

HYDAC INTERNATIONAL



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 unit achieves a very high level of cost effectiveness. All units have an AquaSensor AS 1000 to continuously monitor the water content and to control the 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

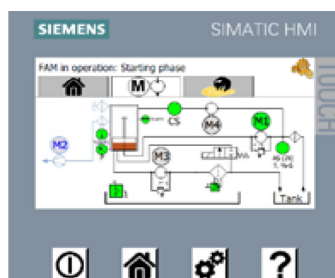
- Siemens S7-1200 with 4" KTP400 TFT colour display with touch and key operation



- 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 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

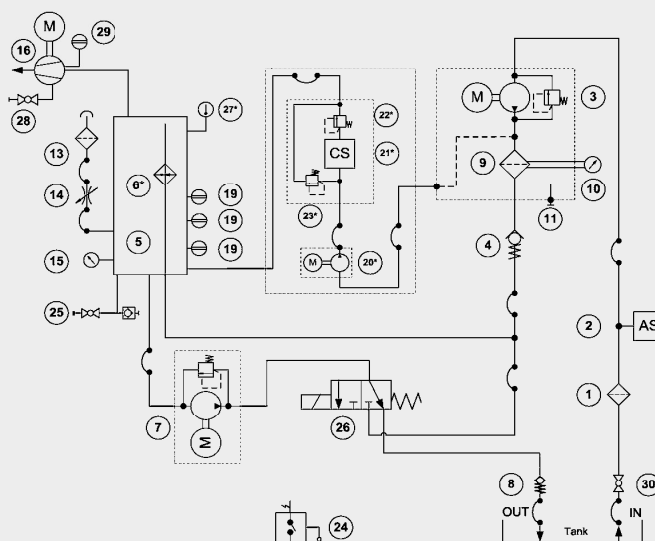
The integrated AquaSensor (AS) enables continuous display of the water content relative to the saturation concentration (saturation level) along with the temperature of the fluid. The optional ContaminationSensor (CS) determines the solid particle contamination of the fluid and displays it in the control panel. The 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	↑	↑

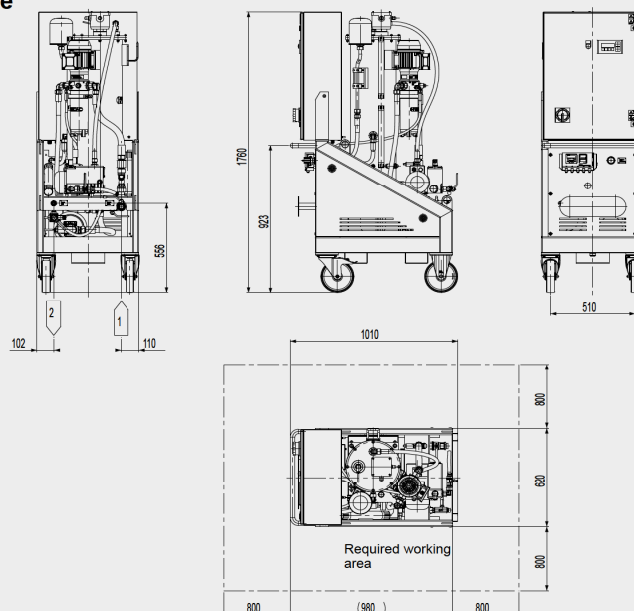
For dimensioning and project planning, please use the FAM checklist, doc. no.: 10000495854

Preferred models (with shorter delivery times)

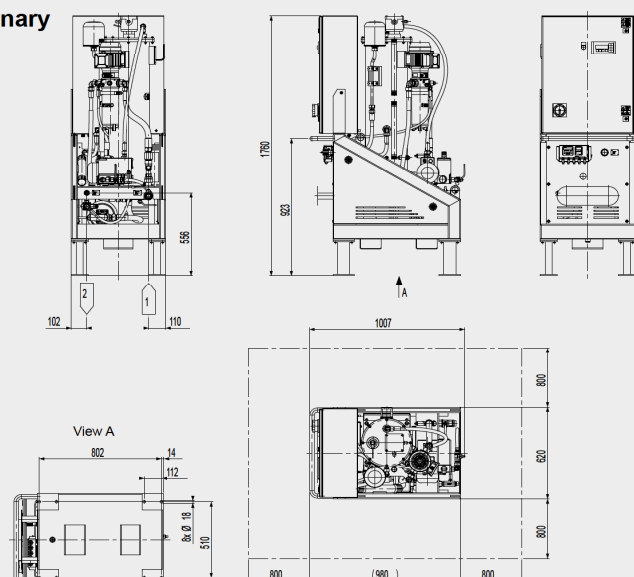
Part no.:	Model code
3726043	FAM-10/15-M-2-A-05-R-H-C1-AC1-2
4292379	FAM-10/15-M-2-A-05-R-H-C2-AC1-2

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

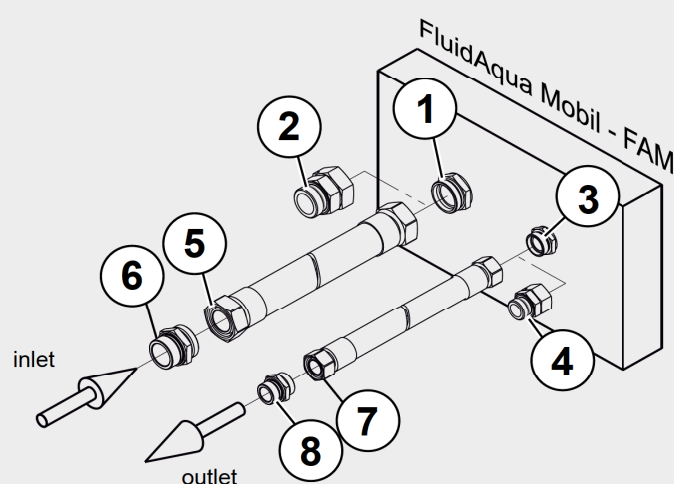
Filter elements for the fine filter must be ordered separately and must be fitted before commissioning on site.

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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