Safety detection solutions
Safety interlock switches
Key-operated with solenoid, turret head
XCSE and XCSTE rectangular design

XCSE metal	**Safety interlock switches operated by actuating key**

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XCSTE plastic	**Safety interlock switches operated by actuating key**

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Environmental characteristics

Safety interlock switch type		XCSE (metal)	XCSTE (plastic)
Conformity to standards	Products	EN/IEC 60947-5-1, UL 508, CSA C22-2 no. 14	EN/IEC 62061, EN/IEC 60947-1
	Machine assemblies	EN/IEC 60204-1, EN/ISO 14119	
Product certifications		UL, CSA, CCC, EAC	UL, CSA, CCC, EAC
Maximum safety level *(1)*		PL=e, category 4 conforming to EN/ISO 13849-1 and SIL 3 conforming to EN/IEC 61508	
Reliability data B$_{10D}$		5,000,000 (data value for a service life of 20 years can be limited by contact and mechanical wear)	
Ambient air temperature	For operation	-25…+40 °C	-25…+60 °C
	For storage	-40…+70 °C	
Vibration resistance		5 gn (10…500 Hz) conforming to EN/IEC 60068-2-6	
Shock resistance		10 gn (duration 11 ms) conforming to EN/IEC 60068-2-27	
Electric shock protection		Class I conforming to EN/IEC 61140	Class II conforming to EN/IEC 61140
Degree of protection		**IP 67 conforming to EN/IEC 60529 and EN/IEC 60947-5-1** *(2)*	
Cable entry		2 entries tapped ISO M20 x 1.5 (clamping capacity 7 to 13 mm) or tapped for Pg 13.5 cable gland (clamping capacity 8 to 12 mm) or for 1/2" NPT conduit	1 entry tapped M16 x 1.5 (clamping capacity 4.5 to 10 mm) or tapped for Pg 11 cable gland (clamping capacity 7 to 10 mm) or for 1/2" NPT conduit using metal adapter DE9RA1012 with Pg 11 tapped entry
Connecting cable		–	4 x 0.5 mm^2
Materials		Zamak case	Polyamide PA66 fibreglass impregnated case
		Actuating keys (all types): steel XC60, surface treated	

(1) Using an appropriate and correctly connected safety control unit.

(2) Live parts of these switches are protected to some extent against the penetration of dust and water. However, when installing take all necessary precautions to help prevent the penetration of solid bodies, or liquids with a high dust content, into the actuating key aperture. Use of XCSZ27 (with XCSE) or XCSZ28 (with XCSTE) blanking plugs for unused key slots can reduce the penetration of unwanted elements (one blanking plug is delivered with the product). Not recommended for use in saline atmospheres.

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Contact block characteristics

| Rated operational characteristics	2 and 3 contacts, slow break	**XCSE**, **XCSTE**: ∼ AC-15, B300: Ue = 240 V, Ie = 1.5 A or Ue = 120 V, Ie = 3 A All models: ⎓ DC-13, Q300: Ue = 250 V, Ie = 0.27 A or Ue = 125 V, Ie = 0.55 A conforming to EN/IEC 60947-5-1
Conventional thermal current in enclosure		**XCSE**, **XCSTE** 2 and 3 slow break contact versions: Ithe = 6 A
Rated insulation voltage	2 and 3 contacts	3 contacts (**XCSE**), 2 contacts (**XCSTE**): Ui = 500 V conforming to EN/IEC 60947-1; Ui = 300 V conforming to UL 508, CSA C22-2 no. 14
Rated impulse withstand voltage	2 and 3 contacts	3 contacts (**XCSE**), 2 contacts (**XCSTE**): Uimp = 6 kV conforming to EN/IEC 60947-5-1
Positive operation		NC contacts with positive opening operation conforming to EN/IEC 60947-5-1, Section 3
Resistance across terminals		≤ 30 mΩ conforming to EN/IEC 60947-5-4
Short-circuit protection	2 and 3 contacts	3 contacts (**XCSE**), 2 contacts (**XCSTE**): 10 A cartridge fuse type gG (gl)
Connection	Screw clamp terminals	2 and 3 contacts	3 contacts (**XCSE**), 2 contacts (**XCSTE**): Clamping capacity, min: 1 x 0.5 mm², max: 2 x 1.5 mm² with or without cable end

Complementary characteristics

Actuation speed	Maximum: 0.5 m/s, minimum: 0.01 m/s
Resistance to forcible withdrawal of actuating key (locked)	**XCSE**: F_{1max} = 2600 N; F_{Zh} = 2000 N; **XCSTE**: F_{1max} = 650 N; F_{Zh} = 500 N
Mechanical durability	**XCSE: > 1 million operating cycles** **XCSTE: 1 million operating cycles**
Maximum operating rate	For maximum durability: 600 operating cycles per hour
Minimum force for extraction of actuating key (not locked)	≥ 20 N
Materials	Body and head: Zamak (**XCSE**) Body and head: polyamide PA66, fibreglass impregnated (**XCSTE**)

Electrical durability

- Conforming to EN/IEC 60947-5-1 Appendix C
- Utilization categories AC-15 and DC-13
- Maximum operating rate: 3600 operating cycles/hour
- Load factor: 0.5

XCSE 3-contact and XCSTE 2-contact version, slow break

AC supply
50/60 Hz ∼
inductive circuit
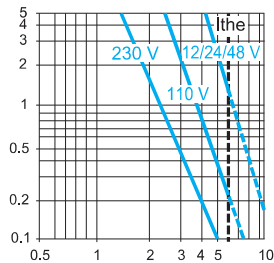
DC supply ⎓
**Power broken in W for
5 million operating cycles.**

Voltage	**V**	**24**	**48**	**120**
	W	13	9	7

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Safety detection solutions
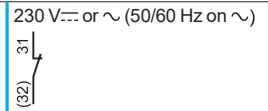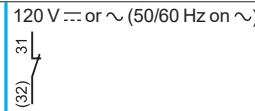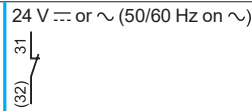## Safety interlock switches
Key-operated with solenoid, turret head *(1)*
XCSTE plastic, 1 cable entry

Type of switch	Locking on de-energization and unlocking on energization of solenoid *(2)*		
Types of auxiliary contact actuated by the solenoid (locking contact). Contact state NC is to be considered with actuating key inserted and solenoid not energized.	24 V ⎓ or ∿ (50/60 Hz on ∿) $^{31}_{(32)}$	120 V ⎓ or ∿ (50/60 Hz on ∿) $^{31}_{(32)}$	230 V⎓ or ∿ (50/60 Hz on ∿) $^{31}_{(32)}$
References of switches without actuating key *(3)* **(⊖ NC contact with positive opening operation) with 1 cable entry tapped ISO M16 x 1.5**			
2-pole NC + NC break before make, slow break	XCSTE5312 ⊖	XCSTE5332 ⊖	XCSTE5342 ⊖
2-pole NO + NC make before break, slow break	XCSTE6312 ⊖	–	–
2-pole NC + NC slow break	XCSTE7312 ⊖	–	XCSTE7342 ⊖
Weight (kg)	0.360	0.360	0.360

References of switches with locking on energization and unlocking on de-energization

To order a Safety interlock switch with locking on energization and unlocking on de-energization of the solenoid, replace the second number **(3)** with **5**.
Example: XCSTE5312 becomes **XCSTE5512**. For these models, the auxiliary contact state is to be considered with key inserted and solenoid not energized and the contact terminals are identified 33 - (34) 33 ⎓⎓ (34), Some references with locking on energization may not be available.

References of switches with 1 cable entry tapped Pg 11 or 1/2" NPT

To order a switch with 1 cable entry for Pg 11 cable gland, replace the last number **(2)** with **1** in the selected reference.
Example: XCSTE5312 becomes **XCSTE5311**.
To order a switch with 1 cable entry for 1/2" NPT conduit, replace the last number **(2)** with **3** in the selected reference.
Example: XCSTE5312 becomes **XCSTE5313**. The Pg 11 tapped entry is fitted with metal adapter DE9RA1012 for 1/2" NPT conduit.
Some Pg 13 and 1/2" NPT references may not be available.

Solenoid characteristics			
Load factor	100%		
Rated operational voltage	24 V ⎓ or ∿ (50/60 Hz on ∿)	120 V ⎓ or ∿ (50/60 H on ∿)	230 V ⎓ or ∿ (50/60 Hz on ∿)
Voltage limits	- 15%, +10% of the rated operational voltage (including ripple on ⎓) conforming to EN/IEC 60947-1		
Service life	20,000 hours		
Consumption	10 VA max.		

(1) Head adjustable in 90° steps through 360°. Blanking plug for operating head slot included with switch.
(2) A special tool included with the safety interlock switch enables forced opening of the interlocking mechanism by authorized personnel, allowing withdrawal of the actuating key and subsequent opening of the NC safety contacts (auxiliary release).
(3) Actuating keys to be ordered separately (see page 81)

Other versions: please consult our Customer Care Center.

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Safety detection solutions
Safety interlock switches
Key-operated with solenoid, turret head *(1)*
XCSTE plastic, 1 cable entry

References of actuating keys and guard retaining device

Description	Straight key	Key with wide fixing *(2)*		Pivoting key	Right-angled key
For XCSTE safety interlock switches	**XCSZ11**	**XCSZ12**	**XCSZ15**	**XCSZ13**	**XCSZ14**
Weight (kg)	0.015	0.015	0.012	0.085	0.025

References of accessories

XCSZ91

XCSZ200

DE9RA1012

Description	For use with	Unit reference	Weight kg
Blanking plugs for operating head slot (Sold in lots of 10)	XCSTE	**XCSZ28**	0.050
Tool for forced opening of interlocking device (Sold in lots of 10)	XCSTE	**XCSZ100**	0.050
Padlocking device to help prevent insertion of key, for up to 3 padlocks (padlocks not included)	XCSTE	**XCSZ91**	0.053
Key centering device *(3)* (Fixing screws included)	XCSTE	**XCSZ200**	0.022
1/2" NPT conduit adapter (Sold in lots of 10)	XCSTE	**DE9RA1012**	0.048
M16 x 1.5 adapter (Sold in lots of 10)	XCSTE	**DE9RA1016**	0.048

(1) Head adjustable in 90° steps through 360°. Blanking plug for operating head slot included with switch.
(2) 2 key lengths, XCSZ12: L = 40 mm, XCSZ15: L = 29 mm.
(3) Not for use with XCSZ91.

Other versions: please consult our Customer Care Center.

Safety detection solutions
Safety interlock switches
Key-operated with solenoid, turret head
XCSTE plastic, 1 cable entry

Dimensions

Safety interlock switches
XCSTE●●●●
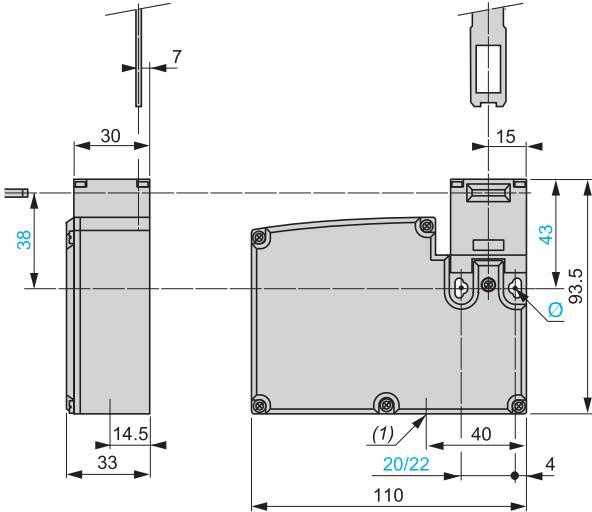
(1) 1 tapped entry for cable gland
Ø: 2 elongated holes Ø 4.3 x 8.3 on 22 centers, 2 holes Ø 4.3 on 20 centers

Actuating key centering device
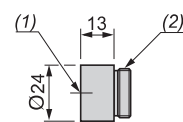**XCSZ200**
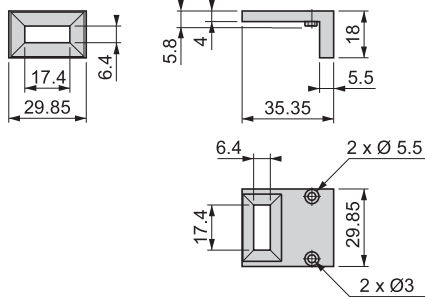
1/2" NPT conduit adapter
DE9RA1012
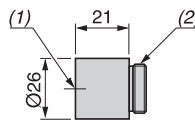
(1) Tapped entry for 1/2" NPT conduit
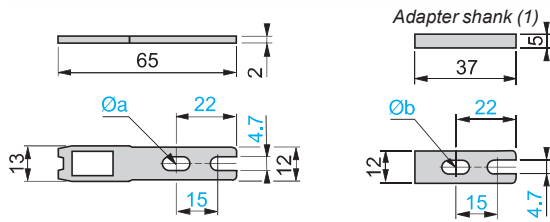(2) Pg 11 threaded shank

M16 x 1.5 adapter
DE9RA1016

(1) M16 x 1.5 tapped entry
(2) Pg 11 threaded shank

Actuating keys

XCSZ11

Adapter shank (1)

(1) Adapter (included with XCSZ11 actuating key) for replacing, without drilling an additional fixing hole, an XCKT safety interlock switch with XCKY01 actuating key by an XCSTA safety interlock switch with XCSZ11 actuating key.
Ø a: 2 elongated holes Ø 4.7 x 10
Ø b: 1 elongated hole for M4 or M4.5 screw

XCSZ12, XCSZ15
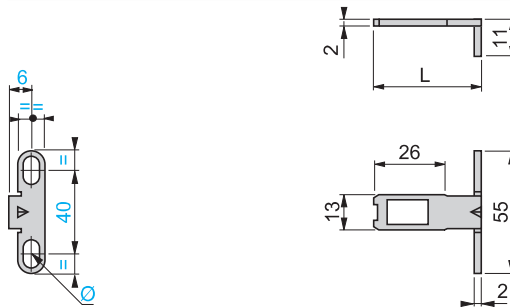
Ø: 2 elongated holes Ø 4.7 x 10
L = 40 mm (XCSZ12) or 29 mm (XCSZ15)

XCSZ13
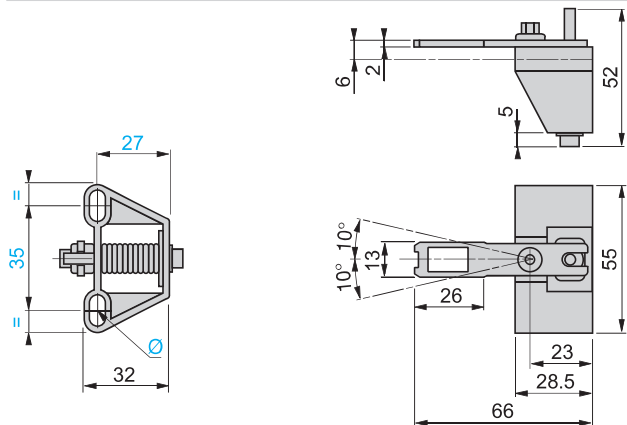
Ø: 2 elongated holes Ø 4.7 x 10

XCSZ14
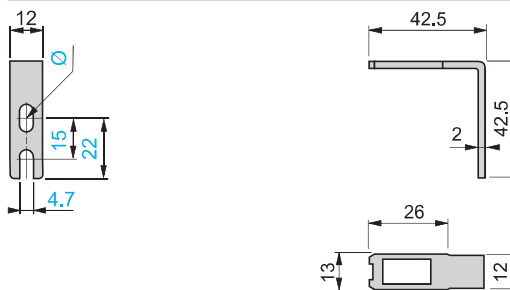
Ø: 1 elongated hole Ø 4.7 x 10

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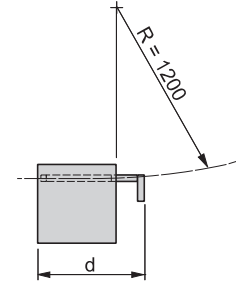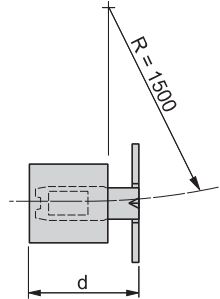Key-operated with solenoid, turret head
XCSTE plastic, 1 cable entry

Dimensions (continued)
Operating radius required for actuating key

XCSZ11

R = 1500

71

R = 1200

71

XCSZ12, XCSZ15

R = 1500

d

R = 1200

d
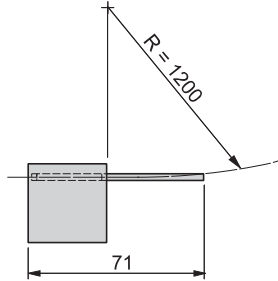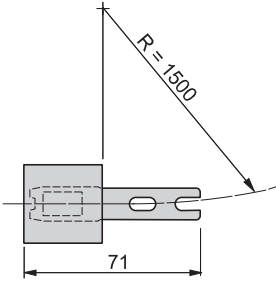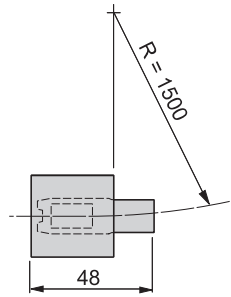
d = 46 mm (XCSZ12) or 35 mm (XCSZ15)

XCSZ13

R = 150

72

R = 300

72

XCSZ14

R = 1500

48

R = 1200

48
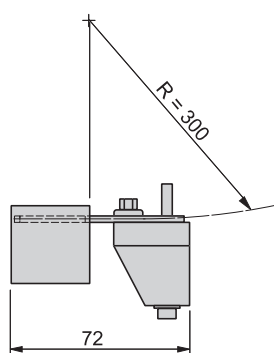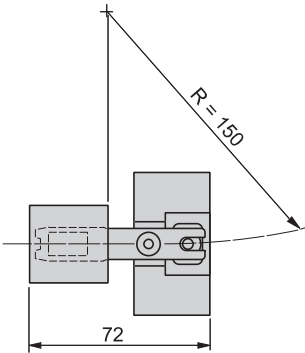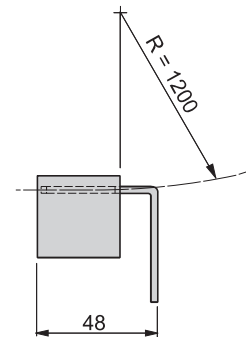
R = minimum radius

Setting-up
Functional diagrams

XCSTE5●●●

24
18.5
17
21-22
17.5
16
13-14

XCSTE6●●●

24
17
15
21-22
18.5
17
13-14

XCSTE7●●●

24
18.5
17
11-12
21-22
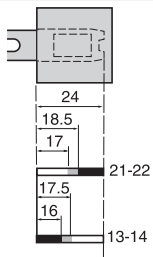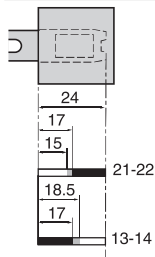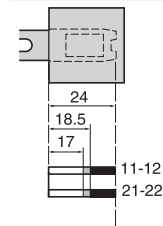
Contact operation

■ Closed   ☐ Open   ▨ Transient state

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Safety interlock switches
Key-operated with solenoid, turret head
XCSTE plastic, 1 cable entry

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Schemes (continued)
Contact states are represented with the actuating key inserted and the solenoid not energized.
Note: These schemes are given as examples only, the designer should refer to the relevant safety standards for guidance.

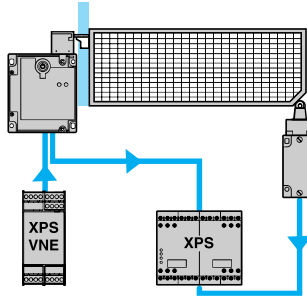### Wiring to PL=d, category 3 conforming to EN/ISO 13849-1

Example with 2-pole NC + NO contact with mixed redundancy of the contacts and the associated control relays. To activate K1, it is necessary to remove and re-insert the actuating key when the supply is switched on.
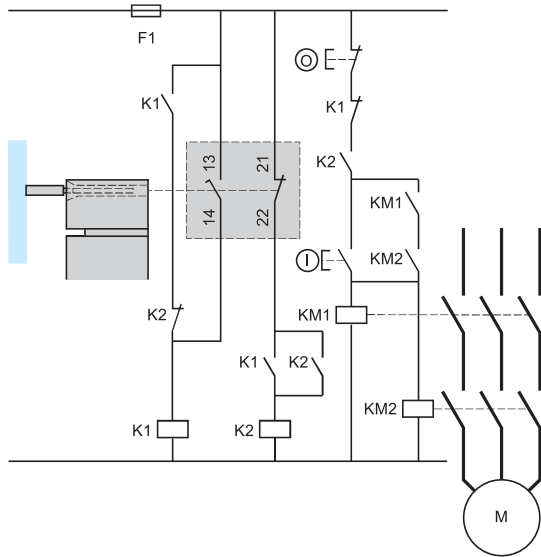
Wiring to PL=e, category 4 conforming to EN/ISO 13849-1 and SIL 3 conforming to EN/IEC 61508

(The safety interlock switch should be used in conjunction with a safety limit switch to give electrical/mechanical redundancy)

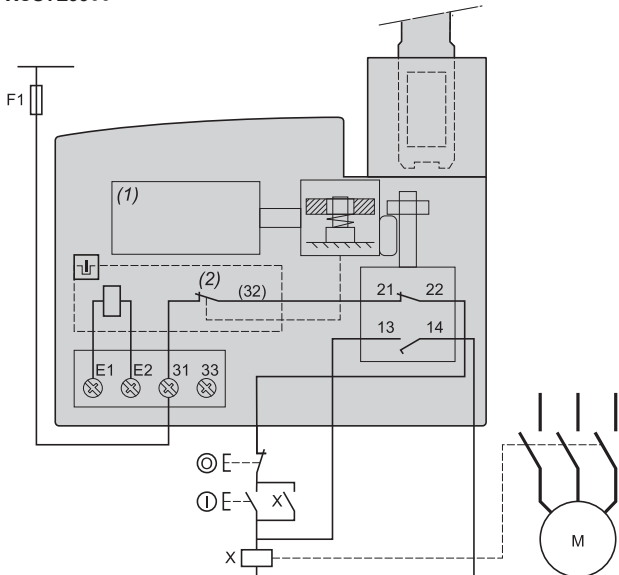**Method for machines with long rundown time (high inertia)**

Interlocking device for actuating key fitted on guard and zero speed detection.

Wiring to PL=b, category 1 conforming to EN/ISO 13849-1
Wiring examples with protection fuse to help prevent shunting of the NC contact, due to either cable damage or tampering.

Locking on de-energization	Locking on energization
NC + NO	NC + NO
XCSTE53••	XCSTE55••

(1) Solenoid
(2) Auxiliary contact
E1-E2: Solenoid supply
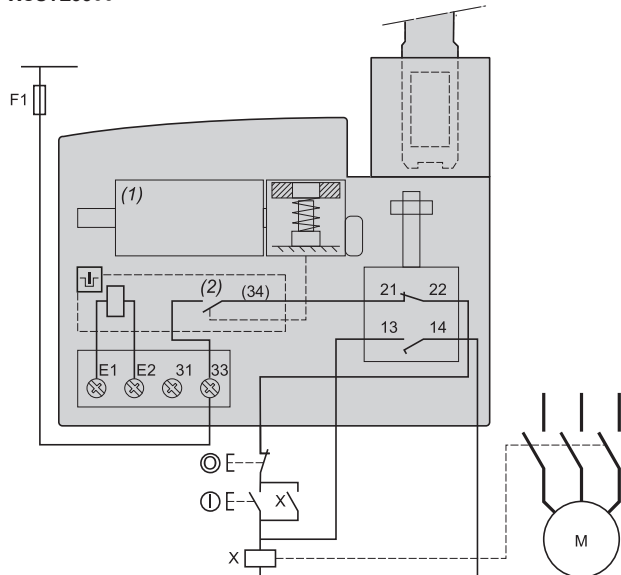13-14: Safety contact for detecting a possible shunt on 21-22 NC contact

(1) Solenoid
(2) Auxiliary contact
E1-E2: Solenoid supply
13-14: Safety contact for detecting a possible shunt on 21-22 NC contact

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XCSTE plastic, 1 cable entry

Schemes (continued)

Contact states are represented with the actuating key inserted and the solenoid not energized.

Note: These schemes are given as examples only, the designer should refer to the relevant safety standards for guidance.

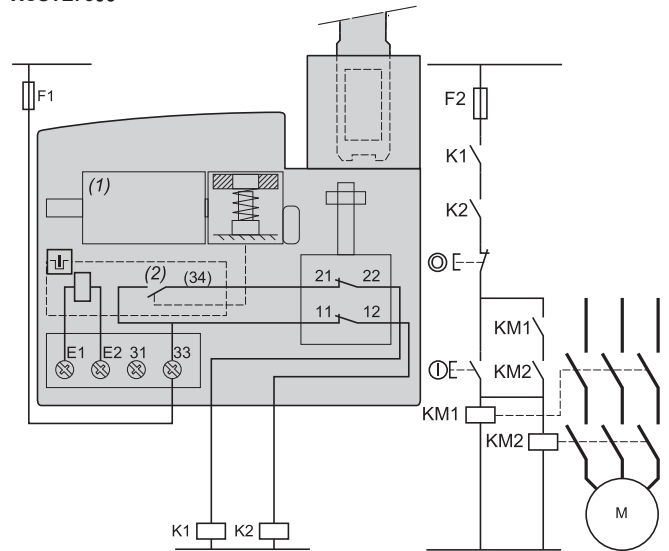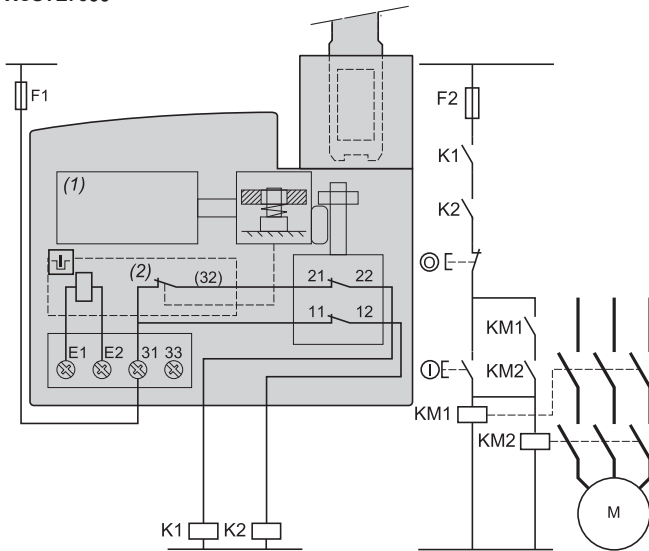**Wiring to PL=d, category 3 conforming to EN/ISO 13849-1**

Wiring examples with redundancy for the safety interlock switch contacts, without monitoring or redundancy in the power circuit

Locking on de-energization	Locking on energization
NC + NC	NC + NC
XCSTE73●●	XCSTE75●●

(1) Solenoid

(2) Solenoid auxiliary contact

E1-E2: Solenoid supply

21-22 and 11-12: Redundant Safety contacts: key position monitoring

(1) Solenoid

(2) Solenoid auxiliary contact

E1-E2: Solenoid supply

21-22 and 11-12: Redundant Safety contacts: key position monitoring