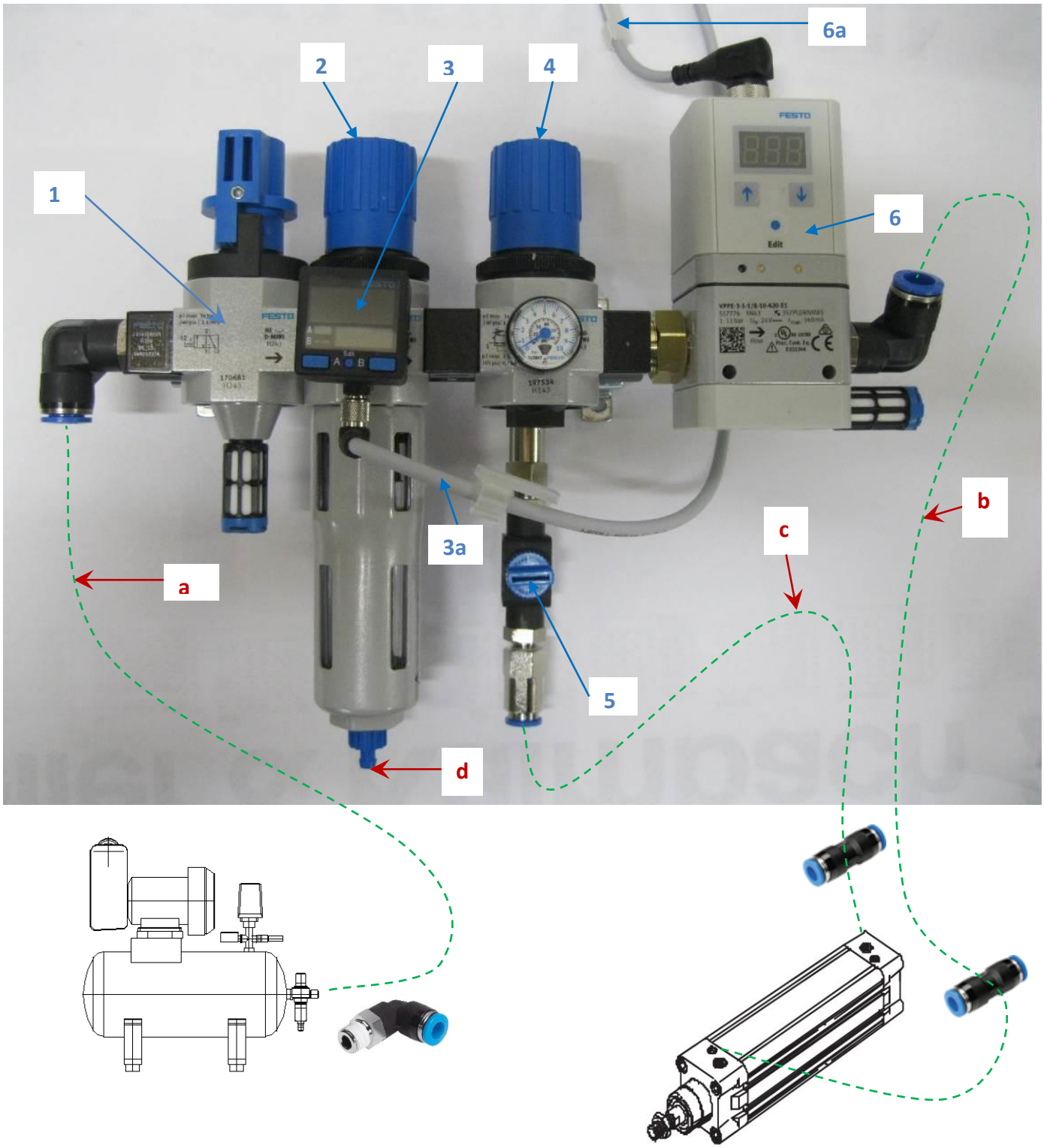
HUBER Sludgecleaner STRAINPRESS®

Operating Instructions – Pneumatic Pressure Cone System **01.2018**

Schematic diagram of the pneumatic pressure cone system (HUBER article no. 10089173):



Scope of supply:

1: Switch-on valve to shut off air supply and deaerate the system
(manual lockable protective device)
2: Filter pressure reducer for manual regulation of compressed air supply (typically 7.0 bar)
Pressure air filtering
Condensate outlet (manual)
3: Pressure sensor (24 VDC supply voltage, PNP) for actual pressure indication (digital)
Input and monitoring of minimum compressor pressure (typically 6.5 bar)
3a: Electric connection cable on pressure sensor (2.5 m long)
4: Pressure reducer for manual regulation of cone pressure loading
(typically 5.0 bar, to be adjusted at the time of plant start-up!)
5: Shutoff valves for active pressure cone relief during maintenance and inspection
6: Proportional valve (24 VDC supply voltage; setpoint setting 4-20mA) for cone pressure relief regulation depending on the torque of the press motor
(typically 0.0-7.0 bar, for power control see Control Philosophy)
6a: Electric connection cable on proportional valve (2.5 m long)

Connections:

a: Compressed air from compressor (air supply minimum DIN ISO 8573 class 4);
10 mm ID quick star coupling;
Minimum pressure: 7 bar, maximum pressure: 10.0 bar, temperature: 0° - 40°C;
Pressure dew point: at least 10 °C below ambient temperature
b: Pressure air to pneumatic cylinders on pressure cone (cone pressure relief),
10 mm quick star;
Pressure control via proportional valve
c: Pressure air to pneumatic cylinders on pressure cone (cone pressure loading);
8 mm quick star;
Pressure set as fixed value
d: Condensate outlet (manual); 5 mm AD plug nipple

Incoming and outgoing pneumatic lines are not included in the scope of supply (available under article no. 700789)

Loose supplied component parts:
-10 mm quick star coupling with G1/4A to be screwed into a compressor
-10 mm quick star coupling, air hose for cone pressure relief
-8 mm quick star coupling, air hose for cone pressure loading

Dimensions:
Width: approx. 310 mm
Height: approx. 260 mm
Depth: approx. 130 mm

Recommended free space for operation:
+30 mm on top; +80 mm at the bottom

Protection grade:
IP 40

Ambient temperature:
0 – 50°

NOTE

The loading pressure and relief characteristics of the pneumatic pressure cone must be set during the start-up phase, taking into account sludge properties. Presetting the pressure without prior verification of the resulting operating behaviour of the press may lead to a loss in press performance.

It is essential that the electrical switchboard and control panel is designed in compliance with the specifications made by HUBER SE. Otherwise, perfect functioning of the pressure cone control system cannot be guaranteed. These minimum requirements are described under the respective Control Philosophy.

Safety instructions:

The mounting plate must be installed inside a lockable control cabinet to prevent faulty operation by untrained staff and protect it against environmental influences.

⚠ WARNING

Depressurize the system prior to starting with any maintenance or inspection work to prevent getting caught and injured by the accidentally moving pressure cone.

To do so, turn the knob on the switch-on valve '(1) to shut off air supply and deaerate the system. The knob is lockable to prevent an unintentional restart.

Maintenance instructions:

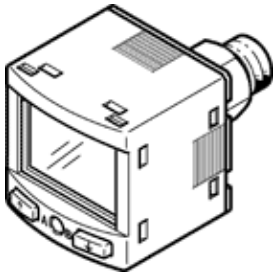
Monthly execute the following maintenance work:

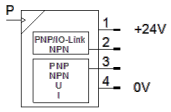
- Function check of switch-on valve, filter pressure reducer, pressure sensor, pressure reducer, shutoff valve and proportional valve
- Drain the condensate on the filter pressure reducer.
- Check the hose lines for porosity and accumulated condensate.
- Check the lines for leakage.

pressure sensor
SPAN-P10R-G18M-PNLK-PNVBA-L1

Part number: 8035533

FESTO



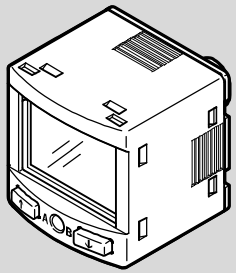


Data sheet

Feature	Value
Authorisation	RCM Mark
CE mark (see declaration of conformity)	to EU directive for EMC
Materials note	Conforms to RoHS
Measured variable	Relative pressure
Measurement method	Piezoresistive pressure sensor
Pressure measuring range, initial value	0 bar
Pressure measuring range, final value	10 bar
Overload range	15 bar
Operating medium	Compressed air in accordance with ISO8573-1:2010 [7:4:4] Inert gases
Note on operating and pilot medium	Lubricated operation possible
Medium temperature	0 ... 50 °C
Ambient temperature	0 ... 50 °C
Accuracy, FS	1.5 %FS
Repetition accuracy in ± %FS	0.3 %FS
Temperature co-efficient in ± %FS/K	0.05 %FS/K
Switch output	2 x PNP or 2 x NPN switchable
Switching function	Window comparator Threshold value comparator Auto difference monitoring
Switching element function	N/C or N/O contact, switchable
Max. output current	100 mA
Analogue output	0 - 10 V 4 - 20 mA 1 - 5 V
Max. load resistance, current output	500 Ohm
Min. load resistance, voltage output	20 kOhm
Short circuit strength	Yes
Protocol	IO-Link
IO-Link, protocol	Device V 1.1
IO-Link, profile	Smart sensor profile
IO-Link, function classes	Binary Data Channels (BDC) Process Data Variable (PDV) Identification diagnosis Teach channel
IO-Link, communication mode	COM2.
IO-Link, SIO mode support	Yes
IO-Link, port type	A
IO-Link, process data width OUT	0 Byte
IO-Link, process data width IN	2 Byte
IO-Link, process data content IN	14 bit PDV (pressure reading) 2 bit BDC (pressure monitoring)
IO-Link, minimum cycle time	3 ms
IO-Link, data memory required	0.5 Kilobyte
Operating voltage range DC	15 ... 30 V

Feature	Value
Polarity protected	for all electrical connections
Electrical connection	Plug Cubic design 4-pin
Mounting type	Front panel installation with thread with wall/surface fixing
Assembly position	Any
Pneumatic connection	Male thread G1/8 Female thread M5
Product weight	46 g
Material housing	PA-reinforced
Type of display	illuminated LCD
Unit(s) that can be displayed	MPa bar inchH2O inchHg kPa kgf/cm² mmHg psi
Setting options	Teach-In IO-Link Via display and buttons
Protection against manipulation	IO-Link PIN-Code
Threshold value setting range	0 ... 100 %
Hysteresis setting range	0 ... 90 %
Protection class	IP40
Corrosion resistance classification CRC	2 - Moderate corrosion stress

Pressure sensor SPAN



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Operating instructions 8049275
1607
[8049280]

Original: de

Pressure sensor SPAN . . . . . English

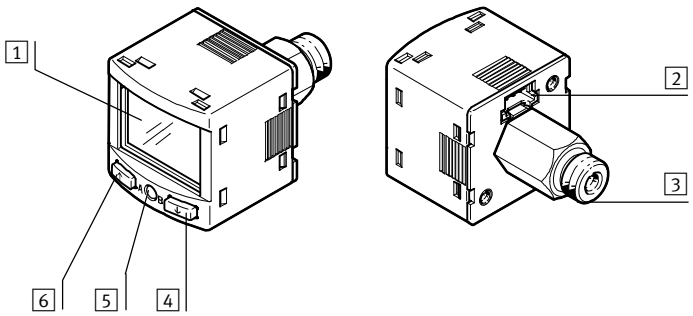
1 Product description

The operating instructions describe the entire function range. The function range is limited, depending on the product variant.

➔ Note

You can find detailed specifications for the product, the device description file (IODD) with a description of the IO-Link parameters and the declaration of conformity at: ➔ www.festo.com/sp.

1.1 Overview



1 Display
2 Electrical connection
3 Pneumatic connection
4 B-key
5 Edit button
6 A-key

Fig. 1 Representation of other variants can deviate from this

1.2 Characteristics

Characteristic	Value	Description
Type	SPAN	Pressure sensor
Pressure measuring range	-B2, -B11, -P025, -P05, -P1, -P2, -P6, -P10, -P12, -P16, -V025, -V05, -V1	➔ Technical data
Supply port	R	Relative pressure
Pneumatic port	-G18, -R18, N18, -M5, -Q4,	Thread G⅛, R⅛, NPT⅛, M5 Push-in connector 4 mm
Thread type	 M F	None Male thread Female thread
Electrical output 1	-PNLK -PN	Switching output PNP / NPN / IO-Link PNP / NPN
Electrical output 2	-PNVBA -PN	PNP / NPN / 0...10 V / 1...5 V / 4...20 mA PNP / NPN
Electrical connection	-L1	Plug connector, design L1
Certificate	 +T	Without With inspection report

Fig. 2

2 Safety

Intended use

The pressure sensor SPAN is intended for monitoring pressure of compressed air and inert gases in the piping.

General safety information

- Only use the product in its original status, without any unauthorised modifications.
- Only use the product if it is in an excellent technical status.
- The product is intended for use in industrial environments. Measures may need to be implemented in residential areas for radio interference suppression.
- Take into consideration the ambient conditions at the location of use.
- Operate the product only with compressed air of the specified air quality class (➔ Technical data).
- Observe the specifications on the rating plate.
- Comply with all applicable national and international regulations.

Disposal

- Observe the local specifications for environmentally friendly disposal.

3 Function and application

The sensor converts pneumatic pressure values (relative pressure) into electrical signals, which can be used for control or regulating functions. Measurements are carried out using a piezoresistive sensor element with a following electronic evaluation unit. Interfacing to the higher-level system is provided by 1 or 2 switching outputs, an optional analogue output and an optional IO-Link interface.
The switching outputs can be configured for monitoring of a threshold value, a pressure range or a differential pressure. The outputs can be set as PNP or NPN and normally open (NO) or normally closed (NC). Via the IO-Link interface, process values can be read out and parameters changed and transmitted to additional devices.

3.1 Operating statuses

Operating status	Function
RUN mode	– Basic status after the operating voltage is switched on – Display of the current measured value
SHOW mode	– Display of the current settings
EDIT mode	– Setting or modification of parameters
TEACH mode	– Acceptance of the current measured value to determine switching points

Fig. 3

3.2 Switching functions

Threshold value comparator for monitoring of a pressure threshold

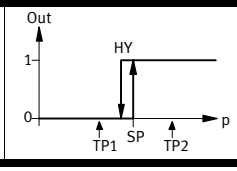
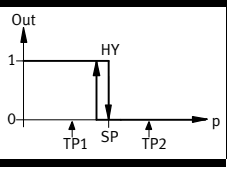
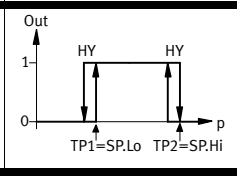
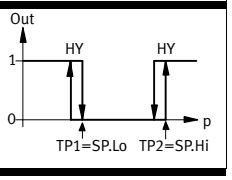
Function	NO (normally open)	NC (normally closed)
Switching function: – 1 switching point (SP) TEACH mode: – 2 teach-in points (TP1, TP2) – SP = ½ (TP1+TP2)		

Fig. 4

Window comparator for monitoring of a pressure range

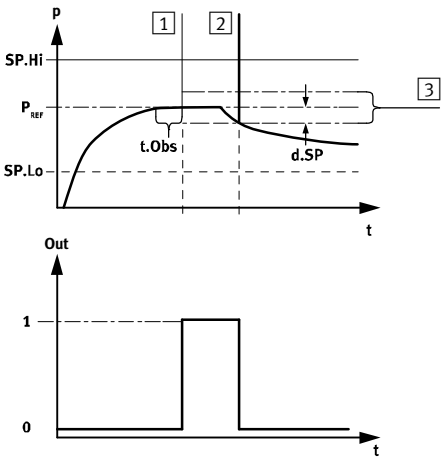
Function	NO (normally open)	NC (normally closed)
Switching function: – 2 Switching points (SP.Lo, SP.Hi) TEACH mode[1]: – 2 teach-in points (TP1, TP2) – TP1 = SP.Lo, TP2 = SP.Hi		

1) SP.Lo = smaller pressure/vacuum value, SP.Hi = larger pressure/vacuum value, dependent on the Teach sequence

Fig. 5

Auto difference monitoring d_I¯I_

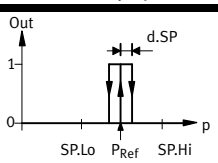
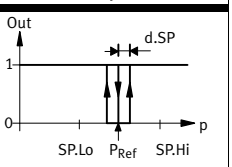
This funciton permits monitoring of a pressure value for constancy.
If the applied pressure is constant in the range between [SP.Lo] and [SP.Hi], the reference pressure PRef is automatically determined. The result is a switching operation at the output. The signal change signals the start of pressure monitoring.
If the pressure remains in the monitoring range [d.SP] around PRef, the pressure is stable. When the monitoring range is left (e.g. caused by a leakage in the system), the output switches back.



1 Reference value is determined
2 Measured value deviates by [d.SP] from the reference value
3 Monitoring area

Fig. 6

The parameters [SP.Lo], [SP.Hi], [t.Obs] and [d.SP] can be configured by the user.
The greater [t.Obs] is set, the more constant the pressure signal must be to establish the reference value PRef.

Function	NO (normally open)	NC (normally closed)
Switching function: – 2 switching points (SP.Lo, SP.Hi) for setting the valid work range – 1 switching point (d.SP) for determination of the monitoring area TEACH mode[1]: – 2 teach-in points (TP1, TP2) – TP1 = SP.Lo, TP2 = SP.Hi		

1) SP.Lo = smaller pressure value, SP.Hi = larger pressure value, independent of the Teach sequence

Fig. 7

4 Installation

Note

Installation and commissioning are to be carried out only by qualified personnel in accordance with the operating instructions.

- Remove all transport packaging. The material used in the packaging has been specifically chosen for its recyclability.

4.1 Mechanical and pneumatic

Note

An unfavourable mounting position can impair the function of the product.
- Mount the sensor so that no condensate from the compressed air lines can gather in the device.
- Install the sensor so that it cannot be heated above the maximum permissible operating temperature (plan for convection possibilities).

SPAN-...-G18M/R18M/N18M

– Seal connecting thread.

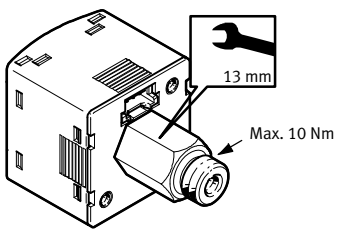


Fig. 8 Example with G18M

Mounting bracket

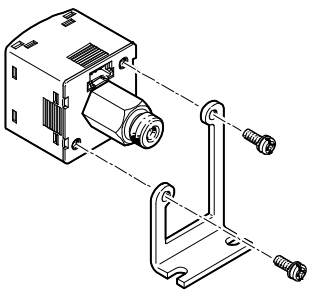


Fig. 9 Example with SAMH-PU-A-. Fastening SAMH-PN-W correspondingly

Front panel use SAMH-PN-F

– Size of the front panel cut-out in mm ➔ Fig. 10.
– Fasten panel frame to the sensor.
– Guide sensor from the front into the cut-out on the front panel.
– Attach the clamping element and press until it catches.

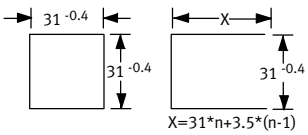
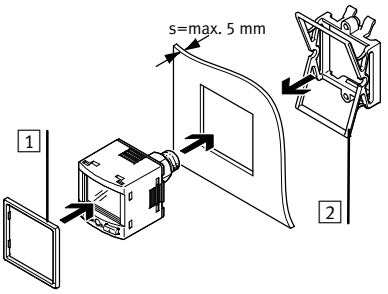


Fig. 10



1 Panel frame
2 Clamping element

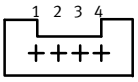
Fig. 11

4.2 Electrical

Warning

Use only power sources which guarantee reliable electrical isolation of the operating voltage in accordance with IEC/EN 60204-1. Consider also the general requirements for PELV circuits in accordance with IEC/EN 60204-1.

- Connect sensor.
– Consider the maximum permissible line length: 30 m (20 m for IO-Link).

Pin	Colour[1]	Allocation	Plug L1
1	Brown (BN)	Operating voltage +24 V DC	
2	Black (BK)	Switching output OutA or IO-Link (C/Q line)	
3	White (WH)	Switching output OutB or analogue output (pressure signal InA)	
4	Blue (BU)	0 V	

1) Colours apply for connecting cables NEBS-L1... or electrical adapter SASC-P4... with NEBU-M8...

Fig. 12

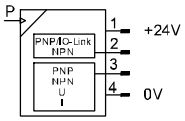
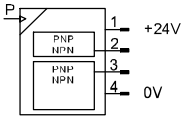
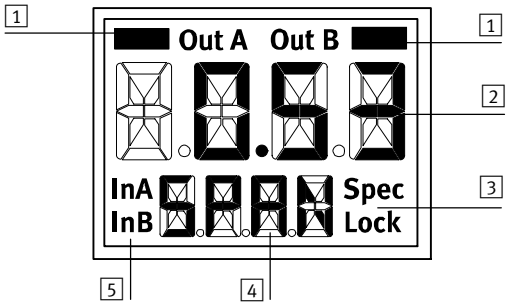
Circuit diagrams	
SPAN-...-PNLK-PNVBA	SPAN-...-PN-PN
	

Fig. 13 Fig. 14

5 Commissioning

5.1 LCD display



1 Output display
2 Main display (e.g. measured value)
3 Status information
4 Lower display (e.g. unit)
5 Signal indicator

Fig. 15

Example for LCD display	Meaning
Output display	
[OutA]	Switching output OutA selected (flashes with active IO-Link)
[OutA]	Switching output OutA set
[OutB]	Switching output OutB selected
[OutB]	Switching output OutB set
Status information / signal indicator	
[Lock]	Security code activated (➔ Chap. 5.4)
[Spec]	Special menu selected (➔ Chap. 5.6)
[InA]	Pressure signal InA or analogue signal is selected
IIIIIIII	Graphic bar graph in the lower display [Sub.d]

Fig. 16

Example for LCD display		Meaning
Main display	Lower display	
Measured value indicator and unit in the RUN mode		
[– 0.53]	[bar]	Measured value indicator (here: negative value) and unit
Menu for the switching outputs (OutA and OutB)		
[Edit]	[bin]	Edit menu for the switching outputs (binary)
⌐¬	[Fctn]	Determination of the switching function: threshold value comparator
⌐¬⌐¬	[Fctn]	Determination of the switching function: window comparator
d⌐¬⌐¬	[Fctn]	Determination of the switching function: auto difference monitoring
[1.80]	[SP]	Value of switching point (only for threshold value comparator)
[2.45]	[SP.Lo]	Value of lower switching point (window comparator); lower limit of the work space (auto difference monitoring)
[6.45]	[SP.Hi]	Value of upper switching point (window comparator); upper limit of the work space (auto difference monitoring)
[0.50]	[HY]	Value of hysteresis (not for auto difference monitoring)
[18]	[t.obS] / [MSEC]	Time interval for determination of a mean value, which is used to determine the pressure change and establish the reference value.
[0.25]	[d.SP]	Threshold value of the differential pressure with auto difference monitoring
[NO]	[LOGC]	Switching characteristics of the switching outputs: [NO] = normally open, [NC] = normally closed
[bLUE]	[COLR]	Display colour: [bLUE] = Blue, colour change function deactivated [R.ON] = Red, if switching output set [R.OFF] = Red, if switching output not set Note: Independent of the settings [COLR], the red colour change appears with some malfunctions.
Extreme values (only SHOW mode)		
[1.64]	[MIN]	Minimum measured pressure since switch-on or the last reset
[8.50]	[MAX]	Maximum measured pressure since switch-on or the last reset
Menu of the pressure signal (InA)		
[Edit]	[ANLG]	Edit menu for the analogue output
[1 _ 5]	[Out] / [V]	Output function of the analogue output
[93]	[In.Hi] / [%]	Scaling of the analogue output in percent of the final value of the pressure measuring range (FS - full scale)
[3]	[In.Lo] / [%]	Scaling of the analogue output in percent of the initial value of the pressure measuring range (offset)
Menu for device settings (Spec)		
[Edit]	[MENU]	Edit menu for additional settings
[16]	[Filt] / [MSEC]	Value of the filter time constant for the pressure measurement signal
[bar]	[Unit]	Unit for the pressure indicator
[OFF]	[Z.AdJ]	[OFF] = zero point synchronisation (zero adjust) deactivated [ON] = offset correction for measured value indicator, switching points and analogue output possible
[Unit]	[Sub.d]	Settings of the lower display in RUN mode: selected unit or switching point of OutA or bar graph
[40]	[Eco] / [SEC]	Economy mode: period after which the display background lighting is switched off
[PNP]	[bin] / [Out]	Shift of the switching outputs (binary) between PNP and NPN
[bin]	[Pin3] / [Out]	Shift between switching output (binary) and analogue output (InA) at Pin3
[OFF]	[Code]	Activation and determination of the security code
[OFF]	[MASt]	Activation of the IO-Link master function for replication of parameters

Fig. 17

5.2 Switch on sensor (RUN mode)

- Switch on the operating voltage.
  ➔ Current measured value is displayed. The sensor is in the basic status (RUN mode).

The basic status can be reached from other modes by:
– pressing edit button for 3 seconds
– expiration of a monitoring time (Timeout)

5.3 Displaying parameters (SHOW mode)

Requirement: The sensor is ready for operation (RUN mode).

Switching output OutA

- Press A-key.
  ➔ The first parameter set is displayed. [Fctn] flashes.

The subsequent parameters can be displayed by repeatedly pressing the A key (➔ Fig. 18).

  ➔ At the end, the min. and max. values are displayed. This can be reset with the Edit key.

Switching output OutB or analogue output for pressure signal InA

- Press B-key.
  ➔ The first parameter set is displayed. [Fctn] with OutB or [Out] with InA flashes.

The subsequent parameters can be displayed by repeatedly pressing the B-key (➔ Fig. 18).

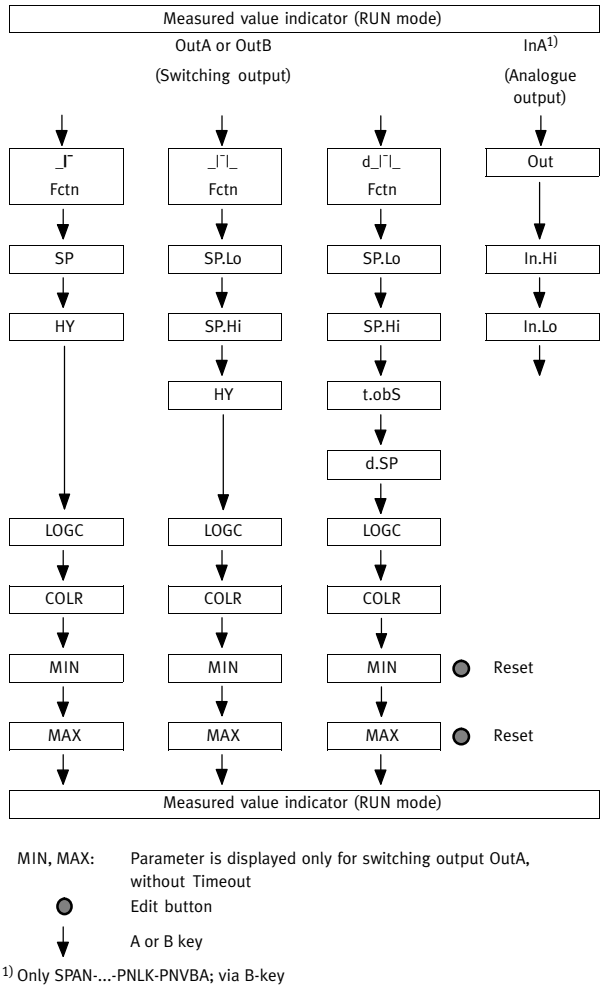


Fig. 18

5.4 Enter the security code (EDIT mode)

Requirement: The sensor is ready for operation (RUN mode).

1. Press the Edit button.
   ➔ The EDIT mode is active. If the security code is activated, the parameter entry option is blocked: [Lock] flashes.
2. Enter security code set with A or B key.
3. Press the Edit button briefly.
   ➔ [OutA] flashes. The parameter entry option is unblocked.

5.5 Configuring switching output (EDIT mode)

➔ **Note**

The process is the same for configuring the switching outputs for OutA and OutB. In the following, the process is described using the switching output OutA. Menu structure ➔ Fig. 20.

Requirement: The sensor is ready for operation (RUN mode).

Set threshold value comparator _I¯, window comparator _I¯I_, auto difference monitoring d_I¯I_

1. Press the Edit button briefly.
   ➔ [Edit] appears. [OutA] flashes.
2. Press the Edit button briefly.
   ➔ [Fctn] flashes.
3. With A or B key, select _I¯ or _I¯I_ or d_I¯I_.
4. Press the Edit button briefly.
   ➔ The set value is saved.
   ➔ The next adjustable parameter is shown.
5. Set parameters with A- or B-key.
6. Repeat points 4 and 5 until all parameters are set.
7. Press the Edit button.
   ➔ Switch to the RUN mode.

– Switching functions ➔ Chapter 3.2

5.6 Change device settings (EDIT mode)

Requirement: The sensor is ready for operation (RUN mode).

1. Press the Edit button briefly.
   ➔ [Edit] appears. [OutA] flashes.
2. With A or B key, select special menu [Spec].
   ➔ [Spec] flashes.
3. Press the Edit button briefly.
   ➔ [Filt] flashes.
4. Set parameters with A- or B-key.
5. Press the Edit button briefly.
   ➔ The set value is saved
   ➔ The next adjustable parameter is displayed.
6. Repeat points 4 and 5 until all parameters are set.

5.7 Set analogue output (EDIT mode)

Requirement: The sensor is ready for operation (RUN mode).

1. Press the Edit button briefly.
   ➔ [Edit] appears. [OutA] flashes.
2. Select [InA] with the A-key or B-key.
   ➔ [Edit] appears. [InA] flashes.
3. Press the Edit button briefly.
   ➔ [Out] flashes.
4. Set parameters with A- or B-key.
5. Press the Edit button briefly.
   ➔ The set value is saved.
   ➔ The next adjustable parameter is shown.
6. Repeat points 4 and 5 until all parameters are set.
7. Press the Edit button.
   ➔ Switch to the RUN mode.

5.8 Replicating parameters (EDIT mode)

Requirement:

– The pre-configured sensor (master sensor) is ready for operation (RUN mode).
– Master sensor and device sensor have the same design regarding the parameters (same device ID).
– The master sensor is connected with the device sensor (➔ Fig. 19).
– Parameterisation of the device sensor must not be blocked via IO-Link®.
– The device sensor is in an unswitched status (switching output PNP, display OutA off).

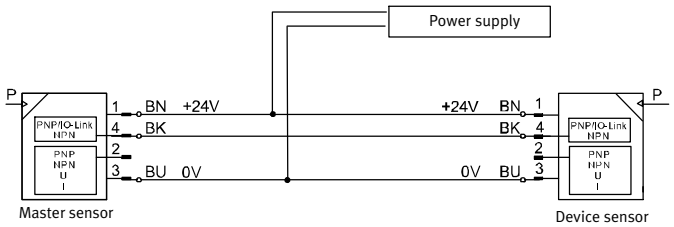
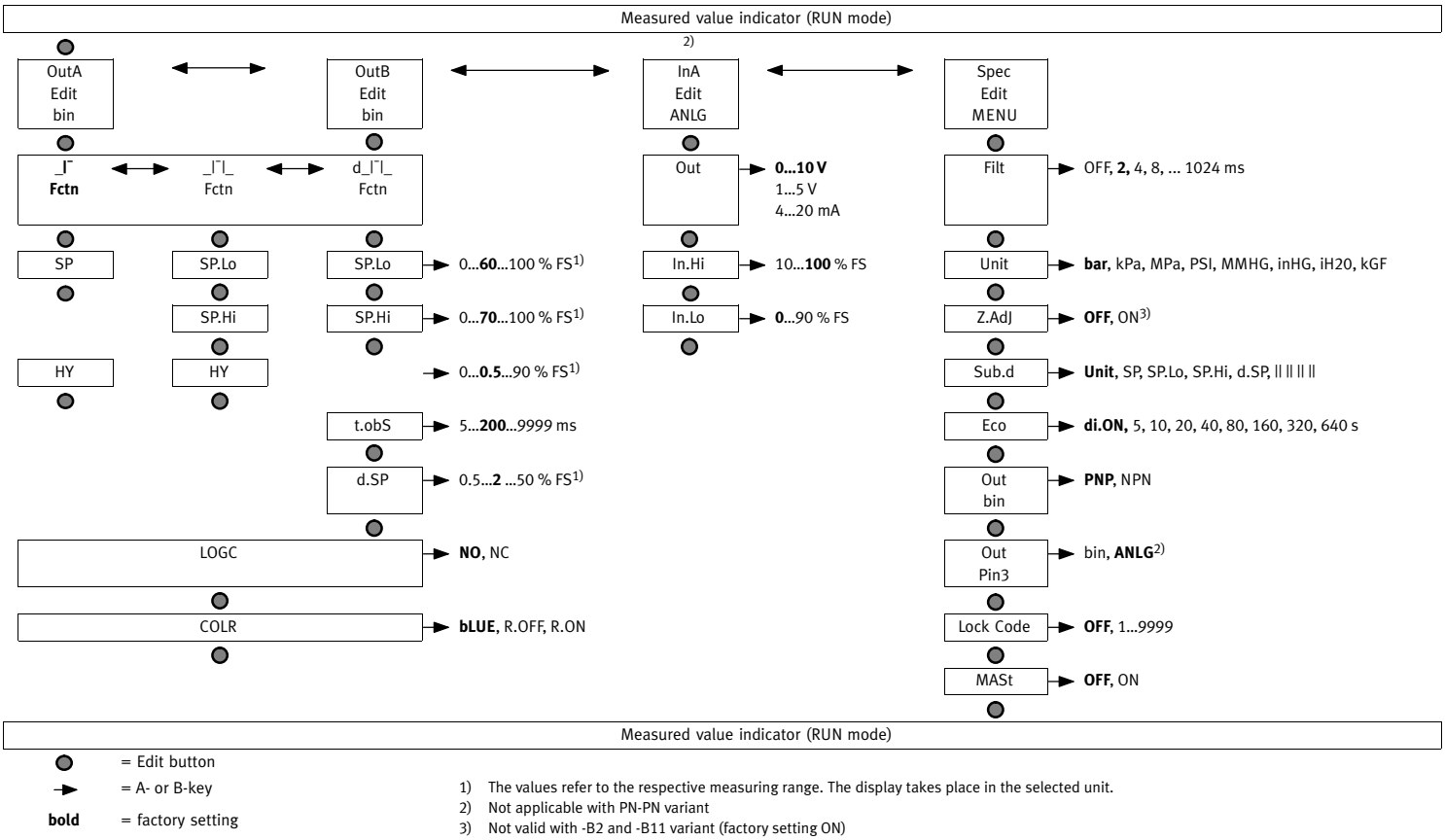


Fig. 19

1. Select special menu [Spec] at the master sensor via device settings.
2. Press the Edit button briefly until [MASt] appears.
3. With A or B key, select [ON].
4. Press the Edit button
   ➔ [REPL] / [RedY] appears.
5. Press A- or B-key.
   ➔ [REPL] / [RUN] appears briefly.
   ➔ The parameters are transmitted to the device sensor.
   ➔ [REPL] / [RedY] appears.
   If an error occurs, an error message appears (➔ Fig. 21).
6. Repeat point 5 if an additional sensor should be parameterised.
7. Press the Edit button briefly.
   ➔ Switch to the RUN mode.

5.9 Menu structure



= Edit button
→ = A- or B-key
bold = factory setting

1) The values refer to the respective measuring range. The display takes place in the selected unit.
2) Not applicable with PN-PN variant
3) Not valid with -B2 and -B11 variant (factory setting ON)

Fig. 20

5.10 Zero point synchronisation (zero adjust)

Requirement:
– The sensor is ready for operation (RUN mode).
– [Z.AdJ] [ON] is set (➔ Chap. 5.6).
– The measured value lies in the range 0 bar ± 3 % FS.

- Press the A- and B-key and Edit button simultaneously.
  ➔ [OK] appears. The zero point synchronisation was successful.
  ➔ [FAIL] appears. The zero point synchronisation was not successful. Check requirements.

Note

If [Z.AdJ] [OFF] is set for a later time, the device takes over the factory setting calibration values.

5.11 Teach switching points (TEACH mode)

Note

The process for teaching the switching outputs for OutA (A-key) and OutB (B-key) is the same. In the following, the process is described using the switching output OutA.

Note

There is no Timeout in the TEACH mode. The sensor changes to the RUN mode only after the entire teach process is ended.

Requirement: The sensor is ready for operation (RUN mode).
If the security code is activated, the parameter entry option is blocked: [Lock] flashes.
- Enter the security code (➔ Chap. 5.4).

1. Establish switching function in the EDIT mode (➔ Chap. 5.5).
2. Create pressure value 1.
3. Press the A-key and Edit button.
   ➔ The current pressure value will then be adopted as the first teach point (TP1).
   ➔ [t-IN] flashes.
4. Create pressure value 2.
5. Press the A-key and Edit button.
   ➔ The current pressure value is adopted as the second teach point (TP2).
   ➔ Switch to the RUN mode.

6 Operation

Caution

Property damage due to high temperatures.
Extreme pneumatic conditions (high cycle rate with large pressure amplitude) can heat the product above 80° C.
- Select the operating conditions (in particular the ambient temperature, pressure amplitude, cycle rate, current consumption) such that the product does not heat up above the maximum permitted operating temperature.

Restoring factory settings (restore)

Note

By resetting to factory settings, the current settings are lost.

1. Switch off the operating voltage.
2. Keep the A- and B-keys pressed down simultaneously.
3. Switch on the operating voltage.
4. Additionally press the Edit button.
   ➔ [Rsto] [PARM] appears. All parameters are reset to the factory settings (➔ Fig. 20).

7 Maintenance and care

1. Switch off the energy sources (operating voltage, compressed air).
2. Clean sensor with non-abrasive cleaning agents.

8 Disassembly

1. Switch off the energy sources (operating voltage, compressed air).
2. Separate connections from the sensor.
3. Loosen the mountings.

9 Fault clearance

Malfunction	Possible cause	Remedy
No display	No operating voltage or impermissible operating voltage	• Apply permissible operating voltage
	Electrical connections swapped	• Connect the device in accordance with the circuit diagram
	Device defective	• Replace device
Display or switching output does not react in accordance with the settings	Short circuit or overload at the output	• Eliminate short circuit or overload
	Incorrect switching point taught (e.g. at 0 bar)	• Repeat teaching procedure
	Device defective	• Replace device
	Parameter incorrect	• Reset to factory settings
[Er_1] / [FAIL] 1)	Device defective	• Replace device
[Er_2] / [ASIC] 1)	Device defective	• Replace device
[Er10] / [OVER]	Measuring range exceeded	• Comply with the measuring range
[Er20] / [tEMP] 2)	Temperature error	• Check operating conditions • Replace device
[Er21] / [SHRt] 2)	Short circuit at OutA	• Eliminate short circuit
[Er22] / [SHRt] 2)	Short circuit at OutB	• Eliminate short circuit
[Err] / [BUSY]	OutA is switched active	• Check device settings
[Err] / [ID]	Device ID error, replication function failed	• When replicating, use sensors with the same type (same device ID)
[Err] / [COMM]	IO-Link communication error	• Check the C/Q line • Check settings of the device sensor

1) Display flashes red
2) Display illuminated red

Fig. 21

10 Accessories

Accessories: ➔ www.festo.com/catalogue

11 Technical data

SPAN-		
General		
Approval certificate		RCM
CE marking (➔ declaration of conformity)		In accordance with EU EMC directive
Note on materials		RoHS compliant
Input signal / measuring element		
Operating medium		Compressed air in accordance with ISO 8573-1:2010 [7:4:4]; inert gases, operation with lubricated medium possible
Temperature of medium	[°C]	0 ... +50
Ambient temperature	[°C]	0 ... +50
Output, general		
Accuracy		
– P16	[% FS]	±2 at room temperature
– B2, B11, V1, P1, P2, P6, P10, P025, P05, V025, V05, P12	[% FS]	±1.5 at room temperature
– B2, B11, V1, P1, P2, P6, P10	[% FS]	±3 in the entire temperature range
– P025, P05, V025, V05, P12, P16	[% FS]	±4 in the entire temperature range
Repeat accuracy	[% FS]	±0.3 with Filt = OFF
Temperature coefficient	[% FS/K]	Typically 0.05
Switching output		
Switching output		2x PNP or 2x NPN switchable
Switching function		Threshold value comparator Window comparator Auto difference monitoring
Switch-on/switch-off time	[ms]	typ.: 2, max.: 4 with FILT = OFF
Max. output current	[mA]	100
Capacitive load maximum DC	[nF]	100
Voltage drop	[V]	Max. 2
Pull-down / pull-up resistor		PNP: integrated; NPN: not integrated
Inductive protective circuit		Present
Analogue output		
Output characteristic curve initial value ... end value	[V] [V] [mA]	0 ... 10 1 ... 5 4 ... 20
Max. load resistance of current output	[Ω]	500
Min. load resistance of voltage output	[kΩ]	20
Output, additional data		
Short circuit protection		Yes
Overload protection		Present
Electronics		
Max. current consumption	[mA]	230
Nominal operating voltage DC	[V]	24
Operating voltage range DC	[V]	15 ... 30
No-load supply current	[mA]	Max. 30
Ready-state delay	[ms]	typ. 80 1)
Protection against polarity reversal		All connections against each other
Mechanical system		
Mounting position		Any, avoid condensation gathering in the sensor
Housing material		PA reinforced
Keyboard material		TPE-O
Threaded connections material		Brass (nickel-plated)
Display		
Displayable units		bar, kPa, MPa, psi, mmHg, inchHg, inchH_2O, kgf/cm^2
Immissions / emissions		
Storage temperature	[°C]	–20 ... +80
Max. permissible relative air humidity	[%RH]	85
Degree of protection (in accordance with EN 60529)		IP40
Protection class (in accordance with DIN VDE 0106-1)		III
Resistance to shocks (in accordance with EN 60068-2)		30 g acceleration with 11 ms duration (half-sine)
Vibration resistance (in accordance with EN 60068-2)		10 ... 60 Hz: 0.35 mm / 60 ... 150 HZ: 5 g

1) After this time, the electrical outputs take a defined, stable condition

Fig. 22

SPAN-		-B2	-B11	-V025	-V05	-V1	-P025	-P05
Pressure measuring range Start value	[bar]	-1				0		
	[MPa]	-0.1				0		
Pressure measuring range End value	[bar]	1	10	-0.25	-0.5	-1	0.25	0.5
	[MPa]	0.1	1	-0.025	-0.05	-0.1	0.025	0.05
Overload range Start value	[bar]	-1						
	[MPa]	-0.1						
Overload range End value	[bar]	5	15	1	2	5	1	2
	[MPa]	0.5	1.5	0.1	0.2	0.5	0.1	0.2

Fig. 23

SPAN-		-P1	-P2	-P6	-P10	-P12	-P16
Pressure measuring range Start value	[bar]	0					
	[MPa]	0					
Pressure measuring range End value	[bar]	1	2	6	10	12	16
	[MPa]	0.1	0.2	0.6	1	1.2	1.6
Overload range Start value	[bar]	-1					
	[MPa]	-0.1					
Overload range End value	[bar]	5	6	15			20
	[MPa]	0.5	0.6	1.5			2.0

Fig. 24

IO-Link 1)	
Protocol version	Device V1.1
Profiles	Smart sensor profile
Function classes	Binary data channel (BDC) Process data variable (PDV) Identification Diagnostics Teach channel
Communication mode	COM2 (38.4 kBaud)
Port class	A
Process data width IN	2 byte
Process data content IN	2 bit BDC (pressure monitoring) 14 bit PDV (pressure reading)
IODD, IO-Link device description	➔ www.festo.com/sp

1) Only SPAN-...-PNLK-PNVBA

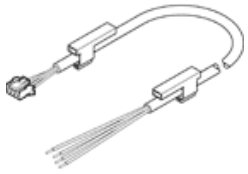
Fig. 25

Connecting cable NEBS-L1G4-K-2.5-LE4

Part number: 572576

FESTO

General operating conditions
Data sheet



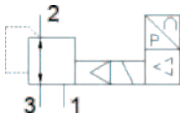
Data sheet

Feature	Value
Shipping date	→ View
Electrical connection 1	Socket, rectangular design L1, 4-pin
Electrical connection 2	Open end, 4-wire
Operating voltage range DC	0 ... 30 V
Acceptable current load at 40°C	1 A
Surge strength	0.8 kV
Cable length	2.5 m
Cable attribute	Standard
Test conditions of cable	Bending strength according to Festo standard Test conditions on request
Cable diameter	4.1 mm
Cable structure	4x0,14
Nominal conductor cross-section	0.14 mm2
Color code, core insulation	blue brown Black white
Protection class	IP40
Ambient temperature	-20 ... 60 °C
Ambient temperature with flexible cable installation	-5 ... 60 °C
Materials note	Free of copper and PTFE Conforms to RoHS
Degree of contamination	2
Corrosion resistance classification CRC	4 - Very high corrosion stress
Materials information, cable sheaths	PVC
Cable sheath color	Grey
Materials information, housing	PA
Material information, isolating sleeve	PP

Proportional pressure regulator
VPPE-3-1-1/8-10-420-E1

Part number: 557776

FESTO

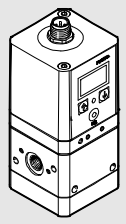


Data sheet

Feature	values
Nominal diameter, pressurisation	5 mm
Nominal diameter, exhaust	2.5 mm
Type of actuation	electrical
Sealing principle	soft
Assembly position	Any Preferably upright
Design structure	Pilot actuated diaphragm regulator
Short circuit strength	for all electrical connections
Safety instructions	VPPE safety position: If the power supply cable is interrupted, output pressure is maintained unregulated.
Polarity protected	for all electrical connections
Type of reset	mechanical spring
Type of piloting	Piloted
Valve function	3-way proportional-pressure regulator
Type of display	LED display 3-digit
Pressure regulation range	0.1 ... 10 bar
Inlet pressure 1	6 ... 11 bar
Max. pressure hysteresis	0.05 bar
Standard nominal flow rate	1,250 l/min
Operating voltage range DC	21.6 ... 26.4 V
Max. current consumption	160 mA
Duty cycle	100%
Max. electrical power consumption	4.2 W
Residual ripple	10 %
Switch output	PNP
Signal range, analogue output	4 - 20 mA
Signal range, analogue input	4 - 20 mA
Operating medium	Compressed air in accordance with ISO8573-1:2010 [7:4:4] Inert gases
Note on operating and pilot medium	Lubricated operation not possible
CE mark (see declaration of conformity)	to EU directive for EMC
Corrosion resistance classification CRC	2
Medium temperature	10 ... 50 °C
Protection class	IP65
Ambient temperature	0 ... 60 °C
Authorisation	RCM Mark c UL us - Listed (OL)
Product weight	390 g
Linearity error in ± %FS	1 %FS
Temperature coefficient	0.04 %/K
Repetition accuracy in ± %FS	0.5 %FS
Electrical connection	Plug M12 5-pin
Mounting type	with through hole

Feature	values
Pneumatic connection, port 1	G1/8
Pneumatic connection, port 2	G1/8
Pneumatic connection, port 3	G1/8
Materials note	Conforms to RoHS
Materials information, housing	Wrought Aluminium alloy Anodised

VPPE-3-1-1/8-...-E1 (LED indicator)



FESTO

Operating instructions

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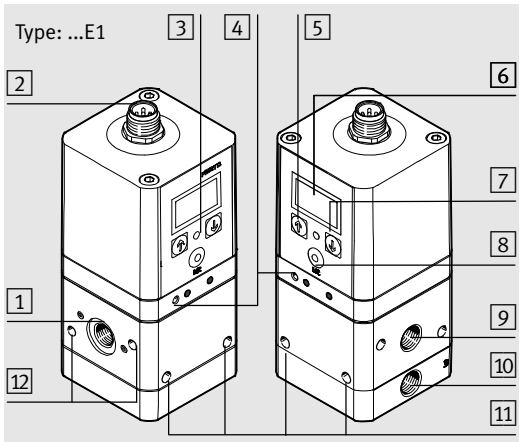
Germany
Phone:
+49 711 347-0
www.festo.com

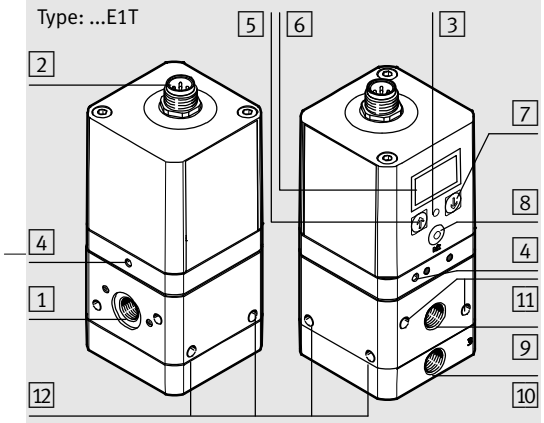
Original: de

1508c

8047957 [8047953]

Proportional pressure regulator . . . . . en





1 Supply port (1)
2 Electrical connection
3 Status LED (green)
4 Earth terminal, external (front and reverse side)
5 Operating key UP
6 LED indicator
7 Operating key DOWN
8 Edit key
9 Pressure output (2)
10 Venting (3)
11 Front fastening hole
12 Side fastening hole

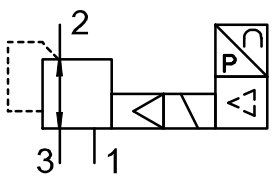
Fig. 1

➔ **Note**

- Installation and commissioning may only be performed in accordance with the operating instructions and by qualified personnel.

1 Application and function

The VPPE-... is intended for regulating pressure proportionally to a specified setpoint value.
Manually adjustable pressure regulators can be replaced by remotely adjustable electric regulators. This way, various machine parameters are available quickly and automatically.



2 Range of applications and certifications

In combination with the UL mark on the product, the information included in this section is also applicable for compliance with the certification requirements of Underwriters Laboratories Inc. (UL) for USA and Canada. Observe the following notes from UL:

➔ **Note**

- The Unit shall be supplied by a power source which fulfils the requirements on a limited-energy circuit in accordance to IEC/EN/UL/CSA 61010-1 or on a Limited Power Source (LPS) in accordance to IEC/EN/UL/CSA 60950-1 or IEC/EN/UL/CSA 62368-1 or a Class 2 circuit in accordance to NEC or CEC.

UL approval information	
Product category code	QUYX, QUYX7
File number	E322346
Considered standards	UL 61010-1, CAN/CSA-C22.2 No. 61010-1
UL mark	c UL us LISTED

Electrical and environmental ratings	
Supply voltage	24 V DC
Max. Power	4.2 W
Rated pressure	Up to 1.1 MPa
Altitude up to 2000 m.	

3 Variants of the VPPE-...

Type code of the VPPE-...

VPPE - 3 - 1 - 1/8 - 6 - 010 - E1T
(1 = Pos. 1, 2 = Pos. 2, 3 = Pos. 3)

Pos.	Characteristic	Significance
1	Pressure regulation range: 2 6 10	 0.02 ... 2.0 bar 0.06 ... 6.0 bar 0.1 ... 10.0 bar
2	Setpoint specification: 010 420	 0 ... 10 V (voltage) 4 ... 20 mA (current)
3	Operator unit: E1 Mounting method: T	7-segment LED indicator Common supply manifold mounting

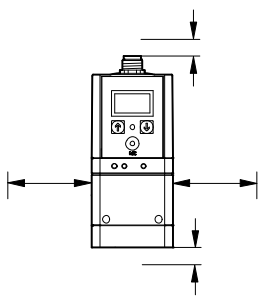
4 Requirements for product use

General conditions for the correct and safe use of the product, which must be observed at all times:
- Maintain the specified limits (e.g. for pressures, temperatures and electric voltages).
- Make sure the compressed air is properly prepared (➔ Technical data).
- Please observe the prevailing ambient conditions.
- All applicable national and international regulations must be complied with.
- Remove all transport packaging, such as protective wax, foils, caps, cartons (except for covers in the pneumatic connections).
  The individual materials can be disposed of in recycling containers.
- Pressurize your entire system slowly. There will then be no uncontrolled movements.
- Observe the warnings and notes
  – on the product
  – in these operating instructions.
- Use the product in its original status, without any unauthorised modifications.

5 Installation

5.1 Mechanical

- Handle the VPPE-... with care so that the electrical connection is not damaged.
  Such damage will reduce operational reliability.
- Make sure there is sufficient space for the cable connection and tubing connections. In this way you will prevent the connecting cable from being bent.



- Place the VPPE-... as close to the load as possible. This leads to improved control precision and shorter response times.
- Push two screws (M4) into the side mounting holes 12 or the front mounting holes 11 (➔ Fig. 1), max. tightening torque: 2 Nm.
- Secure the VPPE-... at the intended position.

➔ **Note**

- When installing the VPPE-...-E1T on the mounting rail IPM-PN-08-40x80-AL, make sure that the compressed air supply corresponds to the total air consumption. Further information can be found in the VAME-PS-MK assembly instructions.

5.2 Pneumatic

- Remove the covers on the compressed air connections.
- Attach pneumatic tubing to the following connections (➔ Fig. 1):
  – Supply port (1) 1
  – Pressure output (2) 9
- Mount a silencer at the exhaust (3) (item 10) or remove the exhaust with ducted tubing.

Operating medium

➔ **Note**

Too much residual oil content in the compressed air will reduce the service life of the valve.
- When using bio-oils (oils that are based on synthetic ester or native ester, e.g. rapeseed oil methyl ester), the maximum residual oil content of 0.1 mg/m³ must not be exceeded (➔ ISO 8573-1:2010 [-:-:2]).

➔ **Note**

The position of the pneumatic connections depends on the variant ordered.

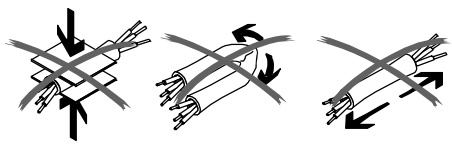
5.3 Electrical

⚠ **Warning**

Electric voltage
Injury caused by electric shock, damage to machine and system
- For the electrical power supply, use only PELV circuits in accordance with IEC 60204-1/EN 60204-1.
- Use only voltage sources that ensure a reliable electric separation from the mains network in accordance with IEC 60204-1/EN 60204-1.
- Observe the requirements of IEC 60204-1/EN 60204-1 for PELV circuits.

➔ **Note**

Make sure that the cable is laid as follows:
– not squashed
– not bent
– not stretched.

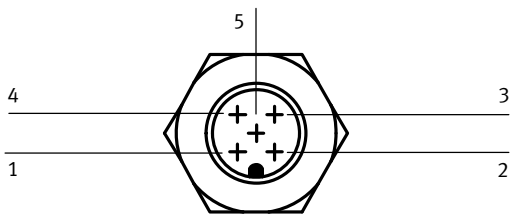


- Use accessories from Festo (➔ Accessories):
  – plug socket with cable
    or
  – plug socket with cable, pre-assembled.
  You can then guarantee that the specified protection class IP 65 and EMC are fulfilled.

➔ **Note**

To ensure EMC safety, the device must be earthed as follows:
- Use the earth/ground connection (➔ Fig. 1).
- Use the following earthing accessories (included in delivery):
  – self-tapping screw
  – flat plug
  – contact disc.

- Connect the VPPE-... as show in the connection pattern. Preferably use cable from Festo.



Pin no.	Colour [1]	Assignment
1	Brown	+24 V DC
2	White	Analogue input - setpoint value / - w
3	Blue	GND
4	Black	Analogue input + setpoint value / + w (0 ... 10 V or 4 ... 20 mA)
5	Grey	Switching output (24 V) or analogue output (0 ... 10 V or 4 ... 20 mA) + Actual value / X_{OUT}

[1] Colour is only valid for accessory cable from Festo

6 Commissioning

➔ **Note**

- The VPPE-... interprets setpoint signals less than 0.1 V as 0 V and setpoint signals less than 4.16 mA as 4 mA. In this case, the output pressure is set to 0 bar through activation of the exhaust valve. As a result, a defined valve condition is assured at w = 0.
- Safety position: With the voltage variant, if the setpoint cable breaks, the output pressure is set to 0 bar. With the current variant, if the setpoint cable breaks or the operating voltage fails, the output pressure remains uncontrolled. Leakage produces a change in pressure in the long term.

- Connect the VPPE-... with a setpoint value signal.
  The VPPE has a so-called “differential input”. The setpoint signal is applied to the contacts pin 2 and pin 4, whereby the lower potential must be connected to contact pin 2 and the higher potential to contact pin 4.
  Contact pin 2 (– setpoint) can be connected to contact pin 3 (GND).
- Supply the VPPE-... with direct current (supply voltage U_V = 24 V DC ± 10 %).
- Pressurize the VPPE-... with an inlet pressure (p1) at least 1 bar higher than the maximum desired outlet pressure. A proportional output pressure (p2) is set automatically.

  The following output pressure range is then assigned to the setpoint signal range 0 ... 10 V or 4 ... 20 mA:

Setpoint signal range	Output pressure range of the variant		
	2 bar	6 bar	10 bar
0 ... 10 V or 4 ... 20 mA	0.02 ... 2 bar	0.06 ... 6 bar	0.1 ... 10 bar

6.1 Recommended parameter sets

The valves in all pressure variants are set at the factory to Preset 2.

Preset recommendation	Preset		
	1	2	3
Load volumes	‹ 0.5 l	~ 0.5 l	› 0.5 l

6.2 VPPE display and meaning

Notes on the following table:
Preset, control behaviour
You can select the desired factory parameter set in the menu on the VPPE (Pr1, Pr2, Pr3).

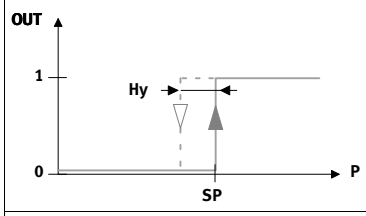
Display	Significance	Description
[An]	Analogue	Output: analogue
[bAr]	bar	Pressure unit
[Eco]	ECO mode	Display shut-down (adjustable)
[Frc]	Force	Manual setpoint specification
[HY]	Hysteresis	Spread, switch difference
[in]	Setpoint value	When ↓ key is pressed (1 sec.), [in] appears. When the key is released, the setpoint value is displayed.
[Loc]	Lock	Input blocked with PIN code
[n.Hi]	Switch normally closed	Contact (normally closed)
[n.Lo]	Switch normally open	Contact (normally open)
[OFS]	Offset	Zero point lift (outlet pressure without setpoint value)
[out]	Actual value	When ↑ key is pressed (1 sec.), [out] appears. When the key is released, the actual value is displayed.
[PA]	**Kilo** Pascal	Pressure unit (in **K**Pa !)
[Pin]	Pin code	Enter value for locking (1 ... 999)
[Pr1]	Preset 1	(➔ Section 6.1)
[Pr2]	Preset 2	(➔ Section 6.1)
[Pr3]	Preset 3	(➔ Section 6.1)
[PSi]	psi	Pressure unit
[rES]	Reset (factory setting)	Switch on device while pressing ↑ + ↓ + Edit keys. Observe the note in section 11
[rnG]	Range	Pressure range adaptation
[Snr]	Display serial number	Switch on device while pressing ↑ + Edit keys: 6 digits of the serial number will be shown, first [xxx.] then [xxx], alternating approx. 2 sec.
[SOF]	Display software version	Switch on device while pressing ↓ + Edit keys: Software version appears
[SP]	Switching point	(➔ Section 5.3)
[SP.H]	Switching point high	Upper switching point (➔ Section 5.3)
[SP.L]	Switching point low	Lower switching point (➔ Section 5.3)
[SP.O.]	Set point ok	Setpoint value reached (➔ Section 5.3)
[unL]	Unlock	Lock removed
⌐	Threshold value comparator	(➔ Section 5.3)
⊓	Window comparator	(➔ Section 5.3)
[._..]	ECO mode activated	After x seconds (adjustable), a line moves through the display [._..]

6.3 Configuring the output

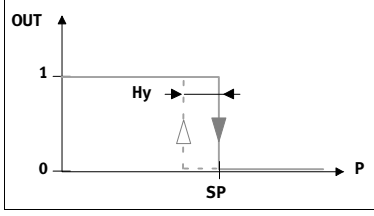
Depending on the variant ordered, the actual value displayed at the analogue output [An] is 0 ... 10 V or 4 ... 20 mA.
If a switching output is chosen, the following modes can be selected: threshold value, window comparator or SP.O.
Switching points (SP...) and hysteresis (HY)
The switching point is only active when a switching point or window comparator is active.
The value of the hysteresis specifies the tolerance for the deviation without causing a signal change at the output (Pin 5).
Setting SP.O.
The SP.O. signal indicates that the setpoint value has been reached in the range (+/-) of the set hysteresis.

If the threshold value comparator is selected ⌐¬

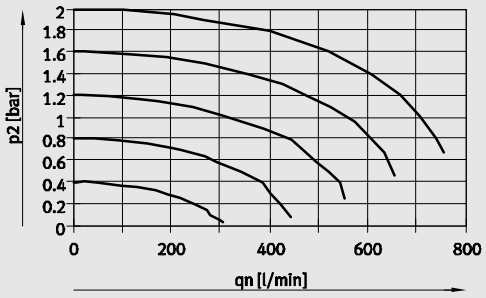
Switching characteristic NO (normally open)



Switching characteristic NC (normally closed)



VPPE-3-1-1/8-2-... p1 = 4 bar



VPPE-3-1-1/8-6-... p1 = 8 bar

VPPE-3-1-1/8-10-... p1 = 11 bar

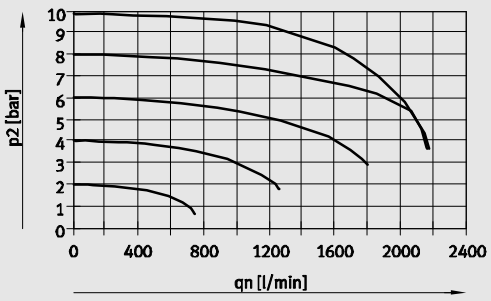
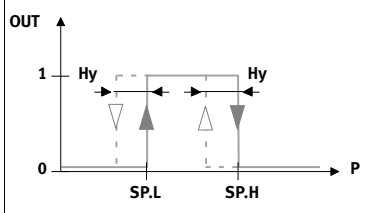


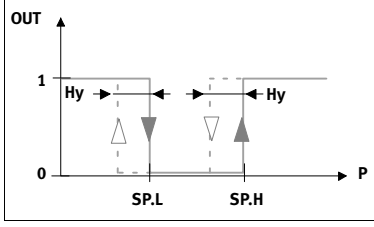
Fig. 2

If the window comparator is selected ⌐¬

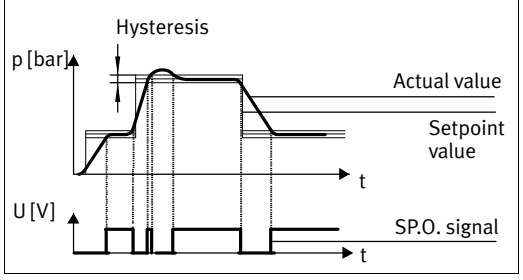
Switching characteristic NO (normally open)



Switching characteristic NC (normally closed)



If SP.O. is selected.



6.4 Display symbols menu

Notes on the following table:
[x.xx] = pressure display (actual value or setpoint value)
[...] = Enter value (with flashing display)

- The main menu selection can be made in only one direction with the Selection key ↓.
- Within a menu option, the selection is normally made with the key ↑ or ↓.
- If no selection is made within 10 sec. in the main menu or 80 sec. within a menu option, the display automatically jumps back to the basic position, which is exception [Frc].

Menu = main menu selection
[x.xx] = value specification (setpoint value/actual value)
Continue in the menu = press Edit key
If the display flashes (grey background) = you can select something with keys ↑ ↓
Change value [...] = with keys ↑ ↓
Save selection/value = press Edit key

No.	Menu	Selection option ↑ ↓		
1	[x.xx]	↑ (1 sec.) = [in]	↓ (1 sec.) = [out]	
2	[Pr...]			
	[Pr...]	Pr1	Pr2	Pr3
3	[bAr]			
	[bAr]	bAr	PA	PSI
4	[OFS]			
	[...]			
5	[rnG]			
	[...]			
6	[Frc]	0.00 ... 10.0 V (voltage variant) 4.00 ... 20.0 mA (current variant)		
	[...]			
7	[An]			
	[An]	⌐	⌐¬	SP.O.
		SP	SP.L	HY
		[...]	[...]	[...]
		[...]	[...]	[...]
		HY	SP.H	[n.Lo/ n.Hi]
		[...]	[...]	[n.Lo/ n.Hi]
		[...]	[...]	
		[n.Lo/ n.Hi]	HY	
		[n.Lo/ n.Hi]	[...]	
			[...]	
			n.Lo/ n.Hi	
			n.Lo/ n.Hi	
8	[Eco]			
	[OFF]			
	[OFF]	[1 ... 999] sec.		
9	[Pin]			
	[OFF]			
	[OFF]	[1 ... 999]		
	Back to no. 1			

7 Operation

➔ ..... **Note**

- When switching off the VPPE-..., first make sure that the setpoint voltage or setpoint current intensity is switched off, then switch off the supply pressure and finally the supply voltage.

The green status LED lights up when the actual value is equal to or in a range of ± 1 % (FS) of the setpoint value.

Lock [Loc] – unlock [unL]
If a PIN code was entered with [Pin], [Loc] is shown in the display and the edit mode is locked via the PIN code. If a flashing [0] appears, enter the correct PIN. After the correct PIN is entered, [unL] is displayed. If the entry is incorrect, the VPPE jumps to the basic position.

8 Maintenance and care

- Clean the housing of the VPPE-... with a soft cloth only. The permitted cleaning medium is a mild soapsuds solution max. 50 °C.

9 Accessories

➔ ..... **Note**

You can find product accessories at:
http://www.festo.com/catalogue

10 Fault clearance

Malfunction	Possible cause	Remedy
VPPE-... does not react	No power, LED is not illuminated	Check connection of the 24 V DC power supply
	No setpoint voltage	Check control unit; check connection
	VPPE-... defective	Send the device to the Festo repair service
Flow rate too low	Flow is restricted by the connector (swivel fittings)	Use an alternative connection
Pressure rise too slow	Large cylinder volume and long tube length	Select different parameter set
Pressure constant despite modified setpoint value specification	– Supply cable fractured (the last set working pressure is maintained unregulated). Slow pressure drop due to leakage. – Too little supply pressure p1	– Replace supply cable – Increase supply pressure

11 Reset to factory setting

➔ ..... **Note**

By resetting to factory settings, the current settings are lost.
– If required, make a note of these settings before resetting.

Reset [rES] returns settings to factory setting. To do this, press and hold the following keys "↑ + ↓ + Edit" and then switch on the device.
Then the following parameters are set:

Parameter	Setting / value
x.xx	Permanent display (actual value/setpoint value)
Pr2	(universal control behaviour)
bar	bar
OFS	000
rnG	for 10 bar type: 10.0 for 6 bar type: 6.00 for 2 bar type: 2.00
Frc	Display shows existing pressure at pressure output (p2)
An	Output: analogue
Eco	OFF
Pin	OFF

12 Technical data

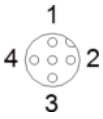
Type	VPPE-3-1-1/8-...-E1		
Design	Proportional pressure regulator valve		
Mounting position	As desired, preferably vertical (electronics upward).		
Medium	Compressed air to ISO 8573-2010:1 [7:4:4] Lubricated operation not possible		
Pressure ranges	2 bar type	6 bar type	10 bar type
– Permissible supply pressure	3 ... 4 bar	6 ... 8 bar	6 ... 11 bar
– Control range	0.02 ... 2 bar	0.06 ... 6 bar	0.1 ... 10 bar
	Input pressure p1 at least 1 bar above output pressure p2		
Standard nominal flow rate	➔ Fig. 2		
Total leakage when new	‹ 5 l/h		
Ports	G1/8		
Nominal width – Pressurisation – Exhaust	 5 mm 2.5 mm		
Degree of protection	IP65 in combination with plug socket according to accessories		
Permitted temperature range – Environment – Storage – Medium	 0 ... +60 °C –10 ... +60 °C +10 ... +50 °C		
Electrical connection	Pin contact M12x1, 5-pin		
Permitted supply voltage	24 V DC ± 10 %		
Setpoint variable Input resistance	0 ... +10 V / 4 ... 20 mA 10 kΩ (voltage) / 250 Ω (current)		
Load actual value output	Min. 2 kΩ (voltage) Max. 500 Ω (current)		
Linearity error	Max. ± 1 % FS (full scale) at 24 V DC and 25 °C		
Residual ripple	10 %		
Vibration and shock – Vibration – Shock	 Tested in accordance with DIN/IEC 68/EN 60068 part 2-6, Severity level 2 Tested in accordance with DIN/IEC 68/EN 60068 part 2-27, Severity level 2		
Power consumption	max. 4.2 W		
Electromagnetic compatibility – EMC interference emission and resistance	 See declaration of conformity ➔ www.festo.com CE conformity for industrial installations fulfilled		
Materials – housing – cover – seals – lubrication	 Al PA NBR silicone free		
Weight	Approx. 390 g		

Connecting cable
NEBU-M12W5-K-2.5-LE4

Part number: 550325

FESTO

For SOPA air gap sensor.



Data sheet

Feature	values
Conforms to standard	EN 61076-2-101 EN 61984
Cable attribute	Standard
Test conditions of cable	Bending strength according to Festo standard Test conditions on request Chain link trunking: 5 million cycles, bending radius 75 mm
Operating voltage range AC	0 ... 250 V
Operating voltage range DC	0 ... 250 V
Surge strength	2.5 kV
Acceptable current load at 40°C	4 A
Degree of contamination	3
CE mark (see declaration of conformity)	to EU directive low-voltage devices
Protection class	IP65 IP68 IP69K
Ambient temperature with flexible cable installation	-5 ... 70 °C
Ambient temperature	-25 ... 70 °C
Electrical connection	Angled socket/open end M12x1 / - 5-pin/4-wire
Cable structure	4 x 0,25 mm²
Cable diameter	4.5 mm
Cable length	2.5 m
Nominal conductor cross-section	0.25 mm2
Plug coding	A
Colour code, core insulation	blue brown Black
Housing colour	Black
Cable sheath colour	Grey
Materials information for locknut	Brass Nickel plated
Materials note	Free of copper and PTFE Conforms to RoHS
Materials information, housing	TPE-U(PUR)
Material information, isolating sleeve	PP
Materials information, cable sheaths	TPE-U(PUR)