MultiController E Regulate 24V and 230V

Multi function controller with display, scheduler function
and Modbus interface

Software version 2.7

If you wish to alter MultiController E Regulate to MultiController 0-100% it is done by pressing ESC, when 'Main window' is displayed at first connection. Choose menu point 'D' for display and then D6. If MultiController is altered to MultiController til 0-100% it is recommended to download the manual MultiController 0-100%, which is found under downloads at the MultiControllers product pages

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Description

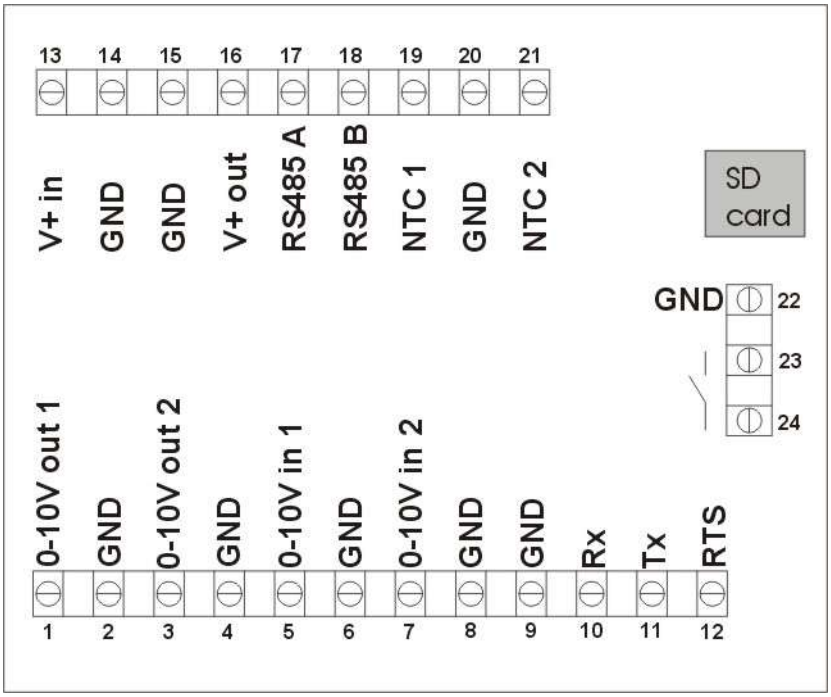
The MultiController E Regulate is a PID/XP multi function controller with integrated display.
It is equipped with a built-in week scheduler for automatic control of setpoints and ON/OFF. Furthermore it is compatible with a number of different input signals, e.g. pressure, flow, temperature, CO_2 and humidity.
MultiController E Regulate is equipped with 2 regulators with 0-10VDC output and a pulse/pause output for adjustment of heating elements. Furthermore it features outdoor temperature compensation, flexible sensor adaptation and Modbus via RS485 connection.

Built-in quick guide for easy setting up and adjustment. Integrated micro SD card reader for easy updating of software. Furthermore it is possible to update software as well as import and export scheduler settings and setpoints via the integrated Micro SD card reader (supports cards up to 2Gb).

1 Mounting

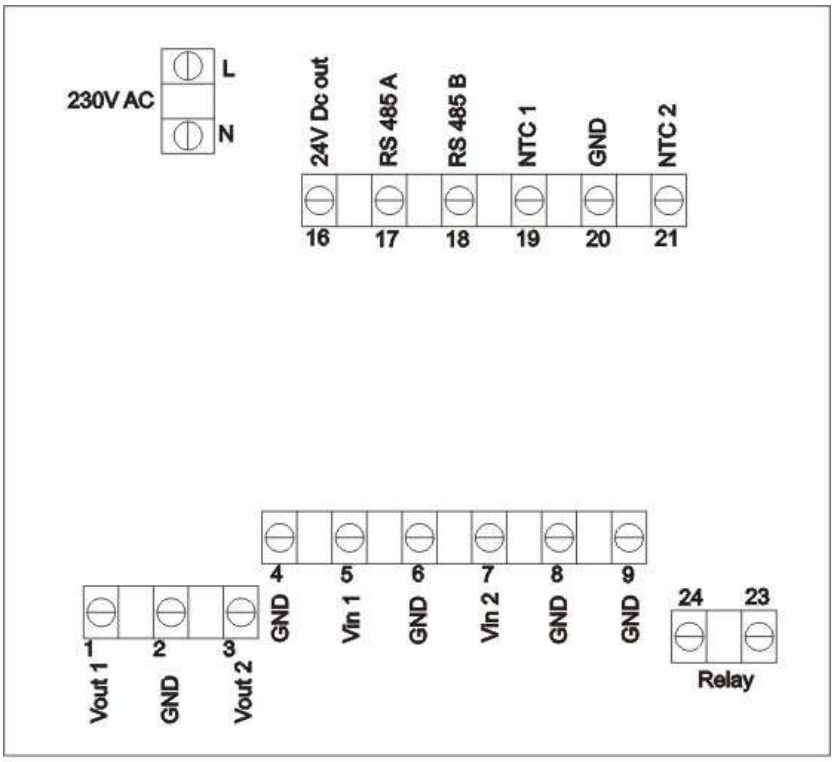
The MultiController E is mounted according to the general applicable installation rules in the low voltage directive. The unit is to be fixed on a plane and stable surface with screws in the 2 ovale holes. The unit is not to be fixed on moving or vibrating surfaces. Avoid exposure to high temperatures 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 nos	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 and 6 (Vin1)	0-10V input 1	7k ohm input impedance
7 and 8 (Vin2)	0-10V input 2	7k ohm input impedance
13 and 14	Connection of power supply	15-30VDC or 24VAC
15 and 16	Power supply auxiliary outlet	As terminals 13 and 14
15,17 and 18	RS 485 Modbus	
19 and 20	NTC1 temperature sensor	10k / 22k Ohm NTC
20 and 21	NTC2 temperature sensor / Alarm input / PIR input	10k / 22k Ohm NTC / switch
2,4,6,8,9,14,15,20,22	0V	
23 and 24	Voltage free contact. Function depending on model	24VDC NO, 3A AC1

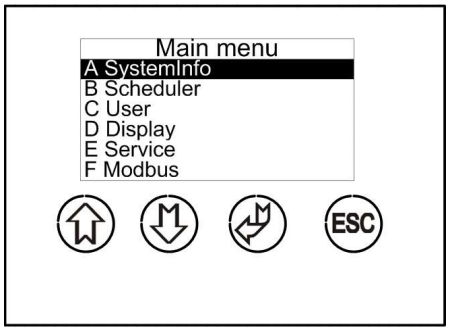
Terminal connections 230V version



Terminal nos	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 and 6 (Vin1)	0-10V input 1	7k ohm input impedance
7 og 8 (Vin2)	0-10V indgang 2	7k ohm input impedance
L and N	Connection of power supply	230V AC ±10%
16	24V power outlet	+24VDC max 100mA
17 and 18	RS 485 Modbus	
19 and 20	NTC1 temperature sensor	10k / 22k NTC
21 and 20	NTC2 temperature sensor / Alarm input / PIR input	10k / 22k NTC / switch
2,4,6,8,9,20	0V, GND	
23 and 24	Voltage free contact. Function depending on model.	5A-AC1, 250VAC

2 Functions

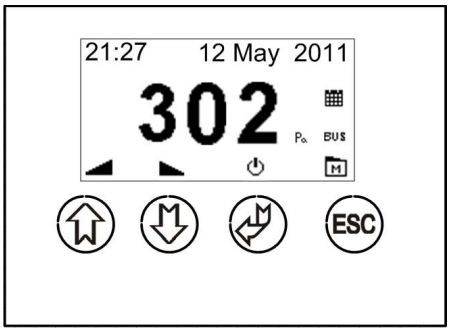
2.1 User interface



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.
These are indicated by an icon above the button.



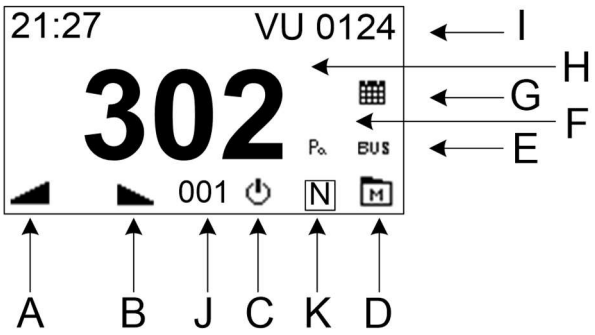
Icon	Function
⏻	Change between Normal/Alternative/Stop mode. Press for 3 sec to activate ”extended operation”
◢	Increase of setpoint
◣	Decrease of setpoint
M	Go to menu

2.2 Main window

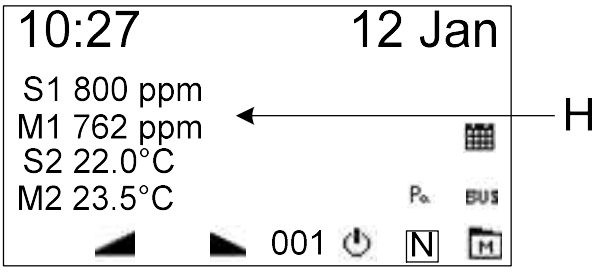
In the main window, the current setpoint or measured value as well as the status of the enabled functions (e.g. scheduler and modbus) are displayed. The icons at the bottom of the display indicate the functions of the buttons.

A) By pressing ”arrow up”, the selected setpoint is increased.
B) By pressing ”arrow down”, the selected setpoint is decreased.
C) By pressing ”on/off” the Regulator changes between normal/alternative and off.
D) By pressing ”menu” the display window changes to main menu window.
E) Icon indicating that Modbus communication is enabled.
F) Icon indicating current unit setting (E1).
G) Icon indicating that scheduler function is enabled.
H) Setpoint is indicated with ”Set” after the number.
I) Display of time and date and, if required, plant name / alarm.
J) Display of extended period time.
K) Display of normal setpoint (N) alternative setpoint (A) or (P) PIR operatioin (motion sensor).

Fig.1



It is also possible to display two regulators in the main window (double window). See setpoint, C7.



S1: Setpoint regulator 1
M1:Measured value regulator 1
S2: Setpoint regulator 2
M2: Measured value Regulator 2

2.3 Quick set-up guide:

The first time the controller is connected to power, the function of the controller is selected (01-06).
Subsequently the operation parameters will be adjusted to a standard set-up. A new quick set-up can be done by resetting the unit (D4).

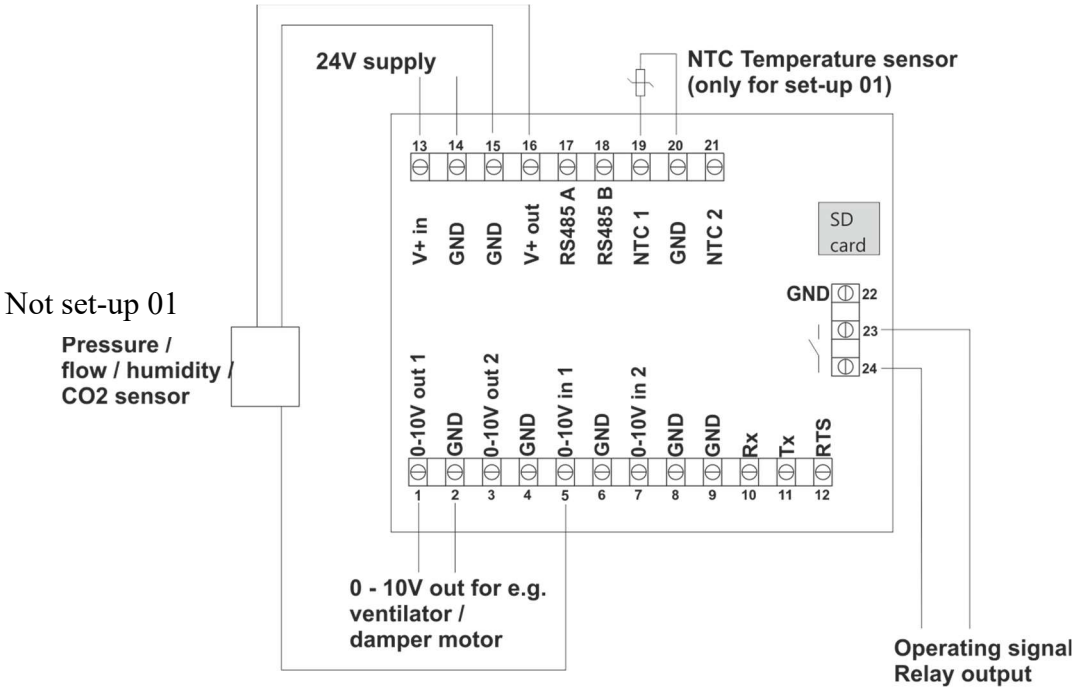
Regulator choice	**Type / output**
01 Temperature	**Temperature 0-10V.** Use this set-up if you want to regulate damper, ventilator or water valve with 0-10V.
02 Temperature 1 heating element:	**Temperature 1.** Use this set-up for temperature control of one (1) electrical heating elements via solid state relays. 1 pulse output 0/10V.
03 Temperature 2 heating element:	**Temperature 2.** Use this set-up for temperature control of two (2) electrical heating elements via solid state relays. Heating element 1 is pulse controlled, heating element 2 is subsequently switched on. The power distribution should be: 1+1. 2 pulse outputs 0/10V.
04 Temperature 3 heating element:	**Temperature 3.** Use this set-up for temperature control of three (3) electrical heating elements via solid state relays. Heating element 1 is pulse controlled, heating elements 2 and 3 are switched on via binary system. The power distribution should be: 1+1+2. 3 pulse outputs: 2 x 0/10V+ 1 x relay.
05 Constant flow	Use this setup if you want to maintain a constant flow velocity in the ventilation. 0-10V output.
06 Constant pressure	Use this set-up if you want to maintain a constant pressure in the ventilation / room. 0-10V output.
07 Constant humidity	Use this set-up if you want to maintain a constant humidity level in a room. 0-10V output.
08 Constant CO2	Use this set-up if you want to maintain a constant CO2 concentration in a room. 0-10V output.
09 CO2 +Temp	Use this set-up if you want to maintain a constant CO2 / temperature level in the room. (If either the CO2 level or the temperature becomes too high, the output signal will increase). 0-10V output.
10 Temp + Temp	Use this set-up if you want to maintain a constant temperature in the room (by room sensor). An inflow sensor is connected to ensure that a minimum inflow temperature is maintained regardless of room temperature (to avoid draft problems). 0-10V output.
11 Compressor	Used for controlling a cooling compressor + condenser fan. Separate manual for this function can be downloaded from our web side.

Description of set-up options:

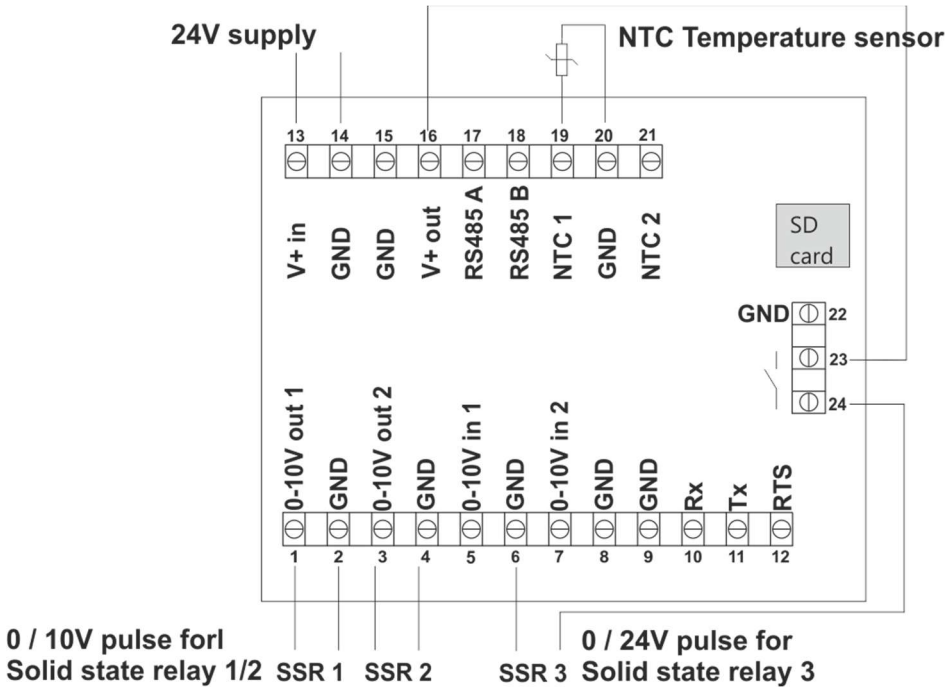
Note! It is possible to connect a PIR sensor on set-up options 01 – 08. The PIR sensor will change between 2 setpoints (E42=PIR1) or between stop and normal setpoint (E42=PIR2). This may be used as a means of saving energy when a room is not occupied.
The PIR sensor must be connected to terminals 20 and 21.

Please see additional connection examples on the next page.

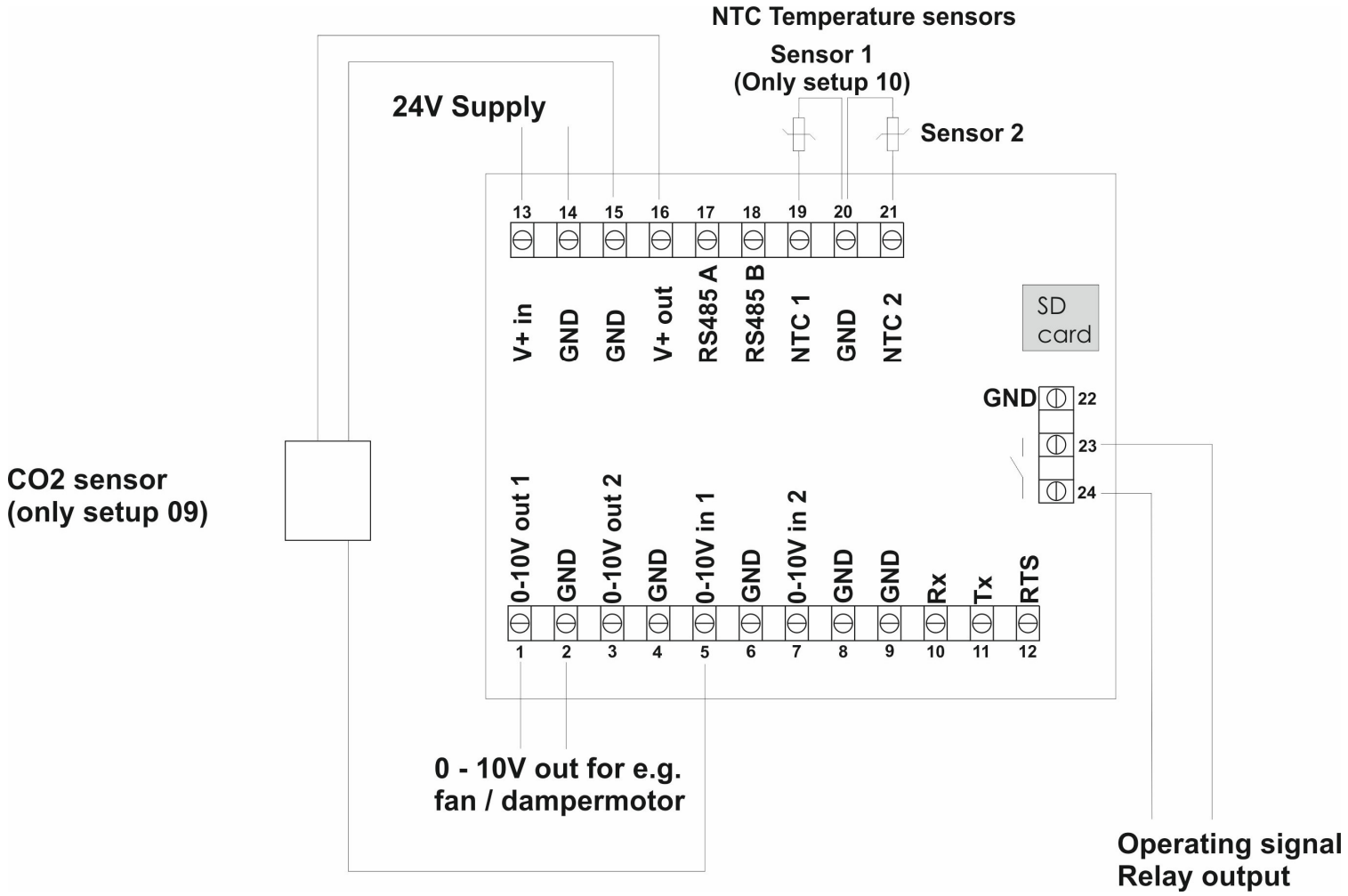
Set-up 01-05-06-07-08



Set-up 02-03-04



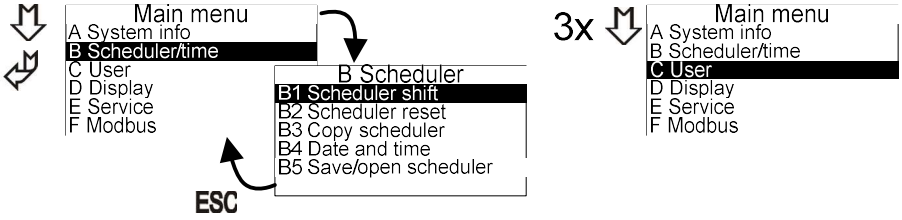
Set-up 09-10


NTC Temperature sensors
Sensor 1
(Only setup 10)
Sensor 2
24V Supply
13 14 15 16 17 18 19 20 21
V+ in
GND
GND
V+ out
RS485 A
RS485 B
NTC 1
GND
NTC 2
SD
card
GND
22
23
24
CO2 sensor
(only setup 09)
0-10V out 1
GND
0-10V out 2
GND
0-10V in 1
GND
0-10V in 2
GND
GND
Rx
Tx
RTS
1 2 3 4 5 6 7 8 9 10 11 12
0 - 10V out for e.g.
fan / dampermotor
Operating signal
Relay output

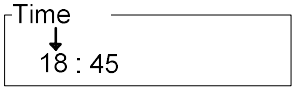
2.4 Menu structure:

The menu is operated by 4 buttons. The function of the 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:



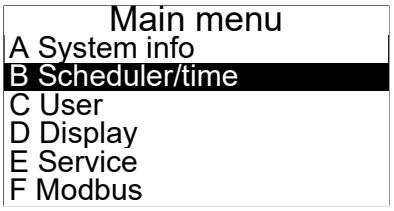
Different pop up boxes are available for editing of model parameters.



Arrow up and arrow down are used for editing of values. The cursor is moved by pressing Enter. After the last figure, the value is saved by pressing Enter. Press ESC to cancel the changes.

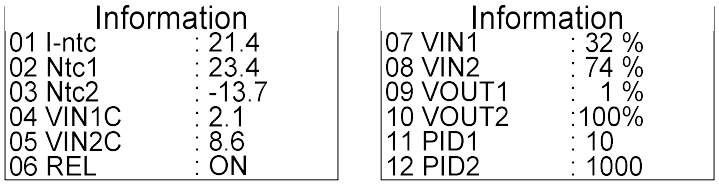
2.5 Main menu and submenus

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



2.6 System information (A-menu)

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



01: I-NTC Temperature measured with internal sensor
02: NTC1 Temperature measured at NTC1 input (terminals 19+20). No sensor = - 40°C
03: NTC2 Temperature measured at NTC2 input (terminals 20+21). No sensor = - 40°C
04: VIN1C The calculated value of VIN1. (Ex: If E15 + E16 have been defined as 0V= 0Pa/10V=500 Pa, 5V on VIN1 will result in 250 Pa on VIN1C)
05: VIN2C The calculated value of VIN2. (Ex: If E27 + E28 have been defined as 0V= 0°C/10V=50°C, 5V on VIN2 will result in 25°C on VIN2C)
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 PID regulator 1
12: PID2 PID regulator 2

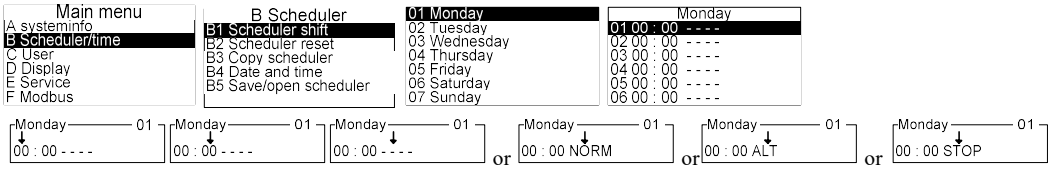
2.7 Scheduler menu (B-menu):

The built-in scheduler function is a week scheduler with up to 10 shifts per day.
The scheduler function is enabled/disabled in the user menu (menu point C2).

The scheduler allows you to switch between Normal (NORM) setpoint, Alternative (ALT) setpoint or Stop on a specific day / time.

An icon in the main window indicates current scheduler status.

B1:
Programme the scheduler in menu B:



Set the time for the required shift and press enter ⏎. Now you have 3 options:

- Choose NORM for normal operation. This setpoint is set in C1.
- Choose ALT for alternative setpoint. The alternative setpoint is set in C3.
- Choose STOP to stop the regulator.

Repeat the above the required number of shifts and for each day (see also menu point B3).
NB! A shift is only active, if it is different from ---- , i.e. if one of the 3 options above are chosen.

Note that it is still possible to manually edit the setpoint in the main window. At the next event shift, the scheduler will revert to the settings.

B2: Scheduler reset.
Use this function to reset the scheduler.
NB! All scheduler settings will be deleted (except date and time).

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 time, date and week day are set.
The clock is a 24 hour clock. Automatic change between summer and winter time is available.
The clock in the Multicontroller E is equipped with 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.

B5: Save/open function
It is possible to copy the scheduler settings by using the “save/open” function. Firstly insert a MicroSD card (max 2GB) in the MultiController. When the settings have been saved, the SD card can be moved to another MultiController, and the saved settings can be retrieved by entering menu B5, press open and the saved settings will be retrieved.

2.8 User menu (C-menu)

The user menu comprises frequently used control configurations.
The below functions can be edited in this menu:

C1: The regulator setpoint (Reg 1) is set in this function (NORM). This setpoint is also the setpoint that the scheduler will use as NORM value. The setpoint can be edited in the main window (arrow up / arrow down), this function is not available in double window mode (C/7). However this change is only valid until the next event transition from the scheduler or On/Off in the main window.

C2: Enabling and disabling of the Integrated scheduler.

C3: Setpoint for regulator (Reg 1) in alternative (ALT) scheduler mode.
An ALT (alternative) setpoint can be set in the scheduler function.

C4: Safety levels are set in this function.
0 = Only service menu is password protected
1= All menus are password protected
2= All buttons except Enter (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 expires, the multicontroller will stop ("OFF"), and it will start again when Enter is pressed or when the next scheduler shift occurs. Extended operation is indicated 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 (signal to be defined in **E25-E28)**

C7: Display of setpoint or measured value of connected sensor or double window display.
In this function it is possible to change the value displayed in the main window to be either the setpoint (C7=OFF) or the measured value (C7=ON).
Measured value can be displayed either as a current value, or as an average of the last 10 measured values.
Note that if it is chosen to have the measured value displayed, the setpoint will be displayed for approx. 5 seconds (indicated with "Set" after the figure) when the setpoint is adjusted in the main window and at operation shift. If C7="dobb display" is selected the double regulator window will appear and the values (setpoint + measured value) for both regulator 1 and regulator 2 will be displayed simultaneously.

C8: Alarm.
If 0 seconds is selected, the alarm function will not be active. If 1 – 60 seconds is selected, the alarm function will be active. The time selected determines how long the alarm setpoint (E43) is allowed to be exceeded before the alarm relay (clamps 23 – 24) opens. At flow and pressure regulation, the alarm will be activated when the sensor measurement is lower than the alarm point. At temp-hum-CO2 regulation, the alarm will be activated when the sensor measurement is higher than the alarm point. Alarm is indicated in the display with an alarm text.
NOTE. If the alarm function is activated, the operation relay function (E5/E6) 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. Press enter to accept the reset.

C11: The regulator setpoint (Reg 2) is set in this function (NORM).

C12: Setpoint for regulator (Reg 1) in alternative (ALT) scheduler mode.
An ALT (alternative) setpoint can be set in the scheduler function.

2.9 Display menu (D-menu)

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

D1: Information on version and model.

D2: Display language.
Danish, English, Swedish and German is available.

D3: Contrast in display.

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 on MicroSD card / Open setpoints from SD card.

D6: Selection of Multicontroller model - Regulator or 0-100%. If 0-100% is chose, please refer to the manual: Multicontroller E 0-100 available on www.lscontrol.com.

2.10 Service menu (E-menu)

The service menu contains vital configurations. Erroneous adjustment of these configurations may destroy the functionality. This menu is password protected.
The password is 5550
The following configurations can be edited in the service menu:

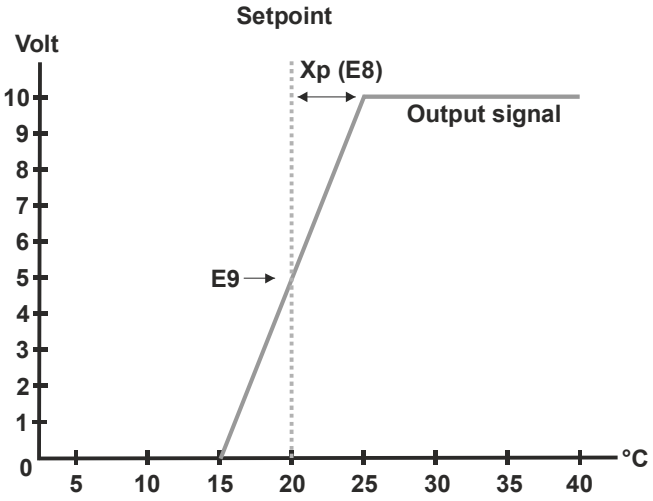
E1: Regulator type **(Regulator 1)**

E2: Setting of controller direction. **(Regulator 1)**
The direction of the controller output can be inverted in this function.
Normal: input signal lower than the desired setpoint = The output signal is increased
Inverted: input signal higher than the desired setpoint = The output signal is increased

E3: Selection of temperature sensor. **(Regulator 1)**
If the controller is set for temperature, it is possible to choose whether the controller is to use an external NTC sensor (E3=EXTERNAL) (terminals 19-20) or a 0-10V sensor (E3=2) (terminals 5-6) or NTC10K ohm NTC sensor (E3=3) (terminals 19-20).

E4: Controller output. **(Regulator 1)**
The controller output can be set as a 0-10V signal or a pulse output (only if the controller has been set to operate as "Temp Pulse").
1 PWM signal output, 2 PWM output signals or 2 PWM output signals + relay switch are available as pulse output signal. The first PWM signal is modulated in relation to the pulse length. This is described in E19.

E5: Relay direction.
The integrated change-over relay can be configured to be NC (E5=0) or NO (E5=1)**. If the alarm function has been activated (C8), this menu point will not be available.**



E6: Relay change by voltage.
The output voltage (Vout1) at which the relay is to change from inactive to active is indicated in this function**. If the alarm function has been activated (C8) or (E42=ALARM), this menu point will not be available.** If E6=0, the relay will change when the regulator becomes active.

E7: Controller type. **(Regulator 1)**
The integrated controller output can be configured as a XP controller or a PI controller.

E8: XP band. **(Regulator 1)**
If the point E7 is selected as the XP, this parameter is used for adjustment of the band width (steepness). The band represents the +/- sensor deviation relative to the setpoint. A low value will result in a considerable change in the output signal (steep), and a high value will result in a less important change in the output signal (less steep).

E9: XP volt at setpoint. **(Regulator 1)**
The output voltage of the setpoint is entered here.

E10: PID controller - P term. **(Regulator 1)**
If E7 is selected as PI controller this value is used as proportional gain parameter.

E11: PID controller - I term. **(Regulator 1)**
If E7 is selected as PI controller this value is used as proportional damping parameter.

E12: PID controller - H term. **(Regulator 1)**
The parameter indicates the sampling frequency (how often this signal is required to be adjusted). The resolution is 100ms.

E13..E16 (Regulator 1)
The controller is designed for configuration with different sensors (See section 2.3).
The sensor range and voltage are adjustable on the parameters E13-E16.

E13: Minimum output voltage of the connected sensor (on Vin1). **(Regulator 1)**

E14: Maximum output voltage of the connected sensor (on Vin1). **(Regulator 1)**

E15: Sensor value at minimum. **(Regulator 1)**
Minimum output voltage of sensor is set in this function (E13).

E16: Sensor value at maximum. **(Regulator 1)**
Maximum output voltage of sensor is set in this function (E14).

E17: Minimum output voltage. **(Regulator 1)**
If the connected equipment cannot adjust from 0V, the min output signal can be adjusted in this function.

E18: Maximum output voltage. **(Regulator 1)**
If the connected equipment cannot adjust up to 10V, the max output signal can be adjusted in this function.

E19: Period time for pulse adjustment. **(Only for use with Temp - Pulse)**
If the controller is set to pulse adjustment output, the pulse period time is edited on output 1 (terminals 1 and 2).

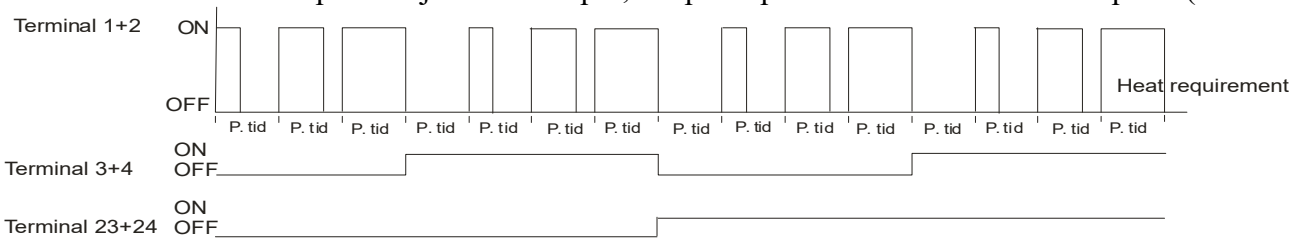


Figure 1: Pulse output sequence

E20..E23: (Regulator 1)
The MultiController E Regulate features an outdoor compensation function. The outdoor compensation function is only active, if pressure regulator or flow regulator have been selected (see paragraph 2.3). The outdoor temperature is measured by a temperature sensor fitted in terminals 20 and 21. The measuring range of the sensor is –40.0 and +60.0 °C. The outdoor temperature compensation function is enabled by adjusting setpoint E20.
If the outdoor temperature drops below setpoint E23, the pressure/air speed setpoint will start to decrease. This decrease will continue until the value for setpoint E22 is reached. The reduction range is adjusted in setpoint E21.
Note:
The outdoor temperature compensation function is only active, if the pressure regulator or the flow regulator has been selected (see section 2.3).

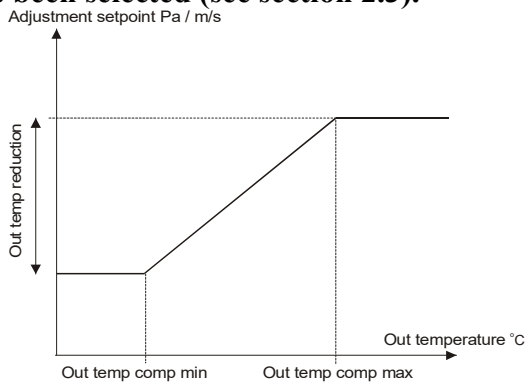


Figure 2: Outdoor temperature compensation.

E24: Not in use.

E25: Minimum output voltage of the connected sensor (on Vin2). **(Regulator 2)**

E26: Maximum output voltage of the connected sensor (on Vin2). **(Regulator 2)**

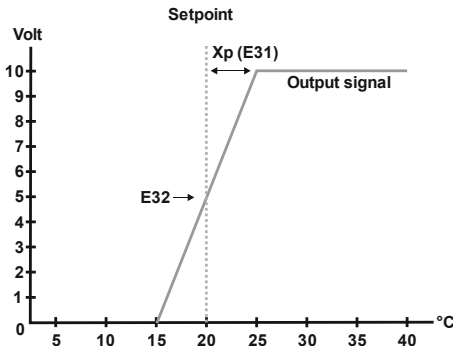
E27: Sensor value at minimum. **(Regulator 2)**
Minimum output voltage value of the sensor is entered in this menu (E25).

E28: Sensor value at maximum. **(Regulator 2)**
Maximum output voltage value of the sensor is entered in this menu (E26).

E29: Regulator 1 together with Regulator 2.
Regulator 2 will be interconnected with Regulator 1 (= the highest signal wins) and sent out on Vout1.

E30: Controller type. **(Regulator 2)**
The integrated controller output (terminals 3+4) can be configured as a XP controller or a PI controller.

E31: XP band. **(Regulator 2)**
If the point E30 is selected as the XP, this parameter is used for adjustment of the band width (steepness). The band represents the +/- sensor deviation relative to the setpoint. A low value will result in a considerable change in the output signal (steep), and a high value will result in a less important change in the output signal (less steep).



E32: XP volt at setpoint. **(Regulator 2)**
The output voltage is set in this menu.

E33: PID controller - P term. **(Regulator 2)**
If E30 is selected as PI controller, this value is used as integral gain parameter.

E34: PID controller - I term. **(Regulator 2)**
If E30 is selected as PI controller, this value is used as integral damping parameter.

E35: PID controller - H term. **(Regulator 2)**
The parameter indicates the sampling frequency (how often this signal is required to be adjusted). The resolution is 100ms.

E36: Minimum output voltage. **(Regulator 2)**
If the connected equipment cannot adjust from 0V, the min output signal can be adjusted in this function.

E37: Maximum output voltage. **(Regulator 2)**
If the connected equipment cannot adjust up to 10V, the max output signal can be adjusted in this function.

E38: Regulator direction. **(Regulator 2)**
The direction of the controller can be inverted in this menu.
Normal: input signal below desired setpoint = output signal is increased
Inverted: input signal above desired setpoint = output signal is increased

E39: Not in use.

E40: Vout2 **(Regulator 2)**
If E40=0, then Vout2 permanently is 10V DC. If E40=1, then the output is regulated as PID/XP regulator2.
If E40=2, then the output will be an offset of Regulator1 (see **E49)**. If E40=3, the output is 10V when the regulator is ON and 0V when the regulator is OFF. If E40=4, the output is 10V when value of Regulator1 exceeds the value of E2 (minimum output), when value of Regulator1 = E2 or below, the output is 0V.
If E40=5 Night cool function is enabled. If E40=6-9 the output is 0V DC. If E40=10-100 then the output is a constant factor of number set (e.g. E40=10 output is 1.0V DC, E40=55 output is 5.5V DC and if E40=100 output is 10,0V DC.

E41: Regulator type **(Regulator 2).** Regulator 2 can be temperature (degree C), pressure (Pa), or CO2 (ppm).

E42: Selection of sensor input. **(Regulator 2). External=** NTC sensor (22k) on terminals 20-21. **Volt=** 0-10V signal on terminals 7-8 (the 0-10V signal is defined in menu E25-E28). **Alarm=** 20-21 are used as alarm input (open signal=alarm text + relay). **Tacho**= terminals 20-21. **PIR1** (change between NORM/ALT operation)= terminals 20-21. **NTC10K**=10K ohm NTC sensor on terminals 20-21. **PIR2** (change between NORM/OFF operation)= terminals 20-21. **Alarm2**= 20-21 is used as input (open signal= alarm text).

E43: Alarm setpoint (Alarm1)
The alarm setpoint is entered in this menu (the alarm function is activated in menu **C8**)

E44: User defined text name.
A plant name or similar may be entered (max 12 characters, text is enabled in **C9**).

E45: User defined text – Operation hour counter (max. 6 lines of 12 characters, counter is enabled in **C10**).
An alarm text or similar may be entered in this menu.

E46: Alarm level Min
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: Alarmlevel Max: 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 function.

E49: Offset of Vout2 in relation to Vout1. Equation: (Vout2=Vout1*(E49/100)).

E50: K-factor Reg 1. If Regulator 1 is a pressure regulator, it is possible to convert the pressure to m3/h via the K-factor. Now Regulator 1 will regulated in m3/h. If the K-factor is set to be "0", this conversion function is disabled.
Equation: m3/h = √ΔPressure * E50 * 3,6

E51: K-factor Reg 2. If Regulator 2 is a pressure regulator, it is possible to convert the pressure to m3/h via the K-factor. Now Regulator 2 will regulated in m3/h. If the K-factor is set to be "0", this conversion function is disabled.
Equation: m3/h = √ΔPressure * E51 * 3,6

E52: Time delay before regulation is released at start of regulator (Regulation output will be maintained at 0V for the set time). **Note! E6 must be set at 0.0**

E53: Start level Regulator 1. In this menu the start level of Regulator 1 is set.

E54: Start level Regulator 2. In this menu the start level of Regulator 2 is set.

E59: Do not show unit. Display of the measuring unit (e.g. °C) is activated in this menu.

E60: Adjust clock by seconds. Possibility of adjusting the clock by number of seconds. If the clock is either a little too fast or to slow this function will adjust the clock by number of entered seconds once a week (Monday at 13:13).

E61: Night cool room temperature.
When room temperature exceeds the setpoint, night cooling is released.

E62: Night cool difference.
Temperature difference between outside temperature and room temperature must exceed the setpoint before night cool is released. (outside temperature must always be cooler than room temperature).

E63: Night cool min. If outside temperature is cooler than setpoint, night cool is disabled.

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 writting 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 setting	Min	Max	Unit
C1 Regulator setpoint (NORM) Dep. On input selection. E1	Temp: 22.0 Flow: 3.00 Pressure: 200 Humidity: 60 CO2: 800	Temp: -20.0 Flow: 0.0 Pressure: 0 Humidity: 0 CO2: 0	Temp: 50.0 Flow: 50.0 Pressure: 5000 Humidity: 100 CO2: 2000	Temp: °C Flow: m/s Pressure: Pa Humidity: % CO2: ppm
C2 SchedulerOnOff	OFF	OFF	ON	ON/OFF
C3 regulator 1 setpoint (ALT) Dep. On input selection. E1	Temp: 22.0 Flow: 2.00 Pressure: 150 Humidity: 50 CO2: 700	Temp: -20.0 Flow: 0.0 Pressure: 0 Humidity: 0 CO2: 0	Temp: 50.0 Flow: 50.0 Pressure: 5000 Humidity: 100 CO2: 2000	Temp: °C Flow: m/s Pressure: Pa Humidity: % CO2: ppm
C4 User rights	0	0	3	
C5 Extended operation	10	1	240	min
C6 Setpoint source	Internal	Internal	External	
C7 Display setpoint (C7=OFF). Display measured value (C7=ON). Average (C7=AVG). Double window display (C7=dobb display)	OFF			OFF ON AVG Dobb. display
C8 Alarm	0	0 / 1	60	Sec.
C9 Optional text	OFF	OFF	ON	
C10 Operation hour counter	0	0	12	Months
C11 regulator 2 setpoint (NORM) Dep. On input selection. E41	Temp: 22.0 Pressure: 200 CO2: 800	Temp: -20.0 Pressure: 0 CO2: 0	Temp: 50.0 Pressure: 5000 CO2: 2000	Temp: °C Pressure: Pa CO2: ppm
C12 regulator 2 setpoint (ALT) Dep. On input selection. E41	Temp: 20.0 Pressure: 150 CO2: 700	Temp: -20.0 Pressure: 0 CO2: 0	Temp: 50.0 Pressure: 5000 CO2: 2000	Temp: °C Pressure: Pa CO2: ppm
E1 Reg1 input (temp, pressure, flow, humidity, CO2)				Temp: °C Pressure: Pa Flow: m/s Humidity: % CO2: ppm
E2 Regulator direction	Temp: Normal Flow: Normal Pressure: Normal Humidity: Inverted CO2: Inverted	Normal	Inverted	
E3 Temperature sensor 1 Choice NTC1	External			External Volt NTC10K
E4 Regulator 1 outputs (0=0-10V 1=PWM 2=PWM+1 3=PWM+2) **(1-2-3 only for use with Temp. Pulse)**	0	0	3	
E5 Relay direction (NC=0,NO=1)	NOpen	NOpen	NClosed	
E6 Relay change	0.1	0.0 V	10.0 V	Volt
E7 Regulator 1 type	PID reg.	PID reg.	Xp reg.	
E8 XP Band (Regulator 1) Dep. On input selection. E1	Temp: 2,0 Flow: 5.00 Pressure: 50 Humidity: 10 CO2: 200	Temp: 0.5 Flow: 0.00 Pressure: 2 Humidity: 0 CO2: 50	Temp: 20.0 Flow: 20.0 Pressure: 1000 Humidity: 40 CO2: 500	Temp: °C Flow: m/s Pressure: Pa Humidity: % CO2: ppm
E9 XP volt at setpoint (Regulator 1)	5.0	0.1	10.0	Volt
E10 PID P (Regulator 1)	Temp: 20 Flow: 40 Pressure: 40 Humidity: 40 CO2: 40	1	100	

Name	Factory setting	Min	Max	Unit
E11 PID I (Regulator 1)	Temp: 100 Flow: 20 Pressure: 20 Humidity: 20 CO2: 20	0	2000	
E12 PID reg time (H) @100	3	1	10	ms
E13 Min. Input1	0.0	0.0	10.0	Volt
E14 Max.Input1	10.0	0.0	10.0	Volt
E15 Sensor1 value at Min. Dep. On input selection. E1	Temp: 0.0 Flow: 0 Pressure: 0 Humidity: 0 CO2: 0	Temp: -40.0 Flow: 0.00 Pressure: 0 Humidity: 0 CO2: 0	Temp: 60.0 Flow: 50.00 Pressure: 5000 Humidity: 100 CO2: 5000	Temp: °C Flow: m/s Pressure: Pa Humidity: % CO2: ppm
E16 Sensor value at Max. Dep. On input selection. E1	Temp: 50.0 Flow: 8.0 Pressure: 500 Humidity: 100 CO2: 2000	Temp:-40.0 Flow: 0.00 Pressure: 0 Humidity: 0 CO2:0	Temp: 60.0 Flow: 50.00 Pressure: 5000 Humidity: 100 CO2: 5000	Temp: °C Flow: m/s Pressure: Pa Humidity: % CO2: ppm
E17 Min.output1	0.0	0.0	5.0	V
E18 Max.output1	10.0	5.0	10.0	V
E19 Pulse period time (s) **(Only use with Temp pulse)**	Temp pulse:30	10	250	Sec
E20 OutTempOnOff (NTC2)	OFF	OFF	ON	ON/OFF
E21 OutTemp reduction Dep. On input selection. E1 **(Only use w Flow / Pressure Regulator)**	Flow: 0.0 Pressure: 0	Flow: 0.00 Pressure: 0	Flow: 5.00 Pressure: 500	m/s Pa
E22 OutTemp min temp. **(Only use w Flow/Pressure Regulator)**	-10 °C	0,0 °C	-25 °C	°C
E23 OutTemp max temp. **(Only use w Flow / Pressure Regulator)**	10,5 °C	-10 °C	15 °C	°C
E24 Not in use				
E25 Min. input 2	0.0	0.0	10.0	Volt
E26 Max.input 2	10.0	0.0	10.0	Volt
E27 Sensor2 value at Min.	Temp: 0.0 Pressure: 0.0 CO2: 0.0	-20 0.0 0.0	50 5000 5000	°C Pa ppm
E28 Sensor2 value at Max.	Temp: 50.0 Pressure: 500 CO2: 2000	-20 0.0 0.0	50 5000 5000	°C Pa ppm
E29 Reg1+2	OFF	OFF	ON	
E30 Reg2 selection	PID reg	PID reg	Xp reg	
E31 Reg2 XP amplification	1.0	0.5	20	°C
E32 Reg2 XP Volt out at setpoint	5.0	0.1	10.0	Volt
E33 Reg2 PID P	20	1	100	
E34 Reg2 PID I	200	0	2000	
E35 Reg2 PID reg time (H) @100ms	1	1	10	ms
E36 Min. output2	0.0	0.0	5.0	V
E37 Max output2	10.0	5.0	10.0	V
E38 Reg2 direction	Normal	Normal	Inverted	
E39 – not in use				
E40 Vout2 (0=10V 1= Regulator 2=offset)	0	0	2	
E41 Reg2 input (Temp, Pressure, CO2)				Temp: °C Pressure: Pa CO2: ppm

Name	Factory setting	Min	Max	Unit
E42 TempSensor2 selection. **External**=NTC2, **Volt**=Vin2, **Alarm**=Vin2 + Alarm via NTC2, **Tacho**=KI 20-21, **PIR1**= KI 20-21, **NTC10K**=NTC2, **PIR2**=KI 20-21	External			External Volt Alarm Tacho PIR1 NTC10K PIR2
E43 Alarm setpoint (Alarm1)	Temp: 5 Flow: 1 Pressure: 100 Humidity: 20 CO2: 1200	Temp: -20 Flow: 0.1 Pressure: 2 Humidity: 10 CO2: 400	Temp: 50 Flow: 40,00 Pressure: 4000 Humidity: 90 CO2: 1800	Temp: °C Flow: m/s Pressure: Pa Humidity: % CO2: ppm
E44 User defined texts Name				
E45 User defined texts Hour counter				
E46 Alarm Level min	10	0	50	
E47 Alarm level max	60	50	100	
E48 PIR time	600	1	3600	Sec.
E49 Offset of Vout2	100	1	200	%
E50 K-factor Reg 1	0	0	10000	0 (0=disabled)
E51 K-factor Reg 2	0	0	10000	0 (0=disabled)
E52 Time delay start regulator	0	0	240	Sec.
E53 Start level Reg 1	500	0	1000	
E54 Start level Reg 2	500	0	1000	
E59 Do not show unit				
F1 ModbusAddress (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 +-15%	230V AC ±10%
Mains	Max 1A	13A
Power consumption	Max 2,4W	Max <1W
Enclosure	IP 40 / IP 54	IP 40 / IP 54
Dimensions (hxwxd)	LSBOX85: 34x87x87 mm LSBOX85: 42x87x87 mm DIN rail: 45x85x120 mm Panel:100x100x65 mm (hole:91x91 mm) IP 54 box: 120x122x56 mm	
Operating temperature	0 - 60 °C	0 - 50 °C
Relay	24VDC NO, 3A AC1.	5A-AC1, 250VAC NO, 150W / 1150VA.
0-10VDC input1 (Vin1)	7k Ohm input impedance	
0-10VDC input2 (Vin2)	7k Ohm 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: 950-206606 MultiControllerE_regulate_ES874_24_UK
Date: 14-02-2022
Rev.: 2.4
Software version: Program 2.7
Drawn by: UP/MJ/TJ
Manufactured by: LS Control A/S, Denmark