



The HKE series of Gefran are pressure transmitters with HART communication protocol for using in high temperature environment.

The main characteristic of this series is the capability to read temperature of the media up to 538°C.

The constructive principle is based on the hydraulic transmission of the pressure.

The fluid-filled system assures the temperature stability. The physical measure is transformed in a electrical measure by means of thick film 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 0-1000 bar / 0-250 to 0-15000 psi
- Accuracy:  $< \pm 0.25\%$  FS (H);  $< \pm 0.5\%$  FS (M)
- Hydraulic transmission system for pressure signal guarantees stability at working temperature (NaK).
- SIL2 and PL d approvals for Functional Safety
- 1/2-20UNF, M18x1.5 standard threads; other types available on request
- Autozero function on board / external option
- 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

*GTP+ (advanced protection)*

*Coating with high resistance against corrosion, abrasion and high temperature*

### AUTOZERO FUNCTION

All signal variations in absence of pressure can be eliminated by using the Autozero function.

This function is activated by closing a magnetic contact located on the transmitter housing.

The procedure is permitted only with pressure at zero.

This function can be activated via HART as well.

### TECHNICAL SPECIFICATIONS

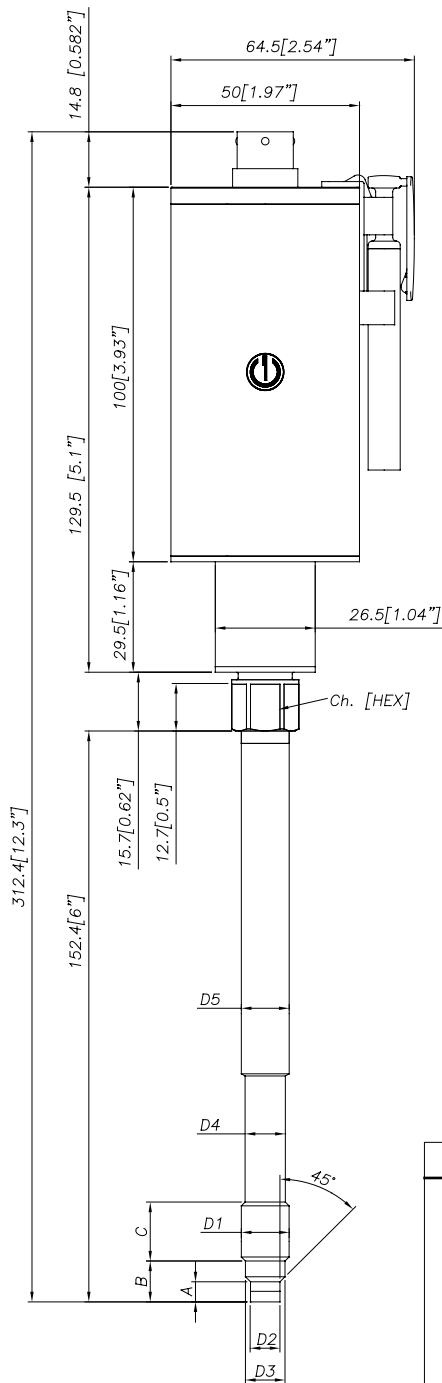
Accuracy (1)	H $< \pm 0.25\%$ FS (100...1000 bar) M $< \pm 0.5\%$ FS (17...1000 bar)
Resolution	16 bit
Measurement range	0..17 to 0..1000bar 0..250 to 0..15000psi
Rangeability	3:1
Maximum overpressure (without degrading performances)	2 x FS 1.5 x FS above 700bar/10000psi
Measurement principle	Extensimetric
Power supply	13...30Vdc
Maximum current absorption	23mA (40mA with relay optional)
Output signal Full Scale (FS)	20mA
Zero balance (tolerance $\pm 0.25\%$ 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	538°C / 1000°F
Zero drift due to change in process temperature (zero)	$< 3.5$ bar/100°C / $< 28$ psi/100°F
Thermocouple (model HKE2)	STD: type "J" (isolated junction)
Protection degree (with 6-pole female connector CON300)	IP66
SIL2 certification	IEC/EN 62061 / IEC 61508
PL d certification	EN ISO 13849

FS = Full scale output :

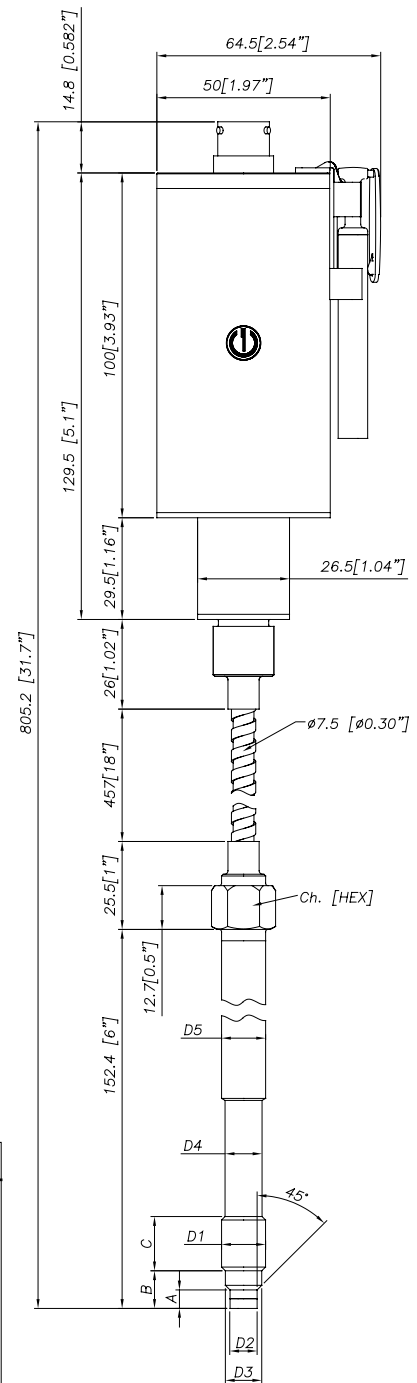
(1) BFSL method (Best Fit Straight Line): includes combined effects of Non-Linearity, Hysteresis and Repeatability (according to IEC 62828-2)

# MECHANICAL DIMENSIONS

## HKE0



## HKE1



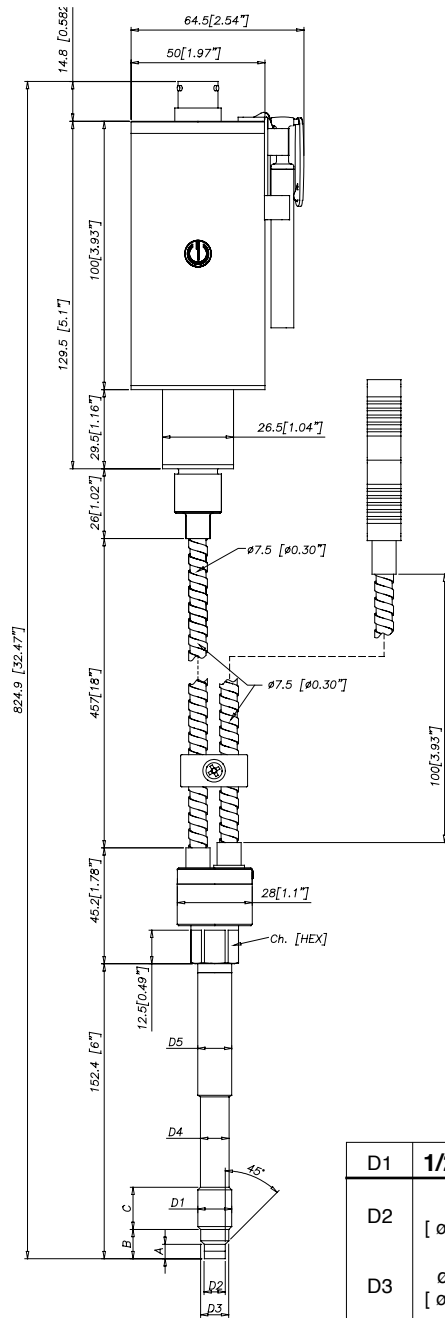
D1	1/2 - 20UNF	D1	M18x1.5
D2	$\phi 7.8 -0.05$ [ $\phi 0.31$ -0.002 ]	D2	$\phi 10 -0.05$ [ $\phi 0.394$ -0.002 ]
D3	$\phi 10.5 -0.025$ [ $\phi 0.41$ -0.001 ]	D3	$\phi 16 -0.08$ [ $\phi 0.63$ -0.003 ]
D4	$\phi 10.67$ [ $\phi 0.42$ ]	D4	$\phi 16 -0.4$ [ $\phi 0.63$ -0.016 ]
D5	$\phi 12.7$ [ $\phi 0.5$ ]	D5	$\phi 18$ [ $\phi 0.71$ ]
A	$5.56 -0.26$ [ $0.22$ -0.01 ]	A	$6 -0.26$ [ $0.24$ -0.01 ]
B	$11.2$ [ $0.44$ ]	B	$14.8 -0.4$ [ $0.58$ -0.016 ]
C	$15.74$ [ $0.62$ ]	C	$19$ [ $0.75$ ]
Ch [Hex]	$16$ [ $5/8$ ]	Ch [Hex]	$19$ [ $3/4$ ]

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

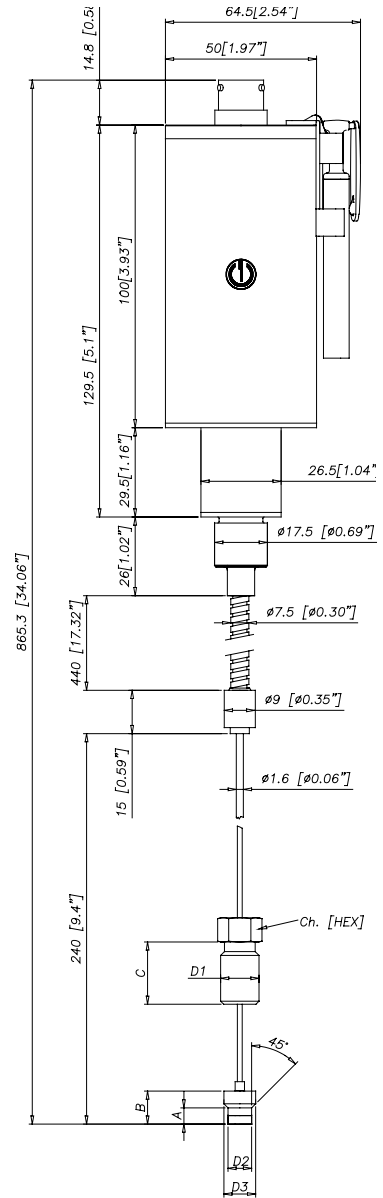
**WARNING:** For installation use a maximum tightening torque of 56 Nm (500 in-lb)

# MECHANICAL DIMENSIONS

## HKE2



## HKE3



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]
B	11.2 [0.44"]	B	14.8 -0.4 [0.58" -0.016]
C	15.74 [0.62"]	C	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)

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

(\*) In such conditions the Alarm Type can be programmed via HART at  $\geq 21\text{mA}$ .

## OPTIONAL RELAY OUTPUT FOR EXCESS PRESSURE PROTECTION

Safety relay characteristics:

- Activation threshold to be defined in the order code
- Rated carry current: 1A
- Rated voltage:  $24\text{Vdc} \pm 20\%$
- Switch accuracy: 2 x sensor accuracy
- Hysteresis: 2% FS

SUPPLY	OUTPUT	RELAY STATUS
OFF	-	OPEN
ON	$< X\%fs$	CLOSED
ON	$> X\%fs$	OPEN
ON	Output $\leq 3.6\text{mA}$	OPEN
ON	Output $\geq 21\text{mA}$	OPEN

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

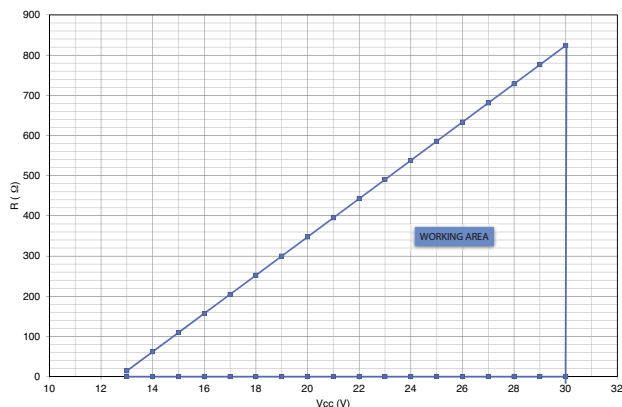
(\*) In such a condition the Alarm Type can be programmed via HART at  $\geq 21\text{mA}$ .

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.

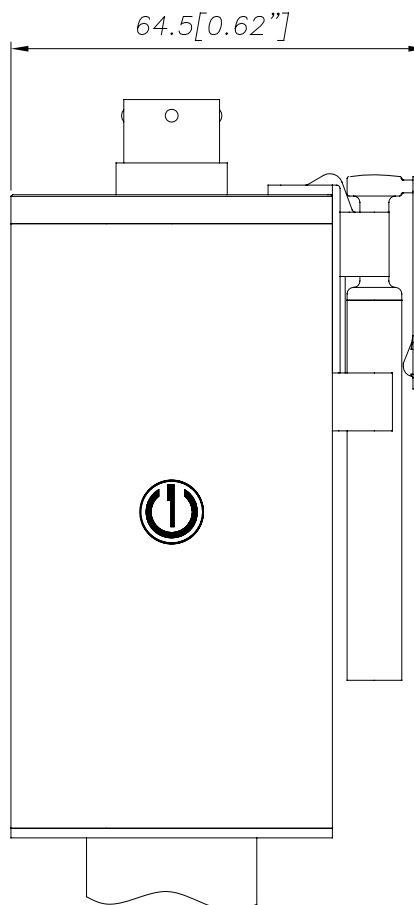
## LOAD DIAGRAM



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



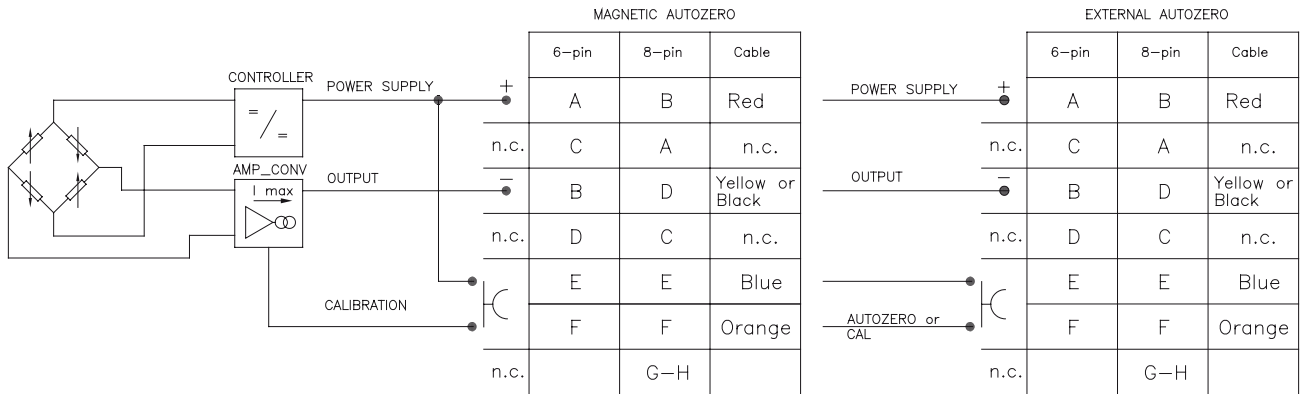
The Autozero function is activated through a magnetic contact (external magnet supplied with the sensor).

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

See the manual for a complete Autozero function explanation.

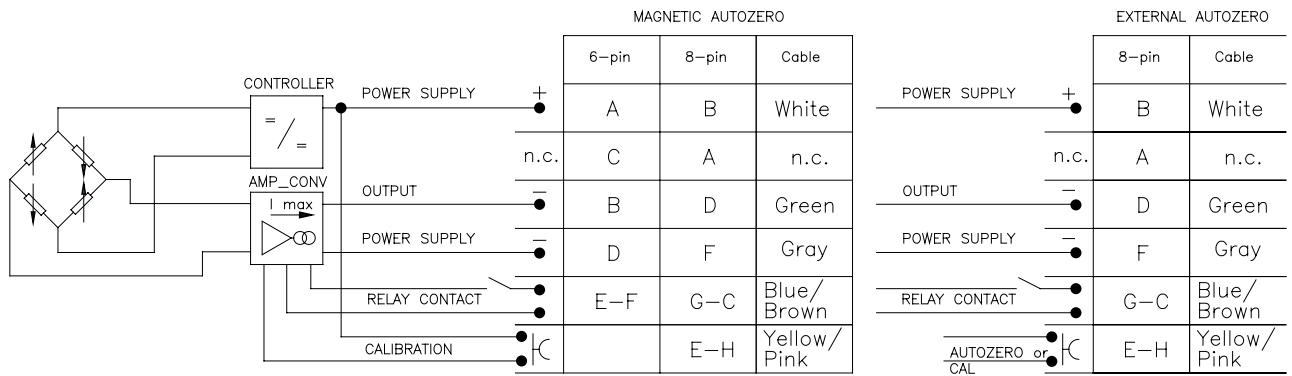
# ELECTRICAL CONNECTIONS

## CURRENT OUTPUT



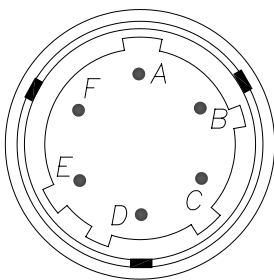
The cable shield is tied to both sides, i.e. to the sensor connector and to the controller

## RELAY OUTPUT

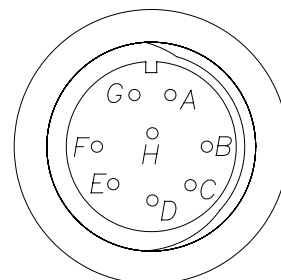


The cable shield is tied to both sides, i.e. to the sensor connector and to the controller

**6 pin Connector VPT07RA10-6PT2 (PT02A-10-6P)**

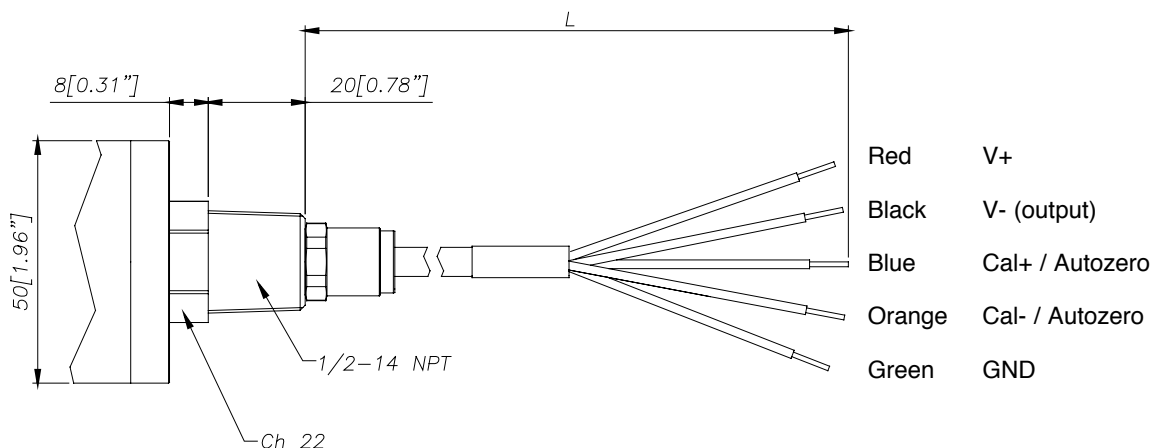


**8 pin Connector (PC02E-12-8P) Bendix**

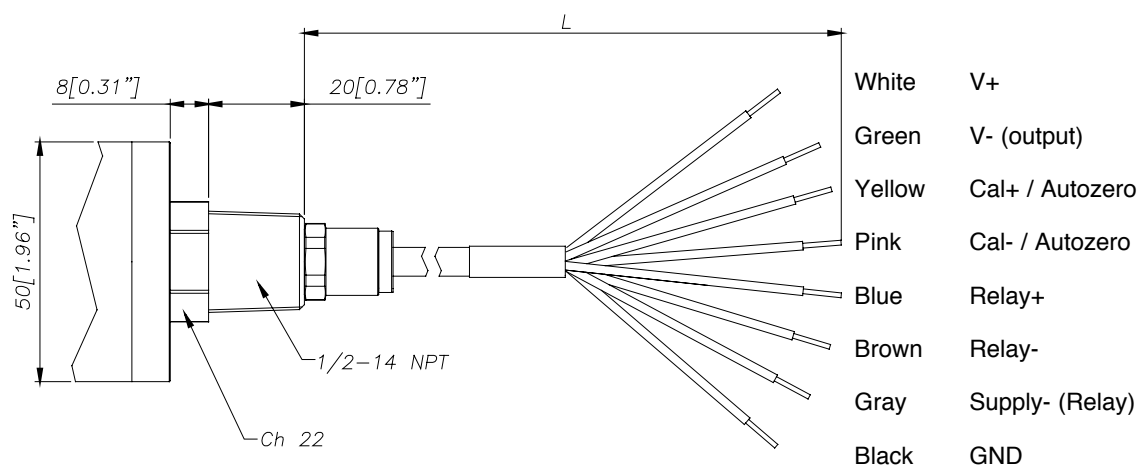


## CABLE OUTPUT (1/2 14-NPT) L = 1 m

### Current output



### Relay output Magnetic Autozero/External Autozero



## ACCESSORIES

### Connectors

6-pin female connector (IP66 protection degree)  
8-pin female connector

CON300  
CON307

### Extension cables

6-pin connector with 8m (25ft) cable  
6-pin connector with 15m (50ft) cable  
6-pin connector with 25m (75ft) cable  
6-pin connector with 30m (100ft) cable

C08WLS  
C15WLS  
C25WLS  
C30WLS

### Accessories

Mounting bracket  
Dummy plug for 1/2-20 UNF  
Dummy plug for M18x1,5  
Drill kit for 1/2 -20 UNF  
Drill kit for M18 x 1,5  
Cleaning kit for 1/2-20 UNF  
Cleaning kit for M18x1,5  
Fixing pen clip  
Autozero pen

SF18  
SC12  
SC18  
KF12  
KF18  
CT12  
CT18  
PKIT 1032  
PKIT 378

### Thermocouple for HKE2 model

Type "J" (153mm - 6" rigid rod)

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

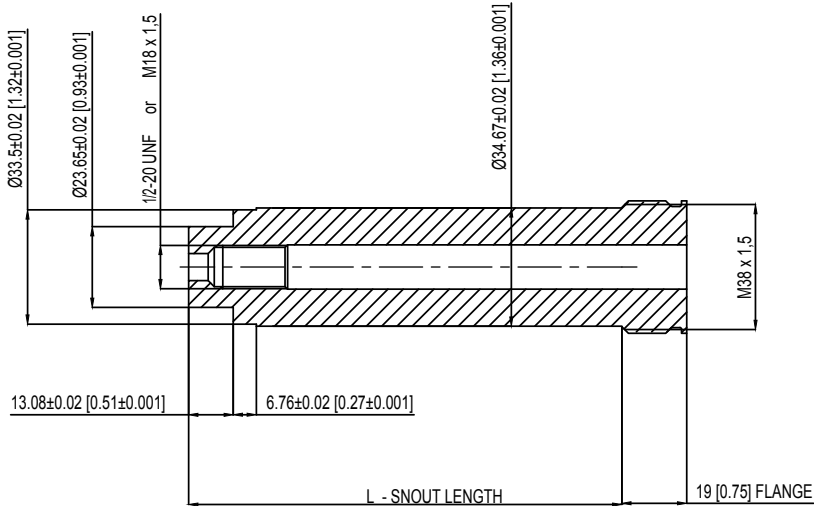
# PROCESS FLANGE ADAPTER

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 adapter 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

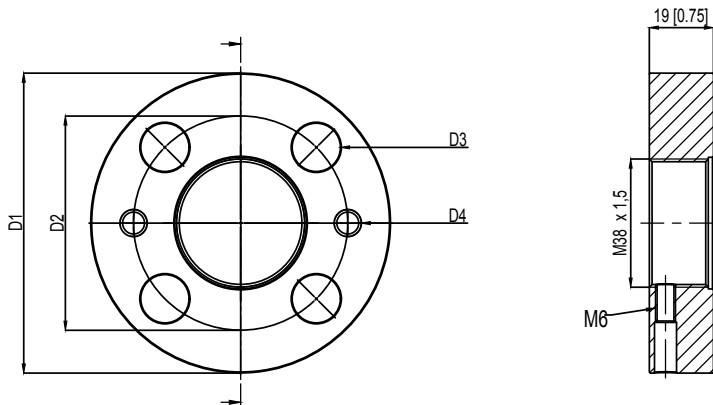
## ADAPTER BODY



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

M18 X 1,5	L - SNOOT 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 GASKETS			
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

