



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 strain-gauge technology.

### MAIN FEATURES

- Pressure ranges from: 0-35 to 0-1000 bar / 0-500 to 0-15000 psi
- Accuracy:  $< \pm 0.25\%$  FSO (H);  $< \pm 0.5\%$  FSO (M)
- Hydraulic transmission system for pressure signal guarantees stability at working temperature (NaK).
- Liquid conforming to RoHS Directive. NaK is defined as a safe substance (GRAS)
- Quantity of NaK contained per model: HKE0 series (30mm<sup>3</sup>) [0.00183 in<sup>3</sup>], HKE1, HKE2, HKE3 (40mm<sup>3</sup>) [0.00244 in<sup>3</sup>]
- 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.

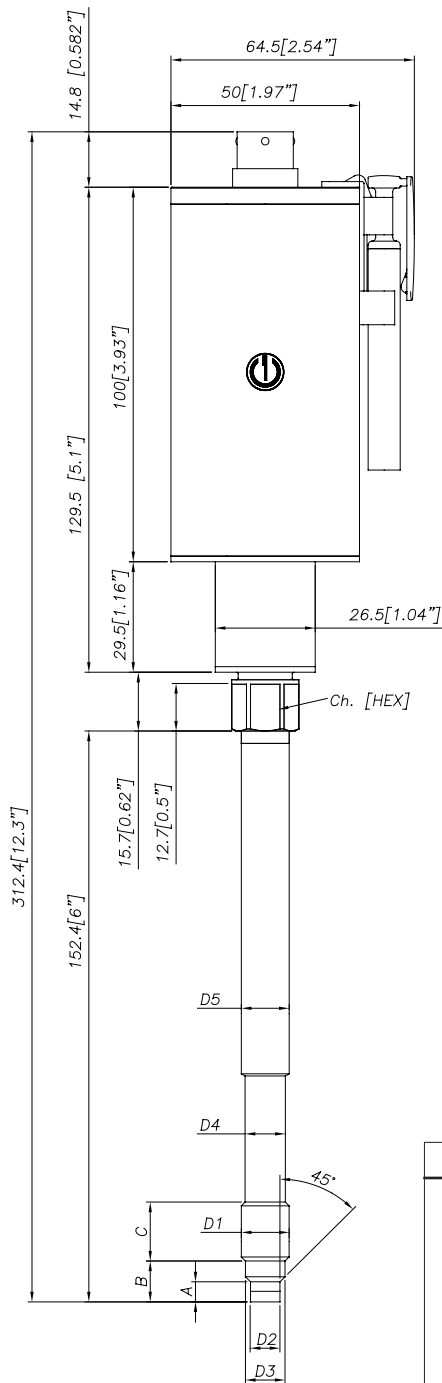
This function can be activated via HART as well.

### TECHNICAL SPECIFICATIONS

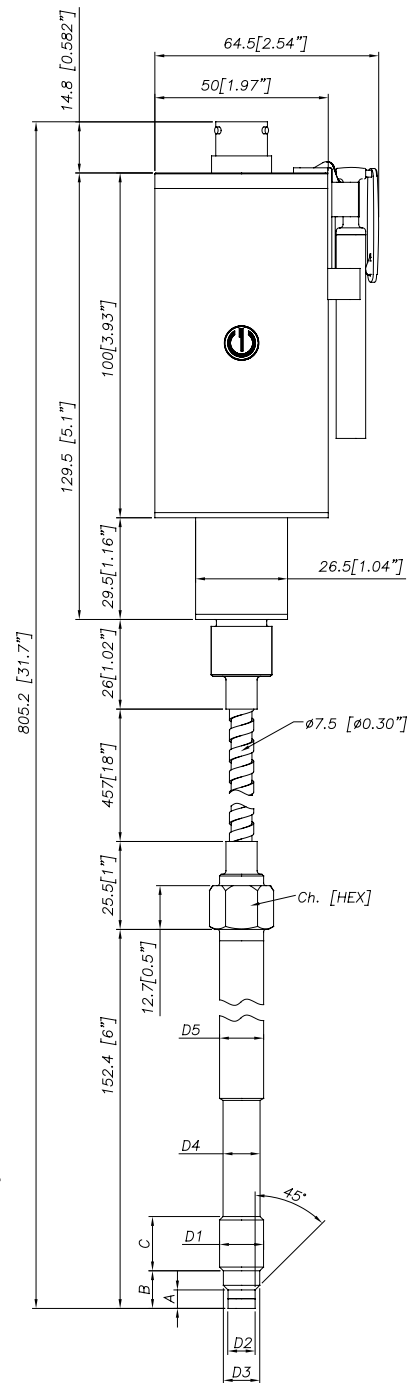
Accuracy (1)	H $< \pm 0.25\%$ FSO (100...1000 bar) M $< \pm 0.5\%$ FSO (17...1000 bar)
Resolution	16 bit
Measurement range	0..17 to 0..1000bar 0..250 to 0..15000psi
Rangeability	3:1
Maximum overpressure (without degrading performances)	2 x FS 1.5 x FS above 700bar/10000psi
Measurement principle	Extensimetric
Power supply	13...30Vdc
Maximum current absorption	23mA (40mA with relay optional)
Output signal Full Scale (FSO)	20mA
Zero balance (tolerance $\pm 0.25\%$ FSO)	4mA
Calibration signal	80% FSO
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	$< 0.02\%$ FSO/°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)	IP65
FSO = Full scale output : (1) BFSL method (Best Fit Straight Line): includes combined effects of Non-Linearity, Hysteresis and Repeatability	

# MECHANICAL DIMENSIONS

## HKE0



## HKE1



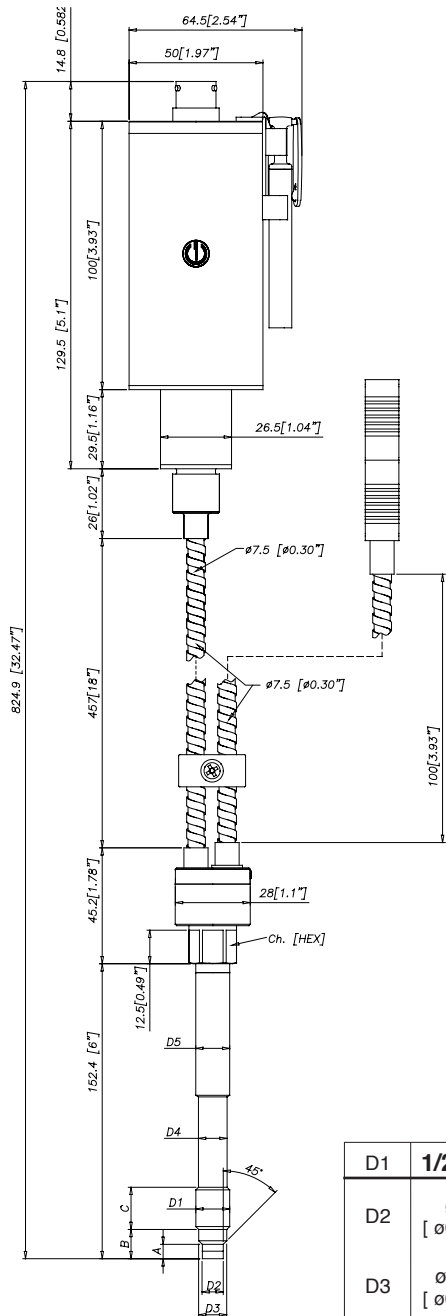
D1	1/2 - 20UNF	D1	M18x1.5
D2	$\phi 7.8 -0.05$ [ $\phi 0.31 -0.002$ ]	D2	$\phi 10 -0.05$ [ $\phi 0.394 -0.002$ ]
D3	$\phi 10.5 -0.025$ [ $\phi 0.41 -0.001$ ]	D3	$\phi 16 -0.08$ [ $\phi 0.63 -0.003$ ]
D4	$\phi 10.67$ [ $\phi 0.42$ ]	D4	$\phi 16 -0.4$ [ $\phi 0.63 -0.016$ ]
D5	$\phi 12.7$ [ $\phi 0.5$ ]	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")

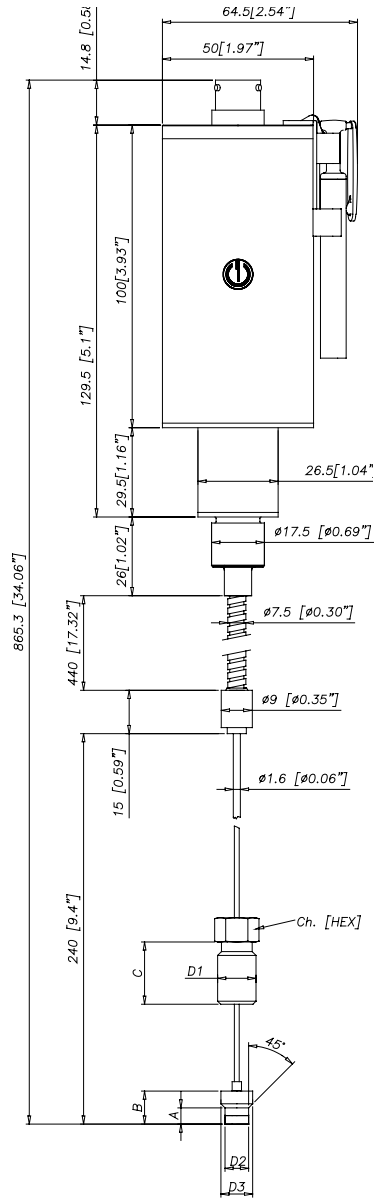
**WARNING:** For installation use a maximum tightening torque of 56 Nm (500 in-lb)

# 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 PL'C' 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% FSO

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 PL'C' 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  $\leq 3.6\text{mA}$ (\*)

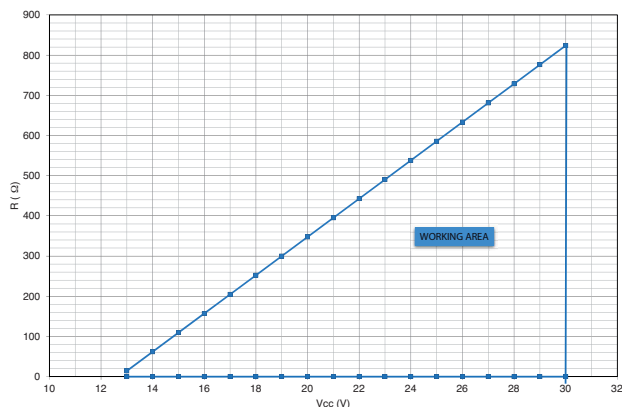
(\*) In such a condition the Alarm Type can be programmed via HART at  $\geq 21\text{mA}$ .

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.

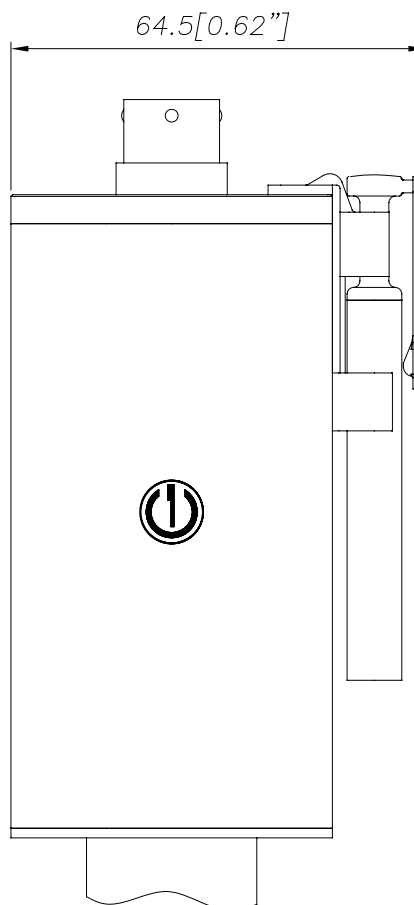
## LOAD DIAGRAM



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



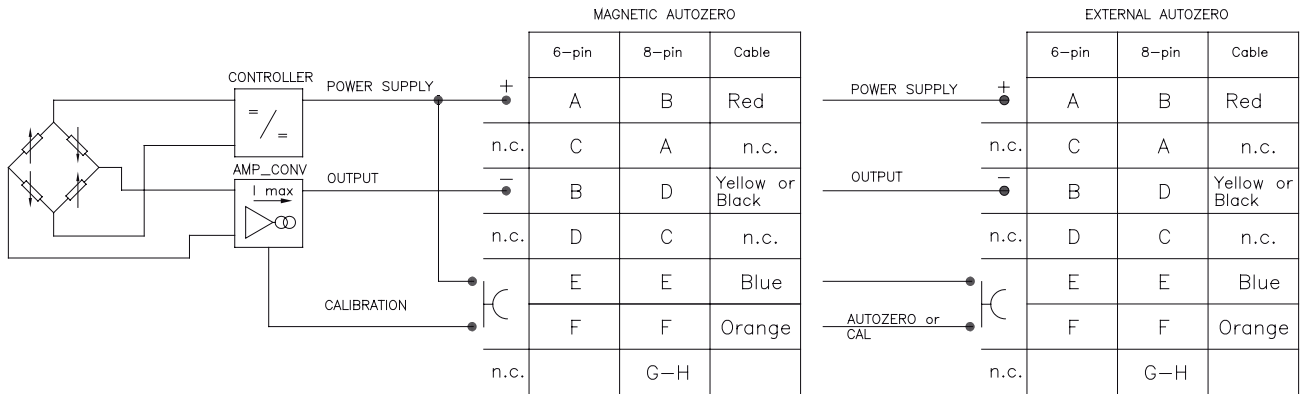
The Autozero function is activated through a magnetic contact (external magnet supplied with the sensor).

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

See the manual for a complete Autozero function explanation.

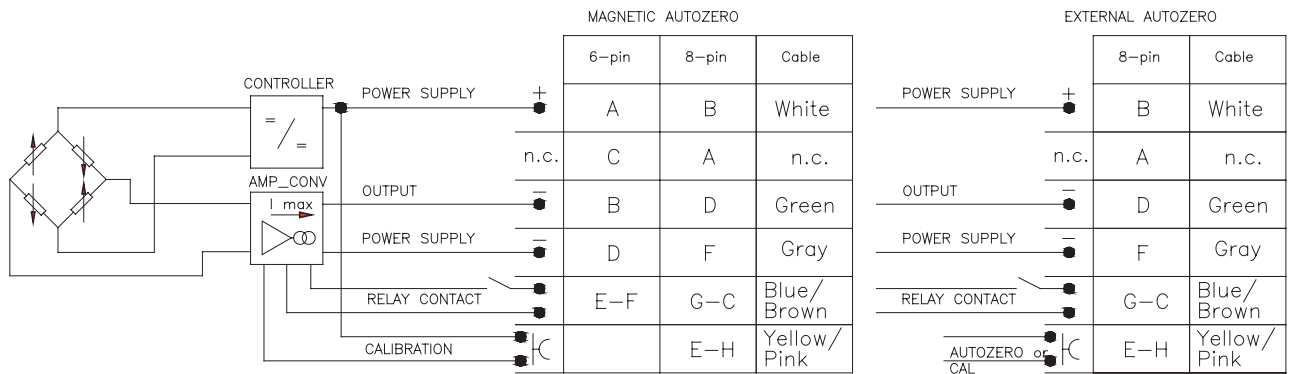
# ELECTRICAL CONNECTIONS

## CURRENT OUTPUT



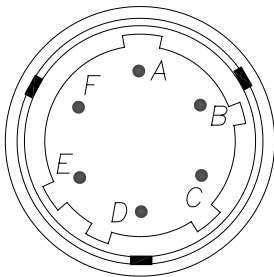
The cable shield is tied to both sides, i.e. to the sensor connector and to the controller

## RELAY OUTPUT

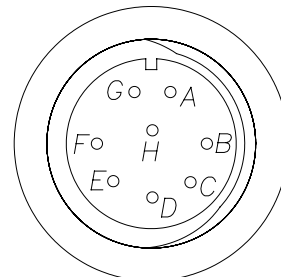


The cable shield is tied to both sides, i.e. to the sensor connector and to the controller

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

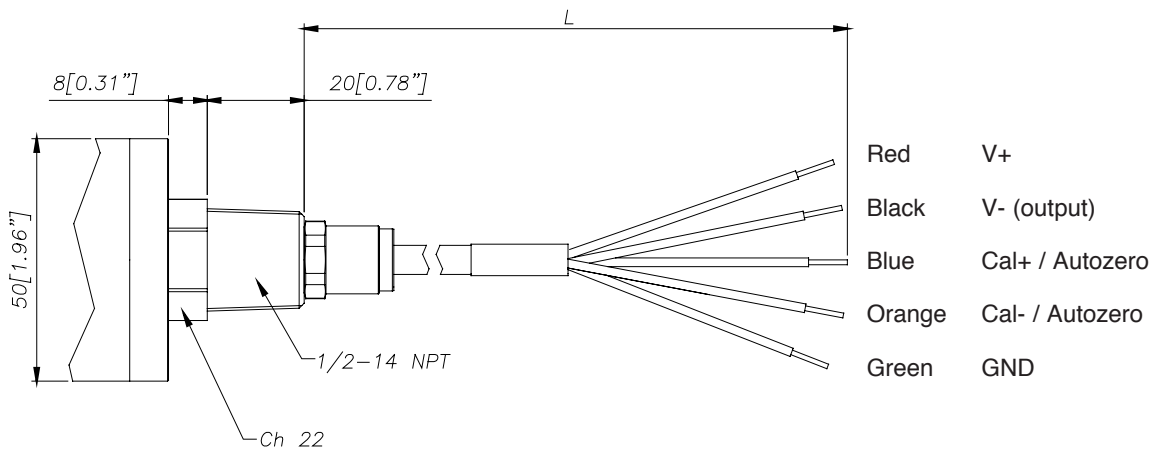


**8 pin Connector (PC02E-12-8P) Bendix**

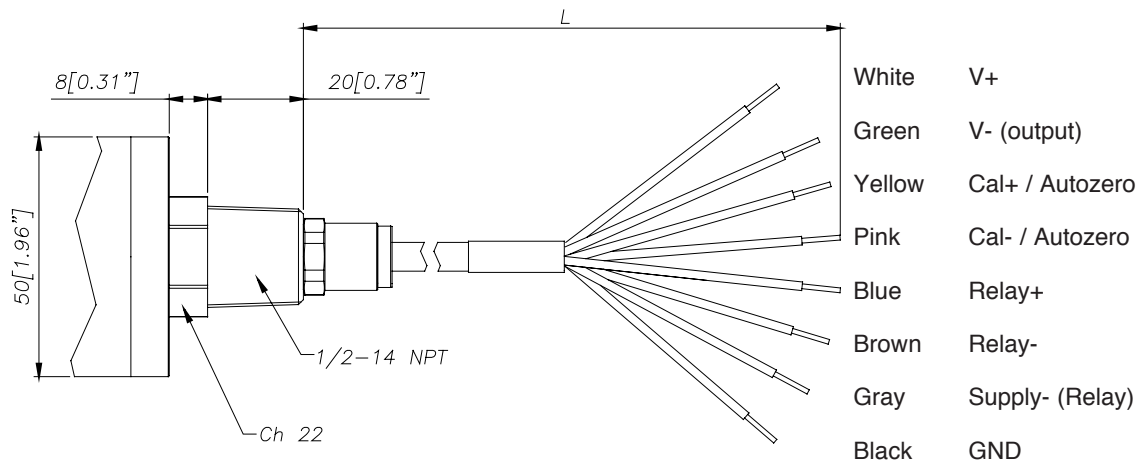


## CABLE OUTPUT (1/2 14-NPT) L = 1 m

### Current output



### Relay output Magnetic Autozero/External Autozero



## ACCESSORIES

### Connectors

6-pin female connector (IP65 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

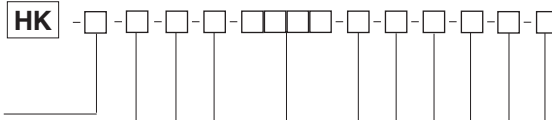
**Thermocouple for HKE2 model Type "J"**  
(153mm - 6" rigid rod)

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

# ORDER CODE



OUTPUT SIGNAL	
4...20mA	E

VERSION	
Rigid rod	0
Rigid + flexible rod	1
With thermocouple	2
Exposed capillary	3

CONNECTOR	
6 pin	6
8 pin	8
NPT Cable	N

ACCURACY CLASS	
0.25% FSO (ranges ≥ 100 bar/1500 psi)	H
0.5% FSO	M

MEASUREMENT RANGE			
bar (*)		psi (*)	
17	<b>B17U</b>	250	<b>P25D</b>
35	<b>B35U</b>	500	<b>P05C</b>
50	<b>B05D</b>	750	<b>P75D</b>
70	<b>B07D</b>	1000	<b>P01M</b>
100	<b>B01C</b>	1500	<b>P15C</b>
200	<b>B02C</b>	3000	<b>P03M</b>
350	<b>B35D</b>	5000	<b>P05M</b>
500	<b>B05C</b>	7500	<b>P75C</b>
700	<b>B07C</b>	10000	<b>P10M</b>
1000	<b>B01M</b>	15000	<b>P15M</b>

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

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

0000 X 000 X 0

Output relay version (activation threshold):  
X = no relay B = 80% fs  
A = 70% fs C = 90% fs

000= Special executions

E	External Autozero (*)
0	Magnetic Autozero

(\*) as an alternative to the CAL function

P	Performance Level='c'
0	Standard 4...20mA

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)		
<b>Standard (HKE0)</b>		
0	none	
<b>Standard (HKE1, HKE2)</b>		
D	457mm	18"
E	610mm	24"
F	760mm	30"
<b>Standard (HKE3)</b>		
L	711mm	28"
<b>Available on request</b>		
A	76mm	3"
B	152mm	6"
C	300mm	12"
G	914mm	36"
H	1067mm	42"
I	1220mm	48"
J	1372mm	54"
K	1520mm	60"

RIGID ROD LENGTH (*) (mm/inches)		
<b>Standard (HKE0, HKE1,HKE2)</b>		
4	153mm	6"
5	318mm	12.5"
<b>Standard (HKE3)</b>		
0	none	
<b>Available on request</b>		
1	38mm	1.5"
2	50mm	2"
3	76mm	3"
6	350mm	14"
7	400mm	16"
8	456mm	18"

(\*) max. combined rigid / flexible stem length is 1000mm - 39"

Example

### HKE1-6-M-B07C-1-4-D-I-P-0

Melt pressure transducer 4...20mA output with HART protocol, 6-pin connector, 0.5% accuracy, 700 bar pressure range, 1/2-20 UNF threading, 153 mm (6") rigid rod, 457 mm (18") flexible rod, Inconel 718 diaphragm, Performance Level='c'.

Sensors are manufactured in compliance with:

- EMC 2004/108/CE compatibility directive
- RoHS 2002/95/CE directive
- 2006/42/CE machinery directive

Electrical installation requirements and conformity certificate are available on our web site: [www.gefran.com](http://www.gefran.com)

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>

# GEFRAN

DTS\_HKE\_12-2014\_ENG