

# ASi Safety Relay Output Module with Diagnostic node and 1 EDM Input

Safety + standard I/O in one module

ASi Safety relay output with galvanically isolated contact sets,  
approved up to 230 V


Applications up to category 4/PLe/SIL 3

Protection category IP20



(Figure similar)



Figure	Inputs digital, EDM <sup>(1)</sup>	Outputs Safety, SIL 3, cat 4	Input voltage (sensor supply) <sup>(2)</sup>	Output voltage (actuator supply) <sup>(3)</sup>	ASi address <sup>(4)</sup>	Article no.
	1 EDM	1 release circuit; 2 x relay	out of ASi	–	1 single address + 1 AB address	<b>BWU2045</b>

(1) **Inputs digital, EDM**

An externally connected relay (contactor) can be monitored by connecting the feedback loop to the EDM input.

(2) **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.

(3) **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

(4) **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.

# ASi Safety Relay Output Module with Diagnostic node and 1 EDM Input

<b>Article no.</b>	<b>BWU2045</b>
<b>Connection</b>	
ASi connection	COMBICON plugs, push-in terminals <sup>(1)</sup>
Periphery connection	COMBICON plugs, push-in terminals <sup>(1)</sup>
Length of connecting cable	I: max. 15 m <sup>(2)</sup> O: unlimited
<b>ASi</b>	
Profile	S-7.A.E (ID1=5 default), value adjustable
Address	1 Single address + 1 AB address
Required master profile	≥ M3
As of ASi specification	2.1
Operating voltage	30 V <sub>DC</sub> (18 ... 31,6 V)
Max. current consumption	< 200 mA
Max. current consumption without sensor/ actuator supply	100 mA
<b>Inputs</b>	
Number	1 diagnostic + 1 EDM
Switching current	15 mA (T = 100 µs), continuously 4 mA at 24 V
Power supply	out of ASi
Power supply of attached sensors	90 mA
External device monitoring (EDM)	supplied out of ASi, approx. 24 V, approx. 10 mA
<b>Output</b>	
Number	1 relay output max. contact load: 3 A DC-13 at 24 V or 3 A AC-15 at 230 V protection via external fuse, max. 4 A semi time-lag type E
Max. output current	max. 3 A
Max. inrush current	20 A for 20 ms
<b>Number of switching operations</b>	
Usage category (EN 60347-4-1 / EN 60947-5-1)	AC1: 230 V/3 A (ca. 150 x 10 <sup>3</sup> cycles) AC 15: 230 V/3 A (ca. 80 x 10 <sup>3</sup> cycles) DC 1: 24 V/3 A (ca. 500 x 10 <sup>3</sup> cycles) DC 13: 24 V/3 A/0,1 Hz (ca. 50 x 10 <sup>3</sup> cycles)
<b>Display</b>	
LED I1 ... I3 (yellow)	state of inputs I1 ... I3
LED 1.Y1 (yellow)	state of EDM input 1.Y1
LED ASI (green)	ASi voltage ON
LED FAULT (red)	ASi fault
LED OUT (yellow)	for definition see table "Diagnostic (device color)"
LED ALARM (red)	PLC indicates alarm

# ASi Safety Relay Output Module with Diagnostic node and 1 EDM Input

<b>Article no.</b>	<b>BWU2045</b>
<b>Environment</b>	
Applied standards	EN 61508:2010 EN ISO 13849-1:2015 EN 62061:2005+Cor.:2010+A1:2013+A2:2015 EN 60947-5-1:2004+ Cor.:2005+A1:2009 EN 60529
It can be used with a switched AUX cable, which is passively safe up to SIL3/PLe	yes <sup>(3)</sup>
Operating height max.	5000 m
Ambient temperature	-30 °C ... +55 °C <sup>(4)</sup> , no condensation permitted
Storage temperature	-25 °C ... +85 °C
Relative humidity max.	90% (40 °C), no condensation permitted
Pollution degree	2
Protection category	IP20
Housing	plastic, Din-rail mounting
Voltage of insulation relay contact to ASi resp. AUX <sub>ext.in</sub>	2,3 kV
Voltage of insulation ASi to AUX <sub>ext.in</sub>	500 V
Rated impulse withstand voltage	1500 V
Weight	149 g
Dimensions (L / W / H in mm)	22,5 / 99 / 114

(1) **see table „wiring instructions“**

(2) Loop resistance  $\leq 150 \Omega$

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

(4) temperature range up to -30°C from Ident.No.  $\geq 16366$

## Wiring instructions

Push-in terminals, 2 poles/4 poles (pitch 5 mm)	
<b>General</b>	
Nominal cross section	2.5 mm <sup>2</sup>
<b>Conductor cross section</b>	
Conductor cross section solid	0.2 ... 2.5 mm <sup>2</sup>
Conductor cross section flexible	0.2 ... 2.5 mm <sup>2</sup>
Conductor cross section flexible, with ferrule	without plastic sleeve: 0.25 ... 2.5 mm <sup>2</sup>
	with plastic sleeve: 0.25 ... 2.5 mm <sup>2</sup>
2 conductors with same cross section, stranded, with TWIN ferrules	without plastic sleeve: 0.5 ... 1.5 mm <sup>2</sup>
AWG	24 ... 14
Stripped insulation length	10 mm

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# ASi Safety Relay Output Module with Diagnostic node and 1 EDM Input

Push-in terminals, 2 poles/4 poles (pitch 5 mm)	
2 conductors with same cross section, stranded, with TWIN ferrules	without plastic sleeve: 0.5 ... 1.5 mm <sup>2</sup>
AWG	24 ... 14
Stripped insulation length	10 mm

UL-specifications (UL508) BWU2045	
External protection	An isolated source with a secondary open circuit voltage of $\leq 30 V_{DC}$ 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.

## Diagnostic operation ID1 = 5<sub>hex</sub> (default)

Programming instructions (Bit values of inputs/outputs, Diagnostic node)				
Bit	ASi output		Bit	ASi input
<b>O0</b>	1: Alarm LED <i>on</i> 0: Alarm LED <i>off</i>		<b>I0</b>	Diagnostic (for definition see table „Diagnostics (device colors)“)
<b>O1</b>	<b>Parameter P1=1</b>	<b>Parameter P1=0</b>	<b>I1</b>	
	not used	1: output controlled by safety release 0: inhibits output on irrespective of safety release		
<b>O2</b>	not used		<b>I2</b>	
<b>O3</b>	inexistent		<b>I3</b>	1.Y1

Diagnostic (device colors)				
Value	Color	Description	State change	LED "Out"
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	switching-on by setting of O1	off

Programming instructions Diagnostic node (bit values of the ASi parameter)	
<b>Bit P1</b>	
P1=1	safety output controlled by safety release only
P1=0	safety output controlled by output O1 in addition to safety release
<b>Bit P2</b>	
P2=1	LED I3: safety release
P2=0	LED I3: state of I3
<b>Bits P0, P3:</b>	
not used	

# ASi Safety Relay Output Module with Diagnostic node and 1 EDM Input

Release		ASi Safety Relay Output Module, safety release from the ASi safety monitor	
		not received	received
ASi Parameter (Diagnostic node) changes the function of output bit O1	ASi Parameter P1=1 (default) O1=0	safety output contact set open	safety output contact set closed
	ASi Parameter P1=1 O1=1	safety output contact set open	safety output contact set closed
	ASi Parameter P1=0 O1=0	safety output contact set open	safety output contact set open
	ASi Parameter P1=0 O1=1	safety output contact set open	safety output contact set closed

### 3 standard inputs instead of diagnostic ID1=7<sub>hex</sub>, connection of sensors



The configuration using 3 standard inputs is not advisable, as there is no diagnostic information available in this mode of operation!

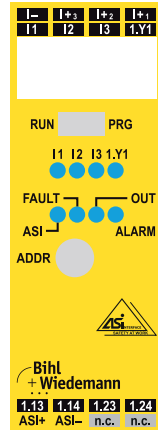
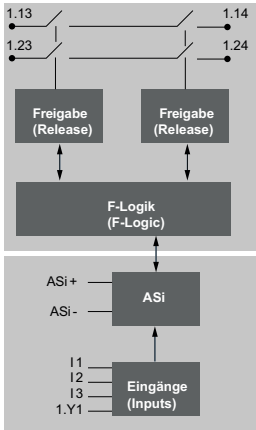
Programming instructions (Bit values of inputs/outputs AB-node)				
Bit	ASi output		Bit	ASi input
O0	1: Alarm LED on 0: Alarm LED off		I0	I1
O1	Parameter P1=1	Parameter P1=0	I1	I2
	not used	1: output controls by safety release 0: inhabits output on irrespective of safety release		
O2	not used		I2	Parameter P2=0
			I3	Parameter P2=1 1: feedback for user: <i>safety release on</i> 0: feedback for user: <i>safety release off</i>
O3	inexistent		I3	1.Y1

Programming instructions AB node (bit values of the ASi parameter)	
<b>Bit P1</b>	
P1=1	safety output controlled by safety release only
P1=0	safety output controlled by output O1 in addition to safety release
<b>Bit P2</b>	
P2=1	feedback: safety release at ASi bit I2 / LED I3
P2=0	input I3 at ASi bit I2
<b>Bits P0, P3</b>	
not used	

Release		ASi Safety Relay Output Module, safety release from the ASi safety monitor	
		not received	received
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# ASi Safety Relay Output Module with Diagnostic node and 1 EDM Input

## Operating elements and clamp assignment



Clamps/Switch	Description
I1, I2, I3	standard inputs I1, I2 and I3
1.13, 1.14	safety output contact set 1
1.23, 1.24	safety output contact set 2
I-, I+	supply voltage for inputs (out of ASi)
1.Y1	EDM / input for electronic device monitoring
ASi +, ASi -	ASi network connection
ADDR	connection for ASi-3 addressing plug
PRG	Programming of safety-related ASi address enabled.
RUN	Programming of non safety-related ASi address enabled

LEDs	State	Signal / Description
<b>ASi (green)</b>		no operating voltage
		operating voltage present, safety-related ASi address and/or ASi AB address is „0“
		operating voltage present
<b>FAULT (red)</b>		ASi communication OK
		no data exchange with AB node and/or safety-related ASi address is „0“
<b>OUT (yellow)</b>		output relays contacts open
		restart inhibit, waiting for the start signal, the output relays switch-on after the start signal
		device is in unlockable error state. Waiting for "reset of error condition signal". After receiving this signal the device follows up with normal operation.
		output relays contacts closed
<b>ALARM (red)</b>		ASi output bit A0 is <i>not</i> set
		ASi output bit A0 is set
<b>I1, I2, I3, 1.Y1 (yellow)</b>		the corresponding input is <i>not</i> connected (mode standard inputs) or release has not been issued (I3, diagnostic mode)
		the corresponding input is connected (mode standard inputs) or release has not been issued (I3, diagnostic mode)
		(running light) switch is adjust to PRG position
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-run disconnection of the power supply (Power On Reset).

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

## ASi Safety Relay Output Module with Diagnostic node and 1 EDM Input



### Accessories:

- Safe contact expander, 1 or 2 independent channels (art. no. BWU2548 / BWU2539)
- Double level push-In terminals kit for ASi and AUX (art. no. BW3420)
- ASi-5/ASi-3 Address Programming Device (art. no. BW4925)
- Bihl+Wiedemann Safety Suite License - Safety Software for Configuration, Diagnostics and Commissioning (art. no. BW2916)