Design/versions

This technical document contains detailed information about the technical properties of the product. If you would like to place an order, please use the MESSKO inquiry and order specification, which you can also find on our website http://www.reinhausen.com below the respective product.

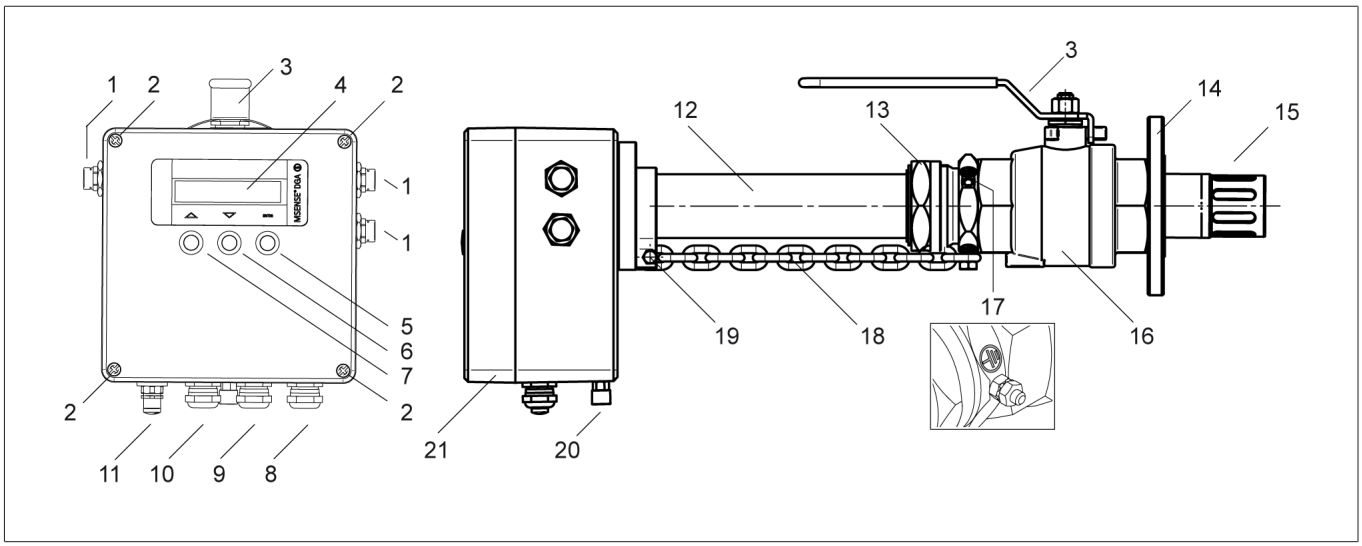

Figure 1: MSENSE® DGA 2/3

DGA 2	Measurement components H_2, moisture in oil and oil temperature (for mineral oils)	DGA 3	Measurement components H_2, CO, moisture in oil and oil temperature (for mineral oils)

1	Ventilation	2	Housing cover screw connection
3	Ball valve locking lever	4	Display (optional)
5	ENTER key	6	DOWN key
7	UP key	8	Supply voltage cable screw connection (3x M20 x 1.5 WADI or 3x ½“ NPT)
9	Signaling relay cable screw connection	10	Analog outputs cable screw connection
11	Interface (5-pole) for service PC and Modbus RTU communication	12	Measuring pipe (285 mm / 507 mm)
13	Ball valve clamp connection	14	Mounting flange O-ring gasket: DN50 PN6/PN16 and DN80 PN16 Mounting flange any gasket: DN50 PN16 and DN80 PN16
15	Measuring head	16	Ball valve
17	Grounding screw	18	Safety chain
19	Fixing screw for safety chain	20	Connection for venting and taking samples
21	Housing cover		

Additional signal protocols (with additional protocol converter)	DNP 3.0; Modbus TCP; IEC 61850-8-1 MMS (optional)
Accessories (optional)	Power supply unit for protocol converter
Offshore version	Offshore

Technical data

Technical data

Measurement					
Application	Determination of the gas concentration of fault gases as well as moisture in oil and oil temperature of mineral-based transformer insulating oil in accordance with IEC 60296:2012 / ASTM D3487-09				
Measured variables	H_2	CO (only for MSENSE DGA 3)	Humidity		Oil temperature
			relative display can be switched	absolute display can be switched	
Lower detection limit	15 ppm	25 ppm	3%RH	5 ppm	-20°C
Upper detection limit	2,000 ppm	2,000 ppm	90%RH	2,000 ppm	+115°C
Measuring accuracy	±10%[1, 2] or[3] ±20 ppm	±15%[1, 2] or[3] ±20 ppm	±1.8%RH[5]	±2%[4]	±1°C
Repetition accuracy	±5%[2] or[3] ±10 ppm	±5%[2] or[3] ±10 ppm	±1% RH	±1%[4]	±1°C
Sensor resolution	1 ppm	1 ppm	1%RH	n/a	1°C

[1] Determination based on IEC 60567, Appendix E

[2] Of the measured value

[3] Depending on which value is larger

[4] Of the saturation curve; IEC 60422

[5] At +23°C

Conditions of use	
Locations of use	Indoors and outdoors, all climate zones
Installation altitude	Up to 4,000 m above sea level
Offshore	Optional
Mounting location	Directly on the transformer tank or in the oil closed circuit cooling pipe; installation horizontal
Ambient temperature during operation[6]	-40...+60°C
Oil temperature during operation[6, 7]	-20...+115°C
DGA measuring range with respect to the ambient temperature[6]	-20...+60°C
DGA measuring range with respect to the oil temperature[6, 7]	+10...+90°C
Ambient humidity	0...100%RH
Ambient temperature storage/transport	-40...+80°C

[6] Please contact MR to check the use in case of extreme conditions

[7] At the point of measurement

Device properties	
Mechanical connection	Via ball valve and configurable flange DN50 or DN80 (several flanges available); with safety chain for safe installation and removal
Measuring pipe length	Two different lengths for optimum measuring conditions; Short measuring pipe: 285 mm; Long measuring pipe: 507 mm
Oil extraction connection	Luer lock socket on the device; adapter set for safe and clean oil extraction included in the scope of delivery
Operation	Optional VFD display (suitable for use in daylight) with three operating keys for displaying measured values and messages as well as for calling up parameters
Materials used	Stainless steel and aluminum; All external parts and parts in contact with oil are weather-resistant, resistant to transformer oil and UV-resistant
Gasket material	FPM (Viton®)

Device properties	
Available colors (terminal box)	RAL 7033 RAL 7038
Vacuum resistance	5 Pa for 48 hours
Pressure resistance	max. 400 kPa
Degree of protection	IP66
Dimensions	435 / 657 x 218 x 264 mm (version with short / long measuring pipe)
Device weight	Version with short measuring pipe: approx. 12 kg Version with long measuring pipe: approx. 14 kg (without ball valve / flange / safety chain)
Ball valve weight	Approx. 6 kg (including flange and safety chain)

Electrical connection	
Voltage supply	95...280 V AC, 50/60 Hz or 95...280 V DC (protected against polarity reversal)
Power consumption	<13 W
Overvoltage category	III
Connection terminals	Voltage supply, relays and analog outputs: 2.5 mm^2, AWG 14
Cable gland	3 x M20 x 1.5 or 3 x ½“ NPT; 8…15 mm lead diameter

Interfaces	
Relay outputs	Four freely configurable signaling relays (one changeover contact each) for warning and alarm messages and for maintenance messages from the device-internal monitoring; One signaling relay for safety messages (e.g. loss of voltage) Contact current capacity: 250 V AC / 5 A; max. 400 V AC, cos φ = 1 at 85°C; 30 V DC / 5 A to 300 V DC / 0.25 A
Analog outputs	Passive, signal tolerance ±0.03 mA, load resistance max. 700 Ω at 24 V DC MSENSE® DGA 2: Two configurable outputs, 4...20 mA MSENSE® DGA 3: Three configurable outputs, 4...20 mA
Service interface	5-pole socket (Molex) for communication via Modbus RTU and parameterization via MSET parameterization software

MESSKO® MSET parameterization software	
Delivery	On USB stick; included in the MSENSE® DGA 2/3 scope of delivery
Operating system	From Microsoft Windows 7 [8]
Measured value display and evaluation	Display of the current measured values and device information; Event database with time stamp (date and time); Graphic display and evaluation of the temporal progression of the measured values; Export of the measured values (CSV file) or settings of a protocol (PDF file)
Parameterization	Configuration of the parameters for commissioning, communication and ongoing operation
Field calibration	Setting the time stamp of the oil sample extraction; Entry of the reference values in accordance with the laboratory report
Service	Reading out the internal device service database for further analysis by MR experts

[8] Please note that Microsoft has stopped providing regular support for versions earlier than Windows 10.

Mechanical tests	
Vibration	10–150 Hz with 2g, 2 h (IEC 60068-2-6)
Seismic event	2–10 Hz, 22.5 mm, 1 h (IEC 60068-2-57)
Shock	10g, 10 ms (IEC 60068-2-27)

Protocol converter

Operating conditions	
Supply voltage	24 V DC
Power consumption	15 W
Mounting location	On cap rail

Operating conditions	
Environmental conditions in operation[6]	Ambient temperature with horizontal mounting position: -25...+70°C Relative humidity in operation: 10...95%, non-condensing Air pressure and installation altitude: up to 2,000 m above MSL
Contamination level	2
Protection class	II
Degree of protection	IP20
Mounting position	Horizontal
Environmental conditions during transport/storage	Temperature: -40...+85°C Relative humidity: 10%...95%, non-condensing Air pressure: corresponding to 4,500 m above MSL
Dimensions and weight	See dimensional drawing for dimensions Weight: approx. 0.8 kg

Specifications		
Communication	Ethernet with 3 ports	2 separate networks: 2 x RJ45 (for protocol converter parameterization) 1 x RJ45 (for SCADA)
Protocols	DNP 3.0 via Ethernet; Modbus TCP; IEC 61850-8-1 MMS (optional)	

Wide range power supply unit (optional)	
Input	100...240 V AC 50⁄60 Hz (±10%) 110...300 V DC (-20...+25%)
Output	24 V DC ⁄ 80 W
Temperature range	-25...+70°C
Degree of protection	IP20
Dimensions W x H x D:	32 x 124 x 102 mm

Dimensional drawings

For dimensional drawings, refer to the following pages.

Device dimensions with 285 mm measuring pipe length

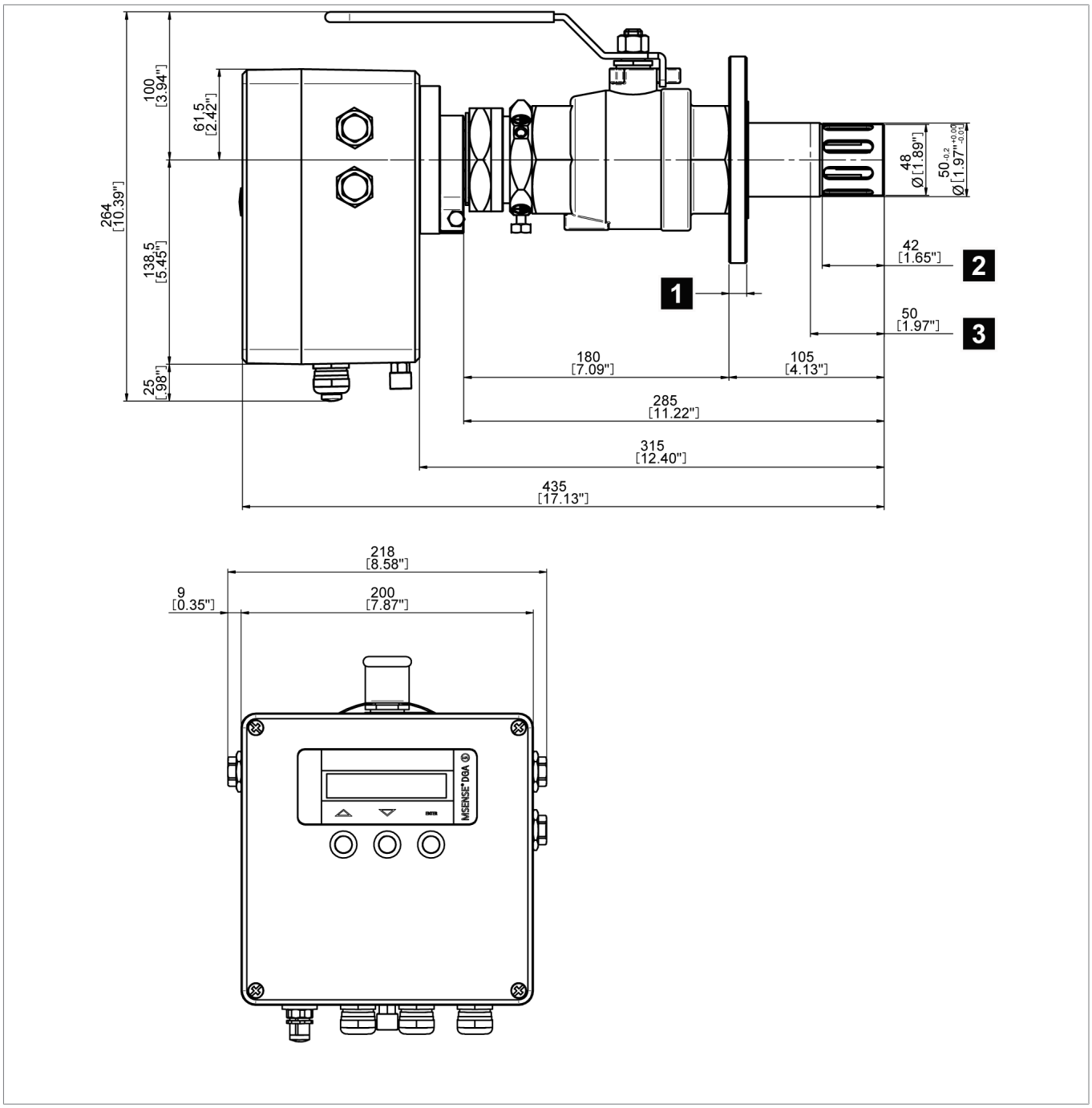

Figure 2: Device dimensions with 285 mm measuring pipe

1	Flange, see table [▶ 7]
2	Minimum immersion depth
3	Recommended immersion depth

Device dimensions with 507 mm measuring pipe length

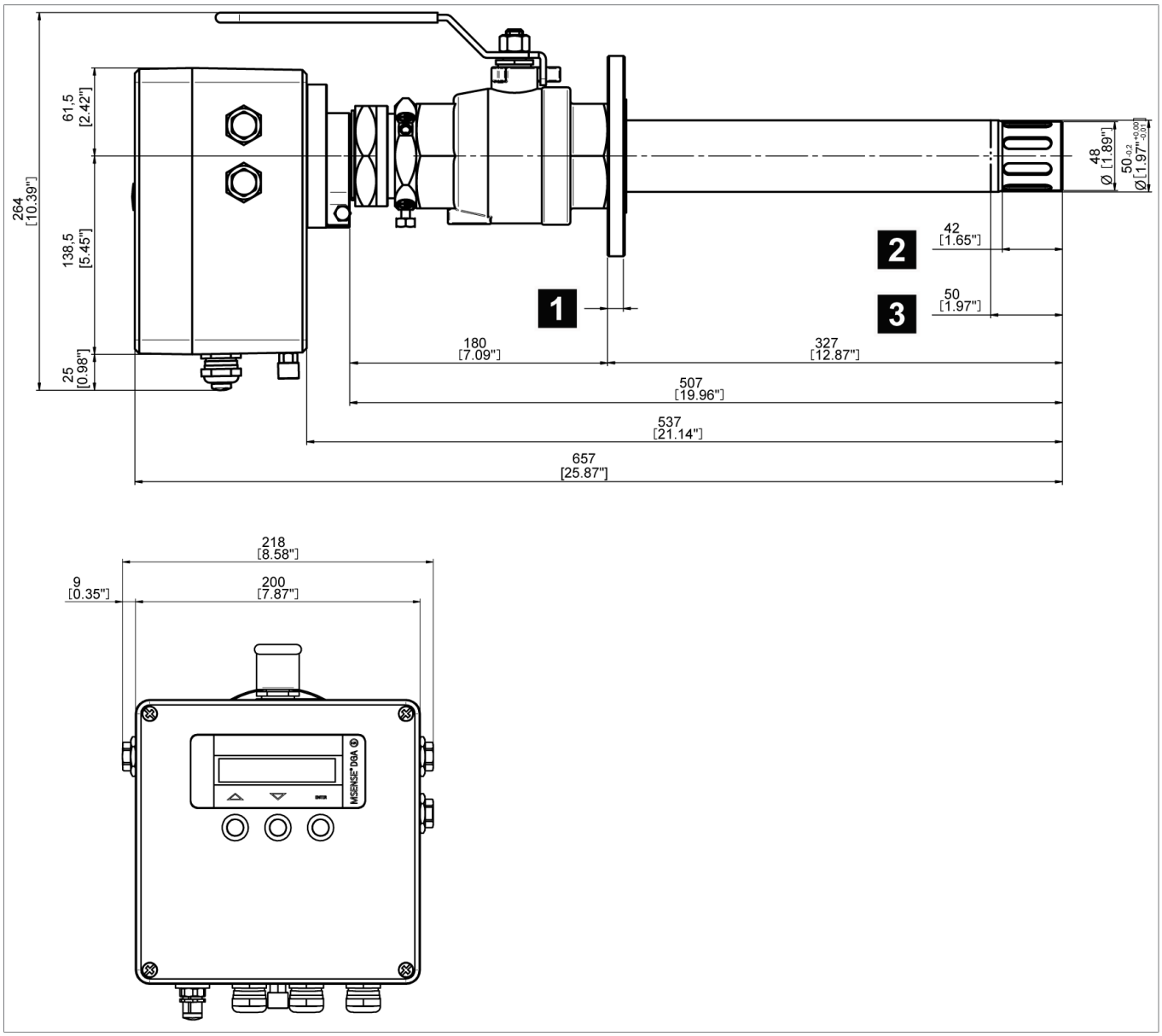

Figure 3: Device dimensions with 507 mm measuring pipe

1	Flange, see table [► 7]
2	Minimum immersion depth
3	Recommended immersion depth

Connecting flange dimensions

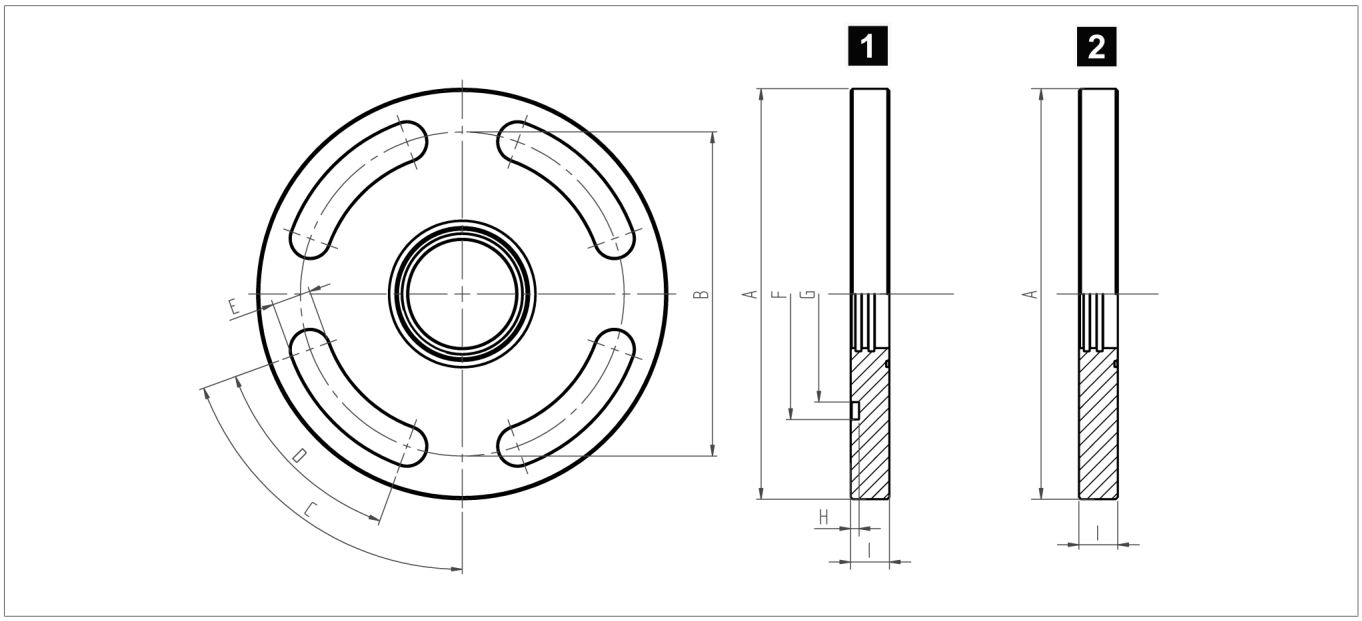

Figure 4: Flange DN50 PN6; DN50 PN16

1	For o-ring gasket (included in delivery)
2	For any gasket (not included in delivery)

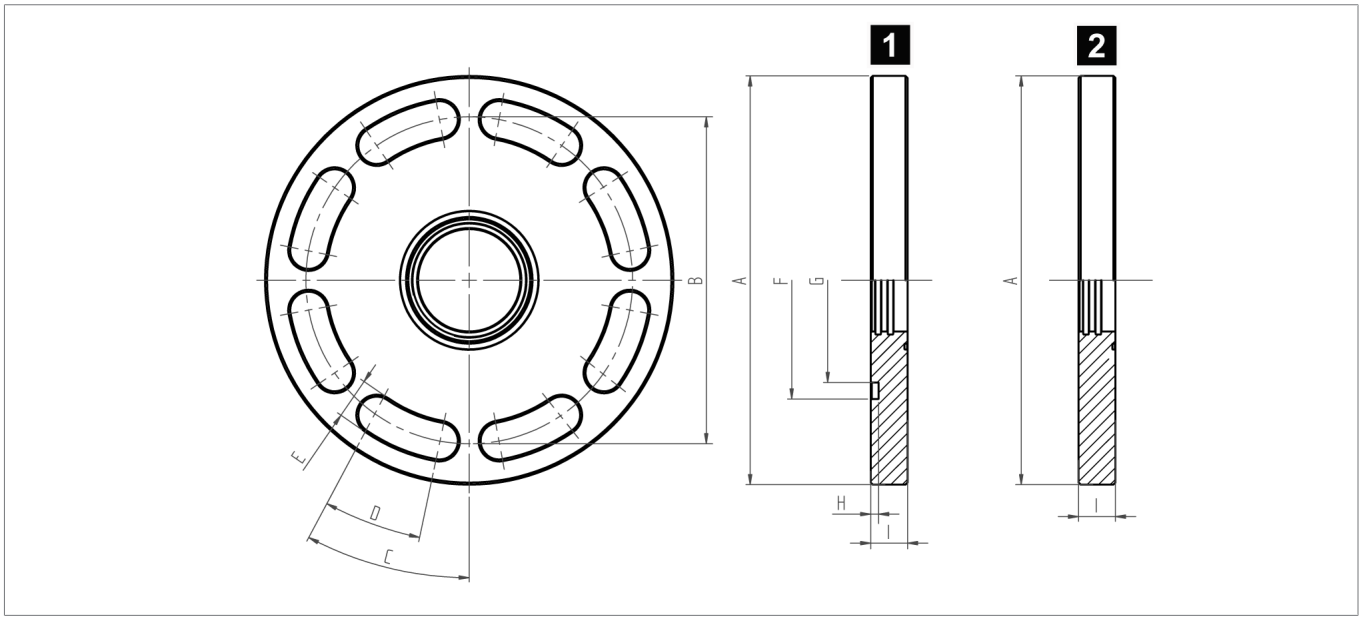

Figure 5: Flange DN80 PN16

1	For o-ring gasket (included in delivery)
2	For any gasket (not included in delivery)

Flange dimensions table

Flange version	A mm [inch]	B mm [inch]	C	D	E mm [inch]	F mm [inch]	G mm [inch]
DN50 PN6	Ø140 [5.51"]	Ø110 [4.33"]	70°	4 x 50°	Ø13 [0.51"]	Ø81 [3.19"]	Ø65 [2.56"]
DN50 PN16	Ø165 [6.50"]	Ø125 [4.92"]	70°	4 x 50°	Ø18 [0.71"]	-	-
DN50 PN16	Ø165 [6.50"]	Ø125 [4.92"]	70°	4 x 50°	Ø18 [0.71"]	Ø81 [3.19"]	Ø65 [2.56"]

Flange version	A mm [inch]	B mm [inch]	C	D	E mm [inch]	F mm [inch]	G mm [inch]
DN80 PN16	Ø200 [7.87"]	Ø160 [6.30"]	34.5°	8 x 24°	Ø18 [0.71"]	-	-
DN80 PN16	Ø200 [7.87"]	Ø160 [6.30"]	34.5°	8 x 24°	Ø18 [0.71"]	Ø116.2 [4.57"]	Ø100 [3.94"]

Gasket dimensions table

Flange version	H mm [inch]	I mm [inch]	O-ring gasket (di) x (da) x (t) mm [inch]
DN50 PN6	3 [0.12"]	12 [0.47"]	O-ring 67 [2.64"] x 79 [3.11"] x 4 [0.16"]
DN50 PN16	-	18 [0.71"]	For any gasket (not included in delivery)
DN50 PN16	3 [0.12"]	18 [0.71"]	O-ring 67 [2.64"] x 79 [3.11"] x 4 [0.16"]
DN80 PN16	-	18 [0.71"]	For any gasket (not included in delivery)
DN80 PN16	3.9 [0.15"]	18 [0.71"]	O-ring ID100 [3.94"] x Ø 6 [0.24"]

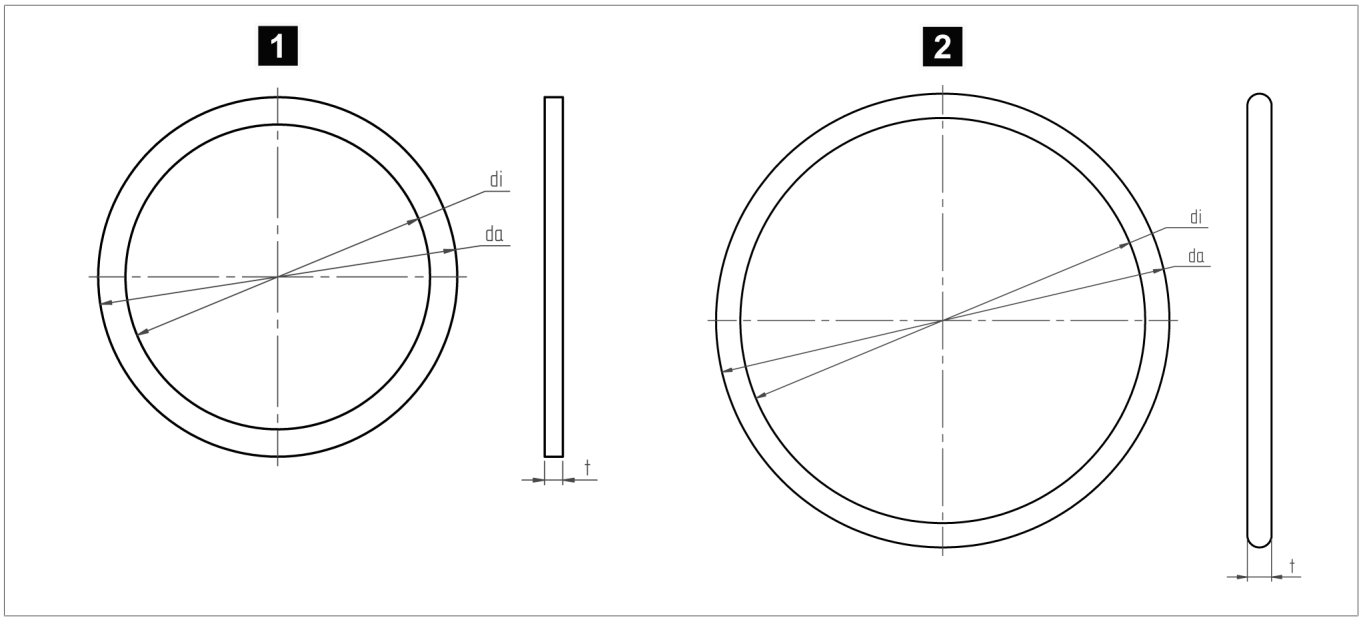

Figure 6: Flange gaskets

1	O-ring gasket for DN50/PN6/16
2	O-ring for DN80/PN16

Electrical connection

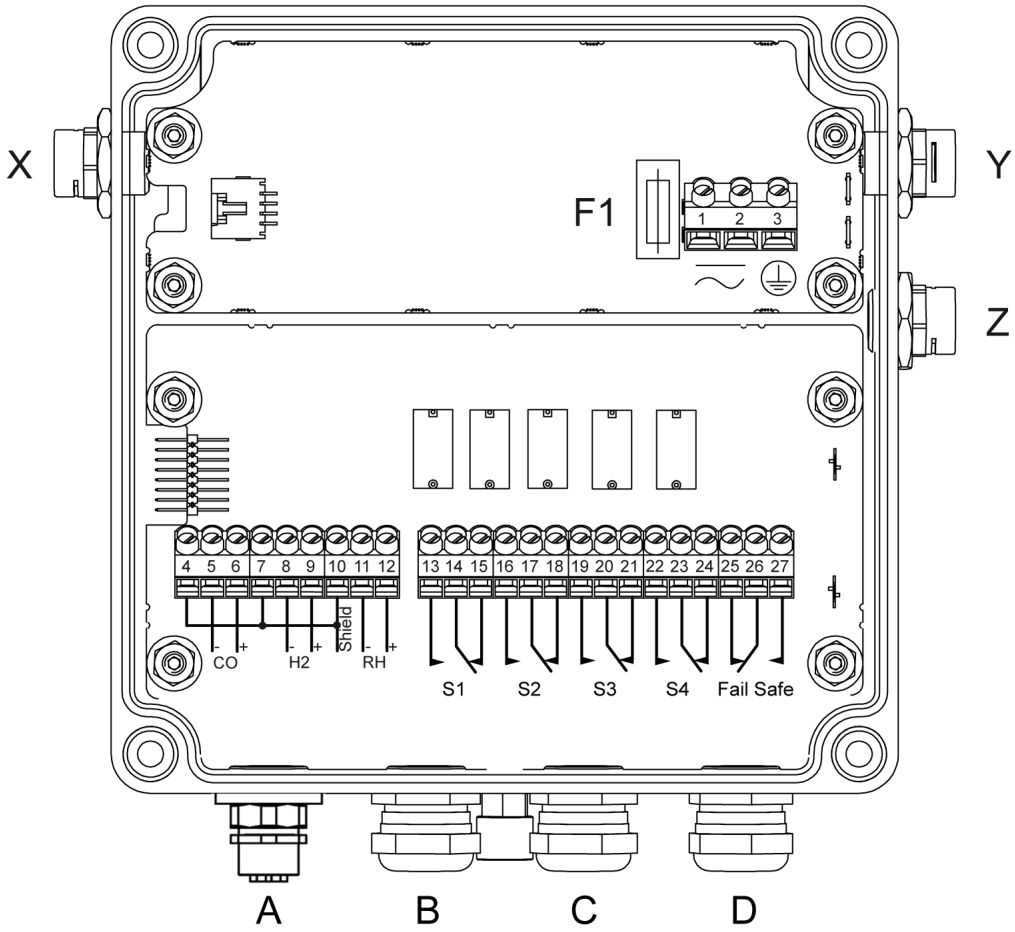

Figure 7: Electrical connection

1-2	Supply voltage (overvoltage category III) 95...280 V AC 50/60 Hz or 95...280 V DC (any polarity)
3	Protective conductor
4-12	Analog outputs 4…20mA passive (must be supplied with 24 V DC)
13-27	Main switching contacts (crossovers for state signaling): capacity: 30 V DC / 5 A to 300 V DC / 0.25 A or 250 V AC / 5 A; max. 400 V AC, cos φ = 1 at 85°C, observe warning information.
F1	Safety fuse 500 V, 500 mA, delayed-action
A	M12 socket, type A fro Modbus RTU (RS485) and for USB service adapter (included in delivery)
B	M20x1.5 cable screw connection for analog outputs
C	M20x1.5 cable screw connection for signaling relay
D	M20x1.5 cable screw connection for supply voltage
X, Y, Z	Vents

Protocol converter dimensions

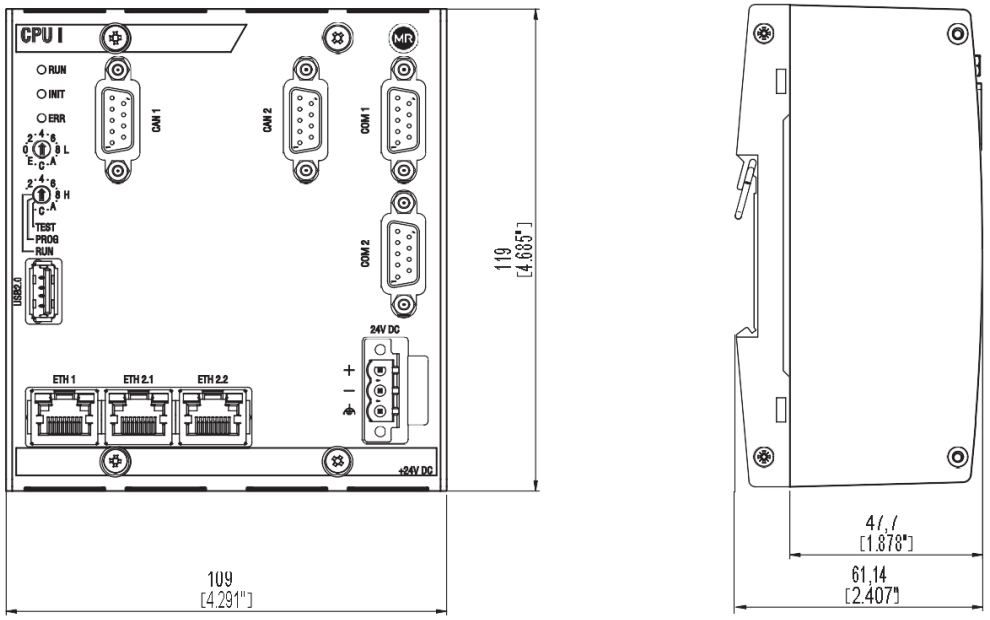

Figure 8: Protocol converter

Wide range power supply unit dimensions

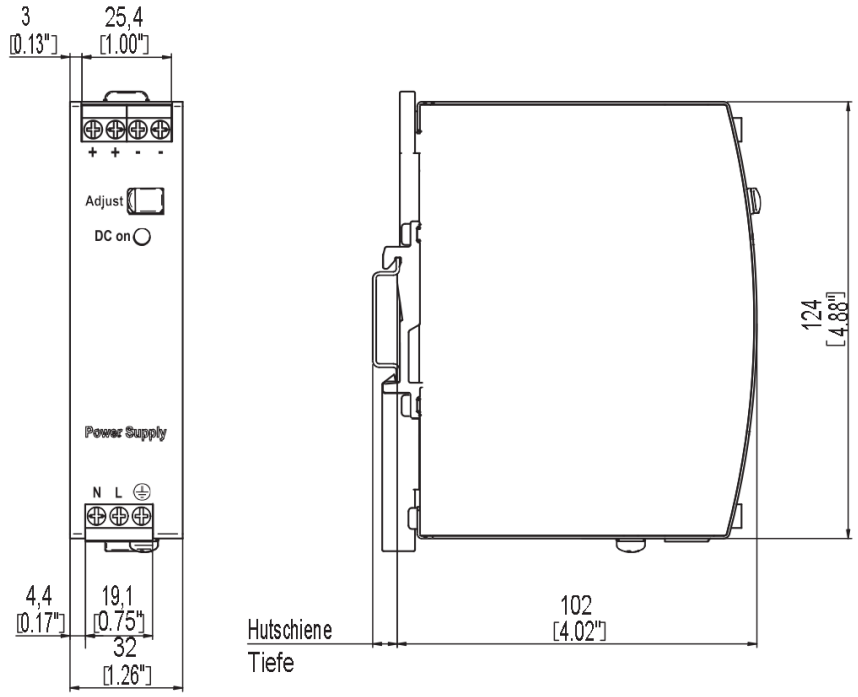

Figure 9: Wide range power supply unit

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