

# INSTRUMENTS FOR MEASUREMENT & CONTROL OF PRESSURE AND TEMPERATURE, DEDICATED TO THE INCREASE OF CONFORT AND SAFETY OF RAILWAY CARS

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The project of a modernisation for 100 pcs. railway cars is a part of an assembly of projects referring the rehabilitation of Romanian Railways, inter-conditionally financed by BIRD, BERD and EU-PHARE.

The aim of this project is to modernise a lot of 100 pcs. railway cars from the serial-type no.19-50 and no.20-50, builded-up by the German company DWA and having at this time more than 15-20 years of activity; more, to increase the level of confort offered to passengers at the level asked by the actual European standers; and more, to decrease the exploitation costs and expenditure.

The main objectiv of INCDMF is to realise and to developpe new systems to increase the confort of passengers and to increase the safety of railway cars, by creating and by putting into production of new types of pressure and/or temperature measuring and controlling instruments. In the same time, to induce into the manufacturing process of this instruments of new methods, able to insure the increase of accuracy, of productivity and able to offer a rapid rithm of the transfer of the information to the producer.

In this way, this new products will need a very short time to be introduced in the production process, without preliminary steps for experimental models a.s.o., so, the result will be the realisation of new products in a very short time and with high performances, at the actual level of the market.

## 1. Temperature Switch, type boyler.

This temperature switch is used on the principal tank for hot water existing inside the railway car.

Like components, this temperature switch is realised with a thermosensibil sub-assembly, metallic case, some fixing parts and one inversing electrical contact.

Like fonctionement: this temperature switch is based on the cubic dilatation of a special liquid existing inside the thermosensibil system. Under the increasing/decreasing of the temperature, this special

liquid will modify his own volum, acting on an elastic element. This elastic element will act (thru a levier) on the inversing electrical contact, modifying his position.

The technical characteristics of the product are the following:

- Temperature range: +20°C...+100°C;
- Stting points: +30°C; + 70 °C;
- Fixed differential: max.4°C;
- Contact error:  $\pm 2^\circ\text{C}$ ;
- Working media : normal;
- Electrical current (nominal): 1,5 A; 1,0 A;
- Electrical current (nominal): 250V; 380V.



## 2. Bimetal temperature switch.

This product can be offered in two variants: one, covering the range of temperature 50°C...60°C, to be used to command the heating resistances inside the ventilation system of hot air, the other, covering the range of temperature 5°C...10°C, to be used in the retention tank of the railway car.

Like components, this temperature swith is realised with a metallic case, an assembly of elastic lamella, snap-action bimetallic diaphragm and a superior cover.

Like fonctionement: the product is based on the changement of the shape of a dedicated bimetallic disk (diaphragm) under the variation of the temperature. The temperature switch has a NC (normally closed) or NO (normally open) electrical contact. Like effect of the increasing temperature, this elastic disk will change the initial position, and in this way will produce the changement into the electrical circuit. Decreasing the temperature will generate the

changement of the position of the disk, to his initial position, with a same effect inside the electrical circuit.

The technical characteristics of the bimetal temperature switch:

- Contacting temperature range:
  - + 5°C±3°C....+10°C±3°;
  - +50°C±3°C.....+60°C±3°C;
- Working media: normal;
- Electrical current (nominal) : 6A;
- Electrical current (nominal): 250 V;
- Electrical resistance on contacts:10mΩ;
- Electrical connection : 2,8mm;6,3mm.



### 3. Temperature switch for hot air.

This temperature switch is used in the heating circuit of the railway car during the cold wether.

Like components: fixing flange;metallic case;thermosensibil assembly; acting lever assembly; electrical contact assembly.

Like fonctionement: the temperature switch is based on the cubic dilatation of a special liquid existing inside the thermosensibil assembly. At the increasing or decreasing the temperature, this liquid modify his own volum, acting on an elastic element type capsule. This capsule act, via the lever, on the electrical contact (type inversor), modifying his initial stage.

Technical characteristics:

- Temperature range: +80°C....+126°C;
- Setting point: 118°C±5°C; 90°±5°C;
- Electrical contacts : NC +NO with common point;
- Electrical current (nominal):1,5A (16A);
- Electrical current (nominal): 220V;
- $\cos\phi = 0,8$  ;
- electrical connection: 6,3 mm.



### 4. Differential pressure switch for air

This product is designed for the hot air turbine.

Like components: elastic element type diaphragm; electrical contacts assembly; metallic case.

The differential pressure is the result of the different two pressures,  $p_1$  and  $p_2$  (with  $p_1 > p_2$ ). This two pressure act under the elastic element of the gauge (rubber ondulated diaphragm). At the setted value for the differential pressure, the rigid center of the diaphragm act on the electrical contact, generating his changement. At the value  $\Delta p_u$  (rising), the NC contact will open, and at the value  $\Delta p_c$  (decreasing), the NO contact will close ( $\Delta p_u > \Delta p_c$ ). The difference between  $\Delta p_u$  and  $\Delta p_c$  represent the fixed differential of the gauge.

Technical characteristics :

- Pressure range: 0,3...2 mbar;
- Electrical contacts: NC+NO with common point, 220V,5A,  $\cos\phi=0,8$ ;
- Working media: normal;
- Sensibil element: rubber diaphragm;
- Process connection:G 1/4" ( G1/2");
- Maximum admisibil pressure: 600 mbar;
- Fixxed differential: 0,5 mbar;
- Contacting error:  $\pm 0,2$  mbar;
- Overpressure: 800 mbar.



## 5. Pressure connector

The product is dedicated to be used inside the braking system of the railway car.

Like components: pressure connector with diaphragm assembly; electrical switch assembly; electrical cable output assembly; case.

Like fonctionnement: the pressure connector is based on the pressure variation acting on the effective surface of an elastic element type diaphragm. This generate a displacement who, thru a lever and a spring is transmitted to an electrical microswitch, modifying his position from “normal closed“ to “normal open“ and vice – versa , depending of the increasing or the decreasing of the pressure.

Technical characteristics:

- Pressure range: 0,4...4 bar;
- Setting point: 3 bar;
- Fixes differential: 0,4 bar;
- Contacting error:  $\pm 0,2$  bar ;
- Switch contact: NC + NO with common point; 220V; 50 Hz;  $\cos\varphi=0,8$ ;
- Process connection: M16x1,5.

