

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)
- · 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.

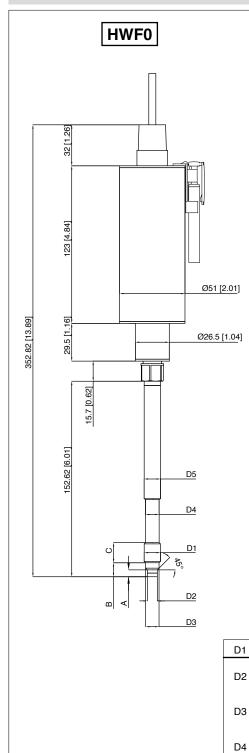
TECHNICAL SPECIFICATIONS

| 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 | |
| 1/2 - 20UNF 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

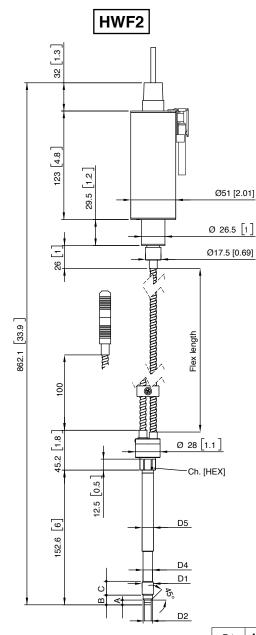
С

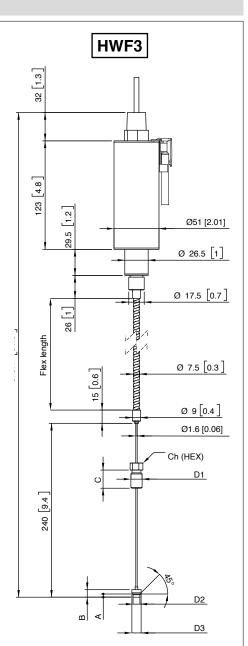
Ch

[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



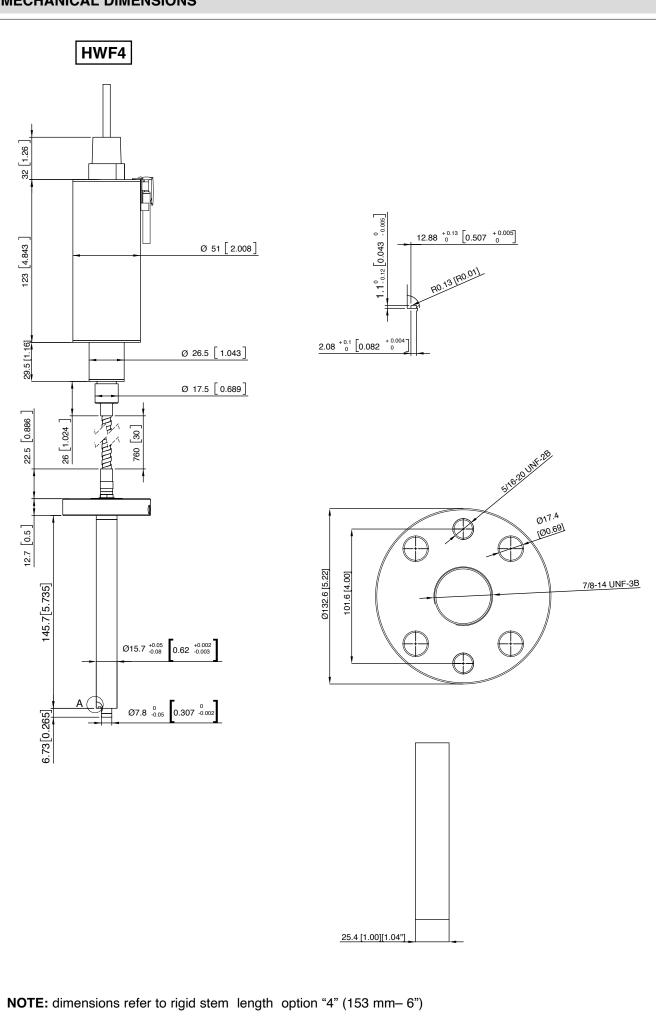


| D1 | 1/2 - 20UNF | D1 | M18x1.5 |
|-------------|---------------------------------|-------------|-------------------------------|
| D2 | ø7.8 -0.05 [ø0.31" -0.002] | D2 | ø10 -0.05 [ø0.394" -0.002] |
| D3 | ø10.5 -0.025 [ø0.41" -0.001] | D3 | ø16 -0.08 [ø0.63" -0.003] |
| D4 | ø10.67 [ø0.42"] | D4 | 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 ≥ 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(*)

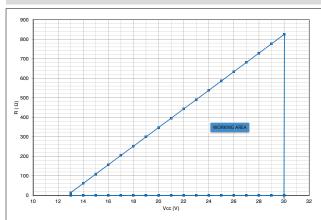
(*) In such a condition the Alarm Type can be programmed via HART at ≥ 21 mA.

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

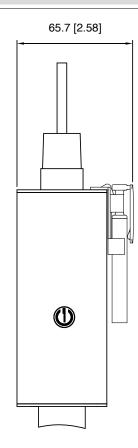


Recommendation: the error level set by the customer (e.g. maximum pressure value) has to be inside the nominal range.

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.



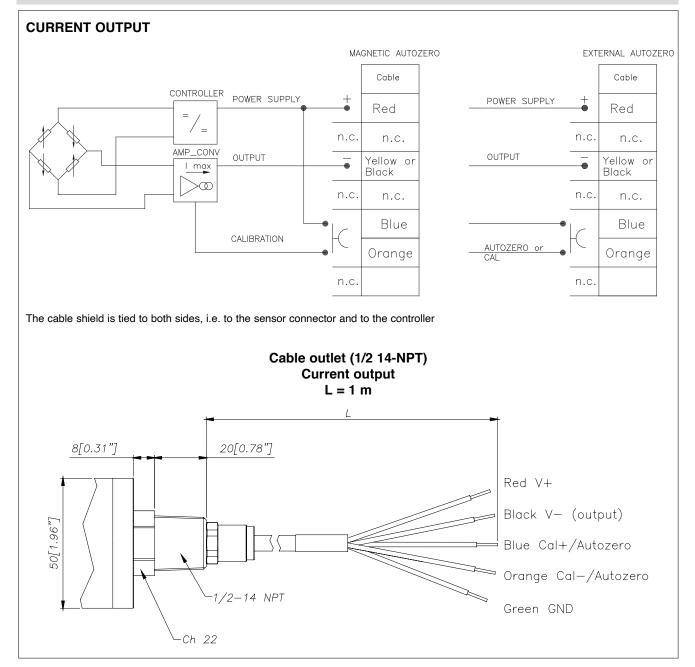
The Autozero function is activated through a magnetic contact (external magnet supplied with the sensor).

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") | TTER 601 | 8 | Pink | | |

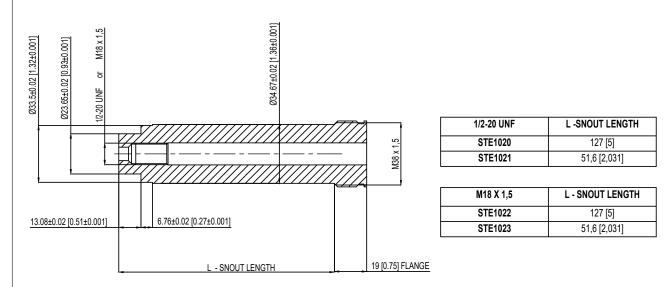
PROCESS FLANGE ADAPTER

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.

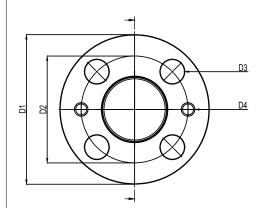
SPECIFICATIONS

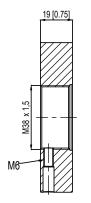
- Pressure range: according to the selected sensor (up to 1000 bar/15000 psi max)
- Temperature range: according to the selected sensor
- Material of construction: 17-4PH Stainless steel

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 | - [|]-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 | | | | | | | | | | 0 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 TH (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 | IEASUREM | 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 -1-N-M-B07C - | 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.



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