



PU-10K/E

Process Pressure Transmitter



Features

/ Acc. up to 0.1% FSO IEC 60770

/ HART®- communication

/ ATEX-approval

/ Up to 300°C media temperature

/ All common flange and
thread connections

/ St. steel or ceramic sensor

/ LCD display

/ Adjustable offset, span,
attenuation etc.

Description:

The PU-10 K/E process pressure transmitter has been developed to meet the highest demands in the processing industry. A piezo-resistive pressure sensor of high signal stability is used as a base element. The downstream amplifier electronic component linearizes the sensor signal and compensates the temperature errors. A 4 to 20 mA output signal is present in 2-wire method with a HART® frequency signal to make the PU-10 K/E into an intelligent device. In the version with display, parameters like offset, span and attenuation are programmable over a keypad. By means of the HART® component this information can be transmitted via a PC or hand-held programming device. A good readable visible LCD display (optional) shows the measuring value and displays it visually by means of an additional bar graph indicator. The PU-10 E (with stainless steel sensor) has an accuracy of 0.1% of the end value of the operating range. It can be equipped with two different variants of housing. By means of a temperature decoupler mounted between the process connection and the electronic component, measurements up to 300°C media temperature can be obtained.

Application:

Today's pressure measurement technology places high demands on measurement device manufacturers regarding the sealing materials used, material contacting components besides temperature and overload safety. In addition to this, accuracy and, not the least, the price to performance ratio, too, play a decisive role in the selection of a suitable measuring device. The PU-10 K/E signifies the development of a new series of pressure measuring transmitters which meets these requirements to justify their highest standards. Sensor elements are available from stainless steel or ceramic and are therefore compatible with nearly any type of medium, especially because the standard sealing material Viton is supplemented by a number of special designs. Optionally, connections from Hastelloy can also be supplied. Besides the normal inch-system thread, also flange and DRD connections are used as an interface with the processing, offering thus a wide range possibilities to meet any type of requirement. Intelligent electronics are embedded in one of the two robust connection housings that were especially conceived for use in harsh industrial environment. The PU-10 K/E is compatible with nearly any task of pressure measurement in the industry. Ask us for special customized versions in regard to process connections, sealing material and so on.



Electrical Specs. PU-10K:

Output signal /	4 . .20 mA, 2-wire with Hart [®] -communication; intrinsically safe version (option)
Auxillary power /	$U_B = 12 . .28$ VDC
Power consumption /	max. 25 mA
Accuracy ¹⁾ /	for nominal pressure: $0.16 . .0.4$ bar $\leq \pm (0.2 + (TD-1) \times 0.02)$ % FSO for nominal pressure: $1 . .20$ bar $\leq \pm (0.1 + (TD-1) \times 0.01)$ % FSO with turn-down = nominal pressure range / adjusted range
Permissible load /	$R_{max} \leq [(U_B - U_{Bmin}) / 0.02 \text{ A}] \Omega$, HART [®] : $R_{min} = 250 \Omega$
Influencing factors /	
Auxillary power:	0.05 % FSO / 10 V
Load:	0.05 % FSO / k Ω
Long-time stability /	$\leq \pm 0.1\%$ FSO / year at reference cond.
Response time /	200 ms - without consideration of electronic damping
Operating rate /	5/s
Settings /	
Attenuation:	0 . .100 s
Offset:	0 . .80 % FSO
Span:	turn-down of span: max. 1:5 (span min. 0.02 bar)
Electrical protection /	
Short-circuit protection:	permanent
Reverse polarity protection:	no damage, but also no function
Electromagnetic compatibility:	emission and immunity according to EN 61326
ATEX-Protection /	
St. steel Field-housing:	Zone 0/ ²⁾ II 1/2G Ex ia IIC T4 Ga/Gb Zone 20: II 1D Ex ia IIIC T85°C Da
Aluminium pressure-cast housing:	Zone 1: II 2G Ex ia IIB T4 Gb Zone 20: II 1D Ex ia IIIC T85°C Da
Pressure-resistant:	Aluminium pressure-cast housing Zone 1: II 2G Ex d IIC T5 Gb
Safety-related maximum values:	$U_i = 28$ V, $I_i = 98$ mA, $P_i = 680$ mW, $C_i = 0$ nF, $L_i = 0$ μ H, $C_{GND} = 27$ nF

max. Ambient temp.:
 - Zone 0: -20 . .+60°C at p_{atm} 0.8 . .1.1 bar
 - from Zone 1: -40 . .+70°C intr. safe
 - pressure-resistant encl. -20 . .+70°C

Display (Option) /

Type: LCD-display, visible range 32.5 x 22.5 mm

 Operating display: 5-digit, 7-segment, digit height 8 mm, range ± 9999

 Additional display: 8-digit, 14-segment, digit height 5 mm

 Bar graph: 52-segments

 Accuracy: 0.1% \pm 1 Digit

Protection class /

IP67

CE-Approval /

EMC-directive: 2014/30/EU

Technical Specs. PU-10K:

Accuracy /

Nom. Press. < 1 bar $\leq \pm 0.2$ % FSV
 Nom. Press. ≥ 1 bar $\leq \pm 0.1$ % FSV

Operating ranges /

from 0 . .160 mbar to 0 . .20 bar

Mechanical strength /

Vibration: 5 g RMS (20 . .2000Hz)
 Shock: 100 g / 11 ms

Temperature range without Display /

Storage: -40 . .+80°C
 Ambient: -40 . .+70°C
 Media: -25 . .+125°C

Temperature range with Display /

Storage: -30 . .+80°C
 Ambient: -20 . .+70°C
 Media: -25 . .+125°C

Temperature error /

$\leq \pm (0.02 \times \text{Turn-Down})$ % FSO/10 K
 in comp. range -20 . .+80°C

Material /

Housing: aluminium pressure cast, powder coated or st. steel 1.4404

 Cable gland: brass, nickel plated

 Window: laminated safety glass

 Pressure connection: Standard: st. steel 1.4404;
 Option for G 1½" flush (DIN 3852): PVDF

 Seals: FKM (-25 . .+125°C), EPDM (-40 . .+125°C), others on request

¹⁾ Accuracy according to IEC 60770 - limit point adjustment (non-linearity, hysteresis, repeatability)

²⁾ The designation depends on the nominal pressure range. Nominal pressure ranges ≤ 60 mbar are marked with „2G“. For nominal pressure ranges > 60 mbar and < 10 bar see the notes under the EC type-examination certificate.



Diaphragm:	Al ₂ O ₃ 99,9 %
Wetted parts:	pressure connection, sealings, diaphragm
Weight /	min. 400 g (depending on process connection)
Mounting position /	any (standard calibration in a vertical position with the pressure port connection down; differing installation position have to be specified in the order)
Life span /	> 100 x 10 ⁶ load cycles

Connection table /

Electrical layout	Aluminium pressure cast housing terminal clamps (clamp section 2,5 mm ²)	Stainless steel field housing terminal clamps (clamp section 1,5 mm ²)
Supply +	IN +	IN +
Supply -	IN -	IN -
Load	ground contact	ground contact
Test	Test	-

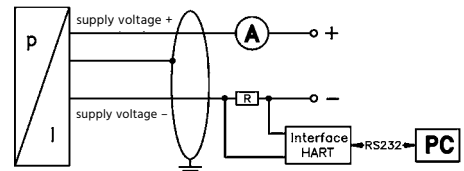
Ordering Codes PU-10K:

Order no.	PU-10K.	2.	1.	1.	0.	K01.	2.	K04.	1
Process Pressure Transmitter with Ceramic Sensor									
Housing /									
1 = st. steel field housing									
1d = st. steel field housing with display									
2 = aluminium pressure cast housing									
2d = aluminium pressure cast housing with display									
Communication /									
0 = 4...20 mA, 2-wire, with Hart®-comm.									
1 = 4...20 mA, 2-wire, ATEX-intrinsically safe version with Hart®-communication ^{A)}									
Diaphragm /									
1 = ceramics Al ₂ O ₃ 99,9 %									
Temperature range /									
0 = Media temperature up to 125°C									
Process connection /									
K01 = G 1/2"-male (DIN 3852)									
K03 = G 1/2"-male (EN 837)									
K04 = 1/2" NPT -male									
K06 = G1 1/2"-male flush (DIN 3852)									
K07 = DIN flange DN25 PN40 (DIN 2501)									
K08 = DIN flange DN50 PN40 (DIN 2501)									
K09 = DIN flange DN80 PN16 (DIN 2501)									
K10 = ANSI flange DN 2" / 150 lbs (ANSI B16.5) ^{B)}									
K11 = ANSI flange DN 3" / 150 lbs (ANSI B16.5) ^{B)}									
K12 = DRD Ø 65 mm ^{C)}									
Calibration /									
2 = relative pressure									
Operating range /									
K02 = 0...+0.16 bar (overload up to 4 bar, perm. vacuum up to -0.3 bar)									
K03 = 0...+0.40 bar (overload up to 6 bar, perm. vacuum up to -0.5 bar)									
K04 = 0...+1 bar (overload up to 8 bar, perm. vacuum up to -0.5 bar)									
K05 = 0...+2 bar (overload up to 15 bar, perm. vacuum up to -1.0 bar)									
K06 = 0...+5 bar (overload up to 25 bar, perm. vacuum up to -1.0 bar)									
K07 = 0...+10 bar (overload up to 35 bar, perm. vacuum up to -1.0 bar)									
K08 = 0...+20 bar (overload up to 45 bar, perm. vacuum up to -1.0 bar)									
Special design /									
0 = none									
1 = sealing EPDM (standard FKM)									
9 = please specify in detailed text									

^{A)} only possible in combination with aluminium pressure case
^{B)} DN 2"/150 and DN 3"/150 lbs only possible for nominal pressure ranges PN ≤ 10 bar
^{C)} mounting flange is included in the delivery (already pre-assembled)

Wiring Diagram:

2-Wire-System (Current) HART®





Electrical Specs. PU-10E:

Output signal /	4...20 mA, 2-wire with Hart®-communication; Ex-intrinsically safe version (option)
Auxillary power /	$U_B = 12...28$ VDC
Power consumption /	max. 25 mA
Accuracy ⁹⁾ /	$\leq \pm 0.1$ % FSO Turn-Down $\leq 1:5$ no changes Turn-Down $> 1:5$ $\leq 0.1 + 0.015 \times (TD-5)$ % FSO
Permissible load /	$R_{max} \leq [(U_B - U_{Bmin}) / 0.02 \text{ A}] \Omega$, HART®: $R_{min} = 250 \Omega$
Influencing factors /	
Auxillary power:	0.05 % FSO / 10 V
Load:	0.05 % FSO / k Ω
Long-time stability /	$\leq \pm 0.1\%$ FSO / year at ref. conditions
Response time /	100 ms - without consideration of electronic damping
Operating rate /	10/s
Settings /	
Attenuation:	0...100 s
Offset:	0...90 % FSO
Span:	Turn-Down der Spanne bis 1:10
Electrical protection /	
Short-circuit protection:	permanent
Reverse polarity protection:	no damage, but also no function
Electromagnetic compatibility:	emission and immunity according to EN 61326
ATEX-Protection /	
St. steel Field-housing:	Zone 0: II 1G Ex ia IIC T4 Ga / II 1D Ex ia IIIC T85°C Da
Aluminium pressure-cast housing:	Zone 1: II 2G Ex ia IIB T4 Gb / II 1D Ex ia IIIC T85°C Da
Pressure-resistant:	aluminium pressure cast housing: Zone 1: II 2G Ex d IIC T5 Gb
Safety-related maximum values:	$U_i = 28$ V, $I_i = 98$ mA, $P_i = 680$ mW, $C_i = 0$ nF, $L_i = 0$ μ H, $C_{GND} = 27$ nF

⁹⁾ Accuracy according to IEC 60770 - limit point adjustment (non-linearity, hysteresis, repeatability)

¹⁰⁾ This directive is only valid for devices with max. permissible overpressure > 200 bar

max. Ambient temp.:
- Zone 0: -20...+60°C bei p_{atm} 0.8...1.1 bar
- from Zone 1: -40...+70°C intrins. safe
- pressure resistant -20...+70°C

Connecting cables (from factory) /
capacitance: signal line/shield also signal line/signal line: 160 pF/m

inductance: signal line/shield also signal line/signal line: 1 μ H/m

Display (Option) /

Type: LCD-display, visible range 32.5 x 22.5 mm

Operating display: 5-digit, 7-segment, digit height 8 mm, range ± 9999

Additional display: 8-digit, 14-segment, digit height 5 mm

Bar graph: 52-segments

Accuracy: 0.1% \pm 1 Digit

Protection class / IP67

CE-Approval / EMC-Directive: 2014/30/EU
Pressure equipment directive: 2014/68/EU (Modul A) ¹⁰⁾

Technical Specs. PU-10E:

Accuracy / 0.1 % FSO as per IEC 60770

Operating ranges / from 0.4...0.4 bar up to -1...10 bar
from 0...400 mbar up to 0...600 bar

Temperature range media ⁶⁾ /

Silicon oil: -40...+125°C

Food compatible oil: -10...+125°C

Temp. range for media with temperature decoupler /

Silicon oil: -40...+300°C - overpressure

-40...+150°C - low pressure

Food compatible oil: -10...+250°C - overpressure

-10...+150°C - low pressure

Temperature range without Display ⁶⁾ /

Storage: -40...+80°C

Ambient: -40...+80°C

Temperature range with Display ⁶⁾ /

Storage: -30...+80°C

Ambient: -20...+70°C

Temperature error ^{7 + 8)} / ≤ 0.2 FSO x Turn-Down
in comp. range -20...+85°C



Material /

- Housing: aluminium pressure cast, powder coated or st. steel 1.4404
- Cable gland: brass, nickel plated
- Window: laminated safety glass
- Pressure conn.: st. steel 1.4435
- Seals: FKM (Standard); Option: FFKM (min. Temperature range from -15°C, possible for PN ≤ 100 bar)
- Diaphragm: st. steel 1.4435 (Standard); Option: Hastelloy® C-276, Tantal (possible from 1 bar)
- Wetted parts: pressure connection, sealings, diaphragm

Filling /

silicon oil (standard); option: food compatible oil, Halocarbon and others on request

Weight /

min. 400 g (depending on process connection)

Mounting position /

any (standard calibration in a vertical position with the pressure port connection down; differing installation position have to be specified in the order)

Lifetime /

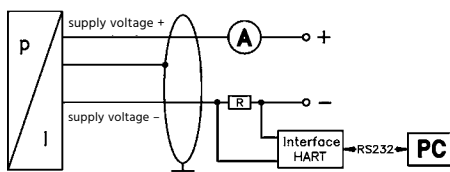
> 100 x 10⁶ load cycles

- X) only possible in combination with aluminium pressure case
- F) only possible with process connections
- G) tantal diaphragm possible with nominal pressure ranges from 1 bar
- H) not possible for vacuum ranges and pressure ranges > 40 bar
- I) DN 2"/150 and DN 3"/150 lbs only possible for ranges PN ≤ 6 bar
- J) mounting flange is included in the delivery (already pre-assembled)
- K) min. permissible temperature from -15°C, possible for ranges PN ≤ 100 bar
- 6) max. temperature of the medium for PN gauge > 0 bar: 150°C for 60 min. with a max. environmental temp. of 50°C (without temp. decoupler)
- 7) an opt. temp. decoupler can influence thermal effects for offset and span depending on installation position and filling conditions
- 8) for flange- and DRD-version: tolerance band offset ± 1.6 % FSO / tolerance band span ± 0.6 % FSO

Connection table /

Electrical layout	Aluminium pressure cast housing terminal clamps (clamp section 2,5 mm ²)	Stainless steel field housing terminal clamps (clamp section 1,5 mm ²)
Supply +	IN +	IN +
Supply -	IN -	IN -
Load	ground contact	ground contact
Test	Test	-

2-Wire-System (current) HART®

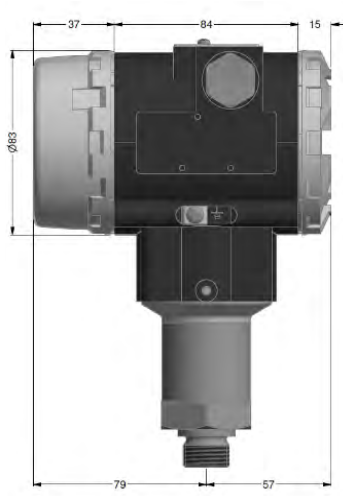


Ordering Codes PU-10E:

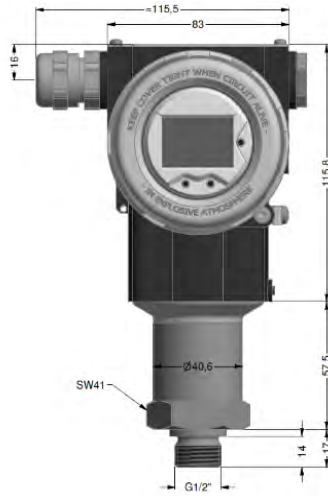
Order no.	PU-10E.	2.	1.	2.	0.	E01.	2.	E04.	0
Process Pressure Transmitt. with St. Steel Sensor									
Housing /									
1 = stainless steel field housing									
1d = stainless steel field housing, display									
2 = alum. pressure cast housing									
2d = alum. pressure cast housing, display									
Communication /									
0 = 4...20 mA, 2-wire, with Hart®-communication									
1 = 4...20 mA, 2-wire, intrinsically safe version with Hart®-communication X)									
Diaphragm /									
2 = stainless steel 1.4435 (316L)									
3 = Hastelloy® F)									
4 = Tantal F) G)									
Temperature range /									
0 = without temperature decoupler up to 125°C									
1 = with temperature decoupler up to 300°C F)									
Process connection /									
E01 = G 1/2"-male (DIN 3852)									
E02 = G 1/2"-male (DIN 3852) with flush sensor H)									
E03 = G 1/2"-male (EN 837)									
E04 = 1/2" NPT-male									
E05 = G 1"-male with flush welded diaphragm (DIN 3852)									
E07 = DIN-flange DN25 PN40 (DIN 2501)									
E08 = DIN-flange DN50 PN40 (DIN 2501)									
E09 = DIN-flange DN80 PN16 (DIN 2501)									
E10 = ANSI-flange DN 2" / 150 lbs (ANSI B16.5) I)									
E11 = ANSI-flange DN 3" / 150 lbs (ANSI B16.5) I)									
E12 = DRD Ø 65 mm J)									
Calibration /									
1 = absolute pressure (possible from 1 bar)									
2 = gauge pressure									
Operating range /									
E01 = -0,4...+0,4 bar (overload up to 2,0 bar, burst pressure 3,0 bar)									
E02 = -1...+1 bar (overload up to 5,0 bar, burst pressure 7,5 bar)									
E03 = -1...+2 bar (overload up to 10,0 bar, burst pressure 15,0 bar)									
E04 = -1...+4 bar (overload up to 20,0 bar, burst pressure 25,0 bar)									
E05 = -1...+10 bar (overload up to 40,0 bar, burst pressure 50,0 bar)									
E06 = 0...+0,4 bar (overload up to 2 bar, burst pressure 3 bar)									
E07 = 0...+1 bar (overload up to 5 bar, burst pressure 7,5 bar)									
E08 = 0...+2 bar (overload up to 10 bar, burst pressure 15 bar)									
E09 = 0...+4 bar (overload up to 20 bar, burst pressure 25 bar)									
E10 = 0...+10 bar (overload up to 40 bar, burst pressure 50 bar)									
E11 = 0...+20 bar (overload up to 80 bar, burst pressure 120 bar)									
E12 = 0...+40 bar (overload up to 105 bar, burst pressure 210 bar)									
E13 = 0...+100 bar (overload up to 210 bar, burst pressure 420 bar)									
E14 = 0...+200 bar (overload up to 600 bar, burst pressure 1000 bar)									
E15 = 0...+400 bar (overload up to 1000 bar, burst pressure 1250 bar)									
E16 = 0...+600 bar (overload up to 1000 bar, burst pressure 1250 bar)									
Special design /									
0 = none									
1 = sealing FFKM (standard FFKM) K)									
2a = filling fluid - food compatible oil (standard silicon oil) F)									
2b = filling fluid - Halocarbon (standard silicon oil) F)									
9 = please specify in detailed text									



Dimensions PU-10K (mm):

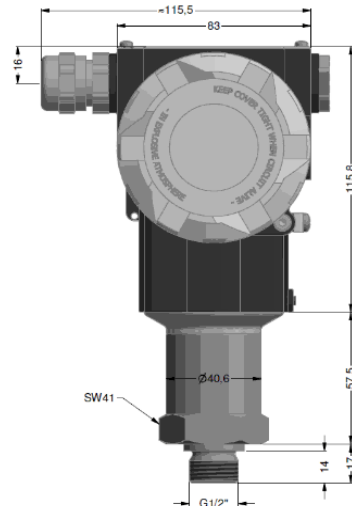
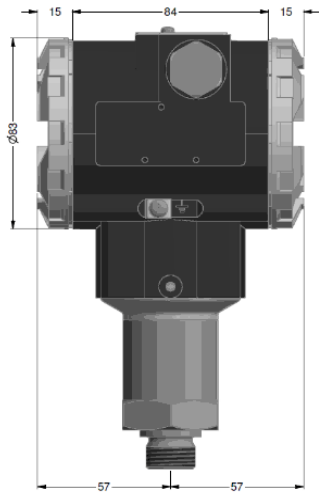
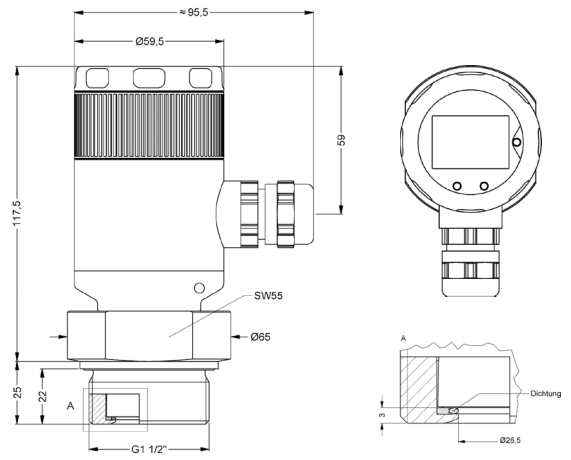


G 1/2"-male DIN 3852



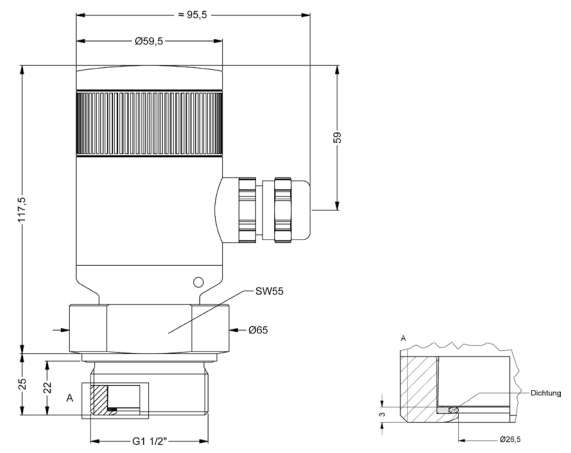
G1 1/2"-AG flush DIN 3852

Stainless steel field housing with display



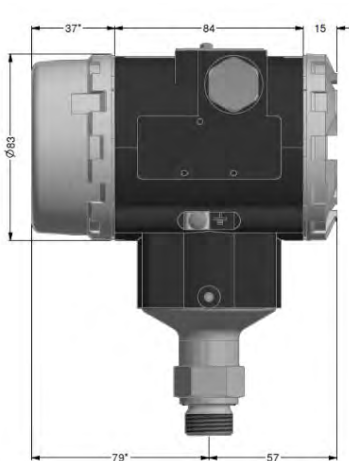
G1 1/2"-AG flush DIN 3852

Stainless steel field housing without display

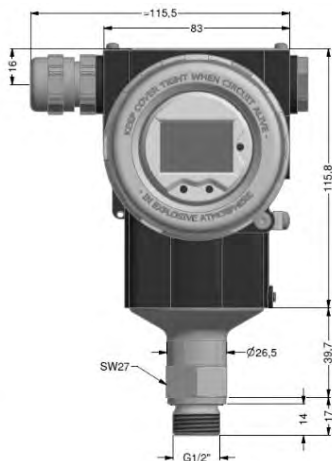


>> - aluminium pressure casting housing is horizontally rotatable as standard

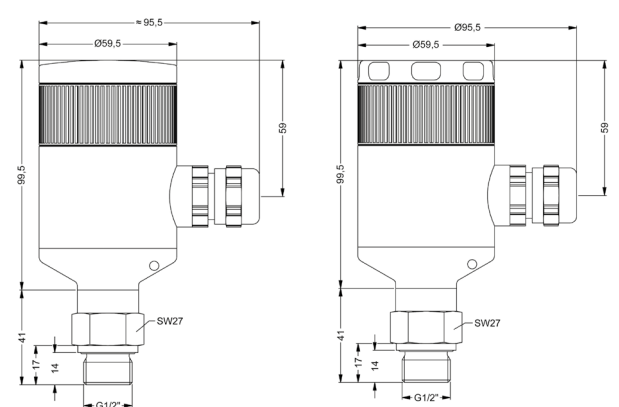
Dimensions PU-10E (mm):



by 19 mm (with aluminium pressure casting housing)



Stainless steel field housing

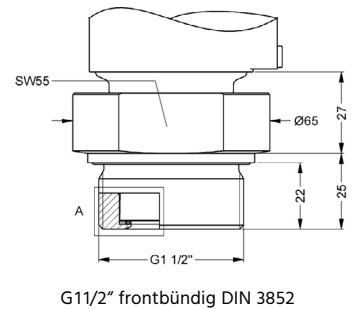
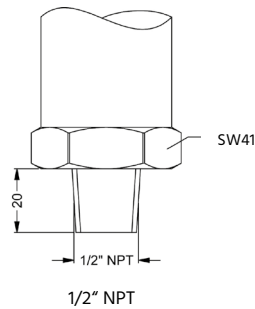
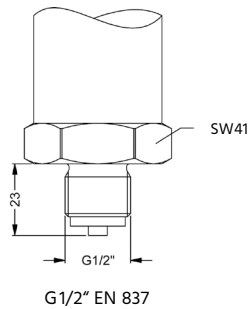
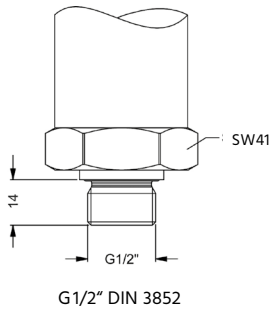


>> - for nominal pressure PN > 400 bar increases the length of devices by 39 mm

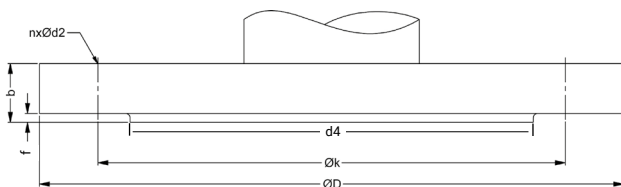


Mechanical Connections (mm):

Inch-system thread

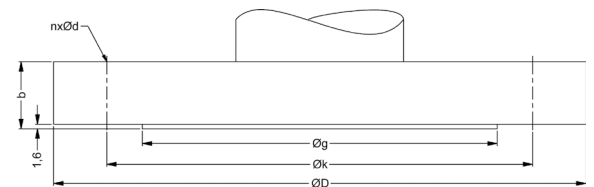


Flange (DIN 2501)



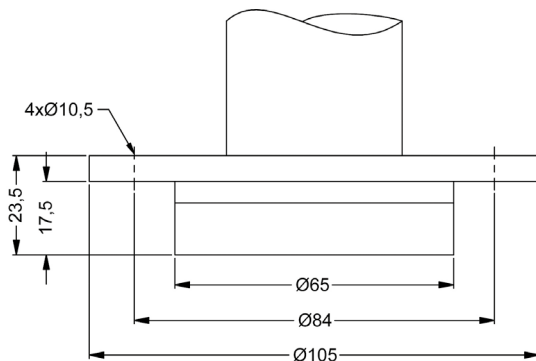
Size	DN25 / PN40	DN50 / PN40	DN80 / PN16
D	115	165	200
k	85	125	160
b	18	20	20
n	4	4	8
d2	14	18	18
f	2	3	3
d4	68	102	138
PN	≤ 40 bar	≤ 40 bar	≤ 16 bar

Flange (ANSI B16.5)



Size	2" / 150 lbs	3" / 150 lbs
D	152.4	190.5
g	91.9	127.0
k	120.7	152.4
b	19.1	23.9
n	4.0	4.0
d	19.1	19.1
PN	≤ 10 bar	≤ 10 bar
PN	≤ 40 bar	≤ 40 bar

DRD-connection



Temperature decoupler

