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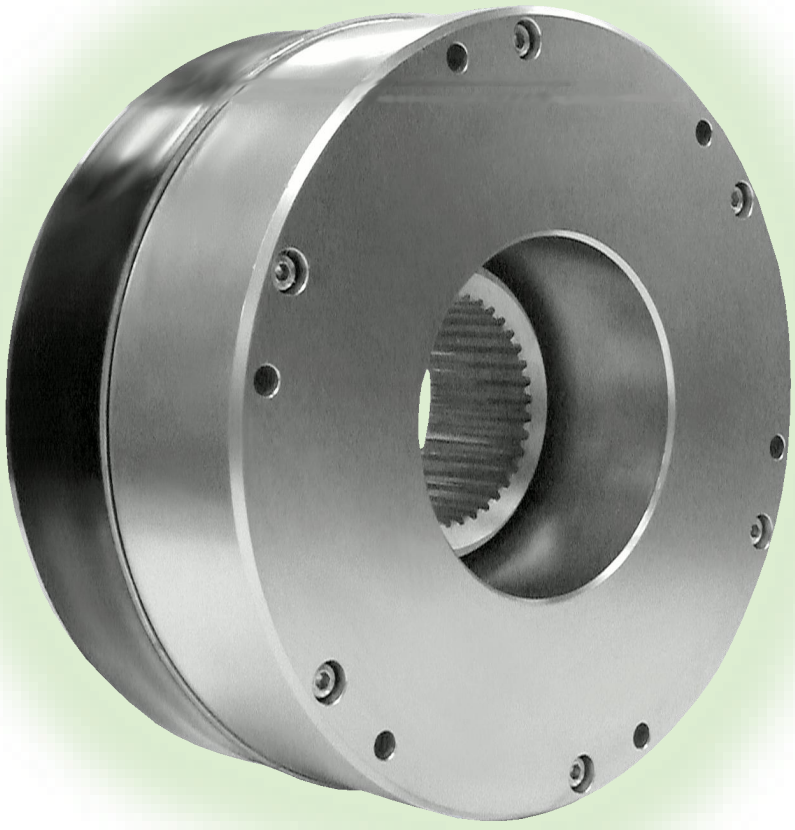
ELECTROMAGNETIC DISC BRAKES

HSAX, HSX(Y)

WITH CONSTANT BRAKING TORQUE



K-EN-HSAX-20151203

Spring actuated and electromagnetically released disk brake type HSAX and HSX(Y) powered by direct current. Designed for braking rotating machine parts and their precision positioning. Utilized as safety brake. High repeatability even with large number of actuations. The brake characterizes relatively simple construction, facility for regulating brake parameters such as braking torque, braking time and also possibility of supply from alternating current source after connecting up a rectifier circuit delivered at customer's request along with the brake. An additional feature is quiet operation, particularly important when the equipment is operated by a number of drives operating additionally with high frequency of actuations. 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 meed 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.

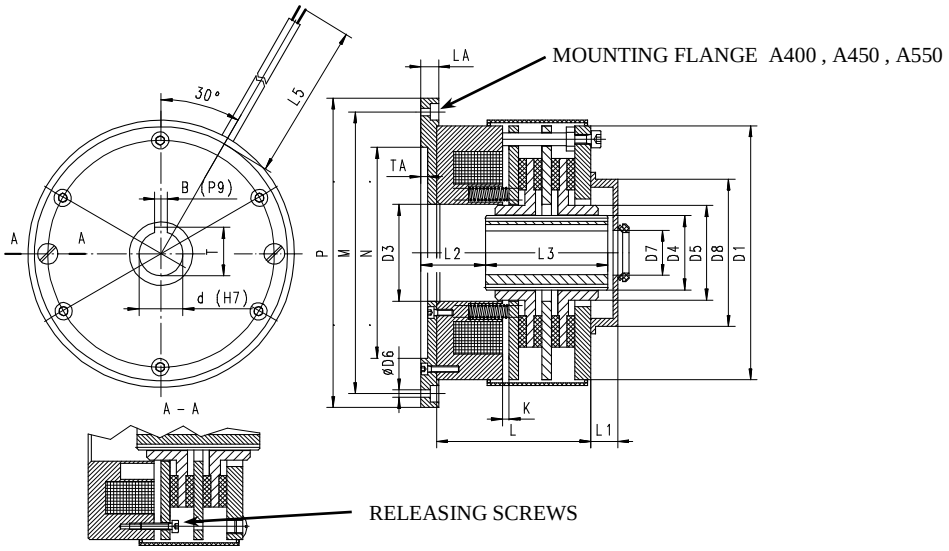
Brakes can be manufactured in variants suitable for various direct-current voltages: 104V, 180V which allows them to be supplied from standard alternating current sources, through appropriate rectifier.

Parameters			Unit	Brake type		
				HSAX630 HSX(Y)630	**HSAX1000 HSX(Y)1000**	**HSAX2500 HSX(Y)2500**
Supply voltage		U_n	V	104VDC , 180VDC		
Power		$P_{20°}$	W	100	250	340
Max. speed		n_{max}	min^{-1}	3000		
Braking torque				800	1500	2500
Weight		G	kg	60	100	145
Ambient temperature		T	^0C	-25 ÷ +40		
Operating time *	On direct voltage side	$t_{0,1}$	ms	500	600	890
		$t_{0,9}$		300	500	500
	On alternating voltage side	$t_{0,1}$	ms	500	600	890
		$t_{0,9}$		Brake disconnection on alternating current side causes about five-times growth in braking time t_{09} 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})

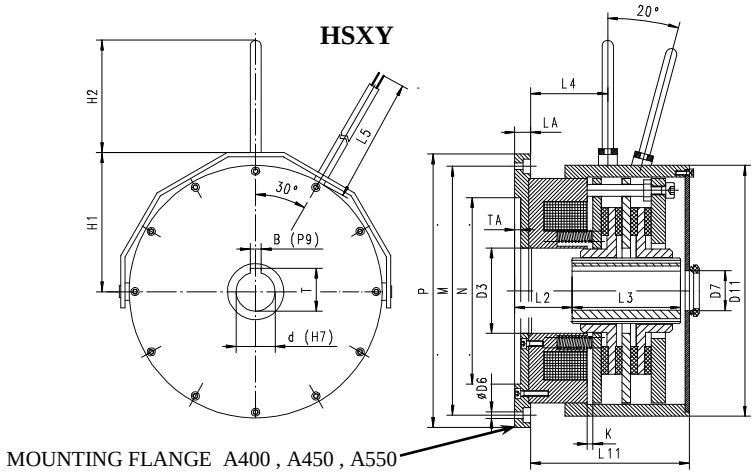
*) Values of releasing and braking times are given as approximations, since they depend on mode of assembly/installation, temperature and power supply.

HSAX



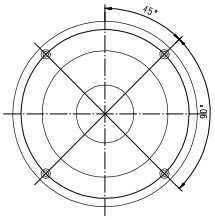
Type	D1	D3	D4	D5	D8	L	L1	L2	L3	L5	d	d_{max}	B	T	K
HSAX 630	302	138	110	128	144	156	30	70	115	1500	55	75	16	59,3	0,7
HSAX 1000	340	150	100	130	152	188	50	80	160	1500	55	75	16	59,3	0,7
HSAX 2500	374	170	140	165	200	205	50	80	180	1500	70	100	20	74,9	0,8

HSXY

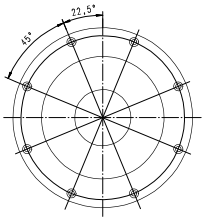


Type	D7	D11	L11	L4	H1	H2
HSXY 630	58	342	187	94	208	280
HSXY 1000	58	380	230	100	220	390
HSXY 2500	74	420	260	125	260	470

MOUNTING FLANGES



MOUNTING FLANGE A400



MOUNTING FLANGE A450 , A550

Type	M	N	P	D6	TA	LA	TA	STOSOWANA W HAMULCACH		
A400	350	300	400	4 x Ø18	6	30	6	HSAX(Y)630	HSAX(Y)1000	-
								HSX(Y)630	HSX(Y)1000	-
A450	400	350	450	8 x Ø18	6	30	6	HSAX(Y)630	HSAX(Y)1000	HSAX(Y)2500
								HSX(Y)630	HSX(Y)1000	HSX(Y)2500
A550	500	450	550	8 x Ø18	6	30	6	-	HSAX(Y)1000	HSAX(Y)2500
								-	HSX(Y)1000	HSX(Y)2500

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 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 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}	0,45U_{IN}
Maximum continuous output current rectifier	I_{OUT}	5A	5A

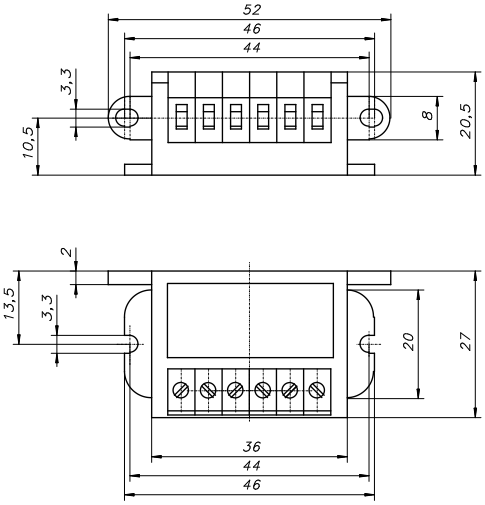
For example

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

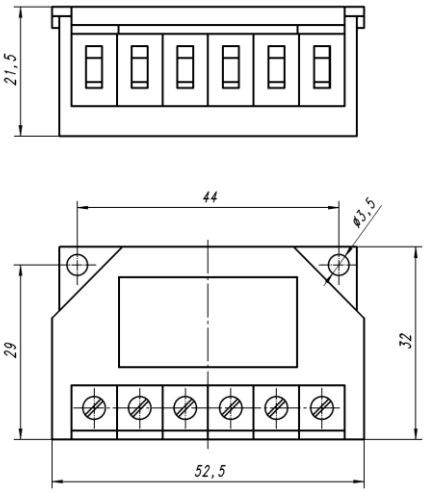
The resulting output voltage of the rectifier
(direct voltage) - 0,45U_{IN}= 0,45 x 230=104VDC

Rectifiers dimensions

B5-1P-400

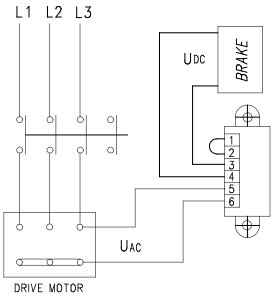


B5-1P-600



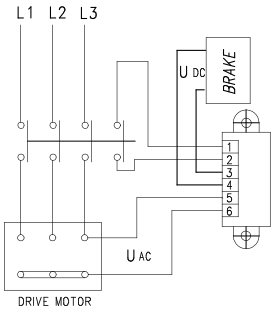
Disconnection of power supply on AC side

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.

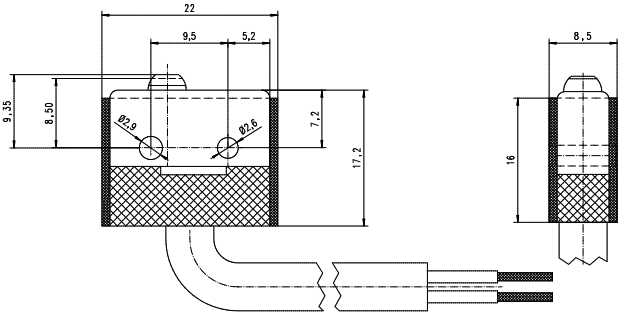


CONTROL AND SIGNALING CIRCUTS – microswitches

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

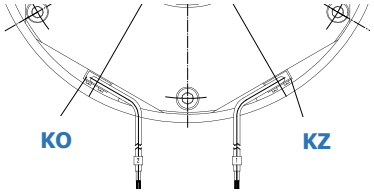
MICROSWITCH DIMENSIONS



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



SAMPLE INSTALATION

PROCTECTIVE 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.

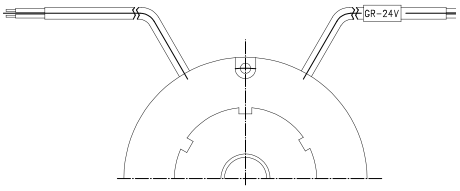
The brake protection has the form of a bimetallic sensor. Brake operation is controlled by a sensor or by a set of sensors, which ensure its safe operation; excessive temperature indication is obtained from the thermal switch installed inside the brake electromagnet's housing rated for a specific temperature.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

AUXILIARY CIRCUITS – anti-condensation heaters

The so-called parking heating is used to prevent vapours condensation inside the brake. The equipment is particularly useful in negative temperatures or in high humidity environments. The heater is supplied through its dedicated pair of wires. The heater power supply voltage matches customer requirements. – the need to define the voltage during order.

Anti-condensation heaters – GR -____V



SAMPLE INSTALATION

HSAX
HSX [ ] [ ] . [ ] . [ ] . [ ] **VDC** [ ] **Nm** [ ] [ ] **...**

Y	LEVER FOR MANUAL FLANGE
Only variant HS	

MECHANICAL SIZE
630, 1000, 2500

OPTIONS	
MOUNTING FLANGE A 400	A400
MOUNTING FLANGE A 450	A450
MOUNTING FLANGE A 550	A550

PROTECTION RATING		
BASIC VERSION IP44		0
VERSION IP55 WITHOUT HOLE D7	only HSAX	1
VERSION IP55 WITH HOLE D7	only HSAX	2
VERSION IP65 WITHOUT HOLE D7	only HSX(Y)	3
VERSION IP65 WITH HOLE D7	only HSX(Y)	4
VERSION IP66 WITHOUT HOLE D7	only HSX(Y)	5
VERSION IP66 WITH HOLE D7	only HSX(Y)	6

OPERATING VOLTAGE [V DC]
104 , 180

NOMINAL BRAKING TORQUE [Nm]		
HSAX630 **HSX(Y)630**	**HSAX1000** **HSX(Y)1000**	**HSAX2500** **HSX(Y)2500**
600, 700, 800	1000, 1300, 1500	1750, 2100, 2500

DIAMETER OF SLEEVE GEAR d(H7)

CLIMATIC VERSION: ACCORDING TO STANDARDS : e.g. MT, TH

Execution options for the customer's request:
- non-standard diameter of the sleeve gear brake d(H7)
- equipped with heating elements in the winding
  (need to define the voltage supply) – e.g. **GR___V**
- work at low temperatures -40^{0}C - **Z**
- 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**

EXAMPLE:

HSAX1000 . A450 . 0 . 104VDC 800Nm d55 KZ+KO
HSXY2500 . A450 . 3 . 180VDC 1300Nm d70 GR110V

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