

## TEMPERATURE-RESISTANT AND HEATED DIAPHRAGM GAS SAMPLING PUMPS

## DATA SHEET E 076



N 012 ST.16 E, temperature resistant



N 024 ST.11 E with thermostatic  
temperature control



N 036 ST.26 E with electronic  
temperature control

### Concept

The temperature-resistant and heated Diaphragm Vacuum Pumps from KNF are based on a simple principal - an elastic diaphragm, fixed on its edge, moves up and down its central point by means of an eccentric. In this way the medium is transferred using automatic valves.

Pumps for this new range are available in three different versions:

- A resistant to temperature version up to 240 °C (.16)
- A heated version (240 °C) with thermostatic temperature control (.11)
- A heated version for temperatures up to 240 °C with electronic temperature control (.26) with PC software .

There is a choice of pump drives ranging from a selection of AC motors to explosion-proof models. Please contact us for further details.

### Features and Benefits

**Uncontaminated flow of the media (oil-free operation)**  
**No maintenance required**

**No condensation in the pump head**

**Even saturation of heat throughout the pump head**

**Low heat loss to surroundings**

**Easy access to the pump head**

**Energy efficient heating**

**Electronically controled heating system**

**PC software for controlling the pump via a PC and documentation of all operational data**

**Gas tight:**  
**Leakage < 6 x 10<sup>-3</sup> mbar-l/s**

### Areas of use

Diaphragm pumps have become the standard in many analytical applications. Based on their design, they work without any lubrication.

Often hot gases need to be analysed, and the gas must not be allowed to cool down when it is transferred from the source being checked, to the analyser as the constituent parts could condense out, leading to faulty results. To overcome these problems hot gases are pumped using diaphragm pumps with heated heads.

All models are characterised by an even spread of temperature throughout the pump head and highly efficient insulation.

## PERFORMANCE DATA

Type		Delivery (l/min)	Vacuum (mbar absolute)	atm. Pess.	Pressure (bar g)	Weight (kg)
N 012 AT.16 E	temperature-resistant	10.5	240		1.5	3.4
N 012 ST.16 E	temperature-resistant	10.5	240		1.5	4.0
N 012 ST.11 E	heated (with thermostat)	10.5	240		1.5	4.0
N 012 ST.26 E	heated (electronic control)	10.5	240		1.5	4.2
N 024 AT.16 E	temperature-resistant	18	200		1.5	6.1
N 024 ST.16 E	temperature-resistant	18	200		1.5	7.3
N 024 ST.11 E	heated (with thermostat)	18	200		1.5	7.3
N 024 ST.26 E	heated (electronic control)	18	200		1.5	7.5
N 036 AT.16 E	temperature-resistant	30	200		1.5	10.0
N 036 ST.16 E	temperature-resistant	30	200		1.5	12.0
N 036 ST.11 E	heated (with thermostat)	30	200		1.5	11.9
N 036 ST.26 E	heated (electronic control)	30	200		1.5	12.1

## PERFORMANCE DATA

Type and OrderNo. <sup>2)</sup>	Delivery at atm. pressure (l/min) <sup>1)</sup>	Max. operating pressure (bar g)	Vacuum (mbar abs.)
<b>N 012 AT.16 E</b>	10.5	1.5	240
<b>N 012 ST.16 E</b>	10.5	1.5	240
<b>N 012 ST.11 E</b>	10.5	1.5	240
<b>N 012 ST.26 E</b>	10.5	1.5	240

<sup>1)</sup> Litre at STP<sup>2)</sup> „See also „MODEL CODE FOR EASY ORDERING“

## MODEL CODES AND MATERIALS

Type and Order No. <sup>2)</sup>	Pump head	Diaphragm	Valves
<b>N 012 AT.16 E</b>	Aluminium	PTFE	PTFE
<b>N 012 ST.16 E</b>	Stainless steel	PTFE	PTFE
<b>N 012 ST.11 E</b>	Stainless steel	PTFE	PTFE
<b>N 012 ST.26 E</b>	Stainless steel	PTFE	PTFE

## MOTOR DATA

Protection class	<b>IP 54</b>		
Voltage/Frequencies (V/Hz)	~230/50		
Power P <sub>1</sub> (W)	80		
Operating current (A)	0.4		

Motors with other voltages, frequencies and protection classes on request.

## Heating: N 012 ST.11 E and N 012 ST.26 E

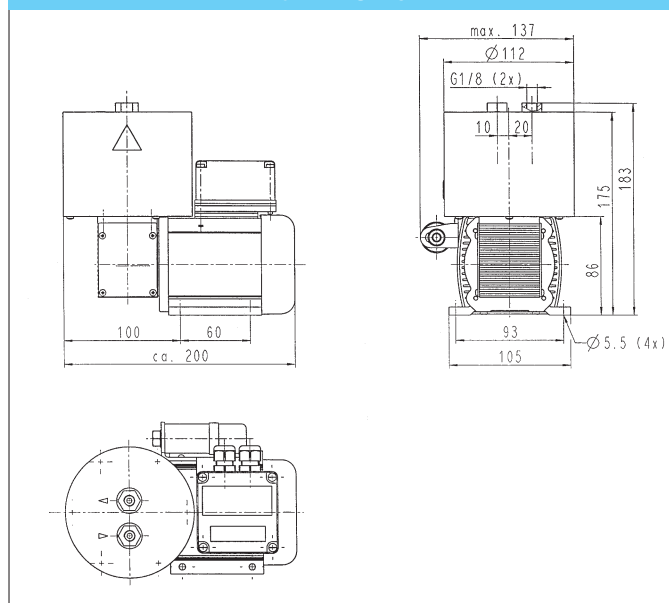
Protection class	<b>IP 20</b>		
Voltage/Frequencies (V/Hz)	~230/50		
Power P <sub>1</sub> (W)	140		
Operating current (A)	0.6		
Heating temperature (°C)	240		

Heating with other voltages and frequencies on request.

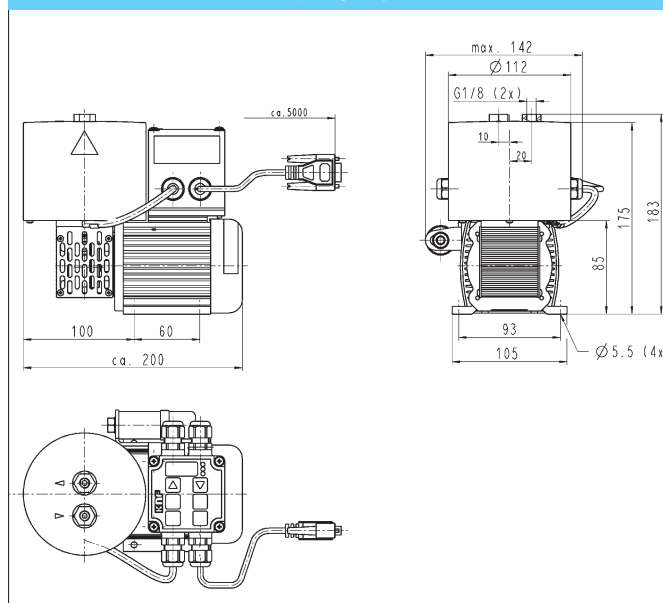
KNF offers the pump N 012 ST.26 E with an RS 232 interface. The interface protocol can be made available for applications which require external control.

Dimensions <sup>3)</sup> (mm)

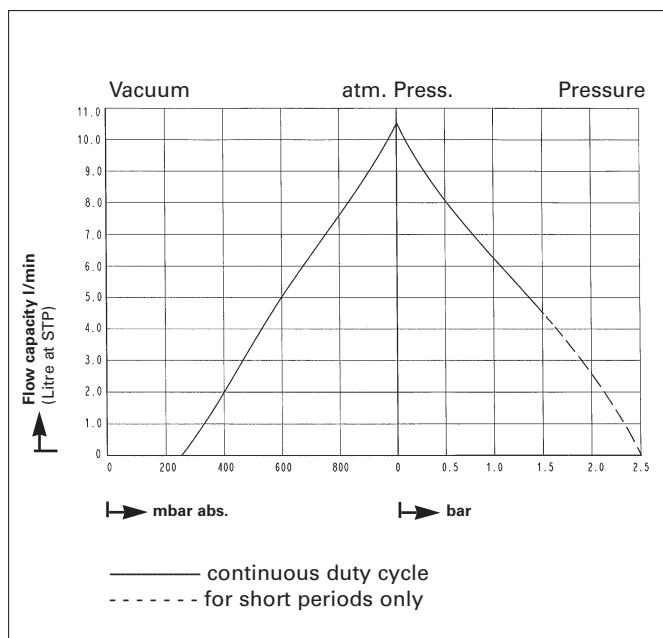
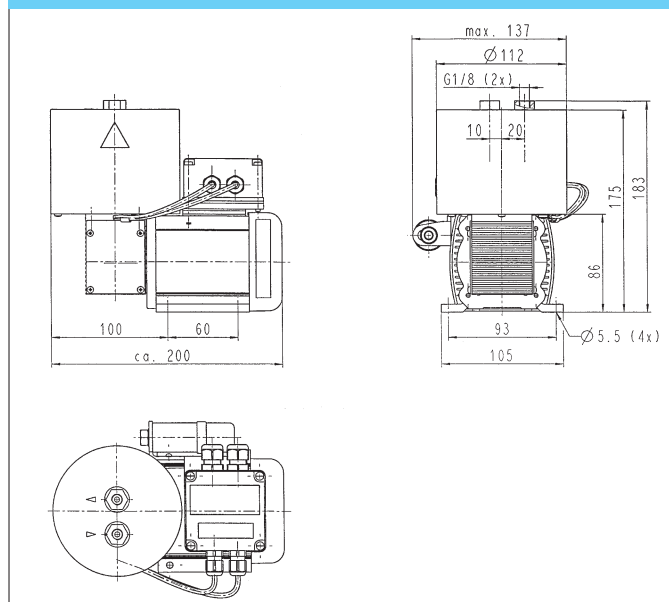
N 012 AT/ST.16 E



N 012 ST.26 E



N 012 ST.11 E

<sup>3)</sup> All dimensional tolerances conform to DIN ISO 2768-1, Tolerance Class V

## PERFORMANCE DATA

Type and Order No. <sup>2)</sup>	Delivery at atm. Pressure (l/min) <sup>1)</sup>	Max. Operation pressure (bar g)	Vacuum (mbar abs.)
N 024 AT.16 E	18	1.5	200
N 024 ST.16 E	18	1.5	200
N 024 ST.11 E	18	1.5	200
N 024 ST.26 E	18	1.5	200

<sup>1)</sup> Litre at STP

<sup>2)</sup> „See also „MODEL CODE FOR EASY ORDERING.“

## MODEL CODES AND MATERIALS

Type and Order No. <sup>2)</sup>	Pump head	Diaphragm	Valves
N 024 AT.16 E	Aluminium	PTFE	PTFE
N 024 ST.16 E	Stainless steel	PTFE	PTFE
N 024 ST.11 E	Stainless steel	PTFE	PTFE
N 024 ST.26 E	Stainless steel	PTFE	PTFE

## MOTOR DATA

Protection class	IP 54		
Voltage/Frequencies (V/Hz)	~230/50		
Power P <sub>1</sub> (W)	100		
Operating current (A)	0.6		

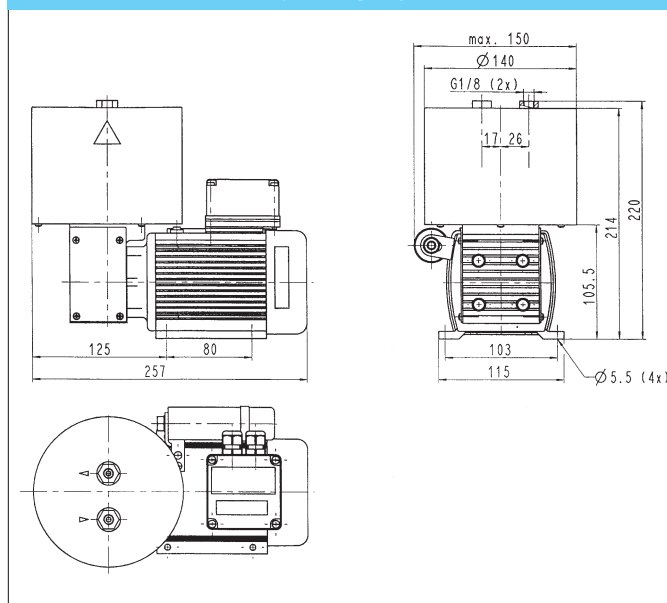
## Heating: N 024 ST.11 E and N 024 ST.26 E

Protection class	IP 20		
Voltage/Frequencies (V/Hz)	~230/50		
Power P <sub>1</sub> (W)	250		
Operating current (A)	1.2		
Heating temperature (°C)	240		

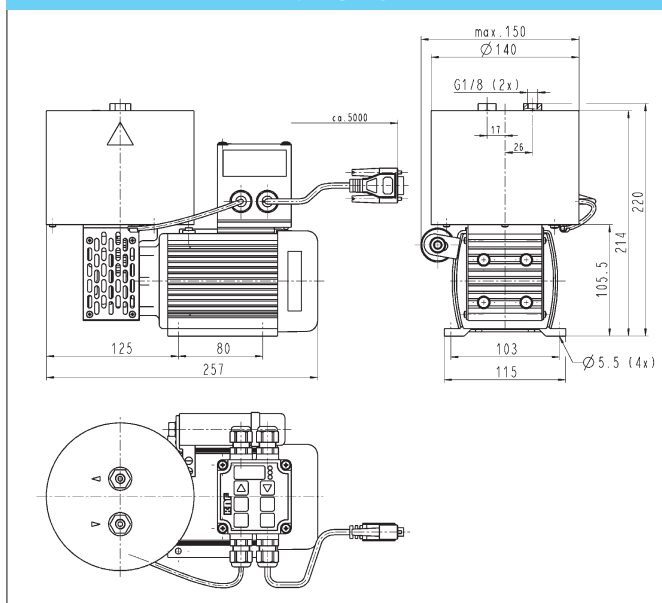
Heating with other voltages and frequencies on request.

KNF offers the pump N 024 ST.26 E with an RS 232 interface. The interface protocol can be made available for applications which require external control.

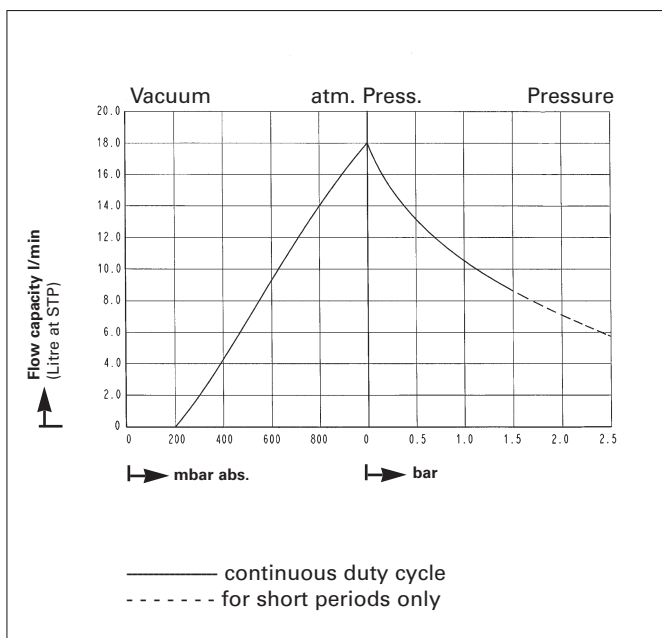
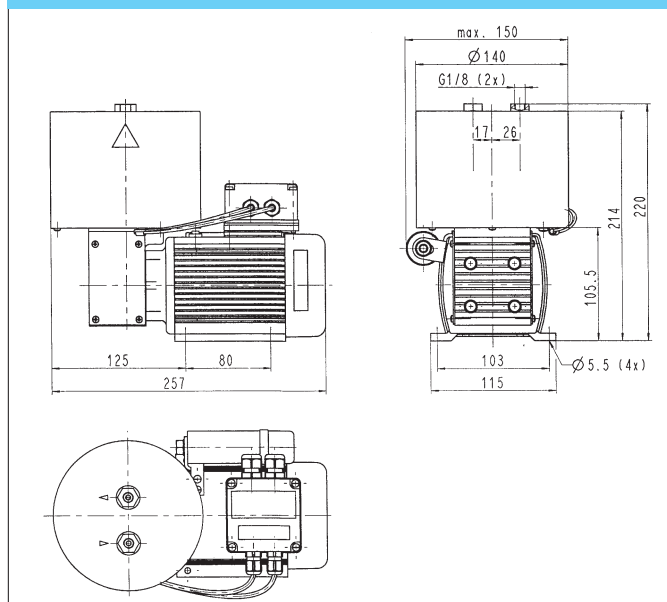
### N 024 AT/ST.16 E



### N 024 ST.26 E



### N 024 ST.11 E



## PERFORMANCE DATA

Type and Order No. <sup>2)</sup>	Delivery at atm. Pressure (l/min) <sup>1)</sup>	Max. Operation pressure (bar g)	Vacuum (mbar abs.)
N 036 AT.16 E	30	1.5	200
N 036 ST.16 E	30	1.5	200
N 036 ST.11 E	30	1.5	200
N 036 ST.26 E	30	1.5	200

<sup>1)</sup> Litre at STP<sup>2)</sup> „See also „MODEL CODE FOR EASY ORDERING“

## MODEL CODES AND MATERIALS

Type and Order No. <sup>2)</sup>	Pump head	Diaphragm	Valves
N 036 AT.16 E	Aluminium	PTFE	PTFE
N 036 ST.16 E	Stainless steel	PTFE	PTFE
N 036 ST.11 E	Stainless steel	PTFE	PTFE
N 036 ST.26 E	Stainless steel	PTFE	PTFE

## MOTOR DATA

Protection class	IP 54		
Voltage/Frequencies (V/Hz)	~230/50		
Power P <sub>1</sub> (W)	170		
Operating current (A)	1.0		

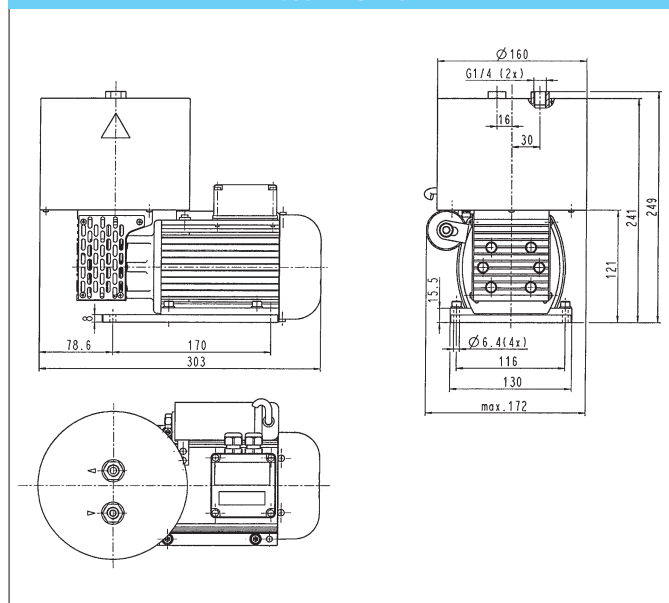
## Heating: N 036 ST.11 E and N 036 ST.26 E

Protection class	IP 20		
Voltage/Frequencies (V/Hz)	~230/50		
Power P <sub>1</sub> (W)	400		
Operating current (A)	1.9		
Heating temperature (°C)	240		

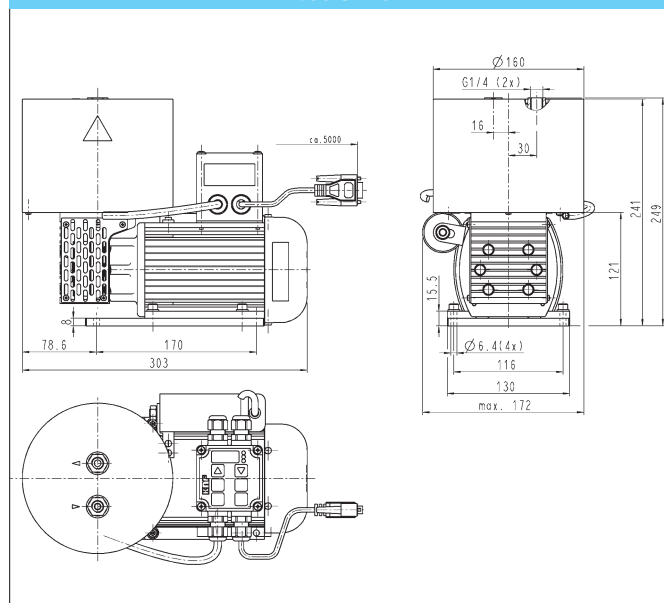
Heating with other voltages and frequencies on request.

KNF offers the pump N 036 ST.26 E with an RS 232 interface. The interface protocol can be made available for applications which require external control.

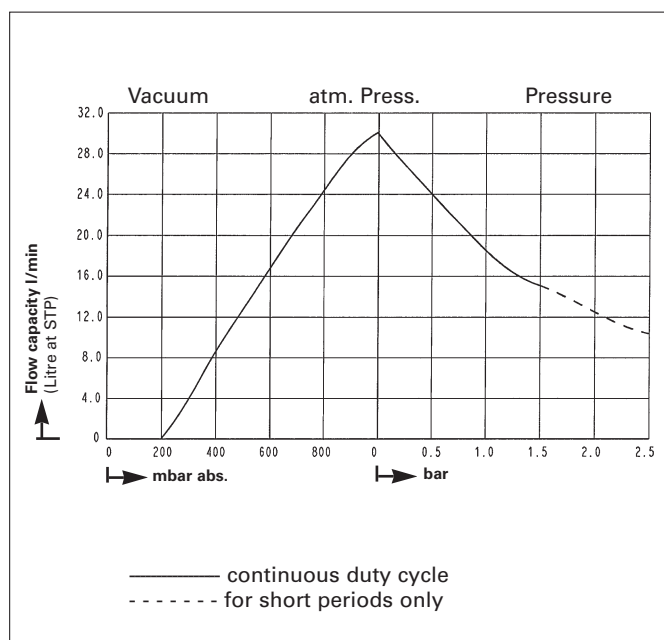
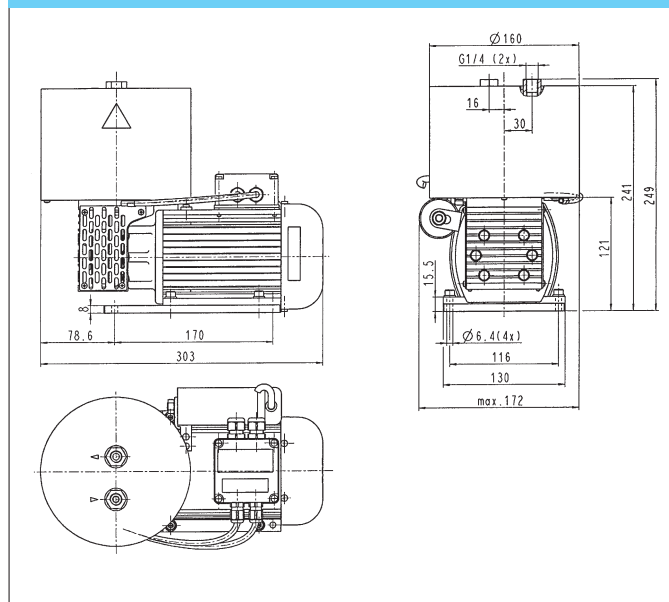
N 036 AT/ST.16 E

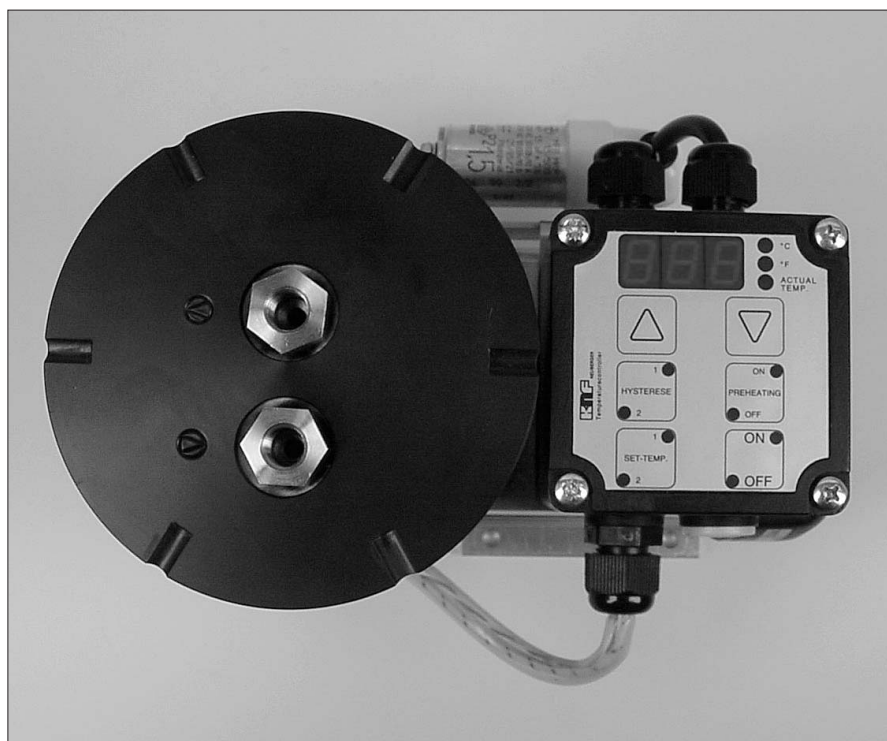


N 036 ST.26 E



N 036 ST.11 E





Heated Pump with electronic temperature control and control panel with display.

## MODEL CODE FOR EASY ORDERING

The model code is identical to the order number. It is made up as follows:

<b>N 012</b>	<b>ST</b>	<b>.26</b>	<b>E</b>	<b>230 V/50 Hz, IP 54</b>
■ Base model	■ Head materials	■ Technical variant e.g., with electronic temperature control	■ Production type e.g. OEM version for mains connection	■ Other motor data e.g.:

In addition motor data must be given in the purchase order (voltage, frequency, and protection class, see before).

Motors with other voltages, frequencies and protection classes on request.

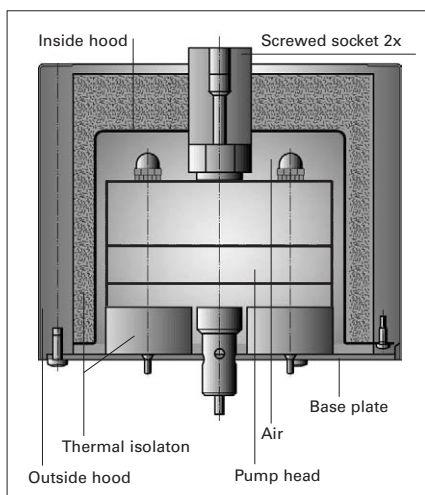
## INSULATION OF THE PUMP - AN INGENIOUS SOLUTION

In all models of the new pump range the pump head is completely sealed by a removable cover. This encapsulation leads to excellent heat insulation and an even saturation of heat distribution in the pump head.

As the insulation unit requires easy removal, a method of insulation was chosen which is not in direct contact with the pump head. Therefore, only air comes into direct contact with the pump head. Air, with an extremely low thermal conductivity of  $(= 0,038 \text{ W / m K})$ , at  $200^\circ\text{C}$ , limits heat transfer very effectively. Heat transfer through convection is also extremely low because of the small volume of air.

Up to 85 percent of the radiation is reflected by an internal, stainless-steel cover, again resulting in a even heat saturation within the pump head. In addition, thermal insulation is provided by fleece material made of glass fibres. This is protected, by a the stainless-steel cover, from direct heat radiation so that its only purpose is to limit thermal conduction. On the outside, a protective cover provides

the final insulation and protection against contact (see below, section drawing) .



In order to provide the design with the best possible thermal insulation and thermal distribution, KNF engineers made extensive use of complex finite element calculations.

Hints on function, installation, and service, please turn over.

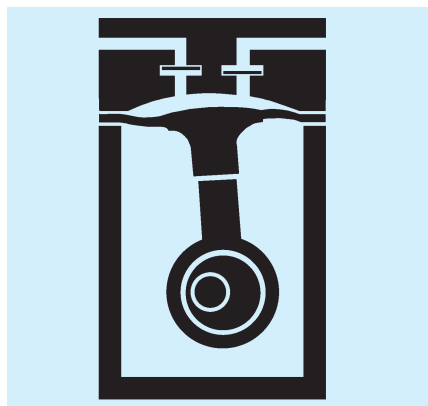
KNF - the competent partner for vacuum and compressor technology. Especially for unusual problems. Call us and talk to our application engineers.

## HINTS ON FUNCTION, INSTALLATION AND SERVICE

### FUNCTION OF KNF DIAPHRAGM VACUUM PUMPS AND COMPRESSORS

An elastic diaphragm is moved up and down by an eccentric (see illustration). On the down-stroke it draws the air or gas being handled through the inlet valve. On the up-stroke the diaphragm forces the medium through the exhaust valve and out of the head. The compression chamber is hermetically separated from the drive mechanism by the diaphragm. The pumps transfer, evacuate and compress completely oil-free.

#### Diaphragm pump



### HINTS ON INSTALLATION AND OPERATION

- Range of use: Transferring air and gases at temperatures between +5°C and +240°C
- Please check the compatibility of the materials of the pump head, diaphragm and valves with the medium.
- The KNF product line contains pumps suitable for pumping aggressive gases and vapors - please contact us.
- Permissible ambient temperature: between +5°C and +40°C
- The standard pumps are not suitable for use in areas where there is a risk of explosion. In these cases there are other products in the KNF program - please ask us for details
- The pumps are designed to start against vacuum. Pumps that start against pressure are available on request.
- To prevent the maximum operating pressure being exceeded, restriction or regulation of the air flow should only be carried out in the suction line
- Components connected to the pump must be designed to withstand the pneumatic performance of the pump
- Install the pump so that the fan can blow in sufficient cooling air
- Fit the pump at the highest point in the system, so that condensate of the tubing cannot flow to in the pump head

### HINTS ON SERVICE

The diaphragm and valve plates are the only parts of the KNF diaphragm pumps subject to wear. They are easy to change, as no special tools are needed.

### ELECTRONIC CONTROL

The .26 version permits electronic control of the pump head temperature. The following values can be set:

- The head temperature
- The hysteresis i.e. the level in degree's C. by which the temperature can reduce before the heating element in the head is switched back on.

The pumps are equipped with a thermal sensor; controlled electronically. The display shows either the current temperature or the desired temperature. The operator can choose whether the temperature is displayed in degrees Celsius or degrees Fahrenheit.

In addition, the new heated diaphragm pumps equipped with electronic controls have a completely new function for increased reliability in analyzing results and for lowering energy consumption. When the pre-heating mode is activated at the controls, the pump only starts when the pump head has reached the required operating temperature. Thus it is impossible for the medium under analysis to be pumped at a stage when constituent elements could condense out in the pump head.

The pumps can also be controlled by a PC via the supplied PC software. Up to five measurement cycles can be preprogrammed, with defined operational parameters. The measured operational data is shown on the PC in graphical form, and is documented as a .knf file.

If you have any questions, please call one of our sales engineers (see below for contact telephone number).

#### **KNF Neuberger GmbH Diaphragm Pumps + Systems**

Alter Weg 3  
D-79112 Freiburg  
Tel. ++49 (0)7664/5909-0  
Fax ++49 (0)7664/5909-99  
www.knf.de  
E-mail: info@knf.de

Please visit our website at [www.knf.com](http://www.knf.com) for further information.