ROEMHELD
HILMA ▪ STARK

Electronic Pressure Switch

9740-07X

(Menu navigation acc. to VDMA)

User manual

(Translation of original instructions)

Part No.. 670009 / Status 27.03.2019 E

Content

1 Safety Information

Before commissioning, check the instrument and any accessories supplied. Before commissioning, please read the operating instructions. Ensure that the instrument is suitable for your application.

If the instrument is not handled correctly, or if the operating instructions and specifications are not adhered to, damage to property or personal injury can result.

2 Exclusion of liability

This operating manual was made to the best of our knowledge. Nevertheless and despite the greatest care, it cannot be excluded that mistakes could have crept in. Therefore please understand that in the absence of any provisions to the contrary hereinafter our warranty and liability – for any legal reasons whatsoever – are excluded in respect of the information in this operating manual. In particular, we shall not be liable for lost profit or other financial loss. This exclusion of liability does not apply in cases of intent and gross negligence. Moreover, it does not apply to defects which have been deceitfully concealed or whose absence has been guaranteed, nor in cases of culpable harm to life, physical injury and damage to health. If we negligently breach any material contractual obligation, our liability shall be limited to foreseeable damage. Claims due to the Product Liability shall remain unaffected.

In the event of translation, only the original version of the operating manual in German is legally valid.

3 Functions of the 9740-07X

Depending on which model you have, the instrument offers the following functions:

- Display of the actual pressure in **bar, PSI, MPa**
- Switching of the switch outputs in accordance with the pressure and the pre-set switching parameters
- Menu navigation in accordance with the VDMA standard 24574-1
- Coloured LED backlight indicates the switching status

4 Installation

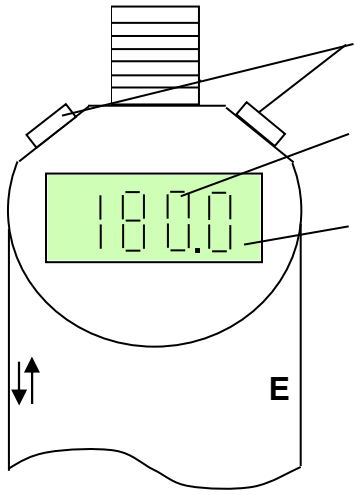
The 9740-07X can be mounted directly via the pressure connection or indirectly on a hydraulic block using a hose or a minimess line
(for torque value, see Chapter 9 - Technical specifications).
For optimum alignment, we recommend connecting the 9740-07X mechanically using a rotating adapter (for Mechanical Accessories see Chapter 12.2).
The electrical connection must be carried out by a qualified electrician according to the relevant regulations of the country concerned (VDE 0100 in Germany). The housing of the pressure switch must be properly earthed. When fitting into a hydraulic block, it is sufficient if the block is earthed via the hydraulic system. When installing with a minimess hose, the housing must be earthed separately (e.g. with a screened cable).

Caution:
The 9740-07X must be fitted using a suitable open-end wrench (across flats 27) on the hexagon nut of the pressure connection.
Do not install the 9740-07X by gripping the housing, as this would damage the housing or the entire instrument.

Additional installation suggestions which, from experience, reduce the effect of electromagnetic interference:

- Make line connections as short as possible
- Use screened cabling (e.g. LIYCY 4 x 0.5 mm²)
- The cable screening must be fitted by qualified personnel subject to the ambient conditions and with the aim of suppressing interference
- Keep the unit well away from the electrical supply lines of power equipment, as well as from any electrical or electronic equipment causing interference

5 Controls of the 9740-07X



2 keys (↓↑ and E) for adjusting the switch points, switch-back points and additional functions

4-digit
digital display

LED backlight
to indicate switch points
(red = active / green = inactive)

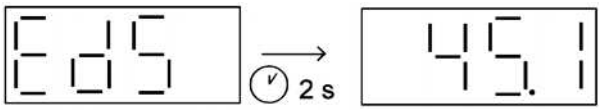
Use the keys to select the next menu point, or alternatively to adjust the values.

↓↑
- To scroll through the menu
- To increase the value
- Hold the key down to fast-scroll through the parameter values

E
- To select the menu point
- To confirm value

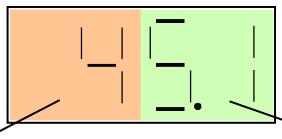
6 Digital display

Once the power supply has been switched on, the device briefly flashes "**EdS**", and then begins to show the actual pressure.



To check the unit of measurement being used for the pressure indication, press the right-hand key. Depending on the setting, bar, PSI or MPA will be shown.

The backlight changes colour according to the settings of the switch outputs and their switch points, i.e. when the switch output is inactive or low-level, the relevant backlight is "green", when the switch output is active or high-level, the relevant backlight is "red".



Backlight
for switching output 1

Backlight
for switching output 2

E

Reading the digital display

Description	Representation on 7-segment display	ASCII representation
Switch point, output 1	SP 1	SP1
Switch-back point, output 1	rP 1	RP1
Switch point, output 2	SP2	SP2
Switch-back point, output 2	rP2	RP2
Pressure window upper value, output 1	FH 1	FH1
Pressure window lower value, output 1	FL 1	FL1
Pressure window upper value, output 2	FH2	FH2
Pressure window lower value, output 2	FL2	FL2
Reset	rES	RES
Switch delay time, output 1 (unit in s)	dS 1	dS1
Switch delay time, output 2 (unit in s)	dS2	dS2
Switch-back delay time, output 1 (unit in s)	dr 1	dR1
Switch-back delay time, output 2 (unit in s)	dr2	dR2
Output 1	ou 1	Ou1
Output 2	ou2	Ou2
Normally open when hysteresis function is active	Hno	HNO
Normally open when window function is active	Fno	FNO
Normally closed when hysteresis function is active	Hnc	HNC
Normally closed when window function is active	Fnc	FNC
Unit conversion	Un ı	Uni
Units in bar	bAr	Bar
Units in MPa	MPA	MPa
Units in psi	PS ı	psi
Maximum value	H ı	HI
Error indication	Err	ERR
Delete	---	---
Extended functions	EF	EF

Description	Representation on 7-segment display	ASCII representation
Yes	YES	Yes
No	no	No
Reset Min-/Max-value	rS.HL	rS.HL
Programming lock	PrG	PrG
Calibrations of sensors zero point	cAL i	cALi
New	nEU	nEU
Version	UEr	Ver

Note:

- If the actual pressure exceeds the instrument's nominal pressure it can no longer be displayed. The nominal pressure flashes in the display. As a result, when the menu point Max Value (Hi) is selected, the value of the highest measured pressure which has been stored flashes until the instrument is reset by “reset Min-/Max-value” (re.HL) or “reset” (rES).
- If the actual pressure is less than 0.6 % of the nominal range, 0 bar is displayed.

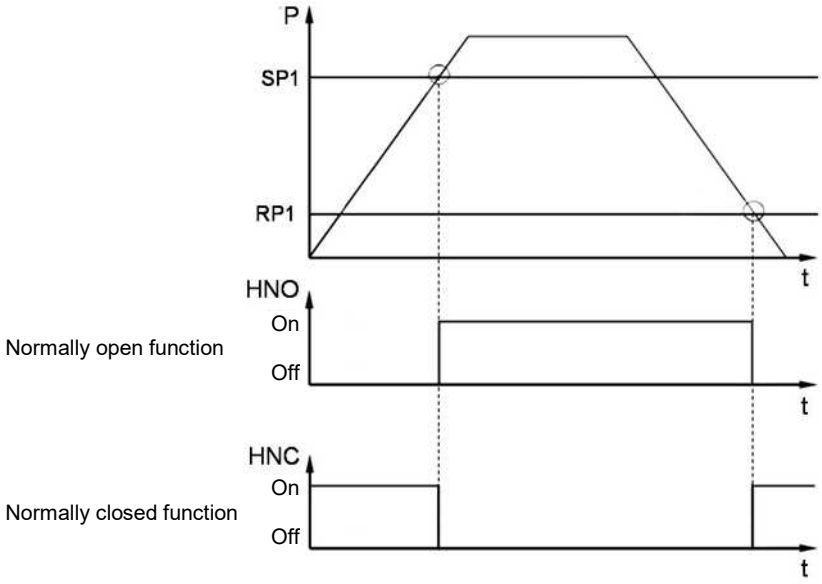
7 Output function

7.1 Switching outputs

The 9740-07X has either 1 or 2 switch outputs. The following settings can be made under the basic settings:

7.1.1 Switch point setting (SP)

One switch point and one switch-back point can be set for each switching output. The particular output will switch when the set switch point is reached and switch back when the pressure drops below the switch-back point.
Example for switch point 1 (normally closed and normally open function):



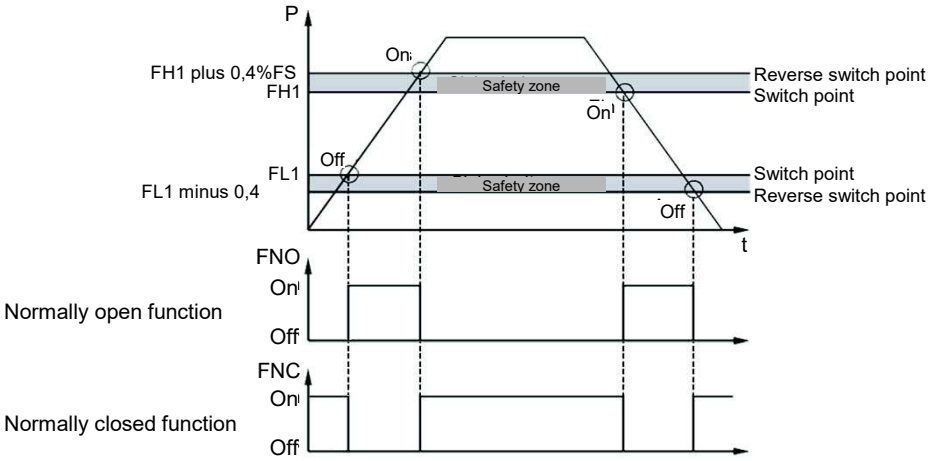
Abbreviations:		
	"SP1", "SP2"	= switch point 1 / switch point 2
	"RP1", "RP2"	= switch-back point 1 / switch-back point 2
	"HNO",	= normally open when hysteresis function is active
	"HNC"	= normally closed when hysteresis function is active

Note:
- It is only possible to set the switch point (SP) if it is higher than the respective switch-back point (RP). In the case of low SPs we recommend setting the RP first.

7.1.2 Window function setting (Fno / Fnc)

The window function allows you to monitor a range. An upper and a lower switch value can be entered for each switch output. These values determine the range.
The relevant output will then switch when the pressure enters this range.
When the pressure leaves this range, i.e. when the switch-back point has been reached, the output switches back. The lower switch-back value is just below the lower switch value. The upper switch-back value is just above the upper switch value. The range between the switch value and the switch-back value forms a safety margin which prevents unwanted switching operations from being triggered (such as those triggered by the pulsations of a pump).

Example for switch output 1 (normally closed and normally open function):



Abbreviations:
"FH1", "FH2" = upper switch value 1 / upper switch value 2
"FL1", "FL2" = lower switch value 1 / lower switch value 2
"FNO" = normally open when window function is active
"FNC" = normally closed when window function is active

Notes:
- It is only possible to set the switch point (SP) if it is higher than the respective switch-back point (RP). In the case of low SPs we recommend setting the RP first.
- The window function only works properly (switching on and off) if all switch values (including the safety margin) are above 0 bar and below the nominal pressure range.

7.2 Setting ranges for the switch outputs

Measuring range	Lower limit of RP / FL	Upper limit of SP / FH	Minimum difference between RP and SP or FL and FH	Increment
in bar	in bar	in bar		in bar
0 .. 250	2.5	250.0	2.5	0.5
0 .. 600	6	600	6	1

* All ranges given in the table can be adjusted by the increments shown.

8 Menu navigation

The 9740-07X can be adapted to suit the particular application as required by changing multiple settings. These settings are combined in a single menu.

NOTE:
- If no key is pressed for approx. 60 seconds, the menu closes automatically, and any changes that may have been made will not be saved.
- If both keys are pressed at the same time, the menu closes automatically and any changes made are saved.
- When an adjusted parameter is confirmed, the set value is displayed for a second before returning to the relevant menu point.

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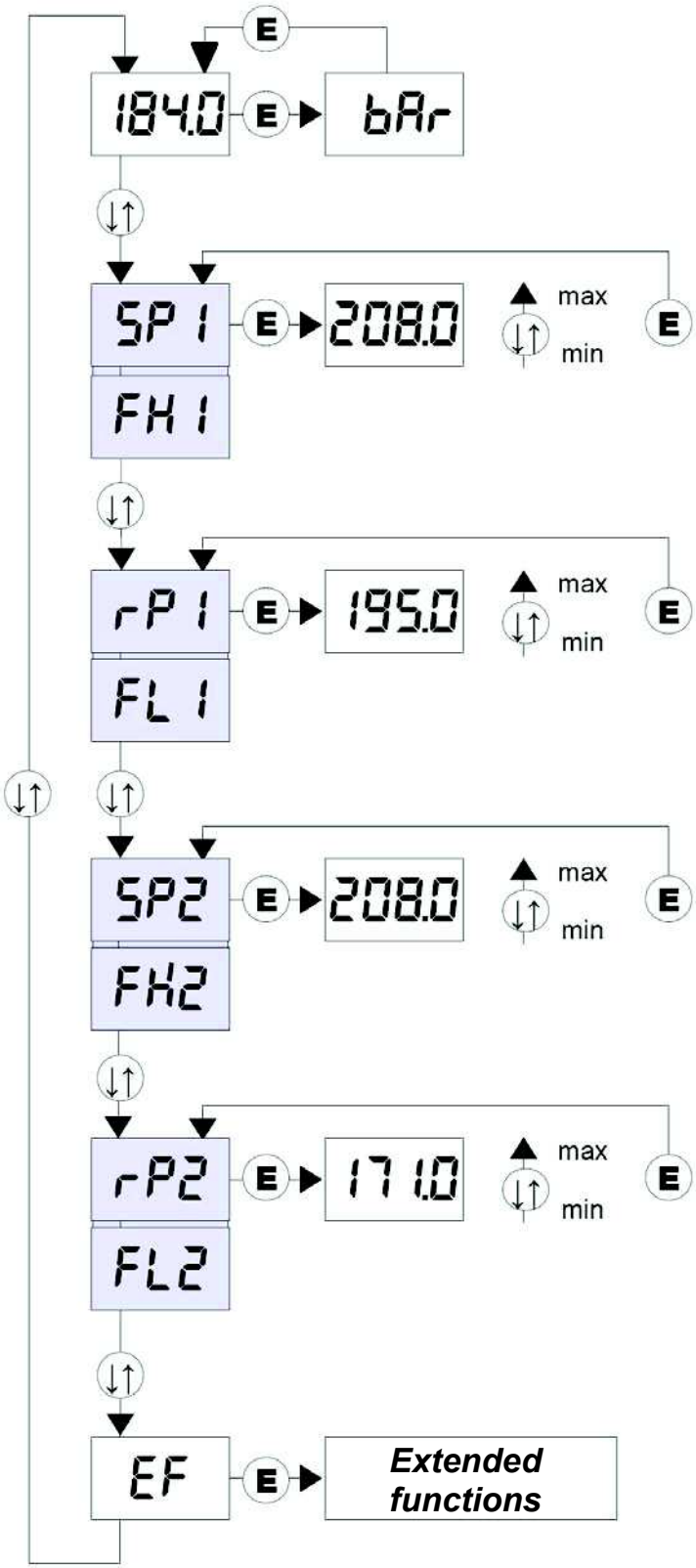
The function "Cali" enables the calibration of the sensor zero point. The current pressure is saved as the new zero point. This is possible in the range +/- 3% of the instrument rated pressure. "neW" appears in the display when a calibration is carried out in the permitted range, otherwise "Err" is displayed.
This function is useful, for example, if there is always a residual pressure left in the system which should be displayed as 0 bar.

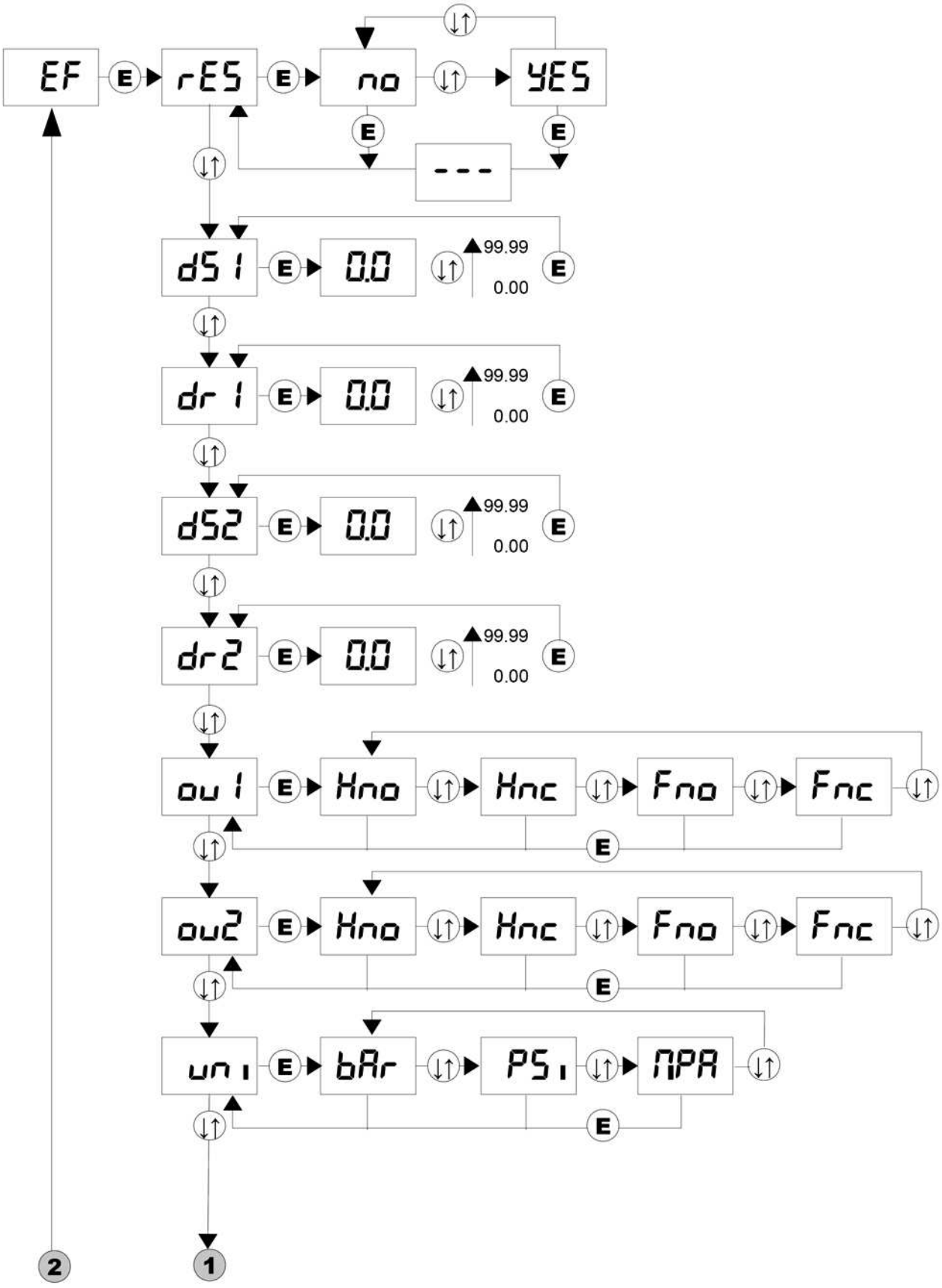
CAUTION:
Following a zero point adjustment, for example on a 600 bar instrument, a pressure of up to 18 bar will be displayed as 0 bar. Before any work is carried out on the hydraulic system, ensure that the system is depressurised.

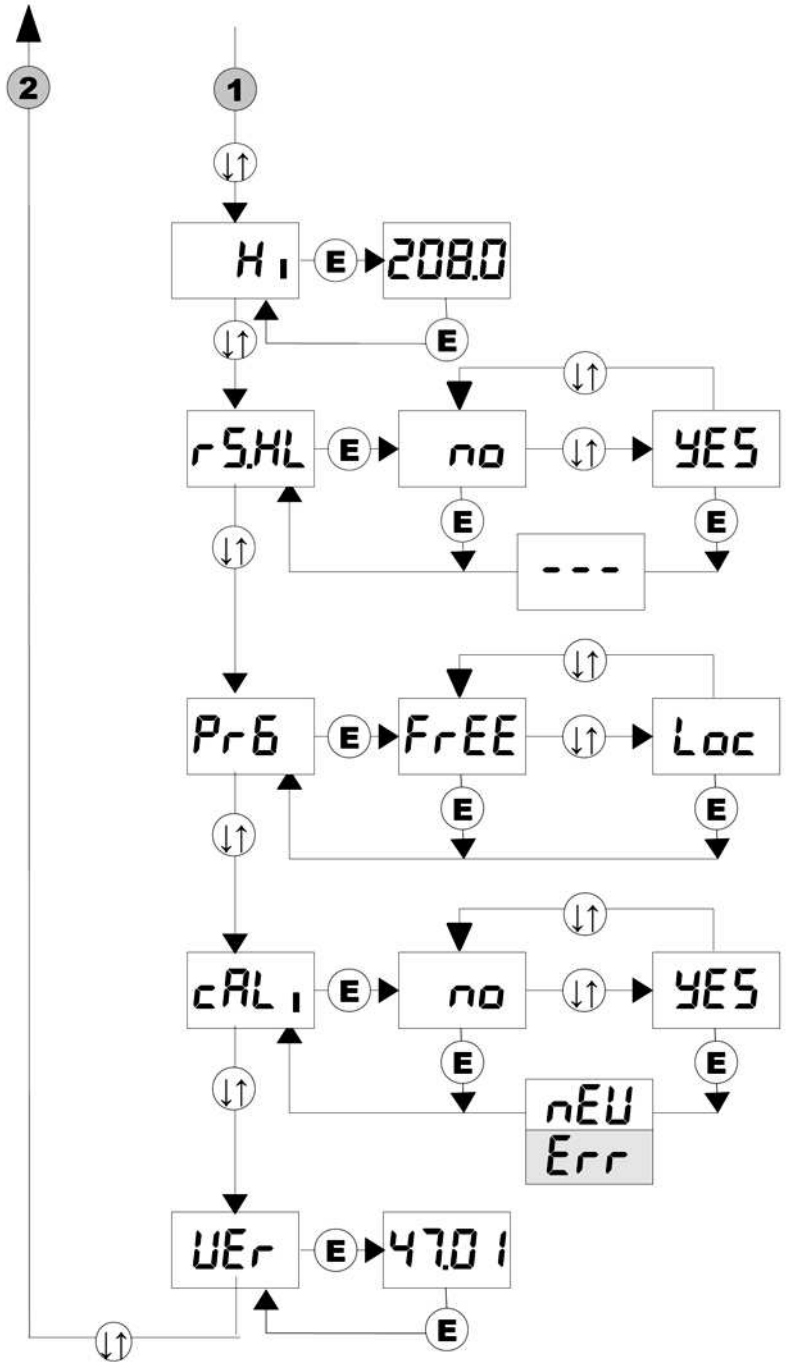
In order to prevent unauthorised adjustment of the device, a programming lock can be set. If the menu item "PrG" is set to "Loc" in the extended menu, the programming lock is set. All values can still be read but can't be edited. When trying to edit a value by means of the arrow keys, "Loc" is displayed as long as the key is pressed. The functions "reS" and Rs.HL" are locked as well.

8.1 Main menu


E
184.0
E
bAr
SP 1
E
208.0
max
min
E
FH 1
rP 1
E
195.0
max
min
E
FL 1
SP2
E
208.0
max
min
E
FH2
rP2
E
171.0
max
min
E
FL2
EF
E
Extended functions

8.2 Extended functions




2
1
H1
E
208.0
E
rS.HL
E
no
YES
E
E

PrG
E
FrEE
Loc
E
E
cAL1
E
no
YES
E
E
nEU
Err
UEr
E
47.01
E

E

9 Error messages

If an error is detected, a corresponding error message appears that must be acknowledged by pressing any key.
Possible error messages:

E.10 A data error was detected in the saved settings. This could be due to strong electromagnetic interference or a component fault.

Action: Press (E) and confirm "RES" by pressing "Yes". The factory settings will be restored for all adjustable parameters and all minimum and maximum values will be deleted. Enter the data again from the beginning.

E.12 An error was detected in the saved calibration data. This could be due to strong electromagnetic interference or a component fault.

Action: Disconnect then reconnect the supply voltage to the instrument. If the error persists, the instrument must be returned to the factory for recalibration or repair.

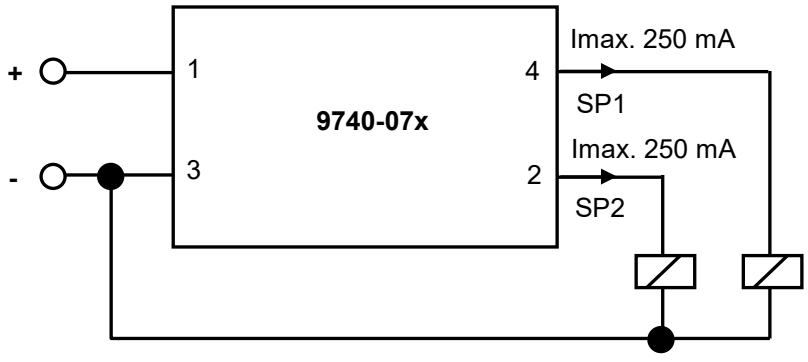
E.21 A communication error was detected within the instrument. This could be due to strong electromagnetic interference or a component fault.

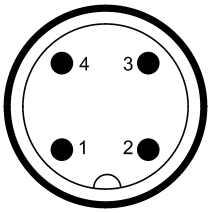
Action: Press (E). If the error persists, disconnect then reconnect the supply voltage to the instrument. If the error still persists, please contact our service department.

10 Pin assignment

Version with
2 PNP switch outputs:

Male 4 pole, M12x1





Pin 1	+ U_B
Pin 2	SP2
Pin 3	0 V
Pin 4	SP 1

11 Technical details

Input data			
Measuring ranges	bar	250	600
Overload pressures	bar	500	1000
Burst pressure	bar	1000	2000
Mechanical connection		G¼ A ISO 1179-2	
Tightening torque, recommended		20 Nm	
Parts in contact with fluid		Mechanical connection: stainless steel Sensor cell: thin-film strain gauge Seal: FPM	
Output data			
Switching outputs		2 transistor outputs, PNP Switching current: max. 250 mA per output Switching cycles: > 100 million	
Accuracy acc. to DIN 16086, Terminal based		≤ ±0.5 % FS typ. ≤ ± 1 % FS max.	
Temperature compensation, zero point		≤ ± 0.02 % / °C typ. ≤ ± 0.03 % / °C max.	
Temperature compensation, span		≤ ± 0.02 % / °C typ. ≤ ± 0.03 % / °C max.	
Repeatability		≤ ± 0.5 % FS max.	
Reaction time		< 10 ms	
Long-term drift		≤ ± 0.25 % FS max./ year	
Environmental conditions			
Compensated temperature range		-25 .. + 85 °C	
Operating temperature range [1)]		-40 .. + 100 °C / -25 .. + 100 °C	
Nominal temperature range of display (read-out)		-15 .. + 70 °C	
Storage temperature range		-40 .. + 85 °C	
Fluid temperature range [1)]		-40 .. + 125 °C / -25 .. + 125 °C	
CE mark		EN 61000-6-1 / 2 / 3 / 4	
Vibration resistance acc. to DIN EN 60068-2-6 at 0 .. 500 Hz		approx. 10 g	
Shock resistance acc. to DIN EN 60068-2-29 (11 ms)		approx. 50 g	
Protection class acc. to DIN EN 60529 [2)]		IP 67	
Other data			
Supply voltage		9.6 .. 32 V DC	
Residual ripple of supply voltage		≤ 5 %	
Current consumption		max. 0.535 A total max. 35 mA (with inactive switching outputs)	
Display		4-digit, LED, 7-segment, Height of digits 4.5 mm	
Weight		approx. 70 g	

FS (**F**ull **S**cale) = relative to the complete measuring range

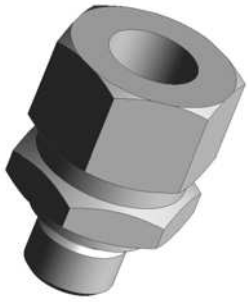
1) -25°C with FPM seal, -40°C on request

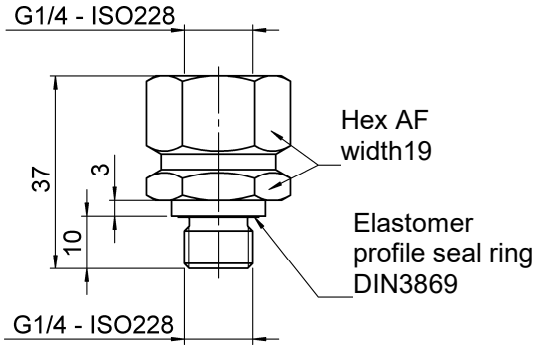
2) With mounted mating connector in corresponding protection class

12 Order details

Order no.	**9740073**	**9740075**
Measuring range	2,5 .. 250 bar	6,0 .. 600 bar
Overload pressure	500 bar	1000 bar

13 Accessory

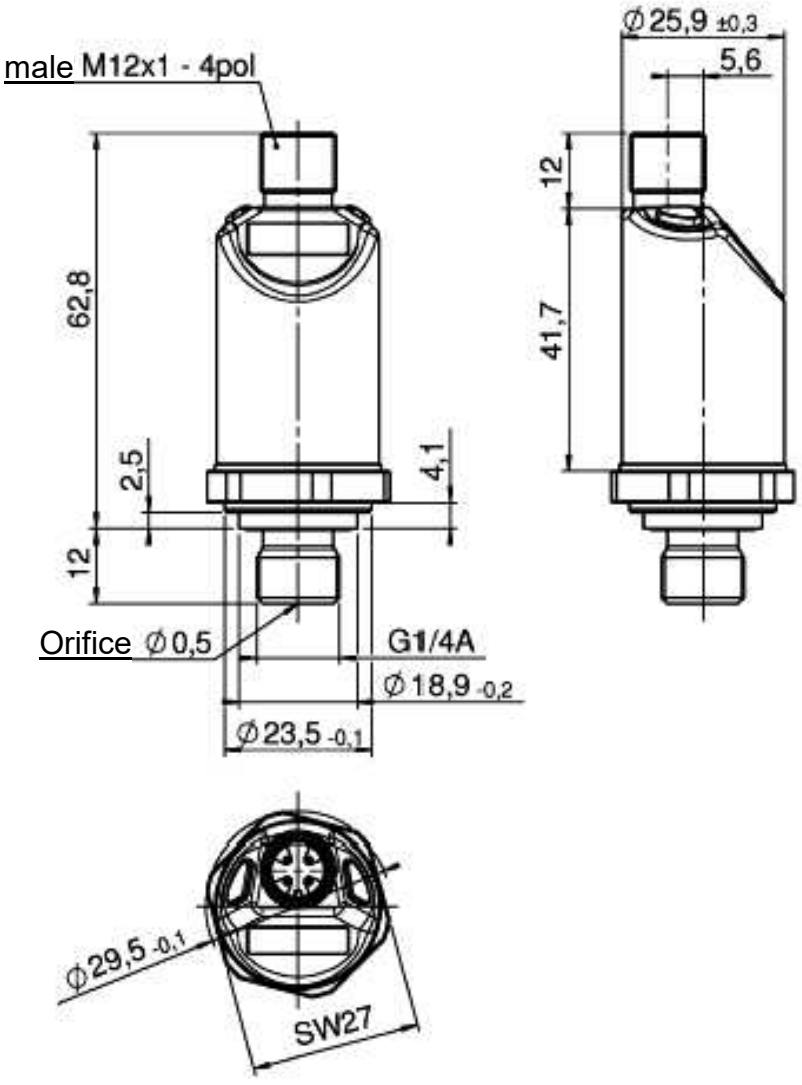




Connection adapter rotating

Female thread G ¼
male thread G ¼
Order no.9208225

14 Instrument dimensions



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Note

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

If you have any questions, suggestions, or encounter any problems of a technical nature, please contact your RÖMHELD representative.

Notizen / Notes / *Notes*