ETNA®

ECP 25-8 180N and ECP 25-12 180H Series Frequency Controlled, Wet Rotor Circulation Pump User Manual

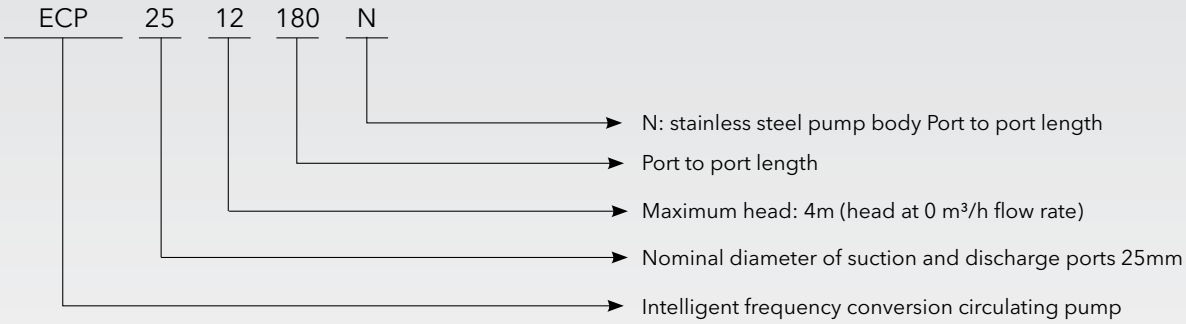
Contents

Read this manual carefully before installation.The product can not be used for medical industry because it can cause personal injury, also can not be used for pumping liquids other than water.

1. Product overview

ECP series frequency converter circulation pump (hereinafter referred to as electric pump). The electric pump is composed of four main parts: motor, pump, seal and controller. The motor is a canned motor with a permanent magnet rotor, and the drive is controlled by a special frequency converter. The pump is sealed with the motor by the shielding sleeve, and the fixed stop seal adopts 'O' shaped rubber sealing ring for static sealing. This series of electric pump is compact, light, simple and convenient in installation. It is an ideal high effiiciency and energy-saving household electric pump, widely used for tap water pressurisation, pipeline heating and other applications.

1.1 Meaning of models



1.2 Product applications

Designed for heating or cooling systems, can be used in domestic hot water circulation systems, heating, ventilation and air conditioning (HVAC) systems and other systems such as:

- Underfloor Heating Mixing System
- Air Energy Hot Water Recirculation System
- HVAC
- Boiler System
- Heat Pumps
- Micro combined heat and power (CHP)

1.3 Main features

1. Energy Efficiency Index EEI≤0.23.
2. Permanent magnet motor, frequency conversion control.
3. The controller and motor are designed as a whole, with compact structure of the whole pump and small installation size.
4. The cable is a quick-plug type, convenient for installation and maintenance.
5. Low noise, no leakage.

1.4 Conditions of use

Medium temperature: -2˚C~+110˚C.
Maximum system pressure: 10 bar.
Insulation class: F.
Rated voltage/frequency: 230V, 50/60 Hz.
Protection grade: IP44.

Note: Please note that when the ambient temperature is between 30~40˚C, and the maximum medium temperature should be used with a corresponding reduction. Additionally, to prevent condensation inside the control box or motor, it is necessary to ensure that the temperature of the pumped medium is always higher than the ambient temperature, following the requirements outlined in the table below.

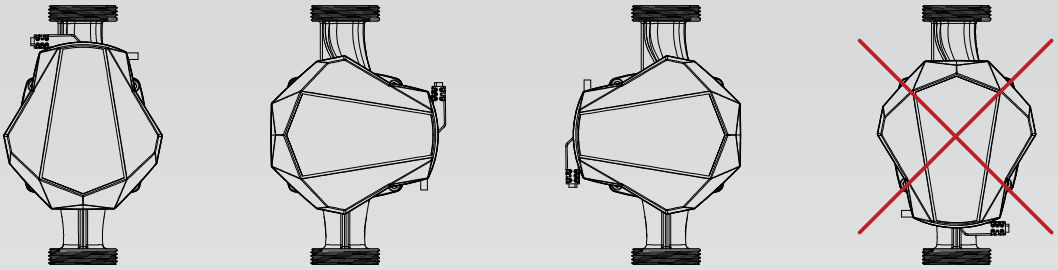
Ambient temperature (˚C)	Liquid temperature	
	Minimum (˚C)	Maximum (˚C)
0	2	110
10	10	110
20	20	110
30	30	110
35	35	90
40	40	70

1.5 Conveying medium

Heating or cooling water.
Glycol solutions with solubility ≤ 50%.
The pH value of the medium between 6.5 ~ 8.5.
The volume content of solid particles does not exceed 0.1 per unit volume, and the particle size is not larger than 0.2mm.
The mesh size of the filter shall not be less than 55 mesh.

1.6 Water pump installation requirements

The motor shaft must be parallel to the horizontal plane when the pump is installed.



Do not run without water

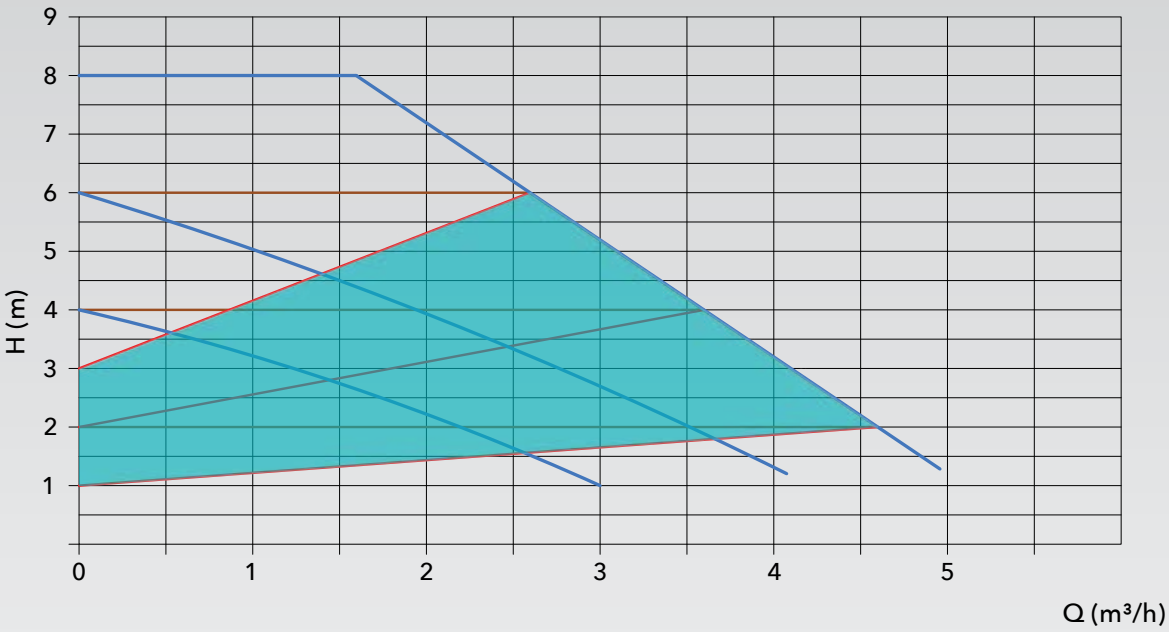
Before installing the pump, make sure the piping system is in good condition and clean, welding slag, dirt and other impurities may damage the pump The pump should be installed in a place where it is easy to be serviced and replaced.

2. Product functions

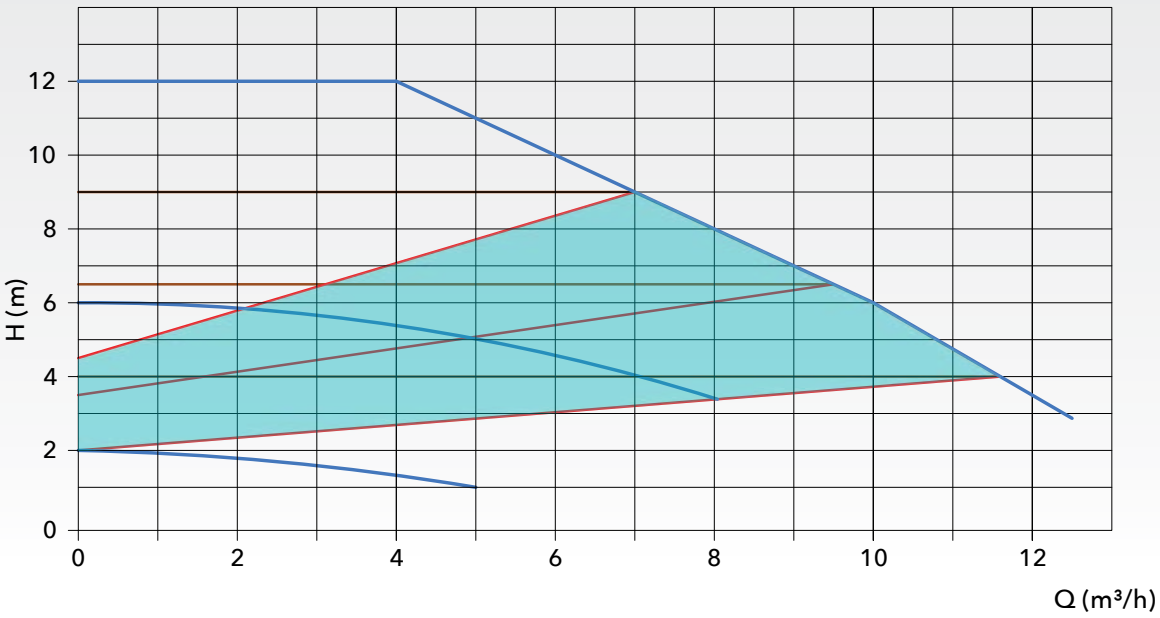
No	Function	Function description
1	Operation Mode	Proportional pressure mode, constant pressure mode, constant speed mode, PWM mode
2	Display	LED digital tube, operation mode display, fault code display, real-time power display
3	Operation	Button switching method
4	Protective functions	Over-current protection, phase failure protection, blocking protection, over-temperature protection
5	Activation	Maximum torque start,power off memory

2.1 Hydraulic performance curve

ECP 25-8-180N



ECP 25-12-180H



Model	Size	Max. head (m)	Flow (m³/h)	Power (W)
ECP 25-8-180N	1½"	8	5	80
ECP 25-12-180H	1½"	12	12.5	350

2.2 Sound pressure level

e sound pressure level of the pump depends on the power consumption. The sound pressure level is determined according to the ISO 3745 and ISO 11203 methods Q2.

Pump size	Max dB (A)
25/32-4/5/6/7/8	40
25/32-10/12	45
25/32-15/18/12H	50

2.3 PWM description

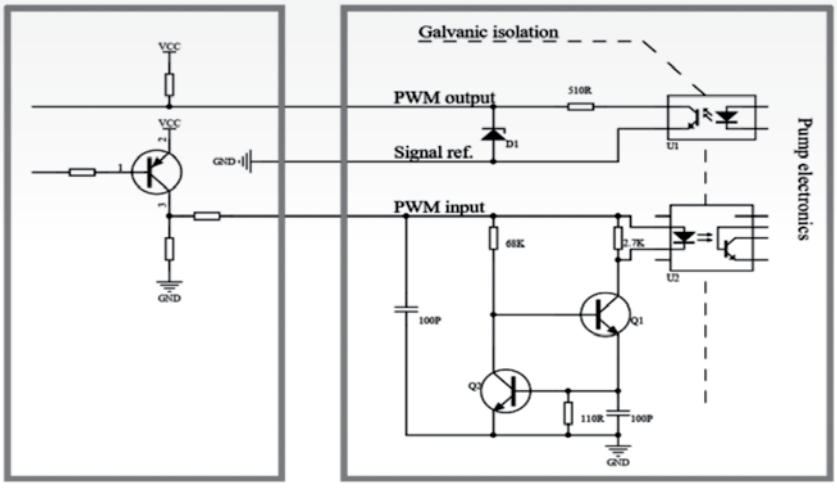
The ECP pump is controlled by a digital low-pressure pulse-width modulation (PWM) signal, which means that the rotational speed depends on the input signal.

The ECP pump can be configured for internal or external control. The rotational speed varies with changes in the input profile. These communication signals are standardized in VDMA Einheitsblatt 24244 “Wet Runner Circulation Pumps - PWM Control Signal Specification.

The PWM interface includes electronic components that connect external control signals to the pump. The interface converts external signals into types that can be understood by the microprocessor. Additionally, this interface ensures that when power is supplied to the pump, users will not encounter hazardous voltage by touching the signal lines.

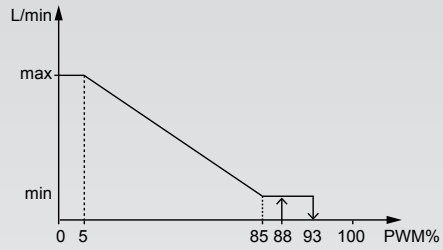
2.3.1 Control principle

When the PWM signal is connected, the operation of the circulation pump is controlled by the PWM signal. If there is no PWM signal, the operation of the circulation pump is controlled by the internal control logic.



2.3.2 PWM Input signal curve GT (Heating)

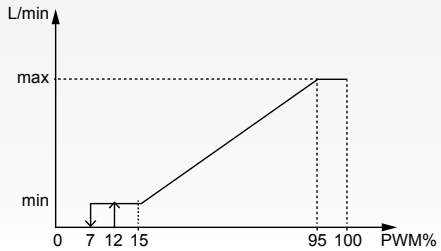
In cases where the PWM signal percentage (duty cycle) is high, fluctuations in the input signal near the shift point can prevent the pump from starting and stopping. When the PWM signal percentage is relatively low, for safety reasons, the pump operates at a higher speed. If a cable breaks in the gas boiler system, the pump will continue to run at maximum speed to transfer heat in the heat exchanger. This also applies to heat pumps, ensuring that the pump can transfer heat in the event of a cable failure.



PWM input signal (%)	Pump status
0≤PWM≤5	Maximum speed: Max.
5<PWM≤85	Variable speed: max. to min.
85<PWM≤93	Minimum speed: Min
85<PWM≤88	Hysteresis area: on/off
94<PWM≤100	Standby mode: off

2.3.3 PWM Input signal curve ST (solar energy)

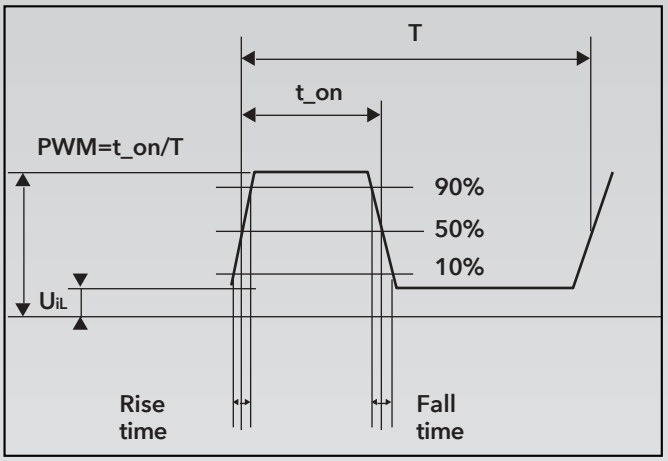
In cases where the PWM signal percentage (duty cycle) is low, fluctuations in the input signal near the shift point can prevent the pump from starting and stopping. If there is no PWM signal percentage, the pump will stop operating for safety reasons. If the signal is lost, for example due to a cable break, the pump will stop running to prevent overheating of the solar thermal system.



PWM input signal (%)	Pump status
0≤PWM≤7	Standby mode: off
7<PWM≤12	Hysteresis area: on/off
12<PWM≤15	Minimum speed: Min
15<PWM≤95	Variable speed: min. to max.
95<PWM≤100	Maximum speed: Max

2.3.4 Definition of PWM signal characteristics

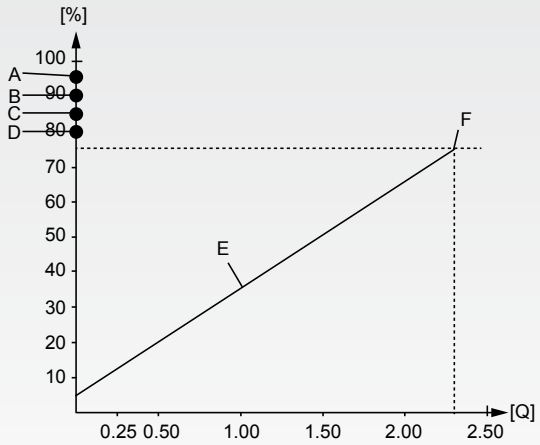
Definition of input signal characteristics	Definition of input signal characteristics	YES
	PWM Input frequency	100-5000 Hz (200 Hz normally used)
	High level input voltage UiH	4-24V
	Low level input voltage UiL	<1V
	High level input current IH	3mA-30mA
	PWM adjustable range	0-100%
	Signal cable length	<3m
	Rising edge or falling edge time	<T/1000
Definition of feedback signal characteristics	Optically coupled isolation	YES
	PWM feedback signal frequency	75 (±3) Hz
	PWM output signal accuracy	± 5W
	Maximum pull-up voltage at output pole VS	3V-24V
	Output current drive capability of output pole	1mA-2.5mA
	PWM feedback range	0-100%
	Signal cable length	<3m
	Rising edge or falling edge time	<T/500
	PWM output pull-up resistor R2	(VS-0.2)/Iout-R1



PWM waveform

2.3.5 PWM feedback signal - flow estimation (standard)

Upon request, the PWM feedback signal can also be used to display the pump flow rate for specific pump housings (such as cast iron directly connected pumps) with a head of over 1 meter. The accuracy of the feedback signal depends on the medium, medium temperature, and operating point, but it can indicate the actual flow rate (see the figure below).



POS.	Description
A:95	Alarm stop: locked-rotor, electrical fault
B:90	Alamm stop: overcurrent, speed exceeded
C:85	Alarm stop: overload,over-temperature, over-voltage, under-voltage
D:80	Warning: 0verload or overvoltage
E	Slope: 0.03285[m³/h]/%PWM
F	Saturation at 2.3[m³/h]

PWM output signal (%)	Pump info	Description
2	The water pump stops operating according to user instructions.	6
5-75	The water pump flow rate linearly increases from 0 to Qmax (m³/h), providing feedback flow information.	5
80	The water pump operation displays "Overload" or "Low Voltage" warnings.	4
85	The water pump stops when errors such as "Overload," "Over Temperature," "Over Voltage," or "Low Voltage" occur.	3
90	The water pump stops when errors such as "Over Current" or "Exceeding RPM" occur.	2
95	The water pump stops when errors such as "Rotor Lock," "Motor Fault," or "Winding Fault" occur.	1

Feedback process description:

Model	Feedback slope i value	Max flow (m³/h)	Flow calculation formula (Q: m³/h, PWMout: %)
ECP25-4-180	0.0143	2.3	Q = 0014343×2.3×(PWMout-5)

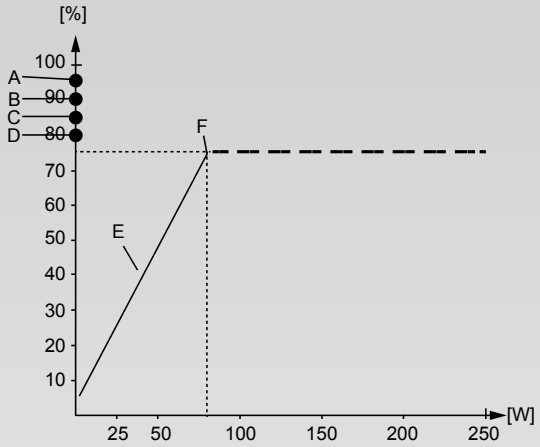
2.3.6 PWM feedback signal - Power (upon request)

The PWM feedback signal can provide pump information, such as pump details in the bus system:

- Current power consumption (with an accuracy of ± 2 for the PWM signal)
- Warnings
- Alarms
- Operating status.

Alarms

Certain PWM output signals are dedicated to alarm information, so alarm output signals can be provided. If the measured supply voltage falls below the specified voltage range, the output signal will be set to 85%. If rotor lock occurs due to deposits in the hydraulic system, the output signal will be set to 95%, as this alarm has a higher priority.



POS.	Description
A:95	Alarm stop: locked-rotor, electrical fault
B:90	Alamm stop: overcurrent, speed exceeded
C:85	Alarm stop: overload,over-temperature, over-voltage, under-voltage
D:80	Warning: 0verload or overvoltage
E	Slope: 1.142 [W]/%PWM
F	Saturation at 80[W]

PWM output signal (%)	Pump info	Description
2	The water pump stops operating according to user instructions.	6
5-75	The water pump flow rate linearly increases from 0 to Qmax (m^3/h), providing feedback flow information.	5
80	The water pump operation displays "Overload" or "Low Voltage" warnings.	4
85	The water pump stops when errors such as "Overload," "Over Temperature," "Over Voltage," or "Low Voltage" occur.	3
90	The water pump stops when errors such as "Over Current" or "Exceeding RPM" occur.	2
95	The water pump stops when errors such as "Rotor Lock," "Motor Fault," or "Winding Fault" occur.	1

Feedback process description:

Model	Feedback slope i value	Power (W)	Power calculation formula (P: W, PWMout: %)
ECP25-4-180	0.0143	80	P = 0.0143×80×(PWMout-5)

The maximum values are defined in the table below:

Model	Max.flow	Power
ECP 25-8-180N	5	80
ECP 25-12-180H	12.5	350

Low / over voltage protection considerations:

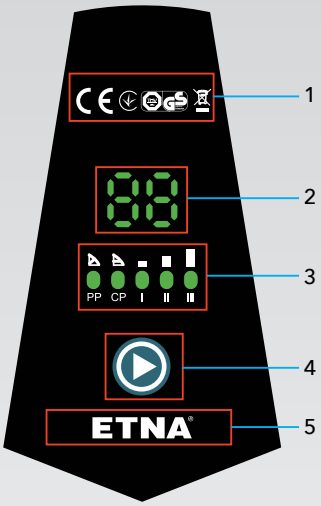
The accuracy range for low / over voltage protection voltage values is ±5V.

Over Voltage Reset: When the voltage drops below 160V, the pump stops operating due to over voltage protection. It can only restart normally when the voltage resets to 185V (during dynamic voltage changes).

Over Voltage Reset: When the voltage exceeds 285V, the pump stops operating due to over voltage protection. It can only restart normally when the voltage resets to 265V (during dynamic voltage changes).

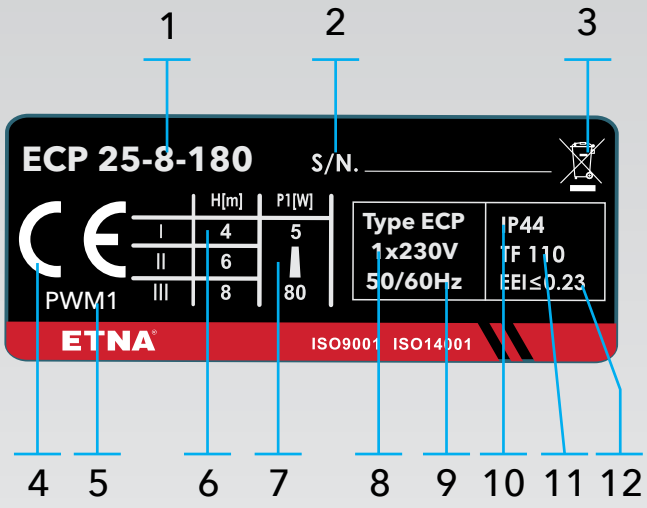
2.4 Operation and panel display

2.4.1 Operation and panel overview



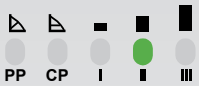
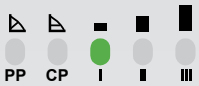
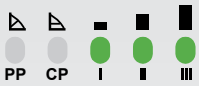
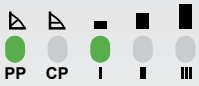
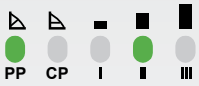
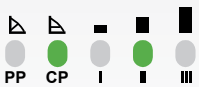
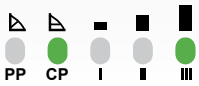
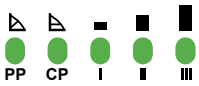
No	Name
1	Certification marks
2	Product power display
3	Power indicator
4	Buttons
5	Product brand

2.4.2 Nameplate



No	Name
1	Model
2	Serial number
3	Environmental Label
4	CE mark and approvals
5	PWM Type
6	Maximum head
7	Power range
8	Voltage(V)
9	Frequency(Hz)
10	Enclosure protection grade
11	Maximum medium temperature
12	Energy Efficiency Index, EEI

2.4.3 Operating instructions

Press	Light display	Function
0		Constant speed III
1		Constant speed II
2		Constant speed I
3		AUTO
4		Proportional pressure I
5		Proportional pressure II
6		Proportional pressure III
7		Constant - pressure I
8		Constant - pressure II
9		Constant - pressure III
When PWM signal is input		PWM

2.4.4 Fault display

When the electric pump detects a fault, the LED displays the error codes in the table below.

Fault protection type	Error codes	Pump status	Remedies
Stall protection	E1	Attempts to restart, warning after failed start, pump shuts down	Please open the pump and clean the rotor
Phase loss protection	E2	Attempt to restart, warning after failed start, pump shuts down	Replace the circuit board or motor
Over temperature protection	E3	Warning, pump stops and starts after temperature recovers	Please contact the manufacturer or local service center
Hardware overcurrent protection	E4	Attempt to restart, warning after failed start, pump shuts down	Please replace the circuit board
Software overcurrent protection	E5	Attempt to restart, warning after failed start, pump shuts down	Please contact the manufacturer or local service center
Idling protection	E6	Pump shuts down	Fill water into the pipeline
Overpressure protection	E7	Pump shuts down	"Please disconnect the power supply and check the voltage"
Under-voltage protection	E8	Pump shuts down	"Please disconnect the power supply and check the voltage"

If there is a fault display, the power supply must be disconnected in order to troubleshoot. After the fault is eliminated, the power supply must be reconnected and the electric pump must be started. In the event of an abnormal power outage, the electric pump has a memory function and will automatically enter the operating mode before the power outage when power is restored.

3. Quality and safety requirements

3.1 Implementation standards

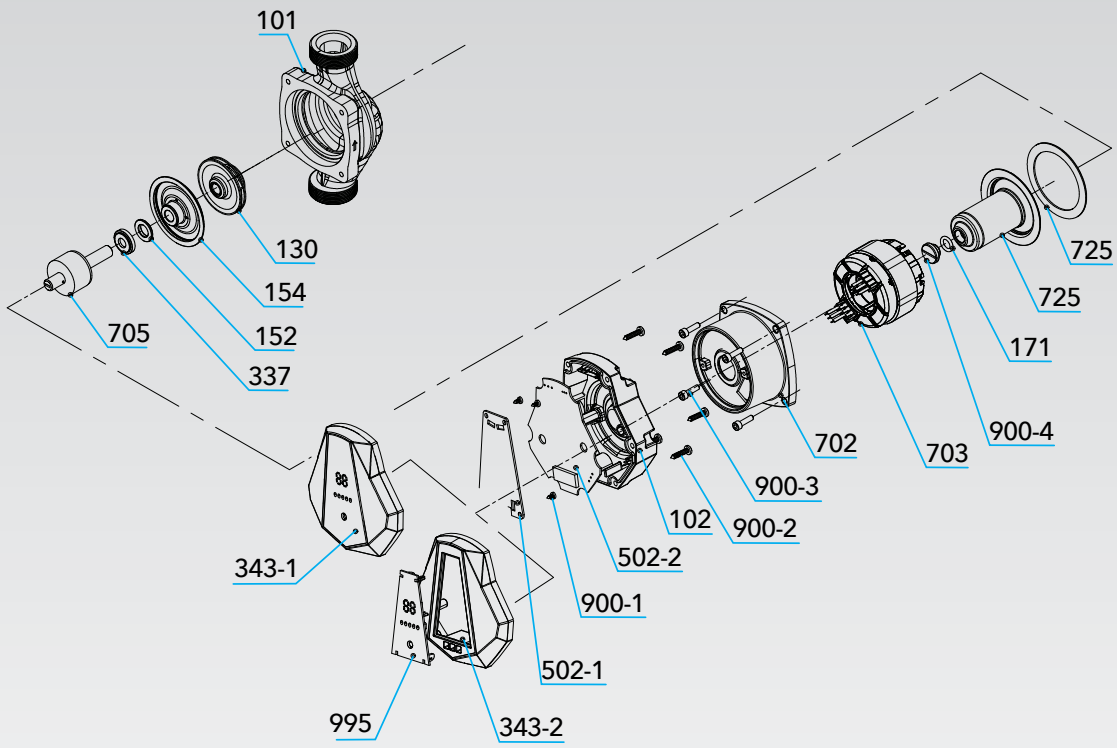
3.1.1 GB 4706.1 Safety of household and similar electrical appliances Part 1: general requirements

3.1.2 GB 4706.71 Safety of household and similar electrical appliances Particular requirements for fixed circulation pumps for heating and water supply installations

Subject	Description
Product brand	ETNA
Protection level	IP44
Temperature resistance level	Class F
CE certification	CE
Erp certification	EEI≤0.23

4. Water pump structure

ECP-4/5/6/7/8

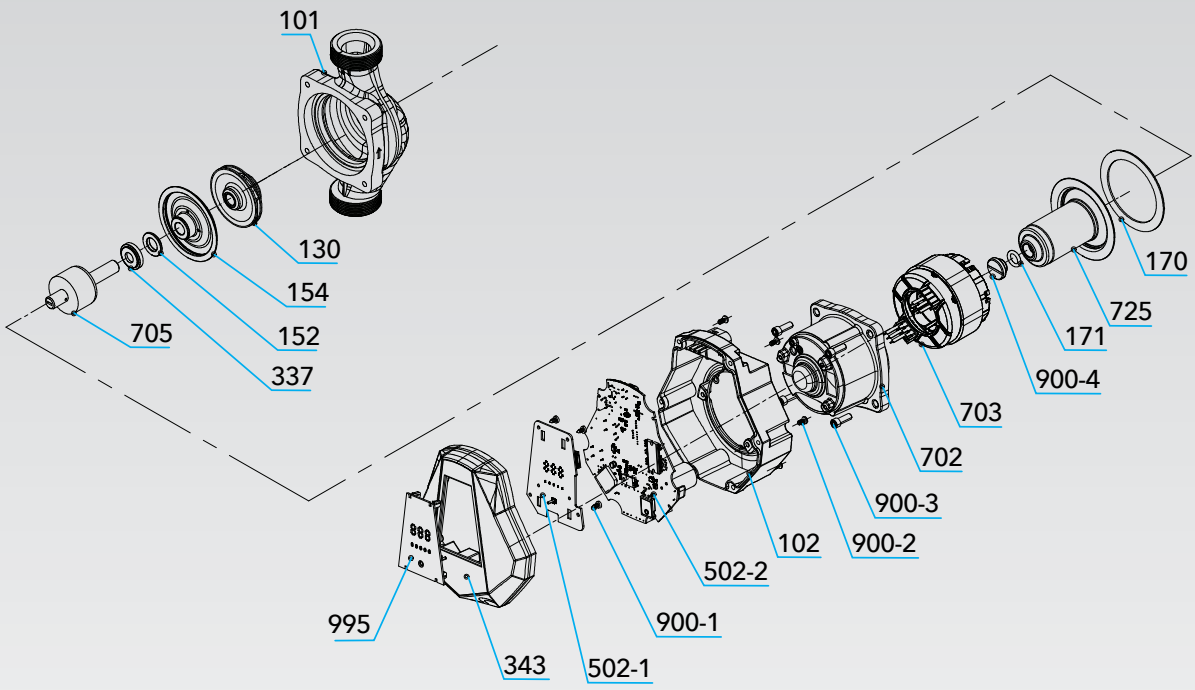


Pos.	Description in English	Q-ty
101	Pump body (Threaded)	1
102	Casing	1
130	Impeller	1
152	Thrust bearing	1
154	Bearing plate	1
170	Gasket	1
171	O ring	1

Pos.	Description in English	Q-ty
337	Thrust bearing iron ring	1
343-1	Cover A	1
343-2	Cover B	1
502-1	Control panel	1
502-2	Drive board	1
702	Motor case	1
703	Electronic stator assembly	1

Pos.	Description in English	Q-ty
705	Motor rotor assembly	1
725	Shield sleeve	1
900-1	Hexagon socket head cap screw	4
900-2	Phillips pan head screw	4
900-3	Hexagon socket head cap screw	4
900-4	Vent cock	1
995	Button plate	1

ECP-10/12/15/18

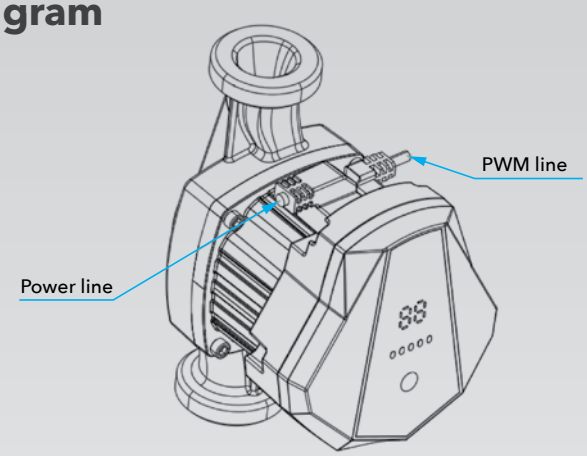


Pos.	Description in English	Q-ty
101	Pump body (Threaded)	1
102	Casing	1
130	Impeller	1
152	Thrust bearing	1
154	Bearing plate	1
170	Gasket	1
171	O ring	1

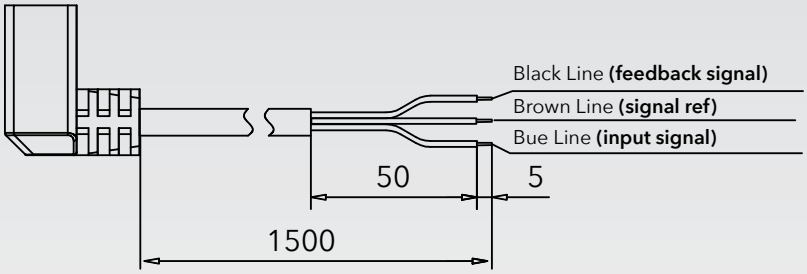
Pos.	Description in English	Q-ty
337	Thrust bearing iron ring	1
343	Terminal box cover	1
502-1	Control panel	1
502-2	Drive board	1
702	Motor case	1
703	Electronic stator assembly	1
705	Motor rotor assembly	1

Pos.	Description in English	Q-ty
725	Shield sleeve	1
900-1	Hexagon socket head cap screw	4
900-2	Phillips pan head screw	4
900-3	Hexagon socket head cap screw	4
900-4	Vent cock	1
995	Button plate	1

5. Wiring diagram



Cable harness specification: 3*0.5 mm²



The brown wire of the PWM signal line is connected to the SGND mark (ground) of the control board, the blue wire is connected to the IN mark (input), and the black wire is connected to the OUT (output)

6. Usage Instructions

1. Before installing the electric pump, check whether the pipeline system is connected reliably and ensure that impurities, welding slag, dirt, etc. in the pipeline have been cleaned;

2. The electric pump should be installed in a dry and ventilated place to prevent moisture, short circuit or water splashing, and the installation should be convenient for future maintenance and replacement;

3. When the electric pump is installed outdoors, a protective cover should be added, and when installed indoors, it should be prevented from being splashed by water to avoid electric shock. Do not install it in the bathroom to prevent water vapor or water from entering the junction box and causing leakage;

4. In order to facilitate the maintenance of the electric pump in the future, it is recommended to install independent shut-off valves at the water inlet and outlet of the electric pump;

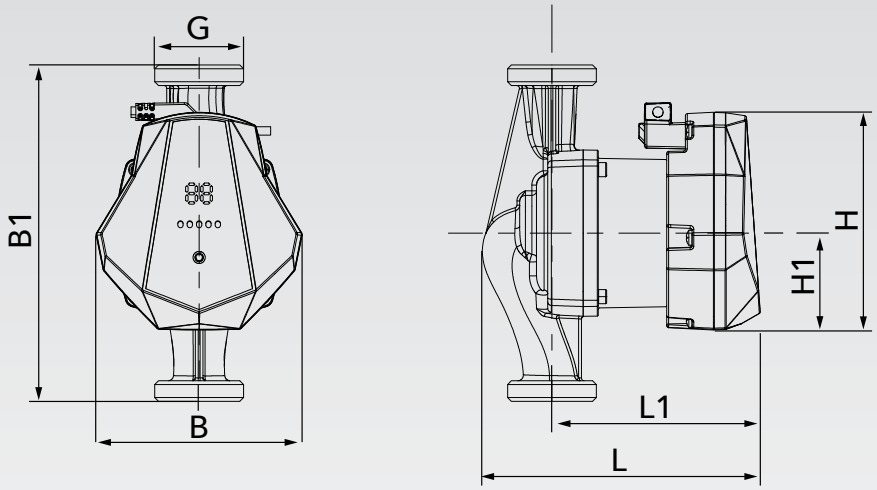
5. When the electric pump supplies water to the supporting heating system, do not touch the electric pump and its pipeline with your hands to avoid burns;

6. The power plug should be strictly grounded, and the grounding pin of the plug should be reliably connected to the grounding hole of the power socket. The power grounding plug must not be changed without authorization;

7. When the electric pump is working, if you want to adjust the position of the electric pump or touch the electric pump, you must first cut off the power supply to prevent accidents;

8. In winter, the ambient temperature is lower than At 0°C, if the electric pump stops running, the water in the piping system should be drained to avoid freezing and cracking of the pump body.

Appendix A: pump dimensions



Pump type	Dimensions (mm)						
	B	B1	H	H1	L	L1	G
ECP 25-8-180N	110	180	116.5	52	149	111.5	1½"
ECP 25-12-180H	148.5	180	157	66.7	208	155.5	1½"

7. Warranty Terms

The warranty period of ECP-F series circulation pump is 2 (two) years from the date of purchase. During the warranty period, free repair and maintenance service will be provided for malfunctions caused by manufacturing defects. Failures caused by operating conditions will also provide paid service.

1. Malfunctions caused by operating conditions.

2. Damages caused by installation pollution.

3. Faults caused by faulty wiring or unsuitable power supply.

4. Disassembly or intervention of the product outside the authorised service.

5. Failures caused by improper installation shall be considered outside the scope of warranty

Notes

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Dudullu Organize Sanayi Bölgesi 2. Cadde No: 14
34775 Ümraniye - İstanbul / Turkey
Tel : +90 216 561 47 74 (Pbx) • Fax : +90 216 561 47 50
www.etna.com.tr/en • info@etna.com.tr

ETNA®

0850 455 38 62
customer service