

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 9999.

(Full scale can not be higher than a 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.





**R®HS** Compliant



1- Supply Voltage

230VAC...230V AC 24VAC.....24V AC

SM.....9-30V DC / 7-24V AC

2- Modbus Option

RS.....With RS-485 Modbus communication Empty.....Without RS-485 Modbus communication

#### TECHNICAL SPECIFICATIONS

ENVIRONMENTAL CONDITIONS				
Ambient/storage temperature 0	Ambient/storage temperature 0 +50°C/-25 +70°C (without icing)			
Max. relative humidity 8	30% 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 M	Max. 2000m			
^				



Do not use the device in locations subject to corrosive and flammable gases.

ELECTRICAL CHARACTERISTICS				
Supply	230V AC +10% -20%, 50/60Hz or 24V AC ±10% 50/60Hz or optional 9-30V DC / 7-24V AC ±10% 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)				
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	Enclosure material Self extinguishing plastics			
While cleaning the device, solvents (thinner, benzine, acid etc.) or corrosive materials must not be used.				





#### **TERMS**



- Adjusted potentiometer value is seen in run mode Parameter name, value or its unit in programming mode.
- 2) Increment key during run mode.
  Increment or parameter selection key during programming mode.
- Decrement key during run mode.
   Decrement or parameter selection key during programming mode.
- 4) Used for selecting run or programming modes and for adjusting parameters.

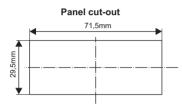
(1) Digital display
(2),(3),(4) Keypad

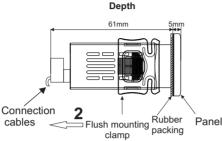
12,5 mm 4 digits 7 segment red LED display

Micro switch

#### **DIMENSIONS**

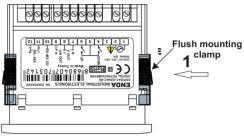






To remove the device from panel:

- While pushing the the flush-
- mounting clamp in direction **1**,pull out it in direction **2**.



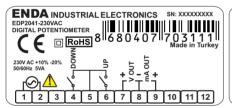
#### Note:

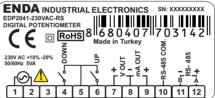
- 1) Panel thickness should be maximum 7mm.
- 2) There must be at least 60mm free space behind the device, otherwise it would be difficult to remove it from the panel.

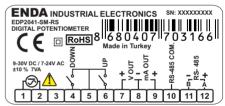
#### **CONNECTION DIAGRAM**

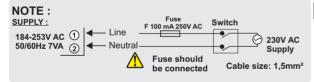


**ENDA EDP2041** is intended for installation in control panels. Make sure that the device is used only for intended purpose. The electrical connections must be carried out by a qualified staff and must be according to the relevant locally applicable regulations. During an installation, all of the cables 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.









Equipment is protected throughout by DOUBLE INSULATION.

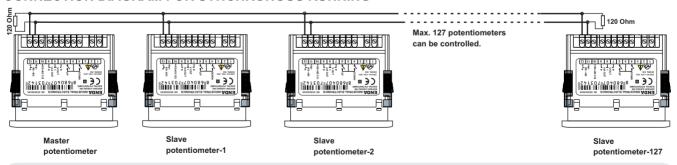




## Note

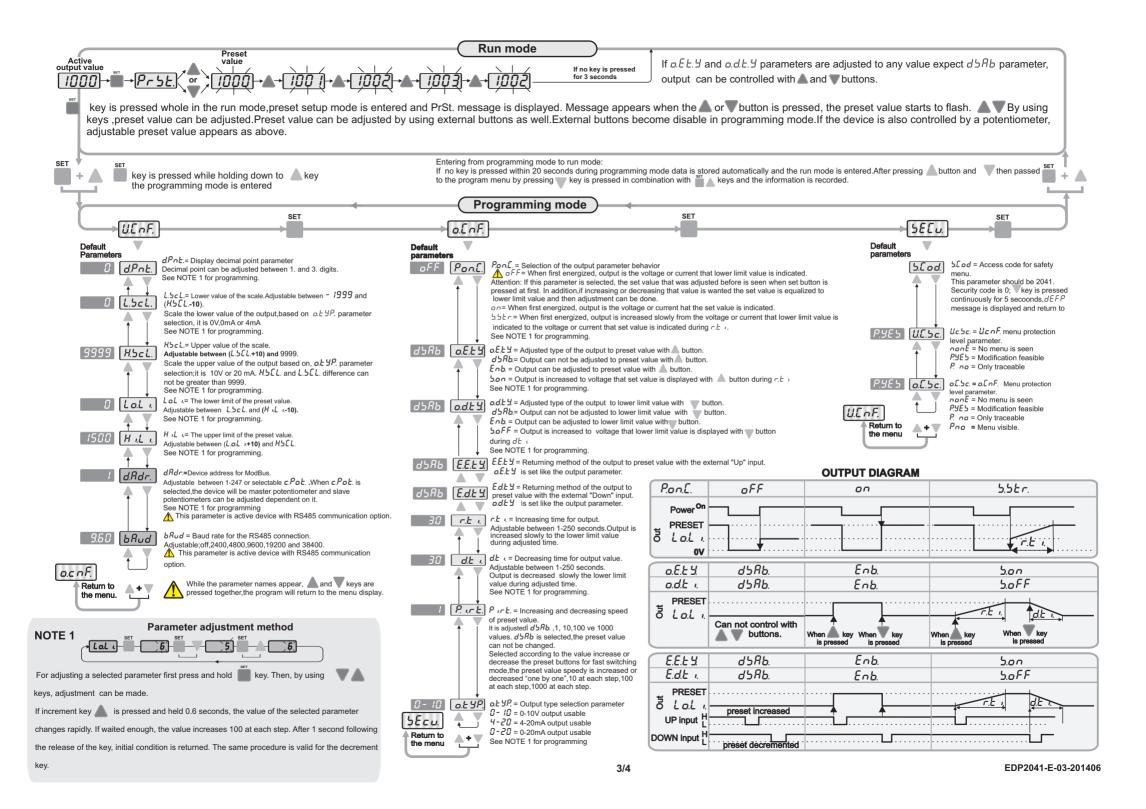
Mains supply cords shall meet the requirements of IEC 60227 or IEC 60245.
 In accordance with the safety regulations, the power supply switch shall bring the identification of the relevant instrument and it should be easily accessible by the operator.

### **CONNECTION DIAGRAM FOR SYNCHRONOUS RUNNING**



#### NOTE:

- $d\mathcal{A}dr$ . parameter should be selected  $\mathcal{L}Pab$  in master potentiometer. In this case  $d\mathcal{A}dr$ . parameter of other potentiometers aren't used. But be sure that  $\mathcal{L}Pab$  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. Panc parameter of slave potentiometer should be selected aFF 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.
- Baud rate of potentiometers must be same in both conditions. 120 Ohm termination resistor should be used at the ends and beginning of transmission line. See www.enda.com.tr/EDP2041.htm for detailed information.



# **ENDA EDP2041 DIGITAL POTENTIOMETER** MODBUS PROTOCOL ADDRESS MAP

## 1.1 Memory map for Holding Registers

Parameter Number	Holding Registe addresses Decimal (Hex	Type	Data Content	Parameter Name	Read/Write Permission	Default Parameters
H0	0000d (0000l	) Word	Percentage of the external control.Adjustable between %0.00 and %100.0		Readable / Writable	10000
H1	0001d (0001l	) Word	Preset value	Pr5E.	Readable / Writable	1000
H2	0002d (0002l	) Word	Decimal point	d.Pnt.	Readable / Writable	0
Н3	0003d (0003l	) Word	The lower value of the scale	L.5[L.	Readable / Writable	0
H4	0004d (0004l	) Word	The upper value of the scale	H.5[L.	Readable / Writable	9999
Н5	0005d (0005l	) Word	The lower limit of the preset value	Lo.L ı.	Readable / Writable	0
Н6	0006d (0006l	) Word	The upper limit of the preset value	H .L .	Readable / Writable	2000
Н7	0007d (0007l	) Word	Device address for Rs485 network connection (Adjustable between 1-247.) If set to "0",the control potentiometer mode is entered.	d.Rdr.	Readable / Writable	1
Н8	0008d (0008l	) Word	Baud rate selection ( 0= None;1=2400bps ; 2=4800bps ; 3=9600bps ; 4=19200bps; 5=38400bps)	bRud.	Readable / Writable	3
Н9	0009d (0009l	) Word	The first opening the control parameter $\theta = \rho F$ , $1 = \rho n$ , $2 = 5.5 E$		Readable / Writable	0
H10	0010d (000A	n) Word	Output upper arrow button to fetch the value of the preset selection	er arrow button to fetch the value of the preset selection		0
H11	0011d (000B	n) Word	Output lower arrow button to fetch the value of the lower limit selection $0 = d5Rb$ , $1 = Enb$ , $2 = 5oFF$ .	er arrow button to fetch the value of the lower limit selection		0
H12	0012d (000C	n) Word	Time to increase the output voltage	r.Ł ı.	Readable / Writable	30
H13	0013d (000D	n) Word	Time to decrease the output voltage	d.t 1.	Readable / Writable	30
H14	0014d (000E	n) 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. rdt.	Readable / Writable	1
H15	0015d (000F	) Word	Output type selection parameter 0 = 0-10V output, 1 = 4-20mA output, 2 = 0-20mA output	o.Ł YP.	Readable / Writable	0
H16	0016d (0010l	) 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 (0011	) Word	Output securify parameter configuration menu (0 = Menu invisible, 1= Menu programmable, 2 or 3 = Menu only traceable).	o.E.5E.	Readable / Writable	1
H18	0018d (0012	) Word	Function control parameter (23040d (5A00h) value is entered, any function executed. (23041d (5A01h) value is entered, the default values will be restored.	Readable / Wr		0
H19	0019d (0010l	) Word	Returning method of the output to preset value with the external "Up" input. 0 = d5Rb, $1 = Enb$ , $2 = 5.60$ .	E.E.Ł.Y.	Readable / Writable	0
H20	0020d (0011	) Word	Returning method of the output to preset value with the external "Down" input. $0 = d5Rb$ , $1 = Enb$ , $2 = 5.0FF$ .	E.d.L.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
10	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		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		
The function code received in the query is not an allowable action for the slave. If a Poll Complete command was issued, this code indicates that no program function preceded it.		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.		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) Structure of response message (Byte Format)

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

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Device Addres	(0A)h			
Function Code	(81)h			
Error Code	(02)h			
ODO DATA	LSB	(B0)h		
CRC DATA	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.