

Mounting- and operating instructions

Electronic safety pressure limiter with integrated pressure monitor function DW500

ZILA GmbH
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1. Introduction

The DW500 is an electronic pressure safety device that combines the functions of a pressure monitor (PSH or PSL) and a safety pressure limiter (PZHH or PZLL) in a common housing. Both functions work independently.

The device protects compressors in cooling and air-conditioning systems, heat pumps, steam boilers and general hydraulic systems against exceeding the maximum operating pressure (PSH / PZHH) or lowering (PSL / PZLL) of the minimum operating pressure according to DGUV regulation 100-500 (BGR 500), chapter 2.35 (operator) and EN 378 (manufacturer).

In the following the pressure monitor with PSx and the safety pressure limiter with PZxx are described as "x" for "H" corresponds to a maximum pressure limitation and "L" for the version for minimum pressure limitation.

The device is certified by TÜV Rheinland according to EC type examination (PED Directive 2014/68 / EU), certificate no. 01 202 973-B-16-0023 is certified.

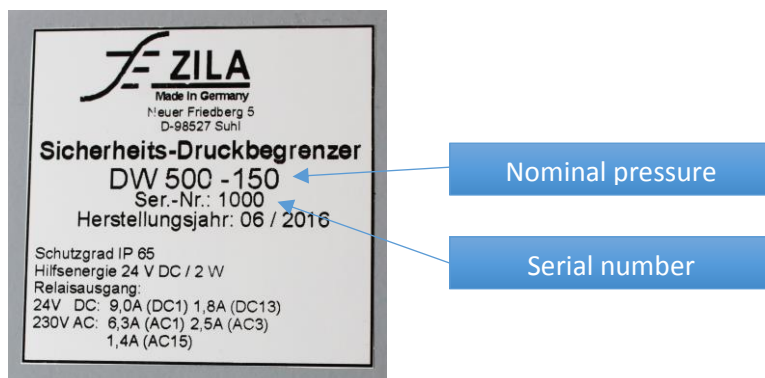
2. Operating Conditions

The DW500 is suitable for use in conjunction with all refrigerants of media groups 1 and 2 according to pressure equipment directive 2014/68 / EU, for example:

- MG1: NH3 (R717)
- MG2: R22, R134a, R507, R23, R744 (CO2), R404a, R407a, R407c

The pressure cells are dimensioned depending on the application.

The nominal pressure is indicated in the type designation. For example, the type designation DW500-150 means that this device has pressure cells for a nominal pressure of 150 bar. The complement "L" on the nameplate indicates the version for minimum pressure limitation.



3. Installation / Cable Connection



S1 - Relay outputs

S2- Operating voltage, alarm outputs, current output

S3 - remote unlocking PZxx

P1 - PSH/PSL

P2 - PZHH/PZLL

The electronic pressure limiter with integrated pressure monitor functionality is supplied in an encapsulated aluminum housing (IP 65). The DW500 can be attached to the unit after unscrewing the cover. Four holes with a diameter of 5mm are visible. Data on the permissible vibration load can be found under point 8.

Media connection (P1 and P2)

The media connection has to provide the same pressure to both pressure sensors P1 and P2. This can be realized with a T-piece (optional equipment). When tightening the screw connections, use a 22 mm ring wrench. The maximum permissible torque of 10 Nm must not be exceeded.

Connection of the auxiliary energy (S2)

The DW500 requires a voltage of 24V DC +/- 20%. The maximum current consumption is max. 90mA. To connect the operating voltage to the connector S2 of the electronic pressure limiter, a 5-pole straight 99 0436 12 05 (binder) is required (included in the scope of delivery). The connection assignment is according to point 8.

Output 4-20 mA (S2)

The DW500 has a 4-20 mA output where a current proportional to the pressure applied to the PSx is available for measurement purposes. A current of 4mA corresponds to a pressure of 0 bar (relative)

and a current of 20 mA corresponds to the measuring range end value (nominal pressure) of the respectively used sensor. The overall accuracy is 1.5%. The output is available at connector S2. The connection assignment is according to point 6.

Alarm contact (S2)

The DW500 has a potential-free alarm contact which is only closed when both outputs (PSx and PZxx) are active. If one of the two is inactive (for example by exceeding the pressure threshold for a version for maximum pressure limitation), the alarm contact is open.

Data on the permissible contact load can be found under point 8.

Connection of the switching output (S1)

Both the pressure monitor (PSx) and the safety pressure limiter (PZxx) have a safety relay with one working contact each.

This contact is closed in normal operation and opens when the switching threshold is reached or in the event of a fault. Both contacts are connected in series in the cable box, so that the load circuit is interrupted both when the pressure switch is switched off and when the pressure limiter is switched off. Data on the permissible contact load can be found under point 8.

A cable gland PG9 4-pin 99-0210-00-04 (truss) is required to connect the switching output to connector S1 of the DW500 (included).

Remote release PZxx (S3)

The safety pressure limiter (PZxx) of the DW500 can be reset by means of an integrated key or alternatively can be unlocked remotely. A 3-pole flange socket is located on the side of the unit. The external reset circuit is supplied with the 24V operating voltage. It is constructed as a 4-20mA current loop and is optically isolated from the main part of the circuit via an optotransistor. A maximum of 20 mA will flow at the pushbutton or short circuit.

A suitable cable connector (Binder 99 9105 00 03) is included for the connection S3 for a remote release. The connection assignment is according to point 6.

The following restrictions on the use of the remote release must be observed:



The actual plant condition and the information relevant to the process to be controlled must be recognizable to the user before, during and after the reset operation;
the maximum number of provisions must be limited to 5 actions within 15 minutes.
Thereafter, no further provisions may be allowed unless the device has been tested.

4. General Features

The electronic pressure limiter with integrated pressure monitor function DW500 is designed for continuous operation. The device combines a pressure monitor (PSx) and a safety pressure limiter (PZxx) in one housing. Both functions are completely independent of each other and thus offer maximum security. After the operating voltage has been applied, the green POWER LED lights up. The pressure monitor (PSx) and the safety pressure limiter (PZxx) monitor the respective set pressure threshold. If this is exceeded or undershot, the respective output relay is switched inactive, i. the working contact is opened.

This state is indicated by the yellow LED (on) and the PZxx by the red LED on the PSx. The PZxx state is also retained when the pressure falls below the threshold value (or rises above the threshold value at minimum pressure limitation) or if the operating voltage is interrupted in the meantime.

While the pressure monitor is automatically unlocked when the set switch-on threshold (switching threshold minus configurable hysteresis) is reached, the safety pressure limiter has to be reset manually or remotely by connecting S3. The manual reset (active switching) of the safety pressure limiter (PZxx) is carried out by means of a reset button, which can only be actuated after unscrewing the cover.

When the cover is removed, a USB port is also accessible, which is used to configure the parameters, to query the pressure maxima, and to perform a function test.

5. Device intelligence

The state of the device is indicated by additional LEDs. For this purpose, the pressure monitor (PSH / PSL) has a yellow LED and the safety pressure limiter (PZHH / PZLL) has a red LED, see figure in chapter 3.

6. Normal operation

The DW500 has several self-test functions. After the operating voltage has been switched on, the following processes occur simultaneously with both the pressure monitor and the pressure limiter:

First, an internal test is performed. The microcontroller checks the pressure cell, memory and other hardware components. If errors occur, a flashing code is generated depending on the error. The individual flashing codes and the reading of the codes from the LED are described in a separate document.

If an error occurs, it is advisable to interrupt the operating voltage by pulling the cable box on connector S2 and to restore it after a few seconds. If the fault occurs again, the device must be handed over to the service for repair.

The test of the two pressure sensors is also carried out before each measurement in normal operation, whereby the output of the monitor or safety pressure limiter is immediately switched to passive if the result is negative ("sensor break").

After successful testing, the device goes into normal operation: the pressure is measured at a distance of 1 ms, integrated over a period of 100 ms and compared with the set switching thresholds. As long as the switching limits for pressure monitors and safety pressure limiters are not violated, both outputs are actively switched.

6.1. Linking monitors and limiters

Both functions operate on one switching element each (mechanical safety relay), the outputs of the relays being connected to separate terminals. At the factory, the outputs are connected in series by a bridge. (See point 3.)

7. Visualization of the set values

After changing the switching thresholds and / or the switching delay times by means of the PC program, the changes made must be documented on a sticker on the device so that it is always possible to see which setup values are currently set. The self-adhesive labels contain fields for handwritten entry of the values and are supplied with the device.

The sticker is glued directly onto the front panel of the device and is visible from the outside through the transparent cover and protected against environmental influences.

8. Technical data and operating conditions

Electrical specifications

- Supply voltage 24V +/- 20%
- Power consumption max. 90mA
- Power consumption approx. 2W

media connection

- G ¼ inch thread in the standard version

Pressure Sensors

Stainless steel diaphragm, resistant to all refrigerants according to EN 378-1 (appendix E) Overload-proof up to 2 x measuring range, burst pressure 2.5 times the nominal pressure Switching point accuracy: better than 0.5% of the measuring range end value

pressure measurement

- Pressure measuring cycle 1ms, integration over 100 ms
- Pressure threshold for PSx and PZxx separately adjustable between 5% and 90% of nominal pressure
- Hysteresis range for PSx 0 ... 7.5% of nominal pressure
- Switching point accuracy: <0.5% of the nominal pressure. Switch-off delay: 0.1 ... 1.1 s adjustable

Load capacity of the switching contacts of the safety relays

24V DC operation

- DC1: non-load or low-inductance loads (L / R <1ms) maximum 9.0A
- DC13: DC solenoid (contactor) maximum 1.8A

AC power 230V

- AC1: not or low inductive loads (cos phi > 0,95) maximum 6,3A
- AC3: cage rotor motors maximum 2.5A
- AC15: electromagnetic load (contactor > 72VA) maximum 1.4A

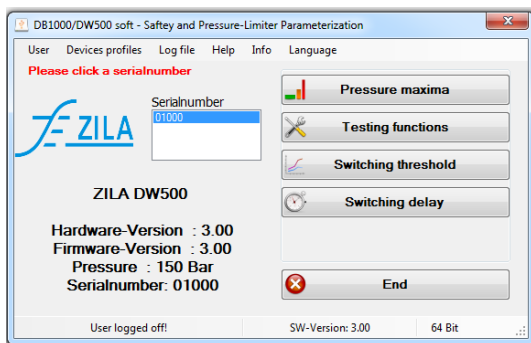
Permissible voltage and permissible current at the alarm contact

- Voltage range 5 ... 250V (AC / DC)
- Current range 5 mA ... 6 A (AC / DC)

Operating conditions

- Operating temperature range: - 40 + 60 ° C (for electronics)
- Media temperature range: -40 ... + 125 ° C (with interposition of the necessary heat insulation measures between sensor and medium)
- Vibration load: Vibration speed max. 4.5 (10) mm / s (category B class III according to ISO 2372) at 50 Hz
- Protection class: IP 65 (with cover closed)
- Media resistance to all refrigerants according to EN 378-1 (Annex E)

9. Device configuration

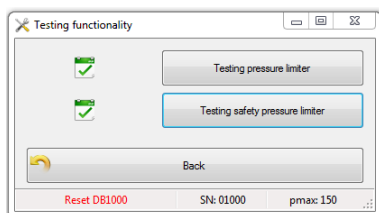


9.1. Self-test function

The function test is carried out with the PC software db1000soft, which can be downloaded from www.zila.de.

After the software has been installed on a PC or notebook, connect the USB cable to the device. To do this, unscrew the cover of the safety pressure limiter. Start the software "DB1000soft" and follow the operating instructions of the PC program.

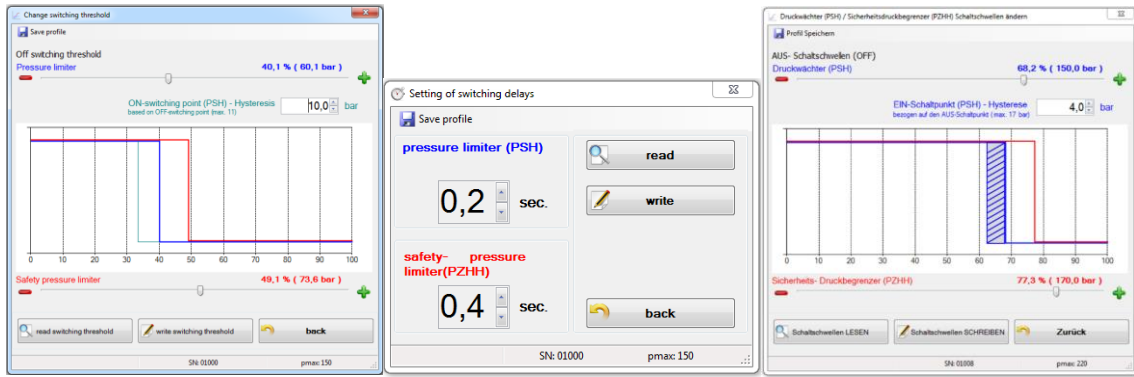
The "Function test" button is then pressed and the threshold of the set point pressure can be simulated individually for the PZH and the PZHH. Afterwards reset the PZH and PZHH via the reset buttons.



9.2. Setting the switching threshold, switching delay and hysteresis

These setting functions are also performed by means of the PC software.

To configure the switching thresholds and switching delay, choose the specific option from the settings menu. The parameters can be set individually for the PZH and the PZHH.

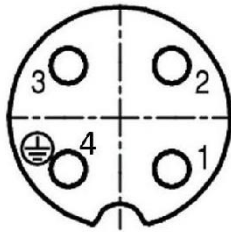


10. Wiring diagram

Cable sockets and connectors

S1

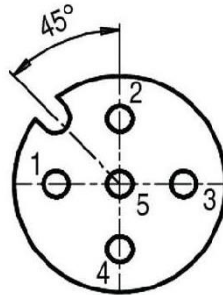
4 pole cabledose PG9, Serie 692/693, Binder: 99 0210 00 04



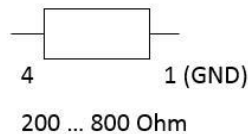
1 und 2: relay contact PSx
3 und 4: relay contact PZxx

S2

5polige Kabeldose, Serie 713, Binder: 99 0436 12 05

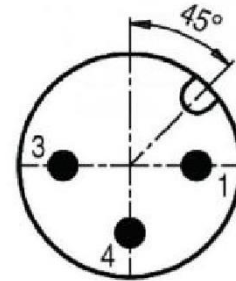


1: GND (Minus 24V DC)
2: Plus 24 V DC, max 90 mA
3 und 5: alarm contact
(Normally closed - Normally open, in the event of a fault)
4: Pressure measurement output (4...20mA)



S3

3-pole angled connector, M12-A Serien 713, Binder: 99 0429 27 04



1 und 3: Reset-Button
4: PE