video system	–	PAL colour system
Resolution	–	2048 x 1536 Pixel
PC interface	–	USB 2.0
System requirements	–	Windows 98 / ME / 2000 / XP, Vista / 7 / 8, USB port, CD-ROM drive, 32 MB RAM

Model code

MM S5 M U

Basic model
MM = Measuring microscope

Lens system
S5 = Standard eyepiece

Supply voltage
M = 230 V 50 Hz 1 phase
P = 110 V 60 Hz 1 phase

Image digitization
No details = Standard illumination
U = CCD camera with USB port to laptop or PC

Scope of delivery

– 1 Measuring microscope
– 1 Transport case
– 1 USB camera (only with MM-SS-M-U) incl. CD with driver software

NOTE

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Measuring Microscope
MM-KKE-M-C-U

Description
This measurement microscope is used mainly for the measurement of particles from oil samples on filter membranes. The microscope is stable and robust in design and is convenient to use. The lens tube adjustment is accomplished by means of a gentle coarse drive movement and a fine drive, in order that optimum sharpness can be guaranteed at maximum enlargement. The mounted LED illumination with mains power supply ensures sufficient illumination, even with 200x enlargements. The tripod is equipped with a 3-part Knurled object lens revolver and attachable cross table.

The optical equipment consists of the achromatic lenses: 4:1, 10:1, 20:1. The lenses are used in conjunction with a micrometre eyepiece with 10x enlargement. Thanks to the micrometre eyepiece and the attached measurement cards, you have the opportunity of determining the object size directly and for all three lenses. The microscope cabinet protects the microscope against impacts and dust.

Applications
- Laboratories

Advantages
- Simple inspection of diaphragms (including onsite)

Technical details

Huygens eyepiece	10 x M
Achromatic lenses	4x, 10x, 20x
Magnifications	40x, 100x, and 200x
Tube length	160 mm
Total height	330 mm
Paint colour	Light grey
PC interface	USB 2.0
System requirements	Windows 98 / ME / 2000 / XP / Vista / 7 / 8, USB port, CD-ROM drive, 32 MB RAM

Model code

MM KKE M C U

Basic model
MM = Measuring microscope

Lens system
KKE = Triocular

Supply voltage
0 = 240 V 50 Hz 1 phase (Australia)
M = 230 V 50 Hz 1 phase (Europe)
P = 110 V 60 Hz 1 phase (Japan)

Accessories
C = Cold light illumination

Image digitization
U = CCD camera with USB port

Scope of delivery
– 1 Measuring microscope
– 1 USB camera
incl. CD with driver software
– 1 Transport case

NOTE

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WaterTest Kit

WTK500

Description

The WaterTest Kit is used for quantitative analysis of the absolute water content in mineral-oil-based lubricating and hydraulic oils.
The absolute water content is made up of the free, the emulsified and the dissolved water in the fluid measured. The measurement involves adding two reagents to the contaminated oil. This causes a pressure increase in the measurement cell that is output via the digital display as water content in vol. % or ppm.

Time per measurement: only approximately 5 minutes (without sample preparation)

Advantages

- Easily performed determination of the absolute water content
- Direct comparison with the values measured in the lab thanks to the absolute water content being output in ppm
- Measurement cell is easy to clean
- High resolution in the lower measuring range
- Measurement series can be recorded for different fluids to depict trend curves
- Battery can be recharged via USB cable
- Illuminated display
- The following display languages can be selected:
  - English (default setting)
  - German
  - French
  - Spanish
  - Portuguese
  - Danish

Technical data

Hydraulic data	
Permitted fluid	Mineral-oil-based lubricating and hydraulic fluid
Permitted fluid temperature	70 °C maximum
Electrical data	
Supply voltage	Internal battery rechargeable via USB cable
General data	
Measurement ranges, can be selected via display	0.02 to 1%* 0.1 to 5%* 100 to 1500 ppm* (0.01 to 0.15 %) 200 to 6000 ppm* (0.02 to 0.6%) *) Measurement error ≤ ± 1.8 vol. % FS (full scale)
Measurement data memory	10 measurement series of 10 measurements each
Weight including carry case	2.7 kg
Dimensions of carry case	34 x 28 x 13.5 cm

Model code

WTK 5 0 0

Type
WTK = WaterTest Kit

Series
5 = series

Option
0 = standard

Modification number
0 = standard

Scope of delivery:
- 1 x aluminium case (W 340mm x H 275mm x D 140mm)
- 1 x measurement cell
- 1 x bottle containing reagent A (500 ml)
- 25 x sachet containing reagent B
- 1 x measuring beaker (100 ml)
- 1 x plastic tweezers
- 3 x agitator (in plastic case)
- 10 x syringe 1 ml
- 3 x syringe 5 ml
- 1 x test kit cleaner (250 ml)
- 1 x operating and maintenance manual
- 1 x USB cable

Replacement pack, consisting of consumables sufficient for 50 tests, can be ordered separately.

EN 7.944.7/03.18

NOTE

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ContaminationTest Unit CTU 1000 series

Description

The Hydac ContaminationTest Unit CTU 1000 series is used to determine the technical cleanliness of lightly contaminated components.

The reasons behind this are the ever increasing demands made on life expectancy of individual components and assemblies which has meant growing demands for technical cleanliness of components and systems. Starting with production, assembly and storage, this extends right through to operation of the complete system.

Analysing the type, size and quantity of contamination enables quality standards to be verified and documented, and the requisite optimisation measures to be implemented.

Applications

- Automotive and supplier industry
- Gearbox and engine builders
- Mobile hydraulics
- Manufacturers of hydraulic and lubrication systems and components

Advantages

- Reduction in costs as a result of less production waste
- Identification and elimination of weak points
- Reduction in production-stage failures
- Optimisation of both internal and external handling processes
- Customer-oriented documentation of the technical cleanliness of components

Technical data

Outer dimensions	See page 79
Weight	CTU10xx: ≈ 270 kg ≈ 290 kg with ultrasonic unit CTU12xx: ≈ 310 kg ≈ 330 kg with ultrasonic unit
Design	Mobile (mounted on casters)
Power consumption	600 W (800 W with ultrasonic unit)
Ambient temperature	15 to 28°C
Analysis chamber (clean box)	
Analysis chamber material	Polished stainless steel
Maximum load capacity	CTU10xx = 47.5 kg * CTU12xx = 47.5 kg *
Control system	PC controlled with user-friendly software, rinse options and rinsing volume programmable
Storage and filtration module	
Membrane holder	For Ø 47 to 50 mm filter membranes
Vacuum nozzle	for extracting the analysis fluid over the membrane
Diffuser	For even distribution of the analysis fluid over the membrane
Operating pressure	-0.8 to 6 bar
Test liquid reservoir	2x 20 l (1x storage reservoir, 1x suction reservoir)
Reservoir switch-over	Automatic
Filtration of test liquid	Fine filtration to ISO 4406 min. ISO 12/9
Filter size, filtration rating	2x MRF-1-E/1, 1 µm
Built-in drip tray	25 litres with drain
Ultrasound	100 W, 40 KHz
Basket for ultrasonic unit	Dimensions: 200 x 110 x 40 mm Mesh width: 4 mm
Emission sound pressure level L_{PA}	< 70 db(A)
To be provided by the operator (not included)	
Compressed air	pre-filtered (min. 5 µm) and dry compressed air, 6.5 to 7.0 bar Air flow rate: 60 l/min, Connection: nipple DN 7.2
Voltage supply	According to order

* For evenly distributed load, no point loading

Preferred models (with shorter delivery times)

Part no.	Model code
4060459	CTU-1040-M-Z-Z
4096185	CTU-1040-M-U-Z
3918423	CTU-1240-M-Z-Z

Model code

CTU 1 0 3 0 - M - Z - Z

Type
CTU = ContaminationTest Unit

Series
1 = 1000 series

Size
0 = Dimensions of analysis chamber (cleanbox):
300 mm x 765 mm x 365 mm
(height (approx.) x width x depth)
2 = Dimensions of analysis chamber (cleanbox):
460 mm x 765 mm x 650 mm
(height (approx.) x width x depth)

Version
3 = Version 2011
– Software ConTes
– 1 µm filtration
– automatic pressure control
4 = Version 2014
– Compression closure, cleanbox
– Internal extraction, cleanbox
– filled via 3/2 way ball valve und filling hose
– Monitor arm (only 124x)
– Nozzles with plug-in connection (plug-in nipple in analysis chamber)

Test liquid
0 = Solvent A III class
Flash point ≥ 60°C, lower explosive limit > 0.6 vol. %)
1 = Water with surfactants, permitted pH values 6 to 10,
no deionised water

Supply voltage
K = 120 V AC / 60Hz / 1 phase USA / Canada
M = 230 V AC / 50Hz / 1 phase Europe
N = 240 V AC / 50Hz / 1 phase UK
O = 240 V AC / 50Hz / 1 phase Australia
P = 100 V AC / 50Hz / 1 phase Japan

Extraction method
Z = Spray, medium pressure
U = Spray, medium pressure plus ultrasound

Supplementary details
Z = Series
R = External rinsing connections Ø 6 mm, between manual actions
F = Fluid connections A/B/C and R fitted with rapid quick-release fastener on outside, Control line to CTM-E modules
A = Manual change-over for filter membrane holder

Blank values

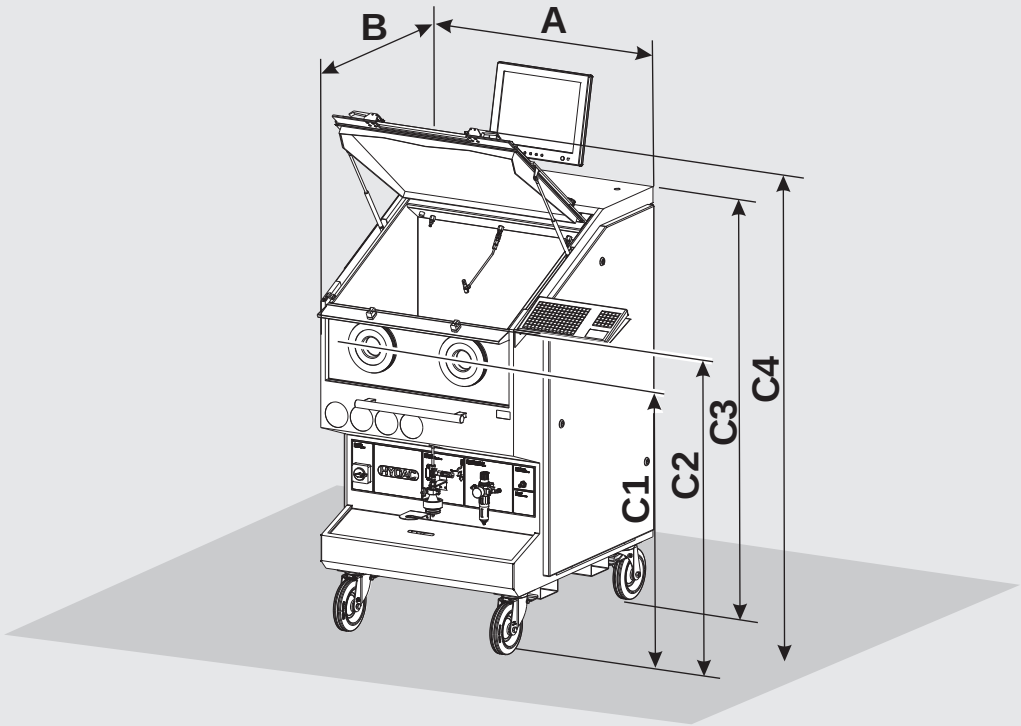
All data is dependent on the ambient conditions.

Environment	CTU 1xxx
Clean room	0.1 to 0.2 mg
Laboratory	0.2 to 0.4 mg
Separate sampling room	0.2 to 0.6 mg
Factory building	0.2 to 0.8 mg

Max. particle size (metallic) [µm]	Time required	Cleaning time [h] after brief shutdown (≤ 24 h)	Cleaning time [h] after extended shutdown (> 24 h)
100*	Great	1.5 ... 4	3 ... 5
150*	Medium	1 ... 2	2 ... 4
250*	Low	0.5 ... 1.5	1 ... 3

* applies to a maximum membrane load of 0.8 mg

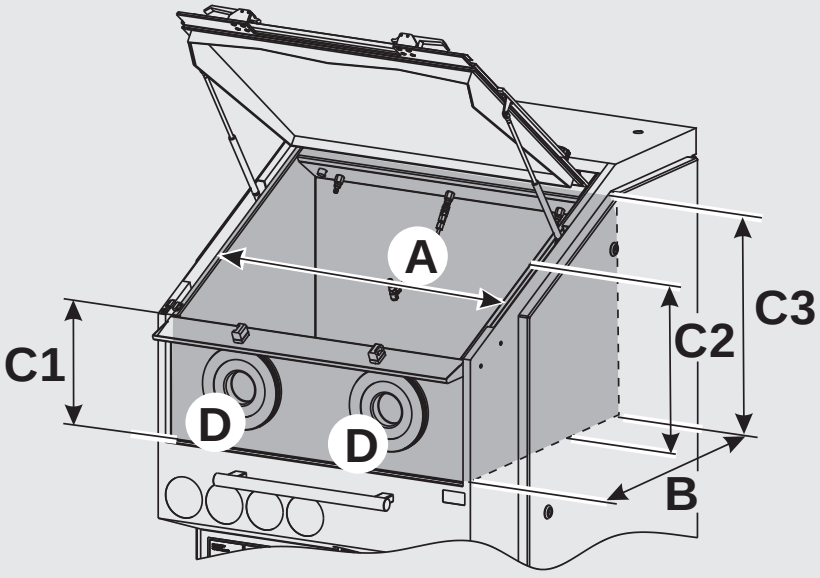
Dimensions



	A	B	C1	C2	C3	C4
CTU10XX	985	850	1170	1290	1500	≈ 1700
CTU12XX	910	1140	1160	1280	1750	≈ 2070

All dimensions in mm

Dimensions of analysis chamber



	A	B	C1	C2	C3	D
CTU10XX	765	365	260	335	380	2x Ø 180
CTU12XX	765	650	300	445	560	2x Ø 180

All dimensions in mm

Note

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Subject to technical modifications.

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ContaminationTest Module – Supply & Control
CTM-SC

Description
The ContaminationTest Module CTM is a modular system for inspecting components with reference to their technical cleanliness. The solid contamination is thereby dedusted from the component surface through wet sampling and conveyed per diaphragm to a later evaluation.

The ContaminationTest Module CTM-SC is the central module in the CTM series. It is used to supply media and to control the entire extraction processes and it includes the graphic user prompting.

Applications
- Automotive and supplier industry
- Gearbox and engine builders
- Mobile hydraulics
- Manufacture of hydraulic and lubrication system components
- Aircraft industry

Advantages
- Cost reductions through lower production waste
- Detection and elimination of weak points
- Reduction of zero-km breakdowns
- Internal and external process optimisation
- Documentation of technical cleanliness of components

Special features
- Reversible pulsation of the test fluid
- Filling and emptying connection
- Controlling and monitoring CTM-E modules
- Automatic pressure setting using software
- User-programmable extraction procedure

Technical specifications

General data	
Dimensions (Height x Width x Depth)	1.80 m x 0.90 m x 0.80 m
Housing material	S235JR powder coated
Coupling connection	CPC coupling
Ambient temperature	15 to 28°C
Weight	≈ 250 kg (empty)
Test liquid reservoir	2 x 20 litres (1x reservoir, 1x collection tank)
Reservoir switch-over	Automatic
Filtration of analysis fluid	Fine filtration to ISO4406 min. 12/9
Filter size	2x MRF-1-E/1, 1 µm
Built-in drip tray	25 litres with drain
Compressed air connection	Nipple DN 7.2
Compressed air supply (provided by customer)	6.5 to 7.0 bar, Air flow rate: 60 l/min. Dry and pre-filtered to 5 µm
Emission sound pressure level L_{PA}	< 70 db(A)
Electrical data	
Supply voltage	According to order
Power consumption	600 watts
Protection class to DIN 40050	IP 54

Model code

CTM SC 100 0 - M

Type
CTM = ContaminationTest Module

Module
SC = Supply & Control

Series
100 = Standard

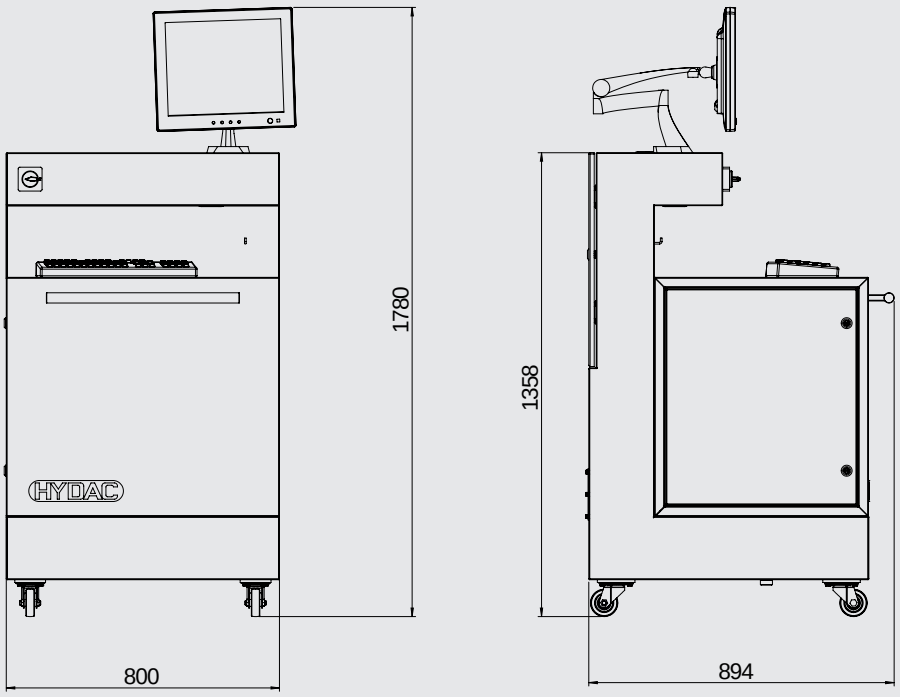
Analysis fluid
0 = solvent A III class
(flash point > 60 °C, lower explosion limit > 0.6 vol.%)
1 = water with surfactants,
permitted pH values 6 to 10, no desalinated water

Supply voltage

K	= 120 V AC / 60 Hz / 1 phase	USA/Canada
M	= 230 V AC / 50 Hz / 1 phase	Europe
N	= 240 V AC / 50 Hz / 1 phase	UK
O	= 240 V AC / 50 Hz / 1 phase	Australia
P	= 100 V AC / 50 Hz / 1 phase	Japan
AE	= 110 V AC / 60 Hz / 1 phase	

Instrument dimensions

(All dimensions in mm)



Items supplied

– CTM-SC
- incl. monitor and monitor bracket
- PC with Windows operating system
- LPC
- keyboard with touchpad
- foot switch
- ConteS software

– Operating and maintenance manual

NOTE

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ContaminationTest Module – Supply Control CTM-SC 3xxx

Description

The ContaminationTest Module CTM is a modular system for inspecting components with reference to their technical cleanliness. The solid particle contamination is thereby dedusted from the component surface through wet sampling and conveyed per diaphragm to a later evaluation.

The ContaminationTest Module CTM-SC 3xxx is the central module in the CTM series. It is used to supply media and to control the extraction processes and it includes the graphic user prompting.

Fields of application

- Automotive and supplier industry
- Gearbox and engine builders
- Mobile hydraulics
- Manufacture of hydraulic and lubrication system components
- Aircraft industry

Advantages

- Cost reductions through lower production waste
- Detection and elimination of weak points
- Reduction of failures before delivery
- Internal and external process optimisation
- Documentation of technical cleanliness of components

Special features

- Reversible pulsation of the test liquid
- Filling and emptying connection
- Controlling and monitoring of CTM-E modules
- Automatic flow rate control setting using software
- Free programming of the extraction procedure

Technical data

General data	
Operation	Via touchscreen
Test liquid feed	Gear pump
Test liquid return	Diaphragm pump
Flow rate: feed-side return	 2.5–18 l/min 4 l/min (without filter membrane)
Pressure limit max. ΔP via consumer @ 5 l/min @ 18 l/min	10 bar ± 0.5 9.5 bar 5.0 bar
Test liquid reservoir	Up to 90 litres
Filtration of analysis fluid	Fine filtration to ISO4406 min. 12/9
Filter size	2x MRF-1-E/1, 1 µm
Built-in collecting pan	100 litres with drain
Dimensions (height x width x depth)	1.70 x 1.20 x 1.80 m
Housing material	S235JR powder-coated
Connection	Screw connection acc. to ISO8434-1-BHS-L12-1.4571
Ambient temperature	15 to 28 °C
Emission sound pressure level LPA	< 70 db(A)
Weight when empty	≈ 270 kg
Electrical data	
Supply voltage	Acc. to model code
Power consumption	1100 watts
Protection class as per DIN 40050	IP 54

Model code

CTM SC 3 0 0 0 - M

Type
CTM = ContaminationTest Module

Module
SC = Supply Control

Series
3 = series

Tank volume (nominal)
0 = 60 litres
4 = 90 litres

Version
0 = V2016

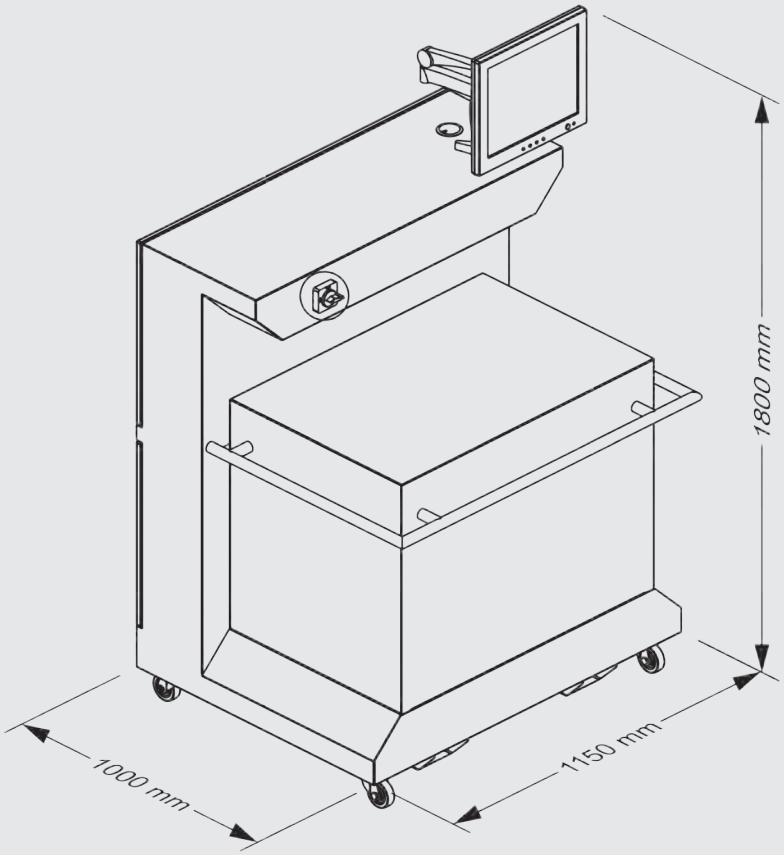
Analysis fluid
0 = G60 special
(flash point > 60 °C, lower explosion limit > 0.6 vol. %)
1 = water with surfactants,
permitted pH values 6 to 10, no deionised water and G60 special

Supply voltage

K	= 120 V AC / 60 Hz / 1 phase	USA / Canada
M	= 230 V AC / 50 Hz / 1 phase	Europe
N	= 240 V AC / 50 Hz / 1 phase	UK
O	= 240 V AC / 50 Hz / 1 phase	Australia
P	= 100 V AC / 50 Hz / 1 phase	Japan

Instrument dimensions

(All dimensions in mm)



Scope of delivery

– CTM-SC
– Operating and maintenance instructions

NOTE

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ContaminationTest Module – Extraction Box CTM-EB

Description

The ContaminationTest Module CTM is a modular system designed to analyze the technical cleanliness of components. The particle contamination is washed off the surface of the component and transferred to a membrane for subsequent analysis.

The CTM-EB extraction module is used for spray extraction in conjunction with the CTM-SC.

Applications

- Automotive and supplier industry
- Gearbox and engine builders
- Mobile hydraulics
- Manufacture of hydraulic and lubrication system components
- Aircraft industry

Advantages

- Cost reductions as a result of fewer production failures
- Identification and elimination of weak points in processes
- Reduction in start-up breakdowns
- Optimization of internal and external processes
- Documentation of the technical cleanliness of components
- Working height adjustable

Technical details

General data	
Dimensions of CTM (Height x width x depth)	see page 83
Housing material/coating	S235JR powder coated
Ambient temperature	15 to 28°C
Working height adjustment	electrical
Weight when empty	CTM-EB 121x: ~200 kg CTM-EB 141x: ~240 kg CTM-EB 161x: ~220 kg CTM-EB 181x: ~220 kg CTM-EB 201x: ~260 kg CTM-EB 461x: ~280 kg
Hydraulic connection	Quick release coupling
Filtration of analysis fluid	Very fine filtration to ISO4406 min. ISO 12/9
Filter size	3x MRF1-E/1, 1 µm filtration rating
Extraction cabinet (clean box)	
Dimensions	see page 83
Material	polished stainless steel 1.4301
Maximum load capacity	EB121x: 100 kg* EB141x: 150 kg* EB161x: 150 kg* EB181x: 150 kg* EB201x: 150 kg* EB461x: 150 kg* *) for evenly distributed load, no point load.
Glass panel lifter (opening/closing)	electrical
Height adjustment (lifting/lowering)	Electrical
Filter membrane holder	for Ø 47 mm filter membranes
Electrical data	
Supply voltage	according to order
Power consumption	400 W
Protection class to DIN 40050	IP 54

Model code

CTM EB 12 1 0 - M - Z - Z / –

Type
CTM = ContaminationTest Module

Module
EB = Extraction Box

Dimensions of extraction cabinet (clean box)
see drawing on page 83

Load design
1 = heavy load

Analysis fluid
0 = solvent A III class (flash point > 60 °C, lower explosive limit > 0.6 Vol.%)
1 = water with surfactants, permitted ph-values 6 ... 10, no deionized water

Supply voltage

K	= 120 V AC / 60 Hz / 1 phase	USA / Canada
M	= 230 V AC / 50 Hz / 1 phase	Europe
N	= 240 V AC / 50 Hz / 1 phase	UK
O	= 240 V AC / 50 Hz / 1 phase	Australia
P	= 100 V AC / 50 Hz / 1 phase	Japan

Extraction method
Z = spray, medium pressure

Supplementary details
Z = standard

Modifications
– = without modifications

Blank values

All data is dependent on the ambient conditions

CTM-EB	Clean room	Laboratory	Separate sampling room	Factory building
12xx	0.4 ... 0.6 mg	0.6 ... 1.0 mg	0.6 ... 1.2 mg	1.0 ... 1.4 mg
14xx	0.4 ... 0.6 mg	0.4 ... 0.6 mg	0.6 ... 1.2 mg	1.0 ... 1.4 mg
16xx	0.4 ... 0.6 mg	0.4 ... 0.6 mg	0.6 ... 1.2 mg	1.0 ... 1.4 mg
18xx	0.6 ... 0.8 mg	0.6 ... 1.0 mg	0.8 ... 1.4 mg	1.0 ... 1.6 mg
20xx	0.6 ... 0.8 mg	0.6 ... 1.0 mg	0.8 ... 1.4 mg	1.0 ... 1.6 mg
46xx	0.6 ... 0.8 mg	0.6 ... 1.0 mg	0.8 ... 1.4 mg	1.0 ... 1.6 mg

CTM-EB 12xx / CTM-EB 14xx / CTM-EB 16xx / CTM-EB 19xx

Max. particle size (µm) (metallic)	Time and effort	Cleaning time [h] after brief shutdown (≦ 24 h)	Cleaning time [h] after extended shutdown (≥ 24 h)
150 µm*	high	1 ... 4	3 ... 8
250 µm*	medium	1 ... 3	2 ... 6
500 µm*	low	1 ... 2	1 ... 3

* applies to a maximum membrane load of 0.8 mg

CTM-EB 18xx

Max. particle size (µm) (metallic)	Time and effort	Cleaning time [h] after brief shutdown (≦ 24 h)	Cleaning time [h] after extended shutdown (≥ 24 h)
150 µm*	high	1 ... 4	3 ... 8
250 µm*	medium	1 ... 3	2 ... 6
500 µm*	low	1 ... 2	1 ... 3

* applies to a maximum membrane load of 0.8 mg

CTM-EB 20xx / 46xx

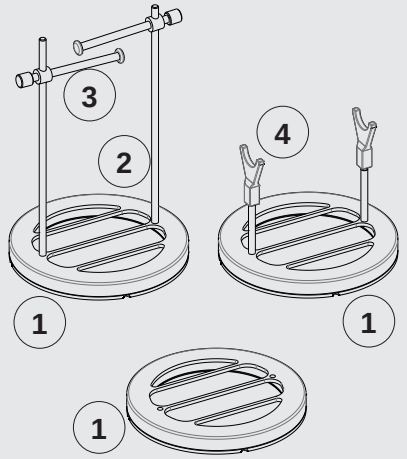
Max. particle size (µm) (metallic)	Time and effort	Cleaning time [h] after brief shutdown (≦ 24 h)	Cleaning time [h] after extended shutdown (≥ 24 h)
150 µm*	high	2 ... 5	4 ... 10
250 µm*	medium	1 ... 4	3 ... 8
500 µm*	low	1 ... 3	2 ... 6

* applies to a maximum membrane load of 0.8 mg

Items supplied

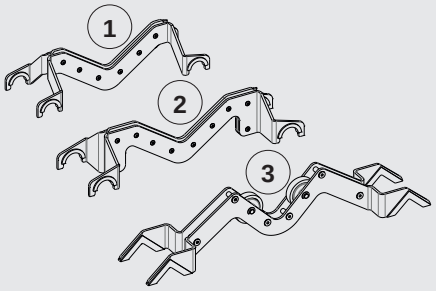
– CTM-EB
– Operating and maintenance manual

Accessory - CTM-EB Disk



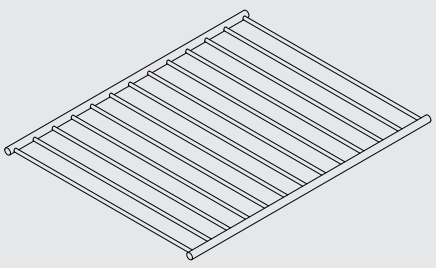
Item	Description
1	Disk
2	Guide rod (available in various lengths)
3	Pressure piece (available in various lengths)
4	Y-shaped bracket

Accessory - Angled bracket



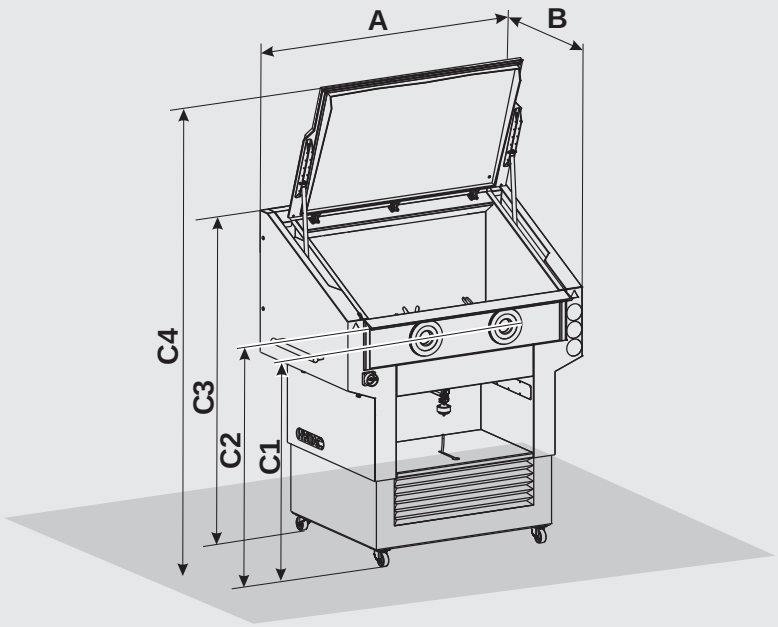
Item	Description
1	Angled bracket – light duty
2	Angled bracket – medium duty
3	Angled bracket – heavy duty

Accessory - Polished rack



Supplied with the CTM-EB 1200.

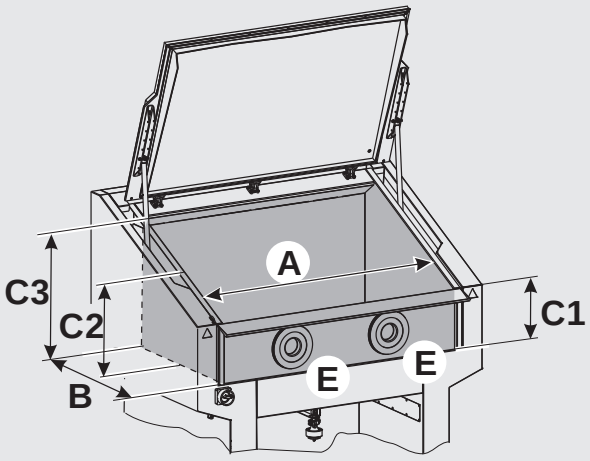
Overall dimensions



CTM-EB	A	B	C1	C2	C3	C4
12xx	1110	920	985 ... 1235	1195 ... 1395	1510 ... 1760	2150 ... 2400
14xx	1830	920	955 ... 1205	1145 ... 1395	1510 ... 1760	1800 ... 2050
16xx	1110	920	1020 ... 1270	1270 ... 1520	1560 ... 1810	2150 ... 2400
18xx	1630	1070	1020 ... 1270	1150 ... 1400	1590 ... 1840	2375 ... 2625
20xx	1400	1150	1000 ... 1340	1235 ... 1485	1080 ... 1930	2450 ... 2700
46xx	2300	920	990 ... 1240	1180 ... 1430	1500 ... 1750	2200 ... 2450

All dimensions in mm.

Dimensions of extraction cabinet (clean box)



CTM-EB	A	B	C1	C2	C3	E
12xx	770	650	280	470	545	2 x Ø 180
14xx	1400	400	280	400	435	3 x Ø 180
16xx	670	620	595	700	765	2 x Ø 230
18xx	1200	780	270	450	605	2 x Ø 180
20xx	900	895	680	800	960	2 x Ø 230
46xx	1770	650	360	570	615	4 x Ø 230

All dimensions in mm.

NOTE

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For applications and operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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ContaminationTest Module – Extraction Flushing CTM-EF

Description

The ContaminationTest Module CTM is a modular system designed to analyze the technical cleanliness of components. The particle contamination is washed off the surface of the component and transferred to a membrane for subsequent analysis.

The CTM-EF extraction module is used for flushing in conjunction with the CTM-SC.

Applications

- Automotive and supplier industry
- Gearbox and engine builders
- Mobile hydraulics
- Manufacture of hydraulic and lubrication system components
- Aircraft Industry

Advantages

- Cost reductions as a result of fewer production failures
- Identification and elimination of weak points in processes
- Reduction in start-up breakdowns
- Optimization of internal and external processes
- Customized documentation of the technical cleanliness of components

Technical data

General data	
Ambient temperature	15 to 28°C
Membrane holder	for Ø 47 to 50 mm filter membranes
Weight	≈ 53 kg (empty)
Dimensions (Height x Width x Depth)	1.82 x 0.42 x 0.65 m
Self-cleaning	with an integrated nozzle
Fill level monitoring	Ultrasonic sensor
Reservoir volume	≈ 5 litres/8 litres
Reservoir material	Polished stainless steel 1.4301
Housing material	S235JR powder coated
Hydraulic connection	Quick release coupling
Built-in drip tray	8 litres with drain
Electrical data	
Supply voltage, option	Acc. to model code
Power consumption, option	Acc. to option
Protection class to DIN 40050	IP 54
Supply voltage, module	24 V DC of CTM-SC 10 W maximum

Blank values

All data is dependent on the ambient conditions

Environment	**CTM-EF 1200**	**CTM-EF 1400**
Clean room	0.1 mg	0.1 mg
Laboratory	0.1 mg	0.1 mg
Separate sampling room	0.1 mg	0.1 mg
Factory building	0.1 mg	0.1 mg

CTM-EF 1200 / CTM-EF 1400

Max. particle size (metallic) [µm]	**Time and effort**	**Cleaning time [h] after brief shutdown (≤ 24 h)**	**Cleaning time [h] after extended shutdown (≥ 24 h)**
70	high	1 ... 4	1 ... 4
100	medium	1 ... 2	1 ... 2
150	low	0.5	0.5

Model code

CTM EF 12 0 0 - Z - Z - Z / –

Type
CTM = ContaminationTest Module

Module
EF = Extraction Flushing

Volume, reservoir
12 = nominal, volume: 5 litres
14 = nominal, volume: 8 litres

Filtration
0 = without

Analysis fluid
0 = solvent A III class (flash point > 60 °C, lower explosion limit > 0.6 vol.%)
1 = water with surfactants, permitted pH values 6–10, no deionised water

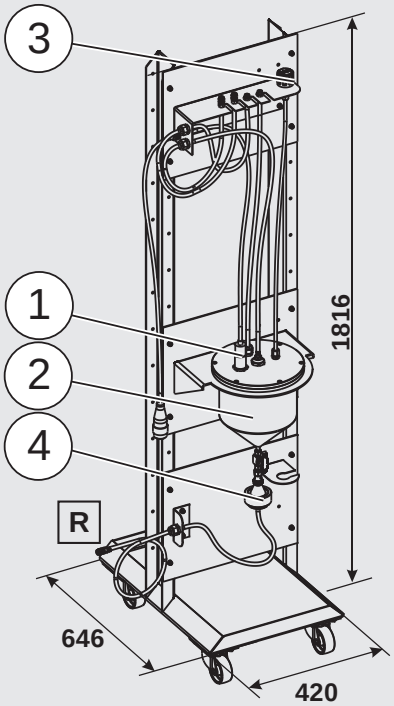
Supply voltage of option
K = 120 V AC / 60 Hz / 1 phase USA/Canada
M = 230 V AC / 50 Hz / 1 phase Europe
N = 240 V AC / 50 Hz / 1 phase UK
O = 240 V AC / 50 Hz / 1 phase Australia
P = 100 V AC / 50 Hz / 1 phase Japan
Z = without

Extraction method
Z = spray, medium pressure

Supplementary details
Z = standard

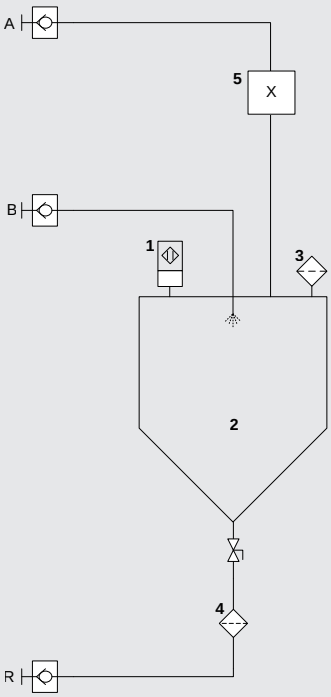
Modifications
– = without modifications

Dimensions (all dimensions in mm)



Item	Designation
A	Quick release coupling "A"
B	Quick release coupling "B"
R	Quick release coupling "R"
1	Fluid level sensor
2	Reservoir
3	Breather filters
4	Membrane holder
5	Test item

Hydraulic circuit



Items supplied

– CTM-EF
– Instructions

Note

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ContaminationTest Module – Extraction Flushing CTM-EF 3xxx

Description

The ContaminationTest Module CTM is a modular system for inspecting components with reference to their technical cleanliness. The solid particle contamination is thereby dedusted from the component surface through wet sampling and conveyed per diaphragm to a later evaluation.

The CTM-EF 3xxx extraction module is used for flushing in conjunction with the CTM-SC 3xxx.

Fields of application

- Automotive and supplier industry
- Gearbox and engine builders
- Mobile hydraulics
- Manufacture of hydraulic and lubrication system components
- Aircraft industry

Advantages

- Cost reductions through lower production waste
- Detection and elimination of weak points
- Reduction of failures before delivery
- Internal and external process optimisation
- Customised documentation of the technical cleanliness of components

Technical data

General data	
Ambient temperature	15 to 28 °C
Filter membrane holder	for Ø 47 to 50 mm filter membranes
Weight when empty	≈ 110 kg
Dimensions (height x width x depth)	1.60 x 0.60 x 0.60 m
Self-cleaning	with an integrated orifice
Fill level monitoring	Ultrasonic sensor
Reservoir filling volume	Up to 60 litres
Reservoir material	Polished stainless steel 1.4301
Housing material	S235JR powder-coated
Hydraulic connection	Screw connection acc. to ISO8434-1-BHS-L12-1.4571
Built-in collecting pan	36 litres with drain
Electrical data	
Supply voltage	Acc. to model code
Power consumption	50 W
Protection class to DIN 40050	IP 54

Blank values

All data is dependent on the ambient conditions

Environment	**CTM-EF 34xx**	**CTM-EF 36xx**
Clean room	0.2 mg	0.3 mg
Laboratory	0.2 mg	0.3 mg
Separate sampling room	0.2 mg	0.3 mg
Factory building	0.2 mg	0.3 mg

CTM-EF 34xx / CTM-EF 36xx

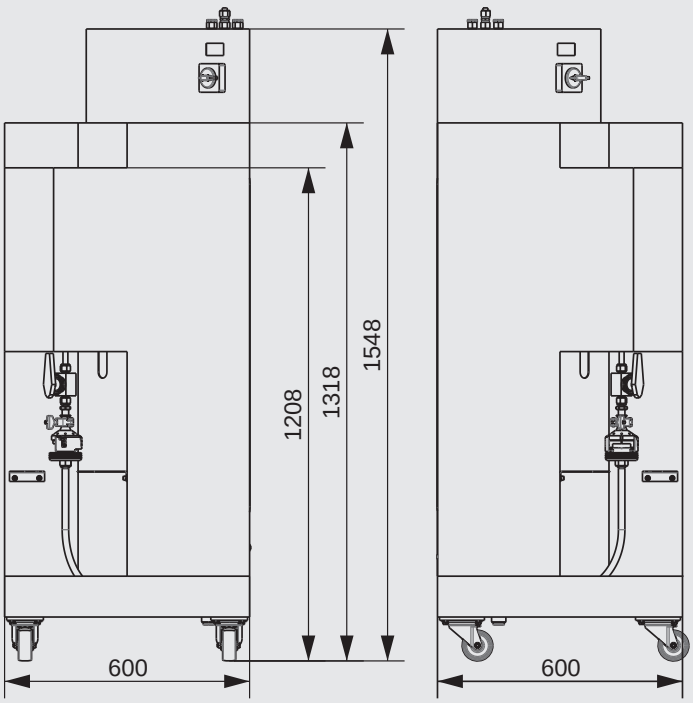
Max. particle size (metallic) [µm]	**Time required**	**Cleaning time [h] after brief shutdown (≤ 24 h)**	**Cleaning time [h] after extended shutdown (> 24 h)**
100	High	1 to 4	1 to 4
150	Medium	1 to 2	1 to 2
200	Low	0.5	0.5

Model code

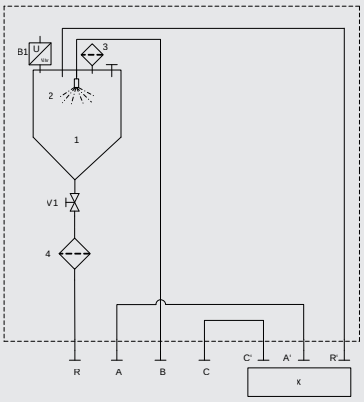
CTM EF 3 4 0 0 - Z - Z - Z / –

Type
CTM = ContaminationTest Module
Module
EF = Extraction Flushing
Series
3 = series
Reservoir filling volume
4 = 40 litres (nominal)
6 = 60 litres (nominal)
Version
0 = V2016
Analysis fluid
0 = G60 special (flash point > 60 °C, lower explosion limit > 0.6 vol. %)
1 = water with surfactants, permitted pH values 6–10, no deionised water + G60 special (flash point > 60 °C, lower explosion limit > 0.6 vol.%)
Supply voltage of option
K = 120 V AC / 60 Hz / 1 phase USA/Canada
M = 230 V AC / 50 Hz / 1 phase Europe
N = 240 V AC / 50 Hz / 1 phase UK
O = 240 V AC / 50 Hz / 1 phase Australia
P = 100 V AC / 50 Hz / 1 phase Japan
Z = without
Extraction method
Z = spray, medium pressure, flow rate up to 18 l/min
Supplementary details
Z = series
Modifications
– = without modifications

Dimensions (all dimensions in mm)



Hydraulic circuit diagram



No.	Designation
A	Screw connection acc. to ISO8434-1-BHS-L12-1.4571
B	Screw connection acc. to ISO8434-1-BHS-L12-1.4571
C	Screw connection acc. to ISO8434-1-BHS-L12-1.4571
A'	Screw connection acc. to ISO8434-1-S-L12-1.4571
B'	Screw connection acc. to ISO8434-1-S-L12-1.4571
C'	Screw connection acc. to ISO8434-1-S-L12-1.4571
R	Screw connection acc. to ISO8434-1-BHS-L12-1.4571
B1	Fluid level sensor
X	External test item
1	Reservoir
2	Orifice
3	Breather filter
4	Filter membrane holder

Scope of delivery

– CTM-EF 3xxx
– 3x connection hose, length 3 m
– CTM-EF 3xxx <-> CTM-SC 3xxx
– Technical documentation

NOTE

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Subject to technical modifications.

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SensorMonitoring Unit SMU 1200 Series

Description

The SensorMonitoring Unit SMU1200 is a display unit for HYDAC fluid sensors and is designed to display and store measured data.

The following combinations of fluid sensors can be connected directly:

- ContaminationSensor CS1000 and AquaSensor AS1000 or HLB 1400
- MetallicContamination Sensor MCS 1000 and AquaSensor AS 1000 or HLB 1400

Advantages

- Simple installation in parallel to the customer system (Hydac Sensor Interface HSI for SMU1200, transfer of the sensor's own analogue and switching outputs).
- Simple installation using the magnetic holder or DIN rails.
- High protection class IP67. Installation in a switch cabinet is not necessary
- Plug & Work unit including the 5m connection cable required for direct connection of the sensors (sensor connections via M12x1 male connectors, no programming necessary).
- The measured data is displayed on the large display.
- Simple keypad operation.
- Data is stored in the SMU with a date and time stamp.
- Measured values can be read from the standard USB memory stick supplied, via the USB master port, or via Bluetooth using HYDAC FluMoS mobile (Android).
- Simple data processing and data evaluation using MS-Excel or Hydac FluidMonitoring Software FluMoS ('Light Version' available as freeware from www.hydac.com).
- Program restarts independently once voltage is restored; no loss of measured data.

Technical specifications

General data	
Installation position	Optional
Self diagnostics	Continuously with error indication on display
Display	LED, 6/4/4-digit, each with 17 segments
Accuracy of the real-time clock	± 5 s/day / ± 0.5 h/year
Clock buffer	≈ 20 years
Drop test (to IEC/EN 60068-2-31)	Drop height 50 mm
Ambient temperature	0 °C to +55 °C
Storage temperature range	-40 °C to +80 °C
Relative humidity	maximum 95%, non-condensing
IP class	IP 67
Weight	≈ 1 kg
Electrical data	
Supply voltage	12 to 24 V DC (±20%), residual ripple ≤ 10% The SMU must not be used with on-board supply systems without load dump protection of maximum 30 V DC.
Max. power and current consumption	15 watts; 1250 mA
Protection class	III (safety extra-low voltage)
Interfaces	
USB Master port	USB Type A
HSI (**H**YDAC **S**ensor **I**nterface)	1-wire half duplex
	or
Ethernet interface	10 Base-T / 100 Base-Tx Protocol: - HSI TCP/IP (Port 49322) - Modbus TCP (Port 502)
	and / or
Bluetooth	Version 1.2 / Class 3
Internal measurement data memory	
Measurement interval 60 s	> 42 days
Measurement interval 60 min	> 2530 days

Model code

SMU 1 2 6 0 - TU - 00 / 000

Type
SMU = SensorMonitoring Unit

Series
1 = 1000 Series

Data input
2 = Digital

Interface
6 = HSI + USB Master
7 = Ethernet + USB Master

Options
0 = standard
1 = Bluetooth

Supply voltage
TU = 12 ... 24 V DC

Sensor combination

	A	B
00 =	CS1000	AS1000 / HLB 1400
10 =	MCS1000	AS1000 / HLB 1400

Customer modification number
000 = Customer modification number

Items supplied

– 1 x SMU 1200 Series
– 1 x USB memory stick
– 1 x connecting cable 5 pole with flying leads for voltage supply, L= 5m
– 2 x connecting cables according to the combination of measurement sensors, L = 5m
– 1 x FluMoS Light CD
– 1 x operating manual
– 1 x DIN rail, L = 20 cm to DIN EN 60715 TH35

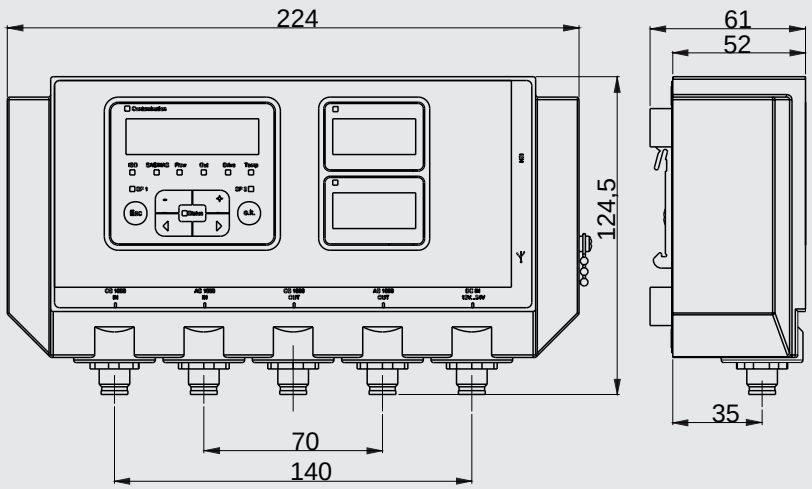
Accessories

– Power supply PS5, 100-240 V AC / 50-60 Hz / 1.1 A → 24 V DC / 1000 mA, Cable length = 1.8 m, Part no.: 3399939

Connection cable – ETHERNET

– ZBE 45-05, length 5 m M12x1 → RJ45, Patch 3346100
– ZBE 45-10, length 10 m M12x1 → RJ45, Patch 3346101

Dimensions



Note

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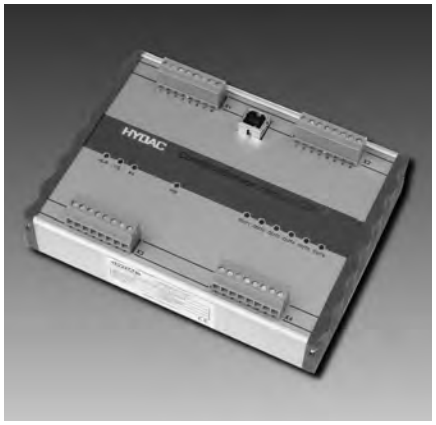


ConditionSensor Interface
CSI-B-1

Description

The ConditionSensor Interface CSI-B-1 is a segment of the HYDAC Condition Monitoring concept, which connects the sensor level with the interpretation level. HYDAC sensors supply an HSI signal which is transmitted by the CSI-B-1 in individual analogue measurement signals. The output can thereby proceed per channel as a current or voltage signal according to choice.

In transparent mode, the measured values can be read with the aid of the PC software FluMoS.

Special features

- 1 input channel for HYDAC sensors
- Direct connection of the sensor via screw terminals
- Automatic sensor detection
- Very compact design
- Suitable for top-hat rail installation
- Protection class IP 40

Technical details

Input data	
HSI interface	HYDAC sensor interface for digital coupling of sensors – male connector X3
Output data	
Analogue output	- 4x analogue output 4 to 20 mA or 4x analogue output 2 to 10 V – male X2
Switch output	- 4x relay – male X4
Ambient conditions	
Operating temperature range	-25 to +85°C
Storage temperature range	-30 to +85°C
Relative humidity	0 to 70%, non-condensing
CE mark	EN 61000-6-2, EN 61000-6-4
IP rating as per DIN 40050	IP 40
Other data	
Supply voltage of the module	24 V DC ± 10% (male X3)
Current consumption (module)	25 mA (in addition to the connected sensor)
Sensor supply	24 V DC (through the CSI)
Electrical connection	
Cross-section of connection	max. 1.5 mm²
X1: Unused	Plug-in terminal block, 8-pin RM 3.5
X2: Analogue output, 4 channels	Plug-in terminal block, 8-pin RM 3.5
X3: Voltage supply + HSI	Plug-in terminal block, 8-pin RM 3.5
X4: Switching output	Plug-in terminal block, 8-pin RM 3.5
USB	B
Pass-through mode selection	can be programmed via HyperTerminal
Display of the selected analogue output	Green LED: voltage 2 to 10 V Red LED: current 4 to 20 mA
Dimensions and weight	
Dimensions	142 x 105 x 35 mm
Housing	Mounting of the housing on a carrier rail (35 mm) in accordance with DIN EN 60715 TH 35 (previously DIN EN 50022)
Weight	≈ 350 g

Model code

CSI - B - 1 - 000

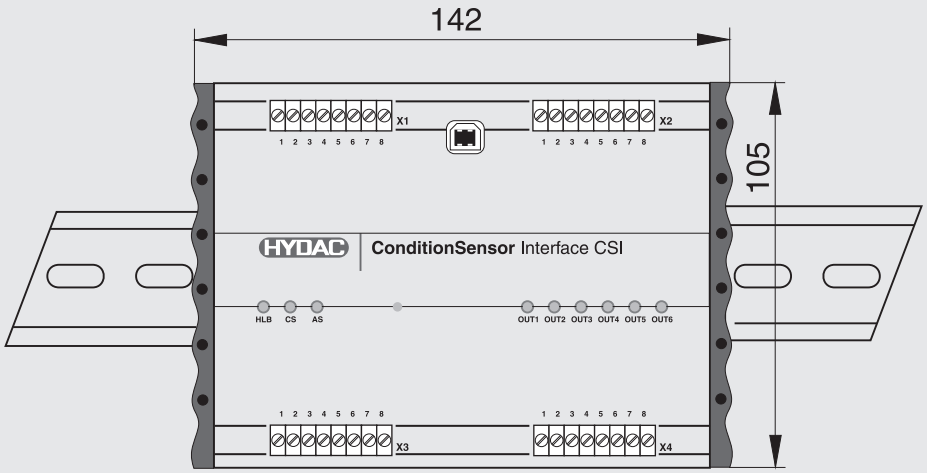
Product series
CSI = ConditionSensor Interface

Housing
B = Top hat rails housing

Output type
1 = HSI → analogue output

Customer modification
000 = Standard

Dimensions



t = 35 mm

Terminal assignment

Terminal block –X1

Pin	Signal	Description
1	-	Not used
2	-	Not used
3	-	Not used
4	-	Not used
5	-	Not used
6	-	Not used
7	-	Not used
8	-	Not used

Terminal block –X2

Pin	Signal	Description
1	mA / V	Analogue output 1
2	mA / V	Analogue output 2
3	mA / V	Analogue output 3
4	mA / V	Analogue output 4
5	GND	Earth
6	-	Not used
7	-	Not used
8	-	Not used

Terminal block –X3

Pin	Signal	Description
1	+ 24 V	Module
2	0 V	Module
3	+ 24 V	Sensor
4	0 V	Sensor
5	HSI	Interface
6	-	Not used
7	-	Not used
8	-	Not used

Terminal block –X4

Pin	Signal	Description
1	R1 +	Relay 1
2	R1 -	Relay 1
3	R2 +	Relay 2
4	R2 -	Relay 2
5	R3 +	Relay 3
6	R3 -	Relay 3
7	R4 +	Relay 4
8	R4 -	Relay 4

Note

The information in this general brochure relates to the operating conditions and applications described.

For applications and operating conditions not described, please contact the relevant technical department.

All technical details are subject to change.

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Condition Monitoring interface module
CSI-B-2

Description
The ConditionMonitoring interface module CSI-B-2 is an additional segment of the HYDAC Condition Monitoring concept which connects the sensor level with the interpretation level.
It is an electronic device for universal use that converts the HDI signal of HYDAC sensors to a standardized PC signal.
The data and measured values of the connected sensors can then be read directly using the HYDAC PC software "**FluMoS**".
Furthermore, it is possible to read the long-term memory and to configure and parameterize the connected sensors (the options for configuration are dependent on the particular sensor).
The HSI signal can be converted into an RS 232 or an RS 485 signal. The CSI-B-2 can be connected to any PC via the RS 232 port and possibly an additional standard RS 232 USB adapter.
Connection to higher-level control and/or bus systems is also possible via the RS 485 port and corresponding additional coupling modules.

Special features
- Input channels for HYDAC sensors
- Direct connection of the sensors via screw terminals
- Display of the active interface via LED (RS 232 / RS 485)
- Very compact design
- Suitable for top-hat rail installation
- Protection class IP 40

Technical details

Input data	
HSI interface	HYDAC sensor interface for digital coupling of sensors (HSI) – male connector X2
Output data	
Signal output	Switchable: RS 485 half duplex or RS 232 - Male connector X1 (RS 485) - SUB-D 9-pin socket (RS 232)
Ambient conditions	
Operating temperature range	-25 to +85°C
Storage temperature range	-30 to +85°C
Relative humidity	0 to 70%, non-condensing
CE mark	EN 61000-6-1 / 2 / 3 / 4
IP rating as per DIN 40050	IP 40
Other data	
Supply voltage of the module	18 to 35 V DC (male X1)
Current consumption (module + sensor)	30 mA to 300 mA max. (depending on power supply and connected sensor)
Sensor supply	15 V DC ± 5% / 300 mA max. at 23 °C (male X2)
Electrical connection	
Cross-section of connection	max. 1.5 mm²
X1: Module supply + RS 232 / RS 485	Plug-in terminal block, 8-pin RM 3.5
X2: Sensor supply + HSI	Plug-in terminal block, 5-pin RM 3.5
SUB-D: RS 232	9-pin socket with securing screws
Selection of conversion mode	Selection of HSI - RS 232 or HSI - RS 485 via jumper: X1.3 - X1.4 open: HSI - RS 232 X1.3 - X1.4 closed: HSI - RS 485
Display of active conversion mode	Green LED: HSI - RS 232 Yellow LED: HSI - RS 485
Dimensions and weight	
Dimensions	≈ 55 x 106 x 34 mm
Housing	Mounting of the housing on a carrier rail (35 mm) in accordance with DIN EN 60715 TH 35 (previously DIN EN 50022)
Weight	≈ 140 g

Note: reverse polarity protection for power supply, overvoltage/override protection, load short circuit protection provided.

Model code

CSI - B - 2 - 000

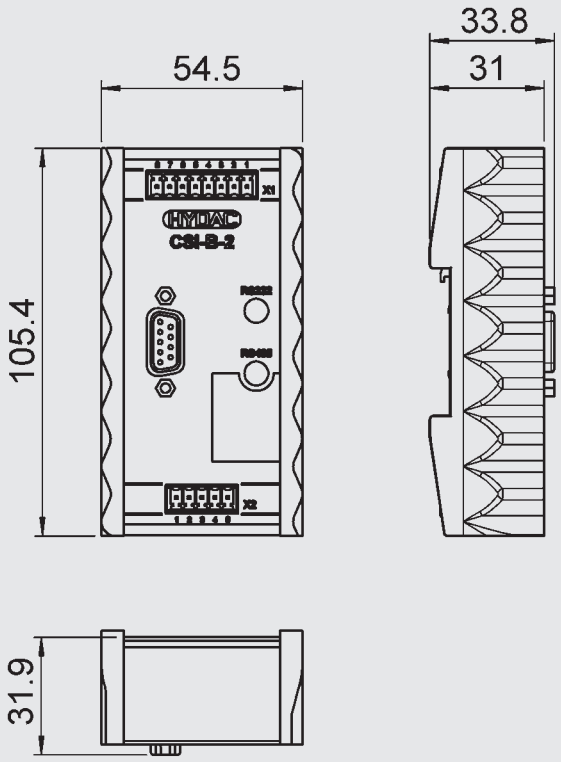
Product series
CSI = ConditionSensor Interface

Housing
B = Top hat rails housing

Output type
2 = HSI → RS 232 / RS 485

Customer modification
000 = Standard

Dimensions



CSI-B-2 Kit, items supplied

Terminal assignment

Terminal block –X1

Pin	Signal	
1	RS 485 (-)	
2	RS 485 (+)	
3	3 – 4 open:	HSI to RS 232
4	3 – 4 closed:	HSI to RS 485
5	RxD RS 232 (connected to Pin 3 SUB-D 9-pin)	
6	TxD RS 232 (connected to Pin 2 SUB-D 9-pin)	
7	0 V (connected to Pin 5 SUB-D 9-pin)	
8	$+U_B$ (18 to 35 V DC) module supply	

Terminal block –X2

Pin	Signal
1	$+U_B$ (15 V DC) sensor supply
2	0 V
3	HSI signal
4	0 V
5	0 V

CSI-B-2 Kit (3409462) consisting of:

1 x	CSI-B-2
3 x	Connecting cable ZBE 08S-05
1 x	Connecting cable ZBE 42S-05
1 x	Y adapter ZBE 41
1 x	RS232 cable/USB adapter
1 x	CD "FluMoS Light"

Note

The information in this brochure relates to the operating conditions and applications described.

For applications and operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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ConditionSensor Interface
CSI-B-7

DESCRIPTION

The ConditionSensor interface module is used to transmit digital sensor signals (**H**ydac **S**ensor **I**nterface HSI) into a network protocol (HSI TCP/IP or Modbus TCP).

On the CSI-B-7 you can connect up to two sensors via the screw terminals and supply them with power. Parameterise the desired IP address and subnet mask once via the 5 pin male connection M12x1. The network connection is made using a commercially available network cable (patch) with an RJ45 connector. The interface module has been developed for top hat rail installation in control cabinets.

Special Features

- 2 input channels for HYDAC sensors
- Modbus TCP
- Direct connection of the sensors via screw terminals
- Network connection via RJ45 socket
- Very compact design
- Suitable for mounting on top hat rails
- Protection class IP 40

Technical specifications

Input data	
HSI interface	HYDAC Sensor Interface for digital coupling of sensors - screw terminals
Output data	
Ethernet 10 Base-T / 100 Base-TX	Protocol: – HSI TCP/IP (Port 49322) – Modbus TCP (Port 502)
Ambient conditions	
Operating temperature range	-25 to +85 °C
Storage temperature range	-30 to +85 °C
Relative humidity	0 to 70 %, non-condensing
CE - marked	EN 61000-6-2, EN 61000-6-4
Protection class to DIN 40050	IP 40
Other data	
Supply voltage	12 to 24 V DC ± 10%
Current requirement (module)	50 mA (plus the current consumption of the connected sensors)
Sensor supply	12 to 24 V DC (looped through)
Electrical connection	- Terminal block, 8 pin, RM 3.5 fitting Gross section max. 1.5 mm² - Ethernet RJ45
Parameterisation	via male connection M12x1, 5 pin, according to DIN VDE 0627
Dimensions	106 x 72 x 47 mm
Housing	Housing to be mounted on rails (35mm) according to DIN EN 60715 TH 35 (formerly DIN EN 50022)
Weight:	≈ 350 g

MODEL CODE

CSI - B - 7 - 000

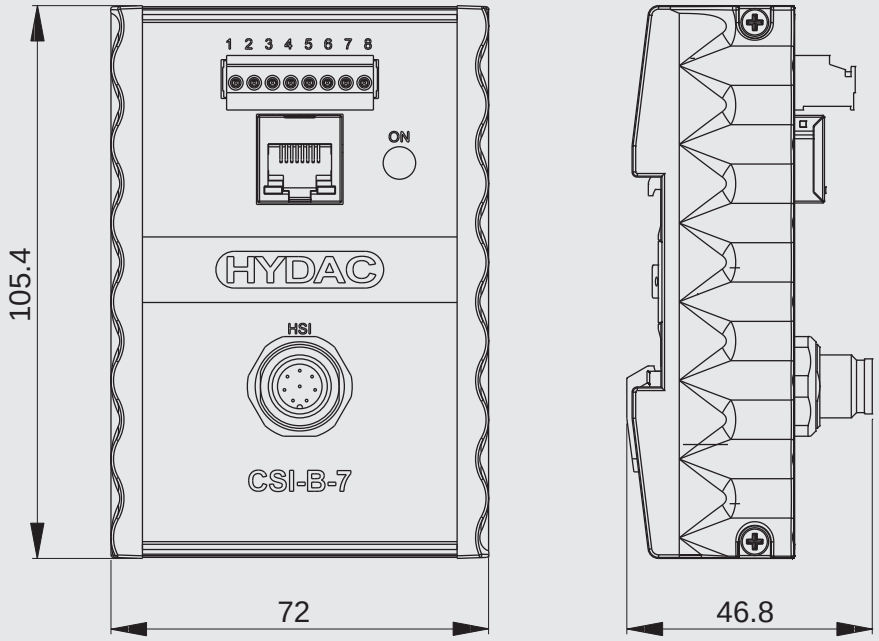
Product series
CSI = ConditionSensor Interface

Housing
B = Top hat rail housing

Output type
7 = HSI → Ethernet / Modbus TCP

Modification
000 = Standard

Dimensions



All dimensions in mm.

Terminal assignment

Pin	Signal	Description	
1	12 … 24 V DC	CSI-B-7	+ Supply voltage
2	GND	CSI-B-7	GND supply voltage
3	S1 +	Sensor 1	+ Supply voltage
4	S1 GND	Sensor 1	GND supply voltage
5	S1 HSI	Sensor 1	HSI signal
6	S2 +	Sensor 2	+ Supply voltage
7	S2 GND	Sensor 2	GND supply voltage
8	S2 HSI	Sensor 2	HSI signal

Note

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ConditionSensor Interface CSI-C-11

Description

The ConditionSensor Interface CSI-C-11 is used to transmit digital sensor signals (Hydac Sensor Interface HSI) into a network protocol (HSI TCP/IP or Modbus® TCP), which can be transmitted to a stationary (i.e PC) or mobile device (i.e. smartphone) via network cable (LAN) or wireless connection (W-LAN). Moreover, the CSI-C-11 is equipped with an internal memory and can be used as a data logger.

At the interface module, up to two sensors can be connected via M12 connector and supplied with power. In addition, the CSI-C-11 is equipped with an Ethernet connector (M12x1 socket), which allows the integration of connected sensors into company networks or superior condition monitoring (CM) and control systems (PLC). The CSI-C-11 serves as a supplement to the HYDAC ContaminationSensor Module CSM Economy. Thanks to its integrated mounting plate (for wall mounting, for example), it can also be used independently of the CSM-E.

Special Features

- 2 input channels for HYDAC SMART sensors
- Direct connection of the sensors via M12x1 connectors
- Easy network and system integration due to industrial network connectors (M12x1)
- Wireless transmission and visualization of the measured values via W-LAN and FluMoS / FluMoS mobile
- Storage of the measured data directly on the CSI-C-11 (data logger)
- Wireless parameterisation of the interface (i.e. IP address, subnet mask) via W-LAN and FluMoS mobile
- Integrated mounting plate for wall fastening or directly on the HYDAC ConditionSensor Module CSM Economy
- Due to a high protection class of IP 66 no switch cabinet for installation required

Technical specifications

Input data	
HSI interface	HYDAC Sensor Interface for digital coupling of sensors
Output data	
Ethernet 10 Base-T / 100 Base-TX W-LAN (HSI only) 2,4 GHz, IEEE 802.11 b/g/n	Protocol: – HSI TCP/IP (Port 49322) – Modbus® TCP (Port 502)
Ambient conditions	
Operating temperature range	-25 … +85 °C
Storage temperature range	-30 … +85 °C
Relative humidity	0 … 70 %, non-condensing
CE - marked	EN 61000-6-2, EN 61000-6-4
Protection class according to DIN 40050	IP 66
Other data	
Supply voltage	12 … 24 V DC ± 10 %
Current requirement (module)	100 mA (plus the consumption of the connected sensors)
Sensor supply	12 … 24 V DC (looped through)
Electrical connection	– Supply voltage: Connector, M12, 5-pole, male – SMART Sensor 1: Connector, M12, 8-pole, female – SMART Sensor 2: Connector, M12, 5-pole, female – LAN: Connector, M12, 4-pole, coding D (according to IEC61076-2-101), female – W-LAN antenna: Connector, RP-SMA socket, female
Parameterisation	via connector M12x1, 5-pole acc. to DIN VDE 0627 or W-LAN (FluMoS mobile)
Dimensions	131 x 77.5 x 35.5 mm
Housing	die cast aluminium
Weight	≈ 360 g
Internal measurement data memory	
Size	64 MB
Measurement interval 60 s	> 1300 days (with CS1000 + HLB1400)
Measurement interval 60 min	> 83000 days (with CS1000 + HLB1400)

Model code

CSI - C - 11 - 000

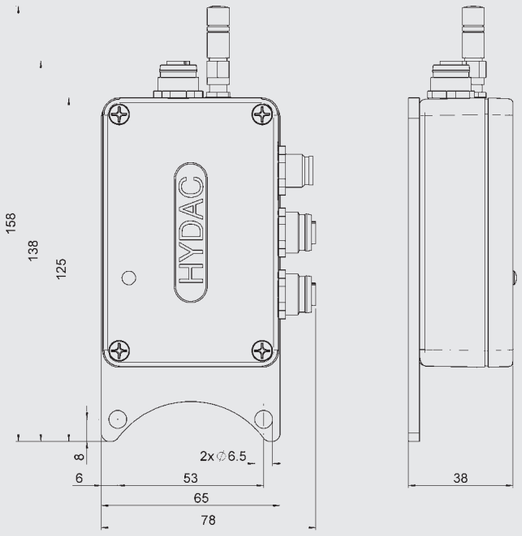
Product series
CSI = ConditionSensor Interface

Housing
C = Aluminium housing

Output type
11 = HSI → Ethernet / W-LAN

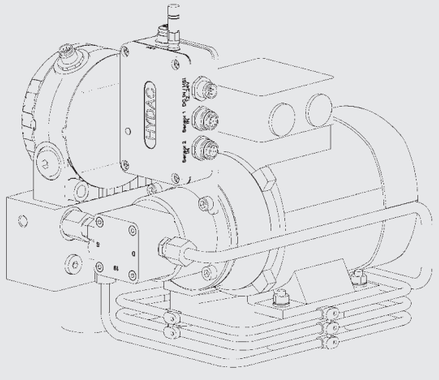
Modification
000 = Standard

Dimensions



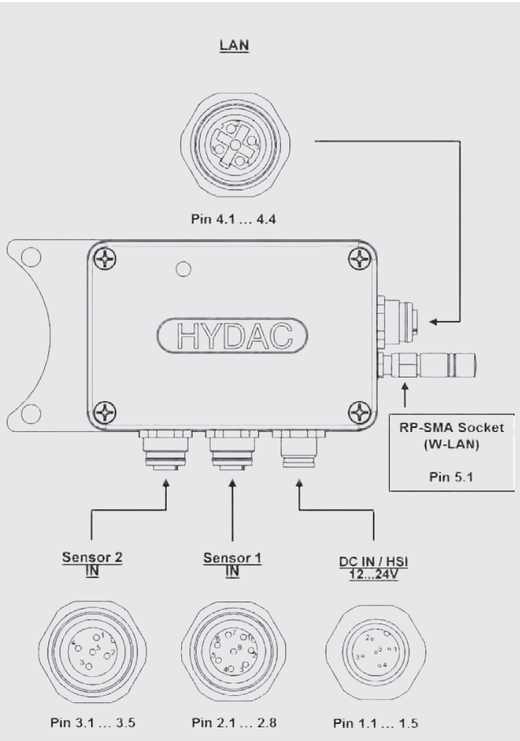
All dimensions in mm.

Example of use:
HYDAC ContaminationSensor Module CSM Economy



Plug Pin Assignment

Pin	Signal	Description	
1.1	Vin 12 … 24 V DC	Device (CSI-C-11)	Power supply +
1.2	---	Device (CSI-C-11)	n.a.
1.3	GND	Device (CSI-C-11)	Power supply GND
1.4	---	Device (CSI-C-11)	n.a.
1.5	HSI	Device (CSI-C-11)	Parameterisation
2.1	S1 12 … 24 V DC	Sensor 1	Power supply +
2.1	---	Sensor 1	n.a.
2.3	S1 GND	Sensor 1	Power supply GND
2.4	---	Sensor 1	n.a.
2.5	S1 HSI	Sensor 1	HSI signal
2.6	---	Sensor 1	n.a.
2.7	---	Sensor 1	n.a.
2.8	---	Sensor 1	n.a.
3.1	S2 12 … 24 V DC	Sensor 2	Power supply +
3.2	---	Sensor 2	n.a.
3.3	S2 GND	Sensor 2	Power supply GND
3.4	---	Sensor 2	n.a.
3.5	S2 HSI	Sensor 2	HSI signal
4.1	ETH TX+	Netzwerk (LAN)	Ethernet port data transmission +
4.2	ETH RX+	Netzwerk (LAN)	Ethernet port data receive +
4.3	ETH TX-	Netzwerk (LAN)	Ethernet port data transmission -
4.4	ETH RX-	Netzwerk (LAN)	Ethernet port data receive -
5.1	ANT	Netzwerk (W-LAN)	RP-SMA-socket W-LAN-antenna



Modbus® is a registered trademark of Schneider Electric U.S.A., Inc.

Accessories

Designation	Part-No.
Supply voltage	
PS5 power supply 100 – 240V AC, 50-60 Hz, 1,1 A, IP40; connector M12, 5-pole, female	3399939
ZBE47S-05 connecting cable, connector 5-pole with cable, length = 5 m	3527626
ZBE47S-10 connecting cable, connector 5-pole with cable, length = 10 m	3527627
Sensor connection cable for CSM-E	
ZBE43-005 connecting cable CSI-C-11, coupling / plug 8-pole, length = 0.5 m	4193544
ZBE30-005 connecting cable CSI-C-11, coupling / plug 5-pole, length = 0.5 m	4193586
Network cable (LAN)	
ZBE 45-05 network cable (Patch), connector 4-pole, coding D / connector RJ45, length = 5 m	3346100
ZBE 45-10 network cable (Patch), connector 4-pole, coding D / connector RJ45, length = 10 m	3346101

Note

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In the event of deviating applications and/or operating conditions, please contact the representive HYDAC department concerned.

Subject to technical modifications

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ConditionSensor Interface
CSI-D-5

Description
The ConditionSensor Interface CSI-D-5 is a unit in the HYDAC Condition Monitoring concept which connects the sensor level with the interpretation level. The fluid sensors ContaminationSensor CS 1000 and the MetallicContamination Sensor MCS 1000 supply an HSI signal via the RS485 port, which is converted by the CSI-D-5 to USB. This ensures simple connection to the PC.

The measured values can be read with the aid of the PC software FluMoS.

Special features
- Direct connection of the CS 1000 or MCS 1000 sensors
- Very compact design
- Kit includes all accessories required to read the measured values

Technical specifications

Input data	
RS485 interface	HYDAC Sensor Interface (HSI) protocol - male M12x1, 8-pole to DIN VDE 0627
Output data	
USB (B) interface	HSI Protocol
Ambient conditions	
Operating temperature range	-25 to +75°C
Storage temperature range	-25 to +80°C
Relative humidity	0 to 95%, non-condensing
CE mark	EN 61000-6-2, EN 61000-6-4
Protection class to DIN 40050	IP 40
Other data	
Supply voltage of the module	12 V DC ± 10%
Current consumption (module)	50 mA (in addition to the connected sensor)
Sensor supply	12 V DC (through the CSI)
Electrical connection	
Cross-section of connection	max. 1.5 mm²
USB	B
Dimensions and weight	
Dimensions	150 x 108 x 47 mm
Housing	Desk-top
Weight	≈ 350 g

Model code

CSI - D - 5 - 000

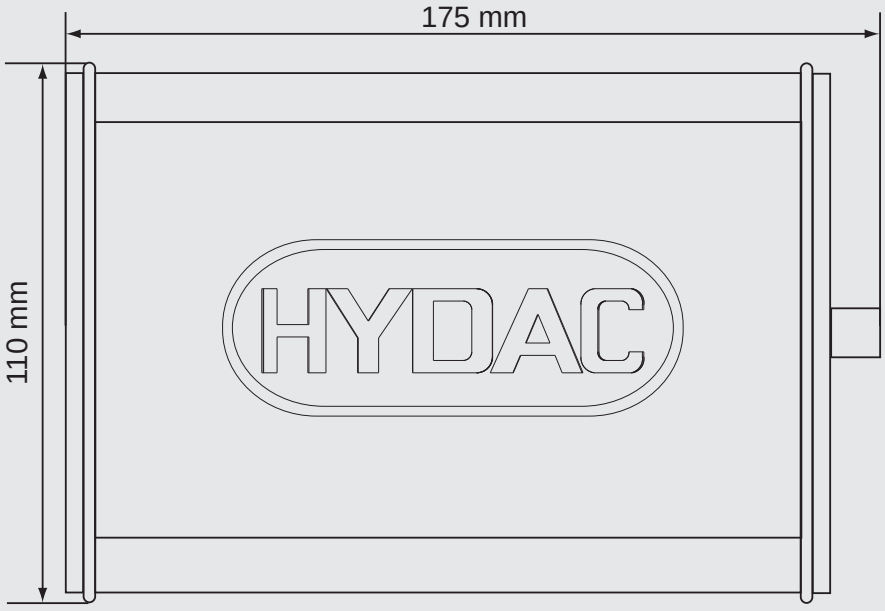
Product series
CSI = ConditionSensor Interface

Housing
D = Desk-top

Output type
5 = HSI → USB

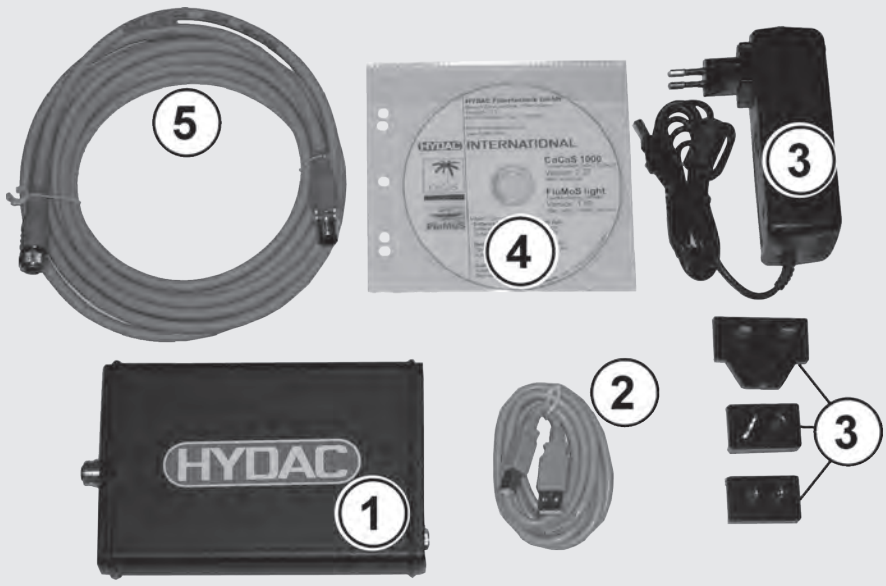
Modification
000 = Standard

Dimensions



Height = 45 mm

CSI-D-5, items supplied



CSI-D-5 KIT

CSI-D-5 Kit (3249563) consisting of:

1 x	CSI-D-5
1 x	Power supply PS7
1 x	USB A <-> B connecting cable, L = 1.8 m
1 x	Extension/connection cable, L = 5 m ZBE 43-05
1 x	CD "FluMoS Light"

Note

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FluidMonitoring Software
FluMoS

Description

The FluidMonitoring Software FluMoS is used to process the measured data from HYDAC fluid sensors on a PC.

The data from the connected sensors is displayed online as a table & graphics and is also automatically stored in files.

The files can be opened again in the software and can be exported in different formats (e.g. MS Excel format, different graphics formats).

Moreover, the graphic currently displayed can be printed using this software.

FluMoS Light and Professional are two different products.

FluMoS Professional can process up to 16 sensors / instruments, FluMoS Light on the other hand is limited to 3 sensors / instruments.

FluMoS Professional enables communication and thus the parameterization of the sensors / instruments.

Furthermore, FluMoS Professional releases can be updated for free within the version purchased.

FluMoS Light is available as freeware from www.hydac.com.

FluMoS Professional can be purchased as a license product. Purchase includes the license key.

Applications

- Remote monitoring of measured data of up to 16 sensors / instruments.
- Condition-based maintenance

Special features

- Spreadsheet and graphic online display of the measured values on the PC
- Automatic storage of the measured values in files on hard disk
- Export of stored files e.g. in Microsoft Excel format
- Print function for the graphic currently displayed

Technical specifications

General data	
For use in conjunction with	● ContaminationSensor CS 1000, CS 2000 ● FluidControl Unit FCU1000, FCU2000, FCU8000 ● MetallicContamination Sensor MCS 1000 ● AquaSensor AS 1000 ● Oil Condition Sensor HYDACLab® HLB
PC interfaces	● RS232 ● USB ● RJ-45 (Ethernet)
Communication logs for serial interfaces	● HSI (HYDAC Sensor Interface) ● DIN measurement bus
Communication logs for Ethernet interfaces	● HSI (TCP/IP) ● DIN measurement bus (TCP/IP) ● HSITP (HSI text protocol)

System requirements for PC	
Processor	Pentium ≥ 200 MHz
RAM	≥ 64 MB
Graphics	VGA graphics card, minimum resolution: 800 x 600
Hard drive	≥ 15 MB free memory
Interface	1 free serial or USB interface which is not being used by any other program (e.g. terminal, modem or network software) 1 network interface (RJ-45)
Operating system	WINDOWS 2000, WINDOWS XP, WINDOWS Vista, WINDOWS 7 (32 bit / 64 bit)
Internet Explorer	≥ 4.0
Access rights	Administrator or software installation rights

Order details

- **FluidMonitoring Software FluMoS Professional**
  Part no. 3371637
- **FluidMonitoring Software FluMoS Light**
  Part No. 3355176 or freeware download from www.hydac.com

Items supplied

- **CD-ROM FluidMonitoring Software FluMoS Professional**
  (with license key)
- **CD-ROM FluidMonitoring Software FluMoS Light**
  (without license key)

NOTE

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FluidMonitoring Toolkit
FluMoT

Description

The FluidMonitoring Toolkit FluMoT is a package of drivers and programs which is used for integrating HYDAC fluid sensors into the customer's existing software.

For this purpose the customer has access to all HYDAC program libraries, a detailed description, help package and example programs in various software languages.

FluMoT can be ordered as a licensed product. Purchase includes the license key.

After purchase of the license and registration, the customer receives:

- Support e-mail (to answer questions about programming, etc.)
- Option to upgrade to new releases within the version purchased

The driver package consists of the following components:

- dll
  - HSI
  - DIN MeasBus
  - TCP/IP including
    - HSI TCP/IP
    - HSI TP
    - DIN MeasBus TCP/IP
- Example programs
  - Delphi
  - LabVIEW
  - VB/VBA
  - C/C++
- OPC-Server

Applications

- To integrate HYDAC fluid sensors into customer's existing software

Special features

- ONE driver package for ALL fluid sensors
- For use in customer’s existing software
- Simple example programs included in the delivery

Technical specifications

General data	
For use in conjunction with	● ContaminationSensor CS 1000, CS 2000 ● FluidControl Unit FCU1000, FCU2000, FCU8000 ● MetallicContamination Sensor MCS 1000 ● AquaSensor AS 1000 ● Oil Condition Sensor HYDACLab® HLB ● Portable Data Recorder HMG 3000 ● ConditionMonitoring Unit CMU 1000

System requirements for PC	
Processor	Pentium ≥ 200 MHz
RAM	≥ 64 MB
Graphics	VGA graphics card, minimum resolution: 800 x 600
Hard drive	≥ 15 MB free memory
Interface	1 free serial or USB interface which is not being used by any other program (e.g. terminal, modem or network software)
Operating system	WINDOWS 2000, WINDOWS XP, WINDOWS Vista, WINDOWS 7 (32bit)
Internet Explorer	≥ 4.0
Access rights	Administrator or software installation rights

Order details

- **FluidMonitoring Toolkit FluMoT**
  Part No. 3355177

Items supplied

- **CD-ROM FluidMonitoring Toolkit FluMoT**

NOTE

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4.2. FLUID SERVICE SYSTEMS

4.2.1 **Mobile Filter Systems**

MobileFiltration Unit
MFU-10
MFU-15

Beschreibung

Die MobileFiltration Unit MFU dient als portables Serviceaggregat zum Befüllen von Hydrauliksystemen, Spülen kleiner Hydraulikanlagen sowie zu deren Abreinigung im Nebenstrom. Sowohl partikuläre Feststoffverschmutzung als auch freies Wasser können über die Filterelemente entfernt werden.

Optional kann die MFU mit einem ContaminationSensor CS 1000 ausgestattet werden. Er ermöglicht die gleichzeitige Überwachung der Feststoffverschmutzung im Öl. Die Ausgabe der Reinheitsklasse erfolgt dabei nach ISO, SAE oder NAS.

Anwendungsgebiete

- Gefiltertes oder ungefiltertes Befüllen von Hydraulikanlagen
- Temporäre Nebenstromfiltration an Hydraulikanlagen
- Gefiltertes oder ungefiltertes Umfüllen
- Ungefiltertes Entleeren von Hydrauliktanks
- Leckölrückführung an Prüfständen

Besondere Merkmale

- Verbesserte Komponenten- und Systemfilterstandzeit
- Erhöhung der Ölstandzeit
- Höhere Maschinenverfügbarkeit
- Einfache Bedienung
- Kompakte Bauweise
- Integrierter Trockenlaufschutz
- Optional: Kontinuierliche Überwachung der Ölreinheit während der Abreinigung mittels CS 1000

Technische Daten

Allgemeine Daten	MFU-E	MFU-S	MFU-P
Volumenstrom, maximal	15 l/min	15 l/min	10 l/min
Pumpentyp	Flügelzellenpumpe		
Betriebsdruck, maximal	4,0 bar		
Zul. Saugdruck am Sauganschluss	-0,4 bar bis 0,5 bar		
Viskositätsbereich	5 ... 350 mm²/s	5 ... 650 mm²/s	5 ... 200 mm²/s
Länge Anschlusskabel	3 m (inklusive Stecker)		
Länge Signalkabel (für Typ Standard)	-	10 m	-
Zulässiger Fluidtemperaturbereich	-10 ... 80 °C		
Zulässiger Umgebungstemperaturbereich	-10 ... 40 °C		
Dichtungswerkstoff	FKM (FPM, Viton®)		
Leergewicht	≈ 14 kg	≈ 17 kg	≈ 16,5 kg

Vorzugstypen (mit verkürzter Lieferzeit)

Filteraggregat	Artikel-Nr.:
MFU-15E9-SM-FE	4263416
MFU-15S9-SN-FE	4269896
MFU-10P9-SM-FE	4263417

Typenschlüssel

MFU - 15 E 9 - S M - F E /-

Grundtyp
MFU = MobileFiltration Unit

Model
10 = 10 l/min (für Typ P)
15 = 15 l/min (für Typ E und S)

Typenkennzahl
E = Economy
S = Standard (mit Signalkabel für "Gerät in Betrieb")
P = Premium (mit Condition Monitoring)

Filterelementlänge
9 = 9"

Pumpenausführung
S = Flügelzellenpumpe

Spannungsversorgung
D = Druckluft (nicht verfügbar für Typ S und P)
K = 120 V, 60 Hz, 1 Ph (0,25 kW für Typ E und P; 0,37 kW für Typ S)
M = 230 V, 50 Hz, 1 Ph (0,25 kW für Typ E und P; 0,37 kW für Typ S)
N = 400 V, 50 Hz, 3 Ph (0,37 kW) (nicht verfügbar für Typ E und P)
T = 12 V DC (0,2 kW) (nicht verfügbar für Typ S)
U = 24 V DC (0,2 kW) (nicht verfügbar für Typ S)
andere auf Anfrage

Dichtungswerkstoff
F = FKM (FPM, Viton®)
andere auf Anfrage

Verschmutzungsanzeige
E = Staudruckmanometer

Ergänzende Angaben

Lieferumfang

– MFU (ohne Filterelement; ohne Schläuche)
– Betriebs- und Wartungsanleitung

Filterelemente und Schläuche müssen separat bestellt und vor der Erstinbetriebnahme vor Ort installiert werden. Bitte beachten Sie hierzu die nächste Seite.

Filterelemente

	Bezeichnung	Artikel-Nr.	Filtereinheit	Wasseraufnahme
Filtration	NX9DM002-F	4265955	2 µm	-
	NX9DM005-F	4265956	5 µm	-
	NX9DM010-F	4265957	10 µm	-
	NX9DM020-F	4265958	20 µm	-
Filtration + Entwässerung	NX9AM002-F	4265959	2 µm	√
	NX9AM005-F	4265960	5 µm	√
	NX9AM010-F	4265961	10 µm	√
	NX9AM020-F	4265962	20 µm	√
Adapter für ungefilterten Betrieb	NX9-xxxxx-F	4265963	-	-

Zubehör

Schläuche mit Lanze (drucklose Ansaugung bis max. 350 mm²/s)

Bezeichnung	Artikel-Nr.	Saugschlauch / Druckschlauch	Lanze	Werkstoff Saug-/ Druckschlauch
E-MFU-15-SDN	4270478	2,5 m / 2,5 m	0,25 m	PVC / PVC
E-MFU-15-SDF	4270479	2,5 m / 2,5 m	0,25 m	1SN / 2TE
E-MFU-15-SD5N	4270480	2,5 m / 5,0 m	0,25 m	PVC / PVC
E-MFU-15-SD5F	4270481	2,5 m / 5,0 m	0,25 m	1SN / 2TE

Schläuche mit Gewindeanschluss (drucklose Ansaugung bis max. 350 mm²/s)

Bezeichnung	Artikel-Nr.	Saugschlauch / Druckschlauch	Gewinde	Werkstoff Saug-/ Druckschlauch
E-MFU-15-SKDKN	4270482	2,5 m / 2,5 m	M30X2 / M26X1,5	PVC / PVC
E-MFU-15-SKDKF	4270483	2,5 m / 2,5 m	M30X2 / M26X1,5	1SN / 2TE
E-MFU-15-SKDK5N	4270484	2,5 m / 5,0 m	M30X2 / M26X1,5	PVC / PVC
E-MFU-15-SKDK5F	4270516	2,5 m / 5,0 m	M30X2 / M26X1,5	1SN / 2TE

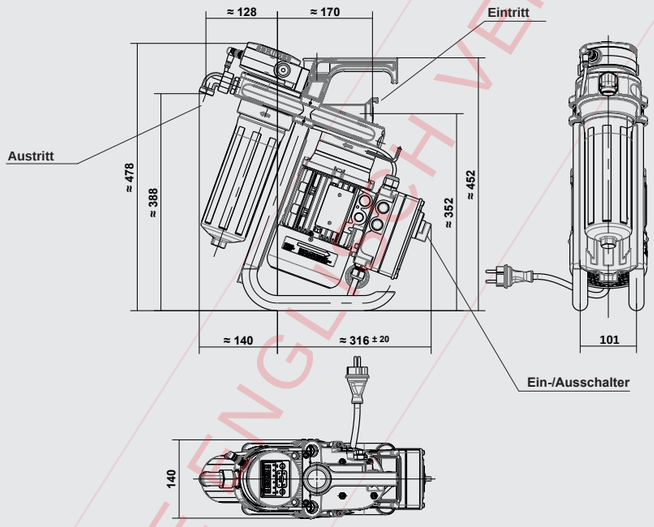
Zubehör für Schläuche mit Gewindeanschluss

Bezeichnung	Artikel-Nr.	Funktion
E-MFU-15-SKDK-LF	4270559	Lanze[1] (1,30 m Länge)
E-MFU-15-SKDK-SF	4270560	Saugfilter[1]
E-MFU-15-SKDK-ZWF	4270518	Zählwerk
E-MFU-15-SKDKN-ZPF	4270561	Zapfpistole[2]
E-MFU-15-SKDKN-ZPWF	4270519	Zapfpistole & Zählwerk[2]

[1] max. Viskosität 200 mm²/s
[2] max. Betriebsdauer des Aggregats bei geschlossener Zapfpistole 5 – 10 min. Zapfpistole nur mit Schläuchen aus 1 SN / 2 TE verwenden

Abmessungen

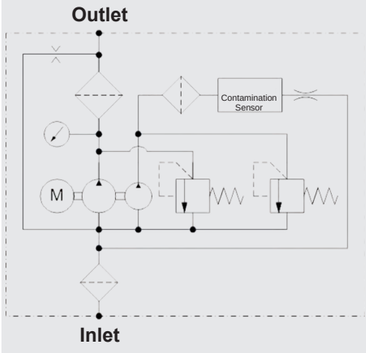
MFU-10P



Alle Abmessungen in mm

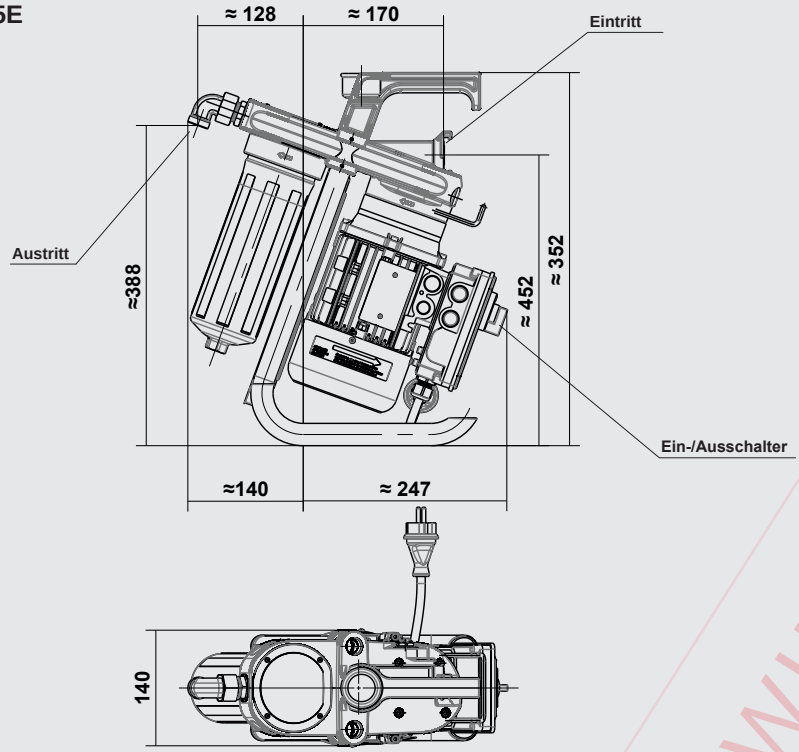
Hydraulikschema

MFU-10P



Abmessungen

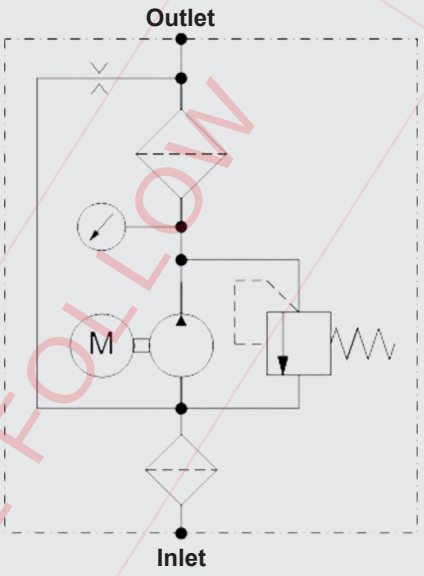
MFU-15E



Alle Abmessungen in mm

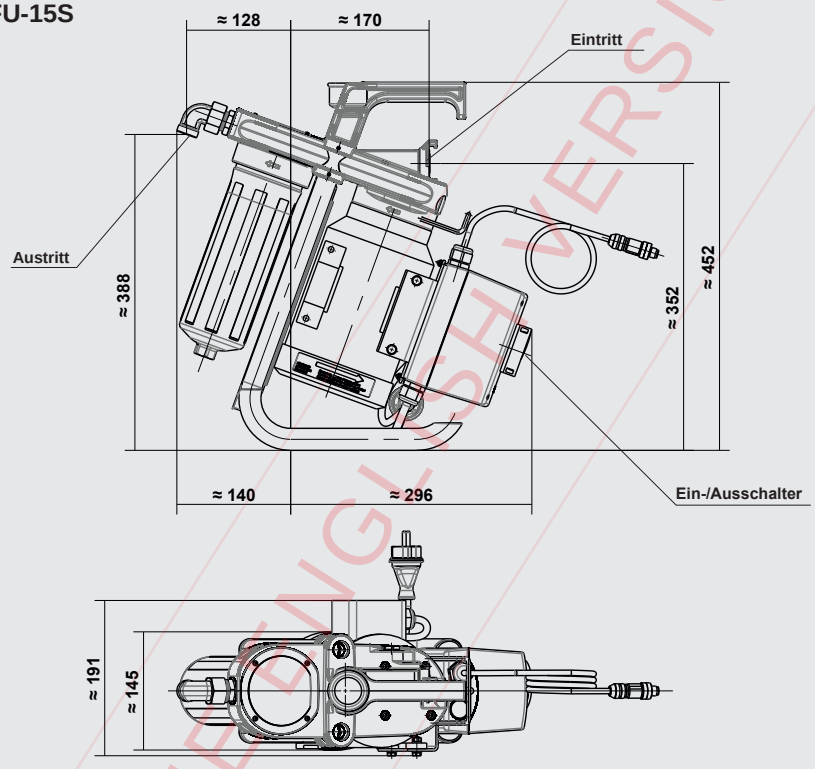
Hydraulikplan

MFU-15E



Abmessungen

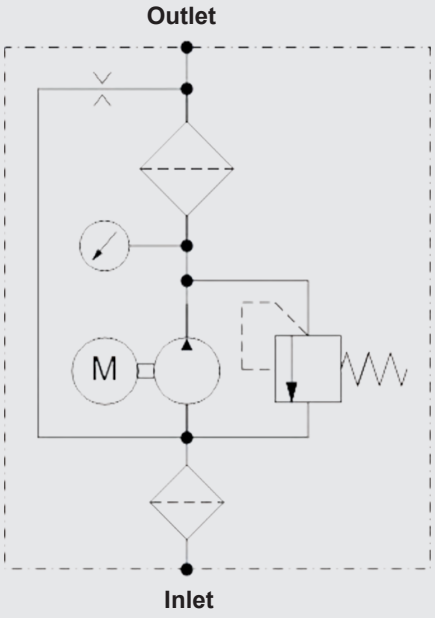
MFU-15S



Alle Abmessungen in mm

Hydraulikplan

MFU-15S



Hinweis

Die Angaben in diesem Prospekt beziehen sich auf die beschriebenen Betriebsbedingungen und Einsatzfälle.

Bei abweichenden Einsatzfällen und / oder Betriebsbedingungen wenden Sie sich bitte an die entsprechende Fachabteilung.

Technische Änderungen sind vorbehalten.

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Filtromat
OF 5 mobile

Description

The filtration unit OF 5 mobile is designed to fill hydraulic tanks (whilst filtering the fluid). It can also filter offline and pump hydraulic and lubrication oils out of hydraulic tanks (without filtration).

In the OF 5 CM design, the unit represents an ideal all-in-one solution for measuring particle contamination and water ingress in the hydraulic fluid. The integral air bubble suppression system prevents CS1000 measurement errors caused by air bubbles. As an option, other condition monitoring sensors such as the HYDAC AquaSensor can be incorporated to measure water in oil.

Applications

- Hydraulic and lubrication oil systems in a variety of industries

Advantages

- Convenient offline filtration
- Simple to operate
- Greater system availability
- Reduction of Life Cycle Cost LCC
- Filtration and fluid monitoring (optional) in one device

Technical specifications

Pump type	Vane type
Max. flow rate	30 l/min / 40 l/min
Operating pressure	4.5 bar
Permitted suction pressure at suction port	-0.4 bar to +0.6 bar
Viscosity range OF 5 F / OF 5 L motor-pump unit 4 OF 5 F / OF 5 L motor-pump unit 6 OF 5 CM	 15 to 450 mm²/s 15 to 350 mm²/s 15 to 200 mm²/s
Permitted operating fluid	Mineral oil (others on request)
Fluid temperature	-10 to 80°C
Ambient temperature	-20 to 40°C
Seals	NBR (Option: FPM)
Protection class	IP 54
Power cable, length	10 m
Hoses, length	3 m
Hose connections	Suction hose NW 30 with lance Pressure hose NW 25 with lance
Weight OF 5 F / OF 5 L OF 5 CM	 ≈ 75 kg ≈ 85 kg

Preferred models (with shorter delivery times)

Part number	Model code
720335	OF5L10 P6N2---E
587220	OF5F10 P6N2---E

Model code

OF 5 F 10 P 6 N 2 B 05 E / -

Basic type
OF 5

Versions
F = with change-over valve
L = without change-over valve
CM = without change-over valve, with Fluid Condition Monitoring

Type code
10 = standard
special models on request

Seals
P = NBR (Perbunan)
V = FKM (FPM, Viton®)

Motor-pump unit

Meas. ref.	Theor. flow rate at 1450 rpm	Max. viscosity	El. motor rating at 50 Hz
3	30 l/min	250 mm²/s	0.75 kW
4*	30 l/min	450 mm²/s	1.5 kW
6*	40 l/min	350 mm²/s	1.5 kW

* for CM version up to 200 mm²/s

Electric motor voltage
M = 230V, 50 Hz, 1 Ph
M60 = 230V, 60 Hz, 1 Ph
N = 400V, 50 Hz, 3 Ph
N60 = 400V, 60 Hz, 3 Ph
S = 500V, 50 Hz, 3 Ph
X = special voltage
Other voltages on request

Filter size
1 = filter element 330
2 = filter element 1300

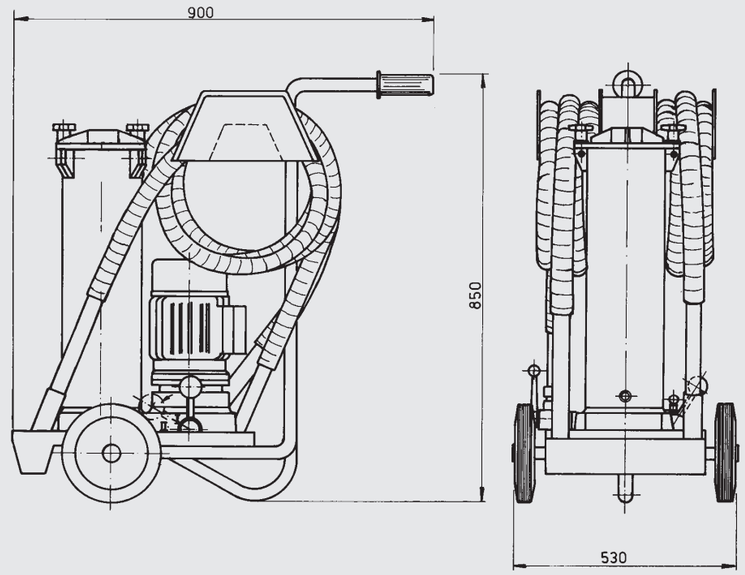
Filter material
B = Betamicron (BN4HC)
A = Aquamicron (BN4AM), (AM)

Filtration rating
03 = 3 µm BN4HC; BN4AM
05 = 5 µm BN4HC
10 = 10 µm BN4HC; BN4AM
20 = 20 µm BN4HC;
40 = 40 µm AM

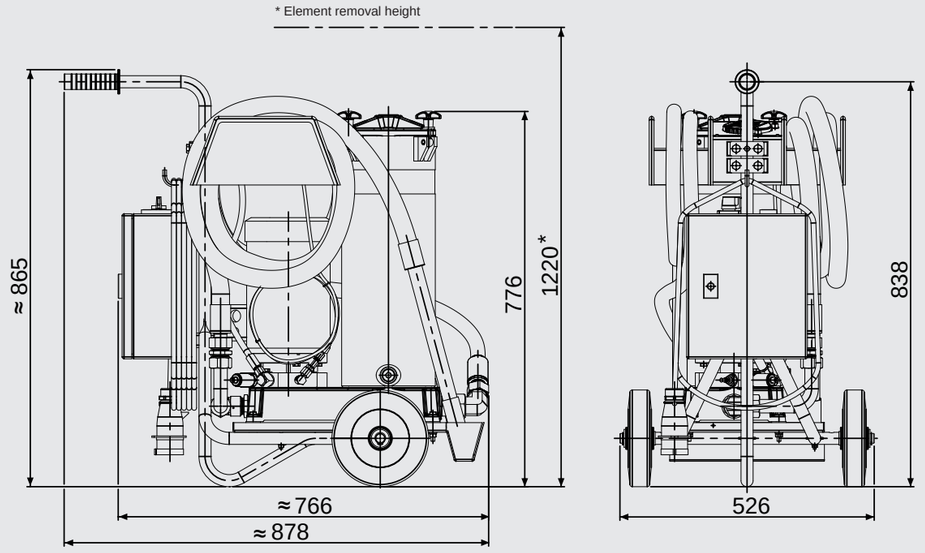
Clogging indicator
E = standard, pressure gauge
B = option: differential pressure gauge - visual (VM 2 B.1)
C = option: differential pressure gauge - electrical (VM 2 C.1)
B, C not for version "L"

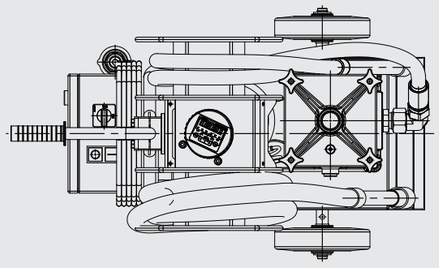
Monitoring devices (only for OF 5 CM)
CD = ContaminationSensor CS1320 (with display)
CS = ContaminationSensor CS1310 (without display) with SensorMonitoring Unit SMU1260
ACD = ContaminationSensor CS1320 (with display) and AquaSensor AS3000 (with Display)
ACS = ContaminationSensor CS1310 (without display) and AquaSensor AS1000 (without display) with SensorMonitoring Unit SMU1270

Dimensions OF 5 F... OF 5 L...



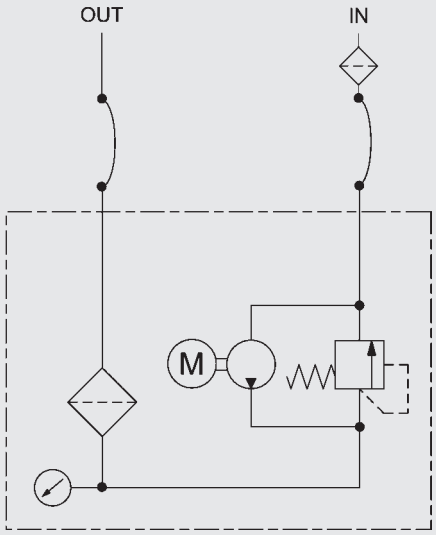
Dimensions OF 5 CM



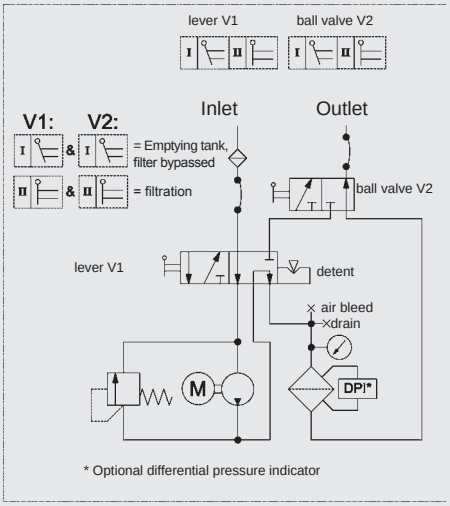


Hydraulic circuit diagram

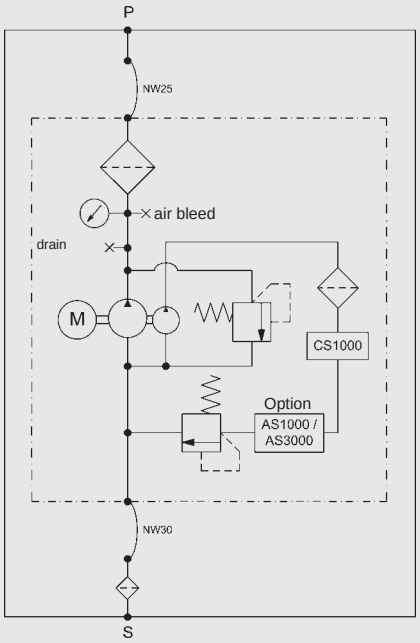
OF 5 L ...



OF 5 F ...



OF 5 CM ...



Replacement elements

Filter size	Filtration rating	Element type	Part No.
1	3 µm	0330 R 003 ON /-KB	1262999 (1263640)
1	5 µm	0330 R 005 ON /-KB	1263000 (1263641)
1	10 µm	0330 R 010 ON /-KB	1263001 (1263642)
1	20 µm	0330 R 020 ON /-KB	1263002 (1263643)
1	40 µm	0330 R 040 AM /-KB (-V-KB)	1272067 (1266563)
1	3 µm	0330 R 003 BN4AM /-KB (-V-KB)	1272069 (1276690)
1	10 µm	0330 R 010 BN4AM /-KB (-V-KB)	1272068 (1281126)
2	3 µm	1300 R 003 ON /-KB	1263059 (1263760)
2	5 µm	1300 R 005 ON /-KB	1263060 (1263761)
2	10 µm	1300 R 010 ON /-KB	1263061 (1263762)
2	20 µm	1300 R 020 ON /-KB	1263062 (1263763)
2	3 µm	1300 R 003 BN4AM /-KB (-V-KB)	1267991 (1271839)
2	10 µm	1300 R 010 BN4AM /-KB (-V-KB)	1270010 (1276060)
2	40 µm	1300 R 040 AM /-KB	1267699

Note

The information in this brochure relates to the operating conditions and applications described.

For applications and operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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Filtromat OF 5 with FCU

Description

The mobile filtration unit OF 5 is designed to fill/filter hydraulic & lubrication tanks and to filter offline whereby the contamination can be monitored. It is also designed for pumping out unfiltered hydraulic and lubrication oils, and draining hydraulic tanks.

The built-in FluidControl Unit FCU 2000 measures the particle contamination and monitors the oil cleanliness.

Applications

- Hydraulic and lubrication oil systems in a variety of industries

Advantages

- Convenient filtration in bypass flow
- Simultaneous monitoring of the particulate contamination
- Simple handling
- Increased system availability
- Reduction of life cycle costs LCC

Technical Details

Pump type	Vane pump
Max. flow rate	40 l/min
Operating pressure	4.5 bar
Permitted suction pressure at suction port	-0.4 bar to +0.6 bar
Viscosity range	15 to 300 mm²/s (version-dependent, see model code)
Permitted operating fluid	Mineral oil (others on request)
Fluid temperature	-10 to 70°C
Ambient temperature	-20 to 40°C
Seals	NBR
IP class	IP 54
Length of power cable	6 m
Length of hoses	3 m
Hose connections	Suction hose NW 28 with lance Pressure hose NW 25 with lance
Weight when empty	≈ 92 kg

Model code

OF 5 C 20 P 6 N 2 B 05 C

Basic type
OF 5

Versions
C = mobile, without change-over valve, with FCU

Type code
20 = with FCU 2010
21 = with FCU 2110
22 = with FCU 2210

Seals
P = NBR (Perbunan)

Motor-pump unit

Meas. ref.	Theor. output at 1450 rpm	Max. viscosity	El. motor rating at 50 Hz
3	30 l/min	250 mm²/s	0.75 kW
6	40 l/min	300 mm²/s	1.5 kW

Electric motor voltage
N = 3 x 380 - 420 V - 50 Hz; 3 x 440 - 480 V - 60 Hz
S = 3 x 500 - 600 V - 50 (60) Hz
X = special voltage

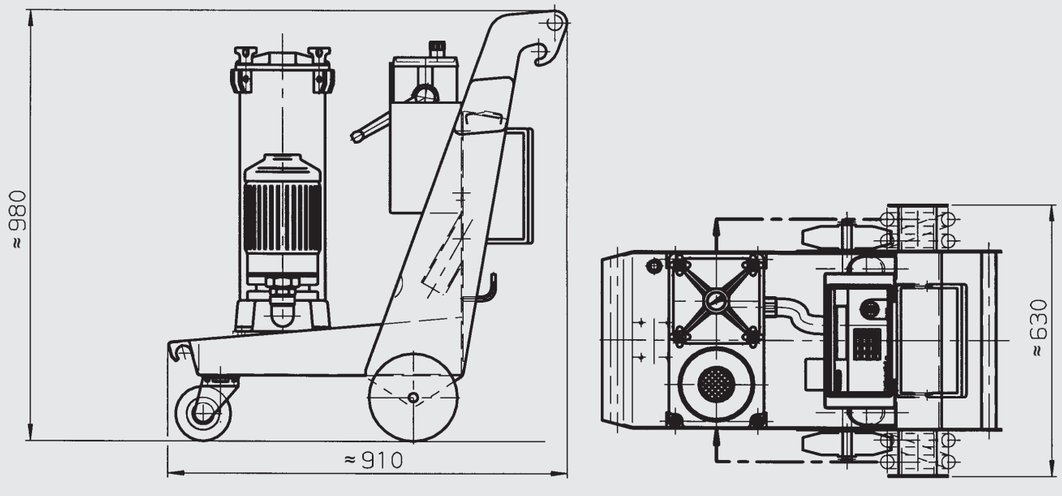
Filter size
2 = element 1300

Filter material
B = Betamicron® (BN4HC)
A = Aquamicron®

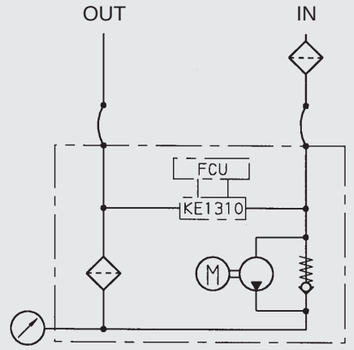
Filtration rating
03 = 3 µm BN4HC; BN4AM
05 = 5 µm BN4HC
10 = 10 µm BN4HC; BN4AM
20 = 20 µm BN4HC
40 = 40 µm AM

Clogging indicator
C = pressure gauge, electrical (VMF 2 C.0)

Dimensions



Hydraulic circuit diagram



Replacement elements

Filter size	Filtration rating	Element type	Part no.
2	3 µm	1300 R 003 BN4HC/-KB (-V-KB)	1263059 (1263760)
2	5 µm	1300 R 005 BN4HC/-KB (-V-KB)	1263060 (1263761)
2	10 µm	1300 R 010 BN4HC/-KB (-V-KB)	1263061 (1263762)
2	20 µm	1300 R 020 BN4HC/-KB (-V-KB)	1263062 (1263763)
2	40 µm	1300 R 040 AM/-KB	1267699
2	3 µm	1300 R 003 BN4AM/-KB (-V-KB)	1267991 (1271839)
2	10 µm	1300 R 010 BN4AM/-KB (-V-KB)	1270010 (1276060)

Note

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All technical details are subject to change.

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Mobile oil transport and **filtration unit** TW 5

Description

The mobile oil transport and filtration unit TW 5 is a mobile oil servicing and care unit used for the transport of oil and for filtration during the filling of plants and when repumping hydraulic and lubrication media. The device is equipped with an integrated 200 l tank.

A switch on the unit enables simple changeover between pumping operations with and without filtration (optional).

Applications

- Hydraulic and lubrication oil systems in a variety of industries

Advantages

- Safer and simpler oil transport
- Convenient filtration in bypass flow
- Simple handling
- Increased system availability
- Reduction of Life Cycle Cost LCC

Technical details

Tank size	200 l
Pump type	Vane pump
Max. flow rate	30/40 l/min
Operating pressure	4.5 bar max.
Permitted suction pressure at suction port	-0.4 bar to +0.6 bar
Viscosity range	15 to 800 mm²/s (version-dependent)
Permitted operating fluid	Mineral oil (others on request)
Fluid temperature	-10 to 80°C
Ambient temperature	-20 to 40°C
Seals	NBR (option FPM)
IP class	IP 54
Length of power cable	10 m
Length of hoses	3 m
Hose connections	Suction hose NW 28 Pressure hose NW 25
Weight (empty)	≈ 160 kg
Accessories	Pistol grip filling nozzle Flow meter

Model code

TW5 L 10 P 6 N 2 B 05 E

Basic type
TW 5 = Mobile oil transport and filtration unit

Versions
L = Without change-over valve
F = With change-over valve

Type code
10 = Standard
Special models on request

Seals
P = NBR (Perbunan)
V = FPM (Viton)

Motor-pump unit

Meas. ref.	Theor. output at 1450 rpm	Max. viscosity	El. motor rating at 50 Hz
3	30 l/min	250 mm²/s	0.75 kW
6	40 l/min	800 mm²/s	1.5 kW

Electric motor voltage (others on request)
M = 1 x 230 V - 50 Hz
N = 3 x 380-420 V - 50 Hz; 3 x 440-480 V - 60 Hz
S = 3 x 500-600 V - 50 (60) Hz
X = Special voltage

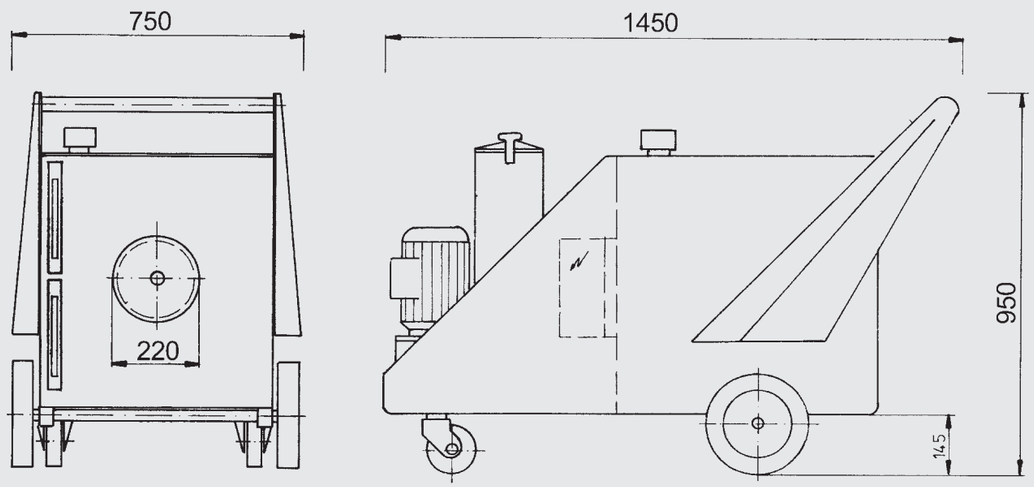
Filter size
1 = Element 330
2 = Element 1300

Filter material
B = Betamicron (BN4HC)
A = Aquamicron (BN/AM), (AM)

Filtration rating
03 = 3 µm BN4HC; BN/AM
05 = 5 µm BN4HC
10 = 10 µm BN4HC;BN/AM
20 = 20 µm BN4HC
40 = 40 µm AM

Clogging indicator
E = Standard, pressure gauge
B = Option: differential pressure gauge - visual
C = Option: differential pressure gauge - electrical
B and C not for version "L"

DIMENSIONS

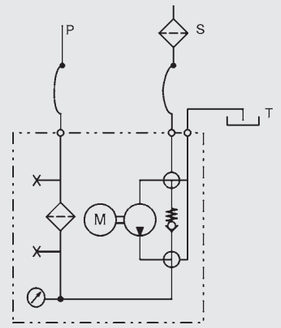


Hydraulic circuit diagram

Version F

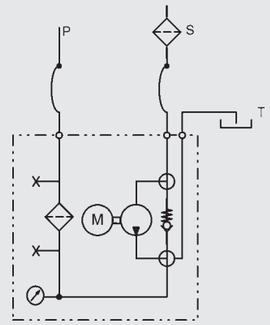
T → P via filter

Transfer of filtered fluid from the TW5 tank to an external system



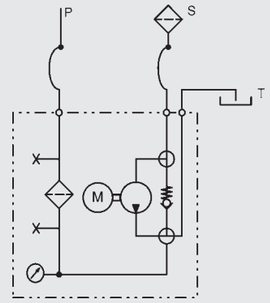
S → P via filter

Transfer with filtration



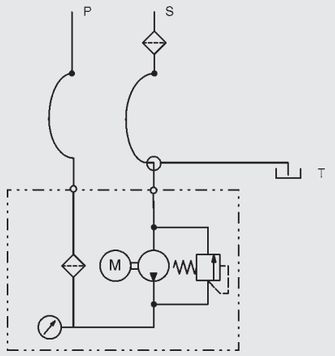
S → T without filtration

Transfer to the TW5 tank from an external system

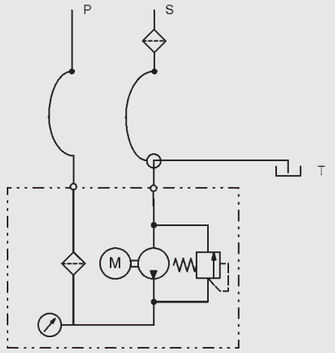


Version L

S → P via filter



T → P via filter



Replacement elements

Filter size	Filtration rating	Element type	Part no.
1	3 µm	0330 R 003 BN4HC/-KB (-V-KB)	1262999 (1263640)
1	5 µm	0330 R 005 BN4HC/-KB (-V-KB)	1263000 (1263641)
1	10 µm	0330 R 010 BN4HC/-KB (-V-KB)	1263001 (1263642)
1	20 µm	0330 R 020 BN4HC/-KB (-V-KB)	1263002 (1263643)
1	40 µm	0330 R 040 AM /-KB (-V-KB)	1272067 (1266563)
1	3 µm	0330 R 003 BN/AM /-KB (-V-KB)	1272069 (1276690)
1	10 µm	0330 R 010 BN/AM /-KB (-V-KB)	1272068 (1281126)
2	3 µm	1300 R 003 BN4HC-/KB (-V-KB)	1263059 (1263760)
2	5 µm	1300 R 005 BN4HC-/KB (-V-KB)	1263060 (1263761)
2	10 µm	1300 R 010 BN4HC-/KB (-V-KB)	1263061 (1263762)
2	20 µm	1300 R 020 BN4HC-/KB (-V-KB)	1263062 (1263763)
2	3 µm	1300 R 003 BN/AM /-KB (-V-KB)	1267991 (1271839)
2	10 µm	1300 R 010 BN4AM /-KB (-V-KB)	1270010 (1276060)
2	40 µm	1300 R 040 AM /-KB	1267699

Note

The information in this general brochure relates to the operating conditions and applications described.

For applications and operating conditions not described, please contact the relevant technical department.

All technical details are subject to change.

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FluidCarrierCompact FCC

Description

The FluidCarrier Compact is designed for carrying out maintenance work on machine tools with tank volumes of up to 200 l.

Special care must be taken to ensure at the time of the introduction of TPM (Total Productive Maintenance) that the filtered topping up of hydraulic and lubrication oils is guaranteed and that a mix-up between different types of oils is excluded.

The FCC offers the possibility of transport and of the filtered filling of topping-up quantities, in addition to measuring points for the connection of particle counters (FCU) for monitoring oil cleanliness. The integrated filter unit (OLF–Compact) can be used to clean smaller, off-line systems.

In addition, there is also the option of connecting a flow meter for documenting the quantity dispensed.

Advantages

- Easy, safe transport
  ⇒ 70 litre volume for filling small units, easy operation
- Filtration of filling fluid
  ⇒ via Olf–Compact ($ß_2$>1000) resulting in fewer breakdowns caused by contamination in new oil
- Checking
  ⇒ FCU and flow meter optional, therefore documentation of flow or purity via maintenance
- Mobile offline filtration unit
  ⇒ Can also be used for offline filtration

Technical details

Filter element	DIMICRON (2, 5, 10, 20 µm absolute) AQUAMICRON (3, 20 µm absolute)
Flow rate	FCC 5/4: 4 l/min FCC 5/15: 15 l/min
Operating pressure	3.5 bar
Viscosity range	FCC 5/4: 15 to 7000 mm²/s FCC 5/15: 15 to 1000 mm²/s
Fluid temperature range	0 to 80°C
Ambient temperature range	0 to 40°C
Seals	NBR
IP class	IP 55 (without FCU)
Weight	≈ 60 kg (empty)
Tank volume	70 l
Length of hoses	2.3 m
Length of power cable	10 m

Model code

FCC –5/15 –S –N –N5DM002 –BM / –K-FA1

Basic model
FCC = Fluid Carrier Compact

Size & flow rate
5/4 = 4 l/min
5/15 = 15 l/min

Pump type
S = Vane pump

Voltage

L	= 115V - 1Ph	G	= 440V - 3Ph
M	= 230V - 1Ph*	O	= 460V - 3Ph
W	= 230V - 3Ph*	B	= 480V - 3Ph
C	= 380V - 3Ph	S	= 500V - 3Ph
N	= 400V - 3Ph*	P	= 575V - 3Ph
R	= 415V - 3Ph		

X = Other voltages on request
M60 = Operation at 60Hz
* Standard in Europe according to CENELEC HD472 S1 at 50 Hz

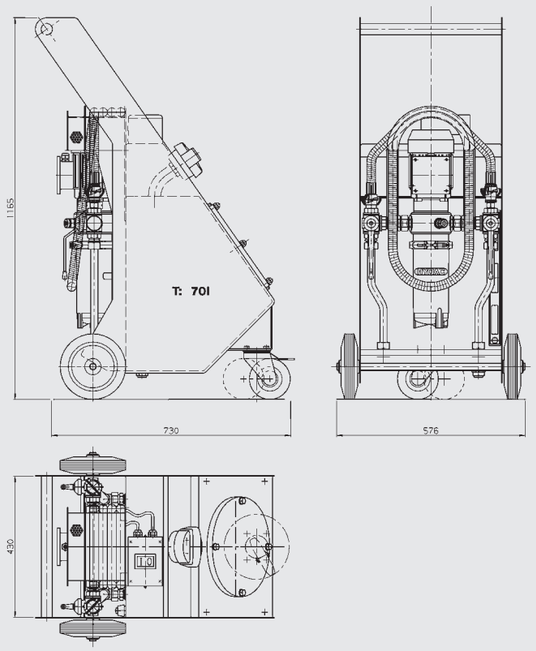
Filter element
N 5 DM 002 = DIMICRON filtration rating 2 µm absolute
N 5 DM 005 = DIMICRON filtration rating 5 µm absolute
N 5 DM 010 = DIMICRON filtration rating 10 µm absolute
N 5 DM 020 = DIMICRON filtration rating 20 µm absolute
N 5 AM 002 = AQUAMICRON® filtration rating 4 µm absolute
N 5 AM 020 = AQUAMICRON® filtration rating 20 µm absolute
Z = Without filter element

Clogging indicator
BM = Differential pressure gauge, visual (VM2BM.1)
C = Differential pressure gauge, electrical (for versions FA1, FA2 and E) (VM2C.0)

Supplementary details
K = Flow meter
FA1 = On/ off switch with motor protection switch and switch-off when filter is clogged. Requires neutral wire. For voltages up to max. 240V, 1Ph, or max. 415V, 3Ph. Clogging indicator type C or D3 required.
FA2 = On/ off switch with motor protection switch and switch-off when filter is clogged. Does not require neutral line. All voltages. Clogging indicator type C required.
FCU*= Prepared for connection of FCU incl. mounting, measurement points and change-over valve
E* = El. control unit for controlling unit with FCU (includes options FA1 and FCU)

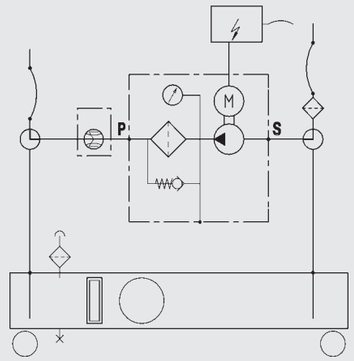
* suitable for FCU 2000 series, please order FCU separately, see FCU brochure

DIMENSIONS

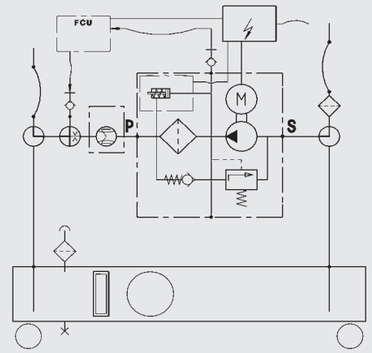


Hydraulic circuit diagram

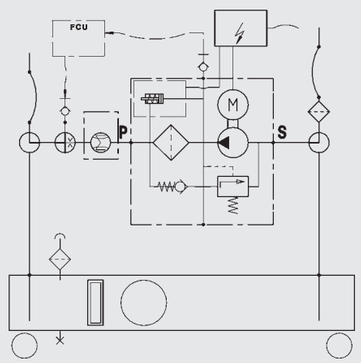
Standard version



Version with electrical control unit for operation with FCU

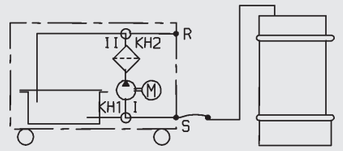


Equipped for connection of FCU: includes test points and change-over valve

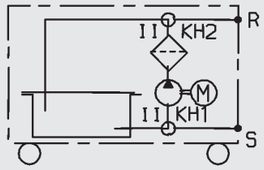


Operation modes

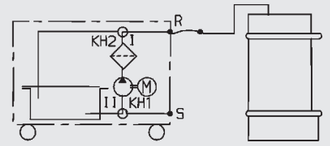
FCC - Transferring to on-board tank



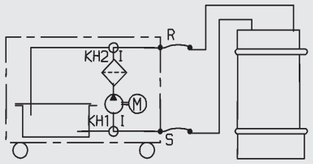
FCC - Filtration of on-board tank



FCC - Transferring to external tank



FCC - Offline filtration of external tank



Note

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FluidCleaner Mobil
FCM series

Description

The FluidCleaner Mobil FCM is a mobile oil servicing and care unit and is used for offline filtration during the filling of plants and when hydraulic and lubrication media are being repumped.

With the FCM, HYDAC is offering a flexible and dependable service device for fluid care and servicing which considerably increases the lifetime of operating media, components and thus entire plants and thereby reduces operating costs.

Applications

- Hydraulic and lubrication systems in different industries (for example, machine tools, plastic injection moulding machines, paper mills, construction machinery, steel industry, marine & offshore, mobile industry)

Advantages

- Avoidance of cost-intensive component damage and system downtimes
- Safe and convenient handling
- Increased oil service lifetimes
- Reduction of life cycle costs

Technical details

	Vane pump version	Gear pump version
Max. flow rate	FCM 60 = 60 l/min FCM 100 = 100 l/min (others on request)	
Operating pressure	p_{max} = 6 bar	p_{max} = 10 bar
Viscosity range	15 to 400 mm²/s	15 to 1000 mm²/s
Permitted operating fluid	Mineral oil (DIN 51424)	
Fluid temperature	-10 to 80°C	
Ambient temperature	-10 to 40°C	
Seals	NBR (option: FKM (FPM/Viton®))	
IP class	IP 55	
Power cable, length	10 m	
Connections: Suction hose Pressure hose	 NW 38 (1 ½") NW 25 (M 36x2) (others on request)	
Length of hoses: Suction hose Pressure hose	 2.5 m 4.0 m (others on request)	
Weight when empty	FCM 60 ≈ 135 kg FCM 100 ≈ 145 kg	

Model code

FCM 100 L N 3 B 03 C/ S5D5-V

Filtration unit
FluidCleaner Mobil

Flow rate
060 = 60 l/min
100 = 100 l/min
(others on request)

Pump versions
L = vane pump without change-over (standard)
F = vane pump with change-over
K = gear pump without change-over
G = gear pump with change-over

Supply voltage
M * = 230 V / 50 Hz (1 Ph + PE)
N = 400 V / 50 Hz (3 Ph + N + PE)
S = 500 V / 50 Hz (3 Ph + PE)
X = other voltages

Filter size
2 = filter size 1300
3 = filter size 2600
see next page

Filter material
B = Betamicron (BN4HC)
A = Aquamicron (BN4AM), (AM)

Filtration rating
03 = 3 µm BN4HC, BN4AM
05 = 5 µm BN4HC
10 = 10 µm BN4HC
20 = 20 µm BN4HC
40 = 40 µm AM

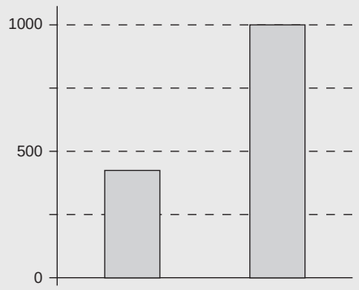
Clogging indicator
B = visual differential pressure indicator (Standard)
C = special model - differential pressure indicator electrical (VM2C.0) with automatic motor cut-out when filter is contaminated

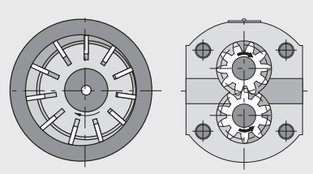
Supplementary details
No specification = series
S5 = suction hose 5 m with lance
D5 = pressure hose 5 m with lance
V = FKM (FPM/Viton®) seal
SK = suction hose with threaded connection
DK = pressure hose with threaded connection

* = only for version FCM 60 (1.5 kW)

Versions

Viscosity [mm²/s]





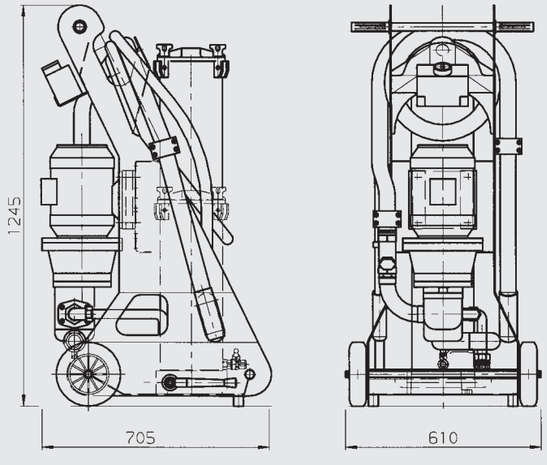
Replacement elements

Filter size	Filtration rating	Element type	Part no.
2	3 µm	1300 R 003 BN4HC-/KB (-V-KB)	1263059 (1263760)
2	5 µm	1300 R 005 BN4HC-/KB (-V-KB)	1263060 (1263761)
2	10 µm	1300 R 010 BN4HC-/KB (-V-KB)	1263061 (1263762)
2	20 µm	1300 R 020 BN4HC-/KB (-V-KB)	1263062 (1263763)
2	40 µm	1300 R 040 AM/-KB	1267699
2	10 µm	1300 R 010 BN4AM/-KB (-V-KB)	1270010 (1276060)
2	3 µm	1300 R 003 BN4AM/-KB (-V-KB)	1267991 (1271839)
3	3 µm	2600 R 003 BN4HC/-KB (-V-KB)	1263071 (1263784)
3	5 µm	2600 R 005 BN4HC/-KB (-V-KB)	1263072 (1263785)
3	10 µm	2600 R 010 BN4HC/-KB (-V-KB)	1263073 (1263786)
3	20 µm	2600 R 020 BN4HC/-KB (-V-KB)	1263074 (1263787)
3	40 µm	2600 R 040 AM/-KB	306899
3	3 µm	2600 R 003 BN4AM/-KB (-V-KB)	1268232 (1275329)
3	10 µm	2600 R 010 BN4AM/-KB	1276840

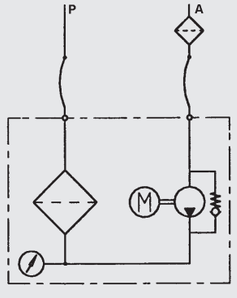
Selection table for motor-pump unit

Design	FCM 60	FCM 100
Vane pump	1.5 kW	2.2 kW
Gear pump	2.2 kW	3.0 kW

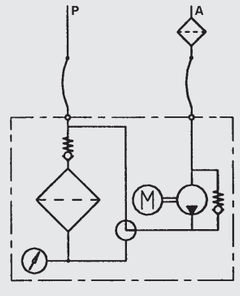
Dimensions



Hydraulic circuit diagram



Standard version



Model with change-over

NOTE

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Subject to technical modifications.

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Barrel Transportation and Filtration Trolley FT 5

Description

The barrel transport and filtration trolling FT 5 is a mobile oil servicing and care unit used for filtration during the filling of plants and when repumping hydraulic and lubrication media. The unit is intended for carrying along a standard oil barrel (200 l).

A switch on the unit enables simple changeover between pumping operations with and without filtration.

Applications

- Hydraulic and lubrication oil systems in a variety of industries

Advantages

- Convenient filtration in bypass flow
- Safe and simple transport of a 200 l standard oil barrel
- Simple handling
- Filling with defined oil cleanliness
- Increased system availability
- Reduction of life cycle costs LCC

Technical details

Max. flow rate	30/40 l/min
Operating pressure	4.5 bar max.
Viscosity range	15 to 800 mm²/s (version-dependent)
Permitted operating fluid	Mineral oil (others on request)
Permitted suction pressure at suction port	-0.4 bar to +0.6 bar
Fluid temperature	-10 to 80°C
Ambient temperature	-20 to 40°C
Seals	NBR (option: FPM)
IP class	IP 54
Length of power cable	6 m
Length of hoses	3 m
Hose connections	Suction hose NW 30 with lance Pressure hose NW 25 with lance
Weight	≈ 160 kg
Accessories	Pistol grip filling nozzle Flow meter

Model code

FT5 L 10 P 6 N 2 B 05 E

Type
FT5 = Barrel Transportation and Filtration Trolley

Versions
L = Without change-over valve
F = With change-over valve

Type code
10 = Standard
Special models on request

Seals
P = NBR (Perbunan)
V = FPM (Viton)

Motor-pump unit

Meas. ref.	Theor. output at 1450 rpm	Max. viscosity	El. motor rating at 50 Hz
3	30 l/min	250 mm²/s	0.75 kW
6	40 l/min	800 mm²/s	1.5 kW

Electric motor voltage
M = 1 x 230V - 50 Hz
N = 3 x 380 - 420 V - 50 Hz, 3 x 440 - 480 V - 60 Hz
S = 3 x 500 - 600 V - 50 (60)Hz
X = Special voltage

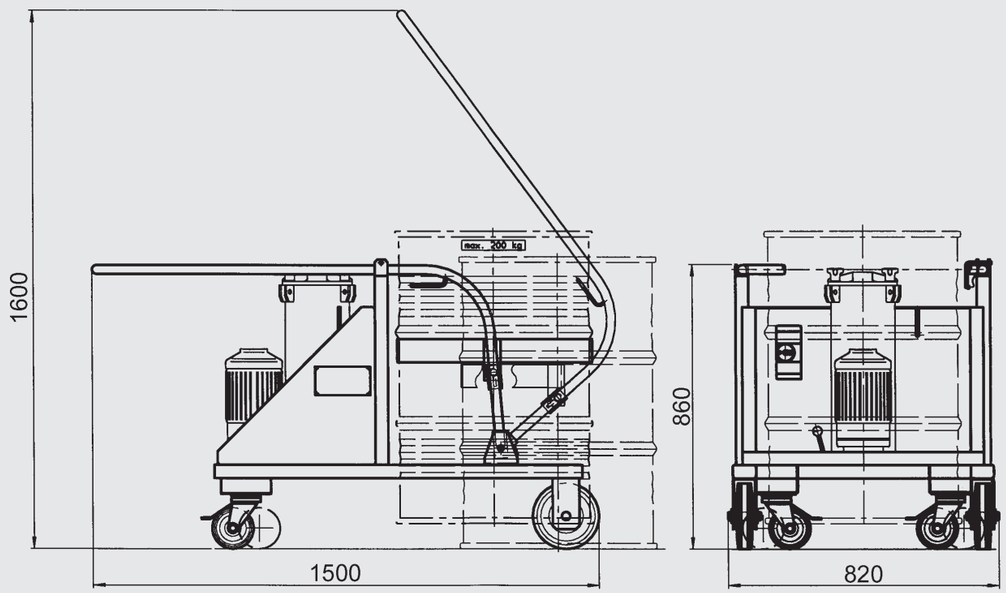
Filter size
1 = Element 330
2 = Element 1300

Filter material
B = Betamicron (BN4HC)
A = Aquamicron (BN/AM), (AM)

Filtration rating
03 = 3 µm BN4HC; BN/AM
05 = 5 µm BN4HC
10 = 10 µm BN4HC; BN/AM
20 = 20 µm BN4HC;
40 = 40 µm AM

Clogging indicator
E = Standard, back-pressure indicator
B = Option: differential pressure gauge - visual
C = Option: differential pressure gauge - electrical
D = Option: differential pressure gauge - visual/electrical
B, C and D not for version "L"

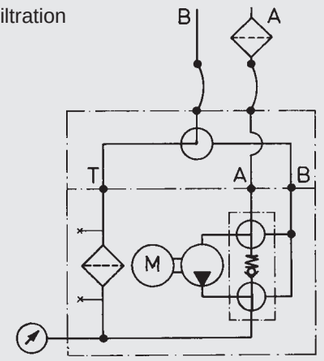
Dimensions



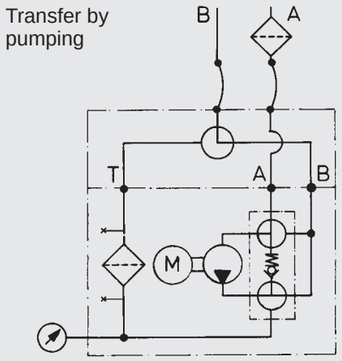
Hydraulic circuit diagram

Version F

Filtration

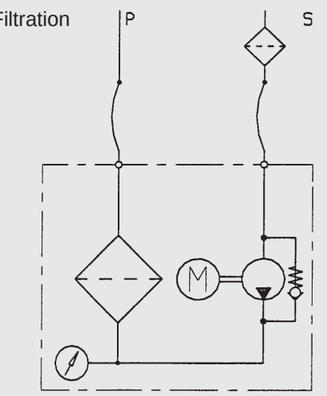


Transfer by pumping



Version L

Filtration



Replacement elements

Filter size	Filtration rating	Element type	Part no.
1	3 µm	0330 R 003 BN4HC/-KB (-V-KB)	1262999 (1263640)
1	5 µm	0330 R 005 BN4HC/-KB (-V-KB)	1263000 (1263641)
1	10 µm	0330 R 010 BN4HC/-KB (-V-KB)	1263001 (1263642)
1	20 µm	0330 R 020 BN4HC/-KB (-V-KB)	1263002 (1263643)
1	40 µm	0330 R 040 AM/-KB (-V-KB)	1272067 (1266563)
1	3 µm	0330 R 003 BN/AM/-KB (-V-KB)	1272069 (1276690)
1	10 µm	0330 R 010 BN/AM/-KB	1272068
2	3 µm	1300 R 003 BN4HC/-KB (-V-KB)	1263059 (1263760)
2	5 µm	1300 R 005 BN4HC/-KB (-V-KB)	1263060 (1263761)
2	10 µm	1300 R 010 BN4HC/-KB (-V-KB)	1263061 (1263762)
2	20 µm	1300 R 020 BN4HC/-KB (-V-KB)	1263062 (1263763)
2	40 µm	1300 R 040 AM/-KB	1267699
2	3 µm	1300 R 003 BN/AM/-KB	1267991
2	10 µm	1300 R 010 BN/AM/-KB (-V-KB)	1270010 (1276060)

V = Viton
KB = Without bypass

Note

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Filter Pump Transfer Unit OFU

Description

The Filter Pump Transfer Unit OFU is a mobile oil service unit and is used to filter oil when filling systems and when transferring hydraulic and lubricating fluids.

Applications

- Hydraulic and lubrication oil systems in a variety of industries

Advantages

- Convenient filtration in bypass flow
- Simple handling
- Increased system availability
- Reduction of life cycle costs LCC

Technical details

Max. flow rate	100 l/min
Pump type	Gear pump
Operating pressure	10 bar max
Permitted suction pressure at suction port	-0.4 bar to +0.6 bar
Viscosity range	15 to 1000 mm²/s
Permitted operating fluid	Mineral oil (others on request)
Fluid temperature	-10 to 80°C
Ambient temperature	-10 to 40°C
Seals	NBR (option: FPM)
IP class	IP 54
Length of power cable	10 m
Connections/Length of hoses Suction hose Pressure hose	 2.5 m 4.0 m
Hose connections	Suction hose NW 38 with lance, others on request Pressure hose NW 25 with lance, others on request
Weight	≈ 130 kg
Accessories	Flow meter, hose with compression ends or threaded couplings

Model code

OFU 10 P 2 N 2 B 05 B

Filter pump transfer unit, mobile
OFU

Type code
10 = standard
special model on request

Seals
P = NBR (Perbunan)
V = FPM (Viton)

Flow rate and motor output
1 = 100 l/min, 3 kW
2 = 100 l/min, 4 kW
others on request

Connection voltage
N = 3 x 380 - 420 V - 50 Hz, 3 x 440 - 480 V - 60 Hz
S = 3 x 500 - 600 V - 50 (60) Hz
X = other

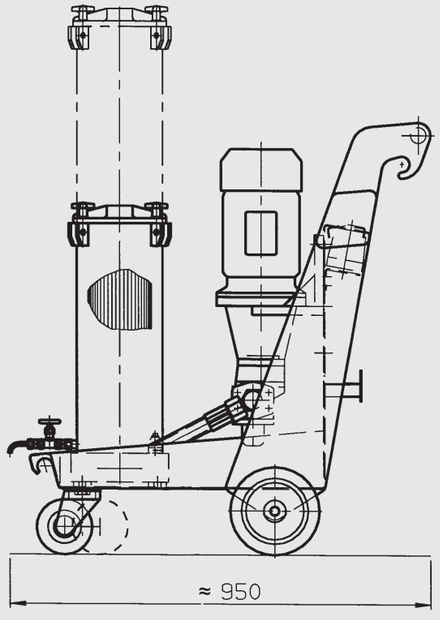
Filter housing
2 = element 1300
3 = element 2600

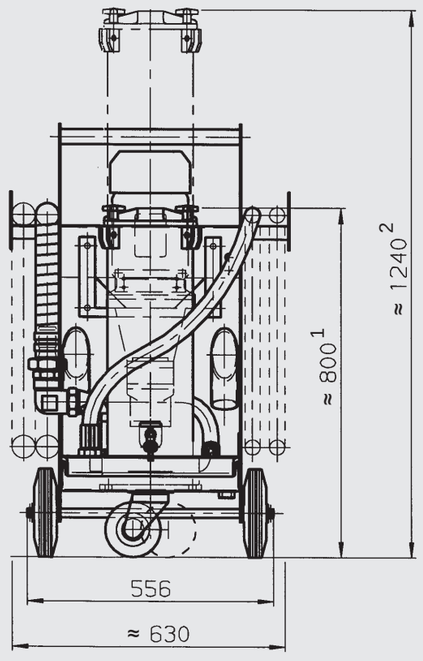
Filter material
A = Aquamicron (BN/AM), (AM)
B = Betamicron (BN4HC)

Filtration rating
03 = 3 µm BN4HC; BN/AM
05 = 5 µm BN4HC
10 = 10 µm BN4HC; BN/AM
20 = 20 µm BN4HC;
40 = 40 µm AM

Clogging indicator
B = standard: visual clogging indicator VM 2 B.1
C = special model: differential pressure switch, electrical (VM 2 C.0/-L220) with automatic motor cut-out when filter is contaminated
D = special model: differential pressure switch, visual / electrical (VM 2 D.0/-L220) with automatic motor cut-out when filter is contaminated

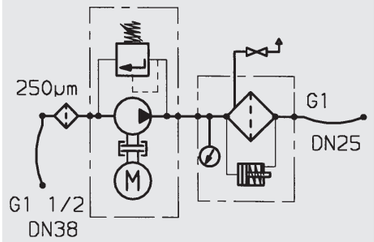
Dimensions





1 = for element 1300
2 = for element 2600

Hydraulic circuit diagram



Replacement elements

Filter size	Filtration rating	Element type	Part no.
2	3 µm	1300 R 003 BN4HC-/KB (-V-KB)	1263059 (1263760)
2	5 µm	1300 R 005 BN4HC-/KB (-V-KB)	1263060 (1263761)
2	10 µm	1300 R 010 BN4HC-/KB (-V-KB)	1263061 (1263762)
2	20 µm	1300 R 020 BN4HC-/KB (-V-KB)	1263062 (1263763)
2	40 µm	1300 R 040 AM/-KB	1267699
2	10 µm	1300 R 010 BN/AM/-KB (-V-KB)	1270010 (1276060)
2	3 µm	1300 R 003 BN/AM/-KB (-V-KB)	1267991 (1271839)
3	3 µm	2600 R 003 BN4HC/-KB (-V-KB)	1263071 (1263784)
3	5 µm	2600 R 005 BN4HC/-KB (-V-KB)	1263072 (1263785)
3	10 µm	2600 R 010 BN4HC/-KB (-V-KB)	1263073 (1263786)
3	20 µm	2600 R 020 BN4HC/-KB (-V-KB)	1263074 (1263787)
3	40 µm	2600 R 040 AM/-KB	306899
3	3 µm	2600 R 003 BN/AM/-KB (-V-KB)	1268232 (1275329)
3	10 µm	2600 R 010 BN/AM/-KB	1276840

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Filtromat
OF 5

Description
The stationary fluid conditioning unit OF 5 is designed to fill/filter hydraulic and lubrication tanks and to filter offline. A change-over valve on the unit allows the operator to bypass the filter when emptying the tank (optional).

Applications
- Hydraulic and lubrication oil systems in a variety of industries

Advantages
- Convenient filtration in bypass flow
- Simple handling
- Increased oil and component service lifetimes
- Reduction of life cycle costs LCC

Technical details

Max. flow rate	30 l/min, 40 l/min
Operating pressure	4.5 bar max.
Viscosity range	15 to 800 mm²/s (version-dependent)
Permitted operating fluid	Mineral oil (others on request)
Permissible suction pressure at suction port	-0.4 bar to +0.6 bar
Fluid temperature	-10 to 80°C
Ambient temperature	-20 to 40°C
Seals	NBR (option: FPM)
IP class	IP 54
Weight (empty)	≈ 46 kg

Model code

OF5 S 10 P 6 N 1 B 05 E

Basic type
OF5

Versions
S = Stationary with change-over valve
N = Offline unit: stationary without change-over valve

Type code
10 = Standard
Special models on request

Seals
P = NBR (Perbunan)
V = FPM (Viton)

Motor-pump unit

Meas. ref.	Theor. output at 1450 rpm	Max. viscosity	El. motor rating at 50 Hz
3	30 l/min	250 mm²/s	0.75 kW
6	40 l/min	800 mm²/s	1.5 kW

Electric motor voltage
M = 1 x 230 V - 50 Hz
N = 3 x 380-420 V - 50 Hz; 3 x 440-480 V - 60 Hz
S = 3 x 500-600 V - 50 (60) Hz
X = special voltage

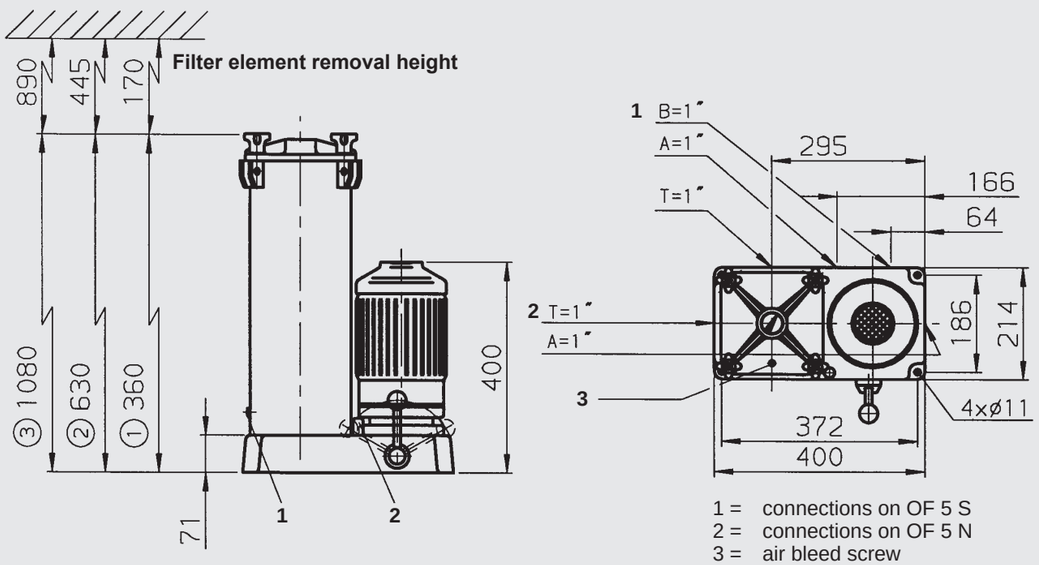
Filter size
1 = Element 330
2 = Element 1300
3 = Element 2600

Filter material
B = Betamicron (BN4HC)
A = Aquamicron (BN/AM), (AM)

Filtration rating
03 = 3 µm BN4HC; BN/AM
05 = 5 µm BN4HC
10 = 10 µm BN4HC;BN/AM
20 = 20 µm BN4HC
40 = 40 µm AM

Clogging indicator
E = Standard, back-pressure indicator
B = Option: differential pressure gauge - visual
C = Option: differential pressure gauge - electrical
D = Option: differential pressure gauge - visual/electrical
B, C and D not for version "N"

Dimensions

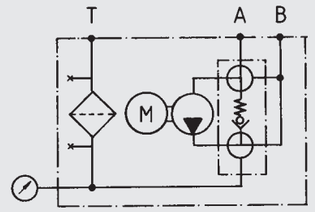


1 = connections on OF 5 S
2 = connections on OF 5 N
3 = air bleed screw

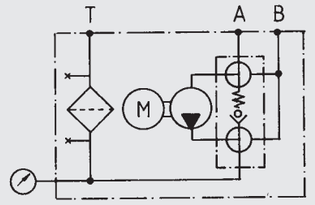
Hydraulic circuit diagram

OF5 S

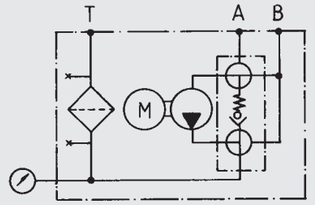
I Emptying tank, filter is bypassed A → B



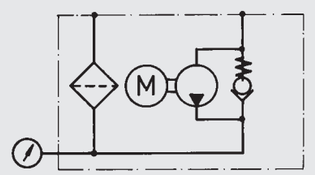
II Filtering offline A → T



III Filling via filter B → T



OF5 N



Replacement elements

Filter size	Filtration rating	Element type	Part no.
1	3 µm	0330 R 003 BN4HC/-KB (-V-KB)	1262999 (1263640)
1	5 µm	0330 R 005 BN4HC/-KB (-V-KB)	1263000 (1263641)
1	10 µm	0330 R 010 BN4HC/-KB (-V-KB)	1263001 (1263642)
1	20 µm	0330 R 020 BN4HC/-KB (-V-KB)	1263002 (1263643)
1	40 µm	0330 R 040 AM/-KB (-V-KB)	1272067 (1266563)
1	3 µm	0330 R 003 BN/AM/-KB (-V-KB)	1272069 (1276690)
1	10 µm	0330 R 010 BN/AM/-KB	1272068
2	3 µm	1300 R 003 BN4HC/-KB (-V-KB)	1263059 (1263760)
2	5 µm	1300 R 005 BN4HC/-KB (-V-KB)	1263060 (1263761)
2	10 µm	1300 R 010 BN4HC/-KB (-V-KB)	1263061 (1263762)
2	20 µm	1300 R 020 BN4HC/-KB (-V-KB)	1263062 (1263763)
2	40 µm	1300 R 040 AM/-KB	1267699
2	3 µm	1300 R 003 BN/AM/-KB	1267991
2	10 µm	1300 R 010 BN/AM/-KB (-V-KB)	1270010 (1276060)
3	3 µm	2600 R 003 BN4HC/-KB (-V-KB)	1263071 (1263784)
3	5 µm	2600 R 005 BN4HC/-KB (-V-KB)	1263072 (1263785)
3	10 µm	2600 R 010 BN4HC/-KB (-V-KB)	1263073 (1263786)
3	20 µm	2600 R 020 BN4HC/-KB (-V-KB)	1263074 (1263787)
3	40 µm	2600 R 040 AM/-KB	306899
3	3 µm	2600 R 003 BN/AM/-KB (-V-KB)	1268232 (1275329)
3	10 µm	2600 R 010 BN/AM/-KB	1276840

V = Viton
KB = Without bypass

Note

The information in this general brochure relates to the operating conditions and applications described.

For applications and operating conditions not described, please contact the relevant technical department.

All technical details are subject to change.

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Filtromat OF5 mini

Description

The stationary fluid conditioning unit OF5 mini is designed to fill/filter hydraulic and lubrication tanks and to filter offline. The change-over valve is provided to bypass the filter when emptying tanks.

Applications

- Hydraulic and lubrication oil systems in a variety of industries
- Mobile hydraulics

Advantages

- Convenient filtration in bypass flow
- Very compact construction
- Increased system availability
- Reduction of life cycle costs LCC

Technical details

Max. flow rate	15 l/min
Operating pressure	4.5 bar max.
Permitted suction pressure at suction port	-0.4 bar to +0.6 bar
Pump type	Gerotor or vane pump
Viscosity range	15 to 350 mm²/s
Permitted operating fluid	Mineral oil (others on request)
Fluid temperature range	-10 to 80°C
Ambient temperature range	-20 to 40°C
Protection class	IP 55
Weight when empty	≈ 20 kg
El. motor rating	
Gerotor pump	0.37 kW @ 50 Hz
Vane pump	0.2 kW @ 50 Hz

Model code

OF5 M 20 V 1 M 2 N5DM002 E - /–

Basic type
OF5

Version
M = Stationary with change-over valve

Type code
20 = Standard with gerotor pump
30 = DC drive with vane pump
Special versions on request

Seals
V = FKM (FPM, Viton®)

Motor-pump unit
Meas. ref. Theor. flow rate at 1450 rpm
1 15 l/min (at 40 mm²/s)
others on request

Voltage
L = 115 V - 1 Ph
M = 230 V - 1 Ph*
N = 400 V - 3 Ph*
T = 12V DC (only with vane pump)
U = 24V DC (only with vane pump)
X = other voltages on request
M60 = operation at 60Hz
* Standard in Europe according to CENELEC HD472 S1 at 50 Hz

Filter size
2 = 1 x filter element N5

Filter element
N 5 DM 002 = DIMICRON® 2 µm absolute
N 5 DM 005 = DIMICRON® 5 µm absolute
N 5 DM 010 = DIMICRON® 10 µm absolute
N 5 DM 020 = DIMICRON® 20 µm absolute
N 5 AM 001 = AQUAMICRON® 1 µm absolute
N 5 AM 002 = AQUAMICRON® 2 µm absolute
N 5 AM 020 = AQUAMICRON® 20 µm absolute

Clogging indicator
E = Standard, back-pressure indicator

Supplementary details

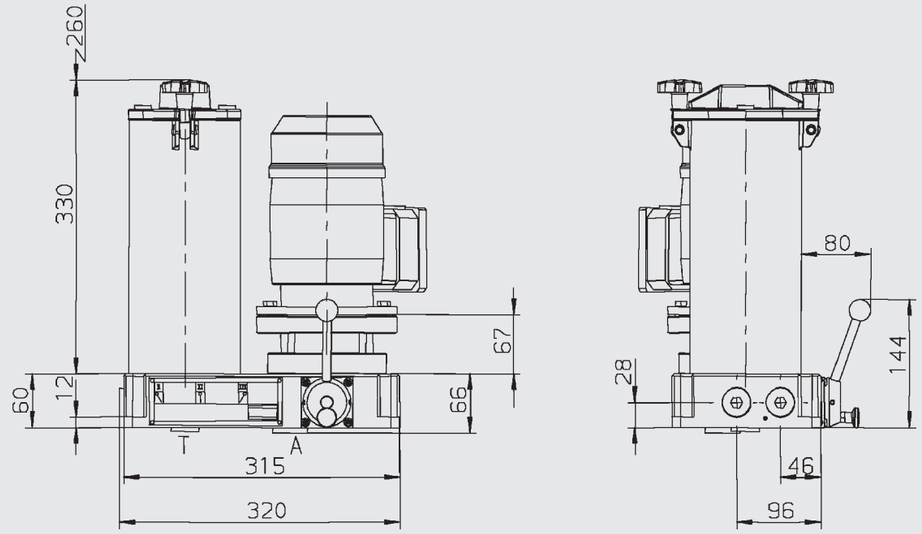
Accessories (optional)

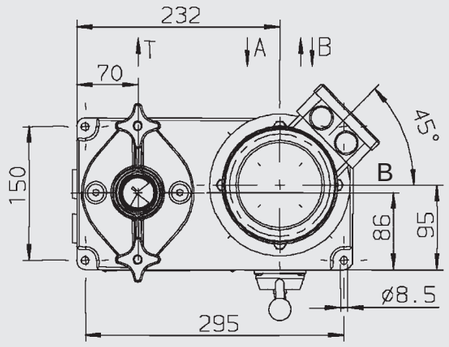
- OF5M anti-vibration mounting kit for universal mounting
  Part. no.: 3124658

Replacement elements

Filtration rating	Element type	Part no.
2 µm (Dimicron®)	N5DM002	349494
5 µm (Dimicron®)	N5DM005	3068101
10 µm (Dimicron®)	N5DM010	3102924
20 µm (Dimicron®)	N5DM020	3023508
1 µm (Aquamicron®)	N5AM001	3114428
2 µm (Aquamicron®)	N5AM002	349677
20 µm (Aquamicron®)	N5AM020	3040345

DIMENSIONS

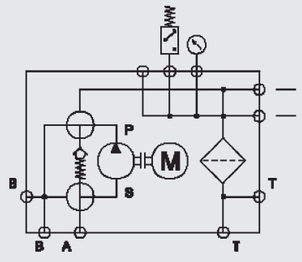




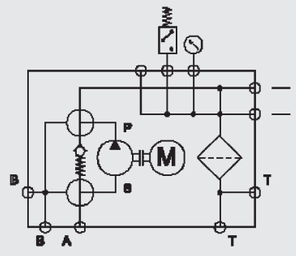
A	Suction port connection	G1
B	Transfer port	G3/4
T	Tank line	G3/4

Hydraulic circuit diagram

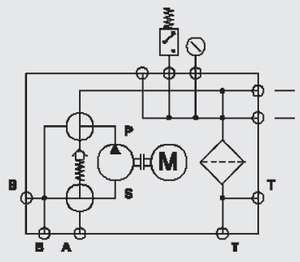
I Emptying tank, filter is bypassed A → B



II Filtering offline A → T



III Filling via filter B → T



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MultiRheo Filter
MRF 1/2/3/4/5/6/7

Description

The MultiRheo filters of the MRF series are filter housings for use in open systems which are continually exposed to contamination.

The candle filter elements protect components such as nozzles, high pressure pumps or working filters, for example in function test rigs or industrial part washers.

There are seven sizes of filter available in single or change-over versions.

Depending on the model, between 1 and 52 elements of different lengths can be fitted.

Applications

- Function test rigs
- Industrial part washers
- Machining centres
- Filling stations
- Engine oils
- Lubrication oil systems

Advantages

- Economical operation ensured by high quality standards, specified filtration rates and high separation values
- Compact housing with high flow rates
- Easy element change
- Efficient protection of system and components
- Environmentally safe disposal of elements (incinerable)

Model code

MRF – 4 – N / 17 – Q – 40 – 10 – N – E – 0 /-OC

Type
MRF = Multi Rheo Filter
MRFD = Change-over Multi Rheo Filter

Size
1 = ≈ 76 mm housing diameter
2 = ≈ 220 mm housing diameter
3 = ≈ 274 mm housing diameter
4 = ≈ 355 mm housing diameter
5 = ≈ 406 mm housing diameter
6 = ≈ 508 mm housing diameter
7 = ≈ 610 mm housing diameter

Housing material

		For size							
E	= Stainless steel*	1	2	3	4	5	6	7	1)
N	= Carbon steel, aluminium*	1	2	3	4	5	6	7	1)

* or quality, see technical specifications

Element quantity

		For size						
1	= 1 filter element	1						
5	= 5 filter elements		2					
11	= 11 filter elements			3				
17	= 17 filter elements				4			
22	= 22 filter elements					5		
36	= 36 filter elements						6	
52	= 52 filter elements							7

Hydraulic connection

		For size						
D	= G 1"	1	2	3				
F	= G 1 ½"		2	3				
G	= G 2"		2	3				
L	= SAE DN50			3				
J	= DIN DN 50			3				
Q	= DIN DN 80				4			
R	= DIN DN 100					5		
V	= DIN DN 150						6	
W	= DIN DN 200							7

Element length

		For size							
10	= 10 "	1	2	3					
20	= 20 "	1	2	3					
30	= 30 "	1	2	3	4*	5*	6*	7*	* only for stainless steel
40	= 40 "	1	2	3	4	5	6	7	

Pressure range

		For size						
10	= 10 bar	1	2	3	4	5	6	7
16	= 16 bar		2	3	4	5	6	7
25	= 25 bar	1						
40	= 40 bar	1						

Material of seal
N = NBR
F = FKM (FPM, Viton®)
E = EPDM

Clogging indicator for housing material E
C12 = Differential pressure indicator - electrical (PVD 2 C.0)
D17 = Differential pressure indicator - visual/electrical (PVD 2 D.0/-L220)
D18 = Differential pressure indicator - visual/electrical (PVD 2 D.0/-L24)
D32 = Differential pressure indicator - visual/electrical (PVL 2 GW.0/-V-113)
D33 = Differential pressure indicator - visual/electrical (PVL 2 GW.0/-V-111-16-)

Clogging indicator for housing material N
E = Standard, pressure gauge
B = Differential pressure indicator - visual (VM 2 B.1)
C = Differential pressure indicator - electrical (VM 2 C.0)
D3 = Differential pressure indicator - visual/electrical (VM 2 D.0/-L220)
D4 = Differential pressure indicator - visual/electrical (VM 2 D.0/-L24)
D5 = Differential pressure indicator - visual/electrical (VD 2 LZ.1/-DB)
F = Pressure switch, electrical (VR 2 F.0)
O = Without clogging indicator
See Hydac brochure for Clogging Indicators (E 7.050...)

Modification number
0 = The latest version is always supplied

Supplementary details
OE = without drain
L = Without stand / oil drip tray

1) for FlexMicron S/E/P elements

Filter calculation

The total pressure drop of the filter at a certain flow rate is the sum of the housing Δp and the element Δp. The housing pressure drop can be determined using the following pressure drop curves. The filter element Δp is calculated using the R-factors (see below).

Housing Δp: Housing pressure drop graphs

The higher curve in each pair of housing curves applies to mineral oil with a density of 0.86 kg/dm³ and a kinematic viscosity of 30 mm²/s. The lower curve applies to water at 20 °C. For turbulent flow, the differential pressure will change proportionally to the density; for laminar flow, it will change proportionally to the density and viscosity.
The flow velocity should not exceed 3 m/s at the filter inlet for oil and 4 m/s for water.

Element Δp: Pressure drop calculation for elements

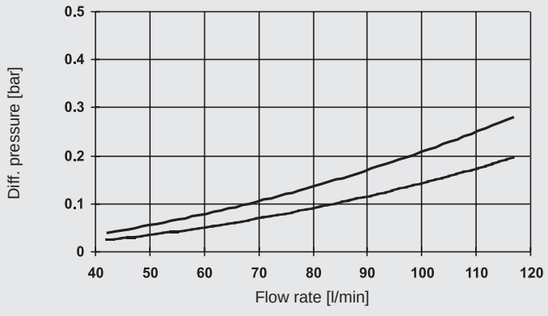
The following calculation is based on clean filter elements.

$$\Delta p\ [bar] = \frac{R \times V\ [mm^2/s] \times Q\ [l/min]}{n \times l\ [inch] \times 1000}$$

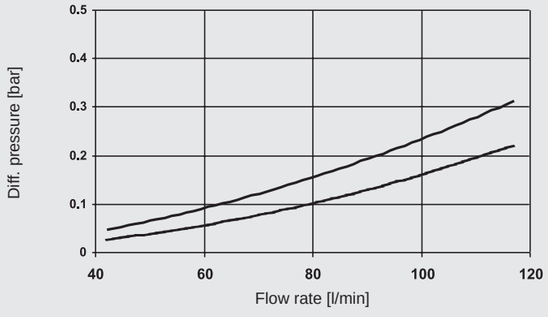
R = R factor
V = Viscosity [mm²/s]
Q = Flow rate [l/min]
n = No. of elements
L = Element length [inch]

Housing pressure drop graphs (Housing-Δp)

MRF-1



MRFD-1



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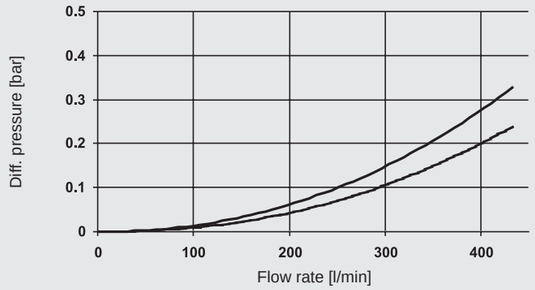

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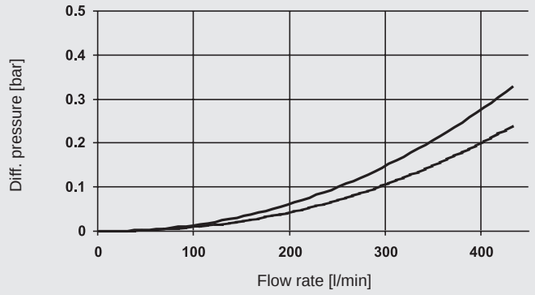

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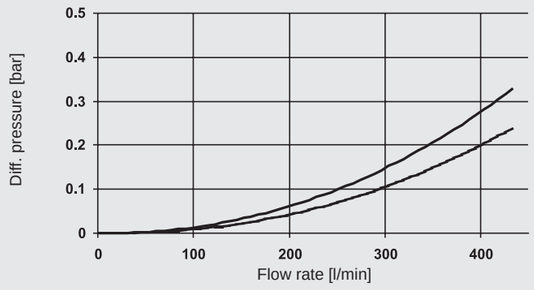

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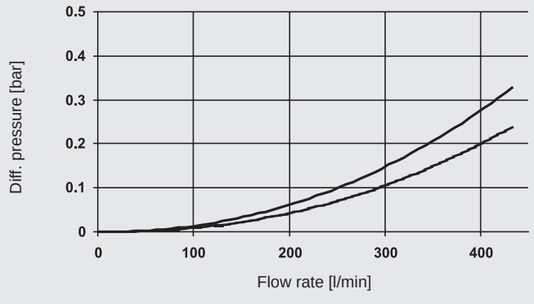

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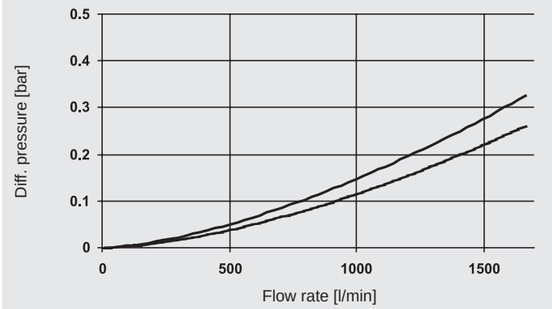

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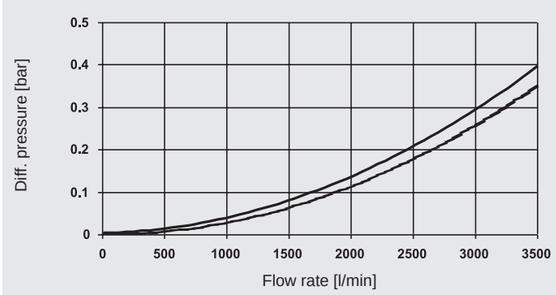
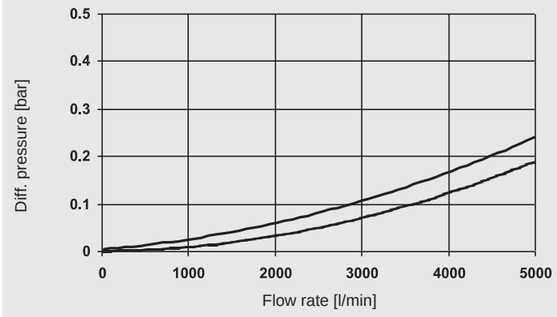
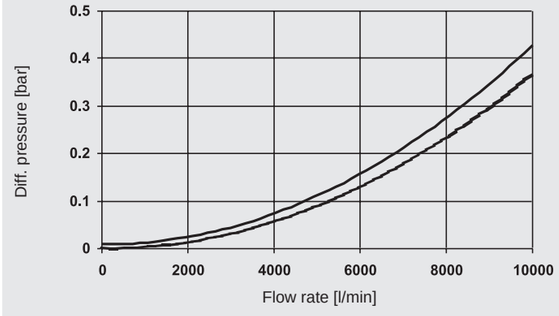


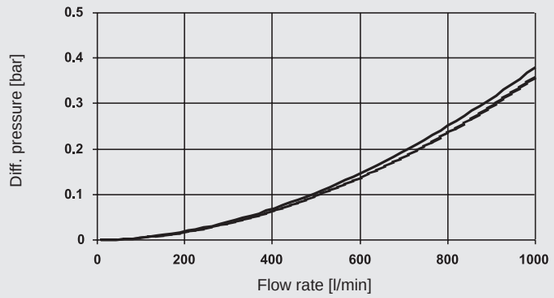
MRF-6



MRF-7



MRFD-4



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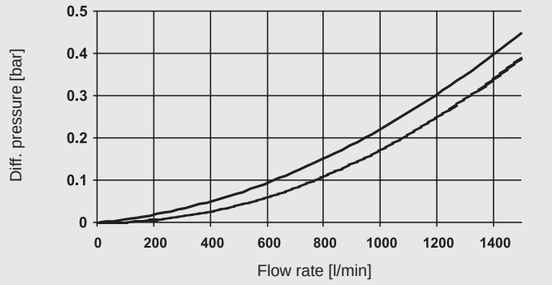

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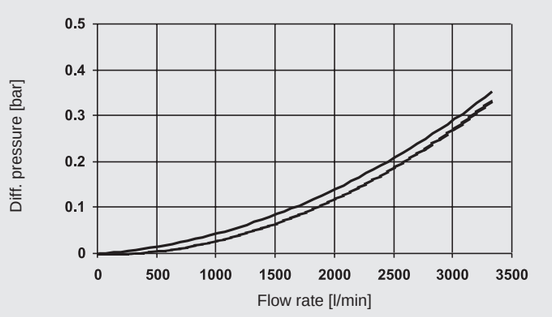

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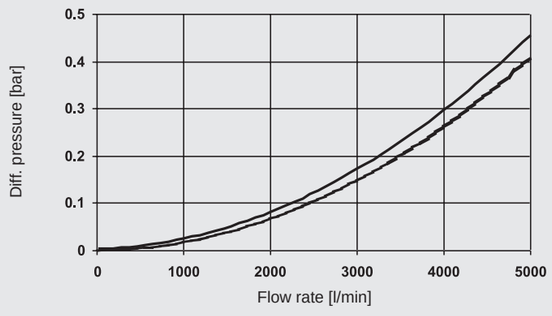
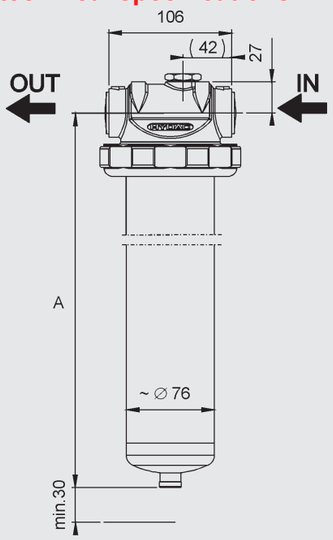
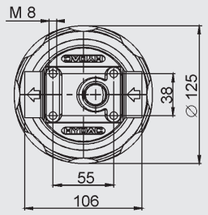


Dimensions and technical specifications

MRF-1 E

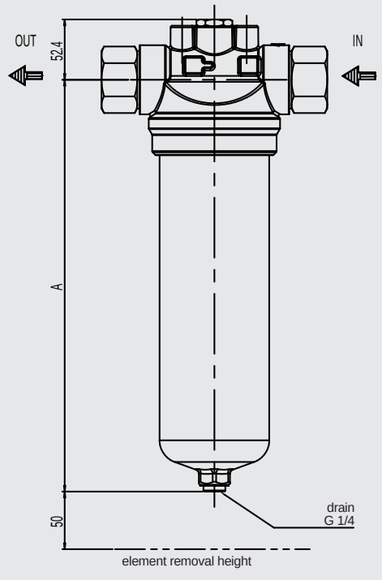


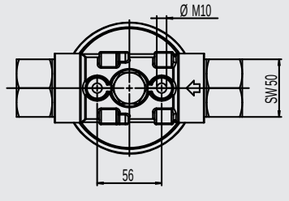


Element size	A
10 = 10"	332.5
20 = 20"	586.5
30 = 30"	816
40 = 40"	1094.5

Max. operating pressure	10 bar / 40 bar
Hydraulic connection (IN, OUT)	G 1"
Permitted temp. range of fluid	-10 to 90°C
Weight (empty)	10": 4.5 kg 20": 5.9 kg 30": 7.4 kg 40": 8.8 kg
Volume of housing	10": 1.1 l 20": 2.2 l 30": 3.2 l 40": 7.4 l
Material of filter head	Stainless steel 1.4581
Material of filter bowl	Stainless steel 1.4571
Material of seals	NBR, FPM, EPDM

MRF-1 N

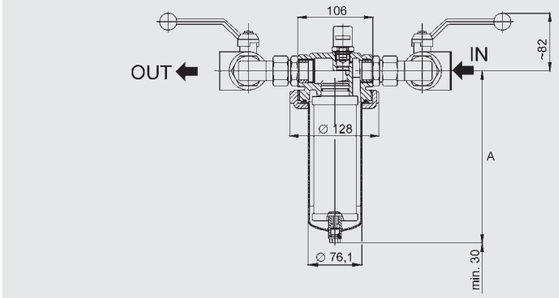


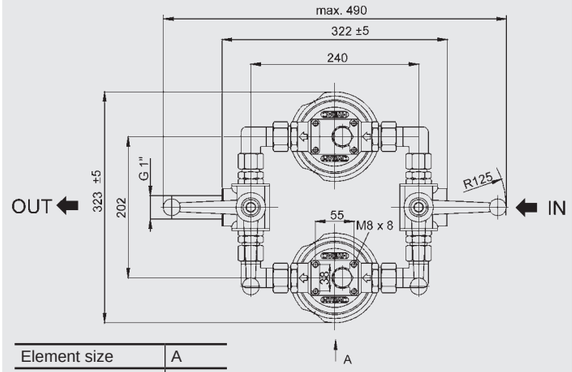


Element size	A
10 = 10"	357.5
20 = 20"	610.5
30 = 30"	864.5
40 = 40"	1118.5

Max. operating pressure	25 bar
Hydraulic connection (IN, OUT)	G 1"
Permitted temp. range of fluid	-10 to 90°C
Weight (empty)	10": 2.3 kg 20": 3.2 kg 30": 4.2 kg 40": 5.2 kg
Volume of housing	10": 1.9 l 20": 3.2 l 30": 4.6 l 40": 5.9 l
Material of filter head	Aluminium AC-44100
Material of filter bowl	Aluminium
Material of seals	NBR, FPM, EPDM

MRFD-1 E

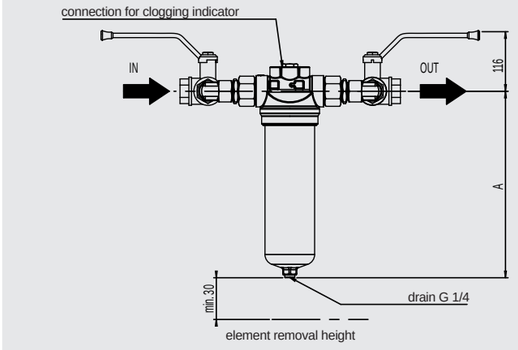


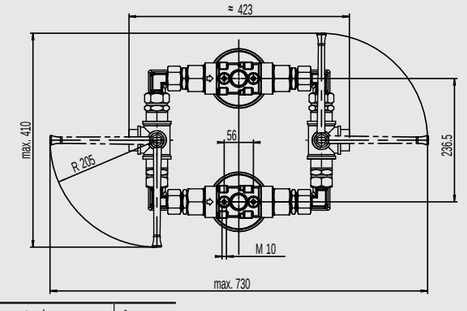


Element size	A
10 = 10"	332.5
20 = 20"	586.5
30 = 30"	816
40 = 40"	1094.5

Max. operating pressure	10 bar / 40 bar
Hydraulic connection (IN, OUT)	G 1"
Permitted temp. range of fluid	-10 to 90°C
Weight (empty)	10": 14 kg 20": 17 kg 30": 20 kg 40": 23 kg
Volume of housing	10": 2 x 1.1 l 20": 2 x 2.2 l 30": 2 x 3.2 l 40": 2 x 7.4 l
Material of seals	NBR, FPM, EPDM
Material of filter head	Stainless steel 1.4581
Material of filter bowl	Stainless steel 1.4571
Material of connections	Stainless steel
Material of clogging indicator	Stainless steel

MRFD-1 N

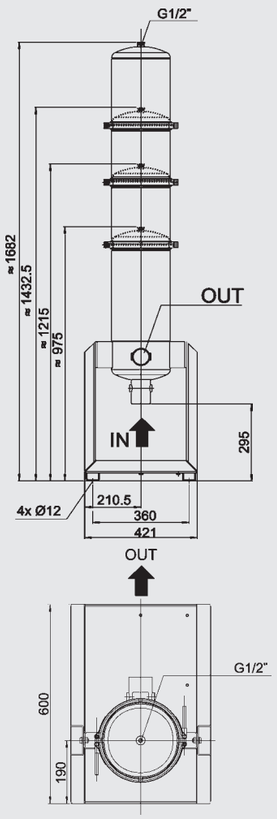




Element size	A
10 = 10"	357.5
20 = 20"	610.5
30 = 30"	864.5
40 = 40"	1118.5

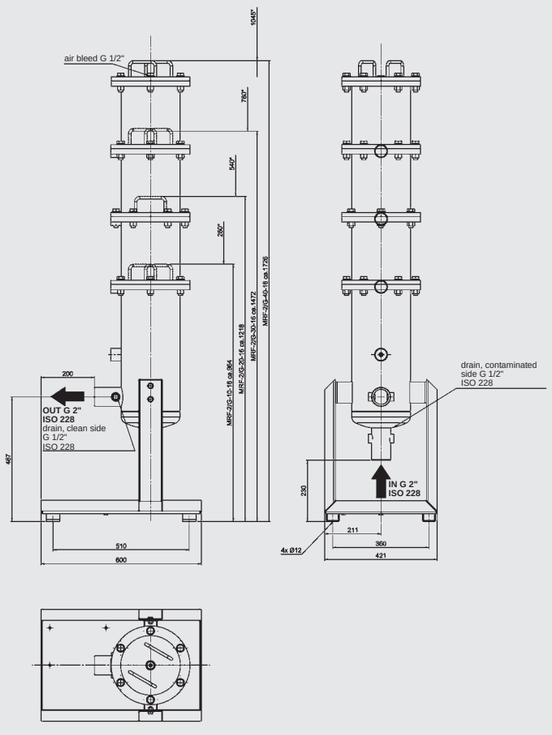
Max. operating pressure	25 bar
Hydraulic connection (IN, OUT)	G 1"
Permitted temp. range of fluid	-10 to 90°C
Weight (empty)	10": 12.2 kg 20": 14.0 kg 30": 16.0 kg 40": 20.6 kg
Volume of housing	10": 2x1.9 l 20": 2x3.2 l 30": 2x4.6 l 40": 2x5.9 l
Material of seals	NBR, FPM, EPDM
Material of filter head	Aluminium AC-44100
Material of filter bowl	Aluminium
Material of connections	Stainless steel
Material of clogging indicator	Stainless steel

MRF-2



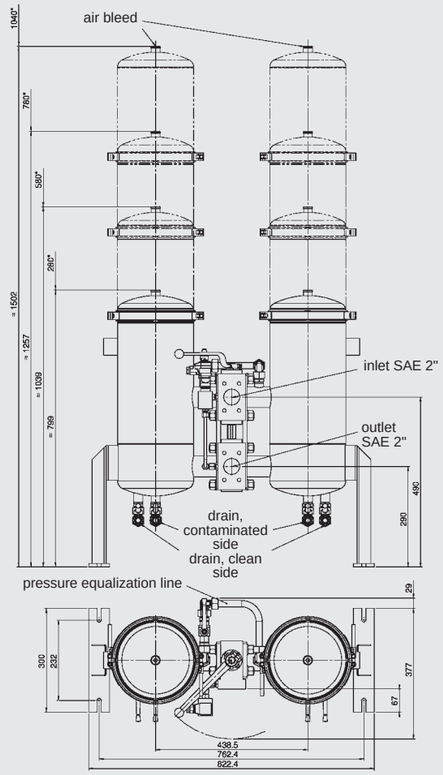
Max. operating pressure	10 bar
Hydraulic connection (IN, OUT)	G 1", G1 1/2", G2"
Permitted temp. range of fluid	-10 to 90°C
Weight (empty)	10": 30 kg 20": 35 kg 30": 36 kg 40": 38 kg
Volume of housing	10": 16 l 20": 24 l 30": 32 l 40": 40 l
Material of seals	NBR, FPM, EPDM
Material of filter head	Stainless steel 1.4301
Material of filter bowl	Stainless steel 1.4301
For housing material N	
Material of connections	Carbon steel
Material of clogging indicator	Aluminium
For housing material E	
Material of connections	Stainless steel
Material of clogging indicator	Stainless steel

MRF-2 16bar



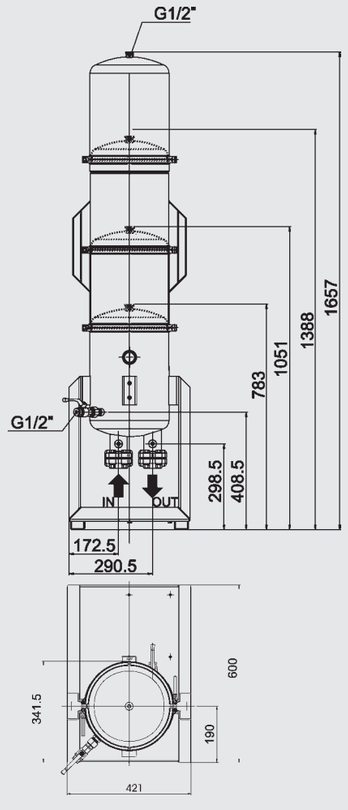
Max. operating pressure	16 bar
Hydraulic connection (IN, OUT)	G 1", G1 1/2", G2"
Permitted temp. range of fluid	-10 to 90°C
Weight (empty)	10": 66 kg 20": 70 kg 30": 75 kg 40": 78 kg
Volume of housing	10": 21 l 20": 31 l 30": 40 l 40": 50 l
Material of seals	FPM, NBR, EPDM
Material of filter head	Stainless steel 1.4301
Material of filter bowl	Stainless steel 1.4301
For housing material N	
Material of connections	Carbon steel
Material of clogging indicator	Aluminium
For housing material E	
Material of connections	Stainless steel
Material of clogging indicator	Stainless steel

MRFD-2 10bar



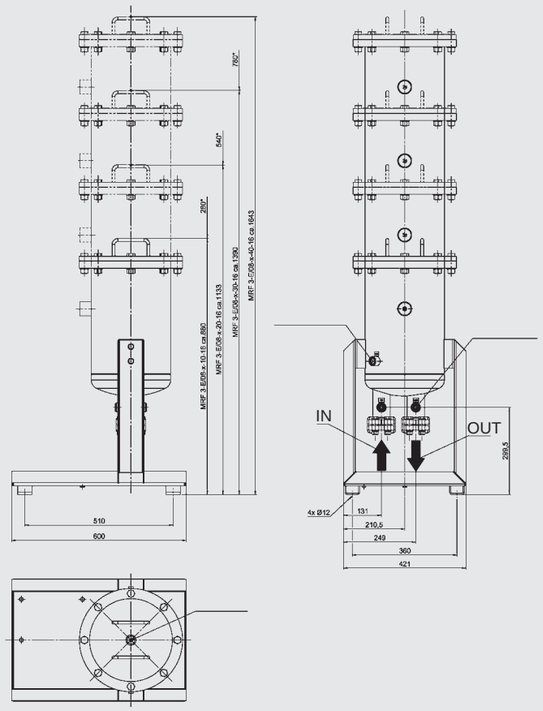
Max. operating pressure	10 bar
Hydraulic connection (IN, OUT)	SAE DN 50
Permitted temp. range of fluid	-10 to 90°C
Weight (empty)	10": 120 kg 20": 130 kg 30": 135 kg 40": 144 kg
Volume of housing	10": 2 x 17 l 20": 2 x 26 l 30": 2 x 35 l 40": 2 x 45 l
Material of seals	FPM, NBR, EPDM
Material of filter head	Stainless steel 1.4301
Material of filter bowl	Stainless steel 1.4301
For housing material N	
Material of connections	Carbon steel
Material of clogging indicator	Aluminium
For housing material E	
Material of connections	Stainless steel
Material of clogging indicator	Stainless steel

MRF-3



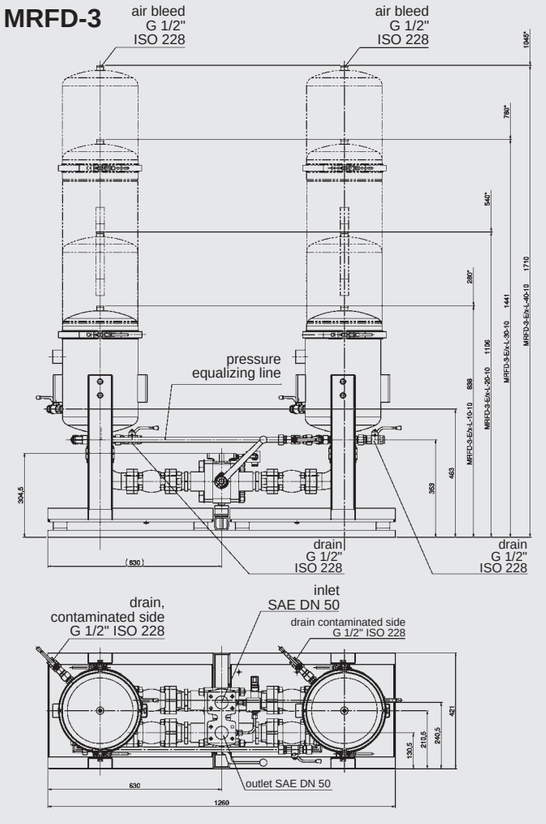
Max. operating pressure	10 bar
Hydraulic connection (IN, OUT)	G1", G1 1/2", G2", SAE DN50, DIN DN50
Permitted temp. range of fluid	-10 to 90°C
Weight (empty)	10": 35 kg 20": 40 kg 30": 45 kg 40": 49 kg
Volume of housing	10": 21 l 20": 42 l 30": 56 l 40": 70 l
Material of seals	NBR, FPM, EPDM
Material of filter head	Stainless steel 1.4301
Material of filter bowl	Stainless steel 1.4301
For housing material N	
Material of connections	Carbon steel
Material of clogging indicator	Aluminium
For housing material E	
Material of connections	Stainless steel
Material of clogging indicator	Stainless steel

MRF-3 16bar



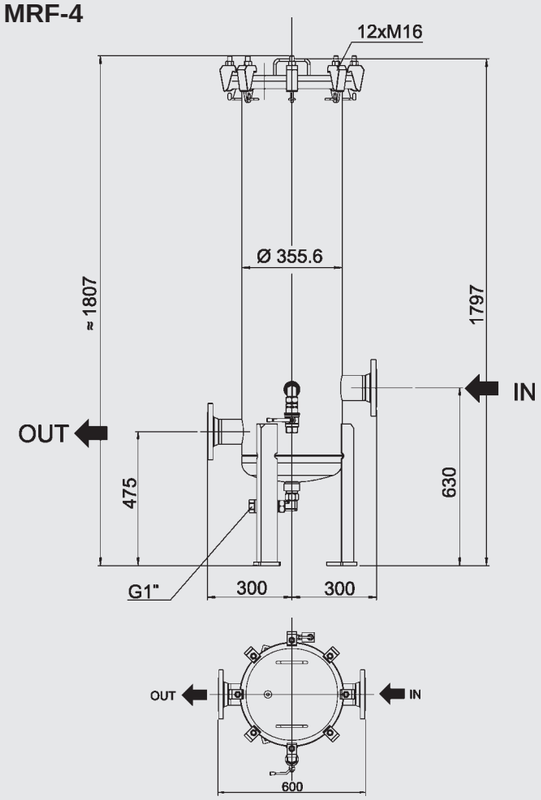
Max. operating pressure	16 bar
Hydraulic connection (IN, OUT)	G 1", G1 1/2", G2" SAE DN 50, DIN DN 50
Permitted temp. range of fluid	-10 to 90°C
Weight (empty)	10": 105 kg 20": 110 kg 30": 120 kg 40": 125 kg
Volume of housing	10": 33 l 20": 47 l 30": 60 l 40": 71 l
Material of seals	FPM, NBR, EPDM
Material of filter head	Stainless steel 1.4301
Material of filter bowl	Stainless steel 1.4301
For housing material N	
Material of connections	Carbon steel
Material of clogging indicator	Aluminium
For housing material E	
Material of connections	Stainless steel
Material of clogging indicator	Stainless steel

MRFD-3



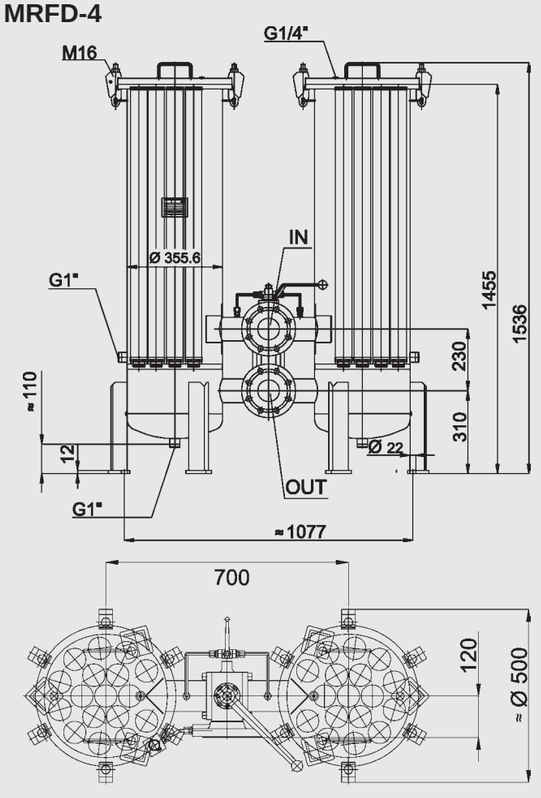
Max. operating pressure	10 bar
Hydraulic connection (IN, OUT)	SAE DN 50
Permitted temp. range of fluid	-10 to 90°C
Weight (empty)	10": 140 kg 20": 150 kg 30": 170 kg 40": 180 kg
Volume of housing	10": 2 x 33 l 20": 2 x 47 l 30": 2 x 60 l 40": 2 x 71 l
Material of seals	FPM, NBR, EPDM
Material of housing	Stainless steel 1.4301
Material of drip tray	S235JR powder-coated
Material of change-over valve	EN-G35-400-15
For housing material N	
Material of connections	Carbon steel
Material of clogging indicator	Aluminium

MRF-4



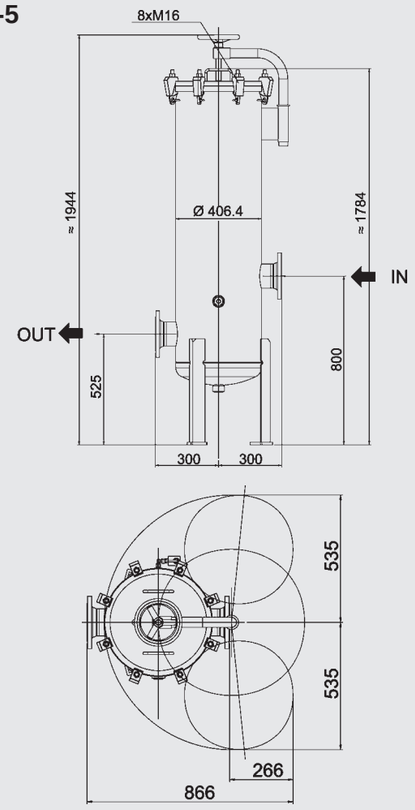
Max. operating pressure	10 bar / 16 bar
Hydraulic connection (IN, OUT)	DN 80/ EN 1092
Permitted temperature range of fluid	-10 to 90°C
Weight (empty)	165 kg (10 bar)
Volume of housing	130 l
Material of seals	NBR, FPM, EPDM
Material of filter head	Carbon steel 1.0305, 1.0038/ Stainless steel 1.4301 or higher
Material of filter bowl	Carbon steel 1.0305, 1.0038/ Stainless steel 1.4301 or higher
For housing material N	
Material of connections	Carbon steel
Material of clogging indicator	Aluminium
For housing material E	
Material of connections	Stainless steel
Material of clogging indicator	Stainless steel

MRFD-4



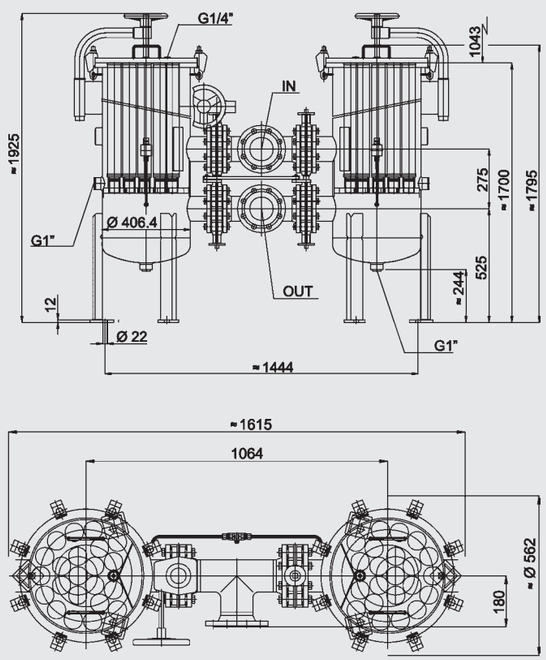
Max. operating pressure	10 bar / 16 bar
Hydraulic connection (IN, OUT)	DN 80/ EN 1092
Permitted temperature range of fluid	-10 to 90 °C
Weight (empty)	380 kg (10 bar)
Volume of housing	2 x 130 l
Material of seals	NBR, FPM, EPDM
Material of filter head	Carbon steel 1.0305, 1.0038/ Stainless steel 1.4301 or higher
Material of filter bowl	Carbon steel 1.0305, 1.0038/ Stainless steel 1.4301 or higher
For housing material N	
Material of connections	Carbon steel
Material of clogging indicator	Aluminium
For housing material E	
Material of connections	Stainless steel
Material of clogging indicator	Stainless steel

MRF-5



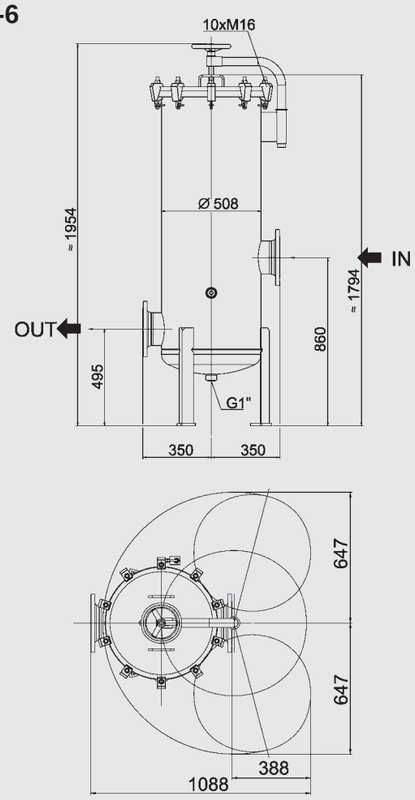
Max. operating pressure	10 bar / 16 bar
Hydraulic connection (IN, OUT)	DN 100/ EN 1092
Permitted temperature range of fluid	-10 to 90°C
Weight (empty)	230 kg (10 bar)
Volume of housing	180 l
Material of seals	NBR, FPM, EPDM
Material of filter head	Carbon steel 1.0305, 1.0038/ Stainless steel 1.4301 or higher
Material of filter bowl	Carbon steel 1.0305, 1.0038/ Stainless steel 1.4301 or higher
For housing material N	
Material of connections	Carbon steel
Material of clogging indicator	Aluminium
For housing material E	
Material of connections	Stainless steel
Material of clogging indicator	Stainless steel

MRFD-5



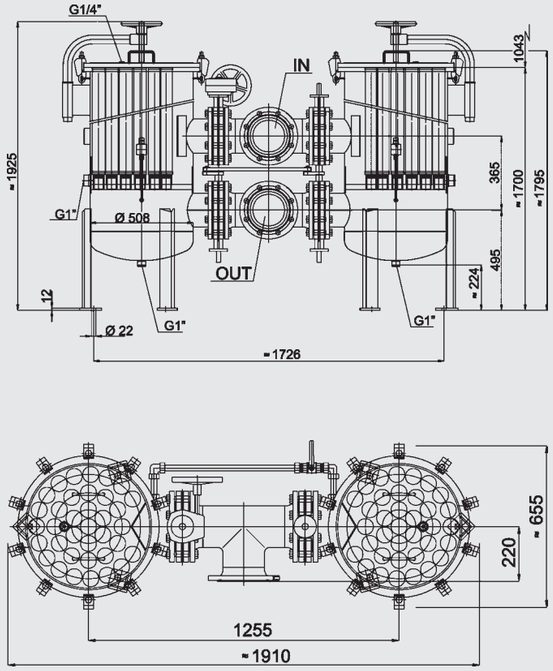
Max. operating pressure	10 bar / 16 bar
Hydraulic connection (IN, OUT)	DN 100/ EN 1092
Permitted temperature range of fluid	-10 to 90°C
Weight (empty)	530 kg (10 bar)
Volume of housing	2 x 180 l
Material of seals	NBR, FPM, EPDM
Material of filter head	Carbon steel 1.0305, 1.0038/ Stainless steel 1.4301 or higher
Material of filter bowl	Carbon steel 1.0305, 1.0038/ Stainless steel 1.4301 or higher
For housing material N	
Material of connections	Carbon steel
Material of clogging indicator	Aluminium

MRF-6



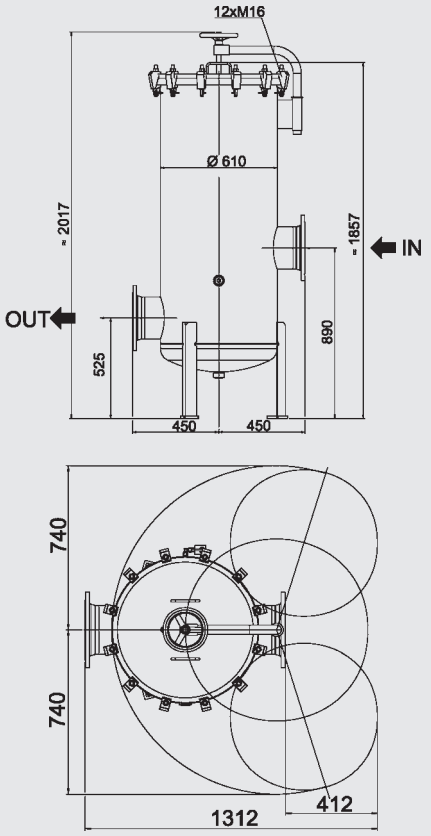
Max. operating pressure	10 bar / 16 bar
Hydraulic connection (IN, OUT)	DN 150/ EN 1092
Permitted temperature range of fluid	-10 to 90°C
Weight (empty)	305 kg (10 bar)
Volume of housing	290 l
Material of seals	NBR, FPM, EPDM
Material of filter head	Carbon steel 1.0305, 1.0038/ Stainless steel 1.4301 or higher
Material of filter bowl	Carbon steel 1.0305, 1.0038/ Stainless steel 1.4301 or higher
For housing material N	
Material of connections	Carbon steel
Material of clogging indicator	Aluminium
For housing material E	
Material of connections	Stainless steel
Material of clogging indicator	Stainless steel

MRFD-6



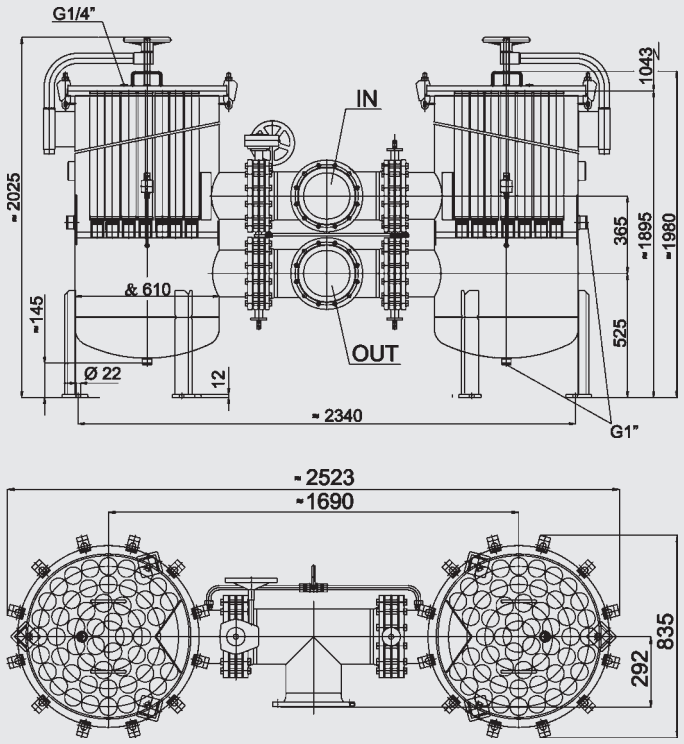
Max. operating pressure	10 bar / 16 bar
Hydraulic connection (IN, OUT)	DN 150/ EN 1092
Permitted temperature range of fluid	-10 to 90°C
Weight (empty)	730 kg (10 bar)
Volume of housing	2 x 290 l
Material of seals	NBR, FPM, EPDM
Material of filter head	Carbon steel 1.0305, 1.0038/ Stainless steel 1.4301 or higher
Material of filter bowl	Carbon steel 1.0305, 1.0038/ Stainless steel 1.4301 or higher
For housing material N	
Material of connections	Carbon steel
Material of clogging indicator	Aluminium

MRF-7



Max. operating pressure	10 bar / 16 bar
Hydraulic connection (IN, OUT)	DN 200/ EN 1092
Permitted temp. range of fluid	-10 to 90°C
Weight (empty)	400 kg (10 bar)
Volume of housing	465 l
Material of seals	NBR, FPM, EPDM
Material of filter head	Carbon steel 1.0305, 1.0038/ Stainless steel 1.4301 or higher
Material of filter bowl	Carbon steel 1.0305, 1.0038/ Stainless steel 1.4301 or higher
For housing material N	
Material of connections	Carbon steel
Material of clogging indicator	Aluminium
For housing material E	
Material of connections	Stainless steel
Material of clogging indicator	Stainless steel

MRFD-7



Max. operating pressure	10 bar / 16 bar
Hydraulic connection (IN, OUT)	DN 200/ EN 1092
Permitted temperature range of fluid	-10 to 90°C
Weight (empty)	920 kg (10 bar)
Volume of housing	2 x 465 l
Material of seals	NBR, FPM, EPDM
Material of filter head	Carbon steel 1.0305, 1.0038/ Stainless steel 1.4301 or higher
Material of filter bowl	Carbon steel 1.0305, 1.0038/ Stainless steel 1.4301 or higher
For housing material N	
Material of connections	Carbon steel
Material of clogging indicator	Aluminium

NOTE

The information in this brochure relates to the operating conditions and applications described.

For applications and operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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Automotive MultiRheo Filter AMRF 2/3/4/5/6/7

Description

The AMRF automotive MultiRheo filters are offline filtration units for use in open systems which are continually exposed to contamination.

The filter elements protect components such as nozzles, high pressure pumps or working filters, for example in function test rigs or industrial part washers.

Various sizes with a variety of connection options are available.

Applications

- Function test rigs
- Industrial part washers
- Machining centres
- Filling stations
- Engine oils
- Lubrication systems

Advantages

- Economic operation through high quality standards, defined filtration rates and high separation values
- Compact housing with high flow rates
- Service-friendly for replacing elements
- Efficient system and component protection
- Environmentally protective disposal because ashable

Model code

AMRF – 4 – E / 15 – Q – 40 – 10 – F – D32 – 0 / – OE

Type

AMRF	= Automotive MultiRheo filter
AMRFD	= Change-over automotive MultiRheo filter

Filter size

2	= ≈ 220 mm housing diameter
3	= ≈ 274 mm housing diameter
4	= ≈ 355 mm housing diameter
5	= ≈ 406 mm housing diameter
6	= ≈ 508 mm housing diameter
7	= ≈ 610 mm housing diameter

Housing material

E	= Stainless steel*

* For quality, see technical specifications

Number of elements

		For size					
5	= 5 filter elements	2					
8	= 8 filter elements		3				
15	= 15 filter elements			4			
18	= 18 filter elements				5		
26	= 26 filter elements					6	
38	= 38 filter elements						7

Hydraulic connection

		For size					
D	= G 1"	2	3				
F	= G 1 ½"	2	3				
G	= G 2"	2	3				
L	= SAE DN50	2	3				
J	= DIN DN 50	2	3				
Q	= DIN DN 80			4			
R	= DIN DN 100				5		
S	= DIN DN 150					6	
W	= DIN DN 200						7

Element length

		For size					
10	= 10 "	2	3				
20	= 20 "	2	3				
30	= 30 "	2	3	4	5	6	7
40	= 40 "	2	3	4	5	6	7

Pressure range

		For size					
10	= 10 bar	2	3	4	5	6	7
16	= 16 bar	2	3	4	5	6	7

Seal material

F	= FPM (Viton)

Clogging indicator

D32	= Differential pressure indicator (Gw.0/-V-113)
Dz	= Piping for retrofitting a differential pressure indicator
Z	= Without clogging indicator

See HYDAC brochure for filter clogging indicators (D 7.050...)

Modification number

0	= The latest version is always supplied

Supplementary details

OE	= Without drain
L	= Without foot / drip tray
E	= Air bleed connection
KL	= Hinged screws
KLM	= Clamp screw

Filter calculation

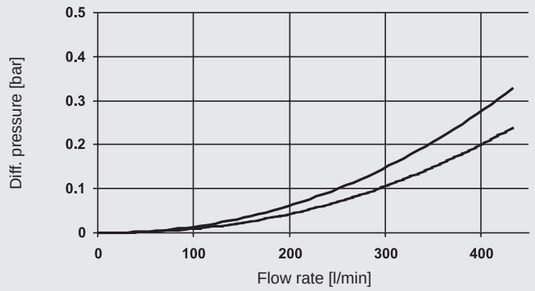
The total pressure drop of the filter at a certain flow rate is the sum of the housing Δp and the element Δp. The housing pressure drop can be determined using the following pressure drop curves. The filter element Δp is calculated using the R-factors (see filter element data sheet).

Housing ∆p: Housing pressure drop graphs

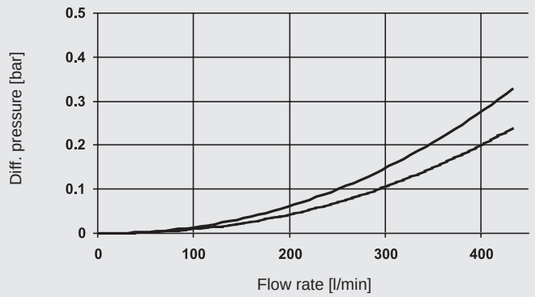
The housing curves above apply to mineral oil with a density of 0.86 kg/dm³ and a kinematic viscosity of 30 mm²/s. The lower housing curves apply to water at 20 °C. For turbulent flow, the differential pressure will change proportionally to the density; for laminar flow, it will change proportionally to the density and viscosity. The flow velocity should not exceed 3 m/s at the filter inlet for oil and 4 m/s for water.

Housing pressure drop graphs (Housing-∆p)

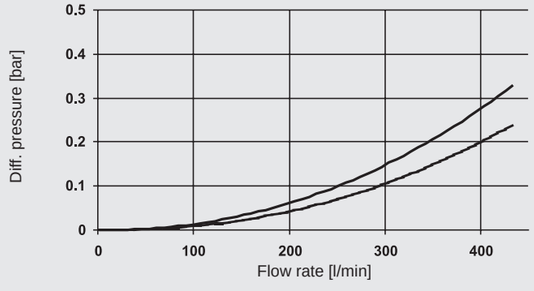
AMRF-2



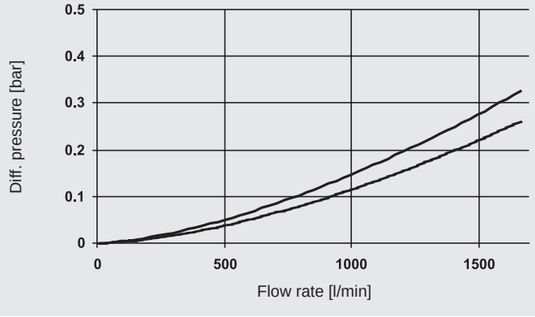
AMRFD-2



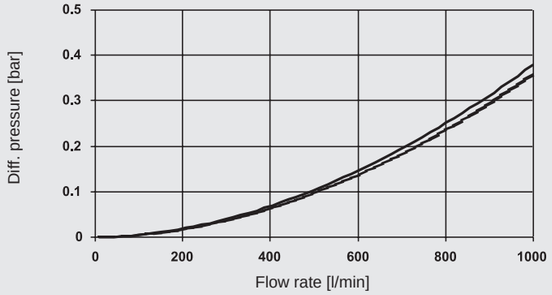
AMRF-3



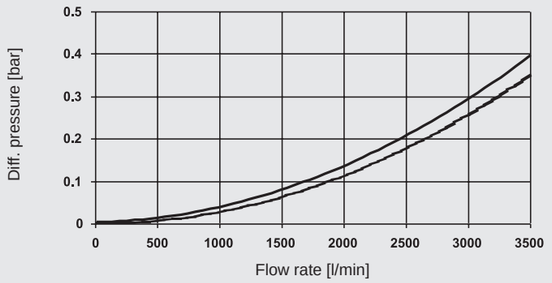
AMRF-4



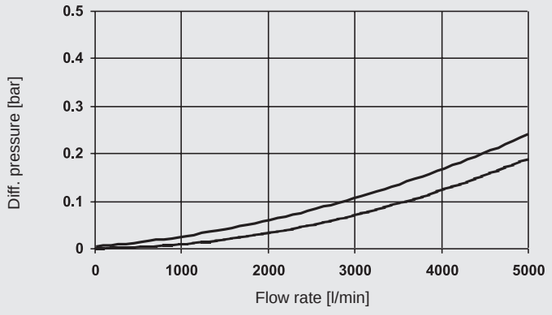
AMRFD-4



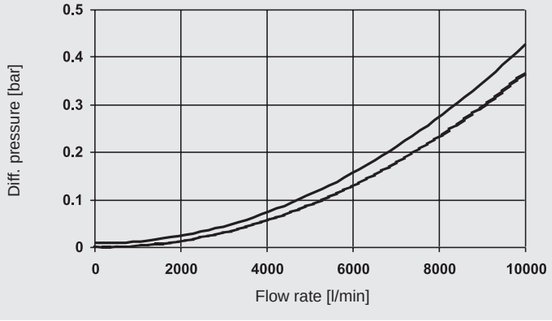
AMRF-5



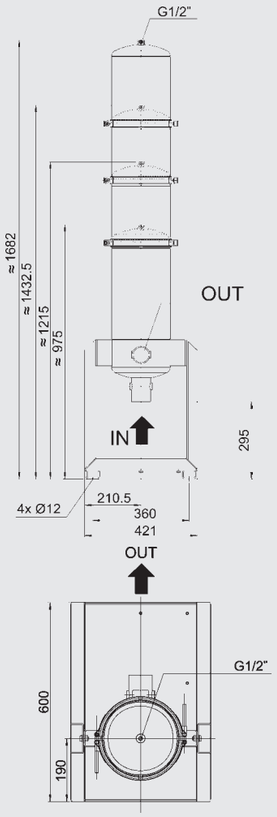
AMRF-6



AMRF-7

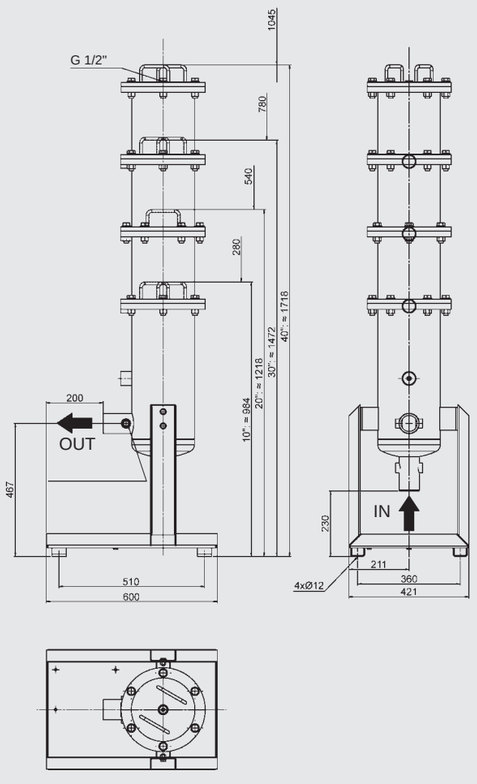


AMRF-2



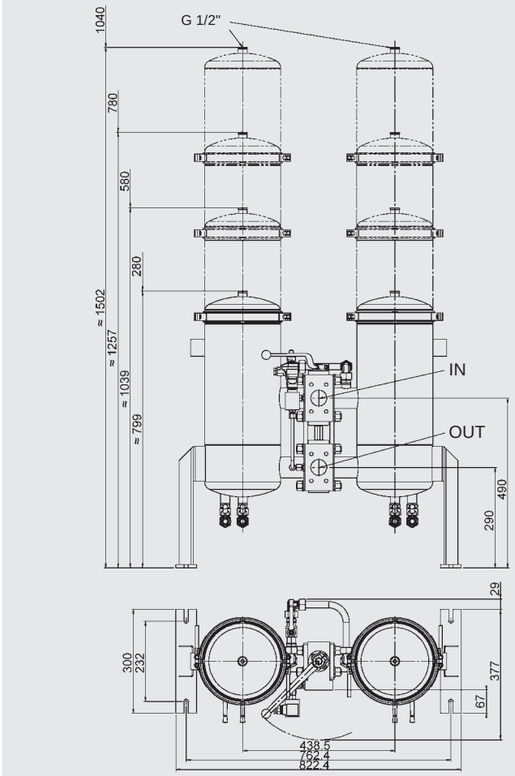
Max. operating pressure	10 bar
Hydraulic connection (IN, OUT)	G 1", G1 1/2", G2" DIN DN 50
Permitted temp. range of fluid	-10 to 90 °C
Weight	10": 30 kg 20": 35 kg 30": 36 kg 40": 38 kg
Volume of housing	10": 16 l 20": 24 l 30": 32 l 40": 40 l
Material of filter head	Stainless steel 1.4301
Material of filter bowl	Stainless steel 1.4301
Material of seals	FPM

AMRF-2 16bar



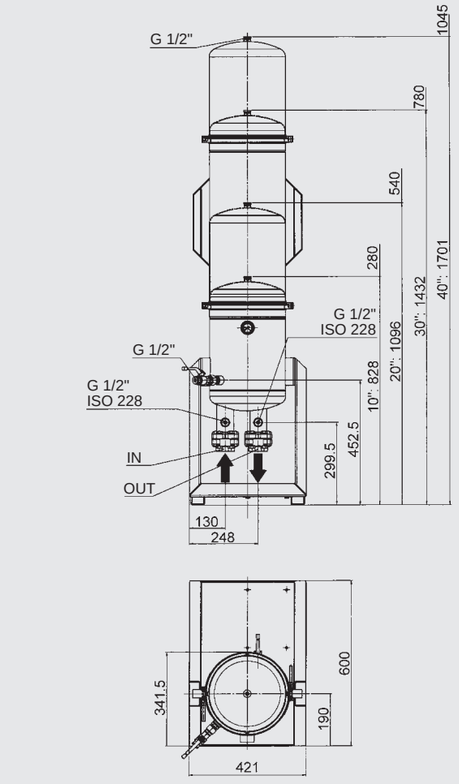
Max. operating pressure	16 bar
Hydraulic connection (IN, OUT)	G 1", G1 1/2", G2"
Permitted temp. range of fluid	-10 to 90 °C
Weight	10": 66 kg 20": 70 kg 30": 75 kg 40": 78 kg
Volume of housing	10": 21 l 20": 31 l 30": 40 l 40": 50 l
Material of filter head	Stainless steel 1.4301
Material of filter bowl	Stainless steel 1.4301
Material of seals	FPM

AMRFD-2 10bar



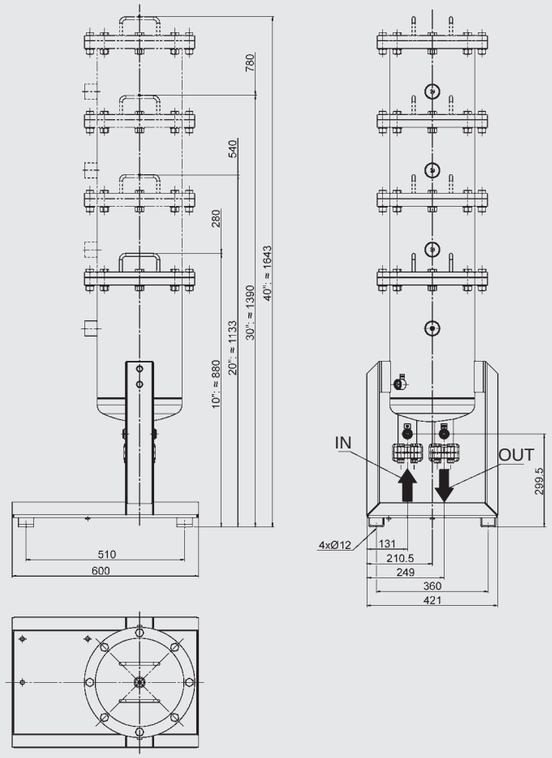
Max. operating pressure	10 bar
Hydraulic connection (IN, OUT)	SAE DN 50
Permitted temp. range of fluid	-10 to 90 °C
Weight	10": 120 kg 20": 130 kg 30": 135 kg 40": 144 kg
Volume of housing	10": 2 x 17 l 20": 2 x 26 l 30": 2 x 35 l 40": 2 x 45 l
Material of filter head	Stainless steel 1.4301
Material of filter bowl	Stainless steel 1.4301
Material of seals	FPM

AMRF-3



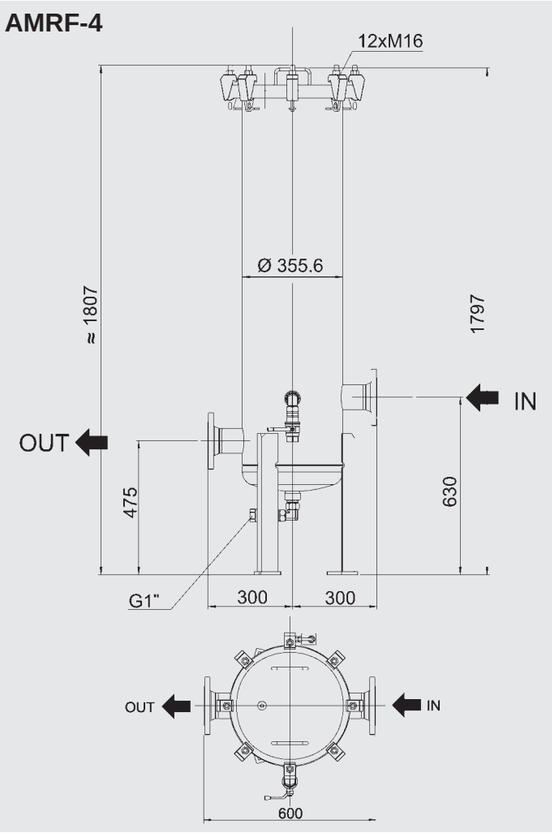
Max. operating pressure	10 bar
Hydraulic connection (IN, OUT)	G1", G1 1/2", G2", SAE DN50, DIN DN50
Permitted temp. range of fluid	-10 to 90 °C
Weight	10": 35 kg 20": 40 kg 30": 45 kg 40": 49 kg
Volume of housing	10": 21 l 20": 42 l 30": 56 l 40": 70 l
Material of filter head	Stainless steel 1.4301
Material of filter bowl	Stainless steel 1.4301
Material of seals	FPM

AMRF-3 16bar



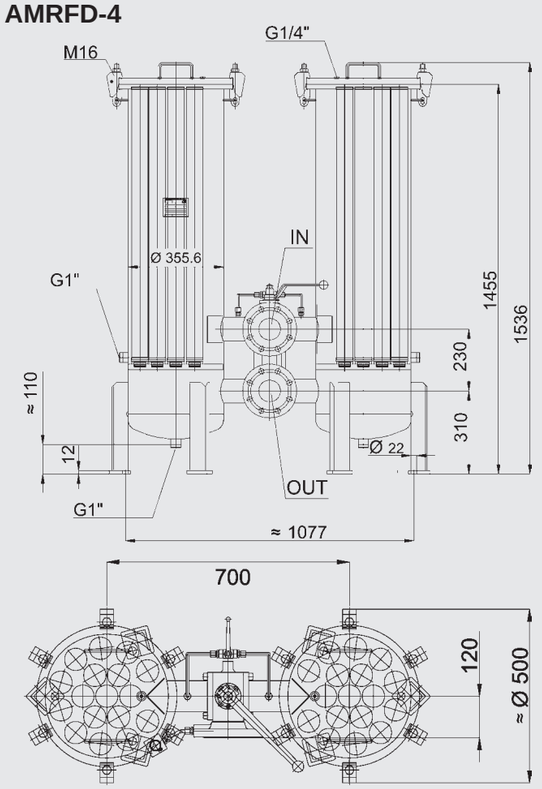
Max. operating pressure	16 bar
Hydraulic connection (IN, OUT)	G 1", G1 1/2", G2" SAE DN 50, DIN DN 50
Permitted temp. range of fluid	-10 to 90 °C
Weight	10": 105 kg 20": 110 kg 30": 120 kg 40": 125 kg
Volume of housing	10": 33 l 20": 47 l 30": 60 l 40": 71 l
Material of filter head	Stainless steel 1.4301
Material of filter bowl	Stainless steel 1.4301
Material of seals	FPM

AMRF-4



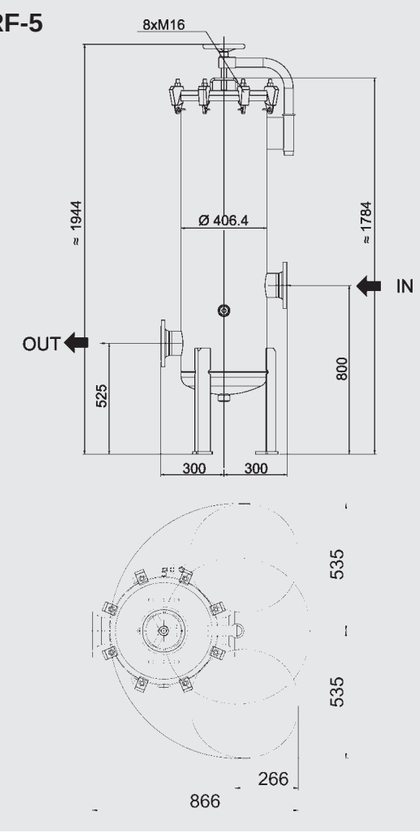
Max. operating pressure	10 bar / 16 bar
Hydraulic connection (IN, OUT)	DN 80
Permitted temperature range of fluid	-10 to 90°C
Weight	165 kg (10 bar)
Volume of housing	130 l
Material of filter head	Stainless steel 1.4301 or higher
Material of filter bowl	Stainless steel 1.4301 or higher
Material of seals	FPM

AMRFD-4



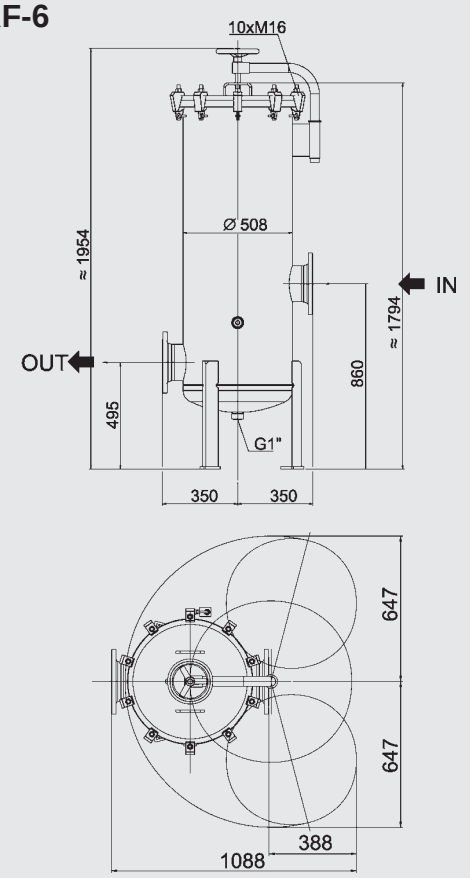
Max. operating pressure	10 bar / 16 bar
Hydraulic connection (IN, OUT)	DN 80
Permitted temperature range of fluid	-10 to 90 °C.
Weight	380 kg (10 bar)
Volume of housing	2 x 130 l
Material of filter head	Stainless steel 1.4301 or higher
Material of filter bowl	Stainless steel 1.4301 or higher
Material of seals	FPM

AMRF-5



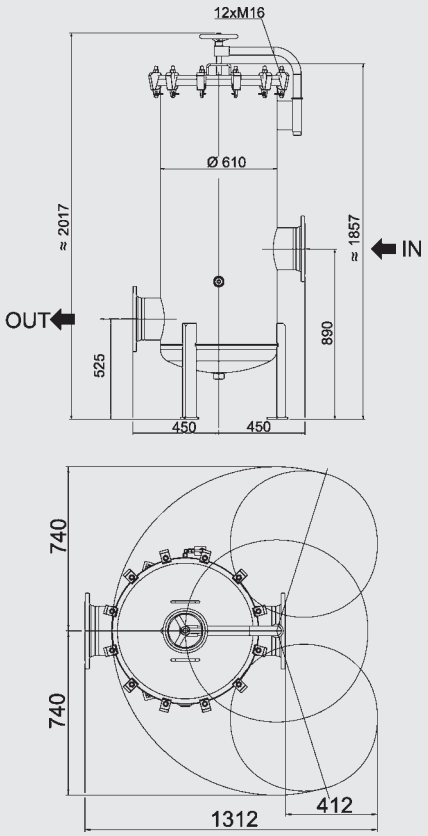
Max. operating pressure	10 bar / 16 bar
Hydraulic connection (IN, OUT)	DN 100
Permitted temperature range of fluid	-10 to 90°C
Weight	230 kg (10 bar)
Volume of housing	180 l
Material of filter head	Stainless steel 1.4301 or higher
Material of filter bowl	Stainless steel 1.4301 or higher
Material of seals	FPM

AMRF-6



Max. operating pressure	10 bar / 16 bar
Hydraulic connection (IN, OUT)	DN 150
Permitted temperature range of fluid	-10 to 90°C
Weight	305 kg (10 bar)
Volume of housing	290 l
Material of filter head	Stainless steel 1.4301 or higher
Material of filter bowl	Stainless steel 1.4301 or higher
Material of seals	FPM

AMRF-7



Max. operating pressure	10 bar / 16 bar
Hydraulic connection (IN, OUT)	DN 200
Permitted temperature range of fluid	-10 to 90°C
Weight	400 kg (10 bar)
Volume of housing	465 l
Material of filter head	Stainless steel 1.4301 or higher
Material of filter bowl	Stainless steel 1.4301 or higher
Material of seals	FPM

Note

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For applications and operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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OffLine Filter
OLF 5

Description

The OLF 5 and 10 series of filters are used for the offline, fine filtration of hydraulic oils.

The series comprises numerous versions, for example with or without motor-pump unit, element removal from either top or bottom, in-tank mounting, with optional sensors for determining the cleanliness code and water content, etc.

For every application therefore, HYDAC can provide the right unit.

Depending on the model, flow rates up to 15 l/min and viscosities up to 7,000 mm²/s can be supported.

The Dimicron elements used are characterized by:
– particularly high contamination retention capacity
– environmentally safe disposal (incinerable) and
– water absorption (optional).

Applications

- Machine tools
- Plastic injection moulding machines
- Mobile hydraulics
- Industrial hydraulics
- Wind power

Advantages

- Improved component and system filter lifetime
- Greater machine availability
- Longer oil change intervals
- Minimum space requirement due to compact design
- Very easy maintenance
- High contamination retention capacity of the elements
- Option: Continuous monitoring of solid particle contamination and water saturation in the oil during cleaning
- Environmentally safe disposal of elements (incinerable)

Technical details

Pump type	Vane pump
Fluid temperature range	0 to 80°C
Ambient temperature range	-20 to 40°C
Seal material	NBR or FKM
Supply voltage / power consumption	Depending on version
Electrical protection class	IP 54

Preferred models (with shorter delicery times)

Part number	Model code
3073372	OLF-5-F-Z-Z-Z-E
349565	OLF-5-S-120-N-Z-E
3655862	OLF-5/15-S-370-N-Z-E

Technical details

	OLF-5...	OLF-5/4...	OLF-5/15...	OLF-10/15...	OLF-5/Z...	OLF-10/Z...
Flow rate	**5 l/min***	**5 l/min***	**15 l/min***	**15 l/min***	**15 l/min***	**30 l/min***
Max. operating pressure	**3.5 bar**	**4.5 bar**	**4.5 bar**	**4.5 bar**	**6.0 bar**	**6.0 bar**
Viscosity range	**15 to 150 mm²/s**	**15 to 7000 mm²/s***	**15 to 1000 mm²/s****	**15 to 1000 mm²/s****	**15 to 1000 mm²/s****	**15 to 1000 mm²/s****
Permitted pressure at INLET port						
OLF-x-S	-0.4 to 0.6 bar	-0.4 to 0.6 bar	-0.4 to 0.6 bar	–	–	–
OLF-x-E	10 to 50 bar	–	–	–	–	–
OLF-x-F	-0.4 to 6 bar	–	–	–	–	–
OLF-x-T	–	–	-0.4 to 0.6 bar	-0.4 to 0.6 bar	6 bar	6 bar
OLFCM-x-T	–	–	-0.4 to 0.6 bar	-0.4 to 0.6 bar	–	–
Hydraulic connections according to ISO 228						
OLF-x-S	IN = ½" OUT = ½"	IN = 1" OUT = 1"	IN = 1" OUT = 1"	–	–	–
OLF-x-E	IN = 3/8" OUT = ½"	–	–	–	–	–
OLF-x-F	IN = ½" OUT = ½"	–	–	–	–	–
OLF-x-T	–	–	IN = 1" OUT = 1"	IN = 1" OUT = 1"	IN = ½" OUT = ½"	IN = 1" OUT = 1"
OLFCM-x-T	–	–	IN = 1" OUT = 1"	IN = 1" OUT = 1"	–	–
Filtration rating						
Dimicron	2, 5, 10 or 20 µm	2, 5, 10 or 20 µm	2, 5, 10 or 20 µm	2, 5, 10 or 20 µm	2, 5, 10 or 20 µm	2, 5, 10 or 20 µm
Aquamicron	2, or 20 µm	2, or 20 µm	2, or 20 µm	2 µm	2, or 20 µm	2 µm
Contamination retention capacity to ISO 16889 Δp = 2.5 bar						
Dimicron	240 g	240 g	240 g	480 g	240 g	480 g
Aquamicron	185 g and ≈ 0.25 l water	185 g and ≈ 0.25 l water	185 g and ≈ 0.25 l water	370 g and ≈ 0.50 l water	185 g and ≈ 0.25 l water	370 g and ≈ 0.50 l water
Weight when empty						
OLF-x-S	≈ 9 kg	≈ 11 kg	≈ 12 kg	–	–	–
OLF-x-E	≈ 4 kg	–	–	–	–	–
OLF-x-F	≈ 4 kg	–	–	–	–	–
OLF-x-T	–	–	≈ 13 kg	≈ 15 kg	≈ 5 kg	≈ 6 kg
OLFCM-x-T	–	–	≈ 16 kg	≈ 16 kg	–	–
Filter element type / size						
	N5	N5 / spin-on	N5	N10	N5	N10

* = When the viscosity is high, the flow rate can be significantly lower.

** = For basic type OLFCM maximum 15 to 200 mm2/s

– = Model not available

Model code

OLF - 5 - S - 120-N - N5DM002 - E /-7.5

Basic type

OLF = OffLine filter
OLFCM = OffLine filter with FluidCondition Monitoring
(only with size 5/15, 10/15 and Toploader version)
(permitted viscosity range 5 to 200 mm²/s)

Size and nominal flow rate

5 = 5 l/min (not for Toploader version)
5/4 = 5 l/min (for lubrication systems)
5/15 = 15 l/min
10/15 = 15 l/min (for N10 elements, only for Toploader version)
5/Z = Filter only (only for Toploader version)
10/Z = Filter only (only for Toploader version)

Version

S = standard with motor (OLF-5, OLF-5/4, OLF-5/15)
E = flow valve (10 to 50 bar) without motor (OLF-5)
T = Toploader with or without motor (OLF-5/15, OLF-10/15, OLF-5/Z, OLF-10/Z)
F = filter only (OLF-5)
Standard seal material is NBR (no need to specify).
For version in FKM (FPM, Viton®) add "V" here, e.g.: OLF-5-SV-...

Voltage supply

	OLF 5	OLF 5/4	OLF 5/15	OLF 10/15
120-N	120 W, 3x400 V 50 Hz	–	–	–
120-M	120 W, 1x230 V 50 Hz	–	–	–
120-K	120 W, 1x120 V 60 Hz	–	–	–
370-N	–	370 W, 3x400 V 50 Hz	370 W, 3x400 V 50 Hz	370 W, 3x400 V 50 Hz
370-M	–	370 W, 1x230 V 50 Hz	370 W, 1x230 V 50 Hz	370 W, 1x230 V 50 Hz
370-K	–	370 W, 1x120 V 60 Hz	370 W, 1x120 V 60 Hz	370 W, 1x120 V 60 Hz
200-U	200 W, 24 V DC	–	200 W, 24 V DC	200 W, 24 V DC
Z-Z	no motor	–	–	–

– not available

Others on request!

Element type

N 5 DM 002 = DIMICRON filtration rating 2 µm absolute
N 5 DM 005 = DIMICRON filtration rating 5 µm absolute
N 5 DM 010 = DIMICRON filtration rating 10 µm absolute
N 5 DM 020 = DIMICRON filtration rating 20 µm absolute
N 5 AM 002 = AQUAMICRON filtration rating 2 µm absolute
N 5 AM 020 = AQUAMICRON filtration rating 20 µm absolute
N 10 DM 002 = DIMICRON filtration rating 2 µm absolute
N 10 DM 005 = DIMICRON filtration rating 5 µm absolute
N 10 DM 010 = DIMICRON filtration rating 10 µm absolute
N 10 DM 020 = DIMICRON filtration rating 20 µm absolute
N 10 AM 002 = AQUAMICRON filtration rating 2 µm absolute
Z = without filter element

Clogging indicator

E = back-pressure indicator (standard on OLF-5)
F = pressure switch – electrical (VR2F.0)
BM = visual differential pressure indicator (VM2BM.1) (standard on OLF-5/15)
C = electrical differential pressure indicator (VM2C.0)
D = visual/electrical differential pressure indicator (VM2D.0)
Z = without clogging indicator

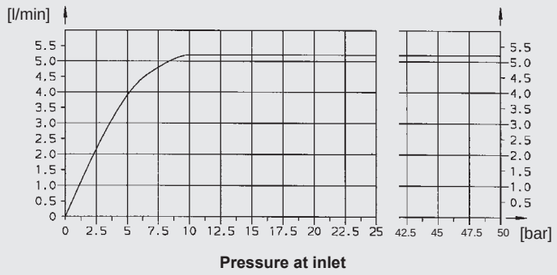
E, F not for sizes/versions OLF-5/15
BM, C, D not for sizes/versions OLF-5-S
For BM, C, D there is no back-pressure indicator

Supplementary details

C = with ContaminationSensor CS 1310 (without display)
CD = with ContaminationSensor CS 1320 (with display)
AC = with ContaminationSensor CS 1310 and AquaSensor AS1000 (without display)
ACD = with ContaminationSensor CS 1320 and AquaSensor AS3000 (with display)
7.5 = with 7.5 bar pressure relief valve

SRV flow control valve curve

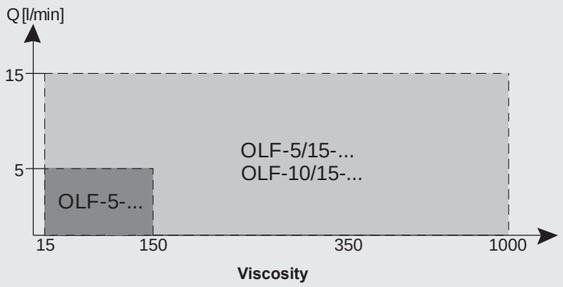
(OLF-5-E...)



Application

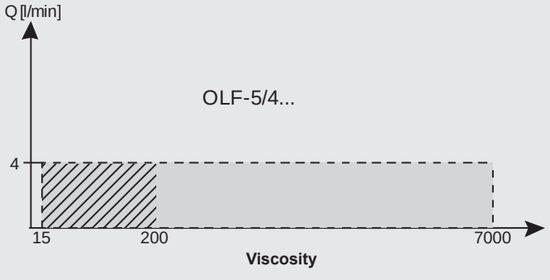
Tank volumes up to approx. 800 l

Tank volumes up to approx. 2000 l

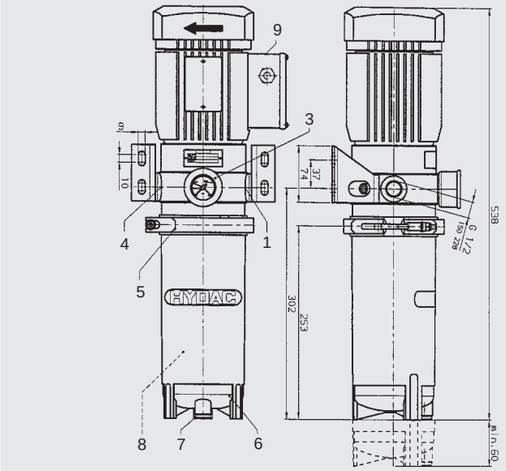


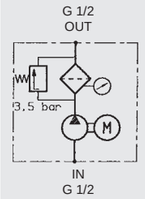
Tank volumes up to approx. 300 l

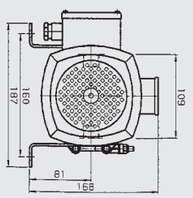
Viscosity range in which the max. flow rate will only be achieved after approx. 10 minutes, if the pump is not primed.



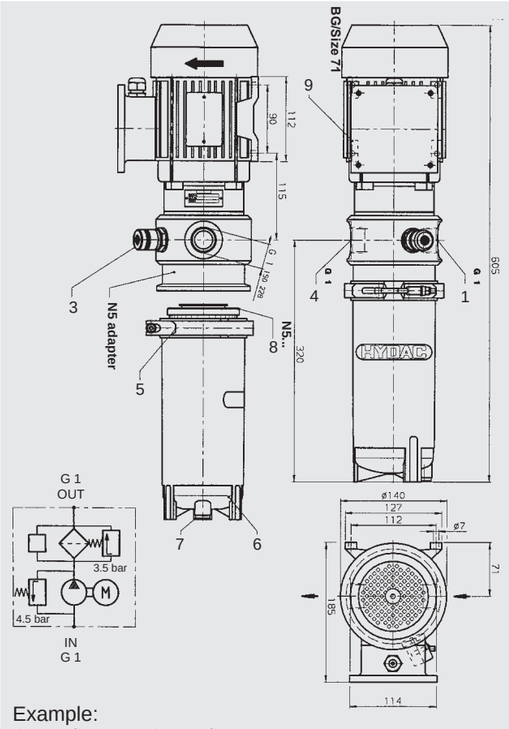
Dimensions





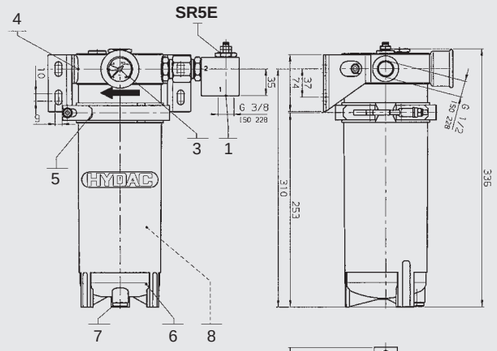


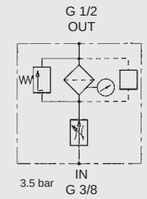
Example:
OLF-5-S...

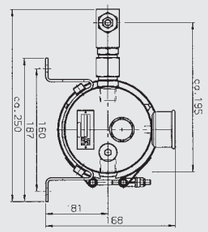


Example:
OLF-5/15-S..., OLF-5/4-S...

1 = Inlet
3 = Clogging indicator
4 = Outlet
5 = Clamp
6 = Filter bowl
7 = Drain
8 = Filter element
9 = Electric motor

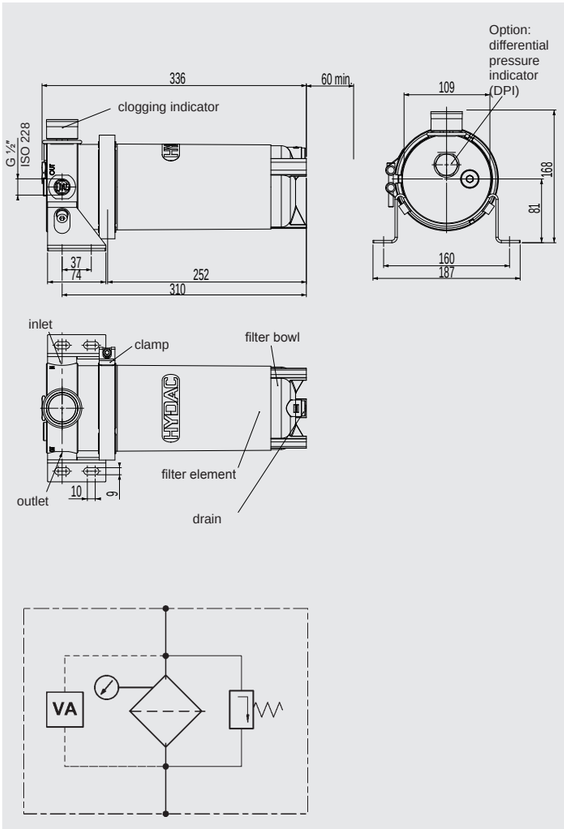




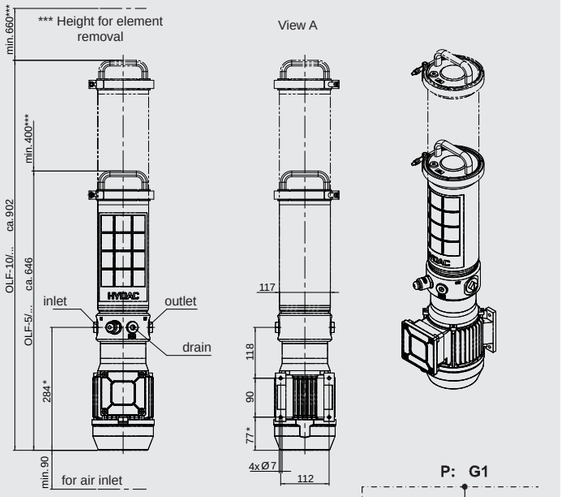


1 = Inlet
3 = Clogging indicator
4 = Outlet
5 = Clamp
6 = Filter bowl
7 = Drain
8 = Filter element

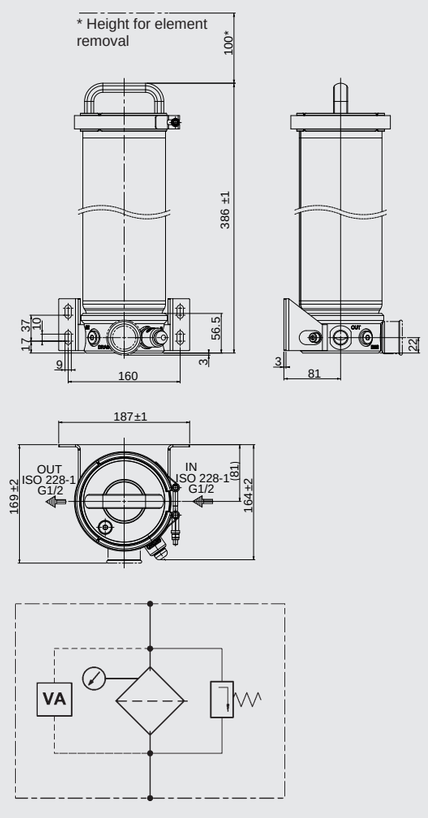
Example:
OLF-5-E...



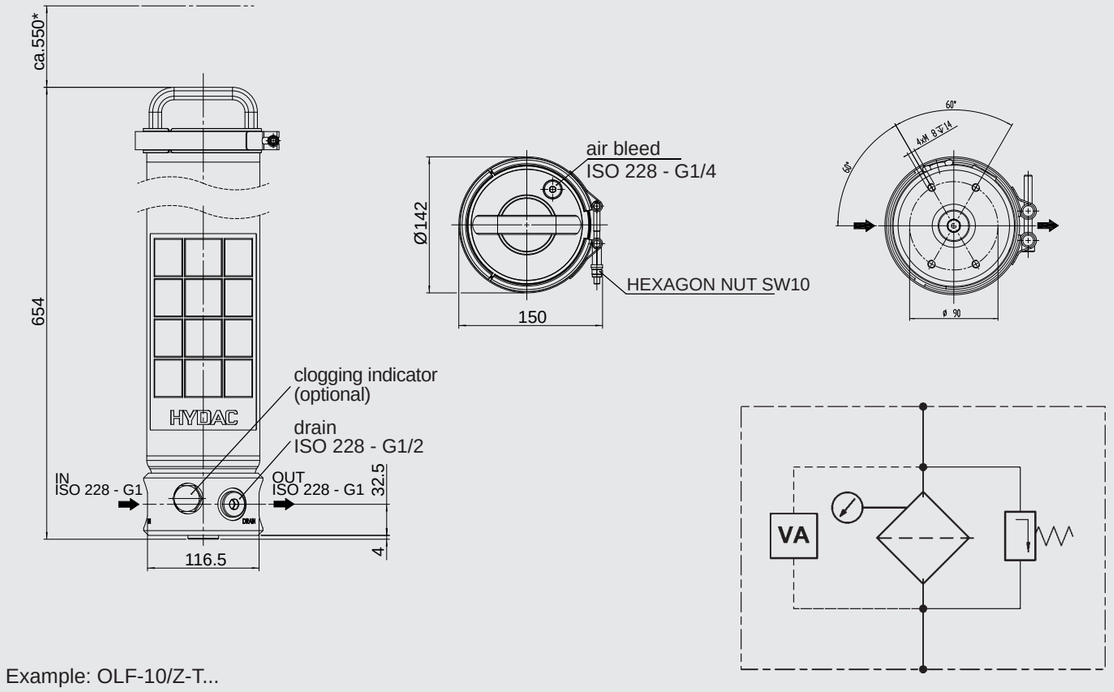
Example: OLF-5-F...



Example: OLF-5/15-T...
OLF-10/15-T...



Example: OLF-5/Z-T...



Example: OLF-10/Z-T...

* Depending on the manufacturer of the electric motor

** space required for maintenance and repair work

Example:
OLFCM-5/15-T...
OLFCM-10/15-T...

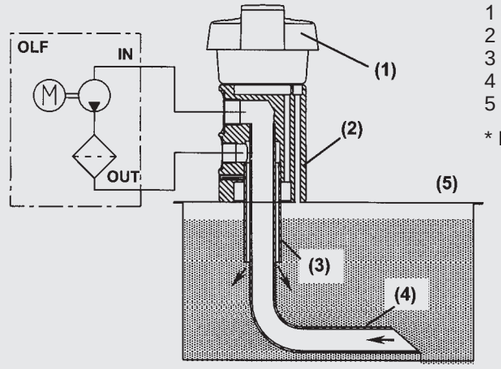
Accessories

– Tank adapter kit OLF-5-TAK

Part No. 3039235

Quick retrofit kit to connect the OLF to hydraulic systems.

Can be installed on systems which have a breather filter with an interface to DIN 24557/Part 2.



1 = breather filter
2 = adapter *
3 = return line *
4 = suction line *
5 = tank

* Items supplied

OLF-5-TAK

Replacement elements

Element type	Part number
N 5 DM 002	349494
N 5 AM 002	349677
N 5 DM 005	3068101
N 5 DM 010	3102924
N 5 DM 020	3023508
N 5 AM 020	3040345
N 10 DM 002	3539235
N 10 DM 005	3539237
N 10 DM 010	3539238
N 10 DM 020	3539242
N 10 AM 002	3582637
M 160 B 03	314609
M 160 B 05	315621
M 160 B 10	314022
M 160 B 20	315485
M 180 B 03	310475
M 180 B 05	315622
M 180 B 10	315726
M 180 B 20	315623

Note

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Subject to technical modifications.

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OffLine Filter
OLF 15/30/45/60

Description

The OLF 15/30/45/60 series of filtration units are robust off-line filters for stationary applications in hydraulic and lubrication systems with a large fluid volume.

The Dimicron elements used in these filters are noted for their particularly high contamination retention capacity and an environmentally safe method of disposal (incinerable).

The optional monitoring equipment ContaminationSensor CS1000 is used to monitor the solid particle contamination in the oil. The AquaSensor AS1000 measures the water saturation (in %) as well as the temperature of the fluid.

To display the measurements, you can choose between the sensor displays or a central display with data storage using the SensorMonitoring Unit SMU 1200.

The measurements can simply be transferred from this to a PC using a USB memory stick or can be integrated into a plant control system using analogue outputs.

Applications

- Machine tools
- Plastic injection machines

Advantages

- Improved service life of components and system filter
- Greater machine availability
- Longer oil change intervals
- Very easy maintenance
- Elements have a high contamination retention capacity
- Environmentally safe disposal of elements (incinerable)
- Optional sensors available to monitor the contamination in the oil

Technical specifications

Filter housing	**OLF-15**	**OLF-30**	**OLF-45**	**OLF-60**
Filter element	N15DMxxx (1x)	N15DMxxx (2x)	N15DMxxx (3x)	N15DMxxx (4x)
Contamination retention capacity to ISO 4572	500 g	1000 g	1500 g	2000 g
Filtration performance data based on ISO 4572	$\beta_{2,\ 10,\ 20,\ 30}$ > 1000 at Δp = 2 bar			
Permitted Δp across the element	4 bar			
Material of housing	Stainless steel 1.4301			
Weight of filter element	3.1 kg	6.2 kg	9.3 kg	12.4 kg
Volume of housing	20 l	40 l	60 l	78 l
Max. operating pressure	6 bar (others on request)			
Material of seals (standard)	NBR			
Weight without motor	25 kg	30 kg	40 kg	45 kg
Fluid temperature	10 to 80°C			

Motor-pump unit	**15 l/min**	**30 l/min**	**45 l/min**	**60 l/min**
Operating pressure of the pump	4.5 to 5.5 bar			
Permitted suction pressure at suction port	-0.4 to +0.5 bar			
Viscosity range with vane pump OLF	15 to 500 mm²/s			
Viscosity range with vane pump OLFCM	15 to 200 mm²/s			
Viscosity range with gear pump	15 to 1000 mm²/s			
Viscosity range with centrifugal pump	1 to 20 mm²/s			
Motor output Vane pump OLF Vane pump OLFCM Gear pump Centrifugal pump	 370 watts 370 watts 370 watts 750 watts	 750 watts 1500 watts 750 watts 750 watts	 1500 watts 1500 watts 1500 watts 1500 watts	 1500 watts 1500 watts 1500 watts 1500 watts
Weight of vane pump	9.8 kg	17.2 kg	23 kg	23 kg
Weight of gear pump	12.3 kg	17.6 kg	29 kg	29 kg
Weight of centrifugal pump	21.1 kg	21.1 kg	27.5 kg	27.5 kg
Material of seals in pump	NBR (option: FKM)			
Ambient temperature	-10 to +40°C			
Protection class	IP 54			

Model code

OLF -30/15 -S -N60 -N15DM002 -E/ -PKZ -V -ACD

Basic type
OLF = OffLine Filter stationary (with back-pressure indicator + drainage ball valve)
OLFCM = OffLine Filter stationary with FluidCondition Monitoring

Filter size and nominal flow rate

Without pump	15 l/min	30 l/min	45 l/min	60 l/min	
15/Z	15/15	X	X	X	1 filter element
30/Z	30/15	30/30	X	X	2 filter elements
45/Z	45/15	45/30	45/45	X	3 filter elements
60/Z	60/15	60/30	60/45	60/60	4 filter elements

X = not available

Pump type
S = vane pump (required for OLFCM)
G = gear pump
W = centrifugal pump
Z = without pump

Voltage
L = 115V - 1 Ph
M = 230V - 1 Ph*
W = 230V - 3 Ph*
C = 380V - 3 Ph
N = 400V - 3 Ph*
R = 415V - 3 Ph
G = 440V - 3Ph
O = 460V - 3Ph
B = 480V - 3Ph
S = 500V - 3Ph
P = 575V - 3Ph
X = other voltage on request
L60,M60,.... = operation at 60Hz
Z = without motor
Protection class: IP55
* Standard in Europe according to CENELEC HD472 S1 at 50Hz

Filter element
N15DM002 = DIMICRON® 2 µm absolute
N15DM005 = DIMICRON® 5 µm absolute
N15DM010 = DIMICRON® 10 µm absolute
N15DM020 = DIMICRON® 20 µm absolute
N15DM030 = DIMICRON® 30 µm absolute
Z = without filter element

Clogging indicator
E = standard, back-pressure indicator
B = differential pressure gauge - visual (VM 2 BM.1)
C = differential pressure indicator - electrical (VM 2 C.0)
D3 = differential pressure indicator - visual/electrical (VM 2 D.0/-L220)
D4 = .../.../... (VM 2 D.0/-L24)
D5 = .../.../... (VD 2 LZ.1/-DB)
F = pressure switch - electrical

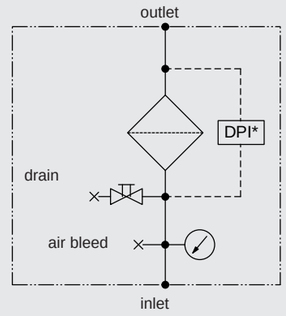
Supplementary details
PKZ = on and off switch with motor protection switch
FA0 = on and off switch with motor protection switch and supply voltage for sensors in OLFCM version.
FA1 = on and off switch with motor protection switch and switch-off when filter is clogged. Neutral wire required. only for voltages with maximum 240 V, 1 phase or maximum 415 V, 3 phases.
FA2 = on and off switch with motor protection switch and switch-off when filter is clogged. No neutral wire required. All voltages possible. Clogging indicator C type required.
FA3 = on and off switch with motor protection switch and switch-off when filter is clogged or target purity reached. No neutral wire required. All voltages possible. Clogging indicator C type required (only for OLFCM).
V = with FKM (FPM, Viton®) seals
MP = Minimess point upstream from filter for FCU incl. throttle valve
L = only filter housing without motor-pump unit, without tray

Monitoring devices (only for OLFCM)
C = ContaminationSensor CS1310 (without display)
CD = ContaminationSensor CS1320 (with display)
CS = ContaminationSensor CS1310 (without display) with SensorMonitoring Unit SMU1270
AC = Contamination Sensor CS1310 (without display) with AquaSensor AS1000 (without display)
ACD = ContaminationSensor CS1320 (with display) and AquaSensor AS3000 (with display)
ACS = ContaminationSensor CS1310 (without display) and AquaSensor AS1000 (without display) with SensorMonitoring Unit SMU1270

Note: When operating at 60 Hz the flow rate can increase by approx. 20%.

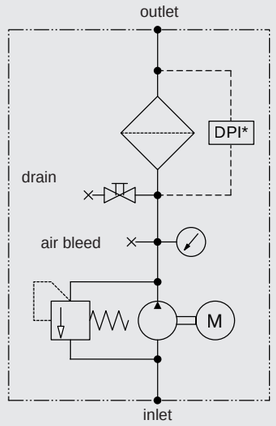
Hydraulic circuit

OLF without motor-pump unit



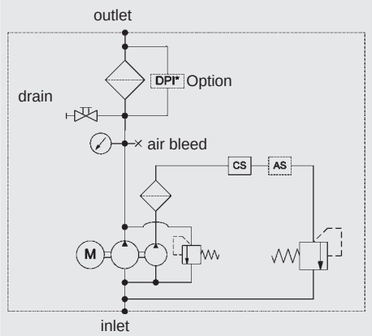
* Optional differential pressure indicator

OLF with motor-pump unit



* Optional differential pressure indicator

OLFCM 15-60

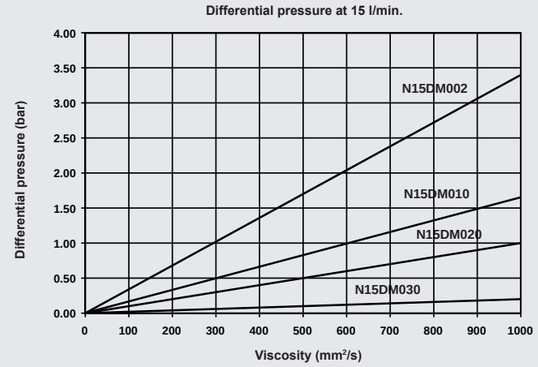


* DPI = Differential pressure indicator

Connections

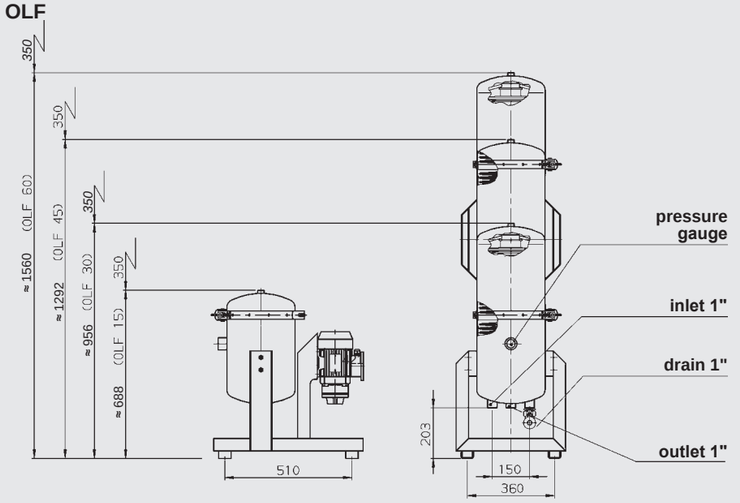
	Vane pump	Gear pump	Centri-fugal pump
Inlet (OLF15, OLFCM15)	G 3/4	G 3/4	G 1
Inlet (OLF30)	G 1 1/4	G 1	G 1
Inlet (OLFCM30)	M45	–	–
Inlet (OLF45, OLF60)	G 1 1/4	G 1 1/2	G 1 1/4
Inlet (OLFCM45, OLFCM60)	M45	–	–

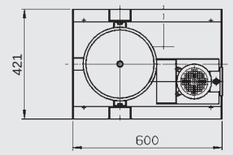
Element pressure drop



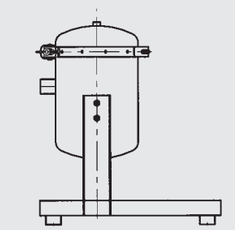
Dimensions

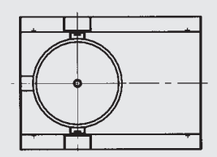
OLF





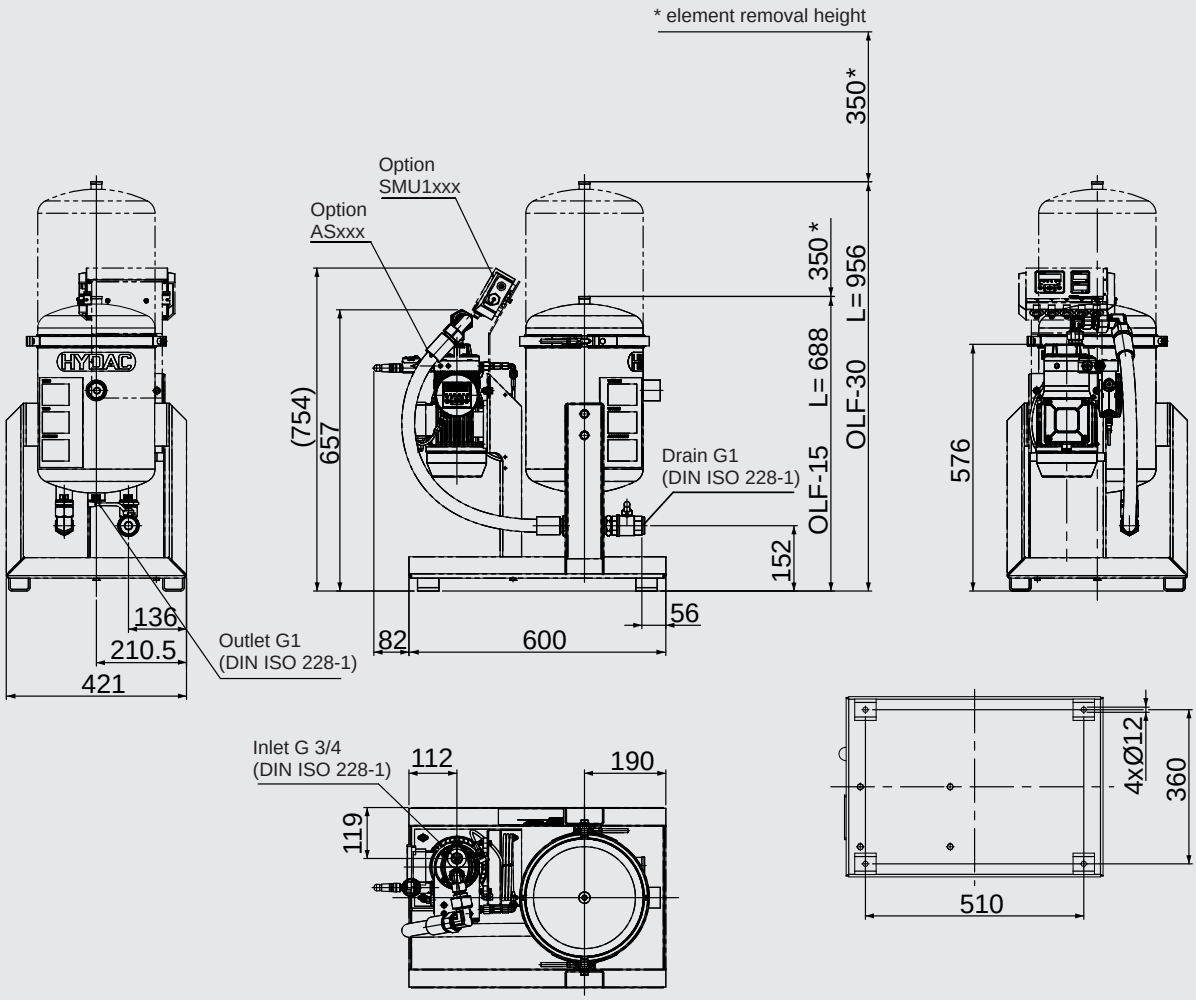
Example OLF-15/Z



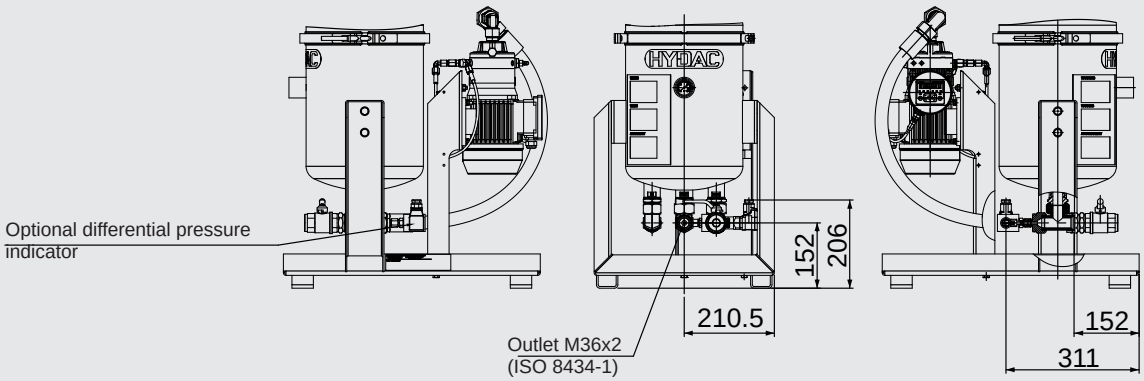


Dimensions

OLFCM



Optional differential pressure indicator



Note

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Subject to technical modifications.

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OffLine Filter BiDirectional OLFBD

Description

The OffLine Filter OLFBD is a small, stationary filter without motor-pump unit designed for fine filtration of hydraulic and lubrication fluids, and for the removal of free water from the system.

The flow is controlled via an orifice in the filter element.

The direction of flow through the filter element can be as required (from inside to outside or vice versa).

Applications

- Hydraulic and lubrication systems in industry
- Mobile hydraulics

Special Features

- Improved service life of component and system filter
- Direction of flow through the filter element can be selected (from inside to outside or vice versa)
- Offline flow is drawn from the cooling-filtration circuit
- The extracted volume is restricted by an orifice in the filter element (no parts are moved mechanically)
- Flow rate max. 5 l/min, others on request

Technical specifications

Flow	maximum 5 l/min
Operating pressure	25 bar / 362 psi
Pressure at inlet (IN)	maximum 25 bar / 362 psi
Pressure at outlet (OUT)	maximum 20 bar / 290 psi
Operating temperature range	-10 to 80 °C / 14 to 176 °F
Storage temperature range	5 to 40 °C / 41 to 104 °F
Filter housing material	EN AW-6060 / Al MgSi
Seal material	NBR / FKM (FPM, VITON®)
Filter housing volume	1 litre
Filter element type	1x EBD xx EA xxx - x - x
Weight when empty	~ 3.5 kg

Type code - Filter housing (without filter element)

OLFBD – 20 – A – N – Z

Filter type
OffLine Filter BiDirectional

Size
20 = 20

Hydraulic connection
A = G ¼ according to ISO 228

Seal material
N = NBR
F = FKM (FPM, VITON®)

Type of clogging indicator
Z = without port, no clogging indicator

Type code - Filter element

EBD – 20 – EA – 005 – N – 4

Filter element type
EBD

Size
20 = 20

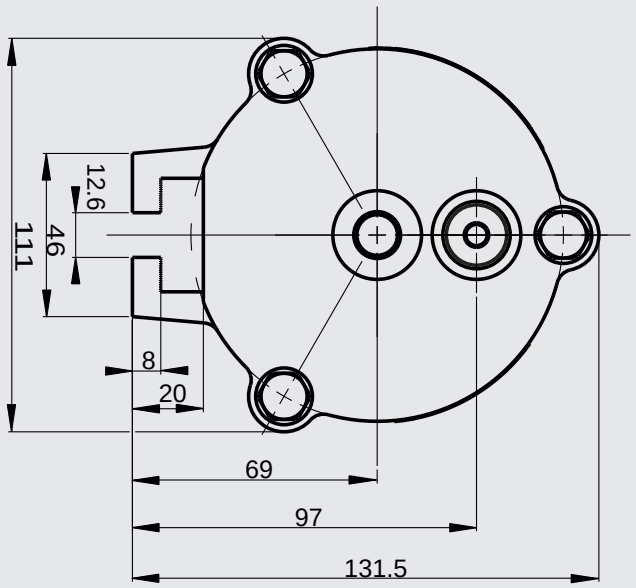
Filter material
EA = Standard

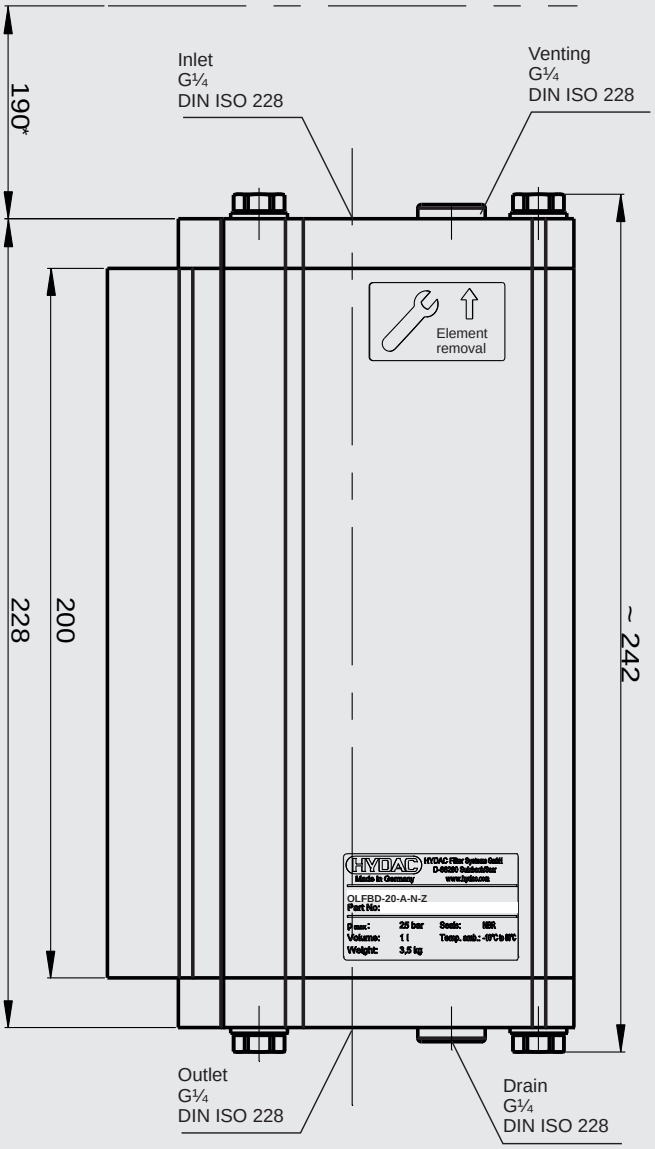
Filtration rating
005 = 5 µm (others on request)

Seal material
N = NBR
F = FKM (FPM, VITON®)

Orifice
4 = standard (others on request)

Dimensions





Items supplied

1x OLFBD
(filter housing without filter element)
1x operating and maintenance manual

Note

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OffLine Filter Pressure
OLFP 1 / 3 / 6

Description
The OffLine Filter Pressure OLFP is a stationary offline filter and is used to remove oil ageing products, water and solid particles from hydraulic and lubrication fluids.

Its compact construction also makes the OLFP ideally suited for use in the smallest of installation spaces. The housings are pressure resistant up to 20 bar. Since the housing material is aluminium, the filters are also suitable for low-temperature applications.

The flow can be taken directly from the main flow through an orifice and the orifice determines the flow rate. Optionally, the OffLine Filters can be equipped with a motor-pump unit and with a particle counter on inductive basis.

The Trimicron series of filter elements NxTMxxx have been specially developed for the combined removal of fine particles, water and oil ageing products. The most modern filter materials with reliable separation characteristics and high contamination retention capacity are used to manufacture these elements.

Applications
- Wind turbines
- Industrial gears

Special Features
- Removal of oil ageing products, solid particles and water
- Improvement in component lifetime
- Greater machine availability
- Minimum space requirement due to compact design
- Very easy maintenance
- Elements have a high contamination retention capacity

Technical Details

	OLFP 1	OLFP 3	OLFP 6
Operating pressure	max. 25 bar	max. 20 bar	max. 20 bar
Fluid temperature range*	-30 to 80 °C	-30 to 80 °C	-30 to 80 °C
Max. operating viscosity	1,000 mm^2/s		
Ambient temperature range*	-30 to 80 °C	-30 to 80 °C	-30 to 80 °C
Survival temperature*	-40 °C	-40 °C	-40 °C
Storage temperature range*	-40 to 30 °C	-40 to 30 °C	-40 to 30 °C
Material of filter head	Aluminium	Aluminium	Aluminium
Material of filter bowl	Aluminium	Aluminium	Aluminium
Seal material	FKM / NBR	FKM / NBR	FKM / NBR
Filter housing volume	≈ 9 litres	≈ 27 litres	≈ 43 litres
Hydraulic port (IN / OUT)	See table "Hydraulic connections"		
Filter element type	1x N1TMxxx	1x N3TMxxx	2x N3TMxxx
Weight when empty	≈ 21 kg	≈ 37 kg	≈ 41 kg

* Housing only, motor-pump unit on request

Order details

OLFP – 1 / 2 – G – M – M– TM – N – E

Basic model
OLFP = OffLine Filter Pressure
OLFPCM = OffLine Filter Pressure with CM

Size
1 = Size 1 (1x filter element*)
3 = Size 3 (1x filter element*)
6 = Size 6 (2x filter elements*)

Nominal flow rate/Orifice type
2 = 2 l/min (orifice A)
3 = 3 l/min (orifice B)
6 = 6 l/min (orifice C)
Z = variable (without orifice, without pump)

Pump type
O = with orifice (for flow rate, see Graph "Flow rate against orifice")
G = with gear pump (only for sizes 3+6)
Z = without

Voltage
M = 230 V / 50 Hz / 1Ph / 0.37 kW
N = 400 V / 50 Hz / 3Ph / 0.37 kW
AB = 690 V / 50 Hz / 3Ph / 0.37 kW
N60, M60 = operation at 60 Hz
Z = without motor (for pump type O and Z)
Other voltages on request

Measurement technology
M = MCS 14xx MetallicContamination Sensor
A = AS 1000 Aqua Sensor
Z = without (for basic type OLFP)

Filter element type*
TM = Trimicron

Seal material
N = NBR
F = FKM (FPM, Viton®)

Clogging indicator
E = standard, pressure gauge
B = differential pressure indicator, visual (VM2BM.x)
C = differential pressure indicator, electrical (VM2C.x)
D3 = differential pressure indicator, visual/electrical (VM2D.x)
D38 = differential pressure gauge, electrical VL x GW.0 /-V-113
Z = without

* Filter element not supplied. These must be ordered separately.

Replacement element

Housing	Trimicron filter element
Size 1	N1TM003 / -N (3 µm)
Size 3	N3TM003 / -N (3 µm)
Size 6	2x N3TM003 / -N (3 µm)

Items supplied

(Preference models, designed for 6 bar inlet pressure)

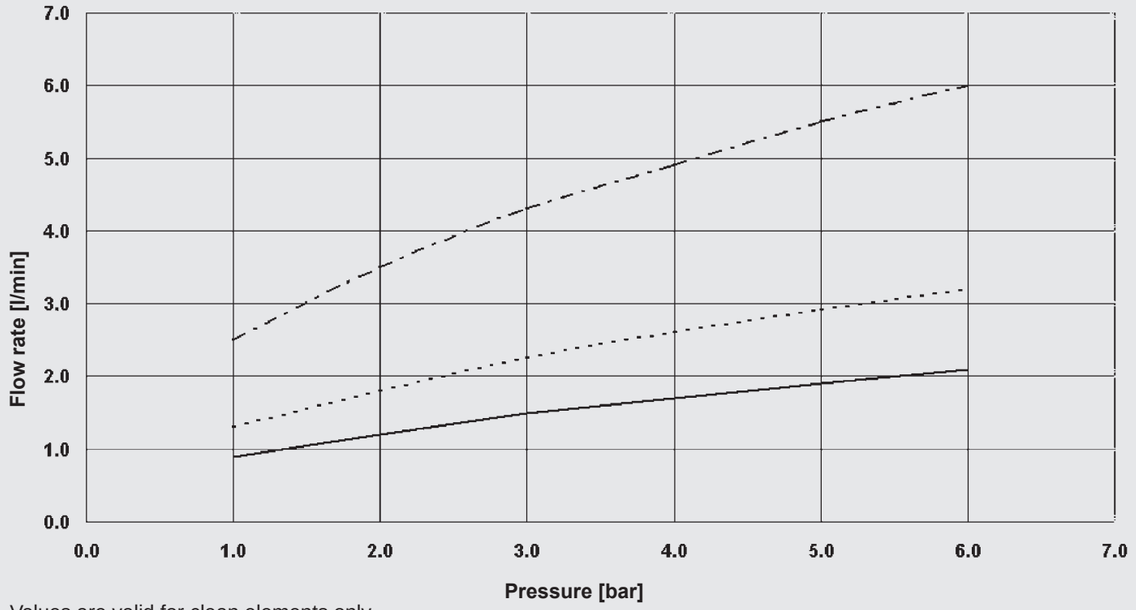
OffLine Filter OLFP 1
- OffLine Filter OLFP-1/2-OZ-Z-TM-NZ
  Part No. 3738168

OffLine Filter OLFP 3
- OffLine Filter OLFP-3/3-OZ-Z-TM-NZ
  Part No. 3712592

OffLine Filter OLFP 6
- OffLine Filter OLFP-6/6-OZ-Z-TM-NZ
  Part No. 3712591

Replacement element

Type	Nominal flow rate	Orifice		Line
OLFP x/2	2 l/min	A	=	
OLFP x/3	3 l/min	B	=	
OLFP x/6	6 l/min	C	=	
OLFP x/z	variable	-	=	

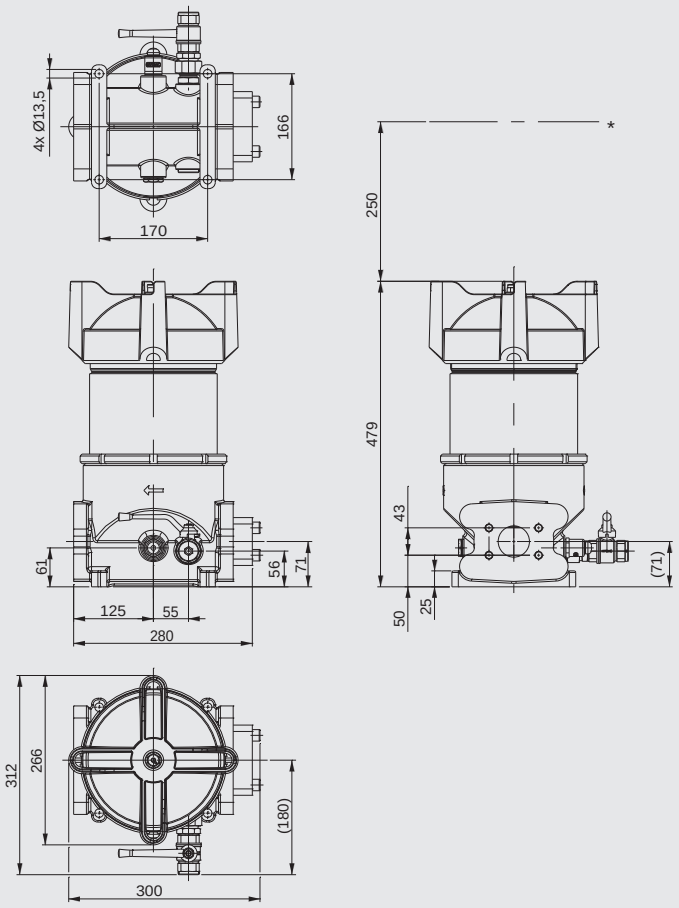


Values are valid for clean elements only.
Valid for viscosities from 0 … 200 mm²/s.

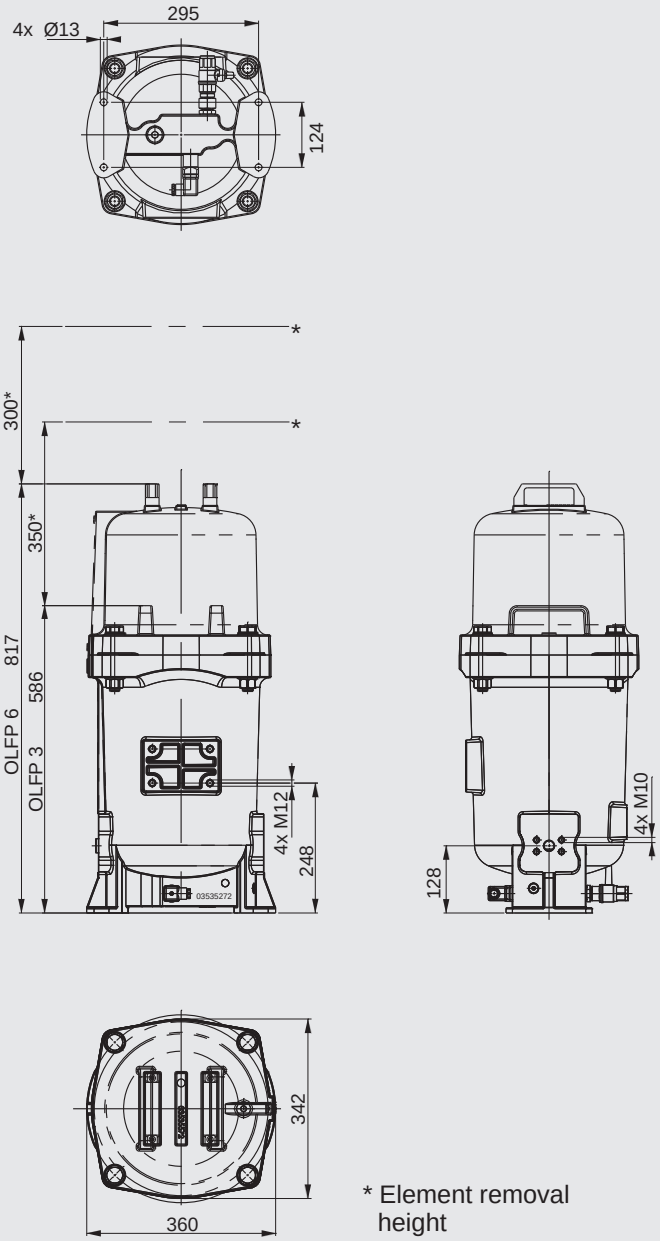
Hydraulic connection types

Type	Connection size						
	IN				OUT		
	SAE 2"	SAE 3/4"	G 3/4"	G 1/2"	SAE 2"	G 3/4"	G 1/2"
OLFP-1/Z-ZZ-Z-TM-NZ	✓	–	–	–	✓	–	–
OLFP-1/2-OZ-Z-TM-NZ	–	–	✓	–	✓	–	–
OLFP-3/Z-ZZ-Z-TM-NZ	–	✓	–	✓	–	–	✓
OLFP-3/3-OZ-Z-TM-NZ	–	–	✓	–	–	✓	–
OLFP-6/3-GN-Z-TM-NZ	–	✓	–	–	–	–	✓
OLFPCM-6/3-GN-MA-TM-NZ	–	✓	–	–	–	–	✓

Dimensions of OLFP 1



Dimensions of OLFP 3 / OLFP 6



* Element removal height

Note

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WombatFilter
WBF

Description
The WombatFilter WBF is used for the pre-filtration and main filtration of fluids. It ensures components and systems have excellent protection, primarily in industrial parts washers as well as in hydraulic and lubrication systems.

The following filter elements are used:

- Wombat WB filter elements:
  The star-folded filter elements are characterised by their particularly high contamination retention capacity, low pressure loss and high deposition rates; for the highest cleanliness requirements.
- Filter bag FB
  Commercial filter bags available in 1, 2 or 3-layered models, depending on the purity requirement.
- Flexmicron FM filter elements (30“ filter candles)
  Filter candles of the premium, standard and economy series enable optimum adaptation to the system and the purity requirement.

The option of using these different types of filter elements provides a high level of flexibility in system planning and in operation.

Applications
- Industrial part washers
- Cooling-lubrication systems
- Hydraulic and lubrication systems
- Lacquer filtration
- Water filtration

Special features
- High contamination retention capacity and low pressure loss due to star-folded Wombat filter elements
- Very high separation performance >99.8% in various filtration ratings
- Magnetic bars available as accessory for the Wombat filter elements and filter bags
- Very straightforward serviceability thanks to special filter element structure
- Stainless steel housing

Technical specifications

General specifications	
Size	100 or 201
Housing material	Stainless steel
Flow rate, recommended	WBF 100: 200 l/min max. WBF 201: 400 l/min max.
Operating pressure, maximum	10 bar or 16 bar
Hydraulic connection, inlet	DIN DN 50
Hydraulic connection, outlet	DIN DN 50
Permissible operating temperature	max. 100 °C
Seal material	FKM (FPM, Viton®)
Empty weight	Size 100 ≈ 40 kg Size 201 ≈ 48 kg
Housing volume	Size 100 = 15 litres Size 201 = 30 litres

Preferred models (with shorter delivery times)

Size	Part no.	Model code
201	4158239	WBF-201B-BL-FZ
201	4158279	WBF-201W-BL-FZ
201	4112609	WBF-201Z-BL-FZ

Model code

WBF - 201 W - B L - F Z /-

Basic model
WBF = WombatFilter

Size
100 = for Wombat filter element N100WB
or filter bag N100FB-xx

201 = for Wombat filter element N200WB
or filter bag N200FB-xx
or 4 filter candles N30FM-x

Filter element model
W = Wombat filter element
B = filter bag
F = Flexmicron filter candles
Z = without basket mount for filter elements

Pressure stage
B = 10 bar
C = 16 bar

Hydraulic connection
L = DIN DN 50

Seal material
F = FKM (FPM, Viton®)

Clogging indicator
A = no indicator, with mount G ½“ for differential pressure indicator 2 bar
E = dynamic pressure gauge
Z = no clogging indicator

Others on request

Supplementary details

Scope of delivery

- WBF (without filter elements)
- Installation and Maintenance Instructions

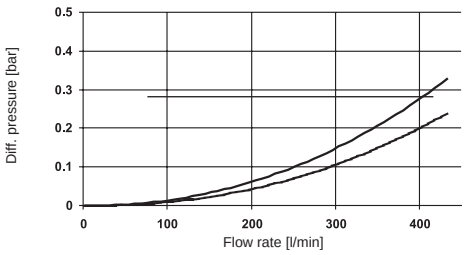
For filter element model “Z” the scope of delivery does not include an element basket mount. The mount must be ordered separately.

Filter elements must be ordered separately and installed before initial start-up on site.

Filter calculation

The total pressure loss of the filters at a particular flow rate is made up of housing Δp and element Δp. The pressure loss of the housing can be determined on the basis of the following pressure loss characteristic curve. The pressure loss of the elements is calculated by means of the R-factors (see further below).

The flow speed at the filter inlet should not exceed 3 m/s for oil and 4 m/s for water.



Top curve:
oil, 30 mm²/s and 0.86 kg/dm³

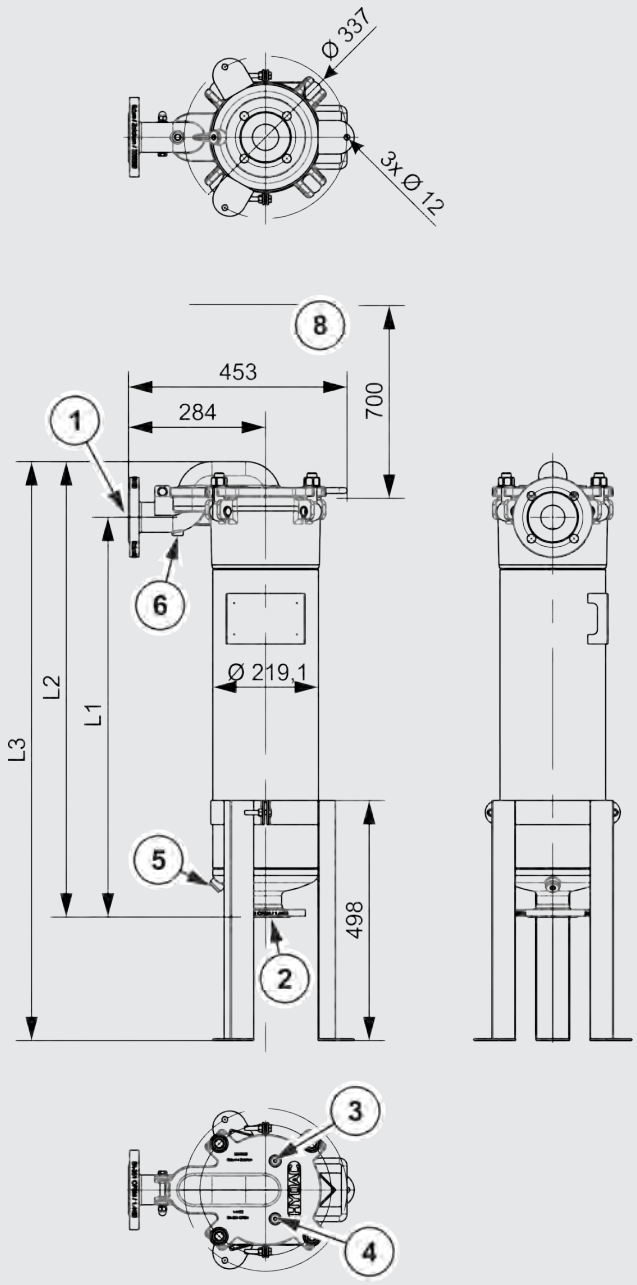
Bottom curve:
water at 20 °C

Element Δp: pressure loss calculation for filter element

$$\Delta p\ [mbar] = \frac{R \times V\ (mm^2/s) \times Q\ (l/min)}{n}$$

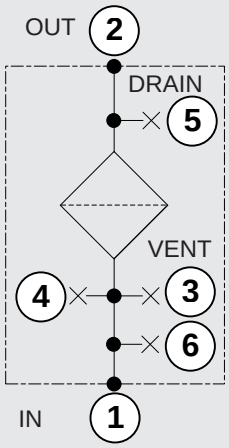
R = R factor
(given in the filter element data sheet)
V = viscosity [mm²/s]
Q = flow rate [l/min]
n = number elements

Model code



All data given in mm

Hydraulic circuit:



Dimensions

Description	WBF 100	WBF 201
L1	395 mm	830 mm
L2	510 mm	945 mm
L3	845 mm	945 to 1280 mm

Ports

The filter housing has the following ports:

	Description	
1	Inlet	Flange connection 2“ DIN DN 50
2	Outlet	Flange connection 2“ DIN DN 50
3	Vent	¼“ in acc. with ISO 228
4	Connection, clogging indicator	¼“ in acc. with ISO 228
5	Drain	½“ in acc. with ISO 228
6	Connection point	¼“ in acc. with ISO 228
8	Filter element removal height	

Filter elements for WBF

Please ensure that the housing is equipped with a suitable element mount (see order information). If it is not, select the suitable basket mount or adapter kit under accessories.

Filter element model	WBF 100	WBF 201
Wombat elements	N100WBxxx-xxxx	N200WBxxx-PESF
Filter bag (1-layer)	N100FB-EAxxx-xxx	N200FB-EAxxx-xxx
Filter bag (2-layer)	N100FB-SAxxx-xxx	N200FB-SAxxx-xxx
Filter bag (3-layer)	N100FB-SBxxx-xxx	N200FB-SBxxx-xxx
Flexmicron (Economy)	-	N30FM-Exxx-xx1x
Flexmicron (Standard)	-	N30FM-Sxxx-xx1x
Flexmicron (Premium)	-	N30FM-Pxxx-xx1x

Accessories

Application	WBF 100	WBF 201
Basket mount for Wombat filter elements	3674956	3549057
Basket mount for filter bag	3878814	3909007
Basket mount for 4 Flexmicron filter elements	-	4107160
Magnetic bar insert (for Wombat filter elements)	3633896	3601237
Magnetic bar insert (for filter bag)	3913551	3913578
Support strainer to increase flow rate	4097906	4027300
Clogging indicator kit (for retrofitting a differential pressure gauge)	4253311	4253311

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LowViscosity Housing Filter LVH-F

Description

The LowViscosity Housing Filter LVH-F is mainly used to filter low-viscosity fluids. It is especially suitable for applications with large amounts of dirt that need to be removed in just a single pass.

The Optimicron® filter elements used here ensure that both the required cleanliness and a long service life are achieved.

Available in various sizes, the filters can be optimally integrated into new or existing systems.

The filters are designed according to AD2000 regulations as standard. Sizing according to ASME is possible.

Applications

- Diesel filtration for high flow rates

Advantages

- Excellent filtration performance in a single pass
- High contamination retention capacity and low pressure losses thanks to Helios pleat geometry
- Easy to service thanks to intelligent element design
- Easy to upgrade with coalescing and separation housings in order to remove water from diesel fuel

Technical specifications

General data			
Sizes	110 120	115 130	140 340 440 540 840
Housing material	Aluminium	Aluminium	Stainless steel or carbon steel*
Inlet / outlet connection	G 1“	SAE DN 50 SAE DN 80 SAE DN 100	DN 50 … 300
Maximum operating pressure	10 bar	10 bar	10 bar
Permitted temperature range	-10 ... 60 °C	-10 ... 60 °C	-10 ... 60 °C
Seal material	FKM (FPM, Viton®)	FKM (FPM, Viton®)	FKM (FPM, Viton®)
Filter elements			
Filter elements used	Optimicron® Diesel	Optimicron® Diesel	Optimicron® Diesel

* Housing finish in carbon steel as per ISO 12944 class C3

Filter calculation

Size	Maximum flow rate	Orientation	Empty weight	Housing volume
LVH-F-110	40 l/min	Vertical	≈ 5 kg	≈ 3 litres
LVH-F-120	80 l/min	Vertical	≈ 6 kg	≈ 6 litres
LVH-F-115	270 l/min	Vertical	≈ 25 kg	≈ 13 litres
LVH-F-130	500 l/min	Vertical	≈ 37 kg	≈ 25 litres
LVH-F-140	800 l/min	Vertical	≈ 90 kg	≈ 55 litres
		Horizontal	≈ 130 kg	≈ 55 litres
LVH-F-340	1200 l/min	Vertical	≈ 205 kg	≈ 210 litres
		Horizontal	≈ 245 kg	≈ 210 litres
LVH-F-440	1800 l/min	Vertical	≈ 255 kg	≈ 276 litres
		Horizontal	≈ 315 kg	≈ 276 litres
LVH-F-540	2400 l/min	Vertical	≈ 340 kg	≈ 300 litres
		Horizontal	≈ 365 kg	≈ 300 litres
LVH-F-840	3600 l/min	Vertical	≈ 410 kg	≈ 540 litres
		Horizontal	≈ 500 kg	≈ 540 litres

Preferred models (with shorter delivery times)

Size	Part no.	Model code
LVH-F-110	4090926	LVH-F-110-AV-BD-FA
LVH-F-115	4085879	LVH-F-115-AV-BN-FA
LVH-F-120	4055370	LVH-F-120-AV-BD-FA
LVH-F-130	4085880	LVH-F-130-AV-BP1-FA
LVH-F-140	3798303	LVH-F-140-EV-BR-FA
LVH-F-340	3798325	LVH-F-340-EV-BV-FA
LVH-F-440	3935524	LVH-F-440-EV-BW-FA
LVH-F-540	3932817	LVH-F-540-EV-BW-FA

EN 7.658.0/07.17

Model code

LVH – F – 3 40 – E V – B V – F A/-Z

Type
LVH = LowViscosity Housing

Function
F = Filter

Size
1 = 1 filter element
3 = 3 filter elements
4 = 4 filter elements
5 = 5 filter elements
8 = 8 filter elements

Filter element length
10 = 10“ (for 1 filter element only)
15 = 15“ (for 1 filter element only)
20 = 20“ (for 1 filter element only)
30 = 30“ (for 1 filter element only)
40 = 40“

Housing material
A = Aluminium (only sizes 110, 115, 120, 130)
E = Stainless steel (only sizes 140 ... 840)
C = Carbon steel (only sizes 140 ... 840)

Version
V = Vertical
VD = Vertical (switchable)
H = Horizontal (only sizes 140 ... 840)

Pressure range
B = 10 bar
X = Others (on request)

Hydraulic connection

		110	115	120	130	140	340	440	540	840
D	G1“	●	-	●	-	-	-	-	-	-
J	DIN DN 50	-	-	-	-	●	●	●	●	●
L	SAE DN 50	-	●	-	●	-	-	-	-	-
N	SAE DN 80	-	●	-	●	-	-	-	-	-
P1	SAE DN 100	-	●	-	●	-	-	-	-	-
P2	SAE DN 100	-	●/◉	-	●/◉	◉	-	-	-	-
R	DIN DN 100	-	-	-	-	●	●	●	●	●
V	DIN DN 150	-	-	-	-	-	●	●	●	●
W	DIN DN 200	-	-	-	-	-	-	❍	❍	❍
Y	DIN DN 300	-	-	-	-	-	-	-	-	❍

❍ = dimensions available on request
◉ = only for VD version

Version with ANSI flanges*

		110	115	120	130	140	340	440	540	840
3	2“	-	-	-	-	●	●	●	●	●
4	3“	-	-	-	-	●	●	●	●	●
5	4“	-	-	-	-	●	●	●	●	●
7	6“	-	-	-	-	-	●	●	●	●
8	8“	-	-	-	-	-	-	❍	❍	❍
9	10“	-	-	-	-	-	-	-	-	❍

❍ = dimensions available on request
* -150 must be entered under supplementary details

Seal material
F = FKM (FPM, Viton®)

Clogging indicator
A = No indicator with holder G ½“, for differential pressure indicator 2 bar
D43 = Differential pressure gauge, visual (only sizes 140 ... 840)
D44 = Differential pressure gauge, visual/electrical (only sizes 140 ... 840)
Z = Without holder for clogging indicator (only sizes 140 ... 840)

Supplementary details
(only for sizes 140 ... 840)
Z = Manufacturer certificate M to DIN 55350 Part 18
Test certificate 3.1 to EN 10204 (material certificate)
ZA = Manufacturer certificate M to DIN 55350 Part 18
Test certificate 3.1 to EN 10204 (material certificate)
+ calculation according to ASME
150 = 150 lbs (flange pressure range; for ASME housing design)

(only for VD version)
39 = Oppositely oriented inlet and outlet

Items supplied

– LVH-F (without filter elements)
– Installation and Maintenance Instructions

Filter elements must be ordered separately and installed on site before commissioning.

Filter elements LVH-F-110

Description	Part no.
N10ON-DF003-FA41F	3917981
N10ON-DF005-FA41F	3917982
N10ON-DF010-FA41F	3917983
N10ON-DF020-FA41F	4142790

Filter elements LVH-F-115

Description	Part no.
N16ON-DF003-FA42F	4079806
N16ON-DF005-FA42F	4055369
N16ON-DF010-FA42F	4142794
N16ON-DF020-FA42F	4142845

Filter elements LVH-F-120

Description	Part no.
N20ON-DF003-FA41F	3918332
N20ON-DF005-FA41F	3918333
N20ON-DF010-FA41F	3918334
N20ON-DF020-FA41F	4142793

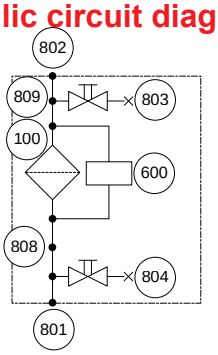
Filter elements LVH-F-130

Description	Part no.
N32ON-DF003-FA42F	4079813
N32ON-DF005-FA42F	4047853
N32ON-DF010-FA42F	4142846
N32ON-DF020-FA42F	4142847

Filter elements LVH-F-x40

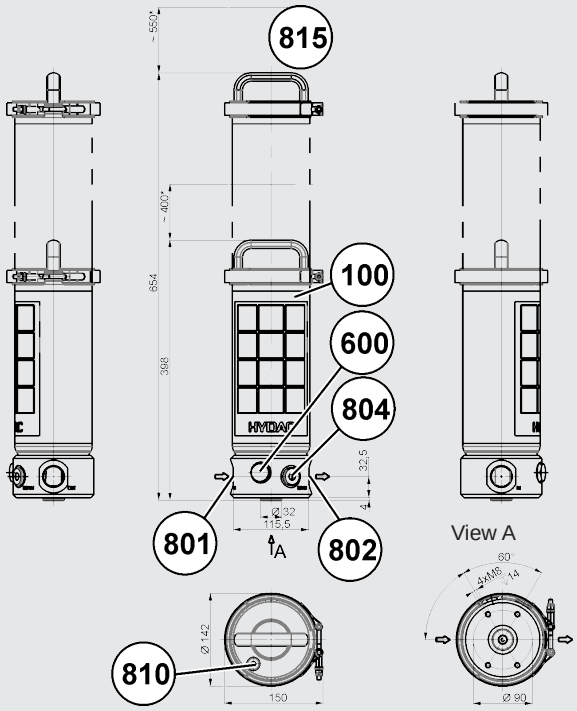
Description	Part no.
N42ON-DF003-FA40F	3965085
N42ON-DF005-FA40F	3916691
N42ON-DF010-FA40F	4055947
N42ON-DF020-FA40F	4066928

Hydraulic circuit diagram



Item	Description
100	Filter housing
600	Clogging indicator
801	Inlet (IN)
802	Outlet (OUT)
803	Drain, clean side (DRAIN)
804	Drain, contaminated side (DRAIN)
808	Measurement point (IN)
809	Measurement point (OUT)

Dimensions LVH-F-110-AV-Bx-xx
LVH-F-120-AV-Bx-xx

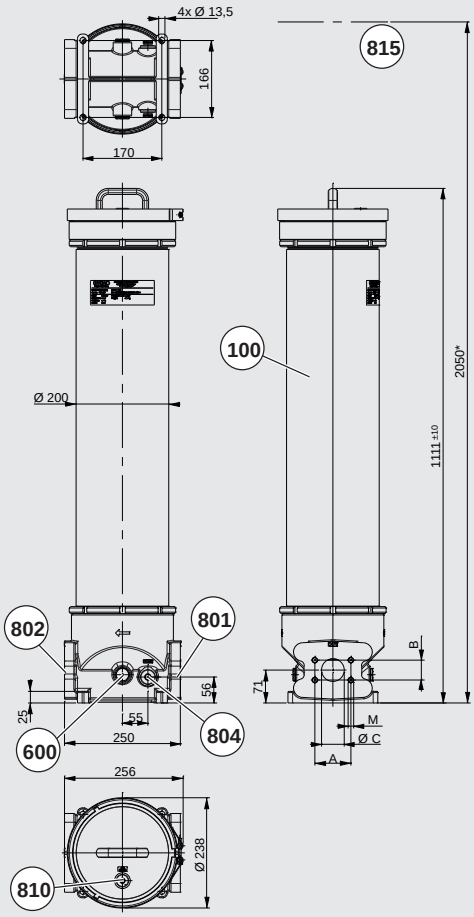


All dimensions in mm

Legend

Item	Description
100	Filter housing
600	Clogging indicator (optional)
801	Inlet (IN)
802	Outlet (OUT)
804	Drain
810	Air bleed
815	Maintenance space for changing the filter elements

Dimensions LVH-F-115-AV-B(L/N/P1)-xx
LVH-F-130-AV-B(L/N/P1)-xx



All dimensions in mm

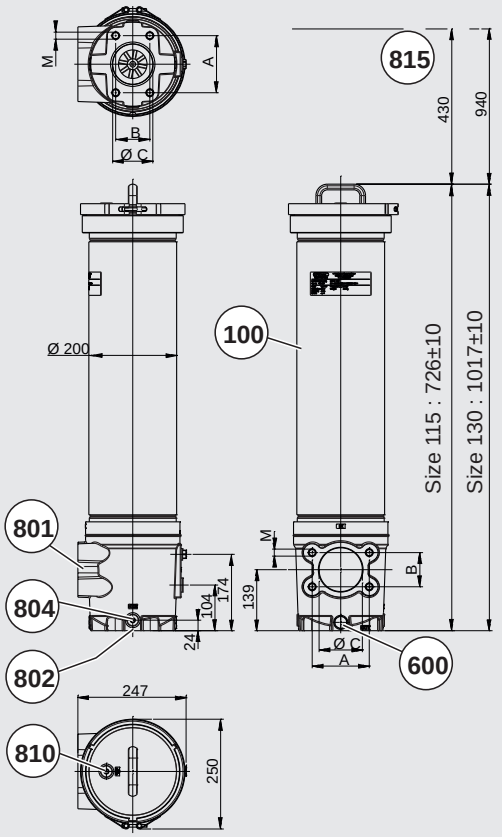
Legend

Item	Description
100	Filter housing
600	Clogging indicator (optional)
801	Inlet (IN)
802	Outlet (OUT)
804	Drain (DRAIN)
810	Air bleed
815	Maintenance space for changing the filter elements

Dimensions

	A	B	ØC	M
SAE DN50	77.8	42.9	50	M12x15
SAE DN80	106.4	62.9	75	M16x24
SAE DN100	130.2	77.8	100	M16x24

Dimensions LVH-F-115-AV-BP2-xx
LVH-F-130-AV-BP2-xx



All dimensions in mm

Legend

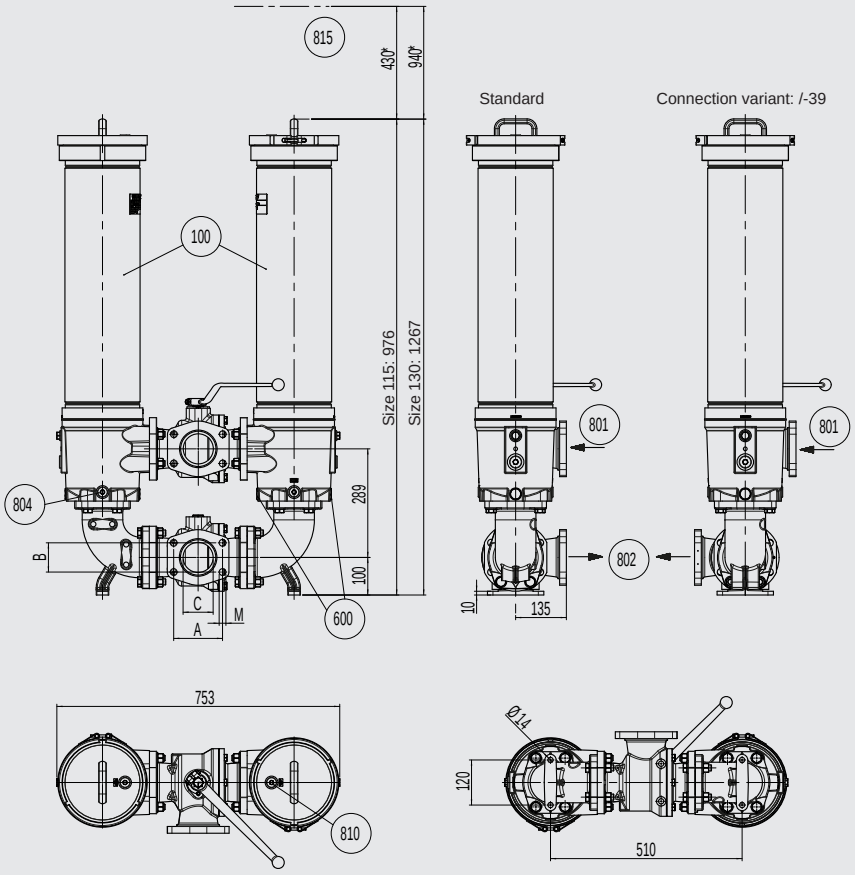
Item	Description
100	Filter housing
600	Clogging indicator (optional)
801	Inlet (IN)
802	Outlet (OUT)
804	Drain (DRAIN)
810	Air bleed
815	Maintenance space for changing the filter elements

Dimensions

	A	B	ØC	M
SAE DN100	130.2	77.8	100	M16x24

All dimensions in mm

Dimensions LVH-F-115/130-AVD-BP2-xx



All dimensions in mm

Legend

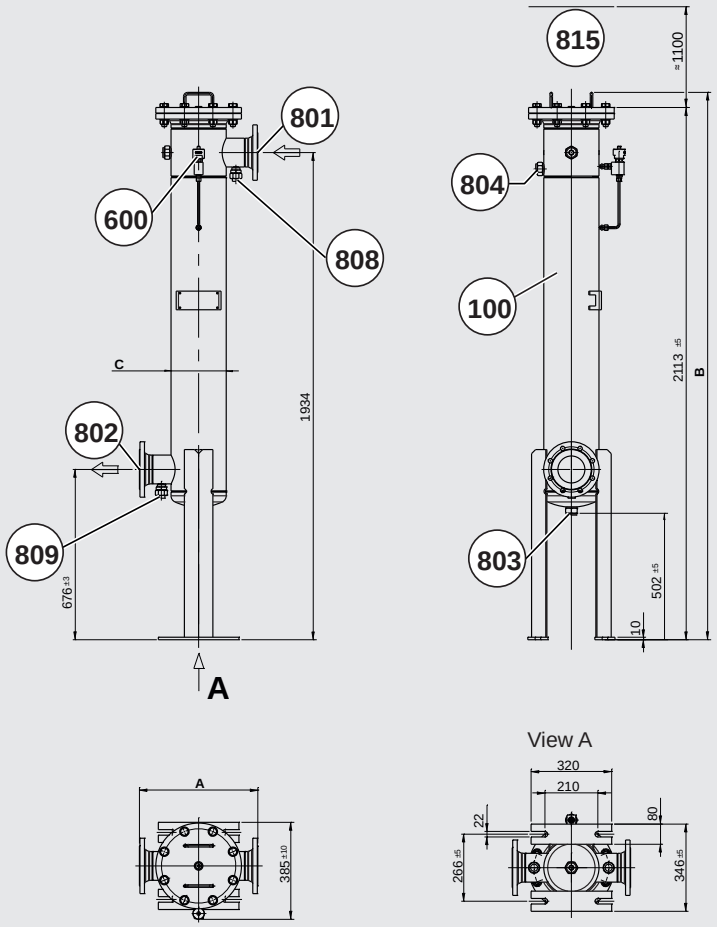
Item	Description
100	Filter housing
600	Clogging indicator (optional)
801	Inlet (IN)
802	Outlet (OUT)
804	Drain (DRAIN)
810	Air bleed
815	Maintenance space for changing the filter elements

Dimensions

	A	B	ØC	M
SAE DN100	130.2	77.8	100	M16x24

All dimensions in mm

Dimensions LVH-F-140-xV-Bx-xx



All dimensions in mm

Legend

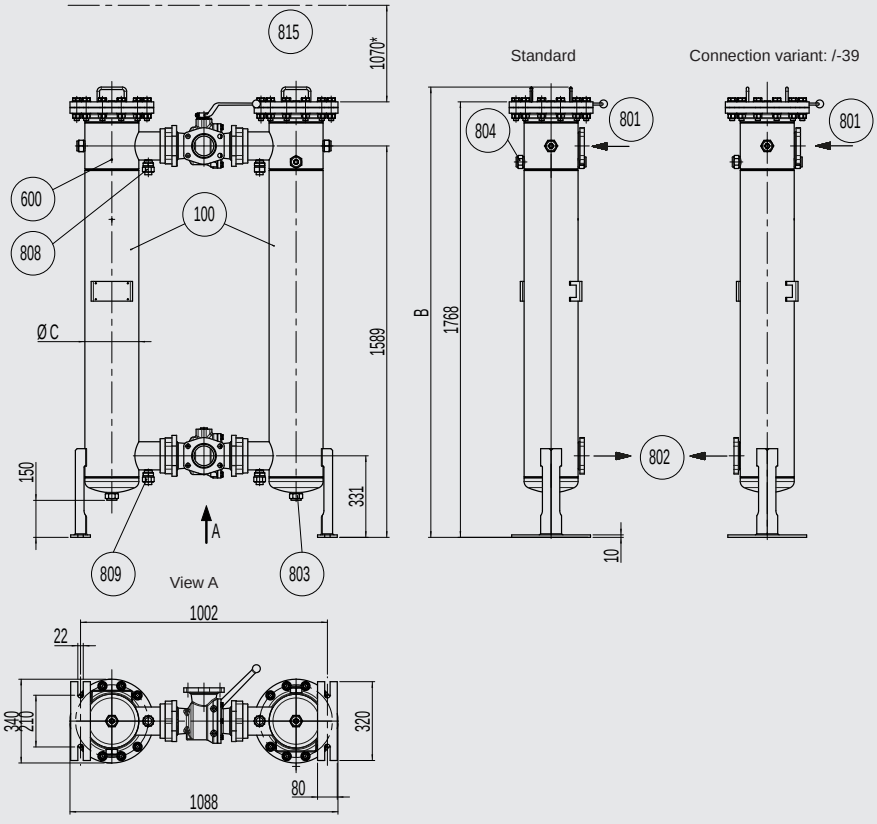
Item	Description
100	Filter housing
600	Clogging indicator (optional)
801	Inlet (IN)
802	Outlet (OUT)
803	Drain, clean side (DRAIN)
804	Drain, contaminated side (DRAIN)
808	Measurement point (IN)
809	Measurement point (OUT)
815	Maintenance space for changing the filter elements

Dimensions

LVH-F	A	B	C
140	470	2173	219

All dimensions in mm

Dimensions LVH-F-140-xVD-BP2-xx



All dimensions in mm

Legend

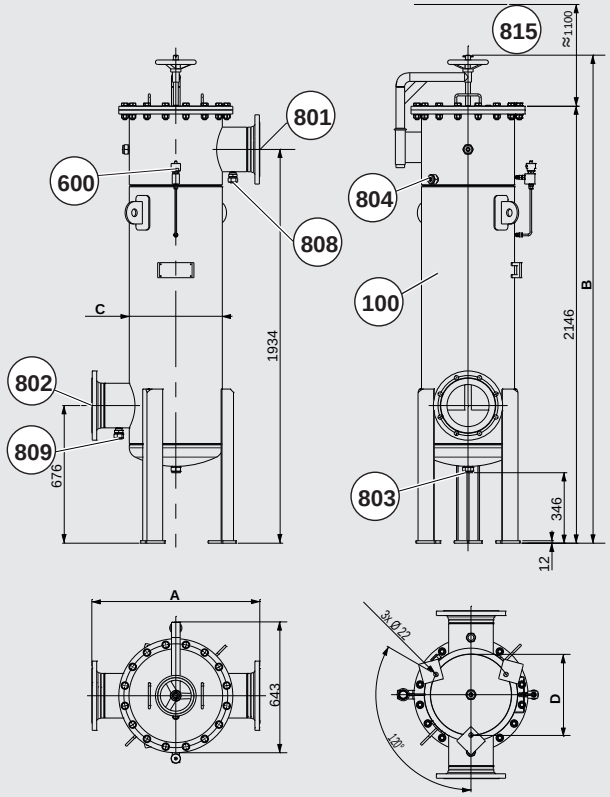
Item	Description
100	Filter housing
600	Clogging indicator (optional)
801	Inlet (IN)
802	Outlet (OUT)
803	Drain, clean side (DRAIN)
804	Drain, contaminated side (DRAIN)
808	Measurement point (IN)
809	Measurement point (OUT)
815	Maintenance space for changing the filter elements

Dimensions

LVH-F... VD ...	B	C
140	1828	219

All dimensions in mm

Dimensions LVH-F-(3/4/5/8)40-xV-Bx-xx



All dimensions in mm
Dimensions not valid for connection sizes marked with ❍ in the table under model code

Legend

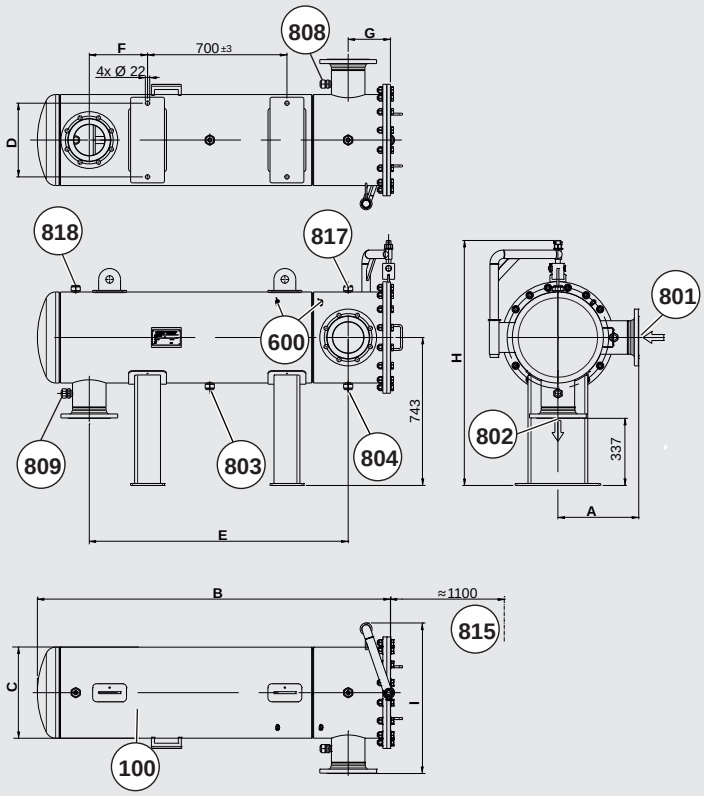
Item	Description
100	Filter housing
600	Clogging indicator (optional)
801	Inlet (IN)
802	Outlet (OUT)
803	Drain, clean side (DRAIN)
804	Drain, contaminated side (DRAIN)
808	Measurement point (IN)
809	Measurement point (OUT)
815	Maintenance space for changing the filter elements

Dimensions

LVH-F	A	B	C	D
340	780	2400	406	345
440	830		457	400
540	880		508	450
840	1140	2500	610	555

All dimensions in mm

Dimensions LVH-F-(1/3/4/5/8)40-xH-Bx-xx



All dimensions in mm
Dimensions not valid for connection sizes marked with ❍ in the table under model code

Legend

Item	Description
100	Filter housing
600	Clogging indicator (optional)
801	Inlet (IN)
802	Outlet (OUT)
803	Drain, clean side (DRAIN)
804	Drain, contaminated side (DRAIN)
808	Measurement point (IN)
809	Measurement point (OUT)
815	Maintenance space for changing the filter elements
817	Air bleed at inlet (IN)
818	Air bleed at outlet (OUT)

Dimensions

LVH-F	A	B	C	D	E
140	260	1587	219	220	1260
340	406	1763	406	320	1300
440		1770	457	370	
540		1785	508		
840		1876	610	470	

LVH-F	F	G	H	I
140	330	180	1120	480
340	290	215	1200	730
440			1230	760
540			1260	790
840		260	1310	870

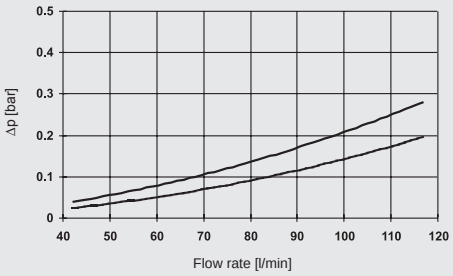
Housing Δp: Housing pressure drop graphs

The upper housing curves apply to mineral oil with a density of 0.86 kg/dm³ and a kinematic viscosity of 30 mm²/s.
The lower housing curves apply to diesel at 20°C.

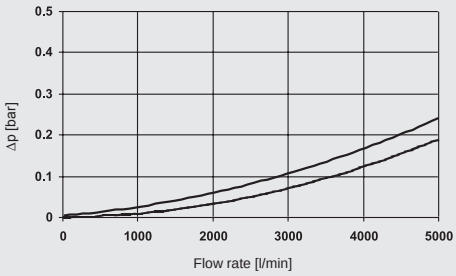
For turbulent flow, the differential pressure will change proportionally to the density; for laminar flow, it will change proportionally to the density and viscosity.

The flow velocity should not exceed 3 m/s at the filter inlet for oil and 4 m/s for diesel.

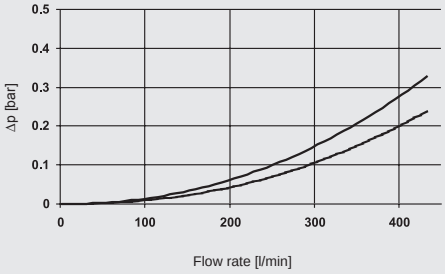
Pressure drop curve LVH-F-110 / LVH-F-120



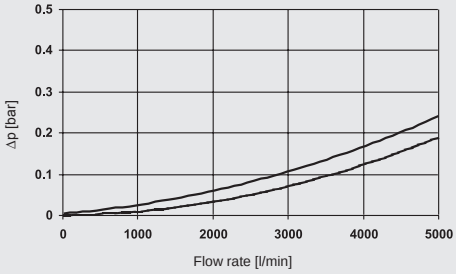
Pressure drop curve LVH-F-440



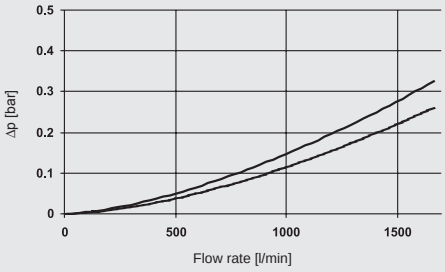
Pressure drop curve LVH-F-115 / LVH-F-130



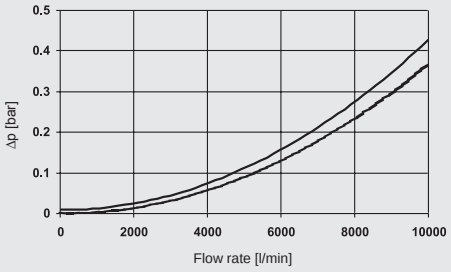
Pressure drop curve LVH-F-540



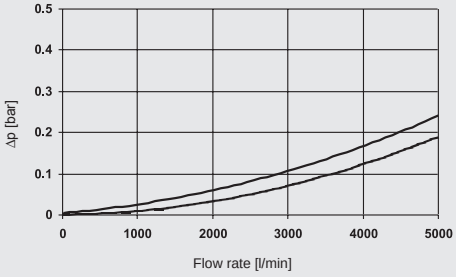
Pressure drop curve LVH-F-140



Pressure drop curve LVH-F-840



Pressure drop curve LVH-F-340



Note

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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FluidAqua Mobil
FAM 5

Description

The FluidAqua Mobil FAM 5 is designed for dewatering, degassing and filtering hydraulic and lubrication fluids.

It operates on the principle of vacuum dewatering to eliminate free and dissolved water as well as free and dissolved gases. By using HYDAC Dimicron filter technology which has a high contamination retention capacity and filtration efficiency, the FAM 5 is extremely cost effective.

Perfect for service work thanks to its compact and mobile design. In the stationary version it provides perfect continuous protection for applications where operating fluids require optimal care, in which valuable bio-oils or fire-resistant fluids are used, or where water frequently gets into the system.

Special features

- Small, compact and easy to use unit with Siemens LOGO! controller as well as control panel for quick use during service calls or emergencies
- Reliable and convenient for fixed and permanent use due to extensive monitoring functions
- Optional integrated heater to increase dewatering performance, especially for cold or high viscosity oils
- Optional integrated water content and particle measurement technology with continuous display of the measurements, storage of the values and control of the unit
- Very low residual water content, gas content and particle contamination result in longer oil change intervals, improved life expectancy of components, higher machine availability and as a result, a reduction in the Life Cycle Cost (LCC)

Technical specifications

Flow rate at 50 Hz	≈ 5 l/min
Permitted fluids**	Fluids compatible with NBR seals: • Mineral oils to DIN 51524 • Gear oils to DIN 51517, 51524 Fluids compatible with FKM (FPM,Viton®) seals: • Synthetic esters (HEES) DIN 51524/2 • Vegetable oils (HETG, HTG) • HFD-R fluids (not for pure phosphate ester which require EPDM seals)
Sealing material	NBR or FKM (FPM,Viton®) see model code "Operating fluid"
Filter size of fluid filter	OLF 5
Filter element for fluid filter (xxx = filtration rating)	N5DMxxx Filter element must be ordered separately, see table "Filter elements for fluid filters"
Clogging indicator	Differential pressure switch with cut-off function when filter is clogged
Type of vacuum pump	Rotary vane vacuum pump
Pump type for filling & draining	Gear pump
Operating pressure (outlet)	0 to 8 bar / 0 to 116 psi
Permitted pressure at suction port (without suction hose)	-0.2 to 1 bar / -2.9 to 14.5 psi
Permitted operating viscosity range**	15 to 350 mm²/s – without integrated heater 15 to 550 mm²/s – with integrated heater
Permitted viscosity range for particle measurement	15 to 200 mm²/s – with measuring equipment ACS, AC
Fluid temperature range**	10 to 80 °C / 50 to 176 °F
Ambient temperature **	0 to 40 °C / 32 to 104 °F
Storage temperature range**	0 to 40 °C / 32 to 104 °F
Relative ambient humidity **	maximum 90%, non-condensing
Electrical power consumption (without heater) / required external fuse*	≈ 1 kW / 16 A for circuit breakers with trip characteristics type C
Heating output (optional)	max. 2.4 kW (depending on the nominal voltage, see model code)
Protection class	IP 54
Length of power cable / plug	10 m / CEE (depending on the nominal voltage, see model code)
Length of connection hoses	5 m (mobile version only)
Material of hoses	see model code
Hydraulic connections	see table "Connection summary"
Weight when empty	≈ 120 kg
Achievable residual water content	< 100 ppm – hydraulic and lubricating oils < 50 ppm – turbine oils (ISO VG 32/46) < 10 ppm – transformer oils ***

* Maximum specifications given, equipment-dependent
** For other fluids, viscosities or temperature ranges, please contact us
*** Units are not suitable for "Online" and "Onload" operation (transformer in operation and connected to grid).

Order details

FAM – 5 – M – 2 – A – 05 – R – H – S – ACS – 00 – / -V

Basic model
FAM = FluidAqua Mobil

Size
5 ≈ 5 l/min

Operating fluid
M = Mineral oil - NBR seals, NBR hoses, tested with mineral oil*
I = Insulating oil - NBR seals, NBR hoses, tested with insulating oil (e.g. Shell Diala)* / **
X = HFD-R fluids - FKM (FPM,Viton®) seals, UPE/PE-PA hoses, tested with HFD-R fluid (e.g. Fyrquel)*
B = Biodegradable (ester based) - FKM (FPM,Viton®) seals, NBR hoses, tested with biodegradable oils based on esters*

Mechanical type
1 = Stationary (with feet)
2 = Mobile (with castors and connection hoses)

Voltage / Frequency / Power supply
A = 400 V/50 Hz/3Ph+PE
B = 415 V/50 Hz/3Ph+PE
E = 220 V/60 Hz/3Ph+PE
H = 440 V/60 Hz/3Ph+PE[1)]
K = 480 V/60 Hz/3Ph+PE[1)]
M = 230 V/50 Hz/1Ph+PE
O = 460 V/60 Hz/3Ph+PE[1)]
P = 230 V/60 Hz/1Ph+PE
S = 380 V/50 Hz/3Ph+PE
AD = 220 V/60 Hz/1Ph+PE
X = other voltage on request

Filter size of fine filter
05 = OLF5

Type of vacuum pump
R = Rotary vane vacuum pump

Heater
Z = Without heater
H = Heater (for 200 ... 359 V = 1 kW, for 360 ... 690 V = 2.4 kW, heater only possible from 200 V)

Control concept
S = standard, operating language de/en. Included in scope of delivery on USB memory stick for subsequent installation: fr/en, es/en, pt/en, it/en, nl/en, da/en, fi/en, sv/en, zh/en (other languages on request)

Measurement equipment
Z = none
A = AquaSensor AS 1000 with control function
AC = AquaSensor AS 1000 + ContaminationSensor CS 1000, with control function
ACS = AquaSensor AS 1000 + ContaminationSensor CS 1000 + SensorMonitoring Unit display and storage of values, with control function

Modification number
00 = The latest version is always supplied.

Supplementary details
No details = series
V = FKM (FPM, Viton®) seals for fluid “M” and “I”

1) Supplied without connector
* Residues of test fluid will remain in the unit after testing
** Units not suitable for "Online" and "Onload" operation (transformer in operation and connected to grid)

Type of vacuum pump

The vacuum pump used is an oil-lubricated rotary vane pump.

The air discharged by the vacuum pump can, in addition to water, contain constituent elements of the operating fluid concerned, as well as any gases it contained.

Therefore, please ensure that the area in which the FAM is operated is adequately ventilated.

Heater

By using the built-in heater, the dewatering capacity can be increased, particularly in the case of high viscosity fluids or fluids at low temperatures.

If the temperature of the fluid is raised by 10 °C then the dewatering capacity increases by up to 50 %. The ideal temperature for dewatering is ≈ 50 ... 60 °C.

Generally speaking, for operating viscosities of between 350 … 550 mm²/s the heater option must be selected and the heater must be used.

Control concept

- Siemens LOGO! controller with 6-line text display (bilingual)

- Automatic, state-based and energy-saving operation through control of the power unit via optionally integrated or external AquaSensor using MIN/MAX values
- Error messages as plain text display
- Manual operation for manual activation of components
- Ethernet connection and web server for remote monitoring

Instrumentation

If the water and particle measuring options (AquaSensor and ContaminationSensor) are included, it is possible to display the water content relative to the saturation point (saturation level, relative humidity), as well as the particle contamination and temperature of the fluid.

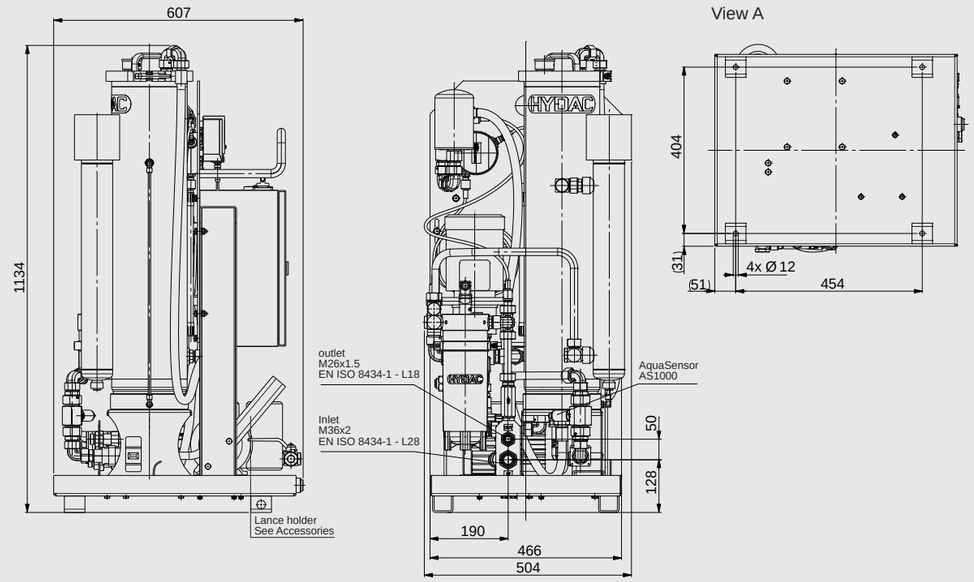
The measured data is stored in the SensorMonitoring Unit with a date and time stamp and can be easily transferred using a USB memory stick.

Preferred models (with shorter delivery times)

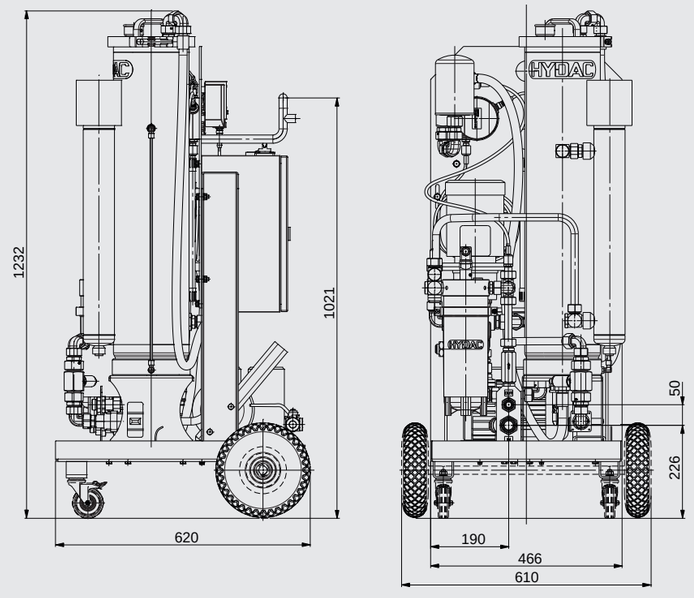
Part no.	Model code
3820052	FAM-5-M-2-A-05-R-H-S-A-2

Measurements

FAM Stationary

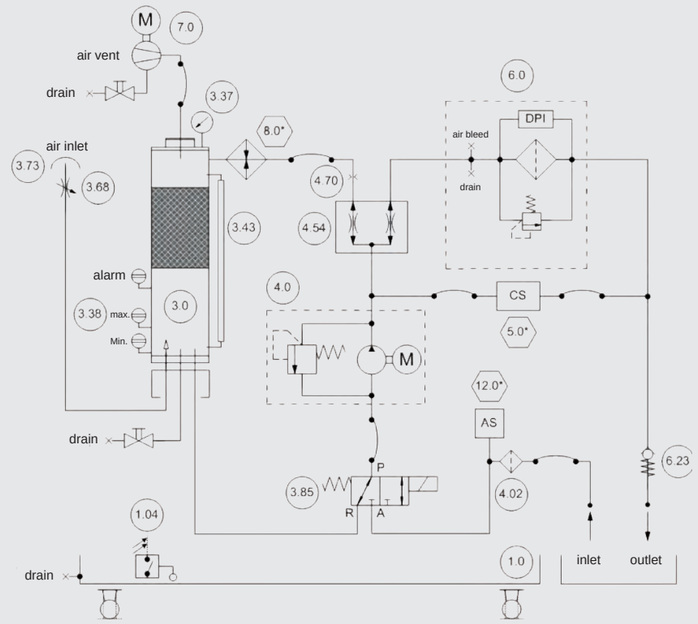


FAM Mobile



Dimensional tolerance ±10mm
Dimensions in mm

Hydraulic circuit



Item	Description
1.0	Drip tray
1.04	"Drip tray full" float switch
3.0	Vacuum column
3.38	Level sensor for vacuum column
3.68	Needle valve to regulate the necessary vacuum in the vacuum column
3.73	Breather filter
3.85	3/2 directional valve
4.0	Motor pump assembly
4.02	Suction screen
4.54	Flow divider
5.0	ContaminationSensor CS1000 (optional)
6.0	Fluid filter for elimination of solid particles, with differential pressure switch for filter monitoring
7.0	Vacuum pump
8.0	Heater (optional)
12.0	AquaSensor AS 1000 (option)

Fluid filter element

Please order the filter element for the fluid filter separately and install it before commissioning.

You will need one of the following filter elements for the fluid filter:

Type	Filtration rating	Seals	Part number
N5DM002	2 µm	FKM	349494
N5DM005	5 µm	FKM	3068101
N5DM010	10 µm	FKM	3102924
N5DM020	20 µm	FKM	3023508

Sizing

As a rough guide, the FluidAqua Mobil can be sized according to the tank volume of the system.

Tank volume in litres	FAM
< 2,000	FAM 5
1,000 – 7,000	FAM 10/15 * / 10*
7,000 – 15,000	FAM 25 **
15,000 – 25,000	FAM 45 ** FAM 45E ***
25,000 – 35,000	FAM 60 **
35,000 – 45,000	FAM 75 ** / FAM 75E ***
> 45,000	FAM 95 **

* see Brochure no. 7.649. FAM 10
** see Brochure no. 7.613. FAM 25/45/60/75/95
*** see Brochure no. 7.654. FAM Economy

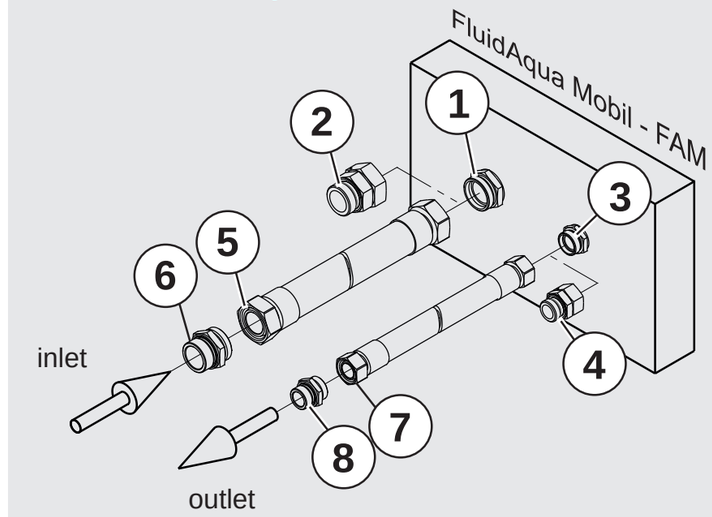
- Select a larger size for systems with very high and continuous process-related water entry
- In contrast, for systems with just a small amount of moisture entry via tank breathing, one size smaller can be selected
- Ideally the water content will be measured periodically to determine the water entry per hour/day. Our sales specialists can then determine the suitable size if they know the oil type, oil temperature, operating viscosity, system dimensions, environmental conditions and target water content

In general, it must however be noted that sizing will depend on the application, the fluid, the temperature of the fluid and the ambient temperature, the fluid quantity and the water ingress into the system. These have a great affect on the dewatering efficiency. Therefore the specifications can only serve as an indication.

		Dewatering rate
Water content	⇧	⇧
Fluid temperature	⇧	⇧
Detergent additives	⇧	⇩
FAM flow rate	⇧	⇧

For dimensioning and project planning, please use the FAM checklist, doc. no.: 10000495854

Connection summary



Item	FAM 5
1 - FAM inlet connector	28L / M36x2 (male thread)*
2 - adapter (accessory)	Adapter G1 A (male thread)**
3 - FAM outlet connector	18L / M26x1.5 (male thread)*
4 - adapter (accessory)	Adapter G ½ A (male thread)**
5 - Suction hose connection	28L / M36x2 (female thread)***
6 - adapter (accessory)	Adapter G1 A (male thread)**
7 - connection, return hose	18L / M26x1.5 (female thread)***
8 - adapter (accessory)	Adapter G ½ A (male thread)**

*) Connection Form D to ISO 8434-1 Series L (corresponds to ISO 12151, Form S, Series L)
**) Screw-in spigot to ISO 1179-2 (Form E)
***) Connection Form N to ISO 8434-4 Series L (corresponds to ISO 12151, Form SWS, Series L)

Items 1 and 3 are supplied with the stationary FAM.
Items 1, 3, 5 and 7 are supplied with the mobile FAM.

External interfaces

The controller has external interfaces for remote control of the unit:

- Start/stop from external (relay)
- Device ready – no error, unit ready for operation (potential-free contact)
- Operating state – unit ON/OFF (potential-free contact)
- Filter contaminated (potential-free contact)

Accessories

Description	Material	Part number
Lance set for suction and return hose, consisting of: 2x lance Ø18 mm, length = 0.5 m 1x lance holder incl. mounting material	FKM	3685146
Connection, adapter set, metric/inch comprising: Items 2, 4, 6 and 8 (see Connection Overview)	FKM	4337754

Items supplied

- FluidAqua Mobil
- Suction and return hose (only on mobile version)
- 1 litre vacuum pump oil for initial filling of vacuum pump
- Switch cabinet key
- USB memory stick with additional language versions and SD card for installation
- Technical documentation:
  - Operating and Maintenance Manual
  - Electrical wiring diagram
  - Test certificate
  - CE declaration of conformity

Note

The information in this brochure relates to the operating conditions and applications described.

For applications and operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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Dewatering and Filtration Unit FluidAqua Mobil FAM 10

Description

The FluidAqua Mobil FAM 10 series operates according to the principle of vacuum dewatering to separate free and dissolved water as well as free and dissolved gases from hydraulic and lubrication fluids. By using HYDAC bypass filter technology, with its high contamination retention capacity and separation performance, the power unit achieves a very high level of cost effectiveness. All power units have an AquaSensor AS 1000 to continuously monitor the water content and to control the power unit. A CS 1000 particle sensor for simultaneous monitoring of the solid particle contamination can be integrated optionally. To increase the dewatering capacity, a heater can be integrated optionally for highly viscous fluids or for low fluid temperatures. The Siemens S7 series programmable logic controller (PLC) used in combination with a Siemens touch control panel guarantees simple and reliable handling in numerous local languages.

Advantages

Extremely low residual water levels, gas levels and particle contamination in the operating fluids make for:

- Longer oil change intervals
- Improved component service life
- Greater machine availability
- Reduction in the LifeCycle Cost (LCC)

Technical specifications

Flow rates at 50 Hz	≈ 10 l/min (FAM-10), ≈ 15 l/min (FAM-10/15)
Flow rates at 60 Hz	≈ 12 l/min (FAM-10), ≈ 18 l/min (FAM-10/15)
Permitted fluids**	Fluids compatible with NBR seals: ● Mineral oils to DIN 51524 ● Gear oils to DIN 51517, 51524 Fluids compatible with FKM (Viton®) seals: ● Synthetic esters (HEES) DIN 51524/2 ● Vegetable oils (HETG, HTG) ● HFD-R fluids (not for pure phosphate ester which requires EPDM seals). Fluids compatible with EPDM seals: ● Aviation phosphoric acid esters e. g. Skydrol® or Hyjet®
Viscosity range	15 to 800 mm²/s
Sealing material	see model code
Filter size of fine filter	OLF-5
Filter elements of fine filter xxx= Filtration rating	N5DMxxx (please order separately.)
Contamination retention capacity to ISO 4572	200 g
Clogging indicator	VM 2 C.0
Setting pressure of differential pressure clogging indicator	2 bar
Pump type, filtration unit	Vane pump
Pump type, drainage pump	Gear pump
Pump type, vacuum pump	Rotary vane vacuum pump
Operating pressure	max. 6 bar
Permitted pressure at suction port (without suction hose) **	-0.2 to +1 bar
Permitted pressure at outlet (without return hose) **	0 to 3.5 bar
Fluid temperature range**	10 to 80°C
Ambient temperature **	10 to 40°C
Storage temperature range	10 to 50 °C
Electrical power consumption FAM 10 / 10/15 * (50 Hz) *	standard: ≈ 1800/2000 W with heater: ≈ 4700/4900 W
External fuse required	16 A or 32 A (see Model code) for circuit breakers with trip characteristics type C
Heating output (optional)	≈ 2900 W only for 3 phase version
Protection class	IP 54
Power cable, length	10 m
Hoses, length	5 m
Material of hoses	see model code
Inlet / outlet connection	see "FAM Connection summary"
Weight when empty	≈ 300 kg
Achievable residual water content	< 100 ppm – hydraulic and lubrication oils < 50 ppm – turbine oils (ISO VG 32/46) < 10 ppm – transformer oils ***

* Maximum specifications given, equipment-dependent
** For other fluids, viscosities or temperature ranges, please contact us.
*** Units not suitable for "Online" and "Onload" operation (transformer in operation and connected to grid).

Model code

FAM – 10 – M – 1 – A – 05 – R – H – C1 – AC1 – 00 – /-V

Basic model
FAM = FluidAqua Mobil

Size and nominal flow rate
10 ≈ 10 l/min (for 50 Hz operation), ≈ 12 l/min (of 60 Hz operation)
10/15 ≈ 15 l/min (for 50 Hz operation), ≈ 18 l/min (for 60 Hz operation)

Operating fluid
M = Mineral oil - NBR seals, NBR hoses, tested using mineral oil *
I = Insulating oil - NBR seals, NBR hoses, tested using insulating oil **
X = HFD-R phosphoric acid ester fluids - FKM seals, UPE hoses tested using HFD-R fluid *
P = Aviation phosphoric acid ester fluid e.g. Skydrol® or Hyjet IV-A*, EPDM seals tested using Hyjet®
B = Biodegradable oils (based on esters) - FKM seals, NBR hoses, tested using rapidly biodegradable fluid (based on esters) *

Mechanical type
1 = Stationary (with feet)
2 = Mobile (with castors and hose attachment)

Voltage / frequency / power supply
A = 400 V/50 Hz/3Ph+PE
B = 415 V/50 Hz/3Ph+PE
C = 200 V/50 Hz/3Ph+PE 1) ***
D = 200 V/60 Hz/3Ph+PE 1) ***
E = 220 V/60 Hz/3Ph+PE
F = 230 V/60 Hz/3Ph+PE ***
G = 380 V/60 Hz/3Ph+PE
H = 440 V/60 Hz/3Ph+PE 1)
J = 230 V/50 Hz/3Ph+PE ***
K = 480 V/60 Hz/3Ph+PE 1)
L = 220 V/50 Hz/3Ph+PE ***
M = 230 V/50 Hz/1Ph+PE (heater not possible)
N = 575 V/60 Hz/3Ph+PE 1)
O = 460 V/60 Hz/3Ph+PE 1)
X = other voltage on request

Filter size of fine filter
05 = OLF-5

Type of vacuum pump
R = Rotary vane vacuum pump

Heater
H = heater (only for 3-phase version)
Z = without heater

Control concept
C1 = Comfort, control panel language de/en/fr/es/pt/it/nl/da/fi/sv
C2 = Comfort, control panel language de/en/bg/hu/ru/pl/zh
(other languages on request)

Monitoring sensors
A = AquaSensor
AC1 = AquaSensor + ContaminationSensor ISO4406:1999
AC2 = AquaSensor + ContaminationSensor SAE AS 4059(D)
AC3 = AquaSensor + ContaminationSensor NAS 1638

Modification number
00 = the latest version is always supplied

Supplementary details
No details = standard
V = FKM seals for **operating fluid** "M" and "I" (if non-standard seal required for the particular **operating fluid**) (see Model Code under "Operating fluid") : Example:. FAM-10-M....-/V)

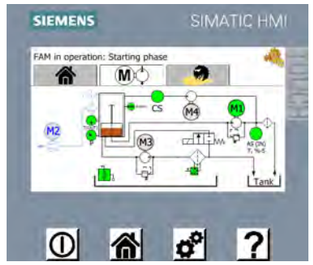
1) Supplied without plug
* Residues of test fluid will remain in the unit after testing.
** Units not suitable for "Online" and "Onload" operation (transformer in operation and connected to grid).
*** For heater option, 32A plug and fuse required.

Control concept

- Siemens S7-1200 with 4" KTP400 TFT colour display with touch and key operation

- Display of water content (% saturation), fluid temperature and optional particle contamination in numerical and graphic form with graphical progress display of measured values

- Automatic, state-based and energy-saving operation through control of the power unit via integrated or external AquaSensor or integrated ContaminationSensor
- Display of hydraulic circuit diagram for active or defective components, such as motors/pumps, level sensors and heaters



- Error messages as plain text display and menu-guided troubleshooting
- Up to 10 selectable languages integrated
- Expandable for Ethernet connection and web server for remote monitoring (see accessories)

Heater option

By using the built-in heater, the dewatering capacity can be increased particularly in the case of high viscosity fluids or fluids at low temperatures. If the temperature of the fluid is raised by 10 °C then the dewatering capacity increases by up to 50%. The ideal temperature for dewatering is roughly 50 to 60 °C. Generally speaking, for operating viscosities of between 350 and 800 mm²/s the heater option must be selected and the heater must be used.

Type of vacuum pump

The vacuum pump used is an oil-lubricated rotary vane vacuum pump. Along with the removed water, the air that emerges from the vacuum pump can contain components of the operating fluid to be cleaned, which may include gases. Therefore, please ensure that the area in which the FAM is operated is adequately ventilated.

Instrumentation

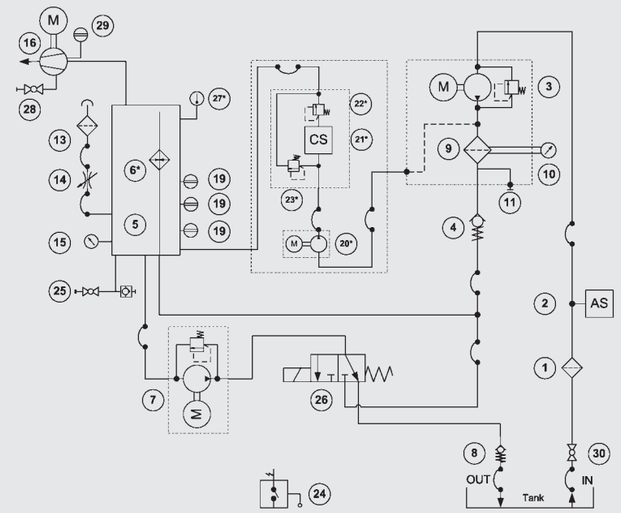
The integrated AquaSensor (AS) enables continuous display of the water content relative to the saturation concentration (saturation level) along with the temperature of the fluid.
The optional ContaminationSensor (CS) determines the solid particle contamination of the fluid and displays it in the control panel. The power units can also be controlled via both sensors fully automatically for state-based and thus energy-saving operation.

External interfaces

The controller has external interfaces for remote control of the unit:

- Start/stop from external (relay)
- Device ready – no error, unit ready for operation (potential-free contact)
- Operating state – unit ON/OFF (potential-free contact)

Hydraulic circuit diagram



1	Suction filter	15	Pressure sensor for measuring the pre-set vacuum
2	AquaSensor AS 1000	16	Vacuum pump
3	Filling pump	19	Level sensor for vacuum column
4	Check valve	20	Pump for ContaminationSensor CS1000 (optional)
5	Vacuum column	21	ContaminationSensor CS1000 (optional)
6	Heater (optional)	22	Pressure relief valve for CS1000 (optional)
7	Drain pump	23	Pressure relief valve for CS1000 (optional)
8	Check valve	24	Leakage indicator for oil drip tray
9	Fluid filter for eliminating solid particles	25	Drain for vacuum column
10	Differential pressure switch for monitoring the filter	26	Return valve
11	Drain for fluid filter	27	Temperature sensor (for the heater (6) option)
13	Air filter and dryer	28	Drain for vacuum pump
14	Needle valve for vacuum setting	29	Level sensor for vacuum pump
		30	Ball valve

Sizing

As a rough guide, the FluidAqua Mobil can be sized according to the tank volume of the system. If the water ingress per hour is known, then a unit can be selected according to the typical dewatering capacities of the various sizes.

Tank volume in litres	FAM
< 2,000	FAM 5 *
1,000 – 7,000	FAM 10/15 / 10
7,000 – 15,000	FAM 25 **
15,000 – 25,000	FAM 45 ** FAM 45E***
25,000 – 35,000	FAM 60 **
35,000 – 45,000	FAM 75 ** / FAM 75E ***
> 45,000	FAM 95 **

* see Brochure no. 7.639. FAM 5
** see Brochure no. 7.613. FAM 25/45/60/75/95
*** see Brochure no. 7.654. FAM Economy Series

- Select a larger size for systems with very high and continuous process-related water entry
- In contrast, for systems with just a small amount of moisture entry via tank breathing, one size smaller can be selected
- Ideally the water content will be measured periodically to determine the water entry per hour/day. Our sales specialists can then determine the suitable size if they know the oil type, oil temperature, operating viscosity, system dimensions, environmental conditions and target water content

In general, it must however be noted that sizing will depend on the application, the fluid, the temperature of the fluid and the ambient temperature, the fluid quantity and the water ingress into the system. These factors have a major influence on the dewatering performance. The information can thus only serve as a general reference.

		Dewatering rate
Water content	⇧	⇧
Fluid temperature	⇧	⇧
Detergent additives	⇧	⇩
Flow rate of the FAM	⇧	⇧

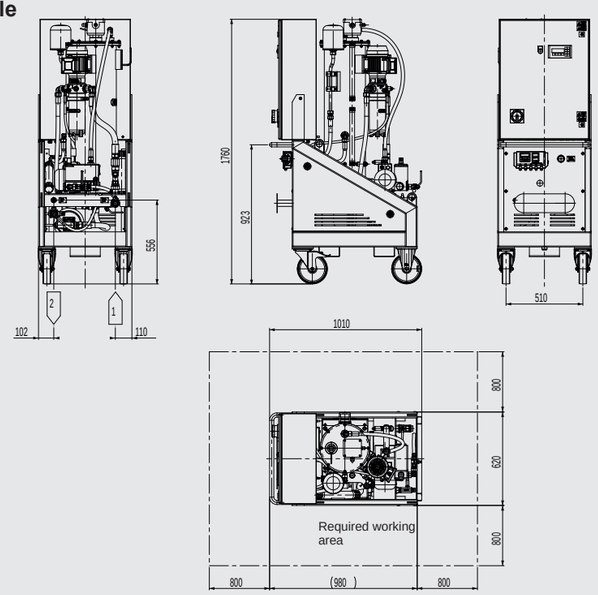
For dimensioning and project planning, please use the FAM checklist, doc. no.: 10000495854

Preferred models (with shorter delivery times)

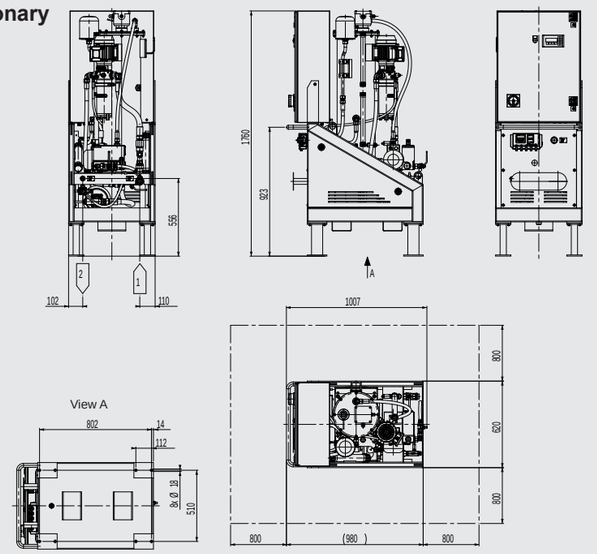
Part no.:	Model code
3726043	FAM-10/15-M-2-A-05-R-H-C1-AC1-2
4292379	FAM-10/15-M-2-A-05-R-H-C2-AC1-2

Measurements

mobile



stationary



Items supplied

- FluidAqua Mobil, ready-for-connection
- With suction and return hose on mobile version
- Key, square 8 mm (for cover panel)
- Pass key for switch cabinet
- Vacuum pump oil (1 litre) for initial filling of vacuum pump
- Connection adapter (see FAM connection summary)
- Technical documentation consisting of:
  - Operating and Maintenance Manual
  - Electrical circuit diagram
  - Test certificate
  - CE conformity declaration

Accessories

Retrofit kit Ethernet connection for web server.

For FAM with SIEMENS S7-1200 controller, PLC program version V1.56 and higher.

Part number 4355412

Filter elements for fine filter

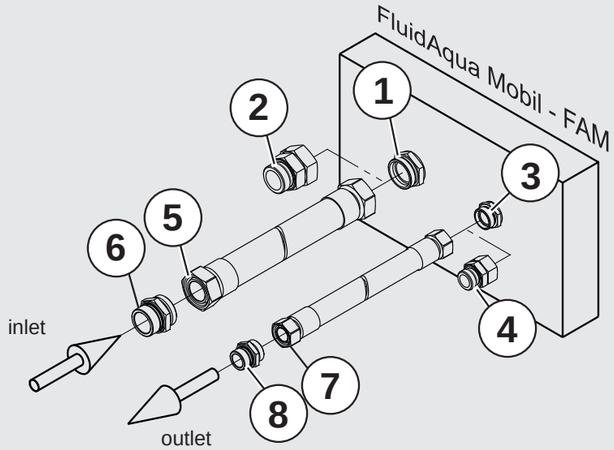
Filter elements for the fine filter must be ordered separately and must be fitted before commissioning on site.

FAM-10

OLF 5: 1 filter element of the type N5DMxxx is required. For operating medium "P": N5DMxxx-EPDM required.

Part number	Designation	Filtration rating	Seal
349494 (3203901)	N5DM002 (-EPDM)	2 µm	FKM (EPDM)
3068101 (3832764)	N5DM005 (-EPDM)	5 µm	FKM (EPDM)
3102924 (4093756)	N5DM010 (-EPDM)	10 µm	FKM (EPDM)
3023508 (4093759)	N5DM020 (-EPDM)	20 µm	FKM (EPDM)

FAM connection summary



Item	FAM 10
1 - FAM inlet connection	28L / M36x2 (male thread)*
2 - Adapter	Adapter G1 A (male thread)**
3 - FAM outlet connection	18L / M26x1.5 (male thread)*
4 - Adapter	Adapter G½ A (male thread)**
5 - Suction hose connection	28L / M36x2 (female thread)***
6 - Adapter	Adapter G1 A (male thread)**
7 - connection, return hose	18L / M26x1.5 (female thread)***
8 - Adapter	Adapter G½ A (male thread)**

*) Connection Form D to ISO 8434-1 Series L (corresponds to ISO 12151, Form S, Series L)
**) Screw-in spigot to ISO 1179-2 (Form E)
***) Connection Form N to ISO 8434-4 Series L (corresponds to ISO 12151, Form SWS, Series L)

Items 1 to 4 are supplied with the stationary FAM. Items 5 to 8 are supplied with the mobile FAM, in addition to the connection hoses.

Note

The information in this brochure relates to the operating conditions and applications described.

For applications and operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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FluidAqua Mobil
FAM 25/45/60/75/95 Series

Description

The FluidAqua Mobil FAM 25/45/60/75/95 series operates according to the principle of vacuum dewatering to separate free and dissolved water as well as free and dissolved gases from hydraulic and lubrication fluids. By using HYDAC bypass filter technology, with its high contamination retention capacity and separation performance, the power unit achieves a very high level of cost effectiveness. All power units have an AquaSensor AS 1000 to continuously monitor the water content and to control the power unit. A CS 1000 particle sensor for simultaneous monitoring of the solid particle contamination can be integrated optionally. To increase the dewatering capacity, a heater can be integrated optionally for highly viscous fluids or for low fluid temperatures. The Siemens S7 series programmable logic controller (PLC) used in combination with a Siemens touch control panel guarantees simple and reliable handling in numerous local languages.

Advantages

Extremely low residual water levels, gas levels and particle contamination in the operating fluids make for:

- Longer oil change intervals
- Improved component service life
- Greater machine availability
- Reduction in the life cycle cost (LCC)

Technical specifications

	FAM 25	FAM 45	FAM 60	FAM 75	FAM 95
Flow rates at 50 Hz	≈ 25 l/min	≈ 45 l/min	≈ 60 l/min	≈ 75 l/min	≈ 95 l/min
Flow rates at 60 Hz	≈ 30 l/min	≈ 54 l/min	≈ 72 l/min	≈ 90 l/min	≈ 114 l/min
Permitted fluids**	Fluids compatible with NBR seals: ● Mineral oils to DIN 51524 ● Gear oils to DIN 51517, 51524 Operating fluids compatible with FKM (FPM,Viton®) seals ● Synthetic esters (HEES) DIN 51524/2 ● Vegetable oils (HETG, HTG) ● HFD fluids (not for pure phosphate ester which require EPDM seals).				
Sealing material	see model code				
Filter size of fine filter	OLF-10		2600 MRF 3/11/40		
Filter elements of fine filter xxx= Filtration rating	N10DMxxx		2600RxxxBN4HC/-KB (-V-KB) N40FMxxx		
Clogging indicator	VM 2 C.0	VM 2 C.0	VM 2 C.0	VM 2 C.0	VM 2 C.0
Pump type, vacuum pump	Rotary vane vacuum pump		Rotary vane vacuum pump or Water ring vacuum pump		
Pump type, others	Gear pumps				
Operating pressure	max. 6 bar				
Permitted pressure at suction port (without suction hose)	-0.2 to 1 bar				
Permitted pressure at outlet (without return hose) **	0 to 3.5 bar				
Operation viscosity range**	15 ... 350 mm²/sec (without built-in heater) 15 ... 550 mm²/sec (with built-in heater)				
Fluid temperature range **	10 ... 80°C				
Ambient temperature **	10 ... 40°C				
Storage temperature range **	10 to 50°C				
Relative humidity (ambient) **	Max. 90%, non-condensing				
Electrical power consumption (50 Hz)*					
Without heater	≈ 3.5 kW	≈ 4.5 kW	≈ 5.9 kW	≈ 7.5 kW	≈ 7.5 kW
With heater	≈ 10.5 kW	≈ 13.5 kW	≈ 19.5 kW	≈ 25.5 kW	≈ 25.5 kW
Heating output (optional)	≈ 6.75 kW	≈ 9 kW	≈ 13.5 kW	≈ 18 kW	≈ 18 kW
Protection class	IP 54	IP 55	IP 55	IP 55	IP 55
Length of electric cable / plug	10 m / CEE (depending on the nominal voltage, see model code)				
Hoses, length	5 m (mobile FAMs only)				
Material of hoses	see model code				
Connection, inlet/outlet	see table "Connection summary"				
Weight when empty	≈ 410 kg	≈ 430 kg	≈ 550 kg	≈ 590 kg	≈ 620 kg
Achievable residual water content	< 100 ppm – hydraulic and heavy oils < 50 ppm – turbine oils (ISO VG 32/46) < 10 ppm – transformer oils ***				

* Maximum specifications given, depends on equipment
** For other fluids, viscosities or temperature ranges, please contact us.
*** Units not suitable for "Online" and "Onload" operation (transformer in operation and connected to grid).

Model code

FAM – 75 – M – 2 – A – 40 – R – H – C1 – AC1 – 00 – /-V

Basic model
FAM = FluidAqua Mobil

Size
25 ≈ 25 l/min 45 ≈ 45 l/min 60 ≈ 60 l/min
75 ≈ 75 l/min 95 ≈ 95 l/min (50 Hz)

Operating medium
M = Mineral oil - NBR seals, NBR hoses, tested with mineral oil*
I = Insulating oil - NBR seals, NBR hoses, tested with insulating oil (Shell Diala)**
X = HFD-R fluids - FKM seals, UPE hoses, tested with HFD-R fluid (Fyrquel)*
B = Biodegradable oils (based on esters) - FKM seals, NBR hoses, tested with biodegradable oils based on esters*

Mechanical type
1 = Stationary (with feet)
2 = Mobile (with castors and hose attachment)

Voltage, frequency, power supply

A	= 400 V, 50 Hz, 3 Ph	F	= 230 V, 60 Hz, 3 Ph	L	= 220 V, 50 Hz, 3 Ph
B	= 415 V, 50 Hz, 3 Ph	G	= 380 V, 60 Hz, 3 Ph	N	= 575 V, 60 Hz, 3 Ph1)
C	= 200 V, 50 Hz, 3 Ph1)	H	= 440 V, 60 Hz, 3 Ph1)	O	= 460 V, 60 Hz, 3 Ph1)
D	= 200 V, 60 Hz, 3 Ph1)	I	= 500 V, 50 Hz, 3 Ph	X	= other voltages
E	= 220 V, 60 Hz, 3 Ph	K	= 480 V, 60 Hz, 3 Ph1)		on request

Filter size of fine filter
10 = OLF 10 Toploader (FAM 25/45 only)
26 = OFU 2600 (FAM 60/75/95 only)
40 = MRF 3/11/40 (FAM 60/75/95 only)

Vacuum pump type
R = rotary vane vacuum pump
W = water ring vacuum pump (for FAM 60/75/95 only)
WA = water ring vacuum pump with automatic water supply (for FAM 60/75/95 only)

Heater
H = Heater appropriate for the size (see technical data) for available voltages, see following pages
Z = without heater

Control concept
C1 = Comfort, control panel language de/en/fr/es/pt/it/nl/da/fi/sv
C2 = Comfort, control panel language de/en/bg/hu/ru/pl/zh
(other languages on request)

Measuring equipment
A = AquaSensor
AC1 = AquaSensor + ContaminationSensor ISO4406:1999
AC2 = AquaSensor + ContaminationSensor SAE AS 4059(D)
AC3 = AquaSensor + ContaminationSensor NAS 1638

Modification number
00 = the latest version is always supplied

Supplementary details
No details = standard
V = FKM seals for **operating fluid** “M” and “I” (if non-standard seal required for the particular **operating fluid**) (see Model Code under “Operating fluid”) Example : FAM-25-M....-/V

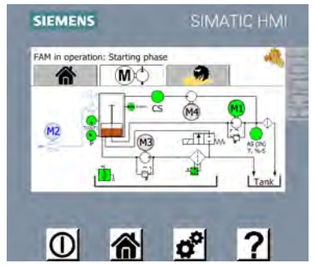
1) Supplied without plug
* Residues of test fluid will remain in the unit after testing.
** Units not suitable for "Online" and "Onload" operation (transformer in operation and connected to grid).

Control concept

- Siemens S7-1200 with 4" KTP400 TFT colour display with touch and key operation

- Display of water content (% saturation), fluid temperature and optional particle contamination in numerical and graphic form with graphical progress display of measured values

- Automatic, state-based and energy-saving operation through control of the power unit via integrated or external AquaSensor or integrated ContaminationSensor
- Display of hydraulic circuit diagram for active or defective components, such as motors/pumps, level sensors and heaters



- Error messages as plain text display and menu-guided troubleshooting
- Up to 10 selectable languages integrated
- Expandable for Ethernet connection and web server for remote monitoring (see accessories)

Heater option

By using the integrated heater, the dewatering capacity can be increased, particularly in the case of high viscosity fluids or low fluid temperatures.

If the temperature of the operating fluid is raised by 10 °C then the dewatering capacity increases by up to 50%. The ideal temperature for dewatering is roughly 50 to 60 °C.

In general, for operating viscosities between 350 and 550 mm²/s the heater option should be selected and the heater should be used.

Type of vacuum pump

The vacuum pump used for sizes FAM 25/45 is an oil-lubricated rotary vane vacuum pump.

For the sizes FAM 60/75/95 we recommend the tried-and-tested water ring vacuum pump, which only requires tap water as a operating medium rather than any special vacuum pump oil. With its 100% oil-free vacuum generation, it has many advantages: high resistance to steam and condensation, low operating costs and clean and above all low-odour waste air. Furthermore, a portion of the water removed from the oil is recovered within the water ring vacuum pump and fed to the pump’s operating water circuit. Depending on the operating conditions, the water ring vacuum pump is then fully self-sufficient in terms of water.

Along with the removed water, the air that emerges from the vacuum pump can, particularly in the case of oil-lubricated rotary vane vacuum pumps, contain components of the operating fluid to be cleaned, which may include gases. Therefore, please ensure that the area in which the FAM is operated is adequately ventilated.

Instrumentation

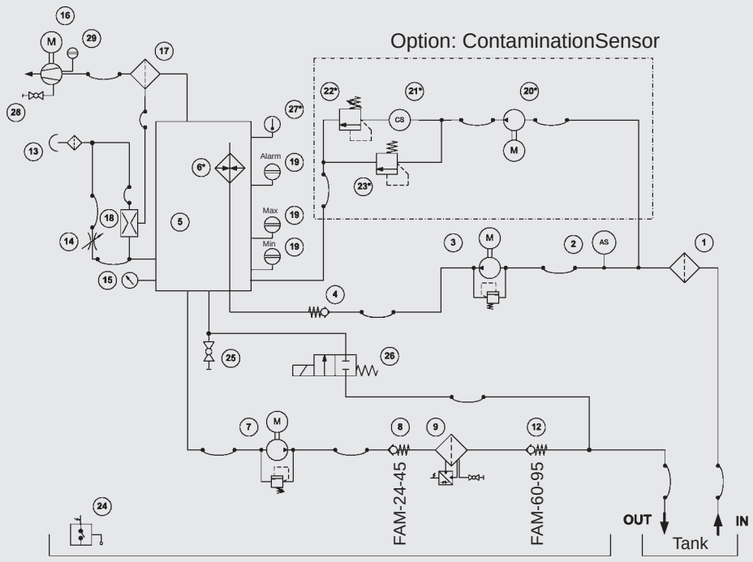
The integrated AquaSensor (AS) enables continuous display of the water content relative to the saturation concentration (saturation level) along with the temperature of the fluid. The optional ContaminationSensor (CS) determines the solid particle contamination of the fluid and displays it in the control panel. The power units can also be controlled via both sensors fully automatically for state-based and thus energy-saving operation.

External interfaces

The controller has external interfaces for remote control of the unit:

- Start/stop from external (relay)
- Device ready – no error, unit ready for operation (potential-free contact)
- Operating state – unit ON/OFF (potential-free contact)

Hydraulic circuit diagram



1	Suction filter	16	Vacuum pump
2	AquaSensor AS 1000	17	Oil mist separator
3	Filling pump	18	Vacuum suction nozzle for the oil mist separator
4	Non-return valve	19	Level sensor for vacuum column
5	Vacuum column	20	Pump for ContaminationSensor CS1000 (optional)
6	Heater (optional)	21	ContaminationSensor CS1000 (optional)
7	Evacuation pump	22	Pressure relief valve for CS1000 (optional)
8	Check valve (FAM-25/45 only)	23	Pressure relief valve for CS1000 (optional)
9	Fluid filter for separating solid particles	24	Leakage indicator for oil drip tray
10	Differential pressure switch for monitoring the filter	25	Drain for vacuum column
11	Drain for fluid filter	26	Return valve
12	Check valve (FAM-60/75/95 only)	27	Temperature sensor (for the heater 6 option)
13	Air filter and dryer	28	Drain for vacuum pump
14	Needle valve for vacuum setting	29	Level sensor for vacuum pump
15	Pressure sensor for measuring the pre-set vacuum		

Sizing

As a rough guide, the FluidAqua Mobil can be sized according to the tank volume of the system.

Tank volume in litres	FAM
< 2,000	FAM 5*
1,000 – 7,000	FAM 10/15** / 10**
7,000 – 15,000	FAM 25 / FAM 45E***
15,000 – 25,000	FAM 45
25,000 – 35,000	FAM 60
35,000 – 45,000	FAM 75 / FAM 75E***
> 45,000	FAM 95

* see Brochure no. 7.639 FAM 5
** see Brochure no. 7.949 FAM 10
*** see Brochure no. 7.654 FAM Economy

- Select a larger size for systems with very high and continuous process-related water entry.
- In contrast, for systems with just a small amount of moisture entry via tank breathing, one size smaller can be selected.
- Ideally the water content will be measured periodically to determine the water entry per hour/day. Our sales specialists can then determine the suitable size if they know the oil type, oil temperature, operating viscosity, system dimensions, environmental conditions and target water content.

In general, it must however be noted that sizing will depend on the application, the fluid, the temperature of the fluid and the ambient temperature, the fluid quantity and the water ingress into the system. These factors have a major influence on the dewatering performance. The information can thus only serve as a general reference.

		Dewatering rate
Water content	⇧	⇧
Fluid temperature	⇧	⇧
Detergent additives	⇧	⇩
Flow rate of the FAM	⇧	⇧

For dimensioning and project planning, please use the FAM checklist, doc. no.: 100000495854

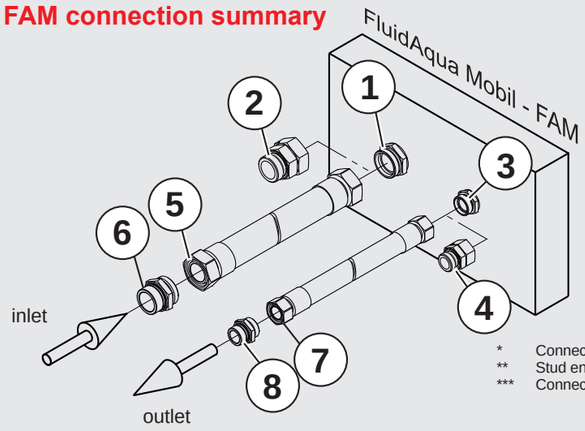
Available voltages and required external fuse

Applicable only when automatic fuses with trip characteristics type C are used.

Voltages \ FAM size	FAM 25	FAM 25 with heater	FAM 45	FAM 45 with heater	FAM 60	FAM 60 with heater	FAM 75	FAM 75 with heater	FAM 95	FAM 95 with heater
A = 400 V, 50 Hz, 3 Ph	16 A	32 A	16 A	32 A	32 A	63 A	32 A	63 A	32 A	63 A
B = 415 V, 50 Hz, 3 Ph	16 A	32 A	16 A	32 A	32 A	63 A	32 A	63 A	32 A	63 A
C = 200 V, 50 Hz, 3 Ph	32 A	63 A	63 A		63 A		63 A		63 A	
D = 200 V, 60 Hz, 3 Ph	32 A	63 A	63 A		63 A		63 A		63 A	
E = 220 V, 60 Hz, 3 Ph	32 A	63 A	32 A	63 A	63 A		63 A		63 A	
F = 230 V, 60 Hz, 3 Ph	32 A	63 A	32 A	63 A	63 A		63 A		63 A	
G = 380 V, 60 Hz, 3 Ph	16 A	32 A	16 A	32 A	32 A	63 A	32 A	63 A	32 A	63 A
H = 440 V, 60 Hz, 3 Ph	16 A	32 A	16 A	32 A	32 A	63 A	32 A	63 A	32 A	63 A
I = 500 V, 50 Hz, 3 Ph	16 A	32 A	16 A	32 A	32 A	63 A	32 A	63 A	32 A	63 A
K = 480 V, 60 Hz, 3 Ph	16 A	32 A	16 A	32 A	32 A	63 A	32 A	63 A	32 A	63 A
L = 220 V, 50 Hz, 3 Ph	32 A	63 A	32 A	63 A	63 A		63 A		63 A	
N = 575 V, 60 Hz, 3 Ph	16 A	32 A	16 A	32 A	32 A	63 A	32 A	63 A	32 A	63 A
O = 460 V, 60 Hz, 3 Ph	16 A	32 A	16 A	32 A	32 A	63 A	32 A	63 A	32 A	63 A

Special version, only on request.

FAM connection summary



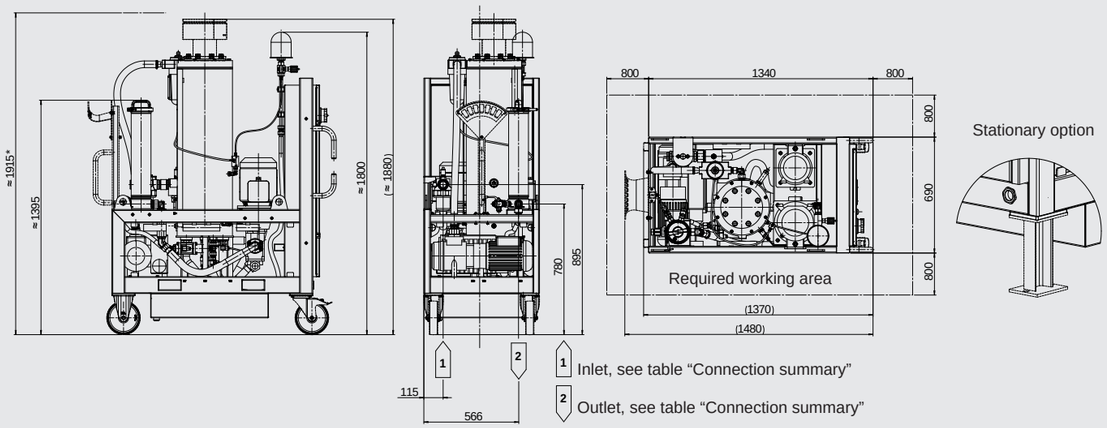
* Connection Form D to ISO 8434-1 Series L (corresponds to ISO 12151, Form S, Series L)
** Stud end to ISO 1179-2 (Form E)
*** Connection Form N to ISO 8434-4 Series L (corresponds to ISO 12151, Form SWS, Series L)

Items 1 to 4 are supplied with the stationary FAM.
Items 5 to 8 are supplied with the mobile FAM, in addition to the connection hoses.

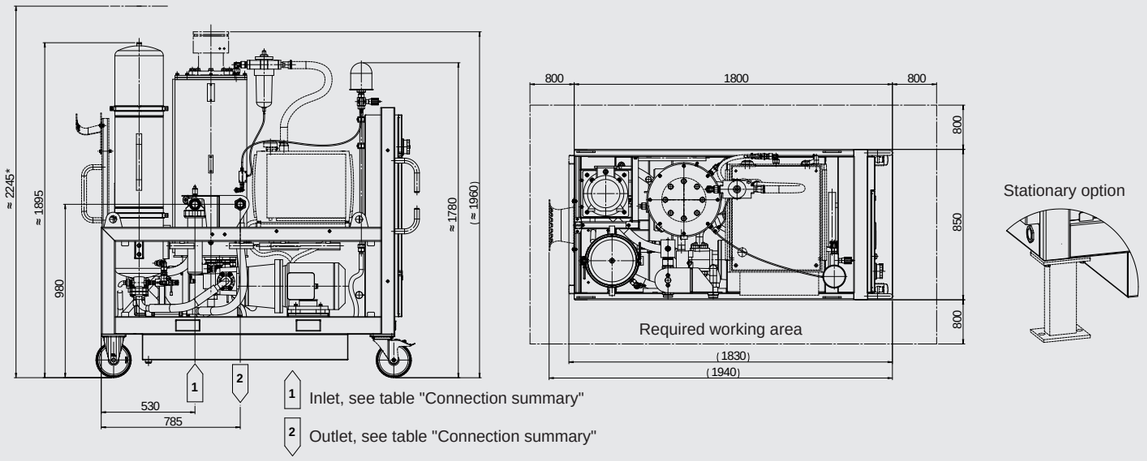
Item	FAM 25	FAM 45	FAM 60	FAM 75	FAM 95
1 - FAM inlet connector	42L / M52x2 (male thread)*	42L / M52x2 (male thread)*	42L / M52x2 (male thread)*	42L / M52x2 (male thread)*	42L / M52x2 (male thread)*
2 - Adapter	Adapter G1½ A (male thread)**	Adapter G1½ A (male thread)**	Adapter G1½ A (male thread)**	Adapter G1½ A (male thread)**	Adapter G1½ A (male thread)**
3 - FAM outlet connector	28L / M36x2 (male thread)*	28L / M36x2 (male thread)*	42L / M52x2 (male thread)*	42L / M52x2 (male thread)*	42L / M52x2 (male thread)*
4 - Adapter	Adapter G1 A (male thread)**	Adapter G1 A (male thread)**	Adapter G1½ A (male thread)**	Adapter G1½ A (male thread)**	Adapter G1½ A (male thread)**
5 - Suction hose connection	42L / M52x2 (female thread)***	42L / M52x2 (female thread)***	42L / M52x2 (female thread)***	42L / M52x2 (female thread)***	42L / M52x2 (female thread)***
6 - Adapter	Adapter G1½ A (male thread)**	Adapter G1½ A (male thread)**	Adapter G1½ A (male thread)**	Adapter G1½ A (male thread)**	Adapter G1½ A (male thread)**
7 - Pressure hose connection	28L / M36x2 (female thread)***	28L / M36x2 (female thread)***	42L / M52x2 (female thread)***	42L / M52x2 (female thread)***	42L / M52x2 (female thread)***
8 - Adapter	Adapter G1 A (male thread)**	Adapter G1 A (male thread)**	Adapter G1½ A (male thread)**	Adapter G1½ A (male thread)**	Adapter G1½ A (male thread)**

Measurements

FAM-25/45



FAM-60/75/95



Items supplied

– FluidAqua Mobil, ready for connection (without cover panel package, see Accessories)
– With suction and return hose on mobile version
– Vacuum pump oil (1 litre) for initial filling of rotary vane vacuum pump (for FAM-x-x-x-x-x-R- ... only)
– Key, square 6 mm (for switch cabinet and cover panel)
– Connection adapter (see FAM connection summary)
– Technical documentation consisting of:
  - Operating and Maintenance Manual
  - Electrical circuit diagram
  - Test certificate
  - CE conformity declaration

Filter elements for suction filter

The suction filter is supplied fitted with a filter element.

FAM 25/45
One filter element of the type 0160 D 200 W/HC is required.

Part number	Description	Filtration rating	Seal
1250304	0160 D 200 W/HC	200µm	NBR
1265447	0160 D 200 W/HC/-V	200µm	FKM

FAM 60/75/95
One filter element of the type 0280 D 200 W/HC is required.

Part number	Description	Filtration rating	Seal
1269748	0280 D 200 W/HC	200µm	NBR
1271978	0280 D 200 W/HC/-V	200µm	FKM

Filter elements for fine filter

Filter elements for the fine filter must be ordered separately and must be fitted before commissioning on site.

FAM 25/45

OLF 10: 1 filter element of the type N10DMxxx is required.

Part number	Description	Filtration rating	Seal
3539235	N10DM002	2 µm	FKM
3539237	N10DM005	5 µm	FKM
3539238	N10DM010	10 µm	FKM
3539242	N10DM020	20 µm	FKM

FAM 60/75/95

OFU 2600: 1 filter element of the type 2600RxxxBN4HC/-KB (-V-KB) is required.

Part number	Description	Filtration rating	Seal
1263071 (1263784)	2600R003BN4HC/-KB (-V-KB)	3 µm	NBR (FKM)
1263072 (1263785)	2600R005BN4HC/-KB (-V-KB)	5 µm	NBR (FKM)
1263073 (1263786)	2600R010BN4HC/-KB (-V-KB)	10 µm	NBR (FKM)
1263074 (1263787)	2600R020BN4HC/-KB (-V-KB)	20 µm	NBR (FKM)

MRF 3/11/40: 11 filter elements of the type N40MRxxx-PES1F are required.

Part number	Designation	Filtration rating	Seal
3509897	N40FM-P001-PES1F	1 µm	FKM
3536452	N40FM-P003-PES1F	3 µm	FKM
3506155	N40FM-P005-PES1F	5 µm	FKM
3506053	N40FM-P010-PES1F	10 µm	FKM
3491730	N40FM-P020-PES1F	20 µm	FKM

Accessories

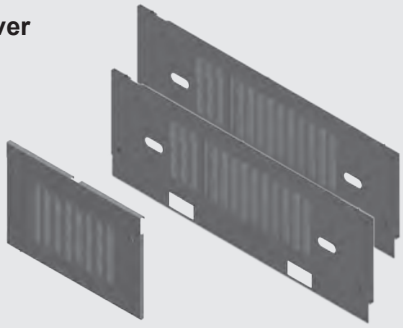
– **Cover panel package: 2 x side sections, 1 x rear cover**

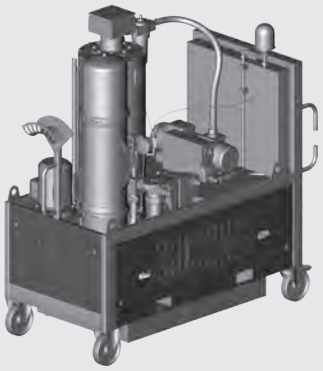
FAM-25/45

Part number	**Description**
3334212	Cover panel FAM 25/45

FAM-60/75/95

Part number	**Description**
3334177	Cover panel FAM 60/75/95





– **Retrofit kit Ethernet connection for web server**

For FAM with SIEMENS S7-1200 controller, PLC program version V1.56 and higher.

Part number 4355412

Note

The information in this brochure relates to the operating conditions and applications described.

For applications and operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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FluidAqua Mobil
FAM Economy Series

Description

The FluidAqua Mobil FAM Economy series operates on the principle of vacuum dewatering to eliminate free and dissolved water as well as free and dissolved gases from hydraulic and lubrication fluids.

Since it uses HYDAC offline filter element technology with its high contamination retention capacity and filtrationefficiency, the unit is extremely economical.

All units are equipped with an AquaSensor AS 1000 for continuous monitoring of the water content and control of the unit. An FCU 1000 (see Accessories) can be connected for temporary measurement of particle contamination.

To increase the dewatering capacity, for high viscosity fluids or for low fluid temperatures, an integrated heater is provided.

The Siemens S7 series of programmable logic control (PLC) in combination with a Siemens control panel guarantees simple and reliable operation in many languages.

Advantages

Extremely low residual water levels, gas levels and particle contamination in the operating fluids have the following benefits:

- Longer oil change intervals
- Improved component service life
- Greater machine availability
- Reduction in the LifeCycle Cost (LCC)

Technical specifications

FAM	45E	75E
Flow rates IN at 50(60) Hz	≈ 45(54) l/min	≈ 75(90) l/min
Flow rates OUT at 50(60) Hz	Max. ≈ 54(65) l/min	Max. ≈ 90(103) l/min
Permitted fluids**	● Mineral oils to DIN 51524 ● Gear oils to DIN 51517, 51524 ● Synthetic esters (HEES) DIN 51524/2 ● Vegetable oils (HETG, HTG) ● HFD-R fluids (not for pure phosphate esters for which EPDM seals are required)	
Sealing material	FKM (FPM, Viton®)	
Filter size of fine filter	OLF-50	OLF-100
Filter elements for fine filter	N50DMxxx	N100DMxxx
... 150 mm²/sec	≥ 2 µm	≥ 2 µm
... 460 mm²/sec	≥ 10 µm	≥ 10 µm
... 1100 mm²/sec	≥ 20 µm	≥ 20 µm
Clogging indicator	VM 2 C.0	VM 2 C.0
Pump type, vacuum pump	Rotary vane vacuum pump	
Operating pressure **	Max. 9 bar	
Permitted pressure at outlet (without return hose)	0 to 3.5 bar	
Permitted pressure at suction port (without suction hose) **	-0.2 ... 1 bar	
Operating viscosity range**	15 ... 800 mm²/sec without built-in heater 15 … 1100 mm²/s with integrated heater	
Fluid temperature range **	10 ... 80°C	
Ambient temperature **	10 ... 45°C	
Storage temperature range **	10 to 50 °C	
Relative humidity (ambient) **	Max. 90%, non-condensing	
Electrical power consumption *		
without built-in heater	≈ 4.5 kW	≈ 8.3 kW
with built-in heater	≈ 11.25 kW	≈ 26.3 kW
Heating output (optional)	≈ 6.75 kW	≈ 18 kW
Protection class	IP 54	IP 55
Length of electric cable / plug	10 m / CEE (depending on the nominal voltage, see model code)	
Length of hoses	5 m (mobile FAMs only)	
Material of hoses	see model code	
Connection inlet/outlet	see Connection summary table	
Weight when empty	≈ 405 kg	≈ 465 kg
Achievable residual water content	< 100 ppm – hydraulic and heavy oils < 50 ppm – turbine oils (ISO VG 32/46) < 10 ppm – transformer oils ***	

* Maximum specifications given, equipment-dependent
** For other fluids, viscosities or temperature ranges, please contact us.
*** Units not suitable for "Online" and "Onload" operation (transformer in operation and connected to grid).

Model code

FAM – 45E – M – 2 – A – 50 – R – H – C1 – A – 00

Basic model
FAM = FluidAqua Mobil

Size
45E ≈ 45 l/min (50Hz), Economy series
75E ≈ 75 l/min (50 Hz), Economy series

Operating medium
M = Mineral oil - FKM seals, NBR hoses, tested with mineral oil*
I = Insulating oil - FKM seals, NBR hoses, tested with insulating oil (e.g. Shell Diala)**
X = HFD-R fluids - FKM seals, UPE hoses, tested with HFD-R fluid (Fyrquel)*
B = Biodegradable oils (based on esters) - FKM seals, NBR hoses, tested with biodegradable oils based on esters*

Mechanical Type
1 = Stationary (with feet)
2 = Mobile (with casters)

Voltage / frequency / power supply

A = 400 V, 50 Hz, 3 Ph	F = 230 V, 60 Hz, 3 Ph	L = 220 V, 50 Hz, 3 Ph
B = 415 V, 50 Hz, 3 Ph	G = 380 V, 60 Hz, 3 Ph	N = 575 V, 60 Hz, 3 Ph[1)]
C = 200 V, 50 Hz, 3 Ph[1)]	H = 440 V, 60 Hz, 3 Ph[1)]	O = 460 V, 60 Hz, 3 Ph[1)]
D = 200 V, 60 Hz, 3 Ph[1)]	I = 500 V, 50 Hz, 3 Ph	S = 380 V, 50 Hz, 3 Ph
E = 220 V, 60 Hz, 3 Ph	K = 480 V, 60 Hz, 3 Ph[1)]	X = other voltage on request

Filter size of fine filter
OLF 50 (FAM 45E only)
OLF 100 (FAM 75E only)

Type of vacuum pump
R = rotary vane vacuum pump

Heater
H = heater appropriate for the size (see technical data) for available voltages, see following pages
Z = without heater

Control concept
C1 = Comfort, control panel language de/en/fr/es/pt/it/nl/da/fi/sv
C2 = Comfort, control panel language de/en/bg/hu/ru/pl/zh
(other languages on request)

Measuring equipment
A = AquaSensor

Modification number
00 = the latest version is always supplied

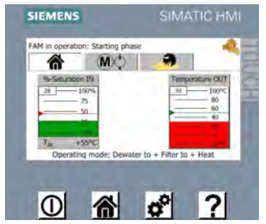
Supplementary details
No details = standard

1) Supplied without plug
* Residues of test fluid will remain in the unit after testing.
** Units not suitable for "Online" and "Onload" operation (transformer in operation and connected to grid).

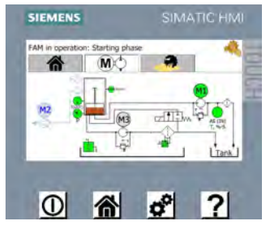
Control concept

- Siemens S7-1200 with 4" KTP400 TFT colour display with touch and key operation

- Display of water content (% saturation) and fluid temperature in numerical and graphic form with graphical progress display of measured values



- Automatic, state-based and energy-saving operation through control of the power unit via integrated or external AquaSensor using MIN/MAX values
- Display of hydraulic circuit diagram for active or defective components, such as motors/pumps, level sensors and heaters



- Error messages as plain text display and menu-guided troubleshooting
- Up to 10 selectable languages integrated
- Expandable for Ethernet connection and web server for remote monitoring (see accessories)

Type of vacuum pump

The vacuum pump used is an oil-lubricated rotary vane vacuum pump.

Along with the removed water, the air that emerges from the vacuum pump can contain components of the operating fluid to be cleaned, which may include gases.

Therefore, please ensure that the area in which the FAM is operated is adequately ventilated.

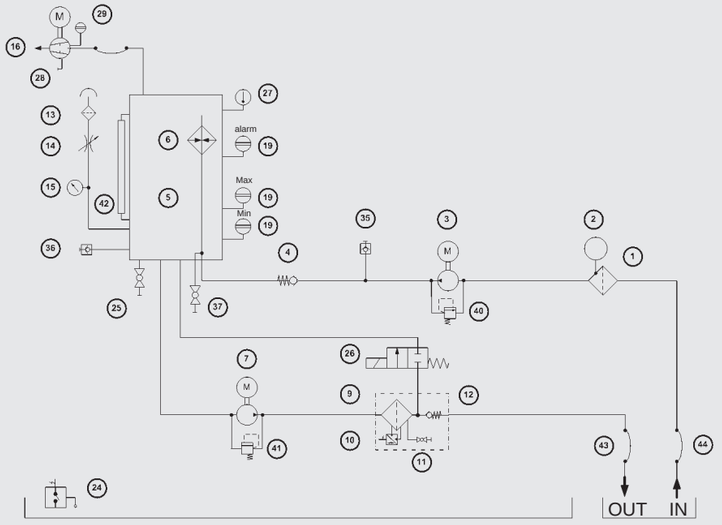
Heater

By using the integrated heater, the dewatering capacity can be increased, particularly in the case of high viscosity fluids or fluids at low temperatures.

If the temperature of the fluid is raised by 10 °C then the dewatering capacity increases by up to 50%. The ideal temperature for dewatering is ≈ 50 to 60 °C.

Generally speaking, for operating viscosities of between 800 and 1100 mm²/sec, the heater option must be selected and the heater must be in operation.

Hydraulic circuit diagram



1	Suction filter	19	Level sensor for vacuum column
2	AquaSensor	24	Leakage indicator for oil drip tray
3	Filling pump	25	Drain for vacuum column
4	Check valve	26	Return valve
5	Vacuum column	27	Temperature sensor
6	Heater	28	Drain for vacuum pump
7	Evacuation pump	29	Level sensor for vacuum pump
9	Fine filter for eliminating solid particles	35	Suction port connection for FCU1000
10	Differential pressure switch for monitoring the filter	36	Return line connection for FCU 1000
11	Fine filter drainage	37	Drain for heater
12	Check valve	40/41	Pressure relief valve (integrated in pump)
13	Air filter	42	Visual fluid level gauge
14	Needle valve for vacuum setting	43	Return hose (mobile version only)
15	Pressure gauge for measuring the pre-set vacuum	44	Suction hose (mobile version only)
16	Vacuum pump		

Instrumentation

The integrated AquaSensor (AS) enables continuous display of the water content relative to the saturation concentration (saturation level) along with the temperature of the fluid and automatic control of the power unit on the basis of the saturation level.

Sizing

As a rough guide, the FluidAqua Mobil can be sized according to the tank volume of the system.

Tank volume in litres	FAM
< 2,000	FAM 5 *
1,000 – 7,000	FAM 10/15 ** / 10**
7,000 – 15,000	FAM 25 ***
15,000 – 25,000	FAM 45 *** / FAM 45E
25,000 – 35,000	FAM 60 ***
35,000 – 45,000	FAM 75 *** / FAM 75E
> 45,000	FAM 95 ***

* see Brochure no. 7.639. FAM 5
** see Brochure no. 7.949. FAM 10
*** see Brochure no. 7.613. FAM 25/45/60/75/95

- Select a larger size for systems with very high and continuous process-related water entry
- In contrast, for systems with just a small amount of moisture entry via tank breathing, one size smaller can be selected
- Ideally the water content will be measured periodically to determine the water entry per hour/day. Our sales specialists can then determine the suitable size if they know the oil type, oil temperature, operating viscosity, system dimensions, environmental conditions and target water content

In general, it must however be noted that sizing will depend on the application, the fluid, the temperature of the fluid and the ambient temperature, the fluid quantity and in particular the water ingress into the system. These factors have a major influence on the dewatering performance. The information can thus only serve as a general reference.

		Dewatering rate
Water content	⇧	⇧
Fluid temperature	⇧	⇧
Detergent additives	⇧	⇩
Volumetric flow of the FAM	⇧	⇧

For triggering and project planning, please use the FAM checklist, doc. no.: 10000495854

Available voltages and required external fuse

Applicable only when automatic fuses with trip characteristics type C are used.

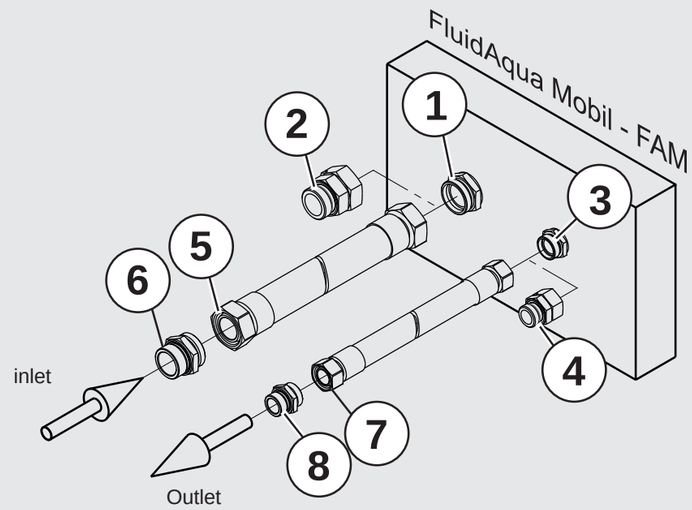
Voltages \ FAM size	FAM - 45E	FAM - 45E with heater	FAM - 75E	FAM - 75E with heater
A = 400 V, 50 Hz, 3 Ph	16A	32 A	32A	63 A
B = 415 V, 50 Hz, 3 Ph	16A	32 A	32A	63 A
C = 200 V, 50 Hz, 3 Ph	63A		63A	
D = 200 V, 60 Hz, 3 Ph	63A		63A	
E = 220 V, 60 Hz, 3 Ph	32A	63 A	63A	
F = 230 V, 60 Hz, 3 Ph	32A	63 A	63A	
G = 380 V, 60 Hz, 3 Ph	16A	32 A	32A	63 A
H = 440 V, 60 Hz, 3 Ph	16A	32 A	32A	63 A
I = 500 V, 50 Hz, 3 Ph	16A	32 A	32A	63 A
K = 480 V, 60 Hz, 3 Ph	16A	32 A	32A	63 A
L = 220 V, 50 Hz, 3 Ph	63A	63 A	63A	
N = 575 V, 60 Hz, 3 Ph	16A	32 A	32A	63 A
O = 460 V, 60 Hz, 3 Ph	16A	32 A	32A	63 A
S = 380V, 50 Hz, 3 Ph	16A	32 A	32A	63 A

Special model, only on request.

Preferred models (with shorter delivery times)

Part no.	Model code
3772164	FAM-45E-M-2-A-50-R-H-C1-A-00
4292381	FAM-45E-M-2-A-50-R-H-C2-A-00
3772161	FAM-75E-M-2-A-100-R-H-C1-A-00
4292380	FAM-75E-M-2-A-100-R-H-C2-A-00

FAM connection summary



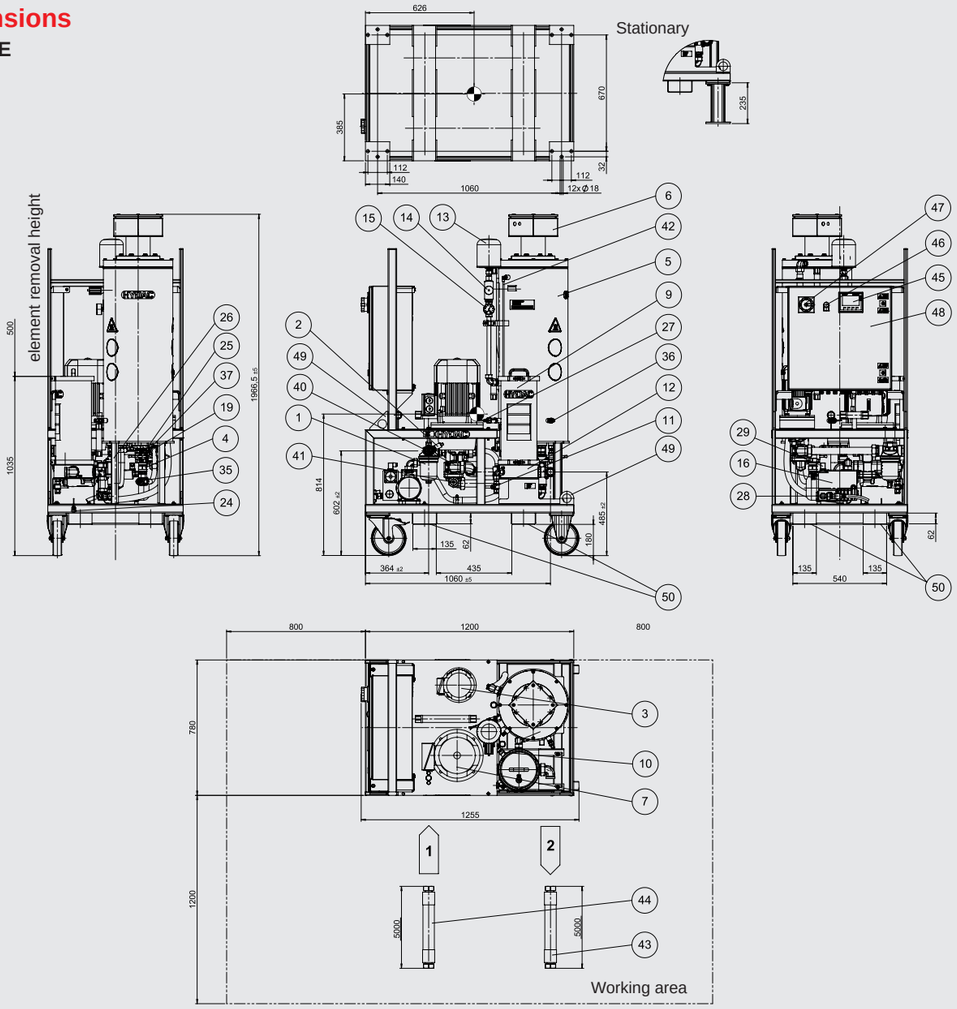
Item	FAM 45E	FAM 75E
1 - FAM inlet connection	42L / M52x2 (male thread)*	42L / M52x2 (male thread)*
2 - Adapter	Adapter G1½ A (male thread)**	Adapter G1½ A (male thread)**
3 - FAM outlet connection	42L / M52x2 (male thread)*	42L / M52x2 (male thread)*
4 - Adapter	Adapter G1½ A (male thread)**	Adapter G1½ A (male thread)**
5 - Suction hose connection	42L / M52x2 (female thread)***	42L / M52x2 (female thread)***
6 - Adapter	Adapter G1½ A (male thread)**	Adapter G1½ A (male thread)**
7 - connection, return hose	42L / M52x2 (female thread)***	42L / M52x2 (female thread)***
8 - Adapter	Adapter G1½ A (male thread)**	Adapter G1½ A (male thread)**

*) Connection Form D to ISO 8434-1 Series L (corresponds to ISO 12151, Form S, Series L)
**) Screw-in spigot to ISO 1179-2 (Form E)
***) Connection Form N to ISO 8434-4 Series L (corresponds to ISO 12151, Form SWS, Series L)

Items 1 ... 4 are supplied with the stationary FAM.
Items 1 ... 8 are supplied with the mobile FAM, in addition to the hoses.

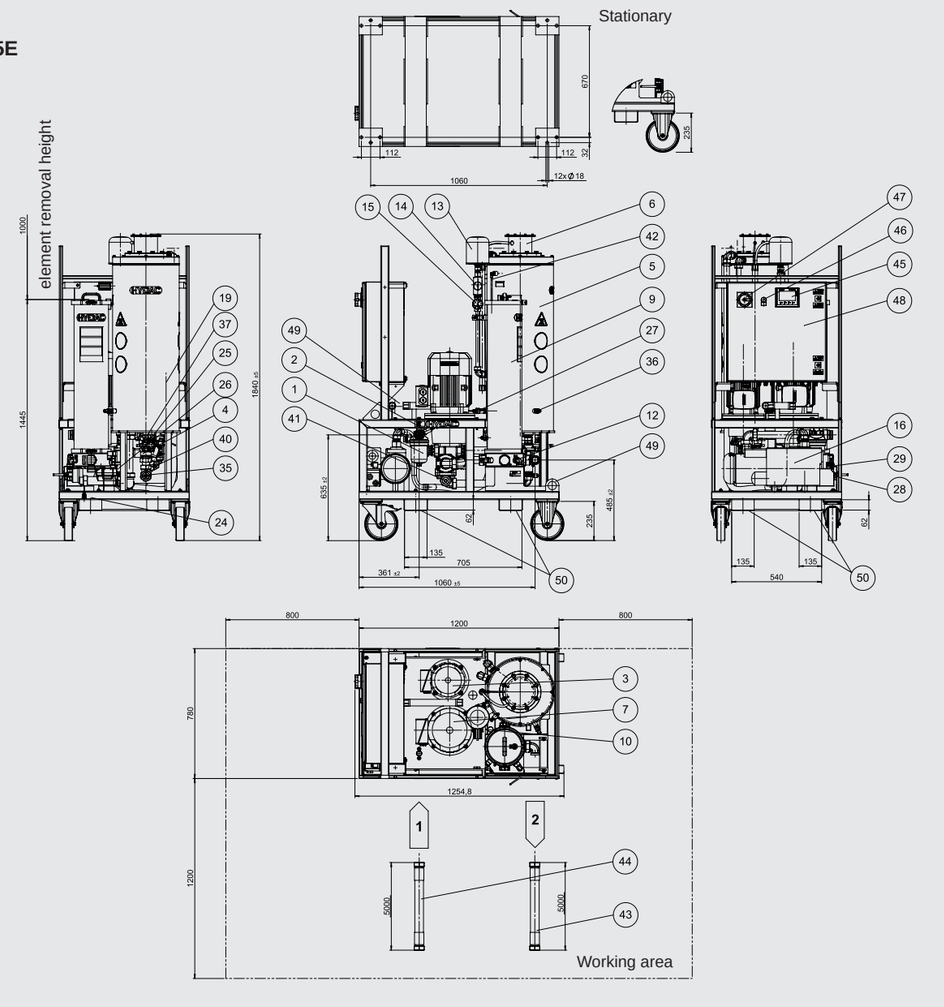
Dimensions

FAM-45E



1	Suction filter	27	Temperature sensor
2	AquaSensor	28	Drain for vacuum pump
3	Filling pump	29	Level sensor for vacuum pump
4	Check valve	35	Suction port connection for FCU1000
5	Vacuum column	36	Return line connection for FCU 1000
6	Heater	37	Drain for heater
7	Evacuation pump	40	Pressure relief valve for filling pump
9	Fine filter for eliminating solid particles	41	Pressure relief valve for evacuation pump
10	Differential pressure switch for monitoring the filter	42	Visual fluid level gauge for vacuum column
11	Fine filter drainage	43	Return hose (mobile version only)
12	Check valve	44	Suction hose (mobile version only)
13	Air filter	45	Control panel
14	Needle valve for vacuum setting	46	Fault indicator light
15	Pressure gauge for vacuum setting	47	Main switch
16	Vacuum pump	48	Switch cabinet
19	Level sensor for vacuum column	49	Lifting eye
24	Leakage indicator for oil drip tray	50	Forklift pockets
25	Drain for vacuum column		
26	Return valve		

FAM-75E



1	Suction filter	27	Temperature sensor
2	AquaSensor	28	Drain for vacuum pump
3	Filling pump	29	Level sensor for vacuum pump
4	Check valve	35	Suction port connection for FCU1000
5	Vacuum column	36	Return line connection for FCU 1000
6	Heater	37	Drain for heater
7	Evacuation pump	40	Pressure relief valve for filling pump
9	Fine filter for eliminating solid particles	41	Pressure relief valve for evacuation pump
10	Differential pressure switch for monitoring the filter	42	Visual fluid level gauge for vacuum column
11	Fine filter drainage	43	Return hose (mobile version only)
12	Check valve	44	Suction hose (mobile version only)
13	Air filter	45	Control panel
14	Needle valve for vacuum setting	46	Fault indicator light
15	Pressure gauge for vacuum setting	47	Main switch
16	Vacuum pump	48	Switch cabinet
19	Level sensor for vacuum column	49	Lifting eye
24	Leakage indicator for oil drip tray	50	Forklift pockets
25	Drain for vacuum column		
26	Return valve		

Items supplied

– FluidAqua Mobil, ready-for-connection
– With suction and return hose on mobile version
– Vacuum pump oil (1 litre) for initial filling of rotary vane vacuum pump
– Key to the control cabinet
– Connection adapter (see FAM connection summary)
– Technical documentation consisting of:
  - Operation and maintenance instructions
  - Electrical wiring diagram
  - Test certificate
  - CE Declaration of Conformity

Filter elements for suction filter

The suction filter is supplied fitted with a filter element.

FAM 45E / 75E
1 filter element type 0160 D 200 W/HC is required.

Part number	Description	Filtration rating	Seal
1265447	0160 D 200 W/HC/-V	200 µm	FKM

Filter elements for fine filter

Filter elements for the fine filter must be ordered separately and must be fitted before commissioning on site.

FAM 45E

OLF 50: 1 filter element of the type N50DMxxx is required.

Part number	Designation	Filtration rating*	Seal
3944985	N50DM002	2 µm	FKM
3944987	N50DM005	5 µm	FKM
3944988	N50DM010	10 µm	FKM
3944989	N50DM020	20 µm	FKM

FAM 75E

OLF 100: one filter element of the type N100DMxxx is required.

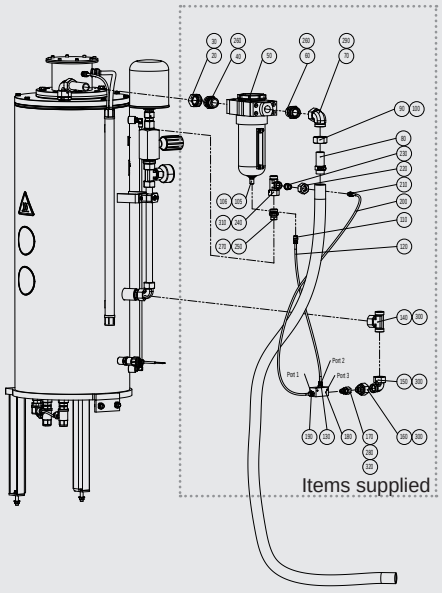
Part number	Designation	Filtration rating*	Seal
3944991	N100DM002	2 µm	FKM
3944992	N100DM005	5 µm	FKM
3944993	N100DM010	10 µm	FKM
3944994	N100DM020	20 µm	FKM

*The selection of the filtration rating is dependent on the operating viscosity – see **Technical data**

Accessories

- FCU 1000 for temporary measurement of the particle contamination. See Brochure no. E 7.607.6 FCU 1000 Series
- Suction hose for connecting the FCU 1000 to the FAM, part number 3992965
- Oil mist separator, part number 3921668
  If, after a few days, there is obvious excessive oil carry-over as a result of overfilling the vacuum pump, the oil mist separator can easily be retrofitted. As oil separation is integrated within the vacuum column, the oil mist separator is not normally required. Potential oil carry-over is greatly dependent on the application, e.g. the oil type, oil age, water content, air content and oil temperature
- Retrofit kit Ethernet connection for web server. For FAM with SIEMENS S7-1200 controller, PLC program version V01.56 and higher. Part number 4355412

Items supplied Oil mist separator



Note

The information in this brochure relates to the operating conditions and applications described.

For fields of application or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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OffLine Separator OLS 10

Description

The OffLine Separator OLS is a dewatering unit for hydraulic oils, light gear oil and with densities below 950 kg/m³.

The dewatering works according to the coalescence principle, with tiny oil droplets combining to form larger drops in the coalescing elements and then being separated from the oil by means of gravity.

The OLS is installed in the bypass flow, but it can also be used as a transfer unit, optionally with a pre-filter.

Applications

- Marine and offshore applications for sensitive systems such as rowing machines, drives and deck machinery
- Transfer lines to reduce downtime
- Turbine lubricating oil

Advantages

- Cost-effective and oil-saving dewatering
- Unlimited water separation, because no absorbent filter elements are used
- Stainless steel housing for the prevention of internal corrosion
- Simple connection as bypass flow unit possible

Technical Details

Hydraulic data	
Flow rate	5 l/min
Permitted fluids	Mineral oils to DIN 50524 Gear oils to DIN 51517, 51524
Fluid temperature	Mineral oil -10 to 80 °C
Permitted viscosity range	15 to 500 mm²/sec (pump design S, G)
Operating pressure	Maximum 6 bar
Permitted pressure at inlet	-0.4 to 0.6 bar (with pump) 0.5 to 2 bar (without pump)
Permissible pressure at water drain	Unpressurized
Housing material	Stainless steel 1.4301
Seal material	NBR (FPM)
INLET connection	G 1"
OUTLET connection	G 1"
Connection, water drain	G ½"
Electrical data	
Supply voltage	See model code
Power consumption	Without heater ≈ 1 kW With heater max. 3 kW
External fuse required	16 amperes
Length of power cable	10 metres (only for options PKZ and FA2)
IP rating as per DIN 40050	IP 54
General data	
Ambient temperature	-40 to 70°C
Storage temperature range	10 to 40°C
Relative humidity	Max. 80%, non-condensing
Weight	Small drip tray ≈ 80 kg Large drip tray ≈ 150 kg

Model code

OLS 10 / 5 - S - N - 20 - Z - BM - Z - Z - Z / V

Basic model
OLS = OffLine Separator

Size
10 = Number of coalescing elements

Nominal flow rate
5 = 5 l/min

Pump type
Z = without pump
G = gear pump
S = vane pump

Supply voltage
B = 480 V - 3 Ph
C = 380 V - 3 Ph
G = 440 V - 3 Ph
L = 115 V - 1 Ph
M = 230 V - 1 Ph*
N = 400 V - 3 Ph*
O = 460 V - 3 Ph
P = 575 V - 3 Ph
S = 500 V - 3 Ph
R = 415 V - 3 Ph
W = 230 V - 3 Ph*
X = other voltage (on request)
L60, M60, ...= operation at 60 Hz
Z = without motor
*) Standard in Europe according to CENELEC HD472 S1 at 50 Hz

Element length
20 = coalescing element 20" – N20WRxxx

Pre-filter
1 = OLF 5/4 Toploader
Z = without

Clogging indicator
BM= differential pressure indicator – visual (VMxBM.1)
C = differential pressure indicator – electrical (VMxC.0)
Z = without
E = VMF 0.6KO (back pressure)

Heater
1 = 1 kW heater
2 = 2 kW heater
Z = without

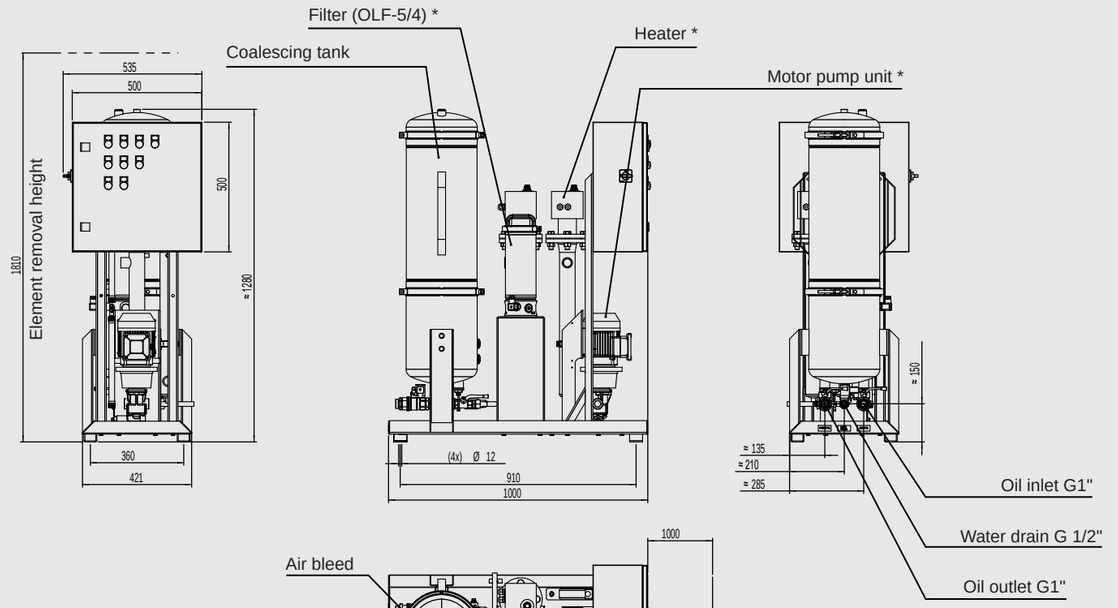
Water drain
1 = automatic
Z = manual

Instrumentation
Z = without

Supplementary details
PKZ = on/ off switch with motor protection switch
FA2 = on/ - off switch with motor protection switch and switch-off when filter is clogged. Does not require neutral line. All voltages. Clogging indicator type C required.
V = Viton (FPM) seals

Dimensions (all dimensions given in mm)

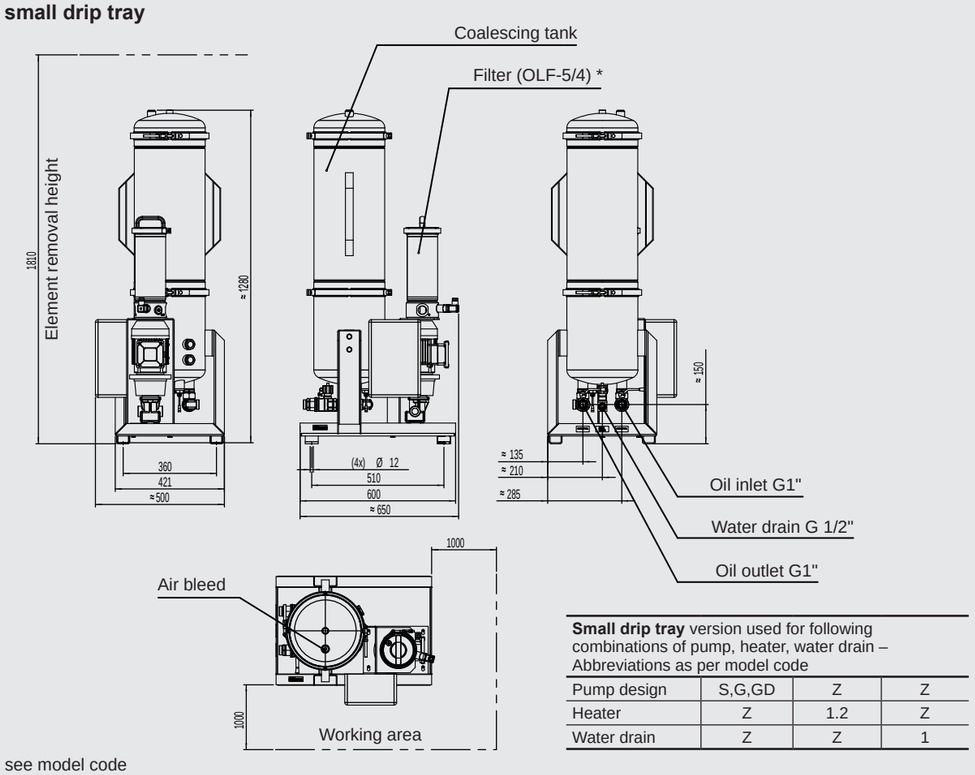
Dimensions depend on the version of the OLS:
Dimensions with large drip tray



Large drip tray version used for following combinations of pump, heater, water drain – Abbreviations as per model code

Pump design	S,G,GD	S,G,GD	Z	S,G,GD
Heater	1.2	Z	1.2	1.2
Water drain	Z	1	Z	1

Dimensions with small drip tray



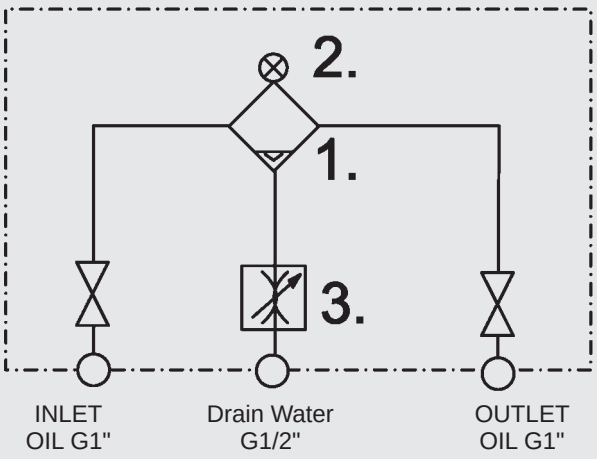
Small drip tray version used for following combinations of pump, heater, water drain – Abbreviations as per model code

Pump design	S,G,GD	Z	Z
Heater	Z	1.2	Z
Water drain	Z	Z	1

* Equipment optional, see model code

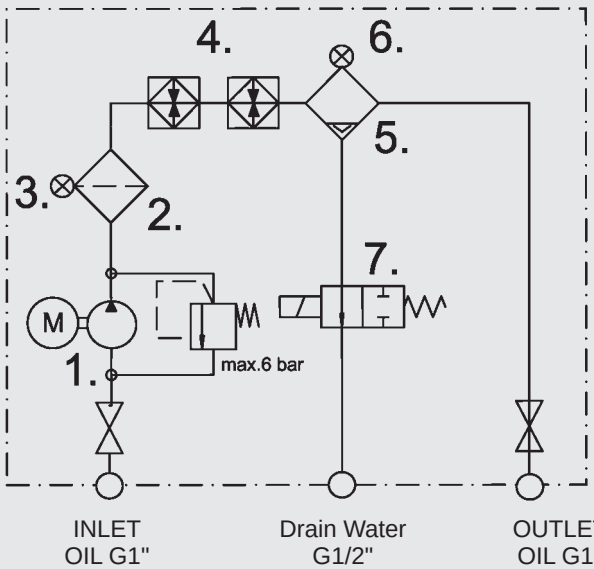
Hydraulic circuit diagram

OLS 10/5 (minimum equipment)



No.	Code
1.	Coalescing tank
2.	Coalescing tank clogging indicator (differential pressure 0.8 bar)
3.	Manual water drain

OLS 10/5 (maximum equipment without monitoring devices)



No.	Code
1.	Motor pump unit
2.	Pre-filter (OLF-5/4)
3.	Coalescing tank pre-filter (differential pressure 2 bar)
4.	Heater
5.	Coalescing tank
6.	Coalescing tank clogging indicator (differential pressure 0.8 bar)
7.	Automatic water drain

Items supplied

– OLS
– Operating and maintenance instructions

Elements

Coalescing element:
– 3277940 - N20WR005-1F (5 µm)

The OLS 10 has 10 coalescing elements

Filter elements, pre-filter:
– 349494 - N5DM002 (2 µm)

Note

The information in this general brochure relates to the operating conditions and applications described.

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OffLine Separator Water OLSW

Description

The OffLine Separator Water is used to remove oil from washing liquids (water with mineral oil < 10 vol. %) that are contaminated with mineral oils (density < 900 kg/m³).

The oil removal unit works according to the coalescence principle. This means that tiny oil droplets combine into larger drops in the coalescing elements and these large drops rise to the top due to the buoyant force of the water.

The OLSW is installed in the bypass flow; a pre-filter is available as an option.

Applications

- Industrial part washing systems

Advantages

- Extended service life
- Improved cleanliness
- Plug & Work unit
- Oil separation is virtually unlimited since the filter elements are non-absorbing
- Stainless steel housing
- Automatic oil drain, allowing unit to function independently

Technical specifications

Hydraulic specifications	
Nominal flow:	for OLSW 11/20: 20 l/min
Maximum permitted pressure	max. 6 bar
Permitted pressure at inlet INLET WATER	-0.6 to 0.4 bar (with pump) 1.5 to 5 bar (without pump)
Permitted pressure at drain DRAIN OIL	Not pressurized
Hydraulic connection INLET / OULTLET WATER	G1/2
Hydraulic connection DRAIN OIL	G1/2
Electrical specifications	
Supply voltage	version-dependent, see Model Code
Protection class to DIN 40050	IP 54
General specifications	
Permitted fluids	Water-based cleaning fluids, contaminated with mineral oil
Permitted fluid temperature	up to 80 °C
Permitted ambient temperature	5 to 40 °C
Capacity of coalescing tank	65 litres
Number of coalescing elements	11 pieces
Number of filter elements	1 piece
Weight	Standard version ≈ 165 kg Version B1 ≈ 50kg
Dimensions	Standard version 1420 X 1040 X 545 mm Version B1 400 X 393 X 1350 mm
Materials:	
Filter housing/foot	Stainless steel / steel, painted
Seals	FPM

Model code

OLSW 11 / 20 - W - N - 20 - 1 - D18 - 1 / Z

Basic model
OLSW =
OffLine Separator Water

Elements
11 = number of elements

Nominal flow rate
20 = 20 l/min

Pump
Z = without pump
W = centrifugal pump

Supply voltage
B = 480 V - 3 Ph
C = 380 V - 3 Ph
G = 440 V - 3 Ph
L = 115 V - 1 Ph
M = 230 V - 1 Ph*
N = 400 V - 3 Ph*
O = 460 V - 3 Ph
P = 575 V - 3 Ph
S = 500 V - 3 Ph
R = 415 V - 3 Ph
W = 230 V - 3 Ph*
X = other voltage (on request)
L60, M60, ...= operation at 60 Hz
Z = without motor
*) Standard in Europe according to CENELEC HD472 S1 at 50 Hz

Element length
20 = coalescing element 20"

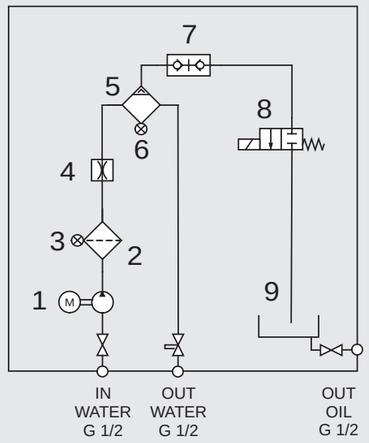
Pre-filter
1 = MRF1
Z = without

Clogging indicator
D18 = electrical clogging indicator

Oil drain
1 = oil drain, automatic, into 22 litre oil tank with manual discharge
2 = oil drain, automatic, into 100 litre oil tank with manual discharge

Supplementary details
H = heater with 10 kW heat output = H10
I = insulation
Z = without electric control
B1 = electric control provided by customer

Hydraulic circuit diagram

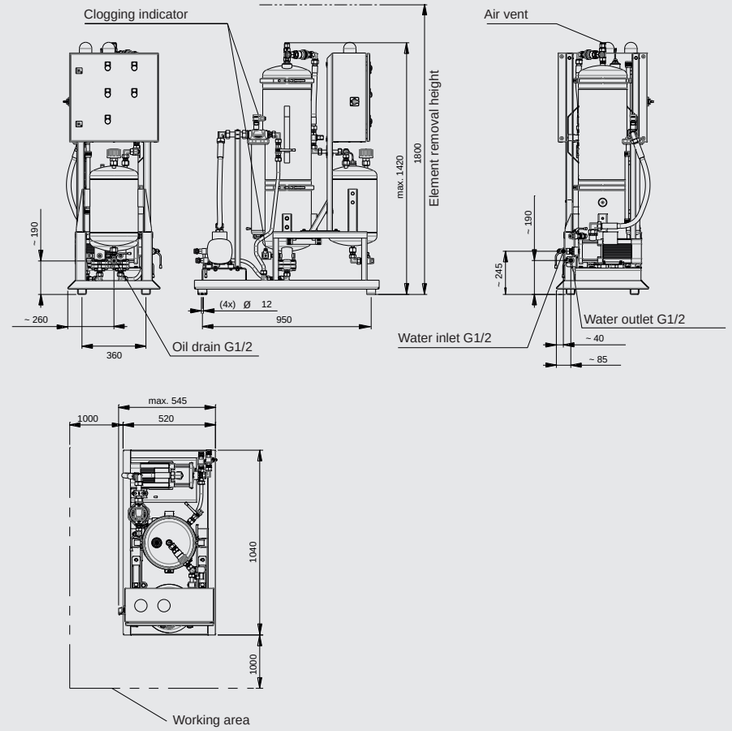


Item	Description
1	Motor-pump assembly
2	Pre-filter
3	Clogging indicator
4	Flow restrictor
5	Coalescing tank
6	Clogging indicator
7	Quick release coupling
8	Oil drain valve (automatic drain)
9	Oil tank / drip tray with fluid level sensor

Elements	
Coalescer elements	
3716715	N20OR001-PP19Z
Pre-filter element	
3510152	N20FM-P010-PES1F

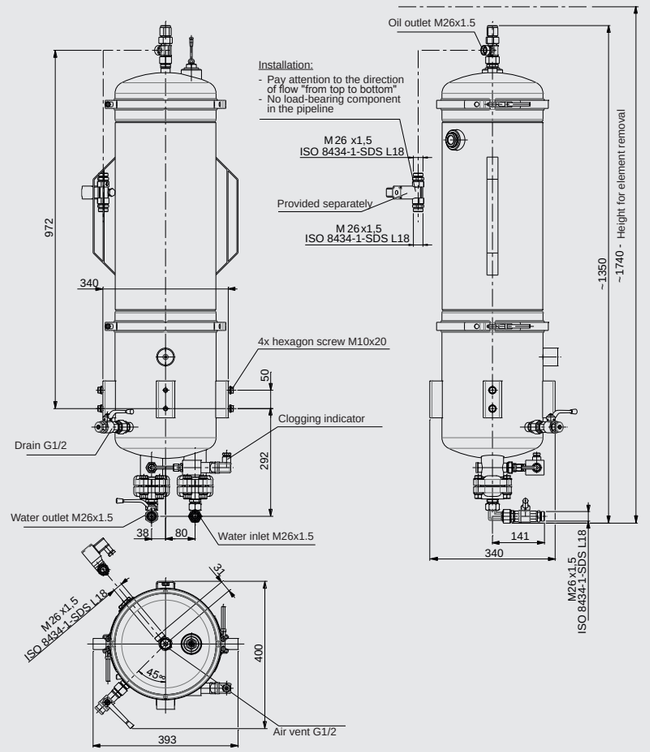
General view - Standard version

22-litre oil tank



General view - Version B1

Electrical integration to be carried out by customer



Items supplied

- OLSW (without elements)
- Operating and Maintenance Instructions

Note

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TransformerCare Unit
TCU Series

REDFOX

Description

The TransformerCare Unit TCU is a service unit designed to extend the operating life of oil-filled transformers and reactors.

The continuous degassing, dewatering and filtration of the insulating oil ensures that the oxygen content, water content and particle contamination in the transformer is kept low and the breakdown voltage of the insulating oil is increased. As a result, the service life of the insulation is also increased. Typically the remaining service life of the transformer can be extended by a factor of three.

The throughput of approx. 15 m³/week prevents the formation of damaging turbulence in the transformer. The TCU is used throughout the life of the transformer, while the transformer is connected and in operation.

The volume of fault gases removed using the TCU corresponds to the gas formation rate in the transformer, which can be interpreted in accordance with DIN EN 60599* or DGA (Dissolved Gas Analysis). In addition, humidity and total gas content in the insulating oil can be monitored online, and an alarm can be triggered in good time in the event of significant changes.

Advantages

- Preserves the insulating property of the transformer oil
- Increased operating reliability
- Fault gas analysis is possible, similar to DGA
- Extends the remaining service life of the transformer by slowing down the process of cellulose ageing.

* DIN EN 60599 - Mineral-oil impregnated electrical equipment in service - Guide to the interpretation of dissolved and free gas analysis.

Technical specifications

General data	
Suitable for transformer sizes	5 to 1100 MVA
Flow rate (50 Hz)	15 m³ / week for 24 hour operation
Degassing capacity	≈ 155 litres / 24 h for 10% gas content ≈ 14 litres / 24 h for 2% gas content
Dewatering capacity (adjusted to prevent excessive drying out of the cellulose insulation)	Temperature of medium 50 °C, 10 ppm water content ≈ 12 ml / 24 h for 10% gas content ≈ 1.12 ml / 24 h for 2% gas content Lower limit of water content ≈ 10 ppm.
Permitted pressure at suction port (IN)	0.1 to 0.5 bar
Operating pressure (OUT)	0 to 6 bar (max. 25 bar internal pump pressure)
Seal material	NBR (FPM)
Filtration rating	3 µm
Operating viscosity	5 to 300 mm²/s
Fluid temperature range	-35 to +90 °C
Ambient temperature range	-35 to +50 °C
Storage temperature range	-20 to +40 °C
Connection inlet/connection outlet	ISO8434-1-18L (M26x1.5 male thread)
Mounting position	≈ 1 metre above the floor
Type of mounting	Mounting via 4 bore holes on the back of the unit
Ambient temperature	-35 to +50 °C
Weight (empty)	≈ 60 kg
Relative humidity	Maximum 95%, non-condensing
Noise level max.	< 70 dBA, at distance of 1 m, 90° from the wall
Electrical specifications	
Supply voltage	(See model code)
Power consumption	≈ 550 watts
Protection class to DIN 40050	IP 55

Model code

TCU - 1 - I - 1 - M - 3 - 3 - Z - Z - AD - 00 / –

Basic type
TCU = TransformerCare Unit

Size
1 ≈ 15 m³/week

Operating medium
I = Insulating oil, NBR seals, tested with insulating oil based on mineral oil (Residues of the test oil remain in the unit after testing)

Mechanical design
1 = stationary unit

Voltage / Frequency / Power supply

A	=	400 V, 50 Hz, 3 Ph	I	=	500 V, 50 Hz, 3 Ph
B	=	415 V, 50 Hz, 3 Ph	K	=	480 V, 60 Hz, 3 Ph
C	=	200 V, 50 Hz, 3 Ph	L	=	220 V, 50 Hz, 3 Ph
D	=	200 V, 50 Hz, 3 Ph	M	=	230 V, 50 Hz, 1 Ph
E	=	220 V, 60 Hz, 3 Ph	N	=	575 V, 60 Hz, 3 Ph
F	=	230 V, 60 Hz, 3 Ph	O	=	460 V, 60 Hz, 3 Ph
G	=	380 V, 60 Hz, 3 Ph	X	=	Other voltage
H	=	440 V, 60 Hz, 3 Ph			

Filter size
3 = Type 3

Filtration rating
3 = 3 µm

Cooler
Z = without cooler

Additional equipment
GS = GasSampling Unit*
Z = without GasSampling Unit

Measuring equipment
Z = without
AD = AquaSensor AS 3000, sensor with integrated display

Modification number
000 = the latest version is always supplied

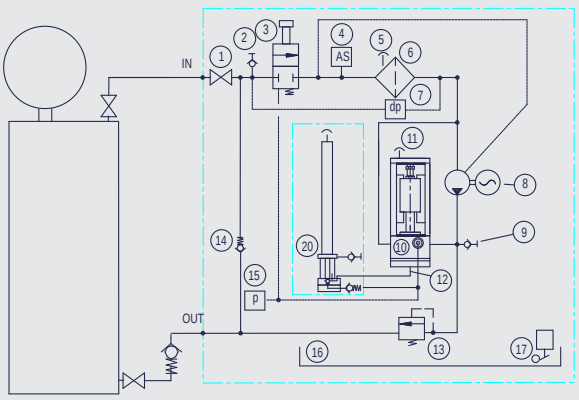
Supplementary details
V = FPM seals

* For first installation only recommended for transformers with a service life of up to max. 10 years

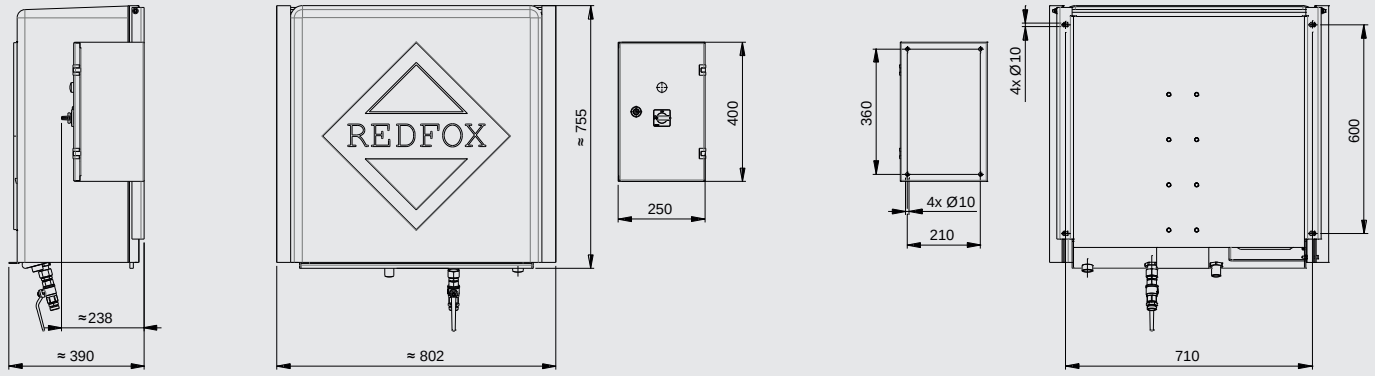
Hydraulic circuit

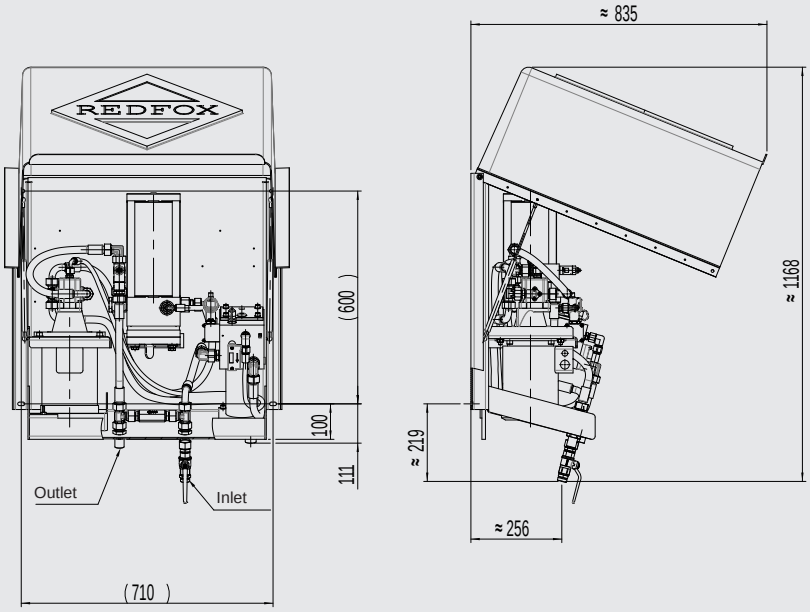
Items supplied

1. Manual shut-off valve
2. Oil sampling point
3. Automatic shut-off valve
4. AquaSensor with integrated display (option)
5. Air bleed valve for fluid filter
6. Fluid filter
7. Filter clogging indicator (differential pressure)
8. Motor-pump unit
9. Oil sampling point
10. Dewatering and degassing unit RFX
11. Air bleed screw for RFX
12. Gas sampling point
13. Pressure relief valve
14. Check valve
15. Electronic pressure switch with integrated display (vacuum measurement)
16. Drip tray
17. Safety switch for drip tray
20. GasSampling Unit GSU (optional)



Dimensions (in mm)





Items supplied

– TCU
– Control cabinet, electrically connected to TCU (roughly 0.5 m)
– Protective cover (weather protection)
– Operating and maintenance manual

Accessories

At the gas sampling point (see hydraulic diagram, no. 12) a small amount of insulation oil is ejected, which is required for lubrication and sealing of the internal vacuum pump (up to ~ 6 litres/year).

TCU with additional equipment GasSampling Unit GS:

- The oil is automatically returned to the TCU.

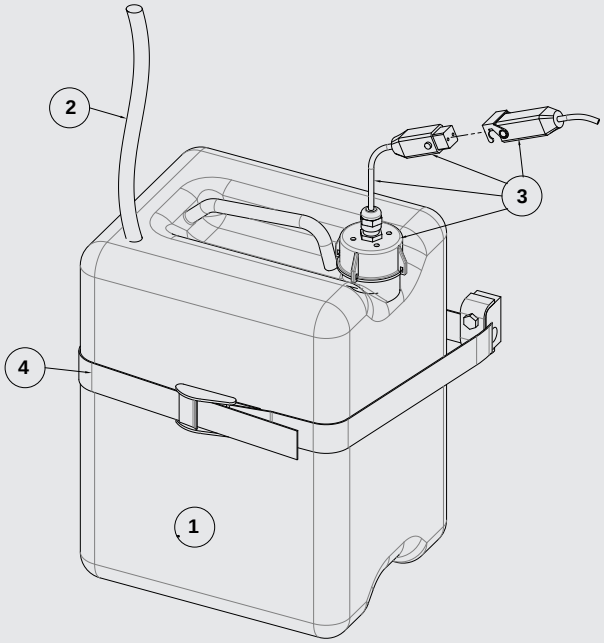
TCU without additional equipment GasSampling Unit GS:

- If regular checks of the TCU are performed, the oil can be collected from the drip tray (16). The drip tray fills up until the safety switch (17) deactivates the TCU (~ 2 litres).
- If regular checks of the TCU are not performed, we recommend installing the collecting canister, available as an accessory, underneath the TCU.

Designation	Part number
Collecting canister with float switch	3534977

Items supplied, collecting cannister

① Collecting canister (capacity ~ 25 litres)
② Connection hose of gas sampling point connection to the collecting canister
③ Float switch
④ Strap to secure or fasten the collecting canister.



Note

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For applications and/or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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Ion eXchange Unit
IXU 1/4 Series

Description

The IXU series of easy-maintenance ion exchange units is designed to condition fire-resistant hydraulic and lubrication fluids based on phosphate esters (HFD-R) and polyol esters (HFD-U).

They are effective in removing the acidic products of degradation resulting from hydrolysis and/or oxidation of the fluid as well as metal soaps present in the fluid.

The units are used offline with flow rates of up to ≈ 9 l/min on hydraulic and lubrication oil tanks.

Mobile or stationary IXUs are available.

HYDAC's own Ion eXchange Elements (IXE), filled with ion exchange resins, are deployed in the IXU.

Special Features

- Effective removal of acids and metal soaps.
- Free from extractable metals or particles, in contrast to fuller's earth or activated aluminium oxide.
- Units are easy to service.
- Available as a complete unit for oil service work, and as a modular system for retrofitting in existing offline circuits or for OEMs.

In addition we recommend that dewatering is carried out continuously using, for example, a FluidAqua Mobile FAM.

Advantages

- Reduces functional problems, e.g. on servo valves
- Extended service life of the operating fluid
- Increased machine and system availability

Technical specifications

Hydraulic data *	
Neutralization number achievable	< 0.1 mg KOH / g
Typically, possible to use up to	max. TAN 1 mg KOH / g oil with HFD-R max. TAN 7 mg KOH / g oil
Nominal flow	IXU -1 ≈ 2.2 l/min IXU -4 ≈ 8.9 l/min
Fluid temperature range	30 to 60 °C / 86 to 140 °F
Operating pressure max.	8 bar / 116 psi
Permitted pressure at suction port IN	-0.2 to 1 bar / 2.9 to 14.5 psi
Viscosity range	15 to 80 mm²/s / 15 to 80 cSt
Permitted operating fluids	HFD-R Fire-resistant hydraulic fluids based on phosphate ester HFD-U Fire-resistant hydraulic fluids based on polyol ester basis
Connections IN / OUT	22L / M30x2 (male thread)
Pump type	Gear pump / without pump
Electrical data *	
Supply voltage	See model code
Electrical power consumption	0.25 to 0.6 kW
External fuse required	16 A
Protection class to DIN 40050	IP 55
Ambient conditions	
Operating temperature range	0 to 40 °C / 32 to 104 °F
Storage temperature range	0 to 60 °C / 32 to 140 °F
Relative humidity	0 to 80%, non-condensing
General data *	
Length of power cable	10 m (for versions PKZ, FA1, FA2)
Length of suction / pressure hose	5 m (for versions S5D5, SKDK)
Sealing material	FKM
Noise level at 1m	< 80 dB(A)
Weight when empty	IXU 1 ≈ 70 kg IXU 4 ≈ 300 kg
Required fluid cleanliness	ISO 19/17/14 (ISO 4406:1999) 9A/9B/9C (SAE AS4059) We recommend that the IXU is only operated with the pre-filter, which is available as an option, to guarantee the required fluid cleanliness.

* Others on request

MODEL CODE

IXU - 4 - M - G - A - 1 - C - Z /-S5D5-PKZ /-ATEX

Basic type
IXU = Ion eXchange Unit

Size
1 = 1 Ion eXchange element
IXE2xx ≈ 2.2 l/min
4 = 4 Ion eXchange element
IXE2xx ≈ 8.9 l/min

Mechanical design
M = mobile
S = stationary

Pump type
G = gear pump with motor
Z = without pump

Voltage, frequency, power supply
A = 400 V, 50 Hz, 3 Ph
B = 415 V, 50 Hz, 3 Ph
C = 200 V, 50 Hz, 3 Ph
D = 200 V, 60 Hz, 3 Ph
E = 220 V, 60 Hz, 3 Ph
F = 230 V, 60 Hz, 3 Ph
G = 380 V, 60 Hz, 3 Ph
H = 440 V, 60 Hz, 3 Ph
I = 500 V, 50 Hz, 3 Ph
K = 480 V, 60 Hz, 3 Ph
L = 220 V, 50 Hz, 3 Ph
M = 230 V, 50 Hz, 1 Ph
N = 575 V, 60 Hz, 3 Ph
O = 460 V, 60 Hz, 3 Ph
X = other voltage (please specify)
Z = without

Pre-filter
1 = with pre-filter (OLF5 Toploader)
Z = without pre-filter

Clogging indicator
C = differential pressure indicator – electrical (VM2C.0), for protective filter, pre-filter with visual differential pressure indicator (VM2BM.1)
BM = differential pressure indicator – visual (VM2BM.1) for pre-filter and protective filter

Measuring equipment
AS = AquaSensor AS1000. Hydraulic connection only. Additional equipment such as HYDAC HMG 3000 or HMG500 is required for display and data storage.
Z = without

Supplementary details
S5D5 = suction/return line hose with lance, length = 5 metres
SKDK = suction/return line hose with threaded connection, length = 5 metres
PKZ = on/off switch with motor circuit breaker
FA1 = on/off switch with motor cirucit breaker and cut-off when filter is clogged. Requires neutral wire. For voltages up to max. 240V, 1Ph, or max. 415V, 3Ph. Clogging indicator type C is required.
FA2 = on/off switch with motor circuit breaker and cut-off when filter is clogged. Does not require neutral line. All voltages. Clogging indicator type C required.

Explosion protection version
On request

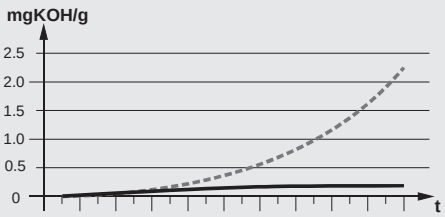
Sizing

As a rough guide, the IXU can be sized according to the tank volume of the system.

Tank volume in litres	IXU
< 3,500	IXU-1
3,500 – 15,000	IXU-4
> 15,000	2x IXU-4

Graph

Example of acidification in HFD fluids with and without Ion eXchange Unit:



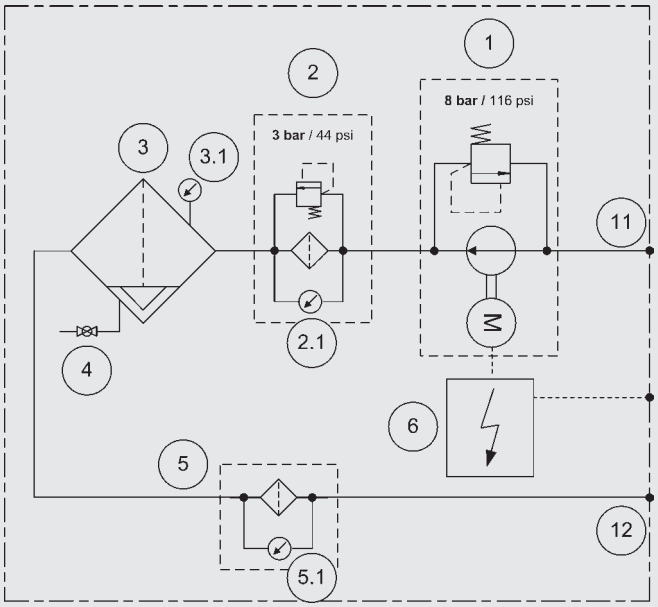
without Ion eXchange Unit
with Ion eXchange Unit

Items supplied

– IXU with protective filter and additional equipment as per model code
– Operating manual
– EC declaration of conformity

Ion eXchange elements and filter elements for pre-filter and protective filter must be ordered separately.

Hydraulic circuit



Item	Description
1	Motor/pump assembly*
2	Prefilter*
2.1	Clogging indicator - visual
3	Ion exchange column
3.1	Pressure gauge
4	Drain
5	Protective filter
5.1	Clogging indicator - electrical or visual
6	On/Off switch with motor protection*
11	Inlet
12	Outlet

*optional

Ion eXchange elements

Filter elements must be ordered separately and installed before initial operation on site. The number of elements is based on the size of the IXU.

Operating fluid: HFD-R

Part number	Description	Application range
3348961	IXE 200	Removes acids and metal soaps
3413670	IXE 210	Removes metal soaps
3464744	IXE 220	Removes acids
4081665	IXE 280 D	Removes acids and water
3560654	IXE 200 D	Removes acids and metal soaps
3559516	IXE 250	Acid (TAN > 1 mg KOH / g)

Operating fluid: HFD-U

Part number	Description	Application range
3820200	IXE 350	Removes acids

The maximum storage time for all Ion eXchange elements is 6 months after supply.

Filter elements for pre-filter and protective filter

Filter elements must be ordered separately and installed before commissioing on site. One filter element per filter is required.

Part number	Description	Filtration rating
3068101	N5DM005	5 µm
3102924	N5DM010	10 µm

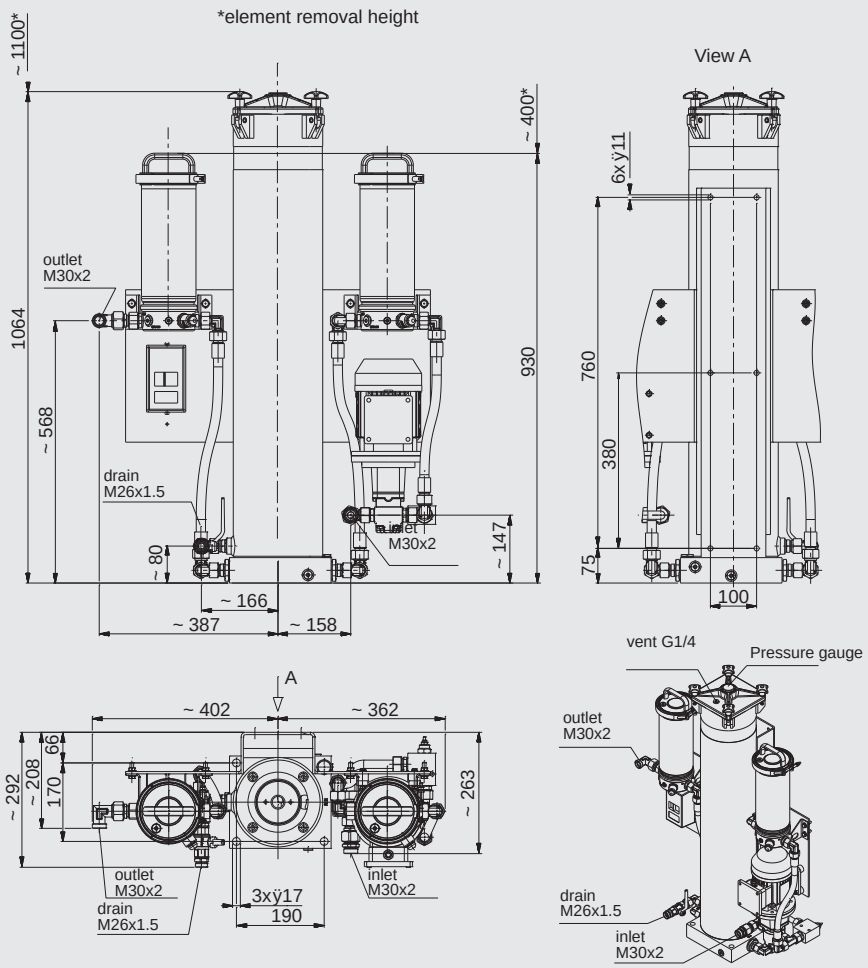
Example of required order quantity:

IXU- **4** -M-G-A -**1**-BM-Z /-S5D5-PKZ
4 x IXE200 element
2 x N5DM010
(for pre-filter and protective filter)

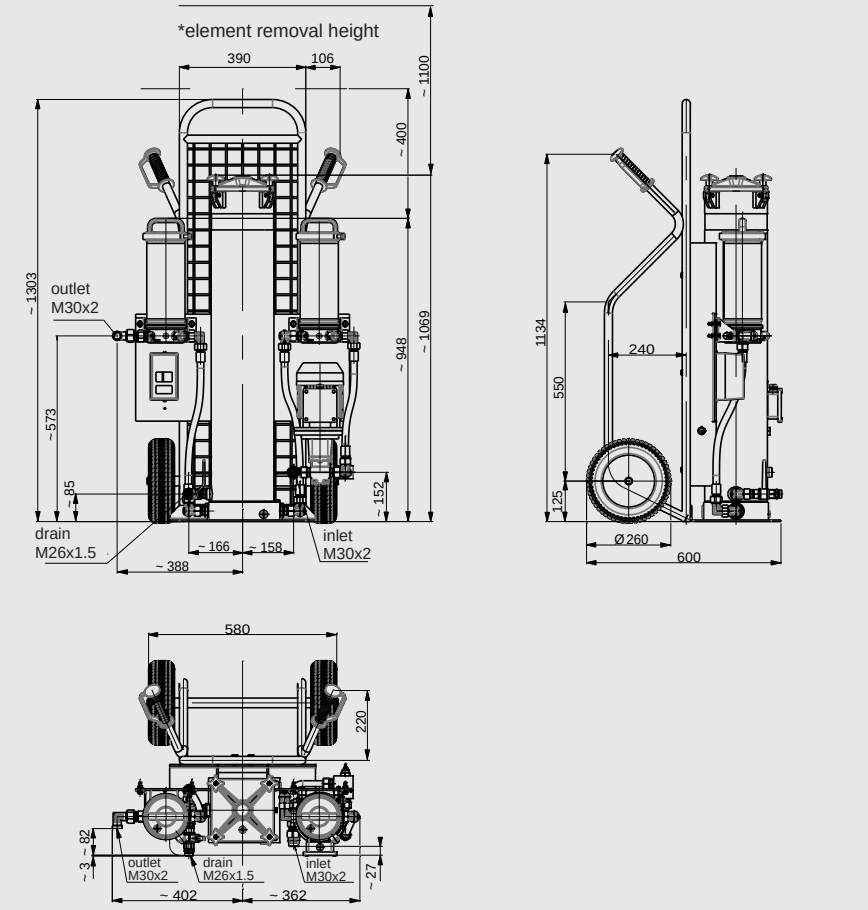
IXU- **4** -M-G-A -**Z**-BM-Z /-S5D5-PKZ
4 x IXE200 element
1 x N5DM010 (only for protective filter)

IXU- **1** -M-G-A -**1**-BM-Z /-S5D5-PKZ
1 x IXE200 element (Tank < 500 Liter)
2 x N5DM010
(for pre-filter and protective filter)

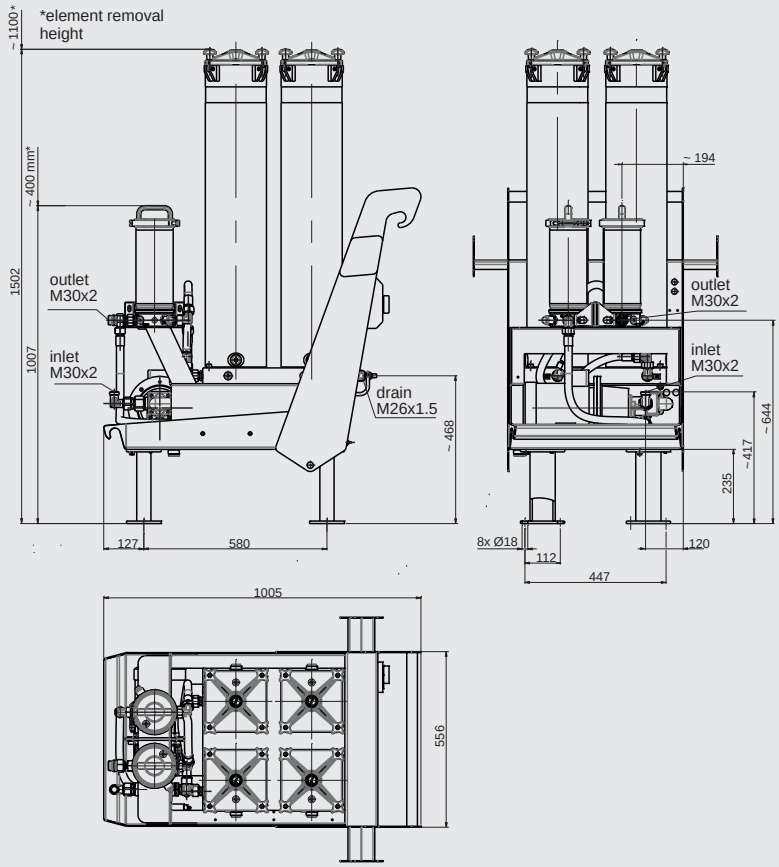
Dimensions - IXU-1 stationary



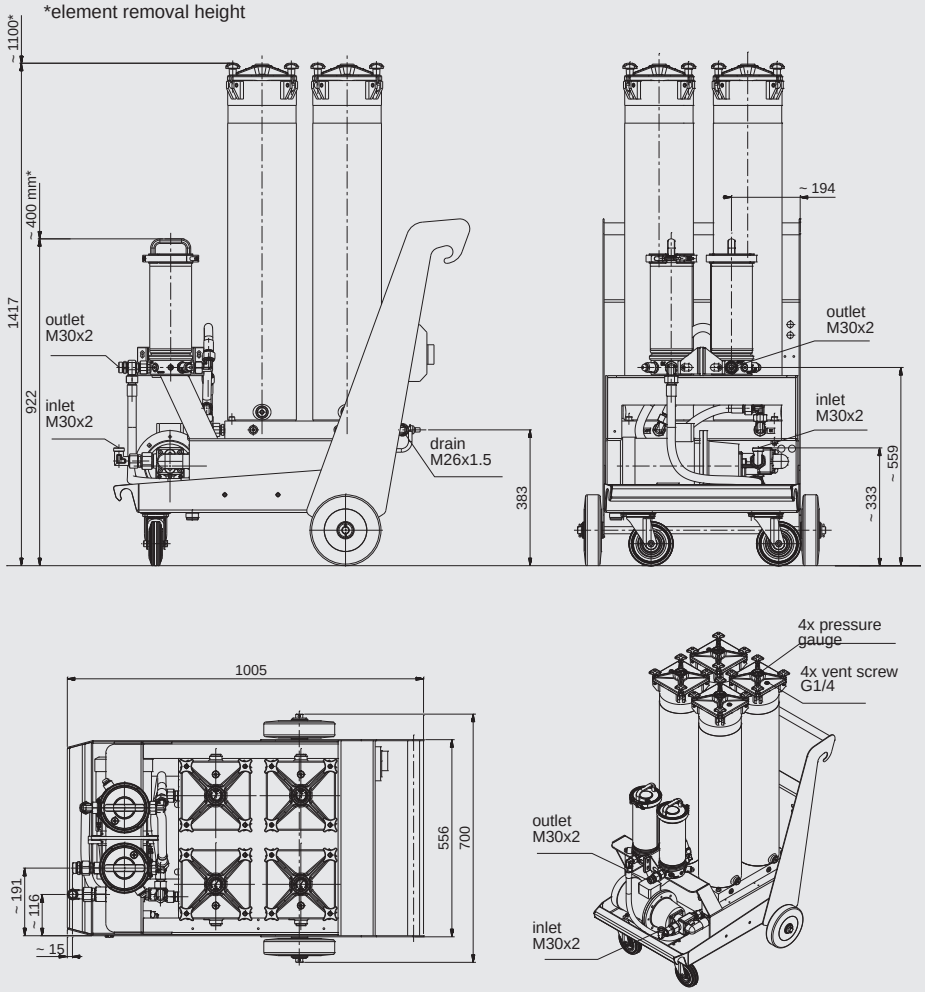
Dimensions - IXU-1 mobile



Dimensions - IXU-4 stationary



Dimensions - IXU-4 mobile



Note

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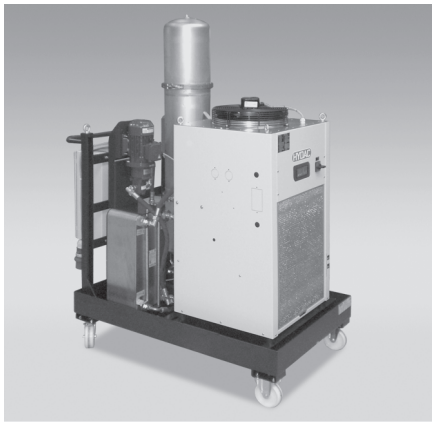


VarnishElimination Unit - Filtration
VEU-F

Description

The service-friendly Varnish Elimination Units VEU are used to prepare mineral oils. They are particularly effective at removing oil ageing products (varnish) from mineral oils. Varnish takes the form of oil-insoluble oil ageing products which settle in the tank, in valves or in bearings. These can be filterable gels or solid paint-type deposits.

The VEU-F series of units is used in bypass flow. The removal of varnish is based on reducing the oil solubility for varnish with subsequent filtration.

Special features

- Removal of solid and gel-like oil ageing products
- Increased operating reliability of the system as a result of fewer deposits in hydraulic valves
- Increase in the oil service life
- Available as a complete unit for retrofitting to existing systems and for new systems

Technical data

Hydraulic data	**60/1**	**15/5**	**30/10**	**45/15**	**60/20**
Permissible flow rate, oil	1 l/min	5 l/min	10 l/min	15 l/min	20 l/min
Recommended flow rate, cooling water (for cooler variant A)	–	5 l/min	10 l/min	15 l/min	20 l/min
Permitted viscosity range	15 - 300 mm²/s				
Permitted operating fluids	Mineral oils				
Oil – permitted temperature range	10 - 80 °C				
Cooling water – permitted temperature range	< 30 °C on average < 40 °C short-term				
Operating pressure	6 bar				
Permissible pressure at suction port	-0.4 to 4 bar				
Connection Oil IN	ISO 8434-1 M36 x2 (28L)				
Connection Oil OUT	ISO 8434-1 M30 x2 (22L)				
Connection Water IN	ISO 8434-1 M26 x1.5 (18L)				
Connection Water OUT	ISO 8434-1 M26 x1.5 (18L)				
MPC values achievable	< 10				
Electrical data					
Supply voltage	See model code				
Power consumption	VEU-F-xx/xx-S(M)-A ≈ 0.4 kW VEU-F-60/1-M-C ≈ 6.5 kW				
Fuse required on site	VEU-F-xx-A = 16 A VEU-F-xx-C = 16 A				
Protection class to DIN 40050	IP55				
General data					
Noise level at 1 m distance	< 80 db(A)				
Seal material	NBR, FKM possible				
Permitted ambient temperature range	0 - 40 °C				
Permitted storage temperature range	0 - 60 °C				
Permitted relative humidity	0 to 80 %, non-condensing				
Weight when empty	VEU-F-xx/xx-S-A max. 135 kg VEU-F-xx/xx-M-A max. 200 kg VEU-F-60/1-M-C max. 335 kg				
Length of hoses (only mobile version)	2.5 m suction hose 5 m pressure hose				

Preferred models (with shorter delivery times)

Part no.	**Model code**
4157202	VEU-F-60/1-M-C-G-N-Z-C/-SKDK-FA1
4191205	VEU-F-60/20-S-A-G-N-Z-D3/-FA1
4262152	VEU-F-30/10-S-A-G-N-Z-D3/-FA1

Model code

VEU - F - 60/20 - S - A - G - M - Z - Z /-PKZ

Basic type
VEU = VarnishElimination Unit

Function
F = filtration

Size
60/1 = filter housing 60 litres / nominal flow rate 1 l/min
15/5 = filter housing 15 litres / nominal flow rate 5 l/min
30/10 = filter housing 30 litres / nominal flow rate 10 l/min
45/15 = filter housing 45 litres / nominal flow rate 15 l/min
60/20 = filter housing 60 litres / nominal flow rate 20 l/min

Version
S = stationary
M = mobile

Cooler / heat exchanger
A = plate heat exchanger (not possible for size 60/1)
C = compressor cooler (only possible for size 60/1)

Pump
G = gear pump
Z = without pump (not possible with cooler variant C)

Power supply
B = 480 V, 3 Ph
C = 380 V, 3 Ph
G = 440 V, 3 Ph
L = 115 V, 1 Ph (not possible with cooler variant C)
M = 230 V, 1 Ph (not possible with cooler variant C)
N = 400 V, 3 Ph
O = 460 V, 3 Ph
P = 575 V, 3 Ph
R = 415 V, 3 Ph
S = 500 V, 3 Ph
W = 230 V, 3 Ph (not possible with cooler variant C)
X = other (on request)
Z = without motor (not possible with cooler variant C)

Filter element
Z = without filter element

Clogging indicator
B = differential pressure indicator, visual (not with cooler variant C)
C = differential pressure indicator, electrical
D3 = differential pressure indicator, visual/electrical (not with cooler variant C)

Supplementary details
S3D5 = suction/return hose with lance, length = 3 m / 5 m (only for mobile variant)
SKDK = suction/return hose with threaded connection, length: 2.5 m / 5 m (only for mobile variant)
PKZ = on/off switch with motor protection switch (not for cooler variant C; inclusive for mobile variant, optional for stationary variant)
FA1 = on/off switch with switch-off for filter clogging including PKZ (clogging indicator C17 or D49)
FA2 = on/off switch with switch-off for filter clogging including PKZ (clogging indicator C17 or D49) without neutral conductor
V = seal material FKM (FPM, Viton®)
S = cooling water flow limiter (only possible with cooler variant A)

Scope of delivery

– VEU-F acc. to model code
– Operating and maintenance instructions

Sizing

As a rough guide, the VEU-F can be sized according to the tank volume of the system.

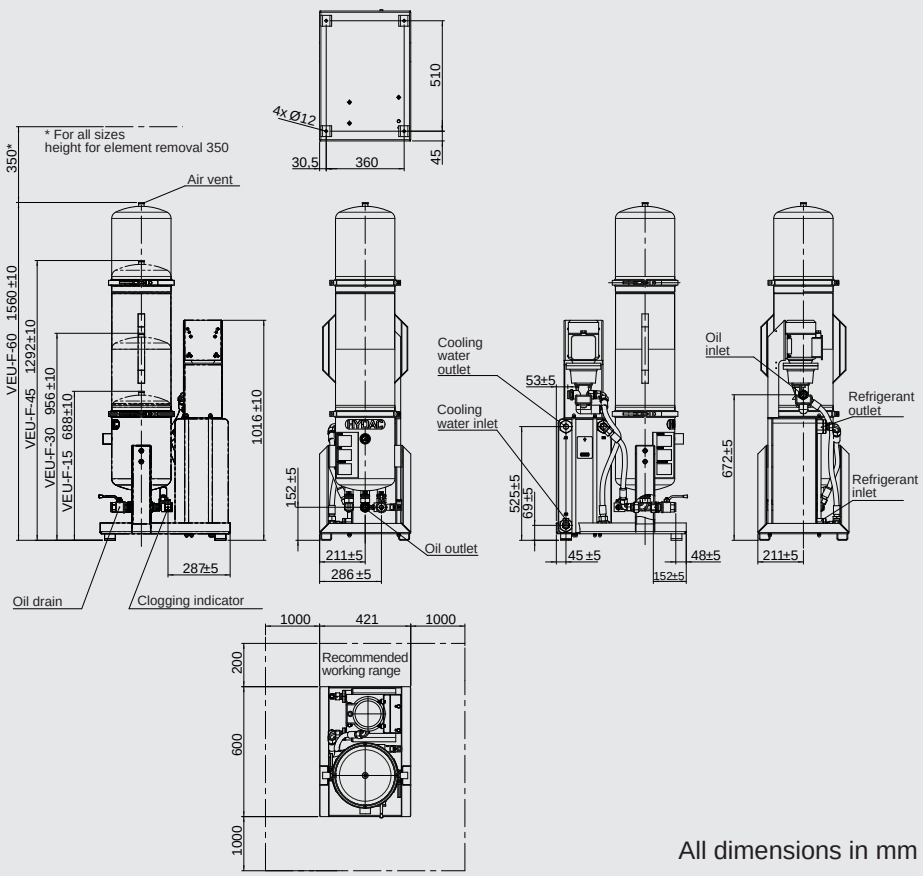
	Cooler type	
System tank volume in litres	**A**	**C**
1,000	15/5	60/1
5,000	30/10	60/1
10,000	30/10	60/1
15,000	45/15	60/1
20,000	60/20	60/1

Filter elements

Filter elements must be ordered separately and installed before commissioning on site.

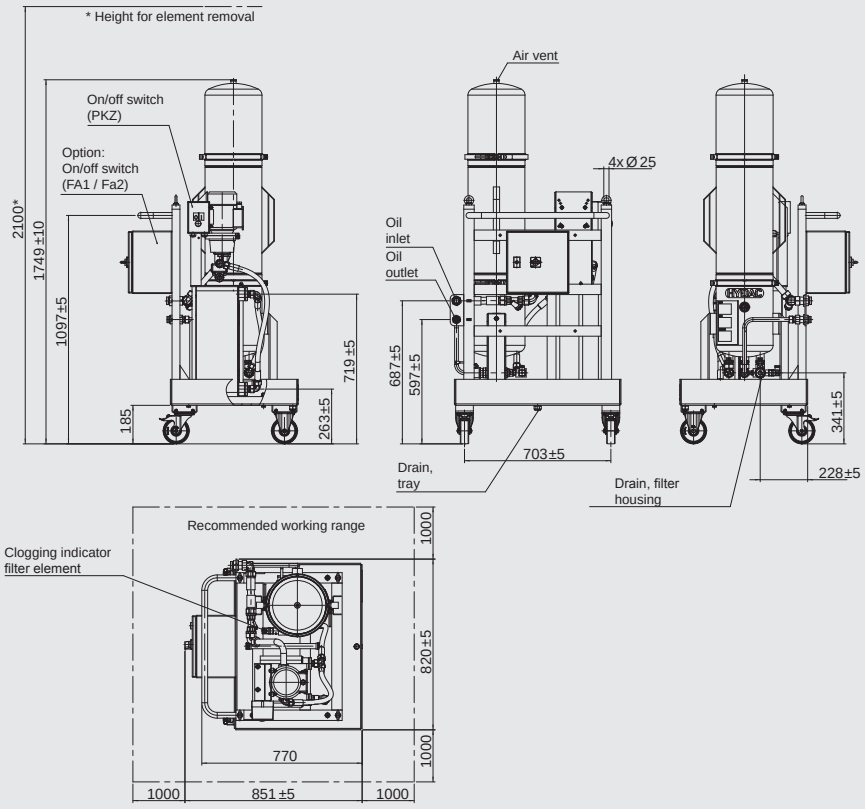
VEU-F size	Number of elements	Part no.
15/5	1	1251590
30/10	2	1251590
45/15	3	1251590
60/20	4	1251590
60/1	4	1251590

Dimensions VEU - F - xx/x - S - A



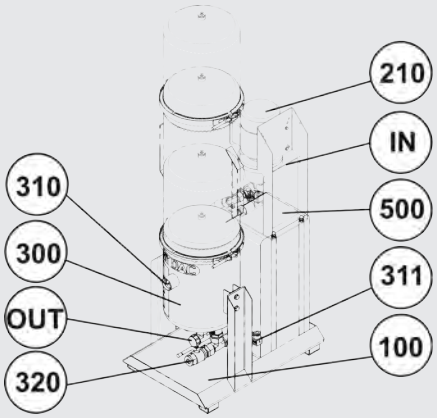
All dimensions in mm

Dimensions VEU - F - xx/x - M - A



All dimensions in mm

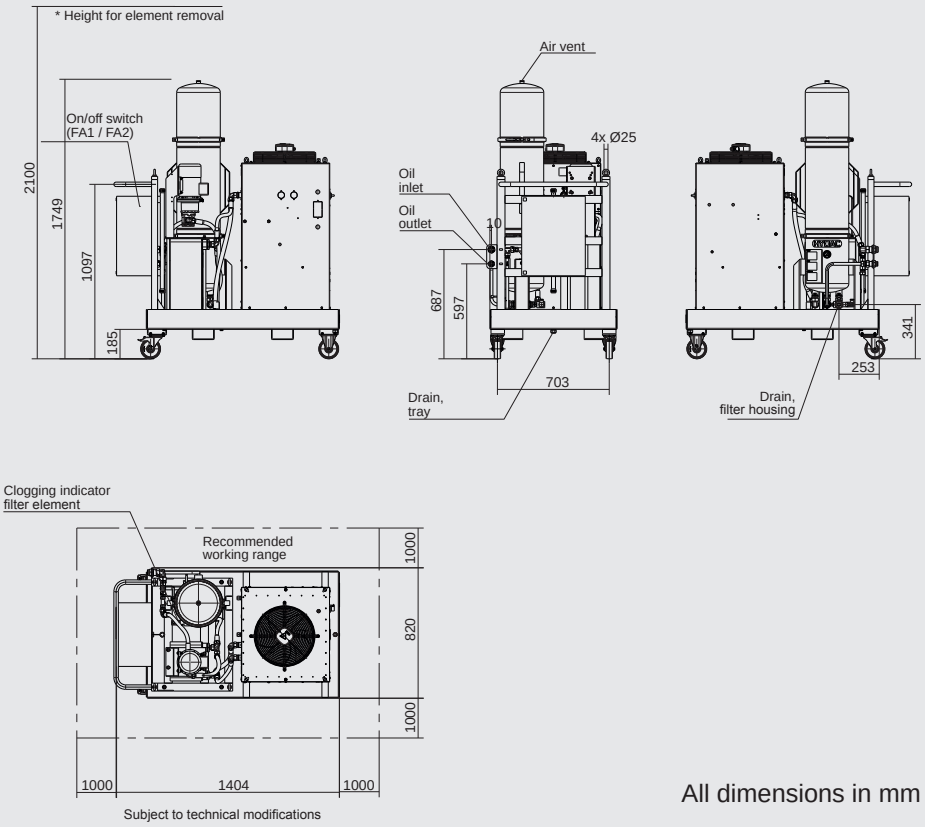
Components



Legend

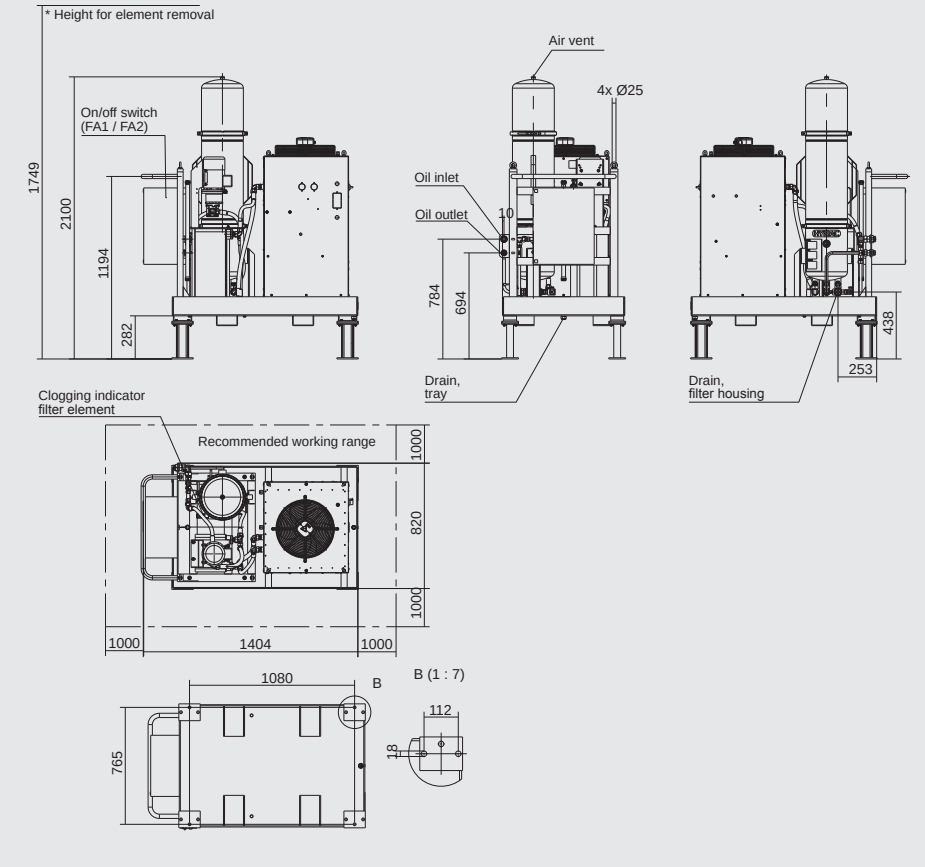
Item	Designation
IN	Inlet
OUT	Outlet
100	Drip tray
210	Motor/pump assembly
300	Filter housing
310	Differential pressure indicator
320	Drain
400	Compressor with cooler
500	Plate heat exchanger

Dimensions VEU - F - 60/1 - M - C



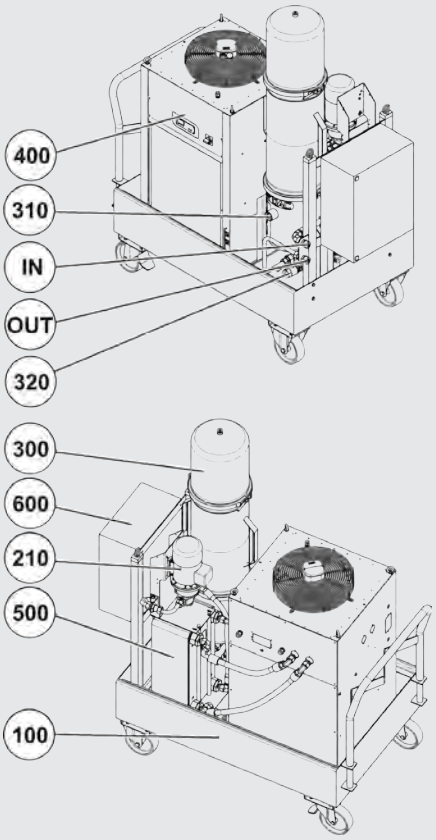
All dimensions in mm

Dimensions VEU - F - 60/1 - S - C



All dimensions in mm

Components



Legend

Item	Designation
IN	Inlet
OUT	Outlet
100	Drip tray
210	Motor/pump assembly
300	Filter housing
310	Differential pressure indicator
320	Drain
400	Compressor with cooler
500	Plate heat exchanger
600	Electric control

Note

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OXiStop
OXS

Description
HYDAC's OXiStop is a tank solution for hydraulic systems with integrated, hydraulically driven degassing and dewatering unit.

An integrated membrane prevents direct contact with the ambient air. This means that the tank can be calculated for the differential operating volume actually needed, thus reducing its size. The pump flow rate is not important for the tank calculation.

A very low gas and water content is achieved in the fluid.

Thanks to the membrane which keeps the fluid “vacuum packed”, it is also possible to install the OXiStop in extremely dusty or humid environments.

HYDAC offers the OXS as a complete solution with tank in three standard sizes, with differential operating volumes ranging from 30 to 70 litres. Custom-designed solutions are also available.

The OXiStop can also be equipped with a return line filter and plate heat exchanger as an interface to the cooling circuit.

Advantages:
- Reduced oil volume, typically by a factor of 10
- Up to 80% less air content and reduced dirt ingress extends oil service life
- Higher process speeds
- Higher efficiency
- Reduced noise and wear due to less cavitation
- Ideal for humid and dusty environments
- Reduced costs due to smaller size, fewer installation costs, less oil required and easier transport
- Longer component service life, less servicing

Technical specifications

	OXS 30	OXS 45	OXS 70
Hydraulic data			
Differential operating volume **	≤ 30 l	≤ 45 l	≤ 70 l
Total tank volume	110 l	135 l	185 l
Typical degassing rate *	4 l/h		
Viscosity range	15 to 300 mm²/s with ACD to 200 mm²/s		
Maximum fluid flow rate IN / OUT OXS 30, 45, 70	900 l/min		
Fluid temperature range	10–80 °C		
Ambient temperature range **	-20 - 40 °C		
Storage temperature range	0–40 °C		
Relative humidity **	0 - 80%, non-condensing		
Filtration unit	OLF 5		
Filter element, filtration unit	N5DM002		
Contamination retention capacity, filter element	200 g ISOMTD ® Δp = 2.5 bar		
Pump type, filtration unit	Vane pump		
Flow rate, filtration unit	10 l/min		
Operating pressure, filtration unit	10 bar		
Clogging indicator	Visual differential pressure indicator		
Connection A (IN / OUT)	2 x SAE 3” 3000PSI		
Connection B (IN / OUT)	2 x SAE 3” 3000PSI		
Electrical data, filtration unit			
Supply voltage, motors	See model code		
Electrical power consumption	370–1,500 W, depending on version		
Protection class to DIN 40050	IP54		
General data			
Permitted fluids**	Mineral oil to DIN 51524		
Sealing material **	NBR		
Membrane material **	PUR		
Typical membrane service life	≈ 6 years with 40 - 60 °C fluid temperature ≈ 2 years with 60 - 80 °C fluid temperature		

* Typical values for ISO VG 46, 40 °C at gas saturation. The degassing rate depends on the total gas content in the oil, the oil temperature, and especially the oil viscosity. The degassing rate reduces as viscosity increases.
** Others on request

Preferred models

Part no.:	Model code	Quantity	Delivery time
4009448	OXS-30-N-1-Z-Z-2-2-ACD	1 pieces	35 days
4009266	OXS-70-N-1-Z-Z-2-2-ACD	1 pieces	35 days

Model code

OXS – 30 – N – 1 – Z – Z – 2 – 2 – ACD – /-

Product
OXS = OXiStop

Size
30 = differential operating volume ≤ 30 l
45 = differential operating volume ≤ 45 l
70 = differential operating volume ≤ 70 l

Supply voltage, motors
N = 400 V / 50Hz / 3 Ph (MPG standard) *

Sealing material/membrane material
1 = NBR seals, PUR membranes

Return line filter **
Z = without
1 = NF160
2 = NF240
3 = NF280
(1, 2, 3: up to 125 l/min)
4 = NF330
5 = NF500
6 = NF750
(4, 5, 6: up to 450 l/min)

Plate heat exchanger + motor-pump unit
Z = without
1 = HYDAC HEX S615, 20 plates + MFZP-2 * / ***
2 = HYDAC HEX S615, 40 plates + MFZP-2 * / ***

Vacuum pressure monitoring, degassing unit
1 = pressure gauge
2 = electronic pressure sensor (EDS)

Level and temperature monitoring
2 = electronic level sensor (HNS)
with integrated temperature sensor
FSA visual fluid level indicator on tank as standard

Measuring equipment
Z = without
ACD = AquaSensor (AS) + ContaminationSensor (CS)

Supplementary details
No details = standard

* Supplied without cable or plug
** The return line filter is supplied without filter element or clogging indicator. Please order separately. For information about sizing and for technical details, see brochure 7.112 NF Inline Filter
*** For information about sizing and for technical details of the cooler, see brochure 5.804 Brazed Plate Heat Exchangers

Sizing

The required OXiStop size (differential operating volume) can be calculated from the actual volume differences of cylinders, accumulators, hoses etc. present in the system. In addition, allowances must be made for the volume required for thermal expansion in the oil and for possible continuous oil losses. This volume (except for accumulators) should be doubled as a safety margin.

Rule of thumb:

Sum of total accumulator volume
+ 2x sum of volume difference
for cylinders, hoses, temperature expansion, etc.

= OXiStop differential operating volume

Also, it is necessary to check whether the total oil volume in the system needs to be returned to the tank when maintenance work is carried out.

Items supplied

- OXiStop tank according to model code incl. tank with membrane cage and integrated membrane, MiniOx degassing unit, OLF 5 offline filtration unit with optional CS 1000 ContaminationSensor and AS 3000 AquaSensor, HNS electronic level sensor, breather filter and piping for individual components.
- Operating and maintenance instructions

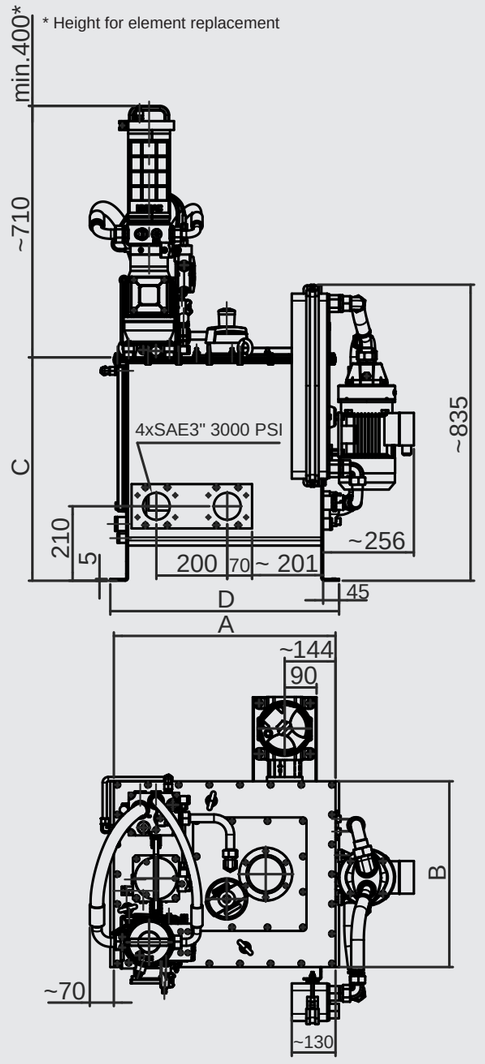
Accessories

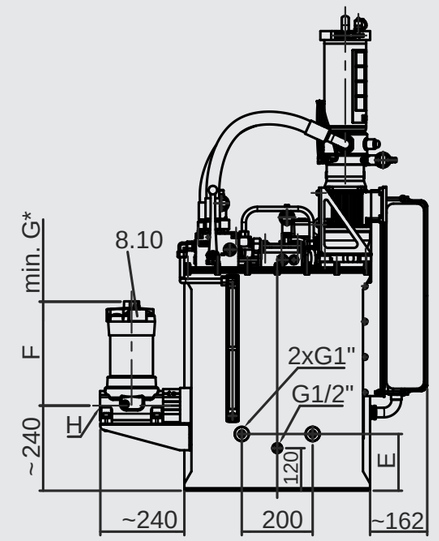
- Filter elements for offline filter OLF 5 (1 × N5DM002 already installed)

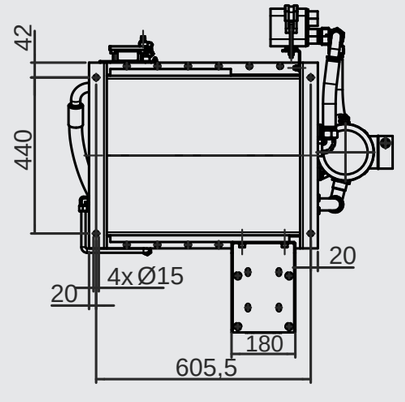
Part number	Designation
349494	N5DM002 (2 µm)

- Filter elements for optional return line filter, see brochure 7.112 NF Inline Filter
- Electrical clogging indicators, see brochure 7.112 NF Inline Filter
- Silicone heater for attaching to the surface of the tank, self-adhesive, approx. 500 W (on request)

Dimensions





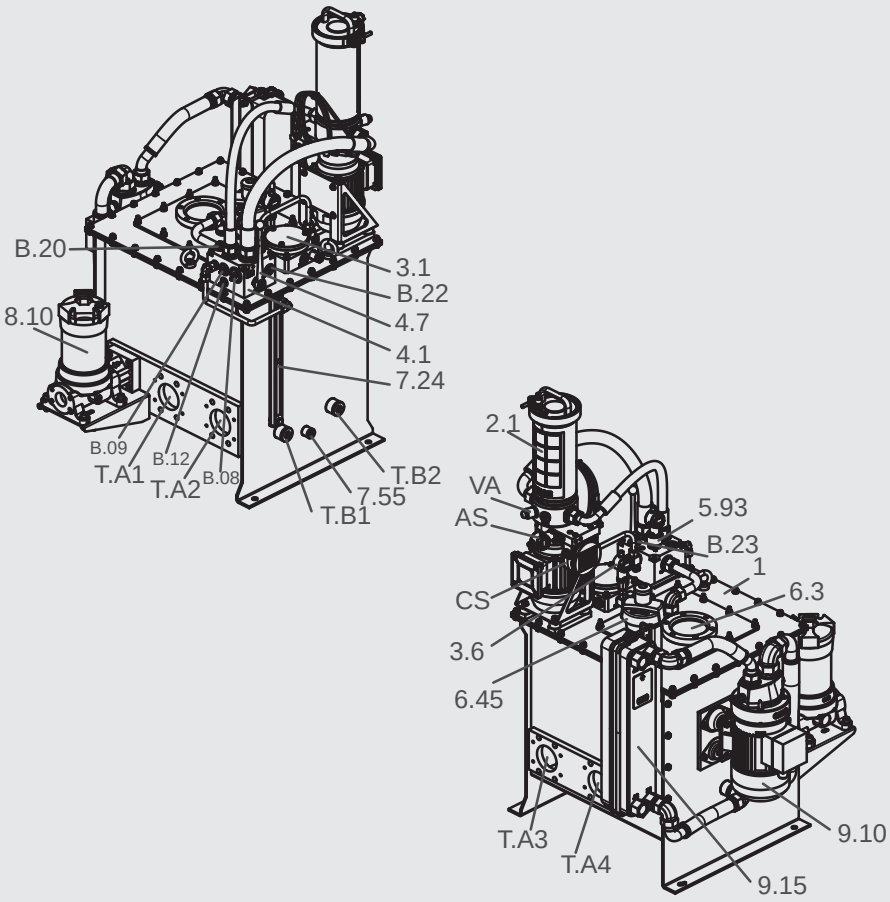


	F	G	H
NF160	205	160	G1 1/4"
NF240	264	220	
NF280	445	400	
NF330	271	170	SAE 1 1/2" 3000 PSI
NF500	352	250	
NF750	702	600	

	A	B	C	D	E
OXS 30	625.5	524	630	645.5	160
OXS 45	625.5	524	750	645.5	160
OXS 70	625.5	524	990	645.5	200

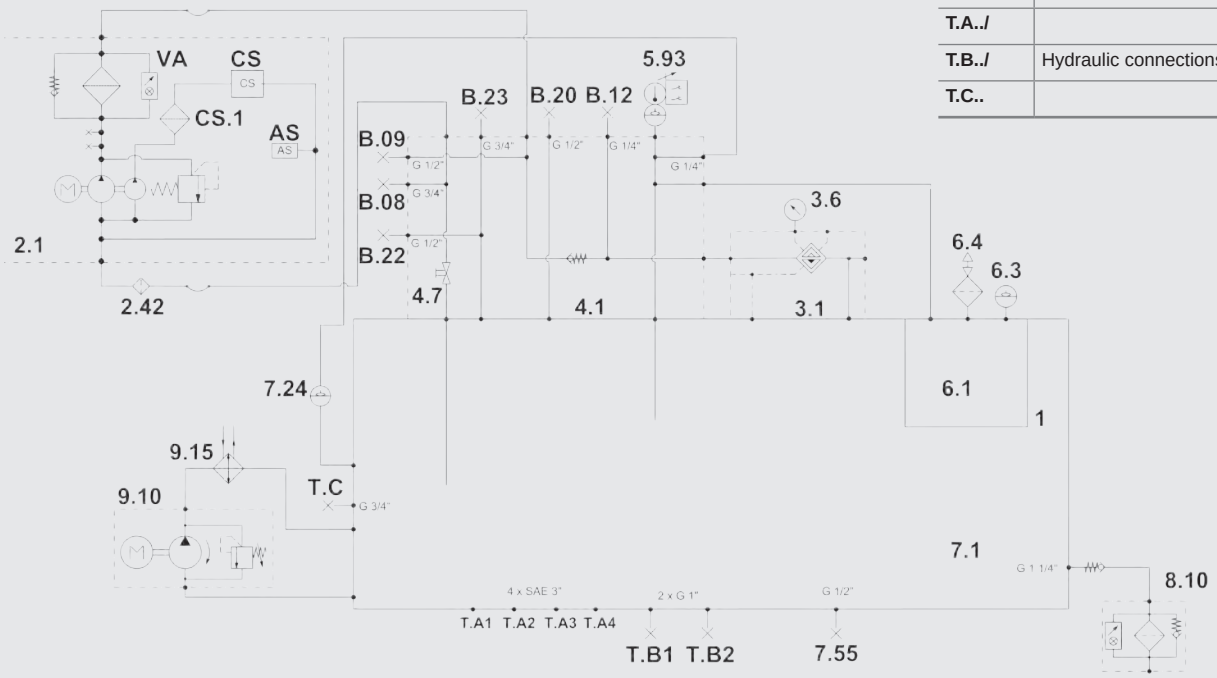
Size	Weight when empty [kg]
OXS 30	148
OXS 45	162
OXS 70	188

Assembly drawing



Item	Component
1	OXS-LID primary body
2.1	OLF 5 offline filtration unit
CI	Clogging indicator on OLF 5 filtration unit
CS	CS ContaminationSensor (optional)
CS.1	Protective screen on fluid filter unit
AS	AS AquaSensor (optional)
2.42	Suction strainer
3.1	MiniOX (MOX) degassing and dewatering unit
3.6	EDS electronic pressure sensor or vacuum gauge (optional)
4	Valve and connection block
4.7	Directional control valve
5.93	Fluid level/temperature sensor HNS, electrical
B.08	Filling port
B.09	Draining port
B.12	Pressure measurement point (pressure line OLF 5)
B.20	Connection for electronic temperature sensor ETS
B.22	Breather fitting / connection for rapid venting
B.23	Connection for additional HNS
6.1	Membrane
6.3	Sight glass
6.4	Breather filter
7.1	Tank
7.24	Fill level indicator, visual
7.55	Drain fitting
8.10	Return line filter (optional)
9.10	Motor-pump assembly for the heat exchanger (optional)
9.15	Heat exchanger (optional)
T.A../	
T.B../	Hydraulic connections
T.C..	

Hydraulic circuit



Note

The information in this brochure relates to the operating conditions and applications described.

For applications and operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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OXiStop
OXS LID series

Description
HYDAC's OXiStop is a tank solution for hydraulic systems with integrated, hydraulically driven degassing and dewatering unit.

An integrated membrane prevents direct contact with the ambient air. This means that the tank can be calculated for the differential operating volume actually needed, thus reducing its size. The pump flow rate is not important for the tank calculation.

A very low gas and water content is achieved in the fluid.

Thanks to the membrane which keeps the fluid “vacuum packed”, it is also possible to install the OXiStop in extremely dusty or humid environments.

The OXS LID series is installed in a custom-designed tank and contains all necessary components.

The OXS LID comes in seven standard sizes, with differential operating volumes ranging from 30 to 500 litres. Combinations are also available.

Advantages:
- Reduced oil volume, typically by a factor of 10
- Up to 80% less air content and reduced dirt ingress extends oil service life
- Higher process speeds
- Higher efficiency
- Reduced noise and wear due to less cavitation
- Ideal for humid and dusty environments
- Reduced costs due to smaller size, fewer installation costs, less oil required and easier transport
- Longer component service life, less servicing

Technical specifications

	OXS 30LID	OXS 45LID	OXS 70LID	OXS 150LID	OXS 250LID	OXS 325LID	OXS 500LID
Hydraulic data							
Differential operating volume	≤ 30 l	≤ 45 l	≤ 70 l	≤ 150 l	≤ 250 l	≤ 325 l	≤ 500 l
Typical degassing rate *	4 l/h						
Viscosity range	15 to 300 mm²/s with ACD to 200 mm²/s						
Maximum fluid flow rate IN / OUT							
OXS 30, 45, 70	900 l/min						
OXS 150, 250	2700 l/min						
OXS 325, 500	5400 l/min						
Fluid temperature range	10–80 °C						
Ambient temperature range **	-20 - 40 °C						
Storage temperature range	0–40 °C						
Relative humidity **	0 - 80%, non-condensing						
Filtration unit	OLF 5						
Filter element, filtration unit	N5DM002						
Contamination retention capacity, filter element	200 g ISOMTD ® Δp = 2.5 bar						
Pump type, filtration unit	Vane pump						
Flow rate, filtration unit	10 l/min						
Operating pressure, filtration unit	10 bar						
Clogging indicator	Visual differential pressure indicator						

Electrical data, filtration unit	
Supply voltage, motor	See model code
Electrical power consumption	370 W
Protection class to DIN 40050	IP54

General data	
Permitted fluids**	Mineral oil to DIN 51524
Sealing material **	NBR
Membrane material **	PUR
Typical membrane service life	≈ 6 years at 40 - 60 °C fluid temperature ≈ 2 years at 60 - 80 °C fluid temperature

* Typical values for ISO VG 46, 40 °C at gas saturation. The degassing rate depends on the total gas content in the oil, the oil temperature, and especially the oil viscosity. The degassing rate reduces as viscosity increases.
** Others on request

Preferred models

Part no.:	Model code	Quantity	Delivery time
3914572	OXS-250LID-N-1-Z-Z-2-2-ACD	1 piece	35 days
3914606	OXS-500LID-N-1-Z-Z-2-2-ACD	1 piece	35 days

Model code

OXS – 30LID – N – 1 – Z – Z – 2 – 2 – ACD – /-

Product
OXS = OXiStop

Size
30LID = differential operating volume ≤ 30 l
45LID = differential operating volume ≤ 45 l
70LID = differential operating volume ≤ 70 l
150LID = differential operating volume ≤ 150 l
250LID = differential operating volume ≤ 250 l
325LID = differential operating volume ≤ 325 l
500LID = differential operating volume ≤ 500 l

Supply voltage, motors
N = 400 V / 50Hz / 3 Ph (MPG standard) *

Sealing material/membrane material
1 = NBR seals, PUR membranes

Return line filter
Z = without

Plate heat exchanger + motor-pump unit
Z = without

Vacuum pressure monitoring, degassing unit
1 = pressure gauge
2 = electronic pressure sensor (EDS)

Level and temperature monitoring
2 = electronic level sensor (HNS) with integrated temperature sensor

Measuring equipment
Z = without
ACD = AquaSensor (AS) + ContaminationSensor (CS)

Supplementary details
No details = standard

* Supplied without cable or plug

Sizing

The required OXiStop size (differential operating volume) can be calculated from the actual volume differences of cylinders, accumulators, hoses etc. present in the system. In addition, allowances must be made for the volume required for thermal expansion in the oil and for possible continuous oil losses. This volume (except for accumulators) should be doubled as a safety margin.

Rule of thumb:

Sum of total accumulator volume
+ 2x sum of volume difference for cylinders, hoses, temperature expansion, etc.

= OXiStop differential operating volume

Also, it is necessary to check whether the total oil volume in the system needs to be returned to the tank when maintenance work is carried out.

Items supplied

- OXiStop LID according to model code with membrane cage and integrated membrane, MiniOx degassing unit, OLF 5 offline filtration unit with optional CS 1000 ContaminationSensor and AS 3000 AquaSensor, HNS electronic level sensor, breather filter and piping for individual components, gasket (interface to tank)
- Operating and maintenance instructions
- Instructions for tank installation

Accessories

- Filter elements for offline filter OLF 5 (1 x N5DM002 already installed)

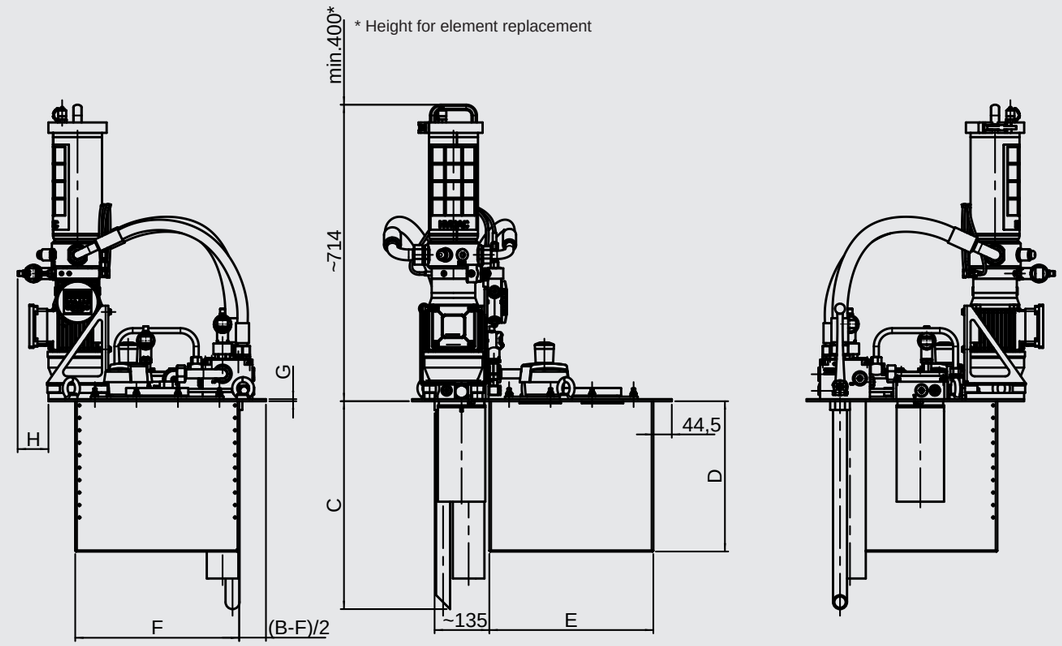
Part number	Designation
349494	N5DM002 (2 µm)

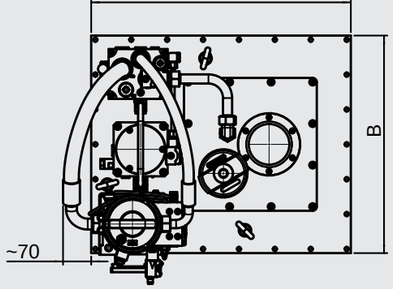
- Electrical clogging indicators, see brochure 7.112 NF Inline Filter

Fluid level gauge (FSA) for mounting on the tank by the customer (recommended)

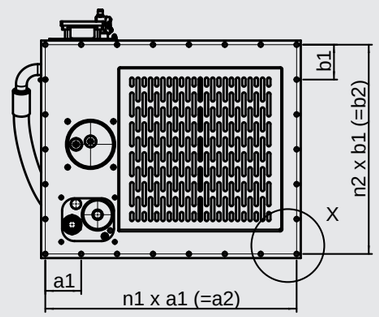
OXS 30	Part no. 700095
OXS 45, 150, 325	Part no. 3858731
OXS 70, 250, 500	Part no. 3858747
Special screw for fluid level gauge (FSA) (1x is required for mounting)	Part no. 3925870

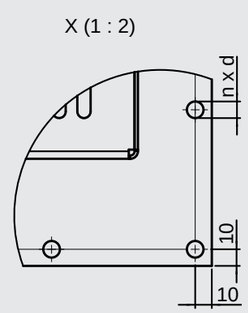
Dimensions





	A	B	C	D	E	F	G	H
OXS 30LID	625.5	524	500	362	395	395	5	74
OXS 45LID	625.5	524	610	472	395	395	5	74
OXS 70LID	625.5	524	820	682	395	395	5	74
OXS 150LID	1015	680	610	472	795	595	5	-14
OXS 250LID	1015	680	820	682	795	595	5	-14
OXS 325LID	1415	880	607	472	1195	795	8	-121
OXS 500LID	1415	880	817	682	1195	795	8	-121

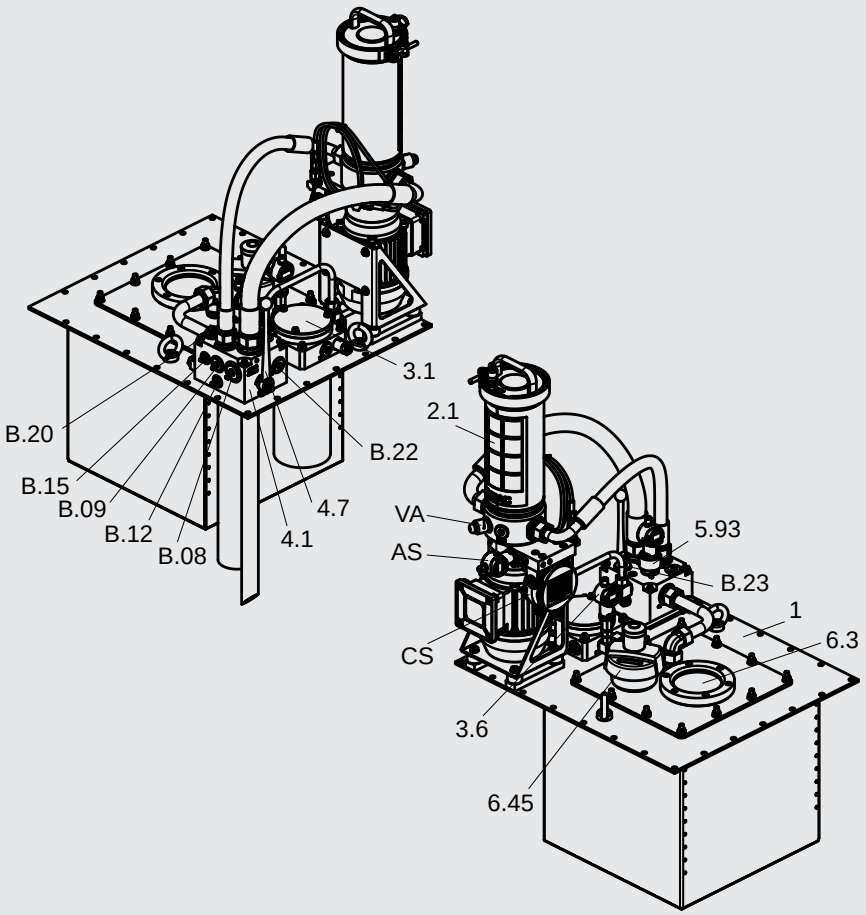




Size	Weight when empty [kg]
OXS 30 LID	66
OXS 45 LID	70
OXS 70 LID	76
OXS 150 LID	99
OXS 250 LID	110
OXS 325 LID	152
OXS 500 LID	166

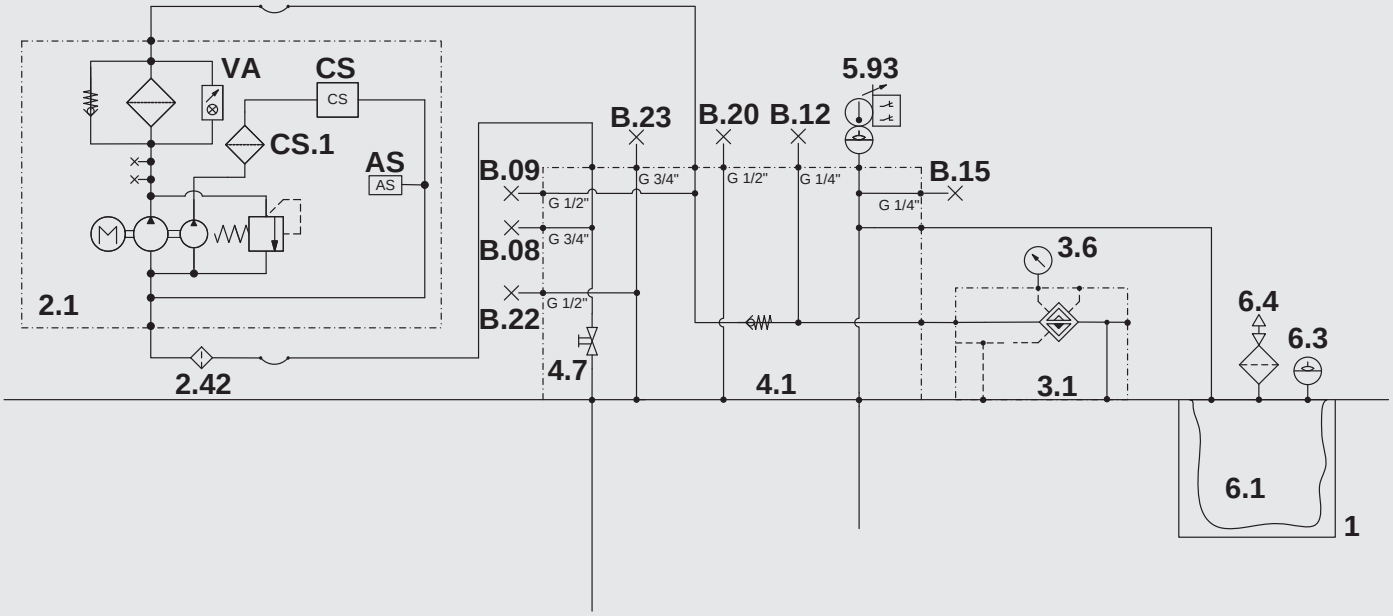
	a1	a2	n1	b1	b2	n2	d	n
OXS 30LID / 45LID / 70LID	86.5	605.5	7	84	504	6	10	26
OXS 150LID / 250LID	99.5	995	10	82.5	660	8	10	36
OXS 325LID / 500LID	116.25	1395	12	86	860	10	10	44

Assembly drawing



Item	Component
1	OXS-LID primary body
2.1	OLF 5 offline filtration unit
Clogging indicator	Clogging indicator on OLF 5 filtration unit
CS	CS ContaminationSensor (optional)
CS.1	Protective screen on fluid filter unit
AS	AS AquaSensor (optional)
2.42	Suction strainer
3.1	MiniOX (MOX) degassing and dewatering unit
3.6	EDS electronic pressure sensor or vacuum gauge (optional)
4	Valve and connection block
4.7	Directional control valve
5.93	Fluid level/temperature sensor HNS, electrical
B.08	Filling port
B.09	Draining port
B.12	Pressure measurement point (pressure line OLF 5)
B.15	Port for visual tank fluid level indicator FSA
B.20	Connection for electronic temperature sensor ETS
B.22	Breather fitting / connection for rapid venting
B.23	Connection for additional HNS
6.1	Membrane
6.3	Sight glass
6.4	Breather filter

Hydraulic circuit



Note

The information in this brochure relates to the operating conditions and applications described.

For applications and operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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LowViscosity Unit Coalescer Diesel LVU-CD-10

Description

The LowViscosity Unit LVU is intended for offline filtration. The LVU removes solid particle contamination and free water from diesel fuel.
Diesel fuel is often subject to long storage periods, especially in tanks which may be used infrequently. As a result, solid particles and water are often deposited on the bottom of the tank and can then damage pumps and sensitive components when the engine is switched on.
In addition, over an extended period of time free water in a tank provides a breeding ground for diesel fuel pests (microorganisms such as bacteria, algae and fungus).
Deposits and pests can both quickly lead to blockage of the machine filter and to damage to diesel injection system components. The consequence: impermissibly high levels of dangerous emissions from the combustion engine. This leads to high costs for downtime, spare parts, maintenance and repairs.
Using the LowViscosity Unit LVU minimises contamination to a system and prevents expensive system downtime. It also eliminates the need for early and expensive disposal of diesel fuel.

Fields of Application

- Mobile & stationary emergency generators e.g. in hospitals, shopping centres, power plants
- Tanks on mobile machines e.g. harvesting and construction machinery
- Storage tanks e.g. in agriculture, construction, mining
- Yachts and leisure boats

Advantages

- Increased system availability
- Reduced risk of diesel pests thanks to separation of free water from diesel fuel
- Care and dewatering possible even when the combustion engine is turned off
- Can be used flexibly thanks to adjustable transfer pumping function (continuous or time-programmed)
- Optional automatic drainage of water from the coalescing housing for increased convenience and greater process reliability

Technical data

Dewatering performance	**Eco**	**Standard**	**Premium**
Water separation efficiency	>95% acc. to ISO CD 16332		
Achievable water content	<200 ppm free water		
Dewatering rate	12 l/h at 5% water in the diesel		
Hydraulic specifications			
Nominal flow	10 l/min		
Permitted fluids	Diesel, biodiesel B0 to B100, fuel oil		
Limit of application	Maximum 10% free water		
Permitted fluid temperature range	5 to 50 °C*		
Operating pressure	Maximum 3 bar		
Permissible pressure at suction port	-0.4 to 0.2 bar		
Permissible pressure at pressure port	3 bar		
Permissible pressure at water drain	0 bar		
Connection (suction and pressure side)	M26x1.5 (18 L) external thread		
Water drain	Drain plug	Ø 10 mm hose	Ø 10 mm hose
Water collection canister	–	5 litres	5 litres
Electrical data			
Power consumption	370 W		
Connection cable	5 m	0.5 m	0.5 m
Protection class	IP44	IP54	IP54
General data			
Dimensions	see dimensions		
Weight when empty	≈ 20 kg	≈ 38 kg	≈ 38 kg
Permitted ambient temperature range	5 to 40 °C*	5 to 50 °C*	5 to 50 °C*

* or at least 10 °C below the flash point of the fluid used/deployed.

Preferred models (with shorter delivery times)

Model code	Part no.:
LVU-CD-10-WM-1E-E-1	4024213
LVU-CD-10-GM-2S-E-1	3884573
LVU-CD-10-GM-2P-F-1	3992032

Model code

LVU-C D – 10 – G M – 2 P – F – 1/-

Type
LVU = LowViscosity Unit

Function
C = filtering and coalescing

Operating fluid
D = diesel

Nominal flow rate
10 = 10 l/min

Pump version
G = gear pump (only for control type S and P)
W = centrifugal pump (only for control type E)

Supply voltage
L = 115 V AC, 60 Hz, 1 Ph
E = 220 V AC, 50 Hz, 1 Ph
M = 230 V AC, 50 Hz, 1 Ph
F = 240 V AC, 50 Hz, 1 Ph
X = others (on request)

Water drain
1 = manual (for control type E only)
2 = automatic (for control type S and P only)

Control type
E = Eco (see control type table)
S = Standard (see control type table)
P = Premium (see control type table)

Clogging indicator
E = clogging indicator, visual
F = negative pressure switch, electrical (only for control type P)

Type code
1 = (you always receive the latest type)

Control type

Choose between the following control types:

	Eco	Standard	Premium
Water drain	Manual	Automatic	Automatic
Clogging indicator	Visual	Visual	Electrical
Float switch in the collecting pan	X	✓	✓
Remote control input on / off	X	✓	✓
Time programming	X	X	✓
Informed when “diesel dry”	X	X	✓

Scope of delivery

– LVU-CD-10, ready for connection (without hoses and filter element)
– Operating and maintenance instructions

Accessories

– Hose with lance (NBR), part no.: 3029032
– Hose with lance (PVC), part no.: 37607

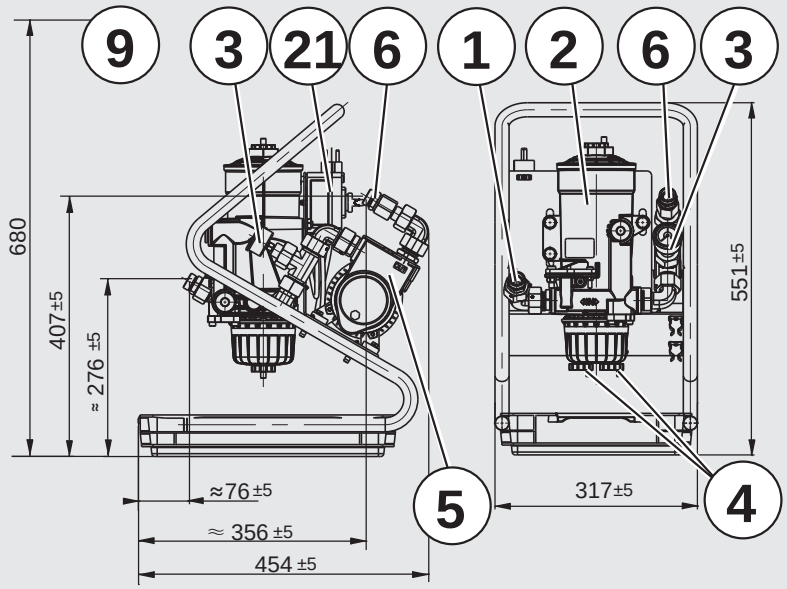
Filter elements
LVU-CD-10-…E = Eco

Designation	Part no.
5 µm N7ON-DC005-CA62H	3891597
10 µm N7ON-DC010- CA62H	3891598
30 µm N7ON-DC030- CA62H	3891599

Filter elements
LVU-CD-10-…S = Standard/ LVU-CD-10-…P = Premium

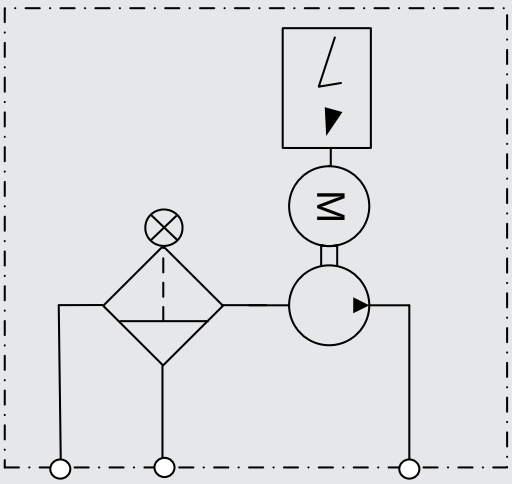
Designation	Part no.
5 µm N7ON-DC005-CA61H	3871268
10 µm N7ON-DC010- CA61H	3871269
30 µm N7ON-DC030- CA61H	3871271

Dimensions (ECO)



All dimensions in mm

Hydraulic diagram (ECO)

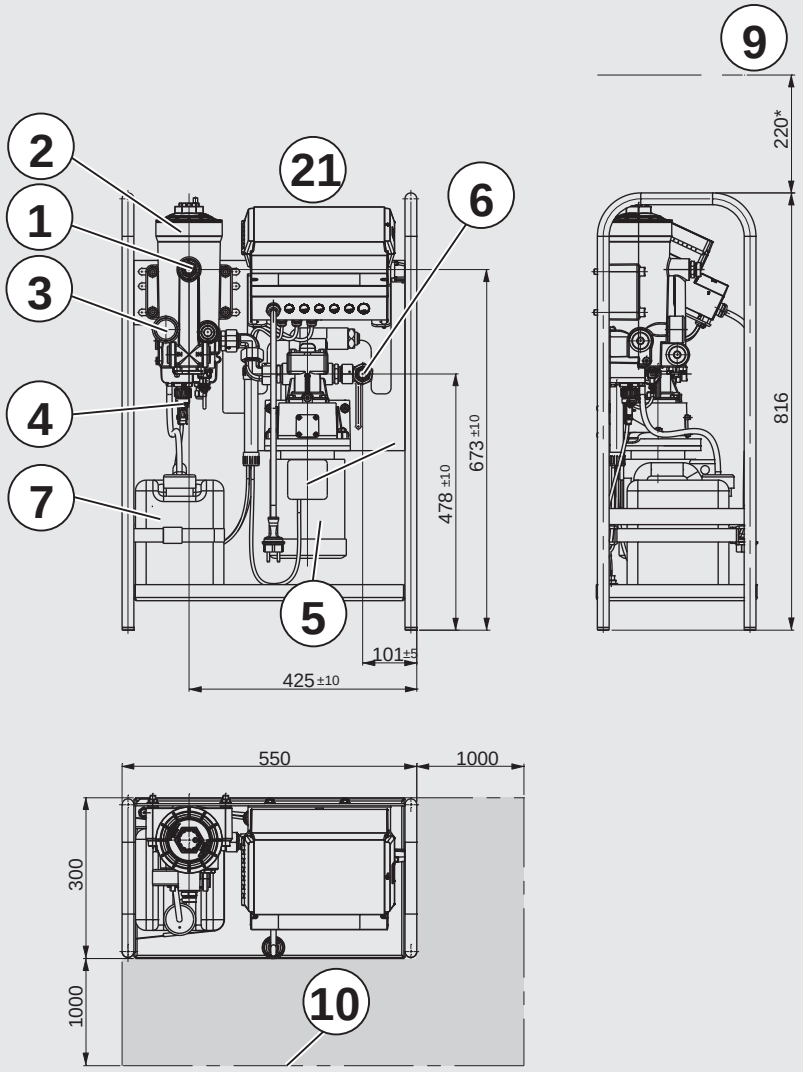


INLET FUEL	DRAIN WATER	OUTLET FUEL
ISO 8434, L18 M26 x 1,5	manual drain screw	ISO 8434, L18 M26 x 1,5

Legend

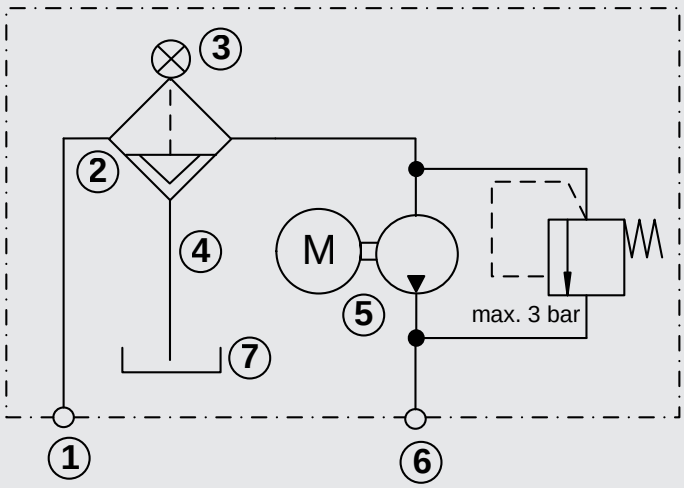
Item	Designation
1	Inlet (ISO8434, L18, M26x1.5)
2	Filter and coalescing housing
3	Clogging indicator
4	Water drain
5	Motor pump unit
6	Outlet (ISO8434, L18, M26x1.5)
9	Element removal height
21	On/Off switch

Dimensions (Standard/Premium)



All dimensions in mm

Hydraulic diagram (Standard/Premium)



Legend

Item	Designation
1	Inlet (ISO8434, L18, M26x1.5)
2	Filter and coalescing housing
3	Clogging indicator
4	Water drain
5	Motor pump unit
6	Outlet (ISO8434, L18, M26x1.5)
7	Water supply tank
9	Element removal height
10	Recommended working area for operating and service staff
21	Electrical control

NOTE

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LowViscosity Unit Coalescer Diesel LVU-CD-40

Description

The LowViscosity Unit LVU is intended for offline filtration. The LVU removes solid particle contamination and free water from diesel fuel.

Diesel fuel is often subject to long storage periods, especially in tanks which may be used infrequently. As a result, solid particles and water are often deposited on the bottom of the tank and can then damage pumps and sensitive components when the engine is switched on.

In addition, over an extended period of time free water in a tank provides a breeding ground for diesel fuel pests (microorganisms such as bacteria, algae and fungus).

Deposits and pests can both quickly lead to blockage of the machine filter and to damage to diesel injection system components. The consequence: impermissibly high levels of dangerous emissions from the combustion engine. This leads to high costs for downtime, spare parts, maintenance and repairs.

Using the LowViscosity Unit LVU minimises contamination to a system and prevents expensive system downtime. It also eliminates the need for early and expensive disposal of diesel fuel.

Fields of Application

- Mobile & stationary emergency generators e.g. in hospitals, shopping centres, power plants
- Tanks on mobile machines e.g. harvesting and construction machinery
- Storage tanks e.g. in agriculture, construction, mining
- Yachts and leisure boats
- Test benches

Advantages

- Increased system availability
- Reduced risk of diesel pests thanks to separation of free water from diesel fuel
- Care and dewatering possible even when the combustion engine is turned off
- Can be used flexibly thanks to adjustable transfer pumping function (continuous or time-programmed)
- Optional automatic drainage of water from the coalescing housing for increased convenience and greater process reliability

Technical data

Dewatering performance		
Water separation efficiency	>95%	
Achievable water content	<200 ppm free water	
Dewatering rate	50 l/h at 5% water in the diesel	
Hydraulic specifications		
Nominal flow	40 l/min	
Permitted fluids	Diesel, biodiesel B0 to B100, fuel oil	
Limit of application	Maximum 10% free water	
Permitted fluid temperature range	5 to 50 °C*	
Operating pressure	Maximum 6 bar	
Permissible pressure at suction port	-0.9 to 0.2 bar	
Permissible pressure at pressure port	0 to 3 bar	
Permissible pressure at water drain	0 bar	
Connection (suction and pressure side)	G 1“ acc. to ISO 228	
Connection (water drain)	G ½“ acc. to ISO 228	
Electrical data		
Power consumption	750 W	
Connection cable length/plug	Eco Standard/Premium	= 5 m / CEE = 0.5 m / CEE
Protection class	IP55	
General data		
Dimensions	510 x 630 x 1440 mm	
Weight when empty	Eco Standard/Premium	≈ 80 kg ≈ 90 kg
Permitted ambient temperature range	0 to 50 °C*	

* and at least 10 °C below the flash point of the fluid used/deployed.

Preferred models (with shorter delivery times)

Model code	Part no.:
LVU-CD-40-1-GM-12P-Z-D4-1	4062321
LVU-CD-40-1-GM-11E-Z-BM-1	3923862
LVU-CD-40-1-GN-21E-Z-BM-1	3918489

Model code

LVU-C D – 40 – 1 – G N – 1 1 E – Z – BM - 1/-

Type
LVU = LowViscosity Unit
Function
C = filtering and coalescing
Operating fluid
D = diesel
Nominal flow rate
40 = 40 l/min
Design
1 = stationary
Pump version
G = gear pump
Supply voltage
M = 230 V AC, 50 Hz, 1 Ph
N = 400 V AC, 50 Hz, 3 Ph
X = others (on request)
Pre-filter
1 = pre-filter element size 10“
2 = pre-filter element size 20“
Water drain
1 = manual (for control type E only)
2 = automatic (for control type S or P only)
Control type
E = Eco (see control type table)
S = Standard (see control type table)
P = Premium (see control type table)
Measurement equipment
Z = without
Clogging indicator
BM = differential pressure indicator, visual
D4 = clogging indicator, visual/electrical (only for control type S and P)
Type code
1 = (you always receive the latest type)

Control type

Choose between the following control types:

	Eco	Standard	Premium
Water drain	Manual	Automatic	Automatic
Clogging indicator	Visual	Visual	Electrical
Float switch in the collecting pan	X	✓	✓
Remote control input on / off	X	✓	✓
Timer control	X	X	✓

Scope of delivery

– LVU-CD-40, ready for connection (without coalescing element set and pre-filter element)
– Operating and maintenance instructions

Coalescing element set and pre-filter element must be ordered separately and installed on site before initial commissioning.

Coalescing element set

Designation	Part no.
N20ON-DCZ-CB1F	3917919

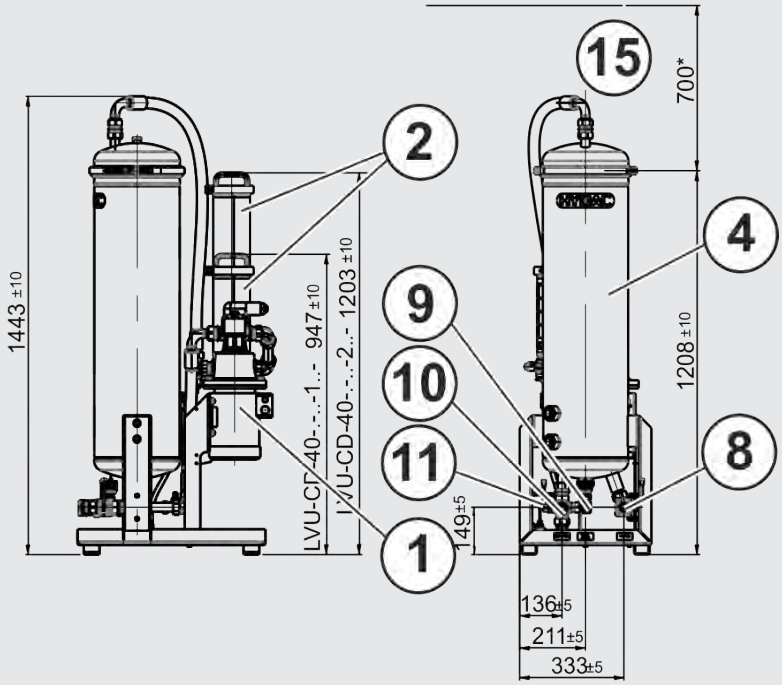
Pre-filter elements Size 10“

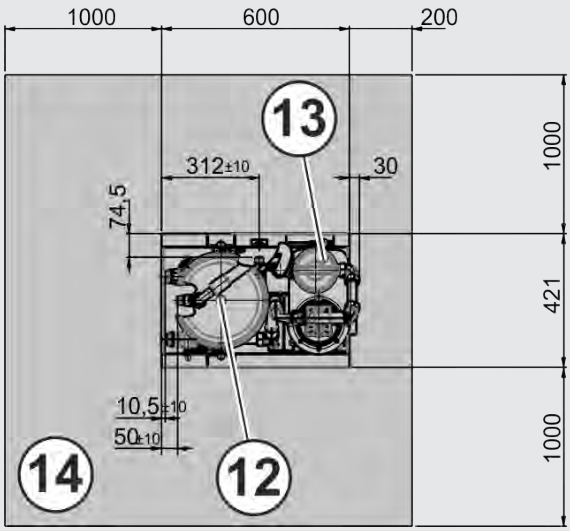
Designation	Part no.:
3 µm N10ON-DF003-FA41F	3917981
5 µm N10ON-DF005-FA41F	3917982
10 µm N10ON-DF010-FA41F	3917983

Pre-filter elements Size 20“

Designation	Part no.:
3 µm N20ON-DF003-FA41F	3918332
5 µm N20ON-DF005-FA41F	3918333
10 µm N20ON-DF010-FA41F	3918334

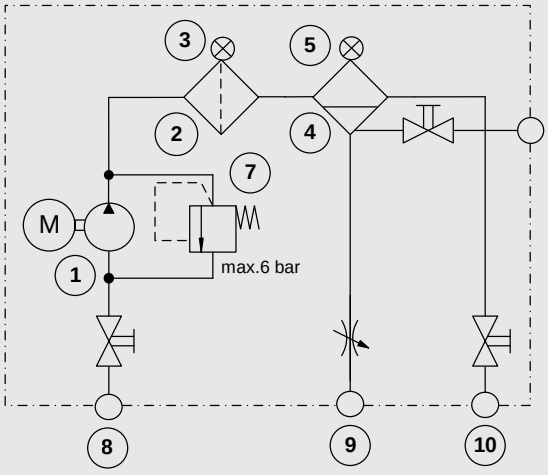
Dimensions LVU-CD-40 Eco





All dimensions in mm

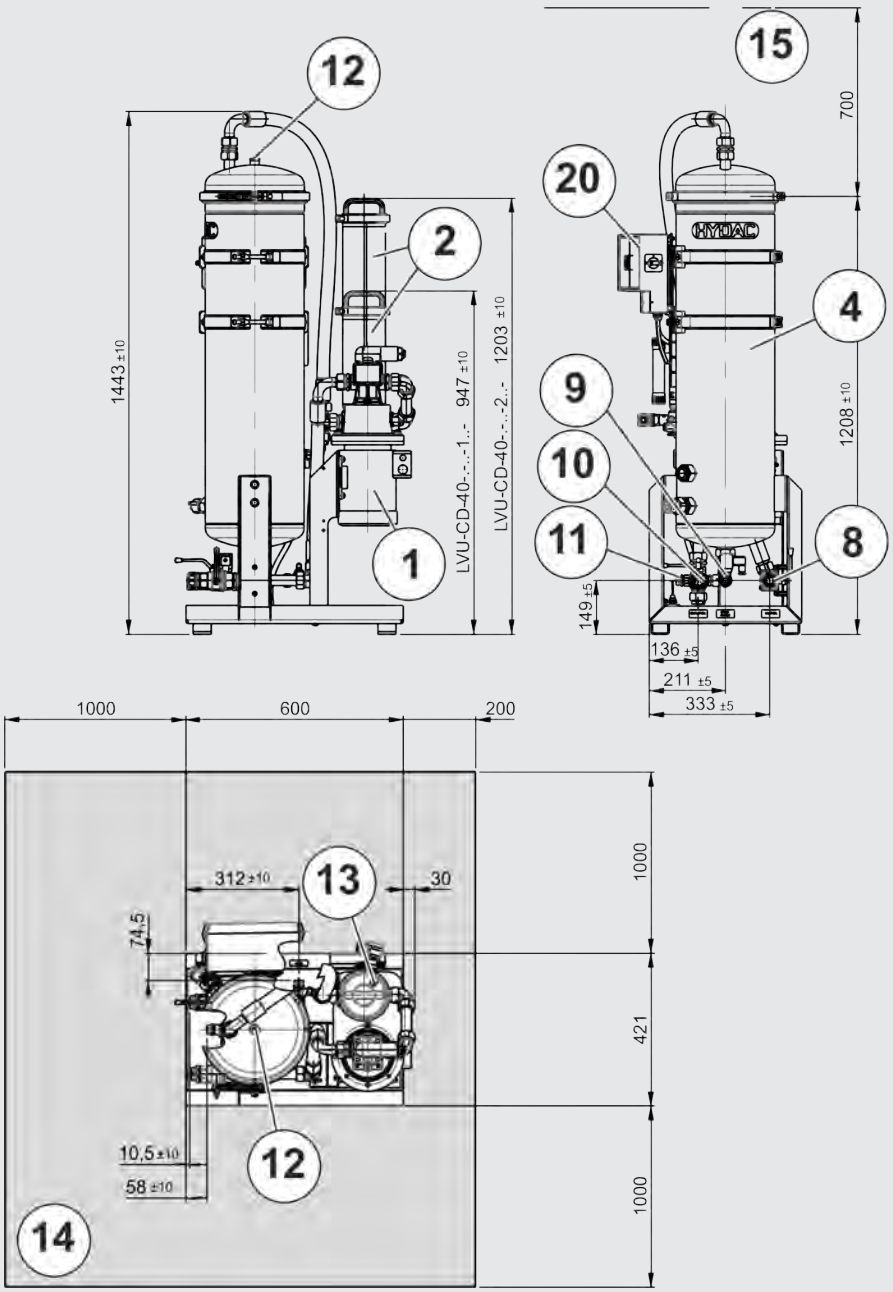
Hydraulic diagram LVU-CD-40 Eco



Legend

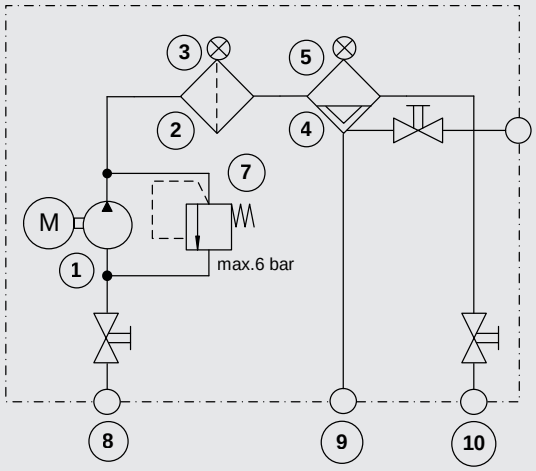
Item	Designation
1	Motor pump assembly
2	Pre-filter
3	Clogging indicator, pre-filter
4	Coalescing housing
5	Clogging indicator, coalescing housing
7	Pressure relief valve
8	Inlet, fuel, G 1“
9	Water drain, G ½“
10	Outlet, fuel, G 1“
11	Drain, coalescing housing
12	Air vent, coalescing housing
13	Air vent, pre-filter
14	Recommended working area for operating and service staff
15	Removal height for filter and coalescing elements

Dimensions LVU-CD-40 Standard/Premium



All dimensions in mm

Hydraulic diagram LVU-CD-40 Standard/Premium



Legend

Item	Designation
1	Motor pump unit
2	Pre-filter
3	Clogging indicator, pre-filter
4	Coalescing housing
5	Clogging indicator, coalescing housing
7	Pressure relief valve
8	Inlet, fuel, G 1“
9	Water drain, G ½“
10	Outlet, fuel, G 1“
11	Drain, coalescing housing
12	Air vent, coalescing housing
13	Air vent, pre-filter
14	Recommended working area for operating and service staff
15	Removal height for filter and coalescing elements
20	Control system

NOTE

The information in this brochure relates to the operating conditions and applications described.

For applications and operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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Flexmicron Premium
(FM-P)

Description
The filter elements of the FlexMicron Premium (FM-P) product line are durable elements, manufactured in meltblown or high-quality fibreglass using pleat technology.

They are designed particularly for use in applications requiring high levels of cleanliness.

Applications
- High-end industrial part washing systems (water-based & hydrocarbon cleaning fluids up to 100 °C)
- Flushing rigs (downstream of part washing systems)
- Test rigs (fuel injection, braking and steering systems)
- Superfinishing with cooling lubricants (honing, grinding, turning, milling, deburring)
- Offline filtration in large hydraulic systems
- Offline filtration in lubrication systems
- Filling systems used in cleanliness applications
- Mining and metallurgy
- Metal-forming (e.g. hydroforming)

Special features
- ß-values up to 20,000
- Filtration efficiency up to 99.99%
- Filtration rating 1 ... 90 µm
- Very low initial Δp
- High differential pressure stability
- Excellent filtration efficiency, also under pulsation conditions (pressure and flow rate pulsation)
- Wide range of adapters
- Materials: polyester, glass fibre
- Pleat technology
- Broad range of fluid compatibility
- Market-standard element geometry

Techical specifications

General data	
Length	10", 13", 20", 30", 40"
Filtration rating	1 to 90 µm
$ß_x$-values	up to 20,000
Filtration efficiency	up to 99.99%

Model code

N 40 FM-P 005 - PES 1 F

Element length
10 = 10"
13 = 13"
20 = 20"
30 = 30"
40 = 40"

Element type
FM-P = Flexmicron P (Premium)

Filtration rating
001 = 1 µm
003 = 3 µm
005 = 5 µm
010 = 10 µm
020 = 20 µm
030 = 30 µm
040 = 40 µm
050 = 50 µm
070 = 70 µm
090 = 90 µm

Filter material
PES = Polyester
GF = Glass fibre

End cap type
1 = plug-in adapter (1x 222 O-ring), flat end cap, element Ø 64 mm
2 = plug-in adapter (2x 222 O-ring), flat end cap, element Ø 64 mm
3 = plug-in adapter (2x 222 O-ring), flat end cap, element Ø 70 mm
5 = plug-in adapter (2x 222 O-ring), locating spigot, element Ø 70 mm
7 = bayonet (2x 226 O-ring), locating spigot, element Ø 70 mm
10 = open flat seal (DOE), element Ø 64 mm
12 = adapter for suspended elements, element Ø 64 mm
others on request

Seal material
N = NBR
F = FKM (FPM, Viton®)
E = EPDM

Other types of element on request

R (Resistance) factors

		Water-based fluids	Oils	
		PES*	PES*	GF**
Filtration rating	1 µm	32.0	10.4	5.4
	3 µm	24.0	7.5	-
	5 µm	18.0	4.4	4.3
	10 µm	17.0	1.8	3.2
	20 µm	15.0	1.8	-
	30 µm	14.0	0.9	-
	40 µm	14.0	0.9	-
	50 µm	11.0	0.7	-
	70 µm	9.0	0.7	-
	90 µm	8.0	0.5	-

* ß > 5,000
** ß > 20,000

Maximum differential pressure Δp_{max} and permitted temperature range across the element:

Fluid temperature	Filter material
	PES, GF
-10 to 30°C	8 bar
-10 to 60°C	6.5 bar
-10 to 100°C	5 bar

Sizing

The total pressure loss of the filter at a certain flow rate is the sum of the housing Δp and the element Δp_E. The housing pressure drop can be determined using the pressure drop curves in the filter housing datasheet. The pressure drop of the elements is calculated using the R factors.

The following calculation is based on clean filter elements.

$$\Delta p_E[bar] = \frac{R \cdot V(mm^2/s) \cdot Q(l/min)}{n \cdot L(inch) \cdot 1000}$$

Δp_E = Element pressure drop [bar]
R = R factor
V = Viscosity (mm²/s)
Q = Flow rate (l/min)
n = No. of elements
l = Element length (inch)

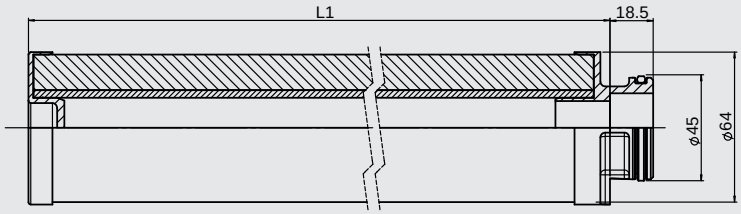
Maximum permitted flow rate for 1 mm²/s

Element length	Maximum permitted flow rate
10"	20 l/min
13"	26 l/min
20"	40 l/min
30"	60 l/min
40"	80 l/min

Other flow rates on request.

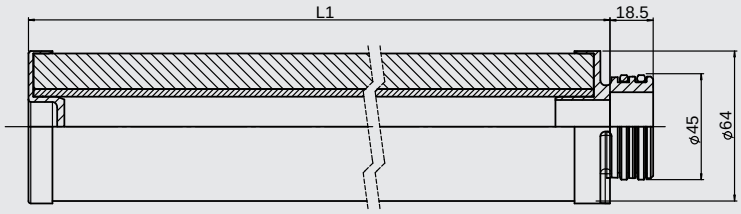
Dimensions of Flexmicron Premium Elements

Type 1: Plug-in adapter (1 x 222 O-ring), flat end cap



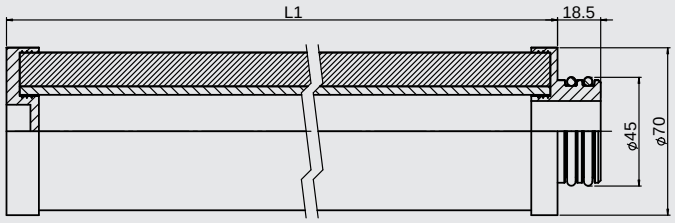
Code	L1 in mm
N10FM-P...	263
N13FM-P...	339
N20FM-P...	517
N30FM-P...	771
N40FM-P...	1025

Type 2: Plug-in adapter (2 x 222 O-ring), flat end cap



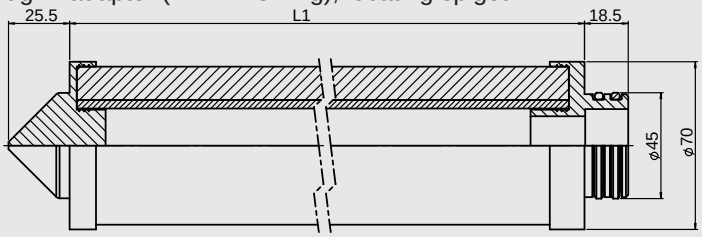
Code	L1 in mm
N10FM-P...	263
N13FM-P...	339
N20FM-P...	517
N30FM-P...	771
N40FM-P...	1025

Type 3: Plug-in adapter (2 x 222 O-ring), flat end cap



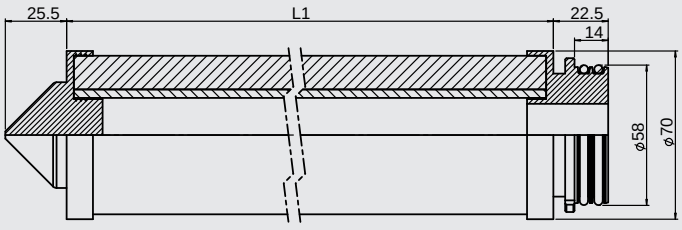
Code	L1 in mm
N10FM-P...	263
N13FM-P...	339
N20FM-P...	517
N30FM-P...	771
N40FM-P...	1025

Type 5: Plug-in adapter (2x 222 O-ring), locating spigot



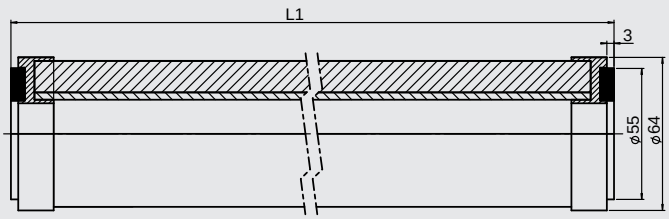
Code	L1 in mm
N10FM-P...	263
N13FM-P...	339
N20FM-P...	517
N30FM-P...	771
N40FM-P...	1025

Type 7: Bayonet (2x 226 O-ring), locating spigot



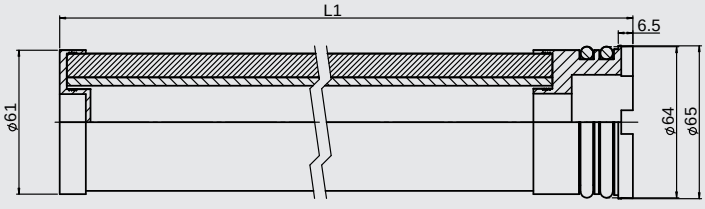
Code	L1 in mm
N10FM-P...	241
N13FM-P...	317
N20FM-P...	495
N30FM-P...	749
N40FM-P...	1003

Type 10: Open flat seal (DOE)



Code	L1 in mm
N10FM-P...	254
N13FM-P...	330
N20FM-P...	508
N30FM-P...	762
N40FM-P...	1016
N40FM-P...-990	988

Type 12: Adapter for suspended elements



Code	L1 in mm
N37FM-P...	977

Note

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Subject to technical modifications.

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Flexmicron Standard (FM-S)

Description

The Flexmicron Standard (FM-S) filter elements are spun-spray depth filter elements, manufactured using melt-blown technology.

They are used particularly in applications where a high level of fluid cleanliness is required.

Applications

- Industrial part washing systems (water-based up to 60 °C)
- Transmission test rigs, hydraulic test rigs
- Superfinishing with cooling lubricants
- Cooling circuits on machinery
- Filling systems
- Refineries, chemical industry
- Semiconductor industry
- Offline filtration in large hydraulic systems
- Offline filtration in lubrication systems

Special features

- Filtration performance 99.8%
- Filtration rating 1 ... 90 µm
- Material purity
- End caps welded, not glued
- Wide range of adapters
- Good price/performance ratio
- Materials: polypropylene, polyamide
- Spun-spray technology
- Broad range of fluid compatibility
- Market-standard element geometry
- High degree of separation due to graduated depth filter construction
- High contamination retention resulting from effectiveness of depth type filter material
- Silicone-free

Technical specifications

General data	
Length	10", 20", 30", 40"
Filtration rating	1 to 90 µm
Filtration efficiency	99.8%

Model code

N 40 FM-S 005 - PP 1 F

Element length
10 = 10"
20 = 20"
30 = 30"
40 = 40"

Element type
FM-S = Flexmicron Standard

Filtration rating
001 = 1 µm
003 = 3 µm
005 = 5 µm
010 = 10 µm
020 = 20 µm
030 = 30 µm
040 = 40 µm
050 = 50 µm
070 = 70 µm
090 = 90 µm

Filter material
PP = Polypropylene
PA = Polyamide

End cap type
0 = compression ring (DOE), no cap or seal, element Ø 63 mm
1 = plug-in adapter (1x 222 O-ring), flat end cap, element Ø 64 mm
2 = plug-in adapter (2x 222 O-ring), flat end cap, element Ø 64 mm
10 = gasket (DOE), element Ø 63 mm
13 = plug-in adapter (2x 222 O-ring), locating spigot, element Ø 64 mm
14 = bayonet (2x 226 O-ring), locating spigot, element Ø 64 mm
others on request

Seal material
N = NBR
F = FKM (FPM, Viton®)
E = EPDM
P = polypropylene (compulsory for end cap type 10)
Z = without seal (compulsory for end cap type 0)

Other types of element on request

R (Resistance) factors

Filtration rating	Water-based fluids		Oil	
	PA	PP	PA	PP
1 µm	274	321	30	240
3 µm	116	186	20	105
5 µm	42	132	18	70
10 µm	15	99	15	50
20 µm	11	54	12	20
30 µm	6	16	9	9
40 µm	3.8	12	6	7
50 µm	1.9	10	4	4
70 µm	1.1	8	3	3
90 µm	0.6	6	3	2

Maximum differential pressure Δp_{max} and permitted temperature range across the element:

Fluid temperature	Filter material	
	PA	PP
-10 to 30 °C	7 bar	4 bar
-10 to 60 °C	5.5 bar	2 bar
-10 to 100 °C	3.5 bar	–

Sizing

The total pressure drop of the filter at a certain flow rate is the sum of the housing Δp and the element ΔpE. The housing pressure drop can be determined using the pressure drop curves in the filter housing datasheet. The pressure drop of the elements is calculated using the R factors.

The following calculation is based on clean filter elements.

$$\Delta p_E \text{ [bar]} = \frac{R \cdot V(mm^2/s) \cdot Q(l/min)}{n \cdot L(inch) \cdot 1000}$$

Δp_E = Element pressure drop [bar]
R = R factor
V = Viscosity (mm²/s)
Q = Flow rate (l/min)
n = No. of elements
L = Element length (inch)

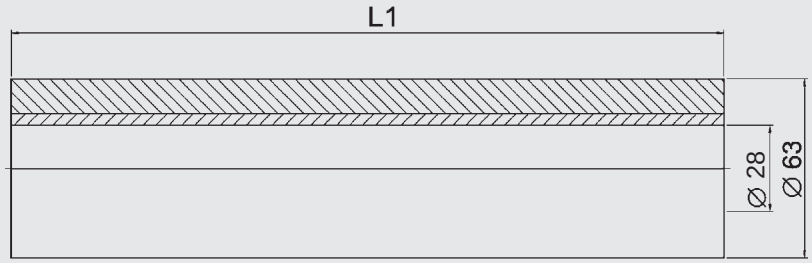
Maximum permitted flow rate for 1 mm²/s

Element length	Maximum permitted flow rate
10"	15 l/min
20"	30 l/min
30"	45 l/min
40"	60 l/min

Other flow rates on request.

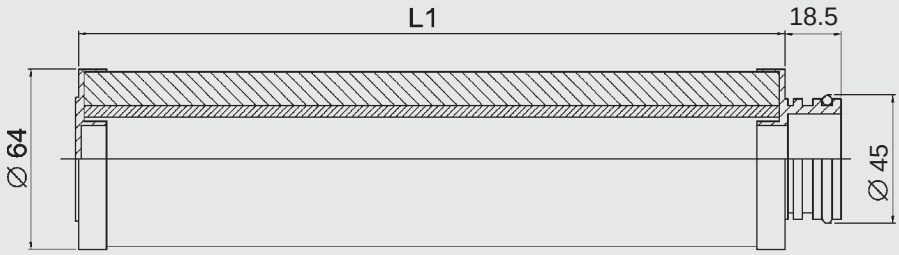
Dimensions of Flexmicron Standard Elements

Type 0: Compression ring (DOE), no cap or seal



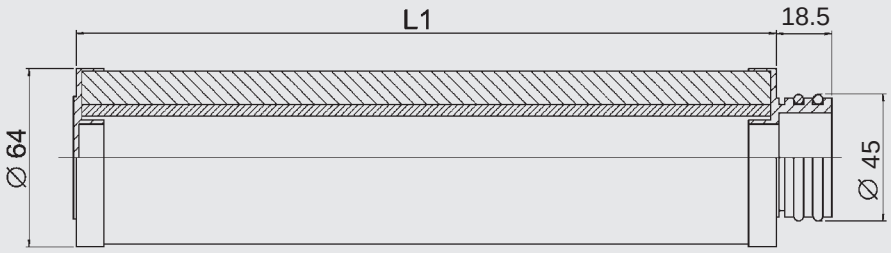
Code	L1 in mm
N10FM-S...	254
N20FM-S...	508
N30FM-S...	762
N40FM-S...	1016

Type 1: Plug-in adapter (1 x 222 O-ring), flat end cap



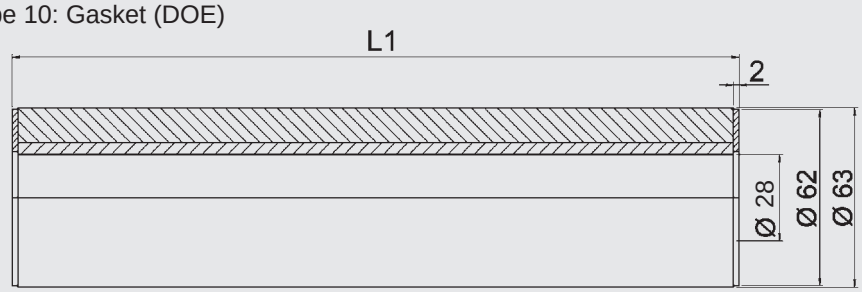
Code	L1 in mm
N10FM-S...	263
N20FM-S...	517
N30FM-S...	771
N40FM-S...	1025

Type 2: Plug-in adapter (2 x 222 O-ring), flat end cap



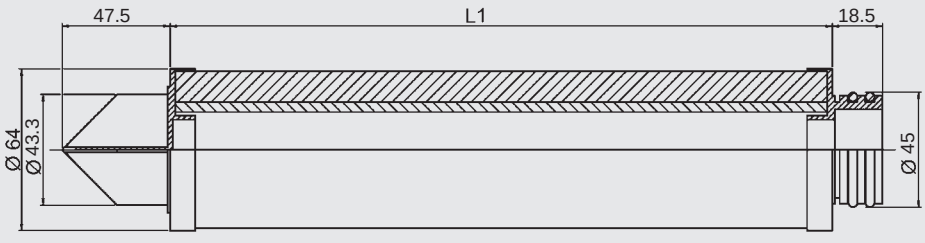
Code	L1 in mm
N10FM-S...	263
N20FM-S...	517
N30FM-S...	771
N40FM-S...	1025

Type 10: Gasket (DOE)



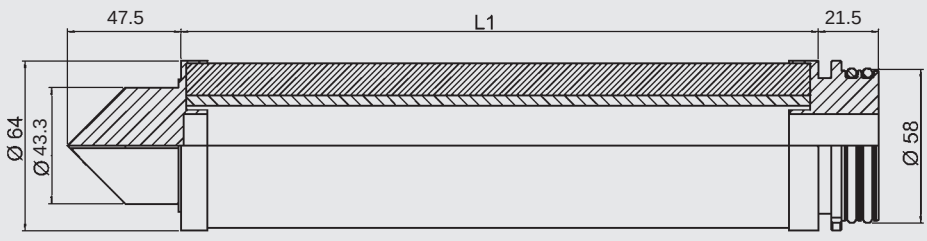
Code	L1 in mm
N10FM-S...	254
N20FM-S...	508
N30FM-S...	762
N40FM-S...	1016

Type 13: Plug-in adapter (2x 222 O-ring), locating spigot



Code	L1 in mm
N10FM-S...	263
N20FM-S...	517
N30FM-S...	771
N40FM-S...	1025

Type 14: Bayonet (2x 226 O-ring), locating spigot



Code	L1 in mm
N10FM-S...	241
N20FM-S...	495
N30FM-S...	749
N40FM-S...	1003

Note

The information in this brochure relates to the operating conditions and applications described.
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Subject to technical modifications.

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Flexmicron Economy (FM-E)

Description

The Flexmicron Economy (FM-E) filter elements are spun-spray depth filter elements, manufactured using melt-blown technology.

They are used particularly in applications where an average level of fluid cleanliness is required and they provide a cost-effective solution.

Applications

- Industrial part washing systems (water-based up to 60 °C)
- Cooling circuits on machinery
- Refineries, chemical industry
- Processes using cooling lubricants

Special features

- Filtration performance 95%
- Filtration rating 1 ... 90 µm
- Material purity
- End caps welded, not glued
- Wide range of adapters
- Cost-effective
- Materials: polypropylene, polyamide
- Spun spray technology
- Broad range of fluid compatibility
- Market-standard element geometry
- High degree of separation due to graduated depth filter construction
- High contamination retention resulting from effectiveness of depth type filter material
- Silicone-free

Technical specifications

General data	
Length	10", 20", 30", 40"
Filtration rating	1 to 90 µm
Filtration performance	95%

Model code

N 40 FM-E 005 - PP 1 F

Element length
10 = 10"
20 = 20"
30 = 30"
40 = 40"

Element type
FM-E= Flexmicron Economy

Filtration rating
001 = 1 µm
003 = 3 µm
005 = 5 µm
010 = 10 µm
020 = 20 µm
030 = 30 µm
040 = 40 µm
050 = 50 µm
070 = 70 µm
090 = 90 µm

Filter material
PP = Polypropylene
PA = Polyamide

End cap type
0 = compression ring (DOE), no cap or seal, element Ø 63 mm
1 = plug-in adapter (1x 222 O-ring), flat end cap, element Ø 64 mm
2 = plug-in adapter (2x 222 O-ring), flat end cap, element Ø 64 mm
10 = gasket (DOE), element Ø 63 mm (only PP as Seal material)
13 = plug-in adapter (2x 222 O-ring), locating spigot, element Ø 64 mm
14 = bayonet (2x 226 O-ring), locating spigot, element Ø 64 mm
others on request

Seal material
N = NBR
F = FKM (FPM, Viton®)
E = EPDM
P = polypropylene (compulsory for end cap type 10)
Z = without seal (compulsory for end cap type 0)

Other types of element on request

R (Resistance) factors

Filtration rating	Water-based fluids		Oil	
	PA	PP	PA	PP
1 µm	22	37	16	28
3 µm	21	29	15	23
5 µm	21	20	14	18
10 µm	16	11	13	14
20 µm	15	8	12	10
30 µm	14	7	10	8
40 µm	12	5	9	6
50 µm	10	4	8	5
70 µm	9	3	6	4
90 µm	8	2	4	2

Maximum differential pressure Δp_{max} and permitted temperature range across the element:

Fluid temperature	Filter material	
	PA	PP
-10 to 30 °C	7 bar	4 bar
-10 to 60 °C	5.5 bar	2 bar
-10 to 100 °C	3.5 bar	–

Sizing

The total pressure drop of the filter at a certain flow rate is the sum of the housing Δp and the element Δp_E. The housing pressure drop can be determined using the pressure drop curves in the filter housing datasheet. The pressure drop of the elements is calculated using the R factors.

The following calculation is based on clean filter elements.

$$\Delta p_E[bar] = \frac{R \cdot V(mm^2/s) \cdot Q(l/min)}{n \cdot L(inch) \cdot 1000}$$

Δp_E = Element pressure drop [bar]
R = R factor
V = Viscosity (mm²/s)
Q = Flow rate (l/min)
n = No. of elements
L = Element length (inch)

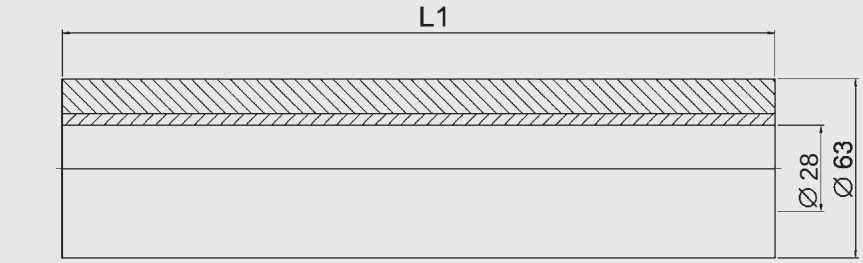
Maximum permitted flow rate for 1 mm²/s

Element length	Maximum permitted flow rate
10"	15 l/min
20"	30 l/min
30"	45 l/min
40"	60 l/min

Other flow rates on request.

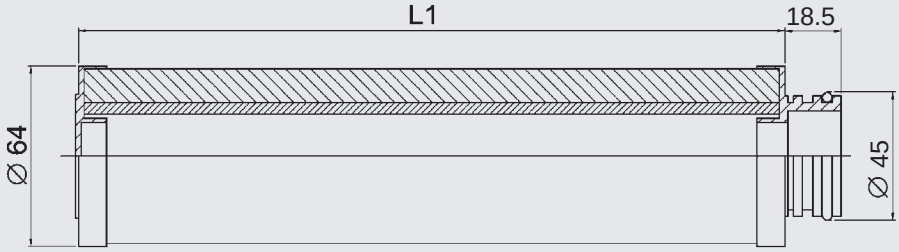
Dimensions of Flexmicron Economy Elements

Type 0: Compression ring (DOE), no cap or seal



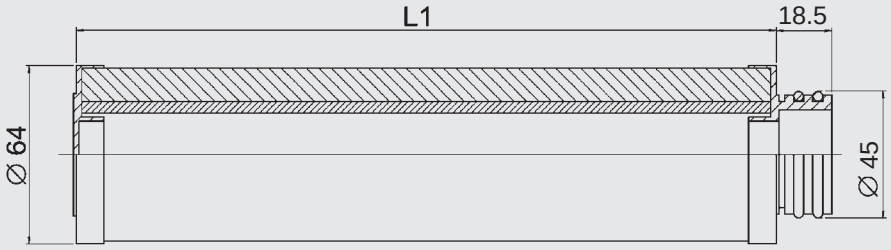
Code	L1 in mm
N10FM-E...	254
N20FM-E...	508
N30FM-E...	762
N40FM-E...	1016

Type 1: Plug-in adapter (1 x 222 O-ring), flat end cap



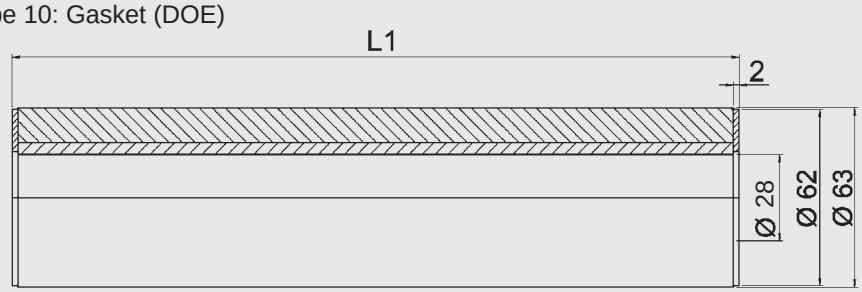
Code	L1 in mm
N10FM-E...	263
N20FM-E...	517
N30FM-E...	771
N40FM-E...	1025

Type 2: Plug-in adapter (2 x 222 O-ring), flat end cap



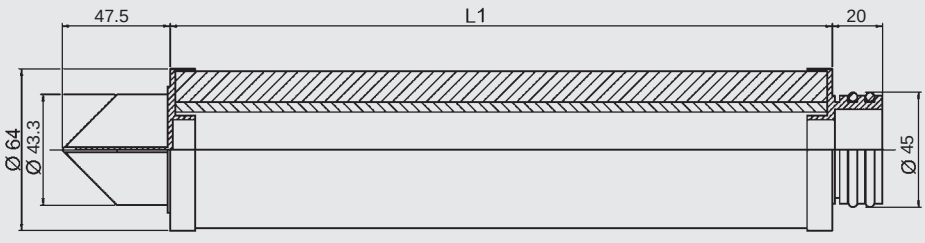
Code	L1 in mm
N10FM-E...	263
N20FM-E...	517
N30FM-E...	771
N40FM-E...	1025

Type 10: Gasket (DOE)



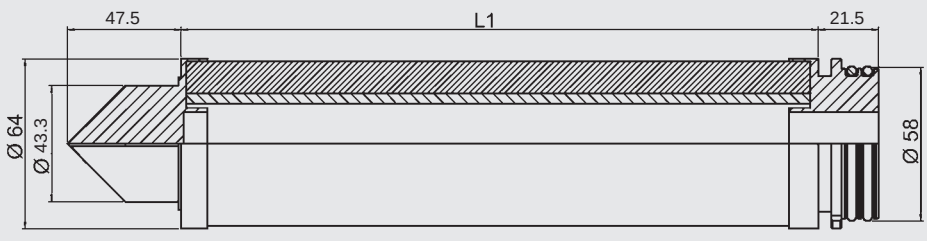
Code	L1 in mm
N10FM-E...	254
N20FM-E...	508
N30FM-E...	762
N40FM-E...	1016

Type 13: Plug-in adapter (2x 222 O-ring), locating spigot



Code	L1 in mm
N10FM-E...	263
N20FM-E...	517
N30FM-E...	771
N40FM-E...	1025

Type 14: Bayonet (2x 266 O-ring), locating spigot



Code	L1 in mm
N10FM-E...	241
N20FM-E...	495
N30FM-E...	749
N40FM-E...	1003

Note

The information in this brochure relates to the operating conditions and applications described.
For applications and operating conditions not described, please contact the relevant technical department.
Subject to technical modifications.

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Trimicron filter element
N1TM, N3TM

Description
The filter elements of the Trimicron series have been specially developed for the combined filtration of:

- Finest solid particle contamination
- Water
- Oil ageing products

from hydraulic and lubrication oils in the bypass flow.

They are a combination of pleated and spun spray depth filter elements. The filter layers used are produced using melt-blown technology (synthetic fibres).

Applications
- Offline filtration in lubrication systems (e.g. in wind turbines)
- Offline filtration in hydraulic systems
- Transmission and hydraulic test rigs

Special features
- Excellent filtration performance ($ß_{5\,(c)}$ > 1000)
- Low initial differential pressure
- High contamination retention capacity
- Fine particle contamination, water and oil ageing products removed by depth filter material
- Broad range of fluid compatibility
- Simple element change

Technical specifications

General specifications

	N1	N3
Contamination retention capacity ISOMTD at ΔP = 2.5 bar	≈ 410 g	≈ 2500 g
Water retention capacity	≈ 680 ml	≈ 2.2 l
Beta value $ß_{5\,(c)}$ @ 2 bar	> 1,000	> 1,000
Filtration rating	3 µm	
Differential pressure at starting point	< 0.1 bar	
Permitted fluid temperature range	-10–80 °C	
Storage temperature range	5–40 °C	

Order details

N – 1 – TM – 003 /- F

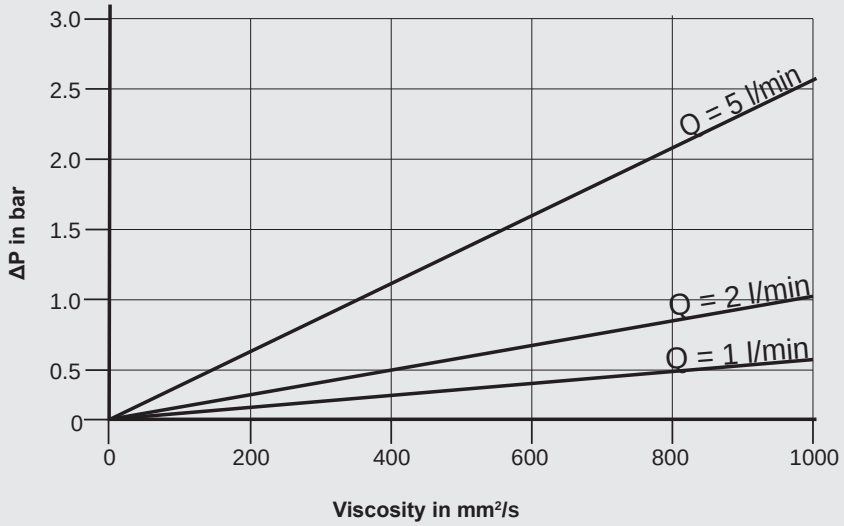
Nominal flow rate
1 = nominal flow rate 1 l/min
3 = nominal flow rate 3 l/min

Element type
TM = Trimicron

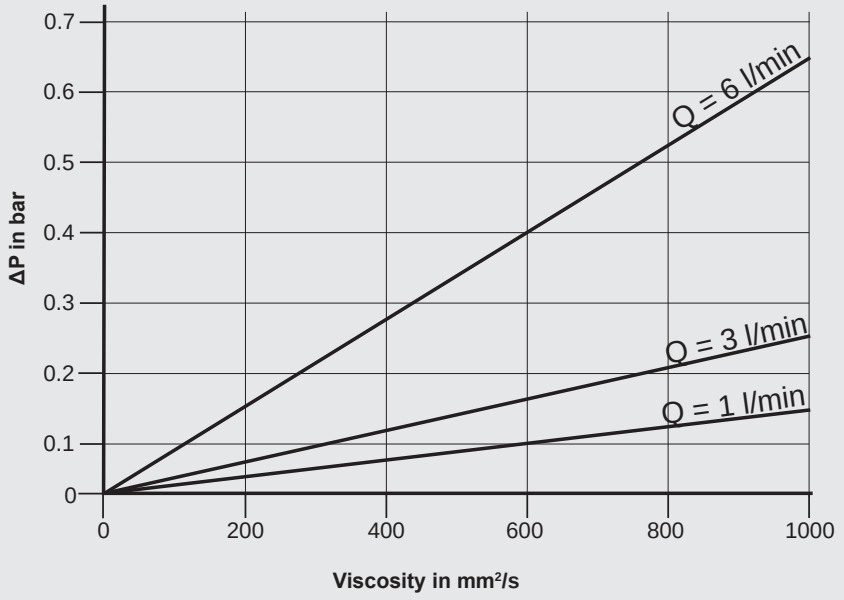
Filtration rating
003 = 3 µm

Seal material
N = NBR
F = FKM (FPM, Viton®)

N1TM element differential pressure



N3TM element differential pressure



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EN 79.000.5/06.18

Wombat Filter Element WB

Description

The Wombat element is a pleated filter element designed for flow from the inside to the outside and for high contamination retention capacity with high filtration efficiency.

The Wombat element can be installed in bag filter housings and can replace the existing filter bag. An adapter kit must be used when installing the Wombat filter. This only needs to be installed once and consists of a retainer basket and seal. Bar magnets are available as an optional extra for filtering magnetic particles.

Applications

- Filtration of washing and machining fluids
- Pre-filtration of fluids in hydraulic and lubrication systems
- As a working and protective filter in cleaning systems (washing bays)
- As a protective filter in machine tools

Advantages over filter bags

- Very high fluid cleanliness
- Longer service life
- Greater contamination retention capacity
- Lower pressure drop (up to 30%)
- Robust element design
- High temperature stability
- Conical design for faster element change

Technical specifications

General specifications	
Max. differential pressure	2.5 bar
Filtration rating	1 - 135 µm
Degree of separation	> 99.8%
Filter material	Polyester (PES)
Cap material	Polypropylene (PP)
Max. temperature	70°C

Model code

N 200 WB 005 - PES F

Element size
100 = for filters size 1
200 = for filters size 2

Element type
WB = Wombat

Filtration rating
001 = 1 µm
003 = 3 µm
005 = 5 µm
010 = 10 µm
020 = 20 µm
030 = 30 µm
040 = 40 µm
A, B, C, D, E = special models (see table below for filtration efficiency)

Filter material
PES = Polyester

Seal material
N = NBR
F = FKM (FPM, Viton®)

Filtration efficiency for special models A - E:

Separation efficiency for given particle size (µm)

Model	>99.8%	99%	95%	80%
A	60	40	30	25
B	70	50	40	30
C	85	65	50	40
D	105	85	70	60
E	135	110	95	85

R (Resistance) factors

for water-based media

R factors		N 100	N 200
Filtration rating	1 µm	0.20	0.12
	3 µm	0.18	0.10
	5 µm	0.14	0.08
	10 µm	0.13	0.07
	20 µm	0.13	0.07
	30 µm	0.11	0.06
	40 µm	0.10	0.05
	A	0.09	0.05
	B	0.08	0.04
	C	0.07	0.04
	D	0.06	0.03
	E	0.05	0.02

Sizing

The total pressure drop of the filter at a certain flow rate is the sum of the housing Δp and the element Δp. The housing pressure drop can be determined using the pressure drop curves. The pressure drop of the elements is calculated using the R factors.

The following calculation is based on clean filter elements.

$$\Delta p\ [mbar] = \frac{R \times V\ (mm^2/s) \times Q\ (l/min)}{n}$$

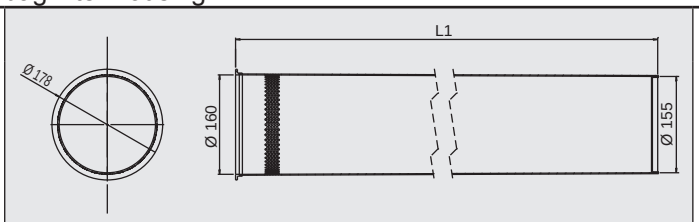
R = R factor
V = viscosity (mm²/s)
Q = flow rate (l/min)
n = no. of elements

Accessories

Adapter kits

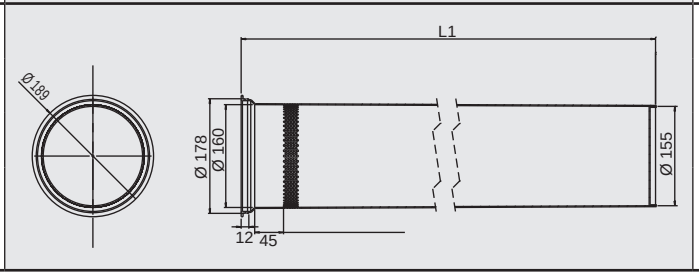
for installing the Wombat element in bag filter housing

Adapter Kit TL-100-F, Part No. 3674956
for e.g. Eaton Topline Housing Part 1
Adapter Kit TL-200-F, Part No. 3549057
for e.g. Eaton Topline Housing Size 2



	L1
Adapter Kit TL-100-F	302
Adapter Kit TL-200-F	710

Adapter Kit EL-100-F, Part No. 3683976
for e.g. Eaton Ecoline Housing Size 1
Adapter Kit EL-200-F, Part No. 3681844
for e.g. Eaton Ecoline Housing Size 2
Adapter Kit FL-100-F, Part No. 3691554
for e.g. Eaton Flowline Housing Size 1
Adapter Kit FL-200-F, Part No. 3691595
for e.g. Eaton Flowline Housing Size 2



	L1
Adapter Kit EL-100-F	317
Adapter Kit EL-200-F	720
Adapter Kit FL-100-F	317
Adapter Kit FL-200-F	720

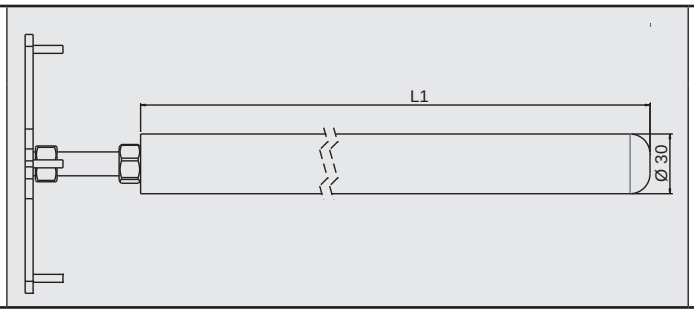
Others on request

Bar magnet insert

for filtering magnetic particles from fluid

Bar Magnet Insert N100
Part No. 3633896
for Wombat element N100

Bar Magnet Insert N200
Part No. 3601237
for Wombat element N200



	L1
Bar magnet insert N100	196
Bar magnet insert N200	540

Separation Element for Bar Magnet
Part No. 3639116

Note

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HYDAC INTERNATIONAL

Conditioning Module Reservoir Extraction
CM-RE

Description

The ConditioningModule Reservoir Extraction CM-RE is designed as an accessory to the CS ContaminationSensors and the FCU FluidControl Units. The CM-RE is a self-priming motor-pump unit which makes it possible for the CS/FCU to measure oil cleanliness in unpressurised reservoirs, tanks or leakage lines.

The oil being analyzed is drawn through the suction strainer at the inlet port (IN). The gear pump supplies the oil at a maximum pressure of 60 bar (870 psi) to the pressure port so that it can be analyzed by the CS / FCU

The pressure relief valve relieves any positive pressure via connection (T) as leakage oil.

For modules with a pump with increased inlet pressure (CM-RE-2 ...), internal leakage oil is drained from the pump via the separate LEAKAGE connection.

Applications

- Hydraulic and lubrication systems

Advantages

- Motor-pump unit to supply CS/FCU
- Optimal flow rate for carrying out measurements

Technical specifications

General data			
Fluid temperature	0 ... 70 °C (32 ... 158 °F)		
Ambient temperature	0 ... 40 °C (32 ... 104 °F)		
Relative humidity	max. 90%, non-condensing		
Hydraulic data	**CM-RE-1-x-x**	**CM-RE-2-x-x**	**CM-RE-4-x-x**
Permitted pressure at inlet (IN)	- 0.4 bar ... 0.5 bar	- 0.4 bar ... 120 bar	- 0.4 bar ... 80 bar
Max. pressure at outlet (P)	30 bar* / 60 bar*	30 bar* / 60 bar*	30 bar* / 40 bar*
Pump type	Gear pump	Gear pump	Gear pump, magnetic drive
Max. suction height	500 mm	500 mm	500 mm
Sealing material	NBR / FKM*	NBR / FKM*	NBR / FKM*
Inlet (IN)	G ¼“	G ¼“	G ¼
Outlet (P)	G ¼“	G ¼“	G ¼
Outlet (T)	G ¼“	G ¼“	G ¼
Leakage oil (LEAKAGE)	–	G ¼“	–

*) Depending on model

Electrical data CM-RE-x-x-W/N/X60/O60		
Voltage (delta circuit)	230 V, **50 Hz**, 3 Ph	265 V, **60 Hz**, 3 Ph
Voltage (star circuit)	400 V, **50 Hz**, 3 Ph	460 V, **60 Hz**, 3 Ph
Current consumption	1.23 A (⅄) / 0.71 A (Δ)	1.18 A (⅄) / 0.68 A (Δ)
Nominal power	0.18 kW	0.21 kW
Duty cycle	100%	100%
Speed	1425 rpm	1710 rpm
IP class	IP55	IP55
Insulation class	F	F
Viscosity range		
CM-RE-1	10 ... 3000 mm²/s	10 ... 3000 mm²/s
CM-RE-2	10 ... 3000 mm²/s	10 ... 3000 mm²/s
CM-RE-4	10 ... 1000 mm²/s	10 ... 1000 mm²/s
Total flow		
CM-RE-1	90 ml/min	110 ml/min
CM-RE-2	180 ml/min	220 ml/min
CM-RE-4	200 ml/min	240 ml/min
Weight	≈ 8.5 kg	≈ 8.5 kg
Electrical data CM-RE-x-x-N/AB/N60/AB60		
Voltage (delta circuit)	400 V, **50 Hz**, 3 Ph	400 V, **60 Hz**, 3 Ph
Voltage (star circuit)	690 V, **50 Hz**, 3 Ph	690 V, **60 Hz**, 3 Ph
Current consumption	0.71 A (⅄) / 0.41 A (Δ)	0.57 A (⅄) / 0.33 A (Δ)
Nominal power	0.18 kW	0.18 kW
Duty cycle	100%	100%
Speed	1425 rpm	1755 rpm
IP class	IP55	IP55
Insulation class	F	F
Viscosity range		
CM-RE-1	10 ... 3000 mm²/s	10 ... 3000 mm²/s
CM-RE-2	10 ... 3000 mm²/s	10 ... 3000 mm²/s
CM-RE-4	10 ... 1000 mm²/s	10 ... 1000 mm²/s
Total flow		
CM-RE-1	90 ml/min	110 ml/min
CM-RE-2	180 ml/min	220 ml/min
CM-RE-4	200 ml/min	240 ml/min
Weight	≈ 8.5 kg	≈ 8.5 kg
Electrical data CM-RE-x-x-U		
Voltage	max. 24 V DC	
Current consumption	2.5 A (S1); max. 3.0 A (S4)	
Nominal power	32 W	
Duty cycle	100% (max. 2.5 A)	
Speed	depending on voltage max. 3700 rpm	
IP class	IP20	
Insulation class	E	
Viscosity range	10 ... 350 mm²/s (S4)	
Total flow	CM-RE-1 ≈ 220 ml/min CM-RE-2 ≈ 440 ml/min (at max. voltage/rpm)	
Weight	≈ 2.4 kg	
Electrical data CM-RE-x-x-U170		
Voltage	24 V DC	
Current consumption	max. 20 A	
Nominal power	170 W	
Duty cycle	100% (max. 5A)	
Speed	depending on voltage max. 4200 rpm	
IP class	IP44	
Insulation class	B	
Viscosity range	10 ... 1000 mm²/s	
Total flow	CM-RE-1 ≈ 250 ml/min CM-RE-2 ≈ 500 ml/min (at max. voltage/rpm)	
Weight	≈ 3.9 kg	

EN 7.612.3/01.16
298 | HYDAC

Model code

CM - RE - 1 - 0 - W/N/X60/O60 - Z

Model
CM = Conditioning Module

Type
RE = Reservoir Extraction

Pump
1 = gear pump, standard
2 = gear pump, with increased inlet pressure, with separate leakage line
4 = gear pump, magnetic drive, with increased inlet pressure, without separate leakage line

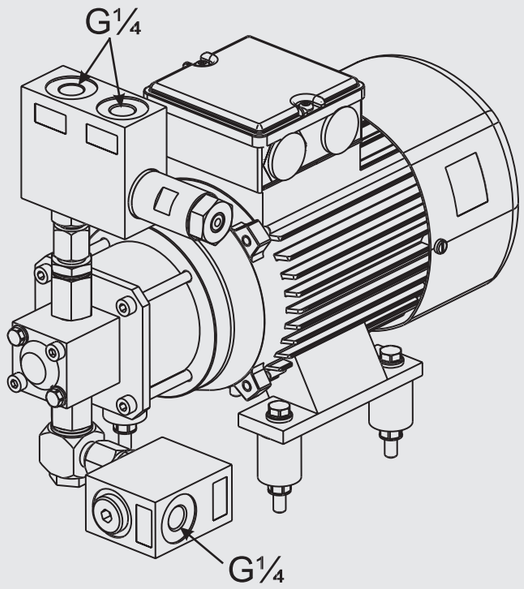
Pump protection
0 = Pump protection 30 bar
1 = Pump protection 60 bar (only for CS 1000, only pump 1 and 2)
2 = Pump protection 40 bar (only for CS 1000, only pump 4)

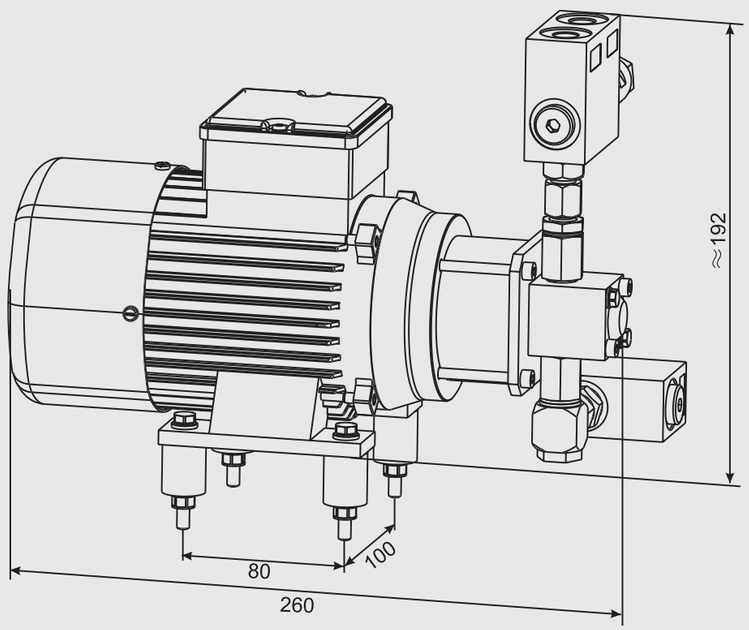
Supply voltage**
W/N/X60/O60 = 230 V, 50 Hz, 3Ph / 265 V, 60 Hz, 3Ph, delta circuit
400 V, 50 Hz, 3Ph / 460 V, 60 Hz, 3Ph, star circuit
N/AB/N60/AB60 = 400 V, 50 Hz, 3Ph / 400 V, 60 Hz, 3Ph, delta circuit
690 V, 50 Hz, 3Ph / 690 V, 60 Hz, 3Ph, star circuit
U = 24 V DC, 32 W
U170 = 24 V DC, 170 W
] only pump 1 and 2

**Other voltages on request

Modification
O = with adjustable throttle valve to adjust pressure supplied to particle counter, pressure gauge and connection hose for pressure gauge
Z = without accessories
V = Viton version (FKM)

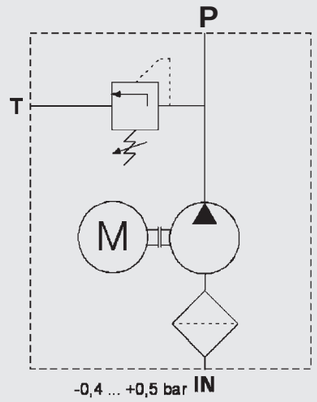
Dimensions (3-phase model)



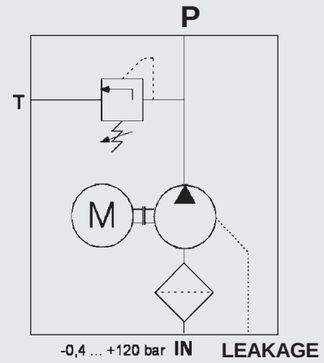


Hydraulic circuit diagram

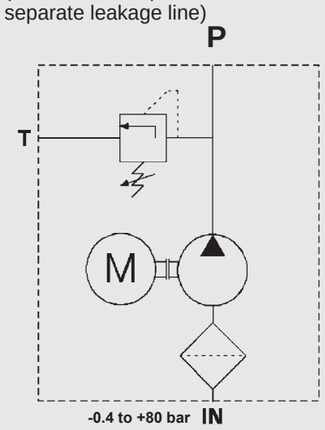
CM-RE-1...



CM-RE-2...
(increased inlet pressure, with separate leakage line)

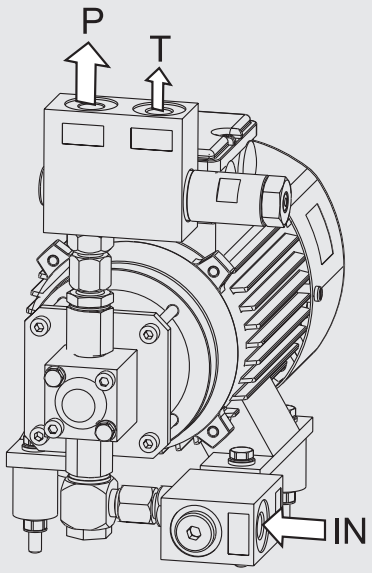


CM-RE-4...
(increased inlet pressure, without separate leakage line)

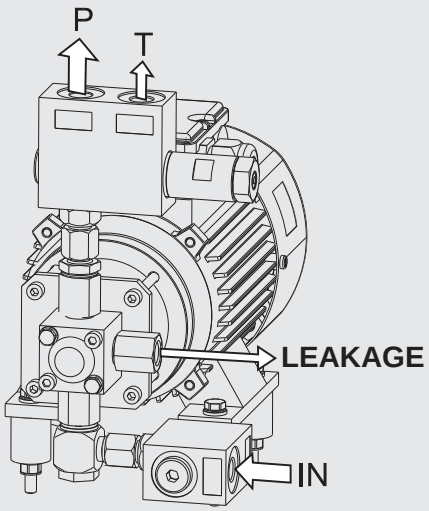


Hydraulic connection

CM-RE-1..., CM-RE-4...



CM-RE-2...



IN = suction connection
P = pressure connection
T = unpressurized return line
LEAKAGE = leakage / unpressurized return line

(3-phase model only is shown. The connections of the DC model have the same configuration.)

Notes on pipes and hoses

In order to keep the pressure drop as low as possible, use as few threaded connections as possible.

The pressure drop in a hydraulic line depends on:

- Flow rate
- Kinematic viscosity
- Pipe dimensions
- Density of medium

The pressure drop for hydraulic oils can be estimated as follows:

$$\Delta p\ [bar] \approx 6.8 \times \frac{L}{d^4} \times Q \times \upsilon \times \rho$$

This applies to straight pipe runs and hydraulic oils. Additional threaded connections and pipe bends increase the pressure differential.

Ensure that the difference in height between the unit and the oil level is as small as possible.

Hoses must be suitable for suction pressures of at least –0.5 bar.

Constrictions in connecting pipes must be avoided because they reduce capacity and increase the risk of cavitation.

The nominal bore of the connecting hoses/pipes must be at least as large as the inlet port sizes.

Note:

The maximum pressure across the IN suction port must be:

- for CM-RE-1 … = -0.4 bar ... 0.5 bar
- for CM-RE-2 … = -0.4 bar ... 120 bar
- for CM-RE-4 … = -0.4 bar ... 80 bar

Note

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Subject to technical modifications.

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Reservoir Extraction Unit REU

Description

The ReservoirExtraction Unit REU is supplied as an accessory to the FluidControl Units. The REU is a self-priming motor-pump unit which makes it possible for the FCU to measure oil cleanliness even in depressurized reservoirs, tanks or leakage oil lines.

The oil being analysed is drawn through the suction strainer at inlet port (S). The gear pump supplies the oil at a maximum pressure of 20 bar (290 psi) to the pressure port (P) so that it can be analysed by the FCU.

The pressure relief valve relieves any positive pressure via connection (R) as leakage oil.

Applications

- Hydraulic and lubrication systems

Advantages

- Motor-pump unit to supply FCU 2000 and FCU 8000.
- Portable unit for service work.
- Can be used even with highly viscous fluids.
- Continuous operation possible.

Technical details

Suction port connection	Male coupling for supplied suction hose DN 7
Pressure port connection	Minimess coupling type 1620
Viscosity range	20 to 1000 mm²/s
Max. suction height	500 mm
Max. operating pressure	20 bar
Flow rate	≈ 0.5 l/min at 100 mm²/s
Fluid temperature range	0 to + 70 °C
Ambient temperature	0 to + 40 °C
Seals	NBR
Weight	≈ 4.5 kg
Duty cycle	100%
IP class	IP 44

Model code

REU 14 3 0 - 1 - M

Type
REU = Reservoir Extraction Unit

Model
14 = Standard

Motor/pump
3 = Standard

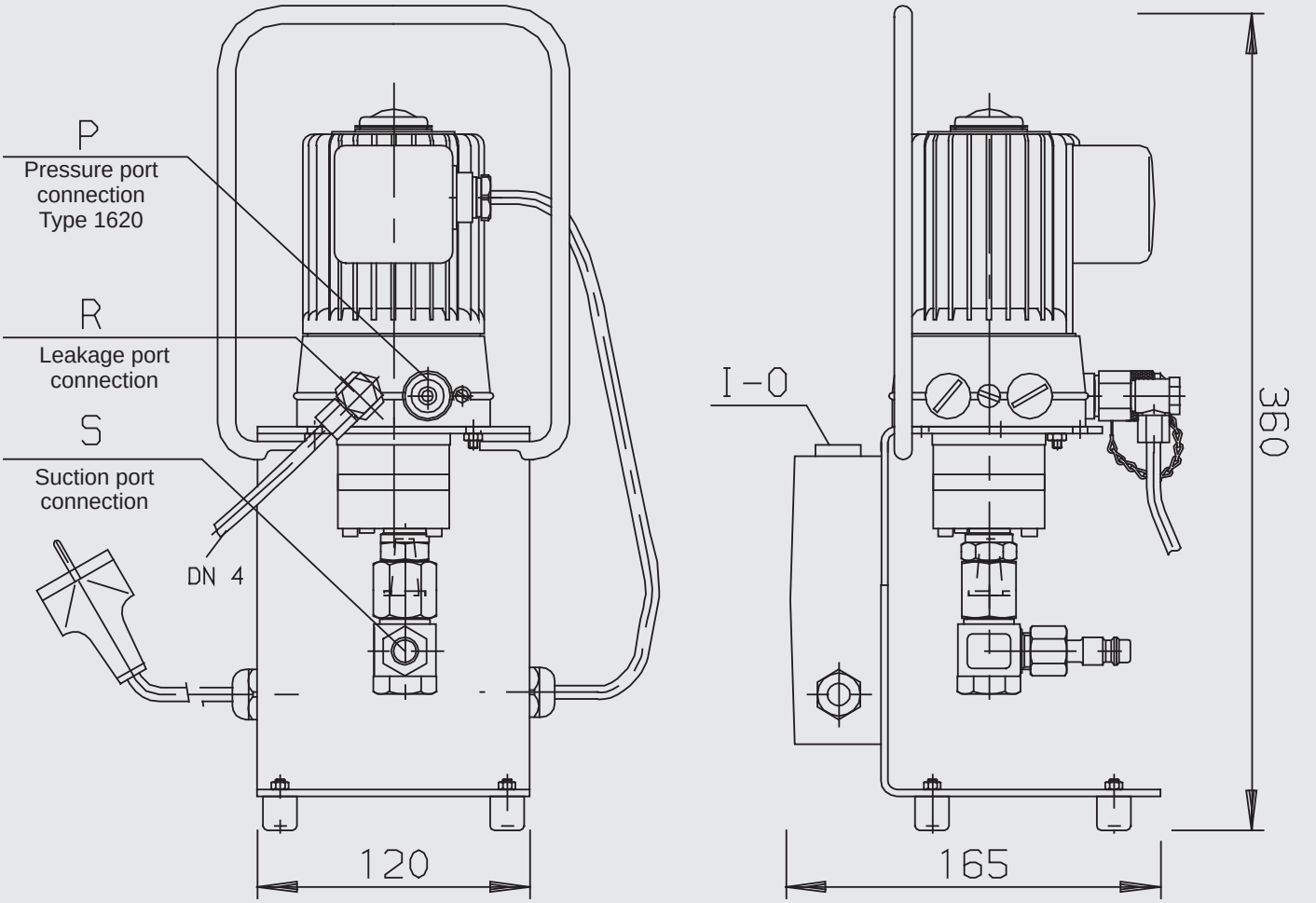
Fluids
0 = For standard mineral oils

Options
1 = Standard, without options

Power supply
K = 110 VAC / 60 Hz / 1 phase, USA/CDN
M = 230 VAC / 50 Hz / 1 phase, Europe

Scope of delivery
– REU
– Suction hose DN 7 (2m long)
– Operating Instructions

Dimensions



Note

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All technical details are subject to change.

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E-mail: filtersystems@hydac.com

Small Filtration Kit SFK

Description

The SmallFiltration Kit SFK is a small filter unit complete with motor-pump unit for the filtration of mineral oil-based fluids.

With a flow rate of 0.4 l/min and a inline filter type LF60, the SFK is designed for use in conjunction with particle counters in laboratories and workshops.

Mineral oils used as rinsing fluids for particle counters such as the ALPC or the FCU from HYDAC can be cleaned using the SFK.

Applications

- Laboratories
- Workshops

Advantages

- Complete kit incl. a 3 µm filter element and Tygothane hoses
- Plug & work
- Flow rate in suitable range

Technical Details

Max. suction height	1 m
Flow rate	0.4 l/min at 1,500 rpm (4.3 mm²/s, 10 bar)
Permitted viscosity range	1 to 350 mm²/s
Hydraulic connection (IN, OUT)	Hose nipple
Seal material	NBR
Fluid temperature range	0 to +70 °C / +32 to +158 °F
Ambient temperature range	-20 to +70 °C / -4 to +158 °F
Storage temperature range	-40 to +80 °C / -40 to +176 °F
Relative humidity	Max. 95%, non-condensing
Voltage supply	Depends on model code
Power consumption	180 W for type M
Weight	7.5 kg

Spare parts

Spare part part no.	Code
3494773	Replacement Tygothane hose 1m incl. connection clamp
1260901	Filter element 3 µm (0060 D 003 BN4HC)

Model code

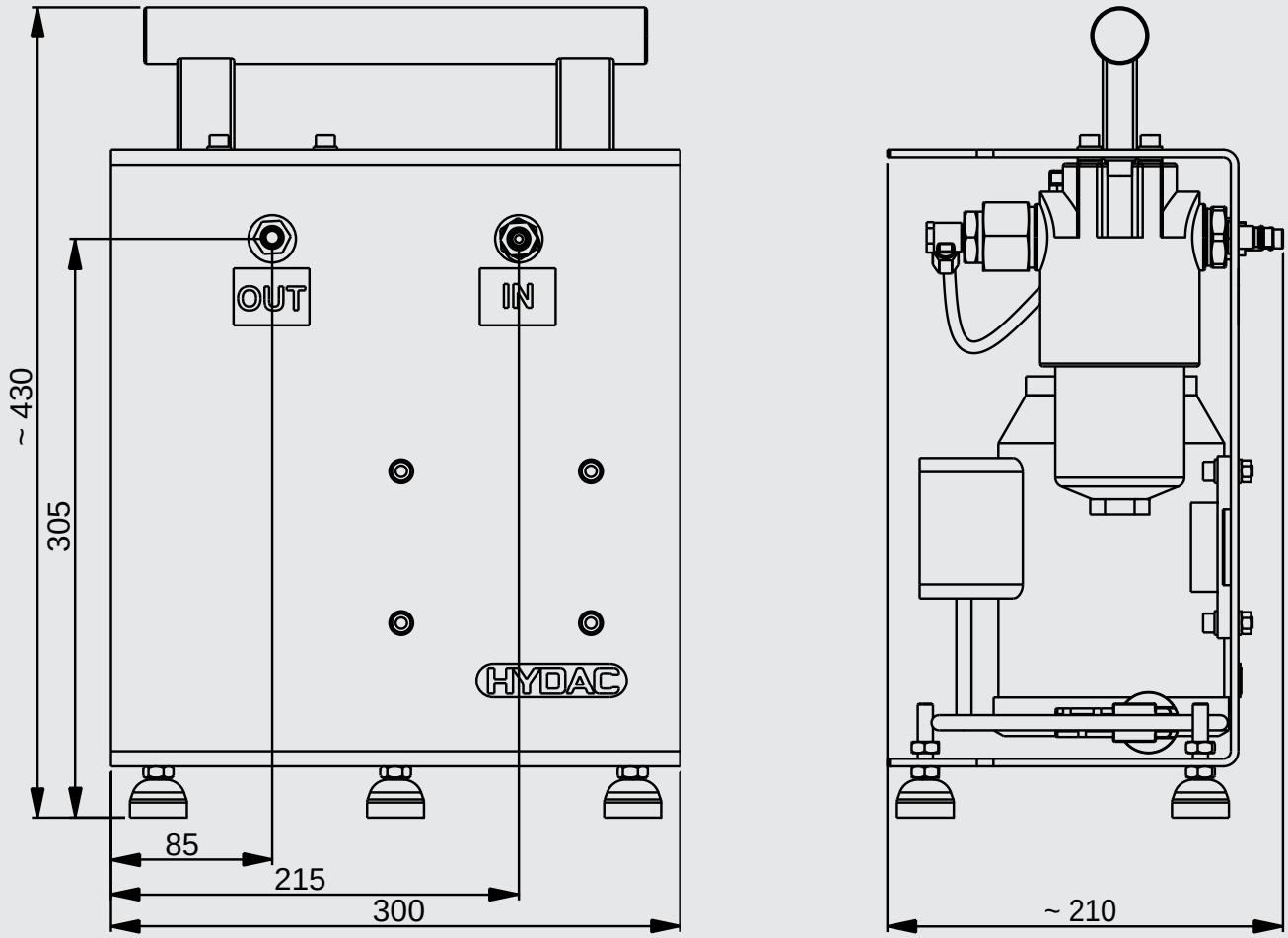
SFK 0 M

Type
SFK = SmallFiltration Kit

Media
O = based on mineral oil

Supply voltage
K = 110 V / 60 Hz
M = 230 V / 50 Hz

DIMENSIONS



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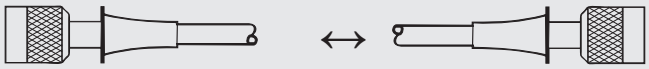
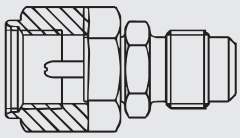
Hydraulic Accessories

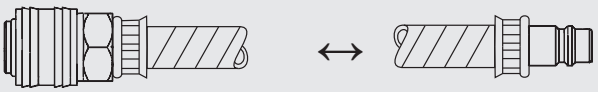
Test hose (high pressure)

			Length	Part No.
				
1604	DN4	1604	1 m	6015331
1604	DN4	1604	2 m	6001212
1604	DN4	1620	1 m	6052790
1604	DN4	1620	2 m	349150
1604	DN4	1620	5 m	1251557
1620	DN2	1620	1 m	632634
1620	DN2	1620	1.5 m	682858
1620	DN2	1620	2 m	682859

Adapter

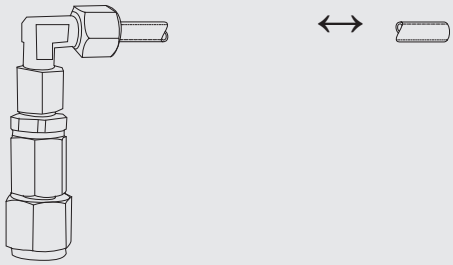
			Part No.
			
1615	↔	1620	629636
female		male	

Low pressure hose (suction/return line hose)

			Length		Part No.
					
Female coupling	DN7	Male coupling			
	DN7		0.6 m	PVC	1204401
	DN7		1 m	PVC	3300054
	DN7		2 m	PVC	349151
	DN7		5 m	PVC	1251558
	DN7		2 m	PA [1]	349434
	DN7		5 m	PUR	3348206

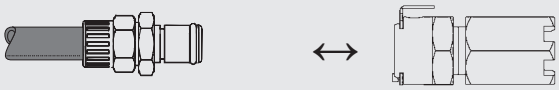
[1] only for HFD-R fluids

Suction hose



			Length	Part No.
1604	DN6	open end	0.3 m	3297276
1604	DN6	open end	0.6 m	3411391
1604	DN6	open end	1.5 m	3325744

			Length	Part No.
Female coupling	DN6	Male coupling	0.25 m	3068209
Female coupling	DN6	Male coupling	1.0 m	3036098

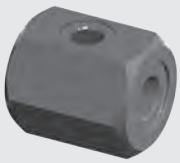


FCU 2000 Suction Strainer		(hose not supplied)	Part No.
Male coupling	DN6	Female coupling	3487290

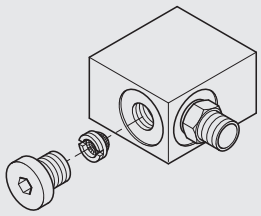
Pressure gauge kit

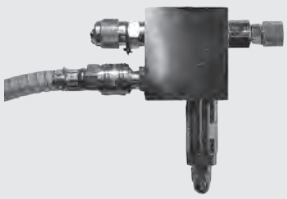
	Part No.
0 - 40 bar → 1604 / 1620	3491971
0 - 60 bar → 1604 / 1620	3491973
0 - 400 bar → 1604 / 1620	3491974

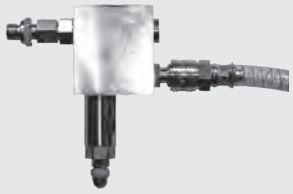
Mounting block for AS1000 / AS3000



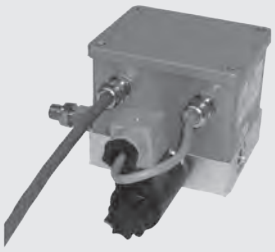
		Part No.
Mounting block for AS1000 / AS3000	up to max. 50 bar	3182134
IN: G 1/4" OUT: G 1/4"		

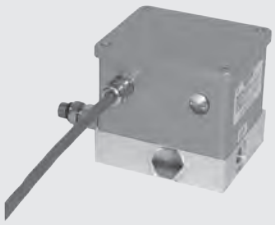
ConditioningModule Strainer [CM-S-1]			Part No.
	Application	Inlet of CSM, CM-RE, CS: protective filter 400 µm	3860591
	IN	G ¼ (female thread)	
	OUT	G ¼ (male thread; for screwing directly into the inlet of the CM-I)	
	Pressure range	Up to 120 bar	
	Setting range	not adjustable	
	Items supplied	CM-S-1	

ConditioningModule Inlet [CM-I]			Part No.
	Application	Inlet of CS: SRE1 valve reduces the flow from the main system to approx. 600 ml/min and the pressure fluctuations across the inlet of the CS are stabilized by opening the return line via the adjustable pressure relief valve	3226048
	IN	Minimess test connection 1604 (in port G ¼)	
	OUT	Threaded connection with male thread G ¼ for screwing directly into the inlet of the CS Return line: DN7 male connection (in port G ¼)	
	Pressure range	Up to 350 bar	
	Setting range	0 to 30 bar (DB4E)	
	Permitted viscosity range	1 to 1000 mm²/s	
	Connection	G ¼ for pressure gauge	
	Items supplied	CM-I, return line 2 m	

ConditioningModule Outlet [CM-O]			Part No.
	Application	Outlet of CS: suppresses air bubbles by pressurizing the test line and limits the flow when the CS is operated in bypass mode or with a separate pump (CM-RE)	3226051
	IN	Threaded connection with male thread G ¼ for screwing directly into the outlet of the CS	
	OUT	DN7 male connection (in port G ¼)	
	Pressure range	Up to 350 bar	
	Setting range	0 to 30 bar (DB4E) Recommendation: 5 to 10 bar (for hydraulic oils) 20 to 25 bar (for lubrication oils)	
	Permitted viscosity range	1 to 1000 mm²/s	
	Connection	G ¼ for pressure gauge	
	Items supplied	CM-O, return line 2 m	

ConditioningModules

ConditioningModule Flow Control [CM-FC]			Part No.
	Application	Outlet of CS 2000: contamination insensitive proportional control of the flow using separate flow rate sensor	3226053
	IN	Threaded connection with male thread G ¼ for screwing directly into the outlet of the CS	
	OUT	G ¼ connection (female thread)	
	Pressure range	Up to 40 bar	
	Setting range	not adjustable	
	Permitted viscosity range	10 to 1000 mm²/s	
	Note	Only available when ordering a CS 2xxx-1-U/-4-1 or /-6 and /-7. When using the CM-FC the analogue output / 4 to 20 mA is no longer available.	
	Items supplied	CM-FC, connection cable	

ConditioningModule Fluid Sensor [CM-FS]			Part No.
	Application	Outlet of CS 2000: separate flow meter	3264341
	IN	Threaded connection with male thread G ¼ for screwing directly into the outlet of the CS	
	OUT	G ¼ connection (female thread)	
	Pressure range	Up to 40 bar	
	Setting range	not adjustable	
	Permitted viscosity range	10 to 1000 mm²/s	
	Note	Available only when ordering a CS 2xxx.	
	Items supplied	CM-FS, connection cable	

ConditionModule Reservoir Extraction CM-RE

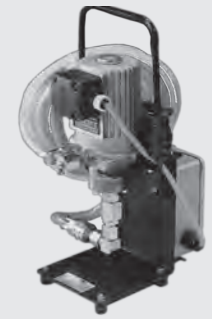
The ConditioningModule Reservoir Extraction CM-RE is designed as an accessory to the CS ContaminationSensors and the FCU FluidControl Units. The CM-RE is a self-priming motor-pump unit which makes it possible for the CS/FCU to measure oil cleanliness in unpressurised reservoirs, tanks or leakage lines.

The oil being analyzed is drawn through the suction strainer at the inlet port (IN). The gear pump supplies the oil at a maximum pressure of 60 bar (870 psi) to the pressure port (P) so that it can be analyzed by the CS / FCU

The pressure relief valve relieves any positive pressure via connection (T) as leakage oil.

For modules with a pump with increased inlet pressure (CM-RE-2 ...), internal leakage oil is drained from the pump via the separate LEAKAGE connection.

Reservoir Extraction Unit REU



The Reservoir Extraction Unit REU is supplied as an accessory to the FluidControl Units. The REU is a self-priming motor-pump unit which makes it possible for the FCU to measure oil cleanliness even in depressurised reservoirs, tanks or leakage oil lines.

The oil being analyzed is drawn through the suction strainer at the inlet port (IN). The gear pump supplies the oil at a maximum pressure of 20 bar (290 psi) to the pressure port (P) so that it can be analyzed by the FCU

The pressure relief valve relieves any positive pressure via connection (R) as leakage oil.

SmallFiltration Kit SFK

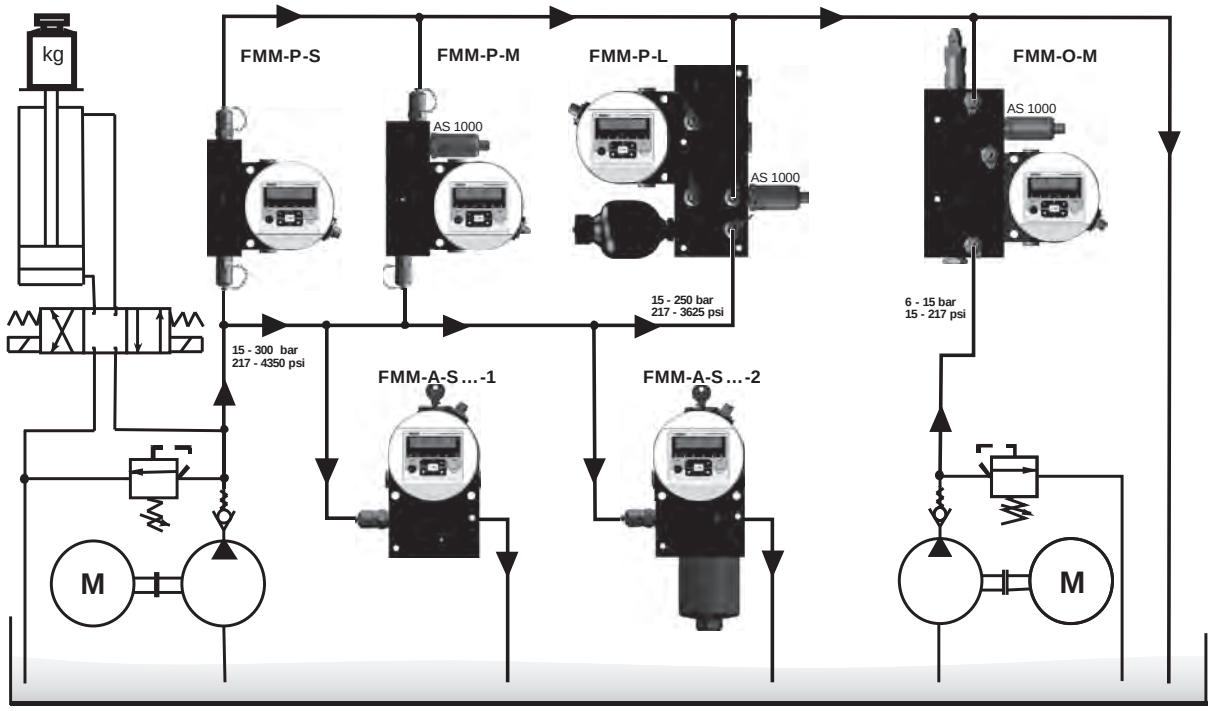
The SmallFiltration Kit SFK is a small filtration unit complete with motor-pump unit for filtering mineral oil-based fluids.

With a flow rate of 0.4 l/min and a inline filter type LF60, the SFK is designed for use in conjunction with particle counters in laboratories and workshops.

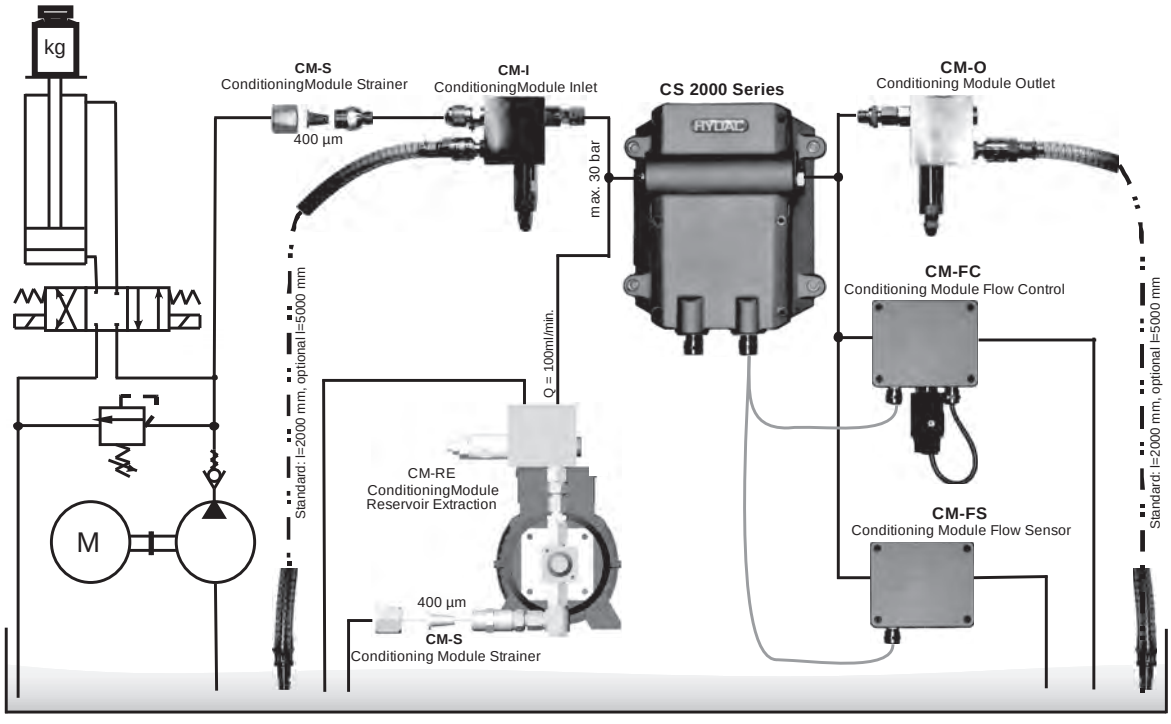
Mineral oils used as rinsing fluids for particle counters such as the ALPC or the FCU from HYDAC can be cleaned using the SFK.

Connection Examples Hydraulic Accessories

FluidMonitoring Modules for CS1000



ConditioningModules for CS2000

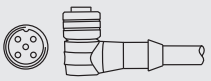
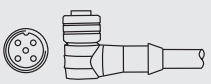
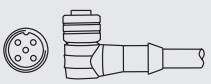
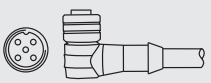


Electrical Accessories

Connector, female

			Part No.
5 	Female connector with screw terminal, 5-pole, M12x1, to DIN VDE 0627	–	6049128
5 	Female connector with screw terminal, with shielding, 5-pole, M12x1, to DIN VDE 0627	ZBE 08	6006786
8 	Female connector with screw terminal, 8-pole, M12x1, to DIN VDE 0627	ZBE 44	3281243
8 	Female connector with screw terminal, 8-pole, M12x1, to DIN VDE 0627	ZBE 0P	6055444

Connection cable, with shielding

Connector, female	↔	Cable with open end	Length		Part No.
8 	↔	 8 + shielding	2 m	ZBE42S-02	3281220
8 	↔	 8 + shielding	5 m	ZBE42S-10	3281239
8 	↔	 8 + shielding	10 m	ZBE42S-10	3449681
5 	↔	 5 + shielding	5 m	ZBE47S-05	3527626
5 	↔	 5 + shielding	10 m	ZBE47S-10	3527627
5 	↔	 5 + shielding	2 m	ZBE08S-02	6019455
5 	↔	 5 + shielding	5 m	ZBE08S-05	6019456
5 	↔	 5 + shielding	10 m	ZBE08S-10	6023102
5 	↔	 5 + shielding	30 m	ZBE08S-30	6035063

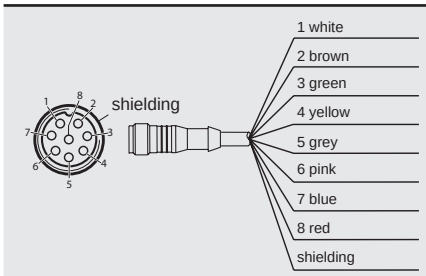
Connection cable, with shielding

Connector, male	↔	Cable with open end	Length		Part No.
8	↔	8 + shielding	2 m	ZBE48S-02	6072261
8	↔	8 + shielding	5 m	ZBE48S-05	6070712
8	↔	8 + shielding	10 m	ZBE48S-10	6072262

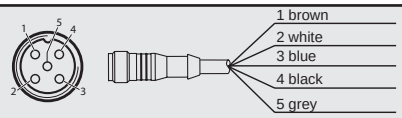
Connection cable

Connector, female	↔	Cable with open end	Length		Part No.
8	↔	8	2 m	ZBE 0P-02	6052697
5	↔	5	2 m	ZBE 08-02	6006792
5	↔	5	5 m	ZBE 08-05	6006791
5	↔	5	5 m	ZBE 47-05	3484562
5	↔	5	10 m	ZBE 47-10	3484564

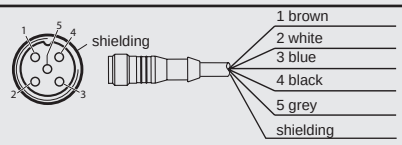
Cable coding



ZBE 42S
ZBE 48S



ZBE 08
ZBE 47



ZBE 08S
ZBE 47S

Connection / extension cable

Connector, female	↔	Connector, male	Length		Part No.
8	↔	8	5 m	ZBE 43-05	3281240
8	↔	8	10 m	ZBE 43-10	3519768
5	↔	5	2 m	ZBE 30-02	6040851
5	↔	5	3 m	ZBE 30-03	6053924
5	↔	5	5 m	ZBE 30-05	6040852
5	↔	5 + shielding	10 m	ZBE 30S-10	3729098

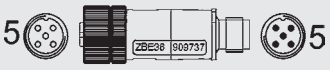
Connection cable – ETHERNET

Ethernet (industrial)	↔	RJ45	Length		Part No.
4*	↔	RJ45 Patch	5 m	ZBE 45-05	3346100
4*	↔	RJ45 Patch	10 m	ZBE 45-10	3346101

* For ETHERNET only (coding “D”: IEC 61076-2-101)

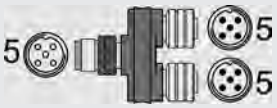
Adapter

For: AS 1000 / HYDACLab ↔ HMG

				Part No.
Connector, female		Connector, male	ZBE 36	909737

Y-Adapters

For: AS 1000 / HYDACLab ↔ HMG

				Part No.
Connector, female	 Colour: blue	Connector, male Connector, male	ZBE 26	3304374

For: HMG 500 / HMG 3000
to double the number of input sockets

				Part No.
Connector, male	 Colour: black	Connector, female Connector, female	ZBE 38	3224436

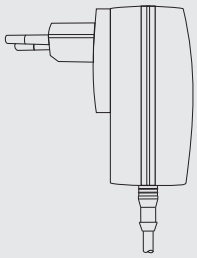
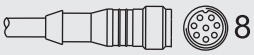
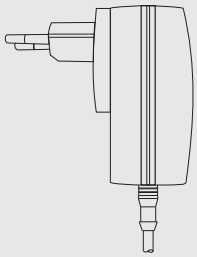
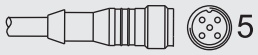
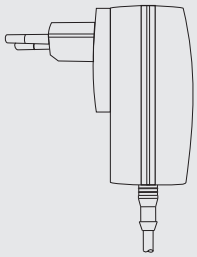
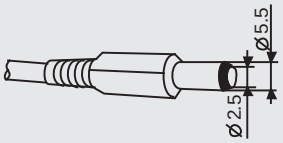
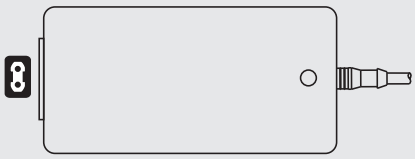
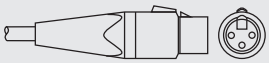
For: CS 1000 <-> CSI / HMG

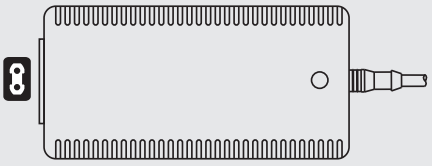
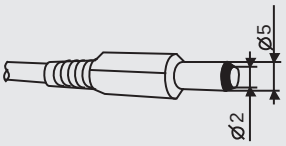
				Part No.
Connector, female	 Colour: yellow	Connector, male Connector, male	ZBE 41	910000

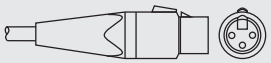
Dust cap

		Part No.
	Cover for M12 connections (nickel-plated)	6079195

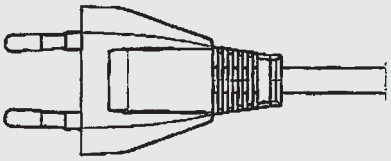
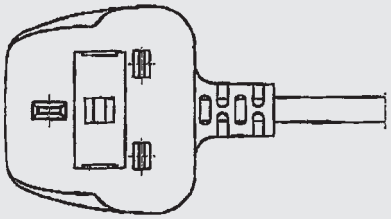
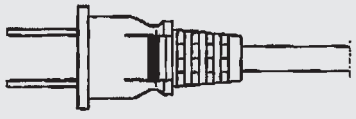
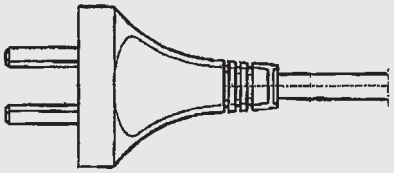
Power supply

Power supply	↔	Connector, female	Length		Part No.
100 – 240 V AC, 50-60 Hz  Protection class: IP40 Example: CS 1000	↔	15 V DC, 800 mA 	1.8 m	PS1	3376530
100 – 240 V AC, 50-60 Hz  Protection class: IP40 Example: SMU 1000 series	↔	24 V DC, 1000 mA 	1.8 m	PS5	3399939
100 – 240 V AC, 50-60 Hz  Protection class: IP40 Example: FAS / CSI-D-5	↔	12 V DC, 2000 mA 	1.8 m	PS7	6099121
100 – 240 V AC, 50-60 Hz  Without power cable Protection class: IP40 Example: FCU 1000 / ROCS 1000	↔	24 V DC, 5000 mA 	1.8 m	PS3	6059933

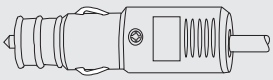
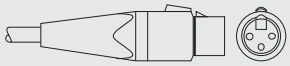
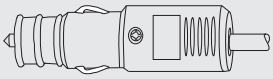
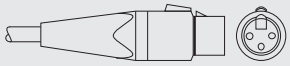
100 – 240 V AC, 50-60 Hz 	↔	24 V DC, 2200 mA 	1.8 m	PS4	3090803
Without power cable Protection class: IP40 Example: FCU 2000-x					

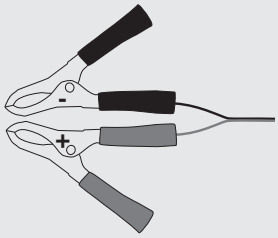
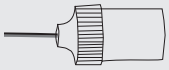
90 – 240 V AC, 47-63 Hz 	↔	12 V DC, 6600 mA 	1.6 m	PS6	6066586
Without power cable Protection class: IP40 Example: FCU 1000, Field Verification Kit					

Connecting cable for power supply (PS3 / PS4)

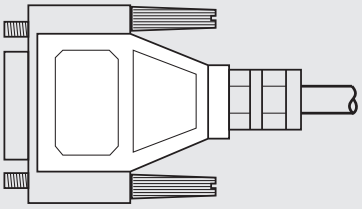
Connector, male	↔	Connector, female	Length		Part No.
 Europe – EN50075	↔		2 m	–	6008448
 United Kingdom	↔		2 m	–	6008447
 USA	↔		2 m	–	6008446
 Australia – A.S. 3112	↔		2 m	–	6008449

Power supply cable

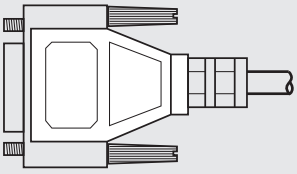
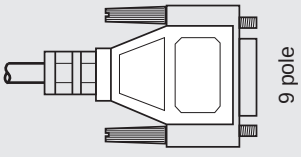
Connector, male	↔	Connector, female	Length		Part No.
max. 24 V DC  Example: FCU 1000	↔		10 m	–	3306236
max. 24 V DC  Example: FCU 1000	↔		1 m	–	3524138

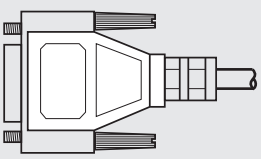
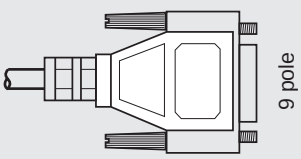
Battery clamps	↔	Connector, female	Length		Part No.
max. 24 V DC  Example: FCU 1000	↔	24 V DC 	0.35 m	–	6051653

Connection cable, parallel

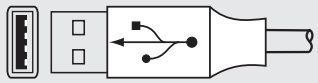
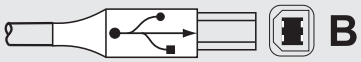
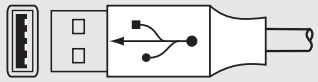
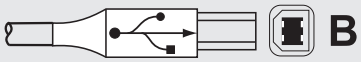
Connector, male	↔	Connector, female	Length		Part No.
25 pole  Example: FCU 2000 -> external printer	↔	CENTRONICS interface	3 m	–	349157

Connection cable - serial

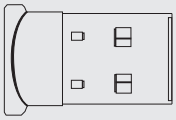
Connector, female	↔	Connector, female	Length		Part No.
15 pole  Example: FCU 2000 -> PC	↔	 9 pole	2 m	–	349204

Connector, female	↔	Connector, male	Length		Part No.
9 pole  Example: ConditionSensor interface <-> Adapter / PC (RS232 cable)	↔	 9 pole	1.8 m	–	629269

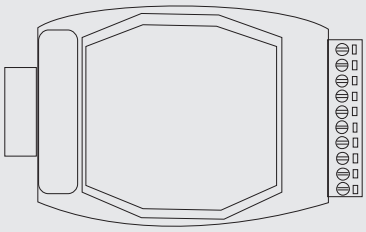
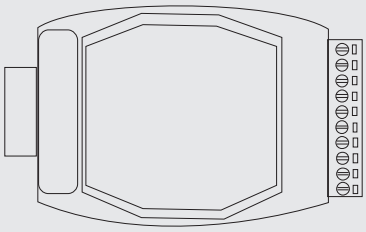
Connection cable - USB

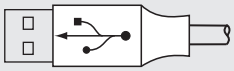
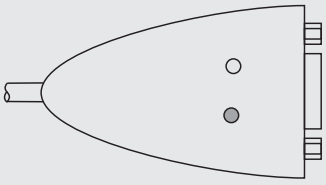
Connector, female	↔	Connector, female	Length	Part No.
A 	↔	 B	1.8 m –	6064126
A 	↔	 B	5 m –	6064127

Bluetooth adapter

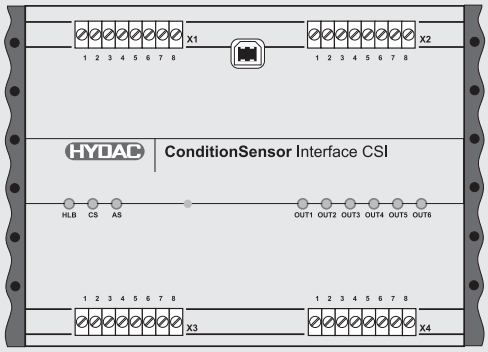
	↔		Part No.
Bluetooth 		USB (A)	6074886

Converter

Connector, female	↔	Terminal strip	Part No.
RS 232 		RS 485	6013281
USB (B) 		RS 485	6042337

Connector, female	↔	Connector, male	Part No.
USB (A) 	↔	RS 232 	6048267

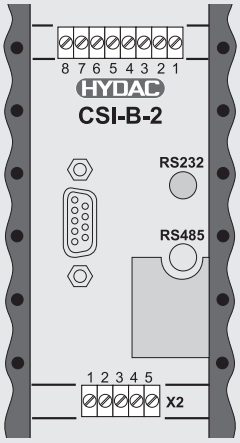
CSI-B-1



Protection class: IP40

3308212

CSI-B-2 Kit

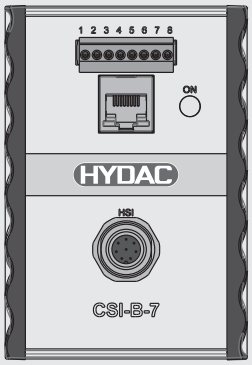


Protection class: IP40

consisting of:
- CSI-B-2
- 3 x connection cable ZBE08S-05
- Connection cable ZBE42S-05
- RS232 cable
- Y-Adapter ZBE41
- Converter RS232/USB
- FluMoS Light CD

3409462

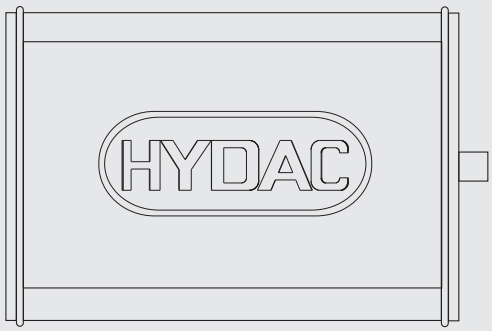
CSI-B-7



Protection class: IP40

3713134

CSI-D-5 KIT



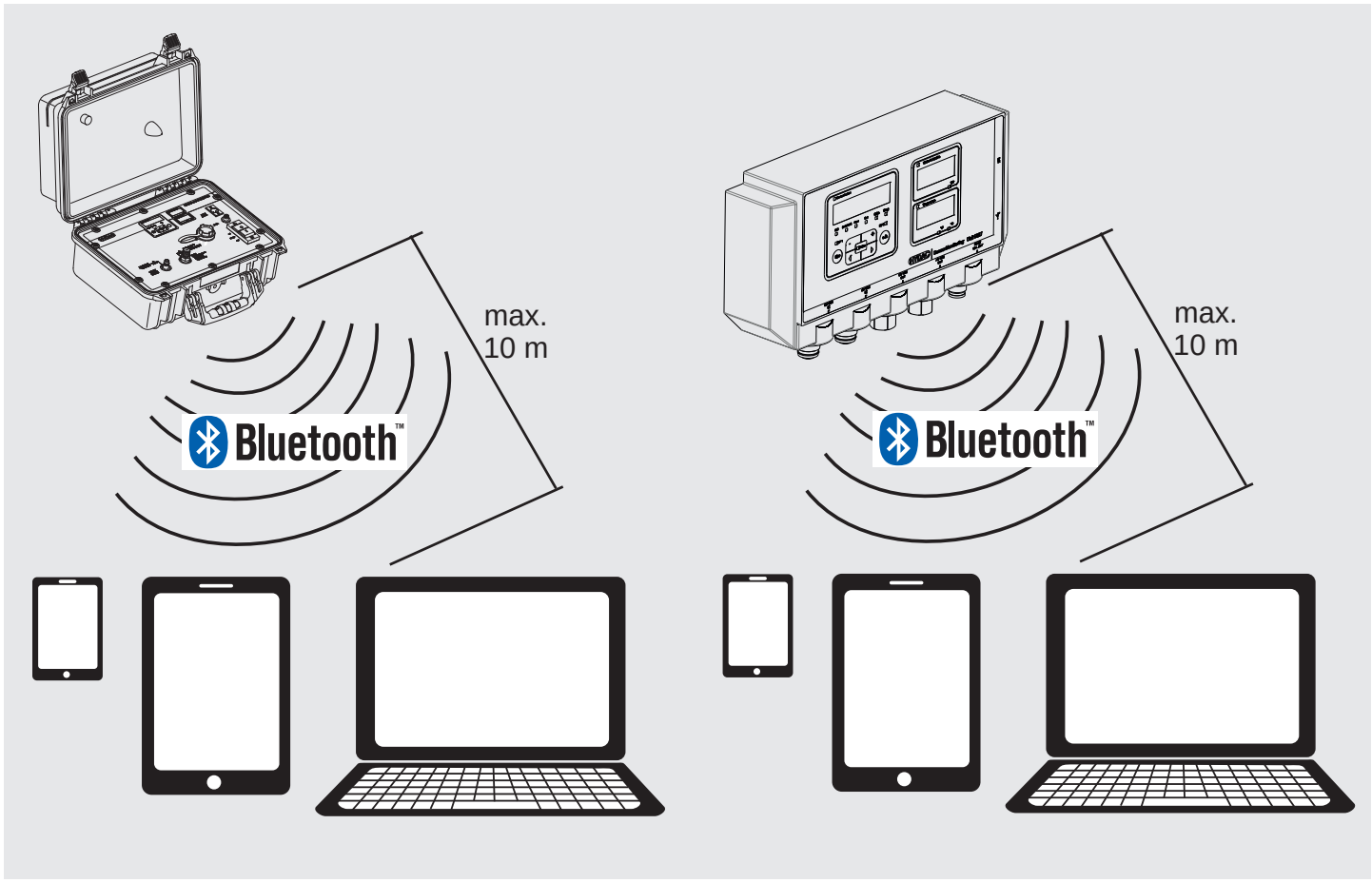
Protection class CSI-D-5: IP40

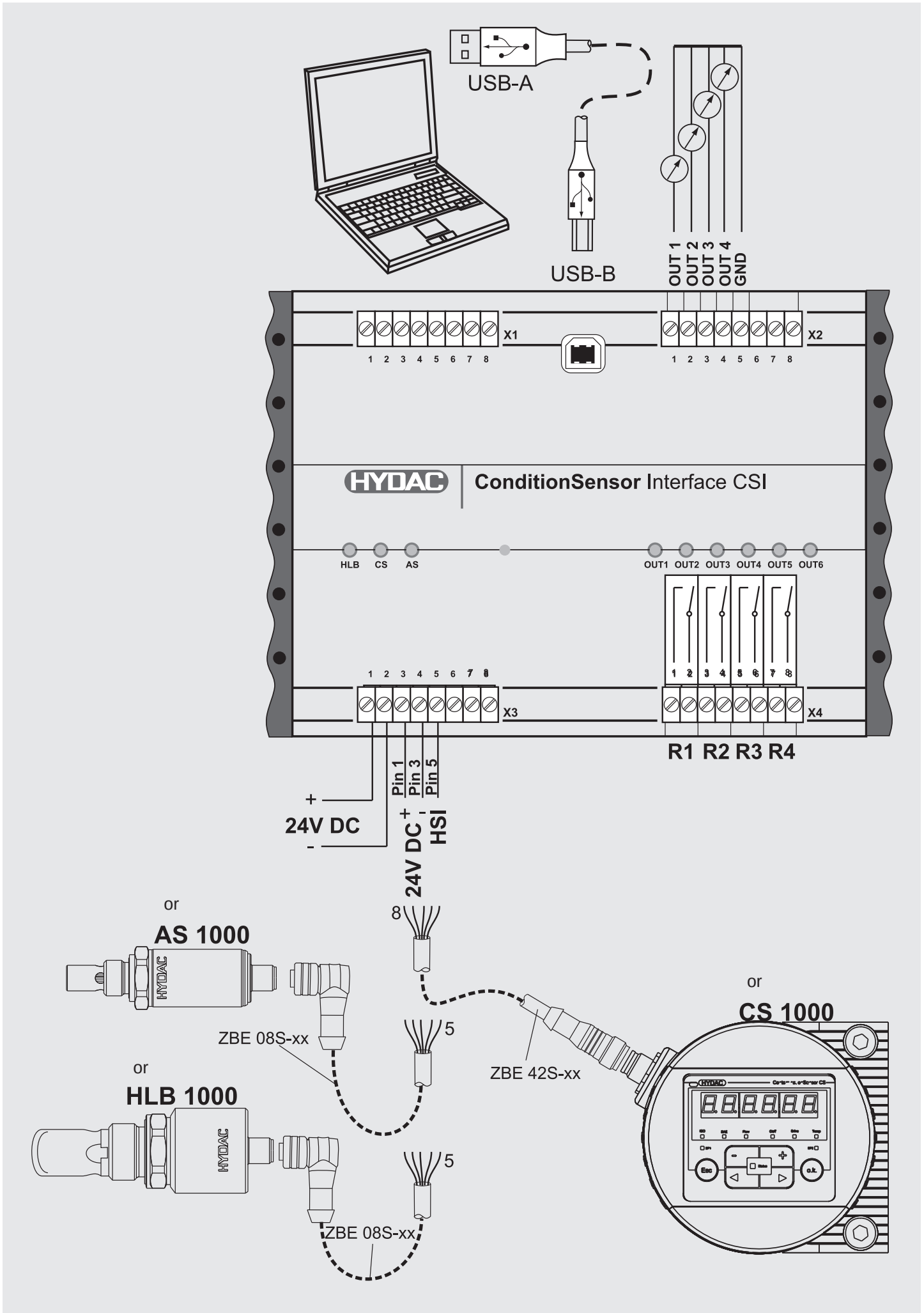
consisting of:
- CSI-D-5
- Power supply PS7
- USB cable, L=1.8m
- Connection cable ZBE43-05
- FluMoS Light CD

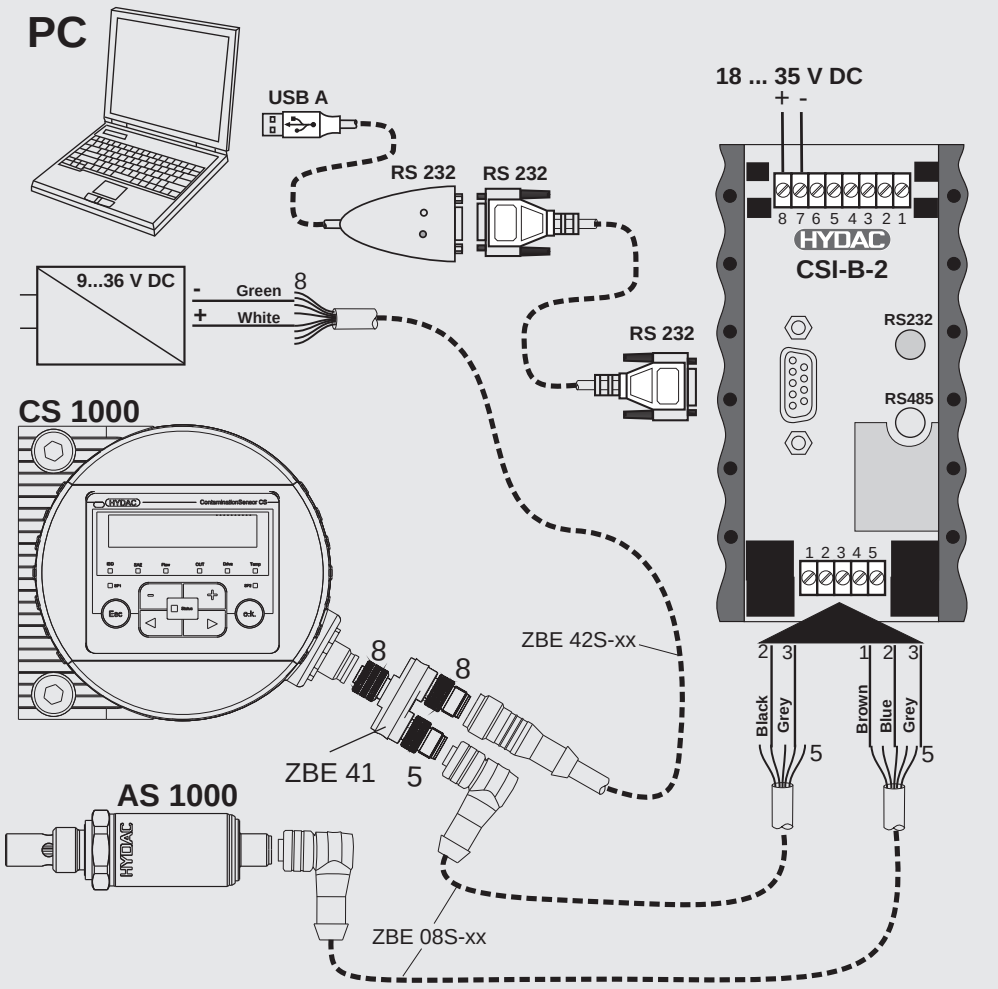
3249563

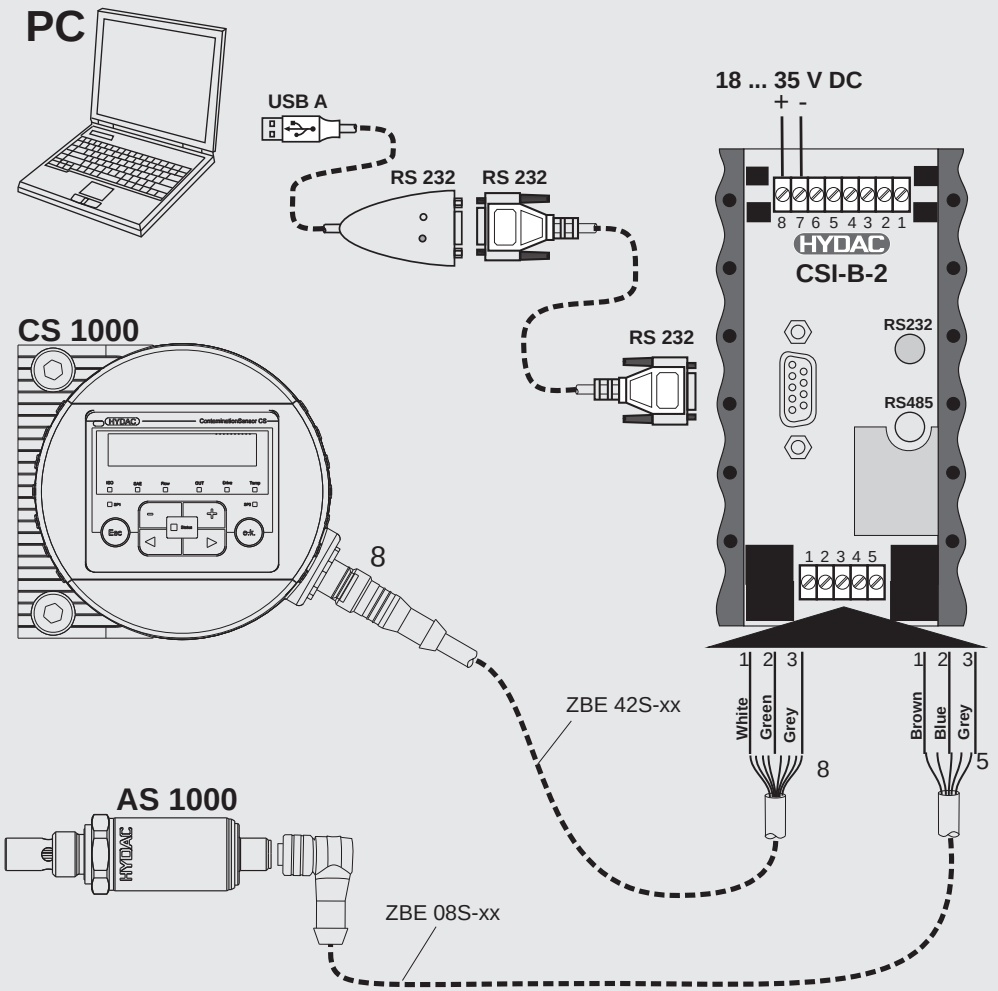
Connection Examples
Electrical Accessories

FCU1000 - Bluetooth / SMU12x1 - Bluetooth

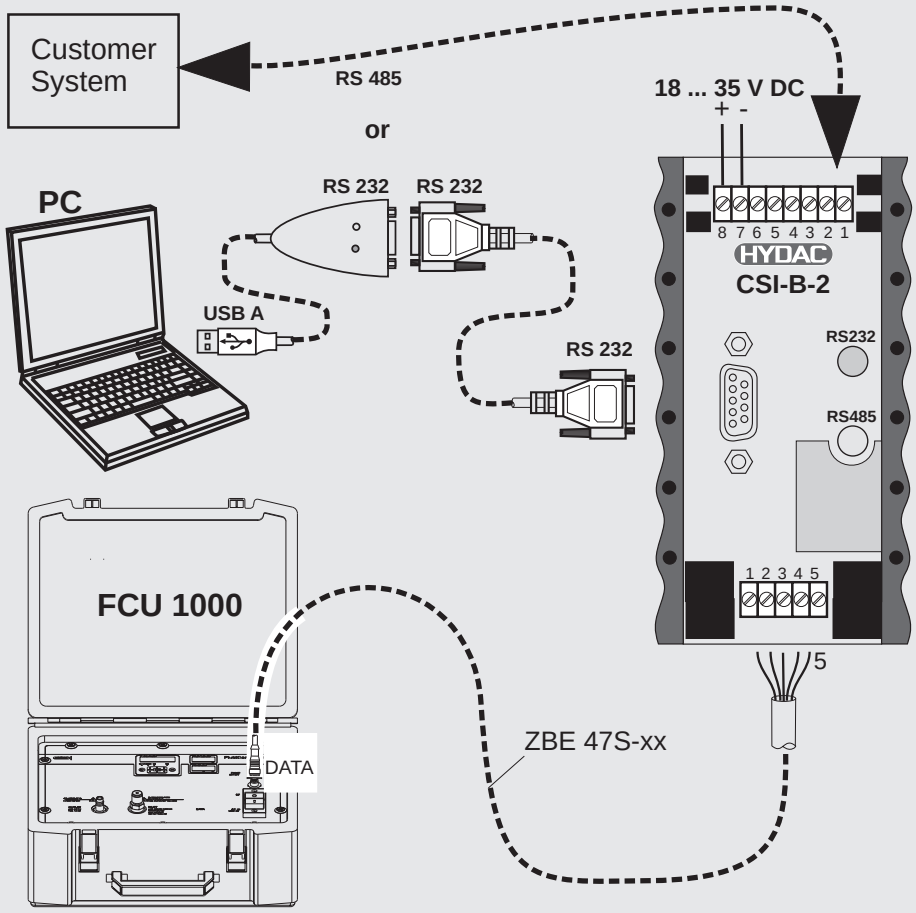



USB-A
USB-B
OUT 1
OUT 2
OUT 3
OUT 4
GND
X1
X2
1 2 3 4 5 6 7 8
HYDAC
ConditionSensor Interface CSI
HLB
CS
AS
OUT1 OUT2 OUT3 OUT4 OUT5 OUT6
X3
X4
R1 R2 R3 R4
+
24V DC
-
Pin 1
Pin 3
Pin 5
24V DC + -
HSI
or
AS 1000
8
ZBE 08S-xx
5
or
CS 1000
ZBE 42S-xx
or
HLB 1000
5
ZBE 08S-xx

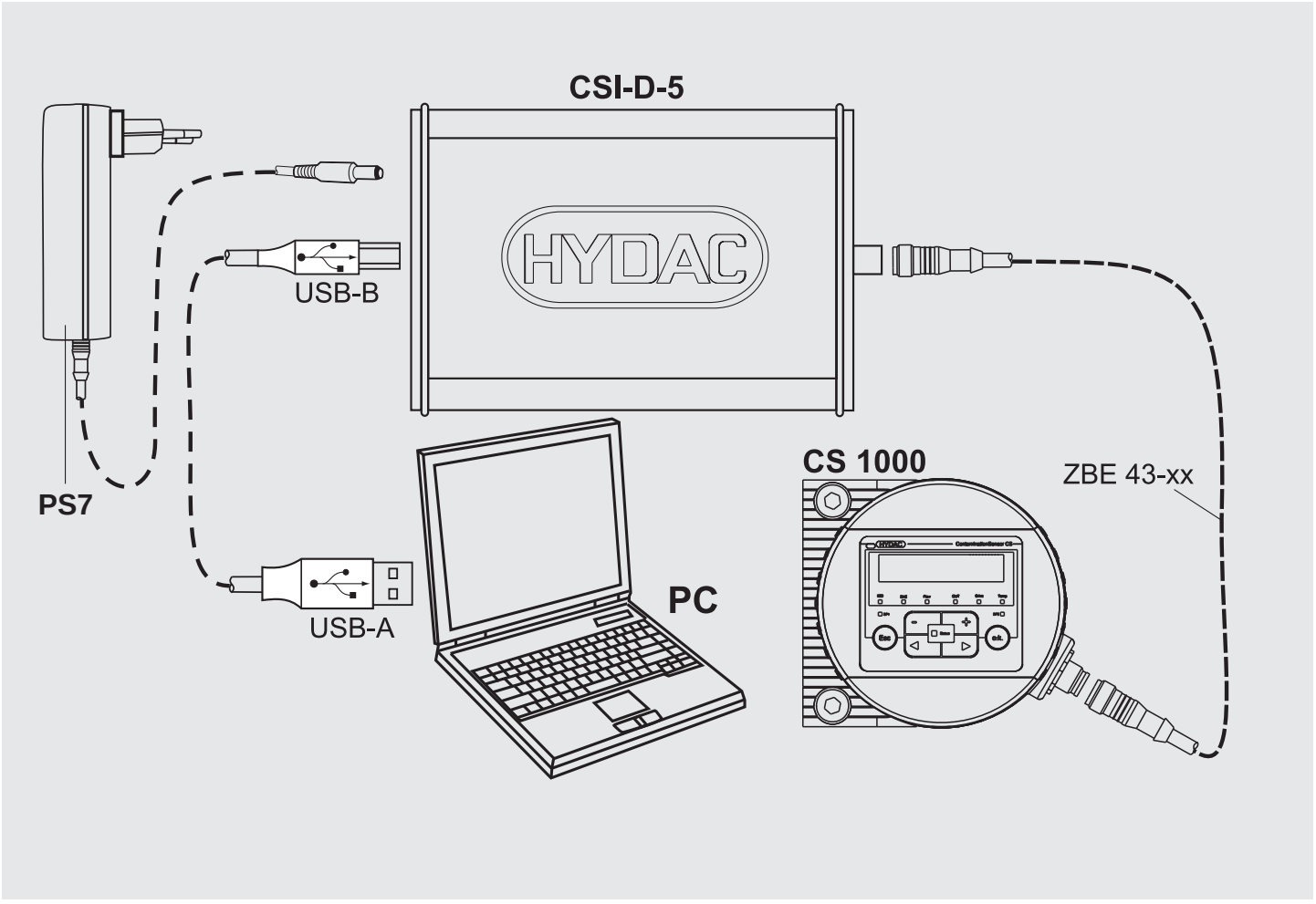

PC
USB A
RS 232
RS 232
18 ... 35 V DC
+ -
8 7 6 5 4 3 2 1
HYDAC
CSI-B-2
RS232
RS485
1 2 3 4 5
9...36 V DC
- Green
+ White
8
RS 232
CS 1000
ZBE 42S-xx
8
8
ZBE 41
5
2 3
Black
Grey
5
1 2 3
Brown
Blue
Grey
5
AS 1000
ZBE 08S-xx


PC
USB A
RS 232
RS 232
18 ... 35 V DC
+ -
8 7 6 5 4 3 2 1
HYDAC
CSI-B-2
RS232
RS485
1 2 3 4 5
RS 232
CS 1000
8
ZBE 42S-xx
1 2 3
White
Green
Grey
8
1 2 3
Brown
Blue
Grey
5
AS 1000
ZBE 08S-xx

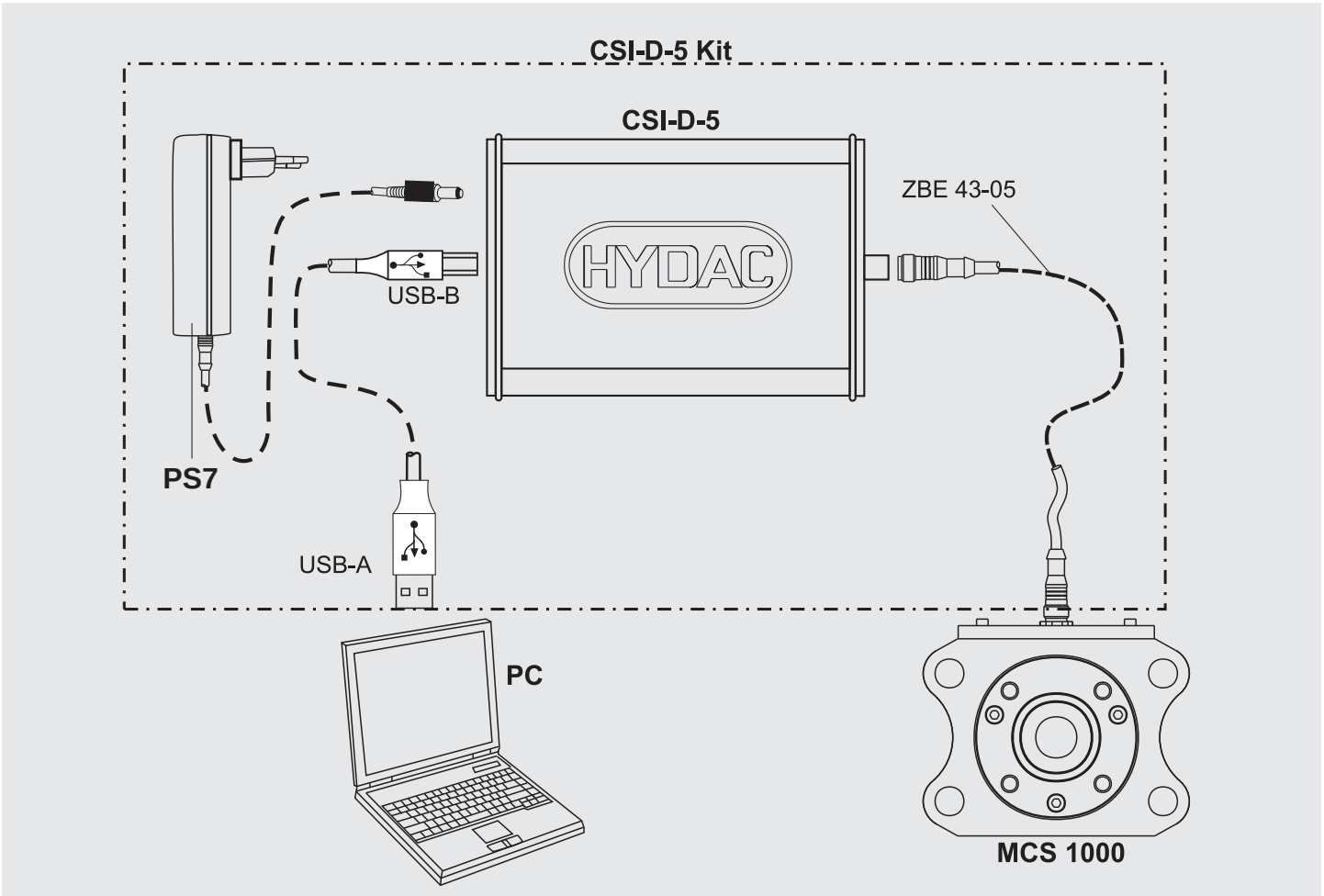
CSI-B-2 - CS1000 / AS1000 / FCU1000 with RS232



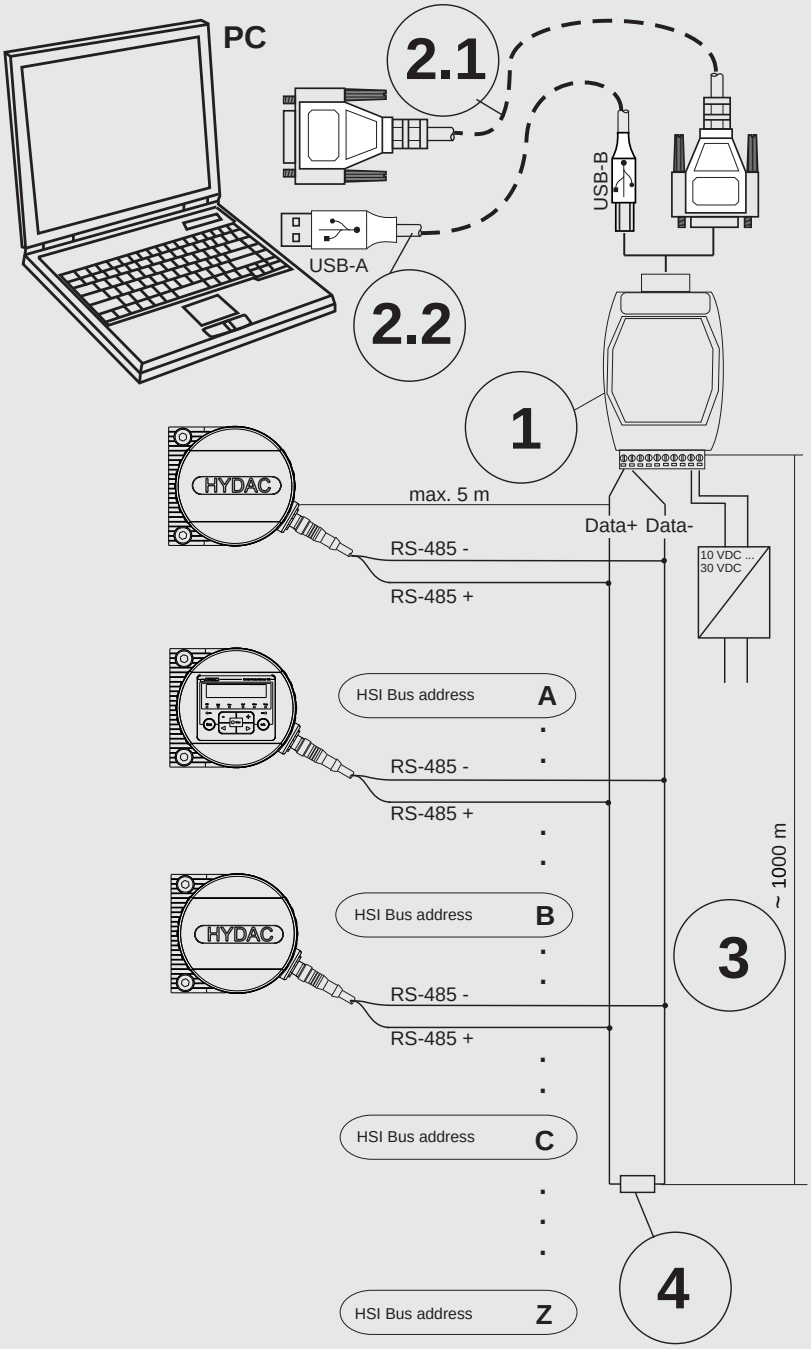
CSI-D-5 Kit - CS1000



CSI-D-5 Kit - MCS1000

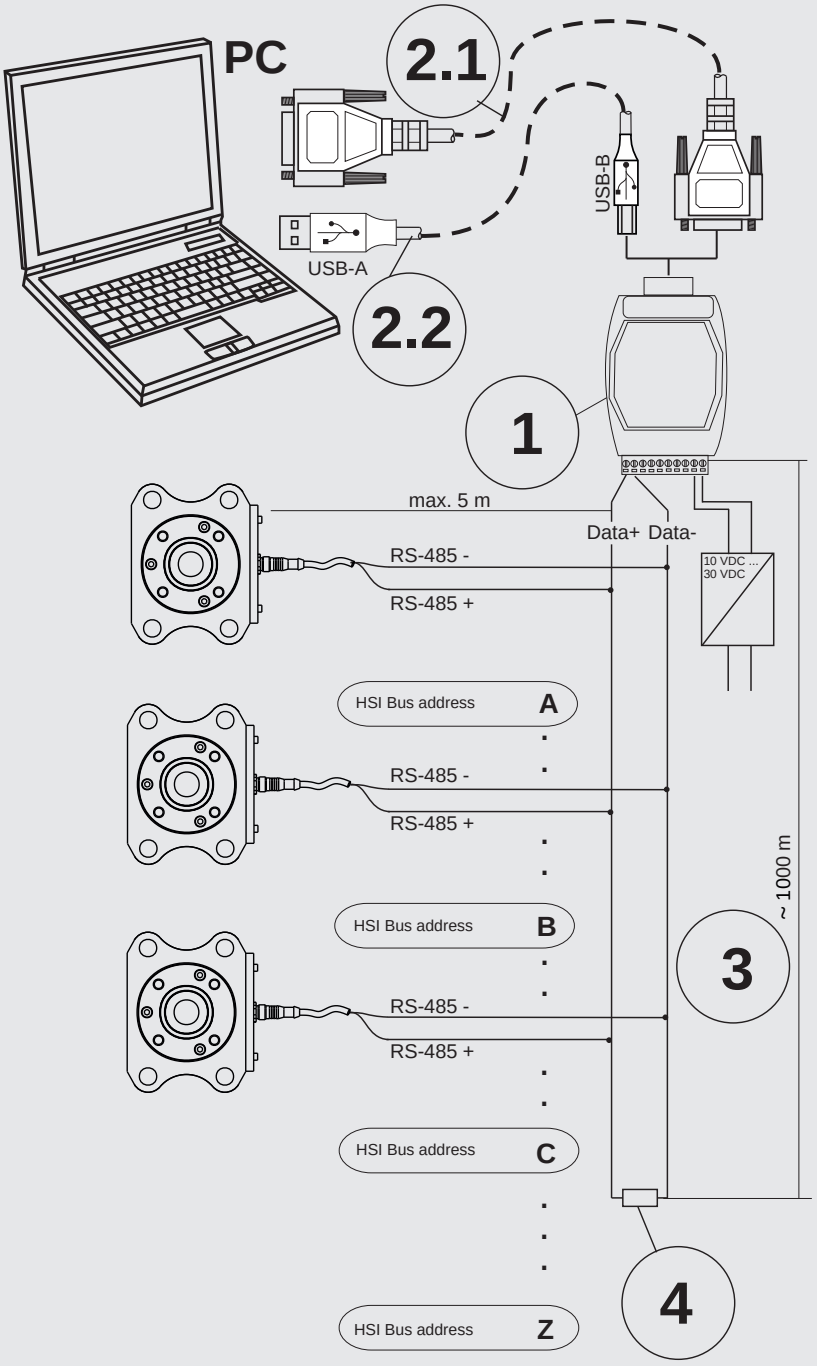


CS1000 in the RS485 BUS

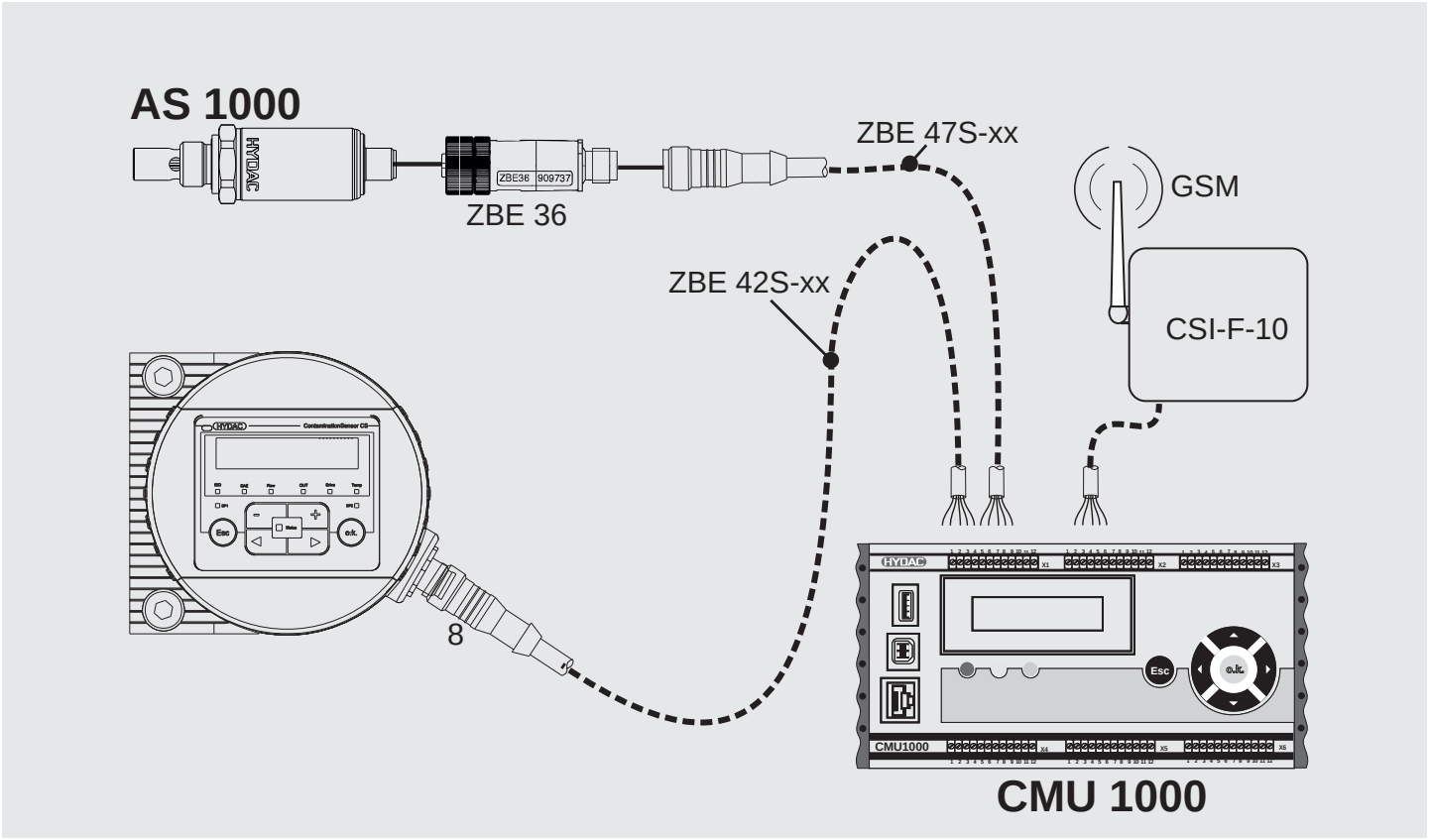


Item	Description	
1	Converter	RS232 <--> RS485
1	Converter	USB <--> RS485
2.1	Connection cable	RS232, 9-pole
2.2	Connection cable	USB [A] <--> USB [B]
3	Cable	Twisted pair recommended
4	Terminating resistor	≈ 120 Ω

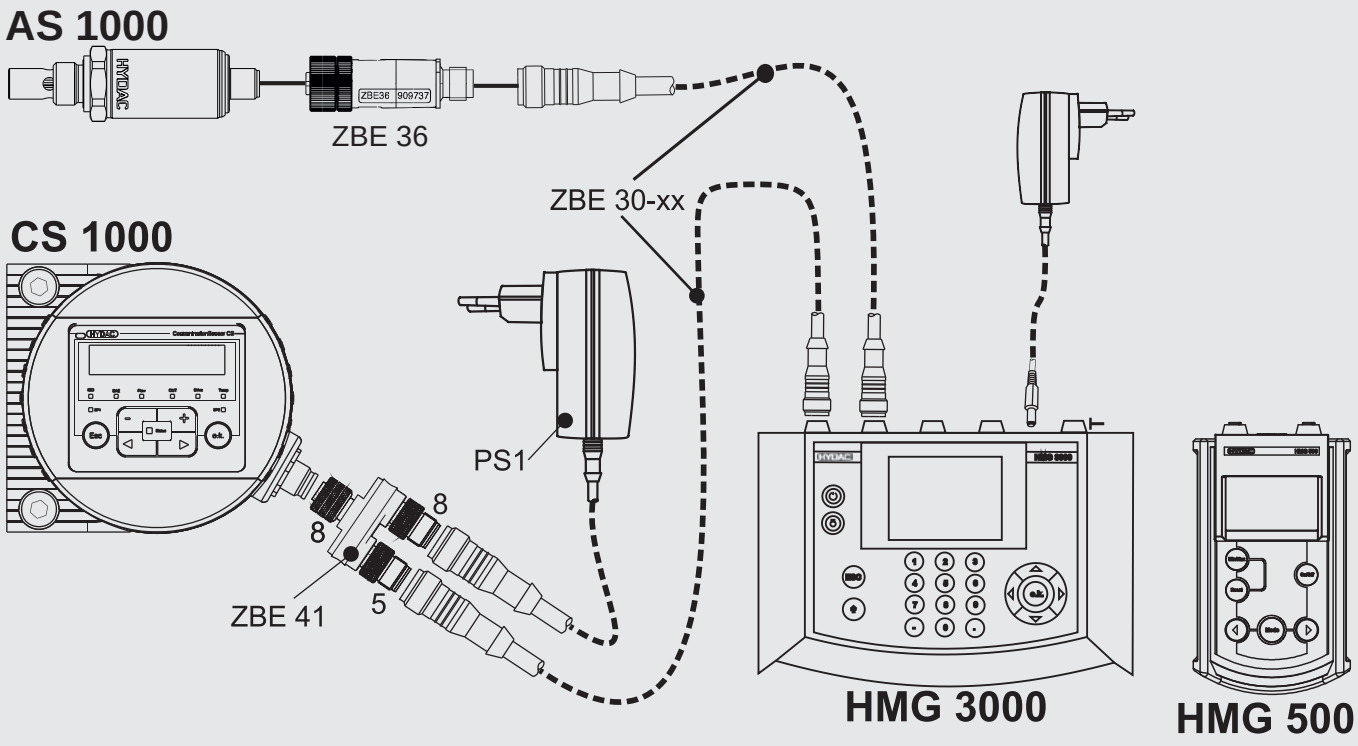
MCS1000 in the RS485 BUS



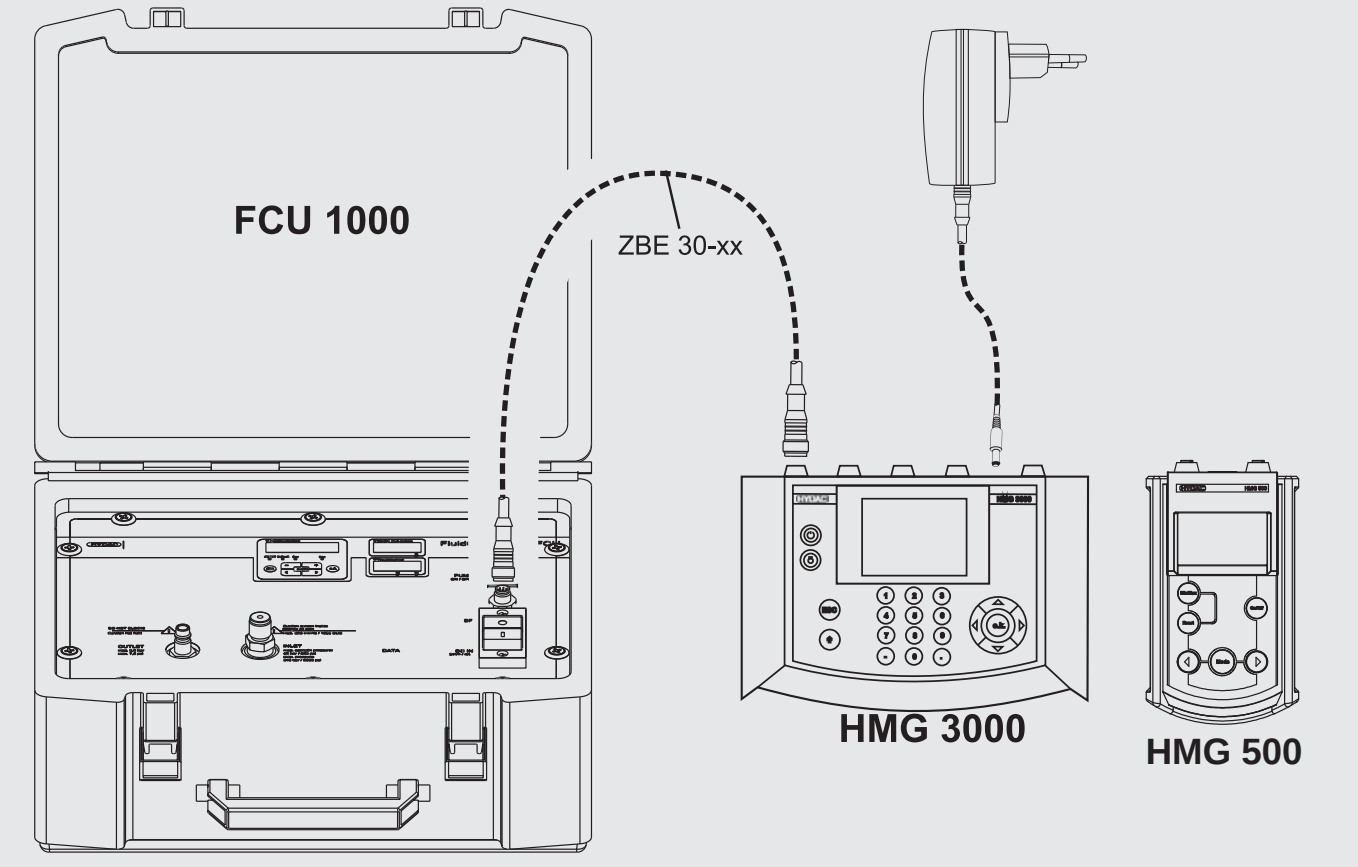
Item	Description	
1	Converter	RS232 <--> RS485
1	Converter	USB <--> RS485
2.1	Connection cable	RS232, 9-pole
2.2	Connection cable	USB [A] <--> USB [B]
3	Cable	Twisted pair recommended
4	Terminating resistor	≈ 120 Ω


AS 1000
ZBE 36
ZBE 47S-xx
ZBE 42S-xx
GSM
CSI-F-10
8
CMU 1000

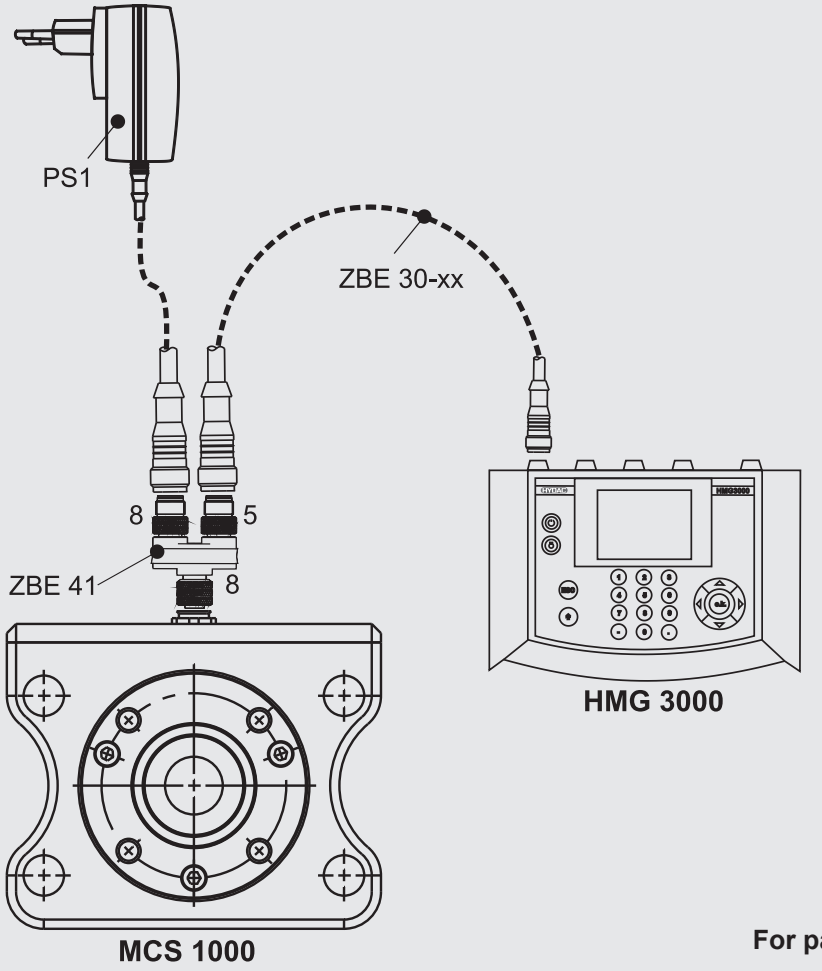
HMG3000 / HMG500 - CS1000 / AS1000



HMG3000 / HMG500 - FCU1000

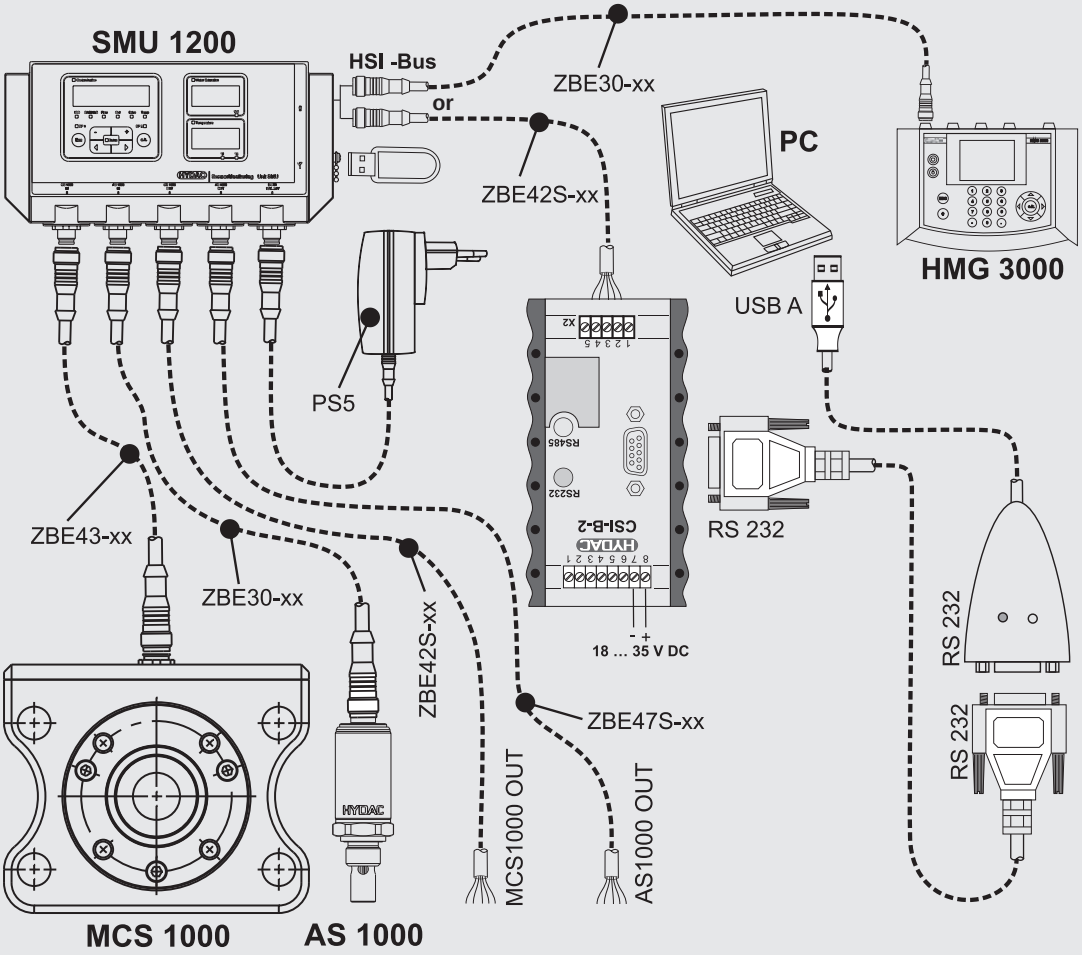


HMG3000 - MCS1000

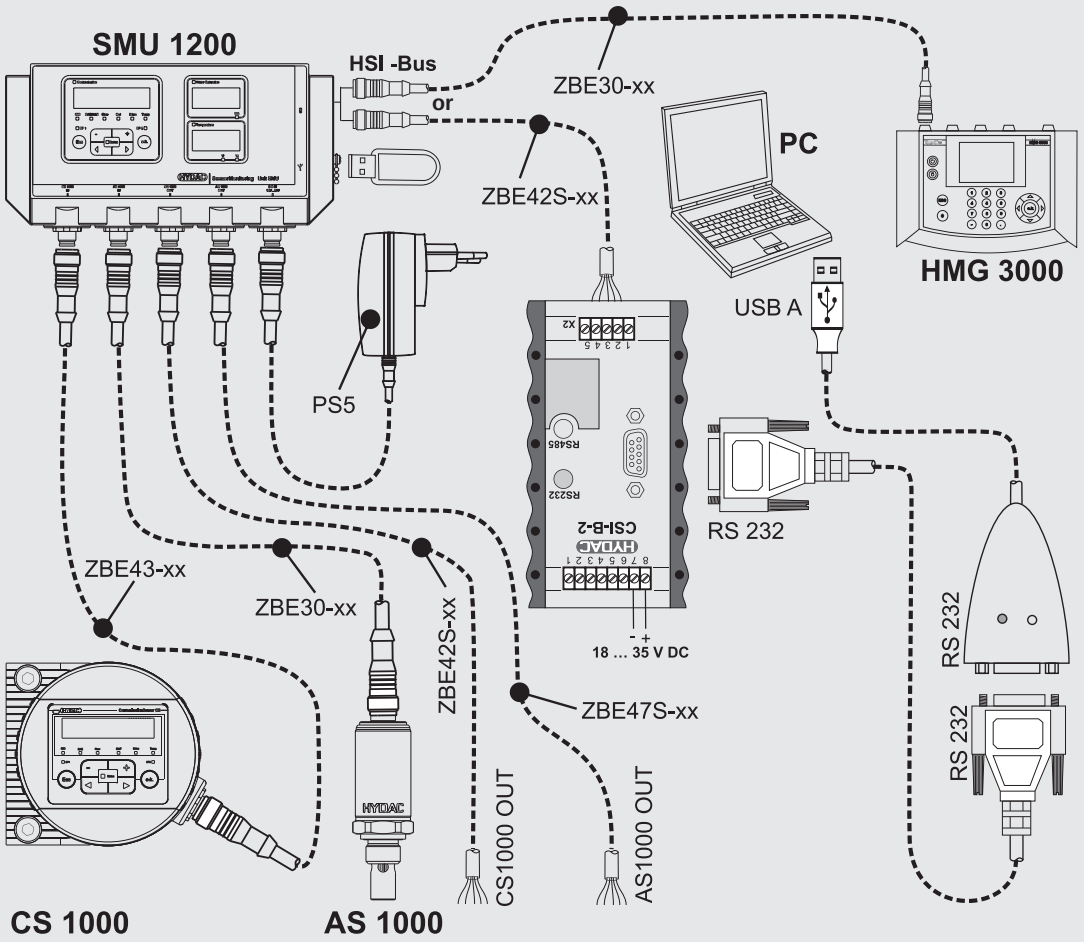


For parameterisation only.

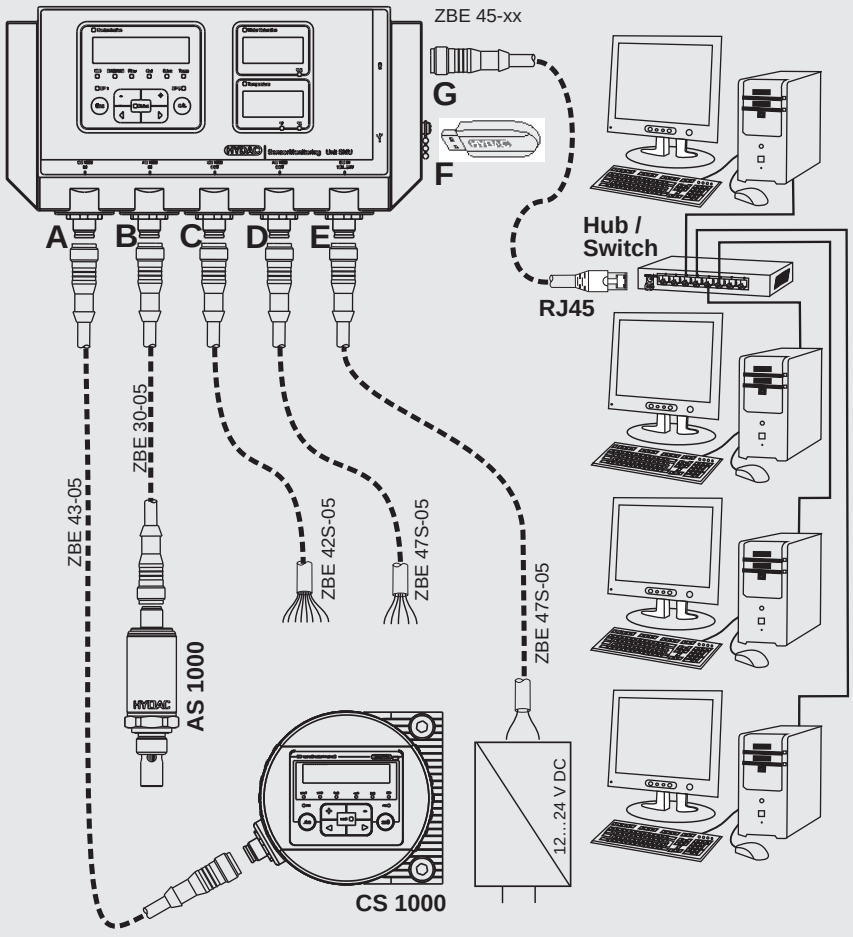
SMU1260 / CSI-B-2 / HMG3000 - MCS1000

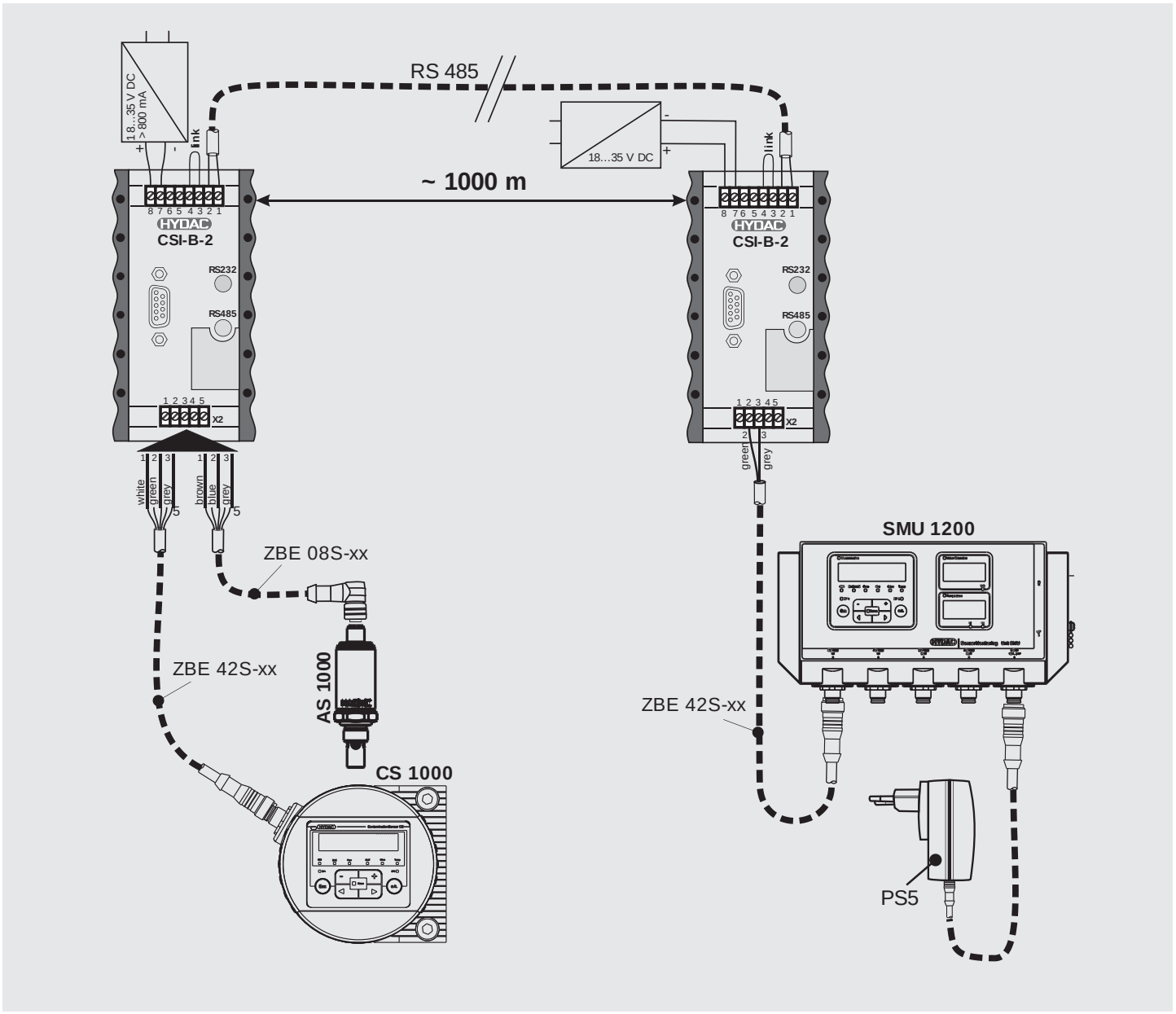


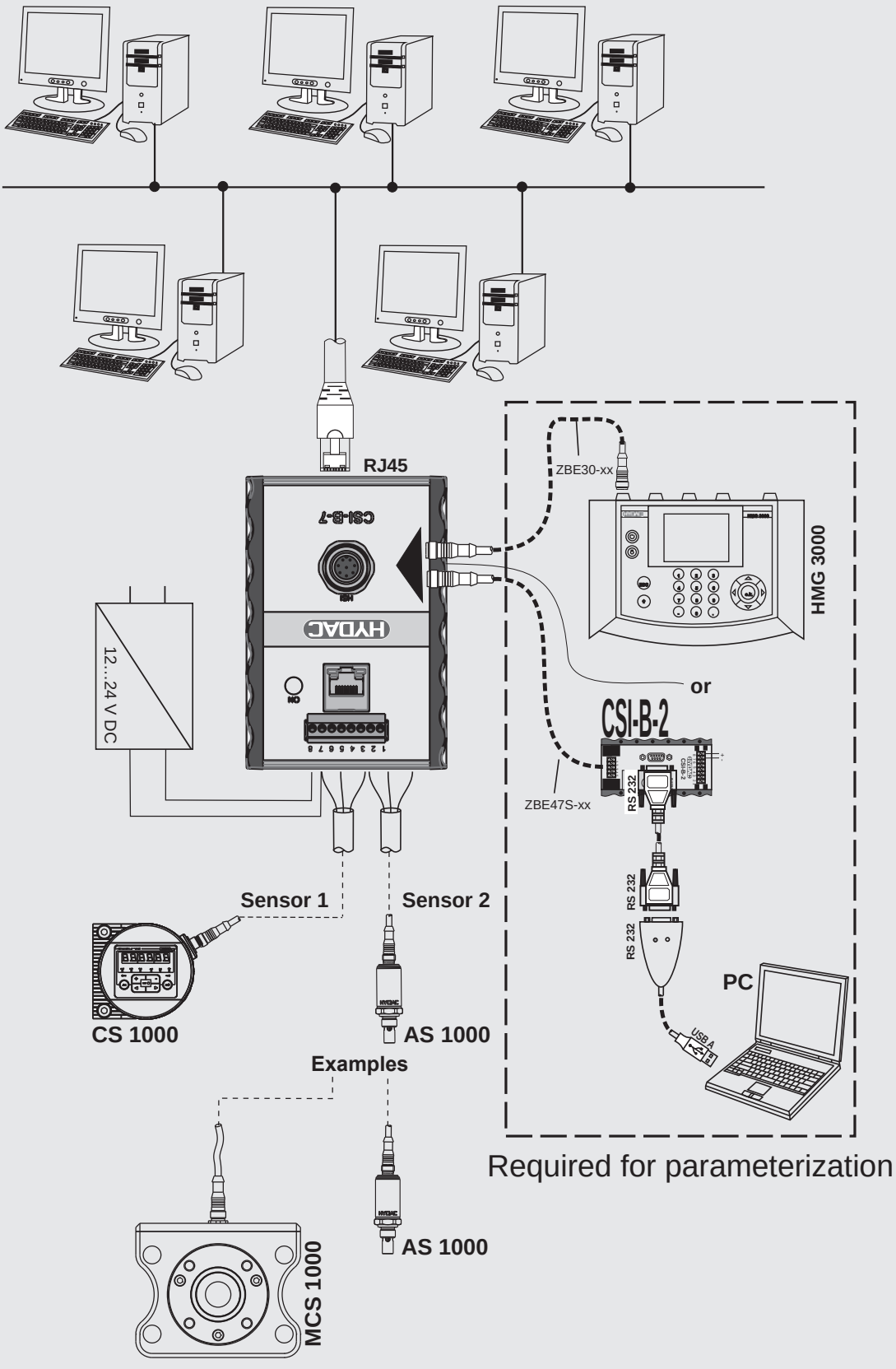
SMU1260 / CSI-B-2 / HMG3000 - CS1000



SMU1270 / LAN / PC




RS 485
18...35 V DC
> 800 mA
link
~ 1000 m
HYDAC
CSI-B-2
RS232
RS485
X2
white
green
grey
brown
blue
grey
ZBE 08S-xx
ZBE 42S-xx
AS 1000
CS 1000
SMU 1200
ZBE 42S-xx
PS5



Note

The information in this brochure relates to the operating conditions and applications described.

For applications and operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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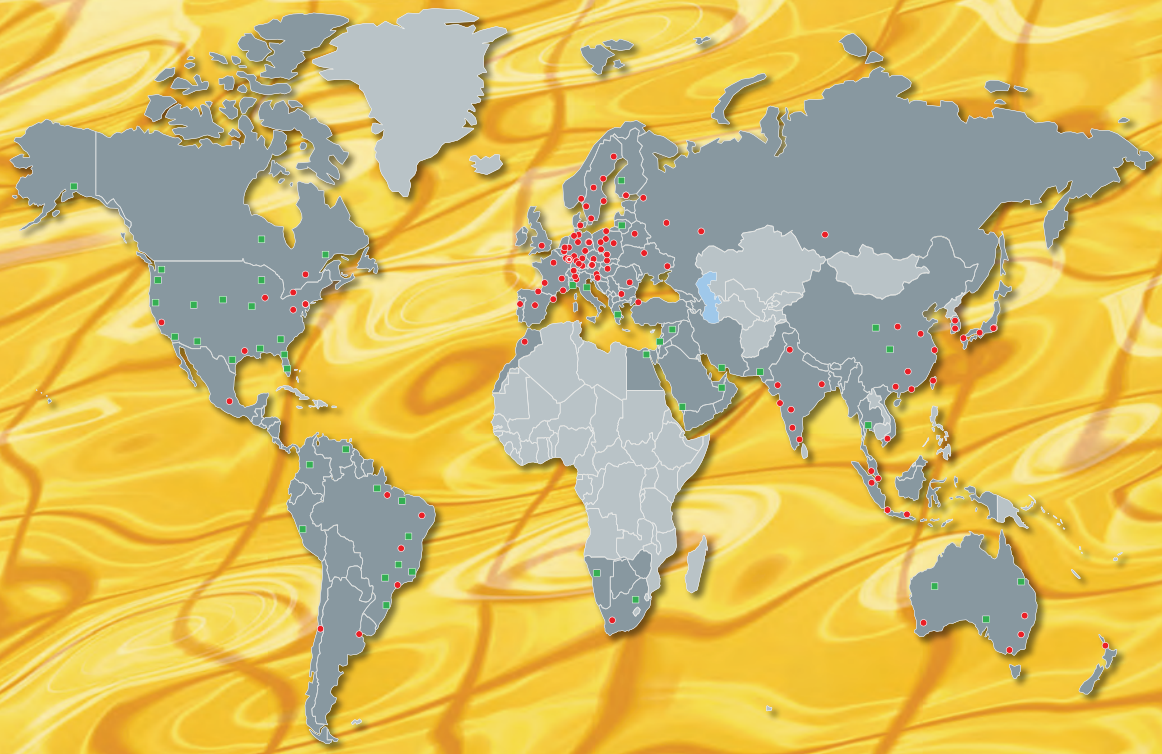

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- HYDAC Distributors and Service Partners

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