

# Circuit Board Modules AS-i, PCB Solutions

**Safety and standard E/A in one module**

**1 diagnostic address**

**1 electronic safety output**

**Additional 2 standard inputs and 2 standard outputs**

**Protection category IP00**



## Article no. BW2914: AS-i Safety Circuit Board Module with Diagnostic Slave and 2I/2O

The stainless steel AS-i Safety Monitor controls the outputs of the AS-i Safety Output Module by using a safety single address.

To set the safety AS-i address, the DIP switches have to be in the following position SW1 = on / SW2 = off. Addressing can then be accomplished, for example, by using an AS-i addressing device.

Several AS-i Safety Output Modules can have the same safety address and can be controlled via this same safety address on a AS-i circuit.

All AS-i Safety Output Modules with the same safety address switch simultaneously.

In addition to the safety single address the module also contains an AB address used to transmit the states of the standard inputs and standard outputs.

An additional AB slave is available for diagnostics.

<b>Article-no.</b>	<b>BW2914</b>
<b>Connection</b>	
AS-i/peripheral connection	screw terminals
Length of connector cable	I/O: max. 3 m <sup>1</sup>
<b>AS-i</b>	
Profile, S-IO.ID.ID2	diagnostic slave: S-7.A.E (ID1 = 5 default) I/O slave: S-7.A.E (ID1 = 7 default)
Address	1 single slave + 2 AB slaves
Operating voltage	30 V (18 ... 31,6 V)
Required Master profile	≥ M3
As of AS-i specification	3.0
Max. current consumption	< 200 mA
<b>AUX</b>	
Voltage	24 V (18 ... 30 V)
Max. current consumption	700 mA
<b>Input</b>	
Number	2 standard inputs
Switching current	static 4 mA at 24 V dynamic 15 mA at 24 V (T = 100 µs)
Power supply	out of AUX
Power supply of attached sensors	max. 100 mA (∑ inputs and outputs = max. 100 mA)
Switching threshold	< 5 V (low) > 15 V (high)

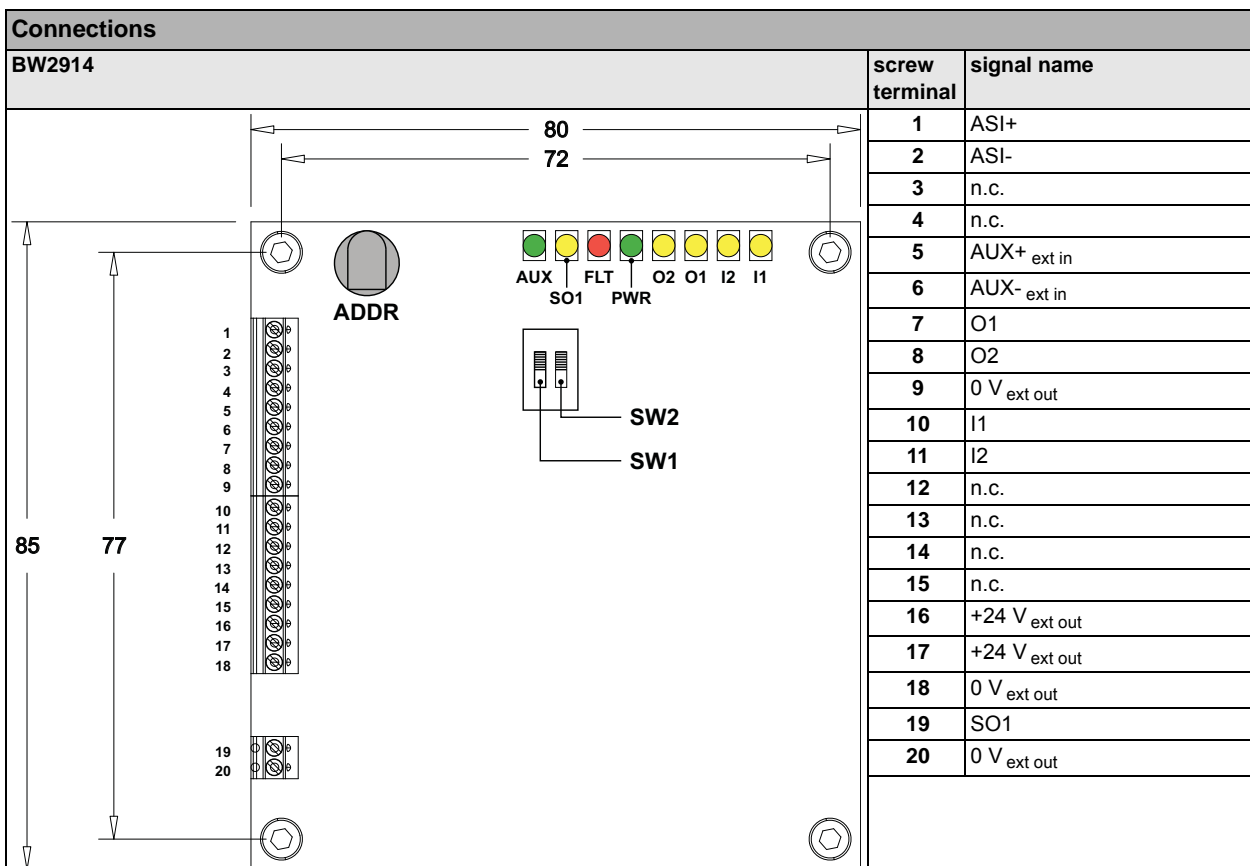
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<b>Article-no.</b>	<b>BW2914</b>
<b>Output</b>	
Number	2 standard outputs 1 safety output
max. contact load	0,5 A <sub>DC-13</sub> at 30 V
Power supply	out of AUX
Max. output current	safety output: max. 500 mA standard outputs: max. 100 mA ( $\Sigma$ inputs and outputs = max. 100 mA)
Test pulse	if output is on: minimum interval between 2 test pulses: 250 ms pulse width: 1 ms
<b>Display</b>	
LED AUX (green)	on: 24 V <sub>DC</sub> AUX off: no 24 V <sub>DC</sub> AUX
LED SO1 (yellow)	state of safety output SO1 (for definition see table „device colors“)
LED FLT (red)	on: Slave off line
LED PWR (green)	on: AS-i voltage OK
LED O1 (yellow)	state of standard output O1
LED O2 (yellow)	state of standard output O2
LED I1 (yellow)	state of standard input I1
LED I2 (yellow)	state of standard input I2
<b>Environment</b>	
Applied standards	EN 61508 SIL 3 EN 62061 SIL 3 EN ISO 13849-1:2008/AC:2009 PLe cat. 4
Operation altitude	max. 2000 m
Operating temperature	0 °C ... +55 °C
Storage temperature	-25 °C ... +85 °C
Maximum tolerable shock and vibration stress	according EN 61131-2
Coated	yes
Protection category (EN 60529)	IP00 (coated)
Dimensions (L / W / H) in mm	80 / 85 / 12

<sup>1</sup> loop resistance  $\leq$  150  $\Omega$

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Explanation	
AS-i+, AS-i-	AS-i bus connection
AUX+ <sub>ext in</sub>	input power supply out of external 24 V, positive pole
AUX- <sub>ext in</sub>	input power supply out of external 24 V, negative pole
+24V <sub>ext out</sub>	output power supply out of external 24 V, positive pole
0V <sub>ext out</sub>	output power supply out of external 24 V, negative pole
I1 ... I2	standard inputs I1 ... I2
O1 ... O2	standard outputs O1 ... O2
SO1	safety output SO1
n.c.	not connected
ADDR	connection for AS-i addressing device
SW1 ... SW2	DIP switches SW1, SW2



## Addressing

- on  SW1  off  on  SW2  off = configuration of AB standard I/O address  
 on  SW1  off  on  SW2  off = configuration of AB diagnostic address  
 on  SW1  off  on  SW2  off = configuration of safety address  
 on  SW1  off  on  SW2  off = RUN

## Programming instructions (Bit values of the standard I/O slave)

Bit	AS-i Output	Bit	AS-i Input
O0	O1	I0	I1
O1	O2	I1	I2
O2	not used	I2	not used
O3	inexistent	I3	not used

Peripheral fault indicates overload of sensor supply

## Programming instructions (Bit values of the diagnostic slave)

Bit	AS-i Output	Bit	AS-i Input				
O0	<table border="1"> <tr> <th>Parameter P1=1</th> <th>Parameter P1=0</th> </tr> <tr> <td>1: switches output SO1 on, if the safety release is active 0: switches output SO1 off, even if the safety release is active</td> <td>not used</td> </tr> </table>	Parameter P1=1	Parameter P1=0	1: switches output SO1 on, if the safety release is active 0: switches output SO1 off, even if the safety release is active	not used	I0	diagnostics (for definition see table device colors)
Parameter P1=1	Parameter P1=0						
1: switches output SO1 on, if the safety release is active 0: switches output SO1 off, even if the safety release is active	not used						
O1	not used	I1					
O2	not used	I2					
O3	inexistent	I3	1: output SO1 controllable via bit O0 0: output SO1 switched off, cause no release or restart inhibited or waiting for reset of error condition signal				

Peripheral fault indicates missing 24V<sub>ext</sub>.

## Diagnostics (device colors)























Value	Color	Description	State change	LED SO1
0	green	output on	–	on
1	green flashing	–	–	–
2	yellow	restart inhibit	auxiliary signal 2	1 Hz
3	yellow flashing	–	–	–
4	red	output off	–	off
5	red flashing	waiting for reset of error condition	auxiliary signal 1	8 Hz
6	gray	internal error, such as fatal error	only via „power on“ on device	all LEDs flashing
7	green/yellow	output released, but not switched on	switched on by setting of O0	off

## Programming instructions (bit values of the AS-i parameter, diagnostic slave)

Bit	AS-i Parameter
<b>Bit P1</b>	
P1=1	Safety output SO1 controlled by safety release and O0=1
P1=0	Safety output SO1 controlled by safety release only
<b>Bits P0, P2, P3:</b>	
not used	

Release	AS-i Parameter	AS-i Safety Output Module, Safety Release via AS-i Safety Monitor	
		no safety release	safety release
AS-i parameter (diagnostic slave) changes function of output bit O0	P1=1 (default) O0=0	semi-conductor output SO1 switched off	semi-conductor output SO1 switched off
	P1=1 O0=1	semi-conductor output SO1 switched off	semi-conductor output SO1 switched on
	P1=0 O0=0	semi-conductor output SO1 switched off	semi-conductor output SO1 switched on
	P1=0 O0=1	semi-conductor output SO1 switched off	semi-conductor output SO1 switched on

## LED flash patterns

LED	State	Signal / Description
AUX (green)		no 24 V <sub>DC</sub> AUX
		24 V <sub>DC</sub> AUX present
SO1 (yellow)		semi-conductor output SO1 switched off
	 1 Hz	restart inhibit, waiting for the start signal to switch on the semi-conductor output SO1
	 8 Hz	device is in unlockable error state; waiting for "reset of error condition signal" from safety monitor, after receiving the signal the device turns into normal operation
		semi-conductor output SO1 switched on
FLT (red)		AS-i communication OK
		no data exchange with at least one AB slave
		24V external power supply unavailable
PWR (green)		no operating voltage
	 1 Hz	operating voltage present, but safety-related AS-i address and/or AS-i AB address is „0“ or no 24V external power supply
		operating voltage present
O1, O2 (yellow)		output is switched off
	 1 Hz	overload standard I/O
	 1 Hz	output is switched on
I1, I2 (yellow)		input is switched off
	 1 Hz	overload standard I/O
		input is switched on
I1, I2, O1, O2 (yellow)	 (running light)	The device is in configuration mode.
 LED on  LED flashing  LED off		



In case all LEDs are blinking simultaneously in fast rhythm a fatal error has been detected.  
This message is reset by a short disconnection of the power supply (Power On Reset).