

Control and signalling units Ø 22

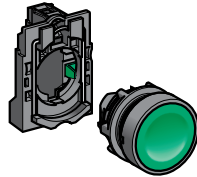
Harmony® style 5
Pushbuttons, switches and pilot lights, with double insulated bezel

Description

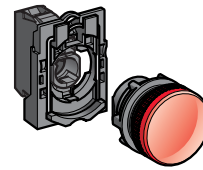
The Ø 22, style 5 range of control and signalling units comprises:

2

Sub-assemblies for user assembly
ZB5-A

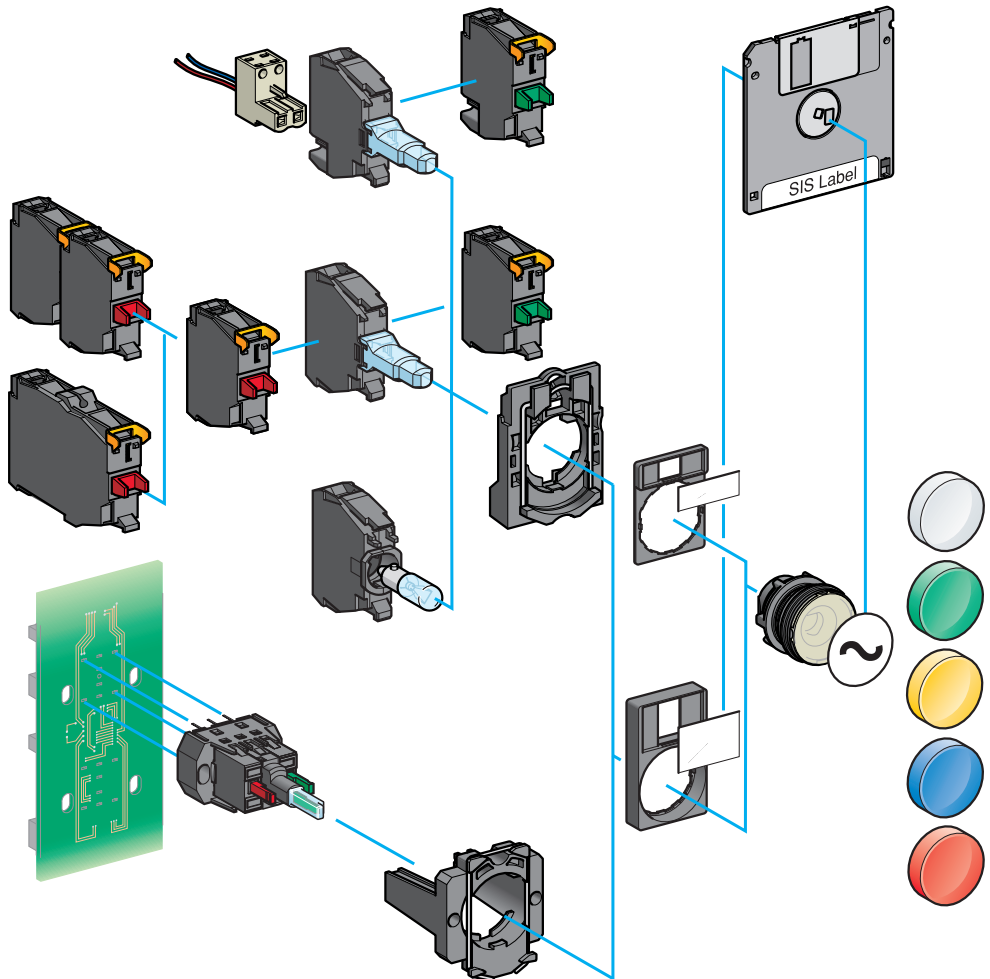


Pushbuttons and switches:
Head and body
sub-assemblies



Pilot lights:
Head and body
sub-assemblies








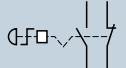
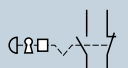

Component parts and accessories
ZB




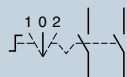

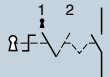
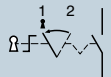
Schematic library

2



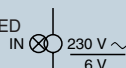
Pushbuttons and Emergency stop pushbuttons

			
Pushbutton N/O contact	Pushbutton N/C contact	Mushroom head, spring return N/O contact	Emergency stop latching mushroom head. Push-pull N/C contact
			
Emergency stop trigger action mushroom head Push-pull N/O + N/C contact	Emergency stop trigger action mushroom head Turn to release - N/C contact	Emergency stop trigger action mushroom head Key release - N/C contact	Emergency stop trigger action mushroom head Turn to release N/O + N/C contact
			
Emergency stop trigger action mushroom head Key release N/O + N/C contact	Double-headed pushbutton N/O + N/C contact		

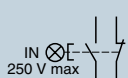
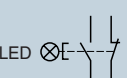
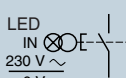
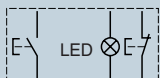
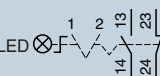
Selector switches

			
Selector switch - 2 position, stay put N/O contact	Selector switch - 3 position, stay put N/O + N/O contact	Selector switch - 3 position, 2 spring return to centre N/O + N/O contact	Selector switch - 2 position, stay put, key withdrawal LH position - N/O contact
			
Selector switch - 2 position, spring return from right to left, key withdrawal LH position N/O contact			


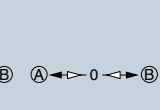
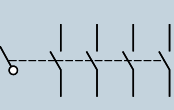
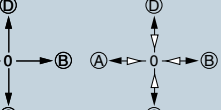
Pilot lights

		
Pilot light with BA 9s incandescent bulb	LED pilot light	Pilot light with integral transformer, 230 V ~ primary, 6 V secondary. BA 9s incandescent bulb or LED

Illuminated pushbuttons and selector switches

			
Illuminated pushbutton BA 9s incandescent bulb N/O + N/C contact	Illuminated pushbutton with LED N/O + N/C contact	Illuminated pushbutton with integral transformer, 230 V ~ 50/60 Hz primary, 6 V secondary. BA 9s incandescent bulb or LED N/O + N/C contact	Double-headed pushbutton with LED pilot light N/O + N/C contact
			
Illuminated selector switch with LED - 2 position stay put N/O + N/C contact			

Joystick controllers

2 direction		4 direction	
			
Without spring return	With spring return	Without spring return	With spring return

Control and signalling units Ø 22

Harmony® style 5
 Pushbuttons, switches and pilot lights, with double insulated bezel
 Sub-assemblies, ZB5-A

2

Non illuminated units for user assembly

Pushbuttons, spring return, without marking

Pushbuttons, spring return, with marking

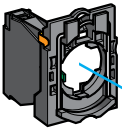
“Push-turn” pushbuttons

Double-headed pushbuttons, spring return

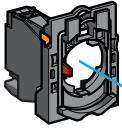
“Push-push to release” pushbuttons

Contact functions

Body sub-assemblies



Screw clamp terminals
 ZB5-AZ10/AZ141
 see page 2/10



Plug-in connector
 ZB5-AZ10p4/AZ1414
 see page 2/10

Head sub-assemblies



Flush push

ZB5-AA0/AA9
 see page 2/11

ZB5-AA
 see page 2/11

Flush push for insertion of legend

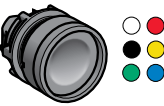
ZB5-AA8
 see page 2/11

Flush push

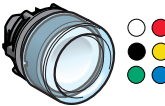
ZB5-CA
 see page 2/11



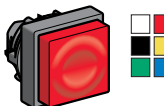
Projecting push
 ZB5-AL
 see page 2/11



Recessed push
 ZB5-AA4
 see page 2/11



Booted flush push
 ZB5-AP/AP8
 see page 2/11



Projecting push
 ZB5-CL
 see page 2/11



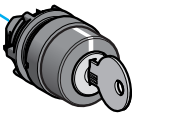
Flush push
 ZB5-AA3/AA4
 see page 2/12



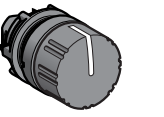
Projecting push
 ZB5-AL
 see page 2/12



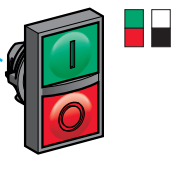
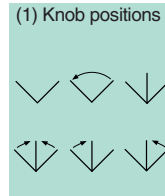
Flush push
 ZB5-CA3/CA9
 see page 2/12



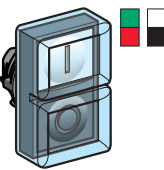
Lockable
 ZB5-AFD
 see page 2/12



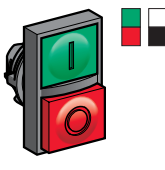
Knurled knob (1)
 ZB5-AF
 see page 2/12



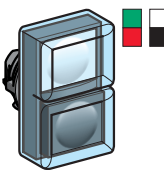
Flush pushes (IP 40/IP 66)
 Without/with markings
 ZB5-AA81/AA82
 see page 2/13



ZB5-AA91/AA92
 see page 2/13



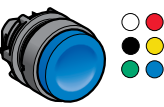
Flush push + Projecting push (IP 40/IP 66)
 Without/with markings
 ZB5-AL83/AL84
 see page 2/13



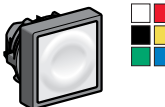
ZB5-AL93/AL94
 see page 2/13



Flush push
 ZB5-AH0/CH0
 see page 2/13



Projecting push
 ZB5-AH
 see page 2/13



Flush push
 ZB5-CH0
 see page 2/13

Control and signalling units Ø 22

Harmony® style 5

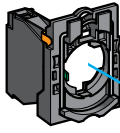
Pushbuttons, switches and pilot lights, with double insulated bezel
Sub-assemblies, ZB5-A

Non illuminated units for user assembly (continued)

Contact functions (continued)

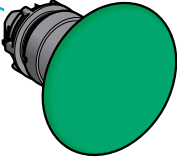
Mushroom head pushbuttons, spring return

Body sub-assemblies



Screw clamp terminals
ZB5-AZ10/AZ141
see page 2/10

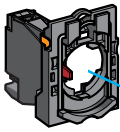
Head sub-assemblies



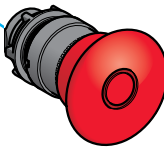
- ●
- ●
- ●
- Ø 30
- Ø 40
- Ø 60

Spring return
ZB5-AC/AR
see page 2/14

Mushroom head pushbuttons, latching

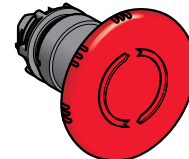


Plug-in connector
ZB5-AZ10/AZ144
see page 2/10



- ●
- ●
- Ø 30
- Ø 40
- Ø 60

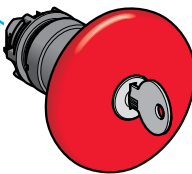
Push-pull
ZB5-AT84/AT/AX
see page 2/15



- ●
- ●
- Ø 30
- Ø 40
- Ø 60

Turn to release
ZB5-AS8/A4/AS5/AS6
see page 2/15

Selector switches and key switches



- ●
- ●
- Ø 30
- Ø 40
- Ø 60

Key release
ZB5-AS9/A7/AS1/AS2
see page 2/15



Standard handle (1)
ZB5-AD
see page 2/16



Long blk.handle (1)
ZB5-AJ
see page 2/17



Knurled blk. knob (1)
ZB5-AD9
see page 2/18



Key switches (2)
ZB5-AG/AG0
see page 2/19

(1) Switch handle and knob	(2) Key withdrawal positions for key switches	
	Key withdrawal positions	
▼	↙	↘
↙	↙	↘
▼	↙	↘
↘	↙	↘
▼	↙	↘
↙	↙	↘

Toggle switches



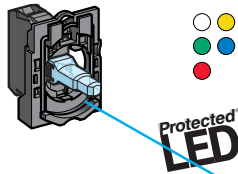
2 positions
ZB5-AD8
see page 2/19

Pilot lights for user assembly

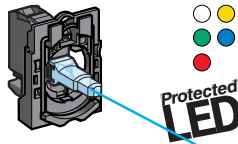
Signalling functions

2

Body sub-assemblies Integral LED



Screw clamp terminals
ZB5-AVB/AVG/AVM
see page 2/20



Plug-in connector
ZB5-AVB•4/AVG•4/AVM•4
see page 2/20

Head sub-assemblies



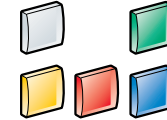
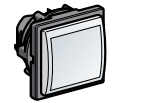
With lens mounted
ZB5-AV0•3
see page 2/21



ZB5-CV0•3
see page 2/21

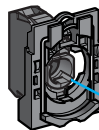


With 5 separate lenses
ZB5-AV003
see page 2/21

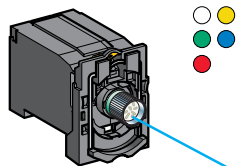


ZB5-CV003
see page 2/21

Body sub-assemblies for BA 9s bulb



Direct supply
Screw clamp terminals
ZB5-AV6
see page 2/21



Via integral transformer
Screw clamp terminals
ZB5-AV•/AV3D•(1)/AV5D•(1)
see page 2/21

Head sub-assemblies



With lens mounted
ZB5-AV0•
see page 2/21

Control and signalling units Ø 22

Harmony® style 5

Pushbuttons, switches and pilot lights, with double insulated bezel
Sub-assemblies, ZB5-A

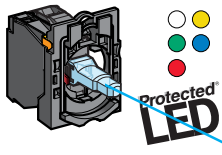
2

Illuminated pushbuttons and selector switches for user assembly

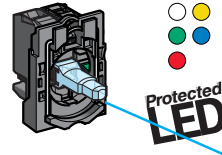
Illuminated pushbuttons, spring return

Combined contact and signalling functions

Body sub-assemblies



Screw clamp terminals
ZB5-AW0B/AW0G/
AW0M
see page 2/24

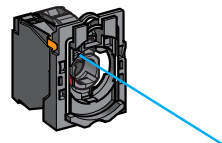


Plug-in connector
ZB5-AW0B/4/
AW0G/4/AW0M/4
see page 2/26

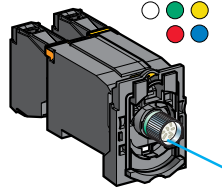
Double headed pushbuttons, spring return, with pilot light

Illuminated "push-push to release" pushbuttons and illuminated selector switches with standard handle

Body sub-assemblies For BA 9s bulb

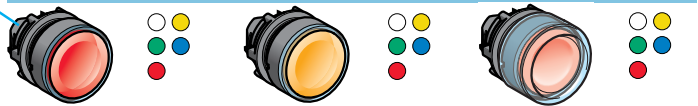


Direct supply
Screw clamp terminals
ZB5-AW06
see page 2/28



Via integral transformer
Screw clamp terminals
ZB5-AW03/4/5/3D/5D
see page 2/28

Head sub-assemblies



Flush push with cap mounted or not

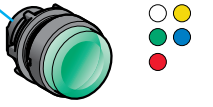
ZB5-AW3/3/AW9/3
see page 2/29

Flush push for insertion of legend

ZB5-AA/8
see page 2/29

Booted Flush push

ZB5-AW5/3
see page 2/29



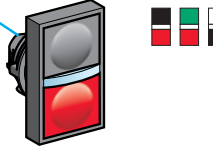
Projecting push

ZB5-AW1/3/AL/8
see page 2/29



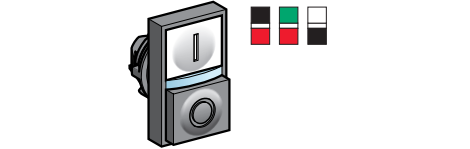
Flush or projecting push

ZB5-CW3/3/CW1/3
see page 2/29



Flush pushes Without/with markings

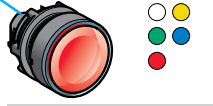
ZB5-AW81/3/3,
see page 2/30



Flush push + projecting push Without/with markings

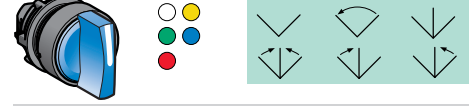
ZB5-AW83/3/3,
see page 2/30

ZB5-AW84/3/3
see page 2/30



Flush or projecting "push-push to release"

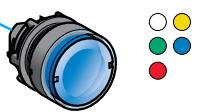
ZB5-AH03/AH/3
see page 2/30



Selector switches with standard handle

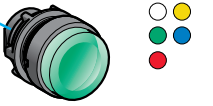
ZB5-AK1/3
see page 2/31

Head sub-assemblies



Flush push

ZB5-AW3
see page 2/29



Projecting push

ZB5-AW1
see page 2/29

2

Environment

Protective treatment standard version			"TH"
Ambient air temperature around the device	Storage	°C	- 40...+ 70
	Operation	°C	- 25...+ 70 unless otherwise stated
Electric shock protection	Conforming to IEC 536		Class II
Degree of protection	Conforming to IEC 529		IP 65, unless otherwise stated IP 66, for booted pushbutton heads
	Conforming to NEMA		NEMA type 4X and 13, unless otherwise stated
High pressure cleaning resistance		Pa	70 x 10 ⁵ (70 bar); distance: 0.1 m Temperature: 55°C
Mechanical shock protection	Conforming to EN 50102		Non illuminated heads: IK 03
			Illuminated heads: IK 05
Conforming to standards			IEC/EN 60947-1, IEC/EN 60947-5-1, IEC/EN 60947-5-4, JIS C 4520, UL 508, CSA C22-2 n° 14
Product certifications	UL Listed, CSA		Standard single contacts with screw clamp terminals: A600; Q600 Double contacts with screw clamp terminals: A600; Q600 Light blocks with screw clamp terminals Joystick controllers XD5-PA/ZD5-PA: A600; R300
	UL Recognized, CSA		Standard single contacts for plug-in connector: A300; R300 Standard single contacts for printed circuit board: B300; R300
	BV, RINA, LROS, DNV, GL (pending)		Standard single contacts and double contacts with screw clamp terminals
Terminal identification	Conforming to EN 50005 & EN 50013		

Characteristics of contact blocks

Mechanical characteristics

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

Characteristics of contact blocks (continued)

Mechanical characteristics (continued)

Operating torque (to change electrical state)	Selector switches	N.m	N/O contact: 0.14
	Additional contact (extra)	N.m	N/O contact: 0.05
Mechanical durability (in millions of operating cycles)	Pushbuttons	Spring return	5
		Double-headed	1
		Push-push to release	0.5
	Selector switches	Non illuminated	3
		Illuminated	1
	Toggle switches		0.5
	Emergency stop pushbuttons		0.3
	Joystick controllers		1
	Standard contact blocks		5
Low power switching contact blocks		0.5	
Vibration resistance	Conforming to IEC 68-2-6	gn	Frequency: 2 to 500 Hz: 5
Shock resistance	Conforming to IEC 68-2-27	gn	All functions except mushroom head pushbuttons
		gn	half sine wave acceleration 11 ms: 50 half sine wave acceleration 18 ms: 30
		gn	Mushroom head pushbuttons (half sine wave acceleration 11 ms: 10)

Electrical characteristics

Cabling capacity	Conforming to IEC/EN 60947-1	mm² mm²	Screw clamp terminals Min.: 1 x 0.22 without cable end Max.: 2 x 1.5 with cable end Cross headed screw (Pozidrive or Philips type 1), slotted for flat 4 and 5.5 mm screwdriver. Tightening torque: 0.8 N.m (max. 1.2 N.m)
Contact material	Silver alloy (Ag / Ni)		Standard single and double blocks with screw clamp 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 IEC/EN 60947-5-1	A	Standard single and double blocks with screw clamp terminals: 10 (gG cartridge fuse conforming to IEC 269-1)
		A	Blocks for plug-in connector: 4 (gG cartridge fuse conforming to IEC 269-1)
		A	Standard blocks for printed circuit board connection: 4 (gG cartridge fuse conforming to IEC 269-1)
Nominal thermal current	Conforming to IEC/EN 60947-5-1	A	Standard single and double blocks with screw clamp terminals: 10
		A	Blocks for plug-in connector: 10
		A	Standard blocks for printed circuit board connection: 6
Rated insulation voltage	Conforming to IEC/EN 60947-1	V	Standard single and double blocks with screw clamp terminals: Ui = 600 degree of pollution 3
		V	Blocks for plug-in connector or Faston connectors: Ui = 250 degree of pollution 3
		V	Standard blocks for printed circuit board connection: Ui = 250 degree of pollution 3
Rated impulse withstand voltage	Conforming to IEC/EN 60947-1	kV	Standard single and double blocks with screw clamp terminals: Uimp = 6
		kV	Blocks for plug-in connector: Uimp = 4
		kV	Standard blocks for printed circuit board connection: Uimp = 4

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Characteristics of contact blocks (continued)

Electrical characteristics (continued)

Rated operational characteristics

Conforming to IEC/EN 60947-5-1

a.c. supply: utilisation category AC-15	Standard single and double blocks with screw clamp 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
d.c. supply: utilisation category DC-13	Standard single and double blocks with screw clamp terminals: Q600: Ue = 600 V and Ie = 0.1 A or Ue = 250 V et Ie = 0.27 A or Ue = 125 V and Ie = 0.55 A Joystick controllers XD5-PA/ZD5-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

Characteristics of special contact blocks for low power switching

VA	P max.: 12
A	I max.: 0.1
V	U max.: 24

Electrical durability

Conforming to IEC/EN 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	Standard single blocks with screw clamp terminals:	V	24	120	230
		A	4	3	2
Standard double blocks with screw clamp terminals and blocks for plug-in connector:		V	24	120	230
		A	3	1.5	1
d.c. supply for 1 million operating cycles, utilisation category DC-13	Standard single blocks with screw clamp terminals:	V	24	110	
		A	0.5	0.2	
Standard double blocks with screw clamp terminals and blocks for plug-in connector:		V	24	110	
		A	0.4	0.15	

Electrical reliability

Failure rate According to IEC/EN 60947-5-4	
- In clean environment	Standard blocks: - at 17 V and 5 mA, $\lambda < 10^{-8}$ - at 5 V and 1 mA, $\lambda < 10^{-6}$ Special blocks with gold flashed contacts, for low power switching: - at 5 V and 1 mA, $\lambda < 10^{-8}$
- In dusty environment	Special blocks with gold flashed contacts and dust protection, for low power switching: - at 5 V and 1 mA, $\lambda < 10^{-8}$

Characteristics of illuminated units (pilot lights, illuminated pushbuttons and illuminated switches)

Mechanical characteristics

Vibration resistance	Conforming to IEC 68-2-6	gn	Frequency: 12 to 500 Hz: 5
Shock resistance	Conforming to IEC 68-2-27	gn gn	Half sine wave acceleration 11 ms: 50 Half sine wave acceleration 18 ms: 30

Electrical characteristics

Cabling capacity	Conforming to IEC/EN 60947-1	mm ² mm ²	Screw clamp 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 IEC/EN 60947-1	V	Direct supply pilot light blocks (BA 9s bulb): U _i = 250 degree of pollution 3
		V	Pilot light blocks with integral LED: U _i = 250 degree of pollution 3
		V	Pilot light blocks with transformer: U _i = 600 degree of pollution 3
Rated impulse withstand voltage	Conforming to IEC/EN 60947-1	kV kV 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 light modules only, with integral LED

Voltage limits	Nominal voltage	V	12 V: 10 to 15 ---; 10.2 to 13.8 ~ 24 V: 19.2 to 30 ---; 21.6 to 26.4 ~ 24 to 120 V: 20 to 132 ~ 48 to 120 V: 40 to 132 ~ 240 V: 195 to 264 ~
Current consumption	Applicable to all colours	mA mA mA mA	~ 12 V supply blocks: 18 ~ 24 V supply blocks: 18 ~ 120 V supply blocks: 14 ~ 240 V supply blocks: 14
Service life	At nominal 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 61000-4-2	kV	8/6
Direct parallel connection across inductive load E.g.: contactor coil or solenoid	Maximum power of load	VA	For applications involving high powers (≥ 30 VA), a ZBZ-V● LED suppressor must be connected across the light block terminals (see page 2/33)
Electromagnetic emission	Conforming to EN 55011		Class B

Specific characteristics

Body/fixing collar

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

Voltage limits	Hour counter and annunciator	V	± 10% of the nominal voltage
Current consumption	Hour counter	mA	XB5-DSB (~ 12 to 24 V): 7 to 15 XB5-DSG (~ 120 V): 8 XB5-DSM (~ 230 to 240 V): 8
	Annunciator	mA	5