Safety switching device
Controlled stop SNV 4063KL

safety

Base device for single-channel or two-channel emergency stop and safety gate applications

- Stop category 0/1 according to EN 60204-1
- Applications up to safety category 4 according to EN 954-1
- Safety category of the device: 4 (undelayed contacts)/ 3 (delayed contacts) according to EN 954-1
- OFF-delay time adjustable in the range 0.15 to 3 s or 1.5 to 30 s
- Control through contacts or semiconductors
- Reset button monitoring, cross monitoring, synchrocheck
- 3 enabling current paths (2 undelayed, 1 OFF-delayed)

Applications

- Protection of people and machinery
- Monitoring of emergency stop applications
- Monitoring of safety gates
- Termination of braking operations through OFF-delay time

Function

Device and function description

With the supply voltage applied to terminals A1/A2 and the emergency stop circuit closed, the control logic is activated with the reset button. This controls controls the K1 to K4 relays that become self-locking (when starting through reset button monitoring after the response time). After this switch-on phase the 3 enabling current paths are closed (terminals 13/14, 23/24 and 37/38).
Three LEDs display the state of the relays K1/K2, K3/K4 and the supply voltage.
If the emergency stop button is activated, the current supplies for the relays K1 to K4 are interrupted. The undelayed enabling current paths (terminals 13/14, 23/24) are opened with release time t_{R1} while the off-delayed enabling current path (terminals 37/38) is opened after the pre-set OFF-delay time t_{R2}. The OFF-delay time can be adjusted infinitely in the range 0.15 to 3 s or 1.5 to 30 s. With a two-channel control and cross-monitoring wiring of the sensor circuit, additional errors such as shunt fault or ground fault can be detected. An electronic fuse protects the device against damage. After the cause of the malfunction has been removed, the device is operational again after approx. 3 s.

Reset button monitoring

The device can be started either with the falling edge or with the rising edge (terminals S34 or S35). For emergency stop applications with manual start the button must be connected to terminals S33/S34. The device is enabled only with the falling edge of the reset signal. For starting the reset button must be pressed and released. For safety gate applications in which an automatic start shall be performed it is necessary to jumper terminals S33/S35. The device will react at the rising edge of input S12 that is internally connected to S33.

Synchrocheck

The use of safety limit switches for single-channel or two-channel circuits in safety gate applications depends on the required safety level. The device offers a two-channel control along with an optional synchrocheck of the limit switches.
A synchronous time $t_S \approx 0.5$ s requires limit switches positioned in a way that channel 1, terminals S11/S12, closes before channel 2, terminals S21/S22.
If channel 2 closes before channel 1, the synchronous time is $t_S = \infty$.

Notes

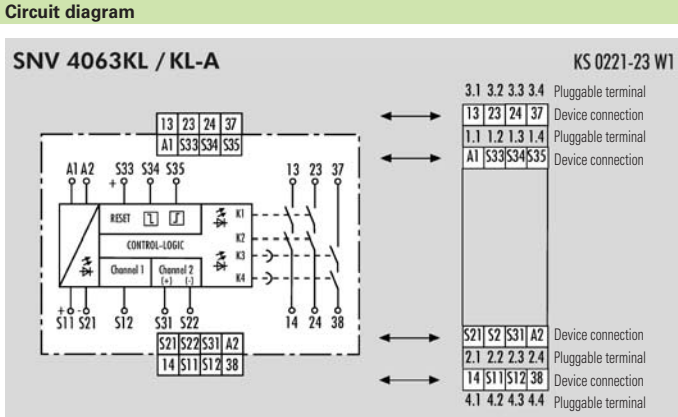
Proper use

The devices are safety switching devices. They must only be used as components of safety equipment on machines for the purpose of protecting people, material and machines.

- The safety category according to EN 954-1 depends on the external circuitry, the choice of control devices and their placement on the machine.
- The reset button used for manual start (S34) must not be actuated for more than 3 s. The indicated times must be observed when the device is operated, otherwise the device could lock. Locking can be released by properly opening the safety inputs.
- SNE expansion devices or external contactors with positively driven contacts can be used to multiply the enabling current paths.
- The device and the contacts must be protected with max. 6 A utilization category gG or through circuit breakers with trigger characteristic B or C.
- The devices are equipped with overload protection (for short circuit). After the cause of the malfunction has been removed, the device is operational again after approx. 3 s.
- Control output S11/S33 is exclusively for connecting control devices as defined in the operating instructions and not for connecting external field devices such as lamps, relays or contactors.
- The emergency stop circuit must be closed before the reset button is activated.
- For connecting sensors with reed contacts or semiconductor outputs the peak current must be considered (see "Technical data" – Control circuit).
- The devices must be installed in a control cabinet with a protection degree of at least IP 54.

Please also note the information provided by your trade association.

Circuit diagram



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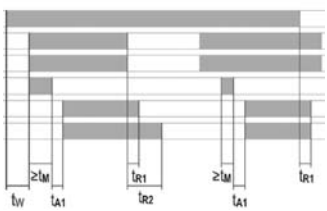
Function diagram

SNV 4063KL

Emergency stop application (installation 1 and 2)

FD 221-11-1 W

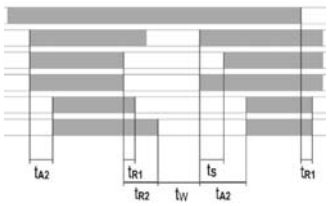


A1/A2, supply voltage, SUPPLY LED
S12 emergency stop channel 1
S31/S22 emergency stop channel 2
S34 reset rising edge
13/14, 23/24, LED K1/K2
37/38, LED K3/K4

t_M = minimum ON time
t_A = response time
t_{R1} = release time
t_{R2} = OFF-delay time (selectable)
t_W = recovery time

Safety gate application (installation 3)

FD 221-11-2 W

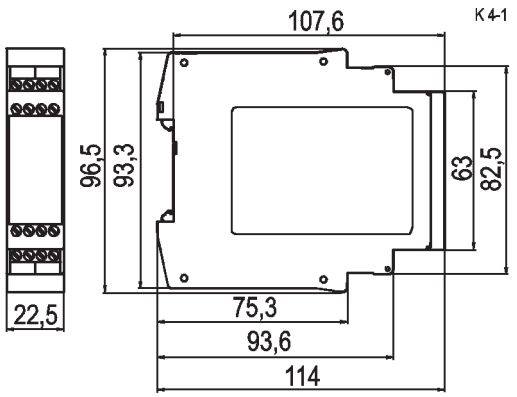


A1/A2, supply voltage, SUPPLY LED
S12 channel 1
S31/S22 channel 2
S34 reset rising edge
13/14, 23/24, LED K1/K2
37/38, LED K3/K4

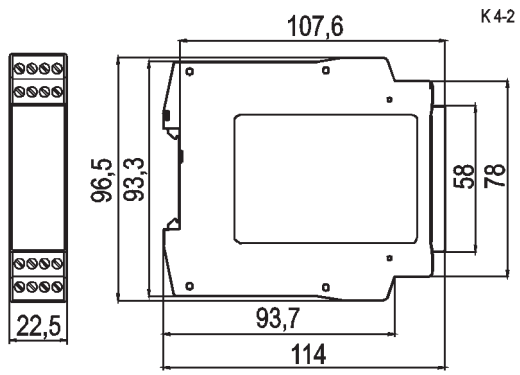
t_A = response time
t_{R1} = release time
t_{R2} = OFF-delay time (selectable)
t_S = synchronous monitoring time
t_W = recovery time

Dimension diagram

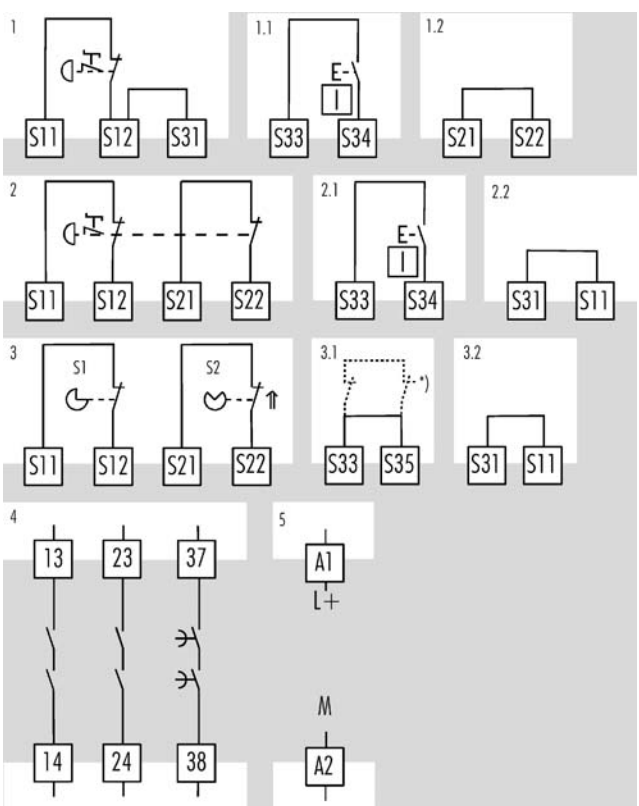
SNV 4063KL



SNV 4063KL-A



Installation



	Please consult the circuit diagram during installation.
1	**Emergency stop, single-channel** with manual start
1.1	RESET (with reset button monitoring S34)
1.2	Bridge
2	**Emergency stop, two-channel** with manual start and cross monitoring
2.1	RESET (with reset button monitoring S34)
2.2	Bridge
3	**Safety gate, two-channel** with cross monitoring
3.1	Feedback loops (external contactors)
3.2	Bridge
4	**2 enabling current paths** undelayed **1 enabling current path** OFF-delay
5	**Supply voltage**

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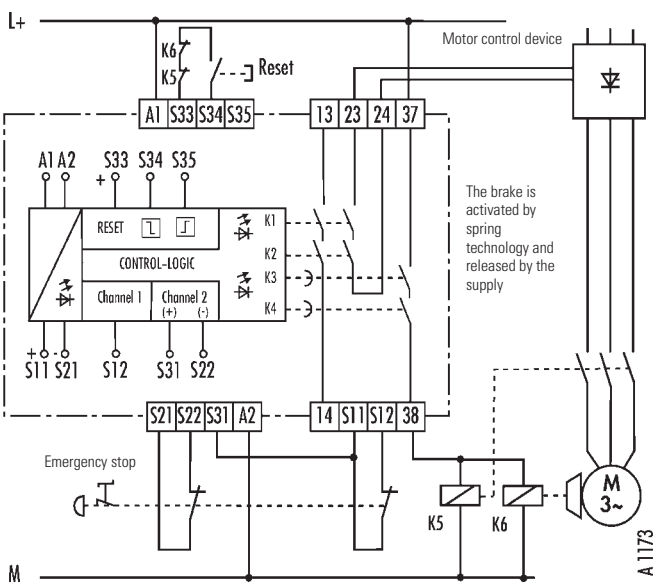

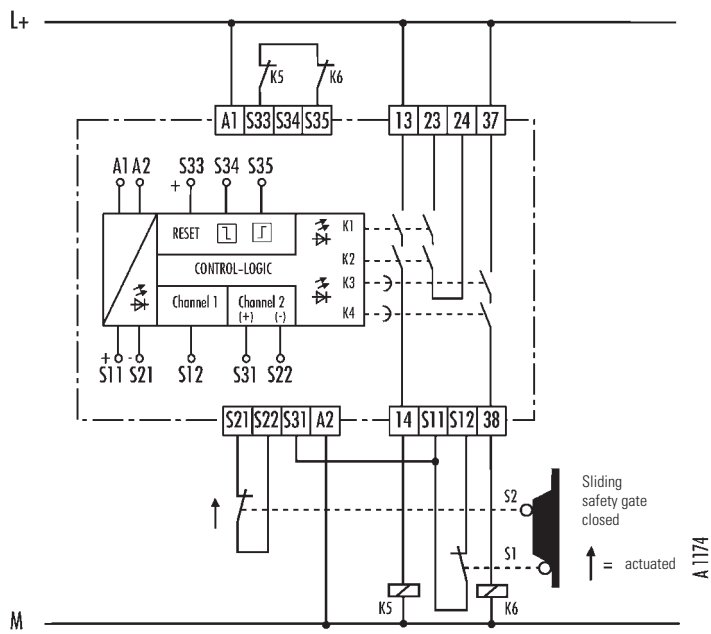

If S2 closes before S1, the synchronous time is $t_S = \infty$
If S1 closes before S2, the synchronous time is $t_S = 0.5$ s

Application example

Two-channel emergency stop application (with cross monitoring) with manual start and reset button monitoring

The OFF-delayed enabling current path locks the drive by using a brake.
The application example includes reset button monitoring. The device is enabled only when the reset button is released (terminals S33/S34, falling edge). This feature only allows a manual start of the device. The two-channel emergency stop application switches off the device even if one of the two contacts of emergency stop button does not open. If an error occurs (for example when the emergency stop contact connected to terminal S22 does not open), the second (redundant) contact S12 will activate safety circuit. The two undelayed enabling current paths 13/14, 23/24 open immediately and the enabling current path 37/38 opens after the pre-set OFF-delay time has elapsed. In case of a short circuit in the lines leading to the emergency stop button, the voltage applied to S11, S21 is short-circuited (cross monitoring). The relays K1 to K4 switch back into the OFF position, the 3 enabling current paths open and the electronic fuse is triggered. A short circuit in the line leading to the reset button is detected by the cyclical self test. This will inhibit the enabling current paths from closing again.

Application example

Two-channel sliding safety gate application (with cross monitoring) with automatic start

This sliding safety gate application is designed with an automatic start (without reset button monitoring). The terminals S33 and S35 must be connected during an automatic start. Channel 1 (S12) and channel 2 (S22) monitor the position of the sliding safety gate. The automatic start activates the SNV 4063KL. If the sliding safety gate is opened, the device will switch back into the OFF position, the two undelayed enabling current paths 13/14, 23/24 open immediately and the enabling current path 37/38 opens after the pre-set OFF-delay time has elapsed. If the sliding safety gate is closed again, the automatic start will activate the SNV 4063KL again. The two-channel control circuit allows synchrocheck of the limit switches. A synchronous time $t_S \approx 0.5$ s requires limit switches positioned in a way that contact S1, terminals S11/S12, closes before contact S2, terminals S21/S22. If channel 2 closes before channel 1, the synchronous time is $t_S = \infty$. If the number or performance of the enabling current paths is insufficient, external contactors with positively driven contacts can be used for expansion. They are controlled through two of the enabling current paths of the SNV 4063KL. The function of the external contactors is monitored by their own NC contacts that are connected in series to the feedback loop S33/S35.

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Technical data	SNV 4063KL		
Function according to EN 60204-1	Emergency stop relay for controlled stop		
Function display	3 LEDs green		
Function diagram	FD 221-11-1 W, FD 221-11-2 W		
Power supply circuit	min.	typ.	max.
Rated voltage U_N	DC 20.4 V	DC 24 V	DC 26.4 V
Rated consumption DC		2.6 W	
Residual ripple U_{ss}			2.4 V
Control circuit			
Rated output voltage S11/S33 for supply of inputs S34, S35, S12, S31, S22		DC 22 V	
Rsponse time / recovery time Fuse (PTC thermistor)		2 s/3 s	
Rated current / peak current S12		25 mA/50 mA	
Rated current / peak current S31, S22		25 mA/100 mA	
Rated current / peak current S34, S35		40 mA/50 mA	
Response time t_{A1} (with reset button monitoring) on S34		30 ms	
Response time t_{A2} (without reset button monitoring) on S35		700 ms	
Release time t_{R1} K1, K2 with emergency stop		25 ms	
Release time t_{R2} K3, K4 (2 setting ranges, infinitely adjustable, unbuffered)	0.15 s ± 16 % 1.5 s ± 16 %		3 s ± 16 % 30 s ± 16 %
Minimum ON time t_M S34-S35	200 ms		3 s
ON time t_M S33-S35	200 ms		∞
Recovery time t_W (start)			500 ms
Synchronous time t_S	100 ms		500 ms
Output circuit			
Contact assignment	2 enabling current paths, undelayed, NO contact, positively driven 1 enabling current path, OFF-delayed, NO contact, positively driven		
Rated operating voltage U_n	AC/DC 230 V		
Max. continuous current I_n per contact	6 A		
Max. total current of all current paths	12 A		
Application category according to EN 60947-5-1	AC-15: U_e 230 V AC, I_e 4 A (3600 switching cycles/h) DC-13: U_e 24 V DC, I_e 5 A (360 switching cycles/h)		
Short-circuit protection, max. fuse insert	6 A class gG or circuit breaker with trigger characteristic B or C		
General data			
Creepage distances and clearances between the circuits	according to EN 60664-1		
Rated impulse voltage	4 kV		
Overvoltage category	III		
Degree of pollution of the device: inside / outside	2/3		
Rated voltage	AC 300 V		
Protection degree according to DIN EN 60529 (housing / terminals)	IP 40/IP 20		
Ambient temperature / storage temperature	-25 – +55 °C/-25 – +75 °C		
Dimension diagram	K 4-1 (screw terminals / K 4-2 (pluggable terminals)		
Rated cross sections fine-stranded/solid or fine-stranded with ferrules	2x0.14 – 0.75 mm²/1x0.14 – 2.5 mm² 1x0.25 – 2.5 mm²/2x0.25 – 0.5 mm²		
Permissible tightening torque	0.5 – 0.6 Nm		
for UL and CSA applications Wire ranges	AWG 18-16 only use Cu wires		
Max. tightening torques	0.79 in-lbs		
Weight	0.2 kg		
Accessories	–		
Approvals			

Overview of the devices/Part numbers

Type	OFF-delay	Rated voltage	Terminals	Part No.	Std. Pack
SNV 4063KL	3 s	DC 24 V	Terminal block, rising cage termination	R1.188.0610.0	1
	30 s	DC 24 V	Terminal block, rising cage termination	R1.188.0630.0	1
SNV 4063KL-A	3 s	DC 24 V	Pluggable connector, rising cage termination	R1.188.0620.0	1
	30 s	DC 24 V	Pluggable connector, rising cage termination	R1.188.0640.0	1