Modbus RTU Protocol

USER MANUAL

For COMMUNICATION

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User Manual Guide

- Please familiarize yourself with the information in this manual before using the product.
- This manual provides detailed information on the product's features. It does not offer any guarantee concerning matters beyond the scope of this manual.
- This manual may not be edited or reproduced in either part or whole without permission.
- A user manual is not provided as part of the product package. Visit our web site (www.nivelco.com) to download a copy.
- The manual's content may vary depending on changes to the product's software and other unforeseen developments within NIVELCO, and is subject to change without prior notice. Upgrade notice is provided through out homepage.
- We contrived to describe this manual more easily and correctly. However, if there are any corrections or questions, please notify us these on our homepage.

Communication Protocol

PMG–500 Series is accepted to Modbus RTU Protocol.

Broadcast command Is not supported.

Table of Contents

1 Modbus RTU Protocol

1.1 Read Coil Status(Func01–01H)

Read the output of ON/OFF(OX reference, Coil) status in Slave device.

1) Query(Master)

Slave Address	Function	Starting Address		No. of Points		Error Check(CRC16)	
		High	Low	High	Low	Low	High
1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte

CRC16

2) Response(Slave)

Slave Address	Function	Byte Count	Data	Data	Data	Error Check(CRC16)	
						Low	High
1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte

CRC16

If read the output status of 10 within Coil 000001(0000 H) to 000010(0009 H) on the Slave(Address 17) from the Master.

- Query(Master)

Slave Address	Function	Starting Address		No. of Points		Error Check(CRC16)	
		High	Low	High	Low	Low	High
11 H	02 H	00 H	00 H	00 H	0A H	## H	## H

If the values of Coil 000008(0007 H) to 000001(0000 H) on Slave are “ON-ON-OFF-OFF-ON-ON-OFF-ON” and the values of Coil 000010(0009 H) to 000009(0008 H) are “OFF-ON”.

- Response(Slave)

Slave Address	Function	Byte Count	Data (000008 to 000001)	Data (000010 to 000009)	Error Check(CRC16)	
					Low	High
11 H	01 H	02 H	CD H	01 H	## H	## H

1.2 Read Input Status(Func02–02H)

Read the input(1X reference) ON/OFF Status in Slave device.

(1) Query(Master)

Slave Address	Function	Starting Address		No. of Points.		Error Check(CRC16)	
		High	Low	High	Low	Low	High
1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte

CRC16

(2) Response(Slave)

Slave Address	Function	Byte Count	Data	Data	Data	Error Check(CRC16)	
						Low	High
1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte

CRC16

If read the input status of 10 (ON: 1, OFF:0) within 100001(0000 H) to 100010(0009 H) on Slave(Address 17) from the Master.

- Query(Master)

Slave Address	Function	Starting Address		No. of Points		Error Check(CRC16)	
		High	Low	High	Low	Low	High
11 H	02 H	00 H	00 H	00 H	0A H	## H	## H

If the values of 100008(0007 H) to 100001(0000 H) on the Slave are “ON-ON-OFF-OFF-ON-ON-OFF-ON” and the values of 100010(0009 H) to 100009(0008 H) are “OFF-ON”.

- Response(Slave)

Slave Address	Function	Byte Count	Data (100008 to 100001)	Data (100010 to 100009)	Error Check(CRC16)	
					Low	High
11 H	02 H	02 H	CD H	01 H	## H	## H

1.3 Read Holding Registers(Func03–03H)

Read the Binary data of Holding Registers(4X reference) in Slave device.

(1) Query(Master)

Slave Address	Function	Starting Address		No. of Points		Error Check(CRC16)	
		High	Low	High	Low	Low	High
1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte

CRC16

(2) Response(Slave)

Slave Address	Function	Byte Count	Data		Data		Data		Error Check(CRC16)	
			High	Low	High	Low	High	Low	Low	High
1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte

CRC16

If read the value of 2 within Holding Register 400001(0000 H) to 400002(0001 H) on Slave(Address 17) from the Master.

- Query(Master)

Slave Address	Function	Starting Address		No. of Points		Error Check(CRC16)	
		High	Low	High	Low	Low	High
11 H	03 H	00 H	00 H	00 H	02 H	## H	## H

If the values of 40001(0000 H) and 40002(0001 H) on Slave are respectively “555(22B H)” and “100(64 H)”.

- Response(Slave)

Slave Address	Function	Byte Count	Data		Data		Error Check(CRC16)	
			High	Low	High	Low	Low	High
11 H	03 H	04 H	02 H	2B H	00 H	64 H	## H	## H

1.4 Read Input Registers(Func04–04H)

Read the Binary data of Input Registers(3X reference) in Slave device.

(1) Query(Master)

Slave Address	Function	Starting Address		No. of Points		Error Check(CRC16)	
		High	Low	High	Low	Low	High
1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte

CRC16

(2) Response(Slave)

Slave Address	Function	Byte Count	Data	Data	Data	Error Check(CRC16)	
						Low	High
1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte

CRC16

If read the value of 2 within Input Register 300001(0000 H) to 300002(0001 H) on Slave from the Master.

- Query(Master)

Slave Address	Function	Starting Address		No. of Points		Error Check(CRC16)	
		High	Low	High	Low	Low	High
11 H	04 H	00 H	00 H	00 H	02 H	## H	## H

If the values of 300001(0000 H) and 300002(0001 H) are respectively “10(A H)” and “20(14 H)”.

- Response(Slave)

Slave Address	Function	Byte Count	Data		Data		Error Check(CRC16)	
			High	Low	High	Low	Low	High
11 H	04 H	04 H	00 H	0A H	00 H	14 H	## H	## H

1.5 Force single coil (Func 05–05H)

Turns ON (FF00 H) or OFF (0000 H) of single coil (0X reference) status within slave device.

(1) Query (Master)

Slave address	Function	Starting address		Preset data		Error check (CRC16)	
		High	Low	High	Low	Low	High
1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte

CRC16

(2) Response (Slave)

Slave address	Function	Starting address		Preset data		Error check (CRC16)	
		High	Low	High	Low	Low	High
1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte

CRC16

If Coil 000001 (0000 H) turns ON of Slave (Address 17) from Master.

- Query (Master)

Slave address	Function	Starting address		Preset data		Error check (CRC16)	
		High	Low	High	Low	Low	High
11 H	05 H	00 H	00 H	FFH	00 H	## H	## H

- Response (Slave)

Slave address	Function	Starting address		Preset data		Error check (CRC16)	
		High	Low	High	Low	Low	High
11 H	05 H	00 H	00 H	FF H	00 H	## H	## H

1.6 Preset Single Registers(Func06–06H)

Preset the Binary data of single Holding Registers(4X reference) in Slave device.

(1) Query(Master)

Slave Address	Function	Register Address		Preset Data		Error Check(CRC16)	
		High	Low	High	Low	Low	High
1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte

CRC16

(2) Response(Slave)

Slave Address	Function	Register Address		Preset Data		Error Check(CRC16)	
		High	Low	High	Low	Low	High
1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte

CRC16

If write “10(A H)” to Holding Register 400001(0000 H) on Slave(Address 17) from the Master.

- Query(Master)

Slave Address	Function	Starting Address		Preset Data		Error Check(CRC16)	
		High	Low	High	Low	Low	High
11 H	06 H	00 H	00 H	00 H	0A H	## H	## H

- Response(Slave)

Slave Address	Function	Starting Address		Preset Data		Error Check(CRC16)	
		High	Low	High	Low	Low	High
11 H	06 H	00 H	00 H	00 H	0A H	## H	## H

1.7 Preset Multiple Registers(Func16–10H)

Write consecutively the Binary data of Holding Registers(4X reference) in Slave device.

(1) Query(Master)

Slave Address	Function	Starting Address		No. of Register		Byte Count	Data		Data		Error Check (CRC16)	
		High	Low	High	Low		High	Low	High	Low	Low	High
1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte

CRC16

(2) Response(Slave)

Slave Address	Function	Starting Address		No. of Register		Error Check(CRC16)	
		High	Low	High	Low	Low	High
1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte

CRC16

If write “10(A H)” to both 400001(0000 H) and 400002(0001 H) of Holding Register on Slave(Address 17) from the Master.

- Query(Master)

Slave Address	Function	Starting Address		No. of Register		Byte Count	Data		Data		Error Check (CRC16)	
		High	Low	High	Low		High	Low	High	Low	Low	High
11 H	10 H	00 H	00 H	00 H	02 H	04 H	00 H	0A H	00 H	0A H	## H	## H

- Response(Slave)

Slave Address	Function	Starting Address		No. of Register		Error Check(CRC16)	
		High	Low	High	Low	Low	High
11 H	10 H	00 H	00 H	00 H	02 H	## H	## H

Please use the Single Register Write function rather than Multi Register Write function if you use the slave(device) connecting with external devices such as PLC, Graphic Panel, except in the case of download that presets minimum/maximum or basic value of the parameter by input type in PC loader program.

1.8 Exception Response-Error Code

If occurs an error, send a response command and transmit each Exception code after set(1) the highest-level bit of received command(function).

Slave Address	Function(Command)+80 H	Exception Code	Error Check(CRC16)	
			Low	High
1Byte	1Byte	1Byte	1Byte	1Byte

CRC16

- ILLEGAL FUNCTION(Exception Code: 01 H): A command(Function order) that is not supported
- ILLEGAL DATA ADDRESS(Exception Code: 02 H): Starting Address of the queried data is inconsistent with transmittable address from the device
- ILLRGAL DATA VALUE(Exception Code: 03 H): Numbers of queried data are inconsistent with the numbers of transferable data from device
- SLAVE DEVICE FAILURE(Exception Code: 04 H): Not properly complete the queried orders

If read the output status of non-existing coil 001001(03E8 H) [ON: 1, OFF: 0)] on Slave(Address 17) from the Master.

- Query (Master)

Slave Address	Function	Starting Address		No. of Points		Error Check(CRC16)	
		High	Low	High	Low	Low	High
11 H	01 H	03 H	E8 H	00 H	01 H	## H	## H

- Response (Slave)

Slave Address	Function(Command)+80 H	Exception Code	Error Check(CRC16)	
			Low	High
11 H	81 H	02 H	## H	## H

2 Modbus Mapping Table

2.1 Read Coils(Func01) / Write Single Coil (Func05)

No(Address)	Classification	Description	Set Range	Unit	Factory Default
000001(0000)	RUN/STOP	Control Output Run/Stop	0: RUN 1: STOP	-	RUN
000002(0001)	Auto-Tuning Run	Auto-Tuning Run/Stop	0: OFF 1: ON	-	OFF
000003 to 000050	Reserved				

2.2 Read Discrete Inputs (Func02)

No(Address)	Classification	Description	Set Range	Unit	Factory Default
100001(0000)	°C Indicator	Unit Indicator	0: OFF 1: ON	-	-
100002(0001)	°F Indicator	Unit Indicator	0: OFF 1: ON	-	-
100003(0002)	% Indicator	Unit Indicator	0: OFF 1: ON	-	-
100004(0003)	OUT1 Indicator	Control Output 1 Indicator	0: OFF 1: ON	-	-
100005(0004)	OUT2 Indicator	Control Output 2 Indicator	0: OFF 1: ON	-	-
100006(0005)	AT Indicator	Auto-Tuning Indicator	0: OFF 1: ON	-	-
100007(0006)	SV1 Indicator	Multi SV 1 Indicator	0: OFF 1: ON	-	-
100008(0007)	SV2 Indicator	Multi SV 2 Indicator	0: OFF 1: ON	-	-
100009(0008)	SV3 Indicator	Multi SV 3 Indicator	0: OFF 1: ON	-	-
100010(0009)	AL1 Indicator	Alarm Output 1 Indicator	0: OFF 1: ON	-	-
100011(000A)	AL2 Indicator	Alarm Output 2 Indicator	0: OFF 1: ON	-	-
100012(000B)	MAN Indicator	Manual Control Indicator	0: OFF 1: ON	-	-
100013(000C)	DI-1 Input	DI-1 Input Status	0: OFF 1: ON	-	-
100014(000D)	DI-2 Input	DI-2 Input Status	0: OFF 1: ON	-	-
100015 to 100050	Reserved				

2.3 Read Input Registers (Func04)

No(Address)	Classification		Set Range	Unit	Factory Default	Note
300001 to 300100	Reserved					
300101(0064)	-	Product Number H	-	-		
300102(0065)	-	Product Number L	-	-		
300103(0066)	-	Hardware Version	-	-		
300104(0067)	-	Software Version	-	-		
300105 to 300117	Reserved					
300118(0075)	-	Coil status Start Address	-	-	0000	
300119(0076)	-	Coil status Quantity	-	-	0	
300120(0077)	-	Input status Start Address	-	-	0000	
300121(0078)	-	Input status Quantity	-	-	0	
300122(0079)	-	Holding Register Start Address	-	-	0000	
300123(007A)	-	Holding Register Quantity	-	-	0	
300124(007B)	-	Input Register Start Address	-	-	0000	
300125(007C)	-	Input Register Quantity	-	-	0	
300127 to 300200	Reserved					
301001(03E8)	PV	Present Value	-1999 to 9999	℃/℉/-	-	
301002(03E9)	-	Decimal point location	0: 0 2: 0.00 1: 0.0 3: 0.000	-	-	
301003(03EA)	-	Indicator Unit	0: °C 2: % 1: °F 3: OFF	-	-	
301004(03EB)	SV	SV Setting Value	Within L-SV to H-SV	℃/℉/-	0000	
301005(03EC)	H-MV	Heating Side MV	0.0 to 1000 : H 0.0 to H100	%	-	
301006(03ED)	C-MV	Cooling Side MV	0 to 1000 : C 0.0 to C100	%	-	
301007(03EE)	℃ Indicator	Unit Indicator	0: OFF 1: ON	-	-	Bit 0
	℉ Indicator	Unit Indicator	0: OFF 1: ON	-	-	Bit 1
	% Indicator	Unit Indicator	0: OFF 1: ON	-	-	Bit 2
	OUT1 Indicator	Control Output 1 Indicator	0: OFF 1: ON	-	-	Bit 3
	OUT2 Indicator	Control Output 2 Indicator	0: OFF 1: ON	-	-	Bit 4
	AT Indicator	Auto-tuning Indicator	0: OFF 1: ON	-	-	Bit 5
	SV1 Indicator	Multi SV1 Indicator	0: OFF 1: ON	-	-	Bit 6
	SV2 Indicator	Multi SV2 Indicator	0: OFF 1: ON	-	-	Bit 7
	SV3 Indicator	Multi SV3 Indicator	0: OFF 1: ON	-	-	Bit 8
	AL1 Indicator	Alarm Output 1 Indicator	0: OFF 1: ON	-	-	Bit 9
	AL2 Indicator	Alarm Output 2 Indicator	0: OFF 1: ON	-	-	Bit A
	MAN Indicator	Manual Control Indicator	0: OFF 1: ON	-	-	Bit B
	DI-I Input	DI-1 Input Status	0: OFF 1: ON	-	-	Bit C
	DI-2 Input	DI-2 Input Status	0: OFF 1: ON	-	-	Bit D
301008(03EF)	-	Heater Current Value Monitoring	0.0 to 50.0	-	-	

- Consists of the 301007(03EE) Address bit data.

Bit F	Bit E	Bit D	Bit C	Bit B	Bit A	Bit 9	Bit 8
-	-	DI-2 Input	DI-1 Input	MAN Ind.	AL2 Ind.	AL1 Ind.	SV4 Ind.
0	0	0 or 1	0 or 1	0 or 1	0 or 1	0 or 1	0 or 1
1 Byte							

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
SV3 Ind.	SV2 Ind.	AT Ind.	OUT2 Ind.	OUT1 Ind.	% Ind.	°F Ind.	°C Ind.
0 or 1	0 or 1	0 or 1	0 or 1	0 or 1	0 or 1	0 or 1	0 or 1
1 Byte							

2.4 Read Holding Register (Func03) / Write Single Register (Func06) / Write Multiple Registers (Func16).

2.4.1 Parameter 0 Group[Func: 03/06/16, RW: R/W]

- MV Monitoring/Manual Control Setting Group

No(Address)	Parameter	Description	Set Range	Unit	Factory Default
400001(0000)	SV	SV Set Value	Within L-SV to H-SV	°C/°F/-	0
400002(0001)	H-MV	Heating MV	0 to 1000 : H 0.0 to H100	%	-
400003(0002)	C-MV	Cooling MV	0 to 1000 : C 0.0 to C100	%	-
400004(0003)	-	Auto/Manual Control	0: AUTO 1: MAN	-	AUTO
400005 to 400050	Reserved				

2.4.2 Parameter 1 Group[Func: 03/06/16, RW: R/W]

No(Address)	Parameter	Description	Set Range	Unit	Factory Default
400051(0032)	R-S	Control Output Run/Stop	0: RUN 1: STOP	-	RUN
400052(0033)	SV-N	Multi SV Number	0: SV-0 1: SV-1 2: SV-2 3 : SV-3	-	SV-0
400053(0034)	CT-A	Heater Current Monitoring	00.0 to 50.0 (display range)	A	-
400054(0035)	AL1L	Alarm Output 1 Low-limit Set Value	Deviation Alarm: -F.S. to F.S. Absolute Value Alarm: Within the display range	°C/°F/-	1550
400055(0036)	AL1H	Alarm Output 1 High-limit Set Value			
400056(0037)	AL2L	Alarm Output 2 Low-limit Set Value			
400057(0038)	AL2H	Alarm Output 2 High-limit Set Value			
400058(0039)	SV-0	Set Value(SV)-0	Within L-SV to H- SV	°C/°F/-	0000
400059(003A)	SV-1	Set Value(SV)-1			
400060(003B)	SV-2	Set Value(SV)-2			
400061(003C)	SV-3	Set Value(SV)-3			
400062(003D)	AL3L	Alarm Output 3 Low-limit Set Value	Deviation Alarm: -F.S. to F.S. Absolute Value Alarm: Within the display range	°C/°F/-	1550
400063(003E)	AL3H	Alarm Output 3 High-limit Set Value			
400064 to 400100	Reserved				

2.4.3 Parameter 2 Group[Func: 03/06/16, RW: R/W]

No(Address)	Parameter	Description	Set Range	Unit	Factory Default
400101(0064)	AT	Auto-tuning Run/Stop	0: OFF 1: ON	-	OFF
400102(0065)	H-P	Heating Proportional Band	1 to 9999: 000.1 to 999.9	°C/°F/%	10.0
400103(0066)	C-P	Cooling Proportional Band			
400104(0067)	H-I	Heating Integral Time	0000 to 9999	Sec.	0000
400105(0068)	C-I	Cooling Integral Time			
400106(0069)	H-D	Heating Derivative Time	0000 to 9999	Sec.	0000
400107(006A)	C-D	Cooling Derivative Time			
400108(006B)	DB	Dead_Overlap Band	- Proportional Band to 0.0 to + Proportional Band (Based on smaller proportional band value) <ON/OFF – ON/OFF Control> -999 to 0999 (H), -199.9 to 999.9 (L)	Digit	0000
			-99.9 to 099.9 (Analog)	%F.S.	000.0
400109(006C)	REST	Manual Reset	0 to 1000: 000.0 to 100.0	%	050.0
400110(006D)	hHYS	Heating Hysteresis	001 to 100 (Temperature H, Analog) 001.0 to 100.0 (Temperature L)	Digit	002
400111(006E)	hOST	Heating OFF Offset	000 to 100 (Temperature H, Analog) 000.0 to 100.0 (Temperature L)	Digit	000
400112(006F)	cHYS	Cooling Hysteresis	001 to 100 (Temperature H, Analog) 000.1 to 100.0 (Temperature L)	Digit	002
400113(0070)	cOST	Cooling OFF Offset	000 to 100 (Temperature H, Analog) 000.0 to 100.0 (Temperature L)	Digit	000
400114(0071)	L-MV	MV Low-limit Set Value	000.0 to H-MV -0.1 (Heating or Cooling Control) -100.0 to 000.0 (Heating & Cooling Control)	%	000.0 -100.0
400115(0072)	H-MV	MV High-limit Set Value	L-MV+0.1 to 100.0 (Heating or Cooling Control) 000.0 to 100.0 (Heating & Cooling Control)	%	100.0 100.0
400116(0073)	RAMU	Ramp Up Change Rate	000 to 999 (Temperature H, Analog) 000.0 to 999.9 (Temperature L)	Digit	000
400117(0074)	RAMD	Ramp Down Change Rate	000 to 999 (Temperature H, Analog) 000.0 to 999.9 (Temperature L)	Digit	0000
400118(0075)	rUNT	Ramp Time Unit	0: SEC 1: MIN 2: HOUR	-	MIN
400119 to 400150	Reserved				

2.4.4 Parameter 3 Group[Func: 03/06/16, RW: R/W]

No(Address)	Parameter	Description	Set Range		Unit	Factory Default
400151(0096)	IN-T	Input Type	Refer the turn of input specifications		-	TCk1
400152(0097)	UNIT	Sensor Temperature Unit	0: °C 1: °F		-	°C
400153(0098)	L-RG	Analog Low-limit Input Value	Minimum Range to H-RG - F.S.10%		Digit	000.0
400154(0099)	H-RG	Analog High-limit Input Value	L-RG+F.S.10% to Maximum Range		Digit	100.0
400155(009A)	DOT	Scaling Decimal Point	0: 0 1: 0.0 2: 0.00 3: 0.000		-	0.0
400156(009B)	L-SC	Low-limit Scale Value	F.S.		-	000.0
400157(009C)	H-SC	High-limit Scale Value	F.S.		-	100.0
400158(009D)	dUNT	Display Unit	0: °C 1: °F 2: % 3: OFF		-	°C
400159(009E)	IN-B	Input Correction	-999 to 0999 -199.9 to 999.9		Digit	0000
400160(009F)	MAvF	Input Digital Filter	1 to 1200: 000.1 to 120.0		Sec.	000.1
400161(00A0)	L-SV	SV Low-limit Set Value	Input Low-limit Value(L-SC) to H-SV-1Digit		°C/°F %F.S.	-200 000.0
400162(00A1)	H-SV	SV High-limit Set Value	L-SV+1Digit to Input High-limit Value(H-SC)		°C/°F %F.S.	1350 100.0
400163(00A2)	O-FT	Control Output Operation Mode	Standard Type	0: HEAT 1: COOL	-	HEAT
			Heating & Cooling Type	0: HEAT 1: COOL 2: H-C	-	H-C
400164(00A3)	C-MD	Control Type	Standard Control	0: PID 1: ONOF	-	PID
			Heating & Cooling Control	0: PP 1: P.on 2: on.P 3: on.on	-	PP
400165(00A4)	ATT	Auto-tuning Mode	0: TUN1 1: TUN2		-	TUN1
400166(00A5)	OUT1	OUT1 Control Output Selection	0: SSR 1: CURR		-	SSR
400167(00A6)	O1SR	OUT1 SSR Output Type	0: STND 1: CYCL 2: PHAS		-	STND
400168(00A7)	O1MA	OUT1 Current Output Range	0: 4-20 1: 0-20		-	4-20
400169(00A8)	OUT2	OUT2 Control Output Selection	0: SSR 1: CURR		-	SSR
400170(00A9)	O2MA	OUT2 Current Output Range	0: 4-20 1: 0-20		-	4-20
400171(00AA)	H-T	Heating Control Time	Relay output, SSR drive output (standard ON/OFF): 000.1 to 120.0 Current output, SSR drive output: 000.1 to 120.0		Sec.	20.0
400172(00AB)	C-T	Cooling Control Time				
400173 to 400200	Reserved					

2.4.5 Parameter 4 Group[Func: 03/06/16, RW: R/W]

No(Address)	Parameter	Description	Set Range	Unit	Factory Default
400201(00C8)	AL-1	Alarm Output 1 Operation Mode	0: OFF 1: DV[[2:]]DV 3:]DV[4: [DV] 5: PV[[6:]]PV 7: LBA 8: SBA 9: HBA	-	DV[[
400202(00C9)	AL1T	Alarm Output 1 Option	0: AL-A 1: AL-B 2: AL-C 3: AL-D 4: AL-E 5: AL-F	-	AL-A
400203(00CA)	A1HY	Alarm Output 1 Hysteresis	001 to 100 (Temperature H, Analog) 000.1 to 100.0 (Temperature L)	Digit	001
400204(00CB)	A1N	Alarm Output 1 N.O./N.C.	0: NO 1: NC	-	NO
400205(00CC)	A1ON	Alarm Output 1 ON Delay Time	0000 to 3600	Sec.	0000
400206(00CD)	A1OF	Alarm Output 1 OFF Delay Time	0000 to 3600	Sec.	0000
400207(00CE)	AL-2	Alarm Output 2 Operation Mode	0: OFF 1: DV[[2:]]DV 3:]DV[4: [DV] 5: PV[[6:]]PV 7: LBA 8: SBA 9: HBA	-	]]DV
400208(00CF)	AL2T	Alarm Output 2 Option	0: AL-A 1: AL-B 2: AL-C 3: AL-D 4: AL-E 5: AL-F	-	AL-A
400209(00D0)	A2HY	Alarm Output 2 Hysteresis	001 to 100 (Temperature H, Analog) 000.1 to 100.0 (Temperature L)	Digit	001
400210(00D1)	A2N	Alarm Output 2 N.O./N.C.	0: NO 1: NC	-	NO
400211(00D2)	A2ON	Alarm Output 2 ON Delay Time	0000 to 3600	Sec.	0000
400212(00D3)	A2OF	Alarm Output 2 OFF Delay Time	0000 to 3600	Sec.	0000
400213(00D4)	LBaT	LBA Time	0000 to 9999	Sec.	0000
400214(00D5)	Reserved				
400215(00D6)	LBaB	LBA Band	000 to 999 (Temperature H)	℃/℉	002
			000.0 to 999.9 (Temperature L)	℃/℉	002.0
			000.0 to 100.0 (Analog)	%F.S.	000.2
400216(00D7)	AoM1	Analog Transmission Output 1 Mode	0: PV 1: SV 2: H-MV 3: C-MV	-	PV
400217(00D8)	FsL1	Transmission Output 1 Low- limit Value	F.S.	℃/℉/-	-200
400218(00D9)	FsH1	Transmission Output 1 High-limit Value	F.S.		1350
400219(00DA)	ADRS	Communication Address	01 to 99	-	01
400220(00DB)	BPS	Communication Speed	0: 24 1: 48 2: 96 3:192 4: 384	X100 bps	96
400221(00DC)	PRTY	Communication Parity Bit	0: NONE 1: EVEN 2: ODD	-	NONE
400222(00DD)	STP	Communication Stop Bit	0: 1 1: 2	Bit	2
400223(00DE)	RSwT	Communication Response Waiting Time	5 to 99	ms	20
400224(00DF)	COMW	Communication Write	0: EnA 1: DIsA	-	EnA
40225(00E0)	AL-3	Alarm Output 3 Operation Mode	0: OFF 1: DV[[2:]]DV 3:]DV[4: [DV] 5: PV[[6:]]PV 7: LBA 8: SBA 9: HBA	-	]]DV
40226(00E1)	AL3T	Alarm Output 3 Option	**0:** AL-A **1:** AL-B **2:** AL-C **3:** AL-D **4:** AL-E **5:** AL-F	-	AL-A
40227(00E2)	A3HY	Alarm Output 1 Hysteresis	001 to 100 (Temperature H, Analog) 000.1 to 100.0 (Temperature L)	Digit	001
40228(00E3)	A3N	Alarm Output 3 N.O./N.C.	0: NO 1: NC	-	NO
40229(00E4)	A3ON	Alarm Output 3 ON Delay Time	0000 to 3600	Sec.	0000
40230(00E5)	A3OF	Alarm Output 3 OFF Delay Time	0000 to 3600	Sec.	0000
40231(00E6)	AoM2	Analog Transmission 2 mode	0: PV 1: SV 2: H-MV 3: C-MV	-	PV
40232(00E7)	FsL1	Transmission Output 2 Low-limit Value	F.S.	℃/℉/-	-200
40233(00E8)	FsH1	Transmission Output 2 High-limit Value	F.S.		1350
400234 to 400250	Reserved				

2.4.6 Parameter 5 Group[Func: 03/06/16, RW: R/W]

No(Address)	Parameter	Description	Set Range	Unit	Factory Default
400251(00FA)	MtSV	Multi SV	0: 1 1: 2 2: 4	EA	1
400252(00FB)	DI-K	Digital Input Key	0: STOP 1: AIRE 2: AT 3: OFF	-	STOP
400253(00FC)	DI-1	DI-1 Input Terminal Function	0: OFF 1: STOP 2: AIRE 3: MAN 4: MtSV	-	OFF
400254(00FD)	DI-2	DI-2 Input Terminal Function			
400255(00FE)	ItMV	Manual Control, Initial MV	0: AUTO 1: PrMV	-	AUTO
400256(00FF)	PrMV	Manual Control, Preset MV	000.0 to 100.0 (Standard Control) -100.0 to 100.0 (Heating & Cooling Control)	%	000.0
400257(0100)	ErMV	Sensor Error, MV	000.0 to 100.0 (Standard Control) -100.0 to 100.0 (Heating & Cooling Control)	%	000.0
400258(0101)	StMV	Control Stop, MV	000.0 to 100.0 (Standard Control) -100.0 to 100.0 (Heating & Cooling Control)	%	000.0
400259(0102)	StAL	Control Stop, Alarm Output	0: CONT 1: OFF	-	CONT
400260(0103)	USER	User Level	0: STND 1: HIGH	-	STND
400261(0104)	INIT	Parameter Initialization	0: NO 1: YES	-	NO
400262(0105)	LcSV	SV Setting Lock	0: OFF 1: ON	-	OFF
400263(0106)	LcP1	Parameter 1 Group Lock			
400264(0107)	LcP2	Parameter 2 Group Lock			
400265(0108)	LcP3	Parameter 3 Group Lock			
400266(0109)	LcP4	Parameter 4 Group Lock			
400267(010A)	LcP5	Parameter 5 Group Lock			
400268(010B)	PWD	Password Setting	0000: OFF 0002 to 9999: Password Set Range (0001: read-only password)	-	0000
400269 to 400300	Reserved				

2.4.7 User parameter group[Func: 03/06/16, RW: R/W]

The user parameter group can have up to 30 parameters.

No(Address)	Parameter	Description	Set Range	Unit	Factory Default
400301(012C)	PARU	Parameter 0	Set range by each parameter	–	–
400302(012D)		Parameter 1			
400303(012E)		Parameter 2			
400304(012F)		Parameter 3			
400305(0130)		Parameter 4			
400306(0131)		Parameter 5			
400307(0132)		Parameter 6			
400308(0133)		Parameter 7			
400309(0134)		Parameter 8			
400310(0135)		Parameter 9			
400311(0136)		Parameter 10			
400312(0137)		Parameter 11			
400313(0138)		Parameter 12			
400314(0139)		Parameter 13			
400315(013A)		Parameter 14			
400316(013B)		Parameter 15			
400317(013C)		Parameter 16			
400318(013D)		Parameter 17			
400319(013E)		Parameter 18			
400320(013F)		Parameter 19			
400321(0140)		Parameter 20			
400322(0141)		Parameter 21			
400323(0142)		Parameter 22			
400324(0143)		Parameter 23			
400325(0144)		Parameter 24			
400326(0145)		Parameter 25			
400327(0146)		Parameter 26			
400328(0147)		Parameter 27			
400329(014F)		Parameter 28			
400330(0150)		Parameter 29			
400331 to 400350	Reserved				