GEFRAN

SMART HART MERCURY FILLED MELT PRESSURE TRANSMITTERS FOR APPLICATIONS IN POTENTIALLY EXPLOSIVE ATMOSPHERES HMF SERIES - CURRENT OUTPUT FM AND SIL2 AND PL 'D APPROVED

4...20mA Output

The HMF series of Gefran are pressure transmitters with HART communication protocol for using in high temperature environment with explosive atmosphere presence.
The main characteristic of this series is the capability to read pressure of the media up to 400°C.
The constructive principle is based on the hydraulic trasmission of the pressure.
The fluid-filled system assures the temperature stability. The physical measure is transformed in a electrical measure by means of strain-gauge technology.
The SIL2 and PL d approvals make the product suitable for use in the Functional Safety applications, particularly in the process plants for the production of polymers, where it is an essential requirement.

MAIN FEATURES

- Pressure ranges from: 0-17 to 0-1000bar/0-250 to 15000 psi
- Extensimetric measurement principle
- Accuracy: < ±0.25% FS (H); < ±0.5% FS (M)
- FM approval for potentially explosive atmospheres
- SIL2 and PL d approvals for Functional Safety
- 1/2-20UNF, M18x1.5 standard threads, mounting flange ø 66.3mm (2.61")
- Standard diaphragm is 15-5 PH stainless steel with GTP+ coating
- 17-7 PH corrugated stainless steel diaphragm with GTP+ coating for ranges below 100 bar-1500 psi
- Other diaphragm types available on request

HMF0 The rigid rod configuration provides fast and easy installation.
HMF1 The flexible rod configuration is suitable for applications demanding greater thermal isolation and where installation would otherwise be difficult.
HMF2 This configuration lets you measure process pressure and temperature at the same point with a single installation (no FM approval available).
HMF3 The configuration with exposed tip is ideal for applications in limited space.
HMF4 Configuration with flange for specific applications.

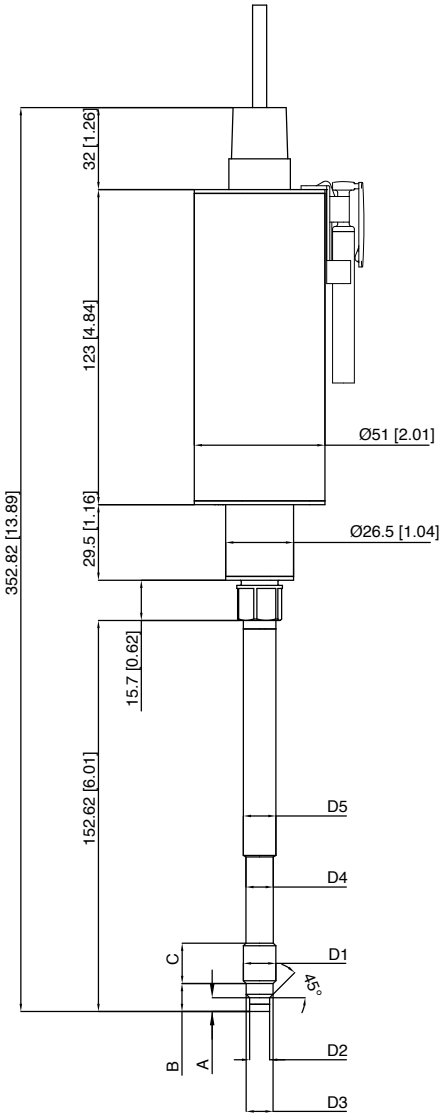
The transmitters have been designed and manufactured according to FM standards with the following types of protection and features:
- Explosion-proof (XP) for Class I, Division 1, Groups A, B, C and D
- Dust-Ignitionproof (DIP) for Classes II, III, Division 1, Groups E, F and G
- Indoor and outdoor areas classified as hazardous: Type 4X, IP67
- Rated ambient temperature of T5 Ta = -20°C to +85°C, T6 Ta = -20°C to +60°C

List of applicable standards:
- FM3600
- FM3615
- FM3616
- FM3810
- ANSI/NEMA 250
- ANSI/IEC 60529

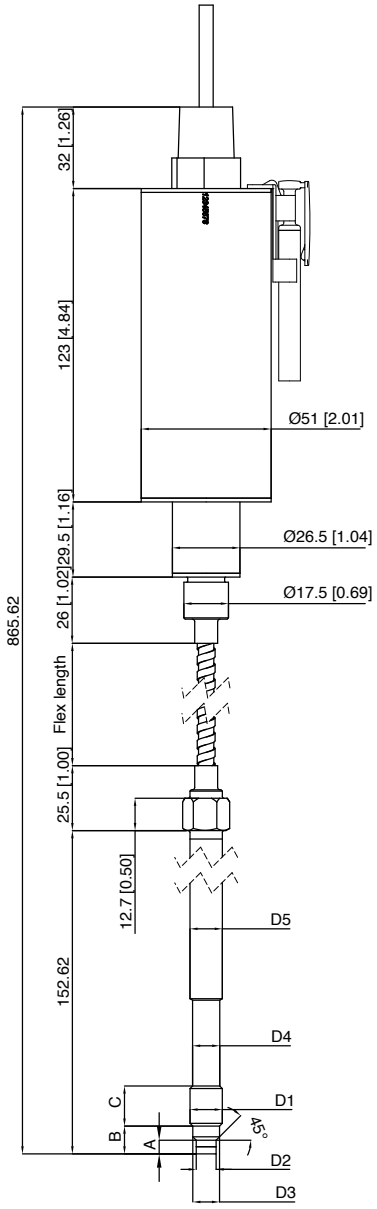
TECHNICAL SPECIFICATIONS	
Accuracy (1)	**H** <±0.25%FS (range ≥100bar/1500psi) **M** <±0.5%FS
Resolution	16 bit
Measurement range	0..17 to 0-1000bar 0..250 to 0..15000psi
Rangeability	3:1
Maximum overpressure (without degrading performances)	2 x FS 1.5 x FS above 1000bar/15000psi
Measurement principle	Extensimetric strain gauge
Power supply	13...30Vdc
Maximum current absorption	23mA
Output signal Full Scale (FS)	20mA
Zero balance (tollerance ± 0.25% FS)	4mA
Calibration signal	80% FS
Power supply polarity reverse protection	YES
Compensated temperature range housing	0...+85°C
Operating temperature range housing	-30...+85°C
Storage temperature range housing	-40...+125°C
Thermal drift in compensated range: Zero / Calibration / Sensibility	< 0.02% FS/°C
Diaphragm maximum temperature	400°C / 750°F
Zero drift due to change in process temperature (zero)	< 0.02 bar/°C
Standard material in contact with process medium	Diaphragm: • 15-5 PH with GTP+ coating • 17-7 PH corrugated diaphragm with GTP+ coating for ranges <100bar (1500psi) Stem: • 17-4 PH
Thermocouple (model HMF2)	STD: type "J" (isolated junction)
Protection degree	IP67, NEMA 4X
SIL2 certification PL 'd certification	IEC/EN 62061 / IEC 61508 EN ISO 13849
FS = Full scale output (1) BFSL method (Best Fit Straight Line): includes combined effects of Non-Linearity, Hysteresis and Repeatability (according to IEC 62828-2)	

MECHANICAL DIMENSIONS

HMF0



HMF1



D1	1/2 - 20UNF
D2	ø7.8 -0.05 [ø0.31" -0.002]
D3	ø10.5 -0.025 [ø0.41" -0.001]
D4	ø10.67 [ø0.42"]
D5	ø12.7 [ø0.5"]
A	5.56 -0.26 [0.22" -0.01]
B	11.2 [0.44"]
C	15.74 [0.62"]
Ch [Hex]	16 [5/8"]

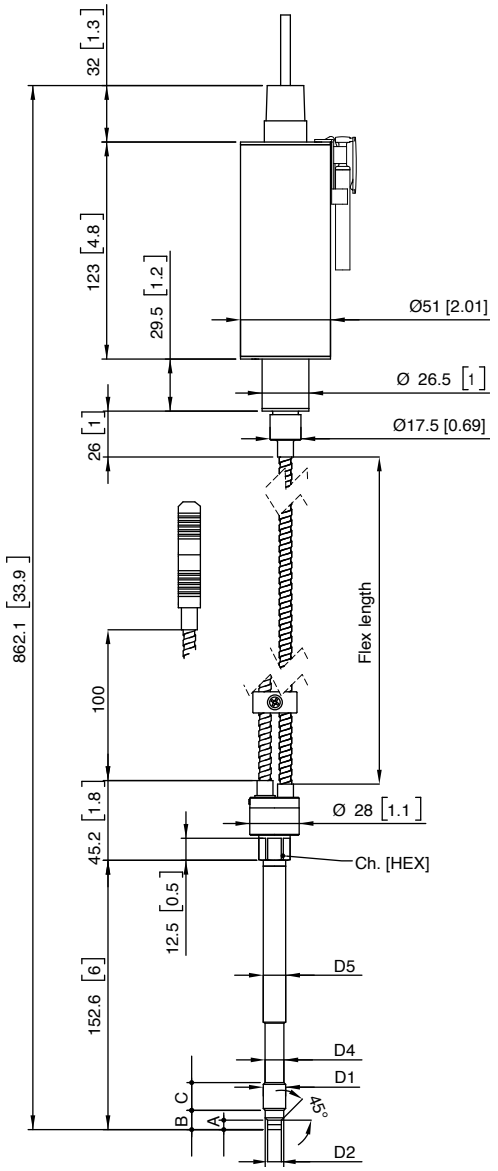
D1	M18x1.5
D2	ø10 -0.05 [ø0.394" -0.002]
D3	ø16 -0.08 [ø0.63" -0.003]
D4	ø16 -0.4 [ø0.63" -0.016]
D5	ø18 [ø0.71"]
A	6 -0.26 [0.24" -0.01]
B	14.8 -0.4 [0.58" -0.016]
C	19 [0.75"]
Ch [Hex]	19 [3/4"]

NOTE: dimensions refer to rigid stem length option "4" (153 mm– 6")

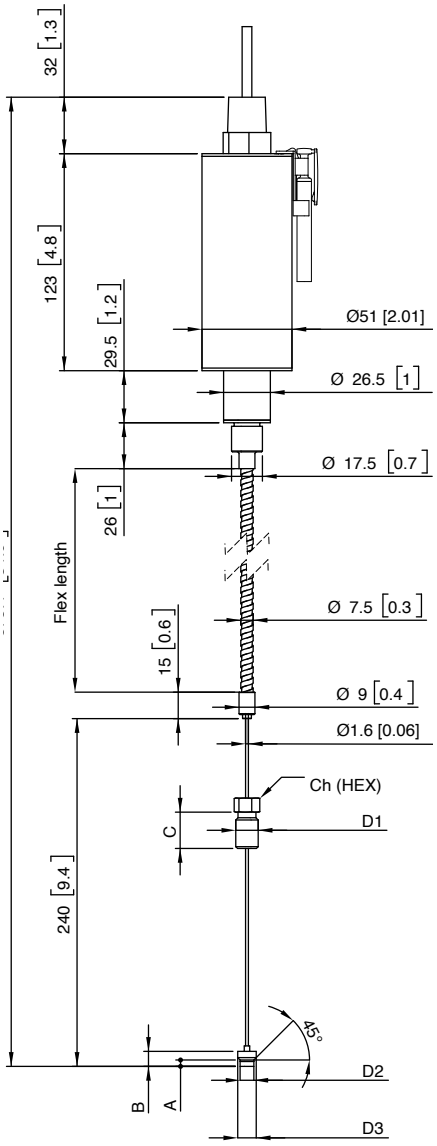
WARNING: For installation use a maximum tightening torque of 56 Nm (500 in-lb)

MECHANICAL DIMENSIONS

HMF2



HMF3



D1	1/2 - 20UNF
D2	ø7.8 -0.05 [ø0.31" -0.002]
D3	ø10.5 -0.025 [ø0.41" -0.001]
D4	ø10.67 [ø0.42"]
D5	ø12.7 [ø0.5"]
A	5.56 -0.26 [0.22" -0.01]
B	11.2 [0.44"]
C	15.74 [0.62"]
Ch [Hex]	16 [5/8"]

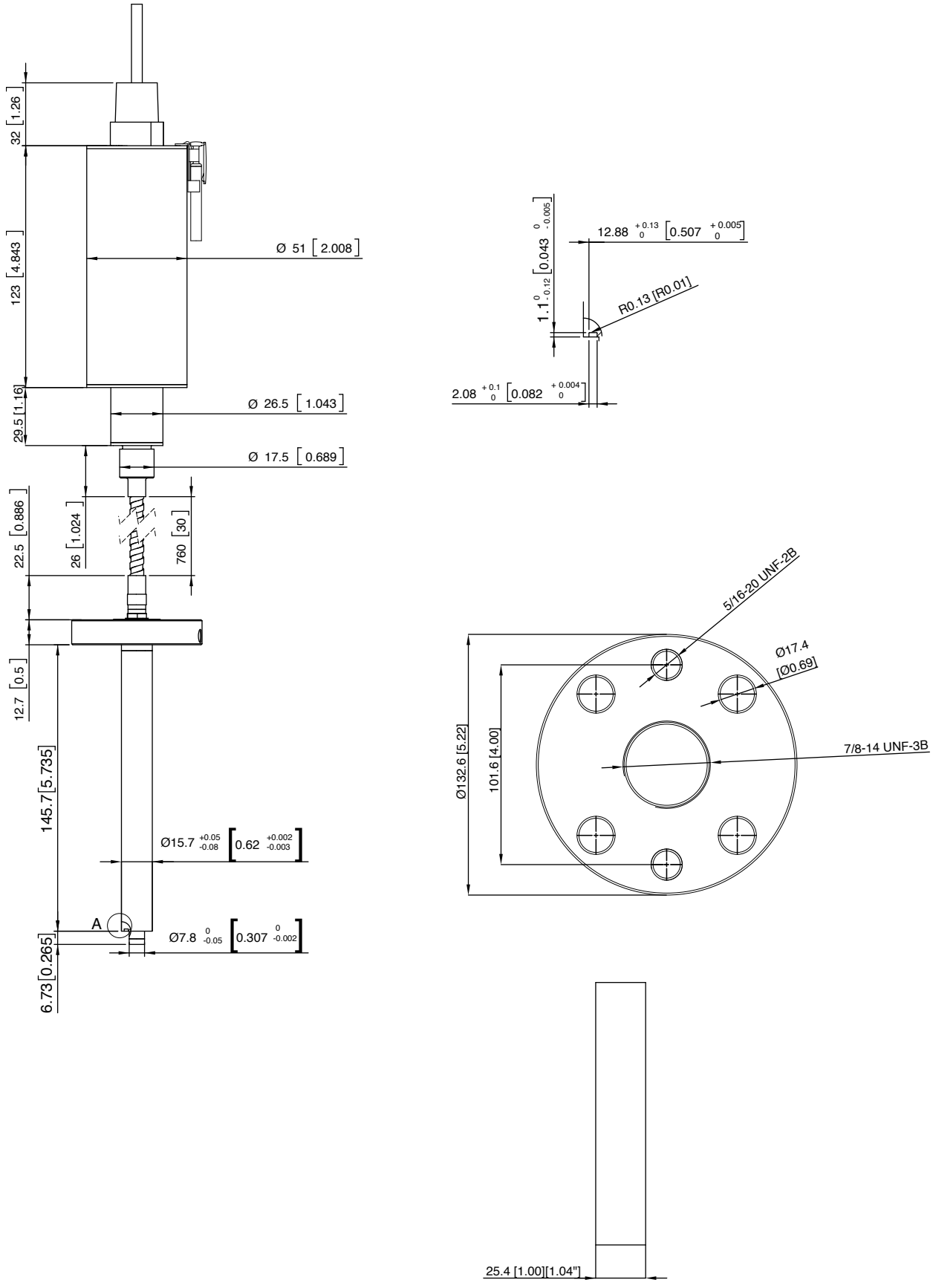
D1	M18x1.5
D2	ø10 -0.05 [ø0.394" -0.002]
D3	ø16 -0.08 [ø0.63" -0.003]
D4	ø16 -0.4 [ø0.63" -0.016]
D5	ø18 [ø0.71"]
A	6 -0.26 [0.24" -0.01]
B	14.8 -0.4 [0.58" -0.016]
C	19 [0.75"]
Ch [Hex]	19 [3/4"]

NOTE: dimensions refer to rigid stem length option "4" (153 mm– 6")

WARNING: For installation use a maximum tightening torque of 56 Nm (500 in-lb)

MECHANICAL DIMENSIONS

HMF4



NOTE: dimensions refer to rigid stem length option “4” (153 mm– 6”)

SELF DIAGNOSTICS (ONLY FOR SIL2 / PL d VERSIONS)

Below the conditions detected by the sensor self-diagnostics:
· Cut cable / device non connected / broken power supply, output ≤ 3.6mA
· Pin detachment output ≤ 3.6mA
· Broken primary element ≥21mA
· Pressure above 200% of the span, output ≥21mA
· Voltage monitor in case of overvoltage/undervoltage/voltage variation in the electronics, output ≤ 3.6mA (*)
· Program sequence error, output ≤ 3.6mA (*)
· Overtemperature on the electronics, output ≤ 3.6mA (*)
· Error on the primary element output or on the first amplification stage, output ≥ 21mA

(*) *In such conditions the Alarm Type can be programmed via HART at ≥ 21 mA.*

NAMUR COMPLIANCE (ONLY FOR SIL2 / PL d VERSIONS)

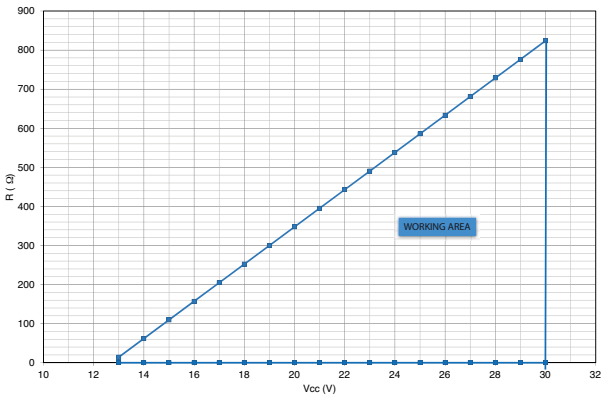
The sensors are tested according to Namur NE21 recommendations. The same compatibility is valid for the NE43 Namur recommendation with the following sensor behaviour in case of breakdown:
· Cut cable: breakdown information as the signal is ≤ 3.6mA
· Device not connected: breakdown information as the signal is ≤ 3.6mA
· Broken power-supply: breakdown information as the signal is ≤ 3.6mA
or in case of performance problems:
· Broken primary element ≥ 21mA
· Pressure above 200% of the span, output ≥21 mA
· Others ≤ 3.6mA(*)

(*) *In such a condition the Alarm Type can be programmed via HART at ≥ 21 mA.*

Note: in all the remaining situations, the output signal is always included between 3.8 and 20.5mA.

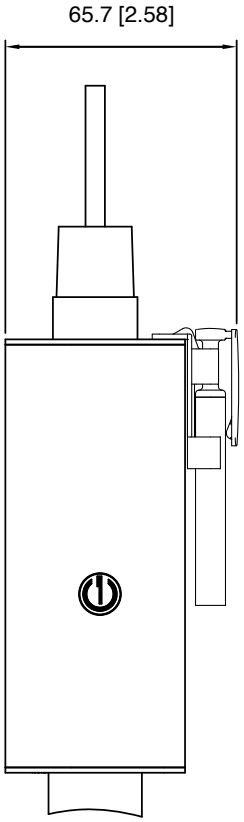
Recommendation: the error level set by the customer (e.g. maximum pressure value) has to be inside the nominal range.

LOAD DIAGRAM



The diagram shows the optimum ratio between load and power supply for transmitters with 4…20mA output.
For correct function, use a combination of load resistance and voltage that falls within the two lines in the graph above.

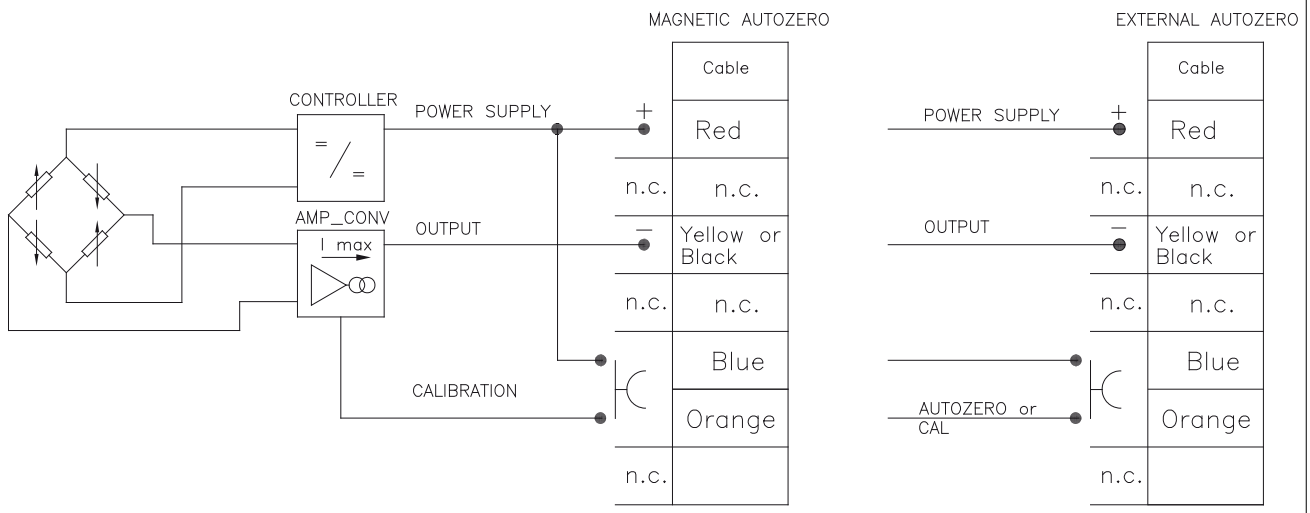
AUTOZERO FUNCTION



The Autozero function is activated through a magnetic contact (external magnet supplied with the sensor).
The Autozero function can be activated through HART command as well.
See the manual for a complete Autozero function explanation.

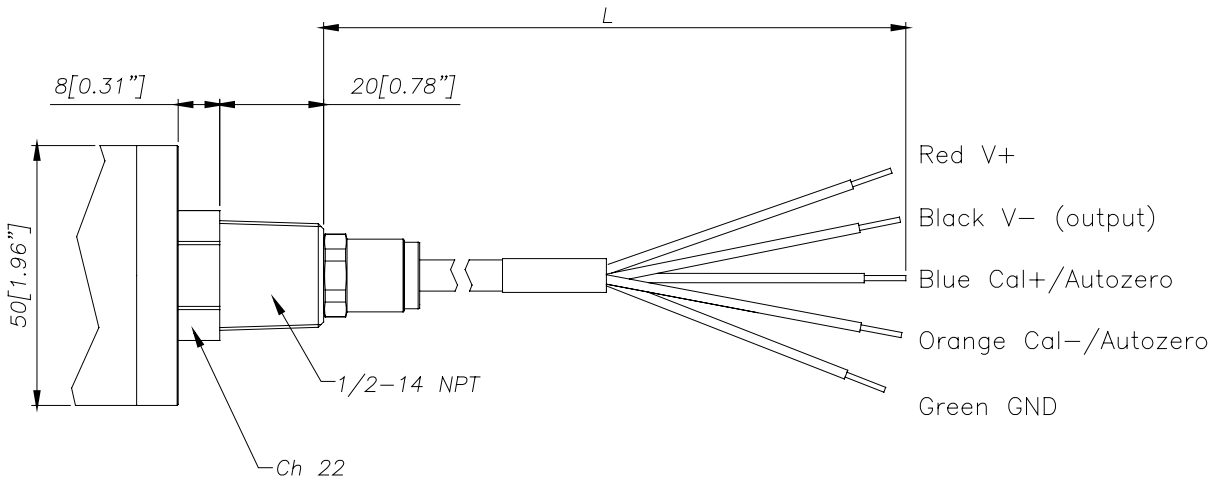
ELECTRICAL CONNECTIONS

CURRENT OUTPUT



The cable shield is tied to both sides, i.e. to the sensor connector and to the controller

Cable outlet (1/2 14-NPT)
Current output
L = 1 m



ACCESSORIES

Accessories	
Mounting bracket	**SF18**
Dummy plug for 1/2-20UNF	**SC12**
Dummy plug for M18x1.5	**SC18**
Drill kit for 1/2-20UNF	**KF12**
Drill kit for M18x1.5	**KF18**
Cleaning kit for 1/2-20UNF	**CT12**
Cleaning kit for M18x1.5	**CT18**
Fixing pen clip	**PKIT1032**
Autozero pen	**PKIT378**
Thermocouples for model HMF2	
Type “J” (for rigid rod 153mm - 6”)	**TTER 601**

Cable color code	
Conn.	**Wire**
A-2	Red
B-4	Black
C-1	White
D-6	Green
E-7	Blue
F-3	Orange
5	Grey
8	Pink

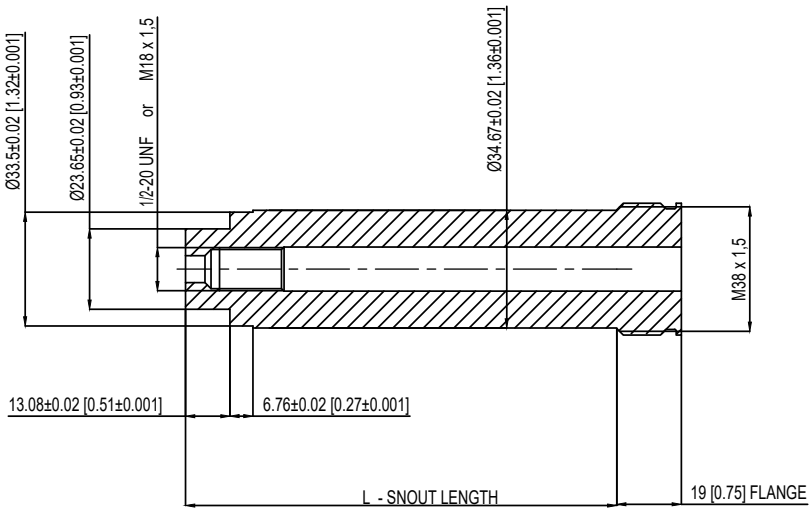
PROCESS FLANGE ADAPTER

The process flange adapter is a sensor accessory that allows for the installation of 1/2-20 UNF or M18x1.5 melt pressure sensor in a button seal style process mounting port. The adapter is made with an adapter body with different snout lengths plus an adpter flange available in different sizes (see tables and drawing below). Each combination of snout and flange is available according to the ordering information with a specific ordering code.

SPECIFICATIONS

- Pressure range: according to the selected sensor (up to 1000 bar/15000 psi max)
- Temperature range: according to the selected sensor
- Material of construction: 17-4PH Stainless steel

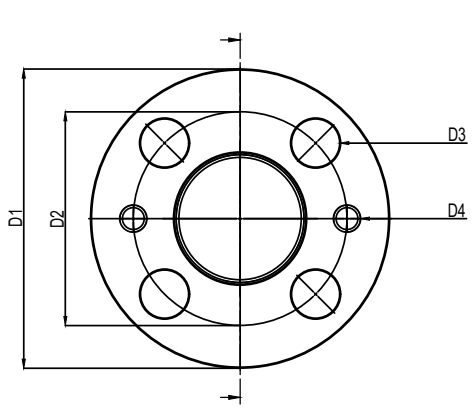
ADAPTER BODY

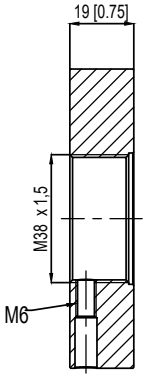


1/2-20 UNF	L -SNOUT LENGTH
STE1020	127 [5]
STE1021	51,6 [2,031]

M18 X 1,5	L - SNOUT LENGTH
STE1022	127 [5]
STE1023	51,6 [2,031]

ADAPTER FLANGE





	FLA960	FLA961
D1	82,6 [3,25]	88,9 [3,50]
D2	54 [2,14]	63,5 [2,50]
D3	13,2 [0,52]	14,3 [0,56]
D4	5/16-18 UNC	5/16-18 UNC

ORDER CODE

KIT - 5 - 0 - 1

Snout length	
5 inch [127 mm]	**5**
2,031 inch [51,6 mm]	**2**

Flange type (see technical drawing)	
FLA960	**0**
FLA961	**1**

Thread dimensions	
1/2-20 UNF	**1**
M18 x 1,5	**4**

ADAPTER GASKESTS			
Material	**Dimensions**	**Max Pressure**	**Ord. Code**
Aluminium	30.2 mm [1.19”] OD 24.1 mm [.950”] ID	200 bar/3000 psi	RON360
AISI 303 SS	30.2 mm [1.19”] OD 24.1 mm [.950”] ID	700 bar/10000 psi	RON361

Example:

KIT501

Process adapter with 5” snout length, 82.6 mm size flange, suitable for 1/2-20 UNF melt sensor

ORDER CODE

HM -□-□-□-□-□□-□-□-□-□-□-□ **0000 X 000 X 0**

000= Special executions

OUTPUT SIGNAL	
4...20mA	**F**

VERSION	
Rigid rod	**0**
Rigid + flexible rod	**1**
With thermocouple	**2**(*)
Exposed capillary	**3**
Flange mounting	**4**

(*) Not FM Approved

CONNECTOR	
NPT Cable	**N**

ACCURACY CLASS	
0.25% FS (ranges ≥ 100 bar/1500 psi)	**H**
0.5% FS	**M**

MEASUREMENT RANGE			
bar		**psi**	
17	**B17U**	250	**P25D**
35	**B35U**	500	**P05C**
50	**B05D**	750	**P75D**
70	**B07D**	1000	**P01M**
100	**B01C**	1500	**P15C**
200	**B02C**	3000	**P03M**
350	**B35D**	5000	**P05M**
500	**B05C**	7500	**P75C**
700	**B07C**	10000	**P10M**
1000	**B01M**	15000	**P15M**

THREADING	
Standard	
1/2 - 20 UNF	**1**
M18 x 1.5	**4**
Flange mounting ø 66.3mm (2.61")	**6**

	Tclass	Tamb
5	T5	-20°C / 85°C
6	T6	-20°C / 60°C
0	No FM certified	

E	External Autozero (*)
0	Magnetic Autozero

(*) as an alternative to the CAL function

P	Performance Level='d'
S	SIL2
0	Standard 4...20mA

FLEXIBLE ROD LENGTH (mm/inches)		
Standard (HMF0)		
0	**none**	
Standard (HMF1, HMF2, HMF4)		
D	457mm	18"
E	610mm	24"
F	760mm	30"
Standard (HMF3)		
L	711mm	28"
Available on request		
A	76mm	3"
B	152mm	6"
C	300mm	12"
G	914mm	36"
H	1067mm	42"
I	1220mm	48"
J	1372mm	54"
K	1520mm	60"

RIGID ROD LENGTH HMF0, HMF1, HMF2, HMF3 (mm/inches)		
Standard (HMF0, HMF1, HMF2)		
4	153mm	6"
5	318mm	12.5"
Standard (HMF3)		
0	**none**	
Available on request		
1	38mm	1,5"
2	50mm	2"
3	76mm	3"
6	350mm	14"
7	400mm	16"
8	456mm	18"
RIGID ROD LENGTH HMF4 (mm/inches)		
Standard (HMF4)		
4	153mm	6"
Available on request		
H	102mm	4"
M	229mm	9"
5	305mm	12"

Example
HMF1-N-M-B07C-1-4-D-0-0-5 2130X000X00
Melt pressure transmitter, 4...20mA output with HART protocol, NPT cable, 1/2-20 UNF threading, 700 bar pressure range, 0.5% accuracy, 153 mm (6") rigid rod, 457 mm (18") flexible rod, FM approval temperature class T5 (-20°C...+85°C).

Sensors are manufactured in compliance with:
- EMC compatibility directive: 2014/30/EU
- FM standard (for FM approved versions only)
- Machinery Directive: 2006/42/EC (For SIL2/PL d approved versions only)

Product designed and available in compliance with Directive 2011/65/EU (RoHS II) only for large-scale stationary installation or industrial tools, or for B-to-B laboratory equipments for R&D purposes.
Electrical installation requirements and conformity certificate are available on our web site: www.gefran.com

GEFRAN spa
via Sebina, 74
25050 PROVAGLIO D'ISEO (BS) - ITALIA
tel. 0309888.1 - fax. 0309839063
Internet: http://www.gefran.com