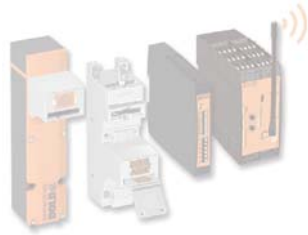


Control technique





Safety technique

- Safety switching devices
- Standstill / speed monitoring
- Multifunctional safety devices
- Wireless Safety System
- Safety switches
- Guard locks
- Key transfer



Monitoring technique

- Residual current monitors
- Insulation monitors
- Insulation fault location system
- Measuring and monitoring relays
- Fault annunciators and fault annunciator systems
- SMS-Telecontrol module



Power electronics

- Solid-state relays /- contactors
- Reversing contactors
- Softstarters
- Motor brake relays
- Speed and phase controllers
- Multifunctional motor control units



Control technique

- Latching / interface / switching relays
- Interface modules
- Power supply units
- I / O modules
- CANopen PLC
- CANopen I / O modules



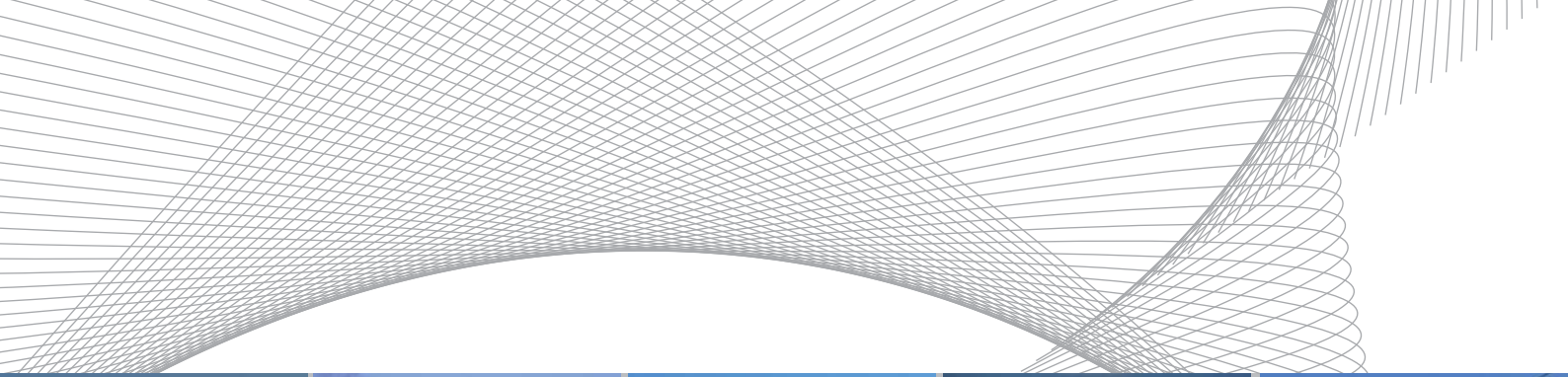
Time control technique

- Multifunction relays
- Flasher relays
- Cyclic timers
- Fleeting action relays
- Pulse extender
- Star delta timers
- Timers
 - on delayed
 - off delayed



Installation technique

- Time switches
- Remote switches
- Specific installation electronics



- Machinery and plant
- Power generation/distribution
- Oil and gas industry
- Automation
- Transport and material handling systems
- Rail technology
- Aviation/marine industry
- Paper and printing industry
- Food industry
- Rubber/plastics industry
- Heating and refrigeration
- Automotive
- Mining/metal working
- Chemical/pharmaceutical applications
- Medical technology
- Water/waste water treatment
- Cable cars/ski lifts

... and wherever safety has high priority.
We can cover your industrial applications as well!

DOLD – Solutions for you



The DOLD philosophy, “Our experience. Your safety” constitutes our program: Offering solutions based on over 80 years of experience with a workforce of more than 400 employees, we manufacture high quality products using state-of-the-art production plant at our Furtwangen facility in Germany.

The comprehensive product range includes relay modules, safety relays with positively-driven contacts and electronic housings with virtually unparalleled production detail. The combination of know-how, innovation and experience makes us one of the leading worldwide manufacturers.

Apart from standard solutions, we are also the right partner when individual industrial solutions with that special touch are required.

Staying in close contact with our customers is very important to us. We listen, analyze and act by offering flexible, custom high-tech solutions, from a single source.

Thanks to our own development laboratory, highly automated production facilities with a modern tool & die shop in addition to injection moulding facility together with a well organized sales and marketing department, we guarantee high quality and short delivery times. Your benefits: Increased plant and machine availability, planning reliability and low production costs.

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BA 7961	Contact protection relay	64	IN		
BD			IN 5509	Input- / Output module, digital	119
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BG			IP		
BG 5595	Switched power supply	105	IP 3070/022	Output interface relay	66
CA			IP 3078	Interface module	103
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CB			IP 5503	Output module, digital	126
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CB 3057	Output interface relay	22	LG 3096	Interface module	81
CC			MK		
CC 3056	Input-Output interface relay	20	MK 3046	Interface relay	43
HC			MK 3096N	Interface module	81
HC 3093	Interface relay pluggable	24	MK 8804N	Interface relay	45
HC 3093_/_/3_	Interface relay pluggable	29	MK 8852	Latching relay	47
HC 3096N	Interface module	74	ML		
HC 3098	Interface module	68	ML 3045	Input-Output interface relay	49
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HO 3094	Interface module	97			
HO 3095	Interface module	97			
IG					
IG 3051	Input-Output interface relay	18			
IK					
IK 3050	Interface relay	31			
IK 3070	Input-Output interface relay	33			
IK 3076	Input-Output interface relay	36			
IK 3079	Interface module	72			
IK 5121	Protective diode module	140			
IK 8701	Input-Output interface relay / Switching relay	38			
IK 8802	Input-Output interface relay	41			

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UG 3096	Interface module	90
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D			Latching relay	UG 8851	55
Diode module	UG 5122	141	O		
I			Output interface relay	CB 3057.....	22
Input- / Output module analogue, for Modbus.....	UG 9461	134	Output interface relay	IP 3070/022	66
Input- / Output module digital, for Modbus	UG 9460	130	Output module, analogue	IL 5507.....	113
Input- / Output module, digital ...	IN 5509	119	Output module, digital	IP 5503	126
Input interface relay	ML 3059.....	51	R		
Input module, analogue	IL 5508.....	116	Resistor module.....	UG 5123	143
Input module, digital	IP 5502	122	P		
Input-Output interface relay	CA 3056, CB 3056, CC 3056	20	Protective diode module	IK 5121	140
Input-Output interface relay	IG 3051	18	S		
Input-Output interface relay	IK 3070	33	Stepping relay.....	BA 7632.....	62
Input-Output interface relay	IK 3076, SK 3076	36	Switched power supply	BG 5595	105
Input-Output interface relay	IK 8802	41	Switched power supply	RL 5596.....	107
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Interface module.....	HC 3096N, HL 3096N.....	74			
Interface module.....	HC 3098	68			
Interface module.....	HK 3087N.....	78			
Interface module.....	HL 3094, HO 3094, HO 3095	97			
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Interface module.....	IK 3079	72			
Interface module.....	IP 3078, SP 3078	103			
Interface module.....	LG 3096, MK 3096N.....	81			
Interface module.....	UG 3088	84			
Interface module.....	UG 3091	87			
Interface module.....	UG 3096, UH 3096	90			
Interface module with plug-type socket	HC 3093	24			
Interface module with plug-type socket	HC 3093, __/3__	29			
Interface relay	IK 3050	31			
Interface relay	MK 3046	43			
Interface relay	MK 8804N.....	45			
Interface relay	UG 3076/007	53			

Product selection

Latching / interface / switching relays

Function	Output contacts max.	Initiator triggering	Suppressor circuit on the coil input	Thermal current lth max. [A]	Enclosure design	Width [mm]	Type	Page
Interface relay / input - output	1 NO			3	Distribution board	9	IG 3051	18
Interface relay / input - output	1 NO	+	+	5	Switch cabinet	11,5	CA 3056	20
Interface relay / input - output	2 NO	+	+	5	Switch cabinet	11,5	CB 3056	20
Output switching relay system	1 C/O	+		5	Switch cabinet	11,5	CB 3057	22
Interface relay / input - output	2 C/O	+	+	5	Switch cabinet	11,5	CC 3056	20
Interface module with plug-type socket	2 C/O			16	Switch cabinet	15,8	HC 3093	24
Interface module with plug-type socket	1 C/O, 1 NO			8	Switch cabinet	17,5	HC 3093.../3__	29
Interface relay	1 C/O		+	5	Distribution board	17,5	IK 3050	31
Input-Output interface relay	2 C/O	+	+	8	Distribution board	17,5	IK 3070	33
Interface relay / input - output	2 C/O	+	+	10	Distribution board	17,5	IK 3076	36
Interface relay / input - output	2 C/O	+	+	16	Distribution board	17,5	IK 8701	38
Interface relay / input - output	2 C/O			10	Distribution board	17,5	IK 8802	41
Interface relay / input - output	2 C/O	+	+	10	Switch cabinet	17,5	SK 3076	36
Interface relay	2 x 1 C/O, 1 NO			5	Switch cabinet	22,5	MK 3046	43
Interface relay / input - output	4 C/O	+	+	5	Switch cabinet	22,5	MK 8804N	45
Latching relay	2 C/O			6	Switch cabinet	22,5	MK 8852	47
Interface relay / input - output	1 C/O			5	Switch cabinet	22,5	ML 3045	49
Interface relay	2 C/O	+		5	Switch cabinet	22,5	ML 3059	51
Interface relay	6 C/O			4	Switch cabinet	22,5	UG 3076/007	53
Latching relay	4 NO, 4 NC		+	6	Switch cabinet	22,5	UG 8851	55
Interface relay / input - output	4 C/O	+	+	16	Distribution board	35	IL 8701	38
Switching Relay	4 NO, 4 NC			8	Switch cabinet	45	AD 866	58
Latching relay	4 NO, 4 NC			8	Switch cabinet	45	AD 8851	60
Stepping relay	3 NO		+	10	Switch cabinet	45	BA 7632	62
Contact protection relay	2 C/O			2 x 5	Switch cabinet	45	BA 7961	64
Interface relay / input - output	4 NO	+	+	16	Distribution board	52,5	IN 8701	38
Output switching relay system	4 x 2 NO		+	10	Distribution board	70	IP 3070/022	66

NC= normally closed contact, NO = normally open contact, C/O = changeover contact

Product selection

Interface modules

Function	Output contacts max.	Thermal current I _{th} max. [A]	Nominal voltage DC	Nominal voltage AC	Nominal voltage AC/DC	Enclosure design	Connection type	Width [mm]	Type	Page
Interface module	1 NO; 1 NC	5	+			Switch cabinet	S	15,8	HC 3098	68
Interface module	1 NO; 1 NC	8	+	+	+	Distribution board	S	17,5	IK 3079	72
Interface module	3 NO; 1 NC	3 x 5	+			Switch cabinet	S	18	HC 3096N	74
Interface module	1 NO; 1 NC	25	+			Switch cabinet	S	22,5	HK 3087N	78
Interface module	5 NO; 1 NC	5	+	+		Switch cabinet	S/PS/PC	22,5	LG 3096	81
Interface module	5 NO; 1 NC	5	+	+		Switch cabinet	S/PS/PC	22,5	MK 3096N	81
Interface module	6 NO; 2 NC	2,5	+	+		Switch cabinet	PS	22,5	UG 3088	84
Interface module	8 NO, 2 NC	4	+			Switch cabinet	PS	22,5	UG 3091	87
Interface module	4 NO, 4 NC	6	+			Switch cabinet	PS	22,5	UG 3096	90
Interface module	4 NO; 2 NC	4 x 5	+			Switch cabinet	S	36	HL 3096N	74
Interface module	5 NO, 1 NC	5 x 5	+			Switch cabinet	PC	36	HL 3096_ C/400	94
Interface module	2 NO; 2 NC	3 x 8	+			Switch cabinet	S	38	HL 3094	97
Interface module	5 NO, 1 NC	5	+			Switch cabinet	S	45	BD 3083/100	101
Interface module	8 NO; 8 NC	6	+			Switch cabinet	PS	45	UH 3096	90
Interface module	2 NO; 2 NC	8		+	+	Distribution board	S	70	IP 3078	103
Interface module	2 NO; 2 NC	8		+	+	Switch cabinet	S	70	SP 3078	103
Interface module	3 NO; 3 NC	3 x 8	+			Switch cabinet	S	73,3	HO 3094	97
Interface module	4 NO; 4 NC	3 x 8	+			Switch cabinet	S	73,3	HO 3095	97

NC= normally closed contact, NO = normally open contact

S = screw terminal fixed

PS = removable terminal blocks, with screw terminals

PC = removable terminal blocks, with cage clamp terminals

Power supply units

Function	Primary voltage AC/DC [V]	Secondary voltage DC [V]	Secondary current [mA]	Enclosure design	Width [mm]	Type	Page
Switched power supply	110 ... 230	24	1000	Switch cabinet	22,5	BG 5595	105
Switched power supply	85 ... 265	24	350	Distribution board	35	RL 5596	107

Product selection

CANopen PLC

Function	Number of inputs/outputs	Output: transistor / relay	Thermal current Ith [A]	Enclosure design	Width [mm]	Type	Page
CANopen PLC	2 I, 2 O	R	2	Distribution board	35	IL 5504	109

I = Input, O = Output

CANopen I/O modules

Function	Number of inputs/outputs	Output: transistor / relay	Thermal current Ith [A]	Enclosure design	Width [mm]	Type	Page
Output module, analogue	2 O			Distribution board	35	IL 5507	113
Input module, analogue	2 I			Distribution board	35	IL 5508	116
Input / Output module, digital	4 I, 4 O	R	2	Distribution board	52,5	IN 5509	119
Input module, digital	8 I			Distribution board	70	IP 5502	122
Output module, digital	8 O	R	2	Distribution board	70	IP 5503	126

I = Input, O = Output

I/O modules

Function	Number of inputs/outputs	Output: transistor / relay	Bus interface	Enclosure design	Width [mm]	Type	Page
Input- / Outputmodule digital, for Modbus	8 I, 4 O	R	Modbus RTU	Switch cabinet	22,5	UG 9460	130
Input- / Outputmodule digital, for Modbus	8 I, 2 O		Modbus RTU	Switch cabinet	22,5	UG 9461	134

I = Input, O = Output

Product selection

Accessories

Function	Enclosure design	Width [mm]	Type	Page
Protective diode module	Distribution board	17,5	IK 5121	140
Diode module	Switch cabinet	22,5	UG 5122	141
Resistor module	Switch cabinet	22,5	UG 5123	143

Interface relays

Connecting links between logic and load

Electronic control units have been inherent parts of advanced automation technology for a long time. Already in the early seventies, they superseded bit by bit contactor and relay control systems that were usual by then. With them, the power consumption of control systems working with extra-low voltage could be reduced to a minimum. However, the energy demand of the power level for driving motors, magnetic clutches or hydraulic cylinders has not changed up to now. They still need a high amount of electrical energy. Therefore, coupling relays undertake the required interface between logic and power levels. Moreover, they guarantee a protective separation. So, coupling relays are perfect connecting links between the highly sensitive logic level of a PLC, control system or process computer working almost without electric power and the rough machine operation.

Application

Inadvertent pulses on the input side of a control may cause false triggering or, if containing a larger amount of energy, serious damages to an electronic control system. On their output side, electronic control systems must be protected against short-circuits and reactions by inductive loads.

DOLD's coupling relays imod (input module) and omod (output module) meet the following criteria:

- Protective (electrical) separation according to VDE 0106 Part 101 between control and load circuits (e.g. between CPU and actuators or sensors)
- Highly effective interference suppression
- Signal conditioning

Therefore, DOLD coupling relays are suited for all interface applications in demanding control systems.

Solid-state coupling relays

The protective (electrical) separation in the solid-state coupling relays imod and omod is achieved by opto-couplers.

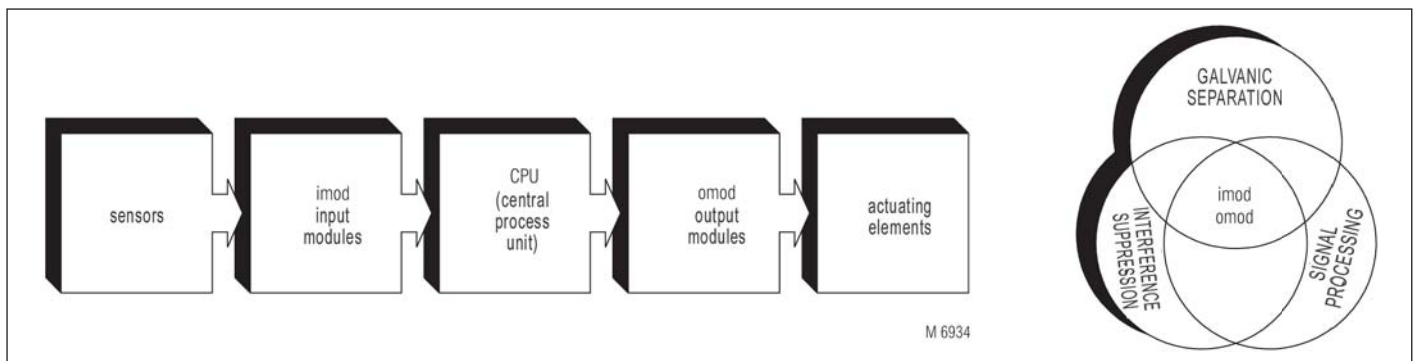
The signal entering the coupling signal is conditioned in several steps to obtain a suited low voltage signal for the operation of the actual switching element on the module's output. In doing so, interferences due to stray capacitances, as they occur in parallel running cables, as well as HF and transient interferences (short-time voltage peaks) are filtered out to a great extent. The conditioned signal is led to an opto-coupler. This consists of a luminescent diode (LED) and a phototransistor. They are used to electrically isolate the input from the output signal. Solid-state relays use a semiconductor output instead of the switching contact in electromechanical relays. This is a transistor for DC output modules, and triacs (bidirectional triode thyristors) are used for AC output modules. Their advantages include:

- Long service life
- Short switching times
- Bounce-free, noiseless switching
- Low trigger power

Electromechanical coupling relays

The electromechanical coupling relays imod and omod include a high-quality PCB relay with following features:

- Better output resistance characteristic than solid-state coupling relays
- Switch any d.c. and a.c. loads
- Switch analog values with lower voltage drop than solid-state coupling relays



Requirements and application fields for fieldbus systems

Control equipment in machines and installations becomes more and more complex. However, sensors and actuators are often conventionally wired. But with increasing complexity and performance also the time needed for engineering, installation, wiring, commissioning and maintenance increases. Such work becomes more confusing, error-prone and also more costly.

An alternative is the use of bus systems. Some advantages of fieldbus systems are listed below:

Advantages of fieldbus systems

- Wiring becomes **clearer** when actuators and sensors are wired to the control system via a fieldbus system.
- Compared to conventional wiring technology, the use of fieldbus technology ensures a **better flexibility** of systems with respect to modifications and extensions.
- Thanks to an **easy extensibility** of fieldbus-enabled components later modifications can be mostly realized more easily.
- The time and materials needed for engineering, installation, commissioning and maintenance of signal processing lines can be considerably reduced in many fields of industrial automation. In a study, **cost savings** up to 40 % were found for wiring, commissioning and maintenance with fieldbus-based solutions.
- **Reduction of installation time and lower error rate (no switch cabinets with thousands of signal lines) compared to conventional wiring.**
- Also the expenditure for engineering and documentation can be reduced with the use of appropriate engineering software tools.
- Control concepts realized by fieldbus systems can be easily incorporated in higher-level control systems (all information can be used and evaluated by several systems). Via so called gateways, it is also possible to pass on information to mobile networks or to transmit it to certain subscribers via the internet.
- **Remote diagnostics** is possible by transmission of different diagnostic information via only one line.

Advanced automation technology is characterized by evermore decentralization of processing and input/output functions via data communication systems. Today, the use of specific fieldbusses is state of the art for the implementation of systems for production automation, networking of control units in vehicles and for the installations in large buildings.

In the meantime, specific fieldbus solutions developed for the above applications have also found entrance into further application fields. In particular CAN with the CANopen and DeviceNet standards designed for industrial automation is widely used for the automation of systems and installations.

Fieldbusses and system overview

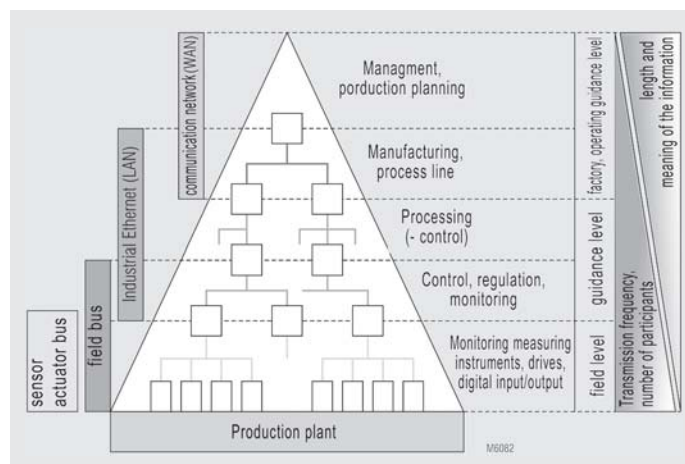
Today, users of communication systems in machinery and installations as well as automation systems can choose from many different fieldbus systems. To help in recognizing the advantages of a bus system for a specific application the following provides a rough classification and indicates the main applications of fieldbus systems.

As can be seen in the schematic representation in fig. 1, a factory and process automation system can be subdivided into different communication levels (network hierarchies). In the lowest level, the communication takes place between all components that can be found in a machine or installation and are involved in a task or process (acquisition, control and direct influencing of process variables). These are sensors and actuators with different complexity besides of control units (e.g. PLC, industrial PCs), display and indication devices, measuring instruments, controllers and drive systems.

This lowest level is also referred to as *Field level*. The next higher level is the *control level* where the control, regulation and monitoring of machinery and processes takes place. The highest level is the plant or factory control level where scheduling and management tasks are done.

These individual levels are networked via bus systems. So, it is also possible to exchange data between the hierarchic levels. For example, data from a sensor in a machine can be passed on from level to level until it can be transmitted via the internet.

Fig. 1: Principle of industrial communication



The field level encompasses both highly complex devices (overriding control units) and also very simple cost-effective devices (e.g. binary sensors, actuators). Therefore, hierarchically structured application-specific communication systems become prevalent also in the field level. An example is the field of pure sensor-actuator interface connection (ASI bus).

The table below shows an overview of the different levels with their tasks. Requirements on the performance of a bus system depend on the different tasks.

A bus system in the field level (e.g. CANopen, Profibus-DP, etc.) must be able to quickly transmit small amounts of data from many bus devices, for example. A bus system in the plant control level (e.g. Ethernet) must be able to exchange relatively large amounts of data (some MB) between a smaller number of bus devices.

CANopen

DOLD offers devices for two-wire transmission that can be used in their basic function (plug & play) **without** programming tool. The following describes most simple easily implementable application examples.

Simple remote control

Using **DOLD's** input modules **IP 5502** and output modules **IP 5503** it is easily possible to transmit input signals to output relays over large distances via two-wire cables without programming (e.g. control of signal lamps, valves, ...). The structure and wiring of this "remote control" is very easy.

Signals from limit switches, pushbuttons, sensors, etc. of a plant can be connected to the digital input module, for example. Signals for a system to be controlled are connected to the digital output module, for example.

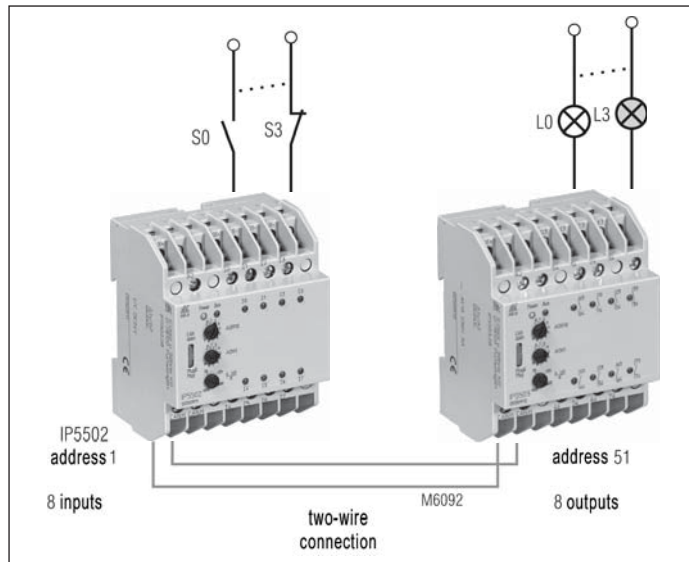


Fig. 2: Structure of a remote control via a two-wire connection (plug & play mode)

To start up a 2-wire remote control only following settings have to be made on the device:

Plug & play mode

For the example represented, the switch of the input/output modules has to be put to the "Plug & Play" position. In this switch position, a variant of the CANopen protocol is run via the existing interface.

Address setting for the plug & play mode

To enable the input module for communication with a corresponding device via the CAN bus an address according to the table has to be set using two rotating knobs on the front. Addresses from 1 ... 49 and 51 ... 99 can be set. In Plug & play mode, no module with the addresses 0 and 50 may be encountered.

Input module IP 5502 with address	transmits to	Output module IP 5503 with address
1	→	51
...		...
49	→	99

Setting example:
 Address 14
 Upper rotating knob "ADR 10": to position 1
 Lower rotating knob "ADR 1": to position 4

Commissioning

- 1.) Connect the CAN bus to the devices.
- 2.) For devices at the bus ends, the terminals CAN-H and R_{ab} must be bridged.
- 3.) Set the transmission speed (e.g. 20 kBit/s).
- 4.) Set the address.

Attention: To achieve a transmission in plug & play mode it must be ensured that one input module, e.g. IP 5502, with the address set to 1 is connected to the CAN bus.

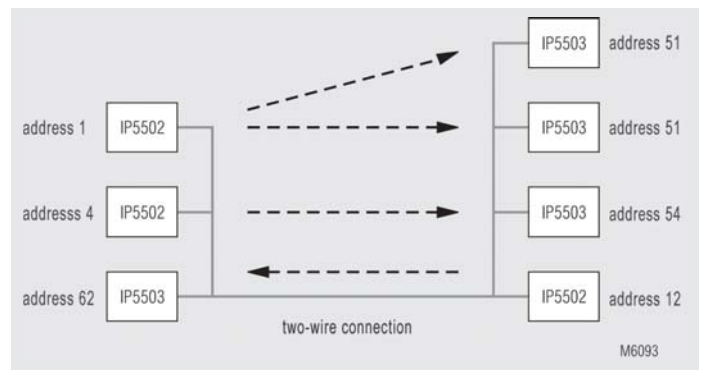


Fig. 3: Address setting example for the plug & play mode

Indication of an operated emergency stop pushbutton

Problem

In installations with many emergency stop command devices it is very time-consuming to locate an operated emergency stop pushbutton in order to restart the stopped plant.

Consequences

Expensive production downtime as each individual emergency stop pushbutton has to be checked.

Solution

Using **DOLD's** emergency stop monitor **BH 5922** the operating state of emergency stop pushbuttons in an emergency stop chain can be directly indicated. Up to eight emergency stop command devices and one emergency stop module **BG 5925** can be directly connected to the BH 5922. Using suited expansion devices, e.g. BG 5925, it is possible to connect almost any number of emergency stop pushbuttons. An operated pushbutton is then visually indicated by means of an associated LED.

It is possible to easily connect the **BH 5922** with an output module **IP 5503** in Plug and Play mode (2-wire line). So, the output relays in the IP 5503 represent the states of the emergency stop pushbuttons and the LEDs of the output module map the states of the status LEDs of the emergency stop monitor. Via the output module, the states of the emergency stop pushbuttons can also be indicated over large distances by indicator lamps that are remotely located - without large wiring expenditure.

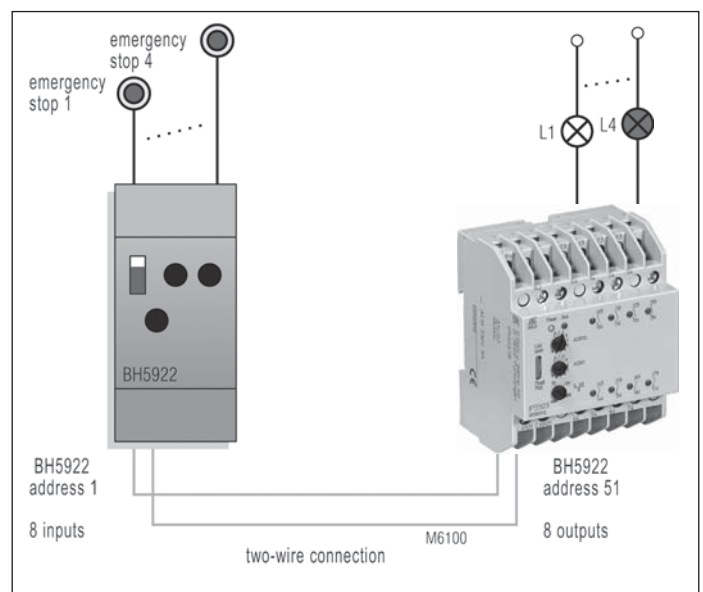


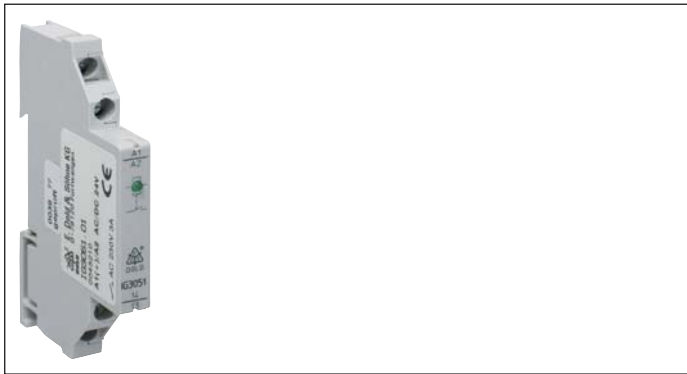
Fig. 4: Operating state of multiple emergency stop pushbuttons (Plug & Play mode)

Address setting and commissioning can be done as described in the example above. For detailed information see the attached data sheet.

Input-Output Interface Relay Interface Relay IG 3051

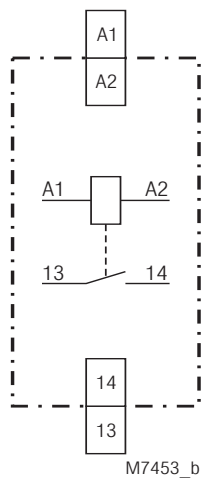


0222103



- According to IEC/EN 60 947-5-1
- Input for AC/DC 24 V, AC 110 V or 230 V, as required
- 1 NO contact for AC 230 V
- LED indicator
- Width 9 mm

Circuit Diagram



Connection Terminals

Terminal designation	Signal description
A1, A2	Operating voltage
13, 14	Output contacts

Approvals and Markings



Indicators

1 LED: on when the output relay is activated

Notes

There must be no 3-phase voltage (400 V) between the input and contact circuit.

Technical Data

Input

Nominal voltage U_N:	AC / DC 24 V AC 110, 230 V
Voltage range:	AC 0.8 ... 1.1 U_N DC 0.9 ... 1.2 U_N
at 10% residual ripple:	
at 48% residual ripple:	DC 0.8 ... 1.1 U_N
Nominal consumption:	AC 230 V 1.3 VA DC 24 V 0.2 W
Nominal frequency:	50 / 60 Hz
Release voltage:	20 % U_N

Output

Contacts:	IG 3051.01:	1 NO contact
Thermal current I_{th}:		3 A
Nominal output voltage:		AC 270 V / DC 125 V
Switching voltage (min.):		5 V
Switching-on capacity:		5 A
Switching current (min.):		1 mA
Switching capacity:		3 A AC 230 V / DC 30 V ohmic load
Electrical life:		1 x 10 ⁵ switching cycles at nominal load IEC/EN 60 947-5-1
Operate time:		≤ 20 ms
Release time:		≤ 20 ms
Short circuit strength		
max. fuse rating:		4 A gG / gL IEC/EN 60 947-5-1
Mechanical life:		2 x 10 ⁶ switching cycles

Technical Data

General Data

Operating mode:	Continuous operation	
Temperature range		
Operation:	- 20 ... + 60 °C	
Storage:	- 20 ... + 60 °C	
Altitude:	< 2,000 m	
Clearance and creepage distances		
rated impulse voltage / pollution degree:	4 kV / 2	IEC 60 664-1
EMC		
Electrostatic discharge:	8 kV (air)	IEC/EN 61 000-4-2
HF irradiation		
80 MHz ... 2,7 GHz:	10 V / m	IEC/EN 61 000-4-3
Fast transients:	4 kV	IEC/EN 61 000-4-4
Surge voltage between		
wires for power supply:	1 kV	IEC/EN 61 000-4-5
between wire and ground:	2 kV	IEC/EN 61 000-4-5
HF-wire guided:	10 V	IEC/EN 61 000-4-6
Interference suppression:	Limit value class B	EN 55 011
Degree of protection		
Housing:	IP 40	IEC/EN 60 529
Terminals:	IP 20	IEC/EN 60 529
Housing:	Thermoplastic with V0 behaviour according to UL subject 94	
Vibration resistance:	Amplitude 0.35 mm, frequency 10 ... 55 Hz IEC/EN 60 068-2-6	
Climate resistance:	20 / 060 / 04 IEC/EN 60 068-1	
Terminal designation:	EN 50 005	
Wire connection:	2 x 2.5 mm ² solid or 2 x 1.5 mm ² stranded ferruled DIN 46 228-1/-2/-3/-4	
Stripping length:	10 mm	
Wire fixing:	Plus-Minus-terminal screws M3,5 with self-lifting clamping piece IEC/EN 60 999-1	
Fixing torque:	0.8 Nm	
Mounting:	DIN rail IEC/EN 60 715	
Weight:	35 g	

Dimensions

Width x height x depth: 8.8 x 89 x 58 mm

Standard Type

IG 3051.01 AC/DC 24 V 50/60 Hz
Article number: 0043210
• Output: 1 NO contact
• Nominal voltage U_N : AC/DC 24 V
• Width: 9 mm

Ordering example

IG 3051 .01 AC 230 V 50 / 60 Hz

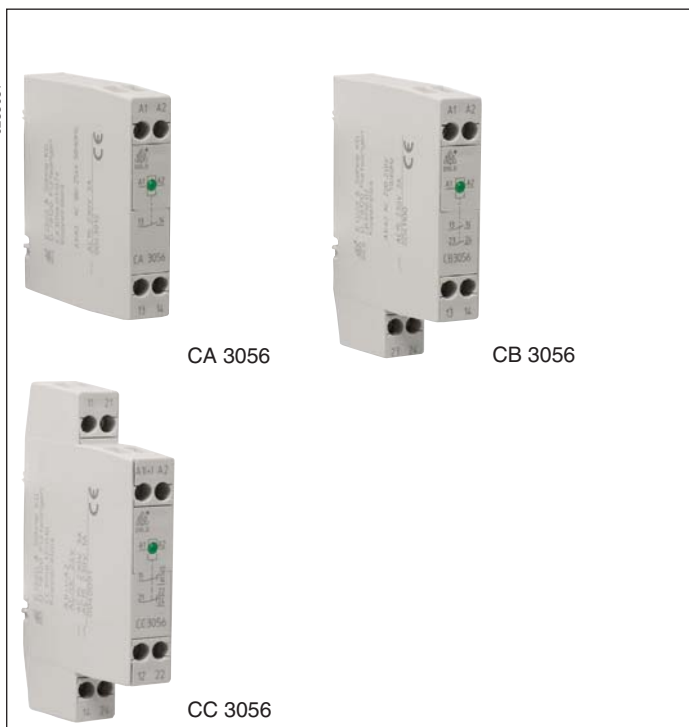
Nominal frequency
Nominal voltage
Contacts
Type

Interface relays

Input Interface Relay - Output Interface Relay CA 3056, CB 3056, CC 3056



02.55.081



- According to IEC/EN 60 947-5-1
- Protective separation acc. to IEC/EN 61 140, IEC/EN 60 947-1: 6 kV / 2, at CA / CB
- As option goldplated contacts (5 μ m Au) to switch low loads
- LED indication
- Optionally with 1 NO contact, 1 NC contact, 1 C/O contact, 2 C/O contacts, 2 NO contacts
- Optionally with MOV on input to achieve higher surge immunity
- Width: 11.5 mm

Approval and Markings



Application

- Link between the control and the power level
- For separating potentials

Indication

LED on, when supply connected

Connection Terminals

Terminal designation	Signal description
A1, A2	Operating voltage
11 ... 24	Output contacts see circuit diagrams

Technical Data

Input

Nominal voltage U_N

CA 3056: DC 24, 48* V
AC 110 ... 130* V, 220 ... 240 V

CB 3056, CC 3056: AC/DC 12 V
AC/DC 24, 48* V
AC 110 ... 130* V, 220 ... 240 V
* on request

Voltage range

CA 3056: DC 90 ... 125 % U_N
(residual ripple < 10 %)
AC 80 ... 110 % U_N

CB 3056, CC 3056: DC 80 ... 110 % U_N
(residual ripple \geq 10 ... 48 %)

Nominal consumption:

DC 24 V / 0.5 W
AC 230 V / 0.8 VA

Nominal frequency:

50 / 60 Hz

Frequency range:

\pm 5 %

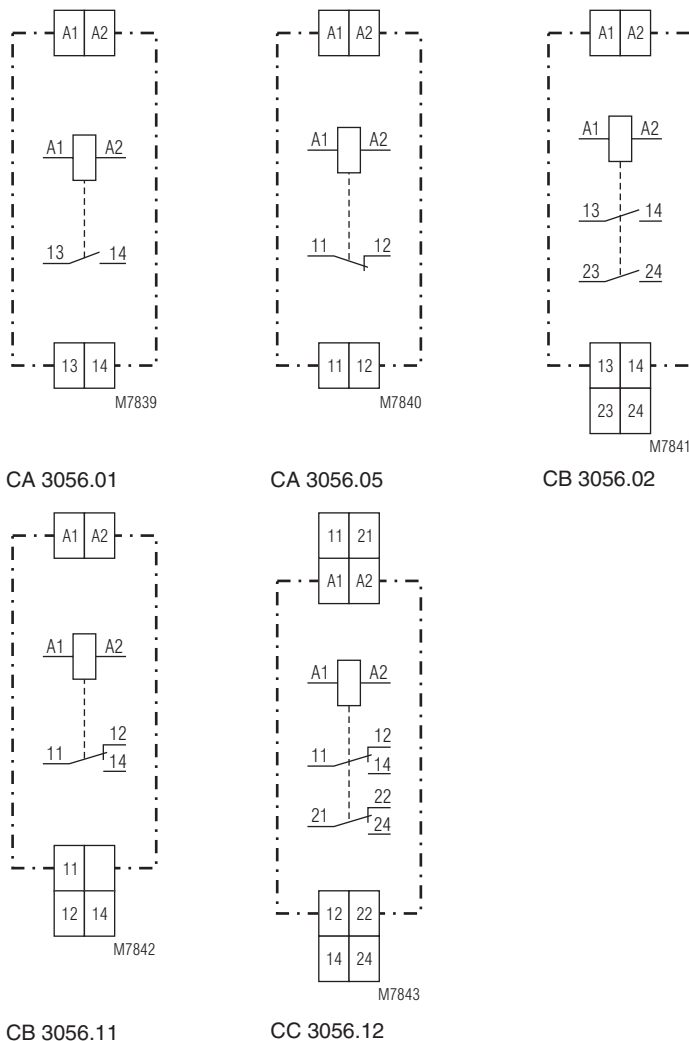
Output

Contacts

CA 3056.01: 1 NO contact
CA 3056.05: 1 NC contact
CB 3056.11: 1 C/O contact
CB 3056.02: 2 NO contacts
CC 3056.12: 2 C/O contacts

Operate time: < 10 ms
Release time: < 20 ms
Nominal output voltage: AC 250 V
Thermal current I_{th} : 5 A (not at CA 3056.01/100)

Circuit Diagrams



Technical Data

Switching capacity

to AC 15

NO contact: 3 A / AC 230 V IEC/EN 60 947-5-1

NC contact: 1 A / AC 230 V IEC/EN 60 947-5-1

to DC 13

NO contact: 1 A / DC 24 V IEC/EN 60 947-5-1

NC contact: 1 A / DC 24 V IEC/EN 60 947-5-1

(not at CA 3056.01/100)

permissible contact-loading capacity at
CA 3056.01/100: 0.1...60 V / 1...300 mA

Electrical life

to AC 15 at 3 A, AC 230 V: > 8 x 10⁵ switch. cycles IEC/EN 60 947-5-1
(not at CA 3056.01/100)

Permissible switching

frequency: 20 switching cycles / s

Short circuit strength

max. fuse rating: 6 A gG / gL IEC/EN 60 947-5-1

Mechanische Lebensdauer: > 30 x 10⁶ switching cycles

General Data

Nominal operating mode continuous operation

Temperature range:

Operation: - 25 ... + 60 °C

Storage: - 25 ... + 60 °C

Altitude: < 2.000 m

Air gap and creepage distance

Rated insulation voltage: 300 V

Overvoltage category: III

Rated impulse voltage /

pollution degree:

CA 3056, CB 3056:

Input to Output: 6 kV / 2 IEC 60 664-1

CC 3056:

Input to Output: 4 kV / 2 IEC 60 664-1

EMC

Electrostatic discharge (ESD): 8 kV (air) IEC/EN 61 000-4-2

HF irradiation:

80 MHz ... 2.7 GHz: 10 V / m IEC/EN 61000-4-3

Fast transients: 4 kV IEC/EN 61 000-4-4

Surge voltages

between

wires for power supply: 1 kV IEC/EN 61 000-4-5

between wire and ground: 2 kV IEC/EN 61 000-4-5

interference suppression: Limit value class B EN 55 011

Degree of protection

Housing: IP 40 IEC/EN 60 529

Terminals: IP 20 IEC/EN 60 529

Enclosure: thermoplastic with VO behaviour

according to UL Subject 94

Vibration resistance: amplitude 0.35 mm

frequency 10 ... 55 Hz, IEC/EN 60 068-2-6

Climate resistance: 20 / 060 / 04 IEC/EN 60 068-1

Wire connection DIN 46 228-1/-2/-3/-4

Fixed screw terminals

Cross section: 1 x 4 mm² solid or
1 x 2.5 mm² stranded wire with sleeve

Insulation of wires or

sleeve length: 8 mm

Wire fixing Captive plus-minus terminal screws

M3.5 box terminals with wire protection

Fixing torque: 0,8 Nm

Mounting: DIN rail IEC/EN 60 715

Weight:

CA 3056: 45 g

CB 3056: 50 g

CC 3056: 55 g

Dimensions

Width x height x depth

CA 3056: 11.5 x 60 x 62 mm

CB 3056: 11.5 x 75 x 62 mm

CC 3056: 11.5 x 90 x 62 mm

Standard Type

CA 3056.01 AC/DC 24 V 50 / 60 Hz

Article number: 0041412

• Ausgang: 1 NO contact

• Nominal voltage U_N: AC/DC 24 V

• Protective separation acc. to

IEC/EN 61 140,

IEC/EN 60 947-1: 6 kV / 2

• Width: 11.5 mm

Variants

CA 3056.___ / 1__

CB 3056.___ / 1__ : Contact with 5 µm Au

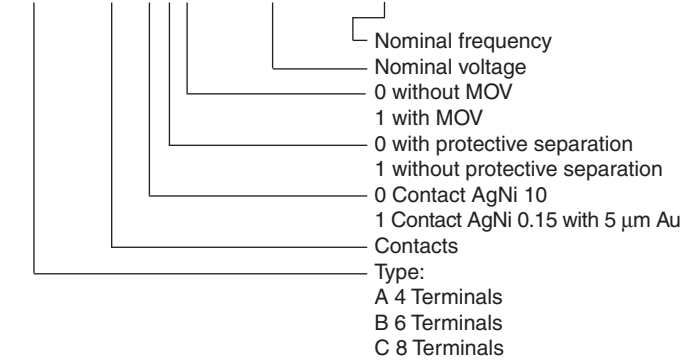
CC 3056.___ / 1__ : without protective separation

CA 3056.___ / __1

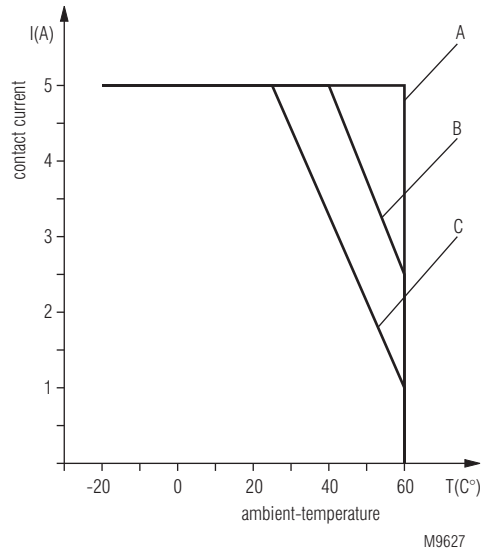
CB 3056.___ / __1 : with MOV on input to achieve higher surge immunity

Ordering example for variants

C 3056.___ / ___ AC 220... 240 V 50/60 Hz



Characteristic



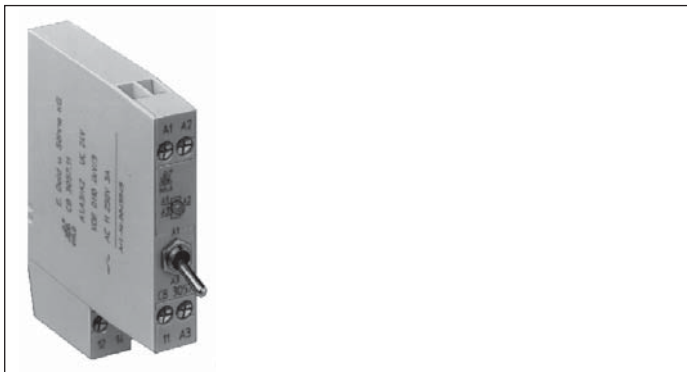
A = Mounted with 2 cm distance between units

B = Mounted without distance, 1 contact leading current

C = Mounted without distance, 2 contacts leading current

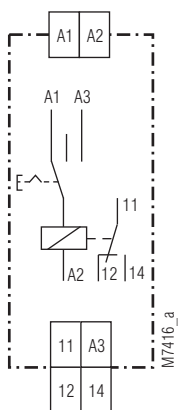
Continuous current limit curve

0225696



- According to IEC/EN 60 255, IEC/EN 61 810-1
- With service switch Auto/On/Off
- Test possible without influence on PLC
- Input AC/DC 24 V
- 1 changeover contact 5 A
- LED indicator
- Width 11.5 mm

Circuit Diagram



Approvals and Markings



Applications

- Link between control and main circuit with integrated selector switch
- manual operation during system failure

Technical Data

Input

Rated voltage:	AC/DC 24 V
Voltage range:	AC/DC 0.9 ... 1.1 U _N
Rated frequency:	50 / 60 Hz
Rated consumption:	0.5 VA

Output

Contacts

CB 3057.11:	1 changeover contact
Response time:	≤ 10 ms
Release time:	≤ 20 ms
Thermal current I_{th}:	5 A
Switching capacity to AC 15	
NO contact:	3 A / AC 230 V IEC/EN 60 947-5-1
NC contact:	1 A / AC 230 V IEC/EN 60 947-5-1
Electrical life to AC 15 at 3 A, AC 230 V:	8 x 10 ⁵ switching cycles IEC/EN 60 947-5-1
Permissible switching frequency:	20 1/s
Maximum fuse rating:	4 AgL IEC/EN 60 947-5-1
Mechanical life:	≥ 30 x 10 ⁶ switching cycles

Technical Data

General Data

Operating mode:	Continuous operation	
Temperature range:	- 20 ... + 60°C	
Clearance and creepage distances		
rated impulse voltage / pollution degree:	4 kV / 2	IEC 60 664-1
EMC		
Electrostatic discharge:	8 kV (air)	IEC/EN 61 000-4-2
HF irradiation:	10 V / m	IEC/EN 61 000-4-3
Fast transients:	2 kV	IEC/EN 61 000-4-4
Surge voltages between wires for power supply:	1 kV	IEC/EN 61 000-4-5
between wire and ground:	2 kV	IEC/EN 61 000-4-5
Interference suppression:	Limit value class B	EN 55011
Degree of protection		
Housing:	IP 40	IEC/EN 60 529
Terminals:	IP 20	IEC/EN 60 529
Housing:	Thermoplastic with V0 behaviour to UL Subject 94	
Vibration resistance:	Amplitude 0.35 mm frequency 10 ... 55 Hz IEC/EN 60 068-2-6	
Climate resistance:	20 / 060 / 04 IEC/EN 60 068-1	
Terminal designation:	EN 50005	
Wire connection:	4 mm ² solid DIN 46 228-1/-2/-3/-4 or 2.5 mm ² stranded wire with sleeve	
Wire fixing:	Box terminal with wire protection, IEC/EN 60 999-1	
Mounting:	DIN rail	IEC/EN 60 715
Weight:	55 g	

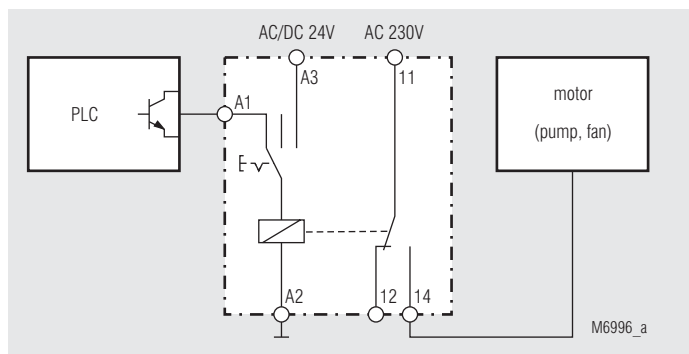
Dimensions

Width x height x depth: 11.5 x 75 x 72 mm

Standard Type

CB 3057.11 AC/DC 24 V 50/60 Hz	
Article number:	0045545 stock item
• Output:	1 changeover contact
• Nominal voltage U_N :	AC/DC 24 V
• Width:	11.5 mm

Application Example



0257864


 ET1415.047
+ OA 56__

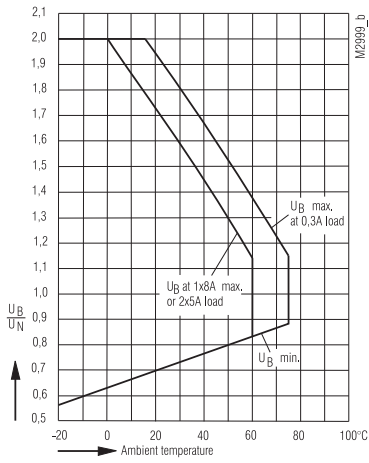
ET1415.044

ET1415.041

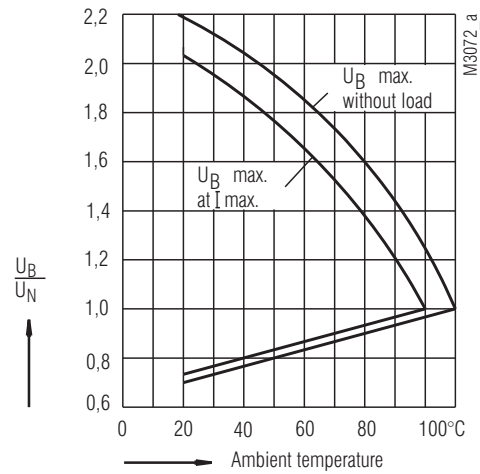
- According to DIN EN 61810
- 2 output contacts with monostable PCB-relay OA 5668
- Version with bistable PCB-relay OB 5694
- Contact material AgNi with fine gold
- High thermal current up to $I_{th} = 16$ A with relays OA 5682 and OB 5694
- Large temperature range: $-40 \dots +85$ °C
- As option with free-wheel diode or varistor between A1/A2
- As option with AgSnO₂ or AgNi with hard gold
- Width: 15.8 mm

	OA 5668	OA 5672	OA5682	OB 5694
Circuit Diagrams				
Approvals and Markings	CE	CE cRU ^{us}	CE cRU ^{us}	CE
Technical Data				
Coil				
Nominal voltage U_N	DC 6, 12, 20, 24, 48, 60, 110 V, others on request			DC 6, 12, 15, 20, 24 V AC 12, 24, 42, 230 V
Voltage range	0.7 ... 2 U_N	0.8 ... 1.4 U_N	0.8 ... 1.4 U_N	0.8 ... 1.1 U_N
Nominal consumption	0.5 W	0.53 W	0.53 W	1 W / 1.4 VA
Contacts				
Contacts	.02 2 NO .12 2 C/O	.01 1 NO .11 1 C/O	.01 1 NO .11 1 C/O	.01 1 NO .11 1 C/O
Contact material	AgNi as option AgSnO ₂ or AgNi with hard gold			
Rated insulation voltage	AC 250 V			
Limiting continuous current I_{th}	5 A	10 A	16 A	16 A
Switching capacity min./max.	3 / 2000 VA 30 / 200 W	4 / 2500 VA 35 / 300 W	4 / 4000 VA 35 / 500 W	3 / 4000 VA 35 / 300 W
Switching capacity AC 15 at AC 230 V DC 13 at DC 24 V	NC: 1 A, NO: 2 A NC: 1 A, NO: 1 A	NC: 1 A, NO: 3 A NC: 1 A, NO: 1 A	NC: 1 A, NO: 3 A NC: 1 A, NO: 1 A	NC: 1 A, NO: 2 A NC: 1 A, NO: 1 A
Electrical life	$\geq 1.5 \times 10^5$	$\geq 3 \times 10^5$	$\geq 2 \times 10^5$	$\geq 5 \times 10^4$
Operate time / release time	$\leq 8 / \leq 10$ ms	$\leq 7 / \leq 3$ ms	$\leq 7 / \leq 3$ ms	
Other				
Mechanical life	$\geq 50 \times 10^6$	$\geq 30 \times 10^6$	$\geq 30 \times 10^6$	$\geq 10 \times 10^6$ DC $\geq 1 \times 10^5$ AC
Temperature range	$-40 \dots +75$ °C	$-40 \dots +110$ °C	$-40 \dots +110$ °C	$-25 \dots +50$ °C
Insulation to DIN EN 60664-1, DIN EN 50178 Overvoltage category	AC 250 V			
Degree of pollution	3			
Rated impulse voltage	III			
est voltage (1 min) Contact-coil Contact-contact	≥ 4 kV AC eff. ≥ 2.5 kV AC eff.	≥ 4 kV AC eff. ≥ 1.5 kV AC eff.		
Surge voltage (1.2 - 50 μ s) Contact-coil	≥ 6 kV			
Clearance and creepage distance to DIN EN 60730, DIN EN 60335; Contact-coil	≥ 8 mm			
Weight	15 g	17 g	17 g	15 g

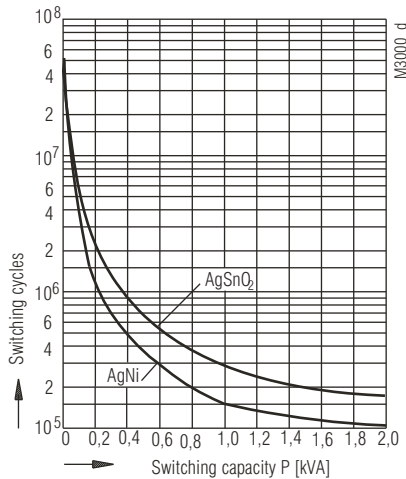
Characteristics



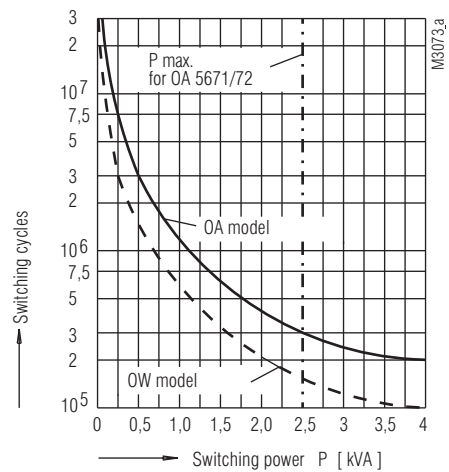
OA 5668: Operating voltage limit curve



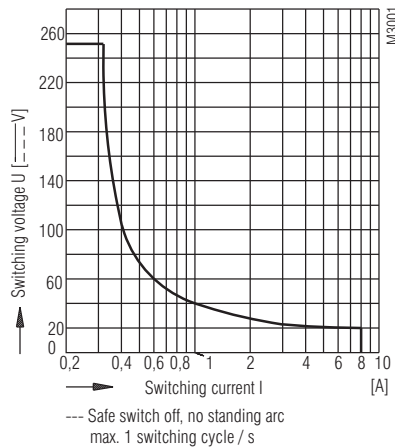
OA 5672, OA 5682: Operating voltage limit curve



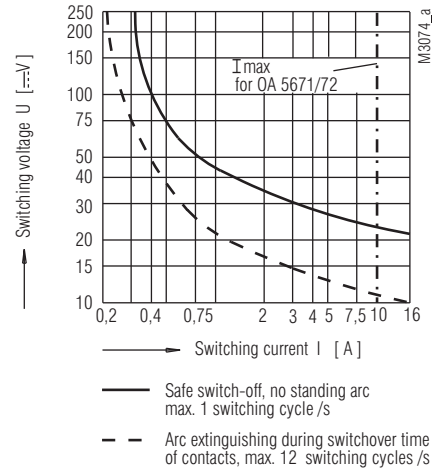
OA 5668: Contact service life (at $t_u = 20^\circ\text{C}$)



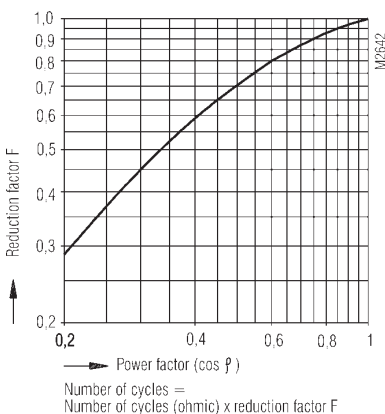
OA 5672, OA 5682: Contact service life (at $t_u = 20^\circ\text{C}$)



OA 5668: Limit curve for arc-free operation (at $t_u = 20^\circ\text{C}$)



OA 5672, OA 5682: Limit curve for arc-free operation (at $t_u = 20^\circ\text{C}$)



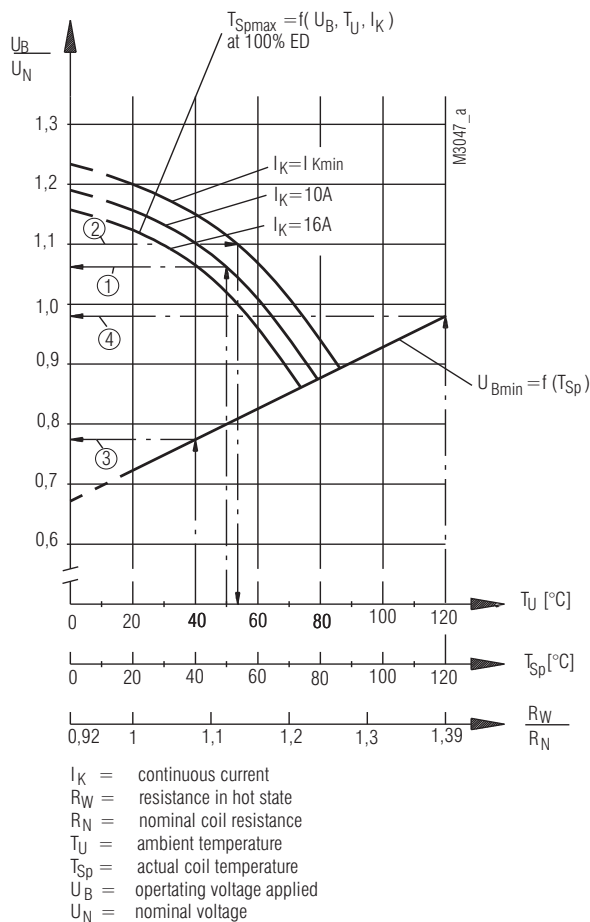
Characteristic is valid for:
 - inductive load
 - capacitive load

The actual number of cycles with reactive loads n_{blind} is calculated as follows:

$$n_{\text{blind}} = n_{\text{ohmic}} \times F$$

OA 5668, OA 5672, OA 5682:
 Reduction factor for inductive loads

Characteristics

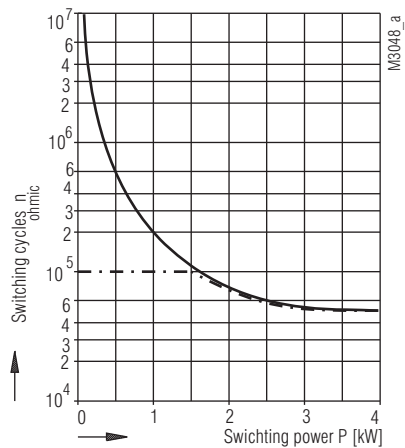


Example:

* for max. voltage or max. coil resistance (at $t_e > 10s \dots 100\% ED$)

- ① known: $T_U = 50^{\circ}C$, $I_K = 10A$
requested: U_{Bmax} ?
solution: $U_{Bmax} = 1,06 \times U_N$
- ② known: $I_K = I_{Kmin}$, $U_B = 1,1U_N$
requested: T_U zul ?
solution: T_U zul = $53^{\circ}C$
- * for operating behaviour of the relay
- ③ known: relay "cold", i.e. $T_{Sp} = T_U$ [with $T_U = 40^{\circ}C$]
requested: U_{Bmin} ?
solution: $U_{Bmin} = 0,77 \times U_N$
- ④ known: Relais "hot", i.e. $T_{Sp} > T_U$
[with $T_{Sp} > 120^{\circ}C$ but according to ① or ② T_U ca. $50^{\circ}C$]
requested: U_{Bmin} ?
solution: $U_{Bmin} = 0,98 \times U_N$

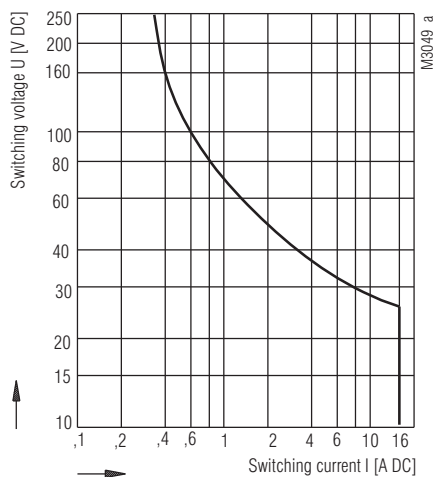
OB 5694: Operating voltage limit curve



— DC-drive
- - - AC-drive

Comment
Graph is valid for:
- clear resistive load ($\cos \Phi = 1$)
- AC 230V

OB 5694: Contact service life



Contact distance $\geq 0,5$ mm
Graphic only for resistive DC-loads

at max. 1 switching cycle / s
- safe switch-off
- no standing arc

At voltages < DC 25 V
max. 300 W can be switched.

OB 5694: Limit curve for arc-free operation (at $t_u = 20^{\circ}C$)

Standard Variants

Nominal voltage	Voltage range DC V	Resistance at 20°C Ω	Design version			
			AgNi		AgSnO ₂	AgNi + 5 μm Au
DC V			.12	.02	.12	.12
5	3.7 ... 9.5	50	941	571	961	921
6	4.5 ... 11.0	70	942	572	962	922
12	9.0 ... 22.0	270	943	573	963	923
20	15.0 ... 36.0	820	948	578	968	928
24	18.0 ... 44.0	1 100	944	574	964	924
48	35 ... 89.0	4 400	945	575	965	925
60	44.0 ... 110.0	6 850	946	576	966	926
110	80.0 ... 190.0	20 000	947	577	967	927

OA 5668

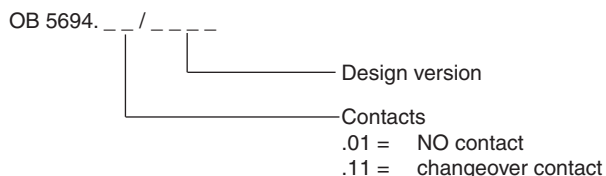
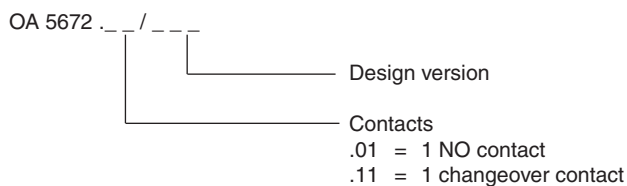
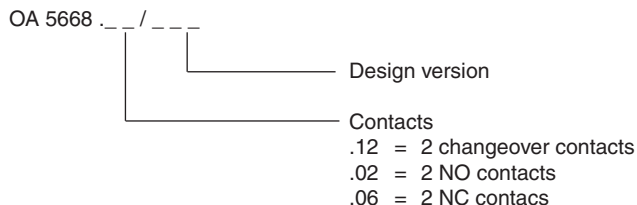
Nominal voltage ¹⁾	Voltage range V	Resistance at 20°C Ω	Design version		
			AgSnO ₂		AgNi + 5 μm Au
DC V			OA 5672 .11	OA 5682 .11	OA 5672 .11
6	4.2 ... 13.2	70	821	881	061
12	8.4 ... 26.4	280	822	882	063
15	10.5 ... 33.0	420	823	883	064
20	14.0 ... 44.0	750	824	884	065
24	16.8 ... 52.8	1 100	825	885	066
48	33.6 ... 105.6	4 500	829	889	070
60	42.0 ... 132.0	7 000	830	890	071
110	77.0 ... 242.0	23 000	831	891	072

OA 5672, OA 5682

Nominal voltage		Voltage range ²⁾ V	Resistance at Ω (±10%)	Design version			
				AgSnO ₂		AgNi	
DC V	AC V			.01/	.11/	.01/	.11/
6		4.8 ... 6.6	38	9321	9301	9331	9311
12		9.6 ... 13.2	150	9322	9302	9332	9312
15		12 ... 16.5	220	9323	9303	9333	9313
20		16 ... 22	410	9324	9304	9334	9314
24		19.2 ... 26.4	575	9325	9305	9335	9315
	12	9.6 ... 13.2	65	9422	8402	9432	9412
	24	19.2 ... 26.4	250	9423	9403	9433	9413
	42	33.6 ... 46.2	830	9424	9404	9434	9414
	230	184 ... 253	25 000	9425	9405	9435	9415

OB 5694

Ordering Example



Accessories

Function module

ET1415.913: DC 24 V, with free-wheel diode and green LED
Article number 0056828

ET1415.911: DC 24 V, with free-wheel diode and red LED
Article number 0055909

ET1415.912: AC/DC 24 V, with varistor and green LED
Article number 0055910

ET1415.924: DC 60 V, with free-wheel diode and red LED
Article number 0062552

Socket incl. fixing clip

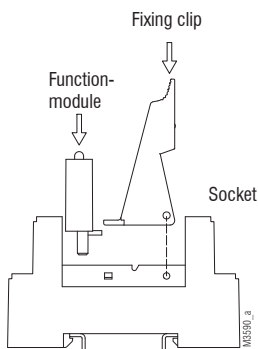
ET 1415.041: with screw terminals
Article number 0055571

ET 1415.044: with screw terminals and safe separation
Article number 0059274

ET 1415.047: with cage clamp terminals
Article number 0059270

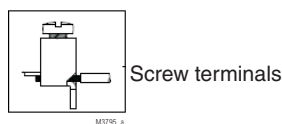
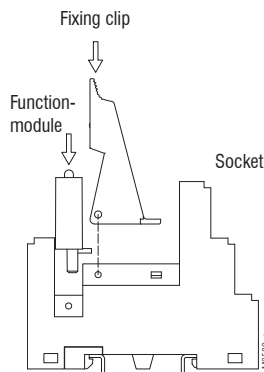
Accessories

Socket ET 1415.041

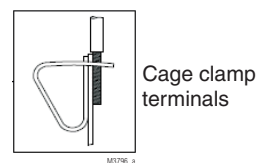
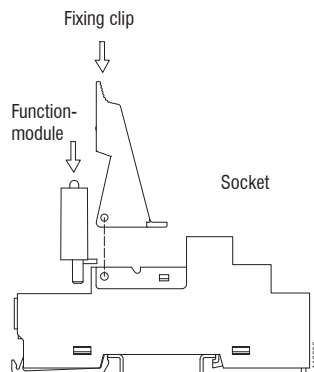


- Socket for DIN-rail
- incl. fixing clip

Socket ET 1415.044



Socket ET 1415.047



- Socket for DIN-rail
- incl. fixing clip
- incl. safe separation between coil and contacts according to DIN EN 60947-1, DIN EN 61140, DIN EN 60204

Degree of protection

Terminals: IP 20 DIN EN 60529

Terminal designation: DIN EN 50005

Wire connection

ET 1415.041, ET 1415.044: 0.14 ... 2.5 mm² solid (14 - 20 AWG)
0.14 ... 2.5 mm² stranded (14 - 20 AWG)
0.14 ... 1.5 mm² sleeved end (14 - 25 AWG)

ET 1415.047: 2 x (0.2 ... 1.5) mm² solid (16 - 25 AWG)
2 x (0.2 ... 1.5) mm² stranded (16 - 25 AWG)
2 x (0.2 ... 1.5) mm² sleeved end (16 - 25 AWG)

Wire fixing:

box terminals or
cage clamp terminals
DIN-rail

DIN EN 60715

Mounting:

Weight:

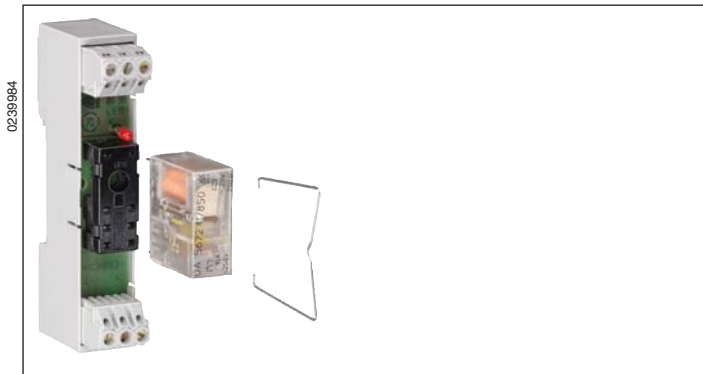
ET 1415.041: approx. 38.5 g
ET 1415.044: approx. 43.5 g
ET 1415.047: approx. 42 g

Dimensions

Width x height x depth:

ET 1415.041: 15.8 x 75 x 69 mm
ET 1415.044: 15.8 x 75 x 75 mm
ET 1415.047: 15.8 x 97 x 75.5 mm

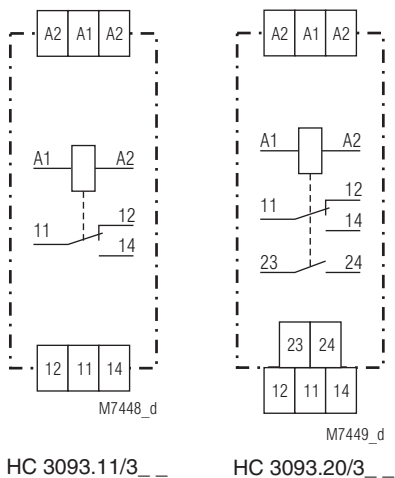
Plugin Socket HC 3093._ / 3_ _ Relay, Plugin OA 5668, OA 5669, OA 5672



0239964

- According to IEC/EN 60 947-5-1
- Protective separation according to IEC/EN 61 140, IEC/EN 60 947-1 between the in- and output
- Plug-in relay
- LED indicator
- 1 changeover contact or 1 changeover contact, 1 NO contact
- As option with MOV at the input to increase the peak voltage resistance
- As option with gold plated contacts to switch low loads
- As option with RC or diode contact protection
- Relay OA 5669 with forcibly guided contacts and 0.5 mm contact gap
- Width 17.5 mm

Circuit Diagrams



HC 3093.11/3_ _

HC 3093.20/3_ _

Connection Terminals

Terminal designation	Signal description
A1, A2	Operating voltage
11 to 24	Output contacts see circuit diagrams

Approvals and Markings



Application

- Link between control and power system
- For galvanic separation

Function

The relay consists of one relay OA 5672, OA 5668 or OA 5669 and socket HC 3093. The plug-in design makes it very easy to change the relay. OA 5672 is used only on socket HC 3093.11/3_ _ and OA 5668 or OA 5669 only on socket HC 3093.20/3_ _.

Indication

LED: on, when control voltage applied

Technical Data

Input

Nominal voltage U_N : AC/DC 24 V
AC 110 ... 130 V, 220 ... 240 V
Voltage range: 0.8 ... 1.1 U_N
0.9 ... 1.15 U_N with battery supply
Release voltage: 0.05 ... 0.33 U_N
Nominal consumption: DC 24 V / 0.5 W
AC 230 V / 0.8 VA
Nominal frequency: 50 / 60 Hz
Frequency range: $\pm 5 \%$

Output

Contacts

HC 3093.11 with OA 5672.11: 1 changeover contact
HC 3093.20 with OA 5668.12,
HC 3093.20 with OA 5669.12: 1 changeover contact, 1 NO contact
Response time: < 15 ms
Release time: < 15 ms
Thermal current I_{th}
HC 3093.11 with OA 5672.11: 8 A
HC 3093.20 with OA 5668.12,
HC 3093.20 with OA 5669.12: 2 x 4 A

Switching capacity

to AC 15
OA 5668
NO contact: 2 A / AC 230 V IEC/EN 60 947-5-1
NC contact: 1 A / AC 230 V IEC/EN 60 947-5-1
OA 5669
NO contact: 2 A / AC 230 V IEC/EN 60 947-5-1
NC contact: 1 A / AC 230 V IEC/EN 60 947-5-1
OA 5672
NO contact: 10 A / AC 230 V IEC/EN 60 947-5-1
NC contact: 5 A / AC 230 V IEC/EN 60 947-5-1

Technical Data

to DC 13		
OA 5668		
NO contact:	1 A / DC 24 V	IEC/EN 60 947-5-1
NC contact:	1 A / DC 24 V	IEC/EN 60 947-5-1
OA 5669		
NO contact:	2 A / DC 24 V	IEC/EN 60 947-5-1
NC contact:	1 A / DC 24 V	IEC/EN 60 947-5-1
OA 5672		
NO contact:	1 A / DC 24 V	IEC/EN 60 947-5-1
NC contact:	1 A / DC 24 V	IEC/EN 60 947-5-1

Especially for switching low loads as option (OA 5668, OA5672: 1 mVA ... 7 VA resp. 1 mW ... 7 W at range from 0,1 ... 60 V and 1 ... 300 mA and OA 5669: 10 mVA ... 12 VA bzw. 10 mW ... 12 W at range from 2 ... 60 V and 2 ... 300 mA) the relays are available with goldplated output contact - as an option. The contacts can switch heavy loads too. However the gold-plating is burnt away and after that the relay can not longer to be used for switching low loads.

Electrical life IEC/EN 60 947-5-1

to AC 15 at 3 A, AC 230 V	
HC 3093.11:	3 x 10 ⁵ switching cycles
HC 3093.20:	8 x 10 ⁵ switching cycles

Permissible switching frequency: 6000 switching cycles / h

Short circuit strength max. fuse rating

HC 3093.11:	6 A gG / gL	IEC/EN 60 947-5-1
HC 3093.20:	4 A gG / gL	IEC/EN 60 947-5-1

Mechanical life: > 30 x 10⁶ switching cycles

General Data

Operating mode: Continuous operation

Temperature range:

Operation:	- 40 ... + 70 °C
Storage:	- 40 ... + 70 °C
Altitude:	< 2,000 m

Clearance and creepage distances

Rated insulation voltage:	300 V
Overvoltage category:	III
Rated impulse voltage / pollution degree	
Input to Output:	6 kV / 2 IEC 60 664-1

EMC

Electrostatic discharge:	8 kV (air)	IEC/EN 61 000-4-2
HF-irradiation:		
80 MHz ... 2.7 GHz:	10 V/m	IEC/EN 61 000-4-3
Fast transients:	2 kV	IEC/EN 61 000-4-4
Surge voltages between wires for power supply:	1 kV	IEC/EN 61 000-4-5
between wire and ground:	2 kV	IEC/EN 61 000-4-5
HF-wire guided:	10 V	IEC/EN 61 000-4-6
Interference suppression:	Limit value class B	EN 55 011

Degree of protection

Terminals: IP 20 IEC/EN 60 529

Housing:

Thermoplast with V0-behaviour according to UL subject 94
Vibration resistance: Amplitude 0.35 mm frequency 10 ... 55 Hz IEC/EN 60 068-2-6 40 / 070 / 04 IEC/EN 60 068-1 EN 50 005

Climate resistance:

Terminal designation:

Wire connection

Cross section: 1 x 0.2 ... 4 mm² solid or 1 x 0.2 ... 2.5 mm² stranded ferruled (isolated) DIN 46 228-1/-2/-3/-4

Insulation of wires or sleeve length

8 mm

Wire fixing:

Fixing torque:

Mounting:

0.6 Nm DIN rail IEC/EN 60 715

Weight:

HC 3093.../300:	32 g
OA 5668:	15 g
OA 5669:	15 g
OA 5672:	17 g

Dimensions

Width x height x depth: 17.5 x 88 x 60 mm

Standard Types

OA 5972.11/850 DC 20 V

Article number:	0052460
• Output:	1 changeover contact
• Nominal voltage U _N :	DC 20 V

HC 3093.11/3_ _ AC/DC 24 V

Article number:	0040350
• Output:	1 changeover contact
• Nominal voltage U _N :	AC/DC 24 V
• Width:	17.5 mm

OA 5668.12/938 DC 20 V

Article number:	0036024
• Output:	1 changeover contact, 1 NO contact
• Nominal voltage U _N :	DC 20 V

OA 5669.12/3003L1 DC 24 V

Article number:	0051170
• Output:	1 changeover contact, 1 NO contact
• Nominal voltage U _N :	DC 24 V

HC 3093.20/300 AC/DC 24 V

Article number:	0040352
• Output:	1 changeover contact, 1 NO contact
• Nominal voltage U _N :	AC/DC 24 V
• Width:	17.5 mm

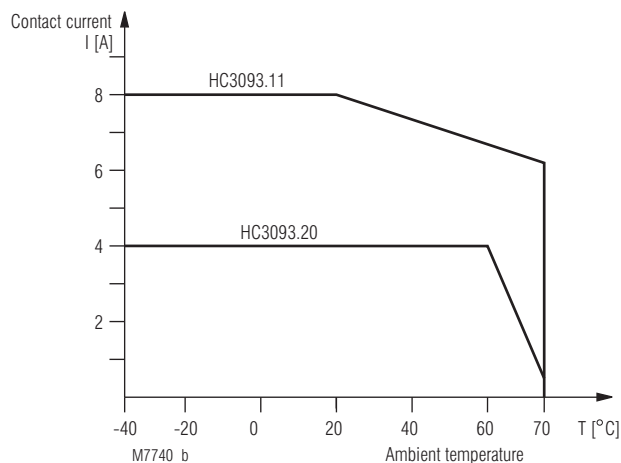
Variants

OA 5672.11/065:	Relay with 1 changeover contact for switching low loads
OA 5668.12/928:	Relay with 1 changeover contact, 1 NO contact for switching low loads
OA 5669.12/3003L1:	Relay with 1 changeover contact, 1 NO contact for switching low loads

Ordering example for variants

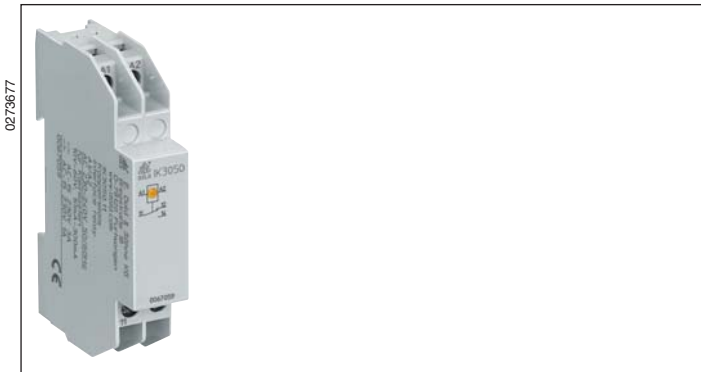
HC 3093... / 0	AC 220 ... 240 V	50 / 60 Hz
		Nominal frequency
		Nominal voltage
		0 without MOV
		1 with MOV
		3 pluggable
		4 soldered
		11 for relay module OA 5672.11 with 1 changeover contact
		20 for relay module OA 5668.12 with 1 changeover contact, 1 NO contact

Characteristics



Max. continuous current in relation to the ambient temperature

Interface Relay IK 3050



Your Advantages

- Suitable for switching low loads > 10 V / > 10 mA
- Compact design for installation systems and industrial distribution systems according to DIN 43880

Features

- According to DIN EN 61 810-1
- Protective separation according to IEC/EN 61 140, IEC/EN 60 947-1
- 1 changeover contact
- With input wiring protection against voltage surges
- LED indicator
- Width: 17.5 mm

Product Description

The interface relay IK 3051 is designed to switch low loads and is used to separate control and load circuits. A input is protected against voltage peaks. To indicate the control status, the unit has an LED indicator. The compact enclosure allows space saving installation in consumer units or industrial cabinets.

Approvals and Markings



Applications

- Link between the control and power levels
- For separating potentials

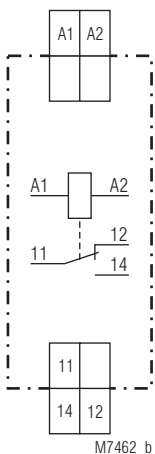
Indicator

yellow LED: on when the relay is supplied with current

Notes

The interface relay is for switching low loads > 10 V / > 10 mA. The contacts also permit the maximum switching current. However, since the gold plating is burnt off at this current level, the unit is no longer suitable for switching low loads again afterwards.

Circuit Diagram



Connection Terminals

Terminal designation	Signal description
A1, A2	Control input
11, 12, 14	Changeover contact

Technical Data

Input

Nominal voltage U_N:	AC/DC 24, 48 V AC 230 ... 240 V
Voltage range:	0.8 ... 1.1 U_N
Nominal consumption:	DC 24 V AC 230 V 0.3 W 2.5 VA
Nominal frequency:	50 / 60 Hz
Frequency range:	± 5 %

Output

Contacts:	1 changeover contact
Contact material:	AgNi + 3 μ m Au
Operate/release time:	< 10 ms / < 25 ms
Switching low loads:	≥ AC/DC 10 V ≥ 0.01 A ≥ 0.1 VA
	ATTENTION ! see „Notes“ switching of low loads
	5 A

Thermal current I_{th} : Switching capacity

to AC 15		
NC contact:	3 A / AC 230 V	IEC/EN 60 947-5-1
NO contact:	1 A / AC 230 V	IEC/EN 60 947-5-1
to DC 13		
NC contact:	1 A / DC 24 V	IEC/EN 60 947-5-1
NO contact:	1 A / DC 24 V	IEC/EN 60 947-5-1

Electrical life

to AC 15 at 3 A, AC 230 V:	1 x 10 ⁵ switch. cycl.	IEC/EN 60 947-5-1
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Permissible switching frequency:

6 000 switching cycles / h

Short circuit strength

max. fuse rating:	6 A gL	IEC/EN 60 947-5-1
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Mechanical life:

> 30 x 10⁶ switching cycles

General Data

Operating mode:	Continuous operation	
Temperature range:	- 20 ... + 60°C	
Clearance and creepage distances		
rated impulse voltage/ pollution degree		
Input / Output:	6 kV / 2	IEC 60 664-1
EMC		
Electrostatic discharge:	8 kV (air)	IEC/EN 61 000-4-2
HF irradiation:	10 V/m	IEC/EN 61 000-4-3
Fast transients:	2 kV	IEC/EN 61 000-4-4
Surge voltages between		
wires for power supply:	1 kV	IEC/EN 61 000-4-5
between wire and ground:	2 kV	IEC/EN 61 000-4-5
HF-wire guided:	10 V	IEC/EN 61 000-4-6
Interference suppression:	Limit value class B	EN 55011
Degree of protection		
Housing:	IP 40	IEC/EN 60 529
Terminals:	IP 20	IEC/EN 60 529
Housing:	Thermoplastic with V0 behaviour according to UL Subject 94	
Vibration resistance:	Amplitude 0.35 mm frequency 10 ... 55 Hz IEC/EN 60 068-2-6	
Climate resistance:	20 / 060 / 04	IEC/EN 60 068-1
Terminal designation:	EN 50 005	
Wire connection:	2 x 2.5 mm ² solid or 2 x 1.5 mm ² stranded ferruled DIN 46 228-1/-2/-3/-4	
Wire fixing:	Flat terminals with self-lifting clamping piece IEC/EN 60 999-1	
Fixing torque:	0.8 Nm	
Mounting:	DIN rail	IEC/EN 60 715
Weight:	72 g	

Dimensions

Width x height x depth:	17.5 x 89 x 59 mm
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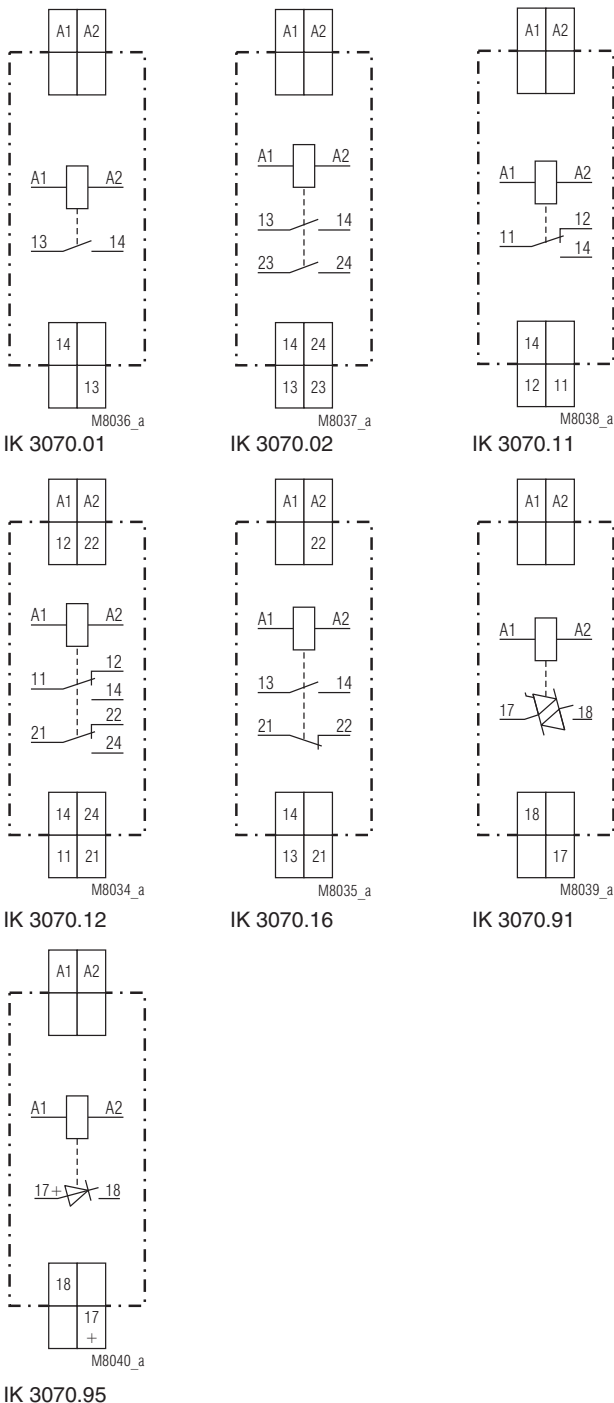
Standard Type

IK 3050.11 AC 230 ... 240 V	50/60 Hz
Article number:	0067059
• Output:	1 Wechsler
• Nominal voltage U_N :	AC 230 ... 240 V
• Width:	17.5 mm



- According to IEC/EN 60 947-5-1
- Relay, triac or transistor output
- Protective separation according to IEC/EN 61 140, IEC/EN 60 947-1 on devices with relay output (only at IK 3070.01 / _0_, IK 3070.02 / _0_, IK 3070.11 / _0_)
- LED as operating position display
- Optionally input wiring with recovery diode or MOV
- Optionally for small switching currents
- Optionally with forcibly guided contacts
- As option with semiconductor output
 - for high switching frequency
 - input protection with varistor
- Width 17.5 mm

Circuit Diagrams



Approvals and Markings



Applications

- Link between the control and the power level
- For separating potentials

Indicators

green LED: on, when supply connected

Connection Terminals

Terminal designation	Signal description
A1, A2	Operating voltage
11 ... 24	Output contacts see circuit diagrams

Technical Data

Input for Interface Relay with Relay Output

Nominal voltage U_N:	DC 24 V AC 230 V Other nominal voltages available on request
Voltage range:	DC 0.9 ... 1.2 U_N AC 0.8 ... 1.1 U_N
Nominal consumption:	DC approx. 0.5 W AC approx. 0.9 W

Input for Interface Relay with Semiconductor Output

Nominal voltage U_N:	DC 24 V	AC 230V
Voltage range:	DC 18 ... 30 V	AC 0.8 ... 1.1 U_N
Input current:	approx. 10 mA	approx. 10 mA
Power consumption:	approx. 0.25 W	approx. 2.5 VA
Nominal frequency:	-	50 / 60 Hz
Frequency range:	-	± 5 %
Protection:	Varistor	Varistor

Relay Output

Contacts	
IK 3070.01:	1 NO contact
IK 3070.02:	2 NO contacts
IK 3070.11:	1 changeover contact
IK 3070.12:	2 changeover contacts
IK 3070.16:	1 NO, 1 NC contact
Reaction time:	≤ 10 ms
Release time:	≤ 15 ms
Nominal switching voltage:	AC 250 V
Nominal output voltage:	min. AC 8 V; max. AC 400 V
Switching-on capacity:	min. 0.3 A max. 8 A or 2 x 5 A at the same time max. 8 A (see continuous current limit curve)
Thermal current I_{th}:	
IK 3070.12, IK 3070.16:	2 x 5 A
Switching capacity	
for IK 3070.01; IK 3070.11:	
to AC 15:	6 A / AC 230 V IEC/EN 60 947-5-1
to DC 13:	2 A / DC 24 V IEC/EN 60 947-5-1
for IK 3070.02	
to AC 15:	3 A / AC 230V IEC/EN 60 947-5-1
to DC 13:	2 A / DC 24V IEC/EN 60 947-5-1
for IK 3070.12; IK 3070.16:	
to AC 15	
NO contact:	3 A / AC 230 V IEC/EN 60 947-5-1
NC contact:	1 A / AC 230 V IEC/EN 60 947-5-1
to DC 13	
NO contact:	1 A / DC 24 V IEC/EN 60 947-5-1
NC contact:	1 A / DC 24 V IEC/EN 60 947-5-1
Electrical life	IEC/EN 60 947-5-1
to AC 15 at 3 A, AC 230 V:	≥ 2.5 x 10 ⁵ switching cycles
Permissible switching frequency:	max. 10 switching cycles / s
Short circuit strength	
max. fuse rating:	10 A gG / gL IEC/EN 60 947-5-1
IK 3070.12, IK 3070.16:	4 A gG / gL IEC/EN 60 947-5-1
Mechanical life:	≥ 10 x 10 ⁶ switching cycles

Transistor Output for DC-Load (pay attention to polarity)

IK 3070.95:	1 Transistor
Nominal output voltage:	DC 24 V
Voltage range:	DC 0 ... 30 V
Switching current:	max 5 A (see diagram)
Pick-up time:	< 2 ms
Drop-out time:	< 18 ms
Max. overcurrent:	25 A, max. 5 s (not cyclic)
Residual voltage:	< 0.3 V
Residual current:	< 1 mA
Min. load current:	1 mA
Protection:	Varistor (tp = 2 ms 8.6 J)

Technical Data

Triac Output for AC-Load

IK 3070.91:	1 Triac
Nominal output voltage:	AC 230 V
Voltage range:	AC 12 ... 275 V
Switching current:	max. 3 A (see diagram)
Pick-up time:	< 12 ms
Drop-out time:	< 20 ms
Max. overcurrent:	25 A, max. 5 s (not cyclic)
Residual voltage:	< 1.1 V
Residual current:	< 1 mA
Min. load current:	50 mA
Protection:	Varistor (tp = 2 ms 8.6 J)

General Data

Operating mode:	Continuous operation
Temperature range:	
Operation:	- 20 ... + 55 °C
Storage:	- 20 ... + 55 °C
Altitude:	< 2,000 m
Clearance and creepage distances	
Rated insulation voltage:	300 V
Overvoltage category:	III
Rated impulse voltage / pollution degree:	4 kV / 2 IEC 60 664-1
EMC	
Electrostatic discharge:	8 kV (air) IEC/EN 61 000-4-2
HF irradiation	
80 MHz ... 2,7 GHz	
Variants with relay output:	10 V / m IEC/EN 61 000-4-3
Variants with semiconductor outputs:	3 V / m IEC/EN 61 000-4-3
Fast transients:	2 kV IEC/EN 61 000-4-3
Surge voltages between wires for power supply:	1 kV IEC/EN 61 000-4-5
between wire and ground:	2 kV IEC/EN 61 000-4-5
HF-wire guided:	10 V IEC/EN 61 000-4-6
Interference suppression:	Limit value class B EN 55 011
Degree of protection	
Housing:	IP 40 IEC/EN 60 529
Terminals:	IP 20 IEC/EN 60 529
Housing:	Thermoplastic with V0 behaviour according to UL subject 94
Vibration resistance:	Amplitude 0.35 mm IEC/EN 60 068-2-6 frequency 10 ... 55 Hz
Climate resistance:	20 / 055 / 04 IEC/EN 60 068-1
Terminal designation:	EN 50 005
Wire connection:	2 x 2.5 mm ² solid or 2 x 1.5 mm ² stranded ferruled DIN 46 228-1/-2/-3/-4
Stripping length:	10 mm
Wire fixing:	vis de serrage cruciformes imperdables M3,5; bornes en caisson avec protection du conducteur. Fonction selon IEC 60 999-1
Fixing torque:	0.8 Nm
Mounting:	DIN rail IEC/EN 60 715
Weight:	68 g

Dimensions

Width x height x depth:	17.5 x 90 x 58 mm
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Standard Type

IK 3070.02/002 DC 24 V

Article number: 0045093

- Output: 2 NO contacts
- Nominal voltage U_N : DC 24 V
- With operating position display (LED)
- Width: 17.5 mm

Variants*

IK 3070. / _ _ _

Input circuit

- 0 Standard
- 1 with MOV
- 2 with LED as operating position display
- 8 with recovery diode for DC version
- A with MOV and recovery diode DC version
- B with MOV and LED as operating position display
- C with LED as operating position display and recovery diode DC version
- D with MOV, LED as operating position display and recovery diode DC version

Additional functions

- 0 Standard
- 1 forcibly guided contacts at IK 3070.02, IK 3070.12, IK 3070.16
- 2 with test switch at IK 3070.01, IK 3070.11

Contacts

- 01 1 NO contact
- 02 2 NO contacts
- 11 1 changeover contact
- 12 2 changeover contacts (only variants with MOV possible)
- 16 1 NO, 1 NC contact (only variants with MOV possible)
- 91 1 NO contact semiconductor triac only with /001 or /00B
- 92 1 NO contact semiconductor transistor only with /001 or /00B

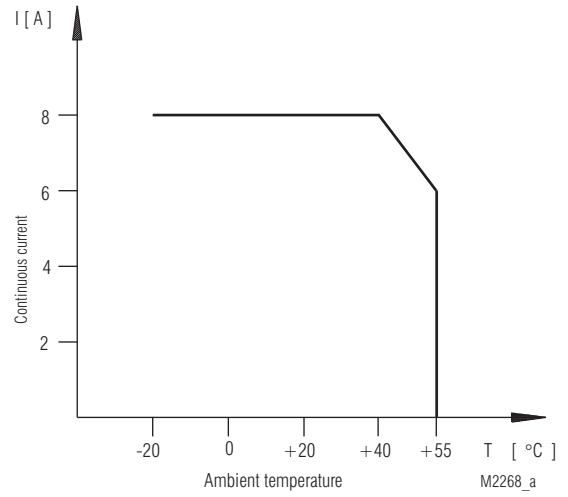
* on request

Ordering example for variants

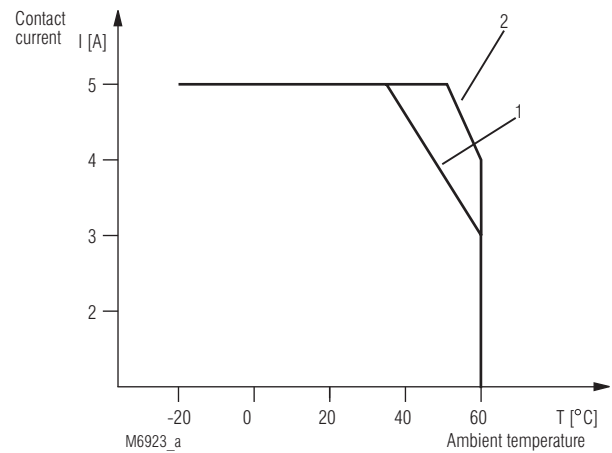
IK 3070 .12 / _ _ _ DC 24 V

- Nominal voltage
- Variant, if required
- Contact
- Type

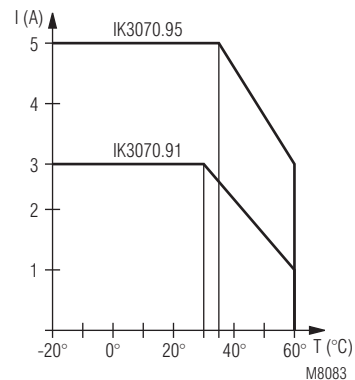
Characteristics



Continuous current limit curve for IK 3070.01, IK 3070.02, IK 3070.11



Continuous current limit curve for
1. IK 3070.12
2. IK 3070.16



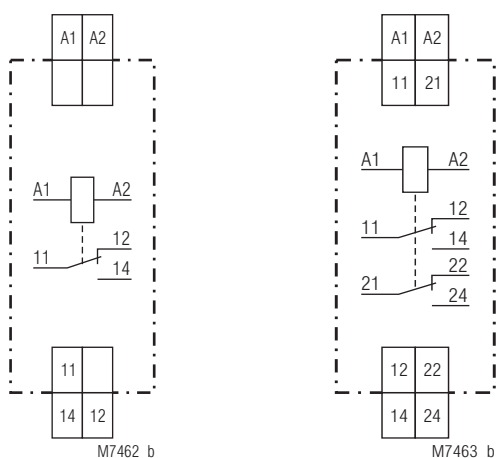
Continuous current limit curve for IK 3070.95, IK 3070.91

Interface Relay Input Interface Relay - Output Interface Relay IK 3076, SK 3076



- According to IEC/EN 60 255, IEC/EN 61 810-1
- Protective separation according to IEC/EN 61 140, IEC/EN 60 947-1 in configuration with 1 changeover contact
- With input wiring protection against voltage surges
- High permanent current I_{th}
- LED indicator
- As option with 1 or 2 changeover contacts
- As option for switching low loads
- Devices available in 2 enclosure versions:
 - IK 3076: depth 59 mm with terminals at the bottom for installation systems and industrial distribution systems according to DIN 43 880
 - SK 3076: depth 98 mm with terminals at the top for cabinets with mounting plate and cable duct
- Width 17.5 mm

Circuit Diagrams



IK 3076.11
SK 3076.11

IK 3076.12
SK 3076.12

Connection Terminals

Terminal designation	Signal description
A1	L / +
A2	N / -
11, 12, 14 21, 22, 24	Changeover contacts

Approvals and Markings



Applications

- Link between the control and power levels
- For separating potentials
- For industrial and railway applications

Indicator

LED: on when the relay is supplied with current

Technical Data

Input

Nominal voltage U_N : AC/DC 8, 12, 24, 48 V
AC 110 ... 130, 230 ... 240 V

Voltage range: 0.8 ... 1.1 U_N
0.9 ... 1.25 U_N in battery operating mode

Nominal consumption: DC 24 V 0.5 W AC 230 V 0.8 VA

Nominal frequency: 50 / 60 Hz

Frequency range: $\pm 5\%$

Output

Contacts
IK 3076.11, SK 3076.11: 1 changeover contact
IK 3076.12, SK 3076.12: 2 changeover contacts

Operate/release time: < 10 ms / < 20 ms

Thermal current I_{th}
IK 3076.11, SK 3076.11: 10 A
IK 3076.12, SK 3076.12: 5 A

Switching capacity
to AC 15:
NC contact: 1 A / AC 230 V IEC/EN 60 947-5-1
NO contact: 3 A / AC 230 V IEC/EN 60 947-5-1
to DC 13:
NC contact: 1 A / DC 24 V IEC/EN 60 947-5-1
NO contact: 1 A / DC 24 V IEC/EN 60 947-5-1

Electrical life
AC 15 at 3 A, AC 230 V IEC/EN 60 947-5-1
IK 3076.11, SK 3076.11: 1 x 10⁵ switching cycles
IK 3076.12, SK 3076.12: 1 x 10⁵ switching cycles

Permissible switching frequency: 6 000 switching cycles/h

Short circuit strength
max. fuse rating
IK 3076.11, SK 3076.11: 10 A gL IEC/EN 60 947-5-1
IK 3076.12, SK 3076.12: 4 A gL IEC/EN 60 947-5-1

Mechanical life: > 30 x 10⁶ switching cycles

Technical Data

General Data

Operating mode: Continuous operation

Temperature range

Operation: - 20 ... + 60 °C

Storage: - 40 ... + 80 °C

Altitude: < 2.000 m

Clearance and creepage distances

rated impulse voltage/

pollution degree:

IK 3076.11, SK 3076.11:

Input/output: 6 kV / 2 IEC 60 664-1

IK 3076.12, SK 3076.12:

Input/output: 4 kV / 2 IEC 60 664-1

Contacts: 2.5 kV / 2 IEC 60 664-1

only for 1-phase systems
(same phase)

EMC

Electrostatic discharge: 8 kV (air) IEC/EN 61 000-4-2

HF irradiation

80 MHz ... 1 GHz: 10 V/m IEC/EN 61 000-4-3

1 GHz ... 2.5 GHz: 3 V/m IEC/EN 61 000-4-3

2.5 GHz ... 2.7 GHz: 1 V/m IEC/EN 61 000-4-3

Fast transients: 2 kV IEC/EN 61 000-4-4

Surge voltages

between

wires for power supply: 1 kV IEC/EN 61 000-4-5

between wire and ground: 2 kV IEC/EN 61 000-4-5

HF-wire guided: 10 V IEC/EN 61 000-5-6

Interference suppression: Limit value class B EN 55011

Degree of protection

Housing: IP 40 IEC/EN 60 529

Terminals: IP 20 IEC/EN 60 529

Housing: Thermoplastic with V0 behaviour
according to UL Subject 94

Vibration resistance: Amplitude 0.35 mm

frequency 10 ... 55 Hz IEC/EN 60 068-2-6

20 / 060 / 04 IEC/EN 60 068-1

Terminal designation: EN 50 005

Wire connection

Cross section:

2 x 2.5 mm² solid or
2 x 1.5 mm² stranded ferruled
DIN 46 228-1/-2/-3/-4

Stripping length:

10 mm

Wire fixing:

Flat terminals with self-lifting
clamping piece IEC/EN 60 999-1
0.8 Nm

Fixing torque:

Mounting:

DIN rail mounting (IEC/EN 60715) or
screw mounting M4, 90 mm hole pattern,
with additional clip available as accessory

Weight

IK 3076: 72 g

SK 3076: 91 g

Dimensions

Width x height x depth

IK 3076: 17.5 x 89 x 59 mm

SK 3076: 17.5 x 90 x 98 mm

Standard Types

IK 3076.12 AC/DC 24 V 50/60 Hz

Article number: 0033445

SK 3076.12 AC/DC 24 V 50/60 Hz

Article-number: 0054988

• Output: 2 changeover contacts

• Nominal voltage U_N : AC/DC 24 V

• Width: 17.5 mm

Accessories

ET 4086-0-2: Additional clip for screw mounting
Article number: 0046578

Variants

IK 3076._./004,

SK 3076._./004:

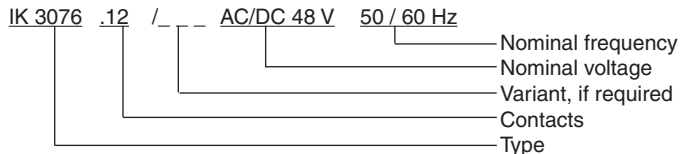
for low loads of 0.1 ... 60 V,
1 mA ... 300 mA

IK 3076._./007,

SK 3076._./007:

safe release voltage
approx. 27 % of U_N

Ordering example for variants



Classification to DIN EN 50155 for IK 3076

Vibration and

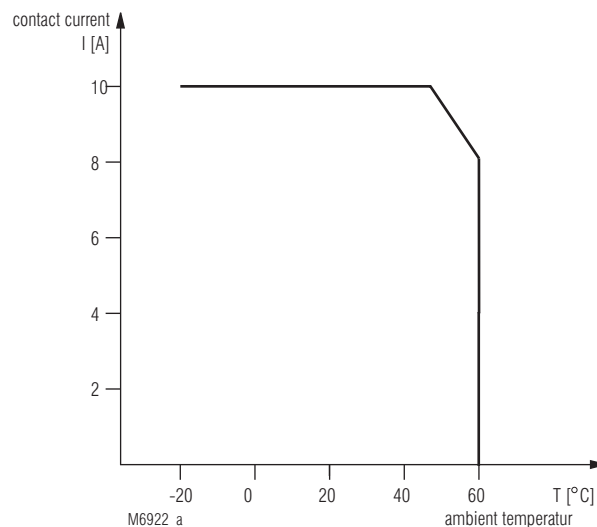
shock resistance: Category 1, Class B IEC/EN 61 373

Ambient temperature: T1 compliant

T2, T3, TX with operational limitations

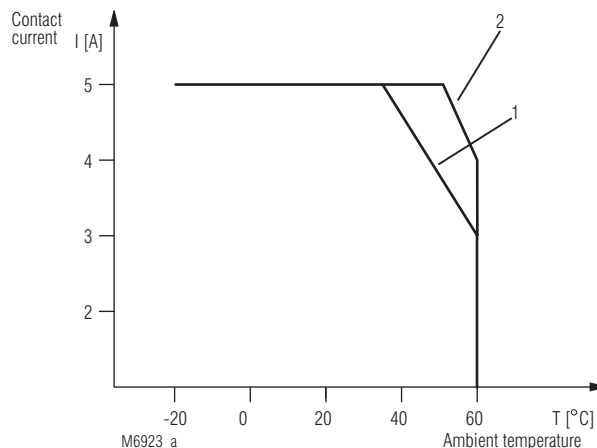
Protective coating of the PCB: No

Characteristics



Permanent current limit curve:

Permissible contact current of IK 3076.11, SK 3076.11 in relation to the ambient temperature

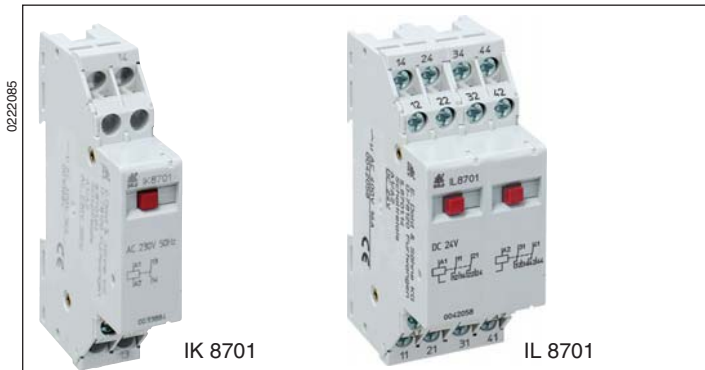


Permanent current limit curve:

Permissible contact current of IK 3076.12, SK 3076.12 in relation to the ambient temperature

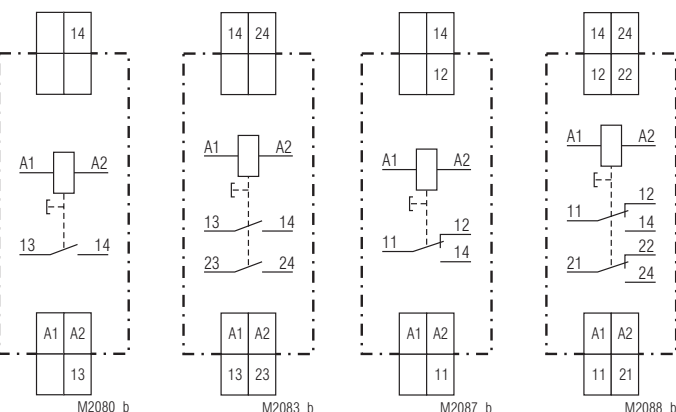
- 1 Nominal voltage, mounted without distance, current supplied to both contacts
- 2 Nominal voltage, mounted without distance, current only supplied to one contact

Switching Relay Input-Output Interface Relay IK 8701, IL 8701, IN 8701

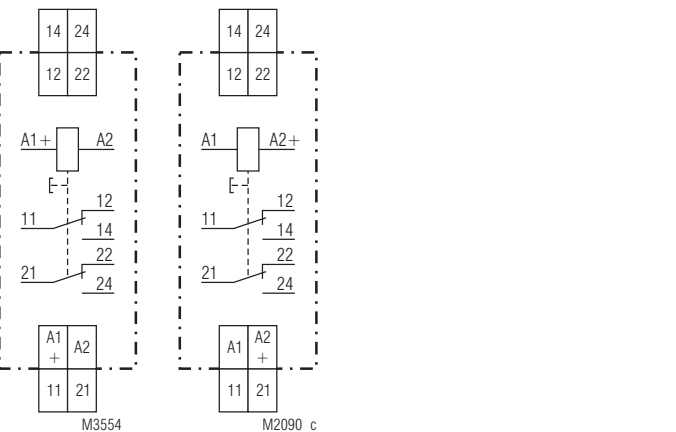


- According to IEC/EN 61 810-1
- Optionally contacts with up to a maximum 4 changeover contacts
- High thermal current I_{th}
- Pushbutton for manual actuation of the contact
- Operating position display
- Optionally without manual actuation and an operating position display
- Optionally for 2-wire initiator activation
- Optionally for switching low loads
- Optionally for switching lamps with parallel compensation (e.g. HQ lamps)
- Optionally for switching large inductive direct current loads
- Optionally with a recovery diode (only DC devices)
- Optionally with reliable release voltage of AC 120 V
- IK 8701: width 17.5 mm
IL 8701: width 35 mm
IN 8701: width 52.5 mm

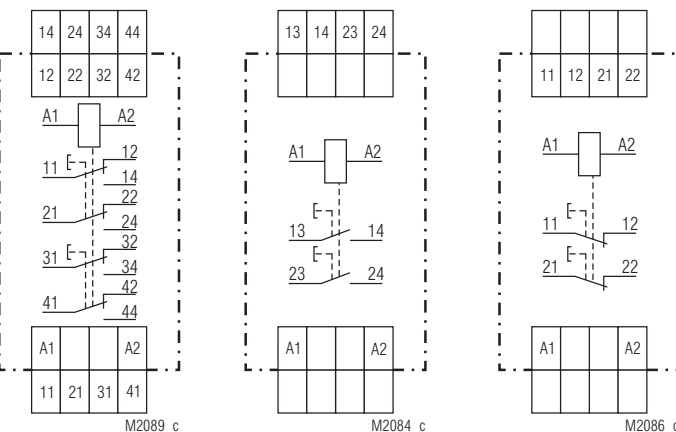
Schaltbilder



IK 8701.01 IK 8701.02 IK 8701.11 IK 8701.12



IK 8701.12/024 IK 8701.12/008
IK 8701.12/005



IL 8701.14 IL 8701.02/006 IL 8701.06/006

Approvals and Markings



Applications

- For switching lamp loads
- Input interface relay, e.g. for activation of PLC
- Output interface relay, e.g. for PLC-controlled loads

Function

The contacts are actuated with an armature via a plunger. After the exciting voltage has dropped, a spring returns the armature (which is connected to the plunger) to its home position. The contacts can be actuated manually via a pushbutton on the front as well. The pushbutton acts at the same time as an operating position display. The contacts are closed when the pushbutton is pressed. The red pushbutton is flush with the front edge when there is no current.

Note: IL devices have 2, IN devices have 3 pushbuttons on the front. These are **not** linked together. The pushbuttons only activate the contact shown on the front under the button.

Indicators

Pushbutton: pressed, when the relay is supplied with current

Technical Data

Input

Nominal voltage: AC 24, 42, 230 V
DC 12, 24 V
other voltages available on request

Voltage range: 0.9 ... 1.1 U_N

Nominal consumption

IK 8701:	AC 1.8 W	DC 1.2 W
IL 8701:	AC 3.8 W	DC 2.6 W
IN 8701:	AC 5.8 W	DC 4.0 W

Nominal frequency: 50 or 60 Hz

Output

Contacts

IK 8701.01:	1 NO contact
IK 8701.02:	2 NO contacts
IK 8701.05:	1 NC contact
IK 8701.06:	2 NC contacts
IK 8701.11:	1 changeover contact
IK 8701.12:	2 changeover contacts
IL 8701.13:	3 changeover contacts
IL 8701.14:	4 changeover contacts

Operate time: < 30 ms

Release time: < 30 ms

Nominal output voltage: AC 230 / 400 V IEC/EN 60 947-5-1

Thermal current I_{th}: 16 A

Direct current load: See arc limit curve

Switching capacity

fluorescent lamp load: 20 lamps with 58 W / contact each

fluorescent lamp load
with electronic series reactor:

58 lamps with 18 W / contact each
28 lamps with 40 W / contact each
20 lamps with 58 W / contact each

duo switching

(series compensated):

2 x 20 lamps with 58 W / contact each
5 x 10⁴ switching cycles

bulb load:

1200 W / contact
5 x 10⁴ switching cycles

Electrical life:

with ohmic load AC 230 V:

500 switching cycles / h
6 A 150 x 10⁴ switching cycles
10 A 75 x 10⁴ switching cycles
16 A 12 x 10⁴ switching cycles
10 A 10 x 10⁴ switching cycles

Inductive load cos φ 0,6:

DC-load:

Permissible switching

frequency: 1 000 switching cycles / h

Short circuit strength

max. fuse rating: 16 A gL IEC/EN 60 947-5-1

Mechanical life: > 10 x 10⁶ switching cycles

General Data

Operating mode: Continuous operation

Temperature range: - 20 ... + 45°C

Clearance and creepage

distances
rated impulse voltage /
pollution degree: 4 kV / 2 IEC 60 664-1

Degree of protection

Housing: IP 30 IEC/EN 60 529

Terminals: IP 20 IEC/EN 60 529

Housing:

Thermoplastic with V0 behaviour
according to UL subject 94

Vibration resistance:

Amplitude 0.35 mm
frequency 10 ... 55 Hz IEC/EN 60 068-2-6

Climate resistance:

Humid heat IEC/EN 60 068-2-30

Terminal designation:

EN 50 005

Wire connection:

2 x 2.5 mm² solid or
2 x 1.5 mm² stranded ferruled
DIN 46 228-1/-2/-3/-4 or
2 x 1 mm² stranded ferruled
DIN 46 228-1/-2/-3/-4

Wire fixing:

Flat terminals with self-lifting
clamping piece IEC/EN 60 999-1

Mounting:

DIN rail IEC/EN 60 715

Weight:

IK 8701: 100 g

IL 8701: 200 g

IN 8701: 300 g

Technical Data

Dimensions

Width x height x depth:

IK 8701:	17,5 x 89 x 58 mm
IL 8701:	35 x 89 x 58 mm
IN 8701:	52.5 x 89 x 58 mm

Standard Type

IK 8701.12 AC 230 V 50 Hz

Article number: 0033896 stock item

- Pushbutton for manual actuation of the contacts and operating position display

- Output: 2 changeover contacts

- Nominal voltage U_N: AC 230 V

- Width: 17.5 mm

Variants

I_ 8701._ _/001: For switching low loads up to maximum of 6 VA/W at 0.3 ... 60 V / 1 ... 300 mA
The contacts also permit the maximum switching current.

However, since the gold plating is burnt off at this current level, the unit is no longer suitable for switching low loads again afterwards.

I_ 8701._ _/002: For U_N > 100 V DC or AC

Can be activated with 2-wire initiators, permissible residual current ≤ 3 mA. Max. 6 glow lamps (0.5 mA each) are possible parallel to the mains button.

I_ 8701._ _/700: Without manual actuation and an operating position display

Only for devices with NC or NO contact:

I_ 8701._ _/003: 3 mm contact opening

I_ 8701._ _/006: 6 mm contact opening

For switching large inductive direct current voltage loads (DC 220 V, L/R = 30 ms)

IK 8701._ _/007: For switching lamps with parallel compensation, e.g. HQ lamps (only 1 or 2 NO contacts).
Maximum parallel compensation 100 µF

Only for DC devices:

I_ 8701._ _/008: With protection diode to protect against wrong polarity and recovery diodes to reduce switching spikes, plus on **A2+**

I_ 8701._ _/013: With recovery diodes to reduce switching spikes, plus on **A2+**; contact gap 6 mm

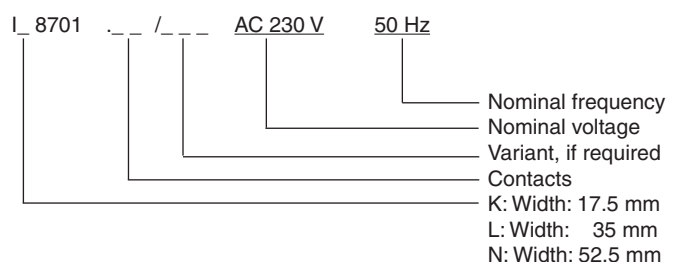
I_ 8701._ _/024: With protection diode to protect against wrong polarity and recovery diodes to reduce switching spikes, plus on **A1+**

I_ 8701._ _/027: With recovery diodes to reduce switching spikes, plus on **A1+**

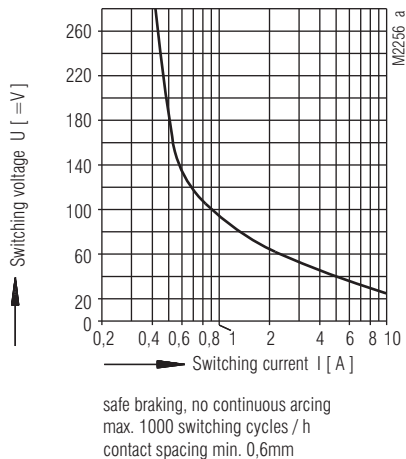
I_ 8701._ _/032: With recovery diodes to reduce switching spikes, plus on **A1+**; 6 mm contact opening

Other variants or combinations on request

Ordering example for variants



Characteristics



Arc limit curve for direct current voltage-resistive load

Specification for Tender for IK 8701

Switching relay according to IEC/EN 61 810-1 to be built in consumer units, 1 NO contact, thermal current 16 A, pushbutton for manual actuation of the contacts and operating position display.

Width 17.5 mm.

Type IK 8701.01

Manufactured by: E. DOLD & SÖHNE KG

Switching relay according to IEC/EN 61 810-1 to be built in consumer units, 2 NO contacts, thermal current 16 A, pushbutton for manual actuation of the contacts and operating position display.

Width 17.5 mm

Type IK 8701.02

Manufactured by: E. DOLD & SÖHNE KG

Switching relay according to IEC/EN 61 810-1 to be built in consumer units, 1 changeover contact, thermal current 16 A, pushbutton for manual actuation of the contacts and operating position display.

Width 17.5 mm

Type IK 8701.11

Manufactured by: E. DOLD & SÖHNE KG

Switching relay according to IEC/EN 61 810-1 to be built in consumer units, 2 changeover contacts, thermal current 16 A, pushbutton for manual actuation of the contacts and operating position display.

Width 17.5 mm

Type IK 8701.12

Manufactured by: E. DOLD & SÖHNE KG

Switching relay according to IEC/EN 61 810-1 to be built in consumer units, 3 changeover contacts, thermal current 16 A, pushbutton for manual actuation of the contacts and operating position display.

Width 35 mm

Type IL 8701.13

Manufactured by: E. DOLD & SÖHNE KG

Switching relay according to IEC/EN 61 810-1 to be built in consumer units, 4 changeover contacts, thermal current 16 A, pushbutton for manual actuation of the contacts and operating position display.

Width 35 mm

Type IL 8701.14

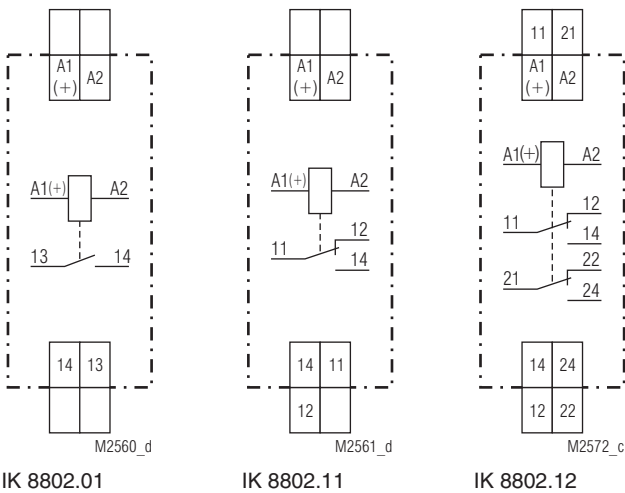
Manufactured by: E. DOLD & SÖHNE KG

Interface Relay Input-Output Interface Relay IK 8802



- According to IEC/EN 60 255, IEC/EN 61 810-1
- With 1 or 2 changeover contacts as options
- High permanent current I_{th}
- For switching low loads as an option
- LED display (for AC/DC 24 V only)
- Width 17.5 mm

Circuit Diagrams



Approvals and Markings



Function

- link between the control and power levels
- for potential separation

Indicators

LED: on, when supply connected

Technical Data

Input

Nominal voltage U_N : AC/DC 12 V max. 48 % RW,
AC/DC 24 V max. 48 % RW,
AC/DC 230 V

Voltage range: 0.8 ... 1.1 U_N

Nominal consumption: AC 12, 24 V 0.7 VA
DC 12, 24 V 0.6 W

Nominal frequency: 50 / 60 Hz

Frequency range: $\pm 5 \%$

Output

Contacts

IK 8802.01: 1 NO contact
IK 8802.11: 1 changeover contact
IK 8802.12: 2 changeover contacts

Operate / release time:

< 10 ms / < 10 ms

Thermal current I_{th}

IK 8802.11: 10 A
IK 8802.12: 2 x 5 A

Switching capacity

to AC 15

NO contact: 3 A / AC 230 V IEC/EN 60 947-5-1
NC contact: 1 A / AC 230 V IEC/EN 60 947-5-1

Electrical life

to AC 15 at 3 A, AC 230 V

1 changeover contact: 2.5 x 10⁵ switching cycles
2 changeover contacts: 0.5 x 10⁵ switching cycles

Permissible switching frequency:

3 000 switching cycles/h

Short circuit strength

max. fuse rating

IK 8802.11: 10 A gL
IK 8802.12: 6 A gL

Mechanical life:

> 50 x 10⁶ switching cycles

Technical Data

General Data

Operating mode:	Continuous operation	
Temperature range:	- 20 ... + 55°C	
Clearance and creepage distances		
rated impulse voltage / pollution degree:		
input/output:	4 kV / 3	IEC 60 664-1
Contacts:	2.5 kV / 2	IEC 60 664-1
	only for 1-phase systems (same phase)	

EMC

Electrostatic discharge:	8 kV (air)	IEC/EN 61 000-4-2
HF-irradiation	10 V/m	IEC/EN 61 000-4-3
Fast transients:	4 kV	IEC/EN 61 000-4-4
Surge voltages between wires for power supply:	1 kV	IEC/EN 61 000-4-5
between wire and ground:	4 kV	IEC/EN 61 000-4-5
HF-wire guided:	10 V	IEC/EN 61 000-4-6
Interference suppression:	Limit value class B	EN 55 011

Degree of protection

Housing:	IP 40	IEC/EN 60 529
Terminals:	IP 20	IEC/EN 60 529

Housing:

Thermoplastic with V0 behaviour according to UL subject 94

Vibration resistance:

Amplitude 0.35 mm
frequency 10 ... 55 Hz IEC/EN 60 068-2-6

Climate resistance:

Humid heat IEC/EN 60 068-2-30

Terminal designation:

EN 50 005

Wire connection:

2 x 2.5 mm² solid or
2 x 1.5 mm² stranded ferruled
DIN 46 228-1/-2/-3/-4

Wire fixing:

Flat terminals with self-lifting clamping piece IEC/EN 60 999-1

Mounting:

DIN rail IEC/EN 60 715

Weight:

60 g

Dimensions

Width x height x depth: 17.5 x 89 x 58 mm

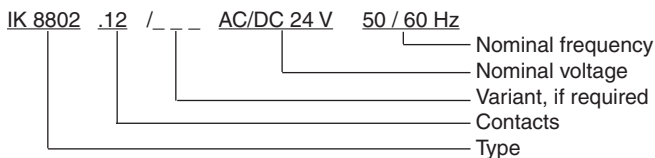
Standard Type

IK 8802.12 AC/DC 24 V 50/60 Hz		
Article number:	0012142	stock item
• Output:	2 changeover contacts	
• Nominal voltage U_N :	AC/DC 24 V	
• Width:	17.5 mm	

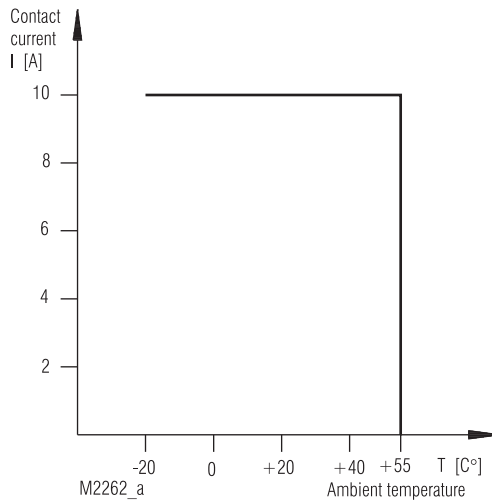
Variants

IK 8802.__/005:	for low loads of 0.1 ... 60 V, 1 mA ... 300 mA
IK 8802.__/023:	AC/DC 230 V, without an LED

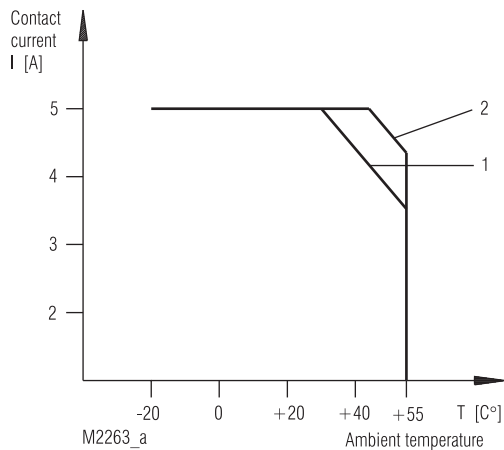
Ordering example for variants



Characteristics

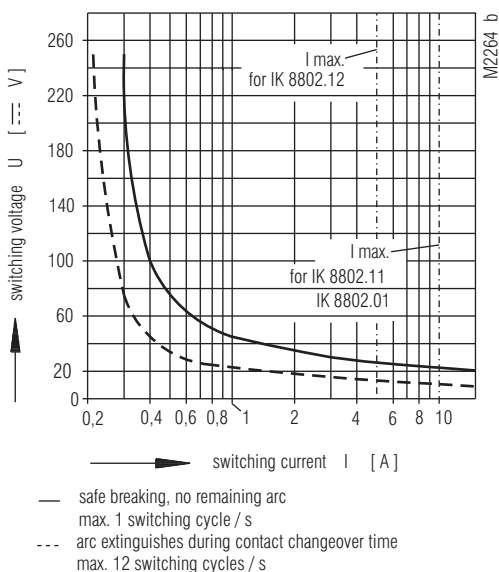


Permissible contact current of IK 8802.01 and IK 8802.11 depends on the ambient temperature.



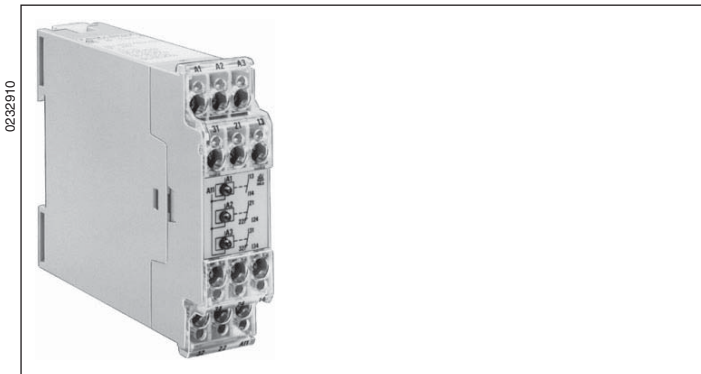
1. at nominal voltage, mounted without distance, current on both contacts
2. at nominal voltage, mounted without distance, current on only one contact

Permissible contact current of IK 8802.12 depends on the ambient temperature.



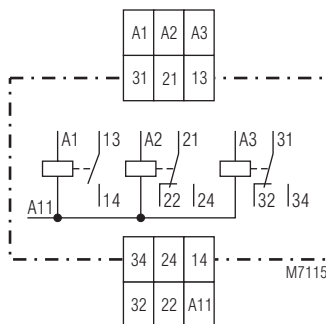
Arc limit curve (load limit curve)

Interface Relay MK 3046

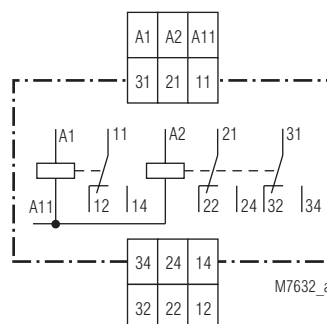


- According to IEC/EN 60 255-1, IEC/EN 61 810-1
- Compact version with 3 separate relay systems
- Available also for switching of low loads
- 2 x 1 changeover contact, 1 x 1 NO contact
or 1 x 1 changeover contact, 1 x 2 changeover contacts
- LED indication
- Width 22.5 mm

Circuit Diagrams



MK 3046.29



MK 3046.13

Approvals and Markings



Application

For separating potentials

Indication

3 LEDs: on, when associated output relay is energized

Technical Data

Input

Nominal voltage U_N : DC 24 V
Voltage range: 0.8 ... 1.1 U_N
Nominal consumption: 0.5 W

Output

Contacts

MK 3046.29: 2 x 1 changeover contacts,
1 x 1 NO contact
 MK 3046.13: 1 x 1 changeover contact,
1 x 2 changeover contacts

Turn-on time: 5 ms
Turn-off time: 7 ms
Thermal current I_{th} : 5 A

Switching capacity to AC 15

NO contact: 3 A / AC 230 V IEC/EN 60 947-5-1
 NC contact: 1 A / AC 230 V IEC/EN 60 947-5-1
 IEC/EN 60 947-5-1

Electrical life
 to AC 15 at 3 A, AC 230 V: 0.5 x 10⁵ switching cycles

**Permissible switching
frequency:** 7 200 switching cycles / h

**Short circuit strength
max. fuse rating:** 4 A gL IEC/EN 60 947-5-1

Mechanical life: 30 x 10⁶ switching cycles

Technical Data

General Data

Operating mode:	Continuous operation	
Temperature range:	- 20 ... + 60 °C	
Clearance and creepage distances		
rated impulse voltage / pollution degree:	4 kV / 2	IEC 60 664-1
EMC		
Electrostatic discharge:	8 kV (air)	IEC/EN 61 000-4-2
HF-irradiation:	10 V/m	IEC/EN 61 000-4-3
Fast transients:	2 kV	IEC/EN 61 000-4-4
Surge voltages between wires for power supply:	1 kV	IEC/EN 61 000-4-5
between wire and ground:	2 kV	IEC/EN 61 000-4-5
Interference suppression:	Limit value class B	EN 55 011
Degree of protection		
Housing:	IP 40	IEC/EN 60 529
Terminals:	IP 20	IEC/EN 60 529
Housing:	Thermoplastic with V0 behaviour according to UL subject 94	
Vibration resistance:	Amplitude 0.35 mm frequency 10 ... 55 Hz IEC/EN 60 068-2-6	
Climate resistance:	20 / 060 / 04	IEC/EN 60 068-1
Terminal designation:	EN 50 005	
Wire connection:	2 x 1.5 mm ² solid or 2 x 1.0 mm ² stranded wire with sleeve DIN 46 228-1/-2/-3/-4	
Wire fixing:	Flat terminals with self-lifting clamping piece IEC/EN 60 999-1	
Mounting:	DIN rail IEC/EN 60 715	
Weight:	135 g	

Dimensions

Width x height x depth: 22.5 x 82 x 99 mm

Standard Type

MK 3046.29 DC 24 V

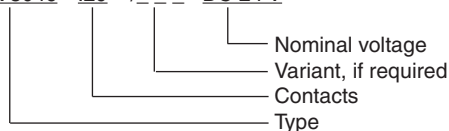
Article number:	0034189
• Output:	2 x 1 changeover contact, 1 x 1 NO contact
• Nominal voltage U_N :	DC 24 V
• Width:	22.5 mm

Variants

MK 3046.___/004:	for low loads from 0.1 ... 60 V, 1 mA ... 300 mA
MK 3046.___/100:	1. system for DC 48 V (connection A1 - A11) 2. and 3. system for DC 24 V (connections A2, A3 - A11)

Ordering example vor variants

MK 3046 .29 / _ _ _ DC 24 V

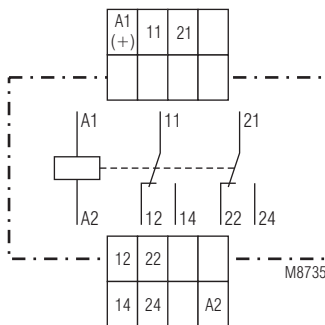


Interface Relay MK 8804N

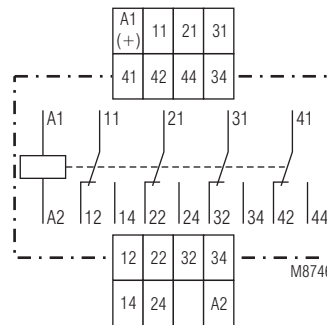


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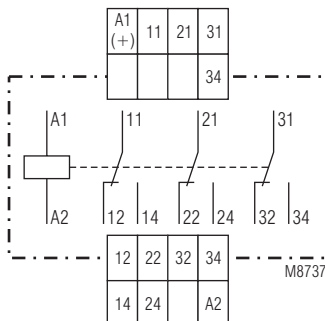
Circuit Diagrams



MK 8804N.12



MK 8804N.14



MK 8804N.13

Connection Terminals

Terminal designation	Signal description
A1(+), A2	Auxiliary voltage AC or DC
11, 12, 14 (MK 8804N.12, .13, .14)	1. changeover contact
21, 22, 24 (MK 8804N.12, .13, .14)	2. changeover contact
31, 32, 34 (MK 8804N.13, .14)	3. changeover contact
41, 42, 44 (MK 8804N.14)	4. changeover contact

Your Advantages

- Up to 4 changeover contacts in 22,5 mm width
- With various terminals

Merkmale

- According to IEC/EN 61 810-1
- As option to switch low loads
- As option for 2-wire proximity sensor control
- Output: 4 changeover contacts
- With LED indicator
- Wire connection: also 2 x 1.5 mm² stranded ferruled, or 2 x 2.5 mm² solid DIN 46 228-1/-2/-3/-4
- As option with pluggable terminal blocks for easy exchange of devices
 - with screw terminals
 - or with cage clamp terminals
- Width 22.5 mm

Approvals and Markings



Application

For separating potentials

Indication

LED: on, when control signal applied

Technical Data

Input

Nominal voltage U_N : AC/DC 12, 24, 42, 48, 60, 110, 127, 220 ... 240 V
Voltage range: 0.8 ... 1.1 U_N
Nominal consumption: ≤ 1.4 W
Nominal frequency: 50 / 60 Hz
Frequency range: ± 5 %

Output

Contacts

MK 8804N.12: 2 changeover contacts
 MK 8804N.13: 3 changeover contacts
 MK 8804N.14: 4 changeover contacts
Operate time: ≤ 10 ms
Release time: ≤ 15 ms
Thermal current I_{th} : 5 A

Switching capacity

to AC 15:
 NO contact: 3 A / AC 230 V IEC/EN 60 947-5-1
 NC contact: 1 A / AC 230 V IEC/EN 60 947-5-1
Electrical life IEC/EN 60 947-5-1
 to AC 15 at 3 A, AC 230 V: 5 x 10⁵ switching cycles

Permissible switching capacity:

3 000 switching cycles / h
Mechanical life: > 30 x 10⁶ switching cycles

Technical Data

General Data

Operating mode:	Continuous operation
Temperature range:	- 20 ... + 60 °C (sum of all contact current < 8 A) - 20 ... + 50 °C (sum of all contact current < 16 A)

Clearance and creepage distances

rated impulse voltage / pollution degree:	4 kV / 2	IEC 60 664-1
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EMC

Electrostatic discharge:	8 kV (air)	IEC/EN 61 000-4-2
HF-irradiation:	10 V/m	IEC/EN 61 000-4-3
Fast transients:	4 kV	IEC/EN 61 000-4-4

Surge voltages between

wires for power supply devices $U_N \leq 48$ V:	1 kV	IEC/EN 61 000-4-5
devices $U_N > 60$ V:	2 kV	IEC/EN 61 000-4-5
between wire and ground:	4 kV	IEC/EN 61 000-4-5
HF-wire guided:	10 V	IEC/EN 61 000-4-6
Interference suppression:	Limit value class B	EN 55 011

Degree of protection:

Housing:	IP 40	IEC/EN 60 529
Terminals:	IP 20	IEC/EN 60 529

Housing:

Thermoplastic with V0 behaviour according to UL subject 94

Vibration resistance:

Amplitude 0.35 mm
frequency 10 ... 55 Hz IEC/EN 60 068-2-6
20 / 060 / 04 IEC/EN 60 068-1

Climate resistance:

EN 50 005

Terminal designation:

DIN 46 228-1/-2/-3/-4

Wire connection

Screw terminals

(integrated):

1 x 4 mm² solid or
1 x 2.5 mm² stranded ferruled or
2 x 1.5 mm² stranded ferruled or
2 x 2.5 mm² solid

Insulation of wires

or sleeve length: 8 mm

Plug in with screw terminals

max. cross section

for connection: 1 x 2.5 mm² solid or
1 x 2.5 mm² stranded ferruled

Insulation of wires

or sleeve length: 8 mm

Plug in with cage clamp terminals

max. cross section

for connection: 1 x 4 mm² solid or
1 x 2.5 mm² stranded ferruled

min. cross section

for connection: 0.5 mm²

Insulation of wires

or sleeve length: 12 ±0.5 mm

Wire fixing:

Plus-minus terminal screws M 3.5
box terminals with wire protection or
cage clamp terminals

Mounting:

DIN rail IEC/EN 60 715

Weight:

150 g

Dimensions

Width x height x depth

MK 8804N:	22.5 x 90 x 97 mm
MK 8804N PC:	22.5 x 111 x 97 mm
MK 8804N PS:	22.5 x 104 x 97 mm

Standard Type

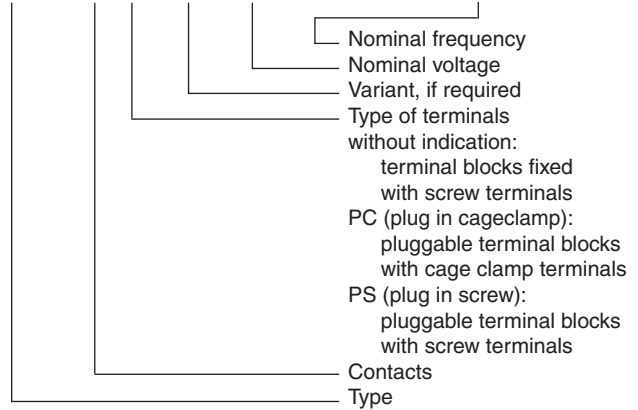
MK 8804N.12 AC/DC 24 V 50 / 60 Hz	
Article number:	0066201
• Output:	2 changeover contacts
• Nominal voltage U_N :	AC/DC 24 V
• Width:	22.5 mm

Variants

MK 8804N._./001:	for low loads from 0.1 ... 60 V, 1 mA ... 300 mA
MK 8804N._./004:	for 2-wire-proximity sensor control, permissible residual current ≤ 5 mA

Ordering example for variants

MK 8804N. 14 _ _ / _ _ AC/DC 220 ... 240 V 50 / 60 Hz



Options with Pluggable Terminal Blocks

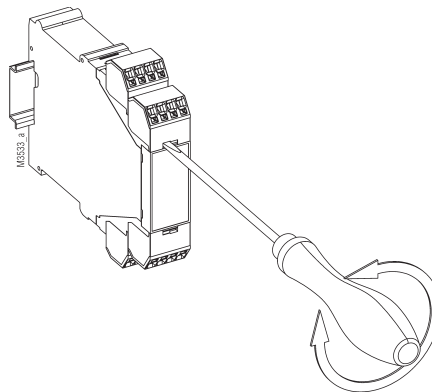


Screw terminal (PS/plugin screw) Cage clamp terminal (PC/plugin cage clamp)

Notes

Removing the terminal blocks with cage clamp terminals

1. The unit has to be disconnected.
2. Insert a screwdriver in the side recess of the front plate.
3. Turn the screwdriver to the right and left.
4. Please note that the terminal blocks have to be mounted on the belonging plug in terminations.

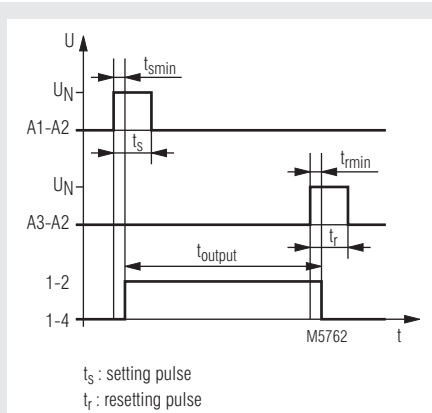


Latching Relay MK 8852



- According to IEC/EN 61 810-1
- Setting input A1 - A2
- Reset input A3 - A2
- Storage function
- Switch position indication
- Manual operation
- Width 22.5 mm

Function Diagram



Approvals and Markings



Application

Impulse conversion into a permanent function*

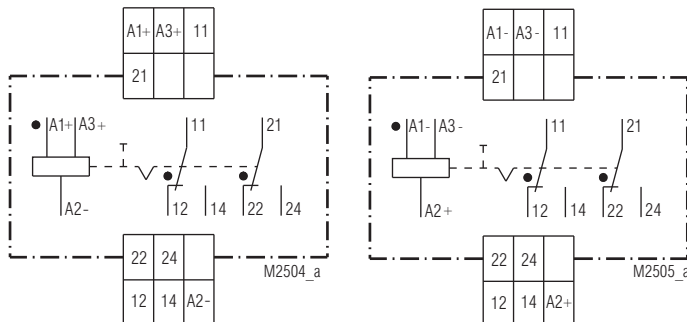
Notes

Latching relays are designed for pulse operation. In case of cyclic pulsed operation, the recommended pulse duration for t_s and t_r are within 0.03 ... 2 s each. A pulse-interval-ratio of 25 % duty cycle is recommended. In no case the permissible operating frequency may be exceeded. For single pulse operation pulse times of > 2 s are possible. A recovery time (min off time between 2 impulses) of > 6 s is required.

In case of a failure a continuous control is possible.

Simultaneous energization of A1 and A3 ist not allowed!

Circuit Diagrams



MK 8852.12

MK 8852.12/002

* A pulse (input) is leading to a continuous function (output).

Technical Data

Input

Operating mode:	Impulse operation
Nominal voltage U_N:	AC / DC 24 V, 30 ... 80 V, 96 ... 150 V, 180 ... 240 V DC 110, 240 V
Voltage range:	0.8 ... 1.1 U_N
Nominal consumption:	1.35 W
Nominal frequency:	50 / 60 Hz
Frequency range:	± 5 %
Min. pulse duration ($\hat{=}$ $t_{s, \min}$ and $t_{r, \min}$):	30 ms

Output

Contacts		
MK 8852.12:	2 changeover contacts	
Operate time of contacts:	10 ms	
Release time of contacts:	10 ms	
Thermal current I_{th}:	6 A	
Switching capacity		IEC/EN 60 947-5-1
to AC 15:	4 A / 230 V	
to DC 13:	1.5 A / 24 V	
	0.1 A / 230 V	
Electrical life		IEC/EN 60 947-5-1
to AC 15 at 4 A, AC 230 V:	> 1 x 10 ⁵ switching cycles	
Permissible switching frequency:	3 600 switching cycles/h ... continuous operation $\hat{=}$ t_{output}	
Short-circuit strength		
max. fuse range	6 A gL	IEC/EN 60 947-5-1
Mechanical life:	10 x 10 ⁶ switching cycles	
General Data		

Temperature range:	- 25 ... + 50 °C	
Clearance and creepage distances		
rated impulse voltage / pollution degree:	4 kV / 2	IEC 60 664-1
EMC		
Electrostatic discharge:	8 kV (air)	IEC/EN 61 000-4-2
HF irradiation:	10 V/m	IEC/EN 61 000-4-3
Fast transients:	4 kV	IEC/EN 61 000-4-4
Surge voltages		
between		
wires for power supply:	2 kV	IEC/EN 61 000-4-5
between wire and ground:	4 kV	IEC/EN 61 000-4-5
HF-wire guided:	10 V	IEC/EN 61 000-4-6
Interference suppression:	Limit value class B	EN 55 011
Degree of protection		
Housing:	IP 40	IEC/EN 60 529
Terminals:	IP 20	IEC/EN 60 529
Housing:	Thermoplast with V0 behaviour according to UL subject 94	
Vibration resistance:	Amplitude 0.35 mm frequency 10 ... 55 Hz	IEC/EN 60 068-2-6
Climate resistance:	25 / 50 / 04	IEC/EN 60 068-1
Terminal designation:	EN 50 005	
Wire connection:	2 x 2.5 mm ² solid or 2 x 1.5 mm ² stranded wire with sleeve DIN 46 228-1/-2/-3/-4 2 x 1.0 mm ² stranded wire with sleeve DIN 46 228-1/-2/-3/-4	

Wire fixing:	Flat terminals with self-lifting clamping piece	IEC/EN 60 999-1
Mounting:	DIN rail	IEC/EN 60 715
Weight:	120 g	

Dimensions

Width x height x depth:	22.5 x 82 x 102 mm
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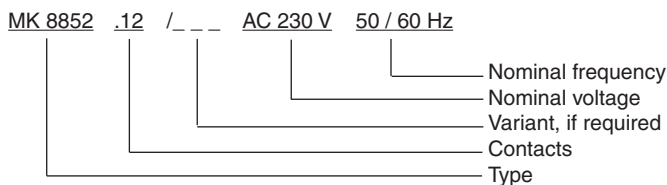
Standard Type

MK 8852.12 AC 230 V		
Article number:	0059338	stock item
• Output:	2 changeover contacts	
• Nominal voltage U_N :	AC 230 V	

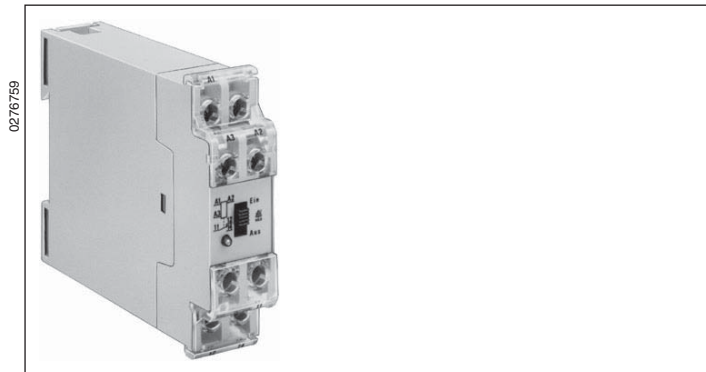
Variant

MK 8852.12/002:	for DC-models, reversed polarity on input
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Ordering example for variant

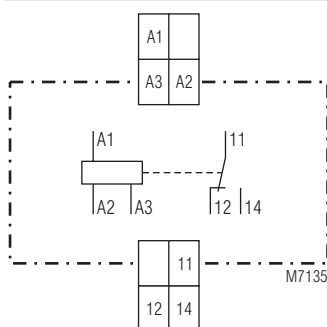


Interface relay Input - Output ML 3045



- According to IEC/EN 60 255, IEC/EN 61 810-1
- With 1 changeover contact
- For 2 control voltages
- Output relay can be switched off via switch for test purposes
- With LED indicator
- Optionally safe separation according to IEC/EN 61 140, IEC/EN 60 947-1 and for switching low loads
- Width: 22,5 mm

Circuit Diagrams



ML 3045.11/100 ML 3045.11
 A1/A2: AC/DC 24 V A1/A2: AC 220 ... 240 V
 A3/A2: AC 220 ... 240 V A3/A2: AC/DC 24 V

Approvals and Markings



Applications

- Link between control and power levels
- For separating potentials

Indicators

LED: on, when the relay is active

Technical Data

Input

Nominal voltage U_N : AC/DC 24 V + AC 220 ... 240 V
Voltage range: AC 0.8 ... 1.1 U_N
Nominal consumption: AC 24 V / 0.5 VA
 AC 230 V / 7 VA
 DC 24 V / 0.5 W
Nominal frequency: 50 / 60 Hz
Frequency range: $\pm 5\%$

Output

Contacts
 ML 3045.11: 1 changeover contact
Operating time: < 15 ms
Release time: < 20 ms
Thermal current I_{th} : 5 A
Switching capacity to AC 15
 NO contact: 3 A / AC 230 V IEC/EN 60 947-5-1
 NC contact: 1 A / AC 230 V IEC/EN 60 947-5-1
Electrical life to AC 15 at 3 A, AC 230 V: 5 x 10⁵ switch. cycl. IEC/EN 60 947-5-1
Permissible switching frequency: 6 000 switching cycles / h
Short circuit strength max. fuse rating: 6 A gL IEC/EN 60 947-5-1
Mechanical life: > 30 x 10⁶ switching cycles

Technical Data

General Data

Operating mode:	Continuous operation	
Temperature range:	- 20 ... + 60 °C	
Clearance and creepage distances		
Rated impuls voltage / pollution degree:	4 kV / 2	IEC 60 664-1
EMC		
Electrostatic discharge:	8 kV (air)	IEC/EN 61 000-4-2
HF-irradiation:	10 V/m	IEC/EN 61 000-4-3
Fast transients:	4 kV	IEC/EN 61 000-4-4
Surge voltages between wires for power supply:	1 kV	IEC/EN 61 000-4-5
between wire and ground:	4 kV	IEC/EN 61 000-4-5
Interference suppression:	Limit value class B	EN 55 011
Degree of protection		
Housing:	IP 40	IEC/EN 60 529
Terminals:	IP 20	IEC/EN 60 529
Housing:	Thermoplast with V0-behaviour according to UL subject 94	
Vibration resistance:	Amplitude 0.35 mm frequency: 10 ... 55 Hz IEC/EN 60 068-2-6	
Climate resistance:	20 / 060 / 04 IEC/EN 60 068-1	
Terminal designation:	EN 50 005	
Wire connection:	2 x 2.5 mm ² solid or 2 x 1.5 mm ² stranded wire with sleeve DIN 46 228-1/-2/-3/-4	
Wire fixing:	Flat terminals with self-lifting clamping piece IEC/EN 60 999-1	
Mounting:	DIN rail IEC/EN 60 715	
Weight:	110 g	

Dimensions

Width x height x depth: 22.5 x 81 x 98.5 mm

Standard Type

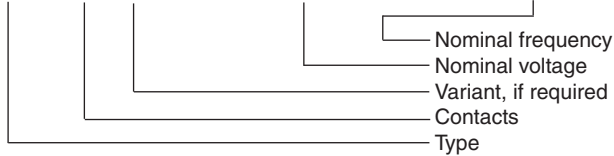
ML 3045.11/100	AC/DC 24 V + AC 220 ... 240 V	50/60 Hz
Article number:	0034641	stock item
• Output:	1 changeover contact	
• Nominal voltage U_N :	AC/DC 24 V + AC 220 ... 240 V	
• Safe separation according to VDE 0106 part 101		
• For switching of low loads with 0.1 ... 60 V, 1 mA ... 300 mA		
• Width:	22.5 mm	

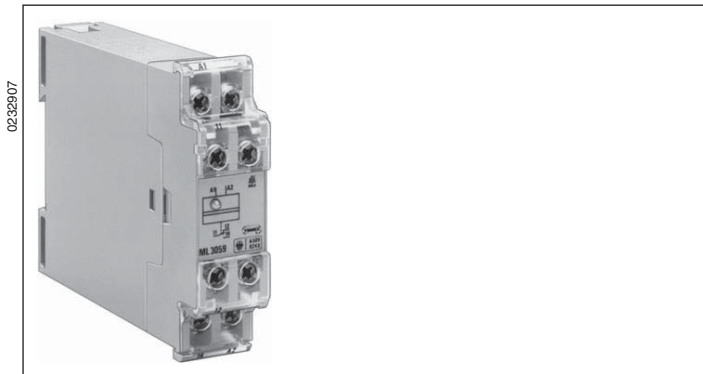
Variant

ML 3045.11: without gold plated contacts,
without safe separation

Ordering example for variants

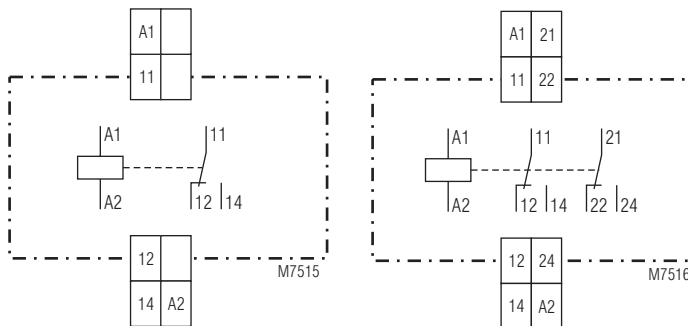
ML 3045 .11 / _ _ _ AC/DC 24 V + AC 220 ... 240 V 50 / 60 Hz





- According to IEC/EN 60 255, IEC/EN 61 810-1
- Optionally safe separation according to IEC/EN 61 140, IEC/EN 60 947-1, 6 kV/2
 - between coil and contacts
 - between the two contacts
- As option with reduced power consumption
- Optionally for switching of low loads
- 1 or 2 changeover contacts
- for AC/DC 12 ... 240 V
- For 2-wire proximity sensors
- LED indicator
- Width 22.5 mm

Circuit Diagrams



ML 3059.11

ML 3059.12
ML 3059.12/100
ML 3059.12/200

Approvals and Markings



Application

- Link between control and power levels
- For separating potentials

Indication

LED: on, when the relay is active

Technical Data

Input

Nominal voltage U_N:	AC/DC 12 ... 240 V			
Voltage range:	AC 0.85 ... 1.1 U_N DC 0.9 ... 1.15 U_N			
Permissible residual current:	≤ 5 mA			
Nominal consumption:	DC 12	24	60	240 V
	0.5	0.55	0.6	1.4 W
Nominal frequency:	50 ... 400 Hz			
Frequency range:	± 5 %			

Output

Contacts

ML 3059.11:	1 changeover contact
ML 3059.12:	2 changeover contacts

Operating time of contacts: ≤ 10 ms

Release time of contacts: ≤ 10 ms

Thermal current I_{th} : 5 A

Switching capacity

to AC 15

NO contact: 3 A / AC 230 V IEC/EN 60 947-5-1

NC contact: 1 A / AC 230 V IEC/EN 60 947-5-1

Electrical life IEC/EN 60 947-5-1

to AC 15 at 3 A, AC 230 V: 5 x 10⁵ switching cycles

Permissible switching frequency:

6 000 switching cycles / h

Short circuit strength

max. fuse rating: 6 A gL IEC/EN 60 947-5-1

Mechanical life: > 30 x 10⁶ switching cycles

Technical Data

General Data

Operating mode:	Continuous operation	
Temperature range:	- 20 ... + 60 °C	
Clearance and creepage distances		
rated impulse voltage / pollution degree:	4 kV / 2	IEC 60 664-1
EMC		
Electrostatic discharge:	8 kV (air)	IEC/EN 61 000-4-2
HF-irradiation:	10 V/m	IEC/EN 61 000-4-3
Fast transients:	4 kV	IEC/EN 61 000-4-4
Surge voltages between wires for power supply:	2 kV	IEC/EN 61 000-4-5
between wire and ground:	4 kV	IEC/EN 61 000-4-5
Interference suppression:	Limit value class B	EN 55 011
Degree of protection		
Housing:	IP 40	IEC/EN 60 529
Terminals:	IP 20	IEC/EN 60 529
Housing:	Thermoplast with V0-behaviour according to UL subject 94	
Vibration resistance:	Amplitude 0.35 mm frequency 10 ... 55 Hz IEC/EN 60 068-2-6	
Climate resistance:	20 / 60 / 04 IEC/EN 60 068-1	
Terminal designation:	EN 50 005	
Wire connection:	2 x 2.5 mm ² solid or 2 x 1.5 mm ² stranded wire with sleeve DIN 46 228-1/-2/-3/-4	
Wire fixing:	Flat terminals with self-lifting clamping piece IEC/EN 60 999-1	
Mounting:	DIN rail IEC/EN 60 715	
Weight:	110 g	

Dimensions

Width x height x depth: 22.5 x 81 x 98.5 mm

Standard Type

ML 3059 .12/100 AC/DC 12 ... 240 V	
Article number:	0037230 stock item
• also for switching of low loads	
• Output:	2 changeover contacts
• Nominal voltage U_N :	AC/DC 12 ... 240 V
• Width:	22.5 mm

For switching of low loads with 0.1 ... 60 V, 1 ... 300 mA, 1 mVA ... 7 VA / 1 mW ... 7 W. The output contacts have the same switching capacity as the standard version. As the gold plating of the contacts will burn off with this switching performance, the device is not longer suitable for switching of low loads.

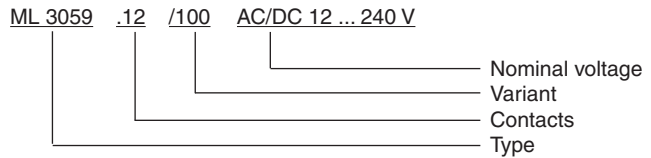
Safe separation according to IEC/EN 61 140, IEC/ 60 947-1, 6 kV/2

- between coil and contacts
- between the two contacts

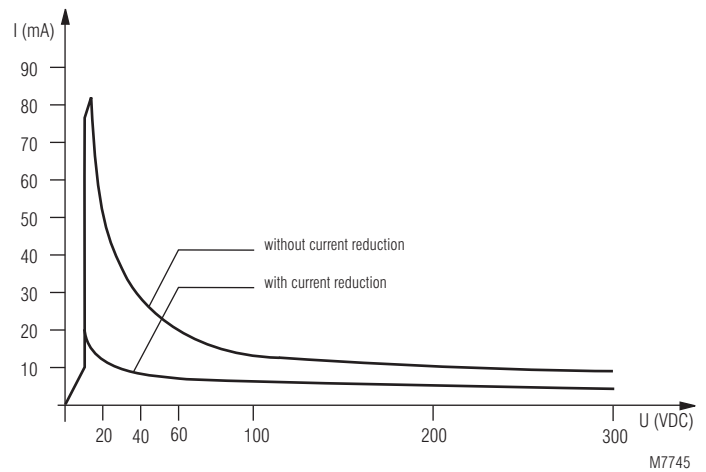
Variants

ML 3059.11:	without gold plated contacts, with safe separation
ML 3059.12:	without gold plated contacts, without safe separation
ML 3059.12/100:	with gold plated contacts 5 µm, with safe separation
ML 3059.12/200:	Version like ML 3059.12/100 with reduced nominal consumption DC 12 V / 0.25 W; DC 24 V / 0.25 W; DC 60 V / 0.45 W; DC 240 V / 1 W Recovery time: < 50 ms

Ordering example for variants



Characteristics



Permissible contact current of ML 3059.12/200 in relation to the auxiliary voltage.

Interface Relay UG 3076/007



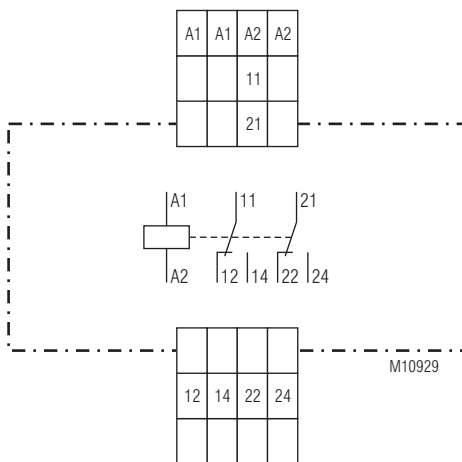
Your Advantages

- According to IEC/EN 60 947-5-1
- Reliable fast response
- Simple contact multiplication
- Cost and space saving alternative compared to contactors
- With pluggable terminal blocks for easy exchange of devices

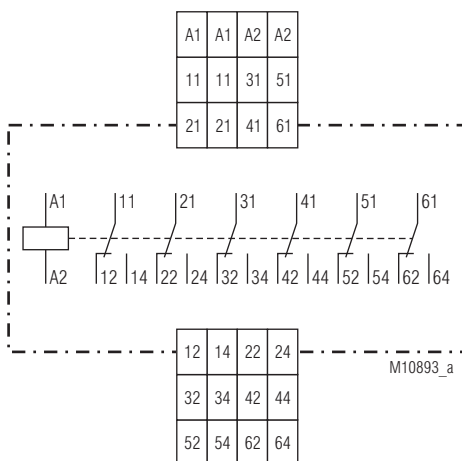
Features

- UG 3076.12: 2 changeover contact
- UG 3076.15: 6 changeover contact
- Safe release voltage: the output relay is de-energized at $U < 27\% U_N$
- Width 22.5 mm

Circuit Diagrams



UG 3076.12



UG 3076.15

Approvals and Markings



Application

- Fast response, e. g. inductive load and circuit breakers
- Interfacing between control and load circuits
- Separate switching of several current circuits, e. g. at
 - Machines and plants,
 - Energy production and transport

Indication

green LED: on, when supply connected

Connection Terminal

Terminal designation	Signal description
A1 / A2	Operation voltage
11 ... 64	Output contacts see circuit diagrams

Technical Data

Input

Nominal voltage U_N :

UG 3076.12:	AC 24, 48, 110, 230 V DC 24, 48, 110, 220 V
UG 3076.15:	AC/DC 24, 48, 110, 125, 230 V

Voltage range

DC:	0.8 ... 1.1 U_N
AC:	0.9 ... 1.1 U_N

Nominal consumption

DC 24 V:	2.7 W
DC 110 V:	3.3 W
AC 230 V:	2.7 W

Nominal frequency:

50 / 60 Hz
Frequency range: $\pm 5\%$ of nominal frequency

Output

Contacts:

UG 3076.12:	2 changeover contacts
UG 3076.15:	6 changeover contact

Operate time: typical 7 ... 8 ms

Release time: typical 7 ms

Nominal output voltage: AC 250 V, DC 24 V

Thermal current I_{th} : 4 A
(see quadratic total current limit curve)

Switching capacity

to AC 15:		
NO contacts:	3 A / AC 230 V	IEC/EN 60 947-5-1
NC contacts:	1 A / AC 230 V	IEC/EN 60 947-5-1
to DC 13:		
NO contacts:	1 A / DC 24 V	IEC/EN 60 947-5-1

Electrical life

NO contacts		
to AC 15 at 1 A, AC 230 V:	2.5 x 10 ⁶ switch. cycl.	IEC/EN 60 947-5-1
NO contacts		
to AC 15 at 0,5 A, AC 230 V:	4 x 10 ⁶ switch. cycl.	IEC/EN 60 947-5-1
NC contacts		
to AC 15 at 1 A, AC 230 V:	1.5 x 10 ⁶ switch. cycl.	IEC/EN 60 947-5-1
NO contacts		
to DC 13 at 1 A, DC 24 V:	1.5 x 10 ⁶ switch. cycl.	IEC/EN 60 947-5-1

Permissible switching frequency:

10 switching cycles / s

Switching voltage min./max.: AC/DC 10 V / AC/DC 250 V

Switching current min./max.: 10 mA / 4 A

Short circuit strength

max. fuse rating: 6 A gG / gL IEC/EN 60 947-5-1

Mechanical life: $\geq 30 \times 10^6$ switching cycles

General Data

Operating mode: Continuous operation

Temperature range:

Operation:	- 20 ... + 60 °C
Storage:	- 20 ... + 60 °C

Altitude: < 2,000 m

Clearance and creepage distances

rated impulse voltage / pollution degree:		
Auxiliary voltage / Contacts:	6 kV / 2	IEC 60 664-1
Contacts / Contacts:	4 kV / 2	IEC 60 664-1

EMC

Electrostatic discharge (ESD):	8 kV (air)	IEC/EN 61 000-4-2
HF irradiation		
80 MHz ... 6 GHz:	10 V / m	IEC/EN 61 000-4-3
Fast transients:	4 kV	IEC/EN 61 000-4-4

Surge voltages

between		
wires for power supply:	2 kV	IEC/EN 61 000-4-5
between wire and ground:	4 kV	IEC/EN 61 000-4-5
HF-wire guided:	20 V	IEC/EN 61 000-4-6
Interference suppression:	Limit value class B	EN 55 011

Degree of protection

Housing:	IP 20	IEC/EN 60 529
Terminals:	IP 20	IEC/EN 60 529

Housing:

Thermoplast with V0-behaviour according to UL subject 94
Amplitude 0,35 mm,
frequency 10 ... 55 Hz, IEC/EN 60 068-2-6

20 / 060 / 04 IEC/EN 60 068-1

Terminal designation: EN 50 005

Technical Data

Wire connection:

Plug in with

screw terminals
max. cross section
for connection:

1 x 0.25 ... 2.5 mm² solid or
stranded ferruled (isolated) or
2 x 0.25 ... 1.0 mm² massiv oder
stranded ferruled (isolated)

Insulation of wires
or sleeve length:

7 mm
captive slotted screw

Wire fixing:

Fixing torque:

0.5 Nm

Mounting:

DIN rail

IEC/EN 60 715

Weight:

approx. 190 g

Dimensions

Width x height x depth: 22.5 x 105 x 120.3 mm

Standard Types

UG 3076.12PS/007 DC 110 V

Article number: 0065524

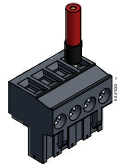
- 2 changeover contacts
- Width: 22.5 mm

UG 3076.15PS/007 AC/DC 24 V

Article number: 0065510

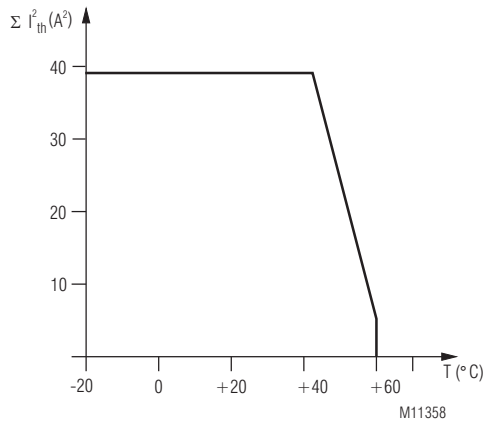
- 6 changeover contacts
- Width: 22.5 mm

Options with Pluggable Terminal Blocks



Screw terminal
(PS/plugin screw)

Characteristics



Quadratic total current

$$\sum I_{th}^2 = I_{th1}^2 + I_{th2}^2 + I_{th3}^2 + I_{th4}^2 + I_{th5}^2 + I_{th6}^2$$

$I_{th1}, I_{th2}, I_{th3}, I_{th4}, I_{th5}, I_{th6}$: thermal current I_{th} in contactrows

Quadratic total current limit curve

Latching Relay UG 8851



0268644

Your Advantage

- Large voltage range AC/DC 24 ... 240 V
- Protection against manipulation by sealable transparent cover over setting switches
- More contacts at small design
- Energy saving, no holding capacity necessary

Features

- According to IEC/EN 61810-1
- With forcibly guided contacts according to IEC 61810-3
- With manual operation and contact position indication via control lever
- With impulse energization A1 - A2
- With reset pulse B1 - B2
- 4 NC contacts, 4 NO contacts or 4 changeover contacts
- With pluggable terminal blocks for easy exchange of devices
- With coded terminal blocks
- Width 22.5 mm

Product Description

The latching relay UG8851 is designed with a wide AC/DC nominal voltage range. Short pulses of several milliseconds switch the relay into a defined position. To change the contact position only low power is necessary. No energy is necessary to hold the relay in ON-state. This is energy efficient and reduces the powerdissipation of the unit. On loss of power the relay stays in it's defined position. The special feature of forcibly guided contacts (IEC 61810-3) allows reliable monitoring of the contact state.

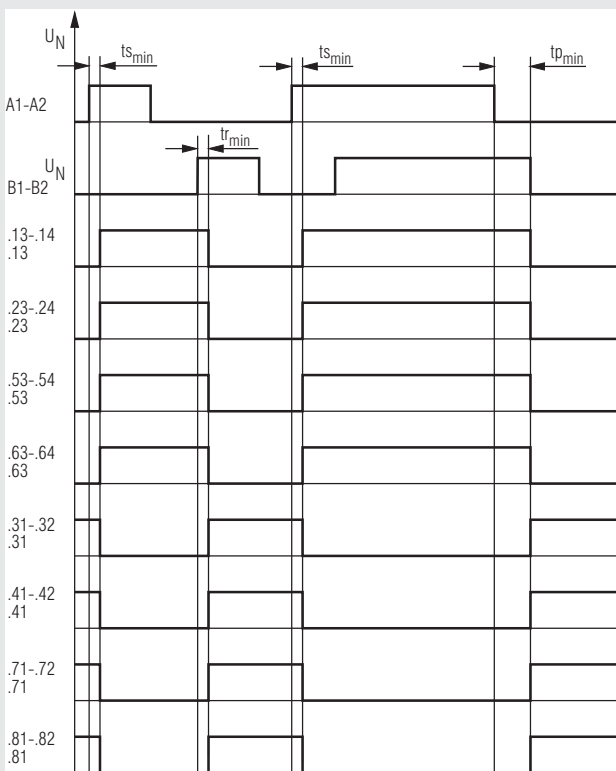
Approvals and Markings



Application

Pulse conversion into a continuous function
A pulse control (inputs side) leads to a continuous function (output side).

Function Diagram



M10967_c

$t_{s_{min}}$ = min. pulse de_activating (A1/A2)

$t_{r_{min}}$ = min. pulse de_activating (B1/B2)

$t_{p_{min}}$ = min. off/changeover time *)

*) $t_{p_{min}}$ is the minimum time that has to pass after the negative edge of a control voltage pulse before the unit accepts a new control voltage pulse.

Function

The relay is operated either by voltage pulses or continuous voltage on the inputs A1-A2, B1-B2. When both coils are activated the contacts keep the state of the first energized coil. The 2 coil systems operate status driven. This means when both coils are energised and the first energised coil is deactivated the status of the contacts is inverted. On loss of voltage, the latching relay remains in it's las contact position.

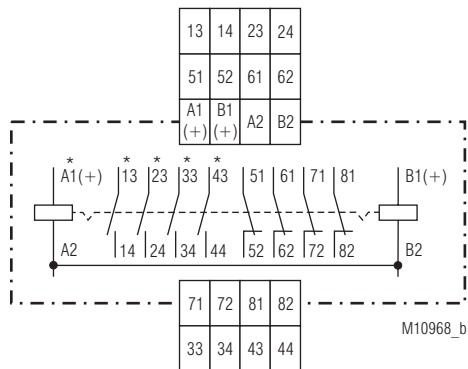
Indication

- yellow LED *A1: on, when control voltage A1/A2 connected
- yellow LED B1: on, when control voltage B1/B2 connected

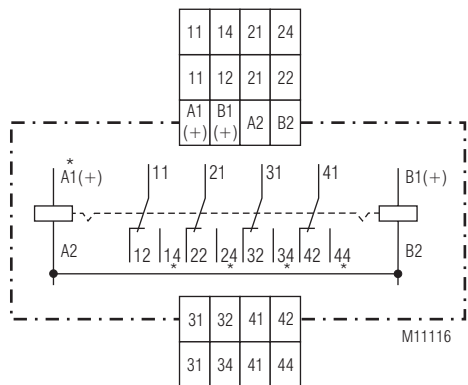
Notes

If coil A1-A2 / coil B1-B2 are controlled with DC, the terminals A1(+) and B1(+) have to be connected on the positive pole.
The device is available on request with customer specific RC element (Snubber Circuit) over the switching contact.

Circuit Diagrams



UG 8851.19



UG 8851.14

Connection Terminals

Terminal designation	Signal description
A1(+), A2	Pulse excitation AC/DC
B1(+), A2	reset pulse AC/DC
13 to 44	4 forcibly guided NO contacts
51 to 82	4 forcibly guided NC contacts
11 to 44 (UG 8851.14)	4 forcibly guided C/O contacts

Technical Data

Input

Nominal voltage U_N:	AC/DC 24 ... 240 V
Voltage range:	AC 0.8 ... 1.1 U_N DC 0.9 ... 1.15 U_N
Nominal consumption:	AC 24 V / 0.1 VA DC 24 V / 0.12 W AC 230 V / 1.3 VA DC 230 V / 1.4 W

Max. consumption during switching operation

$t_{\text{ein}} < 100\text{ms}$:	AC 24 V / 2.5 VA DC 24 V / 3 W AC 230 V / 5.6 VA DC 230V / 4.3 W
---	---

Nominal frequency:

50 ... 400 Hz

Frequency range:

$\pm 5\%$

Min. pulse duration t_{min} , t_{rmin} :

> 30 ms

Min. on and off time t_{pmin} :

> 300 ms

Permissible residual current:

AC/DC < 4 mA

Output

Contacts:

UG 8851.19:	4 NO, 4 NC contacts
UG 8851.14:	4 changeover contacts

Operate time of contacts:

< 30 ms

Release time of contacts:

< 30 ms

Thermal current I_{th} :

6 A / 4 A / 3 A
current via 2 / 3 / 4 contacts

Switching capacity

to AC 15

NO contacts: 3 A / AC 230 V IEC/EN 60 947-5-1

NC contacts: 2 A / AC 230 V IEC/EN 60 947-5-1

to DC 13:

NO contacts: 2 A / DC 24 V IEC/EN 60 947-5-1

NC contacts: 2 A / DC 24 V IEC/EN 60 947-5-1

Electrical life

to AC 15 at 1 A, AC 230 V: 1 x 10⁵ switching cycles
3 000 switches/h at 50 % of the switching capacity
0.5 x 10⁶ switching cycles
1 000 switches/h at 100% of the switching capacity

Permissible switching frequency:

3 000 switching cycles / h

Short circuit strength

max. fuse rating:

6 A gG / gL IEC/EN 60 947-5-1

Mechanical life:

10 x 10⁶ switching cycles

General Data

Operating mode:

Impulse- or continuous operation

Temperature range

Operation: - 20 ... + 60°C

Storage: - 40 ... + 70°C

Altitude:

< 2,000 m

Clearance and creepage distances

rated impulse voltage /

pollution degree

Control (A1, A2; B1, B2) /

contacts:

6 kV / 2

IEC 60 664-1

Contacts / contacts:

4 kV / 2

IEC 60 664-1

EMC

Electrostatic discharge:

8 kV (air)

IEC/EN 61 000-4-2

HF irradiation

IEC/EN 61 000-4-3, EN 50 121-3-2

80 MHz ... 1 GHz:

20 V / m

1 GHz ... 2.7 GHz:

10 V / m

Fast transients:

4 kV

IEC/EN 61 000-4-4

Surge voltages

between

wires for power supply:

2 kV

IEC/EN 61 000-4-5

between wire and ground:

4 kV

IEC/EN 61 000-4-5

Interference suppression:

Limit value class B

EN 55 011

HF-wire guided:

10 V

IEC/EN 61 000-4-6

Technical Data

Degree of protection:

Housing: IP 40 IEC/EN 60 529
Terminals: IP 20 IEC/EN 60 529

Housing: Thermoplast with V0-behaviour to UL subject 94

Vibration resistance: Amplitude 0,35 mm frequency 10...55Hz, IEC/EN 60 068-2-6 20 / 60 / 04 IEC/EN 60 068-1

Climate resistance: IEC/EN 60 068-1

Terminal designation: EN 50 005

Wire connection: DIN 46 228-1/-2/-3/-4

Terminal blocks with screw terminals

Cross section: 1 x 0.25 ... 2.5 mm² solid or stranded ferruled (isolated) or 2 x 0.25 ... 1.0 mm² solid or stranded ferruled (isolated)

Insulation of wires or sleeve length: 7 mm

Wire fixing: captive slotted screw M2,5

Fixing torque: 0,5 Nm

Mounting: DIN rail IEC/EN 60 715

Weight: 190 g

Dimensions

Width x height x depth: 22.5 x 110 x 120.3 mm

Classification to DIN EN 50155

Vibration and shock resistance: Category 1, Class B IEC/EN 61 373

Protective coating of the PCB: No

Standard Type

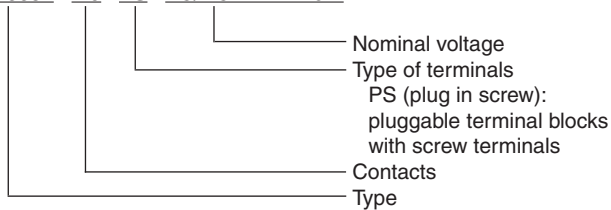
UG 8851.19PS AC/DC 24 ... 240 V

Article number: 0065644

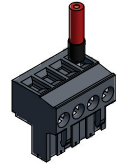
- Output: 4 NO contacts, 4 NC contacts
- Nominal voltage U_N : AC/DC 24 ... 240 V
- Width: 22.5 mm

Ordering example

UG 8851 .19 PS AC/DC 24 ... 240 V



Option with Pluggable Terminal Block



Screw terminal
(PS/plugin screw)

Safety Notes



Dangerous voltage.

Electric shock will result in death or serious injury.



Disconnect all power supplies before servicing equipment.

- Faults must only be removed when the relay is disconnected
- The user has to make sure that the device and corresponding components are installed and wired according to the local rules and law (TUEV, VDE, Health and safety).
- Settings must only be changed by trained staff taking into account the safety regulations. Installation work must only be done when power is disconnected.
- Observe proper grounding of all components

Switching Relay AD 866

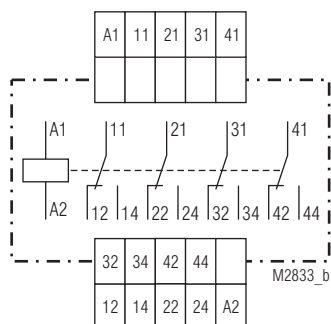


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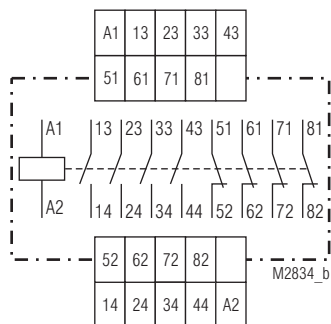


- According to IEC/EN 61 810-1
- With lever for manual operation
- Optionally with LED display
- Optionally with 2, 3 or 4 changeover contacts or
- With 2/2, 3/3, 4/4 NC contact / NO contact
- Width 45 mm

Circuit Diagrams



AD 866.14



AD 866.19

Approvals and Marking



Applications

For potential separation

Technical Data

Input

Nominal voltage U_N:	AC 6, 12, 24, 42, 110, 230, 240 V DC 6, 12, 24, 60, 110 V
Voltage range:	0,8 ... 1,1 U_N
Nominal consumption:	$\leq 2 \text{ W} / 3,6 \text{ VA}$
Nominal frequency:	50 / 60 Hz
Frequency range:	$\pm 5 \%$

Output

Contacts

AD 866.12:	2 changeover contacts
AD 866.13:	3 changeover contacts
AD 866.14:	4 changeover contacts
AD 866.17:	2 NO contacts, 2 NC contacts
AD 866.18:	3 NO contacts, 3 NC contacts
AD 866.19:	4 NO contacts, 4 NC contacts
Turn-on time:	$\leq 30 \text{ ms}$
Turn-off time:	$\leq 30 \text{ ms}$
Thermal current I_{th}:	8 A at one contact 5 A at 2 and 3 contacts 4 A at 4 contacts

Switching capacity

to AC 15		
NO contact:	3 A / AC 230 V	IEC/EN 60 947-5-1
NC contact:	1 A / AC 230 V	IEC/EN 60 947-5-1

Electrical life

to AC 15 at 1 A, AC 230 V: $> 10^5$ switch. cycles IEC/EN 60 947-5-1

Permissible switching frequency:

6000 switching cycles / h

Short circuit strength

max. fuse rating:	10 A gL	IEC/EN 60 947-5-1
Mechanical life:	30 x 10^6 switching cycles at AC 50 x 10^6 switching cycles at DC	

Technical Data

General Data

Operating mode:	Continuous operation	
Temperature range:	- 20 ... + 55 °C	
Clearance and creepage distances		
rated impulse voltage / pollution degree:	4 kV / 2	IEC 60 664-1
EMC		
Electrostatic discharge:	6 kV (contact)	IEC/EN 61 000-4-2
Fast transients:	4 kV	IEC/EN 61 000-4-4
Surge voltages between wires for power supply:	1 kV	IEC/EN 61 000-4-5
between wire and ground:	4 kV	IEC/EN 61 000-4-5
HF-wire guided:	10 V	IEC/EN 61 000-4-6
Degree of protection		
Housing:	IP 40	IEC/EN 60 529
Terminals:	IP 20	IEC/EN 60 529
Housing:	Thermoplastic with V0 behaviour according to UL subject 94	
Vibration resistance:	Amplitude 0,35 mm frequency 10 ... 55 Hz, IEC/EN 60 068-2-6	
Climate resistance:	Humid heat IEC/EN 60 068-2-30	
Terminal designation:	EN 50 005	
Wire connection:	2 x 2,5 mm ² solid or 2 x 1,5 mm ² stranded wire with sleeve DIN 46 228-1/-2/-3/-4	
Wire fixing:	Flat terminals with self-lifting clamping piece IEC/EN 60 999-1	
Mounting:	DIN rail IEC/EN 60 715	
Weight:	310 g	

Dimensions

Breite x Höhe x Tiefe: 45 x 77 x 127 mm

Standard Type

AD 866.14 AC 230V 50 / 60 Hz

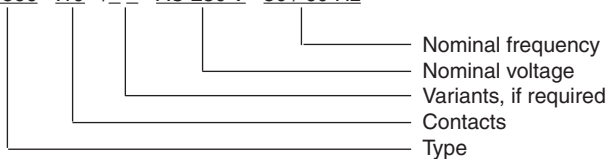
Article number:	0016599
• Output:	4 changeover contacts
• Nominal voltage U _N :	AC 230 V
• Width:	45 mm

Variants

AD 866._ _ /05: LED for switching contact status

Ordering Example for Variants

AD 866 .19 / _ _ AC 230 V 50 / 60 Hz



Latching Relay
AD 8851

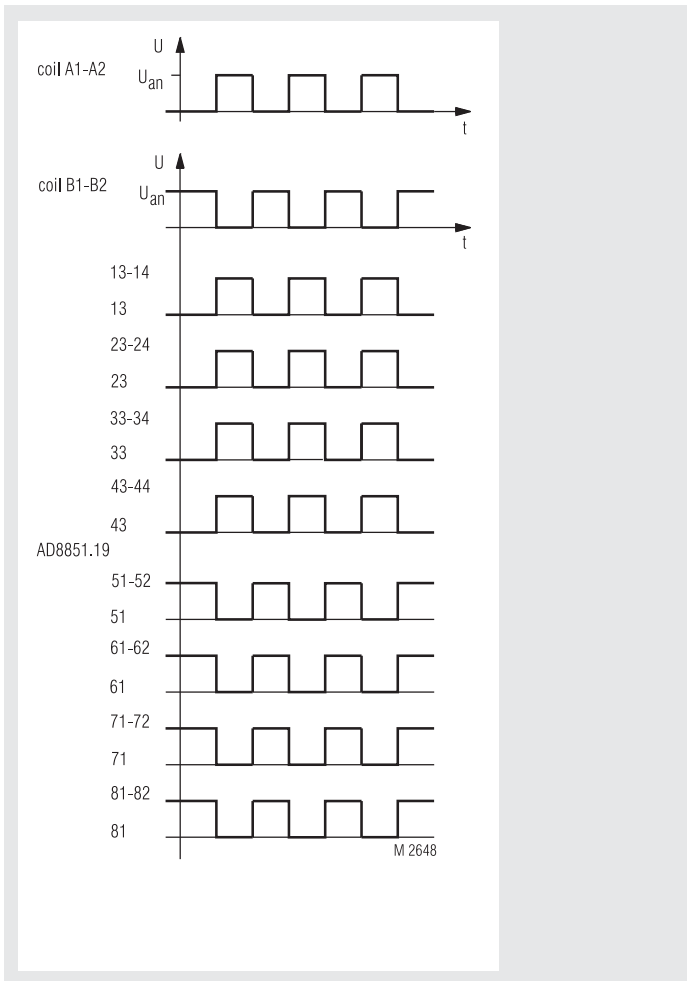


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- According to IEC/EN 61 810-1
- Manual operation possible
- Contact position indication via control lever
- max. 4 NC contacts, 4 NO contacts
- Width 45 mm

Function Diagram



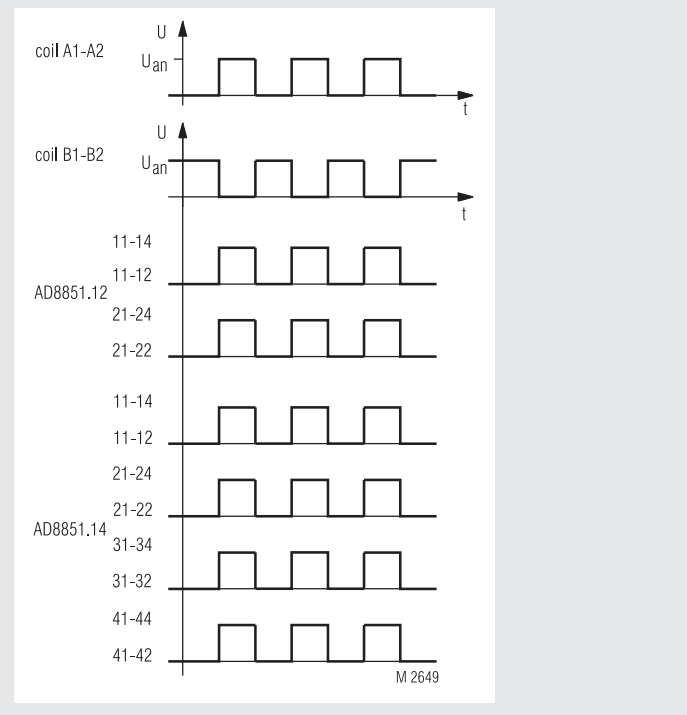
Approvals and Markings



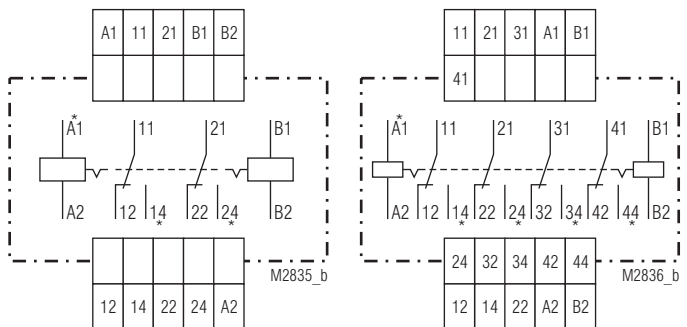
Application

Interlocking of control circuits

Function Diagram

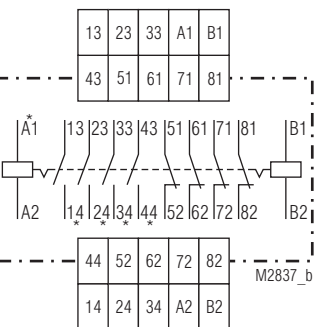


Circuit Diagrams



AD 8851.12

AD 8851.14 / AD 8851.13 (without 41-42-44)



AD 8851.19

The Circuit Diagrams have been provided with star-Marking. If the coil, provided with the star will be energized, the contacts, provided with the star, are closed.

Function

The relay will be actuated by impulse or continuous energizing of the coils A1-A2 or B1-B2. During the energizing of both systems at the same time, the interlocking is disabled; the contact position corresponds with the energizing of the coil A1-A2.

All contacts are on the same magnetic system, which is connected on A1, A2. Thus it is achieved, that in case of energizing of both systems at the same time, there will be no undefined contact condition.

Technical Data

Input

Nominal voltage U_N:	AC 24, 42, 110, 127, 230, 240 V DC 12, 24, 60, 110, 220, 240 V
Voltage range:	0.8 ... 1.1 U_N
Nominal consumption:	AC 230 V / 3 VA DC 220 V / 3 W
Nominal frequency:	50 / 60 Hz
Frequency range:	$\pm 5\%$

Output

Contacts

AD 8851.12:	2 changeover contacts
AD 8851.13:	3 changeover contacts
AD 8851.14:	4 changeover contacts
AD 8851.17:	2 NO, 2 NC contacts
AD 8851.18:	3 NO, 3 NC contacts
AD 8851.19:	4 NO, 4 NC contacts
Operate time of contacts:	< 40 ms
Release time of contacts:	< 40 ms
Thermal current I_{th}:	8 A / 5 A / 4 A current via 2/3/4 contacts

Switching capacity

to AC 15	
NO contacts:	3 A / AC 230 V IEC/EN 60 947-5-1
NC contacts:	1 A / AC 230 V IEC/EN 60 947-5-1
Electrical life	IEC/EN 60 947-5-1
to AC 15 at 1 A, AC 230 V:	1 x 10 ⁵ switching cycles 3 000 switches/h at 50 % of the switching capacity 0.5 x 10 ⁶ switching cycles 1 000 switches/h at 100% of the switching capacity

Permissible switching frequency:

3 000 switching cycles / h

Short circuit strength

max. fuse rating: 10 A gL IEC/EN 60 947-5-1

Mechanical life:

50 x 10⁶ switching cycles

General Data

Operating mode:	Continuous operation
Temperature range:	- 20 ... + 45°C
Clearance and creepage distances	
rated impulse voltage / pollution degree:	4 kV / 2 IEC 60 664-1
EMC	
Electrostatic discharge:	6 kV (contact) IEC/EN 61 000-4-2
Fast transients:	4 kV IEC/EN 61 000-4-4
Surge voltages between wires for power supply:	2 kV IEC/EN 61 000-4-5
between wire and ground:	4 kV IEC/EN 61 000-4-5
HF-wire guided:	10 V IEC/EN 61 000-4-6
Degree of protection:	
Housing:	IP 40 IEC/EN 60 529
Terminals:	IP 20 IEC/EN 60 529
Housing:	Thermoplast with V0-behaviour to UL subject 94
Vibration resistance:	Amplitude 0,35 mm frequency 10...55Hz, IEC/EN 60 068-2-6
Climate resistance:	humid heat IEC/EN 60 068-2-30
Terminal designation:	EN 50 005

Technical Data

Wire connection:	2 x 2.5 mm ² solid or 2 x 1.5 mm ² stranded wire with sleeve DIN 46 228-1/-2/-3/-4
Wire fixing:	Flat terminals with self-lifting clamping piece IEC/EN 60 999-1
Mounting:	DIN rail IEC/EN 60 715
Weight:	400 g

Dimensions

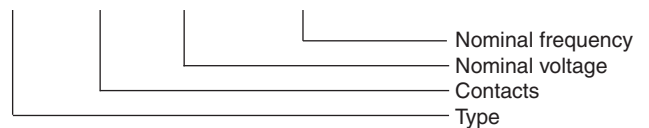
Width x height x depth: 45 x 77 x 127 mm

Standard Type

AD 8851.19	AC 230 V	50 / 60 Hz	
Article number	0016356		stock item
• Output:	4 NO, 4 NC contacts		
• Nominal voltage U_N :	AC 230 V		
• Width:	45 mm		

Ordering Example

AD 8851 .18 AC 230 V 50 / 60 Hz



Stepping Relay BA 7632

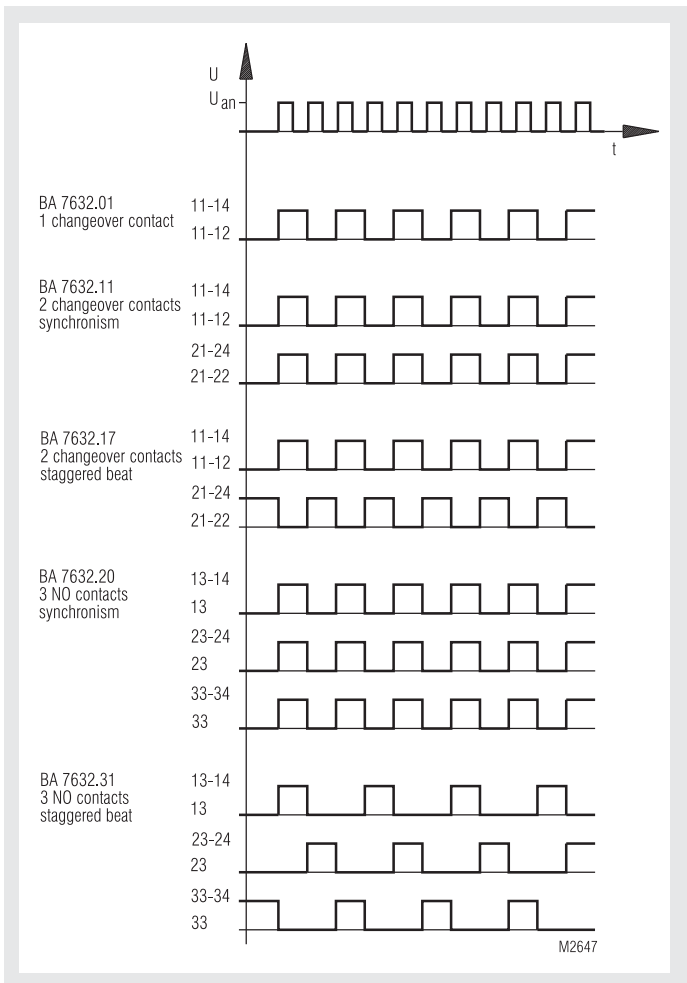


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- According to IEC/EN 61 810-1
- High switching capacity of contacts
- High switching safety
- Width 45 mm

Function Diagram



Approvals and Markings



Application

For cyclic control processes

Function

With an impulse of the control voltage to the terminals A1-A2, a symmetric rotation tongue-magnetic system will be actuated, which switches the cam wheels of the contact links further on step. The sequence of the contact actuation effects according to the desired switching program.

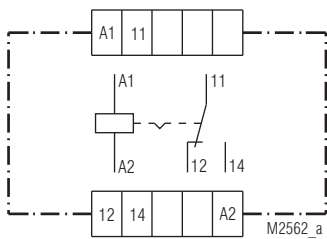
Technical Data

Standard - switching programs

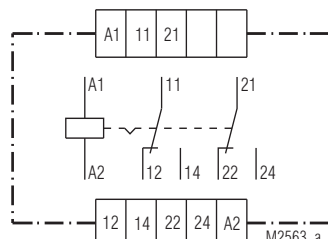
for 1 changeover contact	contact 1		
program .01:	E-A etc.		
for 2 changeover contacts	contact 1	contact 2	
program .11:	E-A etc.	E-A etc.	
program .17:	E-A etc.	A-E etc.	
for 3 NO contacts	contact 1	contact 2	contact 3
program .20:	E-A etc.	E-A etc.	E-A etc.
program .31:	E-A-A etc.	A-E-A etc.	A-A-E etc.

other switching program on request
A = contact in initial position
E = contact in switching position

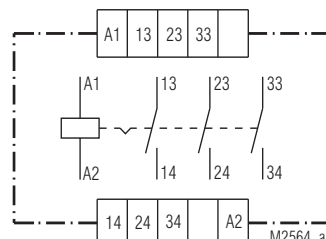
Circuit Diagrams



BA 7632.01



BA 7632.11
BA 7632.17



BA 7632.20
BA 7632.31

Technical Data

Input

Nominal voltage U_N:	AC 24, 42, 110, 127, 230, 240 V DC 24 V
Voltage range:	0,8 ... 1,1 U_N
Min. transition time:	≥ 100 ms
Min. break time:	≥ 200 ms
Nominal consumption:	AC 14 VA / 7 W
Nominal frequency:	50 / 60 Hz

Output

Operate time of contacts:	< 90 ms
Release time of contacts:	< 180 ms
Nominal breaking capacity:	AC 24 V AC 110 V AC 230 V AC 380 V
cos φ 1 ... 0.7:	6 A 6 A 4 A 3 A
cos φ 0.4:	4 A 4 A 3 A 2 A
	DC 24 V DC 60 V DC 110 V DC 220 V
resistive:	1.5 A 0.8 A 0.4 A 0.2 A
inductive:	0.8 A 0.3 A 0.2 A 0.12 A
Thermal current I_{th}:	10 A
Short circuit strength	
max. fuse rating:	10 A gL
Electrical life:	1 x 10 ⁶ switching cycles, 3 000 switches / h at 50 % of the switching capacity 0,5 x 10 ⁶ switching cycles, 1 500 switches / h at 100 % of the switching capacity
Mechanical life:	> 5 x 10 ⁶ switching cycles
Permissible switching frequency:	3 000 switching cycles / h

General Data

Operating mode:	Continuous operation
Temperature range:	- 20 ... + 70°C at 40 % ED (cycle duration 250 s) - 20 ... + 60°C at 60 % ED (cycle duration 160 s) - 20 ... + 45°C at DB
Clearance and creepage distances	
rated impulse voltage / pollution degree:	4 kV / 2 IEC 60 664-1
EMC	
Electrostatic discharge:	6 kV (air) IEC/EN 61 000-4-2
HF-irradiation:	10 V / m IEC/EN 61 000-4-3
Fast transients:	2 kV IEC/EN 61 000-4-4
Surge voltages between	
wires for power supply:	2 kV IEC/EN 61 000-4-5
between wire and ground:	4 kV IEC/EN 61 000-4-5
HF-wire guided:	10 V IEC/EN 61 000-4-6
Interference suppression:	Limit value class B EN 55 011
Degree of protection	
Housing	IP 40 IEC/EN 60 529
Terminals:	IP 20 IEC/EN 60 529
Housing:	Thermoplast PC ISO 1043-1 with V0-behaviour to UL subject 94
Vibration resistance:	Amplitude 0.35 mm, frequency 10...55Hz, IEC/EN 60 068-2-6
Climate resistance:	humid heat IEC/EN 60 068-2-30 24-hours-rhythm: 40°C, 92 % relative air humidity and 23°C, 83 % relative air humidity
Terminal designation:	EN 50 005
Wire connection:	2 x 2,5 mm ² solid or 2 x 1,5 mm ² stranded wire with sleeve DIN 46 228-1/-2/-3/-4
Wire fixing:	Flat terminals with self-lifting clamping piece IEC/EN 60 999-1
Mounting:	DIN rail IEC/EN 60 715
Weight:	450 g

Dimensions

Width x height x depth:	45 x 74 x 121 mm
--------------------------------	------------------

Standard Type

BA 7632.31 AC 230 V 50/60 Hz	
Article number:	0028206 stock item
• Output:	3 NO contacts
• Nominal voltage U_N :	AC 230 V
• Width:	45 mm

Ordering example

BA 7632	.11	AC 230 V	50 / 60 Hz	
				Nominal frequency
				Nominal voltage
				Contact sequence
				Type

MINITIMER Contact Protection Relay BA 7961



Your Advantages

- High electrical life of control contacts
- Longer maintenance intervals

Features

- According to IEC/EN 61 812-1
- Galvanic separation between control contact and supply voltage
- Wide auxiliary range
- Adjustable operate delay
- 2 changeover contacts delayed
- LED-indicator for power and contact position
- Width: 45 mm

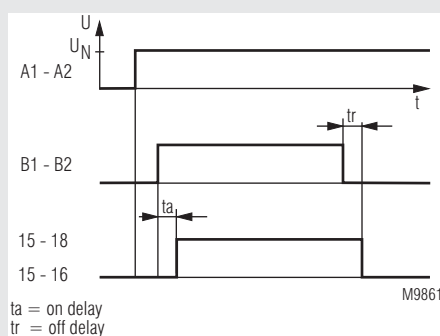
Product Description

The contact protection relay BA 7961 protects sensitive control contacts of e.g. digital plc outputs, limit contacts on measuring devices, low load reed contacts against early wearing.

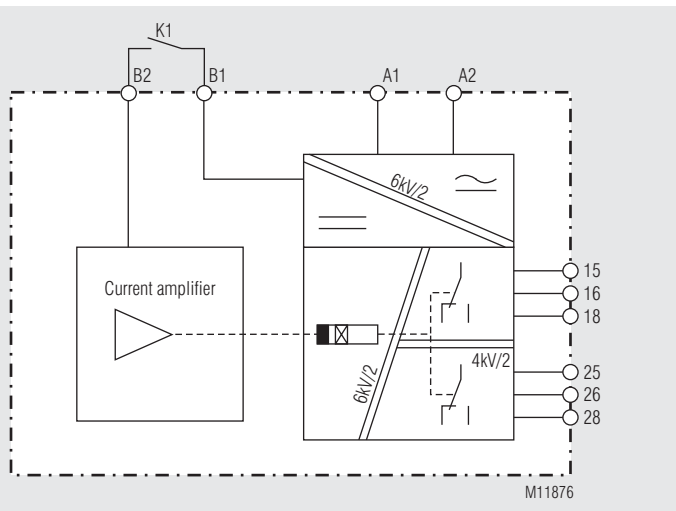
It has a low input consumption on B1-B2 control input and a high switching capacity of the output using a robust relay for mains voltage with 2 changeover contacts. Unintended switching caused by contact bouncing or vibrations are suppressed by an adjustable on delay and a fixed off delay.

The auxiliary supply A1/A2, the control input B1/B2 and the output contacts are galvanically separated. The control input must be voltfree, no external voltage must be connected. 2 LEDs show connected power supply and status of the output relay.

Function diagram



Block diagram



Approvals and Marking



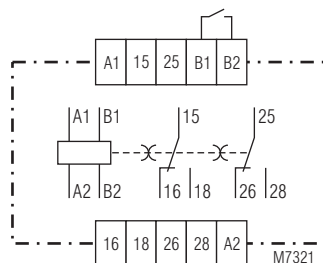
Applications

For protection of sensitive contacts e. g. limit value switches to measuring instruments such as thermometers, manometers and hygrometers

Indicators

- green LED: on, when supply connected
yellow LED: on, when corresponding output relay is active

Circuit Diagrams



Connection Terminals

Terminal designation	Signal description
A1 / A2	Auxiliary voltage
B1, B2	Control contact
15, 16, 18	1. changeover contact
25, 26, 28	2. changeover contact

Technical Data

Input

Nominal voltage U_N : AC/DC 24 ... 80 V,
AC/DC 80 ... 230 V

Nominal voltage	Voltage range	Frequency range
AC/DC 24 ... 80 V	AC 18 ... 100 V	45 ... 400 Hz; DC 48 % W
	DC 18 ... 130 V	$W \leq 5\%$
AC/DC 80 ... 230 V	AC 40 ... 265 V	45 ... 400 Hz; DC 48 % W
	DC 40 ... 300 V	$W \leq 5\%$

Nominal consumption:

AC 230 V: ≤ 4.2 VA
DC 230 V: ≤ 1.5 W

Current over control contact

Contact open: $< DC 20$ V
Contact close: 0.5 mA

Max. resistance of control wire:

25 k Ω

Min. insulating resistance:

100 k Ω

Recovery time:

0.5 s

Repeat accuracy:

$\leq \pm 2\%$ vom Skalenendwert

Operating time t1

(on delayed): 0.1 ... 10 s

Accuracy at potentiometer set clockwise (10s):

12 s $\pm 30\%$

Release time t2

(release delay): ≤ 800 ms

Optional: ≤ 350 ms; ≤ 40 ms

Output

Contacts:

2 changeover contacts

Thermal current I_{th} :

2 x 5 A

Switching capacity

to AC 15

NO contact: 2 A / AC 230 V IEC/EN 60 947-5-1

NC contact: 1 A / DC 24 V IEC/EN 60 947-5-1

to DC 13 at 0.1 Hz: 1 A / DC 24 V IEC/EN 60 947-5-1

Electrical life

to AC 15 at 3 A, AC 230 V 5 x 10⁵ switch. cycles IEC/EN 60 947-5-1

Short-circuit strength

max. fuse rating: 6 A gG (gL) IEC/EN 60 947-5-1

Mechanical life:

50 x 10⁶ switching cycles

General Data

Operating mode:

Continuous operation

Temperature range

Operation: - 40 ... + 60°C
(higher temperature with limitations on request)

Storage: - 40 ... + 70°C

Altitude: < 2.000 m

Clearance and creepage distances

rated impulse voltage / pollution degree

A1, A2 / B1, B2: 6 kV / 2 IEC 60 664-1

A1, A2, B1, B2 / contacts: 6 kV / 2 IEC 60 664-1

15, 16, 18 / 25, 26, 28: 4 kV / 2 IEC 60 664-1

EMC

Electrostatic discharge: 8 kV (air) IEC/EN 61 000-4-2

HF irradiation 80 MHz ... 1 GHz: 20 V / m IEC/EN 61 000-4-3

1 GHz ... 2.7 GHz: 10 V / m IEC/EN 61 000-4-3

Fast transients: 4 kV IEC/EN 61 000-4-4

Surge voltages between wires for power supply: 2 kV IEC/EN 61 000-4-5

between wire and ground: 4 kV IEC/EN 61 000-4-5

HF wire guided: 10 V IEC/EN 61 000-4-6

Interference suppression: Limit value class B EN 55 011

Technical Data

Degree of protection

Housing: IP 40 IEC/EN 60 529

Terminals: IP 20 IEC/EN 60 529

Housing: Thermoplastic with V0 behaviour

according to UL subject 94

Vibration resistance: Amplitude 0,35 mm

frequency 10 ... 55 Hz, IEC/EN 60 068-2-6

40 / 060 / 04 IEC/EN 60 068-1

Climate resistance: DIN EN 50 005

Terminal designation: 2 x 2.5 mm² solid or

2 x 1.5 mm² stranded wire with sleeve

Wire connection: DIN 46 228-1/-2/-3/-4

Wire fixing: Plus-minus terminal screws M3.5 with self-lifting clamping piece IEC/EN 60 999-1

Stripping length: 10 mm

Fixing torque: 0.8 Nm

Mounting: DIN-rail IEC/EN 60 715

Weight: 200 g

Dimensions

Width x height x depth: 45 x 75 x 120 mm

Standard Type

BA 7961.82 AC 80 ... 230 V 0.1 ... 10 s 800 ms

Article number: 0067745

• Output: 2 changeover contacts

• Nominal voltage U_N : AC 80 ... 230 V

• Operating time t1: 0.1 ... 10 s

• Release time t2: 800 ms

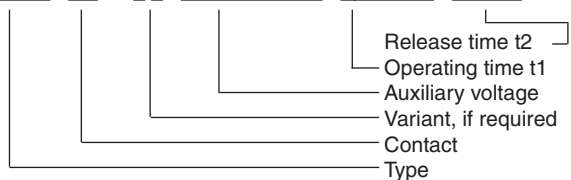
• Width: 45 mm

Variant

BA 7961.82/2_ _ : for secure electrical insulation according to IEC/EN 61140

Ordering example for variants

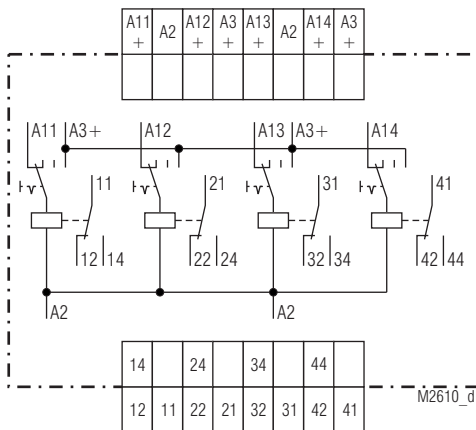
BA 7961 .82 /2_ _ AC 80 ... 230 V 0.1...10 s 800 ms



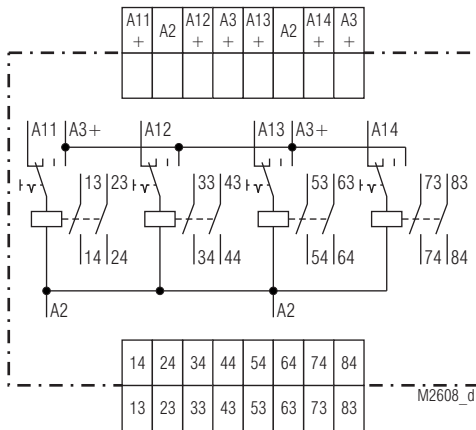


- According to IEC/EN 60 947-5-1
- 4 interface relay with separate control via A1 and common connection of A2
- With 3-position test switch:
 - Position 1: Normal operation
 - Position 2: Relay output always off
 - Position 3: Relay output always switched on
 for switch cabinets with mounting plate and cable duct
- With 1 changeover contact each
- 1 LED each for operating state
- Optionally with 2 NO contacts each
- Width: 70 mm

Circuit Diagrams



IP 3070.11/022



IP 3070.02/022

Connection Terminals

Terminal designation	Signal description
A11, A12, A13, A14, A2, A3	Operation voltages of the relays
11 ... 84	Output contacts see circuit diagrams

Approvals and Markings



Indicators

LEDs light up at the corresponding interface relay when operating voltage is present.

Technical Data

Input

Nominal voltage U_N:	DC 24 V
Voltage range:	0.8 ... 1.1 U_N
Nominal consumption:	4 x 0.5 W
Release voltage:	$\geq 0.05 U_N$

Output

Contacts	IP 3070.11/022: 4 output relays with 1 C/O contact each
	IP 3070.02/022: 4 output relays with 2 NO contacts each
Operate time:	≤ 12 ms
Release time:	≤ 10 ms
Nominal output voltage:	min. AC/DC 10 V max. DC 250 V, AC 400 V
Thermal current I_{th}:	10 A total current (see continuous current limit curve)
Switching capacity to AC 15	
NO contact:	3 A / AC 230 V IEC/EN 60 947-5-1
NC contact:	1 A / AC 230 V IEC/EN 60 947-5-1
to DC 13	1 A / DC 24 V IEC/EN 60 947-5-1
Electrical life to AC 15 at 2 A, AC 230 V:	2.5 x 10 ⁵ switch. cycl. IEC/EN 60 947-5-1
Permissible switching frequency:	max. 36 000 switching cycles / h
Short circuit strength	
max. fuse rating:	10 A gG / gL IEC/EN 60 947-5-1
Mechanical life:	$\geq 10 \times 10^6$ switching cycles

General Data

Operating mode:	Continuous operation
Temperature range:	
Operation:	- 20 ... + 55 °C
Storage:	- 20 ... + 55 °C
Altitude:	< 2.000 m
Clearance and creepage distances	
Rated insulation voltage:	300 V
Oversoltage category:	III
rated impuls voltage / pollution degree:	4 kV / 2 IEC 60 664-1

Technical Data

EMC

Electrostatic discharge:	8 kV (air)	IEC/EN 61 000-4-2
HF irradiation		
80 MHz ... 2.7 GHz:	10 V / m	IEC/EN 61 000-4-3
Fast transients:	2 kV	IEC/EN 61 000-4-4
Surge voltage between		
wires for power supply:	1 kV	IEC/EN 61 000-4-5
between wire and ground:	2 kV	IEC/EN 61 000-4-5
HF-wire guided:	10 V	IEC/EN 61 000-4-6
Interference suppression:	Limit value classe B	EN 55011

Degree of protection

Housing:	IP 40	IEC/EN 60 529
Terminals:	IP 20	IEC/EN 60 529

Housing:

Thermoplastic with V0 behaviour according to UL subject 94

Vibration resistance:

Amplitude 0,35 mm
frequency 10 ... 55 Hz IEC/EN 60 068-2-6
20 / 055 / 04 IEC/EN 60 068-1

Climate resistance:

Terminal designation:

EN 50 005

Wire connection:

2 x 2.5 mm² solid or
2 x 1.5 mm² stranded wire with ferrules
DIN 46 228-1/-2/-3/-4

Stripping length:

10 mm

Wire fixing:

Plus-Minus-terminal screws M3,5 with self-lifting clamping piece function according to IEC 60 999-1

Fixing torque:

0.8 Nm

Mounting:

DIN rail

IEC/EN 60 715

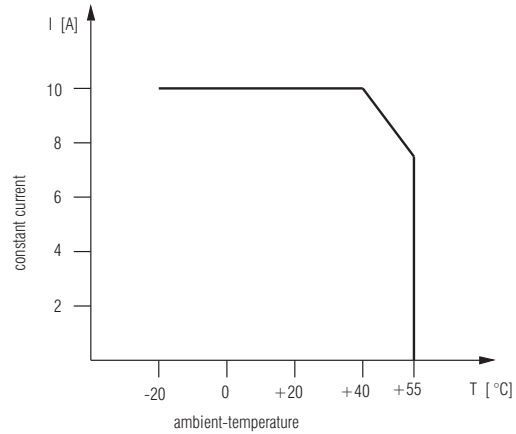
Weight:

250 g

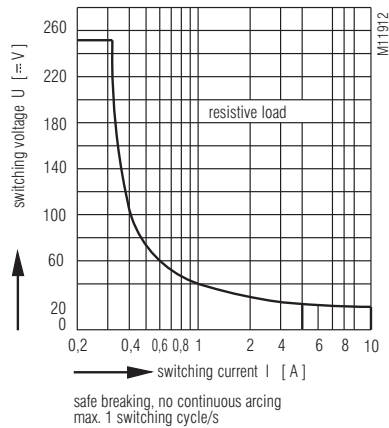
Dimensions

Width x height x depth: 70 x 90 x 61 mm

Characteristics



Derating-curve



Arc limit curve

Standard Type

IP 3070.11/022 DC 24 V

Article number:

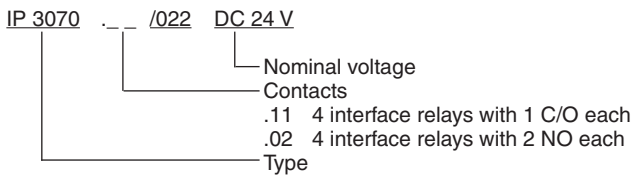
0050977

- Outputs: 4 interface relays with 1 C/O each
- Nominal voltage U_N : DC 24 V
- Width: 70 mm

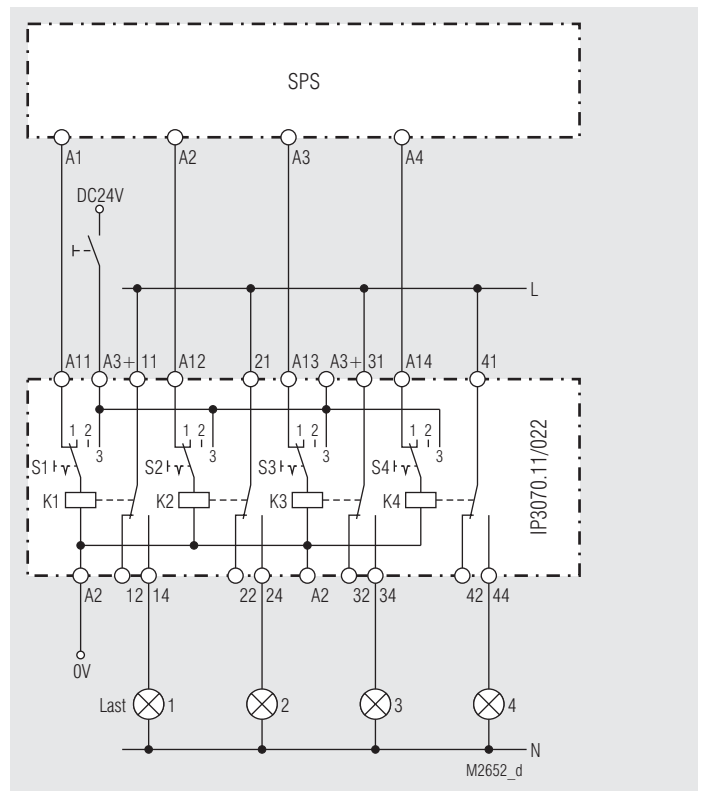
Variant

IP 3070.02/022: Interface relay system consisting of 4 interface relays with 2 NO contacts each

Ordering Example



Connection Example



Interface relay IP 3070.11/022 with slide switch S1 ... S4 with 3 switch positions.

- Position 1: Normal operation, i. e. relay control via e.g. PLC.
- Position 2: Relays are switched off, e.g. for testing the PLC.
- Position 3: external control via "A3+" Terminal possible (Hand-sensor), e. g. for testing the loads 1 ... 4.

0257865



- According to DIN EN 61810
- With forcibly guided contacts according to IEC 61810-3
- Pluggable safety relay
- Low rated power consumption: 0.8 W
- Max. 2 output contacts
- Contact material: AgNi with fine gold
- High thermal current up to $I_{th} = 5 A$
- Large temperature range: $-40 \dots +85 \text{ }^\circ\text{C}$
- As option with free-wheel diode or varistor between A1/A2
- As option with AgSnO₂ or AgNi with hard gold
- Width: 15.8 mm

Notes

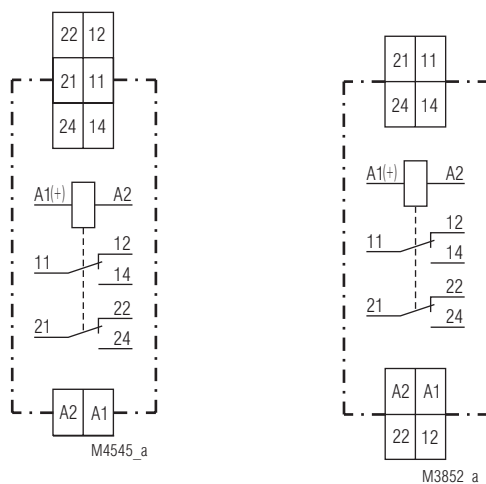
Safety relay with forcibly guided contacts OA 5669 and socket for supporting DIN-rail mounting.

Approval and Markings



*) for Relay OA 5669

Circuit Diagrams



ET1415.047, ET1415.044

ET1415.041

Technical Data

Input

Nominal voltage U_N:	DC 6, 12, 24, 48, 60, 110 V other on request
Voltage range:	0.8 ... 1.4 U_N
Nominal consumption:	0.8 W

Output

Contacts	HC 3098 with OA 5669.16:	1 NO contact and 1 NC contact
	HC 3098 with OA 5669.12:	2 changeover contacts
	Contact material:	AgNi10 + 0.2 μm Au
	Operate time:	typical 15 ms
	Release time:	typical 12 ms
	Nominal output voltage:	AC 250 V
	Thermal current I_{th}:	3 x 5 A
	Switching capacity according to AC 15	
	NO contact:	3 A / AC 230 V IEC/EN 60947-5-1
	NC contact:	1 A / AC 230 V IEC/EN 60947-5-1
	according to DC 13	
	NO contact:	2 A / DC 24 V IEC/EN 60947-5-1
	NC contact:	2 A / DC 24 V IEC/EN 60947-5-1
	Electrical life at 1 s ON, 1 s OFF at AgSnO	
	AC 230 V, 6 A $\cos \varphi = 1$:	2 x 10 ⁵ switch. cycl. IEC/EN 60947-5-1
	at AgNi:	> 1 x 10 ⁶ switching cycles IEC/EN 60947-5-1
	permissible switching frequency:	10 switching cycles / s
	Switching voltage min. / max:	AC/DC 10 V / DC 250 V, AC 380 V
		AgNi + 5 μm Au: 100 mV / AC/DC 60 V
	Switching current min. / max:	0.3 A / 5 A
		AgNi + 5 μm Au: 1 mA / 0.3 A
	Switching capacity min./max:	3 VA / 2000 VA
		AgNi + 5 μm Au: 1 mVA / 7 VA
		3 W / 240 W
		AgNi + 5 μm Au: 1 mW / 7 W
	Mechanical life:	> 50 x 10 ⁶ switching cycles

Technical Data

General Data

Nominal operating mode: continuous operation

Temperature range: - 40 ... + 85 °C

Clearance and creepage distance

rated impulse voltage /

degree of protection: 2.5 kV / 2 IEC 60664-1

Overvoltage category: III

EMC

Electrostatic discharge(ESD): 8 kV (air) IEC/EN 61000-4-2

HF irradiation: 10 V/m IEC/EN 61000-4-3

Fast transients: 4 kV IEC/EN 61000-4-4

Surge voltages

between

wires for power supply: 2 kV IEC/EN 61000-4-5

between wire and ground: 4 kV IEC/EN 61000-4-5

HF-wire guided: 10 V IEC/EN 61000-4-6

Interference suppression: Limit value class B EN 55011

Degree of protection:

Terminals: IP 20 IEC/EN 60 529

Enclosure: thermoplastic with VO behaviour according to UL Subj. 94

Vibration resistance: Amplitude 0.35 mm

Frequency 10 ... 55 Hz, IEC/EN 60068-2-6

humid heat IEC/EN 60068-2-30

EN 50005

Climate resistance:

Terminal designation:

Wire connection

ET 1415.041, ET 1415.044: 0.14 ... 2.5 mm² solid (14 - 20 AWG)

0.14 ... 2.5 mm² stranded (14 - 20 AWG)

0.14 ... 1.5 mm² sleeved end (14 - 25 AWG)

2 x (0.2 ... 1.5) mm² solid (16 - 25 AWG)

2 x (0.2 ... 1.5) mm² stranded (16 - 25 AWG)

2 x (0.2 ... 1.5) mm² sleeved end (16 - 25 AWG)

Wire fixing:

ET 1415.041, ET 1415.044: Screw terminals

ET 1415.047: Cage clamp terminals

Mounting:

DIN-rail IEC/EN 60715

Weight:

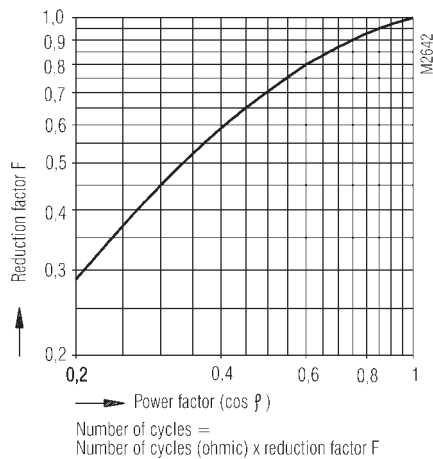
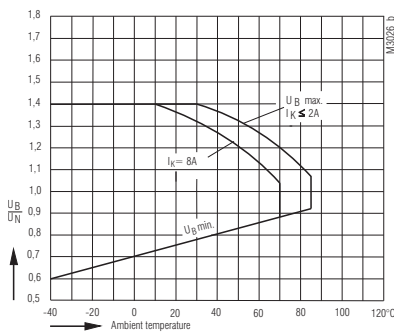
ET1415.____: see accessories

OA 5669: 15 g

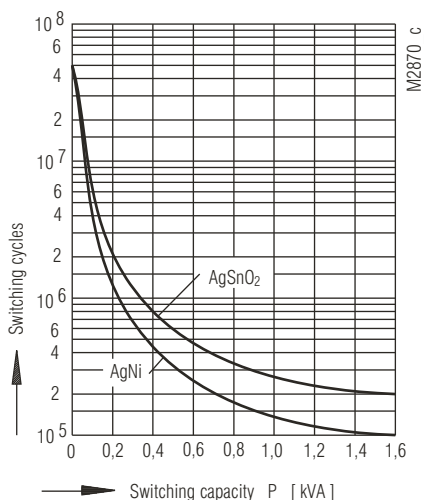
Dimensions

Width x height x depth: 13 x 25.5 x 29 mm

Characteristics

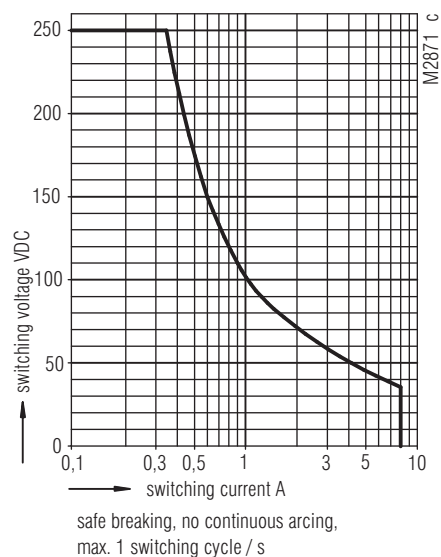


Operating voltage limit curve



Contact service life

Reduction factor for inductive loads



Limit curve for arc-free operation

Technical Data

Coil data with design version for Standard Type:

Nominal voltage DC V	Voltage range V	Resistance Ω ($\pm 10\%$)	AgNi		
			OA 5669.12	OA 5669.16	
6	4.5 ... 8.4	44	3001	3011	3501
12	9.0... 16.8	175	3002	3012	3502
24	18.0 ... 33.6	720	3003	3013	3503
48	36.0 ... 67.0	2 880	3004	3014	3504
60	45.0 ... 84.0	4 500	3005	3015	3505
110	82.0 ... 154.0	15 000	3006	3015	3506
				1)	2)

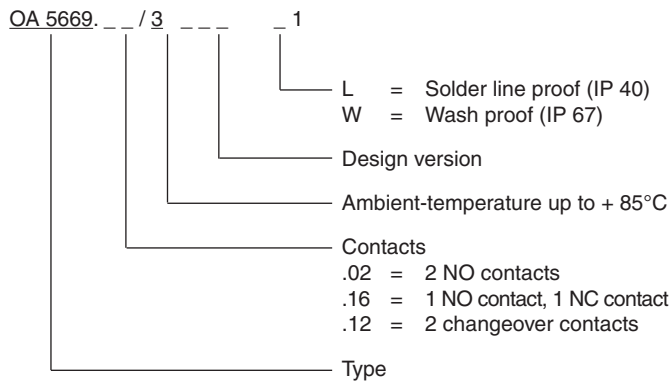
Design version

Nominal voltage DC V	AgNi (hard gold)			AgSnO ₂		
	OA 5669.12	OA 5669.16		OA 5669.12	OA 5669.16	
6	3031	3041	3511	3061	3071	3521
12	3032	3042	3512	3062	3072	3522
24	3033	3043	3513	3063	3073	3523
48	3034	3044	3514	3064	3074	3524
60	3035	3045	3515	3065	3075	3525
110	3036	3046	3516	3065	3075	3526
		1)	2)		1)	2)

1) = Pin configuration standard

2) = Pin configuration reverse

Ordering Example



Accessories

Function module

ET1415.913: DC 24 V, with free-wheel diode and green LED
Article number 0056828

ET1415.911: DC 24 V, with free-wheel diode and red LED
Article number 0055909

ET1415.912: AC/DC 24 V, with varistor and green LED
Article number 0055910

ET1415.924: DC 60 V, with free-wheel diode and red LED
Article number 0062552

Socket incl. fixing clip

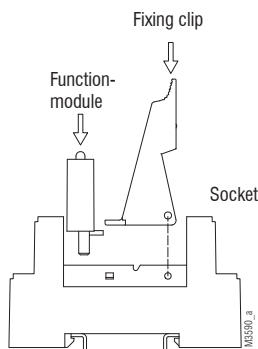
ET 1415.041: with screw terminals
Article number 0055571

ET 1415.044: with screw terminals and safe separation
Article number 0059274

ET 1415.047: with cage clamp terminals
Article number 0059270

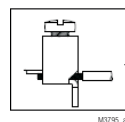
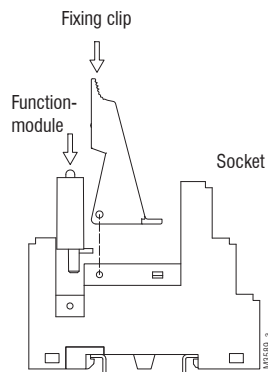
Accessories

Socket ET 1415.041



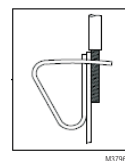
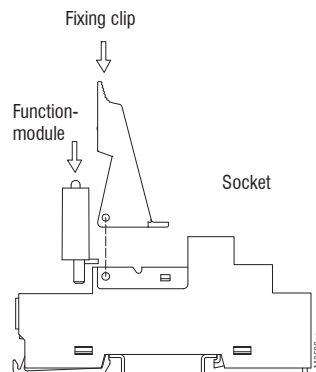
- Socket for DIN-rail
- incl. fixing clip

Socket ET 1415.044



Screw terminals

Socket ET 1415.047



Cage clamp terminals

- Socket for DIN-rail
- incl. fixing clip
- incl. safe separation between coil and contacts according to DIN EN 60947-1, DIN EN 61140, DIN EN 60204

Degree of protection

Terminals: IP 20 IEC/EN 60529

Terminal designation: EN 50005

Wire connection

ET 1415.041, ET 1415.044: 0.14 ... 2.5 mm² solid (14 - 20 AWG)
0.14 ... 2.5 mm² stranded (14 - 20 AWG)
0.14 ... 1.5 mm² sleeved end (14 - 25 AWG)

ET 1415.047: 2 x (0.2 ... 1.5) mm² solid (16 - 25 AWG)
2 x (0.2 ... 1.5) mm² stranded (16 - 25 AWG)
2 x (0.2 ... 1.5) mm² sleeved end (16 - 25 AWG)

Wire fixing:

ET 1415.041, ET 1415.044: Screw terminals
ET 1415.047: Cage clamp terminals

Mounting: DIN-rail IEC/EN 60715

Weight:

ET 1415.041: approx. 38.5 g
ET 1415.044: approx. 43.5 g
ET 1415.047: approx. 42.0 g

Dimensions

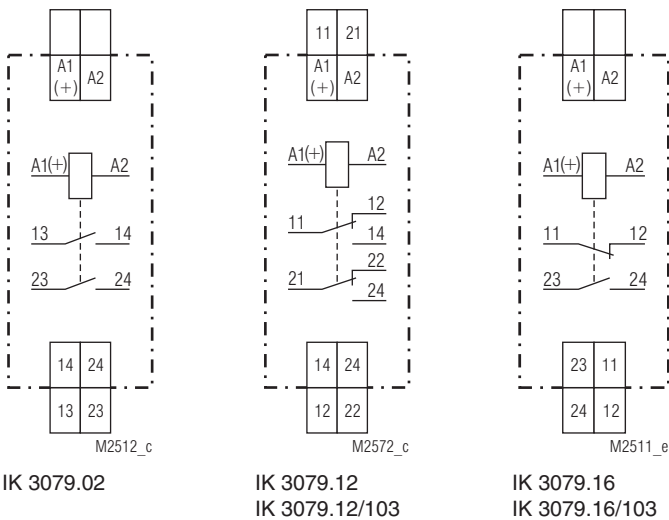
Width x height x depth:

ET 1415.041: 15.8 x 75 x 69.0 mm
ET 1415.044: 15.8 x 75 x 75.0 mm
ET 1415.047: 15.8 x 97 x 75.5 mm



- According to IEC/EN 61 810-1
- With input protection circuit against voltage peaks
- Forcibly guided contacts according to IEC 61810-3
- I_{th} max. 8 A or 2 x 5 A
- Functional display by LED
- Optionally 2 NO or 2 changeover contacts or 1 NO and 1 NC
- IK 3079/103: with forcibly guided contacts according to ZH/457
- DIN rail or screw mounting
- 17.5 mm width

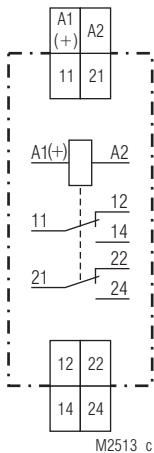
Circuit Diagrams



IK 3079.02

IK 3079.12
IK 3079.12/103

IK 3079.16
IK 3079.16/103



IK 3079.12 (special version)

Connection Terminals

Terminal designation	Signal description
A1+	L / +
A2	N / -
11, 12	NC contact
13, 14; 23, 24	NO contacts
11, 12, 14 21, 22, 24	C/O contacts

Approvals and Markings



Indicator

green LED: on, when control voltage connected

Technical Data

Input

Nominal voltage U_N :
 IK 3079.02, IK 3079.16: AC/DC 24 V
 IK 3079.12: AC/DC 24 V, AC 230 V
 IK 3079.12/103, IK 3079.16/103: DC 24 V
Voltage range: AC 0.8 ... 1.1 U_N , DC 0.9 ... 1.2 U_N
Nominal consumption: approx. 0.9 W
Nominal frequency: 50 / 60 Hz
Frequency range: $\pm 5\%$ of nominal frequency

Output

Contacts

IK 3079.02: 2 NO contacts
 IK 3079.12, IK 3079.12/103: 2 changeover contacts
 IK 3079.16, IK 3079.16/103: 1 NC and 1 NO contact
Response time: ≤ 8 ms
Release time: ≤ 15 ms
Contact type: Spring contact
Nominal output voltage: AC 10 V ... AC 400 V
Thermal current I_{th} : max. 8 A or 2 x 5 A simultaneous
Switching capacity
 to AC 15:
 NO contact: 3 A / AC 230 V IEC/EN 60 947-5-1
 NC contact: 1 A / AC 230 V IEC/EN 60 947-5-1
Electrical life
 to AC 15 at 1 A, AC 230 V: $\geq 2.5 \times 10^5$ switching cycles
Permissible switching frequency: max. 10 switching cycles / s
Switching capacity
min. / max.: 0.1 VA / 2 000 VA
 or 2 x 1250 VA simultaneous
 0.1 W / 200 W
 $\geq 50 \times 10^6$

Mechanical life:

General Data

Operating mode: Continuous operation
Temperature range
 IK 3079
 Operation: - 25 ... + 60 °C
 Storage: - 25 ... + 70 °C
 IK 3079/103
 Operation: - 20 ... + 85 °C
 Storage: - 25 ... + 90 °C
Relative air humidity: 93 % bei 40 °C
Altitude: < 2,000 m

Technical Data

Clearance and creepage distances

rated impulse voltage /
pollution degree
Input / Output:
Output / Output:

4 kV / 2 IEC 60 664-1
2.5 kV / 2 IEC 60 664-1
only for 1-phase systems
(same phase)

EMC

Electrostatic discharge: 8 kV (air) IEC/EN 61 000-4-2
HF-irradiation
80 MHz ... 1 GHz: 10 V / m IEC/EN 61 000-4-3
1 GHz ... 2.7 GHz: 10 V / m IEC/EN 61 000-4-3
Fast transients: 4 kV IEC/EN 61 000-4-4
Surge voltages
between
wires for power supply: 2 kV IEC/EN 61 000-4-5
between wire and ground: 4 kV IEC/EN 61 000-4-5
Interference suppression: Limit value class B EN 55011

Degree of protection:

Housing: IP 40 IEC/EN 60 529
Terminals: IP 20 IEC/EN 60 529

Housing:

Thermoplastic with V0-behaviour
according to UL subject 94

Vibration resistance:

Amplitude 0.35 mm
frequency 10 ... 55 Hz IEC/EN 60 068-2-6
Humid heat IEC/EN 60 068-1

Climate resistance:

Terminal designation:

Wire connection:

2 x 2.5 mm² solid or
2 x 1.5 mm² stranded ferruled
DIN 46 228-1/-2/-3/-4

Wire fixing:

Flat terminals with self-lifting
clamping piece IEC/EN 60 999-1

Fixing torque:

0.8 Nm

Mounting:

DIN rail mounting (IEC/EN 60715) or
screw mounting M4, 90 mm hole pattern,
with additional clip available as accessory
60 g

Weight:

Dimensions

Width x height x depth: 17.5 x 89 x 58 mm

Standard Type

IK 3079.16 AC/DC 24 V

Article number: 0041187
• Temperature range: -20 ... +55 °C
• Output: 1 NC, 1 NO contact
• Nominal voltage U_N: AC/DC 24 V
• Width: 17.5 mm

IK 3079.16/103 DC 24 V

Article number: 0053851
• Temperature range: -20 ... +85 °C
• Output: 1 NC, 1 NO contact
• Nominal voltage U_N: AC/DC 24 V
• Width: 17.5 mm

Ordering Example

IK 3079 .16 AC/DC 24 V 50 / 60 Hz

Nominal frequency
Nominal voltage
Contact
Type

IK 3079 .16 /103 DC 24 V 50 / 60 Hz

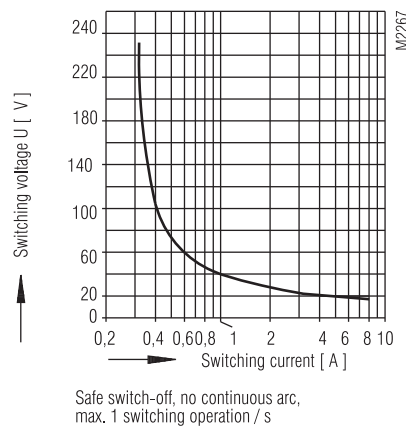
Nominal frequency
Nominal voltage
Temperature range:
-20 ... +85 °C
Contact
Type

Accessories

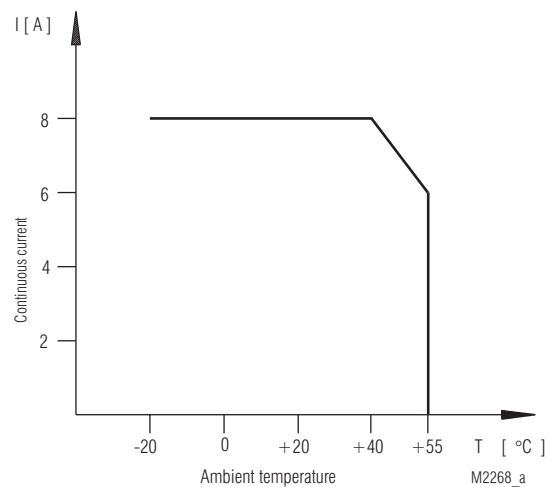
ET 4086-0-2:

Additional clip for screw mounting
Article number: 0046578

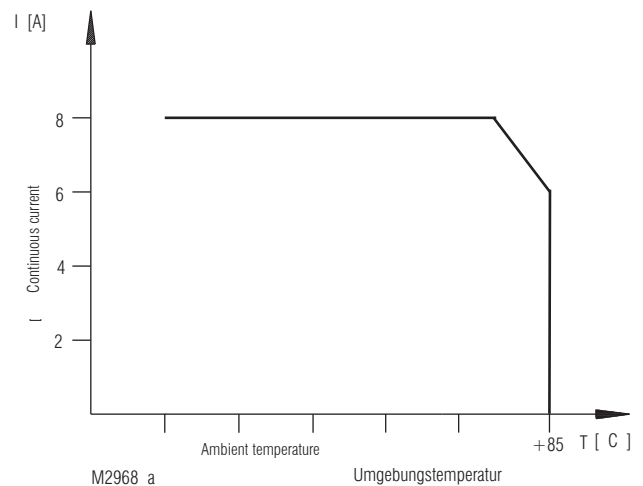
Characteristics



Limit curve for arc-free operation under ohmic load



IK 3079: Continuous current limit curve as a function of the ambient temperature (only for not mounted devices)



IK 3079/103: Continuous current limit curve as a function of the ambient temperature (only for not mounted devices)

SAFEMASTER Interface Module HC 3096N, HL 3096N



0270331



Your Advantages

- Simple contact extension and re-reinforcement also of safety modules
- Cost and space saving alternative compared to contactors
- Simple contact monitoring via forcibly guided NC contact
- large wire cross section 0.5 - 2.5 mm² (12-24 AWG) reduces thermal load on wires

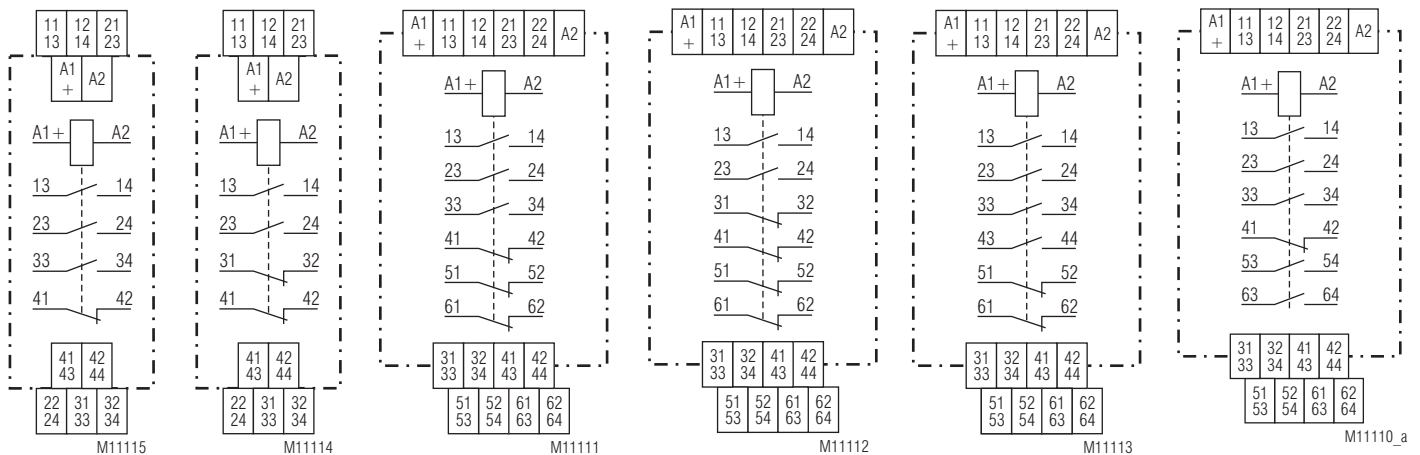
Features

- According to DIN EN 61810-1, IEC 60664-1, IEC/EN 60 947-5-1
- With forcibly guided contacts according to IEC 61810-3
- Models with soldered in or plug-in PCB safety relay consisting of:
 - plug in socket HC 3096N and safety relay OA 5611
 - plug in socket HL 3096N and safety relay OA 5612
- With polarity protected diode
- Optionally with free-wheeling diode across A1+ and A2
- Optionally AgNi + 0,2 µm Au or AgNi + 5 µm Au
- For DIN rail mounting according IEC/EN 60715
- HC 3096N: width 18 mm
- HL 3096N: width 36 mm

Approvals and Markings



Circuit Diagrams



HC 3096N.48

HC 3096N.52

HL 3096N.18

HL 3096N.50

HL 3096N.54

HL 3096N.60

HC 3096N/10_ + OA 5611.48

HC 3096N/10_ + OA 5611.52

HL 3096N/10_ + OA 5612.18

HL 3096N/10_ + OA 5612.50

HL 3096N/10_ + OA 5612.54

HL 3096N/10_ + OA 5612.60

Connection Terminals

Terminal designation	Signal description
A1+	L / +
A2	N / -
41, 42 / 61, 62	NC contact
All other contacts see relevant circuit diagram	NC contacts / or NO contacts

Technical Data

Input

Nominal voltage U_N:	DC 24, 60, 110 V other voltages on request
Voltage range:	0.8 ... 1.1 U_N
Nominal consumption	
HC 3096N:	0.6 W
HL 3096N:	0.8 W
HL 3096N.50:	1.0 W

Output

Contacts:		
HC 3096N.52, OA 5611.52:	2 NO and 2 NC contacts	
HC 3096N.48, OA 5611.48:	3 NO and 1 NC contacts	
HL 3096N.18, OA 5612.18:	3 NO and 3 NC contacts	
HL 3096N.50, OA 5612.50:	2 NO and 4 NC contacts	
HL 3096N.54, OA 5612.54:	4 NO and 2 NC contacts	
HL 3096N.60, OA 5612.60:	5 NO and 1 NC contacts	
Contact material:	AgNi + 0,2 μ m Au, AgNi + 5 μ m Au other on request	
Contact type:	spring contact	
Operate time:	typical 20 ms	
Release time:	typical 6 ms	
Measured nominal voltage:	AC 250 V	
Thermal current I_{th}		
HC 3096N:	3 x 5 A	
HL 3096N:	4 x 5 A	
Switching capacity		
to AC 15		
NO contact:	3 A / AC 230 V	IEC/EN 60 947-5-1
NC contact:	2 A / AC 230 V	IEC/EN 60 947-5-1
to DC 13		
NO contact:	2 A / DC 24 V	IEC/EN 60 947-5-1
NC contact:	2 A / DC 24 V	IEC/EN 60 947-5-1
according to DC 13		
NO contact:	4 A / 24 V at 0.1 Hz	
NC contact:	4 A / 24 V at 0.1 Hz	
Electrical life		
HC 3096N		
to AC 230 V / 5 A $\cos\phi = 1$:	$\geq 2 \times 10^5$ switching cycles	
HL 3096N		
at DC 24 V / 5 A ohmic:	$\geq 2 \times 10^5$ switching cycles	
Permissible switching frequency:	10 switching cycles / s	
Short circuit strength		
max. fuse rating:	6 A gG / gL	IEC/EN 60 947-5-1
Mechanical life:	$\geq 50 \times 10^6$ switching cycles	

General Data

Operating mode:	Continuous operation	
Temperature range:		
Operation:	- 40 ... + 55 °C	
Storage:	- 25 ... + 70 °C	
Relative air humidity:	93 % at 40 °C	
Altitude:	< 2.000 m	
Clearance and creepage distances		
rated impulse voltage / pollution degree		
Input / output		
HC devices:	6 kV / 2	IEC 60 664-1
HL devices:	4 kV / 2	IEC 60 664-1
output / output:	4 kV / 2	IEC 60 664-1
Overvoltage category:	III	
Insulation test voltage, type test:	2,5 kV; 1 min	
EMC		
Electrostatic discharge:	8 kV (air)	IEC/EN 61 000-4-2
HF-irradiation		
80 MHz ... 1 GHz:	20 V / m	IEC/EN 61 000-4-3
1 GHz ... 2,7 GHz:	10 V / m	IEC/EN 61 000-4-3
Fast transient:	4 kV	IEC/EN 61 000-4-4
Surge voltages between		
wires for power supply:	1 kV	IEC/EN 61 000-4-5
between wire and ground:	2 kV	IEC/EN 61 000-4-5
HF-wire guided:	10 V	IEC/EN 61 000-4-6
Interference suppression:	Limit value class B	EN 55 011

Technical Data

Degree of protection

Housing:	IP 40	IEC/EN 60 529
Terminals:	IP 20	IEC/EN 60 529

Housing:

Housing:	Thermoplastic
Vibration resistance:	Amplitude 0.35 mm Frequency 10 ... 55 Hz, IEC/EN 60 068-2-6
Climate resistance:	Humid heat IEC/EN 60 068-2-30

Terminal designation:

Terminal designation:	EN 50 005
-----------------------	-----------

Wire connection:

Wire connection:	0.5 ... 2,5 mm ² solid 0.5 ... 2,5 mm ² flexible Captive slotted screw 0,5 Nm
Mounting:	DIN rail IEC/EN 60 715

Wire fixing:

Fixing torque:

Weight

Weight	
HC 3096N:	approx. 71 g
HL 3096N:	approx. 90 g

Dimensions

Width x height x depth

HC 3096N:	18 x 106 x 65 mm
HL 3096N:	36 x 106 x 65 mm

UL Data

Nominal voltage U_N:	DC 6 ... 110 V
Switching capacity:	
Ambient temperature 60 °C:	Pilot duty B300 5 A 250Vac G. P. 5 A 24Vdc 0.4 A 250Vac resistive
Wire connection:	60°C / 75°C copper conductors only AWG 24 - 12 torque value 4.4 lb-in



Technical data that is not stated in the UL-Data, can be found in the technical data section.

Classification to DIN EN 50155

Vibration and shock resistance:	Category 1, Class B	IEC/EN 61 373
Ambient temperature:	T1, T2, T3 and TX compliant	
Voltage range:	0.7 ... 1.25 U_N with operational limitations	
Protective coating of the PCB:	No	

Standard Types

HC 3096N.48/400 DC 24 V	
Article number:	0066000
• 3 NO, 1 NC contact	
• AgNi + 0.2 μ m Au	
• Width:	18 mm
HL 3096N.54/400 DC 24 V	
Artikelnummer:	0066040
• 4 NO, 2 NC contact	
• AgNi + 0.2 μ m Au	
• Width:	36 mm

Ordering Example

H_ 3096N. _ _ / _ _ /61 DC 24 V	
	Nominal voltage
	with UL approval
	0: Ag Ni
	1: AgNi + 5 μ m Au
	0: Standard
	4: with LED
	9: with free-wheeling diode and LED
	Contacts
	C: 4 Contacts; width: 18 mm
	L: 6 Contacts; width: 36 mm

Variants

Plug in socket
H_3096N /102: Plug in socket with free-wheeling diode and LED
H_3096N /103: Plug in socket with LED

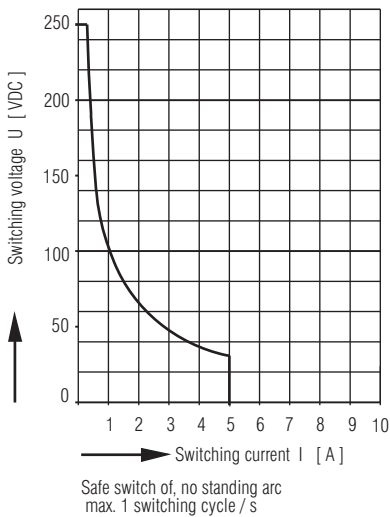
further variants on request

Ordering example for variants

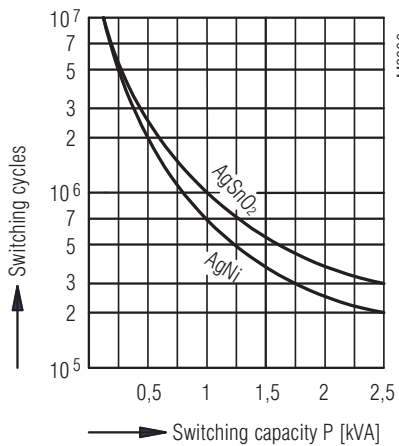
H_3096N / 10 _ /61 DC 24 V

Nominal voltage
with UL-approval
2: Plug in socket with free-wheeling diode and LED
3: Plug in socket with LED
0: Standard
1: Plug in socket
C: 4 Contacts; width: 18 mm
L: 6 Contacts; width: 36 mm

Characteristic



Arc limit curve under resistive load



Contact service life

Connection example for HC 3096N/10_/61

Relay: OA 5611.52 ≅ 2 NO contacts and 2 NC contacts (Standard)

Contact	Contact-type	Connection
1	NO contact	13, 14
2	NO contact	23, 24
3	NC contact	31, 32
4	NC contact	41, 42

The terminal assignment is according to the diagram on the installed relay

Connection example for HC 3096N/10_/61

Relay: OA 5612.18 ≅ 3 NO contacts and 3 NC contacts (Standard)

Contact	Contact-type	Connection
1	NO contact	13, 14
2	NO contact	23, 24
3	NO contact	33, 34
4	NC contact	41, 42
5	NC contact	51, 52
6	NC contact	61, 62

The terminal assignment is according to the diagram on the installed relay



Safety Notes



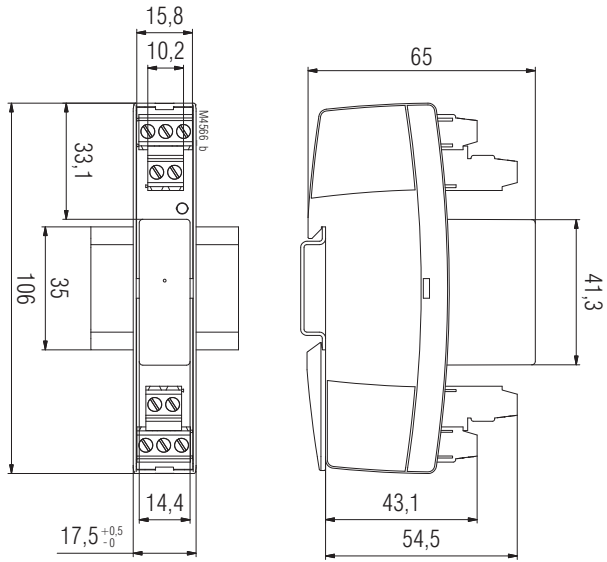
Dangerous voltage.
Electric shock will result in death or serious injury.



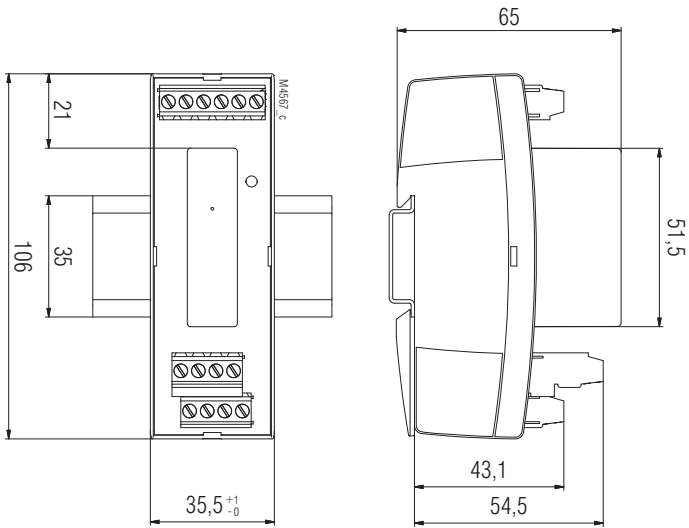
Disconnect all power supplies before servicing equipment.

- Faults must only be removed when the relay is disconnected
- The user has to make sure that the device and corresponding components are installed and wired according to the local rules and law (TUEV, VDE, Health and safety).
- Installation work must only be done when power is disconnected.

Dimensions with safety relay

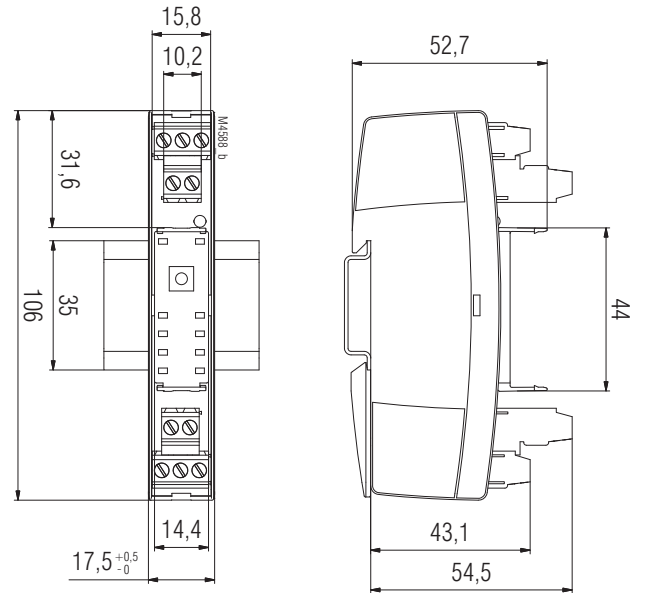


HC 3096N

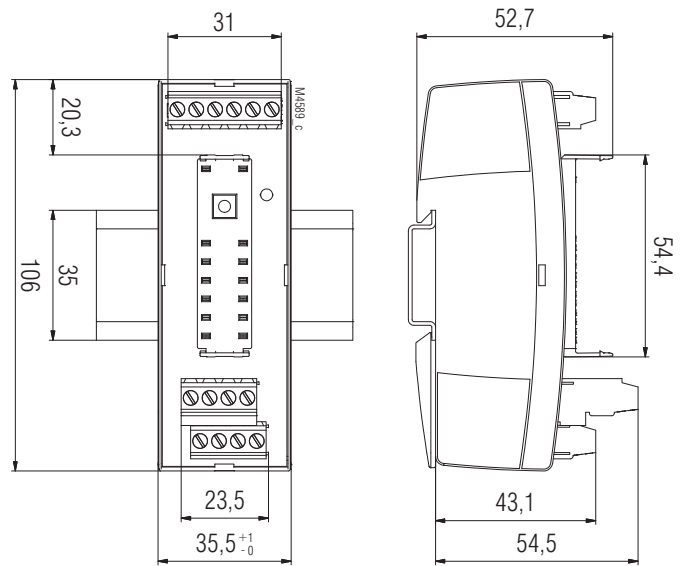


HL 3096N

Dimensions with plug in socket



HC 3096N



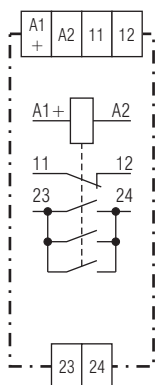
HL 3096N



Product Description

The interface module HK 3087N has forcibly guided contacts. Therefore it can be used to safely separate control and load circuits as well as to reinforce contacts of safety devices. The interface module has a strong isolation between monitoring and load contact and is designed for high thermal current.

Circuit Diagram



M11283_a

HK 3087N.16

Connection Terminals

Terminal designation	Signal description
A1+	+ 24 V DC Coil
A2	GND Coil
11, 12	Forcibly guided indicator contact
23, 24	Forcibly guided load contact

Your Advantages

- Simple contact extension and re-inforcement also of safety modules
- Cost and space saving alternative compared to contactors
- Simple contact monitoring via forcibly guided NC contact
- large wire cross section 0.5 - 6 mm² (10 - 24 AWG) reduces thermal load on wires

Features

- According to IEC/EN 61810-1, IEC 60664-1,
- With forcibly guided contacts according to IEC 61810-3
- Models with soldered in PCB safety relay
- With polarity protected diode
- Optionally with free-wheeling diode across relay coil
- With LED indicator
- Optionally AgNi + 0,2 µm Au or AgNi + 5 µm Au
- For DIN rail mounting according IEC/EN 60715
- Clearance and creepage distance between NC and NO contact > 10 mm
- Width 22,5 mm

Approvals and Markings



Applications

- Interfacing between control and load circuits
- Contact extension and re-inforcement
- Separate switching of several current circuits, e. g. at
 - Machines and plants,
 - Energy production and transport

Indicator

green LED: on, when supply connected

Technical Data

Input

Nominal voltage U_N : DC 24 V (andere auf Anfrage)
Voltage range: 0,8 ... 1,2 U_N
Nominal consumption: 1,0 W

Output

Contacts

HK 3087.16, OA 5602.48: 1 NO and 1 NC contact

Contact material: AgSnO₂ + 0,2 µmAu
 other on request

Contact type: spring contact

Operate time: max. 20 ms

Release time: max. 39 ms

Nominal output voltage: AC 250 V

Thermal current I_{th}

NO contact: 25 A

NC contact: 5 A

Switching capacity

to AC 15

NO contact: 5 A / AC 230 V IEC/EN 60 947-5-1

NC contact: 2 A / AC 230 V IEC/EN 60 947-5-1

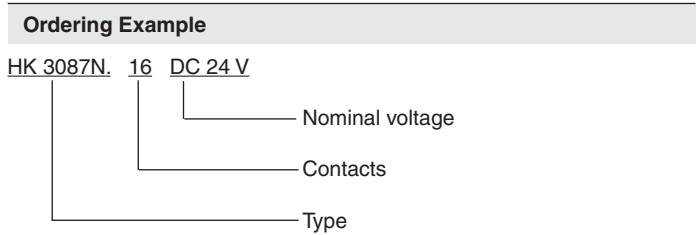
to DC 13

NO contact: 4 A / DC 24 V IEC/EN 60 947-5-1

NC contact: 2 A / DC 24 V IEC/EN 60 947-5-1

Technical Data	
Electrical life	
NO contact	
to AC 15 at 1 A, AC 230 V:	1.5 x 10 ⁶ switch. cycl. IEC/EN 60 947-5-1
to AC 15 at 0.5 A, AC 230 V:	2.5 x 10 ⁶ switch. cycl. IEC/EN 60 947-5-1
NC contact	
to AC 15 at 1 A, AC 230 V:	1 x 10 ⁶ switch. cycl. IEC/EN 60 947-5-1
to DC 13 at 1 A, DC 24 V:	0.5 x 10 ⁶ switch. cycl. IEC/EN 60 947-5-1
Short circuit strength	
max. fuse rating	
NO contact:	32 A gL IEC/EN 60 947-5-1
NC contact	6 A gL IEC/EN 60 947-5-1
Mechanical life: ≥ 50 x 10 ⁶ switching cycles	
General Data	
Operating mode: Continuous operation	
Temperature range: - 40 ... + 55°C	
Clearance and creepage distances	
between NC contact, auxiliary voltage and NO contact:	> 10 mm
rated impulse voltage / pollution degree:	6 kV / 2 IEC 60 664-1
Clearance and creepage distances	
between auxiliary voltage and NC contact:	> 3 mm
rated impulse voltage / pollution degree:	4 kV / 2 IEC 60 664-1
EMC	
Electrostatic discharge:	8 kV (air) IEC/EN 61 000-4-2
HF irradiation:	10 V / m IEC/EN 61 000-4-3
Fast transient:	4 kV IEC/EN 61 000-4-4
Surge voltages	
between	
wires for power supply:	1 kV IEC/EN 61 000-4-5
between wire and ground:	2 kV IEC/EN 61 000-4-5
HF-wire guided:	10 V IEC/EN 61 000-4-6
Interference suppression:	Limit value class B EN 55 011
Degree of protection	
Housing:	IP 40 IEC/EN 60 529
Terminals:	IP 20 IEC/EN 60 529
Housing: Thermoplastic	
Vibration resistance: Amplitude 0.35 mm	
Frequency 10 ... 55 Hz, IEC/EN 60 068-2-6	
Climate resistance: Humid heat IEC/EN 60 068-2-30	
Terminal designation: EN 50 005	
Leiteranschluß:	
NC contact	NO contact
auxiliary voltage	
0.5 ... 2.5 mm ² solid	0,5 ... 6 mm ² solid
0.5 ... 2.5 mm ² flexible	0,5 ... 4 mm ² flexible
Wire connection: Cable wedging according to the elevator principle with captive plus-minus-terminal screws	
Mounting: DIN rail IEC/EN 60 715	
Weight: approx. 130 g	
Dimensions	
Width x height x depth: 22.5 x 106 x 75 mm	

Standard Type	
HK 3087N.16 DC 24 V	
Article number:	0066764
<ul style="list-style-type: none"> • 1 NO contact , 1 NC contact • Contact material AgSnO₂ + 0.2 µm Au • Width: 22.5 mm 	



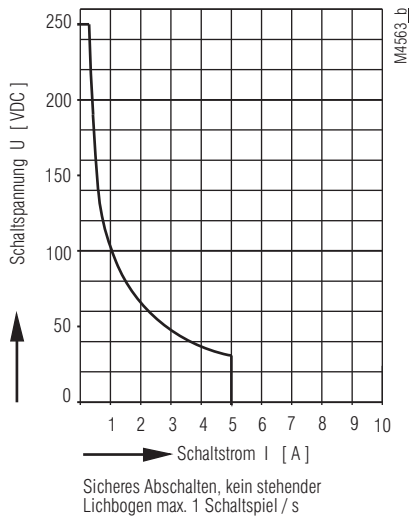
Connection Example for HK 3087N.16

Relay: OA 5602.48 ≅ 1 NO contact and 1 NO contact (standard)

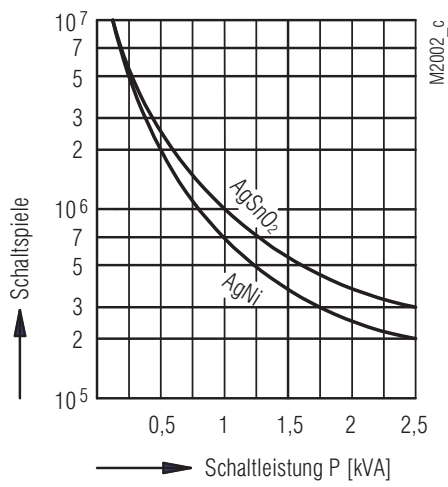
A1+ A2	Contact	Contact-type	Connection
	1	NC contact	11, 12
	2	NO contact	23, 24

The terminal assignment is according to the diagram on the installed relay

Characteristic (NC contact)

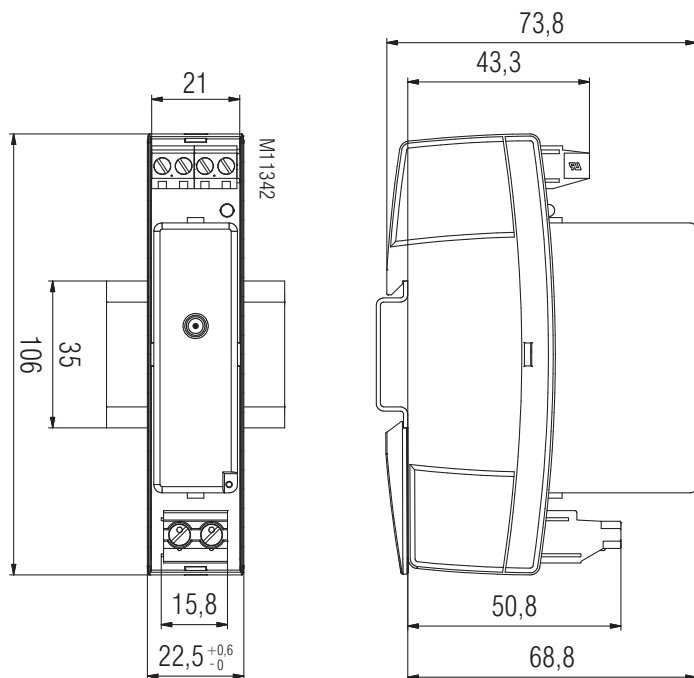


Arc limit curve under resistive load



Contact service life

Dimension

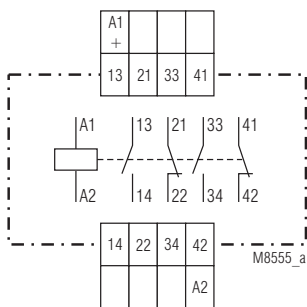


SAFEMASTER
Interface Modules
LG 3096, MK 3096N

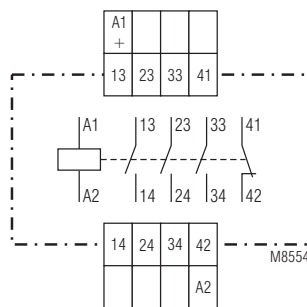


- With **forcibly guided** contacts according to IEC 61810-3
- Max. 6 contacts
- As option goldplated contacts to switch low loads
- Wire connection: also 2 x 1.5 mm² stranded ferruled, or 2 x 2.5 mm² solid DIN 46 228-1/-2/-3/-4
- As option with pluggable terminal blocks for easy exchange of devices
 - with screw terminals
 - or with cage clamp terminals
- Width 22.5 mm

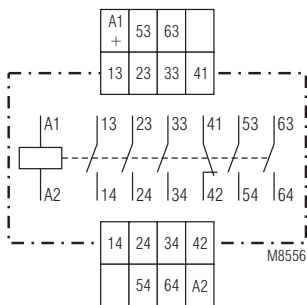
Circuit Diagrams



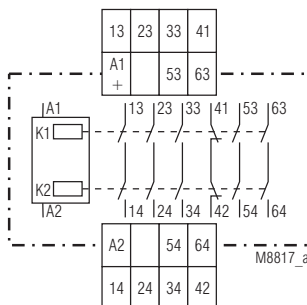
LG 3096.52
MK 3096N.52



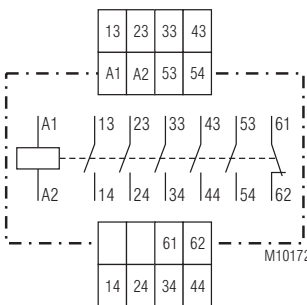
LG 3096.48
MK 3096N.48



LG 3096.60
MK 3096N.60



MK 3096N.60/100



LG 3096.60/300

Approvals and Markings



* see variants

Application

- Switching device with the possibility to monitor the contact status via forcibly guided NC contacts.

Connection Terminals

Terminal designation	Signal description
A1 / A2	Supply voltage
13, 14, 23, 24, 33, 34, 43, 44, 53, 54, 63, 64	Forcibly guided NO contacts
21, 22, 41, 42, 61, 62	Forcibly guided NC contacts

Technical Data

Input

Nominal voltage U_N :

LG 3096: DC 24, 48 V; AC 100, 230 V

MK 3096: DC 24, 48 V

Voltage range: 0.8... 1.1 U_N

Nominal consumption 0.6 W

Output

Contacts:

MK 3096.52, LG 3096.52: 2 NO and 2 NC contacts

MK 3096.48, LG 3096.48: 3 NO and 1 NC contacts

MK 3096.60, LG 3096.60: 5 NO and 1 NC contacts

Contact type: forcibly guided

Operate time: typical 20 ms

Release time: typical 15 ms

Nominal output voltage: AC 250 V

Thermal current I_{th} 5 A

Switching capacity

to AC 15

NO contacts: 3 A / AC 230 V IEC/EN 60 947-5-1

NC contacts: 2 A / AC 230 V IEC/EN 60 947-5-1

to DC 13

NO contacts: 1 A / DC 24 V IEC/EN 60 947-5-1

NC contacts: 1 A / DC 24 V IEC/EN 60 947-5-1

to DC 13

(switching frequency: 0.1 Hz): 0,5 A / DC 110 V

4 A / DC 24 V

2 contacts in series: 1 A / DC 110 V

MK 3096N/100: 1 A / DC 110 V

2 contacts in series: 4 A / DC 110 V

Electrical life IEC/EN 60 947-5-1

NO contacts:

to AC 15 at 3 A, AC 230 V: 1.5 x 10⁵ switching cycles

NO contacts:

to AC 15 at 2 A, AC 230 V: 3 x 10⁵ switching cycles

NC contacts:

to AC 15 at 2 A, AC 230 V: 1 x 10⁵ switching cycles

Permissible switching

frequency: 10 switching cycles / s

Switching voltage min./max.: AC/DC 10 V / DC 250 V, AC 400 V

Switching current min./max.: 10 mA / 5 A

Switching capacity min./max.: 3 VA / 1250 VA

3 W / 200 W

Short circuit strength

max. fuse rating:

LG 3096: 10 A gL IEC/EN 60 947-5-1

MK 3096N: 10 A gL IEC/EN 60 947-5-1

Mechanical life: ≥ 20 x 10⁶ switching cycles

General Data

Operating mode: Continuous operation

Temperature range:

Operation: - 20 ... + 60°C

Storage: - 40 ... + 60°C

Altitude: < 2.000 m

Clearance and creepage distances

rated impulse voltage / pollution degree: 4 kV / 2 IEC 60 664-1

EMC

Electrostatic discharge: 8 kV (air) IEC/EN 61 000-4-2

HF irradiation: 10 V / m IEC/EN 61 000-4-3

Fast transients: 4 kV IEC/EN 61 000-4-4

Surge voltages

between

wires for power supply: 2 kV IEC/EN 61 000-4-5

between wire and ground: 4 kV IEC/EN 61 000-4-5

Interference suppression: Limit value class B EN 55 011

Degree of protection

Housing: IP 40 IEC/EN 60 529

Terminals: IP 20 IEC/EN 60 529

Housing: Thermoplastic

Vibration resistance: Amplitude 0.35 mm, frequency 10 ... 55 Hz, IEC/EN 60 068-2-6

Technical Data

Climate resistance: 20 / 060 / 04 IEC/EN 60 068-1

Terminal designation: EN 50 005

Wire connection DIN 46 228-1/-2/-3/-4

Screw terminals (integrated): 1 x 4 mm² solid or 1 x 2.5 mm² stranded ferruled (isolated) or 2 x 1.5 mm² stranded ferruled (isolated) or 2 x 2.5 mm² solid

Insulation of wires or sleeve length: 8 mm

Plug in with screw terminals

max. cross section for connection: 1 x 2.5 mm² solid or 1 x 2.5 mm² stranded ferruled (isolated)

Insulation of wires or sleeve length: 8 mm

Plug in with cage clamp terminals

max. cross section for connection: 1 x 4 mm² solid or 1 x 2.5 mm² stranded ferruled (isolated)

min. cross section for connection: 0.5 mm²

Insulation of wires or sleeve length: 12 ±0.5 mm

Wire fixing: Plus-minus terminal screws M 3.5 box terminals with wire protection or cage clamp terminals

Fixing torque: 0.8 Nm

Mounting: DIN rail IEC/EN 60 715

Weight 160 g

Dimensions

Width x height x depth

LG 3096: 22.5 x 90 x 121 mm

LG 3096 PC: 22.5 x 111 x 121 mm

LG 3096 PS: 22.5 x 104 x 121 mm

MK 3096N: 22.5 x 90 x 102 mm

MK 3096N PC: 22.5 x 111 x 102 mm

MK 3096N PS: 22.5 x 104 x 102 mm

Classification to DIN EN 50155 for MK 3096N

Vibration and

shock resistance: Category 1, Class B IEC/EN 61 373

Protective coating of the PCB: No

CSA-Data for LG 3096

Switching capacity: 3A 250Vac

Wire connection: 60°C / 75°C copper conductors only

Fixed screw terminal: AWG 20 - 12 Sol/Str Torque 0.8 Nm

Plug in screw terminal: AWG 20 - 14 Sol Torque 0.8 Nm
AWG 20 - 16 Str Torque 0.8 Nm

Plug in cage clamp terminal: AWG 20 - 12 Sol/Str Torque 0.8 Nm

 **Technical data that is not stated in the CSA-Data, can be found in the technical data section.**

CCC-Data for MK 3096N

Thermal current I_{th} : 4 A

Switching capacity

to AC 15: 1,5 A / AC 230 V IEC/EN 60 947-5-1

to DC 13: 1 A / DC 24 V IEC/EN 60 947-5-1

 **Technical data that is not stated in the CCC-Data, can be found in the technical data section.**

Standard Types

LG 3096.60 DC 24 V

Article number: 0056147
 • Output: 5 NO and 1 NC contacts
 • Width: 22.5 mm

MK 3096N.60 DC 24 V

Article number: 0055931
 • Output: 5 NO and 1 NC contacts
 • Width: 22.5 mm

Variants

LG 3096._._/004

MK 3096N._._/004: With gold plated contacts to switch low loads.
 Because of the gold plated contacts the MK 3096N._._/004, LG 3096._._/004 can be used to switch small loads 1 mVA ... 7 VA, 1 mW ... 7 W in the range of 0.1 ... 60 V, 1 ... 300 mA. The gold plated contacts allow also to switch the maximum current but the gold plating will be burnt off. After that the contacts cannot be used any more to switch the small loads.

LG 3096._._/300:

AC-units

LG 3096._._/304:

AC-units with gold plated contacts with CSA-approval (Canada/USA), on request

LG 3096._._/60:

MK 3096N/100:

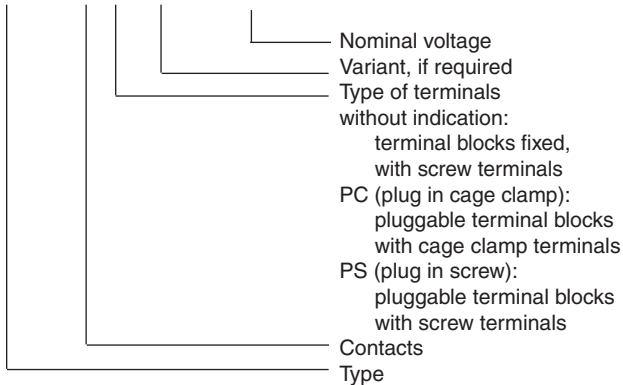
2 contacts switched internally in series.

MK 3096N:

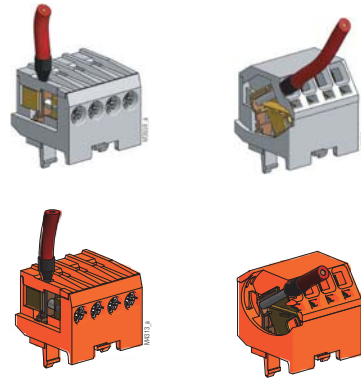
with CCC-approval on request

Ordering example for variants

MK 3096N._. PS/ . DC 24 V



Options with Pluggable Terminal Blocks



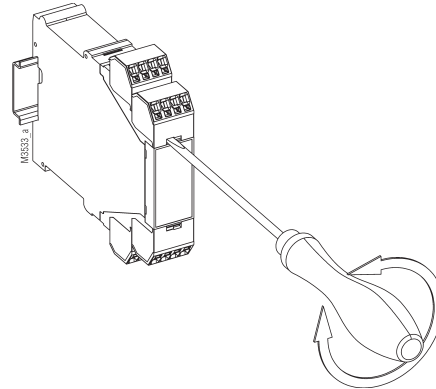
Screw terminal
 (PS/plugin screw)

Cage clamp terminal
 (PC/plugin cage clamp)

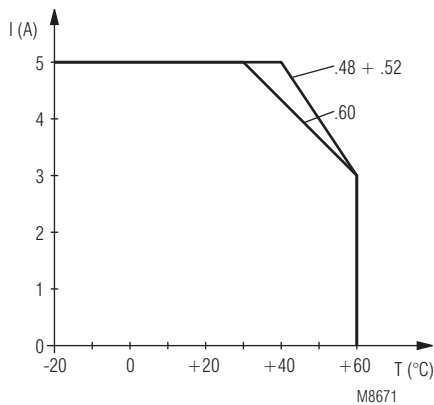
Notes

Removing the terminal blocks with cage clamp terminals

1. The unit has to be disconnected.
2. Insert a screwdriver in the side recess of the front plate.
3. Turn the screwdriver to the right and left.
4. Please note that the terminal blocks have to be mounted on the belonging plug in terminations.



Characteristic



SAFEMASTER Interface Module UG 3088



0270828

Your Advantages

- According to IEC/EN 60 947-5-1
- Economic and space saving because of 2 separate interface modules in one enclosure
- Simple contact multiplication and reinforcement - also of safety modules
- Cost and space saving alternative compared to contactors
- Simple contact monitoring by forcibly guided contacts
- With pluggable terminal blocks for easy exchange of devices

Features

- With forcibly guided contacts according to IEC 61810-3
- Version with up to 2 x 4 contacts
- Variant to switch high DC-load
- Width: 22,5 mm

Product Description

The interface module UG3088 includes 2 separate devices in one enclosure. Because of its forcibly guided contacts a safe interfacing between control circuit and load circuit is provided. It can also be used to multiply and reinforce the contacts of safety modules. Different internal configuration possibilities allow to offer interface modules for various applications. To switch e.g. high DC loads the the output contacts can be connected in series. On the module with 2NO and 2 NC contacts these can be connected internally as changeover contacts. Also a common control of both relays with only one input can be done.

Approvals and Markings



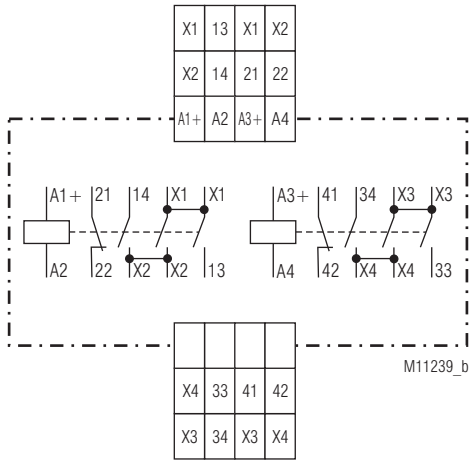
Applications

- Interfacing between control and load circuits
- Contact multiplication and reinforcement
- Separate switching of several current circuits, e. g. at
 - Machines and plants
 - Energy production and transport

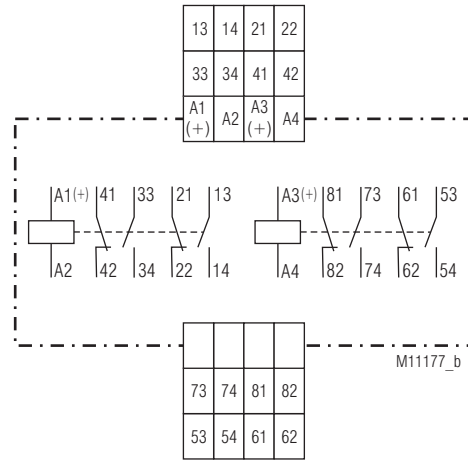
Indicators

- | | |
|--------------|--------------------------------------|
| green LED 1: | on, when supply connected at Relay 1 |
| green LED 2: | on, when supply connected at Relay 2 |

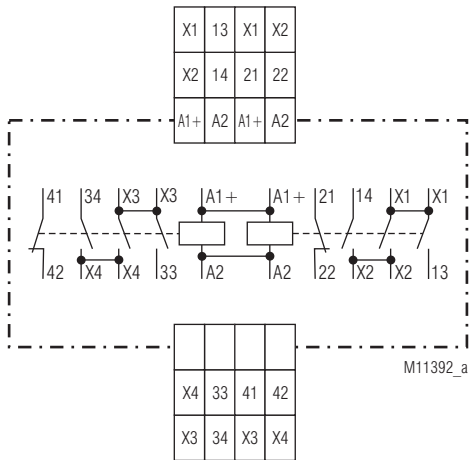
Circuit Diagrams



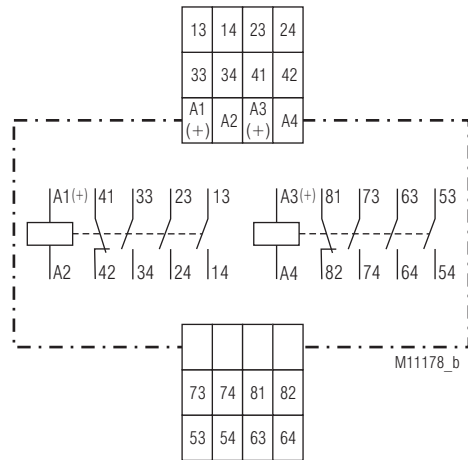
UG 3088.52PS/100



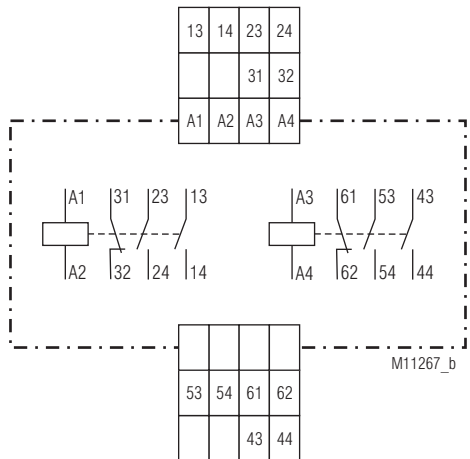
UG 3088.57



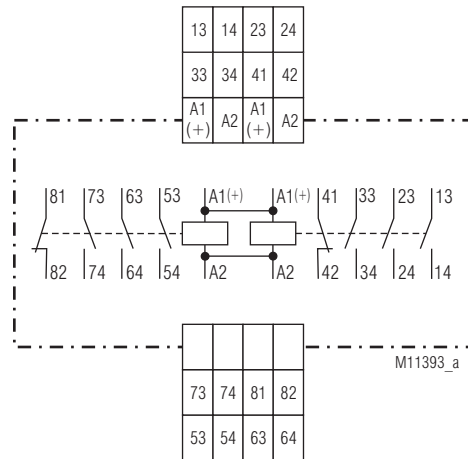
UG 3088.52/101



UG 3088.59



UG 3088.54 (AC 230 V, DC 220 V)



UG3088.59/001

Connection Terminals

Terminal designation	Signal description
A1, A2	Operation voltage Relay 1
A3, A4	Operation voltage Relay 2
13, 14, 23, 24, 33, 34 53, 54, 63, 64, 73, 74	Positive guided NO contacts for release circuit
21, 22, 41, 42, 61, 62, 81, 82	Positive guided NO contacts

Technical Data

Input

Nominal voltage U_N:	AC 24, 48, 110, 230 V DC 24, 48, 110, 220 V
Voltage range:	0.8 ... 1.1 U_N
Nominal consumption	
DC 24 V:	1.1 W
DC 110 V:	1.3 W
AC 230 V:	2.1 W
Nominal frequency:	50 / 60 Hz
Min. Off-time:	250 ms

Output

Contacts:		
UG 3088.52/100, /101:	2 NO contacts, 2 NC contacts	
UG 3088.54 (AC 230 V, DC 220 V):	4 NO contacts, 2 NC contacts	
UG 3088.57:	4 NO contacts, 4 NC contacts	
UG 3088.59, /001:	6 NO contacts, 2 NC contacts	
Contact material:	AgNi + 0.2 μ m Au	
Operate time U_N:	typical 10 ms (only for DC devices)	
Release time:	typical 15 ms (only for DC devices)	
Nominal output voltage:	AC 250 V, DC 24 V	
Thermal current I_{th}:	2,5 A	
Switching capacity		
to AC 15:		
NO contacts:	3 A / AC 230 V	IEC/EN 60 947-5-1
NC contacts:	1 A / AC 230 V	IEC/EN 60 947-5-1
to DC 13:		
NO contacts:	2 A / DC 24 V	IEC/EN 60 947-5-1
NC contacts:	2 A / DC 24 V	IEC/EN 60 947-5-1
to DC 13:		
NO contacts:	0.5 A / DC 110 V	IEC/EN 60 947-5-1
NC contacts:	0.5 A / DC 110 V	IEC/EN 60 947-5-1
Switching capacity variant /100 (internal 3 NO connected in series)		
to DC 13:		
NO contacts:	3 A / DC 110 V at 0.1 Hz	
NC contacts:	3 A / DC 110 V at 0.1 Hz	
Electrical life		
NO contacts		
to AC 15 at 1 A, AC 230 V:	1,5 x 10 ⁶ switch. cycl.	IEC/EN 60 947-5-1
NC contacts		
to AC 15 at 1 A, AC 230 V:	1 x 10 ⁶ switch. cycl.	IEC/EN 60 947-5-1
NO contacts		
to DC 13 at 1 A, DC 24 V:	0,5 x 10 ⁶ switch. cycl.	IEC/EN 60 947-5-1
Permissible switching frequency:	2 switching cycles / s	
Switching voltage min./max.:	AC/DC 10 V / AC/DC 250 V	
Switching current min./max.:	10 mA / 2,5 A	
Short circuit strength		
max. fuse rating:	6 A gG / gL	IEC/EN 60 947-5-1
Mechanical life:	$\geq 40 \times 10^6$ switching cycles	

General Data

Mounting-position:	any	
Operating mode:	Continuous operation	
Temperature range		
Operation:	- 20 ... + 60°C	
Storage:	- 40 ... + 60°C	
Altitude:	< 2,000 m	
Clearance and creepage distances		
rated impulse voltage / pollution degree:	4 kV / 2 (base insulation)	IEC 60 664-1
EMC		
Electrostatic discharge (ESD):	8 kV (air)	IEC/EN 61 000-4-2
Fast transients:	4 kV	IEC/EN 61 000-4-4
Surge voltages between		
wires for power supply:	2 kV	IEC/EN 61 000-4-5
between wire and ground:	4 kV	IEC/EN 61 000-4-5
Interference suppression:	Limit value class B	EN 55 011
Degree of protection		
Housing:	IP 20	IEC/EN 60 529
Terminals:	IP 20	IEC/EN 60 529
Housing:	Thermoplast mit V0-Verhalten nach UL Subjekt 94	

Technical Data

Vibration resistance:	Amplitude 0,35 mm, frequency 10 ... 55 Hz, IEC/EN 60 068-2-6 20 / 060 / 04 IEC/EN 60 068-1
Climate resistance:	
Terminal designation:	EN 50 005
Wire connection:	
Plugin with screw terminals	
max. cross section for connection:	1 x 0.25 ... 2.5 mm ² solid or stranded ferruled (isolated) or 2 x 0.25 ... 1.0 mm ² massiv oder stranded ferruled (isolated)
Insulation of wires or sleeve length:	7 mm
Wire fixing:	captive slotted screw
Mounting:	DIN rail IEC/EN 60 715
Weight:	approx. 180 g

Dimensions

Width x height x depth:	22.5 x 105 x 120.3 mm
--------------------------------	-----------------------

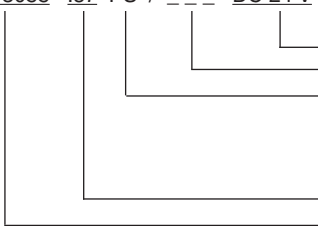
Standard Types

UG 3088.59PS DC 24 V	
Article number:	0066280
• 6 NO contacts, 2 NC contacts	
• Width:	22.5 mm
UG 3088.57PS DC 110 V	
Article number:	0066380
• 4 NO contacts, 4 NC contacts	
• Width:	22.5 mm

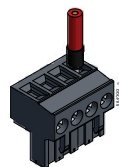
Variants

UG 3088._ _PS/100:	With contacts connected in series to switch high DC-loads. Separate control of the 2 relays
UG 3088._ _PS/101:	With contacts connected in series to switch high DC-loads. Common control of the 2 relays

Ordering example for variants

UG 3088 .57 PS / --- DC 24 V	
	Nominal voltage Variant, if required Type of terminals PS (plugin screw): pluggable terminal blocks, with screw terminals Contacts Type

Options with Pluggable Terminal Blocks



Screw terminal
(PS/plugin screw)

Interface Module UG 3091



02/75155



Your Advantages

- Simple contact multiplication and reinforcement also for safety modules
- Cost and space saving alternative compared to contactors
- Easy monitoring of contact state via forcibly guided NC contacts

Features

- According to IEC/EN 60 947-5-1
- With partially forcibly guided contacts according to IEC 61810-3
- 10 output contacts
- As option with pluggable terminal block for easy exchange of devices
 - with screw terminals
- Terminal blocks coded
- 22,5 mm Baubreite

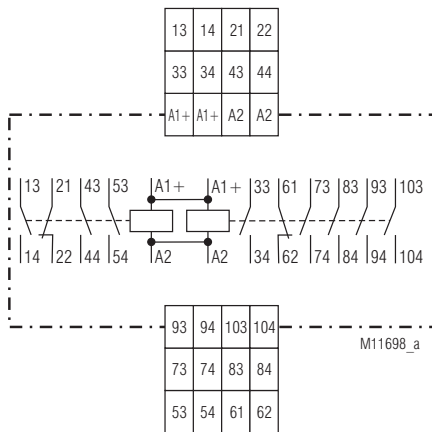
Product Description

The interface module UG 3091 provides 10 contacts in 2 relays with forcibly guided contacts. It is suitable for safe electrical separation of control and power levels as well as for contact multiplication and reinforcement of safety modules.

Approvals and Markings



Circuit Diagram



Applications

- Interfacing between control and load circuits
- Contact multiplication and reinforcement
- separate switching of several current circuits, e. g. with
 - Machines and plants,
 - Energy production and transport

Indicator

green LED: on, when supply connected

Connection Terminals

Terminal designation	Signal description
A1+, A2	Hilfsspannung DC, 2-fach vorhanden, gepolt
33, 34; 73, 74; 83, 84; 93, 94; 103, 104	5 SchlieBerkontakte, Rel 1, zwangsgeföhrt
61, 62	1 Öffnerkontakt, Rel 1, zwangsgeföhrt
13, 14; 43, 44; 53, 54	3 SchlieBerkontakte, Rel 2 zwangsgeföhrt
21, 22	1 Öffnerkontakt, Rel 2, zwangsgeföhrt

Technical Data

Input

Nominal voltage U_N:	DC 24, 110 V (others on request)
Voltage range:	0.8 ... 1.1 U_N
Nominal consumption:	1.4 W
Min. release time	
DC 24 V:	200 ms
DC 110 V:	500 ms

Output

Contacts:	8 NO and 2 NC contacts
Contact type:	2 relays, forcibly guided
Operate time:	typisch 12 ms
Rückfallzeit:	typisch 35 ms
Nominal output voltage:	AC 250 V, DC 24 V
Thermal current I_{th}:	max. 4 A (see quadratic total current limit curve)

Switching capacity

to AC 15:

NO contacts:	3 A / AC 230 V	IEC/EN 60 947-5-1
NC contacts:	2 A / AC 230 V	IEC/EN 60 947-5-1

nach DC 13:

NO contacts:	2 A / DC 24 V	IEC/EN 60 947-5-1
NC contacts:	2 A / DC 24 V	IEC/EN 60 947-5-1

to DC 13:

NO contacts:	4 A / DC 24 V at 0.1 Hz	IEC/EN 60 947-5-1
NC contacts:	4 A / DC 24 V at 0.1 Hz	IEC/EN 60 947-5-1

Electrical life

at AC 230 V, 5 A, $\cos \varphi = 1$:	2.2 x 10 ⁶ switch. cycl.	IEC/EN 60 947-5-1
at DC 24 V, 5 A, ohmic:	1.5 x 10 ⁶ switch. cycl.	IEC/EN 60 947-5-1

Permissible switching

frequency: 10 switching cycles / s

Switching voltage min./max.: AC/DC 10 V / AC/DC 250 V

Short circuit strength

max. fuse rating:

NO contact:	10 A gG / gL	IEC/EN 60 947-5-1
NC contact:	6 A gG / gL	IEC/EN 60 947-5-1

Mechanical life:

≥ 20 x 10⁶ switching cycles

General Data

Operating mode: Continuous operation

Temperature range:

Operation: - 20 ... + 60 °C (siehe Kennlinie)

Storage: - 40 ... + 70 °C

Clearance and creepage distances

Rated impulse voltage / pollution degree

Auxiliary voltage / contacts:	6 kV / 2	IEC 60 664-1
Contacts / contacts:	4 kV / 2	IEC 60 664-1

EMC

Electrostatic discharge: 8 kV (air) IEC/EN 61 000-4-2

HF irradiation

80 MHz ... 2.7 GHz: 10 V / m IEC/EN 61 000-4-3

Fast transients: 4 kV IEC/EN 61 000-4-4

Surge voltage

between

wires for power supply: 1 kV IEC/EN 61 000-4-5

between wire and ground: 2 kV IEC/EN 61 000-4-5

HF-wire guided: 10 V IEC/EN 61 000-4-6

Interference suppression: Limit value class B EN 55 011

Degree of protection

Housing: IP 40 IEC/EN 60 529

Terminals: IP 20 IEC/EN 60 529

Housing: Thermoplastic with VO behaviour according to UL subject 94

Vibration resistance:

Amplitude 0,35 mm, frequency 10 ... 55 Hz, IEC/EN 60 068-2-6

20 / 060 / 04 IEC/EN 60 068-1

EN 50 005

Climate resistance:

Terminal designation:

DIN 46 228-1/-2/-3/-4

Wire connection:

Plugin with screw terminals (PS)

Cross section:

1 x 0.25 ... 2.5 mm² solid or stranded ferruled (isolated) or
2 x 0.25 ... 1.0 mm² solid or stranded ferruled (isolated)

Technical Data

Insulation of wires or sleeve length:

7 mm

Wire fixing: captive slotted screw

Fixing torque: 0.5 Nm

Mounting: DIN rail

IEC/EN 60 715

Weight:

approx. 210 g

Dimensions

Width x height x depth:

UG 3091 PS: 22.5 x 110 x 120.3 mm

Standard Type

UG 3091.67PS DC 24 V

Article number:

0067553

• Outputs:

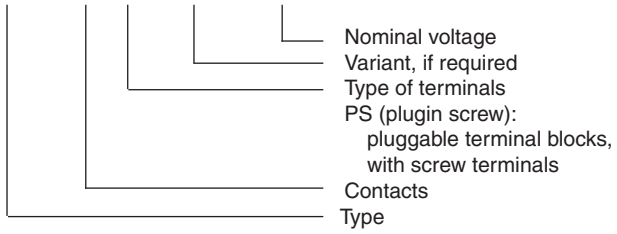
8 NO, 2 NC

• Width:

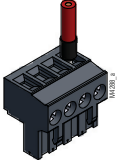
22.5 mm

Variants

UG 3091 .67 / DC 24 V

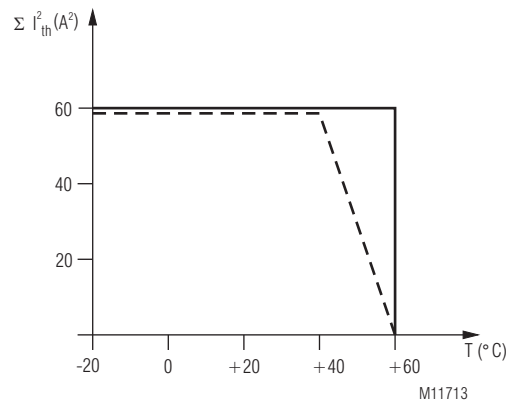


Option with Pluggable Terminal Block



Screw terminal
 (PS/plugin screw)

Characteristic



— Mounted with distance, with air circulation

- - - Mounted without distance,
 heated by units with similar load

Quadratic total current

$$\Sigma I_{th}^2 = I_{th1}^2 + \dots + I_{th7}^2 + \dots + I_{th10}^2$$

$I_{th1} \dots I_{th10}$: thermal current in contactrows

Quadratic total current limit curve

Interface Module UG 3096, UH 3096

0266488



Your Advantages

- According to IEC/EN 60 947-5-1
- Simple contact multiplication and reinforcement also for safety modules
- Cost and space saving alternative compared to contactors
- Easy monitoring of contact state via forcibly guided NC contacts

Features

- With **forcibly guided** contacts according to IEC 61810-3
- UG 3096: 8 output contacts
UH 3096: 16 output contacts
- As option with gold plated contacts to switch low loads
- As option with contacts connected in series to switch high DC-loads
- As option with pluggable terminal block for easy exchange of devices
 - with screw terminals
- UG 3096: Width 22.5 mm
UH 3096: Width 45 mm

Approvals and Markings



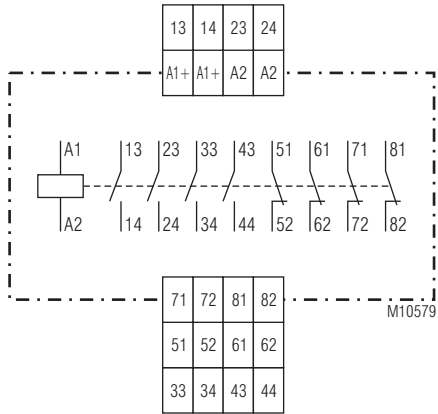
Applications

- Interfacing between control and load circuits
- Contact multiplication and reinforcement
- separate switching of several current circuits, e. g. with
 - Machines and plants,
 - Energy production and transport

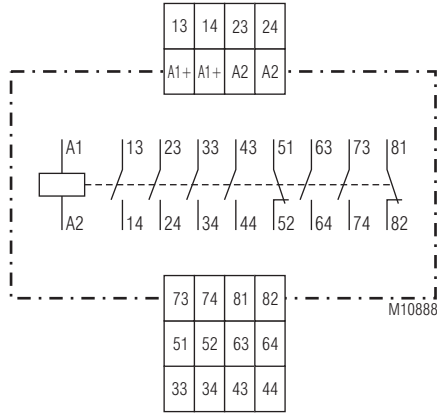
Indicator

green LED: on, when supply connected

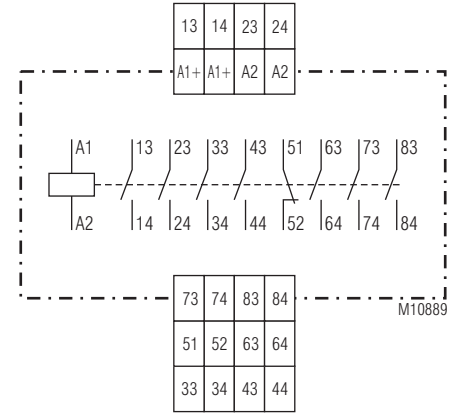
Circuit Diagrams



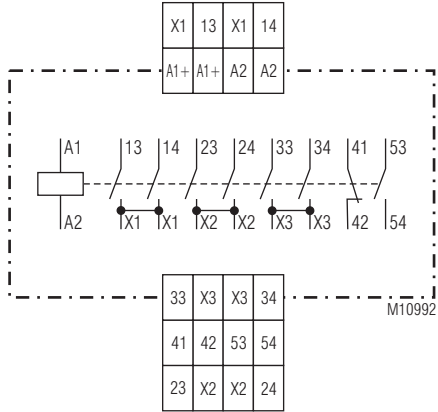
UG 3096.57



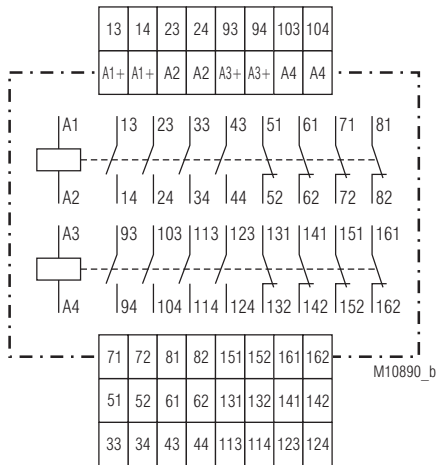
UG 3096.59



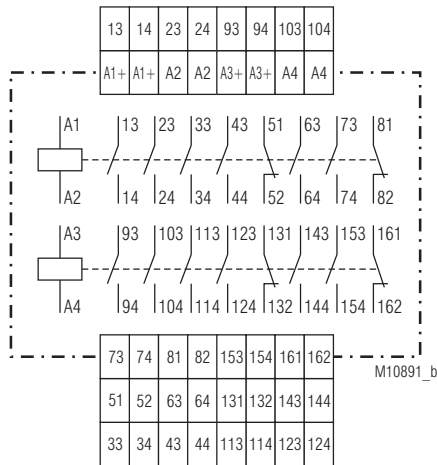
UG 3096.63



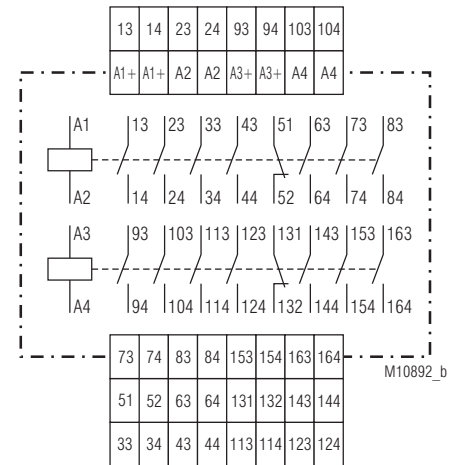
UG 3096.63/800



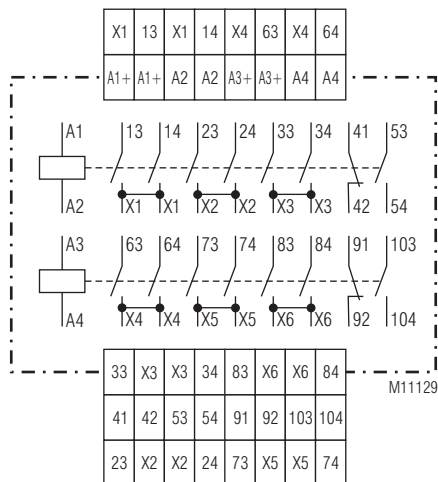
UH 3096.78



UH 3096.79



UH 3096.80



UH 3096.80/800

Connection Terminals	
Terminal designation	Signal description
A1 / A2	Supply voltage relay 1
A3 / A4	Supply voltage relay 2
13 ... 162	Output contacts after contacts
X1 ... X6	Internal bridges for variant /800

Technical Data

Input

Nominal voltage U_N:	DC 24 V, 110 V (others on request)
Voltage range:	0.8 ... 1.1 U_N
Nominal consumption:	
UG 3096:	1.4 W
UH 3096:	2.8 W

Output

Contacts:		
UG 3096.57:	4 NO and 4 NC contacts	
UG 3096.59:	6 NO and 2 NC contacts	
UG 3096.63:	7 NO and 1 NC contacts	
UH 3096.78:	8 NO and 8 NC contacts	
UH 3096.79:	12 NO and 4 NC contacts	
UH 3096.80:	14 NO and 2 NC contacts	
Contact type:	forcibly guided	
Operate time:	typical 30 ms	
Release time:	typical 12 ms	
Nominal output voltage:	AC 250 V, DC 24 V	
Thermal current I_{th}:	max. 6 A	(see quadratic total current limit curve)
Switching capacity		
to AC 15:		
NO contacts:	3 A / AC 230 V	IEC/EN 60 947-5-1
NC contacts:	2 A / AC 230 V	IEC/EN 60 947-5-1
to DC 13 at 0.1 Hz		
NO contacts:	4 A / DC 24 V	IEC/EN 60 947-5-1
NC contacts:	4 A / DC 24 V	IEC/EN 60 947-5-1
NO contacts:	1 A / DC 110 V	IEC/EN 60 947-5-1
2 contacts in series		
NO contacts:	3 A / DC 110 V	IEC/EN 60 947-5-1
3 contacts in series		
NO contacts:	5 A / DC 110 V	IEC/EN 60 947-5-1
Electrical life		
NO contacts:		
to AC 15 at 1 A, AC 230 V:	1.5 x 10 ⁶ switch. cycl.	IEC/EN 60 947-5-1
NO contacts:		
to AC 15 at 0.5 A, AC 230 V:	2.5 x 10 ⁶ switch. cycl.	IEC/EN 60 947-5-1
NC contacts:		
to AC 15 at 1 A, AC 230 V:	1 x 10 ⁶ switch. cycl.	IEC/EN 60 947-5-1
NO contacts:		
to DC 13 at 1 A, DC 24 V:	0.5 x 10 ⁶ switch. cycl.	IEC/EN 60 947-5-1
Permissible switching frequency:	10 switching cycles / s	
Switching voltage min./max.:	AC/DC 10 V / AC/DC 250 V	
Switching current min./max.:	10 mA (typical values) / 6 A	
Short circuit strength		
max. fuse rating:	6 A gG / gL	IEC/EN 60 947-5-1
Mechanical life:	≥ 30 x 10 ⁶ switching cycles	

Technical Data

General Data

Operating mode:	Continuous operation
Temperature range:	
Operation:	- 20 ... + 60° C
Storage:	- 40 ... + 60° C

Clearance and creepage distances

rated impulse voltage / pollution degree		
Auxiliary voltage / contacts:	6 kV / 2	IEC 60 664-1
Contacts / contacts:	4 kV / 2	IEC 60 664-1

EMC

Electrostatic discharge:	8 kV (air)	IEC/EN 61 000-4-2
HF-irradiation		
80 MHz ... 2.7 GHz:	10 V / m	IEC/EN 61 000-4-3
Fast transients:	4 kV	IEC/EN 61 000-4-4

Surge voltages between

wires for power supply:	2 kV	IEC/EN 61 000-4-5
between wire and ground:	4 kV	IEC/EN 61 000-4-5
HF-wire guided:	10 V	IEC/EN 61 000-4-6
Interference suppression:	Limit value class B	EN 55 011

Degree of protection

Housing:	IP 40	IEC/EN 60 529
Terminals:	IP 20	IEC/EN 60 529

Housing:

Thermoplastic with VO behaviour according to UL subject 94	
Vibration resistance:	Amplitude 0.35 mm, frequency 10 ... 55 Hz, IEC/EN 60 068-2-6
Climate resistance:	20 / 060 / 04 IEC/EN 60 068-1
Terminal designation:	EN 50 005
Wire connection:	DIN 46 228-1/-2/-3/-4

Plugin with screw terminals (PS)

max. cross section for connection:	1 x 0.25 ... 2.5 mm ² solid or stranded ferruled (isolated) or 2 x 0.25 ... 1.0 mm ² solid or stranded ferruled (isolated)
Insulation of wires or sleeve length:	7 mm
Wire fixing:	captive slotted screw
Fixing torque:	0.5 Nm
Mounting:	DIN rail IEC/EN 60 715
Weight	
UG 3096:	approx. 215 g
UH 3096:	approx. 420 g

Dimensions

Width x height x depth	
UG 3096 PS:	22.5 x 110 x 120.3 mm
UH 3096 PS:	45 x 110 x 120.3 mm

Standard Types

UG 3096.57 DC 24 V	
Article number:	0065332
• 4 NO contacts, 4 NC contacts	
• Width:	22.5 mm
UH 3096.78 DC 110 V	
Article number:	0065062
• 8 NO contacts, 8 NC contacts	
• Width:	45 mm

Variants

UG 3096.57/004: For switching small loads of 10 mVA ... 12 VA resp. 10 mW ... 12 W in the ranges 2 ... 60 V und 2 ... 300 mA. The device is also suitable for switching the maximum switching current. However, this will burn off the gold plating of the contacts, so that switching of small loads is no longer possible afterwards.

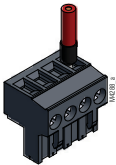
UG 3096.63/800: With contacts connected in series to switch high DC-loads

Ordering example for variant

UG 3096 .57 / DC 24 V

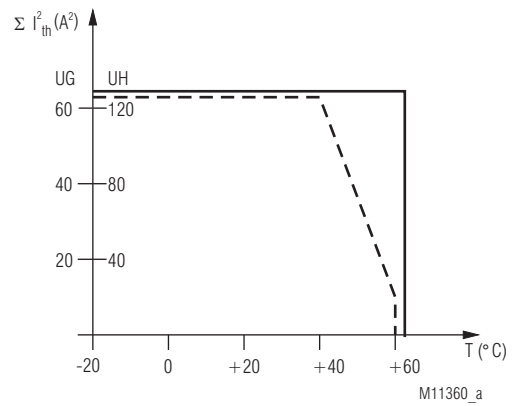
———— Nominal voltage
 ———— Variant, if required
 ———— Type of terminals
 PS (plugin screw):
 pluggable terminal blocks,
 with screw terminals
 ———— Contacts
 ———— Type

Option with Pluggable Terminal Block



Screw terminal
(PS/plugin screw)

Characteristic



— Mounted with distance, with air circulation

- - - Mounted without distance,
heated by units with similar load

Quadratic total current

$$\Sigma I_{th}^2 = I_{th1}^2 + \dots + I_{th8}^2 + \dots + I_{th16}^2$$

$I_{th1} \dots I_{th16}$: thermal current in contactrows

Quadratic total current limit curve

SAFEMASTER
Interface Module
HL 3096N. __ C/ __ __



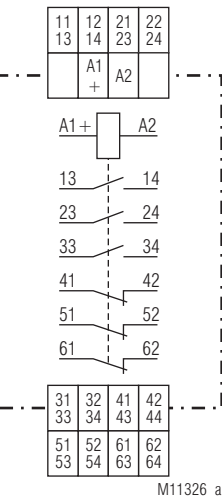
Your Advantages

- Simple contact extension and re-inforcement also of safety modules
- Cost and space saving alternative compared to contactors
- Simple contact monitoring via forcibly guided NC contact
- Large wire cross section 0.5 - 2.5 mm² (12-24 AWG) reduces thermal load on wires
- Fast connection via cage clamp terminals

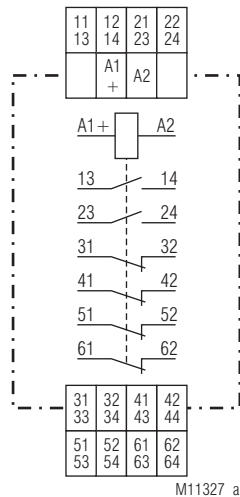
Features

- According to DIN EN 61810-1, DIN EN 60644
- With forcibly guided contacts according to IEC 61810-3
- Models with soldered in PCB safety relay
- With polarity protected diode
- Optionally with free-wheeling diode across A1+ and A2
- Optionally AgNi + 0.2 µm Au or AgNi + 5 µm Au
- For DIN rail mounting according IEC/EN 60715
- Width: 36 mm

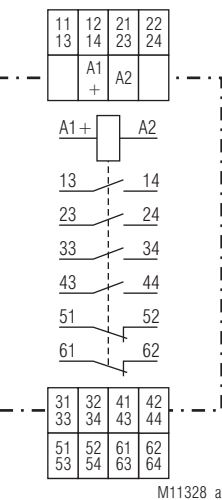
Circuit Diagrams



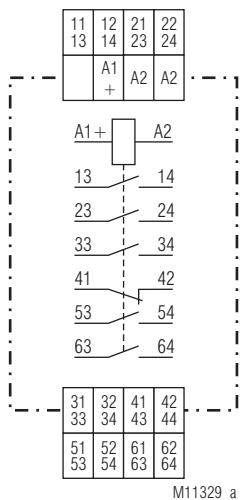
HL 3096N.18C/ __ __



HL 3096N.50C/ __ __



HL 3096N.54C/ __ __



HL 3096N.60C/ __ __

Approvals and Markings



Connection Terminals

Terminal designation	Signal description
A1+	L / +
A2	N / -
41, 42 / 61, 62	NC contact
All other contacts see relevant circuit diagram	NC contacts / or NO contacts

Technical Data	
Input	
Nominal voltage U_N:	DC 24, 60, 110 V other voltages on request
Voltage range:	0.8 ... 1.1 U_N
Nominal consumption	
HL 3096N...C/400:	0.8 W
HL 3096N.50C/400:	1.0 W
Output	
Contacts:	
HL 3096N.18C/400, OA 5612.18:	3 NO and 3 NC contacts
HL 3096N.50C/400, OA 5612.50:	2 NO and 4 NC contacts
HL 3096N.54C/400, OA 5612.54:	4 NO and 2 NC contacts
HL 3096N.60C/400, OA 5612.60:	5 NO and 1 NC contacts
Contact material:	AgNi + 0.2 μ m Au, AgNi + 5 μ m Au other on request
Contact type:	spring contact
Operate time:	typical 20 ms
Release time:	typical 6 ms
Measured nominal voltage:	AC 250 V
Thermal current I_{th}:	5 x 5 A at variant .60C
Switching capacity	
to AC 15	
NO contact:	3 A / AC 230 V IEC/EN 60 947-5-1
NC contact:	2 A / AC 230 V IEC/EN 60 947-5-1
to DC 13	
NO contact:	2 A / DC 24 V IEC/EN 60 947-5-1
NC contact:	2 A / DC 24 V IEC/EN 60 947-5-1
according to DC 13	
NO contact:	4 A / 24 V at 0.1 Hz
NC contact:	4 A / 24 V at 0.1 Hz
Electrical life	
at DC 24 V / 5 A ohmic:	$\geq 2 \times 10^5$ switching cycles
Permissible switching frequency:	10 switching cycles / s
Switching voltage min./max.:	AC/DC 10 V / DC 250 V, AC 400 V (2 V / AC/DC 60 V) *)
Switching current min./max.:	10 mA (typical values) / 5 A (2 mA / 0.3 A) *)
Switching power min./max.:	0.3 VA / 200 VA (10 mVA / 12 VA) *) 0.1 W / 200 W (10 mW / 12 W) *)
*) Values for AgNi-Contacts + 5 μ m Au, other values on request.	
Short circuit strength	
max. fuse rating:	6 A gG / gL IEC/EN 60 947-5-1
Mechanical life:	$\geq 50 \times 10^6$ switching cycles

General Data

Operating mode:	Continuous operation	
Temperature range:		
Operation:	- 40 ... + 55 °C	
Storage:	- 25 ... + 70 °C	
Relative air humidity:	93 % at 40 °C	
Altitude:	< 2.000 m	
Clearance and creepage distances		
rated impulse voltage / pollution degree:	4 kV / 2	IEC 60 664-1
Output / output:	4 kV / 2	IEC 60 664-1
Overvoltage category:	III	
Insulation test voltage, type test:	2,5 kV; 1 min	
EMC		
Electrostatic discharge:	8 kV (air)	IEC/EN 61 000-4-2
HF-irradiation		
80 MHz ... 1 GHz:	20 V / m	IEC/EN 61 000-4-3
1 GHz ... 2,7 GHz:	10 V / m	IEC/EN 61 000-4-3
Fast transient:	4 kV	IEC/EN 61 000-4-4
Surge voltages between		
wires for power supply:	1 kV	IEC/EN 61 000-4-5
between wire and ground:	2 kV	IEC/EN 61 000-4-5
HF-wire guided:	30 V	IEC/EN 61 000-4-6
Interference suppression:	Limit value class B	EN 55 011

Technical Data	
Degree of protection	
Housing:	IP 40 IEC/EN 60 529
Terminals:	IP 20 IEC/EN 60 529
Housing:	Thermoplastic
Vibration resistance:	Amplitude 0.35 mm Frequency 10 ... 55 Hz, IEC/EN 60 068-2-6
Climate resistance:	Humid heat IEC/EN 60 068-2-30
Terminal designation:	EN 50 005
Wire connection:	0.5 ... 2,5 mm ² solid 0.5 ... 2,5 mm ² flexible
Wire fixing:	Cage clamp terminals
Mounting:	DIN rail IEC/EN 60 715
Weight:	approx. 90 g
Dimensions	
Width x height x depth:	36 x 106 x 65 mm

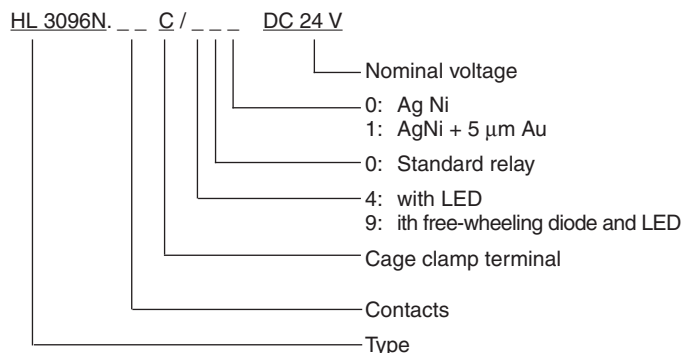
Classification to DIN EN 50155

Vibration and shock resistance:	Category 1, Class B IEC/EN 61 373
Ambient temperature:	T1, T2, T3 and TX compliant
Voltage range:	0.7 ... 1.25 U_N with operational limitations
Protective coating of the PCB:	No

Standard Type

HL 3096N.60C/400 DC 24 V	
Article number:	0066790
• Output:	5 NO, 1 NC
• Contact material:	AgNi + 0.2 μ m Au
• Width:	36 mm

Ordering Example



Safety Notes



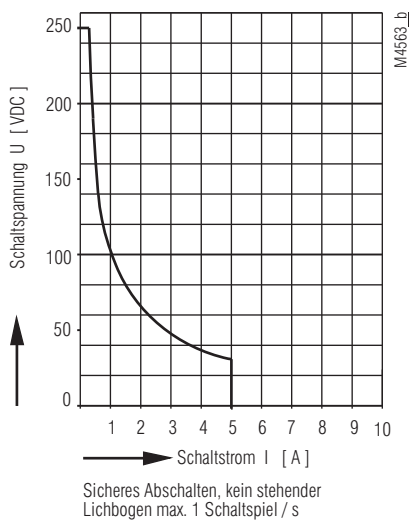
Dangerous voltage.
Electric shock will result in death or serious injury.



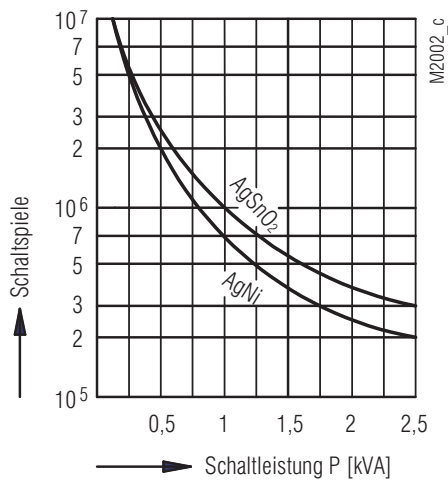
Disconnect all power supplies before servicing equipment.

- Faults must only be removed when the relay is disconnected
- The user has to make sure that the device and corresponding components are installed and wired according to the local rules and law (TUEV, VDE, Health and safety).
- Installation work must only be done when power is disconnected.

Characteristics

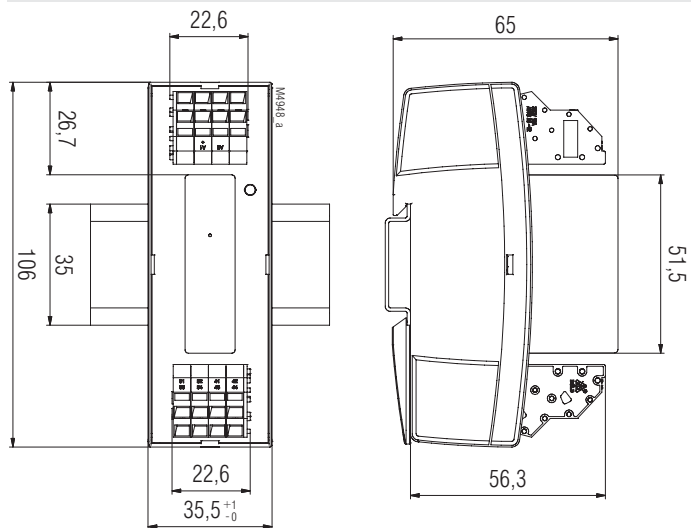


Arc limit curve under resistive load

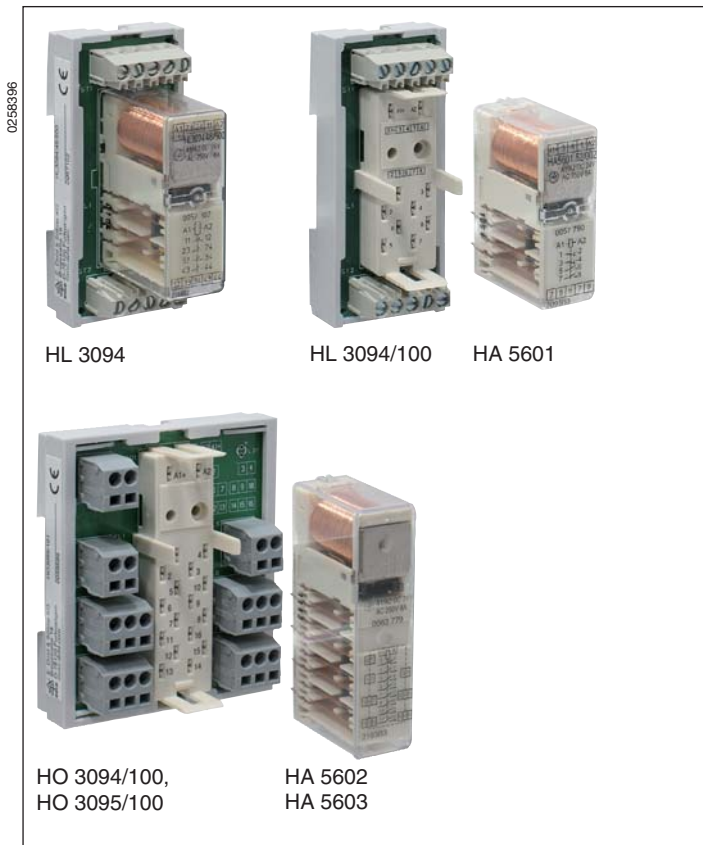


Contact service life

Dimension



SAFEMASTER
Interface Module
HL 3094, HO 3094, HO 3095

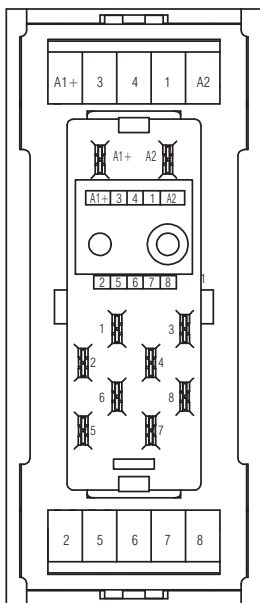


- According to IEC/EN 60255-1, IEC/EN 61810-1
- With forcibly guided contacts according to IEC 61810-3
- Low nominal consumption: 0.75 W / 1 W / 1.25 W
- Max. 8 output contacts
- Contact material AgNi + 0.2 µm Au
- High thermal current $I_{th} = 8$ A
- Large temperature range: -25 ... +55°C
- Safety relay soldered on PCB
- Optional AgNi + 5 µm Au or AgSnO + 0.2 µm Au
- Optional with free-wheeling diode across A1/A2
- Plug in relay option
 - HA 5601 on socket HL 3094/10_
 - HA 5602 on socket HO 3094/10_
 - HA 5603 on socket HO 3095/10_
- DIN rail or screw mounting
- HL: 38 mm width
- HO: 73.3 mm width

Approvals and Markings

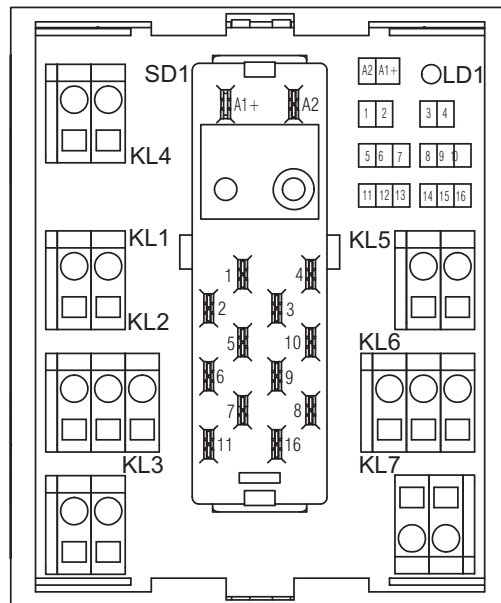


Socket Labeling



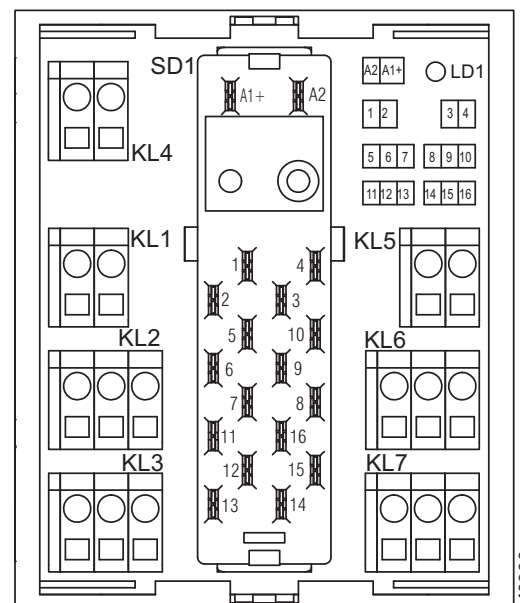
HL 3094/100, HL 3094/101

M2404_c



HO 3094/100, HO 3094/101
HO 3094/102, HO 3094/103

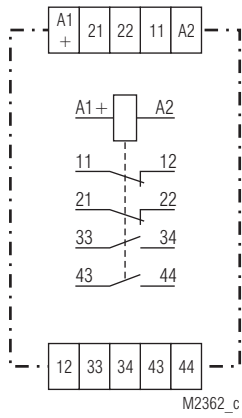
M3993_a



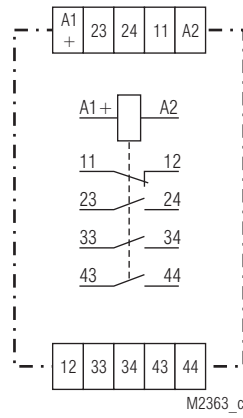
HO 3095/100, HO 3095/101
HO 3095/102, HO 3095/103

M3992_a

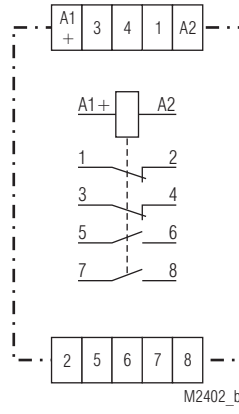
Circuit Diagrams



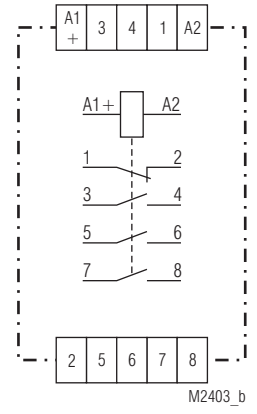
HL 3094.52



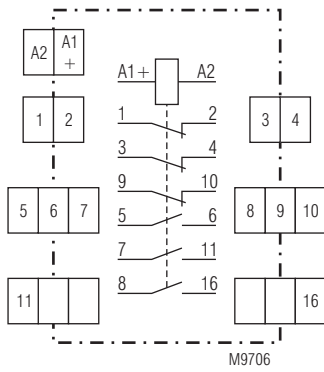
HL 3094.48



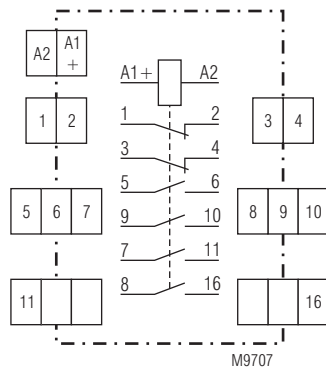
HA 5601.52



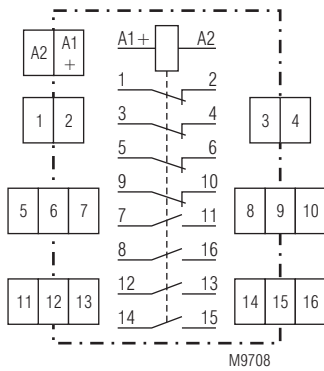
HA 5601.48



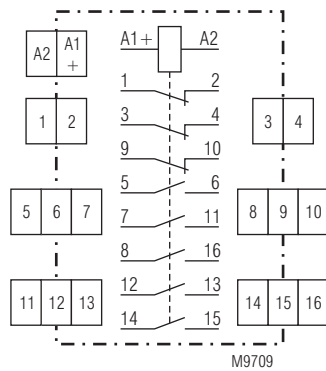
HA 5602.18



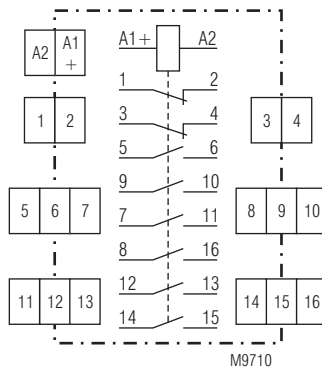
HA 5602.54



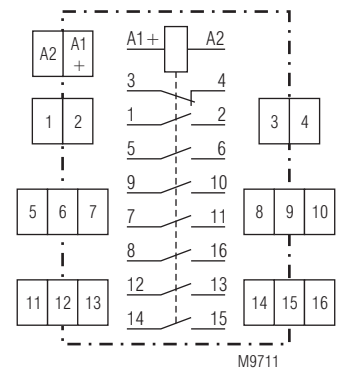
HA 5603.57



HA 5603.58



HA 5603.59



HA 5603.63

Connection Terminals

Terminal designation	Signal description
A1+	L / +
A2	N / -
11, 12 / 1, 2	NC contact
All other contacts see relevant circuit diagram	NC contacts / or NO contacts

Technical Data	
Input	
Nominal voltage U_N:	DC 6, 12, 24, 48, 60, 110 V other voltages on request
Voltage range:	0.8 ... 1.1 U_N
Nominal consumption:	
HL 3094:	0.75 W
HO 3094:	1 W
HO 3095:	1.25 W
Output	
Contacts	
HL 3094.52, HA 5601.52:	2 NO, 2 NC contacts
HL 3094.48, HA 5601.48:	3 NO, 1 NC contacts
HO 3094.18, HA 5602.18:	3 NO, 3 NC contacts
HO 3094.54, HA 5602.54:	4 NO, 2 NC contacts
HO 3095.57, HA 5603.57:	4 NO, 4 NC contacts
HO 3095.58, HA 5603.58:	5 NO, 3 NC contacts
HO 3095.59, HA 5603.59:	6 NO, 2 NC contacts
HO 3095.63, HA 5603.63:	7 NO, 1 NC contacts
Contact material:	AgNi + 0.2 μ m Au
Measured nominal voltage:	AC 250 V
Contact type:	spring contact
Operate time:	\leq 40; typical 27 ms
Release time:	\leq 10; typical 5 ms
Thermal current I_{th}:	3 x 8 A
Switching capacity	
to AC 15	
NO contact:	5 A / AC 230 V IEC/EN 60 947-5-1
NC contact:	2 A / AC 230 V IEC/EN 60 947-5-1
Electrical life	
at 1 s x On, 1 s Off	
at AC 230 V 5 A $\cos \varphi = 1$:	$> 7 \times 10^5$ switching cycles / AgSnO $> 5 \times 10^5$ switching cycles / AgNi
at AC 230 V 8 A $\cos \varphi = 1$:	$> 3 \times 10^5$ switching cycles / AgSnO $> 2 \times 10^5$ switching cycles / AgNi
to AC 15 at 1 A, AC 230 V:	
Permissible switching frequency:	
	10 switching cycles / s
Switching voltage min./max.:	AC/DC 10 V / DC 250 V, AC 400 V (100 mV / AC/DC 60 V for AgNi-contacts + 5 μ m Au)
Switching current min./max.:	10 mA / 8 A (2 mA / 0.3 A for AgNi-contacts + 5 μ m Au)
Switching power min./max.:	0.1 VA / 2000 VA (10 mVA / 7 VA for AgNi-contacts + 5 μ m Au) 0.1 W / 240 W (10 mW / 7 W for AgNi-contacts + 5 μ m Au)
Short circuit strength max. fuse rating:	6 A gL / gG IEC/EN 60 947-5-1
Mechanical life:	$> 30 \times 10^6$ switching cycles
General Data	
Operating mode:	Continuous operation
Temperature range:	
Operation:	- 25 ... + 55 °C
Storage:	- 25 ... + 70 °C
Relative air humidity:	93 % at 40 °C
Altitude:	$<$ 2.000 m
Clearance and creepage distances	
rated impulse voltage / pollution degree:	
Input / Output:	4 kV / 2 (basis insulation) IEC 60 664-1
Output / Output:	4 kV / 2 (basis insulation) IEC 60 664-1
Overvoltage category:	III
Insulation test voltage, type test:	2.5 kV; 1 min

Technical Data	
EMC	
Electrostatic discharge:	8 kV (air) IEC/EN 61 000-4-2
HF-irradiation	
80 MHz ... 1 GHz:	10 V / m IEC/EN 61 000-4-3
1 GHz ... 2,7 GHz:	10 V / m IEC/EN 61 000-4-3
Fast transients:	4 kV IEC/EN 61 000-4-4
Surge voltages	
between	
wires for power supply:	2 kV IEC/EN 61 000-4-5
between wire and ground:	4 kV IEC/EN 61 000-4-5
HF-wire guided:	10 V IEC/EN 61 000-4-6
Interference suppression:	Limit value class B EN 55 011
Degree of protection	
Housing:	IP 40 IEC/EN 60 529
Terminals:	IP 20 IEC/EN 60 529
Housing:	
	Thermoplastic
Vibration resistance:	
	Amplitude 0.35 mm IEC/EN 60 068-2-6 frequency 10 ... 55 Hz
Climate resistance:	
	Humid heat IEC/EN 60 068-2-30
Terminal designation:	
	EN 50 005
Wire connection:	
	0.14 ... 4 mm ² solide 0.14 ... 2.5 mm ² flexible
Wire fixing	
HL 3094:	box terminals
HO 3094, HO 3095:	cage clamp terminals
Fixing torque:	
	0.4 Nm
Mounting:	
	DIN rail mounting (IEC/EN 60715) or screw mounting M4, 90 mm hole pattern, with additional clip available as accessory
Weight:	
HL 3094 (incl. relay):	approx. 120 g
HL 3094/100:	approx. 58 g
HO 3094 (incl. relay):	approx. 173 g
HO 3095 (incl. relay):	approx. 183 g
HO 3094/100, HO 3095/100:	approx. 93 g
HA 5601:	approx. 78 g
HA 5602:	approx. 85 g
HA 5603:	approx. 95 g
Dimensions	
Width x height x depth	
Interface module HL 3094:	37.8 x 88 x 55.2 mm
Interface module HO 3094:	73.8 x 88 x 51.9 mm
Interface module HO 3095:	73.8 x 88 x 51.9 mm
Socket HL 3094 with safety relay HA 5601:	
	37.8 x 88 x 65.5 mm
Socket HO 3094 with safety relay HA 5602:	
	73.8 x 88 x 59.9 mm
Socket HO 3095 with safety relay HA 5603:	
	73.8 x 88 x 59.9 mm

Classification to DIN EN 50155

Vibration and shock resistance:	
	Category 1, Class B IEC/EN 61 373
Ambient temperature:	
	T1 compliant
	T2, T3 and TX with operational limitations
Voltage range:	
	0.7 ... 1.25 U_N with operational limitations
Protective coating of the PCB:	
	No

Standard Type

HL 3094.52 DC 24 V

Article number: 0047426

• 2 NO, 2 NC contacts

• Contact material: AgNi + 0.2 µm Au

• Nominal voltage U_N : DC 24 V

• Width: 38 mm

Variants

Interface module:

H_309_/100: Socket

H_309_/101: Socket with free-wheeling diode

H_309_/102: Socket with free-wheeling diode + LED

H_309_/103: Socket with LED

Safety relay

HA 5601._._, HA 5602._._,

HA 5603._._: Contact material AgNi + 0.2 µm Au

HA 5601._._/001,

HA 5602._._/001

HA 5603._._/001: Contact material AgNi + 5 µm Au

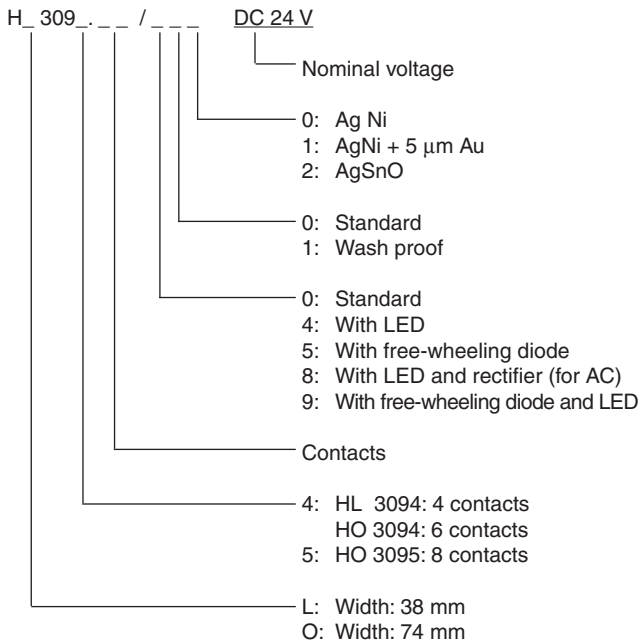
HA 5601._._/002,

HA 5602._._/002,

HA 5603._._/002: Contact material AgSnO + 0.2 µm Au

other variants on request

Ordering example for variants



Accessories

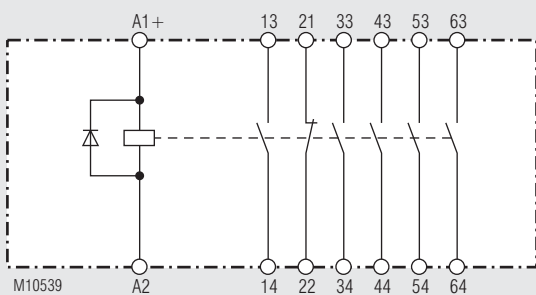
ET 4086-0-2: Additional clip for screw mounting
Article number: 0046578

Interface Module BD 3083/100



- According to IEC/EN 60 255, IEC/EN 61 810-1
- Forcibly guided output contacts according to IEC 61810-3
- With LED indicator
- Width: 45 mm

Block Diagram



Approvals and Markings



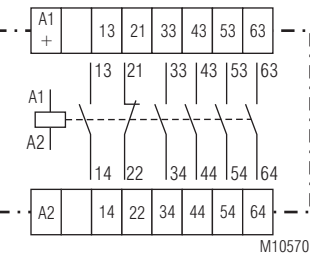
Applications

- Link between the control and the power level
- For separating potentials

Indicators

green LED: on, when supply connected

Circuit Diagram



Technical Data

Input

Nominal voltage U_N : DC 24 V
Voltage range: 0.7 ... 1.25 U_N
Nominal consumption: typ. DC 1 W

Output

Contacts: 5 NO contacts, 1 NC contact
Contact type: Forcibly guided
Thermal current I_{th} : max. 5 A

Switching capacity

to AC 15
 NO contacts: 3 A / AC 230 V IEC/EN 60 947-5-1
 NC contacts: 2 A / AC 230 V IEC/EN 60 947-5-1
 to DC 13
 NO contacts: 1 A / DC 24 V IEC/EN 60 947-5-1
 NC contacts: 1 A / DC 24 V IEC/EN 60 947-5-1

Electrical life

at 5 A, AC 230 V $\cos \varphi = 1$: > 2 x 10⁵ switch. cycl. IEC/EN 60 947-5-1

Permissible switching frequency:

max. 3600 switching cycles / h

Short circuit strength

max. fuse rating: 4 A gL IEC/EN 60 947-5-1

Mechanical life:

10 x 10⁶ switching cycles

Technical Data

General Data

Operating mode:	Continuous operation	
Temperature range		
Operation:	- 25... + 70 °C	
Storage:	- 40 ... + 85 °C	
Altitude:	< 2.000 m	
Clearance and creepage distances		
rated impulse voltage / pollution degree::	4 kV / 2 (Basis insulation) IEC 60 664-1	
EMC		
Electrostatic discharge:	8 kV (air)	IEC/EN 61 000-4-2
HF irradiation:	10 V / m	IEC/EN 61 000-4-3
Fast transients:	2 kV	IEC/EN 61 000-4-4
Surge voltages between		
wires for power supply:	1 kV	IEC/EN 61 000-4-5
between wire and ground:	2 kV	IEC/EN 61 000-4-5
HF-wire guided:	10 V	IEC/EN 61 000-4-6
Interference suppression:	Limit value class B	EN 55 011
Degree of protection		
Housing:	IP 40	IEC/EN 60 529
Terminals:	IP 20	IEC/EN 60 529
Housing:	Thermoplast with V0 behaviour according to UL subject 94	
Vibration resistance:	Amplitude 0.35 mm frequency 10 ... 55 Hz, IEC/EN 60 068-2-6	
Climate resistance:	25 / 070 / 04 IEC/EN 60 068-1	
Terminal designation:	EN 50 005	
Wire connection:	1 x 4 mm ² solid or 1 x 2.5 mm ² stranded ferruled (isolated) or 2 x 1.5 mm ² stranded ferruled (isolated) DIN 46 228-1/-2/-3/-4 or 2 x 2.5 mm ² stranded ferruled DIN 46 228-1/-2/-3	
Wire fixing:	Terminal screws M 3.5 Box terminal with wire protection	
Fixing torque:	0.8 Nm	
Mounting:	DIN rail	EN 50 022
Weight:	approx. 210 g	

Dimensions

Width x height x depth: 45 x 74 x 121 mm

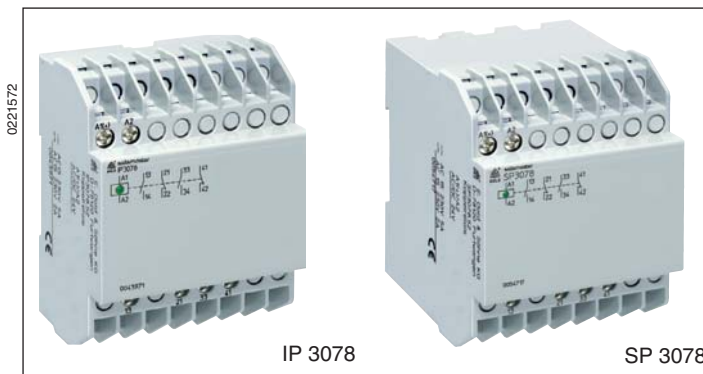
Statistic Characteristics

λ_{total} :	2304	FIT
MTTF:	49.6	a
d_{op} :	365	d/a (days/year)
h_{op} :	24	h/d (hours/day)
t_{zyklus} :	3600	s/Cycle
n_{op} :	8760	Cycle/a
B_{10} :	43410	Cycle

Standard Type

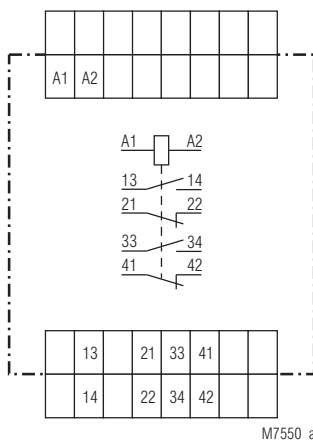
BD 3083.60/100 DC 24 V	
Article number:	0051944
• Output:	5 NO contacts, 1 NC contact
• Nominal voltage U_N :	DC 24 V
• Width:	45 mm

SAFEMASTER Interface Module IP 3078, SP 3078

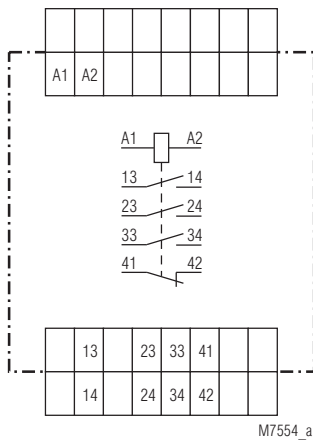


- According to IEC/EN 60 947-5-1, IEC/EN 61 810-1
- Forcibly guided contacts according to IEC 61810-3
- Max. 6 output contacts
- High thermal current $I_{th} = 8$ A
- LED for operating state
- Devices available in 2 enclosure versions:
 - IP 3078: depth 61 mm, with terminals at the bottom for installation systems and industrial distribution systems according to DIN 43 880
 - SP 3078: depth 100 mm, with terminals at the top
- Width 70 mm

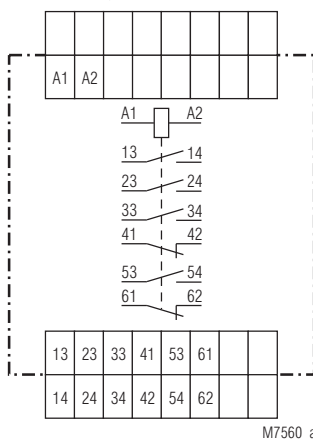
Circuit Diagrams



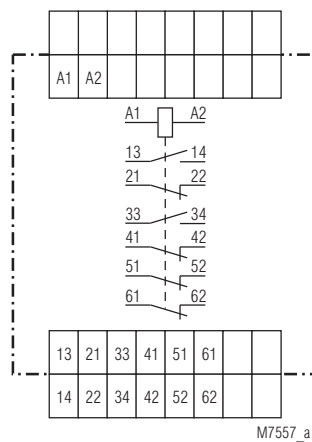
IP 3078.52, SP 3078.52



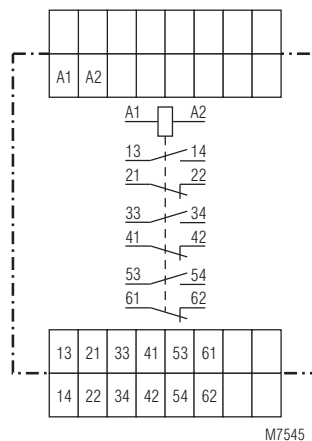
IP 3078.48, SP 3078.48



IP 3078.54, SP 3078.54



IP 3078.50, SP 3078.50



IP 3078.18, SP 3078.18

Approvals and Markings



Indicators

green LED: on, when supply connected

Connection Terminals

Terminal designation	Signal description
A1	+ / L
A2	- / N
13, 14; 23, 24; 33, 34; 53, 54	Forcibly guided NO contacts for release circuit
21, 22; 41, 42; 51, 52; 61, 62	Forcibly guided NC contacts for release circuit

Technical Data

Input

Nominal voltage U_N : AC/DC 24 V
AC 220 ... 240 V

Voltage range: 0.8 ... 1.1 U_N

Nominal consumption:
IP 3078.52, SP 3078.52: 1 W / 2 VA
IP 3078.18, SP 3078.18: 1.5 W / 4 VA

Nominal frequency: 50 / 60 Hz

Frequency range: ± 5 % of nominal frequency

Output

Contacts

IP 3078.52, SP 3078.52: 2 NO and 2 NC contacts
IP 3078.50, SP 3078.50: 2 NO and 4 NC contacts
IP 3078.48, SP 3078.48: 3 NO and 1 NC contacts
IP 3078.18, SP 3078.18: 3 NO and 3 NC contacts
IP 3078.54, SP 3078.54: 4 NO and 2 NC contacts

Response time: typ. 25 ms

Release time: typ. 20 ms

Contact type: Spring contact

Nominal output voltage: min. AC/DC 10 V
max. DC 250 V, AC 230 / 400 V

Thermal current I_{th} : 8 A
(see continuous current limit curve)

Switching capacity

to AC 15:
NO contact: 3 A / AC 230 V IEC/EN 60 947-5-1
NC contact: 2 A / AC 230 V IEC/EN 60 947-5-1

Electrical life
to AC 15 at 2 A, AC 230 V: 2.5 x 10⁵ switching cycles

Permissible switching frequency: max. 36 000 switching cycles / h

Mechanical life: ≥ 30 x 10⁶ switching cycles

Technical Data

General Data

Operating mode:	Continuous operation	
Temperature range:		
Operation:	- 20 ... + 60 °C	
Storage:	- 20 ... + 60 °C	
Altitude:	< 2,000 m	
Clearance and creepage distances		
rated impulse voltage / pollution degree:	4 kV / 2	IEC 60 664-1
EMC		
Electrostatic discharge:	8 kV (air)	IEC/EN 61 000-4-2
HF irradiation		
80 MHz ... 6,0 GHz:	20 V / m	IEC/EN 61 000-4-3
Fast transients:	4 kV	IEC/EN 61 000-4-4
Surge voltages between		
wires for power supply:	2 kV	IEC/EN 61 000-4-5
between wire and ground:	4 kV	IEC/EN 61 000-4-5
HF-wire guided:	20 V	IEC/EN 61 000-4-6
Interference suppression:	Limit value class B EN 55011	
Degree of protection		
Housing:	IP 40	IEC/EN 60 529
Terminals:	IP 20	IEC/EN 60 529
Housing:	Thermoplastic with V0 behaviour according to UL subject 94	
Vibration resistance:	Amplitude 0.35 mm IEC/EN 60 068-2-6 frequency 10 ... 55 Hz	
Climate resistance:	20 / 060 / 04	IEC/EN 60 068-1
Terminal designation:	EN 50 005	
Wire connection:	2 x 2.5 mm ² solid or 2 x 1.5 mm ² stranded ferruled DIN 46 228-1/-2/-3/-4	
Wire fixing:	Captive terminal screw M3.5 clamping piece as per IEC 60 664-1 / IEC/EN 60 999-1	
Fixing torque:	0.8 Nm	
Mounting:	DIN rail	IEC/EN 60 715
Weight		
IP 3078:	225 g	
SP 3078:	274 g	

Dimensions

Width x height x depth

IP 3078:	70 x 90 x 61 mm
SP 3078:	70 x 90 x 100 mm

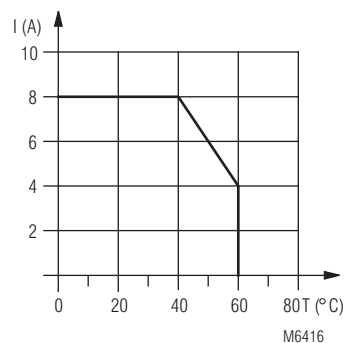
Standard Type

IP 3078.52 AC/DC 24 V	
Article number:	0043971
• Output:	2 NO, 2 NC contacts
• Nominal voltage U _N :	AC/DC 24 V
• Width:	70 mm
IP 3078.52 AC/DC 24 V	
Article number:	0054717
• Output:	2 NO, 2 NC contacts
• Nominal voltage U _N :	AC/DC 24 V
• Width:	70 mm

Ordering Example

IP 3078	.52	AC/DC 24 V	50 / 60 Hz	
			Nominal frequency	
			Nominal voltage	
			Contacts	
			Type	

Characteristic



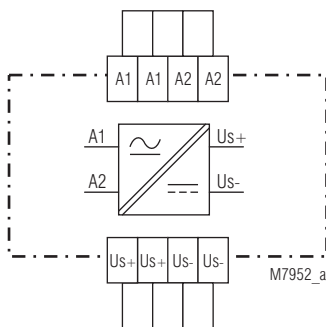
Continuous current limit curve

Switched Power Supply BG 5595



- According to IEC/EN 60 950
- Protection class II acc. to EN 61 558-1
- Secondary voltage DC 24 V up to 1 A
- Short circuit and overload protection
- Width 22.5 mm

Circuit Diagram



Approvals and Markings



Application

For supplying 24 V DC voltage.

Function

The switched power supply unit provides an regulated DC voltage of 24 V on the output. Due to the operating principle an efficiency of approx. 85 % the power dissipation is cut down to a minimum.

Connection Terminals

Terminal designation	Signal description
A1, A2	Auxiliary voltage AC or DC
Us+, Us-	Secondary voltage DC 24 V

Indicator

LED green: on when secondary voltage connected

Technical Data

Primary voltage: AC/DC 110 ... 230 V
The output voltage is available on 2 pairs of terminals (A1 and A2) These are connected internally in parallel.

Voltage range
AC: 70 ... 265 V
DC: 85 ... 300 V

Primary current at nominal voltage U_N :
no-load operation
at AC 230 V: 20 mA
at DC 230 V: 7 mA
at AC 110 V: 16 mA
at DC 110 V: 10 mA

Efficiency: approx. 85 %

Secondary voltage: DC 24 V \pm 10 %
The output voltage is available on 2 pairs of terminals. (U_{S+} and U_{S-}) These are connected internally in parallel.

Secondary current: continuously, device mounted without distances heated by devices with same load:
0.5 A at ambient temperature 45 °C
continuously, device mounted with 10 mm spacing:
1 A at ambient temperature 45 °C
short time 1 min:
1,3 A at AC 110 V; 1,6 A at AC 230 V

Residual ripple at max. load: \leq 1 %

Current limitation: electronic short circuit protection and overload protection.
Disconnection of 1,3 A at AC 110 V and 1,6 A at AC 230 V.

Technical Data

General Data

Operating mode:	Continuous operation	
Temperature range		
Operation:	- 20 ... + 45 °C	
Storage:	- 25 ... + 70 °C	
Altitude:	< 2,000 m	
Clearance and creepage distances		
overvoltage category / contamination level:	6 kV / 2	IEC 60 664-1
EMC		
Electrostatic discharge:	8 kV (air)	IEC/EN 61 000-4-2
HF-irradiation:	10 V / m	IEC/EN 61 000-4-3
Fast transients:	4 kV	IEC/EN 61 000-4-4
Surge voltages between		
wires for power supply:	2 kV	IEC/EN 61 000-4-5
HF-wire guided:	10 V	IEC/EN 61 000-4-6
Interference suppression:	Limit value class B	EN 55 011
Degree of protection:		
Housing:	IP 40	IEC/EN 60 529
Terminals:	IP 20	IEC/EN 60 529
Enclosure:	Thermoplastic with V0 behaviour according to UL subject 94	
Vibration resistance:	Amplitude 0.35 mm frequency 10 ... 55 Hz IEC/EN 60 068-2-6 20 / 045 / 04 IEC/EN 60 068-1 EN 50 005	
Climate resistance:		
Terminal designation:	EN 50 005	
Wire connection:	1 x 2,5 mm ² stranded wire with sleeve or 1 x 4 mm ² solid or 2 x 1,5 mm ² stranded wire with sleeve DIN 46 228-1/-2/-3/-4	
Insulation of wires or sleeve length:	10 mm	
Wire fixing:	Plus-minus terminal screws M3.5 box terminals with wire protection	
Fixing torque:	0.8 Nm	
Mounting:	DIN rail	IEC/EN 60 715
Weight:	200 g	

Dimensions

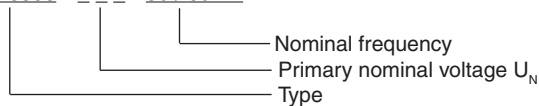
Width x height x depth: 22.5 x 84 x 121 mm

Standard Type

BG 5595 AC/DC 110 ... 230 V	50 / 60 Hz
Article number:	0055045
• Secondary voltage:	DC 24 V
• Primary nominal voltage U_N :	AC/DC 110 ... 230 V
• Width:	22.5 mm

Ordering Example

BG 5595 _ _ _ 50 / 60 Hz

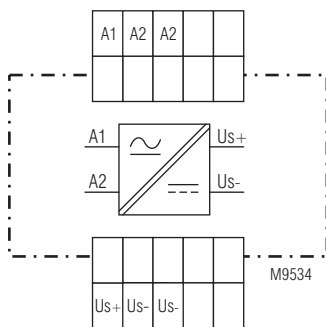


**Switched Power Supply
RL 5596**



- Space saving in industrial cabinets because compact construction type
- Universal use with wide voltage range
- High efficiency
- According to IEC/EN 60 950, EN 61 558
- Protection class II, according to EN 61 558-1
- Secondary voltage DC 24 V up to 350 mA
- Short circuit protection and overload protection
- Width: 35 mm

Circuit Diagram



Approvals and Markings



Application

For DC-voltage 24 V

Function

The switched power supply provides a controlled DC voltage of 24 V ± 5 %.

Connection Terminals

Terminal designation	Signal description
A1, A2	Auxiliary voltage AC or DC
Us+, Us-	Secondary voltage DC 24 V

Indication

LED green: on when secondary voltage connected

Notes

With large capacitive load the power supply detects short circuit on power up. If the secondary voltage of 24 V is not reached within 64 ms the power supply switches off. After 2 sec a new attempt is started.

Technical Data

Primary voltage:	AC/DC 85 ... 265 V The terminal A2 is double. Internally these terminals are connected in parallel.
Voltage range	
AC:	85 ... 265 V
DC:	85 ... 300 V
Primary current at nominal voltage U_N:	
no-load operation	
at AC 230 V:	6 mA
at DC 230 V:	2 mA
at AC 110 V:	8 mA
at DC 110 V:	4 mA
Efficiency:	approx. 80 %
Secondary voltage:	DC 24 V ± 5 % The terminal U_s is double. Internally these terminals are connected in parallel. 350 mA continuously
Secondary current:	
Short time current, 5 s	
at AC 100 V:	max. 500 mA
at AC 230 V:	max. 700 mA
Residual ripple at max. load:	0.1 %
Current limiting:	electronic short circuit protection and overload protection

Technical Data

General Data

Nominal operating mode: continuous operation

Temperature range:

Operation

secondary voltage

350 mA: - 20 ... + 50°C (mounted with distance)

250 mA: - 20 ... + 60°C (mounted with distance)

350 mA: - 20 ... + 60°C (mounted without distance)

Storage: - 25 ... + 70°C

Altitude: < 2.000 m

Clearance and creepage distance

rated impulse voltage /

pollution degree: 6 kV / 2 IEC 60 664-1

EMC

electrostatic discharge (ESD): 8 kV (air) IEC/EN 61 000-4-2

HF irradiation:

80 MHz ... 2.7 GHz: 10 V / m IEC/EN 61 000-4-3

Fast transients: 4 kV IEC/EN 61 000-4-4

surge voltage

between

wires for power supply: 1 kV IEC/EN 61 000-4-5

HF-wire guided: 10 V IEC/EN 61 000-4-6

Interference suppression: Limit value class B EN 55 011

Emitted interference: EN 61 000-6-3

Degree of protection:

Housing: IP 40 IEC/EN 60 529

Terminals: IP 20 IEC/EN 60 529

Enclosure: thermoplastic with VO behaviour

according to UL Subjekt 94

Vibration resistance:

amplitude 0,35 mm

frequency 10 ... 55 Hz, IEC/EN 60 068-2-6

20 / 060 / 04 IEC/EN 60 068-1

EN 50 005

Terminal designation:

Wire connection DIN 46 228-1/-2/-3/-4

Cross section: 0.34 ... 2.5 mm² (AWG 22 - 14) solid

or

0.34 ... 2.5 mm² (AWG 22 - 14)

stranded wire with and without ferrules

Strip length: 7 mm

Wire fixing: captive slotted screw M 2.5

Fixing torque: 0.5 Nm max. IEC/EN 60 999-1

Mounting: DIN-rail IEC/EN 60 715

Weight: 85 g

Dimensions

Width x height: x depth: 35 x 90 x 71 mm

Standard Type

RL 5596 AC/DC 85 ... 265 V 50 / 60 Hz

Article number: 0060669

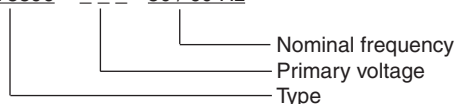
• Secondary voltage: DC 24 V

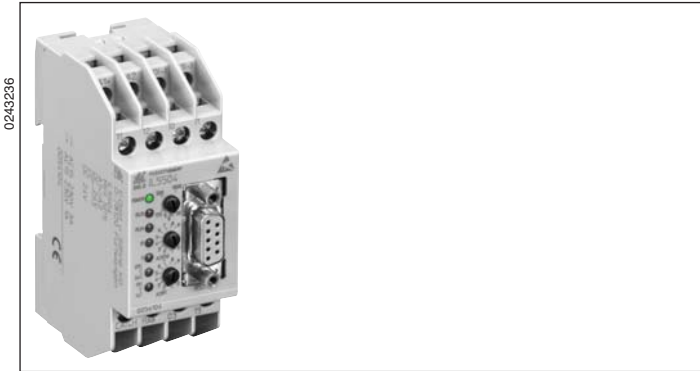
• Primary nominal voltage U_N : AC/DC 85 ... 265 V

• Width: 35 mm

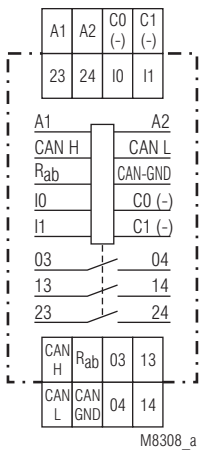
Ordering Example

RL 5596 --- 50 / 60 Hz





Circuit Diagram



IL 5504

Your Advantages

- Compact CAN-operation
- Graphical programming
- Quick and easy installation
- Various input- / output module digital / analogue available

Features

- According to IEC/EN 61 131-2, EN 50 178
- Operation as master
 - Operation as slave
 - Transfer rate up to 1 Mb/s
 - Interface according to DS301 version 3.0
- 2 digital inputs for DC 24 V
- 2 relay outputs
- LED indicators
- Standard programming software CODESYS® under Windows according to IEC/EN 61131-3:
 - Instruction set
 - Ladder diagram
 - Function block diagram
 - Sequential function chart
 - Structured text (similar to Pascal)
- 128 KB Flash memory for user program
- 128 KB RAM for user data
- 16 KB battery buffered RAM for no-voltage safe data
- Battery buffered real time clock
- Monitoring contact for RUN status of the PLC
- Width: 35 mm

Additional Information

- Data sheet Input Module IP 5502
- Data sheet Output Module IP 5503
- Data sheet Emergency Stop Monitor BH 5922
- Data sheet Analogue Output Module IL 5507
- Data sheet Analogue Input Module IL 5508
- Data sheet Input- / Output Module IN 5509

Approvals and Markings



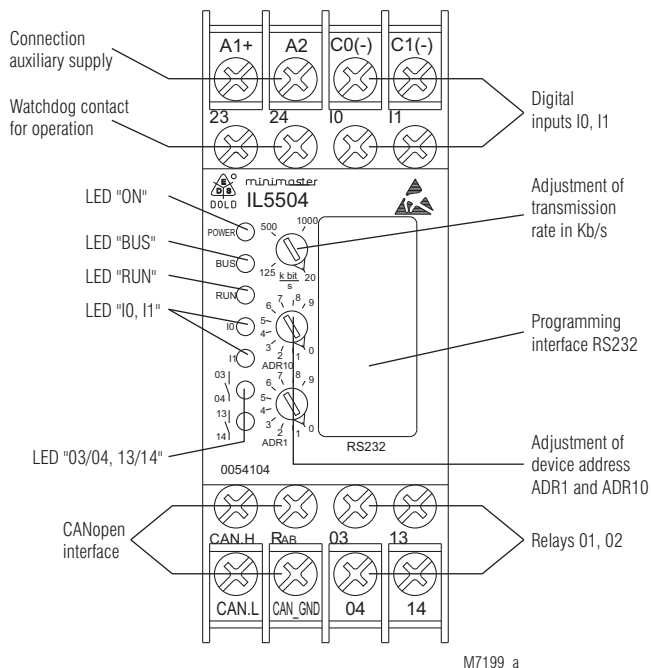
Application

The PLC runs a user program edited with the programming software PN 5501. The program can process local I/Os on the PLC as well as remote I/Os via the CANopen bus.

Indicators

- | | |
|---------------------|--|
| green LED „ON“: | on, when supply connected |
| yellow LED „BUS“: | on, when bus is active |
| yellow LED „RUN“: | on, when PLC in RUN state |
| | flashing, when failure |
| green LED „I0, I1“: | on, when corresponding input is active (I0/C0-, I1/C1-) |
| red LED „O1, O2“: | on, when corresponding output relay is active (03/04, 13/14) |

Setting and Adjustment



IL 5504

Adjustment of address:

To allow communication on the CANopen-Bus the device address has to be set with the 2 rotational switches between 1 ... 99.

Set-up Procedure:

- 1.) Connect device to CANopen-bus
- 2.) Terminate bus on both ends with bridge between CAN-H and R_{ab}
- 3.) Adjust transmission speed
- 4.) Set knot address
- 5.) Transmit program from PC to PLC IL 5504 with programming software and store it.

Technical Data

Auxiliary voltage

Auxiliary voltage U_H A1/A2: DC 24 V
Voltage range: 0.8 ... 1.1 U_N
Nominal consumption: 1.4 W

Input

Inputs: 2 digital inputs according to IEC/EN 61131-2 galvanic separated by optocouplers
Input voltage: DC 24 V
Signalverzögerung: approx. 2 ms

Output

Contacts: 2 relay outputs
 1 monitoring contact 23-24
 2 A

Thermal current I_{th} :
Switching capacity to AC 15: 3 A / AC 230 V IEC/EN 60 947-5-1
Switching capacity: at DC 24 V: 48 W
 at AC 230 V: 460 VA

Short circuit strength max. fuse rating: 4 A gG / gL IEC/EN 60 947-5-1
Mechanical life: > 10⁶ switching cycles
Programming interface RS232

Wire: Null Modem wire link
Transmission parameter: 57.6 Kbaud, 8N1
 The auxiliary voltage U_H is not galvanically separated from the programming interface.

CANopen interface

Wire: screened twisted pair
Transmission speed: adjustable 20 Kb/s, 125 Kb/s, 500 Kb/s, 1 Mb/s,

Attention:



Both ends of the 2-wire bus have to be terminated with a bridge between CAN_H and R_{ab}. The auxiliary voltage U_H is not galvanically separated from the CANopen interface.

General Data

Buffer for RAM and Realtime

clock: 3 years
Cycle time: approx. 10 ms + (0.4 ms per translated 1 Kb user program)

Immunity against phase

failure: 20 ms
Operating mode: Continuous operation
Temperature range: - 20 ... + 60°C

Clearance and creepage distances

overvoltage category / pollution degree	auxiliary voltage, CANopen interface to digital inputs:	1.5 kV / 2	IEC 60 664-1
	digital inputs to digital inputs: <td>1.5 kV / 2 <td>IEC 60 664-1 </td></td>	1.5 kV / 2 <td>IEC 60 664-1 </td>	IEC 60 664-1
	auxiliary voltage, CANopen interface to relay outputs: <td>4 kV / 2 <td>IEC 60 664-1 </td></td>	4 kV / 2 <td>IEC 60 664-1 </td>	IEC 60 664-1
	relay outputs to relay outputs: <td>4 kV / 2 <td>IEC 60 664-1 </td></td>	4 kV / 2 <td>IEC 60 664-1 </td>	IEC 60 664-1

EMC

Electrostatic discharge:	8 kV (air)	IEC/EN 61 000-4-2
HF-irradiation:	10 V/m	IEC/EN 61 000-4-3
Fast transients:	2 kV	IEC/EN 61 000-4-4
Surge voltages between wires for power supply:	1 kV	IEC/EN 61 000-4-5
Interference suppression:	Limit value class B	EN 55 011

Degree of protection

Housing:	IP 30	IEC/EN 60 529
Terminals:	IP 20	IEC/EN 60 529

Technical Data

Housing:	Thermoplastic with V0-behaviour according to UL subject 94
Vibration resistance:	amplitude 0.35 mm frequency 10 ... 55 Hz, IEC/EN 60 068-2-6
Climate resistance:	20 / 060 / 04 IEC/EN 60 068-1
Terminal designation:	EN 50 005
Wire connection:	2 x 2.5 mm ² solid or 2 x 1.5 mm ² stranded wire with sleeve DIN 46 228-1/-2/-3/-4
Wire fixing:	Flat terminals with self-lifting clamping piece IEC/EN 60 999-1
Mounting:	DIN rail IEC/EN 60 715
Weight:	150 g

Dimensions

Width x height x depth: 35 x 90 x 58 mm

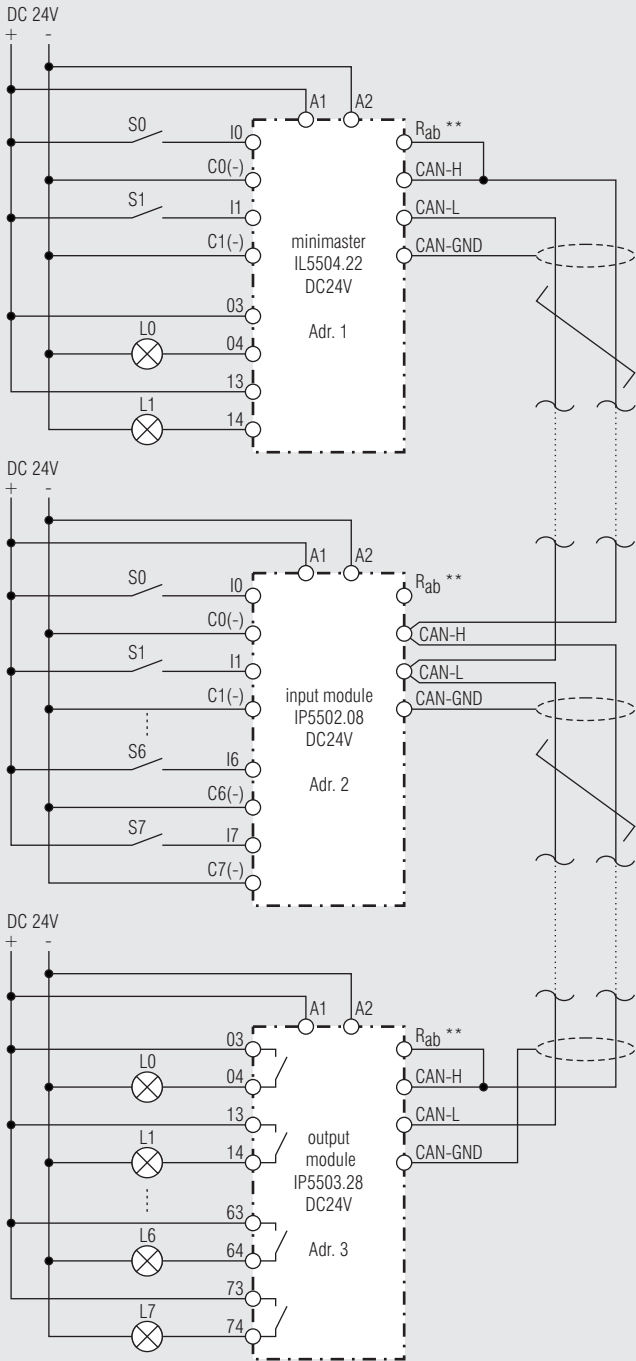
Standard Type

IL 5504.22 DC 24 V	
Article number:	0054104
• 2 relay outputs	
• 1 monitoring contact	
• 2 digital inputs DC 24 V	
• CANopen interface	
• Auxiliary supply U _H :	DC 24 V
• Width:	35 mm

Accessories

PN 5501:	Programming software Article number: 0052860
OA 5529/180:	Programming cable Article number: 0054950
IP 5502.08:	CANopen module with 8 binary inputs DC 24 V Article number: 0050911
IP 5503.28:	CANopen module with 8 relay outputs Article number: 0050912
IN 5509.23:	CANopen in- / output module with 4 binary inputs DC 24 V und 4 relay outputs Article number: 0055929
IL 5507.90/100:	Analogue output modul; 0 ... 10 V; DC 24 V Article number: 0060372
IL 5507.90/110:	Analogue output modul; 0 ... 20 V; DC 24 V Article number: 0060373
IL 5508.90/100:	CANopen module with 2 analogue inputs 0 ... 10 V Article number: 0056431
IL 5508.90/110:	CANopen module with 2 analogue inputs 0 ... 20 mA Article number: 0056807
IL 5508.90/121:	CANopen module with 2 analogue inputs, PT100 Article number: 0056957
IL 5504:	CANopen PLC

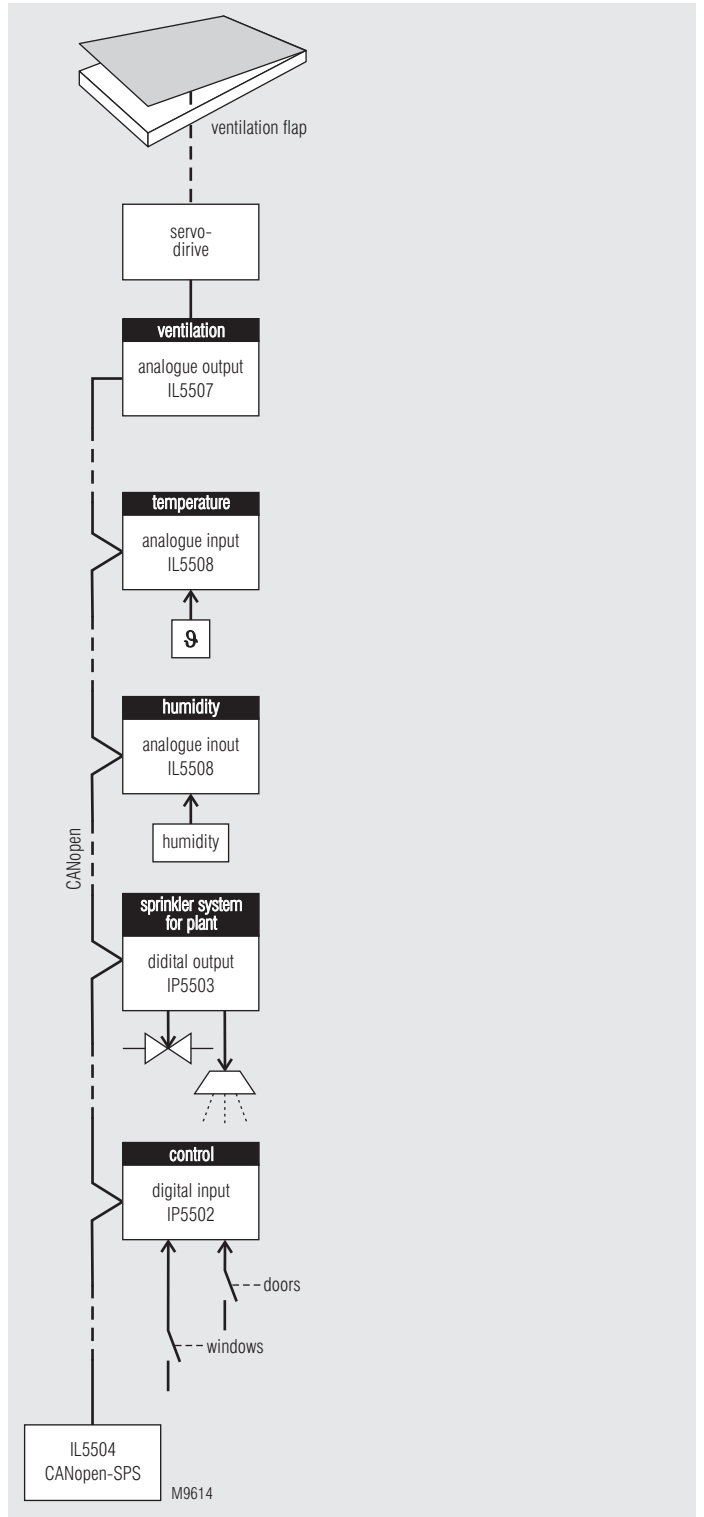
Application Example IL 5504



** Both ends of the 2-wire bus have to be terminated with a bridge between CAN-H and R_{ab}.

M7853_d

Application Example



CANopen-application for greenhouses: dependend on temperature- and humidity ventilation flap applications and sprinkler systems for plants in a greenhouse.

MINIMASTER Analogue Output Module For CANopen IL 5507



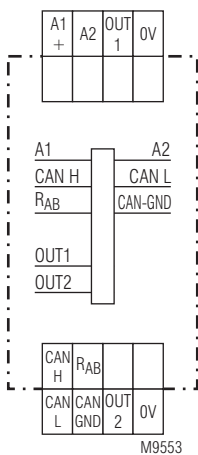
Your Advantages

- Compact structure
- easy installation

Features

- For installation in consumer units or industrial cabinets
- Space saving with 2 analogue outputs at 35 mm width required space not more then for 2 standard line circuit breakers
- 2 analogue outputs, optionally with each 2 x 0 ... 10 V, 2 x 0 ... 20 mA, 2 x -10 V ... +10V oder 2 x 4 ... 20 mA
- 12 bit resolution allows accuracy of $< \pm 0.1 \%$
- Galvanic separation between logic, output and bus guarantees high interference immunity
- No external voltage source necessary for output signal
- Can be used in all CANopen networks due to high data transmission rate up to 1Mbit/s
- Free configuration software CoDeSys
- According to IEC/EN 61 131-2
- CANopen interface according to DS301 version 3.0, DS401
- LED indicators for supply voltage and Bus status

Circuit Diagram



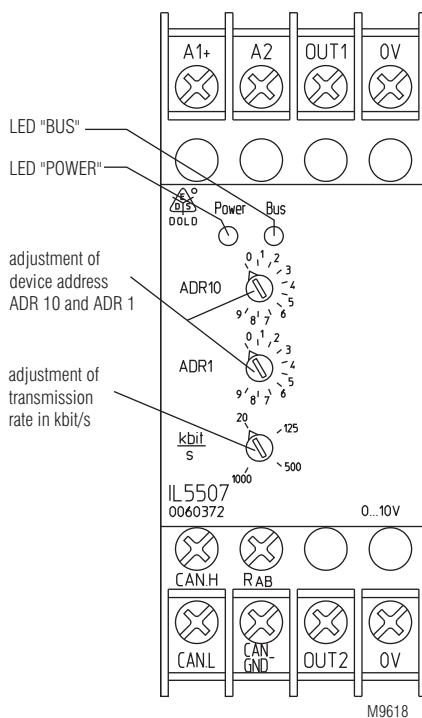
Approvals and Markings



Additional Information about this topic

In addition to the analogue output module IL 5507 Dold offers a complete range of master and slave modules for CANopen field bus systems. Also devices with protection class IP 67 are available. These can be mounted directly at the application without cabinet. This reduces wiring and failures.

Setting and Adjustment



Application

The analogue module IL 5507 for CANopen generates analogue signals e.g. to operate inverters, power- and servo amplifiers. It is designed into a compact installation enclosure and can be used in industry and building automation.

Indication

- LED yellow "Power": on when supply connected
- LED yellow "BUS": on, when bus is active, pulsing when bus is inactive

Set-up Procedure

1. Connect device to CANopen-bus
2. The CANopen bus cable has to be terminated with a 120 Ω resistor on both ends (on DOLD devices this can be done by linking the terminals CAN-H and R_{AB})
3. Adjust transmission speed (e. g. 20 k bit / s)
4. Adjust device addresses
5. Configure bus, e.g. with ProCANopen

The configuration is made with the programming software PN 5501 in conjunction with minimaster IL 5504 / IN 5504 or e.g. with ProCANopen. The corresponding configuration file on CD can be ordered under order no. PN 5501, article no. 0052860

Technical Data

Auxiliary Voltage

Auxiliary Voltage U_H A1/A2:	DC 24 V
Voltage range:	0.85 ... 1.2 U_N
Nominal consumption:	< 2.0 W at DC 24 V

Output

Output:	2, galvanic separation to bus and supply voltage
Separating potentials:	AC 350 V _{eff}
Output current:	0 ... 10 V
Output voltage:	0 ... 20 mA
Burden:	> 1 k Ω for 0 ... 10 V; -10V ... +10 V < 500 Ω for 0 ... 20 mA; 4 ... 20 mA
Output voltage:	< 10 mA for 0 ... 10 V; -10 V ... +10 V
Connection:	2-wire screened
Resolution:	12 bit
Accuracy:	< \pm 0.1 % of end of scale value
Temperature coefficient:	< 0.01 % of max. scale value
Short circuit current / duration:	20 mA / ∞
CANopen interface	
IL 5507.90/1__:	acc. to ISO 11898-1, galvanic separation
Wiring:	screened twisted pair
Transmission rate:	settable 20 K bit/s, 125 K bit/s, 500 K bit/s, 1 M bit/s,
Max. length:	20 K bit/s = 2.500 m 125 K bit/s = 500 m 500 K bit/s = 100 m 1 M bit/s = 25 m

General Data

Nominal operating mode:	continuous operation
Temperature range:	0 ... + 60°C
EMC	
Electrostatic discharge (ESD):	8 kV (air) IEC/EN 61 131-2
HF irradiation:	10 V IEC/EN 61 000-4-6
Fast transients	
wires for power supply:	2 kV IEC/EN 61 131-2
Fast transients	
Analog output:	0.25 kV IEC/EN 61 131-2
Interference suppression:	Limit value class B EN 55 011
Degree of protection	
Housing:	IP 40 IEC/EN 60 529
Terminals:	IP 20 IEC/EN 60 529
Enclosure:	thermoplastic with VO behaviour according to UL Subject 94
Mechanical	
operating conditions:	EN 61 131-2
Climate resistance:	EN 61 131-2
Terminal designation:	EN 50 005
Wire connection:	2 x 2.5 mm ² solid or 2 x 1.5 mm ² stranded ferruled DIN 46 228-1/-2/-3/-4
Wire fixing:	Flat terminals with self-lifting clamping piece IEC/EN 60 999-1
Mounting:	DIN rail DIN/EN 60 715
Weight:	110 g

Dimensions

Width x height x depth:	35 x 90 x 61 mm
--------------------------------	-----------------

Standard Types

IL 5507.90/100 DC 24 V	
Article number:	0060372
• 2 analogue Outputs	0 ... 10 V
• Nominal voltage U_N :	DC 24 V
IL 5507.90/110 DC 24 V	
Article number:	0060373
• 2 analogue Outputs	0 ... 20 mA
• Nominal voltage U_N :	DC 24 V

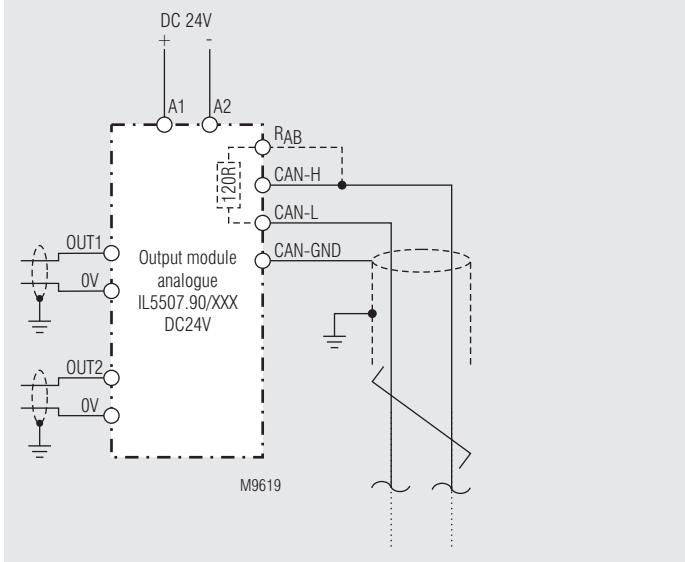
Ordering Example

IL 5507.90 / - 0 DC 24 V	
	Auxiliary voltage
	0: 2 Outputs 0 ... 10 V
	1: 2 Outputs 0 ... 20 mA
	2: 2 Outputs -10 V ... +10 V
	3: 2 Outputs 4 ... 20 mA
	0: CANopen-interface no galvanic separation
	1: CANopen-interface galvanic separation
	Type

Accessories

- CANopen PLC IL 5504
- Input / Output module IN 5509
- Input module, digital IP 5502
- Output module, digital IP 5503
- Input module, analogue IL 5508

Application Example



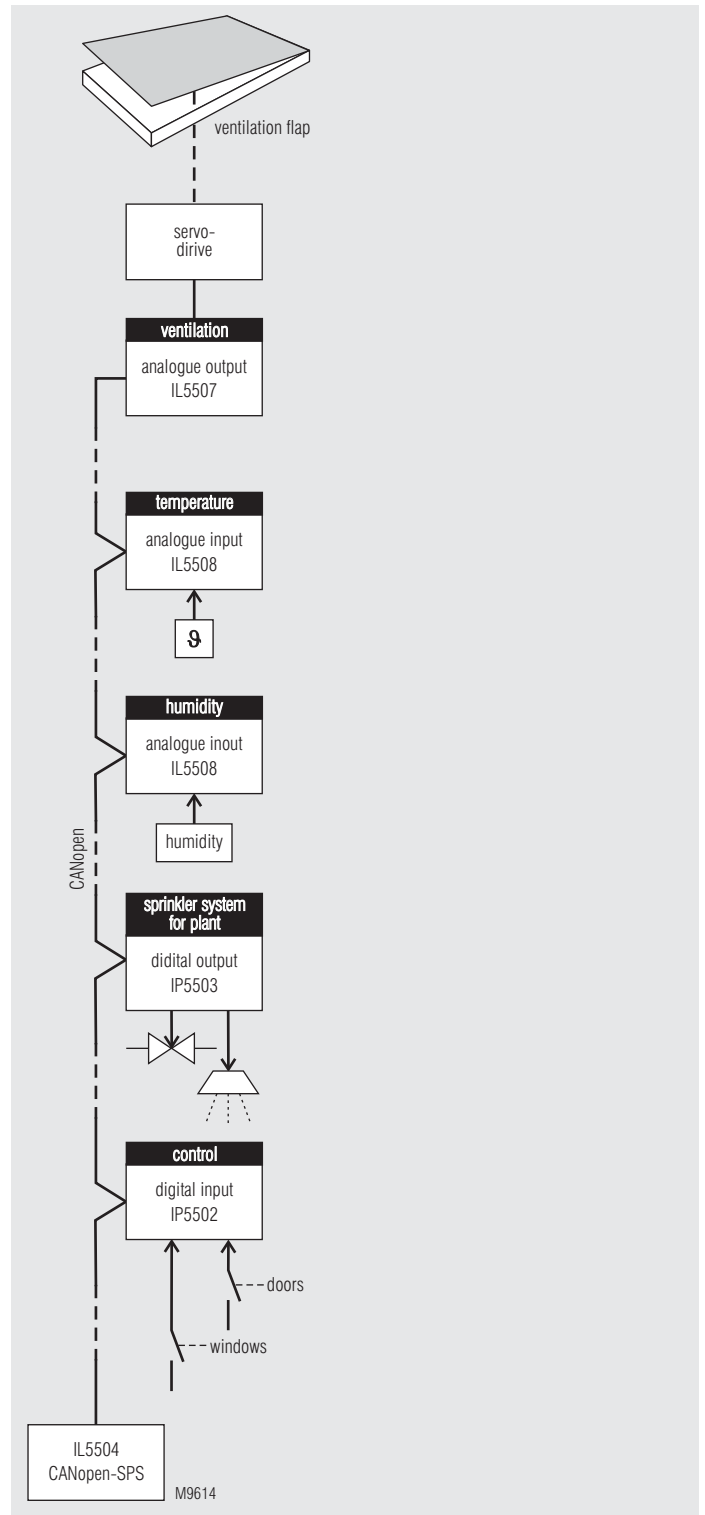
CAN-signals

CAN-H:	CAN_H bus line (dominant high)
CAN-L:	CAN_L bus line (dominant high)
R _{AB} :	Termination resistor 120 Ω
CAN-GND:	reference potential of CAN-transceiver

Notes for wiring

- Mixed networks, or networks that are not galvanically separated
 - CAN-GND is connected between all devices (CIA DRP 303-1).
 - if no 3rd wire is available in the bus cable, the screen of the cable can be used. In this case the screen has to be connected to PE at one point.
- Galvanic separated networks
 - if the networks are completely separated CAN-GND must not be wired (CIA DRP 303-1).
 - The screen is connected to PE.
- An equalisation of potentials between units in far distance has to be provided.
- The CAN-bus must be terminated at the first and last device on the bus with a 120 Ω resistor, e.g. insert a link on terminals R_{AB} and CAN-H.
- Analogue signal wires must be screened. the screen has to be connected to ground near to the input module.
- To achieve proper function, the DIN rail must have a good connection to ground.

Application Example



CANopen-application for greenhouses: dependend on temperature- and humidity ventilation flap applications and sprinkler systems for plants in a greenhouse.

MINIMASTER

Analogue Input Module for CANopen IL 5508



0247890

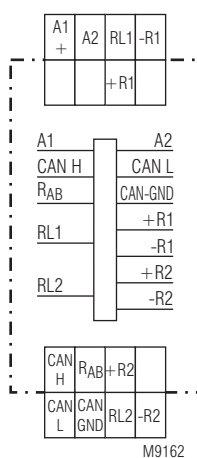
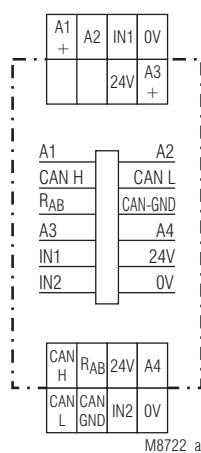


- According to IEC/EN 61 131-2
- CANopen interface according to DS301 version 3.0, DS401
- 2 analogue inputs with each 2 x 0 ... 10 V, 2 x 0 ... 20 mA or 2 x Pt 100 (- 50 ... 300°C)
- Galvanic separation between inputs, bus and auxiliary supply
- LED indicators for supply voltage and Bus status
- 35 mm width

Approvals and Markings



Circuit Diagrams



IL 5508.90/100
IL 5508.90/110

IL 5508.90/122

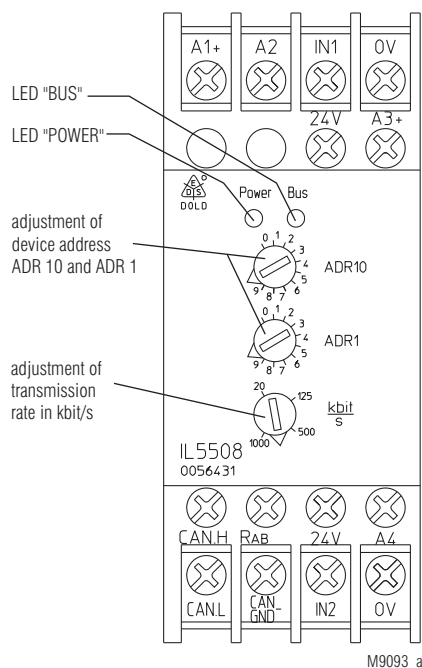
Application

The analog input module IL 5508 collects signals of a control circuit from limit switches, push buttons, sensors etc. The module is used in industrial control circuits and building automation.

Indicators

yellow LED "Power": on, when supply connected
yellow LED "BUS": on, when bus is active, pulsing when bus is inactive

Setting and Adjustment



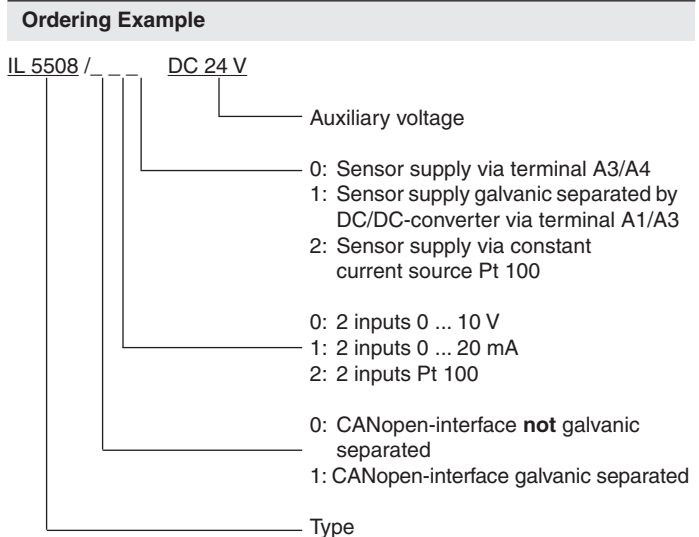
The configuration is made with the programming software PN 5501 in conjunction with minimaster IL 5504 / IN 5504 or e.g. with ProCANopen. The corresponding configuration file on CD can be ordered under order no. PN 5501, article no. 0052860

Set-up Procedure

1. Connect device to CANopen-bus
2. The CANopen bus cable has to be terminated with a 120 Ω resistor on both ends (on DOLD devices this can be done by linking the terminals CAN-H and R_{AB})
3. Adjust transmission speed (e. g. 20 k bit / s)
4. Adjust device addresses
5. Configure bus, e.g. with ProCANopen

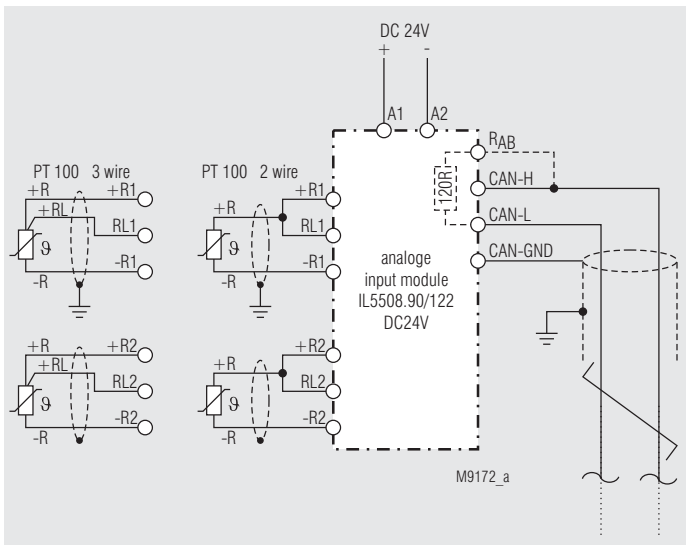
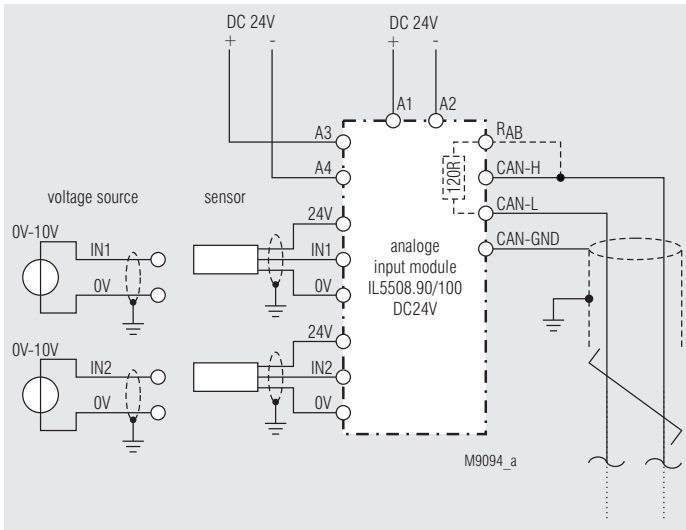
Technical Data	
Auxiliary voltage	
Auxiliary voltage U_H A1/A2:	DC 24 V
Voltage range:	0.85 ... 1.2 U_N
Nominal consumption:	< 2 W at DC 24 V
Sensor supply	
Variant / _ _ 0:	Sensor supply via terminal A3 (+) and A4, DC 24 V
Variant / _ _ 1:	Sensor supply internally from A1 (+) and A2 via galvanic separated DC/DC-converter, max. 24 V / 35 mA-channel
Input	
Inputs	2, single ended galvanic separated to bus and auxiliary supply
Galvanic separation:	AC 350 V _{eff}
Input voltage:	0 ... 10 V
Input current:	0 ... 20 mA
Thermal resistance Pt 100:	- 50 ... 300°C
Input impedance:	> 100 kΩ for 0 ... 10 V 82 Ω for 0 ... 20 mA
Measuring current Pt 100:	1.13 mA
Connection:	2-wire screened for 0 ... 10 V / 0 ... 20 mA 3-wire screened for Pt 100
Common mode voltage:	50 V max.
Resolution:	12 bit
Converting:	successive approximation
Measuring error:	< ± 0.25 % of end of scale value for 0 ... 10 V; 0 ... 20 mA
Pt 100:	< ± 1 % of end of scale value
Quantisation:	2.5 mV 5 µA 0.1°C
Measuring principle:	integrating (mean value)
CANopen interface	
IL 5508.90/1__:	galvanic separation according to ISO 11 898-1
Wire:	screened twisted pair
Transmission speed:	adjustable 20 k bit/s, 125 k bit/s, 500 k bit/s, 1 M bit/s,
max. Bus length:	20 k bit/s = 2.500 m 125 k bit/s = 500 m 500 k bit/s = 90 m 1 M bit /s = 15 m
General Data	
Operating mode:	Continuous operation
Temperature range:	- 20 ... + 60°C
EMC	
Electrostatic discharge:	8 kV (air) IEC/EN 61 131-2
HF-irradiation:	10 V IEC/EN 61 000-4-6
Fast transients wires for power supply:	2 kV IEC/EN 61 131-2
Fast transients analogue input:	0.25 kV IEC/EN 61 131-2
Interference suppression:	Limit value class B EN 55 011
Degree of protection	
Housing:	IP 40 IEC/EN 60 529
Terminals:	IP 20 IEC/EN 60 529
Housing:	Thermoplastic with V0-behaviour according to UL subject 94
Mech. operating conditions:	EN 61 131-2
Climate resistance:	EN 61 131-2
Terminal designation:	EN 50 005
Wire connection:	2 x 2.5 mm ² solid or 2 x 1.5 mm ² stranded wire with sleeve DIN 46 228-1/-2/-3/-4
Wire fixing:	Flat terminals with self-lifting clamping peace IEC/EN 60 999-1
Mounting:	DIN rail IEC/EN 60 715
Weight:	110 g
Dimensions	
Width x height x depth:	30 x 90 x 61 mm

Standard Types	
IL 5508.90/100 DC 24 V	
Article number:	0056431
• 2 analogue inputs	0 ... 10 V
• Nominal voltage U_N :	DC 24 V
• Sensor supply:	on terminal A3 / A4
IL 5508.90/110 DC 24 V	
Article number:	0056807
• 2 analogue inputs	0 ... 20 mA
• Nominal voltage U_N :	DC 24 V
• Sensor supply:	on terminal A3 / A4
IL 5508.90/122 DC 24 V	
Article number:	0056957
• 2 analogue inputs	Pt 100 - 50 ... 300°C
• Nominal voltage U_N :	DC 24 V
• Sensor supply:	constant current source 1.13 mA



Accessories	
•	CANopen PLC IL 5504
•	Input / Output Module IN 5509
•	Input Module, Digital IP 5502
•	Output Module, Digital IP 5503
•	Input Module, Analogue IL 5508
•	Output Module, Analogue IL 5507

Application Examples



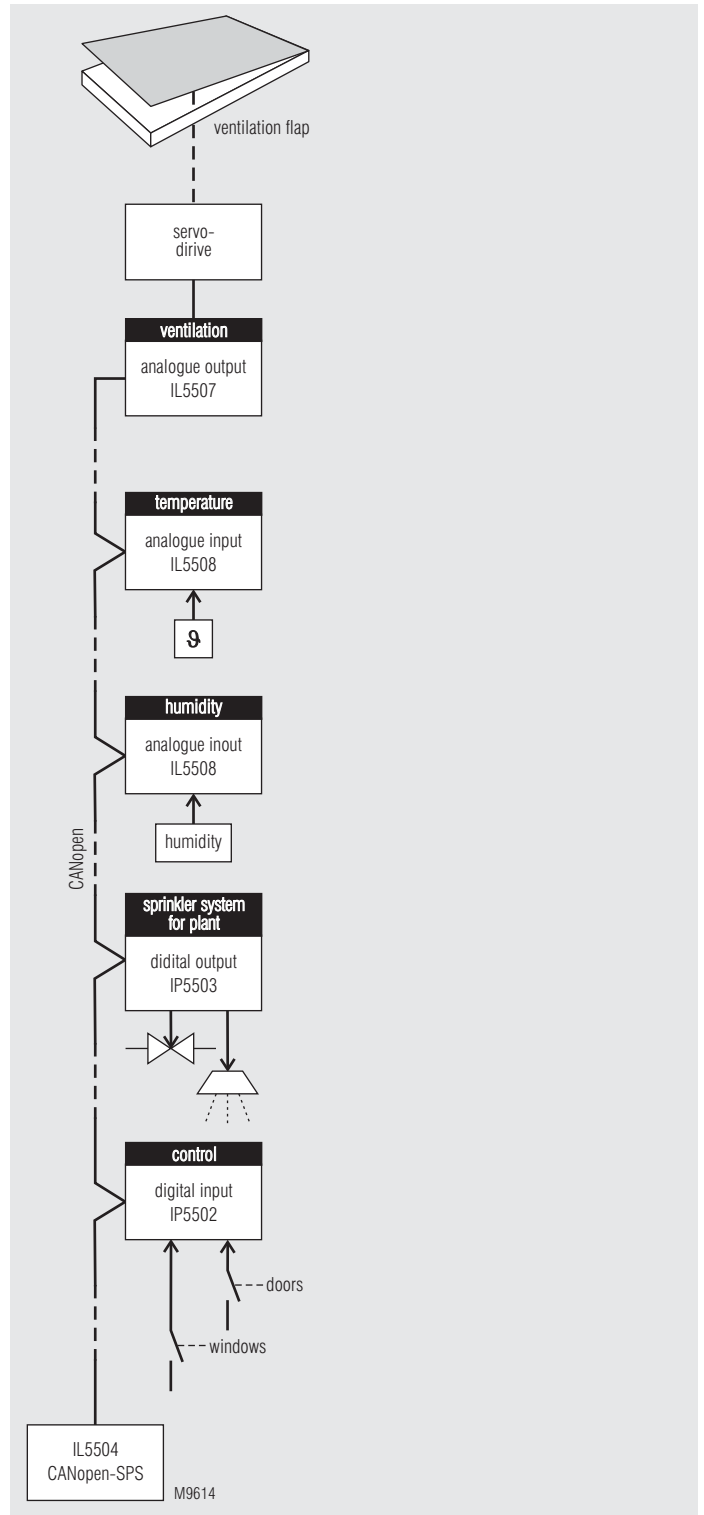
CAN-signals

CAN-H:	CAN_H bus line (dominant high)
CAN-L:	CAN_L bus line (dominant high)
R _{AB} :	Termination resistor 120 Ω
CAN-GND:	reference potential of CAN-transceiver

Notes for wiring

- Mixed networks, or networks that are not galvanically separated
 - CAN-GND is connected between all devices (CIA DRP 303-1).
 - if no 3rd wire is available in the bus cable, the screen of the cable can be used. In this case the screen has to be connected to PE at one point.
- Galvanic separated networks
 - if the networks are completely separated CAN-GND must not be wired (CIA DRP 303-1).
 - The screen is connected to PE.
- An equalisation of potentials between units in far distance has to be provided.
- The CAN-bus must be terminated at the first and last device on the bus with a 120 Ω resistor, e.g. insert a link on terminals R_{AB} and CAN-H.
- Analogue signal wires must be screened. the screen has to be connected to ground near to the input module.
- To achieve proper function, the DIN rail must have a good connection to ground.

Application Example



CANopen-application for greenhouses: dependend on temperature- and humidity ventilation flap applications and sprinkler systems for plants in a greenhouse.

MINIMASTER

Input / Output Module for CANopen IN 5509



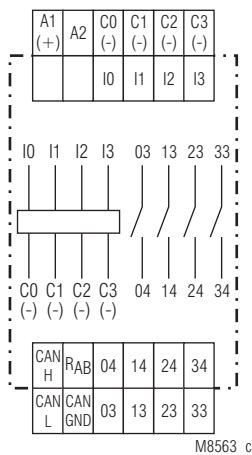
Your Advantages

- Compact structure
- Easy installation

Features

- According to IEC/EN 61 131-2
- CANopen interface according to DS 301 version 3.0, DS 401
- 4 digital inputs for DC 24 V
- 4 relay outputs
- LED indicators
- 52.5 mm width

Circuit Diagram



Approvals and Markings



Application

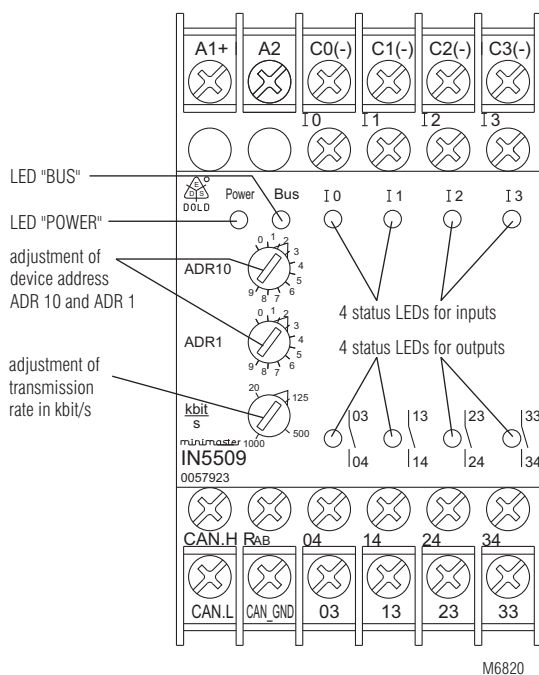
The digital input modules collect signals of a control circuit from limit switches, push buttons, sensors etc. With the relay outputs the signals for a control system are switched. The IN 5509 is used in industrial control circuits and building automation.

Indicators

- yellow LED "Power": on, when supply connected
- yellow LED "BUS": on, when BUS is aktive, pulsing when bus is inactive
- green status LEDs I₀ ... I₃: on, when input active
- red LEDs: on, when output relay active

IN 5509.23

Setting and Adjustment



CANopen-mode

The configuration is made with the programming software PN 5501 in conjunction with minimaster IL 5504 / IN 5504 or e.g. with ProCANopen. The corresponding configuration file on CD can be ordered under order no. PN 5501, article no. 0052860

Set-up procedure

1. Connect device to CANopen-bus
2. Terminate bus on both ends with bridge between CAN-H and R_{ab} on first and last module.
3. Adjust transmission speed (e. g. 20 K bit / s)
4. Adjust device addresses
5. Configure bus

Technical Data

Auxiliary voltage

Auxiliary voltage U_H A1/A2: DC 24 V
Voltage range: 0.8 ... 1.1 U_N
Nominal consumption: 0.5 W DC 24 V

Input

Inputs galvanic separation
IN 5509.23: 4 digital inputs IEC/EN 61 131-2
Input voltage
IN 5509.23/1_ _: DC 24 V
according to ISO 11898-1, galvanic separated

CANopen interface

Wire: screened twisted pair
Transmission speed: adjustable 20 kbit/s, 125 kbit/s, 500 kbit/s, 1 Mbit/s,

	IN 5509.23	IN 5509.23/100
max. buslength:	20 kbit/s 2500 m	2500 m
	125 kbit/s 500 m	500 m
	500 kbit/s 100 m	90 m
	1 Mbit/s 25 m	15 m

Attention:



Both ends of the 2-wire bus have to be terminated with a bridge between CAN_H and R_{ab}.

Output

Contacts
IN 5509.23: 4 NO contacts IEC/EN 61 131-2
Thermal current I_{th} : 2 A
Switching capacity
to AC 15: 3 A / AC 230 V IEC/EN 60 947-5-1
Schaltleistung
at AC 230 V: 460 VA
at DC 24 V: 48 W
Short circuit strength
max. fuse rating: 4 A gL IEC/EN 60 947-5-1
Mechanical life: >10⁸ switching cycles

General Data

Operating mode: Continuous operation
Temperatur range: - 20 ... + 60°C
Clearance and creepage distances
rated impulse voltage / pollution degree: 4 kV / 2 IEC 60 664-1
EMC
Electrostatic discharge: 8 kV (air) IEC/EN 61 000-4-2
HF-irradiation: 10 V / m IEC/EN 61 000-4-3
Fast transients: 2 kV IEC/EN 61 000-4-4
Surge voltages between wires for power supply: 1 kV IEC/EN 61 000-4-5
between wire and ground: 2 kV IEC/EN 61 000-4-5
HF-wire guided: 10 V IEC/EN 61 000-4-6
Interference suppression: Limit value class B EN 55 011
Degree of protection
Housing: IP 40 IEC/EN 60 529
Terminals: IP 20 IEC/EN 60 529
Housing: Thermoplast mit V0 behaviour according to UL subject 94
Vibration resistance: Amplitude 0.35 mm frequency 10 ... 55 Hz IEC/EN 60 068-2-6
Climate resistance: 20 / 060 / 04 IEC/EN 60 068-1
Terminal designation: EN 50 005
Wire connection: 2 x 2.5 mm² solid or 2 x 1.5 mm² stranded ferruled DIN 46 228-1/-2/-3/-4
Wire fixing: Terminal screws M3.5, box terminals with wire protection
Mounting: DIN rail IEC/EN 60 715
Weight: 180 g

Dimensions

Width x height x depth: 52.5 x 90 x 58 mm

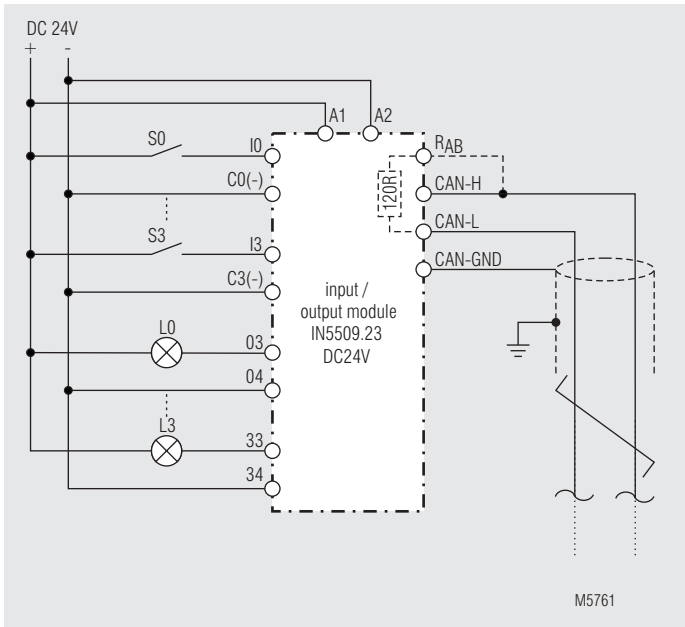
Standard Type

IN 5509.23/100 DC 24 V
Article number: 0055929
• 4 Digital inputs
• 4 Relay outputs
• Nominal voltage U_N : DC 24 V
• Width: 52.5 mm

Accessories

- CANopen PLC IL 5504
- Input / Output Module IN 5509
- Input Module, Digital IP 5502
- Output Module, Digital IP 5503
- Input Module, Analogue IL 5508
- Output Module, Analogue IL 5507

Application Example



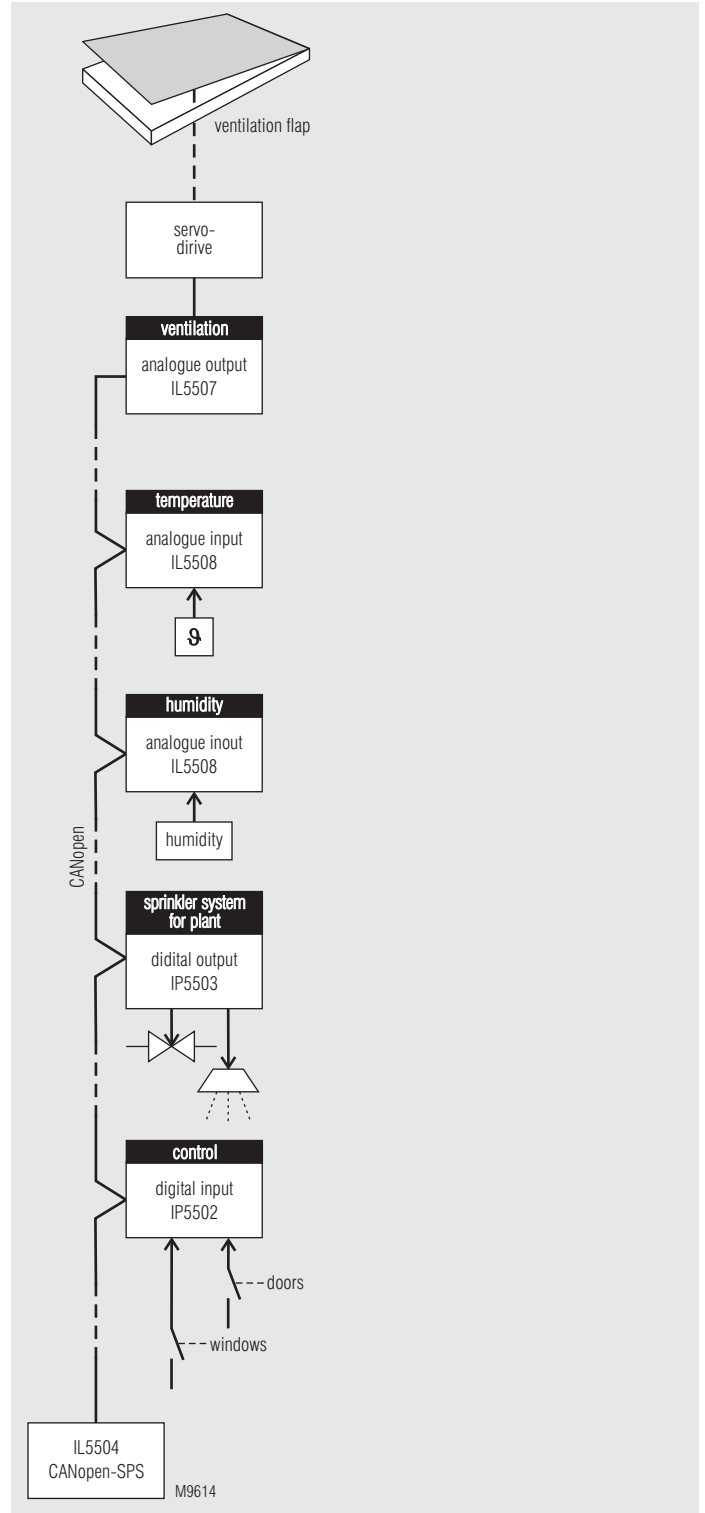
CAN-signals

CAN-H:	CAN_H bus line (dominant high)
CAN-L:	CAN_L bus line (dominant high)
R _{AB} :	Termination resistor 120 Ω
CAN-GND:	reference potential of CAN-transceiver

Notes for wiring

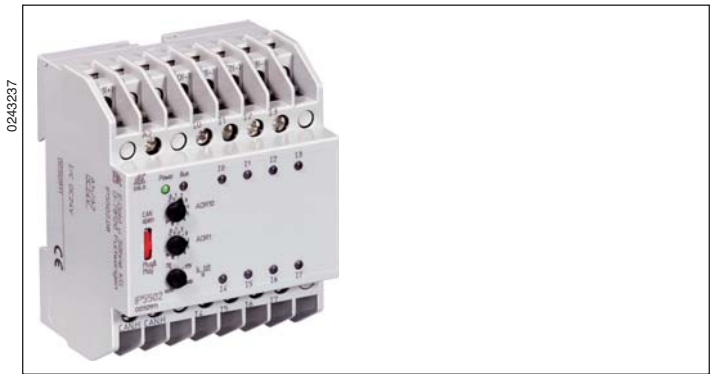
- Mixed networks, or networks that are not galvanically separated
 - CAN-GND is connected between all devices (CIA DRP 303-1).
 - if no 3rd wire is available in the bus cable, the screen of the cable can be used. In this case the screen has to be connected to PE at one point.
- Galvanic separated networks
 - if the networks are completely separated CAN-GND must not be wired (CIA DRP 303-1).
 - The screen is connected to PE.
- An equalisation of potentials between units in far distance has to be provided.
- The CAN-bus must be terminated at the first and last device on the bus with a 120 Ω resistor, e.g. insert a link on terminals R_{AB} and CAN-H.

Application Example



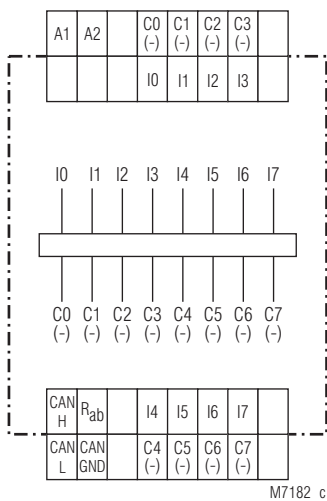
CANopen-application for greenhouses: depend on temperature- and humidity ventilation flap applications and sprinkler systems for plants in a greenhouse.

MINIMASTER Input Module for CANopen IP 5502



- According to IEC/EN 61 131-2, IEC/EN 50 178
- CANopen interface according to DS301 version 3.0 (Plug and Play selectable), as option with galvanic separation
- 8 digital inputs for DC 24 V
- LED indicators for supply voltage and Bus status
- 70 mm width

Circuit Diagram



M7182_c

IP 5502.08

Additional Information

- Datasheet Output Module IP 5503
- Datasheet Emergency Off Monitor BH 5922
- Datasheet MINIMASTER IL 5504, IN 5504
- Datasheet Power Supply IR 5592
- Datasheet Analogue Input Module IL 5508
- Datasheet Analogue Output Module IL 5507

Approvals and Markings



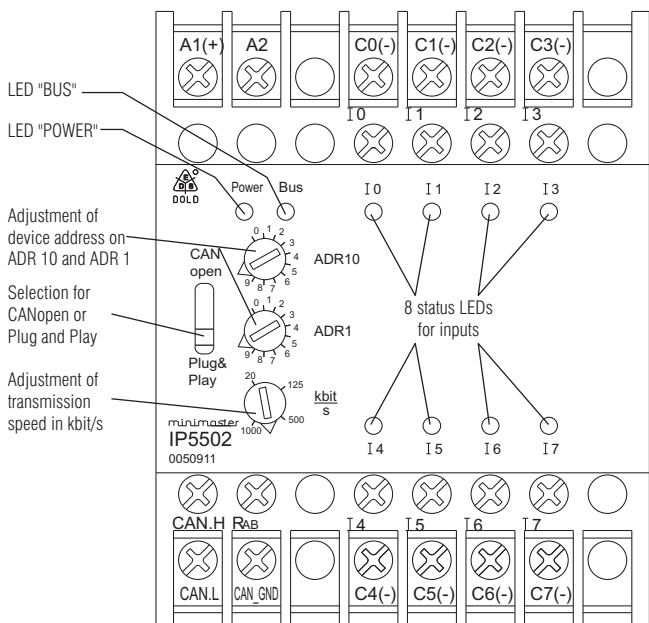
Application

The digital input module IP 5502 collects signals of a control circuit from limit switches, push buttons, sensors etc. The modules are used in industrial control circuits and building automation.

Indicators

- | | |
|--|-------------------------------|
| yellow LED "Power": | on, when supply connected |
| yellow LED "BUS": | on, when bus is active |
| green LEDs I ₀ ... I ₇ : | on, when input signal applied |

Setting and Adjustment



M7340_a

CANopen operation

With switch in position "CANopen" the CAN bus runs the CANopen protocol. The configuration is made with the programming software PN 5501 in conjunction with minimaster IL 5504 / IN 5504 or e.g. with ProCANopen. The corresponding configuration file on CD can be ordered under order no. PN 5501, article no. 0052860

Plug and Play operation

With switch in position "Plug and Play" the CANopen bus runs a variant of the CANopen protocol and allows only to operate Dold modules that have this feature. If a system is configured in Plug and Play operation, it can be altered to CANopen at any time.

Address setting in Plug and Play mode

To allow the input module to communicate via CAN-bus with a corresponding device, the address has to be adjusted on the 2 rotational switches on the front see below: The addresses 1 ... 49 and 51 ... 99 can be chosen. In Plug and Play mode the addresses 0 and 50 do not exist.

Input module IP 5502 with address	transmits to	Output module IP 5503 with address
1	→	51
...		...
49	→	99

Example of setting:
Upper rotational switch "ADR 10": address 14 in position 1
Lower rotational switch "ADR 1": address 14 in position 4

Setting and Adjustment

Set-up procedure

- 1.) Connect device to CANopen-bus
- 2.) Terminate bus on both ends with bridge between CAN-H and R_{ab} on first and last module.
- 3.) Adjust transmission speed (e. g. 20 K bit / s)
- 4.) Adjust device addresses

Attention:



To allow transmission in Plug and Play mode, one of the input modules e.g. IP 5502 of the CAN-bus has to be set to address 1.

Technical Data

Auxiliary voltage

Auxiliary voltage U_H A1/A2: DC 24 V
Voltage range: 0.8 ... 1.1 U_N
Nominal consumption: 0.5 W DC 24 V

Input

Inputs galvanic separated
IP 5502: 8 digital inputs IEC/EN 61 131-2
Input voltage: DC 24 V

CANopen interface

IP 5502.08/100: galvanic separation according to ISO 11 898-1
Wire: screened twisted pair
Transmission speed: adjustable 20 K bit/s, 125 K bit/s, 500 K bit/s, 1 M bit/s,
max. length: 20 K bit/s = 2.500 m
125 K bit/s = 500 m
500 K bit/s = 100 m
1 M bit /s = 25 m

Plug and Play

Transmission speed: 20 K bit / s (recommended)

Attention:



Both ends of the 2-wire bus have to be terminated with a bridge between CAN_H and R_{ab}.

General Data

Operating mode: Continuous operation
Temperature range: - 20 ... + 60°C
Clearance and creepage distances
rated impulse voltage / pollution degree: 4 kV / 2 IEC 60 664-1
EMC
Electrostatic discharge: 8 kV (air) IEC/EN 61 000-4-2
HF-irradiation: 10 V / m IEC/EN 61 000-4-3
Fast transients: 2 kV IEC/EN 61 000-4-4
Surge voltages between wires for power supply: 1 kV IEC/EN 61 000-4-5
between wire and ground: 2 kV IEC/EN 61 000-4-5
Interference suppression: Limit value class B EN 55 011
Degree of protection
Housing: IP 40 IEC/EN 60 529
Terminals: IP 20 IEC/EN 60 529
Housing: Thermoplastic with V0-behaviour according to UL subject 94
Vibration resistance: amplitude 0.35 mm frequency 10 ... 55 Hz IEC/EN 60 068-2-6
Climate resistance: 20 / 060 / 04 IEC/EN 60 068-1
Terminal designation: EN 50 005
Wire connection: 2 x 2.5 mm² solid or 2 x 1.5 mm² stranded wire with sleeve DIN 46 228-1/-2/-3/-4
Wire fixing: Flat terminals with self-lifting clamping peace IEC/EN 60 999-1
Mounting: DIN rail IEC/EN 60 715
Weight: 187 g

Technical Data

Dimensions

Width x height x depth: 70 x 90 x 61 mm

Standard Type

IP 5502.08 DC 24 V
Article number: 0050911
• 8 digital inputs
• Nominal voltage U_N: DC 24 V
• Width: 70 mm

Variant

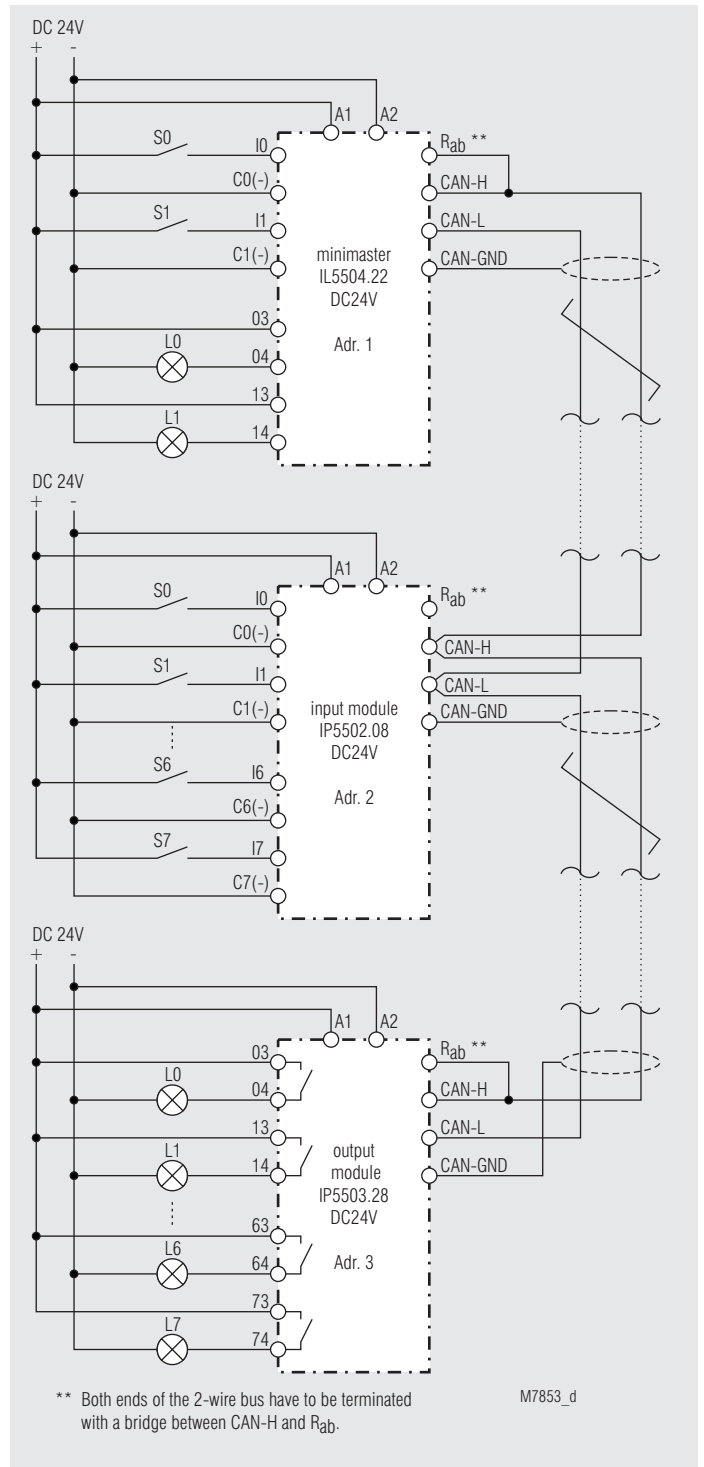
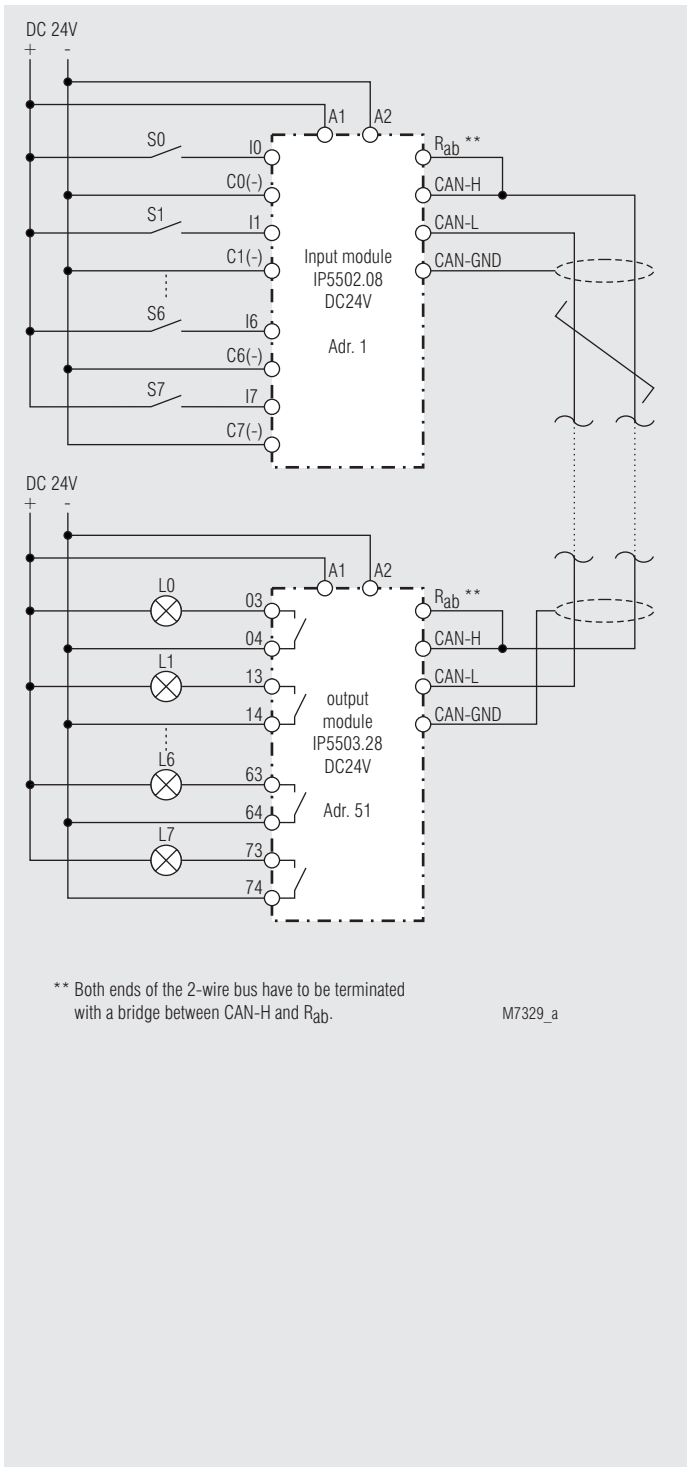
Ordering example for variant

IP 5502.08/_00 DC 24 V
└──────────┬──────────┘ Bus interface
0 CANopen interface without galvanic separation
1 CANopen interface with galvanic separation

Accessories

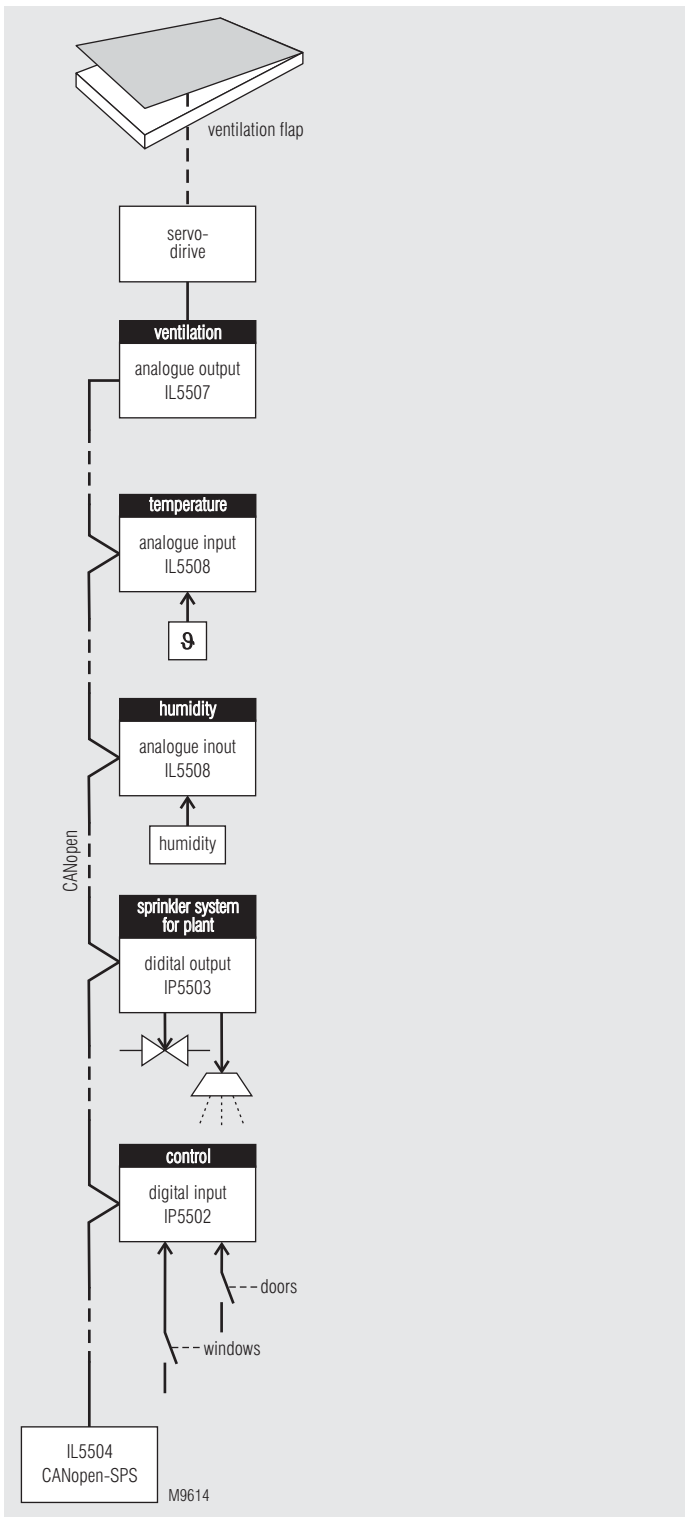
- CANopen PLC IL 5504
- Input / Output module IN 5509
- Input module, digital IP 5502
- Output module, digital IP 5503
- Input module, analogue IL 5508
- Output module, analogue IL 5507

Application Examples



Design of a 2-wire remote control is very simple:
 Connect input module IP 5502 to output module IP 5503 via a 2-wire line
 adjust addresses and speed ... ready to go.

Application example



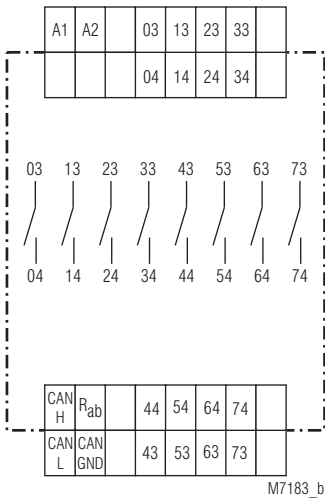
CANopen-application for greenhouses:
depend on temperature- and humidity ventilation flap applications and
sprinkler systems for plants in a greenhouse.

MINIMASTER Output Module for CANopen IP 5503



- According to IEC/EN 61 131-2, IEC/EN 50 178
- CANopen interface according to DS301 version 3.0 (Plug and Play selectable), as option with galvanic separation
- 8 relay outputs
- LED indicators for supply voltage, Bus status and state of contact
- 70 mm width

Circuit Diagram



M7183_b

IP 5503.28

Additional Information

- Datasheet Input Module IP 5502
- Datasheet Emergency Off Monitor BH 5922
- Datasheet MINIMASTER IL 5504, IN 5504
- Datasheet Power Supply IR 5592
- Datasheet Analogue Input Module IL 5508
- Datasheet Analogue Output Module IL 5507

Approvals and Markings



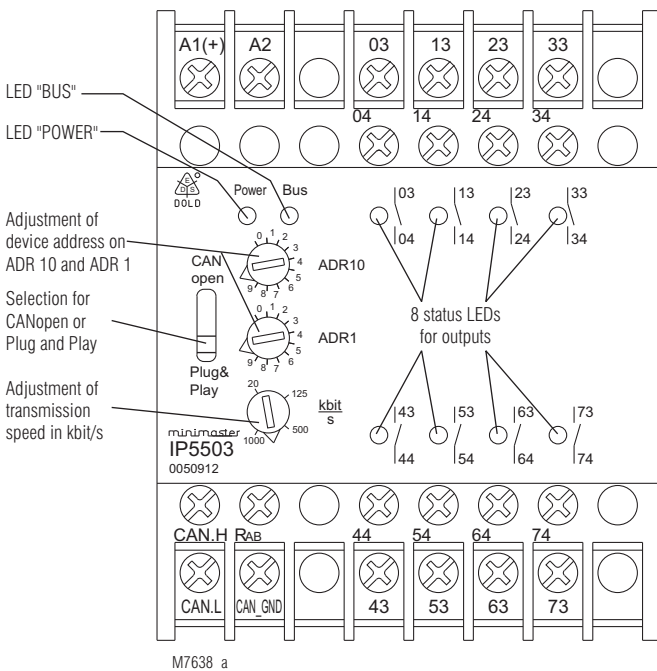
Application

The digital output module actuates signals in control circuits. The modul is used in industrial control circuits and building automation.

Indicators

- yellow LED „Power“: on, when supply connected
- yellow LED „BUS“: on, when bus is active
- red LEDs: on, when output relay is active (8 LEDs)

Setting and Adjustment



M7638_a

CANopen operation

With switch in position "CANopen" the CAN bus runs the CANopen protocol. The configuration is made with the programming software PN 5501 in conjunction with minimaster IL 5504 / IN 5504 or e.g. with ProCANopen. The corresponding configuration file on CD can be ordered under order no. PN 5501, article no. 0052860

Plug and Play operation

With switch in position "Plug and Play" the CANopen bus runs a variant of the CANopen protocol and allows only to operate Dold modules that have this feature. If a system is configured in Plug and Play operation, it can be altered to CANopen at any time.

Address setting in Plug and Play mode

To allow the input module to communicate via CAN bus with a corresponding device, the address has to be adjusted on the 2 rotational switches on the front see below: The addresses 1 ... 49 and 51 ... 99 can be chosen. In Plug and Play mode the addresses 0 and 50 do not exist.

Input module IP 5502 with address	transmits to	Output module IP 5503 with address
1	→	51
.		.
49	→	99

Example of setting:
Upper rotational switch "ADR 10": address 14
Lower rotational switch "ADR 1": in position 1

Setting and Adjustment

Set-up procedure

- 1.) Connect device to CANopen-bus
- 2.) Terminate bus on both ends with bridge between CAN-H and R_{ab} on first and last module.
- 3.) Adjust transmission speed (e. g. 20 K bit / s)
- 4.) Adjust device addresses

Attention:



To allow transmission in Plug and Play mode, one of the input modules e.g. IP 5502 of the CAN-bus has to be set to address 1.

Technical Data

Auxiliary voltage

Auxiliary voltage U_H A1/A2: DC 24 V
Voltage range: 0,8 ... 1,1 U_N
Nominal consumption: 0,5 W

Output

Contacts:

IP 5503.28: 8 NO contacts IEC/EN 61 131-2
2 A

Thermal current I_{th}:

Switching capacity

to AC 15: 3 A / AC 230 V IEC/EN 60 947-5-1
Switching capacity:
at DC 24 V: 48 W
at AC 230 V: 460 VA

Short circuit strength

max. fuse rating: 4 AgL IEC/EN 60 947-5-1

Mechanical life:

> 10⁸ switching cycles

CANopen interface

IP 5503.28/100: galvanic separation according to ISO 11 898-1
Wire : screened twisted pair
Transmission speed: adjustable 20 K bit/s, 125 K bit/s, 500 K bit/s, 1 M bit/s,
max. length: 20 K bit/s = 2.500 m
125 K bit/s = 500 m
500 K bit/s = 100 m
1 M bit /s = 25 m

Plug and Play

Transmission speed: 20 K bit / s (recommended)

Attention:



Both ends of the 2-wire bus have to be terminated with a bridge between CAN_H and R_{ab}.

Operating mode: Continuous operation

Temperature range: - 20 ... + 60°C

Clearance and creepage distances

rated impulse voltage / pollution degree: 4 kV / 2 IEC 60 664-1

EMC

Electrostatic discharge: 8 kV (air) IEC/EN 61 000-4-2

HF-irradiation: 10 V/m IEC/EN 61 000-4-3

Fast transients: 2 kV IEC/EN 61 000-4-4

Surge voltages between

wires for power supply: 1 kV IEC/EN 61 000-4-5

between wire and ground: 2 kV IEC/EN 61 000-4-5

Interference suppression: Limit value class B EN 55 011

Degree of protection

Housing: IP 40 IEC/EN 60 529

Terminals: IP 20 IEC/EN 60 529

Housing: Thermoplastic with V0-behaviour according to UL subject 94

Vibration resistance: amplitude 0,35 mm frequency 10 ... 55 Hz IEC/EN 60 068-2-6

Climate resistance: 20 / 060 / 04 IEC/EN 60 068-1

Terminal designation: EN 50 005

Wire connection: 2 x 2,5 mm² solid or 2 x 1,5 mm² stranded wire with sleeve DIN 46 228-1/-2/-3/-4

Wire fixing: Flat terminals with self-lifting clamping piece IEC/EN 60 999-1

Technical Data

Mounting: DIN rail IEC/EN 60 715
Weight: 225 g

Dimensions

Width x height x depth: 70 x 90 x 61 mm

Standard Type

IP 5503.28 DC 24 V
Article number: 0050912
• 8 relay outputs
• Nominal voltage U_N: DC 24 V
• Width: 70 mm

Ordering Example

IP 5503.28/ 00 DC 24 V

Bus interface

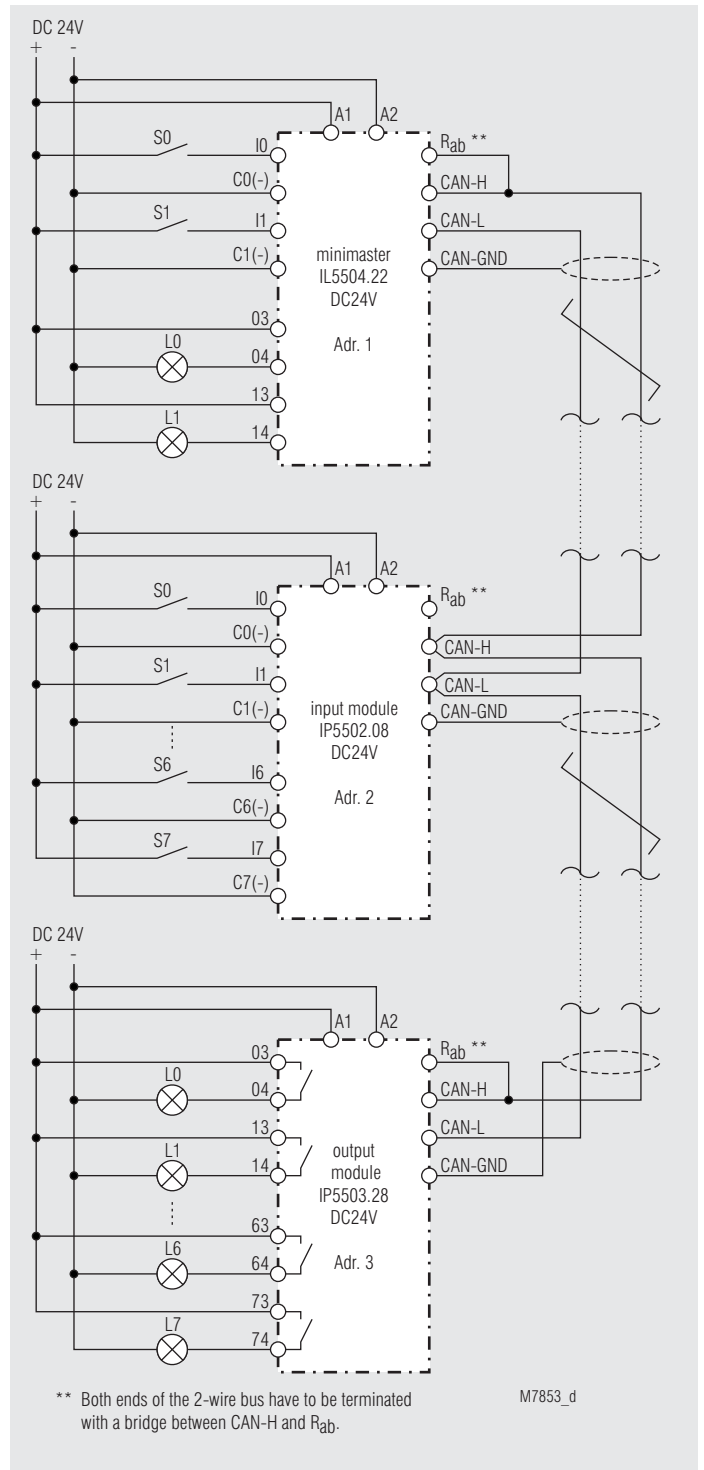
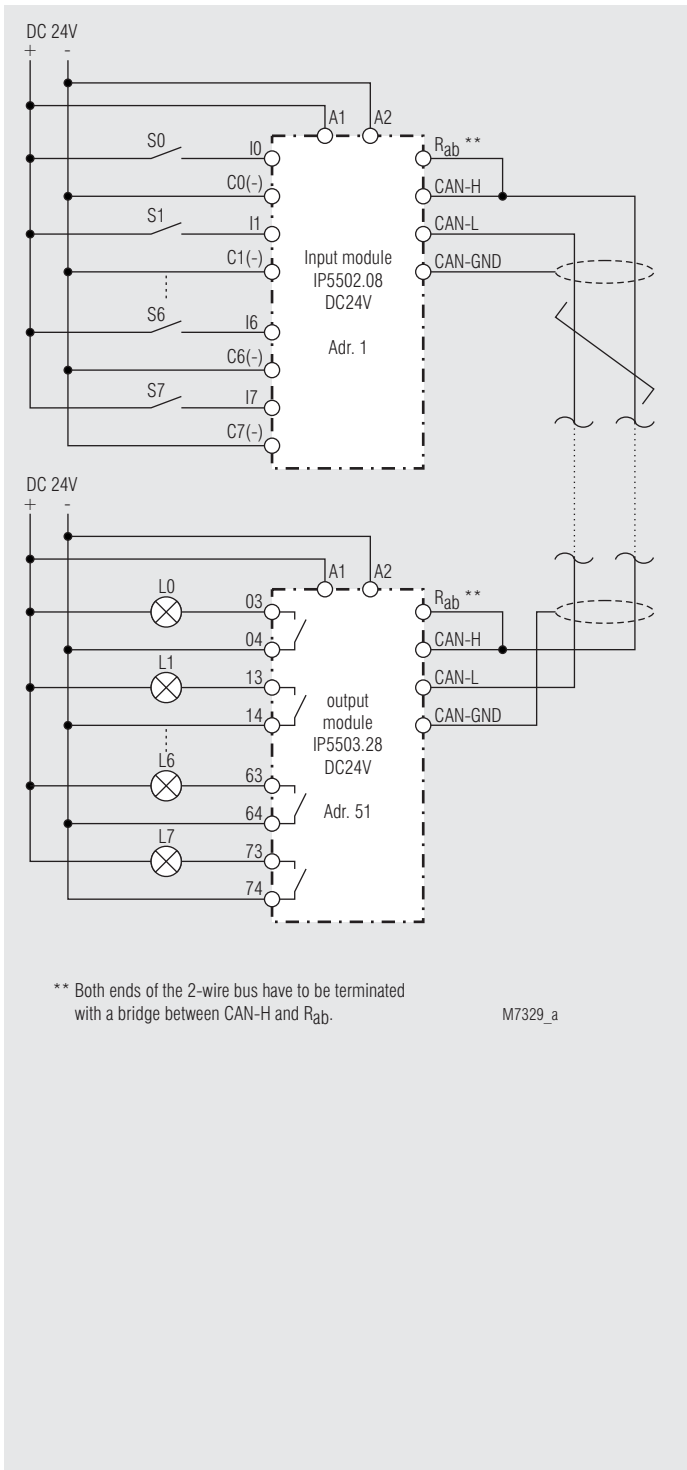
0 CANopen interface without galvanic separation

1 CANopen interface with galvanic separation

Accessories

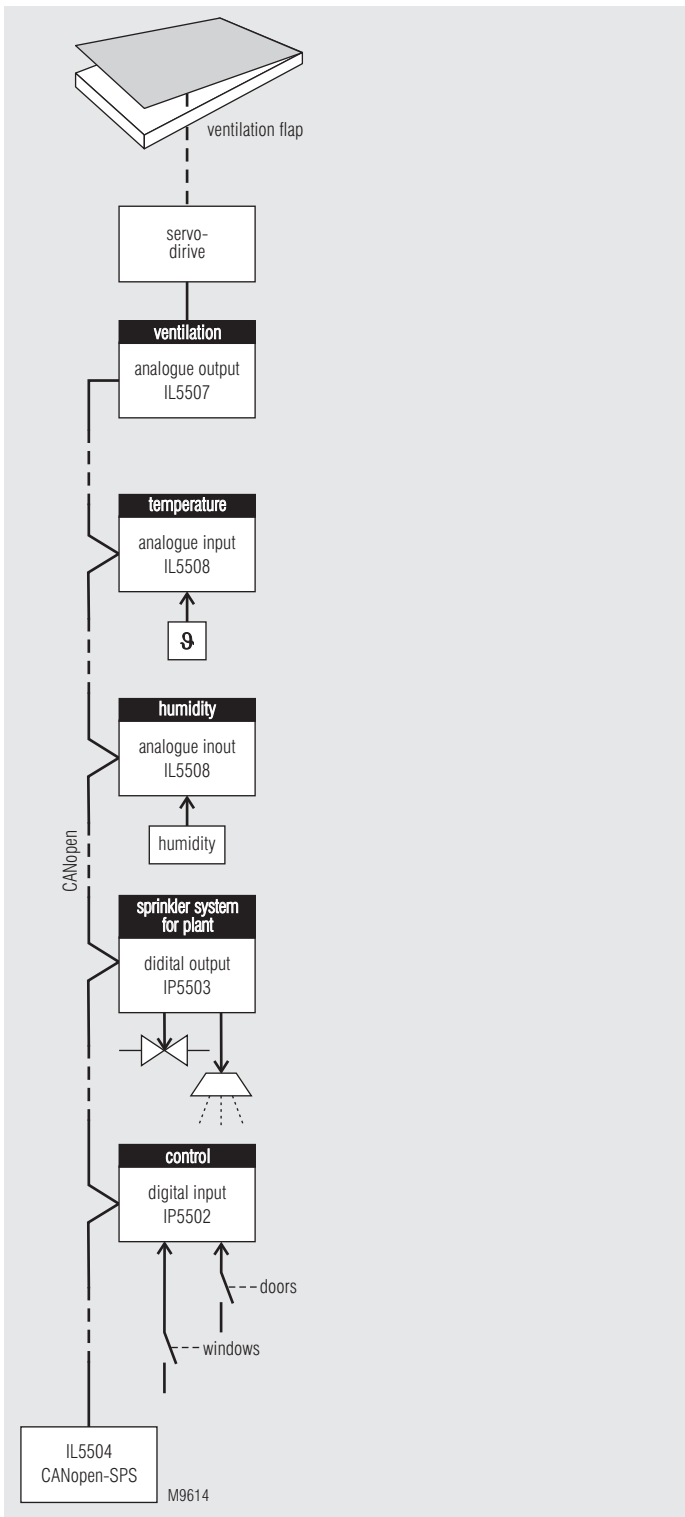
- CANopen PLC IL 5504
- Input / Output module IN 5509
- Input module, digital IP 5502
- Output module, digital IP 5503
- Input module, analogue IL 5508
- Output module, analogue IL 5507

Application Examples



Design of a 2-wire remote control is very simple:
 Connect input module IP 5502 to output module IP 5503 via a 2-wire line
 adjust addresses and speed ... ready to go.

Application example



CANopen-application for greenhouses:
depend on temperature- and humidity ventilation flap applications and
sprinkler systems for plants in a greenhouse.

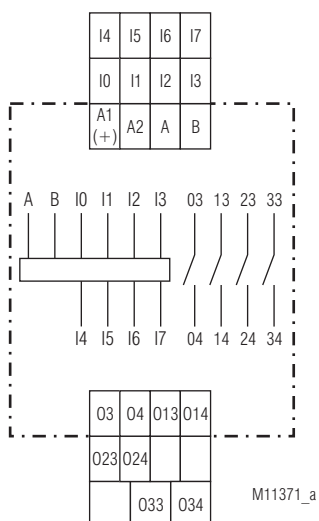
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Product Description

The I/O module UG 9460 has 8 digital 24V inputs and 4 relay outputs. Via Modbus the inputs can be read and the outputs can be set individually.

Circuit Diagram



Connection Terminals

Terminal designation	Signal description
A1 (+)	Auxiliary voltage + DC 24 V
A2	Auxiliary voltage 0 V, inputs 0V
A	Modbus signal A
B	Modbus signal B
I ₀ ... I ₇	Digital inputs 0 ... 7
O ₃ , O ₄	Relay outputs 0
O ₁₃ , O ₁₄	Relay outputs 1
O ₂₃ , O ₂₄	Relay outputs 2
O ₃₃ , O ₃₄	Relay outputs 3

Your Advantages

- Widely used measuring and automation protocol
- Compact structure
- Easy installation
- Easy appliance
- Pluggable clamps
- TWIN- connection terminals to loop auxiliary supply and Bus

Features

- According to IEC/EN 61 131-2
- Modbus RTU-interface
- 8 digital inputs for DC 24 V
- 4 Relay outputs (3 x 8 A, 1 x 16 A)
- 3 potentiometer for setting the modbus adress and baud rate
- 15 LEDs for status indication
- Width: 22.5 mm

Approvals and Markings



Applications

The digital input modules collect signals of a control circuit from limit switches, push buttons, sensors etc. and can be read via Modbus and the outputs can be switched also via Modbus e.g. to activate actuators (e. g. contactors, valves etc.).

Indicators

green LED "On": permanent on - supply connected

red LED "ERR": flashing - Failure code of the device

yellow LED "Bus": flashing - When receiving or transmitting Modbus data

yellow status-LEDs "I₀ ... I₇": On, when input active

yellow status-LEDs "O₀ ... O₃": On, when output relay active

Failure code : 9 - Modbus communication failure

9*) = Number of flashing pulses in sequence

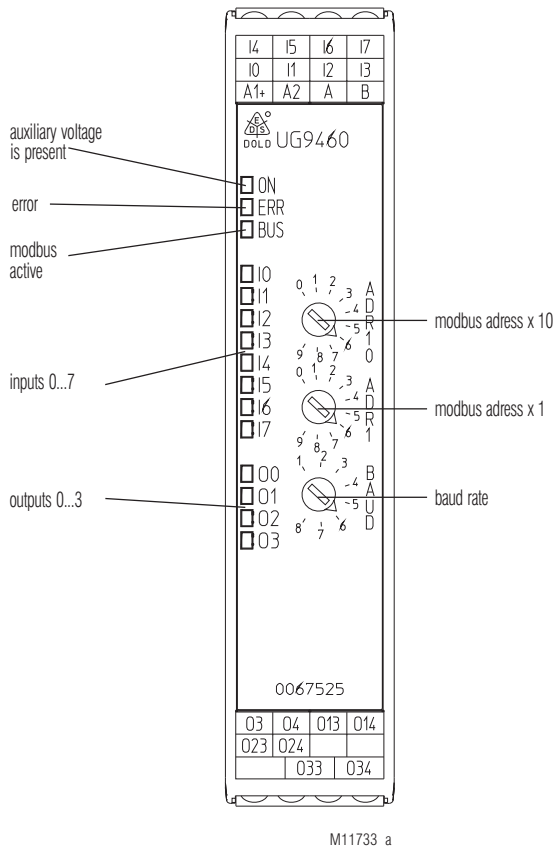
Reset Function

By sending a reset command a reset can be operated via Modbus

Modbus RTU

For communication between input / output module and a supervising control the Modbus RTU protocol according to Specification V 1.1b3 is used.

Setting



Position	1	2	3	4	5	6	7	8
Potentiometer BAUD								
Baud rate Baud	1200	2400	4800	9600	19200	38400	57600	115200
Response Time	< 50 ms	< 25 ms	< 10 ms	< 5 ms	< 5 ms	< 5 ms	< 5 ms	< 5 ms

Technical Data

Auxiliary voltage

Auxiliary voltage U_H A1/A2: DC 24 V
Voltage range: 0.8 ... 1.1 U_H
Nominal consumption: 2.6 W DC 24 V

Inputs

Inputs: 8 digital inputs IEC/EN 61 131-2
Input voltage: DC 10 ... 30 V

Outputs

Contacts

UG 9460: 4 NO contacts

Relay-outputs

	3 NO contacts	1 NO contact
--	---------------	--------------

Limiting continuous current I_{th}	O3, O4; O13, O14; O23, O24; 8 A	O33, O34: 16 A
--------------------------------------	--	-----------------------

Rated insulation voltage	AC 250 V	AC 250 V
Switching capacity min/max	0.1 / 2000 VA	4 / 4000 VA
Switching capacity min/max	0.1 / 120 W	35 / 500 W

Switching capacity to AC 15	AC 230 V / 3 A	AC 230 V / 10 A
to DC 13		DC 24 V / 1 A

Operate time	20 ms	40 ms
Release time	15 ms	30 ms

Electrical life	1,5 x 10 ⁵ switch.cycl. at AC 230 V 5 A cos φ = 1	1,5 x 10 ⁵ switch.cycl. at AC 230 V 16 A
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Mechanical life	> 10 ⁸ switch.cycles	30 x 10 ⁶ switch.cycl.
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Technical Data

General Data

Operating mode: Continuous operation
Operation: - 20 ... + 50 °C (see derating curve)
Storage: - 25 ... + 75 °C
Relative air humidity: 93 % at 40 °C
Altitude: < 2.000 m

Clearance and creepage distances

overvoltage category / contamination level between
output contact and logic: 6 kV / 2 IEC 60 664-1
output-output: 4 kV / 2 IEC 60 664-1

EMC

Electrostatic discharge: 8 kV (air) IEC/EN 61 000-4-2
HF-irradiation
80 MHz ... 1.0 GHz: 10 V / m IEC/EN 61 000-4-3
1.0 GHz ... 2.5 GHz: 3 V / m IEC/EN 61 000-4-3
2.5 GHz ... 2.7 GHz: 1 V / m IEC/EN 61 000-4-3
Fast transients: 4 kV IEC/EN 61 000-4-4

Surge voltage between
wires for power supply: 1 kV IEC/EN 61 000-4-5
between wire and ground: 2 kV IEC/EN 61 000-4-5
HF wire guided: 10 V IEC/EN 61 000-4-6
Voltage dips IEC/EN 61 000-4-11

Interference emission

Wire guided: Limit value class B IEC/EN 61 131-2
Radio irradiation: Limit value class B IEC/EN 61 131-2

Degree of protection

Housing: IP 40 IEC/EN 60 529
Terminals: IP 20 IEC/EN 60 529
Housing: Thermoplastic with V0 behaviour according to UL subject 94

Vibration resistance:

Amplitude constant 3,5 mm, Frequency 5 ... 8.4 Hz, Acceleration constant 1.0g Frequency 8.4 Hz ... 150 Hz IEC/EN 61 131-2
 20 / 050 / 04 IEC/EN 60 068-1
 DIN 46 228-1/-2/-3/-4

Climate resistance:

Wire connection:

Removable terminal blocks

Relay connection 8 A

pluggable cage clamp terminals (PC): 0.25 ... 1.5 mm² solid or 0.25 ... 1.5 mm² stranded wire with sleeve

Insulation of wires or sleeve length: 12 mm

Relay connection 16 A

pluggable screw terminal (S): 0.25 ... 2.5 mm² solid or 0.25 ... 2.5 mm² stranded ferruled

Insulation of wires or sleeve length: 8 mm

Wire connection:

Bus and auxiliary supply pluggable Twin-cage-clamp-terminal (PT): 0.25 ... 1.5 mm² solid or 0.25 ... 1.5 mm² stranded ferruled

Insulation of wires or sleeve length: 8 mm

Fixing torque:

0.5 ... 0.6 Nm
Mounting: DIN rail IEC/EN 60 715
Weight: 220 g

Dimensions

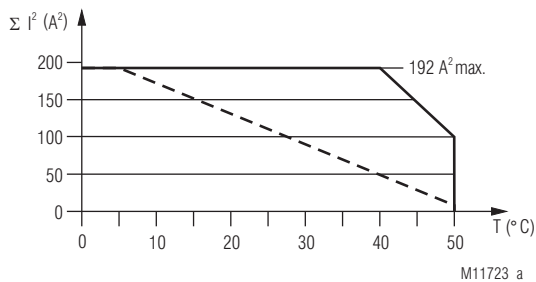
Width x height x depth: 22.5 x 105 x 120.3 mm

Standard Type

UG 9460.04PM DC 24 V 8DI/4DO
Article number: 0067525

- with Modbus RTU interface
- 8 digital inputs
- 4 relay outputs
- Auxiliary voltage U_H : DC 24 V
- Adjustable baud rate
- Width: 22.5 mm

Characteristics

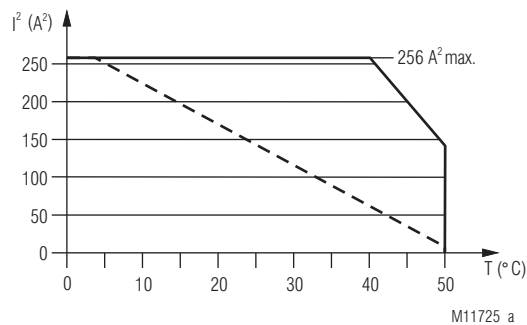


— device mounted on distance max. current at 50°C over contact path 03/04, 013/014, 023/024 = $3 \times (6A)^2 = 108A^2$

- - - device mounted without distance heated by devices with same load, max. current at 50°C over 3 contactrows 03/04, 013/014, 023/024 = $3 \times (1A)^2 = 3A^2$

$$\Sigma I^2 = I_1^2 + I_2^2 + I_3^2$$

I_1, I_2, I_3 - current in contactrows 03/04, 013/014, 023/024



— device mounted on distance max. current at 50°C over contact path 033/034 = $1 \times (12A)^2 = 144A^2$

- - - device mounted without distance heated by devices with same load, max. current at 50°C over contact path 033/034 = $1 \times (2A)^2 = 4A^2$

$$I^2 = I_4^2$$

I_4 - current in contactrow 033/034

Setting Facilities

Potentiometer ADR10: - Unit adress x 10

Potentiometer ADR1: - Unit adress x 1

Potentiometer BAUD: - Baud rate

The module address and baud rate is only read after connecting the auxiliary supply!

Setting and Adjustment

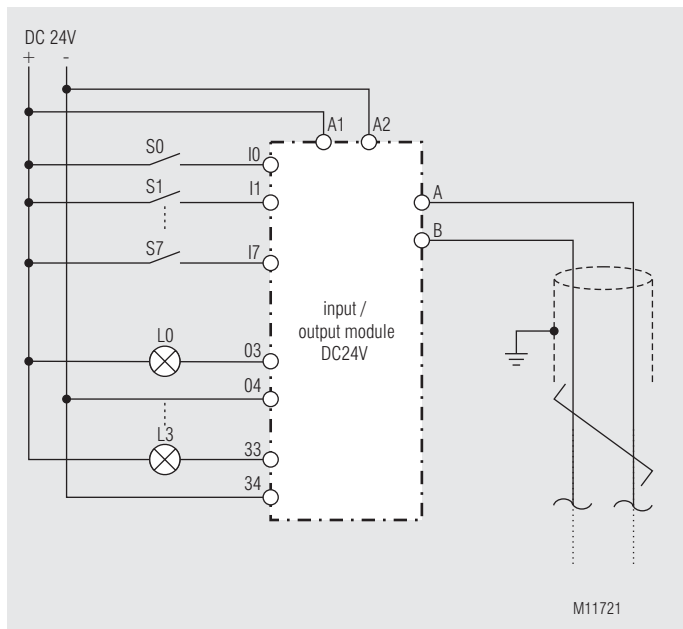
Set-up procedure

1. Connect device according to application example.
2. Setting unit adress and Baud rate via potentiometer.
3. Power up the unit.

Safety Notes

- Never clear a fault when the device is switched on
- The user must ensure that the device and the necessary component are mounted and connected according to the locally applicable regulations and technical standards (VDE, TÜV, BG).
- Adjustments may only be carried out by qualified specialist staff and the applicable safety rules must be observed.
- Touch proof security is only provided when the power connection terminals are plugged into the unit.

Application Examples



Bus Interface

Protocol	Modbus Seriell RTU
Address	1 bis 99
Baudrate	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 Baud
Data bit	8
Stop bit	2
Parity	none

More information about the interface, wiring rules, device identification and communication monitoring can be found in the Modbus user manual.

Function-Codes

At UG 9460 the following function codes are implemented:

Function-Codes	Name	Description
0x01	Read Single Coil	Outputs read individually
0x02	Read Discrete Inputs	Actual values read individually
0x03	Read Holding Register	Device parameter read word by word
0x04	Read Input Register	Actual values read word by word
0x05	Write Single Coil	Outputs write individually
0x06	Write Single Register	Device parameter write word by word
0x10	Write Multiple Register	Device parameter write in blocks

Parameter tables

Every slave owns an output- configuration- and actual value table. In these tables it is defined under which address the parameters can be found.

Input Register:

Register-Adresse	Protokoll-Adresse	Name	Value range	Description	Data type	Access rights
30001	0	State word 1 Device failure	0 ... 9	0: No failure 9: Communication fault Modbus	UINT16	read
30002	1	State word 2 State of device	0 ... 2	0: Device initialize 1: Device ready 2: Error mode	UINT16	read
30003	2	Inputs	0 ... 255	Bit 0 = Input 0 ... Bit 7 = Input 7	UINT16	read

Discrete Inputs:

Register-Adresse	Protokoll-Adresse	Name	Value range	Description	Data type	Access rights
10001	0	Input 0	0 ... 1	0: Input without voltage 1: Input with voltage	BIT	read
10002	1	Input 1	0 ... 1	0: Input without voltage 1: Input with voltage	BIT	read
10003	2	Input 2	0 ... 1	0: Input without voltage 1: Input with voltage	BIT	read
10004	3	Input 3	0 ... 1	0: Input without voltage 1: Input with voltage	BIT	read
10005	4	Input 4	0 ... 1	0: Input without voltage 1: Input with voltage	BIT	read
10006	5	Input 5	0 ... 1	0: Input without voltage 1: Input with voltage	BIT	read
10007	6	Input 6	0 ... 1	0: Input without voltage 1: Input with voltage	BIT	read
10008	7	Input 7	0 ... 1	0: Input without voltage 1: Input with voltage	BIT	read

Discrete Output Coils:

Register-Adresse	Protokoll-Adresse	Name	Value range	Description	Data type	Access rights
1	0	Relay 0	0 ... 1	0: Relay Off 1: Relay On	BIT	write
2	1	Relay 1	0 ... 1	0: Relay Off 1: Relay On	BIT	write
3	2	Relay 2	0 ... 1	0: Relay Off 1: Relay On	BIT	write
4	3	Relay 3	0 ... 1	0: Relay Off 1: Relay On	BIT	write
5	4	Reset	0 ... 1	0: No function 1: Device reset	BIT	write

Output Holding Register

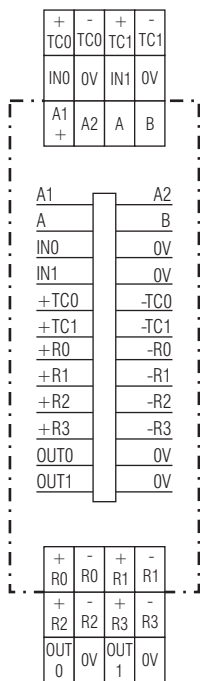
Register-Adresse	Protokoll-Adresse	Name	Value range	Description	Data type	Access rights
40001	0	Control word 1	0 ... 1	Bit 0 = Reset	UINT16	write / reading
40002	1	Control word 2	0 ... 15	Bit 0 : Relay 0 Bit 1 : Relay 1 Bit 2 : Relay 2 Bit 3 : Relay 3	UINT16	write / reading
40003	2	Timeout release	0 ... 1	0 = Disable 1 = Enable	UINT16	write / reading
40004	3	Timeout	0 ... 10000	Timeout value in ms	UINT16	write / reading



Product Description

The universal Input / Output module UG 9461 has analogue inputs and 2 analogue outputs. It can be used to connect thermocouples and thermistors and offers 2 configurable measuring inputs 0-10V or 0-20mA. Via Modbus the input status can be read and the output status can be set. For the analogue outputs a DC 01 ... 10 V interface is available.

Circuit Diagram



Connection Terminals

Terminal designation	Signal description
A1 (+)	Auxiliary voltage + DC 24 V
A2	Auxiliary voltage 0 V
A	Modbus signal A
B	Modbus signal B
IN ₀ , IN ₁	Analogue input +
0V	Analogue input ground
+TC ₀ , +TC ₁	Thermal element +
-TC ₀ , -TC ₁	Thermal element -
+R ₀ ... +R ₃	Thermistor +
-R ₀ ... -R ₃	Thermistor -
OUT ₀ , OUT ₁	Analogue output +
0V	Analogue output ground

Your Advantages

- Widely used measuring and automation protocol
- Compact structure
- Easy installation
- Easy appliance
- Pluggable clamps
- TWIN- connection terminals to loop auxiliary supply and Bus

Features

- According to IEC/EN 61 131-2
- Modbus RTU-interface
- 2 configurable analogue inputs: 0 ... 10 V, 0... 20 mA
- 2 K-Thermal element inputs
- 4 Thermistor inputs for Pt1000 sensors
- 2 Analogue outputs: 0 ... 10 V
- 3 potentiometer for setting the modbus adress and baud rate
- 13 LEDs for status indication
- Width: 22.5 mm

Approvals and Markings



Applications

The universal Input / Output module UG 9461 is used to collect Temperature and other analogue values. Via the analogue outputs voltage signals of DC 0 ... 10 V can be offered to be used in connected systems. The analogue outputs are partly configurable.

Indicators

green LED "On": permanent on - supply connected

red LED "ERR": flashing - Failure code of the device

yellow LED "Bus": flashing - When receiving or transmitting Modbus data

yellow status-LEDs
"IN₀ IN₁, TC₀ TC₁, R₀ R₁, R₂ R₃
OUT₀ OUT₁":

On, when on a connected analogue input or output a valid signal is available.

Failure code : 9 - Modbus communication failure
10 - Checksum failure EEPROM

9*) - 10*) = Number of flashing pulses in sequence

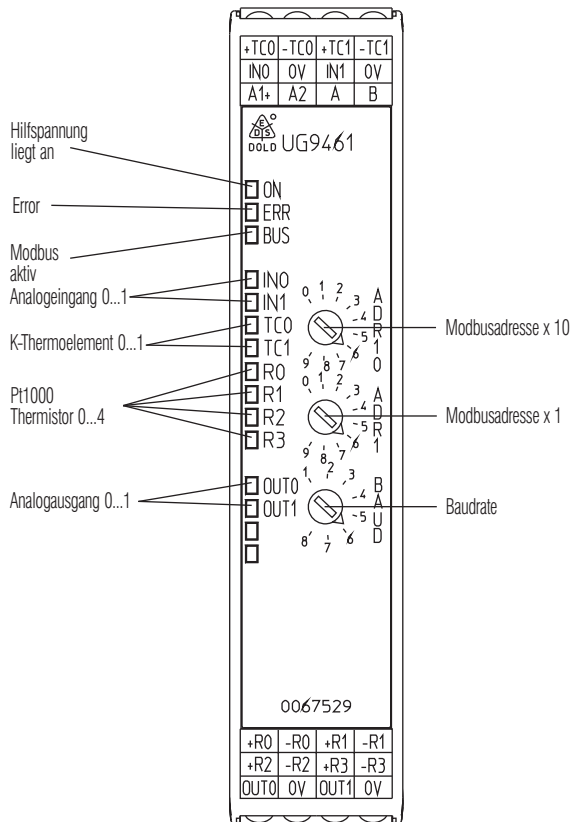
Reset Function

By sending a reset command a reset can be operated via Modbus

Modbus RTU

For communication between input / output module and a supervising control the Modbus RTU protocol according to Specification V 1.1b3 is used.

Setting



M11374_d

Position	1	2	3	4	5	6	7	8
Potentiometer BAUD								
Baud rate Baud	1200	2400	4800	9600	19200	38400	57600	115200
Response Time	< 50 ms	< 25 ms	< 12 ms	< 10 ms	< 5 ms	< 5 ms	< 5 ms	< 5 ms

Technical Data

Auxiliary voltage

Auxiliary voltage U_H A1/A2: DC 24 V
Voltage range: 0,8 ... 1,1 U_H
Nominal consumption: 2 W DC 24 V

Inputs

Inputs	0 ... 10 V, 0 ... 20 mA configurable	Pt 1000 Thermistor meas. current 0.25 mA	K-Thermo- element
Measuring range:	0.1 ... 19.90 mA 0.050 ... 9.950 V	- 50° C ... + 200° C	- 180° C ... + 1350° C
Resolution internal	10 bit	24 bit	24 bit
Accuracy at 25 °C:	3 % v. E.	± 0.5 °C	± 0.5 °C *)
Measuring principle:	integrating	integrating	integrating
Update time	4 ms	650 ms	650 ms
Input resistance:	≥ 100 kΩ	≥ 1 MΩ	≥ 1 MΩ
Sensor wire break detection:	-	yes	yes
Connection:	2-wire- technology	2-wire- technology	2-wire- technology
Noise suppression:	-	70 dB at 50 Hz / 60Hz	70 dB at 50 Hz / 60Hz

*) the internal failure on the cold connection spot is ± 3.0°C.
 This has to be added to the accuracy measured value in the table.

Please note that the tolerance values are only valid after a time period of 15 min when the unit is warmed up. Also ventilation changes on the terminals of the thermocouples can cause measuring faults. When the temperature sensor is missing the maximum temperature is transmitted. The measuring failure on PT1000 inputs caused by line resistance is approx. 0.4°C at 2 x 1 Ohm wire resistance

Outputs DC 0 ... 10 V

Voltage range: DC 0 ... 10 V, short circuit proof
Resolution: 10 bit
Regulating time: 100 ms (95 % of the new value)
Accuracy: ± 1 % of end value
Load impedance: ≥ 2000 Ω

General Data

Operating mode: Continuous operation
Operation: - 20 ... + 50 °C (see derating curve)
Storage: - 25 ... + 75 °C
Relative air humidity: 93 % at 40 °C
Altitude: < 2.000 m

EMC
Electrostatic discharge: 8 kV (air) IEC/EN 61 000-4-2
HF-irradiation
 80 MHz ... 1.0 GHz: 10 V / m IEC/EN 61 000-4-3
 1.0 GHz ... 2.5 GHz: 3 V / m IEC/EN 61 000-4-3
 2.5 GHz ... 2.7 GHz: 1 V / m IEC/EN 61 000-4-3
Fast transients: 4 kV IEC/EN 61 000-4-4
Surge voltage
 between
 wires for power supply: 1 kV IEC/EN 61 000-4-5
 between wire and ground: 2 kV IEC/EN 61 000-4-5
 HF wire guided: 10 V IEC/EN 61 000-4-6
Voltage dips IEC/EN 61 000-4-11

Interference emission
Wire guided: Limit value class B IEC/EN 61131-2
Radio irradiation: Limit value class B IEC/EN 61131-2

Degree of protection
Housing: IP 40 IEC/EN 60 529
Terminals: IP 20 IEC/EN 60 529

Housing: Thermoplastic with V0 behaviour according to UL subject 94

Vibration resistance: Amplitude constant 3,5 mm, Frequency 5 ... 8.4 Hz, Acceleration constant 1.0g Frequency 8.4 Hz ... 150 Hz IEC/EN 61131-2

Climate resistance: 20 / 050 / 04 IEC/EN 60 068-1

Wire connection: DIN 46 228-1/-2/-3/-4

Technical Data

Removable terminal blocks

Relay connection 8 A

pluggable cage clamp terminals (PC): 0.25 ... 1.5 mm² solid or
0.25 ... 1.5 mm² stranded wire with sleeve

Insulation of wires or sleeve length: 12 mm

Relay connection 16 A

pluggable screw terminal (S): 0.25 ... 2.5 mm² solid or
0.25 ... 2.5 mm² stranded ferruled

Insulation of wires or sleeve length: 8 mm

Wire connection:

Bus and auxiliary supply pluggable Twin-cage-clamp-terminal (PT): 0.25 ... 1.5 mm² solid or
0.25 ... 1.5 mm² stranded ferruled

Insulation of wires or sleeve length: 8 mm

Fixing torque: 0.5 ... 0.6 Nm

Mounting: DIN rail IEC/EN 60 715

Weight: 220 g

Dimensions

Width x height x depth: 22.5 x 105 x 120.3 mm

Standard Type

UG 9461PM DC 24 V 8 AI/2 AO

Article number: 0067529

- with Modbus RTU interface
- 8 analogue inputs
- 2 analogue outputs
- Auxiliary voltage U_H : DC 24 V
- Baubreite: 22.5 mm

Setting Facilities

Potentiometer ADR10: - Unit adress x 10

Potentiometer ADR1: - Unit adress x 1

Potentiometer BAUD: - Baud rate

The module address and baud rate is only read after connecting the auxiliary supply!

Setting and Adjustment

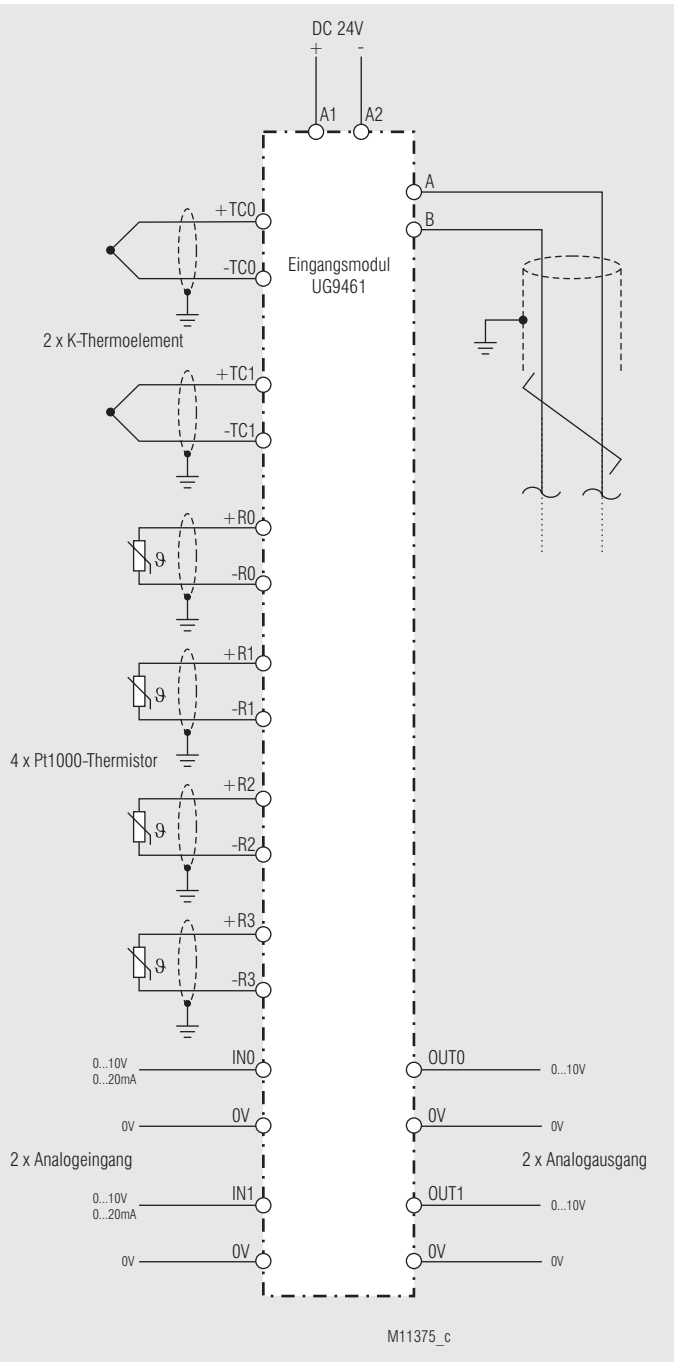
Set-up procedure

1. Connect device according to application example.
2. Setting unit adress and Baud rate via potentiometer.
3. Power up the unit.
4. Parametrization via Modbus.

Safety Notes

- Never clear a fault when the device is switched on
- The user must ensure that the device and the necessary component are mounted and connected according to the locally applicable regulations and technical standards (VDE, TÜV, BG).
- Adjustments may only be carried out by qualified specialist staff and the applicable safety rules must be observed.
- Touch proof security is only provided when the power connection terminals are plugged into the unit.

Application Examples



Bus Interface

Protocol	Modbus Seriell RTU
Address	1 bis 99
Baudrate	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 Baud
Data bit	8
Stop bit	2
Parity	none

More information about the interface, wiring rules, device identification and communication monitoring can be found in the Modbus user manual.

Function-Codes

At UG 9461 the following function codes are implemented:

Function-Codes	Name	Beschreibung
0x03	Read Holding Register	Device parameter read word by word
0x04	Read Input Register	Actual values read word by word
0x05	Write Single Coil	Outputs write individually
0x06	Write Single Register	Device parameter write word by word
0x10	Write Multiple Register	Device parameter write in blocks

Device configuration

If required the device configuration data can be saved permanently by setting the the Bit "WriteKonfig to EEPROM". The data is copied from the EEPROM to the relevant register when connecting the auxiliary voltage. As the numbers of write cycles of an EEPROM are limited, the writing must not be done in cycles. In addition it is not possible to receive modbus telegrams during a period of 50 ms while writing the EEPROM.

Parameter tables

Every slave owns an output- configuration- and actual value table. In these tables it is defined under which address the parameters can be found.

Single Coils (Control signals):

Register-Adresse	Protokoll-Adresse	Name	Value range	Description	Data type	Access rights
1	0	Reset	0x0000 0xFF00	0: No function 1: Device reset	BIT	write
2	1	WriteKonfig to EEPROM	0x0000 0xFF00	0: No function 1: Save parameter	BIT	write

Holding Register:

Register-Adresse	Protokoll-Adresse	Name	Value range	Description	Data type	Access rights
40001	0	Control word 1	0 ... 2	Bit 0 = Reset Bit 1 = WriteKonfig to EEPROM	UINT16	write / reading
40002	1	Analogue input 0 configure	0 ... 1 *)	0 = 0 ... 10 V 1 = 0 ... 20 mA	UINT16	write / reading
40003	2	Analogue input 1 configure	0 ... 1 *)	0 = 0 ... 10 V 1 = 0 ... 20 mA	UINT16	write / reading
40004	3	Analogue output	0 ... 10000	Voltage in mV	UINT16	write / reading
40005	4	Analogue output1	0 ... 10000	Voltage in mV	UINT16	write / reading
40006	5	Timeout release	0 ... 1	0 = Disable 1 = Enable	UINT16	write / reading
40007	6	Timeout	0 ... 10000	Timeout value in ms	UINT16	write / reading

*) Parameters can be stored permanently in the EEPROM by setting the Bit "WriteKonfig to EEPROM"

Parameter tables

Input Register (Gerätestatus- und Messwerte):

Register-Adresse	Protokoll-Adresse	Name	Value range	Description	Data type	Access rights
30001	0	State word 1 Device failure	0 ... 10	0: No failure 7: Temperatur circuit fault 9: Communication fault Modbus 10: Checksum failure EEPROM	INT16	read
30002	1	State word 2 Device state	0 ... 2	0: Device initialize 1: Device ready 2: Error mode	INT16	read
30003	2	Analogue input 0	0 ... 10000 0 ... 20000	mV uA	INT16	read
30004	3	Analogue input	0 ... 10000 0 ... 20000	mV uA	INT16	read
30005	4	Thermal element0	-1800 ... 14000	1/10°C	INT16	read
30006	5	Thermal element1	-1800 ... 14000	1/10°C	INT16	read
30007	6	Thermistor0	-500 ... 2000	1/10°C	INT16	read
30008	7	Thermistor1	-500 ... 2000	1/10°C	INT16	read
30009	8	Thermistor2	-500 ... 2000	1/10°C	INT16	read
30010	9	Thermistor3	-500 ... 2000	1/10°C	INT16	read
30011	10	Sensor state	0 ... 255	Bit0 =1, Eingang IN0 o.k. Bit1 =1, Eingang IN1 o.k. Bit2 =1, Sensor TC0 o.k. Bit3 =1, Sensor TC1 o.k. Bit4 =1, Sensor RTD0 o.k. Bit5 =1, Sensor RTD1 o.k. Bit6 =1, Sensor RTD2 o.k. Bit7 =1, Sensor RTD3 o.k.	INT16	read
30012	11	cold junction-compensation	-500 ... 2000	1/10°C	INT16	read
30013	12	IC-4-Temperature	-500 ... 2000	1/10°C	INT16	read

Protective Diode Module IK 5121

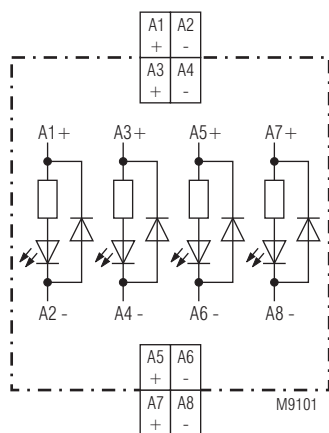


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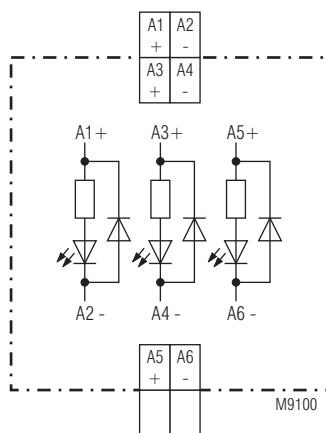


- Protects up to 4 contacts during switching inductive loads
- LED indicators for contact states
- Width 17.5 mm

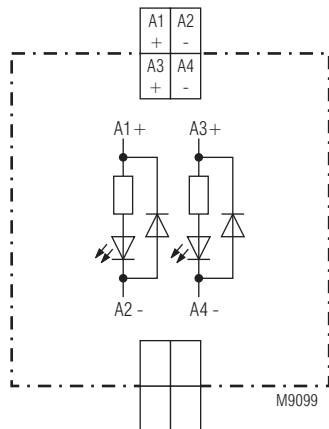
Circuit Diagrams



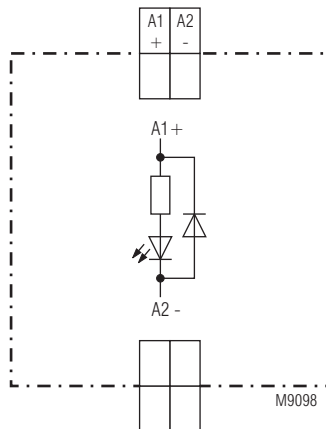
IK 5121_004



IK 5121_003



IK 5121_002



IK 5121_001

Standard Type

IK 5121/003	DC 24 V	3 protective circuits
Article number:	0057740	

Variants

IK 5121/001	to protect of 1 contact
IK 5121/002	to protect of 2 contacts
IK 5121/003	to protect of 3 contacts
IK 5121/004	to protect of 4 contacts

Approvals and Markings



Applications

The protective diode module IK 5121 is used to protect contacts when switching inductances.

Technical Data

Nominal voltage U_N:	DC 24 V
Voltage range:	0.85 ... 1.15 U_N
Input current:	approx. 5 mA / Input at U_N
Max. freewheel current:	30 A for 1 ms

General Data

Operating mode:	Continuous operation
Temperature range:	- 20 ... + 65 °C
Clearance and creepage distances	
Rated impulse voltage / pollution degree:	4 kV / 2 DIN VDE 0110-1 (04.97)
EMC	
Electrostatic discharge:	8 kV (contact) IEC/EN 61 000-4-2 (according to test degree 3)
HF irradiation:	10 V / m IEC/EN 61 000-4-3
Fast transients:	2 kV IEC/EN 61 000-4-4
Surge voltages between wire and ground:	2 kV IEC/EN 61 000-4-5
HF wire guided:	10 V IEC/EN 61 000-4-6
Interference suppression:	Limit value class B EN 55 011
Degree of protection	
Housing:	IP 40 IEC/EN 60 529
Terminals:	IP 20 IEC/EN 60 529
Housing: Thermoplastic with V0 behaviour according to UL Subj. 94	
Vibration resistance: Amplitude 0,35 mm frequency 10 ... 55 Hz, IEC/EN 60 068-2-6	
Climate resistance: EN 50 005	
Wire connection: 2 x 2.5 mm ² solid or 2 x 1.5 mm ² stranded wire with sleeve DIN 46 228-1/-2/-3/-4	
Wire fixing: Flat terminals with self-lifting clamping piece IEC/EN 60 999-1	
Mounting: DIN rail IEC/EN 60 715	

Dimensions

Width x height x depth 17.5 x 90 x 58 mm

Diode Module UG 5122



Your Advantages

- Protects up to 8 contacts when switching inductive DC loads
- High dielectric strength
- Ready for mounting in switching cabinets
- Pluggable clamps allow a fast module change
- Unique design with UG- switching devices

Features

- Pluggable terminal block with screw terminals
- Width: 22.5 mm

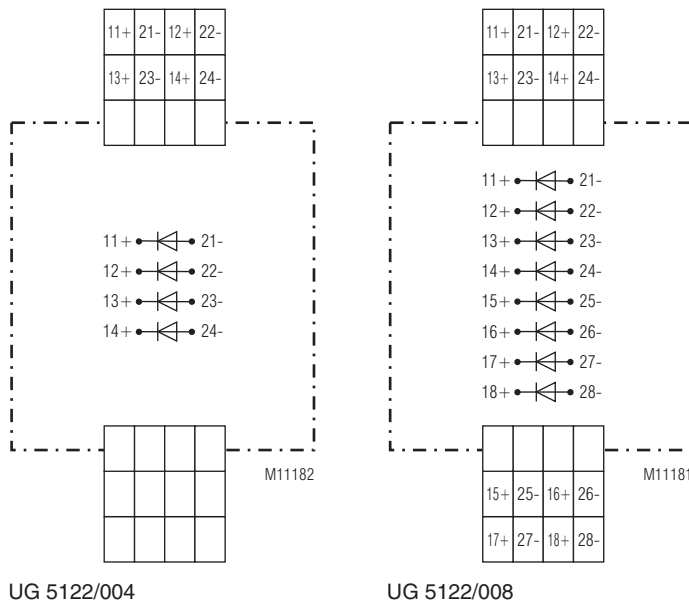
Product Description

The diode module UG 5122 has 4 or 8 free wheeling diodes. Via pluggable connecting clamps they could be integrated easily in DC- loads. So the diode module offers a simple contact protection when switching inductivities at DC- loads.

Approvals and Markings



Circuit Diagrams



Application

The diode module UG 5122 is using to protect contacts when switching inductive DC loads.

Safety notes

A correct polarity has to be observed!

Technical Data		
Technology		Avalanche - Diode
Repetitive peak reverse voltage	[V _{RRM}]	max. 1600 V
Forward current, medium	[I _{F(AV)M}]	max. 1 A
Surge forward current	[I _{FSM}]	120 A (10 ms)
Forward voltage drop	[V _F]	max. 1.25 V (I _F = 7 A)
Reverse leakage current	[I _R]	max. 2 mA (T _A = 180 °C)

General Data

Nominal operating mode:	continuous operation	
Temperature range:	- 40 ... + 80°C	
Clearance and creepage distance	rated impulse voltage / pollution degree:	
	4 kV / 2	IEC 60 664-1
EMC		
Electrostatic discharge (ESD):	8 kV (air)	IEC/EN 61 000-4-2
Fast transients:	2 kV	IEC/EN 61 000-4-4
Surge		
between wire and ground:	4 kV	IEC/EN 61 000-4-5
Interference suppression	Limit value class B	EN 55 011
Degree of protection:		
Housing:	IP 20	IEC/EN 60 529
Terminals:	IP 20	IEC/EN 60 529
Housing:	thermoplastic with V0 behaviour according to UL subject 94	
Vibration resistance:	Amplitude 0.35 mm	
	Frequency 10 ... 55 Hz IEC/EN 60 068-2-6	
Climate resistance:	40 / 080 / 04 IEC/EN 60 068-1	
Wire connection		
Terminals blocks with screw terminal		
Cross section:	1 x 0.25 ... 2.5 mm ² solid or stranded ferruled (isolated) or 2 x 0.25 ... 1.0 mm ² solid or stranded ferruled (isolated)	
Insulation of wires or sleeve length:	7 mm	
Wire fixing:	captive slotted screw	
Mounting:	DIN rail IEC/EN 60 715	
Weight:	approx. 150 g	

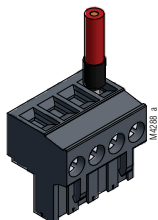
Dimensions

Width x heigh x depth: 22.5 x 105 x 120.3 mm

Standard Types

UG 5122PS/004	
Article number:	066355
• Protection of 4 contacts	
• Width:	22.5 mm
UG 5122PS/008	
Article number:	066356
• Protection of 8 contacts	
• Width:	22.5 mm

Options with Pluggable Terminal Blocks



Screw terminal (PS/plugin screw)

Resistor Module UG 5123



Your Advantages

- Ready for mounting in switching cabinets
- Pluggable clamps allow a fast module change
- Unique design with UG- switching devices

Features

- Load resistor
- Pluggable terminal block with screw terminals
- Width: 22,5 mm

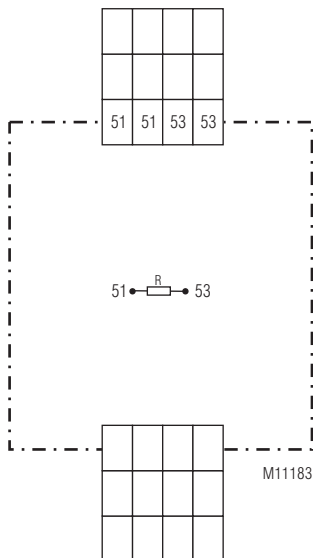
Product Description

The resistor module UG 5123 is generally equipped with a 47 kΩ resistor. Via pluggable clamps it can be integrated easily in switching plants.

Approvals and Markings



Circuit Diagram



Application

General load resistance, e.g. for lowering of rest voltages of capacitive aperture or as voltage divider when using different resistor modules.

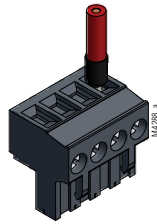
Technical Data	
Technology	Metall oxid layer resistance
Nominal resistance	47 kΩ, other values on request
Load	max. 2 W
Tolerance	± 5 %

Standard Types	
UG 5123PS 47 kΩ	
Article number:	066357
• Nominal resistance:	47 kΩ
• Width:	22,5 mm

General Data

Nominal operating mode:	continuous operation	
Temperature range:	- 40 ... + 60°C	
Clearance and creepage distance		
rated impulse voltage /		
pollution degree:	4 kV / 2	IEC 60 664-1
EMC		
Electrostatic discharge (ESD):	8 kV (air)	IEC/EN 61 000-4-2
Fast transients:	4 kV	IEC/EN 61 000-4-4
Surge		
between		
wires for power supply:	2 kV	IEC/EN 61 000-4-5
between wire and ground:	4 kV	IEC/EN 61 000-4-5
Interference suppression	Limit value class B	EN 55 011
Degree of protection:		
Housing:	IP 20	IEC/EN 60 529
Terminals:	IP 20	IEC/EN 60 529
Housing:	thermoplastic with V0 behaviour according to UL subject 94	
Vibration resistance:	Amplitude 0.35 mm	
	Frequency 10 ... 55 Hz IEC/EN 60 068-2-6	
	40 / 060 / 04	IEC/EN 60 068-1
Climate resistance:		
Wire connection		
Terminals blocks with screw terminal		
Cross section:	1 x 0.25 ... 2.5 mm ² solid or stranded ferruled (isolated) or	
	2 x 0.25 ... 1.0 mm ² solid or stranded ferruled (isolated)	
Insulation of wires or sleeve length:	7 mm	
Wire fixing:	captive slotted screw	
Mounting:	DIN rail	IEC/EN 60 715
Weight:	approx. 120 g	

Options with Pluggable Terminal Blocks



Screw terminal
(PS/plugin screw)

Dimensions

Width x heigh x depth:	22.5 x 105 x 120.3 mm
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Type	Function	Type	Function
BA		BI	
BA 7924.....	Delay module, release delay	BI 5910	Radio controlled safety module
BD		BI 5928	Emergency stop module with time delay
BD 5935.....	Emergency stop module	BI 6910	Radio controlled safety module
BD 5980N.....	Two-hand safety relay	BL	
BD 5987.....	Emergency stop module	BL 5903	Emergency stop module with voltage failure detection
BG		BL 5922	Emergency stop monitor
BG 5551	Diagnostic module for CANopen	BN	
BG 5912	Output module with output contacts	BN 3081.....	Extension module
BG 5913.08/_0_ _ _	Input module	BN 5930.48.....	Emergency stop module
BG 5913.08/_1_ _ _	Input module	BN 5930.48/203.....	Emergency stop module
BG 5913.08/_2_ _ _	Input module	BN 5930.48/204.....	Emergency stop module
BG 5913.08/_3_ _ _	Input module	BN 5983	Emergency stop module
BG 5914.08/_0_ _ _	Input module	BO	
BG 5915.08/_1_ _ _	Input module	BO 5988	Emergency stop module
BG 5924	Emergency stop module	HC	
BG 5925	Emergency stop module	HC 3096N.....	Interface module
BG 5925/900	Light curtain controller	HC 3098	Interface module
BG 5925/910	Safety-mat switch gear	HK	
BG 5925/920	Switch gear for safety switch	HK 3087N.....	Interface module
BG 5929	Extension module	HL	
BG 5933	Two-hand safety relay	HL 3094.....	Interface module
BG 7925	Delay module, release delay	HL 3096N	Interface module
BG 7926	Delay module, release delay	HO	
BH		HO 3094	Interface module
BH 5552.....	Diagnostic module for CANopen	HO 3095	Interface module
BH 5902/01MF2	Light curtain controller	IK	
BH 5903.....	Emergency stop module with voltage failure detection	IK 3079	Interface module
BH 5904/00MF2	Valve monitoring module	IL	
BH 5910	Multifunction safety module	IL 7824.....	Delay module, release delay
BH 5911.....	Control unit	IN	
BH 5913.08/_0_ _ _	Input module	IN 7824	Delay module, release delay
BH 5914.08/_0_ _ _	Input module	IP	
BH 5915.08/_1_ _ _	Input module	IP 3078	Interface module
BH 5922	Emergency stop monitor	IP 5924	Emergency stop module
BH 5928	Emergency stop module with time delay		
BH 5932	Speed or standstill monitor		
BH 5933	Two-hand safety relay		
BH 7925	Delay module, release delay		

Type	Function	Type	Function
LG		S	
LG 3096.....	Interface module	SAFEMASTER M	System overview
LG 5924.....	Emergency stop module	SAFEMASTER PRO	System overview
LG 5925.....	Emergency stop module	SAFEMASTER STS/K...	System overview
LG 5925/034.....	Safety module for elevator controls	SAFEMASTER STS	System overview
LG 5925/900.....	Light curtain controller	SAFEMASTER W	System overview
LG 5925/920.....	Safety module for safety switches		Wireless safety system, e-stop
LG 5928.....	Emergency stop module with time delay	SAFEMASTER W	System overview
LG 5929.....	Extension module		Wireless safety system, enabling switch
LG 5933.....	Two-hand safety relay	SP	
LG 5944.....	Safety edge module	SP 3078.....	Interface module
LG 7927.....	Delay module, on delayed	UF	
LG 7928.....	Delay module, release delay	UF 6925.....	Emergency stop module
LH		UG	
LH 5946.....	Standstill monitor	UG 3088	Interface module
MK		UG 3096	Interface module
MK 3096N.....	Interface module	UG 6929	Extension module
NE		UG 6960	Multifunctional safety timer
NE 5020.....	Magnetic switch coded	UG 6961	Multifunctional safety timer
NE 5021.....	Magnetic switch coded	UG 6970	Multifunctional safety module
RE		UG 6980	Multifunctional safety module
RE 5910.....	Remote control for e-stop	UH	
RE 5910/011,		UH 3096	Interface module
RE 5910/013.....	Industrial charger unit AC 230 V	UH 5947	Speed monitor
RE 5910/012.....	Industrial charger unit DC 24 V	UH 6900	Radio controlled safety module
RE 6910.....	Radio controlled enabling switch	UH 6932	Speed monitor
RK		UH 6937	Frequency monitor
RK 5942.....	Emergency stop module		

Type	Function	Type	Function
AA		EP	
AA 9050.....	Speed monitor	EP 5966.....	Fault annunciator system
AA 9837.....	Frequency relay	EP 5967.....	Fault annunciator system
AA 9838.....	Frequency relay		
AA 9943.....	Undervoltage relay	IK	
AD		IK 8839.....	Current monitor
AD 5960.....	Fault annunciator system	IK 9044.....	Voltage monitor
AD 5992.....	Fault annunciator system	IK 9046.....	Voltage monitor
AD 5998.....	Fault annunciator system	IK 9055.....	Speed monitor
AI		IK 9065.....	Underload monitor (cos φ)
AI 938.....	Thermistor motor protection relay	IK 9076.....	Valve monitor
AI 941N.....	Phase sequence relay	IK 9094.....	Temperature monitoring relay
AI 942.....	Asymmetry relay	IK 9143.....	Frequency relay
AK		IK 9144.....	Standstill monitor
AK 9840.....	Asymmetry relay	IK 9168.....	Phase indicator
BA		IK 9169.....	Phase monitor
BA 9036.....	Voltage relay	IK 9170.....	Overvoltage relay, 3-phase
BA 9037.....	Voltage relay	IK 9171.....	Undervoltage relay, 3-phase
BA 9038.....	Thermistor motor protection relay	IK 9172.....	Overvoltage relay, single phase
BA 9040.....	Asymmetry relay	IK 9173.....	Undervoltage relay, single phase
BA 9041.....	Phase sequence relay	IK 9178.....	Phase sequence indicator
BA 9042.....	Asymmetry relay	IK 9179.....	Phase sequence monitor /-relay
BA 9043.....	Undervoltage relay	IK 9270.....	Overcurrent relay
BA 9053.....	Current relay	IK 9271.....	Undercurrent relay
BA 9054.....	Voltage relay	IK 9272.....	Overcurrent relay
BA 9055.....	Speed monitor	IK 9273.....	Undercurrent relay
BA 9054/331.....	Battery symmetry monitor	IL	
BA 9054/332.....	Battery symmetry monitor	IL 5201/20007.....	Overcurrent relay
BA 9065.....	Underload monitor (cos φ)	IL 5880.....	Insulation monitor
BA 9094.....	Temperature monitoring relay	IL 5881.....	Insulation monitor
BA 9837.....	Frequency relay	IL 5882.....	Residual current monitor
BC		IL 5990.....	Fault annunciator system
BC 9190N.....	Voltage drop detector	IL 5991.....	Fault annunciator system
BD		IL 8839.....	Current monitor
BD 5936.....	Standstill monitor	IL 9055.....	Speed monitor
BD 9080.....	Phase monitor	IL 9059.....	Phase sequence module
BH		IL 9069.....	Neutral monitor
BH 9097.....	Motor load monitor	IL 9071.....	Undervoltage relay
BH 9098.....	Motor load transmitter	IL 9075.....	Fuse monitor
BH 9140.....	Reverse power monitoring	IL 9077.....	Over- and undervoltage relay
EH		IL 9079.....	Undervoltage relay to detect auto-reclosing
EH 5990.....	Display unit	IL 9086.....	Phase monitor with thermistor motor protection
EH 5991.....	Display unit	IL 9087.....	Phase monitor
EH 5994.....	Display unit	IL 9094.....	Temperature monitoring relay
EH 5995.....	Display unit	IL 9144.....	Standstill monitor
EH 5996.....	Text display unit	IL 9151.....	Level sensing relay
EH 9997.....	Fault annunciator system	IL 9163.....	Thermistor motor protection relay

Type	Function	Type	Function
IL 9171.....	Undervoltage relay, 3-phase	MK	
IL 9176.....	Undervoltage relay, 3-phase with test key	MK 5130N.....	Noise filter
IL 9270.....	Overcurrent relay	MK 5880N.....	Insulation monitor
IL 9271.....	Undercurrent relay	MK 9003-ATEX.....	Thermistor motor protection relay
IL 9277.....	Over- and undercurrent relay	MK 9040N.....	Asymmetry relay
IL 9837.....	Frequency relay	MK 9053N.....	Current relay
IN		MK 9054N.....	Voltage relay
IN 5880/710.....	Insulation monitor	MK 9055N.....	Speed monitor
IN 5880/711.....	Insulation monitor	MK 9056N.....	Phase sequence relay
INFOMASTER B.....	System overview	MK 9064N.....	Voltage relay
IP		MK 9065.....	Underload monitor (cos φ)
IP 5880.....	Insulation monitor	MK 9143N.....	Mains frequency monitor
IP 5880/711.....	Insulation monitor	MK 9151N.....	Level sensing relay
IP 9075.....	Fuse monitor	MK 9163N.....	Thermistor motor protection relay
IP 9077.....	Over- and undervoltage relay	MK 9163N-ATEX.....	Thermistor motor protection relay
IP 9270.....	Overcurrent relay	MK 9300N.....	Multifunction measuring relay
IP 9271.....	Undercurrent relay	MK 9397N.....	Motor load monitor
IP 9277.....	Over- and undercurrent relay	MK 9837N.....	Frequency relay
IP 9278.....	Current asymmetry relay with integrated current transformer up to 15 A	MK 9837N/5_0.....	Frequency relay
IR		MK 9994.....	Lamp tester
IR 5882.....	Residual current monitor	MK 9995.....	Lamp tester
LG		ND	
LG 5130.....	Noise filter	ND 5015.....	Residual current transformer
LK		ND 5016.....	Residual current transformer
LK 5894.....	Insulation monitor	ND 5017.....	Residual current transformer
LK 5895.....	Insulation monitor	ND 5018.....	Residual current transformer
LK 5896.....	Insulation monitor	ND 5019.....	Residual current transformer
MH		OA	
MH 5880.....	Insulation monitor	OA 9059.....	Phase sequence module
MH 9055.....	Speed monitor	RK	
MH 9064.....	Voltage relay	RK 9169.....	Phase monitor
MH 9143.....	Mains frequency monitor	RK 9179.....	Phase sequence monitor /-relay
MH 9300.....	Multifunction measuring relay	RK 9871.....	Undervoltage relay
MH 9397.....	Motor load monitor	RK 9872.....	Phase monitor
MH 9837N.....	Frequency relay	RL	
MH 9837/5_0.....	Frequency relay	RL 9836.....	Voltage relay
		RL 9853.....	Current relay
		RL 9854.....	Voltage relay
		RL 9075.....	Fuse monitor
		RL 9877.....	Phase monitor
		RN	
		RN 5883.....	Residual current monitor, type B for AC and DC systems
		RN 5897/010.....	Insulation monitor
		RN 5897/300.....	Insulation monitor
		RN 9075.....	Fuse monitor
		RN 9877.....	Phase monitor

Type	Function	Type	Function
RP		SL 9075	Fuse monitor
RP 5812.....	SMS-Telecontrol module	SL 9077	Over- and undervoltage relay
RP 5888.....	Insulation monitor	SL 9079	Undervoltage relay to detect auto-reclosing
RP 5990.....	Common alarm annunciator	SL 9086	Phase monitor with thermistor motor protection
RP 5991.....	Common alarm annunciator	SL 9087	Phase monitor
RP 5994.....	New- / First- /Common signal annunciator	SL 9094	Temperature monitoring relay
RP 5995.....	New- / First- /Common signal annunciator	SL 9144	Standstill monitor
RP 9140.....	Reverse power monitoring	SL 9151	Level sensing relay
RP 9800.....	Voltage and frequency monitor	SL 9163	Thermistor motor protection relay
RP 9810.....	Voltage and frequency monitor acc. to VDE-AR-N 4105	SL 9171	Undervoltage relay, 3-phase
RP 9811.....	Voltage and frequency monitor	SL 9270	Overcurrent relay
RR		SL 9270CT	Overcurrent relay
RR 5886	Locating current injector	SL 9271	Undercurrent relay
RR 5887	Insulation fault locator	SL 9271CT	Undercurrent relay
SK		SL 9277	Over- and undercurrent relay
SK 9055.....	Speed monitor	SL 9277CT	Over- and undercurrent relay
SK 9065.....	Underload monitor (cos φ)	SL 9837	Frequency relay
SK 9076.....	Valve monitor	SP	
SK 9094.....	Temperature monitoring relay	SP 5880.....	Insulation monitor
SK 9143.....	Frequency relay	SP 9075.....	Fuse monitor
SK 9144.....	Standstill monitor	SP 9077.....	Over- and undervoltage relay
SK 9168.....	Phase indicator	SP 9270.....	Overcurrent relay
SK 9169.....	Phase monitor	SP 9270CT.....	Overcurrent relay
SK 9170.....	Overvoltage relay, 3-phase	SP 9271.....	Undercurrent relay
SK 9171.....	Undervoltage relay, 3-phase	SP 9271CT.....	Undercurrent relay
SK 9172.....	Overvoltage relay, single phase	SP 9277.....	Over- and undercurrent relay
SK 9173.....	Undervoltage relay, single phase	SP 9277CT.....	Over- and undercurrent relay
SK 9178.....	Phase sequence indicator	SP 9278.....	Current asymmetry relay with integrated current transformer up to 15 A
SK 9179.....	Phase sequence monitor /-relay	SP 9278CT.....	Current asymmetry relay with integrated current transformer up to 100 A
SK 9270.....	Overcurrent relay	UG	
SK 9271.....	Undercurrent relay	UG 9075	Fuse monitor
SK 9272.....	Overcurrent relay	UH	
SK 9273.....	Undercurrent relay	UH 5892	Insulation monitor
SL			
SL 5201/20007CT.....	Overcurrent relay		
SL 5880	Insulation monitor		
SL 5881	Insulation monitor		
SL 5882	Residual current monitor		
SL 5990	Fault annunciator system		
SL 5991	Fault annunciator system		
SL 9055	Speed monitor		
SL 9059	Phase sequence module		
SL 9065	Underload monitor (cos φ)		
SL 9069	Neutral monitor		
SL 9071	Undervoltage relay		

Type	Function	Type	Function
BA		PF	
BA 9010	Softstarter	PF 9029	Softstarter for heating pumps
BA 9019	Softstarter with softstop	PH	
BA 9026	Softstarter with softstop	PH 9260	Solid-state relay / - contactor
BA 9034N	Motor brake relay	PH 9260.92	Solid-state relay / - contactor
BF		PH 9260/042.....	Solid-state relay / - contactor with analogue input for pulse package control
BF 9250	Solid-state contactor	PH 9270	Solid-state relay / - contactor with load circuit monitoring
BF 9250/_ _8	Solid-state contactor	PH 9270/003	Solid-state relay / - contactor with load current measurement
BF 9250/002	Semiconductor contactor with analogue input for pulsed output	PI	
BF 9250/042	Solid-state contactor with burst control	PI 9260	Solid-state relay / - contactor
BH		PK	
BH 9250.....	Solid-state contactor	PK 9260	Solid-state relay / - contactor for resistive load
BH 9251.....	Semiconductor contactor with current monitoring	RP	
BH 9253	Reversing contactor	RP 9210/300	Softstart / softstop with reverse function
BH 9255	Reversing contactor with current monitor	SL	
BI		SL 9017	Softstarter
BI 9025	Softstarter	SX	
BI 9028	Softstarter with DC-brake	SX 9240.01	Speed controller 1-phase
BI 9028/900	Softstarter for 1-phase motors	SX 9240.03	Speed controller 3-phase
BI 9034	Motor brake relay	UG	
BI 9254	Reversing contactor with softstart and active power monitoring	UG 9019	Softstarter with softstop
BL		UG 9256	Smart motorstarter
BL 9025	Softstarter	UG 9256/804	Smart motorstarter with autom. phase sequence correction
BN		UG 9256/807	Smart motorstarter with autom. phase sequence correction
BN 9011.....	Softstarter	UG 9410	Smart motorstarter
BN 9034.....	Motor brake relay	UG 9411	Smart motorstarter
GB		UH	
GB 9034	Motor brake relay	UH 9018	Softstarter
GF			
GF 9016	Softstarter and softstop device		
GI			
GI 9014	Softstart- / softstop device		
GI 9015	Softstart- / softstop device		
IL			
IL 9017	Softstarter		
IL 9017/300	Softstarter with softstop		
IN			
IN 9017	Phase controller		

Type	Function	Type	Function
AD		IG	
AD 866.....	Switching Relay	IG 3051.....	Input-Output interface relay
AD 8851.....	Latching relay	IK	
BA		IK 3050.....	Interface relay
BA 7632.....	Stepping relay	IK 3070.....	Input-Output interface relay
BA 7961.....	Contact protection relay	IK 3076.....	Input-Output interface relay
BD		IK 3079.....	Interface module
BD 3083/100.....	Interface module	IK 5121.....	Protective diode module
BG		IK 8701.....	Input-Output interface relay / Switching relay
BG 5595.....	Switched power supply	IK 8802.....	Input-Output interface relay
CA		IL	
CA 3056.....	Input-Output interface relay	IL 5504.....	CANopen PLC
CB		IL 5507.....	Output module, analogue
CB 3056.....	Input-Output interface relay	IL 5508.....	Input module, analogue
CB 3057.....	Output interface relay	IL 8701.....	Input-Output interface relay / Switching relay
CC		IN	
CC 3056.....	Input-Output interface relay	IN 5509.....	Input- / Output module, digital
HC		IN 8701.....	Input-Output interface relay / Switching relay
HC 3093.....	Interface relay pluggable	IP	
HC 3093.__/3__.....	Interface relay pluggable	IP 3070/022.....	Output interface relay
HC 3096N.....	Interface module	IP 3078.....	Interface module
HC 3098.....	Interface module	IP 5502.....	Input module, digital
HK		IP 5503.....	Output module, digital
HK 3087N.....	Interface module	LG	
HL		LG 3096.....	Interface module
HL 3094.....	Interface module	MK	
HL 3096N.....	Interface module	MK 3046.....	Interface relay
HL 3096N.__C/400.....	Interface module	MK 3096N.....	Interface module
HO		MK 8804N.....	Interface relay
HO 3094.....	Interface module	MK 8852.....	Latching relay
HO 3095.....	Interface module	ML	
		ML 3045.....	Input-Output interface relay
		ML 3059.....	Input interface relay

Type	Function
RL	
RL 5596	Switched power supply
SK	
SK 3076	Input-Output interface relay
SP	
SP 3078	Interface module
UG	
UG 3076/007	Interface relay
UG 3088	Interface module
UG 3091	Interface module
UG 3096	Interface module
UG 5122	Diode module
UG 5123	Resistor module
UG 8851	Latching relay
UG 9460	Input- / Output module digital, for Modbus
UG 9461	Input- / Output module analogue, for Modbus
UH	
UH 3096	Interface module

Type	Function	Type	Function
AA		IK	
AA 7512.....	Timer	IK 7813	Timer
AA 7562.....	Timer	IK 7814	Timer
AA 7610.....	Timer	IK 7815	Fleeting action relay
AA 7616.....	Timer	IK 7816	Flasher relay
AA 7666.....	Timer	IK 7817N/200.....	Multifunction relay
AA 9906/200.....	Timer	IK 7818	Fleeting action relay
BA		IK 7819	Timer
BA 7864.....	Cyclic timer	IK 7820	Fleeting action relay
BA 7903.....	Timer	IK 7823	Timer
BA 7905.....	Timer	IK 7825	Timer
BA 7954.....	Timer	IK 7826	Fleeting action relay
BA 7962.....	Timer	IK 7827	Flasher relay
BA 7981	Flasher relay	IK 7854	Cyclic timer
BC		IK 8808	Timer
BC 7930N.....	Timer	IK 9906	Timer
BC 7931N.....	Fleeting action relay	IK 9962	Timer
BC 7932N.....	Flasher relay	MK	
BC 7933N.....	Timer	MK 7830N.....	Multifunction relay, digital
BC 7934N.....	Timer	MK 7850N/200.....	Multifunction relay
BC 7935N.....	Multifunction relay	MK 7851	Flasher relay
BC 7936N.....	Star-delta timer	MK 7852	Flasher relay
BC 7937N.....	Cyclic timer	MK 7853N.....	Star-delta timer
BC 7938N.....	Timer	MK 7854N.....	Cyclic timer
BC 7939N.....	Timer	MK 7858	Timer
EC		MK 7863	Timer
EC 7610.....	Timer	MK 7873N.....	Timer
EC 7616.....	Timer	MK 9906	Timer
EC 7666.....	Timer	MK 9906N.....	Timer
EC 7801.....	Timer	MK 9906N/600.....	Timer
EC 9621.....	Timer	MK 9908	Timer
EF		MK 9961	Timer
EF 7610.....	Timer	MK 9962	Timer
EF 7616.....	Timer	MK 9962N.....	Timer
EF 7666.....	Timer	MK 9988	Fleeting action relay
EH		MK 9989	Fleeting action relay
EH 7610.....	Timer		
EH 7616.....	Timer		
EH 7666.....	Timer		
EO			
EO 7864	Cyclic timer		

Type	Function
RK	
RK 7813.....	Timer
RK 7814.....	Timer
RK 7815.....	Fleeting action relay
RK 7816.....	Flasher relay
RK 7817.....	Multifunction relay
SK	
SK 7813.....	Timer
SK 7814.....	Timer
SK 7815.....	Fleeting action relay
SK 7816.....	Flasher relay
SK 7817N/200	Multifunction relay
SK 7819.....	Timer
SK 7820.....	Fleeting action relay
SK 7823.....	Timer
SK 7854.....	Cyclic timer
SK 9906.....	Timer
SK 9962.....	Timer
SN	
SN 7920.....	Multifunction relay

Type	Function	Type	Function
IK		RK	
IK 3070/200	Hybrid relay	RK 8810/001.....	Staircase lighting time switch
IK 3071	Input interface relay	RK 8810/002.....	Time switch with pre-warning
IK 5115	Display unit	RK 8810/003.....	Light timing switch
IK 8701	Switching relay	RK 8810/004.....	Energy saving time switch
IK 8702	Remote switch (Impulse relay)	RK 8810/005.....	Fan control timer
IK 8702/200	Remote switch (Impulse relay)	RK 8810/006.....	Energy saving time switch
IK 8715	Priority relay	RK 8810/100.....	Staircase lighting time switch
IK 8717	Remote switch (Impulse relay)	RK 8832.....	Buzzer
IK 8717/110	Remote switch (Impulse relay)	SK	
IK 8800	Remote switch (Impulse relay)	SK 8702.....	Remote switch (Impulse relay)
IK 8805	Remote switch f. central switch. op.	SK 8702/200.....	Remote switch (Impulse relay)
IK 8807	Remote switch f. central switch. op.	SK 8832.....	Buzzer
IK 8810	Staircase lighting time switch	SK 9078.....	Mains relay
IK 8810/001	Staircase lighting time switch	SK 9171.....	Undervoltage relay, 3-phase
IK 8810/002	Staircase lighting time switch	SL	
IK 8810/003	Staircase lighting time switch	SL 9171	Undervoltage relay, 3-phase
IK 8810/004	Staircase lighting time switch		
IK 8810/005	Fan control timer		
IK 8813	Energy saving time switch		
IK 8814	Light timing switch		
IK 8825	Light timing switch		
IK 8830	Stepping switch		
IK 8832	Buzzer		
IK 9078	Mains relay		
IK 9171	Undervoltage relay, 3-phase		
IL			
IL 7824.....	Delay module		
IL 8701.....	Switching relay		
IL 8800.....	Remote switch (Impulse relay)		
IL 8805.....	Remote switch f. central switch. op.		
IL 8809.....	Remote switch for central and group switching operation		
IL 9171.....	Undervoltage relay, 3-phase		
IN			
IN 7824	Delay module		
IN 8701	Switching relay		
OA			
OA 8823	Energy saving time switch		
OA 8824	Light timing switch		
OA 8825	Light timing switch		

DE	Notizen
EN	Notice
FR	Note

A large grid of graph paper with a dotted line margin on the left side. The grid consists of 20 columns and 30 rows of small squares. The dotted line is positioned approximately one-fifth of the way from the left edge of the grid.A vertical column of horizontal lines for writing, consisting of 30 lines that correspond to the rows of the grid on the left. The lines are evenly spaced and extend across the right side of the page.

DE	Notizen
EN	Notice
FR	Note

A large grid of graph paper with a dotted horizontal line running through the middle, intended for writing notes.

A vertical column of horizontal lines on the right side of the page, intended for writing notes.

DE	Notizen
EN	Notice
FR	Note

A large grid of graph paper with a dotted line margin on the left side. The grid consists of 20 columns and 30 rows. The dotted line is positioned approximately one-fifth of the way from the left edge of the grid.

A vertical column of horizontal lines for writing, consisting of 30 lines. The lines are evenly spaced and extend from the right edge of the grid to the right edge of the page.

DE	Notizen
EN	Notice
FR	Note

A large grid of graph paper with a dotted horizontal line for writing. The grid consists of 20 columns and 30 rows. The dotted line is positioned approximately one-third of the way down from the top of the grid.

A vertical column of horizontal lines for writing, consisting of 30 lines. These lines are aligned with the rows of the grid on the left.

DE	Notizen
EN	Notice
FR	Note

DE	Notizen
EN	Notice
FR	Note

A large grid of graph paper with a dotted horizontal line for writing. The grid consists of 20 columns and 30 rows. The dotted line is positioned approximately one-third of the way down from the top of the grid.

A series of horizontal lines for writing, consisting of 30 lines. These lines are positioned to the right of the graph paper grid.

DE	Notizen
EN	Notice
FR	Note

A large grid of graph paper with a dotted line margin on the left side. The grid consists of 20 columns and 30 rows of small squares. The dotted line is positioned approximately one-third of the way from the left edge of the grid.

A vertical column of horizontal lines for writing, consisting of 30 lines that align with the rows of the grid on the left.