



DAKO-CZ, a. s.

Products for railway vehicles



Distributors and complementary valves

Brake cylinders

Disc brake units

Panels of devices

Electronic anti-skid device

Devices for automatic continuous load-controlled braking

Brake hose couplings and closing cocks

Additional instruments and devices for brake systems

Limiting valves



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Distributor

DAKO CV1nD

The distributor DAKO CV1nD is main active device of a railway car brake, which fill the dummy cylinder in dependence on pressure decrease in the train brake pipe and in the same time ensures inexhaustibility of a brake by refilling of the auxiliary reservoir.

The distributor is connected with:

- train brake pipe;
- auxiliary reservoir;
- control reservoir;
- dummy cylinder;
- main air-supply pipe (if a car is not equipped with the main air-supply pipe the connection must be blinded so that impurities could not penetrate into the refilling valve);
- (automatic brake release valve OS1).

FUNCTIONAL USE

| Distributor | Changeover device | Pressure relay | Use |
|-------------|----------------------|--|------------------------------|
| CV1nD.. | Changeover valve N-O | Complementary valve DAKO D (DAKO DS, DSS, DSV) | Freight cars |
| CV1nD..-P | Nozzle cover | | Passenger or fast train cars |
| CV1nD..-R | Changeover valve O-R | Complementary valve DAKO R | Fast train cars |
| CV1nD..-R1 | Nozzle cover | Pressure relay TR3 | Passenger or driving cars |
| CV1nD..-L | Changeover valve N-O | Pressure relay TR1, TR2 | Locomotives |

„m“ in the distributor designation means short release time in position “passenger” (e.g. CV1nD..-Pm)

The distributor DAKO CV1nD can be also mounted to cars without the main air-supply pipe, but the connection on the refilling valve must be blinded so that impurities could not penetrate into it.

TECHNICAL CHARACTERISTICS OF DISTRIBUTOR

| | |
|--|--------------------------|
| Common operational pressure in train brake pipe | 5 bar ± 0,05 bar |
| Distributor properly operates at operational pressure range | 4,0 bar ÷ 6,0 bar |
| Non-sensitivity – decrease from common operational pressure in train brake pipe when brake must not operate | 0,3 bar for 60 s |
| Sensitivity – at decrease from common operational pressure in train brake pipe about 0,6 bar for 6 s brake must operate within | 1,2 s |
| Maximum pressure in dummy cylinder (below RV only) | 3,8 bar ± 0,1 bar |
| Braking – filling time of RV | |
| till 95% of max. pressure at position: | |
| goods | 18 s ÷ 30 s |
| passenger | 3 s ÷ 6 s |
| Brake release – time of pressure decrease in RV from maximum pressure to 0,4 bar at position: | |
| goods | 45 s ÷ 60 s |
| passenger | 15 s ÷ 20 s |
| Resistance against inflating charge at position: | |
| goods | 40 s |
| passenger | 10 s |
| Brake serveability – pressure in train brake pipe at brake release when brake must be fully released | 4,85 bar |
| Minimum number of steps at braking and brake Release (sensitivity for pressure change in train brake pipe) | 12 |
| First braking step is set at pressure decrease in train brake pipe from common operational pressure about 0,4 bar maximally | Pressure in RV > 0,5 bar |
| Working temperature | -40°C ÷ +60°C |
| Service life in case of keeping of regular checking times | 35 years |
| Service life of rubber parts | 12 years |
| Mass | ~27 kg |

SIZES OF DISTRIBUTORS

| Group | Designation of distributor | Size of auxiliary reservoir [l] |
|-------|--|---------------------------------|
| 10 | CV1nD10, CV1nD10-P, CV1nD10-L CV1nD10-R, CV1nD10-R1 | 25 ÷ 40 |
| 16 | CV1nD16, CV1nD16-P, CV1nD16-L CV1nD16-R, CV1nD16-R1 | 57 ÷ 75 |
| 23 | CV1nD23, CV1nD23-P, CV1nD23-L CV1nD23-R, CV1nD23-R1 | 100 ÷ 150 |
| 35 | CV1nD35, CV1nD35-P, CV1nD35-L CV1nD35-R, CV1nD35- | 200 ÷ 270 |





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Complementary valves DAKO DS, DSS, DSV

Complementary valves DAKO DS, DSS a DSV are pressure relays with infinitely adjustable ratio and ensure a supply of brake cylinders with pressure air in dependence on an outlet pressure of the load weighing valve or a signal from springs of air springing.

Complementary valves are designed according to conditions stated in the UIC 541-04 leaflet and allow a combination with distributors of UIC automatic brake UIC.

Complementary valves DAKO DS, DSS a DSV are produced in two basic designs:

- Flange design is determined for a direct mounting to the flange of the auxiliary reservoir
- Bracket design is determined for a separate mounting on a car bottom or to a car bogie

The complementary valve DAKO DS is determined for freight cars of "S" regime with classic brake blocks with maximum braking load 14,5 t per an axle or for cars with other then classic brake (non-metallic blocks).

The complementary valve DAKO DSS is determined for freight cars of "SS" regime with classic brake blocks with maximum braking load 18 t per an axle or for cars with other then classic brake (non-metallic blocks, disc brake, etc.).

The complementary valve DAKO DSV is determined for an automatic load-controlled braking of passenger cars with air springing. In this case the valve is proportionally controlled with pressure air from air springing.

FUNCTIONAL USE

The complementary valve is a part of equipment for the automatic

load-controlled braking. It is used in brake sets of railway cars with variable air pressure in brake cylinders. It is specially at braking in dependence on load (brake of freight cars) or vehicle occupancy (brake of passenger cars) with the block brake, disc brake or their combination.

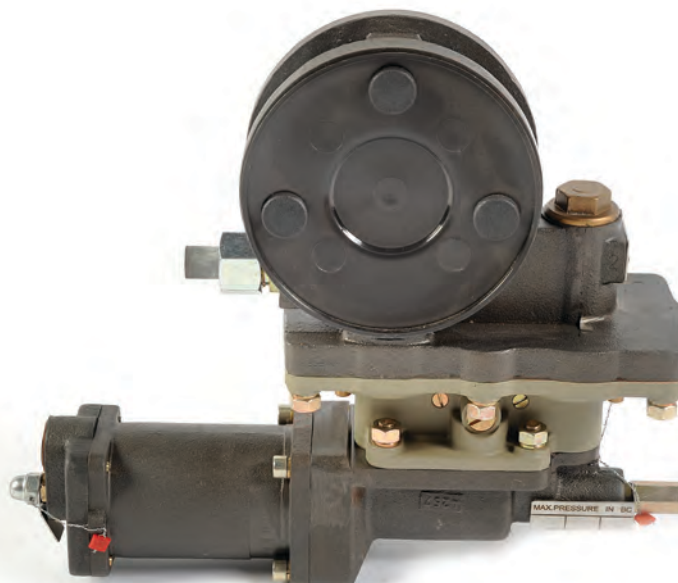
Pressure in the brake cylinder and thus also thrust to the brake shoes is changed automatically by adjusting of the pneumatic piston in dependence on a value of control pressure.

The complementary valve of flange design is used mainly in combination with the DAKO distributor and is mounted between the flange of the auxiliary reservoir and the flange of the distributor eventually to a special bracket.

The complementary valve of bracket design is adapted for mounting to the separate bracket and is used either in connection with the DAKO distributor or in connection with other distributor types according UIC.

BASIC TECHNICAL DATA:

| | |
|--|------------------------------------|
| Outlet air pressure in brake cylinder | 3,8 bar |
| Minimum adjustable outlet pressure in brake cylinder | from 0,5 bar |
| Tolerance of outlet pressure (at normal temperature) | ±0,1 bar |
| Basic inshot | 0,25 bar |
| Hysteresis | |
| At valve ratio 1 (pressure in brake cylinder 3,8 bar) | max. 0,3 bar |
| Sensitivity | |
| Brake cylinder pressure between 0,8 and 3,8 bar | min. 8 braking and releasing steps |
| Brake cylinder pressure < 0,8 bar | min. 5 braking and releasing steps |
| Flow rate | |
| Flow rates of complementary valves ensure keeping of braking and releasing times stated in the UIC 540 Leaflet for freight and passenger brake at use of the brake cylinder 16" till the piston stroke 150 mm; | |
| Mass | cca 18 kg |
| Service life | |
| Service life in case of keeping regular checking times | 35 years |
| Service life of rubber parts | 12 years |





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Limiting valve DAKO DLV3HL

The limiting valve DAKO DLV3HL is the device, which automatically reduces a brake effect of a car by a reduction of air pressure in the brake cylinder in the area of the service brake application at the car load higher than 14,5 t per axle.

The limiting valve is intended for freight cars operating in "SS" regime. The limiting valve serves as a prevention of wheels against overheating especially at running on long gradient tracks.

The limiting valve DAKO DLV3HL meets UIC 541-04 and EN 15611 requirements:

a) In the area of low service brake application ($p_{TBP} = 4,6 - 4,2$ bar) at the car load higher than 14,5 t per axle the pressure course characteristic in the brake cylinder is such that the brake force of a car operating in "SS" regime is decreased to the level of a car operating in "S" regime.

b) In the area of higher service brake application ($p_{TBP} = 4,2 - 3,8$ bar) at the car load higher than 14,5 t per axle the brake force level is again continuously increased so that at brake application ($p_{TBP} < 3,8$ bar) the brake force level of a car operating in "SS" regime is achieved again.

c) At the car load lower than 14,5 t per axle the limiting valve does not influence a course of a car braking in any way. operated in "SS" regime again.

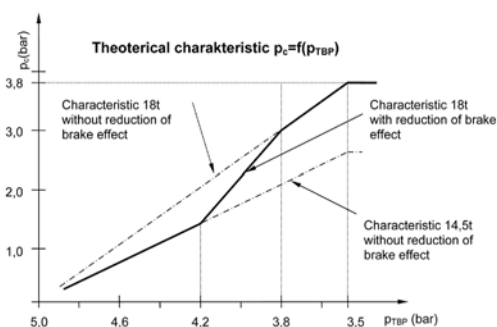
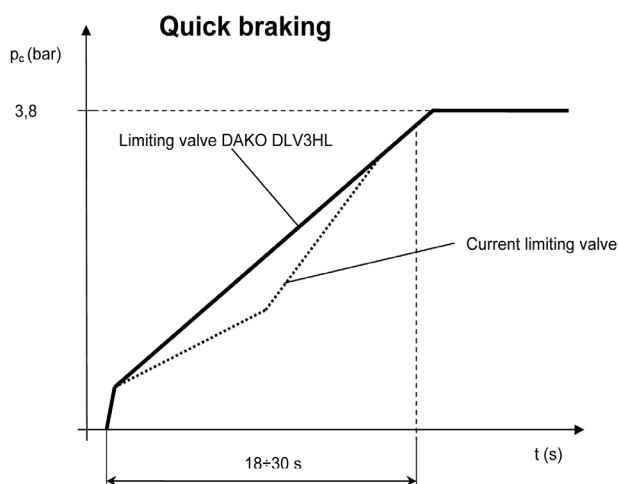
Moreover the limiting valve DAKO DLV3HL also enables, at quick braking, a transition to the full unlimited brake application immediately after a pressure decrease in the train brake pipe independently of a filling time given by the distributor for a pressure progress in the dummy cylinder.

The limiting valve DAKO DLV3HL is produced in one universal design and it needn't to be suit to basic features of the complementary valve of the automatic load-controlled braking (DAKO DSS).

The limiting valve DAKO DLV3HL is placed between the complementary valve of the automatic continuous load-controlled braking (DAKO DSS) and the brake cylinder in the brake pneumatic circuit. The limiting valve is also connected with the distributor (the dummy cylinder) and with the train brake pipe. Both DAKO CV1nD type and DAKO CV1D type (UIC 543, enclosures E1 and E2) can be used as the distributor.

BASIC TECHNICAL DATA

| | |
|--|---|
| Working temperature | from -40°C to $+70^{\circ}\text{C}$ |
| Maximum operational pressure | 4 bar |
| Sensitivity | min. 8 braking and 8 releasing steps |
| Mass | 16,8 kg |
| Service life of brake unit in case of keeping regular checking times | 35 years |





DAKO-CZ, a. s.



Automatic brake release valve DAKO OS1

The automatic brake release valve DAKO OS1 is a part of brake equipment of railway cars, mainly freight cars, ensuring full discharging of the brake cylinder after short-time pulling of a control rod at emptied train brake pipe.

The automatic brake release valve is designed according to conditions defined in the UIC 541-1 leaflet and it is possible to use it with every type of brake according to UIC.

Automatic brake release valves are produced in two designs:
With sockets in bracket (2 x G1/2" outer + 1 x TRř15)
Without sockets in bracket (3 x G1/2" inner)

The automatic brake release valve ensures full discharging of the brake cylinder after short-time pulling of the release valve's control rod at emptied train brake pipe or at pressure in the train brake pipe lower than 0,8 bar. Air pressure in auxiliary and control reservoirs stays same.

If pressure in the train brake pipe is higher than 1 bar the brake cylinder is vented only for time when the control lever of the brake release valve is deflected from vertical (normal) position.

At the same time a venting of auxiliary and control reservoirs occurs through the brake release valve placed on the distributor (in connection with distributors of DAKO types).

The connection of the brake cylinder with the atmosphere (at filling of the train brake pipe) is interrupted at achieving of the pressure 3,0 bar at least, the brake is applied for a short term and it is again release at achieving of the operational pressure.

The automatic brake release valve in connection with the brake release valve placed on the distributor allows, after pulling of the release valve's control rod, an elimination of a pressure overcharge (full venting of the brake cylinder and pressure decrease in auxiliary and control reservoirs to pressure lower than pressure, which is just in the train brake pipe) or full discharging of all brake spaces at the emptied train brake pipe; in this case it is necessary to hold the release valve's control rod for the time which is necessary for the required effect.

FUNCTIONAL USE

The automatic brake release valve is used especially for discharging of the brake cylinder (brake release) at handling with a single car after previous braking and request for pressure keeping in other brake spaces, eventually, with connection with brake release valve placed on the distributor, for full discharging of all brake spaces (control and auxiliary reservoir, brake cylinder) at handling with a car during a brake repair.

BASIC TECHNICAL DATA

| | |
|---|--|
| Operational pressure | 5 ± 1 bar |
| Automatic function | - pressure in train brake pipe < 0,8 bar |
| Return to stand-by status | - pressure in train brake pipe > 3 bar |
| Mass | 6 kg |
| Service life of in case of keeping regular checking times | 35 years |
| Service life of rubber parts | 12 years |





DAKO-CZ, a. s.



Load weighing valve DAKO SL2

The load weighing valve DAKO SL2 is a device of a railway car pneumatic brake. The load weighing valve sets control air pressure in dependence on payload of a railway car. According to the character of dependence of the control pressure on a loading force value there are two types of the load weighing valves:

type 1 - 0,8 bar/10 kN;
type 3 - 1,0 bar/10 kN.

FUNCTIONAL USE

The load weighing valve is a part of the automatic load-controlled braking of railway cars. The valve is used for an automatic adjusting of the control pressure in complementary valves (DAKO or others according UIC rules) in dependence on payload of railway cars.

Air with inlet operational pressure 5 bar is supplied from the auxiliary reservoir to the load weighing valve and outlet pressure air with the control pressure P_r is led to the complementary valve, where sets a ratio for an achieving of brake cylinder pressure corresponding with a car load including payload.

BASIC TECHNICAL DATA

| | |
|---|--|
| Inlet operational pressure of load weighing valve | max. 6 bar |
| Maximum loading force | |
| (Z) - type 3: | 60 kN |
| (Z) - type 1: | 80 kN |
| Outlet (control) pressure | |
| (Pr) - type 3: | $P_r = (Z \cdot 0,09324 + 0,1176) \pm 0,1$ bar |
| (Pr) - type 1: | $P_r = (Z \cdot 0,08 + 0,05) \pm 0,1$ bar |
| Length of load weighing valve | cca 180 mm |
| Mass of load weighing valve | 9,2 kg |
| Service life in case of keeping of regular checking times | 35 years |
| Service life of rubber parts | 12 years |





DAKO-CZ, a. s.



Disc brake unit DAKO KB

The disc brake unit DAKO KB is an active device of a railway brake. It always contains (as one structural unit) the brake cylinder DAKO B with in-built slack adjuster and eventually with the hand brake mechanism and the signalling device, leverage with a defined transmission ratio, pad holders, coupling rods and hangings.

Disc brake unit DAKO KB consists of these main parts:

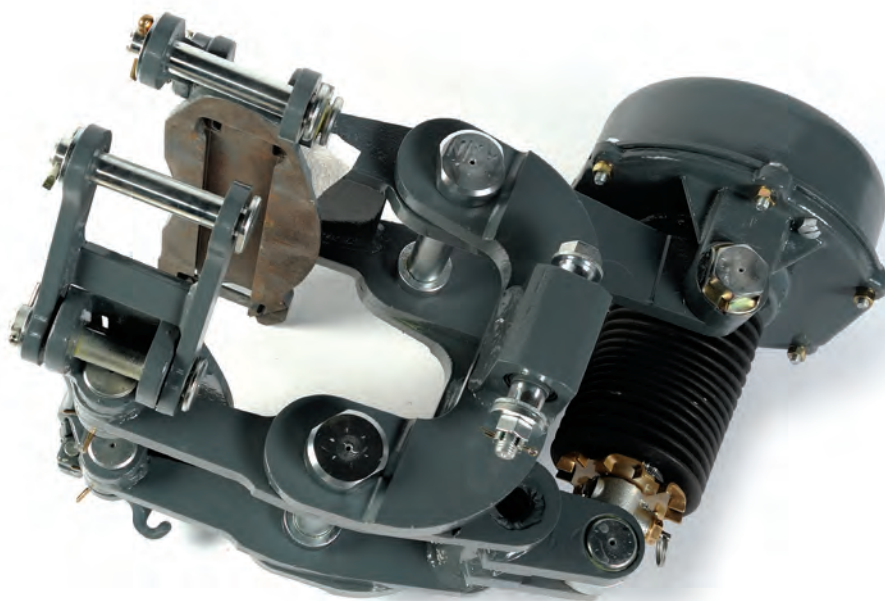
- brake cylinder DAKO BZ 10 with in-built slack adjuster;
- hand brake mechanism and signalling device if brake cylinder is equipped by this
- leverage (complete set of parts for transmission of braking force to brake pad);

FUNCTIONAL USE

The disc brake unit is used as a part of railway cars brake equipment, generally as a part of a brake in a bogie. The brake unit is placed in the bogie of the railway car so that the brake effect is evoked on brake discs directly.

BASIC TECHNICAL DATA

| | |
|--|---------------------|
| Brake cylinder type | DAKO B |
| Brake cylinder diameter | 10" |
| Brake pad area | 400 cm ² |
| Brake disc dimension | ∅ 640/110 |
| Medium friction radius of brake disc | 1.0 ÷ 1.5 |
| Brake clip distance | 2 ± 1 mm |
| Brake unit mass | cca 75 kg |
| Working temperature | from -40°C to +60°C |
| Service life of brake unit in case of keeping regular checking times and repairs | 35 years |





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Container of brake devices **DAKO**

The container of brake devices, drwg. no. 90900-003, is a part of brake equipment of locomotive 109E. The bulk of brake devices are placed inside the container.

The container is composed of a frame, single brake devices and needed pneumatic and electric circuits.

Following brake devices are fastened to the frame:

| | |
|-------|--------------------------|
| 1 pc | distributor DAKO CV1nD |
| 2 pcs | pressure relay DAKO TR 4 |
| 1 pc | brake valve DAKO BSE |
| 2 pcs | panel of devices 40 |
| 1 pc | panel of devices 23 |
| 1 pc | distribution board |
| 1 pc | quick braking valve VR2 |

and also: closing cocks, filters, air reservoirs, brackets of devices and diagnostic connectors.

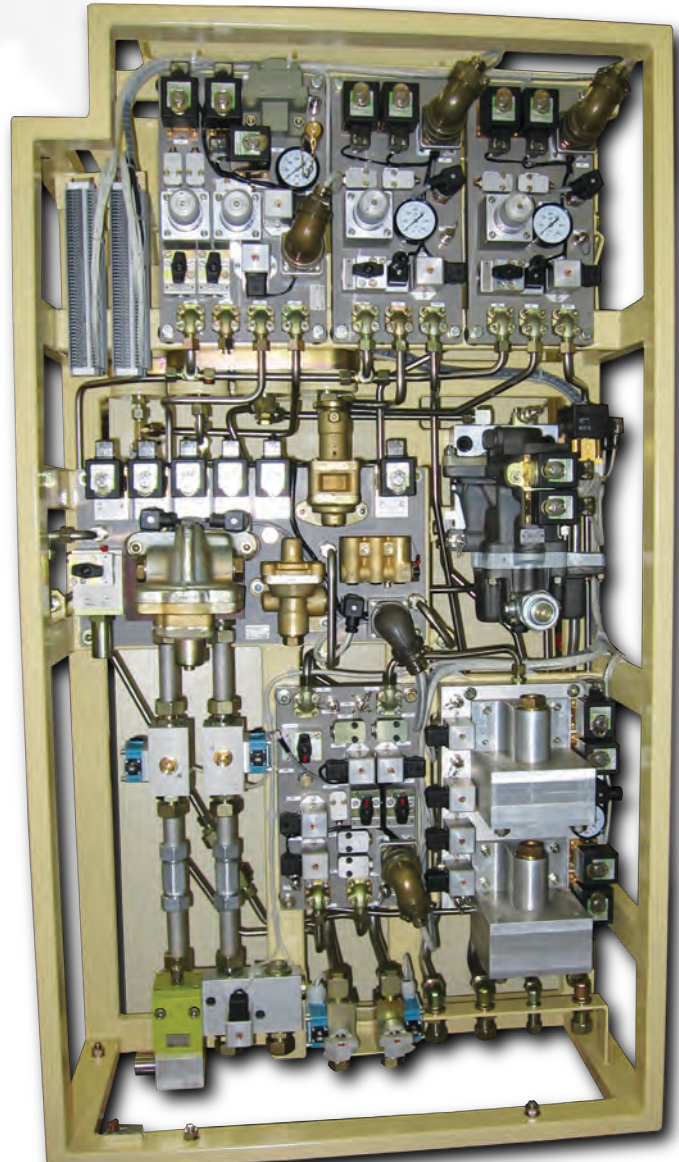
Devices of pneumatic circuits of following brakes are placed inside the container:

automatic
additional
supplemental
pneumatic parking
quick-braking
emergency

Control of single brakes is ensured by means of electric and pneumatic signals from a driver's control desk and from a car control system.

BASIC TECHNICAL DATA

| | |
|--|---|
| Mass | 350 kg |
| Working temperature | from - 40°C to +60°C |
| Storage temperature | from - 40°C to +60°C |
| Supply voltage | 24V DC -30%,+35% |
| Electric covering | IP20 |
| Specific dielectric strength of insulation | min. 750V/50Hz/1min |
| Electrical resistance of insulation | min. 20MW/500V |
| Maximum input | 115 W |
| Relative humidity | max. 95% |
| Mechanical endurance strength | shocks 5g in every main axle (ČSN EN 50155) |





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Electronic antiskid device

DAKO PE06-MSV

The electronic antiskid device DAKO PE06-MSV is equipment of a pneumatic brake of railway cars, which protects a railway car wheel set against wheel lock at braking and optimizes car braking effect in dependence on adhesive conditions.

The antiskid device is designed according to conditions stated in the UIC 541-05 leaflet.

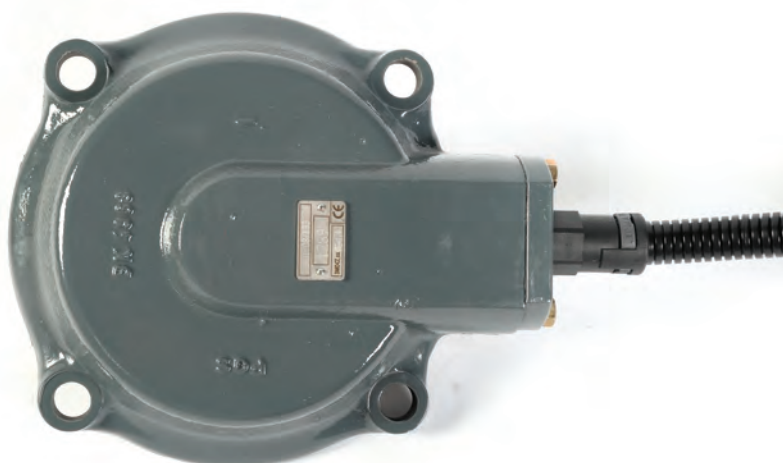
The antiskid device is composed of the antiskid generator, the control unit of electronic antiskid device (hereinafter control unit only), the discharging valve and the pressure switch.

FUNCTIONAL USE

The antiskid device is determined for railway cars fitted with pneumatic air pressure disc or block brake. The antiskid device with use of the discharging valve ensures minimization of braking distance and insures qualitatively higher protection against creation of flat places.

BASIC TECHNICAL DATA

| | |
|---|--|
| Ambient temperature | from -40°C to +70°C |
| Speed range (∅ wheel diameter 920 mm, 60 pulses/revolution) | to 270 km/h |
| Minimum speed ensuring sufficient voltage for security of regulating functions | 2 km/h |
| Maximum difference of diameters of car wheels | 1% of medium diameter |
| Supply voltage | 24VDC, 48VDC or 110 VDC |
| Tolerance of supply voltage | +25%Un, -30%Un |
| Time to automatic switch-off of control unit (after releasing of button TEST) | 5 min ±5% |
| Time to automatic switch-off of control unit (after disconnection of pressure switch contact) | from 20 min to 60 min adjusted during production |
| Evaluation of regulating action | every 10 ms |
| Updating of real speeds and accelerations | every 500 µs |
| Time of switch-off after permanent closure of outlet valve | from 4 s to 8 s |
| Time of switch-off after permanent closure of lock valve | from 10 s to 16 s |
| Time of brake cylinder releasing from 3,8 to 0,5 bar | 0,4 s ± 0,05 s |
| Time of brake cylinder filling from 0 to 3,6 bar | 1,6 s ± 0,1 s |





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Emergency brake DAKO PZ4

The emergency brake DAKO PZ4 is a set of electropneumatic and electric devices serving to high-powered discharge of pressure air from the train brake pipe at pulling down of the handle of the emergency brake safety valve. The emergency brake also ensures a pressure limiting in the train brake pipe and interruption (neutralization) of pressure air discharge from the train brake pipe with induction of electric voltage to the electromagnetic neutralization valve. This status of the emergency brake is called bridging of the emergency brake.

The system of emergency brake with bridging is used in connection:

a) according to UIC: The system of emergency brake bridging is designed according to conditions defined in the UIC 541-5 leaflet. 9-venous UIC - brake train line is used for signal transmission.

b) according to DB requirements: The system of electropneumatic brake according to DB uses 18-venous UIC information line. Connection of train line matches to the UIC 558 leaflet.

FUNCTIONAL USE

The emergency brake is determined for brakes of railway cars fitted with pneumatic air pressure brake.

The emergency brake ensures high-powered pressure decrease in the train brake pipe after pulling down of the handle of the emergency brake safety valve which raises in action of automatic pressure air brake.

The driver can stop effect of the emergency brake by using of bridging and bring train set to a stop on a suitable place.

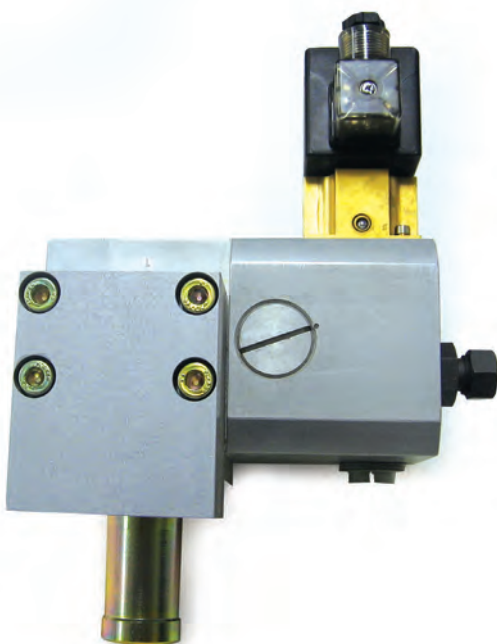
BASIC TECHNICAL DATA

| | |
|---|--|
| Operational pressure | 5 bar |
| Pressure decrease in train brake pipe at action (brake valve in lock) | 1,8 bar ± 0,2 bar |
| Discharging cross section of valve (G1") | 615 mm ² |
| Supply voltage (Un) | 24 V DC |
| (other voltage must be discussed with supplier of emergency brake) | |
| Tolerance of supply voltage ČSN EN 50155 | from 0,7 Un to 1,25 Un |
| Input of electropneumatic valve of emergency brake valve | 6 W |
| Operating force for action | 60 N ± 10 N |
| Volume of connection (control) pipeline at using of one emergency brake valve | max. 1,0 dm ³ |
| Current nominal value of safety valve micro switch | 5 A - 24 V DC |
| Electromagnetic compatibility | brake meets requirements of ČSN EN 50121-3-2 |

Working temperature:

| | |
|--|-----------------------|
| Emergency brake valve | from - 40°C to + 70°C |
| Safety valve of emergency brake DAKO PZ4 | from - 25°C to + 70°C |
| Control unit EOB | from - 25°C to + 45°C |

| | |
|---------------------------------|----------|
| Service life of emergency brake | 35 years |
| Service life of rubber parts | 12 years |





DAKO-CZ, a. s.



Electropneumatic brake

DAKO EPB2

The electropneumatic brake DAKO EPB2 is a system of electropneumatic and electric devices, which are part of railway cars' equipment and serve for ensuring of steady braking or brake releasing effect of all cars in a train set at minimization of braking and brake releasing times. Signals for braking or brake releasing are spread not only in pneumatic way but also in electric way and thus steady effect of all brakes in the train set is achieved.

The electropneumatic brake is designed according to conditions defined in the UIC 541-5 leaflet.

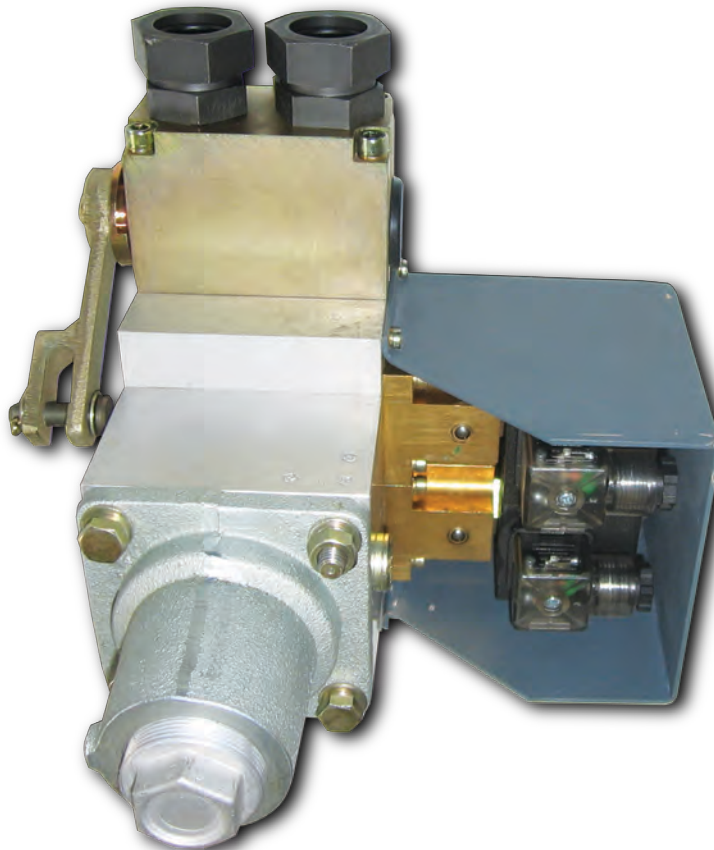
FUNCTIONAL USE

The electropneumatic brake is determined for brakes of railway cars fitted with a double-pipe pneumatic air pressure brake according to requirements of the UIC 540 leaflet.

The electropneumatic brake ensures steady decrease or increase of pressure in the train brake pipe of the whole train set after setting of braking or brake releasing signal.

BASIC TECHNICAL DATA

| | |
|---|--|
| Operational pressure | 5 bar |
| Pressure decrease in train brake pipe at electropneumatic braking | from 3,5 s to 5 s |
| from 5 bar to 3,5 bar | from 3,5 s to 5 s |
| Pressure increase in train brake pipe at electropneumatic brake release | from 7 s to 10s |
| from 3,5 bar to 4,9 bar | from 7 s to 10s |
| Supply pressure | 5,5 bar - 10 bar |
| Output pressure of throttle valve of additional unit | 5,5 - 0,2 bar |
| Rated voltage of valves of additional unit (Un) | 24 V DC or 72 V DC or 110 V DC |
| Tolerance of supply voltage according to ČSN EN 50155 | from 0,7 Un to 1,25 Un |
| Electromagnetic compatibility | brake meets requirements of ČSN EN 50121-3-2 |
| Mass | 9 kg |
| Working temperature | from - 40°C to + 70°C |
| Additional unit of electropneumatic brake | from - 25°C to + 45°C |
| Control unit | from - 25°C to + 45°C |
| Covering of additional unit | IP 65 |
| Service life in case of keeping regular checking times | 35 years |
| Service life of rubber parts | 12 years |





DAKO-CZ, a. s.

Products for tram vehicles



Electromechanical disc passive brake

Hydraulic passive brake

Hydraulic active brake

Passive brake of trailer bogie



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Aggregate K.P.T. 001

The hydraulic aggregate K.P.T. 001 is the control unit of disc accumulator, active, proportional and no proportional brakes.

FUNCTIONAL USE

Power components of a hydraulic brake are controlled with the aggregate. This brake can be used for both proportional and gradual braking of a car, also as parking brake or reserve brake in case of failure of EDB.

TECHNICAL DATA

| | |
|---|-----------------------|
| Pressure in hydraulic system of aggregate | 10 MPa \pm 12 MPa |
| Operational pressure | |
| - proportionally to max. | 7,5 MPa \pm 0,2 MPa |
| - without regulation | 9 MPa \pm 12 MPa |
| Maximum pressure in system | 14,2 MPa |
| Service life | 16 year |

Electromotor

Direct-current series electromotor

Rated voltage

24 VDC + 25% - 30%

Rated current

13 A at pressure 12 MPa

Distributor

Saddle proportional distributor Ra, Rb

Rated voltage

24 VDC + 25% - 30%

Rated current

from 1,2 A to 1,4 A

Pressure switches

Rated voltage

12 V \div 36 V

Output signal

from 4 mA to 20 mA

Pressure valve

Single-stage pressure valve

adjusted to 14 MPa \pm 0,2 MPa

Mass of complete aggregate (without working liquid)

19 kg

Working temperature

Ambient temperature

-30°C \div +40°C

Temperature of working liquid

-30°C \div +70°C

Working liquid

Hydraulic oil

ESSO UNIVIS J26 nebo AERO SHELL FLUID 41

Quantity

2,7 dm³





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Brake unit K.P.T. 001

The brake unit K.P.T. 001 is hydraulically controlled brake with the mechanism of hand brake release and the automatic one-side acting slack adjuster.

FUNCTIONAL USE

The brake unit K.P.T. 001 is used for braking of the tram traction bogie, as additional brake to EBD (blending), as parking brake or as reserve brake at a failure of EDB.

BASIC TECHNICAL DATA

The aggregate K.P.T. 001 is used for control of the brake unit K.P.T. 001.

The aggregate K.P.T. 001 and brake disc are not delivered together with the brake unit K.P.T. 001.

The brake unit K.P.T. 001 acts on the brake disc with parameters stated below.

PARAMETERS OF BRAKE DISCS

| | |
|--|-----------------|
| Disc diameter | 350 mm - 500 mm |
| Difference between outer and inner diameter of disc operational area | cca 82 mm |
| Disc width | 36 mm - 60 mm |

Brake pad

| | |
|--------------------------------------|---------------------------|
| Brake pad material | asbestos-free FERODO 3047 |
| Pad thickness - maximum | 11 mm |
| Pad thickness - minimum | 3 mm |
| Operational area | 163 cm ² |
| Total clearance between disc and pad | 2 x 1,25 mm |
| Friction coefficient | 0,36 at 250°C |
| Friction coefficient | 0,37 at 200°C |
| Friction coefficient | 0,38 at 90°C |
| Maximum specific pressure | 2,0 MPa |
| Maximum temperature | 500°C |
| Working temperature | from 100 °C to 300°C |

Accumulators

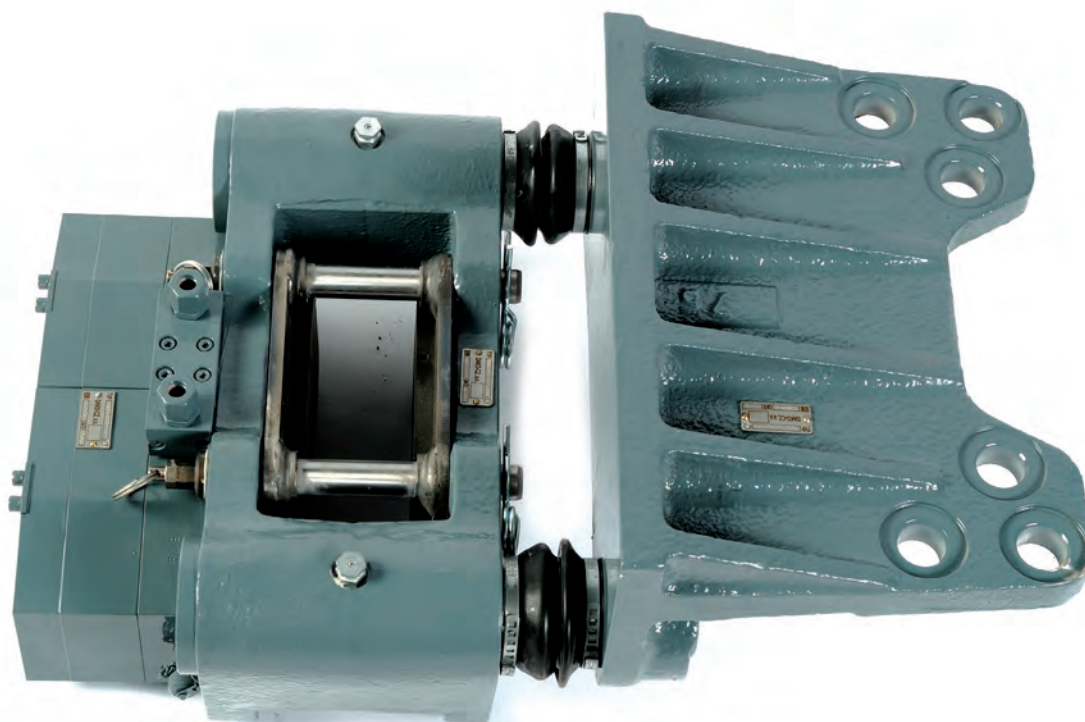
| | |
|------------------------------|--------------|
| Force of accumulators | 2 x 20 ±1 kN |
| Total stroke | 5 mm |
| Working stroke | 3 mm |
| Adjusting length of spindles | 30 mm |

Working liquid

| | |
|--|--|
| hydraulic oil | ESSO UNIVIS J26 or AERO SHELL FLUID 41 |
| Pressure for brake release | from 10 MPa to 12 MPa |
| Working volume | 17 cm ³ |
| Emergency brake release, manually, mechanically, hydraulically, by aggregate of emergency brake release, hydraulically, by hand pump | |
| Mass of brake unit K.P.T. 001 | ~ 61 kg |

Working temperature

| | |
|-------------------------------|---------------------|
| Ambient temperature | from -30°C to +40°C |
| Temperature of working liquid | from -30°C to +90°C |





DAKO-CZ, a. s.



Emergency brake release aggregate

NOE-2000

The emergency brake release aggregate NOE-2000 is the control unit of emergency brake release of the tram accumulator brake.

FUNCTIONAL USE

The aggregate is determined for emergency brake release of accumulators of a tram brake caliper in case of a failure of the main control aggregate.

BASIC TECHNICAL DATA

| | |
|--|--|
| Operational pressure (adjusting of pressure switch) | 10 MPa ± 0,2 MPa |
| Maximum pressure in system (safety valve) | 13 MPa + 0,3 MPa |
| Thread for outlet (connecting) screwing | G1/4" A |
| Filling and discharging valve | M 18 x 1,5 |
| Working liquid | AEROSHELL FLUID 41 or ESSO UNIVIS HVI 26 |
| Volume of working liquid in tank | 0,65 dm ³ |
| Maximum volume of working liquid (for one aggregate) needed for brake release of brake accumulators of tram traction bogie | 0,1 dm ³ |
| Ambient temperature | from -30°C to +40°C |
| Mass (without working liquid) | 7,2 kg |
| Mass (including working liquid) | 8 kg |

| | |
|---------------------|---------|
| Electromotor | |
| rated voltage | 24 V DC |
| rated current | cca 9 A |
| maximum current | 28 A |

| | |
|--------------------|--------|
| Distributor | |
| rated voltage | 4 V DC |
| current | 0,8 A |

| | |
|------------------------------------|-----------------------|
| Pressure switch | |
| rated voltage | 24 V DC |
| maximum switched current | 4 A |
| minimum switched current | 50 mA |
| Covering according to ČSN EN 60529 | - electric part IP66 |
| | - hydraulic part IP54 |

| | | |
|--|--------------------|------|
| Cleanness class in hydraulic output of aggregate is at delivery as per | SAE AS 4059 | 7 |
| | As per ČSN 65 6206 | 7/14 |

Aggregate is operational at voltage range from 17 V DC to 30 V DC (rated voltage 24 V DC).

Service life is 16 years in case of keeping of Operational manuals no. ZH 288 and ZH 381.

Design life of rubber parts is 8 years.





DAKO-CZ, a. s.



Aggregate of hand brake release

RO

The aggregate of hand brake release is other possible control unit of emergency brake release of the tram accumulator brake.

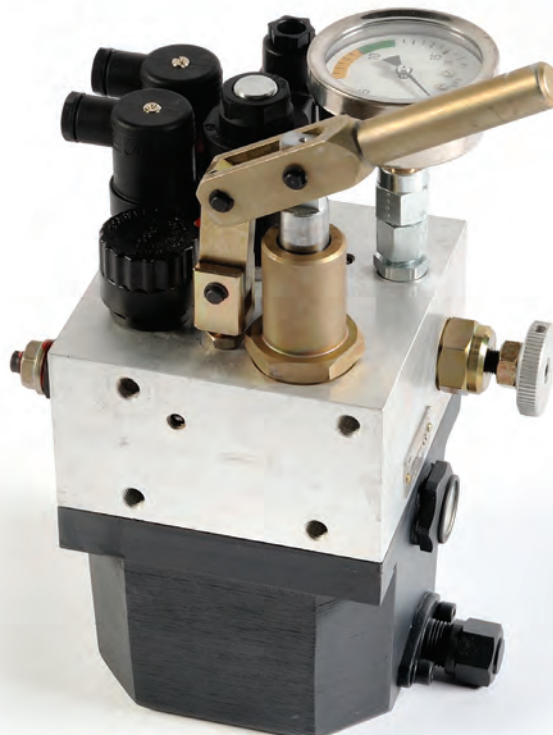
FUNCTIONAL USE

The aggregate RO is determined for emergency brake release of the tram brake caliper at a failure of the main control aggregate or failure of electric energy.

BASIC TECHNICAL DATA

| | |
|--|-------------------|
| Operational pressure (adjustment of pressure switch) | 2 MPa ± 0,2 MPa |
| Maximum pressure in system (safety valve) | 13 MPa + 0,3 MPa |
| Thread for outlet (connecting) screwing | G1/4" A |
| Filling and discharging valve | M 18 x 1,5 |
| Working liquid | ESSO UNIVIS HVI26 |

| | |
|---|-----------------------|
| Volume of working liquid in tank | 0,7 dm ³ |
| Maximum volume of working liquid (for one aggregate) needed for brake release of brake accumulators of tram traction bogie (storage cell 0,16 connected in circuit) | 0,3 dm ³ |
| Ambient temperature | from - 30°C to + 50°C |
| Mass (without working liquid) | 5,9 kg |
| Mass (including working liquid) | 6,7 kg |
| Distributor | |
| rated voltage | 24 V DC |
| current | 0,8 A |
| Pressure switch | |
| rated voltage | 24 V DC |
| maximum switched current | 4 A |
| minimum switched current | 50 mA |
| Covering according to ČSN EN 60529 - electric part | IP6 |
| Cleanness class in hydraulic output of aggregate is at delivery as per SAE AS 4059 | 8 |
| Cleanness class in hydraulic output of aggregate is at delivery as per CSN 65 6206 | 17/14 |
| Supply voltage | 24 V DC + 25 % - 30 % |





DAKO-CZ, a. s.



Brake disc 400/60

DAKO

Brake disc 400/60 is a part of a tram brake system and is determined for braking of an axle of a tramcar bogie.

BASIC TECHNICAL DATA

| | |
|---------------------------------------|--------|
| Maximum disc diameter | 400 mm |
| Maximum width of disc | 60 mm |
| Minimum diameter of disc braking area | 235 mm |
| Maximum width of disc hub | 122 mm |

| | |
|-------------------------------|-------|
| Diameter of holes in disc hub | |
| – for screws M 12 | Ø13mm |
| – for pins Ø14 | Ø14H8 |

| | |
|---|----------|
| Maximum permitted wear of disc braking area | 5 mm |
| Maximum torque on disc | 5 292 Nm |

