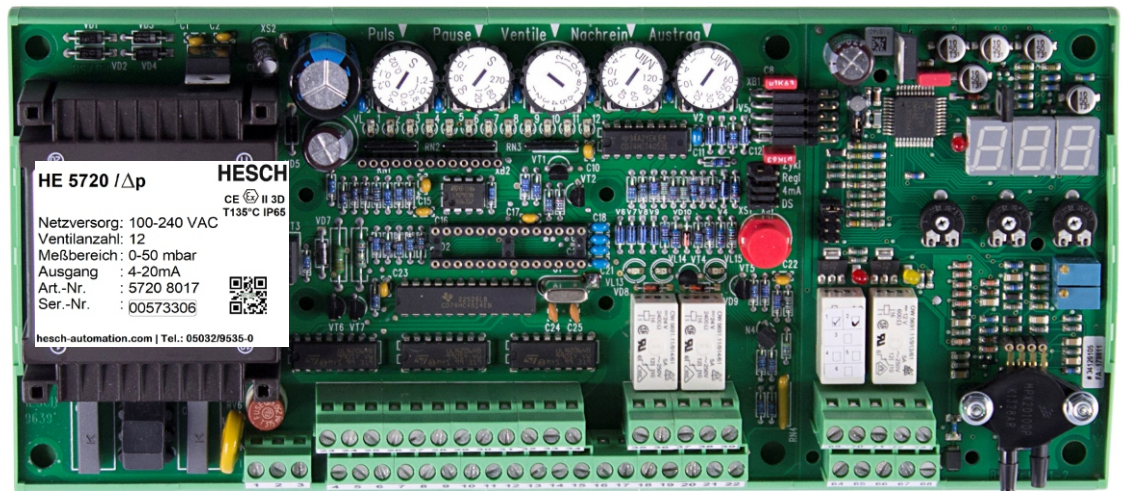


# HE 5720

$\Delta p$  Valve Controller



## Operating instructions

**HESCH**

AUTOMATION



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OPERATING INSTRUCTIONS:HE 5720

Date: 15-03-2023

Art.-No.: 371209

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# Document History

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## Document History

Version / Date	Description
2.2 / 06-07-2016	revision
2.3 / 15-03-2023	Validity of operating instructions for ATEX and Non-ATEX devices

# General Safety Instructions

## 1 General Safety Instructions

### Instrument Safety

This instrument was built and tested according to production-specifications and was shipped in safe condition. The protection class mentioned in the operating instructions is applicable. In order to maintain this condition and to ensure a safe operation, the applicant must follow the hints and warnings given in these safety notes.

The instrument must be operated only by trained personnel. Maintenance and repair should be carried out only by trained, qualified personnel familiar with the relevant hazards.

The instrument may be operated within the specified environmental conditions (see data sheet) without impairing its safety.

The instrument is intended for mounting in an enclosure. Its contact safety is ensured by installation in a housing (switch cabinet, panel etc.).

### Unpacking the Instrument

Remove instrument and accessories from the packing. Enclosed standard accessories: Operating notes or operating instructions for the instrument (if necessary, fixing elements). Check, if the shipment is o.k. and complete and if the instrument was damaged by improper handling during transport and storage.

One instruction manual will be attached to each shipment.



#### **Warning !**

If the instrument is heavily damaged that a safe operation seems impossible, the instrument must not be taken into operation.

We recommend to keep the original packing material for shipment in case of maintenance or repair.

#### **Caution !**

The instrument contains electrostatically sensitive components. While transport and mounting, the rules for protection against Electric Static Discharge (ESD) must be followed.

### Mounting

In order to have a proper function each instrument has to be placed in dustfree and dry rooms, either in a panel or in the relevant socket of a 19-inch instrument carrier.

The ambient temperature at the place of installation should not exceed the permissible nominal operational temperature specified in the data sheet.

When mounting several instruments at high packing density, sufficient ventilation must be provided to ensure a correct function.

The sealing devices (e.g. sealing ring) required for the relevant protection type must be applied.

Two captive screws are provided at the instrument front for fixing the 19-inch module in the instrument carrier. Generally, the fixing elements delivered with the instrument must be applied.

Instruments without ATEX approval may be mounted and operated only outside of explosion-hazarded areas!

### Electrical Connections

All electrical wiring must conform to local Electrical Standards (e.g. VDE 0100 in Germany).

The input leads must be kept separate from signal and mains leads.

The protective earth must be connected to the relevant terminal (in the instrument carrier).

In order to prevent electrical interferences, we recommend using twisted and screened cables.

The electrical connections must be made according to the relevant connecting diagrams.

# General Safety Instructions

## Commissioning

Before instrument switch-on, ensure that the advices and specifications given below are followed:  
Ensure that the supply voltage corresponds to the specification on the instrument label.

All covers required for contact safety must be applied.

Before instrument switch-on, check if other equipment and / or facilities connected in the same signal loop is / are not affected. If necessary, appropriate measures must be taken.

For instruments with protection class I, the protective earth must be connected with the relevant terminal in the instrument carrier.

The instrument may be operated only when mounted in its enclosure.

## Operation

Switch on the supply voltage. The instrument is now ready for operation.

If necessary, a warm-up time of approx. 15 min. should be taken into account.



### Warning !

Any interruption of the protective earth in the instrument carrier can impair the instrument safety. Purposeful interruption is not permissible.



### Warning !

If the instrument is damaged to an extent that safe operation seems impossible, shut it down and protect it against accidental operation.

## Trouble Shooting

Before checking the instrument, all possibilities of error in other equipment and connections (input leads, wiring, equipment connected in the output circuit) should be checked. If the trouble cannot be located by checking these points, we recommend returning the instrument to the manufacturer.

## Hint

Note that primary elements (especially thermocouples) connected to the energized transmitter are grounded in many cases, i.e. that the insulation resistance during operation can be reduced considerably. In these cases, additional connection to earth is not permissible.

## Shut-Down

For permanent shut-down, disconnect the instrument from all voltage sources and protect it against accidental operation.

Before instrument switch-off, check that other equipment and / or facilities connected in the same signal loop is / are not affected. If necessary, appropriate measures must be taken.

# General Safety Instructions

## Maintenance, Repair and Modification

The instrument needs no particular maintenance. Any instrument with electro-mechanical relays has a limited durability (ask for data-sheet).



### Warning !

When opening the instruments, or when removing covers or components, live parts or terminals can be exposed.

Before carrying out such work, the instrument must be disconnected from all voltage sources. After completing such work, re-shut the instrument and re-fit all covers and components. Check, if the specifications on the instrument label are correct !



When opening the instruments, electrostatically sensitive components can be exposed. Therefore any checking or putting into operation of the instrument should be carried out at workstations which are protected against ESD.

Modifications, maintenance and repair may be carried out only by trained, authorized persons. Any repair or trouble-shooting by the applicant during the guarantee-period will result in losing the claim of guarantee. It is not permitted to operate or apply the instrument if the recommended specifications, warnings or conditions are not observed.

If a default was found due to a blown fuse, the cause must be determined and removed. For replacement, only fuses of the same type and current rating as the original fuse must be used. Using repaired fuses, or short-circuiting the fuse socket is inadmissible !

## Explosion Protection (for ATEX approved devices only!)

This device (only the version with the Makrolon housing) is suitable for operation in Explosion Zone 22 with the lid closed (where an explosive atmosphere may arise due to electrically conductive dusts).

Prior to opening the device, one must ensure that there are no explosive ambient conditions, such as dust formation.

The special regulations governing operation in an Ex-area must be observed.

Operating temperature: -20 °C – +40 °C in Ex-area.

## Storage

The storage-room for the instrument must be dry, dustfree and free of vibrations. The range of the storage-temperature is 0 to 70 °C. Any direct UV-radiation to the instrument must be avoided.

## Transport

If no other recommendations are mentioned in the instruction manual the packing material used should have the quality that no damage to the instrument will occur even if it drops from a height of 80 cm.

15-03-2023

**Right of modification reserved !**

## 2 General Description

### 2.1 General

The HE 5720 solenoid valve control system is used for pulse activation of solenoid valves in air pollution control systems.

The HE 5720 permits numerous controlling and monitoring functions and can be extended by a differential pressure measuring and control system.

Cleaning can be effected on either a time-controlled or differential pressure basis with switching thresholds or pause time control.

The valves are monitored to detect open or short-circuits. Optionally, the valve function can be checked mechanically by means of a pressure switch.

The  $\Delta p$  extension unit can be used to check a maximum differential pressure.

As an option, a relay output with adjustable follow-up time is available for activating the discharge organs.

### 2.2 Options

Relays:	1 operating / malfunction relay and 1 relay for activating the discharge organs
Pressure switch:	mechanical valve function monitoring by means of a pressure switch (The pressure switch is not part of the delivery but can be ordered separately)
Valve extension:	Attachable board for extension by 12 valve outputs
$\Delta p$ extension:	Attachable board for measuring and controlling the differential pressure
Power supply:	24 V DC
With / Without	
ATEX-approval:	The devices with Makrolon housing are available with ATEX approval for EX zone 22 as well as without ATEX approval. If you have ordered an ATEX device, you must necessarily observe the safety instructions for explosion protection as well as the information on the name plate.



## 3 Installation and Housing

The instrument should be installed in such a way that it is not exposed to moisture/humidity and dirt. It must also be ensured that the permissible maximum ambient temperature (50° C) is not exceeded. The device has to be protected against direct solar radiation.

Electrical connections should be made in accordance with the relevant VDE (Verein Deutscher Elektrotechniker = Association of German Electrical Engineers) regulations and/or locally applicable regulations.

Power relays installed in the control cabinet should be interference-suppressed by means of RC-combinations.

The instrument features its own built-in mains filter. An additional external mains filter may be necessary if voltage transients occur.

Note: The devices with ATEX approval may be installed in EX zone 22. You must necessarily observe the safety instructions on explosion protection and the indication on the name plate.

### 3.1 Instrument Dimensions

Dimensions of the valve control unit HE 5720:

- PCB with distance tubes 178 × 107 × 46 mm (w × h × d),  
with  $\Delta p$  extension: 248 × 107 × 46 mm (w × h × d)
- DIN-rail-enclosure 180 × 111 × 60 mm (w × h × d),  
with  $\Delta p$  extension: 250 × 111 × 60 mm (w × h × d)
- Macrolon housing: 280 × 190 × 130 mm (w × h × d), see also appendix A

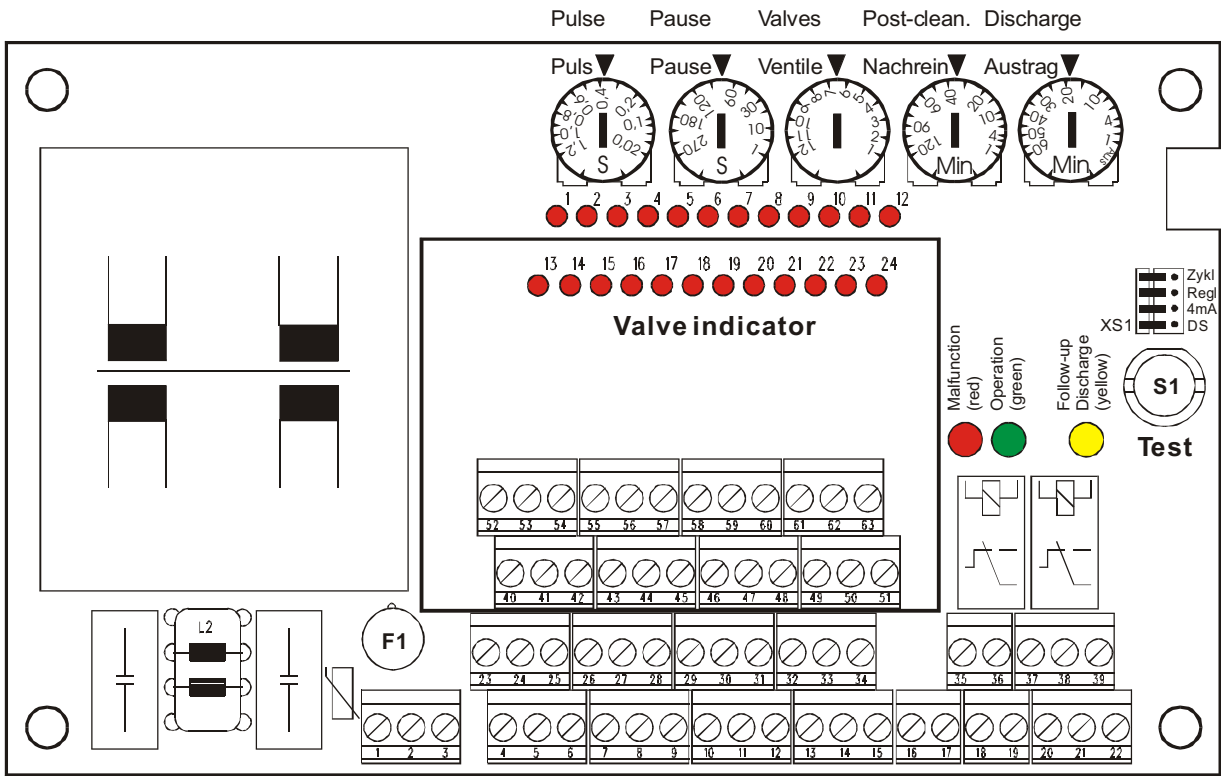
### 3.2 Power Supply

The HE 5720 is designed for mains operation at 100 – 240 V AC, 50/60 Hz.

(Option: 24 V DC)



## 4 Valve Control Unit

### 4.1 Operating and Display Elements



- **Potentiometer:** The time setting potentiometer have a logarithmical scale division.  
Pulse time: 0.02...1.2 s  
Pause time: 1...270 s  
Number of valves: 1...12 valves,  
12 + 1...12 valves if the valve extension board is used.  
If the number of valves is set between two valves, two adjacent valve LEDs flash !  
Post-cleaning time: 1...120 minutes  
Follow-up time for discharge organs: 0...60 minutes

- **Jumper XS1:**

			XS1
Cleaning cycle	partial cycle	total cycle	Zykl
Type of cleaning	switching threshold	pause control	Regl
Analog input	0...20 mA	4...20 mA	4mA
Pressure switch	without pressure sw.	with pressure sw.	DS

- **Push-button S1:** Starts cleaning the next valve, terminates the pause of the current valve.  
('Test') If 'total cycle' is selected, cleaning is carried out up to the last valve.

# Valve Control Unit

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- **LED indicators:** Operation (green) or malfunction (red)  
Cleaning or follow-up time for discharge organs (yellow)  
Pulse indication for each valve (red)
- **Valve error indication:** The valve LED flashes.  
Cause: short-circuit, breakage or error at mechanically valve function monitoring by means of a pressure switch.

## 4.2 Inputs

- **Analog:** Start or  $\Delta p$  0(4)...20 mA  
*The analog signal is measured between terminal 17 + and terminal 18 - (GND). Terminal 16 can be used as an additional source of current (25 mA).*
- **Digital:** Release (contact closed) / Stop (contact open)  
Post-cleaning (signal from push-button)  
Malfunction acknowledgement (signal from push-button)  
Pressure switch for mechanical checking of the valve function  
*The inputs are active if they are switched to ground (terminal 18 GND).*

## 4.3 Outputs

- **Valves:** 1...12 with 24 V DC / 1 A (extensible to 1...24 Valves)
- **Relays:** 250 V AC / 5 A  
1 SPDT for operating/malfunction message (fail-safe-circuit)  
1 SPST for activating the discharge organs or cleaning message



***The inputs and the analog output are not potentially separated !  
Provide an external potential separation, if required !***

## 4.4 Functions

### 4.4.1 Release/Stop

The input releases activation of the valves. If the contact is open, cleaning is stopped immediately.

### 4.4.2 Start / $\Delta p$ IN

The control system can operate in 2 operating modes. They are selected by means of the jumper 'XS1 Type of cleaning'.

1. Switching threshold: Cleaning is effected as long as a switching contact is closed, e.g. between the upper and the lower threshold of a  $\Delta p$  controller.
2. Control: Cleaning is effected permanently with variable pause times.  
→ cf. pause control

The (analog) input signal for cleaning can be connected externally or signalised internally by the  $\Delta p$  extension board.

- Internal signal: Selection by means of XS2 on the  $\Delta p$  extension board 'threshold' for type of cleaning (XS1) 'pause control'

External signal: A 0(4)...20 mA signal is required for controlling.  
In order to serve as a 'switching threshold', the signal must be switched between 0(4) mA and  $\geq 20$  mA. Terminal 16 can be used as source of current for a switching contact.  
The current output of a PLC can be used as an external signal.  
The current output must be connected to terminal 17 + and terminal 18 - (GND).

It is possible to work with an external and an internal signal simultaneously. The higher signal then has priority. This allows the cleaning to be started in special operating situations, even if the set thresholds have not been exceeded (e. g. for time-controlled forced cleaning).

### 4.4.3 Post-cleaning

The signal 'post-cleaning' is used for starting a cleaning cycle for the period set by the post-cleaning potentiometer. If the function 'pause control' (XS1 'Regl') is selected, post-cleaning is effected with a fixed pause time of 30 seconds.

### 4.4.4 Malfunction acknowledgement

A signal at the input 'malfunction acknowledgement' resets a valve error message (LED and malfunction relay). When the cause of error has been eliminated, the error message is automatically removed.

## 4.4.5 Pressure Switch

The input 'pressure switch' serves for the mechanical check the valve function. The contact must be closed before activating a valve (message: pressure exists). During the pause time, the contact has to open (message: pressure drop = valve is open) and close again (pressure rise = valve is closed). The jumper XS1 has to be charged in the position 'with pressure switch'.

## 4.4.6 Follow-up Time for Discharge Organs

The message (LED and relay) is given at the beginning of a cleaning cycle (also if the push-button S1 Test is actuated). The follow-up time starts when the cleaning cycle is finished. When the follow-up time is over, the message is reset. If another cleaning cycle is started during follow-up time, the follow-up time also begins again when this cleaning cycle is over.

## 4.4.7 Cleaning Cycle

The cleaning cycle can be selected with the jumper XS1 (Cleaning Cycle):

- 'Partial cycle' = Cleaning is effected as long as the start signal is active.
- 'Total cycle' = Cleaning is always executed up to the last valve.

## 4.5 Pause Control

The control system is able to carry out a  $\Delta p$ -dependent pause control. This function is selected with the jumper XS1 'Regl'.

The operator selects an individual controller characteristic with the pause potentiometer. For controlling, the current differential pressure must be signalled to the control system as an analog signal. The signal can be made available either internally by the  $\Delta p$  extension board (XS2 on the extension board is charged for 'Regelung') or externally as a 0(4)...20 mA signal at the terminals 17 + and 18 - (cf. also 'Start input').

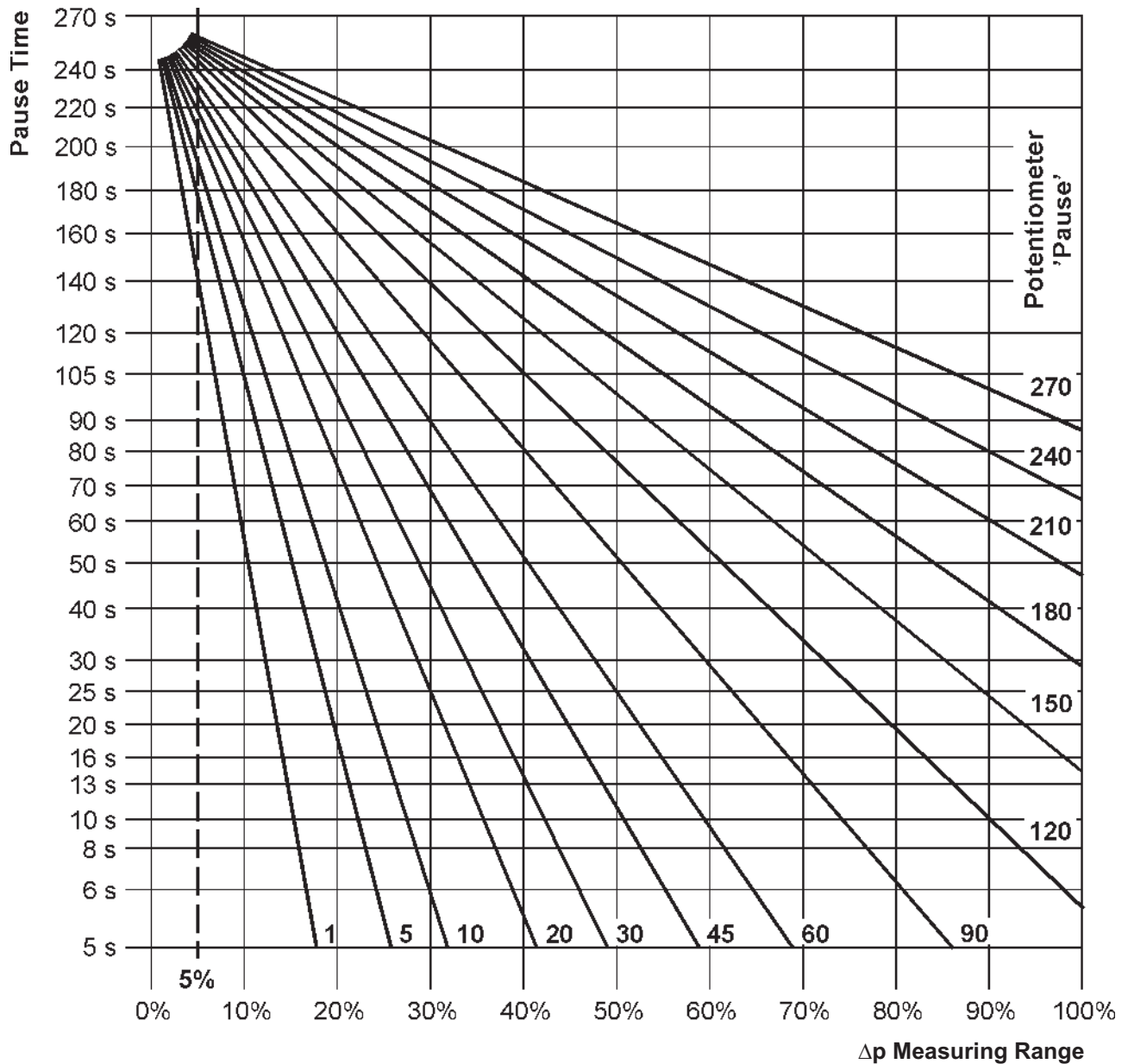
The control system determines the current pause time from the current differential pressure and the selected characteristic curve.

When the differential pressure increases, the pause time is shortened; when the differential pressure decreases, the pause time is prolonged.

The variation of the pause time is not linear.

Cleaning is terminated when the differential pressure falls below approx. 5 % of the measuring range.

## Controller Characteristics



**Example:** The filter is to be cleaned at a differential pressure of 60 % of the  $\Delta p$  measuring range with a pause time of approx. 30 seconds.

Selection of the characteristic curve: The intersection of the curves '60 % of the measuring range' and '30 sec.' is on characteristic curve 90. The pause potentiometer is set to 90 seconds.

The control system controls the pause time along characteristic curve 90. The cleaning capacity is increased progressively due to the shape of the characteristic curve. Additionally, a larger amount of dust per impulse is cleaned if the differential pressure is higher (= higher resistance of filter).

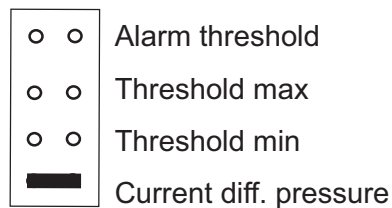
For shorter pause times, the capacity of the pneumatic system must be considered.

## 5 Δp-Extension

### 5.1 Operating and Display Elements

- LED-displays:
  - 3-digit seven-segment display for current differential pressure or switching thresholds,
  - Sign (red)
  - Δp-Alarm (red),
  - Cleaning (yellow)

- Display selection: Jumper XJ1:



- Potentiometer: RV1 = threshold min  
Cleaning is stopped when below this level.  
(cleaning relay inactive)

RV2 = threshold max  
Cleaning starts when this level is exceeded.  
(cleaning relay active)

RV3 = alarm threshold  
An alarm is triggered when exceeded  
(alarm hysteresis  $\geq 1\%$  of span)

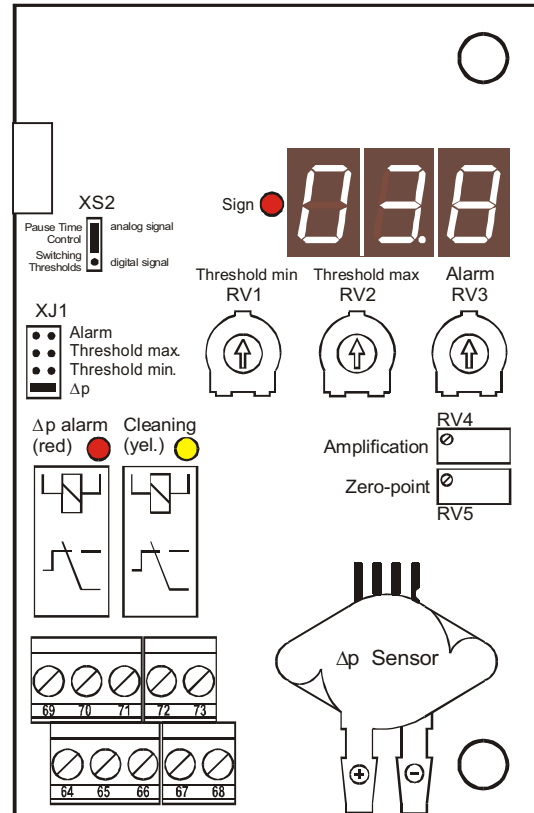
The values set by the potentiometers can be displayed by the indication selection.

- Diff. pressure connections: The differential pressure is measured by the Δp-sensor. The pneumatic connections are designed for tubes with an inside diameter of 4mm.

left connection (+): for higher pressure (= before the filter)

right connection (-): for lower pressure (= behind the filter)

**Hint:** With interchanged pressure connections (Sign-LED illuminated) the device will not work.



control  
analog signal



threshold  
digital signal



no signal to the  
valve control unit

The jumper XS2 and the jumper XS1, Pos2 (Type of cleaning), see page 10, have to be selected to the same functionality:

pause control: XS2 analog signal

switching threshold: XS2 digital signal

## 5.2 Outputs

- Relay: 250 V AC / 5 A
  - 1x SPDT for cleaning
  - 1x SPDT for  $\Delta p$ -alarm
- Analog- Output: 0(4)...20 mA = current differential pressure,  
terminal 67 = - (GND),  
terminal 68 = +



***The inputs and the analog output are not potentially separated !  
Provide an external potential separation, if required !***

## 5.3 $\Delta p$ -Adjustment

In case of a zero drift, the indicator can be set to zero by the 0-point potentiometer RV5. Adjustment should be carried out only when no differential pressure is present, i. e. if no measuring hoses are connected.

Adjustment should be carried out at operational temperature as the sensor can present a temperature drift of up to  $\pm 1$  mbar.

The amplification potentiometer RV4 is used for adjusting the final value. For this, a reference pressure must be given to the sensor. Since this reference pressure is not usually available, the adjustment should be performed only by the manufacturer. For this reason, the adjustment screw is secured.



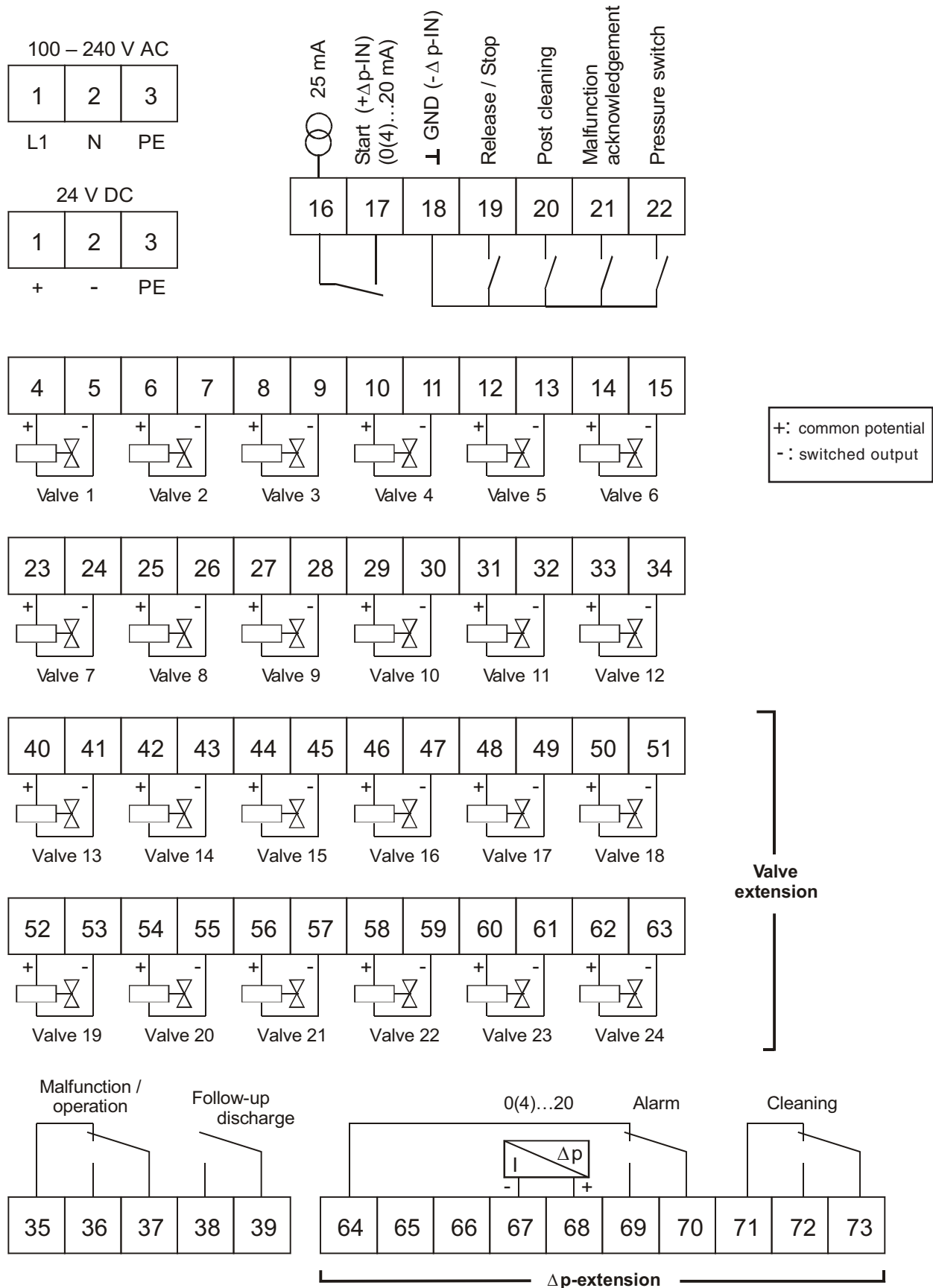
## 6 Technical Data HE 5720

<b>Inputs:</b>	<ul style="list-style-type: none"> <li>• Start- or <math>\Delta p</math>-input 0(4)...20 mA</li> <li>• Release (contact closed) / Stop (contact open)</li> <li>• Post-cleaning (pulse signal)</li> <li>• Acknowledge malfunction (pulse signal)</li> <li>• Pressure switch for mechanically valve function monitoring</li> </ul>	
<b>Valve outputs:</b>	12, extendible to 24 (option)	
<b>Valve voltage:</b>	24 V DC $\pm 10\%$	
<b>Valve current:</b>	1 A at a pulse time $\leq 1$ s and a pause time of $\geq$ the pulse time otherwise 0.5 A	
<b>Relay outputs:</b>	250 V AC / 5 A, <ul style="list-style-type: none"> <li>• 1<math>\times</math> SPDT for operating signal or malfunction signal (fail-safe)</li> <li>• 1<math>\times</math> SPST for triggering of discharge organs or signal for cleaning</li> </ul> additional with $\Delta p$ -extension: <ul style="list-style-type: none"> <li>• 1<math>\times</math> SPDT for cleaning</li> <li>• 1<math>\times</math> SPDT for <math>\Delta p</math>-alarm</li> </ul>	
<b>Analog output:</b>	0(4)...20 mA	
<b><math>\Delta p</math>-sensor:</b>	<ul style="list-style-type: none"> <li>• Meas. range: 0-25 / 30 / 40 / 50 / 60 / 70 / 80 / 90 / 100 mbar</li> <li>• Max. static pressure: 1 bar</li> <li>• Linearity: <math>\pm 1\%</math></li> <li>• Pressure hysteresis: <math>\pm 0.5\%</math></li> <li>• Temperature drift / zero point: <math>\pm 0.025\%</math> / K</li> <li>• Temperature drift / maximum value: <math>\pm 0.01\%</math> / K</li> </ul>	
<b>Power supply:</b>	100 – 240 V AC, 50/60 Hz	24 V DC
<b>Tolerance:</b>	$\pm 10\%$	$\pm 10\%$
<b>Main fuse:</b>	0.315 A, slow reaction	3.15 A, slow reaction
<b>Power consumption:</b>	30 VA	42 W
<b>Electrical connection:</b>	screw-type terminal strips 2.5 mm <sup>2</sup>	
<b>Ambient temperature:</b>	-20 °C ... +50 °C -20 °C ... +40 °C in Ex area (macrolon housing version)	
<b>Humidity:</b>	$\leq 75\%$ rel. humidity, no condensation	
<b>Housing:</b>	<ul style="list-style-type: none"> <li>• PCB with distance tubes for mounting               <ul style="list-style-type: none"> <li>with M4-screws: 178 × 107 × 46 mm (w × h × d),</li> <li>with <math>\Delta p</math>-extension: 248 × 107 × 46 mm (w × h × d)</li> </ul> </li> <li>• DIN-rail-enclosure: 180 × 111 × 60 mm (w × h × d),</li> <li>with <math>\Delta p</math>-extension: 250 × 111 × 60 mm (w × h × d)</li> <li>• dust-tight macrolon housing (IP65) with PG flange, without PG screw-type joints (max. 12 × PG 13.5 possible), 280 × 190 × 130 mm (w × h × d)</li> </ul>	

**Subject to technical alterations !**

# Connecting Diagram

## 7 Connecting Diagram



## Appendix A: Dimensions (Plastic housing)

