Control Units

For pneumatic measuring. Model 200
Sensing of workpieces, tools and positions
Operating pressure 0 to 12 bar

NORGREN HERION

Catalog Register
P20

Publication 750**2942**.06.01.96

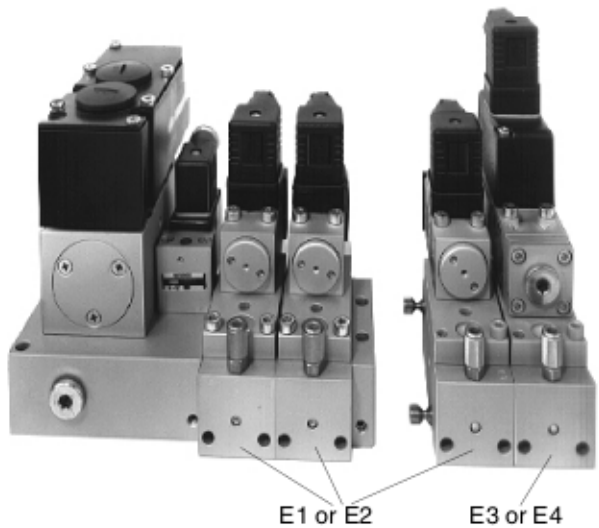
OBSOLETE DOCUMENT
Technical Reference Only

Description

Control unit with proportional pressure control valve, nominal size 8. Analog or digital control.

Working fluid: Filtered compressed air, lubricated or unlubricated. Filtration 10 µm

Temperature range:	–10 to + 60 °C
Ejector pressure:	0.3 to 10 bar
Filling pressure:	1.5 to 1.75 bar
Measuring pressure:	2.5 bar



Features

- Active process safety
- Air-gap sensing possible down to 0.01 mm
- Easy setting of parameters
- Minimum measuring times
- Setting by means of selector disk (only 1 parameter to change)
- High repeating accuracy and constant measuring pressures
- Can be controlled directly by PLC (8-bit parallel), digital setpoint generation
- High ejector-air flow rate thanks to DN 3 bypass valve, ejector pressure as desired
- Fixed-setting pressure switch for signal output
- Modular design allows variable number of measuring points

Equipment list

Description	Design	Measuring distance [mm]	Dimensional drawing Position	No.	Code	Cat. No.
Input module, complete, with end plate (digital; 8 bit;)	NC	–	1	02	D 3	**0543884**
Input module, complete, with end plate (digital; 8 bit;)	NO	–	1	01	D 1	**0546388**[1)]
Input module, complete, with end plate (analog; 0 ... 10 V;)	NC	–	1	02	D 4	**0545541**
Input module, complete, with end plate (analog; 0 ... 10 V;)	NO	–	1	01	D 2	**0546389**[1)]
Function module, complete	–	0.01 to 0.1	2	02	E 1	**0543886**
Function module, complete	–	0.1 to 0.5	2	02	E 2	**0543887**
Function module, complete	–	0.01 to 0.1	2	02	E 3	**0546316**
Function module, complete	–	0.1 to 0.5	2	02	E 4	**0546387**
Function module, complete	–	0.01 to 1.1	2	01	E 5	**0546818**[1)]

[1)] With mini-measuring connection M 16 x 2 for dial gauge

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HERION control units for pneumatic measuring. In modular design and with proportional pressure reducing valve (see Figure)

Functional description

The use of a HERION proportional pressure control valve (Item 1) allows pressures to be adapted to requirements by means of digital or analog setpoints.

A continuous blast pressure between tool-changing keeps the nozzles "D2" at the contact points free of penetrating coolant. Before contact with the workpiece, the blast pressure can be briefly increased (the pressure switch signal is suppressed during this time). This removes any dirt particles from the contact points "D2". The pressure in the pneumatic system is now relieved to p = approx. 1.5 bar. The pressure switch, which is permanently set to 1.8 bar (release pressure), does not detect back-pressure and signals a fault.

For the subsequent measurement a pressure of p = 2.5 bar is selected. At the same time the bypass is closed. The air flow which is adjusted by means of a nozzle (via selector disk "D1") increases the back pressure as a function of the gap "X" to be monitored.
From p = 1.8 bar onwards, the pressure switch generates a positive signal.

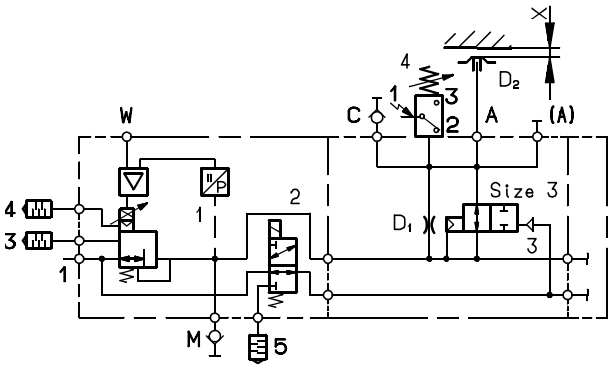
The integral nozzle wheel makes the necessary adjustment much easier.

The 3/2 directional control valve (Item 2) triggers a 2/2 directional bypass valve (Item 3).

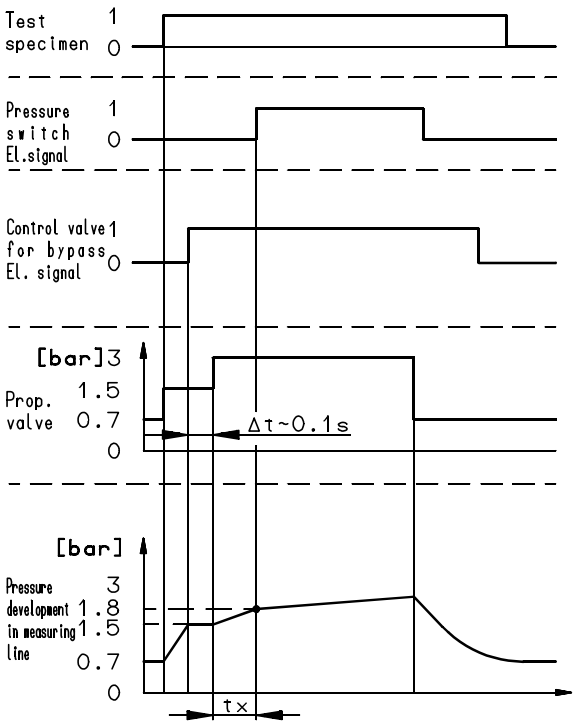
Advantages:
- Large blast-air volume (clean contact surface)
- Very short response time during measurement

Circuit diagram

Design NC (Item 2)

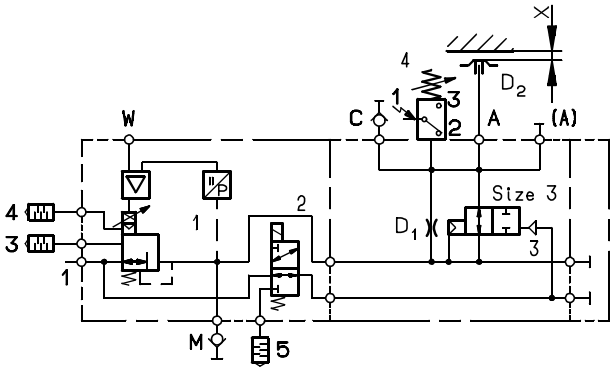


Signal sequence (example)

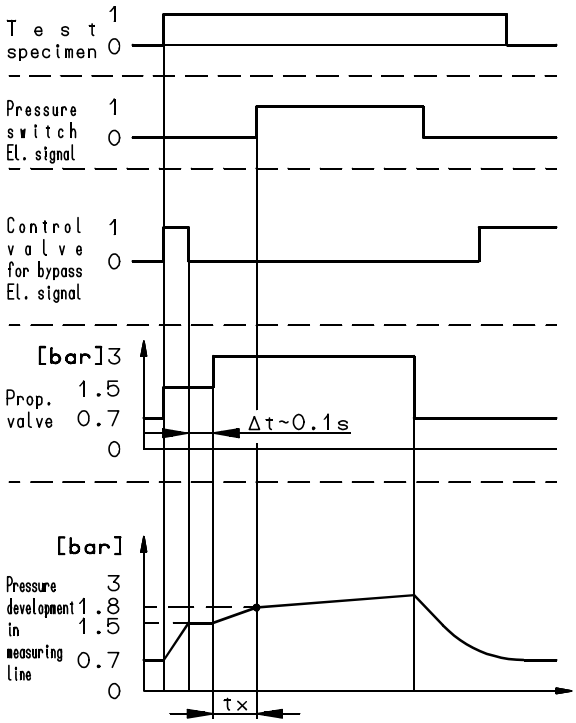


Circuit diagram

Design NO (Item 2)



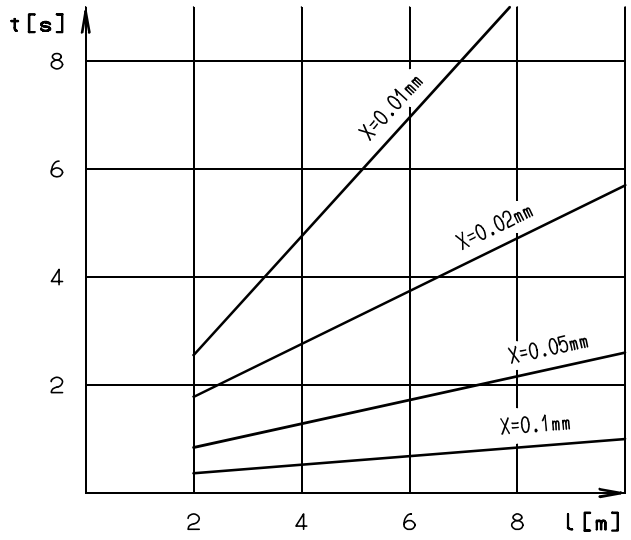
Signal sequence (example)



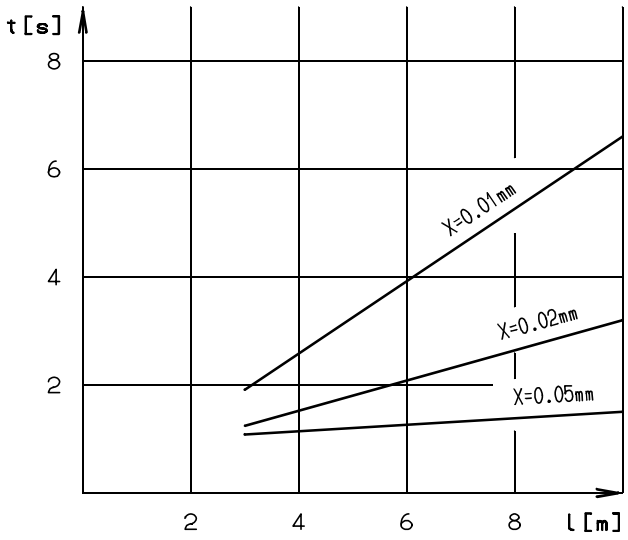
Characteristic curves

Measuring times dependent on hose length
(hose inside dia. = 4 mm)

without filling



with filling

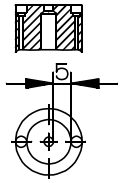


Recommendation for sensor nozzles

When planning the air-exit bores in the contact surface, it must be ensured that the throttling distance between the workpiece and the contact surface is not too long (max. 5 mm). With large contact areas, it is recommended to eliminate the coolant and the air passing through the sensor nozzle by means of bores in the contact surface.

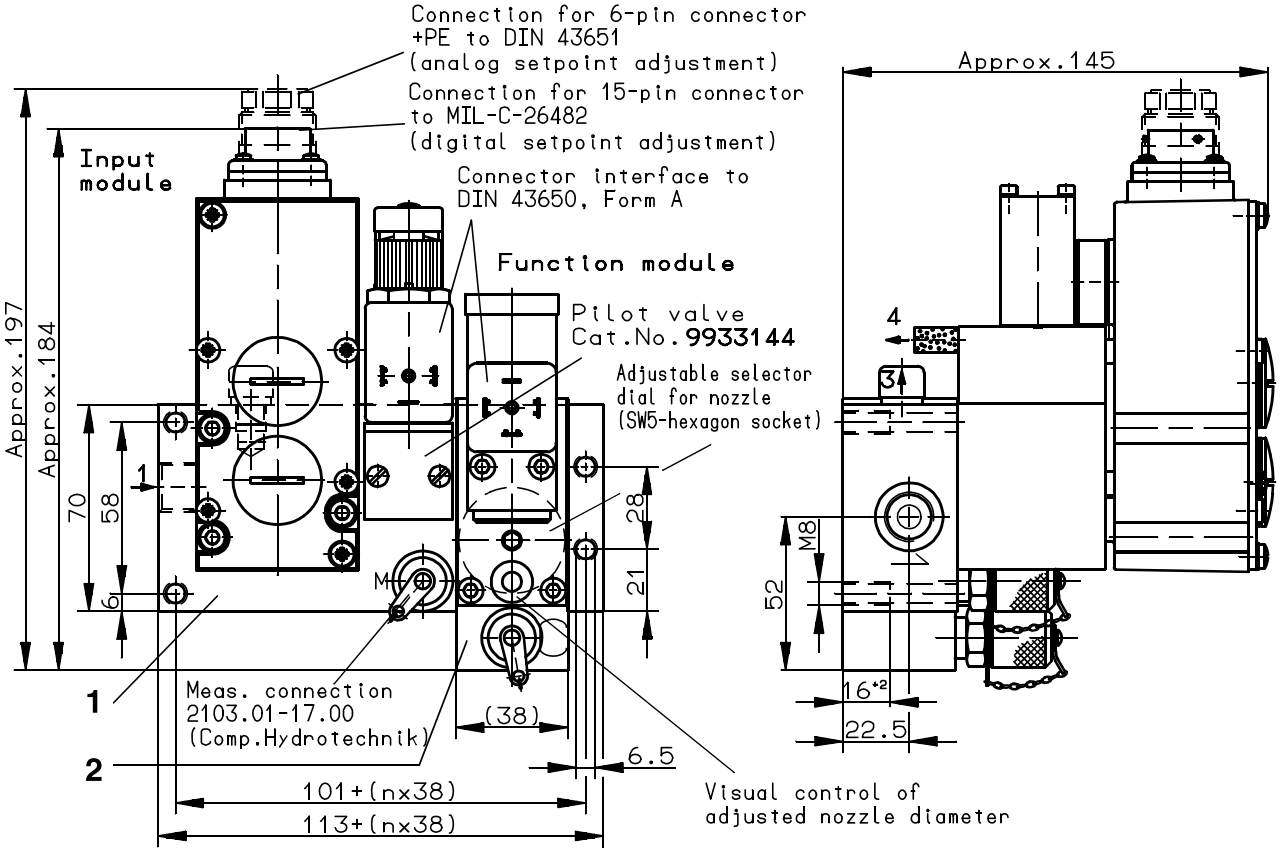
Recommendation for air-exit bore

For measuring distance 0.01 to 0.1: Dia. 2 to 4 mm
For measuring distance 0.1 to 0.5: Dia. 1 to 2.5 mm

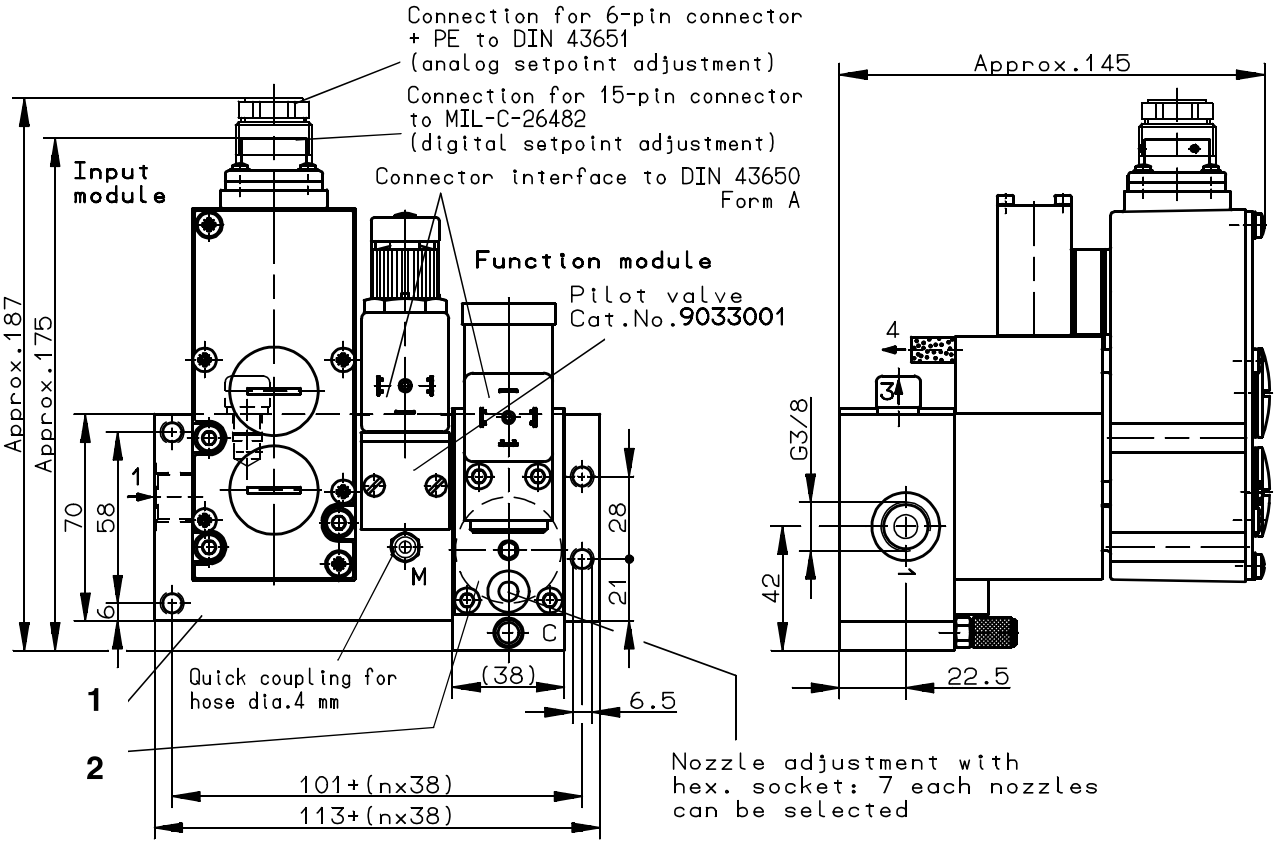


Dimensional drawings [mm]

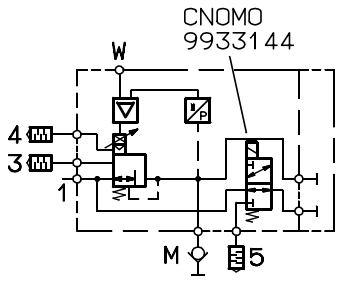
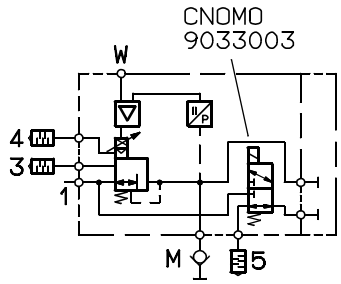
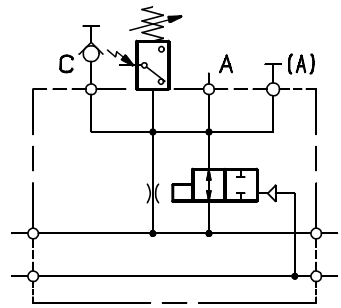
01



02



Modular equipment

Symbol	Cat. No.	Code	Designation	Description	Drawing
	**0546388.0000**	D 1	Input module	With digit. triggered proportional valve, 8 bits Cat. No. **4091313.9000** With meas. connection With CNOMO control valve, NO Cat. No. **9933144.0246**	0546386 DB
	0546389.0000	D 2	Input module	With analog. triggered proportional valve, 0 ... 10 V Cat. No. **4091310.9000** With meas. connection With CNOMO control valve, NO Cat. No. **9933144.0246**	0546386 DB
	**0543884.0000**	D 3	Input module	With digit. triggered proportional valve, 8 bits Cat. No. **4091313.9000** With meas. connection With CNOMO control valve, NC Cat. No. **9033003.0150**	0544566 DB
	0545541.0000	D 4	Input module	With analog. triggered proportional valve, 0 ... 10 V Cat. No. **4091310.9000** With meas. connection With CNOMO control valve, NC Cat. No. **9033003.0150**	0544566 DB
	**0543886.0000**	E 1	Function module	With meas. connection Meas. range: 0.01 to 0.10 mm Nozzle dia: 0.30 to 0.90 mm Pressure switch: **0881217.0000** adjusted to 1.80 bar rising	0544566 DB
	0543887.0000	E 2	Function module	With meas. connection Meas. range: 0.10 to 0.50 mm Nozzle dia: 0.90 to 1.50 mm Pressure switch: **0881217.0000** adjusted to 1.80 bar rising	0544566 DB
	0546316.0000	E 3	Function module	With meas. connection Meas. range: 0.01 to 0.10 mm Nozzle dia: 0.30 to 0.90 mm Pressure switch: **0820227.0000** adjusted to 1.80 bar rising	0544566 DB
	0546387.0000	E 4	Function module	With meas. connection Meas. range: 0.10 to 0.50 mm Nozzle dia: 0.90 to 1.50 mm Pressure switch: **0820227.0000** adjusted to 1.80 bar rising	0544566 DB
	0546828.0000	E5	Function module	With meas. connection Meas. range: 0.01 to 0,10 mm Nozzle dia: 0.30 to 0,90 mm Pressure switch: **0881217.0000** adjusted to 1.80 bar rising	0546386 DB

Control units for pneumatic measuring, Model 200
Series 2397020

Determination of function

Order code

Size of module Single ☐ 2-fold ☐ 3-fold ☐ 4-fold ☐ 5-fold ☐ 6-fold ☐

Module type	Input module	Function module					
	1	2	3	4	5	6	7	End
Module 200								

Example of order

Size of module Single ☐ 2-fold ☐ 3-fold ☐ 4-fold ☒ 5-fold ☐ 6-fold ☐

Module type	Input module	Function module					
	1	2	3	4	5	6	7	End
Module 200	**D 3**	**E 1**	**E 2**	**E 3**	**E 1**	–	–	

Example of order: Mod. 200- D3 – E1– E2 – E3 – E1

Module type — Input module — Function module

3-way proportional pressure regulator DN 8

Description

General
The proportional pressure regulator allows stepless adjustment of a pneumatic pressure. The outlet pressure is controlled by the integrated electronics and pressure sensor.

Function
The pneumatic outlet pressure is adjusted by means of a setpoint signal (reference variable w). The electronics processes this signal and uses a variable current (manipulated variable y) to control the force of the proportional solenoid fitted to the valve. This force effects the adjustment of the pneumatic output pressure.
The outlet pressure is measured by an integrated pressure sensor (actual value x) and controlled by the internal electronics.
There is thus a proportional relationship between the setpoint signal and pneumatic outlet pressure.
If the setpoint is reduced or the outlet pressure increased as the result of conditions in the installation, the valve exhausts from port 2 to port 3 until the outlet pressure once again equals the setpoint.

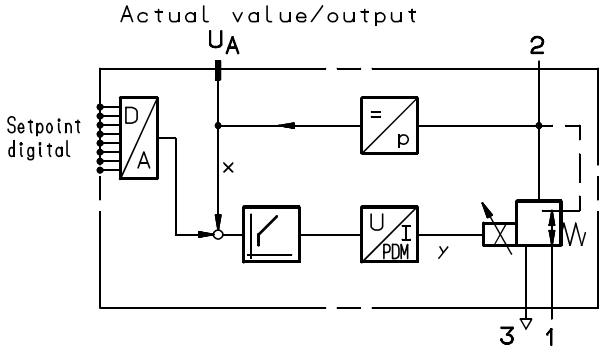
Features

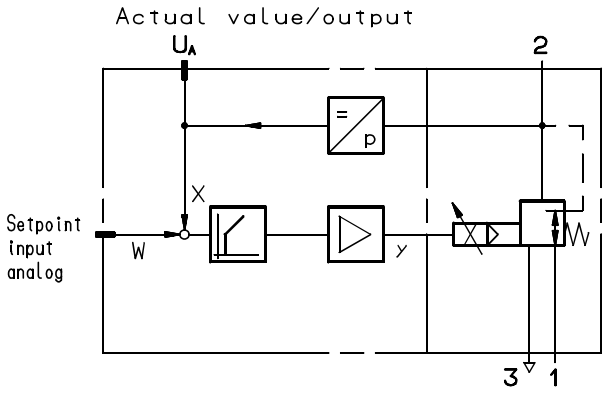
- Valve and control electronics in a single unit
- Minimal hysteresis
- Good linearity
- Good response sensitivity
- Short actuating time
- Variable controller gain
- Can be mounted in any desired position
- High flow rate, even via exhaust cross-section

Input module, Cat. No. **0546388.0000**
With **digit.** triggered proportional pressure regulator
Cat. No. **4091313.9000.024.00**

Input module, Cat. No. **0546389.0000**
With **analog.** triggered proportional pressure regulator
Cat. No. **4091310.9000.024.00**

Block diagram





Parameters

General parameters

Description		3-way proportional pressure regulator with integrated electronic closed-loop pressure controller
Design		Poppet valve, pneumatically piloted
Connection		Flange, subplate
Mounting position		Preferably horizontal
Flow direction		Defined
Actuator		Proportional solenoid
Ambient temperature	[°C]	–10 ... +60
Nominal size	[DN]	8
Weight	[kg]	0.96
Degree of protection		IP 54

Pneumatic parameters

Fluid		Filtered compressed air, lubricated or unlubricated
Filter	[µm]	50
Fluid temperature	[°C]	–10 ... +40
Operating pressure range p_e	[bar]	0 ... 12 bar
Setting pressure range p_v	[bar]	0 ... 10
Hysteresis	[% p_v max.]	<0.5
Repeatability	[% p_v max.]	<0.5
Linearity[1)]	[% p_v max.]	<1
Response sensitivity	[% p_v max.]	≤0.2

[1)] Values referred to 20 °C

Electrical parameters

Power supply

Supply voltage	U_B [V]	18 ... 32 VDC
Residual ripple max.	[%]	10
Current consumption max.	I_B [A]	0.5

Digital setpoints

Data inputs (parallel)	[bit]	8 bits + memory function
Level for logic	"L"[2)][V]	0 ... 2
Level for logic	"H" [V]	12 ... 32
Input current	[mA]	1

Outputs

Voltage signal for pneumatic outlet pressure	U_A [V]	0 ... 10
Output current max.	I_A [mA]	2
Voltage output for supply of external setpoint adjuster (only with version with voltage setpoint)	U [V]	15 ± 0.5
Output current max.	I [mA]	5

[2)] Input open-circuit = Logic "L"

Parameters

General parameters

Description		3-way proportional pressure regulator with integrated electronic closed-loop pressure controller
Design		Poppet valve, pneumatically piloted
Connection		Flange, subplate
Mounting position		Preferably horizontal
Flow direction		Defined
Actuator		Proportional solenoid
Ambient temperature	[°C]	–10 ... +60
Nominal size	[DN]	8
Weight	[kg]	0.96
Degree of protection		IP 54

Pneumatic parameters

Fluid		Filtered compressed air, lubricated or unlubricated
Filter	[µm]	50
Fluid temperature	[°C]	–10 ... +40
Operating pressure range p_e	[bar]	0 ... 12 bar
Setting pressure range p_v	[bar]	0 ... 10
Hysteresis	[% p_v max.]	<0.5
Repeatability	[% p_v max.]	<0.5
Linearity[1)]	[% p_v max.]	<1
Response sensitivity	[% p_v max.]	≤0.2

Electrical parameters

Power supply

Supply voltage	U_B [V]	18 ... 32 VDC
Residual ripple max.	[%]	10
Current consumption max.	I_B [A]	0.5

Analog setpoints

Voltage signal	U_E [V]	0 ... 10
Input resistance	R_I [Ω]	> 300
Current signal	I_E [mA]	
Load	[Ω]	≤ 135

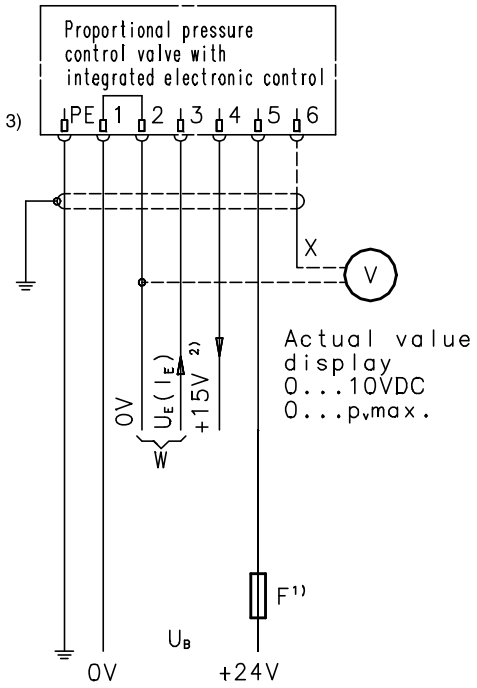
Outputs

Voltage signal for pneumatic outlet pressure	U_A [V]	0 ... 10
Output current max.	I_A [mA]	2
Voltage output for supply of external setpoint adjuster (only with version with voltage setpoint)	U [V]	15 ± 0.5
Output current max.	I [mA]	5

[1)] Values referred to 20 °C

Connection diagram 1

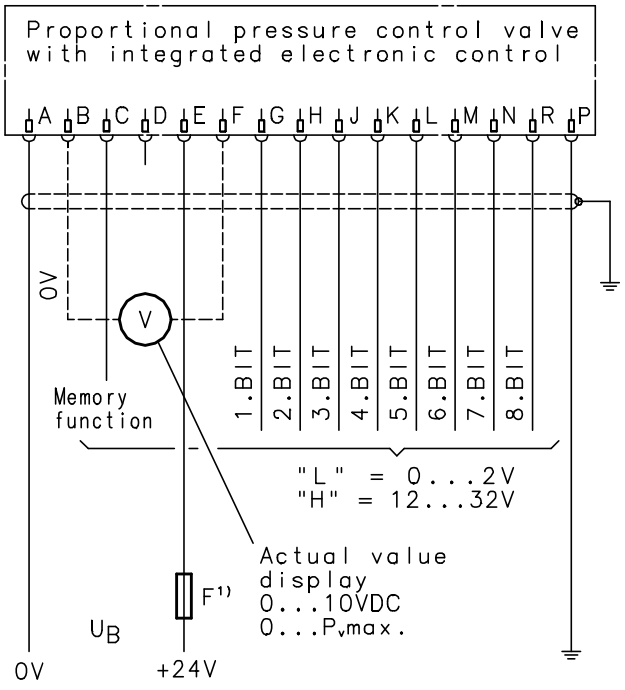
Valves with analog setpoint input



1) Recommended line fuse: M 1.0 A
2) Supply for external setpoint adjuster
(only with version with voltage setpoint)
3) Internal connection 1 to 2 (only with version without electrical isolation)

Connection diagram 2

Valves with digital setpoint input



1) Recommended line fuse: M 1.0 A

Conversion table for digital input signal

Signal at pin								Value z (decimal)	Valve version acc. to pressure range p_v [bar]		
R	N	M	L	K	J	H	G		0 ... 2	0 ... 10	0 ... 16
L	L	L	L	L	L	L	L	0	0.000	0.000	0.000
L	L	L	L	L	L	L	H	1	0.008	0.039	0.063
L	L	L	L	L	L	H	L	2	0.016	0.078	0.125
L	L	L	L	L	H	L	L	4	0.031	0.156	0.251
L	L	L	L	H	L	L	L	8	0.063	0.314	0.502
L	L	L	H	L	L	L	L	16	0.126	0.627	1.004
L	L	H	L	L	L	L	L	32	0.251	1.255	2.008
L	H	L	L	L	L	L	L	64	0.502	2.510	4.016
H	L	L	L	L	L	L	L	128	1.004	5.020	8.031
H	H	H	H	H	H	H	H	255	2.000	10.000	16.000

p_V [bar] =	$\frac{2}{255}$ x z	$\frac{10}{255}$ x z	$\frac{16}{255}$ x z

z = Sum of values triggered with ”H“

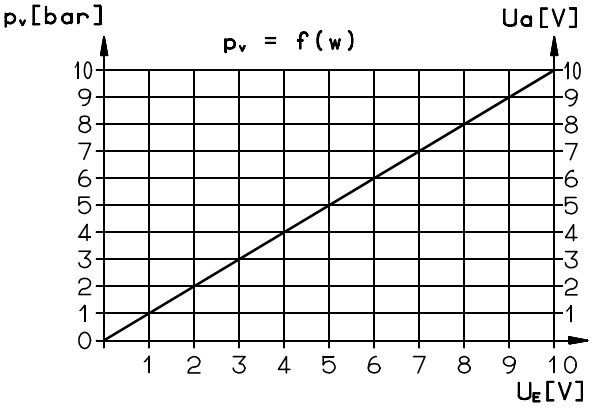
Notes on memory function[1)]
Logic table

R	N	M	L	K	J	H	G	C	Output signal
								L	As triggered at pins G to R
X	X	X	X	X	X	X	X	H	The previously-set value is stored; the triggering signals at pins G to R are ignored

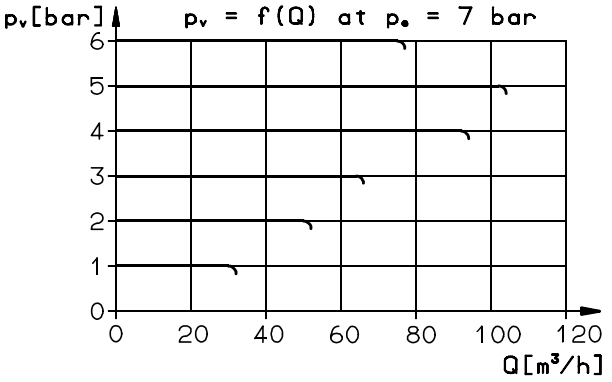
1) If the memory function is not required, pin C can be ignored.

Characteristic curves

Static characteristic curve



Flow characteristic at 7 bar operating pressure



Pressure switch

Description

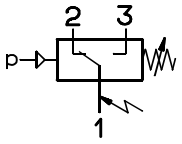
Plastic diaphragm sensor system
Pressure switch for neutral and gaseous fluids

Switching pressure range:	–1 to 16 bar
Repeatability:	± 3%
Electrical connection:	Plug-in connection to DIN 43650
Degree of protection:	IP 65 (with connector)
Switching element:	Microswitch
Ambient temperature:	–10 to +80 °C
Fluid temperature:	–20 to +80 °C
Temperature at switching element:	max. +80 °C
Mounting position:	Optional
Vibration:	max. 15g

Cat. No.. **0881217**

Features

- Compact design
- High number of switching cycles
- Preferably used for pressure monitoring
- Safe functioning under vibrations



Symbol

Description

Plastic diaphragm sensor system
Pressure switch for neutral and gaseous fluids

Switching pressure range:	0.02 to 30 bar
Repeatability:	± 2%
Electrical connection:	Plug-in connection to DIN 43650
Degree of protection:	IP 64
Switching element:	Microswitch
Ambient temperature:	–10 to +60 °C
Fluid temperature:	0 to +80 °C
Temperature at switching element:	max. +80 °C
Mounting position:	Optional
Vibration:	max. 10g (sinusoidal)

Cat. No. **0820227**

Features

- Compact design
- Preferably used for pressure monitoring

Switching function:
Single-pole microswitch (change-over switch)
Terminals 1-3: Contacts close on rising pressure,
Terminals 1-2: Contacts open on rising pressure

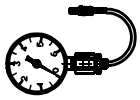
Parameters

Fixed switching pressure difference

Switching pressure range $p_{vu\ min}$...$p_{vo\ max}$ [1]	Switching pressure difference lower range [bar]	Switching pressure difference upper range [bar]	Max. allowable pressure [2] [bar]	Switching cycles per minute	Pressure sensor materials Housing	Pressure sensor materials Seal	Type of connection	Weight [kg]	Cat. No.
0.2 ... 2	0.2	0.5	80	100	Al	NBR	Flange	0.2	**0881217** [3]
0.02 ... 2	0.14		50	60	Al	NBR	Flange	0.3	**0820227** [3]

[1] Referential pressure is the atmospheric pressure
[2] Observe switching range, do not subject switch to max. allowable pressure during normal operation. Even short pressure peaks must not exceed this value.
[3] Adjusted to 1.8 bar, rising

Accessories

Illustration	for model	Description/Design	Cat. No.	Publication
	50 200	**Hand-held control unit HA 04** For control of – 5/3 directional control valves, all ports exhausted in neutral position (ISO-Size 1, Cat. No. 2531730.0246) – Proportional directional control valve with integrated control electronics	**5980101**	HERION 7503133
	50 200	**Power pack NT 30** For voltage supply of hand-held control unit HA 04 Input voltage 220 VAC Plug-in connection Output 24 VDC , 2 A via 3-pin jack With cable, 1.5 m long	**5998714**	HERION 7502260
	200	**Digital input device DE 03** For setting of digital setpoints when controlling pressure regulators With cable 1.5 m long	**5998719**	HERION 7502260
	50 200	**Pressure gauge assly.** With hose, 1.5 m long, and adapter for measuring connection For pressure monitoring	**0546393**	HERION 7503133
	50 200	**Pressure gauge** For measuring hose, Cat. No. 0719885 For pressure monitoring	**0741076**	HERION 7503133
	50 200	**Pressure sensor PU 01, complete** For evaluation of pressure monitoring in hand-held control unit HA 04 With cable, 0.25 m long, and adapter for measuring connection M5	**0546415**	HERION 7503133
	50 200	**Pressure sensor PU 01** For evaluation of pressure monitoring in hand-held control unit HA 04 For measuring hose, Cat. No. 0719885, with measuring connection, Cat. No. 0761844	**5980129**	HERION 7503133
	50 200	**Measuring hose,** length of hose 0.8 m For pressure gauge, Cat. No. 0741076 For pressure sensor, Cat. No. 5980129 **Measuring connection**	**0719885** **0761844**	HERION 7503133
	200	**Connecting cable** for pressure sensor PU 01 For connection to hand-held control unit HA 04 Length of cable 1.5 m	**5980132**	HERION 7502942
	50 200	**Connecting cable** for pressure switch For connection to hand-held control unit HA 04 Connector to DIN 43650 Form A Length of cable 1.5 m	**5980131**	HERION 7502942

Accessories

Illustration	For model	Description/Design	Cat. No.	Publication
	200	**Connecting cable** for solenoid valves – B – For connection of 3/2 bypass control valve, NC With connector to DIN 43650 Form B Length of cable 1.5 m	**5980130**	HERION 7502942
	50	**Connecting cable** for solenoid valves For connection of ISO-5 directional control valves. Solenoid side 14 with connector to DIN 43650 Form A Length of cable 1.5 m	**5998715**	HERION 7502260
	50	**Connecting cable** for solenoid valves For connection of ISO-5 directional control valves. Solenoid side 12 with connector to DIN 43650 Form A Length of cable 1.5 m	**5998722**	HERION 7502260
	200	**Plug socket** For proportional valves with digital setpoint adjustment Straight, 15-pin connection	**0680683**	HERION 7502952
	200	**Plug socket** For proportional valves with analog setpoint adjustment 6-pin + PE to DIN 43651	**0660689**	HERION 7502952
	200	**Setpoint switch SU 01** With two internal setpoints	**5998737**	HERION 7502595
	50 200	**Plug socket** For pressure switch with LED (24 VDC)	**0585418**	HERION 7501628