ecocirc XL
ecocirc XLplus

ELECTRONIC DRIVE MANUAL

1 Introduction

The electronic drive described in this manual controls both *ecocirc XL* and *ecocirc XLplus* circulators; the drive's main features are:

- sensorless motor control
- sine wave modulated PWM
- 2 micro-controllers:
  one dedicated to motor control
  one implementing the following features:
  - several operating and control modes
  - night mode operation
  - 0-10V analog input signal control
  - PWM input signal control[1]
  - 4-20mA pressure sensor control
  - external temperature sensor control[2]
  - external start/stop signal control
  - fault signal control
  - connection to Modbus control systems[2]
  - connection to Bacnet control systems[3]
- multiple alarms and errors detection and control
- multiple pump status indication
- optional Wireless module control[2]
- optional RS485 module control[2]

In the next chapters, a detailed description of *ecocirc XL* family drives' features will follow.

[1] Only on plug-connected models, see 1.1
[2] Only on *ecocirc XLplus*
[3] Only on *ecocirc XLplus* terminal-connected models, see 1.1

1.1 Product Range

Circulator model	Options	Electrical connection
ecocirc XL/XLplus 25-40	(B)	Plug
ecocirc XL/XLplus 25-60	(B)	Plug
ecocirc XL/XLplus 25-80	-	Terminal
ecocirc XL/XLplus 25-100	-	Terminal
ecocirc XL/XLplus 32-40	(B)	Plug
ecocirc XL/XLplus 32-60	(B)	Plug
ecocirc XL/XLplus 32-80	(F) (B)	Terminal
ecocirc XL/XLplus 32-100	(F) (B)	Terminal
ecocirc XL/XLplus 32-120 F	(D) (B)	Terminal
ecocirc XL/XLplus 40-80 F	(D)	Terminal
ecocirc XL/XLplus 40-100 F	(D)	Terminal
ecocirc XL/XLplus 40-120 F	(D) (B)	Terminal
ecocirc XL/XLplus 50-80 F	(D) (B)	Terminal
ecocirc XL/XLplus 50-100 F	-	Terminal
ecocirc XL/XLplus 50-120 F	(D) (B)	Terminal
ecocirc XL/XLplus 65-80 F	(D) (B)	Terminal
ecocirc XL/XLplus 65-120 F	(D) (B)	Terminal
ecocirc XL/XLplus 80-120 F	(D)	Terminal
ecocirc XL/XLplus 100-120 F	-	Terminal

All the subsequent circulators must be considered XLplus models

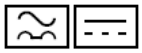
ecocirc XL 20-35	(B)	Terminal
ecocirc XL 36-45	(B)	Terminal
ecocirc XL 15-75	(B)	Terminal
ecocirc XL 55-45	(B)	Terminal
ecocirc XL 20-140	(B)	Terminal
ecocirc XL 65-130	(B)	Terminal
ecocirc XL 40-200	(B)	Terminal
ecocirc XL 70-145	(B)	Terminal
ecocirc XL 40-275	(B)	Terminal
ecocirc XL 95-125	(B)	Terminal
ecocirc XL 27-375	(B)	Terminal
ecocirc XL 105-155	(B)	Terminal
ecocirc XL 45-340	(B)	Terminal

B = Bronze
F = Flanged
D = Twin

2 Electrical installation

Power Supply: 1 x 230V ±10%, 50/60Hz

Check that the power supply line is provided with:

- A mains isolator switch with a contact gap of at least 3mm
- A high-sensitivity (HS) 30mA differential switch (**RCD** – Residual Current Device), suitable for earth fault currents with DC or pulsating DC content (preferably Type B). 
- If an automatic circuit breaker (**CB**) is required, use an automatic circuit breaker with C-type characteristic curve.

ecocirc XL / XLplus	Voltage rating	Nominal max input current	Recommended line protection
		[A]	[A]
25-80 25-100 32-80 32-100 40-80 40-100 50-100 36-45 15-75	1~ 230V 50/60Hz	<2	3
32-120 40-120 50-80 65-80 55-45	1~ 230V 50/60Hz	<3	4
50-120 65-120 65-130	1~ 230V 50/60Hz	<5	6
80-120 100-120 70-145	1~ 230V 50/60Hz	<9	10

Table 1

2.1 Power Supply connection

For plug-connected models, see *Figure 6* and follow the subsequent steps:

1. Open the connector cover and insert the cable inside the cable gland
2. Pull down the contact retention spring
3. Connect the cable according to the wiring diagram
4. Align the two parts of the connector
5. Push the two parts one inside the other
6. Close the connector and tight carefully the cable gland

For terminal-connected models, see *Figure 5* and follow the subsequent steps:

1. Open the terminal block cover removing the screws
2. Insert the cable inside the M20 cable gland
3. Connect the cable according to the wiring diagram (see *Figure 7* and *Figure 9*)
   a. Connect the ground (earth) lead; be sure that the ground (earth) lead is longer than the phase leads
   b. Connect the phase leads

For cable requirements and organization of wiring harness inside the cable glands, refer to par. *2.3 Wiring harness*.

2.2 I/O connection

1. Open the terminal block removing the screws
2. Connect the appropriate cable according to the terminal block diagram. See *Figure 8*, *Figure 9* and the requirements of par. *2.3* and *2.4*.

2.3 Wiring harness

For plug-connected models

	Plug connector	M12 (1) Cable Ø 2÷5mm	M12 (2) Cable Ø 2÷5mm
Power supply	3x 0.75÷1.5 mm^2 (2P+T)		
Fault signal		2x 0.75÷1.5 mm^2	
– Analog 0-10V – External pressure sensor – External temperature sensor – External start/stop		*If NO fault signal on this cable gland*. Multi-wire control cable, number of wires according to number of control circuits. Shielded if necessary	Multi-wire control cable, number of wires according to number of control circuits. Shielded if necessary
Communication bus			Bus cable

Table 2

For terminal-connected models

	M20 Cable Ø 5÷13mm	M16 (1)	M16 (2)
Power supply	3x 0.75÷2.5 mm^2 (2P+T)		
– Power supply – Fault signal	5x 0.75÷1.5 mm^2 (4P+T)		
Fault signal		2x 0.75÷1.5 mm^2	

– Analog 0-10V – External pressure sensor – External temperature sensor – External start/stop		*If NO fault signal on this cable gland*. Multi-wire control cable, number of wires according to number of control circuits. Shielded if necessary	Multi-wire control cable, number of wires according to number of control circuits. Shielded if necessary
Communication bus			Bus cable

Table 3

2.4 Connection diagram

With reference to *Figure 8* and *Figure 9*:

Function	Terminal pair	Contact rating	See par.
External start/stop	⑪⑫	The drive provides 5VDC through these terminals: *no external voltage must be provided!*	2.5.1
0-10V external analog input	⑦⑧		2.5.2
Fault signal	④⑤	Max 250V at 2A (inductive load)	2.5.3
4-20mA pressure sensor input	⑨⑩		2.5.4
External temperature sensor[4]	⑬⑭	The drive works with a KTY83 temperature sensor (1KΩ at 25°C)	2.5.5
Communication bus (standard)[4]	⑮⑯⑰	TIA/EIA RS485	2.5.6
Communication bus (optional)[4]	⑱⑲⑳	TIA/EIA RS485	2.5.7
Optional Wireless / RS485 module	㉑		2.5.8

Table 4

2.5 I/O description

2.5.1 External start/stop [⓫⓬]

The circulator can be started or stopped via an external potential-free contact or a relay connected to terminals ⑪ and ⑫. If no external start/stop switch is connected, the connection jumper between terminals ⑪ and ⑫, which is the factory setting, should be maintained.

NOTICE

The drive provides 5VDC through these terminals: no external voltage must be provided to these terminals!

2.5.2 External analog input 0-10V [❼❽]

An external analog signal 0-10V, applied to terminals ⑦ and ⑧, controls the circulator speed in a range from 0 to 100%, following a linear function as depicted in *Figure 1*.

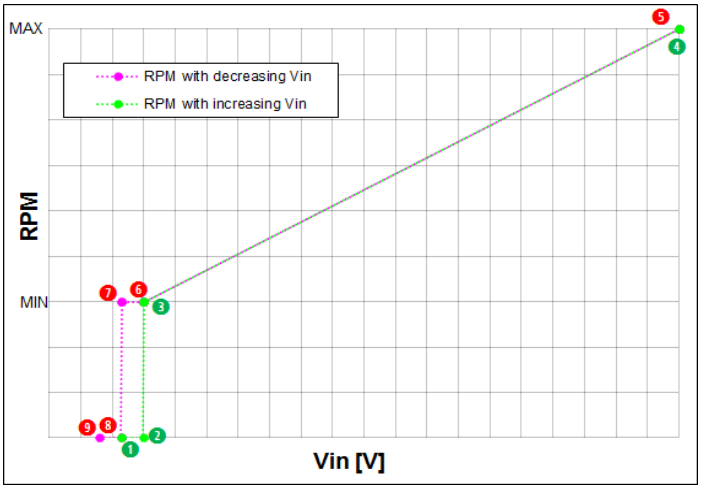


Figure 1

In the below table a description of the milestones shown in *Figure 1.*

V_{in} thresholds [V]	Speed setpoint [rpm] when $V_{in}\Uparrow$	Pump status when $V_{in}\Uparrow$	Point	Speed setpoint [rpm] when $V_{in}\Downarrow$	Pump status when $V_{in}\Downarrow$	Point
0	-	Input disabled	-	-	Input disabled	-
0.8	-	Input disabled	-	0	OFF	❾
1.19	-	Input disabled	-	0	OFF	❽
1.20	0	OFF	❶	MIN	RUN	❼
1.49	0	OFF	❷	MIN	RUN	
1.50	MIN	RUN	❸	MIN	RUN	❻
10.0	MAX	RUN	❹	MAX	RUN	❺

Table 5

2.5.3 Fault signal [❹❺]

The drive controls a relay for a potential-free fault signal: in case of blocking error, the relay is activated so that the terminals ④ and ⑤ are short circuited.

RATINGS

V_{max} < 250VAC
I_{max} < 5A (if resistive load)
I_{max} < 2A (if inductive load)

[4] Only on *ecocirc XLplus*

2.5.4 External analog input 4-20mA [⑨⑩]

The circulator can be equipped with a 4-20mA external differential pressure sensor, connected to terminals ⑨ and ⑩, with the purpose of increasing the precision in operating modes involved with pressure regulation.
For setting, in the drive, the correct pressure sensor model used, see par. 4.3.5.3.

2.5.5 External temperature sensor [⑬⑭]

The circulator can be equipped with an external KTY83 temperature probe (1KΩ at 25°C), connected to terminals ⑬ and ⑭, with the purpose of measuring an absolute or a differential water temperature, in temperature dependent / influenced operating modes.
For setting, in the drive, the desired temperature-dependent control mode, see par. 6.1.2

2.5.6 Communication bus (standard) [⑮⑯⑰]

The circulator (model *ecocirc XLplus* only) can communicate remotely through a built-in RS485 port, whose characteristics are:

Interface	RS485 (TIA/EIA) optically isolated
Baud rate	4800 / 9600 (factory setting) / 14400 / 19200 / 38400 / 56000 / 57600 baud
Data format	8 data bits, no parity, 1 stop bit
Protocol	Modbus RTU (factory setting) Bacnet MSTP[5]
Address	1÷247 Modbus RTU 0 ÷ 127 Bacnet MSTP[5] ID #1 factory setting

For setting, in the drive, the correct communication parameters, see par. 4.3.5.2.

NOTICE
This communication bus, implemented on terminals ⑮, ⑯ and ⑰, is the only one which can be used for connecting 2 pumps in dual pump operations (see par. 4.3.5.1)

2.5.7 Communication bus (optional) [⑱⑲⑳]

The circulator (model *ecocirc XLplus* only) can communicate remotely through an optional RS485 port, available exclusively in case the optional Wireless module or the optional RS485 module is installed; main characteristics of this port are:

Interface	RS485 (TIA/EIA) not isolated
Baud rate	4800 / 9600 (factory setting) / 14400 / 19200 / 38400 / 56000 / 57600 baud
Data format	8 data bits, no parity, 1 stop bit
Protocol	Modbus RTU (factory setting) Bacnet MSTP
Address	1÷247 Modbus RTU 0 ÷ 127 Bacnet MSTP[5] ID #1 factory setting

The aim of this additional communication bus is to offer a connection to an external BMS, or to a generic external device, even when the standard communication bus (described in 2.5.6) is used for dual pump operations (in case of a twin-head pump or 2x single-head pumps)

NOTICE
Don't use this communication bus, implemented on terminals ⑱, ⑲ and ⑳, for connecting 2 pumps in dual pump operations

2.5.8 Optional wireless / RS485 module [㉑]

The drive can be equipped with
- an optional Wireless module;
- an optional RS485 module

Both the modules shall be plugged inside the drive (see *Figure 12*), fixed by the provided clips and with the cable connected to the connector ㉑ (see par. 6.2 and 6.3).

2.6 Settings priority

All the I/O signals, described in 2.5, can interact together changing the behavior of the circulators they are connected to: in particular, in case two or more signals are enabled and active at the same time, the circulator will operate according to the setting with the highest priority.
Refer to the table below for the settings priority:

Priority	Possible settings			
	User Interface	**External Start/Stop**	**External 0-10V**	**Bus signal**
1		Stop		
2			Regulation	
3			Stop	
4				Regulation
5				Stop
6	Regulation			
7	Stop			

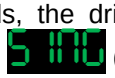
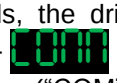
EXAMPLE 1
In case the external start/stop switch is open or unconnected (External Start/Stop = Stop), the drive shall not accept any regulation.

EXAMPLE 2
The circulator can be driven through the User Interface only if no external signals are applied (to the provided terminals) and no communication bus is connected

[5] Only on *ecocirc XLplus* terminal-connected models

3 First Start-up

Before operate the circulator, verify the correct connection of the wirings.

1. *Switch on the power supply to the pump*
   The drive light all the LEDs of the User Interface, to allow a quick detection of any display malfunction
2. ([6]) After few seconds, the drive will display the message  ([7]) or  ([8])
   While this message ("SIN" or "SING") is displayed, the drive gives the possibility to set the dual pump operations' parameters: if the user does not change this setting, the device will default to the factory setting (single-head pump) and proceed to the next step.
   For setting, in the drive, the correct dual pump operations' parameters see par. 4.3.5.1.
3. ([6]) After few seconds, the drive will display the message  ([7]) or  ([8])
   While this message ("COM" or "COMM") is displayed, the drive gives the possibility to set the communication parameters: if the user does not change this setting, the device will default to the factory settings (9600baud, address = 1, no optional module, Modbus RTU protocol) and proceed to the next step.
   For setting, in the drive, the correct communication parameters see par. 4.3.5.2.
4. ([9]) After few seconds, the drive will display the message  ([7]) or  ([8])
   While this message ("PRE" or "PRES") is displayed, the drive gives the possibility to set the differential pressure sensor's parameter: if the user does not change this setting, the device will default to the factory setting (differential pressure sensor 1.0bar) and proceed to the next step.
   For setting, in the drive, the correct differential pressure sensor's parameter, see par. 4.3.5.3.
5. After few seconds, the drive will display the message  ([7]) or  ([8])
   While this message ("4DG" or "4DEG") is displayed, the drive is performing the first (out of 4) cycle of the *Air Purge* procedure: if the user does not stop this procedure, the device will finalize the 4 cycles (decrementing in each sub-phase the countdown "4DG"-"3DG"-"2DG"-"1DG" or "4DEG"-"3DEG"-"2DEG"-"1DEG") and then proceed to the next step.
   To stop or start the *Air Purge* procedure, see par.4.3.4.2
6. At the end of the *Air Purge* procedure, the pump starts pumping in Constant Head control mode (factory default)
   For more information about Control Modes and relative default value, see par. 4.3.3

NOTICE
All the steps from 1 to 5 are always the same at every start-up, regardless it's the first or not.
In step 6, the starting control mode of a generic (not the first) start-up procedure is the last used before the power-off.

[6] Only on *ecocirc XLplus*
[7] On plug-connected models
[8] On terminal-connected models
[9] Only *if an external differential pressure sensor is connected to the provided terminals* (see 2.5.4)

4 Control Panel

For a description of buttons, indicators and display present on the user interface, follow the table below referring to *Figure 10* (in case of plug-connected models) and to *Figure 11* (in case of terminal-connected models).

①	Control Mode button	See par. 4.3.3
②	Control Mode indicators (LEDs)	See par. 4.3.3
③	Parameter button	See par. 4.2
④	Parameter indicators (LEDs)	See par. 4.2
⑤	Setting buttons	See par. 4.3.1
⑥	Numeric display	
⑦	Power indicator (LED)	See par. 4.1.1
⑧	Status indicator (LED)	See par. 4.1.2
⑨	Remote control indicator (LED)	See par. 4.1.3

4.1 LEDs description

4.1.1 Power indicator [⑦]

When the **Power** (green) LED is lit, the circulator is supplied with power and the electronic devices are operative

4.1.2 Status indicator [⑧]

- If the **Status** LED is not lit, then the pump is stopped or disabled and the pump motor is not running.
- If the **Status** (orange) LED is lit, then the pump is still enabled and the pump motor is running, because in presence of a non-blocking alarm
- If the **Status** (red) LED is lit, then the pump is stopped or disabled and the pump motor is not running due to a blocking error
- If the **Status** (green) LED is lit, then the pump is running

4.1.3 Remote control indicator [⑨]

This indicator is used only on *ecocirc XLplus* circulators, because it is related to the presence of any kind of communication.
The way the Remote LED is lit (permanently) or blinks, depends on several settings and conditions as below

4.1.3.1 Condition 1

If no optional wireless / RS485 module is used (referring to par. 4.3.5.2, parameter "**Module**" is set to value "None") and the protocol for the communication bus is Modbus RTU (parameter "**Protocol**" is set to value "Modbus")

- If the **Remote** LED is not lit, then the drive cannot detect any valid Modbus message on the terminals provided for the communication bus
- If the **Remote** (green) LED is permanently lit, then the drive both
  - detected a communication bus on the provided terminals
  - acknowledged the correct addressing
- If the **Remote** (green) LED is blinking with 50% duty every second, then the drive
  - detected a communication bus on the provided terminals
  - has not been correctly addressed

Particular behaviors (in this condition) for this indicator are the following

- If the **Remote** (green) LED switches from being permanently lit to being not lit, then the drive didn't detect any valid Modbus RTU message (at least) for the last 5 seconds
- If the **Remote** (green) LED switches from being permanently lit to blinking with 50% duty every second, then the drive has not been correctly addressed (at least) for the last 5 seconds

4.1.3.2 Condition 2

If no optional wireless / RS485 module is used (referring to par. 4.3.5.2, parameter "**Module**" is set to value "None") and the protocol for the communication bus is Bacnet MSTP (parameter "**Protocol**" is set to value "Bacnet")

- If the **Remote** LED is not lit, then the drive didn't receive any valid request, coming from any other Bacnet MSTP device, (at least) for the last 5 seconds
- If the **Remote** (green) LED is permanently lit, then the drive is exchanging information with any other Bacnet MSTP device

4.1.3.3 Condition 3

If the optional wireless module is used (referring to par. 4.3.5.2, parameter "**Module**" is set to value "Wireless")

- If the **Remote** LED is not lit, then the connection with the wireless module is damaged or absent
- If the **Remote** (green) LED is blinking with 10% duty every second, then the drive is exchanging information with the wireless module

4.1.3.4 Condition 4

If the optional RS485 module is used (referring to par. 4.3.5.2, parameter "**Module**" is set to value "RS485")

- If the **Remote** LED is not lit, then either
  - the connection with the RS485 module is damaged or absent
  - the drive didn't receive any valid request, coming from any other external device, (at least) for the last 5 seconds
- If the **Remote** (green) LED is blinking with 90% duty every second, then both
  - the RS485 module is correctly connected
  - the drive is exchanging information with any other external device

4.2 Parameter LEDs description [④]

Referring to *Figure 10* (in case of plug-connected models) and to *Figure 11* (in case of terminal-connected models), use the Parameter button ③ to change the displayed unit of measurements during normal operation, following these logical flows:

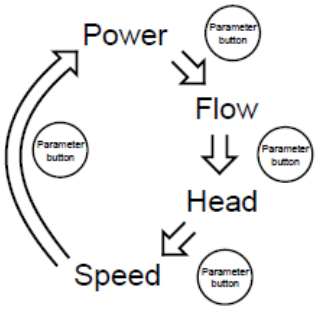


Figure 2: On terminal-connected models

4.2.1 Power

When *Power* (input active electric power) is the measurement selected:

- The current power absorption from the power line [watts] is displayed on the numeric display ⑥
- The **W** indicator is permanently lit

4.2.2 Flow

When *Flow* (hydraulic water flow) is the measurement selected:

- The current water flow estimation [m^3/h or US-gpm] is displayed on the numeric display ⑥
- The **m^3/h** (or **gpm**) indicator is permanently lit

4.2.3 Head

When *Head* (hydraulic water head) is the measurement selected:

- The current water head estimation [meters or feet of water head] is displayed on the numeric display ⑥
- The **m** (or **ft**) indicator is permanently lit

4.2.4 Speed

When *Speed* (pump impeller speed) is the measurement selected:

- The current rotation speed measure [revolutions per minute] is displayed on the numeric display ⑥
- The **rpm** indicator is permanently lit

NOTICE

Each hydraulic measure (Flow or Head) can be singularly switched, between ISO and US units of measure, by pressing the Parameter button ③ continuously for at least 2 seconds

4.3 Settings

4.3.1 Set points editing

Referring to *Figure 10* (in case of plug-connected models) and to *Figure 11* (in case of terminal-connected models), use the Setting buttons ⑤ to change the set point corresponding to the currently selected Control Mode (see par. 4.3.3)

1. *Press shortly one of the Setting buttons ⑤*

The actual set point is shown (blinking) for 4 seconds on the Numeric display ⑥, while the relative unit of measurement is displayed on the Parameter LEDs ④.

2. *Change the value with the Setting buttons ⑤*

A short button pressure will vary the set point by one single step, but if a button is kept pressed, the variation will progress automatically in the selected direction, with an acceleration factor proportional to the pressure time

3. *Wait 4 seconds to store and activate the new set point*

When the change is confirmed, the Numeric display ⑥ stops blinking and gets back to the measurement visualization active before entering the edit operation

NOTICE

During the Set points editing (while the Numeric display ⑥ is blinking), any pressure of the Parameter button ③ is inhibited, therefore changing the measurement selected is impossible. To do that, wait till the end of the edit operation

4.3.2 Operating Modes

Referring to *Figure 10* (in case of plug-connected models) and to *Figure 11* (in case of terminal-connected models), use the Setting buttons ⑤ to change the Operating mode from *On* (factory default) to *Off* or vice versa.

4.3.2.1 On → Off

1. *Press shortly one of the Setting buttons ⑤*

The actual set point is shown (blinking) for 4 seconds on the Numeric display ⑥, while the relative unit of measurement is displayed on the Parameter LEDs ④.

2. *Change the value with the Down arrow button ⑤, till reaching the minimum set point*

The minimum set point can be easily reached keeping pressed continuously the Down arrow button ⑤

3. *A further short pressure of the Down arrow button ⑤ sets the Off operating mode*

When the operating mode is set to *Off*, on the Numeric display ⑥ the message **OFF** appears

4. *Wait 4 seconds to store and activate the new operating mode*

When the change is confirmed, the message **OFF** disappears, so that the Numeric display ⑥, the Parameters LEDs ④ and the Control mode

LEDs ② are not lit. Only the Power, Status and Remote LEDs (⑦, ⑧ and ⑨) remain active according to what described in par. 4.1.

4.3.2.2 Off → On

1. *Press shortly the Up arrow button* ⑤

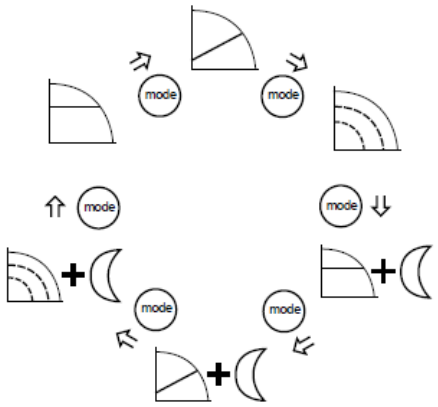
The Numeric display ⑥, the Parameters LEDs ④ and the Control mode LEDs ② returns to show the information according to the last settings before the *Off* operating mode selection

2. *Change the set point value with the Setting buttons* ⑤

After the transition from *Off* to *On* operating mode, the set point (related to the actual control mode) is equal to the minimum value: change it if necessary.

4.3.3 Control Modes

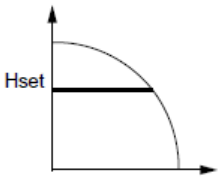
Referring to *Figure 10* (in case of plug-connected models) and to *Figure 11* (in case of terminal-connected models), short press the Control mode button ① to select the desired control mode, following this logical flow:



NOTICE
All the control modes can be combined with the *Night Mode* function (see par. 4.3.4.1)

4.3.3.1 Constant Pressure (Head)

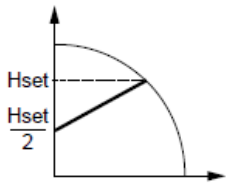
The circulator maintains a constant pressure at any flow demand;



for setting up the desired head of the pump (H_{set}), see par. 4.3.1.
When *Constant Pressure* (which is the factory setting) is the selected control mode, the  indicator is permanently lit
If the hydraulic working point allows the circulator to be operated by regulating the head within the electric power limits, then the target head will coincide with the desired (set) head.
If the hydraulic working point requires the circulator to be operated at a working point that exceeds the electric power limits, then the target head will be de-rated to remain within the maximum power limitation curve.

4.3.3.2 Proportional Pressure (Head)

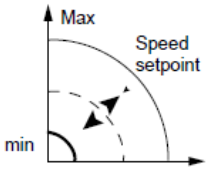
The circulator pressure is continuously increased/decreased depending on the increased/decreased flow demand;



for setting up the desired maximum head of the pump (H_{set}), see par. 4.3.1.
When *Proportional Pressure* is the selected control mode, the  indicator is permanently lit
If the hydraulic working point allows the circulator to be operated by regulating the head within the electric power limits, then the target head will coincide with the desired (set) head.
If the hydraulic working point requires the circulator to be operated at a working point that exceeds the electric power limits, then the target head will be de-rated to remain within the maximum power limitation curve.

4.3.3.3 Fixed speed

The circulator maintains a fixed speed at any flow demand;



for setting up the desired speed of the pump, see par. 4.3.1.
When *Fixed Speed* is the selected control mode, the  indicator is permanently lit
If the hydraulic working point allows the circulator to be operated by regulating the speed within the electric power limits, then the target speed will coincide with the desired (set) speed.
If the hydraulic working point requires the circulator to be operated at a working point that exceeds the electric power limits, then the target speed will be de-rated to remain within the maximum power limitation curve.

4.3.4 Special Functions

4.3.4.1 Night Mode

The *Night Mode* function cannot be used in cooling systems.

Prerequisites:

- The circulator is installed in the supply line

- The “night condition” can be detected with good confidence if a higher-level control system is set to change the supply temperature

When *Night Mode* is active, by short pressing the Control mode button ① as described in par. 4.3.3, the  indicator is permanently lit
The Night Mode can be active in combination with each one of the Control Modes described in par. 4.3.3
This function reduces the power consumption of the circulator to the minimum when the heating system is not running; an algorithm detects the proper working conditions and automatically adjusts the speed of the pump.
The pump returns to the original set point as soon as the heating system restarts.

4.3.4.2 Air Purge

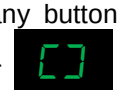
At each power-on, the drive performs (factory default) an automatic *Air Purge* procedure, with the aim of flushing air pockets from the circulator housing.
The Air Purge cycle will run the pump at fixed speed for a predetermined length of time, followed by a shorter period of minimum speed; this cycle will be repeated 4 times (in total around 60sec), with the message  ([10]) or  ([11]) reporting the corresponding decrementing counter (as described in par. 3).
Referring to *Figure 10* (in case of plug-connected models) and to *Figure 11* (in case of terminal-connected models),

- the Air Purge can be skipped or started up (at any time) by short pressing (for around 2 sec) both the Setting buttons ⑤ (Up and Down arrow) together
- the Air Purge can be permanently enabled or disabled (at any time) by long pressing (for at least 10sec) both the Setting buttons ⑤ (Up and Down arrow) together: by this operation, in case of Air Purge initially enabled (factory default), after 10sec the drive will display the message  ([11]). On the contrary, in case of Air Purge initially disabled, after 10sec the drive will display the message  ([11]).

4.3.4.3 Keypad Lock

Keypad Lock is a function with which the drive disables all the buttons of the Control Panel, but maintains running all the indicators and the numeric display.
The Control Panel can be locked/unlocked by pressing simultaneously, and for two seconds, the Parameter button ③ and the Up arrow button ⑤.
In any case, the drive will automatically lock the user interface after 10 minutes from the last button pressure.

[10] On plug-connected models
[11] On terminal-connected models

Once the lock is active, by pressing any button the drive displays the symbol  ([10]) or  ([11]); unlocking the Control Panel, the drive will display the symbol  ([10]) or  ([11]).

4.3.5 Sub-Menus (Parameters)

4.3.5.1 Dual Pump Operations settings

Each electronic drive (model *ecocirc XLplus* only) can be configured for being coupled with another one, so that they start working in concert in *dual pump operations*.
The *dual pump operation* is factory configured in case of a twin-head pump, but can be set up even in case of a spare part drive or if it’s necessary to have 2x single-head pumps working in concert.

Prerequisites:

- 2x single-head pumps available with same part number
- 3-wire bus cable, wired through the terminals ⑮, ⑯ and ⑰ as described in par. 2.4 and par. 2.5.6, connecting the 2x single-head pumps

For a correct automatic configuration, follow the subsequent procedure, setting first the pump selected to be the *master* of the couple

1. *Switch on the power supply to both the pumps*
2. After few seconds, the drive will display the message  ([10]) or  ([11]).
3. While this message (“SIN” or “SING”) is displayed, *press shortly one of the Setting buttons* ⑤, in order to configure the circulator as:
   - **Single Head Pump** (factory default): the message  ([10]) or  ([11]) is flashing onto the Numeric Display ⑥
   - **Twin (Dual) Slave Pump**: the message  ([10]) or  ([11]) is flashing onto the Numeric Display ⑥
   - **Twin (Dual) Master Pump**: the message  ([10]) or  ([11]) is flashing onto the Numeric Display ⑥
4. *Press shortly the Parameter button* ③ to confirm and store the value selected
   The Numeric Display ⑥ stops flashing.
   - In case of **Single Head Pump** or **Twin (Dual) Slave Pump**, the configuration is finalized and the drive will proceed to the next step as described in par. 3, step 2.
   - Only in case of **Twin (Dual) Master Pump**, a new sub-menu is made available (as described in the next steps) for setting the dual pump operation
5. After few seconds, the drive will display the message  ([10]) or  ([11]).
6. While this message (“BUP” or “BCUP”) is displayed, *press shortly one of the Setting buttons* ⑤, in order to configure the dual pump operation as:

- **Backup Operation**: the message bUP ([10]) or bCUP ([11]) is flashing onto the Numeric Display ⑥.
  In this configuration, only the master pump runs, while the second pump starts in case of failure of the master pump.
- **Alternate Operation** (factory default): the message ALt ([10]) or ALtE ([11]) is flashing onto the Numeric Display ⑥.
  In this configuration, only one pump runs at the time. The working time is switched every 24 hours so that workload is balanced between both pumps. The second pump starts immediately in case of failure.
- **Parallel Operation**: the message PAr ([10]) or PArA ([11]) is flashing onto the Numeric Display ⑥.
  In this configuration, both pumps run simultaneously with the same set point. The master pump determines the behavior of the full system and is able to optimize the performance. To guarantee the required performance minimizing at the same time the power consumption, the master pump starts or stops the second pump depending on the required head and flow.
- **Forced Parallel Operation**: the message FUr ([10]) or FUrL ([11]) is flashing onto the Numeric Display ⑥.
  In this configuration, both pumps always run simultaneously with the same set point.

7. *Press shortly the Parameter button* ③ to confirm the value selected
   The Numeric Display ⑥ stops flashing: the configuration is finalized and the drive will proceed to the next step as described in par. 3, step 2.

Once the *master* pump is configured, the second pump (slave) is then automatically configured by the *master* pump, to testify it, the **Remote** (green) LED is permanently lit.
In case the automatic configuration of the second pump (slave) did not take effect (Remote LED not lit), repeat the above procedure, from step 1 to step 4, configuring the second pump to be a **Twin (Dual) Slave Pump**.

NOTICE
Whenever a couple of pumps, connected in Dual Pump Operations, are required to communicate remotely with a BMS or a generic external device, then the Optional Communication Bus, described in par. 2.5.7, shall be activated through the installation of an optional module (see par. 2.5.8) exclusively into the Master pump of the couple

4.3.5.2 Communication settings

Each electronic drive (model *ecocirc XLplus* only) can communicate remotely through a built-in RS485 port, as briefly described in par. 2.5.6.
Referring to *Figure 10* (in case of plug-connected models) and to *Figure 11* (in case of terminal-connected models), the communications settings are accessible following the subsequent procedure.

1. *Switch on the power supply to the pump*
2. After few seconds, the drive will display the message COn ([10]) or COMn ([11]).
3. While this message ("COM" or "COMM") is displayed, *press shortly the Parameter button* ③ in order to configure the subsequent parameters:
   - **Baud Rate**: the message bdr ([10]) or bAUd ([11]) is displayed onto the Numeric Display ⑥: by mean of it, the communication port baud rate is set to a specific value.
     Available values for this parameter are:
     - 4.8 kbps
     - 9.6 kbps (factory default)
     - 14.4 kbps
     - 19.2 kbps
     - 38.4 kbps
     - 56.0 kbps
     - 57.6 kbps.
   - **Protocol** [12] : the message PrOt is displayed onto the Numeric Display ⑥: by mean of it, the user can select a specific protocol on the communication port.
     Available values for this parameter are:
     - Modbus Mod (factory default)
     - Bacnet bAC.
   - **Address**: the message Add ([10]) or Addr ([11]) is displayed onto the Numeric Display ⑥: by mean of it, the circulator address is set to a specific value (1 is the factory default).
     Available values for this parameter are:
     - [1÷247] (in case of Modbus protocol)
     - [0÷127] (in case of Bacnet protocol)
   - **Module**: the message Mdl ([10]) or Modu ([11]) is displayed onto the Numeric Display ⑥: by mean of it, the user specifies the possible presence, into the drive, of one optional module.
     Available values for this parameter are:
     - None NOn ([10]) or NONE ([11]) (factory default)
     - Wireless UF I ([10]) or U IF I ([11])
     - RS485 485
4. Press *the Parameter button* ③ to enter each sub-menu, thus accessing to the next level.

[12] Only on *ecocirc XLplus* terminal-connected models

5. Use *the Setting buttons* ⑤, in order to select the desired value for every parameter
6. Press *the Parameter button* ③ to confirm and store the value selected
7. Press *the Control mode button* ① to exit each sub-menu, thus returning to the previous level

If no buttons are pressed for 10 seconds, then the pump exits the current menu and continues start-up procedure. All the parameters changed without confirmation are restored at former state.

4.3.5.3 Differential Pressure Sensor

When an external differential pressure is connected to the circulator, as described in par. 2.5.4, then powering on the circulator, as described in par. 3, a submenu is made available for setting the differential pressure sensor's parameter.

Referring to *Figure 10* (in case of plug-connected models) and to *Figure 11* (in case of terminal-connected models), the differential pressure sensor's settings are accessible following the subsequent procedure.

1. *Switch on the power supply to the pump*
2. After few seconds, the drive will display the message PrE ([10]) or PrES ([11]).
3. While this message ("PRE" or "PRES") is displayed, *press shortly the Parameter button* ③ in order to configure the subsequent parameter:
   - **Type**: the message tYP ([10]) or tYPE ([11]) is displayed onto the Numeric Display ⑥: by mean of it, the user can select a specific differential pressure range.
     Available values for this parameter are:
     - [0÷1bar] dU1 (factory default)
     - [0÷2bar] dU2
4. Press *the Parameter button* ③ to enter each sub-menu, thus accessing to the next level.
5. Use *the Setting buttons* ⑤, in order to select the desired value for the parameter
6. Press *the Parameter button* ③ to confirm and store the value selected
7. Press *the Control mode button* ① to exit each sub-menu, thus returning to the previous level

If no buttons are pressed for 10 seconds, then the pump exits the current menu and continues start-up procedure. All the parameters changed without confirmation are restored at former state.

5 Fault finding

Referring to *Figure 10* (in case of plug-connected models) and to *Figure 11* (in case of terminal-connected models), as briefly described in par. 4.1

- In case of any alarm that allows the pump to continue running, the display shows alternatively alarm code (see par. 5.1) and last quantity selected, while the status indicator becomes orange
- In case of a failure that stops the pumps, the display shows the error code (see par. 5.2) permanently and the status indicator becomes red

5.1 Alarm codes

Alarm code	Description	Cause
A01	Water probe alarm	Fluid sensor anomaly
A02	Water over-temperature alarm	High temperature on the fluid
A05	Data memory alarm	Data memory corrupted
A06	External water temp. probe alarm	External temperature probe anomaly
A07	Pressure sensor alarm	External pressure sensor anomaly
A12	Twin pump communication alarm	Twin pump communication lost
A20	Internal alarm	

5.2 Error codes

Error code	Description	Cause
E01	Internal communication error	Internal communication lost
E02	Motor overload error	High motor current
E03	DC-bus overvoltage error	DC-bus overvoltage
E04	Trip control error	Motor stall
E05	EEPROM Data memory error	EEPROM Data memory corrupted
E06	Grid voltage error	Voltage supply out of operating range
E07	Motor winding temperature error	Motor thermal protection trip
E08	Power module temperature error	Inverter thermal protection trip
E09	Generic Hardware error	Hardware error
E10	Dry-run error	Dry run detection

6 Accessories

6.1 External Temperature Sensor

As briefly described in par. 2.5.5, the circulator can be equipped with an external KTY83 temperature probe (1KΩ at 25°C), with the purpose of measuring an absolute or a differential water temperature, in temperature dependent / influenced control modes.

6.1.1 Water Temperature dependent Control Modes – Setting parameters

The subset of parameters collected in Parameters Table 2 (described in par. 8.2.1.2) is devoted to set the Water Temperature dependent Control Modes; in particular:

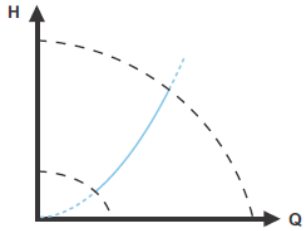
- *0x0030 - Temperature Control Mode*
  Defines if there's a dependency of the control modes on the temperature, and which kind of dependency
  - [= 0] ⇒ None of the standard control mode (described in par. 4.3.3) is affected or influenced by the water temperature
  - [= 1] ⇒ The control modes usually managing the differential pressure control, *Constant Pressure [ConstΔP]* (see par. 4.3.3.1) and *Proportional Pressure [PropΔP]* (see par. 4.3.3.2), are influenced by water temperature (***[ConstΔP]/T*** and ***[PropΔP]/T***)
  - [= 2] ⇒ The active control mode is *Constant Absolute Temperature [**ConstT**]* or *Constant Differential Temperature [**ConstΔT**]*, depending on the value of Parameter "*0x0033 – Temperature Probe"*
- *0x0031 – Absolute Temperature Setpoint*
  The set-point followed by the system when operating in *Constant Absolute Temperature [**ConstT**]*
- *0x0032 – Differential Temperature Setpoint*
  The set-point followed by the system when operating in *Constant Differential Temperature [**ConstΔT**]*
- *0x0033 – Temperature Probe*
  Defines which temperature probe must be considered as input for the temperature-dependent control mode selected
  - [= 0] ⇒ The control mode uses the internal temperature probe's input signal
  - [= 1] ⇒ The control mode uses the auxiliary (external) temperature sensor's input signal (the external temperature sensor must be connected)
  - [= 2] ⇒ The control mode calculates the differential temperature between the internal and the external sensor, and uses the differential temperature as input signal (the external temperature sensor must be connected)
- *0x0034 – Temperature Slope*
  Defines how the Head set-point (when ConstantΔP/T or PropΔP/T control modes are active) reacts to the water temperature's increase/decrease
  - [= 0] ⇒ The Head set-point increases when the temperature increases
  - [= 1] ⇒ The Head set-point decreases when the temperature increases
- *0x0035 – K_p for Temperature Control*
  Is the proportional constant used in the PI-regulator which leads the temperature control
- *0x0036 – K_i for Temperature Control*
  Is the integral constant used in the PI-regulator which leads the temperature control
- *0x0037 – Temperature Control sampling time*
  Sampling time used in the temperature control

6.1.2 Water Temperature dependent Control Modes

Using the setting parameters described in par. 6.1.1, the Water Temperature dependent Control Modes are then the following:

6.1.2.1 Constant Absolute Temperature [ConstT]

This control mode ensures a constant water temperature. Constant temperature is a comfort control mode that can be used in domestic hot-water systems to control the flow to maintain a fixed temperature in the system



In this control mode, the basic assumption is that the circulator regulates (following the feedback of the internal or external temperature sensor) the water temperature in a point, on the return pipe of the system, as close as possible to the consumer (radiator, heat exchanger, …).
It is then clear that the *ConstT* control mode can be deployed in the subsequent possible application

- ***ConstT for heating applications, using internal temp. sensor***
  In this application the pump is installed in the return pipe, and utilizes the internal temp. sensor
  According to what described in par. 6.1.1, the necessary correspondent settings are:
  - *0x0030 - Temperature Control Mode* = 2
  - *0x0031 – Absolute Temperature Setpoint* = desired value in the range [20°C ÷ 110°C]
  - *0x0033 – Temperature Probe* = 0
  - *0x0034 – Temperature Slope* = 1

- ***ConstT, for heating applications, using external temp. sensor***

  In this application the pump is installed in the flow pipe, and utilizes the external temp. sensor
  According to what described in par. 6.1.1, the necessary correspondent settings are:
  - *0x0030 - Temperature Control Mode* = 2
  - *0x0031 – Absolute Temperature Setpoint* = desired value in the range [20°C ÷ 110°C]
  - *0x0033 – Temperature Probe* = 1
  - *0x0034 – Temperature Slope* = 1

- ***ConstT, in cooling applications, using internal temp. sensor***

  In this application the pump is installed in the return pipe, and utilizes the internal temp. sensor
  According to what described in par. 6.1.1, the necessary correspondent settings are:
  - *0x0030 - Temperature Control Mode* = 2
  - *0x0031 – Absolute Temperature Setpoint* = desired value in the range [-10°C ÷ 19°C]
  - *0x0033 – Temperature Probe* = 0
  - *0x0034 – Temperature Slope* = 0

- ***ConstT, in cooling applications, using external temp. sensor***

  In this application the pump is installed in the flow pipe, and utilizes the external temp. sensor
  According to what described in par. 6.1.1, the necessary correspondent settings are:
  - *0x0030 - Temperature Control Mode* = 2
  - *0x0031 – Absolute Temperature Setpoint* = desired value in the range [-10°C ÷ 19°C]
  - *0x0033 – Temperature Probe* = 1
  - *0x0034 – Temperature Slope* = 0

6.1.2.2 Constant Differential Temperature [ConstΔT]

This control mode keeps the differential temperature of the pumped liquid constant, changing the flow rate to maintain the user-settable set-point
In this case, it's unnecessary to discriminate between heating and cooling application, because the differential temperature is considered as absolute value.
According to what described in par. 6.1.1, the necessary correspondent settings are:

- *0x0030 - Temperature Control Mode* = 2
- *0x0032 – Differential Temperature Setpoint* = desired value
- *0x0033 – Temperature Probe* = 2

6.1.2.3 Constant pressure depending on water temperature [ConstΔP/T]

In this control mode the drive alters the differential pressure set-point the pump has to maintain, depending on the measured fluid temperature, as depicted in Figure 3

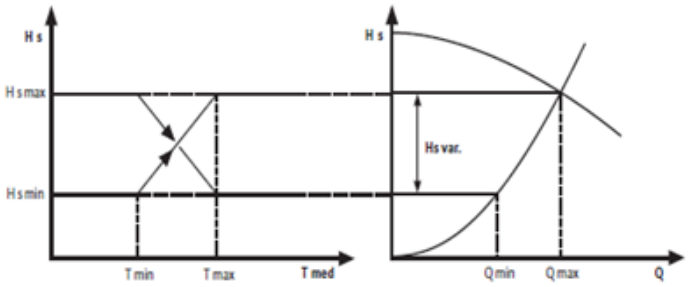


Figure 3

Referring to Figure 3

- Tmin = 20°C
- Tmax = *Absolute Temperature Setpoint (par. 0x0031)*
- Hsmin = 30% of Hsmax
- Hsmax = *Constant pressure set-point (settable via User Interface, see par. 4.3.3.1)*

The *ConstΔP/T* control mode can be evidently deployed in the subsequent possible application

- ***ConstΔP/T, positive relation P/T, using internal temp. sensor***

  According to what described in par. 6.1.1, the necessary correspondent settings are:
  - *0x0030 - Temperature Control Mode* = 1
  - *0x0031 – Absolute Temperature Setpoint* = desired value
  - *0x0033 – Temperature Probe* = 0
  - *0x0034 – Temperature Slope* = 0
  - *Control Mode = Constant Pressure (settable via User Interface)*
  - *Constant Pressure Setpoint = desired value*

- ***ConstΔP/T, negative relation P/T, using internal temp. sensor***

  According to what described in par. 6.1.1, the necessary correspondent settings are:
  - *0x0030 - Temperature Control Mode* = 1
  - *0x0031 – Absolute Temperature Setpoint* = desired value
  - *0x0033 – Temperature Probe* = 0
  - *0x0034 – Temperature Slope* = 1
  - *Control Mode = Constant Pressure (settable via User Interface)*
  - *Constant Pressure Setpoint = desired value*

- ***ConstΔP/T, positive relation P/T, using external temp. sensor***

  According to what described in par. 6.1.1, the necessary correspondent settings are:
  - *0x0030 - Temperature Control Mode* = 1
  - *0x0031 – Absolute Temperature Setpoint* = desired value
  - *0x0033 – Temperature Probe* = 1
  - *0x0034 – Temperature Slope* = 0
  - *Control Mode = Constant Pressure (settable via User Interface)*
  - *Constant Pressure Setpoint = desired value*

- ***ConstΔP/T, negative relation P/T, using external temp. sensor***
  According to what described in par. 6.1.1, the necessary correspondent settings are:
  - *0x0030 - Temperature Control Mode* = 1
  - *0x0031 – Absolute Temperature Setpoint* = desired value
  - *0x0033 – Temperature Probe* = 1
  - *0x0034 – Temperature Slope* = 1
  - *Control Mode = Constant Pressure (settable via User Interface)*
  - *Constant Pressure Setpoint = desired value*

6.1.2.4 Proportional pressure depending on water temperature [PropΔP/T]

In this control mode the drive alters the proportional pressure set-point the pump has to maintain, depending on the measured fluid temperature

Referring to Figure 3

- Tmin = 20°C
- Tmax = *Absolute Temperature Setpoint (par. 0x0031)*
- Hsmin = 30% of Hsmax
- Hsmax = *Proportional pressure set-point (settable via User Interface, see par. 4.3.3.2)*

According to what already described in par. 6.1.2.3, even the *PropΔP/T* control mode can be evidently deployed in the subsequent possible application

- ***PropΔP/T, positive relation P/T, using internal temp. sensor***
  According to what described in par. 6.1.1, the necessary correspondent settings are:
  - *0x0030 - Temperature Control Mode* = 1
  - *0x0031 – Absolute Temperature Setpoint* = desired value
  - *0x0033 – Temperature Probe* = 0
  - *0x0034 – Temperature Slope* = 0
  - *Control Mode = Proportional Pressure (settable via User Interface)*
  - *Proportional Pressure Setpoint = desired value*

- ***PropΔP/T, negative relation P/T, using internal temp. sensor***
  According to what described in par. 6.1.1, the necessary correspondent settings are:
  - *0x0030 - Temperature Control Mode* = 1
  - *0x0031 – Absolute Temperature Setpoint* = desired value
  - *0x0033 – Temperature Probe* = 0
  - *0x0034 – Temperature Slope* = 1
  - *Control Mode = Proportional Pressure (settable via User Interface)*
  - *Proportional Pressure Setpoint = desired value*

- ***PropΔP/T, positive relation P/T, using external temp. sensor***
  According to what described in par. 6.1.1, the necessary correspondent settings are:
  - *0x0030 - Temperature Control Mode* = 1
  - *0x0031 – Absolute Temperature Setpoint* = desired value
  - *0x0033 – Temperature Probe* = 1
  - *0x0034 – Temperature Slope* = 0
  - *Control Mode = Proportional Pressure (settable via User Interface)*
  - *Proportional Pressure Setpoint = desired value*

- ***PropΔP/T, negative relation P/T, using external temp. sensor***
  According to what described in par. 6.1.1, the necessary correspondent settings are:
  - *0x0030 - Temperature Control Mode* = 1
  - *0x0031 – Absolute Temperature Setpoint* = desired value
  - *0x0033 – Temperature Probe* = 1
  - *0x0034 – Temperature Slope* = 1
  - *Control Mode = Proportional Pressure (settable via User Interface)*
  - *Proportional Pressure Setpoint = desired value*

6.1.3 Water Temperature dependent Control Modes – Circulator Control Panel

In order to configure the desired Temperature-dependent control mode using *Circulator Control Panel*, refer to the Advanced Tab

6.1.3.1 Advanced Tab

Collects two subset of parameters:

- The subset used for *advanced settings*, as described in this technical sheet at par. 8.2.1.2
- The subset used for *twin pump settings*, as described in this technical sheet at par. 8.2.1.3

6.2 Wireless Module

Referring to Figure 12, once the module is connected, is necessary to configure it by setting the parameter “Module” to the value “Wireless”, as described in par. 4.3.5.2.

6.2.1 Wireless module use

When the wireless module is assembled into ecocirc XLplus, and correctly configured, it generates a (type 902.11n) wireless network accessible (by a mobile, tablet or a PC) using data (**S/N** and **PWD**) printed on the label sticked on the side of the circulator’s drive

In particular,

- Network name: “ecocircxl**___S/N___**” where S/N is a 8 character word
- Password: “xylem**___PWD___**” where PWD is a 8 character word

To access then the circulator’s web pages using a browser (on the external device connected), use the web address “**https://xylemecoxl**” or type directly “192.168.1.10”

6.3 RS485 Module

Referring to Figure 12, once the module is connected, is necessary to configure it by setting the parameter “Module” to the value “RS485”, as described in par. 4.3.5.2

7 Appendix 1

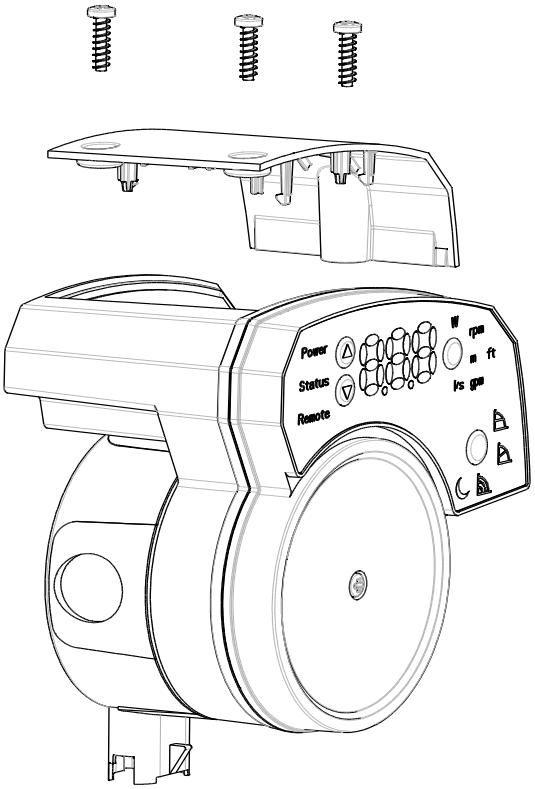


Figure 4

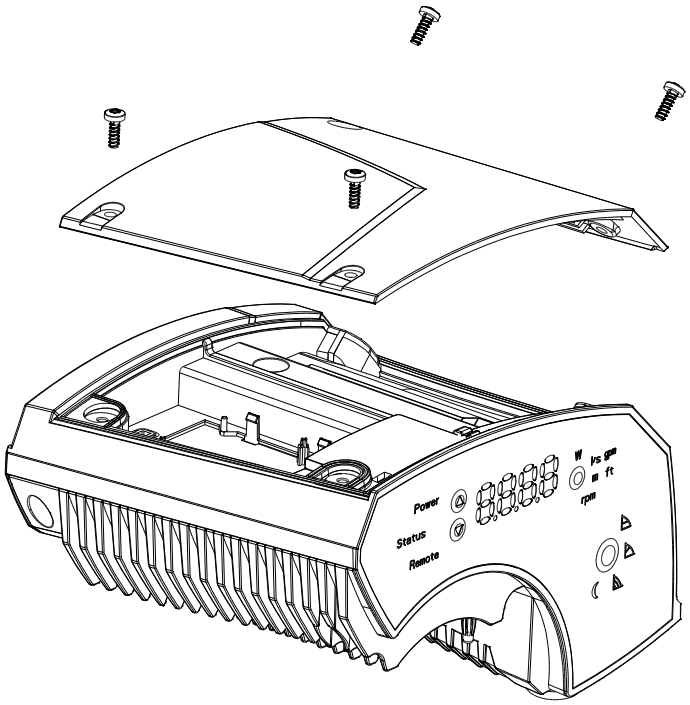
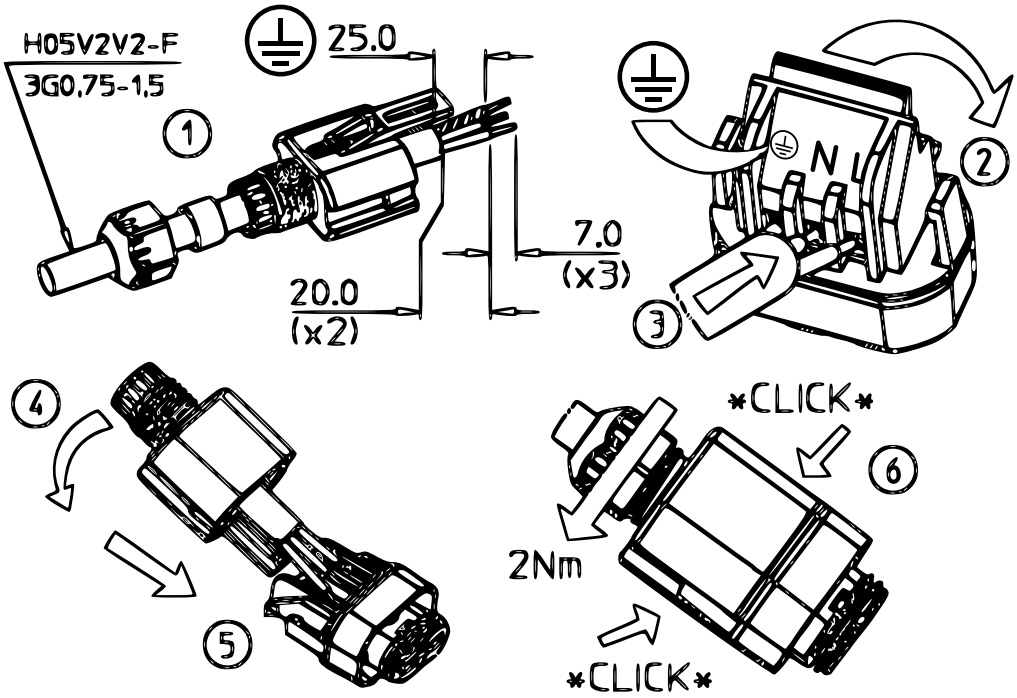


Figure 5



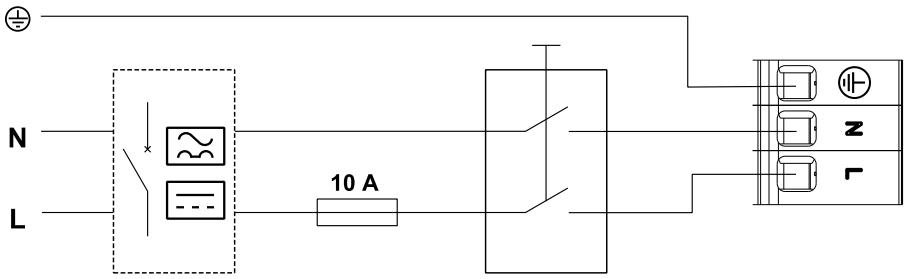


Figure 6

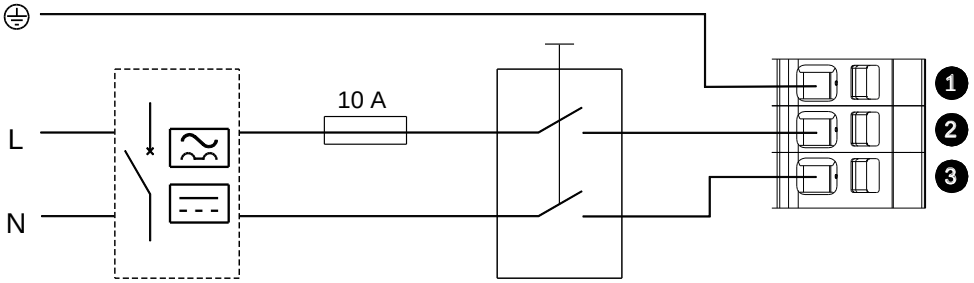


Figure 7

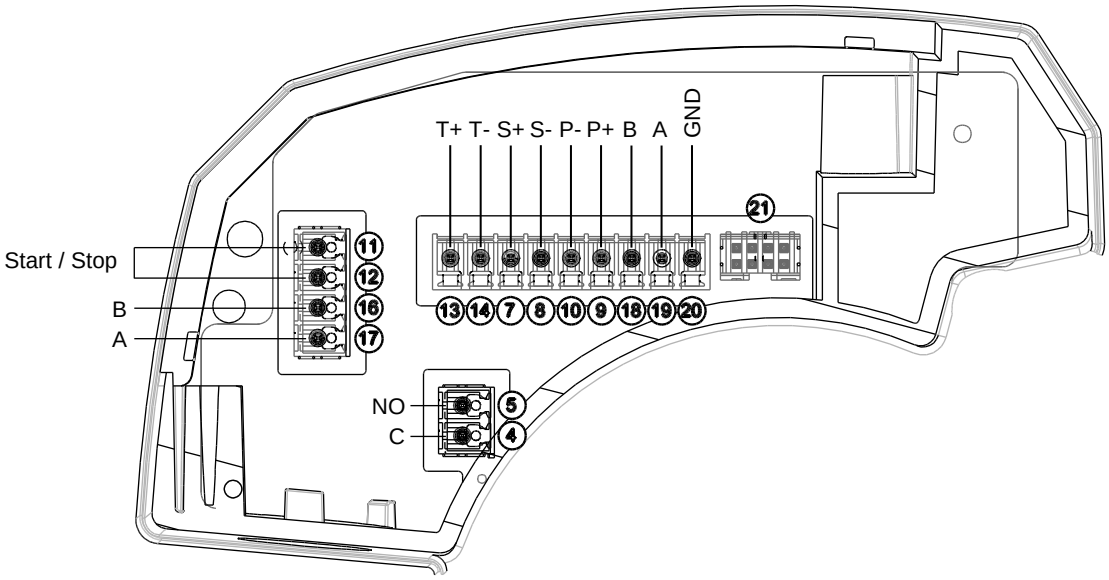


Figure 8

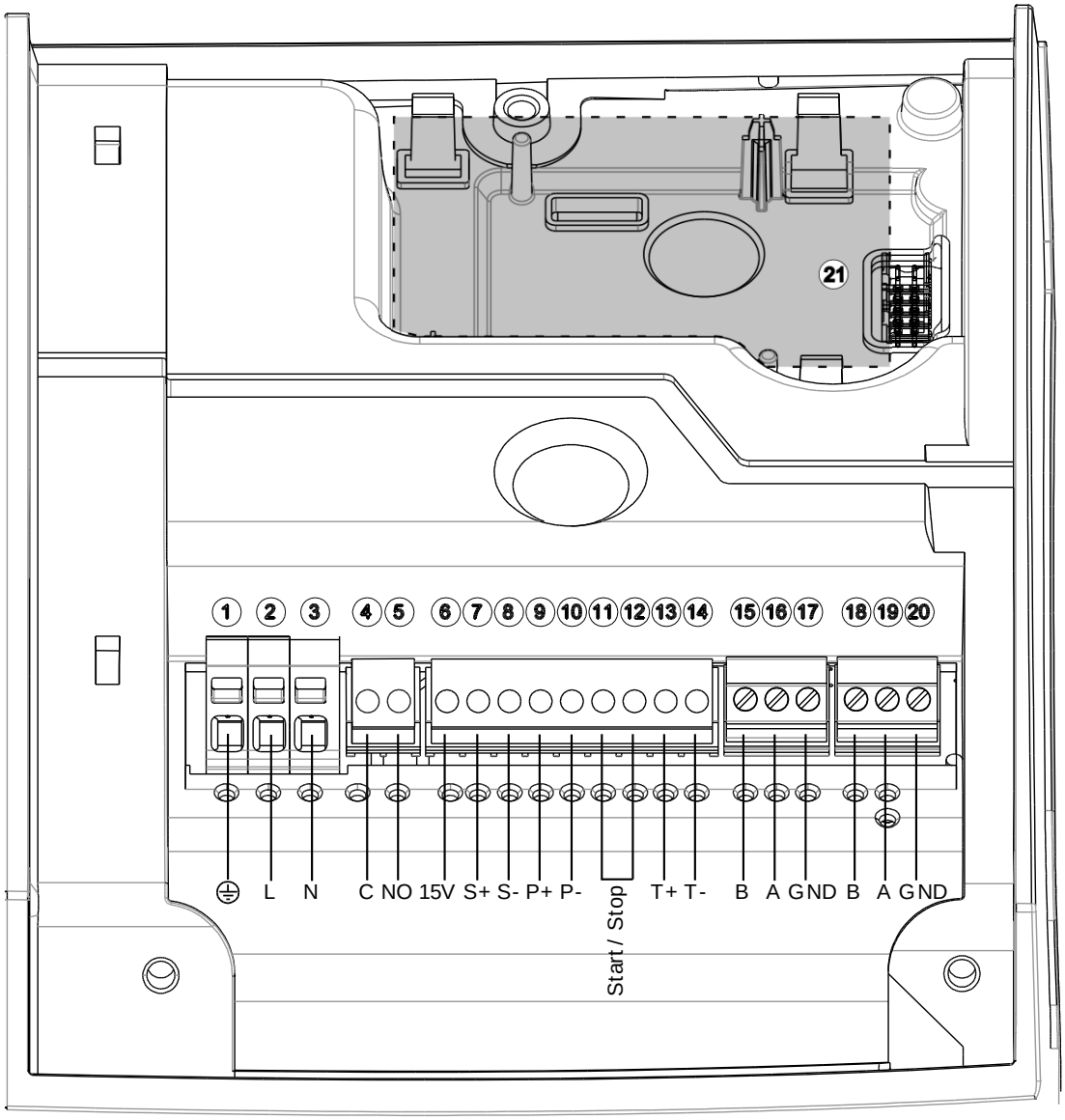


Figure 9

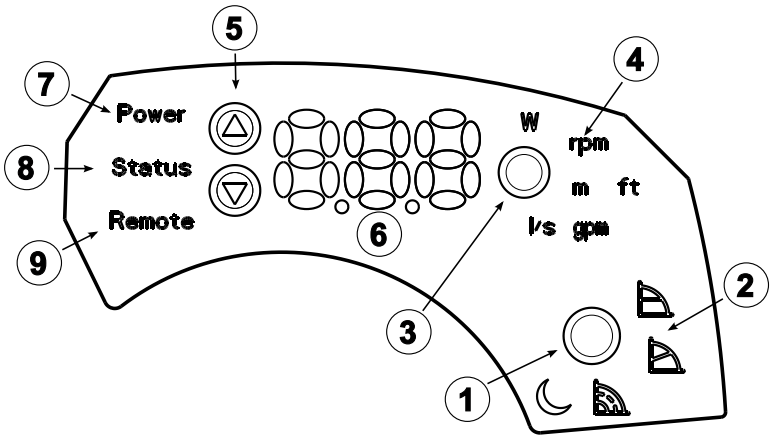


Figure 10

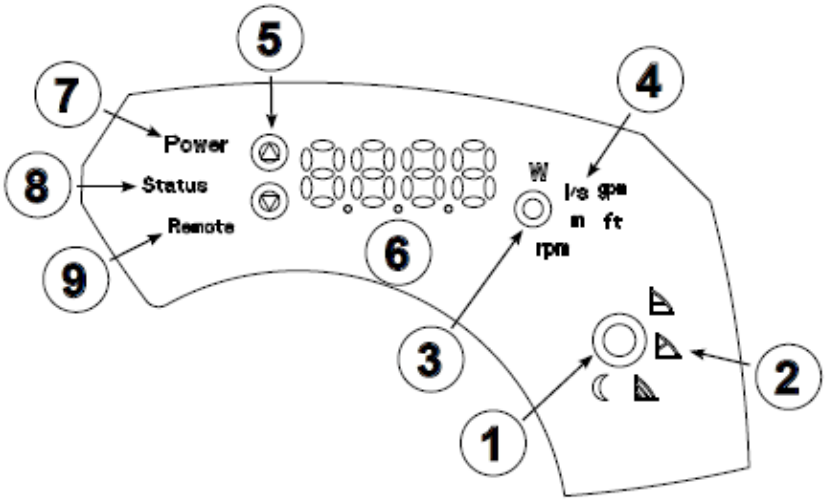


Figure 11

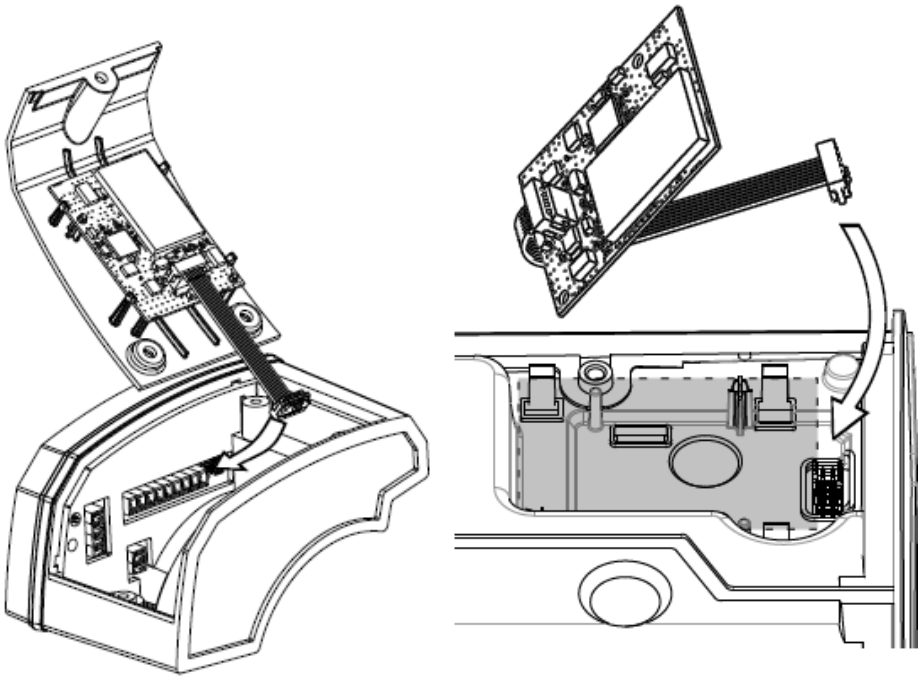


Figure 12

8 Appendix 2 – Modbus registers

8.1 Data Organization

The drive offers the below Modbus Virtual Memory (see par. 8.2), based on a data set that can be divided into 2 main subsets:

- *Parameters*, that is “Readable and Writable” data [**R/W**] used for setting a specific behaviour, activating a function, writing data, etc. inside the drive.
- *Information*, that is “Readable” data [**R**], used for acquiring values or feedbacks from the drive

8.2 Modbus Virtual Memory

The complete data-set managed by the ecocirc XLplus is accessible considering a Modbus Virtual Memory made exclusively of Holding Registers, representing both *Parameters* and *Information*: readable and writable the *Parameters*, readable only the *Information*.

For a detailed description of the Modbus Virtual Memory organization, refer to the related document “ecocircXL - Modbus Parameters Table”.

8.2.1 Parameters Tables

8.2.1.1 Parameters Table 1

It is a set of parameters [**R/W**] used for *standard settings*: generally the same operations or functions a user can perform/activate through the user interface.

MB. ADDRESS (HEX)	PARAMETER DESCRIPTION
0x0000	**OPERATING MODE** 0 = OFF 1 = ON
0x0001	**CONTROL MODE** 1 = CONSTANT PRESSURE 2 = PROPORTIONAL PRESSURE 3 = CONSTANT CURVE
0x0002	**NIGHT-MODE ACTIVATION** 0 = NOT ACTIVE 1 = ACTIVE
0x0003	**AIR VENTING PROCEDURE** 0 = NOT ACTIVE 1 = ACTIVE
0x0004	**PROPORTIONAL PRESSURE SETPOINT** (for CONTROL MODE = 2)
0x0005	**CONSTANT PRESSURE SETPOINT** (for CONTROL MODE = 1)
0x0006	**CONSTANT CURVE SETPOINT** (for CONTROL MODE = 3)
0x0007	**AIR VENTING POWER ON** 0 = NOT ACTIVE 1 = ACTIVE

8.2.1.2 Parameters Table 2

It is a set of parameters [**R/W**] used for *advanced settings*: these operations or functions cannot be performed/activated through the user interface

MB. ADDRESS (HEX)	PARAMETER DESCRIPTION
0x0030	**TEMPERATURE CONTROL MODE** 0 = NOT ACTIVE 1 = PROP. TEMPERATURE TO HEAD 2 = CONSTANT TEMPERATURE
0x0031	**ABSOLUTE TEMPERATURE SETPOINT**
0x0032	**DIFFERENTIAL TEMPERATURE SETPOINT**
0x0033	**TEMPERATURE PROBE** 0 = INTERNAL 1 = EXTERNAL 2 = DIFFERENTIAL
0x0034	**TEMPERATURE SLOPE** 0 = INCREASING 1 = DECREASING
0x0035	**K_P FOR TEMPERATURE CONTROL**
0x0036	**K_I FOR TEMPERATURE CONTROL**
0x0037	**TEMPERATURE CONTROL SAMPLING TIME**

8.2.1.3 Parameters Table 3

It is a set of parameters [**R/W**] used for *twin pump settings*.

MB. ADDRESS (HEX)	PARAMETER DESCRIPTION
0x0060	**CIRCULATOR CONFIGURATION** 0 = TWIN MASTER 1 = TWIN SLAVE 2 = SINGLE
0x0061	**TWIN PUMPS CONTROL MODE** 0 = BACKUP 1 = ALTERNATE 2 = PARALLEL

8.2.2 Information Tables

8.2.2.1 Information Table 1

It is a set of information [**R**] used for *standard use*: generally the same data a user can acquire through the user interface

MB. ADDRESS (HEX)	INFORMATION DESCRIPTION
0x0200	**INPUT POWER**
0x0201	**HEAD [H]**
0x0202	**FLOW [Q]**
0x0203	**SPEED**
0x0204	**WATER TEMPERATURE**

0x0205	**EXTERNAL WATER TEMPERATURE**
0x0206	**WINDING 1 TEMPERATURE**
0x0207	**WINDING 2 TEMPERATURE**
0x0208	**WINDING 3 TEMPERATURE**
0x0209	**POWER MODULE TEMPERATURE**
0x020A	**QUADRATURE CURRENT**
0x020B	**BIT FIELDS STATUS I/O**
0x020C	**BIT FIELDS ALARM 1**
0x020D	**BIT FIELDS ALARM 2**
0x020E	**BIT FIELDS ERRORS**
0x020F	**ACTIVE ERROR CODE**

8.2.2.2 Information Table 2

It is a set of information [**R**] used for *advanced use*: generally these data cannot be accessed through the user interface.

MB. ADDRESS (HEX)	INFORMATION DESCRIPTION
0x0230	**MODBUS SLAVE ADDRESS**
0x0231	**WI-FI CLIENT/SERVER CONFIGURATION** 0 = SERVER 1 = CLIENT
0x0232	**PRESSURE SENSOR MODEL** 0 = DIFF. PRESSURE SENSOR / Range 0 ÷ 1.0bar 1 = DIFF. PRESSURE SENSOR / Range 0 ÷ 2.0bar
0x0233	**PROPORTIONAL PRESSURE MIN SETPOINT**
0x0234	**PROPORTIONAL PRESSURE MAX SETPOINT**
0x0235	**CONSTANT PRESSURE MIN SETPOINT**
0x0236	**CONSTANT PRESSURE MAX SETPOINT**
0x0237	**CONSTANT CURVE MIN SETPOINT**
0x0238	**CONSTANT CURVE MAX SETPOINT**
0x0239	**COMMUNICATION PROTOCOL** 0 = MODBUS 1 = BACNET
0x023A	**BAUD RATE**

8.2.2.3 Information Table 3

It is a set of information [**R**] used for *twin pump use*: generally these data cannot be accessed through the user interface, and are available to the Twin Master for managing the pump: in fact this table is visible only in case the drive is configured as a Twin Pump Master (see par. 4.3.5.1)

MB. ADDRESS (HEX)	INFORMATION DESCRIPTION
0x0260	**TWIN SLAVE DRIVEN CURVE**
0x0261	**TWIN SLAVE START/STOP** 0 = STOP 1 = START
0x0262	**TWIN SLAVE INPUT POWER**
0x0263	**TWIN SLAVE HEAD [H]**
0x0264	**TWIN SLAVE FLOW [Q]**
0x0265	**TWIN SLAVE SPEED**
0x0266	**TWIN SLAVE WINDING 1 TEMPERATURE**
0x0267	**TWIN SLAVE WINDING 2 TEMPERATURE**
0x0268	**TWIN SLAVE WINDING 3 TEMPERATURE**
0x0269	**TWIN SLAVE POWER MODULE TEMPERATURE**
0x026A	**TWIN SLAVE QUADRATURE CURRENT**
0x026B	**TWIN SLAVE BIT FIELDS ALARM 1**
0x026C	**TWIN SLAVE BIT FIELDS ALARM 2**
0x026D	**TWIN SLAVE BIT FIELDS ERRORS**

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