Littelfuse STARTCO

3714 Kinnear Place Saskatoon, SK Canada S7P 0A6 Ph: (306) 373-5505 Fx: (306) 374-2245 www.littelfuse.com/relayscontrols

MPU-32 ETHERNET/IP INTERFACE

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DISCLAIMER

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1. GENERAL

This document describes the Ethernet/IP features supported by the MPU-32. The MPU-32 supports Explicit and Polled I/O. It does not support the Unconnected Message Manager (UCMM).

2. MPU-32 ETHERNET/IP INTERFACE

2.1 MPU-32 NETWORK SETTINGS

The protocol type, IP address, IP mask, and gateway are set in the *Setup* | *Hardware* | *Network Comms* menu.

NOTE: Changing network settings using the menus or SE-Comm-RIS will restart the Ethernet/IP driver.

2.2 NETWORK STATUS DISPLAY

The Ethernet/IP communication status can be viewed using the *Metering* | *Network Status* menu.

This menu indicates "ACTIVITY" or "NO CNXNS". The last communication status is also displayed. The MPU-32 can be programmed to trip if there is no network activity.

2.3 NETWORK ERRORS

The MPU-32 can be configured to trip or alarm on a loss of connection by using the *Setup* | *Hardware* | *Network Comms* menu.

The *Net Trip/Alarm* set point selects the action to be taken when the module has no connections.

2.4 RSLOGIX5000 SETUP

Add a Generic Ethernet Module as a New Module to the PLC. The Comm Format for the MPS is DATA-INT.

2.5 LED INDICATION

Two LED's on the rear panel of the MPU-32 indicate Network Status (NS) and Module Status (MS). The MS LED is ON when the Ethernet/IP driver is enabled in the MPU-32, and OFF when the driver is disabled. The NS LED is OFF when Ethernet/IP is initializing. The NS LED flashes green after Ethernet/IP is initialized and is steady green when a connection is established. The NS LED flashes red when an I/O connection has timed out.

NOTE: On loss of an I/O connection, the NS LED remains flashing red until a new connection is established.

3. ETHERNET/IP OBJECTS (In Order of Class Number)

The module supports the following objects:

TABLE 1. ETHERNET/IP OBJECTS

CLASS	DESCRIPTION
0x01	Identity
0x04	Assembly
0x29	Control Supervisor
0x2C	Overload
0x64	Set Point
0x65	RTD Module
0x66	RTC
0x67	User Defined Registers
0x68	Data Logging

3.1 IDENTITY OBJECT

Identity Object Class Services

Get_Attribute_Single: Returns contents of specified attribute.

Identity Class 1, Instance 0 Attributes

ATTRIBUTE NUMBER	ATTRIBUTE NAME	SERVICES	DESCRIPTION	DEFAULT, MINIMUM, MAXIMUM	DATA TYPE
1	Revision	Get	Revision of this object.	1	UINT
2	Max Instance	Get	Maximum number of instances.	1	UINT

Identity Object Instance Services

Get_Attribute_Single: Returns contents of specified attribute.

Set_Attribute_Single: Modify the specified attribute.

Reset: Performs reset services based on the parameter.

Identity Class 1, Instance 1 Attributes

ATTRIBUTE NUMBER	ATTRIBUTE NAME	SERVICES	DESCRIPTION	DEFAULT, MINIMUM, MAXIMUM	DATA	MPU-32 REGISTER
1	Vendor ID	Get	Identification of each vendor by number.	691	UINT	
2	Device Type	Get	Motor Starter	22	UINT	
3	Product Code	Get	MPU-32 Platform	301	UINT	0
4	Revision	Get	Major revision must match the EDS value (Major.Minor).		A2 02 C6 C6	
5	Status	Get	Summary Status of the Device	0, 0, 255	WORD	
6	Serial Number	Get	Serial number of MPU-32	N/A, 0, 999999999	UDINT	2/3
7	Product Name	Get	Human Readable Identification	"Startco MPU-32"	SHORT_STRING	
100 (0x64)	MPU-32 Revision	Get	Revision of MPU-32 Firmware: 100 = 1.00	N/A, 100, N/A	UINT	1
101 (0x65)	System Name	Get/Set	22 characters, only 20 significant.	"Startco MPU-32"	SHORT_STRING	600
102 (0x66)	MPU-32 Password	Get/Set	22 characters, only 4 significant.	"1111"	SHORT_STRING	590
103 (0x67)	Password timeout	Get/Set	Password Timeout in Minutes	10, 1, 60	REAL	239

3.2 ASSEMBLY OBJECT 0X04

Assembly Object Class Services

Get_Attribute_Single: Returns contents of specified attribute.

Assembly Class 4, Instance 0 Attributes

ATTRIBUTE NUMBER	ATTRIBUTE NAME	SERVICES	DESCRIPTION	DEFAULT, MINIMUM, MAXIMUM	DATA TYPE
1	Revision	Get	Revision of this object.	1	UINT
2	Max Instance	Get	Maximum instance of assembly.	0x64	UINT

Assembly Object Instance Services

Get_Attribute_Single: Returns assembly-instance data. Applies to both output and input instances.

Set_Attribute_Single: Set assembly instance data. Applies to output instances only. Service not supported for input instances.

The following static input instances are supported and can be selected by setting parameter to the desired ID:

INSTANCE	DESCRIPTION	DATA SIZE IN BYTES
100 (0x64)	User Registers (Default)	64
150 (0x96)	Basic Overload	2
151 (0x97)	Extended Overload	2
152 (0x98)	Basic Motor Starter	2
153 (0x99)	Extended Motor Starter 1	2

The following static output instance are supported and can be selected by setting parameter to the desired ID:

INSTANCE	DESCRIPTION	DATA SIZE IN BYTES
102 (0x66)	Basic Overload	2
103 (0x67)	Basic Motor Starter (Default)	2

Assemblies are accessed using Polled I/O or can be read using Explicit Messaging. For explicit messaging, use class, instance, and attribute as indicated in Table 2.

TABLE 2. EXPLICIT MESSAGING

INSTANCE	SERVICES	CLASS_INSTANCE_ ATTRIBUTE
0x67	Get/Set	04_67_03
0x68	Get/Set	04_68_03
0x96	Get	04_96_03
0x97	Get	04_97_03
0x98	Get	04_98_03
0x99	Get	04_99_03
0x64	Get	04_64_03

I/O Assembly Instance Attributes

The following are the attributes that are supported as part of the Control Supervisor. These can be individually accessed and are also part of the pre-defined Ethernet/IP assemblies.

Faulted

This bit is "1" when there is a Trip1, Trip2, or Trip3 condition on the MPU-32 or "0" when there are no trips. Trips are reset using Explicit Messaging commands using 29-01-64, 29-01-0C or by using the FaultReset bit of the output assembly.

Warning

This bit is "1" when there is an Alarm1, Alarm2, or Alarm3 and "0" when there are no alarms.

Running1

This bit is "1" when motor current is detected and "0" when there is no motor current.

Ready

This bit is "1" when there are no trips and the MPU-32 Remote Alarm set point is enabled.

CtrlFromNet

This bit is "1" when one of the MPU-32 output relays is assigned to *Network Run1*. The assigned relay will follow the state of the Run1 bit of the Control Supervisor attribute 3. This bit is also bit 1 of output assembly instance 3.

Run1

When CtrlFromNet is "1", Run1 determines the state of the relay assigned to *Network Run 1*. When Run1 is "0", the relay is de-energized and when Run1 is "1" the relay is energized. Using this feature the PLC can provide remote start/stop control using the MPU-32.

NOTE: When the Ethernet/IP protocol starts or if an internal protocol error occurs, the Run1 bit is cleared.

FaultReset

This bit is used to reset MPU-32 trips. A transition from "0" to "1" will issue a reset to the MPU-32.

This attribute is also updated when a "Reset Trips" command is issued using 29-01-64. When using 29-01-64 commands, a transition on the command or the FaultReset bit is not required.

Assembly Class 4, Instance 0x64, Attribute 3

This assembly is used to access any combination of 32 user-defined registers in the MPU-32. Assembly size is fixed at 64 bytes. User defined registers are programmed in the MPU-32 using the *Setup* | *Hardware* | *Network Comms* | *User Registers* menu, or by explicit messaging to Class 0x64 via the configuration tool. Register values are defined in Appendix E of the MPU-32 manual. Each MPU-32 register in Appendix E defines a 16-bit value. For 32-bit float types (Ethernet/IP REAL), a register pair needs to be entered. For example, to configure an assembly to read the first four RTD temperatures in RTD Module 1, enter register numbers 902, 903, 904, 905, 906, 907, 908, 909 in order. The first 16 bytes of the assembly will contain the RTD data and the remaining bytes do not contain any valid data.

Build assemblies so that REAL types fall on a 32-bit boundary. This simplifies access and type conversions within the PLC's Ethernet/IP scanner.

NOTE: Byte order follows the Ethernet/IP convention and is not the same as indicated in Appendix E of the MPU-32 manual, however 32-bit values are specified as 2 registers in order as per the above example.

Input Assemblies

Input Assembly Bit	Name	Class Name	Class	Instance	Attribute
Bit 0	Faulted/Trip	Control Supervisor	0x29	1	10
Bit 1	Warning	Control Supervisor	0x29	1	11
Bit 2	Running 1	Control Supervisor	0x29	1	7
Bit 4	Ready	Control Supervisor	0x29	1	9
Bit 5	Control From Net	Control Supervisor	0x29	1	15

Assembly Class 4, Instance 0x96, Attribute 3 – Input – Basic Overload

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Faulted/ Trip

Assembly Class 4, Instance 0x97, Attribute 3 – Input – Extended Overload

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Warning	Faulted/ Trip

Assembly Class 4, Instance 0x98, Attribute 3 – Input – Basic Starter

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Reserved	Reserved	Reserved	Reserved	Reserved	Running1	Reserved	Faulted/ Trip

Assembly Class 4, Instance 0x99, Attribute 3 – Input – Extended Motor Starter 1

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Reserved	Reserved	CtrlfromNet	Ready	Reserved	Running1	Warning	Faulted/ Trip

Output Assemblies

Output Assembly Bit	Name	Class Name	Class	Instance	Attribute
Bit 0	Run1	Control Supervisor	0x29	1	3
Bit 2	Fault Reset	Control Supervisor	0x29	1	12

Assembly Class 4, Instance 0x67, Attribute 3 – Output – Basic Overload

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Reserved	Reserved	Reserved	Reserved	Reserved	FaultReset	Reserved	Reserved

Assembly Class 4, Instance 0x68, Attribute 3 – Output – Basic Motor Starter

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Reserved	Reserved	Reserved	Reserved	Reserved	FaultReset	Reserved	Run1

3.3 Control Supervisor Object 0x29

Control Supervisor Class 0x29, Instance 0 Attributes

Attribute Number	Attribute Name	Services	Description	Default, Minimum, Maximum	Data Type
1	Revision	Get	Revision of this object.	1	UINT
2	Max Instance	Get	Maximum number of instances.	1	UINT

Supervisor Object Instance Services

Get_Attribute_Single: Returns contents of specified attribute.

Set_Attribute_Single: Modifies specified attribute.

Reset: Resets attributes 3, 12, 100

Supervisor Class 0x29, Instance 1 Attributes

ATTRIBUTE NUMBER	ATTRIBUTE NAME	SERVICES	DESCRIPTION	DEFAULT, MINIMUM, MAXIMUM	DATA TYPE	MPU-32 REGISTER
3	Run1 [1]	Get/Set	Run 1 Input to MPU-32	0, 0, 1	BOOL	
7	Running	Get	Motor Current Detected	0, 0, 1	BOOL	
9	Ready	Get	No trips and Run1 enabled.	0, 0, 1	BOOL	
10 (0x0A)	Faulted	Get	MPU-32 is tripped.	0, 0, 1	BOOL	
11 (0x0B)	Warning	Get	MPU-32 in alarm.	0, 0, 1	BOOL	
12 (0x0C)	FaultReset	Get/Set	Reset Issued on 0 - >1 Transition	0, 0, 1	BOOL	
15 (0x0F)	CtrlFromNet	Get	1 = Relay assigned to "Network Run1".	N/A	BOOL	
100 (0x64)	MPU-32 Command	Get/Set	A command "Set" will cause the requested command to be issued to the MPU-32. A "Get" will read the last command. 0 = Reserved 1 = Reserved 2 = Reserved 3 = Reset Trips 4 = Set RTC 5 = Clear Data Logging Records 6 = Clear Trips Counters 7 = Reserved 8 = Clear Running Time 9 = Emergency I^2t Reset 10 = Reserved 11 = Reserved 12 = Re-enable Temperature Protection 13 = Remote/Net Trip Set 14 = Remote/Net Trip Clear 15 = Remote/Net Alarm Set 16 = Remote/Net Alarm Clear 17 = Run1 Set 18 = Run1 Clear	0, 0, 18	USINT	
101 (0x65)	TA Summary	Get	Trip, Alarm, Status Summary: Bit 4: 1 = Trip1 Bit 5: 1 = Trip2 Bit 6: 1 = Trip3 Bit 7: 1 = Alarm1 Bit 8: 1 = Alarm2 Bit 9: 1 = Alarm3	0, 0, 512	WORD	1096
102 (0x66)	MPU-32 Status	Get	Bit 0: 1 = I > Threshold Bit 1: 1 = In run mode Bit 2: 1 = Reduced OC on Bit 3: 1 = I > 125% FLA Bit 4: 1 = ETR on Bit 5: 1 = PTC open Bit 8: 1 = Digital Input valid Bit 9: 1 = RY1 energized Bit 10: 1 = RY2 energized Bit 11: 1 = RY3 energized	0, 0, 2048	WORD	1097
103 (0x67)	Trip/Alarm Group 0	Get	Trip and Alarm, Bits 15..0, T45 See MPU-32 Manual, Appendix F.		UINT	1104

[1] At least one relay must be assigned to "Network Run1".

Supervisor Class 0x29, Instance 1 Attributes (Continued)

ATTRIBUTE NUMBER	ATTRIBUTE NAME	SERVICES	DESCRIPTION	DEFAULT, MINIMUM, MAXIMUM	DATA TYPE	MPU-32 REGISTER
104 (0x68)	Trip/Alarm Group 1	Get	Trip and Alarm, Bits 31..16, T46 See MPU-32 Manual, Appendix F.		UINT	1105
105 (0x69)	Trip/Alarm Group 2	Get	Trip and Alarm, Bits 47..32, T47 See MPU-32 Manual, Appendix F.		UINT	1106
106 (0x6A)	Trip/Alarm Group 3	Get	Trip and Alarm, Bits 63..48, T48 See MPU-32 Manual, Appendix F.		UINT	1107
107 (0x6B)	Trip/Alarm Group 4	Get	Trip and Alarm, Bits 79..64, T49 See MPU-32 Manual, Appendix F.		UINT	1108
108 (0x6C)	Trip/Alarm Group 5	Get	Trip and Alarm, Bits 95..80, T50 See MPU-32 Manual, Appendix F.		UINT	1109
109 (0x6D)	Trip/Alarm Group 6	Get	Trip and Alarm, Bits 111..96, T51 See MPU-32 Manual, Appendix F.		UINT	1110
110 (0x6E)	Trip/Alarm Group 7	Get	Trip and Alarm, Bits 127..112, T52 See MPU-32 Manual, Appendix F.		UINT	1111
111 (0x6F)	RY1 Function	Get/Set	Function Assigned to Relay 1: 0 = None 1 = Trip1 2 = Trip2 3 = Trip3 4 = Alarm1 5 = Alarm2 6 = Alarm3 7 = Current Detected 8 = Run Mode 9 = Start Inhibit 10 = Trip1 Pulse 11 = Watchdog 12 = Network Run1 13 = Reduced Overcurrent	0, 0, 12	UINT	334
112 (0x70)	RY1 Mode	Get/Set	0 = Fail Safe, 1 = Non Fail Safe	0, 0, 1	UINT	335
113 (0x71)	RY2 Function	Get/Set	See Attribute 0x6F	0, 0, 18	UINT	336
114 (0x72)	RY2 Mode	Get/Set	0 = Fail Safe, 1 = Non Fail Safe	0, 0, 1	UINT	337
115 (0x73)	RY3 Function	Get/Set	See Attribute 0x6F	0, 0, 18	UINT	338
116 (0x74)	RY3 Mode	Get/Set	0 = Fail Safe, 1 = Non Fail Safe	0, 0, 1	UINT	339
117 (0x75)	RY Pulse Time	Get/Set	Specifies the duration of the trip pulse when the RY function is set to "Trip1 Pulse".	0.25, 0.25, 10	REAL	344/ 345
118 (0x76)	Din Function	Get/Set	Digital Input function selection: 0 = Input not used 1 = Trip1 2 = Reset 3 = Program Enable 4 = Reduced Overcurrent	0, 0, 3	UINT	264
119 (0x77)	Din Bypass	Get/Set	Applies when Trip1 is selected. 0 = Enable, 1 = Disable	1, 0, 1	UINT	265
120 (0x78)	Din Bypass Delay	Get/Set	Applies when Trip1 is selected. Sets the bypass delay on start.	5, 0.5, 100	REAL	266/ 267
121 (0x79)	Din Trip Delay	Get/Set	Applies when Trip1 is selected.	0.1, 0.01, 100	REAL	268/ 269
122 (0x7A)	Din Trip Count	Get	Number of times the Digital Input has tripped.		UINT	1149

Supervisor Class 0x29, Instance 1 Attributes (Continued)

ATTRIBUTE NUMBER	ATTRIBUTE NAME	SERVICES	DESCRIPTION	DEFAULT, MINIMUM, MAXIMUM	DATA TYPE	MPU-32 REGISTER
123 (0x7B)	Aout Param	Get/Set	Specifies the Analog Output parameter: 0 = Phase Current 1 = Earth Leakage (CT Measured) 2 = Earth Leakage (Calculated) 3 = Used I^2t 4 = Local RTD 5 = Max Module Stator RTD 6 = Max Module Bearing RTD 7 = Max Module Load RTD 8 = Max Module Ambient RTD 9 = Unbalance 10 = Zero 11 = Full Scale 12 = Differential Current 13 = Phase Current (FLA)	0, 0, 13	UINT	373
124(0x7C)	DF Enable	Get/Set	Differential Module Enable: 0 = Enable 1 = Disable	0, 1, 0	UINT	160
125 (0x7D)	OPI Trip Action	Get/Set	0 = Disable 1 = Trip1 2 = Trip2 3 = Trip3 4 = Trip1 & Trip2 5 = Trip1 & Trip3 6 = Trip1 & Trip2 & Trip3 7 = Trip2 & Trip3	0, 0, 7	UINT	237
126 (0x7E)	OPI Trip Count	Get	Number of OPI 8 ohm Trips.		UINT	1185
127 (0x7F)	Local Sensor	Get/Set	Selects the Local Temperature Sensor: 0 = Disabled 1 = RTD 2 = PTC	0, 0, 2	UINT	143
128 (0x80)	Local Sensor Count	Get	Counts the number of times that the RTD Sensor Trip has occurred.		UINT	1195
129 (0x81)	Remote Trip Action	Get/Set	0 = Disable 1 = Trip1 2 = Trip2 3 = Trip3 4 = Trip1 & Trip2 5 = Trip1 & Trip3 6 = Trip1 & Trip2 & Trip3 7 = Trip2 & Trip3	0, 0, 7	UINT	140
130 (0x82)	Remote Alarm Action	Get/Set	0 = Disable 1 = Alarm1 2 = Alarm2 3 = Alarm3 4 = Alarm1 & Alarm2 5 = Alarm1 & Alarm3 6 = Alarm1 & Alarm2 & Alarm3 7 = Alarm2 & Alarm3	0, 0, 7	UINT	141
131 (0x83)	Remote Trip Count	Get	Number of Remote Trips		UINT	1197

Supervisor Class 0x29, Instance 1 Attributes (Continued)

ATTRIBUTE NUMBER	ATTRIBUTE NAME	SERVICES	DESCRIPTION	DEFAULT, MINIMUM, MAXIMUM	DATA TYPE	MPU-32 REGISTER
132 (0x84)	UPI Select	Get/Set	Selects UPI Function: 0 = None 1 = Trip1 2 = Trip2 3 = Trip3 4 = Alarm1 5 = Alarm2 6 = Alarm3 7 = Relay1 8 = Relay2 9 = Relay3 10 = Digital Input 11 = Current Detected 12 = Current > 125% FLA 13 = In Run Mode 14 = ETR State 15 = Start Inhibit 16 = Network Run1 17 = Net Activity 18 = Reduced Overcurrent	0, 0, 17	UINT	241
133 (0x85)	DF MOD Trip Action	Get/Set	0 = Disable 1 = Trip1 2 = Trip2 3 = Trip3 4 = Trip1 & Trip2 5 = Trip1 & Trip3 6 = Trip1 & Trip2 & Trip3 7 = Trip2 & Trip3	0, 0, 7	UINT	161
134 (0x86)	DF MOD Alarm Action	Get/Set	0 = Disable 1 = Alarm1 2 = Alarm2 3 = Alarm3 4 = Alarm1 & Alarm2 5 = Alarm1 & Alarm3 6 = Alarm1 & Alarm2 & Alarm3 7 = Alarm2 & Alarm3	0, 0, 7	UINT	162
135 (0x87)	DF Mod Count	Get	Differential Module Communications Trip Count		UINT	1138
136 (0x88)	Trip/Alarm Group 8	Get	Trip and Alarm Bits 143 .. 128 T53 See MPU-32 Manual, Appendix F.		UINT	1112

3.4 OVERLOAD 0x2C

Overload Object Class Services

Get_Attribute_Single: Returns contents of specified attribute.

Overload Class 0x2C, Instance 0 Attributes

ATTRIBUTE NUMBER	SERVICES	DESCRIPTION	DEFAULT, MINIMUM, MAXIMUM	DATA TYPE
1	Get	Revision of this object.	1	UINT
2	Get	Maximum number of instances.	1	UINT

Overload Object Instance Services

Get_Attribute_Single: Returns contents of specified attribute.

Set_Attribute_Single: Modify specified attribute.

Overload Class 0x2C, Instance 1 Attributes

ATTRIBUTE NUMBER	ATTRIBUTE NAME	SERVICES	DESCRIPTION	DEFAULT, MINIMUM, MAXIMUM	DATA TYPE	MPU-32 REGISTER
100 (0x64)	Trip Action	Get/Set	0 = Disable 1 = Trip1 2 = Trip2 3 = Trip3 4 = Trip1 & Trip2 5 = Trip1 & Trip3 6 = Trip1 & Trip2 & Trip3 7 = Trip2 & Trip3	1, 0, 7	UINT	8
101 (0x65)	Thermal Model	Get/Set	0 = NEMA 1 = I²t	0, 0, 1	UINT	9
	Reserved					
102 (0x66)	K-Factor	Get/Set	Used in I²t Algorithm	6, 1, 10	REAL	11/12
103 (0x67)	LR Current	Get/Set	Locked Rotor Current (x FLA)	6, 1, 10	REAL	13/14
104 (0x68)	LR Time Cold	Get/Set	Locked Rotor Time Cold (s)	10, 0.1, 100	REAL	15/16
105 (0x69)	LR Time Hot	Get/Set	Locked Rotor Time Hot (s)	5, 0.1, 100	REAL	17/18
106 (0x6A)	Cooling Factor	Get/Set	Multiples of Running Time Constant	2, 0.1, 10	REAL	19/20
107 (0x6B)	Inhibit Level	Get/Set	Thermal Reset/Inhibit Level Per Unit	0.3, 0.1, 0.9	REAL	21/22
108 (0x6C)	Alarm Level	Get/Set	Level where alarm occurs.	1.0, 0.5, 1.0	REAL	23/24
109 (0x6D)	Alarm Action	Get/Set	0 = Disable 1 = Alarm1 2 = Alarm2 3 = Alarm3 4 = Alarm1 & Alarm2 5 = Alarm1 & Alarm3 6 = Alarm1 & Alarm2 & Alarm3 7 = Alarm2 & Alarm3	1, 0, 7	UINT	25
110 (0x6E)	Inhibit Trip Action	Get/Set		0, 0, 7	UINT	26
111 (0x6F)	Inhibit Alarm Action	Get/Set		0, 0, 7	UINT	27
112 (0x70)	Inhibit Trip Count	Get			UINT	1196
113 (0x71)	EF Source		Earth Fault Protection Source: 0 = Calculated ($3I_0$) 1 = Measured (Ict)	1, 0, 1	UINT	208
114 (0x72)	PH-CT Primary	Get/Set	Phase CT Primary Rating (A)	100, 1, 5000	REAL	210
115 (0x73)	EF-CT Primary	Get/Set	EF-CT Primary Rating (A)	5, 1, 5000	REAL	212
116 (0x74)	Run-Mode Delay	Get/Set		10, 5, 60	REAL	216
117 (0x75)	Frequency	Get/Set	System Frequency: 0 = 50, 1 = 60 Hz, 2 = Variable	1, 0, 1	UINT	224
118 (0x76)	FLA Rating	Get/Set	Full-Load Current	100, 1, 5000	REAL	225/ 226
119 (0x77)	DF-CT Primary	Get/Set	Differential CT Primary Rating	100, 1, 5000	REAL	218/219
120 (0x78)	Service Factor	Get/Set	Motor Service Factor	1, 1, 1.25	REAL	233/ 234
121 (0x79)	Trip Count	Get	Counts Overload Trips		UINT	1132

Overload Class 0x2C, Instance 1 Attributes (Continued)

ATTRIBUTE NUMBER	ATTRIBUTE NAME	SERVICES	DESCRIPTION	DEFAULT, MINIMUM, MAXIMUM	DATA TYPE	MPU-32 REGISTER
122 (0x7A)	Starts / Hour Trip Action	Get-Set	0 = Disable 1 = Trip1 2 = Trip2 3 = Trip3 4 = Trip1 & Trip2 5 = Trip1 & Trip3 6 = Trip1 & Trip2 & Trip3 7 = Trip2 & Trip3	0, 0, 7	UINT	1270
123 (0x7B)	Starts / Hour Alarm Action	Get/Set	0 = Disable 1 = Alarm1 2 = Alarm2 3 = Alarm3 4 = Alarm1 & Alarm2 5 = Alarm1 & Alarm3 6 = Alarm1 & Alarm2 & Alarm3 7 = Alarm2 & Alarm3	0, 0, 7	UINT	1271
124 (0x7C)	Number of Starts / Hour	Get/Set	1 to 10 Starts Per Hour: 0 = 1 Start 9 = 10 Starts	0, 0, 9	UINT	1272
125 (0x7D)	Time between Starts	Get/Set	0 to 500 minutes Between Starts	0, 0, 500m	REAL	1273/ 1274
126 (0x7E)	Starts / Hour Trip Count	Get	Number of Starts/Hour Trips		UINT	1193
144 (0x90)	I_A	Get	Phase A Current (A)		REAL	860/861
145 (0x91)	I_B	Get	Phase B Current (A)		REAL	862/863
146 (0x92)	I_C	Get	Phase C Current (A)		REAL	864/865
147 (0x93)	Ict	Get	Ground-Fault Current (A) from CT		REAL	866/867
148 (0x94)	$3I_0$	Get	Ground-Fault Current (A) Calculated		REAL	868/869
149 (0x95)	+Seq Current	Get	Positive Sequence Current (Pu)		REAL	870/871
150 (0x96)	-Seq Current	Get	Negative Sequence Current (Pu)		REAL	872/873
151 (0x97)	Unbalance Current	Get	Current Unbalance (Pu)		REAL	874/875
152 (0x98)	Used I^2t	Get	Used Thermal Capacity (pu). Scaled to %		REAL	876/877
153 (0x99)	Thermal Trend	Get	Thermal Trend (pu). Scaled to %		REAL	878/879
154 (0x9A)	Frequency	Get	Frequency (from Ia)		REAL	880/881
155 (0x9B)	Local RTD	Get	Load RTD Reading		REAL	900/901
156 (0x9C)	Run Time	Get	Motor Run Time in seconds. Scaled by 1/3600 for display in hours.		UDINT	1210/ 1211
157 (0x9D)	Overload Reset Type	Get/Set	0 = Normal 1 = Auto Reset 2 = Multiple Motor Sequence		UINT	28
158 (0x9E)	I^2t Reset Time	Get	I^2t Reset/Inhibit Time (m)		REAL	882/883
159 (0x9F)	DFa	Get	Differential Current A		REAL	884/885
160 (0xA0)	DFb	Get	Differential Current B		REAL	886/887
161	DFc	Get	Differential Current C		REAL	888/889

3.5 SET POINT CLASS 0x64

Set Point Object Class Services
Get_Attribute_Single: Returns contents of specified attribute.

Set Point Class 0x64, Instance 0 Attributes

ATTRIBUTE NUMBER	ATTRIBUTE NAME	SERVICES	DESCRIPTION	DEFAULT, MINIMUM, MAXIMUM	DATA TYPE
1	Revision	Get	Revision of this object.	5	UINT
2	Max Instance	Get	Maximum number of instances.	12	UINT

Set Point Object Instances

Set Point Object Instance Services
Get_Attribute_Single: Returns contents of specified attribute.
Set_Attribute_Single: Modifies specified attribute.

The set point class consists of seven attributes. Each set-point instance may use some or all of these attributes.

Attribute 1 - Trip Action
Specifies the action to take on a trip.
0 = Disable
1 = Trip1
2 = Trip2
3 = Trip3
4 = Trip1 & Trip2
5 = Trip1 & Trip3
6 = Trip1 & Trip2 & Trip3
7 = Trip2 & Trip3

Attribute 2 - Alarm Action
Specifies the action to take on an alarm.
0 = Disable
1 = Alarm1
2 = Alarm2
3 = Alarm3
4 = Alarm1 & Alarm2
5 = Alarm1 & Alarm3
6 = Alarm1 & Alarm2 & Alarm3
7 = Alarm2 & Alarm3

Attribute 3 - Trip Level

Attribute 4 - Trip Delay

Attribute 5 - Alarm Level

Attribute 6 - Alarm Delay

Attribute 7 - Trip Counter for the set point.

Class 0x64, Instance 1 - Overcurrent

ATTRIBUTE NUMBER	ATTRIBUTE NAME	SERVICES	DEFAULT, MINIMUM, MAXIMUM	DATA TYPE	MPU-32 REGISTER
1	Trip Action	Get/Set	1, 0, 7	UINT	32
3	Trip Level	Get/Set	10, 1, 15	REAL	33/34
4	Trip Delay	Get/Set	0.1, 0, 10	REAL	35/36
7	Trip Count	Get		UINT	1130

Class 0x64, Instance 2 - Aux. Overcurrent

ATTRIBUTE NUMBER	ATTRIBUTE NAME	SERVICES	DEFAULT, MINIMUM, MAXIMUM	DATA TYPE	MPU-32 REGISTER
1	Trip Action	Get/Set	1, 0, 7	UINT	40
3	Trip Level	Get/Set	10, 1, 15	REAL	41/42
4	Trip Delay	Get/Set	0.1, 0, 10	REAL	43/44
7	Trip Count	Get		UINT	1131

Class 0x64, Instance 3 - Earth Fault

ATTRIBUTE NUMBER	ATTRIBUTE NAME	SERVICES	DEFAULT, MINIMUM, MAXIMUM	DATA TYPE	MPU-32 REGISTER
1	Trip Action	Get/Set	1, 0, 7	UINT	48
2	Alarm Action	Get/Set	1, 0, 7	UINT	58
3	Trip Level	Get/Set	0.4, 0.05, 1	REAL	50/51
4	Trip Delay	Get/Set	0.25, 0, 100	REAL	52/53
5	Alarm Level	Get/Set	0.20, 0.05, 1	REAL	54/55
6	Alarm Delay	Get/Set	1, 0, 100	REAL	56/57
7	Trip Count	Get		UINT	1133

Class 0x64, Instance 4 – Jam

ATTRIBUTE NUMBER	ATTRIBUTE NAME	SERVICES	DEFAULT, MINIMUM, MAXIMUM	DATA TYPE	MPU-32 REGISTER
1	Trip Action	Get/Set	1, 0, 7	UINT	64
2	Alarm Action	Get/Set	1, 0, 7	UINT	73
3	Trip Level	Get/Set	6, 1, 10	REAL	65/66
4	Trip Delay	Get/Set	5, 1, 100	REAL	67/68
5	Alarm Level	Get/Set	3, 1, 10	REAL	69/70
6	Alarm Delay	Get/Set	5, 1, 100	REAL	71/72
7	Trip Count	Get		UINT	1136

Class 0x64, Instance 5 - Current Unbalance

ATTRIBUTE NUMBER	ATTRIBUTE NAME	SERVICES	DEFAULT, MINIMUM, MAXIMUM	DATA TYPE	MPU-32 REGISTER
1	Trip Action	Get/Set	1, 0, 7	UINT	80
2	Alarm Action	Get/Set	1, 0, 7	UINT	89
3	Trip Level	Get/Set	0.25, 0.05, 1	REAL	81/82
4	Trip Delay	Get/Set	15, 1, 100	REAL	83/84
5	Alarm Level	Get/Set	0.10, 0.05, 1	REAL	85/86
6	Alarm Delay	Get/Set	10, 1, 100	REAL	87/88
7	Trip Count	Get		UINT	1134

Class 0x64, Instance 6 - Phase Reverse

ATTRIBUTE NUMBER	ATTRIBUTE NAME	SERVICES	DEFAULT, MINIMUM, MAXIMUM	DATA TYPE	MPU-32 REGISTER
1	Trip Action	Get/Set	0, 0, 7	UINT	96
2	Alarm Action	Get/Set	0, 0, 7	UINT	93
4	Trip Delay	Get/Set	2, 1, 100	REAL	97/98
6	Alarm Delay	Get/Set	2, 1, 100	REAL	94
7	Trip Count	Get		UINT	1144

Class 0x64, Instance 7 - Phase Loss

ATTRIBUTE NUMBER	ATTRIBUTE NAME	SERVICES	DEFAULT, MINIMUM, MAXIMUM	DATA TYPE	MPU-32 REGISTER
1	Trip Action	Get/Set	1, 0, 7	UINT	99
2	Alarm Action	Get/Set	1, 0, 7	UINT	102
4	Trip Delay	Get/Set	5, 1, 100	REAL	100
6	Alarm Delay	Get/Set	5, 1, 100	REAL	103
7	Trip Count	Get		UINT	1143

Class 0x64, Instance 8 – Undercurrent

ATTRIBUTE NUMBER	ATTRIBUTE NAME	SERVICES	DEFAULT, MINIMUM, MAXIMUM	DATA TYPE	MPU-32 REGISTER
1	Trip Action	Get/Set	0, 0, 7	UINT	128
2	Alarm Action	Get/Set	0, 0, 7	UINT	137
3	Trip Level	Get/Set	0.5, 0.1, 1	REAL	129
4	Trip Delay	Get/Set	10, 1, 100	REAL	131
5	Alarm Level	Get/Set	0.8, 0.1, 1	REAL	133
6	Alarm Delay	Get/Set	20, 1, 100	REAL	135
7	Trip Count	Get		UINT	1137

Class 0x64, Instance 9 - PTC Temperature

ATTRIBUTE NUMBER	ATTRIBUTE NAME	SERVICES	DEFAULT, MINIMUM, MAXIMUM	DATA TYPE	MPU-32 REGISTER
1	Trip Action	Get/Set	0, 0, 7	UINT	144
2	Alarm Action	Get/Set	0, 0, 7	UINT	145
7	Trip Count	Get		UINT	1142

Class 0x64, Instance 0x0A – Local RTD Sensor

ATTRIBUTE NUMBER	ATTRIBUTE NAME	SERVICES	DEFAULT, MINIMUM, MAXIMUM	DATA TYPE	MPU-32 REGISTER
1	Trip Action	Get/Set	1, 0, 7	UINT	146
2	Alarm Action	Get/Set	1, 0, 7	UINT	151
3	Trip Level	Get/Set	130, 40, 200	REAL	147
5	Alarm Level	Get/Set	110, 40, 200	REAL	149
7	Trip Count	Get		UINT	1194

Class 0x64, Instance 0x0B – Reduced Overcurrent

ATTRIBUTE NUMBER	ATTRIBUTE NAME	SERVICES	DEFAULT, MINIMUM, MAXIMUM	DATA TYPE	MPU-32 REGISTER
1	Trip Action	Get/Set	0, 0, 7	UINT	45
3	Trip Level	Get/Set	1, 1, 15	REAL	46/47
7	Trip Count	Get		UINT	1140

Class 0x64, Instance 0x0C – Differential Overcurrent

ATTRIBUTE NUMBER	ATTRIBUTE NAME	SERVICES	DEFAULT, MINIMUM, MAXIMUM	DATA TYPE	MPU-32 REGISTER
1	Trip Action	Get/Set	0, 0, 7	UINT	170
2	Alarm Action	Get/Set	0, 0, 7	UINT	179
3	Trip Level	Get/Set	1, 0.1, 15	REAL	171/172
4	Trip Delay	Get/Set	0.1, 0, 10	REAL	173/174
5	Alarm Level	Get/Set	0.5, 0.1, 15	REAL	175/176
6	Alarm Delay	Get/Set	0.1, 0, 10	REAL	177/178
7	Trip Count	Get		UINT	1139

3.6 RTD MODULE CLASS 0x65

RTD Module Object Class Services

Get_Attribute_Single: Returns contents of specified attribute.

Set_Attribute_Single: Modifies specified attribute.

Class 0x65, Instance 0, Attributes

ATTRIBUTE NUMBER	ATTRIBUTE NAME	SERVICES	DESCRIPTION	DEFAULT, MINIMUM, MAXIMUM	DATA TYPE	MPU-32 REGISTER
1	Revision Number	Get	Revision number of this class.	1	UINT	
2	Max Instance	Get	Maximum Number of RTD Modules	3	UINT	
100 (0x64)	Modules Used	Get/Set	Specifies the number of RTD modules used.	0, 0, 3	UINT	390
101 (0x65)	Sensor Trip Action(1)	Get/Set	Specifies trip action to take on a sensor error: 0 = Disable Trips 1 = Trip1 2 = Trip2 3 = Trip3 4 = Trip1 & Trip2 5 = Trip1 & Trip3 6 = Trip1 & Trip2 & Trip3 7 = Trip2 & Trip3	0, 0, 7	UINT	388
102 (0x66)	Sensor Alarm Action(1)	Get/Set	Specifies alarm action to take on a sensor error: 0 = Disable Alarms 1 = Alarm1 2 = Alarm2 3 = Alarm3 4 = Alarm1 & Alarm2 5 = Alarm1 & Alarm3 6 = Alarm1 & Alarm2 & Alarm3 7 = Alarm2 & Alarm3	1, 0, 7	UINT	389
103 (0x67)	Module Error Trip Action	Get/Set	Specifies trip action to take on a module error. Action list is the same as Attribute 9.	0, 0, 7	UINT	387
104 (0x68)	Module Error Alarm Action	Get/Set	Specifies alarm action to take on a module error. Action list is the same as Attribute A.	1, 0, 7	UINT	386
105 (0x69)	Module1 Comm Trip Count	Get	Number of module1 communication-error trips.		UINT	1180
106 (0x6A)	Module2 Comm Trip Count	Get	Number of module2 communication-error trips.		UINT	1181
107 (0x6B)	Module3 Comm Trip Count	Get	Number of module3 communication-error trips.		UINT	1182
108 (0x6C)	Module Sensor Trip Count	Get	Number of RTD Sensor Trips		UINT	1183
109 (0x6D)	HMC Enable(1)	Get/Set	Hot Motor Compensation control: 0 = Enable, 1 = Disable		UINT	550
110 (0x6E)	HMC Max Bias(1)	Get/Set	Stator temperature (°C) where compensation ends at 100% I^2t.	150, 40, 200	REAL	551/ 552
111 (0x6F)	HMC Min Bias(1)	Get/Set	Stator temperature (°C) where compensation begins at 0% I^2t.	40, 40, 200	REAL	553/ 554
112 (0x70)	Max Stator Temp	Get	Maximum Stator Temperature (°C)		REAL	950/ 951
113 (0x71)	Max Bearing Temp	Get	Maximum Bearing Temperature (°C)		REAL	952/ 953
114 (0x72)	Max Load Temp	Get	Maximum Load Temperature (°C)		REAL	954/ 955

Class 0x65, Instance 0, Attributes (continued)

Attribute Number	Attribute Name	Services	Description	Default, Minimum, Maximum	Data Type	MPU-32 Register
115 (0x73)	Max Amb Temp	Get	Maximum Ambient Temperature (°C)		REAL	956/ 957
116 (0x74)	Min Stator Temp	Get	Minimum Stator Temperature (°C)		REAL	958/ 959
117 (0x75)	Min Bearing Temp	Get	Minimum Bearing Temperature (°C)		REAL	960/ 961
118 (0x76)	Min Load Temp	Get	Minimum Load Temperature (°C)		REAL	962/ 963
119 (0x77)	Min Ambient Temp	Get	Minimum Ambient Temperature (°C)		REAL	964/ 965

(1)Also applies to local RTD sensor

RTD Module Object Instance Services

Get_Attribute_Single: Returns contents of specified attribute.

Set_Attribute_Single: Modifies specified attribute.

Object Instance Attributes 1 to 8 define the RTD type. Selecting an RTD will enable trip and alarm set points. The trip action is fixed as Trip1 and the alarm action is fixed as Alarm1.

0 = RTD Disabled
1 = Platinum 100 ohm
2 = Nickel 100 ohm
3 = Nickel 120 ohm
4 = Copper 10 ohm

Object Instance Attributes 0x09 to 0x10 define the RTD function.

0 = Stator
1 = Bearing
2 = Load
3 = Ambient

Object Instance Attributes 0x11 to 0x20 define the trip and alarm settings in degrees C. The trip action is fixed as Trip1 and the alarm action is fixed as Alarm1.

Object Instance Attributes 0x21 to 0x28 define an 18-character name.

Object Instance Attributes 0x29 to 0x30 are temperature readings.

Object Instance Attributes 0x31 to 0x38 are the trip counters for each of the RTD's.

Class 0x65, Instance 1

Attribute Number	Attribute Name	Services	Default, Minimum, Maximum	Data Type	MPU-32 Register
1	RTD #1 Type	Get/Set	0, 0, 4	UINT	391
2	RTD #2 Type	Get/Set	0, 0, 4	UINT	392
3	RTD #3 Type	Get/Set	0, 0, 4	UINT	393
4	RTD #4 Type	Get/Set	0, 0, 4	UINT	394
5	RTD #5 Type	Get/Set	0, 0, 4	UINT	395
6	RTD #6 Type	Get/Set	0, 0, 4	UINT	396
7	RTD #7 Type	Get/Set	0, 0, 4	UINT	397
8	RTD #8 Type	Get/Set	0, 0, 4	UINT	398
9	RTD #1 Function	Get/Set	0, 0, 7	UINT	415
10 (0x0A)	RTD #2 Function	Get/Set	0, 0, 7	UINT	416
11 (0x0B)	RTD #3 Function	Get/Set	0, 0, 7	UINT	417
12 (0x0C)	RTD #4 Function	Get/Set	0, 0, 7	UINT	418
13 (0x0D)	RTD #5 Function	Get/Set	0, 0, 7	UINT	419
14 (0x0E)	RTD #6 Function	Get/Set	0, 0, 7	UINT	420
15 (0x0F)	RTD #7 Function	Get/Set	0, 0, 7	UINT	421
16 (0x10)	RTD #8 Function	Get/Set	0, 0, 7	UINT	422
17 (0x11)	RTD #1 Trip Level	Get/Set	130, 40, 200	REAL	446/447
18 (0x12)	RTD #1 Alarm Level	Get/Set	110, 40, 200	REAL	448/449
19 (0x13)	RTD #2 Trip Level	Get/Set	130, 40, 200	REAL	450/451

Class 0x65, Instance 1 (continued)

Attribute Number	Attribute Name	Services	Default, Minimum, Maximum	Data Type	MPU-32 Register
20 (0x14)	RTD #2 Alarm Level	Get/Set	110, 40, 200	REAL	452/453
21 (0x15)	RTD #3 Trip Level	Get/Set	130, 40, 200	REAL	454/455
22 (0x16)	RTD #3 Alarm Level	Get/Set	110, 40, 200	REAL	456/457
23 (0x17)	RTD #4 Trip Level	Get/Set	130, 40, 200	REAL	458/459
24 (0x18)	RTD #4 Alarm Level	Get/Set	110, 40, 200	REAL	460/461
25 (0x19)	RTD #5 Trip Level	Get/Set	130, 40, 200	REAL	462/463
26 (0x1A)	RTD #5 Alarm Level	Get/Set	110, 40, 200	REAL	464/465
27 (0x1B)	RTD #6 Trip Level	Get/Set	130, 40, 200	REAL	466/467
28 (0x1C)	RTD #6 Alarm Level	Get/Set	110, 40, 200	REAL	468/469
29 (0x1D)	RTD #7 Trip Level	Get/Set	130, 40, 200	REAL	470/471
30 (0x1E)	RTD #7 Alarm Level	Get/Set	110, 40, 200	REAL	472/473
31 (0x1F)	RTD #8 Trip Level	Get/Set	130, 40, 200	REAL	474/475
32 (0x20)	RTD #8 Alarm Level	Get/Set	110, 40, 200	REAL	476/477
33 (0x21)	RTD #1 Name	Get/Set	RTD M1 #1	SHORT_ STRING	610
34 (0x22)	RTD #2 Name	Get/Set	RTD M1 #2	SHORT_ STRING	620
35 (0x23)	RTD #3 Name	Get/Set	RTD M1 #3	SHORT_ STRING	630
36 (0x24)	RTD #4Name	Get/Set	RTD M1 #4	SHORT_ STRING	640
37 (0x25)	RTD #5 Name	Get/Set	RTD M1 #5	SHORT_ STRING	650
38 (0x26)	RTD #6 Name	Get/Set	RTD M1 #6	SHORT_ STRING	660
39 (0x27)	RTD #7 Name	Get/Set	RTD M1 #7	SHORT_ STRING	670
40 (0x28)	RTD #8 Name	Get/Set	RTD M1 #8	SHORT_ STRING	680
41 (0x29)	RTD #1 Temp RDG	Get		REAL	902/903
42 (0x2A)	RTD #2 Temp RDG	Get		REAL	904/905
43 (0x2B)	RTD #3 Temp RDG	Get		REAL	906/907
44 (0x2C)	RTD #4 Temp RDG	Get		REAL	908/909
45 (0x2D)	RTD #5 Temp RDG	Get		REAL	910/911
46 (0x2E)	RTD #6 Temp RDG	Get		REAL	912/913
47 (0x2F)	RTD #7 Temp RDG	Get		REAL	914/915
48 (0x30)	RTD #8 Temp RDG	Get		REAL	916/917
49 (0x31)	RTD #1 Trip Cntr	Get		UINT	1156
50 (0x32)	RTD #2 Trip Cntr	Get		UINT	1157
51 (0x33)	RTD #3 Trip Cntr	Get		UINT	1158
52 (0x34)	RTD #4 Trip Cntr	Get		UINT	1159
53 (0x35)	RTD #5 Trip Cntr	Get		UINT	1160
54 (0x36)	RTD #6 Trip Cntr	Get		UINT	1161
55 (0x37)	RTD #7 Trip Cntr	Get		UINT	1162
56 (0x38)	RTD #8 Trip Cntr	Get		UINT	1163

Class 0x65, Instance 2

Attribute Number	Attribute Name	Services	Default, Minimum, Maximum	Data Type	MPU-32 Register
1	RTD #1 Type	Get/Set	0, 0, 4	UINT	399
2	RTD #2 Type	Get/Set	0, 0, 4	UINT	400
3	RTD #3 Type	Get/Set	0, 0, 4	UINT	401
4	RTD #4 Type	Get/Set	0, 0, 4	UINT	402
5	RTD #5 Type	Get/Set	0, 0, 4	UINT	403
6	RTD #6 Type	Get/Set	0, 0, 4	UINT	404

Class 0x65, Instance 2 (continued)

Attribute Number	Attribute Name	Services	Default, Minimum, Maximum	Data Type	MPU-32 Register
7	RTD #7 Type	Get/Set	0, 0, 4	UINT	405
8	RTD #8 Type	Get/Set	0, 0, 4	UINT	406
9	RTD #1 Function	Get/Set	0, 0, 7	UINT	423
10 (0x0A)	RTD #2 Function	Get/Set	0, 0, 7	UINT	424
11 (0x0B)	RTD #3 Function	Get/Set	0, 0, 7	UINT	425
12 (0x0C)	RTD #4 Function	Get/Set	0, 0, 7	UINT	426
13 (0x0D)	RTD #5 Function	Get/Set	0, 0, 7	UINT	427
14 (0x0E)	RTD #6 Function	Get/Set	0, 0, 7	UINT	428
15 (0x0F)	RTD #7 Function	Get/Set	0, 0, 7	UINT	429
16 (0x10)	RTD #8 Function	Get/Set	0, 0, 7	UINT	430
17 (0x11)	RTD #1 Trip Level	Get/Set	130, 40, 200	REAL	478/479
18 (0x12)	RTD #1 Alarm Level	Get/Set	110, 40, 200	REAL	480/481
19 (0x13)	RTD #2 Trip Level	Get/Set	130, 40, 200	REAL	482/483
20 (0x14)	RTD #2 Alarm Level	Get/Set	110, 40, 200	REAL	484/485
21 (0x15)	RTD #3 Trip Level	Get/Set	130, 40, 200	REAL	486/487
22 (0x16)	RTD #3 Alarm Level	Get/Set	110, 40, 200	REAL	488/489
23 (0x17)	RTD #4 Trip Level	Get/Set	130, 40, 200	REAL	490/491
24 (0x18)	RTD #4 Alarm Level	Get/Set	110, 40, 200	REAL	492/493
25 (0x19)	RTD #5 Trip Level	Get/Set	130, 40, 200	REAL	494/495
26 (0x1A)	RTD #5 Alarm Level	Get/Set	110, 40, 200	REAL	496/497
27 (0x1B)	RTD #6 Trip Level	Get/Set	130, 40, 200	REAL	498/499
28 (0x1C)	RTD #6 Alarm Level	Get/Set	110, 40, 200	REAL	500/501
29 (0x1D)	RTD #7 Trip Level	Get/Set	130, 40, 200	REAL	502/503
30 (0x1E)	RTD #7 Alarm Level	Get/Set	110, 40, 200	REAL	504/505
31 (0x1F)	RTD #8 Trip Level	Get/Set	130, 40, 200	REAL	506/507
32 (0x20)	RTD #8 Alarm Level	Get/Set	110, 40, 200	REAL	508/509
33 (0x21)	RTD #1 Name	Get/Set	RTD M2 #1	SHORT_ STRING	690
34 (0x22)	RTD #2 Name	Get/Set	RTD M2 #2	SHORT_ STRING	700
35 (0x23)	RTD #3 Name	Get/Set	RTD M2 #3	SHORT_ STRING	710
36 (0x24)	RTD #4Name	Get/Set	RTD M2 #4	SHORT_ STRING	720
37 (0x25)	RTD #5 Name	Get/Set	RTD M2 #5	SHORT_ STRING	730
38 (0x26)	RTD #6 Name	Get/Set	RTD M2 #6	SHORT_ STRING	740
39 (0x27)	RTD #7 Name	Get/Set	RTD M2 #7	SHORT_ STRING	750
40 (0x28)	RTD #8 Name	Get/Set	RTD M2 #8	SHORT_ STRING	760
41 (0x29)	RTD #1 Temp RDG	Get		REAL	918/919
42 (0x2A)	RTD #2 Temp RDG	Get		REAL	920/921
43 (0x2B)	RTD #3 Temp RDG	Get		REAL	922/923
44 (0x2C)	RTD #4 Temp RDG	Get		REAL	924/925
45 (0x2D)	RTD #5 Temp RDG	Get		REAL	926/927
46 (0x2E)	RTD #6 Temp RDG	Get		REAL	928/929
47 (0x2F)	RTD #7 Temp RDG	Get		REAL	930/931
48 (0x30)	RTD #8 Temp RDG	Get		REAL	932/933
49 (0x31)	RTD #1 Trip Cntr	Get		UINT	1164
50 (0x32)	RTD #2 Trip Cntr	Get		UINT	1165
51 (0x33)	RTD #3 Trip Cntr	Get		UINT	1166

Class 0x65, Instance 2 (Continued)

ATTRIBUTE NUMBER	ATTRIBUTE NAME	SERVICES	DEFAULT, MINIMUM, MAXIMUM	DATA TYPE	MPU-32 REGISTER
52 (0x34)	RTD #4 Trip Cntr	Get		UINT	1167
53 (0x35)	RTD #5 Trip Cntr	Get		UINT	1168
54 (0x36)	RTD #6 Trip Cntr	Get		UINT	1169
55 (0x37)	RTD #7 Trip Cntr	Get		UINT	1170
56 (0x38)	RTD #8 Trip Cntr	Get		UINT	1171

Class 0x65, Instance 3

ATTRIBUTE NUMBER	ATTRIBUTE NAME	SERVICES	DEFAULT, MINIMUM, MAXIMUM	DATA TYPE	MPU-32 REGISTER
1	RTD #1 Type	Get/Set	0, 0, 4	UINT	407
2	RTD #2 Type	Get/Set	0, 0, 4	UINT	408
3	RTD #3 Type	Get/Set	0, 0, 4	UINT	409
4	RTD #4 Type	Get/Set	0, 0, 4	UINT	410
5	RTD #5 Type	Get/Set	0, 0, 4	UINT	411
6	RTD #6 Type	Get/Set	0, 0, 4	UINT	412
7	RTD #7 Type	Get/Set	0, 0, 4	UINT	413
8	RTD #8 Type	Get/Set	0, 0, 4	UINT	414
9	RTD #1 Function	Get/Set	0, 0, 7	UINT	431
10 (0x0A)	RTD #2 Function	Get/Set	0, 0, 7	UINT	432
11 (0x0B)	RTD #3 Function	Get/Set	0, 0, 7	UINT	433
12 (0x0C)	RTD #4 Function	Get/Set	0, 0, 7	UINT	434
13 (0x0D)	RTD #5 Function	Get/Set	0, 0, 7	UINT	435
14 (0x0E)	RTD #6 Function	Get/Set	0, 0, 7	UINT	436
15 (0x0F)	RTD #7 Function	Get/Set	0, 0, 7	UINT	437
16 (0x10)	RTD #8 Function	Get/Set	0, 0, 7	UINT	438
17 (0x11)	RTD #1 Trip Level	Get/Set	130, 40, 200	REAL	510/511
18 (0x12)	RTD #1 Alarm Level	Get/Set	110, 40, 200	REAL	512/513
19 (0x13)	RTD #2 Trip Level	Get/Set	130, 40, 200	REAL	514/515
20 (0x14)	RTD #2 Alarm Level	Get/Set	110, 40, 200	REAL	516/517
21 (0x15)	RTD #3 Trip Level	Get/Set	130, 40, 200	REAL	518/519
22 (0x16)	RTD #3 Alarm Level	Get/Set	110, 40, 200	REAL	520/521
23 (0x17)	RTD #4 Trip Level	Get/Set	130, 40, 200	REAL	522/523
24 (0x18)	RTD #4 Alarm Level	Get/Set	110, 40, 200	REAL	524/525
25 (0x19)	RTD #5 Trip Level	Get/Set	130, 40, 200	REAL	526/527
26 (0x1A)	RTD #5 Alarm Level	Get/Set	110, 40, 200	REAL	528/529
27 (0x1B)	RTD #6 Trip Level	Get/Set	130, 40, 200	REAL	530/531
28 (0x1C)	RTD #6 Alarm Level	Get/Set	110, 40, 200	REAL	532/533
29 (0x1D)	RTD #7 Trip Level	Get/Set	130, 40, 200	REAL	534/535
30 (0x1E)	RTD #7 Alarm Level	Get/Set	110, 40, 200	REAL	536/537
31 (0x1F)	RTD #8 Trip Level	Get/Set	130, 40, 200	REAL	538/539
32 (0x20)	RTD #8 Alarm Level	Get/Set	110, 40, 200	REAL	540/541
33 (0x21)	RTD #1 Name	Get/Set	RTD M3 #1	SHORT_ STRING	770
34 (0x22)	RTD #2 Name	Get/Set	RTD M3 #2	SHORT_ STRING	780
35 (0x23)	RTD #3 Name	Get/Set	RTD M3 #3	SHORT_ STRING	790
36 (0x24)	RTD #4Name	Get/Set	RTD M3 #4	SHORT_ STRING	800
37 (0x25)	RTD #5 Name	Get/Set	RTD M3 #5	SHORT_ STRING	810
38 (0x26)	RTD #6 Name	Get/Set	RTD M3 #6	SHORT_ STRING	820
39 (0x27)	RTD #7 Name	Get/Set	RTD M3 #7	SHORT_ STRING	830

Class 0x65, Instance 3 (continued)

ATTRIBUTE NUMBER	ATTRIBUTE NAME	SERVICES	DEFAULT, MINIMUM, MAXIMUM	DATA TYPE	MPU-32 REGISTER
40 (0x28)	RTD #8 Name	Get/Set	RTD M3 #8	SHORT_ STRING	840
41 (0x29)	RTD #1 Temp RDG	Get		REAL	934/935
42 (0x2A)	RTD #2 Temp RDG	Get		REAL	936/937
43 (0x2B)	RTD #3 Temp RDG	Get		REAL	938/939
44 (0x2C)	RTD #4 Temp RDG	Get		REAL	940/941
45 (0x2D)	RTD #5 Temp RDG	Get		REAL	942/943
46 (0x2E)	RTD #6 Temp RDG	Get		REAL	944/945
47 (0x2F)	RTD #7 Temp RDG	Get		REAL	946/947
48 (0x30)	RTD #8 Temp RDG	Get		REAL	948/949
49 (0x31)	RTD #1 Trip Cntr	Get		UINT	1172
50 (0x32)	RTD #2 Trip Cntr	Get		UINT	1173
51 (0x33)	RTD #3 Trip Cntr	Get		UINT	1174
52 (0x34)	RTD #4 Trip Cntr	Get		UINT	1175
53 (0x35)	RTD #5 Trip Cntr	Get		UINT	1176
54 (0x36)	RTD #6 Trip Cntr	Get		UINT	1177
55 (0x37)	RTD #7 Trip Cntr	Get		UINT	1178
56 (0x38)	RTD #8 Trip Cntr	Get		UINT	1179

3.7 RTC CLASS 0x66

RTC Object Class Services

Get_Attribute_Single: Returns contents of specified attribute.

RTC Class 0x66, Instance 0 Attributes

ATTRIBUTE NUMBER	ATTRIBUTE NAME	SERVICES	DESCRIPTION	DEFAULT, MINIMUM, MAXIMUM	DATA TYPE
1	Revision	Get	Revision of this object.	1	UINT
2	Max Instance	Get	Maximum number of instances.	1	UINT

RTC Object Class Services

Get_Attribute_Single: Returns contents of specified attribute.
Set_Attribute_Single: Modifies specified attribute.

RTC Class 0x66, Instance 1 Attributes

ATTRIBUTE NUMBER	ATTRIBUTE NAME	SERVICES	DESCRIPTION	DEFAULT, MINIMUM, MAXIMUM	DATA TYPE	MPU-32 REGISTER
1	RTC Date	Get	Number of Days Since 1972-01-01		DATE	574
2	RTC Time	Get	Number of Milliseconds Since 00:00:00:00.000		TIME OF DAY	576
3	RTC Set	Get/Set (1)	String Used to Set the Date and Time YY/MM/DD-HH:MM:SS		SHORT_ STRING	580

(1) Time value is also set with a SET RTC command issued using Class 0x29, Instance 1, Attribute 0x64.

3.8 USER-DEFINED REGISTER CLASS 0x67

This object defines the MPU-32 registers that generate the data for Assembly Class 4, Instance 0x64, Attribute 3. Register values are defined in Appendix E of the MPU-32 Manual. Enter the register number for the required parameter data. Parameter data is 16 bits and two registers must be defined to retrieve a 32-bit float value. For example, to configure an assembly to read the first four RTD temperatures in RTD Module 1, enter register numbers 902, 903, 904, 905, 906, 907, 908, 909.

The first 16 bytes of the assembly will contain the RTD data and the remainder of the assembly will not contain any valid data. Register definitions resulting in more than 64 bytes of data will be ignored.

User-Defined Register Object Class Services

Get_Attribute_Single: Returns contents of specified attribute.

User-Defined Register Class 0x67, Instance 0 Attributes

ATTRIBUTE NUMBER	ATTRIBUTE NAME	SERVICES	DESCRIPTION	DEFAULT, MINIMUM, MAXIMUM	DATA TYPE
1	Revision	Get	Revision of this object.	1	UINT
2	Max Instance	Get	Maximum number of instances.	1	UINT

User-Defined Register Object Instance Services

Get_Attribute_Single: Returns contents of specified attribute.

Set_Attribute_Single: Modifies specified attribute.

User-Defined Register Class 0x67, Instance 1 Attributes

ATTRIBUTE NUMBER	ATTRIBUTE NAME	SERVICES	DESCRIPTION	DEFAULT, MINIMUM, MAXIMUM	DATA TYPE	MPU-32 REGISTER
1	Register 0	Get/Set	User Register 0	0, 0, 1274	UINT	1400
2	Register 1	Get/Set	User Register 1	0, 0, 1274	UINT	1401
3	Register 2	Get/Set	User Register 2	0, 0, 1274	UINT	1402
4	Register 3	Get/Set	User Register 3	0, 0, 1274	UINT	1403
5	Register 4	Get/Set	User Register 4	0, 0, 1274	UINT	1404
6	Register 5	Get/Set	User Register 5	0, 0, 1274	UINT	1405
7	Register 6	Get/Set	User Register 6	0, 0, 1274	UINT	1406
8	Register 7	Get/Set	User Register 7	0, 0, 1274	UINT	1407
9	Register 8	Get/Set	User Register 8	0, 0, 1274	UINT	1408
10	Register 9	Get/Set	User Register 9	0, 0, 1274	UINT	1409
11	Register 10	Get/Set	User Register 10	0, 0, 1274	UINT	1410
12	Register 11	Get/Set	User Register 11	0, 0, 1274	UINT	1411
13	Register 12	Get/Set	User Register 12	0, 0, 1274	UINT	1412
14	Register 13	Get/Set	User Register 13	0, 0, 1274	UINT	1413
15	Register 14	Get/Set	User Register 14	0, 0, 1274	UINT	1414
16	Register 15	Get/Set	User Register 15	0, 0, 1274	UINT	1415
17	Register 16	Get/Set	User Register 16	0, 0, 1274	UINT	1416
18	Register 17	Get/Set	User Register 17	0, 0, 1274	UINT	1417
19	Register 18	Get/Set	User Register 18	0, 0, 1274	UINT	1418
20	Register 19	Get/Set	User Register 19	0, 0, 1274	UINT	1419
21	Register 20	Get/Set	User Register 20	0, 0, 1274	UINT	1420
22	Register 21	Get/Set	User Register 21	0, 0, 1274	UINT	1421
23	Register 22	Get/Set	User Register 22	0, 0, 1274	UINT	1422
24	Register 23	Get/Set	User Register 23	0, 0, 1274	UINT	1423
25	Register 24	Get/Set	User Register 24	0, 0, 1274	UINT	1424
26	Register 25	Get/Set	User Register 25	0, 0, 1274	UINT	1425
27	Register 26	Get/Set	User Register 26	0, 0, 1274	UINT	1426
28	Register 27	Get/Set	User Register 27	0, 0, 1274	UINT	1427
29	Register 28	Get/Set	User Register 28	0, 0, 1274	UINT	1428
30	Register 29	Get/Set	User Register 29	0, 0, 1274	UINT	1429
31	Register 30	Get/Set	User Register 30	0, 0, 1274	UINT	1430
32	Register 31	Get/Set	User Register 31	0, 0, 1274	UINT	1431

3.9 DATA LOGGING CLASS 0x68

This data logging class is used to access one of 100 data records. Data records are stored in a circular queue numbered from 0 to 99. Record Head contains the value of the next queue entry where a new record is stored. The last record is stored in Record Head – 1. The queue functions as a FIFO memory and Record Head wraps from 99 to 0. When the queue is full, the oldest record is replaced by the newest record.

Data Logging Object Class Services

Get_Attribute_Single: Returns contents of specified attribute.

Data Logging Class (0x68), Instance (0) Attributes

ATTRIBUTE NUMBER	ATTRIBUTE NAME	SERVICES	DESCRIPTION	DEFAULT, MINIMUM, MAXIMUM	DATA TYPE
1	Revision	Get	Revision of this object.	1	UINT
2	Max Instance	Get	Maximum number of instances.	1	UINT

Data Logging Object Instance Services

Get_Attribute_Single: Returns contents of specified attribute.

Set_Attribute_Single: Modifies specified attribute

Data Logging Class 0x68, Instance 1 Attributes

ATTRIBUTE NUMBER	ATTRIBUTE NAME	SERVICES	DESCRIPTION	DEFAULT, MINIMUM, MAXIMUM	DATA TYPE	MPU-32 REGISTER
1	Record Count	Get	Number of captured records since the last time the event records were cleared.	0, 0, 65535	UINT	973
2	Record Head	Get	Points to next record. Latest record at Record Head – 1.	0, 0, 99	UINT	974
3	Record ID	Get/Set	Selects the record for which the data is displayed in this instance.	0, 0, 99	UINT	975
4	Record Date	Get	The date when the record was captured.	0, 0, 65535	DATE	976/977
5	Record Time	Get	Time-of-Day the record was captured.	0, 0, 86399999	TOD	978/979
6	Record Type	Get	Specifies the trigger source: 0 = Record Empty 1 = Triggered by trip 2 = Triggered by start 3 = ETR Record	0, 0, 3	UINT	980
7	Trip Code	Get	See MPU-32 Manual, Appendix F T27 for a list of trip codes. 255 = No Trip or Alarm	0, 0, 255	UINT	981
8	I_A	Get	Phase A Current (A) (1)		REAL	982/983
9	I_B	Get	Phase B Current (A) (1)		REAL	984/985
10 (0x0A)	I_C	Get	Phase C Current (A) (1)		REAL	986/987
11 (0x0B)	Ig	Get	Ground-Fault Current (A) (1, 3)		REAL	988/989
12 (0x0C)	DFa	Get	Differential Current Phase A		REAL	990/991
13 (0x0D)	DFb	Get	Differential Current Phase B		REAL	992/993
14 (0x0E)	DFc	Get	Differential Current Phase C		REAL	994/995
15 (0x0F)	Reserved	Get				996/997
16 (0x10)	Unbalance	Get	Current Unbalance (pu) (1)		REAL	998/999
17 (0x11)	Local RTD	Get	Local RTD Reading		REAL	1000/1001
18 (0x12)	Start Time	Get	Start time in seconds, only valid for start-type records.		UINT	1002

Data Logging Class 0x68, Instance 1 Attributes (Continued)

ATTRIBUTE NUMBER	ATTRIBUTE NAME	SERVICES	DESCRIPTION	DEFAULT, MINIMUM, MAXIMUM	DATA TYPE	MPU-32 REGISTER
19 (0x13)	I²t Used	Get	For start records this is the I²t (pu) used during a start. Scaled to %.		REAL	1003/1004
20 (0x14)	M1 RTD1	Get	RTD Temperature Reading (ºC)		REAL	1005/1006
21 (0x15)	M1 RTD2	Get	RTD Temperature Reading (ºC)		REAL	1007/1008
22 (0x16)	M1 RTD3	Get	RTD Temperature Reading (ºC)		REAL	1009/1010
23 (0x17)	M1 RTD4	Get	RTD Temperature Reading (ºC)		REAL	1011/1012
24 (0x18)	M1 RTD5	Get	RTD Temperature Reading (ºC)		REAL	1013/1014
25 (0x19)	M1 RTD6	Get	RTD Temperature Reading (ºC)		REAL	1015/1016
26 (0x1A)	M1 RTD7	Get	RTD Temperature Reading (ºC)		REAL	1017/1018
27 (0x1B)	M1 RTD8	Get	RTD Temperature Reading (ºC)		REAL	1019/1020
28 (0x1C)	M2 RTD1	Get	RTD Temperature Reading (ºC)		REAL	1021/1022
29 (0x1D)	M2 RTD2	Get	RTD Temperature Reading (ºC)		REAL	1023/1024
30 (0x1E)	M2 RTD3	Get	RTD Temperature Reading (ºC)		REAL	1025/1026
31 (0x1F)	M2 RTD4	Get	RTD Temperature Reading (ºC)		REAL	1027/1028
32 (0x20)	M2 RTD5	Get	RTD Temperature Reading (ºC)		REAL	1029/1030
33 (0x21)	M2 RTD6	Get	RTD Temperature Reading (ºC)		REAL	1031/1032
34 (0x22)	M2 RTD7	Get	RTD Temperature Reading (ºC)		REAL	1033/1034
35 (0x23)	M2 RTD8	Get	RTD Temperature Reading (ºC)		REAL	1035/1036
36 (0x24)	M3 RTD1	Get	RTD Temperature Reading (ºC)		REAL	1037/1038
37 (0x25)	M3 RTD2	Get	RTD Temperature Reading (ºC)		REAL	1039/1040
38 (0x26)	M3 RTD3	Get	RTD Temperature Reading (ºC)		REAL	1041/1042
39 (0x27)	M3 RTD4	Get	RTD Temperature Reading (ºC)		REAL	1043/1044
40 (0x28)	M3 RTD5	Get	RTD Temperature Reading (ºC)		REAL	1045/1046
41 (0x29)	M3 RTD6	Get	RTD Temperature Reading (ºC)		REAL	1047/1048
42 (0x2A)	M3 RTD7	Get	RTD Temperature Reading (ºC)		REAL	1049/1050
43 (0x2B)	M3 RTD8	Get	RTD Temperature Reading (ºC)		REAL	1051/1052

(1) For start records, current and unbalance are maximum values recorded during the start.
(2) RTD sensor codes are: -100 = Unused, -90 = Open RTD, -80 = Shorted RTD
(3) I_g from EF-CT if *EF Source* is *Measured (Ict)* and calculated value if *EF Source* is *Calculated ($3I_0$)*.

APPENDIX A
MPU-32 ETHERNET/IP INTERFACE REVISION HISTORY

MANUAL RELEASE DATE	MANUAL REVISION
May 13, 2014	0-A-051314

MANUAL REVISION HISTORY

REVISION 0-A-051314

Added Phase Current (FLA) to Supervisor Class (0x29), Instance 1 Attributes.
Updated RTD Module Class Instance 1, Instance 2, and Instance 3 RTD #1-8 Function Maximums to seven.