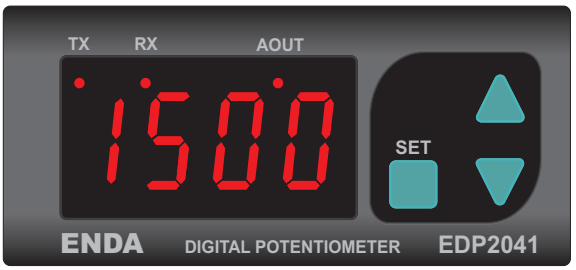
Read this document carefully before using this device. The guarantee will be expired by damages if you don't attend to the directions in the user manual. Also we don't accept any compensations for personal injury, material damage or capital disadvantages.

ENDA EDP2041 DIGITAL POTENTIOMETER

Thank you for choosing **ENDA EDP2041** potentiometer.

- 35x77mm sized.
- 4 digits display.
- Easy to use by front panel keypad.
- Communication via RS-485 Modbus protocol or synchronous running between two or more potentiomers (Optional).
- Preset value can be adjusted from external buttons.
- Display scale can be adjusted between -1999 and up to 9999.
- Decimal point can be adjusted between 1. and 3. digits.
- 0-10V,0-20 mA a and 4-20mA output with adjustable minimum and maximum values.
- 'Soft on' and 'soft off' properties can be selected.
- Parameter access protection on 3 levels.
- CE marked according to European Norms.



CE RoHS Compliant

Order Code : EDP2041 - □□ – □□
1 **2**

1- Supply Voltage	**2- Modbus**
UV....90-250V AC LV.....10-30V DC / 8-24V AC	RS... Modbus (Specify at Order)

TECHNICAL SPECIFICATIONS

ENVIRONMENTAL CONDITIONS	
Ambient/storage temperature	0 ... +50°C/-25 ... +70°C (without icing)
Max. relative humidity	80% Relative humidity for temperatures up to 31 % °C, decreasing linearly to 50% at 40°C.
Rated pollution degree	According to EN 60529 Front panel : IP65 Rear panel : IP20
Height	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	
Supply	90-250V AC 50/60Hz; 10-30V DC / 8-24V AC SMPS
Power consumption	Max. 7VA
Wiring	2.5mm² Screw Connections
Date retention	EEPROM (Min. 10 years)
EMC	EN 61326-1: 2013 (Performance criterion B for the EMC standards)
Safety requirements	EN 61010-1: 2012 (pollution degree 2, overvoltage category II, measurement category I)

INPUTS	
Upwards input (UP)	Contact input or max. 24VDC logic input (active low)
Downwards input (DOWN)	Contact input or max. 24VDC logic input (active low)

OUTPUT	
0-10V output	Digitally adjusted maximum 10mA, max. 10V potentiometer output. Accuracy :%0.1 Resolution : 1mV Fluctuation : Maximum 30mV Rise time from 0 to 10V is maximum 300ms

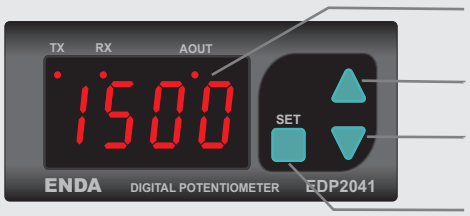
OUTPUT	
0-20mA output	Digitally adjusted maximum 12V, max.20 mA potentiometer output. Accuracy: %0.1 Resolution : 2µA Fluctuation : Maximum 60µA Rise time from 0 to 20mA is maximum 300ms

HOUSING	
Housing type	Suitable for flush-panel mounting according to DIN 43 700.
Dimensions	W77xH35xD71mm
Weight	Approx. 350g (after packing)
Enclosure material	Self extinguishing plastics

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

sisel
SİSEL MÜHENDİSLİK ELEKTRONİK SAN. VE TİC. A.Ş.
Şerifali Mah. Barbaros Cad. No:18 Y.Dudullu 34775
ÜMRANİYE/İSTANBUL-TURKEY
Tel : +90 216 499 46 64 Pbx. Fax : +90 216 365 74 01
url : www.enda.com.tr

TERMS



1) Indicates the adjusted potentiometer value in “Running Mode”.
Parameter’s name, value or parameter unit can be displayed in “Programming Mode”.

2) Increment key in “Running Mode”.
Increment or parameter selection key in “Programming Mode”.
Provides to return to the “Running Mode” during “Programming Mode” by using together SET key.

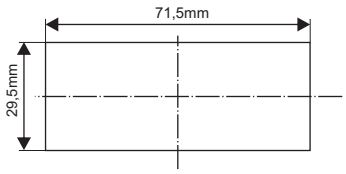
3) Decrement key in “Running Mode”.
Provides to parameter selection and decrements the selected parameter value in “Programming Mode”.

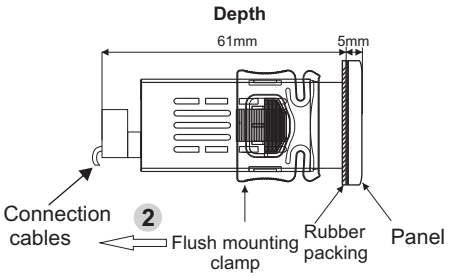
4) Provides to selecting and setting the "Running Mode" and "Programming Mode" parameters.
Provides menu selection in "Programming Mode"

(1) Digital display	12,5 mm 4 digits 7 segment red LED display
(2),(3),(4) Keypad	Micro switch

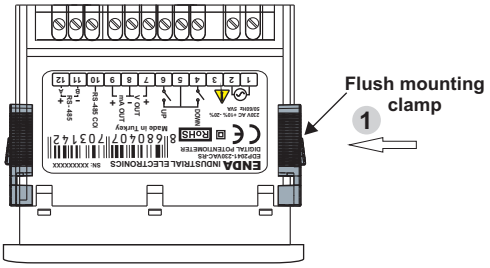
DIMENSIONS

Panel Cut-out





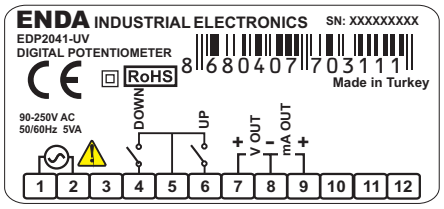
To remove the device from panel :
- While pushing the the flush-mounting clamp in direction **1** , pull out in direction **2** .

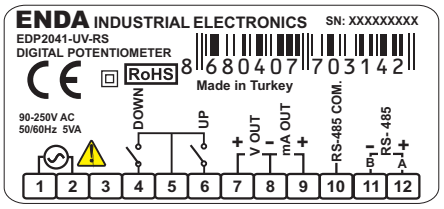


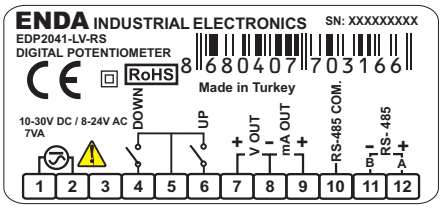
Note :
1) Panel thickness should be maximum 7mm.
2) There must be at least 60mm free space behind the device, otherwise it would be difficult to remove it from the panel.

CONNECTION DIAGRAM

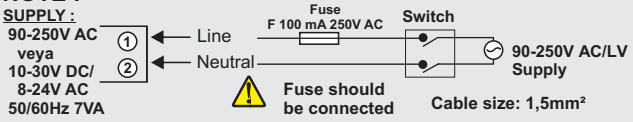
ENDA EDP2041 is intended for installation in control panels. Make sure that the device is used only for intended purpose. The electrical connections must be carried out by a qualified staff and must be according to the relevant locally applicable regulations. During an installation, all of the cables 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. The cables should not be close to the power cables or components.







NOTE :
SUPPLY :

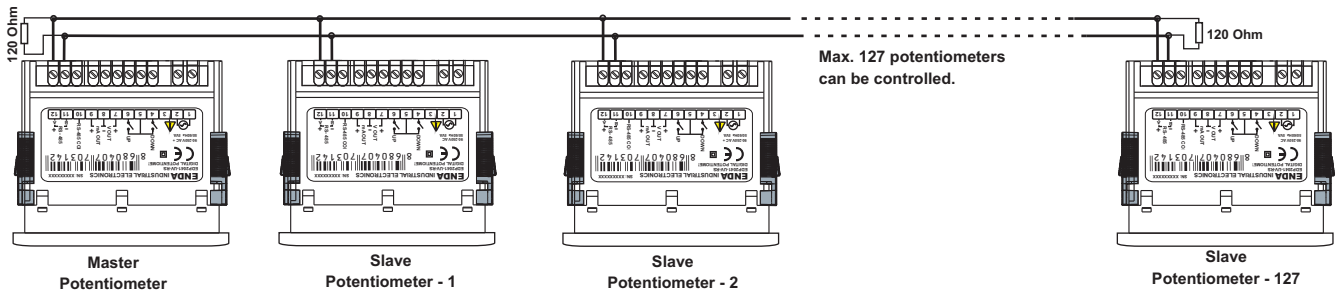


Equipment is protected throughout by DOUBLE INSULATION.

Holding screw 0.4-0.5Nm

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.

SYNCHRONIZED OPERATING CONNECTION



NOTE :
- d.Adr. parameter should be selected C.Pot in master potentiometer. In this case d.Adr. parameter of other potentiometers aren’t used. But be sure that C.Pot isn’t selected in slave potentiometers to prevent confusion. Settings of slave potentiometers change proportional to setting of master potentiometer. For example; When Max. output of master potentiometer is changed from 10V to 5V, max. output of slave potentiometers decrease half of previous value proportional to this. If previous output of slave potentiometer is 6V, it decreases 3V. Pon.c parameter of slave potentiometer should be selected oFF in order to understand master potentiometer when slave is energized.

- Computer should be used to change only a few potentiometers. In this case, there is not master potentiomer. Output of the required potentiometer is changed according to d.Adr. parameter.

Running Mode

Active output value 1000 → SET → PrSt. → or → Preset value 1000 → 1001 → 1002 → 1003 → 1002

If no key is pressed for 3 seconds

If o.Et.Y and o.dt.Y parameters are adjusted to any value expect dSAb parameter, output can be controlled with ▲ and ▼ buttons.

SET key is pressed whole in the run mode,preset setup mode is entered and PrSt. message is displayed. Message appears when the ▲ or ▼ button is pressed, the preset value starts to flash. ▲▼ By using keys ,preset value can be adjusted.Preset value can be adjusted by using external buttons as well.External buttons become disable in programming mode.If the device is also controlled by a potentiometer, adjustable preset value appears as above.

SET + ▲ SET key is pressed while holding down to ▲ key the programming mode is entered

Entering from programming mode to run mode:
If no key is pressed within 20 seconds during programming mode data is stored automatically and the run mode is entered.After pressing ▲ button and ▼ then passed SET + ▲ to the program menu by pressing ▼ key is pressed in combination with SET ▲ keys and the information is recorded.

Programming Mode

U.CnF. → SET → o.CnF. → SET → SEC. → SET

U.CnF.

Default Parameters

- 0 — dPnt. = Display decimal point parameter. Decimal point can be adjusted between 1. and 3. digits. See NOTE 1 for programming.
- 0 — L.ScL. = Lower value of the scale.Adjustable between -1999 and (H.ScL.-10). Scale the lower value of the output,based on o.tYP. parameter selection, it is 0V,0mA or 4mA. See NOTE 1 for programming.
- 9999 — H.ScL. = Upper value of the scale. **Adjustable between (L.ScL.+10) and** 9999. Scale the upper value of the output based on, o.tYP. parameter selection;it is 10V or 20 mA. H.ScL. and L.ScL. difference can not be greater than 9999. See NOTE 1 for programming.
- 0 — LoL 1 = The lower limit of the preset value. Adjustable between L.ScL. and **(H 1L 1-10).** See NOTE 1 for programming.
- 1500 — H 1L 1 = The upper limit of the preset value. Adjustable between (LoL 1+10) and H.ScL. See NOTE 1 for programming.
- 1 — dAdr. = Device address for ModBus. Adjustable between 1-247 or selectable c.Pot. .When c.Pot. is selected,the device will be master potentiometer and slave potentiometers can be adjusted dependent on it. See NOTE 1 for programming. ⚠ This parameter is active device with RS485 communication option.
- 9.60 — bAud = Baud rate for the RS485 connection. Adjustable;off,2400,4800,9600,19200 and 38400. ⚠ This parameter is active device with RS485 communication option.

o.CnF. Return to the menu. + ▼

⚠ While the parameter names appear, ▲ and ▼ keys are pressed together,the program will return to the menu display.

o.CnF.

Default parameters

- oFF — Pon.C. = Selection of the output parameter behavior
  - ⚠ oFF = When first energized, output is the voltage or current that lower limit value is indicated. Attention: If this parameter is selected, the set value that was adjusted before is seen when set button is pressed at first. In addition,if increasing or decreasing that value is wanted the set value is equalized to lower limit value and then adjustment can be done.
  - on = When first energized, output is the voltage or current hat the set value is indicated.
  - S.Str = When first energized, output is increased slowly from the voltage or current that lower limit value is indicated to the voltage or current that set value is indicated during rt 1.

  See NOTE 1 for programming.
- dSAb — o.Et.Y = Adjusted type of the output to preset value with ▲ button.
  - dSAb. = Output can not be adjusted to preset value with ▲ button.
  - Enb. = Output can be adjusted to preset value with ▲ button.
  - S.on = Output is increased to voltage that set value is displayed with ▲ button during rt 1.

  See NOTE 1 for programming.
- dSAb — o.dt.Y = Adjusted type of the output to lower limit value with ▼ button.
  - dSAb. = Output can not be adjusted to lower limit value with ▼ button.
  - Enb. = Output can be adjusted to lower limit value with ▼ button.
  - S.oFF = Output is increased to voltage that lower limit value is displayed with ▼ button during dt 1.

  See NOTE 1 for programming.
- dSAb — E.Et.Y = Returning method of the output to preset value with the external "Up" input. o.Et.Y is set like the output parameter.
- dSAb — E.dt.Y = Returning method of the output to preset value with the external "Down" input. o.dt.Y is set like the output parameter.
- 30 — rt 1. = Increasing time for output. Adjustable between 1-250 seconds.Output is increased slowly to the lower limit value during adjusted time.
- 30 — dt 1. = Decreasing time for output value. Adjustable between 1-250 seconds. Output is decreased slowly the lower limit value during adjusted time. See NOTE 1 for programming.
- 1 — P.rt. = Increasing and decreasing speed of preset value. It is adjusted dSAb. ,1, 10,100 ve 1000 values. dSAb is selected,the preset value can not be changed. Selected according to the value increase or decrease the preset buttons for fast switching mode,the preset value speedy is increased or decreased "one by one",10 at each step,100 at each step,1000 at each step.
- 0-10 — o.tYP. = Output type selection parameter
  - 0-10 = 0-10V output usable
  - 4-20 = 4-20mA output usable
  - 0-20 = 0-20mA output usable

  See NOTE 1 for programming

SEC. Return to the menu + ▼

SEC.

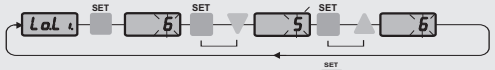
Default parameters

- S.Cod. = Access code for safety menu. This parameter should be 2041. Security code is 0; ▼ key is pressed continuously for 5 secoonds,dEFP message is displayed and return to
- PYES — U.Sc. = U.CnF. menu protection level parameter.
  - nonE = No menu is seen
  - PYES = Modification feasible
  - P. no = Only traceable
- PYES — o.C.Sc. = o.CnF. Menu protection level parameter.
  - nonE = No menu is seen
  - PYES = Modification feasible
  - P. no = Only traceable
  - Pno = Menu visible.

U.CnF. Return to the menu + ▼

Parameter Adjustment Method

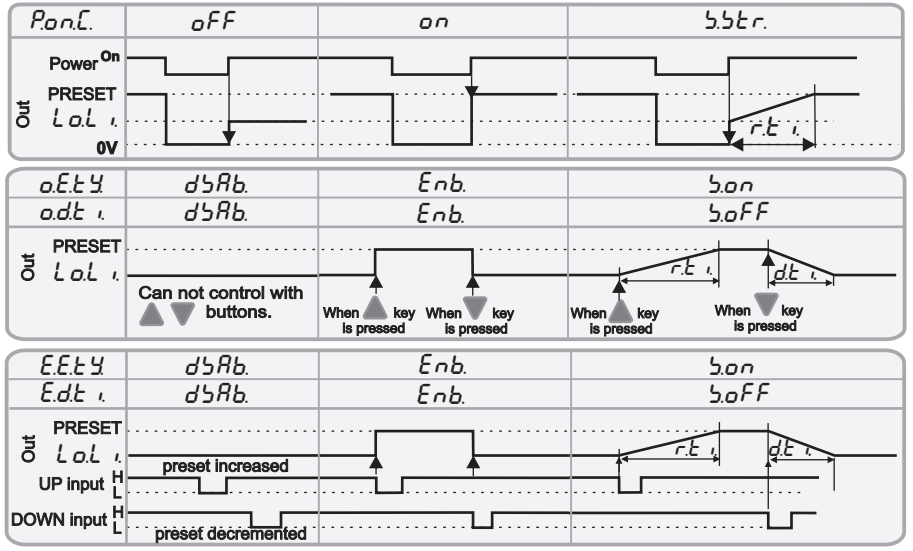
NOTE 1



For adjusting a selected parameter first press and hold SET key. Then, by using ▼▲ keys, adjustment can be made.

If increment key ▲ is pressed and held 0.6 seconds, the value of the selected parameter changes rapidly. If waited enough, the value increases 100 at each step. After 1 second following the release of the key, initial condition is returned. The same procedure is valid for the decrement key.

OUTPUT DIAGRAM



ENDA EDP2041 DIGITAL POTENTIOMETER
MODBUS PROTOCOL ADDRESS MAP

1.1 Memory map for Holding Registers

Parameter Number	Holding Register addresses Decimal (Hex)	Data Type	Data Content	Parameter Name	Read/Write Permission	Default Parameters
H0	0000d (0000h)	Word	Percentage of the external control.Adjustable between %0.00 and %100.0		Readable / Writable	10000
H1	0001d (0001h)	Word	Preset value	PrSt.	Readable / Writable	1000
H2	0002d (0002h)	Word	Decimal point	d.Pnt.	Readable / Writable	0
H3	0003d (0003h)	Word	The lower value of the scale	L.SCL.	Readable / Writable	0
H4	0004d (0004h)	Word	The upper value of the scale	H.SCL.	Readable / Writable	9999
H5	0005d (0005h)	Word	The lower limit of the preset value	LoL.	Readable / Writable	0
H6	0006d (0006h)	Word	The upper limit of the preset value	HiL.	Readable / Writable	2000
H7	0007d (0007h)	Word	Device address for Rs485 network connection (Adjustable between 1-247.) If set to "0",the control potentiometer mode is entered.	d.Adr.	Readable / Writable	1
H8	0008d (0008h)	Word	Baud rate selection (0= None;1=2400bps ; 2=4800bps ; 3=9600bps ; 4=19200bps; 5=38400bps)	bAud.	Readable / Writable	3
H9	0009d (0009h)	Word	The first opening the control parameter 0= oFF , 1= on , 2 = LSt r	P.on.C.	Readable / Writable	0
H10	0010d (000Ah)	Word	Output upper arrow button to fetch the value of the preset selection 0= dSAb.,1= Enb. , 2 = Lon.	o.E.t.Y.	Readable / Writable	0
H11	0011d (000Bh)	Word	Output lower arrow button to fetch the value of the lower limit selection 0= dSAb.,1= Enb., 2 = LoFF.	o.d.t.Y.	Readable / Writable	0
H12	0012d (000Ch)	Word	Time to increase the output voltage	rt.	Readable / Writable	30
H13	0013d (000Dh)	Word	Time to decrease the output voltage	dt.	Readable / Writable	30
H14	0014d (000Eh)	Word	Preset the value of the increament and decrement rate or cancel the setting 0 = cancel, 1=1,2=10,3=100,4=1000.	P.idt.	Readable / Writable	1
H15	0015d (000Fh)	Word	Output type selection parameter 0 = 0-10V output, 1 = 4-20mA output ,2 = 0-20mA output	o.tYP.	Readable / Writable	0
H16	0016d (0010h)	Word	User security parameter configuration menu (0 = Menu invisible, 1= Menu programmable, 2 or 3 = Menu only traceable).	U.C.SC.	Readable / Writable	1
H17	0017d (0011h)	Word	Output security parameter configuration menu (0 = Menu invisible, 1= Menu programmable, 2 or 3 = Menu only traceable).	o.C.SC.	Readable / Writable	1
H18	0018d (0012h)	Word	Function control parameter (23040d (5A00h) value is entered,any function executed. (23041d (5A01h) value is entered,the default values will be restored.		Readable / Writable	0
H19	0019d (0010h)	Word	Returning method of the output to preset value with the external "Up" input. 0 = dSAb. , 1 = Enb. , 2 = Lon.	E.E.t.Y.	Readable / Writable	0
H20	0020d (0011h)	Word	Returning method of the output to preset value with the external "Down" input. 0 = dSAb. , 1= Enb., 2 = LoFF.	E.d.t.Y.	Readable / Writable	0

1.2 Memory map for Coils

Parameter Number	Input Register addresses Decimal (Hex)	Data Type	Data Content	Parameter Name	Read/Write Permission	Default Parameters
I0	0000d (0000h)	Word	Instant set value	▬▬	Only readable	▬▬
I1	0001d (0001h)	Word	% of value the analog output (%0.00-%100.00 sensitivity)	▬▬	Only readable	▬▬

1.3 Memory map for Discrete Input

Parameter Number	Discrete input addresses	Data Type	Data Content	Parameter Name	Read/Write Permission	Default Parameters
D0	(0000)h	Bit	State of the external down button (0 = OFF ,1 = ON)	▬▬	Only readable	▬▬
D1	(0001)h	Bit	State of the external up button (0 = OFF ,1 = ON)	▬▬	Only readable	▬▬

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.