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INSTALLATION and OPERATING INSTRUCTIONS

UHV-LEAKVALVE ND 3
pneumatically operated NC, 2-positions cylinder.

Valve	F3CF1616-29
Valve	F3CF3516-29
Valve	F3VCR-29
Heating Cartridge	HF3
Heater Controller	HF3-S1

CE

Version: A

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1. APPLICATION

The UHV-Leakvalve is both a shut-off device and a control valve to control a gasflow. It covers a wide range of controlability and can be baked, thanks to the used all-metal technology.

The valve is available manually operated and stepper motor driven with Controller. In the present case it is pneumatically operated with closing spring and with an adjustable stop for the open position.

2. DESCRIPTION

The housing and all parts in touch with the medium are made of stainless steel. The plate gasket and the bonnet gasket are one piece and made of stainless steel, gold plated.

The tightening between the valve rod and the inner volume is done through a diaphragm made of metal.

A pneumatic cylinder operates the valve, which is assembled to the valve by using a teflon part for thermic isolation. It is important to keep the temperatures of the actuator under 120°C, and of the solenoid valve under 80°C.

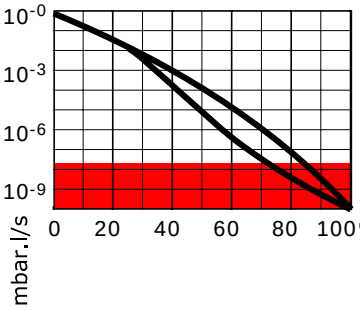
The adjustable open position can be fixed over the whole control range. If there is a distance of 1mm between the screwhead (hexagon 24mm) and the cylinder cap (flat surface), the closed position is adjusted. If this gap is 9mm or more, the full open position is adjusted. The nominal stroke of this screw is 8mm = 4 full turns. This screw is self-locking.

The actuator is greased for life. If the cylinder should be disassembled for any reason, a simple tool is necessary. Ask us, we will provide you with the necessary dimensions. This simple tool is a screw M8 in the right length and a washer.

3. TECHNICAL DATA

Pressure range		1 x 10^{-10} mbar to 10 bar
Leakrate:	Housing	1.10^{-10} mbar.l/s
	Valve plate	1.10^{-10} mbar.l/s
Differential pressure at the valve plate		10 bar in both directions

Leakrate:



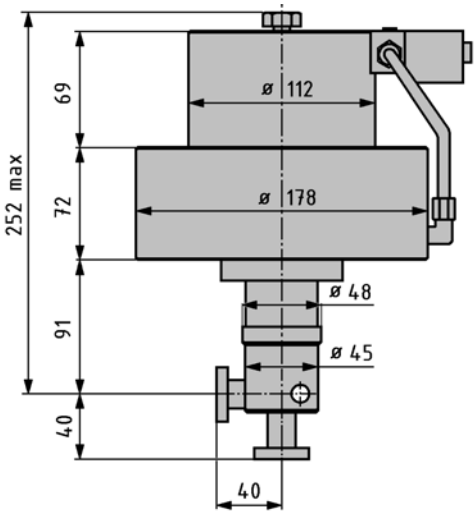
In the range of turn 0 - 3, the diaphragm doesnot touch the valve seat, therefore there is no hysteresis. Due to physical reasons, the valve cannot control the range between 10^{-8} and 10^{-10}, if the valve is used in cold conditions. In that case, the valve is tight from turn 8 to 10.

Mounting position		any. Valves with VCR-connectors have an "1" printed on the valve seat side.
Temperatures:	Housing	300°C in control positions, 450°C in open position
	Actuator	120°C
	Solenoid valve	80°C
Weight	CF-16/16, VCR	10,1 kg
	CF-35/16	10,8 kg
Screw for adjustment: Number of turns		4 (gives 8mm stroke)
Lifetime until first service		100.000 cycles
Materials:	Housing	316L
	Diaphragm	316L gold plated
	Mechanism (not in touch with medium)	304, steel hardened and protected
	Gaskets in the actuator	Viton

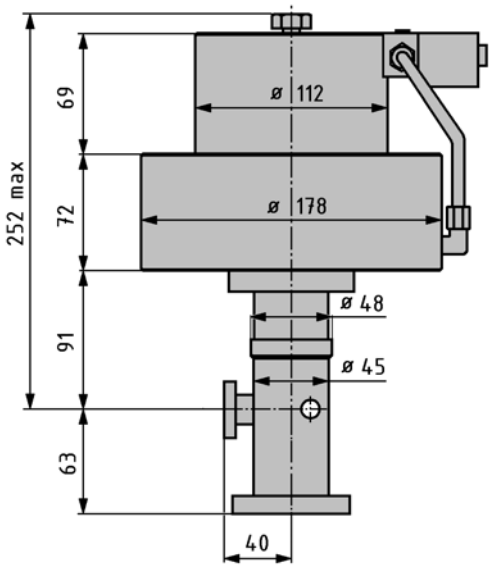
Dead volume:	Main flange (down) Side flange	1,0 and 1,4 ccm (CF-16 and CF-35) 4,6 ccm
Actuation principle of the pneumatic cylinder:		NC
Necessary compressed air pressure		min. 4 bar overpressure, max. 9 bar overpressure.
Voltage of the solenoid valve		24VDC
Power consumption of the solenoid valve		4,5 W

Dimensions:

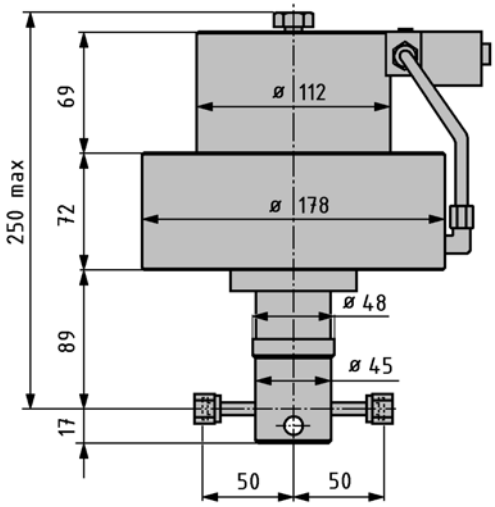
CF-16 rotatable flanges on both sides:



CF-16 rotatable on the side port and
CF-35 rotatable on the main port:



VCR-connectors 3/4“:



4. CONNECTION

4.1 Cleanliness.

The valve may only be unpacked immediately before the valve is installed into the system. Sealing surfaces on the flanges, and also the valve interior may only be touched with clean gloves.

The valve may only be installed in clean systems.

4.2 Mounting position.

These valves may be mounted in aly position. . The valve with VCR-connections has an "1" printed on the valve seat side.

4.3 Admissible forces.

The valve must not be used to support other heavy components. Install bellows elements in the piping to ensure that no additional forces, either during bakeout or by heavy weights of other components of the installation, or by vibrations, can effect the valve.

4.4 Operation.

The valve operaties by the already installed solenoid valve (24VDC). There is an emergency override (red button with slot) which can be actuated by using of a screwdriver. Doing that, compressed air must be present.

CAUTION: This emergency button must be brought back to its starting point, otherwise the solenoid valve will not work in the normal working condition with the 24V.

The adjustable open position can be fixed over the whole control range. If there is a distance of 1mm between the screwhead (hexagon 24mm) and the cylinder cap (flat surface), the closed position is adjusted. If this gap is 9mm or more, the full open position is adjusted. The nominal stroke of this screw is 8mm = 4 full turns. Any position between these two endpositions are possible.

This screw must not be adjusted if the actuator is actuated by compressed air (piston presses then strongly against this screw)

Thanks to the used thread Heli-Coil Mid-Grip, this screw is self-locking. Therefore it is not necessary to fix it with other methods.

If this adjusting screw is screwed down by mistake strongly against the internal stop (gap 1mm), the control courve of the valve might be influenced. To eliminate this influence, it is enough to move once into the fully open position, and the well-known leakrates will be reached again.

5. PUTTING INTO OPERATION

After installing of the valve according to this manual it is ready to operate. The valve is shipped in closed position. To be sure about the tightness of the vacuum system, we recommend to check the whole valve and the flanges about their helium tightness.

6. MAINTENANCE

If the valve us used under clean conditions, it works maintenance-free during the lifetime stated in the technical data. If a valve will be sent back to the factory, it must be free from toxicant and noxious matters. Where applicable, it must undergo a decontamination prior to return. A certificate which confirms the harmless and safety must be added to the shipment.

7. SERVICE and REPAIRS

7.1 General.

During service works the following items must be observed:

- All works must be done under clean conditions.
- Sealing surfaces must be protected.
- Use only original spare parts.

7.2 Dismantling of the actuator.

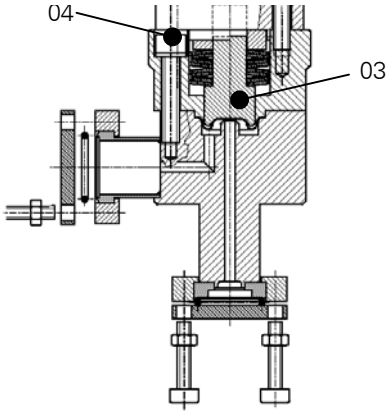
The pneumatic cylinder is an unit and can be removed completely. It is recommended to put the valve into the open position, because otherwise the force of the inner springs will enforce the four M6 screws which connects the actuator with the valve. This force can be up to 4500N. Then, these four M6 screws which connects the actuator with the valve can be removed. Then the whole actuator can be removed. Now the compressed air can be released from the pneumatic cylinder. The rod does its stroke of 8mm out of the cylinder.

Then, two screws M5 x 50 are visible inside (towards the valve body), they connect the valve body with the connection flange. These two screws can be opened and removed, as well as the connection flange.

A packing of spring disks is then accessible, which can be newly greased if requested. Use only temperature resistant grease. The stamp Item 03 in the center can be removed together with the springs. Then, the diaphragm (gold plated) will be visible. At reassembling please pay attention that no dust or dirt or particles are placed on the diaphragm or on the stamp Item 03, because this can influence the tightness heavily. Greases on this surface are not necessary but allowed (because this side is not in touch with vacuum).

CAUTION; The package of spring disks is individually adjusted and selected. It must not be mixed up (sequence of the springs) or otherwise modified.

7.3 Dismantling of the housing.



ATTENTION; From this step on, the medium touched inner parts will be uncovered. Depending on the used medium, it will be released to outside and it must be ensured that absolute no toxicant or noxious materials are left in the valve.

Loose and remove the four screws 04. Now the upper part of the housing, and then the diaphragm can be removed.

The diaphragm is used both as valve plate and as bonnet gasket.

Damages or scratches on the sealing surfaces requests new machining of the parts!

Before assembling, the parts must be cleaned carefully. In the vacuum-area no grease or oil must be used!

8. SPARE PARTS.

Diaphragm	15301
Housing CF 16/16	15421
Housing CF 35/16	15424
Housing VCR	15614

The diaphragm cannot be damaged by normal use. Only through improper use like crystal-growing of the used gases, other solid parts in the medium, chemical reactions between the used medium and the gold layer, or mechanical damage during a repair can damage the diaphragm.

9. WARRANTY

These valves are assembled under clean conditions. Each valve is tested for optimum performance and leak tightness. Installation into customers vacuum system must be done under clean conditions.

Installation and operating instructions must be adhered to according to this manual. Faulty installation, inappropriate operation or modifications of the valve will annul our warranty.

We guarantee a warranty period of 12 months from the date of arrival at the customer. In case of rightly claimed complaints or defects we replace or we repair the goods, according to our own deciding. Replacing of the goods requires always the return of the complainted goods. There is no warranty for subsequent damages.

On demand, services or repairs will be carried-out through us. Goods sent back to the factory, irrespective of the reason (service, repair, replacement due to warranties) must be free from toxicant and noxious matters. Where applicable, it must undergo a decontamination prior to return. A certificate which confirms the harmless and safety must be added to the shipment.

10. ACCESSORIES

10.1 Heating cartridge.

A high performance heating cartridge ø8 x 35mm with an integrated thermoelement is used.

Power:	800W / 230VAC
Material:	Incoloy 800
Max. temperature:	800°C

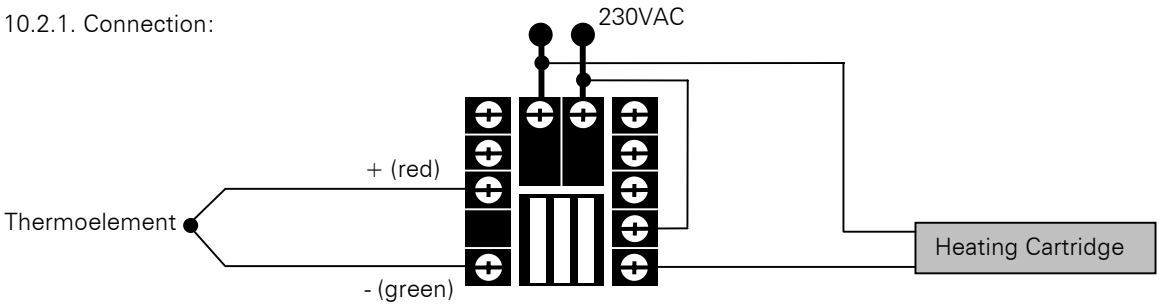
The heating cartridge fits in the boring ø8mm on the housing, and must be secured slightly with the set screw. To avoid damage of the heating cartridge, this set screw must not be hardly tightened.

The valve cannot reach the requested temperature (over 100°C), if the valve is not insulated. After installing of the valve and the heating Cartridge we recommend to put an approximately 20mm thick insulating material over the valve body and its connection flanges. The connection tube between valve body and pneumatic cylinder must not be insulated. Otherwise the temperatures in the cylinder might become too high.

10.2. Heater controller.

The heater controller from WATLOW is adjusted to the heating cartridge and the valve. The adjustable parameters like heating- and cooling ratio are pre-adjusted in our works.

10.2.1. Connection:



10.2.2. Programming:

To enter into the setup-menue, press the arrow keys „up" and „down" together for min. 3 seconds. If no key is pressed for a time of approx. 60 seconds, the setup-menue will be closed automatically. Go through the setup-menue with the green „turn"-key.

The different setup-positions are:

LOC	Factory setting: 0. All parameters can be seen and adjusted.
In	Factory setting: H. Thermoelement type. We use type K which is adjusted as „H".
C – F	Factory setting: C. Celsius.
rL	Factory setting: -200. No adjustment necessary.
rh	Factory setting: 450. This is the maximum possible temperature.
Ot 1	Factory setting: ht. No adjustment necessary.
HSC	Factory setting: 2. Hysteresis-control. No adjustment necessary.
Ot 2	Factory setting: no. No adjustment necessary.
rP	Factory setting: Str. This is the adjustment of the ramp in °C/h.
rt	Factory setting: 180. This is the rapm in °C/h, if rP was set on Str.
P L	Factory setting: 100. No adjustment necessary.
dSP	Factory setting: nor. Display normal.

10.2.3. Display:

Upper 7-segments line red:	Actual temperature in °C at the thermoelement.
Below 7-segments line green:	rP interchanges with a number: Initializing is running (for approx. 45 sec). Number: Adjusted temperature in °C.
LED 1:	Heating runs.
LED 2:	Spare: Heat circuit 2.

%:	If this LED is on, the controller is in the manual-mode. Press infinity-key twice to shut-up this LED and to put the controller in the automatic-mode.
Turn-key green:	Go through the setup program.
Arrow key up:	Go through the adjustments, upwards.
Arrow key down:	Go through the adjustments, downwards.
Infinity-key:	Press twice, to put the controller in the automatic mode. Press once to switch-off a possible alarm-LED. If this key is pressed in the standard menue, the advanced-menue starts. In this advanced-menue a fine tuning can be adjusted. We recommend to leave this menue.

10.2.4. Start heating.

Press arrow key up, until the requested temperature is in the green display. Heating starts immediately after release. The LED 1 flashes, when the heating cartridge is under currency. Due to the adjusted ramp the LED 1 flashes not permanently, but every 10 seconds. The ramp is adjusted to 180°C/h.

10.2.5. End heating.

Press arrow kay down, until a temperature of i.e. 20°C is in the green display. Cooling starts immediately after release. The LED 1 flashes from time to time, if the cooling-down would be faster than the adjusted ramp. The ramp is adjusted to 180°C/h. After reach of under 100°C (red display) the currency can be switched off.

10.2.6. Error messages:

In the upper display appears 4 lines, in the below display appears is „Er X".

Er 2	Thermoelement notifies a temperature under the allowed range (-200 – 450°C), or the controller has a mistake (analog/digital-conversion).
Er 4	Failure of the microprocessor. Send back for repair.
Er 5	Testsum error. Possibly the currency was interrupted while the processor was under calculation.
Er 6	Analog/digital-conversion mistaken: Underflow. Possibly the polarity is wrong connected, or the circuit is cutted.
Er 7	Analog/digital-conversion mistaken: Overflow. Possibly the polarity is wrong connected.

To delate an error message: Switch-off the controller (cut the power input), and switch-on again.

If requested, a detailed manual from the manufacturer of the controller can be sent. This manual contains all different delivery versions and needs very exactly analizing and adjustment.