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Safety Instructions
CNGmass DCI

EAC: Zone 1
Zone 21

Endress+Hauser
People for Process Automation

CNGmass DCI

Table of contents

About this document

The document number of these Safety Instructions (XA) must match the information on the nameplate.

Associated documentation

For an overview of the scope of the associated Technical Documentation, refer to the following:

- *Device Viewer* (www.endress.com/deviceviewer): Enter serial number from nameplate.
- *Endress+Hauser Operations app*: Enter serial number from nameplate or scan matrix code on nameplate.

To commission the device, please observe the Operating Instructions pertaining to the device:

Measuring device	HART	Modbus RS485
CNGmass DCI	BA00138D	BA00140D

Additional documentation

Document type	Contents	Documentation code
Brochure	Explosion Protection	CP00021Z/11

Please note the documentation associated with the device.

Certificates and declarations

Measuring instruments meet the fundamental health and safety requirements for the design and construction of devices and protective systems intended for use in potentially explosive atmospheres in accordance with TR CU 012/2011.

Certification body

LLP "T-Standard"

Certificate number

ЕАЭС KZ 7500525.01.01.01896

Affixing the certificate number certifies conformity with the standards (depending on the device version).

- ГОСТ 31610.0-2019 (IEC 60079-0:2017)
- ГОСТ IEC 60079-1-2013
- ГОСТ 31610.7-2017 (IEC 60079-7:2017)
- ГОСТ 31610.11-2014 (IEC 60079-11:2014)
- ГОСТ IEC 60079-31-2013

Manufacturer address

Endress+Hauser Flowtec AG
Kägenstrasse 7
4153 Reinach BL
Switzerland

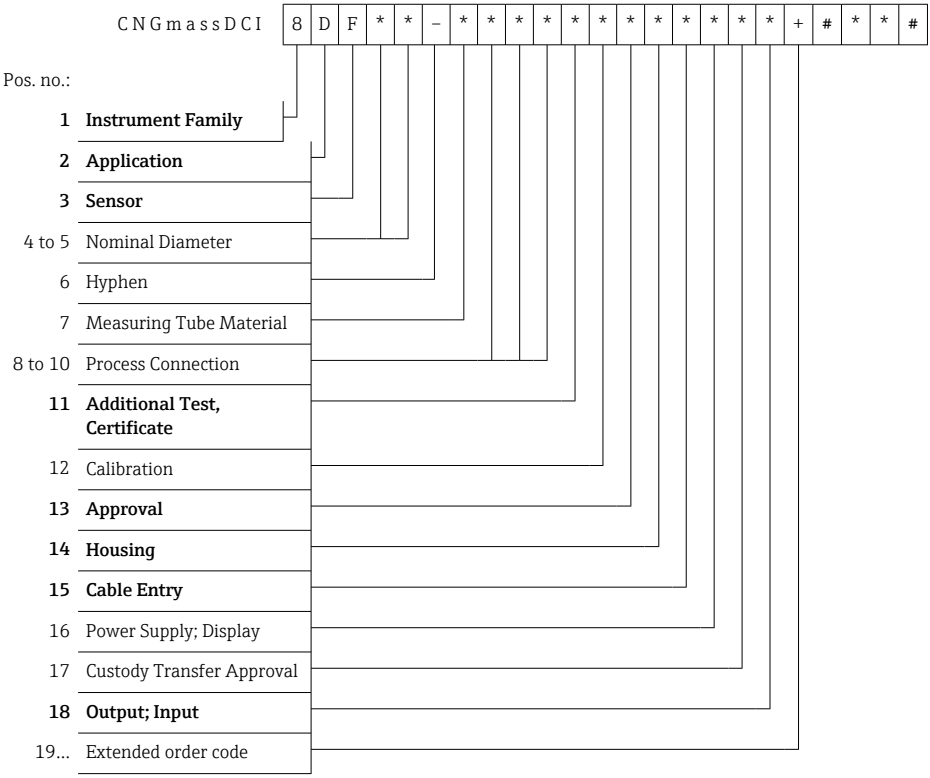
Description of the measuring system

The measuring system consists of a transmitter and a sensor. Two versions are available:

- Compact version: The transmitter and sensor form a mechanical unit.
- Remote version: The transmitter and sensor are mounted separate from one another and interconnected by means of a connecting cable.

Order code

The order code is indicated on the nameplate, which is affixed to the device in such a way that it is clearly visible. Additional information on the nameplate is provided in the associated Operating Instructions.



Additional Test, Certificate (Pos. no. 11 in order code), only in conjunction with order code for "Approvals" (Pos. no. 13 in order code)

*	Explosion protection
E	EAC marking
N	EAC marking + pressure test (tube)

Approval (Pos. no. 13 in the order code): Compact

*	Type of explosion protection		
	Transmitter		Sensor
	intrinsically safe inputs and out- puts Ex ia	non-intrinsically safe inputs and outputs	
B	1Ex db ia [ia Ga] IIC T5...T1 Gb X Ex tb [ia Da] IIIC T** °C Db X	1Ex db ia IIC T5...T1 Gb X Ex tb IIIC T** °C Db X	1Ex ia IIC T5...T1 Gb X Ex ia tb IIIC T** °C Db X
D	1Ex db eb ia [ia Ga] IIC T5...T1 Gb X Ex tb [ia Da] IIIC T** °C Db X	1Ex db eb ia IIC T5...T1 Gb X Ex tb IIIC T** °C Db X	

Approval (Pos. no. 13 in the order code): Remote

*	Type of explosion protection	
	Transmitter	Sensor
B	1Ex db [ia Ga] IIC T5...T1 Gb X Ex tb [ia Da] IIIC T** °C Db X	1Ex ia IIC T5...T1 Gb X Ex ia tb IIIC T** °C Db X
D	1Ex db eb [ia Ga] IIC T5...T1 Gb X Ex tb [ia Da] IIIC T** °C Db X	

Housing (Pos. no. 14 in the order code)

*	Type	Min. ambient temperature $T_{a\ min}$
A	Compact	−20 °C
1,4		−40 °C
E, F	Remote	−20 °C
7,8		−40 °C

Cable Entry (Pos. no. 15 in the order code)

*	Thread (cable entry)
A	M20 × 1.5
B	NPT ½"
C	G ½"

Output; Input (Pos. no. 18 in the order code)

*	**Explosion protection**
D, M, N, Q, 1, 2, 7	non-intrisically safe inputs and outputs
S, T	Ex ia

For a detailed explanation of these values, regarding the available inputs and outputs, as well as a description of the associated terminal assignments and connection data:

Safety instructions: General

- Installation, connection to the electricity supply, commissioning and maintenance of the devices must be carried out by qualified specialists trained to work on Ex-rated devices. ▪ Compliance with all of the technical data of the device (see nameplate) is mandatory.
- Open the device only when it is de-energized (and after a delay of at least 10 minutes following shutdown of the power supply) or when the atmosphere is not potentially explosive.
- It is not permissible to connect the service adapter whilst the atmosphere is considered to be explosive.
- Opening the transmitter housing is only permitted for a brief time. During this time, ensure that no dust enters the housing.
- To guarantee resistance to dust, the transmitter housing and the cable entries must be tightly sealed.
- Compliance with national regulations relating to the installation, connection to the electricity supply, commissioning and maintenance of devices in potentially explosive atmospheres is mandatory, if such regulations exist (e.g. ГОСТ IEC 60079-14-2013).
- Use of the devices is restricted to mediums against which the process-wetted materials are adequately resistant.
- The suitability of the device in the event of simultaneous occurrence of gas-air and dust-air mixtures requires an additional assessment.
- The device must be integrated into the potential equalization system.

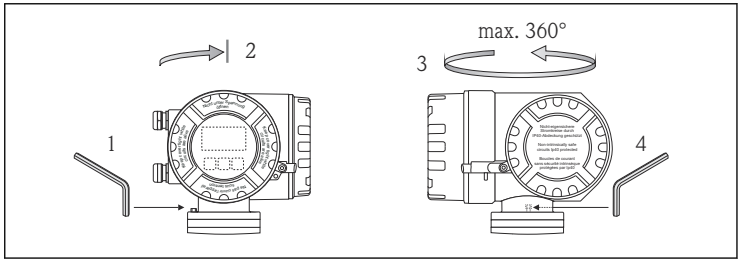
Safety instructions: Installation

- For terminals No. 22 to No. 27 of the transmitter, only devices with ratings Um ≤ 260 V and Im ≤ 500 mA are allowed to be connected (does not apply to intrinsically safe circuits).
- The measuring device must only be used in the permitted temperature class. The values of the individual temperature classes can be found in the temperature tables: → 19.
- The following applies when connecting the transmitter with a connection compartment in Ex db: Only use separately certified cable and wire entries (Ex db IIC) which are suitable for operating temperatures up to 80 °C and for IP 66/67. If using conduit entries, the associated sealing mechanisms must be mounted directly on the housing. Plastic sealing plugs act as transport protection and have to be replaced by suitable, individually approved installation material. The mounted metal thread extensions and dummy plugs are tested and certified as part of the housing for type of protection Ex db IIC. The thread extension or the dummy plug labeled as follows for identification purposes:
  - Md: M20 × 1.5
  - NPTd: NPT ½"
  - Gd: G ½"

- The following applies when connecting the transmitter with a connection compartment in Ex eb: Only use separately certified cable and wire entries and sealing plugs (Ex eb IIC), which are suitable for operating temperatures up to 80 °C and for IP 66/67. The cables must be routed such that they are securely seated, and sufficient strain relief must be ensured. The mounted metal thread extensions and dummy plugs supplied are tested and certified as part of the housing for type of protection Ex eb IIC. Plastic sealing plugs act as transport protection and have to be replaced by suitable, individually approved installation material. Supplied cable glands are separately certified and marked as components and meet device specification requirements.
- Suitable cables and suitable, certified cable glands, cable entries and drain plugs must be used for measuring devices operated at temperatures below −20 °C.
- The cable entries and openings not used must be sealed tight with suitable components.
- Turning the local display: the screw cap has to be removed before the local display can be turned, and this must be done with the device de-energized (and after a delay of at least 10 minutes following shutdown of the power supply).
- If Category "ia" intrinsically safe circuits of the measuring device are connected to certified intrinsically safe Category "ib" circuits with explosion group IIC or IIB ratings, the type of protection changes to Ex ib IIC or Ex ib IIB, as applicable. Intrinsically safe "ib" circuits are suitable for areas which require Category 2 equipment.
- If the active intrinsically safe communication circuits ("Output; Input" option F, G, R, S, T, U; terminals 26/27 resp. 24/25) are fed into areas that require 1D or 2D apparatus, the connected apparatus must be tested and certified accordingly.
- In Zone 0, potentially explosive vapor/air mixtures may only occur under atmospheric conditions. If no potentially explosive mixtures are present, or if additional protective measures have been taken according to EN 1127-1, the devices may be operated under other atmospheric conditions in accordance with the manufacturer's specifications.

Turning the transmitter housing

1. Unscrew the grub screw.
2. Rotate the transmitter housing cautiously clockwise until the end stop (end of the thread).
3. Rotate the transmitter housing counter-clockwise (max. 360°) in the wanted position.
4. Tighten the grub screw again.



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1 Turning the transmitter housing

Temperature tables

Max. medium temperature $T_{m, max}$ for T5…T1 in relation to the maximum ambient temperature $T_{a, max}$

Device	$T_{a, max}$ [°C[	DN [mm[	$T_{m, max}$					
			T6 (85 °C)	T5 (100 °C)	T4 (135 °C)	T3 (200 °C)	T2 (300 °C)	T1 (450 °C)
CNGmass DCI 8DF**-...	+60	08, 15	–	80	130	130	150	150
		25	–	95	130	150	150	150

The minimum **medium temperature** is −50 °C.

The minimum **ambient temperature** T_a is −20 °C.

A version for ambient temperatures T_a up to −40 °C is optionally available.

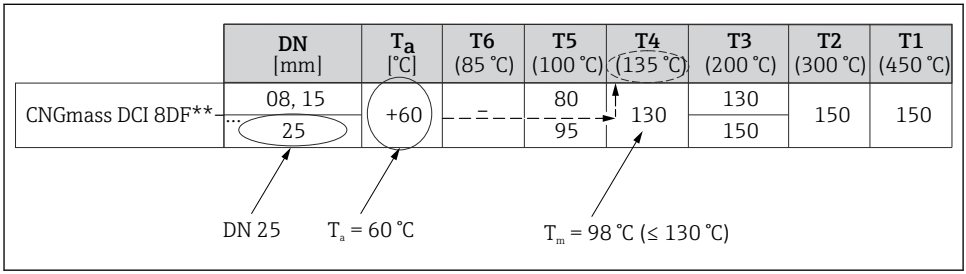
Explosion hazards arising from gas and dust

Determining the temperature class and surface temperature with the temperature table

- In the case of gas: Determine the temperature class as a function of the ambient temperature T_a and the medium temperature T_m.
- In the case of dust: Determine the maximum surface temperature as a function of the maximum ambient temperature $T_{a, max}$ and the maximum medium temperature $T_{m,max}$.

Example of the maximum surface temperature for explosion hazards arising from dust Device:

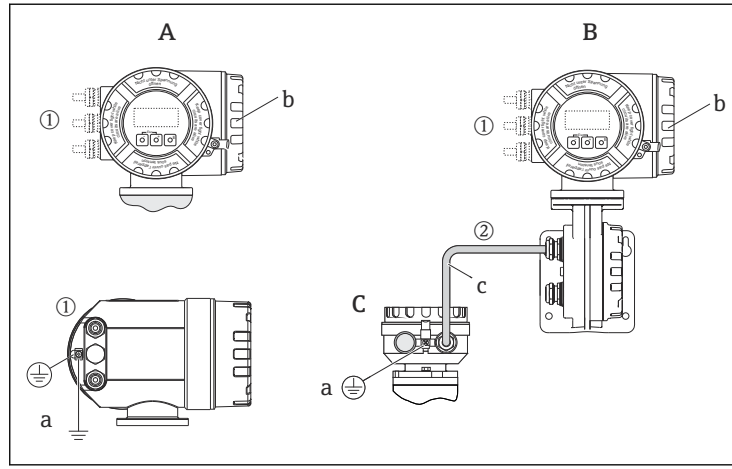
- CNGmass DCI, compact version, DN 25
- Maximum ambient temperature: T_a = 60 °C
- Maximum medium temperature: T_m = 98 °C



2 *Procedure for calculating the max. surface temperature*

1. Select the device (CNGmass DCI), nominal diameter (DN 25) and ambient temperature T_a (60 °C) in the associated temperature table (compact version). The row showing the maximum medium temperature is determined.
2. Select the maximum medium temperature T_m (98 °C), which is smaller than or equal to the maximum medium temperature of a cell. The column with the temperature class for gas is determined (98 °C ≤ 130 °C → T4).
3. The maximum temperature of the temperature class determined corresponds to the maximum surface temperature: T4 = 135 °C = maximum surface temperature for dust.

Design of measuring system



3 *Design of the measuring system, compact/remote version*

A Transmitter housing (compact version)
B Transmitter housing on connection housing, remote version
C Sensor connection housing, remote version
a Screw terminal for connecting to the potential equalization
b Connection compartment cover
c Connecting cable remote version
①and ②see following section "Cable entries"

Connection of remote version connecting cable

Cable entries

- ① for connection compartment (Ex db version): power supply cable and cable of the communication circuit → Choice of thread for cable entries M20 × 1.5, ½" NPT or G ½". Make sure that the Ex db cable glands/entries are secured to prevent working loose and that the seals are installed immediately adjacent to the housing.
- ① for connection compartment (Ex eb version): power supply cable and cable of the communication circuit → Choice of cable gland M20 × 1.5 or thread for cable entries ½" NPT or G ½". The cables must be installed such that they are fixed in place. Adequate strain relief must be ensured.
- ② for remote version connecting cable: → Choice of cable gland M20 × 1.5 or thread for cable entries ½" NPT or G ½"

⚠ WARNING

When using cable glands M20 × 1.5

- ▶ Only approved cable glands may be used (→ 16, "Installation instructions").
- ▶ The cable glands must be very leak-tight.

Cable specification

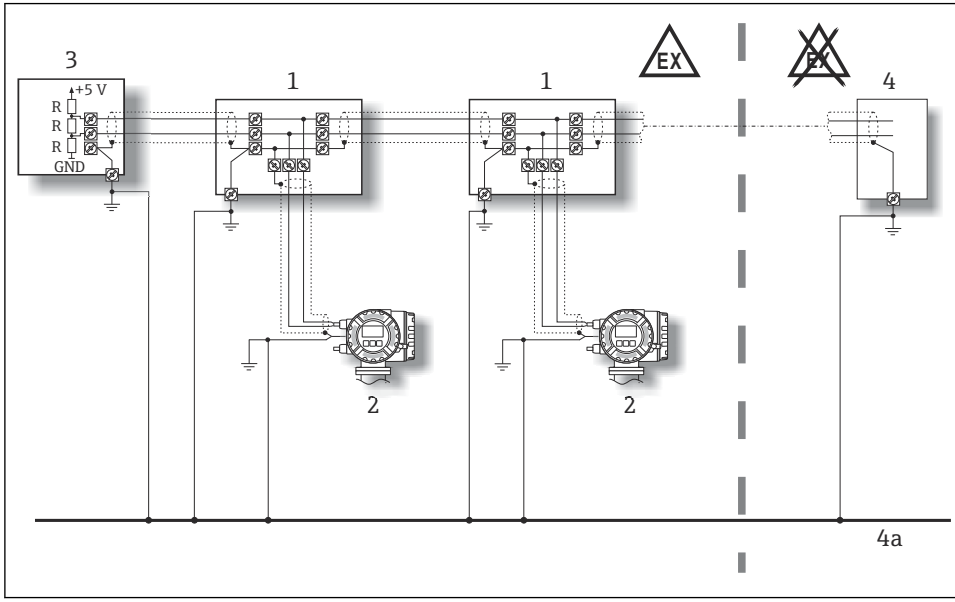
You can find information about the cable specification in the associated Operating Instructions.

Potential equalization

- The transmitter (compact and remote version) is to be securely connected to the potential equalization system using the screw terminal on the outside of the transmitter housing. Alternatively, the transmitter of the compact version as of serial number 4Axxxxxx000 can be connected to the potential equalization system via the pipeline if a ground connection via the pipeline according to regulations can be assured.
- When using the remote version, the connection housing of the sensor must be grounded via the external screw terminal. Alternatively, the sensor can be integrated into the potential equalization via the pipeline as long as the pipeline provides a ground connection conforming to regulations.

Further information about potential equalization, shielding and grounding can be found in the associated Operating Instructions.

Potential equalization with shield grounded at both sides for fieldbus version



4 *Example for connecting potential equalization lines*

1 Distributor/T-Box
2 Bus devices for potentially explosive atmospheres
3 Bus terminator Modbus RS485
4 Bus supply unit or automation system
4a Potential equalization line is fed out into the safe area

The length of the spur must be observed.

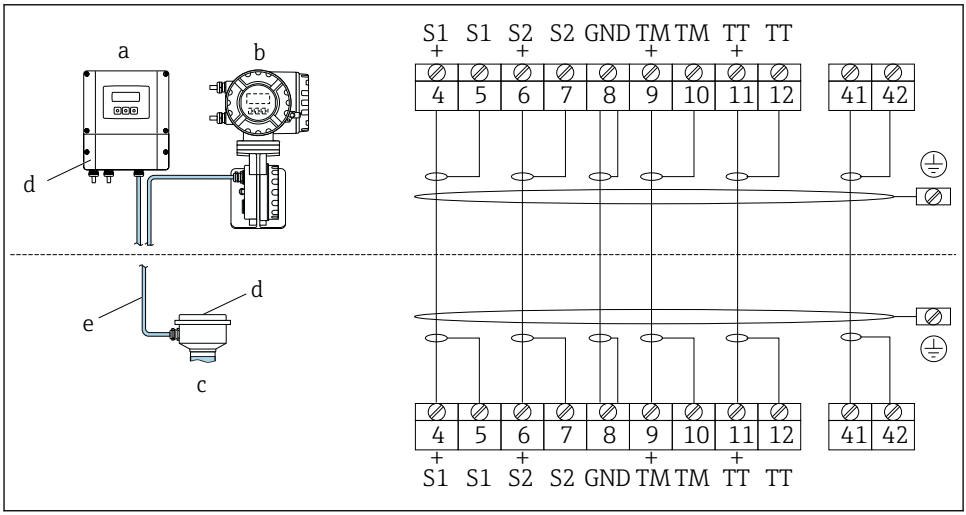
Connection of remote version connecting cable

Terminal assignment and connection data

CAUTION

The connection of the remote version, between the sensor and the transmitter, has Ex i explosion protection.

- Only preterminated connecting cables supplied by Endress+Hauser may be used.



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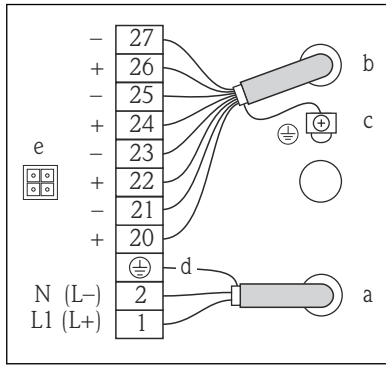
5 Connection of remote version connecting cable

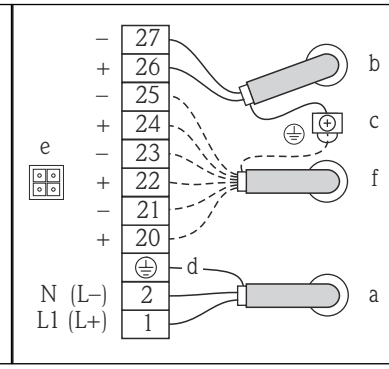
a Transmitter wall-mount housing: non-hazardous area
b Transmitter wall-mount housing: ATEX II2G / Zone 1 / NEC/CEC → separate Ex documentation
c Sensor connecting housing
d Cover of connection compartment or connection housing
e Connecting cable
Wire colors (colour code according to DIN 47100):
Terminal No.: 4/5 = gray; 6/7 = green; 8 = yellow; 9/10 = pink; 11/12 = white; 41/42 = brown

Electrical connection

Transmitter housing compact/ remote version (terminal assignment, connection data →🖹 23 ff.)



6 *4 to 20 mA HART*



7 *Modbus RS485**

*) Flexible communication board

a Power supply cable (terminal assignment and connection data →🖹 23)

b Ground terminal for protective ground

c Signal cable/ fieldbus cable (terminal assignment and connection data →🖹 23)

d Service adapter for connecting service interface FXA 193 (Fieldcheck, FieldCare)

e Signal cable

Terminal assignment and connection data, power supply

All transmitters	1 L (+)	2 N (–)	⏚
Designation	Supply voltage		Protective earth
Functional values	U_{AC} = 85 to 260 V U_{AC}= 20 to 55 V U_{DC} = 16 to 62 V Power consumption: 15 VA / 15 W		**⚠ CAUTION** ▶ Observe the grounding plans of the system!
Intrinsically safe circuit	no		
U_m	260 V AC		

Terminal assignment and connection data for signal circuits (intrinsically safe circuits)

The following tables contain values/specifications, which are dependent on the order code (type of measuring device). Please compare the following order code to the one shown on the nameplate of your measuring device.

For a graphic representation of the electrical connections: → 22.

*Terminal assignment of CNGmass DCI 8DF**-**********S+#**#*

Transmitter	Terminal no. (Output; Input)							
	20 (+)	21 (–)	22 (+)	23 (–)	24 (+)	25 (–)	26 (+)	27 (–)
Assignment	–		–		Pulse/frequency output, passive		Current output HART, active	
Electric circuit	–		–		Ex ia		Ex ia	
Safety-related values	–		–		U_i	30 V_{DC}	U_0	21.8 V_{DC}
					I_i	500 mA	I_0	90 mA
					P_i	600 mW	P_0	491 mW
					L_i	negligible	L_0 IIC/IIB	4.1 mH/15 mH
					C_i	6 nF	C_0 IIC/IIB	160 nF/1160 nF
							[1] L_0 IIC/IIB	2 mH/10 mH
							[1] C_0 IIC/IIB	80 nF/300 nF
							U_i	30 V_{DC} [2]
							I_i	10 mA [2]
							P_i	0.3 W [2]
							L_i	negligible
							C_i	6 nF
Functional values	–		–		galvanically isolated, passive: 30 V DC / 250 mA Open Collector Full scale frequency 2 to 5000 Hz		galvanically isolated, active: 0/4 to 20 mA R_L < 400 Ω R_L ≥ 250 Ω	

1) Permitted values in the event of simultaneous occurrence of concentrated inductances and capacitances.
2) The interconnection must be assessed according to the valid construction provisions.

*Terminal assignment of CNGmass DCI 8DF**-**********T+#**#*

Transmitter	Terminal no. (Output; Input)							
	20 (+)	21 (–)	22 (+)	23 (–)	24 (+)	25 (–)	26 (+)	27 (–)
Assignment	–		–		Pulse/frequency output, passive		Current output HART, active	
Electric circuit	–		–		Ex ia		Ex ia	
Safety-related values	–		–		U_i 30 V_{DC} I_i 500 mA P_i 600 mW L_i negligible C_i 6 nF		U_i 30 V_{DC} I_i 100 mA P_i 1.25 W L_i negligible C_i 6 nF	
Functional values	–		–		galvanically isolated, passive: 30 V DC / 250 mA Open Collector Full scale frequency 2 to 5 000 Hz		galvanically isolated, passive: 4 to 20 mA voltage drop ≤ 9 V $R_L < [(V_{p.supply} - 9\ V): 25\ mA]$	

Terminal assignment and connection data for signal circuits (non-intrinsically safe circuits)

The following tables contain values/ specifications, which are dependent on the order code (type of measuring device). Please compare the following order code to the one shown on the nameplate of your measuring device. For a graphic representation of the electrical connections:

Terminal assignment

Order characteristic "Output; Input"	Terminal no. (Output; Input)							
	20 (+)	21 (–)	22 (+)	23 (–)	24 (+)	25 (–)	26 (+)	27 (–)
Non-convertible communication boards (fixed assignment)								
Q	–		–		Status input		Modbus RS485[1)]	
Convertible communication boards								
D	Status input		Relay output		Frequency output		Current output, HART	
M	Status input		Frequency output 2		Frequency output 1		Current output, HART	
N	Current output		Frequency output		Status input		Modbus RS485[1)]	
1	Relay output		Frequency output 2		Frequency output 1		Current output, HART	
2	Relay output		Current output 2		Frequency output		Current output 1, HART	
7	Relay output 2		Relay output 1		Status input		Modbus RS485[1)]	
Safety-related and functional values of signal circuits								

[1)] Modbus RS485:
- Terminal 26 (+) → B (RxD/TxD-P)
- Terminal 27 (–) → A (RxD/TxD-N)

Safety-related and functional values of signal circuit

Signal circuits	Functional values	Safety-related values
Current output HART	galvanically isolated, active/passive can be selected: ▪ active: 0/4 to 20 mA R_L < 700 Ω, R_L HART ≥ 250 Ω ▪ passive: 4 to 20 mA V_s = 18 to 30 V DC, R_i ≥ 150 Ω	intrinsically safe = no U_m = 260 V I_m = 500 mA
Current output	galvanically isolated, active/passive can be selected: ▪ active: 0/4 to 20 mA R_L < 700 Ω, ▪ passive: 4 to 20 mA V_s = 18 to 30 V DC, R_i ≥ 150 Ω	
Pulse/ frequency output	galvanically isolated, active/passive can be selected: ▪ active: 24 V DC / 25 mA (max. 250 mA during 20 ms) R_L > 100 Ω, ▪ passive:30 V DC / 250 mA Open Collector Full scale frequency 2 to 10 000 Hz (f_{max} = 12 500 Hz)	
Relay output	galvanically isolated, max. 30 V AC / 500 mA max. 60 V DC / 100 mA	
Status input Option "Output; Input" D, M	galvanically isolated, 3 to 30 V DC R_i = 5 kΩ	
Status input Option "Output; Input" N, Q, 7	galvanically isolated, independent of polarity, 3 to 30 V DC R_i = 3 kΩ	
Modbus RS485	galvanically isolated, RS485 as per Standard EIA/TIA-485	

Service adapter

The service adapter is only used for connecting service interfaces approved by Endress+Hauser.

⚠ WARNING

▶ It is not permissible to connect the service adapter whilst the atmosphere is considered to be explosive.

Device fuse

⚠ WARNING

Use only fuses of the following types; the fuses are installed on the power supply board:

- Voltage 20 to 55 V AC / 16 to 62 V DC: fuse 2.0 A slow-blow, disconnect capacity 1 500 A
  (Schurter, 0001.2503 or Wickmann, Standard Type 181 2.0 A)
- Voltage 85 to 260 V AC: fuse 0.8 A slow-blow, disconnect capacity 1 500 A
  (Schurter, 0001.2507 or Wickmann, Standard Type 181 0.8 A)

Technical Data

Dimensions

Please refer to the respective Technical Information → TI00098D.

Weight

The weight of the Ex db version is approximately 2 kg greater than that of the standard version.

www.addresses.endress.com

Endress+Hauser

People for Process Automation