AS-i 3.0 EtherCAT Gateways with integrated Safety Monitor

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Safety over EtherCAt (FSoE) and Safe Link in one device
• up to zu 450 Devices

Safely monitoring safety drives with Safety over EtherCAT (FSoE)

2 / 1 AS-i Master, EtherCAT Slave

1 Safety Monitor for 2 AS-i networks
• Operation using a single Monitor configuration!
  Monitor processes safety slaves on two AS-i networks
  Coupling between the two networks superfluous

Up to 64 release circuits
• up to 6 release circuits SIL 3, cat. 4 on the monitor,
  fast electronic safe outputs

Safe AS-i outputs are supported
• up to 64 independent AS-i outputs
  Multiple safe AS-i outputs possible via a single AS-i address

Safe speed and standstill monitoring

Applications up to category 4/PLe/SIL 3

Chip card for storage of configuration data

(Figure similar)

Figure	Type	Inputs Safety, SIL 3, Cat. 4	Inputs Safety, expandable to	Outputs Safety, SIL 3, cat. 4	Safety outputs, independent according to SIL 3, expandable to	Safety communication	Number of AS-i networks, number of AS-i Master [1]	1 power supply, 1 gateway for 2 AS-i networks, inexpensive power supplies [2]	Diagnostic and configuration interface [3]	Article no.
	Safety EtherCAT	3 x 2 channels	max. 62 x 2 channels, max. 1922 in max. configuration	6 release circuits; 6 x fast electronic safe outputs	max. 64, max. 1984 in max. configuration	FSoE + Safe Link	2 AS-i networks, 2 AS-i Masters	yes, max. 4 A/ AS-i network	Ethernet diagnostic	**BWU3418**
	Safety EtherCAT	3 x 2 channels	max. 62 x 2 channels, max. 1922 in max. configuration	6 release circuits; 6 x fast electronic safe outputs	max. 32, max. 992 in max. configuration	Safe Link	2 AS-i networks, 2 AS-i Masters	yes, max. 4 A/ AS-i network	Ethernet diagnostic	**BWU2944**
	Safety EtherCAT	3 x 2 channels	max. 31 x 2 channels, max. 1891 in max. configuration	6 release circuits; 6 x fast electronic safe outputs	max. 32, max. 992 in max. configuration	FSoE + Safe Link	1 AS-i network, 1 AS-i Master	yes, max. 4 A/ AS-i network	Ethernet diagnostic	**BWU3509**
	Safety EtherCAT	3 x 2 channels	max. 31 x 2 channels, max. 1891 in max. configuration	6 release circuits; 6 x fast electronic safe outputs	max. 31, max. 991 in max. configuration	Safe Link	1 AS-i network, 1 AS-i Master	yes, max. 4 A/ AS-i network	Ethernet diagnostic	**BWU2797**

[1] **Number of AS-i networks, number of AS-i Master**
  "Single Master": 1 AS-i network, 1 AS-i Master.
  "Double Master": 2 AS-i networks, 2 AS-i Masters.

[2] **1 power supply, 1 gateway for 2 AS-i networks, inexpensive power supplies**
  "yes, max. 4 A/AS-i network": Cost-effective power for 2 AS-i networks with 1 power supply.

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(3) **Diagnostic and configuration interface**
"Ethernet diagnostic": Access to AS-i master and safety monitor via Bihl+Wiedemann proprietary software over Ethernet diagnostics interface.

The latest version of the device description file of the gateway is available in the "Downloads" section of the respective device.

Article no.	BWU2797	BWU2944	BWU3509	BWU3418
Interface				
EtherCAT	RJ-45 acc. IEEE 802.3			
Baud rates	100 MBd			
Card slot	chip card (128 KB) for storage of configuration data			
AS-i				
AS-i specification	3.0			
Cycle time	150 µs * (number of slaves + 2)			
Operating voltage	30 V_{DC} (20 ... 31,6 V) (PELV voltage)			
AS-i Power24V capability [1]	yes			
AUX				
Operating voltage	24 V_{DC} (19,2 ... 28,8 V)			
Max current consumption	7,2 A			
Display				
LCD	indication of slave addresses and error messages in plain text			
LED status (green)	EtherCAT communication active			
LED power (green)	power on			
LED config error (red)	configuration error			
LED U AS-i (green)	AS-i voltage o.k.			
LED AS-i active (green)	AS-i normal operation active			
LED prg enable (green)	automatic addresses programming enabled			
LED prj mode (yellow)	configuration mode active			
LED AUX (yellow)	auxiliary power			
LEDs SI1 ... SI6 (yellow)	state of inputs: off: open on: close			
LEDs SO1 ... SO6 (yellow)	state of outputs: off: open on: close			
UL-specifications (UL508)				
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.			
Applied Norms	EN 60529 EN 62026-2 EN 61000-6-2 EN 61000-6-4 EN 62061, SIL 3 EN 61508, SIL 3 EN ISO 13849-1, PL e			
Environment				
Operating altitude	max. 2000 m			
Ambient temperature	0 °C … +55 °C			
Storage temperature	-25 °C … +85 °C			
Housing	stainless steel, for DIN rail mounting			
Protection category	IP20			
Maximum tolerable shock and vibration stress	according EN 6131-2			
Voltage of insulation	≥ 500 V			
Weight	800 g			
Dimensions (B / H / T in mm)	100 / 120 / 96			

(1) **AS-i Power24V**

The device can be operated directly on a 24 V (PELV) power supply. The gateway has been optimized with integrated data coupling coils and adjustable self-resetting fuses for safe use of powerful 24 V power supplies.

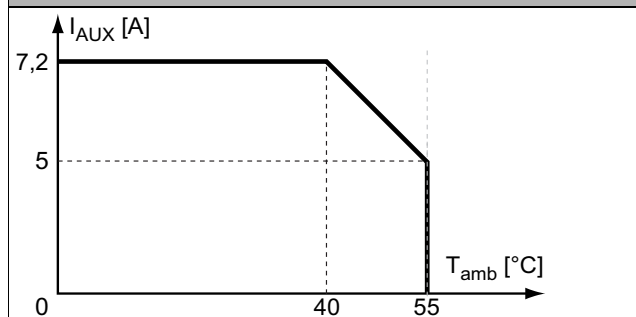| Article no.	BWU2797	BWU2944	BWU3509	BWU3418
Safety monitor				
Start delay	< 10 ms			
Max. turn-off time	< 40 ms			
Antivalent switches for local inputs	yes			
Standstill monitors for local inputs	6 axes up to 50 Hz [1]			
Speed monitors for local inputs	3 to 6 axes up to 400 Hz [2]			
Connection				
Connection	COMBICON			
Length of connector cable	unlimited [3]			
Input				
Inputs Safety, SIL3, Kat. 4	3 x 2 channels [4]			
Inputs digital, EDM	up to 6 standard inputs [4]			
Switching current	15 mA (T = 100 µs), continuously 4 mA at 24 V			
Power supply	out of AUX			
Tolerated test pulse	adjustable			
Output				
Number of release circuits on the monitor	6			
Outputs	semiconductor output max. contact load: 1,2 A DC-13 at 30 V, $\sum$ = 7,2 A in sum [5]			
Power supply (semiconductor outputs)	out of AUX			
Test pulse (semiconductor outputs)	if output is on: minimum interval between 2 test pulses: 250 ms; maximum pulse width 1 ms			

[1] connection at all SI or SO terminals possible.

[2] connection only at terminals SO1 ... SO6 configured as standard inputs (see "Variations of terminal configuration for BWU2797, BWU2944, BWU3418, BWU3509")

[3] loop resistance ≤ 150 Ω

[4] see "Variations of terminal configuration for BWU2797, BWU2944, BWU3418, BWU3509"

[5]

BWU2794, BWU2944, BWU3418, BWU3509
Derating output current

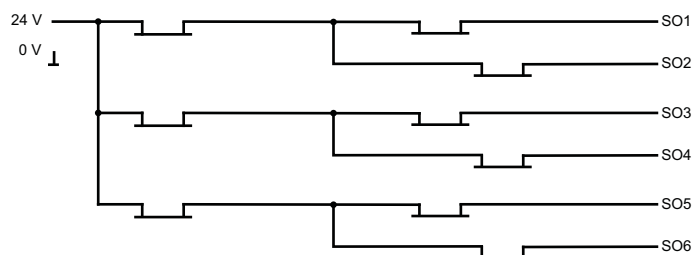Bihl+Wiedemann GmbH · Floßwörthstr. 41 · D-68199 Mannheim · Phone: (+49) 621/33996-0 · Fax: (+49) 621/3392239 · eMail: mail@bihl-wiedemann.de

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Article no.	Operating current		
	Master power supply, ca. 300 mA out of AS-i circuits	Master power supply, max. 300 mA out of AS-i circuit 1 (approx. 70 mA ... 300 mA), max. 300 mA out of AS-i circuit 2 (approx. 70 mA ... 300 mA); in sum max. 370 mA	Version „1 gateway, 1 power supply, for 2 AS-i networks", approx. 300 mA (PELV voltage)
BWU2797	–	–	●
BWU2944	–	–	●
BWU3418	–	–	●
BWU3509	–	–	●

	BWU2797 / BWU2944 / BWU3418 / BWU3509
Redundant power supply out of AS-i: all fundamental functions of the device remain available even in case of power failure in one of the two AS-i networks	–
Current measurement of the AS-i circuits	●
Self-resetting adjustable fuses	●
AS-i earth fault monitor distinguishes between AS-i cable and sensor cable	●
In version „1 gateway, 1 power supply for 2 AS-i circuits": only 1 gateway + 1 AS-i power supply is needed for both 2 AS-i circuits	●

Safety outputs block diagram
BWU2797, BWU2944, BWU3418, BWU3509

Variations of terminal configuration for
BWU2797, BWU2944, BWU3418, BWU3509

Terminal	Safe output	Safe input for mechanical contacts in combination with T1, T2 [1]	Safe antivalent input [1]	Safe electronic input [1]	Standard input [1]
SI1,2	–	●	●	●	●
SI3,4	–	●	●	●	●
SI5,6	–	●	●	●	●
SO1,2 [2]	●	●	●	–	●
SO3,4 [2]	●	●	●	–	●
SO5,6 [2]	●	●	●	–	●

[1] Inputs may only be supplied by the same 24 V source as the device itself.

[2] If outputs are configured as inputs, the input current has to be limited by an external element at ≤ 100 mA

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Connections: Gateway + Safety Monitor:

BWU2797, BWU3509

Connection	Description
SI1, SI3, SI5	Safe input terminal (T1)
SI2, SI4, SI6	Safe input terminal (T2)
T1	Clock output 1
T2	Clock output 2
SO1 ... SO6	Safe semiconductor outputs 1 ... 6
24 V, 0 V	Power supply for local I/Os
+ASI 1-	Connection of AS-i circuit
ASI +PWR-	Power supply for Gateway and AS-i networks

BWU2944, BWU3418

Connection	Description
SI1, SI3, SI5	Safe input terminal (T1)
SI2, SI4, SI6	Safe input terminal (T2)
T1	Clock output 1
T2	Clock output 2
SO1 ... SO6	Safe semiconductor outputs 1 ... 6
24 V, 0 V	Power supply for local I/Os
+ASI 1-, +ASI 2-	Connection of AS-i circuits
ASI +PWR-	Power supply for Gateway and AS-i networks

Accessories:

- **Safe contact expander, 1 or 2 independent channels (art. no. BWU2548 / BWU2539)**
- **Chip card, memory capacity 128 KB (art. no. BW2222)**
- **Bihl+Wiedemann Suite - Safety Software for Configuration, Diagnostics and Commissioning (art. no. BW2916)**
- **Power supplies, e.g.: AS-i power supply, 4 A (art. no. BW1649), AS-i power supply, 8 A (art. no. BW1997)**
  (further power supply units can be found at *www.bihl-wiedemann.de/en/products/accessories/power-supplies*)

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