

Differential pressure guard/Transmitter DPGT-V Bi



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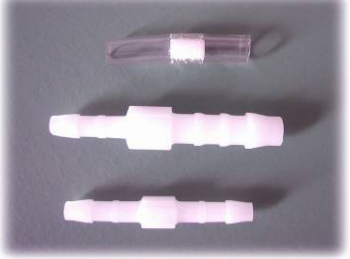
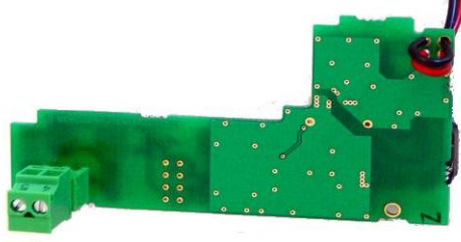


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1 COMPONENTS

1.1 Differential pressure guard / Transmitter

	
<p>AN 29372</p>	<p>AN 29371</p>
<p>Differential pressure guard transmitter type DigiControl DPGT-V Bi $-2'500...+2'500 Pa$, with 24 VAC/VDC power supply, with LCD display, with ABS housing</p>	<p>Differential pressure guard transmitter type DigiControl DPGT-V Bi $-2'500...+2'500 Pa$, with 100..240 VAC power supply, with LCD display, with ABS housing</p>

1.2 Accessories and spare parts

	
<p>AN 28913</p>	<p>AN 28909</p>
<p>Housing cover DPGT-V without electronics and screws (AN 28920 special screw set for housing cover)</p>	<p>Housing bottom complete</p>
	
<p>AN 29380</p>	<p>AN 28899</p>
<p>Electronics Module Transmitter DPGT-V Bi</p>	<p>Hose dust protection filter</p>
	
<p>AN 28914</p>	<p>AN 28915</p>
<p>Power supply module 24 VAC/DC</p>	<p>Power supply module 90...240 VAC</p>
	<p>Factory Calibration</p>
<p>AN 28918</p>	<p>AN 28919</p>
<p>Replacement plug set DPGT-V 5 pieces</p>	<p>calibration at three points, incl. factory certificate</p>

2 PRODUCT DESCRIPTION

The Luwa **DPGT-V** differential pressure transmitter is an electronic precision measuring instrument for the use in air conditioning control and regulating systems. The built-in sensor instrument continuously measures the differential pressure and shows the measured value on a large LCD display as well as on a high-precision analogue output. Moreover the device has two internal relay switch contacts. The DPGT-V is available for a measuring range of -2500...+2500 Pa.

Special features:

- **Large** LCD Display
- Easy and **intuitive menu navigation** with three keys on the front side
- 1 **analogue output** (U and I), freely scalable
- 2 integrated **limit switches** (230V)
- **Calibration of the pressure is possible** at 2 points (Offset and Gain).
- **Password-protection** for all settings
- **Key lock**
- Different **selectable measurement units**
- Permanent **online monitoring** of all functions



Luwa DPGT-V

2.1 Scope of supply

The **DPGT-V** contains:

- Differential pressure measuring instrument
- Operating Instruction

Check the completeness of the box contents. Incomplete deliveries can be completed immediately by the Luwa Air Engineering AG representation.

2.2 Transmitter Features

Type	DPGT-V Bi -2500...+2500 24VAC/DC	DPGT-V Bi -2500...+2500 100..260 VAC
Item number	29372	29371
Measuring range	-2500 ... +2500 Pa	-2500 ... +2500 Pa
Operating voltage	24 VAC/DC +/-10%	100...240 VAC 50/60 Hz +/-10%
Max. Resolution	0.1 Pa intern 1 Pa Display	0.1 Pa intern 1 Pa Display
Measuring accuracy at 20°C	+/- 0.5% (pos) of entire measuring range	+/- 0.5% (pos) of entire measuring range
Temperature effect	< 0.09 Pa/°C	< 0.09 Pa/°C
Offset drift	+/- 10 Pa / year typical	
Measuring element	Piezoresistive diaphragm differential pressure sensor, digital	
Max. allowed over pressure	+/- 35'000 Pa	
Operating temperature	0 ... +50°C	
Moist environment	0 ... 90%RH Non condensing	
Power consumption	max. 4 VA	
Over-voltage category	II	
Degree of pollution	2	
Application	in rooms and ventilation ducts and ventilation filter	
Analogue output	0,2 ... 10V (load >= 10 kOhm) / 0,4 ... 20mA (resistance <= 500 Ohm)	
Resolution of the analogue outputs	Typical 2.5 mV, 5 uA	
Accuracy of the analogue outputs	Typical 0.05% of the AO set range	
Mounting position	not relevant	
Dimensions of the housing	150 x 165 x 56mm	
Protection of the housing	IP 65	
Material of the housing	ABS	
Total weight	ca. 0.2 kg	
Storage temperature	-10 ... + 60°C non condensing	
CE-conformity (EMV)	EN 61326-1 / EN 61326/A1 / EN 61010-1	

Technical specification of the relay contact:

Limit switch	Relay contact 230V, 2A
Type of interruption	Micro-disconnection
Proof voltage V AC/kV (1,2/50us)	1.000/1,5
Max. switching capacity AC1 VA	460
Max. switching capacity AC15 (230 V AC) VA	300
1-Phase motor, AC3-operation (230V AC) kW	0,185
Max. switching current DC1: 30/110/220V A	2/0,2/0,12
Min. switching load mW(V/mA)	500 (12/10)

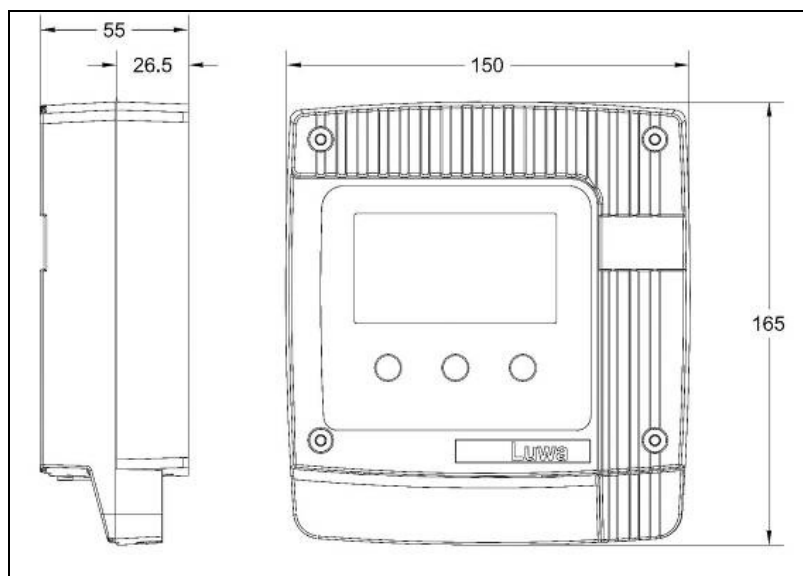
2.3 Factory settings

Display	:	-2'500 ... +2'500 Pa
AOUT	:	2 ... 10V / 4 ... 20mA = 0 ... FS (Full Scale -> entire Measuring range)
Relay-Switching behaviour	:	HI LO THR L: -10Pa / TRH H:FS +10Pa; HYST 0; DELAY 0 / RELAY nOFF
Password	:	"0000" -> deactivated
Factory setting	:	precalibrated (standard)
Optional calibration	:	Measured at three points, including factory certificate (Art. Nr. 28919)

2.4 Technical specifications

- Supply voltage range 1** 24 VAC / VDC ±15%
- Supply voltage range 2** 100...240 VAC 50/60Hz
- Outputs** 0/2 ... 10V (Load >= 10 kOhm) / 0/4 ... 20mA (resistance <= 500 Ohm)
- Limit switch 1+2**..... Relay contact 230V, 2A
- Galvanic Separation** Output
- Power consumption** 2 Watt
- CE-Conformity (EMV)** EN 61 326
- Electrical connection**..... Screw terminal block for cables until max. 1 mm²
- Working temperature**
- Housing**..... 0 to +50°C
- Measuring range dP** -2'500 ... +2'500 Pa
- Storage temperature**..... -10 to +60°C
- Environment**..... air and neutral gazes

2.5 Dimensions



SAFETY

- This device has left the factory in a perfectly safety-related way. Inappropriate manipulations or modifications are strictly forbidden. Follow all warnings and warning labels on the instrument and in the manual.
- The **DPGT-V** is exclusively developed for the measurement of the fresh air within the specifications. Use and run this instrument only for this purpose. A different or additional use is considered as not intended. The manufacture / supplier is not liable for possible damage caused. The risk lies entirely with the user.
- The assembling and installation work may only be done by certificated personal (electrician or workman with equivalent training).
- The **DPGT-V** may operate only under the specified operation conditions.
- Wherever malfunctions or errors can cause large material damage or personal injury, additional precautions and external safety measures must be taken, so that in case of an error the defined operation conditions are guaranteed (for example limit switch).
- The **DPGT-V** is not suitable for the use in hazardous rooms.
- The professional installation should comply with local electrical codes and with this manual.
- The **DPGT-V** contains ESD-sensitive components. Please refer to the appropriate safety measures.
- Use only original accessories and spare parts from Luwa Air Engineering AG.
- Without written permission from Luwa Air Engineering AG it is not allowed to carry out extensions or remodeling at the **DPGT-V**.

3 INSTALLATION

General:

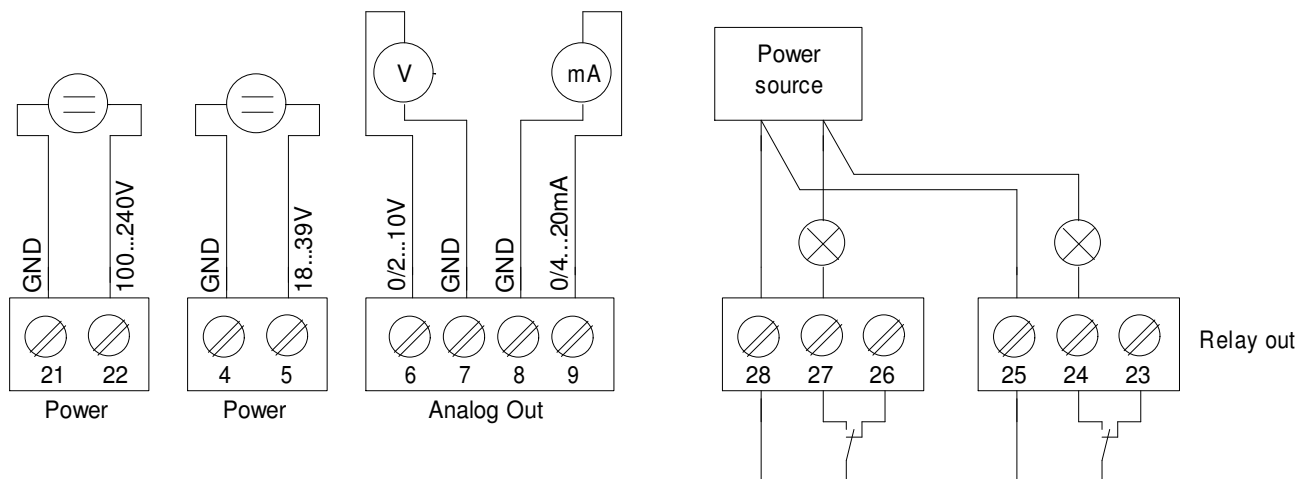
1. Read carefully this manual before the installation of the **DPGT-V** instrument.
2. Check the performance data on the label fixed on the instrument and check whether or not it is suitable for your application.
3. Choose the appropriate mounting place according to the application and specification (possibly in cooperation with the planners).
4. Observe strictly that the device specifications and the MAC values match.
5. Avoid that the instrument and the probe are exposed to a corrosive ambient air.

4 MOUNTING

1. First remove the bottom of the instrument. If necessary, 4 holes can be broken through for the mounting on the wall or at the ventilation duct.
2. In case of unevenness of the mounting wall, 4 spacers can be assembled.
3. Insert the appropriate cables into the membrane which is at the bottom of the instrument by piercing small holes into the membrane with a pointed scribe and then push the cables through the holes.
4. For a stain relief use the delivered stain relief plate.
5. After having set the dowels or drilled the appropriate holes in the wall, the bottom can be screwed.
6. Now you can screw the cables on the connector with the ferrule. Please consider for this the electric diagram of the designer, respectively of the instrument.
7. Check the wiring carefully before connecting the plugs to the cover plate with the integrated electronics.
8. Hang the cover in the hinges, close it and tighten the screws.
9. After switching on the supply voltage, the **DPGT-V** registers on the display.

Note: In case of a change of location an auto zero adjustment of the device should be carried out.

Electrical connections:



Power-connecting terminal 24VDC suitable for:

Single-strands 0.08...1 mm² (1.5 starr), 28...16 AWG

Power-connecting terminal 100-240VAC suitable for:

Single-stands 0.2...2.5 mm² (2.5 starr), 24...14 AWG

Analogue out-connecting terminal suitable for:

Single-strands 0.08...1 mm² (1.5 starr), 28...14 AWG

Relay out – connecting terminal suitable for:

Single-strands 0.2...2.5 mm² (2.5 starr), 24...14 AWG

EMC note:

1. Disturbing circuits of measurement or analysis units have to be separated by open ground.
2. Avoid, wherever possible, the parallel guidance of measurement connections and power electric cables.
3. Shield the measurement connections, if necessary, and connect the screen only on one side with a defined mass potential.
4. Twist the unshielded cables in pairs and keep them as short as possible.

Recommended cabling:**Power:** 19.2 ... 28.8 VDCSingle-strands from 0.5...0.75 mm² (22 ... 18 AWG) with PVC isolation or equivalent 2-fold strand.**Power:** 90 ... 264 VACSingle-strands from 0.5...0.75 mm² (22 ... 18 AWG) with reinforced isolation or corresponding 2-fold strand.**Analogue Out:** 0...10 VDC / 0... 20 mASingle-strands from 0.25...0.5 mm² (24 ... 20 AWG) twisted and possibly shielded with PVC isolation or corresponding 2/3/4-fold strand.**Relay Out:**

Cable type: depending on the application and the devices to be controlled.

Attention!

If voltages are switched on > AC 33V or DC 70V note the following points:

- The feed lines must have reinforced or double isolation. For example by using base isolated conductors they have to be isolated in addition (shrink hose, isolated cable).
- The supply cables must be approved for the corresponding voltages.
- The supply cables have to be installed through the strain relief.

5 STARTUP

Electrical connection power supply 1:

Connect the device to a DC voltage between 18 and 39V. A voltage > 39V can destroy the device.

Electrical connection power supply 2:

Connect the device to an AC voltage between 100 and 240V.

Regulation

Don't forget to secure the supply line in accordance with the current regulations in your country. Before commissioning check again the correct wiring of the power supply.

Attention!

Close the cover of the DPGT-V before the power supply is switched on.

Electrical connection analogue output:

Connect the external control or analysing devices to the analogue pressure output. The DPGT-V has a voltage output (0..10V, 2..10V) and a current output (0..20mA, 4..20mA).

The outputs are protected against overload and short circuit. **Never** connect an external supply! The device could be destroyed.

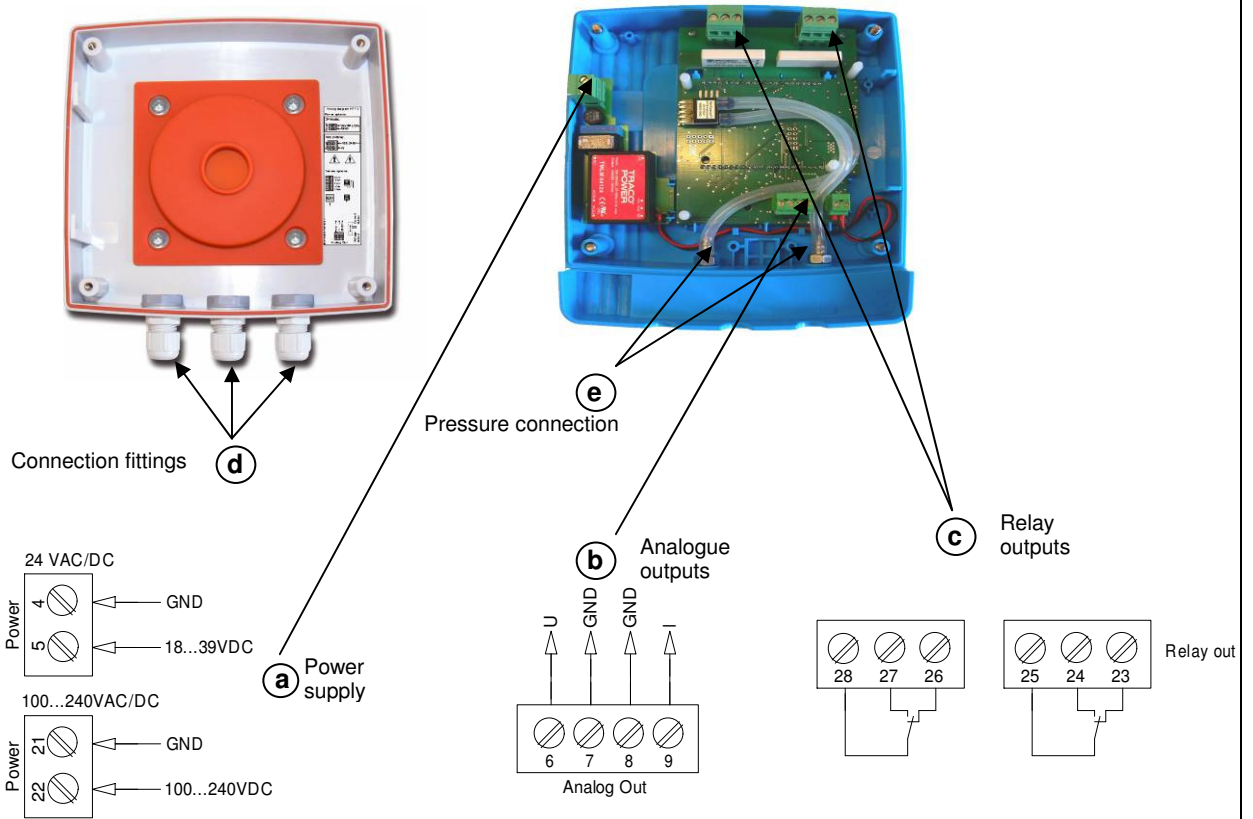
Make sure that the load at the voltage output is $> = 10k\Omega$ or the resistance at the current output is $\leq 500\Omega$.

The **DPGT-V** is calibrated to a basic accuracy of +/- 0.5% for the entire measuring range. After switching on the power supply, an automatic start-up occurs ***S TST***. On the top line of the display the current software version is shown during 2 seconds. After that the measurement starts immediately and the current differential pressure is displayed. In case of faults of the hard- or software, the system alerts "Error" and shows an error-code. The device has an online monitoring, which reports errors immediately.

Hose connection:

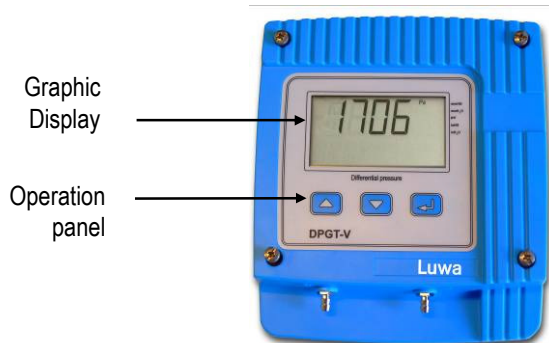
Connect the hoses directly to the both hose nipples at the bottom side of the housing. Hoses with an internal diameter of 4mm can be connected to the nipples.

6.1 Connections

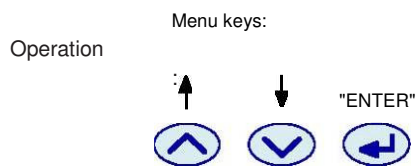


6 CONFIGURATION

6.1 Working principle



The **DPGT-V** is delivered ready for operation. Only the analogue outputs and the alarm output should be configured following to your needs. For this, the instrument has an intuitive menu guidance which can be started with the key „Enter“.



ENTER :-> Press 2 seconds menu and submenus for the measuring mode.

[↑]*: -> Menu upwards increases the blinking digit

[↓]*: -> Menu downwards reduces the blinking digit

Following menu items can be accessed:

- Measuring mode
- Calibration (adjustment) of the differential pressure
- Scaling of the analogue output (U: 0,2...10V - I: 0,4...20 mA)
- Configuration of the alarm output 2 Relays
- Configuration of the low-pass filter (Grading measurement and AO)
- Manual override
- Key lock (password protection)

Each menu item can be selected by [↑], [↓].

6.2 Measurement mode:

Measurement mode

To get directly from any menu item to the measurement mode, press for minimum 2 seconds the „Enter“ key. The measurement mode is automatically activated 2 minutes after the last key press. The current differential pressure is displayed. In case of an error, an error code is displayed.

6.3 Configuration of the pressure output area and the analogue outputs:

Analogue Outputs
*AN OUT

Configuration of the lower range limit

- Turn on the power supply. \Rightarrow a self test is executed “*S TST*” and the current software version is displayed on the top line.
- As soon as the device is started (display of the pressure) press [ENTER] and then, 1x [↓] \rightarrow The submenu “*AN OUT” appears.
- Press [ENTER]. Thus the pressure value is displayed (“RANGE L” <Pa>), which shall be at the lower end of the analogue voltage or current range, i.e. at 0 (2)V or 0 (4) mA.
- If you want to change this value, press [ENTER] \Rightarrow The first digit blinks. By pressing [↑] or [↓] you can change it.
- Press [ENTER] \Rightarrow The second digit blinks and can be changed with [↑] or [↓].
- Continue with all digits to be adjusted until - after the last one - it stops blinking. The value is thus set.

Configuration of the upper range limit

- Immediately after the execution of the configuration of the lower range limit you can continue with [↓] to “RANGE H” <Pa>.
However, should you already be back in the measuring mode, you can change with [ENTER], [↓], [↓], [ENTER] and [↓] to “RANGE H” <Pa>.
- Set up the desired value as described in the previous chapter.

Revision the upper and lower range limit

For example if “RANGE L”<Pa> is set to 1000Pa and “RANGE H” to 0Pa, 1000Pa is at the lower and 0Pa at the upper range limit.

Equation the upper and the lower range limit

For example if “RANGE L”<Pa> is set to 10.0Pa and “RANGE H” to 10.0Pa, 10.0Pa is the lower output variable and 10.1Pa the upper output variable. This can be used for example for an easy limit value monitoring.

Manual override
*MANVAL

6.4 Manual override:

Here it is possible to set a fixed “manual value” which should be issued instead of the current measured value up to 10 minutes. The manual value range is from -2’500 ... +2’500 Pa and corresponds to the analogue output signal. This value is displayed until it is re-adjusted or reset or the 10 minutes are elapsed. After that the instrument goes back into the normal mode of measurement.

6.5 Configuration of the output current and voltage range:

Output range
4mA/2V

- The parameter "4mA/2V" determines whether 4..20mA and 2..10V (with setting "YES") or 0..20mA and 0..10V (with setting "NO") should be issued. Adjust the desired value accordingly.

Press [ENTER] and [↑] or [↓] to meet the desired selection and finish by pressing [ENTER].

The DPGT-V has a voltage output and a current output (see connection scheme).

Note:

Act by "Overflow" and "Underflow".

Is the upper or the lower end of the measuring range overstepped, the device displays "Overflow" or "Underflow". The analogue outputs display in this case the maximum value (for example. 20 mA) by "Overflow" or the minimum value (for example. 0 mA) also 0mA/0V with setting 4mA/2V by "Underflow".

6.6 Configurations of the limit switch 1:

Alarm setting
*ALARM 1

Mode selection

- Once the device has been started (display of the pressure) press [ENTER] and then 3x [↓]. The sub-menu ("*ALARM 1") is displayed.
- Press [ENTER]. Thus the mode ("MODE") is displayed which is currently set.
- If you want to change this value, press [ENTER] ⇒ The display begins to flash. The mode can be changed with [↑] or [↓].

LO: The alarm triggers by falling below a certain value.

HI: The alarm triggers by exceeding a certain value.

HI LO: The alarm triggers by falling below a first value or by exceeding a second value.

Press [ENTER] to confirm.

Switching threshold

- Directly after execution of the mode selection, you can forward to "THRESH" by pressing [↓]. However, if you are already back to the measuring mode, press [ENTER], 3x[↓], [ENTER] and [↓] to switch to "THRESH" <Pa>. At the mode HI LO the menu point "THR L" is displayed.
- Set up the value at which the alarm should be carried out. Proceed the same way as for the input of the range of analogue values.

Note:

The switching thresholds are factory-provided with the values of overflow and underflow, so that they are not active in the measuring range.

- At the mode HI LO go to the menu point "THR H" after the input of "THR L" to define the second switch-point.

Hysteresis

- Select the next menu-point "HYST".
- Now set the value of the hysteresis. Proceed the same way as for the input of the range of the analogue values. The measured value needs to be by this amount below the alarm threshold for the mode HI or above for the mode LO so that the alarm is reset. A combination is also possible -> mode HI LO.

Delay

- Select the menu-point "DELAY".
- Set the value of the alarm delay. Proceed the same way as for the input of the range of the analogue values. The measured value has to be throughout the entire delay time within the alarm range in order to trigger an alarm. The reset is done without delay.

Switching function of the alarm relay

- Select the next menu-point "RELAY".
- Choose the desired switching function of the relay.

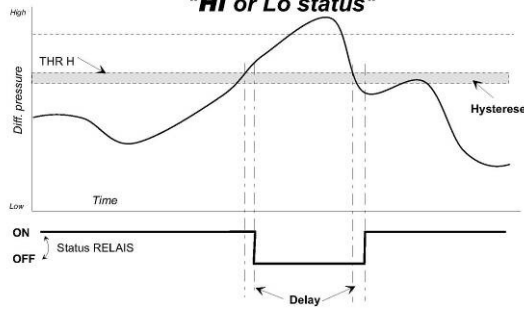
ON: The relay is energized during normal operation.
It cuts out in alarm situations, power failure or a system fault.

OFF: The relay operates only during an alarm. A power failure and a system fault don't create an alarm.

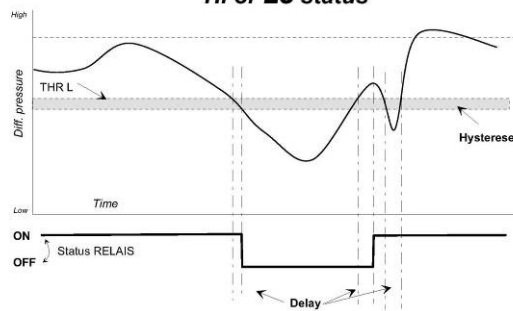
System errors can be:

Supply voltage out of range, sensor error, and fatal error.

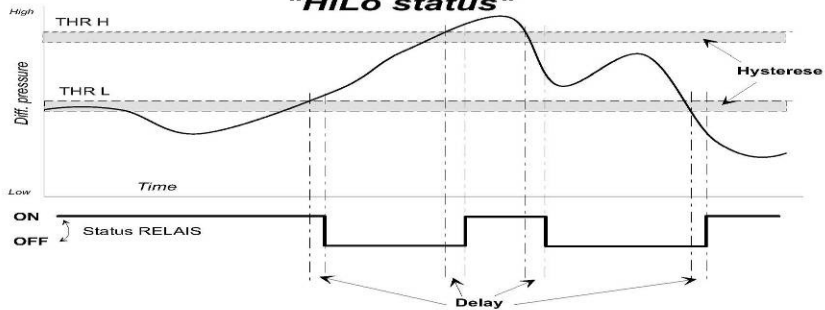
**Alarm control diagram
"Hi or Lo status"**



**Alarm control diagram
"Hi or Lo status"**



**Alarm control diagram
"HiLo status"**



6.7 Configuration of the limit switch 2:

Alarm setting
*ALARM 2

See point 7.6

6.8 Low-pass filter adjustment:

Filter setting
FILTER

- Press [ENTER]. ⇒ The display starts to flash. With [↑] or [↓] the low-pass filter can be adjusted between 0 and 99.
- Press [ENTER] to confirm the entry.

Note:

The low-pass filter damps the measured value indication and the analogue output signal. This function can be used to smooth high pressure oscillations. It is recommended to set up a low filter for high oscillations (high frequency) and a high filter for low oscillations (low frequency).

6.9 Leaving the configuration

Leave menu
EXIT

- In the exit menu press normally [Enter] to change to the measuring mode.
- Press long (ca. 2 Sec.) to switch from each menu item to the measurement mode.

6.10 Calibration Pressure:

The DPGT-V meets the indicated specifications upon delivery. A calibration for a new device is therefore not necessary. The zero point has to be adjusted. By the methods described below, the device can be readjusted and the accuracy be improved.

Delete the calibration:

If you are not sure whether the device has a valid calibration, you should delete the calibration before making a new calibration.

- Select “*CAL P” -> “CAL CLR” and answer the question “CLR?C” with “YES”. P “*DONE” is displayed and you are back in the calibration menu.

Note:

If the calibration is cleared, the device is equipped with the factory calibration values.

Performance of calibration:

Zero point calibration

- Remove the external pneumatic hoses from the connection nipples.
- Leave the connection nipples open.
- Select the zero point calibration “*CAL P” -> “ZERO”.
- Press [ENTER]

For the calibration of the gain you need a known differential pressure. Use for this a reference device or a meter calibration.

Gain-calibration

- Before running the gain-calibration necessarily carry out first the zero point calibration.
- Attach the pressure calibrator or the reference device in the way that a pressure can be applied at the DPGT-V respectively the same pressure can be measured.
- Make sure that the applied pressure is stable.
- Select gain-calibration. “*CAL P” -> “GAIN”.
- Press [ENTER]. ⇒ The actual measured pressure is displayed and can be adapted by [↑] or [↓] to the reference pressure.
- After the settings answer the question “SAVE?” with “YES”.

Note:

*The pressure for the gain calibration must be at least 10% of the measurement range. If this is not the case “*SPACE*” <Error> is displayed and the value is not saved. The gain may differ maximum 15% from the factory calibration. Otherwise “*RANGE*” <Error> is displayed and the value is not saved.*

Display of the meter calibration points:

- At “*CAL P” -> “GAIN” the current gain can be displayed.

6.11 Display

LCD setting
*DISP

You reach this menu by pressing ENTER and 2x [↓] -> “*DISP”:

Contrast

Contrast
CONTR

By pressing again ENTER you get to the “CONTR” mode. Here you can set the contrast of the LCD display individually between 0 and 9.

Unit of pressure

Unit pressure
UNIT P

With “UNIT P” you can select between Pa, mbar, mmHG, mmH2O, psi, inHG, inH2O. This setting affects the display, but not the outputs.

Sign Reversal

Sign reversal
SIGN +-

With “SIGN” you can change the sign from + to -.

6.12 Keyboard-lock:

Password protection
*KEYLO

Key lock switch

With the keyboard lock the device can be protected against accidental setting changes.

- Select under “*KEYLO” -> “CODE” a secret code other than 0000. Don't forget this code! If you don't press a key during 2 minutes, the keyboard and the menu will be locked. Now you can make settings only if you can answer the question “CODE?” correctly.
- With “*KEYLO” -> “LOCK” you can lock the keyboard immediately before expiration of 2 minutes.

Key lock off

Press “*KEYLO” -> “CODE” to 0000.

Attention!

Note your password. The reset can only be done via reset to the factory setting. Thus all configuration data will be reset to factory setting.

Reset on factory setting:

All parameters, including keyboard, password and calibration values will be reset to factory setting by this way: .

- Turn off the supply voltage, press [↑] and switch on the voltage.
- Answer the question “FA SET?” with “YES” ⇒ “*DONE” is displayed and the device is restarted.

7 SYSTEM MESSAGES

S TST	Power ON reset, self-test is performed
DONE	Action completed successfully
CODE?	Password needed
WRONG	Input lock-code: invalid code entered
SPACE	CAL points are too close (at least 10% of the entire measuring range for gain adjustment)
RANGE	Deviation too large, calibration impossible
POWER	Supply voltage outside the limits
FATAL	Self-test has detected serious problem
OVERFL	Measured value above the upper limit of the measuring range of the device (+10 Pa)
UNDERFL	Measured value below the lower limit of the measuring range of the device (-10 Pa)

Error messages:

A serious error is displayed together with an error code. This code is important for the error analysis. Please send us in this case always the error code.

7.1 Maintenance and support

Cleaning:

Please wipe the device only with a damp towel if necessary. Do not use aggressive cleaning agents.

8 TECHNICAL SUPPORT:

Luwa Air Engineering AG has an extensive worldwide network of representatives which offers a service at any time with their experienced technicians. Report any disturbance to your local representative of Luwa Air Engineering AG

www.luwa.com

