

Wilo-Stratos PARA-C/-CZ



en Installation and operating instructions



Fig. I a:

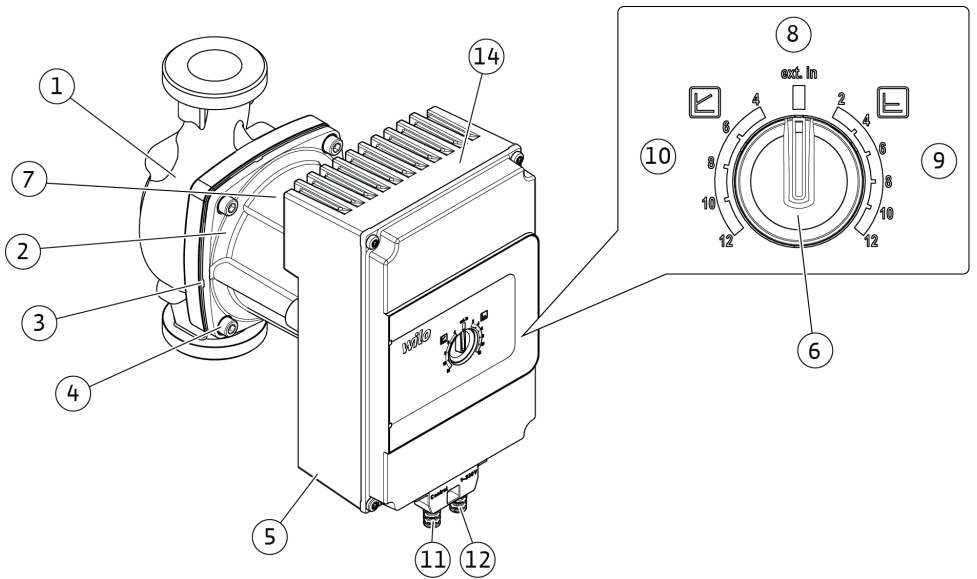


Fig. I b:

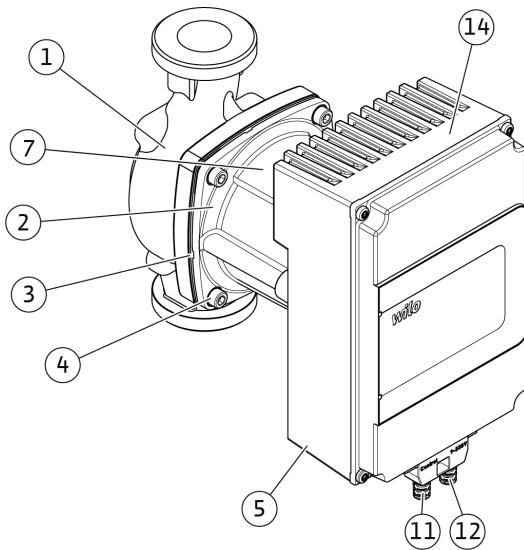


Fig. II

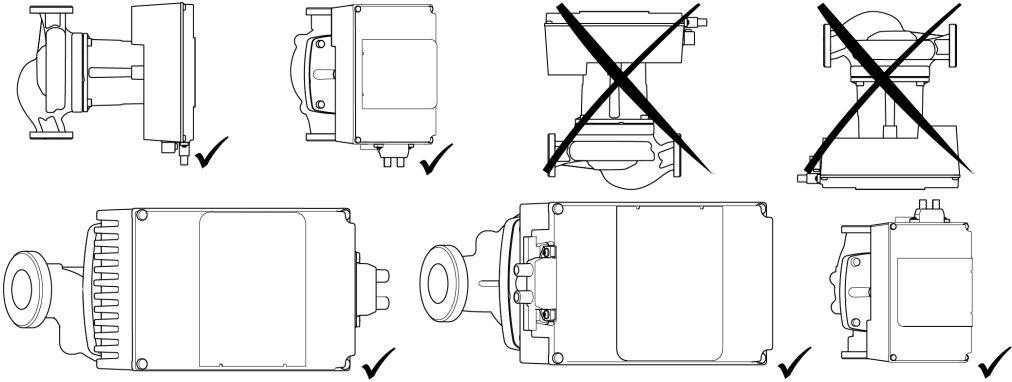


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1 About these instructions

These instructions are an integral part of the product. Adherence to these instructions is a requirement for the intended use and correct operation of the product:

- Read these instructions before commencing any work and keep them in an accessible place at all times.
- Observe instructions and labelling on the pump.
- Observe local regulations where the pump is installed.
- No liability will be accepted for damage resulting from failure to follow these instructions.

The language of the original operating instructions is German. All other languages of these instructions are translations of the original operating instructions.

2 Safety

This chapter contains basic instructions for the individual life cycles of the product. Failure to observe this information carries the following risks:

- Danger to persons from electrical, mechanical and bacteriological effects as well as electromagnetic fields
- Environmental damage from discharge of hazardous substances
- Damage to property
- Failure of important product functions
- Failure of required maintenance and repair procedures

Failure to observe the instructions will result in the loss of any claims for damages.

The directions and safety instructions in the other sections must also be observed!

2.1 Identification of safety instructions

These installation and operating instructions set out safety instructions for preventing personal injury and damage to property, which are displayed in different ways:

- Safety instructions relating to personal injury start with a signal word and are **preceded by a corresponding symbol**.
- Safety instructions relating to property damage start with a signal word and are displayed **without** a symbol.

Signal words

- **DANGER!**

Failure to follow the instructions will result in serious injury or death!

- **Warning!**

Failure to follow instructions can lead to (serious) injury!

- **Caution!**

Failure to follow instructions can lead to property damage and possible total loss.

- **Notice!**

Useful information on handling the product

Symbols

These instructions use the following symbols:



General danger symbol



Danger of electric voltage



Warning of hot surfaces



Warning of magnetic fields



Notices

2.2 Personnel qualifications

Staff must:

- be instructed about locally applicable regulations governing accident prevention,
- have read and understood the installation and operating instructions.

Personnel must have the following qualifications:

- **Electrical work:** a qualified electrician must carry out the electrical work.

- Installation/dismantling: The technician must be trained in the use of the necessary tools and fixation materials.
- The product must be operated by persons who have been instructed on how the complete system functions.
- Maintenance work: The technician must be familiar with the use of operating fluids and their disposal.

Definition of “qualified electrician”

A qualified electrician is a person with appropriate technical education, knowledge and experience who can identify **and** prevent electrical hazards.

The operator must confirm and ensure the field of authority, the competence and the monitoring of the personnel. If the personnel do not possess the necessary knowledge, they must be trained and instructed. If required, this can be carried out by the product manufacturer at the operator’s request.

2.3 Electrical work

- Electrical work must be performed by a qualified electrician.
- Nationally applicable guidelines, standards and regulations as well as specifications issued by the local energy supply companies for connection to the local power supply system must be observed.
- Before commencing work, disconnect the product from the mains and secure it against being switched on again.
- The connection must be secured by means of a residual-current device (RCD).
- The product must be earthed.
- Have defective cables replaced immediately by a qualified electrician.
- Never open the control module and never remove operating elements.

2.4 Operator responsibilities

- Provide installation and operating instructions in a language which the personnel can understand.
- Make sure that personnel are suitably trained for the specified work.
- Verify the area of responsibility and individual responsibilities of personnel.
- Provide the necessary protective equipment and make sure that personnel wear it.
- Ensure that safety and information signs mounted on the device are always legible.
- Train personnel with regard to the operating principles of the system.
- Eliminate risks from electrical current.
- Equip hazardous components (extremely cold, extremely hot, rotating, etc.) with a guard to be provided by the customer.
- Remove leakages of hazardous fluids (e.g. explosive, toxic or hot) in such a way that no danger is posed to persons or the environment. Comply with national statutory provisions.
- Keep highly flammable materials at a safe distance from the product.
- Ensure compliance with the regulations for accident prevention.
- Ensure compliance with local directives or general directives [e.g. IEC, VDE, etc.] and instructions from local energy supply companies.

Follow all information that appears on the product and ensure that it remains permanently legible:

- Warning and hazard notices
- Rating plate
- Direction of rotation arrow/symbol for direction of flow
- Labelling of connections

This device can be used by children from 8 years of age as well as people with reduced physical, sensory or mental capacities or lack of experience and knowledge if they are supervised or instructed on the safe use of the device and they understand the dangers that can occur. Children are not allowed to play with the device. Cleaning and user maintenance must not be carried out by children without supervision.

2.5 Safety instructions

Electrical current



DANGER

Electric shock!

The pump is operated electrically. An electric shock may be a danger to life!

- Have only qualified electricians carry out work on electrical components.
- Before all work, deactivate the power supply (also SSM if necessary) and safeguard against accidental switch-on. Work on the pump may only be started after 5 minutes have elapsed due to the dangerous residual contact voltage.
- Never open control module and never remove operator controls.
- Only operate the pump with intact components and connection cables.

Magnetic field



DANGER

Magnetic field!

When dismantled, the permanent magnet rotor inside the pump can pose a risk of fatal injury for people with medical implants (e.g. pacemakers).

- Never remove the motor impeller unit.

Hot components



WARNING

Hot components!

Pump housing and glandless motor can get hot and cause burns when touched.

- During operation only touch the control module.
- Allow the pump to cool down before commencing any work.
- Keep highly flammable materials away.

3 Transport and temporary storage

3.1 Transport inspection

Immediately after receiving the product:

- Check product for transport damage.
- If transport damage is detected, take the necessary steps with the forwarding agent within the respective time limits.

3.2 Transport and storage conditions

CAUTION

Risk of material damage!

Incorrect transport and storage can cause damage to the product.



WARNING

Risk of injury from sodden packaging!

Packaging that has been sodden loses its strength and can cause injury to persons if the product falls out.




WARNING

Risk of injury from ripped plastic strips!

Ripped plastic strips on the packaging render transport protection void. Products falling out may cause personal injury.

- The pump and its packaging must be protected against moisture, frost and mechanical damage during transport and temporary storage.
- Permitted temperature range during transport:

- -25 °C ... +70 °C
- Permitted relative humidity during transport:
 - +5 % ... 95 %
- Store in original packaging.

- Storage of pump with horizontal shaft on a horizontal surface. Observe the packaging icon  (top).
- Storage must not exceed the six-month period.
- Permitted temperature range during storage:
 - -20 °C ... +60 °C
- Permitted relative humidity during storage:
 - +5 % ... 95 %

4 Intended use and misuse



WARNING

The Wilo-Stratos PARA-C series do not meet the requirements of the ATEX directive and are not suitable for use in ATEX applications!

4.1 Heating fluids


The high-efficiency circulators in the **Wilo-Stratos PARA-C** series are exclusively intended for circulating fluids in hot-water heating systems and similar systems, including solar installations, with constantly changing volume flows.


Permitted fluids:

- Heating water in accordance with VDI 2035 Part 1 and Part 2, within the following limits:
 - Electrical conductivity in the range of 10 µS/cm to 100 µS/cm
 - pH value in the range of 8.2 to 10.0
- Water-glycol mixtures, max. mixing ratio of 1:1. If glycol is added, the pumping data of the pump must be corrected according to the higher viscosity, depending on the mixing ratio percentage.

4.2 Use in applications with coolants

The **Wilo-Stratos PARA-C** can be used as a device in heat pumps or air-conditioning systems designed in accordance with IEC 60335-2-40. The permitted flammable refrigerants are limited to those listed as compatible according to IEC 60335-2-40:2018-01.

Coolant Name	Safety class	Max. permissible surface temperature according to IEC 60335-2-40:2018-01 (°C)	Stratos PARA-C Pictogram on the pump: 
R-32	A2L	700	Compatible
R-50	A3	545	not permitted
R-142b	A2L	650	not permitted
R-143a	A2L	650	not permitted
R-152a	A2	355	not permitted

Coolant Name	Safety class	Max. permissible surface temperature according to IEC 60335-2-40:2018-01 (°C)	Stratos PARA-C Pictogram on the pump: 
R-170	A3	415	not permitted
R-E170	A3	135	not permitted
R-290	A3	370	not permitted
R-444B	A2L	700	Compatible
R-444A	A2L	700	Compatible
R-447B	A2L	700	Compatible
R-451A	A2L	700	Compatible
R-451B	A2L	700	Compatible
R-452B	A2L	700	Compatible
R-454A	A2L	700	Compatible
R-454B	A2L	700	Compatible
R-454C	A2L	700	Compatible
R-457A	A2L	700	Compatible
R-600	A3	265	not permitted
R-600a	A3	360	not permitted
R-1270	A3	355	not permitted
R-1234yf	A2L	700	Compatible
R-1234ze(E)	A2L	700	Compatible



NOTICE

For the most common refrigerants, there is an additional pictogram on the product rating plate to enable fast identification of the possible use of the product:



- R32:

4.3 Domestic hot water

Domestic hot water

The high-efficiency circulators in the **Wilo-Stratos PARA-CZ** series are suitable for use in domestic hot water circulation systems and other drinking water applications. In drinking water applications, the water temperature must not exceed 80 °C.

A list of certificates can be found in the certificate booklet.

Intended use includes compliance with these instructions as well as the information and markings on the pump.

Any use beyond the intended use is considered misuse and will result in the loss of all liability claims.

4.4 Misuse



WARNING

Misuse of the pump can lead to dangerous situations and damage!
Non-permitted substances in the fluid can destroy the pump! Abrasive solids (e.g. sand) increase pump wear.

- Never use non-specified fluids.
- Highly flammable materials/fluids should always be kept at a safe distance from the product.
- Never allow unauthorised persons to carry out work.
- Never operate the pump beyond the specified limits of use.
- Never carry out unauthorised conversions.
- Use exclusively authorised accessories and authorised spare parts.
- Never operate with phase angle control.

5 Product information

5.1 Type key

Example: Wilo-Stratos PARA-C 25-180-12-T01 3,2-3H-C4-AI

Stratos PARA	High-efficiency circulator
-C	General fields of application, heating, solar application
-CZ	Domestic hot water applications
25	Screwed connection: 25 (RP 1 / G1½), 30 (RP 1¼ / G2) Combination flange (PN 6/10): DN 32, 40, 50, 65
180	Port-to-port length in [mm]
12	Maximum pump pressure in metres water column
T01	Equipment variants (note table "Equipment variants")
3.2	OPTIONAL: Cable length in [m], if different from standard value not specified: Cable length 1.5 m
3H	OPTIONAL: Position of the electronic module, if not standard: not specified: 6H = 6 o'clock between discharge port and cable 3H = 3 o'clock between discharge port and cable 9H = 9 o'clock between discharge port and cable 12H = 12 o'clock between discharge port and cable

Example: Wilo-Stratos PARA-C 25-180-12-T01 3,2-3H-C4-AI

-C4	<p>OPTIONAL: Factory setting</p> <p>not specified: Control knob in position "Ext. In"</p> <p>C4 = control knob in position $\Delta p-c$ 4 m</p> <p>V3 = control knob in position $\Delta p-v$ 3 m</p> <p>...</p>
AI	<p>OPTIONAL: Packaging type</p> <p>not specified: Combined packaging</p> <p>A = Accessories are included in the packaging</p> <p>I = Individual packaging</p>

Table 1: Type key

5.2 Equipment variants

Type no.	Operating button	Internal control $\Delta p-v$	Internal control $\Delta p-c$	External control function	SSM (collective fault signal)
T01	●	●	●	Analogue 0 ... 10 V with cable break function	●
T02	●	●	●	Analogue 0 ... 10 V without cable break function	●
T03	●	●	●	Minimum speed*	-
T06	-	-	-	Analogue 0 ... 10 V with cable break function	●
T08	-	-	-	Analogue 0 ... 10 V without cable break function	●
T10	-	-	-	PWM 1	-
T11	-	-	-	PWM 2	-
T12	-	-	-	PWM 1	●
T13	-	-	-	PWM 2	●
T16	●	●	●	Analogue 0 ... 10 V with cable break function	-
T17	●	●	●	Analogue 0 ... 10 V without cable break function	-
T18	-	-	-	Analogue 0 ... 10 V with cable break function	-

Type no.	Operating button	Internal control $\Delta p-v$	Internal control $\Delta p-c$	External control function	SSM (collective fault signal)
T19	-	-	-	Analogue 0 ... 10 V without cable break function	-
T20	●	●	●	PWM 1	-
T21	●	●	●	PWM 2	-
T22	●	●	●	PWM 1	●
T24	●	●	●	PWM 2	●
T26	-	-	-	Maximum speed*	-
T27	●	●	●	Pump stops*	-
T28	●	●	●	Maximum speed*	-

*The pump follows this setting when the button is set to "Ext. In". In this case, the pump is not externally controlled.

Table 2: Equipment variants

5.3 Technical data

Technical data	
Connection voltage	1~230 V +10% / -10%, 50/60 Hz
Protection class	IPX4D
Insulation class	F
Energy efficiency index EEI	See rating plate (Fig. I, Item 7)
Permissible fluid temperature	-20 °C ... +95 °C (+110 °C with reduced performance)
Permissible fluid temperature for domestic hot water	0 °C ... +80 °C
Permissible ambient temperature	-20 °C ... +40 °C (+60 °C with reduced performance)
Max. operating pressure	10 bar (1000 kPa)
Emissions sound-pressure level	< 42 dB(A) ¹⁾
Max. installation height	2000 m above sea level

¹⁾ with regard to the best efficiency point within the dimensioning conditions.

Table 3: Technical data



NOTICE

See Wilo's technical product catalogue for detailed product features.

5.4 Min. inlet pressure

Nominal diameter	Fluid temperature		
	-20 °C to +50 °C 0 °C to +50 °C ¹⁾	up to +95 °C	up to +110 °C
G 1½	0.3 bar	1.0 bar	1.6 bar
G 2	0.3 bar	1.0 bar	1.6 bar
DN 32	0.3 bar	1.0 bar	1.6 bar
DN 40	0.5 bar	1.2 bar	1.8 bar
DN 50	0.5 bar	1.2 bar	1.8 bar
DN 65	0.7 bar	1.5 bar	2.3 bar

¹⁾Stratos PARA-CZ

Table 4: Min. inlet pressure



NOTICE

The values apply up to 300 m above sea level; addition for higher locations: 0.01 bar/100 m increase in height.

5.5 Scope of delivery

- High-efficiency circulator
- Installation and operating instructions

5.6 Accessories

Accessories must be ordered separately. For a detailed list and description, consult the catalogue.

The following accessories are available:

- Thermal insulation shell for heating systems
- Thermal insulation shell for cooling systems

6 Description and function

6.1 Description of the pump

The Wilo-Stratos PARA-C high-efficiency circulators (Fig. 1) are glandless pumps consisting of highly efficient hydraulics, an electronically commutated motor (ECM) with a permanent magnet rotor and integrated differential pressure control. An electronic control module with an integrated frequency converter is on the motor housing. Control mode and delivery head (differential pressure) are adjustable. The differential pressure is controlled via the pump speed.

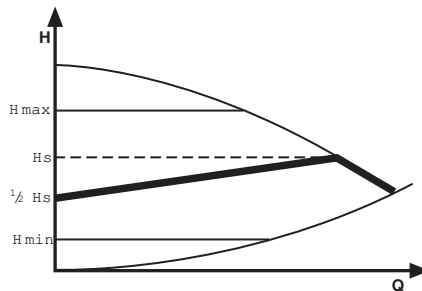
Overview

Item	Designation
1	Pump housing
2	Glandless motor

3	Condensate drain openings (4x around circumference)
4	Housing screws
5	Control module
6	Control knob for pump adjustment
7	Rating plate
8	Setting range Ext. In
9	Constant differential pressure ($\Delta p-c$) setting range
10	Variable differential pressure ($\Delta p-v$) setting range
11	Signal cable connection
12	Mains cable connection

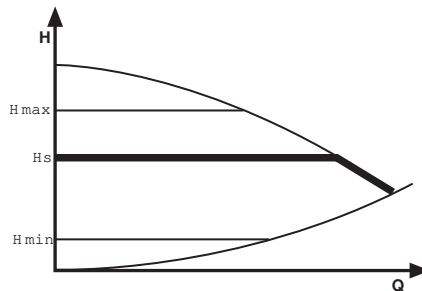
6.2 Control and communication functions

Variable differential pressure $\Delta p-v$



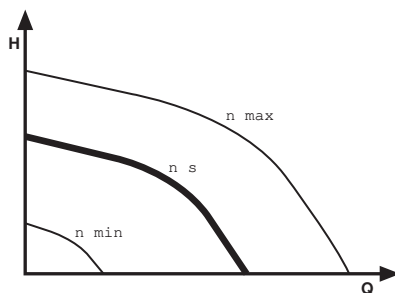
Recommended for two-pipe heating systems with radiators to reduce the flow noise at thermostatic valves. The pump reduces the delivery head to half in the case of decreasing volume flow in the pipe network. Electrical energy saving by adjusting the delivery head to the volume flow requirement and lower flow rates.

Constant differential pressure $\Delta p-c$



Recommended for underfloor heating or for large-sized pipes or all applications without a variable pipe network curve (e.g. storage charge pumps) as well as single-pipe heating systems with radiators. The control keeps the set delivery head constant irrespective of the pumped volume flow.

Constant speed

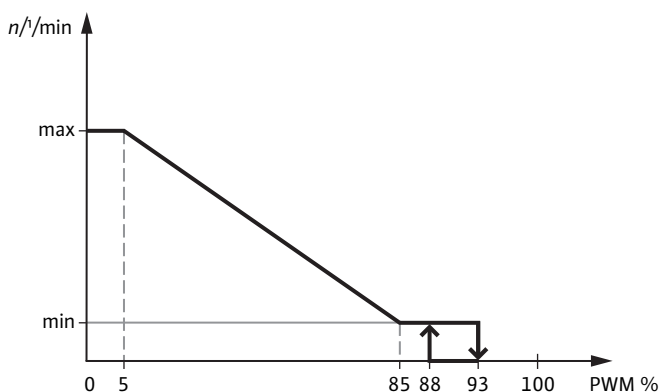


Recommended for systems with fixed system resistance requiring a constant volume flow. The control keeps the set speed constant, irrespective of the pumped volume flow.

PWM in type 1

In PWM 1 mode, the pump speed is controlled depending on the PWM input signal. Behaviour when a cable breaks:

If the signal cable is disconnected from the pump, e.g. due to a cable break, the pump accelerates to maximum speed.

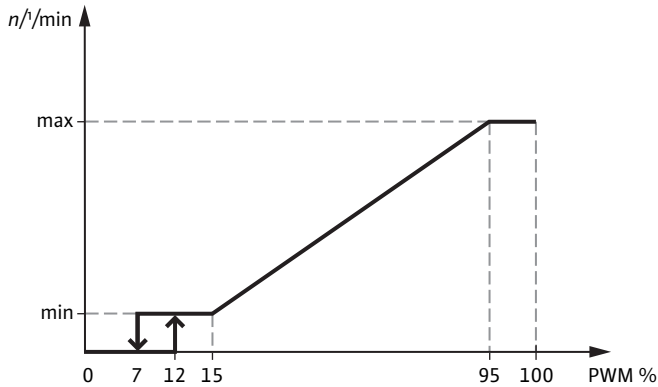


PWM 1 signal input (%)	Pump reaction
< 5	Pump runs at maximum speed.
5 ... 85	The speed of the pump decreases linearly from n_{max} to n_{min} .
85 ... 93 (operation)	Pump runs at minimum speed (operation).
85 ... 88 (starting)	Pump runs at minimum speed (starting).
93 ... 100	Pump stops (standby).

PWM in type 2

In PWM 2 mode, the pump speed is controlled depending on the PWM input signal. Behaviour when a cable breaks:

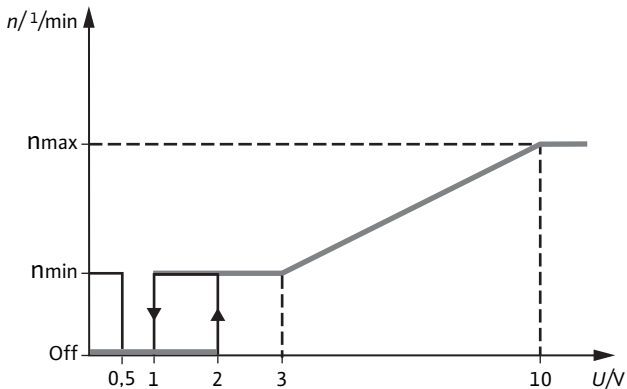
If the signal cable is disconnected from the pump, e.g. due to a cable break, the pump stops.



PWM 2 signal input (%)	Pump reaction
< 7	Pump stops (standby).
7 ... 15 (operation)	Pump runs at minimum speed.
12 ... 15 (starting)	Pump runs at minimum speed.
15 ... 95	The speed of the pump increases linearly from n_{\min} to n_{\max} .
> 95	Pump runs at maximum speed.

Control input "Analogue In 0 ... 10 V" with cable break function

The pump is controlled according to an analogue signal in the range of 0 ... 10 V. Behaviour when a cable breaks: If the signal cable is disconnected from the pump, e.g. due to a cable break, the pump reduces to minimum speed.

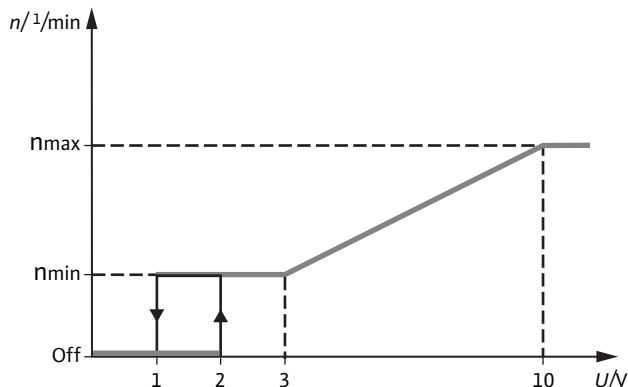


Analogue signal input (V)	Pump reaction
< 0,5	Pump runs at minimum speed (emergency operation).
0,5 ... 1	Pump stops.
1 ... 3 (operation)	Pump runs at minimum speed.

Analogue signal input (V)	Pump reaction
2 ... 3 (starting)	Pump runs at minimum speed.
3 ... 10	The speed of the pump increases linearly from n_{\min} to n_{\max} .

Control input “Analogue In 0 ... 10 V” without cable break function

The pump is controlled according to an analogue signal in the range of 0 ... 10 V. Behaviour when a cable breaks: If the signal cable is disconnected from the pump, e.g. due to a cable break, the pump stops.



Analogue signal input (V)	Pump reaction
< 1	Pump stops.
1 ... 3 (operation)	Pump runs at minimum speed.
2 ... 3 (starting)	Pump runs at minimum speed.
3 ... 10	The speed of the pump increases linearly from n_{\min} to n_{\max} .

Collective fault signal SSM

Faults always result in the activation of the collective fault signal “SSM” via a relay. The contact of the collective fault signal (potential-free normally closed contact) can be connected to the system for the purpose of registering any error messages that may occur.

The internal contact is closed if the pump is without power, if there is no fault or if there is a malfunction of the control module.

The internal contact is open if the pump detects a fault.

The detailed behaviour of the SSM function is described in the section “Faults, causes and remedies”.

7 Installation and electrical connection



DANGER

Risk of fatal electrical shock!

Exclusively carry out any work on the pump/system after it has been de-energised!



WARNING

Risk of fatal electrical shock!

The cover of the control module must never be opened.
Opening the control module will invalidate the warranty.



DANGER

Risk of fatal electrical shock! Generator or turbine operation during pump flow!

Even without the module (without electrical connection), there may be dangerous contact voltage at the motor contacts.

- Avoid flow in the pump during dismantling/installation work!
- Close the existing shut-off devices in front of and behind the pump!
- If no shut-off devices are fitted, drain the system!



WARNING

Danger of injury!

Only carry out work on the pump/system using suitable tools and once it has come to a standstill.



WARNING

Hot surface!

The entire pump can become very hot. There is a risk of burns!

- Allow the pump to cool down before commencing any work!

7.1 Installation

7.1.1 Preparing the installation

May only be installed by qualified installers.

Observe the following points before installation:

Installation within a building:

- Install the pump in a dry, well-ventilated, frost-free room.

Installation outside a building (outdoor installation):

- Install the pump in a chamber with cover or in a cabinet/housing as weather protection.
- Avoid exposure of the pump to direct sunlight.
- Protect the pump against rain.

- Keep the motor and electronics continually ventilated to avoid overheating.
- The permitted fluid temperatures and ambient temperatures should not be exceeded or undershot.
- Choose an installation point that is easily accessible.
- Observe the pump's permitted installation position (Fig. II).

CAUTION

An incorrect installation position may damage the pump!

- Select the installation point in line with the permissible installation positions (Fig. II).
- The motor must always be installed horizontally.
- Install shut-off devices upstream and downstream of the pump to facilitate pump replacement.
- Align the upper shut-off device laterally.

CAUTION

Leaking water may damage the control module!

- Align the upper shut-off valve such that leaking water cannot drip onto the control module.
- If the control module is sprayed with liquid, the surface must be dried off.
- When installing in the feed of open systems, the safety supply must branch off upstream of the pump (EN 12828).
- Carry out all welding and soldering work prior to the installation of the pump.
- Flush the pipeline system.

CAUTION

Contamination from the pipeline system can destroy the pump during operation!

- Before installing the pump, flush the pipeline system.
- Do not use the pump to flush the pipeline system.

7.1.2 Pump installation



WARNING

Risk of fatal injury from magnetic field!

Risk of fatal injury for people with medical implants (e.g. pacemakers) due to permanent magnets installed in the pump.

- Follow the general behavioural guidelines that apply to handling electrical devices!
- The motor must never be removed!



NOTICE

The magnets inside the motor do not pose a danger provided the motor is completely assembled.



WARNING

Incorrect installation can result in personal injury!

There is a risk of injury due to the pump/motor falling!
There is a risk of crushing!

- If necessary, use suitable lifting gear to secure the pump/motor against falling!
- When the pump needs to be transported, it may be carried only by the motor/pump housing. Never by the control module or cable!

CAUTION

Incorrect installation can result in material damage!

- Installation is to be carried out by qualified personnel only!
- Observe national and regional regulations!

The following information should be taken into consideration when installing the pump:

- **Observe the direction of flow!** The arrow-shaped flow indicator on the pump housing must point in the direction of flow.
- Install with glandless motor (Fig. 1, Item 2) horizontal, without mechanical tension.

Installation steps for a threaded pipe union pump

1. Close the shut-off valves in front of and behind the pump.
2. Place gaskets in the screwed connections.
3. Use an open-end wrench to secure the pump against twisting and screw tightly to piping.
4. Open the shut-off valves in front of and behind the pump.
5. Check impermeability.

Installation steps for a flange-end pump

1. Close the shut-off valves in front of and behind the pump.
2. Insert the pump into the pipe together with two suitable flat gaskets in such a way that the flanges can be screwed to the pump inlet and outlet.
3. Screw the flanges together in a crosswise manner, in two steps using suitable screws and washers. Observe specified tightening torques!
4. Open the shut-off valves in front of and behind the pump.
5. Check impermeability.

Screws and tightening torques

Flange-end pump PN 6	DN 32 and DN 40	DN 50 and DN 65
Screw diameter	M 12	M 12
Strength class	≥ 4.6	≥ 4.6
Tightening torque	40 Nm	40 Nm
Screw length	≥ 55 mm	≥ 60 mm

Flange-end pump PN 10	DN 32 and DN 40	DN 50 and DN 65
Screw diameter	M 16	M 16
Strength class	≥ 4.6	≥ 4.6
Tightening torque	95 Nm	95 Nm
Screw length	≥ 60 mm	≥ 65 mm

7.1.3 Insulation of the pump in heating systems

Thermal insulation shells (optional accessories) are only permissible in heating applications with fluid temperatures from +20 °C, since these thermal insulation shells are not diffusion-proof when enclosing the pump housing.

Fix thermal insulation shell before commissioning the pump:

- Fit the two half-shells of the thermal insulation and push them together so that the guide pins engage in the opposing holes.



WARNING

Risk of burns from hot surfaces!

The entire pump can become very hot. When retrofitting the insulation during ongoing operation, there is a risk of burns!

- Allow the pump to cool down before commencing any work.

CAUTION

Insufficient heat dissipation and condensate may damage the control module and glandless motor!

- Do not thermally insulate the glandless motor.
- Ensure all condensate drain openings (Fig. I, Item 3) are kept free.

7.1.4 Insulation of the pump in cooling systems

Use in air-conditioning systems, cooling systems, geothermal systems and similar systems with fluid temperatures down to below 0 °C. Condensate can form on fluid-conveying parts, e.g. pipes and pump housing.

- A diffusion-proof insulation must be provided by the customer for application in such systems (e.g. Wilo Cooling Shell).

CAUTION

Electrical defect!

Condensate that accumulates in the motor can cause an electrical defect.

- Insulate the pump housing only up to the separating gap to the motor!
- Keep the condensate drain grooves unobstructed to ensure that condensate that develops in the motor can drain off unobstructed!

7.2 Electrical connection

- Electrical work: a qualified electrician must carry out the electrical work.



DANGER

Risk of fatal electrical shock!

Before carrying out any work, switch off the power supply and secure it against being switched on again.

Never open the control module (Fig. 1, Item 5) and never remove any operating elements. Work on the pump may only be started after 5 minutes have elapsed due to the dangerous residual contact voltage.

Check whether all connections (including potential-free contacts) are voltage-free.

Do not operate the pump if the control module/cable is damaged.

If adjustment and operating elements on the control module are removed without authorisation, there is a risk of electric shock if internal electrical components are touched.

CAUTION

Material damage caused by improper electrical connection!

If the wrong voltage is applied, the control module can be damaged!

- The current type and voltage of the mains connection must correspond to the specifications on the rating plate!
- Control via triacs/semiconductor relay is not permitted!
- When conducting insulation tests with a high voltage generator, the pump must be disconnected from the mains at all poles in the system's switch cabinet.

7.2.1 Mains supply


- Only operate the pump with sinusoidal AC voltage, 1~230 V 50/60 Hz, DIN IEC 60038.
- A motor protection switch supplied by the customer is not required.
- If a residual-current device (RCD) is used, it is recommended to use an RCD type A (pulse current sensitive). Check that the rules for the coordination of electrical operating fluid in the electrical installation are observed and, if necessary, adjust the RCD accordingly.
- When dimensioning the residual-current device, consider the number of pumps connected and their rated motor currents.
- Observe leakage current $I_{\text{eff}} \leq 3.5 \text{ mA}$ for each pump.

- If a shutdown is carried out with an on-site power relay, the following minimum requirements must be met:
 - Rated current ≥ 8 A
 - Rated voltage: 250 V AC
- Observe the switching frequency:
 - Switching on/off via mains voltage $\leq 100/24$ h
 - $\leq 20/h$ for a switching frequency of 1 min. between switching on/off via mains voltage

7.2.2 Mains cable

- The mains cable is intended for the power supply of the pump.
- The bare cable end is to be inserted in the system's switchbox. Observe cable assignment!
- Ensure that the connecting cable does not contact either the pipes or the pump.

Cable assignment

Cable	Pin	Cable colour	Assignment
	1	Brown	Live wire (L)
	2	Yellow/green	Protective earth conductor PE
	3	Blue	Neutral conductor (N)

7.2.3 Signal properties

CAUTION

Risk of material damage!

The connection of mains voltage (230 V AC) to the communication pins (PWM) will destroy the product.

- Exclusively connect the power supply to 230 V (phase to neutral conductor)!

PWM

- Signal frequency: 90 Hz – 5000 Hz (1000 Hz nominal value)
- Signal amplitude: Min. 4 V to 24.5 V (input resistance > 10 kOhm)
- Signal polarity: yes

0 ... 10 V signal

- Electric strength 30 V DC/24 V AC
- Input resistance of the voltage input > 10 k Ω

7.2.4 SSM signal properties

An integrated collective fault signal is applied as a potential-free normally closed contact.

Contact load:

- Permitted minimum: 12 V AC/DC, 10 mA
- Permitted maximum: 250 V AC, 1 A, (AC1 power factor > 0.95). 30 V DC, 1 A



DANGER

Risk of fatal electrical shock!

Improper connection of the collective fault signal (SSM) contact poses a risk of fatal injury due to electric shock!

7.2.5 Signal cable

- The bare cable end is to be inserted in the system's switchbox. Observe cable assignment!
- Ensure that the connecting cable does not contact either the pipes or the pump.

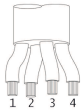
Cable assignment

2-wire cable



Pin	Cable colour	0 ... 10 V signal	PWM
1	brown	ground (GND)	ground (GND)
2	white or blue	0 ... 10 V signal	PWM input

4-wire cable



Pin	Cable colour	0 ... 10 V signal	PWM
1	brown	ground (GND)	ground (GND)
2	white (grey)	0 ... 10 V signal	PWM input
3	blue	SSM	SSM
4	black	SSM	SSM

The design of the control cable should contain the features of the following table:

Feature	Recommended value
Length for the 0 ... 10 V signal	max. 15 m
Length for the PWM signal cable	max. 3 m

8 Commissioning

- Electrical work: a qualified electrician must carry out the electrical work.
- Installation/dismantling: The technician must be trained in the use of the necessary tools and fixation materials.
- The product must be operated by persons who have been instructed on how the complete system functions.
- Prior to commissioning the pump, check that it has been installed and connected correctly.
- Ensure that the system is filled with a permissible fluid.

CAUTION

A dry run leads to bearing damage!

Ensure that a dry run of the pump is not possible!

8.1 Filling and venting

Fill and vent the system correctly. The pump rotor chamber normally vents automatically after a short time in operation.



NOTICE

Incomplete venting will lead to noises in the pump.

8.2 Setting the control mode

8.2.1 Pumps with operating button

(Fig. 1 a):

The control mode is selected with the operating button.

The following settings can be configured:



Constant differential pressure ($\Delta p-c$) setting range

Fig. 1 a, Item 9: The control mode $\Delta p-c$ is active.

The number indicates the delivery head in metres of the water column.



Variable differential pressure ($\Delta p-v$) setting range

Fig. 1 a, Item 10: The control mode $\Delta p-v$ is active.

The digit indicates the delivery head in metres of the water column at nominal flow rate.

ext. in

Setting range ext. In

Fig. 1 a, Item 8: The external control is active. The control mode depends on the technical version of the product. (See section "Equipment variants")

The following settings are possible:

- Setpoint adjustment via analogue input 0 ... 10 V.
- Setpoint adjustment via pulse-width modulation (PWM).
- Setpoint adjustment at constant speed (not externally controlled).

Factory setting

The pump is supplied with the setting mode "ext. In" as standard.

8.2.2 Pumps without operating button

(Fig. 1 b):

The pump automatically follows its external control function. The control mode depends on the technical version of the product. (See section "Equipment variants")

- Setpoint adjustment via analogue input 0 ... 10 V.
- Setpoint adjustment via pulse-width modulation (PWM).
- Setpoint adjustment at constant speed (not externally controlled).

8.3 Operation of the pump in the case of external flow

The pump can be started and operated (e.g., pumps in series connection) with positive external flow through (generator operation). The maximum value of the positive external flow rate can be up to 100% of the maximum volume flow of the installed pump.

The pump can be started and operated with negative external flow through (turbine operation). The maximum value of the negative external flow rate can be up to 30% of the maximum volume flow of the installed pump.



NOTICE

The pump may still be live even in voltage-free state. The driven rotor induces a voltage within the pump.

9 Maintenance



WARNING

Danger due to strong magnetic field

Inside the motor, there is always a strong magnetic field that can cause personal injury and material damage in the event of incorrect dismantling!

The magnetic field may cause death to persons with electronic implants (pacemakers, insulin pump etc.)!



NOTICE

When it is being disassembled, the entire pump should always be dismantled from the system. It is not permitted to remove the components (control module, motor head etc.)!

9.1 Product life cycle

The product is maintenance-free. Regular inspection every 12,000 h is recommended. The intended service life is ten years, depending on the operating conditions and the fulfilment of all the requirements in the installation and operating instructions.

9.2 Shutdown

The pump must be shut down before carrying out maintenance, repair or dismantling work.



DANGER

Electric shock!

There is a risk of fatal injury from electric shock when working on electrical devices!

- Work on electrical components may only be carried out by qualified electricians!
- Switch off the voltage on all-poles of the pump and secure against unauthorised restart!
- Always deactivate the power supply from the pump and if necessary SSM and SBM!

- Due to the presence of dangerous contact voltage, work on the module must not be started until 5 minutes have elapsed!
- Check whether all connections (even potential-free contacts) are voltage-free!
- The pump may still be live even in voltage-free state. The rotor induces a contact voltage, which is also present at the motor contacts. Close the existing shut-off devices in front of and behind the pump!
- If the control module/cable is damaged, do not operate the pump!
- In case of impermissible removal of operating and settings elements on the control module, there is a risk of electrical shock if inner electrical components are touched!

9.3 Dismantling/installation

Before any dismantling/installation operation, make sure that the “Shutdown” section has been taken into consideration!



WARNING

Risk of burns!

Incorrect dismantling/installation can result in personal injury and material damage. Depending on the operating status of the pump and the system (fluid temperature), the entire pump can get very hot. There is a severe risk of burns from simply touching the pump!

- Allow the system and pump to cool to room temperature!



WARNING

Risk of scalding!

The fluid is under high pressure and can be very hot. There is a risk of scalding due to escaping hot fluid!

- Close shut-off devices on both sides of the pump!
- Allow the system and pump to cool to room temperature!
- Drain the shut-off branch of the system!
- If no shut-off devices are fitted, drain the system!
- Follow the manufacturer's instructions and safety data sheets for possible additives in the system!



WARNING

Danger of injury!

Danger of injury caused by falling motor/pump after loosening the fastening screws.

- Comply with national regulations for accident prevention and also with the operator's internal work, company and safety regulations. If necessary, wear protective clothing and equipment!



DANGER

Risk of fatal injury!

The permanent magnet rotor inside the pump can be a danger to life for people with medical implants during dismantling.

- The motor impeller unit may only be removed from the motor housing by authorised qualified personnel!
- If the unit consisting of impeller, bearing plate and rotor is pulled out of the motor, persons with medical aids, such as cardiac pacemakers, insulin pumps, hearing aids, implants or similar are at risk. Death, severe injury and damage to property may be the result. For such persons, a professional medical assessment is always necessary!
- There is a crushing hazard! When removing the motor impeller unit from the motor, it can suddenly be pulled back into its original position by the strong magnetic field!
- If the motor impeller unit is outside the motor, magnetic objects may be suddenly attracted. This may cause bodily injury and material damage!
- Electronic devices can be impaired or damaged by the strong magnetic field of the rotor!

When assembled, the rotor's magnetic field is guided in the motor's iron core. However, there is no magnetic field outside the motor that is harmful to health or affects the motor.



DANGER

Risk of fatal electrical shock!

Even without the module (without electrical connection), there may be dangerous contact voltage at the motor contacts.

It is not permissible to dismantle the module!

10 Faults, causes and remedies

10.1 Troubleshooting

Troubleshooting must only be carried out by a qualified installer, and work on the electrical connection must only be carried out by a qualified electrician.

Faults	Causes	Remedies
Pump is not running with switched-on power supply.	Electric fuse defective.	Check the fuse protection.
Pump is not running with switched-on power supply.	Pump has no voltage.	Reconnect the voltage.
Pump makes noises.	Cavitation due to insufficient suction pressure.	Increase the system pressure within the permissible range.
Pump makes noises.	Cavitation due to insufficient suction pressure.	Check the delivery head setting and set it to a lower head if necessary.
Building does not get warm.	Heat output of the heating surfaces too low.	Increase setpoint.
Building does not get warm.	Heat output of the heating surfaces too low.	Change the control mode from $\Delta p-v$ to $\Delta p-c$.

If a fault cannot be repaired, contact a qualified specialist or the Wilo customer service.

10.2 Error messages

Faults always result in the activation of the “collective fault signal” (SSM) via a relay. In the event of a fault, the SSM contact opens.

11 Spare parts

No spare parts are available for the pumps in the Wilo-Stratos PARA-C series.

In the event of damage, the entire pump is to be replaced and returned to the manufacturer of the system in an assembled state.

12 Disposal

12.1 Information on the collection of used electrical and electronic products

Proper disposal and appropriate recycling of this product prevents damage to the environment and danger to your personal health.



NOTICE

Disposal in domestic waste is prohibited!

In the European Union this symbol may be included on the product, the packaging or the accompanying documentation. It means that the electrical and electronic products in question must not be disposed of along with domestic waste.

Please note the following points to ensure proper handling, recycling and disposal of the used products in question:

- Hand over these products at designated, certified collection points only.
- Observe the locally applicable regulations!

Please consult your local municipality, the nearest waste disposal site, or the dealer who sold the product to you for information on proper disposal. See www.wilo-recycling.com for more information about recycling.

Subject to change without prior notice!





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