Please read this document carefully before using this product. The guarantee will be invalidated if the device is damaged by not following instructions detailed in the manual. The company shall not be responsible for any damage or losses however caused, which may be experienced as a result of the installation or use of this product.

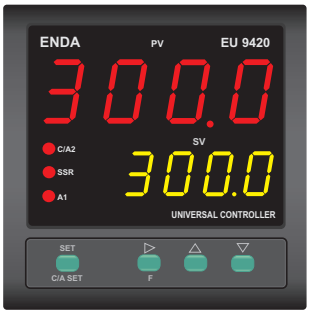
ENDA EU SERIES PID UNIVERSAL CONTROLLER

Thank you for choosing **ENDA EU** Series Universal Controller Devices.

- Dual setpoint value can be selected.
- PT100 ,J, K, L, T, S, R sensor (thermocouple) types can be selected.
- 0-20mA, 4-20mA, 0-10V,2-10V, 0-25mV and 0-50mV input selections.
- Auto calculation for PID parameters (SELF TUNE).

Self tune for automatic PID calculation or manually enter PID parameters if known.

- Three different feature can be assigned to digital input.
- Three different feature can be assigned to F function key.
- Soft-Start feature.
- Analogue, SSR or Relay Control Output selection.
- 0-20mA and 4-20mA analogue Control selection.
- A1 Relay output programmable as first Alarm or Cooling control output.
- C/A2 Relay output can be used as second Alarm or Temperature Control output.
- Heating/Cooling control.
- Zero point input shift.
- In case of sensor failure, periodically, auto-periodically running or relay state can be selected.
- RS485 Modbus RTU communication protocol feature. (Specify at order).
- CE marked according to European Norms.



Order Code

EU □□□□ - □□□□□□ - □□

1	2	3

1 - Size
EU4420.....W48xH48xD87mm
EU7420.....W72xH72xD97mm
EU8420.....W48xH96xD87mm
EU9420.....W96xH96xD50mm

2 - Supply Voltage
230VAC...230V AC
24VAC.....24V AC
SM.....9-30V DC / 7-24V AC

3 - Modbus (Specify at Order)
RS.....RS-485 Modbus
Blank....N/A

RoHS Compliant

CE

TECHNICAL SPECIFICATIONS

Input Type		Scale Range		Accuracy
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		-1999...+9999 (max. scale range 10000)		± 0,2% (for full scale) ± 1 digit
4-20mA input		-1999...+9999 (max. scale range 10000)		± 0,2% (for full scale) ± 1 digit
0-10V input		-1999...+9999 (max. scale range 10000)		± 0,2% (for full scale) ± 1 digit
2-10V input		-1999...+9999 (max. scale range 10000)		± 0,2% (for full scale) ± 1 digit
0-25mV input		-1999...+9999 (max. scale range 10000)		± 0,2% (for full scale) ± 1 digit
0-50mV input		-1999...+9999 (max. scale range 10000)		± 0,2% (for full scale) ± 1 digit

ENVIRONMENTAL CONDITIONS	
Ambient/storage temperature	0 ... +50°C/-25 ... +70°C
Max. Relative humidity	Relative humidity 80% for temperatures up to 31°C decreasing linearly to 50% relative humidity at 40°C.
Rated pollution degree	According to EN 60529; Front panel : IP65, Rear panel : IP20
Height	Max. 2000m
Keep out of flammable, corrosive gases and chemicals at all times.	
ELECTRICAL CHARACTERISTICS	
Supply	90-250V AC, 50/60Hz or 24V AC ±%10, 50/60Hz or 9-30VDC / 7-24VAC ±%10 SMPS
Power consumption	Max. 5VA
Wiring	Power screw-terminal connections: 2.5mm², Signal screw-terminal connections: 1,5mm².
Line resistance	Max. 100 Ohm
Data retention	EEPROM (minimum 10 years)
EMC	EN 61326-1: 2013 (Performance criterion B satisfied for EN 61000-4-3 standard).
Safety requirements	EN 61010-1: 2010 (Pollution degree 2, overvoltage category II)
OUTPUTS	
C/A2 Output	Relay : 250V AC, 2A (for resistive load), NO+NC (Control or Alarm2 Output selection).
A1 Output	Relay : 250V AC, 2A (for resistive load), NO (Alarm1 and Cooling Control Output selection).
ANL/SSR Output	Max. SSR Output ; 0-20mA, 4-20mA, 24V 20mA. Max. load resistance ; 600 Ohm (12 bit 0.2% accuracy).
Life expectancy for relay	Without load 30.000.000 switching; 250V AC, 2A (resistive load) 300.000 switching.
CONTROL	
Control type	Single Setpoint and Alarm Control.
Control algorithm	On-Off / P, PI, PD, PID (selection).
A/D converter	14 bit.
Sampling time	Min. 100ms.
Proportional band	Can be adjusted between %0.0 and %100.0 . If Pb=%0.0 , ON-OFF control is selected.
Control period	Can be adjusted between 1 and 125secs.
Hysteresis	Can be adjusted between 1 and 50°C/F.
Output power	Setpoint value ratio can be adjusted between %0 and %100 .
HOUSING	
Housing type	Suitable for flush-panel mounting according to DIN 43 700.
Dimensions	EU4420 W48xH48xD87mm, EU7420 W72xH72xD97mm, EU8420 W48xH96xD87mm, EU9420 W96xH96xD50mm.
Weight	Approx. 400g (250g for EU4400) After packing.
Enclosure material	Self extinguishing plastics
While cleaning the device, solvents (thinner, gasoline, acid etc.) or corrosive materials must not be used.	

ENDA EUXXX SERIES PROGRAMMING DIAGRAM

SET / C/A SET — F

If SET / C/A SET key is pressed while holding F key, the "Programming Mode" is entered.

Entering from the "Programming Mode" to the "Running mode":
If no key is pressed within 20 seconds during "Programming Mode", the data is stored automatically and the "Running mode" is entered.

Alternatively, the same function occurs first pressing F key is pressing "Programming Mode" is entered. Then SET / C/A SET + F keys are pressing together, data is recorded and "Running mode" is entered.

SET / C/A SET — F

Conn. → F → AL 1.o. → F → AL 2.o. → F → conF. → F → S.tun. → F → SECU. → F → Conn.

Conn.

C.SL.o.= A1 Output Control setpoint value lower limit.
Adjustable between **0** and C.SH.1

C.SH.1= A1 Output Control setpoint value upper limit.
Adjustable between C.SL.o. and Upper scale value.

C. Pb = A1 Output Proportional band value.
Adjustable between %0.0 and %100.0.
If C. Pb= %0.0, ON-OFF control is selected.

C.HYS = A1 Output Hysteresis value.
Adjustable between 1 and 50 °C.
⚠ If C. Pb= 0, this parameter is activated.

C. t.1 = A1 Output Integral value.
Adjustable between 0 and 100.0 minutes.
C. t.1 = 0.0, integral impact is disable.
⚠ If C. Pb parameter is different from "0.0", this parameter is activated.

C. td = A1 Output Derivative value.
Asjustable between 0.00 and 25.00 minutes.
C. td = 0.0, derivative time is disabled.
⚠ If C. Pb parameter is different from"0.0", this parameter is activated.

C. Ct. = A1 Output Period time.
Adjustable between 1 and 125 second.
⚠ If C. Pb parameter is different from"0.0", this parameter is activated.

C.P.St = A1 Output power at A1 setpoint.
Adjustable between 0% and 100%.
⚠ If C.Pb parameter is different from 0.0, this parameter is activated.

C.E.c.t. = Faulty sensor control type.
If C.E.c.t. = E.P.S. , in case of probe failure according to C.E.P.S. proportional value of the parameter control is performed.
If C.E.c.t. = Auto. in case of probe failure, the fault found and recorded before the last setpoint control with the control percentage is performed.
⚠ If C.Pb parameter is different from 0.0, this parameter is activated.

C.E.P.S. = In the case of probe failure, A1 output percentage adjustable between %0 and %100.
⚠ If C.E.c.t. = E.P.S. or C. Pb = 0.0 is selected, this parameter is activated.
In case of failure, if C. Pb = 0.0 (ON/OFF Control) and C.E.P.S = 0 output will be OFF, if different from "0" value, output will be ON.

S.S.t.S. = **Soft Start timer set value.**
This parameter indicates the time to reach set point value when the device is first energised.
Adjustable between 0 and 250 minutes.
If 0 is selected, soft start feature will be enable and the device reaches set point value quickly.

C.t.YP = **Control output type**
C.t.YP. = HEAt **means heating control.**
C.t.YP. = CooL **means cooling control.**

AL 1.o.

A 1.SL = **Alarm1 set value lower limit.**
Adjustable between 0 and A 1.SH parameter value.

A 1.SH = **Alarm1 set value upper limit.**
Adjustable between A 1.SL parameter value and upper scale value.

A 1.HY = **Hysteresis of the Alarm1 output.**
Adjustable between 1 and 50°C.

A 1.tP = **Type of Alarm1.**
Six kinds of functions can be selected.
indE= **Independent alarm**
dE. = **Deviation alarm**
bAnd = **Band alarm (Band)**
bAn.1 = **Band with inhibition**
inCo= **A1 output independent cooling control**
rECo = **A1 output relative cooling control**

A 1.St. = **Alarm1 output situation.**
If Alarm1 output =A1 output is above the Alarm1 set value ; on.
Lo=**A1 output is above the Alarm1 set value ; off.**
⚠ A 1.tP parameter , inCo. or rECo.is selected; this parameter is not seen.

A 1.Er. = **Alarm1 probe failure situation.**
on= **A1 output probe failure; on.**
oFF= **A1 output probe failure; off.**
⚠ A 1.tP parameter, inCo. or rECo. is selected, this parameter is not seen.

A 1.Pb = **A1 output,value of proportional band.**
Adjustable between 0% and 100%.
A 1.Pb= **0%, On-Off control is selected.**
⚠ A 1.tP parameter, inCo. or rECo. is selected,this parameter is activated.

A 1.t.1 = **A1 output integral value.**
Adjustable between 0.0 and 100.0 minute.
A 1.t.1 = **0.0 effect of integral disable.**
⚠ A 1.tP parameter, inCo. or rECo. is selected and if A 1.Pb different from "0" , this parameter is activated.

A 1.td = **A1 output derivative value.**
Adjustable between 0.00 and 25.00 minute.
A 1.td = **0.00 effect of derivative disable.**
⚠ A 1.tP parameter inCo. or rECo. is selected and if A 1.Pb different from "0", this parameter is activated.

A 1.Ct = **A1 output period time.**
Adjustable between 1 and 250sec.
⚠ A 1.tP parameter inCo. or rECo. is selected and if A 1.Pb different from "0", this parameter is activated.

A 1.P.S = **At A1 Set value, A1 output percent of power.**
Adjustable between 0% and 100%.
⚠ A 1.tP parameter inCo. or rECo. is selected and if A 1.Pb different from "0", this parameter is activated.

A 1.EP = **At A1 Set value, A1 output percent of power.**
Adjustable between 0%-100%.
⚠ A 1.tP parameter inCo. or rECo. is selected, this parameter is activated.

AL 2.o.

⚠ **For SSR output devices, if Co.bE parameter is different from C-A2 , this menu is visible.**

A2.SL = **Alarm2 set value lower limit.**
Adjustable between 0 and A2.SH parameter value.

A2.SH= **Alarm2 set value upper limit.**
Adjustable between A2.SL parameter value and upper scale value.

A2.HY= **Hysteresis of the Alarm2 output.**
Adjustable between 0 and 50°C.

A2.tP = **Type of Alarm2.**
Four kinds of functions can be selected.
indE= **Independent alarm**
dE. = **Deviation alarm**
bAnd = **Band alarm**
bAn.1 = **Band with inhibition**

A2.St. = **Alarm2 output situation.**
If A2 output H =A1 outputs is above the Alarm2 set value; on
Lo= **A2 output is above the set value; off.**

A2.Er. = **Alarm2 probe failure situation.**
on= **A2 output probe failure; on.**
oFF= **A2 output probe failure;off.**

conF.

inP.t. = **Type of input selection.**
Pt.0 = **PT100 decimal,**
Pt. = **PT100 Non-decimal,**
J.0 = **J Type decimal,**
J. = **J Type Non-decimal,**
K.0 = **K Type decimal,**
K. = **K Type Non-decimal,**
L.0 = **L Type decimal,**
L. = **L Type Non-decimal,**
t.0 = **T Type decimal,**
t. = **T Type,**
S. = **S Type,**
r. = **R Type, thermocouple selection.**
0-20 = Type of 0-20 mA input selection,
4-20 = Type of 4-20 mA input selection,
0-10 = Type of 0-10 V input selection,
2-10 = Type of 2-10 V input selection,
0-25 = Type of 0-25 mV input selection,
0-50 = Type of 0-50 mV input selection,
⚠ **If this parameter changed some parameters are changed.**

Un.t = **The temperature unit.**
°C= **°C,** °F= **°F**
⚠ **If this parameter changed some parameters are changed.**

FLtr. = **Digital filter coefficient.**
Adjustable between 1 and 200.
if this parameters is 1,digital filter gives the fastest answer. if this parameters is 200, digital filter gives the slow answer.If static in environment, the value of parameter should be incesed

Co.bE = **Control output selection**
C-A2 = **C/A2 (Relay) output selection**
SSr = **SSR output selection**
0-20= **0-20 mA analogue output selection**
4-20= **4-20 mA analogue output selection**
oFFS = **Offset value.**
Offset value is added to the measuring value.
This feature which is the point of measurement due to its distance measurement probe, is used to eliminate errors that might occur.
Adjustable between -99 and 99°C, decimal values can be adjusted between -10.0 and 10°C.
Normal value=0.

dAdr. = **Device address for RS485 connection.**
Adjustable between 1 and 247.
⚠ **This parameter is active devices with Rs485 communications option.**

bAud = **ModBus baud rate for RS485 connection**
Selectable as; off, 2.4, 4.8, 9.6, 19.20 ve 38.40 .
⚠ **This parameter is active devices with RS485 communications option.**

d.inC. = **Digital input setting parameter.**
nonE = **Digital input is closed.**
C2SA= **if digital input is activated, 2nd set value is used.**
MAnu. = **Manual mode start in case of digital outputs are active and and rational output generated according to period value in CCt paremeter and percentage value in MSEt parameter.**
dSPo. = **If the digital input is activated; temperature indicator mode can be exceed.**

F.tEC. = **Function key setting parameter.**
nonE = **Function key is closed.**
C2SA = **The function key is used with the 2nd set value.**
MAnu = **Manual mode can be exceed by using the function key.**
dSPo.= **Temperature indicator mode can be exceed by using function key.**

Ro.Lo. = **Analog output minimum output percentage. Adjustable between 0 and RoH.1**
⚠ Co.bE. parameter, 0-20 or 4-20 is selected; this parameter is seen.

RoH.1 = **Analog output maksimum output percentage. Adjustable between Ro.Lo. and 100**
⚠ Co.bE. parameter, 0-20 or 4-20 is selected; this parameter is seen.

rtr.S. = **the retransmission output control parameter** nonE = **the retransmission is off.**
0-20 = **Analog output 0-20mA the retransmission output**
4-20 = **Analog output 4-20mA retransmission output**
⚠ Co.bE. parameter, C-A2 is selected; this parameter is seen.

S.tun.

S.t.uS. = **Self tune control parameter.**
If SET / CSET keys are pressed together, the device returns to the main screen and if the temperature is not high, P.idt. **message flashes on display and self tune process starts automatically. If the initial temperature is higher to self-tune,** tEH.1 **message appears and the device waits until the temperature goes down. Then** P.id.t. **message appears and automatically self tune procedure is starts. After the self tune procedure,** C.Pb, C. t, C. dt **and** C. Ct. **values are recorded in the memory, then the device returns to "Running mode". After the successful self tune completion,** S.tun. **menu is removed automatically. In order to re-tune,** S.t.Sc. **parameter should be set to** P.YES **in** SECU **menu.**

STOPPING SELF TUNE

If self tune process wanted to be terminated for any reason , "Programming Mode" entered and S.tun **menu opened with SET / CSET and keys, S.t.uS parameter selected with key, SET / CSET and keys pressed together in order to stop self tune process and turn to main display.**

SECU.

S.Cod. = **Security menu access code.**
It should be 442.

⚠ **If in S.Cod = 0 position, first held down SET key then pressed key for 4 seconds** dEFP **message is displayed and return to the factory settings.**

Co.Sc. =**Parameter of Conn. menu security level.**
nonE = **Menu invisible.**
PYES = **Modification can be done.**
P. no = **Only visible.**

A.1.Sc. = **Parameter of AL 1.o. menu security level.**
nonE = **Menu invisible.**
PYES = **Modification can be done.**
P. no = **Only visible.**

A.2.Sc. = **Parameter of AL 2.o. menu security level.**
nonE = **Menu invisible.**
PYES = **Modification can be done.**
P. no = **Only visible.**

Cn.Sc. = **Parameter of conF. menu security level.**
nonE = **Menu invisible.**
PYES = **Modification can be done.**
P. no = **Only visible.**

St.Sc. = **Parameter of S.tun. menu security level.**
nonE = **Invisible.**
PYES = **Modification can be done.**

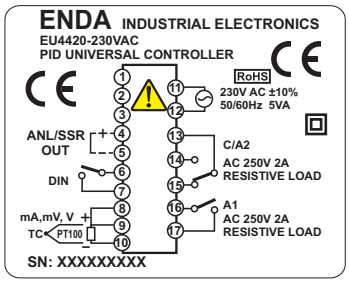
Ro.Lo. = Retransmission output lower scale value.
Adjustable between lower scale and Ro.H.1
⚠ rtr.S. parameter 0-20 or 4-20 and Co.bE. parameter is selected; C-A2 this parameter is seen.

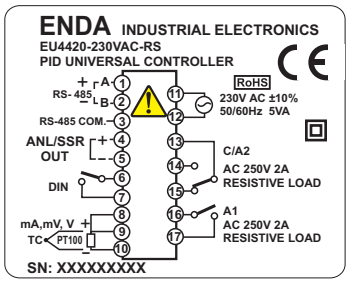
Ro.Ho. = Retransmission output lower scala value. Adjustable beetween Ro.Lo. and lower scala.
⚠ rtr.S. parameter 0-20 or 4-20 and Co.bE. parameter C-A2 selected; this parameter is seen.

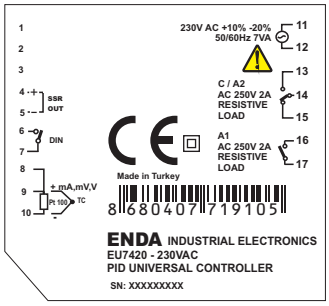
dP.SE. = mA inputs, desimal point adjusment.
Adjustable between 0 and 0.000.
⚠ inP.t. parameter mV, mA or V input is selected; this parameter is seen.

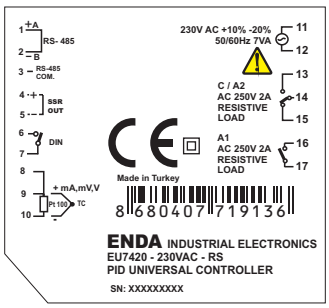
uSLo. = mA inputs, lower scala value.
Adjustable between -1999 and (uSH.1 - 10).
⚠ inP.t. parameter mV, mA or V input is selected; this parameter is seen.
uSH.1 = **mA inputs lower scala value. Adjustable between (uSLo + 10) and 9999**
⚠ inP.t. parameter mV, mA or V input is selected; this patameter is seen.

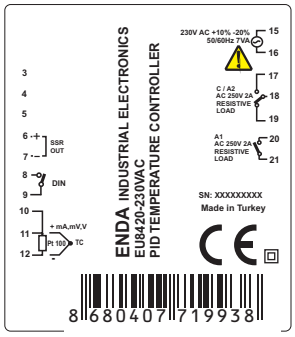
CONNECTION DIAGRAM

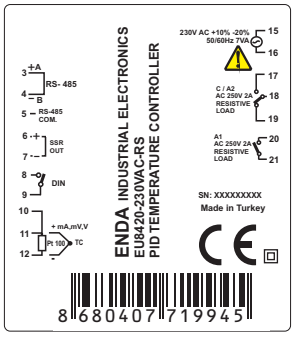


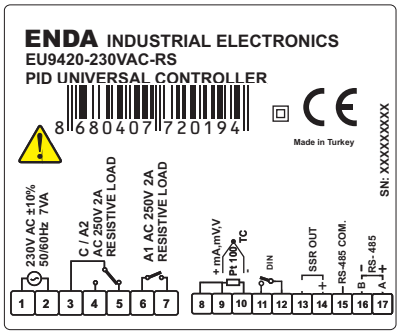


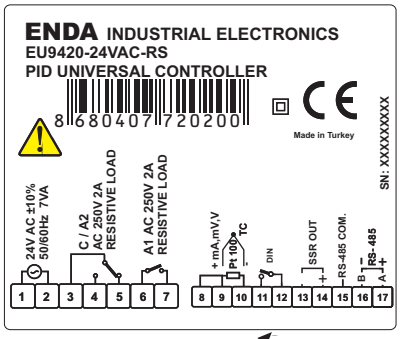










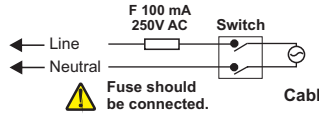


NOTE :

SUPPLY VOLTAGE

184-253V AC 50/60Hz 7VA

	Eu4420	Eu7420	Eu8420	Eu9420
	9	11	15	1
	10	12	16	2



230V AC or 24V AC Supply

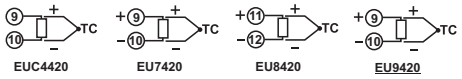
Cable Size : 1,5mm²

Holding screw 0.4-0.5Nm

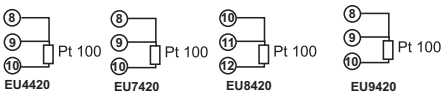
Equipment is protected throughout by DOUBLE INSULATION.

SENSOR INPUT:

For J - K - T- S and R Thermocouples :
Use the correct compensating cable.
Do not make any supplement to cables. Connect the thermocouple cables to the right places at the input terminal.



For resistance (PT100) Sensor :
When using 2-wire PT100 sensor, as shown in the figures, make 8 and 9 terminals short circuit for EU4420, EU7420 and EU9420 devices, make 10 and 11 terminals short circuit for EU8420 devices.



Logic output of the instrument is not electrically insulated from the internal circuits. Therefore, when using a grounding thermocouple, do not connect the logic output terminals to the ground.

Note :

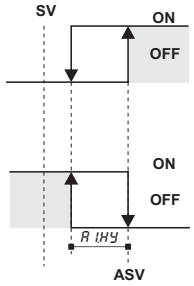
1) Mains supply cords shall meet the requirements of IEC 60227 or IEC 60245.

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.

ALARM1 AND ALARM2 OUTPUT TYPES

Independent Alarm

A1tP= indE

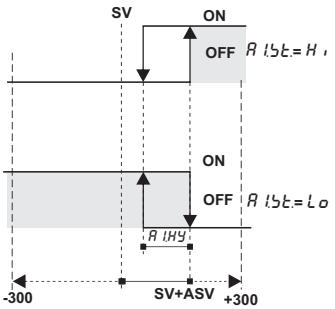


(ASV min. = beginning of scale
ASV max. = end of scale)

SV = CONT output set value

Deviation Alarm

A1tP= dE.

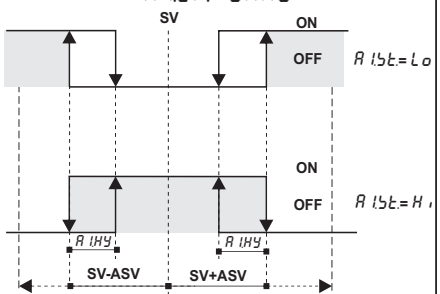


(ASV min. =-300, ASV maks. = +300)

ASV = Alarm output set value

Band Alarm

A1tP= bAnd

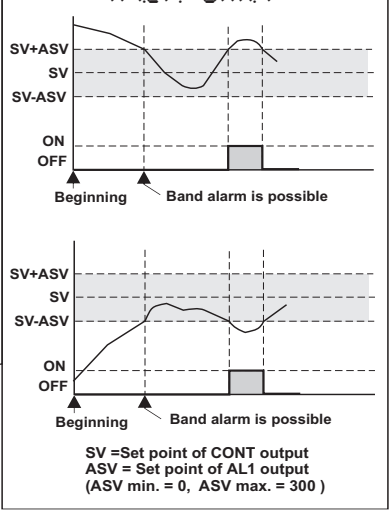


SV =CONT output set value ASV = AL1 output set value

(ASV min. = 0, ASV max. = +300)

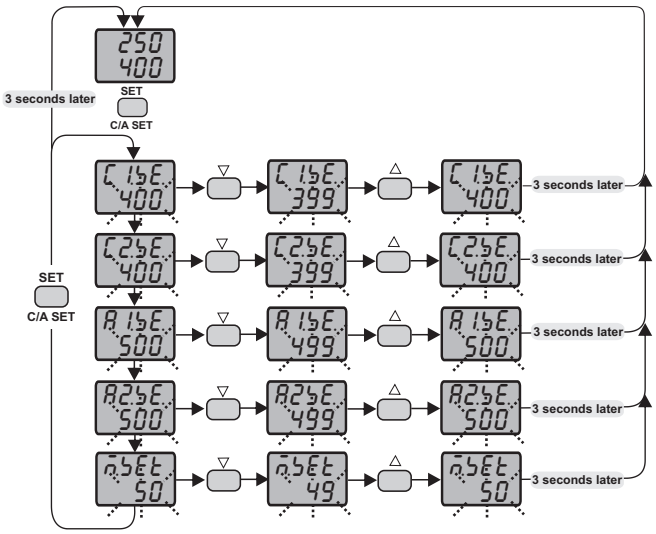
Band Alarm With Inhibition

A1tP= bAn.i



SV =Set point of CONT output
ASV = Set point of AL1 output
(ASV min. = 0, ASV max. = 300)

SETTING UP ALARM CONTROL AND SETPOINT VALUES



If one of the d.inc. or FtEc. parameters are set to the C2SA value, this parameter is seen.

If the Cost. parameter is set to SSR out, this parameter is seen.

If one of the d.inc. or FtEc. parameters are set to the bAnd value and if C. Pb is different from 0, this parameter is seen.

ERROR MESSAGES

PFA 400	Temperature sensor is broken.
---- 400	Temperature value is higher than the scale.
---- 400	Temperature value is broken or over temperature.

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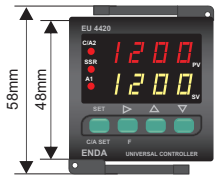
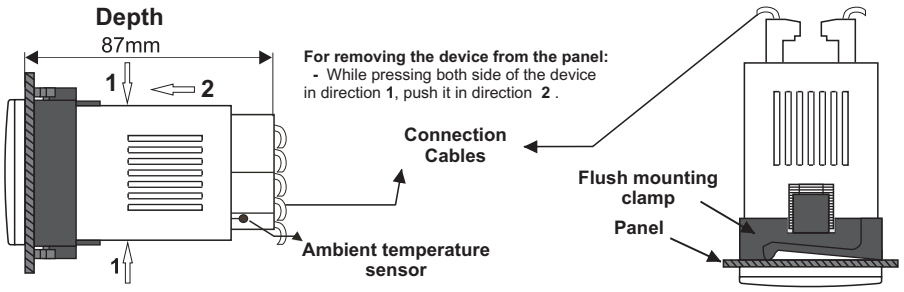
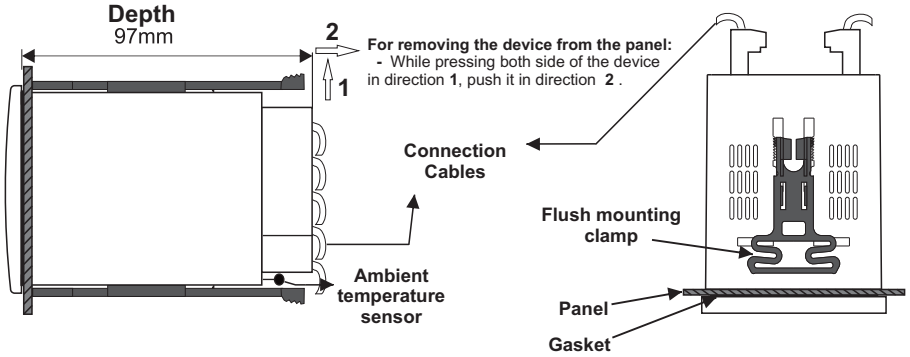
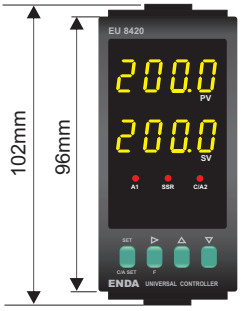
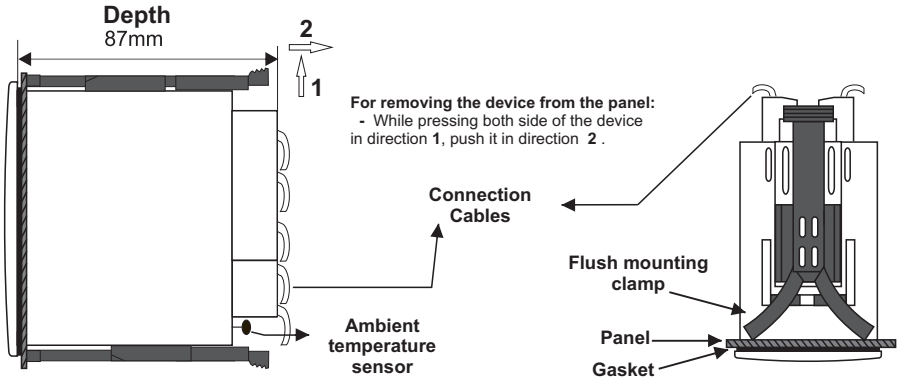
DIMENSIONS

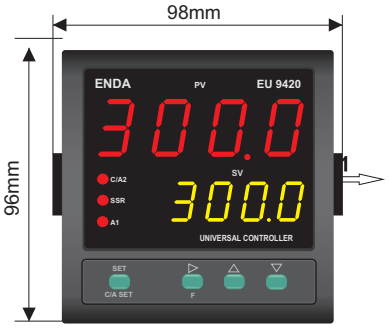


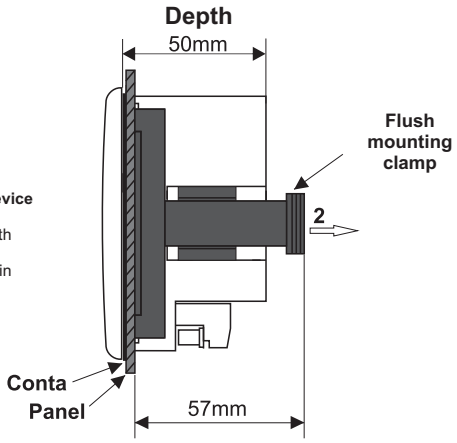






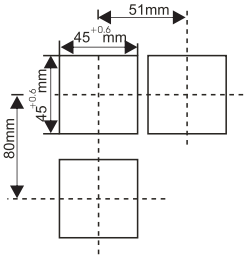




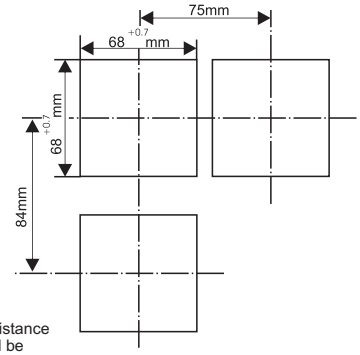


PANEL CUT-OUT

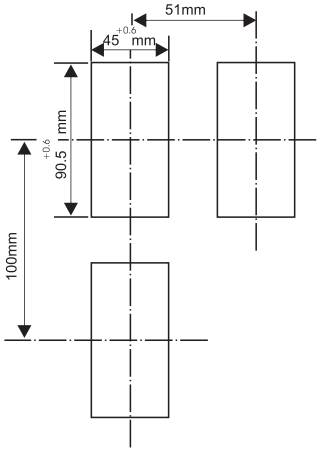
EU4420



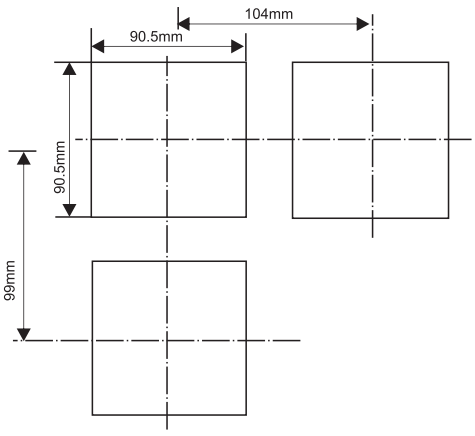
EU7420



EU8420



EU9420



Note :

1) While panel mounting, additional distance required for connection cables should be considered (except EU9420).

2) Panel thickness should be maximum 9mm for EU4420, 10mm for EU7420, 8mm for EU8420 and 6mm for EU9420.

3) If there is no free space at back side of the device, it would be difficult to remove it from the panel. Required minimum free space; EU4420 = 100mm, EU8420 = 90mm, EU9420 = 60mm.

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ENDA EU SERİSİ PID SICAKLIK KONTROL CİHAZI
MODBUS PROTOKOLÜ ADRES HARİTASI

	Parameter Number	Holding Register Addresses Desimal (Hex)	Data Type	Data Content	Read / Write Permission	Factory Defauls
Control Output Parameters	**H0**	0000d (0000h)	Word	Control output, temperature setpoint value	Read / Write	400
	H1	0001d (0001h)	Word	Control output, 2nd temperature setpoint value	Read / Write	400
	H2	0002d (0002h)	Word	Control output, minimum setpoint value	Read / Write	0
	H3	0003d (0003h)	Word	Control output, maximum setpoint value	Read / Write	600
	H4	0004d (0004h)	Word	Control output, proportional band setpoint value (Adjustable between %0.0 and %100.0)	Read / Write	4
	H5	0005d (0005h)	Word	Control output, hysteresis value (Adjustable between 1 and 50 °C or °F)	Read / Write	2
	H6	0006d (0006h)	Word	Control output, integral time (Adjustable between 0.1 and 100.0 minute)	Read / Write	40
	H7	0007d (0007h)	Word	Control output, derivative time (Adjustable between 0.01 and 10.00 minute)	Read / Write	100
	H8	0008d (0008h)	Word	Control output, time period setpoint value (Adjustable between 1 and 125 second)	Read / Write	20
	H9	0009d (0009h)	Word	Control output, set value power ratio (Adjustable between %0 and %100)	Read / Write	0
	H10	0010d (000Ah)	Word	Control output, set value power ratio in case of sensor failure (Adjustable between %0 and %100)	Read / Write	0
	H11	0011d (000Bh)	Word	Control output, soft start value	Read / Write	0
A1 Output Parameters	**H12**	0012d (000Ch)	Word	Alarm1 output temperature setpoint value	Read / Write	500
	H13	0013d (000Dh)	Word	Alarm1 output minimum setpoint value limit	Read / Write	0
	H14	0014d (000Eh)	Word	Alarm1 output maximum setpoint value limit	Read / Write	600
	H15	0015d (000Fh)	Word	Alarm1 output proportional band set value (Adjustable between %0.0 and %100.0)	Read / Write	0
	H16	0016d (0010h)	Word	Alarm1 output hysteresis value (Adjustable between 1 and 50 °C or °F)	Read / Write	2
	H17	0017d (0011h)	Word	Alarm1 output, integral time (Adjustable between 0.1 and 100.0 minute)	Read / Write	0
	H18	0018d (0012h)	Word	Alarm1 output, derivative time (Adjustable between 0.01 and 10.00 minute)	Read / Write	0
	H19	0019d (0013h)	Word	Alarm1 output, time period setpoint value (Adjustable between 1 and 125 second)	Read / Write	20
	H20	0020d (0014h)	Word	Alarm1 output, set value power ratio (Adjustable between %0 and %100)	Read / Write	0
	H21	0021d (0015h)	Word	Alarm1 output, set value power ratio in case of sensor failure (Adjustable between %0 and %100)	Read / Write	0
	H22	0022d (0016h)	Word	Alarm1 output type selection (Values can be given from 0 to 4) (0 = Independent alarm, 1 = Deviation alarm, 2 = Band alarm, 3 = Active alarm after in band time, 4 = Alarm1 output, cooling control selection)	Read / Write	0
A2 Output Parameters	**H23**	0023d (0017h)	Word	Alarm2 output, temperature setpoint value	Read / Write	500
	H24	0024d (0018h)	Word	Alarm2 output minimum setpoint value limit	Read / Write	0
	H25	0025d (0019h)	Word	Alarm2 output maximum setpoint value limit	Read / Write	600
	H26	0026d (001Ah)	Word	Alarm2 output, hysteresis value (Adjustable between 1 and 50 °C or °F)	Read / Write	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)	Read / Write	0
Configuration Parameters	**H28**	0028d (001Ch)	Word	Input 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.	Read / Write	5
	H29	0029d (001Dh)	Word	ModBus device address (Adjustable between 1 and 247)	Read / Write	1
	H30	0030d (001Eh)	Word	Modbus communication speed (Baudrate) (0 = Modbus cancel, 1 = 2400 bps, 2 = 4800 bps, 3 = 9600 bps, 4 =19200 bps, 5 = 38400 bps)	Read / Write	3
	H31	0031d (001Fh)	Word	Digital filter coefficient (Adjustable between 1 and 200, 1 = filter is disable)		10
	H32	0032d (0020h)	Word	Control output, selection value (**0** = C/A2 Control output selection, **1** = SSR Output) **ATTENTION !! If this parameter is set to a 0 value is H42:0**		0
	H33	0033d (0021h)	Word	Analog output minimum out percentage		0
	H34	0034d (0022h)	Word	Analog output maximum out percentage	Read / Write	100
	H35	0035d (0023h)	Word	Offset value	Read / Write	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) returns to factory defaults when this value is entered)	Read / Write	0
	H37	0037d (0025h)	Word	Reserved	Read / Write	XX
	H38	0038d (0026h)	Word	Reserved	Read / Write	XX
	H39	0039d (0027h)	Word	Manual control output percentage (Adjustable between %0 and %100)	Read / Write	50

1.1 Memory Map for Holding Registers (continue)

	Parameter Number	Holding Register Addresses Desimal (Hex)	Data Type	Data Content	Read / Write Permission	Factory Defauls
Configuration Parameters	**H40**	0040d (0028h)	Word	Digital input control parameter (0 = Digital input off, 1 = 2nd set value is selected with digital input, 2 = Manual mode is entered via digital input, 3 = Digital input is passed to display mode	Read / Write	0
	H41	0041d (0029h)	Word	Function key control parameter (0 = Function key off, 1 = 2nd Set value is selected with function key, 2 = Manual mode is entered via function key, 3 = With the function key display mode is entered)	Read / Write	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 **ATTENTION!! To set this parameter must be H32 = 0**	Okunabilir / Yazılabilir	0
	H43	0043d (002Bh)	Word	Retransmission output lower scala value.	Okunabilir / Yazılabilir	0
	H44	0044d (002Ch)	Word	Retransmission output upper scala value.	Okunabilir / Yazılabilir	600
	H45	0045d (002Dh)	Word	Decimal point adjustment for mA and V input	Okunabilir / Yazılabilir	0
	H46	0046d (002Eh)	Word	Users upper scale value for 2-20mA, 4-20mA, 0-10V and 2-10Vamper input selecting	Okunabilir / Yazılabilir	0
	H47	0047d (002Fh)	Word	Users lower scale value for 2-20mA, 4-20mA, 0-10V and 2-10V amper input selecting	Okunabilir / Yazılabilir	9999
	H48	0048d (0030h)	Word	Control output menu, security parameter (0 = Menu invisible, 1 = Menu programmable, 2 = Menu only visible)	Read / Write	1
	H49	0049d (0031h)	Word	Alarm1 output menu security parameter (0 = Menu invisible, 1 = Menu programmable, 2 = Menu only visible)	Read / Write	1
	H50	0050d (0032h)	Word	Alarm2 output menu, security parameter (0 = Menu invisible, 1 = Menu programmable, 2 = Menu only visible)	Read / Write	1
	H51	0051d (0033h)	Word	Configuration menu, security parameter (0 = Menu invisible, 1 = Menu programmable, 2 = Menu only visible)	Read / Write	1
	H52	0052d (0034h)	Word	Self tune menu, security parameter (0 = Menu invisible, 1 = Self tune can be done)	Read / Write	1

1.2 Memory Map for Coils

Parameter Number	Coil Addresses	Data Type	Data Content	Read / Write Permission	Factory Defauls
C0	(0000)h	Bit	Alarm2 Status (0 = Active Low ,1 =Active High)	Read / Write	1
C1	(0001)h	Bit	Alarm2 output position in case of Prob failure (0 = Off , 1 = On)	Read / Write	0
C2	(0002)h	Bit	Alarm1 Status (0 = Active Low ,1 =Active High)	Read / Write	1
C3	(0003)h	Bit	Alarm1 output position in case of Prob failure (0 = Off , 1 = On)	Read / Write	0
C4	(0004)h	Bit	Control output configuration (0 = Heat ; 1 = Cool)	Read / Write	0
C5	(0005)h	Bit	Temperature unit (0 = °C ; 1 = °F)	Read / Write	0
C6	(0006)h	Bit	Control outputs active (0 = Control outputs active, 1 = Only display mode)	Read / Write	0
C7	(0007)h	Bit	Controlling according to 2nd temperature setpoint (If C7 = 0 is H0, if C7 = 1 is H1)	Read / Write	0
C8	(0008)h	Bit	Auto/Manual selection (0 = Automatic "Running mode", 1 = Manual "Running mode". In this mode, output generated according to H39 parameter.)	Read / Write	0
C9	(0009)h	Bit	Control format 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	Read / Write	0

1.3 Memory Map for Input Registers

Parameter Number	Input Register Addresses Desimal (Hex)	Data Type	Data Content	Read / Write Permission
I0	0000d (0000h)	Word	Measured temperature	Read Only
I1	0001d (0001h)	Word	Percentage of analog output	Read Only
I2	0002d (0002h)	Word	Measurement error codes 0 = No error, 1 = Sensor disconnected or broken, 2 = Lower scale error, 3 = Upper scale error, 4 = PT100 short circuit or temperature too low, 5 = Wrong input selection	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 set parameters	Read Only
I4	0004d (0004h)	Word	Current (active) temperature setpoint.	Read Only
I5	0005d (0005h)	Word	Reserved	Read Only
I6	0006d (0006h)	Word	Current (active) decimal point value (0 = No decimal point, 1 = 0.0 Decimal point is tenths	Read Only

1.4 Memory Map for Software Revision Input Registers

Software Revision	61472d (F020h)	14 Word	Software name and update is read in ASCII format and as 14 word. Sample : EU4420-01 22 AUG. 2016. Memory Formats : Word 1 Word 2 Word 3 Word 4 Word 5 Word 6 Word 7 Word 8 Word 9 Word 10 Word 11 Word 12 Word 13 Word 14 E U 4 4 0 2 0 - 1 3 0 F b e 2 1 0 . 6 **NOTE :** **To view each word correctly by changing the byte sequences should be displayed as ASCII TEXT**	Read Only

1.5 Memory Map for Discrete input

Parametre Numarası	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	Digital input status (0 = OFF ,1 = ON)	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. Slave realizes error and sends error message. Most significant bit of function is changed '1' to indicate error in error message by slave. Error code is sent in data section. Master 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 slave. 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 the slave.
03	ILLEGAL DATA VALUE	A value contained in the query data field is not an allowable value for the slave.

Message example;

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.