

Control and signalling units Ø 22

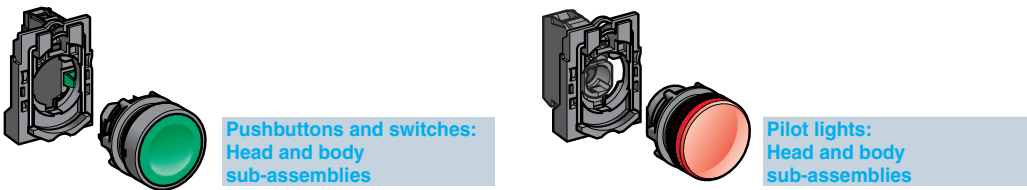
Harmony® style 5
Pushbuttons, switches and pilot lights, with double insulated bezel

Description

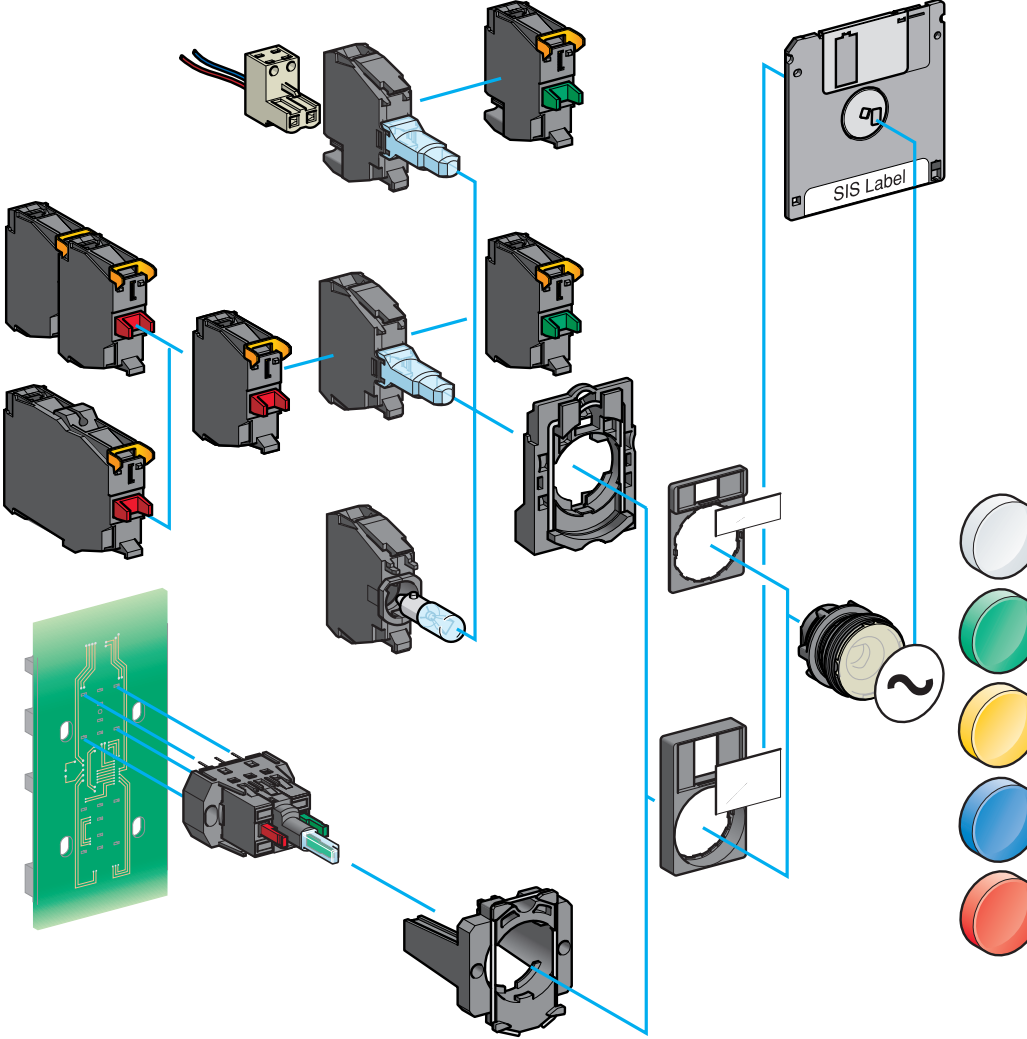
The Ø 22, style 5 range of control and signalling units comprises:

Sub-assemblies for user assembly
ZB5-A

2

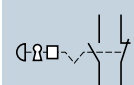


Component parts and accessories
ZB

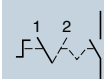
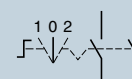
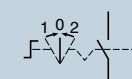


Schematic library

Pushbuttons and Emergency stop pushbuttons

Pushbutton
N/O contactPushbutton
N/C contactMushroom head,
spring return
N/O contactEmergency stop latching
mushroom head. Push-pull
N/C contactEmergency stop trigger
action mushroom head
Push-pull
N/O + N/C contactEmergency stop trigger
action mushroom head
Turn to release - N/C contactEmergency stop trigger
action mushroom head
Key release - N/C contactEmergency stop trigger
action mushroom head
Turn to release
N/O + N/C contactEmergency stop trigger
action mushroom head
Key release
N/O + N/C contactDouble-headed pushbutton
N/O + N/C contact

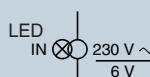
Selector switches

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

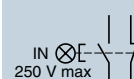
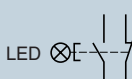
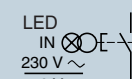
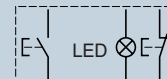
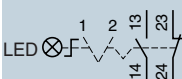
Pilot lights

Pilot light with BA 9s
incandescent bulb

LED pilot light

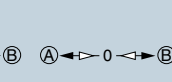
Pilot light with integral transformer, 230 V ~ primary,
6 V secondary. BA 9s incandescent bulb or LED

Illuminated pushbuttons and selector switches

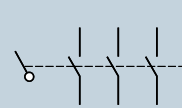
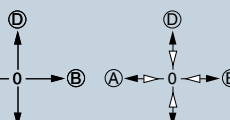
Illuminated pushbutton
BA 9s incandescent bulb
N/O + N/C contactIlluminated pushbutton
with LED
N/O + N/C contactIlluminated pushbutton
with integral transformer,
230 V ~ 50/60 Hz primary,
6 V secondary.
BA 9s incandescent bulb or LED
N/O + N/C contactDouble-headed pushbutton
with LED pilot light
N/O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

Joystick controllers

2 direction

Without
spring returnWith
spring return

4 direction

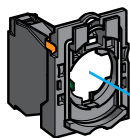
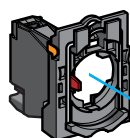
Without
spring returnWith spring
return

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 assemblyPushbuttons, spring return,
without markingBody
sub-assembliesScrew clamp terminals
ZB5-AZ10/AZ141
see page 2/10Plug-in connector
ZB5-AZ10p4/AZ1414
see page 2/10Pushbuttons, spring return,
with marking

"Push-turn" pushbuttons

Double-headed pushbuttons,
spring return"Push-push to release"
pushbuttons

Contact functions

Head
sub-assemblies

Flush push

ZB5-AA0/AA9
see page 2/11ZB5-AA
see page 2/11Flush push for
insertion of legendZB5-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

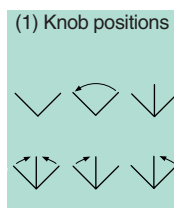
Flush push

ZB5-CA3/CA9
see page 2/12

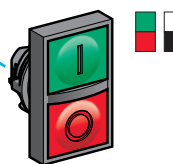
Lockable

ZB5-AFD
see page 2/12

Knurled knob (1)

ZB5-AF
see page 2/12

(1) Knob positions

Flush pushes (IP 40/IP 66)
Without/with markingsZB5-AA81/AA82
see page 2/13ZB5-AA91/AA92
see page 2/13Flush push + Projecting push (IP 40/IP 66)
Without/with markingsZB5-AL83/AL84
see page 2/13ZB5-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

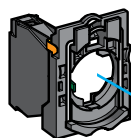
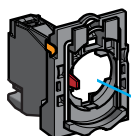
ZB5-CH0
see page 2/13

Control and signalling units Ø 22

Harmony® style 5

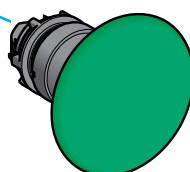
Pushbuttons, switches and pilot lights, with double insulated bezel

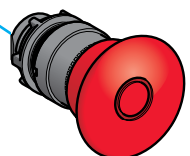
Sub-assemblies, ZB5-A

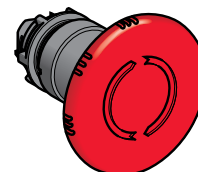
Non illuminated units
for user assembly
(continued)Mushroom head pushbuttons,
spring returnBody
sub-assembliesScrew clamp terminals
ZB5-AZ10●/AZ141
see page 2/10Mushroom head pushbuttons,
latchingPlug-in connector
ZB5-AZ10●4/AZ1414
see page 2/10Selector switches
and key switches

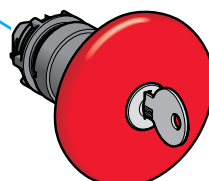
Toggle switches

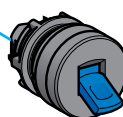
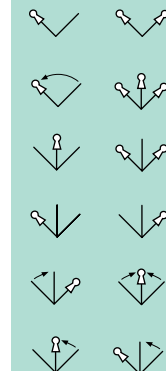
Contact functions (continued)

Head
sub-assemblies

 Ø 30
 Ø 40
 Ø 60
Spring return
ZB5-AC/AR
see page 2/14

 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●4/AS4●/AS5●/AS6●
see page 2/15

 Ø 30
 Ø 40
 Ø 60
Key release
ZB5-AS9●4/AS7●/AS1●/AS2●
see page 2/15Standard handle (1)
ZB5-AD●
see page 2/16Long blk.handle (1)
ZB5-AJ●
see page 2/17Knurled blk. knob (1)
ZB5-AD●9
see page 2/18Key switches (2)
ZB5-AG●/AG0●
see page 2/192 positions
ZB5-AD●8
see page 2/19(1) Switch handle
and knob(2) Key withdrawal
positions for key
switches
Key withdrawal
positions

Control and signalling units Ø 22

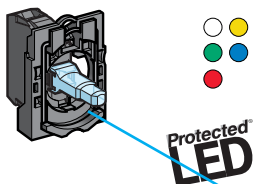
Harmony® style 5

Pushbuttons, switches and pilot lights, with double insulated bezel

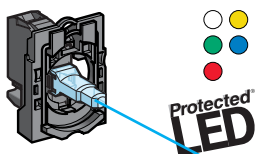
Sub-assemblies, ZB5-A

Pilot lights
for user assembly

Signalling functions

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



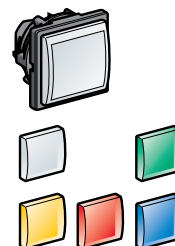
With lens mounted
ZB5-AV0•3
see page 2/21



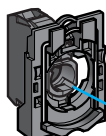
ZB5-CV0•3
see page 2/21



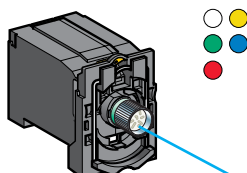
With 5 separate lenses
ZB5-AV003
see page 2/21



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

Illuminated pushbuttons and selector switches for user assembly

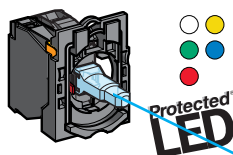
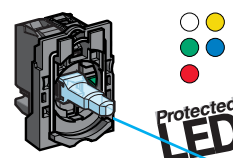
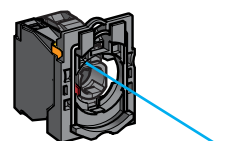
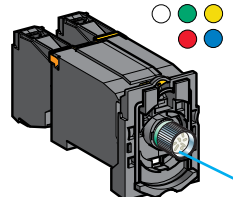
Illuminated pushbuttons, spring return

Double headed pushbuttons, spring return, with pilot light

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

Illuminated pushbuttons, spring return

Combined contact and signalling functions

Body sub-assemblies
Integral LEDScrew clamp terminals
ZB5-AW0B/004/
AW0M
see page 2/24Plug-in connector
ZB5-AW0B/004/
AW0G/004/AW0M/004
see page 2/26Body sub-assemblies
For BA 9s bulbDirect supply
Screw clamp terminals
ZB5-AW06
see page 2/28Via integral transformer
Screw clamp terminals
ZB5-AW03/4/5/3D/5D
see page 2/28

Head sub-assemblies

Flush push with cap
mounted or notZB5-AW3/03/AW9/03
see page 2/29Flush push for
insertion of legendZB5-AA/08
see page 2/29

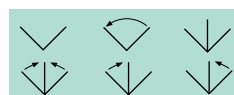
Booted Flush push

ZB5-AW5/03
see page 2/29

Projecting push

ZB5-AW1/03/AL/08
see page 2/29

Flush or projecting push

ZB5-CW3/03/CW1/03
see page 2/29Flush pushes
Without/with markingsZB5-AW81/003/3,
see page 2/30ZB5-AW82/003/3
see page 2/30Flush push + projecting push
Without/with markingsZB5-AW83/003/3,
see page 2/30ZB5-AW84/003/3
see page 2/30Flush or projecting
"push-push to release"ZB5-AH03/03/AH/03
see page 2/30Selector switches with
standard handleZB5-AK1/03
see page 2/31

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 mm mm	Changing N/C state: 1.5 Changing N/O state: 2.6 Total travel: 4.3
Operating force	Pushbutton	N N	Changing N/C state: 3.5 Changing N/O state: 3.8
	Additional contact (extra to change state)	N N	Single N/C contact: 2 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 N	Standard push-pull: 45 Trigger action push-pull: 50
		N N	Standard turn to release and key release: 40 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
		gn	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 A A	Standard single and double blocks with screw clamp terminals: 10 (gG cartridge fuse conforming to IEC 269-1) Blocks for plug-in connector: 4 (gG cartridge fuse conforming to IEC 269-1) 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 A A	Standard single and double blocks with screw clamp terminals: 10 Blocks for plug-in connector: 10 Standard blocks for printed circuit board connection: 6
Rated insulation voltage	Conforming to IEC/EN 60947-1	V V V	Standard single and double blocks with screw clamp terminals: Ui = 600 degree of pollution 3 Blocks for plug-in connector or Faston connectors: Ui = 250 degree of pollution 3 Standard blocks for printed circuit board connection: Ui = 250 degree of pollution 3
Rated impulse withstand voltage	Conforming to IEC/EN 60947-1	kV kV kV	Standard single and double blocks with screw clamp terminals: Uimp = 6 Blocks for plug-in connector: Uimp = 4 Standard blocks for printed circuit board connection: Uimp = 4

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: $U_e = 600\text{ V}$ and $I_e = 1.2\text{ A}$ or $U_e = 240\text{ V}$ and $I_e = 3\text{ A}$
or $U_e = 120\text{ V}$ and $I_e = 6\text{ A}$

Blocks for plug-in connector:
A300: $U_e = 120\text{ V}$ and $I_e = 6\text{ A}$ or $U_e = 240\text{ V}$ and $I_e = 3\text{ A}$

Standard blocks for printed circuit board connection:
B300: $U_e = 120\text{ V}$ and $I_e = 3\text{ A}$ or $U_e = 240\text{ V}$ and $I_e = 1.5\text{ A}$

d.c. supply:
utilisation category DC-13

Standard single and double blocks with screw clamp terminals:
Q600: $U_e = 600\text{ V}$ and $I_e = 0.1\text{ A}$ or $U_e = 250\text{ V}$ and $I_e = 0.27\text{ A}$
or $U_e = 125\text{ V}$ and $I_e = 0.55\text{ A}$

Joystick controllers XD5-PA/ZD5-PA:
R300: $U_e = 125\text{ V}$ and $I_e = 0.22\text{ A}$ or $U_e = 250\text{ V}$ and $I_e = 0.1\text{ A}$

Blocks for plug-in connector:
R300: $U_e = 125\text{ V}$ and $I_e = 0.22\text{ A}$ or $U_e = 250\text{ V}$ and $I_e = 0.1\text{ A}$

Standard blocks for printed circuit board connection:
R300: $U_e = 125\text{ V}$ and $I_e = 0.22\text{ A}$ or $U_e = 250\text{ V}$ and $I_e = 0.1\text{ A}$
Characteristics of special contact blocks for low power switching

VA
A
V

P max.: 12
I max.: 0.1
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

V
A

Standard single blocks with screw clamp terminals:

24	120	230
4	3	2

V
A

Standard double blocks with screw clamp terminals and blocks for plug-in connector:

24	120	230
3	1.5	1

d.c. supply for 1 million operating cycles, utilisation category DC-13

V
A

Standard single blocks with screw clamp terminals:

24	110
0.5	0.2

V
A

Standard double blocks with screw clamp terminals and blocks for plug-in connector:

24	110
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 V 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 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 $\overline{\sim}$; 10.2 to 13.8 $\sim$ 24 V: 19.2 to 30 $\overline{\sim}$; 21.6 to 26.4 $\sim$ 24 to 120 V: 20 to 132 $\sim$ 48 to 120 V: 40 to 132 $\sim$ 240 V: 195 to 264 $\sim$
Current consumption	Applicable to all colours	mA mA mA mA	$\overline{\sim}$ 12 V supply blocks: 18 $\overline{\sim}$ 24 V supply blocks: 18 $\sim$ 120 V supply blocks: 14 $\sim$ 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	$\pm 10\%$ of the nominal voltage
Current consumption	Hour counter	mA	XB5-DSB ($\overline{\sim}$ 12 to 24 V): 7 to 15 XB5-DSG ($\sim$ 120 V): 8 XB5-DSM ($\sim$ 230 to 240 V): 8
	Annunciator	mA	5