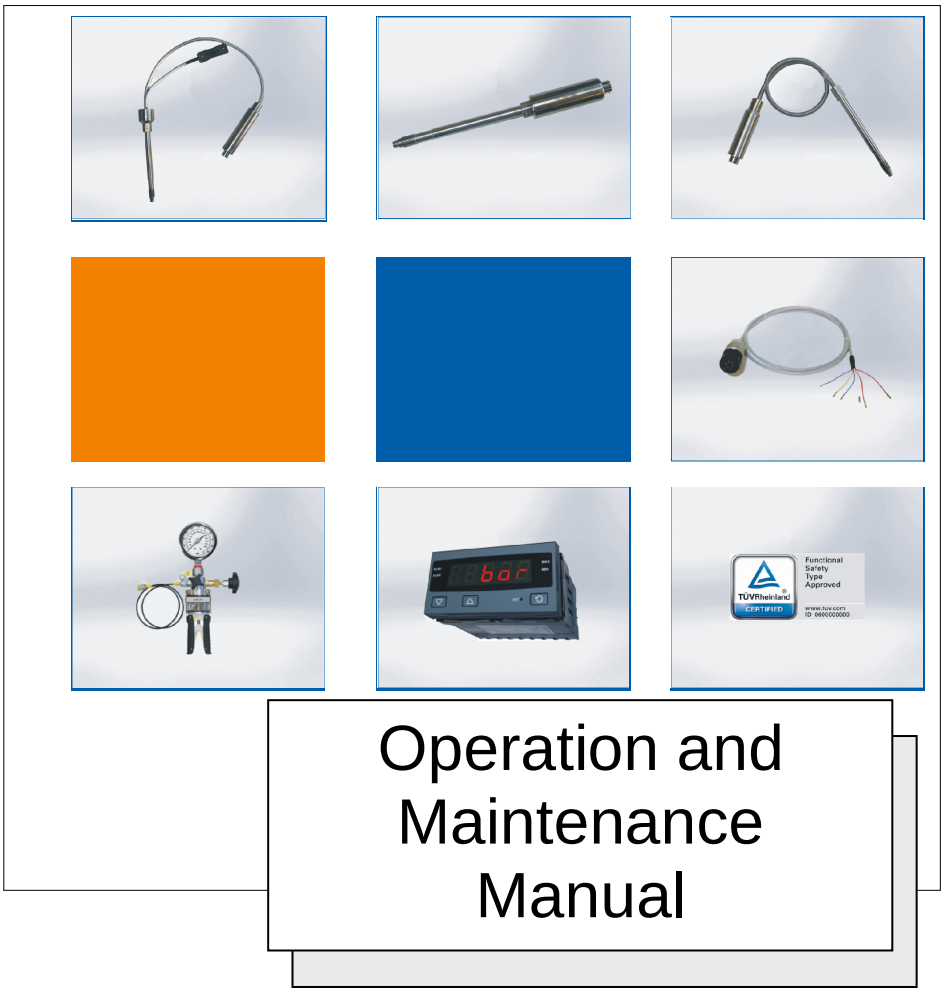
OPERATION INSTRUCTION

Melt pressure sensor with switching output „High Performance Level” Type “GMD-HPL” 0-10V/0(4)-20mA



Operation and Maintenance Manual

MERCURY FREE

NaK FREE

Made in Germany · CE · RoHS COMPLIANT · FDA COMPLIANT · TÜVRheinland CERTIFIED · Functional Safety Type Approved · www.tuv.com ID 0600000000

Please read these operating instructions carefully before taking the device into operation.

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Certified

according to DIN ISO 9001:2008

Table of Contents:

1. Introduction

Melt pressure sensors are precision sensors which achieve their measuring accuracy and high durability only when they are handled correctly. These Operating Instructions should be read thoroughly before taking the sensor into operation to guarantee trouble–free operation later on. However, should difficulties arise at some stage, please contact our Sensor Technology Department or one of our representatives, who will be pleased to help you.

2. Operating range and application area:

Gräff melt pressure sensors with switching output have been designed exclusively for pressure recording and monitoring liquid, doughy or pasty masses at high temperatures. These must have a homogeneous nature.
The use as safety-relevant component refers exclusively to the fixed set threshold value + switching output, a further analogue signal processing in combination serves exclusively for pressure recording. A combined application as safety-relevant component with simultaneous pressure regulation/control is inadmissible! The place of installation must be selected so that a max. differential pressure of 2 % of the measuring range related to the membrane surface is not exceeded.
The temperature of the test prod and the electronics may not exceed the values specified in the technical data during running operations. Even if the permissible operating temperature is exceeded only briefly, it may affect the safety function of the sensor. In this case an inspection by the manufacturer is absolutely necessary.

Each use going beyond the described operating range is deemed as not intended.

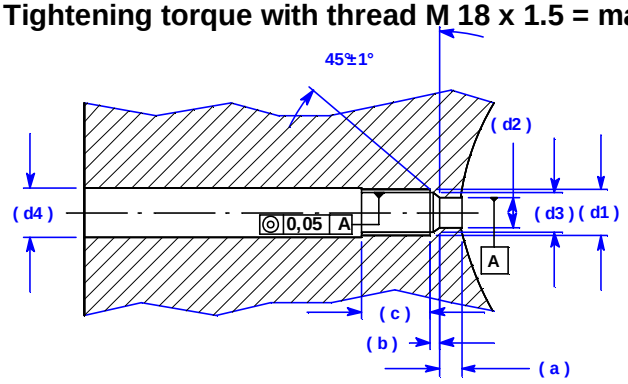
3. Hazard areas:
There is the risk of burning throughout the complete range of the heated melt pressure sensor. Through faulty assembly or disassembly of the pressure sensor during pressurisation there is the danger of hot mediums escaping under high pressure.

4. Disposal:
As our pressure sensors are mercury-free sensors, these can be disposed via the standard metal recycling system.

5. Transport and Storage:
Gräff pressure sensors are generally dispatched in individual packages. The front membrane is fitted with a protective cap against mechanical impacts. This protective cap should be screwed back on for any kind of intermediate storage.

6. Cleaning the Sensors:
To enable cleaning of the membrane, seal surface and the thread, the sensor must have the temperature of the melting point for plastic in this area. The membrane and seal surface can be cleaned with a soft cloth. The thread can be cleaned with a small brass brush.
(Never touch the membrane in this case!)

7. Assembly/Disassembly:
Assembly
When assembling the pressure sensor, attention must be paid that the sensor bore corresponds to the dimensions shown below. The accuracy of fit can be checked with the help of a test pin.
Before installation, the sensor thread should be greased with heat-resistant grease.
In case the machine part with the receiving bore is still at production temperature, a warm up time must be allowed for the sensor. The sensor would otherwise seize due to thermal expansion.
When screwing the sensor in, attention must be paid that it does not cant or fall into the bore. Attention must be paid that the force exercised for screwing the senor in is only applied to the shaft (hexagonal). The sensor head must not be twisted against the shaft.
Tightening torque with thread 1/2-20 UNF = max. 30 Nm
Tightening torque with thread M 18 x 1.5 = max. 50 Nm



d1	M18x1,5	½“20UNF 2A
d2	Ø 10.1 $^{+0.05}$	Ø 7.9 $^{+0.05}$
d3	Ø 16.1 $^{+0.1}$	Ø 10.7 $^{+0.1}$
d4	Ø 20 $^{+0.2}$	Ø 13 $^{+0.2}$
a	6.1 $^{-0.1}$	5.7 $^{-0.1}$
b	4 $^{-0.2}$	3.2 $^{-0.2}$
c	25	19

Dimensions of the assembly bore

Disassembly
The disassembly of the pressure sensor must be conducted in the heated up state (melting point of the plastic). When removing the sensor, attention must be paid that the membrane does not touch. Attention must be paid that the force exercised for screwing the senor out is only applied to the shaft (hexagonal). The sensor head must not be twisted against the shaft.

The most common cause for the failure of this type of pressure sensors is damage of the membrane when touching the melt during assembly and disassembly. Even the smallest damage to the membrane can affect the function of the sensor.
In the case of visible damage to the membrane the sensor should be checked by the manufacturer before it is used further.

8. Switching output for pressure monitoring

The pressure monitoring channel of the sensor fulfils the requirements corresponding to Performance Level C (PL `c`) according to EN13849-1 and can therefore, with corresponding involvement in the machine control, be used for overpressure protection according to EN1114-1. The switching output is closed in the “god-condition” and opens under the following conditions:

- Exceeding the pressure limit value set by the manufacturer
- Interruption of the supply voltage
- Interruption or short-circuit of a part of the measuring element
- Fault in the supply of the measuring element

The switching function must be tested at regular intervals, at least however once a year and the sensor checked for wear of the parts touching the melt, mechanical damage and measuring accuracy. It is recommended to have the manufacturer conduct the check.

When integrating the switching output into the machine control the following points must be observed:

- The maximum current of the switching output must be limited to 500 mA by means of a semiconductor fuse.
- An independent re-start of the pressure-producing units after falling below the switching threshold must be prevented by the machine control. The switching output of the sensor does not have a storing function.
- When using the safety output to monitor maximum pressure, the analogue output signal may be used to display pressure but not for pressure regulation/control by the machine control! (e.g. signal recording for downstream pressure display or machine control)

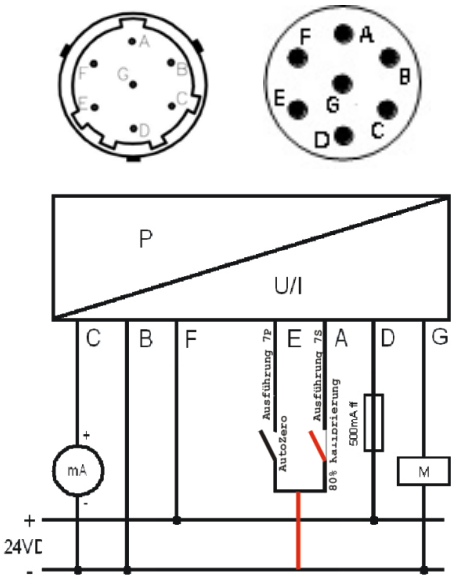
9. Pin assignment and start-up

After the pressure sensor has been installed in the system as described under Section 7, the electrical connection must be carried out as described in the following pin assignment. Gräff pressure sensors are equipped with high-quality, sturdy plug connections. Soldering of the connecting line should be carried out very carefully, as otherwise signal transmission errors can occur. We recommend using ready-assembled cables from Gneuß, which can be supplied ex stock.

Pressure sensors Type HPL are equipped with an integrated measuring amplifier, which, depending on version, supplies a standard signal corresponding to the pressure range. For start-up the sensor must be calibrated to the corresponding evaluation system. **The calibration must be conducted with a heated up and pressureless system**. The procedure is described in the following.
After completed assembly and adequate heating up of the pressure sensor, a zero point adjustment must be carried out by activating the **AUTO ZERO** function.
The **AUTO ZERO** function is triggered by a brief connection of the corresponding connecting lines (see connection assignment).

Eletrical connection **3-conductor Sensor** (Standard)
Connector Type **(62IN-5016-10-7P-4-M)**

4...20mA / 0-10VDC



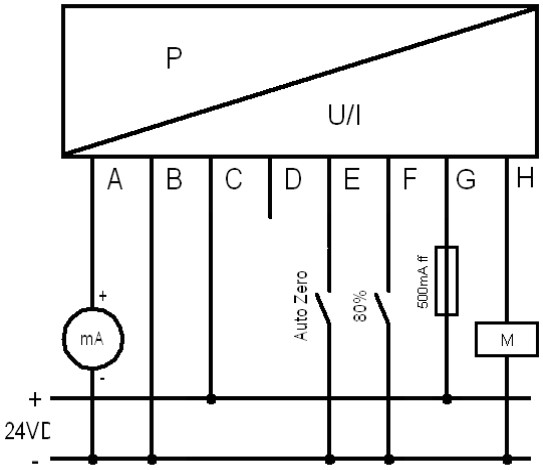
Pin	Function	Wire colour (sample)
A	Auto Zero (7P) / 80% (7S)	Yellow
B	Supply / Signal -	Grey
C	Signal +	White
D	Switching output (SSR)	Green
E	Auto Zero / to – (7S)	Brown
F	Supply +	Red or Pink
G	Switching output (SSR)	blue

Please check the colour code in our orderconfirmation!

To activate the Auto Zero function, PIN A with PIN E (Order Code 7P) or PIN A with Signal minus (Order Code 7S). To activate the 80% calibration (Order Code 7S) PIN A with signal minus. Only the zero point is shifted, signal amplification remains untouched, as it shits linear to the zero point.

Electrical connection **3-conductor Sensor** Connector Type: **P8** (PC06A-12-8P)

0/4...20mA
0…10V

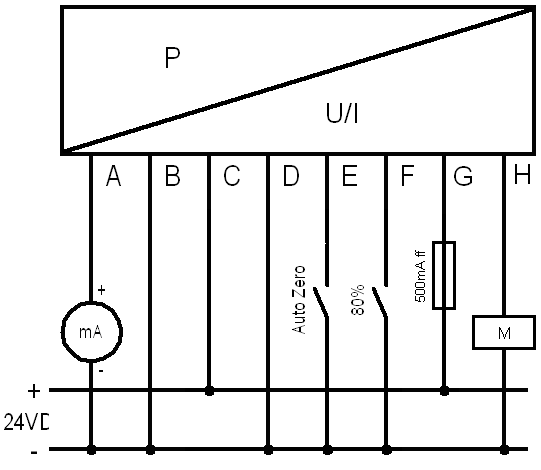


Pin	Function	Wire colour (sample)
A	Signal +	Yellow
B	Supply / Signal -	White
C	Supply +	Brown
D	Free	green
E	Auto Zero	Pink
F	80%	Gray
G	Switching output (semiconductor)	Red
H	Switching output (semiconductor)	blue

To activate the Auto Zero function, Pin E is connected with Supply -. Only the zero point is shifted. Signal amplification remains untouched, as it shifts linear to the zero point. To generate the 80 % signal Pin F must be connected with Supply - .

Electrical connection **4-conductor Sensor** Connector Type: **P8** (PC06A-12-8P)

0/4...20mA
0…10V



Pin	Function	Wire colour (sample)
A	Signal +	Yellow
B	Supply / Signal -	White
C	Supply +	Brown
D	Supply -	Green
E	Auto Zero	Pink
F	80%	Gray
G	Switching output (semiconductor)	Red
H	Switching output (semiconductor)	Blue

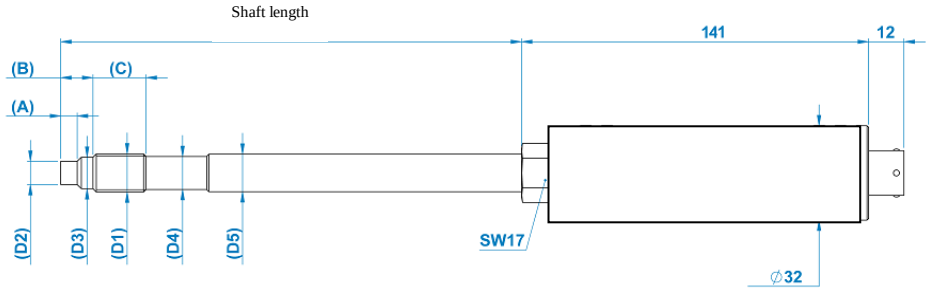
To activate the Auto Zero function, Pin E is connected with Supply -. Only the zero point is shifted. Signal amplification remains untouched, as it shifts linear to the zero point. To generate the 80 % signal Pin F must be connected with Supply -.

10. Technical Data:

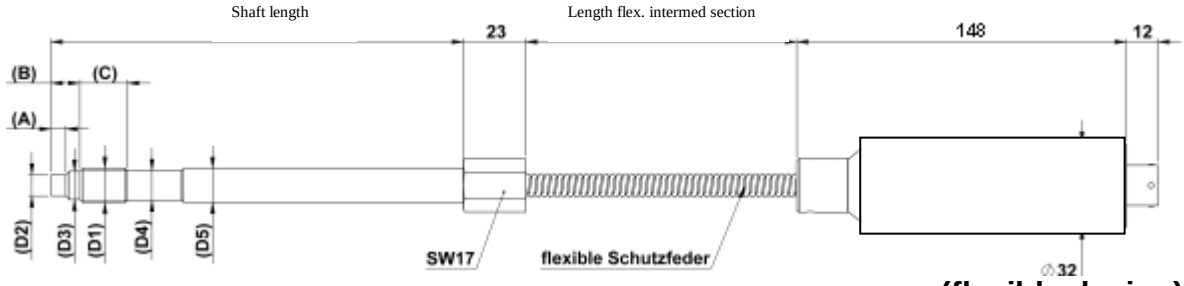
Pressure range:	See order code
Auxiliary energy:	10…30 VDC
Output signal:	0…10 V; 0…20 mA; 4…20 mA (see order code)
Calibration point:	80% of measuring range
Accuracy:	≤ ± 0.50 % FSO resp. ≤ ± 0.25 % FSO (see order code)
Maximum overload:	150% of measuring range
Zero point deviation with temperature change on membrane:	≤ ± 0.02 bar from Ew./℃
Zero point deviation with temperature change on measuring head :	≤ ± 0.003 % from Ew./℃
Max. temperature on membrane:	300℃ / 400 ℃ depending on the filling medium
Max. temperature on measuring head:	80 ℃
Switching output: *(Semiconductor, potential-free)*	Max. 48V AC/DC Max. 500mA On site, current limiting must be ensured via semiconductor fuses (fast, fast acting). On site, the switching point will be set according to customer specifications up to a max.100%!
EMV:	Increased interference immunity according to EN 61326-3-1
Protective type:	IP 55
Harmonised Standards:	EN 1114-1:2011, Section 5.2.5 EN ISO 13849-1:2008 (PL c/Cat. 1) EN 13849-2:2012 EN 50178:1997 EN 61326-3-1 EN ISO 9001:2008

Status: Rev02/2013-11-13

11. Dimensions



(solid design)



(flexible design)

D1	D2	D3	D4	D5	A	B	C	SW
M18x1.5	10 $^{-0.05}$	16 $^{-0.1}$	16 $^{-0.5}$	16	6 $^{-0.25}$	14	20	17
1/2“20UNF 2A	7.8 $^{-0.5}$	10.5 $^{-0.05}$	10.5 $^{-0.5}$	12.5	5.6 $^{-0.1}$	10.8	17	17
M10	6.0 $^{-0.5}$	8.53 $^{-0.05}$	8.5	8.5	6.5 $^{-0.25}$	11	16	14

Please see the order code for the available versions.

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