Quick start
FMSS01S0

MOISTURE AND TEMPERATURE SENSOR

⚠ <u>Read the safety and operating instructions</u> prior to commissioning!

FILTREC®

⚠️ **The device complies with CE requirements**
Read the safety and operating instructions prior to commissioning!

Note: Representations do not always exactly correspond to the original. No legal claims arise from information provided by us in error. Technical information may change without notice

1.Quick Start

The steps that must be executed for commissioning the oil quality sensor FMSS01S0 are described below. The following components are necessary for this:

1. PC / Laptop with RS232 connection, or alternatively with a USB port, which serves as a measuring computer
2. Moisture Sensor FMSS01S0 (order number: 04.006.00188)
3. Sensor cable FMSA04S0 (order number: 04.006.00191)
4. Power supply incl. cold device plug FMSA01S0 (order number: 04.006.00190)
5. FMSS01S0 Sensor Software (this can be downloaded from www.filtrec.com)
6. In addition, when connected via USB: USB-RS232 converter FMSA05S0   (order number: 04.006.00194)
7. Optional block adapter FMSA06S0 for return line (order number: 04.006.00375)

The components are to be prepared as follows:

A) <u>Software Installation</u>
   1. No Installation is required. Just copy the file "FMSS01S0_Sensor_Software.exe" to your PC. The Windows operating systems are supported.

B) <u>Software installation of the driver for the USB-RS232 converter with data acquisition via USB (If you do not use a converter, please continue with point D)</u>
   2. Now connect your USB-RS232 converter to your PC / laptop.
   3. If the USB-RS232 converter is not known by the PC, the corresponding driver must be installed. To do this follow the installation instructions provided by the operating system or the supplied driver CD.

C) Sensor connection with data acquisition via USB
   4. Connect the sensor cable to the M12 connector at the sensor.
   5. Connect the 9-pin D-Sub connector of the cable to the appropriate serial port of the USB-RS232 converter.
   6. Connect the power supply and the sensor cable.
   7. Now properly connect your power supply via the cold device plug to the mains voltage. Your sensor is now ready for operation.

D) Sensor connection with data acquisition via RS232
   8. Connect the sensor cable to the M12 connector at the sensor.
   9. Connect the 9-pin D-Sub connector of the cable to the appropriate serial port of your PC / laptop.
   10. Connect the power supply and the sensor cable.
   11. Now properly connect your power supply via the cold device plug to the mains voltage. Your sensor is now ready for operation.

E) Starting the software
   12.The Software can be started by double click on the file "FMSS01S0_Sensor_Software.exe"
   13. To start the communication process with the sensor, select and open the serial interface (COM) to which you have connected the sensor on the computer (click the button "GET Serial Port" and then select the correct COM with the drop-down menu. Then click the button "Click to Open" to open the selected communication port)
   14. Click READ button or Start Acquisition button on the left side of the window. The data can be visualised on the right side of the window.

2.Technical data

Sensor Data	Size	Unit
Max Operating Pressure	50	bar
Operating conditions		
Temperature [1]	-20 … 120	°C
Relative humidity [1]	0 … 100	% r H. (non-condensing)
Compatible liquids	mineral oils (H, HH, HL, HM, HV, HLP, HLPD, HVLP)	
	synthetic esters (HETG, HEPG, HEES, HEPR)	
	polyalkyleneglycols (PAG)	
	zinc and ash-free oils (ZAF)	
	polyalphaolefins (PAO)	
Wetted Materials	aluminum, HNBR, polyurethane resin, epoxy resin, chemical nickel / gold (ENIG), soldering tin (Sn60Pb40, Sn96,5Ag3Cu0,5NiGe), aluminum oxide, glass (DuPont QQ550)	
Protection class [2]	IP67	
Power supply [3]	9 … 33	V
Current consumption	Max. 60	mA
Output		
Current output (2x) [4]	4...20	mA
Accuracy current output [5]	±2	%
Interfaces	RS232	-
Connecting dimensions		
Threaded connection	G¾	Inch
Tightening torque connection thread	45 ±4,5	Nm
Electrical connection	M12x1, 8-pole	-
Tightening torque M12 connector	0,1	Nm
Measuring range		
Rel. humidity	0...100	% r.H.
Temperature	-20...120	°C
Measuring resolution		
Rel. humidity	1	% r.H
Temperature	0,1	K
Measuring accuracy [6]		
Rel. humidity (10…90 %) [7]	±3	% r.H.
Rel. humidity (<10 %, >90 %) [7]	±5	% r.H.
Temperature	±2	K
Response time humidity measurement		
(0 to 100 %)	<1	min
Weight	115	g

[1] Outside the specified measuring range, there are possibly no plausible measuring values to be expected
[2] With screwed on connector
[3] Automatic switch off at U <8 V and U >36 V, with load-dump impulses over 50V an external protection must be provided
[4] Outputs IOut1 and IOut2 are freely configurable (see operating manual)
[5] In relation to the analogue current signal (4 ... 20 mA)
[6] Works calibration
[7] Calibrated to air at room temperature

Fig. 2.1: Dimensional drawing

3. Installation

The sensor is designed as a screw-in sensor with a G¾ thread (BSP). Ideally, in hydraulic circuits the sensor is installed in the tank or in the return line. With gear units with forced flushing, the sensor can also be arranged in the purge line. In general, when placing the sensor, the maximum allowable pressures and temperatures are to be considered (see section 2).

Screw the sensor into a prepared position in the tank or in the return line. For installation in the return line also the return line block adapter (Code FMSA06S0, order number 04.006.00375) can be used. The sealing to the oil side is provided by a profile sealing ring. To ensure a proper sealing, the sealing surface for inserting the sensor should be specially prepared and the maximum roughness should be Rmax = 1.6. The tightening torque of te sensor is 45 Nm ± 4.5 Nm

Fig. 3.1: Installation of a sensor in an oil tank or a line adapter

To ensure proper operation, please respect the following guidelines and the mounting position and location of the sensor:
- Generally, the measurement should be carried out at a location which is characteristic for the system to be monitored.
- The sensor should be installed at a location at which the medium is sufficiently mixed.

- Ideally, with tank mounting, the sensor should be placed in the vicinity of the return or flushing line.

- Ensure that the sensor is completely covered with oil in all operating conditions of the system. Especially note the pendulum volume of the tank and a possible inclined position. Foaming in the tank should be avoided.
- When installed in the return line or flushing line, it must be ensured that the flushing line is not running empty in any operating situation.

- To avoid thermal influences as far as possible, the sensor should not be installed in the immediate vicinity of hot parts and components (e.g. motor).

- When the oil is insufficiently mixed in the tank, free water may deposit at the bottom. The sensor at position 1 would therefore not detect the free water. In this special case, mounting position 2 is recommended (see Fig.3.2)
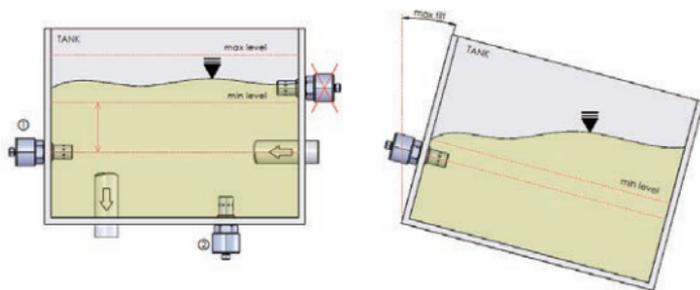

Fig. 3.2: Installation example of correct and incorrect mounting of the sensor in an oil tank

4. Electrical connection

Only a qualified electrician should install the device. Comply with national and international guidelines for setting up electrical equipment.
Power supply in accordance with EN50178, SELV, PELV, VDE0100-410/A1.
Improper electrical connection of the sensor can damage the device!
De-energize the system for the installation and connect the device as follows:
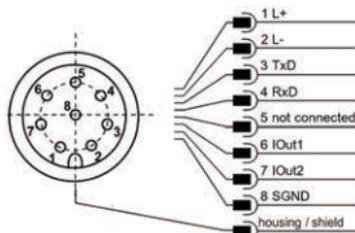
Fig. 4.1: Pin assignment, view from above the sensor

The permissible operating voltage is between 9V and 33V DC. The sensor cable is to be shielded. In order to achieve the protection class IP67, only suitable plugs and cables may be used. The tightening torque for the plug is 0.1 Nm.
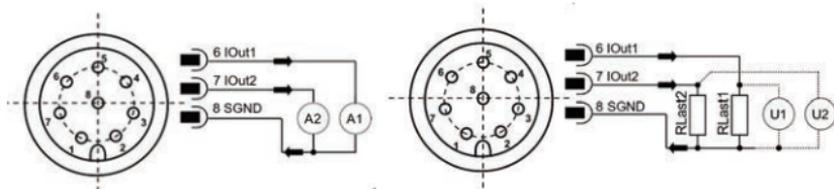

Fig. 4.2: Measuring the analog 4..20 mA outputs with and without load resistors

In order to measure the currents of the analog current output, a load resistor must be connected to each output as shown in Errore. L'origine riferimento non è stata trovata.. The load resistor should be less than 100 ohm for 12 V power supply and less than 400 ohm for 24 V the power supply.

OUTPUT SIZE	RANGE	EQUATION
T [°C]	-20 °C … 120 °C	$T\,[°C] = \dfrac{U[V]}{R[\Omega]} \cdot 8750\,[°C/A] - 55\,[°C]$
RH in %	0% … 100 %	$RH\,[\%] = \dfrac{U[V]}{R[\Omega]} \cdot 6250\,[\%/A] - 25\,[\%]$

Table 4.1: Calculation of the measurement values

I$_{out}$ [mA]	4	12	20
T [°C]	-20	50	120
RH in %	0	50	100

Table 4.2: Scaling of the current outputs for PLC calibration

5. Communication

Interface parameters of RS232:

- Baud rate: 9600   • Parity: none   • Stop bits: 1
- Data bits: 8   • Flow controll: none

#	INSTRUCTION FORMAT	MEANING	RETURN FORMAT
1	RVal[CR]	Reading all measurements	$RH:xx[%];AH:x[ppm];T:xxx.x[C];PCBT:xxx.x[C]; Time:x.xxxx[h];CRC:x[CR][LF]
2	RID[CR]	Reading the identification	$FILTREC;FMSS01S0;SN:xxxxxx;SW:x.x.xx; CRC:x[CR][LF]
3	RCon[CR]	Reading the configuration parameters	$AO1:x;AO2:x;AHScal:x;CRC:x[CR][LF]

Table 5.1: Reading commands

Note:
[CR] = [Carriage Return (0xD)]   [LF] = [Linefeed (0xA)]

For any questions please contact:

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