**General notes**

**Abbreviations and Introduction**

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**Introduction**

As the first high–efficiency pump in the world, the Wilo–Stratos defined energy efficiency class A for stand–alone circulators, thereby setting a new standard. Wilo extended this product technology towards new pump ranges especially for requirements of the OEM industry. The product ranges Wilo–Stratos PICO OEM, Wilo Stratos TEC, Wilo–Stratos PARA are the new generations of high–efficiency pumps especially designed in line with the demands of OEM industry regarding hydraulic performance, scope of functionality, space restrictions and costs. The scope of all pump ranges is precisely tailored to meet the individual requirements of the market and customers and have the following advantages:

- Concentrating on the essentials
- Energy efficiency class A
- Maximum efficiency thanks to ECM technology
- Up to 80% energy savings compared with uncontrolled circulators
- Meet all the new requirements of the ErP directive (2009/125/EC)
- For heating, solar, geothermal energy systems and cooling
- Intelligent design
- Optimal performance in the smallest space
- High starting torque for reliable starting
- Prevention of flow noise
- Quick and safe installation thanks to a standard delivery with cable or plug for an easy electrical connection
- Simple operation and convenient setting of the pump via external control signals or the Red Button technology
- Cast iron pump housing with cataphoretic (KTL) coating for the prevention of corrosion from condensation formation
- Large range of composite housings for heating applications
Energy efficiency class

In the context of the Kyoto Agreement, European governments in particular are pursuing the goal of drastically reducing CO₂ emissions. Energy labelling, particularly for high-consumption household devices such as washing machines and refrigerators, is prescribed as an important control element for providing the end consumer with an aid for making decisions in favour of energy-saving appliances.

Due to the fact that heating circulation pumps are among the biggest individual electricity consumers in household use because of their long running times, leading European heating pump manufacturers have voluntarily declared in 2005 their intention of henceforth attaching energy labels to their stand alone heating pumps. This makes it possible for users and end consumers to recognise, on the basis of an already familiar classification system, whether a heating circulation pump in use is particularly energy-efficient.

The classification of the energy efficiency of heating pumps is carried out by means of a technical measuring procedure which is described in the Europump “Industry Commitment – To improve the energy performance of stand-alone circulators” from January 2005.

The label used for stand alone circulating pumps is comparable to the one used for household appliances, A is the best possible and G is the worst possible of the energy classes. A comparison of hydraulically similar pumps with different energy classifications reveals that there is a difference of approximately 22% in terms of energy consumption between two sequentially numbered energy classes. Accordingly, an energy class A pump requires on average only around 33% of the electrical energy consumed by a class D pump.

Wilo–Stratos PICO OEM, Wilo–Stratos TEC and Wilo–Stratos PARA use the same highly efficient motor technology with energy efficiency class “A”. The pumps equipped with a red button (Stand alone Circulators) which allows to adjust a >p-v curve are allowed to be labelled with the energy label A.

Fig.: Energy label for heating circulation pumps, Example: Energy class A

Energy saving potential in the European Union for 2030

Fig.: Energy saving potentials EU
General notes

Energy-related Products (ErP) Directive


Following the Kyoto Protocol from Dec 1997, the European Commission has set up measures to achieve a 20% reduction on both energy consumption and CO₂-emission until 2020, based on the data from 1990. One of these measures is the ErP Directive. Conformity with the derived EU regulations will be governed through mandatory CE Marking.


The earlier defined Commission Regulation (EC) No 641/2009 on circulators with a rated power output between 1 W and 2500 W stays unchanged and is based on these Directives.

It will come into effect in two main steps:

From 1 January 2013, glandless stand-alone circulators, with the exception of those specifically designed for primary circuits of thermal solar systems and of heat pumps, shall have an energy efficiency index (EEI) of not more than 0.27. From 1 August 2015, stand-alone circulators and circulators integrated in products shall have an energy efficiency index (EEI) of not more than 0.23. Products means an appliance that generates and/or transfers heat. Examples can be:

- Hydronic heating and secondary cooling circuits
- Boilers
- Heat pumps
- Combined heat and power stations
- Solar thermal systems
- District heating house stations
- Assembly kits for radiator or under floor heating systems
- Secondary hydronic cooling distribution and heat recovery circuits
- DHW system boiler

From 1 January 2020, as well all replacement circulators for identical circulators integrated in products before August 2015 shall have an energy efficiency index (EEI) of not more than 0.23.

After these dates Wilo is not allowed any more to bring circulators not fulfilling these EEI values into the market.

The prEN 16297-1...-3 describes how to measure the EEI. The measurement procedure for integrated circulators takes into account various integrated functions available in the many customized hydraulic solutions.

Circulators NOT affected by new legislation ‘Drinking water circulators’, except with regard to information requirements of Annex I, point 2(4). ‘Drinking water circulator’ means a circulator specifically designed to be used in the recirculation of drinking water as defined in Council Directive 98/83/EC.

Wilo high efficiency circulator pumps of the Stratos range already meet all the new requirements of the ErP Directive even for 2015.

Electronic performance control

Heating pumps are, due to their high annual operating hours, among the largest power-consuming appliances in buildings. After the compressor in heat pumps and in other systems of OEM applications, the circulation pump is the biggest consumer of electrical power and is therefore the major efficiency factor for the entire application. Automatic pump performance control helps drastically to reduce power consumption in heating pumps. Compared to standard pumps, high-efficiency pumps can even save up to 80% electricity costs. All operating states, in particular in the partial load range that is typical for heating systems, can be optimised hydraulically by means of automatic pump performance control. A further significant effect connected with the prevention of a rise in pump pressure is the avoidance of flow noise in thermostatic valves.
High-efficiency pumps

The efficiency of the hydraulics and the motor determine the pump’s overall efficiency. Both components were doubled with the Wilo-Stratos pump compared to the glandless pumps previously used in building services, thus resulting in a considerable improvement. The applied ECM technology drastically reduces the annual power consumption, which again results in considerable savings compared to conventional pumps.

ECM technology

The new ECM technology is the basis for the outstanding efficiency of the Wilo-Stratos OEM series PICO OEM / TEC / PARA.

It includes:

EC motor

EC motor stands for electronically commutated motor. Its basis is a synchronous motor with permanent magnet rotor. The rotating stator’s magnetic field is generated by electronic commutation, meaning that the stator windings are activated specifically for the interaction of the electrical and magnetic poles.

Comparison of the motor components for comparable pump hydraulics

This has the following benefits:

- The magnetic field required in the rotor does not need to be generated with any losses.
- Especially in the partial load range (up to 98% of the operating time), the difference in efficiency is even greater than it already is in the full load range compared to an asynchronous motor.
- Higher speeds are possible compared to an asynchronous motor. This results in the reduction of the size and weight of the pump with similar hydraulics.

Wet rotor encapsulation

The rotor of the glandless pump motor runs in the fluid. This fluid lubricates the bearings and cools the motor. The current-carrying stator is separated from the fluid by a can, referred to as wet rotor encapsulation. This wet rotor encapsulation has a direct effect on the efficiency

- due to the size of the necessary gap between stator and rotor,
- and due to the magnetic resistance of the selected can material.

The improvement in terms of efficiency of the Wilo-Stratos pump here is the result of:

- Reduction of the air gap and
- Application of an innovative can material with smaller losses to the magnetic flux between stator and rotor.

Motor protection

The standard integrated protection device reliably protects the Wilo-Stratos PICO OEM, Wilo-Stratos TEC and Wilo-Stratos PARA, in all settings, against excess temperature, low/excess voltage, excess current, blocking as well as dry running.

This has the following advantage:

No external motor protection switch is required. The connecting instructions of the local electricity supply companies are to be observed.

Minimum intake pressure for the prevention of cavitation

To prevent cavitation (vapour bubble formation within the pump), it is necessary to maintain a sufficiently high over pressure (suction head) at the pump suction port in relation to the vapour pressure of the fluid being pumped.

The minimum suction heads are listed in the respective tables for all glandless pumps.

For higher altitudes than 300 m above sea level:

\[ \text{add 0.1 m head/100 m height increase.} \]

These minimum heads must be respectively increased when handling fluids of higher temperatures or lower densities, higher resistances at the circulator suction side and in regions of lower atmospheric pressures.

Pump curves

All pump curves included in the catalogue apply to the pumping of water (kinematic viscosity = 1 mm²/s). If fluids of different density and/or viscosity are pumped (e.g. water–glycol mixtures), the hydraulic values of the pump and the pipe system will deviate. It is recommended that the data is only measured after a minimum of 24h running-in.

Minimum volume flow

Larger pumps require a minimum flow rate to ensure trouble-free operation. Operating against a closed slide valve, volume flow \( Q = 0 \text{ m}^3/\text{h} \), can lead to overheating inside the pump.
General notes
High-efficiency pumps

Standards/directives
• CE marking (all Wilo pumps)
• Certification according to:
  – ISO 9001,
  – ISO 14001

Quality and safety mark

For pump types:
Wilo–Stratos PICO OEM
Wilo–Stratos TEC
Wilo–Stratos PARA

Notes on installation and operation

Installation
Installation inside a building
Glandless pumps must be installed in dry, well-ventilated, frost-free rooms.

Installation outside a building (outdoor installation)
The glandless pumps of the following series are suitable for outdoor installation:
• Wilo–Stratos PICO OEM
• Wilo–Stratos TEC
• Wilo–Stratos PARA
The following conditions must be complied with:
  • Installation of the pump in a sump (e.g. light sump, ring sump) with cover or in a cabinet/housing for protection against the weather
  • Avoidance of direct sunlight on the pump
  • Protection of the pump against rain. Dripping water from above is allowed as long as the pump is installed in an appropriate installation position.
  • In order to ensure that waste heat is dissipated, the motor and the electronics must be ventilated at all times.
  • The minimum ambient temperature may neither fall below the freezing point of the medium nor be lower than –20°C.
  • Fluid and ambient temperatures may not exceed or fall below the admissible values.

Condensation water
All standard pumps for cold water applications down to –10 °C (Stratos PICO OEM/TEC not for temperatures < 0°C) are fully condensation-proof. The grey cast iron pump housing of the following series
• Wilo–Stratos PICO OEM
• Wilo–Stratos TEC
• Wilo–Stratos PARA
is equipped with a special coating (cataphoretic coating) for a subsequent surface finishing.
The benefits of this coating are:
  • Optimum corrosion protection against condensation formation on the pump housings in cold water installations
  • Very high scratch and impact resistance

Intermittent operation
The series
• Wilo–Stratos PICO OEM
• Wilo–Stratos TEC
• Wilo–Stratos PARA
can also be used for intermittent (ON/OFF) operation.
The maximum admissible number of switchings during the service life of the pump is 300000 times (80000 operating hours) at a minimum time period of 5 s between two switchings.

Connections
Screw–end pumps
Screw–end pumps are equipped with connecting threads in accordance with DIN EN ISO 228, Part 1. Seals are on request in the scope of delivery.
Wilo recommends the use of flat gaskets type EPDM 70 shores for cast iron, bronze or composite pump housings.

Electrical connection
• All Wilo pumps are made for a voltage of 230 V (tolerance +10%/- 15%).
• All Wilo pumps made after 1 January 1995 have been labelled with the CE marking in accordance with relevant EU Directives.
• When pumps are used in systems with fluid temperatures above 90°C, a suitably heat-resistant connecting pipe must be used.

Service life, wear and tear
The pumps and their components for OEM applications described hereafter are designed for 60000 operating hours for the Stratos PICO OEM and Stratos TEC/6 series and 80000 operating hours for Stratos TEC/7 and Stratos PARA pumps.
Pumps or parts of pumps are subject to wear in accordance with state–of–the–art technology (DIN 31051/DIN–EN 13306). This wear may vary depending on operating parameters (temperature, pressure, speed, water conditions) and the installation/usage situation and may result in the malfunction or failure at different times of the aforementioned products/components, including their electrical/electronic circuitry.
Wearing parts are all components subject to rotary or dynamic stress, including electronic components under tension, in particular:
• Seals (including mechanical seals), seal rings
• Bearings and shafts
• Impellers and pump components
• Relays
• Electronic circuits, semiconductor components, etc.

We do not accept any liability for faults or defects arising from natural wear and tear.

Pump replacement
No spare parts are available for OEM pumps.
In the event of damage, the complete pump needs to be replaced.

Wilo – General Terms of Delivery and Service
The latest version of our General Terms of Delivery and Service can be found on the Internet at
www.wilo.com/agb

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Wilo-Stratos PICO OEM

The Wilo-Stratos PICO OEM is a version of the successful Wilo-Stratos PICO which was adapted to the special requirements of the OEM market. It was specially designed in order to fulfil the demands of this market.

Special features/product benefits

- Energy efficiency class A
- Maximum efficiency thanks to ECM technology
- Up to 90% electricity savings compared to old uncontrolled heating pumps
- Only 3 watts min. power consumption
- Preselectable control modes for optimum load adjustment Δp-c (constant differential pressure), Δp-v (variable differential pressure)
- Air venting routine for automatic bleeding of the rotor chamber
- Delivered as standard with an OEM plug for an easy electrical connection
- Flexible installation due to compact design
- Very high starting torque for reliable start-up
- Cataphoretically coated (KTL) cast iron pump housing to prevent corrosion when condensation occurs

Heating application

In nearly all circulation systems, correctly sized controlled glandless pumps ensure adequate heat supply at all times at significantly reduced energy costs, while at the same time preventing noise generation.

Thermal insulation for heating

To avoid heat losses via the pump housing, the single pump series Wilo-Stratos PICO OEM come optionally with a thermal insulation shell. The PP material used, foamed polypropylene, has the following properties:

- Environmental compatibility: easily recyclable
- Thermal resistance: up to 120 °C
- Transmission coefficient: 0.04 W/mK according to DIN 52612
- Flammability: Class B2 according to DIN 4102 (normally flammable)

Normally flammable materials are permitted to be utilised in heating areas in Germany in accordance with fire prevention regulations as long as a minimum clearance of 20 cm is maintained between them and the fireplace.

Corrosion-proof pump design

Corrosion-proof designs are required for e.g. radiant cooling or heating ceiling panels. For these applications, the pump housing is coated.

Electronic performance control

Available control modes

Control mode Δp-c:
In the Δp-c control mode, the electronic module keeps the differential pressure generated by the pump constant at the set differential pressure setpoint HS over the permissible volume flow range.

Control mode Δp-v:
In the Δp-v control mode, the electronic module changes the differential pressure setpoint to be maintained by the pump in linear fashion between HS and ½ HS. The differential pressure setpoint value H varies with the volume flow Q.

Air venting routine

The integrated air venting routine supports a bleeding of the overall heating system. After a manual setting, the routine runs for 10 minutes alternatingly at low and high speed of the pump. At the end of the process, the pump switches automatically to a pre-set speed. After that, the desired control mode can be set at the red button.
Planning guide
High-efficiency pumps

Wilo–Stratos PICO OEM

Manual control panel
Control button
The control mode and the differential pressure setpoint at Δp–c for constant differential pressure and at Δp–v for variable differential pressure can be set with the control button. The important basic functions can be set easily and safely, directly at the pump. Depending on customer wishes, a pre-setting of the control mode/setpoint can be done at the factory.

Optional: Wilo–Connector
No tools are required to connect the mains cable to the Wilo–Connector:

Optional: 3-core cable
For mains power supply 1~230 V/50 Hz
black/brown: L1, 1~230V/50Hz
blue: Neutral N
yellow/green: Earth conductor

The cable is delivered with end splices in 0.5 m, 1 m, 1.5 m and 2 m.

Mains connection
For mains power supply 1~230 V/50 Hz

Standard: OEM plug

Electrical connection
To ensure a safe and easy electrical connection, the Wilo–Stratos PICO OEM pumps are equipped with an OEM mains plug as standard.

Mains connection
For mains power supply 1~230 V/50 Hz

The mating plug to the OEM plug can be ordered with one of the following suppliers. (Wilo does not assume any liability for the products supplied by these manufacturers): LTE (www.lte.it) FACON (www.facon.it)

Permissible temperature range
The Wilo–Stratos PICO OEM has an integrated safety function: In the event of too high temperature, outside the permissible temperature range, the electronics reduces automatically the power consumption until normal operating conditions returned.

Example: at a fluid temperature of 90 °C and at an ambient temperature of 60 °C, the delivery head can decrease by 0.5 m depending on the pressure losses of the system.
**Wilo–Stratos PICO OEM**

**Designation, name plate of the Wilo–Stratos PICO OEM**

![Name plate image]

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<td>Made by WILO in France, WILO SE Nordkirchenstraße 140, 44263 Dortmund Germany</td>
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**Permitted installation positions**

**Wilo–Stratos PICO OEM**

1. Article number
2. Pump type
3. Voltage/frequency: 1~230V/50Hz, 3–40W, max. 0.44A, PN10, IPX4D
4. Made by WILO in France, WILO SE Nordkirchenstraße 140, 44263 Dortmund Germany

**Thermal insulation in heating applications**

Thermal insulation shells are available for the Wilo–Stratos PICO OEM as accessories and their function is to avoid heat losses at the pump housing.

- **Material:** EPP, polypropylene foam
- **Thermal conductivity:** 0.04 W/mK according to DIN 2612
- **Flammability:** Class B2 according to DIN 4102, FMVSS 302

When insulating the pump onsite, care must be taken to cover the pump up to the top edge of the pump housing only (the motor must be left uncovered).

**Permitted installation positions**

3, 6, 9 and 12 o’clock are the module positions for the indicated direction of flow at the pump housing.
Heating and cooling
## Heating and cooling
### High-efficiency pumps

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<td>on request</td>
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<tr>
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<td>•</td>
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<td>on request</td>
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<tr>
<td>Including installation and operating instructions</td>
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<td>–</td>
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* = available, – = not available
* see table “Possible combinations of functions and equipment”
Heating and cooling
High-efficiency pumps

Series description Wilo-Stratos PICO OEM 15/1-6, 25/1-6, 30/1-6

Design
Glandless circulation pump with threaded connection or with specific composite pump housing. EC-motor with automatic power adjustment.
Standard delivery with OEM-plug

Application
Hot-water heating systems of all kinds, closed cooling circuits

Type key
Example: Wilo-Stratos PICO OEM 25/1-6 130 12H I
Stratos High-efficiency pump with electronic regulation
PICO OEM Series dedicated to OEM specific market
25/ Nominal diameter:
15 threading 1”
25 threading 1 ½”
30 threading 2”
1-6 Adjustable pressure head: 1 to 6 m
130 Pump housing length: 130 mm or 180 mm
12H Box orientation: 3, 6, 9 or 12 o’clock
I Individual packaging
(not specified) Collective packaging (standard)

Technical data

Approved fluids (other fluids on request)

| Heating water (in accordance with VDI 2035) | • |
| Water–glycol mixtures (max. 1:1; above 20% admixture, the pumping data must be checked) | • |

Power
Max. delivery head 6 m
Max. volume flow 4.0 m³/h

Permitted field of application
Temperature range for applications in HVAC systems at max. ambient temperature
- of 25°C = 2 to 110°C
- of 40°C = 2 to 95°C
- of 45°C = 2 to 85°C
- of 50°C = 2 to 70°C
- of 55°C = 2 to 55°C
- of 60°C = 2 to 40°C

Maximum static pressure 10 bar

Electrical connection
Mains connection 1~230 V, 50/60 Hz

Motor/electronics
Electromagnetic compatibility EN 61800–3
Emitted interference EN 61000–6–3
Interference resistance EN 61000–6–2
Speed control Frequency converter
Protection class IP 44
Insulation class F

Minimum suction head at suction port for avoiding cavitation at water pumping temperature
Minimum suction head at 50/95/110°C 0.5/4.5/11 m

• = available, – = not available

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Pump curves Wilo–Stratos PICO OEM 15/1–6, 25/1–6, 30/1–6

Wilo–Stratos PICO OEM 15/1–6, 25/1–6, 30/1–6

Δp–v (variable)

Δp–c (constant)

Tolerances of each curve according to EN 1151–1:2006
Heating and cooling
High-efficiency pumps

Dimensions, motor data Wilo-Stratos PICO OEM 15/1–6, 25/1–6, 30/1–6

<table>
<thead>
<tr>
<th>Wilo-Stratos PICO OEM...</th>
<th>Speed</th>
<th>Power consumption 1–230 V</th>
<th>Current at 1–230V</th>
<th>Motor protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>.../1–6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n rpm</td>
<td></td>
<td>P1 W</td>
<td>I A</td>
<td></td>
</tr>
<tr>
<td>1200 – 4230</td>
<td></td>
<td>3–40</td>
<td>0.44</td>
<td>Not required (blocking–current proof)</td>
</tr>
</tbody>
</table>

Materials

<table>
<thead>
<tr>
<th>Wilo-Stratos PICO OEM...</th>
<th>Pump housing</th>
<th>Impeller</th>
<th>Pump shaft</th>
<th>Bearing</th>
</tr>
</thead>
<tbody>
<tr>
<td>.../1–6</td>
<td>Grey cast iron</td>
<td>Plastic</td>
<td>Stainless steel</td>
<td>Carbon, metal impregnated</td>
</tr>
</tbody>
</table>

Dimension drawing

Dimensions, weights

<table>
<thead>
<tr>
<th>Wilo-Stratos PICO OEM...</th>
<th>Threaded pipe union</th>
<th>Thread</th>
<th>Overall length</th>
<th>Dimensions</th>
<th>Weight approx.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>l0</td>
<td>l1</td>
<td>m</td>
<td>kg</td>
</tr>
<tr>
<td>15/1–6</td>
<td>Rp ½ G 1</td>
<td></td>
<td>130</td>
<td>65</td>
<td>1.8</td>
</tr>
<tr>
<td>25/1–6</td>
<td>Rp 1 G 1½</td>
<td></td>
<td>180</td>
<td>90</td>
<td>2.2</td>
</tr>
<tr>
<td>25/1–6–130</td>
<td>Rp 1 G 1½</td>
<td></td>
<td>130</td>
<td>65</td>
<td>1.9</td>
</tr>
<tr>
<td>30/1–6</td>
<td>Rp 1¼ G 2</td>
<td></td>
<td>180</td>
<td>90</td>
<td>2.2</td>
</tr>
</tbody>
</table>
Accessories
Wilo-ClimaForm, Wilo thermal insulation shells

Wilo thermal insulation shells

> User benefits
  - Reduces the heat losses of the pump by up to 85% (depending on the electrical power P1)
  - Reduces the overall energy consumption of the heating system
  - Saves energy costs
  - Resistant to moisture, salts, many acids, most greases and solvents
  - Ensures even temperature distribution at the pump
  - Protects the pump from outside moisture
  - Groundwater-neutral, propellant-free, formaldehyde-free
  - 100% recyclable
  - Fire resistance classification B2

> Suitable for pumps of the series:
  - Stratos PARA /1-5; 130 mm, 180 mm
  - Stratos PARA /1-7; 130 mm, 180 mm
  - Stratos PARA /1-11; 180 mm
  - Stratos PARA /1-8; 180 mm
  - Stratos PARA /1-12; 180 mm

Wilo-ClimaForm

> Wilo-ClimaForm
  Diffusion-proof insulation of pump housings in cold water applications (material: Armacell system).

Suitable for pumps of the series:
  - Stratos PARA /1-11; 180 mm
  - Stratos PARA /1-8; 180 mm
  - Stratos PARA /1-12; 180 mm
  - Stratos PARA Z/1-11; 180 mm
  - Stratos PARA Z/1-8; 180 mm
  - Stratos PARA Z/1-12; 180 mm

For avoiding condensation formation on the surface of the pump housing and consequential damage caused by drips and corrosion on the pump housing and on the rest of the system.

> Scope of delivery
  Low-temperature insulation shell including Armaflex band for form-fitting sealing between insulation and motor flange, installation instructions and packaging. The processing materials required for the Armacell system (e.g. special cleaners, AF adhesive, UV protective coating) are to be provided by the customer.

> Application benefits and field of application
  - Industrially prefabricated low-temperature insulation shell for the fast insulation of pump housings and secure connection with onsite diffusion-proof pipe insulation manufactured by Armacell GmbH.
  - Permitted temperature range of the fluid: -10 °C to +105 °C
  - Simple contours and surfaces facilitate the application of any onsite surface coatings (e.g. coat of paint for UV protection, sheet metal application for impact protection)
  - Smoother transition to ongoing pipe insulation: Pipe unions/counter flanges are enclosed by the insulation
  - Dimensionally precise adjustment to the housing geometry reduces the hollow space between insulation and the pump housing and thus the inclusion of air and moisture
  - The flexible elastomer insulation material can be cut and re-glued in situations where access for installation is difficult