

MultiController E 0-100% 24V and 230V

Manual output controller 0-100%, 4 step or on/off
Scheduler and Modbus interface

Software version 2.4



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Description

MultiController E 0-100% for adjustment of output signal (0-10V) from 0 to 100%, 4 steps or on/off.

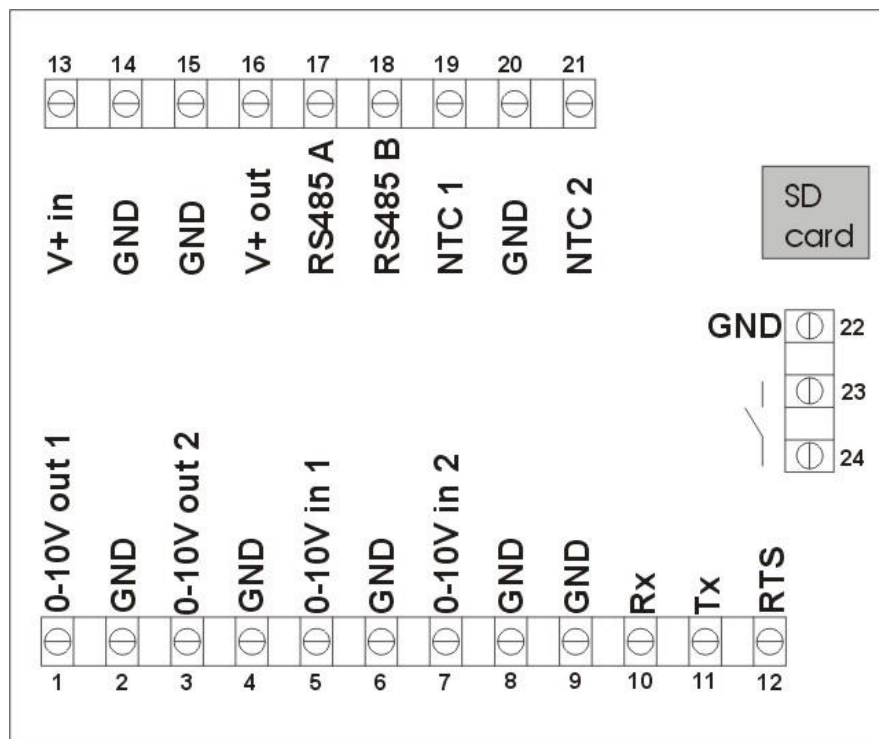
The integrated scheduler function allows for individual adjustment of the output signal with up to 10 shifts per day. Clock with integrated battery backup. RS-485 interface with MODBUS® protocol function facilitating connection to network system.

Built-in quick guide for easy setting up and adjustment. Integrated micro SD card reader for easy updating of software (support cards up to 2Gb).

1 Mounting

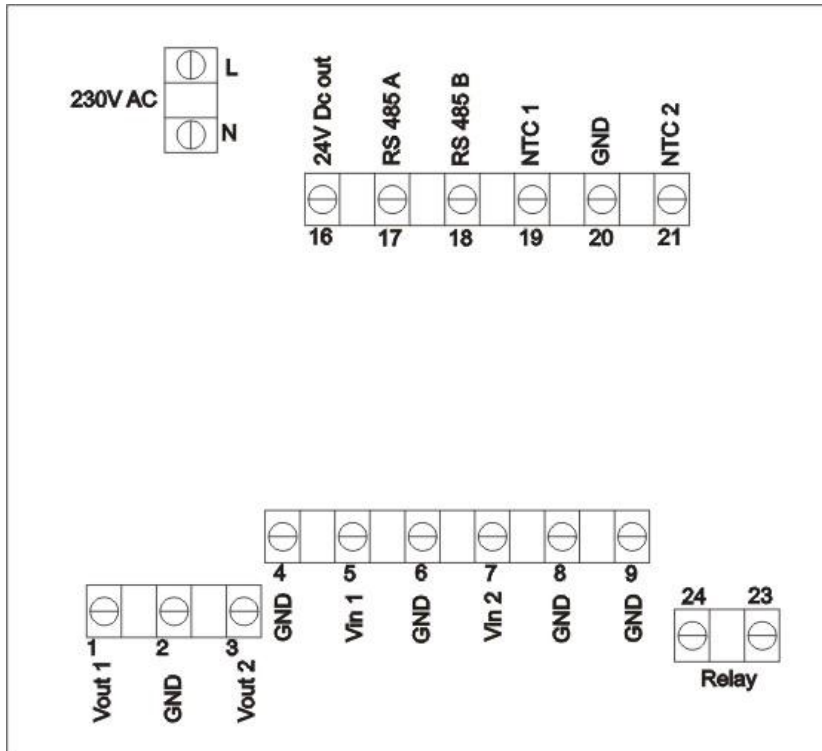
MultiController E 0-100% is mounted according to the general applicable installation rules in the low voltage directive. The unit is to be carefully fixed on a plane and stable surface with screws in the 2 oval holes. The unit is not to be fixed on moving or vibrating surfaces. Avoid exposure to high temperatures and direct sunlight on the unit. If long connection cables are used, ensure that the unit is not disturbed by electromagnetic interference.

Terminal connections 24V version



Terminal no.	Description	Comments
1 and 2 (Vout1)	0-10V output 1	Load max 10mA
3 and 4 (Vout2)	0-10V output 2	Load max 10mA
5	Not in use	
7 and 8	0-10V output (for external setpoint)	7K ohm input impedance
13 and 14	Connection of power supply	15-30VDC or 24VAC
15 and 16	Power supply of auxiliary outlet	As terminals 13 and 14
15,17 and 18	RS 485 Modbus	
2,4,6,8,9,14,15,20,22	0V / GND	
19	Not in use	
20-21	Tacho, PIR or Alarm input	
23 and 24	Voltage free contact. Function depending on choice of model	24VDC NO, 3A AC1

Terminal connections 230V version






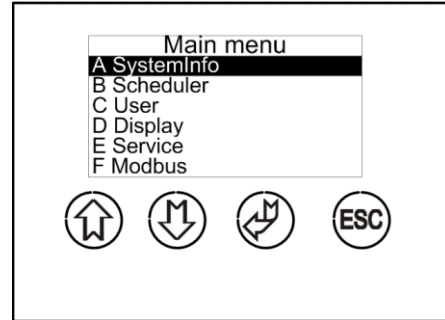
Terminal no.	Description	Comments
L and N	Connection of power supply	230V AC $\pm 10\%$
1 and 2 (Vout1)	0-10V output 1	Load max 10mA
3 and 4 (Vout2)	0-10V output 2	Load max 10mA
5	Not in use	
7 and 8	0-10V input (for external setpoint)	7k Ohm input impedance
16 and 9	24V power output	+24VDC max 100mA
17 and 18	RS 485 Modbus	
19	Not in use	
2,4,6,8,9,20	0V / GND	
20-21	Tacho, PIR or Alarm input	
23 and 24	Voltage free contact. Function depending on model	5A-AC1, 250VAC

2 Functions





2.1 User interface

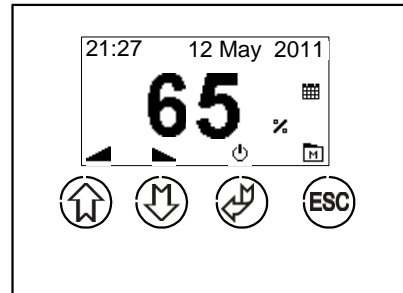
The display is operated by push buttons. The general function of each button is shown below.

Icon	Function
	Enter
	Increase / step up
	Decrease / step down
ESC	Escape, cancel



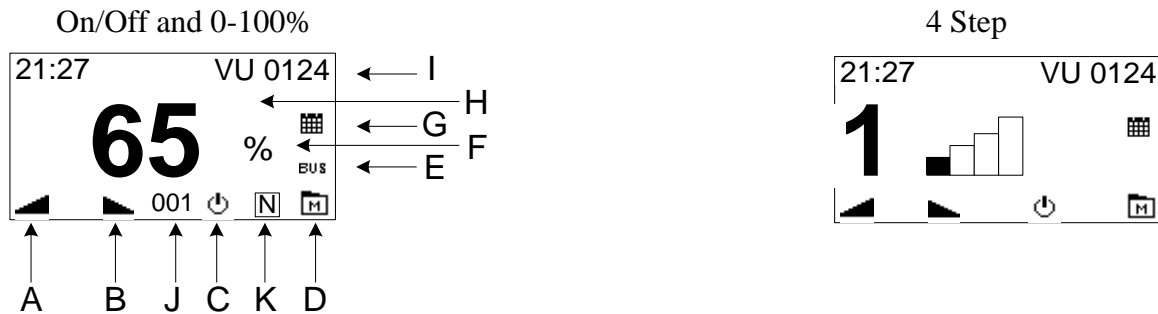
Shortcuts are available in the main window. They are indicated by an icon above the button.

Icon	Function
	On/Off
	Increase / Step up
	Decrease setpoint
	Go to menu



2.2 Main window

In the main menu the current start level and status of the enabled functions are displayed (scheduler and Modbus). The icons at the bottom of the display indicate the function of the buttons.



- A) By pressing "arrow up" the level of the output signal is increased.
- B) By pressing "arrow down" the level of the output signal is decreased.
- C) By pressing "On/Off" the output signal changes between On and Off.
- D) By pressing "menu" the displayed window changes to the main menu window.
- E) Icon indicating that Modbus communication is enabled.
- F) Icon indicating that the output signal is adjusted in percentage / in steps 0 to 4.
- G) Icon indicating that the scheduler function is enabled.
- H) Level of current output signals.
- I) Display of time and date and, if applicable, plant name / alarm (optional).
- J) Display of extended operation in minutes, if enabled.
- K) Display of PIR operation (motion sensor), if enabled.

2.3 Quick set-up:

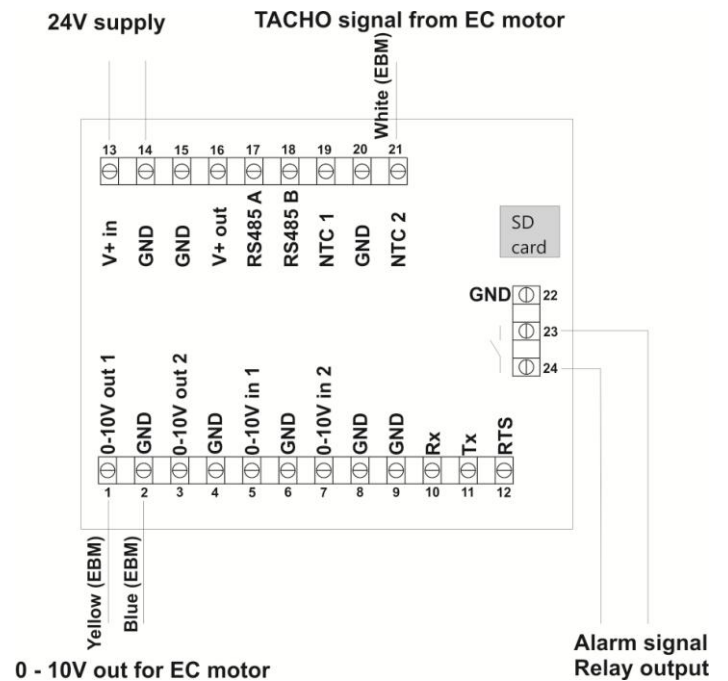
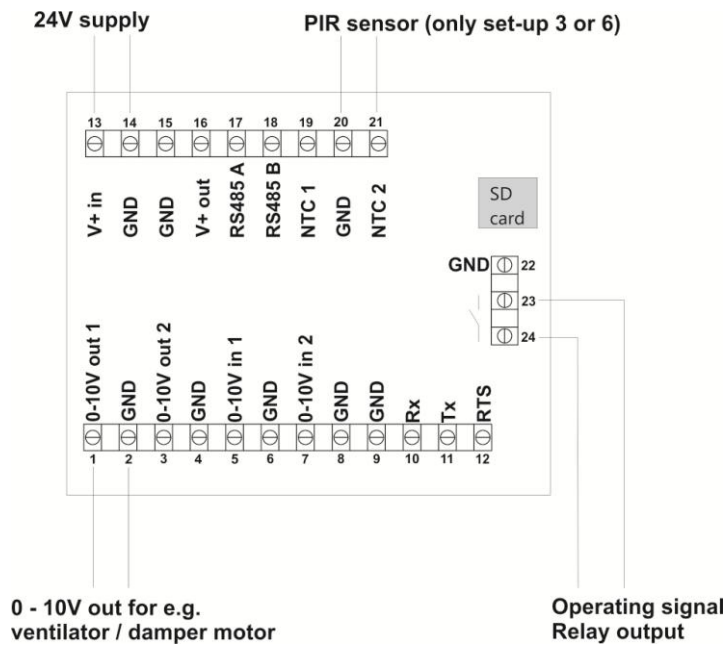
The first time the controller is connected to power, the function of the controller is selected: Initially language is selected, subsequently the desired settings are selected (01-06). Now the operation parameters will be adjusted to the selected set-up. A new quick set-up can be done by resetting the unit (D4).

Set-up	Description
01: ON/Off:	For change between 2 levels (low/high). Both voltage levels are adjustable. E.g.: 0,0/10V 3,5/8,0V etc. Press Enter to change level or use the integrated scheduler. Relay output is closed = "ON"
02: 0-100%:	For stepless level adjustment by pressing "arrow up" and "arrow down". The integrated scheduler function is able to change between 3 operation levels: Stop – Normal setpoint – Alternative setpoint. The relay output closes when the voltage level is higher than the selected level (normally at 0.1V, i.e. the relay operates as an operation relay).
03: 0-100%+PIR:	Function as 02 , but instead of the scheduler function, a PIR motion sensor is used to change between 2 operation levels*. In PIR mode the scheduler function is not available.
04: 0-100%+Tacho:	For use with EC motors with Tacho signal (rotation alarm). Function as 02 and in addition a missing Tacho signal will activate an alarm text in the display.
05: 4 Steps:	For control in 4 fixed steps (all steps are user defined).
06: 2 Steps+PIR:	For change between 2 operation levels* via a connected PIR motion sensor.

*) Or change between stop and an operation level.

Set-up of 01(ON/OFF), 02(0-100%) and 03 (0-100%+PIR), 05 (4 step) and 06 (2 step PIR):

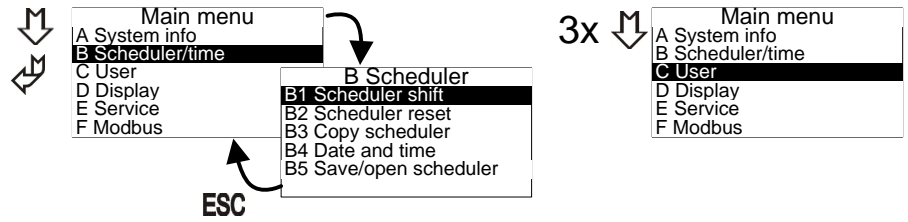
Set-up of 04(0-100% +Tacho):



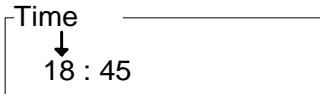
2.4 Menu structure:

The menu is operated by 4 buttons. The function of the individual button is indicated on the button. The menu consists of a main menu with submenus. Configuration parameters are accessed from the submenus. Automatic time out from menu, if the buttons have not been activated for 2 minutes.

Example – menu operation:



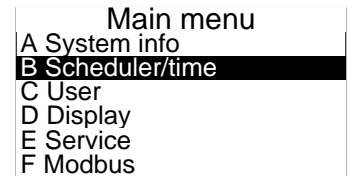
Different pop up boxes are available for editing of mode parameters.



Arrow up and arrow down are used for editing of values. The cursor is moved by activating the Enter key. After the last figure, the value is saved by pressing Enter. Esc to cancel editing without saving it.

2.5 Main menu and submenus

The submenus, A – F, are accessible from the main menu.



2.6 Systeminformation (A menu)

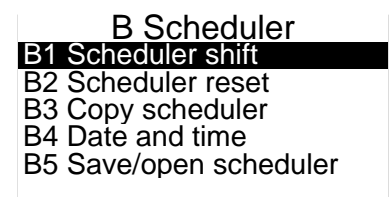
In this menu the controller input and output signals and current operating data are displayed. The window is updated approx. every 5 seconds.

Information		Information	
01 I-ntc	: 21.4	07 VIN1	: 32 %
02 Ntc1	: 23.4	08 VIN2	: 74 %
03 Ntc2	: -13.7	09 VOUT1	: 1 %
04 VIN1C	: 2.1	10 VOUT2	: 100%
05 VIN2C	: 8.6	11 PID1	: 10
06 REL	: ON	12 PID2	: 1000

- 01: I-NTC temperature measured with internal sensor
- 02: NTC1 Not in use
- 03: NTC2 Not in use
- 04: VIN1C Not in use
- 05: VIN2C Not in use
- 06: REL Relay position OFF = open switch ON= closed switch (terminals 23+24)
- 07:VIN1 Measured input signal on VIN1 input (terminals 5+6)
- 08: VIN2 Measured input signal on VIN2 input (terminals 7+8)
- 09:VOUT1 Output signal on VOUT1 (terminals 1+2)
- 10: VOUT2 Output signal on VOUT2 (terminals 3+4)
- 11: PID1 Not in use
- 12: PID2 Not in use

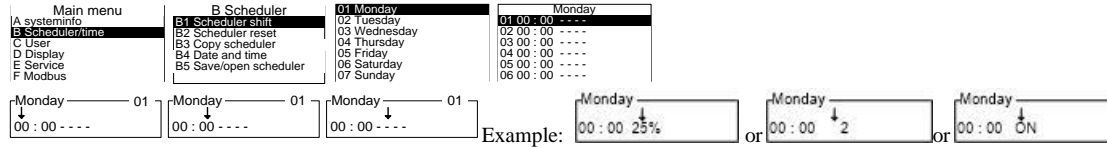
2.7 Scheduler menu (B menu):

The integrated scheduler function is a week scheduler with 10 shifts per day. The scheduler function is enabled / disabled in the user menu (menu point C3). An icon in the main window indicates the current scheduler status.



B1:

Program the scheduler function in menu B:



Set the time for the required shift and press enter ↵. Now you have 4 options:

Repeat the above the required number of shifts and for each day.

NB! A shift is only active, if it is different from ----

Note that it is still possible to manually edit the setpoint in the main window (if the safety level is 0 or 1), but at the next event shift, the scheduler will revert to the settings.

B2: Scheduler reset.

Use this function to reset the scheduler. **Note!** All settings will be deleted!

B3:

Copy of scheduler settings from one day to another day. Previous settings will be overridden during copying.

B4: Date and time.

In this menu the time, date and weekday are set.

The clock is a 24 hour clock. Automatic change between summer and winter time is optional.

The clock in the MultiController is equipped with a battery back-up to ensure that short power cuts do not affect the clock. In case of longer power cuts (> 72 hours) the clock must be reset.

B5: Save / open scheduler.

It is possible to copy the scheduler settings by using the "save/open scheduler" function. Insert a MicroSD card (max 2GB) in the MultiController. When the settings have been saved, the SD card is removed and inserted in a new MultiController, and the settings are retrieved via menu B5 and press "open".

2.8 User menu (C menu)

The user menu includes the frequently used control configurations.

The below functions can be edited in this menu:

C1: The setpoint is adjusted in this menu. (This menu has no function for 4 step / 2 step + PIR function)

The setpoint can be changed in the main window (arrow up / arrow down). This setpoint will, however, only be active until the next event shift from the scheduler or on/off from the main.

C2: Enabling and disabling of integrated scheduler.

C3: From Off position, it is possible to enable a boost on the 0-10V output (e.g. to boost start a large motor). The boost level is adjusted in menu point **E3**. To disable the boost function, set the time to 0 sec.

C4: Safety level are set in this function

0 = Only service menu is password protected (password: **5550**)

1 = All menus are password protected

2 = All buttons except Enter button (On/Off function) are password protected

3 = All buttons are password protected

C5: Extended operation (number of minutes).

Extended operation is chosen by pressing the Enter key for 3 seconds and then select "ON" by use of the arrow buttons. When the extended operation finishes, the MultiController will stop ("OFF"), and it will start again when Enter is pressed or when the next scheduler shift occurs. Extended operation is shown in the display (see Symbol "J" on figure 1 page 4).

C6: Setpoint source.

Select the setpoint from the MultiController or via external control signal on input Vin2.

If "external" is selected, the signal must be defined in **E25-E28** and **E42** should be set at "Volt".

C8: Alarm.

If 0 sec is selected, the alarm function is not active. If 2-60 sec is selected, the alarm function is active. The time selected determines how long the alarm setpoint (**E43**) is allowed to be exceeded before the alarm relay (terminals 23-24) opens. Alarm is indicated in the display by "Alarm Din".

NOTE. If the alarm function is enabled, the normal operation relay function is not available.

C9: Optional plant text. Can be enabled and disabled. (Text is entered in **E44**).

C10: Operation hour counter: In this field the number of months are entered after which time the "service text" will appear (the text is entered in **E45**). The text is visible for 15 seconds and will reappear once a minute until the counter has been reset.

Reset of counter: Press the ESC button for 3 seconds when the "service text" is not visible in the display. Press enter to accept the reset.

2.9 Display menu (D menu)

This menu is password protected. This menu contains vital configurations. Erroneous adjustment of these configurations may destroy the functionality.

The password is 5550

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

D1: Information on software version and model.

D2: Language. Danish, English, Swedish and German is available.

D3: Contrast in display. Adjusted via the arrow keys.

D4: Factory reset.

Factory reset may have an effect on vital configurations and approval prior to reset is therefore required. Note that scheduler events will also be reset. After reset the MultiController will restart showing the quick start guide for selection of model and function.

D5: Save / open setpoints. Save setpoints to MicroSD card / open setpoints from MicroSD card (max. 2Gb).

D6: (Only available if the MultiController is purchased as a Regulate model). The MultiController can either be a Regulator or a manual (0-100%) adjustment controller – this is selected in this menu. If the Regulator model is chosen, please use the manual for MultiControllerE Regulate. This manual is available on www.lscontrol.dk.

2.10 Servicemenu (E menu)

In the service menu you will find the advanced configurations. This menu is password protected. This menu contains vital configurations and erroneous adjustment of these configurations may destroy the functionality.

The password is 5550

The following configurations can be edited in the service menu:

E1: Model choice.

In this menu point, the output signal function is selected: On/Off, stepless or 4 step.

E2: Minimum output voltage.

If the connected equipment is unable to regulate from 0 Volt, the minimum output signal can be adjusted in this menu point.

E3: Maximum output voltage.

If the connected equipment is unable to regulate up to 10 Volt, the maximum output signal can be adjusted in this menu point. Note: This level is also the boost level (100%).

E4: Adjustment of start level.

The manual start level can be set at 3 different start values.

- 1) Minimum level.
- 2) Maximum level.
- 3) The level the controller was set at when it was last turned off.

Note that this function is only available if the controller mode (menu point **E1**) is set at percentage %.

The boost function (menu point **C3**) has priority over start level.

E5: Inverted output.

It is possible to invert the output in this menu point: e.g. 100% = 0V out / 1%=9.9V out.

E25-E28: These menu points are used for adjustment of the MultiController setpoint via an external control signal. In E25/E26 the voltage range is defined. In E27/28 the corresponding min and max voltage signals (in %) are defined.

E25: Minimum voltage that the connected voltage source is able to supply (on Vin 2)

E26: Maximum voltage that the connected voltage source is able to supply (on Vin 2)

E27: Signal value at minimum.

The corresponding minimum value in % (e.g. 0V = 0%) of the voltage source at minimum (**E25**) is entered in this menu point.

E28: Signal value at maximum.

The corresponding maximum value in % (e.g. 10.0V = 100%) of the voltage source at maximum (**E26**) is entered in this menu point.

E40: Vout2 (output 2)

If E40 = 0, Vout2 will be 10V DC. E40=1 is not in use. If E40=2, the output will be an offset of output 1 (Vout 1). See **E49**.

E42: Selection of sensor input.

External = Not in use. **Volt** = 0-10V signal on terminals 7-8 (The 0-10V signal is defined in menu E25-E28).

Alarm = 20-21 (NTC2) is used as alarm input (open signal=alarm text + relay). **Tacho** = terminals 20-21. **PIR1** = terminals 20-21(open signal = no movement in the room). **NTC10K** = not in use. **PIR2** (change between NORM/OFF operation) = terminals 20-21. **Alarm2** = terminals 20-21 used as alarm input (open signal = alarm text).

E44: User defined text Name.

A plant name or similar may be entered: E.g. "Plant 4" (Max 12 characters, the text is enabled in **C9**)

E45: User defined text – Operation hour counter.

A service text or similar may be entered: E.g. "It is time for service" (Max 6 lines of 12 characters, the counter is enabled in **C10**).

E46: Alarmlevel Min (Alarm is enabled in **C8**)

At **E42=TACHO**: Lower limit for tacho signal. Adjustment: If the tacho alarm is activated when motor operates at min rotations, the value must be increased.

At **E42=Alarm**: If the alarm is activated when the input is connected via an "open collector", the value must be increased. (If the input is connected via relay switch, adjustment is not required).

E47: Alarm level Max (Alarm is enabled in **C8**): Upper limit for tacho signal. Adjustment: If the tacho alarm is activated when the motor operates at max rotations, the value must be increased.

E48: PIR Time. The required operation time delay for the PIR input (in seconds) is entered in this menu point.

E49: Offset of Vout2 in relation to Vout1. (Only if **E40=2**) Formula: $Vout2=Vout1 \times (E49/100)$.

E52: Time delay(in seconds) before the output signal is released at start. (The output signal will stay at 0V for delay time period. Relay changes without delay).

E55: Level for step 1(In %)

E56: Level for step 2(In %)

E57: Level for step 3(In %)

E58: Level for step 4(In %)

2.11 Modbus menu (F menu) (MODBUS parameter list is available on WWW.LSCONTROL.DK)

MultiController E Regulate is prepared for configuration as Modbus slave. The interface is serial RS485.

The Modbus unit communicates in accordance with the RTU standard with up to 19200Baud.

Note: The data points in the menus can be set from a Modbus master. With exception of F4 which will function as a blocking if editing of the configuration via Modbus is not allowed.

It is possible to edit the following Modbus configurations in the Modbus menu.

F1: Address: Slave address is entered in this menu.

F2: Baudrate: editing of Baudrate options: Off, 9600 and 19200. Modbus is only active, when baudrate is set at 9600 or 19200.

F3: Parity: Parity options are: EVEN, ODD, NONE.

F4: Permits writing from Modbus. Set the configuration at 1 to edit the Modbus master configuration. Note that this parameter cannot be edited in Modbus. It must be edited manually in point F4.

3 Setpoint overview

Name	Factory settings	Min	Max	Unit
C1 Level	50	0	100	%
C2 SchedulerOnOff	0	0	1	On/Off
C3 BoostTime (0-250sec)	5	0	250	Sec
C4 User rights	0	0	3	
C5 Extended operation	10	1	240	Min
C6 Setpoint source	Internal	Internal	External	
C8 Alarm function	0	0	60	Sec
C9 Optional text	OFF	OFF	ON	
C10 Operation hour counter	0	0	12	Months
E1 Mode (ON/OFF, Percentage %, Step)	Dep. on set.			
E2 OutputMin (0-5V)	0	0	50	Volt 50 = 5.0V
E3 OutputMax (5-10V)	100	50	100	Volt 50 = 5.0V
E4 OutputStart (Min,Max,Last)	Last	Min	Last	
E5 Inverter output	OFF	OFF	ON	
E25 Min Input2	0.0	0.0	10.0	Volt
E26 Max Input2	10.0	0.0	10.0	Volt
E27 Sensor 2 value min	0	0	100	%
E28 Sensor 2 value max	0	0	100	%
E40 Vout2 (0=10V 1=not in use 3=offset of Vout1)	0	0	2	
E42 TempSensor2 selection (Ekstern =NTC2 Volt =Vin2, Alarm = NTC2, Tacho = NTC2 PIR1 = NTC2, NTC10K = not in use, PIR2 = NTC2,)	External			
E44 User text Name				
E45 User text Counter				
E46 Alarm Level Min	10	0	50	
E47 Alarm level Max	60	50	100	
E48 PIR Time	600	1	3600	Sec
E49 Out 2 forskydning	100%	0	200	%
E52 Tid før regulering	0	0	240	Sec
E55 Step 1 niveau	25	0	100	%
E56 Step 2 niveau	50	0	100	%
E57 Step 3 niveau	75	0	100	%
E58 Step 4 niveau	100	0	100	%
F1 ModbusAdress (1-247)	50	1	247	Address
F2 Modbus baudrate(0=Off 1=9600 2=19200)	0	0	2	Velocity
F3 Modbus Parity (1=EVEN 2=ODD 3=NONE)	1	1	3	Data
F4 ModbusAllowWrite	OFF	OFF	ON	OFF/ON

4 Technical specifications

	24V version	230V version
Power supply	15-30VDC or 24VAC \pm 15%	230V AC \pm 10%
Mains	Max 1A	13A
Power consumption	Max 2.4W	Max <1W
Enclosure	IP 40	IP 40
Dimensions (hxwx d)	LSBOX85: 34x87x87 mm LSBOX85:42x87x87 mm DIN rail: 45x85x120 mm Panel:100x100x65 mm(hole:91x91 mm) IP 54 Box: 120x122x56 mm	
Operation Temperature	0 - 60 °C	0 - 50 °C
Relay	24VDC NO, 3A AC1.	5A-AC1, 250VAC NO, 150W /1150VA
0-10VDC input1 (Vin1)	7kOhm input impedance	
0-10VDC input2 (Vin2)	7kOhm input impedance	
0-10VDC output1 (Vout1)	0-10,0V DC Max 10mA	
0-10VDC output2 (Vout2)	0-10,0V DC Max 10mA	
RS-485	Channel A and B	
SD card	MicroSD, max size 2 Gb	
Jumper	120 Ohms termination RS-485	

5 Applied standards

EN 61000-6-1 and EN 61000-6-3 Electromagnetic Compatibility (EMC)

EN-60335-1 The Low Voltage Directive

This product complies with the RoHS directive, Directive 2011/65/EU

Drawing: 950-206605 MultiControllerE-0-100_ES874_24_UK

Date: 04-11-2015

Rev.: 2.4

Software version: Program 2.4 Sub 04

Drawn by: UP/TJ

Manufactured by: LS Control A/S

www.lscontrol.dk - tel. +45 5550 5550