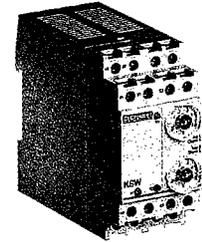


“KSW” safety relay for zero speed monitoring (45mm)

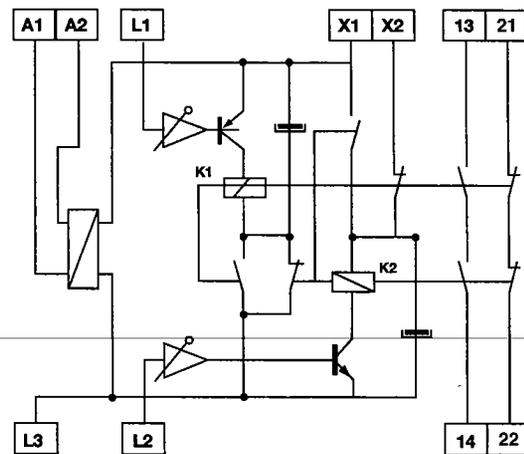
- Zero speed control function for an electric motor
- Increased safety compared to timer solutions.
- Detection of actual stopping time by measuring remnant voltages at the motor winding terminals.
- Once the motor is powered up, the KSW prohibits access to dangerous zones via an electromagnetic interlocking device.
- EC conforming product, UL and cUL recognized.
- Self checking redundancy concept (with wiring integrity check)
- 2 safety contacts (1NO+1NC).



UL - E 87133
cUL - E 87133

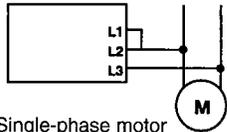
Technical characteristics	
Power supply	
Supply Voltage	AC: 24, 48 115 230 V 50/60 Hz DC: 24 V
Operating range	85 to 110% for AC supply voltage 80 to 120% for DC supply voltage
Accuracy	
Reset time	3s (self-test)
Setting for channels 1 and 2	20 mV to 500 mV±15%
Synchronization difference Ch 1 /Ch 2	< 3 s
Hysteresis	40% ± 50%
Output Specification	
Outputs	Volt-free
Number of safety circuits	1 "N/C" and 1 "N/O" AgCdO
Breaking capacity	1000 VA resistive at 600 operations/hr
Maximum breaking capacity	6 A resistive to 20° C (derating 20 mA / °C)
Maximum breaking voltage	250 VAC
Output protection requirement	8 A quick-blow fuses
Operation and use	
Max. power consumption	9 VA in AC 3 W for DC
On/off indication	1 power supply LED 2 input LEDs
Electrical life	10 ⁶ operations at 1000 VA resistive
Mechanical life	10 ⁷ operations
Operating temperature	-10°C to +55°C
Internal control voltage	24 VDC
Immunity to interference and noise (EMC)	IEC 1000-4-2: Electrostatic discharges: Level 3 IEC 1000-4-3: Electromagnetic field: Level 3 IEC 1000-4-4: Fast transients: Level 3 IEC 1000-4-5: Shock Waves: Level 3 EN 255-22-1: Mains conducted and radiated emissions Class A.
Insulation coordination	Installation category III, degree of pollution 2
Dielectric strength: impulse voltage	IEC 255-5: 2.5 kV/ 1 mA / 1 min / 50 Hz
Thermoplastic case	Self-extinguishing (UL 94)
Degree of protection	Casing IP 40, Terminals IP 20
Connection	2 X 1.5 mm ² multicore with ferrule
Weight	400g (14 oz.)

Types	KSW
Part numbers (and voltages):	
24 VAC / VDC	85 100 316
48 VAC	85 100 313
115 VAC	85 100 314
230 VAC	85 100 315
Conformity	
European "Machinery" Directive 89/392/EEC	•
European Standard EN 60204-1 (Machine safety - Electrical equipment)	•
European Standard EN 292-1 and 2 (Machine safety - Basic concepts)	•
European standard pr EN 954-1 (Safety-related control system elements)	(Level 4)
European standard EN 418 (Machine safety - Emergency stop devices)	•
European standard pr EN 1088 (Machine safety - Locking and interlocking devices)	•
Operating principle diagram	

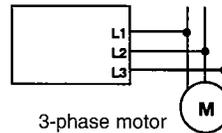


- Key**
- A1-A2 : Supply voltage.
 - X1-X2 : Return loop.
 - L1-L3 : Input channel 1 (motor winding).
 - L2-L3 : Input channel 2 (motor winding).
 - 13-14 ; 21-22 : 1 "N/C" + 1 "N/O" safety contacts.

Connection of a single-phase and 3-phase motor



Single-phase motor



3-phase motor

Description of operation:

Self-test

When terminals A1-A2 are powered up, the test sequence is initiated. The output relays are energized for 1.5 seconds then separate for 1.5 seconds before finally reattaching, via the fork relay on the inputs.

This test can be used to detect:

- failure of the output contacts
- breaking of one of the L1, L2 or L3 phases.
- the validity of the X1, X2 return the loop.
- the failure of a component in the analog input module or control relay.

Safety function

When an electric motor rotates although no longer supplied with power, it behaves like a generator, supplying voltage to the terminals of its windings. This voltage can vary according to parameters such as:

- the motor's own characteristics.
- the remnant magnetization.
- the speed of rotation.

The "KSW" safety relay therefore measures this voltage and interprets it so that the doors and protective covers can only be opened once the motor has actually stopped.

Signalling

The KSW has three green LEDs located on the front panel:

- 1 LED showing voltage present which indicates that the device is powered up.
- 2 LEDs which indicate the output state channels 1 and 2. (the LEDs light up when the measured voltage is less than the threshold set on the potentiometers on the front panel).

Setting

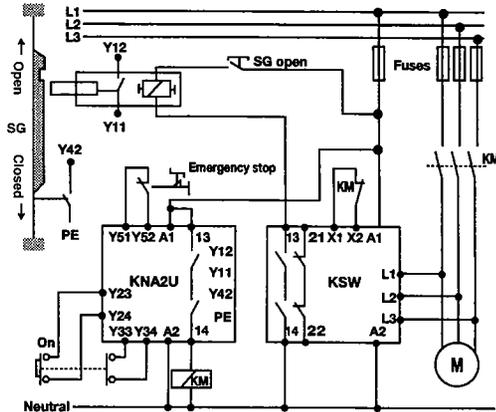
Both channels are set on the front panel using 2 independent potentiometers. This mitigates the effects of any imbalance between the windings and the remnant voltage. Setting is within a range of 20 mV to 500 mV in order to adapt a threshold to a rotation speed (slow or zero).

Faults - failures

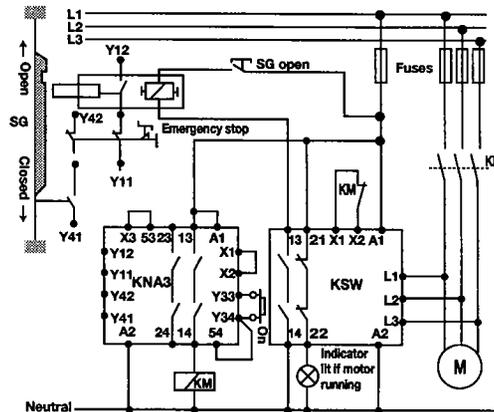
The use of safety relays with associated or guided contacts (that is to say having associated N/C and N/O contacts which cannot be closed simultaneously) enables a logic circuit to be constructed such that in the case of contact closing, the KSW prevents any restart: this is self-checking. It enables detection and acknowledgement by the relay of failures of important components.

Examples of use:

With KNA2U: (2 "N/O" safety output contacts)



With KNA3: (3 "N/O" safety output contacts and 2 data contacts)



Note:

The position of the safety guard (SG) is controlled in redundant and self-checking mode by the KNA2U (or KNA3) via the limit switch contact on Y42-PE (or Y41-Y42) and the interlocking contact on Y11-Y12.

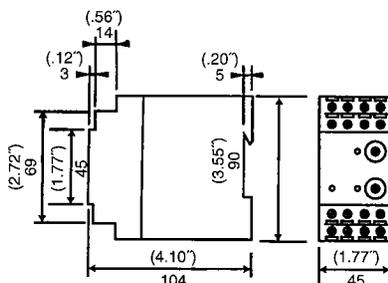
There are two possible scenarios:

- 1) If the position of the safety guard is controlled as closed by the KNA2U (or KNA3), the KM motor contactor can be closed using the KNA2U (or KNA3) "on" button, causing the motor to start.

The safety guard can only be opened once the said motor has been stopped by the KSW.

- 2) If the position of the safety guard is controlled as open by the KNA2U (or KNA3), the KM contactor cannot be closed, preventing the motor from starting.

Dimensions mm (inches)



Mounting - Removing

