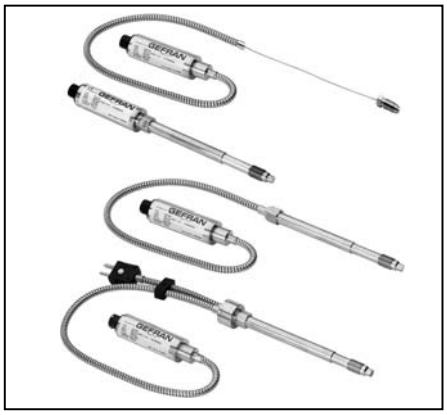
GEFRAN

USER'S AND MAINTENANCE MANUAL

MELT PRESSURE TRANSDUCERS/TRANSMITTERS



The M, W and K series melt pressure transducers and transmitters measure pressure in high temperature locations by hydraulic transmission of the pressure signal to a strain gauge element.

Following these instructions will ensure the maximum lifetime possible for the transducer.

Contents

The Transducer Mounting Hole

Machining the Mounting Hole (see diagram, pg. 2)

The transducer mounting hole must be accurately machined in order to:
- prevent tip damage upon installation;
- ensure reliable output; and
- increase transducer life span.

To simplify the machining process, drill kits are available for 1/2-20 and M18x1.5 mounting holes.

Drill Kit Code	KF12	KF18
Thread Type	1/2-20 UNF-2B	M18x1.5
1 	Ø 9/32" [7.6 mm]	Ø 9.75 mm
2 	Ø 5/16" [7.95 mm]	Ø 10.1 mm
3 	Ø 17/32" [13 mm]	Ø 20 mm
4 	Ø 29/64" [11.5 mm] with pilot guide	Ø 16 mm with pilot guide
5 	1/2-20 UNF-2B coarse	M18x1.5 coarse
6 	1/2-20 UNF-2B fine	M18x1.5 fine

1) Drill the starter hole using tool 1.

2) Ream out the hole with tool 2.

3) Make a second wider hole to the distance of (a+b+c) from the inside surface (tool 3)

4) Form the sealing seat at a distance of (a) from the inner surface (tool 4)

5) Start forming the thread with the coarse thread tap (tool 5)

6) Finish the thread using the fine thread tap to a distance of (a+b) (tool 6)

Refer to page 3 of the manual for diagrams and details on mounting hole dimensions.

Check the Dimensions

To prevent transducer damage, the dimensions of the mounting hole must be verified before installation.

Particular care should be taken to align and center the threads with respect to the hole (concentric within .002" [.05 mm]). To prevent interference or damage due to buildup of extruded material, the hole must not be too deep or too shallow.

The closure shaft (SC12 for 1/2-20 holes, SC18 for M18x1.5 holes) can be used to confirm mounting hole dimensions as follows:

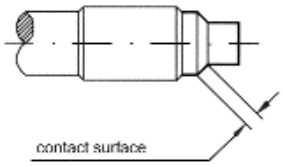
1) Paint the end of the shaft with the appropriate ink.

2) Lubricate the threads to avoid excessive friction.

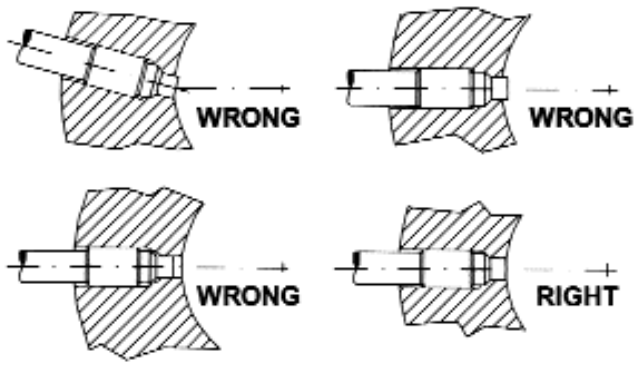
3) Insert the shaft, and screw it down against the bottom of the hole.

4) Remove the shaft and examine it.

The ink should be intact on all surfaces except the 45º contact surface.

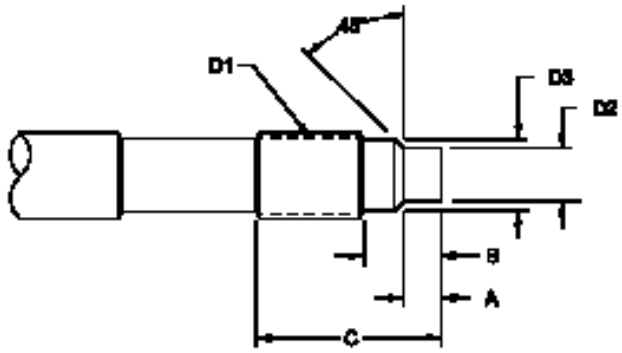


Correct Installation



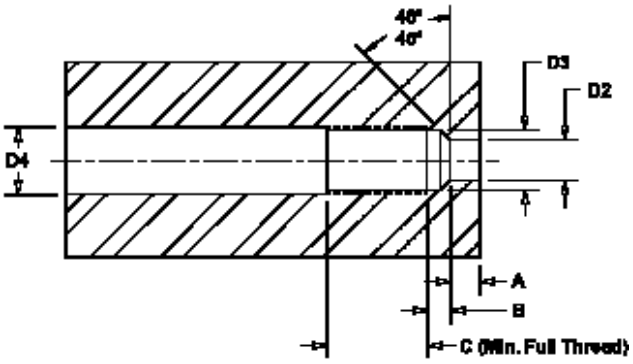
Mounting Hole & Transducer Mechanical Dimensions

Tip Dimensions



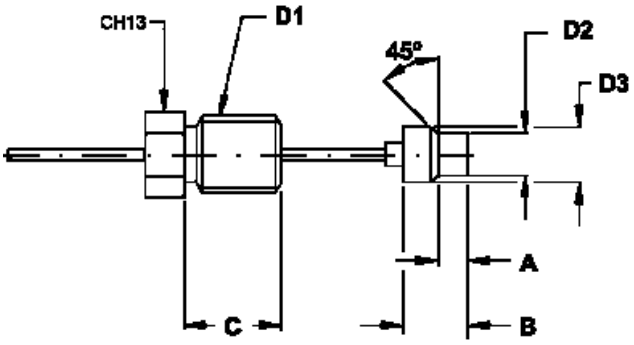
D1	1/2-20 UNF	M10x1.0	M14x1.5	M18x1.5
D2	.307/.305" [7.80/7.75mm]	.236/.234" [5.99/5.94mm]	.307/.305" [7.80/7.75mm]	.394/.392" [10.01/9.96mm]
D3	.414/.412" [10.52/10.46mm]	.336/.334" [8.53/8.48mm]	.475/.470" [12.07/11.94mm]	.630/.627" [16.00/15.92mm]
A	.219/.209" [5.56/5.31mm]	.256/.246" [6.50/6.25mm]	.236/.226" [5.99/5.74mm]	.236/.226" [5.99/5.74mm]
B	.450" [11.43mm]	.430" [10.92mm]	.480" [12.19mm]	.590" [14.98mm]
C	1.07" [27.2mm]	1.06" [26.9mm]	1.28" [32.5mm]	1.34" [34.0mm]

Mounting Hole Dimensions



D1	1/2-20 UNF	M10x1.0	M14x1.5	M18x1.5
D2	.313 ±.001" [7.95 ±.03mm]	.241 ±.001" [6.12 ±.03mm]	.319 ±.001" [8.10 ±.03mm]	.398 ±.001" [10.10 ±.03mm]
D3	.454 ±.004" [11.53 ±.10mm]	.344 ±.004" [8.74 ±.10mm]	.478 ±.004" [12.14 ±.10mm]	.634 ±.004" [16.10 ±.10mm]
D4	.515" [13mm] minimum	.515" [13mm] minimum	.630" [16mm] minimum	.790" [20mm] minimum
A	.225" [5.72mm] minimum	.263" [6.68mm] minimum	.240" [6.10mm] minimum	.240" [6.10mm] minimum
B	.17" [4.3mm] maximum	.11" [2.8mm] maximum	.16" [4.0mm] maximum	.16" [4.0mm] maximum
C	.75" [19mm]	.75" [19mm]	.75" [19mm]	.99" [25mm]

Exposed Capillary



Tip Dimensions (see diagram, left)

D1	1/2-20 UNF
D2	.307/.305" [7.80/7.75mm]
D3	.414/.412" [10.52/10.46mm]
A	.125/.120" [3.18/3.05mm]
B	.318/.312" [8.08/7.92mm]
C	.81" [20.6mm]

Mounting Hole Dimensions (see diagram, above)

D1	1/2-20 UNF
D2	.313 ±.001" [7.95 ±.03mm]
D3	.454 ±.004" [11.53 ±.10mm]
D4	N/A
A	.130" [3.30mm] minimum
B	.15" [4.3mm] maximum
C	N/A

Order Codes for Tools & Accessories

MOUNTING BRACKET	SF 18

CLEANING TOOL KIT	CT [ ]
1/2-20 UNF	12
M18x1.5	18

DUMMY PLUG	SC [ ]
1/2-20 UNF	12
M18x1.5	18

DRILL KIT	KF [ ]
1/2-20 UNF	12
M18x1.5	18

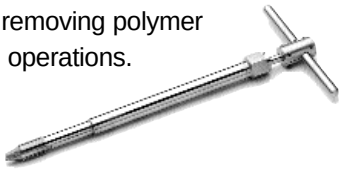
Transducer Installation

Installation Steps

1. Make sure the mounting hole is correctly machined. If installing the transducer into a previously used hole, make sure the hole is thoroughly cleaned to remove any plastic residue.
2. Remove the protective cap from the transducer tip.
3. Lubricate the threads with a high-temperature anti-seize, such as *Neverseez* by Bostik, or *C5A* by Felpro.
4. Thread the transducer into the hole hand-tight, then 1/4 turn with a wrench.
5. Recommended tightening torque for the *M, W and K Series* is 150 inch-pounds (17 N-m); maximum torque is 500 inch-pounds (56.5 N-m).

Cleaning the transducer seat

It is always necessary to clean the mounting hole before inserting the transducer. The cleaning tool is a hard metal scraping tool, designed for removing polymer residue left during previous operations.



The cleaning operation must be performed while the material is in the fluid state.

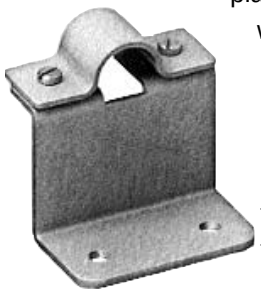
1. Insert the tool into the seat, and screw in the scraper holder incrementally, normally 1/4 turn each.
2. Rotate the scraper pilot clockwise until there is no resistance to its movement.
3. Repeat the operation until the hole is completely clean.

The maximum torque that can be placed on the scraper is 15 N-m (1.5 kgm). Should the blockage in the hole require greater force, the drill kit must be used (see first section, “Machining the Mounting Hole”).

The cleaning tool is available for 1/2-20 UNF mounting holes (CT12) and M18x1.5 mounting holes (CT18).

Mounting Bracket

Transducers with flexible armor require fixed housing placement to prevent interference with measurements. A mounting bracket (code SF18) is recommended to keep the housing firmly in place. The bracket must be in a location free from vibration, where the ambient temperature does not exceed the maximum housing temperature of the installed sensor. Rigid stem units do not require extra housing support.



Extruder start-up

Once the transducer is installed, bring the system up to its operating temperature. Wait until all the material is at the same temperature and fully molten to avoid any solid material damaging the transducer.

Removal

If it is required to continue work without the transducer installed, closure shafts with identical mechanical dimensions are available.

Shafts are available for 1/2-20 UNF holes (SC12) and M18x1.5 holes (SC18). Both versions are rated up to 30,000 psi (2,000 bar).

Proper Care & Handling

The most delicate part of the transducer is the “process diaphragm”, the tip that makes direct contact with the process fluid. The process diaphragm should always be protected from mechanical shock or abrasion.

Follow these guidelines to prolong transducer life:

1. Remove the transducer *only* while the extruder is empty, not under pressure, *and at operating temperature.* An attempt to remove the transducer from a cold extruder may cause diaphragm damage due to polymer adhesion.
2. To help protect the process diaphragm from damage or abrasion, it is recommended that the transducer always be covered with its protective cap while not in the machine.
3. Molten polymer should be cleaned from the transducer with a clean, dry cloth while the tip is still hot. Solidified polymer can be removed using solvents or a fluidized bed cleaning system. *Tools such as wire wheels or abrasive cloths should* ***never*** *be used to clean the process diaphragm.*
4. Before installing the transducer into a machine that has already been used, ensure that the mounting hole is perfectly clean. If necessary, remove any plastic residue using the appropriate cleaning tools. Forcing the transducer tip against solidified polymer will overload the transducer and create a high zero offset.
5. The transducer mounting hole must be correctly machined to prevent transducer damage. (See first section, “Transducer Mounting Hole,” for complete details.)

Wiring & Calibration

Wiring

The power supply/instrument end of the cable should be wired as shown below. Under normal conditions, the transducer will operate normally with the cable shield not terminated at the instrument end of the cable. However, in high-frequency (RF) environments, it may be necessary to connect this shield to ground.

Calibration procedure

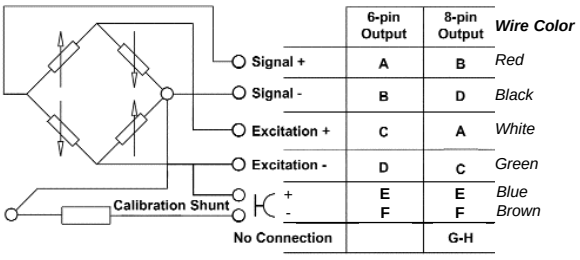
A readout or measuring instrument can be calibrated to provide precise pressure indication in the desired engineering units.

1. Bring the system to operating temperature without applying pressure the the transducer. A zero shift due to temperature will be observed. *This zero shift is normal and does not affect the span or linearity.*
2. For transmitters, the zero shift is corrected by using the procedures on the following pages.
3. For non-amplified units, perform calibration procedure according to instrument instructions. Full-scale pressure is set by using the R-Cal, which is factory-set at 80% of full-scale pressure. R-Cal output is achieved by shorting the blue (pin E) and brown (pin F) wires.
   a. Zero the indication on the instrument to compensate for the zero drift due to temperature.
   b. Perform calibration of the instrument to display the calibration value (approx. 80% of full-scale output).
   c. If instrument no longer indicates the zero correctly, repeat steps a & b.

Note:
Calibration wire polarity should be observed only if indicated in the instrument's wiring instructions.

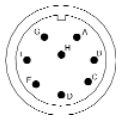
Transducer/Transmitter Wiring Diagrams

Transducers (mV/V Output)



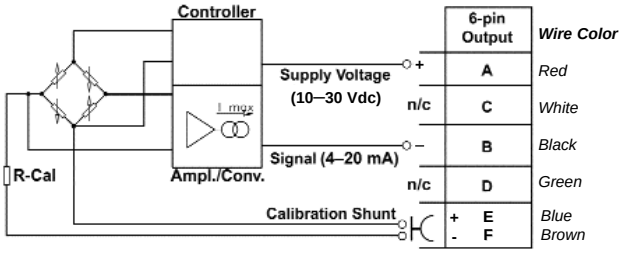
	6-pin Output	8-pin Output	Wire Color
Signal +	A	B	Red
Signal -	B	D	Black
Excitation +	C	A	White
Excitation -	D	C	Green
Calibration Shunt +	E	E	Blue
Calibration Shunt -	F	F	Brown
No Connection		G-H	

PT02A10-6P
6-pin Connector



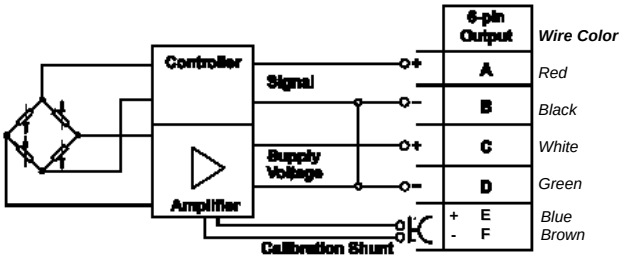
PC02E-12-8P
8-pin Connector

Transmitters (Current Output)



	6-pin Output	Wire Color
+	A	Red
n/c	C	White
–	B	Black
n/c	D	Green
+ Calibration Shunt	E	Blue
- Calibration Shunt	F	Brown

Transmitters (Voltage Output)

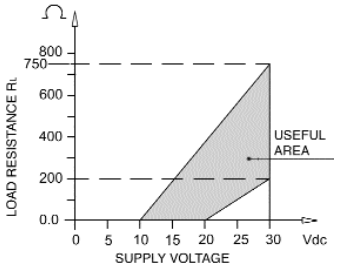


	6-pin Output	Wire Color
+	A	Red
–	B	Black
+	C	White
–	D	Green
+	E	Blue
-	F	Brown

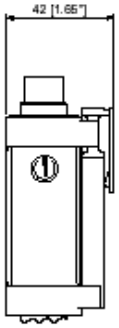
Load Diagram for Current Output

The diagram shows the optimum ratio between the load and supply voltage of the 4-20 mA transmitter.

For correct use, choose a combination of load resistance and supply voltage from the shaded area.



Transmitter Adjustments

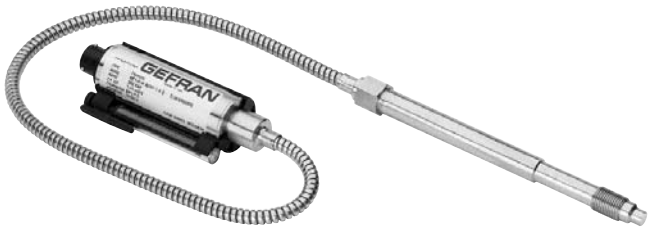


The Autozero Function is activated through a magnetic contact (external magnet supplied with the sensor).

See the Instructions on the following pages for a complete explanation of all transmitter functions.

Transducers	**M3, M2, W3, W2**
Supply Voltage: 6-12 Vdc (10 Rec.) Output: 2.5 or 3.33 mV/V	
Transmitters – Current Output	**ME, WE, KE**
Supply Voltage: 10–30 Vdc (24 Rec.) Output: 4-20 mA Instrument Load: 750 Ω (max. @ 30 Vdc) 600 Ω (max. @ 24 Vdc)	
Transmitters – Voltage Output	**MH, MN, MB, MC, WM, WN, KN**
Supply Voltage: 15–30 Vdc (24 Rec.) Output: Vdc (see data sheets for values) Instrument Load: 3000 Ω minimum Supply Current: 3.0 mA minimum	
Transmitters – Voltage Output	**MN, ML -15 – 15 Vdc power supply**
Supply Voltage: -15 – 15 Vdc Output: Vdc (see data sheets for values) Instrument Load: 3000 Ω minimum Supply Current: 3.0 mA minimum	

Transmitter Operation & Calibration (M, W, K Series)



The Transmitter will remain in the normal operating mode until one of the described functions is enabled using either the supplied Magnetic Pen or the optional External Zero.

Contents

1) AUTOZERO

The Autozero function is activated by *either* a. or b.

a. Positioning the magnet pen near the Autozero label on the shell of the sensor for a period between 1 and 10 seconds.

b. Short-circuiting pins E-F for a period between 1 and 10 seconds.

AVAILABLE ONLY WITH THE OPTIONAL EXTERNAL AUTOZERO FEATURE LIMITS: SEE TABLE 1

The Autozero function results:

1) The effect of the Autozero function will be visible after 2 seconds from the start.
2) The zero value precision is defined by the accuracy class of the sensor.
3) See Table 1 for defined limits of the Autozero function.

It is possible to have a short duration overcurrent up to 7mA during the Autozero operation.

2) FINE-AUTOZERO

The Fine-Autozero function is activated by *either* a. or b.

a. Positioning the magnet pen near the Autozero label on the shell of the sensor for a period between 10 and 30 seconds.

b. Short-circuiting pins E-F for a period between 10 and 30 seconds. (available only with the optional External Autozero feature).

After removing the magnet or releasing the E-F short, the output signal will begin changing value in steps with 5 second intervals.

Touch the Autozero area or produce a momentary E-F short (External Autozero option) to stop the signal variation.

Limits: See Table 1

The Fine-Autozero function results:

1) The effect of the Fine-Autozero function will be visible after removing the magnet or releasing the E-F short.
2) The zero value precision is defined by the accuracy class of the sensor.
3) See Table 1 for defined limits of the Autozero function.
4) The output signal will change within a range of ±100mV (±1.6mA for current). The change decreases in steps of 6mV (12uA for current).
5) The signal step will stop immediately once the Autozero area is touched with the magnet or a momentary short of the E-F wires (External Autozero option).

It is possible to have a short duration overcurrent up to 7mA during the Fine-Autozero operation.

Figure 1 *Figure 2* *Figure 3*

Figure 1: Magnetic Pen

Figure 2: Autozero Label on sensor housing

Figure 3: Position of Pen while activating the function

Autozero: This function allows you to reset the signal offset and can be activated only in the range noted in Table 1.

FS Pressure	% FS Adjustment
<= 35 Bar (500 PSI)	100%
36-99 Bar (500-1500 PSI)	40%
100-199 Bar (1500-2890 PSI)	20%
>= 200 Bar (>= 2900 PSI)	10%

Table 1

3) Calibration Check

Start Calibration check:

a. The calibration check function is activated by shorting pins E-F for a minimum time of 1 second.

b. To stop the calibration check, release the E-F short.

Not available with the optional External Autozero feature

Limits: The zero unbalance must be within ±20% FS

The Calibration Check results:

1) The signal will be electrically unbalanced to produce an 80% FS output.
2) The effect is visible 2 seconds after shorting the E-F pins. It is possible to have a short duration overcurrent up to 7mA during the calibration operation.

In the event that the power supply is switched off while the calibration is enabled, it will be necessary to perform a Partial Reset Function described below.

4) Autospan

The Autospan function is activated in three steps:

Step a. Apply zero pressure then activate the Autozero function.

Step b. Apply FS pressure (±5% FS) then;

Short pins E-F and leave shorted

After a minimum of 1 second, activate the Autozero Function.

After a minimum time of 1 second, release the E-F short.

Step c. Apply zero pressure then activate the Autozero function.

The transmitter will be calibrated at the new Zero and Span values within the accuracy class of the sensor. It is possible to improve the calibration precision by repeating the Autospan function several times.

The Autospan function cannot be accomplished if you have the External Autozero option.

Limits: The zero unbalance must be within ±10% FS.

The span unbalance must be within ±5% FS.

5) Partial Reset of Calibration Values

The Partial Reset function is activated by positioning the magnetic pen near the Autozero label for a time between 30 and 60 seconds.

The zero output of the transmitter will be reset to the factory calibration and an Autozero function will be initiated automatically.

The span calibration will be unchanged.

6) Total Reset of Calibration Values

The Total Reset function is activated by positioning the magnetic pen near the Autozero label for a time greater than 60 seconds.

The zero and span output of the transmitter will be reset to the factory calibration.

Recycling and Disposal

Gefran's M Series melt pressure products contain mercury. They should be returned to Gefran, Inc. at the end of their useful life for proper recycling and disposal.

This page intentionally left blank

This page intentionally left blank

GEFRAN, Inc. 8 Lowell Ave, Winchester MA 01890 USA
Phone: 781-729-5249 | Fax: 781-729-1468 | Internet: www.gefran.com