Read this document carefully before using this device. The guarantee will be expired by damaging of the device 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 EPA241A PROGRAMMABLE AC/DC AMMETER

Thank you for choosing ENDA EPA241A programmable AC/DC ammeter.

*** 77 x 35mm sized.**
*** 4 digits display.**
*** Easy to use with front panel keypad.**
*** Can be used with current transformer or shunt.**
*** Programmable scale between 5A and 9999A.**
*** Multifunctional alarm output (NO+NC) for upper and lower limits.**
*** Communication feature over isolated RS485, using ModBus RTU protocol. (Functional).**
*** Measuring type can be selected as AC, DC or true RMS.**
*** Key lock feature.**
*** CE marked according to European Norms.**

CE

**RoHS Compliant**


**Order Code: EPA241A - □ □□□□□□ -□□□**
**1 2 3**

**1 - Output**
R.....Relay
None...No Relay

**2 - Supply Voltage**
230VAC...230V AC
110VAC...110V AC
24VAC.....24V AC
SM.....9-30V DC / 7-24V AC

**3 - Isolated ModBus**
RSI...Isolated ModBus (Optional)

## TECHNICAL SPECIFICATIONS

| ENVIRONMENTAL CONDITIONS | |
|---|---|
| Ambient/stroge 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 |

**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. 5VA | |
| Wiring | 2.5mm² screw-terminal connections | |
| Scale | AC and RMS<br>DC | 0A...9999A (Specified by c.trr parameter. For example:scale is 0A...5A for c.trr=5.00)<br>-999A...9999A (Specified by c.trr parameter. For example:scale is -5A...5A for c.trr=5.00) |
| Sensitivity | 0.002A x c.trr ( For example , 0.01A for c.trr=5.00 ) | |
| Accuracy | AC<br>DC<br>RMS | ± 1% (full scale) (± 2% For square wave form)<br>± 1% (full scale)<br>± 1% (full scale) (± 2% For square wave form) |
| Input Range | 10 & 11<br>9 & 12 | -5A...5A (Device may be damaged at 10A and above currents.)<br>-60mV...60mV (Device may be damaged at 50V and above voltages.) |
| Input Impedance | 10 & 11<br>9 & 12 | 12mΩ<br>40kΩ |
| Frequency Range | DC , 10Hz - 200Hz (10Hz - 70Hz For square wave form) | |
| EMC | EN 61326-1: 2006 (Performance criterion B for the EMC standards) | |
| Safety requirements | EN 61010-1: 2010 (Pollution degree 2, overvoltage category II) | |

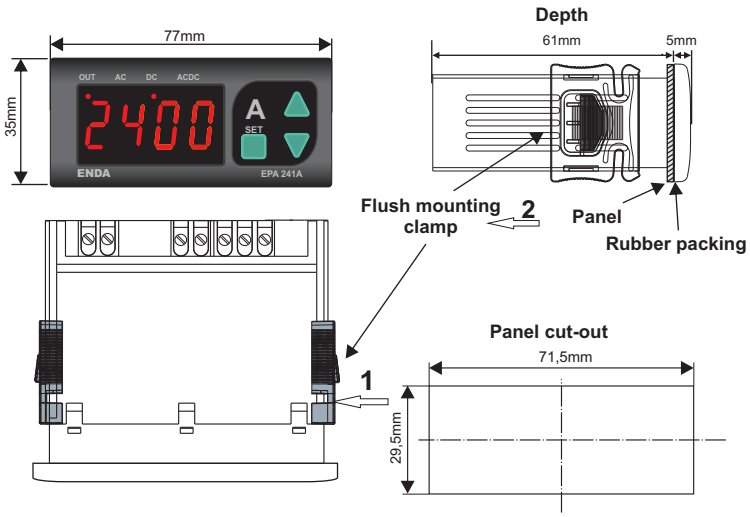
| OUTPUTS | |
|---|---|
| Alarm output | Relay: 250V AC, 8A (for resistive load), NO+NC |
| Life expectancy for relay | Mechanical 30.000.000 ; Electrical 100.000 operation. |

| HOUSING | |
|---|---|
| Housing type | Suitable for flush-panel mounting. (According to DIN 43 700) |
| Dimensions | W77xH35xD71mm |
| Weight | Approx. 250g (after packing) |
| Enclosure material | Self extinguishing plastics. |

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


**SİSEL MÜHENDİSLİK ELEKTRONİK SAN. VE TİC. A.Ş.**
**Yukarı Dudullu Barbaros Cad. Kutup Sok. No:18 34775 - ÜMRANİYE/İSTANBUL/TÜRKİYE**
**Tel : +90 216 499 46 64 Pbx. Fax : +90 216 365 74 01**
**url : www.enda.com.tr**

## DIMENSIONS



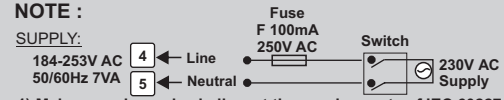

For removing mounting clamps:

- Push the flush-mounting clamp in direction **1** as shown in the figure left.
- Then, pull out the clamp 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.

**NOTE :**

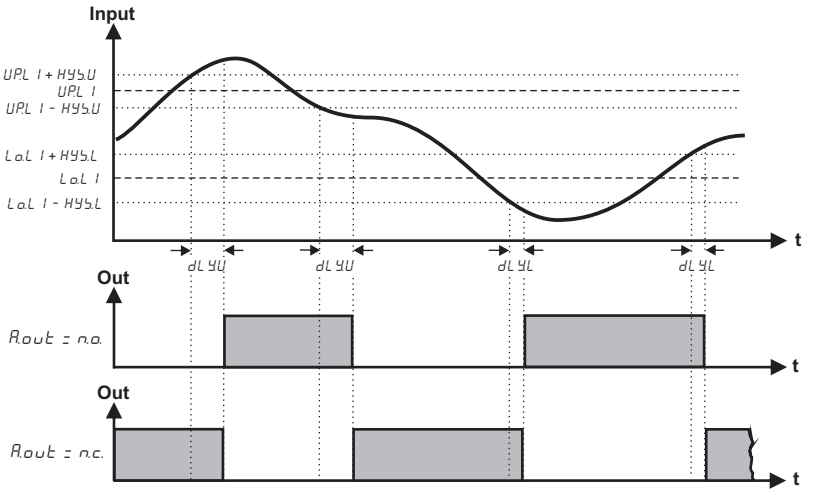



**1) Mains supply cords shall meet the requirements of IEC 60227 or IEC 60245.**
**2) In accordance with the safety regulations, the power supply switch shall bring the identification of the relevant instrurment and it should be easily accessible by the operator.**

**Fuse should be connected.** **Cable size: 1,5mm²**

**Equipment is protected throughout by DOUBLE INSULATION**

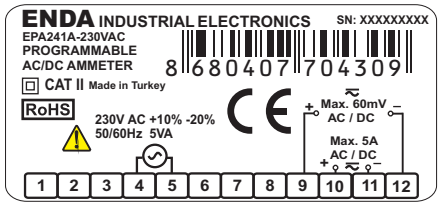
**Holding screw 0.4-0.5Nm.**

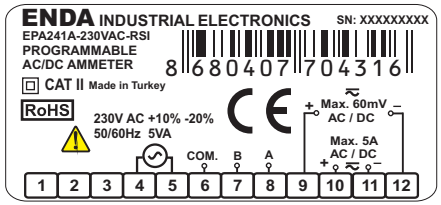


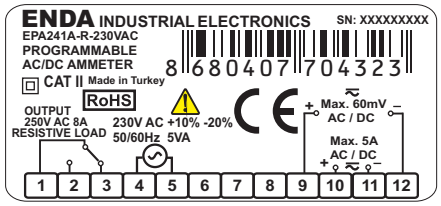

## CONNECTION DIAGRAM

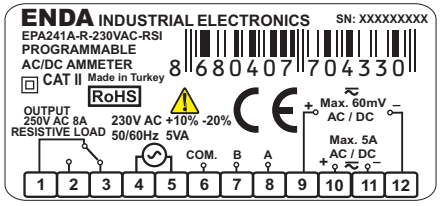
**ENDA EPA241A** is intended for installation in control panels.Make sure that the device is used only for intended purpose.The electrical connections must be carried on by a qualified staff and must be according to the relevant locally applicable regulations. During an installation, all of the cables 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.

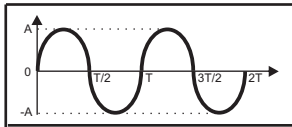
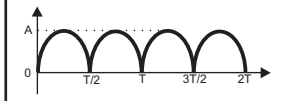
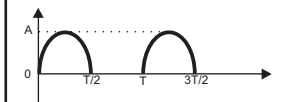
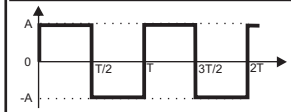
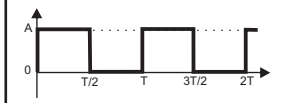
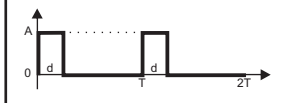
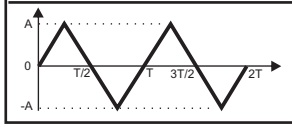
**CAUTION :**
If 5A and 60mV inputs are connected at the same time, the measurement will be incorrect.




| | Rc | dc | Rc.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 | $A\frac{1}{\sqrt{3}}$ |

# EPA241A PROGRAMMING DIAGRAM


**Increment key** — Used for increasing the setpoint value and changing parameters. When held down for a few seconds, configured numeric value increases faster.

**Decrement key** — Used for decreasing the setpoint value and changing parameters. When held down for a few seconds, configured numeric value increases faster.

**Programming key** (SET) — Used for displaying and configuring the selected parameter value.

## ADJUSTING THE ALARM VALUE

Measured value: -400

SET & ▲ → UPL 1 → SET → 300

If both keys are pressed, upper limit value can be udjusted.

If this key pressed, upper limit value appears.

By using ▼ and ▲ keys, upper limit value can be udjusted between lower scale and upper scale that is specified with c.t.r.r parameter. This parameter can't be lower than (LoL 1 + HYSL + HYSU ) value.

if ▲ and ▼ keys are pressed while parameter names are displayed, than it returns to measured value.

SET & ▼ → LOL 1 → SET → 150

If both keys are pressed, lower limit value can be adjusted.

If this key pressed, lower limit value appears.

By using ▼ and ▲ keys, lower limit value can be udjusted between lower scale and upper scale that is specified with c.t.r.r parameter. This parameter can't be higher than (UPL 1 - HYSU - HYSL ) value .

if ▲ and ▼ keys are pressed while parameter names are displayed, than it returns to measured value.

▲ → Loc → Measured Value: -400

If this key is pressed for 3 seconds, Loc mode is entered. Menu and other functions can't be accessed in Loc mode, only the measured value appears.

If ▲ is key pressed for 3 seconds in Loc mode, unL mode is entered. Menu and other functions can be accessed in unL mode.

▲ → unL → Measured value: -400

■ & ▲ & ▼ → 12.03

If these keys are pressed together, revision date appears as day and month.

If ▲ key is pressed, revision date is displayed as year.

▲ → 2013 → Measured value: -400

▲ & ▼ If these keys are pressed and held for 3 seconds, programming mode is entered or it returns to operating mode. If ▲ and ▼ keys are pressed while parameter names are displayed, than it returns to measured value.

## PROGRAMMING MODE

**UPL 1** — SET → 5.00 (Upper limit value)

If this key is pressed, upper limit value appears.

By using ▼ and ▲ keys, upper limit value can be adjusted between minimum and maximum scale that is specified with c.t.r.r parameter. This parameter can't be lower than (LoL 1 + HYSL + HYSU ) value.

If SET key is pressed, it returns to parameter name.

**HYSU** — SET → 0.10 (Hysteresis value for upper limit)

If this key is pressed, hysteresis value for upper limit appears.

By using ▼ and ▲ keys, hysteresis value for upper limit can be adjusted between 0 and Ctrr/5. This parameter can't be higher than ( UPL 1 - LoL 1 - HYSL ) value. When ctrr is changed HYSU gets the value of 1 , if ctrr is bigger than 100 else HYSU gets the value of 0.1 If ctrr is less than 100.

If SET key is pressed, it returns to parameter name.

**dLYU** — SET → 0 (Delay time for upper limit alarm)

If this key is pressed, delay time for upper limit appears

By using ▼ and ▲ keys, delay time for higher limit alarm can be adjusted between 0 and 900 seconds.

If SET key is pressed, it returns to parameter name.

**LOL 1** — SET → 0.00 (Lower limit value)

If this key is pressed, lower limit value appears.

By using ▼ and ▲ keys, lower limit value can be adjusted between lower scale and upper scale that is specified with c.t.r.r parameter.This parameter can't be higher than (UPL 1 - HYSU - HYSL ) value.

If SET key is pressed, it returns to parameter name.

**HYSL** — SET → 0.10 (Hysteresis value for lower limit)

If this key is pressed, hysteresis value for lower limit appears.

By using ▼ and ▲ keys, hysteresis value for upper limit can be adjusted between 0 and Ctrr/5. This parameter can't be higher than ( UPL 1 - LoL 1 - HYSU ) value. When ctrr is changed HYSU gets the value of 1 , if ctrr is bigger than 100 else HYSL gets the value of 0.1 If ctrr is less than 100.

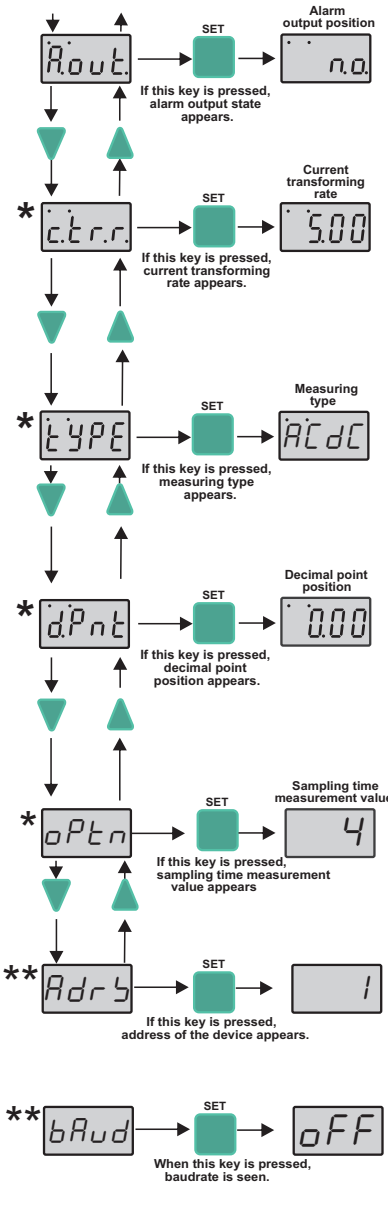
If SET key is pressed, it returns to parameter name.

**dLYL** — SET → 0 (Delay time for lower limit alarm)

If this key is pressed, delay time appears for lower limit appears.

By using ▼ and ▲ keys, delay time for lower limit alarm can be adjusted between 0 and 900 seconds.

If SET key is pressed, it returns to parameter name.




By using ▼ and ▲ keys, alarm output state can be adjusted to *no* or *nc*. If it is adjusted to *no*, output relay is powered at alarm condition.

If SET key is pressed, it returns to parameter name.

By using ▼ and ▲ keys, current transforming rate can be adjusted between *5.00*(/5) and *9999*(/5). If this parameter changes, upper limit value is set to maximum scale ,minimum limit value is set to minimum scale and hysteresis values are set to *0*.

If SET key is pressed, it returns to parameter name.

By using ▼ and ▲ keys, measuring type can be adjusted to *Ac* , *dc* or *Acdc*. Three leds at the top of the display show measuring type.

If SET key is pressed,it returns to parameter name.

By using ▼ and ▲ keys, decimal point state can be adjusted according to value of the *ctrr* parameter. If *ctrr* parameter is lower than 10, measured value can be shown as (*0.00*) or (*0.0*), If it is between 10 and 100, measured value can be shown as (*0.0*) or (*0*). If it is higher than 100, measured value can be shown as (*0*).

If SET key is pressed, it returns to parameter name.

Sampling time of the measurement value is shown on the screen. If *1* selected; sampling time of the measurement is 250ms, If *2* is selected,it is 500ms. If *3* is selected, it is 750ms. If *4* is selected, it is 1 second.

If SET key is pressed, it returns to parameter name.

By using ▼ and ▲ keys, address of the device can be adjusted between *1-247*.

If SET key is pressed, it returns to parameter name.

By using ▼ and ▲ keys, baudrate value of the device can be adjusted to OFF,1200,2400,4800,9600,19200.

If SET key is pressed,it returns to parameter name.

(*) There are only , *ctrr* , *tYPE* . *dPnt* . *oPtn* parameters in the devices those have no relay.

(**) The *Adr5* and *bAud* parameters are only in the devices those have modbus.

*i* For returning to measured value and saving to new settings, one of the following options can be applied ;

a) Wait for 25 seconds without pressing any key after the pogramming.

b) Press ▲ and ▼ keys together after the pogramming.

c) Power down and power up the device after the pogramming.

*i* NOTE : If ▼ key is held down while the device is powered up, *dPAr* message will appear and factory settings will be restored.

**ERROR MESSAGES**

Means, measured current value is higher than maximum scale.

Means, measured current value is lower than minimum scale.

# ENDA EPA241A DIGITAL AMPERMETER MODBUS PROTOCOL ADDRESS MAP

## 1.1 HOLDING REGISTERS

| Holding Register Addresses | | Data Type | Data Content | Parameter Name | Read/Write Permission | Status Value |
|---|---|---|---|---|---|---|
| Decimal | Hex | | | | | |
| 0000d | 0x0000 | word | The upper limit of the setpoint | uPL 1 | Readable/Writable | 5.0 |
| 0001d | 0x0001 | word | The upper limit of the hysteresis value | HYSU | Readable/Writable | 0.10 |
| 0002d | 0x0002 | word | Delay time for the upper limit alarm | dLYU | Readable/Writable | 0 |
| 0003d | 0x0003 | word | The lower limit of the setpoint | LoL 1 | Readable/Writable | 0 |
| 0004d | 0x0004 | word | The lower limit of the hysteresis value | HYSL | Readable/Writable | 0.10 |
| 0005d | 0x0005 | word | Delay time for the lower limit alarm | dLYL | Readable/Writable | 0 |
| 0006d | 0x0006 | word | Current replacement rate | ctrr | Readable/Writable | 5 |
| 0007d | 0x0007 | word | Measurement method (0=AC, 1=dC, 2=ACdC) | tYPE | Readable/Writable | ACdC |
| 0008d | 0x0008 | word | Decimal point. (0=X.XX,1=X.X,2=X) | dPnt | Readable/Writable | X.XX |
| 0009d | 0x0009 | 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 | Readable/Writable | 4 |
| 0010d | 0x000A | word | Device address for RS485 network connection. Adjustable between 1-247. | AdrS | Readable/Writable | 1 |
| 0011d | 0x000B | word | Baudrate (0=Off;1=1200;2=2400; 3=4800; 4=9600; 5=19200) | bAUd | Readable/Writable | oFF |
| *Holding Register Parameter Table (No Relay Models) | | | | | | |
| 0000d | 0x0000 | word | Current replacement rate | ctrr | Readable/Writable | 5 |
| 0001d | 0x0001 | word | Measurement method (0=AC, 1=dC, 2=ACdC) | tYPE | Readable/Writable | ACdC |
| 0002d | 0x0002 | word | Decimal point. (0=X.XX,1=X.X,2=X) | dPnt | Readable/Writable | X.XX |
| 0003d | 0x0003 | word | Sampling time of the measurement value | oPtn | Readable/Writable | 4 |
| 0004d | 0x0004 | word | Device address for RS485 network connection. Adjustable between 1-247. | AdrS | Readable/Writable | 1 |
| 0005d | 0x0005 | word | Baudrate (0=Off;1=1200;2=2400; 3=4800; 4=9600; 5=19200) | bAUd | Readable/Writable | 9600 |

## 1.2 INPUT REGISTERS

| Input Register Addresses | | Data Type | Data Content | Parameter Name | Read/Write Permission |
|---|---|---|---|---|---|
| Decimal | Hex | | | | |
| 0000d | 0x0000 | word | Measured current value | -- | Only Readable |
| 00001 | 0x0001 | word | Measured current value. (Read as 0 in 0.00 and 0.0 mode. In 0 mode, the measured value without-multiplier is read) | -- | Only Readable |

## 1.3 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) | -- | Only Readable |

## 1.4 COILS

| Coil Addresses | | Data Type | Data Content | Parameter Name | Read/Write Permission | Status Value |
|---|---|---|---|---|---|---|
| Decimal | Hex | | | | | |
| 00d | 0x00 | Bit | Alarm output state (0=no; 1=nc) | Aout | Readable/Writable | |
| *Coil and Discrete input parameters are not available in the devices those have no relay | | | | | | |