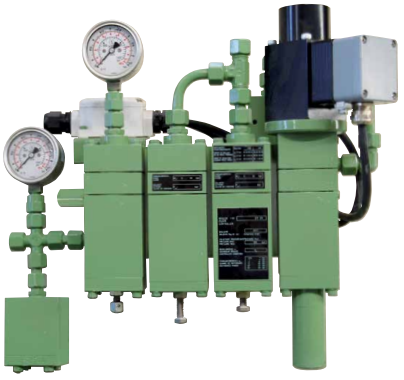
РЕГУЛЯТОРЫ ДАВЛЕНИЯ

Технические характеристики

на HON 638-EP



1. Gas essure regulators with superimposed electronic control loops

Gas pressure regulators normally operate without external energy. The power (auxiliary energy) needed for adjusting the main valve is taken from the regulating line or from the pressure differences between the inlet and outlet.
The increasing tendency to integrate gas pressure regulating systems in a central network management with the goal of improved network utilisation, supply optimisation, etc. requires facilities for connection of the pneumatically operated devices to electronic control systems.

Honeywell has developed a special technology for this interface. The primary functional units of the electro-pneumatic controller are a multi-stage pneumatic pilot with an electro-pneumatic loading pressure stage, a pulse width modulator and a master automation system.
The automation system is equipped with special software for the electro-pneumatic controller. The interconnection of the superimposed automation technology with the pneumatic control loops on the gas pressure regulator achieves uninterrupted supply of the gas network, independent of the electronic circuitry. Even in the event of a power outage the pneumatic components ensure uninterrupted supply. In this case, a lower pressure limit value (uninterrupted supply) and an upper pressure limit value (max. operating pressure) are monitored by DIN-EN 334 approved technology. Between these two limits (setpoints for pilot control stage p_{dmin}, pilot control stage p_{dmax}) the master automation systems can vary the outlet pressure as needed. Together with the master automation system the pilot HON 638-EP enables both remote controllable pressure and flow rate control tasks.

CE registration according to PED and GAD with Honeywell gas pressure regulators
According to DIN EN 334, the pilot is an integral component of this device

Honeywell
CE 0085

The electro-pneumatic pilot HON 638-EP is made up of the following functional modules on a common base plate:

1st stage: load limiting stage

2nd stage: pilot control stage for the lower outlet pressure p_{dmin}

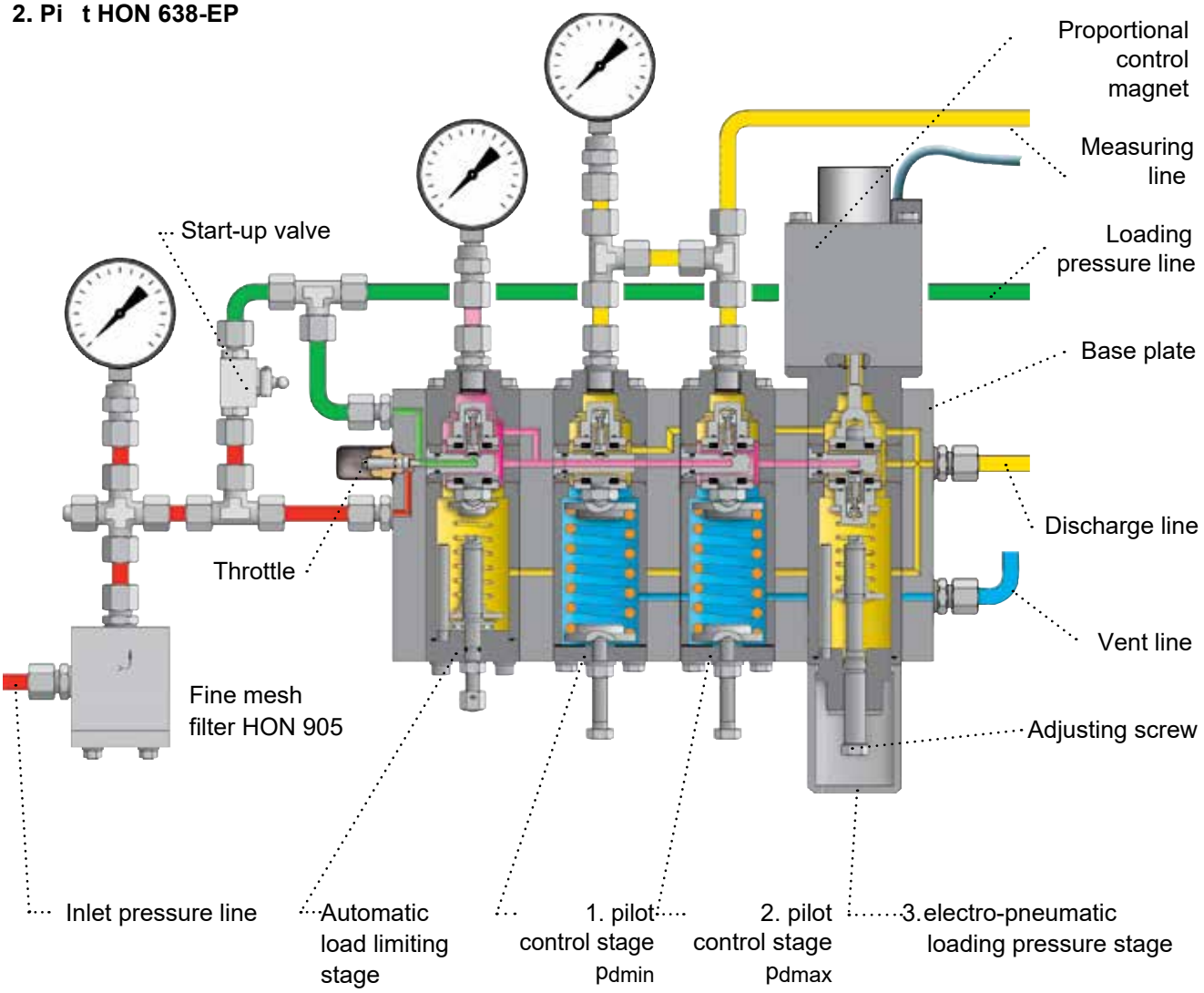
3rd stage: pilot control stage for the upper outlet pressure p_{dmax}

4th stage: electro-pneumatic loading pressure stage as interface between the pneumatic system and the master automation system

System description of electro-pneumatic regulation with the pilot HON 638-EP

Pilot HON 638-EP

2. Pi t HON 638-EP



The pneumatic pilot control stages pdmin and pdmax automatically monitor the configured limit values. As soon as the equipment gets close to these limit values during operation, the pilot control stages are activated and keep the outlet pressure constant. Transition between the electro-pneumatic loading pressure stage controlled by the electronic con-troller and pressure limiting by the pilot control stages is effected independently and without jolts in both directions.

Inlet pressure

Loading pressure

Load limiting pressure

Outlet pressure

Atmosphere

2.1 Automatic load limiting stage

The inlet pressure is supplied via the fine mesh filter HON 905 and the adjustable throttle of the HON 638-EP and
is available as loading pressure upstream of the amplifying valve of the automatic load limiting stage. On the double diaphragm system a comparison is made between the configured setpoint (spring pressure) and the actual value
(load limiting pressure).

The regulated load limiting pressure in this pilot control stage is switched by the internal connections of the base plate to the top side of the measuring diaphragm.

The forces of the setpoint spring and the outlet pressure supplied via the bleed line act on the bottom side of the double diaphragm system.

The force of the setpoint spring, added to the outlet pressure force, determines the level of the load limiting pressure that is reached in balance on the top side of the measuring diaphragm. Even if the outlet pressure changes, the level of the load limiting pressure above the outlet pressure therefore remains constant.

The load limiting pressure is available to the downstream pilot control stages and the electro-pneumatic loading pressure stage as intermediate pressure. Supplying the load limiting pressure above the outlet pressure compensates for changes in amplification at the downstream pilot control stages.

2.2 Pilot control stage for minimum outlet pressure p_{dmin}

The pilot control stage compares the outlet pressure present on the top side of the measuring diaphragm with the setpoint configured via the setpoint spring. Normally the outlet pressure force is higher than the spring force and
the amplifying valve is closed. The load limiting pressure is supplied to the pilot control stage for maximum outlet pressure and to the electro-pneumatic loading pressure stage of the pilot.

If the operating conditions cause the outlet pressure to drop, the amplifying valve opens upon reaching the configured minimum setpoint for the outlet pressure. Gas flows via the bleed line into the outlet chamber. The gas flowing via the load limiting stage causes a pressure loss at the throttle and therefore a pressure reduction via the actuator diaphragm of the gas pressure regulator. The p_{dmin} stage therefore performs the control function and keeps the outlet pressure constant. The p_{dmax} stage and the electro-pneumatic loading pressure stage in the pilot are bypassed.
The p_{dmin} stage has the highest priority. The setpoint of the p_{dmin} stage therefore has priority over the setpoints of the master automation system and the pneumatic p_{dmax} stage.

2.3 Pilot control stage for maximum outlet pressure p_{dmax}

The pilot control stage compares the outlet pressure present on the top side of the measuring diaphragm with the configured setpoint. Since the outlet pressure is normally lower than the configured maximum pressure, the amplifying valve is in open position. The load limiting pressure is sent directly to the electro-pneumatic loading pressure stage.

If the outlet pressure increases and reaches the configured maximum setpoint, then the amplifying valve limits the load limiting pressure for the electro-pneumatic loading pressure stage. The outlet pressure is regulated pneumatically to its upper value. If the outlet pressure continues to drop, the electro-pneumatic loading pressure stage automatically takes over the control task.

2.4 Electro-pneumatic loading pressure stage

The electro-pneumatic loading pressure stage is actuated via the pulse width modulator HON 110a by the automation system. For the conversion of electrical signals to pneumatic signals, first the standard electric signal 4 – 20 mA from the automation system is converted to a 24 VDC pulse signal by means of the HON 110a. Based on the pulse length the voltage pulses create a current through the coil of the proportional pilot solenoid. The magnetic field thus gen-erated exerts a force on an arm in the coil. This force acts via a mechanism on the top side of the double diaphragm system and creates a state of balance against the force of the control spring.

In the event of a deviation in the master automation system, i.e. in the closed control loop, the magnetic force changes and therefore the distance between the nozzle and the valve piston also changes. Due to the changed discharge
of the load limiting pressure, this causes a proportional variation of the loading pressure and therefore a change
in the opening of the gas pressure regulator. The flow rate and/or pressure in the controlled line are equalised to
the defined setpoint.

3. Config ation of the pneumatic pilots 3.1 Throttle

– Adjust the throttle to the setting determined during commissioning (see commissioning protocol)

3.2 Automatic load limiting stage

- Set the load limiting pressure to the pressure measurement determined during commissioning.(see commissioning protocol)
- The setting is made against the closed outlet valve with gas discharge to air via the discharge line
- The adjustment of the load limiting stage must be carried out together with the adjustment of the p_{dmin} stage (see section 3.3)

3.3 p_{dmin} stage

- Swit h automation system to “Manual”
- **Specify valve stroke y of 0 % and close solenoid valve in loading pressure line (Honeywell automation system SCS 2xxx / HC900 automatically closes the solenoid valve)**
- Close outl t valve
- Open dis harge line to air in the outlet
- S t the desired setpoint pressure at the p_{dmin} stage
- A terwards, check the settings for the load limiting pressure and the p_{dmin} pressure again!
- A ter setting the p_{dmin} stage close the discharge line
- Open outl t valve
- Switch automation system to “Automatic”; the electro-pneumatic control system is ready for operation

3.4 p_{dmax} stage

- Swit h automation system to “Manual”
- **Specify valve stroke y of 0 % and close solenoid valve in loading pressure line (Honeywell automation system SCS 2xxx / HC900 automatically closes the solenoid valve)**
- Close outl t valve
- elease tension on setpoint screw of the EP stage
- Open dis harge line to air in the outlet
- Then open the solenoid valve in the loading pressure line (**SCS 2xxx** / HC900 opens the solenoid valve automatically) and specify a valve stroke y of 100 %
- If the electro-pneumatic loading pressure stage has not been set yet, open it by turning
  the adjusting screw counter-clockwise as far as the stop
- S t p_{dmax} stage to the desired setpoint pressure
- **Then reset the valve stroke y to 0 %**
- Close he discharge line in the outlet
- Open outl t valve
- Switch automation system to “Automatic”; the electro-pneumatic control system is ready for operation

3.5. Electro-pneumatic loading pressure stage

- Swit h automation system to “Manual”
- **Specify valve stroke y of 0 % and close solenoid valve in loading pressure line (Honeywell automation system SCS 2xxx / HC900 automatically closes the solenoid valve)**
- Close outl t valve
- Open dis harge line to air in the outlet
- First tension the setpoint spring of the electro-pneumatic loading pressure stage. This is achieved by turning the adjusting screw clockwise as far as the mechanical stop
- Open the solenoid valve in the loading pressure line and specify a valve stroke y of 50 % **(Honeywell automation system SCS 2xxx / HC900 opens the solenoid valve automatically)**
- Then turn the adjusting screw of the electro-pneumatic loading pressure stage counter-clockwise until the outlet pressure starts to rise (within a range of one revolution)
- Then tu n the adjusting screw back (one revolution); the outlet pressure must drop again
- Set the adjusting screw between these two positions (generally 180 degrees) and secure. During this adjustment make sure that the outlet pressure is between the configured p_{dmin} and p_{dmax} pressure. This is to ensure that none of the upstream pneumatic pilots limit the loading pressure.
- **Specify valve stroke Y of 0 %**
- Close he discharge line in the outlet
- Open outl t valve
- Swit h automation system to “Automatic”; the electro-pneumatic control system is ready for operation.

4. Des iption of HON 110a (pulse width modulator)

The pulse width modulator is used to convert a standard electric signal from the master automation system (0/4 – 20 mA or 0 – 10 V) to a 24 volt pulse signal for actuation of the electro-pneumatic loading pressure stage.
The voltage required for supply of the HON 110a is 24 V DC; the maximum current consumption is 1.5 A.

4.1 Configuration options

Several DIP switches allow selection of different operating modes

Honeywell standard: 4 – 20 mA

The characteristic line (down or up) can be selected by means of a jumper.

Honeywell standard: Characteristic line up

The modulation frequency is generally set to “low frequency”; **Honeywell** standard: 50 Hz.
The operating range is defined by the potentiometer settings of the zero point, the spread and the frequency. The default settings are already set at the time of delivery.

Honeywell standard: Zero point, spread and frequency pre-set.

The shut-down function reduces the load on the proportional pilot solenoid if the valve stroke of the master automation system is less than 3 %.

Honeywell standard: Shut-down function activated.

4.2 Adaptation of the electro-pneumatic loading pressure stage to the pulse width modulator

- See Configu ation of the pneumatic pilots, section 3.5

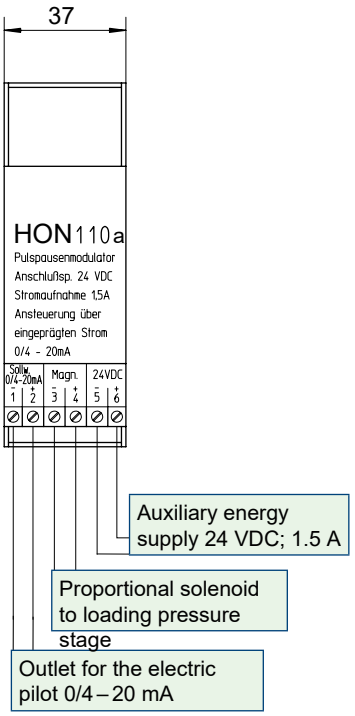
4.3 Pulse width modulator HON

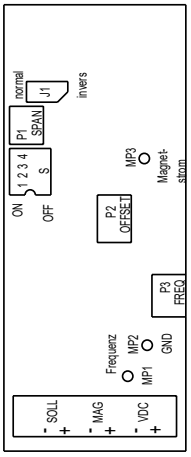
110a Connection diagram

1 – 2 + } Setpoint (valve stroke of the electric pilot)

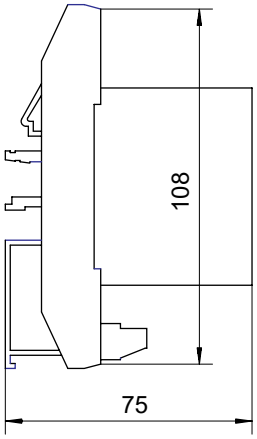
3 – 4 + } Proportional solenoid

5 – 6 + } Auxiliary energy 24 VDC, 1.5 A





Dimensional drawing



Snap on to DIN rail

DIP switch for setpoint selection			
S1	S2	S3	
off	on	off	0 – 10 V
on	on	off	0 – 20 mA
on	off	on	4 – 20 mA

DIP switch for “Shut down”	
S4	
on	active
off	inactive

P 1 = Spread
P 2 = Offset
P 3 = Frequency

Technical data		
Technical data	Auxiliary energy: Amperage: Input signal: Output signal: Impulse frequency: Protection system: Transmission behaviour: either Characteristic line up Characteristic line down	24 VDC 1.5 A max. 0/4 – 20 mA or 0 – 10 V decoupled Pulse signal 24 Vss, short circuit-proof 25 – 4000 Hz IP 20
Dimensions:	height, width, depth	75 x 37 x 108
Miscellaneous:	- Connect using plug-in sc ew terminals - Snap on to DIN rail Honeywell part no. 24322	

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