

# INSTALLATION and OPERATING INSTRUCTIONS

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UHV-LEAKVALVE ND 3

Stepper-motordriven

Valve F3CF1616-45

Valve F3CF3516-45

Valve F3VCR-45

Heating Cartridge HF3

Heater Controller HF3-S1

Controller F3-454



Version E

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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.

## 2. DESCRIPTION

### 2.1. Valve

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.

To ensure the big control range, the spindle works with a variable gear ratio, depending on in which control range the valve actually is. The spindle presses a disk-spring package, and this presses the plate seal.

The actuator is a complete cartridge and cannot be taken apart. It is made of hardened parts and has a lifetime greasing.


The Controller is a half 19" rack, 3HE (42TE), no additional components are necessary to operate the valve.

### 2.2. Controller

The front panel features a touch screen to control the valve. If you click on the nenion Logo at the top left corner, the help is being displayed. See there for the description of the software.

There is also the power button on the right side, a 3,5mm plug to host the nenion pen and below the screen a small hole. If you push the button behind the hole (with a paper clip or the like), the controller starts anew.

The back panel features different plugs:

MAINS SUPPLY	Mains supply 110V / 230V, 50-60 Hz. A 2A - fuse is built-in.
INPUT/OUTPUT:	8-way plug. Configuration is described in 4.5.1.
VALVE	Connection plug to the valve
	 <b>ATTENTION:</b> Do not unplug the valve before the mains supply has been switched off.
USB	2 USB Connectors to connect a mouse, keyboard or USB-Stick for an update.
REMOTE USB	Remote USB Connection to control the valve from a remote Computer via USB. See help in the software for more information: Click on the nenion logo in the upper left corner.
ETHERNET	Remote Ethernet Connection to control the valve from a remote Computer via Netwrok. See help in the software for more information: Click on the nenion logo in the upper left corner.

The controller uses a raspberry pi. ssh is enabled and also file transfer via windows. The settings are:

Host name: nenion\_leakvalv

User name: pi

Password: nenion2018

Help and software description is accessible via long press on the nenion icon directly on the controller.

## 3. TECHNICAL DATA

### 3.1. General

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

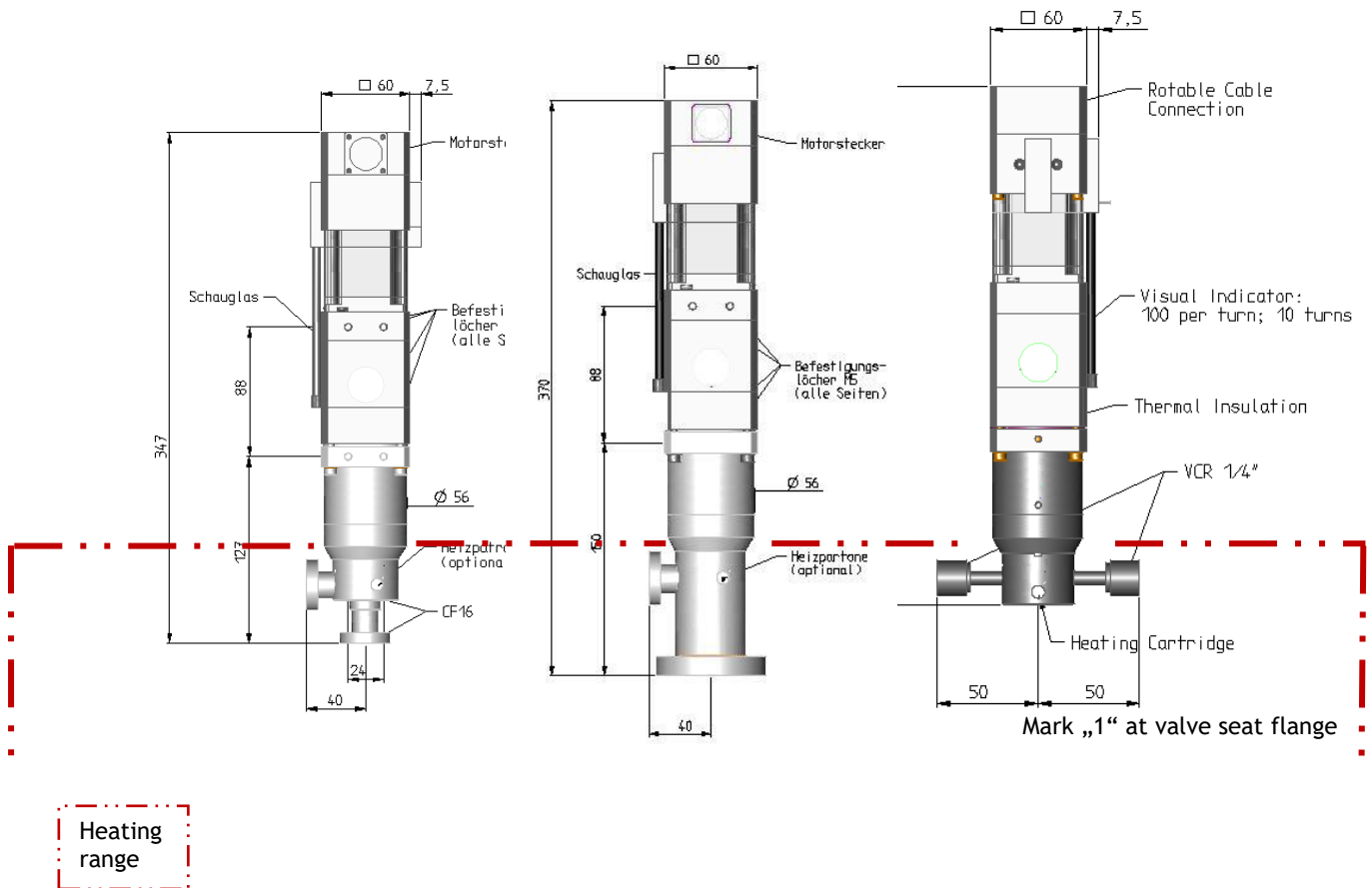
Adjustable leakrate:

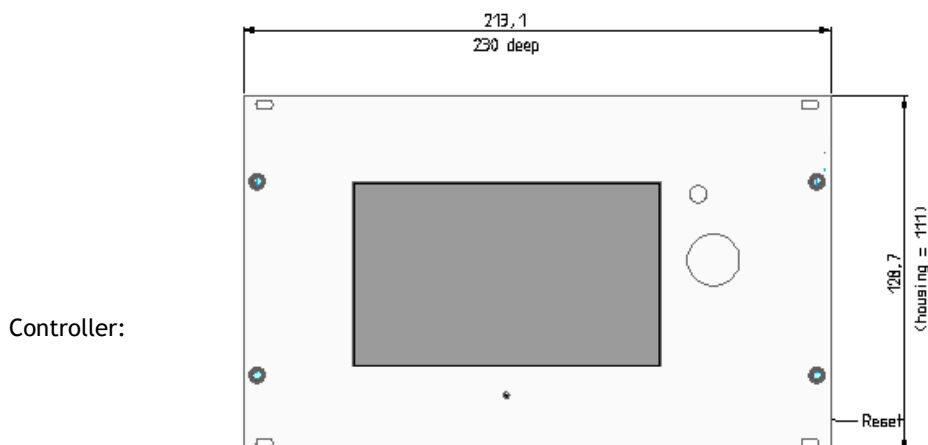
A throughput of 60 mbar.l/s is achieved in the open position. Close position: Due to physical reasons, the valve cannot control the range between  $10^{-8}$  and  $10^{-10}$ , if the valve is used in cold conditions. In that case, the valve is tight from turn 8 to 10. Control in this range is possible if the valve body is heated.

Mounting position Any. Valves with VCR-connectors have an "1" printed on the valve seat side.

Temperatures:	Housing	300°C. Motor may not be heated.
	Actuator	300°C (CAUTION: Heating range see page 5)
	Motor with gear and switches	50°C
Weight	CF-16/16 and VCR	4,5 kg
	CF-35/16	5 kg
Motor actuator:	Number of steps	1.000.000
	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
	Parts between motor and valve	304, aluminium, steel hardened and protected
Deadvolume:	Main flange (down)	1,0 and 1,4 ccm (CF-16 and CF-35)
	Sideflange VCR 3/4"	4,6 ccm
Actuation time:		14 seconds for the whole range.

### 3.2. Dimensions





## 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 any position. There are 4 mounting holes (M5) on each side to attach the valve to a frame. 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. These valves may be mounted in any position. There are 4 mounting holes (M5) on each side to attach the valve to a frame. 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 is actuated by a stepper motor and an electronic Controller.

### 4.5. Electric connection

The valve and its Controller is a ready adjusted system. No programming or additional installations are necessary. All plugs cannot be mixed up or cannot be plugged-in in the wrong way. If longer cables will be used, the shielding and insulation must be done without gaps.

 **ATTENTION:** Before connection and switch-on of the mains supply, the plug and cable of the motor must be connected carefully.


The cable of the heating cartridge is a short one. It may be made longer for some meters. Doing this, the both wires for the thermoelement (green and brown) must not be connected in the hot or warm area, because in that case the temperature would be displayed incorrect.

 **ATTENTION:** There is high voltage inside of the Controller. It must not be opened from unauthorized staff.

The plugs in detail:

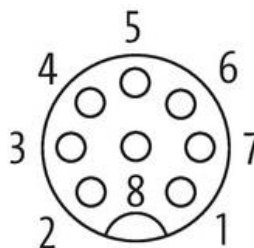
MAINS SUPPLY 110V60Hz or 230V50Hz. Cable is part of the delivery. Fuse 2A is already installed.

VAVLE This plug is connected with the valve.

 **ATTENTION:** Don't plug or unplug the motor before the mains supply is switched off! The motor has a 24V supply with high currents, and injures, electric chocks or burns can occur.

#### 4.5.1. Electric connection with 0 - 10V input

INPUT	1 = Input Signal 1 (0-10V) (white)
	2 = GND for Input Signal 1 (brown)
	3 = Input Signal 2 (0-10V) (green)
	4 = GND for Input Signal 2 (yellow)
	5 = Input Signal 3 (0-10V) (grey)
	6 = GND for Input Signal 3 (pink)
	7 = Output Signal 1 (0-5V) (blue)
	8 = GND for Output Signal 1 (red)



#### 4.5.2. Connection with USB

**REMOTE USB** This port can be connected with a PC by using a common extension cable for standard USB Cable.

For actuating of the Controller by a PC, a terminal program like “PuTTY” can be used.

The attributes for the used COM Interface are:

Bits per second:	19200
Databits:	8
Parity:	Even
Stopbits:	1
Flow control:	None

## 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.

The Controller must be connected with the valve. The plug for the Input-signal may be connected or not. The mains supply cable (MAINS SUPPLY) must be connected. Now the I/O switch can be switched on (I), if the cable to the motor is connected.

### 5.1. Initialization

The valve is shipped in approx. half open position. An initializing procedure is not necessary, because the Controller keeps in its memory its last position before the mains supply was switched off.

You can Calibrate the valve within the settings Tab of the Software via the calibrate button. Calibration means to drive the valve into the close position and reach the limit switch. The force button forces the valve to set the stored position without calibration.

### 5.2. Firmware

Help and software description is accessible via long press on the nenion icon directly on the controller.

## 6. AMBIENT CONDITIONS

Mains Voltage:	230V AC 50 Hz oder 110V AC 50 Hz
Mains Power consumption	150 VA
Fuse	2A
Output Voltage	24V DC
Output Current	2600 mA
Output Power	62,4 W
Ambient Working Temperature	-10° C (no icing allowed) bis 45° C

Relative Air Humidity	15% bis 85% (no condensation allowed)
Maximum working altitude	1000m; from 1000m - 2000m only 40°C ambient working temperature allowed
Weight of Controller	2,5 kg

## 7. MAINTENANCE

If the valve is 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. This certificate can be downloaded at: [www.nenion.at](http://www.nenion.at)

### WARRANTY

These valves are assembled under clean conditions. Each valve is tested for optimum performance and leak tightness. Installation into customer's 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 complained 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. Such a certificate can be downloaded from our homepage: [www.nenion.at](http://www.nenion.at)

## 8. ACCESSORIES

### 8.1. Heating Cartridge

A high performance heating cartridge  $\varnothing 8 \times 35$ mm with an integrated thermoelement is used.

Power: 200W / 230VAC

Material: Incoloy 800

Max. temperature: 800°C Type K Thermocouple

The heating cartridge fits in the boring  $\varnothing 8$ mm 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 hard 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 whole installation. Only the handwheel can - if wanted - jut out. The handwheel can be removed to avoid high temperatures on it.

### 8.2. Heating Controller

The Heating Controller from WATLOW is adjusted to the heating cartridge and the valve. The adjustable parameters like heating- and cooling ratio are pre-adjusted.

The operation is turned on when shipped. Press the turn key and then turn heating on with setting "off" to turn it off and "Auto" to turn it on. The temperature setpoint can then be adjusted with the arrow keys. Operating instructions are available from nenion.

### 8.2.1. Connections

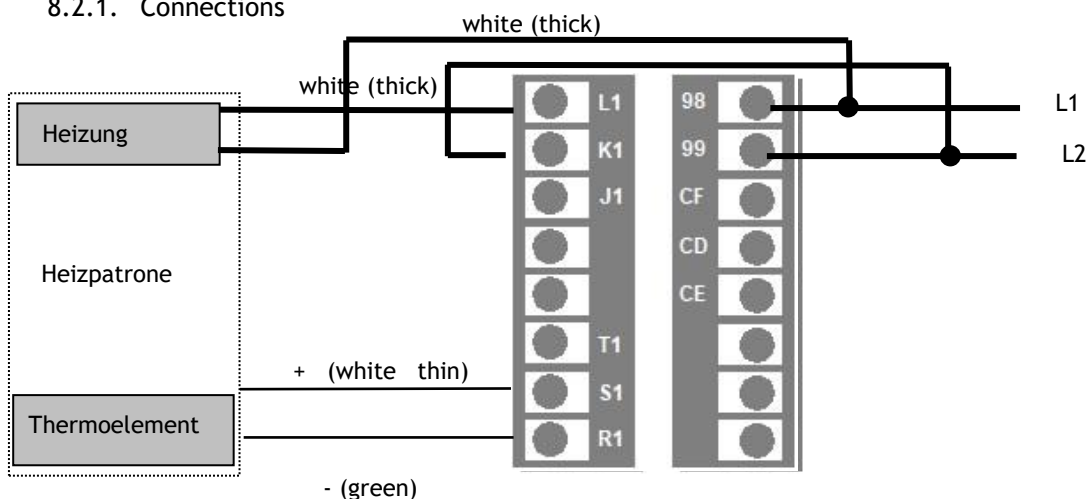


Figure 1: Connection of the Heating Controller

### 8.2.2. Programming

We program and test all controllers using default settings (not factory).

Global Setting: °C

Sensortype: thermocouple. Type K

Heat Loop 1

PID: Ramp 180 °C/h

Min Temp: 0 °C

Max Temp: 450 °C

Power Limit 100.0

Use the Watlow documentation for changing the settings.

### 8.2.3. Control Loop

Use Point 9 of the Watlow Documentation.

## 9. Contact

If you have any questions regarding this or other products here is our contact information:



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