GEFRAN

MELT PRESSURE TRANSMITTERS
ILK SERIES IO-LINK VERSION



The ILK Performance Level 'd'/SIL2 series of Gefran are pressure transmitters for using in high temperature environment with IO-Link output.
The main characteristic of this series is the capability to read temperature of the media up to 538°C (1000°F).
The constructive principle is based on the hydraulic trasmission of the pressure.
The fluid-filled system assures the temperature stability thanks to the filling fluid Nak (Potassium/Sodium).
This "Smart" transmitter with IO-Link output is ready for "Industry 4.0" requirements.

ILK is Gefran's exclusive series of high-temperature pressure sensors with NaK filling fluid and digital output.
This new series ILK with "**IO-Link**" interface is a Smart device specifically designed to meet the requirements of "**Industry 4.0**" environment, with auxiliary information suitable to prevent machine downtime and thanks to the "**mercury free**" solution it can withstand up to **538°C** of process temperature.
In addition, with **PLd** and **SIL2** approvals, the ILK series is the best solution for "functional safety" applications.

MAIN FEATURES

- Pressure ranges from:
  0-17 to 0-1000 bar / 0-250 to 0-15000 psi
- Accuracy: < ±0.25% FS (H); < ±0.5% FS (M)
- "Mercury free" hydraulic transmission system for pressure signal guarantees stability at working temperature (NaK).
- 1/2-20UNF, M18x1.5 standard threads; other types available on request
- Inconel 718 diaphragm with GTP+ coating for temperatures up to 538°C (1000°F)
- 15-5 PH diaphragm with GTP+ coating for temperatures up to 400°C (750°F)
- Hastelloy C276 diaphragm for temperatures up to 300°C (570°F)
- 17-7 PH corrugated diaphragm with GTP+ coating for ranges below 100bar-1500psi up to 400°C (750°F)
- Stem material: 17-4 PH
- IO-Link output, ready for "Industry 4.0"
- Rangeabilty: 3:1
- PLd and SIL2 approvals for Functional safety
- Autozero function
- Auxiliary information over IO-Link protocol

GTP+ (advanced protection)
Coating with high resistance against corrosion, abrasion and high temperature

AUTOZERO FUNCTION

All signal variations in the absence of pressure can be eliminated by using the Autozero function.
This Autozero function is activated via IO-Link command.
The procedure is allowed only at zero pressure.

TECHNICAL SPECIFICATIONS

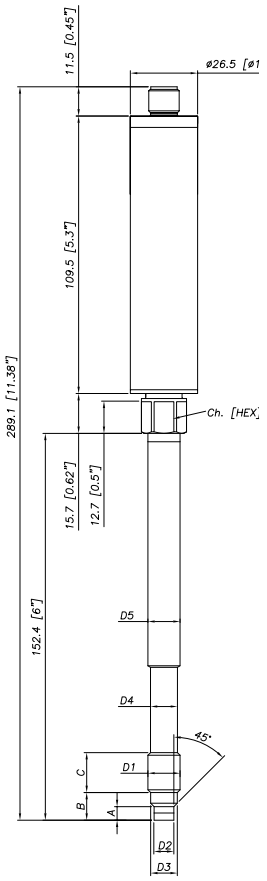
Accuracy (1)	**H** <±0.25% FS (100...1000 bar) **M** <±0.5% FS (17...1000 bar)
Resolution	16 bit
Measurement range	0..17 to 0..1000bar 0..250 to 0..15000psi
Maximum overpressure (without degrading performances)	2 x FS 1.5 x FS above 700bar/10000psi
Measurement principle	Extensimetric (Thick film)
Power supply	18-30 Vdc
Maximum current absorption (*)	1 W (1.2 W with relay optional)
Zero offset	<±0.25% FS
Zero adjustment	"Autozero" function
Communication interface	IO-Link
Cycle time	2 msec
IO-Link version	1.1
Transmission type	COM2 (38.4 kBaud)
Profile	Smart sensor generic profile
SIO Mode	Yes
Required class for Master port	A
Pressure process data resolution	14 bit
Temperature process data resolution	16 bit
Rangeability	3:1 (analogue output opt.)
Calibration signal	80% FS
Power supply polarity reverse protection	YES
Compensed temperature range housing	0...+85°C
Operating temperature range housing	-30...+85°C
Storage temperature range housing	-40...+125°C
Thermal drift in compesated range: Zero / Calibration / Sensibility	< 0.02% FS/°C
Diaphragm maximum temperature	538°C / 1000°F
Zero drift due to change in process temperature (zero)	< 3.5 bar/100°C / < 28 psi/100°F
Integral temperature (optional)	Accuracy T/C type J
Protection degree (5-pole female connector)	IP65 with suitable mating connector

FS = Full scale output: (1) BFSL method (Best Fit Straight Line): includes combined effects of Non-Linearity, Hysteresis and Repeatability.

(*)does not take into account absorption on DO in SIO mode (limited to 200mA)

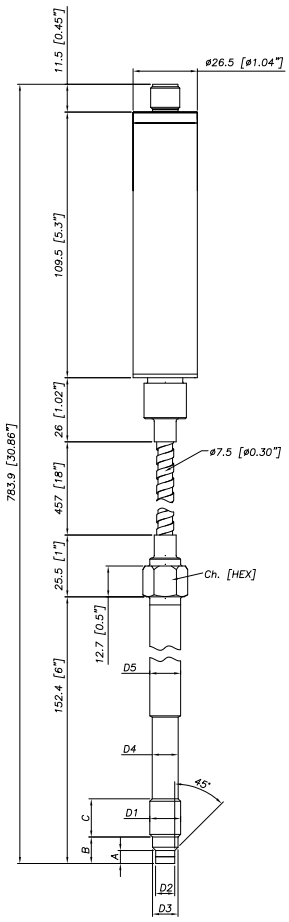
MECHANICAL DIMENSIONS

ILK0



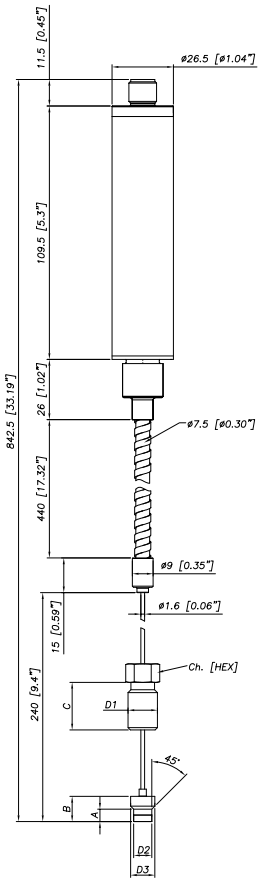
D1	**1/2 - 20UNF**
D2	ø7.8 -0.05 [ø0.31" -0.002]
D3	ø10.5 -0.025 [ø0.41" -0.001]
D4	ø10.67 [ø0.42"]
D5	ø12.7 [ø0.5"]
A	5.56 -0.26 [0.22" -0.01]
B	11.2 [0.44"]
C	15.74 [0.62"]
Ch [Hex]	16 [5/8"]

ILK1



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"]

ILK3



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)

SELF DIAGNOSTICS (for SIL/PL certified models only)

Below the conditions detected by the sensor self-diagnostics:
· Cut cable / device non connected / broken power supply, output <3.6 mA/0.25 V
· Pin detachment, output >20.6 mA/10.8 V
· Pressure above 200% of the span, output >20.6 mA/10.8 V
· Voltage monitor in case of overvoltage/undervoltage/voltage variation in the electronics, output <3.6 mA/0.25 V
· Program sequence error, output <3.6 mA/0.25 V
· Overtemperature on the electronics, output <3.6 mA/0.25 V
· Error on the primary element output or on the first amplification stage, output <3.6 mA/0.25 V

OPTIONAL RELAY OUTPUT FOR EXCESS PRESSURE PROTECTION (for SIL/PL certified models only)

Safety relay characteristics:

· Activation threshold to be defined in the order code
· Rated carry current: 1A
· Rated voltage: 24Vdc ± 20%
· Switch accuracy: 2 x sensor accuracy
· Hysteresis: 2% FS

SUPPLY	OUTPUT	RELAY STATUS
OFF	-	OPEN
ON	< X%FS	CLOSED
ON	> X%FS	OPEN
ON	under range	OPEN
ON	over range	OPEN

NAMUR COMPLIANCE (for SIL/PL certified models only)

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 <3.6 mA/0.25 V
· Device not connected: breakdown information as the signal is <3.6 mA/0.25 V
· Broken power-supply: breakdown information as the signal is <3.6 mA/0.25 V
or in case of performance problems:
· most common failures on primary sensors: the signal goes to >20.6 mA/>10.8 V

Note: in all the remaining situations, the output signal is always included between 3.6 mA/0.25 V and 20.6 mA/10.8 V.



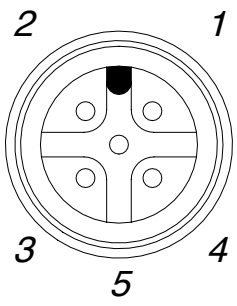
Recommendation: the error level set by the customer (e.g. maximum pressure value) has to be inside the nominal range

AUTOZERO FUNCTION

The Autozero function is activated by IO-Link command.
All zero drift caused by temperature change on the tip can be removed by using this function.
This autozero procedure must be performed at zero pressure only, when the sensor is completely installed on the system.
See operating manual for complete Autozero Function explanation

ELECTRICAL CONNECTIONS

5 pin M12x1 connector



M12x1 5 pin Connector	IO-LINK Output	Relay Output Option	Analogue Output Option
1	V+	V+	V+
2	DO (*)	Relay Conctat 1	DO (*)
3	V-	V-	V-
4	IO-LINK	IO-LINK	IO-LINK
5	N.C.	Relay Conctat 2	Analogue Output

(*) DO = digital output only active in SIO mode

ACCESSORIES

Connectors	
5-pin female connector	**CON031**
5-pin female connector, angle 90°	**CON041**

IO-Link connection cables	
IO-Link and Safety output Y splitter cable, 5 pins M12 connector	**CAV500**
2m unshielded cable, with M12 female 5 pins straight connector and M12 male 5 pins straight connector	**CAV501**
5m unshielded cable, with M12 female 5 pins straight connector and M12 male 5 pins straight connector	**CAV502**
10m unshielded cable, with M12 female 5 pins straight connector and M12 male 5 pins straight connector	**CAV503**

Master IO-Link

Gefran has analyzed and then qualified the main masters on the market that meet the IEC 61131-9 standard relating to the digital communication interface IO-Link 1.1, and therefore compatible with ILM, ILW, ILK and ILI transducers.

Note: For further information (ordering codes, technical specifications, etc.) please contact Gefran or write to: *info@gefran.com*.

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**

ORDER CODE

ILK - □ - □ - □ - □□□□ - □ - □ - □ - □ - □ - **0 00 0 X 000 X 00**

VERSION	
Rigid rod	**0**
Rigid + flexible rod	**1**
Exposed capillary	**3***

*Temperature signal not available with exposed capillary

CONNECTOR	
M12x1 (5 pin)	**5**

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**

(*) Hastelloy diaphragm not available for pressure range ≤ 70 bar (1000 psi)

THREADING	
Standard	
1/2 - 20 UNF	**1**
M18 x 1.5	**4**

Output Relay Version (*)
(activation threshold):
X = no relay B = 80% FS
A = 70% FS C = 90% FS

(*) Available only with PLd/SIL2 version

00	No analogue output
01	4-20 mA output (*)(**)(***)
02	0.5-10.5 V output (*)(**)

(*) Analogue output is not available with relay option
(**) Available only with PLd/SIL2 version
(***) RLoad max 500 Ω

0	Standard
T	Integral temperature

P	Performance Level='d'/SIL2
0	Standard IO-Link

CONTACT DIAPHRAGM	
I	INCONEL 718 (538°C*)
S	15-5 PH (400°C*)
H	HASTELLOY C276 (300°C*)

(*) max temperature

FLEXIBLE ROD LENGTH (*) (mm/inches)		
Standard (ILK0)		
0	none	
Standard (ILK1)		
D	457mm	18"
E	610mm	24"
F	760mm	30"
Standard (ILK3)		
L	711mm	28"
Available on request		
A	76mm	3"
B	152mm	6"
C	300mm	12"

RIGID ROD LENGTH (mm/inches)		
Standard (ILK0, ILK1)		
4	153mm	6"
5	318mm	12.5"
Standard (ILK3)		
0	none	
Available on request		
1	38mm	1.5"
2	50mm	2"
3	76mm	3"
6	350mm	14"
7	400mm	16"
8	456mm	18"

Example

ILK1-5-M-B07C-1-4-D-I-P T000C000X00

Melt pressure transducer, IO-Link output, 5-pin connector, 1/2-20 UNF threading, 700 bar pressure range, 0.5% accuracy, 153 mm (6") rigid rod, 457 mm (18") flexible rod; membrane Inconel 718; Performance Level='d'/SIL2, integral temperature, relay option with 90%FS threshold.

Sensors are manufactured in compliance with:
- EMC directive
- RoHS directive
- machinery directive

Electrical installation requirements and Conformity certificate are available on our web site: www.gefran.com

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

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