

Installation and operating instructions for electronic safety pressure limiter DB1000/2

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1. Introduction

The electronic pressure limiter DB1000/2 is a combination of a pressure limiter (PZH) and a safety pressure limiter (PZHH) which are contained within one housing and work independently of one another.

It is used to protect against exceeding the maximum operating pressure in accordance with BGR 500 (Rules and regulations of the employers' liability insurance association), chapter 2.35 (operators) and EN 378 (manufacturers) in compressors in refrigeration and air conditioning systems.

The device is certified by TÜV Rheinland in accordance with the EC type approval test (guideline 97/23/EC), certificate no. 01 202 931-B-09-0011.

Patent registered under number 117147 35 at the patent office in Munich.

2. Conditions of use

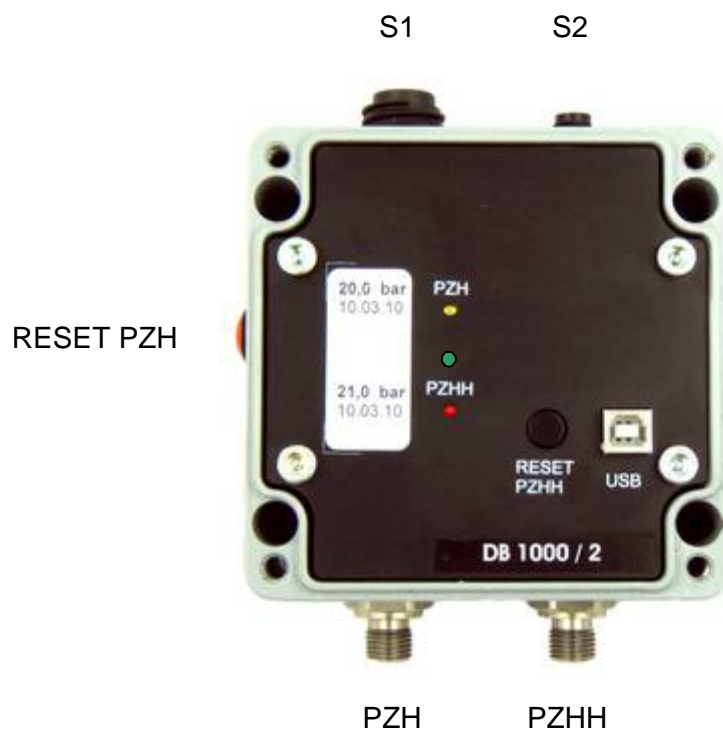
The electronic pressure limiter DB1000/2 is suitable for use in combination with all refrigerants of the media groups 1 and 2 in accordance with pressure guideline 97/23/EC, for example:

MG1: NH3 (R717)

MG2: R22, R134a, R507, R23, R744 (CO₂), R404a, R407a, R407c

The pressure cells of the PZH and the PZHH are dimensioned according to the area of use. The nominal pressure is given in the type designation. For example the type designation DB1000/2 – 160 means that this device has pressure cells for a nominal pressure of 160 bar.

3. Installation / Connecting the device



The electronic pressure limiter is supplied in a metal-clad aluminum moulded housing (IP 65). After unscrewing the lid the drilled holes (hole diameter 5mm) can be seen which allow you to fasten the DB1000/2 in place on the unit. Data regarding permissible vibration strain can be found under point 6.

Media connection

The media connection must be set up so that the same pressure is applied to both pressure sensors P1 and P2. This can, for example, be achieved using a T component. When tightening the screw fittings a ring spanner SW 22mm must be used to apply pressure in the opposing direction to hold it. You must not exceed the maximum permissible torque of 10 Nm.

Connecting auxiliary power

The electronic pressure limiter DB1000/2 requires a voltage of 24V DC +/- 20%. The maximum power consumption is max. 90 mA.

To connect the operating voltage to the plug S2 of the electronic pressure limiter you will need a 4pole straight cable socket 99-0430-10-04 (Boersig – included as part of the delivery)

The layout is as follows:

- Contact 1 Ground
- Contact 2 +24V DC

Output 4-20 mA

The DB 1000/2 has a 4-20 mA output where a current proportional to the pressure on the PZH is available for technical measurement purposes. Here a current of 4 mA equates to a pressure of 0 bar (rel) and a current of 20 mA to the full scale value (nominal value) of the corresponding sensor used. The accuracy of all is 1.5%. The output is available on plug S2.

The configuration is as follows:

- Contact 4 Output 4-20 mA, switchable with a load resistance against GND (Contact 1) between 200 and 800 Ohm

Alarm contact

The DB 1000/2 has a potential free alarm contact. This contact is only closed, if both outputs (PZH and PZHH) are activ. If one or both outputs are inactiv this alarm contact is open.

The configuration is as follows:

- Contact 3 and 5: Alarm contact

Informations of the contact burden you can find at chapter 6.

Connecting the switching output

Both the pressure limiter (PZH) and the safety pressure limiter (PZHH) have a safety relay with one operating contact each.

This contact is closed in normal operations and opens in the case of the pressure threshold value being exceeded or in the case of an error.

Both contacts are factory-set switched in series in the cable box so that the load current circuit is interrupted when the PZH is switched off as well as when the PZHH is switched off. Data on the permissible contact workloads can be found under point 6.

To connect the switching output to the plug S1 of the DB1000/2 you will need a 4pole cable socket 99-0210-00-04 (Boersig – included as part of the delivery).

The configuration is as follows:

- Contact 1 and 2 Relay contact PZH
- Contact 3 and 4 Relay contact PZHH

4. General functionality

The electronic pressure limiter DB1000/2 is set up for long term use. After applying the operating voltage the green LED POWER is switched on. The pressure limiter (PZH) and the safety pressure limiter (PZHH) monitor the relevant inputted pressure threshold. If this is exceeded, then the corresponding output relay is switched to be inactive, which means that the operating contact is opened. This status, which is displayed by a flashing yellow or red LED, is maintained even if the pressure sinks below the threshold value again or if the operating voltage is interrupted momentarily.

To reset (switch to active) the pressure limiter (PZH) and the safety pressure limiter (PZHH) there are two reset buttons. The reset button of the PZH is on the exterior of the housing. The reset button of the PZHH can only be accessed after unscrewing the lid.

When the lid is removed a USB port is also accessible which is used for the parameterization of both pressure limiters, retrieving pressure maximums, and a functionality test.

5. Device intelligence

The pressure limiter (PZH) has a yellow LED for signalling, the safety pressure limiter (PZHH) a red LED. As both limiters are otherwise set up completely identically and also work completely independently of one another, the functionality of only one of the limiters is described here.

5.1. Normal operations

After switching on the operating voltage the following processes take place simultaneously with both limiters:

First an internal check takes place. The microcontroller is checking the pressure cell, memory and other hardware components. If errors occur here, then the LED flashes in a special blink code. The meaning of the blink code is described in a special document. If a blink code occurs, please interrupts the supply voltage for a few seconds. If the blink occurs again, the device must be handed over to the service department for repair.

The checking of the pressure sensor is also carried out before each measurement in normal operations, whereby in the case of a negative result („sensor dropout“) the output of the corresponding limiter is immediately switched to passive.

Then the pressure limiter continues into normal operations: the pressure is measured at an interval of 1 ms, integrated over a time of 100 ms and then compared with the inputted

switching threshold. If it drops below the inputted threshold then the output of the limiter is switched to active.

However, as soon as the switching threshold has been exceeded once and the inputted switching on delay has passed, the limiter switches its output to passive and the LED flashes slowly at 0.5 Hz. This status is maintained even if the pressure drops below the switching threshold again.

A case of the pressure being exceeded is stored in a non-volatile form, which means even after disconnecting and reconnecting the network the limiter is in a passive state.

The limiter can be switched to active again by using the corresponding reset button, in the case that the current pressure is below the switching threshold. In this case the LED goes out when the button is pressed and the output is switched active again.

If the current pressure is still above the switching threshold then the flashing light becomes a constant light and the limiter remains switched to passive. If the current pressure then drops below the switching threshold, the LED goes out and the limiter is switched to active without having to quit again.

5.2. Connecting both limiters

Both limiters work on one gate each (mechanical safety relay), whereby the outputs of the relay are laid out on separate terminals. In a normal case the outputs are switched in series through a bridge. (See point 3)

5.3. Displaying the inputted values

After altering the switching thresholds and/or switching delay using the PC program „DB1000soft“ the alterations made must be documented on a label on the device so that it is visible at all times which setup values are currently configured. The self-adhesive labels contain fields in which you can enter the values by hand and are supplied with the device.

The label is stuck straight onto the front panel of the device and protected from its surroundings, as well as remaining visible, by the transparent cover.

6. Technical data and conditions of use

Auxiliary energy

Supply voltage 24V +/- 20%, power consumption circa 2 W

Media connection

Thread G ¼ inch in standard version

Pressure measurement cells

Stainless steel membrane resistant all refrigerants in accordance with EN 378-1 (appendix E)

Overload-proof to 2 x measurement range, bursting pressure 2.5 times the nominal pressure

Switch point accuracy: better than 0.5% FS

Load-bearing capacity of the switch contacts of the safety relays

DC operation 24V

DC1: non or slightly inductive loads (L/R < 1ms) maximum 9.0A

DC13: DC magnets (contactor) maximum 1.8A

AC operation 230V

AC1: non or slightly inductive loads ($\cos \phi > 0.95$)	maximum 6.3A
AC3: squirrel cage motors	maximum 2.5A
AC15: electromagnetic load (contactor $>72VA$)	maximum 1.4A

Load-bearing capacity of the switch contacts of the alarm relay

Voltage range 5...250V (AC/DC)

Current range 5 mA ... 6 A (AC/DC)

Conditions of use

Operating temperature range: - 40.... + 80 °C (for electronics)

Media temperature range: -40...+125 °C (when interposing the necessary heat insulation measures between sensor and medium)

Vibration strain: Vibration speed max. 4.5 (10) mm/s (category B class III in accordance with ISO 2372) at 50 Hz

Type of protection: IP 65 (with lid closed)

Media resistance against all refrigerants in accordance with EN 378-1 (appendix E)