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 EDP7041 DIGITAL POTENTIOMETER

Thank you for choosing **ENDA EDP7041** Potentiometer.

- 72x72mm sized.
- 4 digits display.
- Easy to use front panel keypad.
- Communication via RS-485 Modbus protocol or synchronous running between two or more potentiomers (Optional).
- External preset key feature.
- Display scale can be adjusted between -1999 and 9999.
- Decimal point can be set between 1st and 3rd digit.
- 0-10V,0-20 mA a and 4-20mA output with adjustable minimum and maximum values.
- Soft ON / Soft OFF feature.
- Parameter access protection.
- CE marked according to European Norms.


**Orde Code : EDP7041 -** □□□□□□-□□
(1 / 2)

**1- Supply**
230VAC...230V AC
24VAC.....24V AC
SM.....9-30V DC / 7-24V AC

**2- Modbus**
RS.....RS-485 Modbus
Blank.....N/A

RoHS Compliant

CE

## 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 |

**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: 2010 (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.<br>**Accuracy** : %0.1 **Resolution** : 1mV<br>**Fluctuation** : Maximum 30mV<br>Rise time from 0 to 10V is maximum 300ms |

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

| HOUSING | |
|---|---|
| **Housing type** | Suitable for flush-panel mounting according to DIN 43 700. |
| **Dimensions** | W72xH72xD97mm |
| **Weight** | Approx. 350g (after packing) |
| **Enclosure material** | Self extinguishing plastics |

**While cleaning the device, solvents (thinner, gasoline, acid etc.) or corrosive materials must not be used.**

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



ENDA

## FRONT PANEL DESCRIPTIONS AND FEATURES


**1)** In “Running Mode”, indicates the potentiometer set value.
In “Programming Mode”, indicates the parameter name, parameter value and/or paremeter unit.

**2)** In “Running Mode”, increases the set value and used for “Output ON” key.
In “Programming Mode”, increases the set value and used for parameter selection.

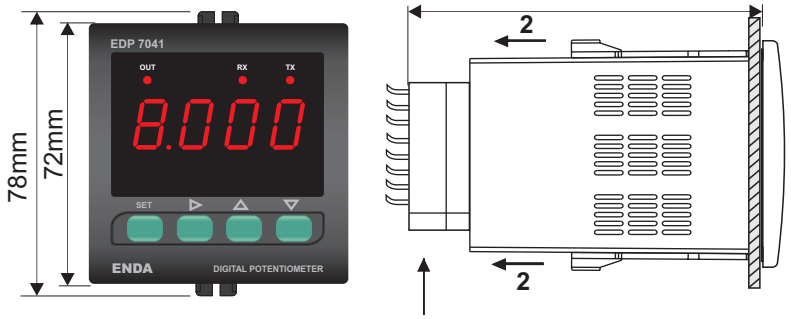
**3)** In “Running Mode”, decreases the set value and used for “Output OFF” key.
In “Programming Mode”, decreases the set value and used for parameter selection.

**4)** In “Programming Mode”, used for menu selection.

**5)** Used for mode selections and set parameters.

| | |
|---|---|
| **( 1 ) Digital Display** | 4 Digits 7 Segment red LED display |
| **Character Height** | 14.2mm |
| **( 2 ),( 3 ),( 4 ),( 5 ) Keypad** | Micro switch |

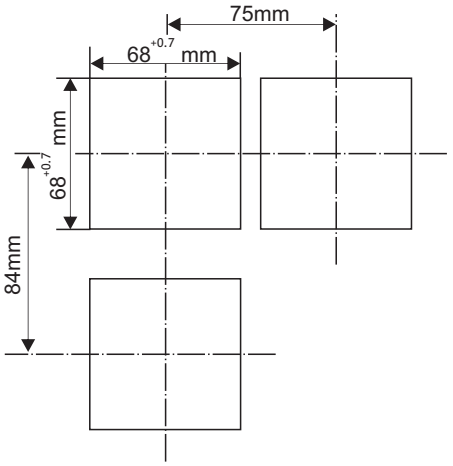
## DIMENSIONS



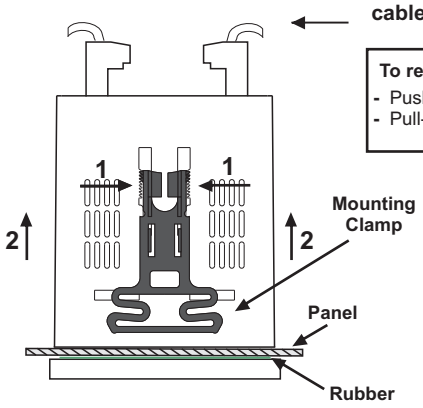

**Depth**
97mm




**Panel Cut-out**




**Connection cables**



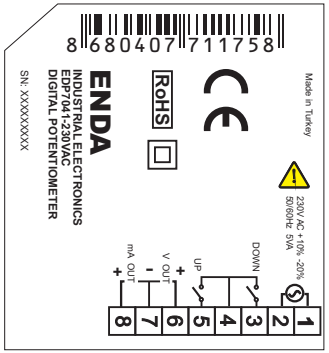

**To removing the device from panel :**
- Push the mounting clamps in directions **1** .
- Pull-back the mounting clamps in direction **2** .

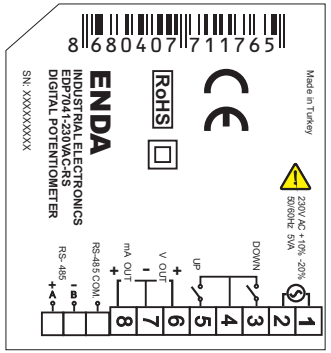
**Note : 1)** While panel mounting, additional distance required for connection cables should be considered.
**2)** Panel thickness should be maximum 10mm.
**3)** If there is no 90mm free space at back side of the device, it would be difficult to remove it from the panel.


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

## CONNECTION DIAGRAM

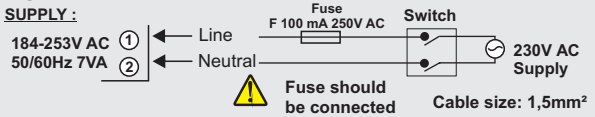
**ENDA EDP7041** is intended for installation in control panels. Make sure that the device is used only for intended purpose. The electrical connections must be carried out by a qualified staff and must be according to the relevant locally applicable regulations. During an installation, all of the cables 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 :**
**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.

**NOTE :**
**SUPPLY :**

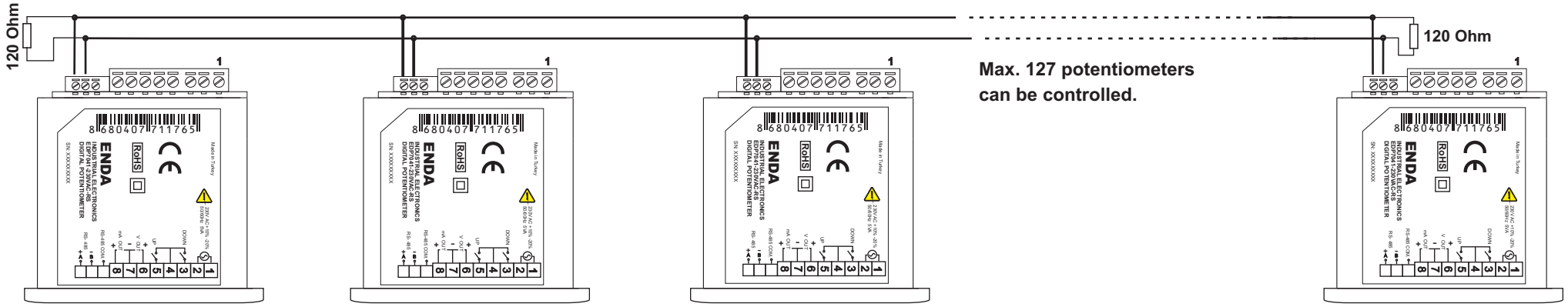



**Equipment is protected throughout by DOUBLE INSULATION.**

**Holding screw 0.4-0.5Nm**

**RoHS Compliant**

## CONNECTION DIAGRAM FOR SYNCHRONOUS RUNNING




**Master potentiometer** | **Slave potentiometer-1** | **Slave potentiometer-2** | **Slave potentiometer-127**

**NOTE :**
- *dAdr*. parameter should be selected *CPot* in master potentiometer. In this case *dAdr*. parameter of other potentiometers aren't used. But be sure that *CPot* 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. *Ponc* 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 *dAdr*. 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.


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

## Running Mode

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

If no key is pressed for 3 seconds, "Running Mode" is entered

If oEtY and odtY parameters are adjusted to any value expect dSAb parameter, output can be controlled with ▲ and ▼ buttons.

If SET key is pressed during in "Running Mode", PrSt message (preset) appears. If, ▲ or ▼ key is pressed while the preset message displaying, preset value flashes. Preset value can be adjusted by using ▲▼ keys. If no key is pressed for 3 seconds, "Running Mode" is entered. The preset value can also be set by using the external button inputs without using the keys on the front panel. In "Programming Mode" the external button inputs are disabled. If the device is under control of another potentiometer, the preset value can be viewed and adjusted as above. However, when returning to the operating mode, the set value is displayed multiplied by the percentage (%) value from the control potentiometer.

SET + ▲

If SET key is pressed while holding down to ▲ key, "Programming Mode" is entered.

**To switch from "Programming Mode" to "Running Mode" :**
If no key is pressed within 20 seconds during "Programming Mode", data is stored automatically and "Running Mode" is entered. After pressing ▲ key and then ▼ key, passed to the "Programming Mode" by pressing ▼ key is pressed in combination with SET ▲ keys and the data is stored.

SET + ▲

## Programming Mode

UCnF. → SET → oCnF. → SET → SECu. → SET

### UCnF.

**Default Parameters**

- 0 — dPnt. = Display decimal point parameter. Decimal point can be adjusted between 1. and 3. digits. See NOTE 1 for programming.
- 0 — LScL. = Lower value of the scale. Adjustable between -1999 and (HSCL.-10). Scale the lower value of the output, based on oEYP. parameter selection, it is 0V,0mA or 4mA. See NOTE 1 for programming.
- 9999 — HScL. = Upper value of the scale. **Adjustable between (LSCL.+10) and** 9999. Scale the upper value of the output based on, oEYP. parameter selection;it is 10V or 20 mA. HSCL. and LSCL. difference can not be greater than 9999. See NOTE 1 for programming.
- 0 — LoL 1 = The lower limit of the preset value. Adjustable between LSCL. 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 HSCL. See NOTE 1 for programming.
- 1 — dAdr. = Device address for ModBus. Adjustable between 1-247 or selectable cPot. .When cPot. 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.

oCnF. → Return to the menu. (▲ + ▼)

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

### oCnF.

**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. StSr. = 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 — oEtY = 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. Son = Output is increased to voltage that set value is displayed with ▲ button during rt 1. See NOTE 1 for programming.
- dSAb — odtY = 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. SoFF = Output is increased to voltage that lower limit value is displayed with ▼ button during dt 1. See NOTE 1 for programming.
- dSAb — EEtY = Returning method of the output to preset value with the external "Up" input. oEtY is set like the output parameter.
- dSAb — EdtY = Returning method of the output to preset value with the external "Down" input. odtY 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. See NOTE 1 for programming.
- 0-10 — oEYP. = 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

SECu. → Return to the menu (▲ + ▼)

### SECu.

**Default parameters**

- SCod. = 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 — UCSC. = UCnF. menu protection level parameter. nonE = No menu is seen. PYES = Modification feasible. P no = Only traceable
- PYES — oCSC. = oCnF. Menu protection level parameter. nonE = No menu is seen. PYES = Modification feasible. P no = Only traceable. Pno = Menu visible.

UCnF. → Return to the menu (▲ + ▼)

### NOTE 1

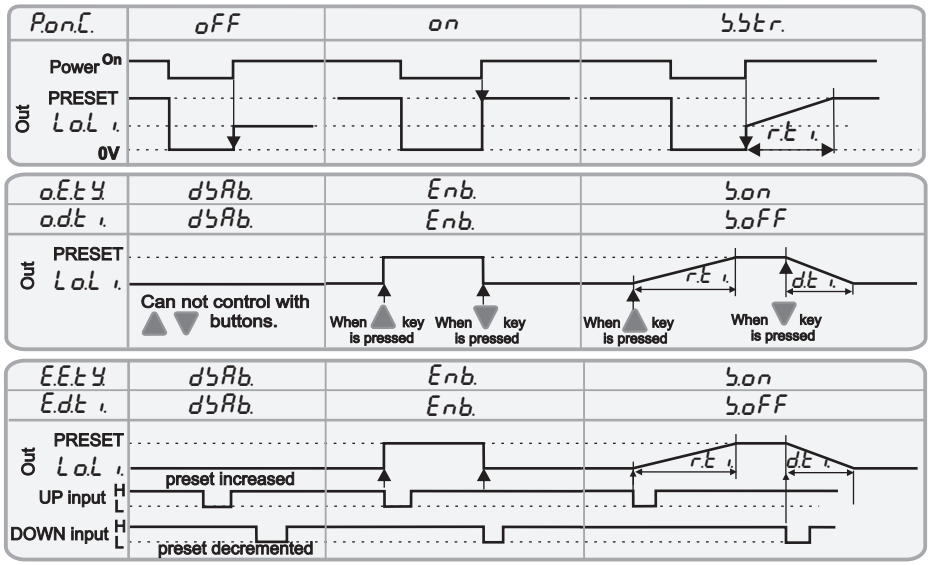
**Parameter adjustment method**

LoL 1 → SET → 6 → SET → 5 → SET → 6 → SET

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






EDP7041-EN-01-171013

# ENDA EDP7041 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 | | R / W | 10000 |
| **H1** | 0001d (0001h) | Word | Preset value | PrSt. | R / W | 1000 |
| **H2** | 0002d (0002h) | Word | Decimal point | dPnt. | R / W | 0 |
| **H3** | 0003d (0003h) | Word | The lower value of the scale | LSCL. | R / W | 0 |
| **H4** | 0004d (0004h) | Word | The upper value of the scale | HSCL. | R / W | 9999 |
| **H5** | 0005d (0005h) | Word | The lower limit of the preset value | Lo.L 1. | R / W | 0 |
| **H6** | 0006d (0006h) | Word | The upper limit of the preset value | Hi.L 1. | R / W | 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. | dAdr. | R / W | 1 |
| **H8** | 0008d (0008h) | Word | Baud rate selection ( 0= None;1=2400bps ; 2=4800bps ; 3=9600bps ; 4=19200bps; 5=38400bps) | bAud. | R / W | 3 |
| **H9** | 0009d (0009h) | Word | The first opening the control parameter 0= oFF , 1= on , 2 = LSt r | Pon.C. | R / W | 0 |
| **H10** | 0010d (000Ah) | Word | Output upper arrow button to fetch the value of the preset selection 0= dSAb.,1= Enb. , 2 = Lon. | o.Et Y | R / W | 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.dt Y | R / W | 0 |
| **H12** | 0012d (000Ch) | Word | Time to increase the output voltage | rt 1. | R / W | 30 |
| **H13** | 0013d (000Dh) | Word | Time to decrease the output voltage | dt 1. | R / W | 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. | R / W | 1 |
| **H15** | 0015d (000Fh) | Word | Output type selection parameter 0 = 0-10V output, 1 = 4-20mA output ,2 = 0-20mA output | o.tYP. | R / W | 0 |
| **H16** | 0016d (0010h) | Word | User security parameter configuration menu (0 = Menu invisible, 1= Menu programmable, 2 or 3 = Menu only traceable). | U.CSC. | R / W | 1 |
| **H17** | 0017d (0011h) | Word | Output security parameter configuration menu (0 = Menu invisible, 1= Menu programmable, 2 or 3 = Menu only traceable). | o.CSC. | R / W | 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. | | R / W | 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.Et.Y | R / W | 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.dt.Y | R / W | 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 | ▬▬ | R | ▬▬ |
| **I1** | 0001d (0001h) | Word | % of value the analog output (%0.00-%100.00 sensitivity) | ▬▬ | R | ▬▬ |

## 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) | ▬▬ | R | ▬▬ |
| **D1** | (0001)h | Bit | State of the external up button (0 = OFF ,1 = ON) | ▬▬ | R | ▬▬ |

## 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 | Description |
|---|---|---|
| **{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.

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