

Calculation unit

With multiple sensor inputs and calculation capabilities

Model BSU-30

WIKA data sheet SP 89.04

For approvals, see
page Seite 6

Applications

- Gas monitoring
- Gas quality control
- Determination of molar mass, specific gravity and binary gas concentrations
- Management of density and temperature sensor (model DTG-30) and pressure sensor

Special features

- Temperature-pressure compensated density (CD)
- Calculation of gas concentrations in binary mixtures (% gas A / % gas B), specific gravity (SG) and molar mass (M)
- Conversion into analogue and digital formats
- Calculated values available via 4 ... 20 mA outputs or RS-485 Modbus®
- Display of calculated values



Calculation unit, model BSU-30

Description

The model BSU-30 is a calculation unit that combines several sensor inputs and calculates specific parameters. With its small footprint, the model BSU-30 is ideal for use in gas metering systems.

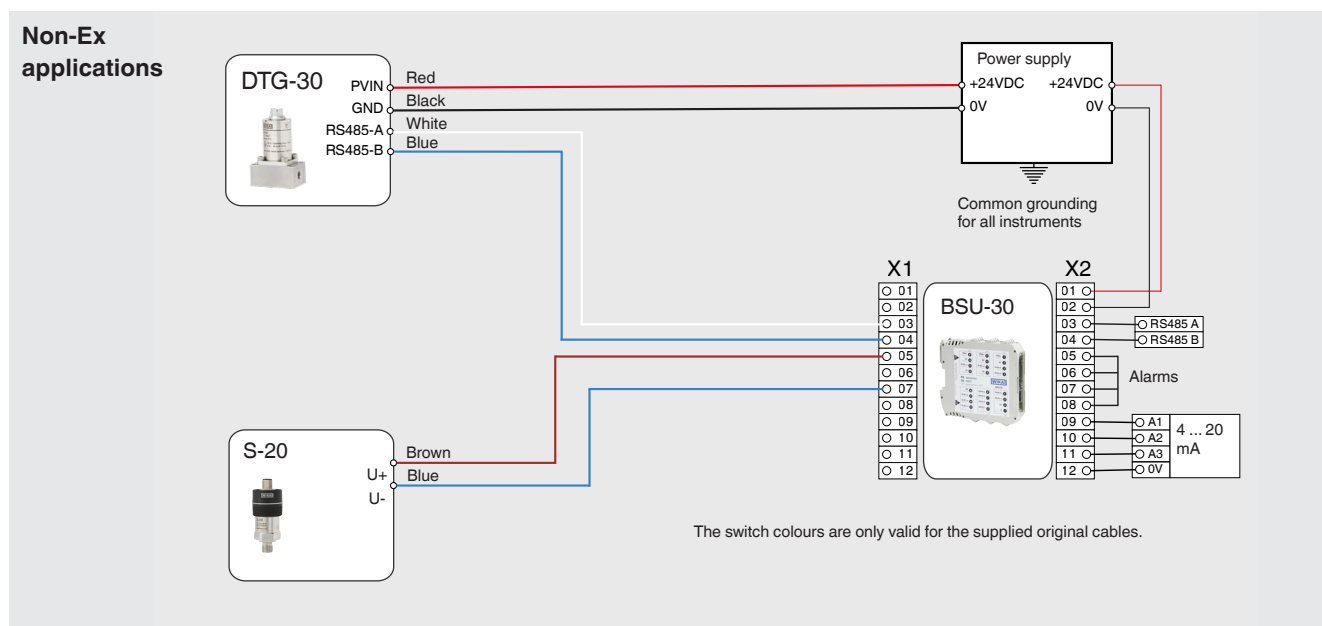
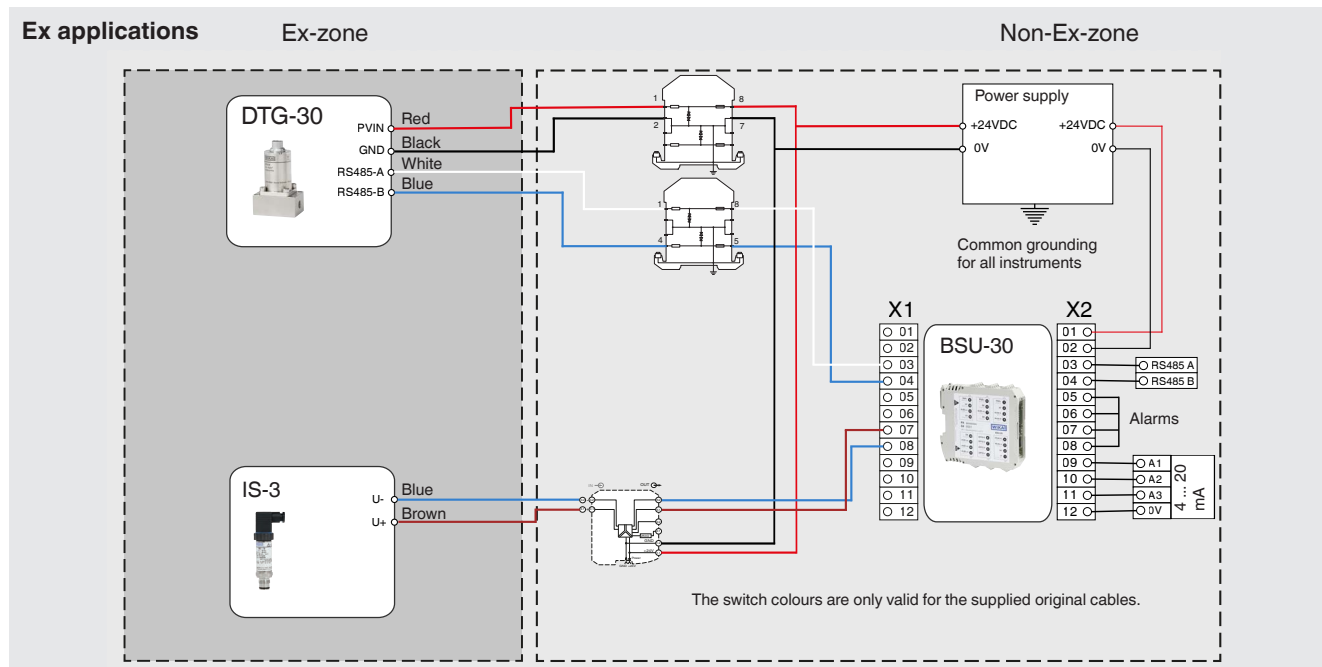
The BSU-30 is equipped with two 4 ... 20 mA analogue inputs for the connection of one or two pressure sensors (such as model IS-3 or model S-20) and with one RS-485 Modbus® input for the connection of one or two density and temperature sensors (model DTG-30).

The model BSU-30 can calculate secondary values such as average molar mass, specific gravity or gas concentration in binary mixtures from primary measurements (temperature, pressure and density).

In addition, the model BSU-30 can make available the calculated values as well as the primary measurements to other systems such as PLC, DCS or display in analogue or digital formats.

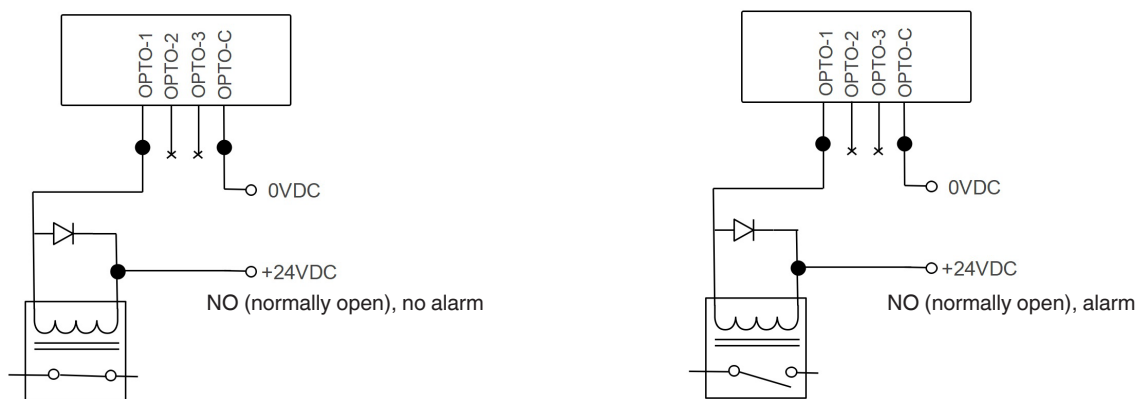
Specifications

Wiring scheme, example



→ The pin assignments vary depending on the selected connector type, which can be found in the respective data sheet of the pressure sensor.

Optocoupler outputs



Basic information

Compatible sensors

Model DTG-30	Temperature and density
Model IS-3 ¹⁾	Pressure, Ex
Model S-20 ¹⁾	Pressure, non-Ex

Measuring range of the pressure sensor

- 0 ... 1.6 bar abs.
- 0 ... 2.5 bar abs.
- 0 ... 10 bar abs.
- Other measuring ranges on request

Calculated values

- Temperature- and pressure-compensated density (kg/m³)
- Molar mass (g/mol)
- Gas concentration in binary mixtures (% gas A, % gas B) for biogas and offgas profiles
- Other gas mixtures on request
- Specific gravity
- Other calculations on request

Mounting

Suitable for DIN rail per EN 60715, TH 35 rail (not included in delivery)

Case

Material	Polyamide, grey
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1) Sensor types recommended by the manufacturer. Other sensors with the same pressure range and accuracy can also be used.

Input signal / Output signal

Analogue input	4 ... 20 mA, for pressure sensor → Second 4 ... 20 mA input on request
Digital input	Modbus® RTU (RS-485), for model DTG-30
Analogue output	3 x 4 ... 20 mA (active)
Digital output	Modbus® RTU (RS-485)
Modbus® RTU (RS-485)	
Baud rate	9600
Data format (bits)	8
Stop bit	1
Parity bit	0
Flow control	No
Bit numbering	LSB (least significant bit) → 32-bit words first
Format	FLOAT32 (ABCD)

Input signal / Output signal	
Optocoupler output	■ OPTO1; active ■ OPTO2; on request ■ OPTO3; on request → Galvanically isolated
Communication	
Network connection	→ Ethernet connection via RJ-45 connector, only for factory configuration.
Communication protocol	Modbus® RTU
Power supply	
Current consumption	DC 12 ... 24 V < 150 mA at DC 24 V → With one set of sensors connected and one 4 ... 20 mA output

Pin assignment

X1 (left connection side)			
Pin	Designation	Function	Sensor ¹⁾
X1-1	+ PSD	Power supply DC 12 ... 24 V	DTG-30
X1-2	Ground	Common 0V	DTG-30
X1-3	RS-485-A (+)	RS-485-A input (Modbus® master)	DTG-30
X1-4	RS-485-B (-)	RS-485-B input (Modbus® master)	DTG-30
X1-5	+PSA	Power supply	Pressure sensor
X1-6	Ground	Common 0V	Pressure sensor
X1-7	Input 1	Analogue input 1	Pressure sensor
X1-8	Ground	Common 0V	Pressure sensor
X1-9	+PSA	Power supply	Pressure sensor ²⁾
X1-10	Ground	Common 0V	Pressure sensor ²⁾
X1-11	Input 2	Analogue input 2	Pressure sensor ²⁾
X1-12	Ground	Common 0V	Pressure sensor ²⁾

1) Pressure sensors depending on version, see „Wiring scheme, example“

2) Connection for second pressure sensor on request.

X2 (right connection side)		
Pin	Designation	Function
X2-1	+V	Power IN DC 12 ... 24 V
X2-2	Ground	0V
X2-3	RS-485-A (+)	RS-485-A terminal (Modbus® slave)
X2-4	RS-485-B (-)	RS-485-B terminal (Modbus® slave)
X2-5	OPTO-1-NO	NO contact, alarm 1: default contact based on C1 < 0.9
X2-6	OPTO-2-NO	NO contact, alarm 2 (on request)
X2-7	OPTO-3-NO	NO contact, alarm 3 (on request)
X2-8	OPTO-C	Common optocoupler output (0V)
X2-9	A1 (+)	Analogue output 1 (4 ... 20 mA)
X2-10	A2 (+)	Analogue output 2 (4 ... 20 mA)
X2-11	A3 (+)	Analogue output 3 (4 ... 20 mA)
X2-12	Ground	Common 0V (for analogue outputs)

Analogue output configuration					
Setting	Name	A1 (+)	A2 (+)	A3 (+)	OLED display, every 5 s
1A	Standard	233.15 K ... 378.15 K	0 ... 20 bar	0 kg/m ³ ... 10 kg/m ³ (density)	T, D, P, C1, F1, M, CD, SG
1B	Exhaust gas	233.15 K ... 378.15 K	0 ... 20 bar	0 % ... 20 % CH ₄	T, D, P, C1, % CO ₂ , % CH ₄
1C	Biogas	233.15 K ... 378.15 K	0 ... 20 bar	0 % ... 100 % CH ₄	T, D, P, C1, % CO ₂ , % CH ₄
1D	Molar mass	233.15 K ... 378.15 K	0 ... 20 bar	0 g/mol ... 100 g/mol (molar mass)	T, D, P, C1, M
1E	Specific gravity	233.15 K ... 378.15 K	0 ... 20 bar	0 ... 2 specific gravity	T, D, P, C1, CD, SG
1F	Compensated density	233.15 K ... 378.15 K	0 ... 20 bar	0 kg/m ³ ... 11.5 kg/m ³ compensated density (T _{ref} = 273,15 K, P _{ref} = 1013,25 mbar)	T, D, P, C1, CD, SG

T = temperature
D = density
P = pressure
SG = specific gravity

CD = compensated density
C1 = confidence factor, see model DTG-30 operating instructions
F1 = resonance frequency of the sensor element

M = molar mass
CO₂ = carbon dioxide
CH₄ = methane

→ Other configurations on request.

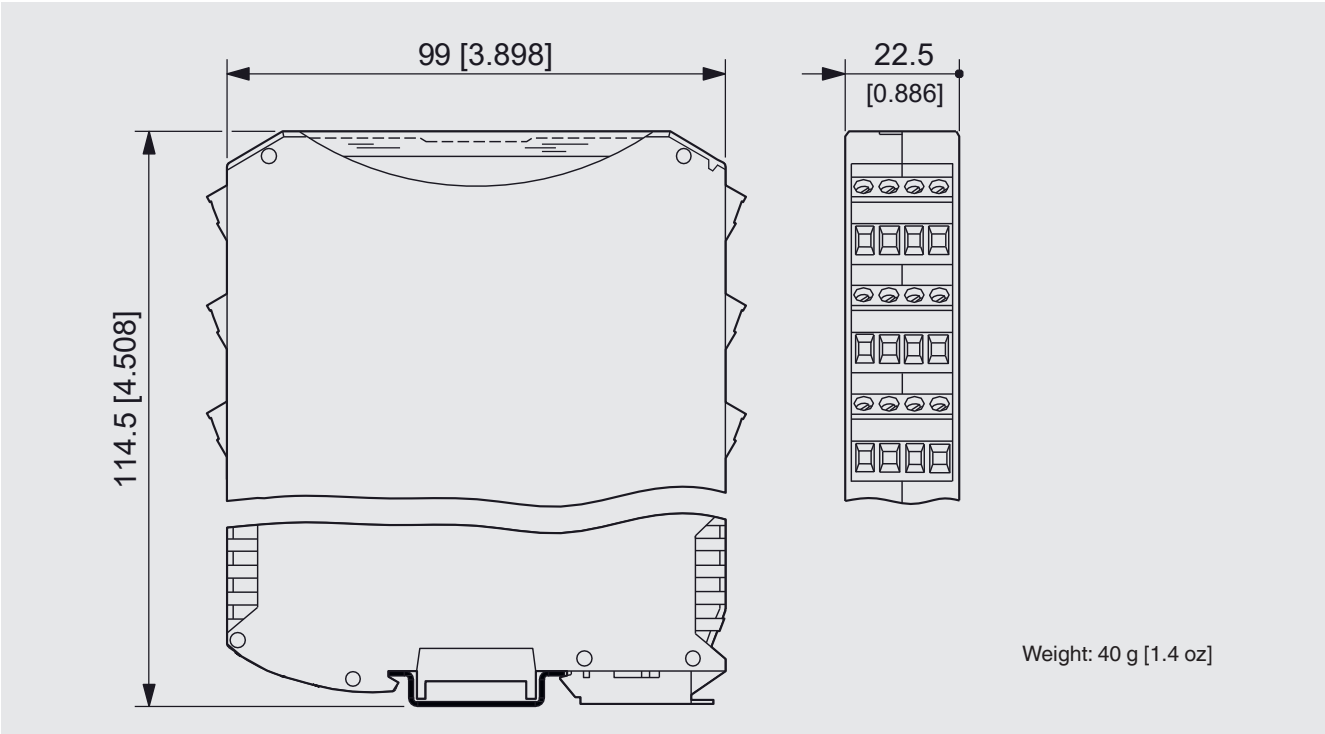
Modbus®					
Address	Length	R/W	Designation	Unit	Settings
102	2 x 16 bits	R	Serial number	N/A	N/A
104	2 x 16 bits	R	Temperature	K	All
106	2 x 16 bits	R	Density	kg/m ³	All
108	2 x 16 bits	R	Pressure	bar	All
110	2 x 16 bits	R	Compensated density (T _{ref} , P _{ref})	kg/m ³	1A, 1E, 1F
112	2 x 16 bits	R	Molar mass	g/mol	1D
114	2 x 16 bits	R	Specific gravity	N/A	1E 1F
116	2 x 16 bits	R	% gas A	%	1B, 1C
118	2 x 16 bits	R	% gas B	%	1B, 1C
122	2 x 16 bits	R	C1 (confidence factor)	N/A	All
126	2 x 16 bits	R	Frequency (F1)	Hz	All
128	2 x 16 bits	R/W	Temperature offset	K	All
130	2 x 16 bits	R/W	Density offset	kg/m ³	All
132	2 x 16 bits	R/W	Pressure offset	bar	All
134	2 x 16 bits	R/W	Compensated density (T _{ref} , P _{ref}) offset	kg/m ³	1A, 1E, 1F
138	2 x 16 bits	R/W	Molar mass offset	g/mol	1D
140	2 x 16 bits	R/W	Specific gravity offset	N/A	1E, 1F
142	2 x 16 bits	R/W	% gas A offset	%	1B, 1C
144	2 x 16 bits	R/W	% gas B offset	%	1B, 1C

Operating conditions	
Operating temperature range	-20 ... +60 °C [-4 ... +140 °F]
Storage temperature range	-40 ... +70 °C [-40 ... +158 °F]

Approvals

Logo	Description	Region
CE	EU declaration of conformity	European Union
	RoHS directive	

Dimensions in mm [in]



Ordering information

Model / Setting / Pressure range

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WIKA Alexander Wiegand SE & Co. KG
Alexander-Wiegand-Straße 30
63911 Klingenberg/Germany
Tel. +49 9372 132-0
info@wika.de
www.wika.de