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 ET1124A RAIL MOUNTED FOUR INPUT PID TEMPERATURE CONTROLLER

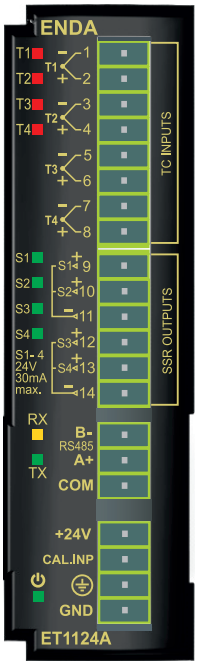
Thank you for choosing **ENDA ET1124A** Rail mounted PID temperature controller.

- DIN Rail Mounting.
- Selectable Dual-set value.
- Selectable TC (J, K, L, T, S, R) or two-wire PT100 sensor (specify at order).
- **Auto calculation for PID parameters (SELF TUNE).**
  - **Selftune for automatic PID calculation or manually enter PID parameters if known.**
- Control outputs can be disabled (Applied for measurement use).
- Four SSR Temperature control outputs.
- Manual controlling feature for SSR outputs.
- Soft-Start feature.
- Communication via RS485 Modbus protocol.
- Heating/Cooling control selection.
- Zero point input shift (Offset feature for input).
- In case of sensor failure, SSR positions can be selected or periodic operation can be performed.
- Can be programmed via Modbus.
- Modbus addressing, baud rate settings or default settings can be applied via DIP Switch.
- Heating error monitoring feature.
- Can be updated via RS485.
- CE Marked according to European Norms.

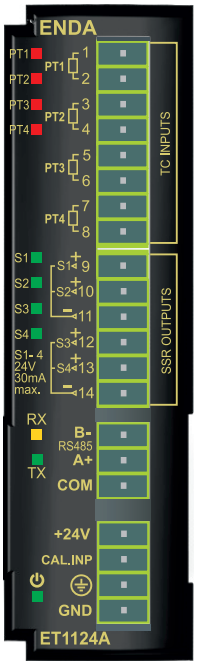
RoHS Compliant

ORDER CODE : ET1124A.....TC Input
ET1124A-RT.....PT100 Input

ET1124A



ET1124A-RT



ENVIRONMENTAL CONDITIONS	
Ambient/storage temperature	0 ... +50°C/-25 ... +70°C (with no icing).
Max. Relative humidity	80% Relative humidity for temperatures up to 31°C, decreasing linearly to 50% at 40°C.
Protection rating	According to EN 60529 IP20.
Height	Max. 2000m.

KEEP AWAY device from exposed to corrosive, volatile and flammable gases or liquids and DO NOT USE the device in similar hazardous locations.

ELECTRICAL CHARACTERISTICS	
Supply	24 VDC 20%.
Power Consumption	Max. 5VA.
Wiring	1.5mm² screw-terminal connections.
Line Resistance	Max. 100Ω Ohm. for thermocouple. Max. 1Ω ohm. for PT100 (Correction should be performed with the offset parameter.).
Data Retention	EEPROM (minimum 10 years).
EMC	EN 61326-1: 2013
Safety Requirements	EN 61010-1: 2010 (Pollution degree 2, overvoltage category II)

INPUTS	
T1...T4 Thermocouple	Four-channel terminal connections. User-defined J, K, L, T, S, R sensor inputs (valid for TC input devices).
PT1...PT4 PT100 Thermocouple	Four-channel terminal connections. PT100 sensor inputs (valid for PT100 input devices).

OUTPUTS	
S1....S4 SSR Control Outputs	Four-channel terminal connections. Short circuit protected SSR control output, 24VDC ±20% , 30mA max.

CONTROL	
Control Type	Single set-point control.
Control Algorithm	On-Off / P, PI, PD, PID (selectable).
A/D Converter	14 bits.
Sampling Time	200ms (Minimum).
Proportional Band	Adjustable between 0% and 100%. If Pb=0%, On-Off control is selected.
Integral Time	Adjustable between 0.0 and 100.0 minutes.
Derivative Time	Adjustable between 0.00 and 25.00 minutes.
Control Period	Adjustable between 1 and 125 seconds.
Hysteresis	Adjustable between 1 and 50°C/F.
Output Power	The ratio of power at the setpoint value can be set between 0% and 100%.

HOUSING	
Housing Type	Rail-mounted box according to DIN 43 700.
Dimensions	W29xH90xD64mm
Weight	Approx. 200g (after packing)
Enclosure Material	Self extinguishing plastics used.

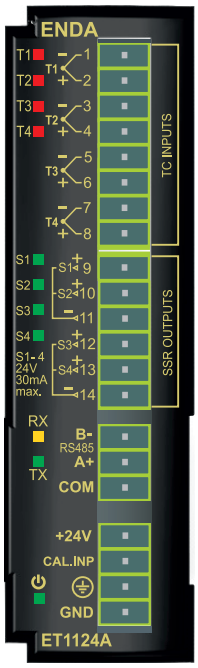
Avoid any liquid contact when the device is switched on.
DO NOT clean the device with solvent (thinner, gasoline, acid etc.) and / or abrasive cleaning agents.

TECHNICAL SPECIFICATIONS

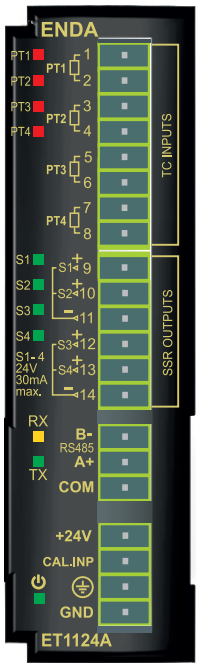
	Input Type		Scale Range		Accuracy
For ET1124A-RT PT100 Devices	PT100 Resistance Thermometer	EN 60751	-199.9...600.0 °C	-199.9...999.9°F	± 0,2% (for full scale) ± 1 digit
	PT100 Resistance Thermometer	EN 60751	-200...600 °C	-328....1112°F	± 0,2% (for full scale) ± 1 digit
For ET1124A TC Devices	J (Fe-CuNi) Thermocouple	EN 60584	-30.0....600.0°C	-22.0....999.9 °F	± 0,5% (for full scale) ± 1 digit
	J (Fe-CuNi) Thermocouple	EN 60584	-30....600°C	-22....1112 °F	± 0,5% (for full scale) ± 1 digit
	K (NiCr-Ni) Thermocouple	EN 60584	-30.0...999.9°C	-22.0....999.9 °F	± 0,5% (for full scale) ± 1 digit
	K (NiCr-Ni) Thermocouple	EN 60584	-30...1300°C	-22....2372 °F	± 0,5% (for full scale) ± 1 digit
	L (Fe-CuNi) Thermocouple	DIN 43710	-30.0....600.0°C	-22.0....999.9 °F	± 0,5% (for full scale) ± 1 digit
	L (Fe-CuNi) Thermocouple	DIN 43710	-30....600°C	-22....1112 °F	± 0,5% (for full scale) ± 1 digit
	T (Cu-CuNi) Thermocouple	EN 60584	-30.0...400.0°C	-22.0....752.0 °F	± 0,5% (for full scale) ± 1 digit
	T (Cu-CuNi) Thermocouple	EN 60584	-30....400°C	-22.....752°F	± 0,5% (for full scale) ± 1 digit
	S (Pt10Rh-Pt) Thermocouple	EN 60584	-40...1700°C	-40....3092°F	± 0,5% (for full scale) ± 1 digit
	R (Pt13Rh-Pt) Thermocouple	EN 60584	-40...1700°C	-40....3092°F	± 0,5% (for full scale) ± 1 digit

T1 (PT1) LED ERROR MESSAGE DESCRIPTIONS

ET1124A

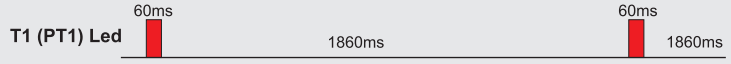


ET1124A-RT

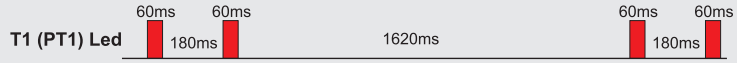


Error LED blinks periodically when an error condition occours. Following charts are created as sample for T1 (PT1) LED indicator. Similar denote is valid for T2 (PT2), T3 (PT3) and T4 (PT4) LEDs according to the relevant Input register parameter.

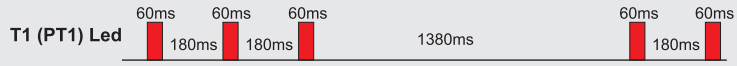
I3 = 1 : Sensor short circuited or temperature too low.
Error LED lights once for 60ms every 1860ms and cycle repeats every 1860ms. LED stops flashing when the error is cleared.



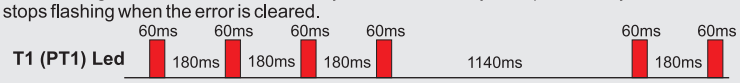
I3 = 2 : Lower scale error.
Error LED lights two times for 60ms every 180ms and the cycle repeats every 1620ms. LED stops flashing when the error is cleared.



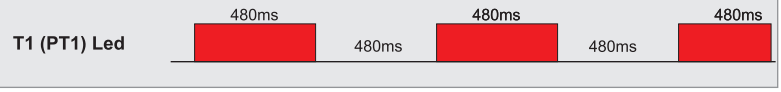
I3 = 3 : Upper scale error.
Error LED lights three times for 60ms every 180ms and the cycle repeats every 1380ms.



I3 = 4 : No communication with the sensor (Sensor not connected or sensor line is faulty).
Error LED lights four times for 60ms every 180ms and the cycle repeats every 1140ms. LED stops flashing when the error is cleared.



I3 = 5 : Output power error.
Error LED blinks each 480ms and the cycle repeats every 480ms.



CONNECTION DIAGRAM

ENDA ET1124A devices are intended for rail mounted installations. 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.

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.

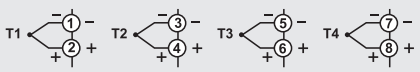
The logic output of the instrument is not electrically insulated from the internal circuits. Therefore, when using a grounded thermocouple, do not connect the logic output terminals to the earth.

SENSOR INPUTS

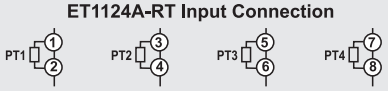
J-K-L-T-S-R Type Thermocouples :
Use the correct compensation cables for thermocouples. Do not use jointed cables. Make sure to connect to the right place and right polarities at the input terminals as shown in the figure.

PT100 Input Devices:
Do not use jointed cables. Long cable causes incorrect temperature measurement.

ET1124A Input Connection

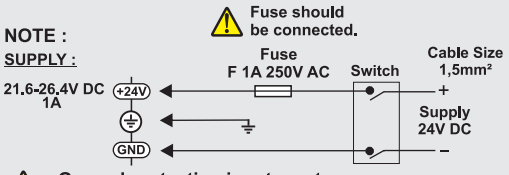


ET1124A-RT Input Connection



MAINS CONNECTION

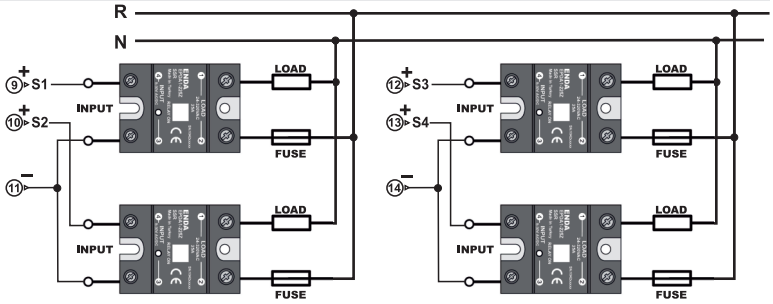
NOTE :
SUPPLY :
21.6-26,4V DC 1A



Ground protection input must be connected to the earth line.

CONTROL OUTPUTS CONNECTION SAMPLE

S1, S2, S3 and S4 SSROutputs :
Each of the four SSR control outputs can drive loads with a maximum of 30mA 24VDC. SSR outputs are short circuit protected.

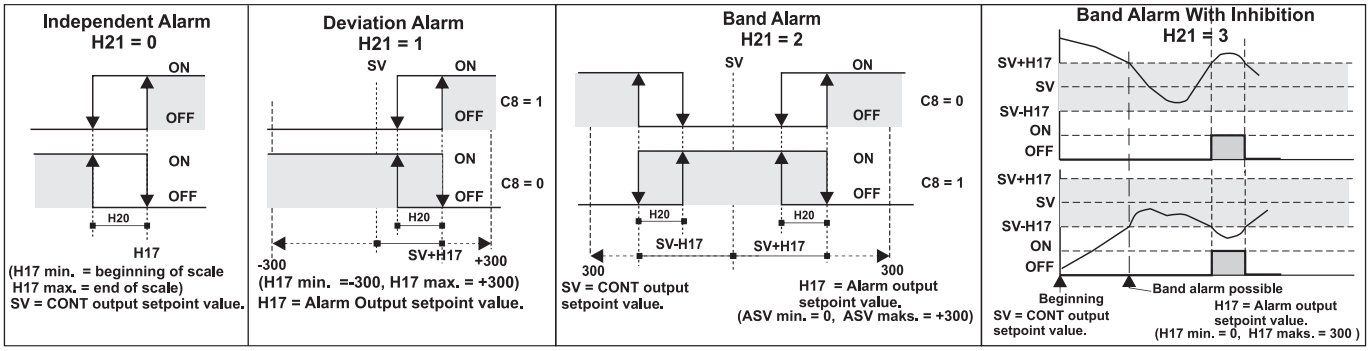


Holding screw 0.4-0.5Nm

Equipment is protected throughout by DOUBLE INSULATION

ALARM OUTPUT TYPES

Following chart indicates the alarm output status for the D1 Parameter Number and it is sampled for CH1. Please see page 5 for details.



ENDA ET1124A PID TEMPERATURE CONTROLLER MODBUS ADDRESS MAP

1.1 Memory Map for Thermostat Holding Registers

	Parameter Number	Holding Register Addresses Decimal (Hex)	Data Type	Data Content	Read / Write Permission	Factory defaults
CH1 Output and Input Control Parameters	H0	0000d (0000h)	Word	Sensor selection parameter for T1 input (Specified in parentheses are applicable for ET1124A-RT) : 0 = J Decimal (PT100 Decimal), 1 = J (PT100), 2 = K Decimal, 3 = K, 4 = L Decimal, 5 = L, 6 = T Decimal, 7 = T, 8 = S, 9 = R,	R / W	1
	H1	0001d (0001h)	Word	Filter coefficient for T1 input (Can be set from 1 to 100. If set to 1, digital filter will be disabled)	R / W	20
	H2	0002d (0002h)	Word	Offset value for T1 input (Adjustable between -100 and 100)	R / W	0
	H3	0003d (0003h)	Word	Temperature setpoint value for S1 output (Adjustable between H5 and H6 parameters)	R / W	400
	H4	0004d (0004h)	Word	Secondary temperature setpoint value for S1 output (Adjustable between H5 and H6 parameters)	R / W	500
	H5	0005d (0005h)	Word	Minimum setpoint value for S1 output (Adjustable between Lower scale and H6 parameters)	R / W	0
	H6	0006d (0006h)	Word	Maximum setpoint value for S1 output (Adjustable between Upper scale and H5 parameters)	R / W	600
	H7	0007d (0007h)	Word	Proportional band set value for S1 output (Adjustable between 0.0 and 100.0%)	R / W	4.0
	H8	0008d (0008h)	Word	Hysteresis value for S1 output (Adjustable between 1 and 50 °C/°F)	R / W	2
	H9	0009d (0009h)	Word	Integral time value for S1 output (Adjustable between 0.0 and 100.0 minutes)	R / W	4.0
	H10	0010d (000Ah)	Word	Derivative time value for S1 output (Adjustable between 0.00 and 25.00 minutes)	R / W	1.00
	H11	0011d (000Bh)	Word	Period time set value for S1 output (Adjustable between 1 and 125 seconds)	R / W	25
	H12	0012d (000Ch)	Word	S1 output value at setpoint (Adjustable between 0.0% and 100.0%)	R / W	0.0
	H13	0013d (000Dh)	Word	S1 output value at sensor failure (Adjustable between 0.0% and 100.0%)	R / W	0.0
	H14	0014d (000Eh)	Word	Soft start time for S1 output at power-up (Adjustable between 0 and 250 minutes)	R / W	0
	H15	0015d (000Fh)	Word	Manual output percentage value for S1 output (Adjustable between 0.0% and 100.0%)	R / W	50.0
	H16	0016d (0010h)	Word	Function Control Parameter (Self tune stops if 23040d (5A00h) value is entered) (Self tune starts if 23041d (5A01h) value is entered) (If 23042d (5A02h) value is entered, CH1 parameters will return to factory values)	R / W	0
	H17	0017d (0011h)	Word	Temperature alarm setpoint value for T1 input (can be set between H18 and H19 parameter value).	R / W	500
	H18	0018d (0012h)	Word	Lower limit for alarm setpoint value (can be set between Lower limit value and H19 parameter value)	R / W	0
	H19	0019d (0013h)	Word	Upper limit for alarm setpoint value (can be set between H18 parameter value and Upper limit value)	R / W	600
	H20	0020d (0014h)	Word	Hysteresis value for the alarm (can be set between 1 and 50 °C or °F)	R / W	50
	H21	0021d (0015h)	Word	Output type selection for alarm (Values can be set from 0 to 3) 0 = Independent alarm,1 = Deviation alarm, 2 = Band alarm, 3 = Active alarm after in band time.	R / W	0
	H22	0022d (0016h)	Word	Heating control duration for S1 output. Heating control is not performed when set to 0. Up to 1000 seconds can be set. An error message will be generated at the end of the time if the temperature value is not changed.	R / W	60
	H23	0023d (0017h)	Word	Configuration registers for CH1 (Holding registers for C0 - C9 configuration coils). B15 B14 B13 B12 B11 B10 B9 B8 B7 B6 B5 B4 B3 B2 B1 B0 - - - - - - C9 C8 C7 C6 C5 C4 C3 C2 C1 C0 See instructions on chapter 1.2 coil descriptions for the meaning of bits	R / W	0302H
CH2 Output and Input Control Parameters	H50	0050d (0032h)	Word	Thermocouple sensor, parameter selections for T2 (Set such as H0)	R / W	3
	H51	0051d (0033h)	Word	Filter coefficient for T2 input (Can be set from 1 to 100. If set to 1, digital filter will be disabled)	R / W	20
	H52	0052d (0034h)	Word	Offset value for T2 input (Adjustable between -100 and 100)	R / W	0
	H53	0053d (0035h)	Word	Temperature setpoint value for S2 output (Adjustable between H55 and H56 parameters)	R / W	400
	H54	0054d (0036h)	Word	Secondary temperature setpoint value for S2 output (Adjustable between H55 and H56 parameters)	R / W	500
	H55	0055d (0037h)	Word	Minimum setpoint value for S2 output (Adjustable between Lower scale and H56 parameters)	R / W	0
	H56	0056d (0038h)	Word	Maximum setpoint value for S2 output (Adjustable between Upper scale and H55 parameters)	R / W	600
	H57	0057d (0039h)	Word	Proportional band set value for S2 output (Adjustable between 0.0 and 100.0%)	R / W	4.0
	H58	0058d (003Ah)	Word	Hysteresis value for S2 output (Adjustable between 1 - 50 °C/°F)	R / W	2
	H59	0059d (003Bh)	Word	Integral time value for S2 output (Adjustable between 0.0 and 100.0 minutes)	R / W	4.0
	H60	0060d (003Ch)	Word	Derivative time value for S2 output (Adjustable between 0.00 and 25.00 minutes)	R / W	1.00
	H61	0061d (003Dh)	Word	Period time set value for S2 output (Adjustable between 1 and 125 seconds)	R / W	25
	H62	0062d (003Eh)	Word	S2 output value at setpoint (Adjustable between 0.0% and 100.0%)	R / W	0.0
	H63	0063d (003Fh)	Word	S2 output value at sensor failure (Adjustable between 0.0% and 100.0%)	R / W	0.0
	H64	0064d (0040h)	Word	Soft start time for S2 output at power-up (Adjustable between 0 and 250 minutes)	R / W	0
	H65	0065d (0041h)	Word	Manual output percentage value for S2 output (Adjustable between 0.0% and 100.0%)	R / W	50.0
	H66	0066d (0042h)	Word	Function Control Parameter. See H16 parameter.	R / W	0
	H67	0067d (0043h)	Word	Temperature alarm setpoint value for T2 input. Can be set between H68 and H69 parameters.	R / W	500
	H68	0068d (0044h)	Word	Lower limit for alarm setpoint value. Can be set between lower scale and H69 parameter.	R / W	0
	H69	0069d (0045h)	Word	Upper limit for alarm setpoint value. Can be set between H68 parameter and upper scale.	R / W	600
	H70	0070d (0046h)	Word	Hysteresis value for alarm. Can be set between 1 and 50 °C or °F.	R / W	50
	H71	0071d (0047h)	Word	Output type selection for alarm. Can be set to 0 and 3. 0 = Independent alarm, 1 = Deviation alarm, 2 = Band alarm, 3 = Active alarm after in band time.	R / W	0
	H72	0072d (0048h)	Word	Heating control duration for S1 output. Heating control is not performed when set to 0. Up to 1000 seconds can be set. An error message will be generated at the end of the time if the temperature value is not changed.	R / W	60
	H73	0073d (0049h)	Word	Configuration registers for CH2 (Holding registers for C50 - C59 configuration coils). B15 B14 B13 B12 B11 B10 B9 B8 B7 B6 B5 B4 B3 B2 B1 B0 - - - - - - C9 C8 C7 C6 C5 C4 C3 C2 C1 C0 See instructions on chapter 1.2 coil descriptions for the meaning of bits	R / W	0302H

1.1 Memory Map for Thermostat Holding Registers (continue).

	Parameter Number	Holding Register Addresses Decimal (Hex)	Data Type	Data Content	Read / Write Permission	Factory defaults
CH3 Output and Input Control Parameters	H100	0100d (0064h)	Word	Thermocouple sensor, parameter selections for T3 (Set such as H0)	R / W	3
	H101	0101d (0065h)	Word	Filter coefficient for T3 input (Can be set from 1 to 100. If set to 1, digital filter will be disabled)	R / W	20
	H102	0102d (0066h)	Word	Offset value for T3 input (Adjustable between -100 and 100)	R / W	0
	H103	0103d (0067h)	Word	Temperature setpoint value for S3 output (Adjustable between H105 and H106 parameters)	R / W	400
	H104	0104d (0068h)	Word	Secondary temperature setpoint value for S3 output (Adjustable between H105 and H106 parameters)	R / W	500
	H105	0105d (0069h)	Word	Minimum setpoint value for S3 output (Adjustable between Lower scale and H106 parameters)	R / W	0
	H106	0106d (006Ah)	Word	Maximum setpoint value for S3 output (Adjustable between Upper scale and H105 parameters)	R / W	600
	H107	0107d (006Bh)	Word	Proportional band set value for S3 output (Adjustable between 0.0 and 100.0%)	R / W	4.0
	H108	0108d (006Ch)	Word	Hysteresis value for S3 output (Adjustable between 1 and 50 °C/°F)	R / W	2
	H109	0109d (006Dh)	Word	Integral time value for S3 output (Adjustable between 0.0 and 100.0 minutes)	R / W	4.0
	H110	0110d (006Eh)	Word	Derivative time value for S3 output (Adjustable between 0.00 and 25.00 minutes)	R / W	1.00
	H111	0111d (006Fh)	Word	Period time set value for S3 output (Adjustable between 1 and 125 seconds)	R / W	25
	H112	0112d (0070h)	Word	S3 output value at setpoint (Adjustable between 0.0% and 100.0%)	R / W	0.0
	H113	0113d (0071h)	Word	S3 output value at sensor failure (Adjustable between 0.0% and 100.0%)	R / W	0.0
	H114	0114d (0072h)	Word	Soft start time for S3 output at power-up (Adjustable between 0 and 250 minutes)	R / W	0
	H115	0115d (0073h)	Word	Manual output percentage value for S3 output (Adjustable between 0.0% and 100.0%)	R / W	50.0
	H116	0116d (0074h)	Word	Function Control Parameter (Self tune stops if 23040d (5A00h) value is entered) (Self tune starts if 23041d (5A01h) value is entered) (If 23042d (5A02h) value is entered, CH1 parameters will return to factory values)	R / W	0
	H117	0117d (0075h)	Word	Temperature alarm setpoint value for T3 input (can be set between H118 and H119 parameter value).	R / W	500
	H118	0118d (0076h)	Word	Lower limit for alarm setpoint value (can be set between Lower limit value and H119 parameter value)	R / W	0
	H119	0119d (0077h)	Word	Upper limit for alarm setpoint value (can be set between H118 parameter value and Upper limit value)	R / W	600
	H120	0120d (0078h)	Word	Hysteresis value for the alarm (can be set between 1 and 50 °C or °F)	R / W	50
	H121	0121d (0079h)	Word	Output type selection for alarm (Values can be set from 0 to 3) 0 = Independent alarm,1 = Deviation alarm, 2 = Band alarm, 3 = Active alarm after in band time.	R / W	0
	H122	0122d (007Ah)	Word	Heating control duration for S3 output. Heating control is not performed when set to 0. Up to 1000 seconds can be set. An error message will be generated at the end of the time if the temperature value is not changed.	R / W	60
	H123	0123d (007Bh)	Word	Configuration registers for CH1 (Holding registers for C100 - C109 configuration coils). B15 B14 B13 B12 B11 B10 B9 B8 B7 B6 B5 B4 B3 B2 B1 B0 - - - - - - C9 C8 C7 C6 C5 C4 C3 C2 C1 C0 See instructions on chapter 1.2 coil descriptions for the meaning of bits	R / W	0302H
CH4 Output and Input Control Parameters	H150	0150d (0096h)	Word	Thermocouple sensor, parameter selections for T4 (Set such as H0)	R / W	3
	H151	0151d (0097h)	Word	Filter coefficient for T4 input (Can be set from 1 to 100. If set to 1, digital filter will be disabled)	R / W	20
	H152	0152d (0098h)	Word	Offset value for T4 input (Adjustable between -100 and 100)	R / W	0
	H153	0153d (0099h)	Word	Temperature setpoint value for S4 output (Adjustable between H155 and H156 parameters)	R / W	400
	H154	0154d (009Ah)	Word	Secondary temperature setpoint value for S4 output (Adjustable between H155 and H156 parameters)	R / W	500
	H155	0155d (009Bh)	Word	Minimum setpoint value for S4 output (Adjustable between Lower scale and H156 parameters)	R / W	0
	H156	0156d (009Ch)	Word	Maximum setpoint value for S4 output (Adjustable between Upper scale and H155 parameters)	R / W	600
	H157	0157d (009Dh)	Word	Proportional band set value for S4 output (Adjustable between 0.0 and 100.0%)	R / W	4.0
	H158	0158d (009Eh)	Word	Hysteresis value for S4 output (Adjustable between 1 - 50 °C/°F)	R / W	2
	H159	0159d (009Fh)	Word	Integral time value for S4 output (Adjustable between 0.0 and 100.0 minutes)	R / W	4.0
	H160	0160d (00A0h)	Word	Derivative time value for S4 output (Adjustable between 0.00 and 25.00 minutes)	R / W	1.00
	H161	0161d (00A1h)	Word	Period time set value for S4 output (Adjustable between 1 and 125 seconds)	R / W	25
	H162	0162d (00A2h)	Word	S4 output value at setpoint (Adjustable between 0.0% and 100.0%)	R / W	0.0
	H163	0163d (00A3h)	Word	S4 output value at sensor failure (Adjustable between 0.0% and 100.0%)	R / W	0.0
	H164	0164d (00A4h)	Word	Soft start time for S4 output at power-up (Adjustable between 0 and 250 minutes)	R / W	0
	H165	0165d (00A5h)	Word	Manual output percentage value for S4 output (Adjustable between 0.0% and 100.0%)	R / W	50.0
	H166	0166d (00A6h)	Word	Function Control Parameter (Self tune stops if 23040d (5A00h) value is entered) (Self tune starts if 23041d (5A01h) value is entered) (If 23042d (5A02h) value is entered, CH4 parameters will return to factory values)	R / W	0
	H167	0167d (00A7h)	Word	Temperature alarm setpoint value for T4 input. Can be set between H168 and H169 parameters.	R / W	500
	H168	0168d (00A8h)	Word	Lower limit for alarm setpoint value. Can be set between lower scale and H169 parameter.	R / W	0
	H169	0169d (00A9h)	Word	Upper limit for alarm setpoint value. Can be set between H168 parameter and upper scale.	R / W	600
	H170	0170d (00AAh)	Word	Hysteresis value for alarm. Can be set between 1 and 50 °C or °F.	R / W	50
	H171	0171d (00ABh)	Word	Output type selection for alarm. Can be set to 0 and 3. 0 = Independent alarm, 1 = Deviation alarm, 2 = Band alarm, 3 = Active alarm after in band time.	R / W	0
	H172	0172d (00ACh)	Word	Heating control duration for S4 output. Heating control is not performed when set to 0. Up to 1000 seconds can be set. An error message will be generated at the end of the time if the temperature value is not changed.	R / W	60
	H173	0173d (00ADh)	Word	Configuration registers for CH4 (Holding registers for C150 - C159 configuration coils). B15 B14 B13 B12 B11 B10 B9 B8 B7 B6 B5 B4 B3 B2 B1 B0 - - - - - - C9 C8 C7 C6 C5 C4 C3 C2 C1 C0 See instructions on chapter 1.2 coil descriptions for the meaning of bits	R / W	0302H
General Control Parameters	H200	0200d (00C8h)	Word	Modbus communication speed (Baudrate). 0 = 2400bps, 1 = 4800bps, 2 = 9600bps, 3 = 19200bps, 4 =38400bps, 5 = 57600bps, 6 = 115200bps. **ATTENTION !!** User must set Parity = None, Stop Bit = 1 and Data Length = 8 on the device that provides the Modbus connection. These settings are set as factory default in ET1124A and are not possible to change by the user.	R / W	4
	H201	0201d (00C9h)	Word	Elapse time duration for switching off the outputs when the RS485 signal is interrupted. Can be set between 2 and 9999 seconds. ⚠ **Attention : C11 parameter must be set to 1 for enabling this timer.**	R / W	2

1.2 Memory Map for Control Coils

	Parameter Number	Coil Addresses Decimal (Hex)	Data Type	Data Content	Read / Write Permission	Factory defaults
CH1 Coil Parameters	C0	0000d (0000h)	Bit	S1 output configuration (0 = Heating , 1 = Cooling)	R / W	0
	C1	0001d (0001h)	Bit	S1 output controlling selection (0 = Monitoring (Outputs are OFF), 1 = S1 output is active)	R / W	1
	C2	0002d (0002h)	Bit	Setpoint selection for S1. If C2 is set to 0, its performed according to H3, if C2 is set to 1, performed to the H4 parameter.	R / W	0
	C3	0003d (0003h)	Bit	Manual control bit for S1output. (C3 = 0 automatic control, C = 1 (According to the output percentage in the H15 parameter is performed to S1 output when the C3 parameter is set to 1).	R / W	0
	C4	0004d (0004h)	Bit	Self-tune control selection (C4 = 0 selftune stops, C4 = 1 selftune starts).	R / W	0
	C5	0005d (0005h)	Bit	S1 output format selection bit in case of T1 probe error (if C5 = 0, the output is performed according to the percentage value in H13 parameter in case of T1 error, according to the last proportional output value in the set value if C5 = 1).	R / W	0
	C6	0006d (0006h)	Bit	Decimal point selection for T1 sensor (0 = 0, 1 = 0.0)	R / W	0
	C7	0007d (0007h)	Bit	Temperature unit selection for T1 sensor (0 = °C, 1 = °F)	R / W	0
	C8	0008d (0008h)	Bit	Alarm condition (0 = The alarm is ON at the lower setpoint. ,1 = The alarm is ON at the upper setpoint.	R / W	0
	C9	0009d (0009h)	Bit	Alarm output status at probe failure. (0 = Off , 1 = On)	R / W	0
	C10	0010d (000Ah)	Bit	Lost connection control for RS485 (0 = Off , 1 = On)	R / W	0
CH2 Coil Parameters	C50	0050d (0032h)	Bit	S2 output configuration (0 = Heating , 1 = Cooling)	R / W	0
	C51	0051d (0033h)	Bit	S2 output controlling selection (0 = Monitoring (Outputs are OFF), 1 = S2 output is active)	R / W	1
	C52	0052d (0034h)	Bit	Setpoint selection for S2. If C52 is set to 0, its performed according to H53, if C52 is set to 1, performed to the H54 parameter.	R / W	0
	C53	0053d (0035h)	Bit	Manual control bit for S2 output. (C53 = 0 automatic control, C53 = 1 (According to the output percentage in the H65 parameter is performed to S2 output when the C53 parameter is set to 1).	R / W	0
	C54	0054d (0036h)	Bit	Self-tune control selection (C54 = 0 selftune stops, C54 = 1 selftune starts).	R / W	0
	C55	0055d (0037h)	Bit	S2 output format selection bit in case of T2 probe error (if C55 = 0, the output is performed according to the percentage value in H63 parameter in case of T2 error, according to the last proportional output value in the set value if C55 = 1).	R / W	0
	C56	0056d (0038h)	Bit	Decimal point selection for T2 sensor (0 = 0, 1 = 0.0)	R / W	0
	C57	0057d (0039h)	Bit	Temperature unit selection for T2 sensor (0 = °C, 1 = °F)	R / W	0
	C58	0058d (003Ah)	Bit	Alarm condition (0 = The alarm is ON at the lower setpoint. ,1 = The alarm is ON at the upper setpoint.	R / W	0
	C59	0059d (003Bh)	Bit	Alarm output status at probe failure. (0 = Off , 1 = On)	R / W	0
CH3 Coil Parameters	C100	0100d (0064h)	Bit	S3 output configuration (0 = Heating , 1 = Cooling)	R / W	0
	C101	0101d (0065h)	Bit	S3 output controlling selection (0 = Monitoring (Outputs are OFF), 1 = S3 output is active)	R / W	1
	C102	0102d (0066h)	Bit	Setpoint selection for S3. If C102 is set to 0, its performed according to H103, if C102 is set to 1, performed to the H104 parameter.	R / W	0
	C103	0103d (0067h)	Bit	Manual control bit for S3 output. (C103 = 0 automatic control, C53 = 1 (According to the output percentage in the H115 parameter is performed to S3 output when the C103 parameter is set to 1).	R / W	0
	C104	0104d (0068h)	Bit	Self-tune control selection (C104 = 0 selftune stops, C104 = 1 selftune starts).	R / W	0
	C105	0105d (0069h)	Bit	S3 output format selection bit in case of T3 probe error (if C105 = 0, the output is performed according to the percentage value in H113 parameter in case of T3 error, according to the last proportional output value in the set value if C105 = 1).	R / W	0
	C106	0106d (006Ah)	Bit	Decimal point selection for T3 sensor (0 = 0, 1 = 0.0)	R / W	0
	C107	0107d (006Bh)	Bit	Temperature unit selection for T3 sensor (0 = °C, 1 = °F)	R / W	0
	C108	0108d (006Ch)	Bit	Alarm condition (0 = The alarm is ON at the lower setpoint. ,1 = The alarm is ON at the upper setpoint.	R / W	0
	C109	0109d (006Dh)	Bit	Alarm output status at probe failure. (0 = Off , 1 = On)	R / W	0
CH4 Coil Parameters	C150	0150d (0096h)	Bit	S4 output configuration (0 = Heating , 1 = Cooling)	R / W	0
	C151	0151d (0097h)	Bit	S4 output controlling selection (0 = Monitoring (Outputs are OFF), 1 = S4 output is active)	R / W	1
	C152	0152d (0098h)	Bit	Setpoint selection for S4. If C152 is set to 0, its performed according to H153, if C152 is set to 1, performed to the H154 parameter.	R / W	0
	C153	0153d (0099h)	Bit	Manual control bit for S4 output. (C153 = 0 automatic control, C153 = 1 (According to the output percentage in the H165 parameter is performed to S4 output when the C153 parameter is set to 1).	R / W	0
	C154	0154d (009Ah)	Bit	Self-tune control selection (C154 = 0 selftune stops, C154 = 1 selftune starts).	R / W	0
	C155	0155d (009Bh)	Bit	S4 output format selection bit in case of T4 probe error (if C155 = 0, the output is performed according to the percentage value in H163 parameter in case of T4 error, according to the last proportional output value in the set value if C155 = 1).	R / W	0
	C156	0156d (009Ch)	Bit	Decimal point selection for T4 sensor (0 = 0, 1 = 0.0)	R / W	0
	C157	0157d (009Dh)	Bit	Temperature unit selection for T4 sensor (0 = °C, 1 = °F)	R / W	0
	C158	0158d (009Eh)	Bit	Alarm condition (0 = The alarm is ON at the lower setpoint. ,1 = The alarm is ON at the upper setpoint.	R / W	0
	C159	0159d (009Fh)	Bit	Alarm output status at probe failure. (0 = Off , 1 = On)	R / W	0

1.3 Memory Map for Output Status Indicator Bits

	Parameter Number	Discrete Input Addresses	Data Type	Data Content	Read / Write Permission
CH1	D0	0000d (0000h)	Bit	S1 Control output status (0 = OFF ,1 = ON)	Read Only
	D1	0001d (0001h)	Bit	Alarm status for T1 input. (0 = OFF ,1 = ON)	Read Only
	D2	0002d (0002h)	Bit	Heating error status for S1 output. (0 = No error ,1 = The heating operation can not perform)	Read Only
CH2	D50	0050d (0032h)	Bit	S2 Control output status (0 = OFF ,1 = ON)	Read Only
	D51	0051d (0033h)	Bit	Alarm status for T2 input. (0 = OFF ,1 = ON)	Read Only
	D52	0052d (0034h)	Bit	Heating error status for S2 output. (0 = No error ,1 = The heating operation can not perform)	Read Only
CH3	D100	0100d (0064h)	Bit	S3 Control output status (0 = OFF ,1 = ON)	Read Only
	D101	0101d (0065h)	Bit	Alarm status for T3 input. (0 = OFF ,1 = ON)	Read Only
	D102	0102d (0066h)	Bit	Heating error status for S3 output. (0 = No error ,1 = The heating operation can not perform)	Read Only
CH4	D150	0150d (0096h)	Bit	S4 Control output status (0 = OFF ,1 = ON)	Read Only
	D151	0151d (0097h)	Bit	Alarm status for T4 input. (0 = OFF ,1 = ON)	Read Only
	D152	0152d (0098h)	Bit	Heating error status for S4 output. (0 = No error ,1 = The heating operation can not perform)	Read Only

1.4 Memory Map for Software Revision Input Registers

Software Revision	65200d (FEB0h)	8 Word	Software name and update is read in ASCII format and as 8 word. Format yy aa gg.SS dd ss i.e : RD.21 08 20.07 09 37 Memory Format : Word 1 Word 2 Word 3 Word 4 Word 5 Word 6 Word 7 Word 8 D R 2 . 0 1 2 8 . 0 7 0 9 0 7 3 **NOTE :** To view each word correctly by changing the byte sequences should be displayed as ASCII TEXT	Read Only

1.5 Memory Map for Input Registers

	Parameter Number	Input Register Adresses Decimal (Hex)	Data Type	Data Content	Read / Write Permission
CH 1 Input Register	I0	0000d (0000h)	Word	Measured temperature value for T1 input (decimal point, if the C6 parameter is set to 1).	Read Only
	I1	0001d (0001h)	Word	Current temperature setpoint value for S1 output.	Read Only
	I2	0002d (0002h)	Word	Output power percent for S1 output.	Read Only
	I3	0003d (0003h)	Word	Error codes for T1 input : 0 = No error, 1 = Short circuit, 2 = Lower scale error, 3 = Upper scale error, 4 = No connection, 5 = Output power error.	Read Only
	I4	0004d (0004h)	Word	Selftune status codes for S1 : 0 = No error, 1 = Initial temperature is higher than 60% setpoint value, 2 = PID parameters calculating, 3 = Power set parameters calculating.	Read Only
CH2 Input Register	I50	0050d (0032h)	Word	Measured temperature value for T2 input (decimal point, if the C56 parameter is set to 1).	Read Only
	I51	0051d (0033h)	Word	Current temperature setpoint value for S2 output.	Read Only
	I52	0052d (0034h)	Word	Output power percent for S2 output.	Read Only
	I53	0053d (0035h)	Word	Error codes for T2 input (See T1 for error codes).	Read Only
	I54	0054d (0036h)	Word	Selftune status codes for S2 (See S1 for codes).	Read Only
CH3 Input Register	I100	0100d (0064h)	Word	Measured temperature value for T3 input (decimal point, if the C106 parameter is set to 1).	Read Only
	I101	0101d (0065h)	Word	Current temperature setpoint value for S3 output.	Read Only
	I102	0102d (0066h)	Word	Output power percent for S3 output.	Read Only
	I103	0103d (0067h)	Word	Error codes for T3 input (See T1 for error codes).	Read Only
	I104	0104d (0068h)	Word	Selftune status codes for S3 (See S1 for codes).	Read Only
CH4 Input Register	I150	0150d (0096h)	Word	Measured temperature value for T4 input (decimal point, if the C156 parameter is set to 1).	Read Only
	I151	0151d (0097h)	Word	Current temperature setpoint value for S4 output.	Read Only
	I152	0152d (0098h)	Word	Output power percent for S4 output.	Read Only
	I153	0153d (0099h)	Word	Error codes for T4 input (See T1 for error codes).	Read Only
	I154	0154d (009Ah)	Word	Selftune status codes for S4 (See S1 for codes).	Read Only
	I200	0200d (00C8h)	Word	Modbus address for ET1124A (with active DIP switch address query)	Read Only

1.6 DIP Switch Settings

Default settings and Baud Rate Settings.

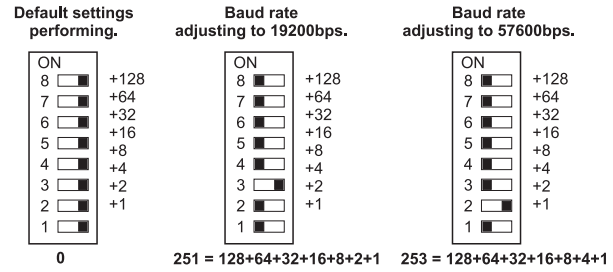
DIPSW Value	Description
0	Default Set Settings. Default settings is performed when all the DIP Switch positions are set to 0 (OFF).
248	Baud rate 2400Bps
249	Baud rate 4800Bps
250	Baud rate 9600Bps
251	Baud rate 19200Bps
252	Baud rate 38400Bps
253	Baud rate 57600Bps
254	Baud rate 115200Bps

When required to return to the factory values or to adjust the modbus communication speed, at first, the DIP switch value should be adjusted according to the numerical value corresponding to the operation in the adjacent table **(Please See Note1).**
DIP switch value is set to required modbus address value and DIP switch is left in this setting position **(Please see Note2).**

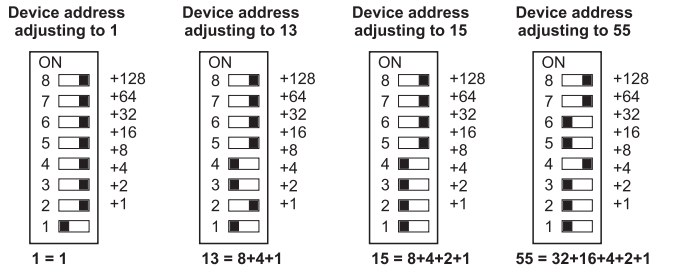
NOTE1 :
While adjusting the Modbus communication speed setting, at first, switch 8 must be set to OFF in order to store the setting correctly, then the switch values from 1 to 7 of the baudrate switch value to be adjusted must be set and finally the 8th switch must be turned ON.

NOTE2 :
When setting the device address at first, the 8th switch should be turned off and then the switch values from 1 to 7 of the address to be adjusted should be set.
If the 8th switch should be ON at the selected address, the 8th switch should be set to ON at the end of the procedure finaly.

DIP Switch Default and Baud rate Samples



Device Addressing Samples



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. ET1124A realizes error and sends error message. Most significant bit of function is changed '1' to indicate error in error message by ET1124A. Error code is sent in data section. ET1124A realizes error type via this message.

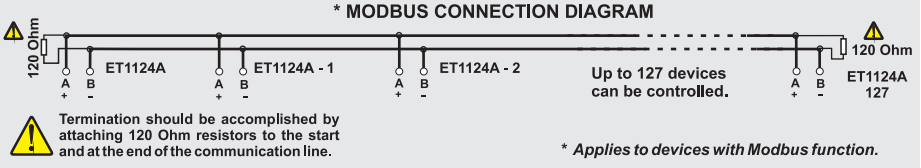
Modbus Error Codes

Error Code	Name	Meaning
{01}	ILLEGAL FUNCTION	The function code received in the query is not an allowable action for the ET1124A. 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 ET1124A.
{03}	ILLEGAL DATA VALUE	A value contained in the query data field is not an allowable value for the ET1124A.

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

* MODBUS CONNECTION DIAGRAM



Termination should be accomplished by attaching 120 Ohm resistors to the start and at the end of the communication line.

** Applies to devices with Modbus function.*

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.

Message sample ; 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