Relays
Tractive electromagnets

Bosch –
Excellence comes as standard

Explanatory notes on parameters

Overview

Relay applications

This catalog contains the technical information which a design engineer requires in order to select a relay for his particular requirements. Bosch DC relays were originally designed for automotive applications. We recommend prior technical clarification for all other applications, especially where requirements, loading or ambient conditions differ from those applying to automotive applications.

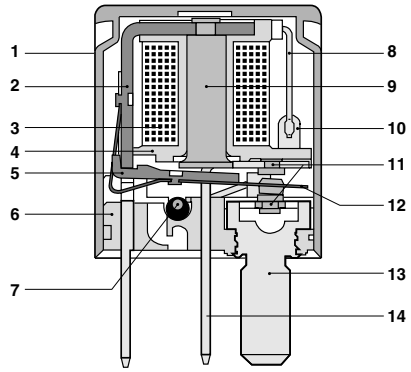
Bosch DC relays are able to withstand exposure to extreme conditions and must comply with the following requirements:
They must
– switch high powers
– function efficiently and reliably in a broad temperature range
– be extremely resistant to vibration
– have a long service life, and
– be highly climate-proof.

Bosch DC relays are used to switch electrical devices featuring high power levels or which are sensitive to voltage loss. Relays relieve the load on control switches and make for small voltage drops with economical conductor cross-sections. And relays make simple interlock circuits possible.

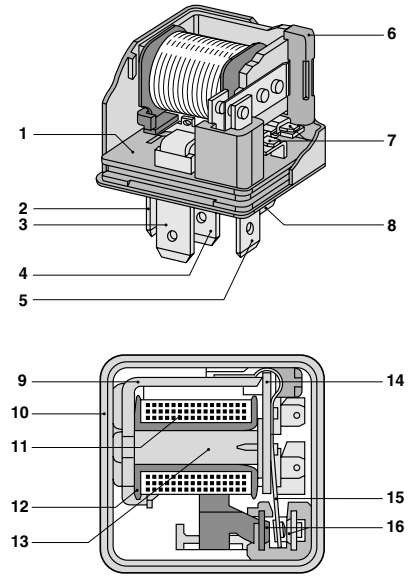
Mini-relays and micro-relays are ideal for use where the available space is restricted. Multiple connectors, together with pre-tested wiring harnesses, ensure simple assembly and the lowest possible error rate. This applies in particular to OEM, but also to customer service. The following versions of mini-relays and micro-relays are available:
– Relays without mounting bracket. Easily plugged into buttable socket housings for screwing on
– Relays with mounting bracket. Connected using a 5-pole socket housing

Power relays can switch a nominal current of 50 A and more, and are suitable for switching motors, starting motors and other devices.

Micro-relay **1** Cap, **2** Magnet bracket and term. 3, **3** Coil, **4** Bobbin, **5** Armature, **6** Baseplate, **7** Damping resistor or diode, **8** Connecting wire, **9** Core, **10** Term. 1/2, **11** Contact, **12** Spring, **13** Term. 4, **14** Term. 5.



Mini-relay **1** Baseplate, **2** Term. 86, **3** Term. 87, **4** Term. 87a, **5** Term. 85, **6** Clamping piece, **7** Coil connection bracket, **8** Term. 30, **9** Magnet bracket, **10** Cap, **11** Coil, **12** Bobbin, **13** Core, **14** Armature, **15** Spring, **16** Contact.



Parameters and definition of terms

Definition of terms (to DIN 41 215, where standardized)

The various parameters with their specific characteristic values permit the selection of the correct relay for a particular job. During its service life, every type of relay must fulfill defined tasks at the specified characteristic values.

The **response voltage** is the value of the smallest excitation voltage which makes a relay respond, taking into account the ambient temperature and self-heating factors.

The **response time** is the time that elapses between the closing of the exciter circuit to the first closing of an NO contact or the first opening of an NC contact.

The **operating voltage** is the value of the excitation voltage at which the relay shows the characteristic data required for operation.

The **excitation voltage** is the electrical voltage which permits the electric current to flow through the excitation winding and produce the excitation. The connection is made via terminals 1 and 2 or 85 and 86.

The **nominal value** is the value of a variable (e.g. voltage, current, resistance) for which a relay, its parts and properties are designed or after which they are named.

Correction factor

The specifications for the energizing side apply at an ambient temperature of +20 °C.
If the ambient temperature deviates from this figure, the correction factor K can be applied to convert the winding resistances, response voltages and release voltages.
$K = [1 + \alpha(t_u - 20\,°C)]$
t_u = actual ambient temperature or coil temperature
$\alpha = 0.004\ K^{-1}$ (mean temperature coefficient for copper).

The **bounce time** is the time that elapses between the first and last closing of a relay contact when the relay changes to another switching position.

The **release voltage** is the value of the maximum excitation voltage at which the relay drops out, taking into account ambient temperature and self-heating factors.

The **release (dropout) time** is the time that elapses between the opening of the exciter circuit and the first opening of an NO contact or the first closing of an NC contact.

The **switching voltage** is the voltage which is present between the contacts when the electric circuit is open, once transient processes have settled.

The **voltage drop** is the voltage at the relay terminals of a closed relay contact measured at a defined current.

The **overall resistance of the exciter circuit** is the electrical resistance between the terminals 1 and 2 or 85 and 86.

Degrees of protection and operating modes

Switching operations

Response is the operation by which a relay is switched from its normal position to its operated position.

Opening is an operation which results in the electrical contact being opened.

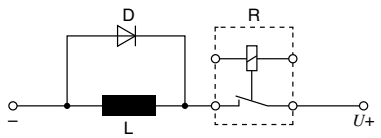
Release (dropout) is the operation by which a relay is switched from its operated position to its normal position.

A **switching cycle** comprises the single response and release of a relay.

The **number of switching operations** comprises the total number of switching cycles.

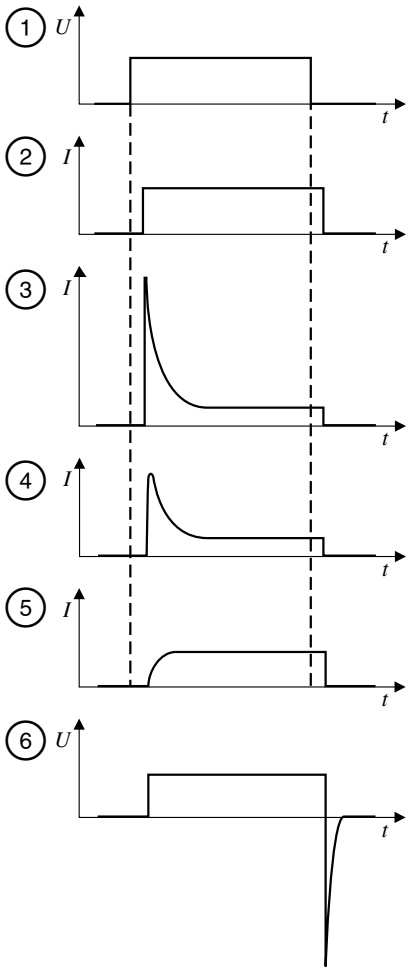
Closing is an operation which results in contact closure.

With inductive loads and motors, a suppresser circuit, which can be set up parallel to the load with a free-wheeling diode, is required (see circuit).



L Inductive Load, **D** Free-wheeling diode, **R** Relay, ***U*** Supply voltage.

Typical load characteristics
1 Excitation voltage for relay coil
2 Current characteristic for resistive load
3 Current characteristic for lamp load
4 Current characteristic for motor load
5 Current characteristic for inductive load
6 Voltage characteristic for inductive load



Service life

The **mechanical service life** is defined as the number of switching cycles, without electrical loading of the contacts, during which the relay remains operational.

The **contact service life** is defined as the number of switching cycles, with electrical loading of the contacts, during which the relay remains operational.

Switching contacts

The **NO** (**N**ormally **O**pen) **contact** is a relay contact which is open in the relay's normal position and closes as the relay changes to its operated position.

The **NC** (**N**ormally **C**losed) **contact** is a relay contact which is closed in the relay's normal position and opens as the relay changes to its operated position.

The **changeover contact** is a contact assembly with three electrically isolated connections consisting of an NO contact an NC contact and a common contact spring. When the switch position changes, the closed contacts open first, followed by the closing of the other contacts (which up to that point were open).

Degrees of protection and operating modes

Degrees of protection

In accordance with DIN 40 050, the **degree of protection** is designated by a code which is always made up of the letters IP (Internal Protection) followed by two numbers signifying the actual level of protection.
The first number indicates the degree of protection against accidental contact and against the ingress of solid foreign bodies, the second number indicates the degree of protection against the ingress of water. If the degree of protection of one of a device's operational parts (e.g. terminals) differs from that of the main part of the device, then its code will be stated separately. The lower degree of protection is given first.
Example: Terminals IP 20 – Housing IP 5K4.

Degrees of protection (DIN 40 050, extract from page 9)

Overview of elements of IP code

First classification number	Protection against contact by persons	Protection against ingress of solid foreign bodies
0	No protection	No protection
1	Back of hand	Object with Ø ≥ 50 mm
2	With a finger	Object with Ø ≥ 12.5 mm
3	Tools	Object with Ø ≥ 2.5 mm
4	Thin wire	Object with Ø ≥ 1 mm
5K	Thin wire	Protection against dust
6K	Thin wire	Dust-proof

Second classification number	Protection against ingress of water
0	No protection
1	Vertical drops
2	Drops at 15° inclination
3	Water spray
4	Splashing water
4K	Splashing water at increased pressure
5	Water jets
6	Heavy water jets
6K	Water jets at increased pressure
7	Temporary immersion
8	Lasting submersion
9K	High-pressure/ steam cleaning

Application

Bosch relays were originally designed for use in automotive applications. The great range of different versions are used for the most varied applications, such as for
– wiper motors
– fan motors
– starting motors
– cooling fans
– rear defrosters
– brake lamps
– electric power-window mechanisms
– central locking
– electric seat adjustment
– electric seat heating
– electric wing mirrors
– fuel pumps
– horns
– headlamps
– security systems
and many more.

In addition to these purely automotive applications, Bosch relays are ideal for switching 12- or 24-V components. This is true for both mobile and stationary applications where, for example, electric motors are actuated. With these relays, a multiplicity of drive assignments can be implemented.

Bosch relays are employed in
– automatic sliding doors
– devices for the disabled
– boat electrics
– electric lawn mowers
– materials-handling technology (e.g. conveyor belts, pneumatic tube conveyor systems)
– garage-door drives
– battery chargers
– emergency generators
– agricultural machinery
– furniture adjustment
– cleaning devices
– robot controls
– control cabinets
– toys
– vending machines
and many more.

Micro-relays

Parameters

Nominal voltage (load and excitation circuit)	12 V	24 V
Permissible operating voltage	8...16 V	17...27 V
Permissible ambient temperature [1])	– 40...100 °C	– 40...100 °C
Response voltage (at 20 °C)	≤ 8 V	≤ 17 V
Release voltage (at 20 °C)	≥ 1.5 V	≥ 3 V
Response time	≤ 10 ms	≤ 10 ms
Release time	≤ 10 ms [2])	≤ 10 ms [2])
Contact material	Silver tin oxide [3])	Silver tin oxide
Voltage drop at NO contact when new	≤ 50 mV at 10 A	≤ 40 mV at 5 A
Voltage drop at NO contact after specified number of switching operations	≤ 100 mV at 10 A	≤ 75 mV at 5 A
Voltage drop at NC contact when new	≤ 50 mV at 10 A	≤ 40 mV at 5 A
Voltage drop at NC contact after specified number of switching operations	≤ 200 mV at 10 A	≤ 150 mV at 5 A
Degree of protection for housing and terminals in general (see page 5)	IP 20	IP 20
Degree of protection for socket housing with blade terminals pointing downwards (s. p. 5)	IP 5K4	IP 5K4

[1]) Up to 125 °C on request.
[2]) ≤ 15 ms for part numbers 0 332 207 304 and 0 332 207 402.
[3]) Hard silver for changeover relay part number 0 332 207 304.

Product overview

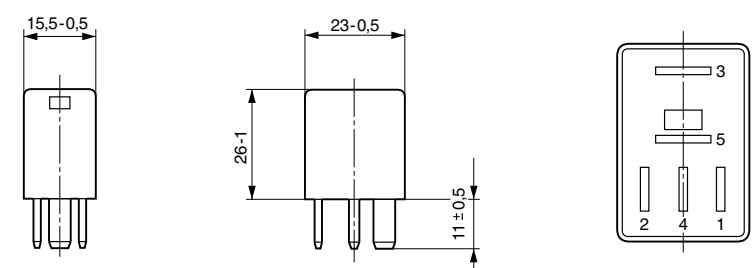
Resistive load [4]) Switching current/ no. of operations [9]) NO contact A/Thousand	NC contact A/Thousand	Motor load [5]) Making/continuous current/ no. of operations [9]) NO contact A/A/Thousand	Lamp load [6]) Switching current/ no. of operations [9]) NO contact A/Thousand	NC contact A/Thousand	Exciter circuit total resistance [10]) Ω	Illustr. and dimens. drawing	Circuit diagram	Terminal diagram	Part number
NO relays 12 V									
20/≥ 300	–	30/15/≥ 200	20/≥ 150	–	78 ±6	1	S1	A1	**0 332 017 300**
20/≥ 300	–	30/15/≥ 200	20/≥ 150	–	78 ±6	2	S1	A1	**0 332 017 302**
30/≥ 100	–	65/17/≥ 200 [8])	17/≥ 150	–	75 ±6	3	S1	A1	**0 332 011 007**
22/≥ 200 [7])	–	–	10/≥ 200	–					
Changeover relays 12 V									
20/≥ 100 16/≥ 200 10/≥ 500	10/≥ 125 5/≥ 250	35/20/≥ 100	–		88 ±6	1	S3	A2	**0 332 207 304**
20/≥ 300	10/≥ 150	30/15/≥ 200	20/≥ 150	10/≥ 75	78 ±6	1	S2	A2	**0 332 207 307**
20/≥ 300	10/≥ 150	30/15/≥ 200	20/≥ 150	10/≥ 75	78 ±6	2	S2	A2	**0 332 207 310**
30/≥ 100 22/≥ 200 [7])	10/≥ 100 5/≥ 200	65/17/≥ 200 [8]) 30/7/≥ 200 [8])	17/≥ 150 10/≥ 200	10/≥ 150 3,5/≥ 200	75 ±6	3	S2	A2	**0 332 201 107**
Changeover relays 24 V									
10/≥ 250	5/≥ 250	–	–	–	410 ±20	1	S3	A2	**0 332 207 402**
10/≥ 250	5/≥ 250	–	–	–	335 ±20	2	S2	A2	**0 332 207 404**

Switching rhythm: [4]) 2 s on, 2 s off. [5]) 5 s on, 5 s off. [6]) 1 s on, 9 s off. [7]) 1 s on, 2 s off. [8]) 2 s on, 6 s off.
[9]) At a test voltage of 13.5 V (12-V relay) or 27 V (24-V relay); test temperature of 23 ±5 °C. [10]) At 20 °C.

Blade terminal connection
Refer to page 12 for corresponding connectors and socket housings.

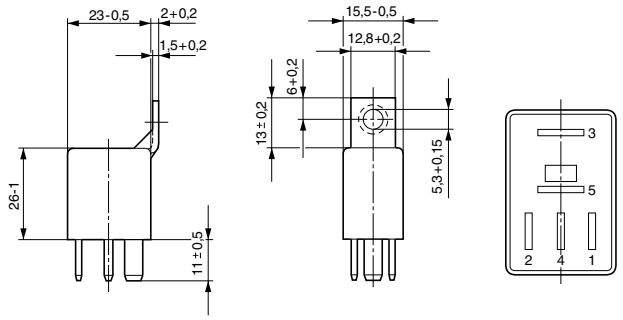
Illustrations and dimension drawings

① 

① 

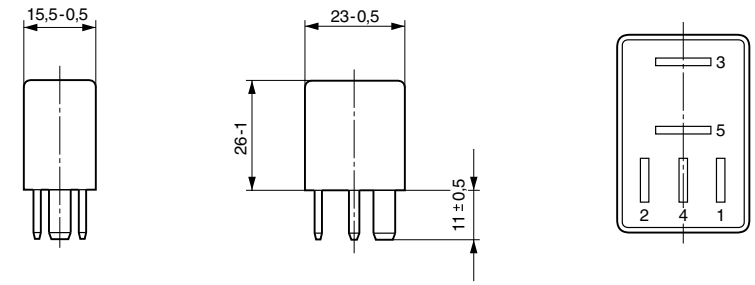
Blade terminal size to DIN 46 244, similar to ISO 8092:
Terms. 1 and 2 (4): 4.8 x 0.8 mm; terms. 3 and 5: 6.3 x 0.8 mm

② 

② 

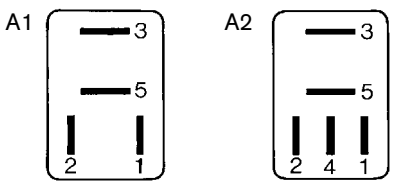
Blade terminal size to DIN 46 244, similar to ISO 8092:
Terms. 1 and 2 (4): 4.8 x 0.8 mm; terms. 3 and 5: 6.3 x 0.8 mm

③ 

③ 

Blade terminal size to DIN 46 244, similar to ISO 8092;
Terms. 1 and 2 (4): 4.8 x 0.8 mm; terms. 3 and 5: 6.3 x 0.8 mm

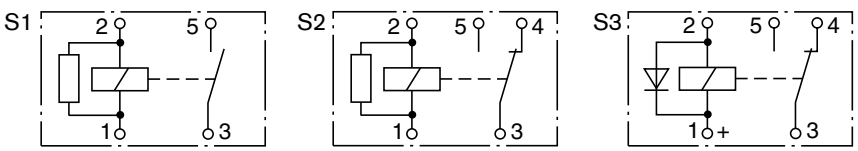
Terminal diagrams



NO contact

Changeover contact

Circuit diagrams



Cross-reference of terminal designations

Micro-relay	Mini-relay	Polarity
1	86	+
2	85	–
3	30	+
4	87a	

Mini-relays

Parameters

Nominal voltage (exciter and switching voltage)	12 V	24 V
Permissible operating voltage	8...16 V	16...32 V
Permissible operating temperature [1])	– 40...+100 °C	– 40...+ 85 °C
Response voltage (at 20 °C)	≤ 8 V	≤ 16 V
Release voltage (at 20 °C)	1.2...5.0 V [2])	2.4...10.0 V
NO contact: Voltage drop in load circuit at 10 A		
when new	≤ 50 mV	≤ 50 mV
after specified number of switching operations	≤ 80 mV	≤ 100 mV
NC contact: Voltage drop in load circuit at 10 A		
when new	≤ 175 mV	
after specified number of switching operations	≤ 250 mV	
Changeover contact: Voltage drop in load circuit at 10 A [2])		
NO contact when new	≤ 50 mV [3])	≤ 50 mV
NO contact after specified number of switching operations	≤ 80 mV [4])	≤ 100 mV
NC contact when new	≤ 70 mV [3])	≤ 50 mV
NC contact after specified number of switching operations	≤ 120 mV [4])	≤ 150 mV
Resistive, motor and lamp load	The number of switching cycles was determined at a test voltage of 13.5 V. When hard silver is the contact material, the test temperature was 23 ±5 °C, in the case of silver tin oxide it was 85 °C.	The number of switching cycles was determined at a test voltage of 27 V. Temperature cycling program 48 h at 85 °C, 24 h at 20 °C and 24 h at –40 °C.

[1]) Up to 125 °C on request [2]) 0.5...5.0 V with 0 332 109 011 [3]) ≤ 30 mV with 0 332 209 158 [4]) ≤ 60 mV with 0 332 209 158

Product overview

NO relays 12 V

Resistive load NO contact Switching current/ no. of operations [5]) A/Thousand	Motor load NO contact Making current/ continuous current/ no. of operations [6]) A/A/Thousand	Lamp load NO contact Switching current/ no. of operations [7]) A/Thousand	Inductive load NO contact Switching current/ no. of operations [8]) A/Thousand	Contact material [9])	Part number
50/≥ 75 40/≥ 125 30/≥ 250	90/40/≥ 75 75/30/≥ 125 50/20/≥ 250	30/≥ 75 20/≥ 125 10/≥ 250	–	a	**0 332 019 103**
50/≥ 50 40/≥ 75 30/≥ 100	72/16/≥ 50	30/≥ 75 20/≥ 125 10/≥ 250	–	a	**0 332 019 109**
50/≥ 75 40/≥ 125 30/≥ 250	90/40/≥ 75 75/30/≥ 125 50/20/≥ 250	30/≥ 75 20/≥ 125 10/≥ 250	–	a	**0 332 019 110**
30/≥ 250 20/≥ 300 10/≥ 500	50/25/≥ 100	30/≥ 100 20/≥ 200 10/≥ 500	24/≥ 100	b	**0 332 019 150**
30/≥ 250 20/≥ 300 10/≥ 500	50/25/≥ 100	30/≥ 100 20/≥ 200 10/≥ 500	24/≥ 100	b	**0 332 019 151**
30/≥ 100 20/≥ 200 10/≥ 350	40/20/≥ 100	20/≥ 100 10/≥ 350	15/≥ 50	b	**0 332 019 155**

[5]) Switching rhythm: 2 s on – 2 s off
[6]) Switching rhythm: 5 s on – 5 s off
[7]) Switching rhythm:
1 s on – 9 s off for silver tin oxide
2 s on – 2 s off for hard silver
[8]) Switching rhythm: 2 s on – 2 s off (8 mH)
[9]) a = silver tin oxide, b = hard silver
[10]) When a socket housing is used and when installed with blade terminals pointing downwards. In a different installation position, the housing degree of protection is IP 20.
[11]) Switching rhythm: 2 s on – 6 s off

Product overview (continued)

NO relays 12 V continued

Overall resistance of excitation circuit at 20 °C Ω	Response time ms	Release time ms	Degree of protection [10] Terminals	Housing	Illustration Dimension drawing *	Circuit diagram *	Terminal diagram *	Part number
75 ±5	≤ 10	≤ 10	IP 20	IP 5 K4	1	S7	A3	**0 332 019 103**
85 ±5	≤ 10	≤ 15	IP 20	IP 34	1	S2	A1	**0 332 019 109**
75 ±5	≤ 10	≤ 10	IP 20	IP 5 K4	2	S7	A3	**0 332 019 110**
85 ±5	≤ 10	≤ 10	IP 20	IP 34	2	S1	A1	**0 332 019 150**
85 ±5	≤ 10	≤ 10	IP 20	IP 34	1	S1	A1	**0 332 019 151**
85 ±5	≤ 10	≤ 15	IP 20	IP 34	2	S2	A1	**0 332 019 155**

NC relay 12 V

Resistive load NC contact Switching current/ no. of operations [5] A/Thousand	Motor load NC contact Making current/ continuous current/ no. of operations [11] A/A/Thousand	Lamp load NC contact Switching current/ no. of operations [7] A/Thousand	Inductive load NC contact Switching current/ no. of operations [8] A/Thousand	Contact material [9]	Part number
10/≥ 100 20/≥ 50	100/18/≥ 200	12/≥ 100	–	a	**0 332 109 011**

NC relays 12 V continued

Overall resistance of excitation circuit at 20 °C Ω	Response time ms	Release time ms	Degree of protection [10] Terminals	Housing	Illustration Dimension drawing *	Circuit diagram *	Terminal diagram *	Part number
75 ±5	≤ 10	≤ 10	IP 20	IP 34	1	S9	A4	**0 332 109 011**

Changeover relays 12 V

Resistive load NO contact	NC contact Switching current/ no. of operations [5] A/Thousand	Motor load NO contact	NC contact Making current/ continuous current/ no. of operations [6] A/A/Thousand	Lamp load NO contact	NC contact Switching current/ no. of operations [7] A/Thousand	Inductive load NO contact	NC contact Switching current/ no. of operations [8] A/Thousand	Contact material [9]	Part number
50/≥ 50 40/≥ 75 30/≥ 100	20/≥ 50	90/40/≥ 75 75/30/≥ 150 50/20/≥ 300	–	30/≥ 75 20/≥ 150 10/≥ 300	5/≥ 150	–	–	a	**0 332 209 135**
50/≥ 75 40/≥ 150 30/≥ 300	20/≥ 100 15/≥ 150 10/≥ 300	90/40/≥ 75 75/30/≥ 150 50/20/≥ 300	35/15/≥ 50 25/10/≥ 150 15/5/≥ 300	30/≥ 75 20/≥ 150 10/≥ 300	5/≥ 300	–	–	a	**0 332 209 137**
50/≥ 75 40/≥ 150 30/≥ 300	20/≥ 100 15/≥ 150 10/≥ 300	90/40/≥ 75 75/30/≥ 150 50/20/≥ 300	35/15/≥ 50 25/10/≥ 150 15/5/≥ 300	30/≥ 75 20/≥ 150 10/≥ 300	5/≥ 300	–	–	a	**0 332 209 138**
30/≥ 250 20/≥ 300 10/≥ 500	5/≥ 250	50/25/≥ 100	–	30/≥ 100 20/≥ 200 10/≥ 500	10/≥ 100 5/≥ 150	15/≥ 100	15/≥ 100	b	**0 332 209 150**
30/≥ 250 20/≥ 300 10/≥ 500	20/≥ 250 10/≥ 250 5/≥ 250	50/25/≥ 100	–	30/≥ 100 20/≥ 200 10/≥ 500	10/≥ 100 5/≥ 150	15/≥ 100	15/≥ 100	b	**0 332 209 151**
30/≥ 250 20/≥ 300 10/≥ 500	20/≥ 250 10/≥ 250 5/≥ 250	50/25/≥ 100	–	30/≥ 100 20/≥ 200 10/≥ 500	10/≥ 100 5/≥ 150	15/≥ 100	15/≥ 100	b	**0 332 209 152**
30/≥ 150 20/≥ 500 10/≥ 750	20/≥ 150 10/≥ 250 5/≥ 500	40/20/≥ 100	–	30/≥ 150 20/≥ 250 10/≥ 750	10/≥ 150 5/≥ 250	15/≥ 100	15/≥ 100	b	**0 332 209 158**
30/≥ 250 20/≥ 300 10/≥ 500	20/≥ 250 10/≥ 250 5/≥ 250	50/25/≥ 100	–	30/≥ 100 20/≥ 200 10/≥ 500	10/≥ 100 5/≥ 150	15/≥ 100	15/≥ 100	b	**0 332 209 159**

* see page 11

continued on next page

Mini-relays (continued)

Product overview (continued)

Changeover relays 12 V continued

Overall resistance of excitation circuit at 20 °C Ω	Response time ms	Release time ms	Degree of protection [10] Terminals	Housing	Illustration Dimension drawing	Circuit diagram	Terminal diagram	Part number
85 ±5	≤ 10	≤ 15	IP 20	IP 5K4	1	S6	A2	**0 332 209 135**
75 ±5	≤ 10	≤ 10	IP 20	IP 5K4	1	S5	A2	**0 332 209 137**
75 ±5	≤ 10	≤ 10	IP 20	IP 5K4	2	S5	A2	**0 332 209 138**
85 ±5	≤ 10	≤ 10	IP 20	IP 34	2	S4	A2	**0 332 209 150**
85 ±5	≤ 10	≤ 10	IP 20	IP 34	1	S4	A2	**0 332 209 151**
85 ±5	≤ 10	≤ 15	IP 20	IP 34	1	S6	A2	**0 332 209 152**
85 ±5	≤ 10	≤ 15	IP 20	IP 34	2	S6	A2	**0 332 209 158**
75 ±5	≤ 10	≤ 10	IP 20	IP 34	1	S5	A2	**0 332 209 159**

NO relays 24 V

Resistive load NO contact Switching current/ no. of operations [5] A/Thousand	Motor load NO contact Making current/ continuous current/ no. of operations [6] A/A/Thousand	Lamp load NO contact Switching current/ no. of operations [7] A/Thousand	Inductive load NO contact Switching current/ no. of operations [8] A/Thousand	Contact material [9]	Part number
20/≥ 250	40/16/≥ 250	16/≥ 250	–	a	**0 332 019 203**
20/≥ 250	40/16/≥ 250	16/≥ 250	–	a	**0 332 019 204**
20/≥ 250	40/16/≥ 250	16/≥ 250	–	a	**0 332 019 213**

NO relays 24 V continued

Overall resistance of excitation circuit at 20 °C Ω	Response time ms	Release time ms	Degree of protection [10] Terminals	Housing	Illustration Dimension drawing	Circuit diagram	Terminal diagram	Part number
255 ±15	≤ 15	≤ 15	IP 20	IP 5K4	2	S1	A1	**0 332 019 203**
216 ±15	≤ 15	≤ 15	IP 20	IP 5K4	1	S8	A1	**0 332 019 204**
255 ±15	≤ 15	≤ 15	IP 20	IP 5K4	1	S1	A1	**0 332 019 213**

Changeover relays 24 V

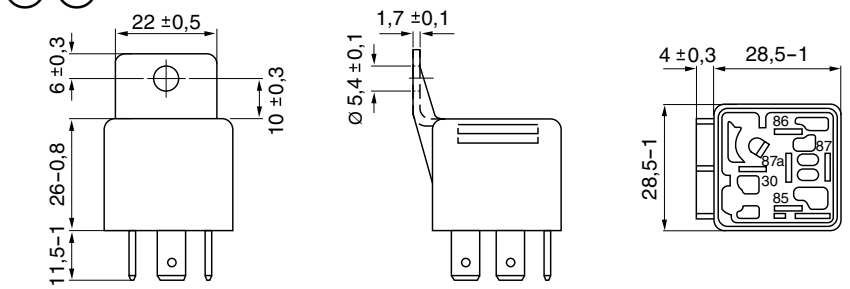
Resistive load NO contact | NC contact Switching current/ no. of operations [5] A/Thousand		Motor load NO contact | NC contact Making current/ continuous current/ no. of operations [6] A/A/Thousand		Lamp load NO contact | NC contact Switching current/ no. of operations [7] A/Thousand		Inductive load NO contact | NC contact Switching current/ no. of operations [8] A/Thousand		Contact material [9]	Part number
20/≥ 250	10/≥ 250	40/16/≥ 250	–	16/≥ 250	8/≥ 50 5/≥ 150	–	–	a	**0 332 209 203**
20/≥ 250	10/≥ 250	40/16/≥ 250	–	16/≥ 250	8/≥ 50 5/≥ 150	–	–	a	**0 332 209 204**
20/≥ 250	10/≥ 250	40/16/≥ 250	–	16/≥ 250	8/≥ 50 5/≥ 150	–	–	a	**0 332 209 206**
20/≥ 250	10/≥ 250	40/16/≥ 250	–	16/≥ 250	8/≥ 50 5/≥ 150	–	–	a	**0 332 209 207**
20/≥ 250	10/≥ 250	40/16/≥ 250	–	16/≥ 250	8/≥ 50 5/≥ 150	–	–	a	**0 332 209 211**

Changeover relays 24 V continued

Overall resistance of excitation circuit at 20 °C Ω	Response time ms	Release time ms	Degree of protection [10] Terminals	Housing	Illustration Dimension drawing	Circuit diagram	Terminal diagram	Part number
255 ±15	≤ 15	≤ 15	IP 20	IP 5K4	2	S4	A2	**0 332 209 203**
255 ±15	≤ 15	≤ 25	IP 20	IP 5K4	1	S6	A2	**0 332 209 204**
216 ±15	≤ 15	≤ 15	IP 20	IP 5K4	1	S5	A2	**0 332 209 206**
216 ±15	≤ 15	≤ 15	IP 20	IP 5K4	2	S5	A2	**0 332 209 207**
255 ±15	≤ 15	≤ 15	IP 20	IP 5K4	1	S4	A2	**0 332 209 211**

[5]) Switching rhythm: 2 s on – 2 s off
[6]) Switching rhythm: 5 s on – 5 s off
[7]) Switching rhythm: 1 s on – 9 s off for silver tin oxide; 2 s on – 2 s off for hard silver
[8]) Switching rhythm: 2 s on – 2 s off (8 mH)
[9]) a = silver tin oxide, b = hard silver
[10]) When a socket housing is used and when installed with blade terminals pointing downwards. In a different installation position, the housing degree of protection is IP 20 (see page 5).

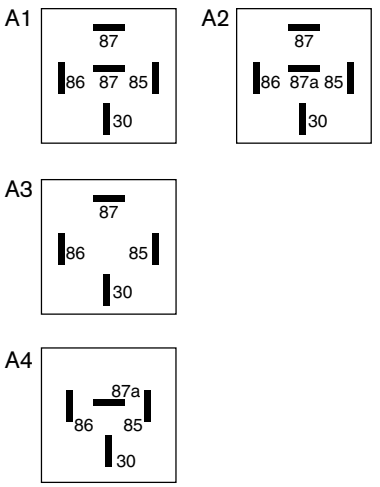
Illustrations and dimension drawings



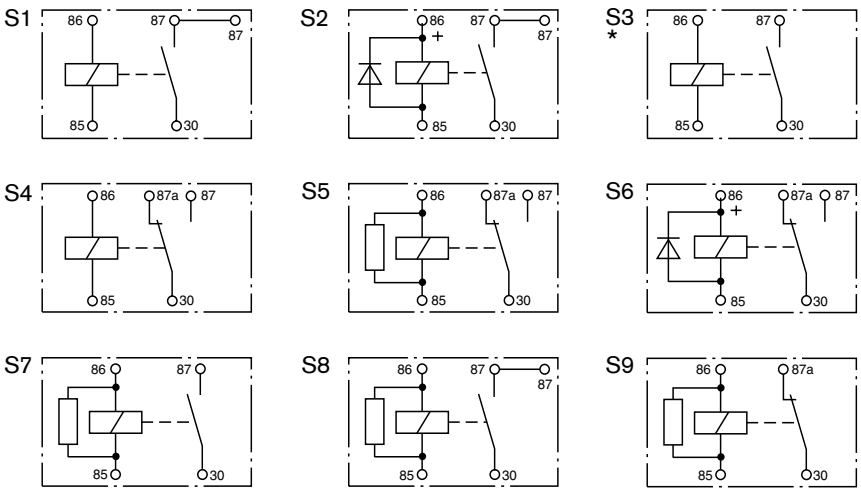
Blade terminal size: 6.3 x 0.8 mm to DIN 46 244 (similar to ISO 8092)

Terminal configuration

Terminal diagrams



Circuit diagrams



Recommended polarity Term. 86 +
Term. 30 +

* S3 available on request

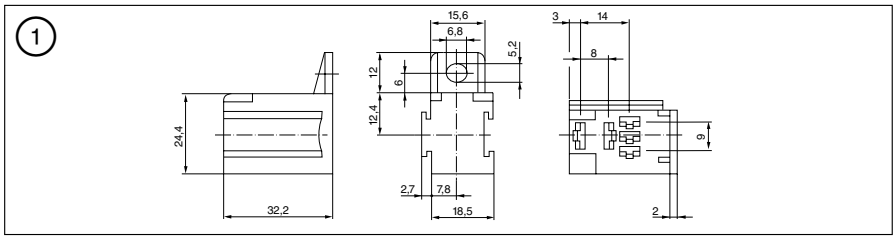
Accessories

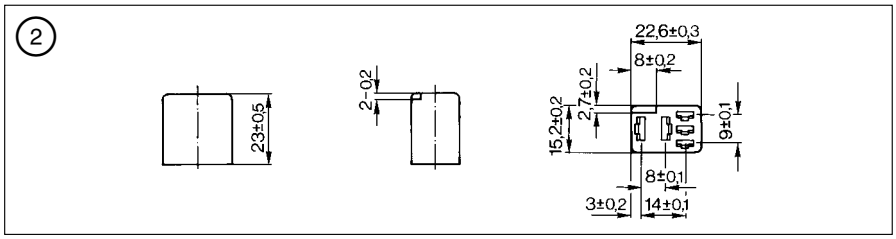
Socket housings for micro-relays

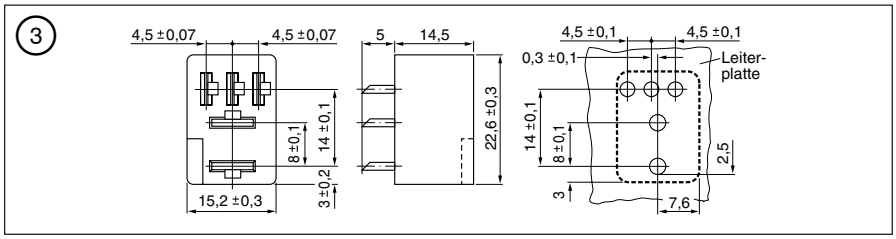
① **Socket housing with bracket**
Individual and multiple mounting possible, for screwing on, 5-pole. Receptacles 6.3 mm or 4.8 mm with locking lance for engagement in housing.
Pack of 5 **3 334 485 045**

② **Socket housing without bracket**
5-pole. Receptacles 6.3 mm or 4.8 mm with locking lance for engagement in housing.
Pack of 5 **3 334 485 046**

③ **Socket housing for soldering into PC boards**
Micro-relays with blade terminals can be attached to PC boards using a solder-in socket housing. The resulting ease of replacement makes for rapid and reasonably priced service work.
Pack of 5 **3 334 485 049**





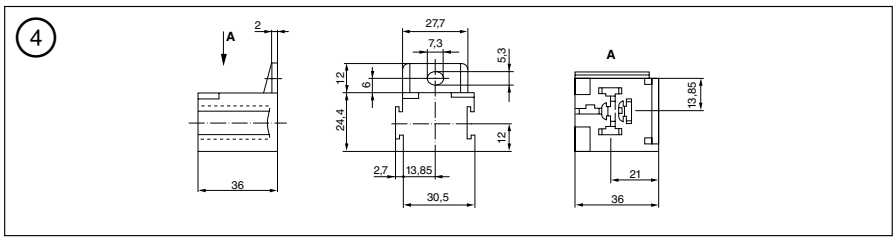


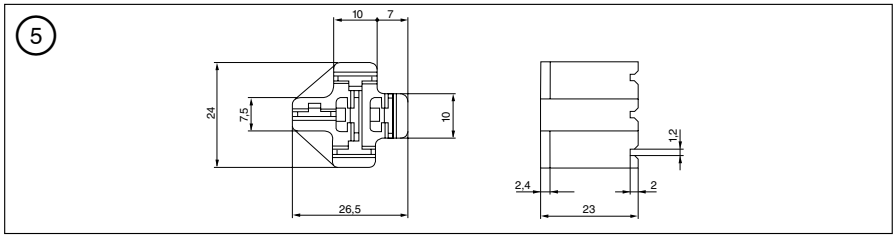
Socket housing for mini-relays

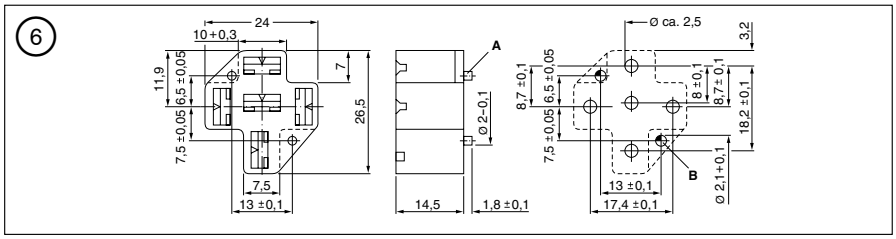
④ **Socket housing with bracket**
Individual and multiple mounting possible, for screwing on, 5-pole. Receptacles 6.3 mm with locking lance for engagement in housing.
Pack of 5 **3 334 485 008**

⑤ **Socket housing without bracket**
5-pole. Receptacles 6.3 mm with locking lance for engagement in housing.
Pack of 5 **3 334 485 007**

⑥ **Socket housing for soldering into PC boards**
Mini-relays with blade terminals can be attached to PC boards using a solder-in socket housing. The resulting ease of replacement makes for rapid and cost-effective service work.
Receptacles in socket housing.
Pack of 1 **3 334 485 041**







A Two locating lugs
B Holes for locating lugs

Assembly parts

⑦ **Plastic extractor tool**
For extracting micro-relays from the socket housing.

Pack of 1	**3 331 329 049**

⑧ **Bronze receptacles**
with locking lance for engagement in socket housing.

Plug size 4.8 x 0.8 mm
for micro-relays (similar to DIN 46 340).
Tin-plated surface, attachable conductor cross-section 1...2.5 mm².

Pack of 25	**1 904 492 016**

Plug size 6.3 x 0.8 mm
for micro- and mini-relays
(to DIN 46 340)
Tin-plated surface, attachable conductor cross-section 1...2.5 mm².

Pack of 25	**1 901 355 895**

⑨ **Brass receptacles**
with insulated sleeve (to DIN 46 245)

Plug size 6.3 x 0.8 mm
for power relay types 1 and 2
Tin-plated surface, attachable conductor cross-section 0.5...1 mm².
Identification color: red

Pack of 100	**1 901 355 880**

Attachable conductor cross-section 1...2.5 mm².
Identification color: blue

Pack of 100	**1 901 355 881**

Plug size 9.5 x 1.2 mm
for power relay type 1
Tin-plated surface, attachable conductor cross-section 4...6 mm².
Identification color: yellow

Pack of 50	**8 781 355 811**

⑦

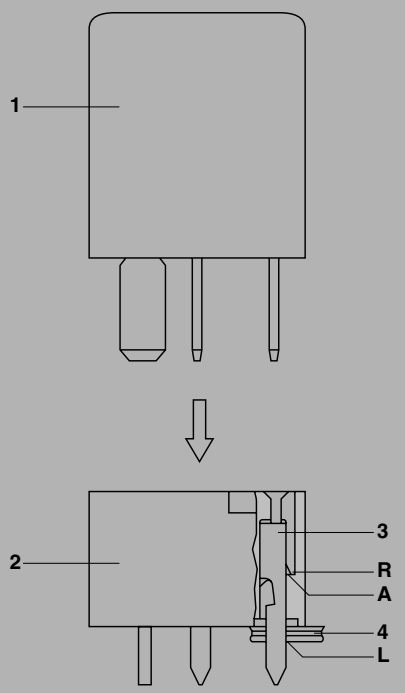
⑧

⑨

Further accessories such as connectors, protection sleeves, crimping pliers, leads, etc. are contained in our “Accessories” catalog 1 987 721 074.

Recommended assembly method:
The socket housing should be soldered to the PC board with the relay inserted, as then the receptacles are automatically centered and the PC board is not put under strain by plugging in the relay. If the relay is plugged in after the socket housing has been soldered in place, take care to care to ensure that the receptacle locking lance is up against the socket-housing stop, so that the soldered connection is not subject to pressure.

1 Relay with blade terminal
2 Socket housing
3 Receptacle
4 PC board
A Stop
L Soldered connection
R Locking lance



Power relays

Parameters

Nominal voltage (switching and excitation circuit)	12 V (type 1)	24 V (type 1)	12 V (type 2)	24 V (type 2)
Permissible operating voltage	8...14.5 V	16...27 V	15 V	30 V
Permissible ambient temperature	– 40...+100 °C [1])	– 40...+100 °C [1])	– 40...+65 °C [2])	– 40...+65 °C [2])
Voltage drop at test current when new	≤ 200 mV/50 A	≤ 150 mV/20 A	≤ 100 mV [3])/75 A	≤ 100 mV [3])/75 A
Voltage drop after specified no. of operations	≤ 225 mV/50 A	–	≤ 200 mV [4])/75 A	≤ 200 mV [4])/75 A
Degree of protection of housing/terminals (see p. 5)	IP 20 [5])/IP 20	IP 20 [5])/IP 20	IP 54/IP 00	IP 54/IP 00

[1]) Up to 125 °C on request.
[2]) +100 °C for short-time operation with 25 % duty cycle, based on 2-minute cycle.
[3]) ≤ 50 mV/75 A with double-contact relay 0 332 002 150.
[4]) ≤ 100 mV/75 A with double-contact relay 0 332 002 150.
[5]) Degree of protection of housing IP 5K4 when using a socket housing installed with blade terminals pointing downwards.

Product overview

Resistive load [6]) Switching current/ no. of operations [10])	Short-time load ≤ 1 s	Motor load [7]) Making current/ continuous current/ no. of operations [10])	Response/ release voltage [8])	Response/ release time	Contact type [9])	Bracket	Overall resistance [8])	Circuit diagram	Part number
A/Thousand	A	A/A/Thousand	V/V	ms/ms			Ω		
NO relays 12 V type 1									
50/≥ 100	120	86/55/≥ 130	≤ 6.0/1.0...5.0	≤ 10/≤ 10	E	plugged in	45 ±5	S4	**0 332 002 192**
NO relays 24 V type 1									
30/≥ 50	70	70/20/≥ 120	≤ 16.0/3.0...8.0	≤ 15/≤ 15	V	none [11])	200 ±10	S1	**0 332 002 270**
NO relays 12 V type 2									
75/≥ 125	400	–	≤ 8.0/1.5...4.0	≤ 10/≤ 15	D	fixed	46 ±5	S5	**0 332 002 150**
75/≥ 100	250	–	≤ 8.5/1.0...4.0	≤ 10/≤ 15	E	fixed	46 ±5	S2	**0 332 002 156**
100/≥ 125 [12])	400	–	≤ 5.5/0.5...4.0	≤ 10/≤ 10	E	fixed	20 ±3	S4	**0 332 002 161**
NO relays 24 V type 2									
50/≥ 100	200	–	≤ 18.0/1.0...8.0	≤ 10/≤ 10	V	fixed	130 ±10	S1	**0 332 002 250**
50/≥ 50	150	–	≤ 17.0/≥ 4.0	≤ 10/≤ 15	E	fixed	130 ±10	S2	**0 332 002 256**
50/≥ 50	–	–	≤ 18.0/1.0...8.0	≤ 10/≤ 10	E	fixed	130 ±10	S3	**0 332 002 257**

[6]) Switching rhythm 2 s on, 2 s off.
[7]) Switching rhythm 4 s on, 26 s off.
[8]) of the excitation circuit at 20 °C.
[9]) E = single, D = twin, V = leading contact.
[10]) The number of switching cycles was determined at a test voltage of 13.5 V for the 12-V relay and at 27 V for the 24-V relay. Type 1: temperature cycling program 6 h at 23 °C, 6 h at – 40 °C, 12 h at 125 °C; type 2 at 23 ± 5 °C.
[11]) Bracket can be obtained under part number 3 331 335 063.
[12]) Switching rhythm 1.5 s on, 13.5 s off.

Notes

- Compact design.
- High degree of corrosion protection due to use of glass-fiber-reinforced polyamide for baseplate and cap.
- High degree of protection against splash water thanks to drip rim between cap and baseplate.
- Leakage-current barriers in baseplate.
- Designed-in ventilation by means of “labyrinth”.
- Option of “heavy duty” version with tungsten leading contact.

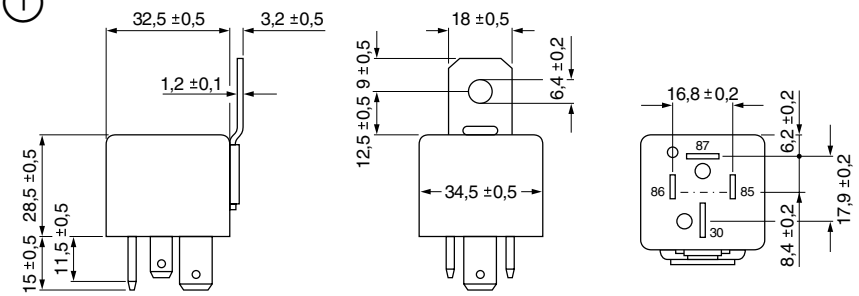
Automotive applications:
- Load-reducing relay for switches.
- Operating relay for starting motors.
- Switch-on relay for hydraulic assemblies, blowers and heaters for the passenger compartment, engine-cooling fans.
- Pre-heating device for diesel starting systems.
- Motor relay for antilock braking system (ABS).
- Battery cutoff relay.

Accessories
See page 12

Illustrations and dimension drawings

① Typ 1

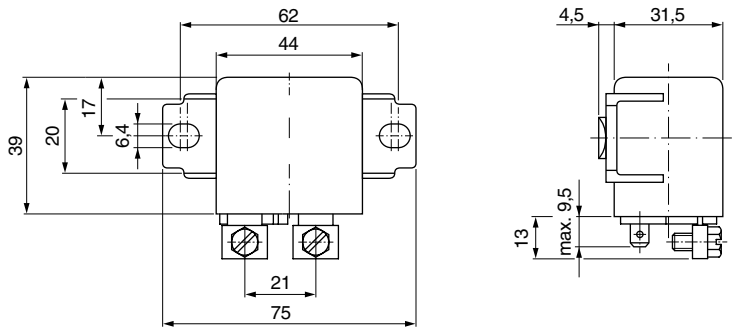
①



Blade terminals:
Energizing side terms. 85 and 86: 6.3 x 0.8 mm
Contact side terms. 30 and 87: 9.5 x 1.2 mm.

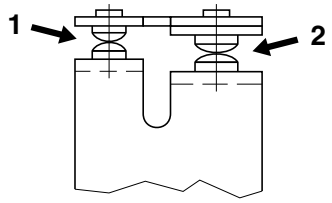
② Typ 2

②



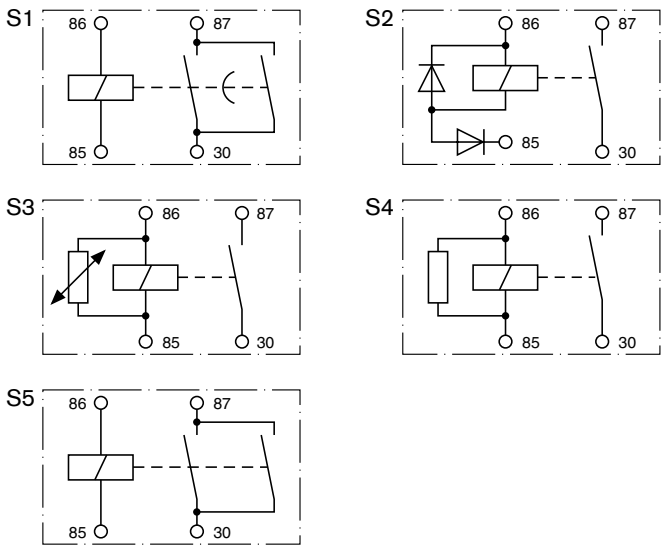
Accessories: Twin socket housing for energizing side (terms. 85 and 86).
Order with AMP number 180 907 from: AMP Deutschland GmbH,
Amperestraße 7-11, D-63225 Langen, Germany, tel. +49 61 03 70 90.

Method of operation of leading contact



1. Closure of leading contact
Coil energized; current flows in leading contact for a fraction of a second.
2. Closure of main contact
Coil energized; current flows in main contact. The characteristics of the tungsten leading contact make it ideal for the considerable loads resulting from the separation arc when contacts are opening (inductive loads). The main contact ensures efficient current flow with minimum voltage losses. The tungsten leading contact (late-opening when the contacts open) ensures that the main contacts are not subject to separation arcs.

Circuit diagrams



Polarity: Terms. 86 and 30 to +

Power relays (continued)
for industrial trucks, hydraulic systems, etc.
Series 200, 201 – single-pole

Parameters

Designation	230 A hinged-armature relay
Nominal voltages *)	24 V, 36 V, 48 V, 80 V
Construction	Open
Operating mode	Continuous duty up to 1 h
Version	Available on request with auxiliary relay and blowout magnet
Voltage limits (permissible)	0.7 x nominal voltage to nominal voltage
Switching times at nominal voltage	Response time ≤ 50 ms; release time ≤ 30 ms
Utilization category	Starting, switching off while running DC4-VDE 0660
Creepage distances and clearances	To insulation group C-VDE 0110
Coil output	32 W
Coil connection	Blade terminal 0.8 x 6.3 mm
Main current contacts	NO contact – series 0 333 200 ..; changeover contact – series 0 333 201 ..
Nominal value of operating current	375 A
Continuous thermal current	230 A
Contact material	Sintered silver cadmium oxide (AgCdO)
Connection stud	M 8; permissible tightening torque 6...8 Nm
Auxiliary contact	Changeover contact
Continuous current of auxiliary contact	2.5 A with inductive load, 6 A with resistive load
Connection of auxiliary contact	Blade terminal 0.8 x 6.3 mm
Blowout magnet	As an option for 36 V, 48 V and 80 V.
Degree of protection (see page 5)	IP 00
Operating temperature range	– 40...+100 °C
Note	Ensure correct polarity of main current connections. Connect to fixed contact.

Product overview

Relay function	Nominal voltage *)	Nominal value of excitation current	Switching current		Service life of contact		Interrupting current with inductive load	Dimensions	Circuit diagram	Weight	Part number
			Contin. duty	Load current 1 s	Mecha-nical	Elec-trical		L x W x H			
	V	A	A	A	Thousand	Thousand	A	mm		kg	
NO relays	24	1.3	230	1500	1250	250	375	135x70x100	S1	1.2	**0 333 200 010**
	24	1.3	230	1500	1250	250	375	135x70x100	S1	1.2	**0 333 200 012** 2)
	36	0.9	230	1500	1250	250	375	135x70x100	S1	1.2	**0 333 200 015**
	80	0.4	230	1500	1250	250	375	135x70x100	S1	1.2	**0 333 200 013** 3)
NO relays with aux. relay 1)	24	1.3	230	1500	1250	250	375	135x70x100	S2	1.2	**0 333 200 011**
Changeover relays	24	1.3	230	1500	1250	100	375	135x70x128	S3	1.3	**0 333 201 010**
	80	0.4	230	1500	1250	100	375	135x70x128	S3	1.3	**0 333 201 012** 3)
Changeover relays with aux. relay 1)	24	1.3	230	1500	1250	100	375	135x70x128	S4	1.3	**0 333 201 011**
	80	0.4	230	1500	1250	100	375	135x70x128	S4	1.3	**0 333 201 013** 3)

*) Excitation and switching voltage.

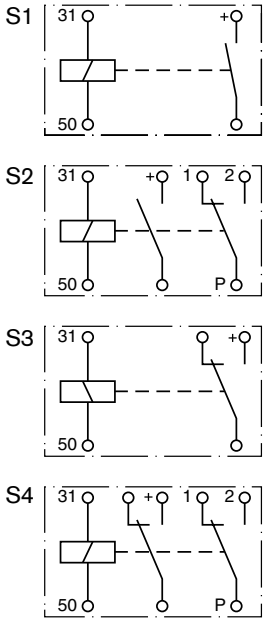
1) With additional auxiliary relay (changeover contact), e.g. for indicator lamps, max. 6 A (resistive load); 2.5 A (inductive load); contact P switches from 1 to 2.

2) Installation position: long edge of baseplate vertical, max. inclination 10°.

3) With blowout magnet.

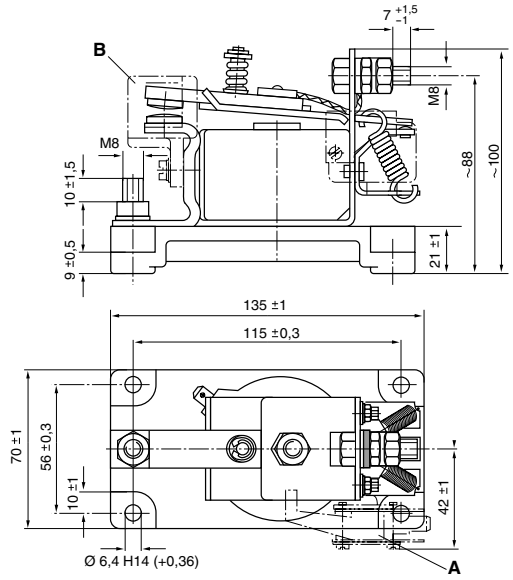
Illustrations

Circuit diagrams



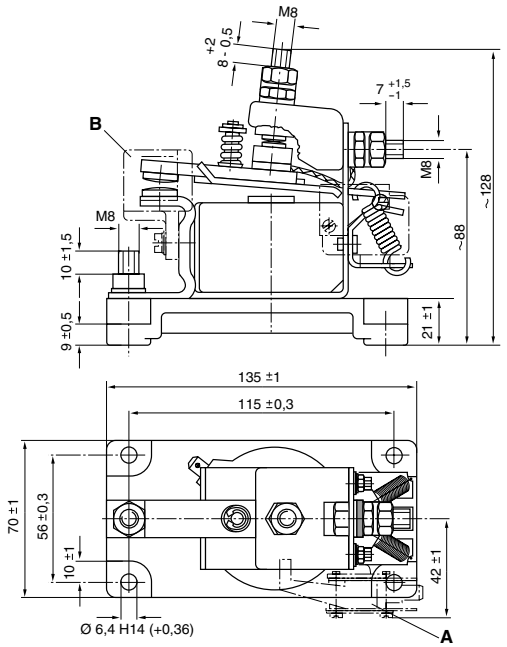
Dimension drawings

Series 0 333 200 ..



A Version with one auxiliary relay, **B** Blowout magnet

Series 0 333 201 ..



A Version with one auxiliary relay, **B** Blowout magnet

Power relays (continued)
Series 006 – single-pole

Parameters

Designation	80 A solenoid plunger circuit
Nominal voltages *)	6 V, 12 V, 24 V
Construction	Closed
Operating mode	Continuous duty up to 1 h
Voltage limits (permissible)	0.75 x nominal voltage, after 1 h continuous duty up to nominal voltage
Switching times at nominal voltage	Response time ≤ 50 ms; release time ≤ 30 ms
Utilization category	Starting, switching off while running DC4-VDE 0660
Creepage distances and clearances	To insulation group C-VDE 0110
Coil output	13 W
Coil connection	Screw terminals, for conductor cross-section 3 mm
Main current contacts	NO contact, NC contact
Contact material	Copper
Connection stud	M 8; permissible tightening torque 10…15 Nm
Degree of protection (see page 5)	Terminals IP 00; housing IP 54
Operating temperature range	–40…+100 °C
Note	Ensure adequate ventilation (cooling) during continuous operation.

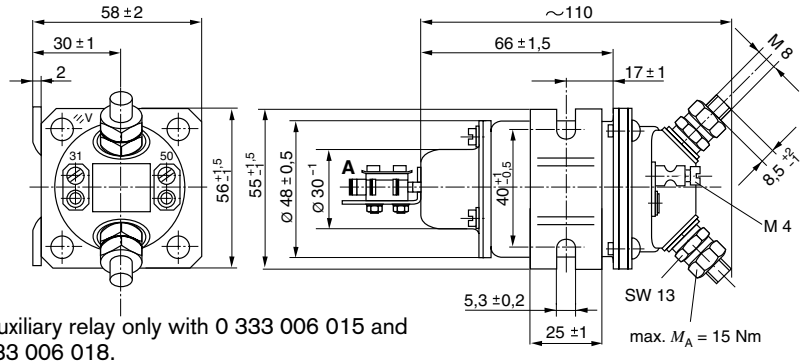
Product overview

Nominal voltage*)	Nominal excitation current	Nominal load current		Service life of contact		Interrupting current with inductive load	Dimensions	Illustration, dimens. drawing	Circuit diagram	Weight	Part number
		Contin. duty	Load current up to 1 s	Mechanical	Electrical		L x W x H				
V	A	A	A	Thousand	Thousand	A	mm			kg	
NO relays											
6	2.5	80	800	500	100	80	110 x 55 x 60	1	S1	0.79	**0 333 006 003**
12	1.1	80	800	500	100	80	110 x 55 x 60	1	S1	0.78	**0 333 006 004**
24	0.6	80	800	500	100	80	110 x 55 x 60	1	S1	0.77	**0 333 006 006**
	6/0.25 [1]	200	800	500	100	–	95 x 50 x 52	2	S5	0.27	**0 333 006 010**
	0.8	75 [2]	150 [2]	150	100	–	130 x 58 x 70	3	S3	0.89	**0 333 006 014**
	6/0.25 [1]	100	500	500	100	–	95 x 50 x 52	2	S6	0.27	**0 333 006 017** [4]
NC relays											
12	2.3	100	500	500	100	100	110 x 55 x 60	1	S4	0.8	**0 333 006 007**
24	0.9	100	500	500	100	100	110 x 55 x 60	1	S4	0.8	**0 333 006 008**
NO relays with auxiliary relay [3]											
12	1.5	80	800	500	100	80	140 x 55 x 56	1	S2	0.77	**0 333 006 015** [5]
24	0.6	80	800	500	100	80	140 x 55 x 56	1	S2	0.7	**0 333 006 018**

*) Excitation and switching voltage.
[1]) Pull-in current 6 A, continuous current 0.25 A.
[2]) Referred to terminals 88 – 88a; terminals 87 – 87a must not be subjected to inductive loads of more than 3 A.
[3]) With additional auxiliary relay (changeover contact), e.g. for indicator lamps, max. 6 A (resistive load); 2.5 A (inductive load); contact P switches from 1 to 2.
Method of functioning: When switching on, auxiliary contact switches before main contact;
When switching off, main contact breaks before auxiliary contact switches.
[4]) Response time ≤ 14 ms, release time ≤ 58 ms.
[5]) Degree of protection for housing: IP 33 (see page 5).

Illustrations and dimension drawings

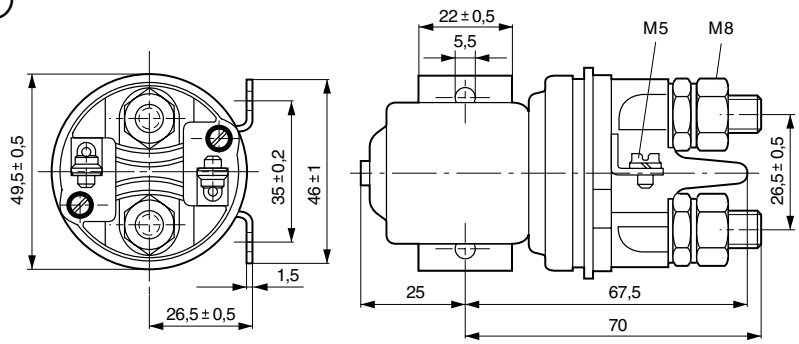
① 

① 

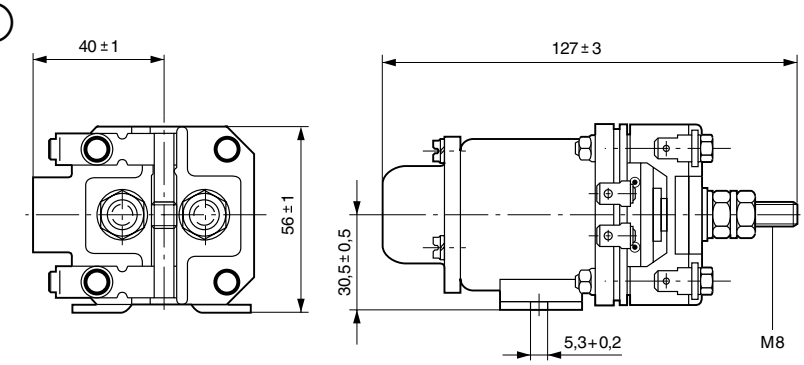
A Auxiliary relay only with 0 333 006 015 and 0 333 006 018.
Parts supplied loose with 0 333 006 006.

SW Width across flats

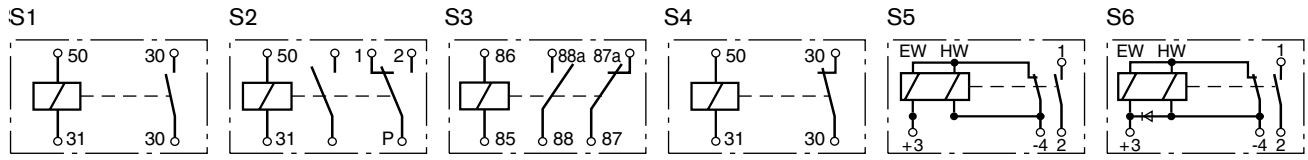
② 

② 

③ 

③ 

Circuit diagrams



EW Excitation winding, **HW** Hold-in winding

Power relays (continued)
Series 007

Parameters

Nominal voltage *)	24 V
Designation	150 A solenoid plunger circuit
Construction	Open
Operating mode	Continuous duty up to 1 h
Voltage limits (permissible)	0.7 x nominal voltage to nominal voltage
Switching times at nominal voltage	Response time ≤ 30 ms; release time ≤ 30 ms
Utilization category	Starting, switching off while running DC4-VDE 0660
Creepage distances and clearances	To insulation group C-VDE 0110
Coil output	20 W
Coil connection	Blade terminals 0.8 x 6.3 mm
Main current contacts	2 NO contacts (2-pole double break or 1-pole four-fold break)
Contact material	Sintered silver cadmium oxide (AgCdO)
Connection bars	Hole Ø 6.4 mm for M 6 steel screws
Degree of protection (see page 5)	IP 00
Operating temperature range	–40…+100 °C

*) Excitation and switching voltage

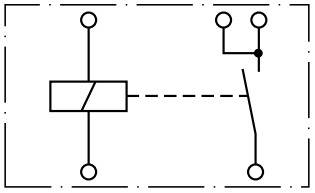
Product overview

Relay function NO contact	Nominal excitation current A	Nominal load current Contin. duty A	Load current 1 s A	Service life of contact Mecha-nical Thousand	Elec-trical Thousand	Interrupting current with inductive load A	Dimensions L x W x H mm	Illustra-tion	Circuit diagram	Dim. drwg.	Weight kg	Part number
Single	2.3	–	250 [1]	100	–	–	87 x 62 x 102	1	S1	1	0.8	**0 333 007 002** [2]
Double	1 [3]	2 x 150	2 x 1000	> 300	> 150	375	98 x 57 x 89	2	S2	2	0.8	**0 333 007 004** [4]

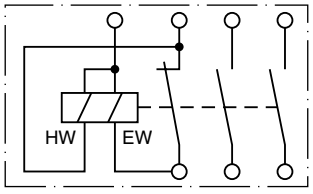
[1]) For max. 3 minutes.
[2]) Contact material: copper.
[3]) A maximum peak current of 13 A occurs at the pull-in moment.
[4]) Installation position: long edge of baseplate vertical, max. inclination 10°.

Circuit diagram

S1



S2



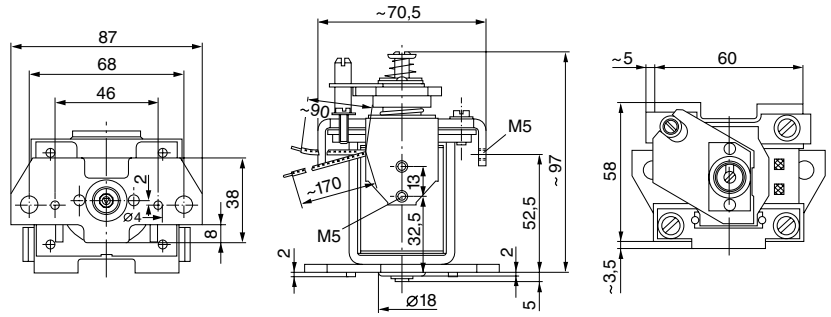
HW Hold-in winding
EW Pull-in winding

The pull-in and hold-in windings are connected in parallel before response and the resulting high making current (approx. 13 A max.) guarantees rapid, reliable response.
After the relay has operated, the electric circuit of the pull-in winding is interrupted and the hold-in winding holds the relay in its operated position at a current of approx. 1 A.

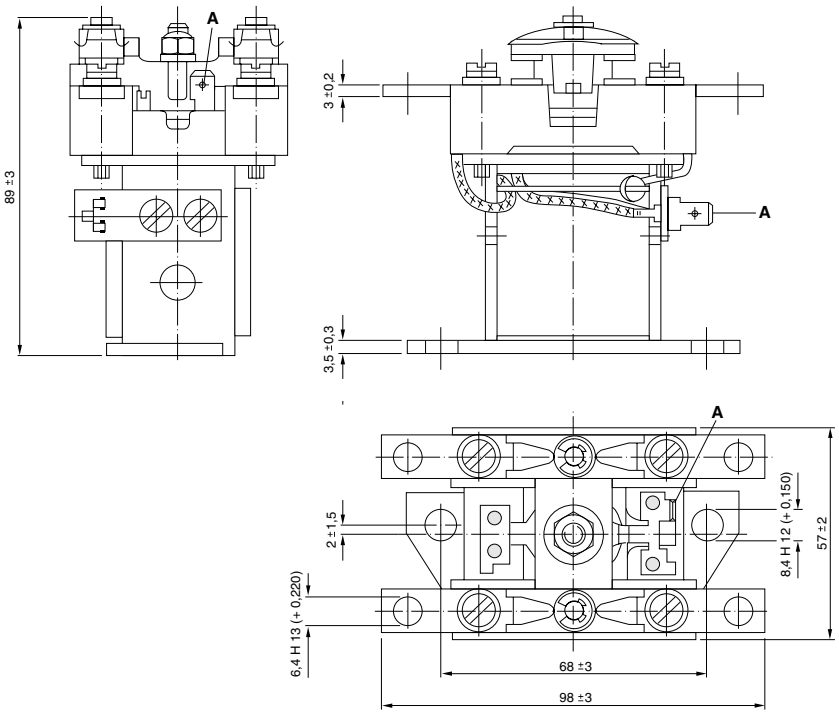
Illustration

Dimension drawing

①



②



A Blade terminal 6.3 x 0.8 DIN 46 244

Series 009 – one-pole

Parameters

Designation	150 A solenoid plunger circuit
Construction	Closed
Operating mode	Continuous duty up to 1 h
Nominal voltages *)	12 V, 24 V
Voltage limits (permissible)	0.75 x nominal voltage to nominal voltage
Switching times at nominal voltage	Response time ≤ 50 ms; relaease time ≤ 40 ms
Utilization category	Starting, switching off while running DC4-VDE 0660
Creepage distances and clearances	To insulation group C-VDE 0110
Coil output	20 W
Coil connection	Blade terminals 0.8 x 6.3 mm, M 4 cable lug
Main current contacts	NO contact (double break)
Contact material	Silver nickel alloy (AgNi)
Connection bars	M 8; permissible tightening torque 5.5 Nm
Degree of protection (see page 5)	Terminals: IP 00; housing: IP 54
Operating temperature range	–40…+100 °C
Note	Ensure adequate ventilation (cooling) during continuous operation

*) Excitation and switching voltage

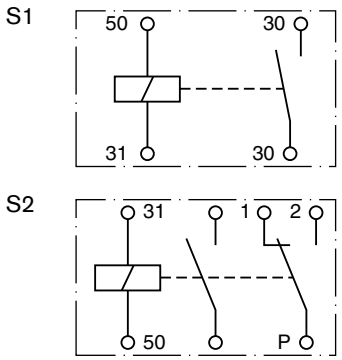
Product overview

Nominal excitation current	Nominal load current		Service life of contact		Interrupting current with inductive load	Dimensions	Illustration	Circuit diagram	Weight	Part number
	Contin. duty	Load current 5 s	Mecha-nical	Elec-trical		L x W x H				
A	A	A	Thousand	Thousand	A	mm			kg	
NO relays 12 V [1]										
3.9	–	500	2000	100	50	114 x 55 x 56	1	S1	0.70	**0 333 009 003**
1.5	150	800	2000	200	150	105 x 56 x 56	1	S1	0.75	**0 333 009 004**
1.5	150	800	2000	200	150	104 x 56 x 57	1	S1	0.75	**0 333 009 010** [2]
1.5	150	800	2000	200	150	104 x 56 x 57	1	S1	0.75	**0 333 009 014**
NO relays 24 V [1]										
0.83	150	800	2000	200	150	104 x 56 x 57	1	S1	0.75	**0 333 009 002**
0.83	150	800	2000	200	150	104 x 56 x 57	1	S1	0.75	**0 333 009 005**
0.83	150	800	2000	200	150	104 x 56 x 56	1	S1	0.75	**0 333 009 009** [2]
0.83	150	800	2000	200	150	106 x 56 x 57	1	S1	0.75	**0 333 009 011**
1.20	–	800	2000	200	150	114 x 56 x 88	2	S1	0.80	**0 333 009 017** [5]
NO relays 24 V [1] with auxiliary relay [4]										
0.83	150	800	2000	200	150	127 x 50 x 67	1	S2	0.75	**0 333 009 008** [3] [4]

[1] Nominal value of voltage (excitation and switching voltage).
[2] With electric lead.
[3] Degree of protection of housing IP 30 (see page 5).
[4] With additional auxiliary relay (changeover contact), e.g. for indicator lamps, max. 6 A resistive load or 2.5 A inductive load. Contact P switches from 1 to 2.
[5] Degree of protection of housing IP 6K9K (see page 5).

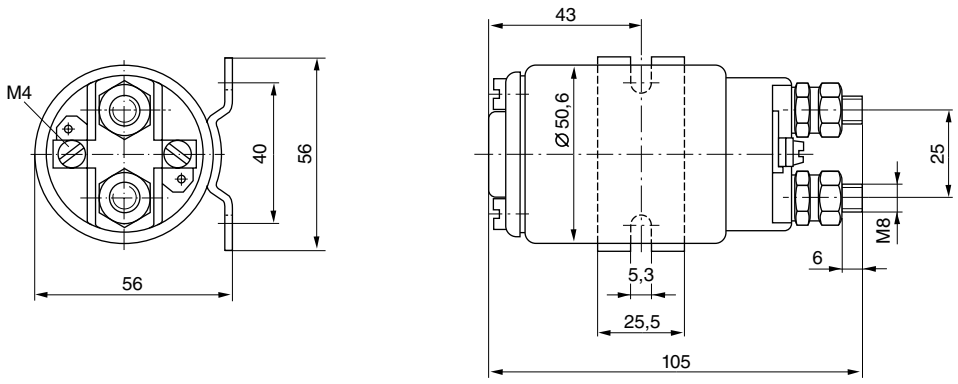
Illustration

Circuit diagram



Dimension drawing

1



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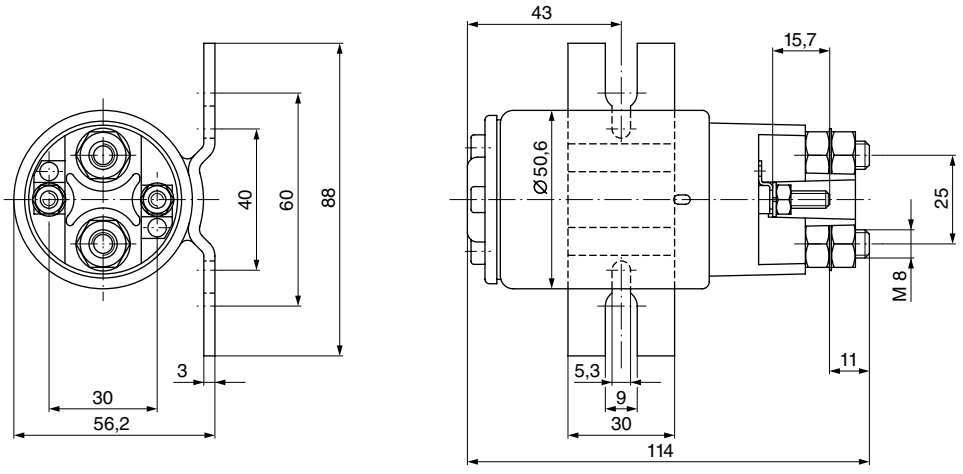


Tractive electromagnets

Pulling electromagnets 12 V
for electromagnetic operation

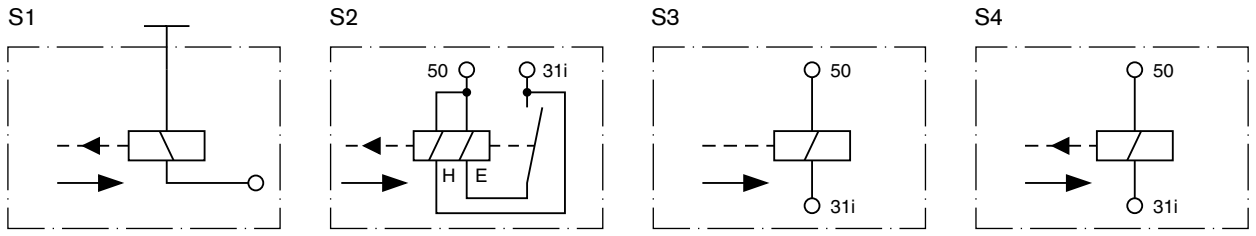
Besides positioning applications, tractive electromagnets may also be used in the following:
Ticket stamping/punching machines, guiding, locking, triggering, metering, ventilating, pushing, clamping, riveting, blocking, etc.

Product overview

Nominal voltage	Working stroke	Nominal wattage [1]	Operating mode [2]	Forces Working stroke [3]	With armature pulled in [3]	Return spring	Illustr./ dimens. drawing	Circuit diagram	Weight	Part number
V	mm	W		N	N	N			kg	
12	1.3	max. 21	Contin. duty	≥ 8	≥ 11	2.3 ±0.5	1	S1	0.074	**0 330 001 040**
	15.3	960/12.5 [4]	Contin. duty	≥ 110	≥ 270	–	2	S2	1.1	**0 330 003 007**
	4	69	Short-time duty	≥ 14	≥ 70	4 ±1	3	S1	0.11	**0 330 001 004**
	6	211	Short-time duty	≥ 80	≥ 250	–	4	S3	0.65	**0 330 002 004**
	15.3	277	Short-time duty	≥ 95	≥ 200	4.5 ±0.5	5	S4	1.11	**0 330 003 002**
	1.3	14	Contin. duty	13	15	2.3 ±0.5	6	S1	0.103	**0 330 001 020**

[1]) With armature pulled in.
[2]) Short-time duty, after 45 sec. of operation there should be a break of 4.5 min.
[3]) At nominal voltage and winding temperature 23 ±5 °C.
[4]) Pull-in winding/hold-in winding

Circuit diagrams

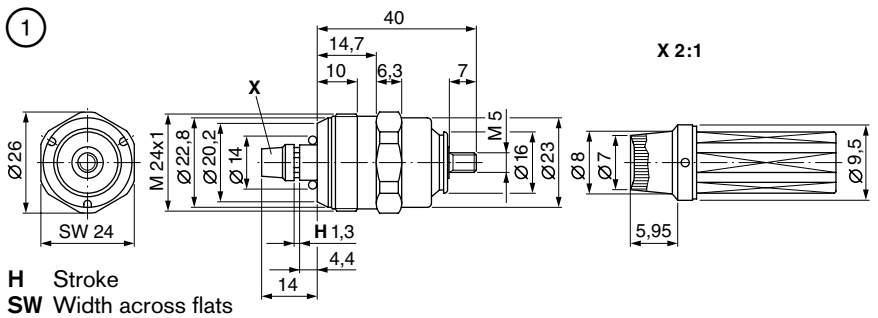


E Pull-in winding
H Hold-in winding

Illustrations and dimension drawings

1

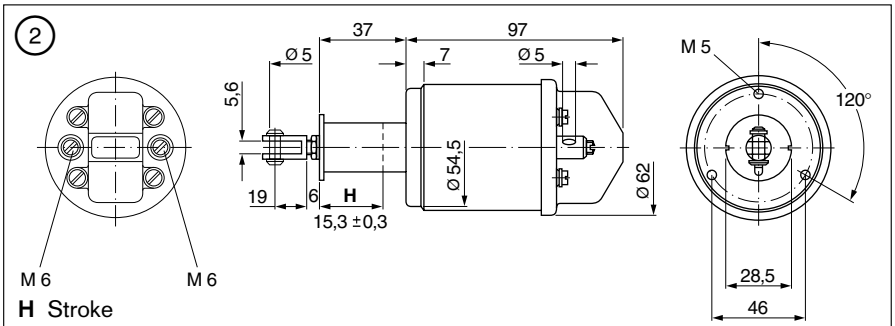
1



H Stroke
SW Width across flats

2

2

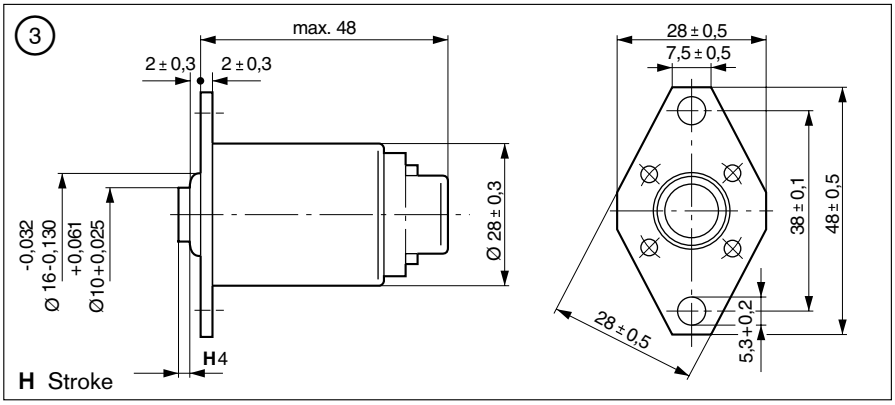


H Stroke

Illustrations and dimension drawings

③

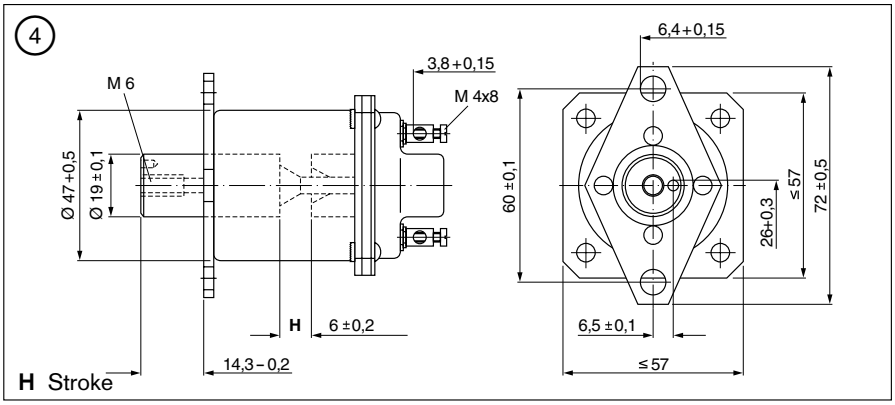
③



H Stroke

④

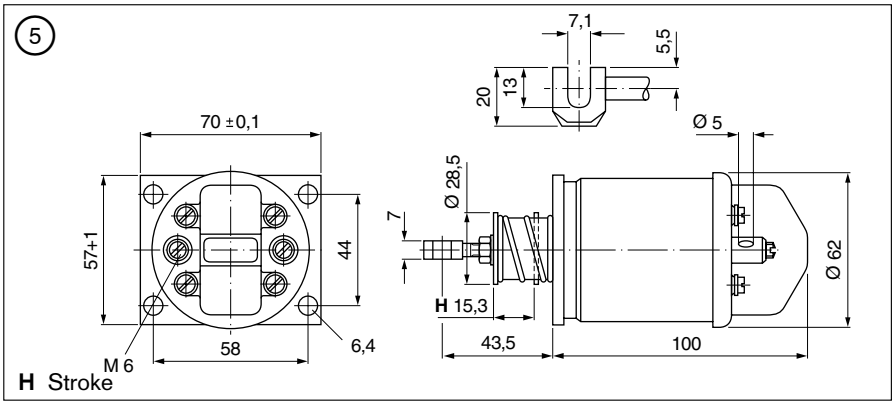
④



H Stroke

⑤

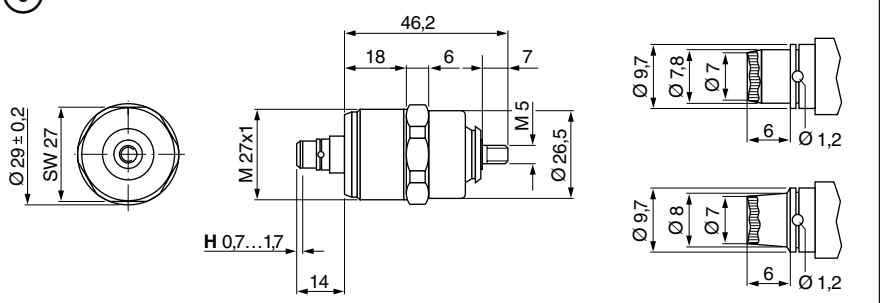
⑤



H Stroke

⑥

⑥



H Stroke
SW Width across flats

Tractive electromagnets (continued)
Pulling electromagnets 24 V for electromagnetic operation

Besides positioning applications, tractive electromagnets may also be used in the following:
Ticket stamping/punching machines, guiding, locking, triggering, metering, ventilating, pushing, clamping, riveting, blocking, etc.

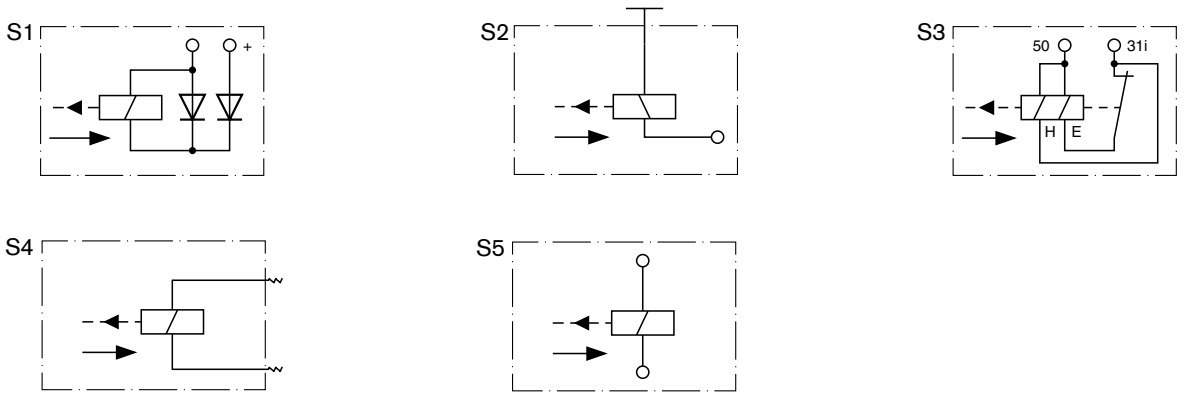
Product overview

Nominal voltage V	Working stroke mm	Nominal wattage [1] W	Operating mode [2]	Forces Working stroke [3] N	With armature pulled in [3] N	Return spring N	Illustr./ dimens. drawing	Circuit diagram	Weight kg	Part number
24	1.8	14	Contin. duty	≥ 16	≥ 26	7.8 ±1	1	S1	0.32	**0 330 005 002**
	1.3	max. 21	Contin. duty	≥ 8	≥ 11	2.3 ±0.5	2	S2	0.076	**0 330 001 047**
	1.3	14	Contin. duty	13	15	2.3 ±0.5	*	S2	0.103	**0 330 001 021**
	1.3	max. 21	Contin. duty	≥ 8	≥ 11	2.2	3	S4	0.094	**0 330 001 048**
	4	75	Short-time duty	≥ 14	≥ 70	4 ±1	4	S5	0.11	**0 330 001 003**
	6	50	Short-time duty	≥ 24	≥ 80	4 ±1	5	S5	0.44	**0 330 004 005**
	15.3	274	Short-time duty	≥ 95	≥ 250	4.5 ±0.5	6	S5	1.11	**0 330 003 001**
	15.3	695/18 [4]	Contin. duty	≥ 55	≥ 350	5 ±1	6	S3	1.18	**0 330 003 003**

[1] With armature pulled in.
[2] Short-time duty, after 45 sec. of operation there should be a break of 4.5 min.
[3] At nominal voltage and winding temperature 23 ±5 °C.
[4] Pull-in winding/hold-in winding

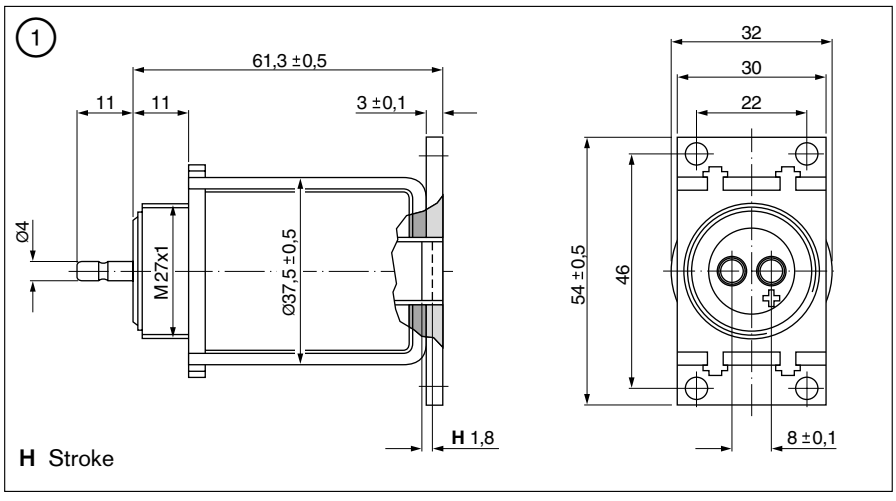
* see figure 6, page 25

Circuit diagrams



E Pull-in winding **H** Hold-in winding

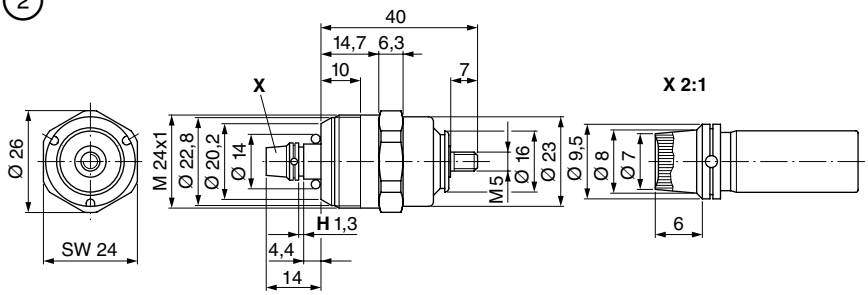
Illustrations and dimension drawings



H Stroke

2

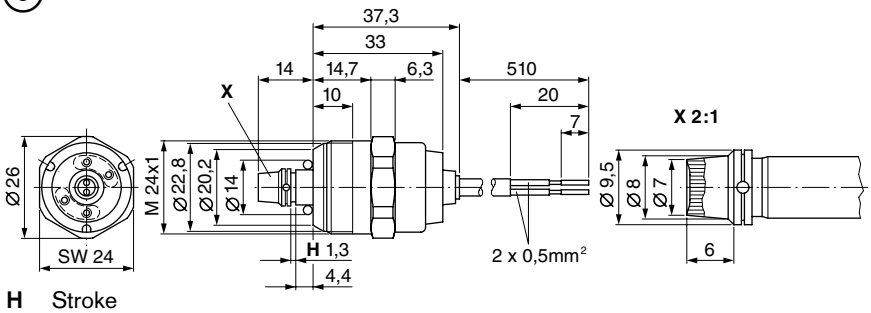
2



H Stroke
SW Width across flats

3

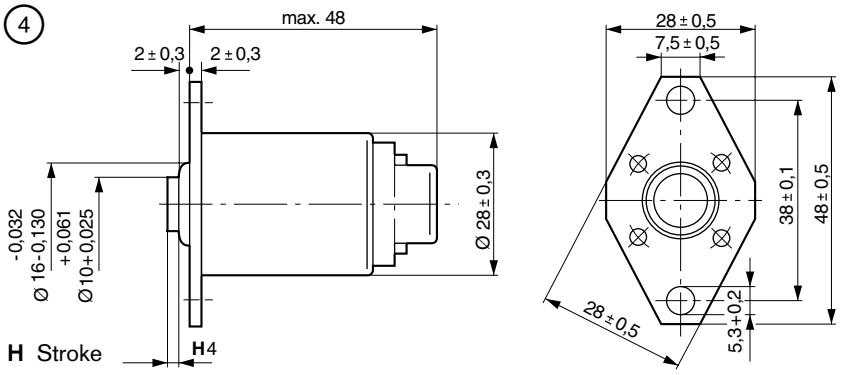
3



H Stroke
SW Width across flats

4

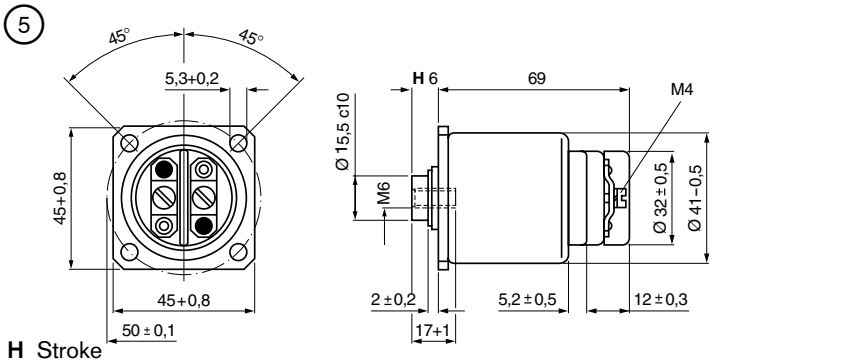
4



H Stroke

5

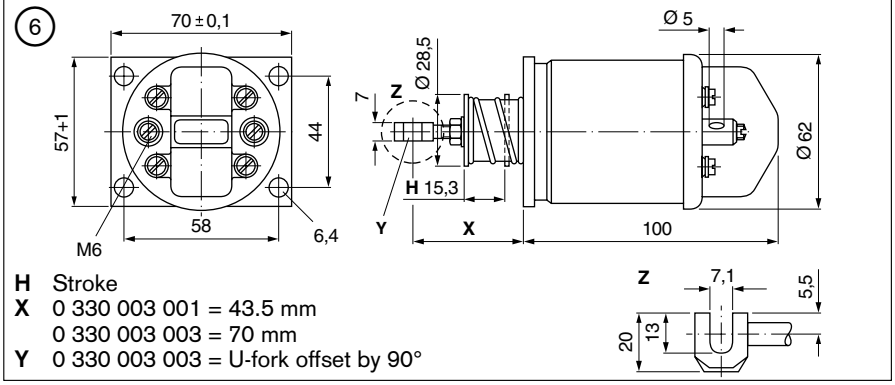
5



H Stroke

6

6



H Stroke
X 0 330 003 001 = 43.5 mm
0 330 003 003 = 70 mm
Y 0 330 003 003 = U-fork offset by 90°

Tractive electromagnets (continued)
Pushing electromagnets 12 V / 24 V for electromagnetic operation

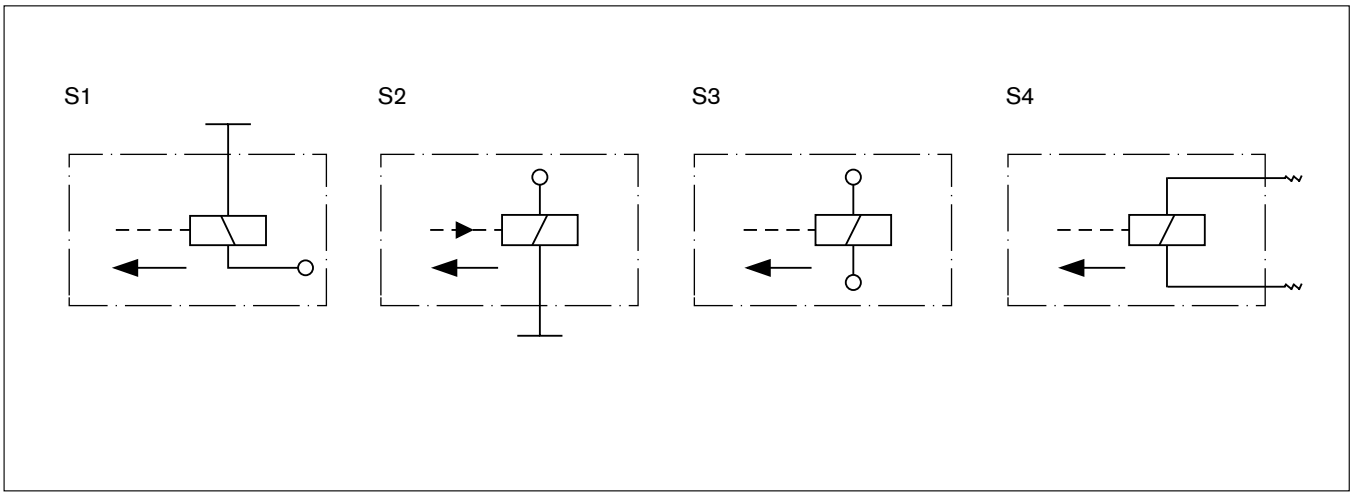
Besides positioning applications, tractive electromagnets may also be used in the following:
Ticket stamping/punching machines, guiding, locking, triggering, metering, ventilating, pushing, clamping, riveting, blocking, etc.

Programmübersicht

Nominal voltage V	Working stroke mm	Nominal wattage [1] W	Operating mode [2]	Forces Working stroke [3] N	With armature pulled in [3] N	Return spring N	Illustr./ dimens. drawing	Circuit diagram	Weight kg	Part number
12	1	32	Short-time duty	≥ 12	≥ 12	–	2	S1	0.088	**0 330 106 010**
	2.6	42.5	Short-time duty	≥ 20	≥ 30	–	1	S1	0.19	**0 330 106 006**
	3	42.5	Short-time duty	≥ 12	≥ 60	0.9 ±0.2	4	S2	0.14	**0 330 106 001**
	6.5	137	Short-time duty	≥ 50	≥ 120	–	5	S3	0.4	**0 330 101 022**
	7	137	Short-time duty	≥ 50	≥ 120	–	6	S1	0.4	**0 330 101 012**
24	1	26	Short-time duty	≥ 11	≥ 11	–	2	S1	0.088	**0 330 106 012**
	1	26	Short-time duty	≥ 11	≥ 11	–	3	S4	0.094	**0 330 106 017**
	3	48	Short-time duty	≥ 12	≥ 60	0.9 ±0.2	4	S2	0.14	**0 330 106 003**
	4.8	26.7	Short-time duty	≥ 32	≥ 100	–	5	S3	0.6	**0 330 100 022**
	7	152	Short-time duty	≥ 50	≥ 120	–	5	S3	0.4	**0 330 101 026**

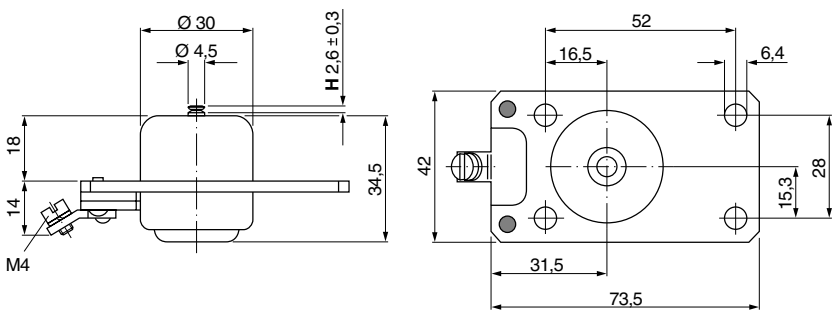
[1]) With armature pulled in.
[2]) Short-time duty, after 45 sec. of operation there should be a break of 4.5 min.
[3]) At nominal voltage and winding temperature 23 ±5 °C.

Circuit diagrams



Illustrations and dimension drawings

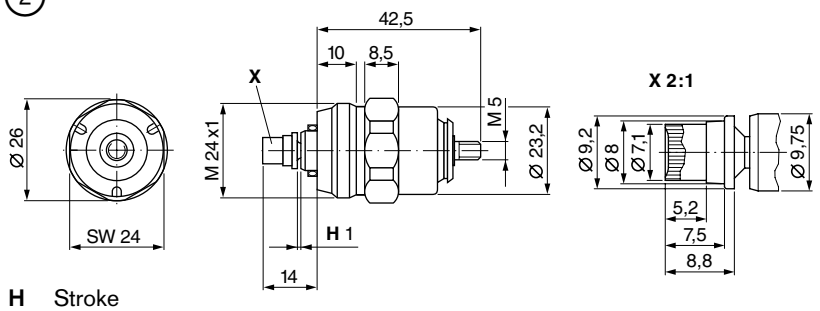
① 

① 

H Stroke

2

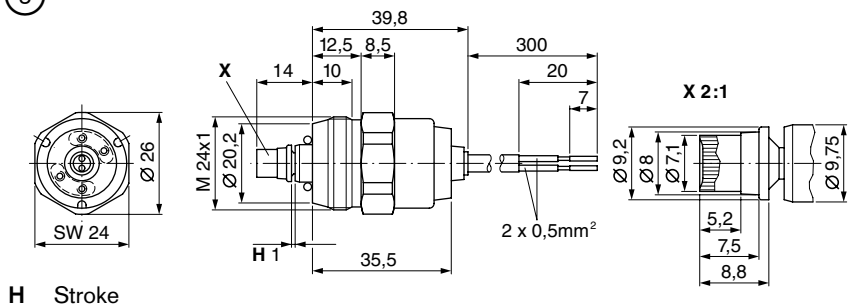
2



H Stroke
SW Width across flats

3

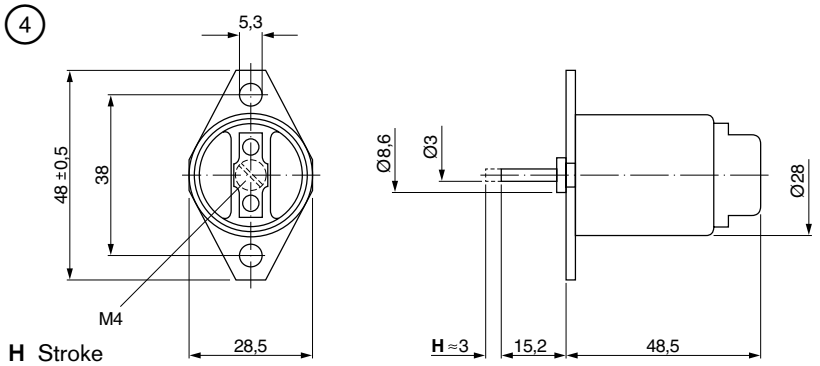
3



H Stroke
SW Width across flats

4

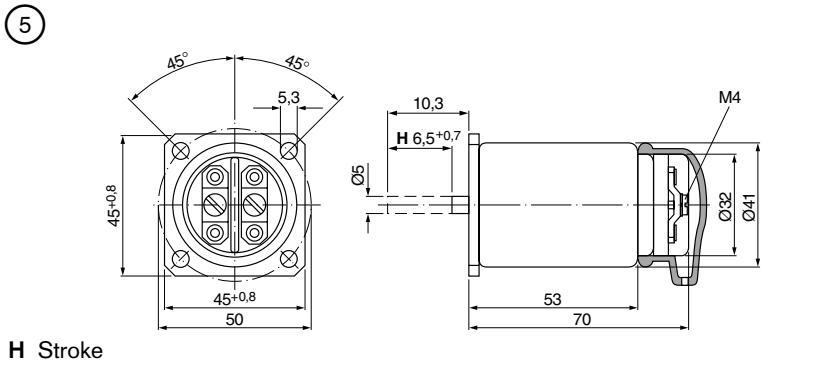
4



H Stroke

5

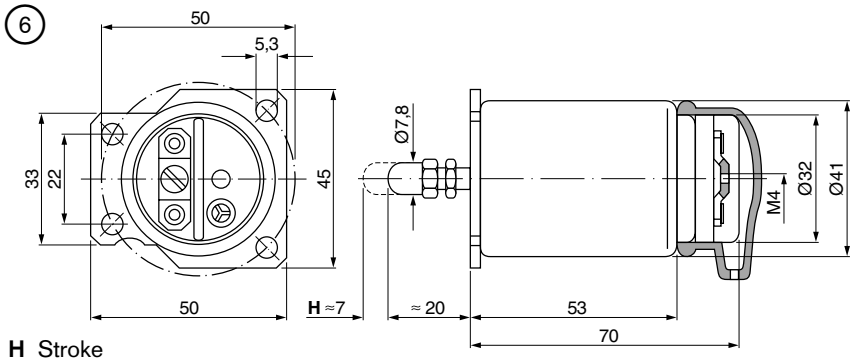
5



H Stroke

6

6



H Stroke

Industry sales

Contacts

Austria

Robert Bosch AG
Abteilung VAA
Geiereckstraße 6
A-1110 Wien

Phone +43 [0]1 / 7 97 22-0
Fax +43 [0]1 / 7 97 22-10 96

e-m@il: helmut.stuphann@at.bosch.com

Belgium

Robert Bosch NV SA
Afdeling EA/Département EA
Rue Henri Genessestraat 1
B-1070 BRUSSEL/BRUXELLES

Phone +32 [0]2 / 5 25-53 60
Fax +32 [0]2 / 5 25-52 62

e-m@il: bosch.elektromotoren@be.bosch.com

Denmark

Robert Bosch A/S
Telegrafvej 1
DK-2750 Ballerup

Phone +45 44 89 83 20
Fax +45 44 89 86 80

e-m@il: mortenh.jensen@dk.bosch.com

Finland

Robert Bosch Oy
Ensiasennustuotteet
PL44 (Tekniikantie 4 A)
FIN-02151 Espoo

Phone +358 [0]9-43 59 92 78
Fax +358 [0]9-43 59 92 70

e-m@il: ensiasennus@fi.bosch.com

France

Robert Bosch (France) S.A.
Sales Pièces de Rechange – Ventes Industrielles (AA/SPR4-So)
32, Av. Michelet – BP 170
F – 93404 Saint-Ouen Cedex (France)

Phone +33 [0]1 / 40 10-76 90
Fax +33 [0]1 / 40 10-73 08

e-m@il: patrick.landes@fr.bosch.com

Germany

Robert Bosch GmbH
Abteilung AA/PKN
Postfach 41 09 60
D-76227 Karlsruhe

Phone +49 [0]7 21 / 9 42-26 21
Fax +49 [0]7 21 / 9 42-25 20

e-m@il: aapkn.mailbox@de.bosch.com

Great Britain

Robert Bosch Ltd.
Department RBGB/SAA/PKN
P.O. Box 98
Uxbridge, UB9 5HN

Phone +44 [0]18 95 83 – 83 71
Fax +44 [0]18 95 83 – 83 32

e-m@il: justin.deary@uk.bosch.com

Israel

Ledico Ltd.
Automation Technology
Mr. Adi Tasman
P.O. Box 1746
IL-58117 Holon

Phone 9 72-3-6 50 40 00
Fax 9 72-3-6 50 40 55

e-m@il: tasman@ledico.com
Internet: www.ledico.com

Italy

Robert Bosch S.p.A.
RBIT/CRV-Ricambi per Veicoli
Via M. A. Colonna 35
I-20149 Milano

Phone +39 02 36 96-3 60
Fax +39 02 36 96-4 23

e-m@il: Carmelo.Perrone@it.bosch.com

Netherlands

Robert Bosch B.V.
Afdeling EA
Postbus 502
NL-2130 AM Hoofddorp

Phone +31 [0] 23-56 56 8 75
Fax +31 [0] 23-56 56 8 70

e-m@il: bosch.elektromotoren@nl.bosch.com

Norway

Robert Bosch AS
Postboks 629
N-1411 Kolbotn

Phone +47-66 81 71 58
Fax +47-66 81 71 86

e-m@il: fabrikkhandel@no.bosch.com

Spain

Robert Bosch España, S.A.
RBSP/VAC2 – Juan Benayas
Hnos. García Noblejas, 19
E-28037 Madrid

Phone +34 91 3 27 96 59
Fax +34 91 3 27 98 58

e-m@il: Juan.Benayas@es.bosch.com

Sweden

Robert Bosch Aktiebolag
Industriförsäljning
Box 1154
SE-164 26 Kista

Phone +46 [0]8 7 50 15 00
Fax +46 [0]8 7 50 15 60

e-m@il: industri@se.bosch.com
Internet: www.bosch.se

Switzerland

Robert Bosch AG
Abteilung EA
Industriestr. 31
CH-8112 Otelfingen

Phone +41 [0]1 8 47-15 30
Fax +41 [0]1 8 47-15 29

e-m@il:
verkauf.erstausruestung.kfz@ch.bosch.com

If you have any requirements beyond the scope of the relays offered in this catalog, please enter these in the data sheet below. In the event of modifications, please enter the known product here.

Bosch part number: ☐ ☐☐☐ ☐☐☐ ☐☐☐

Please make a photocopy of this data sheet and return the completed copy to us.

Address:

Robert Bosch GmbH
Abt. AA/PKN
Postfach 41 09 60

D-76225 Karlsruhe
Fax: 07 21/9 42-25 20

Sender (customer):

Your reference/letter of | Our dept./contact partner | Telephone (direct line) | Date

Project, application:

Basic sketch:

Technical data

Nominal voltage	☐ 6 V		☐ 12 V	☐ 24 V
Nominal current	___ A			
Type	☐ NO contact		☐ Changeover contact	☐ NC contact
Type of load	☐ Resistive load	☐ Inductive load	☐ Motor load	☐ Lamp load
Termination	☐ Blade-type terminal		☐ Screw-on version	☐ Soldered version
Service life	___ Switching cycles			
Switching rhythm	___ seconds on / ___ seconds off			
Ambient temperature	min. ___ °C / max. ___ °C			
Additional requirements Excitation coil damping	☐ None		☐ Resistance	☐ Diode

Installation conditions

Brief description:

Specifications available yes ☐ no ☐

Quantity required

☐ Once only Qty.

Desired delivery date

☐ Following quantities on given dates

Date						
Qty.						

☐ Yearly Qty. Monthly Qty.

☐ I would like more information