

## Operating Manual

Hammer Union Pressure Transmitters for IS-areas

DX18 HU 300, DX18 HU 400



DX18 HU 400:  
**HART**  
COMMUNICATION FOUNDATION



**READ THOROUGHLY BEFORE USING THE DEVICE  
KEEP FOR FUTURE REFERENCE**

ID: BA\_HU 300-400\_Ex\_E | Version: 10.2019.0

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## 1. General and Safety-Related Information on this Operating Manual

This operating manual enables safe and proper handling of the product, and forms part of the device. It should be kept in close proximity to the place of use, accessible for staff members at any time.

All persons entrusted with the mounting, installation, putting into service, operation, maintenance, removal from service, and disposal of the device must have read and understood the operating manual and in particular the safety-related information.

### The following documents are an important part of the operating manual:

- Data sheet
- Type-examination certificate

For specific data on the individual device, please refer to the respective data sheet.

Download this by accessing [www.bdsensors.de](http://www.bdsensors.de) or request it by e-mail or phone: info@bdsensors.de phone: +49 (0) 92 35 / 98 11 0

The IS versions of our products are variants of the standard products.

In addition, the applicable accident prevention regulations, safety requirements, and country-specific installation standards as well as the accepted engineering standards must be observed.

For the installation, maintenance and cleaning of the device, the relevant regulations and provisions on explosion protection (VDE 0160, VDE 0165 and/or EN 60079-14) as well as the accident prevention regulations must absolutely be observed.

The device was designed by applying the following standards:

EN60079-0:2012  
EN60079-11:2012  
EN60079-26:2007

## 1.1 Symbols Used

	<ul style="list-style-type: none"> <li>- Type and source of danger</li> <li>- Measures to avoid the danger</li> </ul>
	<ul style="list-style-type: none"> <li>- Imminent danger!</li> <li>- Non-compliance <b>will result in</b> death or serious injury.</li> </ul>
	<ul style="list-style-type: none"> <li>- Possible danger!</li> <li>- Non-compliance <b>may result in</b> death or serious injury.</li> </ul>
	<ul style="list-style-type: none"> <li>- Hazardous situation!</li> <li>- Non-compliance <b>may result in</b> minor or moderate injury.</li> </ul>

**NOTE** - draws attention to a possibly hazardous situation that may result in property damage in case of non-compliance.

- ✓ Precondition of an action

## 1.2 Staff Qualification

**Qualified persons** are persons that are familiar with the mounting, installation, putting into service, operation, maintenance, removal from service, and disposal of the product and have the appropriate qualification for their activity.

This includes persons that meet at least one of the following three requirements:

- They know the safety concepts of metrology and automation technology and are familiar therewith as project staff.
- They are operating staff of the measuring and automation systems and have been instructed in the handling of the systems. They are familiar with the operation of the devices and technologies described in this documentation.
- They are commissioning specialists or are employed in the service department and have completed training that qualifies them for the repair of the system. In addition, they are authorized to put into operation, to ground, and to mark circuits and devices according to the safety engineering standards.

All work with this product must be carried out by qualified persons!

## 1.3 Intended Use

The devices are used to convert the physical parameter of pressure into an electric signal.

The pressure transmitter HU 300 has been especially developed for extreme operating conditions in the petrochemical industry (on and offshore sites).

This operating manual applies to devices with explosion protection approval and is intended for the use in IS-areas. A device has an explosion-protection approval if this was specified in the purchase order and confirmed in our order acknowledgement. In addition, the manufacturing label includes a  sign.

The user must check whether the device is suited for the selected use. In case of doubt, please contact our sales department: info@bdsensors.de | phone: +49 (0) 92 35 / 98 11 0 BDSENSORS assumes no liability for any wrong selection and the consequences thereof!

Permissible media are gases or liquids, which are compatible with the media wetted parts described in the data sheet.

The technical data listed in the current data sheet are engaging and must absolutely be complied with. If the data sheet is not available, please order or download it from our homepage: <http://www.bdsensors.de>



### Danger through incorrect use

- In order to avoid accidents, use the device only in accordance with its intended use.

## 1.4 Limitation of Liability and Warranty

Failure to observe the instructions or technical regulations, improper use and use not as intended, and alteration of or damage to the device will result in the forfeiture of warranty and liability claims.

## 1.5 Safe Handling

**NOTE** - Do not use any force when installing the device to prevent damage of the device and the plant!

**NOTE** - Treat the device with care both in the packed and unpacked condition!

**NOTE** - The device must not be altered or modified in any way.

**NOTE** - Do not throw or drop the device!

**NOTE** - Excessive dust accumulation (over 5 mm) and complete coverage with dust must be prevented!

**NOTE** - The device is state-of-the-art and is operationally reliable. Residual hazards may originate from the device if it is used or operated improperly.

## 1.6 Safety-Related Maximum Values

The supply connections have an inner capacity of max. 27 nF to the housing.

application in zone 0 ( $p_{atm}$  0.8 bar up to 1.1 bar): -20 ... 60 °C

application in zone 1 and higher: -25 ... 70 °C

## DX18 HU 300

$U_i = 28 \text{ V}$ ;  $I_i = 100 \text{ mA}$ ;  $P_i = 700 \text{ mW}$ ;  $C_i \leq 1 \text{ nF}$ ;  $L_i \leq 5 \mu\text{H}$ ; plus cable inductivities 1  $\mu\text{H}/\text{m}$  and cable capacities 150 pF/m (for cable by factory)

## DX18 HU 400

$U_i = 28 \text{ V}$ ;  $I_i = 93 \text{ mA}$ ;  $P_i = 660 \text{ mW}$ ;  $C_i \leq 0 \text{ nF}$ ;  $L_i \leq 0 \mu\text{H}$

## 1.7 Scope of Delivery

Check that all parts listed in the scope of delivery are included free of damage, and have been delivered according to your purchase order:

- Hammer Union pressure transmitter
- this operating manual

## 2. Product Identification

The device can be identified by means of the manufacturing label with order code. The most important data can be gathered therefrom.

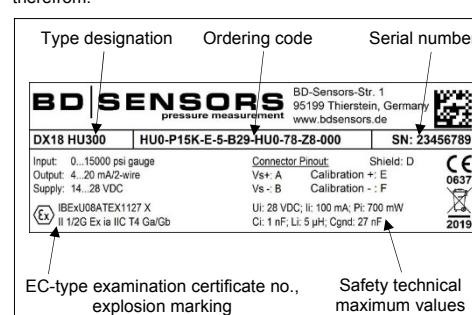


Fig. 1: Example of manufacturing label

**NOTE** - The manufacturing label must not be removed!

**The marking for devices with explosion-protection approval has to include following information:**

EC-type examination certificate IBExU08ATEX1127 X

### Designation:

DX18 HU 300: II 1/2G Ex ia IIC T4 Ga/Gb

DX18 HU 400: II 1G Ex ia IIC T4 Ga

## 3. Mounting

### 3.1 Mounting and Safety Instructions

	<b>Danger of death from explosion, airborne parts, leaking fluid, electric shock</b> <ul style="list-style-type: none"> <li>- Always mount the device in a depressurized and de-energized condition!</li> <li>- Do not install the device while there is a risk of explosion.</li> </ul>
	<b>Danger of death from improper installation</b> <ul style="list-style-type: none"> <li>- Installation must be performed only by appropriately qualified persons who have read and understood the user manual.</li> </ul>

**NOTE** - The technical data listed in the EC-type examination certificate are binding. Download this by accessing [www.bdsensors.de](http://www.bdsensors.de) or request it by e-mail or phone: info@bdsensors.de | phone: +49 (0) 92 35 / 98 11 0

**NOTE** - Make sure that the entire interconnection of intrinsically safe components remains intrinsically safe. The owner-operator is responsible for the intrinsic safety of the overall system (entire circuitry).

**NOTE** - Make sure that an equipotential bonding is in place for the entire course of the line, both in-side and outside the intrinsic area.

**NOTE** - If there is increased risk of damage to the device by lightning strike or overvoltage, increased lightning protection must additionally be provided!

**NOTE** - Treat any unprotected diaphragm with utmost care; this can be damaged very easily.

**NOTE** - Provide a cooling line when using the device in steam piping.

**NOTE** - Do not mount the device in a pneumatic flow rate!

**NOTE** - When installing the device, avoid high mechanical stresses on the pressure port! This will result in a shift of the characteristic curve or to damage.

**NOTE** - In hydraulic systems, position the device in such a way that the pressure port points upward (ventilation).

All work with this product must be carried out by qualified persons!

**1.3 Intended Use**

The devices are used to convert the physical parameter of pressure into an electric signal.

The pressure transmitter HU 300 has been especially developed for extreme operating conditions in the petrochemical industry (on and offshore sites).

This operating manual applies to devices with explosion protection approval and is intended for the use in IS-areas. A device has an explosion-protection approval if this was specified in the purchase order and confirmed in our order acknowledgement. In addition, the manufacturing label includes a  sign.

**NOTE** - If the device is installed with the pressure port pointing upwards, ensure that no liquid drains off on the device. This could result in humidity and dirt blocking the gauge reference in the housing and could lead to malfunctions. If necessary, dust and dirt must be removed from the edge of the screwed joint of the electrical connection.

**NOTE** - Do not remove the packaging or protective caps of the device until shortly before the mounting procedure. Protective caps must be kept! Dispose of the packaging properly!

### NOTES - for mounting outdoors or in a moist environment:

- Please note that your application does not show a dew point, which causes condensation and can damage the pressure transmitter. There are specially protected pressure transmitters for these operating conditions. Please contact us in such case.

- Connect the device electrically straightaway after mounting or prevent moisture penetration, e.g. by a suitable protective cap. (The ingress protection specified in the data sheet applies to the connected device.)

- Select the mounting position such that splashed and condensed water can drain off. Stationary liquid on sealing surfaces must be excluded!

- If the device has a cable outlet, the outgoing cable must be routed downwards. If the cable needs to be routed upwards, this must be done in an initially downward curve.

## 3.2 Mounting Steps for WECO®

	<b>Danger of injury</b> <ul style="list-style-type: none"> <li>- Due to wrong installation</li> <li>- Mount the pressure port according to the manufacturer's specifications of your WECO® connection.</li> </ul>
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## 4. Electrical Connection

### 4.1 Connection and Safety Instructions

	<b>Danger of death from electric shock or explosion</b> <ul style="list-style-type: none"> <li>- Explosion hazard if the operating voltage is too high (max. 28 V<sub>DC</sub>) or for DX18 HU 400 by opening the field housing while an explosion hazard exists.</li> <li>- Always mount the device in a depressurized and de-energized condition!</li> <li>- Do not install the device while there is a risk of explosion.</li> <li>- Operate the device only within the specification! (according data sheet EC-type examination certificate)</li> </ul>
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- ✓ The limit values listed in the EC-type examination certificate are observed. (Capacity and inductance of the connection cable are not included in the values.)
- ✓ The supply corresponds to protection class III (protective insulation).
- ✓ The devices connecting cable has been installed tightly and is fixed by the appropriate fastening material.

### NOTE - for devices with cable outlet

- When routing the cable, following bending radii have to be complied with:

#### cable without

#### 4.3 Electrical Installation

Establish the electrical connection of the device according to the technical data shown on the manufacturing label, the following table and the wiring diagram.

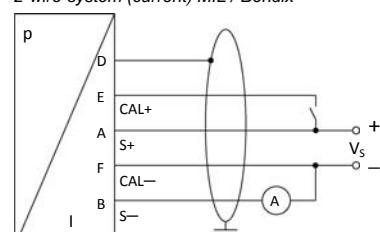
#### DX18 HU 300

Pin configuration:

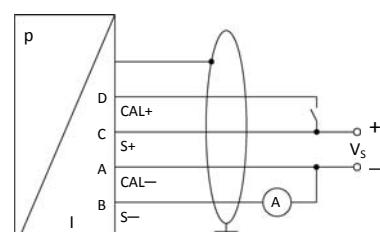
Electrical connections	MIL / Bendix (6-pin)	Glenair (4-pin)	cable colours (IEC 60757)
Supply +	pin A	pin C	WH (white)
Supply -	pin B	pin B	BN (brown)
Calibration +	pin E	pin D	PK (pink)
Calibration -	pin F	pin A	GY (grey)
Shield	cable shield / pin D	plug housing	(green / yellow)

Wiring diagrams:

2-wire-system (current) MIL / Bendix



2-wire-system (current) Glenair



Obtaining an 80 % calibration signal:

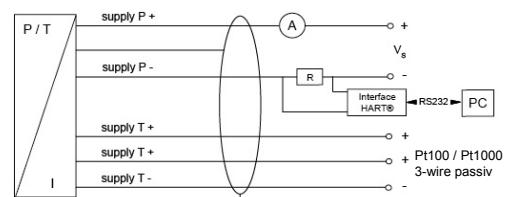
For producing an 80 % calibration signal, please apply in pressureless mode a voltage of min. 5 V to the connections CAL+ and CAL-. The max. voltage has to be equated with the device's max. allowed operating voltage. By applying the voltage to CAL+ and CAL-, an additional current of 12.8 mA is issued, resulting in a total current of 16.8 mA. For Ex devices, it has to be observed that the same source of supply has to trigger the calibration signal and supply the signal circuit.

#### DX18 HU 400

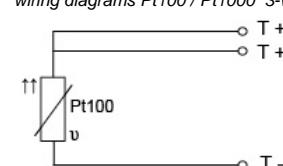
Pin configuration:

Electrical connection	field housing M20x1.5
Pressure	
Supply P+	IN+
Supply P-	IN-
Shield	⊕
Temperature	
Supply T+	T+
Supply T+	T+
Supply T-	T-

Wiring diagrams:



wiring diagrams Pt100 / Pt1000 3-wire system



Connection technique

Hereby two measuring circuits are established. By the third wire it is possible to find out and to compensate the resistance of wire.

#### 5. HART® communication with DX18 HU 400

<b>DANGER</b>	<b>Danger of death from explosion</b>
	- when interrupting the intrinsically safe circuit where an explosion hazard exists - Only interrupt the intrinsically safe circuit for looping-in a HART® communication interface (HART® Communicator or HART® Modem) when no explosion hazard is present.

An additional signal as per HART® specification is superimposed on the analogue output signal. The device may be configured by means of a HART® communication device. In this regard, we recommend the CIS 150 programming kit (available as accessory).

In order to ensure trouble-free operation, the following requirements must be taken into account:

Maximum cable length between measuring device and supply:

$$L_{\max} = \frac{65 \cdot 10^6}{R_v \cdot C_v} - \frac{40 \cdot 10^6}{C_v}$$

Wherein  $L_{\max}$ : maximum length of cable in [m]  
 $R_v$ : resistance of cable together with load resistance in [ $\Omega$ ]  
 $C_v$ : capacity of cable in [ $pF/m$ ]

Resistance R:

$$R = \frac{U - 12}{0.024} \Omega$$

wherein U: supply in [V<sub>DC</sub>]

The resistance must be at least 240  $\Omega$ .

#### 6. Commissioning

<b>DANGER</b>	<b>Danger of death from explosion</b>
	- Explosion hazard if the operating voltage is too high (max. 28 V <sub>DC</sub> )! - Operate the device only within the specification! (according to data sheet)

- ✓ The device has been installed properly.
- ✓ The device does not have any visible defect.
- ✓ The device is operated within the specification. (see data sheet and EC type-examination certificate).

#### 7. Maintenance

<b>DANGER</b>	<b>Danger of death from airborne parts, leaking fluids, electric shock</b>
	- Always service the device in a depressurized and de-energized condition!

<b>WARNING</b>	<b>Danger of injury from aggressive fluids or pollutants</b>
	- Depending on the measured medium, this may constitute a danger to the operator. - Wear suitable protective clothing e.g. gloves, safety goggles.

If necessary, clean the housing of the device using a moist cloth and a non-aggressive cleaning solution.

The cleaning medium for the media wetted parts (pressure port/diaphragm/seal) may be gases or liquids which are compatible with the selected materials. Also observe the permissible temperature range according to the data sheet.

Deposits or contamination may occur on the diaphragm/pressure port in case of certain media. Depending on the quality of the process, suitable maintenance intervals must be specified by the operator. As part of this, regular checks must be carried out regarding corrosion, damage to the diaphragm and signal shift.

If the diaphragm is calcified, it is recommended to send the device to BD SENSORS for decalcification. Please note the chapter "Service/Repair" below.

**NOTE** – Wrong cleaning or improper touch may cause an irreparable damage on the diaphragm. Therefore, never use pointed objects or pressured air for cleaning the diaphragm

#### 8. Troubleshooting

<b>DANGER</b>	<b>Danger of death from airborne parts, leaking fluids, electric shock</b>
	- If malfunctions cannot be resolved, put the device out of service.

<b>DANGER</b>	<b>Danger of death from explosion</b>
	- As a matter of principle, work on energized parts, except for intrinsically safe circuits, is prohibited while there is an explosion hazard.

In case of malfunction, it must be checked whether the device has been correctly installed mechanically and electrically. Use the following table to analyse the cause and resolve the malfunction, if possible.

<b>Fault: no output signal</b>	
<b>Possible cause</b>	<b>Fault detection / remedy</b>
Connected incorrectly	Checking of connections
Conductor/wire breakage	Checking of all line connections.

<b>Fault: analogue output signal too low</b>	
<b>Possible cause</b>	<b>Fault detection / remedy</b>
Load resistance too high	Checking of load resistance (value)
Supply voltage too low	Checking of power supply output voltage

<b>Fault: slight shift of the output signal</b>	
<b>Possible cause</b>	<b>Fault detection / remedy</b>
Diaphragm of sensor is severely contaminated, calcified or crusted	Checking of diaphragm; if necessary, send the device to BDSENSORS for cleaning

<b>Fault: large shift of the output signal</b>	
<b>Possible cause</b>	<b>Fault detection / remedy</b>
Diaphragm of sensor is damaged (caused by overpressure or mechanically)	Checking of diaphragm; when damaged, send the device to BDSENSORS for repair

<b>Fault: wrong or no output signal</b>	
<b>Possible cause</b>	<b>Fault detection / remedy</b>
Cable damaged mechanically, thermally or chemically	Checking of cable; pitting corrosion on the stainless-steel housing as a result of damage on cable; when damaged, send the device to BDSENSORS for repair

<b>DANGER</b>	<b>Danger of death from airborne parts, leaking fluids, electric shock</b>
	- Disassemble the device in a depressurized and de-energized condition!

<b>WARNING</b>	<b>Danger of injury from aggressive media or pollutants</b>
	- Depending on the measured medium, this may constitute a danger to the operator. - Wear suitable protective clothing e.g. gloves, goggles.

**NOTE** – After dismantling, mechanical connections must be fitted with protective caps.

#### 10. Service/Repair

Information on service / repair:

- www.bdsensors.de
- info@bdsensors.de
- Service phone: +49 (0) 92 35 / 98 11 0

#### 10.1 Recalibration

During the life-time of a transmitter, the value of offset and span may shift. As a consequence, a deviating signal value in reference to the nominal pressure range starting point or end point may be transmitted. If one of these two phenomena occurs after prolonged use, a recalibration is recommended to ensure furthermore high accuracy.

#### 10.2 Return

<b>WARNING</b>	<b>Danger of injury from aggressive media or pollutants</b>
	- Depending on the measured medium, this may constitute a danger to the operator. - Wear suitable protective clothing e.g. gloves, goggles.

Before every return of your device, whether for recalibration, decalcification, modifications or repair, it has to be cleaned carefully and packed shatter-proofed. You have to enclose a notice of return with detailed defect description when sending the device. If your device came in contact with harmful substances, a declaration of decontamination is additionally required.

Appropriate forms can be downloaded from our homepage. Download these by accessing [www.bdsensors.de](http://www.bdsensors.de) or request them:  
info@bdsensors.de | phone: +49 (0) 92 35 / 98 11 0

In case of doubt regarding the fluid used, devices without a declaration of decontamination will only be examined after receipt of an appropriate declaration!

#### 11. Disposal

<b>WARNING</b>	<b>Danger of injury from aggressive media or pollutants</b>
	- Depending on the measured medium, this may constitute a danger to the operator. - Wear suitable protective clothing e.g. gloves, goggles.

The device must be disposed of according to the European Directive 2012/19/EU (waste electrical and electronic equipment). Waste equipment must not be disposed of in household waste!

**NOTE** - Dispose of the device properly!

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