Connect the UMC100.3 to an Allen-Bradley PLC over EtherNet/IP™ using the EIU32.0

Universal Motor Controller UMC100.3 and EtherNet/IP™

In this application note will be described how the ABB Universal Motor Controller UMC100.3, equipped with an EIU32.0 EtherNet/IP™ communication interface, can be connected to an Allen-Bradley CompactLogix PLC.

This document is made for technicians integrating the UMC100.3 into an Allen-Bradley PLC.

A qualified knowledge of EtherNet/IP™, CompactLogix and Studio 5000 is required and expected. The basics are not part of this document.

EDS file

For integrating the UMC100.3 into the PLC, the EDS file has to be downloaded and installed.

The latest EDS file can be downloaded from our website:

www.abb.com

> → Products → Low Voltage Products and Systems → Automation, control and protection → Motor controllers → Universal Motor Controllers → Ethernet Interfaces

Setup

The setup used in this application note consists of the following devices:

- 1 pc. Allen-Bradley CompactLogix (1769-L16ER-BB1B)
- 2 pcs. UMC100.3 (1SAJ530000R0100)
- 2 pcs. EIU32.0 (1SAJ262000R0100)
- Ethernet connection cables
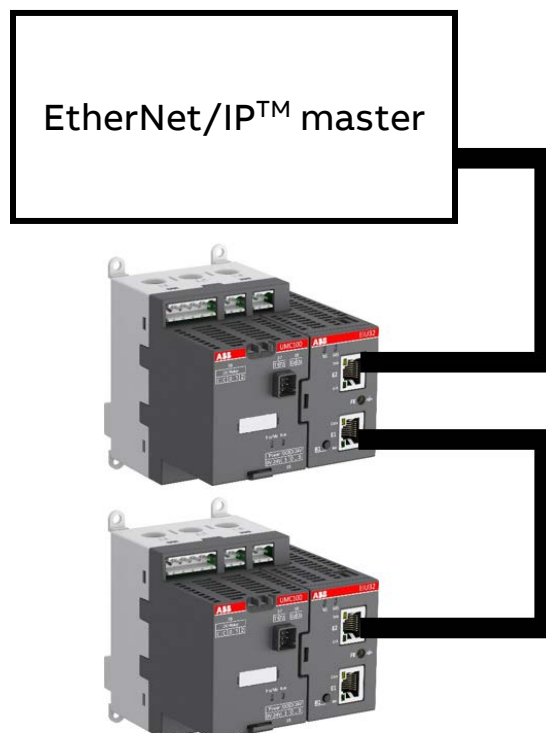
EIU32.0 configuration

To enable communication through the EtherNet/IP™ network, the EIU32.0 needs a valid IP-address.

There are three different ways for setting an IP-address via the connected UMC:

1. DHCP: In this mode the EIU32.0 will get its IP-address from a DHCP server inside the network

2. Basic: With the Basic setting, the first three octets are fixed to 192.162.1.xxx. The last octet will be automatically set as FBP-address of the UMC100.3

3. User-defined: With this setting all four octets can be set directly from the user.

The configuration of the EIU32.0 can be done over the connected UMC, using the operator panel UMC100-PAN:

Enter the Menu → Communication → Ethernet and set the following parameters:

| Parameter Name	Default Setting	Allowed Range
IP Setting Mode	DHCP	DHCP / Basic / User defined
IP address octet 1	192	0 – 255
IP address octet 2	168	0 – 255
IP address octet 3	1	0 – 255
IP address octet 4	UMC address	0 – 255
Subnet mask octet 1	255	0 – 255
Subnet mask octet 2	255	0 – 255
Subnet mask octet 3	255	0 – 255
Subnet mask octet 4	0	0 – 255
Gateway octet 1	0	0 – 255
Gateway octet 2	0	0 – 255
Gateway octet 3	0	0 – 255
Gateway octet 4	0	0 – 255
Enable webserver	Off	On / Off

> ⚠ When the IP setting mode is set to "Basic", you'll be able to change also octets 1 – 3 of the IP-address. This setting will be ignored and set back to the above mentioned default values!

Adding the EIU32.0 to the Project

After creating a project in Studio 5000 and installing the EIU32.0 EDS file, the devices will be added to the project tree:

1. Expand "I/O configuration", right-click on "Ethernet" and select "New Module"

2. Select the "EIU32.0" from the catalog and click on "Create"

3. Insert the name and IP-address and click on "Change"

4. Insert a connection, in this case "Excl. Owner I/O +Diag, Config." and click on "OK"
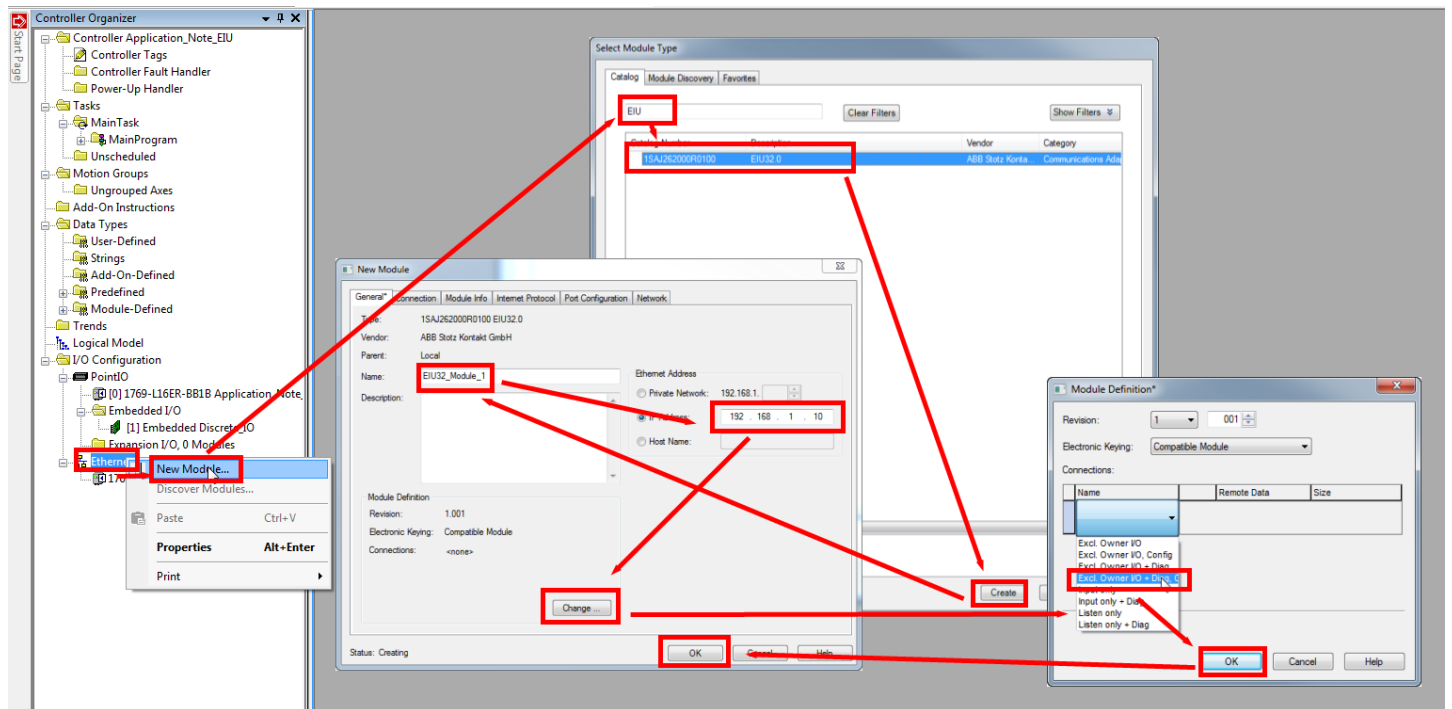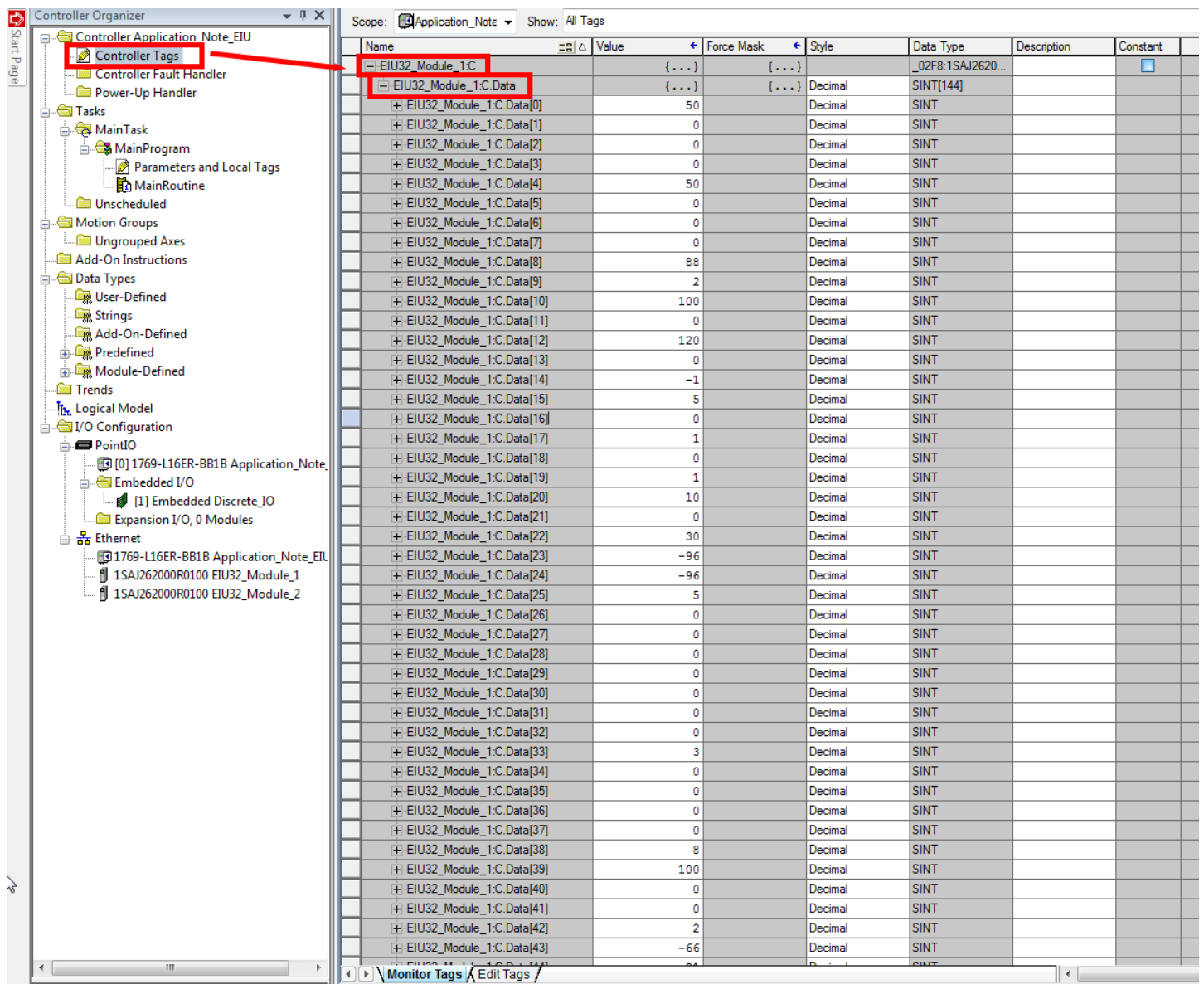

5. Repeat steps 1 to 4 for all UMC100.3

UMC100.3 Configuration with Parameters

Besides the possibility to use the DTM or UMC100.3 operator panel to parametrize the UMC100.3, the configuration parameters can be used also. The following steps describe where to find the parameters and how to change them. To send the configuration parameters, it is required to select a connection including "Config".

1.   Open "Controller Tags"

2.   Expand the EIU32.0 configuration list (name ends with ":C")

3.   Expand the sub list, where the name ends with ":C.Data".

All parameters are shown as signed integer. For changing the values, it is easier to change the style from decimal to hexadecimal. A correlation list between the shown values and the UMC100.3 parameters can be found in the appendix of this document.

Using I/O Data to communicate with the UMC100.3

The I/O data of the UMC100.3 contains three different types, the monitoring data, the command data and diagnostic data.

The monitoring data contains in total 16 bytes of data. There are six byte of binary data and five analog words. The telegram is built up as shown in the following screenshot from the UMC100.3 manual:

Word	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit1	Bit 0
0	0	Summary Warning	Summary Fault	Local Control[3]	Reverse Lockout Time[3]	Overload warning	Run Forward[1,3] / Opening[2,3]	Off[3]	Run Reverse[1,3] / Closing[2,3]
	1	UMC100 DI5	UMC100 DI4	UMC100 DI3	UMC100 DI2	UMC100 DI1	UMC100 DI0	Run Fast Forward4)	-
1	2, 3	Motor Current in % of I_e (0% - 800%)							
2	4, 5	Analogue Word (Thermal Load: 0% - 100%)							
3	6, 7	Analogue Word (Time to trip in seconds)							
4	8, 9	Analogue Word (Time to restart in seconds)							
5	10.11	Analogue Word (Active power in selected scale)							
6	12	DX1xx DI7	DX1xx DI6	DX1xx DI5	DX1xx DI4	DX1xx DI3	DX1xx DI2	DX1xx DI1	DX1xx DI0
	13	-	-	Run Time Exceeded[2]	Out of Position[2]	Torque Open[2]	Torque Closed[2]	End Pos Open[2]	End Pos Closed[2]
7	14	U Imbal. warn	U Imbal. trip	Under-voltage warn	Under-voltage trip	Under-power warn	Under-power trip	Over-power warn	Over-power trip
	15	Earth fault warning	Earth fault trip	Cooling time running	-	THD warning	No start possible[5]	1 start left [5]	More than 1 start left[5]

Profile 1 (rows Word 0 Byte 0 through Word 5)
Profile 2 (rows Word 0)

To start and stop the motor or to transfer data from the PLC to the UMC100.3, the command telegram can be used. It contains twelve byte data in total and is split into four bytes binary data and four analog words. The following screenshot is taken from the UMC100.3 manual and contains the following content:

	Word	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit1	Bit 0	
Profile 1	0	0	-	Fault Reset	Auto Mode[3]	Prepare Emergency Start	-	Run For-ward[1,3] / Opening[2,3]	Off[3]	Run Re-verse[1,3] / Closing[2,3]	Profile 2
		1	UMC100 DO2	UMC100 DO1	UMC100 DO0	UMC100 24 V DC Out	-	-	Run Fast Forward [4]	-	
	1	2	VI15x DO0	-	-	-	DX1xx DO3	DX1xx DO2	DX1xx DO1	DX1xx DO0	
		3	-	-	-	-	-	-	-	-	
	2	4, 5	Analogue Word								
	3	6, 7	Analogue Word								
	4	8,9	Analogue Word								
	5	10,11	Analogue Word								

In case the motor stopped due to a fault, there will be available the diagnostic in a separate telegram. This telegram consists of eight bytes. The last byte is a detailed fault code, which is described in detail in the UMC100.3 manual.

Word	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit1	Bit 0
0	0	Checkback missing	PTC wiring failure	PTC hot	Pre-waring thermal model	Locked rotor during start-up (stall)	Phase imbalance[1]	Phase loss[1]	Thermal overload trip
	1	Actuator problem[1]	UMC self-test error	Earth fault pre-warning	Eart fault trip (internal or externally triggered)	I above high current warning threshold	I above high current trip threshold	I below low current warning threshold	I below low current trip threshold
1	2	Trip/Warning from AuxFault function block input 5[2]	Trip/Warning from AuxFault function block input 4[2]	Trip/Warning from AuxFault function block input 3[2]	Trip/Warning from AuxFault function block input 2[2]	Trip/Warning from AuxFault function block input 1[2]	HW fault on IO module	Custom application error	IO module missing
	3	Warning triggered from AM2	Trip triggered from AM2	Warning triggered from AM1	Trip triggered from AM1	Trip triggered from Multifunction input DI2	Trip triggered from Multifunction input DI1	Trip triggered from Multifunction input DI0	Trip / Warning from AuxFault function block input 6[2]
2	4	-	-	THD Warning	Voltage out of spec[1]	Overload power	Underload power[1]	-	-
	5	-	-	Cooling Time Running	Just one start left	Num Starts Overrun	-	-	-
3	6	Extended diagnosis is available[1].	Parameter out of range	-	-	-	-	-	-
	7	Fault code. See section "Error Handling, Maintenance and Service-> Fault Messages" for a description of the code.							

Creating Local Tags

To read data from the UMC100.3 or write commands to the UMC100.3, the global tags can be used or local tags can be created. To create local tags, the following steps have to be fulfilled:

1. Open "Controller Tags" and open the ribbon "Edit Tags"

2. Insert a name for a local tag, e.g. "Mod_1_Mon_Byte_0" (short for Modul 1, Monitoring Byte 0)

3. Expand the related list for "Alias For" and select the corresponding global variable

4. Repeat steps 1 to 3 for each module and all necessary data frames.

The Input data "EIU32_Module_1:I" contains 24 byte data. The first 16 bytes are the monitoring data and the last 8 bytes are reserved for the diagnostic.

The five analog words are stored within two bytes as a high and a low byte.

Working with Global Tags

After adding the EIU32.0 EtherNet/IP™ module and the connected UMC100.3, the global variables can be directly used within the application. In the following screenshot is shown how digital input 0 of the PLC is sending the remote bit to the UMC100.3 and digital input 1 sends the start command:
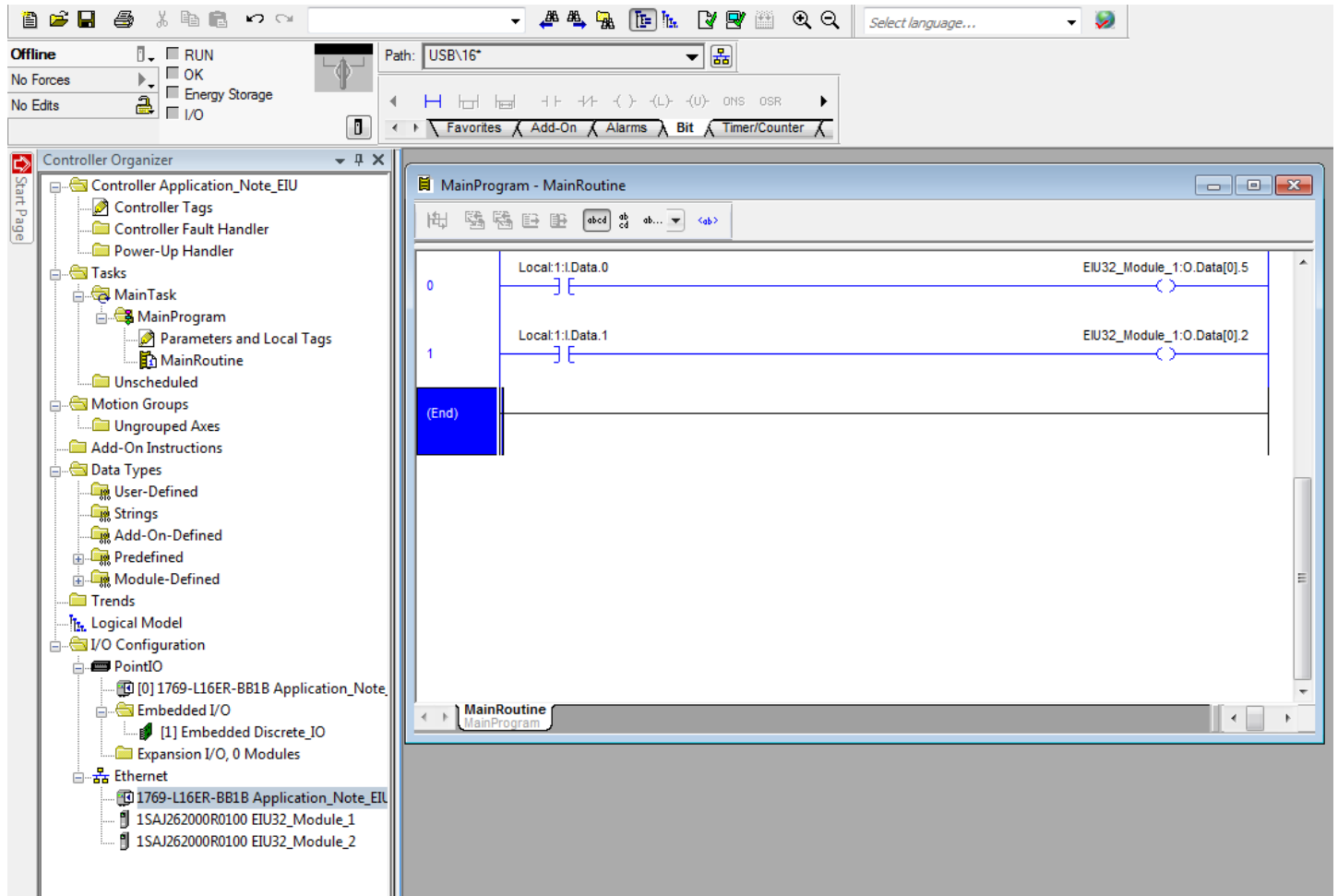
Appendix: Correlation table between PLC parameters and UMC100.3 parameters

	Bit	Parametername	Lower Limit	Upper Limit	Default Value	Parameter Unit / Selection
C.Data[0]	Bit 0-7	Setting Ie1	24	320000	50	0.01A
C.Data[1]	Bit 0-7	Setting Ie1				
C.Data[2]	Bit 0-7	Setting Ie1				
C.Data[3]	Bit 0-7	Setting Ie1				
C.Data[4]	Bit 0-7	Setting Ie2	24	320000	50	0.01A
C.Data[5]	Bit 0-7	Setting Ie2				
C.Data[6]	Bit 0-7	Setting Ie2				
C.Data[7]	Bit 0-7	Setting Ie2				
C.Data[8]	Bit 0-7	YD Starting Time	10	36000	600	0.1s
C.Data[9]	Bit 0-7	YD Starting Time				
C.Data[10]	Bit 0-7	Current Factor	2	64000	100	%
C.Data[11]	Bit 0-7	Current Factor				
C.Data[12]	Bit 0-7	Cooling Time	30	64000	120	s
C.Data[13]	Bit 0-7	Cooling Time				
C.Data[14]	Bit 0-7	Earth Flt Trip Level	20	255	255	%
C.Data[15]	Bit 0-7	Earth Flt Trip Delay	0	255	5	0.1s
C.Data[16]	Bit 0-7	Language	0	8	0	0: English: 1: Deutsch: 2: Francais: 3: Espanol: 4: Italiano: 5: Portugues: 6: Russian: 7: Polski: 8: Finnish:
C.Data[17]	Bit 0-7	Rev Lock-Out Time	1	255	1	s
C.Data[18]	Bit 0-7	Fault Output	0	6	0	0: Off: 1: Flash DO2: 2: On DO2: 3: Invert DO2: 4: Flash DO3: 5: On DO3: 6: Invert DO3:
C.Data[19]	Bit 0-7	Trip Class	0	4	1	0: Class 5: 1: Class 10: 2: Class 20: 3: Class 30: 4: Class 40:
C.Data[20]	Bit 0-7	Low Curr Warn Level	0	20	10	5%
C.Data[21]	Bit 0-7	Low Curr Trip Level	0	20	0	5%
C.Data[22]	Bit 0-7	High Curr Warn Level	20	160	30	5%
C.Data[23]	Bit 0-7	High Curr Trip Level	20	160	160	5%
C.Data[24]	Bit 0-7	Locked Rotor Level	20	160	160	5%

	Bit	Parametername	Lower Limit	Upper Limit	Default Value	Parameter Unit / Selection
C.Data[25]	Bit 0-7	Locked Rotor Delay	0	255	5	0.1s
C.Data[26]	Bit 0-7	Custom App Parameter	0	255	0	
C.Data[27]	Bit 0-7	Multif In 0	0	20	0	0: Off: 1: Stop (NC): 2: Stop (NO): 3: Ext. Flt (NC) always: 4: Ext. Flt (NO) always: 5: Ext. Flt (NC) Motor on: 6: Ext. Flt (NO) Motor on: 7: Prep. emerg. Start (NC): 8: Prep. emerg. Start (NO): 9: Testposition (NC): 10: Testposition (NO): 11: Force local (NC): 12: Force local (NO): 13: Fault reset (NC): 14: Fault reset (NO): 15: Voltage DIP (NC): 16: Voltage DIP (NO): 17: CEM11 always (Warning): 18: CEM11 after startup (Warning): 19: CEM11 always (Fault): 20: CEM11 after startup time (Fault):
C.Data[28]	Bit 0-7	Multif In 1	0	20	0	0: Off: 1: Stop (NC): 2: Stop (NO): 3: Ext. Flt (NC) always: 4: Ext. Flt (NO) always: 5: Ext. Flt (NC) Motor on: 6: Ext. Flt (NO) Motor on: 7: Prep. emerg. Start (NC): 8: Prep. emerg. Start (NO): 9: Testposition (NC): 10: Testposition (NO): 11: Force local (NC): 12: Force local (NO): 13: Fault reset (NC): 14: Fault reset (NO): 15: Voltage DIP (NC): 16: Voltage DIP (NO): 17: CEM11 always (Warning): 18: CEM11 after startup (Warning): 19: CEM11 always (Fault): 20: CEM11 after startup time (Fault):
C.Data[29]	Bit 0-7	Multif In 2	0	20	0	0: Off: 1: Stop (NC): 2: Stop (NO): 3: Ext. Flt (NC) always: 4: Ext. Flt (NO) always: 5: Ext. Flt (NC) Motor on: 6: Ext. Flt (NO) Motor on: 7: Prep. emerg. Start (NC): 8: Prep. emerg. Start (NO): 9: Testposition (NC): 10: Testposition (NO): 11: Force local (NC): 12: Force local (NO):

	Bit	Parametername	Lower Limit	Upper Limit	Default Value	Parameter Unit / Selection
						13: Fault reset (NC): 14: Fault reset (NO): 15: Voltage DIP (NC): 16: Voltage DIP (NO): 17: CEM11 always (Warning): 18: CEM11 after startup (Warning): 19: CEM11 always (Fault): 20: CEM11 after startup time (Fault):
C.Data[30]	Bit 0-7	Multif In 0 Delay	0	255	0	0.1s
C.Data[31]	Bit 0-7	Multif In 1 Delay	0	255	0	0.1s
C.Data[32]	Bit 0-7	Multif In 2 Delay	0	255	0	0.1s
C.Data[33]		Control Function	1	13	3	1: Transparent: 2: Overload Relay: 3: Direct Starter: 4: Reverse Starter: 5: Star-delta Starter: 7: Pole-Changing Starter: 9: Actuator 1: 10: Actuator 2: 11: Actuator 3: 12: Actuator 4: 13: Softstarter:
C.Data[34]	Bit 0-3	Busfault Reaction	0	3	0	0: Motor Off: 1: Retain: 2: Start Forward: 3: Start Reverse:
C.Data[34]	Bit 4-7	Reserved	0	1	0	
C.Data[35]	Bit 0-3	Aux Inp 1 Reaction	0	8	0	0: Disabled: 1: Fault (NC) Motor in On/Off: 2: Fault (NO) Motor in On/Off: 3: Fault (NC) Motor in On: 4: Fault (NO) Motor in On: 5: Warning (NC) Motor in On/Off: 6: Warning (NO) Motor in On/Off: 7: Warning (NC) Motor in On: 8: Warning (NO) Motor in On:
C.Data[35]	Bit 4-7	Aux Inp 2 Reaction	0	8	0	0: Disabled: 1: Fault (NC) Motor in On/Off: 2: Fault (NO) Motor in On/Off: 3: Fault (NC) Motor in On: 4: Fault (NO) Motor in On: 5: Warning (NC) Motor in On/Off: 6: Warning (NO) Motor in On/Off: 7: Warning (NC) Motor in On: 8: Warning (NO) Motor in On:
C.Data[36]	Bit 0-3	Aux Inp 3 Reaction	0	8	0	0: Disabled: 1: Fault (NC) Motor in On/Off: 2: Fault (NO) Motor in On/Off: 3: Fault (NC) Motor in On: 4: Fault (NO) Motor in On: 5: Warning (NC) Motor in On/Off: 6: Warning (NO) Motor in On/Off: 7: Warning (NC) Motor in On: 8: Warning (NO) Motor in On:

	Bit	Parametername	Lower Limit	Upper Limit	Default Value	Parameter Unit / Selection
C.Data[36]	Bit 4-7	Aux Inp 4 Reaction	0	8	0	0: Disabled: 1: Fault (NC) Motor in On/Off: 2: Fault (NO) Motor in On/Off: 3: Fault (NC) Motor in On: 4: Fault (NO) Motor in On: 5: Warning (NC) Motor in On/Off: 6: Warning (NO) Motor in On/Off: 7: Warning (NC) Motor in On: 8: Warning (NO) Motor in On:
C.Data[37]	Bit 0-3	Aux Inp 5 Reaction	0	8	0	0: Disabled: 1: Fault (NC) Motor in On/Off: 2: Fault (NO) Motor in On/Off: 3: Fault (NC) Motor in On: 4: Fault (NO) Motor in On: 5: Warning (NC) Motor in On/Off: 6: Warning (NO) Motor in On/Off: 7: Warning (NC) Motor in On: 8: Warning (NO) Motor in On:
C.Data[37]	Bit 4-7	Aux Inp 6 Reaction	0	8	0	0: Disabled: 1: Fault (NC) Motor in On/Off: 2: Fault (NO) Motor in On/Off: 3: Fault (NC) Motor in On: 4: Fault (NO) Motor in On: 5: Warning (NC) Motor in On/Off: 6: Warning (NO) Motor in On/Off: 7: Warning (NC) Motor in On: 8: Warning (NO) Motor in On:
C.Data[38]	Bit 0-1	PTC, Thermistor	0	2	0	0: Disabled: 1: Trip: 2: Warning:
C.Data[38]	Bit 2-3	Check-Back	1	3	2	1: Contact DI0: 2: Current: 3: Simulation:
C.Data[38]	Bit 4-5	Check Phase Sequence	0	2	0	0: Disabled: 1: Trip: 2: Warning:
C.Data[38]	Bit 6-7	Reserved	0	1	0	
C.Data[39]	Bit 0	Fault Auto Reset	0	1	0	0: Off: 1: On:
C.Data[39]	Bit 1	Emergency Start	0	1	0	0: Off: 1: On:
C.Data[39]	Bit 2	Earth Flt Detection	0	1	1	0: Always: 1: After Startup:
C.Data[39]	Bit 3	Address Check	0	1	0	0: Off: 1: On:
C.Data[39]	Bit 4	Enable Custom Logic	0	1	0	0: No:1: Yes:
C.Data[39]	Bit 5	YD Change-Over Mode	0	1	1	0: Time: 1: Current:
C.Data[39]	Bit 6	Phase Loss Prot.	0	1	1	0: Off: 1: On:
C.Data[39]	Bit 7	Resistive Load	0	1	0	0: No: 1: Yes:
C.Data[40]	Bit 0	DX1xx Enabled	0	1	0	0: Off: 1: On:
C.Data[40]	Bit 1	AI1xx AM1 Enabled	0	1	0	0: Off: 1: On:
C.Data[40]	Bit 2	AI1xx AM2 Enabled	0	1	0	0: Off: 1: On:
C.Data[40]	Bit 3	VI15x Enabled	0	1	0	0: Off: 1: On:

	Bit	Parametername	Lower Limit	Upper Limit	Default Value	Parameter Unit / Selection
C.Data[40]	Bit 4 – 6	Reserved				
C.Data[40]	Bit 7	Missing Module React.	0	1	0	0: Error: 1: Warning:
C.Data[41]	Bit 0	Aux Inp 1 Ack Mode	0	1	0	0: Manual Reset: 1: Auto Reset:
C.Data[41]	Bit 1	Aux Inp 2 Ack Mode	0	1	0	0: Manual Reset: 1: Auto Reset:
C.Data[41]	Bit 2	Aux Inp 3 Ack Mode	0	1	0	0: Manual Reset: 1: Auto Reset:
C.Data[41]	Bit 3	Aux Inp 4 Ack Mode	0	1	0	0: Manual Reset: 1: Auto Reset:
C.Data[41]	Bit 4	Aux Inp 5 Ack Mode	0	1	0	0: Manual Reset: 1: Auto Reset:
C.Data[41]	Bit 5	Aux Inp 6 Ack Mode	0	1	0	0: Manual Reset: 1: Auto Reset:
C.Data[41]	Bit 6	Number Of Phases	0	1	0	0: 3 Phases: 1: 1 Phase:
C.Data[41]	Bit 7	Cooling Mode	0	1	0	0: Time: 1: x% Therm. Load:
C.Data[42]	Bit 0	Invert DI Start Inp.	0	1	0	0: No: 1: Yes:
C.Data[42]	Bit 1	Invert DI Stop Inp.	0	1	1	0: No: 1: Yes:
C.Data[42]	Bit 2 - 3	Reserved				
C.Data[42]	Bit 4	Inching DI Start Inp	0	1	0	0: No: 1: Yes:
C.Data[42]	Bit 5 - 7	Reserved				
C.Data[43]	Bit 0	Loc 1 Start Bus Cyc	0	1	0	0: No: 1: Yes:
C.Data[43]	Bit 1	Loc 1 Stop Bus Cyc	0	1	1	0: No: 1: Yes:
C.Data[43]	Bit 2	Loc 1 Start DI	0	1	1	0: No: 1: Yes:
C.Data[43]	Bit 3	Loc 1 Stop DI	0	1	1	0: No: 1: Yes:
C.Data[43]	Bit 4	Loc 1 Start LCD	0	1	1	0: No: 1: Yes:
C.Data[43]	Bit 5	Loc 1 Stop LCD	0	1	1	0: No: 1: Yes:
C.Data[43]	Bit 6	Loc 1 Start Bus Acyc	0	1	0	0: No: 1: Yes:
C.Data[43]	Bit 7	Loc 1 Stop Bus Acyc	0	1	1	0: No: 1: Yes:
C.Data[44]	Bit 0	Auto Start Bus Cyc	0	1	1	0: No: 1: Yes:
C.Data[44]	Bit 1	Auto Stop Bus Cyc	0	1	1	0: No: 1: Yes:
C.Data[44]	Bit 2	Auto Start DI	0	1	0	0: No: 1: Yes:
C.Data[44]	Bit 3	Auto Stop DI	0	1	1	0: No: 1: Yes:
C.Data[44]	Bit 4	Auto Start LCD	0	1	0	0: No: 1: Yes:
C.Data[44]	Bit 5	Auto Stop LCD	0	1	1	0: No: 1: Yes:
C.Data[44]	Bit 6	Auto Start Bus Acyc	0	1	1	0: No: 1: Yes:
C.Data[44]	Bit 7	Auto Stop Bus Acyc	0	1	1	0: No: 1: Yes:

	Bit	Parametername	Lower Limit	Upper Limit	Default Value	Parameter Unit / Selection
C.Data[45]	Bit 0	Loc 2 Start Bus Cyc	0	1	0	0: No: 1: Yes:
C.Data[45]	Bit 1	Loc 2 Stop Bus Cyc	0	1	1	0: No: 1: Yes:
C.Data[45]	Bit 2	Loc 2 Start DI	0	1	1	0: No: 1: Yes:
C.Data[45]	Bit 3	Loc 2 Stop DI	0	1	1	0: No: 1: Yes:
C.Data[45]	Bit 4	Loc 2 Start LCD	0	1	1	0: No: 1: Yes:
C.Data[45]	Bit 5	Loc 2 Stop LCD	0	1	1	0: No: 1: Yes:
C.Data[45]	Bit 6	Loc 2 Start Bus Acyc	0	1	0	0: No: 1: Yes:
C.Data[45]	Bit 7	Loc 2 Stop Bus Acyc	0	1	1	0: No: 1: Yes:
C.Data[46]	Bit 0 - 3	Reserved				
C.Data[46]	Bit 4	Multif In 0 Autoreset	0	1	0	0: No: 1: Yes:
C.Data[46]	Bit 5	Multif In 1 Autoreset	0	1	0	0: No: 1: Yes:
C.Data[46]	Bit 6	Multif In 2 Autoreset	0	1	0	0: No: 1: Yes:
C.Data[46]	Bit 7	Reserved				
C.Data[47]	Bit 0 - 7	Reserved				
C.Data[48]	Bit 0 – 7	Reserved				
C.Data[49]	Bit 0 – 7	Reserved				
C.Data[50]	Bit 0 – 7	Aux Inp 1 Delay	0	255	0	0.1s
C.Data[51]	Bit 0 – 7	Aux Inp 2 Delay	0	255	0	0.1s
C.Data[52]	Bit 0 – 7	Aux Inp 3 Delay	0	255	0	0.1s
C.Data[53]	Bit 0 – 7	Aux Inp 4 Delay	0	255	0	0.1s
C.Data[54]	Bit 0 – 7	Aux Inp 5 Delay	0	255	0	0.1s
C.Data[55]	Bit 0 – 7	Aux Inp 6 Delay	0	255	0	0.1s
C.Data[56]	Bit 0 – 7	Check-Back Time	1	255	5	0.1s
C.Data[57]	Bit 0 – 7	Low Curr Warn Delay	0	255	5	0.1s
C.Data[58]	Bit 0 – 7	Low Curr Trip Delay	0	255	5	0.1s
C.Data[59]	Bit 0 - 7	High Curr Warn Delay	0	255	5	0.1s
C.Data[60]	Bit 0 – 7	High Curr Trip Delay	0	255	5	0.1s
C.Data[61]	Bit 0 – 7	Curr Imb Trip Level	0	100	50	%
C.Data[62]	Bit 0 – 7	Curr Imb Warn Level	0	100	100	%
C.Data[63]	Bit 0	Phase Reversal	0	1	0	0: Phase Sequence L1 L2 L3: 1: Phase Sequence L3 L2 L1:
C.Data[63]	Bit 1 – 7	Reserved				
C.Data[64]	Bit 0 – 7	Restart Level	10	100	30	

	Bit	Parametername	Lower Limit	Upper Limit	Default Value	Parameter Unit / Selection
C.Data[65]	Bit 0 – 7	User Display 1	0	7	0	0: Thermal Load: 1: DX1xx DI: 2: DX1xx DO: 3: Operating Hours: 4: Number of Trips: 5: Number of Starts: 6: max. Startup Current: 7: Real Startup Time:
C.Data[66]	Bit 0 – 7	User Display 2	0	7	6	0: Thermal Load: 1: DX1xx DI: 2: DX1xx DO: 3: Operating Hours: 4: Number of Trips: 5: Number of Starts: 6: max. Startup Current: 7: Real Startup Time:
C.Data[67]	Bit 0 – 7	User Display 3	0	7	7	0: Thermal Load: 1: DX1xx DI: 2: DX1xx DO: 3: Operating Hours: 4: Number of Trips: 5: Number of Starts: 6: max. Startup Current: 7: Real Startup Time:
C.Data[68]	Bit 0 – 7	User Display 4	0	6	4	0: Binary 0: 1: Binary 1: 2: Analog 0: 3: Analog 1: 4: Time to Trip: 5: Time to Cool: 6: Current to earth:
C.Data[69]	Bit 0 – 7	User Display 5	0	6	5	0: Binary 0: 1: Binary 1: 2: Analog 0: 3: Analog 1: 4: Time to Trip: 5: Time to Cool: 6: Current to earth:
C.Data[70]	Bit 0 - 7	Reserved				
C.Data[71]	Bit 0 – 7	Dip Duration	1	255	5	0.1s
C.Data[72]	Bit 0 – 7	Dip Autorestart Window	1	10	1	0.1s
C.Data[73]	Bit 0 – 7	Dip Autorestart Delay	0	255	0	s
C.Data[74]	Bit 0 – 7	Thermal Load Warnlev	20	100	100	%
C.Data[75]	Bit 0 – 7	Num Starts Allowed	0	32	0	
C.Data[76]	Bit 0 – 7	Num Starts Window	0	255	0	1 min.
C.Data[77]	Bit 0 – 7	Num Starts Pause	0	255	0	1 min.

	Bit	Parametername	Lower Limit	Upper Limit	Default Value	Parameter Unit / Selection
C.Data[78]	Bit 0 - 7	Earth Flt Warn Level	20	255	255	%
C.Data[79]	Bit 0 – 7	Earth Flt Warn Delay	0	255	5	0.1s
C.Data[80]	Bit 0 – 7	Dip Restart Level	50	115	90	%
C.Data[81]	Bit 0 – 7	Dip Level	50	115	70	%
C.Data[82]	Bit 0 – 7	Reserved	0	255	0	
C.Data[83]	Bit 0 – 7	DX1xx DI Delay	3	200	20	ms
C.Data[84]	Bit 0 – 7	AM1 Tmax Delay	0	255	6	s
C.Data[85]	Bit 0 – 7	AM2 Tmax Delay	0	255	6	s
C.Data[86]	Bit 0 – 1	AM2 CH2 Err Reac	0	2	0	0: Disabled: 1: Trip: 2: Warning:
C.Data[86]	Bit 2 – 3	AM2 CH3 Err Reac	0	2	0	0: Disabled: 1: Trip: 2: Warning:
C.Data[86]	Bit 4	AM1 Mode	0	1	0	0: Temperature: 1: Universal:
C.Data[86]	Bit 5	AM2 Mode	0	1	0	0: Temperature: 1: Universal:
C.Data[86]	Bit 6 – 7	Reserved				
C.Data[87]	Bit 0 - 7	Reserved				
C.Data[88]	Bit 0 – 7	U Low Trip Level	70	100	70	%
C.Data[89]	Bit 0 – 7	U Low Trip Delay	0	255	30	0.1s
C.Data[90]	Bit 0 – 7	U Low Warn Level	70	100	70	%
C.Data[91]	Bit 0 – 7	U Low Warn Delay	0	255	30	0.1s
C.Data[92]	Bit 0 – 7	U High Trip Level	100	116	116	%
C.Data[93]	Bit 0 – 7	U High Trip Delay	0	255	30	0.1s
C.Data[94]	Bit 0 – 7	U High Warn Level	100	116	116	%
C.Data[95]	Bit 0 – 7	U High Warn Delay	0	255	30	0.1s
C.Data[96]	Bit 0 – 7	AM1 Tmax Trip Level	0	65535	65535	1K
C.Data[97]	Bit 0 – 7	AM1 Tmax Trip Level				
C.Data[98]	Bit 0 – 7	AM1 Tmax Warn Level	0	65535	65535	1K
C.Data[99]	Bit 0 – 7	AM1 Tmax Warn Level				
C.Data[100]	Bit 0 – 7	AM2 Tmax Trip Level	0	65535	65535	1K
C.Data[101]	Bit 0 – 7	AM2 Tmax Trip Level				
C.Data[102]	Bit 0 – 7	AM2 Tmax Warn Level	0	65535	65535	1K

	Bit	Parametername	Lower Limit	Upper Limit	Default Value	Parameter Unit / Selection
C.Data[103]	Bit 0 – 7	AM2 Tmax Warn Level				
C.Data[104]	Bit 0 – 3	AM1 CH1 Type	0	12	0	0: Disabled: 1: PT100 -50 C…+400 C (2-wire): 2: PT100 -50 C…+400 C (3-wire): 3: PT100 -50 C…+70 C (2-wire): 4: PT100 -50 C…+70 C (3-wire): 5: PT1000 -50 C…+400 C (2-wire): 6: PT1000 -50 C…+400 C (3-wire): 7: KTY83 -50 C…+175 C: 8: KTY84 -40 C…+300 C: 9: NTC +80 C…+160 C: 10: 0…10V: 11: 0…20mA: 12: 4…20mA:
C.Data[104]	Bit 4 – 7	AM1 CH2 Type	0	12	0	0: Disabled: 1: PT100 -50 C…+400 C (2-wire): 2: PT100 -50 C…+400 C (3-wire): 3: PT100 -50 C…+70 C (2-wire): 4: PT100 -50 C…+70 C (3-wire): 5: PT1000 -50 C…+400 C (2-wire): 6: PT1000 -50 C…+400 C (3-wire): 7: KTY83 -50 C…+175 C: 8: KTY84 -40 C…+300 C: 9: NTC +80 C…+160 C: 10: 0…10V: 11: 0…20mA: 12: 4…20mA:
C.Data[105]	Bit 0 – 3	AM1 CH3 Type	0	12	0	0: Disabled: 1: PT100 -50 C…+400 C (2-wire): 2: PT100 -50 C…+400 C (3-wire): 3: PT100 -50 C…+70 C (2-wire): 4: PT100 -50 C…+70 C (3-wire): 5: PT1000 -50 C…+400 C (2-wire): 6: PT1000 -50 C…+400 C (3-wire): 7: KTY83 -50 C…+175 C: 8: KTY84 -40 C…+300 C: 9: NTC +80 C…+160 C: 10: 0…10V: 11: 0…20mA: 12: 4…20mA:
C.Data[105]	Bit 4 – 7	AM2 CH1 Type	0	12	0	0: Disabled: 1: PT100 -50 C…+400 C (2-wire): 2: PT100 -50 C…+400 C (3-wire): 3: PT100 -50 C…+70 C (2-wire): 4: PT100 -50 C…+70 C (3-wire): 5: PT1000 -50 C…+400 C (2-wire): 6: PT1000 -50 C…+400 C (3-wire): 7: KTY83 -50 C…+175 C: 8: KTY84 -40 C…+300 C: 9: NTC +80 C…+160 C: 10: 0…10V: 11: 0…20mA: 12: 4…20mA:
C.Data[106]	Bit 0 – 3	AM2 CH2 Type	0	12	0	0: Disabled: 1: PT100 -50 C…+400 C (2-wire): 2: PT100 -50 C…+400 C (3-wire): 3: PT100 -50 C…+70 C (2-wire):

	Bit	Parametername	Lower Limit	Upper Limit	Default Value	Parameter Unit / Selection
						4: PT100 -50 C...+70 C (3-wire):
						5: PT1000 -50 C...+400 C (2-wire):
						6: PT1000 -50 C...+400 C (3-wire):
						7: KTY83 -50 C...+175 C:
						8: KTY84 -40 C...+300 C:
						9: NTC +80 C...+160 C:
						10: 0...10V:
						11: 0...20mA:
						12: 4...20mA:
C.Data[106]	Bit 4 – 7	AM2 CH3 Type	0	12	0	0: Disabled:
						1: PT100 -50 C...+400 C (2-wire):
						2: PT100 -50 C...+400 C (3-wire):
						3: PT100 -50 C...+70 C (2-wire):
						4: PT100 -50 C...+70 C (3-wire):
						5: PT1000 -50 C...+400 C (2-wire):
						6: PT1000 -50 C...+400 C (3-wire):
						7: KTY83 -50 C...+175 C:
						8: KTY84 -40 C...+300 C:
						9: NTC +80 C...+160 C:
						10: 0...10V:
						11: 0...20mA:
						12: 4...20mA:
C.Data[107]	Bit 0 – 1	AM1 CH1 Err Reac	0	2	0	0: Disabled:
						1: Trip:
						2: Warning:
C.Data[107]	Bit 2 – 3	AM1 CH2 Err Reac	0	2	0	0: Disabled:
						1: Trip:
						2: Warning:
C.Data[107]	Bit 4 – 5	AM1 CH3 Err Reac	0	2	0	0: Disabled:
						1: Trip:
						2: Warning:
C.Data[107]	Bit 6 – 7	AM2 CH1 Err Reac	0	2	0	0: Disabled:
						1: Trip:
						2: Warning:
C.Data[108]	Bit 0 – 7	Param To PV 1	0	255	1	
C.Data[109]	Bit 0 – 7	Param To PV 2	0	255	2	
C.Data[110]	Bit 0 – 7	Param To PV 3	0	255	3	
C.Data[111]	Bit 0 – 7	Param To PV 4	0	255	4	
C.Data[112]	Bit 0 – 1	DX1xx AO Type	0	3	0	0: 0-20mA:
						1: 4-20mA:
						2: 0-10mA:
						3: 0-10V:
C.Data[112]	Bit 2 – 3	DX1xx AO Err Reac	0	2	0	0: Disabled:
						1: Trip:
						2 :Warning:
C.Data[112]	Bit 4 – 7	Reserved				
C.Data[113]	Bit 0 – 7	Param To PV 5	0	255	5	
C.Data[114]	Bit 0 – 7	Mot. op. hours level	0	255	0	
C.Data[115]	Bit 0 – 7	Mot. stand still lev	0	255	0	
C.Data[116]	Bit 0 – 1	Reserved				

	Bit	Parametername	Lower Limit	Upper Limit	Default Value	Parameter Unit / Selection
C.Data[116]	Bit 2 – 3	Num Starts Overrun	0	2	0	0: Disabled: 1: Trip: 2: Warning:
C.Data[116]	Bit 4 – 5	Num Starts Prewarn	0	2	0	0: Disabled: 1: Trip: 2: Warning:
C.Data[116]	Bit 6 – 7	Power Scale Factor	0	3	1	0: Power Scale Factor 1: 1: Power Scale Factor 10: 2: Power Scale Factor 100: 3: Power Scale Factor 1000:
C.Data[117]	Bit 0	Backlight	0	1	1	0: Off: 1: On:
C.Data[117]	Bit 1 – 2	Password Protection	0	2	0	0: Off: 1: On for Parameters: 2: On for Param. + Motor Control:
C.Data[117]	Bit 3 – 4	Dip Enable	0	2	0	0: Off: 1: On: 2: On + Rapid Cycle Lockout:
C.Data[117]	Bit 5	Dip Autorestart Enable	0	1	0	0: Off: 1: On:
C.Data[117]	Bit 6	LCD Panel T Unit	0	1	0	0: Celcius: 1: Fahrenheit:
C.Data[117]	Bit 7	Reserved				
C.Data[118]	Bit 0 – 7	Nominal Line Voltage	90	690	400	V
C.Data[119]	Bit 0 – 7	Nominal Line Voltage				
C.Data[120]	Bit 0 – 7	PwrFactor Trip Level	30	100	30	
C.Data[121]	Bit 0 – 7	PwrFactor Trip Delay	0	255	30	0.1s
C.Data[122]	Bit 0 – 7	PwrFactor Warn Level	30	100	30	
C.Data[123]	Bit 0 – 7	PwrFactor Warn Delay	0	255	30	0.1s
C.Data[124]	Bit 0 – 7	U Imb. Trip Level	2	200	200	0.1%
C.Data[125]	Bit 0 – 7	U Imb. Trip Delay	0	255	10	0.1s
C.Data[126]	Bit 0 – 7	U Imb. Warn Level	2	200	200	0.1%
C.Data[127]	Bit 0 – 7	U Imb. Warn Delay	0	255	10	0.1s
C.Data[128]	Bit 0 – 7	P Low Trip Level	20	100	20	%
C.Data[129]	Bit 0 – 7	P Low Trip Delay	0	255	5	s
C.Data[130]	Bit 0 – 7	P Low Warn Level	20	100	20	%
C.Data[131]	Bit 0 – 7	P Low Warn Delay	0	255	5	s
C.Data[132]	Bit 0 – 7	P High Trip Level	20	200	200	5%
C.Data[133]	Bit 0 – 7	P High Trip Delay	0	255	10	s
C.Data[134]	Bit 0 – 7	P High Warn Level	20	200	200	5%
C.Data[135]	Bit 0 – 7	P High Warn Delay	0	255	10	s

	Bit	Parametername	Lower Limit	Upper Limit	Default Value	Parameter Unit / Selection
C.Data[136]	Bit 0 – 7	Nominal Power Factor	1	100	100	
C.Data[137]	Bit 0 – 7	Reserved				
C.Data[138]	Bit 0 – 7	Reserved				
C.Data[139]	Bit 0 – 7	THD Warning Level	3	10	10	%
C.Data[140]	Bit 0 – 7	Load Startup Delay	0	255	0	s
C.Data[141]	Bit 0 – 7	THD Warning Delay	0	255	5	s
C.Data[142]	Bit 0 – 7	Reserved				
C.Data[143]	Bit 0 – 7	Reserved				

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