

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

4...20mA Output



#### MAIN FEATURES

- Pressure ranges from: 0-35 to 0-1000 bar / 0-500 to 0-15000 psi
- Accuracy: < ±0.25% FS (H); < ±0.5% FS (M)</li>
- · 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")
- · Autozero function on board / external option
- · 17-7 PH corrugated diaphragm with GTP+ coating

HWF0 The rigid rod configuration provides fast and easy installation

- HWF1 The flexible rod configuration is suitable for applications demanding greater thermal isolation and where installation would otherwise be difficult.
- HWF2 This configuration lets you measure process pressure and temperature at the same point with a single installation (no FM approval available).
- HWF3 The configuration with exposed tip is ideal for applications in limited space.

HWF4 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

The HWF 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 315°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.

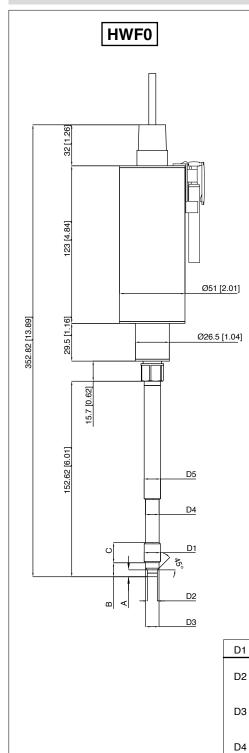
### **TECHNICAL SPECIFICATIONS**

Accuracy (1)	H <±0.25%FS (range ≥100bar/1500psi) M <±0.5%FS
Resolution	16 Bit
Measurement range	035 to 01000bar 0500 to 015000psi
Rangeability	3:1
Maximum overpressure (without degrading performances)	2 x FS 1.5 x FS above 500bar/7500psi
Measurement principle	Extensimetric strain gauge
Power supply	1330Vdc
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 protec- tion	YES
Compensated temperature range housing	0+85°C
Operating temperature range hou- sing	-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	315°C / 600°F
Zero drift due to change in process temperature (zero)	< 0.04 bar/°C
Standard material in contact with process medium	Diaphragm: • 17-7 PH corrugated diaphragm with GTP+ coating Stem: • 17-4 PH
Thermocouple (model HWF2)	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	na); includes combined

(1) BFSL method (Best Fit Straight Line): includes combined effects of

Non-Linearity, Hysteresis and Repeatability (according to IEC 62828-2)

# **MECHANICAL DIMENSIONS**



				32 [1.26]		
				123 [4.84]		j
			865.62	25.5 [1.00] Flex length 26 [1.02]29.5 [1.16]		
				152.62 25.5	12.7 [0.50]	
	Di	Miovi F			B C	
<b>1/2 - 20UNF</b> Ø7.8 -0.05 [Ø0.31" -0.002]	D1 D2	M18x1.5 ø10 -0.05 [ø0.394" -0.002]			1	
ø10.5 -0.025 [ø0.41" -0.001]	D3	ø16 -0.08 [ø0.63" -0.003]				
ø10.67 [ ø0.42" ]	D4	ø16 -0.4 [ø0.63" -0.016]				
ø12.7 [ø0.5"]	D5	ø18 [ø0.71"]				
5.56 -0.26 [ 0.22" -0.01 ]	A	6 -0.26 [ 0.24" -0.01 ]				
11.2 [ 0.44" ]	В	14.8 -0.4 [ 0.58" -0.016 ]				
15.74 [ 0.62" ]	С	19 [ 0.75" ]				
16 [ 5/8" ]	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)

D5

А

В

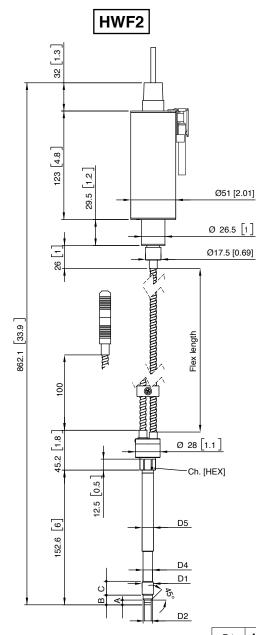
С

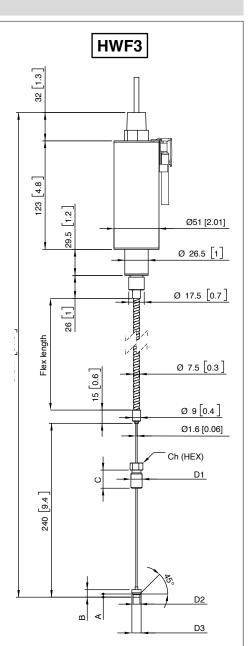
Ch

[Hex]

HWF1 Ø51 [2.01] Ø26.5 [1.04] -Ø17.5 [0.69] 1 1 1 L D5 D4 D1 £5, 7 D2 D3

# **MECHANICAL DIMENSIONS**



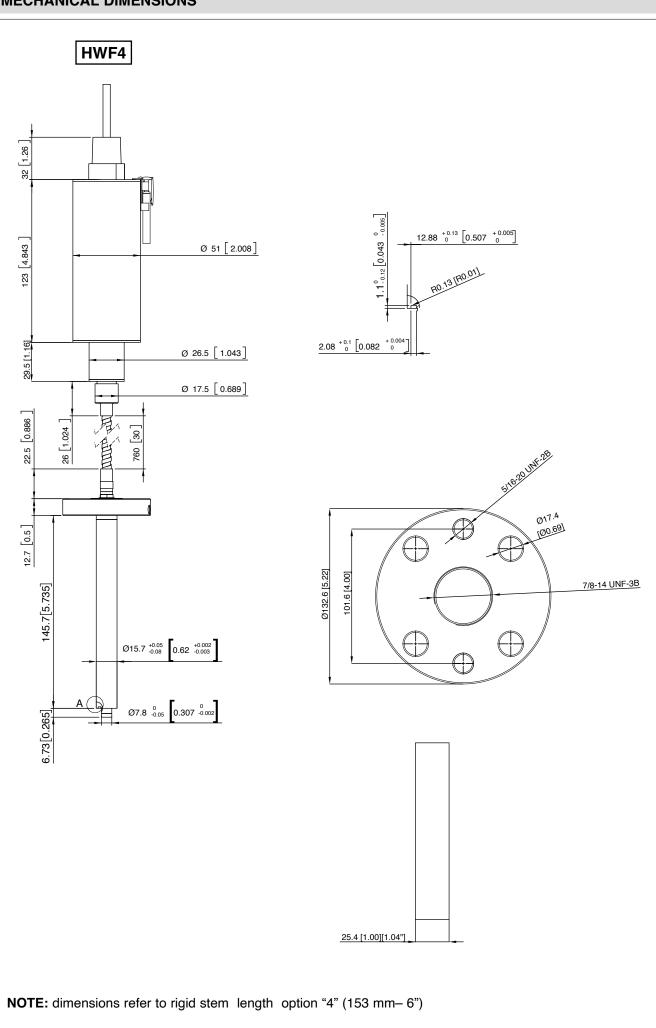


D1	1/2 - 20UNF	D1	M18x1.5
D2	ø7.8 -0.05 [ø0.31" -0.002]	D2	ø10 -0.05 [ø0.394" -0.002]
D3	ø10.5 -0.025 [ø0.41" -0.001]	D3	ø16 -0.08 [ø0.63" -0.003]
D4	ø10.67 [ø0.42"]	D4	ø16 -0.4 [ ø0.63" -0.016 ]
D5	ø12.7 [ø0.5"]	D5	ø18 [ ø0.71" ]
A	5.56 -0.26 [ 0.22" -0.01 ]	A	6 -0.26 [ 0.24" -0.01 ]
В	11.2 [ 0.44" ]	В	14.8 -0.4 [ 0.58" -0.016 ]
с	15.74 [ 0.62" ]	С	19 [ 0.75" ]
Ch [Hex]	16 [ 5/8" ]	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**



## 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  $\leq$  3.6mA
- · Broken primary element ≥21mA
- $\cdot$  Pressure above 200% of the span, output  $\ge\!\!21mA$
- · Voltage monitor in case of overvoltage/undervoltage/voltage variation in the electronics, output ≤ 3.6mA (\*)
- · Program sequence error, output  $\leq$  3.6mA (\*)
- $\cdot$  Overtemperature on the electronics, output  $\leq$  3.6mA (\*)
- · Error on the primary element output or on the first amplification stage, output  $\geq 21$ mA

(\*) In such conditions the Alarm Type can be programmed via HART at  $\geq$  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:

- $\cdot$  Cut cable: breakdown information as the signal is  $\leq$  3.6mA
- $\cdot$  Device not connected: breakdown information as the signal is  $\leq$  3.6mA
- $\cdot$  Broken power-supply: breakdown information as the signal is  $\leq$  3.6mA
- or in case of performance problems:
- Broken primary element  $\geq$  21mA
- $\cdot$  Pressure above 200% of the span, output ≥21 mA
- $\cdot$  Others  $\leq$  3.6mA(\*)

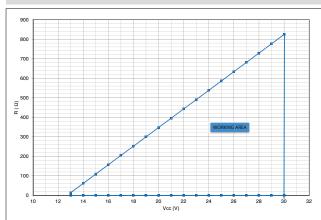
(\*) In such a condition the Alarm Type can be programmed via HART at  $\ge 21$  mA.

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

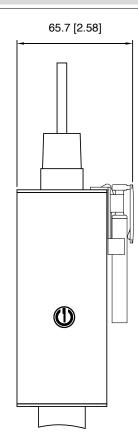


**Recommendation**: the error level set by the customer (e.g. maximum pressure value) has to be inside the nominal range.

## 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.



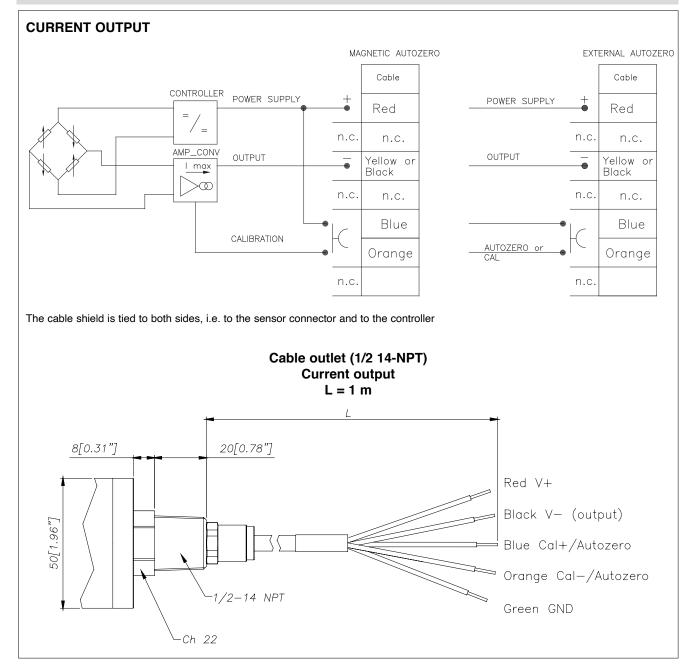
The Autozero function is activated through a magnetic contact (external magnet supplied with the sensor).

The Autozero function can be activated through HART command as well.

See the manual for a complete Autozero function explanation.

## AUTOZERO FUNCTION

# **ELECTRICAL CONNECTIONS**



# ACCESSORIES

Mounting bracket Dummy plug for 1/2-20UNF Dummy plug for M18x1.5	SF18 SC12 SC18		Cable color code		
Drill kit for 1/2-20UNF	KF12	Conn.	Wire		
Drill kit for M18x1.5	KF18	A-2	Red		
Cleaning kit for 1/2-20UNF	CT12	B-4	Black		
Cleaning kit for M18x1.5	CT18	C-1	White		
Fixing pen clip	PKIT1032	D-6	Green		
Autozero pen	PKIT378	E-7	Blue		
		F-3	Orange		
Thermocouples for model HWF2		5	Grey		
Type "J" (for rigid rod 153mm - 6")	<b>TTER 601</b>	8	Pink		

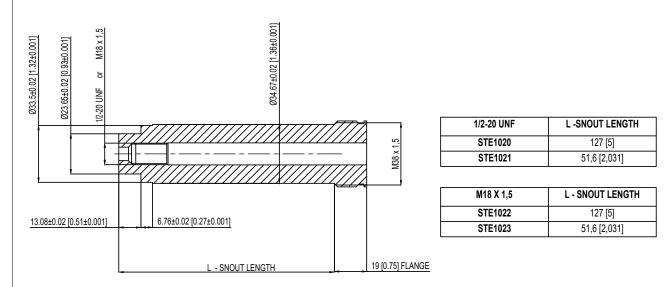
# **PROCESS FLANGE ADAPTER**

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.

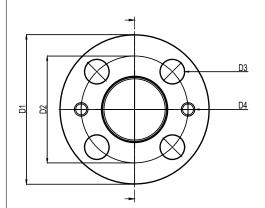
### SPECIFICATIONS

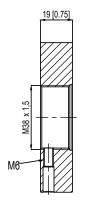
- Pressure range: according to the selected sensor (up to 1000 bar/15000 psi max)
- Temperature range: according to the selected sensor
- Material of construction: 17-4PH Stainless steel

## ADAPTER BODY



### 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 I	ength	
5 inch [127 mm]	5	
2,031 inch [51,6 mm]	2	
Flange type (see technical dra	wing)	
FLA960	0	
FLA961	1	
Thread dimen	sions	ļ
1/2-20 UNF	1	
M18 x 1,5	4	1

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**

	JE													
			HW	φ-φ-	Π-C	<b> </b> - [	]-口-	[	]-[	]- [	00	00   X   00	00	X 0
											00	0= Special exe	ecutior	IS
	OUTPUT	SIGNAL -										Tclass	-	Tamb
	420mA	F									5	T5		C / 85°C
											6	T6	-20°	C / 60°C
	VI										<b>0</b> No	FM certified		
	Rigid rod	0									E	External A	utozer	o (*)
Rigid +	flexible rod	1									0	Magnetic A	Autoze	ro
With the	ermocouple	2(*)									(*) as an a	alternative to the	e CAL	function
Expose	ed capillary	3										Derfermen		ما نمان
Flang	e mounting	4									P	Performance	ce Lev	el='d'
(*) Not FM Ap	proved										S	SIL2		
	CONN	ECTOR									0	Standard 4	20m	A
	NPT Cable										FLEXIBL	E ROD LENG	i <b>TH</b> (m	m/inches)
		IN									Standard	d (HWF0)		
	ACCURACY	CLASS									0	none		
0.25% FS	6 (ranges ≥										Standar	d (HWF1, HW	F2, H	WF4)
	r/1500 psi)	н									D	457mm		18"
	0.5% FS	М									E	610mm		24"
											F	760mm		30"
	N	<b>IEASUREM</b>	ENT RANGE									d (HWF3)		
b	ar		osi								L	711mm		28"
35	B35U	500	P05C								Available	e on request		3"
50	B05D	750	P75D								B	152mm		
70	B07D	1000	P01M								C	300mm		12"
100	B01C	1500	P15C								G	914mm		36"
200	B02C	3000	P03M								н	1067mm		42"
350	B35D	5000	P05M								I	1220mm		48"
500	B05C	7500	P75C								J	1372mm		54"
700	B07C	10000	P10M								к	1520mm		60"
1000	B01M	15000	P15M									D LENGTH H		
											HWF3 Standard	I (HWF0, HWF		(mm / inche
			THREADING								4	153mm	1,111	6"
			Standard								5	318mm		12.5"
		1/2 - 20 UNF	1								Standard	d (HWF3)		
		M18 x 1.5	5 4								0	none		
Flange r	mounting ø 66	.3mm (2.61")	) 6								Availabl	e on request		
											1	38mm		1,5"
nnlo											2	50mm		2"
nple <b>-1-N-M-B07C</b> -	1-4-D-P-0-0-	5 2130X000	X00								3	76mm		3"
pressure t				HART	proto	col, N	PT c	able,	0.5	%	6	350mm		14"
iracy, 700 bar	•	0		•	•	') rigid ı	rod, 4	57 mr	n (18	5")	7	400mm		16"
ble rod, FM ap				°C85°(	<i>.</i> .						8	456mm		18"
sors are manu		•											HWF	I (mm/inche
EMC compatit	•		U									d (HWF4)		
FM standard (			s only)								4	153mm		6"
Machinery Dire		•				• ·						e on request		4 11
trical installati .gefran.com	ion requirem	ents and co	onformity certi	ficate are	e availa	able on	our w	eb site	э:		H	102mm		4"
.genan.com											M	229mm		9"
											5	305mm		12"

GEFRAN spa reserves the right to make any kind of design or functional modification at any moment without prior notice.



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