



FACTORY OF ELECTRIC APPARATUS

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Cantoni®
GROUP

ELECTROMAGNETIC DISC BRAKES
H2SP...AT SERIES
WITH CONSTANT BRAKING TORQUE
THEATRICAL VERSION



Spring actuated and electromagnetically released disk brake type H2SP ...AT forms a variation of H2SP brake. Designed for braking rotating machine parts and their precision positioning, in all applications where the drive is required to have limited level of noise. The specifics of this type of drive has made us draw up a brake version whose crucial units are so designed that the “quiet operation” requirement demanded by the user is fulfilled. Drives fitted with brake series H2SP ...AT can be used in objects where limited level of noise has huge significance, e.g. theatres, concert halls, etc. where, as stage equipment drives, they meet strict safety requirements. Brake design guarantees simple and problem-free installation. Various options of executions are at disposal with respect to fittings/accessories, brake supply, climatic conditions of utilization, enabling selection of appropriate option for definite utilization conditions.



They are designed for braking rotating parts of machines and their task is:

- ❖ emergency stopping, in order to ensure drive safety functions,
- ❖ immobilizing machine actuators, acting as a positioning device,
- ❖ minimizing run-on times of drives (to meet safety requirements according to Office of Technical Inspection (UDT) regulations,
- ❖ built onto an electric motor, the brake provides a self-braking motor, a drive unit meeting the requirements of utilisation safety and positioning.

Brakes can be manufactured in variants suitable for various direct-current voltages: 24V, 104V, 180V, 207V which allows them to be supplied from standard alternating current sources, through appropriate rectifier.

| Parameters | | Unit | Brake type | | | | | | | | | | | | | |
|---------------------|-----------------------------|------------|-------------------|---|--------------|--------------|--------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|-----|
| | | | H2SP 56AT | H2SP 63AT | H2SP 71AT | H2SP 80AT | H2SP 90AT | H2SP 100AT | H2SP 112AT | H2SP 132AT | H2SP 160AT | H2SP 180AT | H2SP 200AT | H2SP 280AT | H2SP 315AT | |
| Supply voltage | U_n | [V] | 24, 104, 180, 207 | | | | | | | | | | | | 24, 104, 180 | |
| Power | P_{20° | [W] | 16 | 20 | 25 | 30 | 30 | 40 | 50 | 55 | 65 | 75 | 100 | 250 | 340 | |
| Braking torque | M_h | [Nm] | 4 | 4 | 8 | 16 | 20 | 32 | 60 | 100 | 150 | 240 | 500 | 1000 | 1600 | |
| Max. speed | n_{max} | min^{-1} | 3000 | | | | | | | | | | | | | |
| Weight | G | [kg] | 0,5 | 0,7 | 1,8 | 3,2 | 3,2 | 6,6 | 7,5 | 11,2 | 17,0 | 24,8 | 29,0 | 80,0 | 120 | |
| Ambient temperature | T | $^\circ C$ | -25 ÷ +40 | | | | | | | | | | | | | |
| Operating time * | On direct voltage side | $t_{0,1}$ | ms | 20 | 35 | 65 | 90 | 90 | 120 | 150 | 180 | 300 | 400 | 500 | 500 | 600 |
| | | $t_{0,9}$ | | 10 | 17 | 35 | 40 | 40 | 50 | 65 | 90 | 110 | 200 | 270 | 300 | 500 |
| | On alternating voltage side | $t_{0,1}$ | ms | 20 | 35 | 65 | 90 | 90 | 120 | 150 | 180 | 300 | 400 | 500 | 500 | 600 |
| | | $t_{0,9}$ | | Brake disconnection on alternating current side causes about five-times growth in braking time $t_{0,9}$ with respect to disconnection on direct current side | | | | | | | | | | | | |

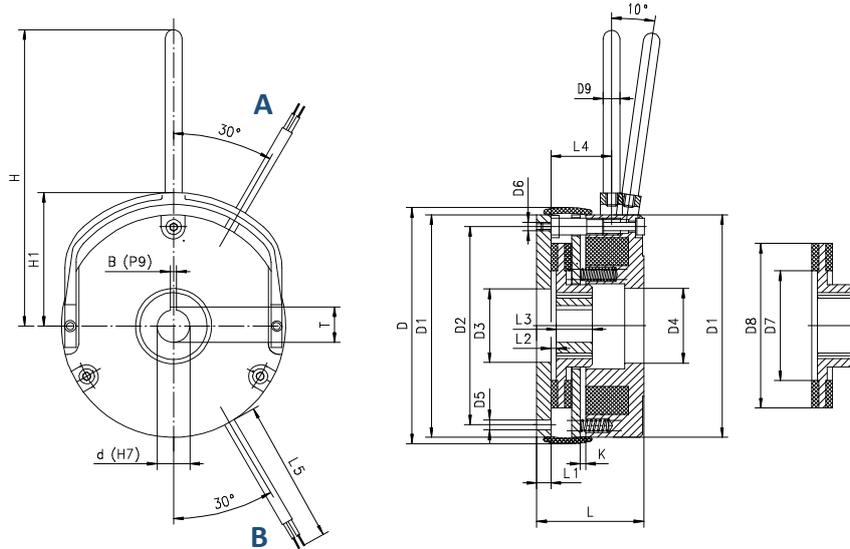
$t_{0,1}$ - releasing time (from switching on current to drop in braking torque to 10% M_{nom})

$t_{0,9}$ - braking time (from switching off current to attaining 90% M_{nom})

*) Values of releasing and braking times are given as approximations, since they depend on mode of assembly/installation, temperature and power supply.

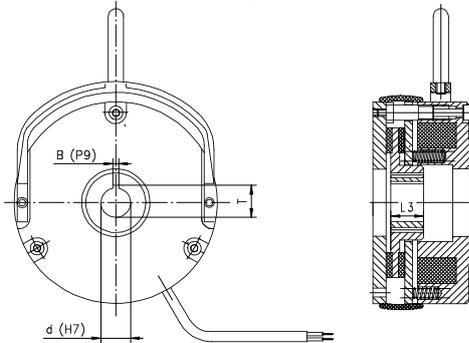
Cable output:

A – H2SP56AT, H2SP100AT, H2SP112AT, H2SP132AT, H2SP160AT, H2SP180AT, H2SP280AT, H2SP315AT
 B – H2SP63AT, H2SP71AT, H2SP80AT, H2SP90AT, H2SP200AT

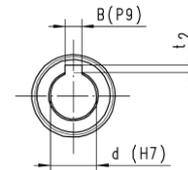


| Type | M _h [Nm] | D | D1 | D2 | D3 | D4 | D5 | D6 | D7 | D8 | D9 | L | L1 | L2 | L3 | L4 | L5 | L6 | L7 | K | H | H1 |
|-----------|------------------------|-----|-----|-----|-----|-------|-------|-------|-----|-----|----|-----|------|-----|----|------|------|------|-----|-----|-----|-----|
| H2SP56AT | 4 | 83 | 74 | 62 | 25 | 13 | 4,3x3 | M4x3 | 30 | 50 | 6 | 40 | 6 | 0,5 | 18 | 23 | 450 | 6,7 | 1,0 | 0,2 | 90 | 46 |
| H2SP63AT | 4 | 91 | 84 | 72 | 25 | 23,4 | 4,5x3 | M4x3 | 47 | 62 | 8 | 41 | 6 | 0,5 | 18 | 24 | 450 | 6,7 | 1,0 | 0,2 | 100 | 51 |
| H2SP71AT | 8 | 110 | 102 | 90 | 30 | 30,4 | 5,5x3 | M5x3 | 59 | 76 | 8 | 48 | 7 | 1,8 | 20 | 29 | 450 | 6,7 | 1,0 | 0,2 | 115 | 61 |
| H2SP80AT | 16 | 133 | 125 | 112 | 44 | 40,4 | 6,4x3 | M6x3 | 61 | 95 | 10 | 58 | 9 | 3,5 | 20 | 37 | 450 | 9,0 | 1,0 | 0,2 | 170 | 73 |
| H2SP90AT | 20 | 133 | 125 | 112 | 44 | 40,4 | 6,4x3 | M6x3 | 61 | 95 | 10 | 58 | 9 | 3,5 | 20 | 37 | 450 | 9,0 | 1,0 | 0,2 | 170 | 73 |
| H2SP100AT | 32 | 156 | 148 | 132 | 45 | 48,4 | 6,4x3 | M6x3 | 74 | 114 | 10 | 66 | 9 | 3 | 25 | 40,5 | 450 | 9,0 | 1,0 | 0,3 | 184 | 94 |
| H2SP112AT | 60 | 170 | 162 | 145 | 55 | 58,3 | 8,4x3 | M8x3 | 90 | 124 | 12 | 76 | 11 | 3 | 30 | 41,5 | 450 | 9,0 | 2,0 | 0,3 | 191 | 102 |
| H2SP132AT | 100 | 196 | 188 | 170 | 84 | 66,4 | 8,4x3 | M8x3 | 100 | 154 | 12 | 83 | 11 | 3 | 30 | 43,5 | 450 | 9,0 | 2,0 | 0,3 | 204 | 116 |
| H2SP160AT | 150 | 223 | 215 | 196 | 104 | 82,8 | 9,0x4 | M8x6 | 130 | 176 | 12 | 91 | 11 | 3 | 35 | 51 | 450 | 11,0 | 2,0 | 0,3 | 230 | 129 |
| H2SP180AT | 240 | 262 | 252 | 230 | 134 | 87,8 | 11x6 | M10x6 | 148 | 207 | 14 | 110 | 11 | 3 | 40 | 68 | 800 | 11,0 | 2,0 | 0,5 | 339 | 157 |
| H2SP200AT | 500 | 314 | 302 | 278 | 120 | 132,8 | 11x6 | M10x6 | 198 | 255 | 14 | 122 | 12,5 | 4,5 | 50 | 82 | 800 | 11,0 | 2,0 | 0,5 | 466 | 182 |
| H2SP280AT | 1000 | 356 | 342 | 308 | 150 | 150,0 | 13x6 | M12x6 | 200 | 270 | 20 | 157 | 25 | 0 | 70 | 90 | 1500 | 11,0 | 3,0 | 0,6 | 408 | 206 |
| H2SP315AT | 1600 | 412 | 400 | 360 | 170 | 170,0 | 13x6 | M12x6 | 210 | 300 | 20 | 171 | 25 | 0 | 80 | 98 | 1500 | 13,5 | 3,0 | 0,6 | 434 | 232 |

Geared bushing hole diameters



Normalized hole diameter ranges



| Type | d | B | T | d _{max} | d _{smax} * | L3 |
|-----------|------|----|------|------------------|---------------------|----|
| H2SP56AT | 11 | 4 | 12,8 | 11 | | 18 |
| H2SP63AT | 15 | 5 | 17,3 | 15 | | 18 |
| H2SP71AT | 15 | 5 | 17,3 | 15 | | 20 |
| H2SP80AT | 19 | 6 | 21,8 | 25 | | 20 |
| H2SP90AT | 19 | 6 | 21,8 | 25 | | 20 |
| H2SP100AT | 25 | 8 | 28,3 | 25 | | 25 |
| H2SP112AT | 25 | 8 | 28,3 | 35** | | 30 |
| H2SP132AT | 35** | 8 | 38,3 | 35** | | 30 |
| H2SP160AT | 40 | 12 | 43,3 | 45 | 50 | 35 |
| H2SP180AT | 42 | 12 | 45,3 | 45 | 50 | 40 |
| H2SP200AT | 42 | 12 | 45,3 | 45 | 75 | 50 |
| H2SP280AT | 55 | 16 | 59,3 | 75 | | 70 |
| H2SP315AT | 70 | 20 | 74,9 | 100 | | 80 |

| Hole diameter [mm] | B | t ₂ |
|--------------------|----|----------------|
| above - to | | |
| 10 - 12 | 4 | 1,8 |
| 12 - 17 | 5 | 2,3 |
| 17 - 22 | 6 | 2,8 |
| 22 - 30 | 8 | 3,3 |
| 30 - 38 | 10 | 3,3 |
| 38 - 44 | 12 | 3,3 |
| 44 - 50 | 14 | 3,8 |
| 50 - 58 | 16 | 4,3 |
| 58 - 65 | 18 | 4,4 |
| 65 - 75 | 20 | 4,9 |
| 75 - 85 | 22 | 5,4 |
| 85 - 95 | 25 | 5,4 |
| 95 -110 | 28 | 6,4 |

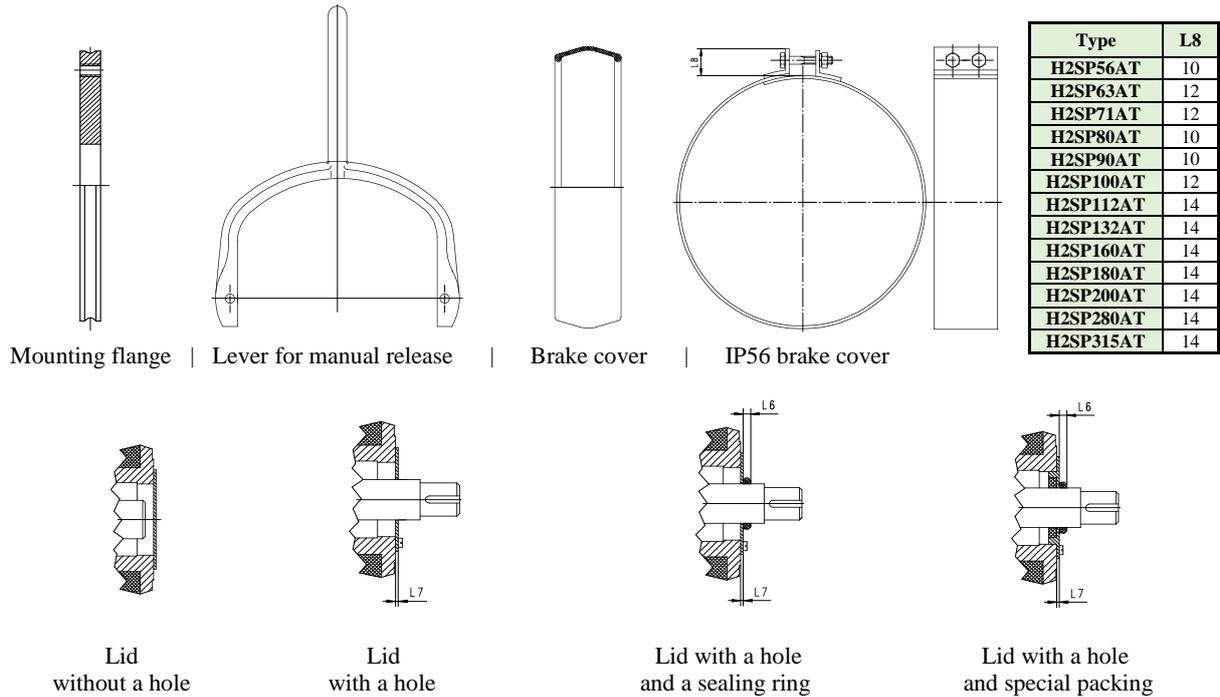
d - standard geared bushing hole diameters

d_{smax} - maximum geared bushing hole diameters

d*_{smax} - at extra charge it is possible to manufacture the brakes with the specially increased diameter of the gear hub

** - for the H2SP112AT and H2SP132AT brakes and for the geared bushing hole diameters from 32 to 35mm, the key groove with the width of 8 mm (the width of the groove is incompatible with PN/M-85005 and DIN 6885 standards)

BEAKES EQUIPMENT



ELECTRICAL EQUIPMENT

A number of modules, ranging from simple circuits with classic designs, to complex assemblies ensuring quick action and drives positioning have been designed to drive the brakes. Relevant brake applications with switching in the primary or secondary circuits are ensured by half- or full-wave rectifiers and fast electronic circuits. The manufacturer recommends to use as low alternating current voltages as possible to supply the brakes. Appropriate choice of the control voltage will prevent or at least limit surges that may occur in power supply circuits. It is not recommended to use extensively long control wiring, which would be a source of harmful surges.

Rectifier B2-1P

The B2-1P rectifiers series forms a complete wave rectifier unit for direct installation. The terminal strip provided facilitates installation and connection to the circuit.

Rectifier B2-1P cooperates with brakes H2SP56AT ÷ H2SP200AT.

| RECTIFIER PARAMETERS | | | |
|--|-----------|---------------|---------------|
| | | B2-1P-400 | B2-1P-600 |
| Maximum input voltage (alternating voltage AC) | U_{IN} | 400 VAC | 600 VAC |
| Maximum output voltage (direct voltage DC) | U_{OUT} | $0,45 U_{IN}$ | $0,45 U_{IN}$ |
| Maximum continuous output current rectifier | I_{OUT} | 2A | 2A |

For example

Maximum input voltage (alternating voltage) - $U_{IN} = 230VAC$,

The resulting output voltage of the rectifier (direct voltage) - $0,45 U_{IN} = 0,45 \times 230 = 104VDC$

Rectifier B5-1P

The B5-1P rectifiers series forms a complete wave rectifier unit for direct installation. The terminal strip provided facilitates installation and connection to the circuit.

Rectifier B5-1P cooperates with brakes H2SP56AT ÷ H2SP315AT.

| RECTIFIER PARAMETERS | | | |
|--|-----------|---------------|---------------|
| | | B5-1P-400 | B5-1P-600 |
| Maximum input voltage (alternating voltage AC) | U_{IN} | 400 VAC | 600 VAC |
| Maximum output voltage (direct voltage DC) | U_{OUT} | $0,45 U_{IN}$ | $0,45 U_{IN}$ |
| Maximum continuous output current rectifier | I_{OUT} | 5A | 5A |

For example

Maximum input voltage (alternating voltage) - $U_{IN} = 230VAC$,

The resulting output voltage of the rectifier (direct voltage) - $0,45 U_{IN} = 0,45 \times 230 = 104VDC$

Rectifier B2-2P

The B2-2P rectifiers series forms a complete full-wave rectifier unit for direct installation. The terminal strip provided facilitates installation and connection to the circuit. The rectifier allows feeding input voltage max. 400VAC, 2A which after rectification provides DC voltage of value equal to 0,9 input voltage.

Rectifier B2-2P cooperates with brakes H2SP56AT ÷ H2SP200AT.

| RECTIFIER PARAMETERS | | |
|--|-----------|-------------|
| Maximum input voltage (alternating voltage AC) | U_{IN} | 250 VAC |
| Maximum output voltage (direct voltage DC) | U_{OUT} | $0,9U_{IN}$ |
| Maximum continuous output current rectifier | I_{OUT} | 2A |

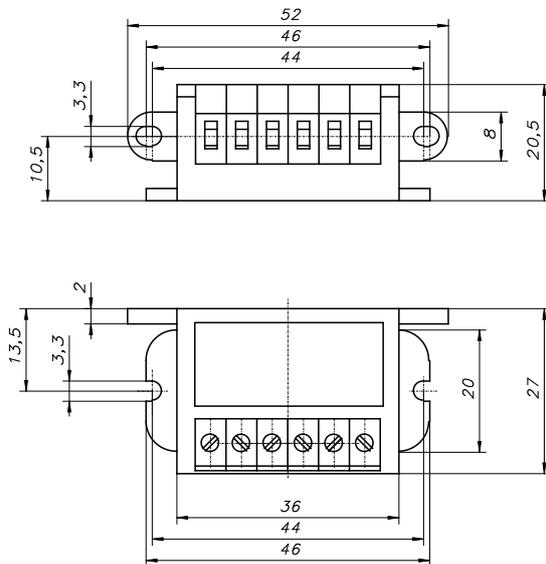
For example

Maximum input voltage (alternating voltage) - $U_{IN} = 230VAC$,

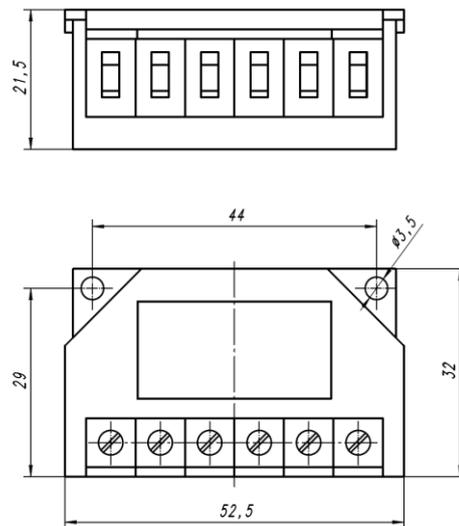
The resulting output voltage of the rectifier (direct voltage) - $0,9U_{IN} = 0,9 \times 230 = 207VDC$

Rectifiers dimensions

**B2-1P-400,
B5-1P-400,
B2-2P**

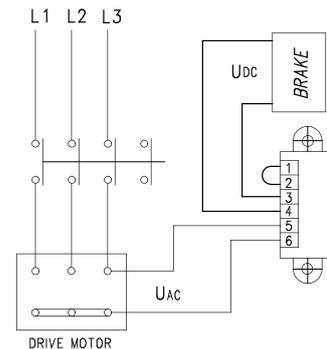


**B2-1P-600,
B5-1P-600**



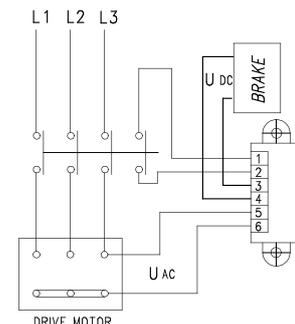
Disconnection of power supply on AC side

The diagram presents connection of rectifiers to supply circuit of motor. When disconnecting the voltage, the magnetic field causes the coil current to flow further through the rectifying diodes and drops slowly. The magnetic field reduces gradually causing prolonged time of braking action and consequently delayed increase of braking torque. If action time is irrelevant, brake should be connected on the AC side. When switching off, the supply circuits act as rectifying diodes.



Disconnection of power supply on DC side

The diagram presents connection of rectifiers into electric motor circuit. The coil current is interrupted between the coil and supply (rectifier) circuit. The magnetic field reduces very quickly, **giving short time of braking action and consequently rapid growth of braking torque.** When switching off on DC voltage side, a high peak voltage is generated in the coil causing faster wear of contacts due to sparking. For protecting the coil against peak voltages and protecting the contacts against excessive wear, the rectifier circuit is provided with protective facility allowing brake connection on DC voltage side.



Rectifier PS-1

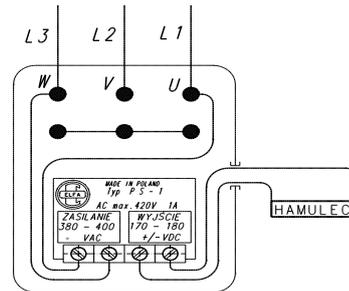
Circuit PS-1 is built on the basis of MOSFET type semiconductor technique which enabled achieving effects not available in traditional designs. The brake electromagnet energized through circuit of this construction enables the brake to achieve connection and disconnection time parameters analogous to breaking of circuit on direct current side. The parameters obtained are not however gained through utilization of additional electrical circuits and switches.

Simplicity of installation and parameters achieved enable very wide application, particularly in cases requiring positioning of drives, operation with high frequency of actuations compounded with repeatability of brake connecting and disconnecting times.

Supply circuit PS-1 forms a complete unit for direct installation. Provided with a four-terminal strip, it enables unhindered adaptation in every cooperating circuit. The circuit is adapted for supply from alternating current source of 380-400 VAC max. 420 VAC which after rectification and appropriate formation enables obtaining direct voltage of 170-180 VDC for brake supply.

The diagram below shows the method of connecting the circuit PS 1 into supply circuit of brake cooperating with 3x400 VAC electric motor with star-connected winding.

[Rectifier PS-1 cooperates with brakes H2SP56AT ÷ H2SP180AT.](#)



Rectifier PS-2

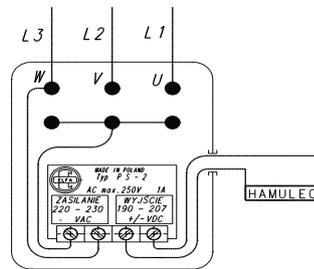
Circuit PS-2 is built on the basis of MOSFET type semiconductor technique which enabled achieving effects not available in traditional designs. The brake electromagnet energized through circuit of this construction enables the brake to achieve connection and disconnection time parameters analogous to breaking of circuit on direct current side. The parameters obtained are not however gained through utilization of additional electrical circuits and switches.

Simplicity of installation and parameters achieved enable very wide application, particularly in cases requiring positioning of drives, operation with high frequency of actuations compounded with repeatability of brake connecting and disconnecting times.

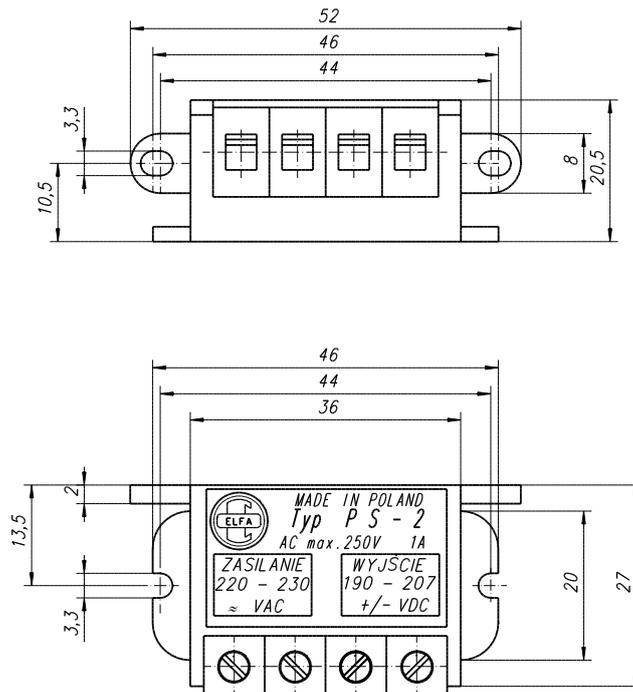
Supply circuit PS 2 forms a complete unit for direct installation. Provided with a four-terminal strip, it enables unhindered adaptation in every cooperating circuit. The circuit is adapted for supply from alternating current source of 220-230 VAC max. 250 VAC which after rectification and appropriate formation enables obtaining direct voltage of 190-207 VDC for brake supply.

The diagram below shows the method of connecting the circuit PS 2 into supply circuit of brake cooperating with 3x400 VAC electric motor with star-connected winding.

[Rectifier PS-2 cooperates with brakes H2SP56AT ÷ H2SP200AT.](#)



Rectifiers PS-1, PS-2 dimensions

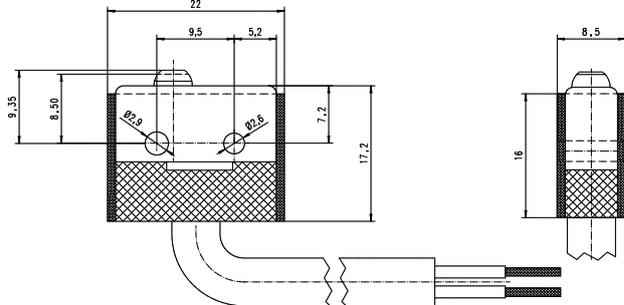


CONTROL AND SIGNALING CIRCUITS – microswitches

Having in mind the user who requires the control of the brake, we have designed special signaling and control circuits, which enable to control the state of the brake (engaged, disengaged) and the wear of the plate lining. The usage of these circuits enables to control the brake with the use of automatic elements, which ensure high level of safety and reliability. Due to its compact design, the microswitch can be used in any other applications, as long as its parameters meet design requirements.

| MICROSWITCHES - ELECTRIC PARAMETERS | | |
|-------------------------------------|---------------------|--|
| Switch parameter | Switch KZ | Switch KO |
| Max. voltage AC | 250 V AC | 250 V AC |
| Max. AC switching current | 5 A | 6 A |
| Max. Voltage DC | 28V DC | 220V DC |
| Max. DC switching current | 3 A / 28V DC | 6A / 12V DC 3A / 24V DC 1A / 60V DC 0,5A / 110V DC 0,25A / 220V DC |
| Protection rating | IP 66 | IP 66 |
| Terminals | NO /NC | NO /NC |

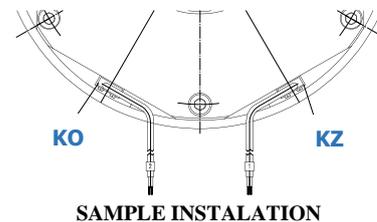
MICROSWITCH DIMENSIONS



Response monitoring microswitch – KZ – control of the state of brake (engaged, disengaged),

Microswitch of the brake lining control – KO – the microswitch indicates approaching the maximum wear of the brake disc and the necessity of the brake's regulation or replacement of the disc brake, which enables further work of the brake. The regulation procedure is described in the brake operating manual.

Response monitoring microswitch and microswitch of the brake lining control – KZ+KO



Microswitches set **KZ+KO** is available from type H2SP80AT inclusive.

PROTECTIVE CIRCUITS – thermal protection

To protect electromagnet windings against heat build-up (slow-changing overloads) thermal sensor are used. In our offer we have PTC thermistors, which feature high resistance gradients when their rated temperature is reached - posistors - P or bimetallic thermal sensor - B.

Posistor-based sensors are made in the form of an insulated pill with connecting wires extending inside a teflon insulation, installed directly on the electromagnet windings. Sensor circuit terminals are routed outside the brake to the terminal box and connected to a separate connection block or terminal strip. So-called resistance relays are intended for thermistor-based PTC temperature sensors. When temperature of at least one of the sensors rises above the rated value, the circuit resistance suddenly increases triggering the relay.

Posistor thermal protection – P

Note! PTC sensor terminals must not be connected directly to the contactor.

The brake protection has the form of a bimetallic sensor. Brake operation is controlled by a sensor or by a set of sensors, which ensure its safe operation; excessive temperature indication is obtained from the thermal switch installed inside the brake electromagnet's housing rated for a specific temperature. When the limit temperature for the sensor is exceeded, the information for the automatic control equipment is sent or the brake circuit is disconnected.

Bimetallic thermal protection – B

H2SP

AT .

VDC

Nm

d

...

MECHANICAL SIZE

56,63,71,80,90,100,112,132,
160,180,200,280,315

CONFIGURATION

| | |
|--|---|
| WITHOUT FITTING / ACCESORIES | 1 |
| LEVER FOR MANUAL RELEASE | 2 |
| MOUNTING FLANGE | 3 |
| LEVER FOR MANUAL RELEASE + MOUNTING FLANGE | 4 |

Execution options for the customer's request:

- non-standard diameter of the sleeve gear brake d(H7)
- posistor thermal protection - **P**
- bimetallic thermal protection - **B**
- other voltage brake
- response monitoring microswitch (engaged, disengaged) - **KZ**
- microswitch of the brake lining control - **KO**
- microswitches set - **KZ+KO**
- increased durability of the brake, the brake is guaranteed lifetime 10×10^6 cycles - brake design allows for long-term and reliable operation H2SP56AT – H2SP90AT - **T**

EXAMPLE:

H2SP 100. 10. 104VDC 32Nm d25 GR110V
 H2SP 80. 32. 180VDC 12Nm d19 T
 H2SP 112. 22. 24VDC 60Nm d25 KZ+KO

DIAMETER OF SLEEVE GEAR d(H7)

CLIMATIC VERSION

ACCORDING TO STANDARDS: e.g. MT, TH

NOMINAL BRAKING TORQUE [Nm]

| H2SP 56AT | H2SP 63AT | H2SP 71AT | H2SP 80AT | H2SP 90AT | H2SP 100AT | H2SP 112AT | H2SP 132AT | H2SP 160AT | H2SP 180AT | H2SP 200AT | H2SP 280AT | H2SP 315AT |
|-----------|-----------|-----------|-----------|-----------|------------|------------|------------|------------|------------|------------|------------|------------|
| | | 8 | 16 | 20 | 32 | 60 | 100 | 150 | 240 | 500 | 1000 | 1600 |
| 4 | 4 | 6 | 12 | 16 | 24 | 45 | 80 | 120 | 180 | 360 | 900 | 1300 |
| | | 3 | 5 | 12 | 16 | 30 | 60 | 75 | 120 | 270 | 700 | 1050 |
| | | | | 5 | | | | | | | 600 | |

OPERATING VOLTAGE [V DC]

24, 104, 180, 207

PROTECTION RATING

| | |
|---|---|
| BASIC VERSION – WITH HOLE D4 | 0 |
| VERSION IP 54 - WITHOUT HOLE D4 | 1 |
| VERSION IP 54 - WITH HOLE D4 + V-RING SEALING | 2 |
| VERSION IP 55 - WITHOUT HOLE D4 | 3 |
| VERSION IP 55 - WITH HOLE D4 + V-RING SEALING | 4 |
| VERSION IP 56 - WITHOUT HOLE D4 + IP56 BRAKE COVER | 5 |
| VERSION IP 56 – WITH HOLE D4 + SPECIAL SEALING + IP56 BRAKE COVER | 6 |

The producer reserves the right to modify as a result of developing the product.
 It is possible to realize special versions.