ENDA EUC PID UNIVERSAL CONTROLLER SERIES
MODBUS PROTOCOL ADDRESS MAP

1.1 Memory map for Holding Registers

Holding Register addresses Decimal (Hex)	Data type	Data content	Parameter Name	Read / Write permission
0000d (0000h)	Byte	Hysteresis of the control output (Adjustable between 1 and 50 °C/F)	C.HYS	Readable / Writable
0001d (0001h)	Byte	Hysteresis of the Alarm1 output (Adjustable between 1 and 50 °C/F)	A1.HY	Readable / Writable
0002d (0002h)	Byte	Hysteresis of the Alarm2 output (Adjustable between 1 and 50 °C/F)	A2.HY	Readable / Writable
0003d (0003h)	Byte	Proportional band set value (Adjustable between 0% and 100%)	Pb.	Readable / Writable
0004d (0004h)	Byte	Control period (Adjustable between 4 and 250)	Ct.	Readable / Writable
0005d (0005h)	Byte	Type of input (0 = PT100 ,1= PT100 decimal, 2 = J , 3 = K ,4 = T, 5 = S , 6 = R ,7 = 0-20mA , 8=4-20mA	inP.	Readable / Writable
0006d (0006h)	Byte	Ratio of output power at the set point (Adjustable between 0% and 100%)	P.SEt.	Readable / Writable
0007d (0007h)	Byte	Control menu accsess level code (0 = Invisible, 1= Modification can be done 2 = Only visible).	A.Con.	Readable / Writable
0008d (0008h)	Byte	Alarm menu accsess level code (0 = Invisible, 1= Modification can be done 2 = Only visible).	A.ALr.	Readable / Writable
0009d (0009h)	Byte	Configuration menu accsess level code (0 = Invisible, 1= Modification can be done 2 = Only visible)	A.CnF.	Readable / Writable
0010d (000Ah)	Byte	Self-tune menu accsess level code (0 = Invisible, 1= Modification can be done .)	A.tun.	Readable / Writable
0011d (000Bh)	Byte	Type of Alarm1 (0= Independent; 1= Deviation ; 2= Band)	A1.tP.	Readable / Writable
0012d (000Ch)	Byte	Type of Alarm2 (0= Independent; 1= Deviation ; 2= Band)	A2.tP.	Readable / Writable
0013d (000Dh)	Byte	%Value for output during a sensor failure (Adjustable between 0% and 100%)	PrEr.	Readable / Writable
0014d (000Eh)	Byte	Device address for RS485 (Adjustable between 1 and 247)	d.Adr.	Readable / Writable
0015d (000Fh)	Byte	Baud rate (0= None;1=1200bps ; 2=2400bps ; 3=4800bps ; 4=9600bps; 5=19200bps)	bAud.	Readable / Writable
0016d (0010h)	Byte	Decimal point for 0-20mA and 4-20mA inputs	d.Pnt.	Readable / Writable
0017d (0011h)	Byte	Filter coefficient (1 = Most quick response time 32 = Most slow response time)	FL.Co.	Readable / Writable
0018d (0012h)	Byte	Type of control output (0 = Out1;1 = SSr. ; 2 = 0-20 ; 3 = 4-20)	C.ot.S.	Readable / Writable
0019d (0013h)	Byte	Soft start timer set value (Adjustable between 0 and 250 minutes)	SSt.S.	Readable / Writable
0020d (0014h)	Byte	Minimum analog output value	A.o.L.L.	Readable / Writable
0021d (0015h)	Byte	Maximum analog output value	A.o.H.L.	Readable / Writable
0022d (0016h)	Word	Temperature set point value	C.SEt.	Readable / Writable
0023d (0017h)	Word	Alarm1 set point value	A1.SE.	Readable / Writable
0024d (0018h)	Word	Alarm2 set point value	A2.SE	Readable / Writable
0025d (0019h)	Word	Integral time (0.1 100.0 min)	t i.	Readable / Writable
0026d (001Ah)	Word	Derivative time (0.01 -10.00 min)	t d.	Readable / Write
0027d (001Bh)	Word	Set point lower limit	C.L o.L.	Readable / Writable
0028d (001Ch)	Word	Set point upper limit	C.H i.L.	Readable / Writable
0029d (001Dh)	Word	Offset value (Adjustable between -99 C and +99 C)	oFFS.	Readable / Writable
0030d (001Eh)	Word	Alarm1 value lower limit	A1.L.L.	Readable / Writable
0031d (001Fh)	Word	Alarm1 value upper limit	A1.H.L.	Readable / Writable
0032d (0020h)	Word	Alarm2 value lower limit	A2.L.L.	Readable / Writable
0033d (0021h)	Word	Alarm2 value upper limit	A2.H.L.	Readable / Writable
0034d (0022h)	Word	0-20mA, 4-20mA inputs lower scale value	U.SC.L.	Readable / Writable
0035d (0023h)	Word	0-20mA, 4-20mA inputs upper scale value	U.SC.H.	Readable / Writable

When datas are written to address values in the table, they are automatically stored in EEPROM (non-volatile memory). If the write process is repeated very often, the write limit of EEPROM may exceed and this may cause written datas not to be stored in non volatile memory. In the applications that we have to change the parameters frequently, if the parameters are written by adding 100d to addresses, they'll be written only in RAM but not in EEPROM. This will protect the EEPROM from exceeding the write limit. Keep in mind that the written values will be lost in a power cut.

Example : In this application, the set value is changed continuously and the EEPROM write limit has to be protected. When 100d is added to the original temperature set value 0022d, the result address is 0122d. If the set value is written to 0122d address instead of 0022d, set value will only be written in RAM, but not in EEPROM.

Caution : This property is valid in and after revision 111220.

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1.2 Memory map for Coils

Coil addresses	Data type	Data content	Parameter Name	Read / Write permission
(0000)h	Bit	State of Alarm2 (0 = Active Low ,1 =Active High)	A2.St.	Readable / Writable
(0001)h	Bit	State of Alarm2 in the case of sensor failure (0 = Low , 1 = High)	A2.PE.	Readable / Writable
(0002)h	Bit	State of Alarm1 (0 = Active Low ,1 =Active High)	A1.St.	Readable / Writable
(0003)h	Bit	State of Alarm1 in the case of sensor failure (0 = Low , 1 = High)	A1.PE.	Readable / Writable
(0004)h	Bit	Configuration of the control output (0 = Heat ; 1 = Cool)	C.St.A.	Readable / Writable
(0005)h	Bit	Temperature unit (0 = °C ; 1 = °F)	Unit.	Readable / Writable
(0006)h	Bit	Thermostat output on/off button control (0 = button inactive ; 1 = button active)	t.oF.E.	Readable / Writable
(0007)h	Bit	Thermostat outuputs control bit (0 = outputs off ; 1 = outputs on)	——	Readable / Writable

1.3 Memory map for Input Registers

Input register address	Data type	Data content	Parameter Name	Read / Write permission
(0000)h	Word	Process value (**°C** or **°F**)	——	Only Readable
(0001)h	Word	Analog output percent (**%**).Between the 0-100.	——	Only Readable

1.4 Memory map for Discrete input

Discrete input addresses	Data type	Data content	Parameter Name	Read / Write permission
(0000)h...(0002)h	Bit	Not used.	——	Only Readable
(0003)h	Bit	State of control output (0 = OFF, 1 = ON)	——	Only Readable
(0004)h	Bit	State of Alarm1 output (0 = OFF, 1 = ON)	——	Only Readable
(0006)h...(000B)h	Bit	Not used.	——	Only Readable
(000C)h	Bit	State of SSR output (0 = OFF, 1 = ON)	——	Only Readable

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.