Analog Modules ASi IP20

(Figure similar)

Figure	Type	Inputs analog	Outputs analog	Input voltage (sensor supply) [1]	Output voltage (actuator supply) [2]	ASi address [3]	Art. no.
	IP20, 22,5 mm x 92 mm 4 x COMBICON	2 x 4 ... 20 mA / 0 ... 10 V	–	selectable, from ASi or AUX, default ASi	–	1 AB address	BWU1897
	IP20, 22,5 mm x 92 mm 4 x COMBICON	2 x 4 ... 20 mA / 0 ... 10 V	–	selectable, from ASi or AUX, default ASi	–	1 single address	BWU1345
	IP20, 22,5 mm x 92 mm 4 x COMBICON	–	2 x 0 ... 20 mA / 0 ... 10 V	–	selectable, from ASi or AUX, default ASi	1 single address	BWU1412
	IP20, 22,5 mm x 92 mm 4 x COMBICON	–	2 x 0 ... 20 mA / 0 ... 10 V	–	selectable, from ASi or AUX, default AUX	1 single address	BWU1727
	IP20, 22,5 mm x 92 mm 4 x COMBICON	–	2 x -10 V ... +10 V	–	out of AUX	1 single address	BWU2224
	IP20, 22,5 mm x 105 mm 6 x COMBICON	4 x 4 ... 20 mA	–	from ASi or AUX, auto switching	–	1 single address	BWU1364
	IP20, 22,5 mm x 105 mm 6 x COMBICON	4 x 0 ... 10 V	–	from ASi or AUX, auto switching	–	1 single address	BWU1365
	IP20, 22,5 mm x 105 mm 6 x COMBICON	4 x Pt100	–	out of ASi	–	1 single address	BWU1368
	IP20, 22,5 mm x 105 mm 6 x COMBICON	4 x thermocouple type J	–	out of ASi	–	1 single address	BWU1933
	IP20, 22,5 mm x 105 mm 6 x COMBICON	4 x thermocouple type K	–	out of ASi	–	1 single address	BWU2243
	IP20, 22,5 mm x 105 mm 6 x COMBICON	–	4 x 0 ... 20 mA	–	from ASi or AUX, auto switching	1 single address	BWU1366
	IP20, 22,5 mm x 105 mm 6 x COMBICON	–	4 x 0 ... 10 V	–	from ASi or AUX, auto switching	1 single address	BWU1367

[1] **Input voltage (sensor supply):** inputs are supplied by ASi or by AUX (auxiliary 24 V power). If supplied by ASi, inputs shall not be connected to earth or to external potential.

[2] **Output voltage (actuator supply):** outputs are supplied by ASi or by AUX (auxiliary 24 V power). If supplied by ASi, outputs shall not be connected to earth or to external potential

[3] **ASi address:** 1 AB address (max. 62 AB addresses/ASi network), 2 AB addresses (max. 31 modules with 2 AB addresses), Single addresses (max. 31 Single addresses/ASi network), mixed use allowed.
For modules with two ASi nodes the second ASi node is turned off as long as the first ASi node is addressed to address "0".
Upon request, ASi nodes are available with specific ASi address profiles.

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Article No.	BWU1897	BWU1345	BWU1364	BWU1365	BWU1368	BWU1933	BWU2243
General Data							
Device type	Input						
Connection							
ASi/AUX connection	COMBICON clamp						
Periphery connection	COMBICON clamp						
ASi							
Profile	S-7.A.9	S-7.3					
Address	1 AB address	1 single address					
Required Master profile	≥M4	≥M3					
Since ASi specification	3.0	2.1					
Operating voltage	30 V (18 …31,6 V)	30 V (19 …31,6 V)	30 V (24 …31,6 V)	30 V (18 …31,6 V)			
Max. current consumption	< 80 mA					< 100 mA	
AUX							
Voltage	24 V (18 … 30 V)				–		
Max. current consumption	500 mA				–		
Input							
Number	2 (4 ... 20 mA/ 0 … 10 V)		4 (4 … 20 mA)	4 (0 ... 10 V)	4 (Pt100)	4 (thermo-couple type J)	4 (thermo-couple type K)
Resolution	14 Bit (1 µA / 1mV)	16 Bit (1 µA / 1 mV)	16 Bit (1 µA)	16 Bit (1 mV)	16 Bit (0,1 °C)	16 Bit (0,1 °C)	
Range of value	4000 ... 20000 dec. / 0 ... 10000 dec.		4000 ... 20000 dec.	0 ... 10000 dec.	-200 °C ... +850 °C	-200 °C ... +760 °C	
Internal resistance	50 Ω / 100 kΩ				–	1 MΩ	
Max. input voltage	25 V				–		
Max. input current	40 mA				–		
Power supply	out of ASi or out of AUX				out of ASi		
Power supply of attached sensors	500 mA out of AUX 50 mA out of ASi				50 mA		
Output							
Resolution	–						
Range of value	–						
Resistance of the actuators	–						
Max. output current	–						
Power supply	–						
Power supply of attached actuators	–						
Environment							
Applied standards	EN 61000-6-2 EN 61000-6-4 EN 60529						
It can be used with a switched AUX cable, which is passively safe up to SIL3/PLe	no [1]				yes [2]		
Operating altitude	max. 2000 m						
Operating temperature	0 °C … +70 °C						
Storage temperature	-25 °C … +85 °C						
Housing	plastic, for DIN rail mounting						
Pollution degree	2						
Protection category	IP20						
Voltage of insulation	≥ 500 V						
Weight	120 g			145 g			
Dimension (W / H / D in mm)	22,5 / 99 / 92			25 / 105 / 114			

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(1) The module is not suitable for use in paths with a passively safe-switched AUX cable, since an exclusion of errors cannot be assumed for the connection of the two ASi and AUX potentials.
If the module is supplied from an unswitched AUX cable, this has no influence on the safety consideration for the paths with passively safe-switched AUX cable. In an ASi circuit, paths supplied from a passively safe-switched AUX cable and paths supplied from unswitched AUX potential can be used together.

(2) The module is suitable for use in passively safe paths as it has no connection to an AUX potential.

Article No.	BWU1366	BWU1367	BWU1412	BWU1727	BWU2224
General Data					
Device type	output				
Connection					
ASi/AUX connection	COMBICON clamps				
Periphery connection	COMBICON clamps				
ASi					
Profile	S-7.3				S-7.3.5
Address	1 single address				
Required Master profile	≥ M3				
Since ASi specification	2.1				
Operating voltage	30 V (24 … 31,6 V)	30 V (18 … 31,6 V)			
Max. current consumption	<80 mA				<100 mA
AUX					
Voltage	24 V (18 … 30 V)				
Max. current consumption	500 mA				
Input					
Resolution	–				
Range of value	–				
Internal resistance	–				
Max. input voltage	–				
Max. input current	–				
Power supply	–				
Power supply of attached sensors	–				
Output					
Number	4 (0 … 20 mA)	4 (0 … 10 V)	2 (0 … 20 mA/0 … 10 V)		2 (-10 V … +10 V)
Resolution	16 Bit (1 µA)	16 Bit (1 mV)	16 Bit (1 µA / 1 mV)		16 Bit
Range of value	0 … 20000 dec.	0 … 10000 dec.	0 … 20000 dec. / 0 … 10000 dec.		-10000 … +10000 dec.
Resistance of the actuators	–				≥1 kΩ
Max. output current	–				10 mA
Power supply	out of ASi or out of AUX				out of AUX
Power supply of attached actuators	500 mA out of AUX 50 mA out of ASi				500 mA

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Article No.	BWU1366	BWU1367	BWU1412	BWU1727	BWU2224
Environment					
Applied standards	EN 61000-6-2 EN 61000-6-4 EN 60529				
It can be used with a switched AUX cable, which is passively safe up to SIL3/PLe	no [1]				
Operating altitude	max. 2000 m				
Operating temperature	0 °C … +70 °C				0 °C … +60°C
Storage temperature	-25 °C … +85 °C				
Housing	plastic, for DIN rail mounting				
Pollution degree	2				
Protection category	IP20				
Voltage of insulation	≥ 500 V				
Weight	145 g		120 g		
Dimension (W / H / D in mm)	22,5 / 105 / 114		22,5 / 99 / 92		

[1] The module is not suitable for use in paths with a passively safe-switched AUX cable, since an exclusion of errors cannot be assumed for the connection of the two ASi and AUX potentials.
If the module is supplied from an unswitched AUX cable, this has no influence on the safety consideration for the paths with passively safe-switched AUX cable. In an ASi circuit, paths supplied from a passively safe-switched AUX cable and paths supplied from unswitched AUX potential can be used together.

Wiring rules

	Push-in terminals
General	
Nominal cross section	2.5 mm^2
Conductor cross section	
Conductor cross section solid	0.2 ... 2.5 mm^2
Conductor cross section flexible	0.2 ... 2.5 mm^2
Conductor cross section flexible, with ferrule	without plastic sleeve: 0.2 ... 2.5 mm^2
	with plastic sleeve: 0.25 ... 2.5 mm^2
2 conductors with same cross section, stranded, with TWIN ferrules	without plastic sleeve: 0.5 ... 1.5 mm^2
AWG	24 ... 14
Stripped insulation length	10 mm

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Programming

| Bit	Bit setting			
	input			
	P3	**P2**	**P1**	**P0**
BWU1345	0: both channels in current mode and without broken wire recognition 1: normal operation	1: peripheral fault is indicated 0: peripheral fault is not indicated	0: channel 2 is not projected 1: channel 2 is projected	0: 60 H filter in A/D converter active 1: 50 H filter in A/D converter active
BWU1364 / BWU1365	0: peripheral fault is not indicated 1: peripheral fault is indicated	Analog module is switched on-/off (bit combination P1 and P2		
BWU1368	0: 4 wire-mode 1: 2 wire-mode	A peripheral fault can be released through channel X (bit combination P1 and P2)		
BWU1897	–	1: peripheral fault is indicated 0: peripheral fault is not indicated	0: both channels in current mode and without broken wire recognition 1: normal operation	
BWU1933 / BWU2243	0: external cold-junction compensation 1: internal cold-junction compensation	Analog module is switched on-/off (bit combination P1 and P2)	A peripheral fault can be released through channel X (bit combina-tion P1 and P2)	

Combination of input bits P1 and P2											
BWU1364, BWU1365						**BWU1368, BWU1933, BWU2243**					
Channel c.X is						Peripheral fault can be released through channel					
P1	P2	c.1	c.2	c.3	c.4	P1	P2	1	2	3	4
0	0	on	off	off	off	0	0	yes	no	no	no
0	1	on	on	off	off	0	1	yes	yes	no	no
1	0	on	on	on	off	1	0	yes	yes	yes	no
1	1	on	on	on	on	1	1	yes	yes	yes	yes

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Bit	Bit setting			
	output			
	P3	**P2**	**P1**	**P0**
BWU1366 / BWU1367	–	0: peripheral fault is not indicated 1: peripheral fault is indicated	–	0: profile is not monitored 1: profile is monitored:
BWU1412 / BWU1727	0: channel 2 is in mode voltage module 1: channel 2 is in mode current module		0: channel 1 is in mode voltage module 1: channel 1 is in mode current module	0: mode of channel 1 and 2 (bit combination P1 and P3) 1: automatic mode recognition
BWU2224	–		–	

Programming notes					
Article no.	**ID Code**	**ID1 Code**		**ID2 Code**	**IO Code**
BWU1345	3_{hex}	ID1 = F (default)		D_{hex}	7_{hex}
BWU1364, BWU1365, BWU1368, BWU1933, BWU2243	3_{hex}	ID1 = F (default)		E_{hex}	7_{hex}
BWU1366, BWU1367	3_{hex}	ID1 = F (default)		6_{hex}	7_{hex}
BWU1412, BWU1727	3_{hex}	ID1 = F (default)		5_{hex}	7_{hex}
BWU1897 [1]	A_{hex}	**Code-Definition**		9_{hex}	7_{hex}
		ID1	14 bit	12 Bit	
		channel 1	0; 2; 3	1	
		channel 1 and 2	4; 5; 7 (default)	6	
BWU2224	3_{hex}	F_{hex} (default)		5_{hex}	7_{hex}

[1] BWU1897 can transfer either 12 or 14 bit-values. Via ID1 the data capacity and the channel number can be defined.

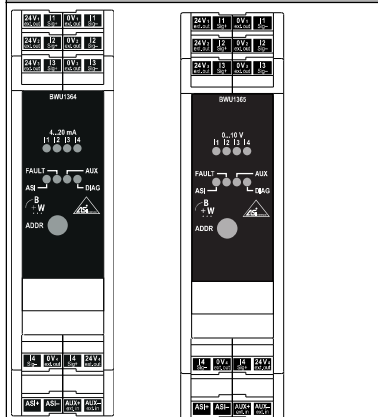| UL-specifications (UL508) BWU1345, BWU1364, BWU1365, BWU1366, BWU1367, BWU1368, BWU1412, BWU172,7 BWU1933, BWU1897, BWU2243	
External protection	An isolated source with a secondary open circuit voltage of ≤30 V_{DC} with a 3 A maximum over current protection. Over current protection is not required when a Class 2 source is employed.
In general	UL mark does not provide UL certification for any functional safety rating or aspects of the above devices.

Connections BWU1345, BWU1897
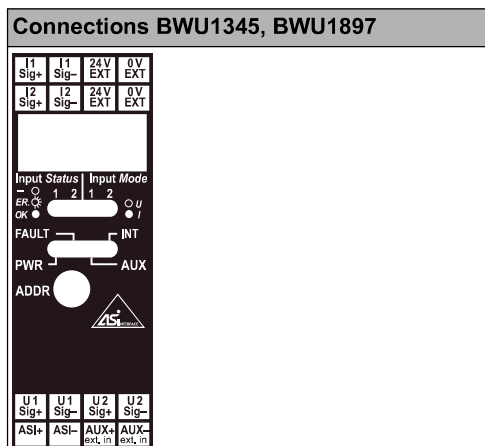
LEDs BWU1345, BWU1897	
PWR (green)	ASi voltage
FAULT (red)	ASi communication error, peripheral fault
AUX (green)	Voltage supply 24 V for the analog part
INT (green)	Voltage supply for the analog part out of ASi
Analog 1 (green)	State of channel 1
Analog 2 (green)	State of channel 2
Analog 1 (green)	On: current measurement; off: voltage measurement
Analog 2 (green)	On: current measurement; off: voltage measurement

Current or voltage modules can be attached over different clamps. The current supply of the sensors can take place depending upon position of a slide switch from ASi or from external voltage (after PELV). With the help of a 2. slide switch the 2. channel in favor of faster data communication can be switched off. The position of the slide switches is indicated over LEDs.
Supplying external loads:
• by supply out of ASi: 50 mA max.
• y external supply: 500 mA max. (750 mA fuse)

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Connections BWU1364, BWU1365

LEDs BWU1364, BWU1365

PWR (green)	ASi voltage
FAULT (red)	ASi communication error, peripheral fault
AUX (green)	Voltage supply 24 V for the analog part
DIAG (green)	Diagnosis
I1 ... I4 (yellow)	State of channel I1, I2, I3, I4

The current supply of the sensors can be made out of ASi or an external voltage supply (according to PELV). The current supply switches automatically to the supply out of external voltage supply, as soon as an external voltage is connected.
The analog sensors and ASi are galvanically separated.

Connections BWU1366, BWU1367
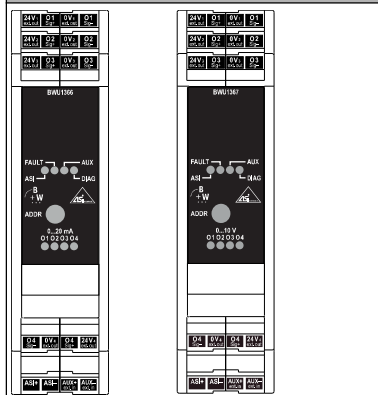
LEDs BWU1366, BWU1367

PWR (green)	ASi voltage
FAULT (red)	ASi communication error, peripheral fault
AUX (green)	Voltage supply 24 V for the analog part
DIAG (green)	Diagnosis
O1 ... O4 (yellow)	State of channel O1, O2, O3, O4

The current supply of the actuators can made out of ASi or an external voltage supply (according to PELV). The current supply switches automatically to the supply out of external voltage supply, as soon as an external voltage is connected.
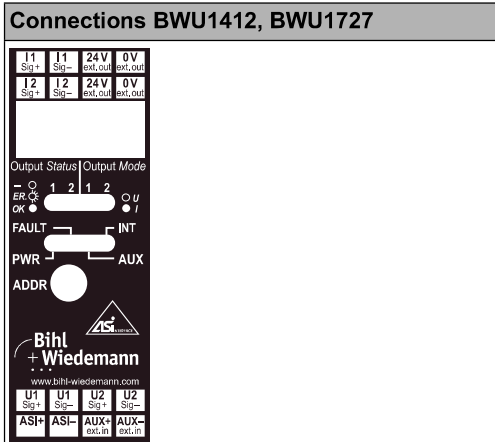The actuators and ASi are galvanically separated.

Connections BWU1368
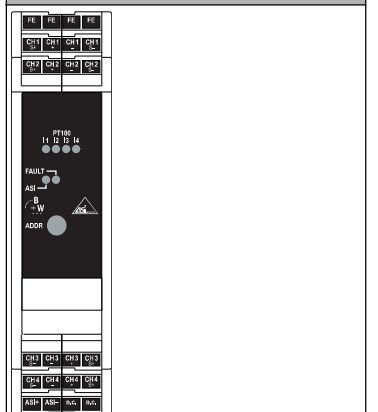
LEDs BWU1368

|	
PWR (green)	ASi voltage
FAULT (red)	ASi communication error, peripheral fault
I1 ... I4 (yellow)	State of channel I1, I2, I3, I4

The measuring sensors and ASi are galvanically separated.

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Connections BWU1412, BWU1727

LEDS BWU1412, BWU1727	
PWR (green)	ASi voltage
FAULT (red)	ASi communication error, peripheral fault
AUX (green)	Voltage supply 24 V for the analog part
INT (green)	Voltage supply for the analog part out of ASi
Analog 1 (green)	State of channel 1
Analog 2 (green)	State of channel 2
Analog 1 (green)	Channel 1: on: current measurement; off: voltage measurement
Analog 2 (green)	Channel 2: on: current measurement; off: voltage measurement

Current or voltage modules can be attached over different clamps. The current supply of the actuators can take place depending upon position of a slide switch from ASi or from external voltage (after PELV). The position of the slide switch is indicated over LEDs. BWU1897: With the help of a 2. slide switch the 2. channel in favor of faster data communication can be switched off.
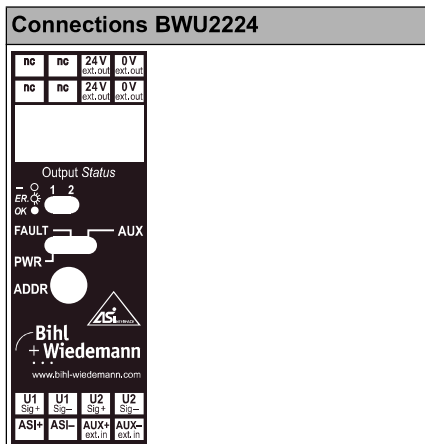
Connections BWU1933, BWU2243
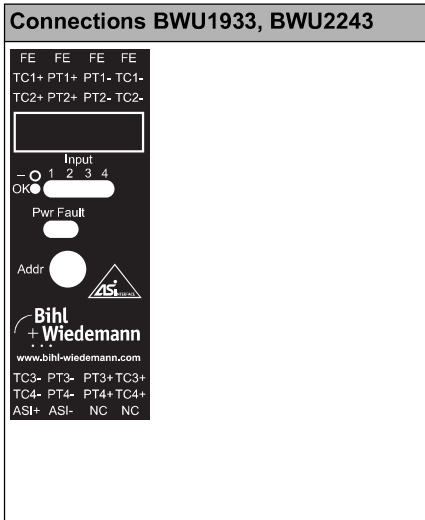
Terminal connections BWU1933, BWU2243	
FE	Functional earth
TCx±	Thermo element +/– (inputs 1 - 4)
PTx±	PT100 +/– (External cold junction compensation)
ASi±	ASinterface +/–
n.c.	Not connected

The inputs ch. 2, ch. 3 and ch 4 are connected with a bridge and a resistor (in default state) to become a valid input value and to avoid peripheral faults.
This can also be obtained by setting the paramater P1 and P2.
The temperature is measured using cold junction temperature compensation. The analog sensors are galvanical separated to ASi. For internal compensation the peripheral fault can be caused by a broken wire of the thermocouple. For the external compensation (Pt100 in connectors 2 and 3) the peripheral fault can also be caused by a broken wire or a short circuit of the Pt100 element. A short circuit of the TC cannot be recognized as an error.
Note:
Precise cold junction compensation requires vertical mounting and natural air circulation. A clearance of at least 5 cm each side is required!

LEDs BWU1933, BWU2243	
PWR (green)	ASi voltage
FAULT (red)	ASi communication error, peripheral fault
In1 ... In4 (yellow)	State of channel I1, I2, I3, I4

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Connections BWU2224
nc / nc / 24V ext.out / 0V ext.out
nc / nc / 24V ext.out / 0V ext.out
Output *Status*
ER. / OK / 1 2
FAULT — AUX
PWR
ADDR
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U1 Sig+ / U1 Sig− / U2 Sig+ / U2 Sig−
ASI+ / ASI− / AUX+ ext.in / AUX− ext.in

LEDs BWU2224	
PWR (green)	ASi voltage
FAULT (red)	On: ASi communication error; flashing: peripheral fault
AUX (green)	Voltage supply 24 V for the analog part
1 (yellow)	State of channel 1
2 (yellow)	State of channel 2

U1 $_{Sig.-}$ and U2 $_{Sig.-}$ connected.

The outputs are short circuit. The output channels have a common reference potential. The actuators are controlled from separate 24 V and they are galvanically isolated from ASi and AUX.

⚠ IP54	**Note**
	To achieve passive safety, the device must be installed in a switching cabinet with protection class IP54.

Accessories:
• **ASi-5/ASi-3 Address Programming Device (art. no. BW4708)**

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