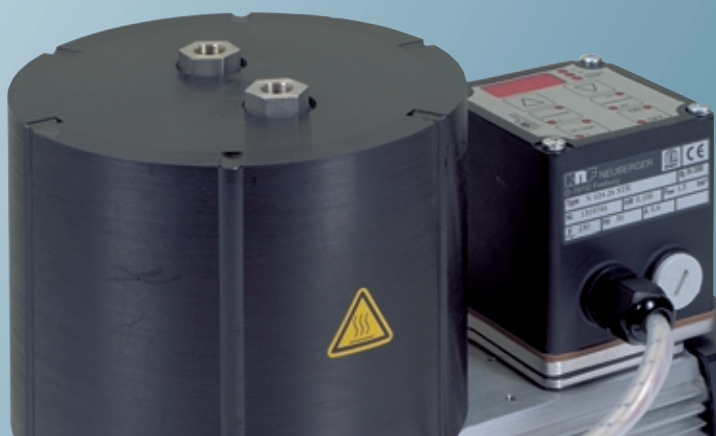


The New Concept

Temperature-Resistant and Heated Diaphragm Pumps

for Analysis :

- No contamination of the medium
- No condensation of the gas in the pump head
- Low heat loss to the surroundings
- Easy access to the pump head
- Energy efficient heating
- Easy to operate
- Electronic control leads to high process reliability:
The pump only starts after the required temperature has been reached



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Applications and operating principle

Diaphragm pumps have become standard in many analytical applications. Based on their design, they work without lubrication (i.e., they cannot contaminate the medium).

Often hot gases need to be analyzed. In these cases, the gas must not cool down when it is transferred from the source being checked to the analyzer as otherwise the constituent parts could condense out, leading to faulty results. Hot gases are therefore pumped using diaphragm pumps with heated pump heads.

In 1974 KNF Neuberger was the first manufacturer to introduce heated diaphragm pumps to the market and since then the technology has continued to be further developed and improved. With the new range of temperature-resistant heated pumps, KNF is once again setting new standards.

The new pump range - versions and characteristics

Pumps of the new range are available in three different versions:

- A version resistant to temperatures up to 240 °C without heating (.16 version)
- A heated version (240 °C) with thermostatic temperature control (.11 version)
- A heated version for temperatures up to 240 °C with electronic temperature control (.26 version).

- All models are characterised by
- the best possible homogeneous spread of temperature throughout the pump head, to reduce the danger of condensation still further
 - Improved insulation of the pump head, so the temperature of the pump surroundings hardly increases at all, thus – with the heated versions – reducing the amount of energy required.

Pumps with electronic temperature control include the additional characteristics of:

- Digital temperature display (in °Celsius or °Fahrenheit)
- Preheating mode: the pump only starts to operate when the temperature in the pump head has reached the required temperature; this improves the process reliability of the analysis and reduces energy consumption.

The entire range of heated pumps is protected against overheating. This leads to increased reliability in operation.



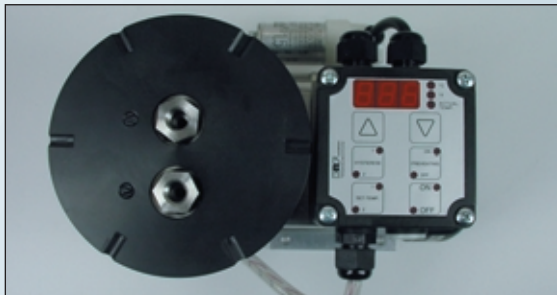
Insulation of the pump head – an ingenious solution

In all models of the new pump range the pump head is completely sealed by a removable cover. This encapsulation leads to excellent heat conservation and outstanding homogeneity 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 $200 \text{ }^\circ\text{C}$, 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, resulting in a homogeneous temperature distribution within the pump head. In addition, thermal insulation is provided by a fleece material made of glass fibres. This is protected, by 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.

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.



Heated pump with electronic temperature control modul and control panel with display.

Electronic control

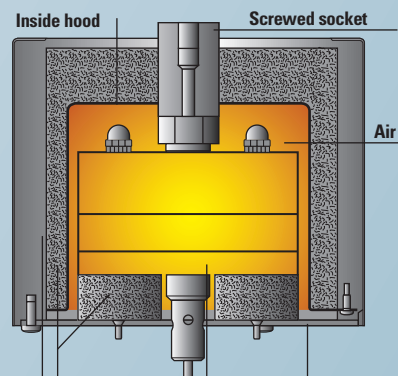
The .26 version permits electronic control of the pump head temperature. The following values can be set:

- The desired temperature
- The hysteresis; you set how many degrees the temperature may fall below the desired temperature before heating begins again.

The pumps are equipped with a thermal sensor; regulation is performed electronically. A display is provided to show 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 analysis medium to be pumped at a stage when constituent elements could condense out in the pump head.

For applications where the electronics need to be controlled externally, KNF offers pumps with an RS 232 interface (specifically adapted to the customers' requirements).



Outside hood | Thermal isolation | Pump head | Base plate / stainless steel

Pump types and pneumatic performance

All parts of the pump which come into contact with the medium are made of corrosion-resistant materials (e. g., stainless steel, PTFE).

| Pump type | Delivery (l/min)* | Ultimate vacuum (mbar abs.) | Max. per- missible pres- sure (bar g) | Data- sheet Nr. |
|---|----------------------|-----------------------------------|---|-----------------------|
| Temperature resistant pumps | | | | |
| N 012 ST.16 E | 10,5 | 240 | 1,5 | D076 |
| N 012 AT.16 E | 10,5 | 240 | 1,5 | D076 |
| N 024 ST.16 E | 18 | 200 | 1,5 | D076 |
| N 024 AT.16 E | 18 | 200 | 1,5 | D076 |
| N 036 ST.16 E | 30 | 200 | 1,5 | D076 |
| N 036 AT.16 E | 30 | 200 | 1,5 | D076 |
| N 036.0 ST.16 E | 30 ² | 200 | 1,5 | D078 |
| N 036.0 AT.16 E | 30 ² | 200 | 1,5 | D078 |
| Heated pumps with thermostatically temperature limit stop | | | | |
| N 012 ST.11 E | 10,5 | 240 | 1,5 | D076 |
| N 024 ST.11 E | 18 | 200 | 1,5 | D076 |
| N 036 ST.11 E | 30 | 200 | 1,5 | D076 |
| N 036.0 ST.11 E | 30 ² | 200 | 1,5 | D078 |
| Heated pumps with electronic control | | | | |
| N 012 ST.26 E | 10,5 | 240 | 1,5 | D076 |
| N 024 ST.26 E | 18 | 200 | 1,5 | D076 |
| N 036 ST.26 E | 30 | 200 | 1,5 | D076 |
| N 036.0 ST.26 E | 30 ² | 200 | 1,5 | D078 |
| Material | | | | |
| Code | Pump head | Diaphragm | Valves | |
| AT | Aluminium | PTFE | PTFE | |
| ST | Stainless steel | PTFE | PTFE | |

* at atmospheric pressure and 20 °C

² twin-head pumps, delivery per pump head

1/2006/WAN KNF reserves the right to make changes

For further details, please ask for the appropriate technical data sheet.

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