

ECU-301

Intelligent Compact Controller



Features

- Standalone electronic universal controller with P or PI response
- Operating voltage in accordance to type AC 24 V
- Control application selectable via Application Number
- Active input scale can be selectable
- Limit & direction of the output scale is able to be freely assigned
- Three inputs for NTC10K temperature sensors, 0...10V or 4...20mA analog signals
- Unit can be set as °C, °F, % , Pa, bar or no specified unit
- One modulating outputs with DC 0...10 V signal outputs, direct or reverse action
- Energy saving with stand by functionality and adaptation of set points
- Entering or changing of all data via operating buttons on the controller, possible without additional tools
- PC connection for downloading canned applications via the software tool

HVAC&R Application

The universal controllers are intended for Heating, Ventilating, Air-Conditioning and Refrigeration in comfort control plants. It can be mounted in a control panel or in the housing on ducts, walls and in plant rooms.

Measurement and control of temperature, relative humidity, absolute humidity, enthalpy, pressure differential, volumetric airflow and indoor air quality. The input scale can be set from 0 units to 1,000 units. The start and end points of output voltage can be any value between 0 V DC to 10 V DC.

Control Parameters (password 09)

Warning! Only experts should change these settings! The parameters are grouped according to control modules. After completing the logging in, a control module must be selected before accessing the parameters.

See the parameter modules list:

Module	Description
IP	Input configuration
1L	PI control Loop 1 configuration
2L	PI control Loop 2 configuration
1S	2 Point Linear scaler 1 configuration
1H	Time schedule configuration
OP	Output configuration
UP	User Parameters configuration

Input configuration(IP)

Parameter	Description	Range	Default
AI 0: Pressure input (0-10V)			
IP 00	AI 0: Lower display transformation value	-50 – 1000	0
IP 01	AI 0: Upper display transformation value	-50 – 1000	200
IP 02	AI 0: Filter(1-500 second)	1 – 500	10
IP 04	AI 0:Calibration value of AI 0	-10...10 K	0
AI 1: Room temperature input (external NTC 10K) (range 0 - 50 °C)			
IP 05	AI 1:Calibration value of AI 1	-10...10 K	0
AI 2: Universal input			
IP 06	AI 2: Universal input sensor select 0 = Dry contact or NTC10K, 1 = 4–20mA	0 – 1	0
IP 07	AI 2: Lower display transformation value	-50 – 1000	0
IP 08	AI 2: Upper display transformation value	-50 – 1000	100
IP 09	AI 2: Filter(1-500 second)	1 – 500	10
IP 10	AI 2: Unit of input, 0 = no unit, 1 = %, 2 = °C,3= °F,4=Pa,5=ba	0 – 5	2
IP 11	AI 2:Calibration value of AI 2	-10...10 K	0
AI 3: Room temperature input(Internal NTC10K) (range 0 - 50 °C)			
IP 12	AI 3: Calibration value of AI 3	-10...10 K	0

PI Control Loop 1 Parameters (1L), use for temperature control

Parameter	Description	Range	Default
1L 00	FB : Feedback input, 0 = AI3, 1 = AI1	0 – 1	0
1L 01	SP: Set Point , 0 = 1L set point,	0	0
1L 02	Standby set point shift	0 – 10	5
1L 03	Set point minimum limit	0 – 50	16
1L 04	Set point maximum limit	0 – 50	26
1L 05	Kp: Proportional constant	0 – 20	10
1L 06	Ki : Integral constant	0.1 – 60	0.5
1L 07	Imax: Maximum integral change	0 – 100	60
1L 08	Ilim : Integral limit	0 – 100	50
1L 09	STUP: Integral startup	0 – 100	50
1L 10	Accuracy	0 – 10	1
1L 11	PI output: high limit	0 – 100	100
1L 12	PI output: low limit	0 – 100	0
1L 13	PI control direction : 0 = heating , 1 = cooling , 2 = heating/cooling exchange by push up and down button 5 sec.	0 – 2	2

PI Control Loop 2 Parameters (2L), use for pressure control

Parameter	Description	Range	Default
2L 00	FB : Feedback input, 0 = AI0	0	0
2L 01	SP: Set Point , 0 = 2L set point , 1 = 1S output	0 – 1	1
2L 02	Standby set point shift	0 – 1000	5
2L 03	Set point minimum limit	0 – 200	0
2L 04	Set point maximum limit	0 – 200	100
2L 05	Kp: Proportional constant	0 – 20	10

2L 06	Ki : Integral constant	0.1 – 60	0.5
2L 07	Imax: Maximum integral change	0 – 100	60
2L 08	Ilim : Integral limit	0 – 100	50
2L 09	STUP: Integral startup	0 – 100	50
2L 10	Accuracy	0 – 10	1
2L 11	PI output: high limit	0 – 100	100
2L 12	PI output: low limit	0 – 100	0
2L 13	PI control direction : 0 = reverse ,	0	0

2 Point Linear Scaler 1 parameters (1S)

Parameter	Description	Range	Default
1S 00	Input : 0 = AI0, 1 = 1L output	0 – 1	1
1S 01	IN 1 Value	0 – 1000	0
1S 02	IN 2 Value	0 – 1000	50
1S 03	OUT 1 Value	0 – 1000	0
1S 04	OUT 2 Value	0 – 1000	100

Time Schedule 1 parameters (1H)

Parameter	Description	Range	Default
1H 00	Enable the time schedule, oFF = disable , on = Enable	On / oFF	oFF
Pro 1: The time program 1 with 4 switch time points			
1H 01	Enable the time program 1, oFF = disable , on = Enable	On / oFF	oFF
1H 02	Select weekday , 0 = day1-5, 1 = day1, 2 = day2, 3 = day3, 4 = dya4, 5 = dya5, 6 =day6, 7 = day7 , 8 = day 1-7, 9 = day6-7	0 – 9	0
1H 03	Select switch time 1,	00:00 – 23:45	80:00
1H 04	Select action mode (no, ON, Eco, OFF), no = disables this time schedule, On = sets operation mode to On and Comfort, Eco = sets operation mode to On and Standby, OFF = switches unit Off	no,ON,Eco,OFF	no
1H 05	Select switch time 2,	00:00 – 23:45	12:00
1H 06	Select action mode (no, ON, Eco, OFF),	no,ON,Eco,OFF	no
1H 07	Select switch time 3,	00:00 – 23:45	12:00
1H 08	Select action mode (no, ON, Eco, OFF),	no,ON,Eco,OFF	no
1H 09	Select switch time 4,	00:00 – 23:45	12:00
1H 10	Select action mode (no, ON, Eco, OFF),	no,ON,Eco,OFF	no
Pro 2: The time program 2 with 4 switch time points: 1H 11 – 1H 20 , see parameter Pro 1			
Pro 3: The time program 3 with 4 switch time points: 1H 21 – 1H 30 , see parameter Pro 1			
Pro 4: The time program 4 with 4 switch time points: 1H 31 – 1H 40 , see parameter Pro 1			

Output configuration(OP)

Parameter	Description	Range	Standard
AO 0: Analog output configuration			
OP 00	AO0: Selection of control source 0 = OFF, 1 = 1L Output (Loop 1 PI control output) 2 = 2L Output (Loop 2 PI control output)	0 – 2	2
OP 01	AO 0: Minimum signal output (0-10V or 2-10V), display 0	0 – 100%	0%
OP 02	AO 0: Maximum signal output (0-10V or 2-10V), display 100	0 – 100%	100%
OP 03	AO 0: Output when controller power off	0 – 100	50

User Parameters(UP)

Parameter	Description	Setting Range	Factory Setting
UP 00	Enable user change of operation modes , ON = enable , OFF = disable	ON, OFF	ON
UP 01	Enable standby functionality , ON = enable , OFF = disable	ON, OFF	OFF
UP 02	State after power failure: 0 = OFF, 1 = ON, 2 = Last State	0, 1, 2	2
UP 03	Running display page 1, show PI control Loop1 value , 1L	ON, OFF	ON
UP 04	Running display page 2, show PI control Loop2 value , 2L	ON, OFF	OFF
UP 05	Running display page 3, show AO 0 present value	ON, OFF	OFF
UP 06	Running display page 4, show AI 0 current value	ON, OFF	OFF
UP 07	Running display page 5, show AI 1 current value	ON, OFF	OFF
UP 08	Running display page 6, show AI 2 current value	ON, OFF	OFF
UP 09	Running display page 7, show AI 3 current value	ON, OFF	OFF

MODBUS communication data

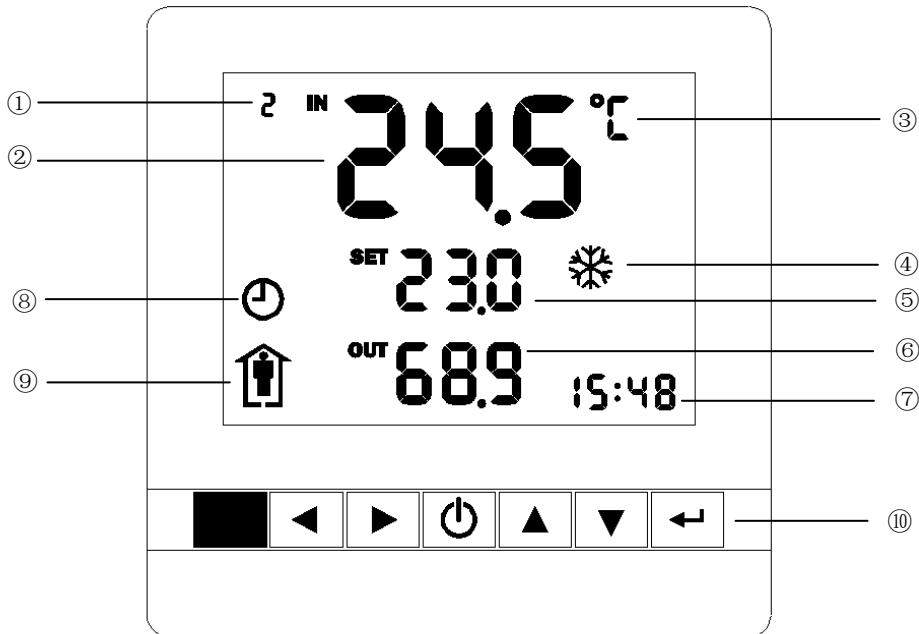
Register	Register address	Modbus variable type	Description
RG 00	100	Read or write coil status	Controller ON / OFF control: 0 = OFF ; 1 = ON
RG 01	101	Read or write coil status	1L PI direction, Heating or cooling switch: 0 = heating ; 1 = cooling
RG 02	300	Read or write holding register	1L Set point (temperature): integer 0-500;setpoint 0-50°C; example: integer 220 is set point 22°C.
RG 03	301	Read or write holding register	2L Set point (pressure): integer 0-200;setpoint 0-200Pa;
RG 04	302	Read or write holding register	AO present value: integer 0-100;AO present 0-100;
RG 05	400	Read only input register	AI 0 present value(pressure input): integer 0-200;pressure 0-200Pa;
RG 06	401	Read only input register	AI 1 present value(external temperature input): integer 0-500;temperature 0-50°C; example: integer 220 is temperature 22°C.
RG 07	402	Read only input register	AI 2 present value(universal input): integer 0-1000; AI 2 value 0-1000
RG 08	403	Read only input register	AI 3 present value(internal temperature input): integer 0-500;temperature 0-50°C; example: integer 220 is temperature 22°C.

Note: ECU-301 only support Modbus communication function code : 01, 02, 03, 04, 05, 06

Display and Operation

The ECU controller is designed with a modular casing structure. The user has the choice of different colors and coatings. Standard is White RAL 9003.

operation terminal uses an LCD display and six operation buttons.



Legend:

- ① 2-digit display of LCD page number.
- ② 3-digit display of input current value
- ③ Unit of displayed value, °C, °F, % ,Pa, bar, or none
- ④ Graphical display of PI direction

Heating Active	Cooling Active	Direct active	Reverse active

switch heating/direct or cooling/active , Push UP and Down button more than 5 second .

- ⑤ 3-digit display of setpoint value
- ⑥ 3-digit display of PI control output
- ⑦ 4-digit display of time
- ⑧ Graphical display of time schedule indicate.
- ⑨ Operation modes: Comfort mode, Standby mode, **OFF**, Energy Hold Off
- ⑩ Buttons for operating the controller

POWER button: comfort mode, Pressing the button less than 5 second; power off, Pressing the button less than 5 second again; standby and comfort mode switch, Pressing the button less than 2 seconds.

UP and DOWN buttons: change set points or parameters

Enter button: Acts as Enter in parameter or value changing menu.

Left and Right buttons: change the running and operation display page number

Operation Modes

- Comfort: The unit is in full operation mode. All the control functions are operating according to their setpoints. The unit displays occupied mode.
- Standby: The set points are shifted according to parameters. The heating parameter is shifted down and cooling parameter up. The unit displays unoccupied mode.
- Energy Hold Off : The unit is switched off. All outputs are off. Off is displayed.

Operation of the Terminal Unit

Switching ON / OFF, COMFORT and STANDBY

The unit is switched on/off by pressing the POWER button more than 5 seconds. Press the POWER button for less than 2 seconds toggles between STANDBY and COMFORT modes. Standby mode may be disabled with UP01.

Changing of set points

Change the set point with the UP/DOWN buttons. Changing of set points may be disabled with UP-00.

The menu operation

First menu

The running and operation display → the parameter configuration → the current time setting.

Change the first menu by pressing the LEFT and POWER button simultaneously for 3 seconds.

The running and operation display

See the display of running and operation page below. Change the running display page by LEFT and RIGHT button.

The parameter configuration

When enter the parameter configuration, the module parameter is displayed.

Press the LEFT button change the module parameter as IP → 1L → 2L → 1S → 1C → 2C → 3C → 1H → OP → UP → IP

Press the RIGHT button change the subset parameter as IP00 → IP01 → IP02 → → IP00

Change the parameter value by UP and DOWN button, press UP button increase the value and press DOWN button decrease the value, press the ENTER button to save the parameter change value. When change 1H parameter, the UP button change time hours and the DOWN button change time minutes (5 minutes step) .

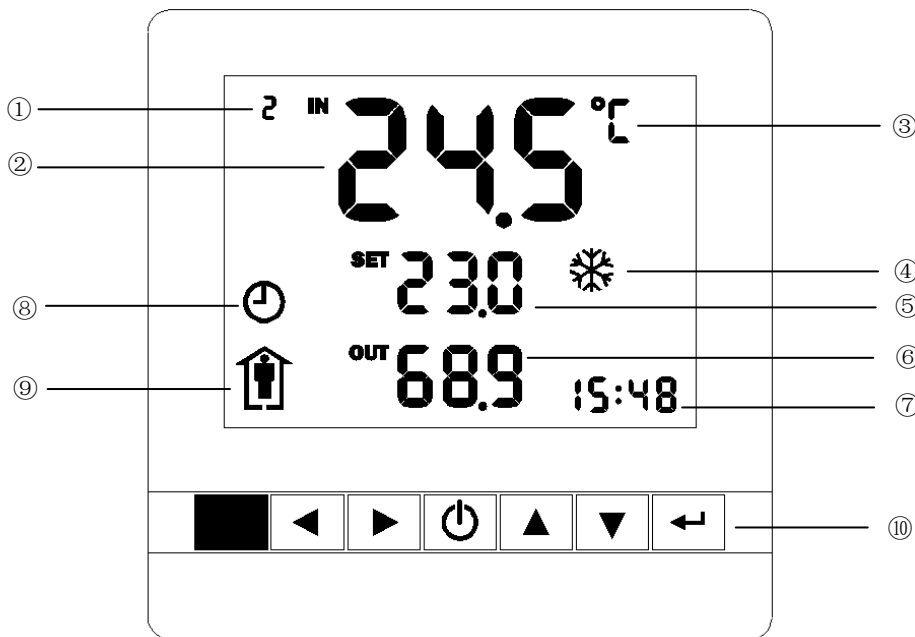
The current time setting

Press the UP button increase time hours and press the DOWN button increase time minutes.

Press the UP and DOWN button simultaneously increase the week date (Monday to Sunday).

Display of the running and operation page

Page 1 (1L) , 2 (2L) :



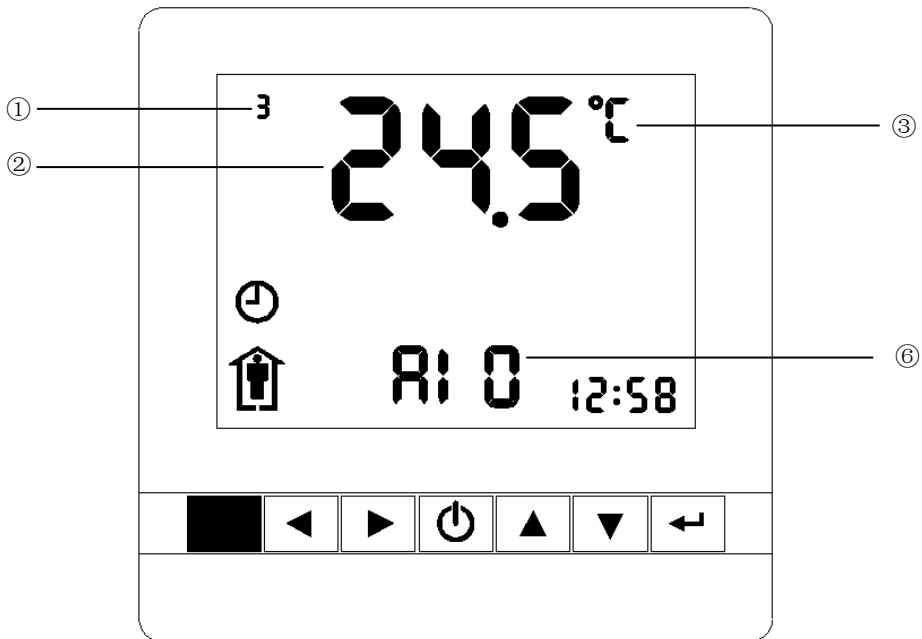
Legend:

- ① page1---PI control loop 1; page2---PI control loop 2;
- ② 3-digit display of input current value
- ③ Unit of displayed value, °C, °F, % ,Pa, bar, or none
- ④ Graphical display of PI direction

Heating Active	Cooling Active	Direct active	Reverse active

- ⑤ 3-digit display of set point value
- ⑥ 3-digit display of PI control output

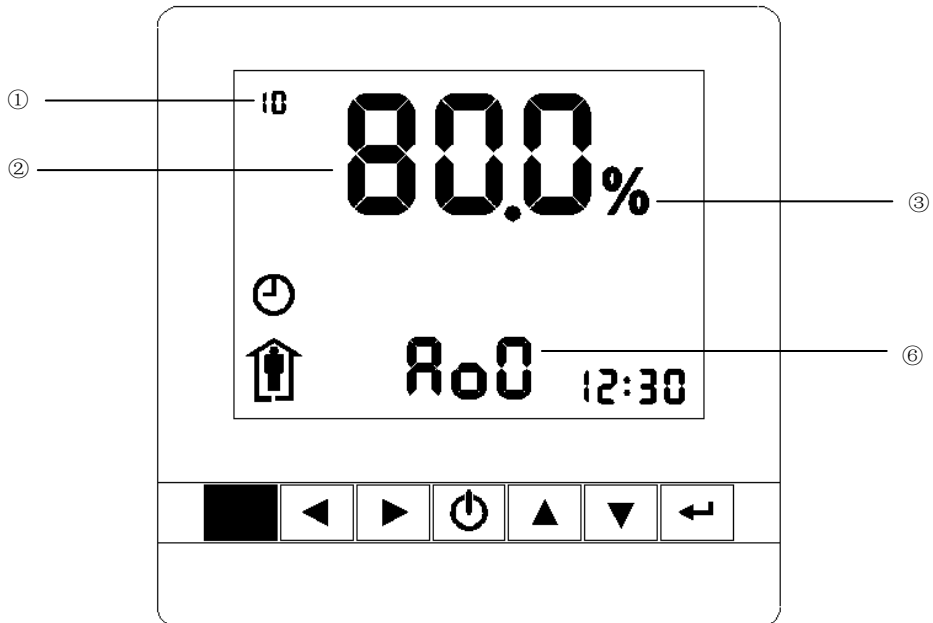
Page 3(AI 0),4(AI 1),5(AI 2),6(AI 3):



Legend:

- ① page3---AI 0; page4---AI 1; page5---AI 2; page6---AI 3;
- ② 3-digit display of analog input current value
- ③ Unit of displayed value, °C, °F, % ,Pa, bar, or none
- ⑥ 3-digit display of analog input channels AI 0, AI 1, AI 2, AI 3

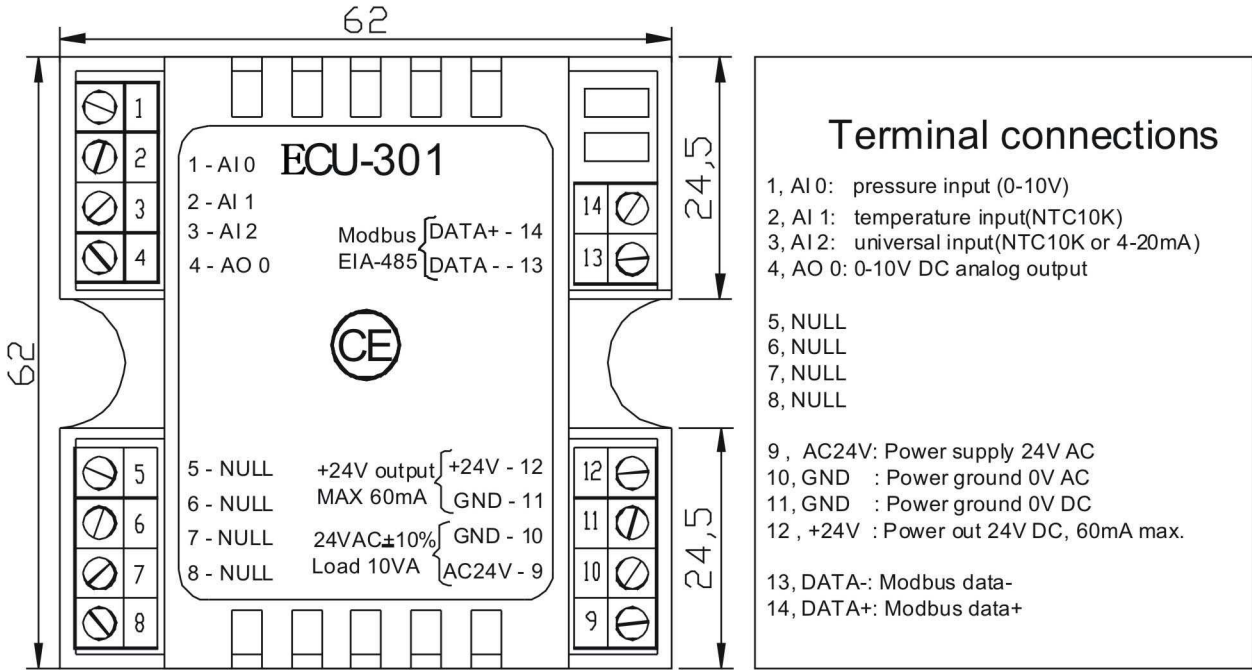
Page 7 (Ao 0):



Legend:

- ① page7---Ao 0
- ② 3-digit display of analog output current value, if manual output by press the UP / DOWN buttons and indicate hand symbol, if automatic output by press UP and DOWN button simultaneously
- ③ Unit of displayed value, °C, °F, % ,Pa, bar, or none
- ⑥ 3-digit display of analog output channels Ao 0

Connection terminals



Connection Diagram, half wave rectified