



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 ECH SERIES UP/DOWN COUNTER & RPM/TACHOMETER

Thank you for choosing ENDA ECH series devices.

- \* 48x48mm and 72x72mm sizes.
- \* 2x6 digits indicator.
- \* Programmable as Counter and RPM/Tachometer.
- \* 6 Digits Batch Counter.
- \* 9 Digits Total Counter.
- \* Period time differences, pulse time, turnover and speed measurement.
- \* Easy to use front panel keypad.
- \* Counts Up or Down according to input phase difference.
- \* Input frequency can be selected.
- \* Input signal can be calibrated to the desired value by multiplying between 0.000001 and 99.9999.
- \* Decimal point can be set between 1 and 5.
- \* Sensor input type can be selected by using keypad ( PNP, NPN ).
- \* Dual setpoint and dual contact relay.
- \* SET1 can be selected to dependent on SET2.
- \* Output contact relay can be adjusted to continuous output or between 0.01 and 999.9-second intervals.
- \* Output delay time can be adjusted in Tachometer Mode.
- \* Functional reset selection.
- \* 0 - 500000 Offset selection.
- \* Parameter access protection.
- \* Easy installation.
- \* RS485 Modbus communication interface (Specify at order).
- \* CE marked according to European Norms.



Order Code : ECH 

1	2	3									

- |   |  |  |
|---|--|--|
| <b>1 - Size</b><br>4400.....48x48x87mm<br>7700.....72x72x97mm | <b>2 - Supply Voltage</b><br>230VAC...230V AC<br>24VAC.....24V AC<br>SM.....9-30V DC /<br>7-24V AC | <b>3 - Modbus Selection</b><br>RSI.....RS-485 Modbus<br>Blank....N/A |
|---|--|--|

## TECHNICAL SPECIFICATIONS



**RoHS**  
Compliant

### ENVIRONMENTAL CONDITIONS

<b>Ambient / Storage Temperature</b>	0 ... +50°C/-25 ... +70°C (with no icing)
<b>Max. relative humidity</b>	80% Relative humidity for temperatures up to 31°C, decreasing linearly to 50% at 40°C.
<b>Rated pollution degree</b>	According to EN 60529 ; Front Panel : IP65, Rear Panel : IP20
<b>Height</b>	Max. 2000m

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

### ELECTRICAL CHARACTERISTICS

<b>Supply</b>	230V AC +%10 -%20, 50/60Hz, 24V AC ±%10, 50/60Hz or 9-30V DC / 7-24V AC ±%10 SMPS
<b>Power Consumption</b>	Max. 5VA
<b>Wiring</b>	Power connection : 2.5mm <sup>2</sup> screw-terminal, Signal connection : 1,5mm <sup>2</sup> screw-terminal connections
<b>Data Protection</b>	EEPROM (Min. 10 years)
<b>EMC</b>	EN 61326-1: 2013.
<b>Safety Requirements</b>	EN 61010-1: 2010 (Pollution degree 2, over voltage category II, measurement category I).

### INPUTS

<b>Count inputs CPA, CPB</b>	2 Channels (Max. 50KHz, between 5V and 30V pulses). Can be selected as PNP and NPN input.
<b>Counting frequency (Hz)</b>	Can be programmed to 20hz, 50hz, 100Hz,500hz, 1000hz, 5000hz, 10KHz,20KHz, 30KHz and 40KHz.
<b>Reset Input</b>	PNP : Positive Reset (Can be adjusted between 1ms and 100ms for 5V and 30V pulses). NPN : GND terminal can be reset by connecting to "RESET IN" terminal.

### OUTPUTS

<b>Control Output (OUT1 and OUT2)</b>	Relay : 250V AC, 2A (for resistive load), NO
<b>SSR1 and SSR2 Output</b>	Open collector output (S.S. OUT) : Max. 30V DC, 50mA
<b>Sensor (Auxiliary) Supply Output</b>	12V DC, Max. 50mA (without regulation)
<b>Life expectancy for relay</b>	Mechanical 5.000.000 operation; 200.000 operation at 250V AC, 2A resistive load.
<b>Accuracy</b>	± % 0.01 ± 1ms

Note : "Relay" and "S.S.OUT" outputs runs simultaneously. i.e, When "OUT1" or "OUT2" relay is operated, "SSR1" or "SSR2" transistor is activated.

### HOUSING

<b>Housing Type</b>	Suitable for flush-panel mounting according to DIN 43 700.
<b>Dimensions</b>	ECH4400 : G48xY48xD87mm, ECH7700 : G72xY72xD97mm.
<b>Weight</b>	Approx. 230g (after packing)
<b>Enclosure Material</b>	Self extinguishing plastics

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



SİSEL MÜHENDİSLİK ELEKTRONİK SAN. VE TİC. A.Ş.  
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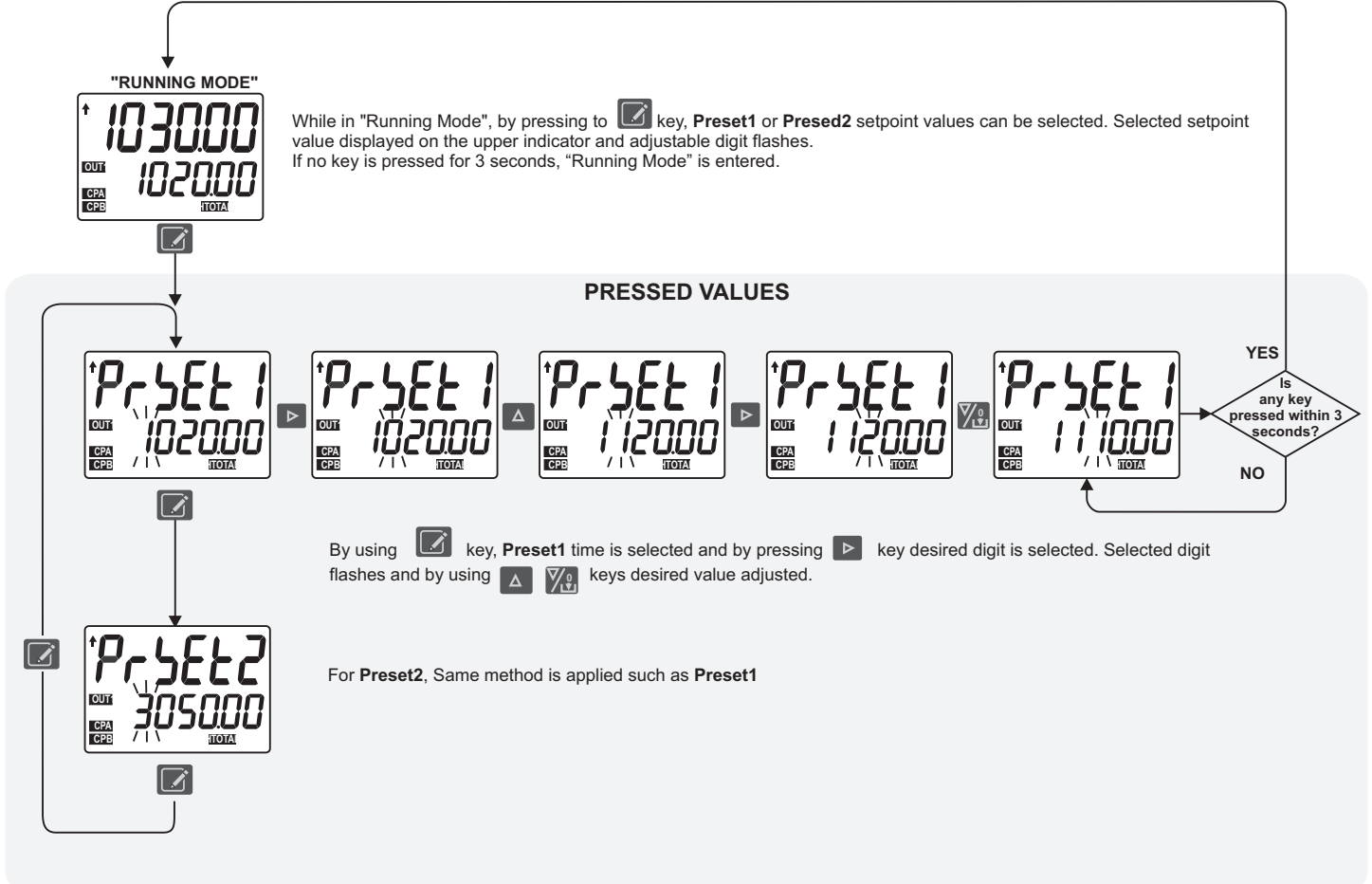
# TERMS



In counter mode, if the Total Counter is active and this key is pressed during "Running Mode", Total Counter value can be displayed.

(1) Counting Direction	Up / Down arrows (same as PV indicator color)
(2) Output status indicators	Two pieces (same as SV indicator color)
(3) Signal inputs status indicators	Two pieces (same as SV indicator color)
(4) PV Indicators	7 segment, 6 digits. LCD indicator colors can be selected as red, green and orange. (Character height 10 mm).
(5) PV Indicators	7 segment, 6 digits. LCD indicator colors can be selected as red, green and orange. (Character height 7 mm).
(6) Device status indicators	Six pieces (same as SV indicator color)
(7) Keypad	Micro switch

## SETTING UP PRESET VALUES



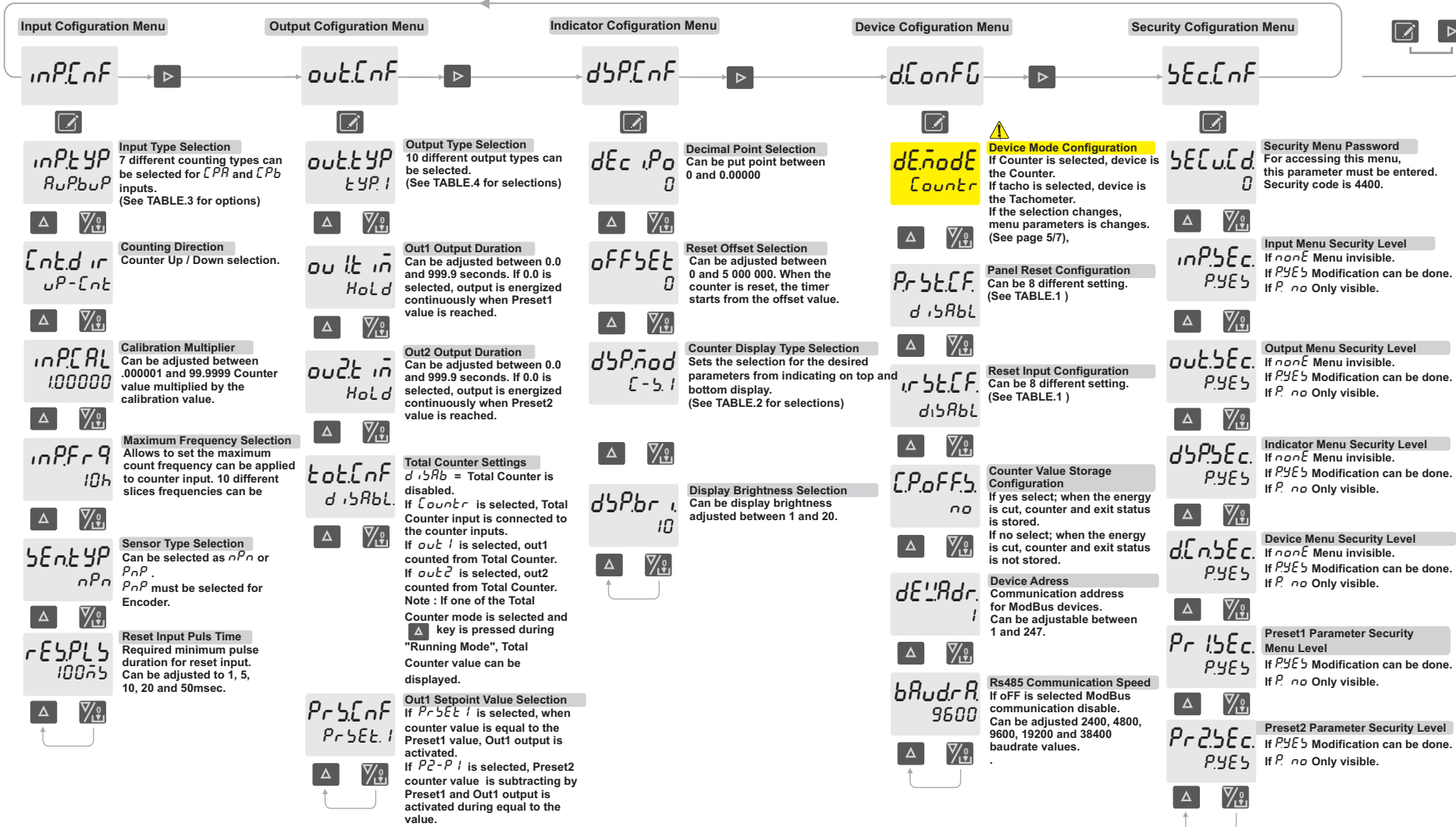
## COUNTER SETTINGS

⚠ If *dEñodE* parameter is selected as *Counter*, following parameters will be activated.

If key is pressed while holding key, "Programming Mode" is entered.

Accessing to "Running Mode" from "Programming Mode":

if no key is pressed within 20 seconds, during "Programming Mode", data is stored automatically and "Running Mode" is entered. Alternatively, the same function occurs first pressing key and "Programming Mode" is entered. Then keys are pressing together, data is recorded and "Running Mode" is entered.



**TABLE.1**  
Reset Configuration Table:

Parameter Message	action to be taken
0 d5RbL	Reset is not done
1 C-r	Counter Reset On
2 t-r	Total Reset On
3 b-r	Batch Reset On
4 Ct-r	Counter and Total Reset On
5 Cb-r	Counter and Batch Reset On
6 t.b-r	Total and Batch Reset On
7 Ct.b-r	Counter, Total and Batch Reset On

**TABLE.2**  
Parameter selection table

d5Pñod"R value	Parameter Message	UPPER Display	Lower Display
0	C-5.1	Counter	SET1
1	C-5.2	Counter	SET2
2	C-b	Counter	Batch
3	b-5.1	Batch	SET1
4	b-5.2	Batch	SET2
5	t.b-tL	Total H	Total L

**Attention!!**  
 \* If Batch counter mode is not selected, mode 2, mode 3 and mode 4 can not be selected  
 \* If the Total Counter is disabled, mode 5 can not be selected.  
 \* If one of the Total Counter mode is selected and mode 5 is not selected, by pressing key during "Running Mode", Total Counter value can be displayed.  
 \* While Total Counter displayed, by pressing key, Total Counter value can be reset.

### PARAMETER SETTINGS



If held down key, left two digits of selected parameter flashes and by using keys, desired values can be adjusted. By using key, desired other digits can be adjusted. key desired value can be adjusted as described above. If selected parameter decimal point is adjustable, when selecting digit appears in the screen -dP. When this message appears in the display, by using keys, desired decimal point value can be adjusted.  
 If key is pressed and held 0.6 seconds, the value of the selected parameter increases rapidly. If waited enough, the value increases a hundred at each step. After 1 second, following the release of the key, initial increasing

**TABLE.3**

**COUNTER INPUT TYPE TABLE**

	$uP-Cnt$	$Cntd\ ir$	$dn-Cnt$
<b>0</b> $RuPbuP$			
<b>1</b> $RuPbGt$			
<b>2</b> $RuPbdn$			
<b>3</b> $inPtYp$			
<b>4</b> $uPdnP1$			
<b>5</b> $uPdnP2$			
<b>6</b> $uPdnP4$			

**Attention:** The maximum value of the input frequency can be one half of the selected value

**Attention:** The maximum value of the input frequency can be 1/3 of the selected value (imp. Freq.)

NOTE: 1

**INPUT TYPE**

Input Symbol	NPN input (Voltage input no)	PNP input (Voltage input)
H	input short circuit	4,5V - 30V DC
L	input open circuited	0V - 2V DC



Input frequency must not exceed the specified value. If input frequency exceed the specified value, the device does not make accurate count.

**TABLE.4**

**COUNTER OUT TYPE TABLE**

	UP COUNTER $inPtYp = RuPbuP, RuPbGt$ $Cntd\ ir = uP-Cnt$	DOWN COUNTER $inPtYp = RuPbuP, RuPbGt$ $Cntd\ ir = dn-Cnt$	UP/ DOWN COUNTER $inPtYp = RuPbdn, RuPbd, uPdnP1$ $uPdnP2, uPdnP4$	UP / DOWN COUNTER $inPtYp = RuPbdn, RuPbd, uPdnP1$ $uPdnP2, uPdnP4$
<b>0</b> $outLYP$				
<b>1</b> $outLYP$				
<b>2</b> $outLYP$				
<b>3</b> $outLYP$				
<b>4</b> $outLYP$				
<b>5</b> $outLYP$				
<b>6</b> $outLYP$				
<b>7</b> $outLYP$				
<b>8</b> $outLYP$				
<b>9</b> $batch$				

While *batch* counter mode is selected, decimal point is invisible.

Because, *Prset2* and *batch* values are integer.

■ If *ou1t in* and *ou2t in* is adjusted between 0.01 and 999.9 sec. pulse output is obtained

□ If *ou1t in* and *ou2t in* is adjusted between 0.0 and 999.9 sec. continuous output is obtained.

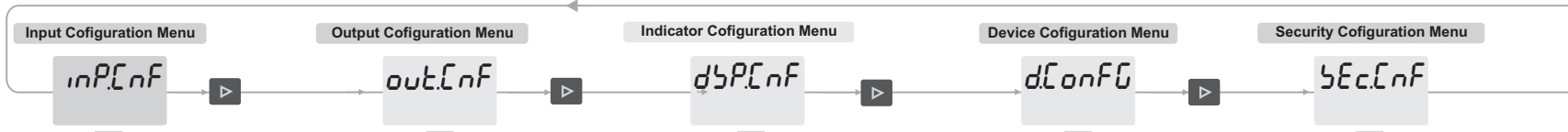
# REV/SPEED MEASURING MODE PROGRAMMING DIAGRAM

⚠ If *dEnodE* parameter is selected as *tRcho*, following parameters will be activated.

Accessing to "Running Mode" from "Programming Mode" :

If no key is pressed within 20 seconds, during "Programming Mode", data is stored automatically and "Running Mode" is entered. Alternatively, the same function occurs first pressing key and "Programming Mode" is entered. Then keys are pressing together, data is recorded and "Running Mode" is entered.

If key is pressed while holding key, "Programming Mode" is entered.



**Input Configuration Menu**

**inPtYP**  
tRcho  
TACH

**Input Type Selection**  
For *CPA* and *CPb* inputs, 9 different counting types can be selected. (See TABLE.8 for Selections)

**Measurement Time Unit Selection**  
Time unit will be changed according to selected input type. (See TABLE.5 for Selections)

**Minimum Pulse and Void Time**  
Can be selected durations minimum applied for signal inputs. If valid pulse time is from smaller applied time, error message appears on the screen. (See TABLE.6 for Selections)

**Minimum Sample Time**  
Sampling time, measurement the value resumption determine. Adjusted between 0.20 and 20.00 sec.

**Maximum Sample Time**  
Setting maximum time. If the signal period is greater from the maximum sample time, error message appears on the screen. Adjusted between 5.99 and 99.99 sec.

**Calibration Multiplier**  
Can be adjusted between 0.00001 and 99.9999 Counter value multiplied by the calibration value.

**Sensor Type Selection**  
Can be selected as *nPN* or *PnP*. For encoder *PnP* must be selected.

**Reset Input Puls Time**  
Required minimum pulse duration for reset input. Can be adjusted to 1, 5, 10, 20 and 50 msec.

**Output Configuration Menu**

**outtYP**  
oILo2L  
TACH

**Output Type Selection**  
8 different output types can be selected. (See TABLE.9 for Selections)

**Out1 Output Duration**  
Can be adjusted between 0.0 and 999.9 seconds. If 0.0 is selected, output is energized continuously when Preset1 value is reached.

**Out2 Output Duration**  
Can be adjusted between 0.0 and 999.9 sec. If 0.0 is selected, output is energized continuously when Preset2 value is reached.

**Out1 Delay Time Selection**  
Can be adjusted between 0.0 and 99.99 sec. If Out1 is activated, Out1 output activation is delayed until Out1 time.

**Out2 Delay Time Selection**  
Adjusted between 0.0 and 99.99sec. If Out2 is activated, Out2 output activation is delayed until Out2 time.

**Out1 Setpoint Value Selection**  
If *Pr5Et 1* is selected, when counter value is equal to the Preset1 value, Out1 output is activated. If *P2-P 1* is selected, Preset2 counter value is subtracting by Preset1 and Out1 output is activated during equal to the value.

**Indicator Configuration Menu**

**dEc.iPo**  
0  
TACH

**Decimal Point Selection**  
Can be put point between 0 and 0.00000

**Counter Display Type Selection**  
Sets the selection for the desired parameters from indicating on top and bottom display. (See TABLE.2 for Selections)

**Display Brightness Selection**  
Can be display brightness adjusted between 1 and 20.

**Device Configuration Menu**

**dEnodE**  
tRcho  
TACH

**Device Configuration Mode**  
If *Counter* is selected, device is the Counter. If *tRcho* is selected, device is the Tachometer. If the selection changes, menu parameters is changes. (See page 3/7),

**Panel Reset Configuration**  
If *no* is selected, panel can not be reset. If *YE5* is selected, panel can be reset.

**Reset Input Configuration**  
If *no* is selected, from reset input can not be reset. If *YE5* is selected, from reset input can be reset.

**Counter Value Storage Configuration**  
If yes select; when the energy is cut, counter and exit status is stored. If no select; when the energy is cut, counter and exit status is not stored.

**Device Address**  
Communication address for ModBus devices. Can be adjustable between 1 and 247.

**Rs485 Communication Speed**  
If *oFF* is selected, ModBus communication is disable. Can be adjusted 2400, 4800, 9600, 19200 and 38400 baudrate values.

**Security Configuration Menu**

**SEcULd**  
0  
TACH

**Security Menu Password**  
For accessing this menu, this parameter must be entered. Security code is 4400.

**Input Menu Security Level**  
If nonE Menu invisible. If P.YEs Modification can be done. If P. no Only visible.

**Output Menu Security Level**  
If nonE Menu invisible. If P.YEs Modification can be done. If P. no Only visible.

**Indicator Menu Security Level**  
If nonE Menu invisible. If P.YEs Modification can be done. If P. no Only visible.

**Device Menu Security Level**  
If nonE Menu invisible. If P.YEs Modification can be done. If P. no Only visible.

**Preset1 Parameter Security Menu Level**  
If P.YEs Modification can be done. If P. no Only visible.

**Preset2 Parameter Security Level**  
If P.YEs Modification can be done. If P. no Only visible.

**TABLE.5**  
Measurement Time Unit Selection Table

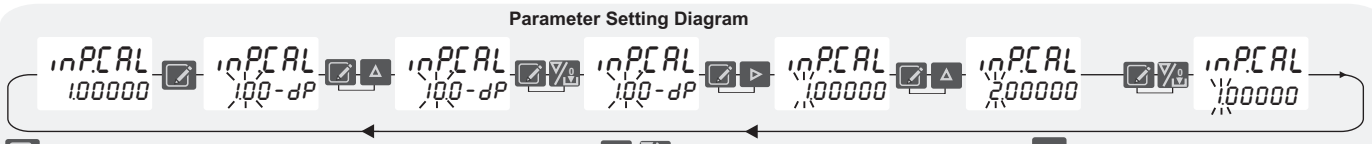
tEnBR value	Parameter message	Explanation	inPtYP
0	rP5Ec	Puls in 1 second	tRcho
1	rP5in	Puls in 1 minute	iL2rR
2	rPhour	Puls in 1 hour	iL2
0	rP5Ec	meter / second	L n5Pd
1	rP5in	meter / minute	
2	rPhour	metre / hour	
0	rnc5Ec	microseconds	PERiod
1	rL5Ec	milliseconds	tEnBR
2	100ns	100 milliseconds	PL5t n

**TABLE.6**  
Minimum Pulse Void Time Selection Table

PL5t n value	Parameter message	Explanation
0	40ns	40 msec
1	20ns	20 msec
2	10ns	10 msec
3	1ns	1 msec
4	0.5ns	0.5 msec
5	0.1ns	0.1 msec
6	0.05ns	0.05 msec
7	0.02ns	0.01 msec

**TABLE.7**  
Parameter Selection Table to Display

d5Pnod value	Parameter message	UPPER Display	LOWER Display
0	P-5.1	Measuring	SET1
1	P-5.2	Measuring	SET2
2	P-R5.1	Measuring	On SET1
3	P-tP	Measuring	Total Rev
4			
5			



If held down key, left two digits of selected parameter flashes and by using keys, desired values can be adjusted. By using key, desired other digits can be adjusted and key desired value can be adjusted. If selected parameter decimal point is adjustable, when selecting digit appears in the screen -dP. When this message appears, by using keys, desired decimal point value can be adjusted.

If key is pressed and held 0.6 seconds, the value of the selected parameter increases rapidly. If waited enough, the value increases a hundred at each step. After 1 second, following the release of the key, initial increasing

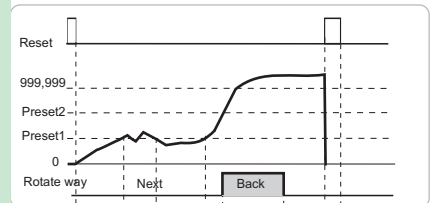
**TABLE.8 PULSE MEASUREMENT INPUT TYPE TABLE**

**TABLE.9 PULSE MEASURED OUTPUTS TYPE TABLE**

<p><b>0</b> Pulse Measurement Method (rps: pulse/second, rpm: pulse/minute, rph: pulse/hour)</p> <p>CPA input </p> <p>CPB(HOLD)input </p> <p>Process value <math>\dot{r} = \frac{r}{60} \cdot n</math></p> <p>Previous value (Calibration/T1x60) rpm (Calibration/T2x60) rpm (Calibration/T3x60) rpm</p> <p>Attention: Pulse and void times input signal appropriate must be selected.</p>	<p><b>1</b> Phase Difference Input Pulse Measurement Method (rps: pulse/second, rpm: pulse/minute, rph: pulse/hour) Direction Indicator</p> <p>CPA Input </p> <p>CPB Input </p> <p>Process value <math>\dot{r} = \frac{r}{60} \cdot n</math></p> <p>Previous value (Calibration/T1x60) rpm (Calibration/T2x60) rpm (Calibration/T3x60) rpm</p> <p>Attention: Pulse and void times input signal appropriate must be selected.</p>								
		<p><b>2</b> CPA With CPB Inputs Puls Rate Finding Method</p> <p>CPA input </p> <p>CPB input </p> <p>Process value <math>\frac{1}{T_a} / \frac{1}{T_b}</math></p>	<p><b>3</b> Speed Measurement Method ( m/s : meter / second, m/m : meter / minute, m/h : meter / hour) Can Be Selected</p> <p>CPA input </p> <p>CPB input </p> <p>Process value <math>\frac{\text{Calibration value}}{T_1} \text{m/s}</math> <math>\frac{\text{Calibration value}}{T_2} \text{m/s}</math> <math>\frac{\text{Calibration value}}{T_3} \text{m/s}</math></p> <p>Attention: Pulse and void times input signal appropriate must be selected.</p>						
				<p><b>4</b> Period Measurement Method</p> <p>CPA input </p> <p>CPB(HOLD)input </p> <p>Process value <math>\frac{T_1+T_2+\dots+T_n}{n}</math></p> <p>Attention: Pulse and void times input signal appropriate must be selected.</p>	<p><b>5</b> Time Difference Measurement Method</p> <p>CPA input </p> <p>CPB input </p> <p>Process value <math>T_1</math> <math>T_2</math> <math>T_3</math></p> <p>Attention: Pulse and void times input signal appropriate must be selected.</p>				
						<p><b>6</b> Puls Width Measurement Value</p> <p>CPA input </p> <p>CPB(HOLD)input </p> <p>Process Value <math>T_1</math> <math>T_2</math> <math>T_4</math></p> <p>Attention: Pulse and void times input signal appropriate must be selected.</p>	<p><b>7</b> Pulse Census Method</p> <p>CPA input </p> <p>CPB input </p> <p>RESET IN input </p> <p>Process value <math>\text{Previous value}</math> <math>\text{counting value: 9}</math> <math>\text{sayma değeri: 10}</math> SIFIR</p> <p>Attention: Pulse and void times input signal appropriate must be selected. ( Counting values Calibration = for 1 )</p>		
								<p><b>8</b> Pulse Census Method</p> <p>CPA input </p> <p>CPB input </p> <p>RESET IN input </p> <p>Process value <math>\text{Previous value}</math> <math>\text{counting value: 9}</math> <math>\text{counting value: 13}</math> ZERO</p> <p>Attention: Pulse and void times input signal appropriate must be selected. ( Counting values Calibration = for 1 )</p>	<p><b>9</b> CHA with CHB Inputs Pulse Difference Finding Method</p> <p>CPA input </p> <p>CPB input </p> <p>Process value <math>\frac{1}{T_a} - \frac{1}{T_b} \times 60 \text{ rpm}</math> <math>\frac{1}{T_a} - \frac{1}{T_b} \times 60 \text{ rpm}</math> <math>\frac{1}{T_a} - \frac{1}{T_b} \times 60 \text{ rpm}</math></p> <p><b>ATTENTION!</b> If this method selected, measured pulse from CPA input must be greater or equal from CPB inputs pulse. If CPA small CPB; <math>\text{inPULb}</math> this error message is visible.</p>

<p><b>0</b> </p> <p><b>1</b> </p> <p><b>2</b> </p> <p><b>3</b> </p>	<p><b>4</b> </p> <p><b>5</b> </p> <p><b>6</b> </p> <p><b>7</b> </p>		
		<p><b>0</b> </p> <p><b>1</b> </p> <p><b>2</b> </p> <p><b>3</b> </p>	<p><b>4</b> </p> <p><b>5</b> </p> <p><b>6</b> </p> <p><b>7</b> </p>

**!** If  $\text{inPULYP} = \text{tRcd ir}$  is selected, following output types will be activated.

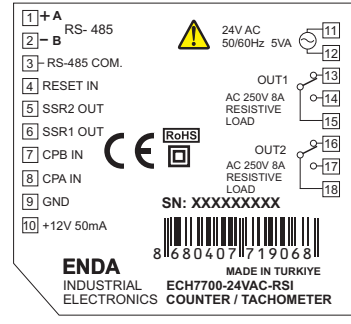
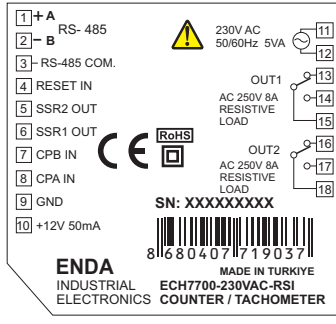
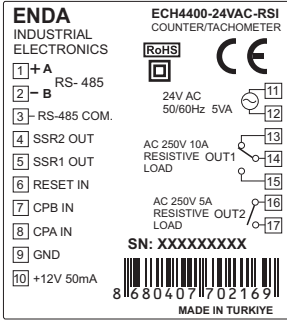
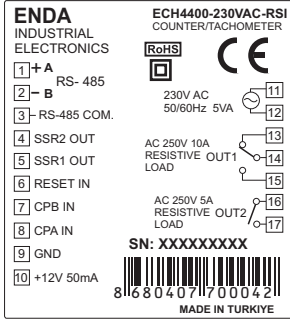


■ If  $\text{ou} \text{lt} \dot{r}$  and  $\text{ou} \text{2} \dot{r}$  is adjusted between 0.01 and 999.9 sec. pulse output is obtained.

□ If  $\text{ou} \text{lt} \dot{r}$  and  $\text{ou} \text{2} \dot{r}$  is adjusted between 0.0 sec. (Hold) continuous output is obtained.

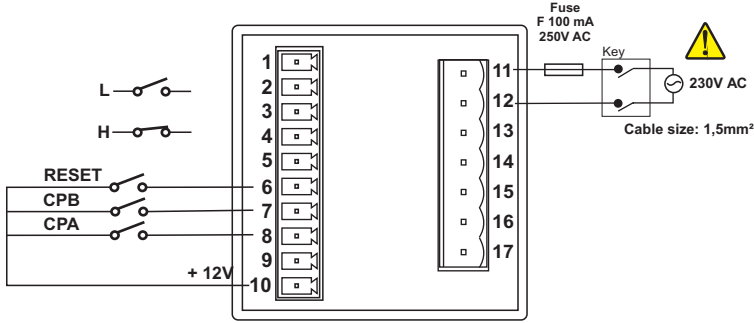
$\text{ou} \text{ldt} \dot{r}$  and  $\text{ou} \text{2} \text{d} \dot{r}$  is adjusted between 0.0 and 999.9 sec. Output delayed of until adjusted time . When set 0 output is instantly taken

# CONNECTION DIAGRAM

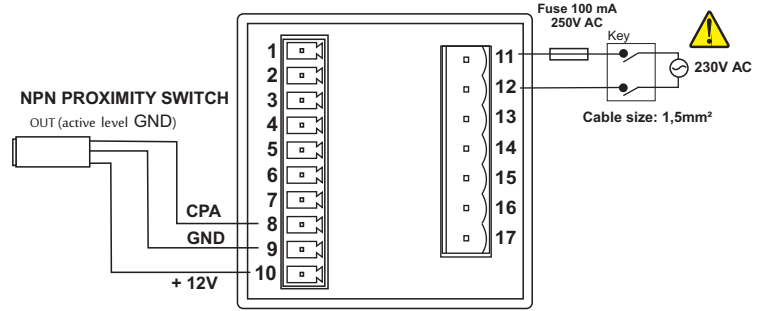
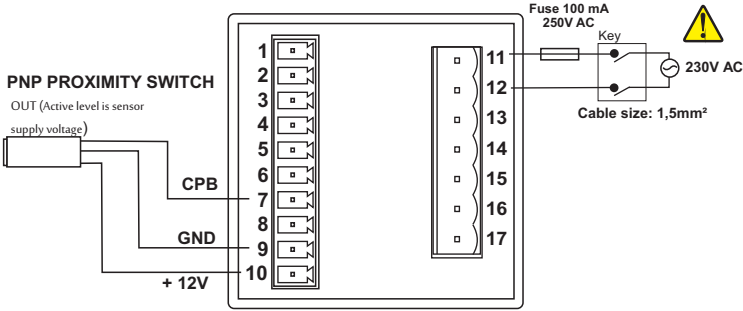
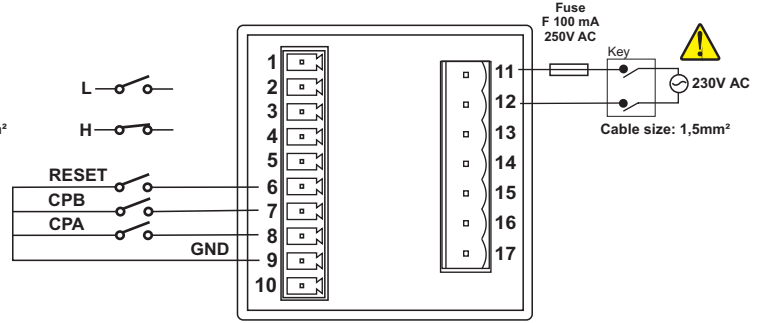


## SENSOR CONNECTION SAMPLES

Connection samples for PNP sensor type



Connection samples for NPN sensor type



Logic output of the device is not electrically isolated..

**Note :** 1) Mains supply cords shall meet the requirements of IEC60227 or IEC60245.

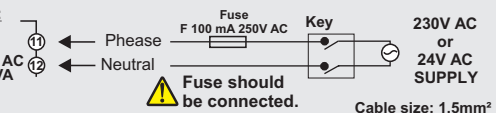
2) In accordance with the safety regulations, the power supply switch shall bring the identification of the relevant instrument and it should be easily accessible by the operator.

Holding screw 0.4-0.5Nm

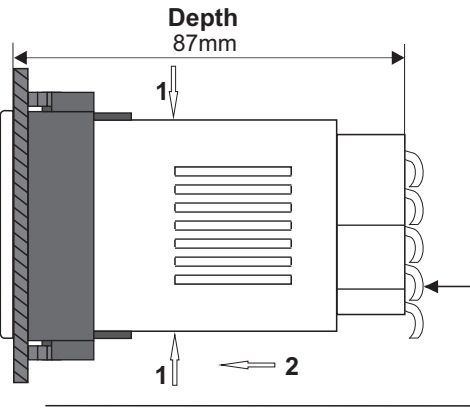
Equipment is protected throughout by DOUBLE INSULATION.

### NOT :

**SUPPLY :**  
230V AC  
or  
21.6-26.4V AC  
50/60Hz 5VA



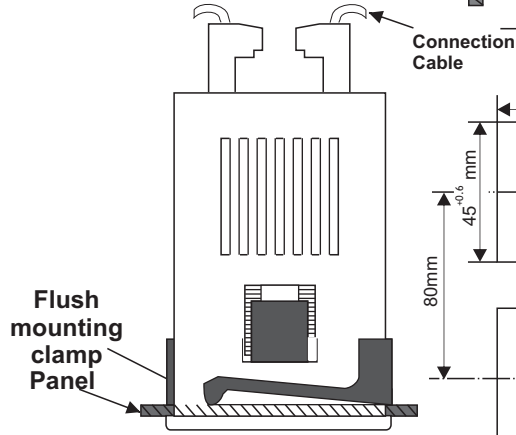
**DIMENSIONS:**



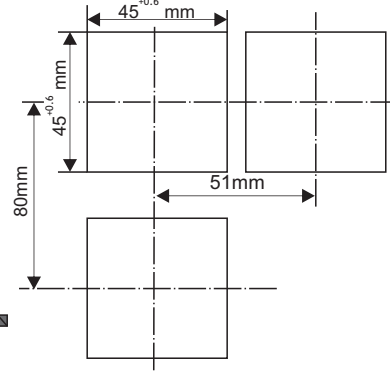
- Push the device in direction 1 as shown in the figure.
- Then pull out the device in direction 2 .

**NOTE:**

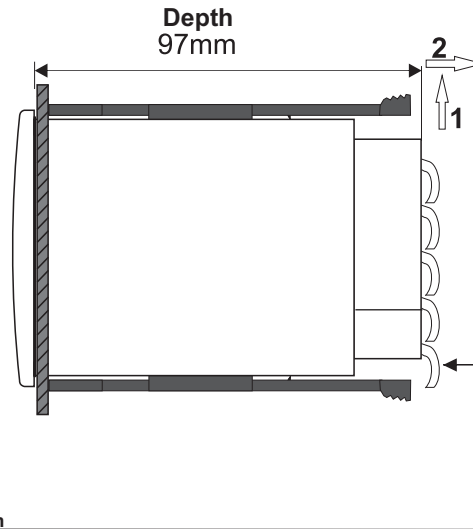
- 1) While performing panel mounting, additional space should be allocated for cables.
- 2) Panel thickness should be maximum 9mm.
- 3) If there is no 100mm free space at back side of the device, it would be difficult to remove it from the panel.



**ECH4400**



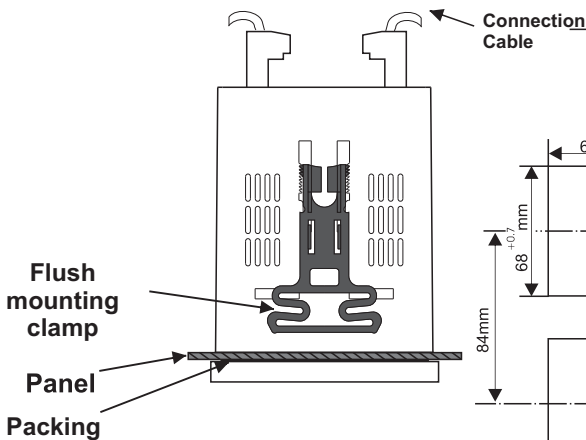
**ENDA ECH** is intended for installation within control panels. Make sure that the device is used only for intended purpose. The shielding must be grounded on the instrument side. During an installation, all of the cables that are connected to the device must be free of electrical power. The device must be protected against inadmissible humidity, vibrations, severe soiling. Make sure that the operation temperature is not exceeded. All input and output lines that are not connected to the supply network must be laid out as shielded and twisted cables. These cables should not be close to the power cables or components. The installation and electrical connections must be carried out by a qualified staff and must be according to the relevant locally applicable regulations.



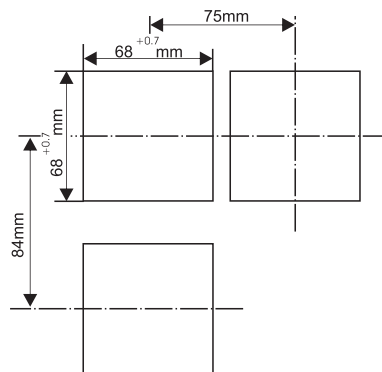
- Push the device in direction 1 as shown in the figure.
- Then pull out the device in direction 2 .

**NOTE:**

- 1) While performing panel mounting, additional space should be allocated for cables.
- 2) Panel thickness should be maximum 9mm.
- 3) If there is no 100mm free space at back side of the device, it would be difficult to remove it from the panel.



**ECH7700**





# ENDA ECHxx00 COUNTER/TACHOMETER MODBUS ADDRESS MAP

## 1.1 Counter/Tachometer Memory Map for Timer Holding Registers

Parameter Number	Holding Register Address Decimal (Hex)	Data Type	Data Content	Read /Write Permissions	Factory Settings		
Counter/Tachometer Configuration Parameters	H0	0000d (0000h)	Dword	Setpoint for Preset1 value. (Adjustable between 0-999999d. Format :32 Bit Hex = 0-999999d) First word LSW, second word MSW Sample: Adjusting for 550000d (86470h); LSW = 6470h, MSW = 0008h	R W	100000	
	H2	0002d (0002h)	Dword	Setpoint for Preset2 value. (Format must be as in the H0 parameter)	R W	200000	
	H4	0004d (0004h)	Word	Counter input type selection. (See TABLE.3 for adjustment)	R W	0	
	H5	0005d (0005h)	Word	Counter input frequency selection. 0 = 20Hz, 1 = 50Hz, 2 = 100Hz, 3 = 500Hz, 4 = 1000Hz, 5 = 5Khz 6 = 10Khz, 7 = 20Khz, 8 = 50Khz, 9 = 80Khz	R W	0	
	H6	0006d (0006h)	Word	Counter counting direction selection. 0 = Up counting, 1 = Down counting	R W	0	
	H7	0007d (0007h)	Word	Sensor type selection. 0 = NPN, 1 = PNP	R W	0	
	H8	0008d (0008h)	Word	Reset input pulse time selection. 0 = 1ms, 1 = 5ms, 2 = 20ms, 3 = 50ms, 4 = 100ms	R W	0	
	H9	0009d (0009h)	Dword	Setpoint for Calibration. (Adjustable between Format :32 Bit BCD = 1-999999) First word LSW second word MSW Sample: Adjustable between 150000 BCD (0150000h); LSW = 0000h, MSW = 0150h	R W	100000	
	H11	0011d (000Bh)	Word	Decimal point selection for Calibration. (0 = .000000, 1 = 0.00000, 2 = 00.0000)	R W	1	
	H12	0012d (000Ch)	Word	Tachometer input type selection. (See TABLE.8 for adjustment )	R W	0	
	H13	0013d (000Dh)	Word	Tachometer time base selection. (See TABLE.5 for setting )	R W	0	
	H14	0014d (000Eh)	Word	Tachometer pulse time selection. (See TABLE.6 for adjustment )	R W	3	
	H15	0015d (000Fh)	Word	Tachometer sampling time selection. Selectable between 0.20 s with 20.0 s.	R W	50	
	H16	0016d (0010h)	Word	Tachometer maximum sample time selection. Selectable between H8 and 99.99 s	R W	200	
	H17	0017d (0011h)	Word	Counter output type selection. ( See TABLE.4 for adjustment )	R W	0	
	Output Parameters	H18	0018d (0012h)	Word	Total Counter configuration selection. 0 = Total Counter disable, 1 = Counter input connects: Total Counter 2 = OUT1 output connects: Total Counter, 3 = OUT2 output connects: Total Counter	R W	0
		H19	0019d (0013h)	Word	Setpoint value selection for OUT1 0 = Preset1 OUT1 output value, 1 = Preset2 - Preset1 OUT1 output value	R W	0
H20		0020d (0014h)	Word	OUT1 output time setting. Adjustable between 0.0 and 999.9 sec. 0= continuously activated	R W	0	
H21		0021d (0015h)	Word	OUT2 output time setting. Adjustable between 0.0 and 999.9 sec. 0= continuously activated	R W	0	
H22		0022d (0016h)	Word	Tachometer output type select (See TABLE.9 for adjusment )	R W	0	
H23		0023d (0017h)	Word	Tachometer OUT1 output delay time. Adjustable between 0.0 and 999.9 sec.	R W	0	
H24		0024d (0018h)	Word	Tachometer OUT2 output delay time. Adjustable between 0.0 and 999.9 sec.	R W	0	
Display Configuration Parameters		H25	0025d (0019h)	Dword	Decimal point selection parameter. 0 = Decimal point no, 1 = 0.0 , 2 = 0.00 , 3 = 0.000, 4 = 0.0000, 5 = 0.00000	R W	10
	H27	0027d (001Bh)	Word	Offset value (Format must be as in the H0 parameter)	R W	0	
	H28	0028d (001Ch)	Word	Counter display configuration selection. (See TABLE.2 for adjustment )	R W	0	
	H29	0029d (001Dh)	Word	Tachometer display configuration selection. (Seen TABLE.7 for adjustment )	R W	0	
	H30	0030d (001Eh)	Word	Display brightness setting parameter. Adjustable between 1 and 20 .	R W	10	
	H31	0031d (001Fh)	Word	Counter/Tachometer selection parameter.( 0 = Counter mode, 1 = Tachometer mode ).	R W	0	
	H32	0032d (0020h)	Word	Counter panel reset configuration selection. (See TABLE.1 for adjusment )	R W	0	
Device Configuration	H33	0033d (0021h)	Word	Counter reset input configuration selection. (See TABLE.1 for adjusment )	R W	0	
	H34	0034d (0022h)	Word	Tachometer panel reset configuration selection. (0 = No, 1 = Yes )	R W	0	
	H35	0035d (0023h)	Word	Tachometer reset input configuration selection. (0 = No, 1 = Yes )	R W	0	
	H36	0036d (0024h)	Word	When the energy is cut, measurement value stored. (0 = No, 1 = Yes )	R W	0	
	H37	0037d (0025h)	Word	Device address value for Modbus (Adjustable between 1 and 247)	R W	1	
	H38	0038d (0026h)	Word	Connection speed for Modbus: 0 = 1200 bps, 1 = 2400 bps, 2 = 4800 bps, 3 = 9600 bps, 4 = 14400 bps, 5 = 19200 bps, 6 = 38400 bps, 7 = 57600 bps	R W	3	
Security Parameters	H39	0039d (0027h)	Word	Counter/Tachometer configuration menu security parameter. Adjustable between 0 and 2. 0 = Menu invisible, 1 = Menu parameters is programmable, 2 = Menu parameters is only visible	R W	1	
	H40	0040d (0028h)	Word	Output parameters menu security parameter. Adjustable between 0 and 2 0 = Menu invisible, 1 = Menu parameters is programmable, 2 = Menu parameters is only visible	R W	1	
	H41	0041d (0029h)	Word	Display configuration menu security parameter. Adjustable between 0 and 2 0 = Menu invisible, 1 = Menu parameters is programmable, 2 = Menu parameters is only visible	R W	1	
	H42	0042d (002Ah)	Word	Device configuration menu security parameter. Adjustable between 0 and 2 0 = Menu invisible, 1 = Menu parameters is programmable, 2 = Menu parameters is only visible	R W	1	
	H43	0043d (002Bh)	Word	Preset 1 (H0) parameter security parameter. Adjustable between 1 and 2 1 = Menu parameters is programmable, 2 = Menu parameters is only visible	R W	1	
	H44	0044d (002Ch)	Word	Preset 2 (H2) parameter security parameter. Adjustable between 1 and 2 1 = Menu parameters is programmable, 2 = Menu parameter is only visible	R W	1	
	H45	0045d (002Dh)	Word	Function control parameter If ( 23040d ( 5A00h ) value is entered, device is returned to factory settings. If 23041d ( 5A01h ) value is entered, must be reset according to H33 value. If 23042d ( 5A02h ) value is entered, counting value is reset. If 23043d ( 5A03d ) value is entered, Total Counter reset If 23044d ( 5A04h ) value is entered, Batch counter reset If 23045d ( 5A05h ) value is entered, Tachometer values is reset	R W	0	

## ENDA ECHxx00 COUNTER/TACHOMETER MODBUS ADDRESS MAP

### 1.2 Memory Map For Input Registers

Parameter Number	Input Register address Decimal (Hex)	Data Type	Data Content	Read / Write Permission
<b>10</b>	0000d (0000h)	Dword	Counter counting values ( <b>Format :32 Bit Hex = Adjustable between -999999 and 999999d</b> ) First word LSW, second word MSW Sample: Reading value for 550000d (86470h); LSW = 6470h, MSW = 0008h.	R
<b>12</b>	0002d (0002h)	Dword	Batch counter counting value ( <b>Format :32 Bit Hex = Adjustable 0 and 999999d</b> ) First word LSW, second word MSW Sample: If reading value is 550000d (86470h); LSW = 6470h, MSW = 0008h	R
<b>14</b>	0004d (0004h)	Dword	Total Counter counting value ( <b>Format :32 Bit Hex = Adjustable between -999,999,999 and 999,999,999d</b> ) First word LSW, second word MSW	R
<b>16</b>	0006d (0006h)	Dword	Counter hold value ( <b>Format is as in the I0 input register</b> )	R
<b>18</b>	0008d (0008h)	Dword	Active Preset1 value ( <b>Format is as in the I2 input register</b> )	R
<b>110</b>	0010d (000Ah)	Dword	Tachometer measurement value ( <b>Format is as in the I2 input register</b> )	R
<b>112</b>	0012d (000Ch)	Dword	CPA pulse value ( <b>Format is as in the I2 input register</b> )	R
<b>114</b>	0014d (000Eh)	Dword	CPB pulse value ( <b>Format is as in the I2 input register</b> )	R

## ENDA ECHxx00 COUNTER/TACHOMETER MODBUS ADDRESS MAP

### 1.3 Memory Map for Input Registerlers

Parameter Number	Holding Register addresses Decimal (Hex)	Data Type	Data Content	Read / Write Permission
<b>I0</b>	0000d (0000h)	Word	Timer1 time value ( <b>Must be read according to BCD format</b> )	R
<b>I1</b>	0001d (0001h)	Word	Timer2 time value ( <b>Format is as in the I0 parameter</b> )	R
<b>I2</b>	0002d (0002h)	Word	Out1 pulse time value ( <b>Must be read according to BCD format. Sensitivity 0.00sn</b> )	R
<b>I3</b>	0003d (0003h)	Word	Out2 pulse time value ( <b>Format is as in the I2 parameter</b> )	R

### 1.4 Memory Map for Output Status Indicator Bits

Parameter Number	Discrete input addresses	Data Type	Data Content	Read / Write Permission
<b>D0</b>	(0000)h	Bit	OUT1 Output status (0 = OFF , 1 = ON)	R
<b>D1</b>	(0001)h	Bit	OUT2 Output status (0 = OFF , 1 = ON)	R
<b>D2</b>	(0002)h	Bit	Panel reset key status (0 = Reset key inactive, 1 = Reset key is active)	R
<b>D3</b>	(0003)h	Bit	Reserve	R
<b>D4</b>	(0004)h	Bit	Reset input status (0 = Reset input inactive, 1 = Reset input is active)	R
<b>D5</b>	(0005)h	Bit	Gate input status (0 = Gate input inactive, 1 = Gate input is active)	R
<b>D6</b>	(0006)h	Bit	Start input status (0 = Start input inactive, 1 = Start input is active)	R
<b>D7-D15</b>	0007d (0007h) ..... 0015d (000Fh)	Bit	Reserve	R

### 1.5 Memory Map for Software Revision Input Registers

Software Revision	0920d (0398h)	14 Word	Software name and update date is in ASCII format and 14 word. Example : EM4400-01 28 Feb 2015. Memory Format : <div style="text-align: center;"> <table style="border-collapse: collapse; margin: auto;"> <tr> <td style="font-size: 8px;">Word</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td> </tr> <tr> <td style="font-size: 8px;">C</td><td style="font-size: 8px;">E</td><td style="font-size: 8px;">4</td><td style="font-size: 8px;">4</td><td style="font-size: 8px;">0</td><td style="font-size: 8px;">0</td><td style="font-size: 8px;">-</td><td style="font-size: 8px;">1</td><td style="font-size: 8px;"> </td><td style="font-size: 8px;"> </td><td style="font-size: 8px;"> </td><td style="font-size: 8px;"> </td><td style="font-size: 8px;"> </td><td style="font-size: 8px;"> </td><td style="font-size: 8px;"> </td> </tr> <tr> <td style="font-size: 8px;">4</td><td style="font-size: 8px;">2</td><td style="font-size: 8px;">A</td><td style="font-size: 8px;">g</td><td style="font-size: 8px;">u</td><td style="font-size: 8px;">2</td><td style="font-size: 8px;">1</td><td style="font-size: 8px;">0</td><td style="font-size: 8px;">.</td><td style="font-size: 8px;">6</td><td colspan="5"></td> </tr> </table> </div>	Word	1	2	3	4	5	6	7	8	9	10	11	12	13	14	C	E	4	4	0	0	-	1								4	2	A	g	u	2	1	0	.	6						R
Word	1	2	3	4	5	6	7	8	9	10	11	12	13	14																																			
C	E	4	4	0	0	-	1																																										
4	2	A	g	u	2	1	0	.	6																																								
<b>NOTE :</b> To view each word correctly by changing the byte sequences should be displayed as ASCII TEXT																																																	

## 2. MODBUS ERROR MESSAGES

Modbus protocol has two types error, communication error and operating error. Reason of the communication error is data corruption in transmission. Parity and CRC control should be done to prevent communication error. Receiver side checks parity and CRC of the data. If they are wrong, the message will be ignored. If format of the data is true but function doesn't perform for any reason, operating error occurs. Slave realizes error and sends error message. Most significant bit of function is changed '1' to indicate error in error message by slave. Error code is sent in data section. Master realizes error type via this message.

### ModBus Error Codes

Error Code	Name	Meaning
01	ILLEGAL FUNCTION	The function code received in the query is not an allowable action for the slave. If a Poll Program Complete command was issued, this code indicates that no program function preceded it.
02	ILLEGAL DATA ADDRESS	The data address received in the query is not an allowable address for the slave.
03	ILLEGAL DATA VALUE	A value contained in the query data field is not an allowable value for the slave.

Message example;

Structure of command message (Byte Format)

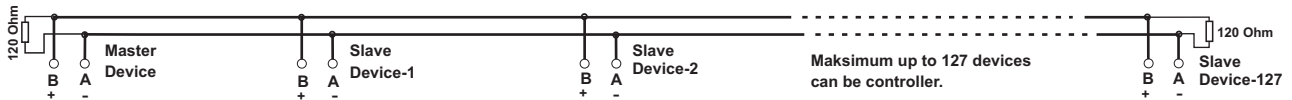
Device Address	(0A)h
Function Code	(01)h
Beginning address of coils.	MSB (04)h
	LSB (A1)h
Number of coils (N)	MSB (00)h
	LSB (01)h
CRC DATA	LSB (AC)h
	MSB (63)h

Structure of response message (Byte Format)

Device Address	(0A)h
Function Code	(81)h
Error Code	(02)h
CRC DATA	LSB (B0)h
	MSB (53)h

As you see in command message, coil information of (4A1)h = 1185 is required but there isn't any coil with 1185 address. Therefore error code with number (02) (Illegal Data Address) sends.

### ModBus CONNECTION SCHEMATICS



Terminations must be added to headline and endline by using 120 ohm resistors.