



Read this document carefully before using this device. The guarantee will be expired by device 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 EPA542 PROGRAMMABLE AC/DC AMMETER

Thank you for choosing **ENDA EPA542** programmable AC/DC ammeter.

- ▶ 54 x 94mm sized.
- ▶ 4 digits display.
- ▶ Easy to use with front panel keypad.
- ▶ 5A or 60 mV , CT20/30 current transformer or 60 mV input feature (Please Specify at Order). ⚠
- ▶ Programmable scale range between 5A and 9999A.
- ▶ Multifunctional alarm output (NO+NC) for upper and lower limits.
- ▶ Communication feature over isolated RS485, using ModBus RTU protocol (Optional).
- ▶ Measuring type can be selected as AC, DC or true RMS.
- ▶ Keylock feature.
- ▶ 0-20mA, 4-20mA, 0-10V or 1-5V output selection (Specified devices with output type 'A' only).
- ▶ CE marked according to European Norms.

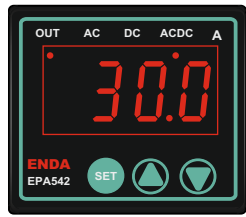
⚠ **CT20/30 should be ordered separately if required.**

|                                                                                                                                                                                                                                                                                             |                                                                                                                          |                                                     |                                                                                     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|-------------------------------------------------------------------------------------|
| Order Code : EPA542 - <span style="border: 1px solid black; padding: 0 2px;"> </span> - <span style="border: 1px solid black; padding: 0 2px;"> </span> - <span style="border: 1px solid black; padding: 0 2px;"> </span> - <span style="border: 1px solid black; padding: 0 2px;"> </span> |                                                                                                                          |                                                     |                                                                                     |
|                                                                                                                                                                                                                                                                                             | 1                                                                                                                        | 2                                                   | 3                                                                                   |
| <b>1- Supply Voltage</b><br>UV.....90-250V AC<br>LV.....10-30V DC / 8-24V AC                                                                                                                                                                                                                | <b>2 - Input</b><br>CT.....CT20/30<br>Current Transformer input OR 60mV.<br>X1.....1A<br>Default (Blank).....5A or 60mV. | <b>3 -Output</b><br>R.....08A Relay<br>A.....Analog | <b>4 - Isolated Modbus</b><br>RSI.....RS485 Modbus Available<br>( Specify at order) |



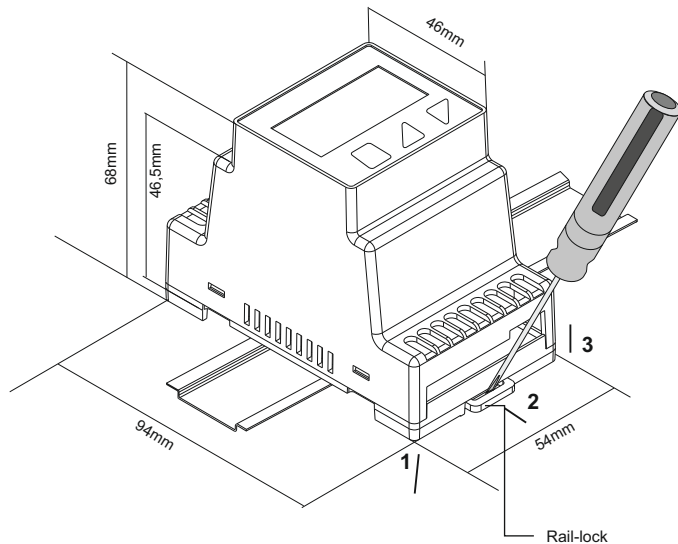
## TECHNICAL SPECIFICATIONS

| ENVIRONMENTAL CONDITIONS                                                                                                                                                                                                                                          |                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Ambient/Storage Temperature                                                                                                                                                                                                                                       | 0 ... +50°C/-25 ... 70°C                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
| 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                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
| <div> KEEP AWAY device from exposed to corrosive, volatile and flammable gases or liquids and DO NOT USE the device in similar hazardous locations.</div>                       |                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
| ELECTRICAL CHARACTERISTICS                                                                                                                                                                                                                                        |                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
| Supply                                                                                                                                                                                                                                                            | 90-250V AC 50/60Hz ;10-30V DC / 8-24V AC SMPS                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
| Power Consumption                                                                                                                                                                                                                                                 | Max. 5VA                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
| Wiring                                                                                                                                                                                                                                                            | 2.5mm² screw-terminal connections                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
| Scale                                                                                                                                                                                                                                                             | AC and RMS                                                                                                                      | If input type is 5A / 60mV, scale 0A...9999A : ( Specified by C.T.R.R parameter. i.e : scale is 0A...5A for C.T.R.R = 5 )<br>If input type is 1A, scale 0A...9999A : ( Specified by C.T.R.R parameter. i.e : scale is 0A...1A for C.T.R.R = 1 )<br>If ITYP = CT20 , 0A...300A or CT30 , 0A...120A ( Specified by TURN parameter. i.e : scale is 0A..300A / 0A..120A for TURN = 1 )<br>If ITYP = SHNT , 0A...9999A ( Specified by C.T.R.R parameter. i.e : scale is 0A...5A for C.T.R.R = 5 ) |  |
|                                                                                                                                                                                                                                                                   | DC                                                                                                                              | If input type is 5A / 60mV, scale : -999A...9999A ( Specified by C.T.R.R parameter. i.e : scale is -5A...5A for C.T.R.R = 5 )<br>If input type is 1A, scale : -999A...9999A ( Specified by C.T.R.R parameter. i.e : scale is -1A...1A for C.T.R.R = 1 )<br>If input type is CT20/30 / 60mV :<br>DC measurement can not be performed by using CT.<br>If ITYP = SHNT , scale : 0A...9999A ( Specified by C.T.R.R parameter. i.e : scale is -5A...5A for C.T.R.R=5 )                            |  |
| Sensitivity                                                                                                                                                                                                                                                       | 0.002A x C.T.R.R ( i.e. : 0.01A for C.T.R.R = 5 )                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
| Accuracy                                                                                                                                                                                                                                                          | AC<br>DC<br>RMS                                                                                                                 | ± %1 (full scale) (± 2% For square wave form)<br>± %1 (full scale) (± 2% For square wave form)<br>± %1 (full scale) (± 2% For square wave form)                                                                                                                                                                                                                                                                                                                                              |  |
| Input Range                                                                                                                                                                                                                                                       | <div><div>2 and 3</div><div>1 and 4</div></div>                                                                                 | -1A...1A ( Device may be damaged at 2A and above currents )<br>-5A...5A or CT20/30 input, 0 ... 150 mA ( Device may be damaged at 10A and above currents )<br>-60mV...60mV ( Device may be damaged at 50V and above voltages ) <div></div>                                                                                                                                                              |  |
| Input Impedance                                                                                                                                                                                                                                                   | <div><div>2 and 3</div><div>1 and 4</div></div>                                                                                 | 12mΩ (For 5A input) , 90mΩ (For 1A input)<br>40kΩ (For 5A input) , 600mΩ (For CT20/30 input)                                                                                                                                                                                                                                                                                                                                                                                                 |  |
| Frequency Range                                                                                                                                                                                                                                                   | DC , 10Hz - 200Hz (10Hz - 70Hz For square wave form)                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
| EMC                                                                                                                                                                                                                                                               | EN 61326-1: 2013                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
| Safety Requirements                                                                                                                                                                                                                                               | EN 61010-1: 2010 (Pollution degree 2, overvoltage category II)                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
| OUTPUTS                                                                                                                                                                                                                                                           |                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
| Analog Output                                                                                                                                                                                                                                                     | 0-20mA DC, 4-20mA DC, 0-10V DC or 1-5V DC can be selected on program. ( Load resistance for current outputs <b>Max. 500Ω</b> ). |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
| Output                                                                                                                                                                                                                                                            | Relay : 250V AC, 8A (for resistive load), NO+NC                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
| Life Expectancy For Relay                                                                                                                                                                                                                                         | Mechanical 30.000.000; Electrical 100.000 operation. 250V AC, 8A (resistive load).                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
| HOUSING                                                                                                                                                                                                                                                           |                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
| Housing Type                                                                                                                                                                                                                                                      | Suitable for EN60715 Standards, TH35 rail type.                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
| Dimensions                                                                                                                                                                                                                                                        | W54xH94xD68mm                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
| Weight                                                                                                                                                                                                                                                            | Approx. 250g (after packing)                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
| Enclosure Material                                                                                                                                                                                                                                                | Self extinguishing plastics.                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
| <div> Avoid any liquid contact when the device is switched on.<br/>DO NOT clean the device with solvent (thinner, gasoline, acid etc.) and / or abrasive cleaning agents.</div> |                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |



|                        |                                                                                   |                                                                                                                                                 |
|------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Increment key</b>   |   | Used for increasing the setpoint value and changing parameters.<br>When held down for a few seconds, configured numeric value increases faster. |
| <b>Decrement key</b>   |  | Used for decreasing the setpoint value and changing parameters.<br>When held down for a few seconds, configured numeric value decreases faster. |
| <b>Programming key</b> |  | Used for displaying and configuring the selected parameter value.                                                                               |

## DIMENSIONS & CONNECTION DIAGRAM



### For mounting the device on rail :

Push the device to rail in direction 1 and make sure that rail-lock is interlocked to rail.

### For removing the device from rail :

Push the rail-lock with a flat tip screwdriver in direction 2 and pull the device in direction 3.



Equipment is protected throughout by  
DOUBLE INSULATION



Holding screw 0.4-0.5Nm.

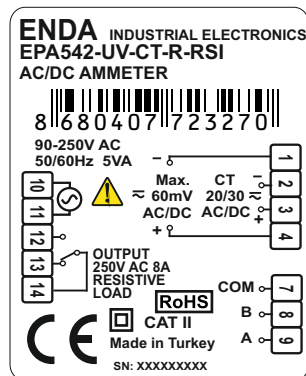
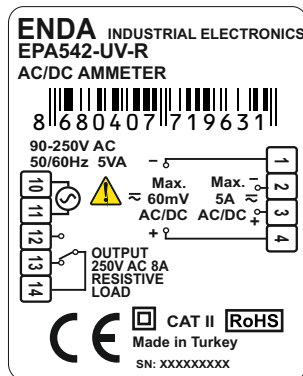
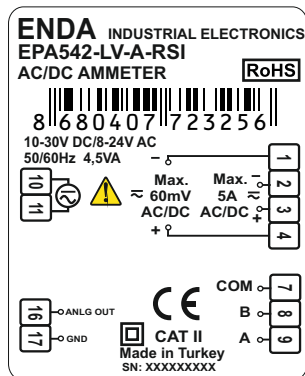


**ENDA EPA542** ammeters are rail mounted control devices. Device must be used according to instructions. Mounting and electrical connections must be carried out by a qualified staff and must be according to the relevant locally applicable regulations. During an installation, all of the cables that are connected to the device must be free of electrical power. The device must be protected against inadmissible humidity, vibrations and severe soiling. Make sure that the operation temperature is not exceeded. The cables should not be close to the power cables or components.



### CAUTION :

If 5A / CT20-30 and 60mV inputs are connected at the same time, the measurement will be incorrect.



**CT20**  
Measurement Input  
0-300A



### NOTE :

**SUPPLY:**  
90-250V AC  
10-30V DC /  
8-24V AC  
50/60Hz 7VA

10 - Line  
11 - Neutral

Fuse F 100mA  
250V AC

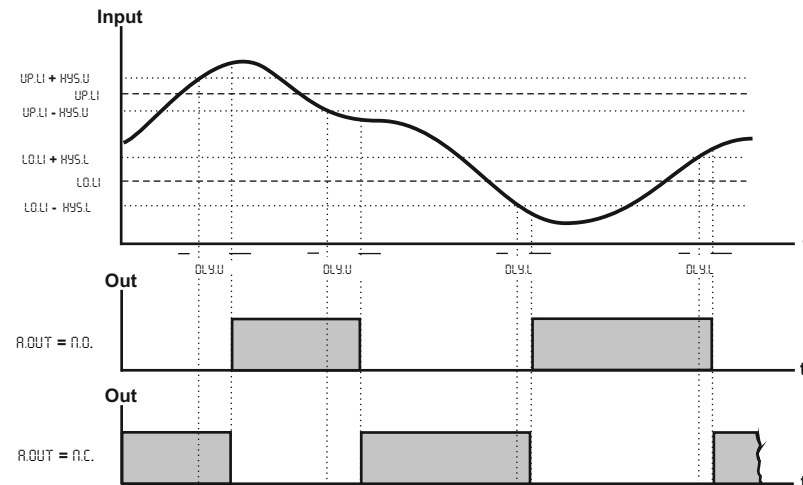
Switch UV / LV  
Supply

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.

⚡ Fuse should be connected.

Cable size: 1,5mm<sup>2</sup>

**Please see page 5 for Modbus Connection Diagram**



|  | AC                                       | DC                | AC.DC (rms)            |
|--|------------------------------------------|-------------------|------------------------|
|  | $A \frac{1}{\sqrt{2}}$                   | 0.000             | $A \frac{1}{\sqrt{2}}$ |
|  | 0.308 A                                  | $A \frac{2}{\pi}$ | $A \frac{1}{\sqrt{2}}$ |
|  | 0.386 A                                  | $A \frac{1}{\pi}$ | $A \frac{1}{2}$        |
|  | A                                        | 0.000             | A                      |
|  | $A \frac{1}{2}$                          | $A \frac{1}{2}$   | $A \frac{1}{\sqrt{2}}$ |
|  | $A \sqrt{\frac{d}{T} - \frac{d^2}{T^2}}$ | $A \frac{d}{T}$   | $A \sqrt{\frac{d}{T}}$ |
|  | $A \frac{1}{\sqrt{3}}$                   | 0.000             | $A \frac{1}{\sqrt{3}}$ |

# ENDA EPA542 DIGITAL AMMETER MODBUS PROTOCOL ADDRESS MAP

## HOLDING REGISTERS FOR OUTPUT TYPE UNIT "R" (RELAY) DEVICES

| Holding Register Adresleri |        | Data Type | Data Content                                                                                                                                                           | Parameter Name | Read/Write Permission | Default Value |
|----------------------------|--------|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-----------------------|---------------|
| Decimal                    | Hex    |           |                                                                                                                                                                        |                |                       |               |
| 0000d                      | 0x0000 | word      | Alarm output status                                                                                                                                                    | OTYP           | R / W                 | 00            |
| 0001d                      | 0x0001 | word      | Current replacement rate                                                                                                                                               | CTRR           | R / W                 | 5             |
| 0002d                      | 0x0002 | word      | The upper limit of the setpoint                                                                                                                                        | UPLL           | R / W                 | 5.00          |
| 0003d                      | 0x0003 | word      | The upper limit of the hysteresis value                                                                                                                                | HYSU           | R / W                 | 0.10          |
| 0004d                      | 0x0004 | word      | Delay time for the upper limit alarm                                                                                                                                   | OLYU           | R / W                 | 0             |
| 0005d                      | 0x0005 | word      | The lower limit of the setpoint                                                                                                                                        | LOLL           | R / W                 | 0.00          |
| 0006d                      | 0x0006 | word      | The lower limit of the hysteresis value                                                                                                                                | HYSL           | R / W                 | 0.10          |
| 0007d                      | 0x0007 | word      | Delay time for the lower limit alarm                                                                                                                                   | OLYL           | R / W                 | 0             |
| 0008d                      | 0x0008 | word      | Measurement method (0=AC, 1=DC, 2=ACDC)                                                                                                                                | TYPE           | R / W                 | ACDC          |
| 0009d                      | 0x0009 | word      | Decimal point. ( 0 = 0 , 1 = 0.0 , 2 = 0.00 , 3 = 0.000 )                                                                                                              | DPNT           | R / W                 | 0.00          |
| 0010d                      | 0x000A | word      | Sampling time of the measurement value. If 1 is selected, it is 250ms. If 2 is selected, it is 500ms. If 3 is selected, it is 750ms. If 4 is selected, it is 1 second. | OPTN           | R / W                 | 4             |
| 0011d                      | 0x000B | word      | Device address for RS485 network connection. Adjustable between 1-247.                                                                                                 | RORS           | R / W                 | 1             |
| 0012d                      | 0x000C | word      | Baudrate (0=Off;1=1200;2=2400; 3=4800; 4=9600; 5=19200 6= 38400; 7= 57600; 8= 115200)                                                                                  | BAUD           | R / W                 | OFF           |
| 0013d                      | 0x000D | word      | Delay Time for Initial Upper Limit Alarm                                                                                                                               | SOLY           | R / W                 | 0             |
| *0014d                     | 0x000E | word      | Input Type ( 0 = CT20 , 1 = CT30 , 2 = SHNT )                                                                                                                          | ITYP           | R / W                 | CT20          |
| *0015d                     | 0x000F | word      | Number of windings for transformer                                                                                                                                     | TURN           | R / W                 | 1             |

 \* 14d and 15d addresses are available for only in CT20/30 input type devices.

## HOLDING REGISTERS FOR OUTPUT TYPE UNIT "BLANK" (NO RELAY) OR "A" (ANALOG) DEVICES

|         |        |      |                                                                                       |      |       |      |
|---------|--------|------|---------------------------------------------------------------------------------------|------|-------|------|
| 0000d   | 0x0000 | word | Current Conversion Ratio                                                              | CTRR | R / W | 5    |
| 0001d   | 0x0001 | word | Measurement method (0=AC, 1=DC, 2=ACDC)                                               | TYPE | R / W | ACDC |
| 0002d   | 0x0002 | word | Decimal point ( 0 = 0 , 1 = 0.0 , 2 = 0.00 , 3 = 0.000 )                              | DPNT | R / W | 0.00 |
| 0003d   | 0x0003 | word | Sampling time of the measurement value                                                | OPTN | R / W | 4    |
| 0004d   | 0x0004 | word | Device address for RS485 network connection. Adjustable between 1-247.                | RORS | R / W | 1    |
| 0005d   | 0x0005 | word | Baudrate (0=Off;1=1200;2=2400; 3=4800; 4=9600; 5=19200 6= 38400; 7= 57600; 8= 115200) | BAUD | R / W | OFF  |
| *0006d  | 0x0006 | word | Input Type ( 0 = CT20 , 1 = CT30 , 2 = SHNT )                                         | ITYP | R / W | CT20 |
| *0007d  | 0x0007 | word | Number of windings for transformer                                                    | TURN | R / W | 1    |
| **0008d | 0x0008 | word | Analog output type. (0 = 0 - 20 , 1 = 4 - 20 , 2 = 0 - 10 , 3 = 1 - 5 )               | ATYP | R / W | 0-20 |

 \* 6d and 7d addresses are available for only in CT20/30 input type devices.

 \*\* Address 8d is available for only in "A" (Analog) input type devices.



### NOTE :

In devices with input type CT20/30, following parameter settings will change automatically if the ITYP parameter is changed.

If ITYP = CT20 ; UPLL = 300.0 , LOLL = 0 , HYSU = 0.10 , HYSL = 0.10

If ITYP = CT30 ; UPLL = 120.0 , LOLL = 0 , HYSU = 0.10 , HYSL = 0.10

### ENDA EPA542-xx-xx-x-RSI INPUT REGISTERS FOR OUTPUT DEVICES

| Input Register Addresses |        | Data Type | Data Content                            | Parameter Name | Read / Write Permission |
|--------------------------|--------|-----------|-----------------------------------------|----------------|-------------------------|
| Decimal                  | Hex    |           |                                         |                |                         |
| 0000d                    | 0x0000 | word      | Measured current value                  | --             | Read Only               |
| 0001d                    | 0x0001 | word      | Decimal point of measured current value | --             | Read Only               |
| 0002d                    | 0x0002 | word      | Specified analog output value           | --             | Read Only               |

### ENDA EPA542-xx-xx-R-RSI DIGITAL AMMETER WITH ALARM RELAY OUTPUT DISCRETE INPUTS

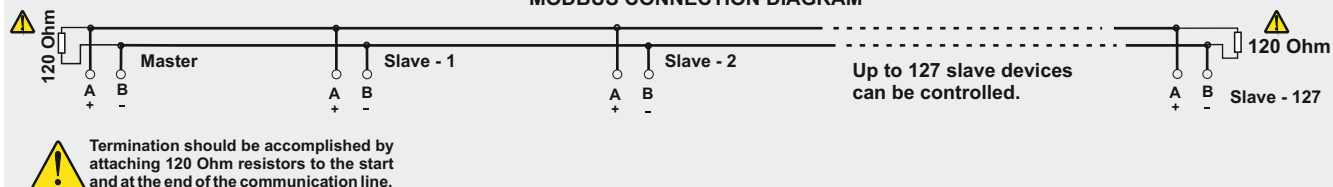
| Discrete Input Addresses |      | Data Type | Data Content                     | Parameter Name | Read/Write Permission |
|--------------------------|------|-----------|----------------------------------|----------------|-----------------------|
| Decimal                  | Hex  |           |                                  |                |                       |
| 00d                      | 0x00 | Bit       | Relay output state (0=OFF; 1=ON) | --             | Read Only             |

### ENDA EPA542-xx-xx-R-RSI DIGITAL AMMETER WITH ALARM RELAY OUTPUT COILS INPUTS

| Coil Addresses |      | Data Type | Data Content              | Parameter Name | Read/Write Permission | Default Value |
|----------------|------|-----------|---------------------------|----------------|-----------------------|---------------|
| Decimal        | Hex  |           |                           |                |                       |               |
| 00d            | 0x00 | Bit       | Output state (0=NO; 1=NC) | OTYP           | R / W                 | NO            |

- Note 1 :** Coil and Discrete input parameters are not available in the devices those have no relay
- Note 2 :** OTYP menu parameters can be used as "Holding Register" or "Coil".
- Note 3 :** Value read in 0th address of input register gives the measured value. Also, the 1st address of the input register specifies the decimal part of the measured current value.  
 For example ;  
 Value read in 0th address of input register is 2842 , if value read in 1st address from input register as 1, it is 284.2  
 Value read in 0th address of input register is 2842 , if value read in 1st address from input register as 2, it is 28.42  
 Value read in 0th address of input register is 2842 , if value read in 1st address from input register as 3, it is 2.842

### \* MODBUS CONNECTION DIAGRAM



\* Applies to devices with Modbus function.