Operating and Installation Instructions

Multi-functional Device

Gas Shortage Alarm and Magnetic Valve Control

SK05MV04-SNT

1 Description

The SK05MV04-SNT monitors up to five pressure gauges (mechanical or inductive contact) for gas shortage alarm and controls and monitors up to four magnetic valves. The pressure gauges and magnetic valves are functionally independent.

The contacts of the connected contact pressure gauges must be closed when there is no gas shortage. If one or more contacts open due to a gas shortage, the device reports it acoustically and optically through an internal piezo buzzer and red blinking LEDs assigned to the manometers, and with the potential-free relay changeover contacts "New Fault" and "Fault".

The magnetic valves are monitored for line and coil malfunction. They are protected in the device with replaceable wire fuses. The magnetic valves are switched on and off through a Key Switch on the device. There is an input to connect an "Emergency Stop" switch to perform emergency shutdown of the magnetic valves. Magnetic valve malfunctions are also reported acoustically and optically with the internal Piezo Buzzer and green blinking LEDs assigned to the valves, and with the potential-free relay changeover contacts "New Fault" and "Fault".

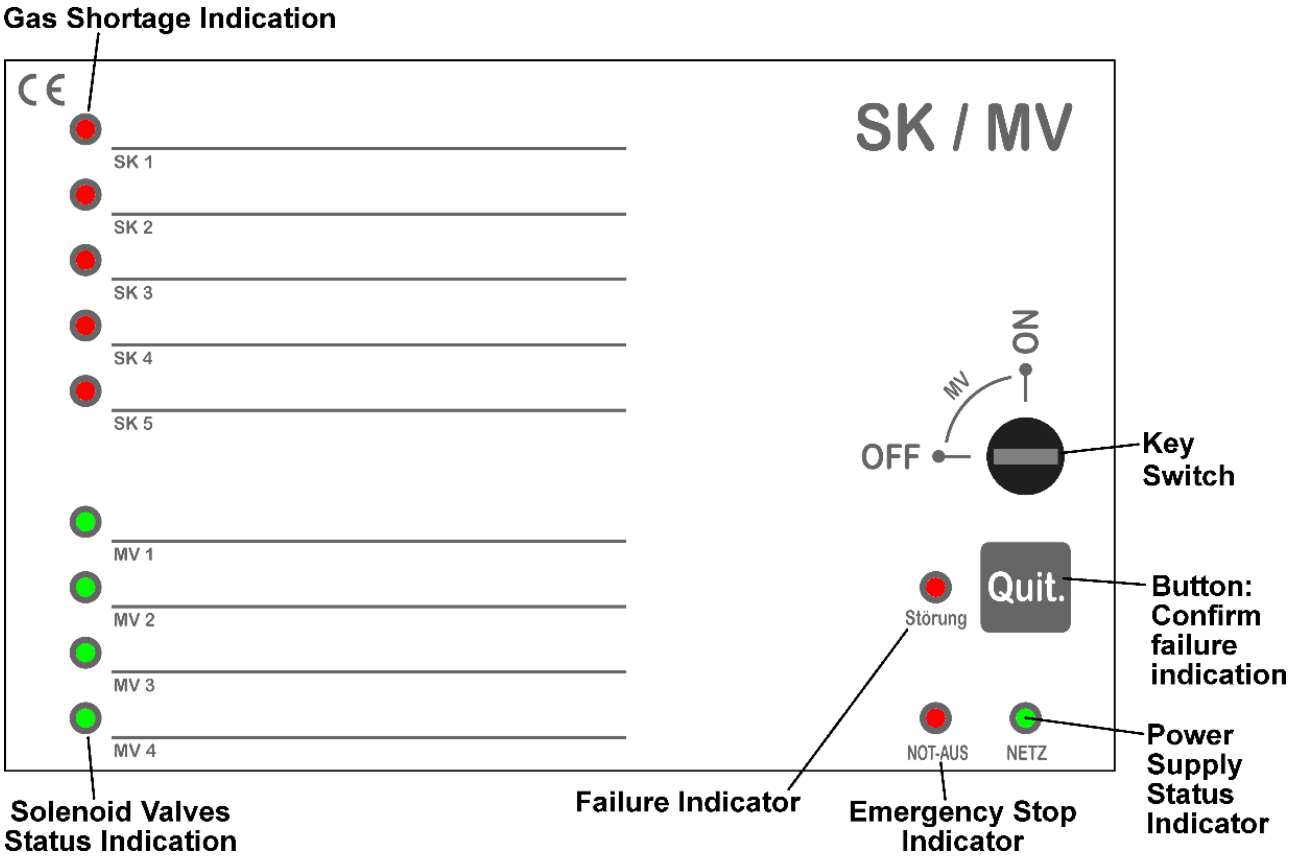
Any emergency shutdown that may have been initiated (emergency stop button pressed) switches off all solenoid valves. The situation is indicated by the red flashing "Emergency Stop" LED, the piezo buzzer, and the "Emergency Stop" relay changeover contact. The green "Power" status indicator flashes as long as the key switch is still set to "ON". The associated acoustic alarm can be stopped by pressing the "Quit" button.

Any time a new fault indication (acoustically, channel red blinking LEDs and the "New Fault" relay) can be deactivated by pressing the built-in acknowledgment button "Quit". If there are no further faults, the potential-free changeover contact "Fault" also stops its signal.

If the device is powered up while the key switch is in the "ON" position, the control prevents the magnetic valves from switching back on automatically. The green "Power" LED blinks. If no channel fault, the red LED "Fault" alerts to the special situation with periodically double pulsing and the relay "Fault" is reporting an error (for remote signalization). This simulates a fault situation. Simultaneous gas shortage messages are reported as a priority. The same behavior happens by returning from an emergency stop situation. It is used to signal the need for operator intervention to restart the magnetic valves after a power UP or an emergency shutdown. The simulated fault is only ended when the key switch is turned "OFF". Subsequently switching "ON" the key switch, sets the magnetic valves back to on.

Gas shortage and magnetic valve error messages as well as emergency stop situations can be forwarded to a higher-level control system or used to activate on-site displays or signal horns using the potential-free relay changeover contacts "New Fault", "Fault", and "Emergency Stop".

2 Frontal View of SK05MV04



3 Functions

Normal Conditions (no gas fault, no magnetic valve failure)

- The contacts of all connected manometers are closed.
- The green LED (Power) lights up indicating correct supply voltage.
- All channels red LEDs are off.
- All active channels green LEDs are on.
- The key switch stays at "ON" position.
- The messages "Fault", "New Fault" and "Emergency Stop" are not active. The associated relays are switched on (S and NO contacts closed).

Gas shortage

Gas fault is detected when the contact of the corresponding manometer opens (new fault).

- The "Fault" channel red LED blinks.
- The "Fault" red LED blinks.
- The "Fault" and "New Fault" relays turn off (S and NC contacts closed).
- The internal buzzer rings.

The gas fault alarm is acknowledged by pressing the "Quit" button:

- The channel red LED stays always on.
- The "New Fault" relay turns on (S and NO contacts closed).
- The "Fault" relay remains turned off (S and NC contacts closed).
- The buzzer stops ringing.

One of several gas faults is fixed

- The corresponding channel red LED turns off.
- The "Fault" LED remains blinking and the associated relay stays off since other faults exists (S and NC contacts closed).

All gas faults are fixed

- All channels red LEDs turn off.
- The "Fault" LED turns off.
- The "Fault" and "New Fault" relays switch on (S and NO contacts closed).

Magnetic valve fails

Current interruption on active magnetic valve (due to wire/fuse/coil break) triggers a fault message.

- The green MV LED of the channel failed valve blinks.
- The "Fault" LED blinks.
- The buzzer rings.
- The "Fault" and "New Fault" relays turn off (S and NC contacts closed).
- The "Emergency Stop" message is not affected and remains inactive. Its relay remains on (S and NO contacts closed).

The message is recognized pushing the "Quit" button. The buzzer then stops and the "New Fault" relay turns on again (S and NO contacts closed).

Magnetic valve failure is fixed

- The corresponding channel MV LED turns on.
- The "Fault" LED turns off.
- The "Fault" and "New Fault" relays turn on (S and NO contacts closed).
- The message "Emergency Stop" stays inactive and its relay remains switched on (S and NO contacts closed).

Emergency shutdown when the magnetic valves are switched on

If the Emergency Stop switch is actuated (Emergency Stop button locked), the operating voltage for the magnetic valves goes down and all valves switch off.

- The "Emergency Stop" red LED blinks.
- The "Power" green LED blinks. It signals that the key switch is still "ON".
- All channels green LEDs switch off.
- The Buzzer reports the emergency shutdown acoustically.
- The "Emergency Stop" message is active and its relay is turned off (S and NC contacts closed).

Pushing the "Quit" button stops the acoustic message.

Pressing "Emergency Stop" button case magnetic valves are turned off (key switch is "OFF")

By pressed "Emergency Stop" button, no line voltage is supplied to the valves. It leads to:

- The "Emergency Stop" red LED blinks.
- All green MV LEDs remain **off**.
- The buzzer rings.
- The "Emergency stop" message is active and its relay turns off (S and NC contacts closed).
- The "Fault" and "New Fault" messages are not active. "Fault" LED is off and respective relays are turned on (S and NO contacts closed). **Obs.: only if no manometer failure exists.**

The acoustic message can be stopped by pressing the "Quit" button.

Unlocking "Emergency Stop" after shutting down the magnetic valves

When the "Emergency Stop" is deactivated, the supply voltage is available to the magnetic valves again. However, if the key switch is in the "ON" position, the control system prevents the magnetic valves from automatically being switched on. Operator intervention is required to switch the valves back to "ON".

- All magnetic valves remain switched off, even if the key switch is now in the "ON" position.
- The green power LED blinks.
- The "Fault" relay is switched off (its S and NC contacts are connected) simulating a fault to request intervention from operator to switch the magnetic valves back to "ON".
- The red LED "Fault" makes double pulse periodically.
- Case channel "Fault" exists, it has priority for indication.

Only when the "key switch" is returned to the "OFF" position, the simulated "Fault" message stops.

Subsequent turning "ON" the key switch, turns the magnetic valves back to "ON".

The device is switched on with the key switch in the "ON" position.

With the key switch in the "ON" position, it is assumed that the magnetic valves should actually be switched on. However, this does not happen automatically after switching on the supply voltage. It requires operator intervention, which is requested using a simulated "Fault" message.

- All magnetic valves remain switched off even though the key switch is in the "ON" position.
- The green power LED blinks.
- The red LED "Fault" makes double pulse periodically.
- The "Fault" relay is switched off (its S and NC contacts are connected) simulating a fault to request intervention from operator to switch the magnetic valves back to "ON".
- Case channel "Fault" exists, it is indicated with priority.

Returning the key switch to the "OFF" position, it ends the simulated fault message. To switch on the magnetic valves, the key switch must be turned to the "ON" position.

4 First Use

! Warning! The SK05MV04-SNT is not suitable for installation in Explosion Zone (Ex. Zone). In this case, additional isolating amplifiers are required for the pressure gauges. The SK05MV04-SNT itself must be installed outside the Ex Zone!

X1 – X5: Connections for the manometers.

X6 – X9: Connections for the magnetic valves.

X10: Output connection for messaging "Emergency Stop".

X11: (Fault) connection for external horn/lamp alarm or can be forwarded to a central control unit.

X12: (New Fault) connection for external horn/lamp alarm or can be forwarded to a central control unit.

X20: Supply Voltage (100–240V_{AC}, 50/60Hz) – power for the device and the magnetic valves.

X30: "Emergency Stop" input – connection of "Emergency Stop" button.

! X30 is intended for direct connection of a **potential-free emergency stop button** and already supplies the necessary operating voltage (100–240V_{AC}, 50/60Hz).
No external voltage may be applied to it!

4.1 Programming Mode

SK and MV channels can be activated or deactivated at any time independently of one another or the position of the key switch. To do this, proceed as follows:

1. **Programming Mode Activating:**
   – Hold down the "Quit" button at least 4s until hearing two short beeps from the buzzer.
   – Then immediately press the button twice successively.
2. The red LED SK1 blinks every second and is selected for activation/deactivation. This can be done by pressing the "Quit" button for approx. 1s. The pulse duration of the LED then changes:
   - Long pulse → The channel is activated
   - Short pulse → The channel is deactivated
3. The next channel for configuration is selected by briefly pressing the "Quit" button.
4. **Leaving the programming mode:**
   Press the "Quit" button for approx. 4s until first a beep (at 1s) and then two short beeps (at 4s) can be heard from the buzzer. The device switches back to normal operating mode.

4.2 Buzzer Deactivation/Activation

The buzzer is activated at the factory and reports incoming error situations acoustically. In some cases, it may be desired that the buzzer remains silent. For this case, the buzzer can be deactivated or reactivated as follows:

1. Switch off the SK05MV04-SNT device.
2. Press and hold the "Quit" button.

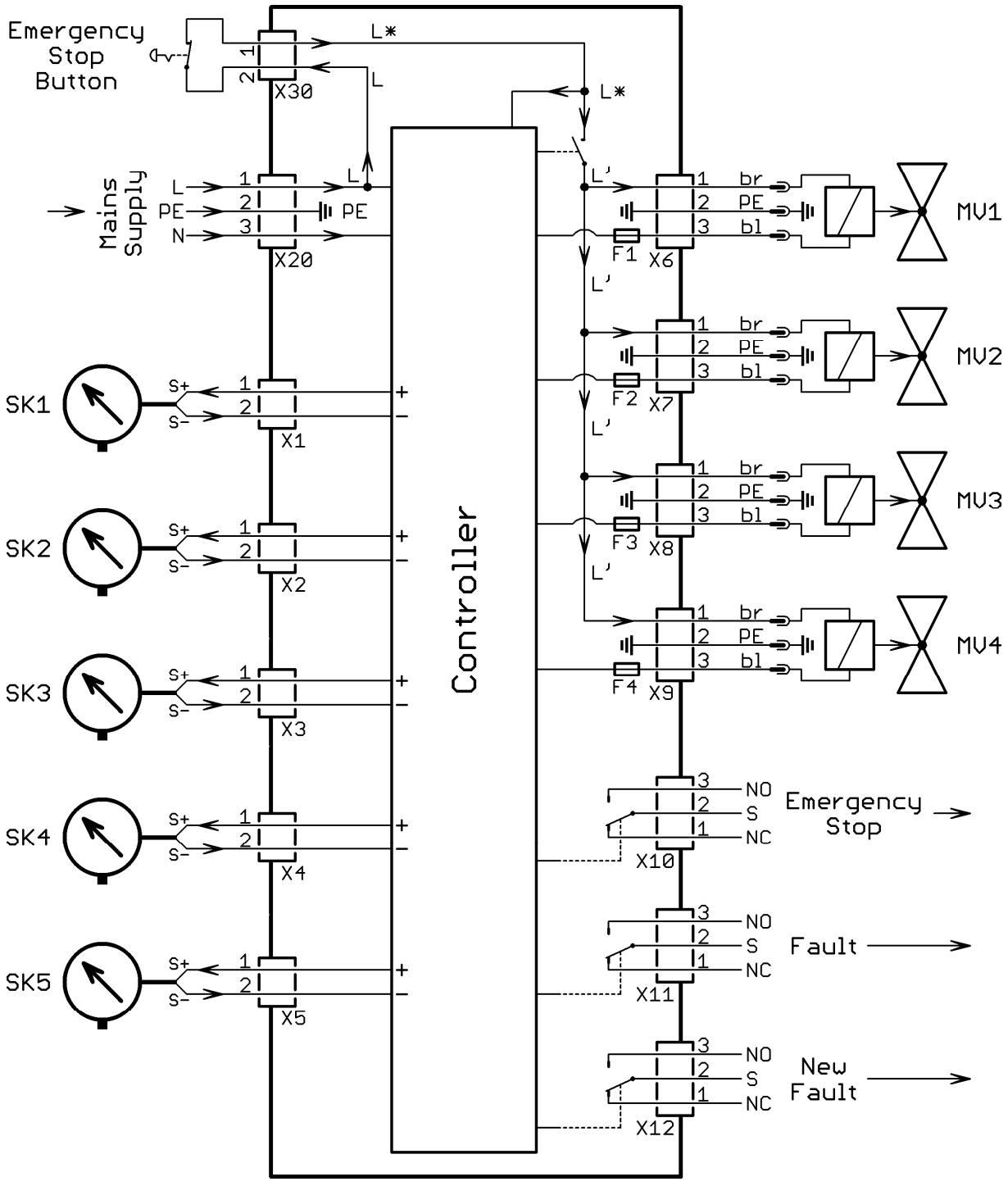
3. Switch on the SK05MV04 again.
4. Wait about 3s and release the button.
   If the buzzer is switched from inactive to active operating mode, a single beep sounds as confirmation. In the opposite case, the buzzer remains silent.

When the device is just switched on (without the "Quit" button pressed), a short single beep indicates that the buzzer is currently in active operating mode whereas it remains silent in inactive operating mode. Any pending error messages comes after this.

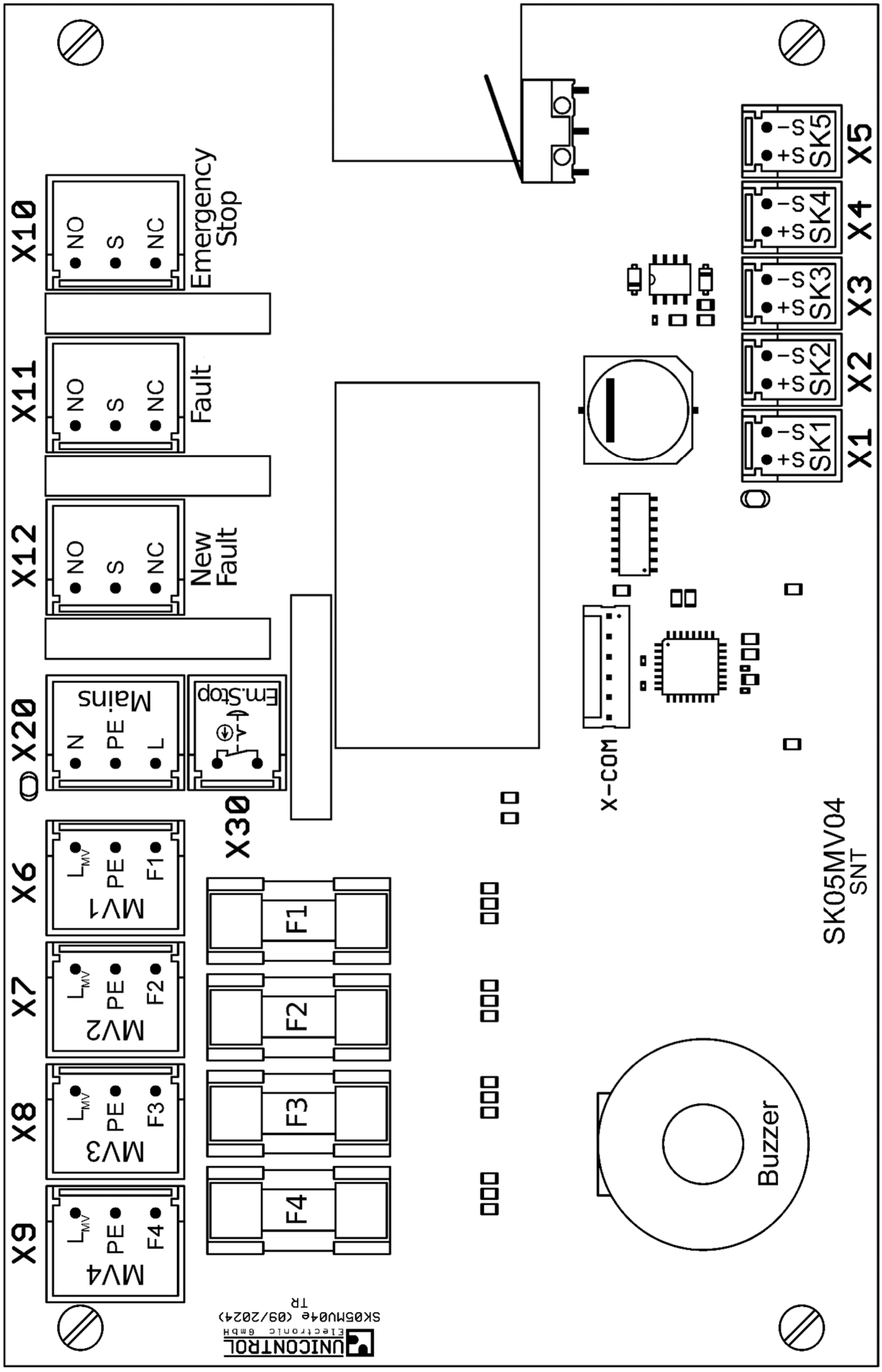
In the inactive operating mode, the buzzer remains silent when gas shortages and solenoid valve errors occur. On Emergency situations the buzzer is always active independent of the configured mode.

5 Installation

5.1 Cabling



5.2 Connection Plan



6 Technical Data

6.1 SK05MV04-SNT

Parameter	Sym.	Conditions			min	typ	max	Unit
Operating voltage	V_S	50/60 Hz			100	115 230	240	V_{AC}
Power consumption#	P_S	$100V_{AC} \le V_S \le 240V_{AC}$					3	VA
Manometer input		X1 – X5 Internal, non-stabilized, floating DC power supply unit for inductive gauges and gauges with mechanical contacts.				10		V_{DC}
						10		mA
Magnetic Valves (also see chapter 6.2)	V_{MV}	X6 – X9	Rated voltage			115 230		V_{AC}
	P_{MV}		Power		see chapter 6.2			VA
		internal fine-wire fuses; ex factory (see chapter 6.2)			T100mA 250VAC 5 x 20			
Relay-Outputs X10 Emergency Stop X11 Fault X12 New Fault		changeover contact, potential-free, resistive load	Rated voltage	AC		115 230	250	V_{AC}
				DC		24	125	V_{DC}
			Rated current (externally fused)				6	A
Conductor cross section	ø	X1 – X5 Push-in Cage clamp fine stranded	without ferrule		0,2		1,5	mm^2
					24		14	AWG
			with insulated ferrule		0,25		0,75	mm^2
			with uninsulated ferrule		0,25		1,5	mm^2
	ø	X6 – X12 X20; X30 Push-in Cage clamp fine stranded	without ferrule		0,2		2,5	mm^2
					24		12	AWG
			with insulated ferrule		0,25		1,5	mm^2
			with uninsulated ferrule		0,25		2,5	mm^2
Strip length		X1 – X5			8		9	mm
		X6 – X12; X20; X30			9		10	mm
Ambient temperature	T_O	Operating temperature			0	+20	+55	°C
	T_S	Storage temperature			-20		+60	°C
Case	W	Width				200		mm
	H	Height				120		mm
	D	Depth				75		mm
		Material			ABS			
		Level of protection			IP65 / DIN 40050			
		Colour			RAL 7035			
		Cable glands			8 x M16			

Plus the power for the magnetic valves. The "Emergency Stop" switch must be designed accordingly!

6.2 Connectable Magnetic Valves

Each magnetic valve is protected by a fine-wire fuse inside the device.

Operating Voltage	Power /VA		Fuse (5 x 20)
	min.	max.	
230 V_{AC}; 50/60 Hz	3	15	T100mA/250VAC
	> 15	32	T200mA/250VAC
	> 32	50	T315mA/250VAC
115 V_{AC}; 50/60 Hz	2	7,5	T100mA/250VAC
	> 7,5	15	T200mA/250VAC
	> 15	30	T315mA/250VAC

! **Caution:**
When using Ex-Magnetic Valves, the fine-wire fuses must always be adjusted in accordance with its data sheet (see VDE 0165).

7 Warning Notices

7.1 Danger of the Devices

This gas monitoring equipment is manufactured and tested in accordance with generally accepted technical standards of the electronics industry.

If used properly, the devices are safe to operate. The units may be operated in a perfect condition and in accordance with the instructions only. Incorrect operation or incorrect commissioning and installation results in

– user life and body hazards,
– damage of devices and other properties of the user,
– device malfunctions.

7.2 Permitted Users

All persons involved with installation, commissioning, operation, maintenance and repair of the devices must

– be qualified,
– follow the operating instructions carefully and
– observe the recognized rules for occupational safety.

The devices may be installed and put into operation by trained personnel only. Electrical work must be performed by trained VDE-compliant professional person.

Untrained personnel may work in these products under supervision of trained professionals only.

The operator's manual must be made available for the operator by the system installer.

The installer and the user have to read and understand the manual and this safety information before working with the device.

The minimum age for users is 18 years.

7.3 Intended Use

The unit of SK05MV04-SNT is exclusively qualified for the monitoring of contact pressure gauges and solenoid valves in normal rooms without potentially explosive areas, so, it may not be installed in environment with risk of explosion.

The device SK05MV04-SNT must be located outside of the explosion prone area!

In these risk areas, **only explosion-proof pressure gauges** with a certificate of EC approved test centers for use in Ex-rooms may be used. This certificate does not say anything about the function, but merely indicates that the gauges are explosion protected.

Explosion-proof pressure gauges that are operated in potentially explosive environments may only be operated on the SK05MV04-SNT using a suitable intermediate isolating amplifier.

When using the devices, local conditions must be observed. The technical data of the corresponding environmental conditions for the operation of this equipment must be maintained.

7.4 Electrical Connections

WARNING: Line voltage (100–240 V_{AC}, 50/60 Hz) can cause severe burns. Careless behavior may be dangerous.

Electrical work may be carried out by qualified person only.

The devices may be installed only with disconnected power!

The VDE regulations, accident prevention regulations and operating manuals for the devices must be always observed.

7.5 Installation

Before installation, it must be verified that all requirements for trouble-free operation are met:

- Are the SK05MV04-SNT, the contact gauges and the solenoid valves mounted correctly?
- Is the SK05MV04-SNT accessible and visible?
- Are there required environment conditions for installation and operation?
- Are the SK05MV04-SNT, the contact gauges and the solenoid valves connected properly?
- Is the power supply corresponding to the necessary power ratings?

After installation, the proper functioning of the entire system must be reviewed.

7.6 Maintenance

The devices must be inspected regularly by qualified personnel. The inspection should be documented conclusively.