

SATRON VDt Differential Pressure Transmitter

BPdT750
M3, revision 3
01.01.2014

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 external 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 +50°C (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 (cm ³)	
	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.

¹⁾ Parts in contact with process medium.

Humidity limits
0-100 % RH

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:
±[0.01+0.008 x ($\frac{\text{max. span}}{\text{calibrated span}}$)] % of calibrated span

(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), 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.

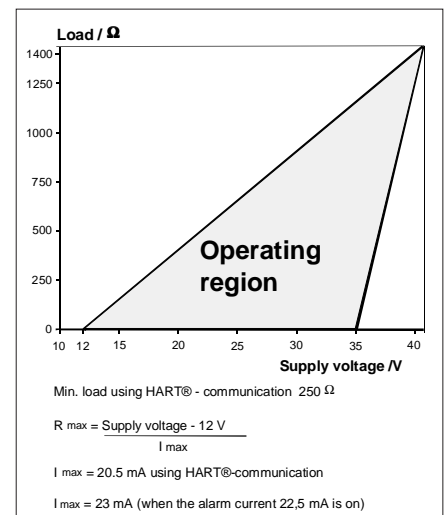
Housing with junction box/terminal strip, M and N
Housing: AISI303/316; Seals: Nitrile and Viton®; Nameplates: Polyester

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. (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 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

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

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

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

Input Parameters :

$U_i = 28 \text{ V}$

$I_i = 93 \text{ mA}$

$P_i = 0.651 \text{ W}$

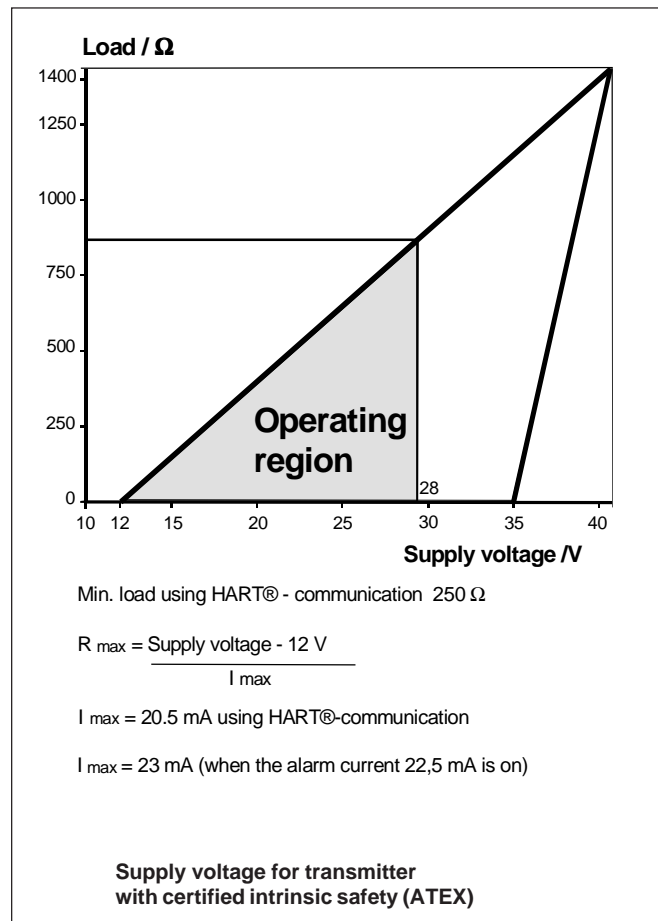
$C_i = 5 \text{ nF}$

$L_i = 0.2 \text{ mH}$

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.

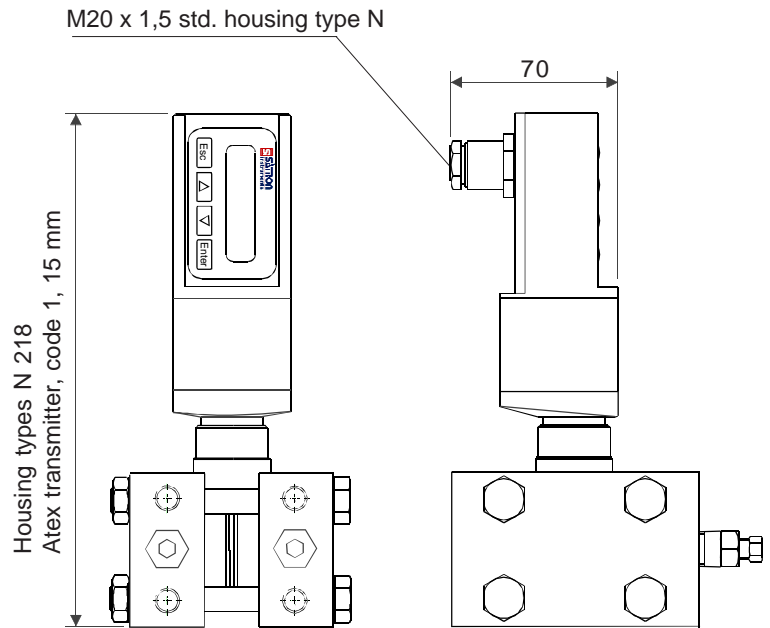
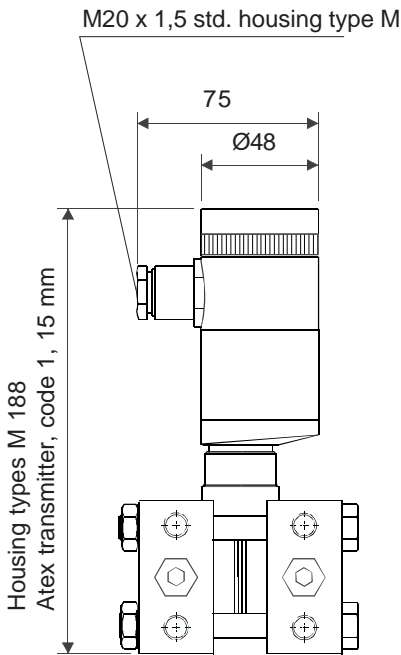
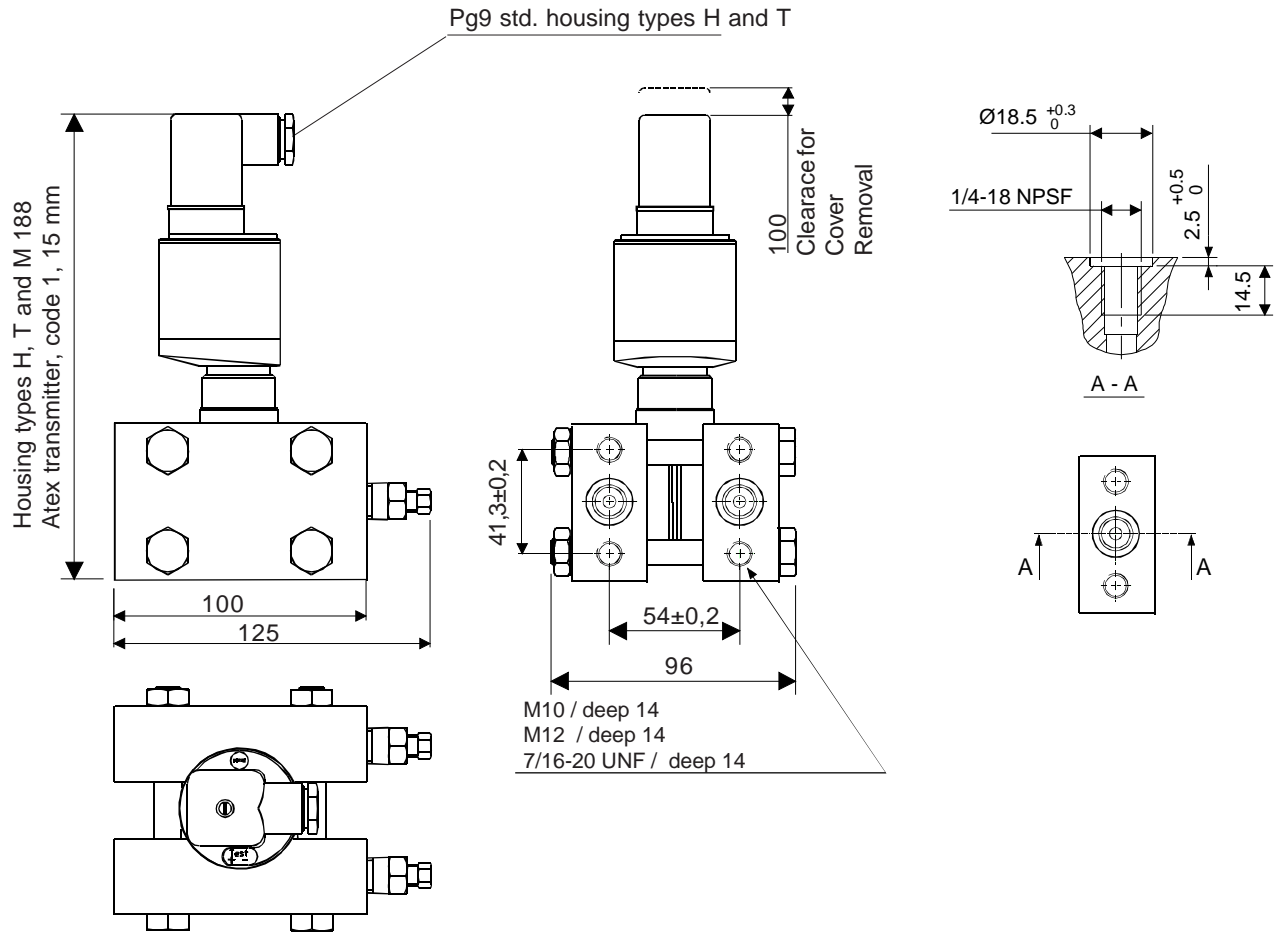
The equipment shall be installed and connected according to the manufacturers instructions.



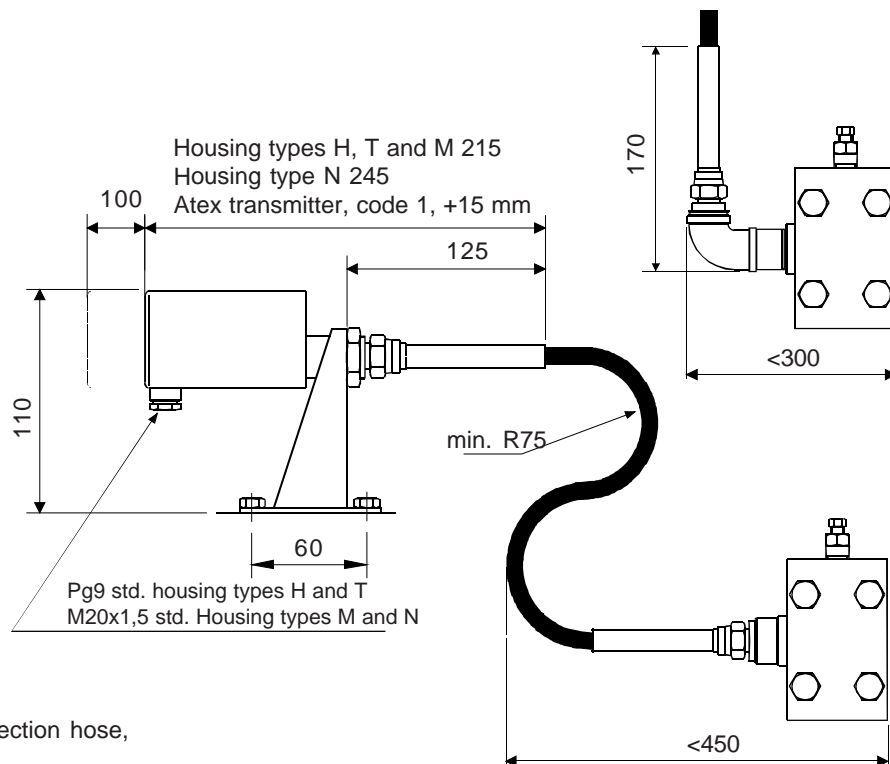
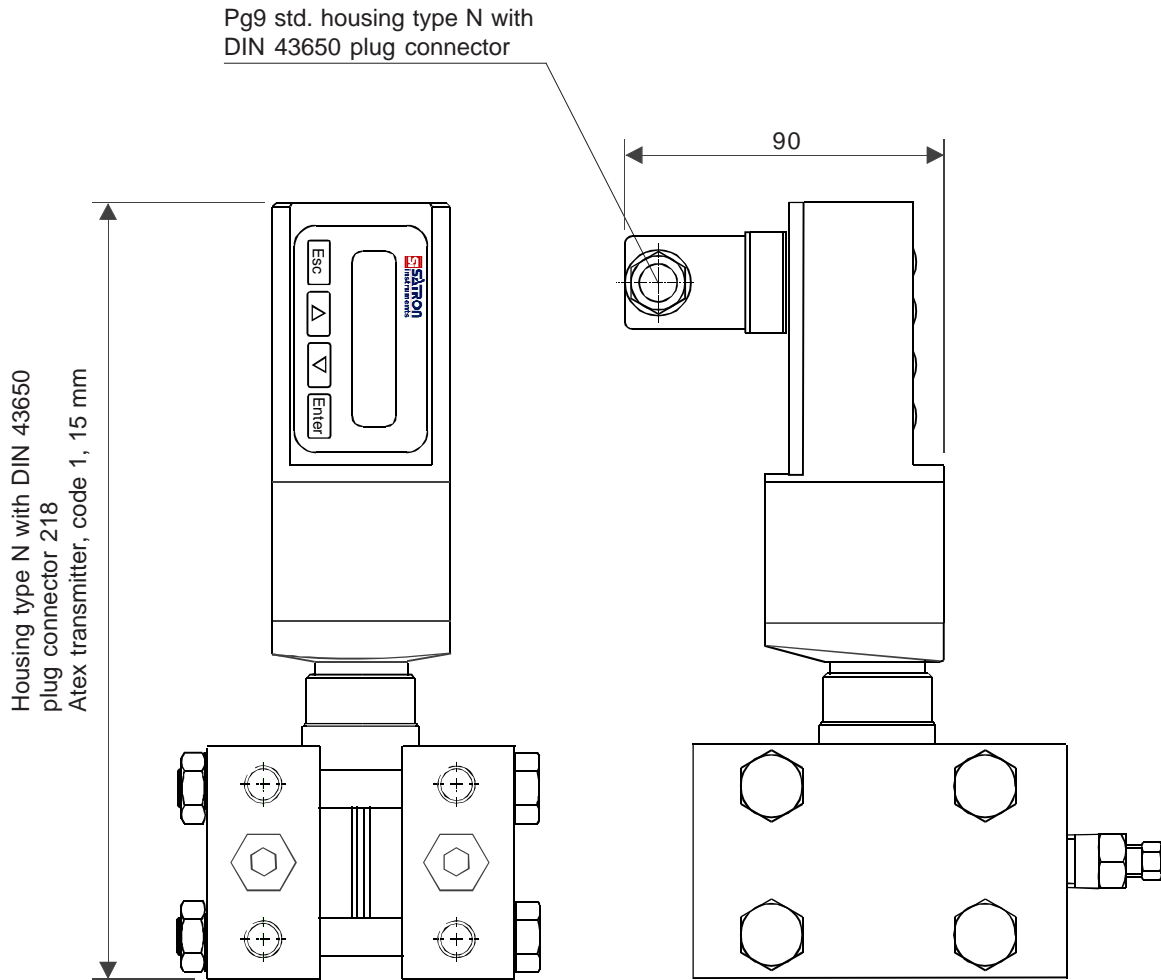
Weight (kg)

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

Dimensions (in mm)



Dimensions (in mm)

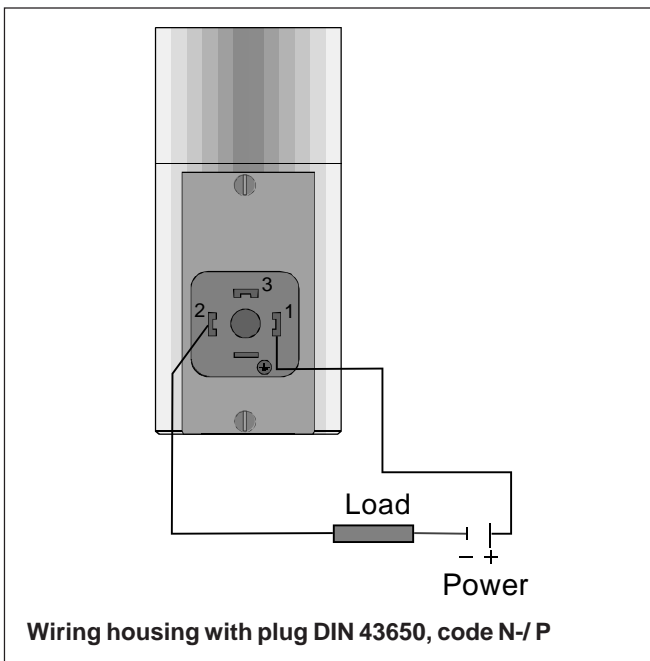
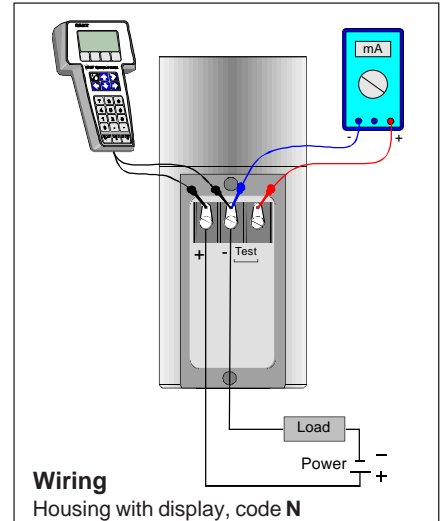
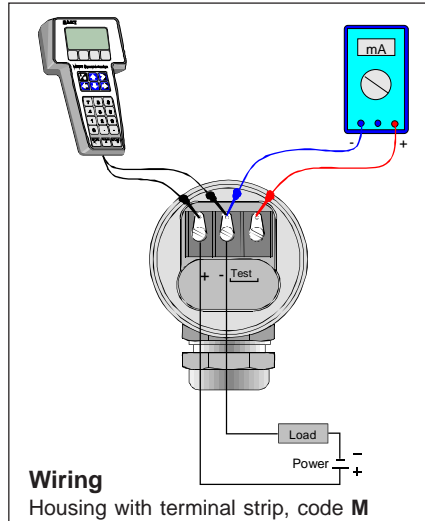
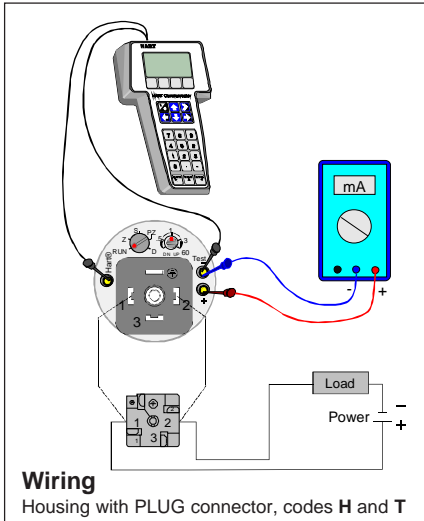
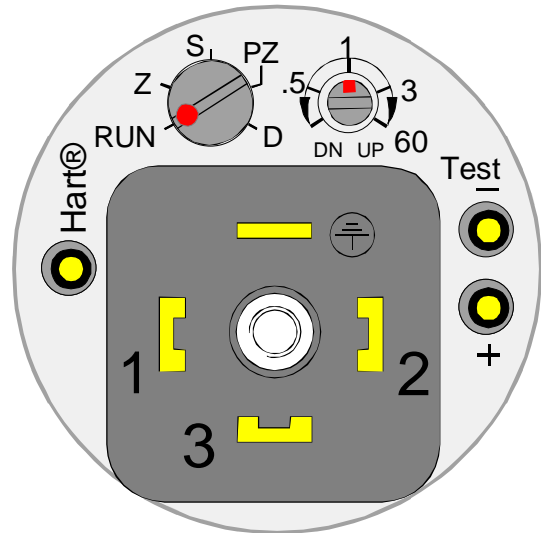


Remote electronics,
connecting cable with protection hose,
codes L and K

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






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.

Selection Chart

VDt	Differential Pressure Transmitter		VAt	Absolute Pressure Transmitter (ranges 4 to 7, range 0...xx, abs.)																																																																
<table border="1"> <tr> <td colspan="3">Adjustability (±)</td> <td colspan="3">Span, max.</td> <td colspan="3">Measurig range</td> </tr> <tr> <td>2</td> <td colspan="2">Span, min. 0,1 kPa (1 mbar)</td> <td colspan="3">6 kPa (60 mbar)</td> <td colspan="3">-6...+6 kPa (-60...+60 mbar)</td> </tr> <tr> <td>3</td> <td colspan="2">1,4 kPa (14 mbar)</td> <td colspan="3">35 kPa (350 mbar)</td> <td colspan="3">-35 kPa...+35 kPa (-350...+350 mbar)</td> </tr> <tr> <td>4</td> <td colspan="2">4 kPa (40 mbar)</td> <td colspan="3">100 kPa (1000 mba)</td> <td colspan="3">-100...+100 kPa (-1000...+1000 mbar)</td> </tr> <tr> <td>5</td> <td colspan="2">26,5 kPa (265 mbar)</td> <td colspan="3">500 kPa (5000 mbar)</td> <td colspan="3">-500...+500 kPa (-5000...+5000 mbar)</td> </tr> <tr> <td>6</td> <td colspan="2">0,145 MPa (1,45 bar)</td> <td colspan="3">3 MPa (30 bar)</td> <td colspan="3">-3...+3 MPa (-30...+30 bar)</td> </tr> <tr> <td>7</td> <td colspan="2">1 MPa (10 bar)</td> <td colspan="3">15 MPa (150 bar)</td> <td colspan="3">-15...+15 MPa (-150...+150 bar)</td> </tr> </table>						Adjustability (±)			Span, max.			Measurig range			2	Span, min. 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)		
Adjustability (±)			Span, max.			Measurig range																																																														
2	Span, min. 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)																																																														
<table border="1"> <tr> <td colspan="6">Output</td> </tr> <tr> <td>S</td> <td colspan="5">4-20mA DC/HART® -protocol</td> </tr> </table>						Output						S	4-20mA DC/HART® -protocol																																																							
Output																																																																				
S	4-20mA DC/HART® -protocol																																																																			
<table border="1"> <tr> <td colspan="6">Process connection</td> </tr> <tr> <td>D</td> <td colspan="2">M10,PN40 range 2/PN100 ranges 3...6, IEC 61518</td> <td>F</td> <td colspan="2">Screwed flange adapters, PN40 range 2 and PN420 ranges 3 to 7, IEC 61518</td> </tr> <tr> <td>A</td> <td colspan="2">M10, PN420 ranges 3, 4, 5 and 7, IEC 61518</td> <td>V</td> <td colspan="2">Connection through hydraulic seal</td> </tr> <tr> <td>H</td> <td colspan="2">M12, PN420 ranges 3, 4, 5 and 7, IEC 61518</td> <td>Z</td> <td colspan="2">Welded flange adapters, PN420 ranges 3 to 5 and 7, IEC61518</td> </tr> <tr> <td>U</td> <td colspan="2">7/16-20 UNF, (PN420 ranges 3, 4, 5 and 7)</td> <td></td> <td colspan="2"></td> </tr> </table>						Process connection						D	M10,PN40 range 2/PN100 ranges 3...6, IEC 61518		F	Screwed flange adapters, PN40 range 2 and PN420 ranges 3 to 7, IEC 61518		A	M10, PN420 ranges 3, 4, 5 and 7, IEC 61518		V	Connection through hydraulic seal		H	M12, PN420 ranges 3, 4, 5 and 7, IEC 61518		Z	Welded flange adapters, PN420 ranges 3 to 5 and 7, IEC61518		U	7/16-20 UNF, (PN420 ranges 3, 4, 5 and 7)																																					
Process connection																																																																				
D	M10,PN40 range 2/PN100 ranges 3...6, IEC 61518		F	Screwed flange adapters, PN40 range 2 and PN420 ranges 3 to 7, IEC 61518																																																																
A	M10, PN420 ranges 3, 4, 5 and 7, IEC 61518		V	Connection through hydraulic seal																																																																
H	M12, PN420 ranges 3, 4, 5 and 7, IEC 61518		Z	Welded flange adapters, PN420 ranges 3 to 5 and 7, IEC61518																																																																
U	7/16-20 UNF, (PN420 ranges 3, 4, 5 and 7)																																																																			
<table border="1"> <tr> <td colspan="2">Wetted material</td> <td colspan="2">Flanges</td> <td colspan="2">Diaphragm</td> <td colspan="2">Diaphragm coating</td> </tr> <tr> <td></td> <td>Code</td> <td>Code</td> <td>Material</td> <td>Code</td> <td>Material</td> <td>Code</td> <td>Material</td> </tr> <tr> <td></td> <td>2</td> <td>2</td> <td>AISI316L (EN 1.4404)</td> <td>2</td> <td>AISI316L (EN 1.4435)</td> <td></td> <td>(specify only when coated)</td> </tr> <tr> <td></td> <td>3</td> <td>3</td> <td>Hast.C 276 (EN 2.4819)</td> <td>3</td> <td>Hast.C 276 (EN 2.4819)</td> <td>9</td> <td>gold / rhodium</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>5</td> <td>Tantalum</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>8</td> <td>Duplex (EN 1.4462)</td> <td></td> <td></td> </tr> </table>						Wetted material		Flanges		Diaphragm		Diaphragm coating			Code	Code	Material	Code	Material	Code	Material		2	2	AISI316L (EN 1.4404)	2	AISI316L (EN 1.4435)		(specify only when coated)		3	3	Hast.C 276 (EN 2.4819)	3	Hast.C 276 (EN 2.4819)	9	gold / rhodium					5	Tantalum							8	Duplex (EN 1.4462)																	
Wetted material		Flanges		Diaphragm		Diaphragm coating																																																														
	Code	Code	Material	Code	Material	Code	Material																																																													
	2	2	AISI316L (EN 1.4404)	2	AISI316L (EN 1.4435)		(specify only when coated)																																																													
	3	3	Hast.C 276 (EN 2.4819)	3	Hast.C 276 (EN 2.4819)	9	gold / rhodium																																																													
				5	Tantalum																																																															
				8	Duplex (EN 1.4462)																																																															
<table border="1"> <tr> <td colspan="2">Fill fluid</td> <td>S</td> <td>Silicone oil</td> <td>G</td> <td>Inert oil</td> </tr> </table>						Fill fluid		S	Silicone oil	G	Inert oil																																																									
Fill fluid		S	Silicone oil	G	Inert oil																																																															
<table border="1"> <tr> <td colspan="6">Housing type</td> </tr> <tr> <td>H</td> <td colspan="5">Housing with PLUG-connector, DIN43650, no display, inlet PG9</td> </tr> <tr> <td>T</td> <td colspan="5">Housing with PLUG-connector, DIN43650, no display, inlet PG9, with manual adjust</td> </tr> <tr> <td>M</td> <td colspan="5">Housing with junction box/terminal strip, no display, inlet M20x1,5</td> </tr> <tr> <td>N</td> <td colspan="5">Housing with junction box/terminal strip, with display, inlet M20x1,5</td> </tr> </table>						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																																					
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																																																																			
<table border="1"> <tr> <td colspan="6">Explosion proof</td> </tr> <tr> <td>0</td> <td colspan="2">No explosion proof classification</td> <td>1</td> <td colspan="2">Atex Intrinsic Safety,  II 1 GD T135°C (*)</td> </tr> </table>						Explosion proof						0	No explosion proof classification		1	Atex Intrinsic Safety,  II 1 GD T135°C (*)																																																				
Explosion proof																																																																				
0	No explosion proof classification		1	Atex Intrinsic Safety,  II 1 GD T135°C (*)																																																																
<table border="1"> <tr> <td>Process thread on flange adapter (only specify for type F)</td> <td>Thread type</td> <td colspan="2">Thread size</td> </tr> <tr> <td></td> <td>Code Type</td> <td>Code</td> <td>Size</td> </tr> <tr> <td></td> <td>R straight R thread</td> <td>2</td> <td>1/4</td> </tr> <tr> <td></td> <td>N NPS thread</td> <td>3</td> <td>3/8</td> </tr> <tr> <td></td> <td>P taper R thread</td> <td>4</td> <td>1/2</td> </tr> <tr> <td></td> <td>T NPT thread</td> <td></td> <td></td> </tr> </table>						Process thread on flange adapter (only specify for type 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																																									
Process thread on flange adapter (only specify for type 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																																																																			
<table border="1"> <tr> <td colspan="6">Special size of electrical inlet</td> </tr> <tr> <td>N</td> <td>1/2NPT</td> <td>G</td> <td>Pg13.5</td> <td>P</td> <td>Plug DIN 43650</td> </tr> </table>						Special size of electrical inlet						N	1/2NPT	G	Pg13.5	P	Plug DIN 43650																																																			
Special size of electrical inlet																																																																				
N	1/2NPT	G	Pg13.5	P	Plug DIN 43650																																																															
<table border="1"> <tr> <td colspan="6">Special features</td> </tr> <tr> <td colspan="6">Special electronics (specify only if housing connected with hose to sensing element)</td> </tr> <tr> <td colspan="6">- connecting cable with protection hose</td> </tr> <tr> <td>L</td> <td colspan="5">Hose protected with PTFE/AISI316 braiding, straight</td> </tr> <tr> <td>K</td> <td colspan="5">Hose protected with PTFE/AISI316 braiding, angle of 90°</td> </tr> <tr> <td colspan="6">Length of cable between sensing element and housing (specify only if housing connected with cable to sensing element)</td> </tr> <tr> <td>2</td> <td>2 m cable</td> <td>3</td> <td>3 m cable</td> <td colspan="2">etc. (max. 20 m)</td> </tr> <tr> <td colspan="6">Mounting parts for remote electronics for Ø51 mm tube</td> </tr> <tr> <td>0</td> <td colspan="2">No mounting parts</td> <td>1</td> <td colspan="2">Mounting parts</td> </tr> </table>						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 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. 20 m)		Mounting parts for remote electronics for Ø51 mm tube						0	No mounting parts		1	Mounting parts										
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 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. 20 m)																																																																
Mounting parts for remote electronics for Ø51 mm tube																																																																				
0	No mounting parts		1	Mounting parts																																																																
<table border="1"> <tr> <td colspan="6">Documentation</td> </tr> <tr> <td colspan="3">Calibration Certificate</td> <td>AE</td> <td colspan="2">English</td> </tr> <tr> <td colspan="3">Installation and Operating Instructions</td> <td>IE</td> <td>English</td> <td>IF Finnish</td> </tr> </table>						Documentation						Calibration Certificate			AE	English		Installation and Operating Instructions			IE	English	IF Finnish																																													
Documentation																																																																				
Calibration Certificate			AE	English																																																																
Installation and Operating Instructions			IE	English	IF Finnish																																																															
<table border="1"> <tr> <td colspan="6">Material Certificates</td> </tr> <tr> <td>0</td> <td colspan="5">No material certificate</td> </tr> <tr> <td>MC1</td> <td colspan="5">Raw materials certificate without appendixes, in accordance with SFS-EN 10204-2.1 (DIN 50049-2.1) standard</td> </tr> <tr> <td>MC2</td> <td colspan="5">Raw materials certificate for wetted parts with appendixes, in accordance with SFS-EN 10204-2.2 (DIN 50049-2.2) standard</td> </tr> <tr> <td>MC3</td> <td colspan="5">Raw materials certificate for wetted parts with appendixes, in accordance with SFS-EN 10204-3.1B (DIN 50049-3.1B) standard</td> </tr> </table>						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																																					
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

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

