

AS-i Safety Relay Output Module with Diagnostic Slave and 1 EDM Input

Safety + standard I/O in one module

AS-i Safety relay output with galvanically isolated contact sets,
approved up to 230 V


IEC 61508 SIL 3, EN ISO 13849-1/PLe Kat 4, EN 62061 SIL 3

Protection category IP20



(Figure similar)



Figure	Type	Housing	Inputs digital, EDM ⁽¹⁾	Outputs Safety, SIL 3, cat 4	Input voltage (sensor supply) ⁽²⁾	Output voltage (actuator supply) ⁽³⁾	AS-i address ⁽⁴⁾	Article no.
	IP20, 22,5 mm x 114 mm, 4 x COMBICON, Safety	4 x COMBICON	1 EDM	1 release circuit; 2 x relay	out of AS-i	–	1 single slave + 1 AB slave	BWU2045

(1) **Inputs digital, EDM**

An externally connected relay (contactor) can be connected via a feedback loop to the Safety Monitor for monitoring purposes.

(2) **Input voltage (sensor supply):** inputs are supplied by AS-i or by AUX (auxiliary 24 V power). If supplied by AS-i, inputs shall not be connected to earth or to external potential.

(3) **Output voltage (actuator supply):** outputs are supplied by AS-i or by AUX (auxiliary 24 V power). If supplied by AS-i, outputs shall not be connected to earth or to external potential

(4) **AS-i address:** 1 AB Slave (max. 62 AB Slaves/AS-i network), 2 AB Slaves (max. 31 modules with 2 AB Slaves), Single Slaves (max. 31 Single Slaves/AS-i network), mixed use allowed.

For modules with two slaves the second slave is turned off as long as the first slave is addressed to address "0".
Upon request, slaves are available with specific AS-i Slave profiles.

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Article no.	BWU2045
Connection	
AS-i connection	COMBICON plugs, push-in terminals ⁽¹⁾
Periphery connection	COMBICON plugs, push-in terminals ⁽¹⁾
Length of connecting cable	I/O: max. 15 m ⁽²⁾
AS-i	
Profile	S-7.A.E (ID1=5 default), value adjustable
Address	1 Single Slave + 1 AB Slave
Required master profile	≥ M3
As of AS-i specification	2.1
Operating voltage	30 V _{DC} (18 ... 31,6 V)
Max. current consumption	< 200 mA
Inputs	
Number	1 diagnostic + 1 EDM
Switching current	15 mA (T = 100 μs), continuously 4 mA at 24 V
Power supply	out of AS-i
Power supply of attached sensors	90 mA
External device monitoring (EDM)	supplied out of AS-i, approx. 24 V, approx. 10 mA
Output	
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
Number of switching operations	
Usage category (EN 60347-4-1 / EN 60947-5-1)	AC1: 230 V/3 A (ca. 150 x 10 ³ cycles) AC 15: 230 V/3 A (ca. 80 x 10 ³ cycles) DC 1: 24 V/3 A (ca. 500 x 10 ³ cycles) DC 13: 24 V/3 A/0,1 Hz (ca. 50 x 10 ³ cycles)
Display	
LED I1 ... I3 (yellow)	state of inputs I1 ... I3
LED 1.Y1 (yellow)	state of EDM input 1.Y1
LED ASI (green)	AS-i voltage ON
LED FAULT (red)	AS-i fault
LED OUT (yellow)	for definition see table "Diagnostic (device color)"
LED ALARM (red)	PLC indicates alarm
Environment	
Applied standards	IEC 61508 SIL 3 EN ISO 13849-1 PLe cat 4 EN 62061 SIL 3 EN 60529
Operating height max.	5000 m
Ambient temperature	-30 °C ... +55 °C ⁽³⁾ , 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	≥6 kV
Weight	149 g
Dimensions (L / W / H in mm)	22,5 / 99 / 114

⁽¹⁾ see table „wiring instructions“

⁽²⁾ Loop resistance ≤150 Ω

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⁽³⁾ temperature range up to -30°C from Ident.No. ≥16366

Wiring instructions

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

Diagnostic operation ID1 = 5_{hex} (default)

Programming instructions (Bit values of inputs/outputs, Diagnostic Slave)			
Bit	AS-i output	Bit	AS-i input
00	1: Alarm LED <i>on</i> 0: Alarm LED <i>off</i>	I0	Diagnostic (for definition see table „Diagnostics (device colors)“)
01	Parameter P1=1 Parameter P1=0 not used 1: output controlled by safety release 0: inhibits output on irrespective of safety release	I1	
02	not used	I2	
03	inexistent	I3	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 Slave (bit values of the AS-i parameter)	
Bit P1	
P1=1	safety output controlled by safety release only
P1=0	safety output controlled by output O1 in addition to safety release
Bit P2	
P2=1	LED I3: safety release
P2=0	LED I3: state of I3
Bits P0, P3:	
not used	

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

3 standard inputs instead of diagnostic ID1=7_{hex}, connection of sensors



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

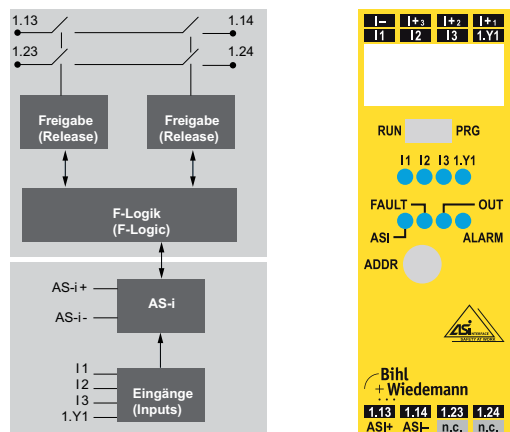
Programming instructions (Bit values of inputs/outputs AB-Slave)			
Bit	AS-i output		Bit AS-i input
O0	1: Alarm LED on 0: Alarm LED off		I0 11
O1	Parameter P1=1	Parameter P1=0	I1 12
	not used	1: output controls by safety release 0: inhabits output on irrespective of safety release	
O2	not used		I2 Parameter P2=0
			I3 Parameter P2=1
			1: feedback for user: safety release on 0: feedback for user: safety release off
O3	inexistent		I3 1.Y1

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

Release		AS-i Safety Relay Output Module, safety release from the AS-i safety monitor	
		not received	received
AS-i parameter (AB slave) changes the function of output bit O1	AS-i Parameter P1=1 (default) O1=0	safety output contact set open	safety output contact set closed
	AS-i Parameter P1=1 O1=1	safety output contact set open	safety output contact set closed
	AS-i Parameter P1=0 O1=0	safety output contact set open	safety output contact set open
	AS-i Parameter P1=0 O1=1	safety output contact set open	safety output contact set closed

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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 AS-i)
1.Y1	EDM / input for electronic device monitoring
AS-i+, AS-i-	AS-i network connection
ADDR	addressing socket
PRG	protective mode not possible. Programming of safety-related AS-i address enabled
RUN	protective mode possible. Programming of non safety-related AS-i address enabled

LEDs	State	Signal / Description
ASI (green)		no operating voltage
	1 Hz	operating voltage present, safety-related AS-i address and/or AS-i AB address is „0“
		operating voltage present
FAULT (red)		AS-i communication OK
		no data exchange with AB slave and/or safety-related AS-i address is „0“
OUT (yellow)		output relays contacts open
	1 Hz	restart inhibit, waiting for the start signal, the output relays switch-on after the start signal
	8 Hz	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
ALARM (red)		AS-i output bit A0 is <i>not</i> set
		AS-i output bit A0 is set
I1, I2, I3, 1.Y1 (yellow)		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).

Accessories:

- Safe contact expander, 1 or 2 independent channels (art. no. BWU2548 / BWU2539)
- Double level push-In terminals kit for AS-i and AUX (art. no. BW3420)