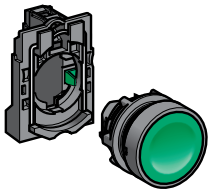
Control and signalling units Ø 22

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

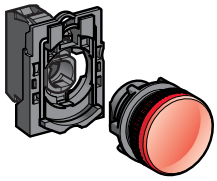
Description

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

Sub-assemblies for user assembly ZB5-A

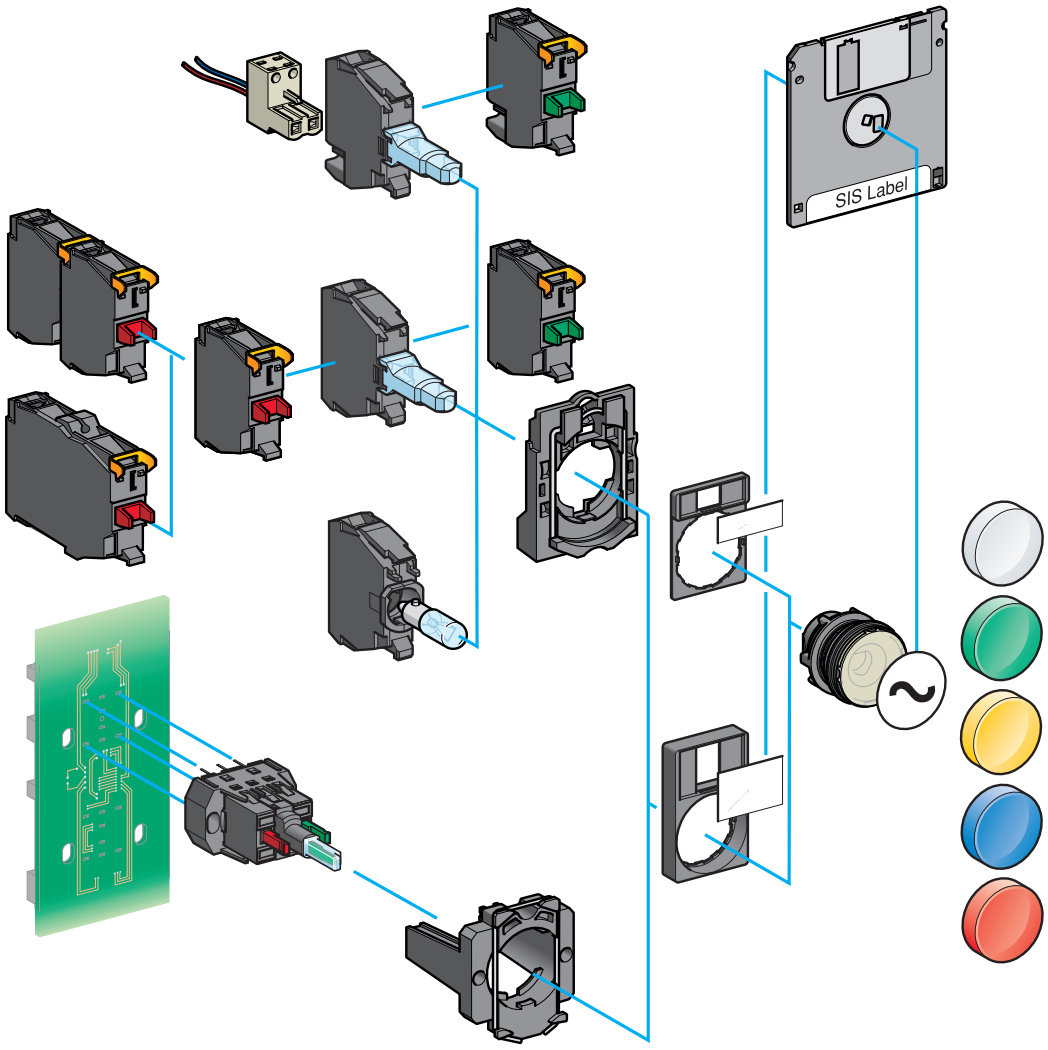


Pushbuttons and switches: Head and body sub-assemblies



Pilot lights: Head and body sub-assemblies

Component parts and accessories ZB



Characteristics: pages 2/6 to 2/9
References: pages 2/10 to 2/47
Dimensions: pages 2/48 to 2/55

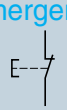
Control and signalling units Ø 22

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

Schematic library

Pushbuttons and Emergency stop pushbuttons

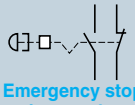
Pushbutton
N/O contact



Pushbutton
N/C contact

Mushroom head,
spring return
N/O contact

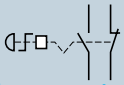
Emergency stop latching
mushroom head. Push-pull
N/C contact



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

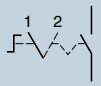


Emergency stop trigger
action mushroom head
Turn to release
N/O + N/C contact

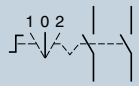
Emergency stop trigger
action mushroom head
Key release
N/O + N/C contact

Double-headed pushbutton
N/O + N/C contact

Selector switches

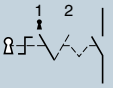


Selector switch - 2 position,
stay put
N/O contact

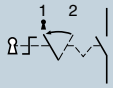


Selector switch - 3 position,
stay put
N/O + N/O contact

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

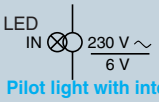


Selector switch - 2 position,
spring return from right to left,
key withdrawal LH position
N/O contact

Pilot lights

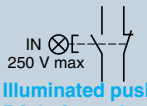
Pilot light with BA 9s
incandescent bulb

LED pilot light



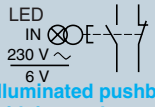
Pilot light with integral transformer, 230 V ~ primary,
6 V secondary. BA 9s incandescent bulb or LED

Illuminated pushbuttons and selector switches

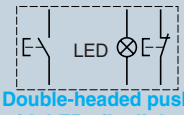


Illuminated pushbutton
BA 9s incandescent bulb
N/O + N/C contact

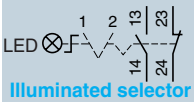
Illuminated pushbutton
with LED
N/O + N/C contact



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



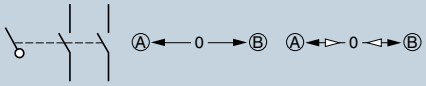
Double-headed pushbutton
with LED pilot light
N/O + N/C contact



Illuminated selector switch
with LED - 2 position stay put
N/O + N/C contact

Joystick controllers

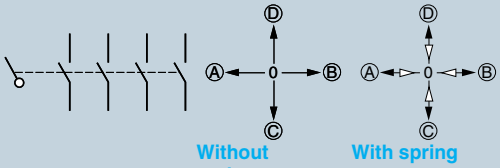
2 direction



Without
spring return

With
spring return

4 direction



Without
spring return

With spring
return

Characteristics: pages 2/6 to 2/9
References: pages 2/10 to 2/47
Dimensions: pages 2/48 to 2/55

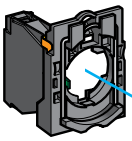
Control and signalling units Ø 22

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

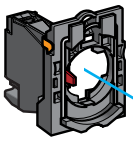
Non illuminated units for user assembly

Contact functions

Body sub-assemblies



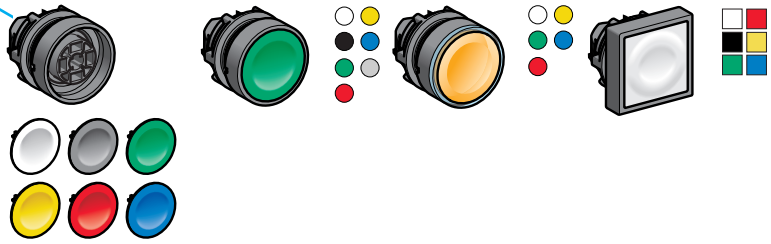
Screw clamp terminals
ZB5-AZ10●/AZ141
see page 2/10



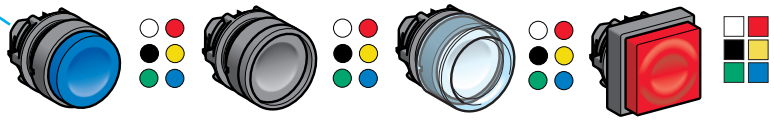
Plug-in connector
ZB5-AZ10p4/AZ1414
see page 2/10

Head sub-assemblies

Pushbuttons, spring return, without marking



Flush push		Flush push for insertion of legend	Flush push
ZB5-AA0/AA9	ZB5-AA●	ZB5-AA●8	ZB5-CA●
see page 2/11	see page 2/11	see page 2/11	see page 2/11

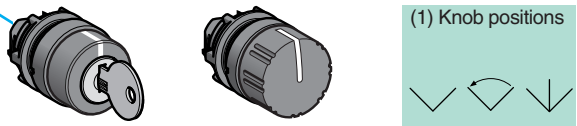


Projecting push	Recessed push	Booted flush push	Projecting push
ZB5-AL●	ZB5-AA●4	ZB5-AP●/AP●8	ZB5-CL●
see page 2/11	see page 2/11	see page 2/11	see page 2/11

Pushbuttons, spring return, with marking

Flush push	Projecting push	Flush push
ZB5-AA●3●/AA●4●	ZB5-AL	ZB5-CA●3/CA●9
see page 2/12	see page 2/12	see page 2/12

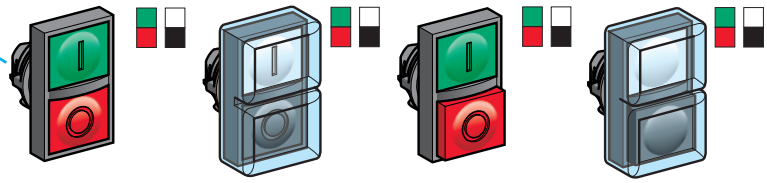
"Push-turn" pushbuttons



(1) Knob positions

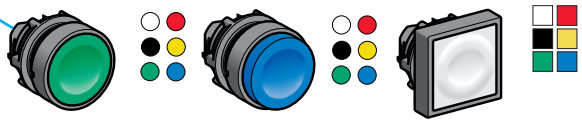
Lockable	Knurled knob (1)
ZB5-AFD	ZB5-AF
see page 2/12	see page 2/12

Double-headed pushbuttons, spring return



Flush pushes (IP 40/IP 66) Without/with markings		Flush push + Projecting push (IP 40/IP 66) Without/with markings	
ZB5-AA81/AA82	ZB5-AA91/AA92	ZB5-AL83/AL84	ZB5-AL93/AL94
see page 2/13	see page 2/13	see page 2/13	see page 2/13

"Push-push to release" pushbuttons



Flush push	Projecting push	Flush push
ZB5-AH0/CH0	ZB5-AH●	ZB5-CH0●
see page 2/13	see page 2/13	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

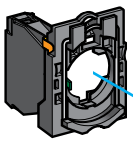
Non illuminated units for user assembly (continued)

Contact functions (continued)

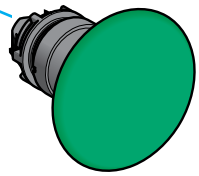
Body sub-assemblies

Head sub-assemblies

Mushroom head pushbuttons, spring return



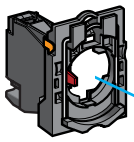
Screw clamp terminals
ZB5-AZ10●/AZ141
see page 2/10



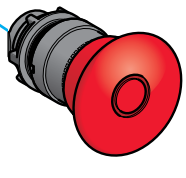
Ø 30
Ø 40
Ø 60

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

Mushroom head pushbuttons, latching

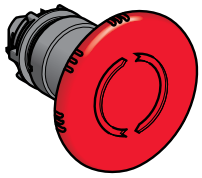


Plug-in connector
ZB5-AZ10●4/AZ1414
see page 2/10



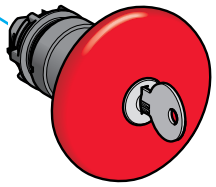
Ø 30
Ø 40
Ø 60

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



Ø 30
Ø 40
Ø 60

Turn to release
ZB5-AS8●4/AS4●/AS5●/AS6●
see page 2/15



Ø 30
Ø 40
Ø 60

Key release
ZB5-AS9●4/AS7●/AS1●/AS2●
see page 2/15

Selector switches and key switches

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

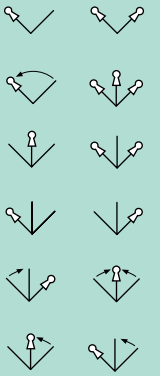
Long blk.handle (1)
ZB5-AJ●
see page 2/17

Knurled blk. knob (1)
ZB5-AD●9
see page 2/18

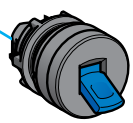
Key switches (2)
ZB5-AG●/AG0●
see page 2/19

(1) Switch handle and knob

(2) Key withdrawal positions for key switches
⚷ Key withdrawal positions



Toggle switches



2 positions
ZB5-AD●8
see page 2/19

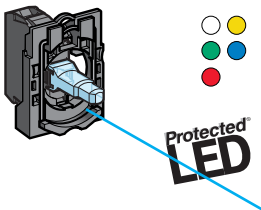
Control and signalling units Ø 22

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

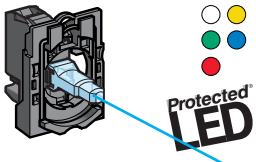
Pilot lights for user assembly

Signalling functions

Body sub-assemblies Integral LED



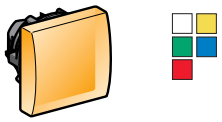
Screw clamp terminals
ZB5-AVB/AVG/AVM
see page 2/20



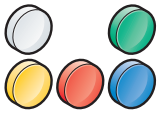
Plug-in connector
ZB5-AVB●4/AVG●4/AVM●4
see page 2/20

Head sub-assemblies

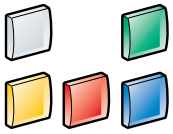
With lens mounted
ZB5-AV0●3
see page 2/21



ZB5-CV0●3
see page 2/21

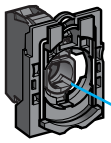


With 5 separate lenses
ZB5-AV003
see page 2/21

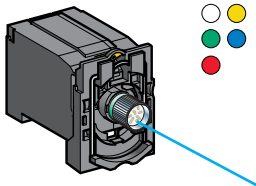


ZB5-CV003
see page 2/21

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

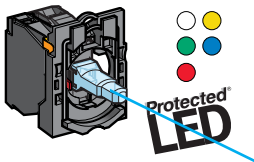
Harmony® style 5
Pushbuttons, switches and pilot lights, with double insulated bezel
Sub-assemblies, ZB5-A

Illuminatedpushbuttons and selector switches for user assembly

Combined contact and signalling functions

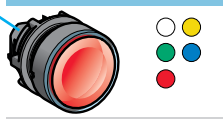
Illuminated pushbuttons, spring return

Body sub-assemblies Integral LED

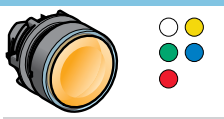


Screw clamp terminals
ZB5-AW0B/AW0G/AW0M
see page 2/24

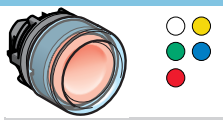
Head sub-assemblies



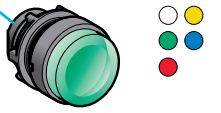
Flush push with cap mounted or not
ZB5-AW3●3/AW9●3
see page 2/29



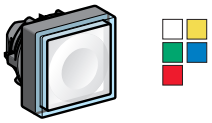
Flush push for insertion of legend
ZB5-AA●8
see page 2/29



Booted Flush push
ZB5-AW5●3
see page 2/29

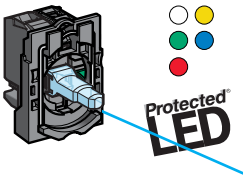


Projecting push
ZB5-AW1●3/AL●8
see page 2/29

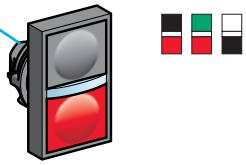


Flush or projecting push
ZB5-CW3●3/CW1●3
see page 2/29

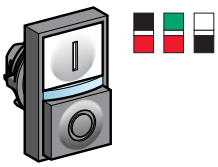
Double headed pushbuttons, spring return, with pilot light



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

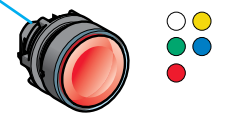


Flush pushes
Without/with markings
ZB5-AW81●●●3, see page 2/30
ZB5-AW82●●●3 see page 2/30

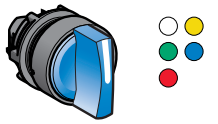


Flush push + projecting push
Without/with markings
ZB5-AW83●●●3, see page 2/30
ZB5-AW84●●●3 see page 2/30

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



Flush or projecting “push-push to release”
ZB5-AH0i3/AH●3
see page 2/30

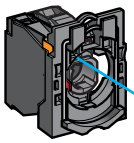


Selector switches with standard handle
ZB5-AK1●i3
see page 2/31

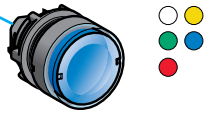
Body sub-assemblies For BA 9s bulb

Head sub-assemblies

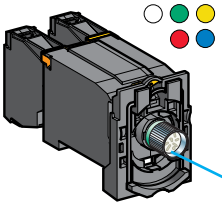
Illuminated pushbuttons, spring return



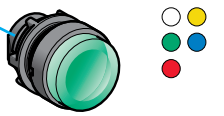
Direct supply
Screw clamp terminals
ZB5-AW06●
see page 2/28



Flush push
ZB5-AW3●
see page 2/29



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



Projecting push
ZB5-AW1●
see page 2/29

Control and signalling units Ø 22

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

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

General: pages 2/0 to 2/5
References: pages 2/10 to 2/47
Dimensions: pages 2/48 to 2/55

Control and signalling units Ø 22

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

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			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		Screw clamp terminals
		mm²	Min.: 1 x 0.22 without cable end
		mm²	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		Standard single and double blocks with screw clamp terminals:
		V	Ui = 600 degree of pollution 3
		V	Blocks for plug-in connector or Faston connectors: Ui = 250 degree of pollution 3
			Standard blocks for printed circuit board connection:
		V	Ui = 250 degree of pollution 3
Rated impulse withstand voltage	Conforming to IEC/EN 60947-1		Standard single and double blocks with screw clamp terminals:
		kV	Uimp = 6
		kV	Blocks for plug-in connector: Uimp = 4
		kV	Standard blocks for printed circuit board connection: Uimp = 4

General: pages 2/0 to 2/5
References: pages 2/10 to 2/47
Dimensions: pages 2/48 to 2/55

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** **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		Standard single blocks with screw clamp terminals:
		V **A**	24 4 — 120 3 — 230 2
			Standard double blocks with screw clamp terminals and blocks for plug-in connector:
		V **A**	24 3 — 120 1.5 — 230 1
	d.c. supply for 1 million operating cycles, utilisation category DC-13		Standard single blocks with screw clamp terminals:
		V **A**	24 0.5 — 110 0.2
			Standard double blocks with screw clamp terminals and blocks for plug-in connector:
		V **A**	24 0.4 — 110 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, $\lambda < 10^{-8}$

Control and signalling units Ø 22

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

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	 **mm²** **mm²**	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): Ui = 250 degree of pollution 3 Pilot light blocks with integral LED: Ui = 250 degree of pollution 3 Pilot light blocks with transformer: Ui = 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): Uimp = 4 Pilot light blocks with integral LED: Uimp = 4 Pilot light blocks with transformer: Uimp = 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.)

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

General: pages 2/0 to 2/5 **References:** pages 2/10 to 2/47 **Dimensions:** pages 2/48 to 2/55