



Read this document carefully before using this device. The guarantee will be expired by damaging of the device if you don't attend to the directions in the user manual. Also we don't accept any compensations for personal injury, material damage or capital disadvantages.

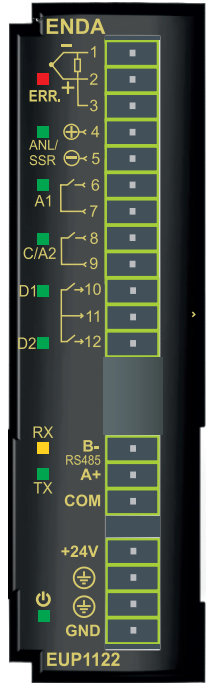
## ENDA EUP1122 RAIL MOUNTED UNIVERSAL PID CONTROLLER

Thank you for choosing ENDA EUP1122 Rail mounted PID universal controller.

- ▶ DIN Rail Mounting.
- ▶ Selectable Dual-set value.
- ▶ PT100, J, K, L, T, S, R sensor types can be used.
- ▶ 0-20mA, 4-20mA, 0-10V, 2-10V, 0-25mV and 0-50mV input selections.
- ▶ Programmable D1 and D2 digital contact input.
- ▶ **Auto calculation for PID parameters (SELF TUNE).**

**Selftune for automatic PID calculation or manually enter PID parameters if known.**

- ▶ Control outputs can be disabled (Applied for measurement use).
- ▶ Manual control for C/A2 or ALN/SSR outputs.
- ▶ Soft-Start feature.
- ▶ Communication via RS485 Modbus protocol.
- ▶ Analogue, SSR or Relay output control selection.
- ▶ 0-20mA, 4-20mA, 0-10V and 2-10V Analogue Output Control selection.
- ▶ C/A2 Relay output can be set as secondary Alarm or Temperature Control output.
- ▶ Heating/Cooling control selection.
- ▶ Zero point input shift (Offset feature for input).
- ▶ In case of sensor failure, relay positions can be selected or periodic operation can be performed.
- ▶ Can be programmed via Modbus.
- ▶ Up to 16 steps profile controlling feature.
- ▶ Contact output triggering feature at profile steps.
- ▶ Timer or Thermostat feature can be used during profile controlling.
- ▶ Modbus addressing, baud rate settings or default settings can be applied via DIP Switch.
- ▶ Heating error monitoring feature.
- ▶ Can be updated via RS485.
- ▶ CE Marked according to European Norms.



**RoHS  
Compliant**



**ORDER CODE : EUP1122**

### ENVIRONMENTAL CONDITIONS

<b>Ambient/storage temperature</b>	0 ... +50°C/-25 ... +70°C (with no icing).
<b>Max. Relative humidity</b>	80% Relative humidity for temperatures up to 31°C, decreasing linearly to 50% at 40°C.
<b>Protection rating</b>	According to EN 60529 IP20.
<b>Height</b>	Max. 2000m.

**KEEP AWAY device from exposed to corrosive, volatile and flammable gases or liquids and DO NOT USE the device in similar hazardous locations.**

### ELECTRICAL CHARACTERISTICS

<b>Supply</b>	24 VDC 20%.
<b>Power Consumption</b>	Max. 5VA.
<b>Wiring</b>	1.5mm <sup>2</sup> screw-terminal connections.
<b>Line Resistance</b>	Max. 100Ω Ohm. for thermocouple. Max. 20Ω ohm. For three-wire Pt100.
<b>Data Retention</b>	FLASH Memory (minimum 20 years).
<b>EMC</b>	EN 61326-1: 2013
<b>Safety Requirements</b>	EN 61010-1: 2010 ( Pollution degree 2, overvoltage category II )

### INPUTS

<b>D1 Dry Contact Input</b>	Programmable 1st. control key input.
<b>D2 Dry Contact Input</b>	Programmable 2nd. control key input.

### OUTPUTS

<b>C/A2 Output</b>	Relay : 250V AC, 5A (for resistive load), NO (Control or Alarm2 Output selection).
<b>A1 Output</b>	Relay : 250V AC, 5A (for resistive load), NO+NC (Alarm1 Output selection).
<b>ANL/SSR Control Outputs</b>	Used for 0-20mA, 4-20mA, 0-10V, 2-10V Analog output and SSR. Maximum load resistance is 600Ω Ohm. on mA output and SSR mode. Source resistance is 500Ω Ohm. for V output.
<b>Life Expectancy for Relay</b>	Without load 30.000.000 switching; 250V AC, 5A (resistive load) 300.000 switching.

### CONTROL

<b>Control Type</b>	Single set-point and alarm control.
<b>Control Algorithm</b>	On-Off / P, PI, PD, PID (selectable).
<b>A/D Converter</b>	14 bits.
<b>Sampling Time</b>	100ms (Minimum).
<b>Proportional Band</b>	Adjustable between 0% and 100%. If Pb=0%, On-Off control is selected.
<b>Integral Time</b>	Adjustable between 0.0 and 100.0 minutes.
<b>Derivative Time</b>	Adjustable between 0.00 and 25.00 minutes.
<b>Control Period</b>	Adjustable between 1 and 125 seconds.
<b>Hysteresis</b>	Adjustable between 1 and 50°C/F.
<b>Output Power</b>	The ratio of power at the setpoint value can be set between 0% and 100%.

### HOUSING

<b>Housing Type</b>	Rail - mounted box according to DIN 43 700.
<b>Dimensions</b>	W29xH90xD64mm
<b>Weight</b>	Approx. 200g (after packing)
<b>Enclosure Material</b>	Self extinguishing plastics used.

**Avoid any liquid contact when the device is switched on. DO NOT clean the device with solvent (thinner, gasoline, acid etc.) and / or abrasive cleaning agents.**



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## TECHNICAL SPECIFICATIONS

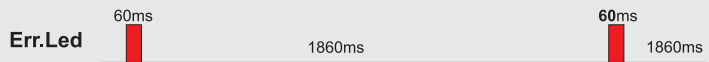
Input Type		Scale Range		Accuracy
		°C	°F	
PT100 Resistance Thermometer	EN 60751	-199.9...600.0 °C	-199.9...999.9 °F	± 0,2% (for full scale) ± 1 digit
PT100 Resistance Thermometer	EN 60751	-200...600 °C	-328....1112 °F	± 0,2% (for full scale) ± 1 digit
J (Fe-CuNi) Thermocouple	EN 60584	-30.0...600.0°C	-22.0....999.9 °F	± 0,5% (for full scale) ± 1 digit
J (Fe-CuNi) Thermocouple	EN 60584	-30....600°C	-22....1112 °F	± 0,5% (for full scale) ± 1 digit
K (NiCr-Ni) Thermocouple	EN 60584	-30.0...999.9°C	-22.0....999.9 °F	± 0,5% (for full scale) ± 1 digit
K (NiCr-Ni) Thermocouple	EN 60584	-30....1300°C	-22....2372 °F	± 0,5% (for full scale) ± 1 digit
L (Fe-CuNi) Thermocouple	DIN 43710	-30.0...600.0°C	-22.0....999.9 °F	± 0,5% (for full scale) ± 1 digit
L (Fe-CuNi) Thermocouple	DIN 43710	-30....600°C	-22....1112 °F	± 0,5% (for full scale) ± 1 digit
T (Cu-CuNi) Thermocouple	EN 60584	-30.0...400.0°C	-22.0....752.0 °F	± 0,5% (for full scale) ± 1 digit
T (Cu-CuNi) Thermocouple	EN 60584	-30....400°C	-22.....752 °F	± 0,5% (for full scale) ± 1 digit
S (Pt10Rh-Pt) Thermocouple	EN 60584	-40...1700°C	-40....3092 °F	± 0,5% (for full scale) ± 1 digit
R (Pt13Rh-Pt) Thermocouple	EN 60584	-40...1700°C	-40....3092 °F	± 0,5% (for full scale) ± 1 digit
0-20mA input		-10000...+10000 (max. scale range 10000)		± 0,2% (for full scale) ± 1 digit
4-20mA input		-10000...+10000 (max. scale range 10000)		± 0,2% (for full scale) ± 1 digit
0-10V input		-10000...+10000 (max. scale range 10000)		± 0,2% (for full scale) ± 1 digit
2-10V input		-10000...+10000 (max. scale range 10000)		± 0,2% (for full scale) ± 1 digit
0-25mV input		-10000...+10000 (max. scale range 10000)		± 0,2% (for full scale) ± 1 digit
0-50mV input		-10000...+10000 (max. scale range 10000)		± 0,2% (for full scale) ± 1 digit

### ERROR INDICATOR LED

Error LED blinks periodically when an error condition occurs. Periods are described below.

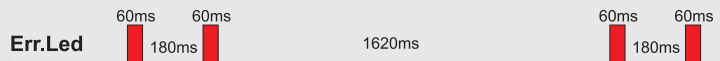
**I2 = 1 : Sensor short circuited or temperature too low.**

Error LED lights once for 60ms every 1860ms and the loop repeats after the 1860ms.



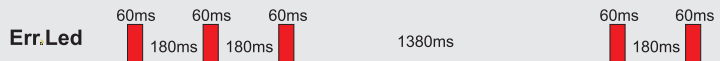
**I2 = 2 : Lower scale error.**

Error LED lights two times for 60ms every 180ms and the loop repeats after the 1620ms.



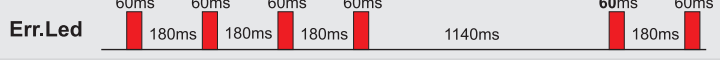
**I2 = 3 : Upper scale error.**

Error LED lights three times for 60ms every 180ms and the loop repeats after the 1380ms.



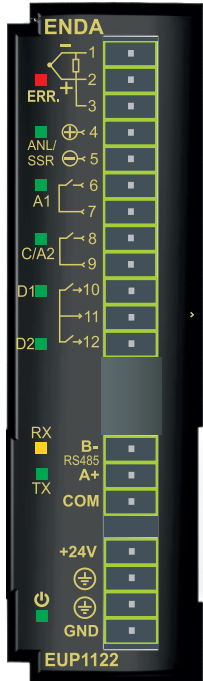
**I2 = 4 : No communication with the sensor (Sensor not connected or sensor line is faulty).**

Error LED lights four times for 60ms every 180ms and the loop repeats after the 1140ms.



See "1.9 Memory Map for Input Registers" for details.

Input Register	Parameter Number	Description
I2	12	Measurement Error codes. 0 = No Error, 1 = Short circuit, 2 = Lower scale, 3 = Upper scale, 4 = No communication with the sensor.



### CONNECTION DIAGRAM



ENDA EUP1122 devices are intended for rail mounted installations. Make sure that the device is used only for intended purpose. The shielding must be grounded on the instrument side. During an installation, all of the cables that are connected to the device must be free of electrical power. The device must be protected against inadmissible humidity, vibrations, severe soiling. Make sure that the operation temperature is not exceeded. All input and output lines that are not connected to the supply network must be laid out as shielded and twisted cables. These cables should not be close to the power cables or components. The installation and electrical connections must be carried out by a qualified staff and must be according to the relevant locally applicable regulations.



- 1) Mains supply cords shall meet the requirements of IEC 60227 or IEC 60245.
- 2) In accordance with the safety regulations, the power supply switch shall bring the identification of the relevant instrument and it should be easily accessible by the operator.

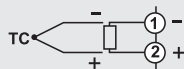


The logic output of the instrument is not electrically insulated from the internal circuits. Therefore, when using a grounded thermocouple, do not connect the logic output terminals to the earth.

### SENSOR INPUTS

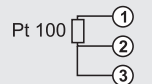
#### J-K-L-T-S-R Type Thermocouples :

Use the correct compensation cables for thermocouples. Do not use jointed cables. Make sure to connect to the right place and right polarities at the input terminals as shown in the figure.

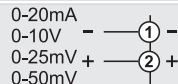


#### Resistance (PT100) Thermocouples :

Make short circuits 2 and 3 terminal lines for two-wire PT100 sensors. Do not use jointed cables. Long cable causes incorrect temperature measurement.



**0-20mA, 4-20mA, 0-10V, 2-10V, 0-25mV and 0-50mV Inputs :**  
Make sure to connect to the right place and right polarities at the input terminals as shown in the figure. Do not use jointed cables. Long cable causes incorrect measurement results.



#### D1 and D2 Dry Contact Inputs :

Dry contacts must be used with mechanical keys.



### MAINS CONNECTION

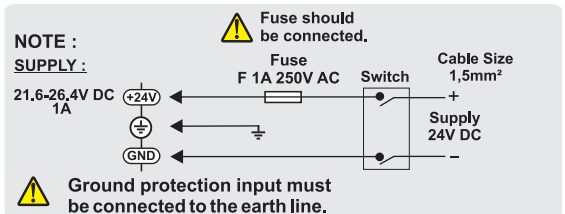


Fig.1. ALARM1 AND ALARM2 OUTPUT TYPES (Diagrams are based on Alarm1 graphics)

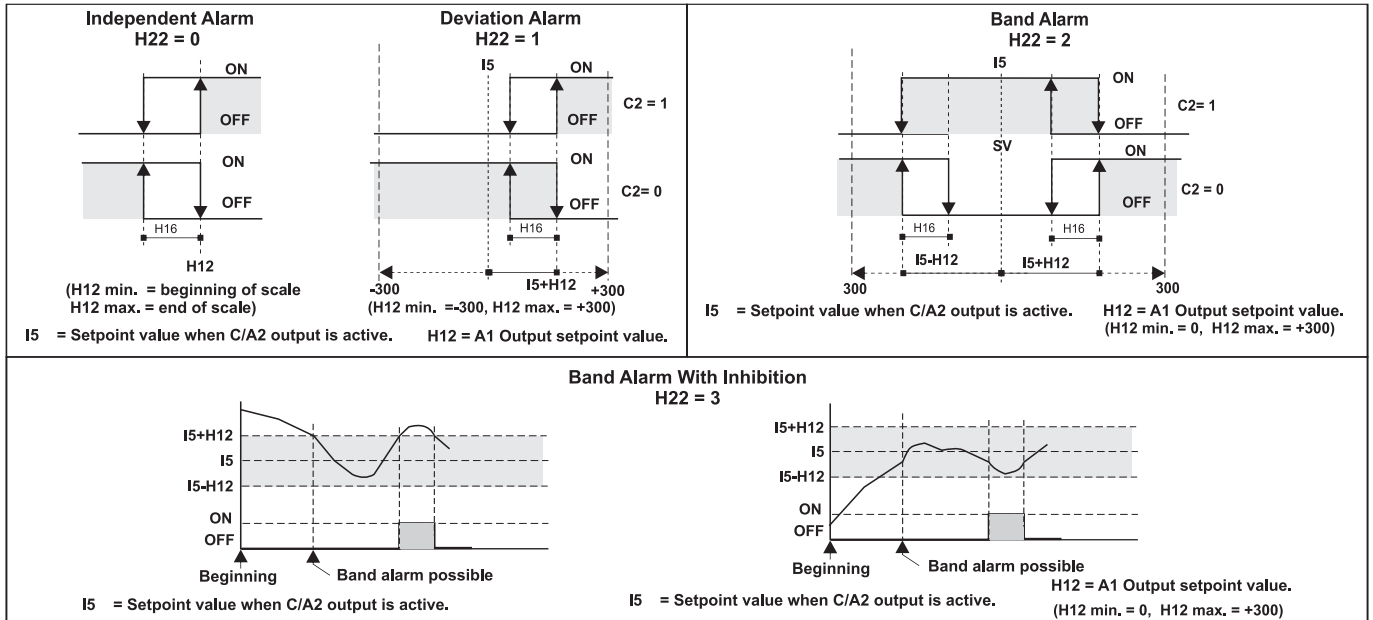


Fig.2. BAND ALARM WITH INHIBITION H22 = 3



Fig.2. TIMER / THERMOSTAT OUTPUT SAMPLES

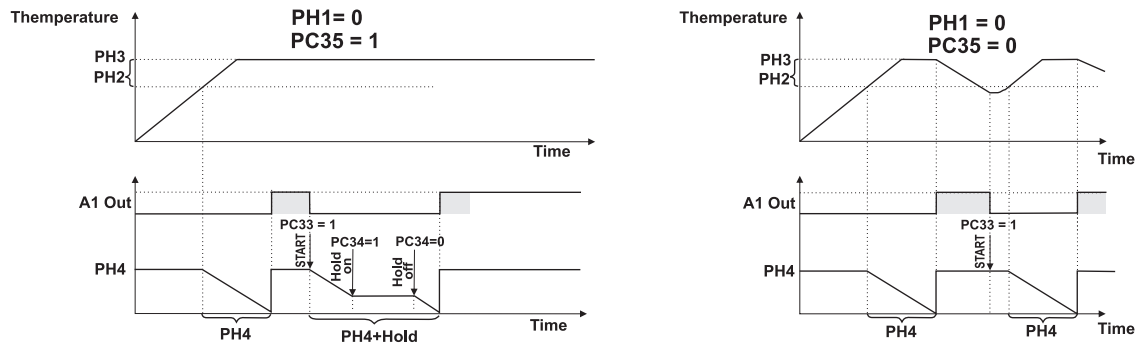


Fig.3. PROFILE CONTROL OUTPUT SAMPLES

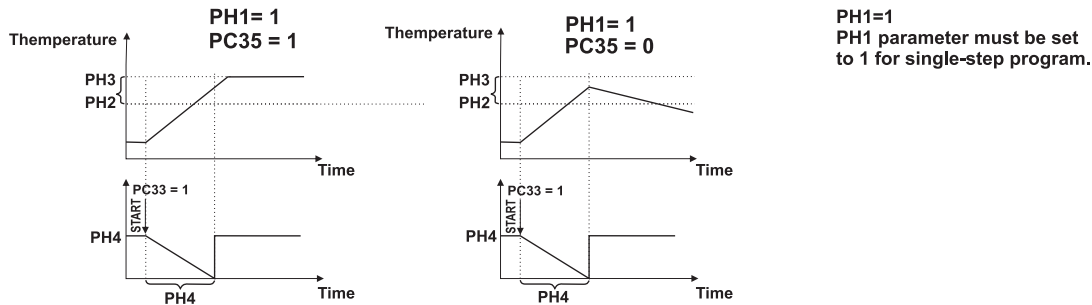
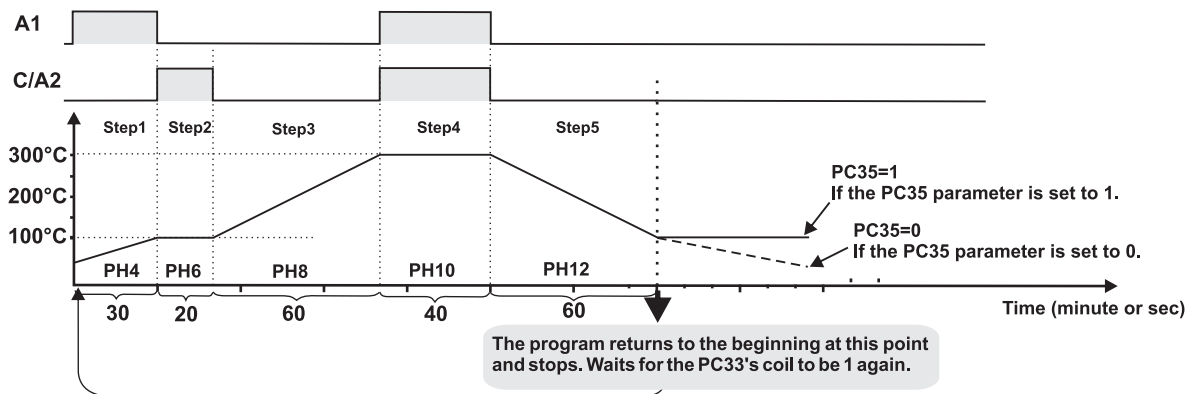


Fig.4. MULTI-STEP PROFILE CONTROL OUTPUT SAMPLES

	Step1	Step2	Step3	Step4	Step5
Target Temp.	PH3 = 100	PH5 = 100	PH7 = 300	PH9 = 300	PH11 = 100
Time	PH4 = 30	PH6 = 20	PH8 = 60	PH10 = 40	PH12 = 60
A1 Output	PC0 = 1	PC1 = 0	PC2 = 0	PC3 = 1	PC4 = 0
C/A2 Output	PC16 = 0	PC17 = 1	PC18 = 0	PC19 = 1	PC20 = 0

PH1=5  
PH1 parameter must be set to 5 for five-step program.



# ENDA EUP1122 PID UNIVERSAL CONTROLLER MODBUS PROTOCOL ADDRESS MAP

## 1.1 Memory Map for Thermostat Holding Registers.

Parameter Number	Holding Register Address Decimal (Hex)	Data Type	Data Content	Read / Write Permission	Default Value	
Control Output Parameters	H0	0000d (0000h)	Word	Control output, temperature setpoint value	R / W	400
	H1	0001d (0001h)	Word	Control output, 2nd temperature setpoint value	R / W	500
	H2	0002d (0002h)	Word	Control output, minimum setpoint value	R / W	0
	H3	0003d (0003h)	Word	Control output, maximum setpoint value	R / W	600
	H4	0004d (0004h)	Word	Control output, proportional band setpoint value (Adjustable between 0.0% and 100.0%)	R / W	4.0
	H5	0005d (0005h)	Word	Control output, hysteresis value (Adjustable between 1 and 50 °C or °F)	R / W	2
	H6	0006d (0006h)	Word	Control output, integral time (Adjustable between 0.1 and 100.0 minute)	R / W	4.0
	H7	0007d (0007h)	Word	Control output, derivative time (Adjustable between 0.01 and 10.00 minute)	R / W	1.00
	H8	0008d (0008h)	Word	Control output, time period setpoint value (Adjustable between 1 and 125 second)	R / W	1
	H9	0009d (0009h)	Word	Control output, set value power ratio (Adjustable between 0% and 100%)	R / W	0
	H10	0010d (000Ah)	Word	Control output energy percentage in case of sensor error (can be set between 0% to 100%)	R / W	0
A1 Output Parameters	H11	0011d (000Bh)	Word	Control output, soft start value	R / W	0
	H12	0012d (000Ch)	Word	Alarm1 output temperature setpoint value	R / W	500
	H13	0013d (000Dh)	Word	Alarm1 output minimum setpoint value limit	R / W	0
	H14	0014d (000Eh)	Word	Alarm1 output maximum setpoint value limit	R / W	600
	H15	0015d (000Fh)	Word	Alarm1 output proportional band set value (Adjustable between 0.0% and 100.0%)	R / W	0.0
	H16	0016d (0010h)	Word	Alarm1 output hysteresis value (Adjustable between 1 and 50 °C or °F)	R / W	2
	H17	0017d (0011h)	Word	Alarm1 output, integral time (Adjustable between 0.1 and 100.0 minute)	R / W	0.0
	H18	0018d (0012h)	Word	Alarm1 output, derivative time (Adjustable between 0.01 and 10.00 minute)	R / W	0.0
	H19	0019d (0013h)	Word	Alarm1 output, time period setpoint value (Adjustable between 1 and 125 second)	R / W	1
	H20	0020d (0014h)	Word	Alarm1 output, set value power ratio (Adjustable between 0% and 100%)	R / W	0
	H21	0021d (0015h)	Word	Alarm1 output, set value power ratio in case of sensor failure (Adjustable between %0 and %100)	R / W	0
H22	0022d (0016h)	Word	Alarm1 output type selection (Values can be given from 0 to 6) 0 = Independent alarm, 1 = Deviation alarm, 2 = Band alarm, 3 = Active alarm after in band time, 4 = Alarm1 output, cooling control selection, 5 = Alarm1 output, heating setpoint dependent cooling control.	R / W	0	
A2 Output Parameters	H23	0023d (0017h)	Word	Alarm2 output, temperature setpoint value	R / W	500
	H24	0024d (0018h)	Word	Alarm2 output minimum setpoint value limit	R / W	0
	H25	0025d (0019h)	Word	Alarm2 output maximum setpoint value limit	R / W	600
	H26	0026d (001Ah)	Word	Alarm2 output, hysteresis value (Adjustable between 1 and 50 °C or °F)	R / W	2
	H27	0027d (001Bh)	Word	Alarm2 output type selection (Values can be given from 0 to 3) 0 = Independent alarm, 1 = Deviation alarm, 2 = Band alarm, 3 = Active alarm after in band time.	R / W	0
Configuration Parameters	H28	0028d (001Ch)	Word	Input Type Selection Number. 0 = PT100 Decimal, 1 = PT100 Non-decimal, 2 = J Decimal, 3 = J Non-decimal, 4 = K Decimal, 5 = K Non-decimal, 6 = L Decimal, 7 = L Non-decimal, 8 = T Decimal, 9 = T Non-decimal, 10 = S Non-decimal, 11 = R Non-decimal, 12 = 0-20mA, 13 = 4-20mA, 14 = 0-10V, 15 = 2-10V, 16 = 0-25mV, 17 = 0-50mV	R / W	3
	H29	0029d (001Dh)	Word	Heating control output duration. Heating control not performed if set to 0. Up to 1000 seconds can be set. Error message is generated at the end of time if no temperature value is change.	R / W	60
	H30	0030d (001Eh)	Word	Modbus communication speed (Baudrate). 0 = 2400bps, 1 = 4800bps, 2 = 9600bps, 3 = 19200bps, 4 = 38400bps, 5 = 38400bps, 6 = 115200bps. <b>ATTENTION !!</b> User must set Parity = None, Stop Bit = 1 and Data Length = 8 on the device that provides the Modbus connection. In EUP1122 these settings are set as factory default and can not be changed by the user. Baud rate can be set with the dip switches on the device. <b>Please see 1.2 DIP Switch Settings for details.</b>	R / W	4
	H31	0031d (001Fh)	Word	Digital filter coefficient (Adjustable between 1 and 100, 1 = filter is disable)	R / W	20
	H32	0032d (0020h)	Word	Control output, selection value. 0 = C/A2 Output is Control output, 1 = SSR/ANL is SSR, 2 = SSR/ANL is 0-20mA, 3 = SSR/ANL is 4-20mA, 4 = SSR/ANL is 0-10V, 5 = SSR/ANL is 2-10V. <b>ATTENTION !! H42 parameter will be 0 if this parameter set to different from 0.</b>	R / W	0
	H33	0033d (0021h)	Word	Analog output minimum out percentage	R / W	0



# ENDA EUP1122 PID UNIVERSAL CONTROLLER MODBUS PROTOCOL ADDRESS MAP

## 1.1 Memory Map for Thermostat Holding Registers (continue).

Parameter Number	Holding Register Address Decimal (Hex)	Data Type	Data Content	Read / Write Permission	Default Value																																
H34	0034d (0022h)	Word	Analog output maximum out percentage	R / W	100																																
H35	0035d (0023h)	Word	Offset value	R / W	0																																
H36	0036d (0024h)	Word	Function control parameter. ( 23040d ( 5A00h ) Self tune stops when this value is entered ) ( 23041d ( 5A01h ) Self tune starts when this value is entered ) ( 23042d ( 5A02h ) H0...H51 and C0...C10 parameters are returns to factory defaults when this value is entered). (23043d ( 5A03h) PH0...PH37 and PC0...PC38 parameters are returns to factory defaults when this value is entered.	R / W	0																																
H37	0037d (0025h)	Word	Not used.	R / W	X																																
H38	0038d (0026h)	Word	Not used	R / W	X																																
H39	0039d (0027h)	Word	Manual output percentage value (can be set from 0 to 100%).	R / W	50																																
H40	0040d (0028h)	Word	D1 digital contact input control parameter: If 0, input D1 is not used. If 1 and D1 input is OFF, H0, if ON, H1 parameter is used as control set value. If it is 2 and D1 input is OFF, Auto control is performed, if ON, Manual control is performed. If it is 3 and D1 input is OFF, it is Thermostat, if it is ON, it is in display mode. If 4 and D1 input is OFF, Profile Start, if ON, Profile stop. If 5 and input D1 is OFF, Hold off, if ON, Hold on.	R / W	0																																
H41	0041d (0029h)	Word	D2 digital contact input control parameter: If 0, input D1 is not used. If 1 and D1 input is OFF, H0, if ON, H1 parameter is used as control set value. If it is 2 and D1 input is OFF, Auto control is performed, if ON, Manual control is performed. If it is 3 and D1 input is OFF, it is Thermostat, if it is ON, it is in display mode. If 4 and D1 input is OFF, Profile Start, if ON, Profile stop. If 5 and input D1 is OFF, Hold off, if ON, Hold on.	R / W	0																																
H42	0042d (002Ah)	Word	Retransmission output control parameter: If this parameter is 0, Retransmission output; OFF. If this parameter is 1, Analog output; 0-20mA Retransmission output. If this parameter is 2, Analog output; 4-20mA Retransmission output. If this parameter is 3, Analog output; 0-10V Retransmission output. If this parameter is 4, Analog output; 2-10V Retransmission output <b>ATTENTION!! To setting up this parameter, H32 parameter must be set to 0.</b>	R / W	0																																
H43	0043d (002Bh)	Word	Retransmission output lower scala value.	R / W	0																																
H44	0044d (002Ch)	Word	Retransmission output upper scala value.	R / W	600																																
H45	0045d (002Dh)	Word	Decimal Point selection for mA anv V inputs.	R / W	0																																
H46	0046d (002Eh)	Word	User defined lower scale value for 0-20mA, 4-20mA, 0-10V and 2-10V input selections	R / W	0																																
H47	0047d (002Fh)	Word	User defined upper scale value for 0-20mA, 4-20mA, 0-10V and 2-10V input selections	R / W	10000																																
H48	0048d (0030h)	Word	Not used.	R / W	X																																
H49	0049d (0031h)	Word	Not used.	R / W	X																																
H50	0050d (0032h)	Word	Not used.	R / W	X																																
H51	0051d (0033h)	Word	Configuration register (holding register of C0-C9 configuration coils). <div style="text-align: center;"> <table border="1" style="border-collapse: collapse; margin: auto;"> <tr> <td>B15</td><td>B14</td><td>B13</td><td>B12</td><td>B11</td><td>B10</td><td>B9</td><td>B8</td><td>B7</td><td>B6</td><td>B5</td><td>B4</td><td>B3</td><td>B2</td><td>B1</td><td>B0</td> </tr> <tr> <td>C10</td><td>C9</td><td>C8</td><td>C7</td><td>C6</td><td>C5</td><td>C4</td><td>C3</td><td>C2</td><td>C1</td><td>C0</td><td colspan="5"></td> </tr> </table> </div> See the coil descriptions in section 1.3 for bit meanings.	B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0	C10	C9	C8	C7	C6	C5	C4	C3	C2	C1	C0						R / W	0
B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0																						
C10	C9	C8	C7	C6	C5	C4	C3	C2	C1	C0																											

## 1.2 DIP Switch Settings

### Default settings and Baud Rate Settings.

DIPSW Value	Description
0	Default Set Settings. Default settings is performed when all the DIP Switch positions are set to 0 (OFF).
248	Baud rate 2400Bps
249	Baud rate 4800Bps
250	Baud rate 9600Bps
251	Baud rate 19200Bps
252	Baud rate 38400Bps
253	Baud rate 57600Bps
254	Baud rate 115200Bps

When required to return to the factory values or to adjust the modbus communication speed, at first, the DIP switch value should be adjusted according to the numerical value corresponding to the operation in the adjacent table (**Please See Note1**).

DIP switch value is set to required modbus address value and DIP switch is left in this setting position (**Please see Note2**).



#### NOTE1 :

While adjusting the Modbus communication speed setting, at first, switch 8 must be set to OFF in order to store the setting correctly, then the switch values from 1 to 7 of the baudrate switch value to be adjusted must be set and finally the 8th switch must be turned ON.



#### NOTE2 :

When setting the device address at first, the 8th switch should be turned off and then the switch values from 1 to 7 of the address to be adjusted should be set. If the 8th switch should be ON at the selected address, the 8th switch should be set to ON at the end of the procedure finally.

### DIP Switch Default and Baud rate Samples

<p><b>Default settings performing.</b></p> <p>0</p>	<p><b>Baud rate adjusting to 19200bps.</b></p> <p>251 = 128+64+32+16+8+2+1</p>	<p><b>Baud rate adjusting to 57600bps.</b></p> <p>253 = 128+64+32+16+8+4+1</p>
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### Device Addressing Samples

<p><b>Device address adjusting to 1</b></p> <p>1 = 1</p>	<p><b>Device address adjusting to 13</b></p> <p>13 = 8+4+1</p>	<p><b>Device address adjusting to 15</b></p> <p>15 = 8+4+2+1</p>	<p><b>Device address adjusting to 55</b></p> <p>55 = 32+16+4+2+1</p>
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# ENDA EUP1122 PID UNIVERSAL CONTROLLER MODBUS PROTOCOL ADDRESS MAP

## 1.3 Memory Map for Step Control Holding Registers

Parameter Number	Holding Register Address Decimal (Hex)	Data Type	Data Content	Read / Write Permission	Default Value																																
PH0	0100d (0064h)	Word	Profile time base set value. (0 = 9999s, 1 = 9999m)	R / W	0																																
PH1	0101d (0065h)	Word	Maximum number of steps (can be adjusted between 0 and 16. If set to 0, runs on timer/thermostat mode)	R / W	0																																
PH2	0102d (0066h)	Word	Target temperature difference for increasing the step. (It can be set between 0 and H3 parameter. If the step time is reached before the target temperature is reached when the profile is checked, then the difference between the target temperature and the measured temperature is expected to be less than or equal to this parameter value and then proceed to the next step. If the difference is smaller than or equal to this parameter, the timer is switched on. See Fig.2. / page 3).	R / W	0																																
PH3	0103d (0067h)	Word	1st-Step target temperature set value (can be adjusted between H2 and H3 parameter).	R / W	200																																
PH4	0104d (0068h)	Word	1st-Time value can be set from 0 to 9999 seconds or minutes (changes with the depending on PH0 parameter).	R / W	0																																
PH5	0105d (0069h)	Word	2nd-Step target temperature set value (can be adjusted between H2 and H3 parameter)	R / W	200																																
PH6	0106d (006Ah)	Word	2nd-Time value can be set from 0 to 9999 seconds or minutes (changes with the depending on PH0 parameter).	R / W	0																																
PH7	0107d (006Bh)	Word	3rd-Step target temperature set value (can be adjusted between H2 and H3 parameter)	R / W	200																																
PH8	0108d (006Ch)	Word	3rd-Time value can be set from 0 to 9999 seconds or minutes (changes with the depending on PH0 parameter).	R / W	0																																
PH9	0109d (006Dh)	Word	4th-Step target temperature set value (can be adjusted between H2 and H3 parameter)	R / W	200																																
PH10	0110d (006Eh)	Word	4th-Time value can be set from 0 to 9999 seconds or minutes (changes with the depending on PH0 parameter).	R / W	0																																
PH11	0111d (006Fh)	Word	5th-Step target temperature set value (can be adjusted between H2 and H3 parameter)	R / W	200																																
PH12	0112d (0070h)	Word	5th-Time value can be set from 0 to 9999 seconds or minutes (changes with the depending on PH0 parameter).	R / W	0																																
PH13	0113d (0071h)	Word	6th-Step target temperature set value (can be adjusted between H2 and H3 parameter)	R / W	200																																
PH14	0114d (0072h)	Word	6th-Time value can be set from 0 to 9999 seconds or minutes (changes with the depending on PH0 parameter).	R / W	0																																
PH15	0115d (0073h)	Word	7th-Step target temperature set value (can be adjusted between H2 and H3 parameter)	R / W	200																																
PH16	0116d (0074h)	Word	7th-Time value can be set from 0 to 9999 seconds or minutes (changes with the depending on PH0 parameter).	R / W	0																																
PH17	0117d (0075h)	Word	8th-Step target temperature set value (can be adjusted between H2 and H3 parameter)	R / W	200																																
PH18	0118d (0076h)	Word	8th-Time value can be set from 0 to 9999 seconds or minutes (changes with the depending on PH0 parameter).	R / W	0																																
PH19	0119d (0077h)	Word	9th-Step target temperature set value (can be adjusted between H2 and H3 parameter)	R / W	200																																
PH20	0120d (0078h)	Word	9th-Time value can be set from 0 to 9999 seconds or minutes (changes with the depending on PH0 parameter).	R / W	0																																
PH21	0121d (0079h)	Word	10th-Step target temperature set value (can be adjusted between H2 and H3 parameter)	R / W	200																																
PH22	0122d (007Ah)	Word	10th-Time value can be set from 0 to 9999 seconds or minutes (changes with the depending on PH0 parameter).	R / W	0																																
PH23	0123d (007Bh)	Word	11th-Step target temperature set value (can be adjusted between H2 and H3 parameter)	R / W	200																																
PH24	0124d (007Ch)	Word	11th-Time value can be set from 0 to 9999 seconds or minutes (changes with the depending on PH0 parameter).	R / W	0																																
PH25	0125d (007Dh)	Word	12th-Step target temperature set value (can be adjusted between H2 and H3 parameter)	R / W	200																																
PH26	0126d (007Eh)	Word	12th-Time value can be set from 0 to 9999 seconds or minutes (changes with the depending on PH0 parameter).	R / W	0																																
PH27	0127d (007Fh)	Word	13th-Step target temperature set value (can be adjusted between H2 and H3 parameter)	R / W	200																																
PH28	0128d (0080h)	Word	13th-Time value can be set from 0 to 9999 seconds or minutes (changes with the depending on PH0 parameter).	R / W	0																																
PH29	0129d (0081h)	Word	14th-Step target temperature set value (can be adjusted between H2 and H3 parameter)	R / W	200																																
PH30	0130d (0082h)	Word	14th-Time value can be set from 0 to 9999 seconds or minutes (changes with the depending on PH0 parameter).	R / W	0																																
PH31	0131d (0083h)	Word	15th-Step target temperature set value (can be adjusted between H2 and H3 parameter)	R / W	200																																
PH32	0132d (0084h)	Word	15th-Time value can be set from 0 to 9999 seconds or minutes (changes with the depending on PH0 parameter).	R / W	0																																
PH33	0133d (0085h)	Word	16th-Step target temperature set value (can be adjusted between H2 and H3 parameter)	R / W	200																																
PH34	0134d (0086h)	Word	16th-Time value can be set from 0 to 9999 seconds or minutes (changes with the depending on PH0 parameter).	R / W	0																																
PH35	0135d (0087h)	Word	A1 Output control bits in steps. <table border="1" style="width: 100%; text-align: center;"> <tr> <td>B15</td><td>B14</td><td>B13</td><td>B12</td><td>B11</td><td>B10</td><td>B9</td><td>B8</td><td>B7</td><td>B6</td><td>B5</td><td>B4</td><td>B3</td><td>B2</td><td>B1</td><td>B0</td> </tr> <tr> <td>Step8</td><td>Step7</td><td>Step6</td><td>Step5</td><td>Step4</td><td>Step3</td><td>Step2</td><td>Step1</td><td>Step16</td><td>Step15</td><td>Step14</td><td>Step13</td><td>Step12</td><td>Step11</td><td>Step10</td><td>Step9</td> </tr> </table> AL1 Output will be activated when related step bits are set.	B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0	Step8	Step7	Step6	Step5	Step4	Step3	Step2	Step1	Step16	Step15	Step14	Step13	Step12	Step11	Step10	Step9	R / W	0
B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0																						
Step8	Step7	Step6	Step5	Step4	Step3	Step2	Step1	Step16	Step15	Step14	Step13	Step12	Step11	Step10	Step9																						
PH36	0136d (0088h)	Word	A2 output control step bits. (Set such as PH35 parameter).	R / W	0																																
PH37	0137d (0089h)	Word	Step control parameter (holding registers of PC32-PC38 step control coils) <table border="1" style="width: 100%; text-align: center;"> <tr> <td>B15</td><td>B14</td><td>B13</td><td>B12</td><td>B11</td><td>B10</td><td>B9</td><td>B8</td><td>B7</td><td>B6</td><td>B5</td><td>B4</td><td>B3</td><td>B2</td><td>B1</td><td>B0</td> </tr> <tr> <td>—</td><td>PC38</td><td>PC37</td><td>PC36</td><td>PC35</td><td>PC34</td><td>PC33</td><td>PC32</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td> </tr> </table> See chapter 2.2 coil descriptions for bit significations.	B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0	—	PC38	PC37	PC36	PC35	PC34	PC33	PC32	—	—	—	—	—	—	—	—	R / W	0
B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0																						
—	PC38	PC37	PC36	PC35	PC34	PC33	PC32	—	—	—	—	—	—	—	—																						

Step Control Parameters

# ENDA EUP1122 PID UNIVERSAL CONTROLLER MODBUS PROTOCOL ADDRESS MAP

## 1.4 Memory Map for Control Coils

Parameter Number	Coil Addresses Decimal (Hex)	Data Type	Data Content	Read / Write Permission	Default Value
C0	0000d (0000h)	Bit	Alarm2 condition (0 = Alarm is ON at below setpoint value , 1 = Alarm is OFF at above setpoint value).	R / W	1
C1	0001d (0001h)	Bit	Alarm2 output status in case of probe failure (0 = OFF , 1 = ON).	R / W	1
C2	0002d (0002h)	Bit	Alarm1 condition (0 = Alarm is ON at below setpoint value , 1 = Alarm is OFF at above setpoint value).	R / W	1
C3	0003d (0003h)	Bit	Alarm1 output status in case of probe failure (0 = OFF , 1 = ON).	R / W	1
C4	0004d (0004h)	Bit	Control output configuration ( 0 = Heat ; 1 = Cool )	R / W	0
C5	0005d (0005h)	Bit	Temperature unit ( 0 = °C ; 1 = °F)	R / W	0
C6	0006d (0006h)	Bit	Controlling according to 2nd temperature setpoint (If C7 = 0 is H0, if C7 = 1 is H1)	R / W	0
C7	0007d (0007h)	Bit	Control outputs active (0 = Indicator mode (outputs OFF), 1 = Control outputs active)	R / W	0
C8	0008d (0008h)	Bit	Manual control bit (Auto control if C8 = 0. C/A2 output or ANL/SSR, according to the output percentage in parameter H39 if C8 = 1).	R / W	0
C9	0009d (0009h)	Bit	Control behavior in case of probe failure (0 = H10 proportional control according to percentage value, 1 = Error found before the setpoint control is done with the value of the proportional control)	R / W	0
C10	0010d (000Ah)	Bit	Self-tune control (If C = 0 Self-tune stops, if C = 1 Self-tune starts).	R / W	0

## 1.5 Memory Map for Step Control Coils

Parameter Number	Coil Addresses Decimal (Hex)	Data Type	Data Content	Read / Write Permission	Default Value
PC0-PC15	0100d (0064h) 0115d (0073h)	Bit	A1 alarm output programming coils in profile steps ; If PC0=1, A1 output is ON at 1st step.... If PC15=1, A1 output will be ON at 16th step.	R / W	0
PC16-PC31	0116d (0074h) 0131d (0083h)	Bit	C/A2 alarm output programming coils in profile steps ; If PC16=1, C/A2 output is ON at 1st step.... If PC31=1, C/A2 output will be ON at 16th step.	R / W	0
PC32	0132d (0084h)	Bit	Depending on set control or profile control selection. (PC32=0 thermostat mode, PC32=1 profile control mode)	R / W	0
PC33	0133d (0085h)	Bit	If PC33 = 0, in profile mode, the profile is stopped and the first step is returned. If PC33 = 1, the profile is started in profile mode.	R / W	0
PC34	0134d (0086h)	Bit	If PC34 = 0, the profile continues to run. If PC34 = 1, the profile operation is put on hold (Hold mode).	R / W	0
PC35	0135d (0087h)	Bit	If PC35 = 0, the control process is finished when the profile is finished (Control outputs are OFF). If PC35 = 1, the control is continued according to the last set value when the profile is finished.	R / W	0
PC36	0136d (0088h)	Bit	If PC36 = 0, the profile stops and returns to 1st step if power-off. If PC36 = 1, In case of power-off or restarted and the current step value of the temperature setpoint(s) are not configured for resuming, returns to the 1st step and the profile stops.	R / W	0
PC37	0137d (0089h)	Bit	If PC37 = 0, output A1 is controlled according to H22 parameter. If PC37 = 1 and PC32 = 1, output A1 is controlled at each step according to PH35 parameter.	R / W	0
PC38	0138d (008Ah)	Bit	If PC38 = 0, output A2 is controlled according to H27 parameter. If PC38 = 1 and PC32 = 1, output C / A2 is controlled at each step according to PH36 parameter.	R / W	0

## 1.6 Memory Map for Output Status Indicator Bits

Parameter Number	Discrete Input Addresses	Data Type	Data Content	Read / Write Permission
D0	(0000)h	Bit	C/A2 Control output status (0 = OFF , 1 = ON)	Read Only
D1	(0001)h	Bit	A1 Output status (0 = OFF , 1 = ON )	Read Only
D2	(0002)h	Bit	SSR Output status (0 = OFF , 1 = ON)	Read Only
D3	(0003)h	Bit	D1 Digital input status (0 = OFF , 1 = ON)	Read Only
D4	(0004)h	Bit	D2 Digital input status (0 = OFF , 1 = ON)	Read Only
D5	(0005)h	Bit	Heating error condition for control output (0 = No error , 1 = Heating not possible).	Read Only

## 1.7 Memory Map for Step Control Status Indicator Bits

Parameter Number	Discrete Input Addresses	Data Type	Data Content	Read / Write Permission
PD0	0100d (0064h)	Bit	If PD0=1, profile is in constant temperature step.	Read Only
PD1	0101d (0065h)	Bit	If PD1=1, profile is in heating step.	Read Only
PD2	0102d (0066h)	Bit	If PD2=1, profile is in cooling step.	Read Only
PD3	0103d (0067h)	Bit	If PD3=1, profile terminated.	Read Only
PD4	0104d (0068h)	Bit	If PD4=1, profile step timer is 0.	Read Only
PD5	0105d (0069h)	Bit	PD5=1, profile step timer is running.	Read Only

## 1.8 Memory Map for Software Revision Input Registers

Software Revision	Discrete Input Addresses	Data Type	Data Content	Read / Write Permission															
65200d (FEB0h)	8 Word		Software name and update is read in ASCII format and as 8 word. Format yy aa gg.SS dd ss i.e: RD.21 08 20.07 09 37 Memory Format : <table style="display: inline-table; border-collapse: collapse;"> <tr> <td style="border: 1px solid black; padding: 2px;">D</td> <td style="border: 1px solid black; padding: 2px;">R</td> <td style="border: 1px solid black; padding: 2px;">.</td> <td style="border: 1px solid black; padding: 2px;">0</td> <td style="border: 1px solid black; padding: 2px;">1</td> <td style="border: 1px solid black; padding: 2px;">2</td> <td style="border: 1px solid black; padding: 2px;">8</td> <td style="border: 1px solid black; padding: 2px;">.</td> <td style="border: 1px solid black; padding: 2px;">0</td> <td style="border: 1px solid black; padding: 2px;">7</td> <td style="border: 1px solid black; padding: 2px;">0</td> <td style="border: 1px solid black; padding: 2px;">9</td> <td style="border: 1px solid black; padding: 2px;">0</td> <td style="border: 1px solid black; padding: 2px;">7</td> <td style="border: 1px solid black; padding: 2px;">3</td> </tr> </table>	D	R	.	0	1	2	8	.	0	7	0	9	0	7	3	Read Only
D	R	.	0	1	2	8	.	0	7	0	9	0	7	3					

**NOTE** : To view each word correctly by changing the byte sequences should be displayed as ASCII TEXT

# ENDA EUP1122 PID UNIVERSAL CONTROLLER MODBUS PROTOCOL ADDRESS MAP

## 1.9 Memory Map for Input Registers

Parameter Number	Input Register Addresses Decimal (Hex)	Data Type	Data Content	Read / Write Permission
I0	0000d (0000h)	Word	Measured temperature	Read Only
I1	0001d (0001h)	Word	Analog output percentage	Read Only
I2	0002d (0002h)	Word	Measurement error codes 0 = No error, 1 = Sensor and/or sensor line short circuit, 2 = Lower scale error, 3 = Upper scale error, 4 = No communication.	Read Only
I3	0003d (0003h)	Word	Self tune condition codes 0 = No error, 1 = Initial temperature is higher than 60% setpoint value, 2 = Calculating PID parameters, 3 = Calculating power setpoint parameters	Read Only
I4	0004d (0004h)	Word	Modbus address. Can be set between 1 and 247 with DIP switch.	Read Only
I5	0005d (0005h)	Word	Current (active) temperature setpoint.	Read Only
I6	0006d (0006h)	Word	Current (active) decimal point value.	Read Only

## 1.10 Memory Map for Step Control Input Registers

Parameter Number	Discrete Input Addresses Decimal (Hex)	Data Type	Data Content	Read / Write Permission
PI0	0100d (0064h)	Word	The number of the active step.	Read Only
PI1	0101d (0065h)	Word	Remaining time indicator of the active step.	Read Only
PI2	0102d (0066h)	Word	Target temperature value of the active step.	Read Only

## 2. MODBUS ERROR MESSAGES

Modbus protocol has two types error, communication error and operating error. Reason of the communication error is data corruption in transmission. Parity and CRC control should be done to prevent communication error. Receiver side checks parity and CRC of the data. If they are wrong, the message will be ignored. If format of the data is true but function doesn't perform for any reason, operating error occurs. EUP1122 realizes error and sends error message. Most significant bit of function is changed '1' to indicate error in error message by EUP1122. Error code is sent in data section. EUP1122 realizes error type via this message.

### ModBus Error Codes

Error Code	Name	Meaning
01	ILLEGAL FUNCTION	The function code received in the query is not an allowable action for the EUP1122. If a Poll Program Complete command was issued, this code indicates that no program function preceded it.
02	ILLEGAL DATA ADDRESS	The data address received in the query is not an allowable address for EUP1122.
03	ILLEGAL DATA VALUE	A value contained in the query data field is not an allowable value for the EUP1122.

Message sample ;

Structure of command message (Byte Format)

Device Address	(0A)h
Function Code	(01)h
Beginning address of coils.	MSB (04)h
	LSB (A1)h
Number of coils (N)	MSB (00)h
	LSB (01)h
CRC DATA	LSB (AC)h
	MSB (63)h

Structure of response message (Byte Format)

Device Address	(0A)h
Function Code	(81)h
Error Code	(02)h
CRC DATA	LSB (B0)h
	MSB (53)h

As you see in command message, coil information of (4A1)h = 1185 is required but there isn't any coil with 1185 address. Therefore error code with number (02) (Illegal Data Address) sends.

