HYDAC ELECTRONIC

Operating Instructions
Pressure Transmitter Series HDA 4000
with HART interface
Intrinsically safe, non incendive
$_{c}CSA_{us}$ approval

Protection types and applications:

(Details see model code and associated evaluation table)

Intrinsically safe:			
- Class I	**Division 1**	**Group A, B, C, D T6, T5**	**[C, US]**
- Class II	**Division 1**	**Group E, F, G**	**[C, US]**
- Class III			**[C, US]**
- Class I	**Zone 0**	**AEx ia IIC T6, T5 Ga**	**[US]**
-		**Ex ia IIC T6, T5 Ga**	**[C]**
-	**Zone 20**	**AEx ia IIIC T85/T95°C, T_{500}90/100°C Da**	**[US]**
-		**Ex ia IIIC T85/T95°C, T_{500}90/100°C Da**	**[C]**
Non incendive:			
- Class I	**Division 2**	**Group A, B, C, D, T6, T5, T4**	**[C, US]**
- Class II	**Division 2**	**Group F, G**	**[C, US]**
- Class III			**[C, US]**
- Class I	**Zone 2**	**AEx ic IIC T6, T5, T4 Gc**	**[US]**
-		**Ex ic IIC T6, T5, T4 Gc**	**[C]**
- Class I	**Zone 2**	**AEx nA IIC T6, T5, T4 Gc**	**[US]**
-		**Ex nA IIC T6, T5, T4 Gc**	**[C]**
-	**Zone 22**	**AEx tc IIIB T80/ T90/T100°C Dc**	**[US]**
-		**Ex tc IIIB T80/ T90/T100°C Dc**	**[C]**
Dust protected enclosure:			
- Class II	**Division 1**	**Group E, F, G**	**[C, US]**
- Class III			**[C, US]**
-	**Zone 20**	**AEx ta IIIC T80/T90/T100°C Da**	**[US]**
-		**Ex ta IIIC T80/T90/T100°C Da**	**[C]**
Certificate Nr.:		**CSA 1760344 / 06CA1760344**	

Table of Contents

1 General

If you have any queries regarding technical details or the suitability of the unit for your application, please contact our **Technical Sales Department**. The series HDA 4000 pressure transmitters are individually tested and calibrated at a computer operated test station. They are maintenance-free and operate perfectly when used according to the data (see Technical Specifications). However, if there is a cause for complaint, please contact **HYDAC Service**. Interference by anyone other than HYDAC personnel will invalidate all warranty claims as well as the CSA approvial.

2 Function

The pressure signal measured by the sensor is converted into an analog 4 .. 20 mA signal. In addition to the analog output of the measured value, digital communication is possible by means of the HART protocol. Connection to the power supply is carried out via a plug connector or a permanently connected line.

3 Installation and Commissioning Information

The pressure transmitters can be installed directly on the process side via the threaded connection. It is important to ensure that the membrane is protected from mechanical damage. This is particularly relevant for instruments with a flush membrane.

In order to prevent mechanical damage when dealing with critical applications involving heavy vibrations or blows, for example, we recommend securing the unit with an elastomer clamp and decoupling the hydraulic ports via a Minimess hose.

Tightening torque see dimensions.

Pressure transmitters with a rated pressure of ≤100 bar (≤1500 psi) provide for pressure equalization with the ambient pressure. This is enabled by a small hole underneath the plug connector. The connector is covered on the inside by a special membrane which prevents moisture from seeping into the unit from the outside. In order to prevent the hole from becoming clogged, mounting should be done in a horizontal position in moist or dusty environments, or vertically with the pressure port pointing downwards.

On units with a rated pressure of ≤ 100 bar (≤ 1500 psi) and a ½-14 NPT conduit electrical connection, the pressure equalization with single leads is realized by means of a short vent line, using jacketed cables, it is realized by means of a cable with an integrated venting hose. It must be ensured that the venting only takes place outside the hazardous area.

Connection is to be done from qualified personal in accordance with the pertinent regulations pertaining to potentially explosive environments

The requirements of the standards (see technical data) cannot be satisfied unless the pressure transmitter housing is properly grounded via the mechanical connection, the ½-14 NPT or M 20x1.5 conduit. If a green-yellow wire is available, it can be used additionally for grounding, but may not be used on its own as the grounding connection. When using hose mounting the housing has to be grounded separately.

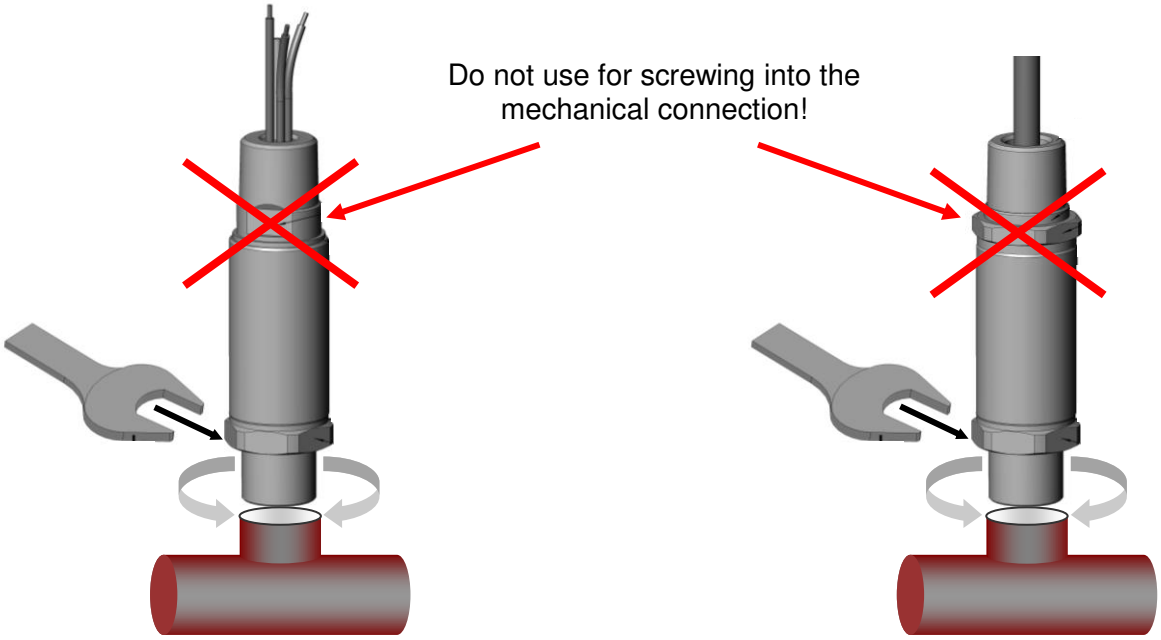
The related intrinsically safe devices (e.g. zener barriers) must also be grounded.

Installation per Control Drawing No. 18-000-601-4-663893 (see chapter 11).

4 Important Mounting Instructions for Units with ½-14 NPT conduit

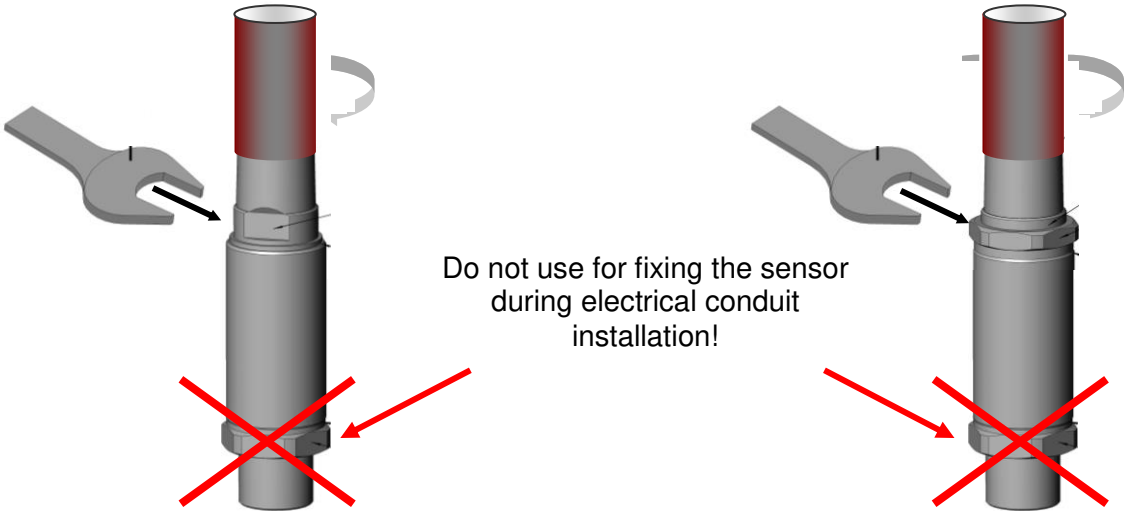
Mechanical Installation

The process installation of the transmitters may only be carried out utilizing the hex. flats on the process connection side.



Electrical Installation

The electrical installation of the transmitter may only be carried out utilizing the flats on the ½-14 NPT conduit (cable outlet)



5 Safety Information

The pressure transmitter may no longer be used when the label becomes illegible.
The pressure transmitters are to be used in general with a suitable intrinsically safe barrier.

The seals and gaskets are to be checked to see that they function properly prior to mounting and at regular intervals in keeping with the climatic conditions and the influence of the fluid, and to be changed as needed. Replacement seals and gaskets can be obtained from HYDAC ELECTRONIC GMBH. (Standard seal see technical data) This check is to be conducted at least every three years.

HDA 41xx / 43xx with ceramic measurement cell:
If used simultaneously in zones 0 and 1, the ceramics membrane of the pressure transmitter serves as a partition wall between zones 0 and 1. The thickness of this partition wall is generally ≤ 1mm, and with a nominal pressure ranging below 1 bar, ≤ 0.2 mm. In order to ensure this partition function, the compatibility of the measuring fluids with the used materials is compulsory, as well as the overload and bursting pressures must absolutely be complied with (further details, please see "Technical Data").

HDA 44xx / 47xx with stainless steel membrane:

If used simultaneously in zones 0 and 1, the metal membrane of the pressure transmitter serves as a partition wall between zones 0 and 1. The thickness of this partition wall is generally ≤ 1mm, and with a nominal pressure ranging below 100 bar, ≤ 0.2 mm. In order to ensure this partition function, the compatibility of the measuring fluids with the used materials is compulsory, as well as the overload and bursting pressures must absolutely be complied with (further details, please see "Technical Data").

It is imperative that the measurement fluid is compatible with the materials used in the pressure transmitter; similarly, the overload pressures and bursting pressures must be adhered to without fail (for these specifications, see the “Technical Specifications” and “Safety Information” of the EC type examination certificate).

The internal measurement membrane of the pressure transmitter is to be protected against mechanical damage. This applies especially for transmitters with flush membrane if the unit is used simultaneously in zones 0 and 1 equally zones 1 and 2.

The transfer fluid between the flush membrane and the internal measurement membrane is paraffin oil (white oil, S933).
Please ensure sufficient sealing between the zones as well.

The data pertaining to use in Hazardous Location is to be heeded in any event.

Operation is only permitted when operational and process related intensive electrostatic changes are eliminated.
When used in atmospheres containing combustible dusts, the pressure transmitter must be installed in such a way that it is protected from damage and knocks.
From a safety point of view, the supply / output circuit of pressure transmitter shall be considered to be connected to earth.

6 Technical Data

6.1 HDA 4100 / HDA 4300 Standard without temperature measurement option

Input data		**HDA 4100 (Absolute pressure)**						**HDA 4300 (Relative pressure)**					
		absolute and relative		relative									
Measuring Ranges	bar	1	2.5	-1 .. 1	-1.. 9	4	6	10	16	25	40	60	
Overload ranges	bar	3	8	3	32	12	20	32	50	80	120	200	
Burst pressure	bar	5	12	5	48	18	30	48	75	120	180	300	
		absolute and relative			relative								
Measuring Ranges	psi	15	30	50	100	150	250	500	1000				
Overload ranges	psi	45	100	150	290	450	725	1500	2900				
Burst pressure	psi	70	150	250	400	650	1000	2500	4300				
Mechanical connection		see model code / dimensions											
Tightening torque		See dimensions											
Parts in contact with fluid								**Standard**			**Flush membrane**		
		Sensor						Ceramic			Ceramic		
		Flange connection						1.4301			1.4435; 1.4301		
		seals						FPM /EPDM			FPM		
		O-ring									FPM		
Pressure transfer fluid											Silicon-free oil		
Output data													
Output signal, permitted resistance		4 .. 20 mA (2-conductor) with HART protocol, $R_{Lmax.} = (U_B – 12\ V) / 20\ mA\ [k\Omega]$, for HART communikation min. 250 Ω											
Hart communication		According to HART 7 specifications											
HART Common Practice Commands e.g.		Altering of measuring range limits (see table) Zero point adjustment within max. 3% of the span											
Accuracy to DIN 16086, limit setting	Typ. Max.	≤ ± 0.5 % FS ≤ ± 1.0 % FS											
Accuracy at minimum setting (B.F.S.L)	Typ. Max.	≤ ± 0.25 % FS ≤ ± 0.5 % FS											
Temperature compensation Zero point	Type Max.	≤ ± 0.02 % FS / °C ≤ ± 0.03 % FS / °C											
Temperature compensation Span	Typ. Max.	≤ ± 0.02 % FS / °C ≤ ± 0.03 % FS / °C											
Non-linearity at max. setting to DIN 16086	Max.	≤ ± 0.5 % FS											
Hysteresis	Max.	≤ ± 0.4 % FS											
Repeatability		≤ ± 0.1 % FS											
Rise time		≤ 1.5 ms											
Long term drift	Typ.	≤ ± 0.3 % FS / year											
Ambient conditions													
Compensated temperature range		-20 .. +85°C [-13 .. +185°F]											
Operation / ambient temperature range [1) 2)]		T6, T80/T85°C, T_{500}90°C Ta = -20 .. +60°C [-13 .. +140°F] T5, T90/T95°C, T_{500}100°C Ta = -20 .. +70°C [-13 .. +158°F] T100°C, T_{500}110°C Ta = -20 .. +80°C [-13 .. +176°F] T4 Ta = -20 .. +85°C [-13 .. +185°F]											
Fluid temperature range [1) 2)]		T6, T80/T85°C, T_{500}90°C Ta = -20 .. +60°C [-13 .. +140°F] T5, T90/T95°C, T_{500}100°C Ta = -20 .. +70°C [-13 .. +158°F] T100°C, T_{500}110°C Ta = -20 .. +80°C [-13 .. +176°F] T4 Ta = -20 .. +85°C [-13 .. +185°F]											
Storage temperature range		-40°C .. +100°C [-40 .. +212°F]											
Vibration resistance to DIN EN 60068-2-6 at 10.. 500 Hz		≤ 20 g ≤ 10 g for devices with electrical connection 1/2 NPT Conduit											
Protection class to DIN EN 60529 Protection class to ISO 20653	[3)]	IP 67 (M12x1 male connector, connector EN175301-803) IP 6K9K (Conduit welded)											

Relevant data for Ex applications		**Intrinsically safe / Ex ia / Ex ic**	**Non-Incendive / Dust protected enclosure / Ex nA, ta, tb, tc**
Supply voltage		Ui = 12 .. 28 V	12 .. 28 V
Max. input current		Ii = 100 mA	
Maximum input power		Pi = 0.7 W	
Connection capacitance of the sensor		C_i = ≤ 22 nF	C_i = ≤ 22 nF
Inductance of the sensor		L_i = 0 mH	L_i = 0 mH
Insulation voltage [4)]		50 V AC, with integrated overvoltage protection	
Other data			
Reverse polarity protection of the supply voltage, overvoltage, override and short circuit protection		Standard	
Residual ripple supply voltage		According FSK Physical Layer Specification (HCF_SPEC-054)	
Current consumption		≤ 25 mA	
Life expectancy		> 10 million load cycles 0 .. 100 %FS	
Weight		approx. 150 g (Standard) approx. 180 g (flush mount version) approx. 300 g with ½ Conduit	

Note:

FS (**F**ull **S**cale) = relative to the full measuring range
B.F.S.L = **B**est **F**it **S**traight **L**ine
[1)] -20 °C [-13°F] with FPM or EPDM seal, -40 °C [-40°F] on request
[2)] With electrical connector M12x1 and EN 175301-803 maximum Ta = +70°C [+158°F]
[3)] With mounted mating connector in corresponding protection class.
[4)] see model code for "insulation voltage", 500 V AC on request

6.2 HDA 4400 / HDA 4700 Standard without temperature measurement option

Input data		**HDA 4400**							**HDA 4700**								
Measuring Ranges	bar	-1 .. 5	-1..9	2.5	6	16	25	40	60	100	160	250	400	600	1000	1600	2000
Overload ranges	bar	12	20	6	12	32	50	80	120	200	320	500	800	900[1)]	1600	2400	3000
Burst pressure	bar	100	100	100	100	200	125	200	300	500	800	1000	2000	2000	3000	3000	4000

Measuring range	psi	-15..50	-15..75	100	150	200	300	400	500	600	
	psi	1500	2000	3000	5000	6000	9000	10000	15000	20000	30000
Overload pressure	psi	174	174	290	290	460	725	1160	1160	1160	
	psi	2900	4600	7250	11600	11600	13050[1)]	13050[1)]	23200	34800	43500
Burst pressure	psi	1450	1450	1450	1450	1450	1800	2900	2900	2900	
	psi	7250	11600	14500	29000	29000	29000	29000	43500	43500	58000

Mechanical connection		see model code / dimensions	
Tightening torque		See dimensions	
Parts in contact with fluid		**Standard**	**Flush membrane**
	Stainless steel	1.4542; 1.4571; 1.4435; 1.4404; 1.4301; 1.4548	1.4435; 1.4301
	seals	FPM	FPM
	O-ring		FPM
Pressure transfer fluid			Silicon-free oil

Output data			
Output signal, permitted resistance		4 .. 20 mA (2-conductor) with HART protocol, $R_{Lmax.} = (U_B – 12\ V) / 20\ mA\ [k\Omega]$, for HART communikation min. 250 Ω	
Hart communication		According to HART 7 specifications	
HART Common Practice Commands e.g.		Altering of measuring range limits (see table) Zero point adjustment within max. 3% of the span	
Accuracy to DIN 16086, limit setting	Typ. Max.	≤ ± 0.5 % FS ≤ ± 1.0 % FS	≤ ± 0.25 % FS ≤ ± 0.5 % FS
Accuracy at minimum setting (B.F.S.L)	Typ. Max.	≤ ± 0.25 % FS ≤ ± 0.5 % FS	≤ ± 0.15 % FS ≤ ± 0.25 % FS
Temperature compensation zero point	Typ. Max.	≤ ± 0.015 % FS / °C ≤ ± 0.025 % FS / °C	≤ ± 0.008 % FS / °C ≤ ± 0.015 % FS / °C
Temperature compensation Span	Typ. Max.	≤ ± 0.015 % FS / °C ≤ ± 0.025 % FS / °C	≤ ± 0.008 % FS / °C ≤ ± 0.015 % FS / °C
Non-linearity at max. setting to DIN 16086	Max.	≤ ± 0.3% FS	≤ ± 0.3 % FS
Hysteresis	Max.	≤ ± 0.4 % FS	≤ ± 0.1 % FS
Repeatability		≤ ± 0.1 % FS	≤ ± 0.05 % FS
Rise time		≤ 1.5 ms	≤ 1.5 ms
Long-term drift	Typ.	≤ ± 0.3 % FS / year	≤ ± 0.1 % FS / year

Ambient conditions			
Compensated temperature range		-25 .. +85°C [-13 .. +185°F]	
Operation / ambient temperature range [2) 3)]		T6, T80/T85°C, T_{500}90°C T5, T90/T95°C, T_{500}100°C T100°C, T_{500}110°C T4	Ta = -20 .. +60°C [-13 .. +140°F] Ta = -20 .. +70°C [-13 .. +158°F] Ta = -20 .. +80°C [-13 .. +176°F] Ta = -20 .. +85°C [-13 .. +185°F]
Fluid temperature range [2) 3)]		T6, T80/T85°C, T_{500}90°C T5, T90/T95°C, T_{500}100°C T100°C, T_{500}110°C T4	Ta = -20 .. +60°C [-13 .. +140°F] Ta = -20 .. +70°C [-13 .. +158°F] Ta = -20 .. +80°C [-13 .. +176°F] Ta = -20 .. +85°C [-13 .. +185°F]
Storage temperature range		-40 .. +100°C [-40 .. +212°F]	
Vibration resistance to DIN EN 60068-2-6 at 10.. 500 Hz		≤ 20 g ≤ 10 g in devices with electrical connection 1/2 NPT Conduit	
Protection class to DIN EN 60529 Protection class to ISO 20653	[4)]	IP 67 (M12x1 male connector, connector EN175301-803) IP 6K9K (conduit welded)	

Relevant data for Ex Application		**Intrinsically safe / Ex ia / Ex ic**	**Non-Incendive / Dust protected enclosure / Ex nA, ta, tb, tc**
Supply voltage		Ui = 12 .. 28 V	12 .. 28 V
Max. input current		Ii = 100 mA	
Maximum input power		Pi = 0.7 W	
Connection capacitance of the sensor		C_i = ≤ 22 nF	C_i = ≤ 22 nF
Inductance of the sensor		L_i = 0 mH	L_i = 0 mH
Insulation voltage [5)]		50 V AC, with integrated overvoltage protection	

Other data		
Reverse polarity protection of the supply voltage, overvoltage, override and short circuit protection		Standard
Residual ripple supply voltage		According FSK Physical Layer Specification (HCF_SPEC-054)
Current consumption		≤ 25 mA
Life expectancy [6)]		> 10 million load cycles 0 .. 100 %FS
Weight		approx. 150 g (Standard) approx. 180 g (flush mount version) approx. 300 g with 1/2 conduit

Note:

FS (**F**ull **S**cale) = relative to the full measuring range
B.F.S.L = **B**est **F**it **S**traight **L**ine
[1)] Standard: overload rage 1000bar (14500 psi), Flush mount version overload range 900 bar (13050 psi)
[2)] -20 °C [-13°F] with FPM or EPDM seal, -40 °C [-40°F] on request
[3)] With electrical connector M12x1 and EN 175301-803 maximum Ta = +70°C [+158°F]
[4)] With mounted mating connector in corresponding protection class
[5)] see model code for "insulation voltage", 500 V AC on request
[6)] Measuring range ≥ 1000 bar: >1 million load cycles (0 .. 100 % FS)

6.3 HDA 4400 / HDA 4700 Standard with temperature measurement option

General parameters: See 6.2 HDA 4400 / HDA 4700 without the temperature measurement option
Additional parameters temperature measurement:

Input data		**HDA 4400 / HDA4700**	
Measuring principle		Silicon semiconductor device	
Measuring range [7]		-25..+100°C (-13..+212°F)	
Probe lenght [8]		7 mm	
Mechanical connection		G 1/2 A ISO 1179-2 with Probe pin (20Nm)	
Output data		**HDA 4400**	**HDA 4700**
Output signal pressure			
Output signal temperature		Available as a digitel signal via the HART protocol.	
Accuracy (room temparature)	Typ. Max.	≤ ± 1,0 % FS ≤ ± 2,0 % FS	≤ ± 0,4 % FS ≤ ± 0,8 % FS
Temperature drift (enviroment)		≤ ± 0,02 % FS / °C	≤ ± 0,01 % FS / °C
Rise time to DIN EN 60751		t_{50}: ~ 10s t_{90}: ~ 15s	

7) other measuring ranges on request

8) other probe length on request

Note: The measuring range is different to the operating/ambient as well as the fluid temperature range.

6.4 Measuring Range Limits

By means of HART Common Practice Commands, you have the opportunity to adjust the following measuring ranges:

Measuring range limits of the primary variable, pressure:

Lower measuring range limit		Upper measuring range limit		Measuring span	
min	max	min	max	min	max
0 % FS	112.5% FS	37.5% FS	150% FS	37.5% FS	150% FS

For devices with temperature measurement option HDA 4000-T: Measuring range limits of the secondary variable, temperature:

Lower measuring range limit		Upper measuring range limit		Measuring span	
min	max	min	max	min	max
-25 °C	75°C	0°C	100°C	25°C	125°C
-13°F	167°F	32°F	212°F	-13°F	257°F

6.5 Protocol Data

HART Version: 7
Manufacturer Code: 0x605E
Manufacturer String: HYDAC ELECTRONIC
Device Type Code: 0xE1BC version with pressure as PV
0xE2A7 version with pressure as PV and temperature as SV

7 Model Code to identify the delivered part

7.1 Standard

7.1.1 Model code HDA 4100 / HDA 4300

HDA 4 X X X -F21- XXXXX - C X X - XXX - F1 (XX inch)

Accuracy

1 = 1% FS max., ceramic absolute
3 = 1% FS max., ceramic relative

Mechanical Connection

4 = G 1/4 A ISO 1179-2, male
5 = 7/16-20 UNF 2B (SAE 4), female
6 = 7/16-20 UNF 2A (SAE 4), male
7 = 9/16-18 UNF 2A (SAE 6), male
8 = 1/4-18 NPT, male
C = SF250CX, Autoclave (7/16-20 UNF 2B), female
F = 1/4-18 NPT, female

Electrical Connection

5 = Male connector, EN 175301-803, 3 pol. + PE
6 = Male connector M 12 x 1, 4 pol.
9 = 1/2-14 NPT Conduit (male) single leads
A = Male connector EN 175301-803, 3 pole + PE, 1/2" Conduit female
G = 1/2-14 NPT Conduit (male) jacketed cable

Signal

F21 = 4 .. 20 mA, 2-conductor, with HART protocol

Measuring Ranges

4 digit number (ranges in bar)
5 digit number (ranges in psi)

Approval

C = **$_{c}CSA_{us}$**, details see evaluation table chapter 7.3 and certificate

Insulation voltage

H = 500 V AC to housing
N = 50 V AC to housing

Protection types and applications: (see evaluation table chapter 7.3)

A = Model code characteristic A
B = Model code characteristic B
C = Model code characteristic C
D = Model code characteristic D
E = Model code characteristic E
F = Model code characteristic F
L = Model code characteristic L (only in combination with longer housing and male conduit)

Modification number

000 = Standard (other alphanumeric numbers are used for e.g.: pin connection,plug at the end of the jacketed cable)

Seal material (parts in contact with the fluid)

F = FPM-Dichtung (e.g. for hydraulic oils)
E = EPDM-seal (e.g. for coolant)

Material of connection (parts in contact with the fluid)

1 = stainless steel

Cable length (e.g. for conduit connection or jacketed cable)
Shown in cm or inch

7.1.2 Model Code HDA 4400 / HDA 4700

HDA 4 X X X -F21- XXXXX - C X X - XXX (XX inch)

Accuracy
4 = 1% FS max.
7 = 0.5% FS max.

Mechanical Connection
1 = G1/2 DIN EN 837
2 = G1/2 A ISO 1179-2
4 = G 1/4 A ISO 1179-2, male
5 = 7/16-20 UNF 2B (SAE 4), female
6 = 7/16-20 UNF 2A (SAE 4), male
7 = 9/16-18 UNF 2A (SAE 6), male
8 = 1/4-18 NPT, male
B = F250C Autoclave (9/16-18 UNF 2B), female
C = SF250CX, Autoclave (7/16-20 UNF 2B), female
F = 1/4-18 NPT, female

Electrical Connection
5 = Male connector, EN 175301-803, 3 pol. + PE
6 = Male connector M 12 x 1, 4 pol.
9 = 1/2-14 NPT Conduit (male) single leads
A = Male connector EN 175301-803, 3 pole + PE, 1/2" Conduit female
G = 1/2-14 NPT Conduit (male) jacketed cable

Signal
F21 = 4 .. 20 mA, 2-conductor, with HART protocol

Measuring ranges
4 digit number (ranges in bar)
5 digit number (ranges in psi)

Approval
C = **$_{c}CSA_{us}$**, details see evaluation table chapter 7.3 and certificate

Insulation voltage
H = 500 V AC to housing
N = 50 V AC to housing

Protection types and applications: : (see evaluation table chapter 7.3)

A = Model code characteristic A
B = Model code characteristic B
C = Model code characteristic C
D = Model code characteristic D
E = Model code characteristic E
F = Model code characteristic F
L = Model code characteristic L (only in combination with longer housing and male conduit)

Modification Number
000 = Standard
(other alphanumeric numbers are used for e.g.: orifice, pin connection,plug at the end of the jacketed cable)

Cable length (e.g. for Conduit connection or jacketed cable)
Shown in cm or inch

7.2 Model Code with Flush Membrane

7.2.1 Model Code HDA 4300 with flush membrane

HDA 4 3 Z X-F21-XXXX - XXX - CNX – XXX (XX inch)

Accuracy
3 = 1% FS max., ceramic relative

Mechanical Process Connection
Z = flush membrane

Electrical connection

5 = Male connector, EN 175301-803, 3 pol. + PE
6 = Male connector M 12 x 1, 4 pol.
9 = 1/2-14 NPT Conduit (male) single leads
A = Male connector EN 175301-803, 3 pole + PE, 1/2" Conduit female
G = 1/2-14 NPT Conduit (male) jacketed cable

Signal
F21 = 4 .. 20 mA, 2-conductor, with HART protocol

Measuring ranges
4 digit number (ranges in bar)
5 digit number (ranges in psi)

Mechanical Connection
G01 = G1/2 A, ISO 1179-2
G02 = G1/2 with additional front O-ring seal
G04 = G1/4 with additional front O-ring seal

Approval
C = cCSAus, details see evaluation table chapter 7.3 and certificate

Insulation voltage
H = 500 V AC to housing
N = 50 V AC to housing

Protection types and applications: (see evaluation table chapter 7.3)

A = Model code characteristic A
B = Model code characteristic B
C = Model code characteristic C
D = Model code characteristic D
E = Model code characteristic E
F = Model code characteristic F
L = Model code characteristic L (only in combination with longer housing and male conduit)

Modification number
000 = Standard
(other alphanumeric numbers are used for e.g.: pin connection,plug at the end of the jacketed cable cable)

Cable length (e.g. for Conduit connection or jacketed cable)
Shown in cm or inch

7.2.2 Model Code HDA 4400 / HDA 4700 with flush membrane

HDA 4 X Z X -F21- XXXXX - XXX - CNX – XXX (XX inch)

Accuracy
4 = 1% FS max
7 = 0.5 % FS max

Mechanical Process Connection
Z = flush membrane

Electrical Connection
5 = Male connector, EN 175301-803, 3 pol. + PE
6 = Male connector M 12 x 1, 4 pol.
9 = 1/2-14 NPT Conduit (male) single leads
A = Male connector EN 175301-803, 3 pole + PE, 1/2" Conduit female
G = 1/2-14 NPT Conduit (male) jacketed cable

Signal
F21 = 4 .. 20 mA, 2-conductor, with HART protocol

Measuring ranges
4 digit number (ranges in bar)
5 digit number (ranges in psi)

Mechanical Connection
G01 = G1/2 A, ISO 1179-2
G02 = G1/2 with additional front O-ring seal
G04 = G1/4 with additional front O-ring seal

Approval
C = cCSAus, details see evaluation table chapter 7.3 and certificate

Insulation voltage
H = 500 V AC to housing
N = 50 V AC to housing

Protection types and applications: (see evaluation table chapter 7.3)
A = Model code characteristic A
B = Model code characteristic B
C = Model code characteristic C
D = Model code characteristic D
E = Model code characteristic E
F = Model code characteristic F
L = Model code characteristic L (only in combination with longer housing and male conduit)

Modification number
000 = Standard
(other alphanumeric numbers are used for e.g.: pin connection,plug at the end of the jacketed cable cable)

Cable length (e.g. for Conduit connection or jacketed cable)
Shown in cm or inch

7.2.3 Model code Standard with temperature measurement option

HDA 4 X X X – F21 - XXXXX - T - 007 – CXX (XXinch)

Optional with temperatuere measurement
available via HART protocol as a digital signal

Probe length
007 = 7mm

7.3 Evaluation table: Classification of the protection type

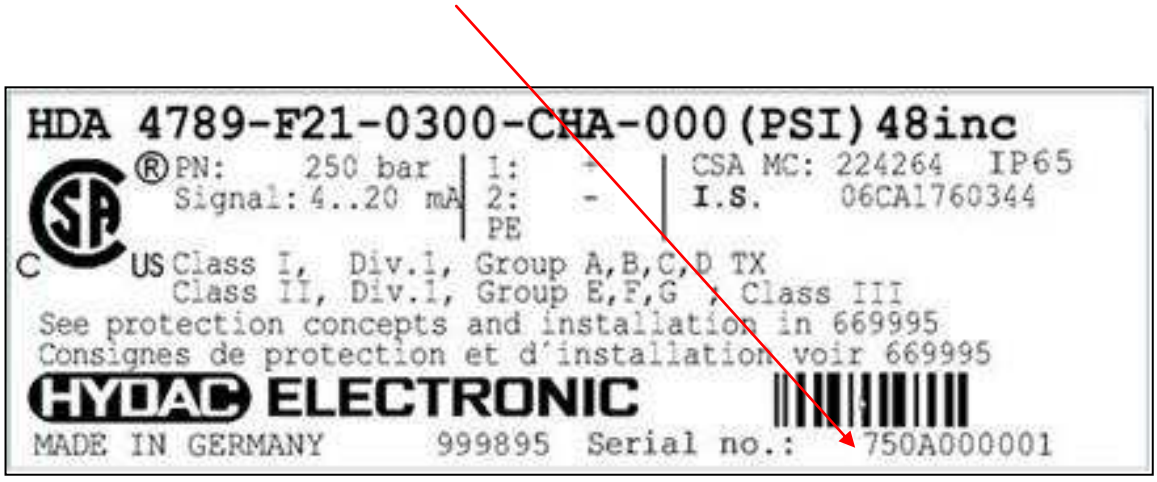
Protection Concept					
CSA certificate number 1760344					
Model code characteristic	A	B		C	F
		D	E		
	L				
Protection class	**Intrinsically safe Use in gases and dusts**	**Intrinsically safe Use in gases**	**Non incendive with field wiring Use in gases**	**Non incendive Use in gases and dusts**	**Dust protected enclosure**
Application	**Class I, Division 1 Group A, B, C, D T6, T5 Class II, Division 1 Group E, F, G Class III Class I, Zone 0 AEx ia IIC T6, T5 Ga Ex ia IIC T6, T5 Ga Zone 20 AEx ia IIIC T85/T95°C, T_{500} 90/100°C Da Ex ia IIIC T85/T95°C, T_{500} 90/100°C Da**	**Class I, Division 1 Group A, B, C, D T6, T5 Class I, Zone 0 AEx ia IIC T6, T5 Ga Ex ia IIC T6, T5 Ga**	**Class I, Division 2 Group A, B, C, D, T6, T5, T4 Class I, Zone 2 AEx ic IIC T6, T5, T4 Gc Ex ic IIC T6, T5, T4 Gc**	**Class I, Division 2 Group A, B, C, D, T6, T5, T4 Class II, Division 2 Group F, G Class III Class I, Zone 2 AEx nA IIC T6, T5, T4 Gc Ex nA IIC T6, T5, T4 Gc Zone 22 AEx tc IIIB T80/T90/T100°C Dc Ex tc IIIB T80/T90/T100°C Dc**	**Class II, Div. 1 Group E, F, G Class III Zone 20 AEx ta IIIC T80/T90/T100°C Da Ex ta IIIC T80/T90/T100°C Da**
Electrical connection (see model code)	9; A; G	5; 6; 9; A; G for "L" 9; G		9; G	9; G

8 Serial Number

The serial number includes the calendar week and year of manufacture of the unit, adjacent to the sequential serial number.

Configuration of serial number (SN): xyykzzzzzz

XX	Manufacturing date	e.g. : 7 → 2017
yy	Calendar week	e.g. : 50→ KW 50
k	Change control status	e.g. : -, A, B
zzzzzz	Sequential serial number	e.g. : 123456

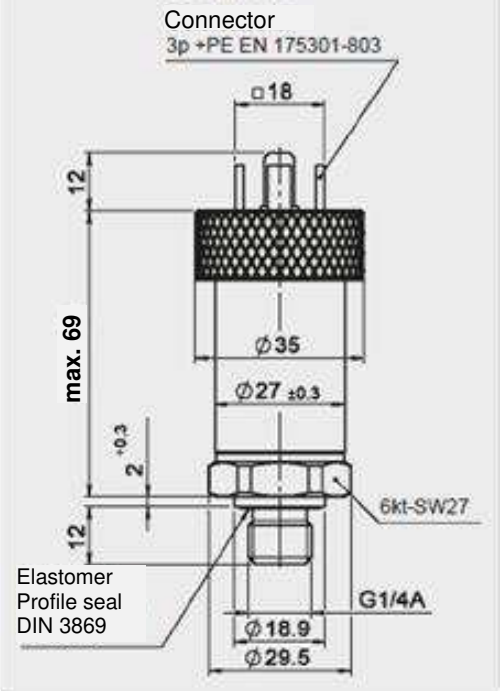


9 Pin assignment

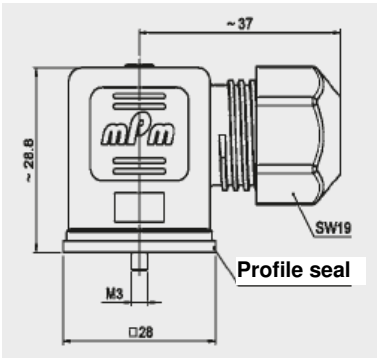
The pin assignment for the electrical connection is mentioned in the chapter “Control Drawing” as well as at the label of the pressure transmitter.

10 Dimensions

G 1/4 A ISO 1179-2
Torque value: 20 Nm

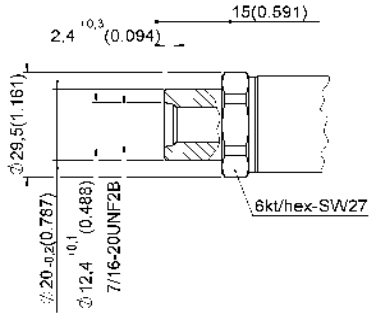


Connector
EN 175301-803
3 pol. + PE

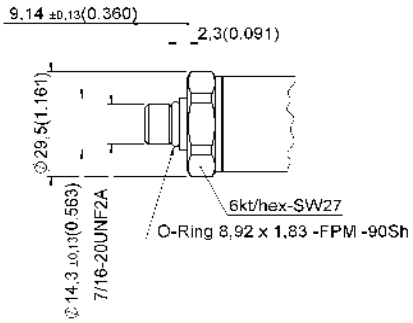


10.1 Mechanical Connection Variants

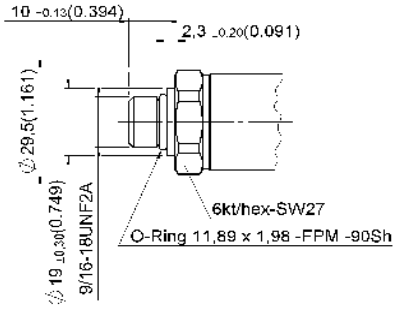
7/16-20 UNF 2B (SAE 4), female
Torque value: 15 Nm



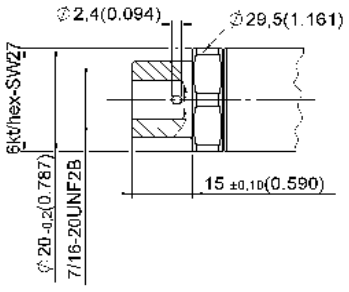
7/16-20 UNF 2A (SAE 4)
Torque value: 15 Nm



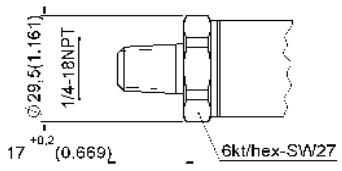
9/16-18 UNF 2A (SAE 6),
Torque value: 20 Nm



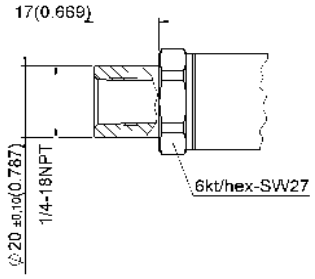
SF 250CX20, Autoclave (7/16-20 UNF 2B), female
Torque value: 15 Nm



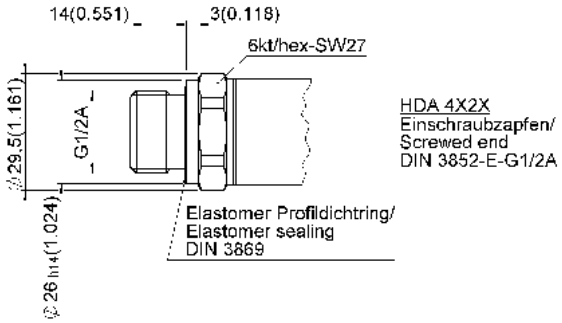
1/4-18 NPT
Torque value max. 40 Nm



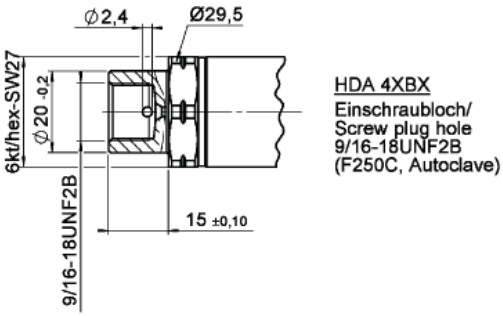
1/4-18 NPT, female
Torque value: max. 40 Nm



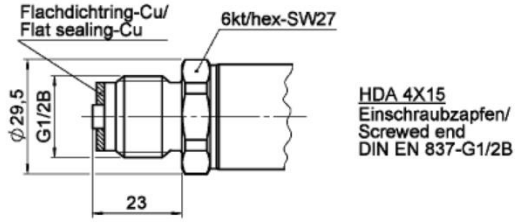
G 1/2 A ISO 1179-2
Torque value max. 45 Nm



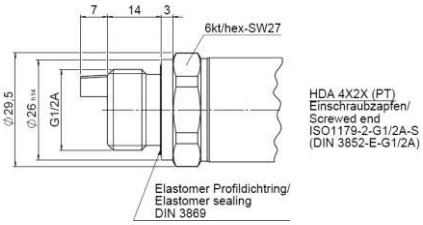
F250C Autoclave (9/16-18 UNF2B), female
Torque value max. 40 Nm



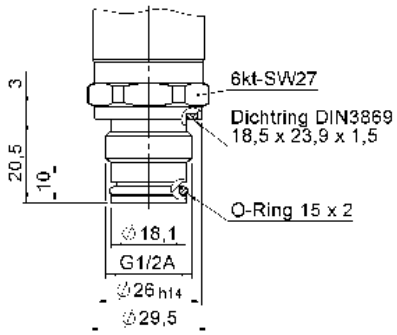
G1/2 DIN EN 837
Anzugsdrehmoment: maximal 45Nm



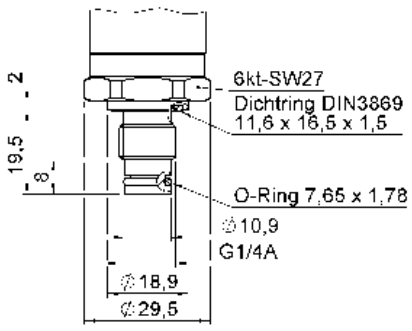
Dimensions with temperature measurement option



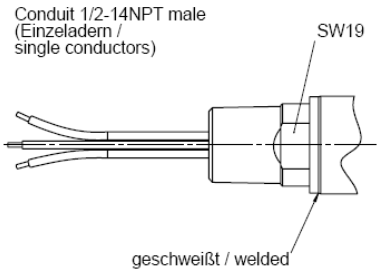
G 1/2 with additional front O-ring-seal,
Torque value: max. 45 Nm

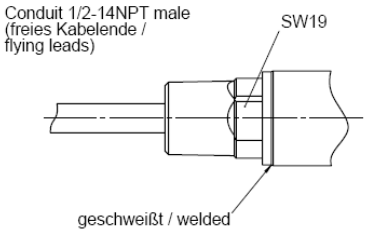


G 1/4 with additional front O-ring-seal
Torque value: max. 20 Nm

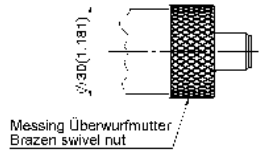


10.2 Electrical Connection Variants

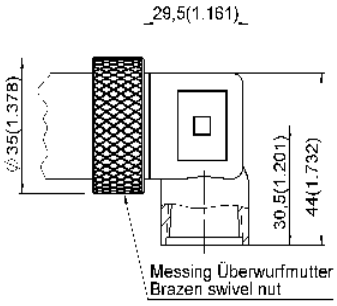




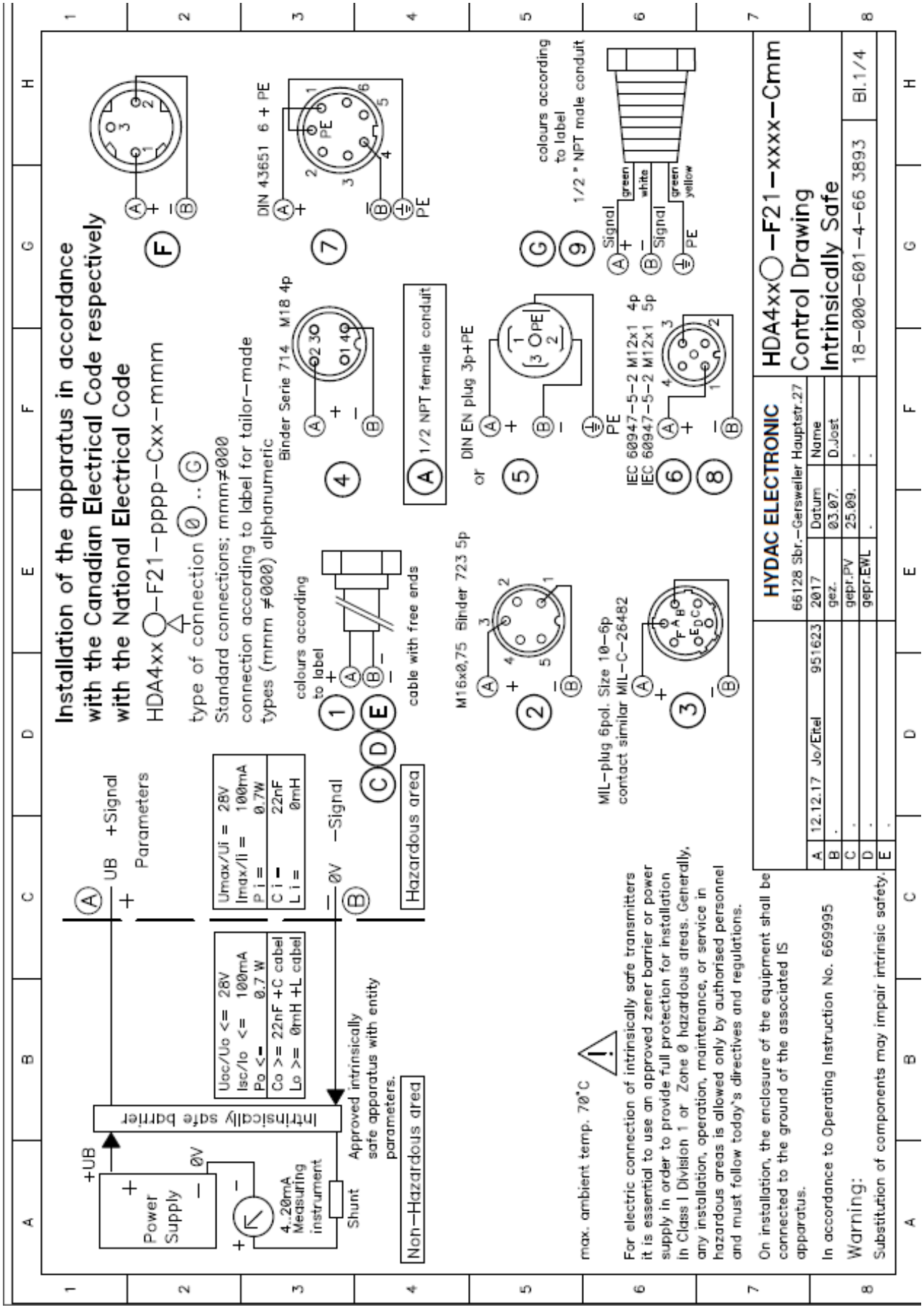
Device plug M12x1, 4 pole, male

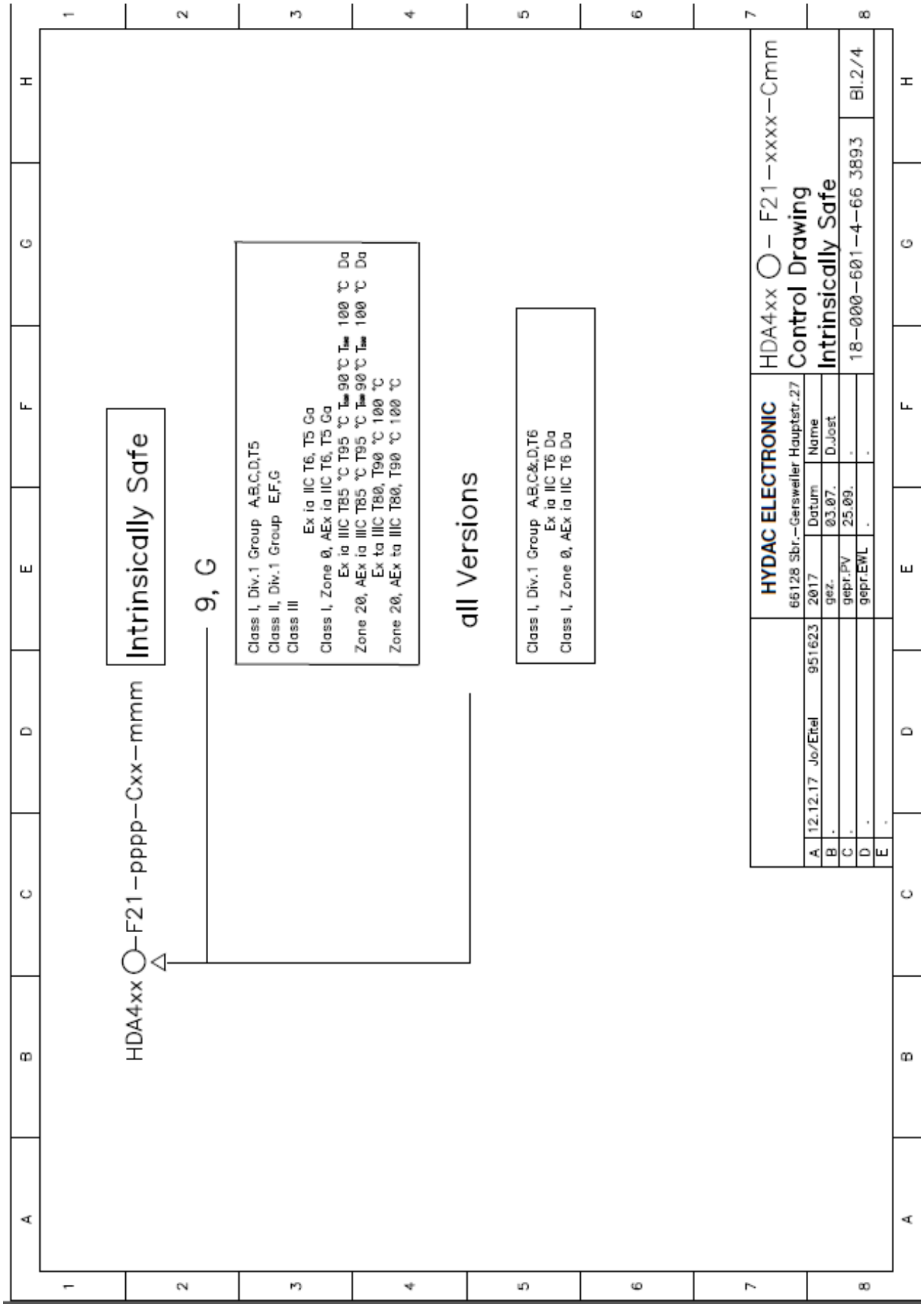


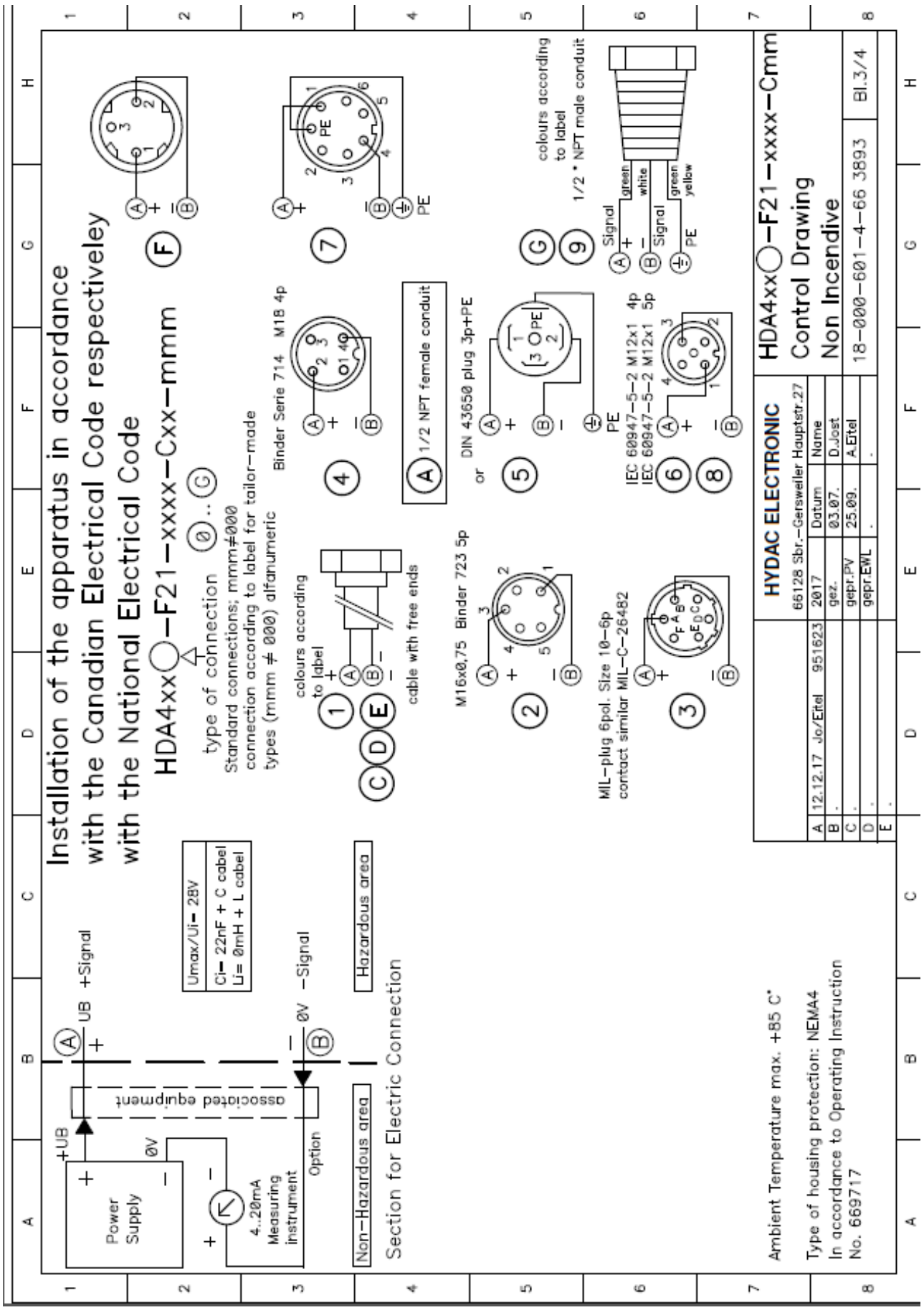
Male connection EN 175301-803 (DIN 43650) , 3 pol. + PE,
1/2" Conduit female

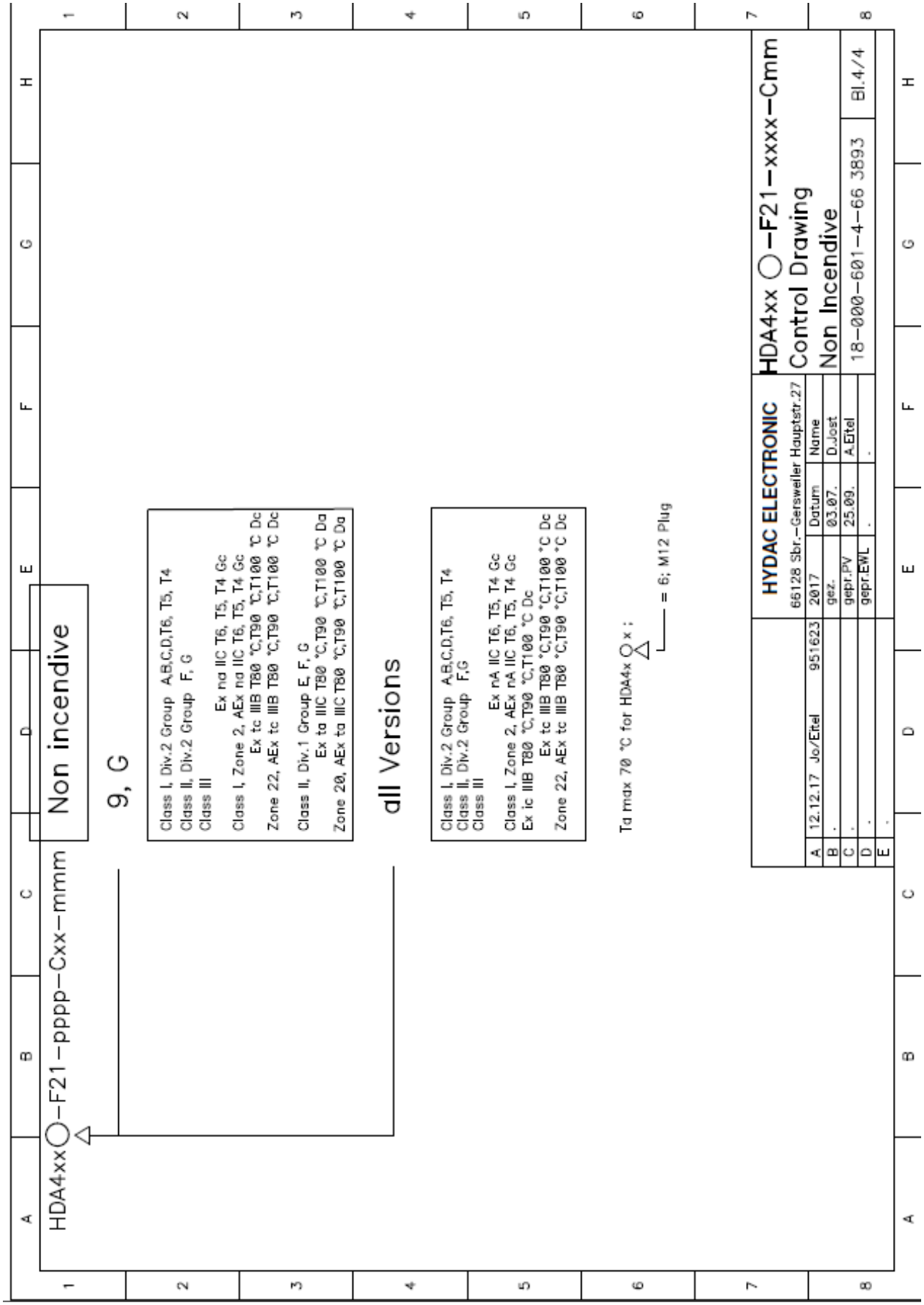


11 Control Drawing




HDA4xx ○– F21–pppp–Cxx–mmm
Intrinsically Safe
9, G
Class I, Div.1 Group A,B,C,D,T5
Class II, Div.1 Group E,F,G
Class III
Ex ia IIC T6, T5 Ga
Class I, Zone 0, AEx ia IIC T6, T5 Ga
Ex ia IIIC T85 °C T95 °C T= 90 °C T= 100 °C Da
Zone 20, AEx ia IIIC T85 °C T95 °C T= 90 °C T= 100 °C Da
Ex ta IIIC T80, T90 °C 100 °C
Zone 20, AEx ta IIIC T80, T90 °C 100 °C
all Versions
Class I, Div.1 Group A,B,C&,D,T6
Ex ia IIC T6 Da
Class I, Zone 0, AEx ia IIC T6 Da
HYDAC ELECTRONIC
66128 Sbr.–Gersweiler Hauptstr.27
HDA4xx ○– F21–xxxx–Cmm
Control Drawing
Intrinsically Safe
18–000–601–4–66 3893
Bl.2/4
A 12.12.17 Jo/Eftel 951623
B .
C .
D .
E .
2017 Datum Name
gez. 03.07. D.Jost
gepr.PV 25.09. .
gepr.EWL . .


Installation of the apparatus in accordance
with the Canadian Electrical Code respectiveley
with the National Electrical Code
HDA4xx◯–F21–xxxx–Cxx–mmm
type of connection Ø .. G
Standard connections; mmm≠000
connection according to label for tailor–made
types (mmm ≠ 000) alfanumeric
Umax/Ui= 28V
Ci= 22nF + C cabel
Li= 0mH + L cabel
+UB
+Signal
–Signal
0V
Power Supply
4..20mA Measuring instrument
Option
associated equipment
Non–Hazardous area
Hazardous area
Section for Electric Connection
colours according to label
cable with free ends
M16x0,75 Binder 723 5p
MIL–plug 6pol. Size 10–6p
contact similar MIL–C–26482
Binder Serie 714 M18 4p
1/2 NPT female conduit
DIN 43650 plug 3p+PE
or
IEC 60947–5–2 M12x1 4p
IEC 60947–5–2 M12x1 5p
colours according to label
1/2 " NPT male conduit
green
white
green
yellow
Signal
PE
Ambient Temperature max. +85 C°
Type of housing protection: NEMA4
In accordance to Operating Instruction
No. 669717
HYDAC ELECTRONIC
66128 Sbr.–Gersweiler Hauptstr.27
HDA4xx◯–F21–xxxx–Cmm
Control Drawing
Non Incendive
18–000–601–4–66 3893
Bl.3/4
A 12.12.17 Jo/Eitel 951623
B . C . D . E .
2017 gez. gepr.PV gepr.EWL
Datum 03.07. 25.09. .
Name D.Jost A.Eitel .


HDA4xx○-F21-pppp-Cxx-mmm
Non incendive
9, G
Class I, Div.2 Group A,B,C,D,T6, T5, T4
Class II, Div.2 Group F, G
Class III
Ex na IIC T6, T5, T4 Gc
Class I, Zone 2, AEx na IIC T6, T5, T4 Gc
Ex tc IIIB T80 °C,T90 °C,T100 °C Dc
Zone 22, AEx tc IIIB T80 °C,T90 °C,T100 °C Dc
Class II, Div.1 Group E, F, G
Ex ta IIIC T80 °C,T90 °C,T100 °C Da
Zone 20, AEx ta IIIC T80 °C,T90 °C,T100 °C Da
dII Versions
Class I, Div.2 Group A,B,C,D,T6, T5, T4
Class II, Div.2 Group F,G
Class III
Ex nA IIC T6, T5, T4 Gc
Class I, Zone 2, AEx nA IIC T6, T5, T4 Gc
Ex ic IIIB T80 °C,T90 °C,T100 °C Dc
Ex tc IIIB T80 °C,T90 °C,T100 °C Dc
Zone 22, AEx tc IIIB T80 °C,T90 °C,T100 °C Dc
Ta max 70 °C for HDA4x○x ;
= 6; M12 Plug
HYDAC ELECTRONIC
66128 Sbr.-Gersweiler Hauptstr.27
HDA4xx ○-F21-xxxx-Cmm
Control Drawing
Non Incendive
18-000-601-4-66 3893
Bl.4/4
A 12.12.17 Jo/Eitel 951623
B .
C .
D .
E .
2017 Datum Name
gez. 03.07. D.Jost
gepr.PV 25.09. A.Eitel
gepr.EWL . .

12 CSA Certificate

CSA Group

Certificate of Compliance

Certificate: 1760344 **Master Contract:** 224264 (224264)

Project: 70155216 **Date Issued:** 2017-12-15

Issued to: **Hydac Electronic GmbH**
Hauptstrasse 27
Saarbruecken, Saarland 66128
GERMANY
Attention: Alwin Eitel

The products listed below are eligible to bear the CSA Mark shown with adjacent indicators 'C' and 'US' for Canada and US or with adjacent indicator 'US' for US only or without either indicator for Canada only.

C US

Issued by: Konstantin Rybalko
Konstantin Rybalko

PRODUCTS

CLASS - C225804 - PROCESS CONTROL EQUIPMENT-Intrinsically Safe, Entity - For Hazardous Locations
CLASS - C225884 - PROCESS CONTROL EQUIPMENT - Intrinsically Safe, Entity-- For Hazardous Locations - Certified to US Standards

Class I, Div. 1, Group A, B, C & D, TX;
Class II, Div. 1, Group E, F & G;
Class III;
Ex ia IIC TX Ga;
Class I, Zone 0, AEx ia IIC TX Ga;
Ex ia IIIC TX Da;
Zone 20, AEx ia IIIC TX Da;
Ex ta IIIC TX Da;
Zone 20, AEx ta IIIC TX Da:

- Pressure Transducer, series HDA 4ab9-A-, HDA 4abA-A- and HDA 4abG-A-

Input rated 12 - 28 Vdc, 4 - 20 mA; with entity parameters: Ui (Vmax) = 28 V, Ii (Imax) = 100 mA, Pi = 1 W, Ci = 22 nF, Li = 0 mH; intrinsically safe when connected in accordance with Installation Drawing No. 18-00-601-4-66 3126, page 1.

DQD 507 Rev. 2016-02-18 Page 1

CSA Group

Certificate: 1760344 **Master Contract:** 224264
Project: 70155216 **Date Issued:** 2017-12-15

Ambient temperature range:
Ex ia IIC & Ex ia IIIC: -40°C to +60°C;
Ex ta IIIC: -40°C to +80°C;

- Pressure Transducer, series HDA 4ab9-F21-, HDA 4abA- F21-; HDA 4abG- F21-

Input rated 12 - 28 Vdc, 4 - 20 mA; with entity parameters: Ui (Vmax) = 28 V, Ii (Imax) = 100 mA, Pi = 0.7 W, Ci = 22 nF, Li = 0 mH; intrinsically safe when connected in accordance with Installation Drawing No. 18-00-601-4-663893, page 1.

Ambient temperature range:
Ex ia IIC & Ex ia IIIC: -40°C to +70°C;
Ex ta IIIC: -40°C to +80°C;

Maximum Ambient Temperature (°C)	Temperature Class (Ex ia IIC)	Maximum Surface Temperature (T) (Ex ta IIIC) (°C)	Maximum Surface Temperature (T) (Ex ia IIIC), (°C)	Maximum Surface Temperature (T_{500}) (Ex ta IIIC), (°C)
60	T6	80	85	90
70	T5	90	95	100
80	-	100	-	110
85	T4	-	-	-

Class I, Div. 1, Group A, B, C & D, TX;
Ex ia IIC TX Ga;
Class I, Zone 0, AEx ia IIC TX Ga:

- Pressure Transducer, series HDA 4abc-A-

Input rated 12 - 28 Vdc, 4 - 20 mA; with entity parameters: Ui (Vmax) = 28 V, Ii (Imax) = 100 mA, Pi = 1 W, Ci = 22 nF, Li = 0 mH; intrinsically safe when connected in accordance with Installation Drawing No. 18-00-601-4-66 3126, page 1.
Ambient temperature range: -40 °C to +60°C.
Temperature Class: T6

- Pressure Transducer, series HDA 4abc-F21-

Input rated 12 - 28 Vdc, 4 - 20 mA; with entity parameters: Ui (Vmax) = 28 V, Ii (Imax) = 100 mA, Pi = 0.7 W, Ci = 22 nF, Li = 0 mH; intrinsically safe when connected in accordance with Installation Drawing No. 18-00-601-4-663893, page 1.

Ambient temperature range: -40 °C to +70°C.
Temperature Class: T6 @ Tamb +60 °C, T5 @ Tamb +70 °C

DQD 507 Rev. 2016-02-18 Page 2

CSA Group

Certificate: 1760344 **Master Contract:** 224264
Project: 70155216 **Date Issued:** 2017-12-15

Notes:

1. Measures shall be taken to avoid ignition due to impact for models utilizing light metal enclosures.
2. Measures shall be taken to avoid ignition due to electrostatic charges for installation of device incorporating external polymeric components.
3. The process separation element shall be protected against environmental stress.

CLASS 2258-02 – PROCESS CONTROL EQUIPMENT - For Hazardous Locations
CLASS 2258-82 – PROCESS CONTROL EQUIPMENT - For Hazardous Locations - Certified to US Standards

Class II, Div. 1, Group E, F & G;
Class III;
Ex ta IIIC TX Da;
Zone 20, AEx ta IIIC TX Da:

- Pressure Transducer, series HDA 4ab9-A-, HDA 4abA-A-, HDA 4abG-A- and series HDA 4ab9-F21-, HDA 4abA- F21-; HDA 4abG- F21-

Input rated 12 - 28 Vdc, 4 - 20 mA; Ambient temperature range: -40°C to +80°C.

Maximum Ambient Temperature (°C)	Maximum Surface Temperature (T) (°C)
60	80
70	90
80	100

Class I, Div. 2, Group A, B, C & D, T4;
Class II, Div. 2, Group F & G;
Class III;
Ex nA IIC T4 Gc;
Class I, Zone 2, A/Ex nA IIC T4 Gc;
Ex tc IIIB T100 Dc;
Zone 22, AEx tc IIIB T100 Dc:

- Pressure Transducer, series HDA 4ab9-A- and HDA 4abG-A- and series HDA 4ab9-F21-, HDA 4abG-A-F21-

Input rated 12 - 28 Vdc.
Degree of Protection provided by the enclosure: IP6x
Ambient temperature range
Ex nA IIC: -40°C to +85°C,
Ex tc IIIC: -40°C to +80°C

DQD 507 Rev. 2016-02-18 Page 3

Certificate: 1760344 **Master Contract:** 224264
Project: 70155216 **Date Issued:** 2017-12-15

Maximum Ambient Temperature (°C)	Temperature Class (Ex nA IIC)	Maximum Surface Temperature (T) (Ex tc IIIC) (°C)
60	T6	80
70	T5	90
80	-	100
85	T4	-

Class I, Div. 2, Group A, B, C & D, TX;
Class II, Div. 2, Group F & G;
Class III;
Ex ic IIC TX Gc;
Class I, Zone 2, AEx ic IIC TX Gc;
Ex ic IIIB TX Dc;
Ex tc IIIB TX Dc;
Zone 22, AEx tc IIIB TX Dc:

- Pressure Transducer, series HDA 4abc-A-

Input rated 12 - 28 Vdc, Ci = 22 nF, Li = 0 mH, non-incendive when connected in accordance with Installation Drawing No. 18-00-601-4-66 3126, page 2.

- Pressure Transducer, series HDA 4abc-F21-

Input rated 12 - 28 Vdc, Ci = 12 nF, Li = 0 mH, non-incendive when connected in accordance with Installation Drawing No. 18-00-601-4-663893, page 2.

Degree of Protection provided by the enclosure: IP6x
Ambient temperature range:
Ex ic IIC: -40 to +85°C,
Ex ic IIIC & Ex tc IIIC: -40°C to +80°C

Maximum Ambient Temperature (°C)	Temperature Class (Ex ic IIC)	Maximum Surface Temperature (T) (Ex tc IIIC) (°C)
60	T6	80
70	T5	90
80	-	100
85	T4	-

Notes: Measures shall be taken to avoid ignition due to impact for models utilizing light metal enclosures.

DQD 507 Rev. 2016-02-18 Page 4

CSA Group

Certificate: 1760344 **Master Contract:** 224264
Project: 70155216 **Date Issued:** 2017-12-15

APPLICABLE REQUIREMENTS

CAN/CSA-C22.2 No. 0-M91	-	General Requirements - Canadian Electrical Code, Part I
C22.2 No 61010-1: 2012	-	Safety requirements for Elect1ical Equipment for Measurement, Control and Laboratory Use - Part 1: General Requirements
UL 61010-1 3rd Ed.	-	Safety requirements for Elect1ical Equipment for Measurement, Control and Laboratory Use - Part 1: General Requirements
CAN/CSA-C22.2 No. 25 -1966	-	Enclosures for Use in Class II Groups E, F, and G Hazardous Locations
C22.2 No. 30-M1986	-	Explosion-Proof Enclosures for Use in Class I Hazardous Locations
CAN/CSA-C22.2 No. 157-92	-	Intrinsically Safe and Non-Incendive Equipment for Use in Hazardous Locations
ANSI/UL Standard 508	-	Electric Industrial Control Equipment
ANSI/UL Standard 913	-	Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II and III, Div. 1 Hazardous (Classified) Locations
C22.2 NO. 213 / ISA-12.12.01: 2016	-	Nonincendive electrical equipment for use in Class I and II, Division 2 and Class III, Divisions 1 and 2 hazardous (classified) locations
CAN/CSA-E60079-0-02/ UL 60079-0	-	Electrical Apparatus for Explosive Gas Atmospheres - Part 0: General Requirements
CAN/CSA-E60079- 11 -02/ UL 60079-11	-	Electrical Apparatus for Explosive Gas Atmospheres - Part 11: Intrinsic Safety "i"
CAN/CSA-E60079-15-02/ UL 60079-15	-	Electrical Apparatus for Explosive Gas Atmospheres - Part 15: Type of Protection "n"
C22.2 No 60079-0 / UL 60079-0 6th Ed.	-	Explosive Atmospheres - Part 0: General Requirements
C22.2 No 60079-11 / UL 60079-11 6th Ed.	-	Explosive Atmospheres - Part 11: Equipment protected by Intrinsic Safety "i"
C22.2 No 60079-15 / UL 60079-15 4th Ed.	-	Explosive Atmospheres - Part 15: Equipment protected by type of protection "n"
C22.2 No 60079-26 / UL 60079-26 2nd Ed.	-	Explosive Atmospheres - Part 26: Equipment with equipment protection level (EPL) Ga
C22.2 No 60079-31 / UL 60079-31 1st Ed.	-	Explosive Atmospheres - Part 31: Equipment dust ignition protection by enclosure "t"

Notes:

1. C22.2 No. 30 was used as a guide and is included solely to allow direct process connection.

DQD 507 Rev. 2016-02-18 Page 5

CSA Group

Supplement to Certificate of Compliance

Certificate: 1760344 **Master Contract:** 224264 (224264)

The products listed, including the latest revision described below, are eligible to be marked in accordance with the referenced Certificate.

Product Certification History

Project	Date	Description
70155216	2017-12-15	Update to report 1760344 to cover addition of HDA 4xxx-F21 (HART) model based on existing ExTR; changes to existing models including update to documentation and mechanical changes; applicable requirements update to replace obsolete standards.
1951662	2007-09-10	Update to report 1760344 for construction changes
1760344	2006-03-10	Original certification

DQD 507 Rev. 2016-02-18 Page 1

HYDAC ELECTRONIC GMBH
Hauptstraße 27
D-66128 Saarbrücken
Germany

Web: www.hydac.com
E-Mail: electronic@hydac.com
Tel.: +49-(0)6897-509-01
Fax: +49-(0)6897-509-1726

HYDAC Service
If you have any questions concerning repair work, please do not hesitate to contact HYDAC Service:

HYDAC SERVICE GMBH
Hauptstr. 27
D-66128 Saarbruecken
Germany

Tel.: +49-(0)6897-509-1936
Fax: +49-(0)6897-509-1933

Note

The information and particulars provided in this manual apply to the operating conditions and applications described herein. For applications and operating conditions not described, please contact the relevant technical department.

If you have any questions, suggestions, or encounter any problems of a technical nature, please contact your Hydac representative.

Subject to technical modifications.