

CHUNDE

Auto-Tune Fuzzy / PID
Process / Temperature
Controller

CMP-XX15

Communication manual Rev1.1

Parameters Description

Modbus Register Address	Parameter Notation	Parameter Description	Range	Default Value	Data Access Type	Scale	
						Low	High
0	SP1	Set Point 1	Low: SP1L High: SP1H	25.0°C (77.0°F)	R/W	-19999	45536
1	SP2	Set Point 2	Low: SP1L High: SP1H	100.0°C (212.0°F)	R/W	-19999	45536
2	SP3	Set Point 3	Low: SP1L High: SP1H	100.0°C (212.0°F)	R/W	-19999	45536
3	SP4	Set Point 4	Low: SP1L High: SP1H	100.0°C (212.0°F)	R/W	-19999	45536
4	SP5	Set Point 5	Low: SP1L High: SP1H	100.0°C (212.0°F)	R/W	-19999	45536
5	SP6	Set Point 6	Low: SP1L High: SP1H	100.0°C (212.0°F)	R/W	-19999	45536
6	SP7	Set Point 7	Low: SP1L High: SP1H	100.0°C (212.0°F)	R/W	-19999	45536
7	TIME	Dwell timer output	Low: 0.0 High: 4553.6	0.0	R/W	-19999	45536

Modbus Register Address	Parameter Notation	Parameter Description	Range	Default Value	Data Access Type	Scale	
						Low	High
8	INPT	Input sensor selection	0 J_tC: J type Thermocouple 1 K_tC: K type Thermocouple 2 T_tC: T type Thermocouple 3 E_tC: E type Thermocouple 4 B_tC: B type Thermocouple 5 R_tC: R type Thermocouple 6 S_tC: S type Thermocouple 7 N_tC: N type Thermocouple 8 L_tC: L type Thermocouple 9 U_tC: U type Thermocouple 10 P_tC: P type Thermocouple 11 C_tC: C type Thermocouple 12 D_tC: D type Thermocouple 13 Pt.dN: PT100 Ω DIN curve 14 Pt.JS: PT100 Ω JIS curve 15 4-20: 4-20mA linear current input 16 0-20: 0-20mA linear current input 17 0-5V: 0-5VDC linear voltage input 18 1-5V: 1-5VDC linear voltage input 19 0-10: 0-10VDC linear voltage input	1	R/W	0	65535
9	UNIT	Input unit selection	0 oC: °C unit 1 oF: °F unit 2 Pu: Process unit	0	R/W	0	65535
10	DP	Decimal point selection	0 No.dP: No decimal point 1 1-dP: 1 decimal digit 2 2-dP: 2 decimal digit 3 3-dP: 3 decimal digit	1	R/W	0	65535
11	INLO	Input low scale value	Low: -19999 High: 45536	-17.8°C (0.0°F)	R/W	-19999	45536
12	INHI	Input high scale value	Low: INLO+50 High: 45536	93.3°C (200.0°F)	R/W	-19999	45536
13	SP1L	Low limit of set point value	Low: -19999 High: 45536	-17.8°C (0.0°F)	R/W	-19999	45536

Modbus Register Address	Parameter Notation	Parameter Description	Range	Default Value	Data Access Type	Scale	
						Low	High
14	SP1H	High limit of set point value	Low: SP1L High: 45536	537.8°C (1000.0°F)	R/W	-19999	45536
15	FILT	Filter damping time constant of PV	0 0: 0 second time constant 1 0.2: 0.2 second time constant 2 0.5: 0.5 second time constant 3 1: 1 second time constant 4 2: 2 second time constant 5 5: 5 second time constant 6 10: 10 second time constant 7 20: 20 second time constant 8 30: 30 second time constant 9 60: 60 second time constant	2	R/W	0	65535
16	DISP	MV/TIME display selection	0 None: No Display 1 MV1: Display MV1 (66/130) 2 MV2: Display MV2(67/131) 3 tMR: Display Time (68)	1	R/W	0	65535
17	PB	Proportional band value	Low: 0.0 High: 500.0°C (900.0°F)	10.0° C (18.0° F)	R/W	0	65535
18	TI	Integral time value	Low: 0 High: 3600 sec	100	R/W	0	65535
19	TD	Derivative time value	Low: 0.0 High: 360.0 sec	25	R/W	0	65535
20	OUT1	Output 1 function	0 REVR: Reverse (heating) control action 1 dIRt : Direct (cooling) control action	0	R/W	0	65535

Modbus Register Address	Parameter Notation	Parameter Description	Range	Default Value	Data Access Type	Scale	
						Low	High
21	O1TY	Output 1 signal type	0 <i>RELY</i> : Relay output 1 <i>SSrd</i> : Solid state relay drive output 2 <i>4-20</i> : 4-20mA linear current 3 <i>0-20</i> : 0-20mA linear current 4 <i>0-5V</i> : 0-5VDC linear voltage 5 <i>1-5V</i> : 1-5VDC linear voltage 6 <i>0-10</i> : 0-10VDC linear voltage	0	R/W	0	65535
22	O1FT	Output 1 failure transfer mode	Select BPLS (Bumpless transfer), or 0.0 ~ 100.0 % to continue output 1 control function if the sensor fails, or select OFF (0) or ON (1)for ON-OFF control	0	R/W	-19999	45536
23	O1HY	Output 1 ON-OFF control hysteresis	Low: 0.1°C (0.2°F) High: 50.0°C (90.0°F)	0.1° C (0.2 °F)	R/W	0	65535
24	CYC1	Output 1 cycle time	Low: 0.1 High: 90.0 sec.	18	R/W	0	65535
25	OFST	Offset value for P control	Low: 0 High: 100.0 %	25	R/W	0	65535
26	RAMP	Ramp function selection	0 <i>NoNE</i> : No Ramp Function 1 <i>MINR</i> : Use unit/minute as Ramp Rate 2 <i>HRR</i> : Use unit/hour as Ramp Rate	0	R/W	0	65535
27	RR	Ramp rate	Low: 0.0 High: 500.0°C (900.0°F)	0	R/W	0	65535
28	OUT2	Output 2 function	0 <i>NoNE</i> : Output2 turned off 1 <i>COOL</i> : Cooling PID Function 2 <i>AL1</i> : Alarm 1 Function 3 <i>rAL1</i> : Reverse Alarm 1 Function	2	R/W	0	65535

Modbus Register Address	Parameter Notation	Parameter Description	Range	Default Value	Data Access Type	Scale	
						Low	High
29	O2TY	Output 2 signal type	0 <i>RELY</i> : Relay output 1 <i>SSrd</i> : Solid state relay drive output 2 <i>4-20</i> : 4-20mA linear current 3 <i>0-20</i> : 0-20mA linear current 4 <i>0-5V</i> : 0-5VDC linear voltage 5 <i>1-5V</i> : 1-5VDC linear voltage 6 <i>0-10</i> : 0-10VDC linear voltage	0	R/W	0	65535
30	O2FT	Output 2 failure transfer mode	Select BPLS (Bumpless transfer), or 0.0 ~ 100.0 % to continue output 2 control function if the sensor fails	0	R/W	-19999	45536
31	CYC2	Output 2 cycle time	Low: 0.1 High: 90.0 sec.	18	R/W	0	65535
32	CPB	Cooling proportional band value	Low: 50 High: 300 %	100	R/W	0	65535
33	DB	Heating-cooling dead band (negative value= overlap)	Low: - 36.0 High: 36.0 %	0	R/W	-19999	45536
34	A1FN	Alarm 1 function for alarm 1 output	0 <i>NoNE</i> : No alarm function 1 <i>tIMr</i> : Dwell timer action 2 <i>dE.HI</i> : Deviation high alarm 3 <i>dE.Lo</i> : Deviation low alarm 4 <i>db.HI</i> : Deviation band out of band alarm 5 <i>db.Lo</i> : Deviation band in band alarm 6 <i>PV.HI</i> : Process value high alarm 7 <i>PV.Lo</i> : Process value low alarm 8 <i>H.bK</i> : Heater break alarm 9 <i>H.St</i> : Heater short alarm	2	R/W	0	65535

Modbus Register Address	Parameter Notation	Parameter Description	Range	Default Value	Data Access Type	Scale	
						Low	High
35	A1MD	Alarm 1 operation mode	0 NoRM: Normal alarm action 1 LtCH: Latching alarm action 2 HoLd: Hold alarm action 3 Lt.Ho: Latching & Hold action 4 SP.Ho: Set point holding alarm	0	R/W	0	65535
36	A1HY	Hysteresis control of alarm 1	Low: 0.1°C High: 50.0°C(90.0°F)	0.1 °C (0.2 °F)	R/W	0	65535
37	A1FT	Alarm 1 failure transfer mode	0 OFF: Alarm output OFF if sensor fails 1 ON: Alarm output ON if sensor fails	1	R/W	0	65535
38	A1SP	Alarm 1 set point	Low: -1128 High: 2512	100.0 °C (212.0°F)	R/W	-19999	45536
39	A1DV	Alarm 1 deviation value	Low: -1111 High: 2529	10.0 °C (18.0°F)	R/W	-19999	45536
40	A2OT	Alarm 2 Output	0 AL2: Alarm 2 output 1 1 rAL2: Reverse Alarm 2 Output	0	R/W	0	65535

Modbus Register Address	Parameter Notation	Parameter Description	Range	Default Value	Data Access Type	Scale	
						Low	High
41	A2FN	Alarm 2 function for alarm 2 output	0 NoNE: No alarm function 1 tIMr: Dwell timer action 2 dE.HI: Deviation high alarm 3 dE.Lo: Deviation low alarm 4 db.HI: Deviation band out of band alarm 5 db.Lo: Deviation band in band alarm 6 PV.HI: Process value high alarm 7 PV.Lo: Process value low alarm 8 H.bK: Heater break alarm 9 H.St: Heater short alarm 10 E1.C.o: Event Input 1 Control Alarm Output 11 E2.C.o: Event Input 2 Control Alarm Output	2	R/W	0	65535
42	A2MD	Alarm 2 operation mode	0 NoRM: Normal alarm action 1 LtCH: Latching alarm action 2 HoLd: Hold alarm action 3 Lt.Ho: Latching & Hold action 4 SP.Ho: Set point holding alarm	0	R/W	0	65535
43	A2HY	Hysteresis control of alarm 2	Low: 0.1°C High: 50.0°C(90.0°F)	0.1° C (0.2° F)	R/W	0	65535
44	A2FT	Alarm 2 failure transfer mode	0 OFF: Alarm output OFF if sensor fails 1 ON: Alarm output ON if sensor fails	1	R/W	0	65535
45	A2SP	Alarm 2 set point	Low: -1128 High: 2512	100.0 °C (212.0°F)	R/W	-19999	45536
46	A2DV	Alarm 2 deviation value	Low: -1111 High: 2529	10.0°C (18.0 °F)	R/W	-19999	45536
47	A3OT	Alarm 3 output	0 AL3: Alarm 3 output 1 rAL3: Reverse Alarm 3 Output	0	R/W	0	65535

Modbus Register Address	Parameter Notation	Parameter Description	Range	Default Value	Data Access Type	Scale	
						Low	High
48	A3FN	Alarm 3 function for alarm 3 output	0 NoNE: No alarm function 1 tIMr: Dwell timer action 2 dE.HI: Deviation high alarm 3 dE.Lo: Deviation low alarm 4 db.HI: Deviation band out of band alarm 5 db.Lo: Deviation band in band alarm 6 PV.HI: Process value high alarm 7 PV.Lo: Process value low alarm 8 H.bK: Heater break alarm 9 H.St: Heater short alarm 10 E1.C.o: Event Input 1 Control Alarm Output 11 E2.C.o: Event Input 2 Control Alarm Output	2	R/W	0	65535
49	A3MD	Alarm 3 operation mode	0 NoRM: Normal alarm action 1 LtCH: Latching alarm action 2 HoLd: Hold alarm action 3 Lt.Ho: Latching & Hold action 4 SP.Ho: Set point holding alarm	0	R/W	0	65535
50	A3HY	Hysteresis control of alarm 3	Low: 0.1°C High: 50.0°C(90.0°F)	0.1°C (0.2°F)	R/W	0	65535
51	A3FT	Alarm 3 failure transfer mode	0 OFF: Alarm output OFF if sensor fails 1 ON: Alarm output ON if sensor fails	1	R/W	0	65535
52	A3SP	Alarm 3 set point	Low: -1128 High: 2512	100.0°C (212.0°F)	R/W	-19999	45536
53	A3DV	Alarm 3 deviation value	Low: -1111 High: 2529	10.0°C (18.0°F)	R/W	-19999	45536

Modbus Register Address	Parameter Notation	Parameter Description	Range	Default Value	Data Access Type	Scale	
						Low	High
54	A4OT	Alarm 4 output	0 AL3 : Alarm 4 output 1 rAL3 : Reverse Alarm 4 Output	0	R/W	0	65535
55	A4FN	Alarm 4 function for alarm output	0 NoNE : No alarm function 1 tIMr : Dwell timer action 2 dE.HI : Deviation high alarm 3 dE.Lo : Deviation low alarm 4 db.HI : Deviation band out of band alarm 5 db.Lo : Deviation band in band alarm 6 PV.HI : Process value high alarm 7 PV.Lo : Process value low alarm 8 H.bK : Heater break alarm 9 H.St : Heater short alarm	2	R/W	0	65535
56	A4MD	Alarm 4 operation mode	0 NoRM : Normal alarm action 1 LtCH : Latching alarm action 2 HoLd : Hold alarm action 3 Lt.Ho : Latching & Hold action 4 SP.Ho : Set point holding alarm	0	R/W	0	65535
57	A4HY	Hysteresis control of alarm 4	Low: 0.1°C High: 50.0°C(90.0°F)	0.1 °C (0.2°F)	R/W	0	65535
58	A4FT	Alarm 4 failure transfer mode	0 OFF : Alarm output OFF if sensor fails 1 ON : Alarm output ON if sensor fails	1	R/W	0	65535
59	A4SP	Alarm 4 set point	Low: -1128 High: 2512	100.0°C (212.0°F)	R/W	-19999	45536
60	A4DV	Alarm 4 deviation value	Low: -1111 High: 2529	10.0 °C (18.0 °F)	R/W	-19999	45536
61	BPL1	Bumpless transfer value of MV1	Low: 0.00 High: 100.00	-----	R	0	65535

Modbus Register Address	Parameter Notation	Parameter Description	Range	Default Value	Data Access Type	Scale	
						Low	High
62	BPL2	Bumpless transfer value of MV2	Low: 0.00 High: 100.00	-----	R	0	65535
63	CJCL	Sense voltage during cold junction calibration low	Low: 0 High: 7552	-----	R	0	65535
64	PV64	Process value	Low: -19999 High: 45536	-----	R	-19999	45536
65	SV65	Current set point value	Low: SP1L High: SP1H	-----	R	-19999	45536
66	MV1 66	Output 1 %Value (Heating)	Low: 0.00 High: 100.00 %	-----	R (R/W,Manual)	0	65535
67	MV2 67	Output 2 %Value (Cooling)	Low: 0.00 High: 100.00 %	-----	R (R/W,Manual)	0	65535
68	TIMER	Remaining time of dwell timer	Low: 0.0 High: 4553.6	-----	R	-19999	45536
69	EROR	Error code	Low: 0 High: 65535	-----	R	0	65535
70	MODE	Operation mode & alarm status	Low: 0 High: 65535	-----	R	0	65535
71	PROG71	Program code	CMP-2415:22.XX CMP-4815:62.XX CMP-4915:82.XX CMP-9415:83.XX CMP-7215:72.XX CMP-9615:42.XX CMP-R:23.XX	-----	R	0	65535
72	CMND	Command code	Low: 0 High: 65535	-----	R/W	0	65535
73	JOB1	Job code	Low: 0 High: 65535	-----	R/W	0	65535
74	JOB2	Job code	Low: 0 High: 65535	-----	R/W	0	65535
75	JOB3	Job code	Low: 0 High: 65535	-----	R/W	0	65535
76	CJCT	Cold Junction Temperature	Low: -4000 High: 9000	-----	R	-19999	45536
77	ADLO	mV calibration low coefficient	Low: -1999 High: 1999	-----	R/W	-19999	45536

Modbus Register Address	Parameter Notation	Parameter Description	Range	Default Value	Data Access Type	Scale	
						Low	High
78	ADHI	mV calibration high coefficient	Low: -1999 High: 1999	-----	R/W	-19999	45536
79	RTDL	RTD calibration low coefficient	Low: -1999 High: 1999	-----	R/W	-19999	45536
80	RTDH	RTD calibration high coefficient	Low: -1999 High: 1999	-----	R/W	-19999	45536
81	CJLO	Cold junction calibration low coefficient	Low: -5.00 High: 40.00	-----	R/W	-19999	45536
82	CJHI	Cold junction calibration high coefficient	Low: -1999 High: 1999	-----	R/W	-19999	45536
83	V1L	V1 calibration low coefficient	Low: -1999 High: 1999	-----	R/W	-19999	45536
84	V1G	V1 calibration high coefficient	Low: -1999 High: 1999	-----	R/W	-19999	45536
85	MA1L	MA1 calibration low coefficient	Low: -1999 High: 1999	-----	R/W	-19999	45536
86	MA1G	MA1 calibration high coefficient	Low: -1999 High: 1999	-----	R/W	-19999	45536
87	V2L	V2 calibration low coefficient	Low: -1999 High: 1999	-----	R/W	-19999	45536
88	V2G	V2 calibration high coefficient	Low: -1999 High: 1999	-----	R/W	-19999	45536
89	MA2L	MA2 calibration low coefficient	Low: -1999 High: 1999	-----	R/W	-19999	45536

Modbus Register Address	Parameter Notation	Parameter Description	Range	Default Value	Data Access Type	Scale	
						Low	High
90	MA2G	MA2 calibration high coefficient	Low: -1999 High: 1999	-----	R/W	-19999	45536
91	PL1L	Power limit 1 low	Low: 0 High: PL1H or 50%	0	R/W	0	65535
92	PL1H	Power limit 1 high	Low: PL1L High: 100 %	100	R/W	0	65535
93	PL2L	Power limit 2 low	Low: 0 High: PL2H or 50%	0	R/W	0	65535
94	PL2H	Power limit 2 high	Low: PL2L High: 100 %	100	R/W	0	65535

Modbus Register Address	Parameter Notation	Parameter Description	Range	Default Value	Data Access Type	Scale	
						Low	High
95	SEL1	Select 1'st parameter for user menu	0 <i>NoNE</i> : No Parameter selected 1 <i>SP2</i> : SP2 moved to USER Menu 2 <i>SP3</i> : SP3 moved to USER Menu 3 <i>SP4</i> : SP4 is moved to USER Menu 4 <i>SP5</i> : SP5 is moved to USER Menu 5 <i>SP6</i> : SP6 is moved to USER Menu 6 <i>SP7</i> : SP7 is moved to USER Menu 7 <i>INPt</i> : INPT is moved to USER Menu 8 <i>Pb</i> : PB is moved to USER Menu 9 <i>tI</i> : TI is moved to USER Menu 10 <i>td</i> : TD is moved to USER Menu 11 <i>o1HY</i> : O1HY is moved to USER Menu 12 <i>CPb</i> : CPB is moved to USER Menu 13 <i>db</i> : DB is moved to USER Menu 14 <i>A1HY</i> : A1HY is moved to USER Menu 15 <i>A1SP</i> : A1SP is moved to USER Menu 16 <i>A2HY</i> : A2HY is moved to USER Menu 17 <i>A2SP</i> : A2SP is moved to USER Menu 18 <i>A3HY</i> : A3HY is moved to USER Menu 19 <i>A3SP</i> : A3SP is moved to USER Menu 20 <i>A4HY</i> : A4HY is moved to USER Menu 21 <i>A4SP</i> : A4SP is moved to USER Menu	0	R/W	0	65535
96	SEL2	Select 2'nd parameter for user menu	Same as SEL1	0	R/W	0	65535
97	SEL3	Select 3'rd parameter for user menu	Same as SEL1	0	R/W	0	65535
98	SEL4	Select 4'th parameter for user menu	Same as SEL1	0	R/W	0	65535

Modbus Register Address	Parameter Notation	Parameter Description	Range	Default Value	Data Access Type	Scale	
						Low	High
99	SEL5	Select 5'th parameter for user menu	Same as SEL1	0	R/W	0	65535
100	SEL6	Select 6'th parameter for user menu	Same as SEL1	0	R/W	0	65535
101	SEL7	Select 7'th parameter for user menu	Same as SEL1	0	R/W	0	65535
102	SEL8	Select 8'th parameter for user menu	Same as SEL1	0	R/W	0	65535
103	OFS1	Option function 1 selection	CMP-4915/CMP-9415 /CMP-7215/CMP-9615: 0 NoNE: Not selected 1 R485: RS-485 and Remote SP	0	R/W	0	65535
			CMP-4815: 0 NoNE: Not selected 1 R485: RS-485				
			CMP-2415/CMP-R: 0 NoNE: Not selected 1 R485: RS-485 2 EI1: Event 1 input 3 CT1: CT 1 input 4 4-20: 4-20mA retransmission output 5 0-20: 0-20mA retransmission output 6 0-5V: 0-5VDC retransmission output 7 1-5V: 1-5VDC retransmission output 8 0-10: 0-10VDC retransmission output				
104	OFS2	Option function 2 selection	CMP-4915/CMP-9415 /CMP-7215/CMP-9615: 0 NoNE: Not selected 1 CT1: CT1 input and Remote SP 2 CT1.2: CT1,CT2 inputs and Remote SP	0	R/W	0	65535

Modbus Register Address	Parameter Notation	Parameter Description	Range	Default Value	Data Access Type	Scale	
						Low	High
			<u>CMP-4815:</u> 0 <i>NoNE</i> : Not selected 1 <i>EI1.2</i> : Event input 1 and Event input 2 2 <i>EI.CT</i> : Event input 1 and CT2 input 3 <i>CT1.2</i> : CT1 and CT2 inputs				
105	OFS3	Option function 3 selection	<u>CMP-4915/CMP-9415/CMP-9615:</u> 0 <i>NoNE</i> : Not selected 1 <i>4-20</i> : 4-20mA retransmission output and Remote SP 2 <i>0-20</i> : 0-20mA retransmission output and Remote SP 3 <i>0-5V</i> : 0-5VDC retransmission output and Remote SP 4 <i>1-5V</i> : 1-5VDC retransmission output and Remote SP 5 <i>0-10</i> : 0-10VDC retransmission output and Remote SP	0	R/W	0	65535

Modbus Register Address	Parameter Notation	Parameter Description	Range	Default Value	Data Access Type	Scale	
						Low	High
			CMP-7215: 0 NoNE: Not selected 1 4-20: 4-20mA retransmission output and Remote SP 2 0-20: 0-20mA retransmission output and Remote SP 3 0-5V: 0-5VDC retransmission output and Remote SP 4 1-5V: 1-5VDC retransmission output and Remote SP 5 0-10V: 0-10VDC retransmission output and Remote SP 6 AL4: Alarm 4 Output CMP-4815: 0 NoNE: Not selected 1 4-20: 4-20mA retransmission output 2 0-20: 0-20mA retransmission output 3 0-5V: 0-5VDC retransmission output 4 1-5V: 1-5VDC retransmission output 5 0-10: 0-10VDC retransmission output 6 AL3: Alarm 3 output				
106	RETY	Retransmission type	0 rE.PV: Retransmit process value 1 rE.SV: Retransmit set point value	0	R/W	0	65535
107	RELO	Retransmission low scale value	Low: -19999 High: 45536	0.0°C (32.0°F)	R/W	-19999	45536
108	REHI	Retransmission high scale value	Low: -19999 High: 45536	100.0 °C (212.0 °F)	R/W	-19999	45536
109	ADDR	Address assignment of digital communication	Low: 1 High: 255	-----	R/W	0	65535

Modbus Register Address	Parameter Notation	Parameter Description	Range	Default Value	Data Access Type	Scale	
						Low	High
110	BAUD	Baud rate of digital communication	0 2.4: 2.4 Kbits/s baud rate 1 4.8: 4.8 Kbits/s baud rate 2 9.6: 9.6 Kbits/s baud rate 3 14.4: 14.4 Kbits/s baud rate 4 19.2: 19.2 Kbits/s baud rate 5 28.8: 28.8 Kbits/s baud rate 6 38.4: 38.4 Kbits/s baud rate	2	R/W	0	65535
111	DATA	Data bit count of digital communication	0 7bit: 7 data bits 1 8bit: 8 data bits	1	R/W	0	65535
112	PARI	Parity bit of digital communication	0 EVEN: Even parity 1 Odd: Odd parity 2 NoNE: No parity bit	0	R/W	0	65535
113	STOP	Stop bit count of digital communication	0 1bit: One stop bit 1 2bit: Two stop bits	0	R/W	0	65535
114	CT1R	Reading of CT 1	Low: 0.0 High: 150.0	0.0	R	0	65535
115	CT2R	Reading of CT 2	Low: 0.0 High: 150.0	0.0	R	0	65535
116	HBEN	Enable Heater break detection	0 oFF: Off 1 oN: On	0	R/W	0	65535
117	HBHY	Heater break hysteresis	Low: 0.1 High: 50.0	0.1	R/W	0	65535
118	HB1T	Triple point current for heater break 1	Low: 0.0 High: 120.0	0.0	R/W	0	65535
119	HB2T	Triple point current for heater break 2	Low: 0.0 High: 120.0	0.0	R/W	0	65535
120	HSEN	Enable Heater short detection	0 oFF: Off 1 oN: On	0	R/W	0	65535
121	HSHY	Heater short hysteresis	Low: 0.1 High: 50.0	0.1	R/W	0	65535
122	HS1T	Triple point current for heater short 1	Low: 0.0 High: 120.0	50.0	R/W	0	65535

Modbus Register Address	Parameter Notation	Parameter Description	Range	Default Value	Data Access Type	Scale	
						Low	High
123	HS2T	Triple point current for heater short 2	Low: 0.0 High: 120.0	50.0	R/W	0	65535
124	RMSP	Remote SP type	0 4-20: 4-20mA retransmission output 1 0-20: 0-20mA retransmission output 2 0-5V: 0-5VDC retransmission output 3 1-5V: 1-5VDC retransmission output 4 0-10: 0-10VDC retransmission output	0	R/W	0	65535
125	RINL	Remote SP Input low scale value	Low: -19999 High: RINH-50	-17.8°C (0.0°F)	R/W	-19999	45536
126	RINH	Remote SP Input high scale value	Low: RINL+50 High: 45536	93.3°C (200.0°F)	R/W	-19999	45536
127	FILE	Default File Selection	0 dFLt: Default Menu 1 Ld.Us: Load User Setting 2 St.Us: Store User Setting	0	R/W	0	65535
128	PV	Process value	Low: -19999 High: 45536	-----	R	-19999	45536
129	SV	Current set point value	Low: SP1L High: SP1H	-----	R	-19999	45536
130	MV1	Output 1 percentage value (Heating)	Low: 0.00 High: 100.00	-----	R (R/W, manual mode)	0	65535
131	MV2	Output 2 percentage value (Cooling)	Low: 0.00 High: 100.00	-----	R (R/W, manual mode)	0	65535
132	PASS	Password entry	Low: 0 High: 9999	0	R/W	0	65535
133	CODE	Security code for parameter protection	Low: 0 High: 9999 0 = unprotected 1000 = user mode unprotected 9999 = SPx(1 to 7) unprotected	0	R/W	0	65535
134	OFSTL	Offset value for low point calibration	Low: -1999 High: 1999	0	R/W	-19999	45536

Modbus Register Address	Parameter Notation	Parameter Description	Range	Default Value	Data Access Type	Scale	
						Low	High
135	OFSTH	Offset value for high point calibration	Low: -1999 High: 1999	0	R/W	-19999	45536
136	CALO	Input signal value during low point calibration	Low: -19999 High: CAHI-1	0	R/W	-19999	45536
137	CAHI	Input signal value during high point calibration	Low: CALO+1 High: 45536	1000	R/W	-19999	45536
138	...	Reserved	...	...	...	...	...
139	...	Reserved	...	...	...	...	...
140	PROG	Program code	Same as PROG71	-----	R	0	65535
141	E1FN	Event input 1 function	0 NoNE: none 1 SP2: SP2 activated to replace SP1 2 rS.A1: Reset alarm 1 output 3 rS.A2: Reset alarm 2 output 4 rS.A3: Reset alarm 3 output 5 rS.A4: Reset alarm 4 output 6 rS.Ao: Reset all alarm outputs 7 CA.LH: Cancel alarm latch 8 d.o1: Disable output 1 9 d.o2: Disable output 2 10 d.o12: Disable output 1 and 2 11 LoCK: Lock all parameters 12 AU.MA: Switch Auto and Manual control mode 13 F.trA: Failure Transfer 14 AL.oN: EI Control Alarm Output	0	R/W	0	65535
142	E2FN	Event input 2 function	1 SP3: SP3 activated to replace SP1 Others: Same as E1FN	0	R/W	0	65535

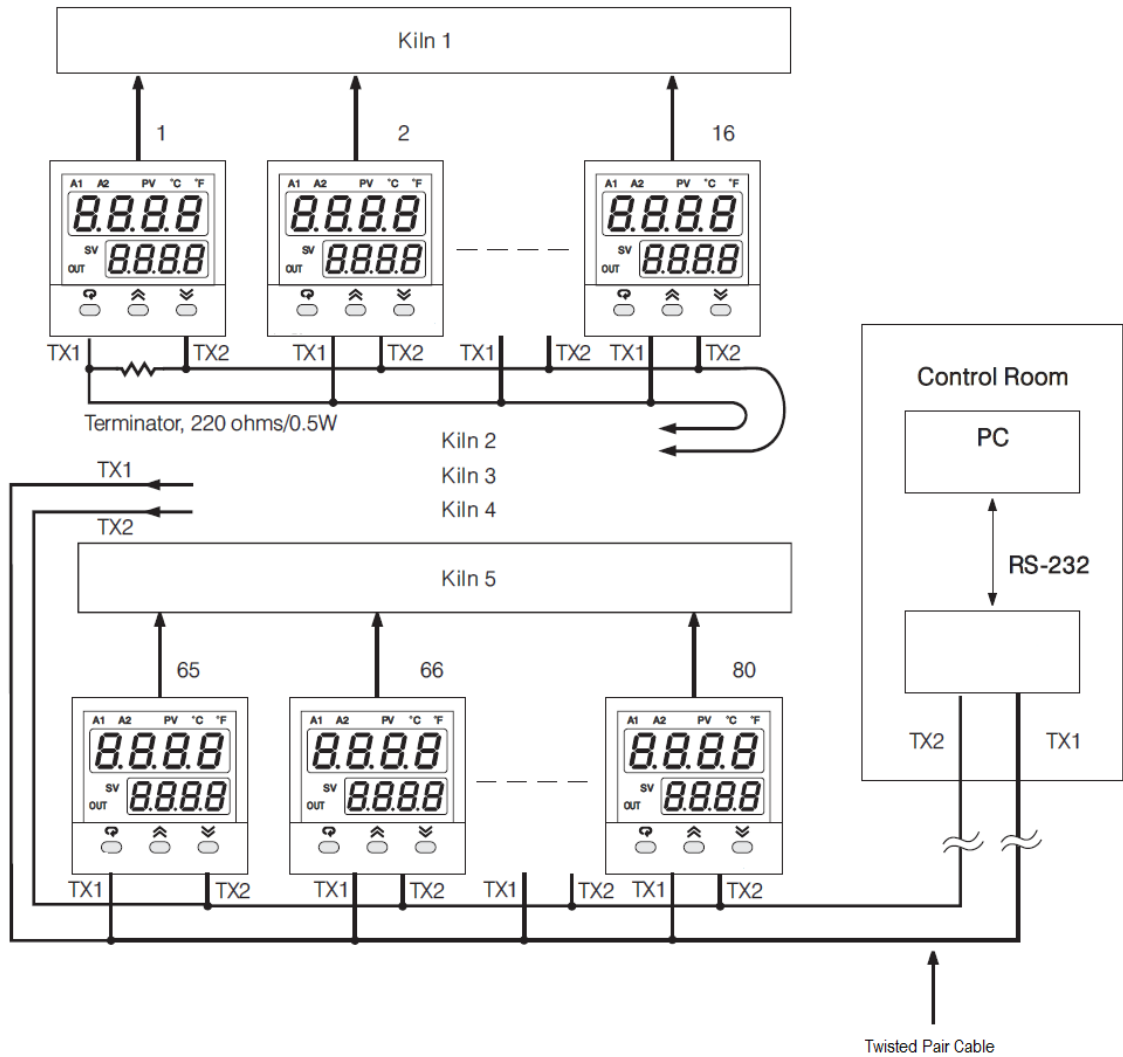
Modbus Register Address	Parameter Notation	Parameter Description	Range	Default Value	Data Access Type	Scale	
						Low	High
143	E3FN	Event input 3 function	0 NoNE: none 1 SP4: SP4 activated to replace SP1 2 rS.A1: Reset alarm 1 output 3 rS.A2: Reset alarm 2 output 4 rS.A3: Reset alarm 3 output 5 rS.A4: Reset alarm 4 output 6 rS.Ao: Reset all alarm outputs 7 CA.LH: Cancel alarm latch 8 d.o1: Disable output 1 9 d.o2: Disable output 2 10 d.o12: Disable output 1 and 2 11 LoCK: Lock all parameters 12 AU.MA: Switch Auto and Manual control mode 13 F.trA: Failure Transfer	0	R/W	0	65535
144	E4FN	Event input 4 function	1 SP5: SP5 activated to replace SP1 Others: Same as E3FN	0	R/W	0	65535
145	E5FN	Event input 5 function	1 SP6: SP6 activated to replace SP1 Others: Same as E3FN	0	R/W	0	65535
146	E6FN	Event input 6 function	1 SP7: SP7 activated to replace SP1 Others: Same as E3FN	0	R/W	0	65535
147	A1DL	Alarm 1 Delay	Low: 00.00 High:99.59	00.00	R/W	0	65535
148	A2DL	Alarm 2 Delay	Low: 00.00 High:99.59	00.00	R/W	0	65535
149	A3DL	Alarm 3 Delay	Low: 00.00 High:99.59	00.00	R/W	0	65535

Modbus Register Address	Parameter Notation	Parameter Description	Range	Default Value	Data Access Type	Scale	
						Low	High
150	A4DL	Alarm 4 Delay	Low: 00.00 High:99.59	00.00	R/W	0	65535

4.6 RS 485 Communication in Controller

A Tile making plant has 5 production lines. Each production line is equipped with 16 Controllers to control the temperature for the Kiln. The foreman wants to be able to program the controllers and monitor the process in the control room for the purpose of improving quality and productivity. A cost effective solution for the above application is to use 80 controllers with RS-485 communication plus a converter and PC based software for this application.

The system is installed as shown in the following diagram.



4-9.RS-485 Application

6 Communication

This chapter explains the Modbus Communication protocol of the controller using RS-485 communication. This supports only RTU mode. Data is transmitted as 8 bit binary bytes with 1 start bit, 1 stop bit and optional parity checking (None, Odd, Even). Baud rate may be set to 2400, 4800, 9600, 14400, 19200, 28800 and 38400 BPS.

6.1 Functions Supported

Only function code 03, 06 and 16 are available for this series of controllers. The message formats for each function code are described as follows.

6.1.1 Function Code 03: Read Holding Registers

Query (From Master)	Response (From Slave)
Slave address(1-247)	←
Function code(3)	←
Starting address of register Hi (0)	Byte count
Starting address of register Lo (0-79)	Data1Hi
Starting address of register Lo (128-131)	Data1Lo
No.ofwordsHi(0)	Data2Hi
No.ofwordsLo(1-79)	Data2Lo
CRC16Hi	.
CRC16Lo	.
	CRC16Hi
	CRC16Lo

6-1.Function Code 03

6.1.2 Function Code 06: Preset Single Register

Query (From Master)	Response (From Slave)
Slave address (1-247)	←
Function code (6)	←
Register address Hi (0)	←
Register address Lo (0-79, 128-131)	←
Data Hi	←
Data Lo	←
CRC16 Hi	←
CRC16 Lo	←

6-2.Function Code 06

6.1.3 Function Code 16: Preset Multiple Register

Query (From Master)	Response (From Slave)
Slave address(1-247)	←
Function code(16)	←
Starting address of register Hi (0)	←
Starting address of register Lo (0-79)	←
Starting address of register Lo (128-131)	←
No.ofwordsHi(0)	←
No.ofwordsLo(1-79)	←
Bytes Count (2-158)	CRC16Hi
Data 1 Hi	CRC16Lo
Data 1 Lo	
Data 2 Hi	
Data 2 Lo	
.	
.	
.	
.	
CRC16Hi	
CRC16Lo	

6-3.Function Code 16

6.2 Exception Responses

If the controller receives a message which contains a corrupted character (parity check error, framing error etc.), or if the CRC16 check fails, the controller ignores the message. However, if the controller receives a syntactically correct message which contains an illegal value, it will send an exception response, consisting of five bytes as follows:

Slave address +offset function code + exception code + CRC16 Hi +CRC16 Lo

Where the offset function code is obtained by adding the function code with 128 (i.e. function 3 becomes H'83), and the exception code is equal to the value contained in the following table.

Exception Code	Description	Reason
1	Bad Function Code	Function code is not supported by the controller
2	Illegal Data Addresses	Register address out of range
3	Illegal Data Value	Data value out of range or attempt to write a read-only or protected data

6-4.Exception Code

6.3 Parameter Mapping

The parameter mapping of Modbus address is available in Parameters Description

6.3.1 Error Code

The description of Error code is explained below

Error Code	Display Symbol	Description & Reason	Corrective Action
4	ER04	Illegal setup values used: COOL is used for OUT2 when DIRT (cooling action) is used for OUT1, or when PID mode is not used for OUT1 (PB =0 and/or TI=0)	Check and correct setup values of OUT2,PB1, PB2, TI1, TI2 and OUT1. IF OUT2 is needed for cooling control, the controller should use PID mode (PB≠ 0 and TI≠ 0) and OUT1 should use reverse mode (heating action), otherwise, OUT2 cannot be used for cooling control
10	ER10	Communication error : bad function code	Correct the communication software to meet the protocol requirements.
11	ER11	Communication error : register address out of range	Do not issue an over range address of register to the slave
14	ER14	Communication error : attempt to write a read only data	Do not write a read only data or a protected data to the slave.
15	ER15	Communication error : write a value which is out of range to a register	Do not write an over range data to the slave register
16	EIER	Event Input Error: Two or more event inputs are set to the same function	Do not set the same function in two or more Event Input Function parameters (E1FN through E6FN)
26	ATER	Auto tuning Error: Failed to perform auto-tuning function	<ol style="list-style-type: none"> 1. The PID values obtained after auto-tuning process are out of range. Retry auto-tuning. 2. Do not change the set point value during auto-tuning process. 3. Use manual tuning instead of auto-tuning process. 4. Do not set a zero value for TI. 5. Do not set a zero value for PB. 6. Touch RESET key
29	EEPR	EEPROM can't be written correctly	Return to factory for repair.
30	CJER	Cold junction compensation for Thermocouple malfunction	Return to factory for repair.
39	SBER	Input sensor break, or input current below 1 mA if 4-20 mA is used, or input voltage below 0.25V if 1 - 5V is used	Replace input sensor.
40	AADER	A to D converter or related component(s) malfunction	Return to factory for repair.

6-5.Error Code

6.3.2 Mode

The Value of the Mode Register is as below.

Value	Mode
H'000X	Normal mode
H'010X	Calibration mode
H'020X	Auto-tuning mode
H'030X	Manual control mode
H'040X	Failure mode
H'0X00	Alarm status is off
H'0x01	Alarm status is on

6-6.Operation Mode

6.3.3 PROG Code

The Program Code is defined in the below table.

Program Code	Model No
22.XX	CMP-2415
62.XX	CMP-4815
82.XX	CMP-4915
83.XX	CMP-9415
72.XX	CMP-7215
42.XX	CMP-9615
23.XX	CMP-R

6-7.Program Code

6.3.4 Scaling

The scale high/low values are defined in the following table for SP1, INLO, INHI, SP1L, SP1H, PV, SV, RELO and REHI

Condition	Scale Low	Scale High
Non-Linear Input	-1999.9	4553.6
Linear Input DP=0	-19999	45536
Linear Input DP=1	-1999.9	4553.6
Linear Input DP=2	-199.99	455.36
Linear Input DP=3	-19.999	45.536

6-8.Scaling for PV, SV, SP1, INLO,INHI,SP1L,SP1H,RELO,REHI

The scale high/low values are defined in the following table for PB, O1HY, RR, O2HY and ALHY

Condition	Scale Low	Scale High
Non-Linear Input	0.0	6553.5
Linear Input DP=0	0	65535
Linear Input DP=1	0.0	6553.5
Linear Input DP=2	0.00	655.35
Linear Input DP=3	0.000	65.535

6-9.Scaling for PB, O1HY, RR, O2HY, ALHY

6.4 Data Conversion

The word data's are regarded as unsigned (positive) Integer data in the Modbus message. However, the actual value of the parameter may be a negative value with the decimal point. The high/low scale values for each parameter are used for the purpose of such conversion.

Let

M = Value of Modbus message

A = Actual value of the parameter

SL = Scale low value of the parameter

SH = Scale high value of the parameter

The conversion formulas are as follows:

$M = ($

$A = (($

6.5 Communication Examples

6.5.1 Read PV, SV, MV1 and MV2

Send the following command to the controller via communication port

	03	00	H'40 H'80	00	04	HI	LO
Slave Address	Function Code	Starting Address		No of Words		CRC16	

6.5.2 Perform Reset Function (same effect as pressing R key)

Query

	06	00	H'48	H'68	H'25	HI	LO
Slave Address	Function Code	Register Address		Data Hi /Lo		CRC16	

6.5.3 Enter Auto Tuning Mode

Query

	06	00	H'48	H'68	H'28	HI	LO
Slave Address	Function Code	Register Address		Data Hi /Lo		CRC16	

6.5.4 Enter Manual Control Mode

Query

	06	00	H'48	H'68	H'27	HI	LO
Slave Address	Function Code	Register Address		Data Hi /Lo		CRC16	

6.5.5 Read All Parameters

Query

	03	00	00	00	H'50	HI	LO
Slave Address	Function Code	Starting Address		No of Words		CRC16	

6.5.6 Modify Calibration Co-efficient

Preset the CMND register with 26669 before attempting to change the Calibration coefficient

	06	00	H'48	H'68	H'29	HI	LO
Slave Address	Function Code	Register Address		Data Hi /Lo		CRC16	

