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Environment			
Protective treatment standard version			"TH" treatment
Ambient air temperature around the device	Storage	°C	- 40...+ 70
	Operation	°C	- 25...+ 70: LED and neon bulb versions - 25...+ 55: incandescent bulb version
Electric shock protection	Conforming to IEC 61140		Class I
Degree of protection	Conforming to IEC 60529		IP 66 IP 69 K (Selector switches and multiple-headed pushbuttons)
	Conforming to NEMA		NEMA type 4X and 13, unless otherwise stated
Resistance to high pressure washer		Pa	70 x 10 ⁵ (70 bar); distance: 0.1 m Temperature: 55°C
Mechanical shock protection	Conforming to IEC 50102		Non illuminated heads: IK 03 Illuminated heads: IK 05 Selector switch heads: IK 06
Conforming to standards	UL, CSA, GOST, CCC and C€		EN/IEC 60947-1, EN/IEC 60947-5-1, EN/IEC 60947-5-4, EN/IEC 60947-5-5, EN/IEC 60204-1 and EN/ISO 13850 (Emergency stop trigger action and mechanical latching pushbuttons, see page 1/68), IEC 60364-5-53 (Emergency switching off mechanical latching pushbuttons, see page 1/69) UL 508, CSA C22-2 n° 14, GB 14048.5
Product certifications	UL Listed, CSA		Standard single contacts with screw clamp and spring terminals: A600; Q600 Double contacts with screw clamp terminals: A600; Q600 Light blocks with screw clamp terminals Joystick controllers XD4 PA/ZD4 PA: A600; R300 Special contact blocks: <input type="checkbox"/> ZBE 201: A300; Q300 <input type="checkbox"/> ZBE 202: A600; Q600 Single contacts for high power switching: <input type="checkbox"/> ZBE 501 and ZBE 502: A300; P300
	UL Recognized, CSA		Standard single contacts for plug-in connector: A300; R300 Standard contacts for printed circuit board: B300; R300
	BV, RINA, LROS, DNV, GL, GOST, CCC		Standard single contacts and double contacts with screw clamp or spring terminals:
Terminal referencing	Conforming to EN 50005 and EN 50013		

Characteristics of contact or combined contact and signalling functions (see page 1/56)

Mechanical characteristics			
Contact operation	N/C or N/O		Slow break
Positive operation	Conforming to EN/IEC 60947-5-1 appendix K		All functions incorporating a N/C contact have positive opening operation
Operating travel (to change the electrical state)	Pushbutton	mm	Changing N/C state: 1.5 Changing N/O state: 2.6 Total travel: 4.3
Operating force	Pushbutton	N	Changing N/C state: 3.5 Changing N/O state: 3.8
	Additional contact only (extra to change state)	N	Single N/C contact: 2 Single N/O contact: 2.3
		N	Double N/C contact: 3.4 Double N/O contact: 5 Double contact N/C + N/O: 4.6
Emergency stop or Emergency switching off with N/C + N/O		N	Standard push-pull: 45 Trigger action push-pull: 50
		N	Standard turn to release and key release: 40 Trigger action turn to release and key release, "trigger action": 44

Characteristics of contact or combined contact and signalling functions (continued) (see page 1/56)

Mechanical characteristics (continued)			
Operating torque (to change the electrical state)	Selector switches	N.m	N/O contact: 0.14
	Additional contact only	N.m	N/O contact: 0.05
Mechanical durability (in millions of operating cycles)	Pushbutton	Spring return	5
		Multiple-headed	1
		Push-push to release	0.5
	Selector switch	Non illuminated	1
		Illuminated	0.5
	Toggle switch		0.5
	Emergency Stop or Emergency switching off pushbutton		0.3 with 3 contacts
	Joystick controller		1
	Standard contact block only		5
	Low power switching contact block only (dust protected)		0.5
Vibration resistance	Conforming to IEC 60068-2-6		Frequency: 2 to 500 Hz: 5 gn
Mechanical shock resistance	Conforming to IEC 60068-2-27		All functions except mushroom head pushbuttons, spring return: <input type="checkbox"/> half sine wave acceleration 11 ms: 50 gn <input type="checkbox"/> half sine wave acceleration 18 ms: 30 gn Mushroom head pushbutton, spring return: <input type="checkbox"/> half sine wave acceleration 11 ms: 10 gn
Electrical characteristics			
Cabling capacity	Conforming to EN/IEC 60947-1	mm²	Standard block with screw clamp or spring terminals: Min: 1 x 0.22 without cable end Max: 2 x 1.5 with cable end Cross headed screws (Pozidriv or Philips type 1), slotted for flat 4 and 5.5 mm screwdriver Tightening torque: 0.8 N.m (maxi 1.2 N.m) Contact blocks for high power switching: Min: 1 x 0.5 without cable end Max: 2 x 2.5 with or without cable end
Contact material	Silver alloy (Ag / Ni)		Standard single and double blocks with screw clamp or spring terminals Blocks for plug-in connector Standard blocks for printed circuit board connection
	Gold flashed (Ag / Ni / Au)		Low power switching contact blocks with screw clamp terminals Low power switching contact blocks for printed circuit board connection
Short-circuit protection	Conforming to EN/IEC 60947-5-1	A	Standard single and double blocks with screw clamp or spring terminals: 10 (gG cartridge fuse conforming to IEC 60269-1) Blocks for plug-in connector: 4 (gG cartridge fuse conforming to IEC 60269-1) Standard blocks for printed circuit board connection: 4 (gG cartridge fuse conforming to IEC 60269-1)
Rated thermal current	Conforming to EN/IEC 60947-5-1	A	Standard single and double blocks with screw clamp or spring terminals: 10 Blocks for plug-in connector: 10 Standard blocks for printed circuit board connection: 6
Rated insulation voltage	Conforming to EN/IEC 60947-1	V	Standard single and double blocks with screw clamp or spring terminals: Ui = 600, degree of pollution 3 Blocks for plug-in connector or Faston connectors: Standard blocks for printed circuit board connection Contact blocks for high-power switching: Ui = 250, degree of pollution 3
Rated impulse withstand voltage	Conforming to EN/IEC 60947-1	kV	Standard single and double blocks with screw clamp or spring terminals: Uimp = 6 Blocks for plug-in connector Standard blocks for printed circuit board connection Contact blocks for high-power switching applications: Uimp = 4

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Characteristics of contact or combined contact and signalling functions (continued) (see page 1/56)

Electrical characteristics (continued)			
Rated operational characteristics Conforming to EN/IEC 60947-5-1	a.c. supply: utilisation category AC-15		Standard single and double blocks with screw clamp or spring terminals: A600: Ue = 600 V and Ie = 1.2 A or Ue = 240 V and Ie = 3 A or Ue = 120 V and Ie = 6 A Blocks for plug-in connector: A300: Ue = 120 V and Ie = 6 A or Ue = 240 V and Ie = 3 A Standard blocks for printed circuit board connection: B300: Ue = 120 V and Ie = 3 A or Ue = 240 V and Ie = 1.5 A Special contact blocks: <input type="checkbox"/> ZBE 201: A300: Ue = 240 V and Ie = 3 A or Ue = 120 V and Ie = 6 A (with insulation voltage Ui = 500 V) <input type="checkbox"/> ZBE 202: A600: Ue = 600 V and Ie = 1.2 A or Ue = 240 V and Ie = 3 A or Ue = 120 V and Ie = 6 A Contact blocks for high power switching: <input type="checkbox"/> ZBE 50●: A300: Ue = 240 V and Ie = 3 A or Ue = 120 V and Ie = 6 A
	d.c. supply: utilisation category DC-13		Standard single and double blocks with screw clamp or spring terminals Q600: Ue = 600 V and Ie = 0.1 A or Ue = 250 V and Ie = 0.27 A or Ue = 125 V and Ie = 0.55 A Joystick controllers XD4 PA/ZD4 PA: R300: Ue = 125 V and Ie = 0.22 A or Ue = 250 V and Ie = 0.1 A Blocks for plug-in connector: R300: Ue = 125 V and Ie = 0.22 A or Ue = 250 V and Ie = 0.1 A Standard blocks for printed circuit board connection: R300: Ue = 125 V and Ie = 0.22 A or Ue = 250 V and Ie = 0.1 A Special contact blocks: <input type="checkbox"/> ZBE 201: Q300: Ue = 125 V and Ie = 0.55 A or Ue = 250 V and Ie = 0.27 A <input type="checkbox"/> ZBE 202: Q600: Ue = 600 V and Ie = 0.1 A or Ue = 250 V and Ie = 0.27 A or Ue = 125 V and Ie = 0.55 A Contact block for high power switching: <input type="checkbox"/> ZBE 50●: P300: Ue = 125 V and Ie = 1.1 A or Ue = 250 V and Ie = 0.55 A
Characteristics of special contact blocks	Low power switching		P max: 12 I max: 0.1 U max: 24
	High power switching Conforming to EN/IEC 60947-5-1	100 000 operating cycles Load factor: 0.5 Operating rate: 900 cycles/hour	P max: 240 I max: 10 U: 24 ---
Electrical durability Conforming to EN/IEC 60947-5-1 appendix C Operating rate 3600 operating cycles/hour Load factor: 0.5	a.c. supply for 1 million operating cycles utilisation category AC-15	V	24 120 230
		A	4 3 2
	d.c. supply for 1 million operating cycles utilisation category DC-13	V	24 110
		A	0.5 0.2
	Standard double blocks with screw clamp terminals and blocks for plug-in connector:	V	24 120 230
		A	3 1.5 1
	Standard double blocks with screw clamp terminals and blocks four plug-in connector:	V	24 110
		A	0.4 0.15
Electrical reliability Failure rate Conforming to EN/IEC 60947-5-4	In clean environment	Standard blocks	- at 17 V and 5 mA, with confidence level of 90 %: $\lambda_{90} = 10^{-8}$, defect contact voltage drop = 1.7 V
			- at 5 V and 1 mA, with confidence level of 90 %: $\lambda_{90} = 10^{-7}$, defect contact voltage drop = 1 V
	In dusty environment	Special blocks with gold flashed contacts for low power switching	At 5 V and 1 mA, with confidence level of 90 %: $\lambda_{90} = 5 \cdot 10^{-8}$, defect contact voltage drop = 1 V
Special blocks with gold flashed contacts and dust protection for low power switching only		At 5 V and 1 mA, $\lambda < 10^{-7}$	

Characteristics of illuminated units (pilot lights)

Mechanical characteristics

Vibration resistance	Conforming to IEC 60068-2-6		Frequency: 12 to 500 Hz: 5 gn
Mechanical shock resistance	Conforming to IEC 60068-2-27		Half sine wave acceleration 11 ms: 50 gn Half sine wave acceleration 18 ms: 30 gn

Electrical characteristics

Cabling capacity	Conforming to EN/IEC 60947-1	mm ²	Screw clamp and spring terminals Min: 1 x 0.22 without cable end (1 x 0.34 for linking) Max: 2 x 1.5 with cable end
Rated insulation voltage	Conforming to EN/IEC 60947-1	V	Direct supply pilot light blocks (BA 9s bulb): U _i = 250, degree of pollution 3 Pilot light blocks with integral LED: U _i = 250, degree of pollution 3 Pilot light blocks with transformer: U _i = 600, degree of pollution 3
Rated impulse withstand voltage	Conforming to EN/IEC 60947-1	kV	Direct supply pilot light blocks (BA 9s bulb): U _{imp} = 4 Pilot light blocks with integral LED: U _{imp} = 4 Pilot light blocks with transformer: U _{imp} = 6

Specific characteristics of single light blocks with integral LED

Voltage limits	For rated voltage	V	12 V: 10 to 15 ~ and 10.2 to 13.8 ~ 24 V: 19.2 to 30 ~ and 21.6 to 26.4 ~ 24 to 120 V: 19.2 to 132 ~ and 21.6 to 132 ~ 110 to 120 V: 94 to 132 ~ 230/240 V: 195 to 264 ~
Current consumption	Applicable to all colours	mA	Blocks with ~ 12 V supply: 18 Blocks with ~ 24 V supply: 18 Blocks with ~ 120 V supply: 14 Blocks with ~ 240 V supply: 14
Service life	At rated voltage and at an ambient temperature of 25 °C	H	100 000
Surge withstand	Conforming to IEC 61000-4-5	kV	1
Resistance to fast transients	Conforming to IEC 61000-4-4	kV	2
Resistance to electromagnetic fields	Conforming to IEC 61000-4-3	V/m	10
Resistance to electrostatic discharges	Conforming to IEC 61000-2-6	kV	8: in free air, in insulating parts 6: on contact, on metal parts
Direct parallel connection across inductive load e.g.: contactor coil or solenoid	Maximum power of load	VA	For high power applications (≥ 30 VA), a ZBZ V● LED suppressor must be connected across the light block terminals (see page 1/83)
Electromagnetic emission	Conforming to IEC 55011		Class B

Specific characteristics

Body/fixing collar

Tightening torque of fixing screw		N.m	0.8 (max 1.2)
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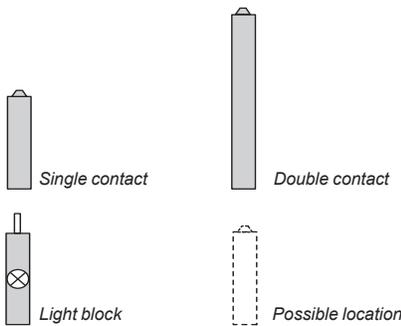
Hour counters and annunciators

Voltage limits	Hour counter and annunciator		± 10% of the nominal voltage
Current consumption	Hour counter	mA	XB5 DSB: 7 to 15 XB5 DSG: 8 XB5 DSM: 8
	Annunciator	mA	5

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Maximum recommended configurations guaranteeing achievement of catalogue characteristics

Unit type (complete units XB4 B, heads ZB4 B)	Pushbuttons, spring return XB4 BA●, ZB4 BA●, (except ZB4 BA●8) XB4 BC●, ZB4 BC●, XB4 BL●, ZB4 BL●, XB4 BP●, ZB4 BP●, ZB4 BR● Triple-headed pushbuttons XB4 BA731327, XB4 BA711137, ZB4 BA7313●, ZB4 BA7111●, ZB4 BA72124, ZB4 BA791	Double-headed pushbuttons XB4 BL73415, ZB4 BA712●, ZB4 B●734●, ZB4 BA79	Illuminated pushbuttons, spring return XB4 BW●, ZB4 BW●, ZB4 BA●8 Double-headed pushbuttons + pilot light block XB4 BW73731●5, ZB4 BW7A17●●, ZB4 BW7●374●, ZB4 BW7A9	
Solution using single contacts				
Solution using single and double contacts				
Maximum recommended configurations	Single contacts Double contacts + single contacts Light block	9 3 + 3 -	6 2 + 2 -	6 2 + 2 1



Possible configurations for high power switching contacts (1) (2)

High power switching contact blocks with screw clamp terminal connections:

ZBE 501, ZBE 502, ZBE 503, ZBE 504 and ZBE 505

High power switching contact blocks with connection by Faston connectors:

ZBE 5013, ZBE 5023, ZBE 5033, ZBE 5043 and ZBE 5053

1 N/O	1 N/C	1 N/O + N/C 1 N/O + N/O 1 N/C + N/C

(1) The configurations are not upgradable and cannot be combined with other types of contact and signalling functions.

(2) High power switching contacts are not compatible with Harmony triple-headed pushbuttons.

Emergency stop or Emergency switching off XB4BT●, ZB4BT●, XB4BS●, ZB4BS●		Selector switches <ul style="list-style-type: none"> ■ Standard handle XB4 BD●, ZB4 BD●, ■ Long handle XB4 BJ●, ZB4 BJ●, ■ Knurled knob ZB4 BD●9, ■ Key switch XB4 BG●, ZB4 BG● 			Illuminated selector switches, standard handle XB4 BK●, ZB4 BK●		Toggle switches ZB4 BD●8	Pushbuttons, push-push ZB4 BH●	Illuminated pushbuttons, push-push ZB4 BH●3
							-	-	
4	4	5	4	6	4	6	3	2	
2	1	2	1	2	2	3	-	-	
+	+	+	+	+	+	+	-	-	
0	2	1	2	2	0	0	-	-	
-	-	-	-	-	1	-	-	1	

Sequence of contacts fitted to selector switch bodies

Unit type			Selector switches				
			2-position		3-position		
			315°	45°	315°	0°	45°
Push	Position	Top					
		Bottom					
Contacts	Location		L C R	L C R	L C R	L C R	L C R
	State		0 0 0	1 1 1	1 1 0	0 0 0	0 1 1
	N/O		□ □ □	■ ■ ■	■ ■ □	□ □ □	□ ■ ■
	N/C		■ ■ ■	□ □ □	□ □ ■	■ ■ ■	■ □ □
L left, C centre, R right							
□ open, ■ closed							