

NIPRESS

DD-400

3-wire differential pressure transmitter

User's and Programming manual

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Thank you for choosing a NIVELCO instrument.
We are convinced that you will be satisfied with our product!

1. INTRODUCTION

NIPRESS DD-400 series differential pressure transmitters work in a 3-wire system, measure pressure and convert it into voltage or current output. The NIPRESS DD-400 family equipped with stainless steel sensors, rotatable LCD display, 3-wire 4...20 mA current output and one or two PNP switching output. The transmitters are suitable for the measurement of pressure difference between gases and fluids in the 0–70 bar (0–1015 psi) pressure range.

2. ORDER CODE (NOT ALL COMBINATIONS POSSIBLE!)

NIPRESS				D <div></div> - 4 <div></div> 5 - <div></div>					
Measuring method		Process connection		Range / Max. static pressure [bar] ⁽²⁾		Accuracy		Output / Ex	
Code		Code		Code		Code		Code	
Differential	D	1/4" BSP	A	0 – 0.1 ... 1 adjustable / 7	F	2%	5	4...20 mA 3-wire	2
		1/2" BSP	C	0 – 0.2 ... 2 adjustable / 20	G				
		1/4" NPT ⁽¹⁾	G	0 – 0.35 ... 3,5 adjustable / 20	O				
		1/2" NPT ⁽¹⁾	H	0 – 0.7 ... 7 adjustable / 70	K				
				0 – 2 ... 20 adjustable / 70	M				
				0 – 3.5 ... 35 adjustable / 70	N				
				0 – 7 ... 70 adjustable / 70	P				

⁽¹⁾ Threaded inner process connection

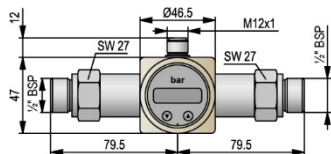
⁽²⁾ Custom measuring range available; subject to prior negotiation.

3. TECHNICAL SPECIFICATION

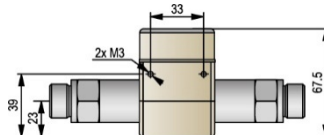
Type		DD□-4□5-□
Measuring range		0–70 bar (0–1015 psi) (per order code)
Overload tolerance		Per order code
Accuracy		2 %
Medium temperature		-40°C...+125°C (-40°F...+257°F)
Ambient temperature		-25°C...+85°C (-13°F...+185°F)
Materials of the wetted parts	Sensor	Stainless steel 1.4435 (316L) (2 pcs)
	Sensor seal	FKM
	Process connection	Stainless steel 1.4404 (316L)
Housing		PA 6.6, Polycarbonate
Output		4...20 mA (3-wire), 1 or 2 PNP switching output
Switching output		Short circuit protected PNP output (max.: 125 mA) Adjustable switching delay between 0...100 ms
Power supply (U _{Supply})		24V DC ±10%
Load resistance		500 Ω
Display		4-digit (7 mm), red LED display; Range of indication: -1999...+9999; Accuracy: 0.1% ±1 digit; Damping: 0.3–30 sec (adjustable)
Process connection		Per order code
Electrical connection		M12x1 (5-pin, metal)
Ingress protection		IP65 (M12x1)
Electrical protection		Class III (SELV)
Weight		~ 0.35 kg (0.77 lbs)

3.1 DIMENSIONS

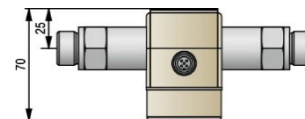
DDC-4□5-2



1/2" NPT

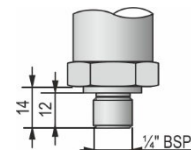
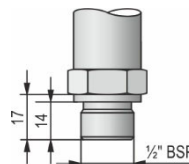
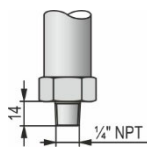
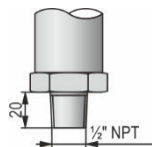


1/4" NPT



1/2" BSP

1/4" BSP



3.2 ACCESSORIES

- User's and programming manual
- Warranty card
- EU declaration of conformity
- Mounting bracket
- Two screws

3.3 SPECIAL CONDITIONS OF SAFE USE



- Make sure the installation is complete with no visible defects before turning on the device.
- The device may only be used within the limitations specified in the technical specifications.
- The acceptable measuring medium are liquids and gases that can be used with the diaphragm material: sensor; stainless steel 1.4435 (316L), process connection; stainless steel 1.4404 (316L).

4. INSTALLATION

With the mounting bracket the transmitter can be mounted on smooth surfaces or walls. The mounting bracket is screwed onto the plastic housing of the transmitter. Remove the blind caps and use the screws. The use of a sealing armature is required for the device to be replaced during operation. A simple ball valve is suitable for lower pressures; higher pressures (above 6 bar) require a three-way blow-off valve. The pressure ports of the device are marked. Make sure that the higher pressure is connected to the input "P+", the lower pressure is connected to the input "P-" pressure port!

4.1 INSTALLATION INSTRUCTION

Install the device only in a depressurized and disconnected state!

The medium may be dangerous; therefore, suitable protective clothing, gloves, and goggles are required for the installation process.

Remove the packaging and the protective cap just before the beginning of the assembly to avoid any damage to the diaphragm. Keep the protective cap! In case the unit is not installed immediately, the protective cap must be put back on as soon as possible! Treat any unprotected diaphragm with utmost care, as it can be damaged very easily.

Torque must only be transmitted to the hexagonal screw on the instrument body (torque wrench). When installing the device, avoid applying strong mechanical stress on the pressure port! It will result in a shift of the characteristic curve or damage the device.

The transmitter housing is grounded to suppress electronic noise. If the grounding of the device is correct, no further grounding is needed, otherwise the instrument must be grounded.

Positioning the display:

The display and the operating module can be rotated for easy readability even in unusual mounting positions. The pivoting of the module is limited. Do not rotate the display beyond the rotation limits.

Tightening torques:

¼" BSP: max. 20 Nm; ½" BSP: max. 50 Nm;

¼" NPT max. 30 Nm; ½" NPT max. 70 Nm;

The specified tightening torques must not be exceeded!

Installation steps for BSP process connection (DIN 3852):

Do not use any additional sealing material such as Teflon tape! Check if the O-ring is intact, its surface even and clean and seat in the designated groove accurately. Screw the device into the correct thread by hand! If your device is to be secured with a knurled ring instead of a hexagon head screw, the pressure transmitter should only be tightened by hand! Devices with hexagon head screw mounting must be tightened using a suitable open-end wrench (torque wrench)!

Do not use any additional sealing material such as Teflon tape! Check if the O-ring is undamaged, its surface is flawless and clean and it is seated in the designated groove. Screw the device into the correct thread by hand! If your device is secured with a knurled ring instead of a hexagonal screw, the pressure transmitter must only be tightened by hand! Devices with hexagonal screw mounting must be tightened using an open-ended wrench (torque wrench)!

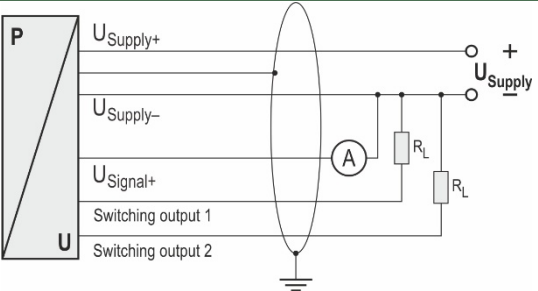
Installation steps for NPT process connection:

Use suitable seal (e.g. a PTFE-strip)! Screw the device into the correct thread by hand, and tighten it with a wrench!

5. WIRING

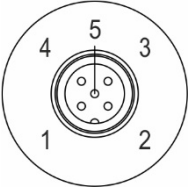
Wiring the device must be done according to the pin-out table and the wiring diagram.
Use a shielded and twisted multicore cable for the electrical connection.

Wiring diagram

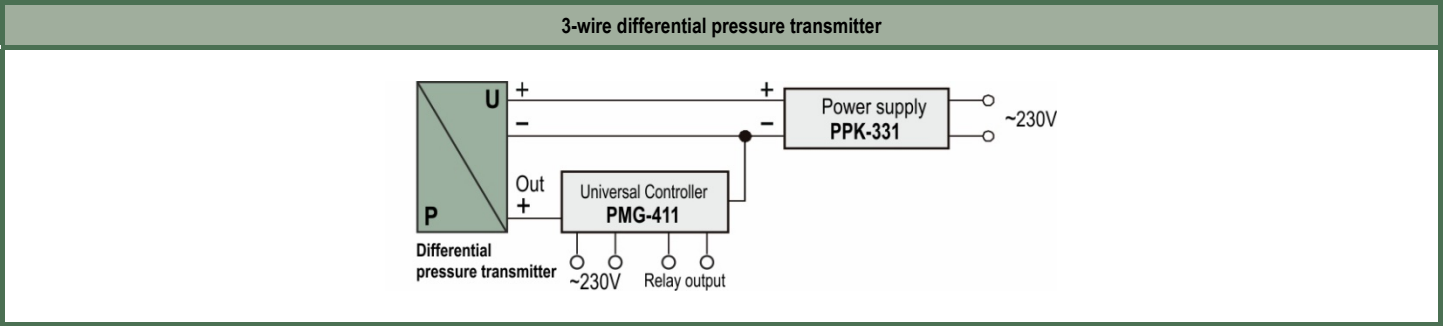


M12x1 (5-pin, metal) pin configuration

Electrical connection	M12x1 (5-pin)
Power supply +	1
Power supply -	3
3-wire: signal +	2
Switching output 1	4
Switching output 2 (optional)	5
Shield	pressure port -

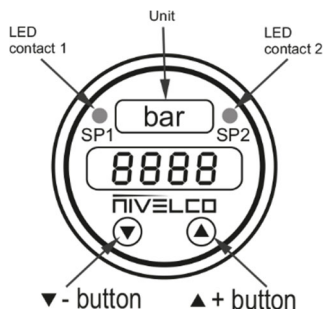


5.1 ARRANGEMENT EXAMPLES



6. PROGRAMMING

6.1 CONFIGURATION



The status of the outputs is indicated by 2 LEDs. The LEDs will light up when the respective point has been reached, and the contact is active. The green LED 1 is on if switching point 1 is reached and the switch output 1 is active. The yellow LED 2 lights up when switching point 2 is reached, and the switch output 2 is active (optional).

Regardless of the number of PNP switches, the menu structure is the same for all device types. They differ only in the number of menu items. Following the chart (6.5) and the menu list (6.6) they guide you through all possible menu items.

The 4-digit 7-segment display shows the measured value and provides information about the menu items.

The two buttons below the display are for moving in the menu and setting the parameters.

Button “▲”: moves forward in the menu system or increases the displayed value.

Button “▼”: moves backwards in the menu system or decreases the displayed value.

Pressing the two buttons simultaneously: pressing both buttons at the same time changes between display mode and configuration mode and confirms the menu items and values.

When setting the values, the counting speed can be increased by holding down the up or down key for more than 5 seconds.

The menu navigation is a wrap-around system scrolling both forward and backward through the individual set-up menus to the desired item.

Changes take effect only after pressing the two buttons together and leaving the menu item.

All settings are stored permanently in an EEPROM so settings will not be forgotten even after disconnecting from the supply voltage.

6.2 PASSWORD

The menu system of the device can be protected by a password, so it is only possible for authorized persons to change the settings. If password access ("PAon") is activated, the entire menu system will be locked. For more information, see "6.6 Description of the Menu System." Entering the password will make the entire menu accessible again, and the password can be changed in the special menu item 4. If the password is lost or forgotten, restore the factory default settings of the device. Use the special menu item 2 to do so.

6.3 CONFIGURING THE ANALOG OUTPUT (EXAMPLE)

The analog output can be configured in the menus **ZP** (zero point) and **EP** (end point). The following example shows how to use them:

In this example, the device has a measurement range of 0–6 bar (0–87 psi), and it is connected to P1. The analogous signal amounts to 4...20 mA / 3-wire and were configured in the menu 26 "SiAn" on "P1."

The output analog signal:

0 bar (0 psi) = 4.00 mA 3 bar (43.5 psi) = 12.00 mA 6 bar (87 psi) = 20 mA.

If the value is changed from 0 to 1 in ZP and the EP value from 6 to 5, the output signal changes as follows:

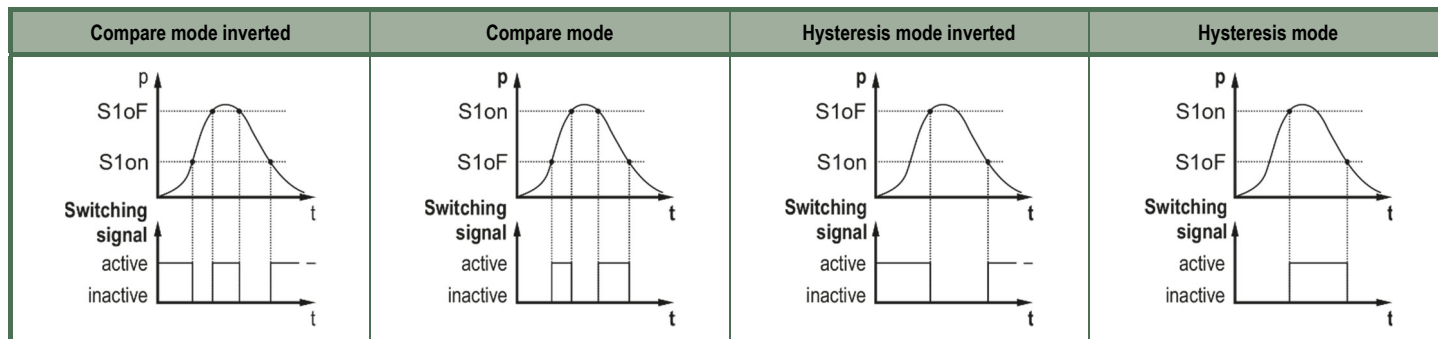
1 bar (14.5 psi) = 4.00 mA 3 bar (43.5 psi) = 12.00 mA 5 bar (72.51) = 20 mA.

The values of ZP and EP are adjustable up to 1:10 of the nominal pressure range.

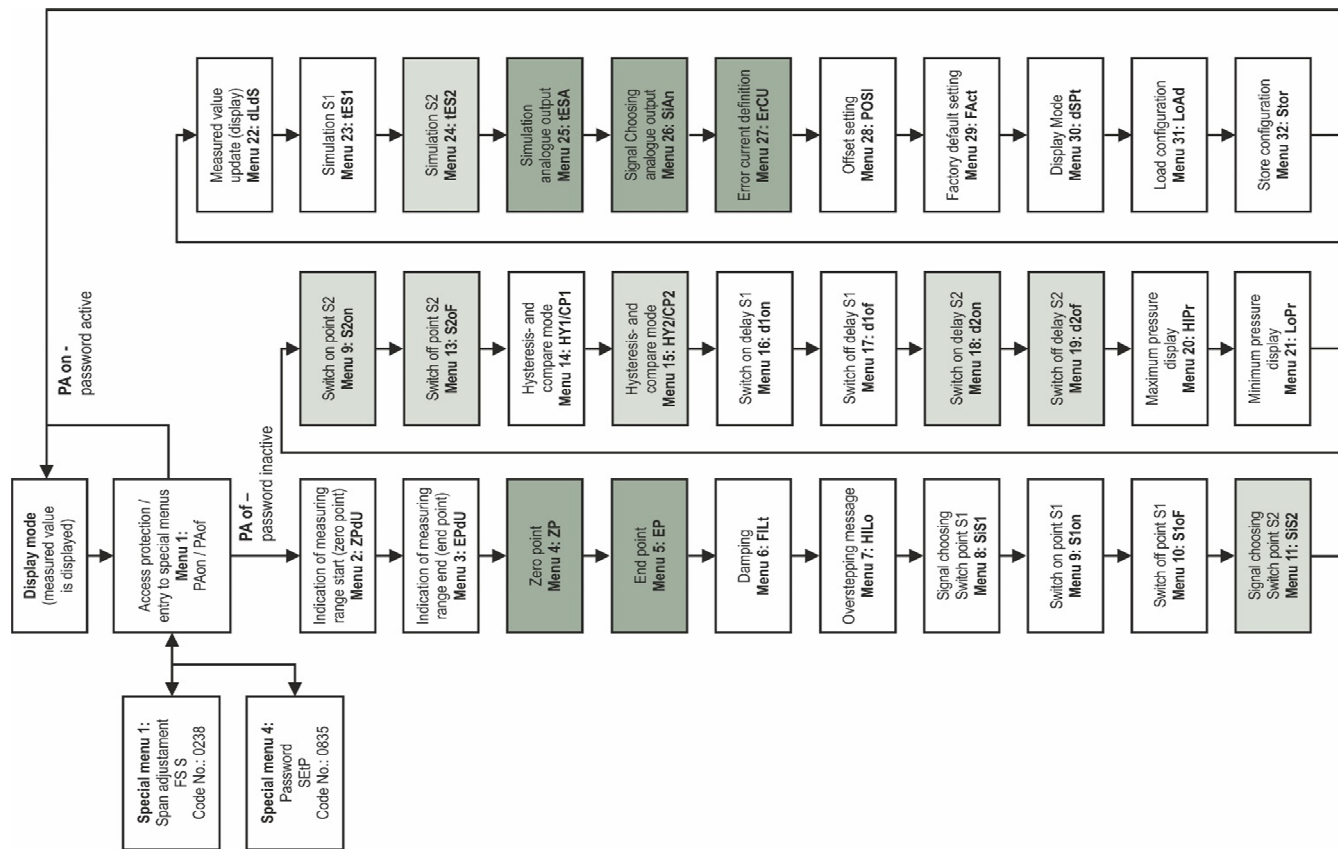
6.4 HYSTERESIS AND COMPARE MODES

The diagrams below show the operation of the switch outputs.

To reverse the relevant modes, you have to swap the values for the switch-on and switch-off points.



6.5 STRUCTURE OF THE MENU SYSTEM



6.6 DESCRIPTION OF THE MENU SYSTEM

Menu 1 – Access protection

PAon PAon → password active → to deactivate: enter password.

PAof PAof → password inactive → to activate: enter password.

The default password is "0005"; modification of the password is described in "Special menu 4".

Menu 2 – Indication of the start of the measuring range (zero point)

2Pdu Value defined at order, no input option.

Menu 3 – Indication of the end of the measuring range (end point)

EPdu Value defined at order, no input option.

Menu 4 and Menu 5 – Set zero point / end point

2P & EP The configuration of the zero point affects the analog output, whereas the display value remains unchanged (zero and endpoint can be configured within the limits of the nominal pressure range, according to the manufacturing label); for more information, see "6.3 Configuration the analog output (example)."

Menu 6 – Set damping

FILt This feature eliminates problems caused by rapidly changing pressure values. By setting the time (0.3 – 30 sec), the current output signal can be delayed. The higher the value entered, the longer it takes to reach the current pressure output signal's value.

Menu 7 – Excess value message

HiLo Set "On" or "Off".

Menu 8 – Switch output selector S1

5.51 "P1", "P2" (the switching point reacts to the static pressure at the appropriate input) or "DIFF" (difference pressure between P1 and P2)

Menu 9 – Set switch-on point for switching output S1

51on Set a switch-on value for S1 output. (**S1on**)

Menu 10 – Set switch-off point for switching output S1

51of Set a switch-off value for S1 output. (**S1of**)

Menu 11 – Switch output selector S2

5.52 "P1", "P2" (the switching point reacts to the static pressure at the appropriate input) or "DIFF" (difference pressure between P1 and P2)

Menu 12 – Set switch-on point for switching output S2

52on Set a switch-on value for S2 output. (**S2on**).

Menu 13 – Set switch-off point for switching output S2

52of Set a switch-off value for S2 output. (**S2of**)

Menu 14 – Select hysteresis or compare mode of S1 output

HY 1 & CP 1 Select the hysteresis mode (HY 1) or compare mode (CP 1) for the contact 1. You can find a description from the hysteresis and compare mode are in chapter 6.4.

Menu 15 – Select hysteresis or compare mode of S2 output

HY 2 & CP 2 Select the hysteresis mode (HY 2) or compare mode (CP 2) for the contact 1. You can find a description from the hysteresis and compare mode at 6.4 chapter.

Menu 16 – Set switch-on delay for S1 output

d1on Set the switch-on delay value for the S1 output. (0 – 100 sec).

Menu 17 – Set switch-off delay for S1 output

d1of Set the switch-off delay value for the S1 output. (0 – 100 sec).

Menu 18 – Set switch-on delay for S2 output

d2on Set the switch-on delay value for the S2 output. (0 – 100 sec).

Menu 19 – Set switch-off delay for S2 output

d2of Set the switch-off delay value for the S2 output. (0 – 100 sec).

Menu 20 and Menu 21 – Maximum / minimum pressure display

H1Pr & LoPr Displays the high pressure (HiPr) or low pressure (LoPr) value during the measurement process (values are lost when power is gone). To delete the values, press the two buttons at the same time again within 1 second.

Menu 22 – Measured value update (display)

dLdS Sets the display refresh cycle length (0.0–10 sec).

Menu 23 – Simulate contact output S1

tES1 The state of switch output S1 can be simulated. Select activate or deactivate with the up and down buttons (output S1, tES1).

Menu 24 – Simulate contact output S2

tES2 The state of switch output S2 can be simulated. Select activate or deactivate with the up and down buttons (output S2, tES2).

Menu 25 – Simulate analogue output

tESR The value of the analog output signal can be simulated. Select one of the following settings: "oi 4" (4 mA or 2 V), "oi12" (12 mA or 6 V) and "oi20" (20 mA or 10 V)

Menu 26 – Signal choosing for analogue output

51An Assigning the desired input signal to the analog output; if "P1" or "P2" is selected, the analog output follows the static pressure on the suitable input. By the setting "DIFA", "DIFB" and "DIFC" the analog output follows the calculated difference pressure from P1 and P2. With "DIFB," the analog signal is offset, in addition, about 50% FSO upwards; with "DIFC" the square root of the differential signal is displayed.

Menu 27 – Error signal definition

ErS Set the desired error signal (this is sent out if there is an error).

Permitted options: "OFF" (no error signal), "C 0" (0 mA or 0 V), "C L0" (3.5 mA or 1.75 V) and "C HI" (23 mA or 11.5 V). The error message appears only when Menu 6 "HILO" is set to "on."

Menu 28 – Offset compensation / position correction

P0S1 A position correction or an offset's comparison can be carried out only with an available appropriate reference source, in so far as the measuring value deviation lies within certain borders; confirm the menu point "P0SI" by pressing both buttons. If the offset deviates from the environment pressure, it is necessary to connect the pressure reference, which corresponds to the measuring start value in P1. P2 must stay open! If both keys are pressed again afterwards, the signal typically spent by the differential pressure transmitter will be stored as an offset. The display shows the adjusted zero point value, although the sensor signal is offset.

Note that with an available analog output, this remains unaffected by the change. Furthermore, offsetting shifts the full scale as well.

Menu 29 – Load default settings

FRct This option restores the factory default value for all settings. To reset the factory defaults, press the two buttons at the same time after selecting this option. Note that any changes you have made so far will be lost, so the password will also be reverted to "0005."

Menu 30 – Display mode

dSPt Assigning the desired input signal to the display value ("P1," "P2" or "DIFF")

Menu 31 – Load configuration

LoAd Load configuration stored on the device (Menu 32). (Choose from 1 to 5).

Menu 32 – Store configuration

Stor Saves the device configuration settings. Select a number between 1 and 5.

SPECIAL MENUS:

To access the special menu, select "PAof" with the "▲" or "▼" button, then press both buttons to activate the menu item. "1" appears on the display.

Special menu 1 – Full-scale compensation

FS S Full-scale compensation is necessary if the indicated value for full scale differs from the real full-scale value in the application; compensation is only possible with an appropriate reference source if the deviation of the measured value is within the defined limits.

Set "0238" with the "▲" and "▼" keys; confirm with both buttons; "FS S" will appear on the display. Now it is necessary to connect the pressure reference, which corresponds to the measuring range's end value, to P1. P2 must stay open! Press both keys again, to store the signal being emitted from the pressure switch as full scale; the display will show the set endpoint, although the entire range detection signal has been shifted.

Please note that the analog output signal (on devices with analog output) remains unaffected by this change.

Special menu 2 – Set password

SEtP Enter "0835"; apply setting by pressing the two keys together; the display will say "SEtP"; now set the password using the "▲" - or "▼" -keys. Any number from 0 to 9999 can be entered except for the following code numbers: 0238, 0247, 0729, and 0835. After entering the new code number, save it by pressing the two buttons together.

7. TROUBLESHOOTING

Fault	Possible causes	Fault detection / remedy
No output signal:	Faulty connection.	Check the connections!
	Broken wire.	Check all wires using a cable tester!
	Defective measuring device (signal input).	Check the ampere meter (and its fuse) and the analogue input of the signal processing unit!
Analog output signal too low:	Load resistance too high.	Check the value of the load resistance!
	Supply voltage too low.	Check the power supply and power / current on the transducer / transmitter!
	Power supply failure.	Inspect the power supply and the applied supply voltage at the device.
Output signal slightly offset:	The diaphragm of the sensor is severely contaminated.	Cleaning with non-aggressive cleaning solutions, soft brush or sponge.
	The diaphragm of the sensor is calcified or crusted.	It is recommended to clean carefully to ensure all the dirt is completely removed.
Large offset in the output signal:	The diaphragm of the sensor is damaged (caused by overpressure or a mechanical impact).	Check the diaphragm of the sensor, if it is damaged then send the device back to the manufacturer!
Incorrect output signal:	Damaged electrical connection	Check the connection
	Reverse polarity of the pressure ranges	Ensure that the higher pressure is connected to input "P+"

8. MAINTENANCE AND REPAIR

The instrument does not require regular maintenance. If necessary possible dirt deposited should be cleaned off. The warranty conditions are included in the warranty card.

Dismount the device only when it is depressurized and disconnected! Drain the medium before dismantling the device.

If necessary, clean the diaphragm carefully with a non-aggressive cleaning solution, soft brush, or sponge. Improper cleaning may cause irreparable damage to the diaphragm.

For this reason, never use sharp objects or pressurized air for cleaning the diaphragm. Before returning the device for repairs, it must be cleaned carefully, the parts in contact with the medium that might contain harmful substances must be decontaminated. Our official form (Returned Equipment Handling Form) must be enclosed. Download it from our website www.nivelco.com. The device must be sent with a declaration of decontamination. Please provide a statement in the declaration that the decontamination process is completed, the device is clean and free from harmful materials, and there are no hazardous substances on it.

9. STORAGE CONDITIONS

Storage temperature: -40°C...+85°C (-40°F...+185°F)

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NIVELCO reserves the right to change technical data without notice!

