SPRM

SPRM Communication (RS485 / EtherCAT)

Communication Manual MCY-SPRMC1-V1.2-2212US

Thank you for purchasing an Autonics product.
This user manual contains information about the product and its proper use,
and should be kept in a place where it will be easy to access.

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Contents

Preface

Thank you for purchasing Autonics products.
Be sure to read and follow the **Safety Precautions** thoroughly before use.
This manual contains information about the product and how to use it properly, so keep it in a place where users can easily find it.

Manual Guide

- Use the product after fully reading the contents of the manual.
- The manual explains the product functions in detail and does not guarantee the contents other than the manual.
- Any or all of the manual may not be edited or copied without permission.
- The manual is not provided with the product.
- Download and use from our website (www.autonics.com).
- The contents of the manual are subject to change without prior notice according to the improvement of the product's performance, and upgrade notices are provided through our website.
- We put a lot of effort to make the contents of the manual a little easier and more accurate. Nevertheless, if you have any corrections or questions, please feel free to comment through our website.

Common Symbols in the Manual

Failure to follow instructions may result in serious injury or death.

Failure to follow instructions may result in injury or product damage.

Supplementary explanation of the function

Example of that function

Important information about the feature

1. Modbus RTU Protocol

1.1. Modbus

The Modbus industrial protocol was developed in 1979 to make communication possible between automation devices. The protocol has expanded to include implementations over serial, TCP/IP, and the user datagram protocol (UDP). Today, it is a common protocol used by countless devices for simple, reliable, and efficient communication across a variety of modern networks.

Refer to the reference document of developer for the details.

1.2. Frame Structure of Modbus RTU

1.2.1. Read Coil Status (Func 01-01H)

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

Query (Master)

Slave Address	Function	Starting Address	No. of Points	Error Check (CRC16)
1 Byte	1 Byte	2 Byte	2 Byte	2 Byte

- Calculation range of CRC16 = Slave Address to No. of Points

Response (Slave)

Slave Address	Function	Byte Count	Data	Data	Data	Error Check (CRC16)
1 Byte	1 Byte	1 Byte	1 Byte	1 Byte	1 Byte	2 Byte

- Calculation range of CRC16 = Slave Address to Data

1.2.2. Read Input Status (Func 02-02H)

Reads Input ON/OFF status (1X reference) in Slave device.

Query (Master)

Slave Address	Function	Starting Address	No. of Points	Error Check (CRC16)
1 Byte	1 Byte	2 Byte	2 Byte	2 Byte

- Calculation range of CRC16 = Slave Address to No. of Points

Response (Slave)

Slave Address	Function	Byte Count	Data	Data	Data	Error Check (CRC16)
1 Byte	1 Byte	1 Byte	1 Byte	1 Byte	1 Byte	2 Byte

- Calculation range of CRC16 = Slave Address to Data

1.2.3. Read Holding Registers (Func 03-03H)

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

Query (Master)

Slave Address	Function	Starting Address	No. of Points	Error Check (CRC16)
1 Byte	1 Byte	2 Byte	2 Byte	2 Byte

- Calculation range of CRC16 = Slave Address to No. of Points

Response (Slave)

Slave Address	Function	Byte Count	Data	Data	Data	Error Check (CRC16)
1 Byte	1 Byte	1 Byte	2 Byte	2 Byte	2 Byte	2 Byte

- Calculation range of CRC16 = Slave Address to Data

1.2.4. Read Input Registers (Func 04-04H)

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

Query (Master)

Slave Address	Function	Starting Address	No. of Points	Error Check (CRC16)
1 Byte	1 Byte	2 Byte	2 Byte	2 Byte

- Calculation range of CRC16 = Slave Address to No. of Points

Response (Slave)

Slave Address	Function	Byte Count	Data	Data	Data	Error Check (CRC16)
1 Byte	1 Byte	1 Byte	1 Byte	1 Byte	1 Byte	2 Byte

- Calculation range of CRC16 = Slave Address to Data

1.2.5. Force Single Coil (Func 05-05H)

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

Query (Master)

Slave Address	Function	Coil Address	Preset Data	Error Check (CRC16)
1 Byte	1 Byte	2 Byte	2 Byte	2 Byte

- Calculation range of CRC16 = Slave Address to Preset Data

Response (Slave)

Slave Address	Function	Coil Address	Preset Data	Error Check (CRC16)
1 Byte	1 Byte	2 Byte	2 Byte	2 Byte

- Calculation range of CRC16 = Slave Address to Preset Data

1.2.6. Preset Single Register (Func 06-06H)

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

Query (Master)

Slave Address	Function	Register Address	Preset Data	Error Check (CRC16)
1 Byte	1 Byte	2 Byte	2 Byte	2 Byte

- Calculation range of CRC16 = Slave Address to Preset Data

Response (Slave)

Slave Address	Function	Register Address	Preset Data	Error Check (CRC16)
1 Byte	1 Byte	2 Byte	2 Byte	2 Byte

- Calculation range of CRC16 = Slave Address to Preset Data

1.2.7. Preset Multiple Registers (Func 16-10H)

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

Query (Master)

Slave Address	Function	Starting Address	No. of Register	Byte Count	Data	Data	Error Check (CRC16)
1 Byte	1 Byte	2 Byte	2 Byte	1 Byte	2 Byte	2 Byte	2 Byte

- Calculation range of CRC16 = Slave Address to Data

Response (Slave)

Slave Address	Function	Starting Address	No. of Registers	Error Check (CRC16)
1 Byte	1 Byte	2 Byte	2 Byte	2 Byte

- Calculation range of CRC16 = Slave Address to No. of Registers

It is recommended to 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 the minimum/maximum or basic value of parameter by Input specifications in PC Loader Program.

1.2.8. 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 + 80H	Exception Code	Error Check (CRC16)
1 Byte	1 Byte	1 Byte	2 Byte

- Calculation range of CRC16 = Slave Address to Exception Code

- ILLEGAL FUNCTION (Exception Code: 01 H): When a command is not supported.
- ILLEGAL DATA ADDRESS (Exception Code: 02 H): When Reserved area is read.
- ILLEGAL DATA VALUE (Exception Code: 03 H): When data write to out of setting range is requested.
- SLAVE DEVICE FAILURE (Exception Code: 04 H): When the parameter is locked or communication write is disable.
- SLAVE DEVICE BUSY (Exception Code: 06 H): When the device status cannot perform the requested order.
- When the exception response situation, the device do not respond data, but send exception code only.

1.3. Autonics Modbus Address System

Parameter address structure

The parameter address is written in form ‘Reference number - Decimal address (Hexadecimal address).

For example, if the parameter address is **3** 0 **1001** (**03E8**), it means that **3** is Reference number, **1001** is Decimal address (DEC), **03E8** is Hexadecimal address (HEX).

Reference number per each FUNC

Reference	Function
0	FUNC 01 [R], FUNC 05 [W], FUNC 15 [MW]
1	FUNC 02 [R]
3	FUNC 04 [R]
4	FUNC 03 [R], FUNC 06 [W], FUNC 16 [MW]

Correlation between decimal address and hexadecimal address

The parameter address can be somewhat different for each manufacturer because the regulation for a starting number is not defined.

Autonics Modbus address is started at ‘1’ for decimal (DEC) address, and at ‘0’ for hexadecimal (HEX). So, decimal (DEC) address values are +1 for Hex (HEX) address values.

03E8 (HEX) → 1001 (DEC) (1000 + 1)
07D0 (HEX) → 2001 (DEC) (2000 + 1)
157C (HEX) → 5501 (DEC) (5500 + 1)

2. Modbus Mapping Table

2.1. Common [Func: 04, R / W: R]

No (Address)	Parameter	Description	Default
300101 (0064)	DeviceID_H	Product number H	91
300102 (0065)	DeviceID_L	Product number L	00
300103 (0066)	HWVersion	H/W version	43
300104 (0067)	FWVersion	S/W version	A+x
300105 (0068)	Model name 1	Model name 1 - Item	PS
300106 (0069)	Model name 2	Model name 2 - Item	MR
300107 (006A)	Model name 3	Model name 3 - 3-phase	_3
300108 (006B)	Model name 4	Model name 4 - Rated current	xF
300109 (006C)	Model name 5	Model name 5 - Item	xx
300110 (006D)	Model name 6	Model name 6 - EtherCAT / RS485	xx
300111 (006E)	Model name 7	Model name 7	0
300112 (006F)	Model name 8	Model name 8	0
300113 (0070)	Model name 9	Model name 9	0
300114 (0071)	Model name 10	Model name 10	0

2.2. 3-phase [Func: 04, R / W: R]

2.2.1. Alarm

No (Address)	Parameter	Description	Type
301001 (03E8)	Alm_L1	3-phase L1 Alarm value	• BIT0: Overcurrent alarm • BIT1: Overvoltage alarm • BIT2: Heater break alarm • BIT3: Load unbalance alarm • BIT4: SCR error alarm • BIT5: Fuse break alarm • BIT6: Frequency error alarm • BIT7 (Not used): Partial heater break alarm
301002 (03E9)	Alm_L2	3-phase L2 Alarm value	• BIT0: Overcurrent alarm • BIT1: Overvoltage alarm • BIT2: Heater break alarm • BIT3: Load unbalance alarm • BIT4: SCR error alarm • BIT5: Fuse break alarm • BIT6: Frequency error alarm • BIT7 (Not used): Partial heater break alarm

No (Address)	Parameter	Description	Type
301003 (03EA)	Alm_L3	3-phase L3 Alarm value	• BIT0: Overcurrent alarm • BIT1: Overvoltage alarm • BIT2: Heater break alarm • BIT3: Load unbalance alarm • BIT4: SCR error alarm • BIT5: Fuse break alarm • BIT6: Frequency error alarm • BIT7 (Not used): Partial heater break alarm

2.2.2. Information

No (Address)	Parameter	Description	Weight	Unit
301004 (03EB)	MV_cnt	3-phase output	x 10	%
301005 (03EC)	U_Volt	U-phase voltage	x 10	V
301006 (03ED)	U_V	Between U-V lines voltage	x 10	V
301007 (03EE)	V_Volt	V-phase voltage	x 10	V
301008 (03EF)	V_W	Between V-W lines voltage	x 10	V
301009 (03F0)	W_Volt	W-phase voltage	x 10	V
301010 (03F1)	W_U	Between W-U lines voltage	x 10	V
301011 (03F2)	U_V_W_Volt_Avg	Average voltage	x 10	V
301012 (03F3)	U_Current	U-phase current	x 10	A
301013 (03F4)	V_Current	V-phase current	x 10	A
301014 (03F5)	W_Current	W-phase current	x 10	A
301015 (03F6)	U_V_W_Current_Avg	Average current	x 10	A
301016 (03F7)	U_Watt	U-phase power	x 10	kW
301017 (03F8)	V_Watt	V-phase power	x 10	kW
301018 (03F9)	W_Watt	W-phase power	x 10	kW
301019 (03FA)	U_V_W_Watt_Avg	Average power	x 10	kW
301020 (03FB)	SET_Freq	Set frequency of 3-phase	x 1	HZ
301021 (03FC)	Freq_R	Present R-phase frequency	x 1	HZ
301022 (03FD)	Freq_S	Present S-phase frequency	x 1	HZ
301023 (03FE)	Freq_T	Present T-phase frequency	x 1	HZ

2.3. Single-phase L1 [Func: 04, R / W: R]

2.3.1. Alarm

No (Address)	Parameter	Description	Type
302001 (07D0)	Alm	Single-phase L1 Alarm value	• BIT0: Overcurrent alarm • BIT1: Overvoltage alarm • BIT2: Heater break alarm • BIT3 (Not used): Load unbalance alarm • BIT4: SCR error alarm • BIT5: Fuse break alarm • BIT6: Frequency error alarm • BIT7: Partial heater break alarm

2.3.2. Information

No (Address)	Parameter	Description	Type	Weight	Unit
302002 (07D1)	MV_cnt	Single-phase L1 output	-	x 10	%
302003 (07D2)	Volt	Single-phase L1 voltage	-	x 10	V
302004 (07D3)	Current	Single-phase L1 current	-	x 10	A
302005 (07D4)	Watt	Single-phase L1 power	-	x 10	W
302006 (07D5)	SET_Freq	Set frequency of single-phase L1	-	x 1	HZ
302007 (07D6)	Freq	Present single-phase L1 frequency	-	x 1	HZ
302008 (07D7)	DLFCompleteflag	Partial load SCAN completed check	• 0: False • 1: True	x 1	-

2.4. Single-phase L2 [Func: 04, R / W: R]

2.4.1. Alarm

No (Address)	Parameter	Description	Type
303001 (0BB8)	Alm	Single-phase L2 Alarm value	• BIT0: Overcurrent alarm • BIT1: Overvoltage alarm • BIT2: Heater break alarm • BIT3 (Not used): Load unbalance alarm • BIT4: SCR error alarm • BIT5: Fuse break alarm • BIT6: Frequency error alarm • BIT7: Partial heater break alarm

2.4.2. Information

No (Address)	Parameter	Description	Type	Weight	Unit
303002 (0BB9)	MV_cnt	Single-phase L2 output	-	x 10	%
303003 (0BBA)	Volt	Single-phase L2 voltage	-	x 10	V
303004 (0BBB)	Current	Single-phase L2 current	-	x 10	A
303005 (0BBC)	Watt	Single-phase L2 power	-	x 10	W
303006 (0BBD)	SET_Freq	Set frequency of single-phase L2	-	x 1	HZ
303007 (0BBE)	Freq	Present single-phase L2 frequency	-	x 1	HZ
303008 (0BBF)	DLFCompleteflag	Partial load SCAN completed check	• 0: False • 1: True	x 1	-

2.5. Single-phase L3 [Func: 04, R / W: R]

2.5.1. Alarm

No (Address)	Parameter	Description	Type
304001 (0FA0)	Alm	Single-phase L3 Alarm value	• BIT0: Overcurrent alarm • BIT1: Overvoltage alarm • BIT2: Heater break alarm • BIT3 (Not used): Load unbalance alarm • BIT4: SCR error alarm • BIT5: Fuse break alarm • BIT6: Frequency error alarm • BIT7: Partial heater break alarm

2.5.2. Information

No (Address)	Parameter	Description	Type	Weight	Unit
304002 (0FA1)	MV_cnt	Single-phase L3 output	-	x 10	%
304003 (0FA2)	Volt	Single-phase L3 voltage	-	x 10	V
304004 (0FA3)	Current	Single-phase L3 current	-	x 10	A
304005 (0FA4)	Watt	Single-phase L3 power	-	x 10	W
304006 (0FA5)	SET_Freq	Set frequency of single-phase L3	-	x 1	HZ
304007 (0FA6)	Freq	Present single-phase L3 frequency	-	x 1	HZ
304008 (0FA7)	DLFCompleteflag	Partial load SCAN completed check	• 0: False • 1: True	x 1	-

2.6. Accumulated power [Func: 04, R / W: R]

No (Address)	Parameter	Description	Unit
305001 (0FA1)	IntegratedvoltageL1_L	Single-phase L1 accumulated power lower 16 bit	kWh
305002 (0FA1)	IntegratedvoltageL1_H	Single-phase L1 accumulated power higher 16 bit	kWh
305003 (0FA2)	IntegratedvoltageL2_L	Single-phase L2 accumulated power lower 16 bit	kWh
305004 (0FA3)	IntegratedvoltageL2_H	Single-phase L2 accumulated power higher 16 bit	kWh
305005 (0FA4)	IntegratedvoltageL3_L	Single-phase L3 accumulated power lower 16 bit	kWh
305006 (0FA5)	IntegratedvoltageL3_H	Single-phase L3 accumulated power higher 16 bit	kWh
305007 (0FA6)	Integratedvoltage3PH_l1_L	3-phase L1 accumulated power lower 16 bit	kWh
305008 (0FA2)	Integratedvoltage3PH_l1_H	3-phase L1 accumulated power higher 16 bit	kWh
305009 (0FA3)	Integratedvoltage3PH_l2_L	3-phase L2 accumulated power lower 16 bit	kWh
305010 (0FA4)	Integratedvoltage3PH_l2_H	3-phase L2 accumulated power higher 16 bit	kWh
305011 (0FA5)	Integratedvoltage3PH_l3_L	3-phase L3 accumulated power lower 16 bit	kWh
305012 (0FA6)	Integratedvoltage3PH_l3_H	3-phase L3 accumulated power higher 16 bit	kWh

In case of 305001 = 0x000F, 305002 = 0x0001,
Single-phase L1 accumulated power is 0x0001000F = 65,551 kWh

2.7. Alarm History [Func: 04, R / W: R]

No (Address)	Parameter	Description	Type	Unit
305013 (1394)	Log0_year	Year of alarm	-	Year
305014 (1395)	Log0_month	Month of alarm	-	Month
305015 (1396)	Log0_day	Day of alarm	-	Day
305016 (1397)	Log0_hour	Hour of alarm	-	Hour
305017 (1398)	Log0_minute	Minute of alarm	-	Minute
305018 (1399)	Log0_ph3_L1_ALM	3-phase L1 Alarm history value	• BIT0: Overcurrent alarm • BIT1: Overvoltage alarm • BIT2: Heater break alarm • BIT3: Load unbalance alarm • BIT4: SCR error alarm • BIT5: Fuse break alarm • BIT6: Frequency error alarm • BIT7: Partial heater break alarm	-
305019 (139A)	Log0_ph3_L2_ALM	3-phase L2 Alarm history value	• BIT0: Overcurrent alarm • BIT1: Overvoltage alarm • BIT2: Heater break alarm • BIT3: Load unbalance alarm • BIT4: SCR error alarm • BIT5: Fuse break alarm • BIT6: Frequency error alarm • BIT7: Partial heater break alarm	-

No (Address)	Parameter	Description	Type	Unit
305020 (139B)	Log0_ph3_L3_ALM	3-phase L3 Alarm history value	• BIT0: Overcurrent alarm • BIT1: Overvoltage alarm • BIT2: Heater break alarm • BIT3: Load unbalance alarm • BIT4: SCR error alarm • BIT5: Fuse break alarm • BIT6: Frequency error alarm • BIT7: Partial heater break alarm	-
305021 (139C)	Log0_L1_ALM	Single-phase L1 Alarm history value	• BIT0: Overcurrent alarm • BIT1: Overvoltage alarm • BIT2: Heater break alarm • BIT3: Load unbalance alarm • BIT4: SCR error alarm • BIT5: Fuse break alarm • BIT6: Frequency error alarm • BIT7: Partial heater break alarm	-
305022 (139D)	Log0_L2_ALM	Single-phase L2 Alarm history value	• BIT0: Overcurrent alarm • BIT1: Overvoltage alarm • BIT2: Heater break alarm • BIT3: Load unbalance alarm • BIT4: SCR error alarm • BIT5: Fuse break alarm • BIT6: Frequency error alarm • BIT7: Partial heater break alarm	-

No (Address)	Parameter	Description	Type	Unit
305023 (139E)	Log0_L3_ALM	Single-phase L3 Alarm history value	• BIT0: Overcurrent alarm • BIT1: Overvoltage alarm • BIT2: Heater break alarm • BIT3: Load unbalance alarm • BIT4: SCR error alarm • BIT5: Fuse break alarm • BIT6: Frequency error alarm • BIT7: Partial heater break alarm	-
305024 (139F)	Log0_Remain_ALM	Common alarm history value	• BIT0: Heatsink over heat alarm • BIT1: Heatsink over heat protection alarm • BIT2: FAN error alarm • BIT3: RUN / STOP switch • BIT4: AUTO / MANU switch	-

Alarm history number according to No (Address)

No (Address)	Alarm history number
305013 (1394) to 305024 (139F)	ALM Log 0
305025 (13A0) to 305036 (13AB)	ALM Log 1
305037 (13AC) to 305048 (13B7)	ALM Log 2
305049 (13B8) to 305060 (13C3)	ALM Log 3
305061 (13C4) to 305072 (13CF)	ALM Log 4
305073 (13D0) to 305084 (13DB)	ALM Log 5
305085 (13DC) to 305096 (13E7)	ALM Log 6
305097 (13E8) to 305108 (13F3)	ALM Log 7
305109 (13F4) to 305120 (13FF)	ALM Log 8
305121 (1400) to 305132 (140B)	ALM Log 9

2.8. Common [Func: 04, R / W: R]

No (Address)	Parameter	Description	Type	Unit
306001 (1770)	ALM_Remain	Present common alarm	• BIT0: Heatsink over heat alarm • BIT1: Heatsink over heat protection alarm • BIT2: FAN error alarm • BIT3: RUN / STOP switch • BIT4: AUTO / MANU switch • BIT5: L1 SCAN status • BIT6: L2 SCAN status • BIT7: L3 SCAN status • BIT8: L1 partial heater break alarm possible status • BIT9: L2 partial heater break alarm possible status • BIT10: L3 partial heater break alarm possible status	-
306002 (1771)	SinkTemp	Heatsink temperature	-	℃
306003 (1772)	year	Present year	-	Year
306004 (1773)	month	Present month	-	Month
306005 (1774)	day	Present day	-	Day
306006 (1775)	hour	Present hour	-	Hour
306007 (1776)	minute	Present minute	-	Minute
306010 (1779)	RomWirteNum Low	ROM saving count LOW	-	-
306011 (177A)	RomWirteNum High	ROM saving count HIGH	-	-

Operation of each situation ALM_Remain No. (Address) = 306001 (1771)

Type	1	0
Alm_OT_60	OTW (Heatsink over heat alarm) occurs	When OTW alarm does not occur
Alm_OT_80	OTP (Heatsink over heat protection alarm) occurs	When OTP alarm does not occur
Alm_FAN	FAN (FAN error alarm) occurs	When FAN alarm does not occur
RunStopFlag	During RUN	During STOP
AutomanFlag	During MANU	During Auto
DLFL1SCANINGFlag	During L1 SCAN	If not during L1 SCAN
DLFL2SCANINGFlag	During L2 SCAN	If not during L2 SCAN
DLFL3SCANINGFlag	During L3 SCAN	If not during L3 SCAN
DLFL1PossibleFlag	L1 DLF (Partial heater break alarm) possible status	L1 DLF alarm impossible status
DLFL2PossibleFlag	L2 DLF (Partial heater break alarm) possible status	L2 DLF alarm impossible status
DLFL3PossibleFlag	L3 DLF (Partial heater break alarm) possible status	L3 DLF alarm impossible status

2.9. Control [Func: 03 / 06 / 16, R / W: R / W]

No (Address)	Parameter	Description	Set range	Default	Unit	Save
400001 (0000)	RS485ph3MVCnt	3-phase control input	0 to 1000 (0.0 to 100.0)	0	%	N
400002 (0001)	RS485L1MVCnt	Single-phase L1 control input	0 to 1000 (0.0 to 100.0)	0	%	N
400003 (0002)	RS485L2MVCnt	Single-phase L2 control input	0 to 1000 (0.0 to 100.0)	0	%	N
400004 (0003)	RS485L3MVCnt	Single-phase L3 control input	0 to 1000 (0.0 to 100.0)	0	%	N

2.10. 3-phase Setting [Func: 03 / 06 / 16, R / W: R / W]

2.10.1. Control

No (Address)	Parameter (Description)	Set range	Default	Unit	Save
401001 (03E8)	enable (On / Off)	• 0: off • 1: on	1	-	Y
401002 (03E9)	Input (Control input)	• 0: 4 - 20 mA at Channel 1 • 1: 4 - 20 mA at Channel 2 • 2: 4 - 20 mA at Channel 3 • 3: 1 - 5 VDC • 4: 0 - 5 VDC • 5: 0 - 10 VDC • 6: EtherCAT communication • 7: RS485 communication • 8: External volume 10 kΩ	0	-	Y
401003 (03EA)	Load_Sel (Load type)	• 0: Resistive load • 1: Transformer load	0	-	Y
401004 (03EB)	Control_Mode (Control mode)	• 0: Phase control • 1: Fixed cycle control • 2: Variable cycle control	0	-	Y
401005 (03EC)	FbModeSel (Feedback control)	• 0: Not used • 1: Constant voltage feedback • 2: Constant current feedback • 3: Constant power feedback	0	-	Y
401006 (03ED)	v_fb_max (Constant voltage feedback control)	1100 to 4800 (110.0 to 480.0)	3800	V	Y

No (Address)	Parameter (Description)	Set range	Default	Unit	Save
401007 (03EE)	c_fb_max (Constant current feedback control)	10 to 1100 % of rated current (1 to 110 % of rated current)	Rated current	A	Y
401008 (03EF)	w_fb_max (Constant power feedback control)	440V×100 % of rated current to 440V×1100 % of rated current (440V×10 % of rated current to 440V×110 % of rated current)	Rated power	kW	Y
401009 (03F0)	StartTime (Soft start time)	0 to 999	3	sec	Y
401010 (03F1)	SoftUPTime (Soft up time)	0 to 999	3	sec	Y
401011 (03F2)	SoftDownTime (Soft down time)	0 to 999	3	sec	Y
401012 (03F3)	OutputMin (Output low-limit value)	0 to 1000 (0.0 to 100.0)	0	%	Y
401013 (03F4)	OutputMax (Output high-limit value)	0 to 1000 (0.0 to 100.0)	1000	%	Y
401014 (03F5)	CurrentLimit (Output current limit)	10 to 1100 % of rated current (1 to 110 % of rated current)	1100 % of rated current	A	Y
401017 (03F8)	SlopeOutputRate (Input slope compensation)	-999 to 999 (-99.9 to 99.9)	0	%	Y
401018 (03F9)	OffsetOutputRate (Input offset)	-999 to 999 (-99.9 to 99.9)	0	%	Y
401019 (03FA)	WiringMode (3-phase connection)	• 0: Star connection • 1: Delta connection	0	-	Y

2.10.2. Alarm

No (Address)	Parameter (Description)	Set range	Default	Unit	Save
401020 (03FB)	OCAlmEnable (Overcurrent alarm enable/disable)	• 0: off • 1: on	1	-	Y
401021 (03FC)	OCCurrent (Limit output current value of overcurrent alarm)	10 to 1100 % of rated current (1 to 110 % of rated current)	1100 % of rated current	A	Y
401022 (03FD)	OCDelayTime (Alarm delay time of overcurrent alarm)	0 to 100	3	sec	Y
401023 (03FE)	OCOutputSel (Relay output of overcurrent alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y
401024 (03FF)	OCAutoRecovery (Overcurrent alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y
401025 (0400)	OVAlmEnable (Overvoltage alarm enable/disable)	• 0: off • 1: on	1	-	Y
401026 (0401)	OVVolt (Limit output voltage value of overvoltage alarm)	100 to 5000 (10.0 to 500.0)	5000	V	Y
401027 (0402)	OVDelayTime (Alarm delay time of overvoltage alarm)	0 to 100	3	sec	Y

No (Address)	Parameter (Description)	Set range	Default	Unit	Save
401028 (0403)	OVOutputSel (Relay output of overvoltage alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y
401029 (0404)	OVAutoRecovery (Overvoltage alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y
401030 (0405)	LFAlmEnable (Heater break alarm enable/disable)	• 0: off • 1: on	1	-	Y
401031 (0406)	LFPercent (Set output of heater break alarm)	0 to 1000 (0.0 to 100.0)	1000	%	Y
401032 (0407)	LFLimitCurrent (Set current of heater break alarm)	10 to 1100 % of rated current (1 to 110 % of rated current)	10	A	Y
401033 (0408)	LFDelayTime (Alarm delay time of heater break alarm)	0 to 100	3	sec	Y
401034 (0409)	LFOutputSel (Relay output of heater break alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y

No (Address)	Parameter (Description)	Set range	Default	Unit	Save
401035 (040A)	LFAutoRecovery (Heater break alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y
401036 (040B)	ULAlmEnable (Load unbalance alarm enable/disable)	• 0: off • 1: on	1	-	Y
401037 (040C)	ULLimitPercent (Unbalance rate of load unbalance alarm)	50 to 1000 (5.0 to 100.0)	300	%	Y
401038 (040D)	ULDelayTime (Alarm delay time of load unbalance alarm)	0 to 100	3	sec	Y
401039 (040E)	ULOutputSel (Relay output of load unbalance alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y
401040 (040F)	ULAutoRecovery (Load unbalance alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y
401041 (0410)	SCRAlmEnable (SCR error alarm enable/disable)	• 0: off • 1: on	1	-	Y
401042 (0411)	SCRPercent (Set output of SCR error alarm)	0 to 1000 (0.0 to 100.0)	0	%	Y

No (Address)	Parameter (Description)	Set range	Default	Unit	Save
401043 (0412)	SCRLimitCurrent (Output current of SCR error alarm)	10 to 1100 % of rated current (1 to 110 % of rated current)	30	A	Y
401044 (0413)	SCRDelayTime (Alarm delay time of SCR error alarm)	0 to 100	3	sec	Y
401045 (0414)	SCROutputSel (Relay output of SCR error alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y
401046 (0415)	SCRAutoRecovery (SCR error alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y
401047 (0416)	FuseAlmEnable (Fuse break alarm enable/disable)	• 0: off • 1: on	1	-	Y
401048 (0417)	FuseDelayTime (Alarm delay time of fuse break alarm)	0 to 100	3	sec	Y
401049 (0418)	FuseOutputSel (Relay output of fuse break alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y

No (Address)	Parameter (Description)	Set range	Default	Unit	Save
401050 (0419)	FuseAutoRecovery (Fuse break alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y
401051 (041A)	FreqAlmEnable (Frequency error alarm enable/disable)	• 0: off • 1: on	1	-	Y
401052 (041B)	FreqDelayTime (Alarm delay time of frequency error alarm)	0 to 100	3	sec	Y
401053 (041C)	FreqOutputSel (Relay output of frequency error alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y
401054 (041D)	FreqAutoRecovery (Frequency error alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y

2.11. Single-phase L1 Setting [Func: 03 / 06 / 16, R / W: R / W]

2.11.1. Control

No (Address)	Parameter (Description)	Set range	Default	Unit	Save
402001 (07D0)	enable (On / Off)	• 0: off • 1: on	1	-	Y
402002 (07D1)	Input (Control input)	• 0: 4 - 20 mA at Channel 1 • 1: 4 - 20 mA at Channel 2 • 2: 4 - 20 mA at Channel 3 • 3: 1 - 5 VDC • 4: 0 - 5 VDC • 5: 0 - 10 VDC • 6: EtherCAT communication • 7: RS485 communication • 8: External volume 10 kΩ	0	-	Y
402003 (07D2)	Load_Sel (Load type)	• 0: Resistive load • 1: Transformer load	0	-	Y
402004 (07D3)	Control_Mode (Control mode)	• 0: Phase control • 1: Fixed cycle control • 2: Variable cycle control	0	-	Y
402005 (07D4)	FbModeSel (Feedback control)	• 0: Not used • 1: Constant voltage feedback • 2: Constant current feedback • 3: Constant power feedback	0	-	Y
402006 (07D5)	v_fb_max (Constant voltage feedback control)	1100 to 4800 (110.0 to 480.0)	2200	V	Y

No (Address)	Parameter (Description)	Set range	Default	Unit	Save
402007 (07D6)	c_fb_max (Constant current feedback control)	10 to 1100 % of rated current (1 to 110 % of rated current)	Rated current	A	Y
402008 (07D7)	w_fb_max (Constant power feedback control)	440V×100 % of rated current to 440V×1100 % of rated current (440V×10 % of rated current to 440V×110 % of rated current)	Rated power	kW	Y
402009 (07D8)	StartTime (Soft start time)	0 to 999	3	sec	Y
402010 (07D9)	SoftUPTime (Soft up time)	0 to 999	3	sec	Y
402011 (07DA)	SoftDownTime (Soft down time)	0 to 999	3	sec	Y
402012 (07DB)	OutputMin (Output low-limit value)	0 to 1000 (0.0 to 100.0)	0	%	Y
402013 (07DC)	OutputMax (Output high-limit value)	0 to 1000 (0.0 to 100.0)	1000	%	Y
402014 (07DD)	CurrentLimit (Output current limit)	10 to 1100 % of rated current (1 to 110 % of rated current)	1100 % of rated current	A	Y
402017 (07E0)	SlopeOutputRate (Input slope compensation)	-999 to 999 (-99.9 to 99.9)	0	%	Y
402018 (07E1)	OffsetOutputRate (Input offset)	-999 to 999 (-99.9 to 99.9)	0	%	Y
402019 (07E2)	DLFLoadNum (Number of multi-load)	2 to 6	2	-	Y
402020 (07E3)	DLFMaxOutPutLimit (Scan output limit value)	250 (25.0), 500 (50.0), 750 (75.0), 1000 (100.0)	1000	%	Y

No (Address)	Parameter (Description)	Set range	Default	Unit	Save
402021 (07E4)	DLFTuningUpDelayTime (Output increase scan time)	0 to 10	1	-	Y
402022 (07E5)	DLFTuningDownDelayTime (Output decrease scan time)	0 to 10	1	-	Y
402023 (07E6)	DLFStart (Start scan)	0, 1 • Starts DLF scan at 0 → 1 rising edge.	0	-	N

2.11.2. Alarm

No (Address)	Parameter (Description)	Set range	Default	Unit	Save
402024 (07E7)	OCAlmEnable (Overcurrent alarm enable/disable)	• 0: off • 1: on	1	-	Y
402025 (07E8)	OCCurrent (Limit output current value of overcurrent alarm)	10 to 110 % of rated current	110 % of rated current	A	Y
402026 (07E9)	OCDelayTime (Alarm delay time of overcurrent alarm)	0 to 100	3	sec	Y
402027 (07EA)	OCOutputSel (Relay output of overcurrent alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y
402028 (07EB)	OCAutoRecovery (Overcurrent alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y
402029 (07EC)	OVAlmEnable (Overvoltage alarm enable/disable)	• 0: off • 1: on	1	-	Y
402030 (07ED)	OVVolt (Limit output voltage value of overvoltage alarm)	100 to 5000 (10.0 to 500.0)	5000	V	Y
402031 (07EE)	OVDelayTime (Alarm delay time of overvoltage alarm)	0 to 100	3	sec	Y

No (Address)	Parameter (Description)	Set range	Default	Unit	Save
402032 (07EF)	OVOutputSel (Relay output of overvoltage alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y
402033 (07F0)	OVAutoRecovery (Overvoltage alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y
402034 (07F1)	LFAlmEnable (Heater break alarm enable/disable)	• 0: off • 1: on	1	-	Y
402035 (07F2)	LFPercent (Set output of heater break alarm)	0 to 1000 (0.0 to 100.0)	1000	%	Y
402036 (07F3)	LFLimitCurrent (Set current of heater break alarm)	10 to 1100 % of rated current (1 to 110 % of rated current)	10	A	Y
402037 (07F4)	LFDelayTime (Alarm delay time of heater break alarm)	0 to 100	3	sec	Y
402038 (07F5)	LFOutputSel (Relay output of heater break alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y

No (Address)	Parameter (Description)	Set range	Default	Unit	Save
402039 (07F6)	LFAutoRecovery (Heater break alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y
402040 (07F7)	DLFAlmEnable (Partial heater break alarm enable/disable)	• 0: off • 1: on	0	-	Y
402041 (07F8)	DLFDelayTime (Alarm delay time of partial heater break alarm)	0 to 100	3	sec	Y
402042 (07F9)	DLFOutputSel (Relay output of partial heater break alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y
402043 (07FA)	SCRAlmEnable (SCR error alarm enable/disable)	• 0: off • 1: on	1	-	Y
402044 (07FB)	SCRPercent (Set output of SCR error alarm)	0 to 1000 (0.0 to 100.0)	0	%	Y
402045 (07FC)	SCRLimitCurrent (Output current of SCR error alarm)	10 to 1100 % of rated current (1 to 110 % of rated current)	30	A	Y
402046 (07FD)	SCRDelayTime (Alarm delay time of SCR error alarm)	0 to 100	3	sec	Y

No (Address)	Parameter (Description)	Set range	Default	Unit	Save
402047 (07FE)	SCROutputSel (Relay output of SCR error alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y
402048 (07FF)	SCRAutoRecovery (SCR error alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y
402049 (0800)	FuseAlmEnable (Fuse break alarm enable/disable)	• 0: off • 1: on	1	-	Y
402050 (0801)	FuseDelayTime (Alarm delay time of fuse break alarm)	0 to 100	3	sec	Y
402051 (0802)	FuseOutputSel (Relay output of fuse break alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y
402052 (0803)	FuseAutoRecovery (Fuse break alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y
402053 (0804)	FreqAlmEnable (Frequency error alarm enable/disable)	• 0: off • 1: on	1	-	Y
402054 (0805)	FreqDelayTime (Alarm delay time of frequency error alarm)	0 to 100	3	sec	Y

No (Address)	Parameter (Description)	Set range	Default	Unit	Save
402055 (0806)	FreqOutputSel (Relay output of frequency error alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y
402056 (0807)	FreqAutoRecovery (Frequency error alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y

2.12. Single-phase L2 Setting [Func: 03 / 06 / 16, R / W: R / W]

2.12.1. Control

No (Address)	Parameter (Description)	Set range	Default	Unit	Save
403001 (0BB8)	enable (On / Off)	• 0: off • 1: on	1	-	Y
403002 (0BB9)	Input (Control input)	• 0: 4 - 20 mA at Channel 1 • 1: 4 - 20 mA at Channel 2 • 2: 4 - 20 mA at Channel 3 • 3: 1 - 5 VDC • 4: 0 - 5 VDC • 5: 0 - 10 VDC • 6: EtherCAT communication • 7: RS485 communication • 8: External volume 10 kΩ	0	-	Y
403003 (0BBA)	Load_Sel (Load type)	• 0: Resistive load • 1: Transformer load	0	-	Y
403004 (0BBB)	Control_Mode (Control mode)	• 0: Phase control • 1: Fixed cycle control • 2: Variable cycle control	0	-	Y
403005 (0BBC)	FbModeSel (Feedback control)	• 0: Not used • 1: Constant voltage feedback • 2: Constant current feedback • 3: Constant power feedback	0	-	Y
403006 (0BBD)	v_fb_max (Constant voltage feedback control)	1100 to 4800 (110.0 to 480.0)	2200	V	Y

No (Address)	Parameter (Description)	Set range	Default	Unit	Save
403007 (0BBE)	c_fb_max (Constant current feedback control)	10 to 1100 % of rated current (1 to 110 % of rated current)	Rated current	A	Y
403008 (0BBF)	w_fb_max (Constant power feedback control)	440V×100 % of rated current to 440V×1100 % of rated current (440V×10 % rated current to 440V×110 % of rated current)	Rated power	kW	Y
403009 (0BC0)	StartTime (Soft start time)	0 to 999	3	sec	Y
403010 (0BC1)	SoftUPTime (Soft up time)	0 to 999	3	sec	Y
403011 (0BC2)	SoftDownTime (Soft down time)	0 to 999	3	sec	Y
403012 (0BC3)	OutputMin (Output low-limit value)	0 to 1000 (0.0 to 100.0)	0	%	Y
403013 (0BC4)	OutputMax (Output high-limit value)	0 to 1000 (0.0 to 100.0)	1000	%	Y
403014 (0BC5)	CurrentLimit (Output current limit)	10 to 1100 % of rated current (1 to 110 % of rated current)	1100 % of rated current	A	Y
403017 (0BC8)	SlopeOutputRate (Input slope compensation)	-999 to 999 (-99.9 to 99.9)	0	%	Y
403018 (0BC9)	OffsetOutputRate (Input offset)	-999 to 999 (-99.9 to 99.9)	0	%	Y
403019 (0BCA)	DLFLoadNum (Number of multi-load)	2 to 6	2	-	Y
403020 (0BCB)	DLFMaxOutPutLimit (Scan output limit value)	250 (25.0), 500 (50.0), 750 (75.0), 1000 (100.0)	1000	%	Y

No (Address)	Parameter (Description)	Set range	Default	Unit	Save
403021 (0BCC)	DLFTuningUpDelayTime (Output increase scan time)	0 to 10	1	-	Y
403022 (0BCD)	DLFTuningDownDelayTime (Output decrease scan time)	0 to 10	1	-	Y
403023 (0BCE)	DLFStart (Start scan)	0, 1 • Starts DLF scan at 0 → 1 rising edge.	0	-	N

2.12.2. Alarm

No (Address)	Parameter (Description)	Set range	Default	Unit	Save
403024 (0BCF)	OCAlmEnable (Overcurrent alarm enable/disable)	• 0: off • 1: on	1	-	Y
403025 (0BD0)	OCCurrent (Limit output current value of overcurrent alarm)	10 to 110 % of rated current	110 % of rated current	A	Y
403026 (0BD1)	OCDelayTime (Alarm delay time of overcurrent alarm)	0 to 100	3	sec	Y
403027 (0BD2)	OCOutputSel (Relay output of overcurrent alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y
403028 (0BD3)	OCAutoRecovery (Overcurrent alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y
403029 (0BD4)	OVAlmEnable (Overvoltage alarm enable/disable)	• 0: off • 1: on	1	-	Y
403030 (0BD5)	OVVolt (Limit output voltage value of overvoltage alarm)	100 to 5000 (10.0 to 500.0)	5000	V	Y
403031 (0BD6)	OVDelayTime (Alarm delay time of overvoltage alarm)	0 to 100	3	sec	Y

No (Address)	Parameter (Description)	Set range	Default	Unit	Save
403032 (0BD7)	OVOutputSel (Relay output of overvoltage alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y
403033 (0BD8)	OVAutoRecovery (Overvoltage alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y
403034 (0BD9)	LFAlmEnable (Heater break alarm enable/disable)	• 0: off • 1: on	1	-	Y
403035 (0BDA)	LFPercent (Set output of heater break alarm)	0 to 1000 (0.0 to 100.0)	1000	%	Y
403036 (0BDB)	LFLimitCurrent (Set current of heater break alarm)	10 to 1100 % of rated current (1 to 110 % of rated current)	10	A	Y
403037 (0BDC)	LFDelayTime (Alarm delay time of heater break alarm)	0 to 100	3	sec	Y
403038 (0BDD)	LFOutputSel (Relay output of heater break alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y

No (Address)	Parameter (Description)	Set range	Default	Unit	Save
403039 (0BDE)	LFAutoRecovery (Heater break alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y
403040 (0BDF)	DLFAlmEnable (Partial heater break alarm enable/disable)	• 0: off • 1: on	0	-	Y
403041 (0BE0)	DLFDelayTime (Alarm delay time of partial heater break alarm)	0 to 100	3	sec	Y
403042 (0BE1)	DLFOutputSel (Relay output of partial heater break alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y
403043 (0BE2)	SCRAlmEnable (SCR error alarm enable/disable)	• 0: off • 1: on	1	-	Y
403044 (0BE3)	SCRPercent (Set output of SCR error alarm)	0 to 1000 (0.0 to 100.0)	0	%	Y
403045 (0BE4)	SCRLimitCurrent (Output current of SCR error alarm)	10 to 1100 % of rated current (1 to 110 % of rated current)	30	A	Y
403046 (0BE5)	SCRDelayTime (Alarm delay time of SCR error alarm)	0 to 100	3	sec	Y

No (Address)	Parameter (Description)	Set range	Default	Unit	Save
403047 (0BE6)	SCROutputSel (Relay output of SCR error alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y
403048 (0BE7)	SCRAutoRecovery (SCR error alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y
403049 (0BE8)	FuseAlmEnable (Fuse break alarm enable/disable)	• 0: off • 1: on	1	-	Y
403050 (0BE9)	FuseDelayTime (Alarm delay time of fuse break alarm)	0 to 100	3	sec	Y
403051 (0BEA)	FuseOutputSel (Relay output of fuse break alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y
403052 (0BEB)	FuseAutoRecovery (Fuse break alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y
403053 (0BEC)	FreqAlmEnable (Frequency error alarm enable/disable)	• 0: off • 1: on	1	-	Y

No (Address)	Parameter (Description)	Set range	Default	Unit	Save
403054 (0BED)	FreqDelayTime (Alarm delay time of frequency error alarm)	0 to 100	3	sec	Y
403055 (0BEE)	FreqOutputSel (Relay output of frequency error alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y
403056 (0BEF)	FreqAutoRecovery (Frequency error alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y

2.13. Single-phase L3 Setting [Func: 03 / 06 / 16, R / W: R / W]

2.13.1. Control

No (Address)	Parameter (Description)	Set range	Default	Unit	Save
404001 (0FA0)	enable (On / Off)	• 0: off • 1: on	1	-	Y
404002 (0FA1)	Input (Control input)	• 0: 4 - 20 mA at Channel 1 • 1: 4 - 20 mA at Channel 2 • 2: 4 - 20 mA at Channel 3 • 3: 1 - 5 VDC • 4: 0 - 5 VDC • 5: 0 - 10 VDC • 6: EtherCAT communication • 7: RS485 communication • 8: External volume 10 kΩ	0	-	Y
404003 (0FA2)	Load_Sel (Load type)	• 0: Resistive load • 1: Transformer load	0	-	Y
404004 (0FA3)	Control_Mode (Control mode)	• 0: Phase control • 1: Fixed cycle control • 2: Variable cycle control	0	-	Y
404005 (0FA4)	FbModeSel (Feedback control)	• 0: Not used • 1: Constant voltage feedback • 2: Constant current feedback • 3: Constant power feedback	0	-	Y
404006 (0FA5)	v_fb_max (Constant voltage feedback control)	1100 to 4800 (110.0 to 480.0)	2200	V	Y

No (Address)	Parameter (Description)	Set range	Default	Unit	Save
404007 (0FA6)	c_fb_max (Constant current feedback control)	10 to 1100 % of rated current (1 to 110 % of rated current)	Rated current	A	Y
404008 (0FA7)	w_fb_max (Constant power feedback control)	440V×100 % of rated current to 440V×1100 % of rated current (440V×10 % of rated current to 440V×110 % of rated current)	Rated power	kW	Y
404009 (0FA8)	StartTime (Soft start time)	0 to 999	3	sec	Y
404010 (0FA9)	SoftUPTime (Soft up time)	0 to 999	3	sec	Y
404011 (0FAA)	SoftDownTime (Soft down time)	0 to 999	3	sec	Y
404012 (0FAB)	OutputMin (Output low-limit value)	0 to 1000 (0.0 to 100.0)	0	%	Y
404013 (0FAC)	OutputMax (Output high-limit value)	0 to 1000 (0.0 to 100.0)	1000	%	Y
404014 (0FAD)	CurrentLimit (Output current limit)	10 to 1100 % of rated current (1 to 110 % of rated current)	1100 % of rated current	A	Y
404017 (0FB0)	SlopeOutputRate (Input slope compensation)	-999 to 999 (-99.9 to 99.9)	0	%	Y
404018 (0FB1)	OffsetOutputRate (Input offset)	-999 to 999 (-99.9 to 99.9)	0	%	Y
404019 (0FB2)	DLFLoadNum (Number of multi-load)	2 to 6	2	-	Y
404020 (0FB3)	DLFMaxOutPutLimit (Scan output limit value)	250 (25.0), 500 (50.0), 750 (75.0), 1000 (100.0)	1000	%	Y

No (Address)	Parameter (Description)	Set range	Default	Unit	Save
404021 (0FB4)	DLFTuningUpDelayTime (Output increase scan time)	0 to 10	1	-	Y
404022 (0FB5)	DLFTuningDownDelayTime (Output decrease scan time)	0 to 10	1	-	Y
404023 (0FB6)	DLFStart (Start scan)	0, 1 • Starts DLF scan at 0 → 1 rising edge.	0	-	N

2.13.2. Alarm

No (Address)	Parameter (Description)	Set range	Default	Unit	Save
404024 (0FB7)	OCAlmEnable (Overcurrent alarm enable/disable)	• 0: off • 1: on	1	-	Y
404025 (0FB8)	OCCurrent (Limit output current value of overcurrent alarm)	10 to 110 % of rated current	110 % of rated current	A	Y
404026 (0FB9)	OCDelayTime (Alarm delay time of overcurrent alarm)	0 to 100	3	sec	Y
404027 (0FBA)	OCOutputSel (Relay output of overcurrent alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y
404028 (0FBB)	OCAutoRecovery (Overcurrent alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y
404029 (0FBC)	OVAlmEnable (Overvoltage alarm enable/disable)	• 0: off • 1: on	1	-	Y
404030 (0FBD)	OVVolt (Limit output voltage value of overvoltage alarm)	100 to 5000 (10.0 to 500.0)	5000	V	Y
404031 (0FBE)	OVDelayTime (Alarm delay time of overvoltage alarm)	0 to 100	3	sec	Y

No (Address)	Parameter (Description)	Set range	Default	Unit	Save
404032 (0FBF)	OVOutputSel (Relay output of overvoltage alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y
404033 (0FC0)	OVAutoRecovery (Overvoltage alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y
404034 (0FC1)	LFAlmEnable (Heater break alarm enable/disable)	• 0: off • 1: on	1	-	Y
404035 (0FC2)	LFPercent (Set output of heater break alarm)	0 to 1000 (0.0 to 100.0)	1000	%	Y
404036 (0FC3)	LFLimitCurrent (Set current of heater break alarm)	10 to 1100 % of rated current (1 to 110 % of rated current)	10	A	Y
404037 (0FC4)	LFDelayTime (Alarm delay time of heater break alarm)	0 to 100	3	sec	Y
404038 (0FC5)	LFOutputSel (Relay output of heater break alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y

No (Address)	Parameter (Description)	Set range	Default	Unit	Save
404039 (0FC6)	LFAutoRecovery (Heater break alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y
404040 (0FC7)	DLFAlmEnable (Partial heater break alarm enable/disable)	• 0: off • 1: on	0	-	Y
404041 (0FC8)	DLFDelayTime (Alarm delay time of partial heater break alarm)	0 to 100	3	sec	Y
404042 (0FC9)	DLFOutputSel (Relay output of partial heater break alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y
404043 (0FCA)	SCRAlmEnable (SCR error alarm enable/disable)	• 0: off • 1: on	1	-	Y
404044 (0FCB)	SCRPercent (Set output of SCR error alarm)	0 to 1000 (0.0 to 100.0)	0	%	Y
404045 (0FCC)	SCRLimitCurrent (Output current of SCR error alarm)	10 to 1100 % of rated current (1 to 110 % of rated current)	30	A	Y
404046 (0FCD)	SCRDelayTime (Alarm delay time of SCR error alarm)	0 to 100	3	sec	Y

No (Address)	Parameter (Description)	Set range	Default	Unit	Save
404047 (0FCE)	SCROutputSel (Relay output of SCR error alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y
404048 (0FCF)	SCRAutoRecovery (SCR error alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y
404049 (0FD0)	FuseAlmEnable (Fuse break alarm enable/disable)	• 0: off • 1: on	1	-	Y
404050 (0FD1)	FuseDelayTime (Alarm delay time of fuse break alarm)	0 to 100	3	sec	Y
404051 (0FD2)	FuseOutputSel (Relay output of fuse break alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y
404052 (0FD3)	FuseAutoRecovery (Fuse break alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y
404053 (0FD4)	FreqAlmEnable (Frequency error alarm enable/disable)	• 0: off • 1: on	1	-	Y

No (Address)	Parameter (Description)	Set range	Default	Unit	Save
404054 (0FD5)	FreqDelayTime (Alarm delay time of frequency error alarm)	0 to 100	3	sec	Y
404055 (0FD6)	FreqOutputSel (Relay output of frequency error alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y
404056 (0FD7)	FreqAutoRecovery (Frequency error alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y

2.14. Other Setting [Func: 03 / 06 / 16, R / W: R / W]

No (Address)	Parameter (Description)	Set range	Default	Unit	Save
405001 (1388)	PDCONOFF (Power distribution control enable/disable)	• 0: off • 1: o	1	-	Y
405002 (1389)	PDCINPLSel (Power distribution control input)	• 0: Fixed cycle control • 1: Variable cycle control	0	-	Y
405004 (138B)	RS485ProtocolSel (Protocol selection)	• 0: Modbus RTU • 1: Modbus ASCII	0	-	Y
405005 (138C)	RS485DeviceAddr (Device address)	1 to 99	1	-	Y
405006 (138D)	RS485DeviceBps (Communication speed)	• 24: 2400 • 48: 4800 • 96: 9600 • 144: 14400 • 192: 19200 • 384: 38400 • 576: 57600 • 1152: 115200	96	bps	Y
405007 (138E)	RS485DevicePbit (Parity bit)	• 0: Not used • 1: Even parity bit • 2: Odd parity bit	0	-	Y
405008 (138F)	RS485DeviceSbit (Stop bit)	1, 2	1	bit	Y
405009 (1390)	RS485DelayTime (Response waiting time)	0 to 9999	0	ms	Y
405010 (1391)	RS485Copy (RS485 communication)	• 0: off • 1: on	1	-	Y

No (Address)	Parameter (Description)	Set range	Default	Unit	Save
405011 (1392)	LockModeSel (Parameter lock)	• 0: Unlock • 1: Lock program setting mode • 2: Lock alarm setting mode	0	-	Y
405012 (1393)	OTCautionAlmEnable (Heatsink over heat alarm enable/disable)	• 0: off • 1: on	1	-	Y
405013 (1394)	OTCautionTemp (Heatsink over heat alarm temperature)	40 to 65	60	°C	Y
405014 (1395)	OTCautionDelayTime (Alarm delay time of heatsink over heat alarm)	0 to 100	3	sec	Y
405015 (1396)	OTCautionOutputSel (Relay output of heatsink over heat alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y
405016 (1397)	OTWarningAlmEnable (Heatsink over heat protection alarm enable/disable)	• 0: off • 1: on	1	-	Y
405017 (1398)	OTWarningTemp (Heatsink over heat protection temperature)	65 to 90	80	°C	Y
405018 (1399)	OTWarningDelayTime (Alarm delay time of heatsink over heat protection alarm)	0 to 100	3	sec	Y

No (Address)	Parameter (Description)	Set range	Default	Unit	Save
405019 (139A)	OTWarningOutputSel (Relay output of heatsink over heat protection alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y
405020 (139B)	OTWarningAutoRecovery (Heatsink over heat protection alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y
405021 (139C)	FanAlmEnable (FAN error alarm enable/disable)	• 0: off • 1: on	1	-	Y
405022 (139D)	FanDelayTime (Alarm delay time of FAN error alarm)	0 to 100	3	sec	Y
405023 (139E)	FANOutputSel (Relay output of FAN error alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y

2.15. Display & Time & Alarm History Setting [Func: 03 / 06 / 16, R / W: R / W]

No (Address)	Parameter (Description)	Set range	Default	Unit	Save
405026 (13A1)	DisplayLine1Sel (Line1 Monitor)	• 0: Power • 1: Heatsink temperature • 2: Control mode • 3: Control input • 4: Input power frequency • 5: Load current • 6: Load voltage • 7: output	3	-	Y

No (Address)	Parameter (Description)	Set range	Default	Unit	Save
405027 (13A2)	DisplayLine2Sel (Line2 Monitor)	• 6: U-phase voltage • 7: Between U_V lines voltage • 8: U-phase current • 9: U-phase power • 10: U-phase frequency • 11: U-phase resistance • 12: V-phase voltage • 13: Between V_W lines voltage • 14: V-phase current • 15: V-phase power • 16: V-phase frequency • 17: V-phase resistance • 18: W-phase voltage • 19: Between W_U lines voltage • 20: W-phase current • 21: W-phase power • 22: W-phase frequency • 23: W-phase resistance	8	-	Y

No (Address)	Parameter (Description)	Set range	Default	Unit	Save
405028 (13A3)	DisplayLine3Sel (Line3 Monitor)	• 6: U-phase voltage • 7: Between U_V lines voltage • 8: U-phase current • 9: U-phase power • 10: U-phase frequency • 11: U-phase resistance • 12: V-phase voltage • 13: Between V_W lines voltage • 14: V-phase current • 15: V-phase power • 16: V-phase frequency • 17: V-phase resistance • 18: W-phase voltage • 19: Between W_U lines voltage • 20: W-phase current • 21: W-phase power • 22: W-phase frequency • 23: W-phase resistance	14	-	Y

No (Address)	Parameter (Description)	Set range	Default	Unit	Save
405029 (13A4)	DisplayLine4Sel (Line4 Monitor)	• 6: U-phase voltage • 7: Between U_V lines voltage • 8: U-phase current • 9: U-phase power • 10: U-phase frequency • 11: U-phase resistance • 12: V-phase voltage • 13: Between V_W lines voltage • 14: V-phase current • 15: V-phase power • 16: V-phase frequency • 17: V-phase resistance • 18: W-phase voltage • 19: Between W_U lines voltage • 20: W-phase current • 21: W-phase power • 22: W-phase frequency • 23: W-phase resistance	20	-	Y
405031 (13A6)	ALMSaveEnable (Alarm save enable/disable)	• 0: off • 1: on	0	-	Y
405032 (13A7)	ALMSaveCleanStart (Alarm save clear)	0, 1 • Delete saved alarms at 0 → 1 rising edge.	0	-	N

No (Address)	Parameter (Description)	Set range	Default	Unit	Save
405033 (13A8)	SystemFactoryInitStart (Reset start)	0, 1 • Starts reset at 0 → 1 rising edge.	0	-	N
405034 (13A9)	year (Time setting - year)	00 to 99 (2000 to 2099)	20	Year	Y
405035 (13AA)	month (Time setting - month)	1 to 12	7	Month	Y
405036 (13AB)	day (Time setting - day)	1 to 31	13	Day	Y
405037 (13AC)	hour (Time setting - hour)	0 to 23	12	Hour	Y
405038 (13AD)	minute (Time setting - minute)	0 to 59	0	Minute	Y
405039 (13AE)	TimeSetEnable (Time setting save)	0, 1 • Starts saving the set time at 0 → 1 rising edge.	0	-	N

3. EtherCAT communication

3.1. EtherCAT communication Overview

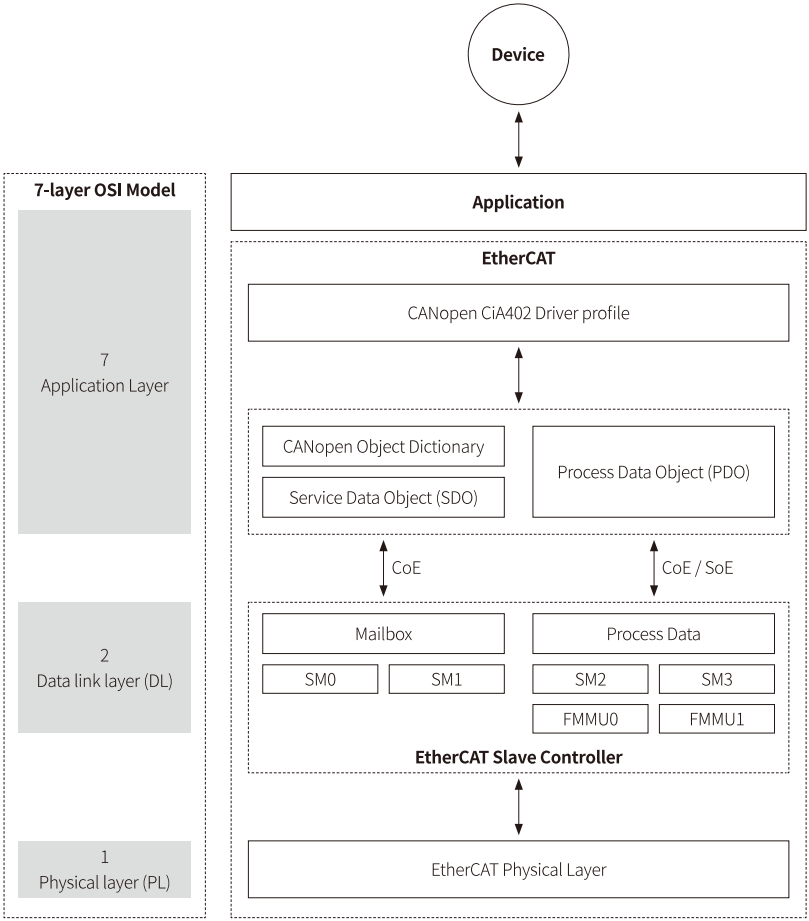
3.1.1. EtherCAT communication Interface

Communication method	EtherCAT
Physical layer / Protocol	100 BASE-TX / IEEE 802.3
Baudrate	10 / 100 Mbps
Comm. period (DC mode)	≥ 2 ms
Comm. port / connector	RJ45 × 2 (Shield confrontation) ECAT IN: EtherCAT input ECAT OUT: EtherCAT output
Topology	Daisy Chain (≤ 99 Node)
Process Data	Static PDO Mapping
Synd Manager	SM0: Mailbox input SM1: Mailbox output SM2: Process Data input SM3: Process Data output
Mailbox	SDO Mapping
Support protocol	CAN application protocol over EtherCAT
DC setting range	2 ms, 4 ms, 8 ms

3.2. EtherCAT Device Protocol

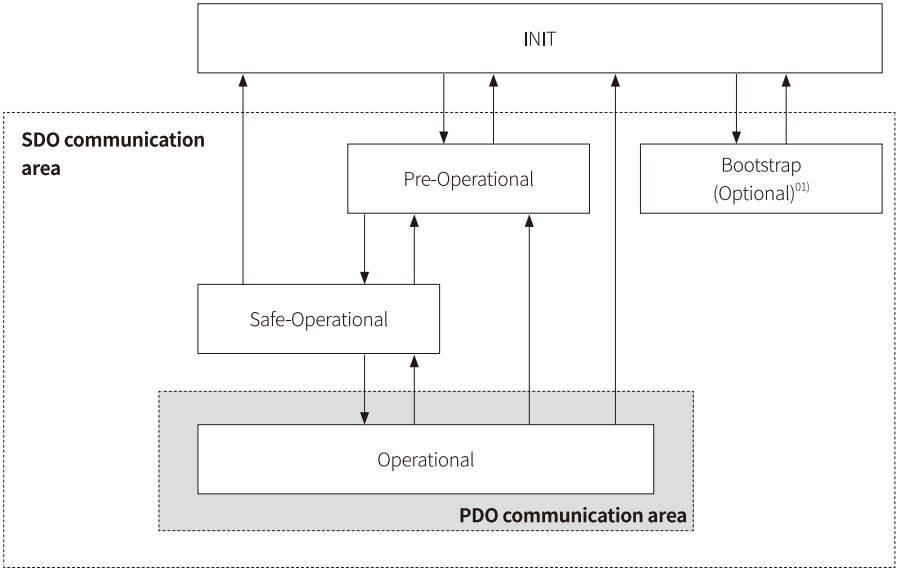
3.2.1. CANopen over EtherCAT (CoE)

SPRM Series is a slave device that supports CANopen application protocol with built-in EtherCAT communication.
All objects of Slave device are defined in Object dictionary, and controlled in real time communication with Master and Slave through Buffered mode(PDO) and Mailbox mode(SDO) based on CAN communication protocol.



3.2.2. EtherCAT State Machine (ESM)

ESM is controlled by Master.



01) SPRM Series does not support Bootstrap.

ESM State	Status
Init (INIT)	Initialized state and comm. connection is not available.
Pre-Operational (Pre-OP)	After initializing, this state will turn into this and operate initial network setup. • SDO (Mailbox comm.) is only available.
Safe-Operational (Safe-OP)	Through TxPDO, the driver status is able to transferred to Master. • SDO (Mailbox comm.) and TxPDO (transmit) are available.
Operational (OP)	Through PDO comm., the command is able to received from Master to driver. • SDO (Mailbox comm.), TxPDO (transmit)and RxPDO (receive) are available.

ESM State	Status
Bootstrap (Boot)	Following state is mainly used for firmware upgrade. • SDO (Mailbox comm.) is only available.

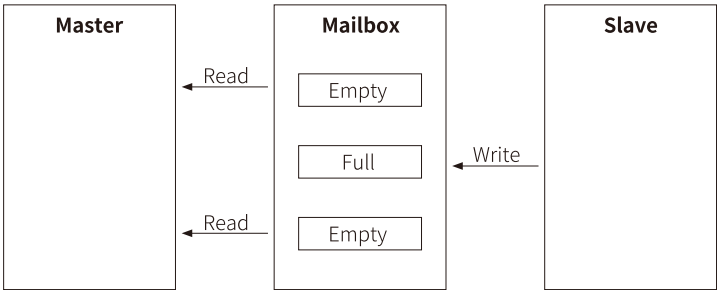
3.2.3. SyncManager (SM)

In order to ensure the stability and consistency of data transmission between Master and Slave, the interrupt type channel is provided.
It is composed by Mater and able to configure communication mode and direction. It refers to specific memory buffer to exchange data, and SM accesses these memory buffers to exchange data.
SyncManager contains Mailbox mode and Buffered mode.

Channel	Operation mode	Start address	Descriptions
SM0	Receive Mailbox	0x1000	Mailbox dedicated input channel, Used for asynchronous data input.
SM1	Transmit Mailbox	0x1400	Mailbox dedicated output channel, Used for asynchronous data output.
SM2	Receive PDO	0x1800	PDO comm. mode dedicated input channel, Used for synchronous data input.
SM3	Transmit PDO	0x1C00	PDO comm. mode dedicated output channel, Used for synchronous data output.

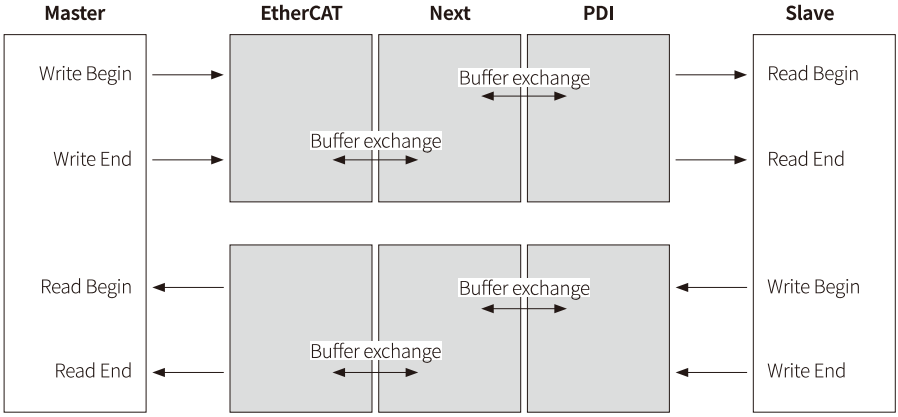
3.2.3.1. Mailbox Mode

Mailbox transmits/receives data only when either connection between Master and Slave is completed.
At first, the data is written to a buffer and saved in a buffer until the receive read the buffer.
There is no data loss due to Handshake mechanism is used.
It is asynchronous and is generally used for SDO communication.



3.2.3.2. Buffered Mode

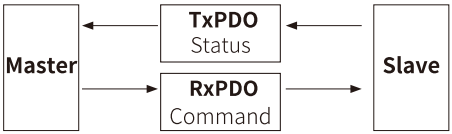
In Buffered mode, both Master and Slave can access the communication buffer at any time.
The data transmit side can read the recently written buffer, and the data receive side can update the buffer value at all time.
If the writing speed from Master is faster than receiving buffer reading speed, the previous data will be dumped and writing is available immediately.
It is used for PDO communication that operates as a periodic signal.

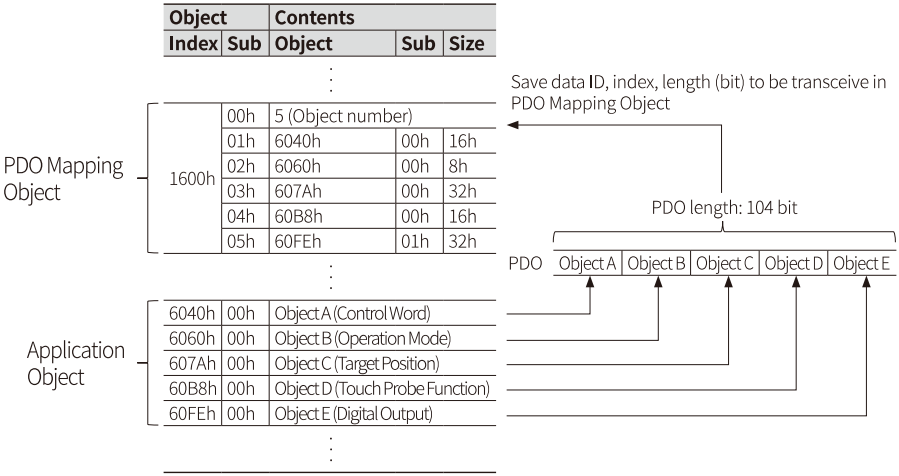


3.2.4. Process Data Object (PDO)

Process Data Object (PDO) assigns Object and is used for real-time data transfer between Master and Slave.

PDO consists received RxPDO and transmit TxPDO. To mapping Object at the dedicated PDO to the assign data.





3.2.5. Service Data Object (SDO)

All objects defined in Object Dictionary are communicated asynchronously in Mailbox communication. It is used when the user sets a value for a specific object or monitors the status.

3.3. Communication Sync Mode

There are 3 communication sync mode.

Free-Run mode

Slave operates asynchronously by internal timer event independent of synchronization signal.

SM Event sync mode

Whenever RxPDO receive is completed from Master, SM event occurs.
Slave is synchronized on the corresponding signal. Jitter may take several μs at the point of receive complete.

DC Event sync mode

Master and Slave operate in synchronized. At this point, jitter is available to real-time synchronous communication in several ns.
Communication cycle supports as 250 us, 500 us, 1 ms, 2 ms, 4 ms, 8 ms.

4. EtherCAT Mapping Table

4.1. Service Data Object (SDO) [R / W: R / W]

4.1.1. 3-phase Setting

4.1.1.1. Control [Index: 8001h Phase_3_Control_Config]

Sub Index	Parameter (Description)	Set range	Default	Unit	Save
1	enable (On / Off)	• 0: off • 1: on	1	-	Y
2	Load_Sel (Load type)	• 0: Resistive load • 1: Transformer load	0	-	Y
4	FbModeSel (Feedback control)	• 0: Not used • 1: Constant voltage feedback • 2: Constant current feedback • 3: Constant power feedback	0	-	Y
5	v_fb_max (Constant voltage feedback control)	1100 to 4800 (110.0 to 480.0)	3800	V	Y
6	c_fb_max (Constant current feedback control)	10 to 1100 % of rated current (1 to 110 % of rated current)	Rated current	A	Y
7	w_fb_max (Constant power feedback control)	440V×100 % of rated current to 440V×1100 % of rated current (440V×10 % of rated current to 440V×110 % of rated current)	Rated power	kW	Y

Sub Index	Parameter (Description)	Set range	Default	Unit	Save
8	Input (Control input)	• 0: 4 - 20 mA at Channel 1 • 1: 4 - 20 mA at Channel 2 • 2: 4 - 20 mA at Channel 3 • 3: 1 - 5 VDC • 4: 0 - 5 VDC • 5: 0 - 10 VDC • 6: EtherCAT communication • 7: RS485 communication • 8: External volume 10 kΩ	0	-	Y
9	Control_Mode (Control mode)	• 0: Phase control • 1: Fixed cycle control • 2: Variable cycle control	0	-	Y
10	StartTime (Soft start time)	0 to 999	3	sec	Y
11	SoftUPTime (Soft up time)	0 to 999	3	sec	Y
12	StartDownTime (Soft down time)	0 to 999	3	sec	Y
13	OutputMin (Output low-limit value)	0 to 1000 (0.0 to 100.0)	0	%	Y
14	OutputMax (Output high-limit value)	0 to 1000 (0.0 to 100.0)	1000	%	Y
15	CurrentLimit (Output current limit)	10 to 1100 % of rated current (1 to 110 % of rated current)	1100 % of rated current	A	Y
18	SlopeOutputRate (Input slope compensation)	-999 to 999 (-99.9 to 99.9)	0	%	Y
19	OffsetOutputRate (Input offset)	-999 to 999 (-99.9 to 99.9)	0	%	Y

Sub Index	Parameter (Description)	Set range	Default	Unit	Save
20	WiringMode (3-phase connection)	• 0: Star connection • 1: Delta connection	0	-	Y

4.1.1.2. Alarm [Index: 8002h Phase_3_ALM_Config]

Sub Index	Parameter (Description)	Set range	Default	Unit	Save
1	OCAlmEnable (Overcurrent alarm enable/disable)	• 0: off • 1: on	1	-	Y
2	OCAutoRecovery (Overcurrent alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y
4	OCCurrent (Limit output current value of overcurrent alarm)	10 to 1100 % of rated current (1 to 110 % of rated current)	1100 % of rated current	A	Y
5	OCDelayTime (Alarm delay time of overcurrent alarm)	0 to 100	3	sec	Y
6	OCOutputSel (Relay output of overcurrent alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y
7	OVAlmEnable (Overvoltage alarm enable/disable)	• 0: off • 1: on	1	-	Y
8	OVAutoRecovery (Overvoltage alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y
10	OVVolt (Limit output voltage value of overvoltage alarm)	100 to 5000 (10.0 to 500.0)	5000	V	Y

Sub Index	Parameter (Description)	Set range	Default	Unit	Save
11	OVDelayTime (Alarm delay time of overvoltage alarm)	0 to 100	3	sec	Y
12	OVOutputSel (Relay output of overcurrent alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y
13	LFAlmEnable (Heater break alarm enable/disable)	• 0: off • 1: on	1	-	Y
14	LFAutoRecovery (Heater break alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y
16	LFPercent (Set output of heater break alarm)	0 to 1000 (0.0 to 100.0)	1000	%	Y
17	LFLimitCurrent (Set current of heater break alarm)	10 to 1100 % of rated current (1 to 110 % of rated current)	10	A	Y
18	LFDelayTime (Alarm delay time of heater break alarm)	0 to 100	3	sec	Y

Sub Index	Parameter (Description)	Set range	Default	Unit	Save
19	LFOutputSel (Relay output of heater break alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y
20	ULAlmEnable (Load unbalance alarm enable/disable)	• 0: off • 1: on	1	-	Y
21	ULAutoRecovery (Load unbalance alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y
23	ULLimitPercent (Unbalance rate of load unbalance alarm)	50 to 1000 (5.0 to 100.0)	300	%	Y
24	ULDelayTime (Alarm delay time of load unbalance alarm)	0 to 100	3	sec	Y
25	ULOutputSel (Relay output of load unbalance alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y
26	SCRAlmEnable (SCR error alarm enable/disable)	• 0: off • 1: on	1	-	Y

Sub Index	Parameter (Description)	Set range	Default	Unit	Save
27	SCRAutoRecovery (SCR error alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y
29	SCRPercent (Set output of SCR error alarm)	0 to 1000 (0.0 to 100.0)	0	%	Y
30	SCRLimitCurrent (Output current of SCR error alarm)	10 to 1100 % of rated current (1 to 110 % of rated current)	30	A	Y
31	SCRDelayTime (Alarm delay time of SCR error alarm)	0 to 100	3	sec	Y
32	SCROutputSel (Relay output of SCR error alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y
33	FuseAlmEnable (Fuse break alarm enable/disable)	• 0: off • 1: on	1	-	Y
34	FuseAutoRecovery (Fuse break alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y
36	FuseDelayTime (Alarm delay time of fuse break alarm)	0 to 100	3	sec	Y

Sub Index	Parameter (Description)	Set range	Default	Unit	Save
37	FuseOutputSel (Relay output of fuse break alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y
38	FreqAlmEnable (Frequency error alarm enable/disable)	• 0: off • 1: on	1	-	Y
39	FreqAutoRecovery (Frequency error alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y
41	FreqDelayTime (Alarm delay time of frequency error alarm)	0 to 100	3	sec	Y
42	FreqOutputSel (Relay output of frequency error alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y

4.1.2. Single-phase L1 Setting

4.1.2.1. Control [Index: 8003h L_1_Control_Config]

Sub Index	Parameter (Description)	Set range	Default	Unit	Save
1	enable (On / Off)	• 0: off • 1: on	1	-	Y
2	Load_Sel (Load type)	• 0: Resistive load • 1: Transformer load	0	-	Y
4	FbModeSel (Feedback control)	• 0: Not used • 1: Constant voltage feedback • 2: Constant current feedback • 3: Constant power feedback	0	-	Y
5	v_fb_max (Constant voltage feedback control)	1100 to 4800 (110.0 to 480.0)	2200	V	Y
6	c_fb_max (Constant current feedback control)	10 to 1100 % of rated current (1 to 110 % of rated current)	Rated current	A	Y
7	w_fb_max (Constant power feedback control)	440V×100 % of rated current to 440V×1100 % of rated current (440V×10 % of rated current to 440V×110 % of rated current)	Rated power	kW	Y

Sub Index	Parameter (Description)	Set range	Default	Unit	Save
8	Input (Control input)	• 0: 4 - 20 mA at Channel 1 • 1: 4 - 20 mA at Channel 2 • 2: 4 - 20 mA at Channel 3 • 3: 1 - 5 VDC • 4: 0 - 5 VDC • 5: 0 - 10 VDC • 6: EtherCAT communication • 7: RS485 communication • 8: External volume 10 kΩ	0	-	Y
9	Control_Mode (Control mode)	• 0: Phase control • 1: Fixed cycle control • 2: Variable cycle control	0	-	Y
10	StartTime (Soft start time)	0 to 999	3	sec	Y
11	SoftUPTime (Soft up time)	0 to 999	3	sec	Y
12	StartDownTime (Soft down time)	0 to 999	3	sec	Y
13	OutputMin (Output low-limit value)	0 to 1000 (0.0 to 100.0)	0	%	Y
14	OutputMax (Output high-limit value)	0 to 1000 (0.0 to 100.0)	1000	%	Y
15	CurrentLimit (Output current limit)	10 to 1100 % of rated current (1 to 110 % of rated current)	1100 % of rated current	A	Y
18	SlopeOutputRate (Input slope compensation)	-999 to 999 (-99.9 to 99.9)	0	%	Y
19	OffsetOutputRate (Input offset)	-999 to 999 (-99.9 to 99.9)	0	%	Y

Sub Index	Parameter (Description)	Set range	Default	Unit	Save
20	DLFLoadNum (Number of multi-load)	2 to 6	2	-	Y
21	DLFMaxOutPutLimit (Scan output limit value)	250 (25.0), 500 (50.0), 750 (75.0), 1000 (100.0)	1000	%	Y
22	DLFTuningUpDelayTime (Output increase scan time)	0 to 10	1	-	Y
23	DLFTuningDownDelayTime (Output decrease scan time)	0 to 10	1	-	Y
24	DLFStart (Start scan)	0, 1 • Starts DLF scan at 0 → 1 rising edge.	0	-	N

4.1.2.2. Alarm [Index: 8004h L_1_ALM_Config]

Sub Index	Parameter (Description)	Set range	Default	Unit	Save
1	OCAlmEnable (Overcurrent alarm enable/disable)	• 0: off • 1: on	1	-	Y
2	OCAutoRecovery (Overcurrent alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y
4	OCCurrent (Limit output current value of overcurrent alarm)	10 to 1100 % of rated current (1 to 110 % of rated current)	1100 % of rated current	A	Y
5	OCDelayTime (Alarm delay time of overcurrent alarm)	0 to 100	3	sec	Y
6	OCOutputSel (Relay output of overcurrent alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y
7	OVAlmEnable (Overvoltage alarm enable/disable)	• 0: off • 1: on	1	-	Y
8	OVAutoRecovery (Overvoltage alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y
10	OVVolt (Limit output voltage value of overvoltage alarm)	100 to 5000 (10.0 to 500.0)	5000	V	Y

Sub Index	Parameter (Description)	Set range	Default	Unit	Save
11	OVDelayTime (Alarm delay time of overvoltage alarm)	0 to 100	3	sec	Y
12	OVOutputSel (Relay output of overcurrent alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y
13	LFAlmEnable (Heater break alarm enable/disable)	• 0: off • 1: on	1	-	Y
14	LFAutoRecovery (Heater break alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y
16	LFPercent (Set output of heater break alarm)	0 to 1000 (0.0 to 100.0)	1000	%	Y
17	LFLimitCurrent (Set current of heater break alarm)	10 to 1100 % of rated current (1 to 110 % of rated current)	10	A	Y
18	LFDelayTime (Alarm delay time of heater break alarm)	0 to 100	3	sec	Y

Sub Index	Parameter (Description)	Set range	Default	Unit	Save
19	LFOutputSel (Relay output of heater break alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y
20	DLFAlmEnable (Partial heater break alarm enable/disable)	• 0: off • 1: on	0	-	Y
22	DLFDelayTime (Alarm delay time of partial heater break alarm)	0 to 100	3	sec	Y
23	DLFOutputSel (Relay output of partial heater break alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y
24	SCRAlmEnable (SCR error alarm enable/disable)	• 0: off • 1: on	1	-	Y
25	SCRAutoRecovery (SCR error alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y
27	SCRPercent (Set output of SCR error alarm)	0 to 1000 (0.0 to 100.0)	0	%	Y

Sub Index	Parameter (Description)	Set range	Default	Unit	Save
28	SCRLimitCurrent (Output current of SCR error alarm)	10 to 1100 % of rated current (1 to 110 % of rated current)	30	A	Y
29	SCRDelayTime (Alarm delay time of SCR error alarm)	0 to 100	3	sec	Y
30	SCROutputSel (Relay output of SCR error alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y
31	FuseAlmEnable (Fuse break alarm enable/disable)	• 0: off • 1: on	1	-	Y
32	FuseAutoRecovery (Fuse break alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y
34	FuseDelayTime (Alarm delay time of fuse break alarm)	0 to 100	3	sec	Y
35	FuseOutputSel (Relay output of fuse break alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y

Sub Index	Parameter (Description)	Set range	Default	Unit	Save
36	FreqAlmEnable (Frequency error alarm enable/disable)	• 0: off • 1: on	1	-	Y
37	FreqAutoRecovery (Frequency error alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y
39	FreqDelayTime (Alarm delay time of frequency error alarm)	0 to 100	3	sec	Y
40	FreqOutputSel (Relay output of frequency error alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y

4.1.3. Single-phase L2 Setting

4.1.3.1. Control [Index: 8005h L_2_Control_Config]

Sub Index	Parameter (Description)	Set range	Default	Unit	Save
1	enable (On / Off)	• 0: off • 1: on	1	-	Y
2	Load_Sel (Load type)	• 0: Resistive load • 1: Transformer load	0	-	Y
4	FbModeSel (Feedback control)	• 0: Not used • 1: Constant voltage feedback • 2: Constant current feedback • 3: Constant power feedback	0	-	Y
5	v_fb_max (Constant voltage feedback control)	1100 to 4800 (110.0 to 480.0)	2200	V	Y
6	c_fb_max (Constant current feedback control)	10 to 1100 % of rated current (1 to 110 % of rated current)	Rated current	A	Y
7	w_fb_max (Constant power feedback control)	440V×100 % of rated current to 440V×1100 % of rated current (440V×10 % of rated current to 440V×110 % of rated current)	Rated power	kW	Y

Sub Index	Parameter (Description)	Set range	Default	Unit	Save
8	Input (Control input)	• 0: 4 - 20 mA at Channel 1 • 1: 4 - 20 mA at Channel 2 • 2: 4 - 20 mA at Channel 3 • 3: 1 - 5 VDC • 4: 0 - 5 VDC • 5: 0 - 10 VDC • 6: EtherCAT communication • 7: RS485 communication • 8: External volume 10 kΩ	0	-	Y
9	Control_Mode (Control mode)	• 0: Phase control • 1: Fixed cycle control • 2: Variable cycle control	0	-	Y
10	StartTime (Soft start time)	0 to 999	3	sec	Y
11	SoftUPTime (Soft up time)	0 to 999	3	sec	Y
12	StartDownTime (Soft down time)	0 to 999	3	sec	Y
13	OutputMin (Output low-limit value)	0 to 1000 (0.0 to 100.0)	0	%	Y
14	OutputMax (Output high-limit value)	0 to 1000 (0.0 to 100.0)	1000	%	Y
15	CurrentLimit (Output current limit)	10 to 1100 % of rated current (1 to 110 % of rated current)	1100 % of rated current	A	Y
18	SlopeOutputRate (Input slope compensation)	-999 to 999 (-99.9 to 99.9)	0	%	Y
19	OffsetOutputRate (Input offset)	-999 to 999 (-99.9 to 99.9)	0	%	Y

Sub Index	Parameter (Description)	Set range	Default	Unit	Save
20	DLFLoadNum (Number of multi-load)	2 to 6	2	-	Y
21	DLFMaxOutPutLimit (Scan output limit value)	250 (25.0), 500 (50.0), 750 (75.0), 1000 (100.0)	1000	%	Y
22	DLFTuningUpDelayTime (Output increase scan time)	0 to 10	1	-	Y
23	DLFTuningDownDelayTime (Output decrease scan time)	0 to 10	1	-	Y
24	DLFStart (Start scan)	0, 1 • Starts DLF scan at 0 → 1 rising edge.	0	-	N

4.1.3.2. Alarm [Index: 8006h L_2_ALM_Config]

Sub Index	Parameter (Description)	Set range	Default	Unit	Save
1	OCAlmEnable (Overcurrent alarm enable/disable)	• 0: off • 1: on	1	-	Y
2	OCAutoRecovery (Overcurrent alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y
4	OCCurrent (Limit output current value of overcurrent alarm)	10 to 1100 % of rated current (1 to 110 % of rated current)	1100 % of rated current	A	Y
5	OCDelayTime (Alarm delay time of overcurrent alarm)	0 to 100	3	sec	Y
6	OCOutputSel (Relay output of overcurrent alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y
7	OVAlmEnable (Overvoltage alarm enable/disable)	• 0: off • 1: on	1	-	Y
8	OVAutoRecovery (Overvoltage alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y
10	OVVolt (Limit output voltage value of overvoltage alarm)	100 to 5000 (10.0 to 500.0)	5000	V	Y

Sub Index	Parameter (Description)	Set range	Default	Unit	Save
11	OVDelayTime (Alarm delay time of overvoltage alarm)	0 to 100	3	sec	Y
12	OVOutputSel (Relay output of overcurrent alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y
13	LFAlmEnable (Heater break alarm enable/disable)	• 0: off • 1: on	1	-	Y
14	LFAutoRecovery (Heater break alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y
16	LFPercent (Set output of heater break alarm)	0 to 1000 (0.0 to 100.0)	1000	%	Y
17	LFLimitCurrent (Set current of heater break alarm)	10 to 1100 % of rated current (1 to 110 % of rated current)	10	A	Y
18	LFDelayTime (Alarm delay time of heater break alarm)	0 to 100	3	sec	Y

Sub Index	Parameter (Description)	Set range	Default	Unit	Save
19	LFOutputSel (Relay output of heater break alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y
20	DLFAlmEnable (Partial heater break alarm enable/disable)	• 0: off • 1: on	0	-	Y
22	DLFDelayTime (Alarm delay time of partial heater break alarm)	0 to 100	3	sec	Y
23	DLFOutputSel (Relay output of partial heater break alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y
24	SCRAlmEnable (SCR error alarm enable/disable)	• 0: off • 1: on	1	-	Y
25	SCRAutoRecovery (SCR error alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y
27	SCRPercent (Set output of SCR error alarm)	0 to 1000 (0.0 to 100.0)	0	%	Y

Sub Index	Parameter (Description)	Set range	Default	Unit	Save
28	SCRLimitCurrent (Output current of SCR error alarm)	10 to 1100 % of rated current (1 to 110 % of rated current)	30	A	Y
29	SCRDelayTime (Alarm delay time of SCR error alarm)	0 to 100	3	sec	Y
30	SCROutputSel (Relay output of SCR error alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y
31	FuseAlmEnable (Fuse break alarm enable/disable)	• 0: off • 1: on	1	-	Y
32	FuseAutoRecovery (Fuse break alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y
34	FuseDelayTime (Alarm delay time of fuse break alarm)	0 to 100	3	sec	Y
35	FuseOutputSel (Relay output of fuse break alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y

Sub Index	Parameter (Description)	Set range	Default	Unit	Save
36	FreqAlmEnable (Frequency error alarm enable/disable)	• 0: off • 1: on	1	-	Y
37	FreqAutoRecovery (Frequency error alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y
39	FreqDelayTime (Alarm delay time of frequency error alarm)	0 to 100	3	sec	Y
40	FreqOutputSel (Relay output of frequency error alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y

4.1.4. Single-phase L3 Setting

4.1.4.1. Control [Index: 8007h L_3_Control_Config]

Sub Index	Parameter (Description)	Set range	Default	Unit	Save
1	enable (On / Off)	• 0: off • 1: on	1	-	Y
2	Load_Sel (Load type)	• 0: Resistive load • 1: Transformer load	0	-	Y
4	FbModeSel (Feedback control)	• 0: Not used • 1: Constant voltage feedback • 2: Constant current feedback • 3: Constant power feedback	0	-	Y
5	v_fb_max (Constant voltage feedback control)	1100 to 4800 (110.0 to 480.0)	2200	V	Y
6	c_fb_max (Constant current feedback control)	10 to 1100 % of rated current (1 to 110 % of rated current)	Rated current	A	Y
7	w_fb_max (Constant power feedback control)	440V×100 % of rated current to 440V×1100 % of rated current (440V×10 % of rated current to 440V×110 % of rated current)	Rated power	kW	Y

Sub Index	Parameter (Description)	Set range	Default	Unit	Save
8	Input (Control input)	• 0: 4 - 20 mA at Channel 1 • 1: 4 - 20 mA at Channel 2 • 2: 4 - 20 mA at Channel 3 • 3: 1 - 5 VDC • 4: 0 - 5 VDC • 5: 0 - 10 VDC • 6: EtherCAT communication • 7: RS485 communication • 8: External volume 10 kΩ	0	-	Y
9	Control_Mode (Control mode)	• 0: Phase control • 1: Fixed cycle control • 2: Variable cycle control	0	-	Y
10	StartTime (Soft start time)	0 to 999	3	sec	Y
11	SoftUPTime (Soft up time)	0 to 999	3	sec	Y
12	StartDownTime (Soft down time)	0 to 999	3	sec	Y
13	OutputMin (Output low-limit value)	0 to 1000 (0.0 to 100.0)	0	%	Y
14	OutputMax (Output high-limit value)	0 to 1000 (0.0 to 100.0)	1000	%	Y
15	CurrentLimit (Output current limit)	10 to 1100 % of rated current (1 to 110 % of rated current)	1100 % of rated current	A	Y
18	SlopeOutputRate (Input slope compensation)	-999 to 999 (-99.9 to 99.9)	0	%	Y
19	OffsetOutputRate (Input offset)	-999 to 999 (-99.9 to 99.9)	0	%	Y

Sub Index	Parameter (Description)	Set range	Default	Unit	Save
20	DLFLoadNum (Number of multi-load)	2 to 6	2	-	Y
21	DLFMaxOutPutLimit (Scan output limit value)	250 (25.0), 500 (50.0), 750 (75.0), 1000 (100.0)	1000	%	Y
22	DLFTuningUpDelayTime (Output increase scan time)	0 to 10	1	-	Y
23	DLFTuningDownDelayTime (Output decrease scan time)	0 to 10	1	-	Y
24	DLFStart (Start scan)	0, 1 • Starts DLF scan at 0 → 1 rising edge.	0	-	N

4.1.4.2. Alarm [Index: 8008h L_3_ALM_Config]

Sub Index	Parameter (Description)	Set range	Default	Unit	Save
1	OCAlmEnable (Overcurrent alarm enable/disable)	• 0: off • 1: on	1	-	Y
2	OCAutoRecovery (Overcurrent alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y
4	OCCurrent (Limit output current value of overcurrent alarm)	10 to 1100 % of rated current (1 to 110 % of rated current)	1100 % of rated current	A	Y
5	OCDelayTime (Alarm delay time of overcurrent alarm)	0 to 100	3	sec	Y
6	OCOutputSel (Relay output of overcurrent alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y
7	OVAlmEnable (Overvoltage alarm enable/disable)	• 0: off • 1: on	1	-	Y
8	OVAutoRecovery (Overvoltage alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y
10	OVVolt (Limit output voltage value of overvoltage alarm)	100 to 5000 (10.0 to 500.0)	5000	V	Y

Sub Index	Parameter (Description)	Set range	Default	Unit	Save
11	OVDelayTime (Alarm delay time of overvoltage alarm)	0 to 100	3	sec	Y
12	OVOutputSel (Relay output of overcurrent alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y
13	LFAlmEnable (Heater break alarm enable/disable)	• 0: off • 1: on	1	-	Y
14	LFAutoRecovery (Heater break alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y
16	LFPercent (Set output of heater break alarm)	0 to 1000 (0.0 to 100.0)	1000	%	Y
17	LFLimitCurrent (Set current of heater break alarm)	10 to 1100 % of rated current (1 to 110 % of rated current)	10	A	Y
18	LFDelayTime (Alarm delay time of heater break alarm)	0 to 100	3	sec	Y

Sub Index	Parameter (Description)	Set range	Default	Unit	Save
19	LFOutputSel (Relay output of heater break alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y
20	DLFAlmEnable (Partial heater break alarm enable/disable)	• 0: off • 1: on	0	-	Y
22	DLFDelayTime (Alarm delay time of partial heater break alarm)	0 to 100	3	sec	Y
23	DLFOutputSel (Relay output of partial heater break alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y
24	SCRAlmEnable (SCR error alarm enable/disable)	• 0: off • 1: on	1	-	Y
25	SCRAutoRecovery (SCR error alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y
27	SCRPercent (Set output of SCR error alarm)	0 to 1000 (0.0 to 100.0)	0	%	Y

Sub Index	Parameter (Description)	Set range	Default	Unit	Save
28	SCRLimitCurrent (Output current of SCR error alarm)	10 to 1100 % of rated current (1 to 110 % of rated current)	30	A	Y
29	SCRDelayTime (Alarm delay time of SCR error alarm)	0 to 100	3	sec	Y
30	SCROutputSel (Relay output of SCR error alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y
31	FuseAlmEnable (Fuse break alarm enable/disable)	• 0: off • 1: on	1	-	Y
32	FuseAutoRecovery (Fuse break alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y
34	FuseDelayTime (Alarm delay time of fuse break alarm)	0 to 100	3	sec	Y
35	FuseOutputSel (Relay output of fuse break alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y

Sub Index	Parameter (Description)	Set range	Default	Unit	Save
36	FreqAlmEnable (Frequency error alarm enable/disable)	• 0: off • 1: on	1	-	Y
37	FreqAutoRecovery (Frequency error alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y
39	FreqDelayTime (Alarm delay time of frequency error alarm)	0 to 100	3	sec	Y
40	FreqOutputSel (Relay output of frequency error alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y

4.1.5. Other Setting

4.1.5.1. Control [Index: 8009h Device_Control_Config]

Sub Index	Parameter (Description)	Set range	Default	Unit	Save
1	PDCONOFF (Power distribution control enable/disable)	• 0: off • 1: on	1	-	Y
3	PDCINPLSel (Power distribution control input)	• 0: Fixed cycle control • 1: Variable cycle control	0	-	Y
5	RS485ProtocolSel (Protocol selection)	• 0: Modbus RTU • 1: Modbus ASCII	0	-	Y
6	RS485DeviceAddr (Device address)	1 to 99	1	-	Y
7	RS485DeviceBps (Communication speed)	• 24: 2400 • 48: 4800 • 96: 9600 • 144: 14400 • 192: 19200 • 384: 38400 • 576: 57600 • 1152: 115200	96	bps	Y
8	RS485DevicePbit (Parity bit)	• 0: Not used • 1: Even parity bit • 2: Odd parity bit	0	-	Y
9	RS485DeviceSbit (Stop bit)	1, 2	1	bit	Y
10	RS485Copy (RS485 communication)	• 0: off • 1: on	0	-	Y

Sub Index	Parameter (Description)	Set range	Default	Unit	Save
12	RS485DelayTime (Response waiting time)	0 to 9999	0	ms	Y
13	LockModeSel (Parameter lock)	• 0: Unlock • 1: Lock program setting mode • 2: Lock alarm setting mode	0	-	Y
14	ALMSaveCleanStart (Alarm save clear)	0, 1 • Delete saved alarms at 0 → 1 rising edge.	0	-	N
15	SystemFactoryInitStart (Reset start)	0, 1 • Starts reset at 0 → 1 rising edge.	0	-	N

4.1.5.2. Alarm [Index: 800Ah Device_ALM_Config]

Sub Index	Parameter (Description)	Set range	Default	Unit	Save
1	OTCautionAlmEnable (Heatsink over heat alarm enable/disable)	• 0: off • 1: on	1	-	Y
3	OTCautionTemp (Heatsink over heat alarm temperature)	40 to 65	60	°C	Y
4	OTCautionDelayTime (Alarm delay time of heatsink over heat alarm)	0 to 100	3	sec	Y
5	OTCautionOutputSel (Relay output of heatsink over heat alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y
6	OTWarningAlmEnable (Heatsink over heat protection alarm enable/disable)	• 0: off • 1: on	1	-	Y
7	OTWarningAutoRecovery (Heatsink over heat protection alarm auto-recovery enable/disable)	• 0: off • 1: on	0	-	Y
9	OTWarningTemp (Heatsink over heat protection temperature)	65 to 90	80	°C	Y
10	OTWarningDelayTime (Alarm delay time of heatsink over heat protection alarm)	0 to 100	3	sec	Y

Sub Index	Parameter (Description)	Set range	Default	Unit	Save
11	OTWarningOutputSel (Relay output of heatsink over heat protection alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y
12	FanAlmEnable (FAN error alarm enable/disable)	• 0: off • 1: on	1	-	Y
14	FanDelayTime (Alarm delay time of FAN error alarm)	0 to 100	3	sec	Y
15	FANOutputSel (Relay output of FAN error alarm)	• 0: AlmRelay_U_OUT1 • 1: AlmRelay_U_OUT2 • 2: AlmRelay_V_OUT1 • 3: AlmRelay_V_OUT2 • 4: AlmRelay_W_OUT1 • 5: AlmRelay_W_OUT2 • 6: Not used	6	-	Y

4.1.6. Display & Time & Alarm History Setting

4.1.6.1. Display [Index: 800Bh Display_Config]

Sub Index	Parameter (Description)	Set range	Default	Unit	Save
1	DisplayLine1Sel (Line1 Monitor)	• 0: Power • 1: Heatsink temperature • 2: Control mode • 3: Control input • 4: Input power frequency • 5: Load current • 6: Load voltage • 7: Output	3	-	Y

Sub Index	Parameter (Description)	Set range	Default	Unit	Save
2	DisplayLine2Sel (Line2 Monitor)	• 6: U-phase voltage • 7: Between U_V lines voltage • 8: U-phase current • 9: U-phase power • 10: U-phase frequency • 11: U-phase resistance • 12: V-phase voltage • 13: Between V_W lines voltage • 14: V-phase current • 15: V-phase power • 16: V-phase frequency • 17: V-phase resistance • 18: W-phase voltage • 19: Between W_U lines voltage • 20: W-phase current • 21: W-phase power • 22: W-phase frequency • 23: W-phase resistance	8	-	Y

Sub Index	Parameter (Description)	Set range	Default	Unit	Save
3	DisplayLine3Sel (Line3 Monitor)	• 6: U-phase voltage • 7: Between U_V lines voltage • 8: U-phase current • 9: U-phase power • 10: U-phase frequency • 11: U-phase resistance • 12: V-phase voltage • 13: Between V_W lines voltage • 14: V-phase current • 15: V-phase power • 16: V-phase frequency • 17: V-phase resistance • 18: W-phase voltage • 19: Between W_U lines voltage • 20: W-phase current • 21: W-phase power • 22: W-phase frequency • 23: W-phase resistance	14	-	Y

Sub Index	Parameter (Description)	Set range	Default	Unit	Save
4	DisplayLine4Sel (Line4 Monitor)	• 6: U-phase voltage • 7: Between U_V lines voltage • 8: U-phase current • 9: U-phase power • 10: U-phase frequency • 11: U-phase resistance • 12: V-phase voltage • 13: Between V_W lines voltage • 14: V-phase current • 15: V-phase power • 16: V-phase frequency • 17: V-phase resistance • 18: W-phase voltage • 19: Between W_U lines voltage • 20: W-phase current • 21: W-phase power • 22: W-phase frequency • 23: W-phase resistance	20	-	Y

4.1.6.2. Time [Index: 800Ch Time_Config]

Sub Index	Parameter (Description)	Set range	Default	Unit	Save
1	year (Time setting - year)	00 to 99 (2000 to 2099)	20	Year	Y
2	month (Time setting - month)	1 to 12	7	Month	Y
3	day (Time setting - day)	1 to 31	13	Day	Y
4	hour (Time setting - hour)	0 to 23	12	Hour	Y
5	minute (Time setting - minute)	0 to 59	0	Minute	Y
6	TimeSetEnable (Time setting save)	0, 1 • Starts saving the set time at 0 → 1 rising edge.	0	-	N

4.1.6.3. Alarm History [Index: 800Dh Save_ALM_Log0]

Sub Index	Parameter	Description	Type	Unit
1	Log0_year	Year of alarm	-	Year
2	Log0_month	Month of alarm	-	Month
3	Log0_day	Day of alarm	-	Day
4	Log0_hour	Hour of alarm	-	Hour
5	Log0_minute	Minute of alarm	-	Minute
6	Log0_ph3_L1_ALM	3-phase L1 Alarm history value	• BIT0: Overcurrent alarm • BIT1: Overvoltage alarm • BIT2: Heater break alarm • BIT3: Load unbalance alarm • BIT4: SCR error alarm • BIT5: Fuse break alarm • BIT6: Frequency error alarm • BIT7: Partial heater break alarm	-
7	Log0_ph3_L2_ALM	3-phase L2 Alarm history value	• BIT0: Overcurrent alarm • BIT1: Overvoltage alarm • BIT2: Heater break alarm • BIT3: Load unbalance alarm • BIT4: SCR error alarm • BIT5: Fuse break alarm • BIT6: Frequency error alarm • BIT7: Partial heater break alarm	-

Sub Index	Parameter	Description	Type	Unit
8	Log0_ph3_L3_ALM	3-phase L3 Alarm history value	• BIT0: Overcurrent alarm • BIT1: Overvoltage alarm • BIT2: Heater break alarm • BIT3: Load unbalance alarm • BIT4: SCR error alarm • BIT5: Fuse break alarm • BIT6: Frequency error alarm • BIT7: Partial heater break alarm	-
9	Log0_L1_ALM	Single-phase L1 Alarm history value	• BIT0: Overcurrent alarm • BIT1: Overvoltage alarm • BIT2: Heater break alarm • BIT3: Load unbalance alarm • BIT4: SCR error alarm • BIT5: Fuse break alarm • BIT6: Frequency error alarm • BIT7: Partial heater break alarm	-

Sub Index	Parameter	Description	Type	Unit
10	Log0_L2_ALM	Single-phase L2 Alarm history value	• BIT0: Overcurrent alarm • BIT1: Overvoltage alarm • BIT2: Heater break alarm • BIT3: Load unbalance alarm • BIT4: SCR error alarm • BIT5: Fuse break alarm • BIT6: Frequency error alarm • BIT7: Partial heater break alarm	-
11	Log0_L3_ALM	Single-phase L3 Alarm history value	• BIT0: Overcurrent alarm • BIT1: Overvoltage alarm • BIT2: Heater break alarm • BIT3: Load unbalance alarm • BIT4: SCR error alarm • BIT5: Fuse break alarm • BIT6: Frequency error alarm • BIT7: Partial heater break alarm	-
12	Log0_Remain_ALM	Common Alarm history value	• BIT0: Heatsink over heat alarm • BIT1: Heatsink over heat protection alarm • BIT2: FAN error alarm • BIT3: RUN / STOP switch • BIT4: AUTO / MANU switch	-

Alarm history number according to index

Index	Alarm history number
800Dh	Save ALM Log 0
800Eh	Save ALM Log 1
800Fh	Save ALM Log 2
8010h	Save ALM Log 3
8011h	Save ALM Log 4
8012h	Save ALM Log 5
8013h	Save ALM Log 6
8014h	Save ALM Log 7
8015h	Save ALM Log 8
8016h	Save ALM Log 9

4.2. Process Data Object (PDO) [R / W: R]

4.2.1. 3-phase Monitoring Value [Index: 6010h Phase_3_Input]

Sub Index	Parameter	Description	BIT	Unit
0x01	Alm_L1_OC	3-phase L1 overcurrent alarm possible status	1	-
0x02	Alm_L1_OV	3-phase L1 overvoltage alarm possible status	1	-
0x03	Alm_L1_LF	3-phase L1 heater break alarm possible status	1	-
0x04	Alm_L1_UL	3-phase L1 load unbalance alarm possible status	1	-
0x05	Alm_L1_SCR_Short	3-phase L1 SCR error alarm possible status	1	-
0x06	Alm_L1_FUSE	3-phase L1 fuse break alarm possible status	1	-
0x07	Alm_L1_Frq	3-phase L1 frequency error alarm possible status	1	-
0x09	Alm_L2_OC	3-phase L2 overcurrent alarm possible status	1	-
0x0A	Alm_L2_OV	3-phase L2 overvoltage alarm possible status	1	-
0x0B	Alm_L2_LF	3-phase L2 heater break alarm possible status	1	-
0x0C	Alm_L2_UL	3-phase L2 load unbalance alarm possible status	1	-
0x0D	Alm_L2_SCR_Short	3-phase L2 SCR error alarm possible status	1	-
0x0E	Alm_L2_FUSE	3-phase L2 fuse break alarm possible status	1	-
0x0F	Alm_L2_Frq	3-phase L2 frequency error alarm possible status	1	-
0x11	Alm_L3_OC	3-phase L3 overcurrent alarm possible status	1	-
0x12	Alm_L3_OV	3-phase L3 overvoltage alarm possible status	1	-
0x13	Alm_L3_LF	3-phase L3 heater break alarm possible status	1	-
0x14	Alm_L3_UL	3-phase L3 load unbalance alarm possible status	1	-
0x15	Alm_L3_SCR_Short	3-phase L3 SCR error alarm possible status	1	-
0x16	Alm_L3_FUSE	3-phase L3 fuse break alarm possible status	1	-
0x17	Alm_L3_Frq	3-phase L3 frequency error alarm possible status	1	-
0x19	MV_cnt	3-phase output	16	%
0x1A	U_Volt	U-phase voltage	16	V
0x1B	U_V	Between U-V lines voltage	16	V
0x1C	V_Volt	V-phase voltage	16	V
0x1D	V_W	Between V-W lines voltage	16	V
0x1E	W_Volt	W-phase voltage	16	V
0x1F	W_U	Between W-U lines voltage	16	V
0x20	U_V_W_Volt_Avg	Average voltage	16	V
0x21	U_Current	U-phase current	16	A

Sub Index	Parameter	Description	BIT	Unit
0x22	V_Current	V-phase current	16	A
0x23	W_Current	W-phase current	16	A
0x24	U_V_W_Current_Avg	Average current	16	A
0x25	U_Watt	U-phase power	16	kW
0x26	V_Watt	V-phase power	16	kW
0x27	W_Watt	W-phase power	16	kW
0x28	U_V_W_Watt_Avg	Average power	16	kW
0x29	SET_Freq	Set frequency of 3-phase	16	HZ
0x2A	Freq_R	Present R-phase frequency	16	HZ
0x2B	Freq_S	Present S-phase frequency	16	HZ
0x2C	Freq_T	Present T-phase frequency	16	HZ
0x2D	Integratedvoltage_l1	3-phase L1 accumulated power	32	kWh
0x2E	Integratedvoltage_l2	3-phase L2 accumulated power	32	kWh
0x2F	Integratedvoltage_l3	3-phase L3 accumulated power	32	kWh

4.2.2. Single-phase L1 Monitoring Value [Index: 6020h L_1_Input]

Sub Index	Parameter	Description	BIT	Unit
0x01	Alm_OC	Single-phase L1 Overcurrent alarm possible status	1	-
0x02	Alm_OV	Single-phase L1 Overvoltage alarm possible status	1	-
0x03	Alm_LF	Single-phase L1 Heater break alarm possible status	1	-
0x04	Alm_UL	Single-phase L1 Load unbalance alarm possible status	1	-
0x05	Alm_SCR_Short	Single-phase L1 SCR error alarm possible status	1	-
0x06	Alm_FUSE	Single-phase L1 Fuse break alarm possible status	1	-
0x07	Alm_Frq	Single-phase L1 Frequency error alarm possible status	1	-
0x08	Alm_DLF	Single-phase L1 Partial heater break alarm possible status	1	-
0x09	DLFCompleteflag	Partial load SCAN completed check	1	-
0x0B	MV_cnt	Single-phase L1 output	16	%
0x0C	Volt	Single-phase L1 Voltage	16	V
0x0D	Current	Single-phase L1 Current	16	A
0x0E	Watt	Single-phase L1 Power	16	kW
0x0F	SET_Freq	Set frequency of single-phase L1	16	HZ
0x10	Freq	Present Single-phase L1 Frequency	16	HZ
0x11	Integratedvoltage_l1	Single-phase L1 Accumulated power	32	kWh

4.2.3. Single-phase L2 Monitoring Value [Index: 6030h L_2_Input]

Sub Index	Parameter	Description	BIT	Unit
0x01	Alm_OC	Single-phase L2 overcurrent alarm possible status	1	-
0x02	Alm_OV	Single-phase L2 overvoltage alarm possible status	1	-
0x03	Alm_LF	Single-phase L2 heater break alarm possible status	1	-
0x04	Alm_UL	Single-phase L2 load unbalance alarm possible status	1	-
0x05	Alm_SCR_Short	Single-phase L2 SCR error alarm possible status	1	-
0x06	Alm_FUSE	Single-phase L2 fuse break alarm possible status	1	-
0x07	Alm_Frq	Single-phase L2 frequency error alarm possible status	1	-
0x08	Alm_DLF	Single-phase L2 partial heater break alarm possible status	1	-
0x09	DLFCompleteflag	Partial load SCAN completed check	1	-
0x0B	MV_cnt	Single-phase L2 output	16	%
0x0C	Volt	Single-phase L2 voltage	16	V
0x0D	Current	Single-phase L2 current	16	A
0x0E	Watt	Single-phase L2 power	16	kW
0x0F	SET_Freq	Set frequency of single-phase L2	16	HZ
0x10	Freq	Present single-phase L2 frequency	16	HZ
0x11	Integratedvoltage_l2	Single-phase L2 accumulated power	32	kWh

4.2.4. Single-phase L3 Monitoring Value [Index: 6040h L_3_Input]

Sub Index	Parameter	Description	BIT	Unit
0x01	Alm_OC	Single-phase L3 overcurrent alarm possible status	1	-
0x02	Alm_OV	Single-phase L3 overvoltage alarm possible status	1	-
0x03	Alm_LF	Single-phase L3 heater break alarm possible status	1	-
0x04	Alm_UL	Single-phase L3 load unbalance alarm possible status	1	-
0x05	Alm_SCR_Short	Single-phase L3 SCR error alarm possible status	1	-
0x06	Alm_FUSE	Single-phase L3 fuse break alarm possible status	1	-
0x07	Alm_Frq	Single-phase L3 frequency error alarm possible status	1	-
0x08	Alm_DLF	Single-phase L3 partial heater break alarm possible status	1	-
0x09	DLFCompleteflag	Partial load SCAN completed check	1	-
0x0B	MV_cnt	Single-phase L3 output	16	%
0x0C	Volt	Single-phase L3 voltage	16	V
0x0D	Current	Single-phase L3 current	16	A
0x0E	Watt	Single-phase L3 power	16	kW
0x0F	SET_Freq	Set frequency of single-phase L3	16	HZ
0x10	Freq	Present single-phase L3 frequency	16	HZ
0x11	Integratedvoltage_l3	Single-phase L3 accumulated power	32	kWh

4.2.5. Alarm Monitoring Value [Index: 6050h Device_ALM]

Sub Index	Parameter	Description	BIT	Unit
0x01	RunStopFlag	RUN / STOP switch	1	-
0x02	AutomanFlag	AUTO / MANU switch	1	-
0x03	Alm_OT_60	Heatsink over heat alarm	1	-
0x04	Alm_OT_80	Heatsink over heat protection alarm	1	-
0x05	Alm_FAN	FAN error alarm	1	-
0x06	DLFL1SCANINGFlag	L1 SCAN status	1	-
0x07	DLFL2SCANINGFlag	L2 SCAN status	1	-
0x08	DLFL3SCANINGFlag	L3 SCAN status	1	-
0x09	DLFL1PossibleFlag	L1 Partial heater break alarm possible status	1	-
0x0A	DLFL2PossibleFlag	L2 Partial heater break alarm possible status	1	-
0x0B	DLFL3PossibleFlag	L3 Partial heater break alarm possible status	1	-
0x0D	Sink Temp	Heatsink temperature	16	°C

Operation of each situation ALM_Remain

Type	1	0
RunStopFlag	During RUN	During STOP
AutomanFlag	During MANU	During Auto
Alm_OT_60	OTW (Heatsink over heat alarm) occurs	When OTW alarm does not occur
Alm_OT_80	OTP (Heatsink over heat protection alarm) occurs	When OTP alarm does not occur
Alm_FAN	FAN (FAN error alarm) occurs	When FAN alarm does not occur
DLFL1SCANINGFlag	During L1 SCAN	If not during L1 SCAN
DLFL2SCANINGFlag	During L2 SCAN	If not during L2 SCAN
DLFL3SCANINGFlag	During L3 SCAN	If not during L3 SCAN
DLFL1PossibleFlag	L1 DLF (Partial heater break alarm) possible status	L1 DLF alarm impossible status
DLFL2PossibleFlag	L2 DLF (Partial heater break alarm) possible status	L2 DLF alarm impossible status
DLFL3PossibleFlag	L3 DLF (Partial heater break alarm) possible status	L3 DLF alarm impossible status

4.2.6. Time Monitoring Value [Index: 6060h TIME]

Sub Index	Parameter	Description	BIT	Unit
0x01	Year	Present year	16	Year
0x02	Month	Present month	16	Month
0x03	Day	Present day	16	Day
0x04	Hour	Present hour	16	Hour
0x05	Minute	Present minute	16	Minute

4.2.7. Control

4.2.7.1. 3-phase [Index: 7010h Phase_3_Output]

Sub Index	Parameter (Description)	Set range	Default	Unit	Save
0x01	PH3_Output_Value (3-phase control input)	0 to 1000 (0.0 to 100.0)	0	%	N

4.2.7.2. Single-phase L1 [Index: 7020h L1_Output_Value]

Sub Index	Parameter (Description)	Set range	Default	Unit	Save
0x01	L1_Output_Value (Single-phase L1 control input)	0 to 1000 (0.0 to 100.0)	0	%	N

4.2.7.3. Single-phase L2 [Index: 7030h L2_Output_Value]

Sub Index	Parameter (Description)	Set range	Default	Unit	Save
0x01	L2_Output_Value (Single-phase L2 control input)	0 to 1000 (0.0 to 100.0)	0	%	N

4.2.7.4. Single-phase L3 [Index: 7040h L3_Output_Value]

Sub Index	Parameter (Description)	Set range	Default	Unit	Save
0x01	L3_Output_Value (Single-phase L3 control input)	0 to 1000 (0.0 to 100.0)	0	%	N

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