EC Modbus Display
230V AC model / ES 974

Display of parameters on ebmpapst fans with modbus
Supports ebmpapst series 84/112/150/200" V5.00
Doc: alg000566818_ENG of 3 Nov 2014

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Description:

This product is designed specifically for reading and displaying of parameters from ebmpapst EC fans via RS485/MODBUS® RTU interface.

Mounting:

The EC Modbus display is mounted according to the general applicable installation rules in the low voltage directive. The product must be fixed on a plane and stable surface with screws in the 4 corner holes and is not to be fixed on moving or vibrating surfaces. Avoid exposure to high temperatures and direct sunlight.
If long connection cables are used, ensure that the product is not disturbed by electromagnetic interference.

Modbus termination:

Terminal nos:	Description	Comments
L and N	Connection of power supply	230V AC ±10%
17 and 18	RS 485 Modbus	
8 and 9	0V, GND	

Electrical Diagram:

Shielded cable (max length 20m)
2 x 2x0,5mm² Twisted pair
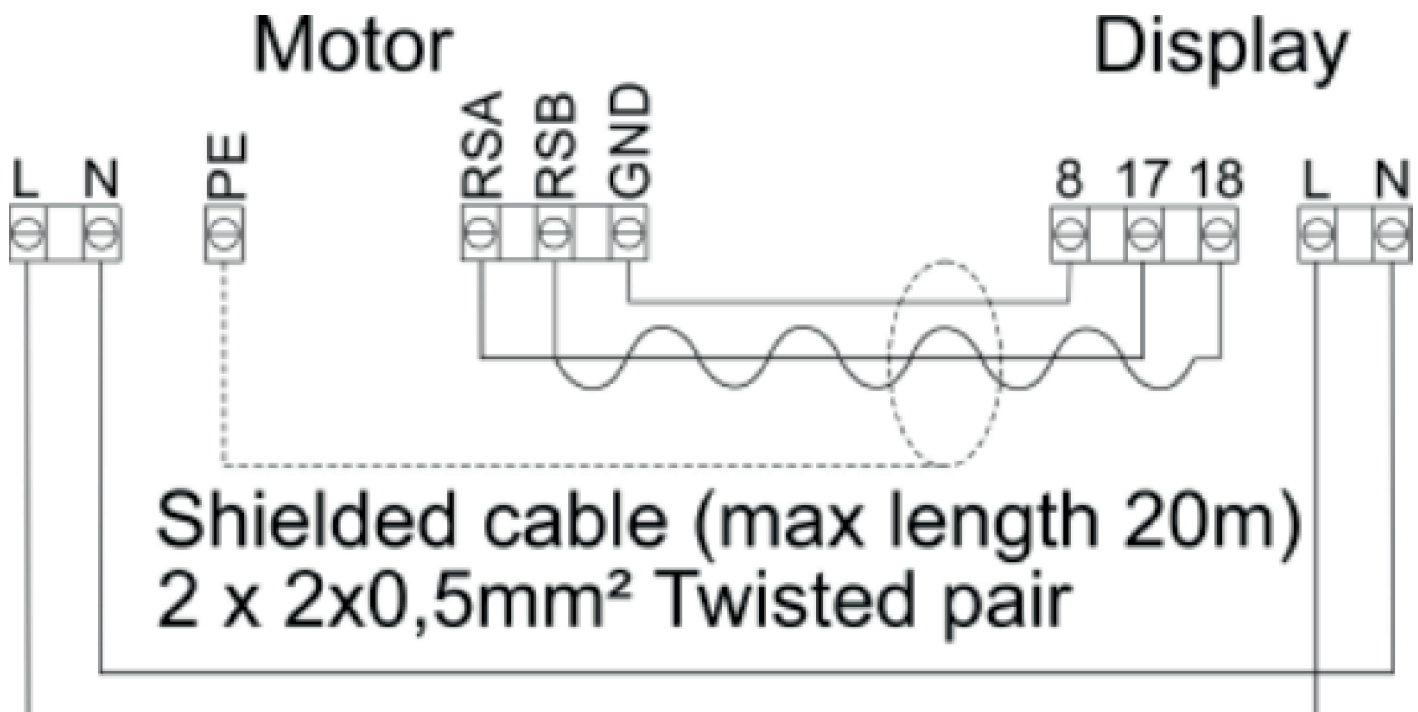
How to Set Up the EC Modbus Display

The display is operated by push buttons. When the EC Modbus Diplay is displaying data you may go to the Main Menu by pushing the ›ESC‹ button. Icons on each button indicates which function the button has.

When setting up the menus in the EC Modbus Display the icons have the below functions.

Icon	Function
⏎	Enter
⇧	Increase / Step up
⇩	Decrease / Step down
ESC	Escape / Cancel

Before the EC Modbus Display can display any type of motor data, it must be connected to a motor and the menus and sub-menus must be set.

Menu structure

The button function is as above. The menu consists of a main menu with submenus. Configuration parameters are accessed from the submenus. Automatic timeout from menu occurs, if no buttons have been activated for 2 minutes.

Example - menu operation:
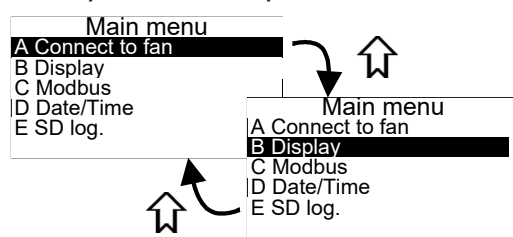
Different pop up boxes are available for editing of model parameters. Arrow up and arrow down are used for editing of values. Enter key for approval and saving of value, and ESC to cancel editing without saving it.

If several figures are displayed in the pop up box, the cursor will indicate the value which is being edited. Press enter to move the cursor. After the last figure, the values are saved. ESC to cancel without saving.

Main menu and submenus

The submenus, A-D, are accessible from the main menu.
The password is 5550 for password pop up.

Connect to fan (A-menu) *Example - Create network:*
A-1 Create Network

The EC Modbus Display can only establish network connection with ebmpapst EC Motors. EC Modbus Display is able to communicate with one fan. Notice when entering this menu previous network settings will be deleted. The EC Modbus Display uses a conventional setup method where command 0x06 write single command is used. Follow the below set-up guide:

    Switch off power to the fan and EC Modbus Display

❷   Connect the AB lines from terminals 17-18 to the fans terminals AB. Max 1 fan is supported.
    Switch on power to the EC Modbus Display and fan.

❹   Activate «search» on the display panel by pressing the enter button until a progress bar pop-up box appears.

❺   When the EC Modbus Display has located the motor, a pop-up box will show the found fan serial number.
    Press Enter to save the setting or ESC to cancel (nothing is saved and you must start over).
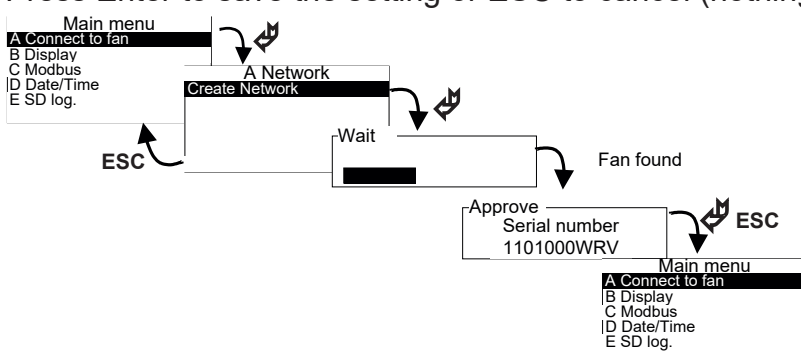
Display Menu (B-menu)

The display menu includes general display configurations. The following functions are displayed / can be edited:

B1: SW Information of the EC Modbus Display and model.

B2: Display language; Danish, German and English are available.

B3: Contrast. If the text is blurred, the contrast may be adjusted. The changes are displayed immediately.

B4: Display Power. Value 0..99. A threshold value can be interposed on the displayed power value in the main screen. B4 value = 0 mean no threshold. Value of 1..99 equals the actual threshold value. To stabilize the reading near the threshold value, a constant hysteresis value of 2W is implemented. This means that if a threshold value e.g. is set to 20, the display will show LOW when the data from the fan is below or equal to 20W. The display will show the measured value again, when the fan value is higher than 20+2W. If the measured value is Higher than 9999W, the display will show HIGH.

B5: Enable Log functionality. This function enable/disable logging functionality implemented in the display (E-Menu) and the date/time setting (D-Menu). When B5=Disable then menu D and E is not visible.

B6: Reset kWh. This function reset current kWh measurement.

B7: Chose internal or external speed control. Internal speed control is using the EC Modbus Display as speed controller. External speed control require an external potentiometer to be applied.

B8(E2): Set minimum speed 0-50%. Only applicable when internal speed control is selected. Default value is 0%.

B9(E3): Set maximum speed 50-100%. Only applicable when internal speed control is selected. Default value is 100%.

Modbus (C-menu)

If the fan will not connect to the display, it is possible to change parameters for the modbus communication.

C1 Modbus baud rate: It is possible to change the baud rate to either 9600 or 19200 baud.

C2 Modbus parity: The parity can be changed among Odd, Even or None.

Date / Time (D-menu)

The integrated clock is adjusted in this menu. It is possible to set time, date and weekday. The clock is a 24 hour clock. Summer / Winter time is not adjusted automatically. The clock in the EC Modbus Display is equipped with a battery backup to ensure that short power cuts do not affect the clock. In case of longer power cuts (>72 hours) the clock must be reset.

Example of setting of time:
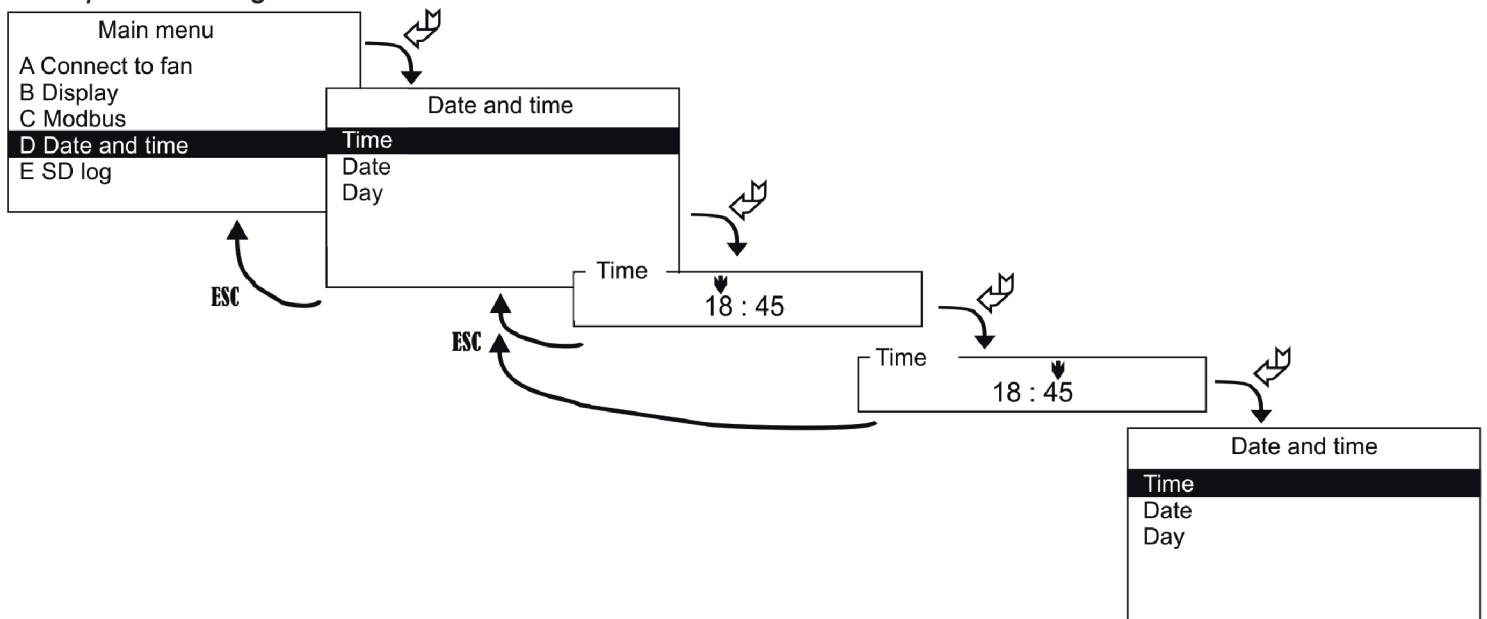
SD-Log (E-menu)

E1 save log to SD Card

When the connected fan is reporting an error or warning, the error or warning will be saved in a cyclic log. The log has the format: 1) Date, 2) Time, 3) Error number, 4) Warning number, 5) latest log number. The log is cyclic, which mean that after 100 events the log will use event number 1 again. The file saved to the SD card has the name; CYLICB.LSC. The file is a plain text file, which van be opened in e.g. excel, notepad.

Example of saving the Error log:
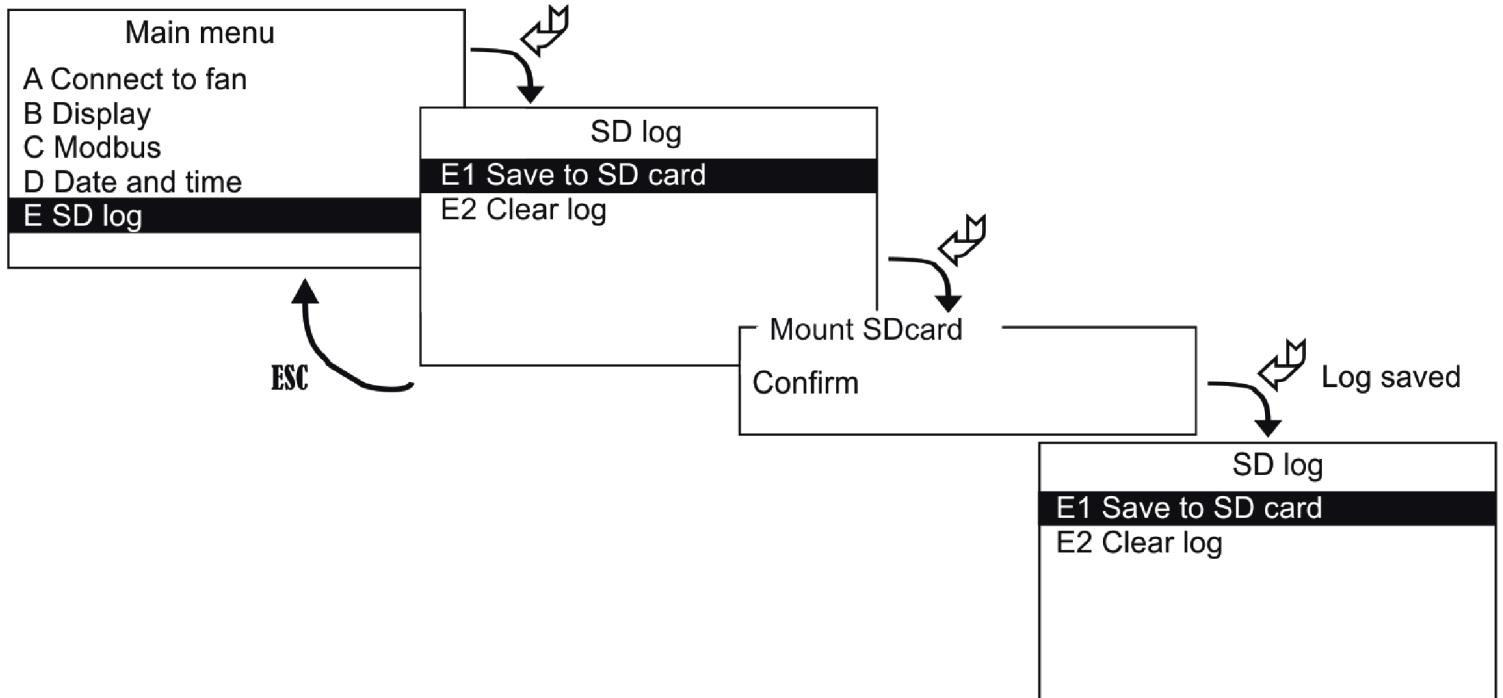
E2 Clear log:

This will reset the internal Error log in the product.
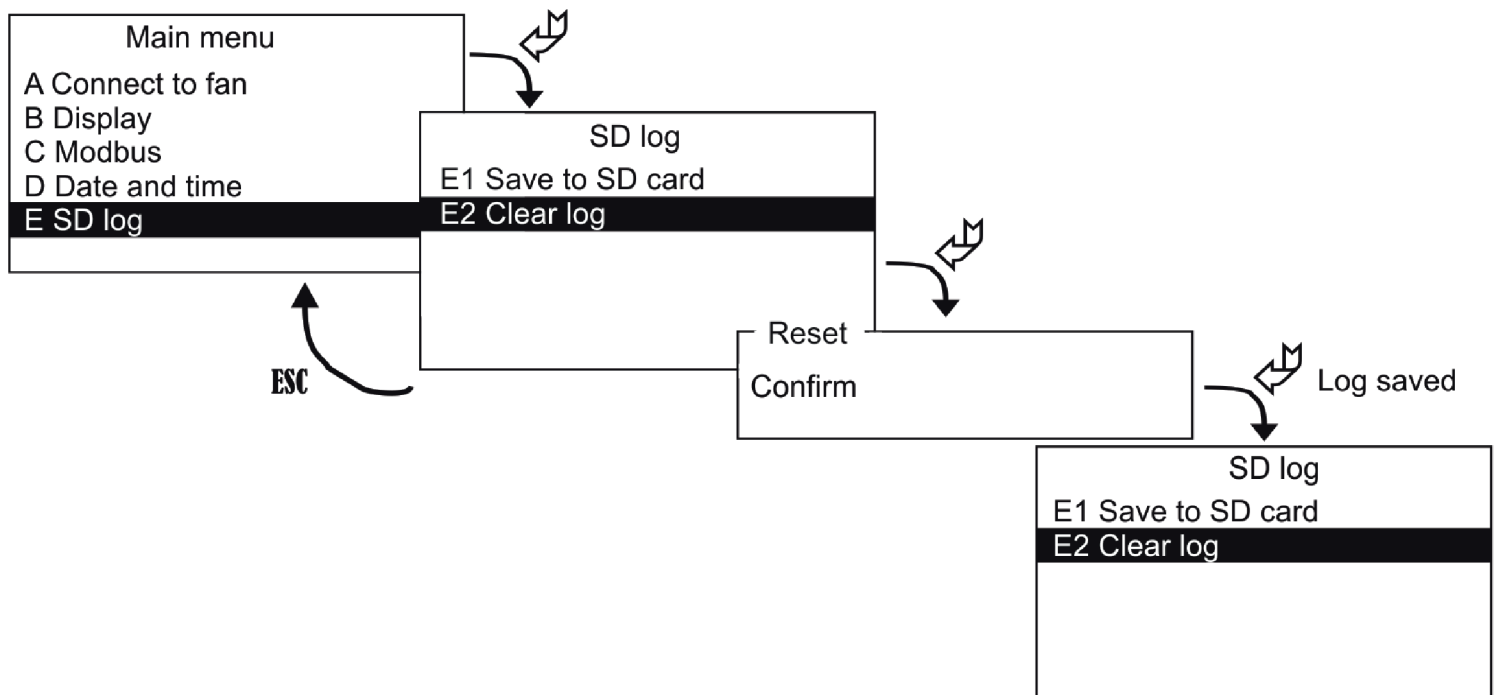
Reading the EC Modbus Display data

When the EC Modbus Display is running in display mode the icons on the buttons have the following functions:

| Icon	Function
↵	go to manual speed setting
⇧	Previous Page
⇩	Next Page
ESC	Go to Menu

The displayed information in the «Main Window» consisting of 4 different information screens originates from the connected fan and will be updated every 3 sec.
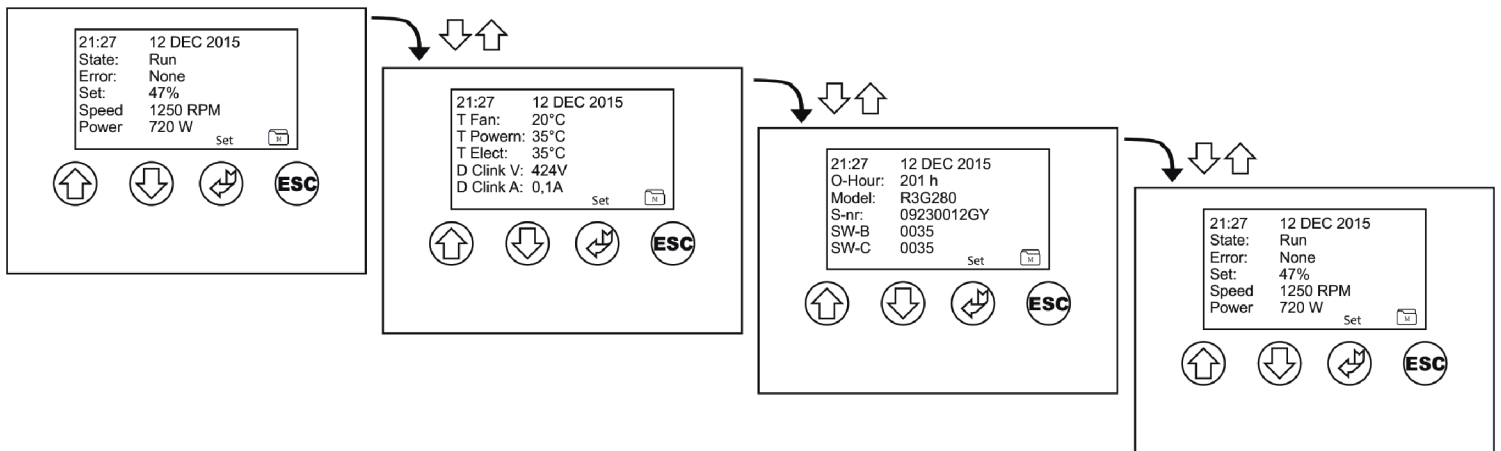
Choosing the Manual Speed Setting

When pressing the ↵ a new screen set-up will appear as below and it is possible to manually adjust the speed up and down using the ⇧⇩ arrows. The speed is adjusted between 0-100% within the Minimum and Maximum speed limit set in the Display Menu (B-Menu) B8 and B9. It only possible to adjust speed manually when Speed Control Internal is chosen in the Display Menu (B-Menu) B7.

When the speed is changed manually the EC Modbus Display (internal controller) will save the last chosen speed as a new set-point when motor is turned off. When turning motor back on, the EC Modbus Display (internal controller) remember the last chosen speed and will start using that as setpoint until new speed is selected. Default Value if nothing else is saved / selected is 50%
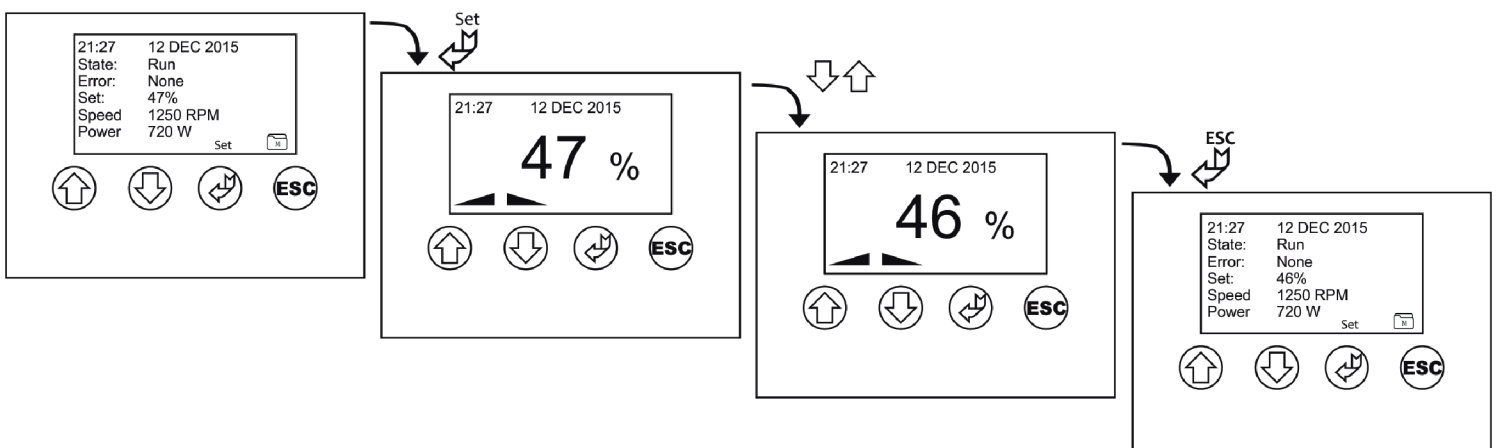
EC Modbus Display Information Screens

The following list states what type of information which is displayed on the EC Modbus Display when in operation.

- ➲ 1Status:
  Ready: No error and RPM = 0
  Run: No error and RPM > 0
  Fault: Error > 0

- ➲ Error / warning
  If there are no errors and no warnings then text will be None.
  If there are no errors but warnings, see ›Warning table‹ on next page.
  If there are errors, see ›Error table‹ on next page
  Errors will suppress warnings.
  Only one error / warning is displayed at a time - See last 2 points on list for further about errors / warnings.

- ➲ Set.: This is the input voltage applied to fan. Unit is %

- ➲ Speed: This is the current calculated speed value from fan. Unit is RPM.

- ➲ kWh: Energy consumption displayed in integers. Maximum is 100000kWh.

- ➲ Power: This is the current calculated power consumption of the fan. Unit i W.

- ➲ T.Fan: This is the motor temperature in °C.

- ➲ T.Module: This is the power module temperature in °C.

- ➲ T.Elec: This is the electronics temperature in °C.

- ➲ Dclink V: This is the current calculated DC-link voltage.

- ➲ Dclink A: This is the current calculated DC-link ampere.

- ➲ Hours: After every hour the fan has run this counter increases by 1. (total number of operating hours).

- ➲ Model: This is the fan model type.

- ➲ Serial number: This is the serial number from the fan.

- ➲ SW-B: This is the bus controller SW version.

- ➲ SW-C: This is the commutation controller SW version.

- ➲ E-Num: This is the decimal value of current error variable from fan.

- ➲ W-Num: This is the decimal value of current warning variable from fan.

Error and Warning tables

Error Table	alg00566818_ENG of 3 Nov 2015 Column 1: Error spec from ebmpapst doc:
ULOW	DC link under voltage
BLK	Locked motor
HLL	Hall sensor error
TFM	Motor overheated
SKF	Communication error
TFE	Power module overheated
PHA	Phase failure (3-phase device) or mains under voltage (1-phase device)

Errors are classified most significant = PHA and least significant = ULOW (previous page on information screen). Please seek more information in ebmpapst manuals. .

Warning	alg000566818_ENG of 3 Nov 2015 Column 1: Warning spec from ebmpapst doc
SHF	Shedingfct. Active
UEHI	Supply voltage high
UZHI	DC-link voltage high
HEAT	Heating enabled, the fan should not be started.
CBREAK	Cable break at set value analog input
NLOW	Actual speed is less than limit speed for running fan
BRAKE	Brake mode
UZLO	DC-link voltage low
TEIHI	Electronics interior temperature high
TMHI	Motor temperature high
TEHI	Output stage temperature high
PLIM	Power limitation engaged
LHI	Line impedance too high
ILIM	Current limitation engaged

Warnings are classified most significant = ILIM and least significant = SHF (previous page on information screen). Please seek more information in ebmpapst manuals.

Technical Data:

Power Supply:	230 VAC
Mains:	13A main fuse
Power Consumption	Max <1W
Operating Temperature>	0-60°C
RS-485	Channel A and B
SD card	MicroSD, max size 2Gb
Jumper	120 Ohm termination RS-485
Weight	100 g.
Enclosure	IP 40
Dimensions (HxWxD)	85x85x33 mm

WEEE

Electrical and electronic equipment contains material which may be hazardous to human health and environment if it is not handled correctly at disposal.

Electrical and electronic equipment is marked with a crossed/out wheelie bin logo. This logo symbolises that electrical and electronic equipment must not be disposed together with normal household waste but must be collected separately.

Contact your local authorities for further information on disposal of equipment under the WEEE directive.

Applicable Standards
EN 61000-6-1 and EN 61000-6-3 Electromagnetic Compability (EMC)
EN-60335-1 Product Standard

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