HUBA

Type 712 Level Measuring Pressure Transmitter

Gage/Absolute Ranges to 3 bar, Voltage/Current/Ratiometric Outputs

DESCRIPTION

The 712 level transmitter consists of a ceramic measuring cell (gage and absolute pressure) with signal conditioning electronics. The sensor, the electronics and the connection cable are hermetically encapsulated in a stainless steel case. The measuring diaphragm is protected from outside influences by a protection cover. A venting pipe is included in the connection cable for the gage pressure version. Versions with integrated temperature measurement are available.

SPECIFICATIONS

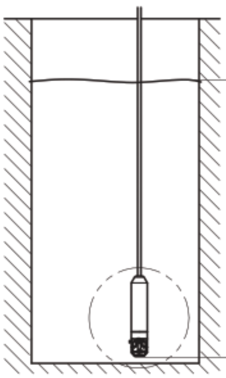
Full Scale Pressure Ranges	Gage Pressure: zero to 0.3, 1.0, 1.6 or 2.5 bar Absolute Pressure: 0.8 to 1.4, 2.0 or 3.0 bar	
Medium	Compatible liquids	
Temperature Operatng Range		
Medium & Ambient	-20...+80oC	
Storage	-40...+80oC	
Max Over/Rupture Pressure	3 times F.S.; max. 3 bar for range 0-0.3 bar	
Wetted Materials	Pressure Connections	AISI 316L
	Sensor	Ceramic Al_2O_3
	Cable	PE-HD
	Protection Cover	PPE
	Sealing Material	FPM, EPDM (for water)
Electrical		
Signal Output Options		
2-wire, 4-20 mA output	Power Supply 10-30 VDC; Current Consumption- <20 mA	
	Load (Ohms)= Supply Voltage-7V÷0.02 A	
3-wire, 0-10V output	Power Supply 12-30 VDC; Current Consumption- <5 mA	
	Load - >10k Ohm/<100 nF	
3-wire, ratiometric 10...90% supply voltage	Power Supply 5 VDC ±10% Current Consumption- <3 mA	
	Load - >5k Ohm/<100 nF	
4-wire with temperature measurement, ratiometric 10...90% supply voltage	Power Supply 5 VDC ±10%	
	Current Consumption- <3 mA	
	Load - >5k Ohm/<100 nF	
Temperature Output	>1MOhm	
Dynamic Response Time	<2 ms	
Protection Standard	IP68	
Run Time (Time starts at the moment of application of minimal supply voltage)	<10 ms	

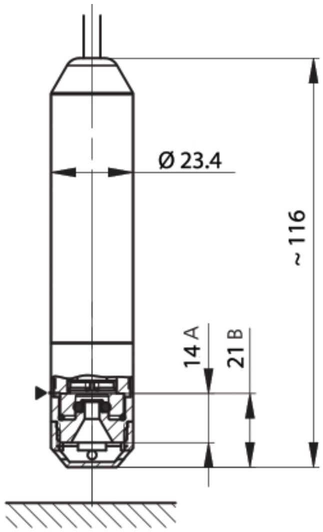
Specifications Continued	
Electrical Connection	
Cable PE-HD	length 2, 5, 10, 15, 20, 30 m
Accuracy	
Standard Accuracy: ± 0.8% F.S. (Max. deviation at 25 oC including zero point, full scale, linearity, hysteresis and repeatability)	
Long Term Stability Per IEC EN 60770-1: ±0.2% F.S.	
Thermal Characteristics: ±0.2% F.S./10oC at -20 ... +80 oC; 0.3 bar range with output 4 ... 20 mA = ±0.5% fs/10oC	
Higher Accuracy Model: ± 0.5% F.S. (Max. deviation at -10 to 25 oC including zero point, full scale, linearity, hysteresis and repeatability) Available only with ratiometric execution and pressure ranges > 1 bar. Long Term Stability Per IEC EN 60770-1: ±0.2% F.S.	
Explosion Proof Models	ATEX rated designs for use with a barrier are available for current output and ratiometric output models
Weight (Without Cable)	200 g
Testing:	
Explosion Protection	IECEx SEV 12.006: Ex ia IIC T4 Ga SEV 12 ATEX 0138: II 1 G Ex ia IIC T4 Ga
Electromagnetic Compatibility	CE conformity per EN 61326-2-3
Drinking Water Approval	ACS
Drinking Water Verificaton Certificate For Plastic Parts	KTW W270 WRAS

Max Level Measurement Possible For Absolute Pressure Ranges (Effect of Atmospheric Pressure)

Pressure Range	P_{Baro}= 1060 mbar (At Sea Level)	P_{Baro}= 740 mbar (At 2000 Meters Above Sea Level)
0.8 to 1.4 bar	3.5 meters w.c.	6.7 meters w.c.
0.8 to 2.0 bar	9.6 meters w.c.	12.8 meters w.c.
0.8 to 3.0 bar	20.0 meters w.c.	23.0 meters w.c.

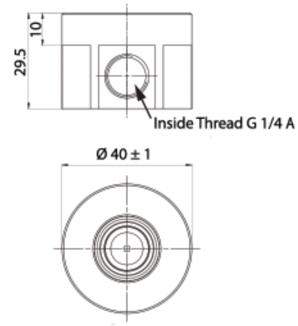
DIMENSIONS (MM), ELECTRICAL CONNECTIONS, WIRING



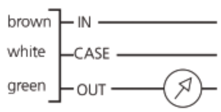


h - Fluid level
► - Measurement reference height
A - Distance from protection cover to the position of measuring diaphragm
B - distance from beginning of thread to the position of measuring diaphragm (versions without protection cover)

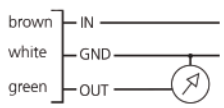
Protection Cover



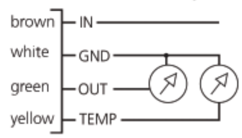
4-20 mA



Ratiometric & 0-10V Models



Ratiometric With Temperature



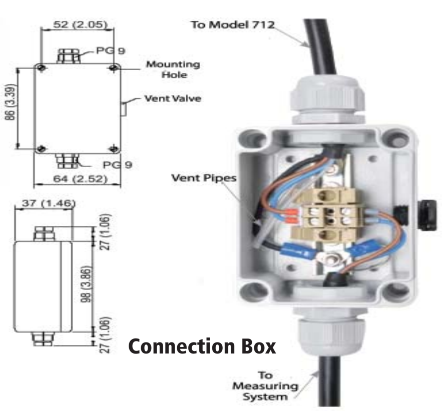
See installation manual for explosion proof model wiring

ORDERING INFORMATION

BUILD PART NUMBER FROM TABLE BELOW- A.B.C.D.E.F.G.H
EXAMPLE: 712.9.14.1.0.2.4.0

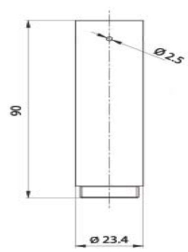
A MODEL	B PRESSURE MODE	C PRESSURE RANGE	D SEALING MATERIAL	E OUTPUT	F ELECTRICAL CONNECTION	G PROTECTION COVER	H EXPLOSION PROTECTION
712	8= Absolute 9= Gage *C= Absolute, high accuracy *D= Gage, high accuracy	Gage Pressure 13= 0 to 0.3 bar 11= 0 to 1.0 bar 12= 0 to 1.6 bar 14= 0 to 2.5 bar Abolute Pressure 13= 0.8 to 1.4 bar 12=.8 to 2.0 bar 14= 0.8 to 3 bar	0= FPM (Fluo-ro-elastomer) 1= EPDM (Ethylene propylene)	0= 4-20 mA 1= Ratiometric 2= Ratiometric, includes tem-perature sensor 3= 0-10 VDC	0= 2 m cable 1=5 m cable 2= 10 m cable 3= 15 m cable 4= 20 m cable 5= 20 m cable	0= Without 4= With	0= Without 1= With
*Available only for ratiometric models with ranges 1 bar or greater							

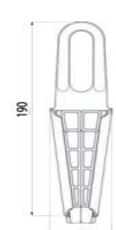
ACCESSORIES	
P/N	DESCRIPTION
118026	Cable Hanger
118027	Connection Box
118028	Test Adapter
118067	Protection Cover (pkg of 10)
118093	Additional Weight



Connection Box

Weight (200 g)





Cable Hanger (Hot dipped galvanized Steel, PA6 glass fiber reinforced)

LEVEL CALCULATIONS

General level with relative pressure sensor:

$$h = \frac{\Delta p}{\rho \cdot g}$$

General level with absolute pressure sensor:

$$h = \frac{P_{TS} - P_{Baro}}{\rho \cdot g}$$

which

$$P_{TS} = \frac{U_{TS} - U_{TS\_NP}}{U_{TS\_EW} - U_{TS\_NP}} \cdot \left(P_{TS\_EW} - P_{TS\_NP}\right) + P_{TS\_NP}$$

and

$$P_{Baro} = \frac{U_{Baro} - U_{Baro\_NP}}{U_{Baro\_EW} - U_{Baro\_NP}} \cdot \left(P_{Baro\_EW} - P_{Baro\_NP}\right) + P_{Baro\_NP}$$

Using a second level sensor as barometric air pressure sensor

For level sensor with current output use nominal signal values for I_{TS} ... instead of variables U_{TS} ... (resp. I_{Baro} ... instead of U_{Baro} ...)

Simplification of formula for level sensor with ratiometric output:

$$P_{TS} = \frac{U_{TS} - 0.1 \cdot U_{IN}}{0.8 \cdot U_{IN}} \cdot \left(P_{TS\_EW} - P_{TS\_NP}\right) + P_{TS\_NP}$$

$$P_{Baro} = \frac{U_{Baro} - 0.1 \cdot U_{IN}}{0.8 \cdot U_{IN}} \cdot \left(P_{Baro\_EW} - P_{Baro\_NP}\right) + P_{Baro\_NP}$$

Using a second level sensor as barometric air pressure sensor

Legend:

h	level [m]	ρ	density of media [kg/m³]
		g	acceleration of fall 9.80665 [m/s²]
Δp	measured relative pressure [Pa]		
P_{TS}	measured pressure of level sensor [Pa]	U_{TS}	signal on level sensor output [V or mA]
P_{BARO}	measured pressure of barometer [Pa]	U_{BARO}	Signal on barometer output [V or mA]
P_{TS_NP}	minimal nominal pressure of level sensor [Pa]	U_{TS_NP}	minimal nominal signal of level sensor [V or mA]
P_{TS_EW}	maximum nominal pressure of level sensor [Pa]	U_{TS_EW}	maximum nominal signal of level sensor [V or mA]
P_{BARO_NP}	minimal nominal pressure of barometer [Pa]	U_{BARO_NP}	minimal nominal signal of barometer [V or mA]
P_{BARO_EW}	maximum nominal pressure of barometer [Pa]	U_{BARO_EW}	maximum nominal signal of barometer [V or mA]

TEMPERATURE SENSOR CHARACTERISTICS

$$T_{TEMP} = T_0 + 1 \Big/ \left(a + b \cdot \ln\left(R \cdot \left[\frac{U_{IN}}{U_{TEMP}} - 1\right]\right) + c \cdot \ln\left(R \cdot \left[\frac{U_{IN}}{U_{TEMP}} - 1\right]\right)^3 \right)$$

a = 0.001204001
b = 0.000208775
c = 0.000000294

T_{TEMP}	Temperature NTC [°C]	U_{TEMP}	Voltage NTC [V]
T_0	-273.15 [°C]	R	20'000 [Ω]
		U_{IN}	4.5 ... 5.5 [V]

$T_{TEMP} = f(U_{TEMP})$