# 6.2 Emergency Stop and push buttons



Application

Command devices are of great importance on the man-machine interface in the area of industrial applications. For example, they are mounted in switchboards, control panels, two-hand operation consoles, in lift manufacture and on material-handling plants, including conveyors. Manual actuation of the devices starts operating sequences and functional processes or serves to bring these to an end.

Emergency Stop devices are generally connected in the safety circuit of a machine or plant and are of particular importance in terms of the control system for these. In case of a fault or accident, the secure function and quick accessibility of Emergency Stop devices can be crucial for saving life, limiting the degree of injury to personnel or the extent of damage to a machine. New requirements are placed on the mode of operation of these command devices by the new harmonised European Standard EN 418 regarding functional aspects and recommendations for the arrangement of Emergency Stop equipment.

Design and<br/>mode of<br/>operationThe EDRRZ, KDRRZ and ADRR ranges of Emergency<br/>Stop switches are of modular design. The EDRRZ and<br/>KDRRZ ranges comprise an actuator, ELM mounting<br/>flange, EFR spring element and up to two contact<br/>blocks. Since the snap-function is included in the EFR<br/>spring element, which is clipped onto the rear of the<br/>front plate, the front projection of the units is only

29 mm. The danger of damage to the Emergency Stop equipment by leverage due to actuation from an angle is thus practically eliminated.

The ADRR range can be assembled with up to six contact blocks, each with one NC contact or one NO contact.

The design of the actuating parts as a mushroom head includes the technical safety feature of a collar to prevent blocking. This ensures that foreign bodies which happen to be under the button cannot lead to the actuation of the device being blocked. Instead, the conical collar pushes such bodies away.

The ES/EM 14 command devices, which are not suitable for use in safety circuits, are available as push buttons, selector switches and key switches. The actuators are connected to the contact blocks by a bayonet fastener. These command devices are for Ø 22.5 mm mounting holes and are suitable for spacings of 30 mm between centres. All actuators provide IP 65 and are of class II thermoplastic. The actuator is connected by a bayonet fastener to the ES/EM 14 limit switch or in the case of EEx version to the EX/EXM 14 switch. Two switching elements are available.

# 6.2 Emergency Stop and push buttons



#### Features EDRRZ 40 RT

- Emergency Stop push buttons
  - Metal actuators
  - Max. 2 NC and 2 NO or 4 NC contacts
  - Front projection 29 mm
  - Mounting hole Ø 22.3 mm
  - Push-stayput and pull
  - to reset

### KDRRZ 40 RT • Emergency Stop

- push buttonsThermoplastic actuators
- Max. 2 NC and 2 NO or
- 4 NC contactsFront projection 29 mm
- Mounting hole Ø 22.3 mm
- Push-stayput and pull to reset

### ADRR 40 RT • Emergency Stop

- push buttons
  - Thermoplastic actuators
  - Max. 6 contacts
  - Front projection 37.8 mm
  - Mounting hole Ø 22.3 mm
  - Push-stayput and pull
     to reset

### ES 14 RUV

**ES/EM** 14

EX/EXM 14

- Emergency Stop push buttons
- Thermoplastic actuators
- 1 NC and 1 NO contact
- Front projection 41 mmMounting hole Ø 22.5 mm
- Push-stayput and pull
- to reset
- Pre-wired cable
- EEx version available
- Command devices

# without safety function

- Thermoplastic enclosureslow action
- with 1 NC and 1 NO
- Snap action with 1 change-over contact,
- single break
- Pre-wired cableEEx version available
- EEX version available
  Actuators:
  - Actuators: Mushroom head buttons Push buttons with/without diaphragm Selector switch
  - Spring-return control switch Key switch



Note

The technical data for the Emergency Stop and push buttons listed above are shown in tabular form in chapter 6.4.



- 6. Command devices
- 6.2 Emergency Stop and push buttons
- 6.2.1 EDRRZ 40 RT and KDRRZ 40 RT range



Features
----------

- Metal or thermoplastic actuators
   To EN 418
  - Max. 2 NC and 2 NO or 4 NC contacts
  - Extremely small projection from front of panel 29 mm
  - $\bullet$  Mounting hole Ø 22.3 mm
  - Push-stayput, pull to reset
  - Two EF contact blocks can be clipped onto ELM mounting flange
- Info
- EF contact blocks also available on enquiry with push-on or clip-in WAGO terminals
- Reset by twist plus pull movement on enquiry

Approvals	8	ŰL	SP
	D	USA	CAN





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- 6. Command devices
- **6.2** Emergency Stop and push buttons
- 6.2.1 EDRRZ 40 RT and KDRRZ 40 RT range

### EDRRZ 40 RT





#### Metal actuators

- To EN 418
- Max. 2 NC and 2 NO or 4 NC contacts
- Projection from front of panel 29 mm
- Mounting hole Ø 22.3 mm
- Selection of terminal designations available
- Pull to reset

Info

Available with key reset, Part number EDRRSZ 40 RT
Enclosures for top mounting, see chapter 6.2.3





ø 38,5

- 6. Command devices
- **6.2** Emergency Stop and push buttons
- 6.2.1 EDRRZ 40 RT and KDRRZ 40 RT range

## **KDRRZ 40 RT**





#### Features

### Thermoplastic actuators

- To EN 418
- Max. 2 NC and 2 NO or 4 NC contacts
- Projection from front of panel 29 mm
- Mounting hole Ø 22.3 mm
- Selection of terminal designations available
- Pull to reset

- Info
- Enclosures for top mounting, see chapter 6.2.3



Ordering	KDRRZ 40 RT range Emergency Stop switch with two contact blocks
details	with four NC contacts EF as well as one spring block EFR:
	KDRRZ 40 RT EF 220.1/EF220.1/EFR

Note In order to avoid repeating of the same terminal designations in wiring diagrams, contact blocks with the same contact configuration are available with different terminal designations.

- 6. Command devices
- 6.2 Emergency Stop and push buttons

# 6.2.2 ADRR 40 RT range

Features	<ul> <li>Thermoplastic actuators</li> <li>To EN 418</li> <li>Max. 6 contacts in tandem arrangement</li> <li>Mounting hole Ø 22.3 mm</li> <li>Push-stayput, pull to reset</li> </ul>		
Info	• Enclosures for top mounting, see chapter 6.2.3		
			1
Contacts/ Switch travel		1 NO	1 NC
		0 3 6	0 1 6
	1⊶⁺∽⊶2		AF 10
	3∽4	AF 03	
Ordering details	ADRR 40 RT range Emergency comprising three NC and three	Stop switch with six contacts, NO contacts:	

ADRR 40 RT 3 x AF 10 / 3 x AF 03

### 6.2 Emergency Stop and push buttons

### **6.2.3** Accessories

### Empty enclosure MBK 311 / GB

- Thermoplastic enclosure, grey with yellow cover, glass-fibre reinforced nylon, self-extinguishing
- Depth 84 mm
- Mounting hole Ø 22.3 mm
- 2 knockouts for Pg 16
- 4 mounting holes M4 at bottom of enclosure
- Resistant to chemicals
- Double insulated
- Terminal for ground conductor
- Resistant to ambient temperatures
- 40 °C ... + 100 °C
- Protection class IP 67



## Empty enclosure MBG 311 / GB

- Enamelled metal enclosure, base RAL 7012 dark grey, cover RAL 1012 yellow
- Depth 80 mm
- Mounting hole Ø 22.3 mm
- 4 mounting holes M5 at bottom of enclosure
- Protection class IP 65



### **Emergency Stop label MDP-8**

- Aluminium enamelled yellow to RAL 1012
- Outside diameter 53 mm
- Without inscription
- For Ø 22.3 mm mounting holes
- Info
- Version in yellow thermoplastic material 100 mm outside diameter on enquiry

### 6.2 Emergency Stop and push buttons

## 6.2.4 ES 14 RUV range



Slow action

**ES 14 RUV** 

Standard version

-

- Cable length Cable length 1 m long • Other lengths on enquiry
- Note The EEx version can be found in chapter 14.1.6.1.

## 6.2 Emergency Stop and push buttons

## 6.2.5 ES/EM 14 and EX/EXM 14 range







#### Features

- Thermoplastic enclosure
- To EN 418
- Slow action ⊖ with
- 1 NC and 1 NO contact
- Snap action with 1 change-over contact, single break
- Pre-wired cable
- Clip-in actuator

### Cable length

Cable length 1 mOther lengths on enquiry

6.2 Emergency Stop and push buttons

6.2.5 ES/EM 14 and EX/EXM 14 range

## **RT and RTM push button**





#### Features

- RT push button without diaphragm RTM push button with diaphragm
- Diaphragm of transparent silicon material
- IP 67 for actuator with diaphragm
- Pre-wired cable

Contacts		1 NO 1 NC BK 23 →→→→ 24 BK BN 11 →→→→ 12 BU	Change-over contact 4 BK 2 BN 1 BU
	Without diaphragm	Slow action	Snap action
$\langle E \rangle$	With diaphragm Without diaphragm With diaphragm	ES 14 RTM EX 14 RT EX 14 RTM	EM 14 RTM EXM 14 RT EXM 14 RTM
Cable length	• Cable length 1 m		

• Other lengths on enquiry

Note The part numbers shown in the "Contacts" table comprise the actuator and basic unit complete with connecting cable.

6.2 Emergency Stop and push buttons

### 6.2.5 ES/EM 14 and EX/EXM 14 range

### RW and RST selector and control switch





#### Features

- RW selector with rest positions
- 5 variants available
- RST type with spring return
- Pre-wired cable



Cable length • Cable length 1 m

Other lengths on enquiry

**6.2** Emergency Stop and push buttons

### 6.2.5 ES/EM 14 and EX/EXM 14 range

## RW and RST selector and control switch

Contacts		1 NO 1 NC BK 23 24 BK BN 11 12 BU	Change-over contact
		Slow action	Snap action
	RWA actuator	ES 14 RWA 0 - I	EM 14 RWA 0 - I
	RWA actuator	ES 14 RWA I - II	EM 14 RWA I - II
	RWB actuator	ES 14 RWB I - 0 - II	
	RWB actuator	ES 14 RWB 0 - I - II	
	RWC actuator	ES 14 RWC I - 0 🛨 II	
	RSTA actuator	ES 14 RSTA 0 🖛 I	EM 14 RSTA 0 🖛 I
	RSTB actuator	ES 14 RSTB I → 0 ← II	EM 14 RSTB I → 0 ← II
(Ex)	RWA actuator	EX 14 RWA 0 - I	EXM 14 RWA 0 - I
	RWA actuator	EX 14 RWA I - II	EXM 14 RWA I - II
	RWB actuator	EX 14 RWB I - 0 - II	
	RWB actuator	EX 14 RWB 0 - I - II	
	RWC actuator	EX 14 RWC I - 0 🖛 II	
	RSTA actuator	EX 14 RSTA 0 🖛 I	EXM 14 RSTA 0 🖛 I
	RSTB actuator	EX 14 RSTB I 🛨 0 🗲 II	EXM 14 RSTB I 🛨 0 🗲 II

Ordering	A command device of the ES/EM and EX/EXM 14 range
details	with slow action, RWA selector switch actuator
	inscribed 0 - I, in EEx version: EX 14 RWA 0 - I

A command device of the ES/EM and EX/EXM 14 range with snap action, RSTA control switch actuator inscribed 0 - I: EM 14 RSTA 0 - I



6.2 Emergency Stop and push buttons

### 6.2.5 ES/EM 14 and EX/EXM 14 range

## **RSSA** key switch







#### Features

- RSSA key actuator with safety cylinder lock (locks against turning)
  Normal version always
- has same key number9 versions available
- 9 versions available Up to 20 lock combinations
- available on enquiry
- Pre-wired cable



**6.2** Emergency Stop and push buttons

# 6.2.5 ES/EM 14 and EX/EXM 14 range

# **RSSA** key switch

Contacts		1 NO 1 NC BK 23	Change-over contact
		Slow action	Snap action
	RSSA 12 key switch actuator RSSA 13 key switch actuator RSSA 14 key switch actuator RSSA 15 key switch actuator RSSA 17 key switch actuator RSSA 18 key switch actuator RSSA 23 key switch actuator RSSA 24 key switch actuator RSSA 27 key switch actuator	ES 14 RSSA 12 ES 14 RSSA 13 ES 14 RSSA 14 ES 14 RSSA 15 ES 14 RSSA 17 ES 14 RSSA 18 ES 14 RSSA 23 ES 14 RSSA 24 ES 14 RSSA 27	EM 14 RSSA 14 EM 14 RSSA 15 EM 14 RSSA 17 EM 14 RSSA 18 EM 14 RSSA 27
G	RSSA 12 key switch actuator RSSA 13 key switch actuator RSSA 14 key switch actuator RSSA 15 key switch actuator RSSA 17 key switch actuator RSSA 18 key switch actuator RSSA 23 key switch actuator RSSA 24 key switch actuator RSSA 27 key switch actuator	EX 14 RSSA 12 EX 14 RSSA 13 EX 14 RSSA 13 EX 14 RSSA 14 EX 14 RSSA 15 EX 14 RSSA 17 EX 14 RSSA 17 EX 14 RSSA 18 EX 14 RSSA 23 EX 14 RSSA 24 EX 14 RSSA 27	EXM 14 RSSA 14 EXM 14 RSSA 15 EXM 14 RSSA 17 EXM 14 RSSA 18 EXM 14 RSSA 27

Ordering	A command device of the ES/EM and EX/EXM 14 range
details	with slow action, RSSA 23 key switch actuator,
	in EEx version: EX 14 RSSA 23

A command device of the ES/EM and EX/EXM 14 range with snap action, RSSA 14 key switch actuator: EM 14 RSSA 14



### 6.3 Two-hand control panels



#### Application

Two-hand control panels are non-separating protection devices. In general, they serve to ensure the location of both hands of a machine operator who gives a control signal for a movement which can be dangerous. Two-hand control panels thus ascertain that intervention by the operator in dangerous moving processes is avoided when a machine or plant has been started.

The areas of application include presses for metal working, powder metallurgy, printing and paperprocessing machines, croppers and similar, as well as machinery in the rubber, plastic and chemical industries.

Two-hand control panels are the preferred protection devices for use in setting-up work and single-stroke operations for feed and removal processes.

Further information on the use of two-hand operation consoles and their evaluation is given in EN 574.

In order to achieve Category 0 to EN 60204-1, an additional signal evaluation circuit is needed. Safety monitoring modules for secure evaluation of signals from two-hand control panels and Emergency Stop devices are to be found in chapter 10.8 and 10.3.

#### Design and mode of operation

Two-hand control panels are protection devices, which require the simultaneous use of both hands for their actuation. By virtue of their forced location, both hands are kept out of the area of danger. In order to start and continue the operation of a machine or plant which can be dangerous, the location of the hands is controlled as long as danger can continue to be present.

The two-hand control panels are mounted as standard with an Emergency Stop push button to EN 418 and two operating units. In addition, there are guard hoods over the operating elements, which prevent simple manipulation of the protection function using hands, elbows, stomach, hips, thighs or knees, for example.

EN 574 differentiates between various types of twohand switching circuits with regard to their technical degree of control security. In this respect, the selection of the type depends on the evaluation and the risk assessment.

# **6.3** Two-hand control panels

Features SEP	<ul> <li>2 operating points</li> <li>1 EDRRZ 40 RT Emergency Stop button</li> <li>Metal enclosure</li> <li>IP 65</li> </ul>
SEPK	<ul> <li>2 operating points</li> <li>1 KDRRZ 40 RT Emergency Stop button</li> <li>Thermoplastic enclosure</li> <li>IP 65</li> </ul>
Note	Technical data for the two-hand control panels listed above are shown in chapter 6.4.

### Application



- 6. Command devices
- **6.3** Two-hand control panels

# 6.3.1 SEP range

	Features	<ul> <li>Aluminium enclosure</li> <li>2 black operating buttons (positioning parts) Ø 55 mm each with 1 NC and 1 NO contact in accordance with EN 574</li> <li>1 Emergency Stop button in metal version, EDRRZ 40 RT, with 1 NC and 1 NO contact, see chapter 6.2.1</li> <li>Protection class IP 65</li> </ul>
1 NO 1 NC 23 °24 11 °12		

Standard version SEP 01.0.1.0.22/95 Empty enclosure with 3 mounting holes without mountings SEP 01.0.L.22

Note Customer-specific versions are also possible on enquiry.

Contacts

- 6. Command devices
- **6.3** Two-hand control panels

# 6.3.2 SEPK range



Features

- Thermoplastic enclosure
- 2 black operating buttons (positioning parts) Ø 49 mm each with 1 NC and 1 NO contact in accordance with EN 574
- 1 Emergency Stop button in thermoplastic version, KDRRT 40 RT, with 1 NC and 1 NO contact, see chapter 6.2.1
- 8 knockouts for additional operating devices Ø 22.3 mm
- Layed out for 9 additional operating devices
- Stand or wall mounting possible
- 2 part enclosure

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• Protection class IP 65

Approvals





Contacts		1 NO 1 NC
		23⊶°24 11⊶ <sup></sup> 12
	Standard version	SEPK 02.0.4.0.22

Empty enclosure with 3 mounting holes without mountings SEPK 02.0.L.22

Note Customer-specific versions are also possible on enquiry.

# 6.4 Technical data



	ZS 71	ZS 73	ZS 75
Standards:	IEC/EN 60947-5-1; EN 418		
Certificates:	BIA (BG) No. 973003		
Enclosure material:	Cast aluminium, enamelled		
Cover:	Thermoplastic	Cast aluminium, enamelled	
Protection class:	IP 54, IP 65 for version with push but	on reset and watertight collar	
	to IEC/EN 60529		
Contact material:	Silver		
Contact type:	Change-over with double break		Change-over with
	or 2 NC contacts		double break
			or 2 NO and 2 NC
			or 4 NC contacts
Switching system:	⊖ IEC 60947-5-1		
	Snap action with positive break NC co	ontacts	
Termination:	Screw terminals for max. 2.5 mm <sup>2</sup> cal	oles (including conductor ferrules)	
Rated impulse			
withstand voltage U <sub>imp</sub> :	6 kV		
Rated insulation voltage Ui:	400 V		
Thermal test current I <sub>th</sub> :	6 A		
Utilisation category:	AC-15		
Rated operating			
current/voltage I <sub>e</sub> /U <sub>e</sub> :	6 A/400 VAC		
Max. fuse rating:	6 A (slow blow)		
Torque for positive break:	-		
Angle for positive			
break travel:	-		
Force for positive break:	-		
Actuating force:	-		
Ambient temperature:	– 25 °C + 70 °C		
Mechanical life:	> 1 million operations		
Indicator lamp:	-		

CE

# **6.4** Technical data



	ZS 441	ZS 75 S	T3Z 068
Standards:	IEC/EN 60947-5-1; EN 418, BG-GS-E	ET-15	
Certificates:	BIA (BG) No. 973003		
Enclosure material:	Cast aluminium, enamelled		Cast iron, enamelled
Cover:	Cast aluminium, enamelled		Cast iron, enamelled
Protection class:	IP 54, IP 65 for version with push		IP 65
	button reset and watertight collar		to IEC/EN 60529
	to IEC/EN 60529		
Contact material:	Silver		
Contact type:	Change-over with	Change-over with	Change-over with
	double break	double break	double break,
	or 2 NC contacts	or 2 NO and 2 NC	max. 3 NO and 3 NC contacts
		or 4 NC contacts	
Switching system:	Snap action with positive break NC co	ontacts	Snap action with
			positive break NC contacts
Termination:	Screw terminals for max. 2.5 mm <sup>2</sup> cal	oles (including conductor ferrules)	
Rated impulse			
withstand voltage U <sub>imp</sub> :	6 kV		
Rated insulation voltage Ui:	400 V		250 VAC
Thermal test current I <sub>th</sub> :	6 A		10 A
Utilisation category:	AC-15		
Rated operating			
current/voltage I <sub>e</sub> /U <sub>e:</sub>	6 A/400 VAC		2.5 A/230 VAC
Max. fuse rating:	6 A (slow blow)		6 A gL/gG D-fuse
Torque for positive break:	-	-	1.8 Nm
Angle for positive			
break travel:	-	-	32°
Force for positive break:	_	_	20 N parallel to mounting surface
Actuating force:	-	-	30 N in direction of rope
Ambient temperature:	– 25 °C + 70 °C		– 30 °C + 90 °C
Mechanical life:	> 1 million operations		50,000 operations
Indicator lamp:	-	-	Yellow 220 VAC/5 W,
			BA 15D screw socket

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# 6.4 Technical data



	EDRRZ 40 RT KDRRZ 40 RT	ADRR 40 RT	ES/EM 14 ES 14 RUV
Standards:	IEC/EN 60947-5-1		
Enclosure:	Thermoplastic,	Thermoplastic	Thermoplastic,
	self-extinguishing,		self-extinguishing UL 94-VO
	hardly inflammable		
Protection class:	IP 65 to IEC/EN 60529		IP 67 to IEC/EN 60529
Contact material:	Silver		
Contact type:	Change-over, 2 NC contacts	NO and NC contacts,	ES 14: Change-over contact,
	combined as desired	combined as desired	double break, galvanically
			separated contact bridges
			EM 14: Change-over contact,
			single break
Switching system:	Slow action		Slow or snap action,
			positive break NC contacts $\ominus$
Termination:	Screw terminals,	Screw terminals for max. 2.5 mm <sup>2</sup>	ES 14: H05W-F 4 x 0.75 mm <sup>2</sup>
	push-on spade 1 x 6.3 x 0.8	cables (including conductor ferrules)	EM 14: H05W-F 3 x 0.75 mm <sup>2</sup>
	or 2 x 2.8 x 0.8, PCB connection,		
	WAGO clip-in terminals		
Rated impulse			
withstand voltage U <sub>imp</sub> :	-	6 kV	4 kV
Rated insulation			
voltage U <sub>i</sub> :	400 V, test voltage 2,500 V	500 V	250 V
Thermal test current I <sub>th</sub> :	10 A	-	ES 14: 6 A; EM 14: 5 A
Rated operating	-	2 A/500 V; 4 A/400 V;	ES 14: 6 A/250 VAC; 0.25 A/230 VDC
current/voltage I <sub>e</sub> /U <sub>e</sub> :		6 A/250 V; 0.5 A/220 V;	EM 14: 5 A/250 VAC; 0.16 A/230 VDC
		1 A/110 V	
Utilisation category:	AC-15; DC-13		
Max. fuse rating:	10 A (slow blow)		ES 14: 6 A; EM 14: 5 A
Switching capacity:	-	-	-
Contact break:	> 2 x 1.25 mm	2 x 1.75 mm	-
Switchover time:	-	-	-
Bounce duration:	< 5 ms at 100 mm/s	-	-
Ambient temperature:	– 25 °C + 80 °C	– 25 °C + 60 °C	– 25 °C + 75 °C
	(– 40 °C on enquiry)		
Mechanical life:	Operators: > 100,000 operations	500,000 operations	ES 14: 5 million operations;
	Contact blocks: 10 million operations		EM 14: 1 million operations
Switching frequency:	1,200/h	6,000/h	1,800/h
Repeat operation			
accuracy:	-	-	ES 14: ± 0.1 mm;
			EM 14: ± 0.02 mm
Resistance to shock:	Max. 70 g/4 ms	50 g/20 ms	50 g/6 ms
	Contact block: 110 g/4 ms		

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