PRODUCT CATALOGUE

SATRON instruments

Satron Instruments Inc. P.O Box22, FI-33901 Tampere, Finland
Tel.+358207464801, Telefax +358207464801
info@satron.com, sale@satron.com
www.satron.com

Satron Instruments Inc.
P.O.Box 22, FI-33901 Tampere, Finland
Tel. +358 207 464 800, Fax +358 207 464 801
www.satron.com

We reserve the right for technical modifications without prior notice.

Cover: Designed by Freepik.com

14.6.2016

Satron Instruments Inc. P.O.Box22, FI-33901 Tampere,Finland
Tel.+358207464801, Telefax+358207464801
www.satron.com, info@satron.com, sale@satron.com

Satron Instruments Inc.
P.O.Box 22, FI-33901 Tampere, Finland
Tel. +358 207 464 800, Fax +358 207 464 801
www.satron.com

Expressing performance

April 30, 2010

Some of the most common quantities expressing performance and the reference conditions in which they are measured are described on this page. The following description conforms to the IEC 546 and IEC 770 recommendations.
Values of performance specifications apply to 316 SS diaphragms, unless standard material otherwise defined.

Quantities used for expressing performance

Non-linearity is the maximum deviation of the characteristic curve (of the average of the increasing and decreasing portions) from the straight line drawn so as to minimize the deviation (= non-linearity with respect to independent straight line).
Conformity error is a term used instead of non-linearity if the ideal characteristic curve is not a straight line: conformity error is the maximum deviation of the average-deviation curve from the ideal characteristic curve drawn so as to minimize the deviation. Dead band, also known as neutral zone, is the range through which the input signal may vary without causing any perceptible change in the output signal.
Hysteresis, as a quantity expressing performance, is defined as the maximum difference between the increasing and decreasing output signal corresponding to the same input signal value when the input signal is changed through the full range in both directions.

Repeatability is the maximum deviation of output signal values corresponding to the same input signal value in consecutive measurements, when conditions remain unchanged and when this input signal value is always approached from the same direction while the input is changed through full range. Repeatability is calculated on the basis of measurement results from the formula.

$$\sqrt{\frac{\sum(x_i-\bar{x})^2}{N}}$$

where x_i = individual measurement result
$\bar{x}$ = average of measurement results
N = number of measurements

Accuracy requirements for measuring equipment in performance measurements

The errors of the measuring equipment used should be at least 1/4 of the performance of the device to be tested.

Reference conditions

Rated operating conditions, or reference conditions, refer to the equalization of such factors independent of the apparatus as affect performance, in order to obtain comparable performance values from the apparatus.

In performance testing of the devices included in this catalogue the reference conditions should be as follows:

Ambient conditions

- ambient temperature: +20°C ± 2°C
- relative humidity of air: 65 % ± 5 %
- pressure of air: 860 to 1060 mbar

Auxiliary energy

Electrical devices

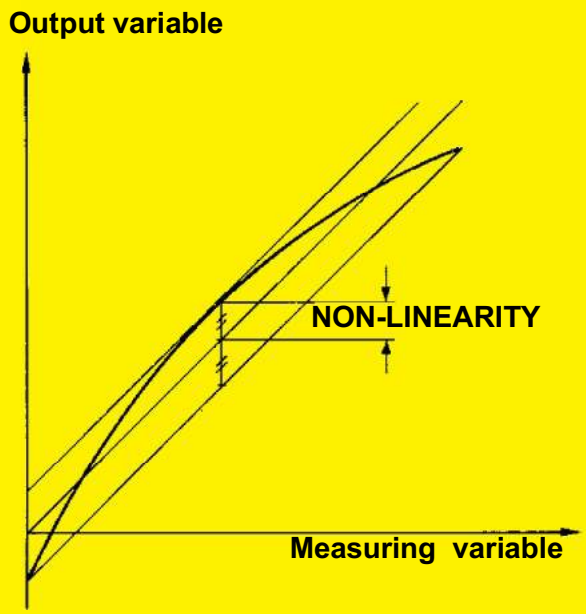
- supply voltage: nominal voltage ± 1 %
- ripple ≤ 0.1 % (with DC voltage)

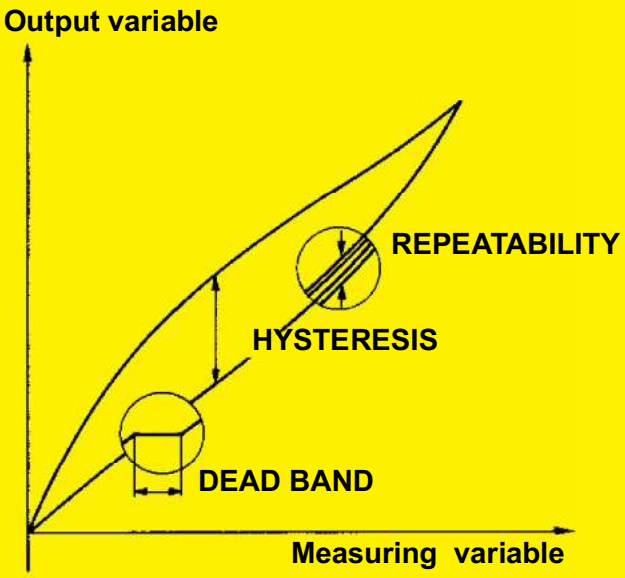
Pneumatic devices

- supply pressure: nominal pressure ± 1 %
- supply air temperature: ambient temperature: ± 2°C
- supply air humidity: dew point at least 10°C lower than the temperature of the device being tested
- supply air free from dust and oil, particle size less than 3 μm.

Other conditions

Position of device when tested: nominal position (normal mounting position).
Load: nominal load.





Satron Instruments Inc., P.O.Box 22, FI-33901 Tampere, Finland
Tel. +358 207 464 800, Telefax +358 207 464 801, www.satron.com

Pressure measurement

Our instruments for pressure measurement:

VT pressure transmitter ..... Spec. BPV710
VB pressure transmitter ..... Spec. BPLV770

ALSO SUITABLE FOR PRESSURE MEASUREMENT
VG pressure transmitter ..... Spec. BPLV700
VL pressure transmitter ..... Spec. BLV820
SEE ALSO:
HPS hydraulic pressure seal..... Spec. BP415

Process connections

Some typical connections for tapping the pressure are shown below. Fig. 1a is for liquids and gases, fig. 1b for steam, and fig. 1c for high-pressure service. Suggested material for the branch shown in fig. 1c is e.g. St35.8 or 13CrMo44. All burrs should be carefully removed from the tapping point. The processor coupling must be welded with a thin compound rod (max. diameter Ø 2.0 mm) to avoid harmful thermal strains, Fig. 1d.

Connection pipe

Recommended materials for the connection pipe:
- AISI304 stainless steel
- AISI316 acid-resistant steel

For high pressure measurements (above 100 bar):
- St35.8 or 13CrMo44 heat-resistant steels

Recommended pipe dimensions (o.d. x wall thickness):
- Ø 12 × 1 mm, Ø 12 × 1.5 mm, or Ø 14 × 2.5 mm.

It is recommendable always to equip the connection pipe with shut-off valves and, when necessary, with a pressure gauge connection valve.

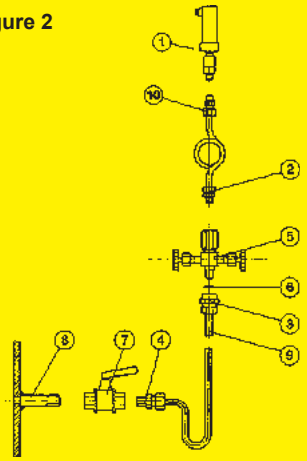
For low pressures and for fluids liable to form sediments a ball valve should be used as shut-off valve. A threaded or welded needle valve is used for steam and high pressures.

Protection from pulsation

If pulsations caused by the process occur at the point of measurement, the instrument should be protected by means of a restriction, damping pot, or equivalent means. See figure 2 for connection pipe configuration. After the shut-off valve there is a bend for protective liquid or gas. A loop (12) is installed below the transmitter for collecting condensates.
Figure 2 gives an example of the measurement pipe arrangement for a pressure transmitter.
Figure 3 illustrates some applications of a pressure transmitter.

Pressure transmitters	Adjustability		
	Span		Measuring range
	min.	max.	
VT3	1.4 kPa (14 mbar)	35 kPa (350 mbar)	-35...+35 kPa (-350...350 mbar)
VT4	4 kPa (40 mbar)	100 kPa (1000 mbar)	-100...+100 kPa (-1000...1000 mbar)
VT5	26.5 kPa (265 mbar)	500 kPa (5000 mbar	-100...+500 kPa (-1000...5000 mbar)
VT6	0.145 MPa (1.45 bar)	3 MPa (30bar)	-0.1...+3 MPa (-1...+30 bar)
VTA6	0.145 MPa (1.45 bar)	3 MPa (30 bar)	0...+3 MPa (0...+30 bar), abs.
VT7	1 MPa (10 bar)	15 MPa (150 bar)	0...+15 MPa (0...+150 bar), abs.
VT8	6.7 MPa (67 bar)	100 MPa (1000 bar)	-0.1...+100 MPa (-1...+1000 bar)
VB 4	4 kPa (40 mbar)	100 kPa (1000 mbar)	-100...+100 kPa (-1000...1000 mbar)
VB 5	10 kPa (100 mbar)	500 kPa (5000 mbar)	-100...+500 kPa (-1000...5000 mbar)
VB 6	0.03 MPa (0.3 bar)	3 MPa (30bar)	-0,1...+3 MPa (-1...+30 bar)

Figure 2



1 Pressure transmitter VT
2 Ø 12 / G½ stud coupling
3 Ø 12-G½ pressure gauge connector
4 Ø 12-G½ stud coupling
5 R1/2 pressure gauge connector
6 Gasket 18.5 x 7 mm
7 G½ ball valve
8 Process connection G½
9 Pipe 12 mm dia. x 1.5 mm AISI 316
10 Ø 12 / G½ connector

Figure 1

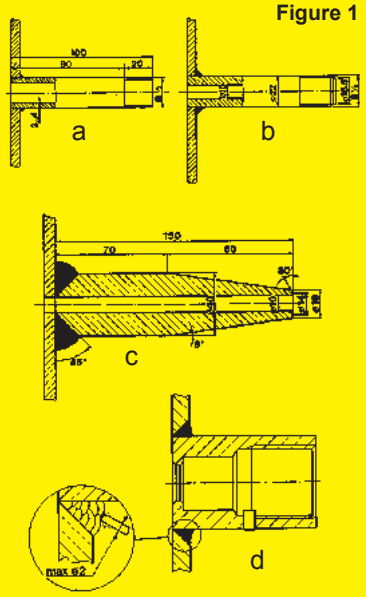
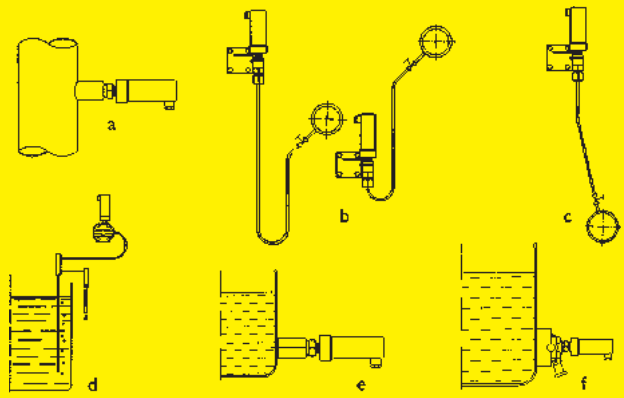


Figure 3



a. Installation of pressure transmitter VG
b. Steam and liquid pressure measurement
c. Gas pressure measurement with pressure transmitter VT
d. Level measurement using the bubbling method
e. Level measurement with pressure transmitter VG
f. Level measurement; installation by means of the PASVE mounting valve

SATRON instruments
Satron Instruments Inc., P.O.Box 22, FI-33901 Tampere, Finland
Tel. +358 207 464 800, Telefax +358 207 464 801, www.satron.com

SATRON VT Pressure Transmitter

SATRON VT pressure transmitter belongs to the series V-transmitters. SATRON VT is used for 0-1.4 kPa...0-100 MPa ranges. It is a 2-wire transmitter with HART® standard communication. In pressure measuring applications SATRON VT-transmitters are used for measuring the pressure of clean gases, steam and non-crystallizing liquids.The transmitter's sensor is piezoresistive. The rangeability is 100:1 for types VT6 - VT8.

TECHNICAL SPECIFICATIONS

Measuring range and span
See Selection Chart.

Zero and Span adjustment
Zero elevation: Calibrated span is freely selectable on the specified range depending from the desired option. This can be made by using extern control shafts, keyboard (display option), HART®275/375 communicator.

Damping
Time constant is continuously adjustable 0.01 to 60 s.

Temperature limits
Ambient: -30 to +80 °C
Process:
Process connections 1 and 2:
-30 to +125 °C
Process connections 3 and 5:
-30 to +80 °C
Shipping and storage: -40 to +80 °C.
Operating temperature of display:
0 to +50ºC *(does not affect operation of the transmitter)*

Pressure limits Min. and max. process pressure: See the appended tables.

Volumetric displacement
< 0.5 mm^3 /max. span

Output 2-wire (2W), 4-20 mA, user selectable for linear, square root, inverted signal or the transfer function (16 points)specified by the user

Supply voltage and permissible load
See the load capacity diagram;
4-20 mA output: 12-35 VDC.

Humidity limits
0-100 % RH; freezing of condensed water not allowed in reference pressure channels.

PERFORMANCE SPECIFICATIONS
Tested in accordance with IEC 60770: Reference conditions, specified span, no range elevation, horizontal mounting; AISI316L diaphragm, silicone oil fill.

Accuracy
Process connections 1 and 2:
±0.05 % of calibrated span
(span 1:1-5:1 /max.range).

Process connections 3 and 5:
±0.10 % of calibrated span
(span 1:1-5:1 /max.range).

On the measuring ranges 5:1-100:1:

$$\pm[0.025+0.01 \times (\frac{\text{max.span}}{\text{calibrated span}})]\%$$ of calibrated span

Diaphragm material AISI304:
±1,5 % of calibrated span
(span 1:1-100:1 /max.range).

(incl. nonlinearity, hysteresis and repeatability)

Long-term stability
±0.1 %/max. span/12 months

Temperature effect on compensated temperature ranges -20...+80 °C
Zero and span shift:
±0.15 % of max. span

Mounting position effect
(**VT3** - **VT7**)
Zero error < 0.32 kPa, which can be calibrated out.
VT8: mounting position has no effect

Vibration effect (IEC 68-2-6: FC):
±0.1 % of measuring range/
2g/10 to 2000 Hz
4g/10 to 100 Hz

Power supply effect
< ±0.01 of calibrated span per volt

Insulation test voltage
500 V rms 50 Hz

CONSTRUCTION AND CALIBRATION
Materials
Diaphragm [1]: AISI316L (EN 1.4435), AISI304 (EN 1.4301), Duplex (EN 1.4462), Hast. C276 (EN 2.4819), Tantalum or Titanium Gr2 (EN 3.7035).

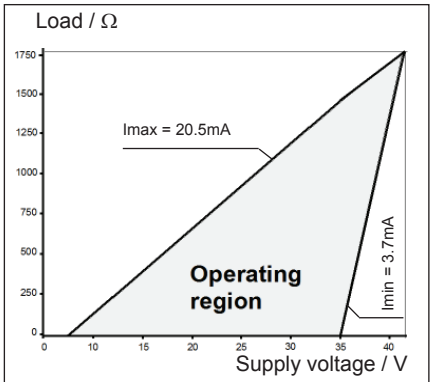
Other sensing element materials: AISI316, SIS 2343.

Filling fluid: Silicone oil or inert oil (VT3 - VT7)

Enclosure class IP66

Housing with PLUG connector, housing type codes **H** and **T**
Housing: AISI316, Seals: Viton® and NBR
TEST jacks: MS358Sn/PVDF, protected with silicone rubber shield.
PLUG connector: PA6-GF30 jacket, Silicone rubber seal, AISI316 retaining screw.
Housing with junction box/terminal strip, housing type codes **M** and **N**
Housing: AISI303/316, Seals: Nitrile and Viton®; Nameplates: Polyester
Connection hose between sensing element and housing :
Codes **L** and **K** :
PTFE hose with AISI316 braiding.

[1] Parts in contact with process medium



$$R_{max} = \frac{\text{Supply voltage - 10V}}{I_{max}}$$

Imax = 20.5mA using HART®-communication

Imax = 23mA (when the alarm current 22.5mA is on)

Supply voltage for transmitter without intrinsic safety (not ATEX)

Pressure limits

Maximum process pressure, MPa

Transmitter type	Max. overload pressure	Pressure class
VT3	0.2	PN40
VT4	0.3	PN40
VT5	1.5	PN40
VT6	7.5	PN100
VT7	40.0	PN250
VT8	100.0	PN1000

Minimum process pressure
(VT8: no min. pressure limitations)

$T_{proc.}$ °C	Minimum pressure for different fill fluids (kPa, abs.)	
	DC200 100 cSt	Inert oil
20	5	8
40	8	10
80	16	28
120	21	53

Satron Instruments Inc., P.O.Box 22, FI-33901 Tampere, Finland
Tel. +358 207 464 800, Telefax +358 207 464 801, www.satron.com

Calibration
For customer-specified range with 1 s. damping. (If range is not specified, transmitter is calibrated for maximum range.)

Electrical connections
Housing with PLUG connector, **H** and **T:**
PLUG connector, connector type DIN 43650 model AF; Pg9 gland for cable; wire cross-section 0.5 to 1.5 mm^2.

Housing with junction box/terminal strip**, M** and **N:**
M20x1.5, 1/2-NPT inlet; screw terminals for 0.5 to 2.5 mm^2 wires

Weight
Transmitter
- with housing types **H** and **T** : 0,7 kg
- with housing type **M** and **N** : 1.2 kg

Product Certifications

European Directive Information

Electro Magnetic Compatibility
(EMC directive 2004/108/EC)
All pressure transmitters

Atex Directive (94/9/EC)
Satron Instruments Inc. complies with the ATEX Directive.

European Pressure Equipment Directive (PED)
(97/23/EC)

All Pressure Transmitters :
- Sound Engineering Practice

Transmitters with nominal pressure higher than 200 bar fulfil the requirements of the Conformity Assessment procedure Module A of the directive.

Hazardous Locations Certifications

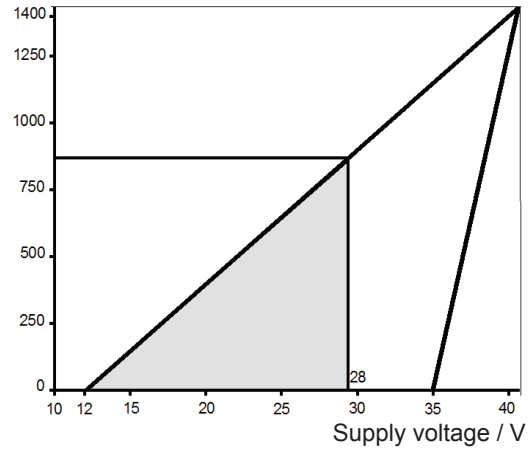
European Certifications
ATEX Intrinsic Safety

Certification No. : DNV-2007-OSL-ATEX- 1346X

Ex II 1 GD T135°C EEx ia II C T4 -20°C ≤ Tamb ≤ 50°C
Ex II 2 GD T135°C EEx ia II C T4 -20°C ≤ Tamb ≤ 50°C

Input Parameters :
Ui = 28 V
Ii = 93 mA
Pi = 0.651 W
Ci = 5 nF
Li = 0.2 mH

Special Conditions for Safe Use (X) :
The enclosure with plastic window and the plastic DIN43650 connector must not be installed in potentially explosive atmosphere requiring category 1 apparatus.
The non-conducting surface of the sensor element may be charged by the flow of non-conducting media, so there may be electrostatic hazard with IIC-gases. These units should be marked 2 GD.
The equipment shall be installed and connected according to the manufacturers instructions.



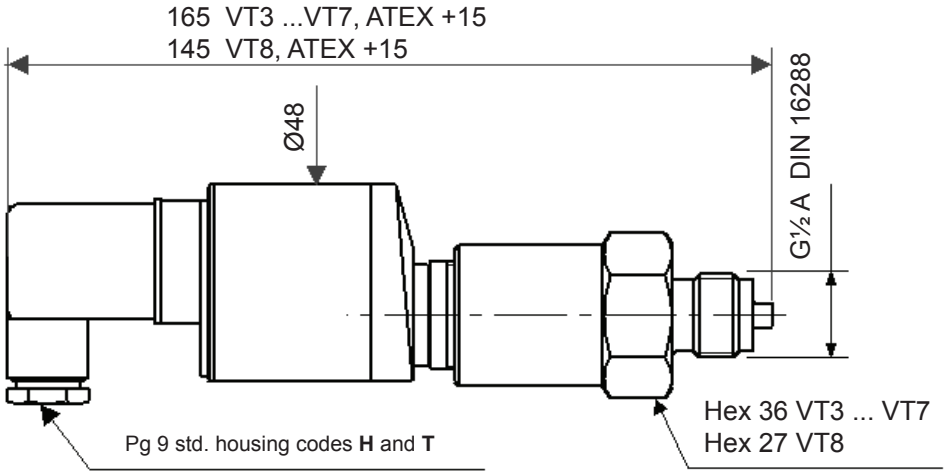
Rmax = $\frac{\text{Supply voltage - 10V}}{\text{Imax}}$

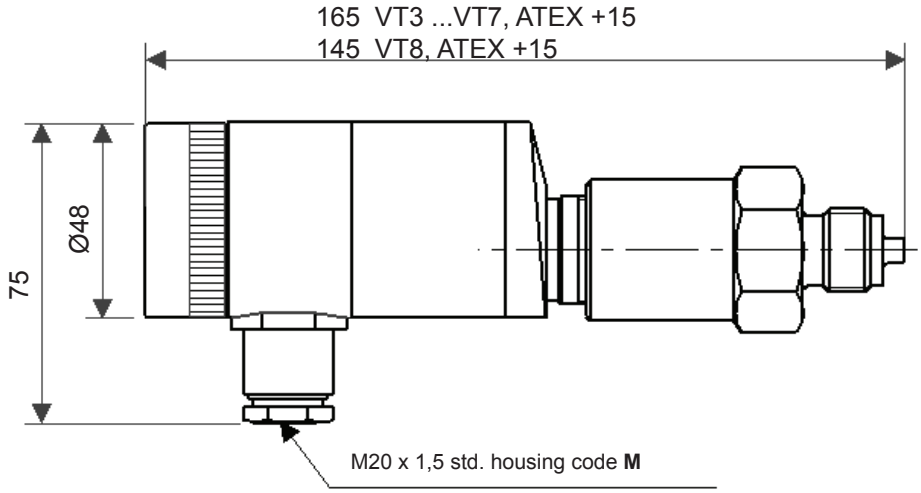
Imax = 20.5mA using HART®-communication

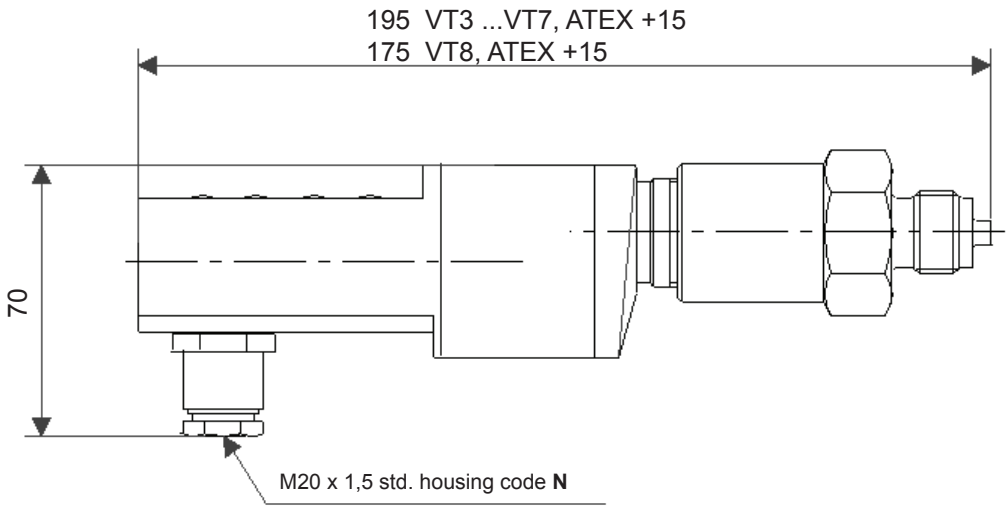
Imax = 23mA (when the alarm current 22.5mA is

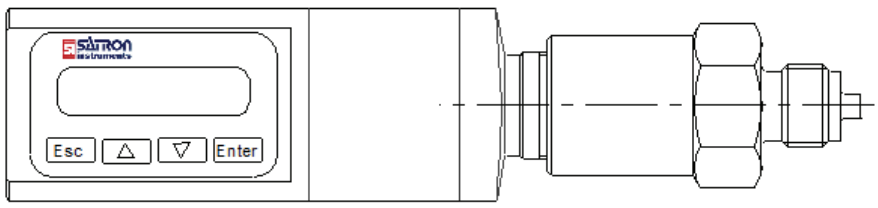
Supply voltage for transmitter with certified intrinsic safety (ATEX)

Dimensions (in mm)

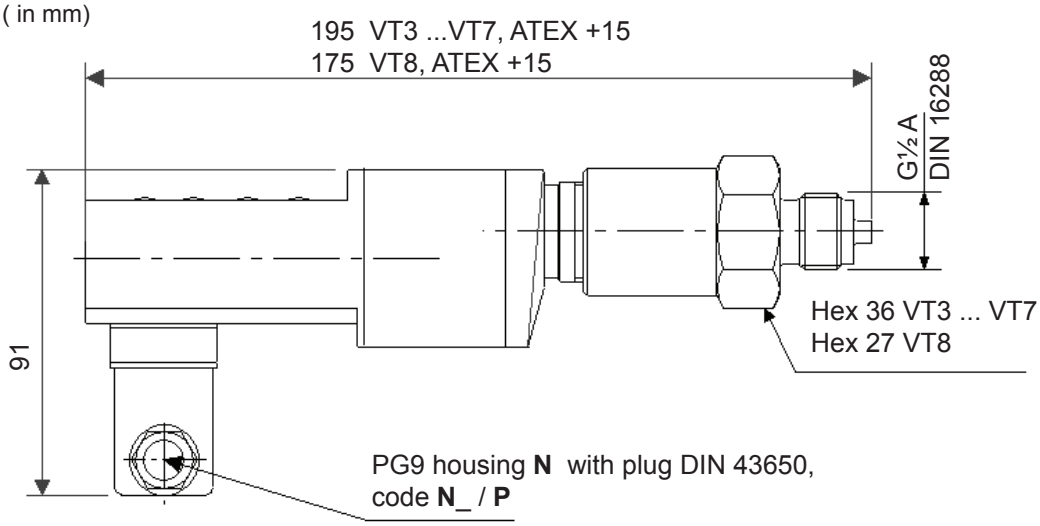


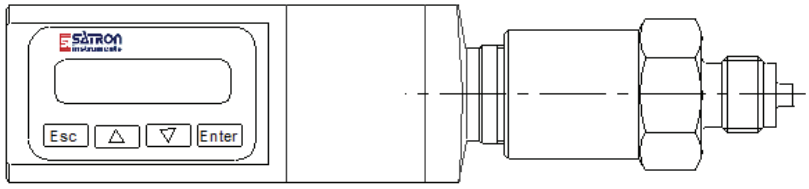


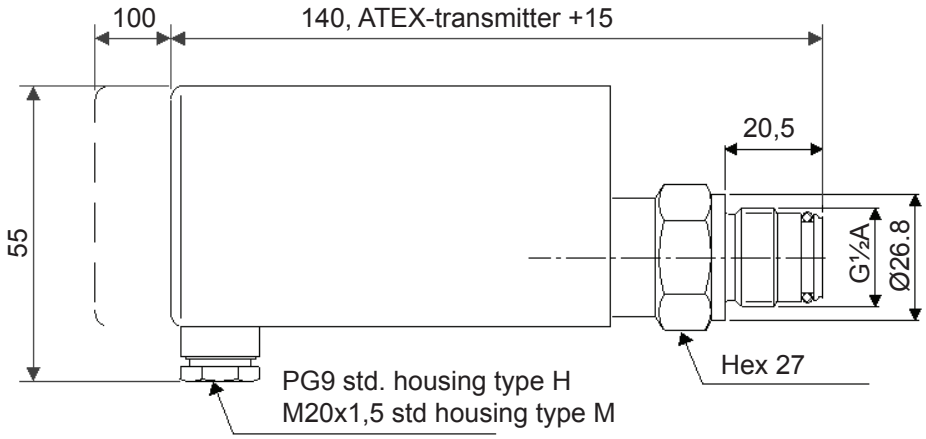




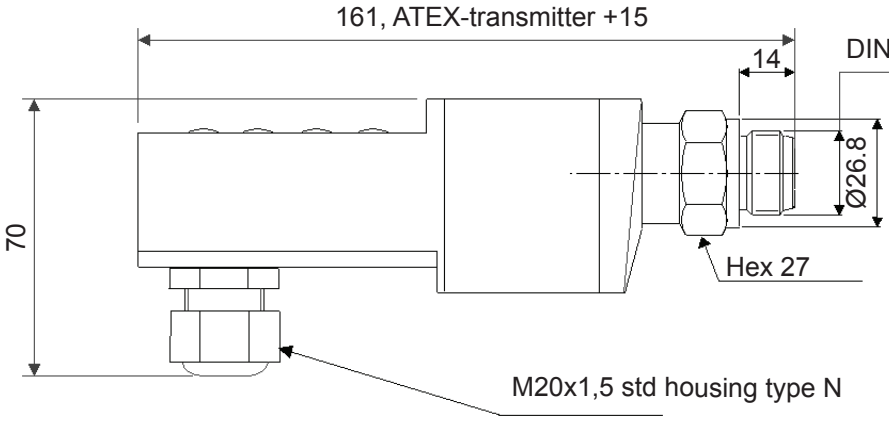
Dimensions (in mm)







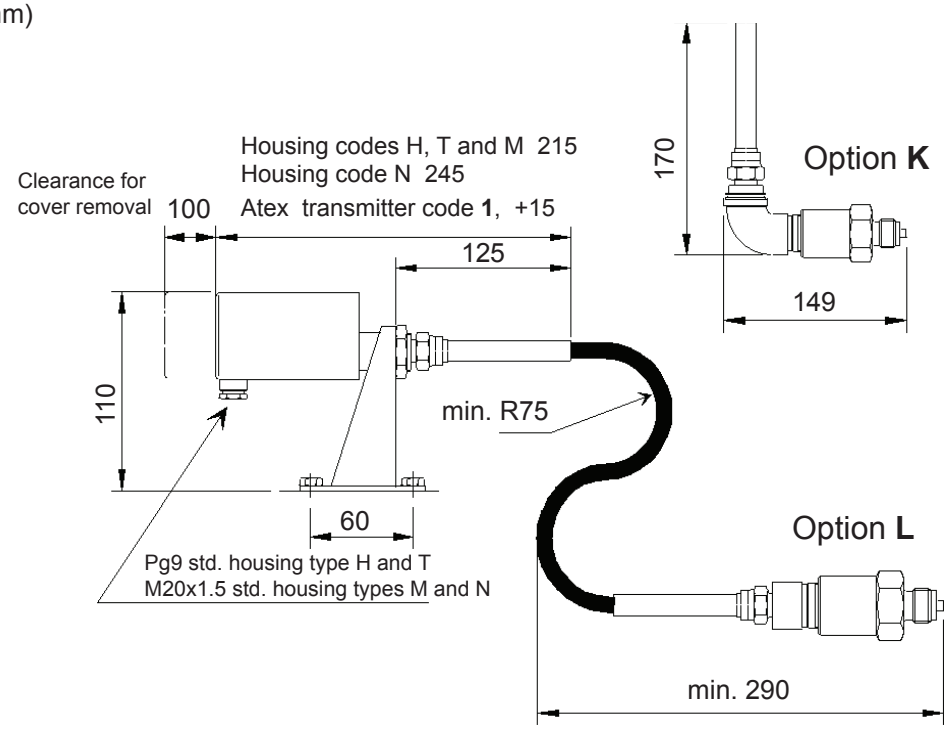
Process connection G½A, flush mounted with o-ring, code **5**



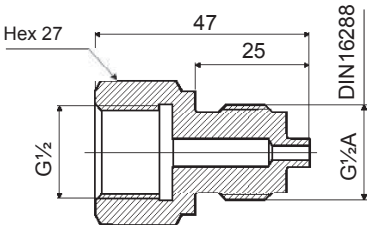
Process connection DIN3852-E-G½A, flush mounted, code **3**

SATRON VT Pressure Transmitter

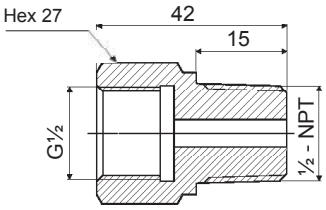
Dimensions (mm)



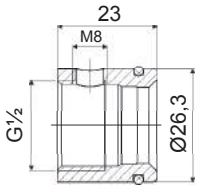
Remote electronics, connecting cable with protection hose, codes **L** and **K**



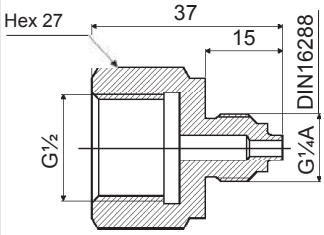
Thread DIN16288 - G½A
Orded code : T1320291



Thread ½ - 14 NPT
Orded code : T1320293



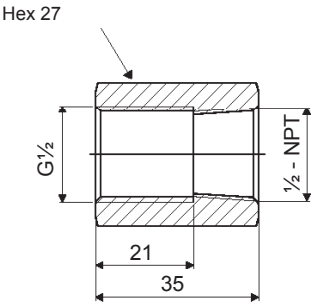
PMC 1" (Ø26,3), for process connection code 5
Orded code : T1320310



Thread DIN16288 - G¼A
Orded code : T1320292

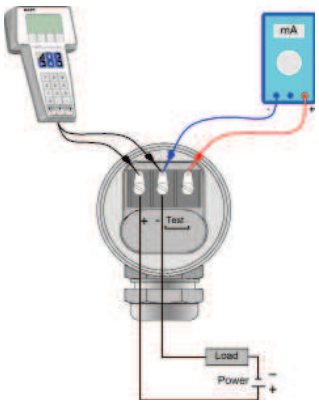
For example the process connection of the flush mounted transmitter (DIN3852-E-G½) can be changed using modification adapters.

Other adapter sizes, please contact to Satron Instruments Inc.

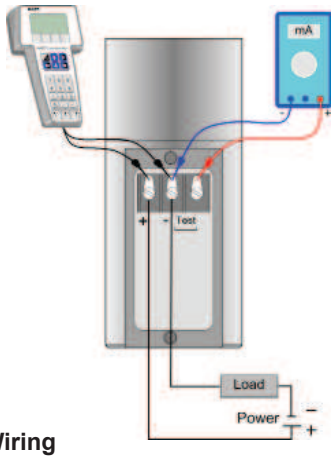


Thread ½ - 14 NPT, female
Orded code : M1050471

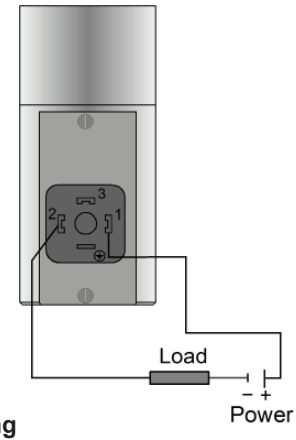
Modification adapters of the process connection, for types VT3 ... VT8



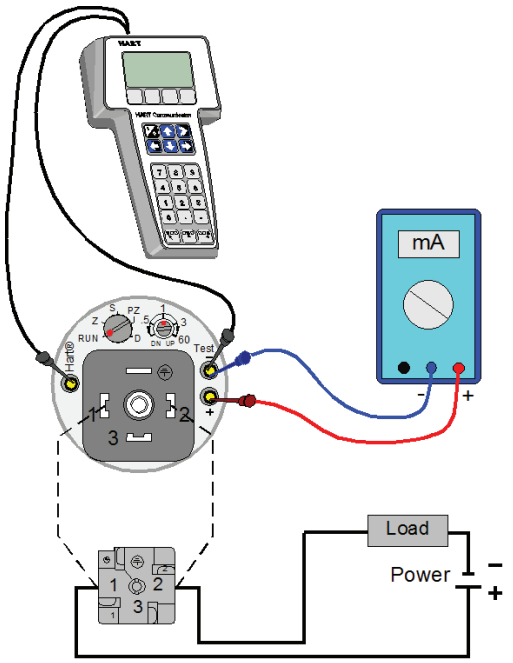
Wiring
Housing with terminal strip, code **M**



Wiring
Housing with terminal strip and display, code **N**



Wiring
Housing with terminal strip and display with plug connector DIN 43650 , code **N _/ _P**



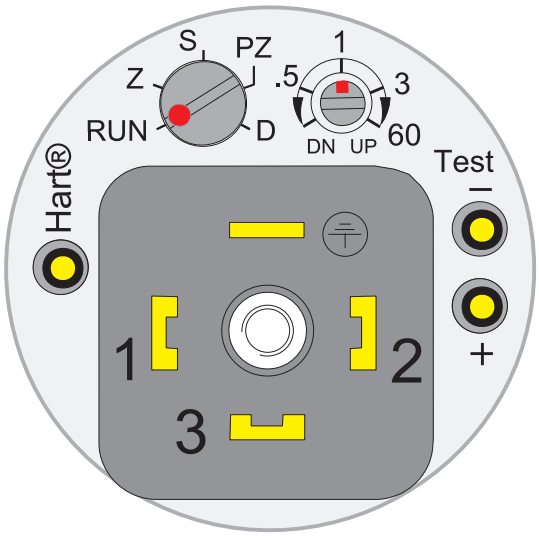
Wiring
Housing with PLUG connector, codes **H** and **T**

Keyboard :

Esc	=	Press **Esc** move back towards the top of the main menu.
▲	=	Use the **UP** arrow key to move up on the current menu level or to increase the selected parameter value.
▼	=	Use the **DOWN** arrow key to move down on the current menu level or to decrease the selected parameter value.
Enter	=	Press **ENTER** to move to a lower level in a menu or to accept a command or parameter value.

Housing with display, code N

Use of selector switch :
RUN = working position
PZ = Process value zero
D = Damping adjustment
S = Span adjustment
Z = Zero adjustment
DN = Down
UP = Up



Housing with PLUG connector, code T

SATRON VT Pressure Transmitter

BPV710
01.06.2015

Selection Chart

Adjustability	Span, min	Span, max	Measuring range
VT3	1.4 kPa (14 mbar)	35 kPa (350 mbar)	-35...+35 kPa (-350...350 mbar)
VT4	4 kPa (40 mbar)	100 kPa (1000 mbar)	-100...+100 kPa (-1000...1000 mbar)
VT5	10 kPa (100 mbar)	500 kPa (5000 mbar)	-100...+500 kPa (-1000...5000 mbar)
VTA5	10 kPa (100 mbar)	500 kPa (5000 mbar)	0...+500 kPa (0...5000 mbar), abs.
VT6	0.03 MPa (0.3 bar)	3 MPa (30bar)	-0.1...+3 MPa (-1...+30 bar)
VTA6	0.03 MPa (0.3 bar)	3 MPa (30 bar)	0...+3 MPa (0...+30 bar), abs.
VT7	0.15 MPa (1.5 bar)	15 MPa (150 bar)	0...+15 MPa (0...+150 bar), abs.
VT8	1 MPa (10 bar)	100 MPa (1000 bar)	-0.1...+100 MPa (-1...+1000 bar)

Output **S** 4-20mA DC/HART® -protocol

Process connection

1 G ½A DIN 16288 (male) **2** ½ - NPT (male) **3** DIN 3852-X-G½A (male), Flush Mounted, not VT3, VT8

5 G½A (male), Flush Mounted, with o-ring, not VT3, VT8

Wetted material

Body

Code	Material
2	AISI316L (EN 1.4404)
3	Hast. C 276 (EN 2.4819) (*)
6	Titanium Gr2 (EN 3.7035) (*)
8	Duplex (EN 1.4462) (*)

Diaphragm

Code	Material
2	AISI316L (EN 1.4435) (no VT8)
3	Hast. C276 (EN 2.4819) (no VT3, VT8) (*)
5	Tantalum (no VT3, VT8) (*)
6	Titanium Gr2 (EN 3.7035) (no VT3, VT4) (*)
8	Duplex (EN 1.4462) (no VT3, VT8) (*)
A	AISI304 (EN 1.4301)

Fill fluid (specify for types VT3 - VT7) **S** Silicone oil **G** Inert oil

Housing type

H Housing with PLUG-connector, DIN43650, no display, inlet PG9

T Housing with PLUG-connector and with manual adjust, DIN43650, no display, inlet PG9, (no ATEX)

M Housing with junction box/terminal strip, no display, inlet M20x1,5

N Housing with junction box/terminal strip, with display, inlet M20x1,5

Explosion proof **0** No explosion proof classification **1** Atex Intrinsic Safety, Ex II 1 GD T135°C (**)

□□□□□□□ / □□ / □□□ / □□□

Process coupling

0 No coupling
1 Threaded coupling G½, DIN 16288
2 Threaded coupling G½, DIN 3852-X-G½ (Flush-Mounted)
3 Threaded coupling G½, for process connection code 5
4 Threaded coupling ½ - NPT, for process connection code 2

Special size of electrical inlet

N 1/2 NPT **G** Pg13.5 **P** Plug DIN 43650

Special features

Remote electronics (specify only if housing connected with cable to sensing element)
- connecting cable with protection hose
L Hose protected with PTFE/AISI316 braiding, straight
K Hose protected with PTFE/AISI316 braiding, angle of 90°

Length of connection cable between sensing element and housing

2 2 m cable **3** 3 m cable etc. (max. 10 meter)

Mounting parts for remote electronics for Ø 51 mm tube

0 No mounting parts **1** Mounting parts

Documentation

Calibration certificate **AE** English

Installation and operating instructions **I E** English **I F** Finnish

Material certificates

O No material certificate
MC1 Raw material certificate without appendices, in accordance with SFS-EN 10204-2.1 (DIN 50049-2.1) standard
MC2 Raw material certificate for wetted parts, in accordance with SFS-EN 10204-2.2 (DIN 50049-2.2) standard
MC3 Raw material certificate for wetted parts, in accordance with SFS-EN 10204-3.1 B (DIN 50049-3.1 B) standard

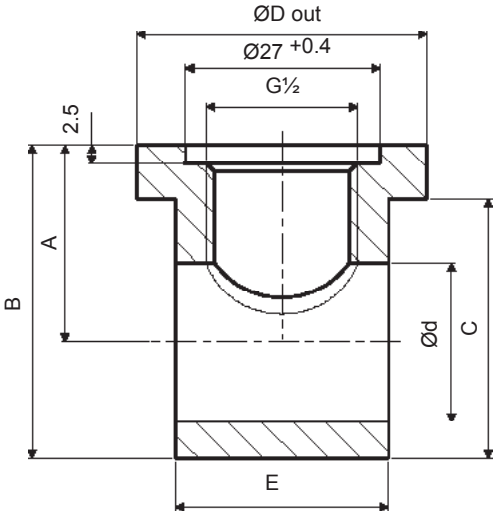
(*) = not for process connection code 3

(**) = Housing H and N : Ex II 2 GD T135°C
ATEX transmitter with display are the model without membrane key.

SATRON instruments

SATRON VT Pressure Transmitter

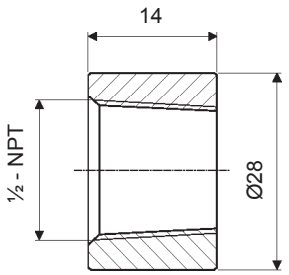
Process couplings



Pipe size	Dim. øD out	Dim. A	Dim. B	Dim. C	Dim. Ø d	Dim. E	Order code
DN15	40	27.5	43.5	36	22 $^{+0.2}_{0}$	29.5	M1050395
DN20	40	30.5	49	42	27.5 $^{+0.3}_{0}$	26	M1050396
DN25	50	33.5	55.5	48	34 $^{+0.5}_{+0.2}$	29.5	M1050397

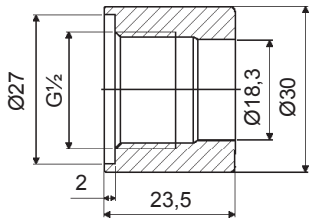
Other sizes, please contact to Satron Instruments Inc.

T-coupling DIN 3852-X-G½, sizes DN15 - 25



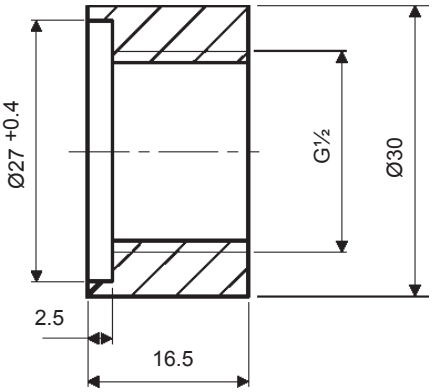
Order code: M1050368

Process coupling ½ - NPT



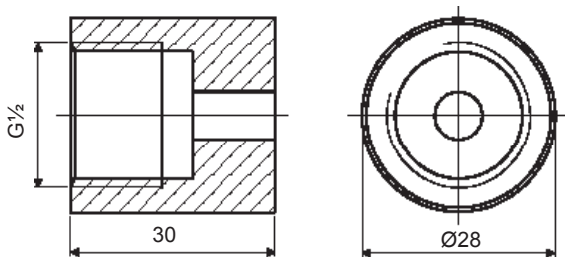
Order code: M1050515

Process coupling G½ (for process connection code 5)



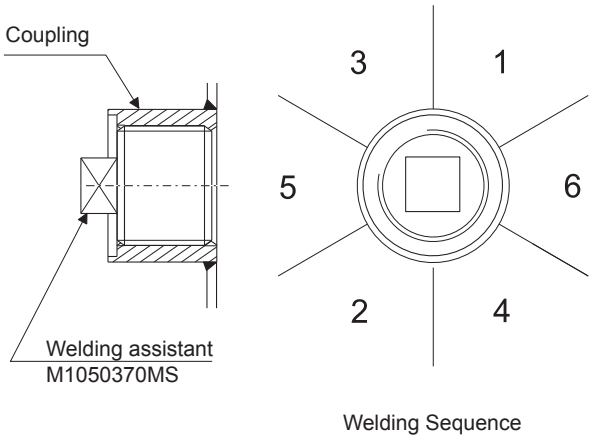
Order code : M1050369

Process coupling DIN 3852-X-G½



Order code : M1050367

Process coupling DIN 16288 - G½



Welding the coupling M1050369

We reserve the right for technical modifications without prior notice.
HART® is a registered trademark of HART Communication Foundation.
Viton® is the registered trademark of DuPont Down Elastomers.
Hastelloy® is the registered trademark of Haynes International.
Teflon® is the registered trademark of E.I. du Pont de Nemours & Co

CE

SATRON VB Pressure Transmitter

SATRON VB pressure transmitter belongs to the series V transmitters.
SATRON VB is user-friendly, through the ball valve mounted transmitter which is used for 0-4 kPa ... 0-3 MPa ranges.
The transmitter communicates in a 2-wire system.
In pressure measuring applications SATRON VB transmitter is used for measuring the pressure of gases, steams and sedimenting, crystallizing and sticking liquids. The transmitter's sensor is piezoresistive. The rangeability of the model VB6 is 100:1. The transmitter communicates digitally using the HART® protocol.

TECHNICAL SPECIFICATIONS

Measuring range and span
See Selection Chart.

Zero and Span adjustment
Zero elevation: Calibrated span is freely selectable on the specified range depending from the desired option. This can be made by using a HART®275/375 communicator.

Damping
- Time constant is continuously adjustable from 0.01 to 60 s.

Response time
Maximum 100 ms

Temperature limits
Ambient: -30 to +80 °C
Process: -30 to +125 °C
Shipping and storage: -40 to +80 °C
Operating temperature of display: 0 to +50ºC *(does not affect operation of the transmitter)*

Pressure limits
Min. and max. process pressure:
See the appended tables.

Volumetric displacement
< 0.5 mm^3 /max. span

Output 2-wire (2W), 4-20 mA, user selectable for linear, square root, inverted signal or the transfer function (16 points) specified by the user.

Supply voltage and permissible load
See the load capacity diagram;
4-20 mA output: 12 - 35 VDC.

Humidity limits
0-100 % RH; freezing of condensed water is not allowed in reference pressure channels.

PERFORMANCE SPECIFICATIONS
Tested in accordance with IEC 60770:
Reference conditions, specified span, no range elevation, horizontal mounting; O-ring seals, AISI316L diaphragm, silicone oil fill.

Accuracy
±0.1 % of calibrated span
(span 1:1 - 7.5:1 /max.range).
On the measuring ranges 7.5:1 - 100:1:
$\pm[0.025+0.010 \times (\frac{\text{max.span}}{\text{calibrated span}})]\%$ of calibrated span
(incl. nonlinearity, hysteresis and repeatability)

Long-term stability
±0.1 % / max. span / 12 months

Temperature effect on compensated temperature ranges -20...+80 °C:
Zero and span error, types VB5 and VB6: ±0.15 % of max.span.

Zero and span error, type VB4:
±0.25 % of max.span

Mounting position effect (**VB4** ... **VB6**)
Zero error < 0.15 kPa which can be calibrated out.

Vibration effect (IEC 68-2-6: FC):
±0.1 % of measuring range/
2g/10 to 2000 Hz
4g/10 to 100 Hz

Power supply effect
< ±0.01 % of calibrated span per volt

European Directive Information
European Pressure Equipment Directive (PED) (97/23/EY)
- Sound Engineering Practice
Electro Magnetic Compatibility (EMC directive 2004/108/EC)
-All pressure transmitters

Insulation test voltage
500 V rms 50 Hz

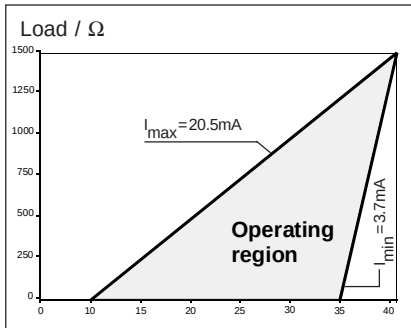
CONSTRUCTION
Wetted materials: AISI316L (EN 1.4404 and EN 1.4435)
Other materials: AISI316L, AISI303

Housing with PLUG connector, housing type code **H**
Housing: AISI303/316
Seals: Viton® and NBR
TEST jacks: MS358Sn/PVDF, protected with silicone rubber shield.
PLUG connector: PA6-GF30 jacket, Silicone rubber seal, AISI316 retaining screw.

Housing with junction box/terminal strip, housing type codes **M** and **N**
Housing: AISI303/316; Seals: Nitrile and Viton®; Nameplates: Polyester

Filling fluid: Silicone oil or inert oil

Enclosure class IP66



$R_{max} = \frac{\text{Supply voltage - 10V}}{I_{max}}$

I_{max} = 20.5mA using HART®-communication

I_{max} = 23mA (when the alarm current 22.5mA is on)

Pressure limits

Maximum process pressure, MPa

Transmitter type	Max. overload. pressure, **MPa**	Pressure class
VB4	0.3	PN40
VB5	1.5	PN40
VB6	7.5	PN100

Minimum process pressure

$T_{proc.}$ ℃	Minimum pressure for different fill fluid (**kPa**, abs.)	
	DC200 100 cSt	Inert oil
20	5	8
40	8	10
80	16	28
120	21	53

Satron Instruments Inc., P.O.Box 22, FI-33901 Tampere, Finland
Tel. +358 207 464 800, Telefax +358 207 464 801, www.satron.com

Calibration

Transmitter is calibrated for maximum range with 1 sec. damping
Calibration for customer-specified range and item positioning must be mentioned in the order.

Electrical connections

Housing with PLUG connector, code **H**
PLUG connector, connector type DIN 43650 model AF; Pg9 gland for cable; wire cross section 0,5...1,5 mm^2.
Housing with junction box/terminal strip, code **M**
M16x1.5 inlet; screw terminals for
0,5...2,5 mm^2 wires

Product Certifications

European Directive Information

Electro Magnetic Compatibility (EMC directive 2004/108/EC)

All pressure transmitters

Atex Directive (94/9/EC)

Satron Instruments Inc. complies with the ATEX Directive.

European Pressure Equipment Directive (PED) (97/23/EC)

All Pressure Transmitters :
- Sound Engineering Practice

Hazardous Locations Certifications

European Certifications

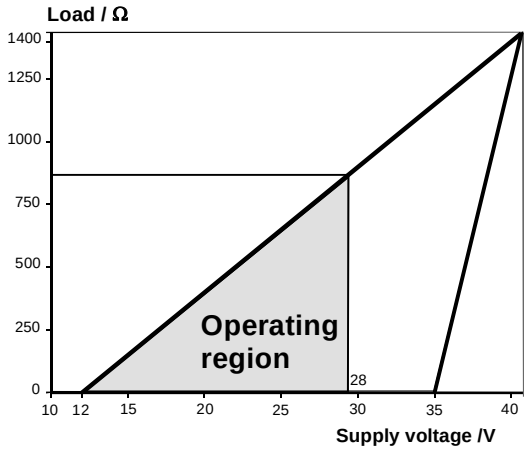
ATEX Intrinsic Safety

Certification No. : DNV-2007-OSL-ATEX-1346X

Ex II 1 GD T135°C EEx ia II C T4 -20°C ≤ Tamb ≤ 50°C
Ex II 2 GD T135°C EEx ia II C T4 -20°C ≤ Tamb ≤ 50°C

Input Parameters :
U_i = 28 V
I_i = 93 mA
P_i = 0.651 W
C_i = 5 nF
L_i = 0.2 mH

Special Conditions for Safe Use (X) :
The enclosure with plastic window and the plastic DIN43650 connector must not be installed in potentially explosive atmosphere requiring category 1 apparatus.
The non-conducting surface of the sensor element may be charged by the flow of non-conducting media, so there may be electrostatic hazard with IIC-gases. These units should be marked 2 GD.
The equipment shall be installed and connected according to the manufacturers instructions.



Min. load using HART® - communication 250 Ω

$R_{max} = \frac{\text{Supply voltage - 12 V}}{I_{max}}$

I_{max} = 20.5 mA using HART®-communication

I_{max} = 23 mA (when the alarm current 22,5 mA is on)

Supply voltage for transmitter with certified intrinsic safety (ATEX)

Weight

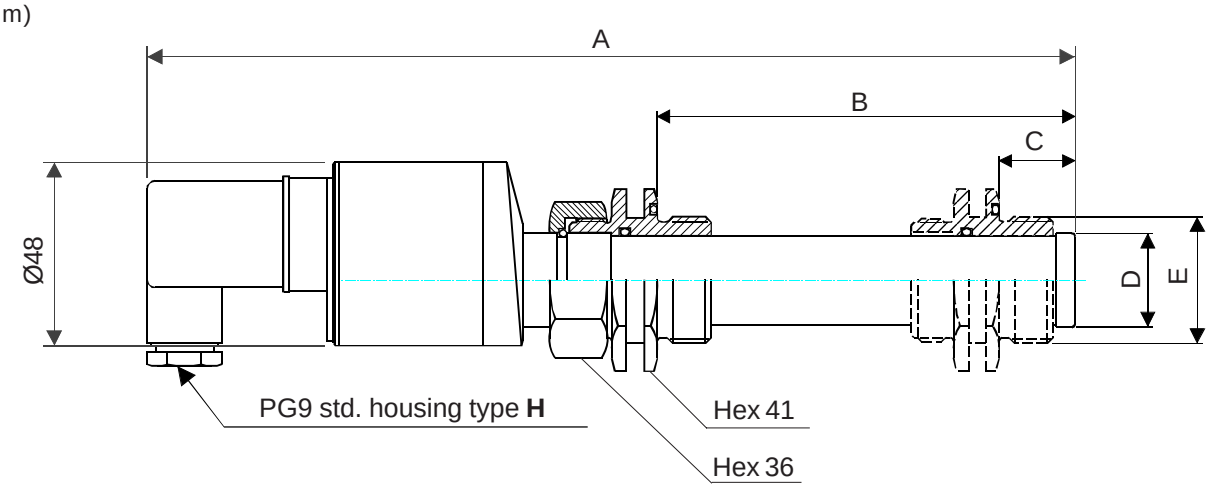
Transmitter
- with housing type **H**: 0.9 kg
- with housing type **M**: 1.4 kg
- with housing type **N**: 1.5 kg

Keyboard :

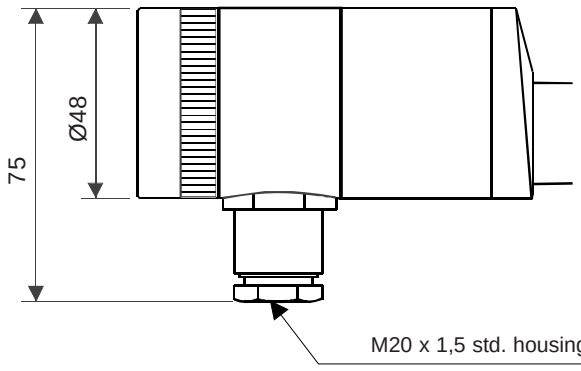
Esc = Press **Esc** to move back towards the top of the main menu.
▲ = Use the UP arrow key to move up on the current menu level or to increase the selected parameter value.
▼ = Use the DOWN arrow key to move down on the current menu level or to decrease the selected parameter value.
Enter = Press **Enter** to move to a lower level in a menu or to accept a command or parameter value.

Housing with display, code N

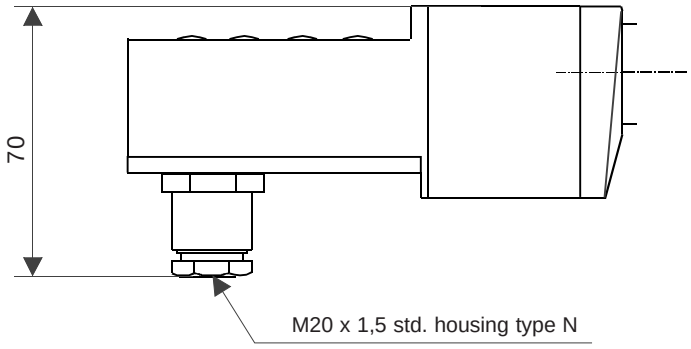
Dimensions
(mm)



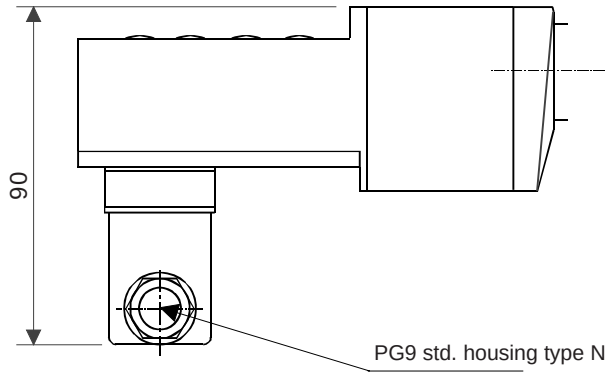
Process connection code	Dim. A	Dim. B	Dim. C	Dim. D	Thread E
1	228	109	20	Ø24.5	G1A



Housing with junction box/terminal strip, code M

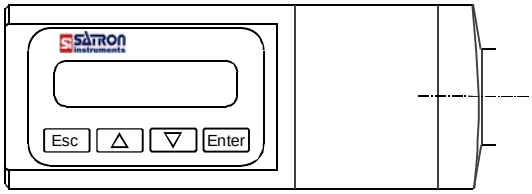


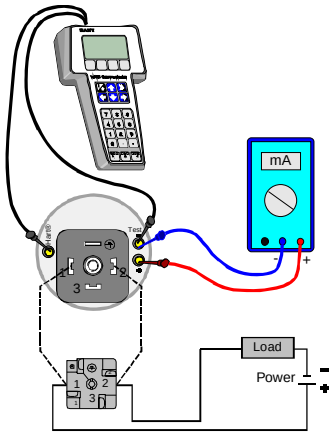
Housing with junction box/terminal strip, with display, code N



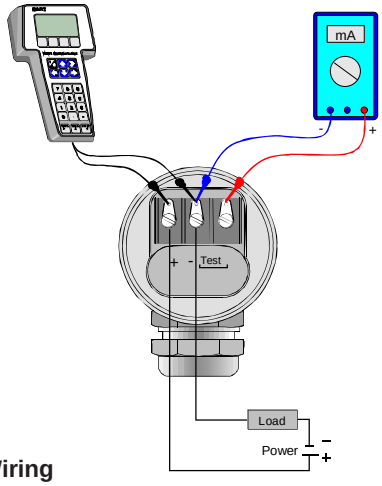
Housing with junction box/terminal strip, with display and plug-connector DIN 43650, code N--- /-P

PG9 std. housing type N with plug DIN 43650

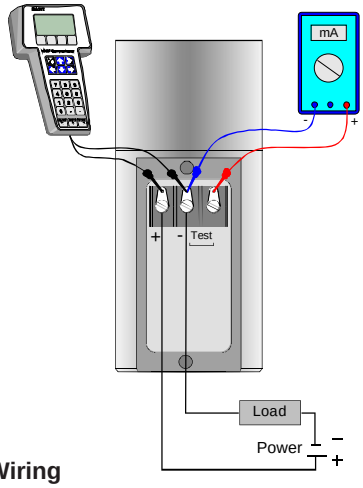




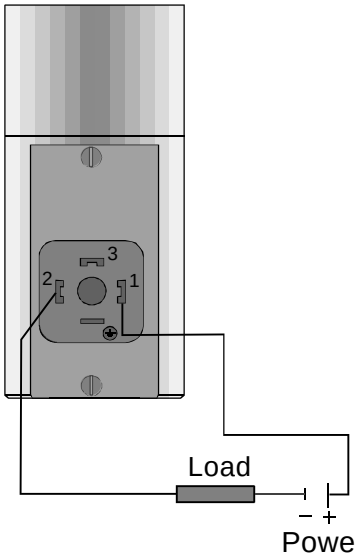
Wiring
Housing with PLUG connector, code **H**



Wiring
Housing with terminal strip, code **M**

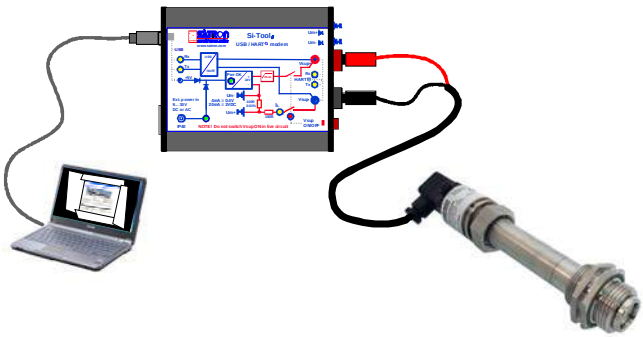


Wiring
Housing with terminal strip, code **N**



Wiring housing N **with plug DIN 43650, code N- / P**

Satron SI-Tool$_e$
Order code : M1330001



Connection with Satron SI-Tool$_e$ USB-HART® modem

SATRON VB Pressure Transmitter

Selection Chart

Adjustability	Span, min	Span, max	Measuring range
VB 4	4 kPa (40 mbar)	100 kPa (1000 mbar)	-100...+100 kPa (-1000...1000 mbar)
VB 5	10 kPa (100 mbar)	500 kPa (5000 mbar)	-100...+500 kPa (-1000...5000 mbar)
VB 6	0.03 MPa (0.3 bar)	3 MPa (30bar)	-0.1...+3 MPa (-1...+30 bar)

Output **S** 4-20mA DC/HART®

Process connection

1 Thread G1A, extension diameter Ø24.5 mm, extension length 109 mm

Wetted materials

Body		Diaphragm	
Code	Material	Code	Material
2	AISI316L (EN 1.4404)	**2**	AISI316L (EN 1.4435)

Fill fluid **S** Silicone oil **G** Inert oil (*)

Housing type

H Housing with PLUG-connector, DIN43650, no display, inlet PG9
M Housing with junction box/terminal strip, no display, inlet M20x1,5
N Housing with junction box/terminal strip, with display, inlet M20x1,5

Explosion proof **0** No explosion proof classification **1** Atex Intrinsic Safety, Ex II 1 GD T135°C (**)

□□□□□□□ / □ / □□□

Special size of electrical inlet
N 1/2 NPT **G** Pg13,5 **P** PLUG connector, DIN43650

Documentation

Calibration certificate **AE** English

Installation and operating instructions **IE** English **IF** Finnish

Material certificates

O No material certificate
MC1 Raw material certificate without appendices, in accordance with SFS-EN 10204-2.1 (DIN 50049-2.1) standard
MC2 Raw material certificate for wetted parts with appendices, in accordance with SFS-EN 10204-2.2 (DIN 50049-2.2) standard
MC3 Raw material certificate for wetted parts with appendices, in accordance with SFS-EN 10204-3.1 B (DIN 50049-3.1 B) standard

(*) = Oxygen cleaning must be mentioned in the order

(**) = Housing H and N : Ex II 2 GD T135°C
ATEX transmitters with display are the model without membrane key.

Satron Instruments Inc.
P.O.Box 22, FI-33901 Tampere, Finland
Tel. +358 207 464 800, Fax +358 207 464 801
www.satron.com

We reserve the right for technical modifications without prior notice.

Differential pressure measurement

Our instruments for differential pressure measurement:

VDt differential pressure transmitter.....Spec.BPdT750
VDU differential pressure transmitter
using two separate pressure sensors...Spec. BPDUV760

ALSO SUITABLE FOR DIFFERENTIAL PRESSURE MEASUREMENT
VDtL differential pressure transmitter
....Spec.BLVT830

Points to be considered in the installation of differential pressure transmitters

The transmitter should be mounted at a vibration-free location near the point of measurement, which should be selected in such a way that the effects of disturbance factors are as small as possible.
Some of the most common faults noticed in the selection of the point of measurement:
- Pumps and compressors are too close, producing pronounced pulsations (see page 1/01 for protection against pulsations).
- Pipe blend or valve too close.
- Velocity of flow too high in density measurement.
- Incorrectly chosen points of measurement in level measurement (e.g. at a point where flow occurs).

Section 2/02 gives further instructions for the installation of a transmitter for flow measurement.
When measuring corrosive, viscous, or impure media, a continuous or periodic water purging is employed to protect the transmitter and to keep the measure-ment piping clean. The flow of the purging water is regulated by means of a miniature rotameter equipped with a needle valve (fig. I a) or, in periodic purging, by means of a solenoid valve.
The purging water is often taken directly from the water mains, and possible impurities or pressure variations in the mains may cause disturbances in purging water supply. In important cases it is advisable to use condensate for purging and to use a separate purging water pump in order to obtain a sufficient and steady pressure. The purging water pipes should be connected as close to the process connection of the measurement piping as possible.

VDt Differential Pressure Transmitter

	Adjustability (±)		
	Span, min.	**Span, max.**	**Measurig range**
2	0.1 kPa (1 mbar)	6 kPa (60 mbar)	-6...+6 kPa (-60...+60 mbar)
3	1.4 kPa (14 mbar)	35 kPa (350 mbar)	-35 kPa...+35 kPa (-350...+350 mbar)
4	4 kPa (40 mbar)	100 kPa (1000 mbar)	-100...+100 kPa (-1000...+1000 mbar)
5	26.5 kPa (265 mbar)	500 kPa (5000 mbar)	-500...+500 kPa (-5000...+5000 mbar)
6	0.145 MPa (1.45 bar)	3 MPa (30 bar)	-3...+3 MPa (-30...+30 bar)
7	1 MPa (10 bar)	15 MPa (150 bar)	-15...+15 MPa (-150...+150 bar)

VDU Differential Pressure Transmitter using two separate pressure sensors

	Adjustability (±)		
	Span, min.	**Span, max.**	**Measurig range**
3	1.4kPa (14 mbar)	35 kPa (350 mbar)	-35...+35 kPa (-350...350 mbar)
4	4kPa (40 mbar)	100 kPa (1000 mbar)	-100...+100 kPa (-1000...1000 mbar)
5	26.5 kPa (265 mbar)	500 kPa (5000 mbar)	-100...+500 kPa (-1000...5000 mbar)
6	0.145 MPa (1.45 bar)	3 MPa (30 bar)	-0.1...+3 MPa (-1...30 bar)

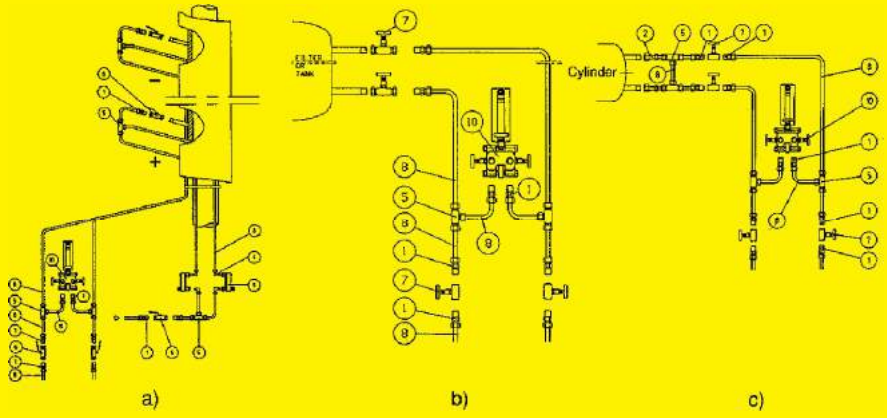


Figure 1

1 Stud coupling, 12 mm dia./ G½ male
2 Stud coupling, 12 mm dia./ G½ female
4 Stud elbow, 12 mm dia./ G¼ male
5 Tee, 12 mm dia.
6 Ball valve, G½
7 Needle valve, G½
8 Pipe, 12x 1 calibred
9 Needle valve rotameter
10 3-spindle mounting valve

Satron Instruments Inc.
P.O.Box 22, FI-33901 Tampere, Finland
Tel. +358 207 464 800, Fax +358 207 464 801
www.satron.com

SATRON VDt Differential Pressure Transmitter

SATRON VDt differential pressure transmitter belongs to V-transmitter family. The series V transmitters have both analog and smart properties. SATRON VDt is used for 0-0,1kPa...0-15 MPa ranges. It is a 2-wire transmitter with HART® standard communication. In pressure measuring applications SATRON VDt transmitters are used for measuring differential pressure and absolute pressure. SATRON VDt transmitter is equipped with an SOS (Silicon On Sapphire) or piezoresistive sensing element. The rangeability is 25:1.

TECHNICAL SPECIFICATIONS

Measuring range and span
See Selection Chart.

Zero and Span adjustment
Zero elevation: Calibrated span is freely selectable on the specified range depending from the desired option. This can be made by using extern control shafts (analog option), keyboard (display option), HART®275/375 communicator.

Damping
Time constant is continuously adjustable 0,01 to 60 s.

Temperature limits
Sensing element operating:
• -30 to +125 °C
Electronics operating: -30 to +80 °C
Shipping and storage: -50 to +80 °C.
Operating temperature of display: 0 to +50ºC *(does not affect operation of the transmitter)*

Pressure limits
Min. and max. process pressure:

Type	Max. overload pressure, MPa	Pressure class
VDt2	4	PN40
VDt3	10	PN100
VDt4,5	10	PN100
VDt6	10	PN100
VDt3,4,5,7	40	PN420
VDt6	15	PN420

Transmitter operates within specifications for pressures above 10 mbar abs.

Process chamber volume (cm³)

Type	Volume (cm³)	
	Standard transmitter	with hydraulic seal
VDt2...7	2.5	2.0

Volume of negative-side process chamber: < 1 cm³.

Output 2-wire (2W), 4-20 mA, user selectable for linear, square root, inverted signal or the transfer function (16 points)specified by the user

Supply voltage and permissible load
See the load capacity diagram;
4-20 mA output: 12 - 35 VDC.
Humidity limits
0-100 % RH

[1] Parts in contact with process medium.

PERFORMANCE SPECIFICATIONS
Tested in accordance with IEC 60770: Reference conditions, specified span, no range elevation, horizontal mounting; AISI316L-diaphragm, silicone oil fill.
Accuracy
±0.05 % of calibrated span
(span 1:1-5:1 /max.range).
On the measuring ranges 5:1-60:1:

$$\pm[0.01+0.008 \times (\frac{\text{max.span}}{\text{calibrated span}})]\% \text{ of calibrated span}$$

Special accurate diaphragm **AISI304**: ±1.5 % of calibrated span
(For spans 1:1 - 60:1)

(incl. nonlinearity, hysteresis and repeatability)

Long-term stability
±0.1 % of max. span / year

Temperature effect on compensated temperature ranges -20 to 80 °C
Zero and span shift: ±0,15 % of max. span

Static pressure effect on Zero of max. span
VDt2: ±0,2 % / 4 MPa
VDt3...5, PN100: ±0,2 % / 10 MPa
VDt6...7, PN100 / PN400: ±0.3 % / 10 MPa

Overpressure effect on Zero of max. span
VDt2: ±0,5 % / 4 MPa;
VDt3...7: PN100: ±0,3 % / 10 MPa;
PN400: ±1 % / 40 MPa.

Mounting position effect
Zero error ± 0.4 kPa, which can be calibrated out.

Vibration effect (IEC 61298-3):
±0.1 % of measuring range

Power supply effect
< ±0.01 % of calibrated span / volt.

Insulation test voltage
500 V rms 50 Hz

CONSTRUCTION AND CALIBRATION
Materials
Diaphragms [1]: AISI316L (EN 1.4435), AISI304 (EN 1.4301), Duplex (EN 1.4462), Hast. C276 (EN 2.4819) or Tantalum.
Flanges [1] and vent valves [1]: AISI316, Duplex or Hast. C276.
O-ring on sensing element: PTFE.
Other sensing element materials: AISI316, SIS 2343, SIS 2324.
Mounting bolts and nuts for sensor flanges: AISI316 (PN400: m.8.8.Zne)

Fill fluid
Silicone oil (DC200, 10 cSt) or inert oil.

Housing with PLUG connector, H and **T**
Housing: AISI316
Seals: Viton® and NBR
TEST jacks: MS358Sn/PVDF, protected with silicone rubber shield.
PLUG connector: PA6-GF30 jacket, Silicone rubber seal, AISI316 retaining screw.

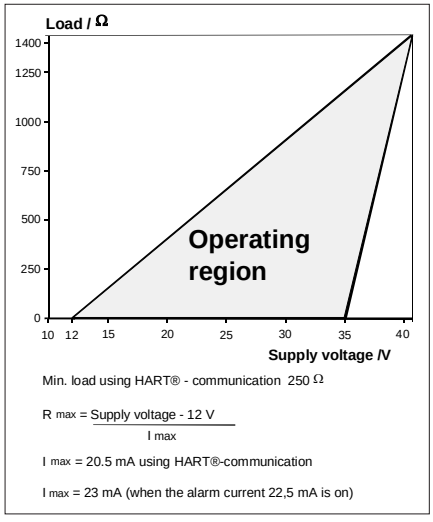
Housing with junction box/terminal strip, M and **N**
Housing: AISI303/316; Seals: Nitrile and Viton®; Nameplates: Polyester

Connection cable between sensing element and housing
Codes **L** and **K** :
PTFE hose with AISI316 braiding.

Enclosure class: IP66.

Process connections
See Selection Table.

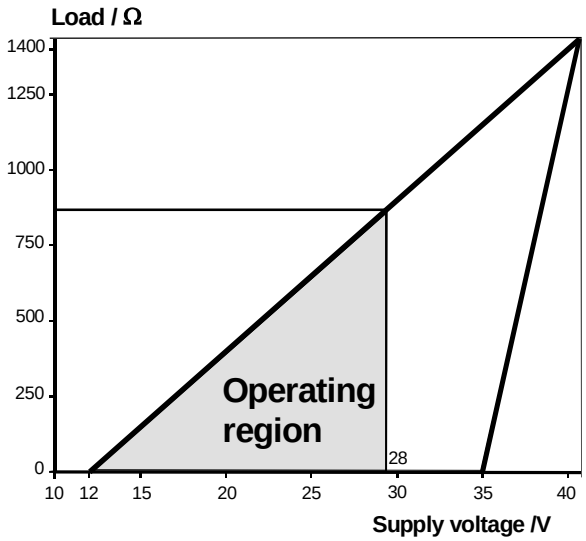
Calibration
For customer-specified range with 1 s. damping. Min. factory calibration range: 10mbar (VDt2). (If range is not specified, transmitter is calibrated for maximum range.)



Satron Instruments Inc., P.O.Box 22, FIN-33901 Tampere, Finland
Tel. +358 207 464 800, Telefax +358 207 464 801, www.satron.com

Electrical connections
Housing with PLUG connector, **H** and **T:**
PLUG connector, connector type DIN 43650 model AF; Pg9 gland for cable; wire cross-section 0.5 to 1.5 mm².

Housing with junction box/terminal strip, **M** and **N :**
M20x1.5, 1/2-NPT inlet; screw terminals for 0.5 to 2.5 mm² wires



Min. load using HART® - communication 250 Ω

$R_{max} = \frac{\text{Supply voltage - 12 V}}{I_{max}}$

I_{max} = 20.5 mA using HART®-communication

I_{max} = 23 mA (when the alarm current 22,5 mA is on)

Supply voltage for transmitter with certified intrinsic safety (ATEX)

Product Certifications

European Directive Information

Electro Magnetic Compatibility
(EMC directive 2004/108/EC)
All differential pressure transmitters

Atex Directive (94/9/EC)
Satron Instruments Inc. complies with the ATEX Directive.

European Pressure Equipment Directive (PED) (97/23/EC)

All Differential Pressure Transmitters :
- Sound Engineering Practice

Hazardous Locations Certifications

European Certifications
ATEX Intrinsic Safety

Certification No. : DNV-2007-OSL-ATEX- 1346X

Ex II 1 GD T135°C EEx ia II C T4 -20°C ≤ Tamb ≤ 50°C
Ex II 2 GD T135°C EEx ia II C T4 -20°C ≤ Tamb ≤ 50°C

Input Parameters :
U_i = 28 V
I_i = 93 mA
P_i = 0.651 W
C_i = 5 nF
L_i = 0.2 mH

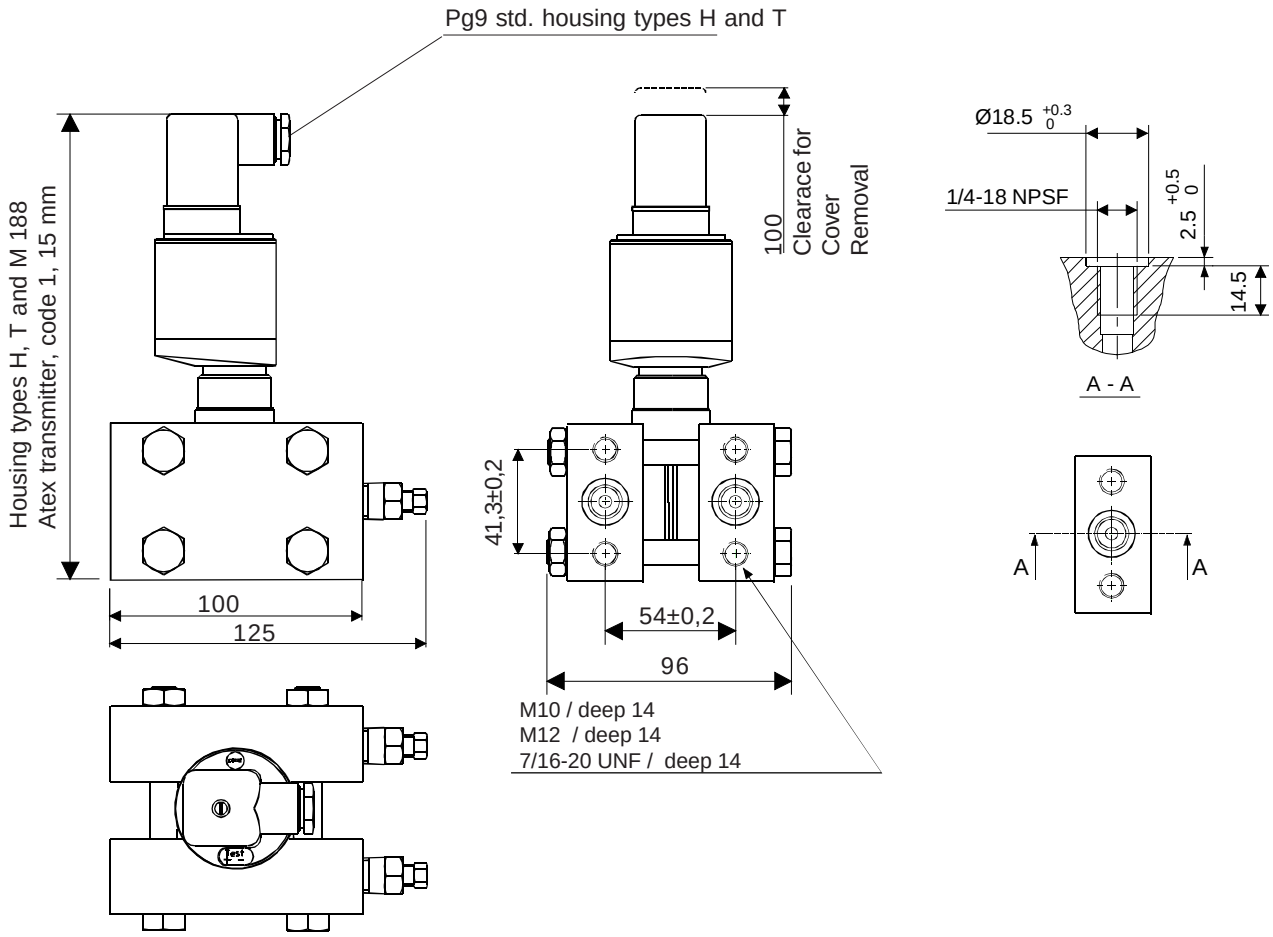
Special Conditions for Safe Use (X) :
The enclosure with plastic window and the plastic DIN43650 connector must not be installed in potentially explosive atmosphere requiring category 1 apparatus. The non-conducting surface of the sensor element may be charged by the flow of non-conducting media, so there may be electrostatic hazard with IIC-gases. These units should be marked 2 GD.
The equipment shall be installed and connected according to the manufacturers instructions.

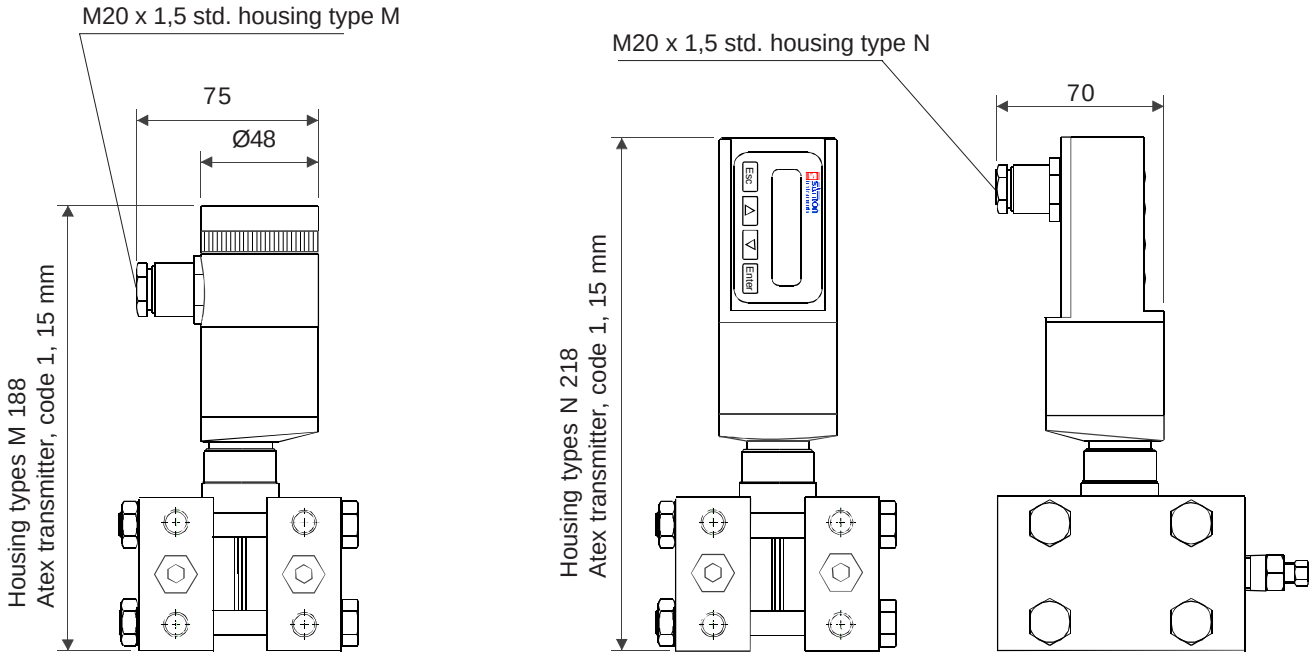
Weight (kg)

Type	Housing type		
	H	M	N
VDt2 ... 7	4,0	4,6	4,6

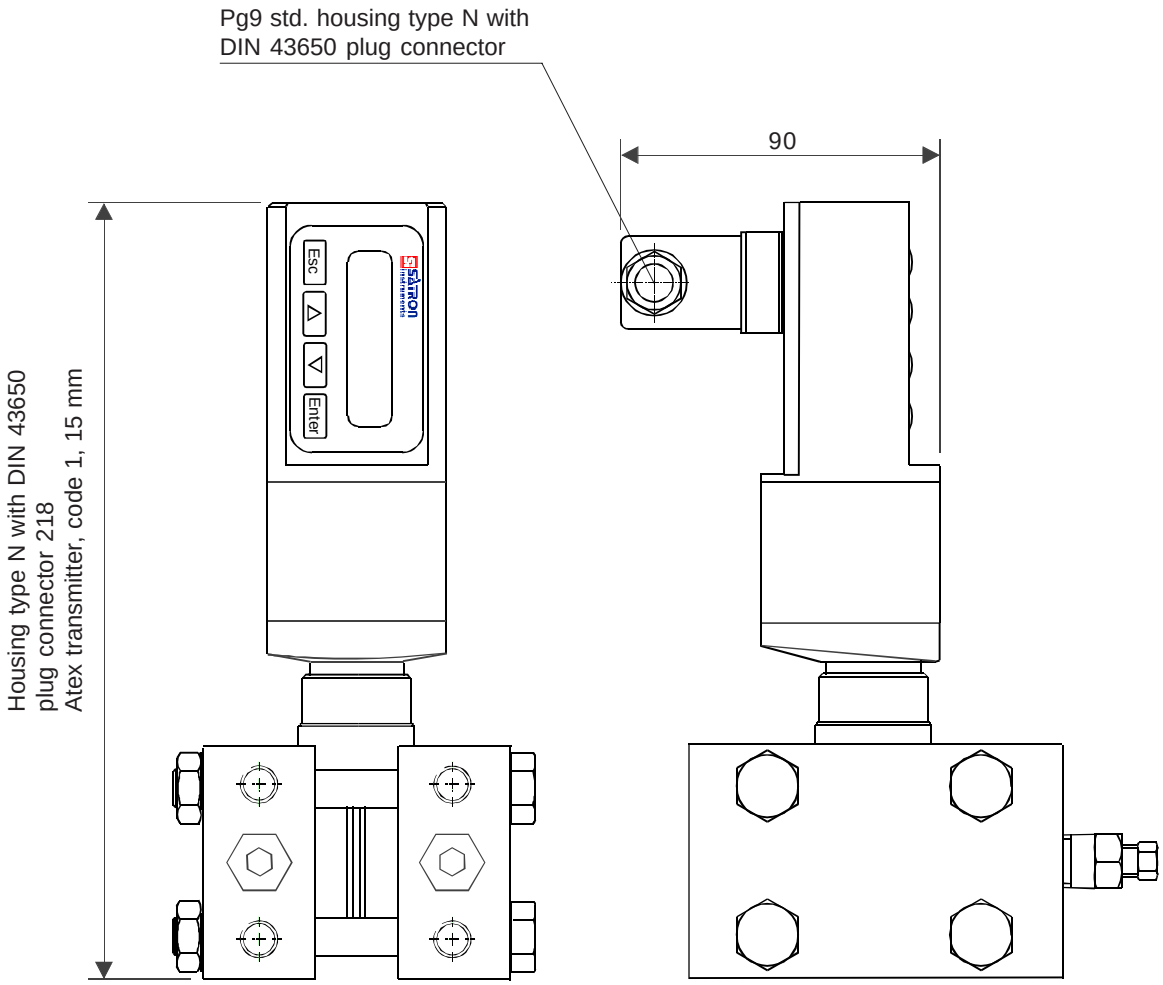
SATRON VDt Differential Pressure Transmitter

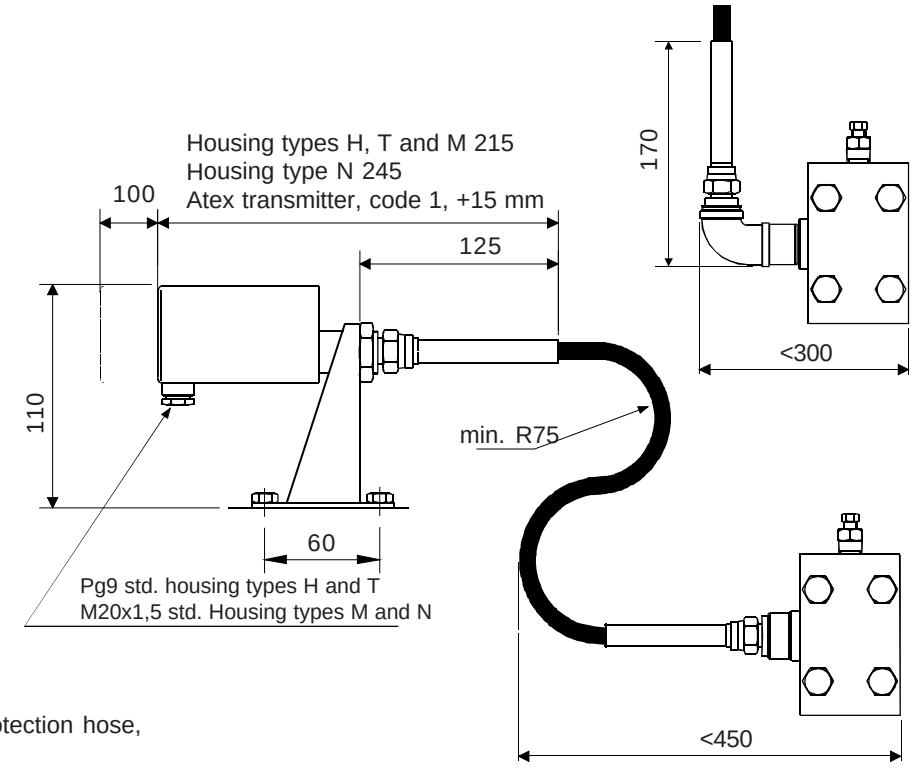
Dimensions (in mm)





Dimensions (in mm)



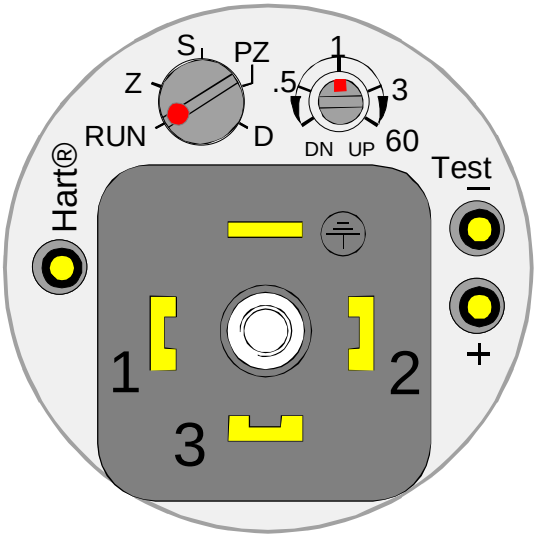


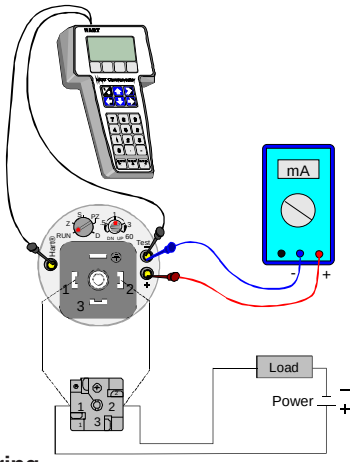
Remote electronics,
connecting cable with protection hose,
codes **L** and **K**

Housing with PLUG connector, code T

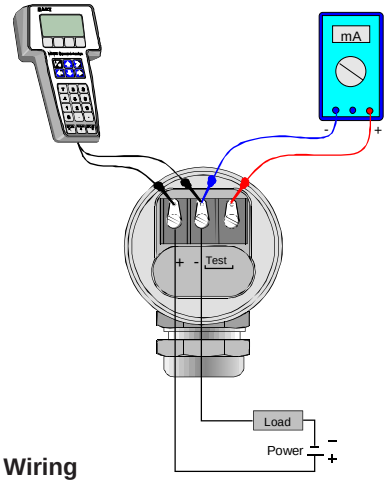
Use of selector switch :

RUN = working position
PZ = Process value zero
D = Damping adjustment
S = Span adjustment
Z = Zero adjustment
DN = Down
UP = Up

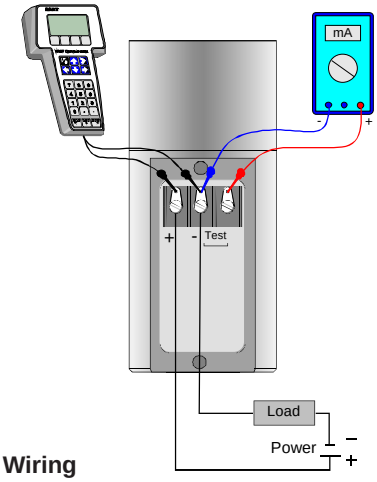




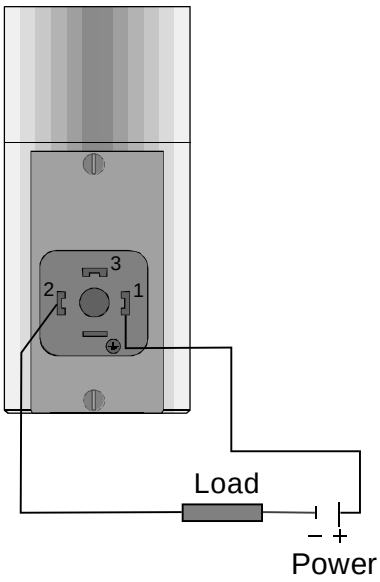
Wiring
Housing with PLUG connector, codes **H** and **T**



Wiring
Housing with terminal strip, code **M**



Wiring
Housing with display, code **N**



Wiring housing with plug DIN 43650, code N-/ P

Housing with display, code N

Keyboard :

Esc = Press **Esc** move back towards the top of the main menu.
▲ = Use the **UP** arrow key to move up on the current menu level or to increase the selected parameter value.
▼ = Use the **DOWN** arrow key to move down on the current menu level or to decrease the selected parameter value.
Enter = Press **ENTER** to move to a lower level in a menu or to accept a command or parameter value.

SATRON VDt Differential Pressure Transmitter

Selection Chart

VDt Differential Pressure Transmitter **VAt** Absolute Pressure Transmitter (ranges 4 to 7, range 0...xx, abs.)

Adjustability (±)

	Span, min.	Span, max.	Measurig range
2	0,1 kPa (1 mbar)	6 kPa (60 mbar)	-6...+6 kPa (-60...+60 mbar)
3	1,4 kPa (14 mbar)	35 kPa (350 mbar)	-35 kPa...+35 kPa (-350...+350 mbar)
4	4 kPa (40 mbar)	100 kPa (1000 mba)	-100...+100 kPa (-1000...+1000 mbar)
5	26,5 kPa (265 mbar)	500 kPa (5000 mbar)	-500...+500 kPa (-5000...+5000 mbar)
6	0,145 MPa (1,45 bar)	3 MPa (30 bar)	-3...+3 MPa (-30...+30 bar)
7	1 MPa (10 bar)	15 MPa (150 bar)	-15...+15 MPa (-150...+150 bar)

Output
S 4-20mA DC/HART® -protocol

Process connection

D M10,PN40 range 2/PN100 ranges 3...6, IEC 61518
A M10, PN420 ranges 3, 4, 5 and 7, IEC 61518
H M12, PN420 ranges 3, 4, 5 and 7, IEC 61518
U 7/16-20 UNF, (PN420 ranges 3, 4, 5 and 7)
F Screwed flange adapters, PN40 range 2 and PN420 ranges 3 to 7, IEC 61518
V Connection through hydraulic seal
Z Welded flange adapters, PN420 ranges 3 to 5 and 7, IEC 61518

Wetted material

Flanges

Code	Material
2	AISI316L (EN 1.4404)
3	Hast.C 276 (EN 2.4819)

Diaphragm

Code	Material
2	AISI316L (EN 1.4435)
3	Hast.C 276 (EN 2.4819)(**)
5	Tantalum (**)
8	Duplex (EN 1.4462) (**)
A	AISI304 (EN 1.4301) (**)

Diaphragm coating

Code	Material
	(specify only when coated)
9	gold / rhodium

Fill fluid **S** Silicone oil **G** Inert oil

Housing type

H Housing with PLUG-connector, DIN43650, no display, inlet PG9
T Housing with PLUG-connector, DIN43650, no display, inlet PG9, with manual adjust
M Housing with junction box/terminal strip, no display, inlet M20x1,5
N Housing with junction box/terminal strip, with display, inlet M20x1,5

Explosion proof **0** No explosion proof classification **1** Atex Intrinsic Safety, Ex II 1 GD T135°C (*)

Process thread on flange adapter (only specify for type **F**)

Thread type

Code	Type
R	straight R thread
N	NPS thread
P	taper R thread
T	NPT thread

Thread size

Code	Size
2	1/4
3	3/8
4	1/2

Special size of electrical inlet
N 1/2 NPT **G** Pg13.5 **P** Plug DIN 43650

Special features

Special electronics (specify only if housing connected with hose to sensing element)
- connecting cable with protection hose
L Hose protected with PTFE/AISI316 braiding, straight
K Hose protected with PTFE/AISI316 braiding, angle of 90º

Length of cable between sensing element and housing
(specify only if housing connected with cable to sensing element)
2 2 m cable **3** 3 m cable etc. (max. 20 m)

Mounting parts for remote electronics for Ø51 mm tube
0 No mounting parts **1** Mounting parts

Documentation

Calibration Certificate **AE** English

Installation and Operating Instructions **IE** English **IF** Finnish

Material Certificates
0 No material certificate
MC1 Raw materials certificate without appendixes, in accordance with SFS-EN 10204-2.1 (DIN 50049-2.1) standard
MC2 Raw materials certificate for wetted parts with appendixes, in accordance with SFS-EN 10204-2.2 (DIN 50049-2.2) standard
MC3 Raw materials certificate for wetted parts with appendixes, in accordance with SFS-EN 10204-3.1B (DIN 50049-3.1B) standard

We reserve the right for technical modifications without prior notice.
HART® is a registered trademark of HART Communication Foundation.
Viton® is the registered trademark of DuPont Down Elastomers.
Hastelloy® is the registered trademark of Haynes International.
Teflon® is the registered trademark of E.I. du Pont de Nemours & Co

CE

(*) = Housing H and N : Ex II 2 GD T135°C
ATEX transmitters with display are the model without membrane key.
(**) = Not for ranges 2-3

SATRON instruments

SATRON VDU

Differential Pressure Transmitter
using two separate pressure sensors

SATRON VDU differential pressure transmitter belongs to V-series transmitters. SATRON VDU differential pressure transmitter is used from 0-1.4 kPa to 0-3 MPa ranges (static pressure + measuring range). It is a 2-wire transmitter with HART® standard communication. In pressure measuring applications SATRON VDU diff.pressure transmitters are used for measuring the pressure of clean, sedimenting, crystallizing and sticking materials.The transmitter's sensor is piezoresistive. The rangeability is 25:1.

TECHNICAL SPECIFICATIONS

Measuring range and span
See Selection Chart.

Zero and Span adjustment
Zero elevation: Calibrated span is freely selectable on the specified range. This can be made by using keyboard or HART®275 communicator.

Damping
- Time constant is continuously adjustable 0,01 to 60 s.

Temperature limits
Ambient: -30 to +80 °C
Process: -30 to +125 °C
0 to +200 °C (temp. code **H**)
Shipping and storage: -40 to +80 °C.
Operating temperature of display: 0 to +50ºC *(does not affect operation of the transmitter)*

Pressure limits Min. and max. process pressure: See the appended tables.

Volumetric displacement
< 0.5 mm^3 /max. span (in both sensors)

Output 2-wire (2W), 4-20 mA, user selectable for linear, square root, inverted signal or the transfer function (16 points)specified by the user

Supply voltage and permissible load
See the load capacity diagram;
4-20 mA output: 12 - 35 VDC.

Humidity limits
0-100 % RH; freezing of condensed water not allowed in reference pressure channels.

PERFORMANCE SPECIFICATIONS
Tested in accordance with IEC 60770: Reference conditions, specified span, no range elevation, horizontal mounting; AISI316L diaphragm, silicone oil fill.

Accuracy
±0.2 % of calibrated span
(span 1:1-7.5:1 /max.range).
On the measuring ranges 7.5:1-25:1:

$\pm[0.02+0.024 \times (\frac{\text{max.span}}{\text{calibrated span}})]$% of calibrated span

Special accuracy types **BA** and **DA :** (Temperature effect on +20 to +70 °C) ±0,15 % of calibrated span, only process connections **BA** and **DA** / temperature effect code **S,** for spans 1:1-7,5:1).

[1] Parts in contact with process medium

On the measuring ranges 7,5:1-25:1:

$\pm[0.01+0.007 \times (\frac{\text{max.span}}{\text{calibrated span}})]$% of calibrated span

(incl. nonlinearity, hysteresis and repeatability)

Long-term stability
±0.2 % / max. span / year

Temperature effect
- on -20 to +80 °C range
Zero and span error:
±0.3 % of max. span.

- on 0 °C to +200 °C range
(process temperature code **H**)
±2 % of max. span, VDU6
±4 % of max. span, VDU4, VDU5

Temperature effect
- on +20 °C to +70 °C,
process connections **BA** and **DA**
Zero and span error:
±0.15 % of max.span, code **S**

Mounting position effect
Zero error < 0.32 kPa, which can be calibrated out.

Vibration effect (IEC 68-2-6: FC):
±0.1 % of measuring range/
2g/10 to 2000 Hz
4g/10 to 100 Hz

Power supply effect
< ±0.01 of calibrated span per volt

Insulation test voltage
500 V rms 50 Hz

CONSTRUCTION AND CALIBRATION
Materials
Diaphragm [1]: AISI316L (EN 1.4435), Duplex (EN 1.4462), Hast. C276 (EN 2.4819), CoNi-alloy, Titanium Gr2 (EN 3.7035), Nickel or Tantalum.
Coupling [1]: AISI316L (EN 1.4404), Duplex (EN 1.4462), Hast.C276 (EN 2.4819) or Titanium (EN 3.7035)
Other sensing element materials: AISI316, AISI303.

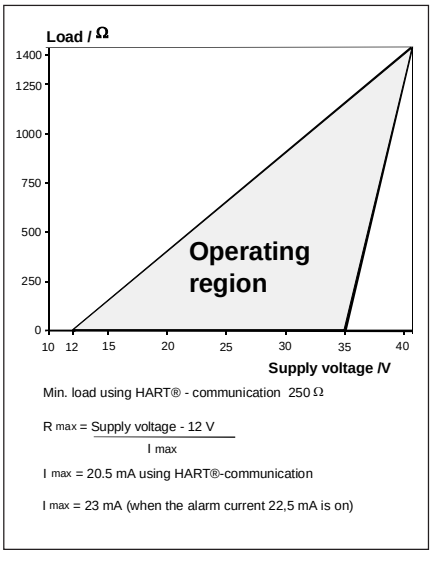
Filling fluid: Silicone oil, food industry oil or inert oil

Enclosure class IP66

Electronics housing:
AISI303/316, Seals: nitrile rubber and Viton®, Nameplates: Polyester

Calibration
For customer-specified range with 1 s. damping. (If range is not specified, transmitter is calibrated for maximum range.)

Process connections
See Selection Chart
Process couplings: See Selection Chart and installation instructions or technical specification: Couplings for Transmitters **G150**.



Pressure limits

Transmitter type	Max. overload pressure, MPa	Max. operating range (=static pressure +meas. range), kPa	Pressure class
VDU3	0.25	35	PN40
VDU4	0.3	100	PN40
VDU4/5	0.3	250	PN40
VDU5	1.5	500	PN40
VDU5/6	1.5	1000	PN40
VDU6	7.5	3000	PN100

Min. process pressure

$T_{proc.}$ ºC	Minimum pressure for different fill fluids (kPa, abs) DC200 100 cSt	Inert oil
20	5	8
40	8	10
80	16	28
120	21	53

Satron Instruments Inc., P.O.Box 22, FIN-33901 Tampere, Finland
Tel. +358 207 464 800, Telefax +358 207 464 801, www.satron.com

Electrical connections
M20x1.5, 1/2-NPT ; screw terminals for 0.5 to 2.5 mm² wires and with PLUG connector, connector type DIN 43650 model AF; Pg9 gland for cable; wire gross-section 0.5 to 1.5 mm².

Product Certifications

European Directive Information

Electro Magnetic Compatibility (EMC directive 2004/108/EC)
All differential pressure transmitters

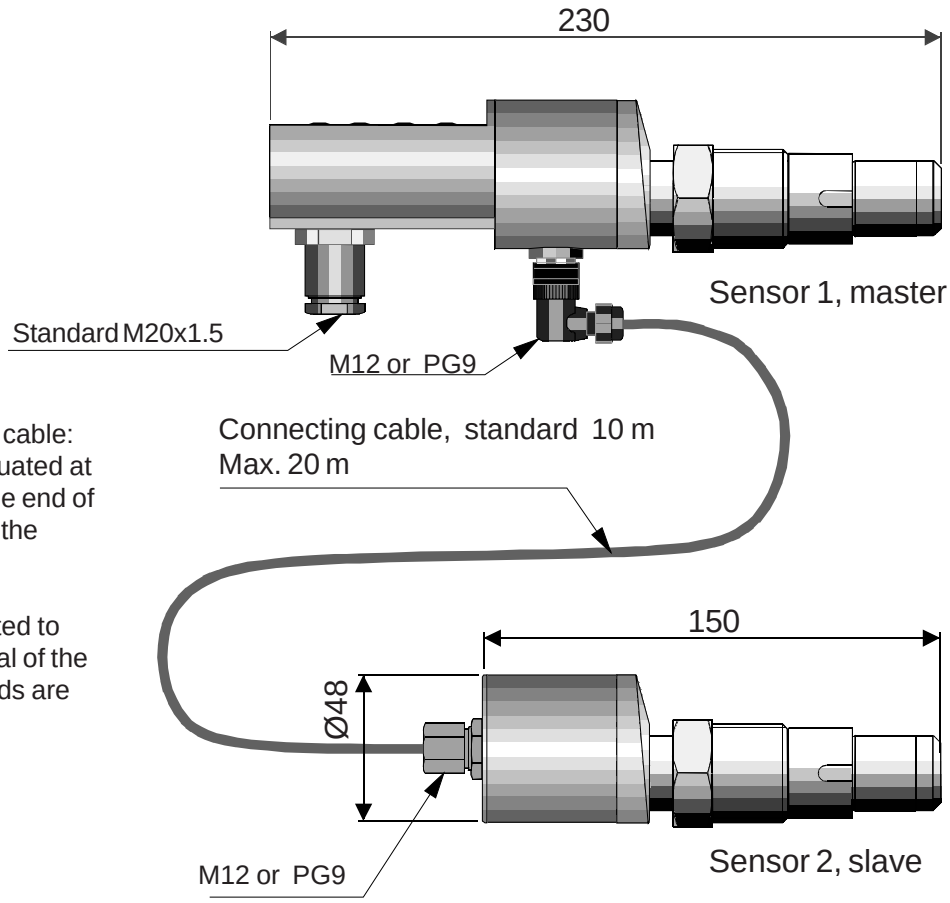
European Pressure Equipment Directive (PED) (97/23/EC)

All Differential Pressure Transmitters :
- Sound Engineering Practice

Weight

Mounting type		Weight / kg Extension code 0	2	4	6
Flange	DN50	8.8	10	10.5	11
	DN80	13.5	15.8	16	16.8
SA (Sandvik)		-	8.2	10.6	12.8
Tx (Tri-Clamp)		2.4	-	-	-
PA (PMC 1")		1.8	-	-	-
BA, VA, WA		1.8			
UA, VB, WB		2.6	-	-	-
G1...G4		2.5			

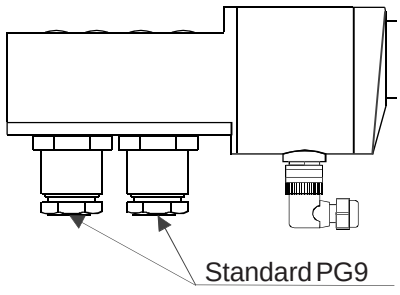
Dimensions (mm)



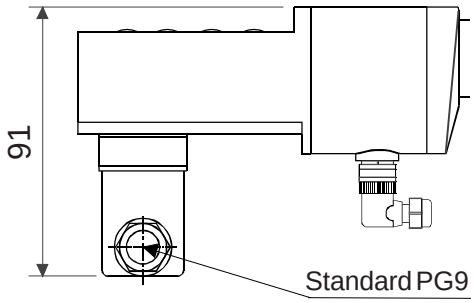
Options of the connecting cable:
a) M12 connector are situated at the end of sensor 1 and the end of sensor 2. The material of the cable is PUR.

b) Cable is firmly connected to both sensors. The material of the cable is PVC. Cable glands are AISI316.

Dimensions (mm)

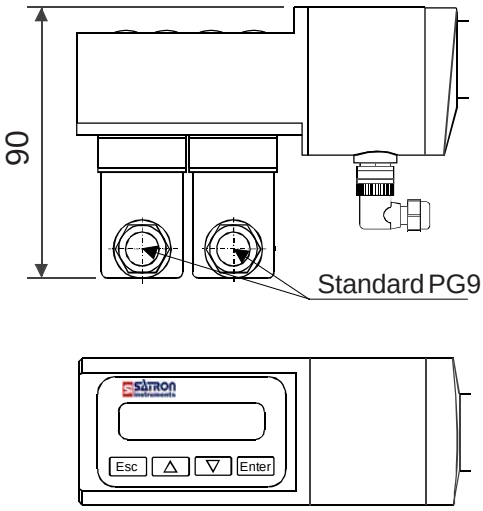


Double current output

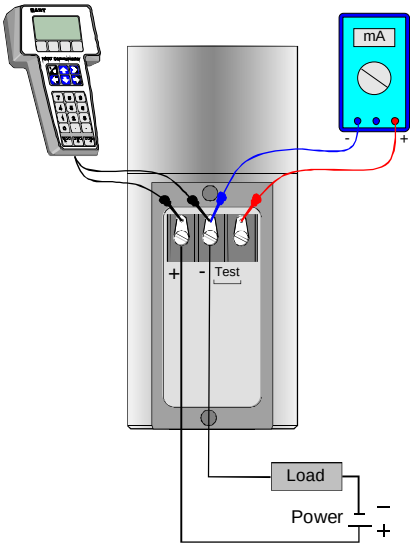


Plug DIN 43650 electrical inlets

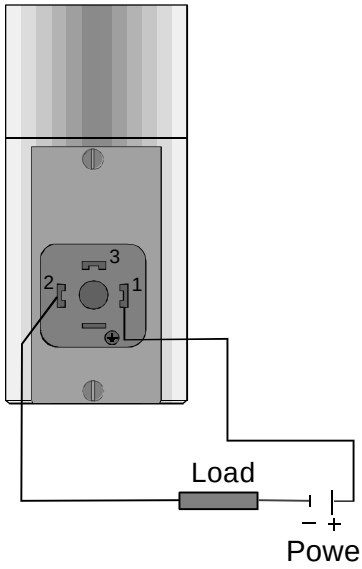
Dimensions (mm)



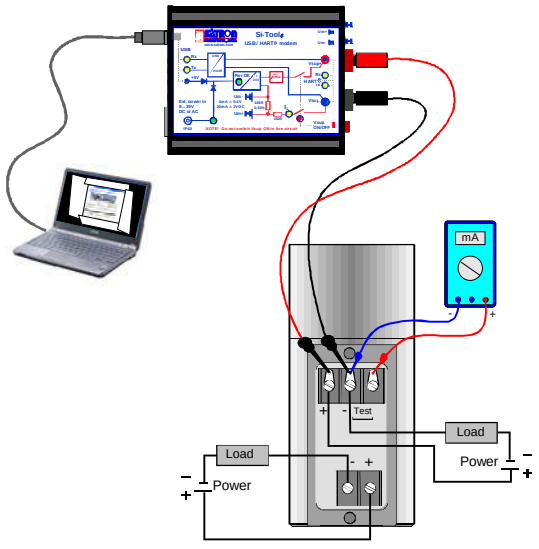
Double current output with plug DIN43650 connector



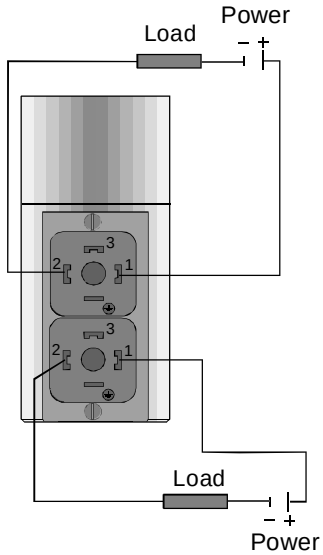
Wiring one current output



Wiring one current output, plug DIN43650 connector

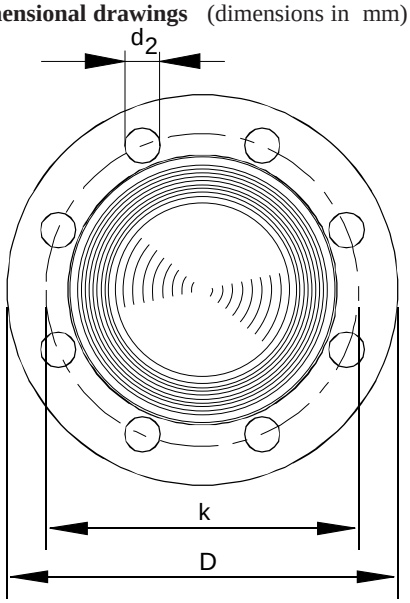


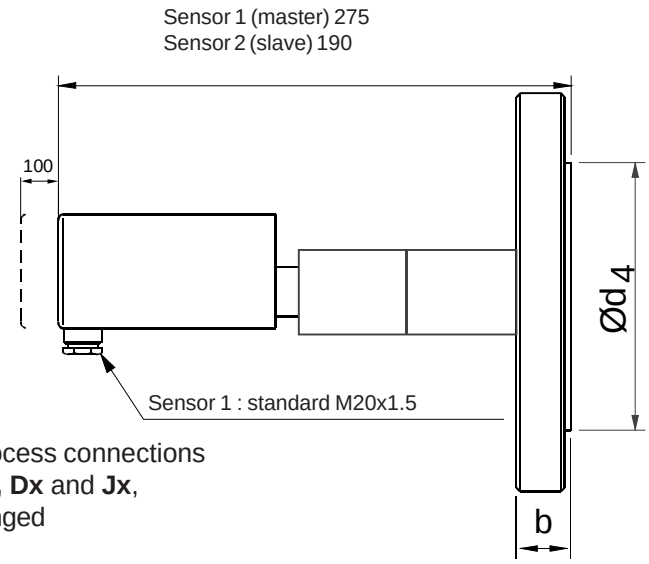
Wiring double current output



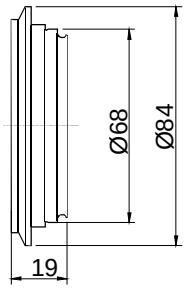
Wiring double current output, plug DIN 43650 connector

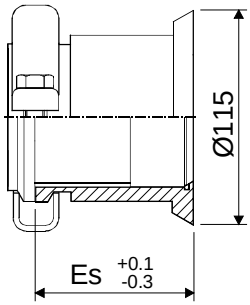
Dimensional drawings (dimensions in mm)





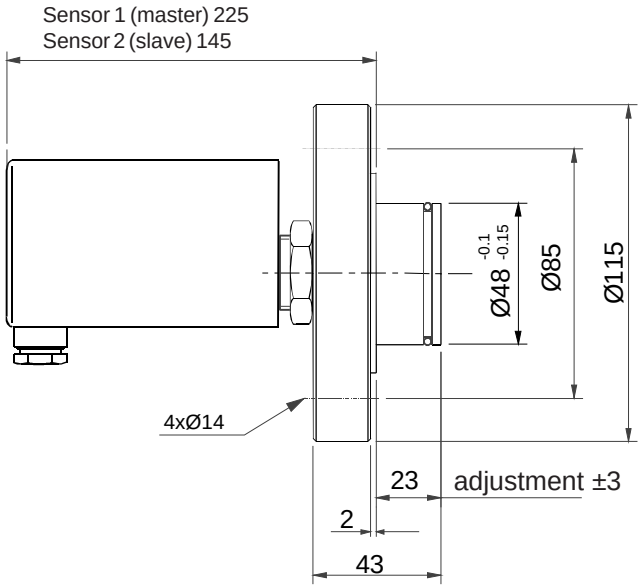
Process connections
Ax, Dx and **Jx**,
flanged



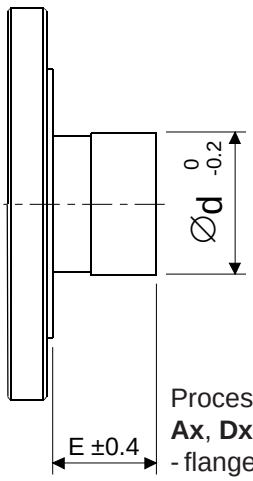


Process connection **UA,**
- Tuchenhagen DN50/40
(Varivent®)

Process connection **SA,**
- Sandvik-clamp



Process connection **DA**, DN25 PN40 flange with extension, process temperature max. +125°C

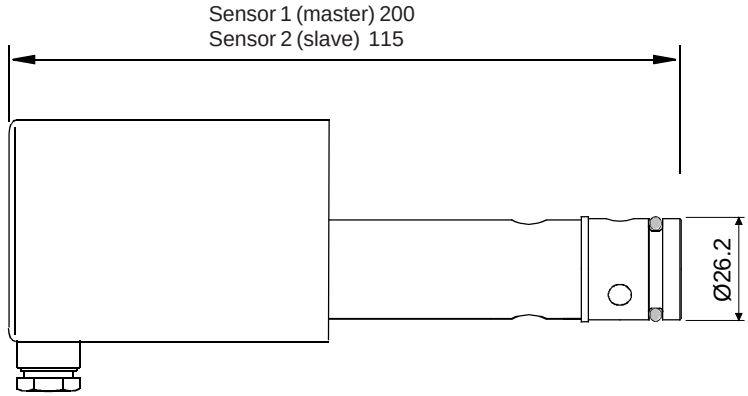


Process connections
Ax, **Dx** and **Jx** ,
- flange with extension

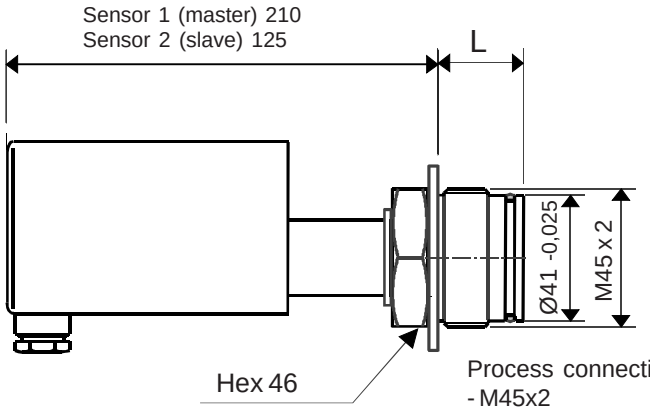
Code	E +0.4 -0.4	Es +0.3 -0.2
0	0	-
1	23	-
2	51	54,5
4	102	105
6	152	156

FLANGE SIZE	Flange dimens.			Holes			Extens.
	b	D	Ød4	pcs	d2	k	Ød -0.2
ISO DN25 PN40	18	115	68	4	14	85	48
ISO DN50 PN40	20	165	102	4	18	125	51
ISO DN80 PN40	24	200	138	8	18	160	73
ISO DN100 PN40	24	235	162	8	22	190	73
ANSI 1" 150 lbs	15	108	51	4	16	79.4	-
ANSI 1" 300 lbs	18	124	51	4	20	88.9	-
ANSI 2" 150 lbs	23	152	92	4	20	120.6	51
ANSI 2" 300 lbs	25	165	92	8	20	127	51
ANSI 3" 150 lbs	26	191	127	4	20	152.4	73
ANSI 3" 300 lbs	31	210	127	8	23	168.3	73
ANSI 4" 150 lbs	26	229	157	8	20	190.5	73
ANSI 4" 300 lbs	34	254	157	8	23	200	73
JIS 10K-50	16	155	96	4	19	120	51
JIS 40K-50	26	165	105	8	19	130	51
JIS 10K-80	18	185	126	8	19	150	73
JIS 40K-80	32	210	140	8	23	170	73
JIS 10K-100	18	210	151	8	19	175	73
JIS 40K-100	36	250	165	8	25	205	73

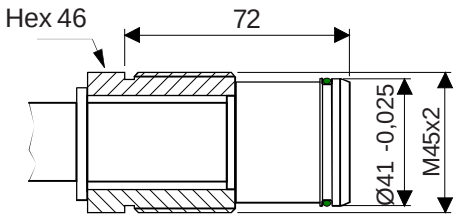
Dimensional drawings (dimensions in mm)



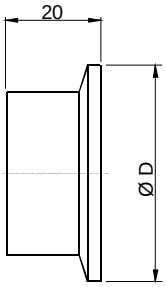
Process connection **PA**
- PMC 1"



Process connection **BA**
- M45x2



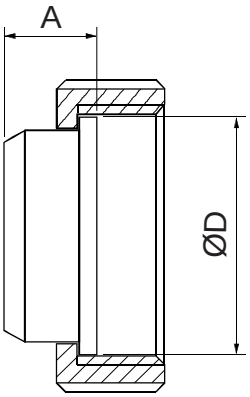
Process connection **BB**
- M45x2



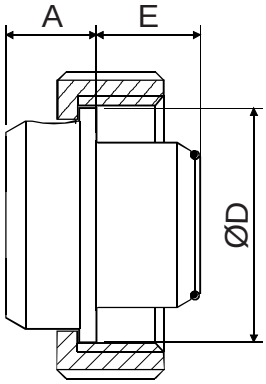
Process connections **TA , TB** and **TC**
- Tri-clamp DN38 ... 63,5

DN	ØD
38	50.5
51	64
63.5	77.5

BA - extension code	**L**
0	28,5
2	51
3	72
4	102



Process connection **VA** and **VB**
- SMS38 and SMS51



Process connection **WA** and **WB**
- SMS-SI38 and SMS-SI51

Size	**Dimensions**		**Thread**
	ØD	A	
38	54	21	Rd 60 x 1/6
51	64	23	Rd 70 x 1/6

Size	**Dimensions**			**Thread**
	ØD	A	E	
SI38	54	21	24	Rd 60 x 1/6
SI51	64	23	27	Rd 70 x 1/6

SATRON VDU

Differential Pressure Transmitter
using two separate pressure sensors

BPDUV760
5.2.2016

Selection Chart

Adjustability	Span, min	Span, max.	Measuring range
VDU3	1.4kPa (14 mbar)	35 kPa (350 mbar)	-35...+35 kPa (-350...350 mbar)
VDU4	4kPa (40 mbar)	100 kPa (1000 mbar)	-100...+100 kPa (-1000...1000 mbar)
VDU4/5	4kPa (40 mbar)	250 kPa (2500 mbar)	-100...+250 kPa (-1000...2500 mbar)
VDU5	26.5 kPa (265 mbar)	500 kPa (5000 mbar)	-100...+500 kPa (-1000...5000 mbar)
VDU5/6	26.5 kPa (265 mbar)	1 MPa (10 bar)	-0.1...+1 MPa (-1... 10 bar)
VDU6	0.145 MPa (1.45 bar)	3 MPa (30 bar)	-0.1...+3 MPa (-1...30 bar)

Output **S** 4-20mA DC/HART® **D** 4-20mA DC/HART® and with galvanic isolation 4-20mA

Process connections

DA	DN25 PN40 ISO 2084-1974	**AB**	ANSI 1" 300 lbs ANSI B16-5	**UA**	Tuchenhagen DN50/40 (Varivent®) PN40
DB	DN50 PN40 ISO 2084-1974	**AC**	ANSI 2" 150 lbs ANSI B16-5	**PA**	PMC 1" PN40
DC	DN80 PN40 ISO 2084-1974	**AD**	ANSI 2" 300 lbs ANSI B16-5	**SA**	Sandvik DN70 PN64
DD	DN100 PN40 ISO 2084-1974	**AE**	ANSI 3" 150 lbs ANSI B16-5	**BA**	M45x2 PN160
JA	JIS 10K 50 JIS B 2220	**AF**	ANSI 3" 300 lbs ANSI B16-5	**BB**	M45x2 PN160
JB	JIS 40K 50 JIS B 2220	**AG**	ANSI 4" 150 lbs ANSI B16-5	**G4**	G1 thread, metal/metal taper sealing
JC	JIS 10K 80 JIS B 2220	**AH**	ANSI 4" 300 lbs ANSI B16-5	**G5**	G1 thread, FPM 0-ring sealing (**) (1)
JD	JIS 40K 80 JIS B 2220	**TA**	Tri-clamp DN38 PN40 ISO 2852	**G6**	G1 thread, EPDM 0-ring sealing (**) (1)
JE	JIS 10K 100 JIS B 2220	**TB**	Tri-clamp DN51 PN40 ISO 2852	**VA**	SMS 38
JF	JIS 40K 100 JIS B 2220	**TC**	Tri-clamp DN63.5 PN40 ISO 2852	**VB**	SMS 51
AA	ANSI 1" 150 lbs ANSI B16-5			**WA**	SMS-SI 38 with extension 24 mm
				WB	SMS-SI 51 with extension 27 mm

Extension length (mm)	(Flanged conn.)	(Sandvik conn.)	
0	0	-	(not proc.conn. SA)
1	23	-	(only proc.conn. DA1, DN25 PN40, max. +125 °C)
2	51	54.5	(not proc.conn. BB, VA, VB, WA, WB, Tx, UA, PA, DA, G1, G2, G4)
3	72	-	(only proc.conn. BA)
4	102	105	(not proc.conn. BB, VA, VB, WA, WB, Tx, UA, PA, DA, G1, G2, G4)
6	152	156	(not proc.conn. BB, VA, VB, WA, WB, Tx, UA, PA, DA, G1, G2, G4)

Wetted materials

Diaphragm

Code	Material	Code	Material
1	Nickel (x) (*) (***)	**5**	Tantalum (*)(***)
2	AISI316L	**6**	Titanium (xx) (*) (***)
3	Hast.C 276 (*)(***)	**8**	Duplex (*)(***)

Extension or other wetted parts

Code	Material
2	AISI316L
3	Hast.C 276
8	Duplex

Diaphragm coating

Code	Material
9	gold/Rhodium
Y	diamond (specify only when coated)

Filling oil **S** Silicone oil **G** Inert oil **A** Food industry oil (Neobee M20)

Housing type, master
N Housing with junction box/terminal strip, display, inlet M20x1,5

Explosion proof **0** No explosion proof classification

Process temperature **N** -30 ... +125 °C **H** 0 ... +200 °C (*) (***)
S +20 ... +70 °C (only process connections **BA** and **DA**)

Cable between sensors
1 PUR cable with M12 connector both end of cable
2 PVC cable with AISI316/ PG9 inlet, fixed factory mounted

Process couplings
0 Will be ordered separately
A With coupling

Material
2 AISI316L
3 Hast.C276
6 Titanium
8 Duplex

Special sizes of electrical inlets (Standard M20x1.5)
N 1/2 NPT **G** Pg13.5 **P** PLUG connector, DIN43650

Documentation

Calibration certificate **AE** English

Installation and Operating Instructions **I E** English **I F** Finnish

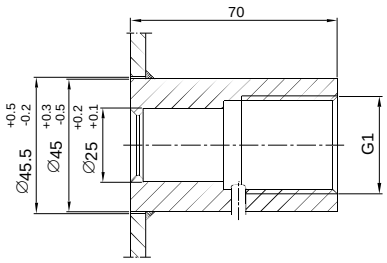
Material certificates

0	No material certificate
MC1	Raw material certificate without appendixes, in accordance with SFS-EN 10204-2.1 (DIN 50049-2.1) standard
MC2	Raw material certificate for wetted parts, in accordance with SFS-EN 10204-2.2 (DIN 50049-2.2) standard
MC3	Raw material certificate for wetted parts, in accordance with SFS-EN 10204-3.1 B (DIN 50049-3.1 B) standard

(x) = only with flange
(xx) = only with flange and G4
(1) = EHEDG - certified

(*) = not proc.conn. G5 and G6
(**) = not for range 3
(***) = not for range 3 with process connection code G4

Process couplings, G1 thread

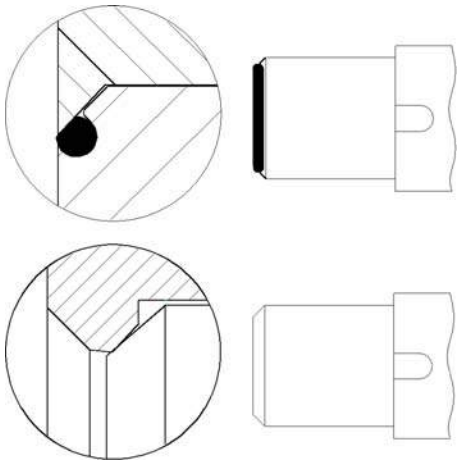


Standard coupling
Material: AISI316 L, Titanium or Hastelloy C

Special couplings, e.g.:
G1 hygienic coupling , M548101
G1/2A/G1 coupling, M546190
G1/2A/G1 coupling with venting, M860280
G1/2A/ G1 couplings with bracket:
- G1/2A male, M546195
- G1/2 female, M550393

Transmitter's process sealing G1 thread

Three different options are available for the transmitter's process sealing:

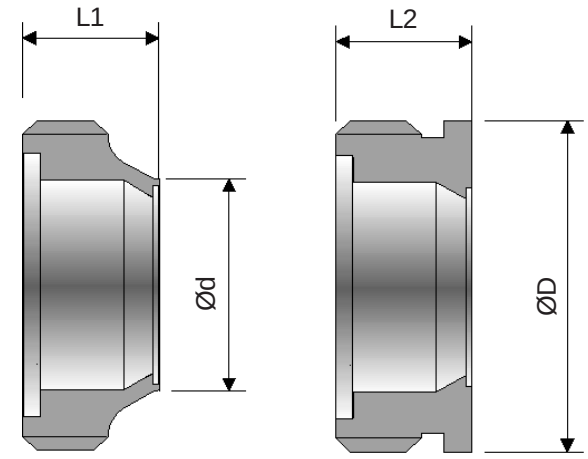


AISI316L, AISI317L or Duplex diaphragm, o-ring **FPM** (Viton) (code **G5**)
EHEDG - certified

AISI316L, AISI317L or Duplex diaphragm, o-ring **EPDM** (code **G6**)
EHEDG - certified

AISI316L, CoNi-, Duplex, Hastelloy C276 or Tantalum diaphragm, metal/metal taper sealing (diaphragm on sealing face) (code **G4**)

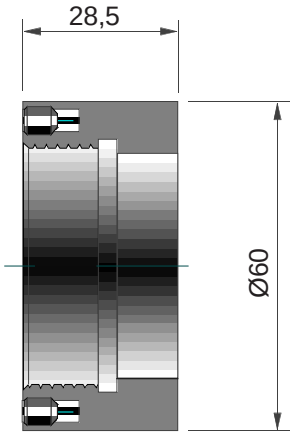
SMS-SI couplings :



for pipe for vessel

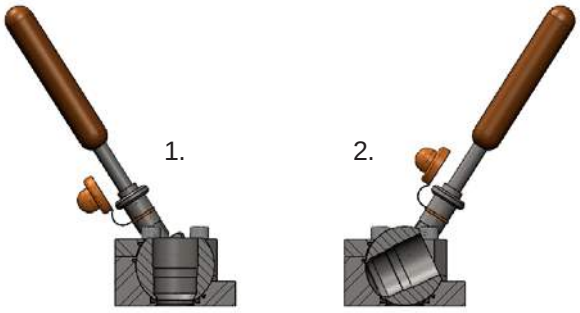
Size	Dimensions				Thread
	L1	Ød	L2	ØD	
38	27	38,5	24	60	Rd 60 x 1/6
51	30	51	25	70	Rd 70 x 1/6

Coupling M45x2 with adjust, for process connection BA, order code M1050459

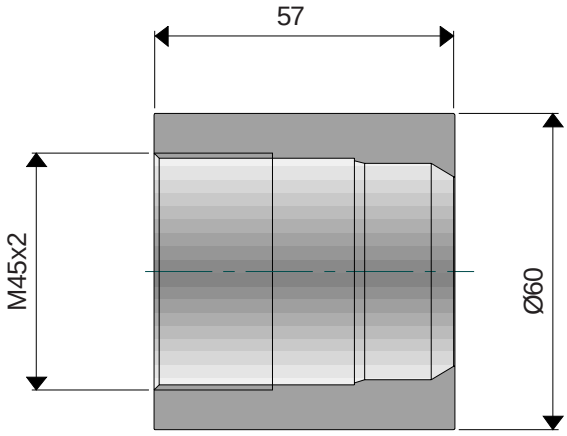


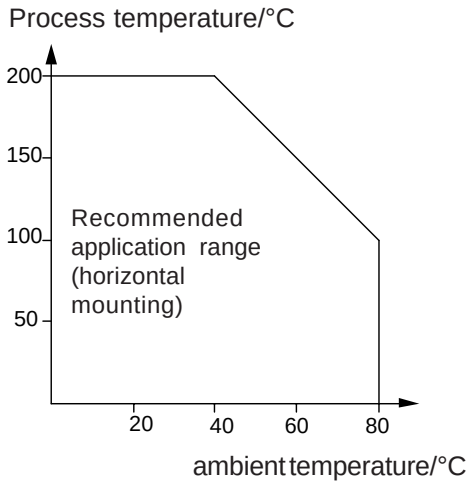
Pasve BA working position:

For process connections **BA3** and **BB**
1. Transmitter in measuring
2. Transmitter can be checked, changed, calibrated or the transmitter diaphragm can be flushed



Coupling BB M45x2, for process connection BB, order code M1050474 (Welding assistant, code M1050473)



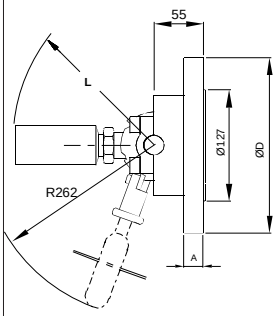


Process temperature limits, code **H**

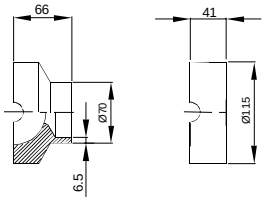
PASVE® mounting & service valve

All PASVE types are also available with pneumatic actuator, flushing and limit switches.

PASVE GF (NF)
(Flange type)



GP (NP)
(Welded
on pipe)



Keyboard :

Esc	=	Press **Esc** move back towards the top of the main menu.
▲	=	Use the **UP** arrow key to move up on the current menu level or to increase the selected parameter value.
▼	=	Use the **DOWN** arrow key to move down on the current menu level or to decrease the selected parameter value.
Enter	=	Press **ENTER** to move to a lower level in a menu or to accept a command or parameter value.

Satron Instruments Inc., P.O.Box 22, FIN-33901 Tampere, Finland
Tel. +358 207 464 800, Telefax +358 207 464 801, www.satron.com

Flow measurement

Our instruments for flow measurement:

- **Condensate pot..... Spec. G450**
- **VDt differential pressure transmitter..... Spec. BPdT750**

FOR MEASUREMENT IN AN OPEN CHANNEL:

VG pressure transmitter ..... Spec. BPLV700
VV pressure transmitter..... Spec. BLV810

FOR MEASUREMENT IN A PIPE:
VDt differential pressure transmitter ..... Spec. BPdT750

Measurement in a pipe by means of restricting element (Fig. 1)

The flow to be measured in a pipe is passed through a restricting device and the pressure differential between two points, one upstream of the restriction and the other immediately downstream from it, is measured by means of a transmitter. (Pressure upstream of the restriction = the high-pressure or positive side, and the pressure downstream = the low-pressure or negative side). The differential pressure Δp thus obtained is proportional to the square of flow Q, i.e.,

$Q = k\sqrt{\Delta p}$ (k = constant)

For this reason a linearization relay is normally required in a control loop between transmitter and controller. It is also possible to use a transmitter that incorporates square root extraction.

Open channel measurement (Fig. 2)
Open channel measurement is used primarily for liquids that contain impurities (e.g. waste water). Measurement is based on restricting the flow in such a manner that the level rises upstream of the restriction. Level variations are measured with either a bubbling tube or a flanged transmitter (see Liquid level measurement). The signal thus obtained is linearized as follows:

Weir with rectangular opening, and Venturi flume:

$Q = kh^{3/2}$ (k = constant)

Weir with V opening:

$Q = kh^{5/2}$

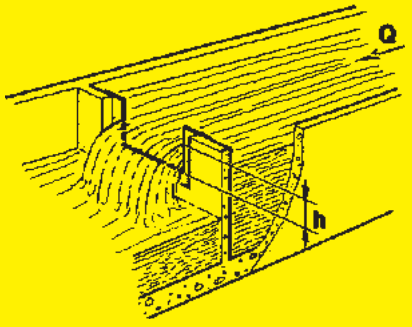


Figure 2

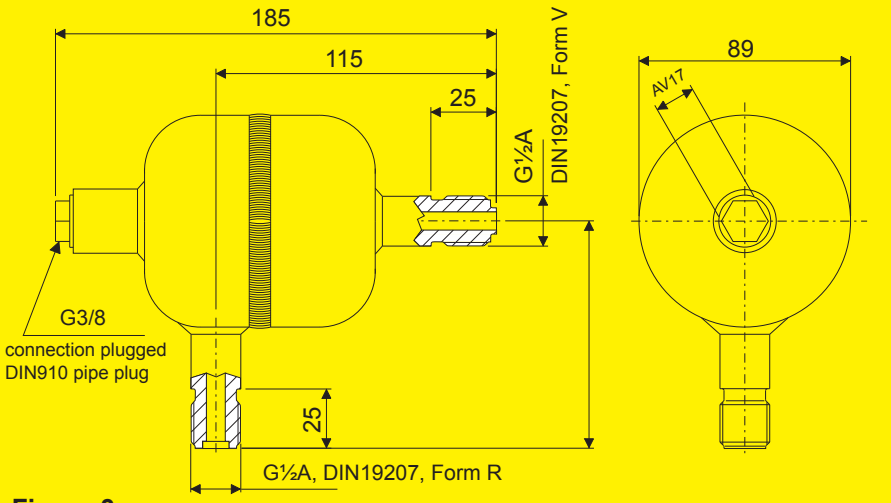


Figure 3

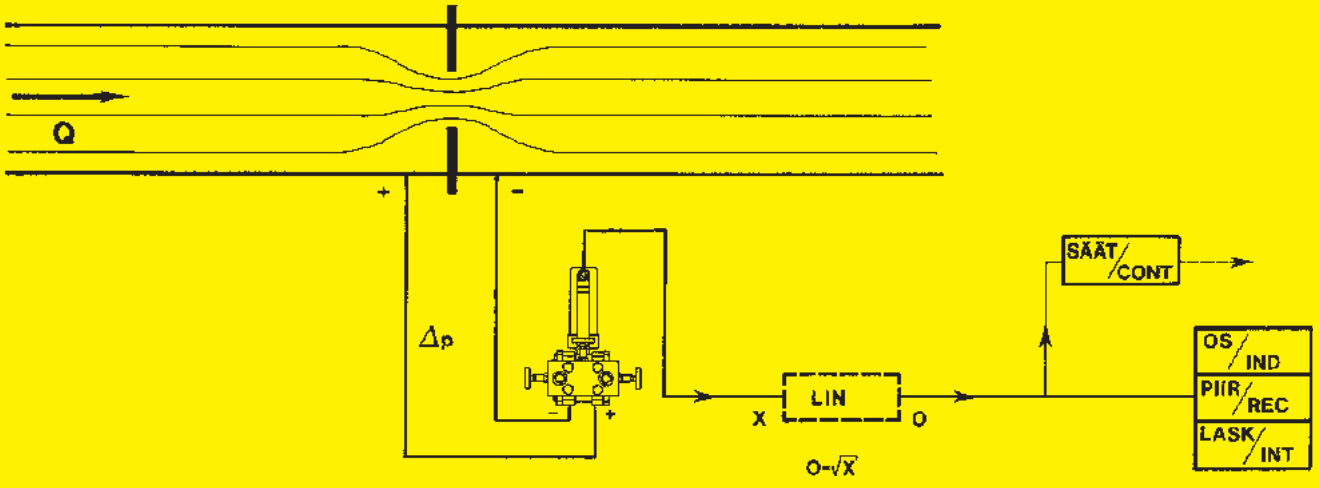
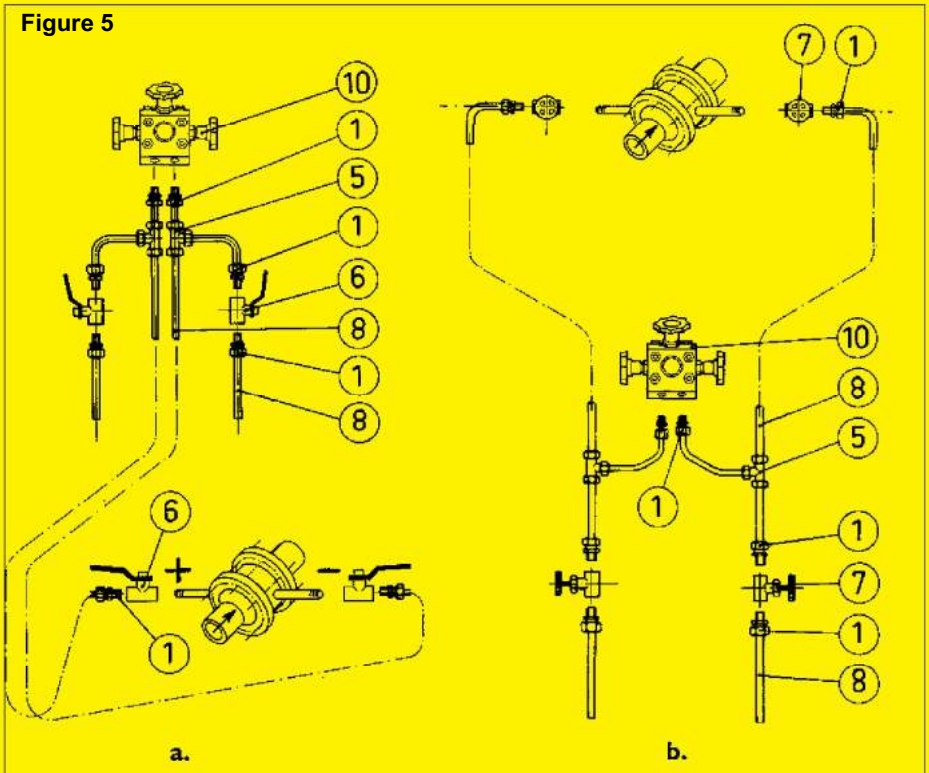


Figure 1

Satron Instruments Inc., P.O.Box 22, FI-33901 Tampere, Finland
Tel. +358 207 464 800, Telefax +358 207 464 801, www.satron.com

Figure 5



1 Stud coupling, 12 mm dia./ G½ male
5 Tee, 12 mm dia.
6 Ball valve, G½
7 Needle valve, G½
8 Pipe, 12 x 1 calibred
10 3-spindle mounting valve

Figure 4 Gas flow application

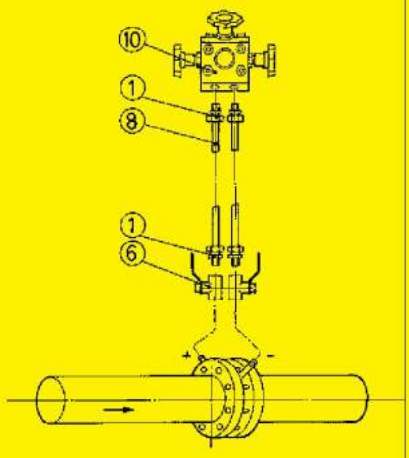
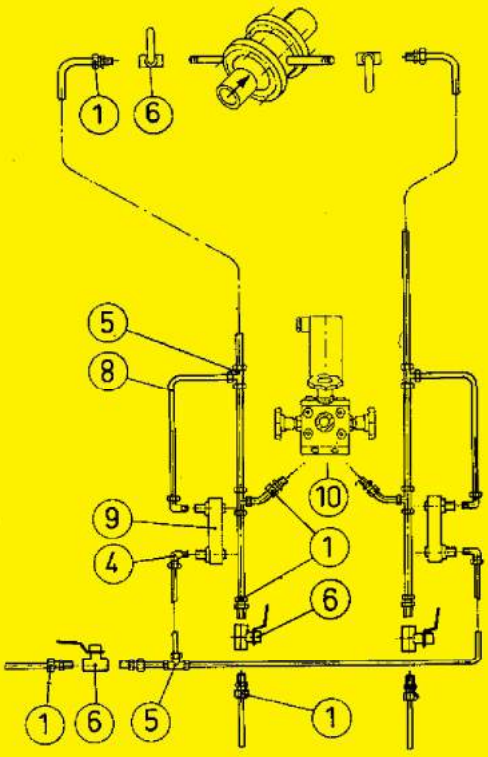


Figure 7

Figure 6



1 Stud coupling, 12 mm dia./ G½ male
4 Stud elbow, 12 mm dia./ G¼ male
5 Tee, 12 mm dia.
6 Ball valve, G½
8 Pipe, 12 x 1 calibred
9 Needle valve rotameter
10 3-spindle mounting valve

Condensate pot

Application

In steam flow measurement special condensate pots are installed in the immediate vicinity of restricting organ. The connection pipes from the restricting device to the condensate pots are full of steam, and from the condensate pot to the meter full of condensate. The condensate pots must be mounted in such a manner that the liquid levels are the same in them.
The function of the condensate pots is to condensate steam into a liquid (e.g. to protect the transmitter from heat, to prevent dribbling), to keep the liquid levels unaltered with overflow and to collect air. The condensate water transmits the pressure to the transmitter, so that the transmitter itself is not in contact with steam.

Construction

Condensing Pots are designed according to DIN 19211. Connections with thread according to DIN 19207 Form R and V.
They fulfil the requirements of the PED 97/23/EC.

Technical specification

Volume: 0.3 liters

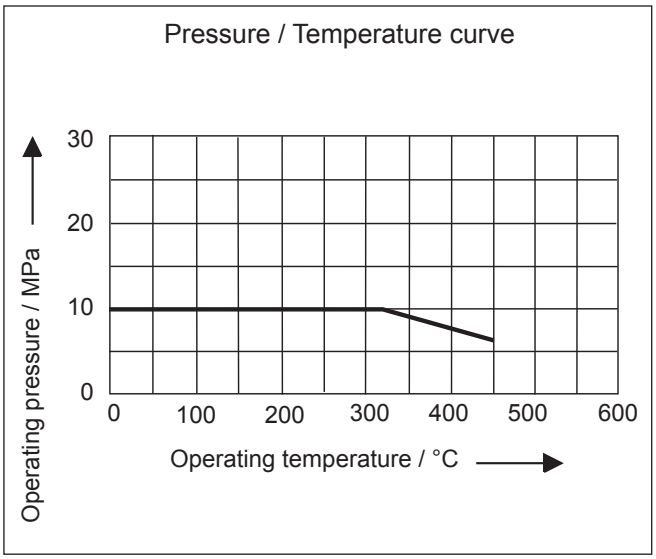
Operating pressure, max.: 100 bar (10 MPa)

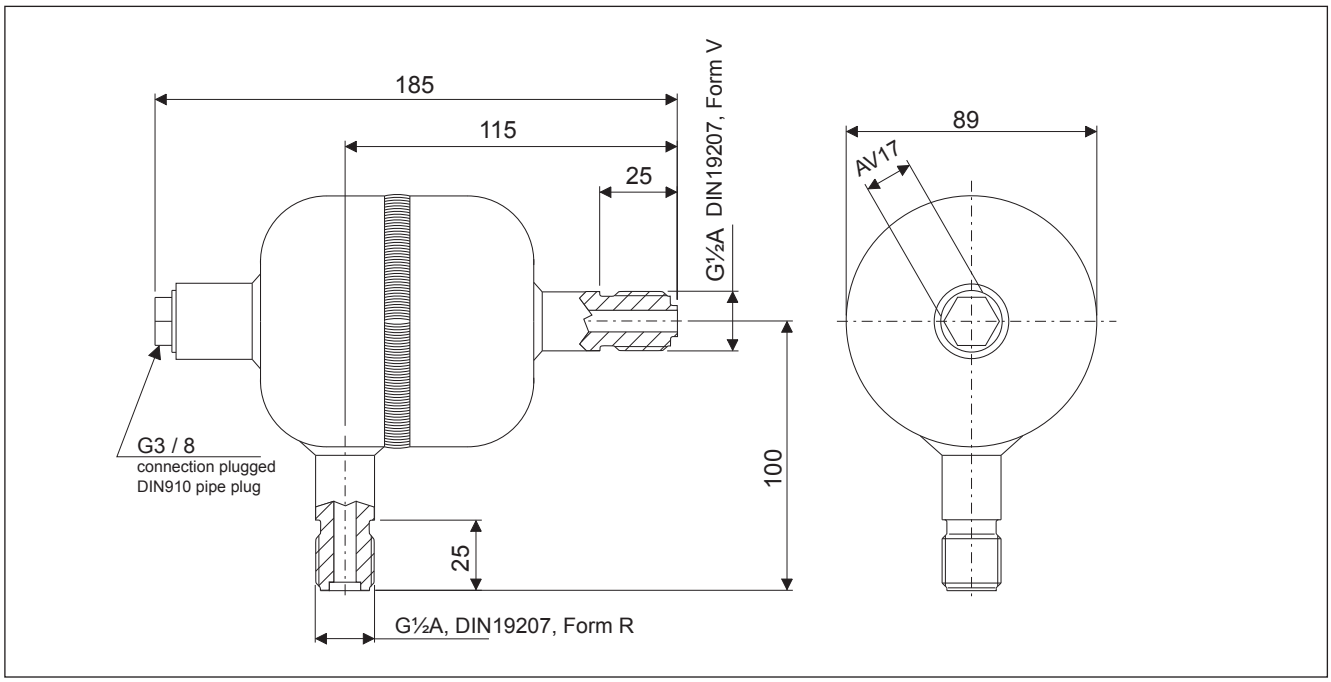
Operating temperature, max.: +450°C

Materials
- housing: HII DIN 17155 (Wnr. 1.0425)
- pipes: St 35.8/II (Wnr. 1.0305)

Surface handling: fresh paint

Weight: 1.8 kg





We reserve the right to make technical changes without prior notice.

Satron Instruments Inc., P.O.Box 240, FIN-33201 Tampere, Finland
Tel. +358 3 387 1800, Telefax +358 3 387 1899

Satron Instruments Inc.
P.O.Box 22, FI-33901 Tampere, Finland
Tel. +358 207 464 800, Fax +358 207 464 801
www.satron.com

Liquid level measurement

Our instruments for liquid level measurement:
VG pressure transmitter ..... Spec. BPLV700
VV pressure transmitter..... Spec. BLV810
VVFe pressure transmitter..... Spec. BLV811
VL pressure transmitter ..... Spec. BLV820
VDtL differential pressure transmitter . Spec.BLVT830

ALSO SUITABLE FOR LIQUID LEVEL MEASUREMENT

VDt differential pressure transmitter Spec.BPdT750

Liquid level measurement using a transmitter

In an open vessel the liquid level is propotional to the hydrostatic pressure in the vessel, and level can be measured by means of pressure measurement. The most commonly used methods are measurement through the side of the vessel by means of a flanged pressure or differential pressure transmitter, as in fig. 2 (the negative leg connection of differential pressure transmitter is left open), and bubbling tube measurement, as in fig. 3. In the latter method compressed air is fed through a monitoring rotameter into a bubbling tube and the back pressure produced in the tube – proportional to liquid level – is measured. The choice between these two methods, bubbling tube or flanged transmitter, is determined between by the ease of making the process connection and by the likelihood of sedimentation. The bubbling tube is well suited for applications such as level measurement in a stock chest made of cement where, especially at some later date, it would be difficult to install a side connection for a flanged transmitter.
In general a flanged transmitter is suitable for almost any type of vessel. With fluids liable to form sediments the measuring diaphragm can be kept clean by washing it trough a special flushing flange (fig. 1). The flange is installed between the transmitter and the process flange. A continious or periodic water flow is issued through the flushing bore. If level variations are small and if the fluid is not liable to form sediments, a float type transmitter can be used.
In a pressurized vessel the liquid level can be measured with a flangeless or flanged differential pressure transmitter (fig. 4). When measuring fluids liable to form sediments, a flanged transmitter is equipped with a flushing flange when necessary.
As in open vessel, a float type transmitter can be used for level measurement if there is no risk of sedimentation and if level variations are small.

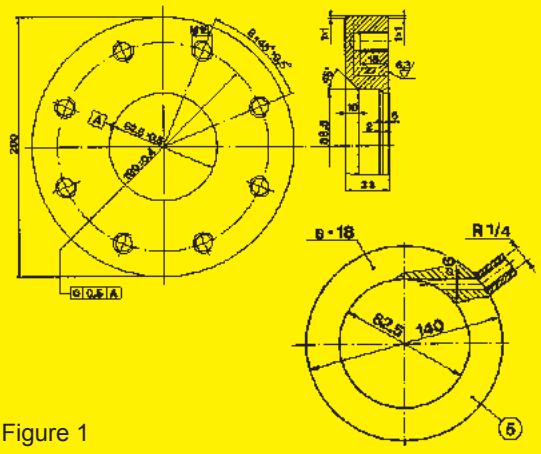
Calculating the calibration values (fig. 2)
To simplify the calculations, the effect of the density of the gas above the liquid level has been ignored.
s, h, and k = distances as in fig. 2.
d_1 = relative density of the liquid with res-pect to water at 4°c.
d_2 = relative density with respect to water of the fill fluid in the negative leg.
When s, h, and k are expressed in metres, the unit for range elevation, span, and supression is mH_2O; for millimetres the unit is mmH_2O, etc.

Open vessel
Span = d_1h
Elevation = d_1s
Range = d_1s to ($d_1s + d_1h$

Example:
If
d_1 = 1.2, h = 1000 mm, and s = 500 mm,
then span = 1.2 x 1000 mmH_2O =
1200 mmH_2O,
elevation = 1.2 x 500 mmH_2O =
600 mmH_2O,
range = 600 to (600 + 1200) = 600
to
1800 $mmH_2O \approx$ 59 to 177 mbar.

Pressurized vessel
When no fill fluid is used in the negative leg, the calculation is the same as for open vessel.
If the negative leg is filled with condensate or some other liquid, then
span = d_1h
suppression = $d_1s - d_2k$
range = ($d_1s - d_2k$) to ($d_1s - d_2k$) + d_1h

Example:
If
d_1 = 0.9, d_2 = 1.0, h = 5m, s = 1 m, and
k = 6.5 m, then
Span = 0.9x5 mH_2O = 4.5 mH_2O,
Suppression = (0.9x1 - 1.0x6.5) mH_2O
= -5.6 mH_2O
Range
= -5.6 to (-5.6+4.5) mH_2O
= -5.6 to -1.1 mH_2O
= -549 to -108 mbar.
The minus sign indicates that, when calibrating, the pressure is taken to the negative side of the transmitter.



1 Pressure transmitter VL
2 M 16 nut
3 DN80 gaskets
4 Process flange
5 Flushing flange
6 GE8-L1/4" BSP stud coupling

Figure 1

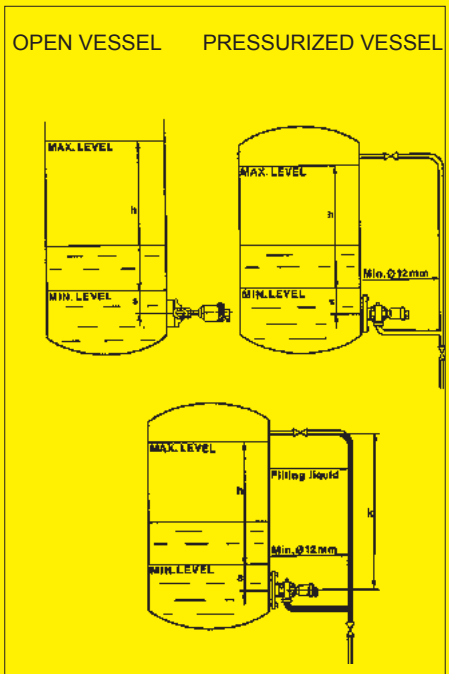


Figure 2

SATRON instruments
Satron Instruments Inc., P.O.Box 22, FI-33901 Tampere, Finland
Tel. +358 207 464 800, Telefax +358 207 464 801, www.satron.com

Liquid level measurement

Installation examples

As regards process connection materials and connection piping, the requirements are the same as in pressure measure-ment. Figure I shows an ordinary flanged transmitter in an open vessel application, with corresponding process flange and flushing flange. Figure 3 shows an installation example for bubbling tube application. Figure 4 illustrates level measurement in a pressurized vessel with flanged transmitter. When measuring liquid level in an open vessel in the same manner, the suppression pipe is not needed. Bating of the piping system and vessel have to be taken account when selecting the gasket material.
Gasket materials have to be selected in such a way that the eventual bate is not absorbed in the gasket (e.g. Viton®).

1 Stud coupling, Ø12 mm dia./ G½ male
2 Tee, 12 mm dia.
3 Double male connector, Ø12 mm dia.
4 Plug
5 Ball valve
6 Process connection, G½
7 Pipe, Ø12 x 1 calibred
8 Gasket DN80
9 Flange connection DN80
10 Nut

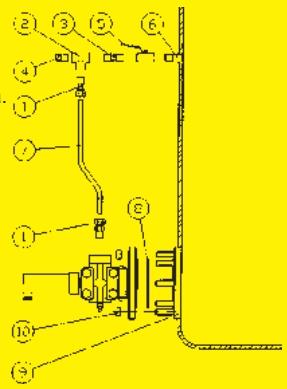
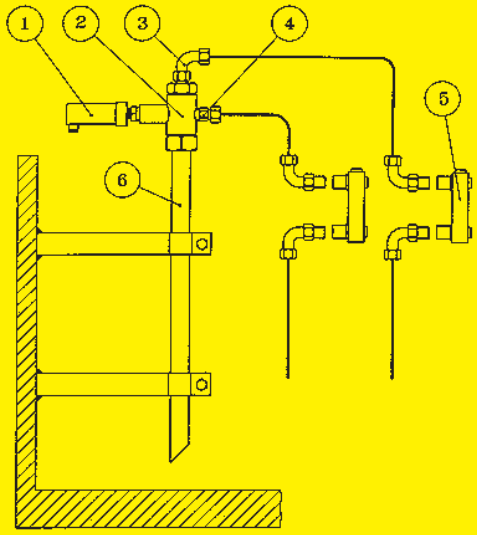


Figure 4

Liquid level measurement	Adjustability		
	Span		Measuring range
	min.	max.	
VG3	1.4 kPa (14 mbar)	35 kPa (350 mbar)	-35...+35 kPa (-350...350 mbar)
VG4	4kPa (40 mbar)	100 kPa (1000 mbar)	-100...+100 kPa (-1000...1000 mbar)
VG5	10 kPa (100 mbar)	500 kPa (5000 mbar)	-100...+500 kPa (-1000...5000 mbar)
VGA5	10 kPa (100 mbar)	500 kPa (5000 mbar)	0...+500 kPa (0...5000 mbar), abs.
VG6	0.03 MPa (0,3 bar)	3 MPa (30 bar)	-0.1...+3 MPa (-1...30 bar)
VGA6	0.03 MPa (0,3 bar)	3 MPa (30 bar)	0...+3 MPa (0...30 bar), abs.
VG7	0.15 MPa (1,5 bar)	15 MPa (150 bar)	0...+15 MPa (0...150 bar), abs.
VG8	1 MPa (10 bar)	25 MPa (250 bar)	-0.1...+25 MPa (-1....250 bar)
VVx3	1,4kPa (14 mbar)3	5 kPa (350 mbar)	-35...+35 kPa (-350...350 mbar)
VVx4 x)	4kPa (40 mbar)	100 kPa (1000 mbar)	-100...+100 kPa (-1000...1000 mbar)
VVx5	10 kPa (100 mbar)	500 kPa (5000 mbar)	-100...+500 kPa (-1000...5000 mbar)
VVF$_e$ 4	4kPa (40 mbar)	100 kPa (1000 mbar)	-100...+100 kPa (-1000...1000 mbar)
VVF$_e$ 5	10kPa (100 mbar)	500 kPa (5000 mbar)	-100...+500 kPa (-1000...5000 mbar)
VL3	1.4kPa (14 mbar)	35 kPa (350 mbar)	-35...+35 kPa (-350...350 mbar)
VL4	4kPa (40 mbar)	100 kPa (1000 mbar)	-100...+100 kPa (-1000...1000 mbar)
VL5	10 kPa (100 mbar)	500 kPa (5000 mbar)	-100...+500 kPa (-1000...5000 mbar)
VLA5	10 kPa (100 mbar)	500 kPa (5000 mbar)	0...+500 kPa (0...5000 mbar), abs.
VL6	0,03 MPa (0,3 bar)	3 MPa (30 bar)	-0.1...+3 MPa (-1...30 bar)
VLA6	0,03 MPa (0,3 bar)	3 MPa (30 bar)	0...+3 MPa (0...30 bar), abs.
VL7	1 MPa (10 bar)	15 MPa (150 bar)	0...+15 MPa (0...150 bar), abs.
VDtL 3	1.4 kPa (14 mbar)	35 kPa (350 mbar)	-35...+35 kPa (-350...+350 mbar)
VDtL4	4 kPa (40 mbar)	100 kPa (1000 mbar)	-100...+100 kPa (-1000...+1000 mbar)
VDtL 5	26.5 kPa (265 mbar)	500 kPa (5000 mbar)	-500...+500 kPa (-5000...+5000 mbar)
VDtL 6	145 kPa (1.45 bar)	3 MPa (30 bar)	-3...+3 MPa (-30...+30 bar)



1 Pressure transmitter VG
2 Special fitting
3 Stud elbow WE8-L/1/4”
4 Stud coupling, SF8-L/1/4”
5 Rotameter

Figure 3

x) See the data sheet BLV810

Viton is the registered trademark of Du Pont Down Elastomers.

SATRON VG Flush Mount Pressure Transmitter

SATRON VG pressure transmitter belongs to the series V transmitters which will have both analog and smart properties. SATRON VG is used for 0-1.4 kPa...0-25 MPa ranges. It is a 2-wire transmitter with HART® standard communication.
In pressure measuring applications SATRON VG transmitters are used for measuring the pressure of clean, sedimenting, crystallizing and sticking materials. The transmitter's sensor is piezoresistive. The rangeability is 100:1 for types VG6 - VG7.

TECHNICAL SPECIFICATIONS

Measuring range and span
See Selection Chart.

Zero and Span adjustment
Zero elevation: Calibrated span is freely selectable on the specified range depending from the desired option. This can be made by using extern control shafts, keyboard (display option) or HART®275/375 communicator.

Damping
- Time constant is continuously adjustable 0.01 to 60 s.

Temperature limits
Ambient: -30 to +80 °C
Process: -30 to +125 °C
0 to +200 °C (temp. code H)
Shipping and storage: -40 to +80 °C.
Operating temperature of display:
0 to +50ºC *(does not affect operation of the transmitter)*

Pressure limits Min. and max. process pressure: See the appended tables.

Volumetric displacement
< 0.5 mm^3 /max. span
Output 2-wire (2W), 4-20 mA, user selectable for linear, square root, inverted signal or the transfer function (16 points)specified by the user

Supply voltage and permissible load
See the load capacity diagram;
4-20 mA output: 12 - 35 VDC.

Humidity limits
0-100 % RH; freezing of condensed water is not allowed in reference pressure channels.

PERFORMANCE SPECIFICATIONS
Tested in accordance with IEC60770: Reference conditions, specified span, no range elevation, horizontal mounting; O-ring seals, AISI316L diaphragm, silicone oil fill.

Accuracy
±0.05 % of calibrated span
(span 1:1-5:1 /max.range).
On the measuring ranges 5:1-100 :1:

$\pm[0.025+0.01 \times (\frac{\text{max.span}}{\text{calibrated span}})]$% of calibrated span

(incl. nonlinearity, hysteresis and repeatability)

Long-term stability
±0.1 % / max. span / 1 year

Temperature effect
- **on -20 to +80 °C range**
(process temperature code **N**)
Zero and span error:
±0.15 % of max. span.
- **on 0 to +200 °C range**
(process temperature code **H**)
Zero and span error:
±1 % of max. span, VG6 - VG8
±2 % of max. span, VG4 - VG5

Mounting position effect
Zero error < 0.32 kPa, which can be calibrated out.

Vibration effect (IEC 68-2-6: FC):
±0.1 % of measuring range/
2g/10 to 2000 Hz
4g/10 to 100 Hz

Power supply effect
< ±0.01 of calibrated span per volt

Insulation test voltage
500 V rms 50 Hz

CONSTRUCTION AND CALIBRATION
Materials
Diaphragm [1]: AISI316L (EN 1.4435), Duplex (EN 1.4462), Hast. 276 (EN 2.4819), CoNi-alloy, Titanium Gr2 (EN 3.7035) or Tantalum.
Coupling [1]: AISI316L (EN 1.4404), Duplex (EN 1.4462), Hast.C276 (EN 2.4819) or Titanium Gr2 (EN 3.7035).
Other sensing element materials: AISI316, SIS 2343.

Filling fluid: Silicone oil, food industry oil or inert oil

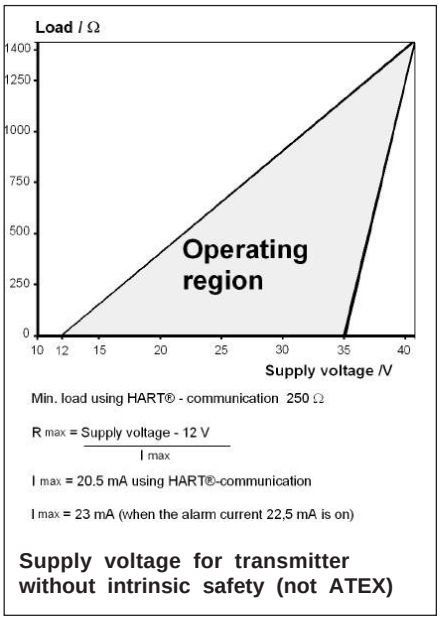
Enclosure class IP66

[1] Parts in contact with process medium

Housing with PLUG connector, housing type codes **H** and **T**
Housing: AISI303/316
Seals: Viton® and NBR
TEST jacks: MS358Sn/PVDF, protected with silicone rubber shield.
PLUG connector: PA6-GF30 jacket, Silicone rubber seal, AISI316 retaining screw.

Housing with junction box/terminal strip, housing type codes **M** and **N**
Housing: AISI303/316; Seals: Nitrile and Viton®; Nameplates: Polyester

Connection hose between sensing element and housing
Codes **L** and **K**:
PTFE hose with AISI316 braiding.



Supply voltage for transmitter without intrinsic safety (not ATEX)

Pressure limits

Maximum process pressure, MPa

Trans-mitter type	Max. overload pressure	Pressure class
VG3	0.2	PN40
VG4	0.3	PN40
VG5	1.5	PN40
VG6	7.5	PN100
VG7	40.0	PN250
VG8	100.0	PN250

Minimum process pressure

$T_{proc.}$ ℃	Minimum pressure for different fill fluids (kPa, abs.)	
	DC200 100 cSt	Inert oil
20	5	8
40	8	10
80	16	28
120	21	53

SATRON VG Flush Mount Pressure Transmitter

Calibration
For customer-specified range with 1 s. damping. (If range is not specified, transmitter is calibrated for maximum range.)

Electrical connections
Housing with PLUG connector, **H** and **T:**
PLUG connector, connector type DIN 43650 model AF; Pg9 gland for cable; wire cross-section 0.5 to 1.5 mm^2.

Housing with junction box/terminal strip**, M** and **N :**
M20x1.5, 1/2-NPT inlet; screw terminals for 0.5 to 2.5 mm^2 wires

Process connections
G1 connecting thread
Process couplings: See Selection Chart and installation instructions or technical specification: Couplings for Transmitters **G150**.

Weight
Transmitter
- with housing type **H** and **T**: 0.7 kg
- with housing type **M** ja **N**: 1.2 kg

Product Certifications

European Directive Information

Electro Magnetic Compatibility (EMC directive 2004/108/EC)
All pressure transmitters

Atex Directive (94/9/EC)
Satron Instruments Inc. complies with the ATEX Directive.

European Pressure Equipment Directive (PED) (97/23/EC)

All Pressure Transmitters :
- Sound Engineering Practice

Hazardous Locations Certifications

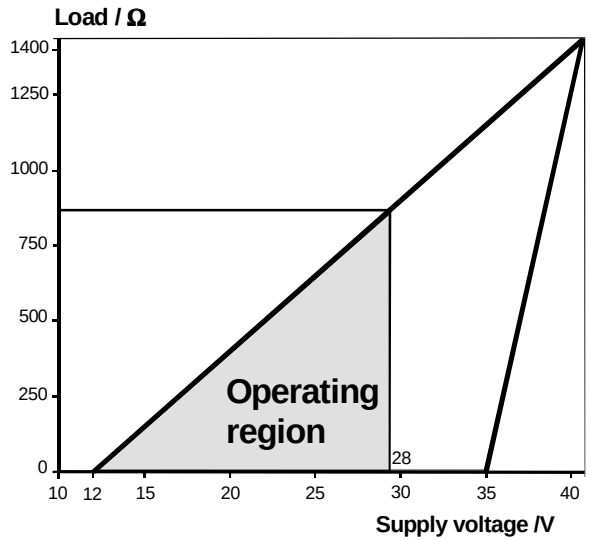
European Certifications
ATEX Intrinsic Safety

Certification No. : DNV-2007-OSL-ATEX- 1346X

Ex II 1 GD T135°C EEx ia II C T4 -20°C ≤ Tamb ≤ 50°C
Ex II 2 GD T135°C EEx ia II C T4 -20°C ≤ Tamb ≤ 50°C

Input Parameters :
U_i = 28 V
I_i = 93 mA
P_i = 0.651 W
C_i = 5 nF
L_i = 0.2 mH

Special Conditions for Safe Use (X) :
The enclosure with plastic window and the plastic DIN43650 connector must not be installed in potentially explosive atmosphere requiring category 1 apparatus. The non-conducting surface of the sensor element may be charged by the flow of non-conducting media, so there may be electrostatic hazard with IIC-gases. These units should be marked 2 GD.
The equipment shall be installed and connected according to the manufacturers instructions.



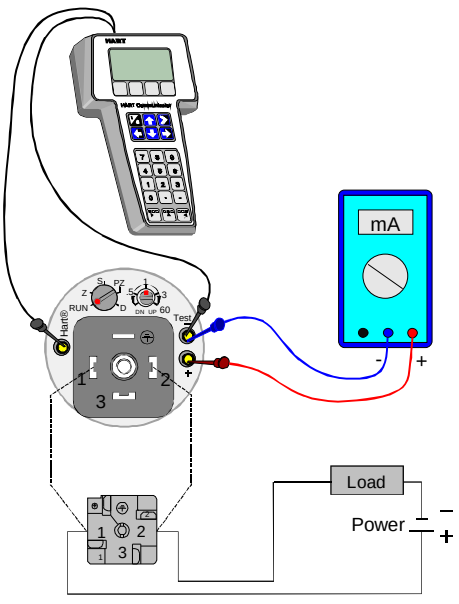
Min. load using HART® - communication 250 Ω

$R_{max} = \frac{\text{Supply voltage - 12 V}}{I_{max}}$

I_{max} = 20.5 mA using HART®-communication

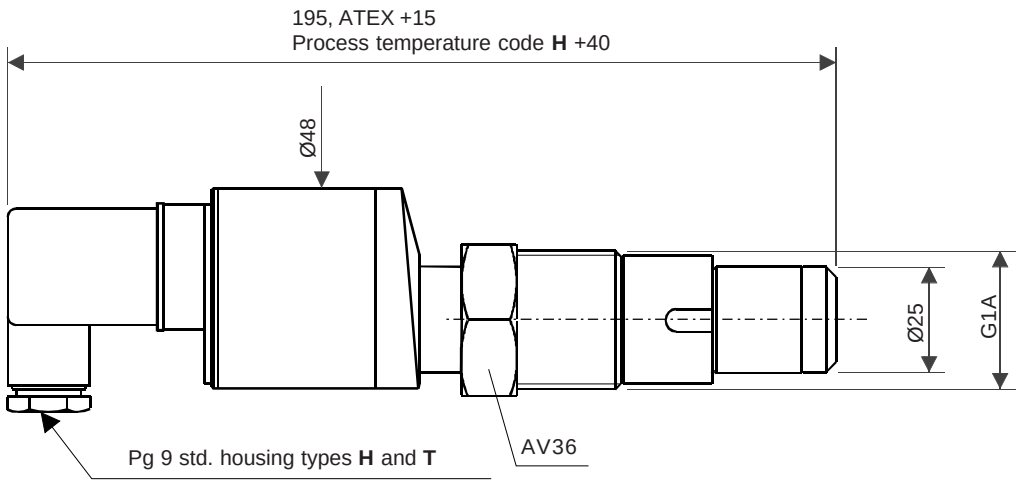
I_{max} = 23 mA (when the alarm current 22,5 mA is on)

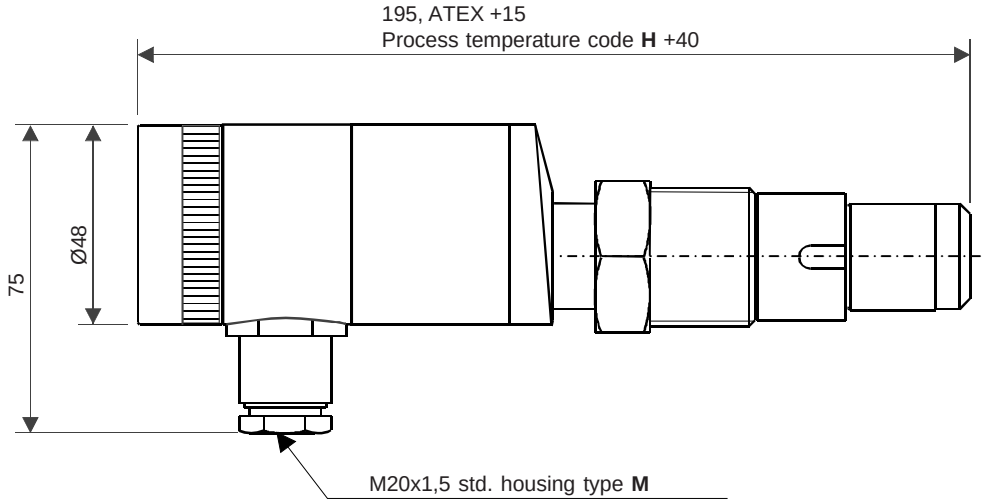
Supply voltage for transmitter with certified intrinsic safety (ATEX)

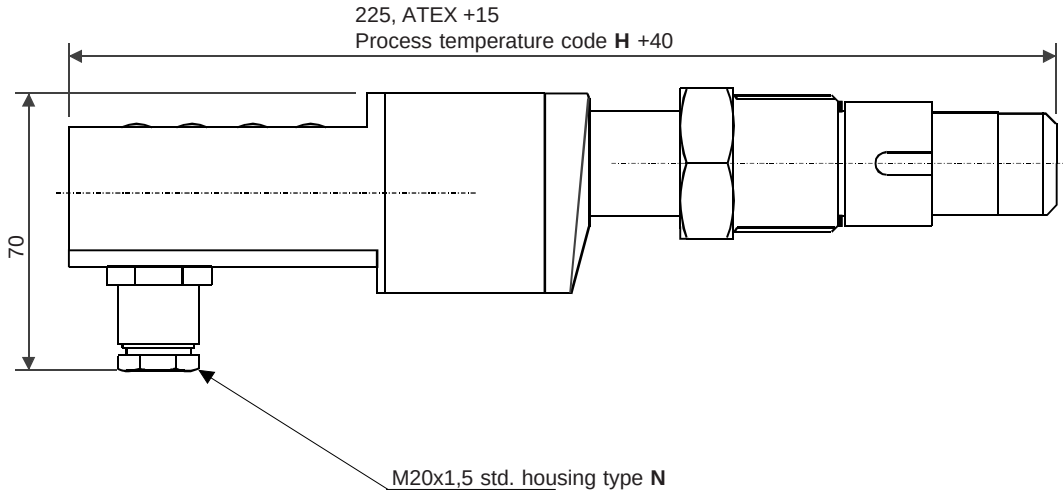


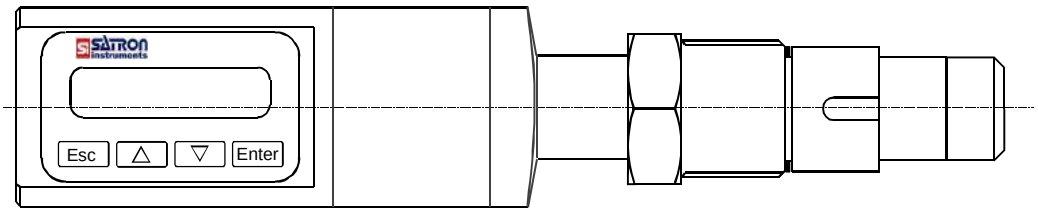
Wiring
Housing with PLUG connector, codes **H** and **T**

Dimensions (in mm)





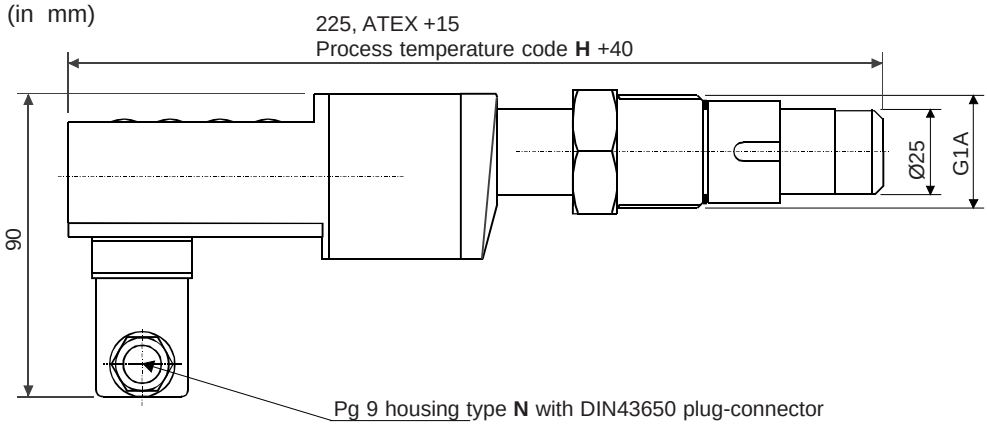


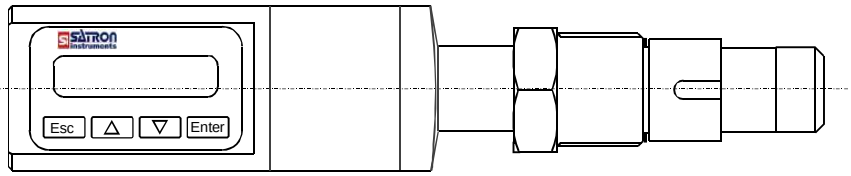


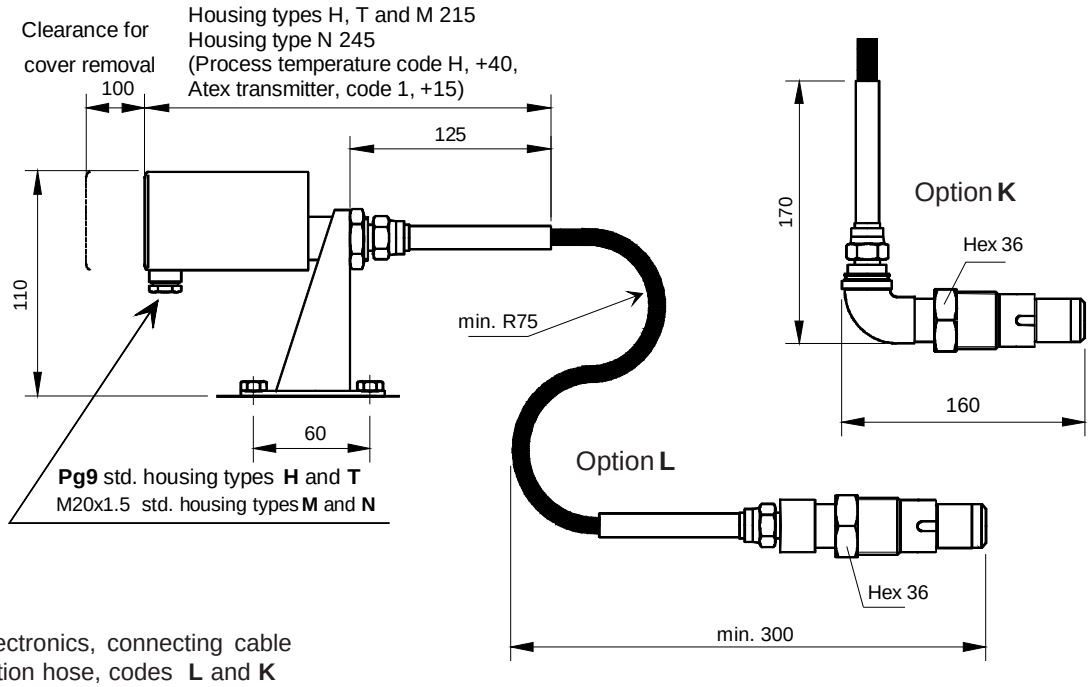
1300354100

Dimensions (in mm)

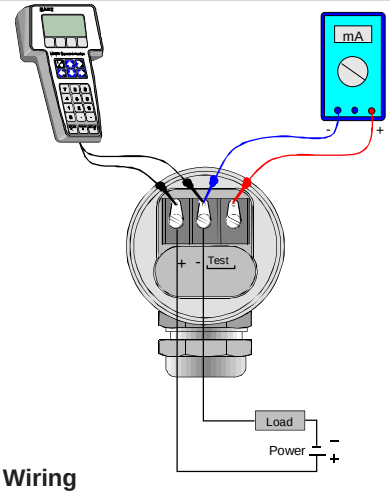
1300354100



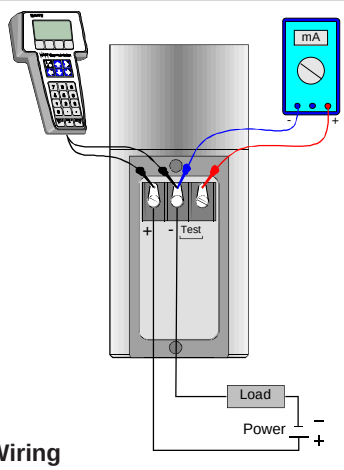




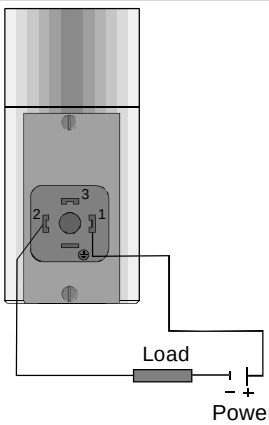
Remote electronics, connecting cable with protection hose, codes **L** and **K**



Wiring
Housing with terminal strip, code **M**



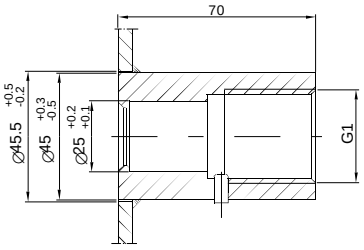
Wiring
Housing with terminal strip and display, code **N**



Wiring
Housing with terminal strip and display with DIN 43650 plug-connector, code **N__ / P**

SATRON VG Flush Mount Pressure Transmitter

Couplings

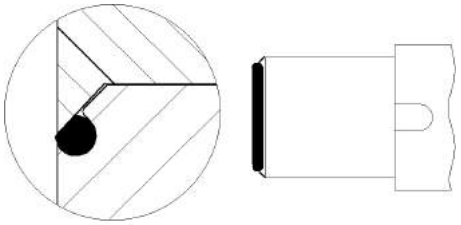


Standard coupling
Material: AISI316 L or Hastelloy C

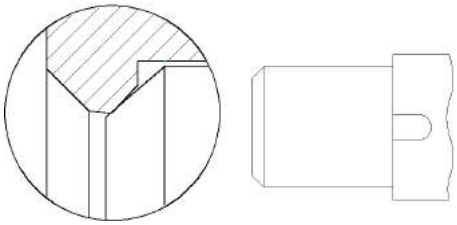
Special couplings:
G1 hygienic coupling , M548101
G1/2A/G1 coupling, M546190
G1/2A/G1 coupling with venting, M860280
G1/2A/ G1 couplings with bracket:
- G1/2A male, M546195
- G1/2 female, M550393

Transmitter's process sealing

Three different options are available for the transmitter's process sealing:



AISI316L, AISI317L or Duplex diaphragm,
FPM (Viton) or EPDM O-ring (code **5** or **6**)
EHEDG - certified



AISI316L, CoNi-, Duplex, Hastelloy C276, Tantalum or Titanium diaphragm,
metal/metal taper sealing (diaphragm also on sealing face)
(code **4**)

Flanges:
Dimensions of flanged couplings, see the installation and setting-up instructions

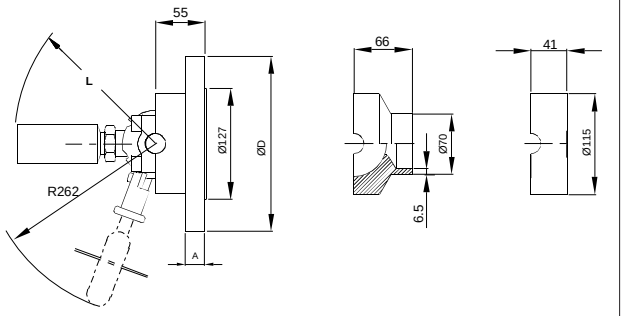
PASVE® mounting & service valve

All PASVE® types are also available with pneumatic actuator, flushing and limit switches.

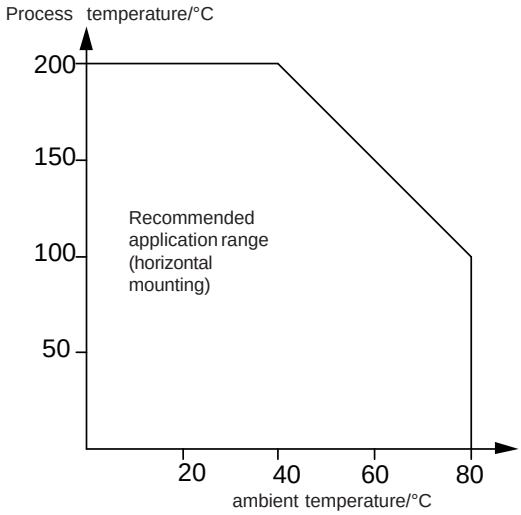
PASVE GF (NF)
(Flange type)

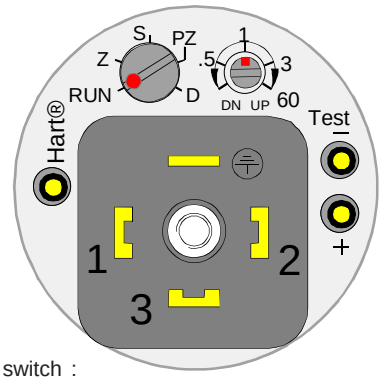
GP (NP)
(Welded on pipe)

GC (NC)
(Welded on container)



Process temperature limits, code **H**





Use of selector switch :
RUN = working position
PZ = Process value zero
D = Damping adjustment
S = Span adjustment
Z = Zero adjustment
DN = Down
UP = Up

Housing with PLUG connector, housing code T

Keyboard :

Esc = Press **Esc** move back towards the top of the main menu.
▲ = Use the **UP** arrow key to move up on the current menu level or to increase the selected parameter value.
▼ = Use the **DOWN** arrow key to move down on the current menu level or to decrease the selected parameter value.
Enter = Press **ENTER** to move to a lower level in a menu or to accept a command or parameter value.

Housing with display, housing code N

SATRON VG Flush Mount Pressure Transmitter

BPLV700
01.01.2014

Selection Chart

Adjustability	Span, min	Span, max	Measuring range
VG3	1.4 kPa (14 mbar)	35 kPa (350 mbar)	- 35...+35 kPa (-350...350 mbar)
VG4	4 kPa (40 mbar)	100 kPa (1000 mbar)	-100...+100 kPa (-1000...1000 mbar)
VG5	10 kPa (100 mbar)	500 kPa (5000 mbar)	-100...+500 kPa (-1000...5000 mbar)
VGA5	10 kPa (100 mbar)	500 kPa (5000 mbar)	0...+500 kPa (0...5000 mbar), abs.
VG6	0.03 MPa (0.3 bar)	3 MPa (30 bar)	-0.1...+3 MPa (-1...30 bar)
VGA6	0.03 MPa (0.3 bar)	3 MPa (30 bar)	0...+3 MPa (0...30 bar), abs.
VG7	0.15 MPa (1.5 bar)	15 MPa (150 bar)	0...+15 MPa (0...150 bar), abs.
VG8	1 MPa (10 bar)	25 MPa (250 bar)	-0,1...+25 MPa (-1...250 bar)

Output **S** 4-20mA DC/HART® -protocol

Process seal **4** metal/metal taper **5** O-ring FPM (Viton®) (1) **6** O-ring EPDM (1)

Wetted materials

Code	Material	Code	Material
2	AISI316L (EN 1.4435)	**6**	Titanium Gr2 (*) (**) (****)
3	Hast. C 276 (*) (**)	**7**	CoNi-alloy (*) (not ranges 3-4)
5	Tantalum (*) (**)	**8**	Duplex (EN 1.4462) (*) (**)

Diaphragm coating

Code	Material
9	gold/Rhodium
Y	diamond (specify only when coated)

Fill fluid **S** Silicon oil **G** Inert oil **A** Food and beverage special oil (Neobee M20)

Housing type
- **H** Housing with PLUG-connector, DIN43650, no display, inlet PG9
- **T** Housing with PLUG-connector and with manual adjust, DIN43650, no display, inlet PG9, (no ATEX)
- **M** Housing with junction box/terminal strip, no display, inlet M20x1,5
- **N** Housing with junction box/terminal strip, with display, inlet M20x1,5

Explosion proof **0** No explosion proof classification **1** Atex Intrinsic Safety, Ex II 1 GD T135°C (***)

Process temperature limits **N** -30 ... +125 °C **H** 0 ... +200 °C (*) (**)

Process coupling
- **0** No coupling
- **E** Hygienic coupling
- **G** Standard coupling

Material
- **2** AISI316L
- **3** Hast.C276
- **6** Titanium Gr2
- **8** Duplex

PASVE® mounting valve, specify separately in the order

Specify special couplings separately in the order

Special size of electrical inlet
N 1/2 NPT **G** Pg13.5 **P** Plug connector DIN 43650

Special features

Remote electronics (specify only if housing connected with cable to sensing element)
- connecting cable with protection hose
- **L** Hose protected with PTFE/AISI316 braiding, straight
- **K** Hose protected with PTFE/AISI316 braiding, angle of 90°

Length of connection cable between sensing element and housing
2 2 m cable **3** 3 m cable etc. (max. 10 m)

Mounting parts for remote electronics for Ø 51 mm tube
0 No mounting parts **1** Mounting parts

Documentation

Calibration certificate **AE** English

Installation and operating instructions **IE** English **IF** Finnish

Material certificates
- **0** No material certificate
- **MC1** Raw material certificate without appendices, in accordance with SFS-EN 10204-2.1 (DIN 50049-2.1) standard
- **MC2** Raw material certificate for wetted parts, in accordance with SFS-EN 10204-2.2 (DIN 50049-2.2) standard
- **MC3** Raw material certificate for wetted parts, in accordance with SFS-EN 10204-3.1 B (DIN 50049-3.1 B) standard

We reserve the right for technical modifications without prior notice.

(*) = only process seal code 4
(**) = not for range 3
(***) = Housing H and N : Ex II 2 GD T135°C ATEX transmitters with display are the model without membrane key.
(****) = Min. process temperature limits 0 °C

(1) = EHEDG - certified

SATRON VV Pressure Transmitter

SATRON VV pressure transmitter belongs to V-transmitter family. The series V transmitters have both analog and smart properties. SATRON VV is used for 0-1.4 kPa...0-0.5 MPa ranges. It is a 2-wire transmitter with HART® standard communication.
SATRON VV pressure transmitter is suitable for liquid level measurements in ground, rock and ships' tanks, and in open channels.
SATRON VV pressure transmitter can be used in corrosive conditions and to measure contaminating liquids. Possible foam on the surface of the measured liquid does not disturb the measurement. SATRON VV does not require compressed air supply.
The transmitter's sensor is piezoresistive. The rangeability is 50:1 for type VV5.

TECHNICAL SPECIFICATIONS

Measuring range and span
See Selection Chart.

Zero and Span adjustment
Zero elevation: Calibrated span is freely selectable on the specified range depending from the desired option. This can be made by using extern control shafts (analog option), keyboard (display option) or HART®275/375 communicator.

Damping
Time constant is continuously adjustable 0.01 to 60 s.

Temperature limits
Process: -10 to +125 °C
Ambient: -30 to +80 °C
Shipping and storage: -40 to +80 °C.
Operating temperature of display:
0 to +50ºC *(does not affect operation of the transmitter)*
Equipment cabinet is recommended for extremely demanding conditions.

Pressure limits
Min. and max. process pressure: See the appended tables.

Output 2-wire (2W), 4-20 mA, user selectable for linear, square root, inverted signal or the transfer function (16 points)specified by the user

Supply voltage and permissible load
See the load capacity diagram;
4-20 mA output: 12-35 VDC.

Humidity limits 0-100 % RH; freezing of condensed water is not allowed in reference pressure channels.

PERFORMANCE SPECIFICATIONS
Tested in accordance with IEC 60770: Reference conditions, specified span, no range elevation,AISI316L diaphragm, silicone oil fill.

Accuracy
- ±0.05 % of calibrated span (span 1:1-5:1 /max.range).
  On the measuring ranges 5:1- 50:1:

$\pm[0.01+0.012 \times (\frac{\text{max.span}}{\text{calibrated span}})]$% of calibrated span

(incl. nonlinearity, hysteresis and repeatability)

Long-term stability
±0.1 % of max. span per 12 months

Temperature effect on compensated temperature ranges
Zero and span shift: ±0.15 % of max.span

Mounting position effect
Zero error <0.32 kPa, which can be calibrated out.

Vibration effect (IEC 68-2-6: FC):
±0.1 % of measuring range/
2 g/10 to 2000 Hz
4 g/10 to 100 Hz

Power supply effect
<±0.01 % of calibrated span per volt.

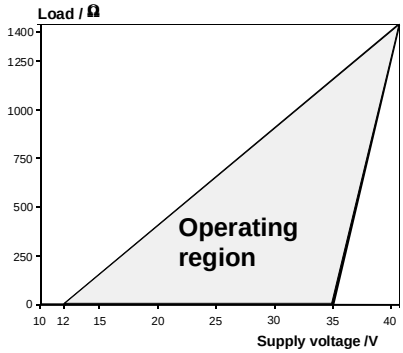
Insulation test voltage
500 V rms 50 Hz.

CONSTRUCTION AND CALIBRATION
Materials
Diaphragm [1]: AISI316L (EN 1.4435), Hast. C276 (EN 2.4819) or Tantalum.
Sensing element [1]: AISI316, PTFE/ AISI316 or PVC
Other materials: SIS2343
Fill fluid Silicone oil or inert oil.

Housing with PLUG connector, codes **H** and **T**
Housing: AISI316/303
Seals: Viton® and NBR
TEST jacks: MS358Sn/PVDF, protected with silicone rubber shield.
PLUG connector: PA6-GF30 jacket, Silicone rubber seal, AISI316 retaining screw.

Housing with junction box/terminal strip, codes **M** and **N**
Housing: AISI303/316; Seals: Nitrile and Viton®; Nameplates: Polyester

Connection cable between sensing element and housing
(code **L**and **K**):
PTFE hose with AISI316 braiding.



Min. load using HART® - communication 250 Ω

$R_{max} = \frac{\text{Supply voltage - 12 V}}{I_{max}}$

I_{max} = 20.5 mA using HART®-communication

I_{max} = 23 mA (when the alarm current 22,5 mA is on)

Supply voltage for transmitter without intrinsic safety (not ATEX)

Equipment cabinet Rittal AE1380, Steel cabinet with polyester paint.

Enclosure class: IP66.

Calibration
For customer-specified range with 1 s. damping. (If range is not specified, transmitter is calibrated for maximum range.)

Electrical connections
Housing with PLUG connector, codes **H** and **T:**
PLUG connector, connector type DIN 43650 model AF; Pg9 gland for cable; wire cross-section 0.5 to 1.5 mm².

Housing with junction box/terminal strip**,** codes **M** and **N:**
M20x1.5, 1/2-NPT inlet; screw terminals for 0.5 to 2.5 mm² wires.

[1] *Parts in contact with process medium*

Pressure limits

Maximum process pressure, MPa

Transmitter type	Max. overload pressure	Pressure class
VV...3	0.2	PN40
VV...4	0.3	PN40
VV...5	1.5	PN40

Minimum process pressure

$T_{proc.}$ °C	Minimum process pressure for different fill fluids (kPa,abs.)	
	DC200 100 cSt	Inert oil
20	5	8
40	8	10
80	16	28

Satron Instruments Inc., P.O.Box 22, FI-33901 Tampere, Finland
Tel. +358 207 464 800, Telefax +358 207 464 801, www.satron.com

Process connections
DN50PN40, DN80PN40,ANSI2" 150 lbs/300 lbs, ANSI3" 150 lbs/300 lbs; clamp mounting on angle bracket (see INSTALLATION)

Weight (kg):
· **VVF** 2.2 kg
· **VVP** 8.7 kg
· **VVH** 9.2 kg
+ 1 kg/m with PVC protective tube and 3 kg/m with AISI316 protective tube.

Product Certifications

European Directive Information

Electro Magnetic Compatibility (EMC directive 2004/108/EC)
All pressure transmitters

Atex Directive (94/9/EC)
Satron Instruments Inc. complies with the ATEX Directive.

European Pressure Equipment Directive (PED) (97/23/EC)

All Pressure Transmitters :
- Sound Engineering Practice

Hazardous Locations Certifications

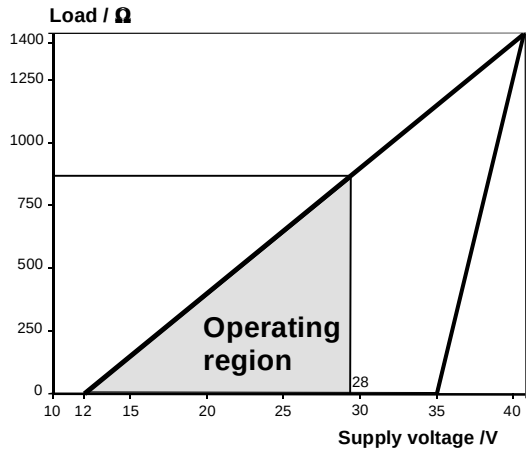
European Certifications
ATEX Intrinsic Safety

Certification No. : DNV-2007-OSL-ATEX- 1346X

Ex II 1 GD T135°C EEx ia II C T4 -20°C ≤ Tamb ≤ 50°C
Ex II 2 GD T135°C EEx ia II C T4 -20°C ≤ Tamb ≤ 50°C

Input Parameters :
U_i = 28 V
I_i = 93 mA
P_i = 0.651 W
C_i = 5 nF
L_i = 0.2 mH

Special Conditions for Safe Use (X) :
The enclosure with plastic window and the plastic DIN43650 connector must not be installed in potentially explosive atmosphere requiring category 1 apparatus.
The non-conducting surface of the sensor element may be charged by the flow of non-conducting media, so there may be electrostatic hazard with IIC-gases. These units should be marked 2 GD.
The equipment shall be installed and connected according to the manufacturers instructions.



Min. load using HART® - communication 250 Ω

$R_{max} = \frac{\text{Supply voltage - 12 V}}{I_{max}}$

I_{max} = 20.5 mA using HART®-communication

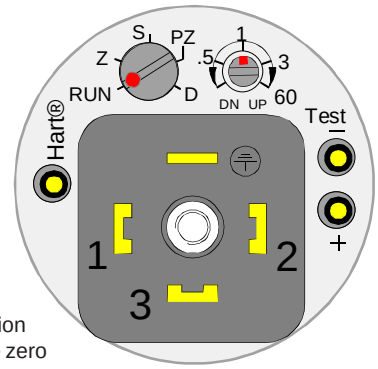
I_{max} = 23 mA (when the alarm current 22,5 mA is on)

Supply voltage for transmitter with certified intrinsic safety (ATEX)

Keyboard :

Esc = Press **Esc** to move back towards the top of the main menu.
▲ = Use the UP arrow key to move up on the current menu level or to increase the selected parameter value.
▼ = Use the DOWN arrow key to move down on the current menu level or to decrease the selected parameter value.
Enter = Press **Enter** to move to a lower level in a menu or to accept a command or parameter value.

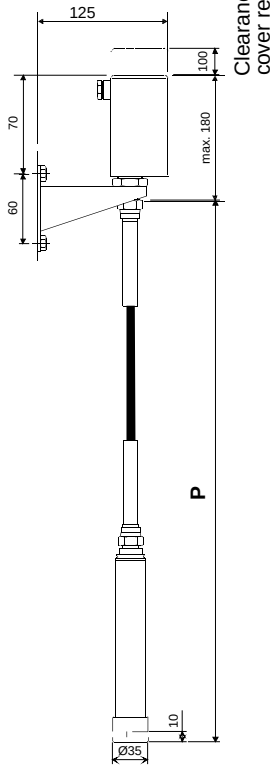
Housing with display, code N



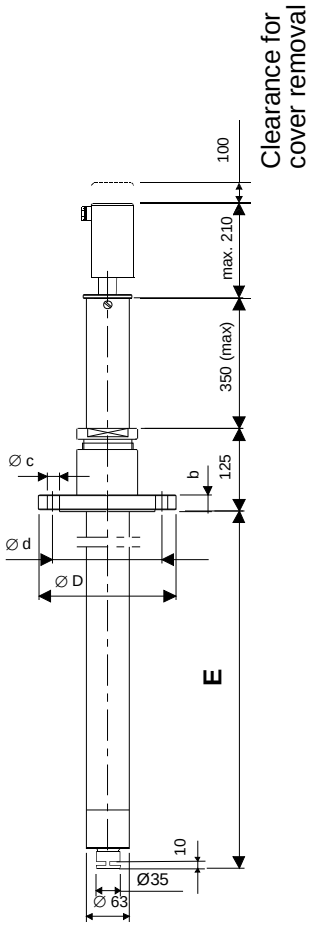
Use of selector switch :
RUN = Working position
PZ = Process value zero
D = Damping adjustment
S = Span adjustment
Z = Zero adjustment
DN = Down
UP = Up

Housing with PLUG connector, code T

Dimensional drawings (drawings in mm)

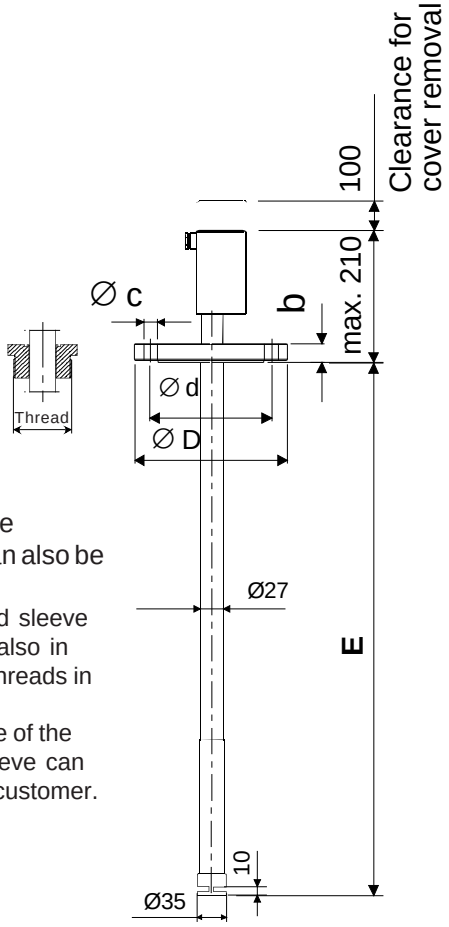


Type **VVF**

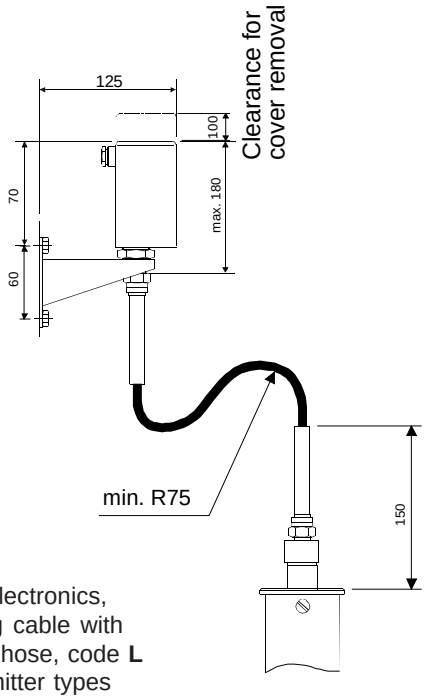


Type **VVP**

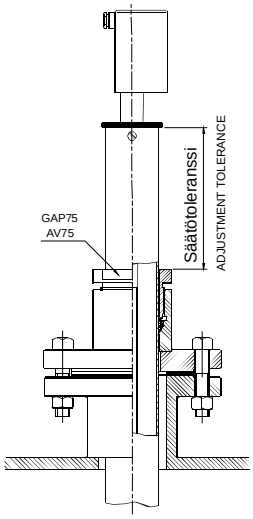
Instead of the flange threaded sleeve can also be used.
Flange and threaded sleeve is possible to have also in VVF type. See the threads in selection chart.
In VVF type the place of the flange/ threaded sleeve can be changed by the customer.



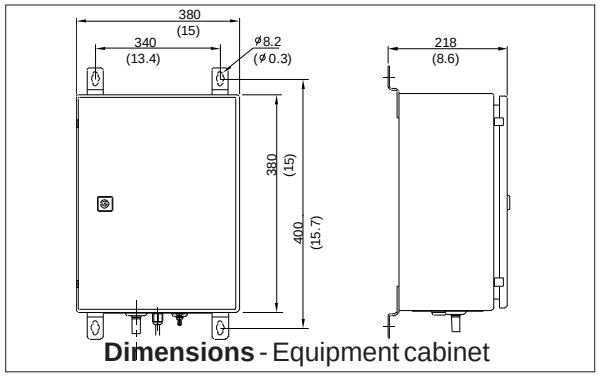
Type **VVH**



Remote electronics, connecting cable with protection hose, code **L** (for transmitter types VVP and VVH)



Flange mounting with adjustment facility, type VVP

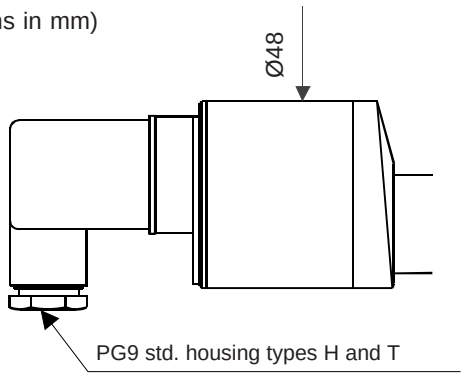


Dimensions - Equipment cabinet

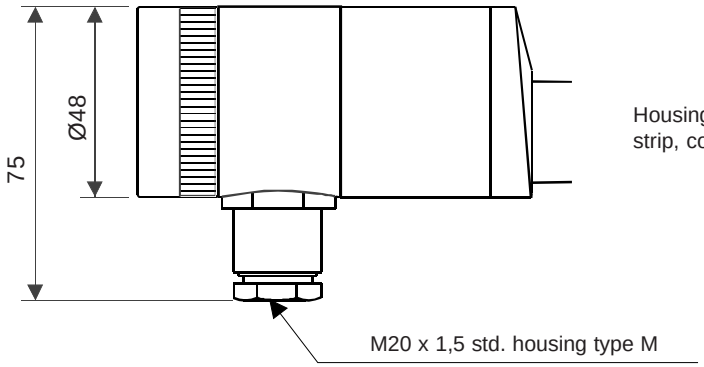
Type	P/m		E/m	
	min.	max.	min.	max.
VVF	1.0	20.0	-	-
VVP	-	-	1.0	5.5
VVH	-	-	1.0	5.5

Flange	Code	ØD	Ød	Øc	b
DN50 PN40	DB	165	125	4x18	20
DN80 PN40	DC	200	160	8x18	24
ANSI2"150lb	AC	152	120.6	4x20	23
ANSI2"300lb	AD	165	127	8x20	25
ANSI3"150lb	AE	191	152.4	4x20	26
ANSI3"300lb	AF	210	168.3	8x23	31

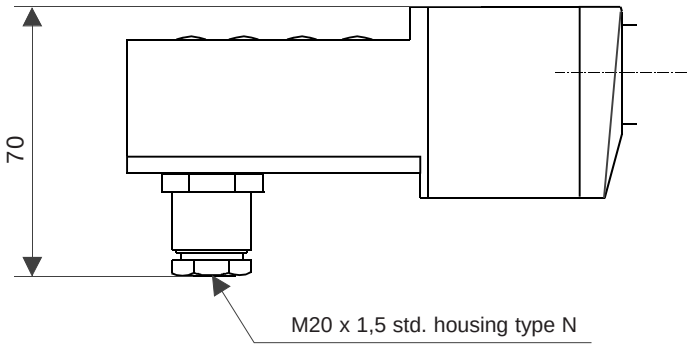
Dimensional drawings (dimensions in mm)



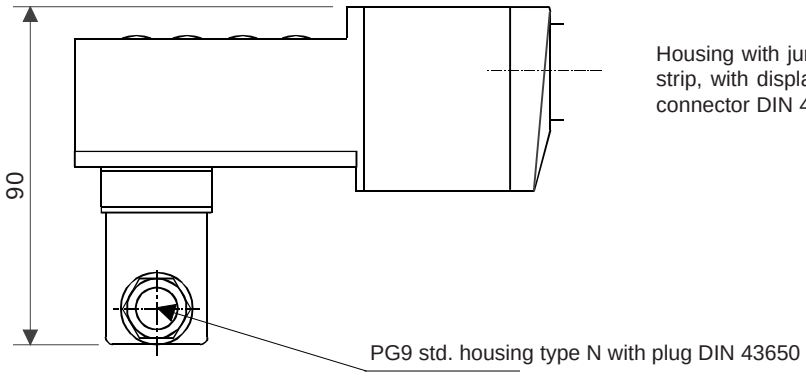
Housing with plug-connector, DIN 43650, codes H and T



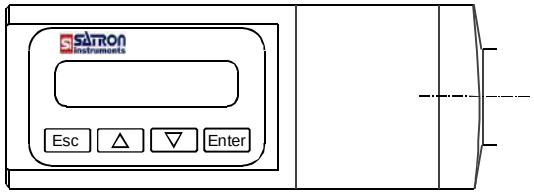
Housing with junction box/terminal strip, code M



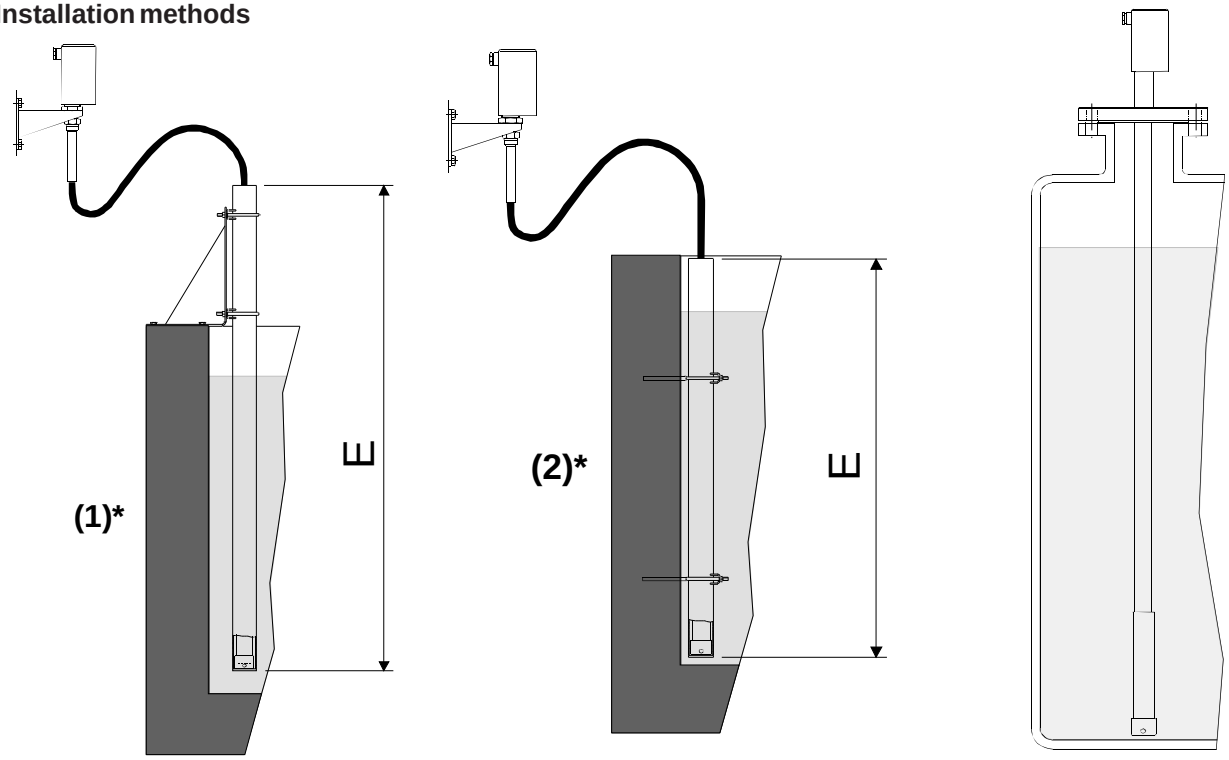
Housing with junction box/terminal strip, with display, code N



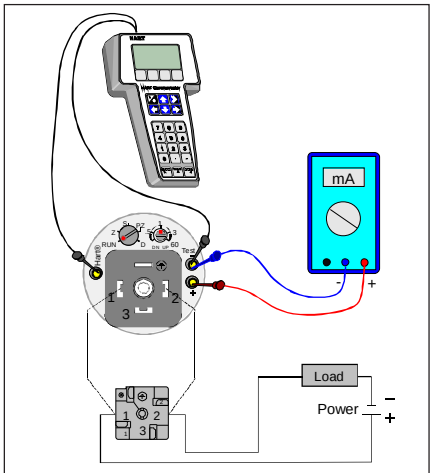
Housing with junction box/terminal strip, with display and plug-connector DIN 43650, code N--- /-P



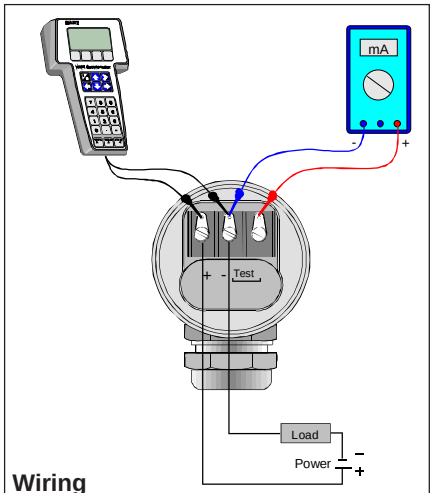
Installation methods



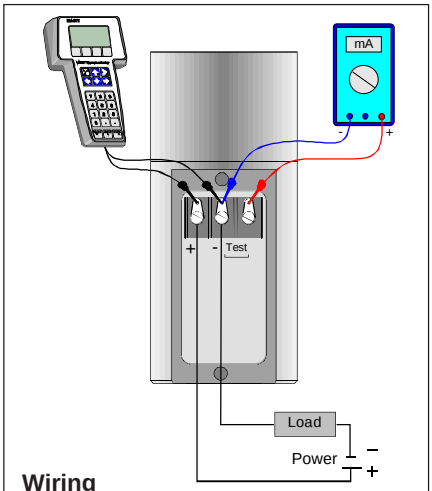
*) See the selection table "Other mounting accessories"



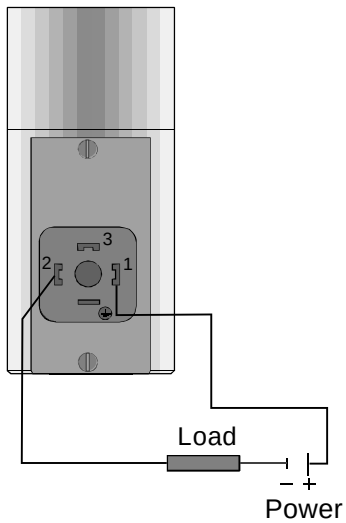
Wiring
Housing with PLUG connector, codes **H** and **T**



Wiring
Housing with terminal strip, code **M**



Wiring
Housing with terminal strip, code **N**



Wiring housing N with plug DIN 43650, code N---/-P

SATRON VV Pressure Transmitter

BLV810
01.01.2014

Selection Chart

Transmitter types
VVF Flexible PTFE hose (PTFE/AISI316 braiding)
VVP PVC hose/Flange
VVH AISI316L hose/Flange (Fixed mounting tube)

Adjustability	Span, min.	Span, max.	Measuring range
3	1.4kPa (14 mbar)	35 kPa (350 mbar)	-35...+35 kPa (-350...350 mbar)
4	4kPa (40 mbar)	100 kPa (1000 mbar)	-100...+100 kPa (-1000...1000 mbar)
5	10 kPa (100 mbar)	500 kPa (5000 mbar)	-100...+500 kPa (-1000...5000 mbar)

Output **S** 4-20mA DC/HART® -protocol

Flange or thread

0 no flange or thread	**DB** DN50 PN40	**DC** DN80 PN40	**AC** ANSI 2" 150lbs
AD ANSI 2" 300 lbs	**AE** ANSI 3" 150 lbs	**AF** ANSI 3" 300lbs	**GA** G1½A
GB G2A	**GC** G1A	**NA** 1½ - NPT	**NB** 2 - NPT

Wetted materials

Flange Code	Flange Material	Diaphragm Code	Diaphragm Material	Extension
2	AISI316L	**2**	AISI316L/317L	(type VVF=PTFE/AISI316)
3	Hast.C 276	**3**	Hast.C 276 (*)	(type VVP=PVC)
		5	Tantalum (*)	(type VVH=AISI316)

Fill fluid **S** Silicone oil **G** Inert oil

Housing type
H Housing with PLUG-connector, DIN43650, no display, inlet PG9
T Housing with PLUG-connector with manual adjust, DIN43650, no display, inlet PG9, (no ATEX)
M Housing with junction box/terminal strip, no display, inlet M20x1,5
N Housing with junction box/terminal strip, with display, inlet M20x1,5
C Transmitter with equipment cabinet (for transmitter type VVF and for special electronics)
D Transmitter with equipment cabinet + heating element (for type VVF and for special electronics)

Explosion proof **0** No explosion proof classification **1** Atex Intrinsic Safety, Ex II 1 GD T135°C (**)

Length P of PTFE/AISI316 hose between sensing element and housing (specify for transmitter type VVF)
P10 1.0 m hose
P25 2.5 m hose
...
P200 20.0 m hose

Length E of mounting/protective tube (specify for transmitter type VVP and VVH also with the type VVF if the protective tube is used)
E10 1.0 m hose
E15 1.5 m hose
...
E55 5.5 m hose

Other mounting accessories
0 No mounting accessories
1 Mounting bracket/Clamps/Protective tube
2 Clamps/Protective tube

Special size of electrical inlet
N 1/2 NPT **G** Pg13.5 **P** Plug DIN 43650

Special features

Special electronics (specify only if housing connected with hose to sensing element) for transmistter types VVP and VVH
- connecting cable with protection hose
L Hose protected with PTFE/AISI316 braiding, straight
K Hose protected with PTFE/AISI316 braiding, angle of 90°

Length of cable between sensing element and housing (specify only if housing connected with cable to sensing element)
2 2 m cable **3** 3 m cable etc. (max. 10 m)

Mounting parts for remote electronics for Ø51 mm tube
0 No mounting parts **1** Mounting parts

Documentation

Calibration Certificate **AE** English

Installation and Operating Instructions **IE** English **IF** Finnish

Material Certificates
0 No material certificate
MC1 Raw materials certificate without appendices, in accordance with SFS-EN 10204-2.1 (DIN 50049-2.1) standard
MC2 Raw materials certificate for wetted parts with appendices, in accordance with SFS-EN 10204-2.2 (DIN 50049-2.2) standard
MC3 Raw materials certificate for wetted parts with appendices, in accordance with SFS-EN 10204-3.1B (DIN 50049-3.1B) standard

We reserve the right for technical modifications without prior notice.
HART® is a registered trademark of HART Communication Foundation.
Hastelloy® is the registered trademark of Haynes International.
Teflon® is the registered trademark of E.I. du Pont de Nemours & Co.
Viton® is the registered trademark of DuPont Dow Elastomers.

CE

(*) = not for range 3
(**) = Housing H and N : Ex II 2 GD T135°C
ATEX transmitters with display are the model without membrane key.

SATRON VVF*e* Pressure Transmitter

SATRON VVF*e* pressure transmitter belongs to V-transmitter family.
SATRON VVF*e* is used for 0 - 4 kPa...0-500 kPa ranges. It is a 2-wire transmitter with HART® standard communication.
SATRON VVF*e* pressure transmitter is suitable for liquid level measurements in ground, rock and ships' tanks, drill well and in open channels.
SATRON VVF*e* pressure transmitter can be used to measure contaminating liquids. Possible foam on the surface of the measured liquid does not disturb the measurement.
SATRON VVF*e* does not require compressed air supply.
The transmitter's sensor is piezoresistive.

TECHNICAL SPECIFICATIONS

Measuring range and span
See Selection Chart.

Zero and Span adjustment
Zero elevation: Calibrated span is freely selectable on the specified range depending from the desired option. This can be made by using extern control shafts (analog option), keyboard (display option) or HART®275/375 communicator.

Damping
Time constant is continuously adjustable 0.01 to 60 s.

Response time
Maximum 100 ms

Temperature limits
Process: -10 to +80 °C
Ambient: -30 to +80 °C
Shipping and storage: -40 to +80 °C.
Operating temperature of display:
0 to +50ºC *(does not affect operation of the transmitter).*

Pressure limits
Min. and max. process pressure: See the appended tables.

Volumetric displacement
< 0.5 mm^3/max. span

Output 2-wire (2W), 4-20 mA, user selectable for linear, square root, inverted signal or the transfer function (16 points)specified by the user

Supply voltage and permissible load
See the load capacity diagram;
4-20 mA output: 10-35 VDC.

Humidity limits 0-100 % RH; freezing of condensed water is not allowed in reference pressure channels.

PERFORMANCE SPECIFICATIONS
Tested in accordance with IEC 60770: Reference conditions, specified span, no range elevation,AISI316L diaphragm, silicone oil fill.

Accuracy
- ±0.1 % of calibrated span (span 1:1-7.5:1 /max.range).
  On the measuring ranges 7.5:1- 50:1:
  $\pm[0.025+0.010 \times (\frac{\text{max.span}}{\text{calibrated span}})]$% of calibrated span

(incl. nonlinearity, hysteresis and repeatability)

Long-term stability
±0.1 % of max. span per 12 months

Temperature effect on compensated temperature ranges -20...+80 °C
Zero and span shift, type VVF*e*5:
±0.15 % of max. span

Zero and span shift, type VVF*e*4:
±0,25 % of max. span

Mounting position effect
Zero error <0.15 kPa, which can be calibrated out.

Vibration effect (IEC 68-2-6: FC):
±0.1 % of measuring range/
2 g/10 to 2000 Hz
4 g/10 to 100 Hz

Power supply effect
<±0.01 % of calibrated span per volt.

European Directive Information
European Pressure Equipment Directive (PED) (97/23/EY)
- Sound Engineering Practice
Electro Magnetic Compatibility (EMC directive 2004/108/EC)

Insulation test voltage
500 V rms 50 Hz.

CONSTRUCTION AND CALIBRATION
Wetted materials
Metal parts: AISI316L (EN 1.4404)
Jacket of cable: PUR
Other materials: AISI303/316
Fill fluid Silicone oil or inert oil.

Housing with PLUG connector, code **H**
Housing: AISI316/303
Seals: Viton® and NBR
TEST jacks: MS358Sn/PVDF, protected with silicone rubber shield.
PLUG connector: PA6-GF30 jacket, Silicone rubber seal, AISI316 retaining screw.

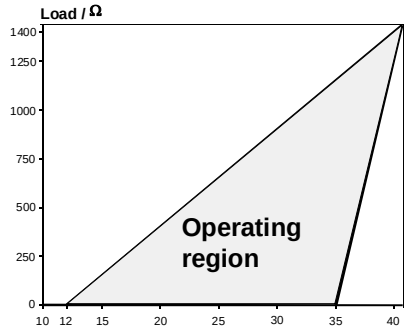
Housing with junction box/terminal strip, codes **M** and **N:**
Housing: AISI303/316; Seals: Nitrile and Viton®; Nameplates: Polyester

Enclosure class: IP66.

Calibration
For customer-specified range with 1 s. damping. (If range is not specified, transmitter is calibrated for maximum range.)

Electrical connections
Housing with PLUG connector, code **H:**
PLUG connector, connector type DIN 43650 model AF; Pg9 gland for cable; wire cross section 0.5 to 1.5 mm^2.

Housing with junction box/terminal strip**,** codes **M** and **N:**
M20x1.5, 1/2-NPT inlet; screw terminals for 0.5 to 2.5 mm^2 wires.



Min. load using HART® - communication 250 Ω

$R_{max} = \frac{\text{Supply voltage - 12 V}}{I_{max}}$

I_{max} = 20.5 mA using HART®-communication

I_{max} = 23 mA (when the alarm current 22,5 mA is on)

Supply voltage for transmitter without intrinsic safety (not ATEX)

Pressure limits

Maximum process pressure, MPa

Transmitter type	Max. overload pressure	Pressure class
VVF*e*4	0.3	PN40
VVF*e*5	1.5	PN40

Minimum process pressure

$T_{proc.}$ °C	Minimum process pressure for different fill fluids (kPa,abs.)	
	DC200 100 cSt	Inert oil
20	5	8
40	8	10
80	16	28
120	21	53

Satron Instruments Inc., P.O.Box 22, FI-33901 Tampere, Finland
Tel. +358 207 464 800, Telefax +358 207 464 801, www.satron.com

Weight
Transmitter
- with housing type **H** : 0,9 kg
- with housing type **M** : 1,4 kg
- with housing type **N** : 1,5 kg

Product Certifications

European Directive Information

Electro Magnetic Compatibility
(EMC directive 2004/108/EC)
All pressure transmitters

Atex Directive (94/9/EC)
Satron Instruments Inc. complies with the ATEX Directive.

European Pressure Equipment Directive (PED) (97/23/EC)

All Pressure Transmitters :
- Sound Engineering Practice

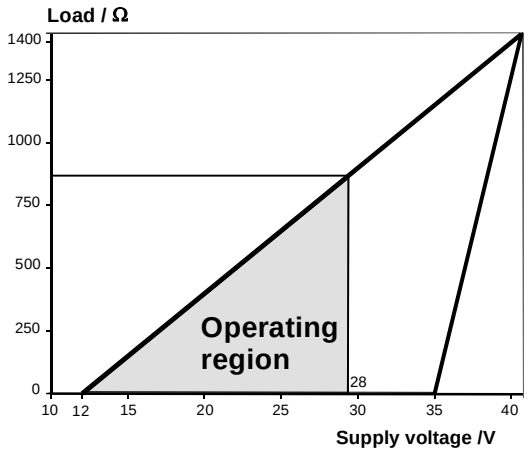
Hazardous Locations Certifications

European Certifications
ATEX Intrinsic Safety

Certification No. : DNV-2007-OSL-ATEX-1346X

Ex II 1 GD T135°C EEx ia II C T4 -20°C ≤ Tamb ≤ 50°C
Ex II 2 GD T135°C EEx ia II C T4 -20°C ≤ Tamb ≤ 50°C

Input Parameters :
U_i = 28 V
I_i = 93 mA
P_i = 0.651 W
C_i = 5 nF
L_i = 0.2 mH



Min. load using HART® - communication 250 Ω

$R_{max} = \frac{\text{Supply voltage - 12 V}}{I_{max}}$

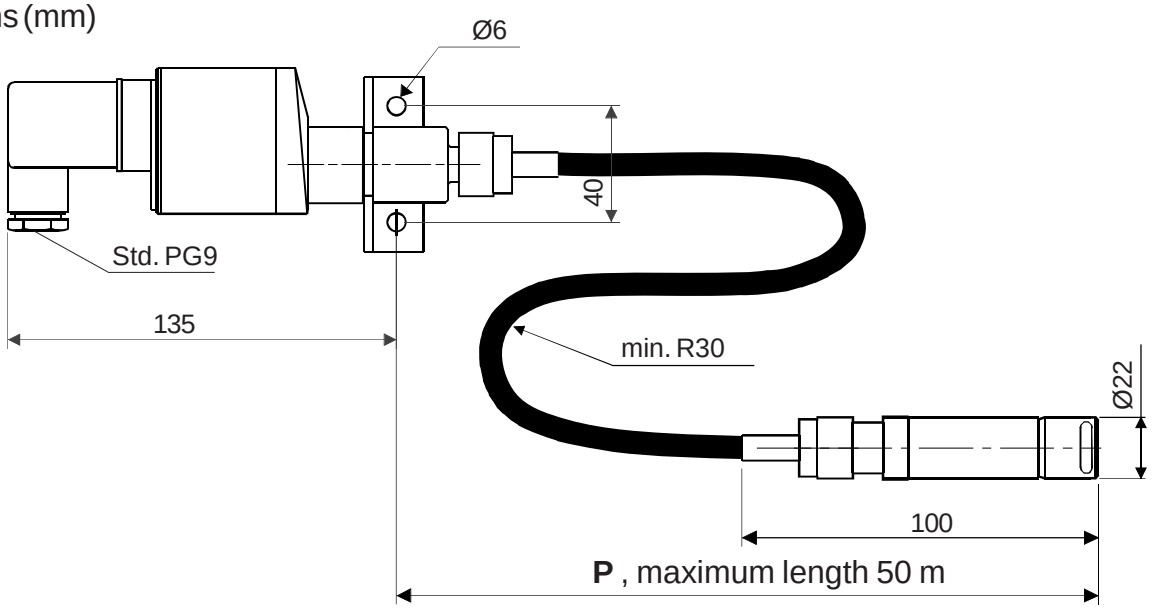
I_{max} = 20.5 mA using HART®-communication

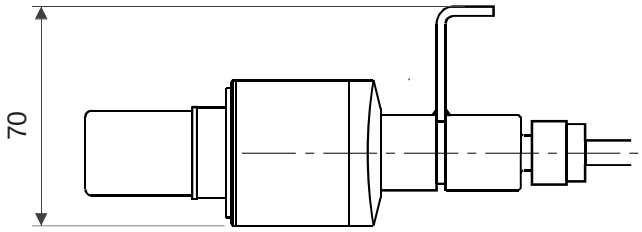
I_{max} = 23 mA (when the alarm current 22,5 mA is on)

Supply voltage for transmitter with certified intrinsic safety (ATEX)

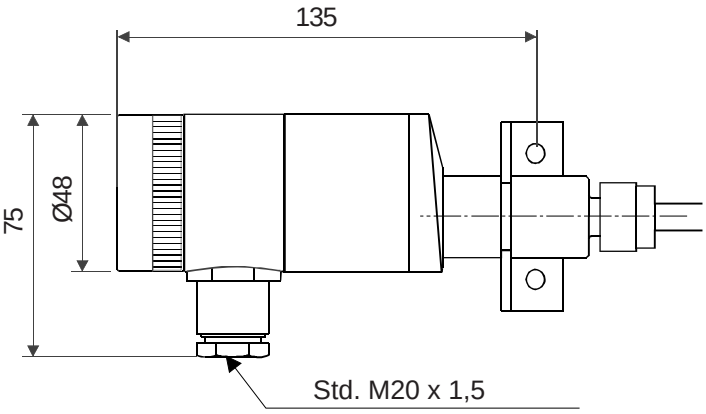
Special Conditions for Safe Use (X) :
The enclosure with plastic window and the plastic DIN43650 connector must not be installed in potentially explosive atmosphere requiring category 1 apparatus.
The non-conducting surface of the sensor element may be charged by the flow of non-conducting media, so there may be electrostatic hazard with IIC-gases. These units should be marked 2 GD.
The equipment shall be installed and connected according to the manufacturers instructions.

Dimensions (mm)

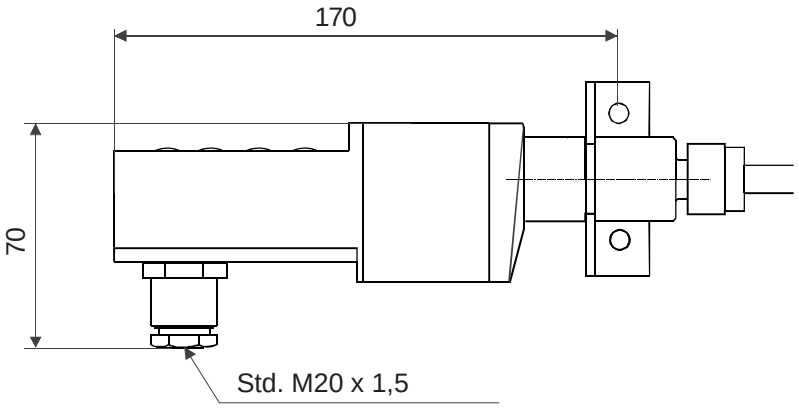




Housing type **H**, plug connector,
DIN43650, no display, inlet PG9

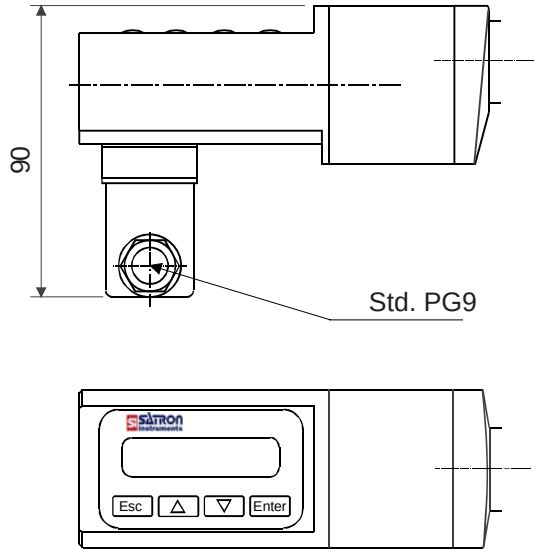


Housing type **M**, junction box/
terminal strip, no display, inlet M20x1.5



Housing type **N**, junction box/
terminal strip, with display, inlet M20x1.5

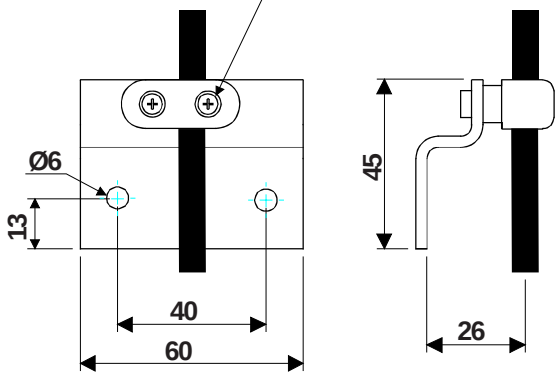
Dimensions (mm)



Housing type **N**, with plug connector, DIN43650

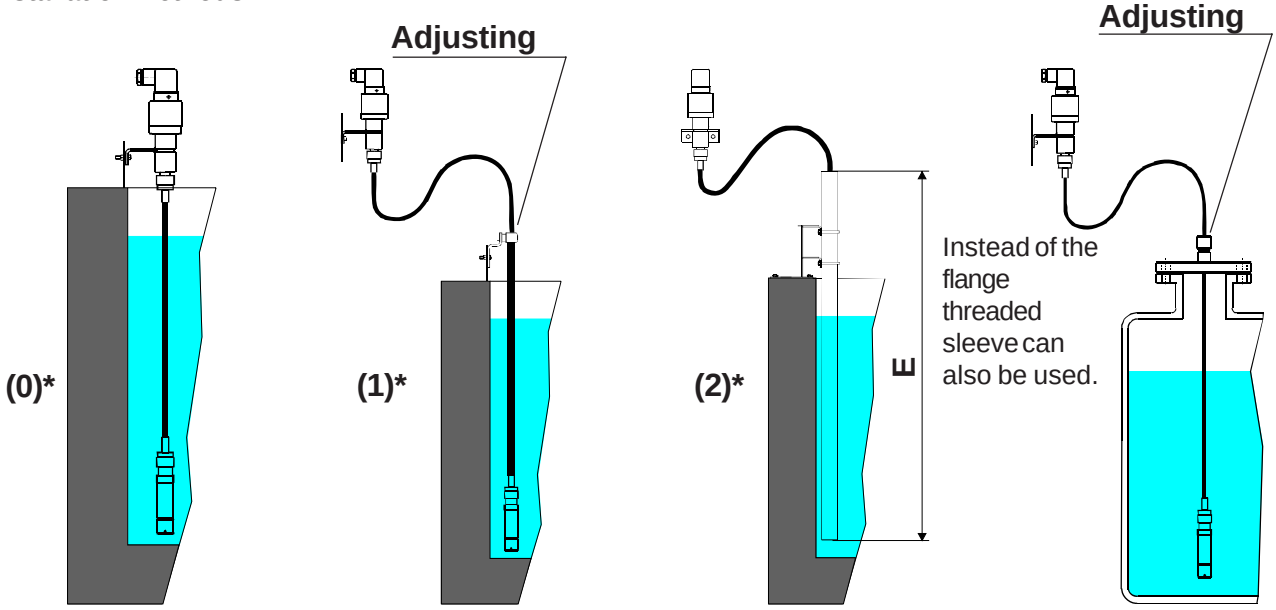
Connection with Satron SI-Tool$_e$

Screws should not be tightened so much so that the cable inside the ref. pressure hose gets blocked!

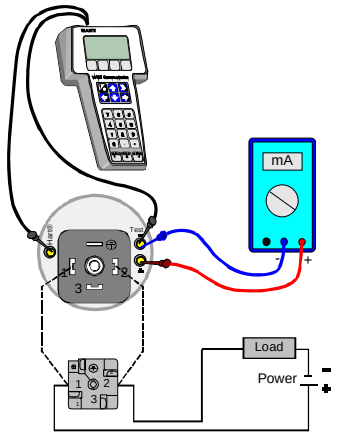


Mounting part for cable

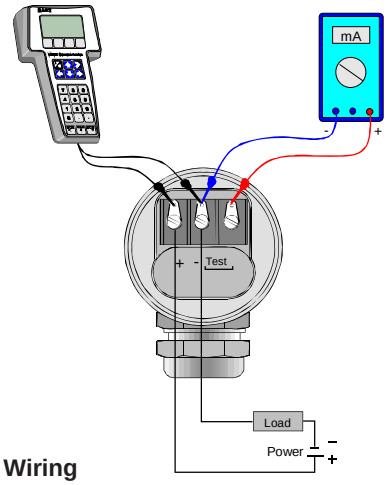
Installation methods



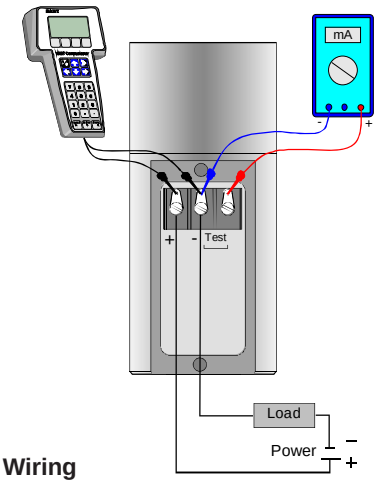
***)** See the selection table "Other mounting accessories"



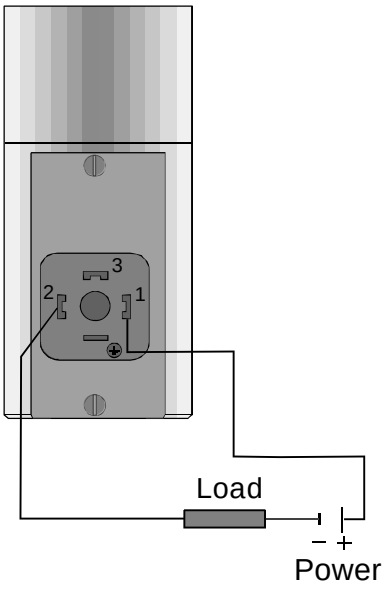
Wiring
Housing with PLUG connector, code **H**



Wiring
Housing with terminal strip, code **M**



Wiring
Housing with display, code **N**



Wiring housing with plug DIN 43650, code N---/ -P

Housing with display, code N

Keyboard :

Esc	=	Press **Esc** move back towards the top of the main menu.
▲	=	Use the **UP** arrow key to move up on the current menu level or to increase the selected parameter value.
▼	=	Use the **DOWN** arrow key to move down on the current menu level or to decrease the selected parameter value.
Enter	=	Press **ENTER** to move to a lower level in a menu or to accept a command or parameter value.

SATRON VVFe Pressure Transmitter

Selection Chart

Adjustability	Span, min.	Span, max.	Measuring range
VVFe 4	4kPa (40 mbar)	100 kPa (1000 mbar)	-100...+100 kPa (-1000...1000 mbar)
VVFe 5	10 kPa (100 mbar)	500 kPa (5000 mbar)	-100...+500 kPa (-1000...5000 mbar)

Output **S** 4-20mA DC/HART® -protocol

Flange or thread sleeve

0 no flange or thread	**DB** DN50 PN40	**DC** DN80 PN40	**AC** ANSI 2" 150lbs
AD ANSI 2" 300 lbs	**AE** ANSI 3" 150 lbs	**AF** ANSI 3" 300lbs	**GA** G1A, male
GB G1½A, male	**GC** G2A, male	**NA** 1½ - NPT, male	**NB** 2 - NPT, male

Wetted materials

Flange or thread sleeve		Diaphragm		Extension
Code	Material	Code	Material	
2	AISI316L (EN 1.4404)	**2**	AISI316L (EN 1.4435)	AISI316/PUR

Fill fluid **S** Silicone oil **G** Inert oil

Housing type

H Housing with PLUG-connector, DIN43650, no display, inlet PG9
M Housing with junction box/terminal strip, no display, inlet M20x1,5
N Housing with junction box/terminal strip, with display, inlet M20x1,5

Explosion proof **0** No explosion proof classification **1** Atex Intrinsic Safety, Ex II 2 GD T135°C

Length P of PTFE/AISI316 hose between sensing element and housing

P10 1.0 m hose
P25 2.5 m hose
...
P500 50.0 m hose

Length E of mounting/protective tube

E10 1.0 m hose
E15 1.5 m hose
...
E55 5.5 m hose

Other mounting accessories

0 No separate fastening parts
1 Separate fastening part for cable, adjustable
2 Mounting bracket and protective tube

Special size of electrical inlet

N 1/2 NPT **G** Pg13.5 **P** Plug DIN 43650

Documentation

Calibration Certificate **AE** English

Installation and Operating Instructions **IE** English **IF** Finnish

Material Certificates

0 No material certificate
MC1 Raw materials certificate without appendices, in accordance with SFS-EN 10204-2.1 (DIN 50049-2.1) standard
MC2 Raw materials certificate for wetted parts with appendices, in accordance with SFS-EN 10204-2.2 (DIN 50049-2.2) standard
MC3 Raw materials certificate for wetted parts with appendices, in accordance with SFS-EN 10204-3.1B (DIN 50049-3.1B) standard

We reserve the right for technical modifications without prior notice.
HART® is a registered trademark of HART Communication Foundation.
Hastelloy® is the registered trademark of Haynes International.
Teflon® is the registered trademark of E.I. du Pont de Nemours & Co.
Viton® is the registered trademark of DuPont Dow Elastomers.

CE

SATRON VL Pressure Transmitter

SATRON VL pressure transmitter belongs to the V transmitter family. The series V transmitters have both analog and smart properties. SATRON VL is used for 0-1.4 kPa...0-15 MPa ranges. It is a 2-wire transmitter with HART® standard communication. In pressure measuring applications SATRON VL transmitters are used for measuring the pressure of clean, sedimenting, crystallizing and sticking materials. The transmitter's sensor is piezoresistive. The rangeability is 100:1 for types VL6 - VL7. The versatile selection of diaphragm materials will meet the needs in most processes. Also the models with special accuracy are included to the series of VL transmitters.

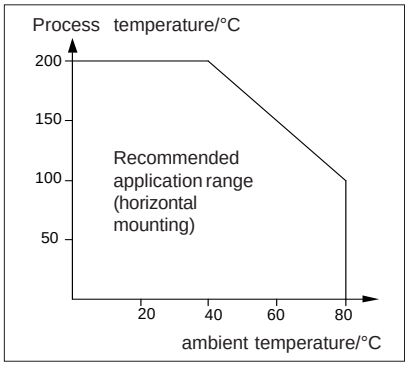
TECHNICAL SPECIFICATIONS

Measuring range and span
See Selection Chart.

Zero and Span adjustment
Zero elevation: Calibrated span is freely selectable on the specified range depending from the desired option. This can be made by using extern control shafts (analog option), keyboard (display option), HART®275/375 communicator.

Damping
Time constant is continuously adjustable 0.01 to 60 s.

Temperature limits
Ambient: -30 to +80 °C
Process: -30 to +125 °C / +200 °C
Shipping and storage: -40 to +80 °C.
Operating temperature of display:
0 to +50ºC *(does not affect operation of the transmitter)*



Output 2-wire (2W), 4-20 mA, user selectable for linear, square root, inverted signal or the transfer function (16 points)specified by the user

Supply voltage and permissible load
See the load capacity diagram;
4-20 mA output: 12-35 VDC.

Humidity limits
0-100 % RH; freezing of condensed water is not allowed in reference pressure channels.

Pressure limits
Minimum and maximum process pressure: see the appended tables.

[1] Parts in contact with process medium.

PERFORMANCE SPECIFICATIONS
Tested in accordance with IEC 60770: Reference conditions, specified span, no range elevation, horizontal mounting; AISI316L diaphragm, silicone oil fill

Accuracy
±0.05 % of calibrated span
(For spans 1:1-5:1).

For spans 5:1-100:1,

$\pm[0.025+0.01 \times (\frac{\text{max.span}}{\text{calibrated span}})]$ % of calibrated span

Special accurate diaphragm **AISI304**:
±1.5 % of calibrated span
(For spans 1:1-100:1).

(incl. nonlinearity, hysteresis and repeatability)

Long-term stability
• ±0.1 % of max. span / 1 year

Temperature effect on -30 °C to +80 °C range, optional
Zero and span error
• ±0.15 % of max. span, code **E**
• ±0.5 % of max. span, code **G**

Temperature effect on +20 °C to +70 °C range, process connections **BA** and **DA**
Zero and span error
• ±0.08 % of max. span, code **S**

Temperature effect on 0 to +200 °C, code **H**
• ±1 % of max. span
• Process connection **PA** (VL4 and 5): ±2 % of max. span

Mounting position effect
Deviation from horizontal position causes a zero shift that can be calibrated out.

Vibration effect (IEC 68-2-6: FC):
±0.1 % of span per 2 g to 10-2000 Hz.

Power supply effect
<±0.01 % of calibrated span per volt.

Insulation test voltage
500 V rms 50 Hz.

CONSTRUCTION AND CALIBRATION

Materials
Diaphragm [1]: AISI316L (EN 1.4435), AISI304 (EN 1.4301), Duplex (EN 1.4462), Hast. C 276 (EN 2.4819), Tantalum or Titanium Gr2 (EN 3.7035). Other sensing element materials: AISI316L, AISI316.

Fill fluid Silicone oil, inert oil or Food oil (Neobee M20).

Housing with PLUG connector, codes **H** and **T**
Housing: AISI303/316
Seals: Viton® and NBR
TEST jacks: MS358Sn/PVDF, protected with silicone rubber shield.
PLUG connector: PA6-GF30 jacket, Silicone rubber seal, AISI316 retaining screw.

Housing with junction box/terminal strip, codes **M** and **N**
Housing: AISI303/316; Seals: Nitrile and Viton®; Nameplates: Polyester

Connection cable between sensing element and housing
Codes **L** and **K** :
PTFE hose with AISI316 braiding.

Calibration
For customer-specified range with 1 s. damping. (If range is not specified, transmitter is calibrated for maximum range.)

Enclosure class: IP66.

Pressure limits

Pressure capacity

Trans-mitter type	Max. over-load pres-sure, MPa	Pressure class, max.
VL3	0.2	PN40
VL4	0.3	PN40
VL5	1.5	PN40
VL6	7.5	PN100
VL7	40.0	PN250

Minimum process pressure:

$T_{proc.}$	Min.pressure for different fill fluids (kPa, abs.)	
℃	DC200 100 cSt	Inert oil
20	5	8
40	8	10
80	10	28
120	15	53
160	25	90
200	40	-

Satron Instruments Inc., P.O.Box 22, FI-33901 Tampere, Finland
Tel. +358 207 464 800, Telefax +358 207 464 801, www.satron.com

Process connections
See Selection Table and dimensional drawings.

Electrical connections
Housing with PLUG connector, codes **H** and **T:** PLUG connector, connector type DIN 43650 model AF; Pg9 gland for cable; wire cross-section 0.5 to 1.5 mm².

Housing with junction box/terminal strip, codes **M** and **N:**
Pg13.5, 1/2-NPT inlet; screw terminals for 0.5 to 2.5 mm² wires.

Weight

MOUNTING TYPE		Weight / kg			
		EXTENSION CODE			
		0	2	4	6
Flange	DN50	4.1	4.7	4.9	5.1
	DN80	6.4	7.6	7.7	8.1
SA (Sandvik)		-	3.8	5.0	6.1
Tx (Tri-Clamp)		0.9	-	-	-
PA (PMC 1")		0.6	-	-	-
BA, VA, WA		0,9			
UA, VB, WB		1.0	-	-	-

Type M : add 0.5 kg
and type N : add 0.6 kg to the specified weights.

Product Certifications

European Directive Information

Electro Magnetic Compatibility (EMC directive 2004/108/EC)
All pressure transmitters

Atex Directive (94/9/EC)
Satron Instruments Inc. complies with the ATEX Directive.

European Pressure Equipment Directive (PED) (97/23/EC)

All Pressure Transmitters :
- Sound Engineering Practice

Hazardous Locations Certifications

European Certifications
ATEX Intrinsic Safety

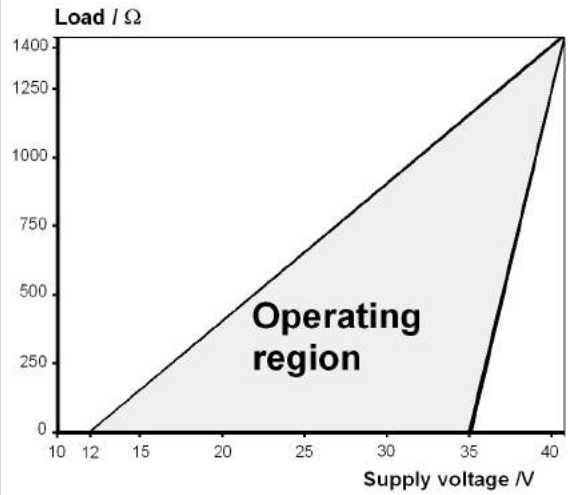
Certification No. : DNV-2007-OSL-ATEX- 1346X

Ex II 1 GD T135°C EEx ia II C T4 - 20°C ≤ Tamb ≤ 50°C

Ex II 2 GD T135°C EEx ia II C T4 - 20°C ≤ Tamb ≤ 50°C

Input Parameters :
U_i = 28 V
I_i = 93 mA
P_i = 0.651 W
C_i = 5 nF
L_i = 0.2 mH

Special Conditions for Safe Use (X) :
The enclosure with plastic window and the plastic DIN43650 connector must not be installed in potentially explosive atmosphere requiring category 1 apparatus.
The non-conducting surface of the sensor element may be charged by the flow of non-conducting media, so there may be electrostatic hazard with IIC-gases. These units should be marked 2 GD.
The equipment shall be installed and connected according to the manufacturers instructions.



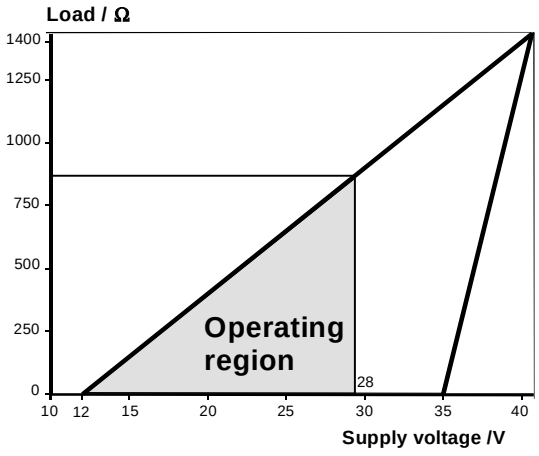
Min. load using HART® - communication 250 Ω

$R_{max} = \frac{\text{Supply voltage - 12 V}}{I_{max}}$

I_{max} = 20.5 mA using HART®-communication

I_{max} = 23 mA (when the alarm current 22,5 mA is on)

Supply voltage for transmitter without intrinsic safety (not ATEX)



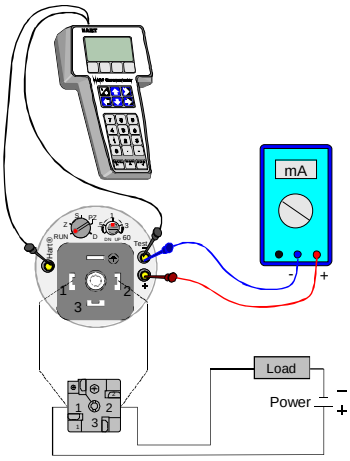
Min. load using HART® - communication 250 Ω

$R_{max} = \frac{\text{Supply voltage - 12 V}}{I_{max}}$

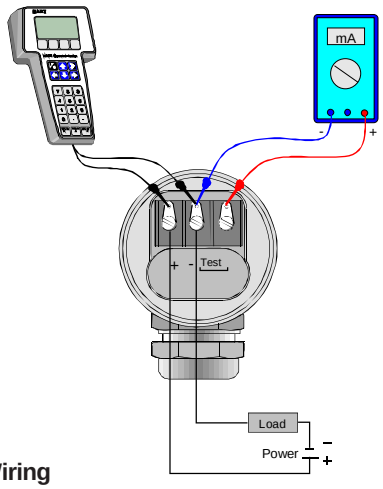
I_{max} = 20.5 mA using HART®-communication

I_{max} = 23 mA (when the alarm current 22,5 mA is on)

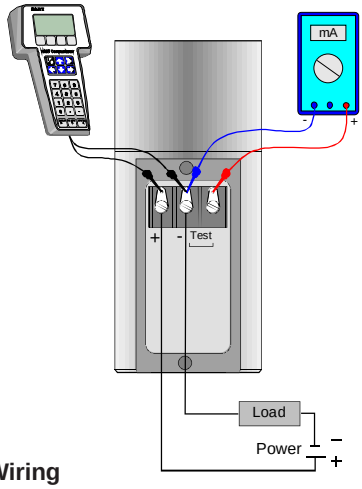
Supply voltage for transmitter with certified intrinsic safety (ATEX)



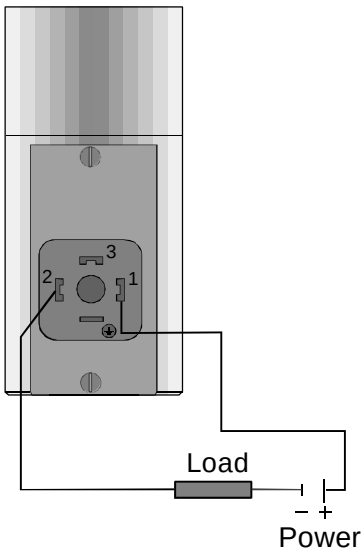
Wiring
Housing with PLUG connector, codes **H** and **T**



Wiring
Housing with terminal strip, code **M**



Wiring
Housing with terminal strip, code **N**

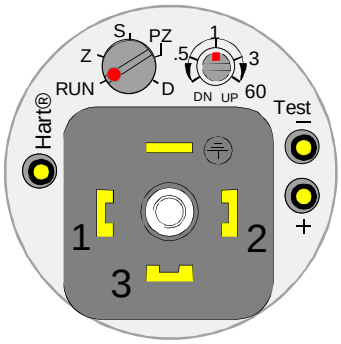


Wiring housing N with plug DIN 43650, code N-/ P

Keyboard :

Esc	=	Press **Esc** move back towards the top of the main menu.
▲	=	Use the **UP** arrow key to move up on the current menu level or to increase the selected parameter value.
▼	=	Use the **DOWN** arrow key to move down on the current menu level or to decrease the selected parameter value.
Enter	=	Press **ENTER** to move to a lower level in a menu or to accept a command or parameter value.

Housing with display, code **N**



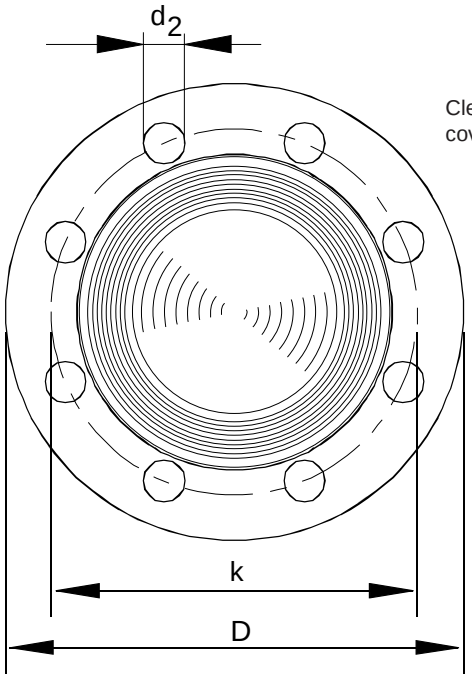
Use of selector switch :

RUN	= working position
PZ	= Process value zero
D	= Damping adjustment
S	= Span adjustment
Z	= Zero adjustment
DN	= Down
UP	= Up

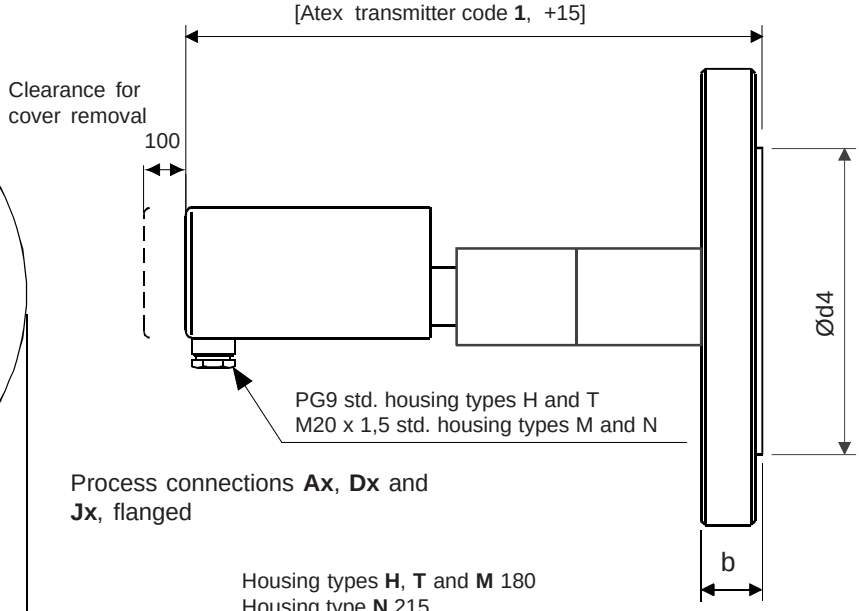
Housing with PLUG connector, code **T**

SATRON VL Pressure Transmitter

Dimensional drawings (dimensions in mm)

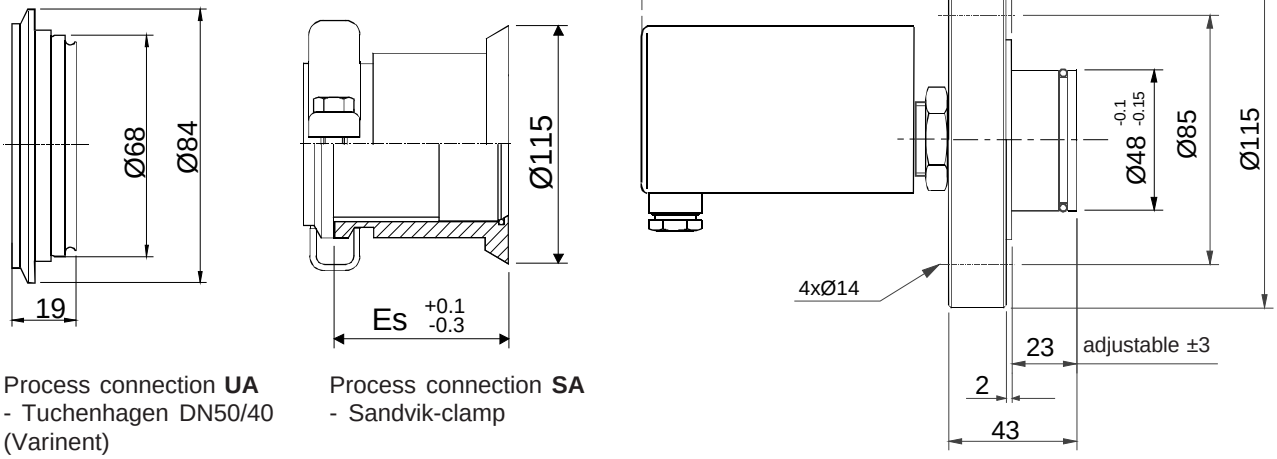


Housing types H, T and M 235
Housing type N 265
[Atex transmitter code **1**, +15]



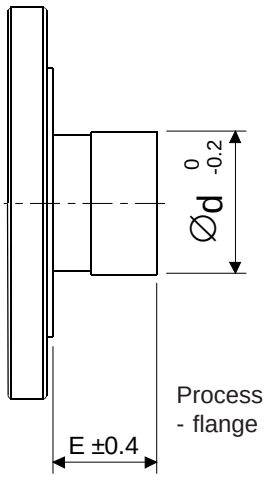
Process connections **Ax**, **Dx** and **Jx**, flanged

Housing types **H**, **T** and **M** 180
Housing type **N** 215
[Atex transmitter code **1**, +15]



Process connection **UA**
- Tuchenhagen DN50/40 (Varinent)

Process connection **SA**
- Sandvik-clamp



Process connection **Ax**, **Dx** and **Jx**
- flange with extension

Code	E +0.4 -0.4	Es +0.3 -0.2
0	0	-
2	51	54,5
4	102	105
6	152	156

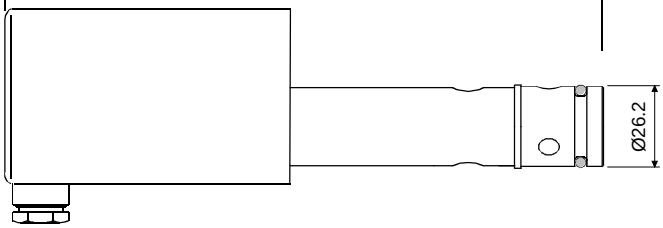
Process connections **DA**, DN25 PN40 flange with extension, process temperature max. +125°C

FLANGE SIZE	Flange dimens.			Holes			Exten.
	b	D	Ød4	Kpl	d2	k	Ød -0.2
ISO DN25 PN40	18	115	68	4	14	85	48
ISO DN50 PN40	20	165	102	4	18	125	51
ISO DN80 PN40	24	200	138	8	18	160	73
ISO DN100 PN40	24	235	162	8	22	190	73
ANSI 1" 150 lbs	15	108	51	4	16	79.4	-
ANSI 1" 300 lbs	18	124	51	4	20	88.9	-
ANSI 2" 150 lbs	23	152	92	4	20	120.6	51
ANSI 2" 300 lbs	25	165	92	8	20	127	51
ANSI 3" 150 lbs	26	191	127	4	20	152.4	73
ANSI 3" 300 lbs	31	210	127	8	23	168.3	73
ANSI 4" 150 lbs	26	229	157	8	20	190.5	73
ANSI 4" 300 lbs	34	254	157	8	23	200	73
JIS 10K-50	16	155	96	4	19	120	51
JIS 40K-50	26	165	105	8	19	130	51
JIS 10K-80	18	185	126	8	19	150	73
JIS 40K-80	32	210	140	8	23	170	73
JIS 10K-100	18	210	151	8	19	175	73
JIS 40K-100	36	250	165	8	25	205	73

SATRON VL Pressure Transmitter

Dimensional drawings (dimensions in mm)

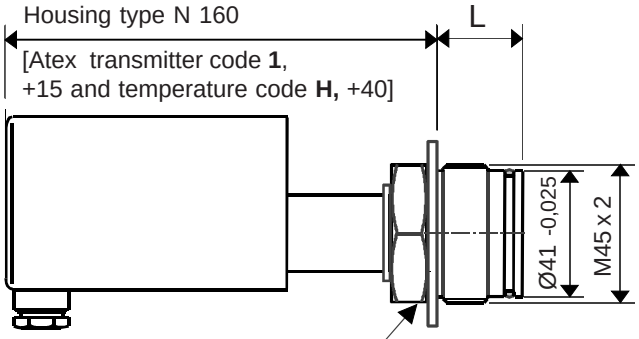
Housing types H, T and M 165
Housing type N 195
[Atex transmitter code **1**, +15]



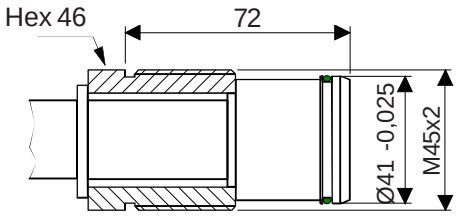
Process connection **PA**
- PMC 1"

BA - extension code	L
0	28,5
2	51
3	72
4	102

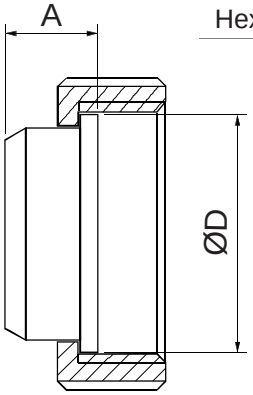
Housing types H, T and M 130
Housing type N 160
[Atex transmitter code **1**, +15 and temperature code **H,** +40]



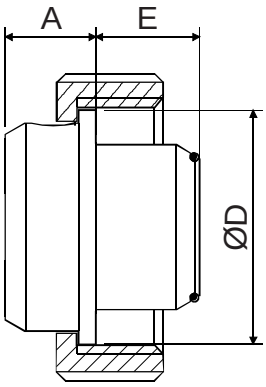
Process connection **BA**
- M45x2



Process connection **BB**
- M45x2 with tapered



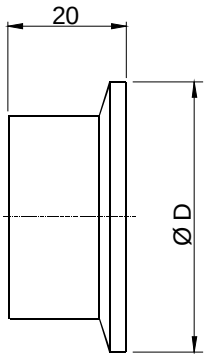
Process connection **VA** and **VB**
- SMS38 and SMS51



Process connection **WA** and **WB**
- SMS-SI38 and SMS-SI51

Size	Dimensions		Thread
	ØD	A	
38	54	21	Rd 60 x 1/6
51	64	23	Rd 70 x 1/6

Size	Dimensions			Thread
	ØD	A	E	
SI38	54	21	24	Rd 60 x 1/6
SI51	64	23	27	Rd 70 x 1/6

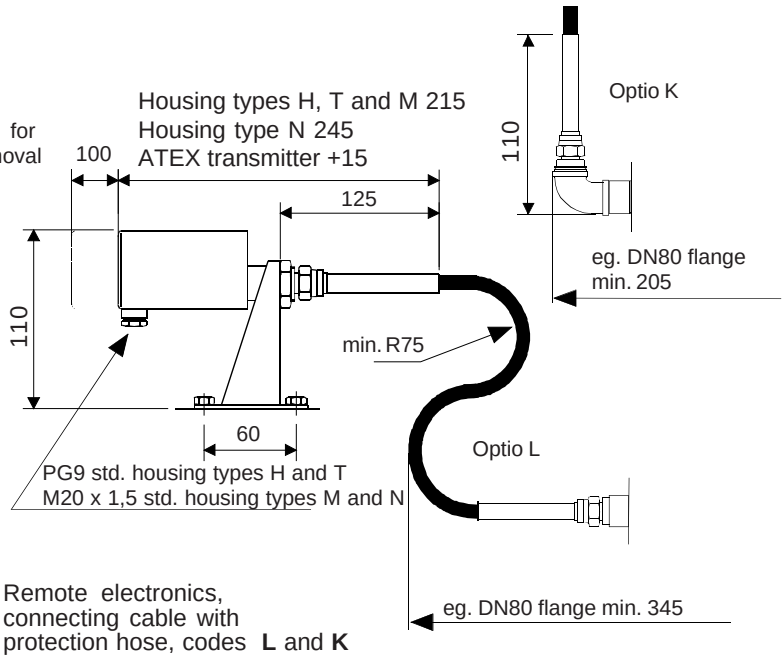


Process connection **TA**, **TB** and **TC**
- Tri-clamp DN38 ... 63.5

DN	ØD
38	50,5
51	64
63,5	77,5

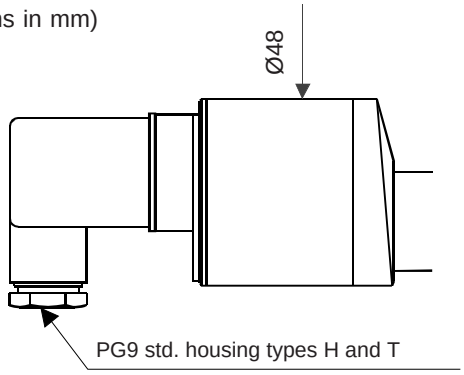
Clearance for cover removal

Housing types H, T and M 215
Housing type N 245
ATEX transmitter +15

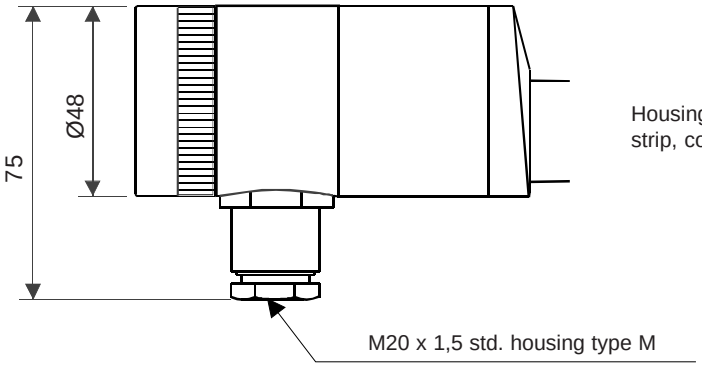


Remote electronics, connecting cable with protection hose, codes **L** and **K**

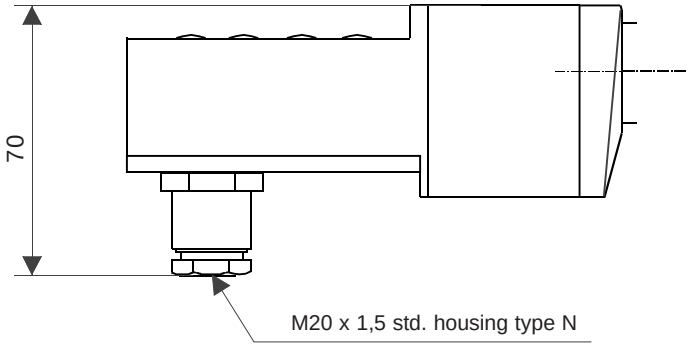
Dimensional drawings (dimensions in mm)



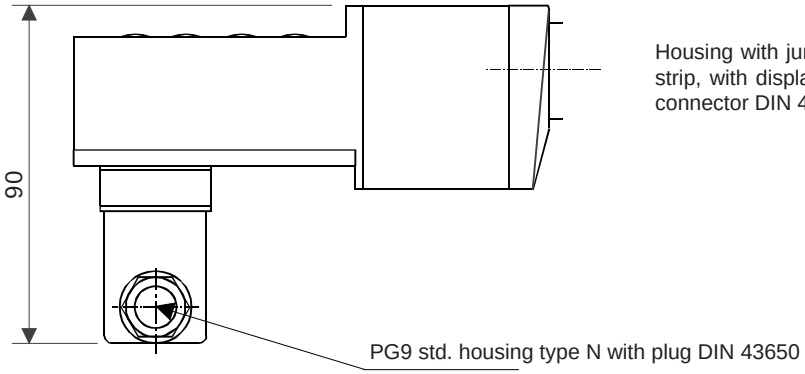
Housing with plug-connector, DIN 43650, codes H and T



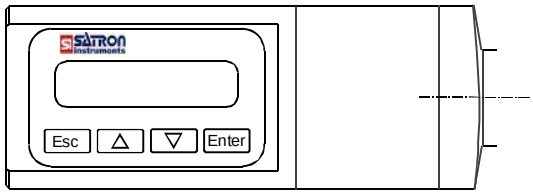
Housing with junction box/terminal strip, code M



Housing with junction box/terminal strip, with display, code N



Housing with junction box/terminal strip, with display and plug-connector DIN 43650, code N- / P



SATRON VL Pressure Transmitter

BLV820
15.06.2015

Selection Chart

Adjustability (±)	Span, min.	Span, max.	Measuring range
VL3	1.4kPa (14 mbar)	35 kPa (350 mbar)	-35...+35 kPa (-350...350 mbar)
VL4	4kPa (40 mbar)	100 kPa (1000 mbar)	-100...+100 kPa (-1000...1000 mbar)
VL5	10 kPa (100 mbar)	500 kPa (5000 mbar)	-100...+500 kPa (-1000...5000 mbar)
VLA5	10 kPa (100 mbar)	500 kPa (5000 mbar)	-100...+500 kPa (-1000...5000 mbar), abs.
VL6	0,03 MPa (0,3 bar)	3 MPa (30 bar)	-0.1...+3 MPa (-1...30 bar)
VLA6	0,03 MPa (0,3 bar)	3 MPa (30 bar)	0...+3 MPa (0...30 bar), abs.
VL7	1 MPa (10 bar)	15 MPa (150 bar)	0...+15 MPa (0...150 bar), abs.

Output **S** 4-20mA DC/HART® -protocol

Process connections

DA	DN25 PN40 ISO 2084-1974	**AA**	ANSI 1" 150 lbs ANSI B16-5	**TC**	Tri-clamp DN63.5 PN40 ISO 2852
DB	DN50 PN40 ISO 2084-1974	**AB**	ANSI 1" 300 lbs ANSI B16-5	**UA**	Tuchenhagen DN50/40 (Varivent) PN40
DC	DN80 PN40 ISO 2084-1974	**AC**	ANSI 2" 150 lbs ANSI B16-5	**PA**	PMC 1" PN40
DD	DN100 PN40 ISO 2084-1974	**AD**	ANSI 2" 300 lbs ANSI B16-5	**SA**	Sandvik DN70 PN64
JA	JIS 10K 50 JIS B 2220	**AE**	ANSI 3" 150 lbs ANSI B16-5	**VA**	SMS 38
JB	JIS 40K 50 JIS B 2220	**AF**	ANSI 3" 300 lbs ANSI B16-5	**VB**	SMS 51
JC	JIS 10K 80 JIS B 2220	**AG**	ANSI 4" 150 lbs ANSI B16-5	**WA**	SMS-SI 38 with 24 mm extension
JD	JIS 40K 80 JIS B 2220	**AH**	ANSI 4" 300 lbs ANSI B16-5	**WB**	SMS-SI 51 with 27 mm extension
JE	JIS 10K 100 JIS B 2220	**TA**	Tri-clamp DN38 PN40 ISO 2852	**BA**	M45x2 PN160
JF	JIS 40K 100 JIS B 2220	**TB**	Tri-clamp DN51 PN40 ISO 2852	**BB**	M45x2 PN160

Extension length (mm)	(Flanged conn.)	(Sandvik-conn.)	
0	0	-	(not proc. conn. SA)
1	23	-	(only proc. conn. DA, DN25 PN40, max. +125°C)
2	51	54.5	(not proc. conn, BB, DA, PA, Tx, UA, Vx and Wx)
3	72	-	(only proc. conn. BA, in the Pasve BA mounting)
4	102	105	(not proc. conn, BB, DA, PA, Tx, UA, Vx and Wx)
6	152	156	(not proc. conn, BB, DA, PA, Tx, UA, Vx and Wx)

Wetted materials

Diaphragm

Code	Material	Code	Material
1	Nickel (*)	**5**	Tantalum
2	AISI316L	**6**	Titanium Gr2 (*)
3	Hast.C 276	**8**	Duplex (**)
		A	AISI304

Extension or other wetted parts

Code	Material
2	AISI316L
3	Hast.C 276
8	Duplex (EN1.4462)

Fill fluid **S** Silicon oil **G** Inert oil **A** Food and beverage special oil (Neobee M20)

Housing type

H Housing with PLUG-connector, DIN43650, no display, inlet PG9
T Housing with PLUG-connector with manual adjust, DIN43650, no display, inlet PG9, (no ATEX)
M Housing with junction box/terminal strip, no display, inlet M20x1,5
N Housing with junction box/terminal strip, with display, inlet M20x1,5

Explosion proof **0** No explosion proof classification **1** Atex Intrinsic Safety, Ex II 1 GD T135°C (***)

Temperature effect on -30°C to +80°C range, % per max. span
G ±0,5% **E** ±0,15%
Temperature effect on +20°C to +70°C range, % per max. span
S ±0.08% (only process connections **BA** and **DA**)
Temperature effect on 0°C to +200°C range, % per max. span
H ±1% (not possible process connections **DA1**, **TA**, **TB** and **TC**)

Process coupling (for types SA, Tx, PA and BA)
0 No coupling
A With coupling

Material
2 AISI316L
3 Hast.C276
8 Duplex (1.4462)

Special size of electrical inlet
N 1/2 NPT **G** Pg13.5 **P** Plug DIN 43650

Special features
Special electronics (specify only if housing connected with hose to sensing element)
- connecting cable with protection hose
L Hose protected with PTFE/AISI316 braiding, straight
K Hose protected with PTFE/AISI316 braiding, angle of 90º

Length of cable between sensing element and housing
(specify only if housing connected with cable to sensing element)
2 2 m cable **3** 3 m cable etc. (max. 10 m)

Mounting parts for remote electronics for Ø51 mm tube
0 No mounting parts **1** Mounting parts

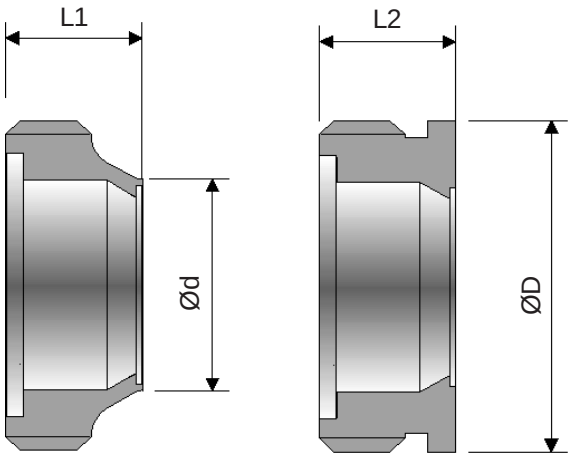
Documentation

Calibration Certificate **AE** English

Installation and Operating Instructions **IE** English **IF** Finnish

Material Certificates
0 No material certificate
MC1 Raw materials certificate without appendices, in accordance with SFS-EN 10204-2.1 (DIN 50049-2.1) standard
MC2 Raw materials certificate for wetted parts with appendices, in accordance with SFS-EN 10204-2.2 (DIN 50049-2.2) standard
MC3 Raw materials certificate for wetted parts with appendices, in accordance with SFS-EN 10204-3.1B (DIN 50049-3.1B) standard

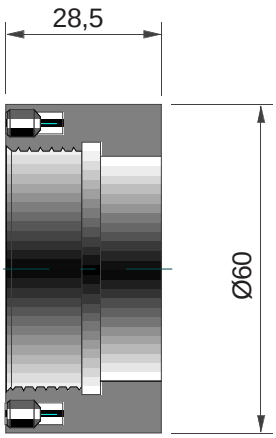
SMS-SI couplings :



for pipe for vessel

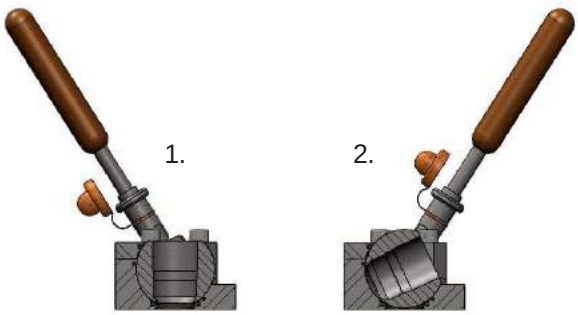
Size	Dimensions				Thread
	L1	Ød	L2	ØD	
38	27	38,5	24	60	Rd 60 x 1/6
51	30	51	25	70	Rd 70 x 1/6

Coupling M45x2 with adjust, for process connection **BA**, order code M1050459

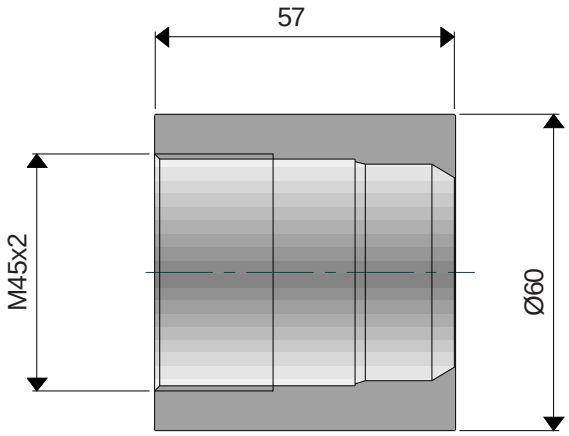


Pasve BA working position:

For process connections **BA3** and **BB**
1. Transmitter in measuring
2. Transmitter can be checked, changed, calibrated or the transmitter diaphragm can be flushed



Coupling BB M45x2, for process connection **BB**, order code **M1050474** (Welding assistant, code M1050473)



(*) = only with flange
(**) = not for range 3 with process connection code PA
(***) = Housing H and N : Ex II 2 GD T135°C
ATEX transmitters with display are the model without membrane key.

Satron Instruments Inc., P.O.Box 22, FI-33901 Tampere, Finland
Tel. +358 207 464 800, Telefax +358 207 464 801, www.satron.com

SATRON VDtL Differential Pressure Transmitter

SATRON VDtL differential pressure transmitter belongs to V-transmitter family. The series V transmitters have both analog and smart properties. SATRON VDtL is used for 1.4 kPa...3 MPa ranges. It is a 2-wire transmitter with HART® standard communication. In pressure measuring applications SATRON VDtL transmitters are used for liquid level, pipeline pressure and density measurements. SATRON VDtL transmitter is equipped with an SOS (Silicon On Sapphire) sensing element. The rangeability is 25:1.

TECHNICAL SPECIFICATIONS

Measuring range and span
See Selection Chart.

Zero and Span adjustment
Zero elevation: Calibrated span is freely selectable on the specified range depending from the desired option. This can be made by using extern control shafts (analog option), keyboard (display option), HART®275/375 communicator.

Damping
Time constant is continuously adjustable 0,01 to 60 s.

Temperature limits
Process temperature:
range **3**: +10 to +80 °C
ranges **4**, **5** and **6**: -30 to +120 °C
Ambient temperature: -30 to +80 °C
Shipping and storage: -30 to +80 °C.
Operating temperature of display: 0 to +50ºC *(does not affect operation of the transmitter)*

Pressure limits
Withstands 40 bar static pressure and unequal pressure load without damage to the transmitter. Pressure class: see Process Connections. See the following table for minimum pressure limits.

Minimum process pressure:

T_{proc} °C	Min. pressure for different fill fluids (kPa, abs.)	
	DC200 10 cSt	Inert oil
20	5.0	8.0
60	12.0	18.5
80	16.0	28.0
120	21.0	53.0

Volume of negative-side process chamber: 2.5 cm^3.

Process chamber's volumetric displacement for maximum span:
< 0.1 cm^3

Output 2-wire (2W), 4-20 mA, user selectable for linear, square root, inverted signal or the transfer function (16 points)specified by the user

Supply voltage and permissible load
See the load capacity diagram;
4-20 mA output: 12-35 VDC.

Humidity limits
0-100 % RH; freezing of condensed water not allowed in reference pressure channels.

PERFORMANCE SPECIFICATIONS
Tested in accordance with IEC 60770: Reference conditions, specified span, no range elevation, horizontal mounting; AISI316L diaphragm, silicone oil fill.

Accuracy
±0.05 % of calibrated span (span 1:1-5:1 /max.range).
On the measuring ranges 5:1-25:1:

$$\pm[0.01+0.012 \times (\frac{\text{max.span}}{\text{calibrated span}})]\%\ \text{of calibrated span}$$

Special accurate diaphragm **AISI304**: ±1.5 % of calibrated span.
(For spans 1:1 - 25:1)

(incl. nonlinearity, hysteresis and repeatability)

Long-term stability
±0.1 %/max. span for 12 months

Temperature effect on compensated temperature range
Ambient: Zero and span shift: ±0.5 % of max. span.
Process: Zero error: ±0.5 % of max.span (ranges 4,5 and 6), ±1 mbar per 10 K or min. ±0.5 % of max.span (range 3)

Static pressure effect on Zero
- ±0.5 % of max.span per 4 MPa

Mounting position effect
Deviation from horizontal position causes a zero shift that can be calibrated out.

Power supply effect
< ±0.01 % of calibrated span per volt.

Insulation test voltage
500 V rms 50 Hz

CONSTRUCTION AND CALIBRATION
Materials
Diaphragms [1]: AISI316L (EN 1.4435), AISI304 (EN 1.4301), Duplex (EN 1.4462), Hast. C276 (EN 2.4819), Nickel, Titanium Gr2 (EN 3.7035) or Tantalum.
Flanges [1] and vent valves [1]: AISI316, Duplex or Hast. C276.
O-ring on sensing element: PTFE.
Other sensing element materials: AISI316, SIS 2343, SIS 2324.
Mounting bolts and nuts for sensor flanges: AISI316 (PN420: m.8.8.Zne)

Fill fluid
Silicone oil (DC200, 10 cSt) or inert oil or food industry oil (Neobee M-20).

Housing with PLUG connector, codes **H** and **T**
Housing: AISI316
Seals: Viton® and NBR
TEST jacks: MS358Sn/PVDF, protected with silicone rubber shield.
PLUG connector: PA6-GF30 jacket, Silicone rubber seal, AISI316 retaining screw.

Housing with junction box/terminal strip, M and **N**
Housing: AISI303/316
Seals: Nitrile and Viton®
Nameplates: Polyester

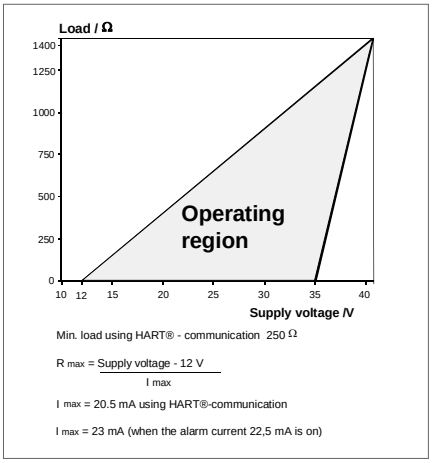
Connection hose between sensing element and housing
(codes **L** and **K**):
PTFE hose with AISI316 braiding.

Calibration
For customer-specified range with 1s. damping. (If range is not specified, transmitter is calibrated for maximum range.)

Enclosure class: IP66.

Process connections
See Selection Table.

[1] Parts in contact with process medium.



Satron Instruments Inc., P.O.Box 22, FI-33901 Tampere, Finland
Tel. +358 207 464 800, Telefax +358 207 464 801, www.satron.com

Electrical connections
Housing with PLUG connector, **H** and **T :**
PLUG connector, connector type DIN 43650 model AF; Pg9 gland for cable; wire cross-section 0.5 to 1.5 mm².

Housing with junction box/terminal strip**, M** and **N:**
Inlet M20x1.5, 1/2-NPT; screw terminals for 0.5 to 2.5 mm² wires

Product Certifications

European Directive Information

Electro Magnetic Compatibility
(EMC directive 2004/108/EC)
All differential pressure transmitters

Atex Directive (94/9/EC)
Satron Instruments Inc. complies with the ATEX Directive.

European Pressure Equipment Directive (PED) (97/23/EC)

All Differential Pressure Transmitters :
- Sound Engineering Practice

Hazardous Locations Certifications

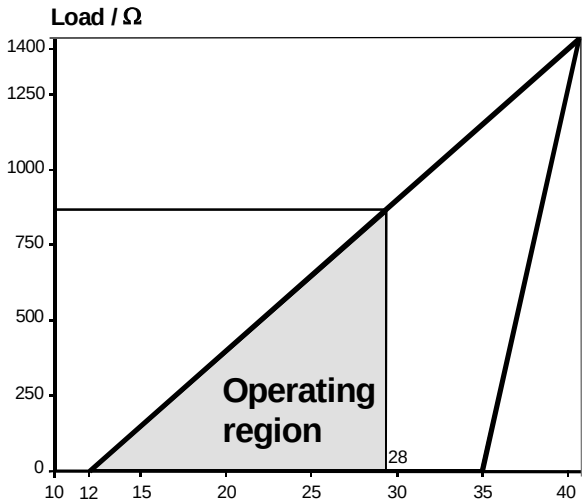
European Certifications
ATEX Intrinsic Safety

Certification No. : DNV-2007-OSL-ATEX- 1346X

Ex II 1 GD T135°C EEx ia II C T4 -20°C ≤ Tamb ≤ 50°C
Ex II 2 GD T135°C EEx ia II C T4 -20°C ≤ Tamb ≤ 50°C

Input Parameters :
U_i = 28 V
I_i = 93 mA
P_i = 0.651 W
C_i = 5 nF
L_i = 0.2 mH

Special Conditions for Safe Use (X) :
The enclosure with plastic window and the plastic DIN43650 connector must not be installed in potentially explosive atmosphere requiring category 1 apparatus. The non-conducting surface of the sensor element may be charged by the flow of non-conducting media, so there may be electrosatic hazard with IIC-gases. These units should be marked 2 GD.
The equipment shall be installed and connected according to the manufacturers instructions.



Min. load using HART® - communication 250 Ω

$R_{max} = \frac{\text{Supply voltage - 12 V}}{I_{max}}$

I_{max} = 20.5 mA using HART®-communication

I_{max} = 23 mA (when the alarm current 22,5 mA is on)

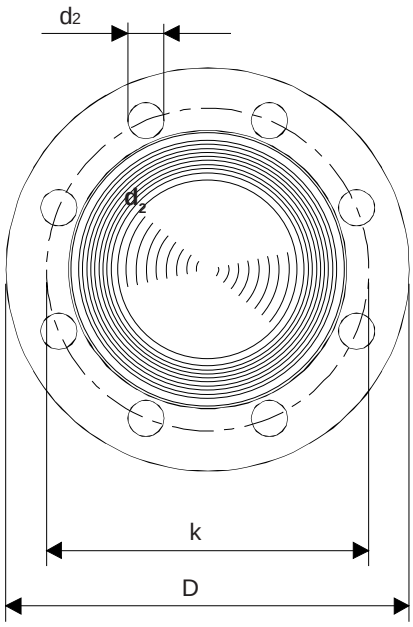
Supply voltage for transmitter with certified intrinsic safety (ATEX)

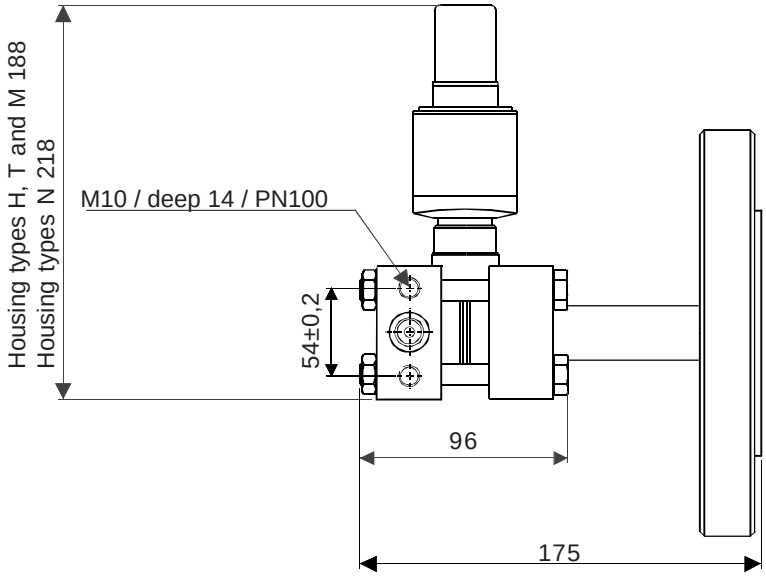
Weight (kg):
See the table; add 0,6 kg for transmitter with screwed cap housing and 0,7 kg for housing with display.

Type	Extension code			
	0	**2**	**4**	**6**
Ax, Dx, JX*	9.2	9.6	10	10.4
SA*		7.2	7.7	8.1

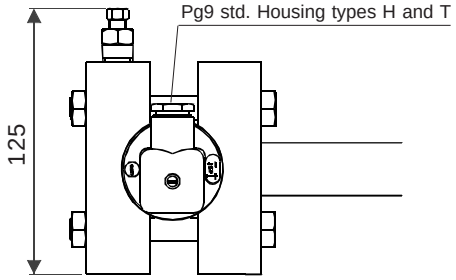
* process connection code

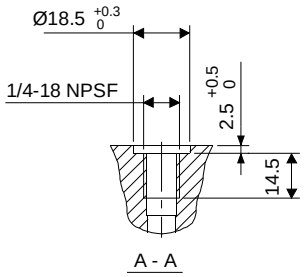
Dimensions (in mm)



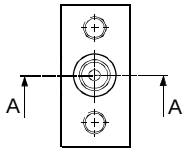


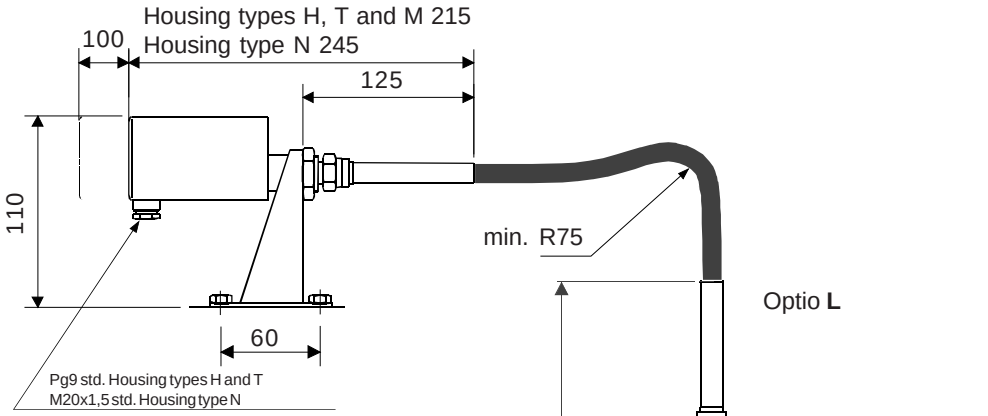
Process connection types **Ax, Dx** and **Jx**

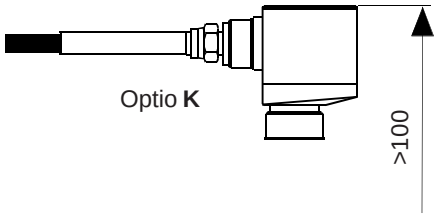


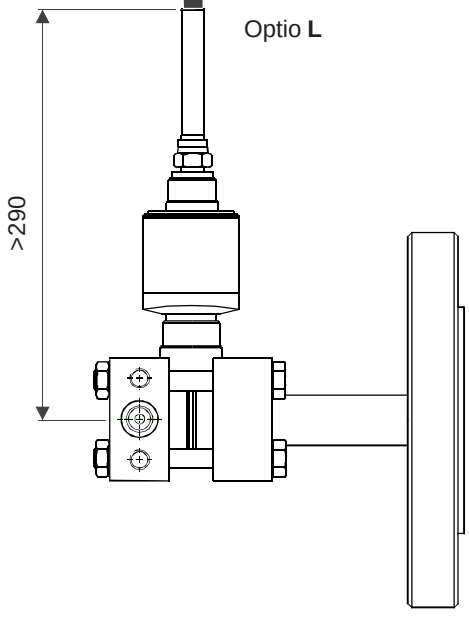


Notice!
The flange dimensions on the last page!



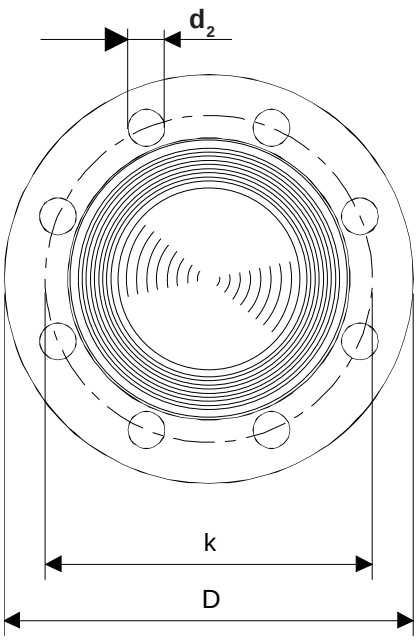


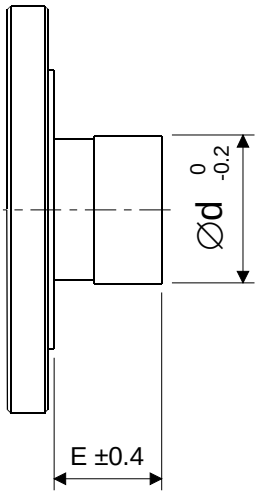


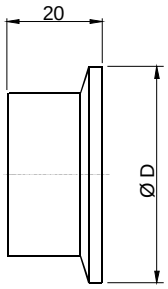


Dimensions (mm)

Notice!
The flange dimensions on the last page!





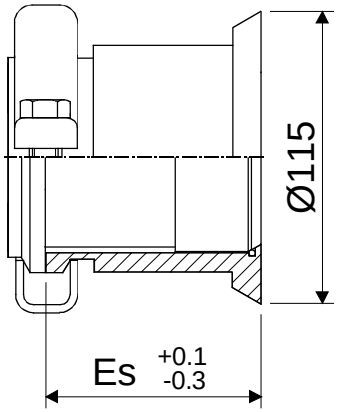


Process connection types **TA , TB** and **TC**
- Tri-clamp DN38 ... 63,5

DN	ØD
38	50,5
51	64
63,5	77,5

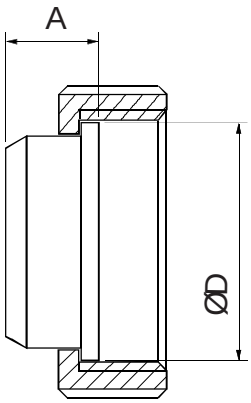
Process connection types Ax, Dx and Jx, with extension

	Extension code			
	0	2	4	6
Dim. E	0	51	102	152



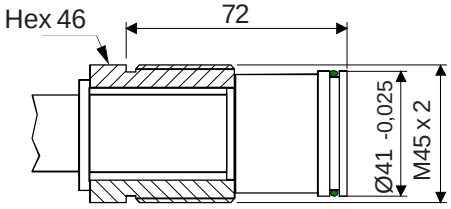
Process connection type SA

	Extension code		
	2	4	6
Dim. Es	54.5	105	156

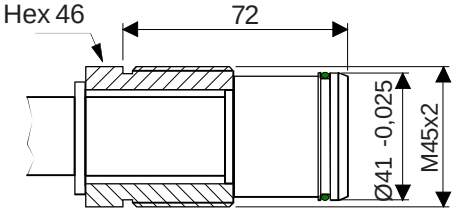


Process connection types **VA** and **VB**
- SMS38 and SMS51

Size	Dimensions		Thread
	ØD	A	
38	54	21	Rd 60 x 1/6
51	64	23	Rd 70 x 1/6

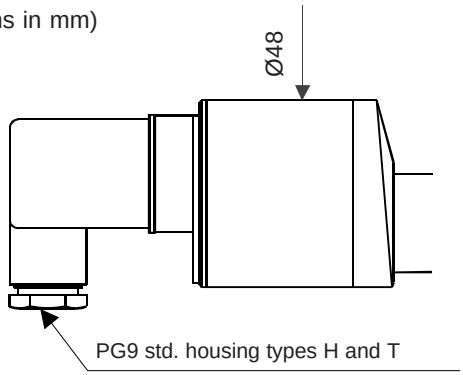


Process connection **BA**
- M45x2

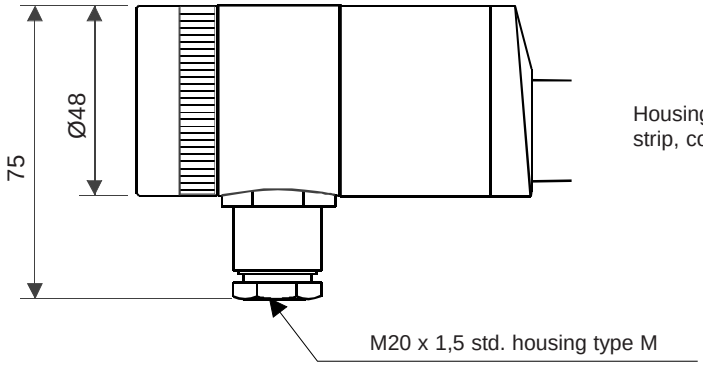


Process connection **BB**
- M45x2 with tapered

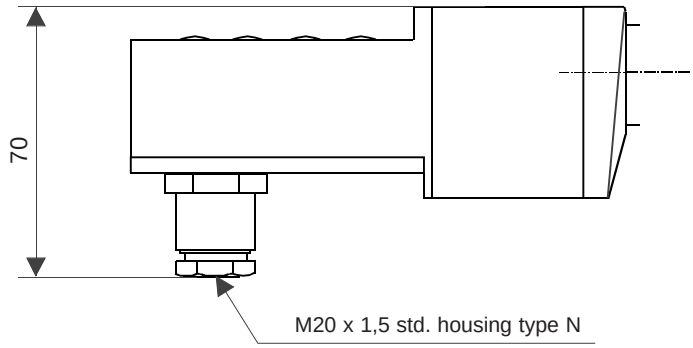
Dimensional drawings (dimensions in mm)



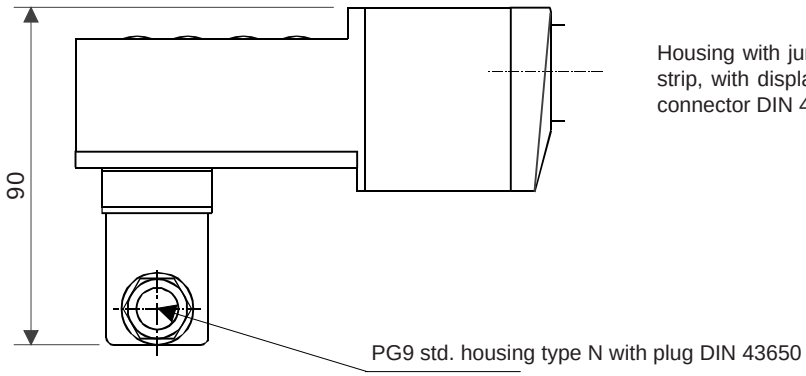
Housing with plug-connector, DIN 43650, codes H and T



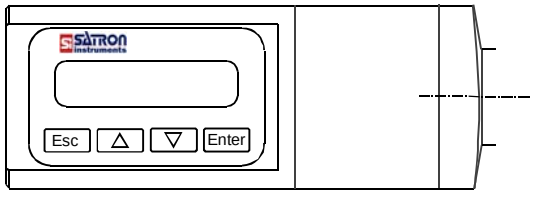
Housing with junction box/terminal strip, code M

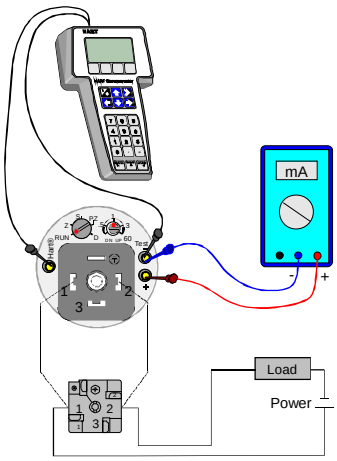


Housing with junction box/terminal strip, with display, code N

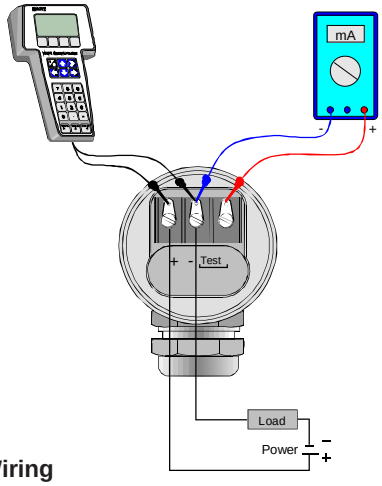


Housing with junction box/terminal strip, with display and plug-connector DIN 43650, code N- / P

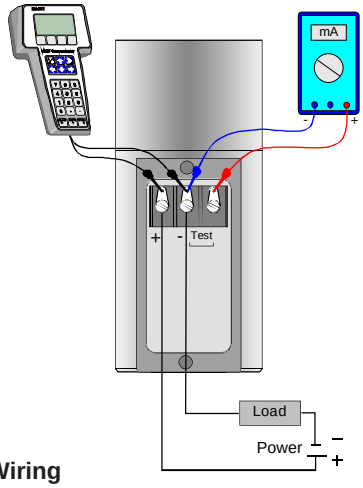




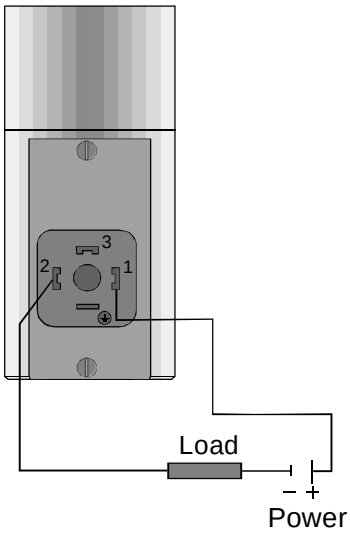
Wiring
Housing with PLUG connector, codes **H** and **T**



Wiring
Housing with terminal strip, code **M**



Wiring
Housing with terminal strip, code **N**

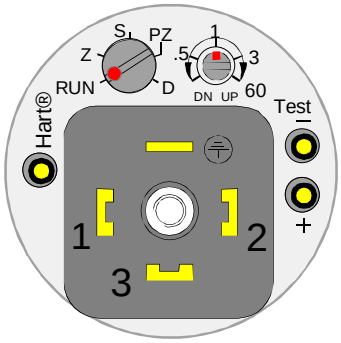


Wiring housing with plug DIN 43650, code N-/ P

Keyboard :

Esc	=	Press **Esc** move back towards the top of the main menu.
▲	=	Use the **UP** arrow key to move up on the current menu level or to increase the selected parameter value.
▼	=	Use the **DOWN** arrow key to move down on the current menu level or to decrease the selected parameter value.
Enter	=	Press **ENTER** to move to a lower level in a menu or to accept a command or parameter value.

Housing with display, code **N**



Use of selector switch :

RUN	= working position
PZ	= Process value zero
D	= Damping adjustment
S	= Span adjustment
Z	= Zero adjustment
DN	= Down
UP	= Up

Housing with PLUG connector, code **T**

SATRON VDtL Differential Pressure Transmitter

BLVT830
11.01.2016

Selection Chart

VDtL Differential Pressure Transmitter

Adjustability (±)	Span, min.	Span, max.	Measuring range
3	1,4 kPa (14 mbar)	35 kPa (350 mbar)	-35...+35 kPa (-350...+350 mbar)
4	4 kPa (40 mbar)	100 kPa (1000 mbar)	-100...+100 kPa (-1000...+1000 mbar)
5	26,5 kPa (265 mbar)	500 kPa (5000 mbar)	-500...+500 kPa (-5000...+5000 mbar)
6	145 kPa (1,45 bar)	3 MPa (30 bar)	-3...+3 MPa (-30...+30 bar)

Output **S** 4-20mA DC/HART® -protocol

Process connections

DB	DN50 PN40 ISO 2084-1974	**JE**	JIS 10K 100 JIS B 2220	**TA**	Tri-clamp DN38 PN40 ISO 2852
DC	DN80 PN40 ISO 2084-1974	**JF**	JIS 40K 100 JIS B 2220	**TB**	Tri-clamp DN51 PN40 ISO 2852
DD	DN100 PN40 ISO 2084-1974	**AC**	ANSI 2" 150 lbs ANSI B16-5	**TC**	Tri-clamp DN63.5 PN40 ISO 2852
JA	JIS 10K 50 JIS B 2220	**AD**	ANSI 2" 300 lbs ANSI B16-5	**SA**	Sandvik DN70 PN64
JB	JIS 40K 50 JIS B 2220	**AE**	ANSI 3" 150 lbs ANSI B16-5	**VA**	SMS 38
JC	JIS 10K 80 JIS B 2220	**AF**	ANSI 3" 300 lbs ANSI B16-5	**VB**	SMS 51
JD	JIS 40K 80 JIS B 2220	**AG**	ANSI 4" 150 lbs ANSI B16-5	**BA**	M45x2 PN160
		AH	ANSI 4" 300 lbs ANSI B16-5	**BB**	M45x2 PN160 with tapered

Extension length/mm	Process connections DC, AE and AF	Process connection SA
0	0	-
2	51	54.5
4	102	105
6	152	156

Wetted materials

(-)-flange		(+)diaphragm		(-)-diaphragm		Extension		(-)diaphragm coating	
Code	Material	Code	Material	Code	Material	Code	Material	Code	Material
2	AISI316L	**1**	Nickel (*)	**2**	AISI316L/317L	**2**	AISI316L	**9**	gold/Rhodium (Do not enter code if diaphragm not coated)
3	Hast.C 276	**2**	AISI316L	**3**	Hast.C 276	**3**	Hast.C 276		
		3	Hast. C276	**5**	Tantalum	**8**	Duplex		
		5	Tantalum	**8**	Duplex				
		6	Titanium Gr2 (*)						
		8	Duplex (EN 1.4462)						
		A	AISI304						

Fill fluid **S** Silicone oil **A** Oil for food Industry (Neobee M-20) **G** Inert oil

(-)-side process connection
- **D** M10, PN100, ranges 3 to 6, IEC 61518.
- **U** 7/16-20 UNF, PN100, ranges 3, 4, and 5 only.
- **F** Screwed flange adapters, PN100, IEC 61518.
- **V** Connection through hydraulic seal (not recommended for ranges 3 and 4).

Housing type
- **H** Housing with PLUG-connector, DIN43650, no display, inlet PG9
- **T** Housing with PLUG-connect.with manual adjust, DIN43650, no display, inlet PG9, no ATEX
- **M** Housing with junction box/terminal strip, no display, inlet M20x1,5
- **N** Housing with junction box/terminal strip, with display, inlet M20x1,5

Explosion proof **0** No explosion proof **1** Atex Intrinsic Safety, Ex II 1 GD T135°C (**)

										/					/				/			
										/					/				/			

Process coupling

0	No coupling	**2**	AISI316L (EN 1.4404)
A	With coupling	**3**	Hast.C276 (EN 2.4819)
		8	Duplex (EN 1.4462)

Process thread on flange adapter (only specify for (-)-side process conn. F)

Thread type		Thread size	
Code	Type	Code	Size
R	straight R thread	**2**	1/4
N	NPS thread	**3**	3/8
P	taper R thread	**4**	1/2
T	NPT thread		

Special size of electrical inlet **N** 1/2 NPT **G** Pg13.5 **P** Plug DIN 43650

Special features

Special electronics (specify only if housing connected with hose to sensing element)
- connecting cable with protection hose
- **L** Hose protected with PTFE/AISI316 braiding, straight
- **K** Hose protected with PTFE/AISI316 braiding, angle of 90º

Length of cable between sensing element and housing
(specify only if housing connected with cable to sensing element)
2 2 m cable **3** 3 m cable etc. (max. 10 m)

Mounting parts for remote electronics for Ø51 mm tube
0 No mounting parts **1** Mounting parts

Documentation

Calibration Certificate **AE** English

Installation and Operating Instructions **IE** English **IF** Finnish

Material Certificates
- **0** No material certificate
- **MC1** Raw materials certificate without appendices, in accordance with SFS-EN 10204-2.1 (DIN 50049-2.1) standard
- **MC2** Raw materials certificate for wetted parts with appendices, in accordance with SFS-EN 10204-2.2 (DIN 50049-2.2) standard
- **MC3** Raw materials certificate for wetted parts with appendices, in accordance with SFS-EN 10204-3.1B (DIN 50049-3.1B) standard

(*) = only with flange (**) = Housing H and N : Ex II 2 GD T135°C

SATRON instruments

Flange size	Flange dimensions			Holes			Extension
	b	D	Ød$_4$	pcs	d$_2$	k	Ød -0.2
ISO DN50 PN40	20	165	102	4	18	125	51
ISO DN80 PN40	24	200	138	8	18	160	73
ISO DN100 PN40	24	235	162	8	22	190	73
ANSI 2" 150 lbs	23	152	92	4	20	120.6	51
ANSI 2" 300 lbs	25	165	92	8	20	127	51
ANSI 3" 150 lbs	26	191	127	4	20	152.4	73
ANSI 3" 300 lbs	31	210	127	8	23	168.3	73
ANSI 4" 150 lbs	26	229	157	8	20	190.5	73
ANSI 4" 300 lbs	34	254	157	8	23	200	73
JIS 10K-50	16	155	96	4	19	120	51
JIS 40K-50	26	165	105	8	19	130	51
JIS 10K-80	18	185	126	8	19	150	73
JIS 40K-80	32	210	140	8	23	170	73
JIS 10K-100	18	210	151	8	19	175	73
JIS 40K-100	36	250	165	8	25	205	73

Process connection types Ax, Dx and Jx

CE

Satron Instruments Inc., P.O.Box 22, FI-33901 Tampere, Finland
Tel. +358 207 464 800, Telefax +358 207 464 801, www.satron.com

(**) = ATEX transmitters with display are the model without membrane key.

We manufacture the following mounting accessories for pressure and differential pressure transmitters:

PASVE® mounting & service valve .....Spec. G340
PASVE® BA mounting & service valve ....Spec. G360

Mounting couplings for transmitters.....Spec. G150

Other mounting accessories:

PASVE® pH mounting & service valve
for pH electrodes ..... Spec. G345
PASVE® DUAL mounting & service valve ... Spec. G365
PASVE® pH-U mounting & service valve .... Spec. G370

PASVE® SC/SP/ST Sampling Valve .....Spec. G347

INSTALLATION OF PRESSURE AND DIFFERENTIAL PRESSURE TRANSMITTERS

The transmitters are isolated from the process with impulse piping and valves, or with a diaphragm seal unit. This isolation protects the transmitter against harmful pressure, temperature, corrosion and vibration effects. It also permits the transmitter to be mounted at the most convenient location from the servicing and maintenance viewpoint.
Pressure transmitters can also be mounted directly on the process pipe (fig. 1) or vessel. In direct mounting you should make sure that the measuring device is suitable for the prevailing conditions. It is advisable to avoid installing transmitters at locations where they would be subjected to heavy vibration and very high temperatures. A wisely chosen mounting environment and suitable mounting accessories will ensure accurate measurement and easy maintenance at the measurement point.

CONNECTING THE TRANSMITTER TO THE IMPULSE PIPING

You connect the transmitter to the impulse piping with mounting valves (Fig. 2), or with a mounting bracket and separate valves.

Figure 1

Figure 2

Satron Instruments Inc.
P.O.Box 22, FI-33901 Tampere, Finland
Tel. +358 207 464 800, Fax +358 207 464 801
www.satron.com

SATRON PASVE Mounting & Service Valve

PASVE® is a ball-type mounting & service valve for SATRON VG and HG type level and pressure transmitters. **PASVE®** makes it simple to disconnect the transmitter from the process for maintenance and cleaning, without stopping the process or draining the tank.
PASVE® is available in a manually operated type or equipped with a pneumatic actuator.

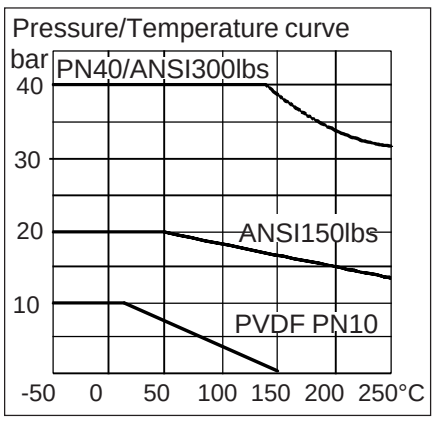
TECHNICAL SPECIFICATIONS

Transmitter connection
G1 female, seat accepts SATRON VG-transmitters.

Max. operating pressure/temperature
Pressure 40 bar, temperature 250 °C, (see the appended table).
Min. operating temp. -50 °C.
PVDF: See the appended table.

Materials
Wetted parts: AISI316L, AISI904L, Duplex, Hastelloy C276, Titanium, for **F** type also PVDF. Seals PTFE or PTFE with carbon and graphite filling.

Weight
PASVE GC 4.3 kg, PASVE GP 4.2 kg, PASVE GF 8.4 kg, Actuator 5.5 kg



Selection table

PASVE □ □ □ □ □ □ □ □ □

Body
G Standard model (with 3 seals)
N Flushing (with 2 seals)

Mounting

		Wetted parts (**C** and **P**) Code	Material
C	On container	**2**	AISI316L (std.)
P	On pipe	**3**	Hastelloy C
		4	AISI904L
		6	Titanium
		8	Duplex
F	On flange		

Flanges

Code	Type
T	DN50 PN40 (only manual)
D	DN80 PN40
J	DN100 PN10/16
C	DN100 PN40
K	ANSI 2½"/150lbs (only manual)
A	ANSI 3"/150 lbs
B	ANSI 3"/300 lbs
H	ANSI 4"150 lbs
G	ANSI 4"/300 lbs

Wetted parts

Code	Material
2	AISI316L
3	Hastelloy® C276
4	AISI904L
6	Titanium
8	Duplex (EN 1.4462)
P1	PVDF PN10

(P1 only for flange codes D,A,E)

Seals
0 PTFE + 20C + 5Gr (std.)
1 PTFE 100%
4 PTFE + 20C + 5Gr / AISI316 / PTFE 50 % (Hard)
5 PTFE 100% / AISI316 / PTFE 50% (Hard)
6 PTFE 100% / PVDF 100% (Hard)

Pt100 temperature sensor (Only with body code **N**)
0 No sensor
X With sensor (measuring range: -50...+200 °C)

Actuator
MD No actuator (manually operated)
AD_ Double-action actuator
AS_ Spring-return actuator
AE1 Electric actuator 230 V
AE3 Electric actuator 115 V

Solenoid valve type (for codes **AD** and **AS** only)
0 _ No solenoid valve
1 _ 230 V AC 50 Hz 2 W (std.)
2 _ 24 V DC 2.5 W (also EEx dm)
3 _ 115 V AC 60 Hz 2 W
4 _ 28 V DC 0.4 W (only EEx ia)

Solenoid explosion proof
0 No explosion proof
1 EEx m II T4
2 EEx ia IIC T6
3 EEx dm IIC T5/T6

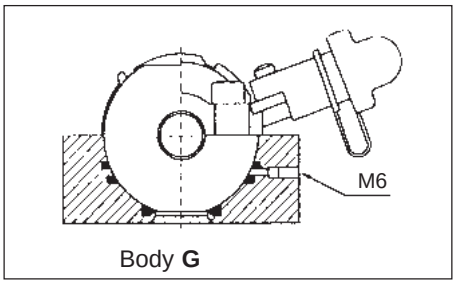
Position switches
0 None
X Equipped with position switches
A Position switch EEx ib IIC T5/T6
E Position switch NAMUR, DIN 19234

Options
Z1 For oxygen use
Z2 Process side flushing
Z4 Cutting ball
Z5 Diamond-coated ball

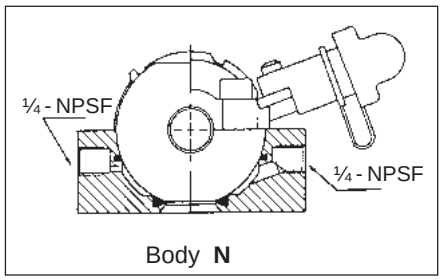
Documentation
IE English
IF Finnish

Material certificates
0 No material certificate
MC1 SFS-EN 10204-2.1 (DIN50049-2.1)
MC2 SFS-EN 10204-2.2 (DIN50049-2.2)
MC3 SFS-EN 10204-3.1B (DIN50049-3.1B)

Specification example: **PASVE G FD2 0 0 AD10 X IE MC1**



Body **G**



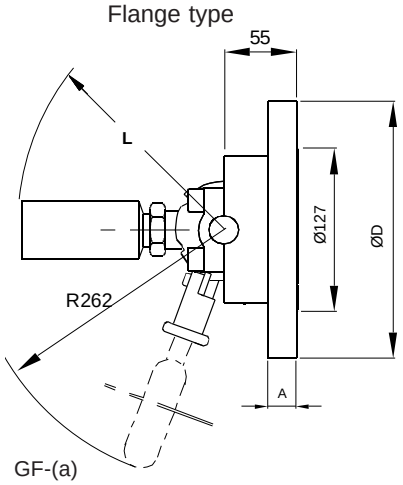
Body **N**

Satron Instruments Inc., P.O.Box 22, FIN-33901 Tampere, Finland
Tel. +358 207 464 800, Telefax +358 207 464 801, www.satron.com

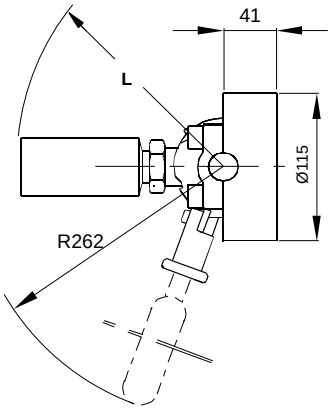
Dimensions (mm)

Manually operated

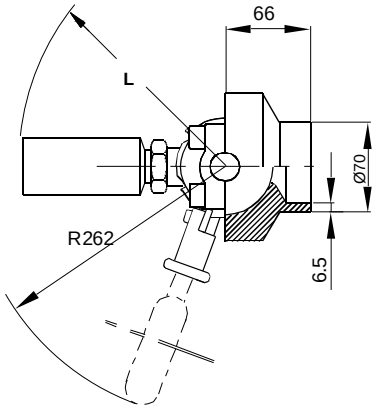
PASVE GF-(a)
NF-(a)
Flange type



PASVE GC
NC
Welded on container



PASVE GP
NP
Welded on pipe



GF-(a)

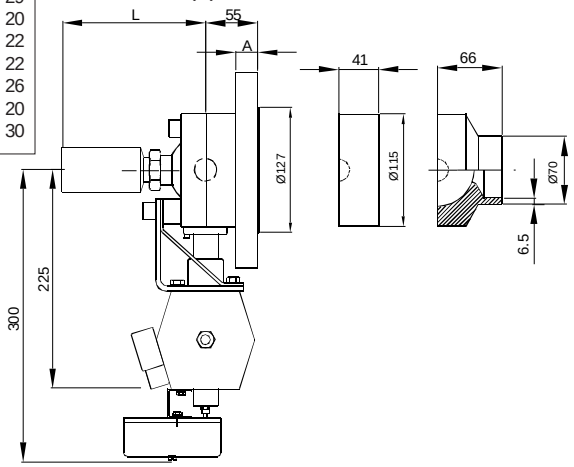
Code	FLANGE Type	ØD	Ød	A
K	ANSI 2½" 150 lbs	172	139.7	22
A	ANSI 3" 150 lbs	191	152.4	22
B	ANSI 3" 300 lbs	210	168.3	27
H	ANSI 4" 150 lbs	229	190.5	26
G	ANSI 4" 300 lbs	254	200	29
T	DN50 PN40	165	125	20
D	DN80 PN40	200	160	22
J	DN100 PN10/16	220	180	22
C	DN100 PN40	235	190	26
E	JIS10K 80	185	150	20
F	JIS40K 80	210	170	30

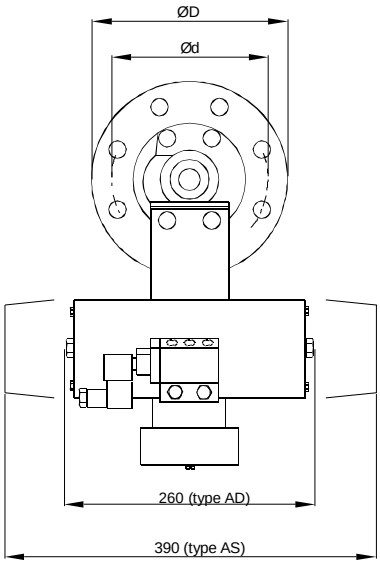
With pneumatic actuator

PASVE GF-(a)
NF-(a)

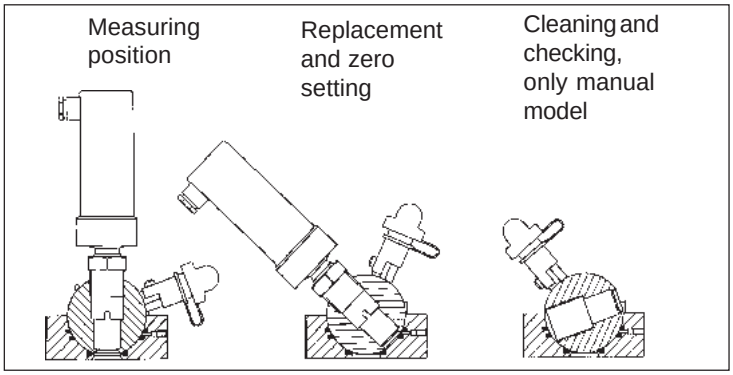
PASVE GC
NC

PASVE GP
NP





OPERATING POSITIONS



Surface temperature

Ambient temperature °C	Temperature class
70	T6
85	T5
120	T4

European Directive Information

ATEX directive (94/9/EC)
Satron Instruments Inc. complies with the ATEX directive.

European Pressure Equipment Directive (PED) (97/23/EC)
- Sound Engineering Practice

European Certification

Ex II 3 GD

We reserve the right for technical modifications without prior notice.

SATRON PASVE BA Mounting & Service Valve

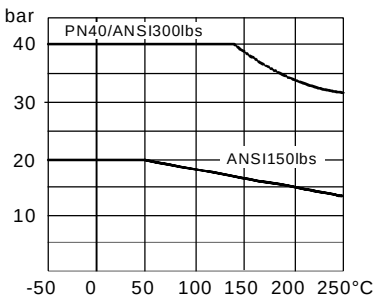
PASVE® BA is a ball-type mounting & service valve for SATRON VL- and VDtL - pressure and differential pressure transmitters and also for Satron HPS hydraulic pressure seals. **PASVE® BA** makes it simple to disconnect the transmitter from the process for checking, changing the transmitter, flushing and calibration without stopping the process. **PASVE® BA** is available in a manually operated type or equipped with a pneumatic actuator.

TECHNICAL SPECIFICATIONS

Transmitter connection
M45x2 female thread, suitable for SATRON VL- and VDtL-transmitters and for Satron HPS hydraulic pressure seals.

Max. operating pressure/temperature
Pressure 40 bar, temperature 250 °C, (see the appended table).
Min. operating temp. -50 °C.

Pressure/Temperature curve



Materials
Wetted parts: AISI316L, AISI904L, Duplex, Hastelloy C276, Titanium, 254 SMO.
Seals: PTFE, PTFE with carbon and graphite filling or PTFE 50%+AISI316 50% mixture

Weight
PASVE BA C 4,3 kg, **PASVE BA P** 4,2 kg, **PASVE BA F** 8,4 kg, Actuator 5,5 kg

Selection table

PASVE BA ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

Mounting

		Wetted parts (**C** and **P**) Code	Material
C	On container	**2**	AISI316L (EN 1.4404) (std.)
P	On pipe	**3**	Hastelloy C (EN 2.4819)
		4	AISI904L (EN 1.4539)
		6	Titanium Ti-2 (EN 3.7035)
		8	Duplex (EN 1.4462)
		K	254 SMO®

F Flange

Flanges Code	Type	Wetted parts Code	Material
D	DN80 PN40	**2**	AISI316L
J	DN100 PN10/16	**3**	Hastelloy® C276
C	DN100 PN40	**4**	AISI904L
A	ANSI 3"/150 lbs	**6**	Titanium
B	ANSI 3"/300 lbs	**8**	Duplex (EN 1.4462)
H	ANSI 4"150 lbs	**K**	254 SMO®
G	ANSI 4"/300 lbs		

Seals

0	PTFE + 20C + 5Gr (std.)
1	PTFE 100%
4	PTFE + 20C + 5Gr / AISI316 / PTFE 50 % (Hard)
5	PTFE 100% / AISI316 / PTFE 50% (Hard)
6	PTFE 100% / PVDF 100% (Hard)

Pt100 Temperature transmitter

0	No sensor
X	With sensor (-50...+200 °C)

Actuator

MD	No actuator (manually operated)	**AE1**	Electric actuator 230 V
AD_	Double-action actuator	**AE3**	Electric actuator 115 V
AS_	Spring-return actuator	**A0**	No actuator, fittings to the actuator

Solenoid valve type (for codes **AD** and **AS** only)

0 _	No solenoid valve	**4** _	28 V DC 0.4 W (only EEx ia)
1 _	230 V AC 50 Hz 2 W (std.)		
2 _	24 V DC 2.5 W (also EEx dm)		
3 _	115 V AC 60 Hz 2 W		

Solenoid explosion proof

0	No explosion proof	**3**	EEx dm IIC T5/T6
1	EEx m II T4		
2	EEx ia IIC T6		

Position switches

0	None	**A**	Position switch EEx ib IIC T5/T6
X	Equipped with position switches		
E	Position switch NAMUR, DIN 19234		

Options

Z1	Oxygen wash	**Z4**	Cutting ball
Z2	Process side flushing	**Z5**	Diamond-coated ball

Dokumentit

IE	English	**IF**	Finnish

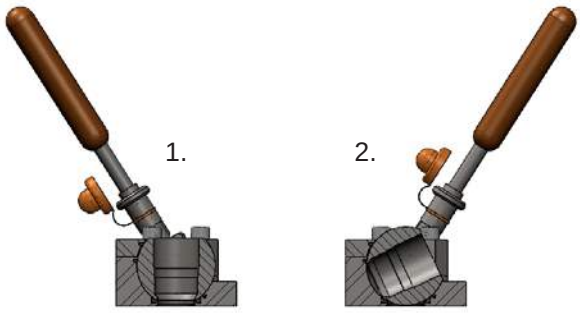
Material certificates

0	No material certificate	**MC2**	SFS-EN 10204-2.2 (DIN50049-2.2)
MC1	SFS-EN 10204-2.1 (DIN50049-2.1)	**MC3**	SFS-EN 10204-3.1B (DIN50049-3.1B)

Specification example: **PASVE BA FD200AD10XIEMC1**

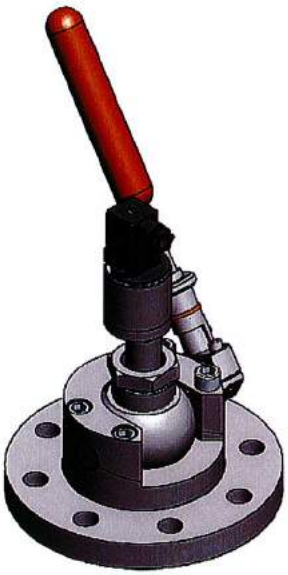
WORKING POSITIONS

1. Transmitter in measuring
2. Transmitter can be checked, changed, calibrated or the transmitter diaphragm can be flushed

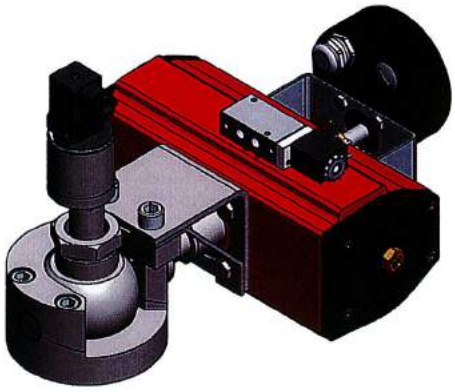


Satron Instruments Inc., P.O.Box 22, FI-33901 Tampere, Finland
Tel. + 358 207 464 800, Telefax +358 207 464 801 www.satron.com

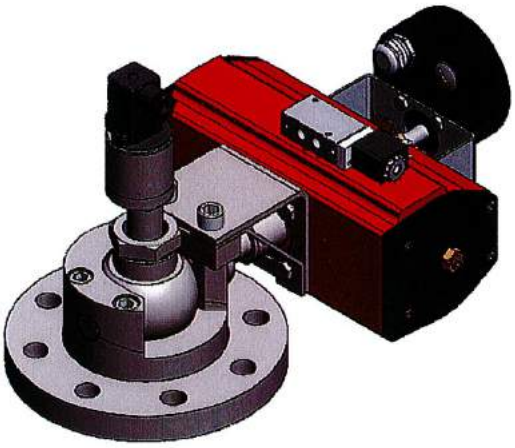
SATRON PASVE BA Mounting & Service Valve



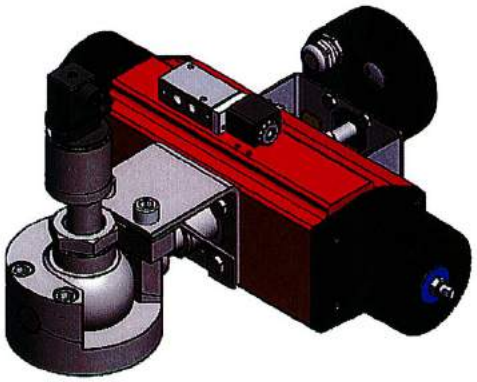
PASVE BA F
- Flange type
- Manually operated (MD)



PASVE BA C
- Welded on container
- Double-action actuator (AD)



PASVE BA F
- Flange type
- Double-action actuator (AD)



PASVE BA C
- Flange type
- Spring-return actuator (AS)

Surface temperature

Ambient temperature °C	Temperature class
70	T6
85	T5
120	T4

CE

European Directive Information

ATEX directive (94/9/EC)
Satron Instruments Inc. complies with the ATEX directive.

European Pressure Equipment Directive (PED) (97/23/EC)
- Sound Engineering Practice

European Certification
Ex II 3 GD

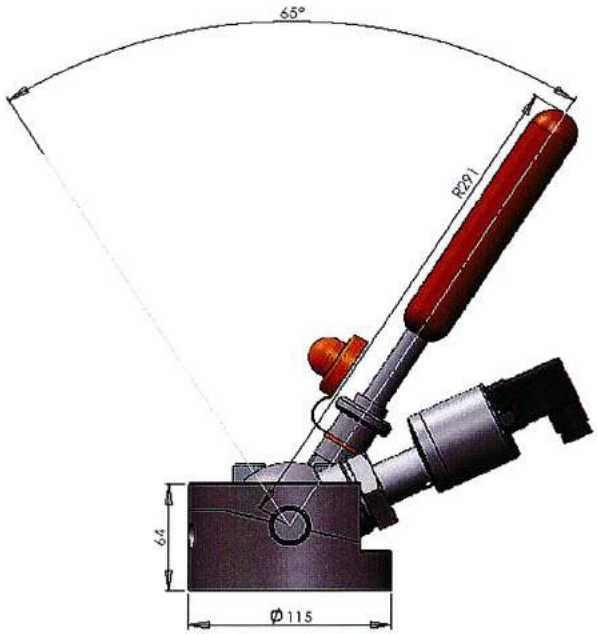
We reserve the right for technical modifications without prior notice.

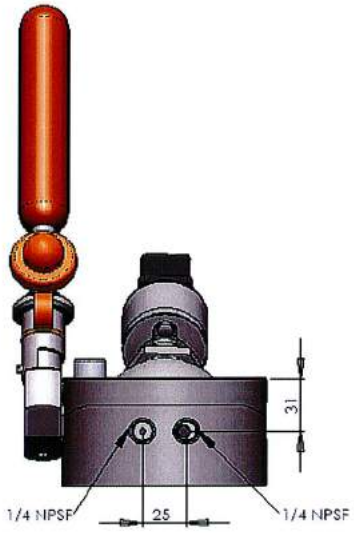
SATRON PASVE BA Mounting & Service Valve

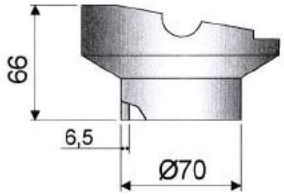
Dimensions (mm)

Manually operated

PASVE BA C
Welded on container



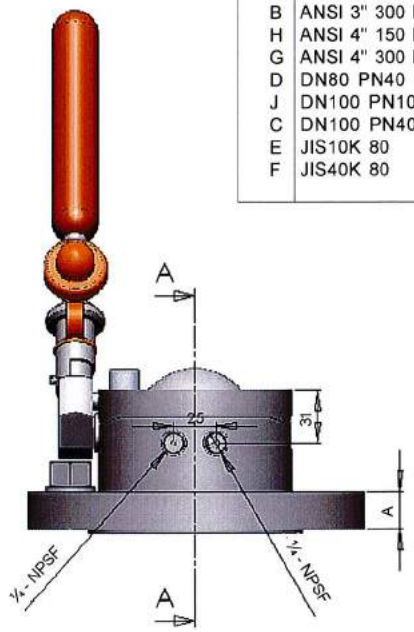


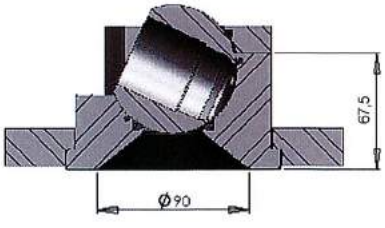


PASVE BA P
Welded on pipe

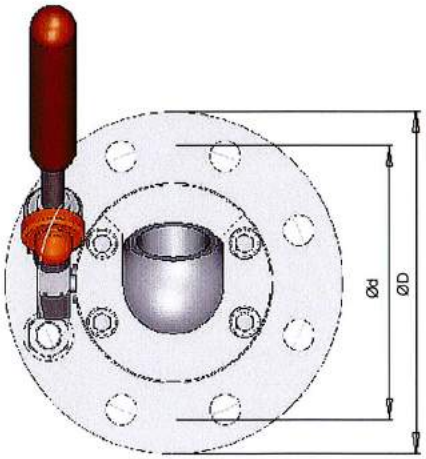
Flange (a) Code	Type	ØD	Ød	A
A	ANSI 3" 150 lbs	191	152.4	22
B	ANSI 3" 300 lbs	210	168.3	27
H	ANSI 4" 150 lbs	229	190.5	26
G	ANSI 4" 300 lbs	254	200	29
D	DN80 PN40	200	160	22
J	DN100 PN10/16	220	180	22
C	DN100 PN40	235	190	26
E	JIS10K 80	185	150	20
F	JIS40K 80	210	170	30

PASVE BA F-(a)
Flange type





SECTION A-A



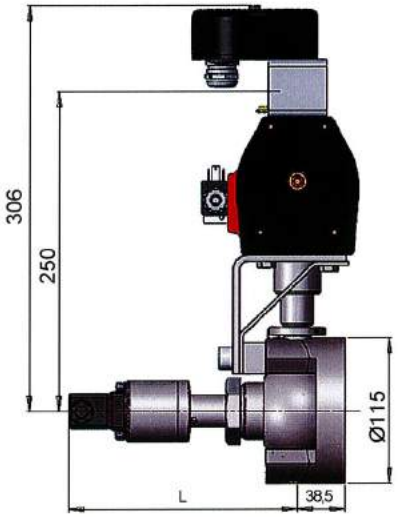
SATRON PASVE BA Mounting & Service Valve

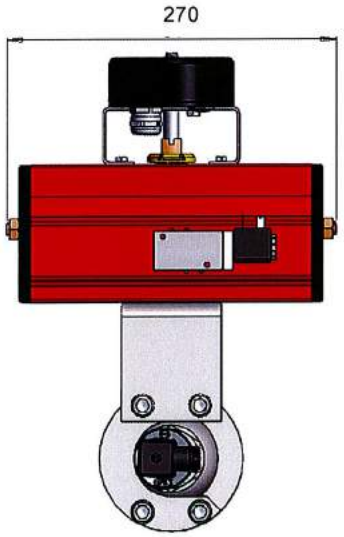
G360
15.11.2012

Dimensions (mm)

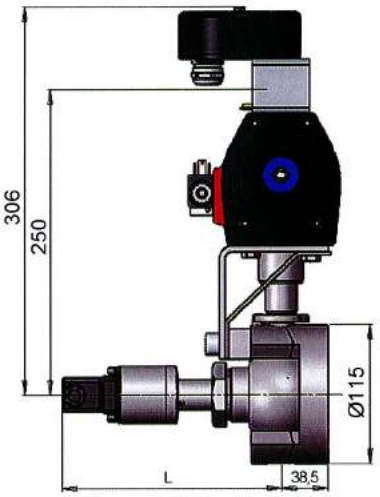
Automatic operated with actuator

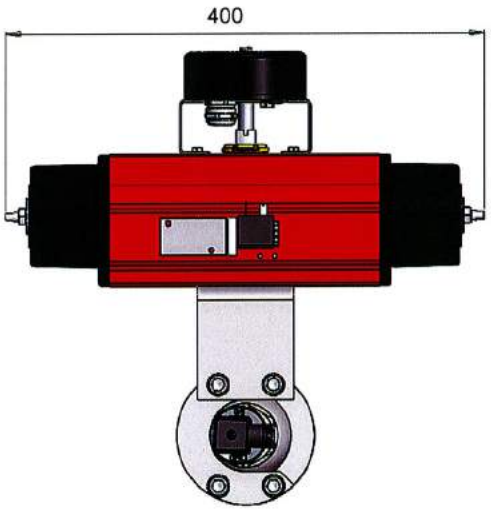
PASVE BA C
- Welded on container
- Double-action actuator (AD)



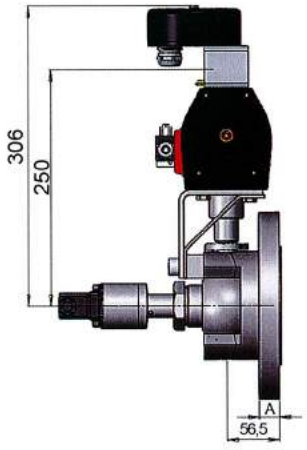


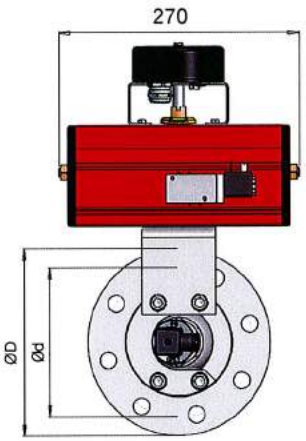
PASVE BA C
- Welded on container
- Spring-return actuator (AS)





PASVE BA F
- Flange type
- Double-action actuator (AD)



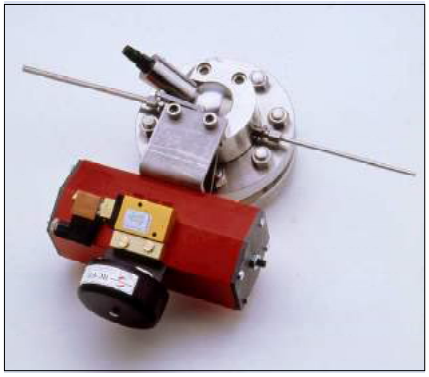


SATRON instruments

SATRON PASVE pH

Mounting & Service Valve

G345
01.11.2015



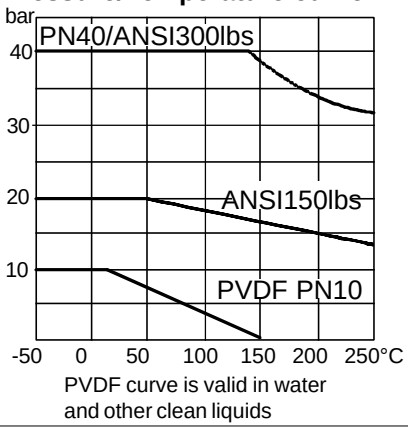
PASVE® pH is a mounting/service valve for pH sensors. It can be used with practically all pH sensors in this size category.
PASVE® pH allows the cleaning and calibration of pH sensors without stopping the process. When required, this can be done automatically. To protect the sensor in abrasive processes, it can be turned to the measuring position only for the duration of the actual measurement.
PASVE® pH is available in a manually operated type or equipped with a pneumatic or electric actuator.

TECHNICAL SPECIFICATIONS

Applicable pH sensors
Refer to the Selection Table.

Max. operating pressure/ temperature
40 bar, 250 °C, (see the appended table). Min. operating temp. -50°C. Sensor-specific limitations should also be taken into account in applications.

Pressure/Temperature curve

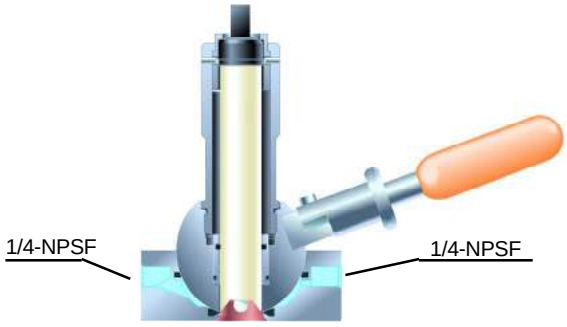


PVDF curve is valid in water and other clean liquids

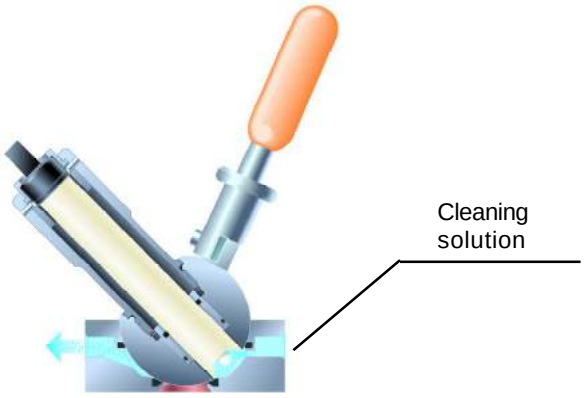
Materials
Wetted parts: AISI316L, AISI904L, Titanium, Hastelloy® C276, Duplex, 254 SMO® and for type **F** PVDF.
Seals: PTFE, PTFE with carbon and graphite filling or PTFE 50%+AISI316 50% mixture

Weight
PASVE pHC 4.7 kg, PASVE pHP 4.8 kg, PASVE pHF 8.9 kg,
Actuator 5.5 kg

OPERATING POSITIONS

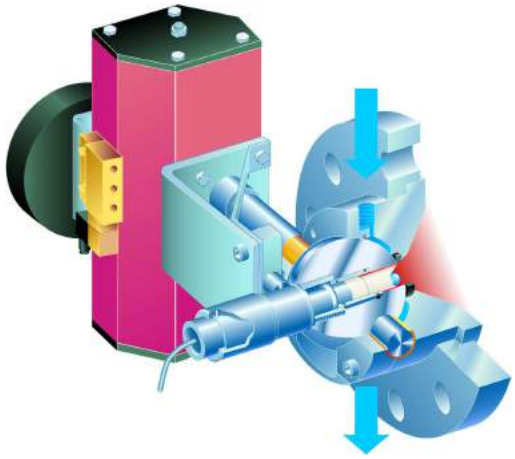


Measuring position
Sensor in measurement. Valve's and sensor's water cooling through flushing channel.



Servicing and calibration position
Sensor turned to cleaning, calibrating and protective position without stopping the process.

Pasve pH manual operation



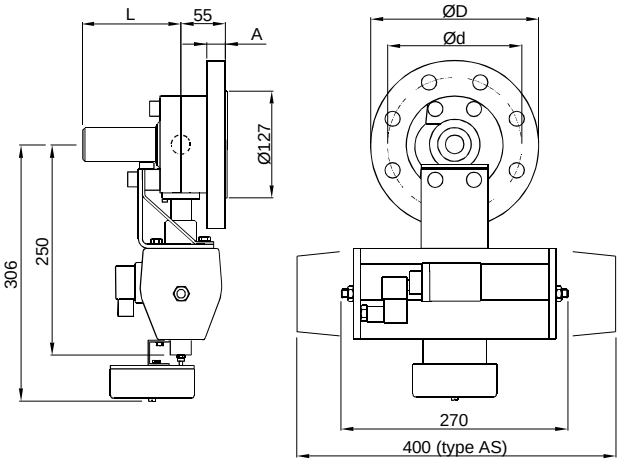
Pasve pH automatic operation with actuator

Spring return, double action, and electric actuator are available. Automatic operation provides many added benefits.

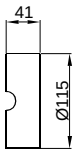
We reserve the right for technical modifications without prior notice.

Pasve pH with pneumatic actuator

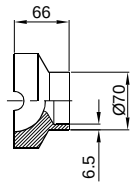
PASVE pHF
(Flange type)



PASVE pHC
(Welded on container or)



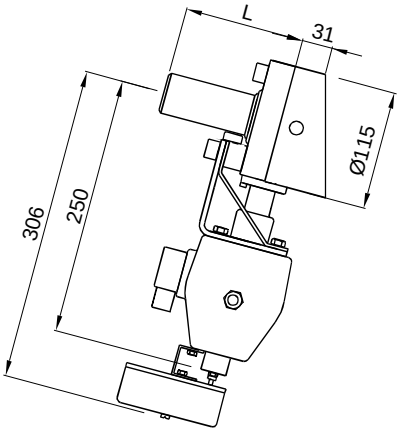
PASVE pHP
(Shape the body to be suitable to the pipe, welded)



PASVE pHF

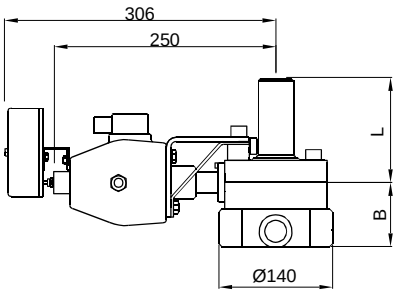
FLANGE Code	Type	ØD	Ød	A
K	ANSI 2½" 150 lbs	172	139.7	22
A	ANSI 3" 150 lbs	191	152.4	22
B	ANSI 3" 300 lbs	210	168.3	27
H	ANSI 4" 150 lbs	229	190.5	26
G	ANSI 4" 300 lbs	254	200	29
T	DN50 PN40	165	125	20
D	DN80 PN40	200	160	22
J	DN100 PN10/16	220	180	22
C	DN100 PN40	235	190	26
E	JIS10K 80	185	150	20
F	JIS40K 80	210	170	30

PASVE pHB
(Welded on container or vertical pipe, body 15º)

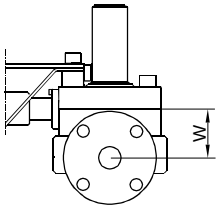


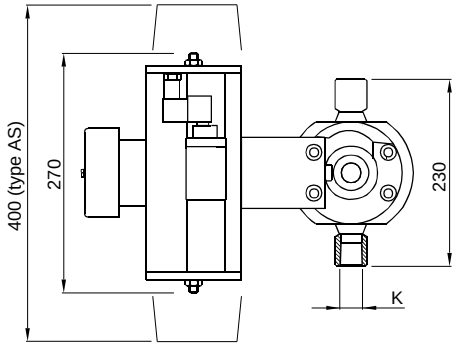
L depends on the sensor type

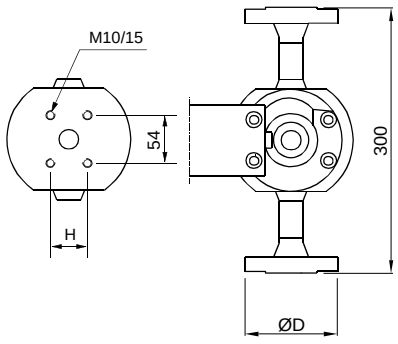
PASVE pHT
(Flow-through, threaded connection)



PASVE pHD
(Flow through, flange connection)







PASVE pHD

FLANGE Code	Type	W	ØD	H
H	ANSI 1" 150 lbs	55	108	48
J	ANSI 1" 300 lbs	55	124	48
U	ANSI 2" 150 lbs	68	153	76
V	ANSI 2" 300 lbs	68	165	76
G	DN25 PN40	55	115	48
T	DN50 PN40	68	165	76

PASVE pHT

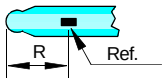
THREAD Code	Type (dim.K)	B	H
2	1" - NPT	77	48
4	1.5" - NPT	92	64
5	2" - NPT	104	76

Dimensions (in mm)

Sensor connection

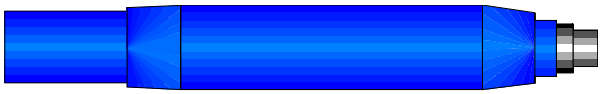
Standard sensor connection PG13.5 / Ø12 mm / length 120 mm

Code	dimension R
S	R < 30 mm
M	R < 20 mm
L	R < 10 mm



Special sensor connection types

Code	Sensor
A1	Satron S508
A2	in-line Satron S508 (manual only)
B1	Broadley-James Dynaprobe II
B2	Broadley-James S410
B3	Broadley-James DynaProbe ST856
C1	Honeywell Durafet II, smooth tip
C2	Honeywell Meredian II and Durafet II guarded tip
D1	Barben 546/556, flat glass, 38 mm insertion depth
D4	Barben 551/561, flat glass, actual insertion depth 3.94"
D6	in-line Barben 551/561, flat glass, 100 mm insertion depth (manual only)
E1	E+H CPF81, guarded tip, machined
E2	E+H CPF81 -flat glass, machined
E3	E+H CPF81/82, guarded tip, not machined
E4	E+H CPF81, flat glass, not machined
F1	Foxboro 871A
F2	Foxboro 871pH
F3	Foxboro PH10-3
F4	Foxboro PH10-2
F5	in-line Foxboro PH10-2 (manual only)
G1	Lange (GLI) PD1P1.99
G2	Lange (GLI) DPD1P1.99
H1	Hamilton Inchtrode N75P
H2	Hamilton Inchtrode N75F
I1	Teledyne Isco 701pH
K1	Kemotron 4835 and 4837 UPW
O2	Orbisphere (31110)
P1	Polymetron 8350/51
R1	Rosemount 389
R2	Rosemount 385+
R4	Rosemount TUpH 396/396VP, 398/398VP
R5	in-line Rosemount TUpH Combination 396P/PVP (manual only)
R6	Rosemount TUpH Combination 396P/PVP
R9	Rosemount 3300HT/HTVP
RA	Rosemount 3500P/VP
RB	Rosemount RB-546
RC	Rosemount 3900/ 3900VP
T1	ABB TB556, flat glass, 38 mm insertion depth
T2	ABB TB557, flat glass
T3	ABB TB564, flat glass
T4	ABB TB561 / Barben 551/561, flat glass, 100 mm insertion depth
T5	in-line ABB TB564 (manual only), flat glass
T6	in-line ABB TB561 (manual only), flat glass, 100 mm insertion depth
T7	ABB TB556, flat glass, 28 mm insertion depth
Y1	Yokogawa FU20 - - NPT (guarded tip)



Surface temperature

Ambient temperature °C	Temperature class
70	T6
85	T5
120	T4

European Directive Information

ATEX directive (94/9/EC)
Satron Instruments Inc. complies with the ATEX directive.

European Pressure Equipment Directive (PED) (97/23/EC)
- Sound Engineering Practice

European Certification: Ex II 3 GD

Selection Table

PASVE pH

Mounting type

- **C** On container or horizontal pipe , welded
- **B** On container or vertical pipe, body 15º, welded
- **P** Shape the body to be suitable to the pipe, welded
- **F** On flange
- **T** Flow-through, threaded connection
- **D** Flow-through, flange connection

Wetted parts (C, B and P)

Code	Material
2	AISI316L (EN 1.4404), std.
3	Hastelloy® C276 (EN 2.4819)
4	AISI904L (EN 1.4539)
6	Titanium Ti-2 (EN 3.7035)
8	Duplex (EN 1.4462)
K	254 SMO®

Process connection type, specified for mounting type F

Flanges Code	Type	Flanges Code	Type
T	DN50 PN40 (only manual using)	**A**	ANSI 3"/150 lbs
D	DN80 PN40	**B**	ANSI 3"/300 lbs
J	DN100 PN10/16	**H**	ANSI 4"150 lbs
C	DN100 PN40	**G**	ANSI 4"/300 lbs
K	ANSI 2½"/150 lbs (only manual using)	**E**	JIS 10K 80
		F	JIS 40K 80

Wetted parts

Code	Material
2	AISI316L (EN 1.4404)
3	Hastelloy® C276 (EN 2.4819)
4	AISI904L (EN 1.4539)
6	Titanium Ti-2 (EN 3.7035)
8	Duplex (EN 1.4462)
K	254 SMO®
P1	PVDF PN10

(P1 only for flange codes D,A,E)

Process connection type, specified for mounting type T

Threads

Code	Type
2	1" - NPT
4	1.5"- NPT
5	2" - NPT

Wetted parts

Code	Material
2	AISI316L (EN 1.4404)
3	Hastelloy® C276 (EN 2.4819)
4	AISI904L (EN 1.4539)
6	Titanium Ti-2 (EN 3.7035)
8	Duplex (EN 1.4462)
K	254 SMO®

Process connection type, specified for mounting type D

Flanges Code	Type	Flanges Code	Type
G	DN25 PN40	**U**	ANSI 2"/150
M	DN40 PN40	**V**	ANSI 2"/300
T	DN50 PN40	**K**	JIS 10K 25
H	ANSI 1"/150	**R**	JIS 10K 40
J	ANSI 1"/300	**S**	JIS 10K 40
N	ANSI 1.5"/150	**X**	JIS 10K 50
P	ANSI 1.5"/300	**L**	JIS 40K 25
		Y	JIS 40K 50

Wetted parts

Code	Material
2	AISI316L (EN 1.4404)
3	Hastelloy® C276 (EN 2.4819)
4	AISI904L (EN 1.4539)
6	Titanium Ti-2 (EN 3.7035)
8	Duplex (EN 1.4462)
K	254 SMO®

Seals

- **0** PTFE + 20C + 5Gr / FPM (std.)
- **1** PTFE 100% / FPM
- **2** PTFE +20C+5Gr / FFPM
- **3** PTFE 100% / FFPM
- **4** PTFE + 20C + 5Gr / FPM+AISI316 / PTFE 50 % (Hard)
- **5** PTFE 100% / FPM+AISI316 / PTFE 50% (Hard)
- **6** PTFE 100% / FPM + PVDF 100% (Hard)
- **7** PTFE + 20C + 5Gr / EPDM
- **8** PTFE 100% / EPDM

Sensor connection

Sensor connection types, see page 3

Pt100 temperature sensor

- **0** No sensor
- **X** With sensor (Measuring range -50 ... +200°C

Actuator

- **MD** No actuator (manually operated
- **AD** Double-action actuator
- **AS** Spring-return actuator
- **AE1** Electric actuator 230 V 50 Hz
- **AE3** Electric actuator 115 V 60 Hz
- **A0** No actuator, fittings to the actuator

Solenoid for actuator (only for actuator types **AD** and **AS**)

- **0** No solenoid valve
- **1** 230 V AC 50 Hz 2 W (as standard)
- **2** 24 V DC 2.5 W (also EEx dm)
- **3** 115 V AC 60 Hz 2 W
- **4** 28 V DC 0.4 W (EEx ia)

Solenoid explosion proof

- **0** No explosion proof
- **1** EEx m II T5
- **2** EEx ia IIC T6 (only 28V)
- **3** EEx dm IIC T5/T6 (only 24V)

Position switches

- **0** None
- **X** Equipped with position switches
- **E** Position switch NAMUR, DIN 19234
- **A** Position switch EEX ib IIC T5/T6

Special options

- **Z1** For oxygen use
- **Z2** Process side flushing
- **Z3** Actuator (AS) reverse action
- **Z4** Cutting ball
- **Z5** Diamond-coated ball
- **Z7** Process side flushing through the ball, only Ø12 / L = 120mm sensors

Documentation

Installation and operating instructions

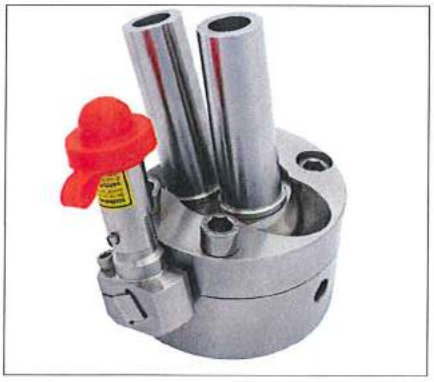
- **IE** English
- **IF** Finnish

Material certificates

- **0** No material certificate
- **MC1** SFS-EN 10204-2.1 (DIN50049-2.1)
- **MC2** SFS-EN 10204-2.2 (DIN50049-2.2)
- **MC3** SFS-EN 10204-3.1B (DIN50049-3.1B)

Specification example: PASVE pH D U2 0 O2 X AD3 1 E Z1 IEMC1

SATRON PASVE DUAL Mounting & Service Valve



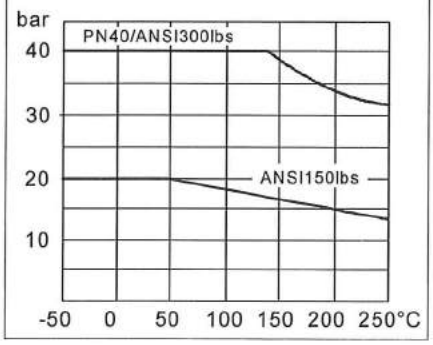
PASVE® DUAL is mounting and service valve for two pH sensors of diameter 12 mm. It can be used with practically all pH sensors in this size category.
PASVE® DUAL allows the cleaning and calibration of pH sensors without stopping the process. When required, this can be done automatically. To protect the sensor in abrasive processes, it can be turned to the measuring position only for the duration of the actual measurement.
PASVE® DUAL is available in a manually operated type or equipped with a pneumatic or electric actuator.

TECHNICAL SPECIFICATIONS

Applicable pH sensors
Refer to the Selection Table.

Max. operating pressure/ temperature
40 bar, 250 °C, (see the appended table). Min. operating temp. -50°C. Sensor-specific limitations should also be taken into account in applications.

Pressure/Temperature curve

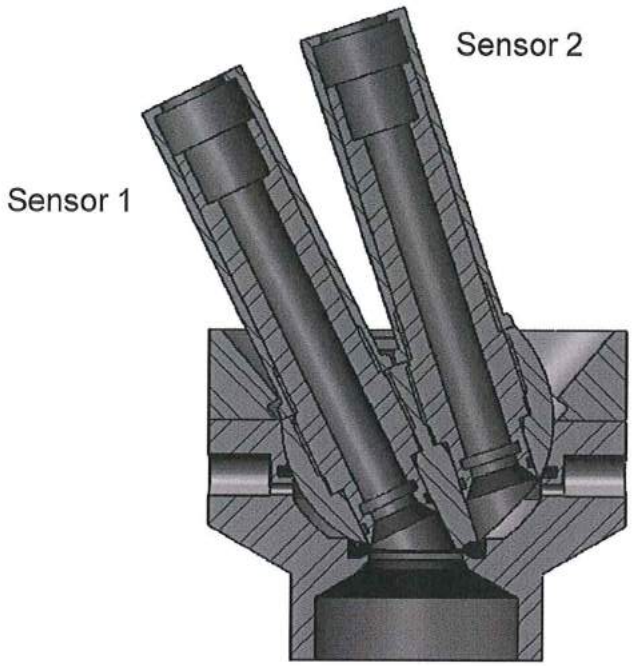


Materials
Wetted parts: AISI316L, AISI904L, Titanium, Hastelloy® C276, Duplex, 254 SMO®.
Seals: PTFE, PTFE with carbon and graphite filling or PTFE 50%+AISI316 50% mixture

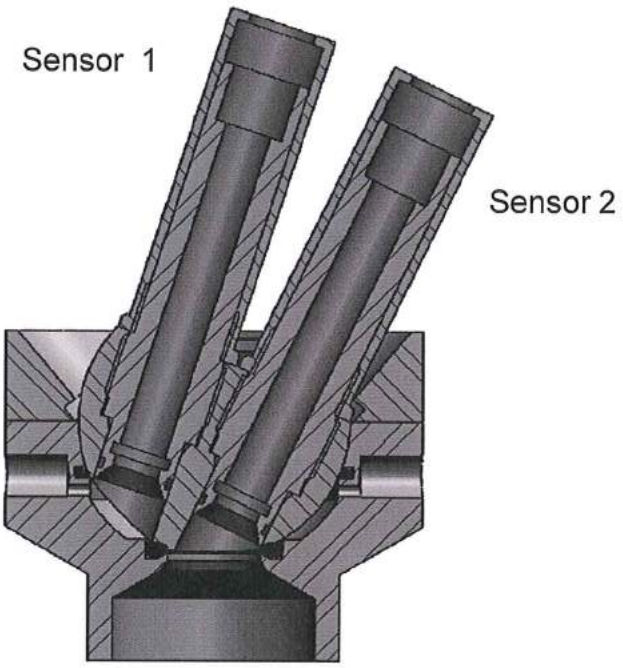
Weight

PASVE DUAL C	4,7 kg
PASVE DUAL B and P	4,8 kg
PASVE DUAL F	8,9 kg
Actuator 5,5 kg	

WORKING POSITIONS



Position A
Sensor 1 in measurement and sensor 2 in flushing, in calibration or in maintenance



Position B
Sensor 1 in flushing, in calibration or in maintenance and sensor 2 in measurement

We reserve the right for technical modifications without prior notice.

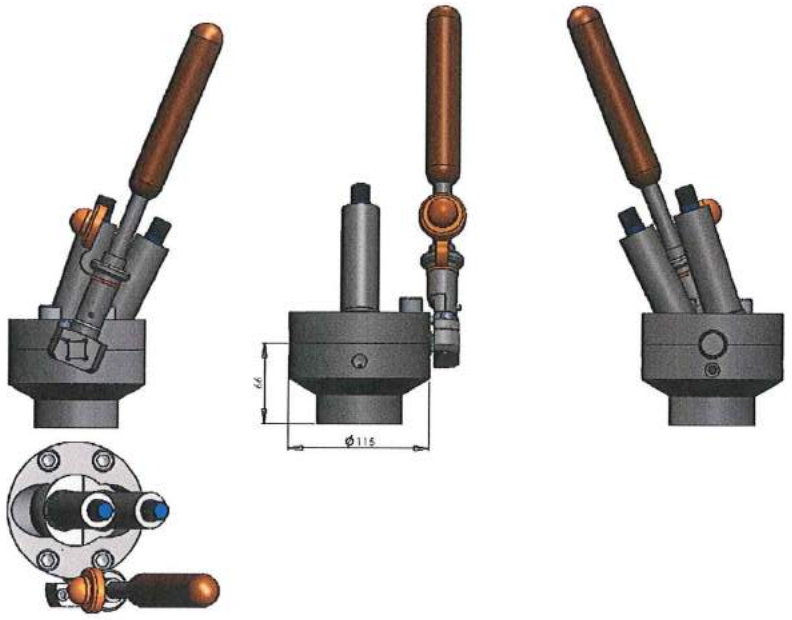
CE

SATRON instruments
Satron Instruments Inc., P.O.Box 22, FI-33901 Tampere, Finland
Tel. + 358 207 464 800, Telefax +358 207 464 801 www.satron.com

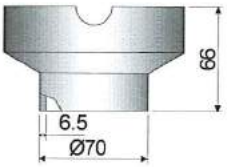
SATRON PASVE DUAL

Mounting & Service Valve

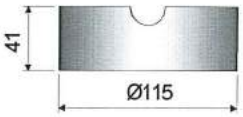
Dimensions (in mm)

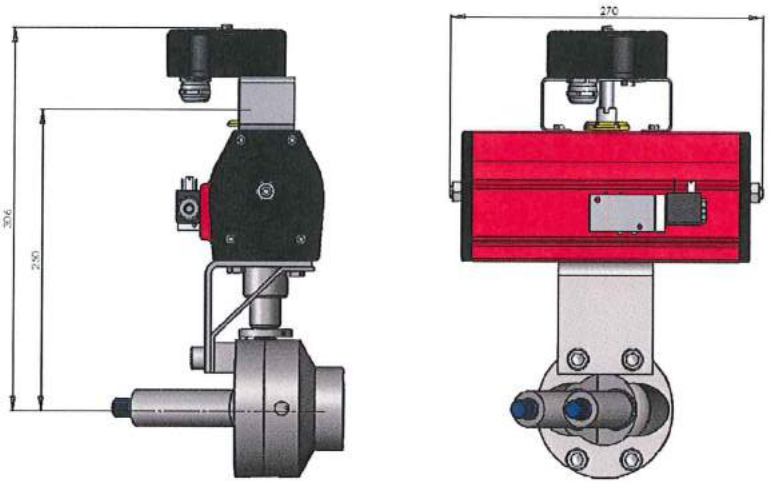


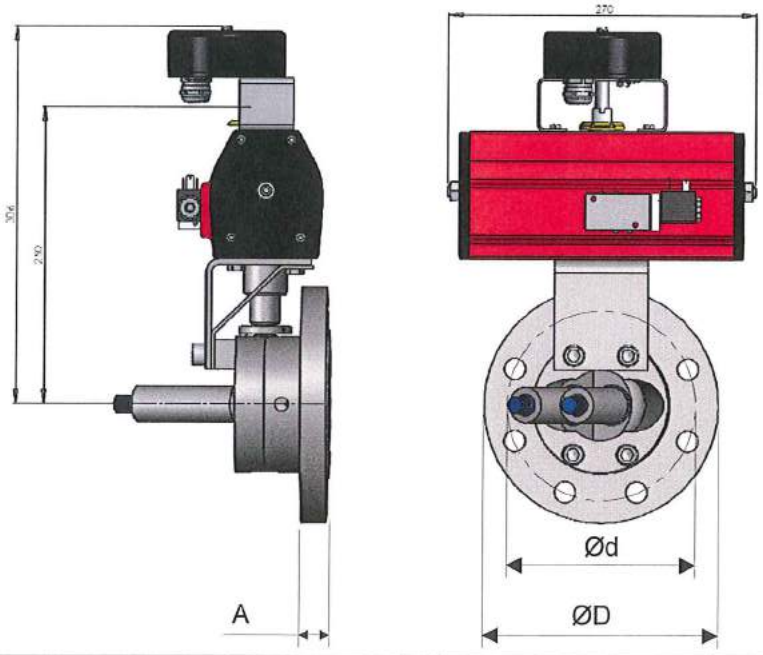
PASVE DUAL P
(Shape the body to be suitable to the pipe, welded)



PASVE DUAL C
(Welded on container or horizontal pipe)





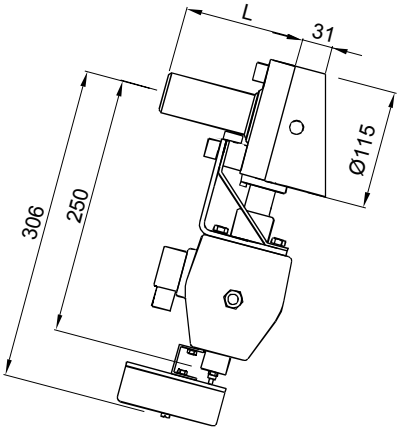


PASVE DUAL F
(Flange type)

PASVE DUAL F

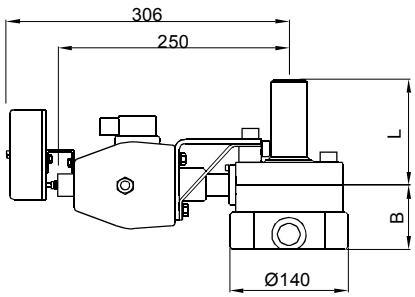
Code	Flange (a) Type	ØD	Ød	A
A	ANSI 3" 150 lbs	191	152.4	22
B	ANSI 3" 300 lbs	210	168.3	27
H	ANSI 4" 150 lbs	229	190.5	26
G	ANSI 4" 300 lbs	254	200	29
D	DN80 PN40	200	160	22
J	DN100 PN10/16	220	180	22
C	DN100 PN40	235	190	26
E	JIS10K 80	185	150	20
F	JIS40K 80	210	170	30

PASVE DUAL B
(Welded on container or vertical pipe, body 15º)

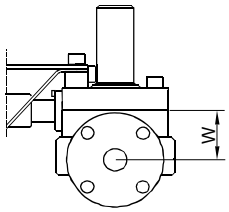


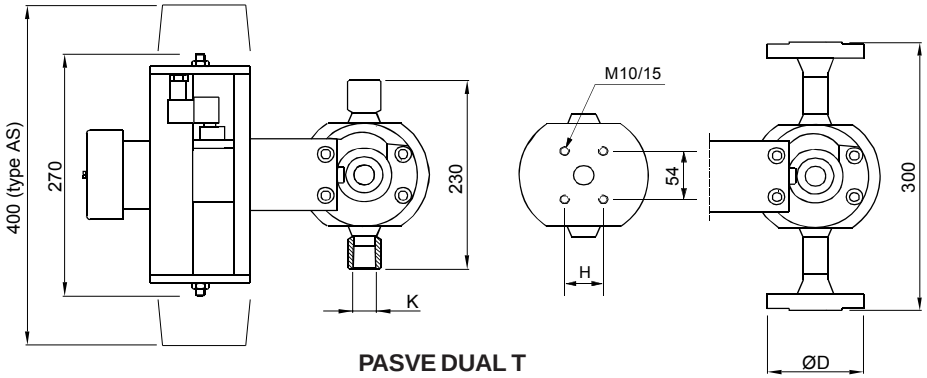
L depends on the sensor type

PASVE DUAL T
(Flow-through, threaded connection)



PASVE DUAL D
(Flow through, flange connection)





PASVE DUAL D

FLANGE Code	Type	W	ØD	H
H	ANSI 1" 150 lbs	55	108	48
J	ANSI 1" 300 lbs	55	124	48
U	ANSI 2" 150 lbs	68	153	76
V	ANSI 2" 300 lbs	68	165	76
G	DN25 PN40	55	115	48
T	DN50 PN40	68	165	76

PASVE DUAL T

THREAD Code	Type (dim.K)	B	H
2	1" - NPT	77	48
4	1.5" - NPT	92	64
5	2" - NPT	104	76

Dimensions (in mm)

Surface temperature

Ambient temperature °C	Temperature class
70	T6
85	T5
120	T4

European Directive Information

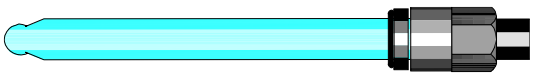
ATEX directive (94/9/EC)
Satron Instruments Inc. complies with the ATEX directive.

European Pressure Equipment Directive (PED) (97/23/EC)
- Sound Engineering Practice

European Certification: Ex II 3 GD

Sensor connection

Code	Sensor
A	**Standard sensor connection PG13.5 / Ø12 / length 120 mm**



Selection Table

PASVE DUAL — ☐☐☐☐☐☐☐☐☐☐☐☐☐

Mounting type

C	On container or horizontal pipe , welded
B	On container or vertical pipe, body 15º, welded
P	Shape the body to be suitable to the pipe, welded
F	On flange
T	Flow-through, threaded connection
D	Flow-through, flange connection

Wetted parts (C, B and P)

Code	Material
none	AISI316L (std.)
3	Hastelloy® C276
4	AISI904L
6	Titanium
8	Duplex (EN 1.4462)
K	254 SMO®

Process connection type, specified for mounting type F

Flanges Code	Type	Flanges Code	Type
T	DN50 PN40 (only manual using)	**H**	ANSI 4"150 lbs
D	DN80 PN40	**G**	ANSI 4"/300 lbs
J	DN100 PN10/16	**E**	JIS 10K 80
C	DN100 PN40	**F**	JIS 40K 80
A	ANSI 3"/150 lbs		
B	ANSI 3"/300 lbs		

Wetted parts

Code	Material
2	AISI316L
3	Hastelloy® C276
4	AISI904L
6	Titanium
8	Duplex (EN 1.4462)
K	254 SMO®

Process connection type, specified for mounting type T

Threads Code	Type
2	1" - NPT
4	1.5"- NPT
5	2" - NPT

Wetted parts

Code	Material
2	AISI 316L
3	Hastelloy® C276
4	AISI904L
6	Titanium
8	Duplex (EN 1.4462)
K	254 SMO®

Process connection type, specified for mounting type D

Flanges Code	Type	Flanges Code	Type
G	DN25 PN40	**U**	ANSI 2"/150
M	DN40 PN40	**V**	ANSI 2"/300
T	DN50 PN40	**K**	JIS 10K 25
H	ANSI 1"/150	**R**	JIS 10K 40
J	ANSI 1"/300	**S**	JIS 10K 40
N	ANSI 1.5"/150	**X**	JIS 10K 50
P	ANSI 1.5"/300	**L**	JIS 40K 25
		Y	JIS 40K 50

Wetted parts

Code	Material
2	AISI316L
3	Hastelloy® C276
4	AISI904L
6	Titanium
8	Duplex (EN 1.4462)
K	254 SMO®

Seals

0	PTFE + 20C + 5Gr / FPM (std.)
1	PTFE 100% / FPM
2	PTFE +20C+5Gr / FFPM
3	PTFE 100% / FFPM
4	PTFE + 20C + 5Gr / FPM+AISI316 / PTFE 50 % (Hard)
5	PTFE 100% / FPM+AISI316 / PTFE 50% (Hard)
6	PTFE 100% / FPM + PVDF 100% (Hard)

Sensor connection

A	PG13,5 / Ø12 / 120 mm

Pt100 temperature sensor

0	No sensor
X	With sensor (Measuring range -50 ... +200°C

Actuator

MD	No actuator (manually operated
AD	Double-action actuator
AS	Spring-return actuator
AE1	Electric actuator 230 V 50 Hz
AE3	Electric actuator 115 V 60 Hz
A0	No actuator, fittings to the actuator

Solenoid for actuator (only for actuator types **AD** and **AS**)

0	No solenoid valve	**2**	24 V DC 2.5 W (also EEx dm)	**4**	28 V DC 0.4 W (EEx ia)
1	230 V AC 50 Hz 2 W (as standard)	**3**	115 V AC 60 Hz 2 W		

Solenoid explosion proof

0	No explosion proof	**2**	EEx ia IIC T6 (only 28V)
1	EEx m II T5	**3**	EEx dm IIC T5/T6 (only 24V)

Position switches

0	None	**A**	Position switch EEX ib IIC T5/T6
X	Equipped with position switches		
E	Position switch NAMUR, DIN 19234		

Special options

Z1	For oxygen use	**Z5**	Diamond-coated ball
Z2	Process side flushing		
Z3	Actuator (AS) reverse action		

Documentation

Installation and operating instructions

IE	English
IF	Finnish

Material certificates

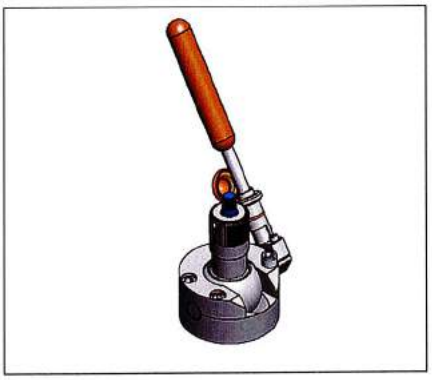
0	No material certificate
MC1	SFS-EN 10204-2.1 (DIN50049-2.1)
MC2	SFS-EN 10204-2.2 (DIN50049-2.2)
MC3	SFS-EN 10204-3.1B (DIN50049-3.1B)

Specification example: PASVE DUAL C 2 0 A X AD3 1 E Z5 IEMC1

SATRON PASVE pH-U

Mounting & Service Valve

G370
15.11.2012



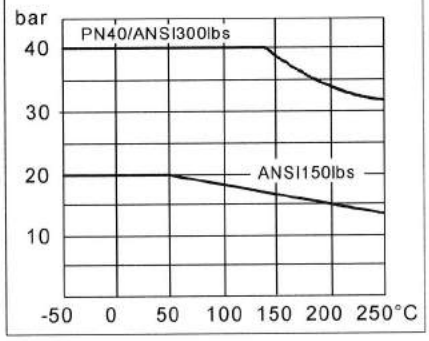
PASVE® pH-U is a mounting/service valve for Ø12 mm pH sensors. It can be used with practically all pH sensors in this size category.
PASVE® pH-U allows the cleaning and calibration of pH sensors without stopping the process. When required, this can be done automatically. To protect the sensor in abrasive processes, it can be turned to the measuring position only for the duration of the actual measurement.
PASVE® pH-U is available in a manually operated type or equipped with a pneumatic or electric actuator.

TECHNICAL SPECIFICATIONS

Applicable pH sensors
Refer to the Selection Table.

Max. operating pressure/ temperature
40 bar, 250 °C, (see the appended table). Min. operating temp. -50°C. Sensor-specific limitations should also be taken into account in applications.

Pressure/Temperature curve



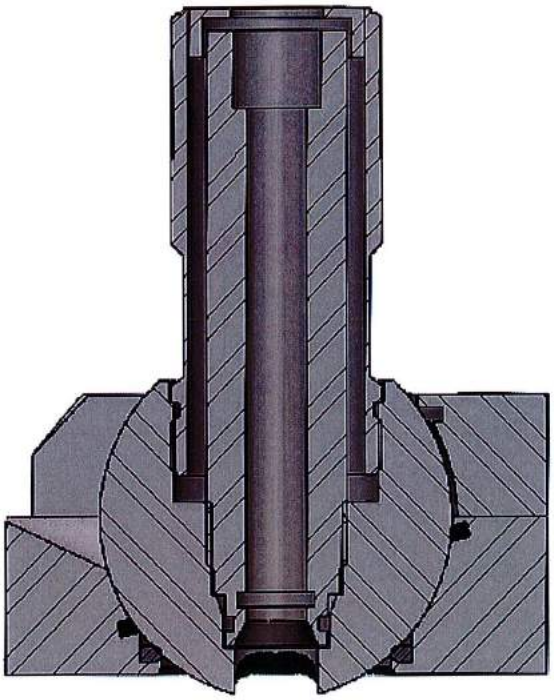
Materials
Wetted parts: AISI316L, AISI904L, Titanium, Hastelloy® C276, Duplex, 254 SMO®.
Seals: PTFE, PTFE with carbon and graphite filling or PTFE 50%+AISI316 50% mixture

Weight

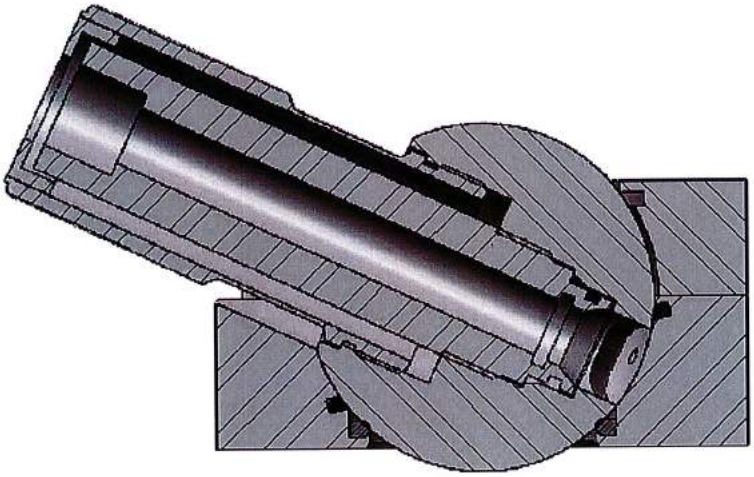
PASVE pH-UB	4,8 kg
PASVE pH-UC	4,7 kg
PASVE pH-UP	4,8 kg

Actuator 5,5 kg

WORKING POSITIONS



Measuring position
Sensor in measurement. Valve's and sensor's water cooling through flushing channel.



Servicing and calibration position
Sensor turned to cleaning, calibrating and protective position without stopping the process.

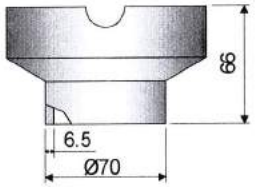
We reserve the right for technical modifications without prior notice.

SATRON instruments

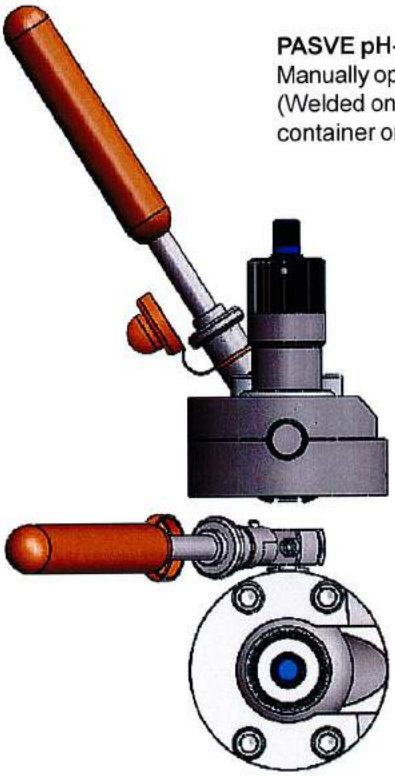
Satron Instruments Inc., P.O.Box 22, FI-33901 Tampere, Finland
Tel. + 358 207 464 800, Telefax 0207 464 801 www.satron.com

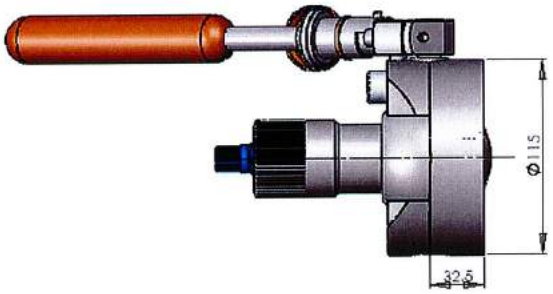
Dimensions (in mm)

PASVE pH-U P
(Shape the body to be suitable to the pipe, welded)

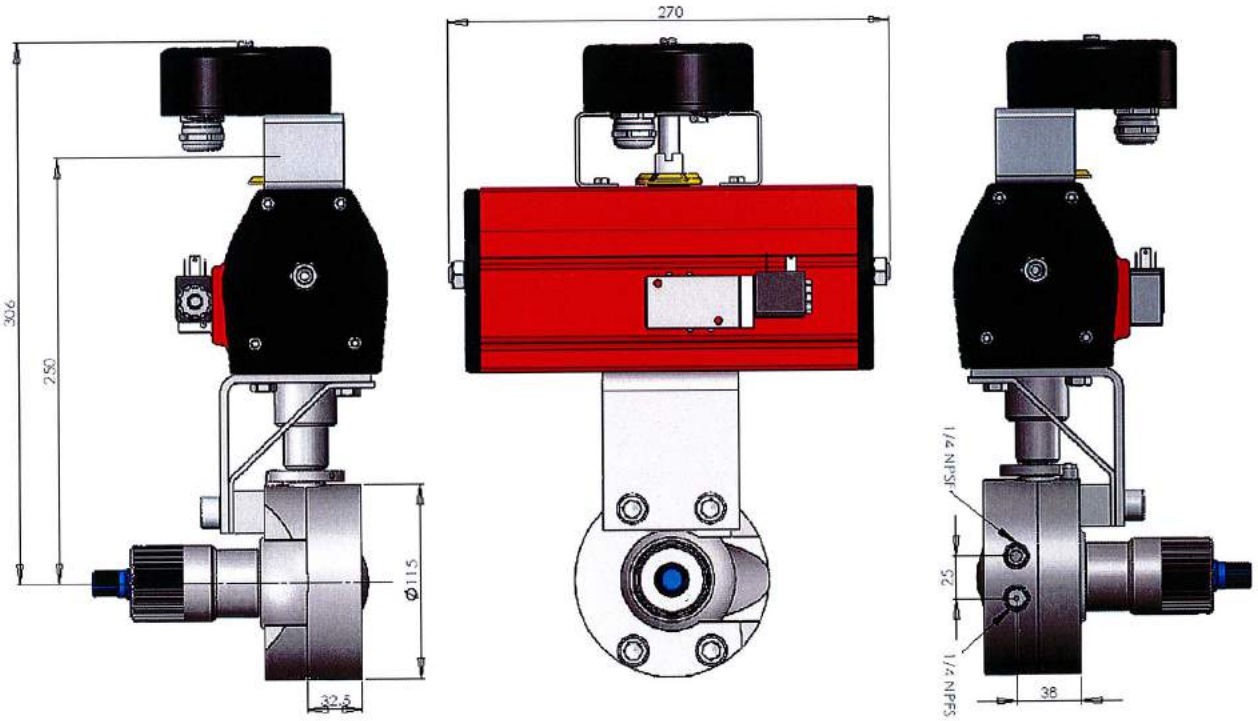


PASVE pH-U C,
Manually operated (MD)
(Welded on container or)



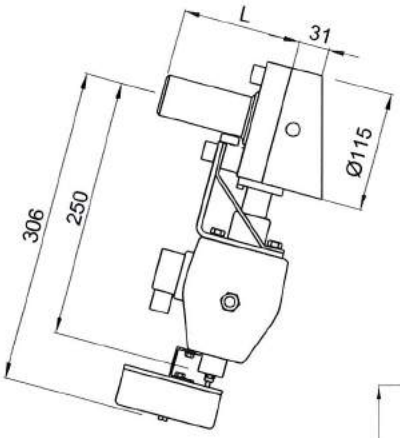


PASVE pH-U C,
Double-action actuator (AD)
(Welded on container or horizontal pipe)



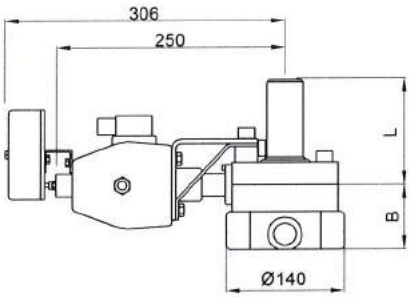
SATRON PASVE pH-U Mounting & Service Valve

PASVE pH-U B
(Welded on container or vertical pipe, body 15°)

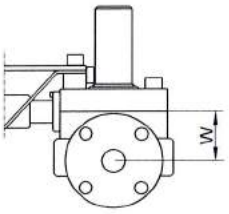


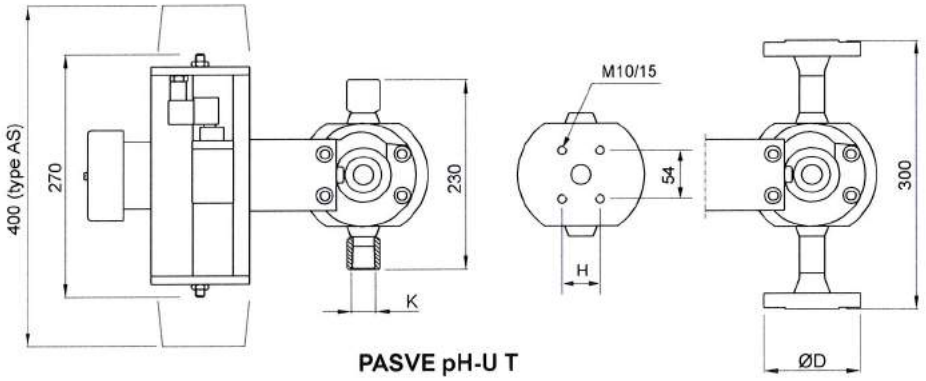
L depends on the sensor type

PASVE pH-U T
(Flow-through, threaded connection, mounting type T)



PASVE pH-U D
(Flow through, flange connection, mounting type D)





PASVE pH-U D

FLANGE Code	Type	W	ØD	H
H	ANSI 1" 150 lbs	55	108	48
J	ANSI 1" 300 lbs	55	124	48
U	ANSI 2" 150 lbs	68	153	76
V	ANSI 2" 300 lbs	68	165	76
G	DN25 PN40	55	115	48
T	DN50 PN40	68	165	76

PASVE pH-U T

THREAD Code	Type (dim.K)	B	H
2	1" - NPT	77	48
4	1.5" - NPT	92	64
5	2" - NPT	104	76

Dimensions (in mm)

Surface temperature

Ambient temperature °C	Temperature class
70	T6
85	T5
120	T4

European Directive Information

ATEX directive (94/9/EC)
Satron Instruments Inc. complies with the ATEX directive.

European Pressure Equipment Directive (PED) (97/23/EC)
- Sound Engineering Practice

European Certification: Ex II 3 GD

Sensor connection

Code	Sensor
A	**Standard sensor connection PG13.5 / Ø12 / length 120 mm**

SATRON PASVE pH-U Mounting & Service Valve

Selection Table

PASVE pH-U

Mounting type

C	On container or horizontal pipe , welded
B	On container or vertical pipe, body 15º, welded
P	Shape the body to be suitable to the pipe, welded
T	Flow-through, threaded connection
D	Flow-through, flange connection

Wetted parts (C, B and P)

Code	Material
2	AISI316L (EN 1.4404) (std.)
3	Hastelloy® C276 (EN 2.4819)
4	AISI904L (EN 1.4539)
6	Titanium Ti-2 (EN 3.7035)
8	Duplex (EN 1.4462)
K	254 SMO®

Process connection type, specified for mounting type T

Threads

Code	Type
2	1" - NPT
4	1.5"- NPT
5	2" - NPT

Wetted parts

Code	Material
2	AISI316L (EN 1.4404) (std.)
3	Hastelloy® C276 (EN 2.4819)
4	AISI904L (EN 1.4539)
6	Titanium Ti-2 (EN 3.7035)
8	Duplex (EN 1.4462)
K	254 SMO®

Process connection type, specified for mounting type D

Flanges

Code	Type
G	DN25 PN40
M	DN40 PN40
T	DN50 PN40
H	ANSI 1"/150
J	ANSI 1"/300
N	ANSI 1.5"/150
P	ANSI 1.5"/300

Flanges

Code	Type
U	ANSI 2"/150
V	ANSI 2"/300
K	JIS 10K 25
R	JIS 10K 40
S	JIS 10K 40
X	JIS 10K 50
L	JIS 40K 25
Y	JIS 40K 50

Wetted parts

Code	Material
2	AISI316L (EN 1.4404) (std.)
3	Hastelloy® C276 (EN 2.4819)
4	AISI904L (EN 1.4539)
6	Titanium Ti-2 (EN 3.7035)
8	Duplex (EN 1.4462)
K	254 SMO®

Seals

0	PTFE + 20C + 5Gr / FPM (std.)	4	PTFE + 20C + 5Gr / FPM+AISI316 / PTFE 50 % (Hard)
1	PTFE 100% / FPM	5	PTFE 100% / FPM+AISI316 / PTFE 50% (Hard)
2	PTFE +20C+5Gr / FFPM	6	PTFE 100% / FPM + PVDF 100% (Hard)
3	PTFE 100% / FFPM		

Sensor connection

A	PG13,5 / Ø12 / 120 mm

Pt100 temperature sensor

0	No sensor
X	With sensor (Measuring range -50 ... +200°C

Actuator

MD	No actuator (manually operated)	AE1	Electric actuator 230 V 50 Hz
AD	Double-action actuator	AE3	Electric actuator 115 V 60 Hz
AS	Spring-return actuator	A0	No actuator, fittings to the actuator

Solenoid for actuator (only for actuator types **AD** and **AS**)

0	No solenoid valve	2	24 V DC 2.5 W (also EEx dm)	4	28 V DC 0.4 W (EEx ia)
1	230 V AC 50 Hz 2 W (as standard)	3	115 V AC 60 Hz 2 W		

Solenoid explosion proof (only for actuator types **AD** and **AS**)

0	No explosion proof	2	EEx ia IIC T6 (only 28V)
1	EEx m II T5	3	EEx dm IIC T5/T6 (only 24V)

Position switches

0	None	A	Position switch EEX ib IIC T5/T6
X	Equipped with position switches		
E	Position switch NAMUR, DIN 19234		

Special options

Z1	For oxygen use	Z5	Diamond-coated ball
Z3	Actuator (AS) reverse action		

Documentation

Installation and operating instructions

IE	English
IF	Finnish

Material certificates

0	No material certificate
MC1	SFS-EN 10204-2.1 (DIN50049-2.1)
MC2	SFS-EN 10204-2.2 (DIN50049-2.2)
MC3	SFS-EN 10204-3.1B (DIN50049-3.1B)

Specification example: PASVE pH-U C 2 0 A X AD3 1 E Z1 IEMC1

CE

PASVE SC/SF/SH/SP/ST Sampling Valve

The PASVE® SC/SF/SH/SP/ST is a miniature ball valve which readily accepts commercially available septum hygienic rubbers. The PASVE® SC/SF/SH/SP/ST provides you with the opportunity of taking hygienic samples from your process without interrupting the process.

The PASVE® SC/SF/SH/SP/ST can be used in any industrial process where it is necessary obtain a sample from the process which is not influenced or contaminated from any outside disturbances.

The PASVE® SC/SF/SH/SP/ST is a member of the Satron PASVE® Series, which is commonly used with pH probes, oxygen sensors and Satron's high precision patented pressure and level transmitters.

Technical Specifications

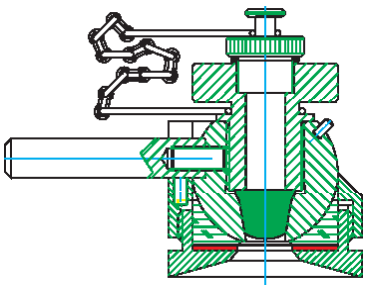
Material
Housing: AISI316L
Gasket: PTFE / Silicone rubber seal

Max. process pressure:
10 bar (150 psi)
(subject to type of rubber septum selected)

Max. process temperature:
120 °C (250 °F) (subject to type of rubber septum selected)

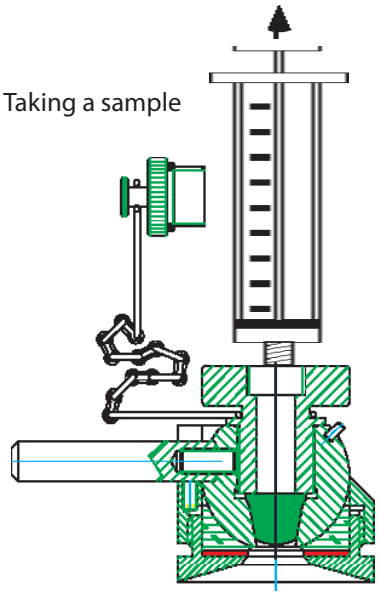
Operation

Position of taking a sample

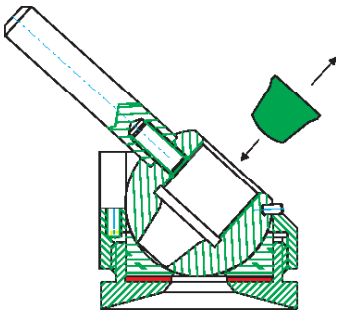


PROCESS

Taking a sample



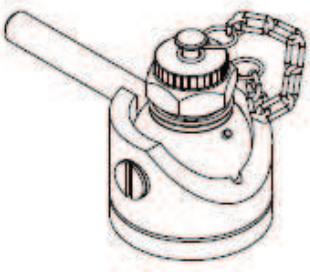
Changing the rubber septum



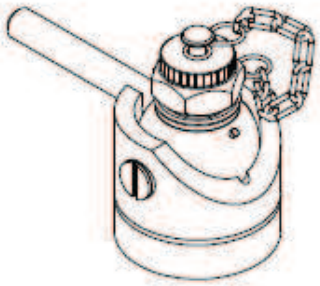
PASVE is the registered trademark of Satron Instruments Inc.

We reserve the right for technical modifications without prior notice.

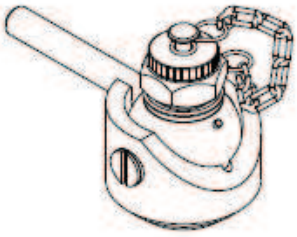
Satron Instruments Inc., P.O.Box 22, FIN-33901 Tampere, Finland
Tel. +358 207 464 800, Telefax +358 207 464 801, www.satron.com



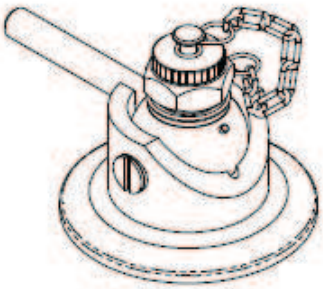
PASVE SC



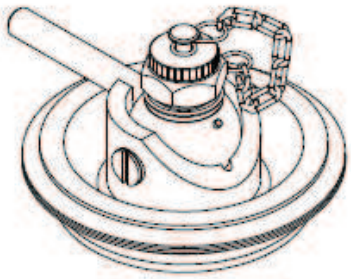
PASVE SC - 10



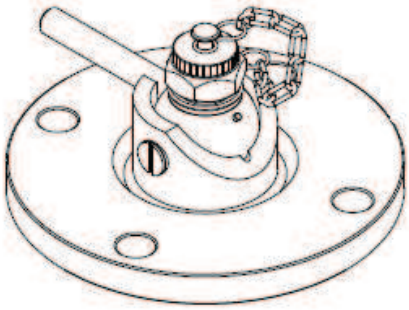
PASVE SP



PASVE SH
- Tri-Clamp, sizes DN25/DN38 and DN40/51



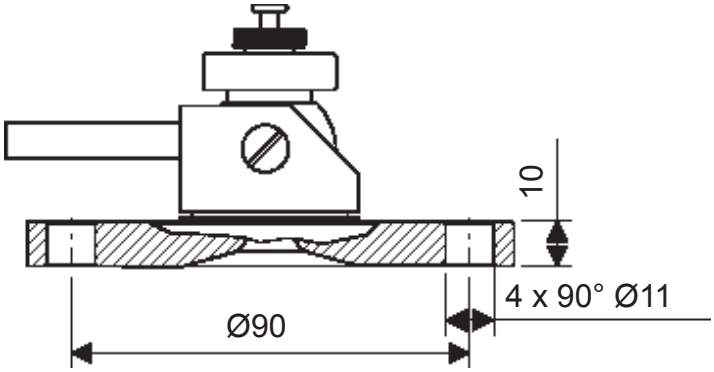
PASVE ST
- Tuchenhagen, sizes DN25/DN32 and DN40/DN50



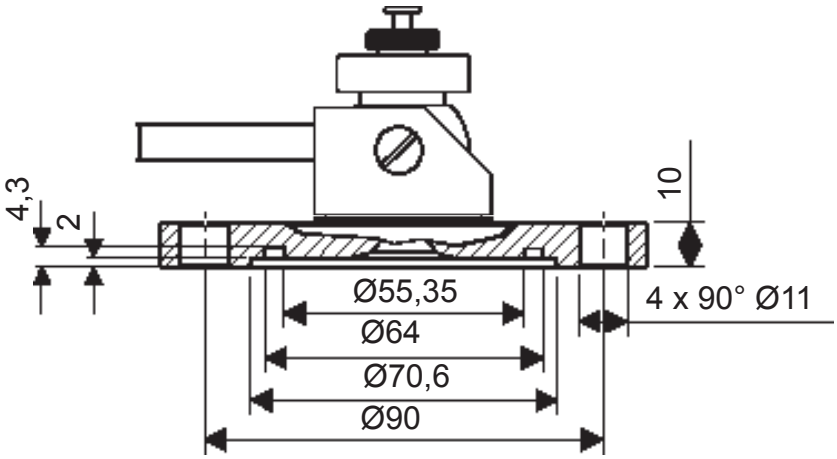
PASVE SF
- Flange SF D110 APV-FN1-50
- Flange SF D110

Dimensions (in mm)

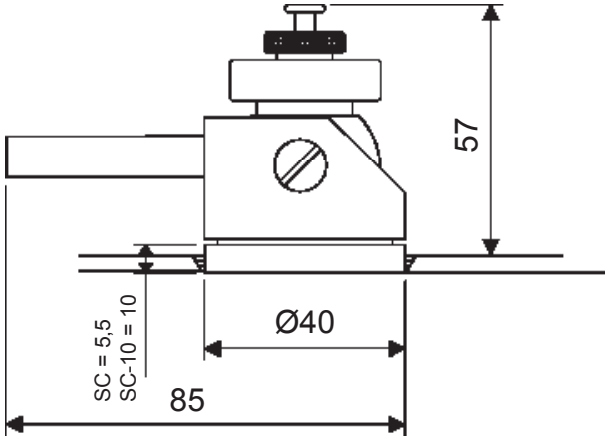
PASVE SF
- Flange SF D110
- Outer diameter of flange is 110 mm



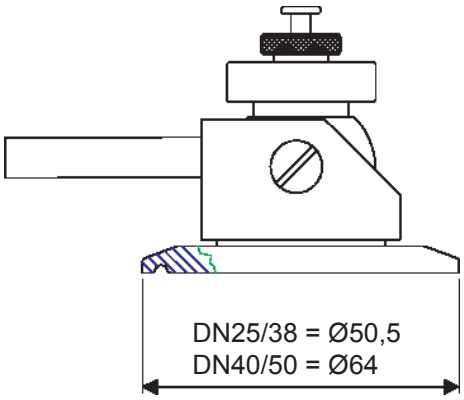
PASVE SF
- Flange SF D110 APV-FN1-50
- Outer diameter of flange is 110 mm



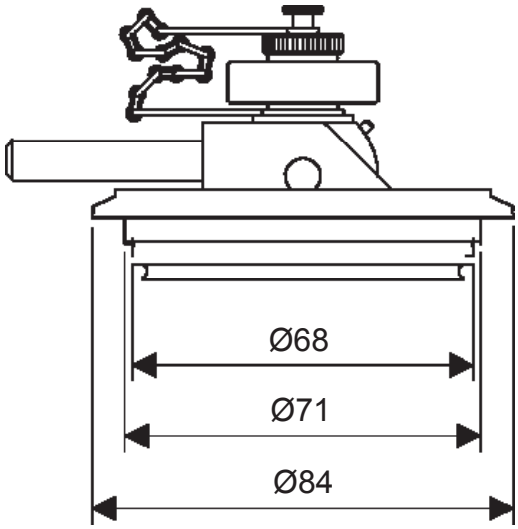
Dimensions (in mm)



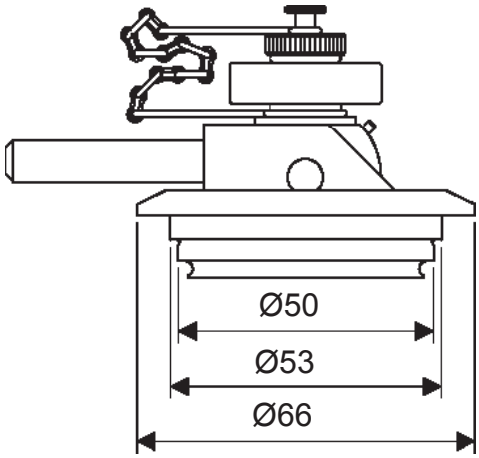
PASVE SC
and SC - 10



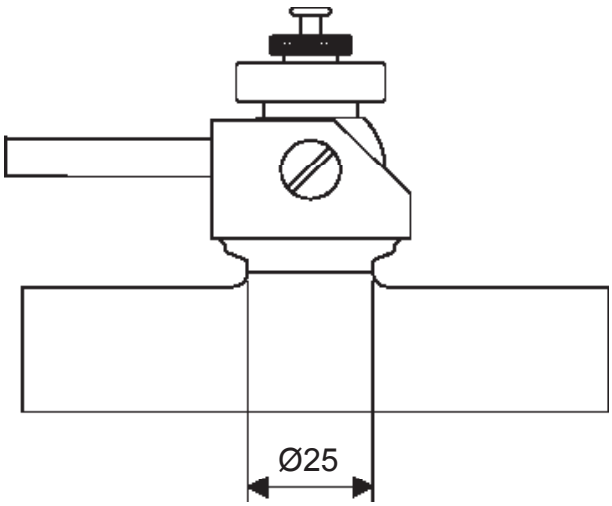
PASVE SH (Tri-Clamp)
- Sizes DN25/38 and DN40 / 51



PASVE ST (Tuchenhagen)
- Size DN40 / 50

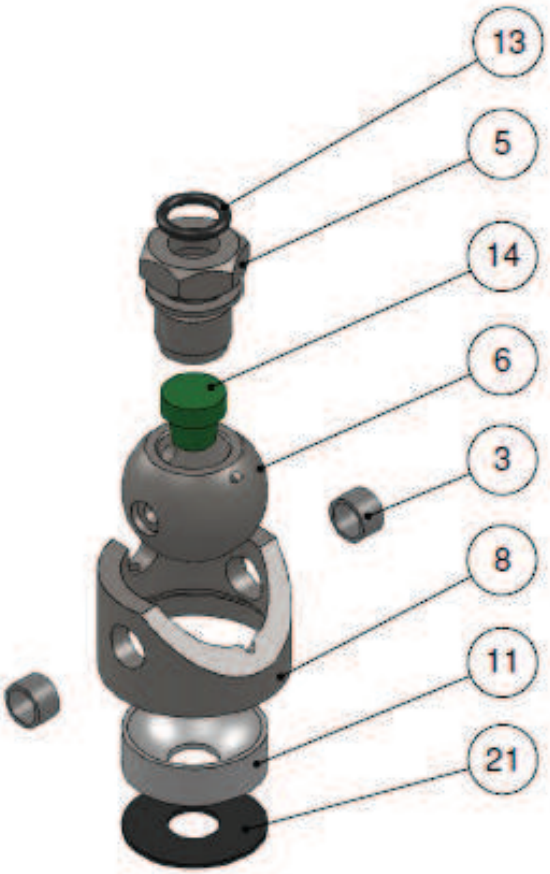


PASVE ST (Tuchenhagen)
- Size DN25 / 32



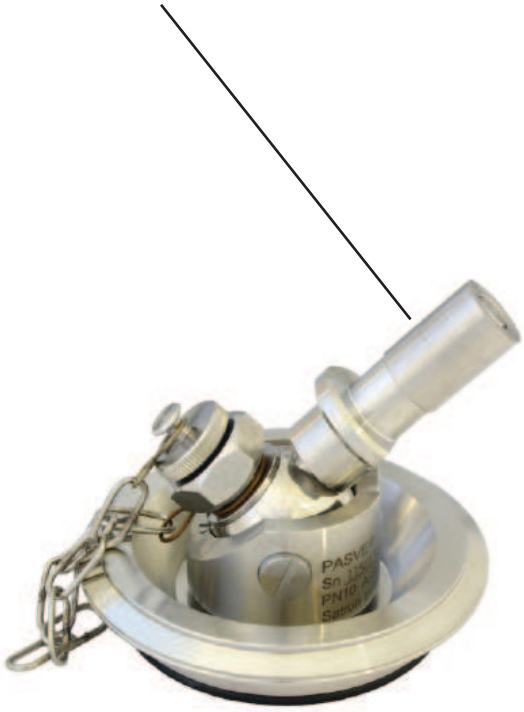
PASVE SP

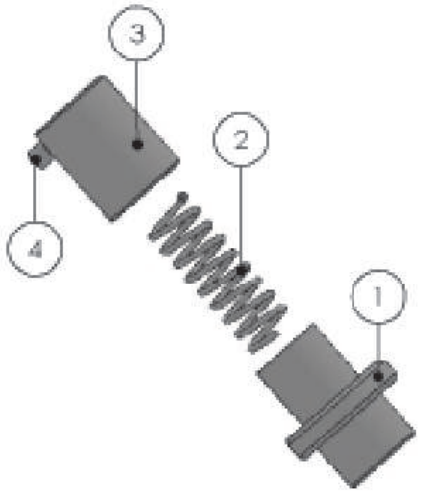
Upgrade kit



Part no.	Part name	Order code
3	Bearing	V10103004
5	Special nut V	T1010344
6	Valve ball V	T1010342
8	Valve body LV	T1010343
11	Gasket	V10103012
13	O-ring Ø11,3 x 2,4 NBR	80001101
14	Rubber septum	V10103014
21	Rubber seal	T1010331
Upgrade kit, assembly		M1010043

Protection kit

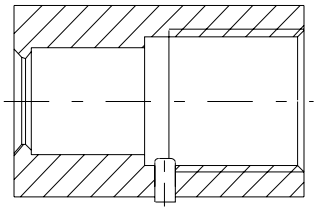




Part no.	Part name	Order code
1	Pull-out sleeve	T1010338
2	Spring	T1010341
3	Locking sleeve	T1010339
4	Retaining screw M4x4 DIN916 A4	53002440
Protection kit 2, assembly		M1010042

Mounting couplings for Satron VG transmitter

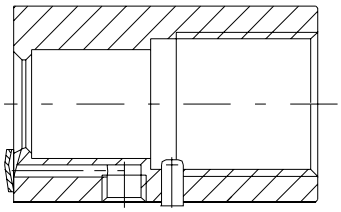
Thread and clamp couplings



Standard coupling G1

Order codes:

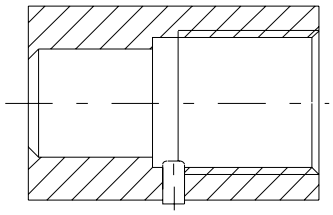
- AISI316L	M546197
- Duplex	M5461978
- Hastelloy C276	M5461973
- Titanium	M5461976



Standard coupling G1 with cleaning

Order codes:

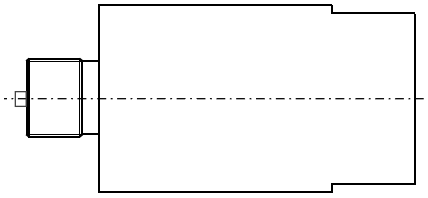
- AISI316L	M1050020
- Duplex	M10500208
- Hastelloy C276	M10500203
- Titanium	M10500206



Hygienic coupling G1

Order codes:

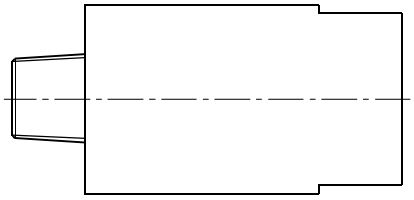
- AISI316L	M548101
- Duplex	M5481018
- Hastelloy C276	M548102
- Titanium	M548103



Coupling G1 / G½A

Order code:

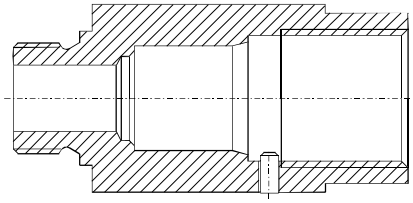
- AISI316L	M546190



Coupling G1 / ½ -NPT

Order code:

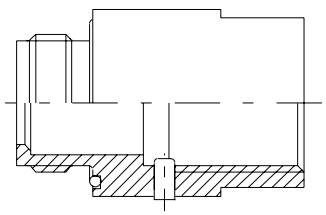
- AISI316L	M551566



Coupling G1 / G¾A

Order code:

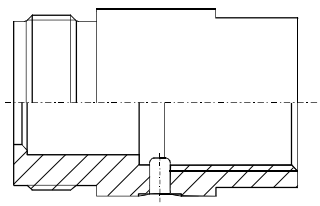
- AISI316L	T1050218



Coupling G1 / G1A

Order codes:

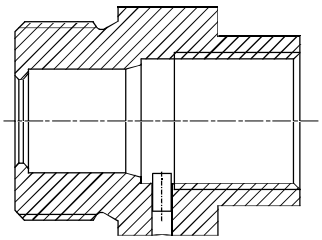
- AISI316L	M1050002
- Hastelloy C276	M10500023



Coupling G1 / G1¼A

Order code:

- AISI316L	M1050014

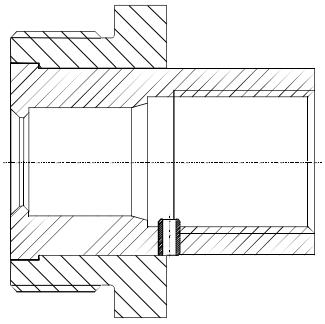


Coupling G1 / G1½A

Order code:

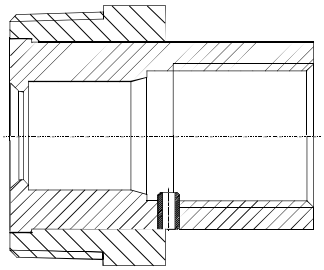
- AISI316L	T1050214

Mounting couplings for Satron VG transmitter



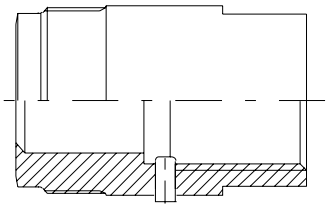
Coupling G1 / G2A

Order code:
- AISI316L M1050036



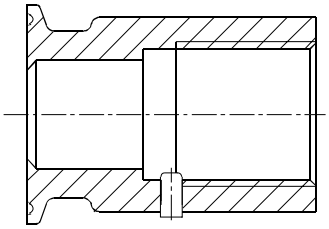
Coupling G1 / 2-NPT

Order code:
- AISI316L M1050028



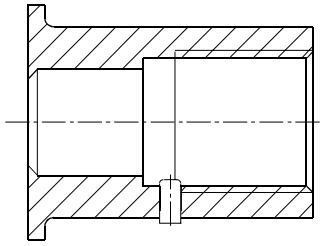
Coupling G1 / M44 x 1,25 (PMC)

Order codes:
- AISI316L M1050004
- Hastelloy C276 M10500043



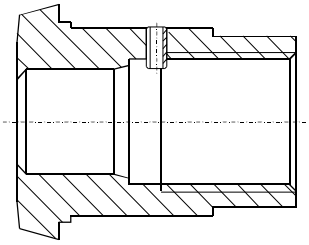
Coupling G1 / Hygienic coupling ISO2852 standard:

Order codes (AISI316L):
- Tri-Clamp 25/38 M1050206
- Tri-Clamp 40/51 M1050222
- Tri-Clamp 63,5 M1050224
- Tri-Clamp 70 M1050225
- Tri-Clamp 76,1 M1050226
- Tri-Clamp 88,9 M1050227
- Tri-Clamp 101,6 M1050228
- Tri-Clamp 114,3 M1050229
- Tri-Clamp 139,7 M1050230



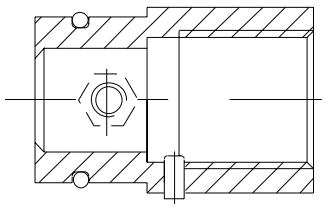
Coupling G1 / Hygienic coupling SMS standard:

Order codes (AISI316L):
- SMS 38 M1050265
- SMS 51 M1050267



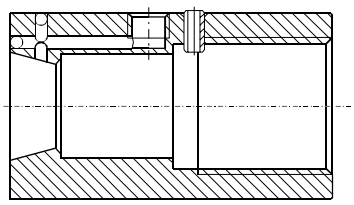
Coupling G1 / Hygienic coupling DIN11851/11887 standards:

Order codes (AISI316L):
- DN40 M1050312
- DN50 M1050313
- DN65 M1050314



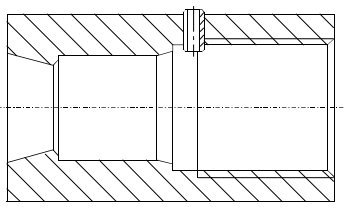
Coupling G1 / PMC 1,5"

Order codes:
- AISI316L M1050010
- Hastelloy C276 M10500103



Extended coupling G1 with cleaning

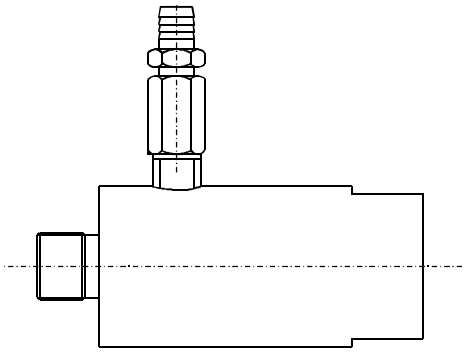
Order code:
- AISI316L M1050293



Extended coupling G1

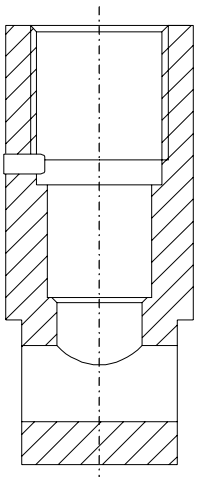
Order codes:
- AISI316L M1050292
- Hastelloy C276 M10502923

Mounting couplings for Satron VG transmitter



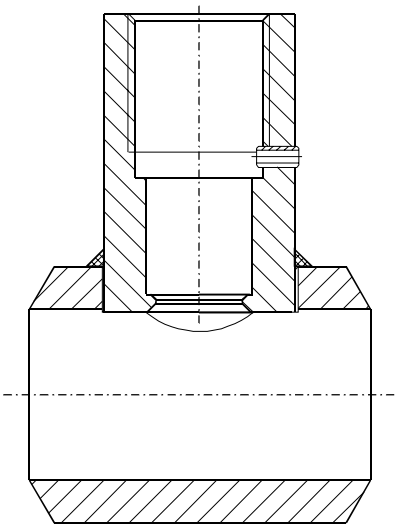
Coupling G1 / G½A + drain valve

Order code:
- AISI316L M860280



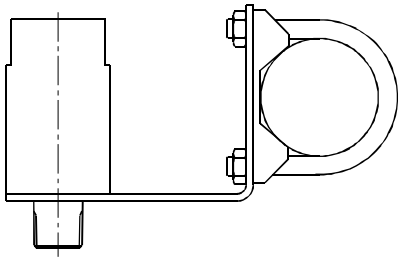
Coupling G1 for pipes DN15 - DN25 and clean liquids

Order codes (AISI316L):
- DN15 M1050295
- DN20 M1050296
- DN25 M1050297



Coupling G1 for pipes DN15 - DN40

Order codes (AISI316L):
- DN15 M105001615
- DN20 M105001620
- DN25 M105001625
- DN32 M105001632
- DN40 M105001640

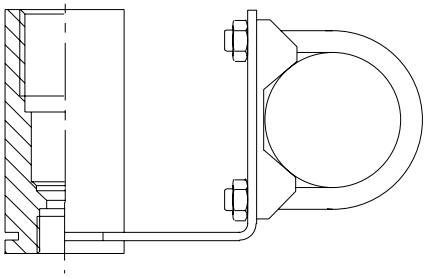


Coupling G1 / G½A (male) with mounting bracket

Order code:
- AISI316L M546195

Coupling G1 / ½ - NPT (male) with mounting bracket

Order code:
- AISI316L M1050017

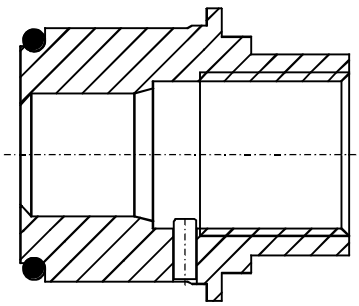


Coupling G1 / G½ (female) with mounting bracket

Order code:
- AISI316L M550393

Coupling G1 / ½ - NPT (female) with mounting bracket

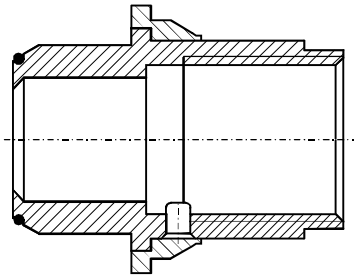
Order code:
- AISI316L M550393N

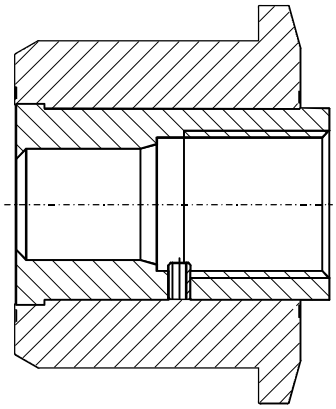


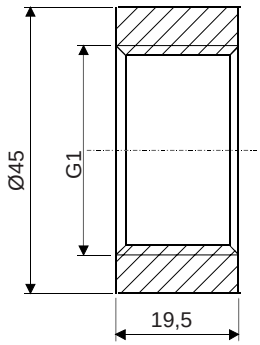
Coupling G1 / Ø52,5 L=38 (SMS nut fixing, size 38, thread 60 x 1/6)

Order code:
- AISI316L M1050575

Mounting couplings for Satron VG transmitter







Coupling G1 / SMS-SI
- with extension

Order codes (AISI316L):
- SMS-SI38 M1050012
- SMS-SI51 M1050126

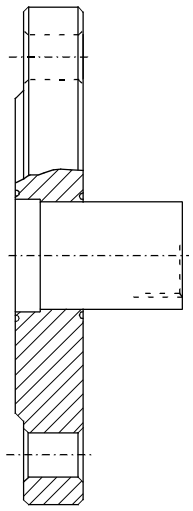
Coupling G1 / Sandvik-clamp
- Extension length 54,5 mm

Order codes:
- AISI316L M1050037
- Duplex M10500378
- Hastelloy C276 M10500373

Thread sleeve G1
(eg. for coupling M1050002)

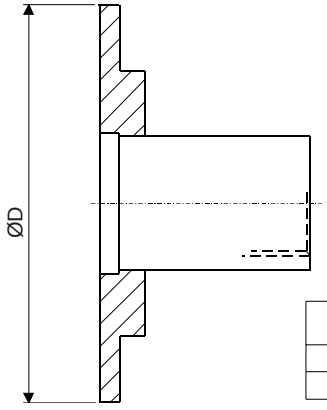
Order codes:
- AISI316L M1050220
- Hastelloy C276 M10502203

Flange couplings



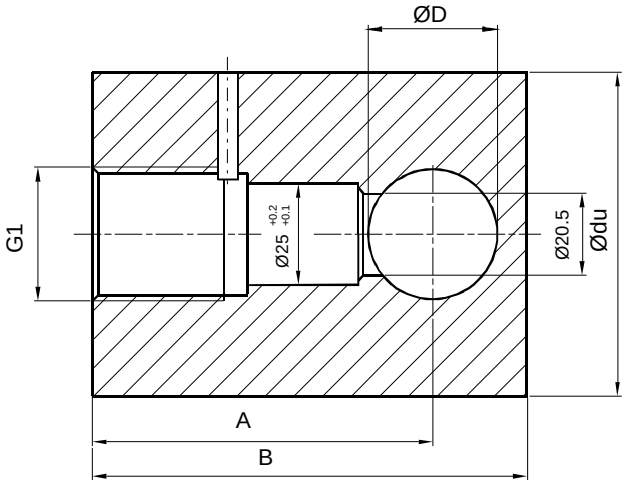
FLANGE TYPE	COUPLING TYPE					
	G1 std.	G1 std. HC	G1 hyg.	G1 hyg. HC	G1 Exi	G1 Exi HC
	ORDER CODE	ORDER CODE	ORDER CODE	ORDER CODE	ORDER CODE	ORDER CODE
DN25 PN40	M548832	M5488323	M548833	M5488333	M548834	M5488343
DN40 PN40	M551267	M5512673	M551268	M5512683	M552361	M5523613
DN50 PN40	M860282	M8602823	M548830	M5488303	M548831	M5488313
DN80 PN40	M860281	M8602813	M548828	M5488283	M548829	M5488283
DN100 PN40	M552364	M5523643	M5523640	M55236403	M5523641	M55236413
ANSI1"150LBS	M552365	M5523653	M5523650	M55236503	M5523651	M55236513
ANSI1"300LBS	M548861	M5488613	M548862	M5488623	M548863	M5488633
ANSI2"150LBS	M552367	M5523673	M5523670	M55236703	M5523671	M55236713
ANSI2"300LBS	M548864	M5488643	M548865	M5488653	M548866	M5488663
ANSI3"150LBS	M551564	M5515643	M5515640	M55156403	M5515641	M55156413
ANSI3"300LBS	M548867	M5488673	M548868	M5488683	M548869	M5488693
ANSI4"150LBS	M552371	M5523713	M5523710	M55237103	M5523711	M55237113
ANSI4"300LBS	M552372	M5523723	M5523720	M55237203	M5523721	M55237213
FOR GASKET CHANNEL : (DIN 2512N)						
DN25 PN40	M548825	M5488253	M548826	M5488263	M548827	M5488273
DN50 PN40	M548822	M5488223	M548823	M5488233	M548824	M5488243
DN80 PN40	M548819	M5488193	M548820	M5488203	M548821	M5488213

Multidimensional flange coupling



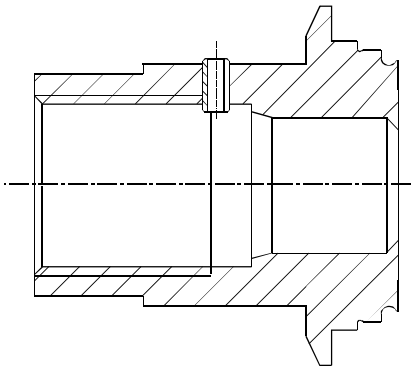
∅ D	COUPLING TYPE					
	G1 std.	G1 std. HC	G1 hyg.	G1 hyg. HC	G1 Exi	G1 Exi HC
	ORDER CODE	ORDER CODE	ORDER CODE	ORDER CODE	ORDER CODE	ORDER CODE
∅ **92**	M1050030	M10500303	M1050031	M10500313	M1050032	M10500323
∅ **127**	M1050033	M10500333	M1050034	M10500343	M1050035	M10500353

Mounting couplings for Satron VG transmitter



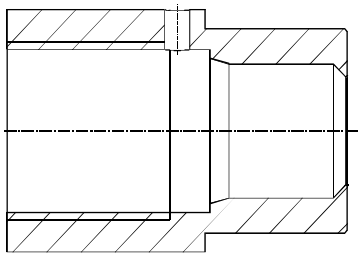
Pipe size	Dim. Ødu	Dim. A	Dim. B	Dim. ØD	Order code	Material
DN15	80	80	96	20 +0.5 +0.2	M1050303xx	Should be mentioned in the order
DN20	80	83	101	25 +0.5 +0.2	M1050304xx	Should be mentioned in the order
DN25	80	86	108	32 +0.5 +0.2	M1050305xx	Should be mentioned in the order
DN32	80	91	117	40 +0.5 +0.2	M1050306xx	Should be mentioned in the order
DN40	100	95	127	50 +0.5 +0.2	M1050307xx	Should be mentioned in the order
DN50	100	103	141	63 +0.5 +0.2	M1050308xx	Should be mentioned in the order

Plastic coupling G1 for plastic pipes DN15 - DN50



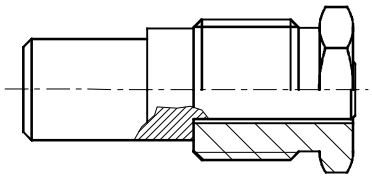
Coupling G1 / Varivent TN

Order code (AISI316L):
- DN25 M1050090
- DN50/40 M1050091
- DN80/65 M1050092



Hygienic Coupling G1 / Ø38

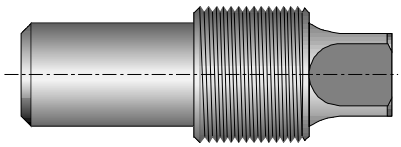
Order code:
- AISI316L M1050577
- Hastelloy C M1050577HC



Seal plug assembly for Satron coupling G1

By seal plug the coupling can be closed tightly.

Order code:
- AISI316L M550405
- EHEDG M1050389



Welding assistant for Satron coupling G1.

It is always recommendable to use the welding assistant while welding the coupling to prevent any distortions due to heat.

Order code:
- Brass M1050420

Special adapter for Satron couplings G1.

By using this adapter it is possible to install the sensor head ca. 3mm deep into the coupling.

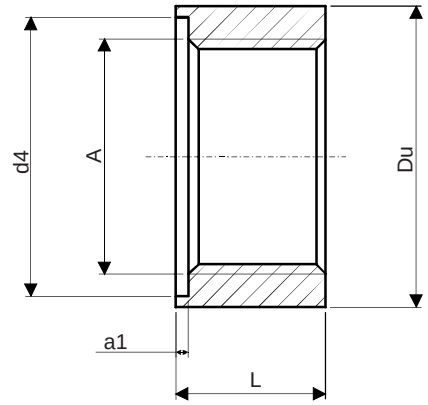
Order code:
- EN 1.4462 (Duplex) M1050294

Seal for Satron couplings G1.

Enables to seal the leaking metal to metal taper.

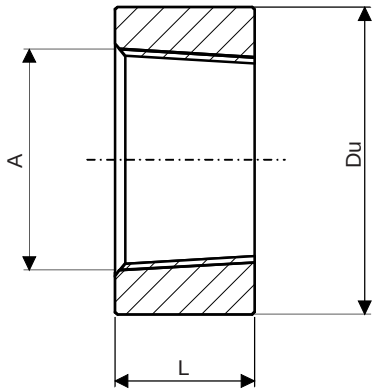
Order code:
- PTFE T546022

Mounting couplings for Satron VT Transmitters



Process couplings with DIN 3852-X thread
Order code: AISI316L

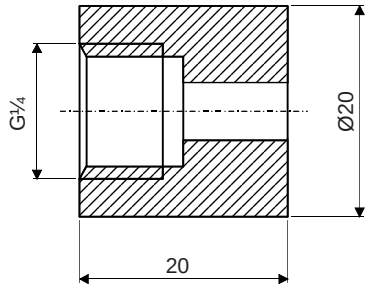
Order code	Thread A	Du $^{0}_{-0.5}$	Length L	d4	a1
M1050369	G½	Ø30	18,5	Ø27	2.5
M1050390	G1	Ø45	23.5	Ø40	2.5
M1050391	G1½	Ø60	32.5	Ø56	2.5
M1050393	G1½	Ø60	26.5	Ø56	2.5
M1050392	G2	Ø75	33	Ø69	3.0



Process couplings with NPT thread

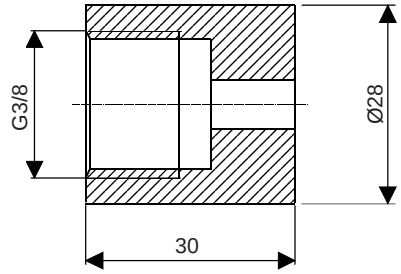
Order code: AISI316L

Order code	Thread A	Du	Length L
M1050368	½-14 NPT	Ø28	14
M1050500	¾-14 NPT	Ø35	16
M1050501	1 - 11½ NPT	Ø44.5	20.5
M1050502	1¼ - 11½ NPT	Ø57.5	20.5
M1050503	1½ - 11½ NPT	Ø63.5	20.5
M1050504	2 - 11½ NPT	Ø76	20.5



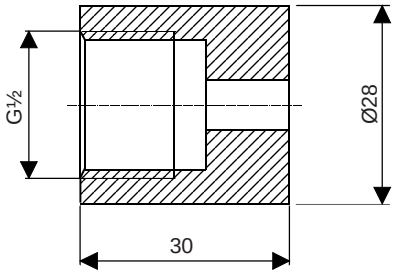
Process coupling DIN 16288 - G¼

Order code:
- AISI316L M1050366



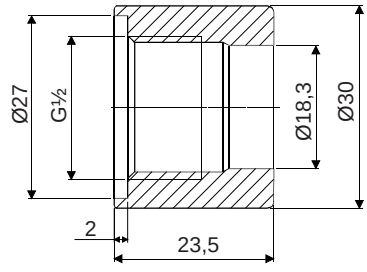
Process coupling G½

Order code:
- AISI316L M1050316



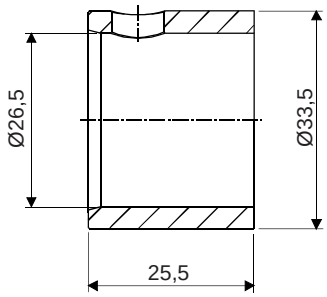
Process coupling DIN 16288 - G½

Order code:
- AISI316L M1050367



Process coupling DIN 3852 - X - G½, for transmitter with two o-ring

Order code:
- AISI316L M1050515

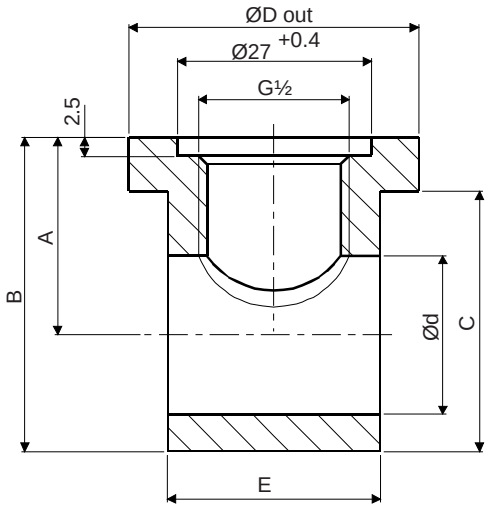


Process coupling PMC 1"

Order code:
- AISI316L M1050300

Satron Instruments Inc., P.O.Box 22, FI-33901 Tampere, Finland
Tel. +358 207 464 800, Telefax +358 207 464 801, www.satron.com

Mounting couplings for Satron VT Transmitters

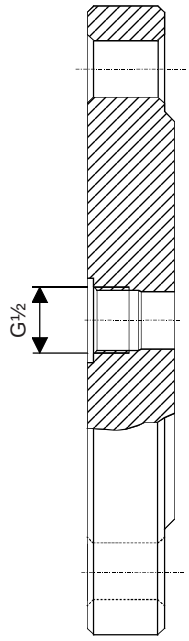


T-coupling DIN 3852-X-G½

Order codes: AISI316L

Pipe size	Dim. øD out	Dim. A	Dim. B	Dim. C	Dim. Ø d	Dim. E	Order code
DN15	40	27.5	43.5	36	22 $^{+0.2}_{0}$	29.5	M1050395
DN20	40	30.5	49	42	27.5 $^{+0.3}_{0}$	26	M1050396
DN25	50	33.5	55.5	48	34 $^{+0.5}_{+0.2}$	29.5	M1050397

Other size, please contact Satron Instruments Inc.

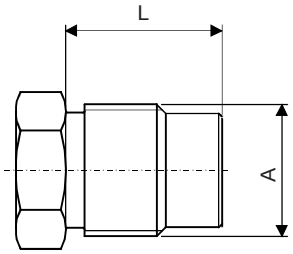


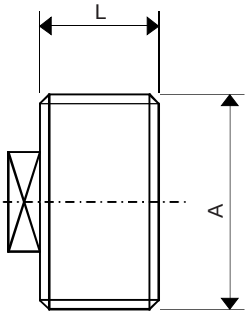
Coupling flange DIN 3852-X-G½
- for the transmitter with two o-rings

Tilauskoodit: AISI316L

ORDER CODE	TYPE OF FLANGE
M1050517-DN25	DN 25 PN 40
M1050517-DN40	DN 40 PN 40
M1050517-DN50	DN 50 PN 40
M1050517-DN80	DN 80 PN 40
M1050517-DN100	DN 100 PN 16
M1050517-1-150	ANSI 1" 150 LBS
M1050517-1-300	ANSI 1" 300 LBS
M1050517-2-150	ANSI 2" 150 LBS
M1050517-2-300	ANSI 2" 300 LBS
M1050517-3-150	ANSI 3" 150 LBS
M1050517-3-300	ANSI 3" 300 LBS
M1050517-4-150	ANSI 4" 150 LBS
M1050517-4-300	ANSI 4" 300 LBS

Special flanges, please contact Satron Instruments Inc.





Welding assistant: Order codes

Order code	Thread A	Dim. L	Position, form and size
M1050516	G½A	25	6-k, AV22
M1050375	G¾A	15	6-k, AV27
M1050371	G1A	20	6-k, AV36
M1050372	G1 ¼A	35	4-k, AV22
M1050373	G1 ½A	35	4-k, AV22
M1050374	G2A	35	4-k, AV22

Satron Instruments Inc.
P.O.Box 22, FI-33901 Tampere, Finland
Tel. +358 207 464 800, Fax +358 207 464 801
www.satron.com

Measurements with hydraulic pressure seal

5/01
April 30, 2010

The hydraulic pressure seal helps to solve many installation problems caused, for instance, by high temperatures, sedimentation and crystallization. Toxicity of the process medium or some other effect that can be harmful to the environment may also require the isolation of the process from its surroundings. DN50, DN80 and ANSI3 hydraulic pressure seals are suitable for pressure measure-ments in open and closed vessels.

General instructions

Make sure that there are good reasons for using a pressure seal. The best way to connect pressure measurement to process is impulse piping.
We recommend applying the following general instructions:

- seal size standardization (see Figure 1); DN80 or ANSI3" up from measuring ranges 60 mbar
  DN50 or ANSI2" up from measuring ranges 400 mbar
- protect capillary tubes and flanges (see Protecting the equipment and Temperature effect)
- use the same size of seal flanges for both (+) and (-) flanges
- use the same lengths of capillary tubes for differential pressure measure-ments
- check the zero point after installation

By observing these instructions you can avoid many factors of inaccuracy caused by the seal principle; a liquid in sealed state undergoes volume and viscosity changes when its temperature changes.

Choosing the suitable equipment

The factors to be considered when choo-sing the measuring device and hydraulic pressure seal include volumetric displa-cements, negative pressure limitations and temperature effect.
The volumetric displacement capacity of the hydraulic pressure seal must be sufficient. The magnitude of volumetric displacements can be calculated by sum-ming the measuring device's volumetric displacement with that caused by thermal expansion of the fill fluid. The result must not exceed the hydraulic pressure seal's volumetric displacement capacity. More information can be found in the technical specifications of measuring devices and hydraulic pressure seals.
Special attention will be required if type DN50 and ANSI2" pressure seals are used at pressures below
400 mbar, and type DN70, DN80 and ANSI3" pressure seals at pressures below 60 mbar. Type DN50 and ANSI2" seals are not recommended for ranges below 150 mbar, and type DN70, DN80 and ANSI3" seals for ranges below 25 mbar.

Connecting the measuring device to the hydraulic pressure seal

Pressure gauge or limit switch is con-nected to the hydraulic pressure seal with an adapter base or capillary tube. When using an adapter connection, the temperature of the process medium must not exceed 60°C.
Differential pressure transmitter is al-ways connected through capillary tube. The connection between hydraulic pressure seal and measuring device must be made with correct methods. When deciding on the connection met-hod you should take into account the fact that gaseous media and moisture normally absorbed in the fill fluid will exit the fluid. It is recommendable to have the hydraulic pressure seals filled and connected by SATRON INSTRUMENTS INC.

Protecting the equipment

Hydraulic pressure seals, capillary tubes and measuring device should be pro-tected against low temperatures and temperature variations. Low ambient temperatures will cause a lag in the me-asurement, while temperature variations will change the zero setting.
Capillary tubes can be protected with thermal insulation. Electric resistance elements or steam heating can also be used as protective methods.

Temperature effect on measuring speed and accuracy

Stiffening and thermal expansion of the fill fluid limit the permissible ambient temperature range. The properties of fill fluids determine the ambient temperatu-res that suit the hydraulic pressure seal connection.
Temperature effect is defined as com-bined zero and span effect. 95% of total effect consist of zero effect and the remaining 5 % of span effect.

Calibration

Factory-filled hydraulic pressure seal assemblies are adjusted for the values specified by the customer.
During the adjustment procedure the pressure seals and transmitters are at equal height. The calibration temperature is 20°C.
When defining the calibration values you must take into account the difference in height between seal flanges and trans-mitter, because the hydrostatic pressure of the fill fluid affects the zero adjust-ment. Zero suppression and elevation can be determined as shown in examp-les 1 and 2.
The temperatures of capillary tubes, transmitter and pressure seal flanges affect the zero. The coefficients given in the technical specifications can be utili-zed when defining the calibration values for a specific temperature distribution.
The total effect of seal flange locations and temperature distribution on zero sup-pression can be determined by summing the partial effects . The signs must be taken into account in the calculations.

Installation

The measuring device, capillary tubes and hydraulic pressure seal comprise a calibrated assembly whose connections should not be opened. For this reason the installation and equipment should be planned so that opening the connections will not be necessary during installation.

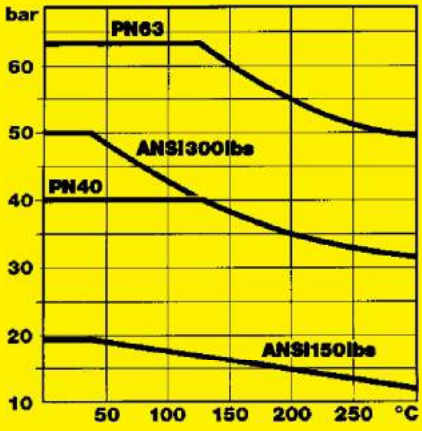


Figure 1: Permissible pressure on seal flange at different temperatu-res

Satron Instruments Inc., P.O.Box 22, FI-33901 Tampere, Finland
Tel. +358 207 464 800, Telefax +358 207 464 801, www.satron.com

Example 1: Open vessel (Fig. 2)

Span p_1, is as follows:
$P_1 = h_1 \rho g$
$= 3.50\ m \times 980\ kg/m^3 \times 9.81\ m/s^2$
$= 33.6\ kPa$

Zero suppression p_2 is as follows:
$P_2 = (h_2\rho + h_3\rho_O) \times g$
$= (1.00\ m \times 980\ kg/m^3 + 0.90\ m \times 960\ kg/m^3 \times 9.81\ m/s^2$
$= 18.\ 1\ kPa$

Example 2: Closed vessel (Fig. 3)

Span p_1, is as follows:
$P_1 = h_1 \rho g$
$= 3.50\ m \times 980\ kg/m^3 \times 9.81\ m/s^2$
$= 33.6\ kPa$

Zero elevation (suppression) p_2 is as follows:

$P_2 = (h_3\text{-}h_4)\ \rho_O g + h_2 \rho g =$
$(0.90\text{-}6.00)m \times 960\ kg/m^3 \times 9.81\ m/s^2 + 1.00\ m \times 980\ kg/m^3 \times 9.81\ m/s^2$

$P_2 = -38.4\ kPa$ (negative result = elevated-zero range)

h_1 = difference in height between maximum and minimum level (3.50 m)
h_2 = height of minimum level from (+) - flange (1.00 m)
h_3 = difference in height between (+)- flange and transmitter (0.90m)
h_4 = difference in height between (-)-flange and transmitter (6.00 m)
ρ = density of measured fluid (980 kg/m³)
ρ_O = density of fill fluid (960 kg/m³)
g = acceleration of gravity (9.81 m/s²)

NOTE: If transmitter is higher than the (+)-flange, the difference h_3 will have a negative value.

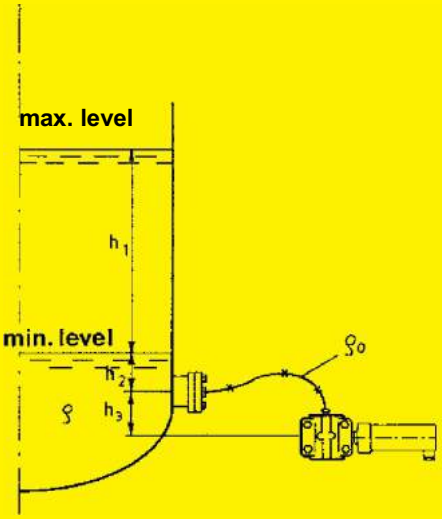


Figure 2: Level measurement in open vessel

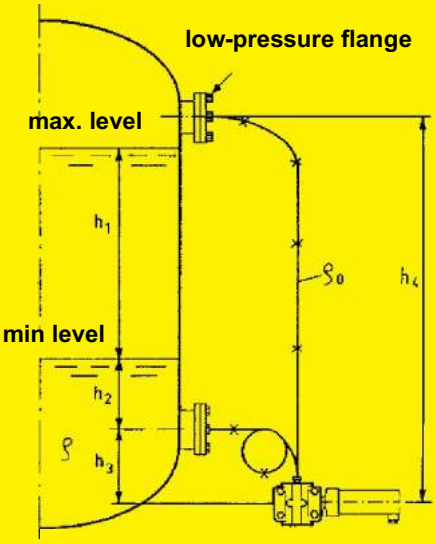
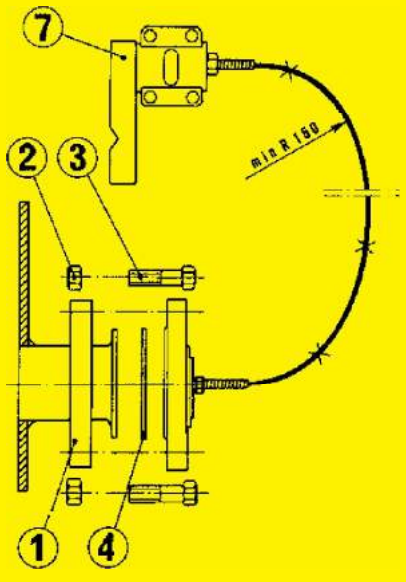


Figure 3: Level measurement in closed vessel

Installation
Measuring device, capillary tubes and hydraulic pressure seal comprise a calibrated assembly whose connections should not be opened. For this reason the installation and equipment should be planned so that opening the connections will not be necessary during installation.

Table: Mounting accessories (Fig.4)
1. Process flange DN80
2. Nut M16, AISI 316
3. Hex. screw M16 × 70
4. Gasket DN80
7. Mounting bracket



Questionnaire for choosing the hydraulic pressure seal

Customer: _____

_____

Address: _____

1. Process medium

Name and analysis: _____

_____

Density: _____

_____

Material for wetted parts: _____

2. Process pressure specification

Pressure (differential pressure): _____

Pressure variation limits: _____ frequency: _____

Maximum static pressure: _____

Maximum overload pressure: _____

Any negative pressures?: _____ yes _____ no

3. Operating temperatures

3.1 Temperatures during measurement

Process: _____ °C Variation: __ _____ °C to _____ °C

Ambient: _____ °C Variation: __ _____ °C to _____ °C

Measuring device: _____ °C Variation: _____ °C to _____ °C

3.2 Highest temperature when equipment is not in measurement (e.g. during cleaning): _____ °C

3.3 Lowest absolute pressure and simultaneous temperature at hydraulic pressure seal:

_____ mbar (abs) _____ °C

4. Capillary tubes

Length:_____ m, Number of pressure seals: _ _____

Heating:_____ yes, _____ no, Temperature _____ °C, Variation_____°C

5. Purpose of measurement

Level measurement: _____ Fig. 2, or Fig. 3 (see page 5/02)

Pressure measurement: __ .. _____ Fig. 4 (see page 5/02)

Other: _____

6. Installation specification

Span (h_1): _____

Difference in height between minimum level and (+)-flange (h_2): _____

Difference in height between (+)-flange and measuring device (h_3): _____

Difference in height between (-)-flange and measuring device (h_4): _____

7. Equipment specification

Selected equipment _____

_____

_____

SATRON HPS Hydraulic Pressure Seal

The Hydraulic Pressure Seal **SATRON HPS** is used in pressure measurement applications where the process medium is aggressive and it is necessary to protect the wetted parts of measuring transmitters. Processes' hygienic requirements may also necessitate the use of the pressure seal. In addition, the pressure seal has to be used when the process temperature exceeds the transmitter's specifications.

Technical specifications

Process connections
- DN25,DN50, DN80, DN100 (EN 1092-1,flange type 05, facing type B), (DIN 2501, form D)
- ANSI2" and 3" (ANSI B16-5)
- JIS 50, 80, 100 (JIS B 2220)
- Sandvik Clamp connector DN65
- TRI-Clamp 1½", 2" and 2,5" (38/51/63,5 mm, ISO2852)
- SMS38 and SMS51
- DIN11851 DN25 ... DN50

Other options available on separate order.

Process pressures
- PN10/16, PN40, PN64 and PN100
- 150 and 300 lbs
- 10K and 50K
- Sandvik Clamp: PN64
- TRI-Clamp: PN40
- SMS and DIN11851 PN25 PN40

Measurement ranges
Above 25 mbar span, depending on the measuring diaphragm's size and the process pressure.

Materials
HPS body: EN 1.4401 (AISI 316)
Process coupling: EN 1.4404 (AISI 316L)

Capillary tube
- Capillary: EN 1.4401 (AISI 316)
- Casing: EN 1.4401 (AISI 316)

Length selectable between 2 and 20 m.
Recommendation: As short as possible.
The capillary's minimum permissible bending radius is 50 mm.
We recommend capillaries of equal length for differential pressure measurements in varying temperature conditions.

Diaphragm materials
EN 1.4435 (AISI 316L), CoNi-alloy, Duplex (EN 1.4462), Hastelloy C22 (EN 2.4602) / C-276 (EN 2.4819), Inconel 600 (EN 2.4816), Monel 400 (EN 2.4360), Nickel (EN 2.4066), Tantalum, Titan Ti-II (3.7035) and Zirkonium

Fill fluids
Silicone oil DC200
- for process and food industry applications

Neobee M20
- for food industry applications

Inert oil (e.g. Fomblin Y04 or Halocarbon)
- for oxygen and chlorine applications

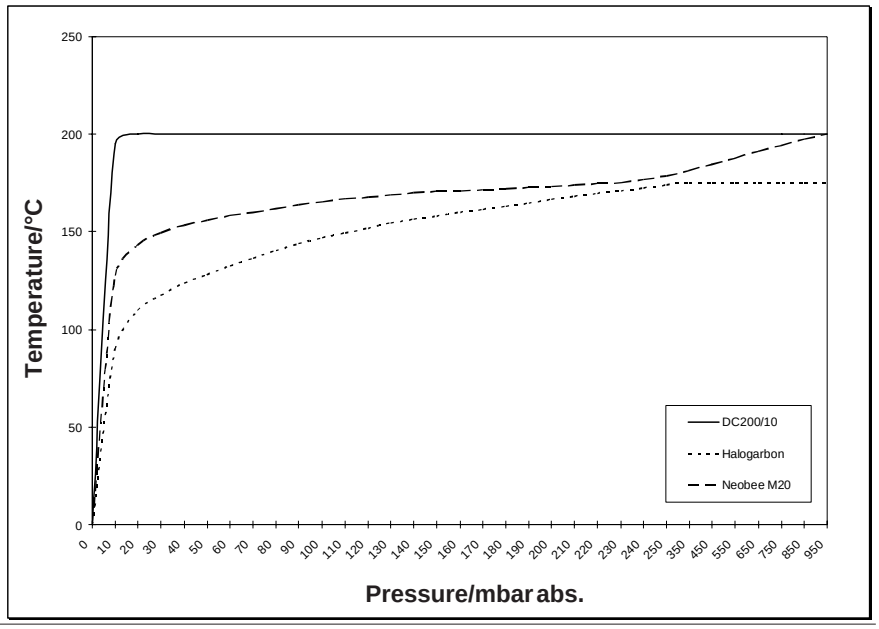
Silicone oil DC705
- for high-temperature and vacuum measurement applications

Gaskets (Sanitary Seal)
- EPDM, FPM (Viton®) and PTFE

Fill fluid properties

Fill fluid	**Temperature range/**°C	**Density** g/cm³	**Thermal expansion coefficient/** 1/°C	**Viscosity** (25°C) cSt(mm²/s)
DC200 Silicone oil	-40...200	0.934	0.00108	9.5
DC705 Silicone oil	20...380	1.090	0.00080	175
Inert oil	-45...175	1.850	0.000864	6.5
Neobee M20	-17...200	0.917	0.001008	9.8

Fill fluid steam pressure curves (specified by manufacturers)



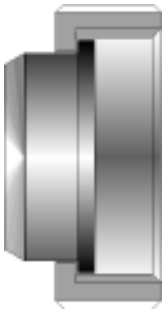
Satron Instruments Inc., P.O.Box 22, FI-33901 Tampere, Finland
Tel. +358 207 464 800, Telefax +358 207 464 801, www.satron.com

HPS types: construction

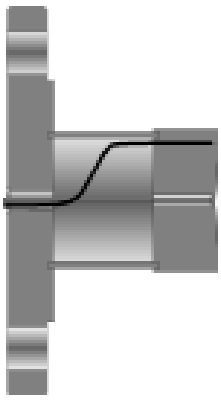
SATRON HPS D
- Mounted between two flanges

SATRON HPS TRI-C
- Mounted on Tri-Clamp (ISO2852)
- Sanitary seals

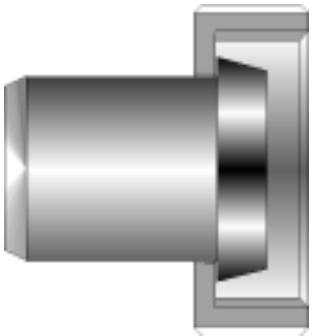
SATRON HPS F
- Flange-mounted pressure seal



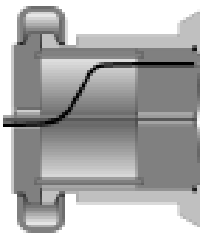
SATRON HPS SMS
- Sanitary seals
- Female Rd-thread



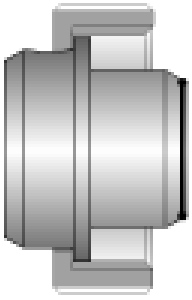
SATRON HPS E
- Flange-mounted with extension



SATRON HPS DIN11851
- Sanitary seals
- Female Rd-thread

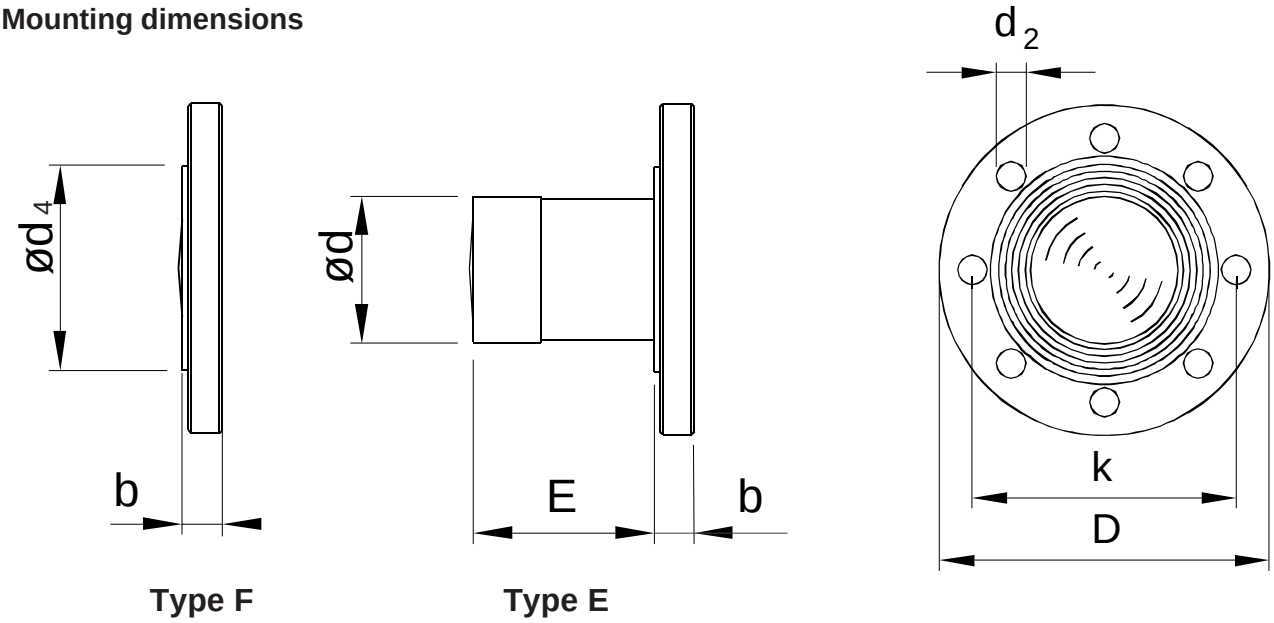


SATRON HPS S
- Mounted on Sandvik Clamp
- Sanitary seals

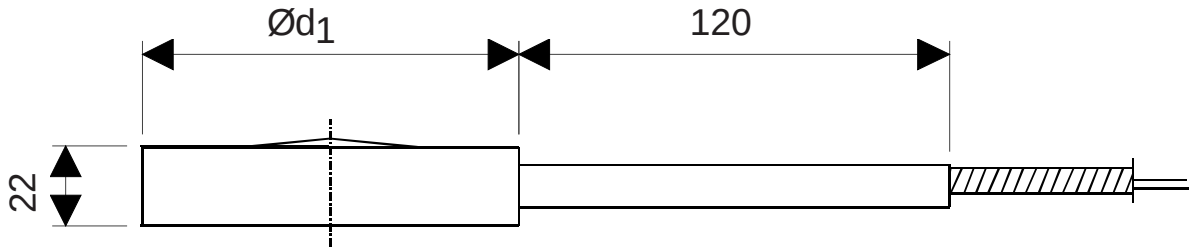


SATRON HPS SMS-SI
- Sanitary seals
- Female Rd-thread

Mounting dimensions



Type F Type E



Type D

FLANGE SIZE	FLANGE CODE	FLANGE DIMENSIONS				HOLES			EXTENS.
		b	D	Ød$_4$	Ød$_1$	Kpl	d$_2$	k	Ød -0.2
ISO DN25 PN10/16	D1A	16	115	68	70	4	14	85	-
ISO DN25 PN40	D1B	18	115	68	70	4	14	85	-
ISO DN25 PN64	D1C	24	140	68	70	4	18	100	-
ISO DN25 PN100	D1D	24	140	68	70	4	18	100	-
ISO DN50 PN10/16	D2A	18	165	102	105	4	18	125	51
ISO DN50 PN40	D2B	20	165	102	105	4	18	125	51
ISO DN50 PN64	D2C	26	180	102	105	4	22	135	51
ISO DN50 PN100	D2D	28	195	102	105	4	26	145	51
ISO DN80 PN10/16	D3A	20	200	138	140	8	18	160	73
ISO DN80 PN40	D3B	24	200	138	140	8	18	160	73
ISO DN80 PN64	D3C	28	215	138	140	8	22	170	73
ISO DN80 PN100	D3D	32	230	138	140	8	26	180	73
ISO DN100 PN10/16	D4A	20	220	158	166	8	18	180	73
ISO DN100 PN40	D4B	24	235	162	166	8	22	190	73
ANSI 2" 150 lbs	A2A	23	152	92	99	4	20	120.6	51
ANSI 2" 300 lbs	A2B	25	165	92	105	8	20	127	51
ANSI 3" 150 lbs	A3A	26	191	127	130	4	20	152.4	73
ANSI 3" 300 lbs	A3B	31	210	127	143	8	23	168.3	73
ANSI 4" 150 lbs	A4A	26	229	157	168	8	20	190.5	73
ANSI 4" 300 lbs	A4B	34	254	157	175	8	23	200	73
JIS 10K-50	J2A	16	155	96	96	4	19	120	51
JIS 40K-50	J2B	26	165	105	105	8	19	130	51
JIS 10K-80	J3A	18	185	126	126	8	19	150	73
JIS 40K-80	J3B	32	210	140	140	8	23	170	73
JIS 10K-100	J4A	18	210	151	151	8	19	175	73
JIS 40K-100	J4B	36	250	165	165	8	25	205	73

CODE	E +0.4 -0.4
2	51
4	102
6	152

Selection table : Flanged Seal

HPS ☐☐☐☐☐☐☐☐☐☐—

Process connection type

D	Pancake
F	Flanged
E	Flanged with extension

Process connection standad

D	DIN (Deutsches Institut für Normung)
A	ANSI/ASME B16.5 (American National Standards Institute
J	JIS (Japanese Industrial Standards)

Process connection size

	DIN	ANSI	JIS
1	25	-	-
2	50	2"	50
3	80	3"	80
4	100	4"	100

Pressure class of process connection (maximum working pressure)

	DIN	ANSI	JIS
A	PN10/16	150lbs	10K
B	PN40	300lbs	40K
C	PN64	-	-
D	PN100	-	-

Extension length

0	No extension	(only codes D and F)
2	Extension 51 mm	(only code E)
4	Extension 102 mm	(only code E)
6	Extension 152 mm	(only code E)

Flange material / in type E also extension material

2	EN 1.4404 (AISI316L)
3	Hastelloy C-276 (EN 2.4819)
8	Duplex (EN 1.4462)

Diaphragm material

1	Nickel (EN 2.4066) (***)	**7**	CoNi-alloy
2	EN 1.4435 (AISI316L)	**8**	Duplex (EN 1.4462)
3	Hastelloy C-276 (EN 2.4819)	**H**	Hastelloy C22 (EN 2.4602)
4	Inconel 600 (EN 2.4816)	**M**	Monel 400 (EN 2.4360)
5	Tantalum	**Z**	Zirkonium (***)
6	Titan TI-II (EN 3.7035) (***)		

Diaphragm thickness

E	0.05 mm (*)
F	0.10 mm (**)

Diaphragm coating

0	No coating	**P**	PTFE sintered
9	Gold / Rhodium		
Y	Diamond		

Fill fluid

S	Silicone oil DC200
A	Neobee M20, oil for food industry
G	Inert oil
D	Silicone oli DC705

(*) = Not Inconel, Monel, Nickel or Zirkonium
(**) = Not Tantalum
(***) = Not connection type E (with extension)

Selection table : Sanitary Seals

HPS ☐☐☐☐☐☐☐☐ –

Process connection type and size

HA	SMS38
HB	SMS51
KA	DIN11851 DN25
KB	DIN11851 DN32
KC	DIN11851 DN42
KD	DIN11851 DN50
S2	Sandvik-Clamp DN65, extension length 54.5 mm
S4	Sandvik-Clamp DN65, extension length 105 mm
S6	Sandvik-Clamp DN65, extension length 156 mm
TA	Tri-Clamp 38 (1½")
TB	Tri-Clamp 51 (2")
TC	Tri-Clamp 63.5 (2½")
WA	SMS-SI 38, extension length 24 mm
WB	SMS-SI 51, extension length 27 mm

Material of body, wetted material only in type SMS-SI

2	EN 1.4404 (AISI316L)	8	Duplex (EN 1.4462) (*)
3	Hastelloy C-276 (EN 2.4819) (*)		

Diaphragm material

2	EN 1.4435 (AISI316L)	7	CoNi-alloy
3	Hastelloy C-276 (EN 2.4819)	8	Duplex (EN 1.4462)
4	Inconel 600 (EN 2.4816)	H	Hastelloy C22 (EN 2.4602)
5	Tantalum	M	Monel 400 (EN 2.4360)

Diaphragm thickness

E	0.05 mm (**)	F	0.10 mm (***)

Diaphragm coating

0	No coating	P	PTFE sintered
9	Gold / Rhodium	Y	Diamond

Fill fluid

S	Silicone oil DC200	G	Inert oil
A	Neobee M20, oil for food industry	D	Silicone oli DC705

Process gasket / material of gasket

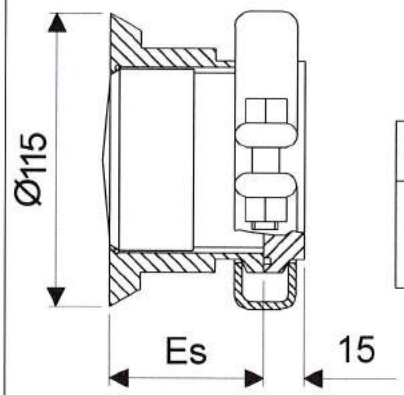
0	No gasket	1	EPDM (ethylene propylene rubber)
2	FPM (Viton®)	3	PTFE (Not process connection SMS-SI)

Mounting parts

0	No mounting parts	1	For type SMS, coupling and gasket
2	For type DIN11851, coupling and gasket	3	For type Sandvik, coupling, gasket and clamp
4	For type Tri-clamp, coupling, gasket and clamp	5	For type SMS-SI, coupling for pipe
6	For type SMS-SI, coupling for vessel		

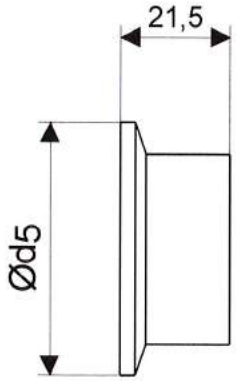
(*) = Only SMS-SI
(**) = Not Inconel or Monel
(***) = Not Tantalum

Mounting dimensions type **Sandvik-Clamp**



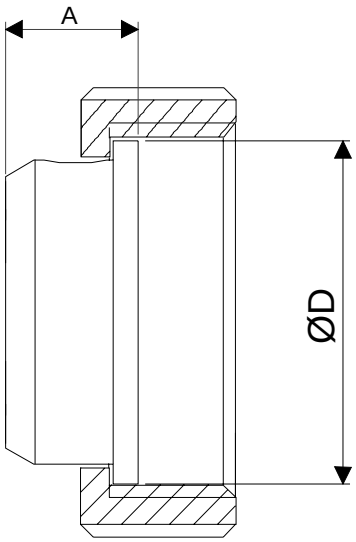
Code	Es +0.1 -0.3
2	54,5
4	105
6	156

Mounting dimensions type **TRI-C**



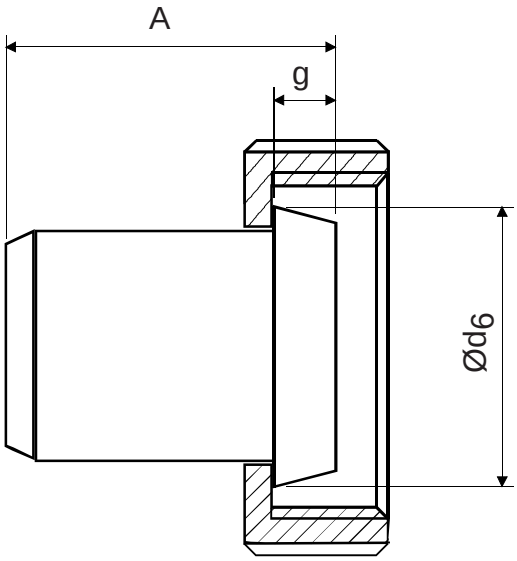
Seal size	Ød5
38 (1½")	50,5
51 (2")	64
63.5 (2,5")	77,5

Mounting dimensions type **SMS**



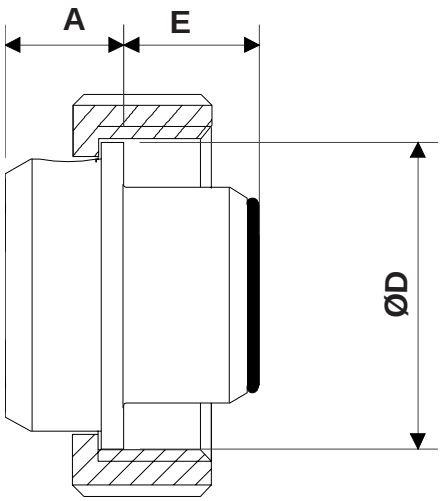
Size	Dimensions		Thread
	ØD	A	
38	54	21	Rd 60 x 1/6
51	64	23	Rd 70 x 1/6

Mounting dimensions type **DIN11851**



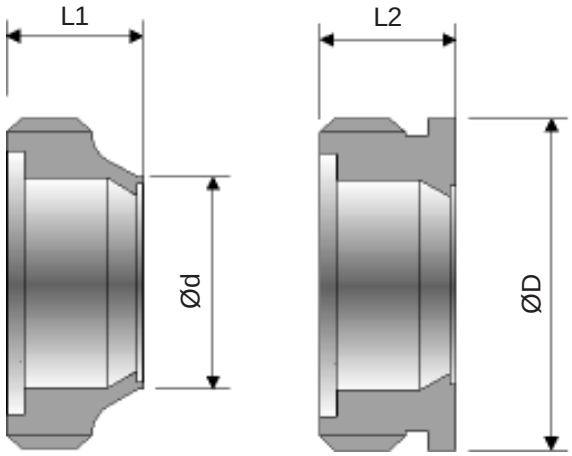
Size	Dimensions			Thread
	$Ød_6$	g	A	
DN25 PN25	44	10	49	Rd 52 x 1/6
DN32 PN25	50	10	49	Rd 58 x 1/6
DN40 PN25	56	10	49	Rd 65 x 1/6
DN50 PN25	68,5	11	50	Rd 78 x 1/6

Mounting dimensions type **SMS-SI**



Size	Dimensions			Thread
	ØD	A	E	
SI38	54	21	24	Rd 60 x 1/6
SI51	64	23	27	Rd 70 x 1/6

SMS-SI couplings :

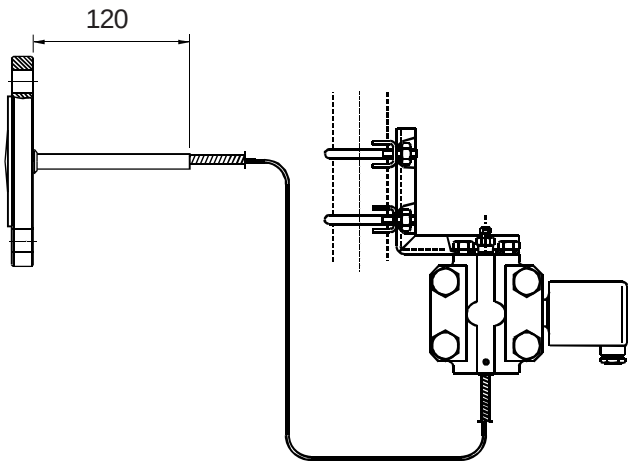


for pipe for vessel

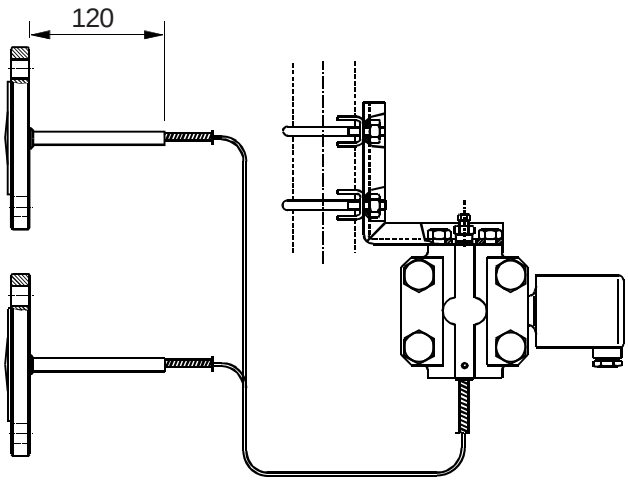
Size	Dimensions				Thread
	L1	Ød	L2	ØD	
38	27	38,5	24	60	Rd 60 x 1/6
51	30	51	25	70	Rd 70 x 1/6

Hydraulic Pressure Seal Connections

Capillary connection



Seal on Low or High pressure side of Differential PressureTransmitter, code **H** or **K**



Same seal on both High and Low pressure sides of Differential Pressure Transmitter, code **L**

Selection table

— □ □ □ □ □

Capillary connection type

H Seal on High pressure side of Differential Transmitter
K Seal on Low pressure side of Differential Transmitter
L Same seal on both High and Low pressure side of Differential Transmitter
M Seal on High pressure side of Pressure Transmitter, process connection G½A

Capillary length (m)

2...20

Mounting bracket for transmitter

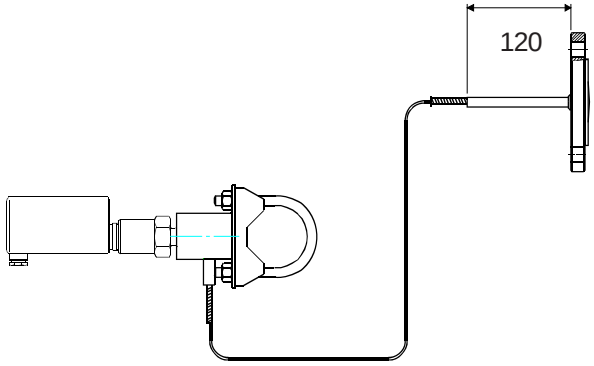
0 No mounting bracket
1 Angle mounting bracket
2 Mounting plate

Documentation

IE English
IF Finnish

Material certificate

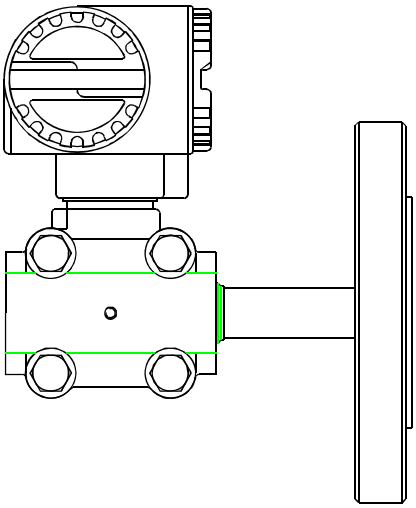
0 No material certificate
MC1 SFS-EN 10204-2.1 (DIN50049-2.1)
MC2 SFS-EN 10204-2.2 (DIN50049-2.2)
MC3 SFS-EN 10204-3.1B (DIN50049-3.1B)



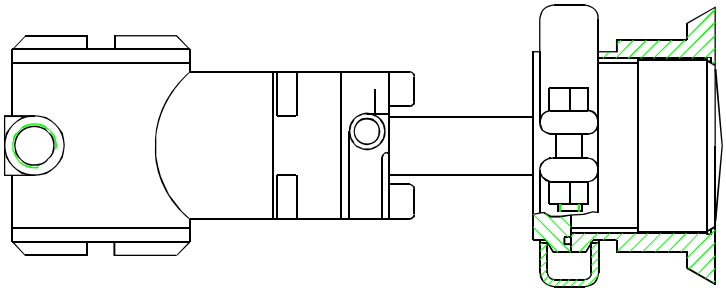
Seal on High pressure side of pressure transmitter, process connection G½A, code **M**

Hydraulic Pressure Seal Connections

Direct mounted connection



Seal on High pressure side of Differential Pressure Transmitter, angle model, code **P**



Seal on High pressure side of Differential Pressure Transmitter, straight model, code **R**

Selection table

— □ □ □

Direct mounted connection type

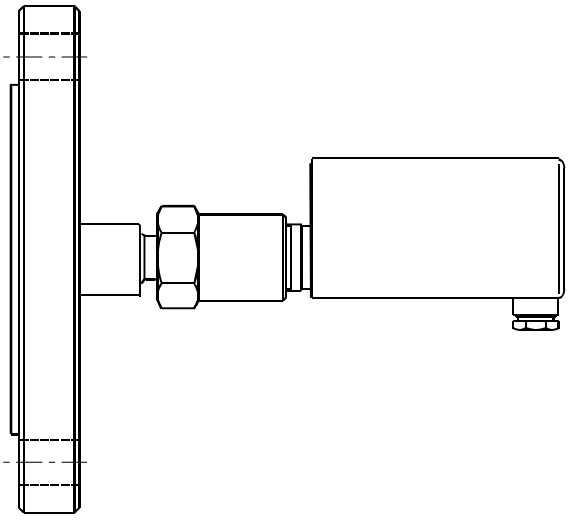
P Seal on High pressure side of Differential Transmitter, angle model
R Seal on High pressure side of Differential Transmitter, straight model
S Seal on High pressure side of Pressure Transmitter, process connection G½A, straight model

Documentation

IE English
IF Finnish

Material certificate

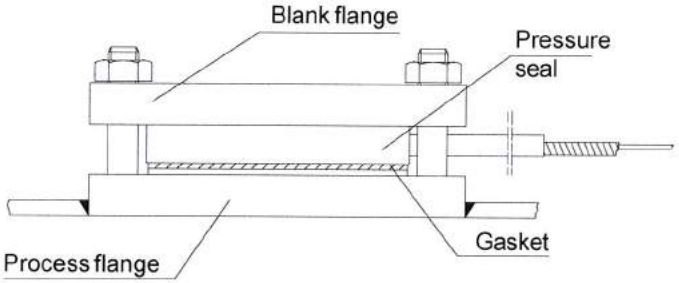
0 No material certificate
MC1 SFS-EN 10204-2.1 (DIN50049-2.1)
MC2 SFS-EN 10204-2.2 (DIN50049-2.2)
MC3 SFS-EN 10204-3.1B (DIN50049-3.1B)



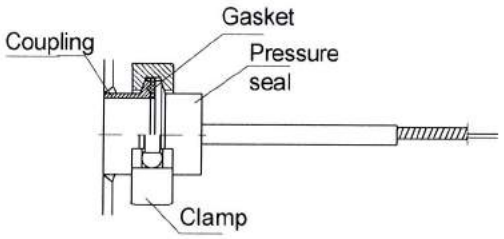
Seal on High pressure side of Pressure Transmitter, process connection G½A, straight model, code **S**

HPS types: Installation

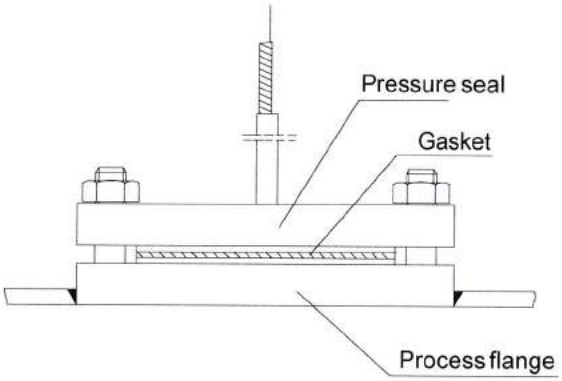
Type D Mounted between two flanges



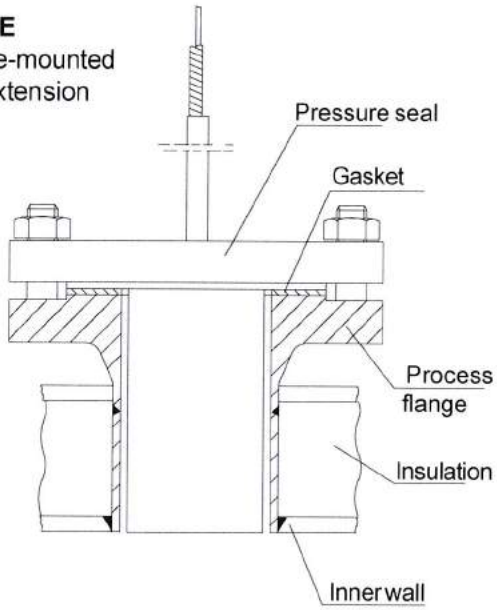
Type TRI-C



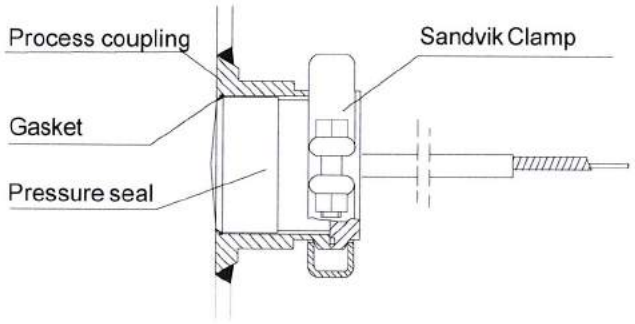
Type F
Flange-mounted pressure seal



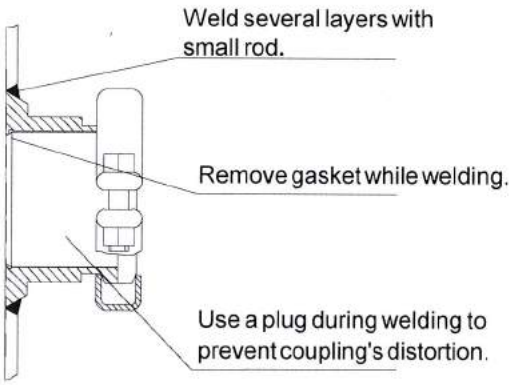
Type E
Flange-mounted with extension



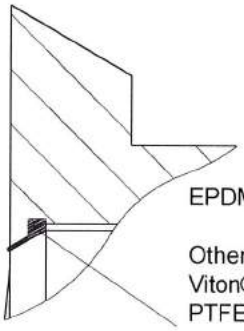
Type S
Mounted on Sandvik Clamp



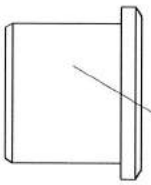
Type S - Coupling installation



Type S - Mounting parts

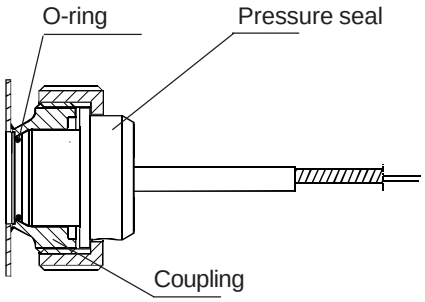


Type S - Plug

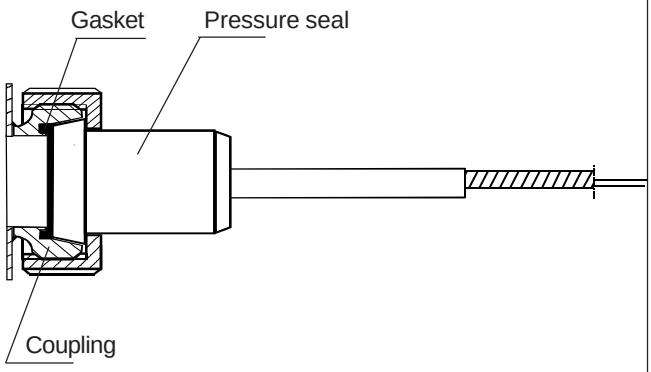


SATRON HPS Hydraulic Pressure Seal

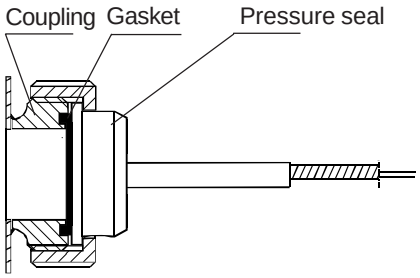
Type SMS-SI



Type DIN11851



Tyyppi SMS



Specification example: **SATRON HPS KA23E0S10-M52IE0**

- Process connection type, sanitary DN25 DIN11851
- Material of body: EN 1.4404 (AISI316L)
- Diaphragm material: Hastelloy C-276 (EN 2.4819)
- Diaphragm thickness: 0.05mm
- No diaphragm coating
- Fill fluid: silicone oil
- Material of process gasket: EPDM
- No mounting parts
- Capillary type connection:
  - Seal on high pressure side of Pressure Transmitter
  - Capillary length 5m
  - Mounting bracket for transmitter, type mounting plate
  - Documentation: English
  - No material certification

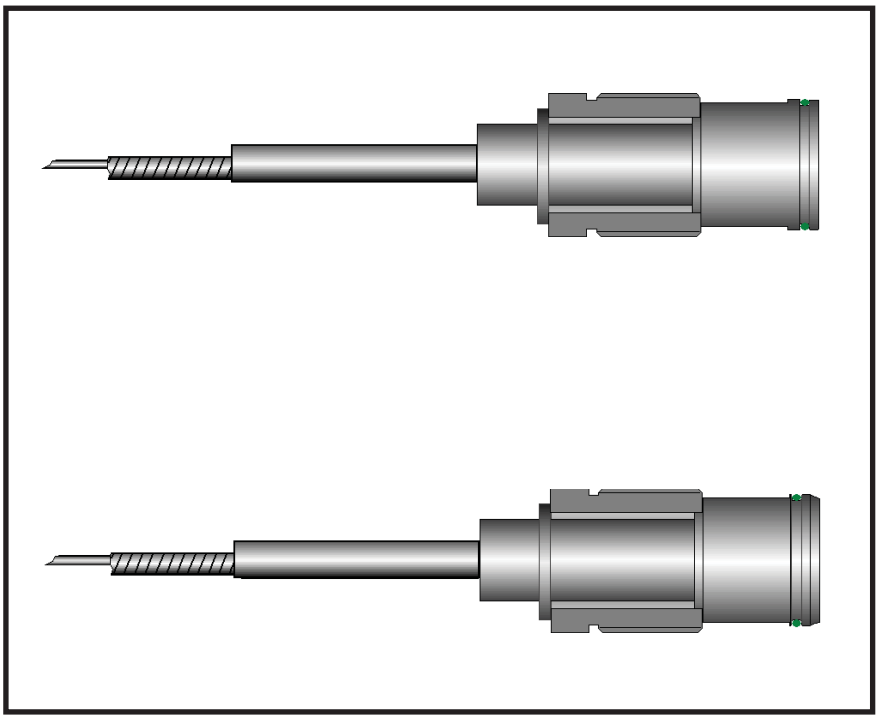
Recommended minimum process pressure for vacuum applications

$T_{proc.}$ °C	Minimum pressure for different fill fluids (kPa, abs.)	
	DC200 100 cSt	Inert oil
20	5	8
40	8	10
80	10	28
120	15	53
160	25	90
200	40	-

SATRON HPS BA / BB Hydraulic Pressure Seal

115061002-EN
30.06.2012

The Hydraulic Pressure Seal SATRON HPS is used in pressure measurement applications where the process medium is aggressive and it is necessary to protect the wetted parts of measuring transmitters. Processes' hygienic requirements may also necessitate the use of the pressure seal. In addition, the pressure seal has to be used when the process temperature exceeds the transmitter's specifications.



Technical specifications

Process connections

• Thread M45 x 2

Process pressures
• PN200

Measurement ranges
Above 25 mbar span, depending on the measuring diaphragm's size and the process pressure.

Materials
HPS body: EN 1.4404 (AISI 316L), EN 1.4462 (Duplex)

Capillary tube
• Capillary: AISI 316
• Casing: AISI 316
Length selectable between 2 and 20 m.
Recommendation: As short as possible.
The capillary's minimum permissible bending radius is 50 mm.
We recommend capillaries of equal length for differential pressure measurements in varying temperature conditions.

Diaphragm materials
AISI 316L (EN 1.4435), CoNi-alloy, Duplex (EN 1.4462), Hastelloy® C22 / C-276 (EN 2.4819), Inconel 600 (EN 2.4816), Tantalum

Fill fluids
Silicone oil DC200
• for process and food industry applications
Neobee M20
• for food industry applications
Inert oil (e.g. Fomblin Y04 or Halocarbon)
• for oxygen and chlorine applications
Silicone oil DC705
• for high-temperature and vacuum measurement applications

Gaskets
• FPM (Viton®)

Fill fluid properties

Fill fluid	**Temperature range/**°C	**Density** g/cm³	**Thermal expansion coefficient/** 1/°C	**Viscosity** (25°C) cSt(mm²/s)
DC200 Silicone oil	-40...200	0.934	0.00108	9.5
DC705 Silicone oil	20...380	1.090	0.00080	175
Inert oil	-45...175	1.850	0.000864	6.5
Neobee M20	-17...200	0.917	0.001008	9.8

Recommended minimum process pressure for vacuum applications

$T_{proc.}$ °C	Minimum pressure for different fill fluids (kPa, abs.)	
	DC200 100 cSt	Inert oil
20	5	8
40	8	10
80	10	28
120	15	53
160	25	90
200	40	-

Satron Instruments Inc., P.O.Box 22, FI-33901 Tampere, Finland
Tel. +358 207 464 800, Telefax +358 207 464 801, www.satron.com

Selection table: M45 x 2 Seal

HPS □ □ □ □ □ □ □ —

Process connection type

BA	M45 x 2 with o-ring
BB	M45 x 2 with o-ring + metal/metal taper

Body material, wetted parts

2	AISI316L (EN 1.4404)	8	Duplex (EN 1.4462), std.
3	Hastelloy C-276 (EN 2.4819)		

Diaphragm material

2	AISI316L (EN 1.4435)	3	Hastelloy C276 (EN 2.4819)
4	Inconel 600 (EN 2.4816)	5	Tantaali
8	Duplex (EN 1.4462)		

Diaphragm thickness

E	0.05 mm	F	0.10 mm

Diaphragm coating

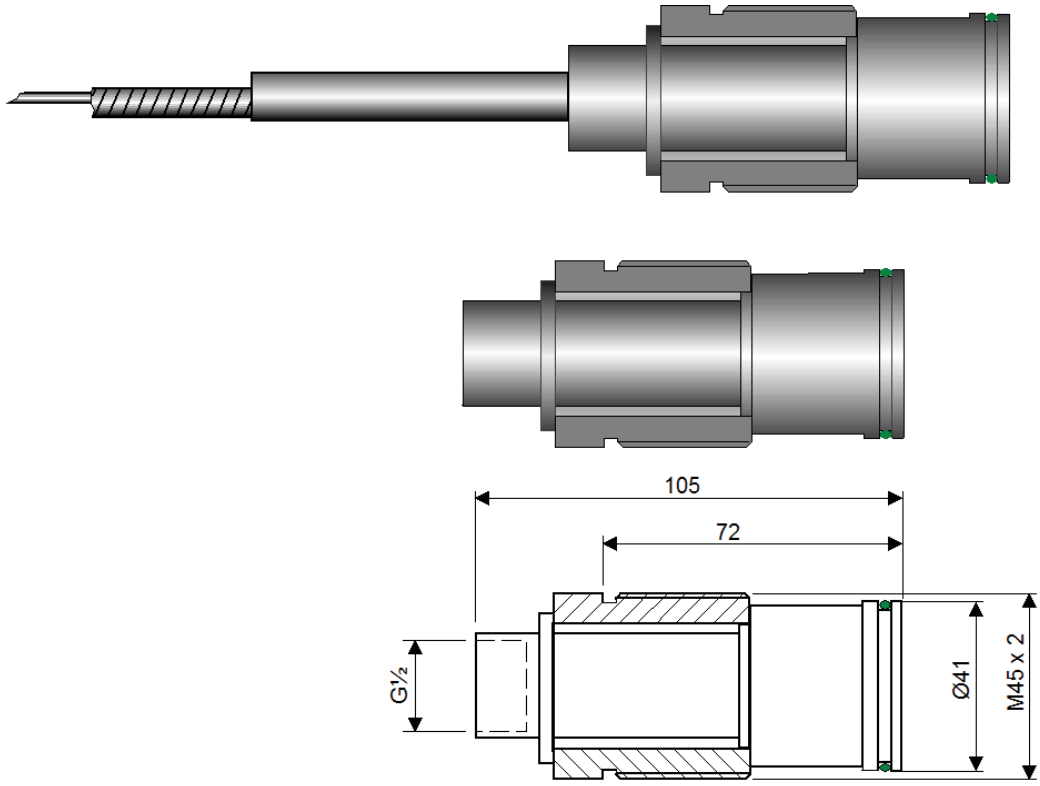
0	No coating	P	PTFE sintered
9	Gold / Rhodium	Y	Diamond

Fill fluid

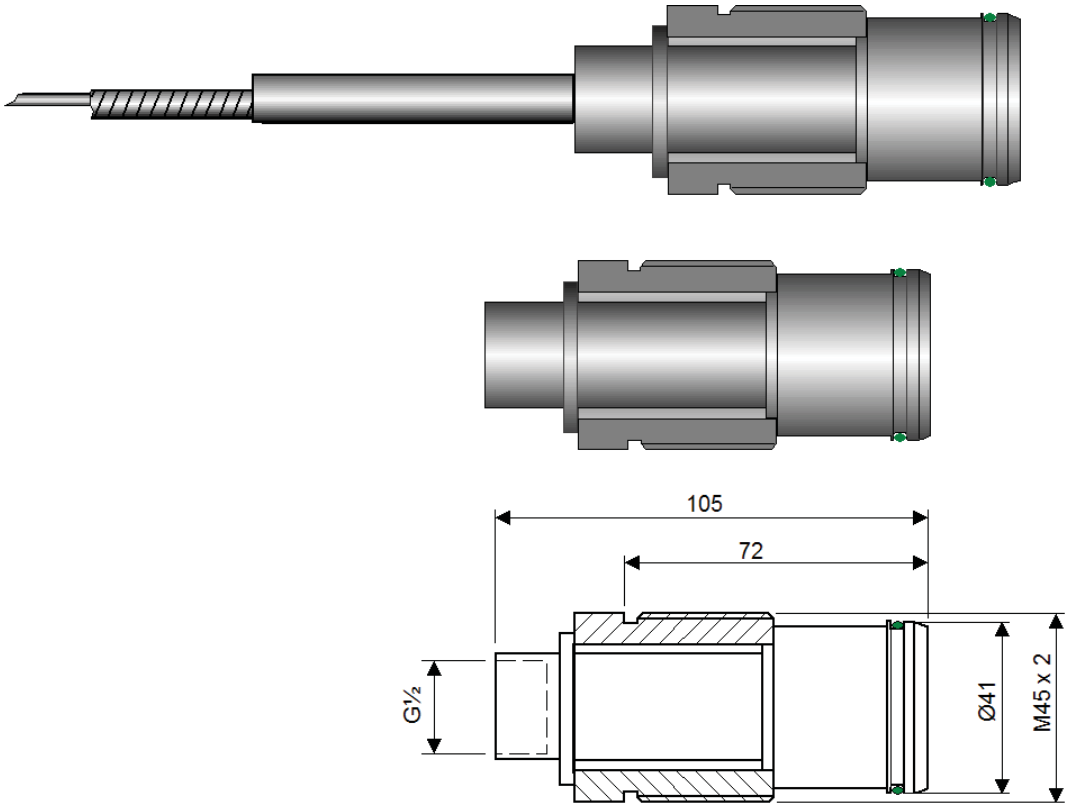
S	Silicone oil DC200	G	Inert oil
A	Neobee M20, oil for food industry	D	Silicone oil DC705

Mounting parts

0	No mounting parts
1	Coupling
2	Pasve BA mounting valve, specify separately in the order



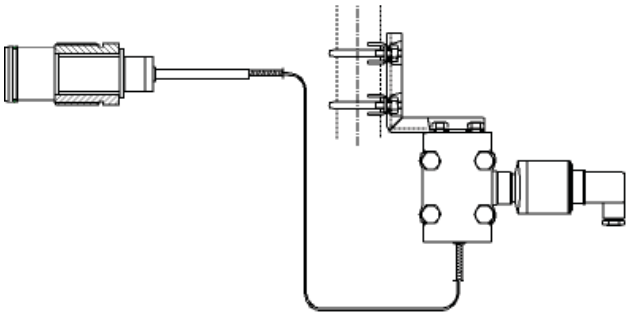
Mounting dimensions, type BA



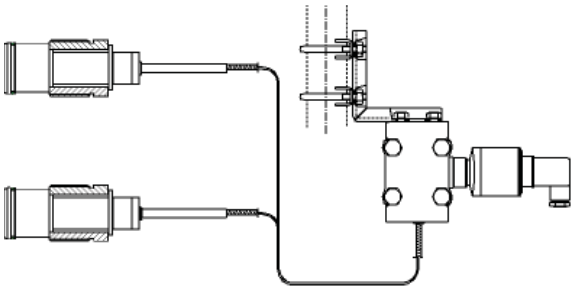
Mounting dimensions, type BB

Hydraulic Pressure Seal Connections

Capillary connection



Seal on Low or High pressure side of Differential PressureTransmitter, code **H** or **K**



Same seal on both High and Low pressure sides of Differential Pressure Transmitter, code **L**

Selection table

— □ □ □ □ □

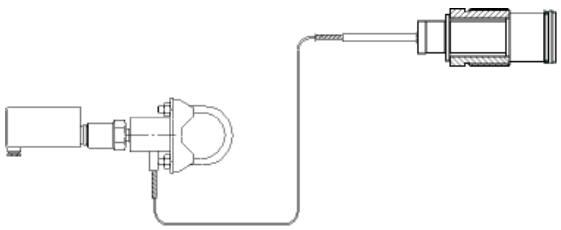
Capillary connection type
- H Seal on High pressure side of Differential Transmitter
- K Seal on Low pressure side of Differential Transmitter
- L Same seal on both High and Low pressure side of Differential Transmitter
- M Seal on High pressure side of Pressure Transmitter, process connection G½A

Capillary length (m)
2...20

Mounting bracket for transmitter
- 0 No mounting bracket
- 1 Angle mounting bracket
- 2 Mounting plate

Documentation
- IE English
- IF Finnish

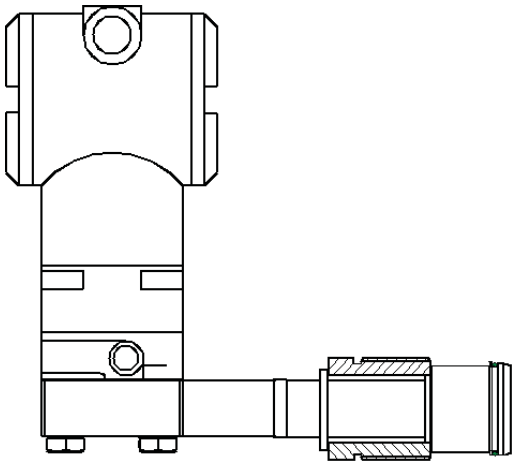
Material certificate
- 0 No material certificate
- MC1 SFS-EN 10204-2.1 (DIN50049-2.1)
- MC2 SFS-EN 10204-2.2 (DIN50049-2.2)
- MC3 SFS-EN 10204-3.1B (DIN50049-3.1B)



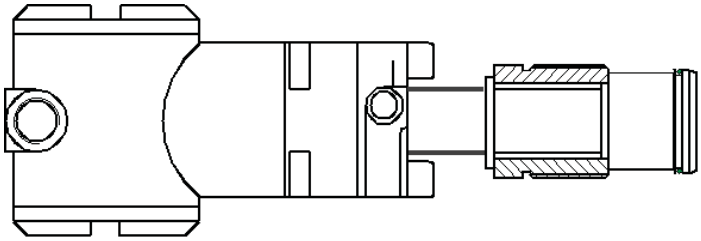
Seal on High pressure side of pressure transmitter, process connection G½A, code **M**

Hydraulic Pressure Seal Connections

Direct mounted connection



Seal on High pressure side of Differential Pressure Transmitter, angle model, code **P**



Seal on High pressure side of Differential Pressure Transmitter, straight model, code **R**

Selection table

— □ □ □

Direct mounted connection type

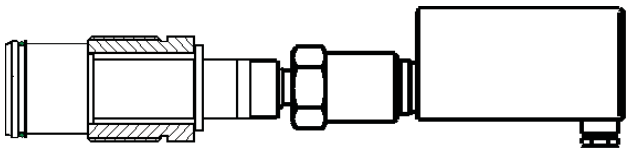
P	Seal on High pressure side of Differential Transmitter, angle model
R	Seal on High pressure side of Differential Transmitter, straight model
S	Seal on High pressure side of Pressure Transmitter, process connection G½A, straight model

Documentation

IE	English
IF	Finnish

Material certificate

0	No material certificate
MC1	SFS-EN 10204-2.1 (DIN50049-2.1)
MC2	SFS-EN 10204-2.2 (DIN50049-2.2)
MC3	SFS-EN 10204-3.1B (DIN50049-3.1B)



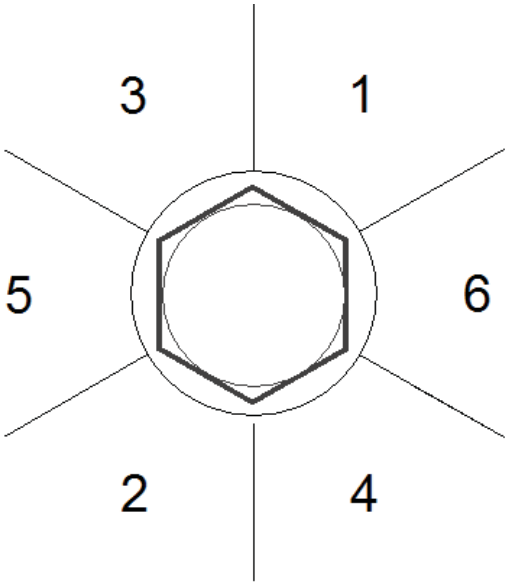
Seal on High pressure side of Pressure Transmitter, process connection G½A, straight model, code **S**

SATRON HPS BA / BB Hydraulic Pressure Seal

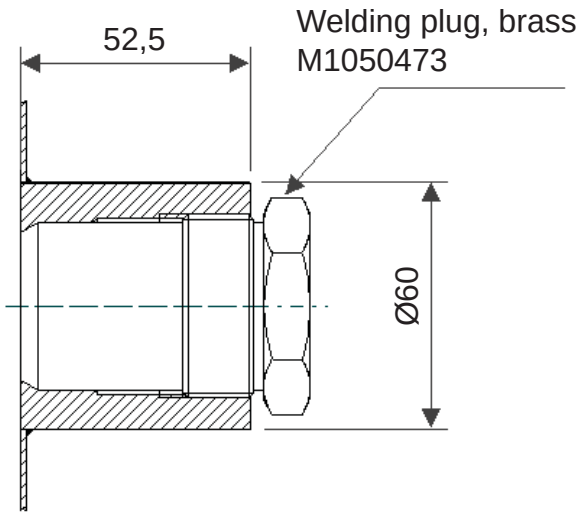
Specification example: **SATRON HPS BB88E0S0-M52IE0**

- Process connection type: Thread M45 x 2 with o-ring + metal/metal taper
- Body material: EN 1.4462, Duplex
- Diaphragm material: EN 1.4462, Duplex
- Diaphragm thickness: 0.05mm
- No diaphragm coating
- Fill fluid: silicone oil
- No mounting parts
- Hydraulic Pressure Seal Connections: Capillary type connection
    - Seal on High pressure side of pressure transmitter, process connection G½A,
    - Capillary length 5m
    - Mounting bracket for transmitter, type mounting plate
    - Documentation: English
    - No material certification

Welding the coupling



Welding sequence



Satron Instruments Inc.
P.O.Box 22, FI-33901 Tampere, Finland
Tel. +358 207 464 800, Fax +358 207 464 801
www.satron.com

Actuators and accessories

ACTUATORS

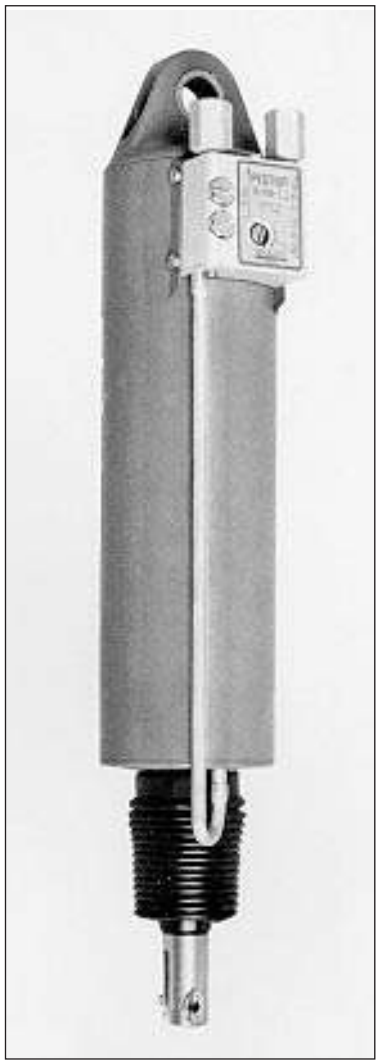
- **PISTOR 75 pneumatic power cylinder ..... Spec. EZ510**

PISTOR 75

pneumatic power cylinder

EZ510
Febr. 15, 1989

The pneumatic PISTOR power cylinder can be used as an actuator in manual and automatic control of control valves and louvers.



Technical specification

	Type	
	PISTOR 75/150	**PISTOR 75/300**
Piston diameter:	75 mm	75 mm
Stroke S:	150 mm	300 mm
Effective cross-sectional area of piston:	41 cm^2	41 cm^2
Output force		
- for 3 bar supply pressure:	1200 N	1200 N
- for 6 bar supply pressure:	2400 N	2400 N
Output work (moment of force)		
- for 3 bar supply pressure:	180 Nm	360 Nm
- for 6 bar supply pressure:	360 Nm	720 Nm
Typical time for full stroke:	12 s	20 s
Weight:	2.8 kg	3.4 kg

Supply pressure: 3 to 6 bar.

Control pressure range
- with standard adjustment:
  0.2 to 1.0 bar
- on separate order:
  0.4 to 0.9 bar spans.

Operating temperature:
-10 to +80 °C

Air consumption
- for 3 bar supply pressure:
  15 litres/min (at STP)
- for 6 bar supply pressure:
  25 litres/min (at STP)

Max. error of adjustment: ± 2 %.

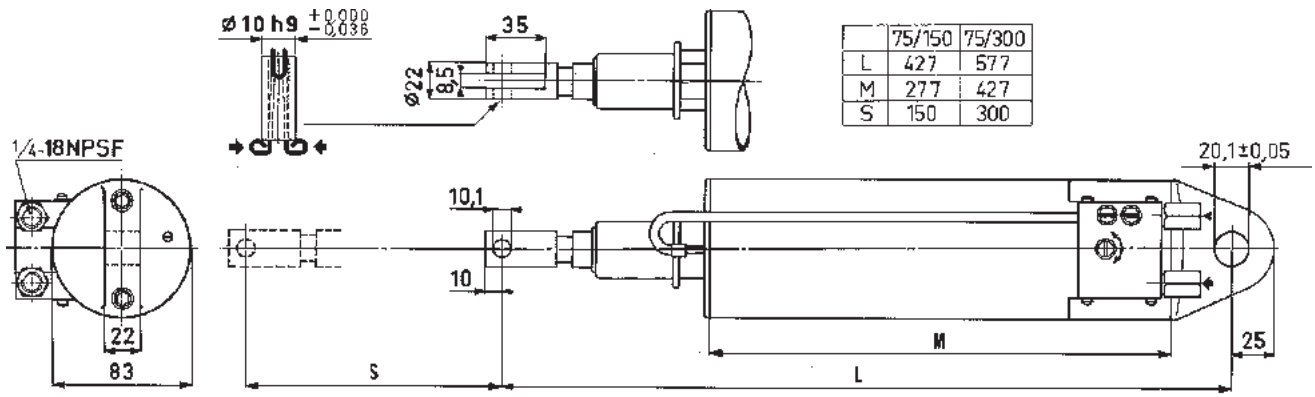
Sensitivity: 0.3 %.

Load effect
- for a load change from 0 to 80 % of the max. force obtainable for the supply pressure in use, the effect is 4 % of max.stroke per 1000 N.

Materials
- body: light alloy with epoxy powder paint, bearing bush of bronze
- piston rod: ground and polished AISI 316 acid-resistant steel
- piston and 0-rings: silicone rubber (max. 80°C).

Connections
- 1/4-18NPSF female threads.

We reserve the right to make technical changes without prior notice.
Performance is indicated in accordance with IEC546 and IEC770 recommendations.



	75/150	75/300
L	427	577
M	277	427
S	150	300

Satron Instruments Inc., P.O.Box 22, FIN-33901 Tampere, Finland
Tel. +358 207 464 800, Telefax +358 207 464 801, www.satron.com

Optical measurement

Satron VO optical analyzer for turbidity and solid content measurement **BA200**

Satron VC Optical Consistency Transmitter **BCs220**

Hygienic **Satron VO** is designed for process industry e.g. food and beverage for turbidity and solid content measurement.
Large variety of process couplings e.g. hygienic, flushed, PASVE® ensure compatibility for a wide application range. The Satron VO is simple to use and easy to calibrate from the smart user interface.

VO is robust and reliable Satron quality.

The analyzer communicates digitally using the

Satron VO is connected to process with hygienic coupling

Optical analyzer Satron VO is available also with remote display.

Satron VC is an optical consistency transmitter. It is suitable for all pulps consisting of a single grade, in consistency range of 0 ... 7%:n Cs located mainly within the mechanical pulp processes (SWG, TMP, PWG ja CTMP). Typical applications are measurements to screens, outlet from latency removal chest, screen rejects and many others.

Satron Instruments Inc., P.O.Box 22, FIN-33901 Tampere, Finland
Tel. +358 207 464 800, Telefax +358 207 464 801, www.satron.com

Satron Instruments Inc.
P.O.Box 22, FI-33901 Tampere, Finland
Tel. +358 207 464 800, Fax +358 207 464 801
www.satron.com

SATRON VO Turbidity and solids content sensor

SATRON VO turbidity and solids content analyzer is suitable for the measurement of different liquids. Savings can be obtained by using SATRON VO analyzer in process industries, e.g. the use of clean water can be minimized, the time used for the cleaning (CIP) will be shortened, the use of the end product (in dairy applications: milk) and the use of cleaning materials needed in the process can be optimized. The transmitter communicates digitally using the HART® protocol.

TECHNICAL SPECIFICATIONS

Measuring range and span
See Selection Chart.

Zero and Span adjustment
Zero elevation: Calibrated span is freely selectable on the specified range depending from the desired option. This can be made by using keyboard (display option) or HART®275/375 communicator.

Damping
- Time constant is continuously adjustable 0.01 to 60 s.

Repeatability
- 0.1% from maximum span.

Temperature limits
Ambient: -30 to +80 °C
Process: 0 to +100 °C / +140 °C (VOF)
-5 to +100 °C / +140 °C (VOM & VOD)
Shipping and storage: -40 to +80 °C.

Output 3-wire (3W), 4-20 mA

Supply voltage
Nominal 24 VDC, (21,6 - 27,6V)

Humidity limits 0-100 % RH

EMC directive 2004/108/EC
- EN 61326-1:2005

CONSTRUCTION
Materials:
Sensing element [1]: AISI316L, Duplex (EN. 1.4462), Hast. C276/C22, or Titanium Gr2.
Surface quality: Polished Ra <0,8µm
Lens: quartz glass, Safir glass or PC plastic
Coupling [1]: AISI316L, Duplex (EN 1.4462), Hast.C276 or Titanium Gr2
Other sensing element materials: AISI316, SIS 2343.

Pressure class:
- PN40
- Test pressure -1 to 30 bar

Housing with display,
codes **N0S & N0T:**
Housing: AISI303/316, Seals: Nitrile-rubber and Viton®,
Nameplates: Polyester

Housing with M12 connector, code **H0T:** Housing: AISI303/316, Seals: Viton® and NBR.

Housing with PLUG DIN 43650 connector, code **H0S:**
Housing: AISI303/316, Seals: Viton® and NBR.
PLUG connector: PA6-GF30 jacket, Silicone rubber seal, AISI316 retaining screw.

Connection hose between sensing element and housing
Codes **L** and **R** :
PUR signal cable or hose protected with PTFE/AISI316 braiding

Calibration
For customer-specified range with minimum damping. (If range is not specified, transmitter is calibrated for maximum range.)

Electrical connections
Housing with PLUG connector, code **H0S:**
Connector type DIN 43650 model AF; Pg9 gland for cable; wire cross-section 0.5 to 1.5 mm^2.

Housing with M12 connector, code **H0T**:
M12 plug connector

Housing with display, code **N0S:**
Connector type DIN 43650 model AF; Pg9 gland for cable; wire cross-section 0.5 to 1.5 mm^2.

Housing with display, code **N0T**:
M12 plug connector

I/O-connections
bout1-3
Relay, grounding contact

Maximum voltage	35 V
Maximum current	50 mA
Maximum leakage current	10 µA

bin1-3

NC (no connection)	OFF
0...2 V	ON

Minimum values for switch in use

Voltage	16 V
Current	4 mA
Leakage current	1 mA

Current output1

Range	3.5...23 mA
Maximum load	600 Ω
Factory setting	4...20 mA

Current output2
Internal power supply
Current output 2 has same ground as binary IO

Maximum load	400 Ω
Range	3.5...23 mA
Factory setting	4...20 mA

External power supply
Current output 2 is galvanically isolated

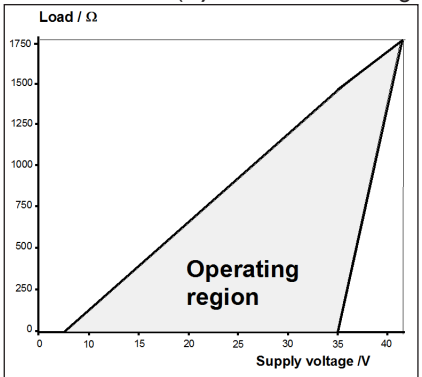
Maximum supply voltage	35 VDC
Range	3.5...23 mA
Factory setting	4...20 mA
Maximum load,	See picture below
Maximum isolation voltage	100 VDC

Process connections
- With G1 connecting thread
- Tri-Clamp 25/38 and 40/51

Protection class: See Selection chart.

Weight

Housing with PLUG DIN43650 connector **(H0T)**:	0.9 kg
Housing with M12 connector **(H0S)**:	0.9 kg
Housing with display **(N0S** & **N0T)**:	1.3 kg
Remote Housing (**L):**	2.5 kg
Remote sensor (**R):**	2.5 kg



Min. load using HART®-communication 250 R

R max = $\frac{\text{Supply voltage -5 V}}{\text{I max}}$

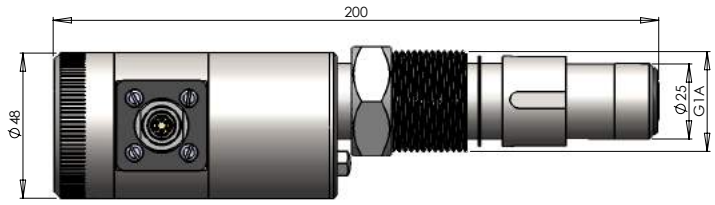
I max = 20,5 mA
I max = 22,5 mA
(when the alarm current 22,5 mA is on)

Current output 2
External power supply

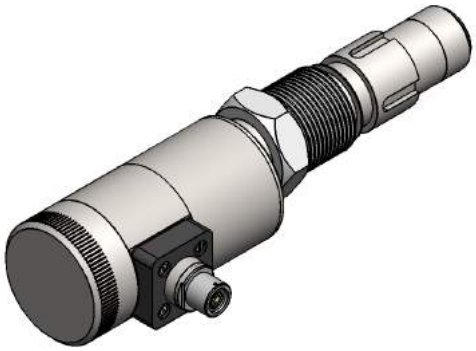
[1] Parts in contact with process medium

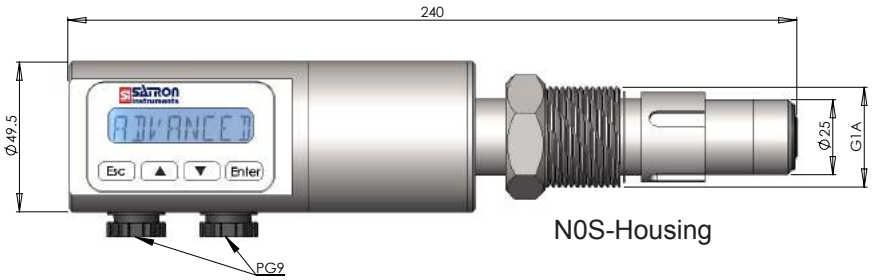
Satron Instruments Inc., P.O.Box 22, FI-33901 Tampere, Finland
Tel. +358 207 464 800, Telefax +358 207 464 801, www.satron.com

Dimensions and Housing types VOM

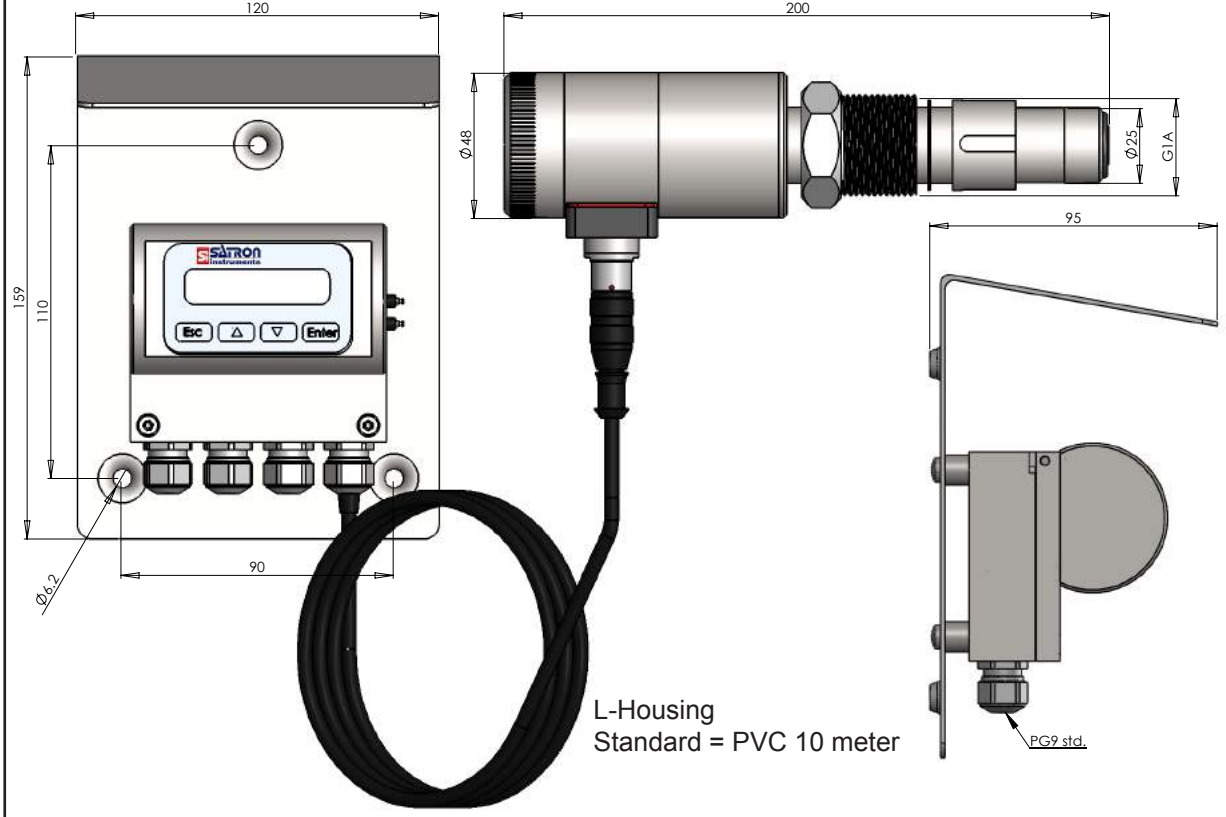


H0T-Housing

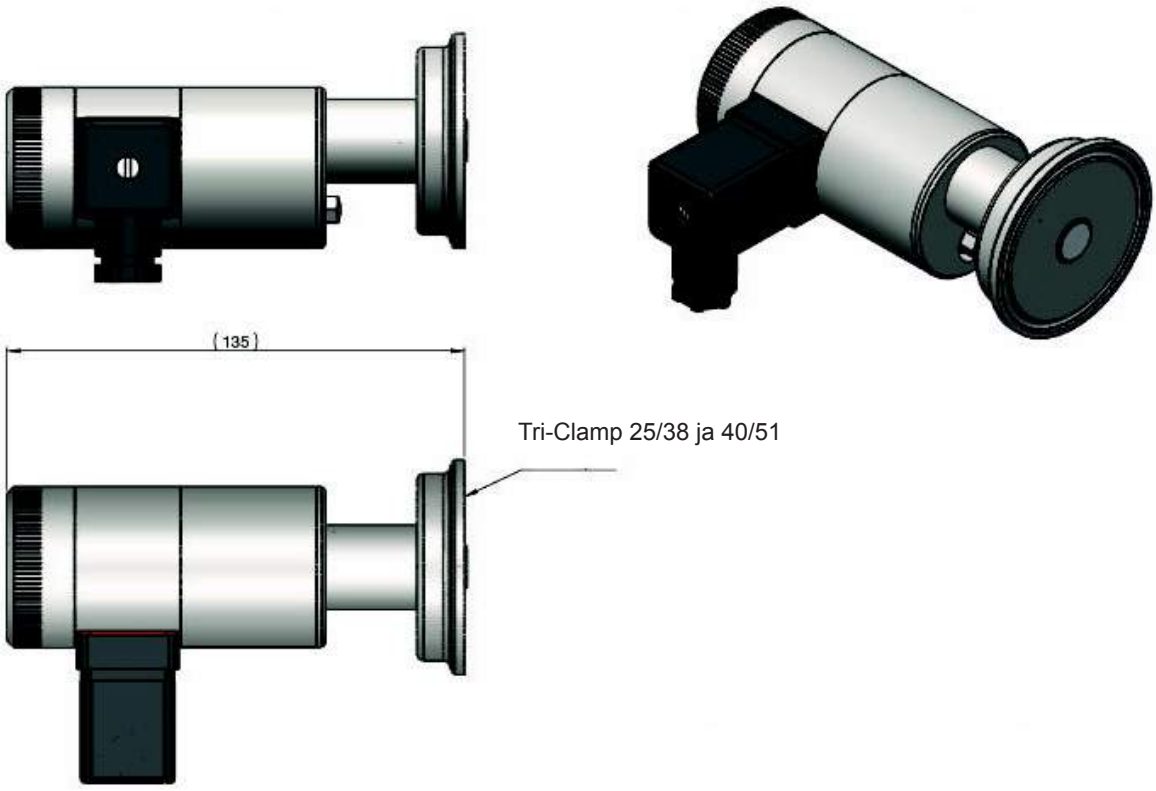




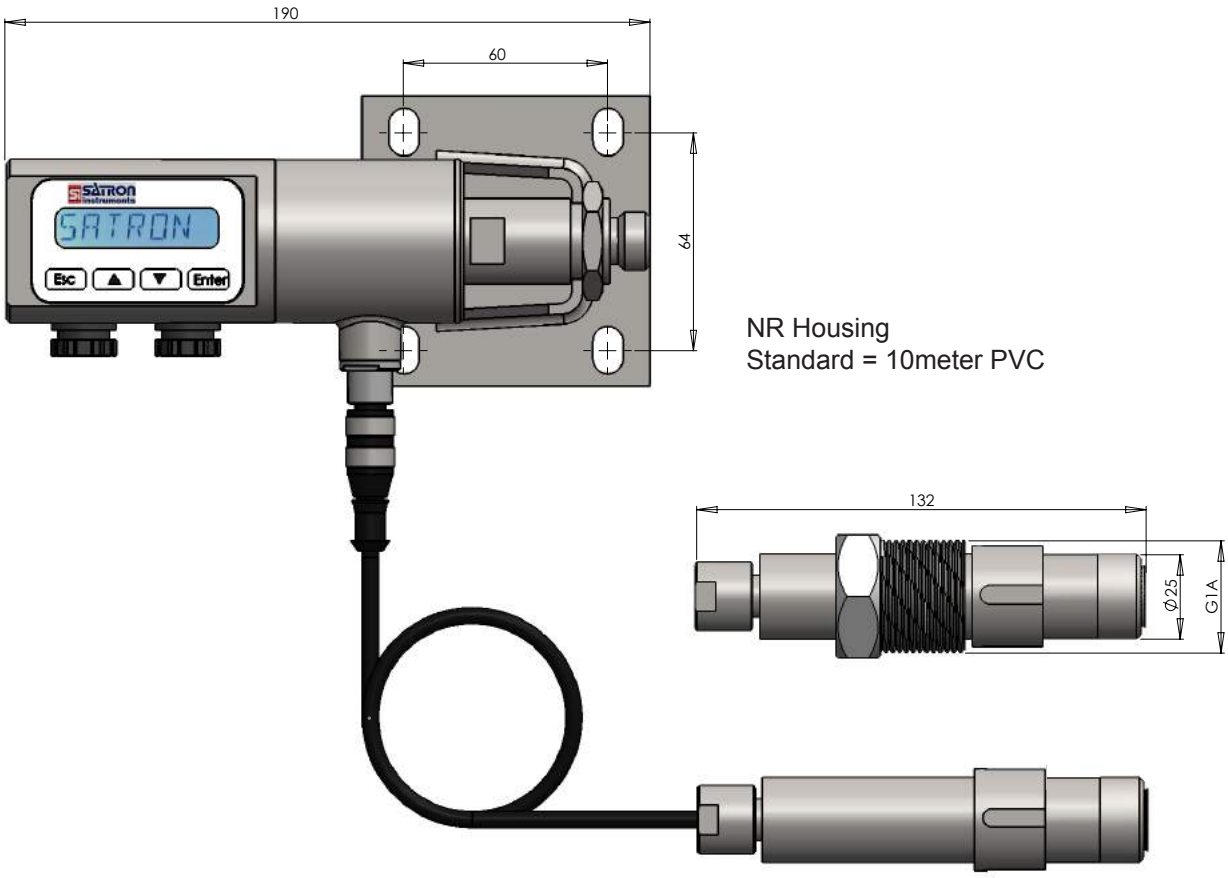
N0S-Housing



L-Housing
Standard = PVC 10 meter

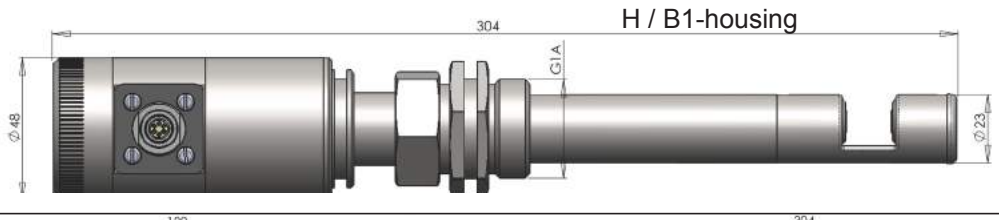


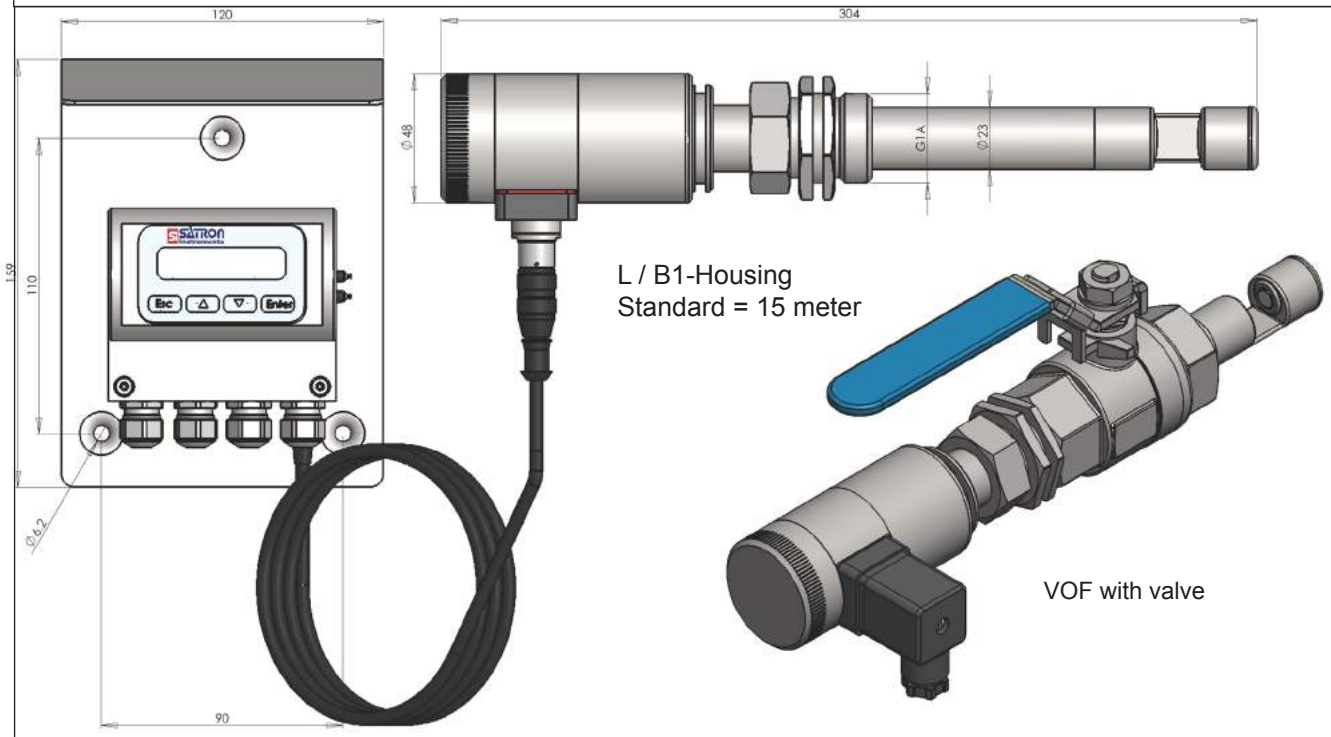
VOM with Tri-Clamp process connections, codes TA and TB



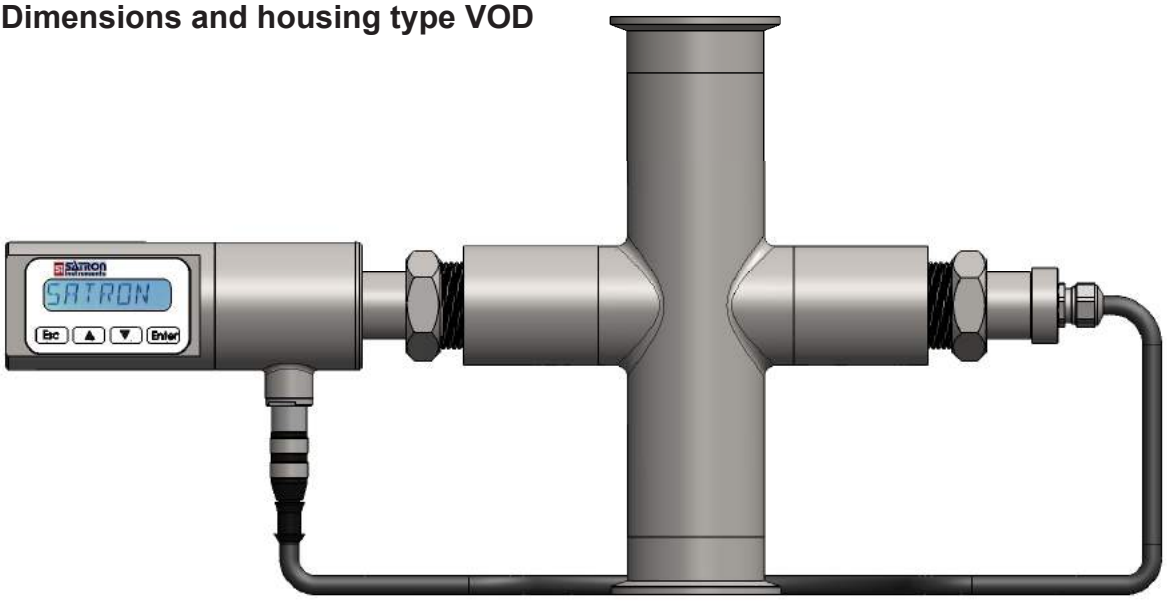
VOM with remote sensor, housing type code R

Dimensions and housing type VOF





Dimensions and housing type VOD



For easy installation the VOD is standard equipped with Tuchenhagen Type N but is is available with many different process connections. The process pipe is NOT included.

Contact Satron for other possibilities, the picture above is a VOD equipped with G1" process connection, and a pipe with 51 Tri-clamp.

SATRON VO Turbidity and solids content analyzer

Instructions and spare parts that are according and within the 3-A appliance

46 - 03

Welding the coupling

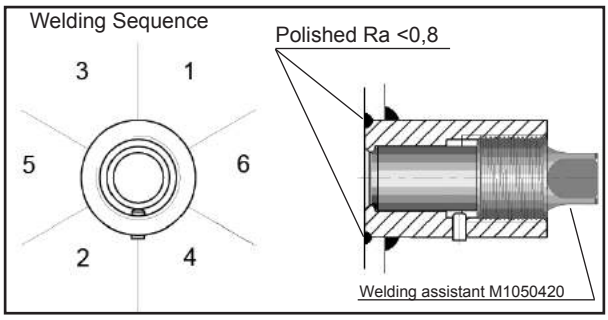
These instructions apply to hygienic welded couplings; welding the G1 standard coupling is described here as an example.

• Place the coupling in the mounting hole as shown in Fig. 1-4. Make sure the leakage detection port is down. Then weld with several runs so to prevent the coupling's oval distortion and tightness problems.
The inside welding must be cleaned, and polished with an end result of Ra <0,8

• The analyzer must be **out of the coupling** while the coupling is welded.You can use the shut-off plug shown in Fig. 1-5 to shut the coupling. The plug protects the coupling's sealing face and permits the starting of the process without the transmitter.

• It is always recommendable to use the welding assistant (M1050450) while welding the coupling to prevent any distortions due to heat.

• Do not make weld grounding via any analyzer's body!



Mounting the analyzer on the coupling

Procedure

• Make sure that the coupling's sealing face is clean.

• Remove the orange protective plug from the analyzer head.

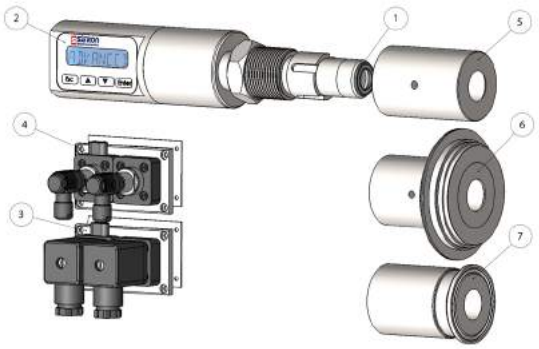
• Insert the analyzer **in a straight line** into the coupling, so that the guide groove on the transmitter aligns with the stop pin on the coupling. The analyzer settles into position when the groove and pin are aligned, and will be prevented from rotating in the coupling.

When inserting the analyzer, be careful not to damage the edge of the lens on the edges of the coupling or on the end of the stop pin!

• Lock the transmitter in position by screwing the hex nut fully home. Finger tightness is sufficient to tighten the sealing faces. However, we recommend final tightening with a tool to eliminate the effect of vibration and other such factors. Apply 60±20 Nm torque.

Do not use sealing tape etc. on threaded connection!

Spare parts

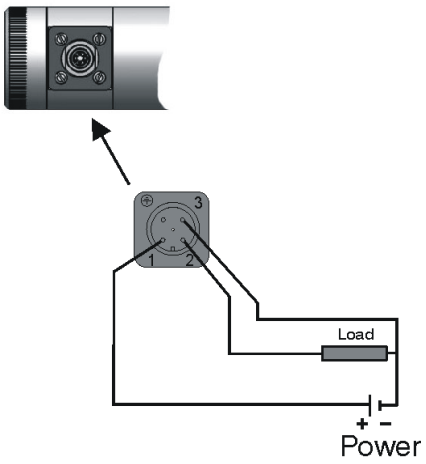


No.	Part name	Order code	Note
1	O-ring EPDM	80031720	3A 18-03 Class II (Do not exceed above 8% fat content).
1	O-ring FPM (Viton®)	80011720	3A 18-03 Class I
1	O-ring FFPM(Kalrez®)	80041717	3A 18-03 Class I
2	Sticker	T1325215	
3	Plug cover DIN43650	T1325003	
4	Plug cover M12	T1325005	
5	38/G1" Welding adapter	M1050577A	
5	45/G1" Welding adapter	M548101A	
6	Tuchenhagen / Varivent DN25	M1050090A	
6	Tuchenhagen / Varivent DN50	M1050091A	
6	Tuchenhagen / Varivent DN65,5	M1050092A	
7	Tri-clover 25/38 ISO2852	M1050206A	
7	Tri-clover 40/51 ISO2852	M1050222A	
7	Tri-clover 63.5 ISO2852	M1050224A	

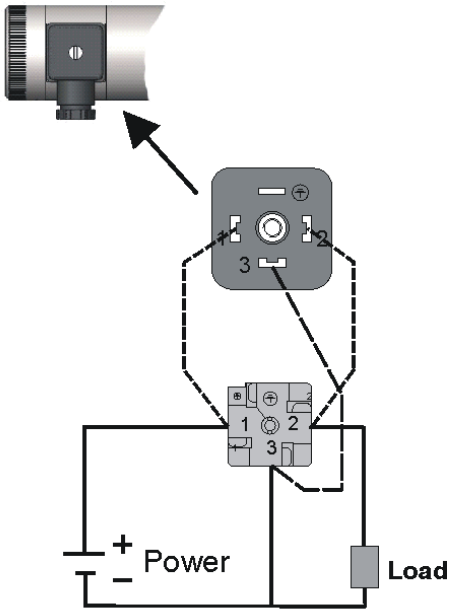
Housing with display, code N

Keyboard :

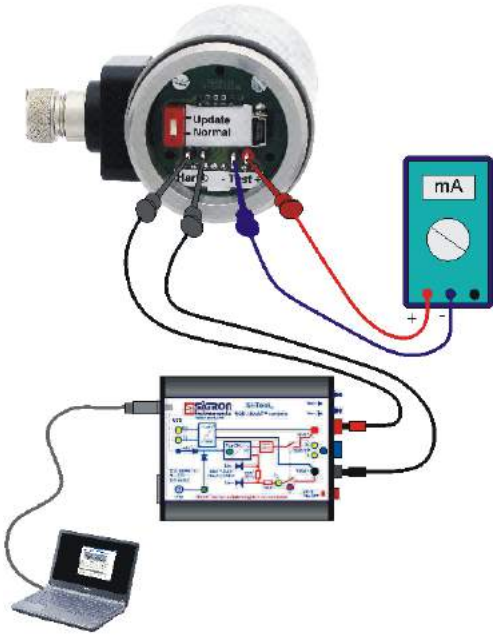
Esc	=	Press **Esc** move back towards the top of the main menu.
▲	=	Use the **UP** arrow key to move up on the current menu level or to increase the selected parameter value.
▼	=	Use the **DOWN** arrow key to move down on the current menu level or to decrease the selected parameter value.
Enter	=	Press **ENTER** to move to a lower level in a menu or to accept a command or parameter value



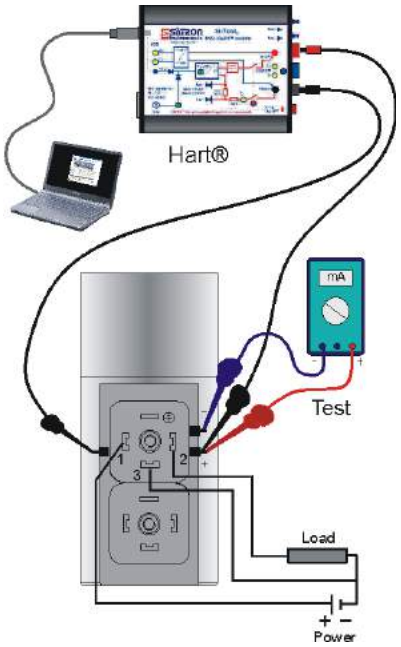
Wiring
Housing with M12-connector, code **HT**



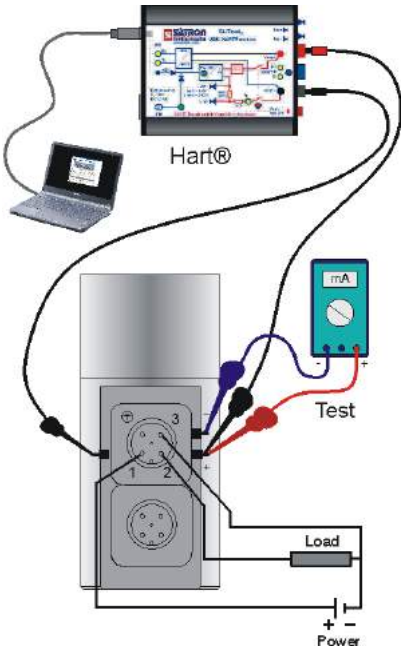
Wiring
Housing with PLUG DIN43650-connector, code **HS**



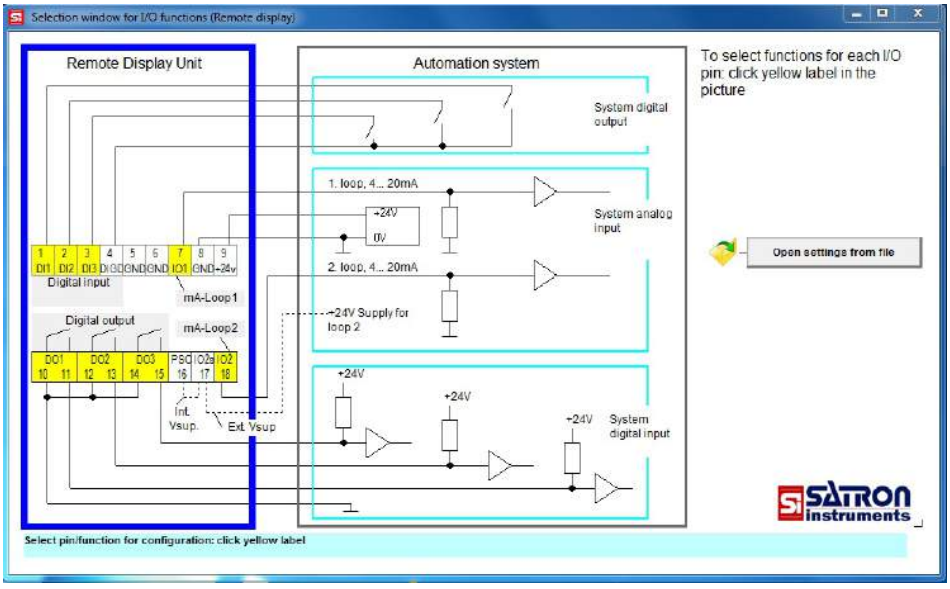
Wiring
Housing with PLUG DIN43650- and M12-connector, test connector box, code **HT & HS**

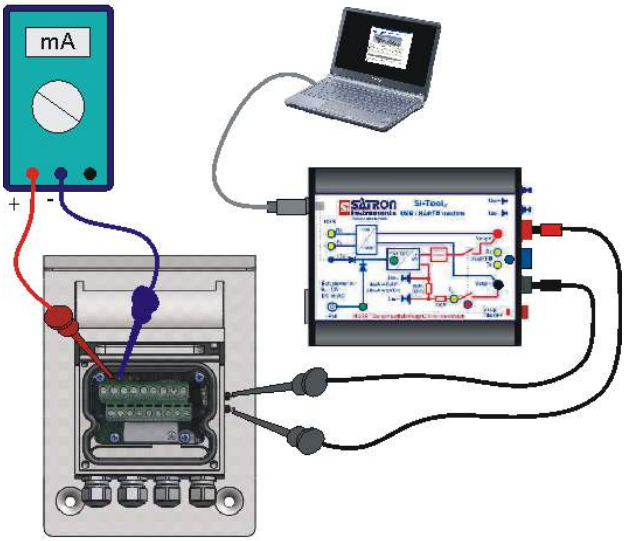


Wiring
Housing with display and PLUG DIN43650-connector, code **NS**



Wiring
Housing with display and M12-connector, code **NT**





Wiring
Remote electronics housing with display, code **L**

SATRON VO Turbidity and solids content analyzer

Selection Chart

Adjustability	Span, min	Span, max
VOM	1000 FTU	5000 FTU
VOF(*)	50 FTU	1500 FTU
VOD	50 FTU	1500 FTU

Process temperature limits

N	Normal version -5...+100 °C (VOM & VOD), 0...+100 °C (VOF)
H(**)	High temperature -5...+140 °C (VOM & VOD), 0...+140°C (VOF)

Output

S	4-20mA DC/HART® for use with 230VAC 50Hz
J	4-20mA DC/HART® for use with 110VAC 60Hz

Material of wetted parts

Body		Lens		Seal		3A 18-03
2	AISI316L	**2**	Sapphire glass	**1**(***)	EPDM	Class II
3	Hast. C 276	**4**	Spinel	**2**	FPM (Viton®)	Class I
6	Titanium Gr2			**3**	FFPM (Kalrez®)	Class I
8	Duplex (EN 1.4462)					
9	Peek					

Housing type

N	Housing with display and pushbuttons
H	Housing with, no display, (only one mA output)
L	Remote electronics housing with display

Probe type

0	No remote probe
R	Remote measuring probe (not available with L housing), IP68

Connection type

S	DIN43650 with PG9, IP66
T	M12, IP67
V	PG9 (always with L housing), IP66

Cable Material

0	No VOD, L or R selected
1	PUR cable.
2(*)	AISI316L braided PTFE hose.
3	Steel reinforced PUR hose.
4	PVC cable

Cable length

0	No VOD or L, R option selected				
1	5 M.	**3**	15 M. (PUR std.)	**5**	25 M.
2	10 M. (PVC std.)	**4**	20 M.	**...**	

Light source

2	365nm	**4**	540nm	**6**	640nm	**8**	950nm
3	460nm	**5**	580nm	**7**	880nm		

Process connections

G1	Standard G1A thread + Oring
TA	Tri-Clamp 25/38 (ISO 2852)
TB	Tri-Clamp 40/51 (ISO 2852)
TN	Tuchenhagen "N" type DN50
HX(*)	Fixed mounting tube, (specify length)
B1(*)	G1A ball valve insertion. Extension 19cm diameter ø 24mm
BX(*)	G1A ball valve insertion. Extension by request diameter ø 24mm

Documentation

Calibration certificate **AE** English

Installation and operating instructions **IE** English **IF** Finnish **FR** French

Material certificates

0	No material certificate
MC1	Raw material certificate without appendices, in accordance with SFS-EN 10204-2.1 (DIN 50049-2.1) standard
MC2	Raw material certificate for wetted parts, in accordance with SFS-EN 10204-2.2 (DIN 50049-2.2) standard
MC3	Raw material certificate for wetted parts, in accordance with SFS-EN 10204-3.1 B (DIN 50049-3.1 B) standard

* **Not EHEDG certified & Not within the 3A approval**
** **Only in combination with Quartz, Sapphire lens and Kalrez Seals. And only 880nm**
*** **Do not exceed above 8% fat content.**

CE

CERTIFIED HYGIENIC ENGINEERING & DESIGN EHEDG EUROPEAN GROUP
TYPE EL - CLASS I
JANUARY 2010

3-A® 46 - 03

We reserve the right for technical modifications without prior notice.

SATRON VC Optical Consistency Transmitter

SATRON VC is an optical consistency transmitter. It is suitable for all pulps consisting of a single grade, in consistency range of 0…7%Cs located mainly within the mechanical pulp processes (SWG, TMP, PWG and CTMP). Typical applications are measurements to screens, outlet from latency removal chest, screen rejects and many others. The **Satron VC** can provide an accurate and reliable consistency measurement without need for regular maintenance.

TECHNICAL SPECIFICATIONS

Measuring range and span
See Selection Chart.

Zero and Span adjustment
Zero elevation: Calibrated span is freely selectable on the specified range depending from the desired option. This can be made by using keyboard (display option) or HART®275/375 communicator.

Damping
- Time constant is continuously adjustable 0.01 to 60 s.

Repeatability
- 0.01% Cs.

Temperature limits
Ambient: -30 to +80 °C
Process: 0 to + 140 °C
Shipping and storage: -40 to +80 °C.

Output 3-wire (3W), 4-20 mA

Supply voltage and permissible load
- 24 VDC, -10 %, + 15 %, 100 mA
- 115/230 VAC, -15% ... +10% (device enclosure)

Humidity limits 0-100 % RH

EMC directive 2004/108/EC
- EN 61326-1:2005

CONSTRUCTION
Materials:
Sensing element [1]: AISI316L (EN 1.4404), Duplex (EN. 1.4462), Hast. C276 (EN 2.4819), or Titanium Gr2.
Safir glass
Coupling [1]: AISI316L (EN 1.4404), Duplex (EN 1.4462), Hast.C276 (EN 2.4819) or Titanium Gr2

Pressure class:
- PN25

Housing with display,
codes **N0S & N0T:**
Housing: AISI303/316, Seals: Nitrile-rubber and Viton®,
Nameplates: Polyester

Housing with M12 connector, code **H0T:** Housing: AISI303/316, Seals: Viton® and NBR.

Connection hose between sensing element and housing
Codes **L** and **R** :
PUR signal cable or hose protected with PTFE/AISI316 braiding

Device enclosure, code **K:**
EN 1.4301 (AISI304)

Calibration
For customer-specified range with minimum damping. (If range is not specified, transmitter is calibrated for maximum range.)

Electrical connections
Housing with PLUG connector, code **H0S:**
Connector type DIN 43650 model AF; Pg9 gland for cable; wire cross-section 0.5 to 1.5 mm^2.

Housing with M12 connector, code **H0T**:
M12 plug connector

Housing with display, code **N0S:**
Connector type DIN 43650 model AF; Pg9 gland for cable; wire cross-section 0.5 to 1.5 mm^2.

Housing with display, code **N0T**:
M12 plug connector

Device enclosures (with display), code **K**:
- PG13,5 inlet, 3 pcs
- The sensor signal M12 plug connector.

I/O-connections
bout1-3
Relay, grounding contact

Maximum voltage	35 V
Maximum current	50 mA
Maximum leakage current	10 µA

bin1-3

NC (no connection)	OFF
0...2 V	ON

Minimum values for switch in use

Voltage	16 V
Current	4 mA
Leakage current	1 mA

Current output1

Range	3.5...23 mA
Maximum load	600 Ω
Factory setting	4...20 mA

Current output2
Internal power supply
Current output 2 has same ground as binary IO

Maximum load	400 Ω
Range	3.5...23 mA
Factory setting	4...20 mA

External power supply
Current output 2 is galvanically isolated
Maximum supply voltage 35 VDC

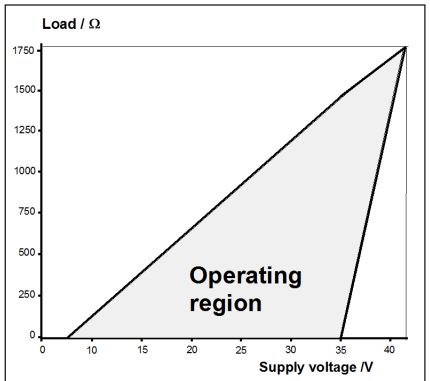
Range	3.5...23 mA
Factory setting	4...20 mA
Maximum load,	See picture below
Maximum isolation voltage	100 VDC

Process connections
- With G1 connecting thread

Protection class: See Selection chart.

Weight

Housing with M12 connector **(H0T)**:	1.3 kg
Housing with display **(N0S** & **N0T)**:	1.7 kg
Remote Housing **(L):**	2.9 kg
Remote sensor **(R):**	2.9 kg
Device enclosure **(K)**	6,2 kg



Min. load using HART®-communication 250 W

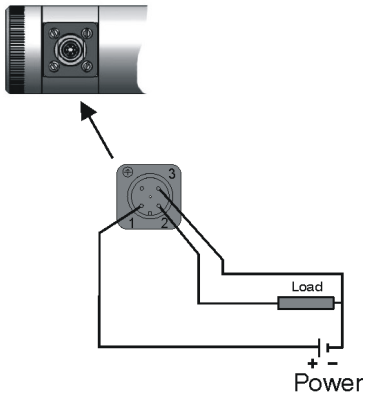
R max = $\frac{\text{Supply voltage -5 V}}{\text{I max}}$

I max = 20,5 mA
I max = 22,5 mA
(when the alarm current 22,5 mA is on)

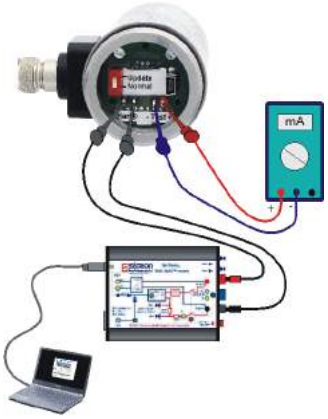
Current output 2
External power supply

[1] Parts in contact with process medium

Satron Instruments Inc., P.O.Box 22, FI-33901 Tampere, Finland
Tel. +358 207 464 800, Telefax +358 207 464 801, www.satron.com

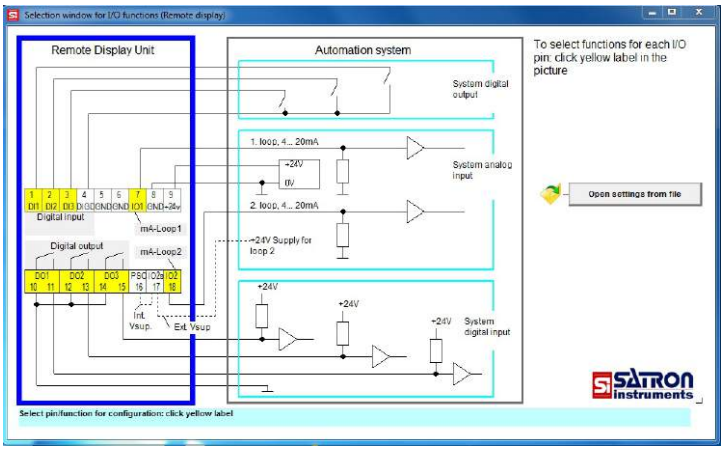


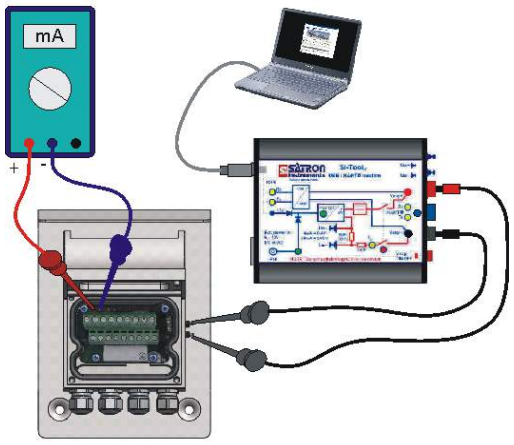
Wiring
Housing with M12-connector, code **HT**



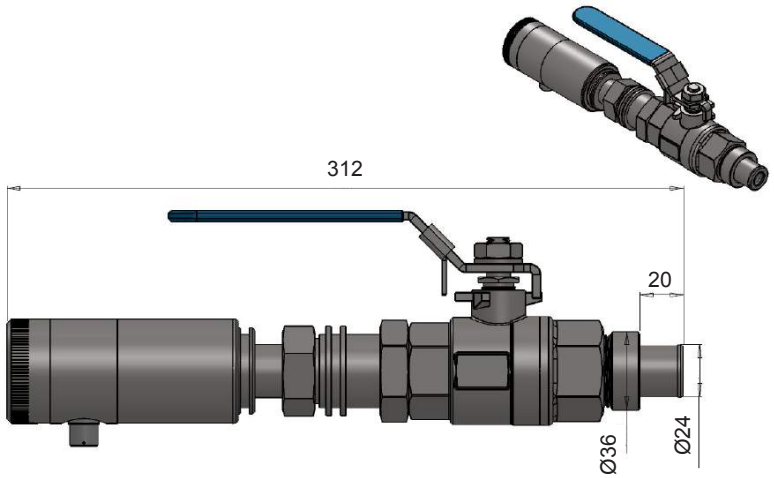
Wiring
Housing with M12-connector, test connector box, code **HT**

Wiring
Remote electronic in the device enclosure. Power supply 115/230 V 50/60 Hz, code **K**.
Only housing type **L** and probe type **R** with display.

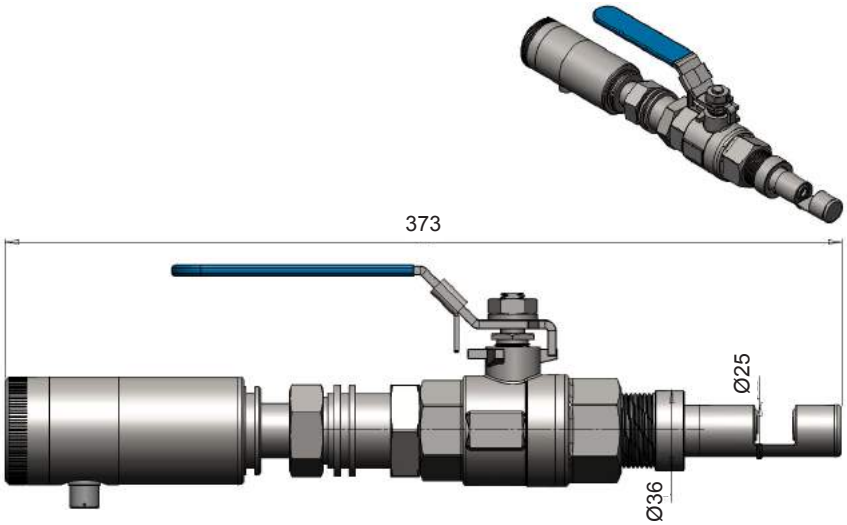




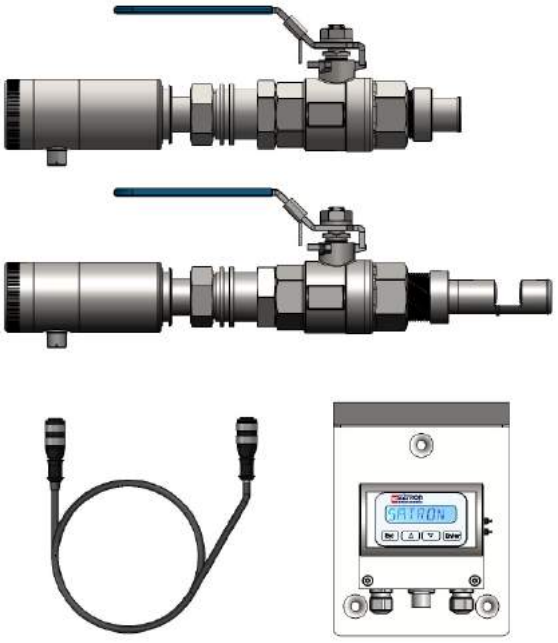
Wiring
Remote electronics housing with display, code **L**



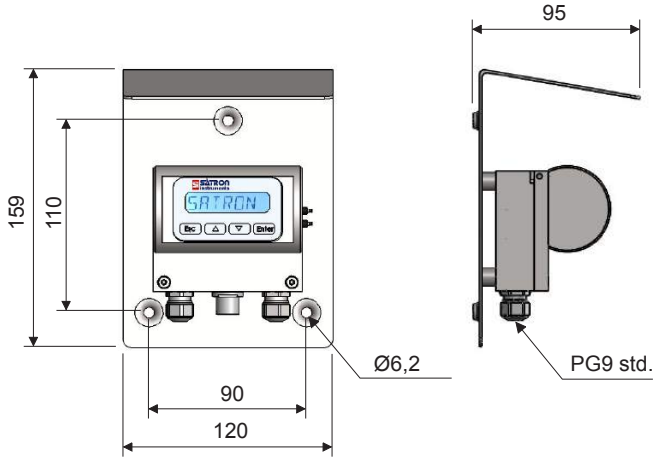
Dimensions Satron VCT



Dimensions Satron VCF



Standard 15 m



Satron VC with L-housing

Selection Chart

Adjustability	Span, min	Consistency Range
VCT	1% Cs	0...7% Cs
VCF	0,5% Cs	0...0,5 Cs

Process temperature limits **N** Normal version 0 ...+140 °C

Output **S** 4-20mA DC/HART®

Material of wetted parts

Body		Lens		Seal	
2	AISI316L (EN 1.4404)	**2**	Sapphire glass	**1**	EPDM
3	Hast. C 276 (EN 2.4819)			**2**	FPM (Viton®)
6	Titanium Gr2 (EN 3.7035)			**3**	FFPM (Kalrez®)
8	Duplex (EN 1.4462)				

Housing type
- **N** Housing with display and pushbuttons (only with remote probe "R")
- **H** Housing with, no display, (only one mA output)
- **L** Remote electronics housing with display

Probe type
- **0** No remote probe
- **R** Remote measuring probe (not available with L housing), IP68

Connection type
- **T** M12, IP67
- **U** M12 & USB (only with N housing), IP67
- **V** PG9 (always with L housing), IP66

Cable Material
- **0** No, L or R selected
- **1** PUR cable.
- **2** AISI316L braided PTFE hose.
- **3** Steel reinforced PUR hose.
- **4** PVC cable

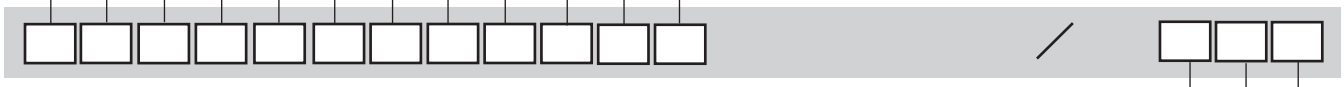
Cable length
- **0** No L or R option selected
- **2** 15 meter

Light source **7** 880nm

Process connections
B1 G1A ball valve insertion. Extension diameter ø 24mm

Device enclosure

K Remote electronic in the device enclosure. Power supply 115/230 V, IP66.
Only housing type **L** and probe type **R** with display.



Documentation
Calibration certificate **AE** English
Installation and operating instructions **IE** English **IF** Finnish **FR** French

Material certificates
- **0** No material certificate
- **MC1** Raw material certificate without appendices, in accordance with SFS-EN 10204-2.1 (DIN 50049-2.1) standard
- **MC2** Raw material certificate for wetted parts, in accordance with SFS-EN 10204-2.2 (DIN 50049-2.2) standard
- **MC3** Raw material certificate for wetted parts, in accordance with SFS-EN 10204-3.1 B (DIN 50049-3.1 B) standard

We reserve the right for technical modifications without prior notice.

CE

SATRON VCA Optical Total Consistency Transmitter + Ash

The SATRON VCA is a multichannel optical transmitter. It is suitable for total & filler (ash %) consistency measurements in majority of the pulp & paper applications.

TECHNICAL SPECIFICATIONS

Measuring range and span
See Selection Chart.

Zero and Span adjustment
Zero elevation: Calibrated span is freely selectable on the specified range depending from the desired option. This can be made by using keyboard (display option) or HART®275/375 communicator.

Damping
- Time constant is continuously adjustable 0.01 to 60 s.

Repeatability
- 0.01% Cs.

Temperature limits
Ambient: -30 to +80 °C
Process: 0 to + 140 °C
Shipping and storage: -40 to +80 °C.

Output
2 current outputs for Cs:
3-wire (3W), 4-20 mA

Supply voltage and permissible load
- 24 VDC, -10 %, + 15 %, 100 mA
- 115/230 VAC, -15% ... +10% (device enclosure)

Humidity limits 0-100 % RH

EMC directive 2004/108/EC
- EN 61326-1:2005

CONSTRUCTION
Materials:
Sensing element [1]: AISI316L (EN 1.4404), Duplex (EN. 1.4462), Hast. C276 (EN 2.4819), or Titanium Gr2. Safir glass
Coupling [1]: AISI316L (EN 1.4404), Duplex (EN 1.4462), Hast.C276 (EN 2.4819) or Titanium Gr2

Pressure class:
- PN25

Housing with display,
codes **N0S & N0T:**
Housing: AISI303/316, Seals: Nitrile-rubber and Viton®,
Nameplates: Polyester

Housing with M12 connector, code **H0T:** Housing: AISI303/316, Seals: Viton® and NBR.

Connection hose between sensing element and housing
Codes **L** and **R** :
PUR signal cable or hose protected with PTFE/AISI316 braiding
Device enclosure, code **K:**
EN 1.4301 (AISI304)

Calibration
For customer-specified range with minimum damping. (If range is not specified, transmitter is calibrated for maximum range.)

Electrical connections
Housing with PLUG connector, code **H0S:**
Connector type DIN 43650 model AF; Pg9 gland for cable; wire cross-section 0.5 to 1.5 mm^2.

Housing with M12 connector, code **H0T**:
M12 plug connector

Housing with display, code **N0S:**
Connector type DIN 43650 model AF; Pg9 gland for cable; wire cross-section 0.5 to 1.5 mm^2.

Housing with display, code **N0T**:
M12 plug connector

Device enclosures (with display), code **K**:
- PG13,5 inlet, 3 pcs
- The sensor signal M12 plug connector.

I/O-connections
bout1-3
Relay, grounding contact

Maximum voltage	35 V
Maximum current	50 mA
Maximum leakage current	10 µA

bin1-3

NC (no connection)	OFF
0...2 V	ON

Minimum values for switch in use

Voltage	16 V
Current	4 mA
Leakage current	1 mA

Current output1

Range	3.5...23 mA
Maximum load	600 Ω
Factory setting	4...20 mA

Current output2
Internal power supply
Current output 2 has same ground as binary IO

Maximum load	400 Ω
Range	3.5...23 mA
Factory setting	4...20 mA

External power supply
Current output 2 is galvanically isolated

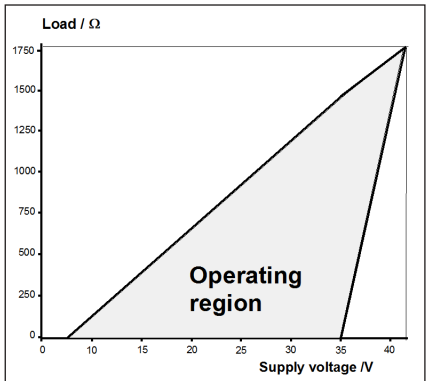
Maximum supply voltage	35 VDC
Range	3.5...23 mA
Factory setting	4...20 mA
Maximum load,	See picture below
Maximum isolation voltage	100 VDC

Process connections
- With G1 connecting thread

Protection class: See Selection chart.

Weight

Housing with M12 connector **(H0T)**:	1.3 kg
Housing with display **(N0S** & **N0T)**:	1.7 kg
Remote Housing **(L):**	2.9 kg
Remote sensor **(R):**	2.9 kg
Device enclosure **(K)**	6,2 kg



Min. load using HART®-communication 250 W

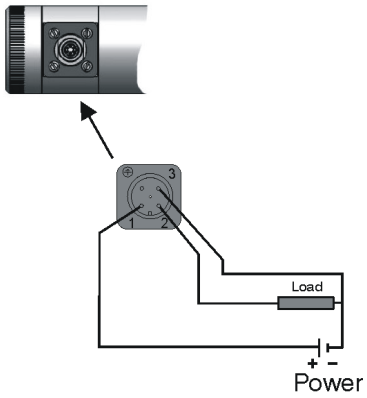
R max = Supply voltage -5 V / I max

I max = 20,5 mA
I max = 22,5 mA
(when the alarm current 22,5 mA is on)

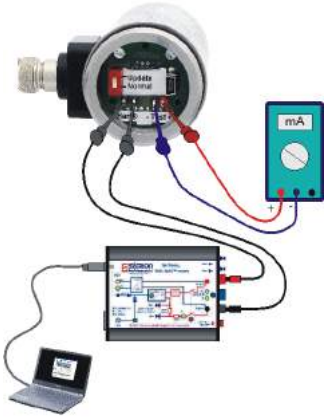
Current output 2
External power supply

[1] Parts in contact with process medium

Satron Instruments Inc., P.O.Box 22, FI-33901 Tampere, Finland
Tel. +358 207 464 800, Telefax +358 207 464 801, www.satron.com

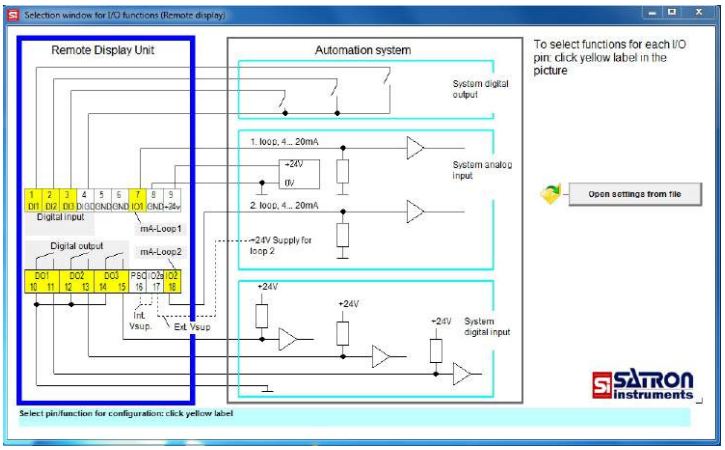


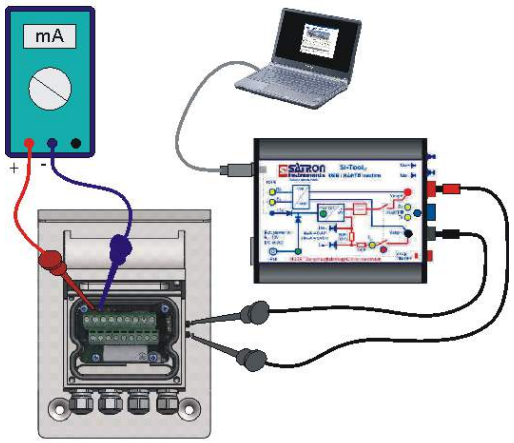
Wiring
Housing with M12-connector, code **HT**



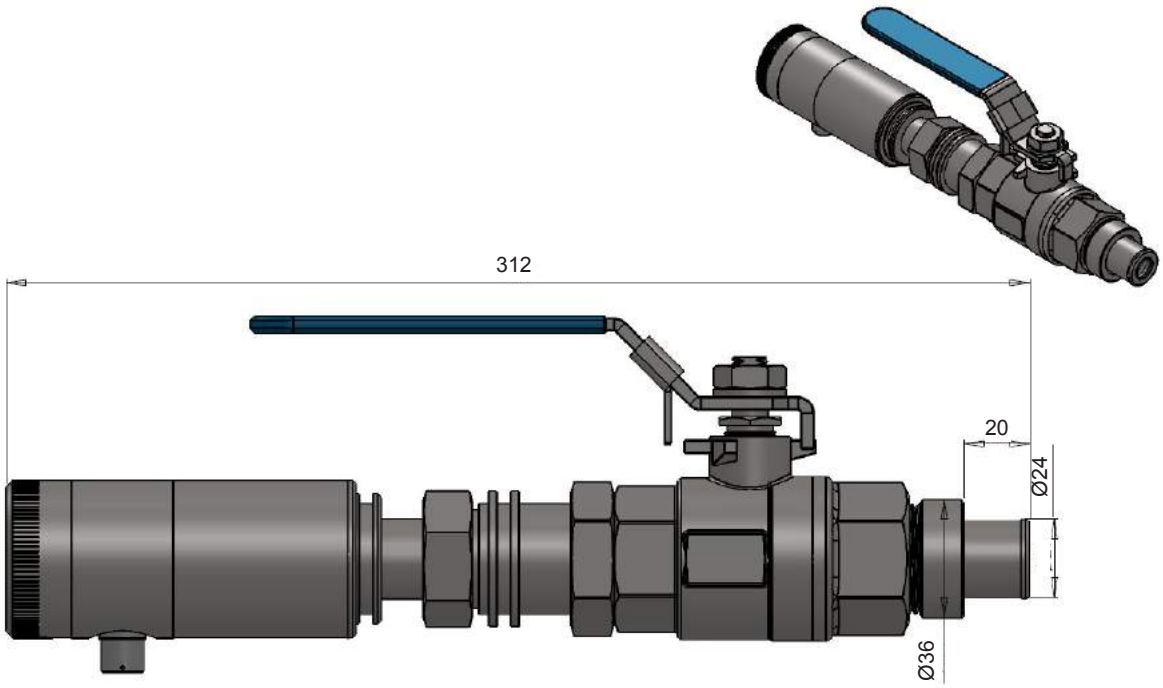
Wiring
Housing with M12-connector, test connector box, code **HT**

Wiring
Remote electronic in the device enclosure. Power supply 115/230 V 50/60 Hz, code **K**.
Only housing type **L** and probe type **R** with display.

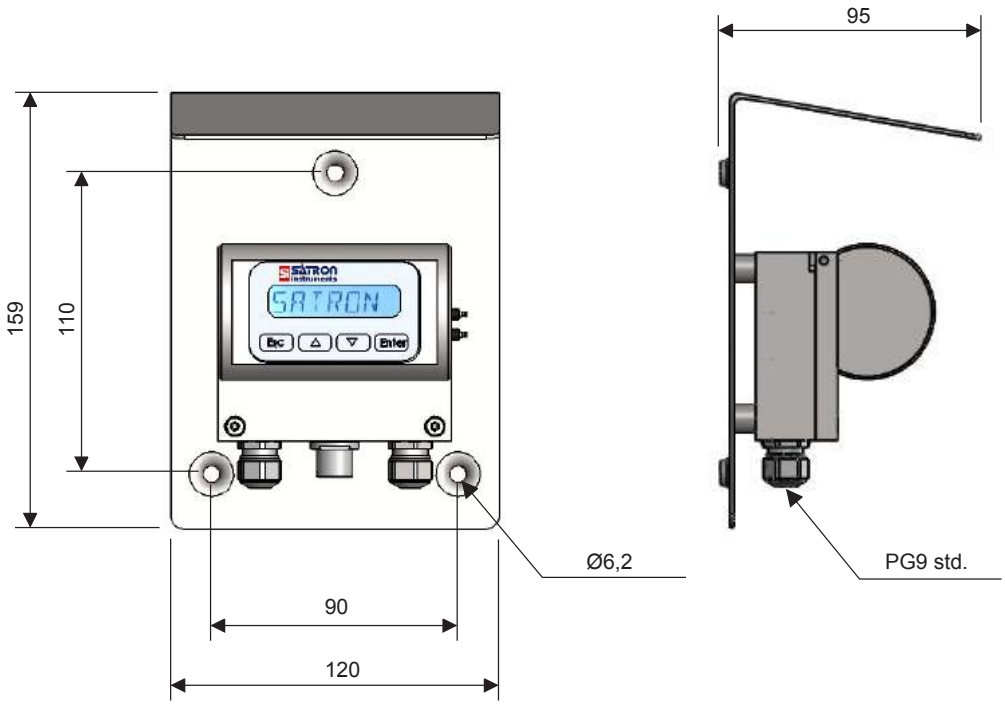




Wiring
Remote electronics housing with display, code **L**



Dimensions Satron VCA



Satron VCA with L-housing

Selection Chart

Adjustability	Span, min	Total Consistency Range	Filler consistency
VCA	1% Cs	0...12% Cs	0 ... 10% Cs

Process temperature limits **N** Normal version 0 ...+140 °C

Output **S** 4-20mA DC/HART®

Material of wetted parts

Body		Lens		Seal	
2	AISI316L (EN 1.4404)	**2**	Sapphire glass	**1**	EPDM
3	Hast. C 276 (EN 2.4819)			**2**	FPM (Viton®)
6	Titanium Gr2 (EN 3.7035)			**3**	FFPM (Kalrez®)
8	Duplex (EN 1.4462)				

Housing type

N	Housing with display and pushbuttons (only with remote probe "R")
H	Housing with, no display, (only one mA output)
L	Remote electronics housing with display

Probe type

0	No remote probe
R	Remote measuring probe (not available with L housing), IP68

Connection type

T	M12, IP67
U	M12 & USB (only with N housing), IP67
V	PG9 (always with L housing), IP66

Cable Material

0	No, L or R selected
1	PUR cable.
2	AISI316L braided PTFE hose.
3	Steel reinforced PUR hose.
4	PVC cable

Cable length

0	No L or R option selected
2	15 meter

Light source

4	880nm / 640 nm / 530 nm
7	880nm / 640 nm / 465 nm

Process connections

B1 G1A ball valve insertion. Extension diameter ø 24mm

Device enclosure

K Remote electronic in the device enclosure. Power supply 115/230 V, IP66.
Only housing type **L** and probe type **R** with display.

												/			

Documentation

Calibration certificate **AE** English

Installation and operating instructions **IE** English **IF** Finnish **FR** French

Material certificates

0 No material certificate
MC1 Raw material certificate without appendices, in accordance with SFS-EN 10204-2.1 (DIN 50049-2.1) standard
MC2 Raw material certificate for wetted parts, in accordance with SFS-EN 10204-2.2 (DIN 50049-2.2) standard
MC3 Raw material certificate for wetted parts, in accordance with SFS-EN 10204-3.1 B (DIN 50049-3.1 B) standard

We reserve the right for technical modifications without prior notice.

CE

SATRON VCB Optical Brightness Transmitter

The SATRON VCB is a multichannel optical Brightness transmitter, suitable for Brightness measurement in majority of the chemical and mechanical pulp, recycled and paper machine applications.

TECHNICAL SPECIFICATIONS

Measuring range and span
See Selection Chart.

Zero and Span adjustment
Zero elevation: Calibrated span is freely selectable on the specified range depending from the desired option. This can be made by using keyboard (display option) or HART®275/375 communicator.

Damping
- Time constant is continuously adjustable 0.01 to 60 s.

Temperature limits
Ambient: -30 to +80 °C
Process: 0 to + 140 °C
Shipping and storage: -40 to +80 °C.

Output
2 current outputs for Cs:
3-wire (3W), 4-20 mA

Supply voltage and permissible load
- 24 VDC, -10 %, + 15 %, 100 mA
- 115/230 VAC, -15% ... +10% (device enclosure)

Humidity limits 0-100 % RH

EMC directive 2004/108/EC
- EN 61326-1:2005

CONSTRUCTION
Materials:
Sensing element [1]: AISI316L (EN 1.4404), Duplex (EN. 1.4462), Hast. C276 (EN 2.4819), or Titanium Gr2. Safir glass
Coupling [1]: AISI316L (EN 1.4404), Duplex (EN 1.4462), Hast.C276 (EN 2.4819) or Titanium Gr2

Pressure class:
- PN25

Housing with display,
codes **N0S & N0T:**
Housing: AISI303/316, Seals: Nitrile-rubber and Viton®,
Nameplates: Polyester

Housing with M12 connector, code **H0T:** Housing: AISI303/316, Seals: Viton® and NBR.

Connection hose between sensing element and housing
Codes **L** and **R** :
PUR signal cable or hose protected with PTFE/AISI316 braiding
Device enclosure, code **K:**
EN 1.4301 (AISI304)

Calibration
For customer-specified range with minimum damping. (If range is not specified, transmitter is calibrated for maximum range.)

Electrical connections
Housing with PLUG connector, code **H0S:**
Connector type DIN 43650 model AF; Pg9 gland for cable; wire cross-section 0.5 to 1.5 mm^2.

Housing with M12 connector, code **H0T**:
M12 plug connector

Housing with display, code **N0S:**
Connector type DIN 43650 model AF; Pg9 gland for cable; wire cross-section 0.5 to 1.5 mm^2.

Housing with display, code **N0T**:
M12 plug connector

Device enclosures (with display), code **K**:
- PG13,5 inlet, 3 pcs
- The sensor signal M12 plug connector.

I/O-connections
bout1-3
Relay, grounding contact

Maximum voltage	35 V
Maximum current	50 mA
Maximum leakage current	10 µA

bin1-3

NC (no connection)	OFF
0...2 V	ON

Minimum values for switch in use

Voltage	16 V
Current	4 mA
Leakage current	1 mA

Current output1

Range	3.5...23 mA
Maximum load	600 Ω
Factory setting	4...20 mA

Current output2
Internal power supply
Current output 2 has same ground as binary IO

Maximum load	400 Ω
Range	3.5...23 mA
Factory setting	4...20 mA

External power supply
Current output 2 is galvanically isolated

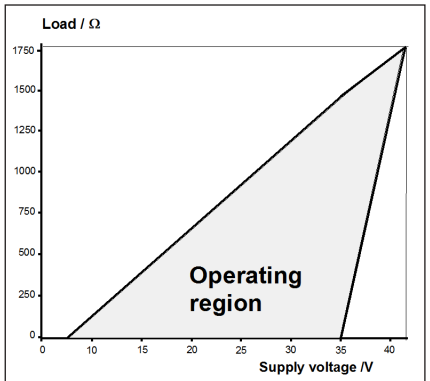
Maximum supply voltage	35 VDC
Range	3.5...23 mA
Factory setting	4...20 mA
Maximum load,	See picture below
Maximum isolation voltage	100 VDC

Process connections
- With G1 connecting thread

Protection class: See Selection chart.

Weight

Housing with M12 connector **(H0T)**:	1.3 kg
Housing with display **(N0S** & **N0T)**:	1.7 kg
Remote Housing **(L):**	2.9 kg
Remote sensor **(R):**	2.9 kg
Device enclosure **(K)**	6,2 kg



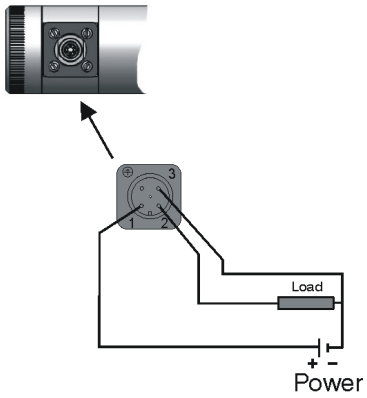
Min. load using HART®-communication 250 W

R max = Supply voltage -5 V / I max

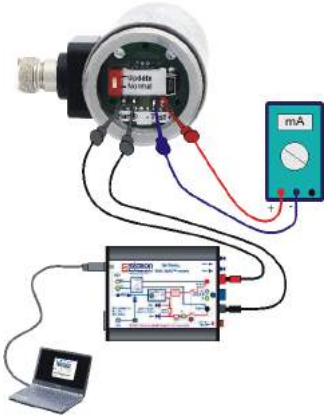
I max = 20,5 mA
I max = 22,5 mA
(when the alarm current 22,5 mA is on)

Current output 2
External power supply

[1] Parts in contact with process medium

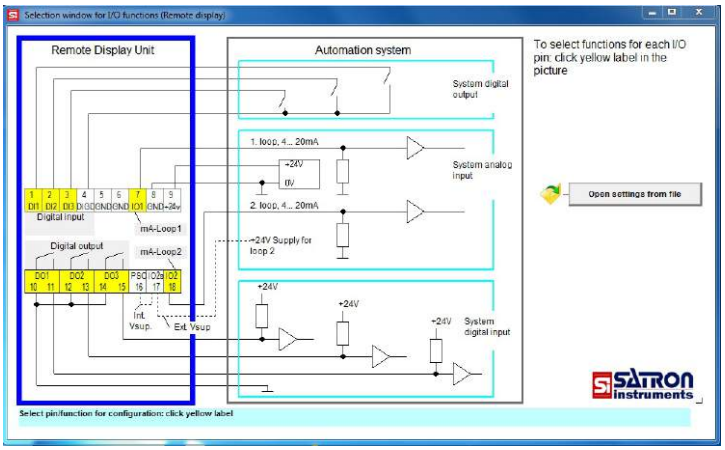


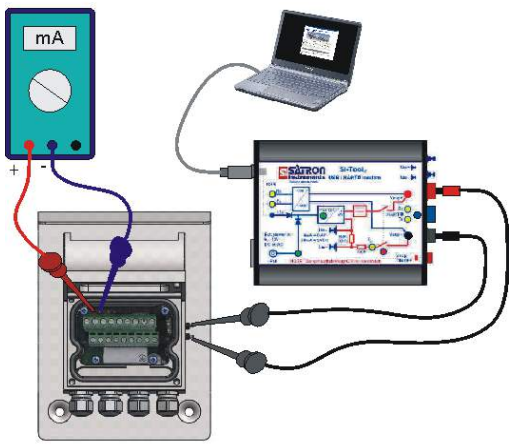
Wiring
Housing with M12-connector, code **HT**



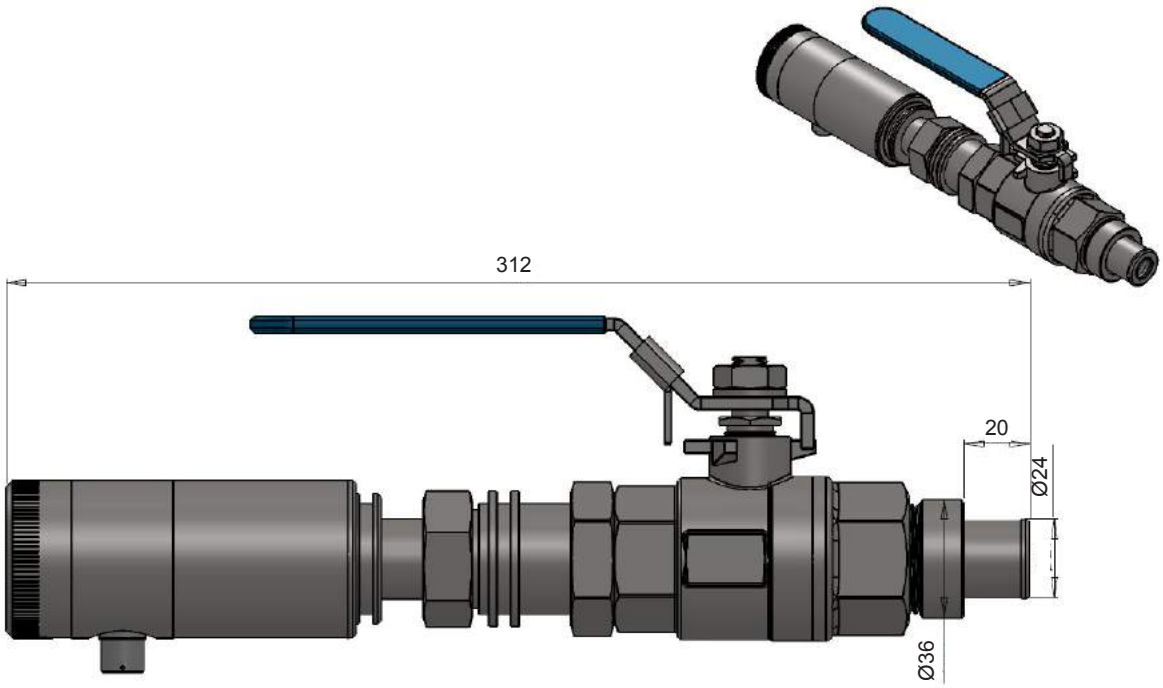
Wiring
Housing with M12-connector, test connector box, code **HT**

Wiring
Remote electronic in the device enclosure. Power supply 115/230 V 50/60 Hz, code **K**.
Only housing type **L** and probe type **R** with display.

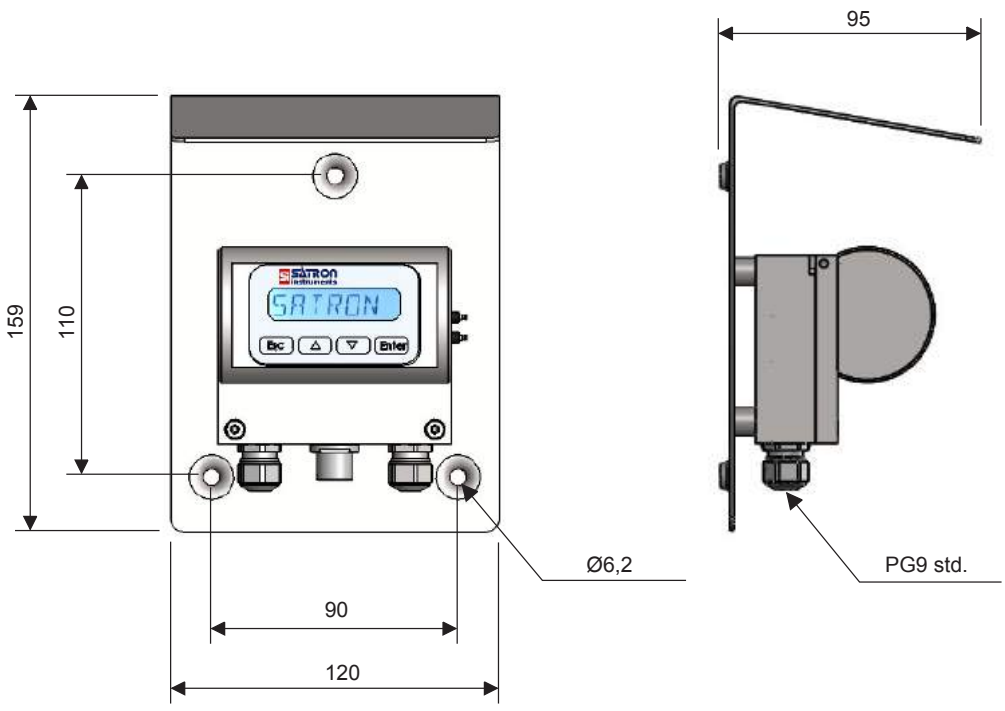




Wiring
Remote electronics housing with display, code **L**



Dimensions Satron VCB



Satron VCB with L-housing

SATRON VCB Optical Brightness Transmitter

Selection Chart

Adjustability	Measuring Range	Span, min
Brightness	20 - 95° SCAN	
Consistency	0...12% Cs	1% Cs

Process temperature limits **N** Normal version 0 ...+140 °C

Output **S** 4-20mA DC/HART®

Material of wetted parts

Body		Lens		Seal	
2	AISI316L (EN 1.4404)	**2**	Sapphire glass	**1**	EPDM
3	Hast. C 276 (EN 2.4819)			**2**	FPM (Viton®)
6	Titanium Gr2 (EN 3.7035)			**3**	FFPM (Kalrez®)
8	Duplex (EN 1.4462)				

Housing type
- **N** Housing with display and pushbuttons (only with remote probe "R")
- **H** Housing with, no display, (only one mA output)
- **L** Remote electronics housing with display

Probe type
- **0** No remote probe
- **R** Remote measuring probe (not available with L housing), IP68

Connection type
- **T** M12, IP67
- **U** M12 & USB (only with N housing), IP67
- **V** PG9 (always with L housing), IP66

Cable Material
- **0** No, L or R selected
- **1** PUR cable.
- **2** AISI316L braided PTFE hose.
- **3** Steel reinforced PUR hose.
- **4** PVC cable

Cable length
- **0** No L or R option selected
- **2** 15 meter

Light source
- **4** 880nm / 640 nm / 530 nm
- **7** 880nm / 640 nm / 465 nm

Process connections
B1 G1A ball valve insertion. Extension diameter ø 24mm

Device enclosure

K Remote electronic in the device enclosure. Power supply 115/230 V, IP66.
Only housing type **L** and probe type **R** with display.

												/			

Documentation

Calibration certificate **AE** English

Installation and operating instructions **IE** English **IF** Finnish **FR** French

Material certificates
- **0** No material certificate
- **MC1** Raw material certificate without appendices, in accordance with SFS-EN 10204-2.1 (DIN 50049-2.1) standard
- **MC2** Raw material certificate for wetted parts, in accordance with SFS-EN 10204-2.2 (DIN 50049-2.2) standard
- **MC3** Raw material certificate for wetted parts, in accordance with SFS-EN 10204-3.1 B (DIN 50049-3.1 B) standard

We reserve the right for technical modifications without prior notice.

CE

SATRON VCK Optical Total Lignin Content Transmitter

The SATRON VCK is a multichannel optical transmitter, suitable for total content measurement (fiber and filtrate) in majority of the Bleach plant applications.

TECHNICAL SPECIFICATIONS

Measuring range and span
See Selection Chart.

Zero and Span adjustment
Zero elevation: Calibrated span is freely selectable on the specified range depending from the desired option. This can be made by using keyboard (display option) or HART®275/375 communicator.

Damping
- Time constant is continuously adjustable 0.01 to 60 s.

Repeatability
- application specific

Temperature limits
Ambient: -30 to +80 °C
Process: 0 to + 140 °C
Shipping and storage: -40 to +80 °C.

Output
2 current outputs for Cs:
3-wire (3W), 4-20 mA

Supply voltage and permissible load
- 24 VDC, -10 %, + 15 %, 100 mA
- 115/230 VAC, -15% ... +10% (device enclosure)

Humidity limits 0-100 % RH

EMC directive 2004/108/EC
- EN 61326-1:2005

CONSTRUCTION
Materials:
Sensing element [1]: AISI316L (EN 1.4404), Duplex (EN. 1.4462), Hast. C276 (EN 2.4819), or Titanium Gr2.
Safir glass
Coupling [1]: AISI316L (EN 1.4404), Duplex (EN 1.4462), Hast.C276 (EN 2.4819) or Titanium Gr2

Pressure class:
- PN25

Housing with display,
codes **N0S & N0T:**
Housing: AISI303/316, Seals: Nitrile-rubber and Viton®,
Nameplates: Polyester

Housing with M12 connector, code **H0T:** Housing: AISI303/316, Seals: Viton® and NBR.

Connection hose between sensing element and housing
Codes **L** and **R** :
PUR signal cable or hose protected with PTFE/AISI316 braiding
Device enclosure, code **K:**
EN 1.4301 (AISI304)

Calibration
For customer-specified range with minimum damping. (If range is not specified, transmitter is calibrated for maximum range.)

Electrical connections
Housing with PLUG connector, code **H0S:**
Connector type DIN 43650 model AF; Pg9 gland for cable; wire cross-section 0.5 to 1.5 mm^2.

Housing with M12 connector, code **H0T**:
M12 plug connector

Housing with display, code **N0S:**
Connector type DIN 43650 model AF; Pg9 gland for cable; wire cross-section 0.5 to 1.5 mm^2.

Housing with display, code **N0T**:
M12 plug connector

Device enclosures (with display), code **K**:
- PG13,5 inlet, 3 pcs
- The sensor signal M12 plug connector.

I/O-connections
bout1-3
Relay, grounding contact

Maximum voltage	35 V
Maximum current	50 mA
Maximum leakage current	10 µA

bin1-3

NC (no connection)	OFF
0...2 V	ON

Minimum values for switch in use

Voltage	16 V
Current	4 mA
Leakage current	1 mA

Current output1

Range	3.5...23 mA
Maximum load	600 Ω
Factory setting	4...20 mA

Current output2
Internal power supply
Current output 2 has same ground as binary IO

Maximum load	400 Ω
Range	3.5...23 mA
Factory setting	4...20 mA

External power supply
Current output 2 is galvanically isolated

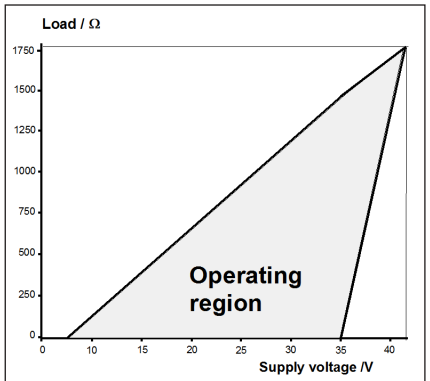
Maximum supply voltage	35 VDC
Range	3.5...23 mA
Factory setting	4...20 mA
Maximum load,	See picture below
Maximum isolation voltage	100 VDC

Process connections
- With G1 connecting thread

Protection class: See Selection chart.

Weight

Housing with M12 connector **(H0T)**:	1.3 kg
Housing with display **(N0S** & **N0T)**:	1.7 kg
Remote Housing **(L):**	2.9 kg
Remote sensor **(R):**	2.9 kg
Device enclosure **(K)**	6,2 kg



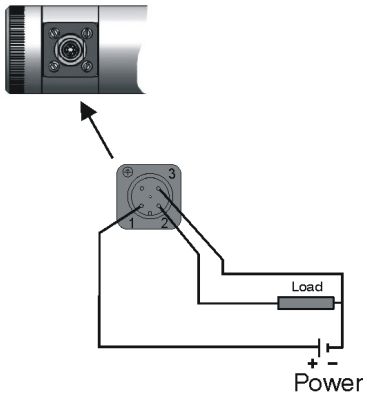
Min. load using HART®-communication 250 W

R max = Supply voltage -5 V / I max

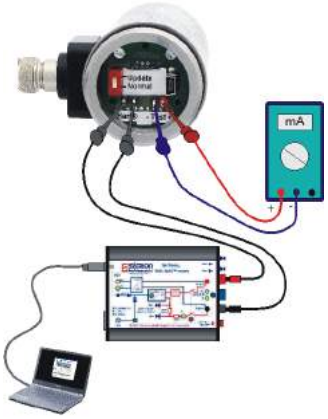
I max = 20,5 mA
I max = 22,5 mA
(when the alarm current 22,5 mA is on)

Current output 2
External power supply

[1] Parts in contact with process medium

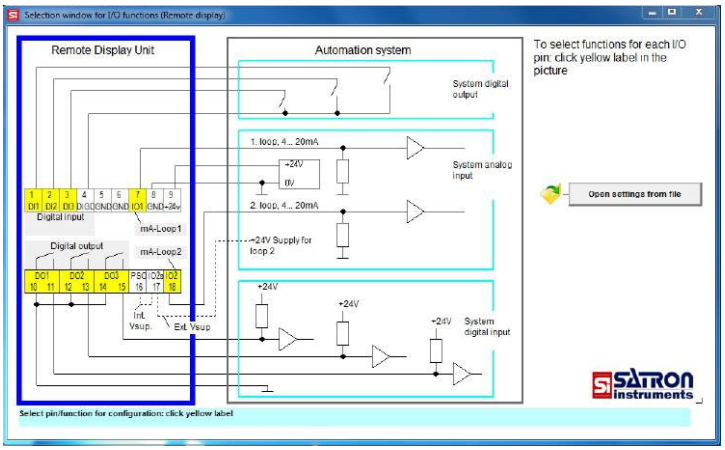


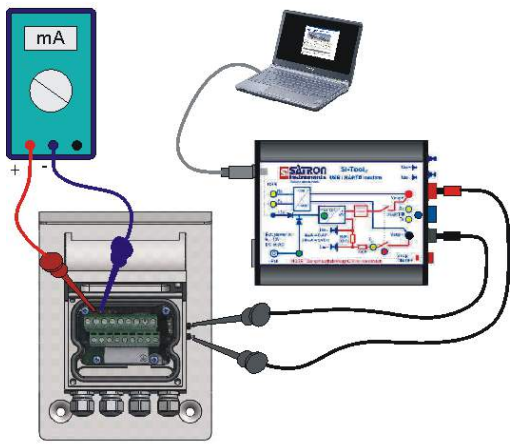
Wiring
Housing with M12-connector, code **HT**



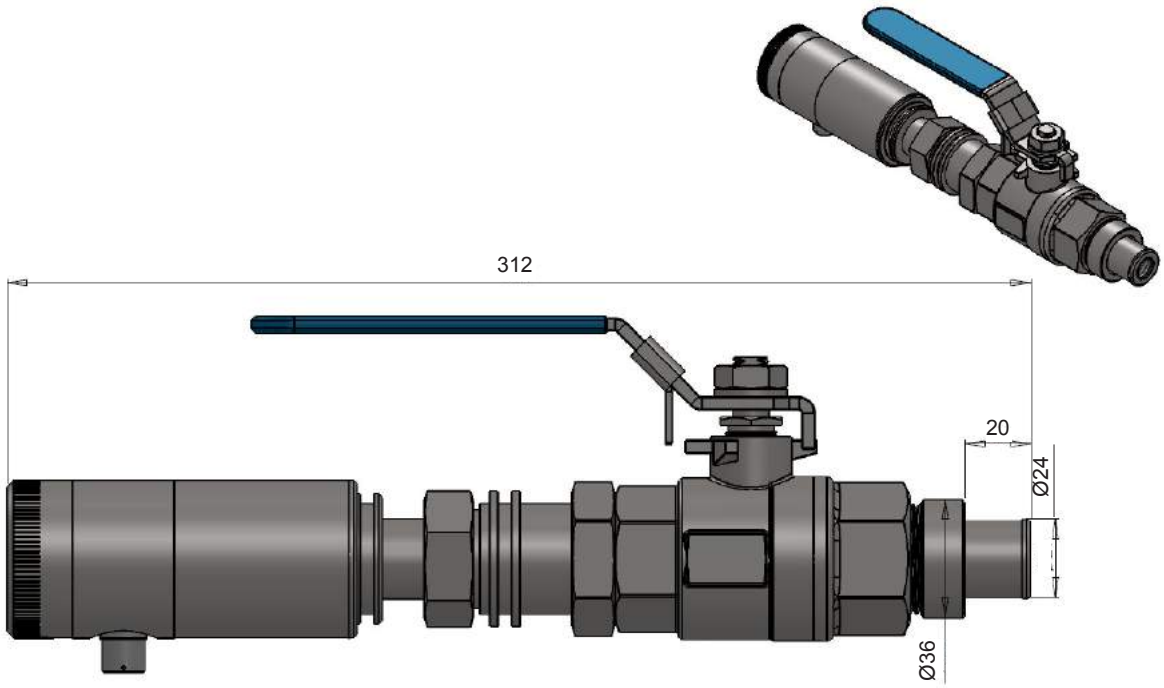
Wiring
Housing with M12-connector, test connector box, code **HT**

Wiring
Remote electronic in the device enclosure. Power supply 115/230 V 50/60 Hz, code **K**.
Only housing type **L** and probe type **R** with display.

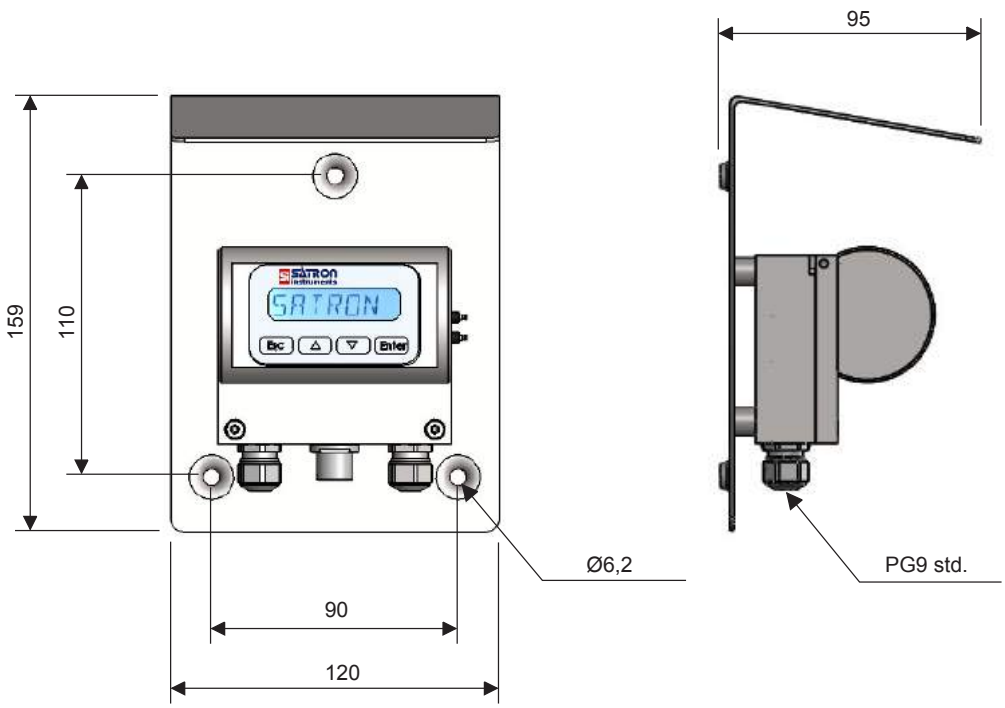




Wiring
Remote electronics housing with display, code **L**



Dimensions Satron VCK



Satron VCK with L-housing

Selection Chart

Adjustability	Measuring Range	Span, min
Kappa	0 - 50 Kappa points	
Consistency	0...12% Cs	1% Cs

Process temperature limits **N** Normal version 0 ...+140 °C

Output **S** 4-20mA DC/HART®

Material of wetted parts

Body		Lens		Seal	
2	AISI316L (EN 1.4404)	**2**	Sapphire glass	**1**	EPDM
3	Hast. C 276 (EN 2.4819)			**2**	FPM (Viton®)
6	Titanium Gr2 (EN 3.7035)			**3**	FFPM (Kalrez®)
8	Duplex (EN 1.4462)				

Housing type
- **N** Housing with display and pushbuttons (only with remote probe "R")
- **H** Housing with, no display, (only one mA output)
- **L** Remote electronics housing with display

Probe type
- **0** No remote probe
- **R** Remote measuring probe (not available with L housing), IP68

Connection type
- **T** M12, IP67
- **U** M12 & USB (only with N housing), IP67
- **V** PG9 (always with L housing), IP66

Cable Material
- **0** No, L or R selected
- **1** PUR cable.
- **2** AISI316L braided PTFE hose.
- **3** Steel reinforced PUR hose.
- **4** PVC cable

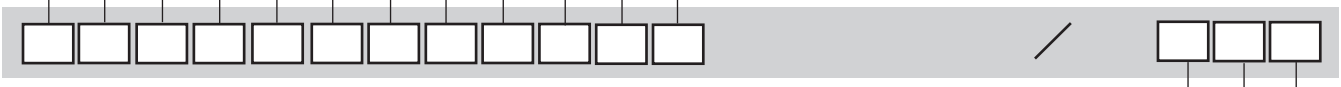
Cable length
- **0** No L or R option selected
- **2** 15 meter

Light source
- **4** 880nm / 640 nm / 530 nm
- **7** 880nm / 640 nm / 465 nm

Process connections
B1 G1A ball valve insertion. Extension diameter ø 24mm

Device enclosure

K Remote electronic in the device enclosure. Power supply 115/230 V, IP66.
Only housing type **L** and probe type **R** with display.



Documentation

Calibration certificate **AE** English

Installation and operating instructions **IE** English **IF** Finnish **FR** French

Material certificates

0 No material certificate
MC1 Raw material certificate without appendices, in accordance with SFS-EN 10204-2.1 (DIN 50049-2.1) standard
MC2 Raw material certificate for wetted parts, in accordance with SFS-EN 10204-2.2 (DIN 50049-2.2) standard
MC3 Raw material certificate for wetted parts, in accordance with SFS-EN 10204-3.1 B (DIN 50049-3.1 B) standard

We reserve the right for technical modifications without prior notice.

SATRON VCL Optical Consistency Transmitter

Satron VCL in an optical consistency transmitter. The sensor uses linearly polarized light from a LED light, which is passed through the measurement cell. The transmitted light is split into two beams in a transverse polarizing beam splitter. The beams are detected by photodiodes and combined to produce a relative depolarization signal, which is a function of the total consistency. The relative depolarization signal is insensitive to brightness, color, freeness or to soluble additives. The sensor is suitable for screened pulp application in the consistency range of approximately 0…1.5%Cs.

TECHNICAL SPECIFICATIONS

Measuring range and span
See Selection Chart.

Zero and Span adjustment
Zero elevation: Calibrated span is freely selectable on the specified range depending from the desired option. This can be made by using keyboard (display option) or HART®275/375 communicator.

Damping
- Time constant is continuously adjustable 0.01 to 60 s.

Temperature limits
Ambient: -30 to + 80 °C
Process: 0 to + 100 °C
Shipping and storage: -40 to +80 °C.

Output
2 current outputs for Cs:
3-wire (3W), 4-20 mA

Supply voltage and permissible load
- 24 VDC, -10 %, + 15 %, 100 mA
- 115/230 VAC, -15% ... +10% (device enclosure)

Humidity limits 0-100 % RH

EMC directive 2004/108/EC
- EN 61326-1:2005

CONSTRUCTION
Materials:
Sensing element [1]: AISI316L (EN 1.4404), Sapphire glass, PEEK

Pressure class:
- PN10

Housing with display,
codes **N0S & N0T:**
Housing: AISI303/316, Seals: Nitrile-rubber and Viton®,
Nameplates: Polyester

Housing with M12 connector, code **H0T:** Housing: AISI303/316, Seals: Viton® and NBR.

Connection hose between sensing element and housing
Codes **L** and **R** :
PUR signal cable or hose protected with PTFE/AISI316 braiding
Device enclosure, code **K:**
EN 1.4301 (AISI304)

Calibration
For customer-specified range with minimum damping. (If range is not specified, transmitter is calibrated for maximum range.)

Electrical connections
Housing with PLUG connector, code **H0S:**
Connector type DIN 43650 model AF; Pg9 gland for cable; wire cross-section 0.5 to 1.5 mm^2.

Housing with M12 connector, code **H0T**
M12 plug connector

Housing with display, code **N0S:**
Connector type DIN 43650 model AF; Pg9 gland for cable; wire cross-section 0.5 to 1.5 mm^2.

Housing with display, code **N0T**:
M12 plug connector

Device enclosures (with display), code **K**:
- PG13,5 inlet, 3 pcs
- The sensor signal M12 plug connector.

I/O-connections
bout1-3
Relay, grounding contact

Maximum voltage	35 V
Maximum current	50 mA
Maximum leakage current	10 µA

bin1-3

NC (no connection)	OFF
0...2 V	ON

Minimum values for switch in use

Voltage	16 V
Current	4 mA
Leakage current	1 mA

Current output1

Range	3.5...23 mA
Maximum load	600 Ω
Factory setting	4...20 mA

Current output2
Internal power supply
Current output 2 has same ground as binary IO

Maximum load	400 Ω
Range	3.5...23 mA
Factory setting	4...20 mA

External power supply
Current output 2 is galvanically isolated

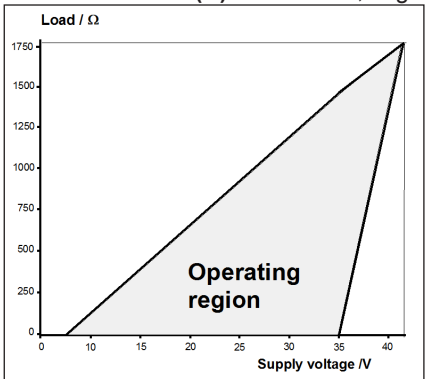
Maximum supply voltage	35 VDC
Range	3.5...23 mA
Factory setting	4...20 mA
Maximum load,	See picture below
Maximum isolation voltage	100 VDC

Process connections
- G1/2A threads
- 3/4" -20, UNEF for 1/2" FEP hose

Protection class: See Selection chart.

Weight

Housing with M12 connector **(H0T)**:	1.4 kg
Housing with display **(N0S** & **N0T)**:	1.8kg
Remote Housing **(L):**	2.9 kg
Remote sensor **(R):**	2.9 kg
Device enclosure **(K)**	6,2 kg



Min. load using HART®-communication 250 W

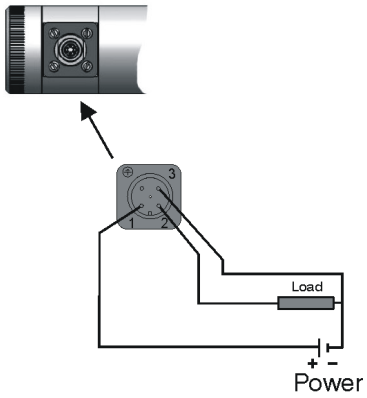
R max = Supply voltage -5 V / I max

I max = 20,5 mA
I max = 22,5 mA
(when the alarm current 22,5 mA is on)

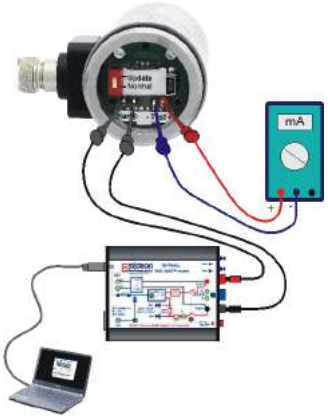
Current output 2
External power supply

[1] Parts in contact with process medium

Satron Instruments Inc., P.O.Box 22, FI-33901 Tampere, Finland
Tel. +358 207 464 800, Telefax +358 207 464 801, www.satron.com

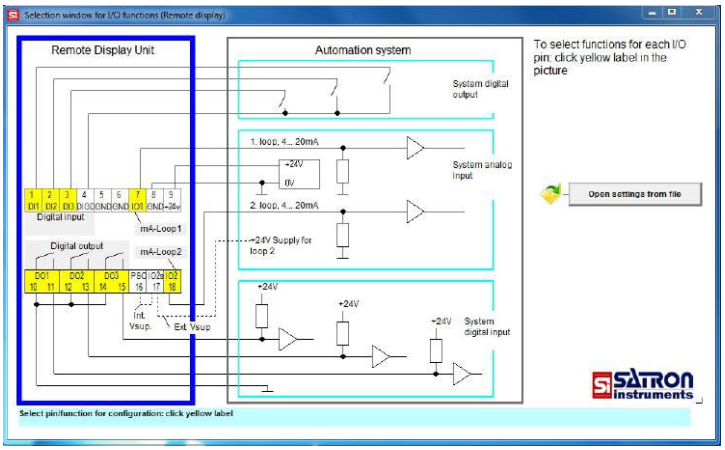


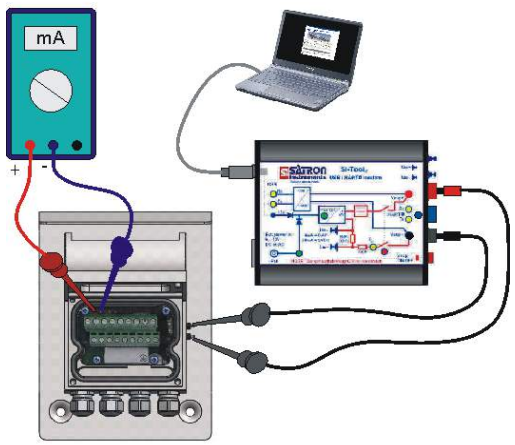
Wiring
Housing with M12-connector, code **HT**



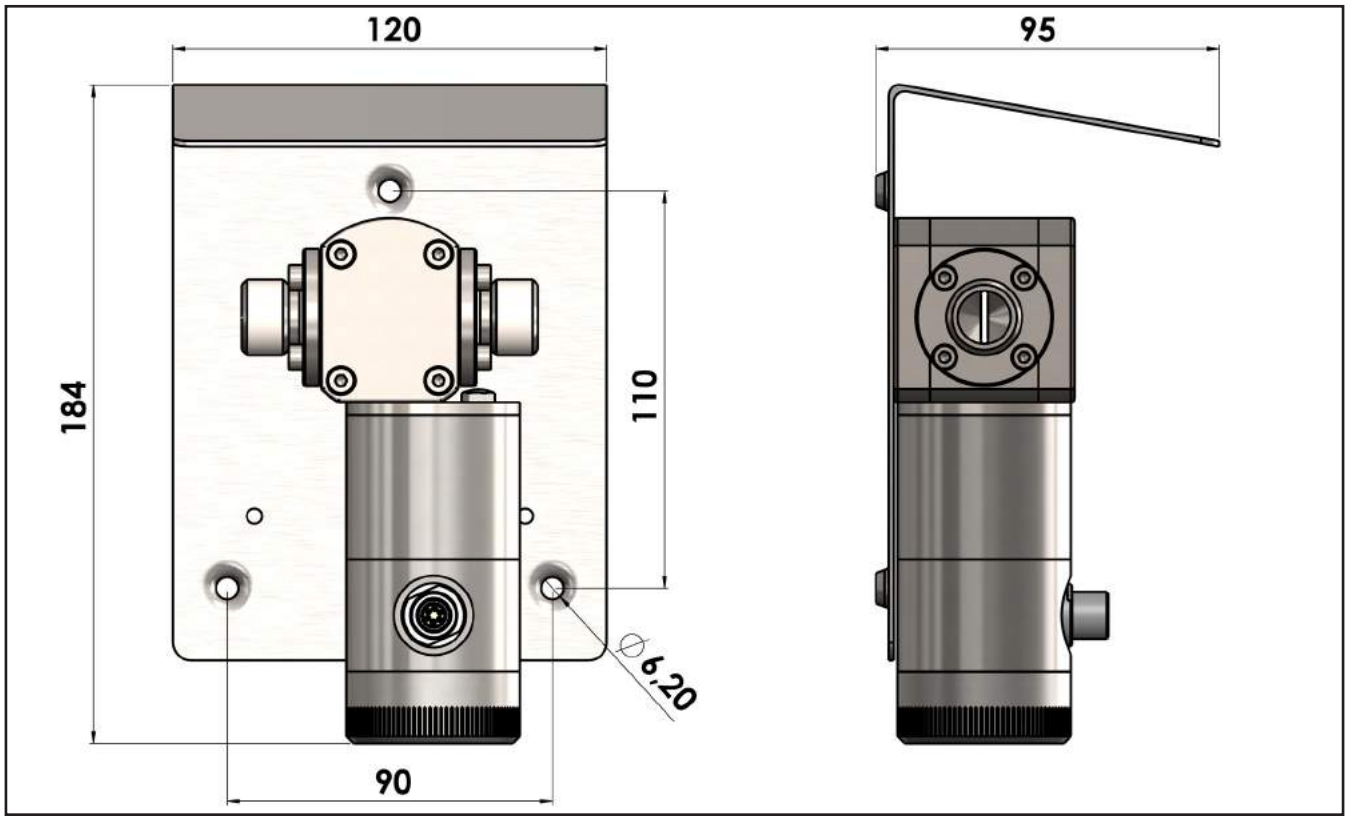
Wiring
Housing with M12-connector, test connector box, code **HT**

Wiring
Remote electronic in the device enclosure. Power supply 115/230 V 50/60 Hz, code **K**.
Only housing type **L** and probe type **R** with display.

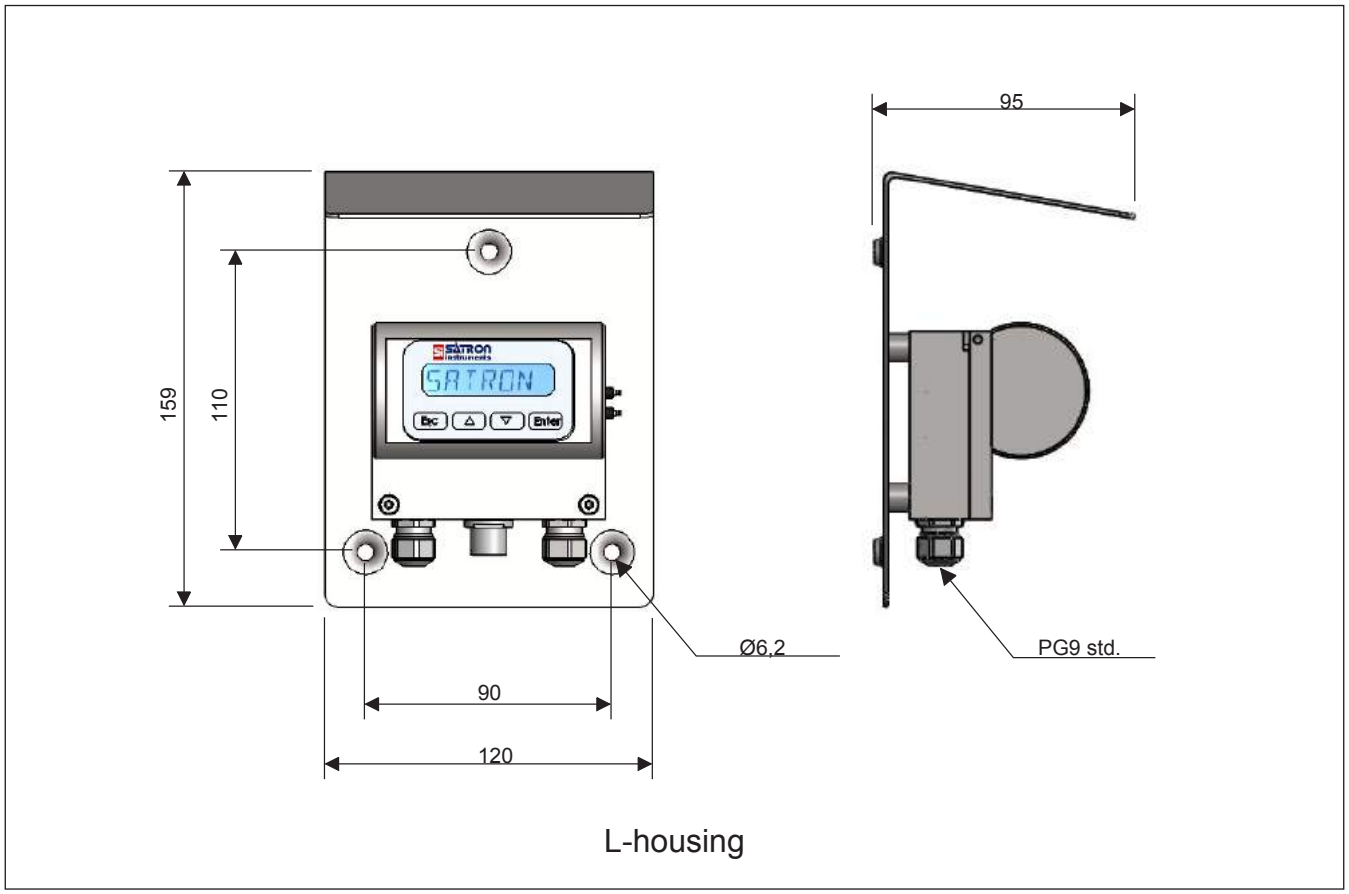




Wiring
Remote electronics housing with display, code **L**



Dimensions Satron VCL



L-housing

Selection Chart

Adjustability	Span, min	Consistency range
VCL	0.1%Cs	0...1.5%Cs

Process temperature limits **N** Normal version 0 ...+100 °C

Output **S** 4-20mA DC/HART®

Material of wetted parts

Body		Lens		Seal	
2	AISI316L (EN 1.4404)	**2**	Sapphire glass	**1**	EPDM

Housing type
- **N** Housing with display and pushbuttons
- **H** Housing with, no display, (only one mA output)
- **L** Remote electronics housing with display

Probe type
- **0** No remote probe
- **R** Remote measuring probe (not available with L housing), IP68

Connection type
- **T** M12, IP67
- **U** M12 & USB (only with N housing), IP67
- **V** PG9 (always with L housing), IP66

Cable Material
- **0** No, L or R selected
- **1** PUR cable.
- **2** AISI316L braided PTFE hose.
- **3** Steel reinforced PUR hose.
- **4** PVC cable

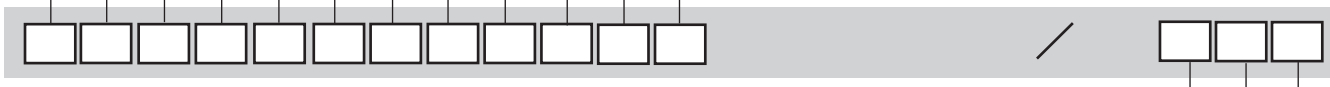
Cable length
- **0** No L or R option selected
- **2** 15 meter

Light source **7** 880nm

Process connections
- **B2** G1/2A, BSPP
- **W1** 3/4" -20, UNEF for 1/2" FEP hose with ferrule + nut

Device enclosure

K Remote electronic in the device enclosure. Power supply 115/230 V, IP66.
Only housing type **L** and probe type **R** with display.



Documentation

Calibration certificate **AE** English

Installation and operating instructions **IE** English **IF** Finnish **FR** French

Material certificates
- **0** No material certificate
- **MC1** Raw material certificate without appendices, in accordance with SFS-EN 10204-2.1 (DIN 50049-2.1) standard
- **MC2** Raw material certificate for wetted parts, in accordance with SFS-EN 10204-2.2 (DIN 50049-2.2) standard
- **MC3** Raw material certificate for wetted parts, in accordance with SFS-EN 10204-3.1 B (DIN 50049-3.1 B) standard

We reserve the right for technical modifications without prior notice.

SATRON SAVE sampler G800

Since the consistency transmitters measure the mass density, indirectly, their tuning stability is monitored by sampling.

By definition, the security will be affected by the sampling instrument and laboratory equipment, as well as goodness, above all, a sufficient number of samples.

Enough certainty to take at one time, we recommend five samples, each of which separately are displayed configuration.

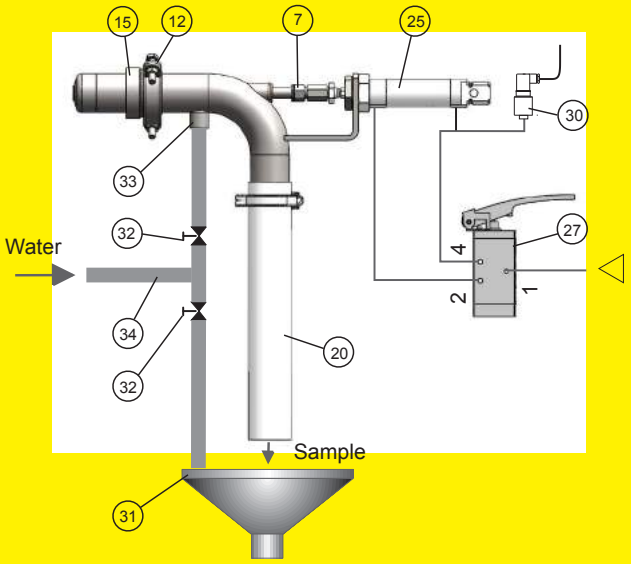
SAVE has been designed for controlled and safe sampling of pulp slurry.

SAVE's head is shaped and dimensioned to ensure a representative sample. The sampler head is inserted deep into the process pipe, past the water layer flowing along the pipe wall.

SAVE's interior parts can be flushed with water after the sample has been taken, to prevent build up or blockage of sampler.

Since the sampling valve's shut-off mechanism is at the head of the sampler, SAVE will not get blocked even during long duty intervals.

SAVE's piston utilizes metal-to-metal sealing and does not include any wearing parts, such as rubber seals.



7. Stop nut
12. Mounting clamp
15. Process coupling
20. Discharge tube
25. Actuating cylinder
27. Manually operated compressed air valve
30. Valve OPEN / CLOSED detector assy [1)]
31. Overflow tunnel [2)]
32. Water valve [1)]
33. Water flushing connection
34. Water pipe [2)]

[1)] Is supplied on special order
[2)] Not supplied with SAVE

Installation of SAVE

SAVE is mounted at a point in the process line that will provide a representative sample. It must not be installed in a dead zone of flow. Refer to the illustrations and instructions in SAVE sampler's user's guide (document G800AV).

SAVE is mounted is an opening made on the process pipe through a process coupling selected in accordance with the Selection Chart. TA and SA couplings are welded on the process pipe, while FA type is laminated on plastic process pipe.

After SAVE has been mounted on the process pipe you attach the supplied 400 mm plastic discharge tube with a hose clamp. This will ensure that the sample will not splash.

Flushing with water is recommended in all installations. For this purpose a waterline equipped with a shutoff valve is needed to be connected to the sampler.

Types of SAVE

SAVE sampler is available for a manually operated (SAVE MD), as well as air-powered (SAVE AD).

Manual probe is easily applied to join to-reach destinations. Pneumatically controlled the probe is also suitable for difficult-to-reach destinations.

SAVE Sampler

SAVE has been designed for controlled and safe sampling of pulp slurry.
SAVE's head is shaped and dimensioned to ensure a representative sample. The sampler head is inserted deep into the process pipe, past the water layer flowing along the pipe wall.
SAVE's interior parts can be flushed with water after the sample has been taken, to prevent build up or blockage of sampler.
Since the sampling valve's shut-off mechanism is at the head of the sampler, SAVE will not get blocked even during long duty intervals.
SAVE's piston utilizes metal-to-metal sealing and does not include any wearing parts, such as rubber seals.

TECHNICAL SPECIFICATIONS

Applicability
- Concistency range 0...8 % Cs

Process pressure
- Minimum process pressure for differen consistencies: refer to Fig 1
- Maximum process pressure: 2,5 MPa (25 bar), except when coupling material is fibreglass-reinforced plastic: 1,6 MPa
- Pneumatic actuator has a return spring that shuts the valve when pressure is lost.

Supply air pressure p_s (**AD** actuator)
- p_s min = 1/3 x process pressure;
- p_s max = 1,0 MPa (10 bar)

Max. discharge rate of pulp
- at different process pressure: refer to Fig. 2.

Connectors
- Water flushing connector: G1/4
- Pneumatic connections for cylinder and regulating valve: G1/8 (5 pcs)

Materials
- Parts in constant contact with process medium: refer to Selection Chart
- Other parts: EN 1.4404 (AISI316L)
- Pneumatic cylinder: aluminium alloy
- Piston rod: hard chrome plated steel

Selection Chart **SAVE** ☐ ☐ ☐ ☐ ☐

Types
- **SA** Clamp mounting NS40
- **TA** 1 1/2 - NPS thread
- **FA** Flange mounting DN40

Material for closing mechanism [1)]
- **2** EN 1.4404 (AISI316L)
- **3** EN 2.4819 (Hast.C276)
- **6** EN 3.7035 (Titaani Ti-II)

Material for process coupling
- **2** EN 1.4404 (AISI316L)
- **3** EN 2.4819 (Hast.C276)
- **6** EN 3.7035 (Titanium Ti-II)
- **9** Fibreglass-reinforced plastic

Function
- **MD** Manual
- **AD** Pneumatic

Open / closed detector
- **0** None
- **1** Yes (for pneumatic actuator only)

[1)] Only parts in constant contact with process medium; other parts always EN 1.4404 (AISI316L)

Weight	Function	
	MD	AD
SAVE SA	1.9 kg	2.1kg
SAVE TA	1.7 kg	1.9 kg
SAVE FA	5.0 kg	5.2 kg

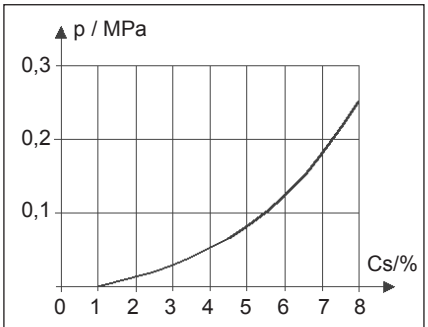


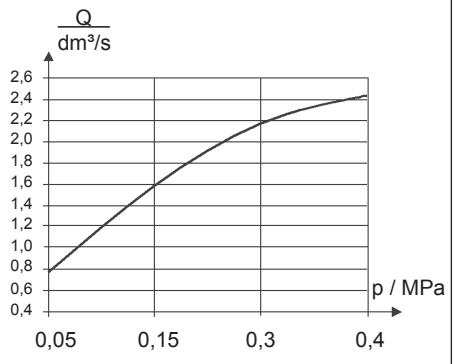
Figure 1 Minimum process pressure at different consistencies

Pulps:
- long-fibered chemical pulp
- groundwood pulp
- recycled fibre pulp
- short-fibered chemical pulp

} Cs = 0...4 %

-TMP
-CTMP

} Cs = 0...2 %

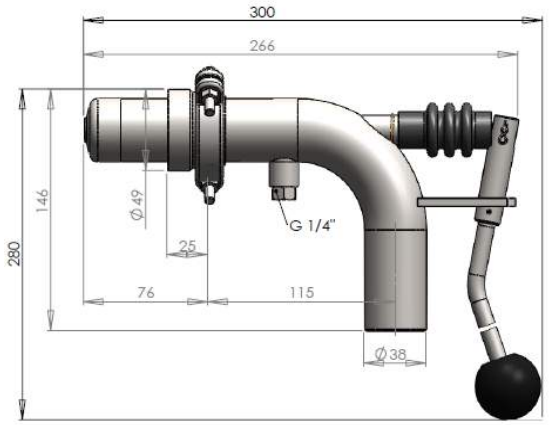


At higher consistencies the sample discharge rate is lower.

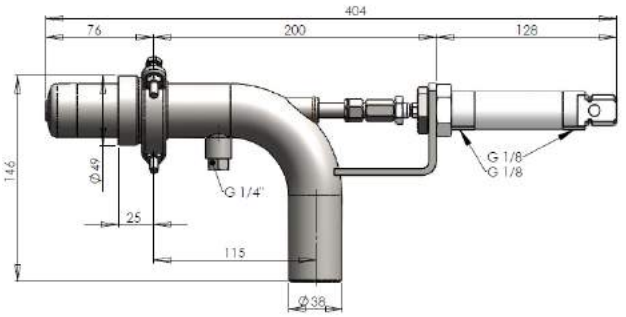
Figure 2 Maximum discharge rate of pulp at different process pressures with maximum valve opening.

Satron Instruments Inc., P.O.Box 22, 33901 Tampere, Finland
Tel. +358 207 464 800, Telefax +358 207 464 801, www.satron.com

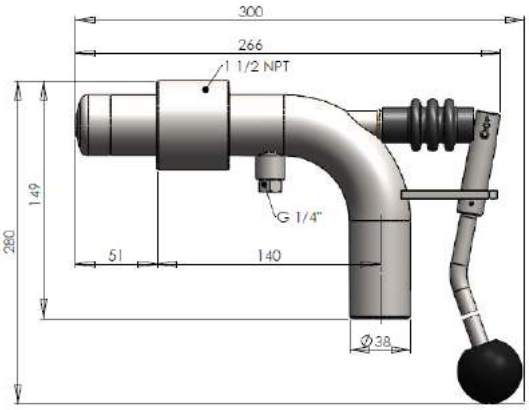
SAVE Sampler



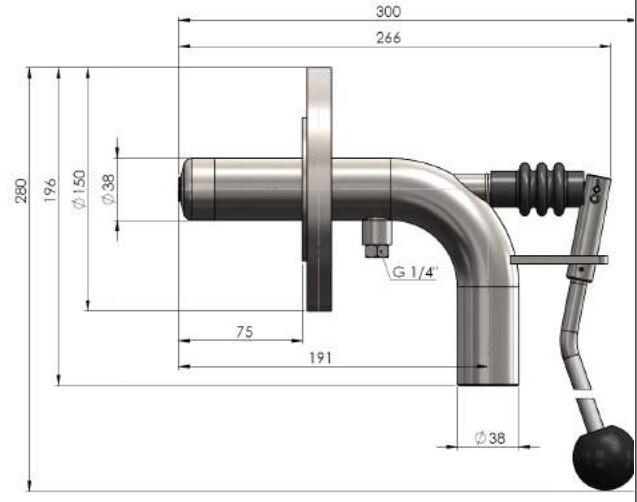
SAVE [SA] [2/3/6] [2/3/6/9] [MD] [0]



SAVE [SA] [2/3/6] [2/3/6/9] [AD] [0]



SAVE [TA] [2/3/6] [2/3/6/9] [MD] [0]



SAVE [FA] [2/3/6] [2/3/6/9] [MD] [0] [(L75)]

European Directive Information

Machinery Directive 2006/42/EC
- Available only for SAVE sampler with the pneumatic cylinder (AD)
- Assessment of conformity with internal checks on the manufacture of machinery.

Pressure Equipment Directive (PED) (97/23/EC)
- Sound Engineering Practice

Installation

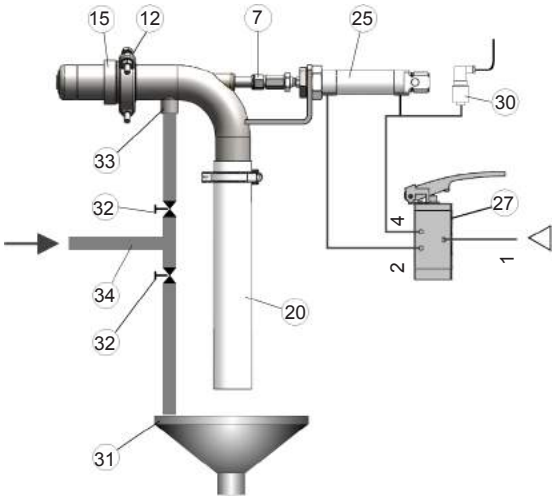
SAVE is mounted at a point in the process line that will provide a representative sample. It must not be installed in a dead zone of flow. Refer to the illustrations and instructions in SAVE sampler's user's guide (document G800AV).
SAVE is mounted is an opening made on the process pipe through a process coupling selected in accordance with the Selection Chart. TA and SA couplings are welded on the process pipe, while FA type is laminated on plastic process pipe.
After SAVE has been mounted on the process pipe you attach the supplied 400 mm plastic discharge tube with a hose clamp. This will ensure that the sample will not splash.

Flushing with water is recommended in all installations. For this purpose a waterline equipped with a shutoff valve is needed to be connected to the sampler. Samplers with Titanium or Hastelloy C276 wetted parts flushing must be connected to prevent corrosion of the samplers interior parts.

Solenoid valves (SAVE AD) must be equipped with restrictors at outlet side to dampen the piston movement.

NOTE!
If the process pressure exceeds 1,0 MPa (10 bar) the strength of the connection between process coupling and process pipe has to be calculated separately in accodance with the pipework's pressure endurance. If necessary, the connection must be reinforced.

Mounting SAVE with pneumatic cylinder
(Function AD)



7. Stop nut
12. Mounting clamp
15. Process coupling
20. Discharge tube
25. Actuating cylinder
27. Manually operated compressed air valve
30. Valve OPEN / CLOSED detector assy [1]
31. Overflow tunnel [2]
32. Water valve [1]
33. Water flushing connection
34. Water pipe [2]

[1] Is supplied on special order
[2] Not supplied with SAVE

Satron Instruments Inc.
P.O.Box 22, FI-33901 Tampere, Finland
Tel. +358 207 464 800, Fax +358 207 464 801
www.satron.com

We reserve the right for technical modifications without prior notice.

Temperature measurement

Our instruments for temperature measurement:

TEMP-EL CNR temperature transmitter mounted in sensor junction box ..... Spec. BT700

TEMP-EL BNR temperature transmitter mounted on terminal board..... Spec. BT710

Selecting the sensor

Temperature sensing elements are not included in the price of the transmitters. The customer must therefore purchase the sensor separately.
The application's requirements must be taken into account when choosing the sensor:
- temperature range
- sensor's mechanical strength (pressure, vibration, shocks)
- sensor's chemical resistance (corrosion)
- measurement accuracy requirements
- response time/time constant
- sensor's compatibility with transmitter in use.

A protective tube can be used for mechanical protection of the sensor. The resultant measurement lag must then be taken into account. The sensor manu-facturer's instructions and recommen-dations should be observed in installation.

Selecting the measurement point

The temperature of a medium flowing in a pipework - especially the temperature of gas - varies constantly even at the same point. The temperature sensor's own heat capacity and imperfect conduction of heat will cause lag and inaccuracy in the measurement. For these reasons it is only possible to measure average temperature. In general, the temperature sensing element or thermometer should be installed in the region of the highest flow velocity. A pipe bend is the most advantageous point in this respect (Fig. 1a). If strength considerations at high pressures prevent this arrangement, the installation shown in Fig. 1b will be used. The tip of the sensor should reach slightly past the centerline of the pipe. However, the installation should always be such that no vibration will occur in the sensor. The effect of thermal radiation can be reduced by using a polished shield.

Figure 1

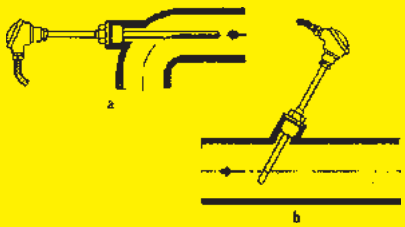
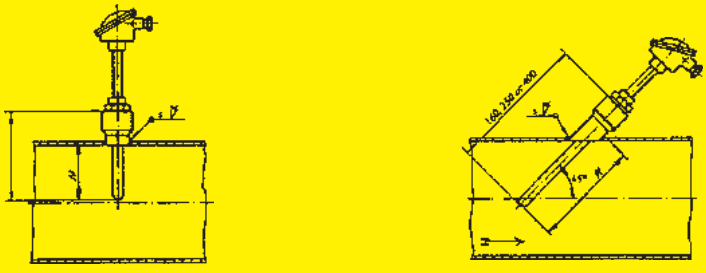


Figure 2 shows the different positions of the mounting boss. Sensor or thermo-meter is usually mounted perpendicularly (a). If dimension N is greater than 3/4 of the pipe diameter, position b will be used.

Figure 2

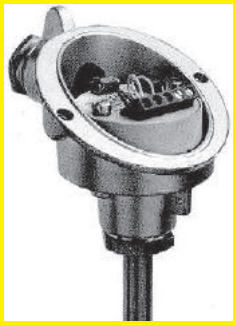


a) b)

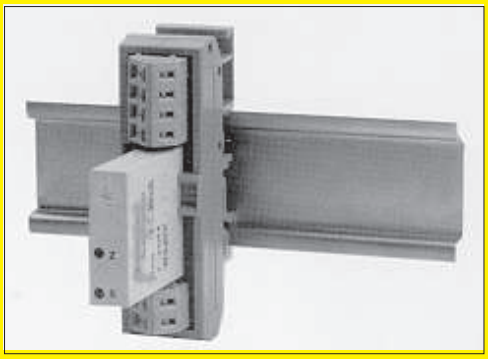
TEMPERATURE TRANSMIT-TERS

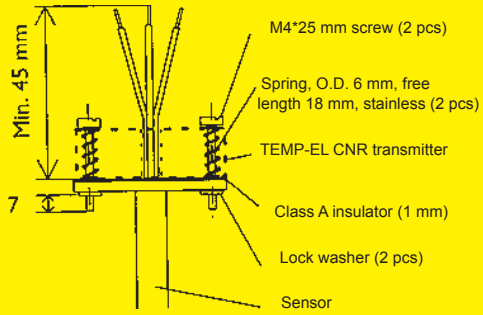
Resistance element transmitters

TEMP-EL CNR (-50 to 800 °C)
- installed in junction box (DIN 43729 B)
- fixed ranges
- Pt100 sensing element
- no electrical isolation
- EEx ib IIC T6 construction

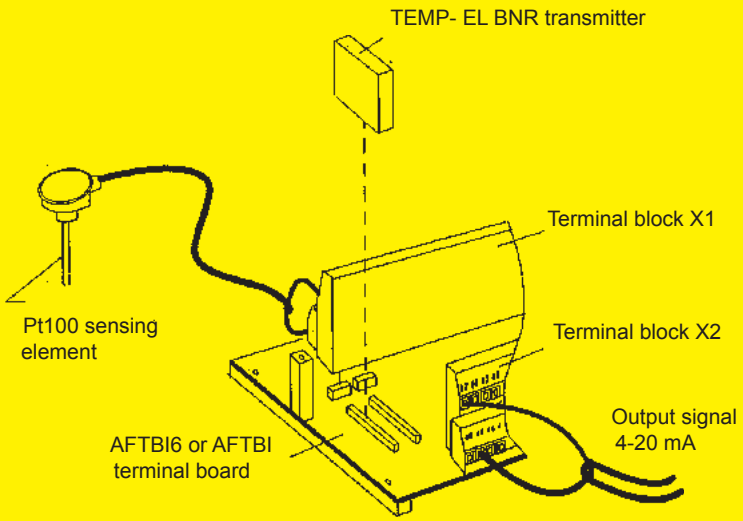


TEMP-EL BNR (-50 to 800 °C)
- installed on terminal board (AFTBI or AFTBI6)
- fixed ranges
- Pt100 sensing element
- no electrical isolation
- no Ex approval
- economical





TEMP-EL CNR mounting example



Installation of TEMP-EL BNR temperature transmitter

TEMP-EL CNR

Temperature transmitter mounted in sensor junction box

BT700
2003-02-12

TEMP-EL CNR is a Pt100 temperature transmitter mounted in DIN43729 B-type sensor head (junction box).

TECHNICAL SPECIFICATIONS

Measuring ranges

Product Number	Range
•M899375	-50...+50°C
•M899376	0...50°C
•M899377	0...100°C
•M899378	0...150°C
•M899379	0...200°C
M899380	0...250°C
•M899381	0...300°C
M899382	0...350°C
•M899383	0...400°C
M899384	0...450°C
M899385	0...500°C
M899386	0...550°C
•M899387	0...600°C
M899388	0...650°C
M899389	0...700°C
M899390	0...750°C
M899391	0...800°C

• Storage options

Functional specifications

Output signal (linear relative to temperature): 4 - 20 mA

Output with break in Pt100 element (current limit): approx. 26 mA

Output with sensor circuit shorted at transducer terminals: < 3 mA

Permissible terminal voltage: 9 - 35 V DC

Sensor current: 2 mA

Permissible ambient temperature: -25 to +70°C

Sensor wiring: 3-wire system

Range adjusting limits (trimmers):
- Zero ±5 %
- Span ±5 %

Overvoltage capacity: The transducer withstands a 1 MHz burst in accordance with IEC 255, 4 App. E across the signal conductors; (amplitude 500 V, repetition frequency 400 Hz, test duration 2 s).

Performance specifications [1)]

Measurement error relative to Pt100 sensor's table values (DIN 43760, terminal voltage 24 V, ambient temperature 23°C, 3-wire system, wire resistance < 0.2 Ω)
- on -50...+50°C to 0...650°C ranges: < 0.15 %
- on 0...700°C to 0...800°C ranges: < 0.25 %

Ambient temperature effect
- on Zero: < 0.01 %/°C
- on Span: < 0.01 %/°C

Effect of sensor circuit wire resistance on output (equal change in all 3 wires): 0.15 %/Ω

Terminal voltage effect: < 0.002 %/V

Supply voltage ripple effect (3 V_{p-p}, 50-400 Hz, 24 V terminal voltage, 50 % input signal): No effect on output signal's DC level, alternating current component < 0.05 % $_{p-p}$

Warm up drift (0-50°C range, 24 V DC terminal voltage, 100 % input signal): < 0.1 %

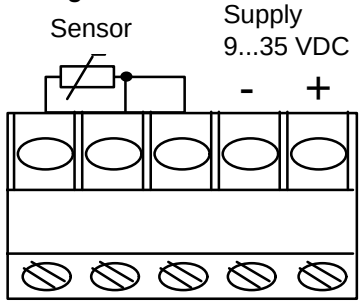
Long-term stability (23°C ambient temperature, 24 V terminal voltage, 50 % input signal): Change during 30 days < 0.1 %

Radiofrequency interference at 175 MHz and 444 MHz (0-50°C range, 24 V terminal voltage, 50 % input signal, 2 W antenna power, 0.5 m distance): < 3 %

Explosion protection: EEx ib IIC T6, PTB Nr.Ex-90.C.2160X

[1)] Errors given in per cent of span

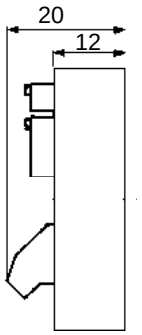
Wiring

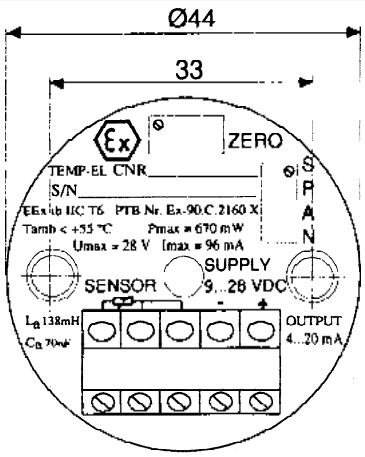


Construction
- Electronics cast in plastics
- Dimensions: diameter 44 mm, height 20 mm

Installation
- Fits a DIN 43729 B-type junction box (sensor head)
- Screw terminals provided with wire screen: max. cross-section 2.5 mm²

Dimensions





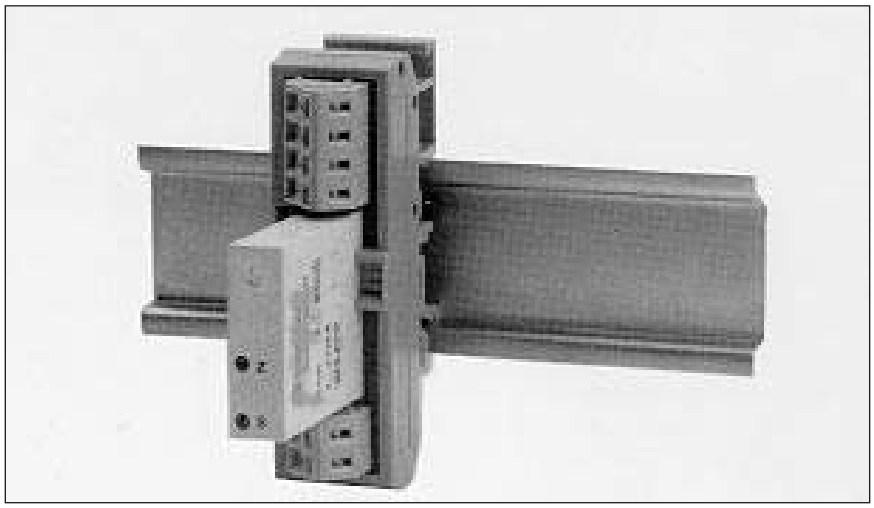
Satron Instruments Inc., P.O.Box 22, FIN-33901 Tampere, Finland
Tel. +358 207 464 800, Telefax +358 207 464 801, www.satron.com

TEMP-EL BNR

Temperature transmitter
mounted on terminal board

BT710
1990-05-15

TEMP-EL BNR is a Pt100 temperature transmitter mounted on AFTB1 and AFTB16 terminal boards.



TECHNICAL SPECIFICATIONS

MEASURING RANGES:

Product Number	Range
• M899475	-50...+50°C
• M899476	0...50°C
• M899477	0...100°C
• M899478	0...150°C
• M899479	0...200°C
• M899480	0...250°C
• M899481	0...300°C
M899482	0...350°C
• M899483	0...400°C
M899484	0...450°C
• M899485	0...500°C
M899486	0...550°C
• M899487	0...600°C
M899488	0...650°C
M899489	0...700°C
M899490	0...750°C
• M899491	0...800°C
• Storage options	

Functional specifications

Output signal (linear relative to temperature): 4-20 mA

Output with break in Pt100 element (current limit): approx. 26 mA

Output with sensor circuit shorted at transducer terminals: < 3 mA

Permissible terminal voltage: 9-35 V DC

Sensor current: 2 mA

Permissible ambient temperature: -25 to +70°C

Sensor wiring: 3-wire system

Range adjusting limits (trimmers):
- Zero: ±5 %
- Span: ±5 %

Overvoltage capacity:
The transducer withstands a 1 MHz burst in accordance with IEC 255, 4 App. E across the signal conductors; (amplitude 500 V, repetition frequency 400 Hz, test duration 2 s).

Performance specifications [1)]

Measurement error relative to Pt100 sensor's table values (DIN 43760, terminal voltage 24 V, ambient temperature 23 °C, 3-wire system, wire resistance <0.2 Ω):
- on -50...+50 °C to 0...650 °C ranges: < 0.15 %
- on 0...700 °C to 0...800 °C ranges: < 0.25 %

Ambient temperature effect
- on Zero: < 0.01 %/°C
- on Span: < 0.01 %/°C

Effect on sensor circuit wire resistance on output (equal change in all 3 wires): 0.15 %/Ω

Terminal voltage effect: < 0.06 %

Supply voltage ripple effect (3 V_{p-p}, 50-400 Hz, 24 V terminal voltage, 50 % input signal): No effect on output signal's DC level, alternating current component < 0.05 % $_{p-p}$

Warm up drift (0-50 °C range, 24 V DC terminal voltage, 100 % input signal): < 0.1 %

Long-term stability (23 °C ambient temperature, 24 V terminal voltage, 50 % input signal): change during 30 days < 0.1 %

Radiofrequency interference (20 V/m) at 175 MHz and 443 MHz (0-50 °C range, 24 V terminal voltage, 50 % input signal): < 3 %

[1)] Errors given in per cent of span.

Construction

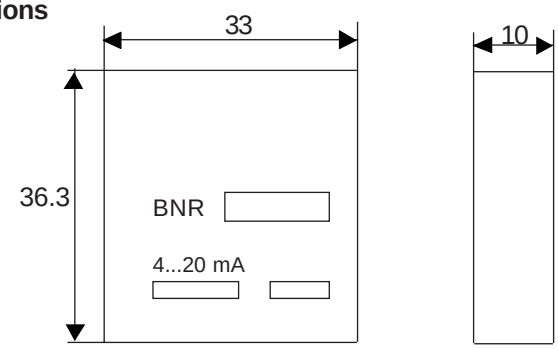
- Electronics cast in plastics
- Dimensions: 36.4 x 33 x 10

Installation

- On AFTB1 or AFTB16 terminal board

Terminal board types
AFTB1: Terminal board for a single temperature transmitter; plug-in connections. The terminal board can be mounted on 15, 32 and 35 DIN46277 rails.
AFTB16: Terminal board for 1...16 temperature transmitters; 0.5...2.5 mm² screw terminals.

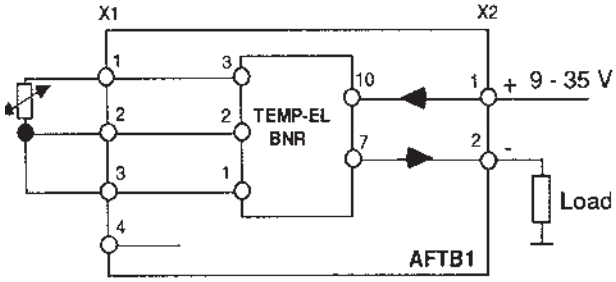
Dimensions



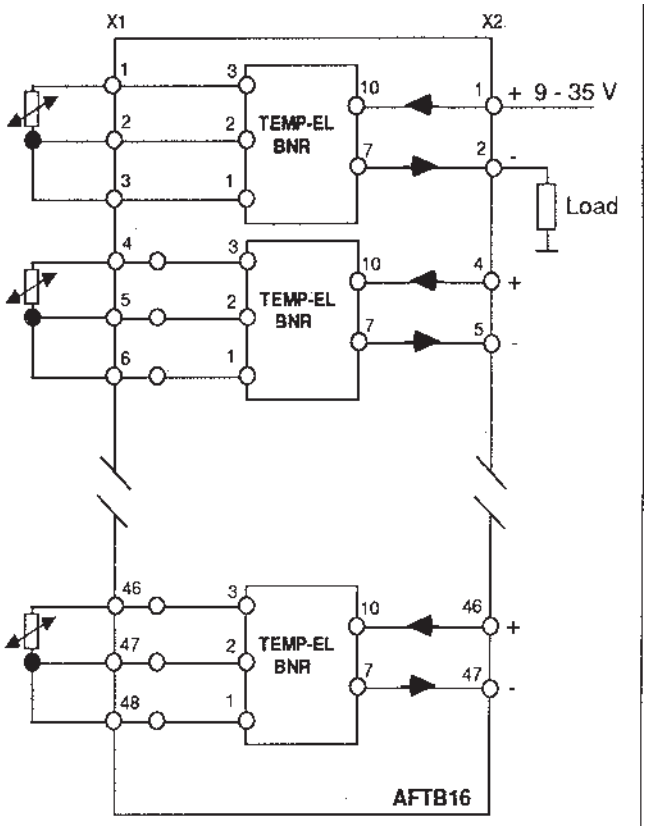
We reserve the right to make technical changes without prior notice.
Performance is indicated in accordance with IEC546 and IEC770 recommendations.

SATRON instruments
Satron Instruments Inc., P.O.Box 22, FIN-33901 Tampere, Finland
Tel. +358 207 464 800, Telefax +358 207 464 801, www.satron.com

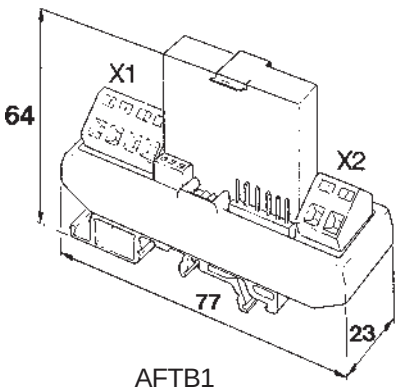
Connections



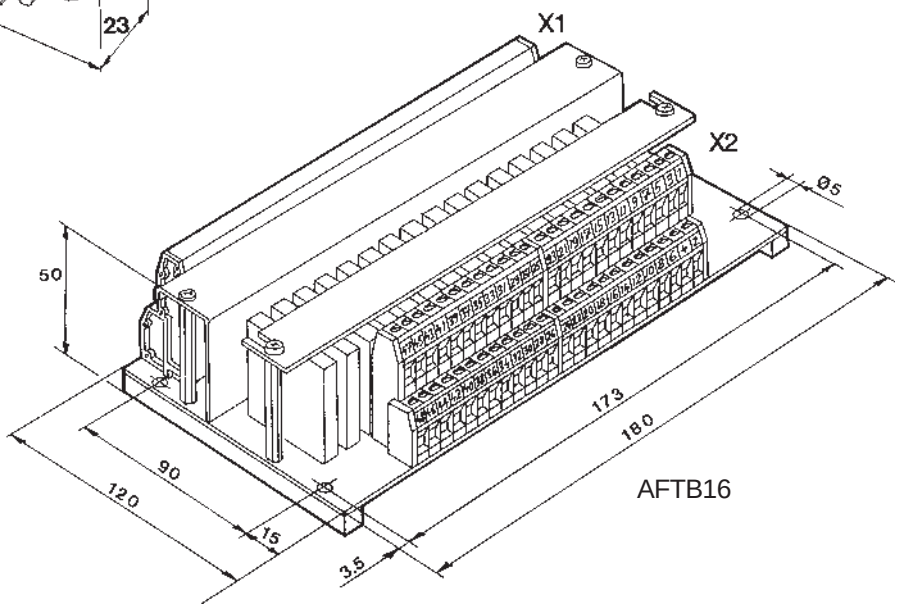
Jumpers have no effect.



Dimensions



AFTB1



AFTB16

Satron Instruments Inc.
P.O.Box 22, FI-33901 Tampere, Finland
Tel. +358 207 464 800, Fax +358 207 464 801
www.satron.com

CONTROLLER
- **DAMATROL MC100**
  Digital Unit Controller ..... Spec. **CC850**

DAMATROL MC100

Satron Instruments Inc.
P.O.Box 22, FI-33901 Tampere, Finland
Tel. +358 207 464 800, Fax +358 207 464 801
www.satron.com

DAMATROL MC100 Digital Unit Controller

CC850
July 15, 1993

DAMATROL MC100 is a digital single-loop unit controller which is used, for example, as PID controller, ratio controller or manual control station.

The controller's and process's operation is controlled and the control parameters are set through DAMATROL MC100's user interface.

The controller's I/O connections are made through a disconnectable I/O connector. The bus interface provided as a standard feature permits connection to a local control room or to higher-level systems, such as DAMATIC.

Technical specifications

Ambient requirements
- Operating temperature 0 to +50 °C
- Storage temperature -40 to +80 °C
- Relative humidity 0 to 80 %
- Vibration 1.3 mmpp, 5-14 Hz, 0.5 g, 14-150 Hz
- Mounting position Freely selectable.

Enclosure class
- Panel-mounting enclosure IP40

Dimensions
- Weight 1.7 kg
- Width x height x length 72 x 144 x 220 mm (without display unit)72 x 144 x 186 mm
- Mounting cut-out 68 x 138 mm (with mounting collar) 3" x 6" (US Std.)

Power supply
- Supply voltage
  230 V (-15 %...+10 %) 50/60 Hz
  115 V (-15 %...+10 %) 50/60 Hz
- Power consumption max. 8 W
- Power failure characteristics
  Data support in memory
  - All data: typically 24 h (e.g. setpoint and controller output)
- Parameters and calibration: 10 y.

I/O connections
- Analog inputs 2
- Analog outputs 1
- Binary inputs 2
- Binary outputs 2
- Transmitter supply connections 2
- Permissible wire cross-section max. 2.5 mm^2
- Field signal connection technique: Multiterminal screw-terminal block

Analog inputs
- Resolution 12 bit
- Accuracy 0.1 % F.S.
- Temperature error 0.06 % / 10 C F.S.
- Input resistance 250 Ω
- Attenuation 50 Hz/60 dB
- Grounding: Inputs have common ground potential
- Max. range 0...20.5 mA (freely selectable)
  (as voltage input) 0...5 V
- Max. voltage 30 V
- Filtering time constant 25 ms
- Impedance 250 Ω
  (as voltage input) 10 MΩ

Analog outputs
- Resolution 12 bit
- Accuracy 0.15 % F.S.
- Temperature error 0.1 % / 10 C F.S.
- Load capacity 800 Ω
- Max. range 0...20.5 mA (freely selectable)

Binary inputs
- Grounding: grounded input
- Switching device
  - Max. leakage current 2 mA
  - Min. current capacity 6 mA
  - Min. voltage capacity 28 V

Binary outputs
- Type: Reed relay, make-contact
- Voltage max. 30 V
- Current max. 100 mA
- Load power max. 3 VA
- Isolation voltage min. 1000 VAC
- Max. switch resistance 0.2 Ω
- Expected life 200 million switchings (10 mA, 10 VDC, resistive load)

Transmitter supply connections
- Current limitation 25 mA
- Mains voltage 230/115 VAC 24 V (+10...-15%)

Grounding
- Analog inputs and outputs: Common ground potential
- Binary inputs and outputs: Common ground potential
- Analog and binary ground: Connected together inside controller
- Guard wire connections 2 grounding screws (protective earth and sheaths of cables)

Buses
- Interfaces RS-232, RS-485
- Max. cable length 1200 m (RS-485), 15 m (RS-232)
- Baud rate 600...38400 baud
- Protocol:
  Modbus RTU (slave),
  DBUS (multidrop bus)
- Max. number of controllers per bus 32 (Modbus) or 15 (DBUS)

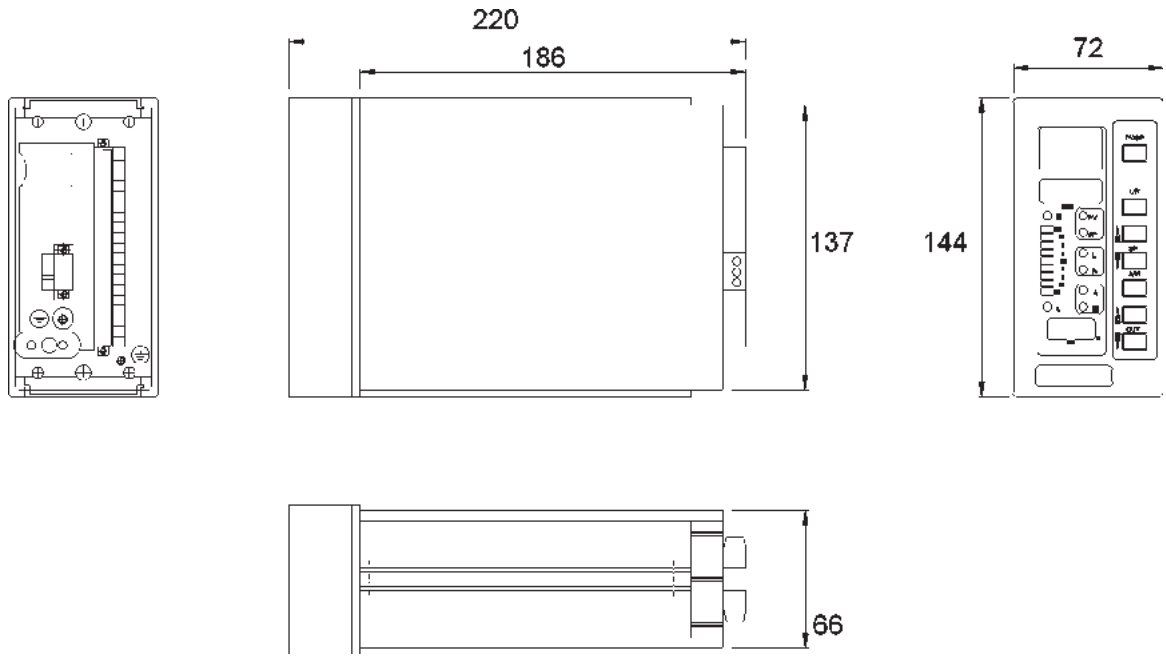
Control panel
- Digital displays 4- and 3-digit green 7-segment displays for measured process value, setpoint and controller output.
- LEDs 2 reds for alarm limits; 3 x 2 greens for indicating the PV/SP, L/R and A/M states; 9-LED green/ yellow/red control deviation display
- Display brightness
  Adjustable (15 steps)
- Keypad 7 pushbutton keys

Satron Instruments Inc., P.O.Box 22, FIN-33901 Tampere, Finland
Tel. +358 207 464 800, Telefax +358 207 464 801, www.satron.com

DAMATROL MC100 Digital Unit Controller

CC850
July 15, 1993

DIMENSIONS



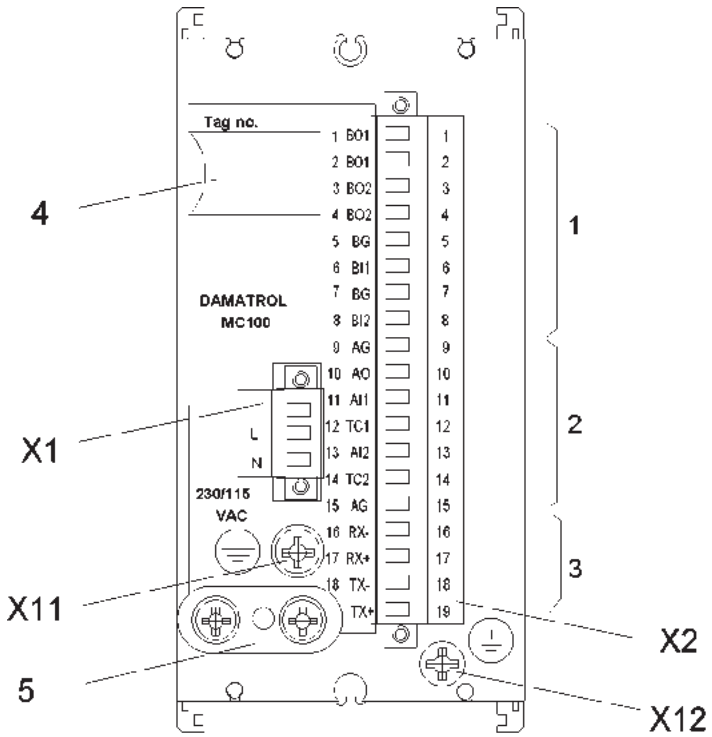
Software

- Computing time 100 ms
- External precision of numbers 16 bit, Internal precision of numbers 24...40 bit
- PID controller
  - KP (gain) 0.125 ... 24.0
  - TI (integral action time) 1.1 s ... infinite
  - TD (derivative action time) 0 ... 153.6 s
- Measured value and setpoint scale: High and low limit selectable -999 ... +9999.
- Measured value handling: Filtering, linearization, square root extraction, high and low limit alarms.
- Remote setpoint handling:Filtering, ratio, bias, high and low limits.
- Output handling: Filtering, interlocking, forced manual control, high and low limits.

CE

MEETS THE COUNCIL OF THE EUROPEAN UNION DIRECTIVES 73/23/EEC FOR ELECTRICAL EQUIPMENT DESIGNED FOR USE WITHIN CERTAIN VOLTAGE LIMITS AND AMENDMENT 93/68/EEC AND 89/336/EEC FOR ELECTROMAGNETIC COMPATIBILITY REQUIREMENTS.

CONNECTIONS



X1	Mains power connector	1	Binary I/Os
X2	I/O connector	2	Analog I/Os
X11	Housing grounding screw	3	RS-485 interface
X12	Grounding screw	4	Tag number pocket
		5	Cable clamp

Satron Instruments Inc.
P.O.Box 22, FI-33901 Tampere, Finland
Tel. +358 207 464 800, Fax +358 207 464 801
www.satron.com