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

Bihl + Wiedemann

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)

Article no. BWU2045: AS-i Safety Relay Output Module with Diagnostic Slave and 1 EDM Input

The stainless steel AS-i Safety Monitor controls the safety relays of the AS-i Safety Relay Output Module by using a safety AS-i single address. To set the safety AS-i address, the dip-switch has to be in the PRG position. Addressing can then be accomplished by using an AS-i addressing device, for example.

Several AS-i Safety Relay 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 Relay Output Modules with the same safety address are controlled simultaneously.

In addition to the safety single address the module also supports an AB-address e.g. used to transmit the states of the standard inputs.

To set the AB address of the inputs, e.g. with an AS-i addressing device, the dip-switch has to be in the RUN position.

BWU2045: 2 AS-i modules in one housing!

| 1 safety relay output | 1 diagnostic- and 1 EDM input | **BWU2045** |

Safety address + AB address = Safety address + AB address
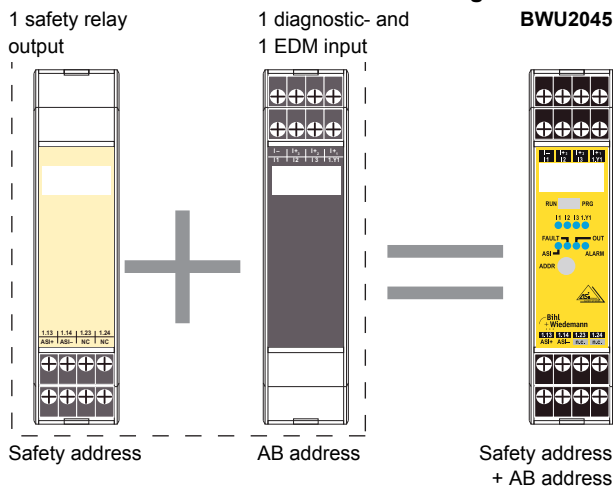
Article no.	BWU2045
Connection	
Connection	4 x COMBICON
Length of connecting cable	I/O: max. 15 m [(1)]
AS-i	
Profile	S.7.A.E ID1 = 5_{hex} (default), value adjustable
Address	1 Single Slave + 1 AB Slave
Required master profile	≥ M3
As of AS-i specification	2.1
Operating voltage	30 V DC
Max. current consumption	< 200 mA
Inputs	
Number	1 diagnostic + 1 EDM
Switching current	static 4 mA at 24 V, dynamic 15 mA at 24 V (T = 100 µs)
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

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Article no.	BWU2045
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 ... In (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.	2000 m
Ambient temperature	-5 °C ... +55 °C, no condensation allowed
Storage temperature	-25 °C ... +85 °C
Relative humidity max.	90% (40 °C), no condensation allowed
Protection category	IP20
Housing	plastic, Din-rail mounting
Voltage of insulation	$\geq$ 6 kV
Weight	149 g
Dimensions (L / W / H in mm)	22,5 / 99 / 114

[1] Loop resistance ≤150 Ω

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

Programming instructions (Bit values of inputs/outputs, Diagnostic Slave)				
Bit	**AS-i output**		**Bit**	**AS-i input**
O0	1: Alarm LED *on* 0: Alarm LED *off*		I0	Diagnostic (for definition see table „Diagnostics (device colors)")
O1	Parameter P1=1	Parameter P1=0	I1	
	not used	1: output controlled by safety release 0: inhibits output on irrespective of safety release		
O2	not used		I2	
O3	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

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

Programming instructiöns 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	

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$_{hex}$ (use not advised!), Connection of sensors

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	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	Parameter P2=1
				I3	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	

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		not received	received
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Operating elements and clamp assignment
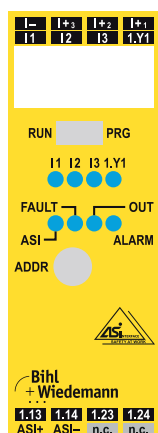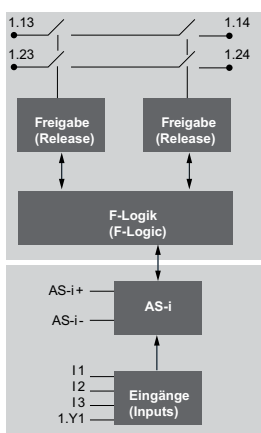
Clamps/Switch	Description
I1, I2, I3	standard inputs I1, I2 and I3
1.13, 1.14	safety output contact set 1
1.23, 1.24	safety output contact set 2
I-, I+	supply voltage for inputs (out of AS-i)
1.Y1	EDM / input for electronic device monitoring
AS-i+, AS-i–	AS-i network connection
ADDR	addressing socket
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 *not* set
	☀	AS-i output bit A0 is set

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LEDs	State	Signal / Description
I1, I2, I3, 1.Y1 (yellow)	◯	the corresponding input is *not* 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)**