



GE VERNOVA

MM300 Motor Management System

Low Voltage Motor Protection and Control



Communications Guide

MM300 Revision: 1.7x

Manual P/N: 1601-9025-AB

Manual Order Code: GEK-113392K



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The following screens are captured from ProfiCaptain v1.0 - © 2005 Profibus Center, Netherlands:

- Figure 2 - Profibus configuration menu
- Figure 3 - Profibus I/O data - 87 words in, 1 word out
- Figure 4 - Profibus configuration menu
- Figure 5 - Profibus I/O data - 3 words in, 1 word out

The following screens are captured from ProfiTrace v1.4 - © 2005 Profibus Center, Netherlands:

- Figure 6 - Profibus - extended diagnostic data
- Figure 7 - Profibus - no extended diagnostic data

The following screen is captured from DeviceNet Master Simulator. HMS Industrial Networks. Version 1.7.4. ©2001, Bihl+Wiedemann GmbH

- Figure 8 - DeviceNet polled I/O data

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Part number: 1601-9025-AB (May 2018)

Safety Words and Definitions

The following symbols used in this document indicate the following conditions:



Indicates a hazardous situation which, if not avoided, will result in death or serious injury.



Indicates a hazardous situation which, if not avoided, could result in death or serious injury.



Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.



Indicates significant issues and practices that are not related to personal injury.

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MM300 Motor Management System

Chapter 1: Communications interfaces

The MM300 has three communications interfaces. These can be used simultaneously:

- RS485
- 10/100Base-T Ethernet
- Fieldbus



Setpoint changes related to DeviceNet, Profibus, and Ethernet, require a power cycle to be activated.



External power must be present on the Fieldbus port at power-up, in order to correctly initialize and operate.



For full details, please refer to the MM300 Communications Guide, to be found on the GE Multilin web site.

MM300 Motor Management System

Chapter 2: RS485 interface (Modbus RTU)

The RS485 interface is a serial two-wire port intended for use as a Modbus RTU slave. The RS485 port has the following characteristics.

- Address: 1 to 254
- Baud rate: 9600 to 115200 bps
- Supported Modbus function codes: 3, 4, 5, 6, 7, 8, 16

Modbus Protocol

The MM300 implements a subset of the Modicon Modbus RTU serial communication standard. The Modbus protocol is hardware-independent. That is, the physical layer can be any of a variety of standard hardware configurations. This includes RS232, RS422, RS485, fibre optics, etc. Modbus is a single master / multiple slave type of protocol suitable for a multi-drop configuration as provided by RS485 hardware. The MM300 Modbus implementation employs two-wire RS485 hardware. Using RS485, up to 32 MM300s can be daisy-chained together on a single communication channel.

The MM300 is always a Modbus slave. It can not be programmed as a Modbus master. Computers or PLCs are commonly programmed as masters.

Both monitoring and control are possible using read and write register commands. Other commands are supported to provide additional functions.

Electrical Interface

The hardware or electrical interface in the MM300 is two-wire RS485. In a two-wire link, data is transmitted and received over the same two wires. Although RS485 two wire communication is bi-directional, the data is never transmitted and received at the same time. This means that the data flow is half duplex.

RS485 lines should be connected in a daisy chain configuration with terminating networks installed at each end of the link (i.e. at the master end and at the slave farthest from the master). The terminating network should consist of a 120 Ohm resistor in series with a 1 nF ceramic capacitor when used with Belden 9841 RS485 wire. Shielded wire should always be used to minimize noise. The shield should be connected to all of the MM300s as well as the master, then grounded at one location only. This keeps the ground potential at the same level for all of the devices on the serial link.



Polarity is important in RS485 communications. The '+' (positive) terminals of every device must be connected together.

Data Frame Format and Data Rate

One data frame of an asynchronous transmission to or from a MM300 typically consists of 1 start bit, 8 data bits, and 1 stop bit. This produces a 10 bit data frame. This is important for transmission through modems at high bit rates (11 bit data frames are not supported by Hayes modems at bit rates of greater than 300 bps).

Modbus protocol can be implemented at any standard communication speed. The MM300 supports operation at 9600, 19200, 38400, 57600, and 115200 baud.

Data Packet Format

A complete request/response sequence consists of the following bytes (transmitted as separate data frames):

Master Request Transmission:

SLAVE ADDRESS: 1 byte

FUNCTION CODE: 1 byte

DATA: variable number of bytes depending on FUNCTION CODE

CRC: 2 bytes

Slave Response Transmission:

SLAVE ADDRESS: 1 byte

FUNCTION CODE: 1 byte

DATA: variable number of bytes depending on FUNCTION CODE

CRC: 2 bytes

SLAVE ADDRESS: This is the first byte of every transmission. This byte represents the user-assigned address of the slave device that is to receive the message sent by the master. Each slave device must be assigned a unique address and only the addressed slave will respond to a transmission that starts with its address. In a master request transmission the SLAVE ADDRESS represents the address of the slave to which the request is being sent. In a slave response transmission the SLAVE ADDRESS represents the address of the slave that is sending the response.

FUNCTION CODE: This is the second byte of every transmission. Modbus defines function codes of 1 to 127.

DATA: This will be a variable number of bytes depending on the FUNCTION CODE. This may be Actual Values, Setpoints, or addresses sent by the master to the slave or by the slave to the master.

CRC: This is a two byte error checking code.

Error Checking

The RTU version of Modbus includes a two byte CRC-16 (16 bit cyclic redundancy check) with every transmission. The CRC-16 algorithm essentially treats the entire data stream (data bits only; start, stop and parity ignored) as one continuous binary number. This number is first shifted left 16 bits and then divided by a characteristic polynomial (1100000000000101B). The 16 bit remainder of the division is appended to the end of the transmission, MSByte first. The resulting message including CRC, when divided by the same polynomial at the receiver will give a zero remainder if no transmission errors have occurred.

If a MM300 Modbus slave device receives a transmission in which an error is indicated by the CRC-16 calculation, the slave device will not respond to the transmission. A CRC-16 error indicates that one or more bytes of the transmission were received incorrectly and thus the entire transmission should be ignored in order to avoid the MM300 performing any incorrect operation.

The CRC-16 calculation is an industry standard method used for error detection. An algorithm is included here to assist programmers in situations where no standard CRC-16 calculation routines are available.

CRC-16 Algorithm

Once the following algorithm is complete, the working register "A" will contain the CRC value to be transmitted. Note that this algorithm requires the characteristic polynomial to be reverse bit ordered. The MSBit of the characteristic polynomial is dropped since it does not affect the value of the remainder. The following symbols are used in the algorithm:

—>: data transfer

A: 16 bit working register

AL: low order byte of A

AH: high order byte of A

CRC: 16 bit CRC-16 value

i, j: loop counters

(+): logical exclusive or operator

Di: i-th data byte (i = 0 to N-1)

G: 16 bit characteristic polynomial = 1010000000000001 with MSbit dropped and bit order reversed

shr(x): shift right (the LSbit of the low order byte of x shifts into a carry flag, a '0' is shifted into the MSbit of the high order byte of x, all other bits shift right one location)

The algorithm is:

1. FFFF hex -> A
2. 0 -> i
3. 0 -> j
4. Di (+) AL -> AL
5. j+1 -> j
6. shr(A)
7. is there a carry? No: go to 8. Yes: G (+) A -> A
8. is j = 8? No: go to 5. Yes: go to 9.
9. i+1 -> i
10. is i = N? No: go to 3. Yes: go to 11.
11. A -> CRC

Timing

Data packet synchronization is maintained by timing constraints. The receiving device must measure the time between the reception of characters. If 3.5 character times elapse without a new character or completion of the packet, then the communication link must be reset (i.e. all slaves start listening for a new transmission from the master). Thus at 9600 baud a delay of greater than $3.5 \times 1 / 9600 \times 10^3 = 3.65 \text{ ms}$ will cause the communication link to be reset.

MM300 supported functions

The following functions are supported by the MM300:

- FUNCTION CODE 03 - Read Setpoints and Actual Values
- FUNCTION CODE 04 - Read Setpoints and Actual Values
- FUNCTION CODE 05 - Execute Operation
- FUNCTION CODE 06 - Store Single Setpoint
- FUNCTION CODE 07 - Read Device Status
- FUNCTION CODE 08 - Loopback Test
- FUNCTION CODE 10 - Store Multiple Setpoints

Modbus Functions

Function Code 03H

Modbus implementation: Read Holding Registers

MM300 implementation: Read Setpoints

For the MM300 implementation of Modbus, this function code can be used to read any setpoints ("holding registers"). Holding registers are 16 bit (two byte) values transmitted high order byte first. Thus all MM300 Setpoints are sent as two bytes. The maximum number of registers that can be read in one transmission is 125.

The slave response to this function code is the slave address, function code, a count of the number of data bytes to follow, the data itself and the CRC. Each data item is sent as a two byte number with the high order byte sent first.

For example, consider a request for slave 17 to respond with 3 registers starting at address 006B. For this example the register data in these addresses is as follows:

Address	Data
006B	022B
006C	0000
006D	0064

The master/slave packets have the following format:

Table 2-1: Master/slave packet format for Function Code 03H

MASTER TRANSMISSION	BYTES	EXAMPLE	DESCRIPTION
SLAVE ADDRESS	1	11	message for slave 17
FUNCTION CODE	1	03	read registers
DATA STARTING ADDRESS	2	00 6B	data starting at 006B
NUMBER OF SETPOINTS	2	00 03	3 registers = 6 bytes total
CRC	2	76 87	CRC error code

SLAVE RESPONSE	BYTES	EXAMPLE	DESCRIPTION
SLAVE ADDRESS	1	11	message from slave 17
FUNCTION CODE	1	03	read registers
BYTE COUNT	1	06	3 registers = 6 bytes
DATA 1 (see definition above)	2	02 2B	value in address 006B
DATA 2 (see definition above)	2	00 00	value in address 006C
DATA 3 (see definition above)	2	00 64	value in address 006D
CRC	2	54 83	CRC error code

Function Code 04H

Modbus Implementation: Read Input Registers

MM300 implementation: Read Actual Values

For the MM300 implementation of Modbus, this function code can be used to read any actual values ("input registers"). Input registers are 16 bit (two byte) values transmitted high order byte first. Thus all MM300 Actual Values are sent as two bytes. The maximum number of registers that can be read in one transmission is 125.

The slave response to this function code is the slave address, function code, a count of the data bytes to follow, the data itself and the CRC. Each data item is sent as a two byte number with the high order byte sent first.

For example, request slave 17 to respond with 1 register starting at address 0008. For this example the value in this register (0008) is 0000.

Table 2-2: Master/slave packet format for Function Code 04H

MASTER TRANSMISSION	BYTES	EXAMPLE	DESCRIPTION
SLAVE ADDRESS	1	11	message for slave 17
FUNCTION CODE	1	04	read registers
DATA STARTING ADDRESS	2	00 08	data starting at 0008
NUMBER OF ACTUAL VALUES	2	00 01	1 register = 2 bytes
CRC	2	B2 98	CRC error code

SLAVE RESPONSE	BYTES	EXAMPLE	DESCRIPTION
SLAVE ADDRESS	1	11	message from slave 17
FUNCTION CODE	1	04	read registers
BYTE COUNT	1	02	1 register = 2 bytes
DATA (see definition above)	2	00 00	value in address 0008
CRC	2	78 F3	CRC error code

Function Code 05H

Modbus Implementation: Force Single Coil

MM300 Implementation: Execute Operation

This function code allows the master to request a MM300 to perform specific command operations.

For example, to request slave 17 to execute operation code 1 (reset), we have the following master/slave packet format:

Table 2-3: Master/slave packet format for Function Code 05H

MASTER TRANSMISSION	BYTES	EXAMPLE	DESCRIPTION
SLAVE ADDRESS	1	11	message for slave 17
FUNCTION CODE	1	05	execute operation
OPERATION CODE	2	00 01	operation code 1
CODE VALUE	2	FF 00	perform function
CRC	2	DF 6A	CRC error code

SLAVE RESPONSE	BYTES	EXAMPLE	DESCRIPTION
SLAVE ADDRESS	1	11	message from slave 17
FUNCTION CODE	1	05	execute operation
OPERATION CODE	2	00 01	operation code 1
CODE VALUE	2	FF 00	perform function
CRC	2	DF 6A	CRC error code

The commands that can be performed by the MM300 using function code 05 can also be initiated by using function code 10.

Operation Code	Description
1	Reset
2	Lockout Reset
3	Stop
4	Start A
5	Start B
96	Clear Last Trip Data Prompt
97	Reset MWh and Mvarh Meters
99	Clear Counters
100	Clear Event Records
102	Clear Maintenance Info
103	Clear Datalog
112	Clear RTD Maximums
113	Reset Motor Information
114	Auto Mode
115	Manual Mode
121	Start Datalog
122	Stop Datalog

Function Code 06H

Modbus Implementation: Preset Single Register

MM300 Implementation: Store Single Setpoint

This command allows the master to store a single setpoint into the memory of a MM300. The slave response to this function code is to echo the entire master transmission.

For example, request slave 17 to store the value 2 in setpoint address 04 5C. After the transmission in this example is complete, setpoints address 04 5C will contain the value 01F4. The master/slave packet format is shown below:

Table 2-4: Master/slave packet format for Function Code 06H

MASTER TRANSMISSION	BYTES	EXAMPLE	DESCRIPTION
SLAVE ADDRESS	1	11	message for slave 17
FUNCTION CODE	1	06	store single setpoint
DATA STARTING ADDRESS	2	04 5C	setpoint address 04 5C
DATA	2	00 02	data for setpoint address 04 5C
CRC	2	CB B9	CRC error code

SLAVE RESPONSE	BYTES	EXAMPLE	DESCRIPTION
SLAVE ADDRESS	1	11	message from slave 17
FUNCTION CODE	1	06	store single setpoint
DATA STARTING ADDRESS	2	04 5C	setpoint address 04 5C
DATA	2	00 02	data stored in setpoint address 04 5C
CRC	2	CB B9	CRC error code

Function Code 07H

Modbus Implementation: Read Exception Status

MM300 Implementation: Read Device Status

This is a function used to quickly read the status of a selected device. A short message length allows for rapid reading of status. The status byte returned will have individual bits set to 1 or 0 depending on the status of the slave device. For this example, consider the following MM300 general status byte:

The master/slave packets have the following format:

Table 2-5: Function code 7 bitmask

Bit	Function
0	Alarm
1	Trip
2	Internal fault
3	Auto
4	Contact A
5	Contact B
6	Contact output 3
7	Drive available (communications control)

Table 2-6: Master/slave packet format for Function Code 07H

MASTER TRANSMISSION	BYTES	EXAMPLE	DESCRIPTION
SLAVE ADDRESS	1	11	message for slave 17
FUNCTION CODE	1	07	read device status
CRC	2	4C 22	CRC error code

SLAVE RESPONSE	BYTES	EXAMPLE	DESCRIPTION
SLAVE ADDRESS	1	11	message from slave 17
FUNCTION CODE	1	07	read device status
DEVICE STATUS (see definition above)	1	2C	status = 00101100 (in binary)
CRC	2	22 28	CRC error code

Function Code 08H

Modbus Implementation: Loopback

Test MM300 Implementation: Loopback Test

This function is used to test the integrity of the communication link. The MM300 will echo the request.

For example, consider a loopback test from slave 17:

Table 2-7: Master/slave packet format for Function Code 08H

MASTER TRANSMISSION	BYTES	EXAMPLE	DESCRIPTION
SLAVE ADDRESS	1	11	message for slave 17
FUNCTION CODE	1	08	loopback test
DIAG CODE	2	00 00	must be 00 00
DATA	2	00 00	must be 00 00
CRC	2	E0 0B	CRC error code

SLAVE RESPONSE	BYTES	EXAMPLE	DESCRIPTION
SLAVE ADDRESS	1	11	message from slave 17
FUNCTION CODE	1	08	loopback test
DIAG CODE	2	00 00	must be 00 00
DATA	2	00 00	must be 00 00
CRC	2	E0 0B	CRC error code

Function Code 10H

Modbus Implementation: Preset Multiple Registers

MM300 Implementation: Store Multiple Setpoints

This function code allows multiple Setpoints to be stored into the MM300 memory. Modbus "registers" are 16-bit (two byte) values transmitted high order byte first. Thus all MM300 setpoints are sent as two bytes. The maximum number of Setpoints that can be stored in one transmission is dependent on the slave device. Modbus allows up to a maximum of 60 holding registers to be stored. The MM300 response to this function code is to echo the slave address, function code, starting address, the number of Setpoints stored, and the CRC.

For example, consider a request for slave 17 to store the value 00 02 to setpoint address 04 5C and the value 01 F4 to setpoint address 04 5D. After the transmission in this example is complete, MM300 slave 17 will have the following setpoints information stored:

Address	Data
04 5C	00 02
04 5D	01 F4

The master/slave packets have the following format:

Table 2-8: Master/slave packet format for Function Code 10H

MASTER TRANSMISSION	BYTES	EXAMPLE	DESCRIPTION
SLAVE ADDRESS	1	11	message for slave 17
FUNCTION CODE	1	10	store setpoints
DATA STARTING ADDRESS	2	04 5C	setpoint address 04 5C

MASTER TRANSMISSION	BYTES	EXAMPLE	DESCRIPTION
NUMBER OF SETPOINTS	2	00 02	2 setpoints = 4 bytes total
BYTE COUNT	1	04	4 bytes of data
DATA 1	2	00 02	data for setpoint address 04 5C
DATA 2	2	01 F4	data for setpoint address 04 5D
CRC	2	31 11	CRC error code

SLAVE RESPONSE	BYTES	EXAMPLE	DESCRIPTION
SLAVE ADDRESS	1	11	message from slave 17
FUNCTION CODE	1	10	store setpoints
DATA STARTING ADDRESS	2	04 5C	setpoint address 04 5C
NUMBER OF SETPOINTS	2	00 02	2 setpoints
CRC	2	82 7A	CRC error code

Error Responses

When a MM300 detects an error other than a CRC error, a response will be sent to the master. The MSBit of the FUNCTION CODE byte will be set to 1 (i.e. the function code sent from the slave will be equal to the function code sent from the master plus 128). The following byte will be an exception code indicating the type of error that occurred.

Transmissions received from the master with CRC errors will be ignored by the MM300.

The slave response to an error (other than CRC error) will be:

SLAVE ADDRESS: 1 byte

FUNCTION CODE: 1 byte (with MSbit set to 1)

EXCEPTION CODE: 1 byte

CRC: 2 bytes

The MM300 implements the following exception response codes:

01 - ILLEGAL FUNCTION

The function code transmitted is not one of the functions supported by the MM300.

02 - ILLEGAL DATA ADDRESS

The address referenced in the data field transmitted by the master is not an allowable address for the MM300.

03 - ILLEGAL DATA VALUE

The value referenced in the data field transmitted by the master is not within range for the selected data address.

Modbus memory map

	Modbus	Hex	Description	Min	Max	Step	Units	Format	Default	Size in Words
ACTUAL VALUES										
PRODUCT INFORMATION										
	30001	0000	Product Device Code	---	---	---	---	F22	N/A	1
	30002	0001	Hardware Revision	---	---	---	---	F15	N/A	1
	30003	0002	Firmware Version	---	---	---	---	F3	N/A	1
	30004	0003	Display Software Version	---	---	---	---	F3	N/A	1
	30005	0004	Modification Number	---	---	---	---	F1	N/A	1
	30006	0005	Boot Version	---	---	---	---	F3	N/A	1
	30007	0006	Boot Modification #	---	---	---	---	F1	N/A	1
	30008	0007	Serial Number	---	---	---	---	F22	N/A	6
	30014	000D	Order Code	---	---	---	---	F22	N/A	16
	30030	001D	MAC Address	---	---	---	---	F22	N/A	6
	30036	0023	Database Version	0	0xFFFF			F3	719	1
	30037	0024	Build Date	---	---	---	---	F22	N/A	6
	30043	002A	Build Time	---	---	---	---	F22	N/A	4
	30047	002E	Original Calibration Date	---	---	---	---	F18	N/A	2
	30049	0030	Last Calibration Date	---	---	---	---	F18	N/A	2
	30051	0032	Communications Build Date	---	---	---	---	F22	N/A	6
	30057	0038	Communications Build Time	---	---	---	---	F22	N/A	4
	30061	003C	Communications Revision	---	---	---	---	F3	N/A	1
	30062	003D	Platform Version	0	0xFFFF	1		F3	120	1
	30063	003E	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	30185	00B8	Reserved							1
LAST TRIP DATA										
	30186	00B9	Cause of Last Trip	---	---	---	---	FC134	N/A	1
	30187	00BA	Time of Last Trip 2 words	---	---	---	---	F19	N/A	2
	30189	00BC	Date of Last Trip 2 words	---	---	---	---	F18	N/A	2
	30191	00BE	Motor Speed During Trip	---	---	---	---	FC135	N/A	1
	30192	00BF	Pre Trip Ia	---	---	---	A	F10	N/A	2
	30194	00C1	Pre Trip Ib	---	---	---	A	F10	N/A	2
	30196	00C3	Pre Trip Ic	---	---	---	A	F10	N/A	2
	30198	00C5	Reserved	---	---	---	---	---	---	1
	30199	00C6	Reserved	---	---	---	---	---	---	1
	30200	00C7	Reserved	---	---	---	---	---	---	1
	30201	00C8	Pre Trip Motor Load	0	2000	1	%	F1	0	1
	30202	00C9	Pre Trip Current Unbalance	---	---	---	%	F1	N/A	1
	30203	00CA	Pre Trip Ig	---	---	---	A	F10	N/A	2
	30205	00CC	Pre Trip Vab	---	---	---	V	F1	N/A	1
	30206	00CD	Pre Trip Vbc	---	---	---	V	F1	N/A	1

	Modbus	Hex	Description	Min	Max	Step	Units	Format	Default	Size in Words
	30207	00CE	Pre Trip Vca	---	---	---	V	F1	N/A	1
	30208	00CF	Pre Trip Van	---	---	---	V	F1	N/A	1
	30209	00D0	Pre Trip Vbn	---	---	---	V	F1	N/A	1
	30210	00D1	Pre Trip Vcn	---	---	---	V	F1	N/A	1
	30211	00D2	Pre Trip System Frequency	---	---	---	Hz	F3	N/A	1
	30212	00D3	Pre Trip Real Power	---	---	---	kW	F13	N/A	2
	30214	00D5	Pre Trip Reactive Power	---	---	---	kvar	F13	N/A	2
	30216	00D7	Pre Trip Apparent Power	---	---	---	kVA	F2	N/A	1
	30217	00D8	Pre Trip Power Factor	---	---	---	---	F21	N/A	1
	30218	00D9	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	30222	00DD	Reserved	---	---	---	---	---	---	1
REAL-TIME CLOCK										
	30223	00DE	Weekday	---	---	---	---	FC171	N/A	1
	30224	00DF	Date Read Only	---	---	---	---	F18	N/A	2
	30226	00E1	Time Read Only	---	---	---	---	F19	N/A	2
	30228	00E3	Daylight Savings Active	---	---	---	---	FC126	N/A	1
	30229	00E4	Reserved	---	---	---	---	---	---	1
TRIP COUNTERS										
	30230	00E5	Total Number of Trips	---	---	---	---	F1	N/A	1
	30232	00E7	Overload Trips	---	---	---	---	F1	N/A	1
	30233	00E8	Mechanical Jam Trips	---	---	---	---	F1	N/A	1
	30234	00E9	Undercurrent Trips	---	---	---	---	F1	N/A	1
	30235	00EA	Current Unbalance Trips	---	---	---	---	F1	N/A	1
	30236	00EB	Ground Fault Trips	---	---	---	---	F1	N/A	1
	30237	00EC	Motor Acceleration Trips	---	---	---	---	F1	N/A	1
	30238	00ED	Undervoltage Trips	---	---	---	---	F1	N/A	1
	30239	00EE	Overvoltage Trips	---	---	---	---	F1	N/A	1
	30240	00EF	Voltage Phase Reversal Trips	---	---	---	---	F1	N/A	1
	30241	00F0	Voltage Freq Trips	---	---	---	---	F1	N/A	1
	30242	00F1	Underpower Trips	---	---	---	---	F1	N/A	1
	30243	00F2	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	30256	00FF	Reserved							1
GENERAL TIMERS										
	30257	0100	Number of Motor Starts	---	---	---	---	F1	N/A	1
	30258	0101	Number of UV Restarts	---	---	---	---	F1	N/A	1
	30259	0102	Motor Running Hours	---	---	---	hrs	F9	N/A	2
	30261	0104	UVR Timer	---	---	---	s	F1	N/A	1
	30262	0105	Start Timer 1	---	---	---	s	F1	N/A	1
	30263	0106	Start Timer 2	---	---	---	s	F1	N/A	1
	30264	0107	Start Timer 3	---	---	---	s	F1	N/A	1
	30265	0108	Start Timer 4	---	---	---	s	F1	N/A	1
	30266	0109	Start Timer 5	---	---	---	s	F1	N/A	1
	30267	010A	TransferTimer	---	---	---	s	F1	N/A	1
	30268	010B	Power Loss Time	0	0xFFFF	1	ms	F1	0	1

	Modbus	Hex	Description	Min	Max	Step	Units	Format	Default	Size in Words
	30269	010C	Motor Stopped Hours	---	---	---	hrs	F1	N/A	1
START BLOCKS										
	30270	010D	Overload Lockout	---	---	---	---	F1	N/A	1
	30271	010E	Starts/Hour Block	---	---	---	s	F1	N/A	1
	30272	010F	Time Between Starts	0	3601	1	s	F1 ¹	0	1
	30273	0110	Restart Block	---	---	---	s	F1	N/A	1
	30274	0111	Reserved	---	---	---	---	---	---	1
	30275	0112	Pre-Contactor Timer	---	---	---	s	F1	N/A	1
	30276	0113	Long Power Loss Time	0	0xFFFFFFFF	1	s	F9	0	2
	30277	0114	Reserved	---	---	---	---	---	---	2
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	30282	0119	Reserved	---	---	---	---	---	---	1
CONTACT/VIRTUAL INPUTS/OUTPUTS STATUS										
	30283	011A	Contact Input 64-33 (Bit Field)	---	---	---	---	FC168	N/A	2
	30285	011C	Contact Input 32-1 (Bit Field)	---	---	---	---	FC167	N/A	2
	30287	011E	Reserved	---	---	---	---	---	---	1
	30288	011F	Virtual Input 32-1 (Bit Field)	---	---	---	---	FC167	N/A	2
	30290	0121	Virtual Output 32-1 (Bit Field)	---	---	---	---	FC167	N/A	2
	30292	0123	Reserved	---	---	---	---	---	---	2
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	30297	0128	Reserved	---	---	---	---	---	---	1
	30298	0129	Contact Output 32-1 (Bit Field)	---	---	---	---	FC167	N/A	2
	30300	012B	Reserved	---	---	---	---	---	---	1
	30301	012C	Reserved	---	---	---	---	---	---	1
SECURITY										
	30302	012D	Current Security Access Level	---	---	---	---	F1	N/A	1
	30303	012E	Reserved	---	---	---	---	---	---	1
	30304	012F	Reserved	---	---	---	---	---	---	1
STATUS - MOTOR										
	30305	0130	Motor Status	---	---	---	---	FC129	N/A	1
	30306	0131	Extended Status	---	---	---	---	FC178	N/A	1
	30307	0132	Thermal Cap Used	---	---	---	%	F1	N/A	1
	30308	0133	Time to Overload Trip	---	---	---	s	F20	N/A	2
	30310	0135	Drive Status	---	---	---	---	FC143	N/A	1
	30311	0136	Reserved	---	---	---	---	---	---	1
	30312	0137	Command Status	---	---	---	---	FC128	N/A	1
	30313	0138	Time To Reset	---	---	---	min	F1	N/A	1
	30314	0139	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	30327	0146	Reserved							1
CURRENT METERING										
	30328	0147	Ia	---	---	---	A	F10	N/A	2
	30330	0149	Ib	---	---	---	A	F10	N/A	2
	30332	014B	Ic	---	---	---	A	F10	N/A	2
	30334	014D	Iavg	---	---	---	A	F10	N/A	2
	30336	014F	Motor Load	---	---	---	%	F1	N/A	1

	Modbus	Hex	Description	Min	Max	Step	Units	Format	Default	Size in Words
	30337	0150	Current Unbalance	---	---	---	%Ub	F1	N/A	1
	30338	0151	Ig	---	---	---	A	F10	N/A	2
VOLTAGE METERING										
	30340	0153	Va1 Angle	---	---	---	°	F1	N/A	1
	30341	0154	Vb1 Angle	---	---	---	°	F1	N/A	1
	30342	0155	Vc1 Angle	---	---	---	°	F1	N/A	1
	30343	0156	Ia Angle	0	359	1	°	F1	0	1
	30344	0157	Ib Angle	0	359	1	°	F1	0	1
	30345	0158	Ic Angle	0	359	1	°	F1	0	1
	30346	0159	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	30357	0164	Reserved							1
	30358	0165	Vab	---	---	---	V	F1	N/A	1
	30359	0166	Vbc	---	---	---	V	F1	N/A	1
	30360	0167	Vca	---	---	---	V	F1	N/A	1
	30361	0168	Average Line Voltage	---	---	---	V	F1	N/A	1
	30362	0169	Van	---	---	---	V	F1	N/A	1
	30363	016A	Vbn	---	---	---	V	F1	N/A	1
	30364	016B	Vcn	---	---	---	V	F1	N/A	1
	30365	016C	Average Phase Voltage	0	20000	1	V	F1	0	1
	30366	016D	Freq	---	---	---	Hz	F3	N/A	1
	30367	016E	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	30375	0176	Reserved	---	---	---	---	---	---	1
	30376	0177	VAux	---	---	---	V	F1	N/A	1
	30377	0178	Voltage Unbalance	0	100	1	%Ub	F1	0	1
	30378	0179	IO Voltage	0	0xFFFF	1	V	F1	0	1
	30379	017A	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	30383	017E	Reserved	---	---	---	---	---	---	1
POWER METERING										
	30384	017F	Power Factor	-99	100	1	1	F21	N/A	1
	30385	0180	Real Power	-50000	50000	1	kW	F13	N/A	2
	30387	0182	Reserved	---	---	---	---	---	---	1
	30388	0183	Reserved	---	---	---	---	---	---	1
	30389	0184	Reactive Power	-50000	50000	1	kvar	F13	N/A	2
	30391 ²	0186	Apparent Power	0	50000	1	kVA	F2	N/A	1
	30392	0187	MWh Consumption	---	---	---	MWh	F17	N/A	2
	30394	0189	Mvarh Consumption	---	---	---	Mvarh	F17	N/A	2
	30396	018B	Mvarh Generation	0	999999999	1	Mvarh	F17	0	2
	30398 ²	018D	Apparent Power	0	4294967295	1	kVA	F10	N/A	2
	30400	018F	Reserved							1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	30425	01A8	Reserved							1
TEMPERATURE METERING										
	30426	01A9	Internal Temp	-40	125	1	°C	F4	0	1

	Modbus	Hex	Description	Min	Max	Step	Units	Format	Default	Size in Words
	30427	01AA	Hottest Stator RTD Number	---	---	---	---	F1	N/A	1
	30428	01AB	Hottest Stator RTD Temp	---	---	---	°C	F4	N/A	1
	30429	01AC	RTD 1 Temp	---	---	---	°C	F4	N/A	1
	30430	01AD	RTD 2 Temp	---	---	---	°C	F4	N/A	1
	30431	01AE	RTD 3 Temp	---	---	---	°C	F4	N/A	1
	30432	01AF	RTD 4 Temp	---	---	---	°C	F4	N/A	1
	30433	01B0	RTD 5 Temp	---	---	---	°C	F4	N/A	1
	30434	01B1	RTD 6 Temp	---	---	---	°C	F4	N/A	1
	30435	01B2	Thermistor	---	---	---	ohms	F1	N/A	1
	30436	01B3	Internal Temp Max	-40	125	1	°C	F4	0	1
	30437	01B4	Reserved	---	---	---	---	---	---	1
	30438	01B5	Reserved	---	---	---	---	---	---	1
	30439	01B6	Reserved	---	---	---	---	---	---	1
MOTOR STARTING LEARNED DATA										
	30467	01D2	Learned Acceleration Time	---	---	---	s	F2	N/A	1
	30468	01D3	Learned Starting Current	---	---	---	A	F10	N/A	2
	30470	01D5	Learned Starting Capacity	---	---	---	%	F1	N/A	1
	30471	01D6	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	30483	01E2	Reserved	---	---	---	---	---	---	1
	30484	01E3	Average Motor Load Learned	---	---	---	%FLA	F3	N/A	1
RTD MAXIMUM TEMPERATURE										
	30485	01E4	RTD 1 MAX Temp	---	---	---	°C	F4	N/A	1
	30486	01E5	RTD 2 MAX. Temp	---	---	---	°C	F4	N/A	1
	30487	01E6	RTD 3 MAX. Temp	---	---	---	°C	F4	N/A	1
	30488	01E7	RTD 4 MAX. Temp	---	---	---	°C	F4	N/A	1
	30489	01E8	RTD 5 MAX. Temp	---	---	---	°C	F4	N/A	1
	30490	01E9	RTD 6 MAX. Temp	---	---	---	°C	F4	N/A	1
HMI										
	30495	01EE	Current Menu Page Displayed	0	2	1		F1	0	1
	30496	01EF	Current Highlight Item Index	0	24	1		F1	0	1
	30497	01F0	Current Display Page	0	39	1		F1	0	1
	30498	01F1	Current Display Item Index	0	40	1		F1	0	1
	30499	01F2	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	30504	01F7	Reserved	---	---	---	---	---	---	1
LED STATUS FOR GRAPHICAL AND BASIC CONTROL PANEL										
	30505	01F8	LED Status	---	---	---	---	FC144	N/A	2
	30507	01FA	LED Flash	---	---	---	---	FC130	N/A	1
	30508	01FB	Reserved	---	---	---	---	---	---	1
GCP FACTORY TEST										
	30509	01FC	LCD Test Color	---	---	---	---	FC212	N/A	1
	30510	01FD	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	30523	020A	Reserved	---	---	---	---	---	---	1
USER MAP VALUES										

	Modbus	Hex	Description	Min	Max	Step	Units	Format	Default	Size in Words
	30524	020B	User Map Value 1	---	---	---	---	F1	N/A	1
	30525	020C	User Map Value 2	---	---	---	---	F1	N/A	1
	30526	020D	User Map Value 3	---	---	---	---	F1	N/A	1
	30527	020E	User Map Value 4	---	---	---	---	F1	N/A	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	30645	0284	User Map Value 122	---	---	---	---	F1	N/A	1
	30646	0285	User Map Value 123	---	---	---	---	F1	N/A	1
	30647	0286	User Map Value 124	---	---	---	---	F1	N/A	1
	30648	0287	User Map Value 125	---	---	---	---	F1	N/A	1
	30649	0288	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	30656	028F	Reserved	---	---	---	---	---	---	1
SELF TEST										
	30657	0290	Internal Fault Cause	---	---	---	---	FC188	N/A	2
EVENT RECORDER										
	30659	0292	Event Recorder Last Reset 2 words	---	---	---	---	F18	N/A	2
	30661	0294	Total Number of Events Since Last Clear	---	---	---	---	F1	N/A	1
	30662	0295	Cause	---	---	---	---	FC134	N/A	1
	30663	0296	Contacting	---	---	---	---	FC136	N/A	1
	30664	0297	Time	---	---	---	---	F19	N/A	2
	30666	0299	Date	---	---	---	---	F18	N/A	2
	30668	029B	Ia	---	---	---	A	F10	N/A	2
	30670	029D	Ib	---	---	---	A	F10	N/A	2
	30672	029F	Ic	---	---	---	A	F10	N/A	2
	30674	02A1	Motor Load	---	---	---	x FLA	F3	N/A	1
	30675	02A2	Iunb	---	---	---	%	F1	N/A	1
	30676	02A3	Ig	---	---	---	A	F10	N/A	2
	30678	02A5	Vab	---	---	---	V	F1	N/A	1
	30679	02A6	Vbc	---	---	---	V	F1	N/A	1
	30680	02A7	Vca	---	---	---	V	F1	N/A	1
	30681	02A8	Van	---	---	---	V	F1	N/A	1
	30682	02A9	Vbn	---	---	---	V	F1	N/A	1
	30683	02AA	Vcn	---	---	---	V	F1	N/A	1
	30684	02AB	Freq	---	---	---	Hz	F3	N/A	1
	30685	02AC	Power Factor	---	---	---	---	F21	N/A	1
	30686	02AD	Real Power	---	---	---	kW	F13	N/A	2
	30688	02AF	Reactive Power	---	---	---	kvar	F13	N/A	2
	30690	02B1	Apparent Power	---	---	---	kVA	F2	N/A	1
	30691	02B2	Hottest Stator RTD	---	---	---	---	F1	N/A	1
	30692	02B3	Hottest Stator RTD	---	---	---	°C	F4	N/A	1
	30693	02B4	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	30709	2C4	Reserved	---	---	---	---	---	---	1
	30710	2C5	Trace Memory Trigger Date	0	0XDC1F082E	0	N/A	F18	0	2
	30712	2C7	Trace Memory Trigger Time	0	0XDC1F082E	0	N/A	F19	0	2

	Modbus	Hex	Description	Min	Max	Step	Units	Format	Default	Size in Words
	30714	2C9	Trace Memory Trigger Cause	0	119	0	N/A	FC134	0	1
	30715	2CA	Trace Memory Trigger Frequency	20	120	1	N/A	F3	0	1
	30716	2CB	Total Trace Memory Triggers	0	1	1	N/A	F1	0	1
	30717	2CC	Buffer Organization	0	3	1	N/A	F1	0	1
	30718	2CD	Trigger Position	0	100	1	N/A	F1	0	1
	30719	2CE	Trace Memory Start Index	0	2047	1	N/A	F1	0	1
	30720	2CF	Sample Index + Trace Memory Sample1	-32767	32767	1	N/A	F4	0	1
	30721	2D0	Sample Index + Trace Memory Sample2	-32767	32767	1	N/A	F4	0	1
	30722	2D1	Sample Index + Trace Memory Sample3	-32767	32767	1	N/A	F4	0	1
	30723	2D2	Sample Index + Trace Memory Sample4	-32767	32767	1	N/A	F4	0	1
	30724	2D3	Sample Index + Trace Memory Sample5	-32767	32767	1	N/A	F4	0	1
	30725	2D4	Sample Index + Trace Memory Sample6	-32767	32767	1	N/A	F4	0	1
	30726	2D5	Sample Index + Trace Memory Sample7	-32767	32767	1	N/A	F4	0	1
	30727	2D6	Sample Index + Trace Memory Sample8	-32767	32767	1	N/A	F4	0	1
	30728	2D7	Sample Index + Trace Memory Sample9	-32767	32767	1	N/A	F4	0	1
	30729	2D8	Sample Index + Trace Memory Sample10	-32767	32767	1	N/A	F4	0	1
	30730	2D9	Sample Index + Trace Memory Sample11	-32767	32767	1	N/A	F4	0	1
	30731	2DA	Sample Index + Trace Memory Sample12	-32767	32767	1	N/A	F4	0	1
	30732	2DB	Sample Index + Trace Memory Sample13	-32767	32767	1	N/A	F4	0	1
	30733	2DC	Sample Index + Trace Memory Sample14	-32767	32767	1	N/A	F4	0	1
	30734	2DD	Sample Index + Trace Memory Sample15	-32767	32767	1	N/A	F4	0	1
	30735	2DE	Sample Index + Trace Memory Sample16	-32767	32767	1	N/A	F4	0	1
	30736	2DF	Sample Index + Trace Memory Sample17	-32767	32767	1	N/A	F4	0	1
	30737	2E0	Sample Index + Trace Memory Sample18	-32767	32767	1	N/A	F4	0	1
	30738	2E1	Sample Index + Trace Memory Sample19	-32767	32767	1	N/A	F4	0	1
	30739	2E2	Sample Index + Trace Memory Sample20	-32767	32767	1	N/A	F4	0	1
	30740	2E3	Sample Index + Trace Memory Sample21	-32767	32767	1	N/A	F4	0	1
	30741	2E4	Sample Index + Trace Memory Sample22	-32767	32767	1	N/A	F4	0	1
	30742	2E5	Sample Index + Trace Memory Sample23	-32767	32767	1	N/A	F4	0	1
	30743	2E6	Sample Index + Trace Memory Sample24	-32767	32767	1	N/A	F4	0	1

	Modbus	Hex	Description	Min	Max	Step	Units	Format	Default	Size in Words
	30744	2E7	Sample Index + Trace Memory Sample25	-32767	32767	1	N/A	F4	0	1
	30745	2E8	Sample Index + Trace Memory Sample26	-32767	32767	1	N/A	F4	0	1
	30746	2E9	Sample Index + Trace Memory Sample27	-32767	32767	1	N/A	F4	0	1
	30747	2EA	Sample Index + Trace Memory Sample28	-32767	32767	1	N/A	F4	0	1
	30748	2EB	Sample Index + Trace Memory Sample30	-32767	32767	1	N/A	F4	0	1
	30749	2EC	Sample Index + Trace Memory Sample31	-32767	32767	1	N/A	F4	0	1
	30750	2ED	Sample Index + Trace Memory Sample32	-32767	32767	1	N/A	F4	0	1
	30751	2EE	Sample Index + Trace Memory Sample33	-32767	32767	1	N/A	F4	0	1
	30752	2EF	Sample Index + Trace Memory Sample34	-32767	32767	1	N/A	F4	0	1
	30753	2F0	Sample Index + Trace Memory Sample35	-32767	32767	1	N/A	F4	0	1
	30754	2F1	Sample Index + Trace Memory Sample36	-32767	32767	1	N/A	F4	0	1
	30755	2F2	Sample Index + Trace Memory Sample37	-32767	32767	1	N/A	F4	0	1
	30756	2F3	Sample Index + Trace Memory Sample38	-32767	32767	1	N/A	F4	0	1
	30757	2F4	Sample Index + Trace Memory Sample39	-32767	32767	1	N/A	F4	0	1
	30758	2F5	Sample Index + Trace Memory Sample40	-32767	32767	1	N/A	F4	0	1
	30759	2F6	Sample Index + Trace Memory Sample41	-32767	32767	1	N/A	F4	0	1
	30760	2F7	Sample Index + Trace Memory Sample42	-32767	32767	1	N/A	F4	0	1
	30761	2F8	Sample Index + Trace Memory Sample43	-32767	32767	1	N/A	F4	0	1
	30762	2F9	Sample Index + Trace Memory Sample44	-32767	32767	1	N/A	F4	0	1
	30763	2FA	Sample Index + Trace Memory Sample45	-32767	32767	1	N/A	F4	0	1
	30764	2FB	Sample Index + Trace Memory Sample46	-32767	32767	1	N/A	F4	0	1
	30765	2FC	Sample Index + Trace Memory Sample47	-32767	32767	1	N/A	F4	0	1
	30766	2FD	Sample Index + Trace Memory Sample48	-32767	32767	1	N/A	F4	0	1
	30767	2FE	Sample Index + Trace Memory Sample49	-32767	32767	1	N/A	F4	0	1
	30768	2FF	Sample Index + Trace Memory Sample50	-32767	32767	1	N/A	F4	0	1
	30769	300	Sample Index + Trace Memory Sample51	-32767	32767	1	N/A	F4	0	1
	30770	301	Sample Index + Trace Memory Sample52	-32767	32767	1	N/A	F4	0	1
	30771	302	Sample Index + Trace Memory Sample53	-32767	32767	1	N/A	F4	0	1

	Modbus	Hex	Description	Min	Max	Step	Units	Format	Default	Size in Words
	30772	303	Sample Index + Trace Memory Sample54	-32767	32767	1	N/A	F4	0	1
	30773	304	Sample Index + Trace Memory Sample55	-32767	32767	1	N/A	F4	0	1
	30774	305	Sample Index + Trace Memory Sample56	-32767	32767	1	N/A	F4	0	1
	30775	306	Sample Index + Trace Memory Sample57	-32767	32767	1	N/A	F4	0	1
	30776	307	Sample Index + Trace Memory Sample58	-32767	32767	1	N/A	F4	0	1
	30777	308	Sample Index + Trace Memory Sample59	-32767	32767	1	N/A	F4	0	1
	30778	309	Sample Index + Trace Memory Sample60	-32767	32767	1	N/A	F4	0	1
	30779	30A	Sample Index + Trace Memory Sample61	-32767	32767	1	N/A	F4	0	1
	30780	30B	Sample Index + Trace Memory Sample62	-32767	32767	1	N/A	F4	0	1
	30781	30C	Sample Index + Trace Memory Sample63	-32767	32767	1	N/A	F4	0	1
	30782	30D	Sample Index + Trace Memory Sample64	-32767	32767	1	N/A	F4	0	1
	30783	30E	Sample Index + Trace Memory Sample65	-32767	32767	1	N/A	F4	0	1
	30784	30F	Sample Index + Trace Memory Sample66	-32767	32767	1	N/A	F4	0	1
	30785	310	Sample Index + Trace Memory Sample67	-32767	32767	1	N/A	F4	0	1
	30786	311	Sample Index + Trace Memory Sample68	-32767	32767	1	N/A	F4	0	1
	30787	312	Sample Index + Trace Memory Sample69	-32767	32767	1	N/A	F4	0	1
	30788	313	Sample Index + Trace Memory Sample70	-32767	32767	1	N/A	F4	0	1
	30789	314	Sample Index + Trace Memory Sample71	-32767	32767	1	N/A	F4	0	1
	30790	315	Sample Index + Trace Memory Sample72	-32767	32767	1	N/A	F4	0	1
	30791	316	Sample Index + Trace Memory Sample73	-32767	32767	1	N/A	F4	0	1
	30792	317	Sample Index + Trace Memory Sample74	-32767	32767	1	N/A	F4	0	1
	30793	318	Sample Index + Trace Memory Sample75	-32767	32767	1	N/A	F4	0	1
	30794	319	Sample Index + Trace Memory Sample76	-32767	32767	1	N/A	F4	0	1
	30795	31A	Sample Index + Trace Memory Sample77	-32767	32767	1	N/A	F4	0	1
	30796	31B	Sample Index + Trace Memory Sample78	-32767	32767	1	N/A	F4	0	1
	30797	31C	Sample Index + Trace Memory Sample79	-32767	32767	1	N/A	F4	0	1
	30798	31D	Sample Index + Trace Memory Sample1	-32767	32767	1	N/A	F4	0	1
	30799	31E	Sample Index + Trace Memory Sample80	-32767	32767	1	N/A	F4	0	1

	Modbus	Hex	Description	Min	Max	Step	Units	Format	Default	Size in Words
	30800	31F	Sample Index + Trace Memory Sample81	-32767	32767	1	N/A	F4	0	1
	30801	320	Sample Index + Trace Memory Sample82	-32767	32767	1	N/A	F4	0	1
	30802	321	Sample Index + Trace Memory Sample83	-32767	32767	1	N/A	F4	0	1
	30803	322	Sample Index + Trace Memory Sample84	-32767	32767	1	N/A	F4	0	1
	30804	323	Sample Index + Trace Memory Sample85	-32767	32767	1	N/A	F4	0	1
	30805	324	Sample Index + Trace Memory Sample86	-32767	32767	1	N/A	F4	0	1
	30806	325	Sample Index + Trace Memory Sample87	-32767	32767	1	N/A	F4	0	1
	30807	326	Sample Index + Trace Memory Sample88	-32767	32767	1	N/A	F4	0	1
	30808	327	Sample Index + Trace Memory Sample89	-32767	32767	1	N/A	F4	0	1
	30809	328	Sample Index + Trace Memory Sample90	-32767	32767	1	N/A	F4	0	1
	30810	329	Sample Index + Trace Memory Sample91	-32767	32767	1	N/A	F4	0	1
	30811	32A	Sample Index + Trace Memory Sample92	-32767	32767	1	N/A	F4	0	1
	30812	32B	Sample Index + Trace Memory Sample93	-32767	32767	1	N/A	F4	0	1
	30813	32C	Sample Index + Trace Memory Sample94	-32767	32767	1	N/A	F4	0	1
	30814	32D	Sample Index + Trace Memory Sample95	-32767	32767	1	N/A	F4	0	1
	30815	32E	Sample Index + Trace Memory Sample96	-32767	32767	1	N/A	F4	0	1
	30816	32F	Sample Index + Trace Memory Sample97	-32767	32767	1	N/A	F4	0	1
	30817	330	Sample Index + Trace Memory Sample98	-32767	32767	1	N/A	F4	0	1
	30818	331	Sample Index + Trace Memory Sample99	-32767	32767	1	N/A	F4	0	1
	30819	332	Sample Index + Trace Memory Sample100	-32767	32767	1	N/A	F4	0	1
	30820	333	Sample Index + Trace Memory Sample101	-32767	32767	1	N/A	F4	0	1
	30821	334	Sample Index + Trace Memory Sample102	-32767	32767	1	N/A	F4	0	1
	30822	335	Sample Index + Trace Memory Sample103	-32767	32767	1	N/A	F4	0	1
	30823	336	Sample Index + Trace Memory Sample104	-32767	32767	1	N/A	F4	0	1
	30824	337	Sample Index + Trace Memory Sample105	-32767	32767	1	N/A	F4	0	1
	30825	338	Sample Index + Trace Memory Sample106	-32767	32767	1	N/A	F4	0	1
	30826	339	Sample Index + Trace Memory Sample107	-32767	32767	1	N/A	F4	0	1
	30827	33A	Sample Index + Trace Memory Sample108	-32767	32767	1	N/A	F4	0	1

	Modbus	Hex	Description	Min	Max	Step	Units	Format	Default	Size in Words
	30828	33B	Sample Index + Trace Memory Sample109	-32767	32767	1	N/A	F4	0	1
	30829	33C	Sample Index + Trace Memory Sample110	-32767	32767	1	N/A	F4	0	1
	30830	33D	Sample Index + Trace Memory Sample111	-32767	32767	1	N/A	F4	0	1
	30831	33E	Sample Index + Trace Memory Sample112	-32767	32767	1	N/A	F4	0	1
	30832	33F	Sample Index + Trace Memory Sample113	-32767	32767	1	N/A	F4	0	1
	30833	340	Sample Index + Trace Memory Sample114	-32767	32767	1	N/A	F4	0	1
	30834	341	Sample Index + Trace Memory Sample115	-32767	32767	1	N/A	F4	0	1
	30835	342	Sample Index + Trace Memory Sample116	-32767	32767	1	N/A	F4	0	1
	30836	343	Sample Index + Trace Memory Sample117	-32767	32767	1	N/A	F4	0	1
	30837	344	Sample Index + Trace Memory Sample118	-32767	32767	1	N/A	F4	0	1
	30838	345	Sample Index + Trace Memory Sample119	-32767	32767	1	N/A	F4	0	1
	30839	346	Sample Index + Trace Memory Sample120	-32767	32767	1	N/A	F4	0	1
	30840	347	Sample Index + Trace Memory Sample121	-32767	32767	1	N/A	F4	0	1
	30841	348	Sample Index + Trace Memory Sample122	-32767	32767	1	N/A	F4	0	1
	30842	349	Sample Index + Trace Memory Sample123	-32767	32767	1	N/A	F4	0	1
	30843	34A	Sample Index + Trace Memory Sample124	-32767	32767	1	N/A	F4	0	1
	30844	34B	Sample Index + Trace Memory Sample125	-32767	32767	1	N/A	F4	0	1
	30845	34C	Sample Index + Trace Memory Sample126	-32767	32767	1	N/A	F4	0	1
	30846	34D	Sample Index + Trace Memory Sample127	-32767	32767	1	N/A	F4	0	1
	30847	34E	Sample Index + Trace Memory Sample128	-32767	32767	1	N/A	F4	0	1
	30951	03B6	Reserved							1
STATUS BUFFER										
	30952	03B7	Alarm Status 4	---	---	---	---	FC182	N/A	2
	30954	03B9	Alarm Status 3	---	---	---	---	FC181	N/A	2
	30956	03BB	Alarm Status 2	---	---	---	---	FC180	N/A	2
	30958	03BD	Alarm Status 1	---	---	---	---	FC179	N/A	2
	30960	03BF	Trip Status 4	---	---	---	---	FC186	N/A	2
	30962	03C1	Trip Status 3	---	---	---	---	FC185	N/A	2
	30964	03C3	Trip Status 2	---	---	---	---	FC184	N/A	2
	30966	03C5	Trip Status 1	---	---	---	---	FC183	N/A	2
	30968	03C7	Message Status 4	---	---	---	---	FC190	N/A	2
	30970	03C9	Message Status 3	---	---	---	---	FC189	N/A	2
	30972	03CB	Message Status 2	---	---	---	---	FC188	N/A	2

	Modbus	Hex	Description	Min	Max	Step	Units	Format	Default	Size in Words
	30974	03CD	Message Status 1	---	---	---	---	FC187	N/A	2
	30976	03CF	Ctrl Element Status 4	---	---	---	---	FC194	N/A	2
	30978	03D1	Ctrl Element Status 3	---	---	---	---	FC193	N/A	2
	30980	03D3	Ctrl Element Status 2	---	---	---	---	FC192	N/A	2
	30982	03D5	Ctrl Element Status 1	---	---	---	---	FC191	N/A	2
	30984	03D7	Reserved	---	---	---	---	---	---	1
	30985	03D8	Reserved	---	---	---	---	---	---	1
	30986	03D9	Reserved	---	---	---	---	---	---	1
FLEXLOGIC										
	30987	03DA	Element Flag	---	---	---	---	FC145	N/A	384
	31371	055A	Program Status	---	---	---	---	FC109	N/A	1
	31372	055B	Flex Lines Used	---	---	---	---	F1	N/A	1
	31373	055C	Error Line	---	---	---	---	F1	N/A	1
	31374	055D	Reserved	---	---	---	---	---	---	1
	31375	055E	Reserved	---	---	---	---	---	---	1
	31376	055F	Reserved	---	---	---	---	---	---	1
	31377	0560	Reserved	---	---	---	---	---	---	1
COMMUNICATION										
	31378	0561	Serial Status	---	---	---	---	FC112	N/A	1
	31379	0562	Ethernet Status	---	---	---	---	FC112	N/A	1
	31380	0563	Profibus Status	---	---	---	---	FC112	N/A	1
	31381	0564	DeviceNet Status	---	---	---	---	FC112	N/A	1
	31382	0565	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	32272	08DF	Reserved							1
SETPOINTS										
COMMANDS										
	40001	0000	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	40128	007F	Reserved							1
	40129	0080	Command address	0	0xFFFF	0		F1	0	1
	40130	0081	Command Function	0	0xFFFF	0		F1	0	1
	40131	0082	Command Data 1	0	0xFFFF	0		F1	0	1
	40132	0083	Command Data 2	0	0xFFFF	0		F1	0	1
	40133	0084	Command Data 3	0	0xFFFF	0		F1	0	1
	40134	0085	Command Data 4	0	0xFFFF	0		F1	0	1
	40135	0086	Command Data 5	0	0xFFFF	0		F1	0	1
	40136	0087	Command Data 6	0	0xFFFF	0		F1	0	1
	40137	0088	Command Data 7	0	0xFFFF	0		F1	0	1
	40138	0089	Command Data 8	0	0xFFFF	0		F1	0	1
	40139	008A	Command Data 9	0	0xFFFF	0		F1	0	1
	40140	008B	Command Data 10	0	0xFFFF	0		F1	0	1
	40141	008C	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼

	Modbus	Hex	Description	Min	Max	Step	Units	Format	Default	Size in Words
	40171	00AA	Reserved							1
COMMUNICATION SETTINGS										
	40172	00AB	Slave Address	1	254	1	---	F1	254	1
	40173	00AC	RS485 Baud Rate	0	4	1	---	FC101	4	1
	40174	00AD	RS485 Parity	0	2	1		FC102	0	1
	40175	00AE	Reserved	---	---	---	---	---	---	1
	40176	00AF	Reserved	---	---	---	---	---	---	1
	40177	00B0	Reserved	---	---	---	---	---	---	1
	40178	00B1	DeviceNet MAC ID	0	63	1	---	F1	63	1
	40179	00B2	DeviceNet Baud Rate	0	2	1	---	FC156	0	1
	40180	00B3	Reserved	---	---	---	---	---	---	1
	40181	00B4	NTP IP Address	0	0xFFFFFFFF	1		FC150	0	2
	40183	00B6	Ethernet IP address	0	0xFFFFFFFF	1		FC150	0	2
	40185	00B8	Ethernet subnet mask	0	0xFFFFFFFF	1		FC150	0xFFFFFFFFC00	2
	40187	00BA	Ethernet gateway address	0	0xFFFFFFFF	1		FC150	0	2
	40189	00BC	Reserved	---	---	---	---	---	---	1
	40190	00BD	Reserved	---	---	---	---	---	---	1
	40191	00BE	Reserved	---	---	---	---	---	---	1
	40192	00BF	Profibus address	1	125	1	---	F1	125	1
	40193	00C0	Profibus Baud Rate	1	0x07E2	1		FC155	0x07E2	1
	40194	00C1	FieldBus Map Entries	0	95	1		F1	0	1
	40195	00C2	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	40227	00E2	Reserved							1
REAL-TIME CLOCK/DAYLIGHT SAVINGS										
	40228	00E3	Set Date	0	0X0C1F082E	0		F18	0	2
	40230	00E5	Set Time	0	0X173B3B63	0		F19	0	2
	40232	00E7	Time Offset From UTC	-2400	2400	25	hrs	F6	0	1
	40233	00E8	Reserved	---	---	---	---	---	---	1
	40234	00E9	Daylight Savings	0	1	1	---	FC126	0	1
	40235	00EA	DST Start Month	0	12	1	---	FC169	0	1
	40236	00EB	DST Start Week	0	5	1	---	FC170	0	1
	40237	00EC	DST Start Weekday	0	7	1	---	FC171	0	1
	40238	00ED	DST End Month	0	12	1	---	FC169	0	1
	40239	00EE	DST End Week	0	5	1	---	FC170	0	1
	40240	00EF	DST End Weekday	0	7	1	---	FC170	0	1
TIME BROADCAST										
	40241	00F0	Time (broadcast)	0	0X173B3B63	0		F19	0	2
	40243	00F2	Date (broadcast)	0	0X0C1F082E	0		F18	0	2
	40244	00F3	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	40261	0104	Reserved	---	---	---	---	---	---	1
VIRTUAL INPUT										
	40262	0105	Virtual Input 32-1 (Bit Field)	0	0xFFFFFFFF	1		FC167	0	2
	40264	0107	Reserved	---	---	---	---	---	---	1
	40265	0108	Reserved	---	---	---	---	---	---	1

	Modbus	Hex	Description	Min	Max	Step	Units	Format	Default	Size in Words
CURRENT SENSING										
	40266	0109	Phase CT Type	0	3	1	---	FC105	0	1
	40267	010A	CT Primary	5	1000	1	A	F1	5	1
	40268	010B	Ground CT Type	0	2	1	---	FC104	2	1
	40269	010C	High Speed CT Primary	5	1000	1	A	F1	5	1
	40270	010D	CT Primary Turns	1	10	1		F1	1	1
	40271	010E	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	40275	0112	Reserved	---	---	---	---	---	---	1
VOLTAGE SENSING										
	40276	0113	3 Phase Voltage Connection	0	1	1	---	FC106	0	1
	40277	0114	Aux VT Connection	0	8	1	---	FC176	0	1
	40278	0115	Aux VT Primary	110	690	1	V	F1	415	1
	40279	0116	Aux VT Secondary	110	300	1	V	F1	110	1
	40280	0117	Reserved	---	---	---	---	---	---	1
	40281	0118	Reserved	---	---	---	---	---	---	1
	40282	0119	Reserved	---	---	---	---	---	---	1
	40283	011A	Reserved	---	---	---	---	---	---	1
MOTOR DATA SETUP										
	40284	011B	Supply Frequency	0	1	1	Hz	FC107	0	1
	40285	011C	Motor Name	0	10	0	---	F22	3	10
	40295	0126	Starter Type	0	7	1	---	FC139	0	1
	40296	0127	Reserved	---	---	---	---	---	---	1
	40297	0128	Reserved	---	---	---	---	---	---	1
	40298	0129	Motor FLA	5	10001	1	A	F2*	10001	1
	40299	012A	High Speed FLA	5	10001	1	A	F2*	10001	1
	40300	012B	Motor Nameplate Voltage	100	690	1	V	F1	690	1
	40301	012C	Change Over Current	10	51	1	x FLA	F2*	15	1
	40302	012D	Reserved	---	---	---	---	---	---	1
	40303	012E	Transfer Time	0	125	1	s	F1	1	1
	40304	012F	High Speed Start Block	0	1	1	---	FC126	1	1
	40305	0130	Ramp Up Time	0	125	1	s	F1	1	1
	40306	0131	Ramp Down Time	0	125	1	s	F1	1	1
	40307	0132	Pre-contactor Time	0	60	1	s	F1	0	1
	40308	0133	Motor Rating	3	11001	1	kW	F2*	11001	1
	40309	0134	High Speed Motor Rating	3	11001	1	kW	F2*	11001	1
	40310	0135	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	40316	013B	Reserved	---	---	---	---	---	---	1
PROCESS INTERLOCK										
	40317	013C	IL Ignore In Test	0	1	1	---	FC126	0	1
	40318	013D	IL A Name	0	10	1	---	F22	4	10
	40328	0147	IL A Function	0	3	1	---	FC140	0	1
	40329	0148	IL A Inst Alarm	0	1	1	---	FC126	0	1
	40330	0149	IL A Startup Override	0	3600	1	s	F1	0	1
	40331	014A	IL A Running Override	0	3601	1	s	F1*	0	1

	Modbus	Hex	Description	Min	Max	Step	Units	Format	Default	Size in Words
	40332	014B	IL A Healthy State	0	1	1	---	FC116	1	1
	40333	014C	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	40337	0150	Reserved	---	---	---	---	---	---	1
	40338	0151	IL B Name	0	10	1	---	F22	5	10
	40348	015B	IL B Function	0	3	1	---	FC140	0	1
	40349	015C	IL B Inst Alarm	0	1	1	---	FC126	0	1
	40350	015D	IL B Startup Override	0	3600	1	s	F1	0	1
	40351	15E	IL B Running Override	0	3601	1	s	F1*	0	1
	40352	015F	IL B Healthy State	0	1	1	---	FC116	1	1
	40353	0160	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	40357	0164	Reserved	---	---	---	---	---	---	1
	40358	0165	IL C Name	0	10	1	---	F22	6	10
	40368	016F	IL C Function	0	3	1	---	FC140	0	1
	40369	0170	IL C Inst Alarm	0	1	1	---	FC126	0	1
	40370	0171	IL C Startup Override	0	3600	1	s	F1	0	1
	40371	0172	IL C Running Override	0	3601	1	s	F1*	0	1
	40372	0173	IL C Healthy State	0	1	1	---	FC116	1	1
	40373	0174	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	40377	0178	Reserved	---	---	---	---	---	---	1
	40378	0179	IL D Name	0	10	1	---	F22	7	10
	40388	0183	IL D Function	0	3	1	---	FC140	0	1
	40389	0184	IL D Inst Alarm	0	1	1	---	FC126	0	1
	40390	0185	IL D Startup Override	0	3600	1	s	F1	0	1
	40391	0186	IL D Running Override	0	3601	1	s	F1*	0	1
	40392	0187	IL D Healthy State	0	1	1	---	FC116	1	1
	40393	0188	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	40397	018C	Reserved	---	---	---	---	---	---	1
	40398	018D	IL E Name	0	10	1	---	F22	8	10
	40408	0197	IL E Function	0	3	1	---	FC140	0	1
	40409	0198	IL E Inst Alarm	0	1	1	---	FC126	0	1
	40410	0199	IL E Startup Override	0	3600	1	s	F1	0	1
	40411	019A	IL E Running Override	0	3601	1	s	F1*	0	1
	40412	019B	IL E Healthy State	0	1	1	---	FC116	1	1
	40413	019C	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	40417	01A0	Reserved	---	---	---	---	---	---	1
	40418	01A1	IL F Name	0	10	1	---	F22	9	10
	40428	01AB	IL F Function	0	3	1	---	FC140	0	1
	40429	01AC	IL F Inst Alarm	0	1	1	---	FC126	0	1
	40430	01AD	IL F Startup Override	0	3600	1	s	F1	0	1
	40431	01AE	IL F Running Override	0	3601	1	s	F1*	0	1
	40432	01AF	IL F Healthy State	0	1	1	---	FC116	1	1

	Modbus	Hex	Description	Min	Max	Step	Units	Format	Default	Size in Words
	40433	01B0	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	40437	01B4	Reserved	---	---	---	---	---	---	1
	40438	01B5	IL G Name	0	10	1	---	F22	10	10
	40448	01BF	IL G Function	0	3	1	---	FC140	0	1
	40449	01C0	IL G Inst Alarm	0	1	1	---	FC126	0	1
	40450	01C1	IL G Startup Override	0	3600	1	s	F1	0	1
	40451	01C2	IL G Running Override	0	3601	1	s	F1*	0	1
	40452	01C3	IL G Healthy State	0	1	1	---	FC116	1	1
	40453	01C4	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	40457	01C8	Reserved	---	---	---	---	---	---	1
	40458	01C9	IL H Name	0	10	1	---	F22	11	10
	40468	01D3	IL H Function	0	3	1	---	FC140	0	1
	40469	01D4	IL H Inst Alarm	0	1	1	---	FC126	0	1
	40470	01D5	IL H Startup Override	0	3600	1	s	F1	0	1
	40471	01D6	IL H Running Override	0	3601	1	s	F1*	0	1
	40472	01D7	IL H Healthy State	0	1	1	---	FC116	1	1
	40473	01D8	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	40477	01DC	Reserved	---	---	---	---	---	---	1
	40478	01DD	IL I Name	0	10	1	---	F22	12	10
	40488	01E7	IL I Function	0	3	1	---	FC140	0	1
	40489	01E8	IL I Inst Alarm	0	1	1	---	FC126	0	1
	40490	01E9	IL I Startup Override	0	3600	1	s	F1	0	1
	40491	01EA	IL I Running Override	0	3601	1	s	F1*	0	1
	40492	01EB	IL I Healthy State	0	1	1	---	FC116	1	1
	40493	01EC	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	40497	01F0	Reserved	---	---	---	---	---	---	1
	40498	01F1	IL J Name	0	10	1	---	F22	13	10
	40508	01FB	IL J Function	0	3	1	---	FC140	0	1
	40509	01FC	IL J Inst Alarm	0	1	1	---	FC126	0	1
	40510	01FD	IL J Startup Override	0	3600	1	s	F1	0	1
	40511	01FE	IL J Running Override	0	3601	1	s	F1*	0	1
	40512	01FF	IL J Healthy State	0	1	1	---	FC116	1	1
	40513	0200	Reserved	---	---	---	---	---	---	1
	40514	0201	Reserved	---	---	---	---	---	---	1
	40515	0202	Reserved	---	---	---	---	---	---	1
	40516	0203	Reserved	---	---	---	---	---	---	1
COMMUNICATION SETUP										
	40517	0204	Comms OK Evaluation	1	64	1		FC131	1	1
	40518	0205	Reserved	---	---	---	---	---	---	1
	40519	0206	Comm Failure Trip	5	30	5	s	F1*	30	1
	40520	0207	Comm Failure Alarm	5	30	5	s	F1*	30	1
OPEN CONTROL CIRCUIT										

	Modbus	Hex	Description	Min	Max	Step	Units	Format	Default	Size in Words
	40521	0208	Open Ctrl Circuit Trip	0	1	1	---	FC126	0	1
	40522	0209	Reserved	---	---	---	---	---	---	1
	40523	020A	Reserved	---	---	---	---	---	---	1
USER MAP ADDRESSES										
	40524	020B	User Map Address 1	30001	43763	1	---	F1	30001	1
	40525	020C	User Map Address 2	30001	43763	1	---	F1	30001	1
	40526	020D	User Map Address 3	30001	43763	1	---	F1	30001	1
	40527	020E	User Map Address 4	30001	43763	1	---	F1	30001	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	40645	0284	User Map Address 122	30001	43763	1	---	F1	30001	1
	40646	0285	User Map Address 123	30001	43763	1	---	F1	30001	1
	40647	0286	User Map Address 124	30001	43763	1	---	F1	30001	1
	40648	0287	User Map Address 125	30001	43763	1	---	F1	30001	1
	40649	0288	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	40658	0291	Reserved	---	---	---	---	---	---	1
EVENT RECORDER										
	40659	0292	Event Recorder Function	0	1	1	---	FC126	1	1
	40660	0293	Recording of Trip Events	0	1	1	---	FC126	1	1
	40661	0294	Recording of Alarm Events	0	1	1	---	FC126	1	1
	40662	0295	Recording of Control Events	0	1	1	---	FC126	1	1
	40663	0296	Recording of Logic Input Events	0	1	1	---	FC126	1	1
	40664	0297	Recording of Level Events	0	1	1	---	FC126	1	1
	40665	0298	Recording of Dropout Events	0	1	1	---	FC126	1	1
	40666	0299	Recording of Set Time/Date Events	0	1	1	---	FC126	0	1
	40667	029A	Event Record Selector	1	65535	1	---	F1	1	1
	40668	029B	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	40700	02BB	Reserved							1
RESET SETUP										
	40701	02BC	Reset Lockout Using Reset Key	0	1	0	---	FC126	0	1
THERMAL MODEL SETUP										
	40702	02BD	Overload Pickup Level	101	125	1	x FLA	F3	101	1
	40703	02BE	Unbalance K Factor	0	19	1	---	F1	0	1
	40704	02BF	Cool Time Constant Running	1	1000	1	min	F1	15	1
	40705	02C0	Cool Time Constant Stopped	1	1000	1	min	F1	30	1
	40706	02C1	Hot/Cold Safe Stall Ratio	1	100	1	%	F1	75	1
	40707	02C2	Thermal Capacity Alarm Level	10	101	1	%	F1*	101	1
	40708	02C3	Standard Overload Curve	1	15	1	---	F1	4	1
	40709	02C4	Reserved	---	---	---	---	---	---	1
	40710	02C5	RTD Bias - Minimum T	0	251	1	°C	F1*	251	1
	40711	02C6	RTD Bias - Center T	0	251	1	°C	F1*	251	1
	40712	02C7	RTD Bias - Maximum T	0	251	1	°C	F1*	251	1
	40713	02C8	Minimize Reset Time	0	1	1	---	FC126	0	1
	40714	02C9	Overload Reset Mode	0	1	1	---	FC160	1	1

	Modbus	Hex	Description	Min	Max	Step	Units	Format	Default	Size in Words
	40715	02CA	Reset TCU Using Reset Key	0	0	---	---	FC126	1	1
	40716	02CB	Thermal O/L Lockout Trip	0	1	---	---	FC126	1	1
	40717	02CC	Reserved	---	---	---	---	---	---	1
	40718	02CD	Reserved	---	---	---	---	---	---	1
MECHANICAL JAM										
	40719	02CE	Mechanical Jam Level	101	451	1	x FLA	F3*	451	1
	40720	02CF	Mechanical Jam Delay	1	300	1	s	F2	1	1
	40721	02D0	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	40724	02D3	Reserved	---	---	---	---	---	---	1
RTD TYPES										
	40725	02D4	Stator RTD Type	0	2	1		FC120	0	1
	40726	02D5	Bearing RTD Type	0	2	1		FC120	0	1
	40727	02D6	Ambient RTD Type	0	2	1		FC120	0	1
	40728	02D7	Other RTD Type	0	2	1		FC120	0	1
RTD OPEN/SHORT CIRCUIT (REQUIRED=IO_G)										
	40729	02D8	RTD Open/Short Alarm	0	1	1	---	FC126	0	1
	40730	02D9	RTD Short Circuit Alarm	0	1	1		FC126	0	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	40734	02DD	Reserved	---	---	---	---	---	---	1
RTD #1 (REQUIRED=IO_G)										
	40735	02DE	RTD 1 Application	0	4	1	---	FC121	0	1
	40736	02DF	RTD 1 Name	0	10	1	---	F22	14	10
	40746	02E9	RTD 1 Alarm Temp	-50	251	1	°C	F4*	251	1
	40747	02EA	RTD 1 Trip Voting	0	6	1	---	FC122	0	1
	40748	02EB	RTD 1 Trip Temp	-50	251	1	°C	F4*	251	1
RTD #2 (REQUIRED=IO_G)										
	40749	02EC	RTD 2 Application	0	4	1	---	FC121	0	1
	40750	02ED	RTD 2 Name	0	10	1	---	F22	15	10
	40760	02F7	RTD 2 Alarm Temp	-50	251	1	°C	F4*	251	1
	40761	02F8	RTD 2 Trip Voting	0	6	1	---	FC122	0	1
	40762	02F9	RTD 2 Trip Temp	-50	251	1	°C	F4*	251	1
RTD #3 (REQUIRED=IO_G)										
	40763	02FA	RTD 3 Application	0	4	1	---	FC121	0	1
	40764	02FB	RTD 3 Name	0	10	1	---	F22	16	10
	40774	0305	RTD 3 Alarm Temp	-50	251	1	°C	F4*	251	1
	40775	0306	RTD 3 Trip Voting	0	6	1	---	FC122	0	1
	40776	0307	RTD 3 Trip Temp	-50	251	1	°C	F4*	251	1
RTD #4 (REQUIRED=IO_G)										
	40777	0308	RTD 4 Application	0	4	1	---	FC121	0	1
	40778	0309	RTD 4 Name	0	10	1	---	F22	17	10
	40788	0313	RTD 4 Alarm Temp	-50	251	1	°C	F4*	251	1
	40789	0314	RTD 4 Trip Voting	0	6	1	---	FC122	0	1
	40790	0315	RTD 4 Trip Temp	-50	251	1	°C	F4*	251	1
RTD #5 (REQUIRED=IO_G)										
	40791	0316	RTD 5 Application	0	4	1	---	FC121	0	1

	Modbus	Hex	Description	Min	Max	Step	Units	Format	Default	Size in Words
	40792	0317	RTD 5 Name	0	10	1	---	F22	18	10
	40802	0321	RTD 5 Alarm Temp	-50	251	1	°C	F4*	251	1
	40803	0322	RTD 5 Trip Voting	0	6	1	---	FC122	0	1
	40804	0323	RTD 5 Trip Temp	-50	251	1	°C	F4*	251	1
RTD #6 (REQUIRED=IO_G)										
	40805	0324	RTD 6 Application	0	4	1	---	FC121	0	1
	40806	0325	RTD 6 Name	0	10	1	---	F22	19	10
	40816	032F	RTD 6 Alarm Temp	-50	251	1	°C	F4*	251	1
	40817	0330	RTD 6 Trip Voting	0	6	1	---	FC122	0	1
	40818	0331	RTD 6 Trip Temp	-50	251	1	°C	F4*	251	1
	40819	0332	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	40824	0337	Reserved	---	---	---	---	---	---	1
THERMISTOR (CPU)										
	40825	0338	Cold Resistance	1	300	1	k ohms	F2	1	1
	40826	0339	Hot Resistance	1	300	1	k ohms	F2	50	1
	40827	033A	Thermistor Alarm	0	1	1	---	FC126	0	1
	40828	033B	Thermistor Trip	0	1	1	---	FC126	0	1
	40829	033C	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	40833	0340	Reserved	---	---	---	---	---	---	1
UNDERCURRENT (REQUIRED=IO_A)										
	40834	0341	Undercurrent Alarm Level	1	101	1	%FLA	F1*	101	1
	40835	0342	Undercurrent Alarm Delay	1	60	1	s	F1	1	1
	40836	0343	Undercurrent Trip Level	1	101	1	%FLA	F1*	101	1
	40837	0344	Undercurrent Trip Delay	1	60	1	s	F1	1	1
	40838	0345	Reserved	---	---	---	---	---	---	1
	40839	0346	Reserved	---	---	---	---	---	---	1
	40840	0347	Reserved	---	---	---	---	---	---	1
	40841	0348	Reserved	---	---	---	---	---	---	1
UNDERPOWER (IO_A + IO_C) OR (IO_A + IO_B)										
	40842	0349	Underpower Alarm Level	1	101	1	%MNR	F1*	101	1
	40843	034A	Underpower Alarm Delay	1	60	1	s	F1	1	1
	40844	034B	Underpower Trip Level	1	101	1	%MNR	F1*	101	1
	40845	034C	Underpower Trip Delay	1	60	1	s	F1	1	1
	40846	034D	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	40850	0351	Reserved	---	---	---	---	---	---	1
ACCELERATION										
	40851	0352	Acceleration Alarm Timer	5	2501	1	s	F2*	2501	1
	40852	0353	Acceleration Trip Timer	5	2501	1	s	F2*	2501	1
	40853	0354	Reserved	---	---	---	---	---	---	1
	40854	0355	Reserved	---	---	---	---	---	---	1
	40855	0356	Reserved	---	---	---	---	---	---	1
	40856	0357	Reserved	---	---	---	---	---	---	1
CURRENT UNBALANCE (REQUIRED=IO_A)										

	Modbus	Hex	Description	Min	Max	Step	Units	Format	Default	Size in Words
	40857	0358	Current Unbalance Alarm Level	4	41	1	%	F1*	15	1
	40858	0359	Current Unbalance Alarm Delay	1	60	1	s	F1	1	1
	40859	035A	Current Unbalance Trip Level	4	41	1	%	F1*	30	1
	40860	035B	Current Unbalance Trip Delay	1	60	1	s	F1	1	1
	40861	035C	Current Unbalance Lockout Trip	0	1	---	---	FC126	0	1
	40862	035D	Reserved	---	---	---	---	---	---	1
	40863	035E	Reserved	---	---	---	---	---	---	1
	40864	035F	Reserved	---	---	---	---	---	---	1
GROUND FAULT										
	40865	0360	Ground Alarm Level	10	101	1	%FLA	F1*	101	1
	40866	0361	CBCT Ground Alarm Level	5	151	1	A	F2*	151	1
	40867	0362	Ground Alarm Delay On Start	0	60	1	s	F1	10	1
	40868	0363	Ground Trip Level	10	101	1	%FLA	F1*	101	1
	40869	0364	CBCT Ground Trip Level	5	151	1	A	F2*	151	1
	40870	0365	Ground Trip Delay On Start	0	100	1	s	F2	0	1
	40871	0366	Ground Alarm Delay On Run	0	60	1	s	F1	10	1
	40872	0367	Ground Trip Delay On Run	0	50	1	s	F2	0	1
	40873	0368	Reserved	---	---	---	---	---	---	1
	40874	0369	Reserved	---	---	---	---	---	---	1
LOAD INCREASE										
	40875	036A	Load Increase Alarm Level	50	151	1	%FLA	F1*	151	1
	40876	036B	Reserved	---	---	---	---	---	---	1
	40877	036C	Reserved	---	---	---	---	---	---	1
	40878	036D	Reserved	---	---	---	---	---	---	1
PHASE UNDERVOLTAGE (REQUIRED=IO_B)										
	40879	036E	Undervoltage Alarm Level	60	100	1	%MNV	F1*	100	1
	40880	036F	Undervoltage Alarm Delay	1	60	1	s	F1	30	1
	40881	0370	Undervoltage Trip Level	60	100	1	%MNV	F1*	100	1
	40882	0371	Undervoltage Trip Delay	1	60	1	s	F1	30	1
	40883	0372	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	40887	0376	Reserved	---	---	---	---	---	---	1
AUXILIARY UNDERVOLTAGE PROTECTION (REQUIRED=IO_C)										
	40888	0377	Aux U/V Alarm	60	91	1	eUnitNCV	F1*	91	1
	40889	0378	Aux U/V Alarm Delay	1	60	1	s	F1	5	1
	40890	0379	Aux UV Trip	60	91	1	eUnitNCV	F1*	91	1
	40891	037A	Aux UV Trip Delay	1	60	1	s	F1	5	1
	40892	037B	Reserved	---	---	---	---	---	---	1
	40893	037C	Reserved	---	---	---	---	---	---	1
	40894	037D	Reserved	---	---	---	---	---	---	1
PHASE OVERVOLTAGE (REQUIRED=IO_B)										
	40895	037E	Overvoltage Alarm Level	101	121	1	%MNV	F1*	121	1
	40896	037F	Overvoltage Alarm Delay	1	60	1	s	F1	30	1
	40897	0380	Overvoltage Trip Level	101	121	1	%MNV	F1*	121	1
	40898	0381	Overvoltage Trip Delay	1	60	1	s	F1	30	1

	Modbus	Hex	Description	Min	Max	Step	Units	Format	Default	Size in Words
	40899	0382	Reserved	---	---	---	---	---	---	1
	40900	0383	Reserved	---	---	---	---	---	---	1
	40901	0384	Reserved	---	---	---	---	---	---	1
	40902	0385	Reserved	---	---	---	---	---	---	1
PHASE REVERSAL (REQUIRED=IO_B)										
	40903	0386	Voltage Phase Reversal	0	2	1	---	FC140	1	1
	40904	0387	Reserved	---	---	---	---	---	---	1
	40905	0388	Reserved	---	---	---	---	---	---	1
	40906	0389	Reserved	---	---	---	---	---	---	1
	40907	038A	Reserved	---	---	---	---	---	---	1
VT FUSE FAIL (REQUIRED=IO_B)										
	40908	038B	VT Fuse Fail	0	2	1	---	FC140	0	1
	40909	038C	Reserved	---	---	---	---	---	---	1
	40910	038D	Reserved	---	---	---	---	---	---	1
	40911	038E	Reserved	---	---	---	---	---	---	1
MAINTENANCE										
	40912	038F	Drive Greasing Interval	100	50100	100	hrs	F1*	50100	1
	40913	0390	Contactors Inspection Interval	100	65000	100	ops	F1*	65000	1
	40914	0391	Max Motor Stopped Time	10	10010	10	hrs	F1*	10010	1
	40915	0392	Reserved	---	---	---	---	---	---	1
	40916	0393	Reserved	---	---	---	---	---	---	1
START INHIBIT										
	40917	0394	Start Inhibit Margin	0	11	1	%	F1*	11	1
	40918	0395	Reserved	---	---	---	---	---	---	1
	40919	0396	Starts/Hour Limit	1	6	1		F1*	6	1
	40920	0397	Time Between Starts	1	3601	1	s	F1*	3601	1
	40921	0398	Reserved	---	---	---	---	---	---	1
CHANGE MODE										
	40922	0399	Change Mode on Comm Alarm	0	1	1	---	FC126	0	1
	40923	039A	Change Mode when running	0	1	1	---	FC126	0	1
	40924	039B	Reserved	---	---	---	---	---	---	1
	40925	039C	Reserved	---	---	---	---	---	---	1
RESTART BLOCK										
	40926	039D	Restart Block Time	1	50001	1	s	F1*	50001	1
	40927	039E	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	40930	03A1	Reserved							1
KW DEMAND										
	40931	03A2	kW Demand Period	5	90	1	min	F1	15	1
	40932	03A3	kW Demand Alarm	0	2	1		FC115	0	1
	40933	03A4	Reserved							1
	40934	03A5	kW Demand Alarm Level	1	50000	1	kW	F1	100	1
	40935	03A6	kW Demand Alarm Events	0	1	1		FC103	0	1
KVAR DEMAND										
	40936	03A7	kvar Demand Period	5	90	1	min	F1	15	1
	40937	03A8	kvar Demand Alarm	0	2	1		FC115	0	1

	Modbus	Hex	Description	Min	Max	Step	Units	Format	Default	Size in Words
	40938	03A9	Reserved							1
	40939	03AA	kvar Demand Alarm Level	1	50000	1	kvar	F1	100	1
	40940	03AB	kvar Demand Alarm Events	0	1	1		FC103	0	1
KVA DEMAND										
	40941	03AC	kVA Demand Period	5	90	1	min	F1	15	1
	40942	03AD	kVA Demand Alarm	0	2	1		FC115	0	1
	40943	03AE	Reserved							1
	40944	03AF	kVA Demand Alarm Level	1	50000	1	kVA	F1	100	1
	40945	03B0	kVA Demand Alarm Events	0	1	1		FC103	0	1
CALIBRATION										
	41040	040F	Calibration Date	0	203360302	1	---	F18	0	2
	41042	0411	Calibration Time	0	389757795	1	---	F19	0	2
	41044	0413	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	41105	0450	Reserved							1
SECURITY										
	41106	0451	Passcode Level 1	11111	55556	1		F1*	0	1
	41107	0452	Passcode Level 2	11111	55556	1		F1*	0	1
	41108	0453	Passcode Level 3	11111	55555	1		F1	0	1
	41109	0454	Access Switch Level	1	2	1		F1	1	1
	41110	0455	Comms Security	0	1	1	---	FC126	0	1
	41111	0456	MCC Setpoint Access	0	1	1	---	FC126	1	1
	41112	0457	Passcode Entry	0	55555	1	---	F1	0	1
	41113	0458	Reserved	---	---	---	---	---	---	1
	41114	0459	Reserved	---	---	---	---	---	---	1
CUTOFF LEVELS										
	41115	45A	Current Cutoff Level	0	10	1	A	F2	2	1
	41116	45B	Voltage Cutoff Level	1	30	1	V	F1	20	1
FLEXLOGIC TIMERS										
	41117	045C	Timer 1 Type	0	2	1	---	FC141	0	1
	41118	045D	Timer 1 Pickup Delay	0	1000	1	---	F1	1	1
	41119	045E	Timer 1 Dropout Delay	0	1000	1	---	F1	1	1
	41120	045F	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	41124	0463	Reserved	---	---	---	---	---	---	1
	41125	0464	Timer 2 Type	0	2	1	---	FC141	0	1
	41126	0465	Timer 2 Pickup Delay	0	1000	1	---	F1	1	1
	41127	0466	Timer 2 Dropout Delay	0	1000	1	---	F1	1	1
	41128	0467	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	41132	046B	Reserved	---	---	---	---	---	---	1
	41133	046C	Timer 3 Type	0	2	1	---	FC141	0	1
	41134	046D	Timer 3 Pickup Delay	0	1000	1	---	F1	1	1
	41135	046E	Timer 3 Dropout Delay	0	1000	1	---	F1	1	1
	41136	046F	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼

	Modbus	Hex	Description	Min	Max	Step	Units	Format	Default	Size in Words
	41140	0473	Reserved	---	---	---	---	---	---	1
	41141	0474	Timer 4 Type	0	2	1	---	FC141	0	1
	41142	0475	Timer 4 Pickup Delay	0	1000	1	---	F1	1	1
	41143	0476	Timer 4 Dropout Delay	0	1000	1	---	F1	1	1
	41144	0477	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	41148	047B	Reserved	---	---	---	---	---	---	1
	41149	047C	Timer 5 Type	0	2	1	---	FC141	0	1
	41150	047D	Timer 5 Pickup Delay	0	1000	1	---	F1	1	1
	41151	047E	Timer 5 Dropout Delay	0	1000	1	---	F1	1	1
	41152	047F	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	41156	0483	Reserved	---	---	---	---	---	---	1
	41157	0484	Timer 6 Type	0	2	1	---	FC141	0	1
	41158	0485	Timer 6 Pickup Delay	0	1000	1	---	F1	1	1
	41159	0486	Timer 6 Dropout Delay	0	1000	1	---	F1	1	1
	41160	0487	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	41164	048B	Reserved	---	---	---	---	---	---	1
	41165	048C	Timer 7 Type	0	2	1	---	FC141	0	1
	41166	048D	Timer 7 Pickup Delay	0	1000	1	---	F1	1	1
	41167	048E	Timer 7 Dropout Delay	0	1000	1	---	F1	1	1
	41168	048F	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	41172	0493	Reserved	---	---	---	---	---	---	1
	41173	0494	Timer 8 Type	0	2	1	---	FC141	0	1
	41174	0495	Timer 8 Pickup Delay	0	1000	1	---	F1	1	1
	41175	0496	Timer 8 Dropout Delay	0	1000	1	---	F1	1	1
	41176	0497	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	41180	049B	Reserved	---	---	---	---	---	---	1
	41181	049C	Timer 9 Type	0	2	1	---	FC141	0	1
	41182	049D	Timer 9 Pickup Delay	0	1000	1	---	F1	1	1
	41183	049E	Timer 9 Dropout Delay	0	1000	1	---	F1	1	1
	41184	049F	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	41188	04A3	Reserved	---	---	---	---	---	---	1
	41189	04A4	Timer 10 Type	0	2	1	---	FC141	0	1
	41190	04A5	Timer 10 Pickup Delay	0	1000	1	---	F1	1	1
	41191	04A6	Timer 10 Dropout Delay	0	1000	1	---	F1	1	1
	41192	04A7	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	41196	04AB	Reserved	---	---	---	---	---	---	1
	41197	04AC	Timer 11 Type	0	2	1	---	FC141	0	1
	41198	04AD	Timer 11 Pickup Delay	0	1000	1	---	F1	1	1
	41199	04AE	Timer 11 Dropout Delay	0	1000	1	---	F1	1	1

	Modbus	Hex	Description	Min	Max	Step	Units	Format	Default	Size in Words
	41200	04AF	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	41204	04B3	Reserved	---	---	---	---	---	---	1
	41205	04B4	Timer 12 Type	0	2	1	---	FC141	0	1
	41206	04B5	Timer 12 Pickup Delay	0	1000	1	---	F1	1	1
	41207	04B6	Timer 12 Dropout Delay	0	1000	1	---	F1	1	1
	41208	04B7	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	41212	04BB	Reserved	---	---	---	---	---	---	1
	41213	04BC	Timer 13 Type	0	2	1	---	FC141	0	1
	41214	04BD	Timer 13 Pickup Delay	0	1000	1	---	F1	1	1
	41215	04BE	Timer 13 Dropout Delay	0	1000	1	---	F1	1	1
	41216	04BF	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	41220	04C3	Reserved	---	---	---	---	---	---	1
	41221	04C4	Timer 14 Type	0	2	1	---	FC141	0	1
	41222	04C5	Timer 14 Pickup Delay	0	1000	1	---	F1	1	1
	41223	04C6	Timer 14 Dropout Delay	0	1000	1	---	F1	1	1
	41224	04C7	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	41228	04CB	Reserved	---	---	---	---	---	---	1
	41229	04CC	Timer 15 Type	0	2	1	---	FC141	0	1
	41230	04CD	Timer 15 Pickup Delay	0	1000	1	---	F1	1	1
	41231	04CE	Timer 15 Dropout Delay	0	1000	1	---	F1	1	1
	41232	04CF	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	41236	04D3	Reserved	---	---	---	---	---	---	1
	41237	04D4	Timer 16 Type	0	2	1	---	FC141	0	1
	41238	04D5	Timer 16 Pickup Delay	0	1000	1	---	F1	1	1
	41239	04D6	Timer 16 Dropout Delay	0	1000	1	---	F1	1	1
	41240	04D7	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	41244	04DB	Reserved	---	---	---	---	---	---	1
	41245	04DC	Timer 17 Type	0	2	1	---	FC141	0	1
	41246	04DD	Timer 17 Pickup Delay	0	1000	1	---	F1	1	1
	41247	04DE	Timer 17 Dropout Delay	0	1000	1	---	F1	1	1
	41248	04DF	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	41252	04E3	Reserved	---	---	---	---	---	---	1
	41253	04E4	Timer 18 Type	0	2	1	---	FC141	0	1
	41254	04E5	Timer 18 Pickup Delay	0	1000	1	---	F1	1	1
	41255	04E6	Timer 18 Dropout Delay	0	1000	1	---	F1	1	1
	41256	04E7	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	41260	04EB	Reserved	---	---	---	---	---	---	1
	41261	04EC	Timer 19 Type	0	2	1	---	FC141	0	1

	Modbus	Hex	Description	Min	Max	Step	Units	Format	Default	Size in Words
	41262	04ED	Timer 19 Pickup Delay	0	1000	1	---	F1	1	1
	41263	04EE	Timer 19 Dropout Delay	0	1000	1	---	F1	1	1
	41264	04EF	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	41268	04F3	Reserved	---	---	---	---	---	---	1
	41269	04F4	Timer 20 Type	0	2	1	---	FC141	0	1
	41270	04F5	Timer 20 Pickup Delay	0	1000	1	---	F1	1	1
	41271	04F6	Timer 20 Dropout Delay	0	1000	1	---	F1	1	1
	41272	04F7	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	41276	04FB	Reserved	---	---	---	---	---	---	1
	41277	04FC	Timer 21 Type	0	2	1	---	FC141	0	1
	41278	04FD	Timer 21 Pickup Delay	0	1000	1	---	F1	1	1
	41279	04FE	Timer 21 Dropout Delay	0	1000	1	---	F1	1	1
	41280	04FF	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	41284	0503	Reserved	---	---	---	---	---	---	1
	41285	0504	Timer 22 Type	0	2	1	---	FC141	0	1
	41286	0505	Timer 22 Pickup Delay	0	1000	1	---	F1	1	1
	41287	0506	Timer 22 Dropout Delay	0	1000	1	---	F1	1	1
	41288	0507	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	41292	050B	Reserved	---	---	---	---	---	---	1
	41293	050C	Timer 23 Type	0	2	1	---	FC141	0	1
	41294	050D	Timer 23 Pickup Delay	0	1000	1	---	F1	1	1
	41295	050E	Timer 23 Dropout Delay	0	1000	1	---	F1	1	1
	41296	050F	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	41300	0513	Reserved	---	---	---	---	---	---	1
	41301	0514	Timer 24 Type	0	2	1	---	FC141	0	1
	41302	0515	Timer 24 Pickup Delay	0	1000	1	---	F1	1	1
	41303	0516	Timer 24 Dropout Delay	0	1000	1	---	F1	1	1
	41304	0517	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	41308	051B	Reserved	---	---	---	---	---	---	1
	41309	051C	Timer 25 Type	0	2	1	---	FC141	0	1
	41310	051D	Timer 25 Pickup Delay	0	1000	1	---	F1	1	1
	41311	051E	Timer 25 Dropout Delay	0	1000	1	---	F1	1	1
	41312	051F	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	41316	0523	Reserved	---	---	---	---	---	---	1
	41317	0524	Timer 26 Type	0	2	1	---	FC141	0	1
	41318	0525	Timer 26 Pickup Delay	0	1000	1	---	F1	1	1
	41319	0526	Timer 26 Dropout Delay	0	1000	1	---	F1	1	1
	41320	0527	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼

	Modbus	Hex	Description	Min	Max	Step	Units	Format	Default	Size in Words
	41324	052B	Reserved	---	---	---	---	---	---	1
	41325	052C	Timer 27 Type	0	2	1	---	FC141	0	1
	41326	052D	Timer 27 Pickup Delay	0	1000	1	---	F1	1	1
	41327	052E	Timer 27 Dropout Delay	0	1000	1	---	F1	1	1
	41328	052F	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	41332	0533	Reserved	---	---	---	---	---	---	1
	41333	0534	Timer 28 Type	0	2	1	---	FC141	0	1
	41334	0535	Timer 28 Pickup Delay	0	1000	1	---	F1	1	1
	41335	0536	Timer 28 Dropout Delay	0	1000	1	---	F1	1	1
	41336	0537	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	41340	053B	Reserved	---	---	---	---	---	---	1
	41341	053C	Timer 29 Type	0	2	1	---	FC141	0	1
	41342	053D	Timer 29 Pickup Delay	0	1000	1	---	F1	1	1
	41343	053E	Timer 29 Dropout Delay	0	1000	1	---	F1	1	1
	41344	053F	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	41348	0543	Reserved	---	---	---	---	---	---	1
	41349	0544	Timer 30 Type	0	2	1	---	FC141	0	1
	41350	0545	Timer 30 Pickup Delay	0	1000	1	---	F1	1	1
	41351	0546	Timer 30 Dropout Delay	0	1000	1	---	F1	1	1
	41352	0547	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	41356	054B	Reserved	---	---	---	---	---	---	1
	41357	054C	Timer 31 Type	0	2	1	---	FC141	0	1
	41358	054D	Timer 31 Pickup Delay	0	1000	1	---	F1	1	1
	41359	054E	Timer 31 Dropout Delay	0	1000	1	---	F1	1	1
	41360	054F	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	41364	0553	Reserved	---	---	---	---	---	---	1
	41365	0554	Timer 32 Type	0	2	1	---	FC141	0	1
	41366	0555	Timer 32 Pickup Delay	0	1000	1	---	F1	1	1
	41367	0556	Timer 32 Dropout Delay	0	1000	1	---	F1	1	1
	41368	0557	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	41372	055B	Reserved	---	---	---	---	---	---	1
CONTACT INPUT ASSIGNMENT										
	41373	055C	U/V Restart Inhibit	0	0xE000	0		FC142	0	1
	41374	055D	Lockout Reset	0	0xE000	0		FC142	0	1
	41375	055E	Access Switch	0	0xE000	0		FC142	0	1
	41376	055F	Field Permissive	0	0xE000	0		FC142	0	1
	41377	0560	Comms Permissive	0	0xE000	0		FC142	0	1
	41378	0561	Forward Limit	0	0xE000	0		FC142	0	1
	41379	0562	Reverse Limit	0	0xE000	0		FC142	0	1
	41380	0563	Remote Reset	0	0xE000	0		FC142	0	1

	Modbus	Hex	Description	Min	Max	Step	Units	Format	Default	Size in Words
	41381	0564	MCC Permissive	0	0xE000	0		FC142	0	1
	41382	0565	Hard Wired Start A	0	0xE000	0		FC142	0	1
	41383	0566	Hard Wired Start B	0	0xE000	0		FC142	0	1
	41384	0567	Hard Wired Stop	0	0xE000	0		FC142	0	1
	41385	0568	Hard Wired Permissive	0	0xE000	0		FC142	0	1
	41386	0569	Field Start A	0	0xE000	0		FC142	0	1
	41387	056A	Field Start B	0	0xE000	0		FC142	0	1
	41388	056B	Field Stop	0	0xE000	0		FC142	0	1
	41389	056C	Contactor Status A	0	0xE000	0		FC142	0	1
	41390	056D	Contactor Status B	0	0xE000	0		FC142	0	1
	41391	056E	Auto/Manual Switch	0	0xE000	0		FC142	0	1
	41392	056F	Reserved	---	---	---	---	---	---	1
	41393	0570	Test Switch	0	0xE000	0		FC142	0	1
	41394	0571	Process Interlock A	0	0xE000	0		FC142	0	1
	41395	0572	Process Interlock B	0	0xE000	0		FC142	0	1
	41396	0573	Process Interlock C	0	0xE000	0		FC142	0	1
	41397	0574	Process Interlock D	0	0xE000	0		FC142	0	1
	41398	0575	Process Interlock E	0	0xE000	0		FC142	0	1
	41399	0576	Process Interlock F	0	0xE000	0		FC142	0	1
	41400	0577	Process Interlock G	0	0xE000	0		FC142	0	1
	41401	0578	Process Interlock H	0	0xE000	0		FC142	0	1
	41402	0579	Process Interlock I	0	0xE000	0		FC142	0	1
	41403	057A	Process Interlock J	0	0xE000	0		FC142	0	1
	41404	057B	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	41465	05B8	Reserved							1
HMI DEFAULT										
	41466	05B9	HMI Default Page	0	100	1		F1	0	1
	41467	05BA	HMI Default Menu Page	0	5	1		F1	0	1
SYSTEM LANGUAGE										
	41470	05BD	Language	0	1	1		FC127	0	1
SELF TEST										
	41471	05BE	Self Test Action	0	1	1	---	FC111	0	1
INTERNAL TEMP SP										
	41472	05BF	Internal Temp Alarm	50	91	1	°C	F1*	70	1
	41473	05C0	Internal Temp Trip	50	91	1	°C	F1*	91	1
	41474	05C1	Phasor Display	0	1	1		F25	1	1
	41475	05C2	Screen Saver	0	1	1		FC126	1	1
LEDs										
	41476	05C3	Orange LED Intensity	0	15	1	---	FC147	0	1
	41477	05C4	Green LED Intensity	0	15	1		FC147	6	1
	41478	05C5	Red LED Intensity	0	15	1	---	FC147	0	1
	41479	05C6	LED colour invert	0	1	1	---	FC177	0	1
	41480	05C7	Tripped LED Flasher	0	1	1	---	FC103	0	1
	41481	05C8	Running LED Assignment	0	0xE000	0		FC142	0x8000	1
	41482	05C9	Running LED Colour	0	3	1		FC157	2	1

	Modbus	Hex	Description	Min	Max	Step	Units	Format	Default	Size in Words
	41483	05CA	Stopped LED Assignment	0	0xE000	0		FC142	0	1
	41484	05CB	Stopped LED Colour	0	3	1		FC157	1	1
	41485	05CC	Alarm LED Assignment	0	0xE000	0		FC142	0xA000	1
	41486	05CD	Alarm LED Colour	0	3	1		FC157	3	1
	41487	05CE	Tripped LED Assignment	0	0xE000	0		FC142	0	1
	41488	05CF	Tripped LED Colour	0	3	1		FC157	1	1
	41489	05D0	Comms OK LED Assignment	0	0xE000	0		FC142	0	1
	41490	05D1	Comms OK LED Colour	0	3	1		FC157	2	1
	41491	05D2	Auto LED Assignment	0	0xE000	0		FC142	0	1
	41492	05D3	Auto LED Colour	0	3	1		FC157	3	1
	41493	05D4	Manual LED Assignment	0	0xE000	0		FC142	0	1
	41494	05D5	Manual LED Colour	0	3	1		FC157	3	1
	41495	05D6	USER1 LED Assignment	0	0xE000	1		FC142	0	1
	41496	05D7	USER1 LED Colour	0	3	1	---	FC157	1	1
	41497	05D8	USER2 LED Assignment	0	0xE000	1		FC142	0	1
	41498	05D9	USER2 LED Colour	0	3	1	---	FC157	1	1
	41499	05DA	USER3 LED Assignment	0	0xE000	1		FC142	0	1
	41500	05DB	USER3 LED Colour	0	3	1	---	FC157	1	1
	41501	05DC	50% LED Assignment	0	0xE000	0		FC142	0	1
	41502	05DD	50% LED Colour	0	3	1		FC157	3	1
	41503	05DE	80% LED Assignment	0	0xE000	0		FC142	0	1
	41504	05DF	80% LED Colour	0	3	1		FC157	3	1
	41505	05E0	100% LED Assignment	0	0xE000	0		FC142	0	1
	41506	05E1	100% LED Colour	0	3	1		FC157	3	1
	41507	05E2	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	41514	05E9	Reserved	---	---	---	---	---	---	1
CONTACT OUTPUTS										
	41515	05EA	Contact Output 1	0	0xE000	0		FC142	0	1
	41516	05EB	Contact Output 2	0	0xE000	0		FC142	0	1
	41517	05EC	Contact Output 3	0	0xE000	0		FC142	0	1
	41518	05ED	Contact Output 4	0	0xE000	0		FC142	0	1
	41519	05EE	Contact Output 5	0	0xE000	0		FC142	0	1
	41520	05EF	Contact Output 6	0	0xE000	0		FC142	0	1
	41521	05F0	Contact Output 7	0	0xE000	0		FC142	0	1
	41522	05F1	Contact Output 8	0	0xE000	0		FC142	0	1
	41523	05F2	Contact Output 9	0	0xE000	0		FC142	0	1
	41524	05F3	Contact Output 10	0	0xE000	0		FC142	0	1
	41525	05F4	Contact Output 11	0	0xE000	0		FC142	0	1
	41526	05F5	Contact Output 12	0	0xE000	0		FC142	0	1
	41527	05F6	Contact Output 13	0	0xE000	0		FC142	0	1
	41528	05F7	Contact Output 14	0	0xE000	0		FC142	0	1
	41529	05F8	Contact Output 15	0	0xE000	0		FC142	0	1
	41530	05F9	Contact Output 16	0	0xE000	0		FC142	0	1
	41531	05FA	Contact Output 17	0	0xE000	0		FC142	0	1
	41532	05FB	Contact Output 18	0	0xE000	0		FC142	0	1

	Modbus	Hex	Description	Min	Max	Step	Units	Format	Default	Size in Words
	41533	05FC	Contact Output 19	0	0xE000	0		FC142	0	1
	41534	05FD	Contact Output 20	0	0xE000	0		FC142	0	1
	41535	05FE	Contact Output 21	0	0xE000	0		FC142	0	1
	41536	05FF	Contact Output 22	0	0xE000	0		FC142	0	1
	41537	0600	Contact Output 23	0	0xE000	0		FC142	0	1
	41538	0601	Contact Output 24	0	0xE000	0		FC142	0	1
	41539	0602	Contact Output 25	0	0xE000	0		FC142	0	1
	41540	0603	Contact Output 26	0	0xE000	0		FC142	0	1
	41541	0604	Contact Output 27	0	0xE000	0		FC142	0	1
	41542	0605	Contact Output 28	0	0xE000	0		FC142	0	1
	41543	0606	Contact Output 29	0	0xE000	0		FC142	0	1
	41544	0607	Contact Output 30	0	0xE000	0		FC142	0	1
	41545	0608	Contact Output 31	0	0xE000	0		FC142	0	1
	41546	0609	Contact Output 32	0	0xE000	0		FC142	0	1
	41547	060A	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	41552	060F	Reserved	---	---	---	---	---	---	1
UNDERVOLTAGE RESTART										
	41553	0610	Under Voltage Restart	0	1	1	---	FC126	0	1
	41554	0611	UVR Short Dip Time	100	510	10	ms	F1*	200	1
	41555	0612	UVR Med Dip Time	1	100	1	s	F2	20	1
	41556	0613	UVR Long Dip Time	5	605	5	min	F2*	605	1
	41557	0614	UVR Med Dip Delay	2	600	2	s	F2	20	1
	41558	0615	UVR Long Dip Delay	10	12000	10	s	F2	100	1
	41559	0616	UVR Dropout Level	60	100	1	%	F1	65	1
	41560	0617	UVR Pickup Level	60	100	1	%	F1	90	1
	41561	0618	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	41570	0621	Reserved	---	---	---	---	---	---	1
AUTO / MANUAL CONTROL										
	41571	0622	Comm Stop Action	0	1	1		FC174	0	1
	41572	0623	Comms Start Ctrl	0	1	1	---	FC126	0	1
	41573	0624	Comms Stop Mode	0	1	1	---	FC172	0	1
	41574	0625	Hard Wired Start Ctrl	0	1	1	---	FC126	0	1
	41575	0626	Hard Wired Stop Mode	0	1	1	---	FC172	0	1
	41576	0627	Hard Wired Stop Actn	0	1	1	---	FC174	0	1
	41577	0628	Hard Wired 2W/3W	0	1	1	---	FC173	1	1
	41578	0629	Field Start Ctrl	0	1	1	---	FC126	0	1
	41579	062A	Field Stop Mode	0	1	1	---	FC172	0	1
	41580	062B	Field Stop Action	0	1	1	---	FC174	0	1
	41581	062C	Field 2W/3W	0	1	1	---	FC173	1	1
	41582	062D	MCC Start Ctrl	0	1	1	---	FC126	0	1
	41583	062E	MCC Stop Mode	0	1	1	---	FC172	0	1
	41584	062F	MCC Stop Action	0	1	1	---	FC174	0	1
	41585	0630	Test Auto Mode	0	2	1	---	FC175	1	1
	41586	0631	Test Manual Mode	0	2	1	---	FC175	0	1

	Modbus	Hex	Description	Min	Max	Step	Units	Format	Default	Size in Words
	41587	0632	External Stop Action	0	1	1	---	FC174	0	1
	41588	0633	Auto/Manual Key	0	1	1	---	FC126	0	1
	41589	0634	Reserved	---	---	---	---	---	---	7
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	41696	069F	Reserved							1
FLEXLOGIC EQUATION										
	41697	06A0	Flex Equation	0	0xFFFF	1		FC142	0x400	512
	42209	08A0	Reserved	---	---	---	---	---	---	1
	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
	43763	0EB2	Reserved							2

1. Maximum setpoint value represents OFF

2. Modbus registers 30391 and 30398 both represent the same actual value, Apparent Power.

Format codes

Code	Type	Definition
F1	16 bits	UNSIGNED VALUE - Maximum Setpoint Value represents OFF when marked "*" on the Modbus Memory Map
Example: 1234 stored as 1234		
F2	16 bits	UNSIGNED VALUE, 1 DECIMAL PLACE - Maximum Setpoint Value represents OFF when marked "*" on the Modbus Memory Map
Example: 123.4 stored as 1234		
F3	16 bits	UNSIGNED VALUE, 2 DECIMAL PLACES - Maximum Setpoint Value represents OFF when marked "*" on the Modbus Memory Map
Example: 12.34 stored as 1234		
F4	16 bits	2's COMPLEMENT SIGNED VALUE - Maximum Setpoint Value represents OFF when marked "*" on the Modbus Memory Map
Example: -1234 stored as -1234 i.e. 64302		
F6	16 bits	2's COMPLEMENT SIGNED VALUE, 2 DECIMAL PLACES
Example: -12.34 stored as -1234 i.e. 64302		
F9	32 bits	UNSIGNED LONG VALUE
1st 16 bits		High Order Word of Long Value
2nd 16 bits		Low Order Word of Long Value
Example: 123456 stored as 123456		
i.e. 1st word: 0001 hex, 2nd word: E240 hex		
F10	32 bits	UNSIGNED LONG VALUE, 1 DECIMAL PLACE
1st 16 bits		UNSIGNED LONG VALUE, 1 DECIMAL PLACE
2nd 16 bits		Low Order Word of Long Value
Example: 12345.6 stored as 123456		
i.e. 1st word: 0001 hex, 2nd word: E240 hex		
F13	32 bits	2's COMPLEMENT SIGNED LONG VALUE, 1 DECIMAL PLACE
1st 16 bits		High Order Word of Long Value
2nd 16 bits		Low Order Word of Long Value
Example: -12345.6 stored as -123456		
i.e. 1st word: FFFE hex, 2nd word: 1DC0 hex		
F15	16 bits	HARDWARE REVISION
0		Prototype
1		A
2		B
3		C
4		D
5		E
6		F
7		G
8		H
9		I
10		J

Code	Type	Definition
11		K
12		L
13		M
14		N
15		O
16		P
17		Q
18		R
19		S
20		T
21		U
22		V
23		W
24		X
25		Y
26		Z
F17	32 bits	UNSIGNED LONG VALUE, 3 DECIMAL PLACES
1st 16 bits		High Order Word of Long Value
2nd 16 bits		Low Order Word of Long Value
Example: 123456 stored as 123456		
i.e. 1st word: 0001 hex, 2nd word: E240 hex		
F18	32 bits	DATE MM/DD/YYYY
1st byte		Month 1 to 12
2nd byte		Day 1 to 31
3rd and 4th byte		Year 2000 to 2099
Example: Feb 20, 1995 stored as 34867142		
i.e. 1st word: 0214, 2nd word 07CB		
F19	32 bits	TIME HH:MM:SS:hh
1st byte		Hundredths of seconds 0 to 99
2nd byte		Seconds 0 to 59
3rd byte		Minutes 0 to 59
4th byte		Hours 0 to 23
Example: 2:05pm stored as 235208704		
i.e. 1st word: 0E05, 2nd word 0000		
F20	32 bits	2's COMPLEMENT SIGNED LONG VALUE
1st 16 bits		High Order Word of Long Value
2nd 16 bits		Low Order Word of Long Value
Note: -1 means "Never"		
F21	16 bits	2's COMPLEMENT SIGNED VALUE, 2 DECIMAL PLACES POWER FACTOR
< 0		Leading Power Factor - Negative
> 0		Lagging Power Factor - Positive
Example: Power Factor of 0.87 lag is used as 87		
i.e. 0057		
F22	16 bits	TWO 8-BIT CHARACTERS PACKED INTO 16-BIT UNSIGNED
MSB		First Character

Code	Type	Definition
LSB		Second Character
Example: String 'AB' stored as 4142 hex		
F25	16 bits	TRACE MEMORY CHANNEL DATA
0		Leading
1		Lagging
F26	16 bits	TRACE MEMORY CHANNEL DATA
0		Va
1		Vb
2		Vc
3		Va2
4		Vb2
5		Vc2
6		Ia
7		Ib
8		Ic
9		Ig
10		Inputs 1 to 16
11		Outputs 1 to 16
F74	16 bits	DATA LOGGER SAMPLE RATE
0		1 cycle
1		1 second
2		1 minute
3		1 hour
F75	16 bits	TRACE MEMORY CHANNEL DATA
0		Stopped
1		Started
2		Triggered
3		Pretrigger
4		PostTrigger
F77	16 bits	DATA LOGGER CHANNEL DATA
0		Disabled
1		Phase A Current
2		Phase B Current
3		Phase C Current
4		Average Phase Current
5		Motor Load
6		Current Unbalance
7		Ground Current
8		System Frequency
9		Vab
10		Vbc
11		Vca
12		Van
13		Vbn
14		Vcn
15		Power Factor
16		Real Power (kW)

Code	Type	Definition
17		Reactive Power (kvar)
18		Apparent Power (kVA)
19		Positive Watthours
20		Positive Varhours
21		Hottest Stator RTD
22		Thermal Capacity Used
23		RTD #1
24		RTD #2
25		RTD #3
26		RTD #4
27		RTD #5
28		RTD #6
FC101	16 bits	RS 485 Baud Rate
0		9600 baud
1		19200 baud
2		38400 baud
3		57600 baud
4		115200 baud
FC103	16 bits	Off / On or No / Yes Selection
0		OFF / NO
1		ON / YES
FC104	16 bits	Ground CT Type
0		None
1		Residual
2		CBCT 2000:1
FC105	16 bits	Differential CT Type
0		None
1		1 A Secondary
2		5 A Secondary
3		Direct Connect
FC106	16 bits	Voltage Transformer Connection Type
0		Wye
1		Delta
FC107	16 bits	Supply Frequency
0		60
1		50
FC109	16 bits	Flex Logic Status
0		OK
1		Unknown Token
2		Too Many Latches
3		Too Many Timers
4		Too Many + OneShots
5		Too Many - OneShots
6		Too Many Duel OneShots
7		Stack Overflow
8		Stack Underflow
9		Program Too Long

Code	Type	Definition
FC111	16 bits	Trip Relays
0		Trip
1		Alarm
FC112	16 bits	Communication Status
0		Error
1		OK
FC116	16 bits	Switch Type
0		Open
1		Closed
FC121	16 bits	RTD Application
0		None
1		Stator
2		Bearing
3		Ambient
4		Other
FC122	16 bits	RTD Voting Selection
0		OFF
1		RTD #1
2		RTD #2
3		RTD #3
4		RTD #4
5		RTD #5
6		RTD #6
FC126	16 bits	Disabled / Enabled Selection
0		Disabled
1		Enabled
FC128	16 bits	Command Status
0		Manual
1		Auto
2		Manual Inhibit
3		Auto/ Manual
4		Hardwired Auto
5		None
FC129	16 bits	Quick Status
Bit 0		Alarm
Bit 1		Trip
Bit 2		Self Test Fault
Bit 3		Auto
Bit 4		Contact A
Bit 5		Contact B
Bit 6		Contact Output 3
Bit 7		Drive Available
FC130	16 bits	LED Flash
Bit 0		Running
Bit 1		Stopped
Bit 2		Tripped
Bit 3		Alarm

Code	Type	Definition
Bit 4		Comms OK
Bit 5		Auto
Bit 6		Manual
Bit 7		USER1
Bit 8		USER2
Bit 9		USER3
Bit 10		50%
Bit 11		80%
Bit 12		100%
FC131	16 bits	Comm Fail Mode
1		Serial
2		Serial & Ethernet
4		Serial & FieldBus
8		Ethernet
16		FieldBus
32		Ethernet & Fieldbus
64		All
FC133	16 bits	CAUSE OF WAVEFORM/DATA LOG TRIGGER
0		None
1		Command
0xC0		VO 1
0xC1		VO 2
0xC2		VO 3
0xC3		VO 4
0xC4		VO 5
0xC5		VO 6
0xC6		VO 7
0xC7		VO 8
0xC8		VO 9
0xC9		VO 10
0xCA		VO 11
0xCB		VO 12
0xCC		VO 13
0xCD		VO 14
0xCE		VO 15
0xCF		VO 16
0xD0		VO 17
0xD1		VO 18
0xD2		VO 19
0xD3		VO 20
0xD4		VO 21
0xD5		VO 22
0xD6		VO 23
0xD7		VO 24
0xD8		VO 25
0xD9		VO 26
0xDA		VO 27

Code	Type	Definition
0xDB		VO 28
0xDC		VO 29
0xDD		VO 30
0xDE		VO 31
0xDF		VO 32
0x8801		Any Trip Pick Up
0x8802		Any Trip
0x8804		Any Trip Drop Out
0xA001		Any Alarm Pick Up
0xA002		Any Alarm
0xA004		Any Alarm Drop Out
0xC002		Any Stop
0xC902		Start A
0xC942		Start B
FC134	16 bits	CAUSE OF EVENT
0		No Event/Trip To Date
1		Control Power Lost
2		Control Power Applied
3		Date or Time Set
4		Reset
5		Lockout Reset
0x8002		Any Trip
0x8042		Thermal O/L Trip
0x8082		Ground Fault Trip
0x80C2		Acceleration Trip
0x8102		Phase Reversal Trip
0x8142		UnderPower Trip
0x8182		UnderVoltage Trip
0x81C2		OverVoltage Trip
0x8202		Mechanical Jam Trip
0x8242		UnderCurrent Trip
0x8282		Unbalance Trip
0x82C2		RTD 1 Trip
0x8302		RTD 2 Trip
0x8342		RTD 3 Trip
0x8382		RTD 4 Trip
0x83C2		RTD 5 Trip
0x8402		RTD 6 Trip
0x8442		Comm Fail Trip
0x8482		Relay Not Configured
0x84C2		Process ILock A Trip
0x8502		Process ILock B Trip
0x8542		Process ILock C Trip
0x8582		Process ILock D Trip
0x85C2		Process ILock E Trip
0x8602		Process ILock F Trip
0x8642		Process ILock G Trip

Code	Type	Definition
0x8682		Process ILock H Trip
0x86C2		Process ILock I Trip
0x8702		Process ILock J Trip
0x8742		Hard Wired Trip
0x8782		Field Trip
0x87C2		MCC Trip
0x8802		Aux U/V Trip
0x8842		Emergency Stop
0x8882		Fuse Fail Trip
0x88C2		Open Control Circuit Trip
0x8902		Thermistor Trip
0x89C2		Self Test Trip
0x8A02		Comm Trip
0xA002		Any Alarm
0xA042		Thermal Level Alarm
0xA082		Ground Fault Alarm
0xA0C2		Acceleration Alarm
0xA102		Phase Reversal Alarm
0xA142		UnderPower Alarm
0xA182		UnderVoltage Alarm
0xA1C2		OverVoltage Alarm
0xA242		UnderCurrent Alarm
0xA282		Unbalance Alarm
0xA2C2		RTD 1 Alarm
0xA302		RTD 2 Alarm
0xA342		RTD 3 Alarm
0xA382		RTD 4 Alarm
0xA3C2		RTD 5 Alarm
0xA402		RTD 6 Alarm
0xA442		RTD Open/Short Alarm
0xA482		RTD Open/Short Alarm
0xA4C2		Process ILock A Alarm
0xA502		Process ILock B Alarm
0xA542		Process ILock C Alarm
0xA582		Process ILock D Alarm
0xA5C2		Process ILock E Alarm
0xA602		Process ILock F Alarm
0xA642		Process ILock G Alarm
0xA682		Process ILock H Alarm
0xA6C2		Process ILock I Alarm
0xA702		Process ILock J Alarm
0xA742		Drive Failed to Start
0xA782		Inverter Failed
0xA7C2		Drive Stop Failed
0xA802		Aux U/V Alarm
0xA842		External Stop Alarm
0xA882		Fuse Fail Alarm

Code	Type	Definition
0xA8C2		Open Ctrl Cct Alarm
0xA902		Thermistor Alarm
0xA982		External Start A Alarm
0xA9C2		External Start B Alarm
0xAA02		Welded Contactor
0xAB02		Load Increase Alarm
0xAB42		Drive Greasing Alarm
0xAB82		Contactor Inspect Alarm
0xABC2		Max Stopped Alarm
0xAC42		Self Test Alarm
0xAC82		Comm Fail Alarm
0xC002		Any Stop
0xC042		Thermal Inhibit
0xC082		AutoMode
0xC0C2		Manual Mode
0xC102		Auto/Manual Mode Input
0xC142		Restart Inhibit
0xC182		Contactor A
0xC1C2		Contactor B
0xC202		Forward Limit
0xC242		Reverse Limit
0xC282		Starts/Hr Inhibit
0xC2C2		Time Between Inhibit
0xC302		Level 1 Access
0xC342		Level 2 Access
0xC382		Level 3 Access
0xC3C2		Comms Ctrl Active
0xC402		Hard Wired Ctrl Active
0xC442		Field Ctrl Active
0xC482		MCC Ctrl Active
0xC4C2		Process ILock A Stop
0xC502		Process ILock B Stop
0xC542		Process ILock C Stop
0xC582		Process ILock D Stop
0xC5C2		Process ILock E Stop
0xC602		Process ILock F Stop
0xC642		Process ILock G Stop
0xC682		Process ILock H Stop
0xC6C2		Process ILock I Stop
0xC702		Process ILock J Stop
0xC742		HW Stop
0xC782		Field Stop
0xC7C2		MCC Stop
0xC802		Access Switch Closed
0xC842		Test Switch Closed
0xC882		Hard Wired Start A
0xC8C2		Hard Wired Start B

Code	Type	Definition
0xC902		Start A
0xC942		Start B
0xC982		Field Start A
0xC9C2		Field Start B
0xCA02		Contact A Status
0xCA42		Contact B Status
0xCA82		Remote Reset Closed
0xCAC2		Lockout Reset Closed
0xCB02		UV Restart
0xCB42		Pre-Contact
0xCB82		MCC Start A
0xCBC2		MCC Start B
0xCC42		Comm Start A
0xCC82		Comm Start B
0xCCC2		Comm Stop
0xCD02		Fuse Fail Inhibit
0xCD42		Phase Reversal Inhibit
0xCD82		Low Aux Voltage Inhibit
0xCDC2		UV Restart Inhibit
0xCE02		Drive Available
0xCE42		Drive Available Manual
0xCE82		Drive Available Auto
0xCEC2		Stop A
0xCF02		Stop B
FC135	16 bits	Motor Speed During Trip / Motor Speed During Event
0		Low Speed
1		High Speed
FC136	16 bits	Contact
0		None
1		A
2		B
FC139	16 bits	Starter Type
0		None
1		FV Nonreversing
2		FV Reversing
3		Two Speed
4		Wye-Delta
5		Inverter
6		Soft Starter
7		Custom Starter
FC140	16 bits	Interlock Function
0		Disabled
1		Trip
2		Alarm
3		Stop
FC141	16 bits	Timer Type
0		Millisecond

Code	Type	Definition
1		Second
2		Minute
FC142	16 bits	Assignment Function / FlexLogic Equation Entry
0x0000		OFF
0x0001		ON
0x0040		Contact Input 1 On
0x0041		Contact Input 2 On
0x0042		Contact Input 3 On
0x0043		Contact Input 4 On
0x0044		Contact Input 5 On
0x0045		Contact Input 6 On
0x0046		Contact Input 7 On
0x0047		Contact Input 8 On
0x0048		Contact Input 9 On
0x0049		Contact Input 10 On
0x004A		Contact Input 11 On
0x004B		Contact Input 12 On
0x004C		Contact Input 13 On
0x004D		Contact Input 14 On
0x004E		Contact Input 15 On
0x004F		Contact Input 16 On
0x0050		Contact Input 17 On
0x0051		Contact Input 18 On
0x0052		Contact Input 19 On
0x0053		Contact Input 20 On
0x0054		Contact Input 21 On
0x0055		Contact Input 22 On
0x0056		Contact Input 23 On
0x0057		Contact Input 24 On
0x0058		Contact Input 25 On
0x0059		Contact Input 26 On
0x005A		Contact Input 27 On
0x005B		Contact Input 28 On
0x005C		Contact Input 29 On
0x005D		Contact Input 30 On
0x0080		Virtual Input 1 On
0x0081		Virtual Input 2 On
0x0082		Virtual Input 3 On
0x0083		Virtual Input 4 On
0x0084		Virtual Input 5 On
0x0085		Virtual Input 6 On
0x0086		Virtual Input 7 On
0x0087		Virtual Input 8 On
0x0088		Virtual Input 9 On
0x0089		Virtual Input 10 On
0x008A		Virtual Input 11 On
0x008B		Virtual Input 12 On

Code	Type	Definition
0x008C		Virtual Input 13 On
0x008D		Virtual Input 14 On
0x008E		Virtual Input 15 On
0x008F		Virtual Input 16 On
0x0090		Virtual Input 17 On
0x0091		Virtual Input 18 On
0x0092		Virtual Input 19 On
0x0093		Virtual Input 20 On
0x0094		Virtual Input 21 On
0x0095		Virtual Input 22 On
0x0096		Virtual Input 23 On
0x0097		Virtual Input 24 On
0x0098		Virtual Input 25 On
0x0099		Virtual Input 26 On
0x009A		Virtual Input 27 On
0x009B		Virtual Input 28 On
0x009C		Virtual Input 29 On
0x009D		Virtual Input 30 On
0x009E		Virtual Input 31 On
0x009F		Virtual Input 32 On
0x00C0		Virtual Output 1 On
0x00C1		Virtual Output 2 On
0x00C2		Virtual Output 3 On
0x00C3		Virtual Output 4 On
0x00C4		Virtual Output 5 On
0x00C5		Virtual Output 6 On
0x00C6		Virtual Output 7 On
0x00C7		Virtual Output 8 On
0x00C8		Virtual Output 9 On
0x00C9		Virtual Output 10 On
0x00CA		Virtual Output 11 On
0x00CB		Virtual Output 12 On
0x00CC		Virtual Output 13 On
0x00CD		Virtual Output 14 On
0x00CE		Virtual Output 15 On
0x00CF		Virtual Output 16 On
0x00D0		Virtual Output 17 On
0x00D1		Virtual Output 18 On
0x00D2		Virtual Output 19 On
0x00D3		Virtual Output 20 On
0x00D4		Virtual Output 21 On
0x00D5		Virtual Output 22 On
0x00D6		Virtual Output 23 On
0x00D7		Virtual Output 24 On
0x00D8		Virtual Output 25 On
0x00D9		Virtual Output 26 On
0x00DA		Virtual Output 27 On

Code	Type	Definition
0x00DB		Virtual Output 28 On
0x00DC		Virtual Output 29 On
0x00DD		Virtual Output 30 On
0x00DE		Virtual Output 31 On
0x00DF		Virtual Output 32 On
0x0400		End
0x0440		NOT (1 input)
0x0480		XOR (2 inputs)
0x04C0		LATCH (2 inputs)
0x0502		OR (2 inputs)
0x0503		OR (3 inputs)
0x0504		OR (4 inputs)
0x0505		OR (5 inputs)
0x0506		OR (6 inputs)
0x0507		OR (7 inputs)
0x0508		OR (8 inputs)
0x0509		OR (9 inputs)
0x050A		OR (10 inputs)
0x050B		OR (11 inputs)
0x050C		OR (12 inputs)
0x050D		OR (13 inputs)
0x050E		OR (14 inputs)
0x050F		OR (15 inputs)
0x0510		OR (16 inputs)
0x0542		AND (2 inputs)
0x0543		AND (3 inputs)
0x0544		AND (4 inputs)
0x0545		AND (5 inputs)
0x0546		AND (6 inputs)
0x0547		AND (7 inputs)
0x0548		AND (8 inputs)
0x0549		AND (9 inputs)
0x054A		AND (10 inputs)
0x054B		AND (11 inputs)
0x054C		AND (12 inputs)
0x054D		AND (13 inputs)
0x054E		AND (14 inputs)
0x054F		AND (15 inputs)
0x0550		AND (16 inputs)
0x0582		NOR (2 inputs)
0x0583		NOR (3 inputs)
0x0584		NOR (4 inputs)
0x0585		NOR (5 inputs)
0x0586		NOR (6 inputs)
0x0587		NOR (7 inputs)
0x0588		NOR (8 inputs)
0x0589		NOR (9 inputs)

Code	Type	Definition
0x058A		NOR (10 inputs)
0x058B		NOR (11 inputs)
0x058C		NOR (12 inputs)
0x058D		NOR (13 inputs)
0x058E		NOR (14 inputs)
0x058F		NOR (15 inputs)
0x0590		NOR (16 inputs)
0x05C2		NAND (2 inputs)
0x05C3		NAND (3 inputs)
0x05C4		NAND (4 inputs)
0x05C5		NAND (5 inputs)
0x05C6		NAND (6 inputs)
0x05C7		NAND (7 inputs)
0x05C8		NAND (8 inputs)
0x05C9		NAND (9 inputs)
0x05CA		NAND (10 inputs)
0x05CB		NAND (11 inputs)
0x05CC		NAND (12 inputs)
0x05CD		NAND (13 inputs)
0x05CE		NAND (14 inputs)
0x05CF		NAND (15 inputs)
0x05D0		NAND (16 inputs)
0x0600		TIMER 1
0x0601		TIMER 2
0x0602		TIMER 3
0x0603		TIMER 4
0x0604		TIMER 5
0x0605		TIMER 6
0x0606		TIMER 7
0x0607		TIMER 8
0x0608		TIMER 9
0x0609		TIMER 10
0x060A		TIMER 11
0x060B		TIMER 12
0x060C		TIMER 13
0x060D		TIMER 14
0x060E		TIMER 15
0x060F		TIMER 16
0x0610		TIMER 17
0x0611		TIMER 18
0x0612		TIMER 19
0x0613		TIMER 20
0x0614		TIMER 21
0x0615		TIMER 22
0x0616		TIMER 23
0x0617		TIMER 24
0x0618		TIMER 25

Code	Type	Definition
0x0619		TIMER 26
0x061A		TIMER 27
0x061B		TIMER 28
0x061C		TIMER 29
0x061D		TIMER 30
0x061E		TIMER 31
0x061F		TIMER 32
0x0640		ASSIGN VIRTUAL OUTPUT 1
0x0641		ASSIGN VIRTUAL OUTPUT 2
0x0642		ASSIGN VIRTUAL OUTPUT 3
0x0643		ASSIGN VIRTUAL OUTPUT 4
0x0644		ASSIGN VIRTUAL OUTPUT 5
0x0645		ASSIGN VIRTUAL OUTPUT 6
0x0646		ASSIGN VIRTUAL OUTPUT 7
0x0647		ASSIGN VIRTUAL OUTPUT 8
0x0648		ASSIGN VIRTUAL OUTPUT 9
0x0649		ASSIGN VIRTUAL OUTPUT 10
0x064A		ASSIGN VIRTUAL OUTPUT 11
0x064B		ASSIGN VIRTUAL OUTPUT 12
0x064C		ASSIGN VIRTUAL OUTPUT 13
0x064D		ASSIGN VIRTUAL OUTPUT 14
0x064E		ASSIGN VIRTUAL OUTPUT 15
0x064F		ASSIGN VIRTUAL OUTPUT 16
0x0650		ASSIGN VIRTUAL OUTPUT 17
0x0651		ASSIGN VIRTUAL OUTPUT 18
0x0652		ASSIGN VIRTUAL OUTPUT 19
0x0653		ASSIGN VIRTUAL OUTPUT 20
0x0654		ASSIGN VIRTUAL OUTPUT 21
0x0655		ASSIGN VIRTUAL OUTPUT 22
0x0656		ASSIGN VIRTUAL OUTPUT 23
0x0657		ASSIGN VIRTUAL OUTPUT 24
0x0658		ASSIGN VIRTUAL OUTPUT 25
0x0659		ASSIGN VIRTUAL OUTPUT 26
0x065A		ASSIGN VIRTUAL OUTPUT 27
0x065B		ASSIGN VIRTUAL OUTPUT 28
0x065C		ASSIGN VIRTUAL OUTPUT 29
0x065D		ASSIGN VIRTUAL OUTPUT 30
0x065E		ASSIGN VIRTUAL OUTPUT 31
0x065F		ASSIGN VIRTUAL OUTPUT 32
0x0681		POSITIVE 1 SHOT (1 input)
0x0682		NEGATIVE 1 SHOT (1 input)
0x0683		DUAL 1 SHOT (1 input)
0x8002		Any Trip
0x8042		Thermal O/L Trip
0x8082		Ground Fault Trip
0x80C2		Acceleration Trip
0x8102		Phase Reversal Trip

Code	Type	Definition
0x8142		UnderPower Trip
0x8182		UnderVoltage Trip
0x81C2		OverVoltage Trip
0x8202		Mechanical Jam Trip
0x8242		UnderCurrent Trip
0x8282		Unbalance Trip
0x82C2		RTD 1 Trip
0x8302		RTD 2 Trip
0x8342		RTD 3 Trip
0x8382		RTD 4 Trip
0x83C2		RTD 5 Trip
0x8402		RTD 6 Trip
0x8442		Comm Fail Trip
0x8482		Relay Not Configured
0x84C2		Process ILock A Trip
0x8502		Process ILock B Trip
0x8542		Process ILock C Trip
0x8582		Process ILock D Trip
0x85C2		Process ILock E Trip
0x8602		Process ILock F Trip
0x8642		Process ILock G Trip
0x8682		Process ILock H Trip
0x86C2		Process ILock I Trip
0x8702		Process ILock J Trip
0x8742		Hard Wired Trip
0x8782		Field Trip
0x87C2		MCC Trip
0x8802		Aux U/V Trip
0x8842		Emergency Stop
0x8882		Fuse Fail Trip
0x88C2		Open Control Circuit Trip
0x8902		Thermistor Trip
0x89C2		Self Test Trip
0xA002		Any Alarm
0xA042		Thermal Level Alarm
0xA082		Ground Fault Alarm
0xA0C2		Acceleration Alarm
0xA102		Phase Reversal Alarm
0xA142		UnderPower Alarm
0xA182		UnderVoltage Alarm
0xA1C2		OverVoltage Alarm
0xA242		UnderCurrent Alarm
0xA282		Unbalance Alarm
0xA2C2		RTD 1 Alarm
0xA302		RTD 2 Alarm
0xA342		RTD 3 Alarm
0xA382		RTD 4 Alarm

Code	Type	Definition
0xA3C2		RTD 5 Alarm
0xA402		RTD 6 Alarm
0xA442		RTD Open/Short Alarm
0xA4C2		Process ILock A Alarm
0xA502		Process ILock B Alarm
0xA542		Process ILock C Alarm
0xA582		Process ILock D Alarm
0xA5C2		Process ILock E Alarm
0xA602		Process ILock F Alarm
0xA642		Process ILock G Alarm
0xA682		Process ILock H Alarm
0xA6C2		Process ILock I Alarm
0xA702		Process ILock J Alarm
0xA742		Drive Failed to Start
0xA782		Inverter Failed
0xA7C2		Drive Stop Failed
0xA802		Aux U/V Alarm
0xA842		External Stop Alarm
0xA882		Fuse Fail Alarm
0xA8C2		Open Ctrl Cct Alarm
0xA902		Thermistor Alarm
0xA982		External Start A Alarm
0xA9C2		External Start B Alarm
0xAA02		Welded Contactor
0xAB02		Load Increase Alarm
0xAB42		Drive Greasing Alarm
0xAB82		Contactor Inspect Alarm
0xABC2		Max Stopped Alarm
0xAC82		Comm Fail Alarm
0xC002		Any Stop
0xC042		Thermal Inhibit
0xC082		AutoMode
0xC0C2		Manual Mode
0xC102		Auto/Manual Mode Input
0xC142		Restart Inhibit
0xC182		Contactor A
0xC1C2		Contactor B
0xC202		Forward Limit
0xC242		Reverse Limit
0xC282		Starts/Hr Inhibit
0xC2C2		Time Between Inhibit
0xC3C2		Comms Ctrl Active
0xC402		Hard Wired Ctrl Active
0xC442		Field Ctrl Active
0xC482		MCC Ctrl Active
0xC4C2		Process ILock A Stop
0xC502		Process ILock B Stop

Code	Type	Definition
0xC542		Process ILock C Stop
0xC582		Process ILock D Stop
0xC5C2		Process ILock E Stop
0xC602		Process ILock F Stop
0xC642		Process ILock G Stop
0xC682		Process ILock H Stop
0xC6C2		Process ILock I Stop
0xC702		Process ILock J Stop
0xC742		HW Stop
0xC782		Field Stop
0xC7C2		MCC Stop
0xC802		Access Switch Closed
0xC842		Test Switch Closed
0xC882		Hard Wired Start A
0xC8C2		Hard Wired Start B
0xC902		Start A
0xC942		Start B
0xC982		Field Start A
0xC9C2		Field Start B
0xCA02		Contactor A Status
0xCA42		Contactor B Status
0xCA82		Remote Reset Closed
0xCAC2		Lockout Reset Closed
0xCB02		UV Restart
0xCB42		Pre-Contactor
0xCB82		MCC Start A
0xCBC2		MCC Start B
0xCC42		Comm Start A
0xCC82		Comm Start B
0xCCC2		Comm Stop
0xCD02		Fuse Fail Inhibit
0xCD42		Phase Reversal Inhibit
0xCD82		Low Aux Voltage Inhibit
0xCDC2		UV Restart Inhibit
0xCE02		Drive Available
0xCE42		Drive Available Manual
0xCE82		Drive Available Auto
0xCEC2		Stop A
0xCF02		Stop B
FC143	16 bits	Drive Status
0		Drive Unavailable
1		Available Auto
2		Available Manual
3		Available
4		Running
5		ESD Trip / Stop
FC144	32 bits	LED Status

Code	Type	Definition
Bit 0		Running Red
Bit 1		Running Green
Bit 2		Stopped Red
Bit 3		Stopped Green
Bit 4		Tripped Red
Bit 5		Tripped Green
Bit 6		Alarm Red
Bit 7		Alarm Green
Bit 8		Auto Red
Bit 9		Auto Green
Bit 10		Manual Red
Bit 11		Manual Green
Bit 12		Comms OK Red
Bit 13		Comms OK Green
Bit 14		USER1 Red
Bit 15		USER1 Green
Bit 16		USER2 Red
Bit 17		USER2 Green
Bit 18		USER3 Red
Bit 19		USER3 Green
Bit 20		50% Red
Bit 21		50% Green
Bit 22		80% Red
Bit 23		80% Green
Bit 24		100% Red
Bit 25		100% Green
FC145	16 bits	Element Status 1
Bit 0		Level
Bit 1		Operated
Bit 2		Latched
Bit 3		Spare
FC147	16 bits	LED Intensity
0		Level 1
3		Level 2
6		Level 3
9		Level 4
12		Level 5
15		Level 6
FC148	16 bits	Trace Memory Trigger Mode
0		Retrigger
1		One-Shot
FC150	32 bits	IP Address
IP address, subnet mask or default gateway Each byte in this register represents one octet of an IP address For example: 0x015EDA1F represents address 19421831		
FC155	16 bits	Profibus Baud Rate
0x0001		9600
0x0002		19200

Code	Type	Definition
0x0004		31250
0x0008		45450
0x0010		93750
0x0020		187500
0x0040		500000
0x0080		1500000
0x07E2		Auto Detect
FC156	16 bits	DeviceNet Baud Rate
0		125 kbps
1		250 kbps
2		500 kbps
FC157	16 bits	LED Colour
0		None
1		Red
2		Green
3		Orange
FC160	16 bits	Auto/Manual Mode
0		Auto
1		Manual
FC167	32 bits	Contact/Virtual Input/Output Status
Bit 0		Input/Output 1
Bit 1		Input/Output 2
Bit 2		Input/Output 3
Bit 3		Input/Output 4
Bit 4		Input/Output 5
Bit 5		Input/Output 6
Bit 6		Input/Output 7
Bit 7		Input/Output 8
Bit 8		Input/Output 9
Bit 9		Input/Output 10
Bit 10		Input/Output 11
Bit 11		Input/Output 12
Bit 12		Input/Output 13
Bit 13		Input/Output 14
Bit 14		Input/Output 15
Bit 15		Input/Output 16
Bit 16		Input/Output 17
Bit 17		Input/Output 18
Bit 18		Input/Output 19
Bit 19		Input/Output 20
Bit 20		Input/Output 21
Bit 21		Input/Output 22
Bit 22		Input/Output 23
Bit 23		Input/Output 24
Bit 24		Input/Output 25
Bit 25		Input/Output 26
Bit 26		Input/Output 27

Code	Type	Definition
Bit 27		Input/Output 28
Bit 28		Input/Output 29
Bit 29		Input/Output 30
Bit 30		Input/Output 31
Bit 31		Input/Output 32
FC168	32 bits	Contact/Virtual Input/Output Status
Bit 0		Input/Output 33
Bit 1		Input/Output 34
Bit 2		Input/Output 35
Bit 3		Input/Output 36
Bit 4		Input/Output 37
Bit 5		Input/Output 38
Bit 6		Input/Output 39
Bit 7		Input/Output 40
Bit 8		Input/Output 41
Bit 9		Input/Output 42
Bit 10		Input/Output 43
Bit 11		Input/Output 44
Bit 12		Input/Output 45
Bit 13		Input/Output 46
Bit 14		Input/Output 47
Bit 15		Input/Output 48
Bit 16		Input/Output 49
Bit 17		Input/Output 50
Bit 18		Input/Output 51
Bit 19		Input/Output 52
Bit 20		Input/Output 53
Bit 21		Input/Output 54
Bit 22		Input/Output 55
Bit 23		Input/Output 56
Bit 24		Input/Output 57
Bit 25		Input/Output 58
Bit 26		Input/Output 59
Bit 27		Input/Output 60
Bit 28		Input/Output 61
Bit 29		Input/Output 62
Bit 30		Input/Output 63
Bit 31		Input/Output 64
FC169	16 bits	Month
0		Not Set
1		January
2		February
3		March
4		April
5		May
6		June
7		July

Code	Type	Definition
8		August
9		September
10		October
11		November
12		December
FC170	16 bits	Count of Week
0		Not Set
1		1st
2		2nd
3		3rd
4		4th
5		Last
FC171	16 bits	Weekdays
0		Not Set
1		SUN
2		MON
3		TUE
4		WED
5		THU
6		FRI
7		SAT
FC172	16 bits	Auto/Manual Control Stop Mode
0		Always Enabled
1		Follow Ctrl Mode
FC173	16 bits	Wire Selection
0		2W
1		3W
FC174	16 bits	Source Stop Action
0		Stop
1		Trip
FC175	16 bits	Test Auto/Manual Mode
0		ON
1		OFF
2		Unaffected
FC176	16 bits	Auxiliary VT Connection
0		Vab VT
1		Vbc VT
2		Vca VT
3		Van VT
4		Vbn VT
5		Vcn VT
6		Van Direct
7		Vbn Direct
8		Vcn Direct
FC177	16 bits	LED Color Invert
0		Green/Red
1		Red/Green

Code	Type	Definition
FC178	16 bits	Motor Status
Bit 0		Lockout
Bit 1		Non-Lockout Trip
Bit 2		UVR Pending
Bit 4		Running
Bit 5		Precontactor
Bit 6		Starting
Bit 8		Inhibit
Bit 9		Stopped
Bit 10		Self Test Fault
Bit 11		Alarm
Bit 12		Forward
Bit 13		Reverse
Bit 14		Low Speed
Bit 15		High Speed
FC179	32 bits	Alarm Status 1
Bit 0		Any Alarm
Bit 1		Thermal Level Alarm
Bit 2		Ground Fault Alarm
Bit 3		Acceleration Alarm
Bit 4		Phase Reversal Alarm
Bit 5		UnderPower Alarm
Bit 6		UnderVoltage Alarm
Bit 7		OverVoltage Alarm
Bit 9		UnderCurrent Alarm
Bit 10		Unbalance Alarm
Bit 11		RTD 1 Alarm
Bit 12		RTD 2 Alarm
Bit 13		RTD 3 Alarm
Bit 14		RTD 4 Alarm
Bit 15		RTD 5 Alarm
Bit 16		RTD 6 Alarm
Bit 18		RTD Open/Short Alarm
Bit 19		Process ILock A Alarm
Bit 20		Process ILock B Alarm
Bit 21		Process ILock C Alarm
Bit 22		Process ILock D Alarm
Bit 23		Process ILock E Alarm
Bit 24		Process ILock F Alarm
Bit 25		Process ILock G Alarm
Bit 26		Process ILock H Alarm
Bit 27		Process ILock I Alarm
Bit 28		Process ILock J Alarm
Bit 29		Drive Failed to Start
Bit 30		Inverter Failed
Bit 31		Drive Stop Failed
FC180	32 bits	Alarm Status 2

Code	Type	Definition
Bit 0		Aux U/V Alarm
Bit 1		Self-Test Alarm
Bit 2		Fuse Fail Alarm
Bit 3		Open Ctrl Cct Alarm
Bit 4		Thermistor Alarm
Bit 6		External Start A Alarm
Bit 7		External Start B Alarm
Bit 8		Welded Contactor
Bit 12		Load Increase Alarm
Bit 13		Drive Greasing Alarm
Bit 14		Contactor Inspect Alarm
Bit 15		Max Stopped Alarm
Bit 17		Self-Test Alarm
Bit 18		Comm Fail Alarm
FC181	32 bits	Alarm Status 3 (Reserved)
FC182	32 bits	Alarm Status 4 (Reserved)
FC183	32 bits	Trip Status 1
Bit 0		Any Trip
Bit 1		Thermal O/L Trip
Bit 2		Ground Fault Trip
Bit 3		Acceleration Trip
Bit 4		Phase Reversal Trip
Bit 5		UnderPower Trip
Bit 6		UnderVoltage Trip
Bit 7		OverVoltage Trip
Bit 8		Mechanical Jam Trip
Bit 9		UnderCurrent Trip
Bit 10		Unbalance Trip
Bit 11		RTD 1 Trip
Bit 12		RTD 2 Trip
Bit 13		RTD 3 Trip
Bit 14		RTD 4 Trip
Bit 15		RTD 5 Trip
Bit 16		RTD 6 Trip
Bit 17		Comm Fail Trip
Bit 18		Relay Not Configured
Bit 19		Process ILock A Trip
Bit 20		Process ILock B Trip
Bit 21		Process ILock C Trip
Bit 22		Process ILock D Trip
Bit 23		Process ILock E Trip
Bit 24		Process ILock F Trip
Bit 25		Process ILock G Trip
Bit 26		Process ILock H Trip
Bit 27		Process ILock I Trip
Bit 28		Process ILock J Trip
Bit 29		Hard Wired Trip

Code	Type	Definition
Bit 30		Field Trip
Bit 31		MCC Trip
FC184	32 bits	Trip Status 2
Bit 0		Aux U/V Trip
Bit 1		Emergency Stop
Bit 2		Fuse Fail Trip
Bit 3		OpenControl Circuit
Bit 4		Thermistor Trip
Bit 7		Self-Test Trip
Bit 8		Comm Trip
FC185	32 bits	Trip Status 3 (Reserved)
FC186	32 bits	Trip Status 4 (Reserved)
FC187	32 bits	Message Status 1
Bit 0		Any Messages
Bit 1		Transfer Timer
Bit 2		FLA Not Set
Bit 3		CT Type Not Set
Bit 4		Starter Type Not Set
Bit 5		No Control Source
Bit 6		Clock Not Set
Bit 7		FLA Too High
FC188	32 bits	Message Status 2
Bit 0		Internal Temperature High
Bit 1		IO Communication Failure
Bit 2		Metering Failure
Bit 3		Order Code Error
Bit 4		Clock Error
Bit 5		Calibration Error
Bit 6		EEPROM Error
Bit 7		IO Input Read Error
Bit 8		IO 3.3V Error
Bit 9		IO 5V Error
Bit 10		IO -5V Error
Bit 11		IO Input Overvoltage
Bit 12		IO Frequency Error
Bit 13		DPRAM Error
Bit 14		System Health Error
FC189	32 bits	Message Status 3 (Reserved)
FC190	32 bits	Message Status 4 (Reserved)
FC191	32 bits	Ctrl Element Status 1
Bit 0		Any Stop
Bit 1		Thermal Inhibit
Bit 2		AutoMode
Bit 3		Manual Mode
Bit 4		AutoManualMode
Bit 5		Restart Inhibit
Bit 6		Contact A

Code	Type	Definition
Bit 7		Contactors B
Bit 8		Forward Limit
Bit 9		Reverse Limit
Bit 10		Starts/Hr Inhibit
Bit 11		Time Between Inhibit
Bit 12		Level 1 Access
Bit 13		Level 2 Access
Bit 14		Level 3 Access
Bit 15		Comms Ctrl Active
Bit 16		Hard Wired Ctrl Active
Bit 17		Field Ctrl Active
Bit 18		MCC Ctrl Active
Bit 19		Process I Lock A Stop
Bit 20		Process I Lock B Stop
Bit 21		Process I Lock C Stop
Bit 22		Process I Lock D Stop
Bit 23		Process I Lock E Stop
Bit 24		Process I Lock F Stop
Bit 25		Process I Lock G Stop
Bit 26		Process I Lock H Stop
Bit 27		Process I Lock I Stop
Bit 28		Process I Lock J Stop
Bit 29		HW Stop
Bit 30		Field Stop
Bit 31		MCC Stop
FC192	32 bits	Ctrl Element Status 2
Bit 0		Access Switch
Bit 1		Test Switch
Bit 2		Hard Wired Start A
Bit 3		Hard Wired Start B
Bit 4		Start A
Bit 5		Start B
Bit 6		Field Start A
Bit 7		Field Start B
Bit 8		Contactors A Status
Bit 9		Contactors B Status
Bit 10		Remote Reset
Bit 11		Lockout Reset
Bit 12		UV Restart
Bit 13		Pre-Contactors
Bit 14		MCC Start A
Bit 15		MCC Start B
Bit 16		Bypass Contact
Bit 17		Comm Start A
Bit 18		Comm Start B
Bit 19		Comm Stop
Bit 20		Fuse Fail Inhibit

Code	Type	Definition
Bit 21		Phase Reversal Inhibit
Bit 22		Low Aux Voltage Inhibit
Bit 23		UV Restart Inhibit
Bit 24		Drive Available
Bit 25		Drive Available Auto
Bit 26		Drive Available Manual
Bit 27		Reserved
Bit 28		Reserved
Bit 29		PFR Inhibit
Bit 30		PF Restart
FC193	32 bits	Ctrl Status 3 (Reserved)
FC194	32 bits	Ctrl Status 4 (Reserved)
FC212	16 bits	LCD Test Paint Color
0		None
1		Red
2		Green
3		Blue

Performing Commands Using Function Code 10H

Commands can be performed using function code 16 as well as function code 5. When using FUNCTION CODE 16, the Command Function register must be written with a value of 5. The Command Operation register must be written with a valid command operation number. The Command Data registers must be written with valid data; this is dependent upon the command operation.

For example, consider a request for slave 17 to perform command operation 1 (RESET): The master/slave packets have the following format:

Table 2-9: Master/slave packet format for performing commands

MASTER TRANSMISSION	BYTES	EXAMPLE	DESCRIPTION
SLAVE ADDRESS	1	11	message for slave 17
FUNCTION CODE	1	10	store multiple setpoints
DATA STARTING ADDRESS	2	00 80	setpoint address 00 80
NUMBER OF SETPOINTS	2	00 02	2 setpoints = 4 bytes total
BYTE COUNT	1	04	4 bytes of data
DATA 1	2	00 05	data for address 00 80
DATA 2	2	00 01	data for address 00 81
CRC	2	7E CE	CRC error code

SLAVE RESPONSE	BYTES	EXAMPLE	DESCRIPTION
SLAVE ADDRESS	1	11	message from slave 17
FUNCTION CODE	1	10	store multiple setpoints
DATA STARTING ADDRESS	2	00 80	setpoint address 00 80
NUMBER OF SETPOINTS	2	00 02	2 setpoints
CRC	2	42 B0	CRC error code

Using the User Definable Memory Map

The MM300 contains a User Definable area in the memory map. This area allows re-mapping of the addresses of any Actual Values or Setpoints registers. The User Definable area has two sections:

1. A Register Index area (memory map addresses 020BH-0287H) that contains 125 Actual Values or Setpoints register addresses.
2. A Register area (memory map addresses 020BH-0287H) that contains the data at the addresses in the Register Index.

Register data that is separated in the rest of the memory map may be re-mapped to adjacent register addresses in the User Definable Registers area. This is accomplished by writing to register addresses in the User Definable Register Index area. This allows for improved throughput of data and can eliminate the need for multiple read command sequences. The User Definable Register Index is stored as a setpoint and therefore it is “remembered” even when the power is removed.

For example, if the values of MOTOR LOAD (register address 014FH; modbus address 30336) and DRIVE STATUS (register address 0135H; modbus address 30310) are required to be read from a MM300, their addresses may be re-mapped as follows:

1. Write 30336 to address 020BH (40524) (User Definable Register Index 0000) using function code 06 or 16.
2. Write 30310 to address 020CH (40525) (User Definable Register Index 0001) using function code 06 or 16.

The MM300PC software can be used to write these locations to the User Definable Register Index using the Setpoints > Modbus Memory Map > User Map screen.

It is now possible to read these two data registers with one read, at addresses 020BH, 020CH. Address 020BH will contain MOTOR LOAD. Address 020CH will contain DRIVE STATUS.

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Chapter 3: Ethernet interface

The 10/100Base-T Ethernet interface is configured as a Modbus RTU slave. The Ethernet port has the following characteristics.

- Configuration: setup using IP address, subnet mask, and gateway address.
- Supported Modbus function codes: 3, 4, 5, 6, and 16.
- Supports time/date synchronization via the Network Time Protocol (NTP).
- Ethernet port 502.
- Supports a maximum of 5 virtual connections.

The Ethernet interface has the same memory map layout as the serial Modbus RTU interface.

Network Time Protocol is enabled if the NTP address is non-zero and the source is detected.

Once connected to the source, the clock is updated every 30 seconds.



If the IP address of the relay is changed for any reason, the relay must be powered down then restarted in order for the new IP address to take effect.

MM300 Motor Management System

Chapter 4: Fieldbus interface

The Fieldbus interface is configurable as either Profibus DPV0/V1 or DeviceNet. Both Fieldbus interfaces support control and status – refer to this *MM300 Communications Guide* for map details.

Note that external power, 5 to 24 VDC, is required for this interface to operate. (Ensure that switches 7 and 8 of the DIPswitch on the communication card, are ON.)



A GSD file is provided on the GE Grid Solutions website: <http://www.gegridsolutions.com/app/ViewFiles.aspx?prod=mm300&type=7>

Configurable Fieldbus input data

The Input Data available to the Profibus master can be made user-configurable by using the Modbus User Map feature available on the MM300.

Configure the setpoint Fieldbus Input Data available in the Communications Settings group (Home > Setpnts > Cfg > Comms) page from the MM300 Graphical front panel if you have ordered one with your unit).

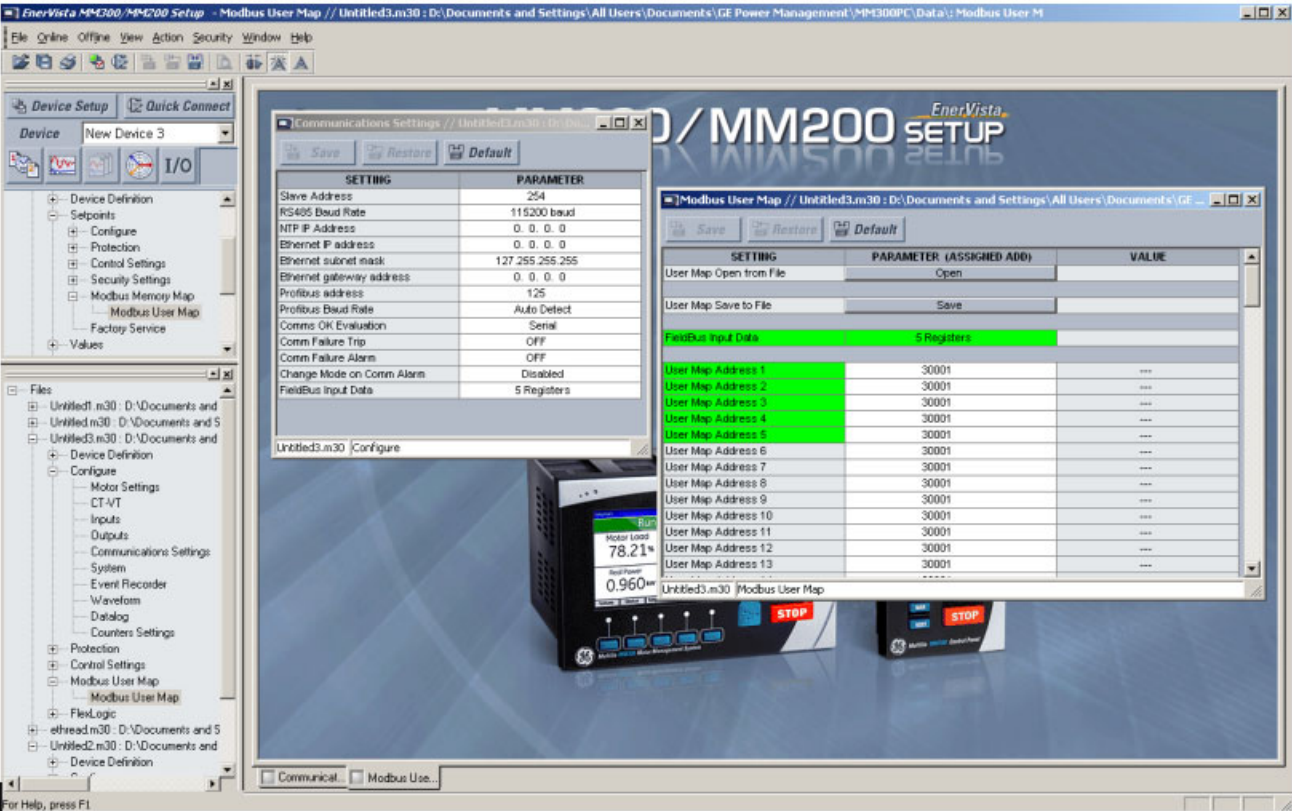


By default this is set to use the default Profibus input data. Configure this to the number of registers you want to read as part of Profibus Input Data. Configure this same number of Modbus User Map registers to the required Actual value registers in the MM300 unit using EnerVista MM300/MM200 Setup. Save the Modbus User map configuration. These actual values configured in User map are now available over Profibus.

The setpoint Fieldbus Input Data can be seen in the Modbus User Map view, but it is not editable from there. This setting can be edited only in the Communications Settings view in EnerVista MM300/MM200 Setup.

If this setting is set to something other than 0, that many number of User Map registers are shown on a green background in the User Map view to indicate that these are used for Profibus input data. This color-coding is done while showing all the User Map registers.

For example: If this setting is configured to a value of 5 registers then the Modbus User Map view in the setup software show 5 User Map registers on a different background color to indicate that these are used for Fieldbus Input data purposes.



Profibus DP

To enable the Profibus physical interface, ensure that switches 3 and 4 of the DIP switch on the communications card (on the CPU module) are ON, and that switches 1 and 2 are OFF. The external connections through the Fieldbus interface are as follows:

Table 4-1: Fieldbus interface external connections (Profibus)

Pin	Connection (external device)
V-	Pin 5
L	Pin 8, line A (negative TX/RX)
C	Common drain
H	Pin 3, line B (positive TX/RX)
V+	Pin 6

Table 4-2: DB9 signal pin applicability to MM300

DB9 pin (external device)	MM300 pin	Signal	Description
1	C	(shield)	Shield or potential equalization
2	No connection	M24	Ground of 24V power supply
3	H	RxD/TxD-P	Receive/Transmit data; line B (red)
4	No connection	CNTR-P	Repeater control
5	V-	DGND	Data ground (reference voltage to VP) ¹
6	V+	VP	Power supply*
7	No connection	P24	+24V power supply
8	L	RxD/TxD-N	Receive/Transmit data; line A (green)
9	No connection	CNTR-N	Repeater control

1.The MM300 can accept an external voltage level up to 24VDC on its V- and V+ terminals. Note that specifically for termination, the voltage must be reduced to 5V; refer to the Profibus Termination section below.

The Modbus status (MS) and network status (NS) LEDs indicate the status of the Fieldbus interface.

Table 4-3: Profibus LED indications

LED	Color	Description
MS	Green	Processor OK
	Off	Processor FAIL
NS	Green	Communications to master OK
	Red	Communications to master FAIL

When used for Profibus, the Fieldbus port has the following characteristics.

- Baud rate: 9600, 19200, 31250, 45450, 93750, 187500, 500000, and 1.5M bps (auto-detect) *
- Address: 1 to 126
- Vendor ID: 4D20 (hex)
- Data table size: inputs = 174 bytes, outputs = 2 bytes
- To be actioned, output bit must be 1 for a minimum time of 100 ms.

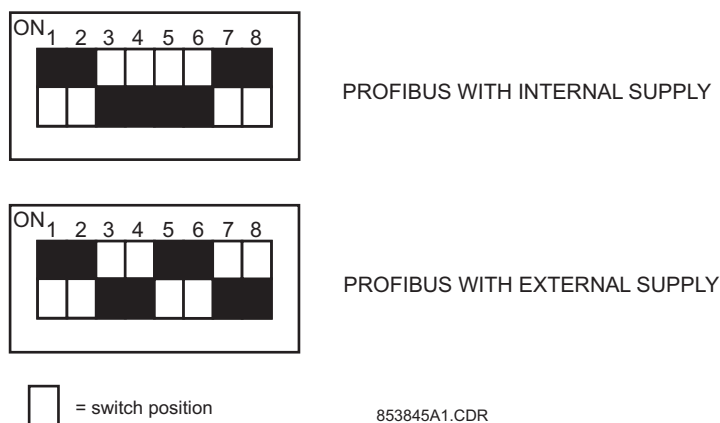
* Profibus communications will operate only in 1.5Mbps or auto-detect with the present implementation. Auto-detect includes baud rates 19.2 kbps, 187.5 kbps, 500 kbps, and 1.5 Mbps.

The Profibus DP Master must read the GSE (Device Master Data) file of the MM300 for the purposes of configuration and parameterization. The GSE file for the MM300 is named GEMU4D20.gse.

Profibus power supply configuration

The Profibus port has two modes of powering the electronics: internal or external. In internal mode, a local 5 V is used, so no external voltage is required (pin 1 and pin 5 of the connector). In external mode, the user must supply an external bus voltage on pin1 and pin 5 of the connector. Profibus is shipped from the factory configured for internal mode. Use the figures below to configure the the comms board power supply.

Figure 4-1: Comms board power supply configuration



Protocol Options				
	SW1	SW2	SW3	SW4
DeviceNet	ON	ON	OFF	OFF
Profibus	OFF	OFF	ON	ON

Supply Options				
	SW5	SW6	SW7	SW8
Internal Supply	ON	ON	OFF	OFF
External Supply	OFF	OFF	ON	ON



Other switch combinations are **not allowed**.

Profibus termination

Profibus segments should be terminated by a bus termination. The MM300 termination voltage is +5V and the connections are as follows:

Figure 4-2: Profibus termination



If the bus voltage level is higher, such as 24V, an external device must be used to drop the voltage to the required +5V termination level. The Procentec T1 Terminator or equivalent is suitable to provide proper termination to the MM300 from a 24V level.

Profibus DP-parameterization

The MM300 relay supports mandatory parametrization. The relay keeps its user parameter data / setpoints in a non-volatile memory and does not need device related parametrization during startup of the DP master. The EnerVista MM300 Setup software is the best tool for user parametrization of the MM300 device.

Profibus DP-configuration

The Profibus-DP basic configuration has one DP master and one DP slave. In a typical bus segment up to 32 stations can be connected (a repeater has to be used if more than 32 stations operate on a bus). The end nodes on a Profibus-DP network must be terminated to avoid reflections on the bus line.

The Profibus bus address (MAC ID) of the MM300 slave, which has a range from 1 to 126, can be set via the Profibus Address setting on the HMI from the **Home > Setpnts > Cfg > Comms** page or via the EnerVista MM300 Setup software. Address 126 is used only for commissioning purposes and should not be used to exchange user data.

The MM300 Motor Management System has autobaud support. The available baud rates and other slave specific information needed for configuration are contained in the "GEMU4D20.gse" file which is used by a network configuration program.

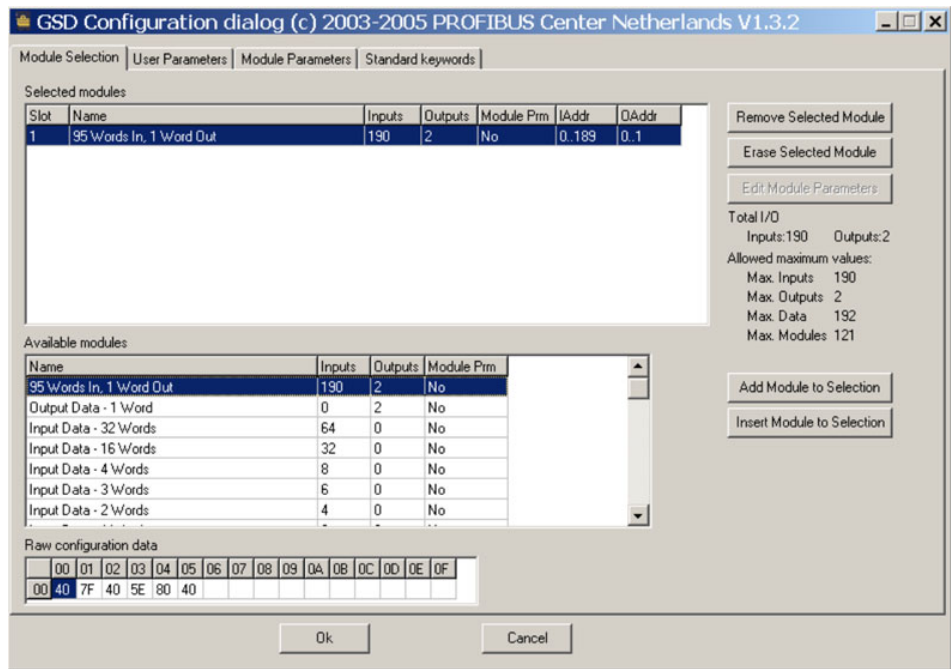
The MM300, as a DP slave, transfers fast process data to the DP master according to master-slave principle. The MM300 Motor Management System is a modular device, supporting up to 95 words of Input data and 1 word of Output (command) data.

Modules define a block size of Input and/or Output data to be read by the master, starting from offset zero. During the network configuration session, the "95 Words In, 1 Word Out" module can be selected in order to get all Input/Output data available in the MM300.

If the "95 Words In, 1 Word Out" module is not selected and a lower number of Input Data bytes is desired, modules with varying sizes of Input data are also provided in the GSE file. Adding modules in your Master configuration increases the size of the total block of data (starting from address zero) that the Master will read, allowing customization of the Input data size up to the maximum of 95 words.

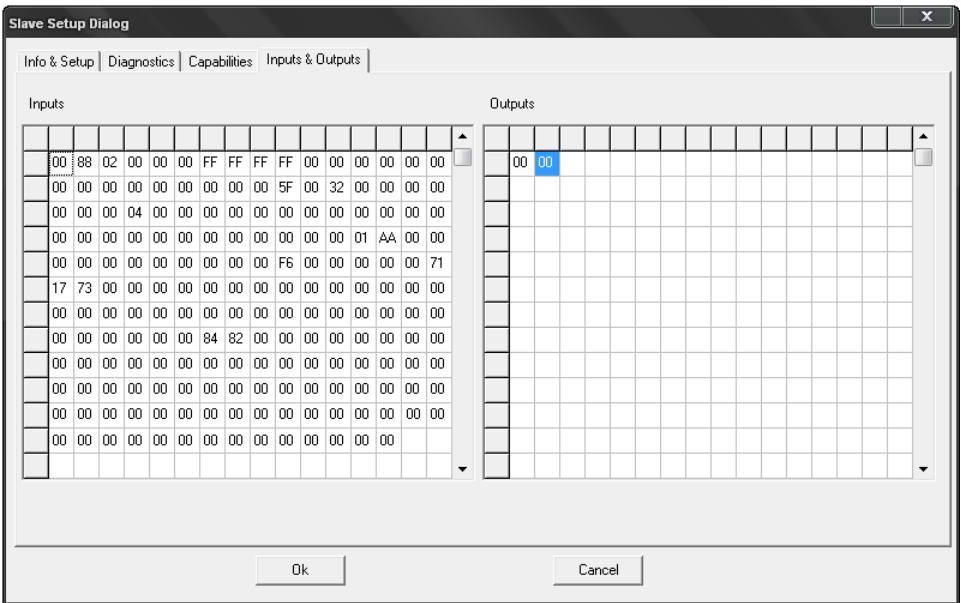
The following diagram shows a possible DP Master configuration menu. In this example, the full set of available MM300 input and output polled data ("95 Words In, 1 Word Out") has been selected from the available modules in the GSE file. As the maximum has been selected, no additional modules can be chosen:

Figure 4-3: Profibus configuration menu



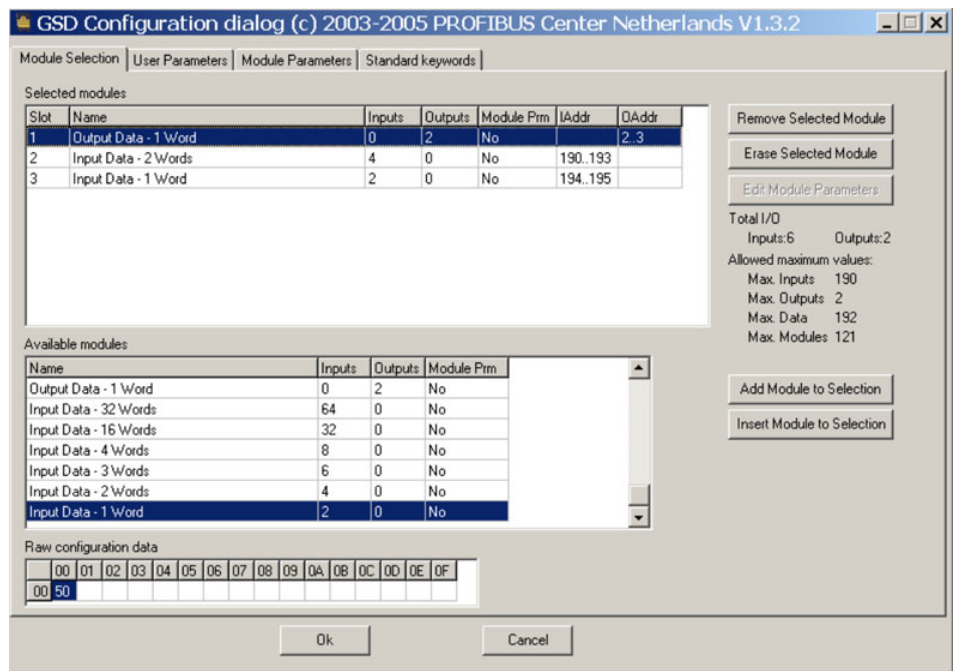
The diagram below shows the input and output data read from the MM300 with the configuration above

Figure 4-4: Profibus I/O data - 95 words in, 1 word out



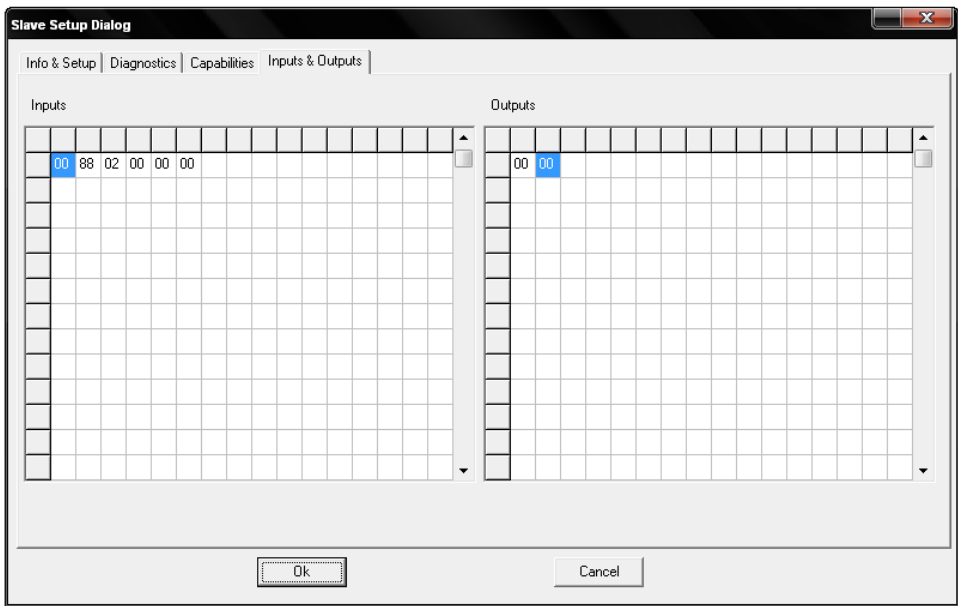
The following DP Master configuration menu shows how a smaller set of I/O poll data can be chosen from the available modules in the GSE file. In this example, a total of 3 words of input and 1 word of output polled data has been selected:

Figure 4-5: Profibus configuration menu



The diagram below shows the input and output data read from the MM300 with the configuration above. When a size of input data smaller than the maximum is configured, the data read from the MM300 by the master will start at address 0 of the Profibus Input Data table (refer to section 4.1.4) and provide data in the order shown in that table, up to the size configured. In this example, the data read via Input polling will consist of "Motor Status", "Extended Status", and Thermal Cap. Used".

Figure 4-6: Profibus I/O data - 3 words in, 1 word out



Profibus Input Data

Category	Address (By Bytes)	Length in Bytes	Description	Format
Status-Motor	0	2	Motor Status	FC129
	2	2	Extended Status	FC178
	4	2	Thermal Cap Used	F1
	6	4	Time to Overload Trip	F20
Start Blocks	10	2	Starts/Hour Block	F1
	12	2	Time Between Starts Lockout	F1B
	14	2	Restart Block Lockout	F1
Learned	16	2	Average Motor Load Learned	F3
	18	2	Learned Acceleration Time	F2
	20	4	Learned Starting Current	F10
	24	2	Learned Starting Capacity	F1
Counters	26	2	Number of Motor Starts	F1
	28	2	Number of UV Restarts	F1
	30	4	Motor Running Hours	F9
	34	2	Motor Stopped Hours	F1
Current Metering	36	4	Ia	F10
	40	4	Ib	F10
	44	4	Ic	F10
	48	4	Iavg	F10
	52	4	Igrd	F10
	56	2	Motor Load	F1
	58	2	Current Unbalance (I Unb)	F1
Voltage Metering	60	2	Vab	F1
	62	2	Vbc	F1
	64	2	Vca	F1
	66	2	Va1 Angle	F1
	68	2	Vb1 Angle	F1
	70	2	Vc1 Angle	F1
	72	2	Van	F1
	74	2	Vbn	F1
	76	2	Vcn	F1
	78	2	VAux	F1
	80	2	Frequency	F3
Power Metering	82	2	Power Factor	F21
	84	4	Real Power	F13
	88	4	Reactive Power	F13
	92	2	Apparent Power	F2
	94	4	MWh Consumption	F17
	98	4	Mvarh Consumption	F17
Sensor Metering	102	2	Hottest Stator RTD	F1
	104	2	Hottest Stator RTD Temp	F4
	106	2	RTD 1 Temp	F4
	108	2	RTD 2 Temp	F4
	110	2	RTD 3 Temp	F4

Category	Address (By Bytes)	Length in Bytes	Description	Format
	112	2	RTD 4 Temp	F4
	114	2	RTD 5 Temp	F4
	116	2	RTD 6 Temp	F4
Last Trip Data	118	2	Cause of Last Trip	FC134
	120	4	Date of Last Trip 2 words	F18
	124	4	Time of Last Trip 2 words	F19
	128	4	Pre Trip Ia	F10
	132	4	Pre Trip Ib	F10
	136	4	Pre Trip Ic	F10
	140	2	Pre Trip Motor Load	F1
	142	2	Pre Trip Current Unbalance	F1
	144	4	Pre Trip Igrd	F10
	148	2	Pre Trip Vab	F1
	150	2	Pre Trip Vbc	F1
	152	2	Pre Trip Vca	F1
	154	2	Pre Trip Van	F1
	156	2	Pre Trip Vbn	F1
	158	2	Pre Trip Vcn	F1
	160	2	Pre Trip System Frequency	F3
	162	4	Pre Trip Real Power	F13
	166	4	Pre Trip Reactive Power	F13
	170	2	Pre Trip Apparent Power	F2
	172	2	Pre Trip Power Factor	F21
Contact Inputs	174	4	Contact Input 32-1 (Bit Field)	FC167
Contact Outputs	178	4	Contact Output 32-1 (Bit Field)	FC167
Virtual Inputs	182	4	Virtual Input 32-1 (Bit Field)	FC167
Virtual Outputs	186	4	Virtual Output 32-1 (Bit Field)	FC167

Profibus Output Data

The capability to reset, stop, and start the motor has been made available via the Profibus Output data. Because polled output data is continuously written to the slave device, the MM300 looks for a change in the value to execute any command.

Byte	Value		Description
	Dec	Hex	
0	0	0x00	Reserved Byte

Byte	Value		Description
	Dec	Hex	
1	1	0x01	Reset
	2	0x02	Lockout Reset
	4	0x04	Stop
	8	0x08	Start A
	16	0x10	Start B
	66	0x42	Clear Last Trip Data Prompt
	67	0x43	Reset MWh and Mvarh Meters
	68	0x44	Clear Counters
	69	0x45	Clear Event Records
	70	0x46	Clear Waveform Data
	71	0x47	Clear Maintenance Timer
	72	0x48	Clear RTD Maximums
	73	0x49	Reset Motor Information
	74	0x4A	Auto Mode
	75	0x4B	Manual Mode
	80	0x50	Trigger Waveform Capture
	81	0x51	Start Datalog
	82	0x52	Stop Datalog

Profibus DPV0-Diagnostics

The MM300 supports both slave mandatory (6 bytes system-wide standardized) and slave specific extended diagnostic data. If the diagnostics are considered high priority, the PLC/host program will be informed of the fault (alarm, trip, command, or message) and can call a special error routine. When no extended diagnostic information is available and the master initiates a diagnostics read, only the six standard slave mandatory bytes are read, formatted as follows:

Table 4-4: System Standard Diagnostics Bytes 1 through 6

Byte	Description	Measured Value
1	Station Status 1	0x08
2	Station Status 2	0x0C
3	Station Status 3	0x00
4	Diagnostic Master Address	0x7D
5	Identification Number (High Byte)	0x0C
6	Identification Number (Low Byte)	0x52

Table 4-5: DPV0 diagnostic alarms

		Byte	Bit	GSE Bit #		Ext. Diag Byte
	Standard Diagnosis	0			Station Status 1	
		1			Station Status 2	
		2			Station Status 3	
		3			Master Address	
		4			Man Id	
		5			Man Id	
		6			Length	0

		Byte	Bit	GSE Bit #		Ext. Diag Byte
		7	0	0	Reserved	1
		7	1	1	Reserved	1
		7	2	2	Reserved	1
		7	3	3	Reserved	1
		7	4	4	Reserved	1
		7	5	5	Reserved	1
		7	6	6	Reserved	1
		7	7	7	Reserved	1
		8	0	8	Reserved	2
		8	1	9	Reserved	2
		8	2	10	Reserved	2
		8	3	11	Reserved	2
		8	4	12	Reserved	2
		8	5	13	Reserved	2
		8	6	14	Reserved	2
		8	7	15	Reserved	2
		9	0	16	Reserved	3
		9	1	17	Reserved	3
		9	2	18	Reserved	3
		9	3	19	Reserved	3
		9	4	20	Reserved	3
		9	5	21	Reserved	3
		9	6	22	Reserved	3
		9	7	23	Reserved	3
0		10	0	24	Reserved	4
1		10	1	25	Reserved	4
2		10	2	26	Reserved	4
3		10	3	27	Reserved	4
4		10	4	28	Reserved	4
5		10	5	29	Reserved	4
6		10	6	30	Reserved	4
7		10	7	31	Reserved	4
8		11	0	32	Reserved	5
9		11	1	33	Reserved	5
10		11	2	34	Reserved	5
11		11	3	35	Reserved	5
12		11	4	36	Reserved	5
13		11	5	37	Reserved	5
14		11	6	38	Reserved	5
15		11	7	39	Reserved	5
16		12	0	40	Reserved	6
17		12	1	41	Reserved	6
18		12	2	42	Reserved	6
19		12	3	43	Reserved	6
20		12	4	44	Reserved	6

		Byte	Bit	GSE Bit #		Ext. Diag Byte
21		12	5	45	Reserved	6
22		12	6	46	Reserved	6
23		12	7	47	Reserved	6
24		13	0	48	Reserved	7
25		13	1	49	Reserved	7
26		13	2	50	Reserved	7
27		13	3	51	Reserved	7
28		13	4	52	Reserved	7
29		13	5	53	Reserved	7
30		13	6	54	Reserved	7
31		13	7	55	Reserved	7
32		14	0	56	Reserved	8
33		14	1	57	Reserved	8
34		14	2	58	Reserved	8
35		14	3	59	Reserved	8
36		14	4	60	Reserved	8
37		14	5	61	Reserved	8
38		14	6	62	Reserved	8
39		14	7	63	Reserved	8
40		15	0	64	Reserved	9
41		15	1	65	Reserved	9
42		15	2	66	Reserved	9
43		15	3	67	Reserved	9
44		15	4	68	Reserved	9
45		15	5	69	Reserved	9
46		15	6	70	Reserved	9
47		15	7	71	Reserved	9
48		16	0	72	Reserved	10
49		16	1	73	Reserved	10
50		16	2	74	Reserved	10
51		16	3	75	Reserved	10
52		16	4	76	Reserved	10
53		16	5	77	Reserved	10
54		16	6	78	Reserved	10
55		16	7	79	Reserved	10
56		17	0	80	"Aux U/V Trip"	11
57		17	1	81	"Emergency Stop"	11
58		17	2	82	"Fuse Fail Trip"	11
59		17	3	83	"OpenControl Circuit"	11
60		17	4	84	"Thermistor Trip"	11
61		17	5	85		11
62		17	6	86		11
63		17	7	87	"Self Test Trip"	11
64		18	0	88	"Process I Lock F Trip"	12
65		18	1	89	"Process I Lock G Trip"	12

		Byte	Bit	GSE Bit #		Ext. Diag Byte
66		18	2	90	"Process I Lock H Trip"	12
67		18	3	91	"Process I Lock I Trip"	12
68		18	4	92	"Process I Lock J Trip"	12
69		18	5	93	"Hard Wired Trip"	12
70		18	6	94	"Field Trip"	12
71		18	7	95	"MCC Trip"	12
72		19	0	96	"RTD 6 Trip"	13
73		19	1	97	"Comm Fail Trip"	13
74		19	2	98	"Relay Not Configured"	13
75		19	3	99	"Process I Lock A Trip"	13
76		19	4	100	"Process I Lock B Trip"	13
77		19	5	101	"Process I Lock C Trip"	13
78		19	6	102	"Process I Lock D Trip"	13
79		19	7	103	"Process I Lock E Trip"	13
80		20	0	104	"Mechanical Jam Trip"	14
81		20	1	105	"UnderCurrent Trip"	14
82		20	2	106	"Unbalance Trip"	14
83		20	3	107	"RTD 1 Trip"	14
84		20	4	108	"RTD 2 Trip"	14
85		20	5	109	"RTD 3 Trip"	14
86		20	6	110	"RTD 4 Trip"	14
87		20	7	111	"RTD 5 Trip"	14
88		21	0	112	"Any Trip"	15
89		21	1	113	"Thermal O/L Trip"	15
90		21	2	114	"Ground Fault Trip"	15
91		21	3	115	"Acceleration Trip"	15
92		21	4	116	"Phase Reversal Trip"	15
93		21	5	117	"UnderPower Trip"	15
94		21	6	118	"UnderVoltage Trip"	15
95		21	7	119	"OverVoltage Trip"	15
96		22	0	120	Reserved	16
97		22	1	121	Reserved	16
98		22	2	122	Reserved	16
99		22	3	123	Reserved	16
100		22	4	124	Reserved	16
101		22	5	125	Reserved	16
102		22	6	126	Reserved	16
103		22	7	127	Reserved	16
104		23	0	128	Reserved	17
105		23	1	129	Reserved	17
106		23	2	130	Reserved	17
107		23	3	131	Reserved	17
108		23	4	132	Reserved	17
109		23	5	133	Reserved	17
110		23	6	134	Reserved	17

		Byte	Bit	GSE Bit #		Ext. Diag Byte
111		23	7	135	Reserved	17
112		24	0	136	Reserved	18
113		24	1	137	Reserved	18
114		24	2	138	Reserved	18
115		24	3	139	Reserved	18
116		24	4	140	Reserved	18
117		24	5	141	Reserved	18
118		24	6	142	Reserved	18
119		24	7	143	Reserved	18
120		25	0	144	Reserved	19
121		25	1	145	Reserved	19
122		25	2	146	Reserved	19
123		25	3	147	Reserved	19
124		25	4	148	Reserved	19
125		25	5	149	Reserved	19
126		25	6	150	Reserved	19
127		25	7	151	Reserved	19
128		26	0	152	Reserved	20
129		26	1	153	Reserved	20
130		26	2	154	Reserved	20
131		26	3	155	Reserved	20
132		26	4	156	Reserved	20
133		26	5	157	Reserved	20
134		26	6	158	Reserved	20
135		26	7	159	Reserved	20
136		27	0	160	Reserved	21
137		27	1	161	"Self Test Alarm"	21
138		27	2	162	"Comm Fail Alarm"	21
139		27	3	163	Reserved	21
140		27	4	164	Reserved	21
141		27	5	165	Reserved	21
142		27	6	166	Reserved	21
143		27	7	167	Reserved	21
144		28	0	168	"Welded Contactor"	22
145		28	1	169	Reserved	22
146		28	2	170	Reserved	22
147		28	3	171	Reserved	22
148		28	4	172	"Load Increase Alarm"	22
149		28	5	173	"Drive Greasing Alarm"	22
150		28	6	174	"Contactor Inspect Alarm"	22
151		28	7	175	"Max Stopped Alarm"	22
152		29	0	176	"Aux U/V Alarm"	23
153		29	1	177	"External Stop Alarm"	23
154		29	2	178	"Fuse Fail Alarm"	23
155		29	3	179	"Open Ctrl Cct Alarm"	23

		Byte	Bit	GSE Bit #		Ext. Diag Byte
156		29	4	180	"Thermistor Alarm"	23
157		29	5	181	Reserved	23
158		29	6	182	"External Start A Alarm"	23
159		29	7	183	"External Start B Alarm"	23
160		30	0	184	"Process I Lock F Alarm"	24
161		30	1	185	"Process I Lock G Alarm"	24
162		30	2	186	"Process I Lock H Alarm"	24
163		30	3	187	"Process I Lock I Alarm"	24
164		30	4	188	"Process I Lock J Alarm"	24
165		30	5	189	"Drive Failed to Start"	24
166		30	6	190	"Inverter Failed"	24
167		30	7	191	"Drive Stop Failed"	24
168		31	0	192	"RTD 6 Alarm"	25
169		31	1	193	Reserved	25
170		31	2	194	"RTD Open/Short Alarm"	25
171		31	3	195	"Process I Lock A Alarm"	25
172		31	4	196	"Process I Lock B Alarm"	25
173		31	5	197	"Process I Lock C Alarm"	25
174		31	6	198	"Process I Lock D Alarm"	25
175		31	7	199	"Process I Lock E Alarm"	25
176		32	0	200	Reserved	26
177		32	1	201	"UnderCurrent Alarm"	26
178		32	2	202	"Unbalance Alarm"	26
179		32	3	203	"RTD 1 Alarm"	26
180		32	4	204	"RTD 2 Alarm"	26
181		32	5	205	"RTD 3 Alarm"	26
182		32	6	206	"RTD 4 Alarm"	26
183		32	7	207	"RTD 5 Alarm"	26
184		33	0	208	"Any Alarm"	27
185		33	1	209	"Thermal Level Alarm"	27
186		33	2	210	"Ground Fault Alarm"	27
187		33	3	211	"Acceleration Alarm"	27
188		33	4	212	"Phase Reversal Alarm"	27
189		33	5	213	"UnderPower Alarm"	27
190		33	6	214	"UnderVoltage Alarm"	27
191		33	7	215	"OverVoltage Alarm"	27
192		34	0	216	Reserved	28
193		34	1	217	Reserved	28
194		34	2	218	Reserved	28
195		34	3	219	Reserved	28
196		34	4	220	Reserved	28
197		34	5	221	Reserved	28
198		34	6	222	Reserved	28
199		34	7	223	Reserved	28
200		35	0	224	Reserved	29

		Byte	Bit	GSE Bit #		Ext. Diag Byte
201		35	1	225	Reserved	29
202		35	2	226	Reserved	29
203		35	3	227	Reserved	29
204		35	4	228	Reserved	29
205		35	5	229	Reserved	29
206		35	6	230	Reserved	29
207		35	7	231	Reserved	29
208		36	0	232	Reserved	30
209		36	1	233	Reserved	30
210		36	2	234	Reserved	30
211		36	3	235	Reserved	30
212		36	4	236	Reserved	30
213		36	5	237	Reserved	30
214		36	6	238	Reserved	30
215		36	7	239	Reserved	30
216		37	0	240	Reserved	31
217		37	1	241	Reserved	31
218		37	2	242	Reserved	31
219		37	3	243	Reserved	31
220		37	4	244	Reserved	31
221		37	5	245	Reserved	31
222		37	6	246	Reserved	31
223		37	7	247	Reserved	31
224		38	0	248	Reserved	32
225		38	1	249	Reserved	32
226		38	2	250	Reserved	32
227		38	3	251	Reserved	32
228		38	4	252	Reserved	32
229		38	5	253	Reserved	32
230		38	6	254	Reserved	32
231		38	7	255	Reserved	32
232		39	0	256	Reserved	33
233		39	1	257	Reserved	33
234		39	2	258	Reserved	33
235		39	3	259	"Comm Stop"	33
236		39	4	260	"Fuse Fail Inhibit"	33
237		39	5	261	"Phase Reversal Inhibit"	33
238		39	6	262	"Low Aux Voltage Inhibit"	33
239		39	7	263	"UV Restart Inhibit"	33
240		40	0	264	Reserved	34
241		40	1	265	Reserved	34
242		40	2	266	Reserved	34
243		40	3	267	Reserved	34
244		40	4	268	"UV Restart"	34
245		40	5	269	Reserved	34

		Byte	Bit	GSE Bit #		Ext. Diag Byte
246		40	6	270	Reserved	34
247		40	7	271	Reserved	34
248		41	0	272	Reserved	35
249		41	1	273	Reserved	35
250		41	2	274	Reserved	35
251		41	3	275	Reserved	35
252		41	4	276	Reserved	35
253		41	5	277	Reserved	35
254		41	6	278	Reserved	35
255		41	7	279	Reserved	35
256		42	0	280	"Process I Lock F Stop"	36
257		42	1	281	"Process I Lock G Stop"	36
258		42	2	282	"Process I Lock H Stop"	36
259		42	3	283	"Process I Lock I Stop"	36
260		42	4	284	"Process I Lock J Stop"	36
261		42	5	285	"HW Stop"	36
262		42	6	286	"Field Stop"	36
263		42	7	287	"MCC Stop"	36
264		43	0	288	Reserved	37
265		43	1	289	Reserved	37
266		43	2	290	Reserved	37
267		43	3	291	"Process I Lock A Stop"	37
268		43	4	292	"Process I Lock B Stop"	37
269		43	5	293	"Process I Lock C Stop"	37
270		43	6	294	"Process I Lock D Stop"	37
271		43	7	295	"Process I Lock E Stop"	37
272		44	0	296	"Forward Limit"	38
273		44	1	297	"Reverse Limit"	38
274		44	2	298	"Starts/Hr Inhibit"	38
275		44	3	299	"Time Between Inhibit"	38
276		44	4	300	Reserved	38
277		44	5	301	Reserved	38
278		44	6	302	Reserved	38
279		44	7	303	Reserved	38
280		45	0	304	"Any Stop"	39
281		45	1	305	"Thermal Inhibit"	39
282		45	2	306	Reserved	39
283		45	3	307	Reserved	39
284		45	4	308	Reserved	39
285		45	5	309	"Restart Inhibit"	39
286		45	6	310	Reserved	39
287		45	7	311	Reserved	39
288		46	0	312	Reserved	40
289		46	1	313	Reserved	40
290		46	2	314	Reserved	40

		Byte	Bit	GSE Bit #		Ext. Diag Byte
291		46	3	315	Reserved	40
292		46	4	316	Reserved	40
293		46	5	317	Reserved	40
294		46	6	318	Reserved	40
295		46	7	319	Reserved	40
296		47	0	320	Reserved	41
297		47	1	321	Reserved	41
298		47	2	322	Reserved	41
299		47	3	323	Reserved	41
300		47	4	324	Reserved	41
301		47	5	325	Reserved	41
302		47	6	326	Reserved	41
303		47	7	327	Reserved	41
304		48	0	328	Reserved	42
305		48	1	329	Reserved	42
306		48	2	330	Reserved	42
307		48	3	331	Reserved	42
308		48	4	332	Reserved	42
309		48	5	333	Reserved	42
310		48	6	334	Reserved	42
311		48	7	335	Reserved	42
312		49	0	336	Reserved	43
313		49	1	337	Reserved	43
314		49	2	338	Reserved	43
315		49	3	339	Reserved	43
316		49	4	340	Reserved	43
317		49	5	341	Reserved	43
318		49	6	342	Reserved	43
319		49	7	343	Reserved	43
320		50	0	344	Reserved	44
321		50	1	345	Reserved	44
322		50	2	346	Reserved	44
323		50	3	347	Reserved	44
324		50	4	348	Reserved	44
325		50	5	349	Reserved	44
326		50	6	350	Reserved	44
327		50	7	351	Reserved	44
328		51	0	352	Reserved	45
329		51	1	353	Reserved	45
330		51	2	354	Reserved	45
331		51	3	355	Reserved	45
332		51	4	356	Reserved	45
333		51	5	357	Reserved	45
334		51	6	358	Reserved	45
335		51	7	359	Reserved	45

		Byte	Bit	GSE Bit #		Ext. Diag Byte
336		52	0	360	Reserved	46
337		52	1	361	Reserved	46
338		52	2	362	Reserved	46
339		52	3	363	Reserved	46
340		52	4	364	Reserved	46
341		52	5	365	Reserved	46
342		52	6	366	Reserved	46
343		52	7	367	Reserved	46
344		53	0	368	Reserved	47
345		53	1	369	Reserved	47
346		53	2	370	Reserved	47
347		53	3	371	Reserved	47
348		53	4	372	Reserved	47
349		53	5	373	Reserved	47
350		53	6	374	Reserved	47
351		53	7	375	Reserved	47
352		54	0	376	Reserved	48
353		54	1	377	Reserved	48
354		54	2	378	Reserved	48
355		54	3	379	Reserved	48
356		54	4	380	Reserved	48
357		54	5	381	Reserved	48
358		54	6	382	Reserved	48
359		54	7	383	Reserved	48
360		55	0	384	Reserved	49
361		55	1	385	Reserved	49
362		55	2	386	Reserved	49
363		55	3	387	Reserved	49
364		55	4	388	Reserved	49
365		55	5	389	Reserved	49
366		55	6	390	Reserved	49
367		55	7	391	Reserved	49
368		56	0	392	Reserved	50
369		56	1	393	Reserved	50
370		56	2	394	Reserved	50
371		56	3	395	"IO Input Overvoltage"	50
372		56	4	396	"IO Frequency Error"	50
373		56	5	397	Reserved	50
374		56	6	398	Reserved	50
375		56	7	399	Reserved	50
376		57	0	400	"Internal Temperature High"	51
377		57	1	401	"IO Communication Failure"	51
378		57	2	402	"Metering Failure"	51
379		57	3	403	Reserved	51
380		57	4	404	"Clock Error"	51

		Byte	Bit	GSE Bit #		Ext. Diag Byte
381		57	5	405	"Calibration Error"	51
382		57	6	406	"EEPROM Error"	51
383		57	7	407	"IO Input Read Error"	51
384		58	0	408	Reserved	52
385		58	1	409	Reserved	52
386		58	2	410	Reserved	52
387		58	3	411	Reserved	52
388		58	4	412	Reserved	52
389		58	5	413	Reserved	52
390		58	6	414	Reserved	52
391		58	7	415	Reserved	52
392		59	0	416	Reserved	53
393		59	1	417	Reserved	53
394		59	2	418	Reserved	53
395		59	3	419	Reserved	53
396		59	4	420	Reserved	53
397		59	5	421	Reserved	53
398		59	6	422	Reserved	53
399		59	7	423	Reserved	53
400		60	0	424	Reserved	54
401		60	1	425	Reserved	54
402		60	2	426	Reserved	54
403		60	3	427	Reserved	54
404		60	4	428	Reserved	54
405		60	5	429	Reserved	54
406		60	6	430	Reserved	54
407		60	7	431	Reserved	54
408		61	0	432	Reserved	55
409		61	1	433	"Transfer Timer"	55
410		61	2	434	"FLA Not Set"	55
411		61	3	435	"CT Type Not Set"	55
412		61	4	436	"Starter Type Not Set"	55
413		61	5	437	"No Control Source"	55
414		61	6	438	"Clock Not Set"	55
415		61	7	439	"FLA Too High"	55

The following diagram shows an example of the extended diagnostic data sent to the Profibus master by the MM300. The extended diagnostic data is only provided when one of the states listed in the above extended diagnostic table has become true. In this example, the extended diagnostic data has been sent because the "External Start A Alarm" is active. Such a case would occur when the motor status is running, but no Start A control was issued by the MM300. In this case, multiple alarms have occurred in the MM300, including one that indicates that FLA is not set.

Figure 4-7: Profibus - extended diagnostic data

Info Panel

Frame structure: SD2 message
Source address: 7
Model Name: MM300 Motor Management System
Destination address: 125
Frame type: Response message

PROFIBUS DPV0 Message
Get Diagnostics (Con/Res)
Status bits
Ext_diag_0bit
Watchdog-run
Master_Ack: 125
Ident_Number: 0C52 (hex)
Extended diagnostics: (56 bytes)
Contains 2 diagnostic blocks.
Block 0: Device related (40 bytes)
20 02 00 00 00 00 00 00
00 00 00 02 00 00 00 00
01 00 00 00 00 00 00 00
00 00 00 00
Block 1: Device related (16 bytes)
10 01 00 00 00 00 00 00
00 00 00 00 00 00 00 00
Additional diag. info. (from GSD)
Get_Less_Alarm = 1
Any_Alarm = 1

Live list

Messages

Messages (with view filter applied)

Station statistics view

Data inspection

Setup Search

Search Up

Search Down

FrameNr	Timestamp	Attention	Frame	Addr	Service	Msg type	Req/Res	SAPS	DataL
833206	8-Jun-2009 15:45:48.218	SD2		125->7	SD2_HIGH	Get Diagnostics	Req	62->60	0
833207	8-Jun-2009 15:45:48.218	SD2		125<-7	DL	Get Diagnostics	Res	62<-60	62
833237	8-Jun-2009 15:45:48.228	SD2		125->7	SD2_LOW	DPV1_Alarm_Ack_Req	Req	51->51	4
833368	8-Jun-2009 15:45:48.269	SD2		125<-7	DL	DPV1_Alarm_Ack_Res	Res	51<-51	4
833377	8-Jun-2009 15:45:48.271	SD2		125->7	SD2_LOW	DPV1_Alarm_Ack_Req	Req	51->51	4
833486	8-Jun-2009 15:45:48.309	SD2		125<-7	DL	DPV1_Alarm_Ack_Res	Res	51<-51	4
833517	8-Jun-2009 15:45:48.321	SD2		125->7	SD2_HIGH	Get Diagnostics	Req	62->60	0
833518	8-Jun-2009 15:45:48.321	SD2		125<-7	DL	Get Diagnostics	Res	62<-60	62
833529	8-Jun-2009 15:45:48.326	SD2		125->7	SD2_LOW	DPV1_Alarm_Ack_Req	Req	51->51	4
833632	8-Jun-2009 15:45:48.362	SD2		125<-7	DL	DPV1_Alarm_Ack_Res	Res	51<-51	4
833639	8-Jun-2009 15:45:48.368	SD2		125->7	SD2_LOW	DPV1_Alarm_Ack_Req	Req	51->51	4
833742	8-Jun-2009 15:45:48.402	SD2		125<-7	DL	DPV1_Alarm_Ack_Res	Res	51<-51	4
1118329	8-Jun-2009 15:47:28.752	SD2		125->7	SD2_HIGH	Get Diagnostics	Req	62->60	0
1118330	8-Jun-2009 15:47:28.752	SD2		125<-7	DL	Get Diagnostics	Res	62<-60	62
1118360	8-Jun-2009 15:47:28.762	SD2		125->7	SD2_LOW	DPV1_Alarm_Ack_Req	Req	51->51	4
1118493	8-Jun-2009 15:47:28.803	SD2		125<-7	DL	DPV1_Alarm_Ack_Res	Res	51<-51	4
1118501	8-Jun-2009 15:47:28.805	SD2		125->7	SD2_LOW	DPV1_Alarm_Ack_Req	Req	51->51	4
1118614	8-Jun-2009 15:47:28.849	SD2		125<-7	DL	DPV1_Alarm_Ack_Res	Res	51<-51	4
1121157	8-Jun-2009 15:47:29.802	SD2		125->7	SD2_HIGH	Get Diagnostics	Req	62->60	0
1121158	8-Jun-2009 15:47:29.802	SD2		125<-7	DL	Get Diagnostics	Res	62<-60	62
1121169	8-Jun-2009 15:47:29.806	SD2		125->7	SD2_LOW	DPV1_Alarm_Ack_Req	Req	51->51	4
1121290	8-Jun-2009 15:47:29.847	SD2		125<-7	DL	DPV1_Alarm_Ack_Res	Res	51<-51	4
1121297	8-Jun-2009 15:47:29.849	SD2		125->7	SD2_LOW	DPV1_Alarm_Ack_Req	Req	51->51	4
1121400	8-Jun-2009 15:47:29.886	SD2		125<-7	DL	DPV1_Alarm_Ack_Res	Res	51<-51	4

<

>

00: 08 0C 08 7B 0C 52 28 02

00 00 00 00 00 00 00 00

00 00 00 00 00 00 00 00

00 00 00 02 00 00 00 00

20: 00 01 00 00 00 00 00 00

00 00 00 00 00 00 10 01

00 00 00 00 00 00 00 00

00 00 00 09 00 00 00 00

Profibus DPV1

The MM300 relay also supports DPV1 extensions. The device supports Class 1 and Class 2 acyclic reads and writes as well as DPV1 Diagnostics.

Profibus DPV1-Acyclic read/write data

The motor status data can be read acyclically by retrieving the byte lengths indicated below from the relevant Object, Slot, Index.

Table 4-6: DPV1 Acyclic read data

Category	Object	Slot	Index	Length (in Bytes)	Data Item	Format
Status-Motor	0	0	0	2	Motor Status	FC129
	0	0	2	2	Extended Status	FC178
	0	0	4	2	Thermal Cap Used	F1
	0	0	6	4	Time to Overload Trip	F20
Start Blocks	0	0	10	2	Starts/Hour Block	F1
	0	0	12	2	Time Between Starts Lockout	F1B
	0	0	14	2	Restart Block Lockout	F1
Learned	0	0	16	2	Average Motor Load Learned	F3
	0	0	18	2	Learned Acceleration Time	F2
	0	0	20	4	Learned Starting Current	F10
	0	0	24	2	Learned Starting Capacity	F1
Counters	0	0	26	2	Number of Motor Starts	F1
	0	0	28	2	Number of UV Restarts	F1
	0	0	30	4	Motor Running Hours	F9
	0	0	34	2	Motor Stopped Hours	F1
Current Metering	0	0	36	4	Ia	F10
	0	0	40	4	Ib	F10
	0	0	44	4	Ic	F10
	0	0	48	4	Iavg	F10
	0	0	52	4	Igrd	F10
	0	0	56	2	Motor Load	F1
	0	0	58	2	Current Unbalance (I Unb)	F1
Voltage Metering	0	0	60	2	Vab	F1
	0	0	62	2	Vbc	F1
	0	0	64	2	Vca	F1
	0	0	66	2	Va1 Angle	F1
	0	0	68	2	Vb1 Angle	F1
	0	0	70	2	Vc1 Angle	F1
	0	0	72	2	Van	F1
	0	0	74	2	Vbn	F1
	0	0	76	2	Vcn	F1
	0	0	78	2	VAux	F1
	0	0	80	2	Frequency	F3

Category	Object	Slot	Index	Length (in Bytes)	Data Item	Format
Power Metering	0	0	82	2	Power Factor	F21
	0	0	84	4	Real Power	F13
	0	0	88	4	Reactive Power	F13
	0	0	92	2	Apparent Power	F2
	0	0	94	4	MWh Consumption	F17
	0	0	98	4	Mvarh Consumption	F17
Sensor Metering	0	0	102	2	Hottest Stator RTD	F1
	0	0	104	2	Hottest Stator RTD Temp	F4
	0	0	106	2	RTD 1 Temp	F4
	0	0	108	2	RTD 2 Temp	F4
	0	0	110	2	RTD 3 Temp	F4
	0	0	112	2	RTD 4 Temp	F4
	0	0	114	2	RTD 5 Temp	F4
	0	0	116	2	RTD 6 Temp	F4
Last Trip Data	0	0	118	2	Cause of Last Trip	FC134
	0	0	120	4	Date of Last Trip 2 words	F18
	0	0	124	4	Time of Last Trip 2 words	F19
	0	0	128	4	Pre Trip Ia	F10
	0	0	132	4	Pre Trip Ib	F10
	0	0	136	4	Pre Trip Ic	F10
	0	0	140	2	Pre Trip Motor Load	F1
	0	0	142	2	Pre Trip Current Unbalance	F1
	0	0	144	4	Pre Trip Igrd	F10
	0	0	148	2	Pre Trip Vab	F1
	0	0	150	2	Pre Trip Vbc	F1
	0	0	152	2	Pre Trip Vca	F1
	0	0	154	2	Pre Trip Van	F1
	0	0	156	2	Pre Trip Vbn	F1
	0	0	158	2	Pre Trip Vcn	F1
	0	0	160	2	Pre Trip System Frequency	F3
	0	0	162	4	Pre Trip Real Power	F13
	0	0	166	4	Pre Trip Reactive Power	F13
	0	0	170	2	Pre Trip Apparent Power	F2
	0	0	172	2	Pre Trip Power Factor	F21
Contact Inputs	0	0	174	4	Contact Input 32-1 (Bit Field)	FC167
Contact Outputs	0	0	178	4	Contact Output 32-1 (Bit Field)	FC167
Virtual Inputs	0	0	182	4	Virtual Input 32-1 (Bit Field)	FC167
Virtual Outputs	0	0	186	4	Virtual Output 32-1 (Bit Field)	FC167

Table 4-7: DPV1 acyclic write data

Object	Slot	Index	Value		Description
			Dec	Hex	
0	0	0	1	0x01	Reset
0	0	0	2	0x02	Lockout Reset
0	0	0	4	0x04	Stop

Object	Slot	Index	Value		Description
			Dec	Hex	
0	0	0	8	0x08	Start A
0	0	0	16	0x10	Start B
0	0	0	66	0x42	Clear Last Trip Data Prompt
0	0	0	67	0x43	Reset MWh and Mvarh Meters
0	0	0	68	0x44	Clear Counters
0	0	0	69	0x45	Clear Event Records
0	0	0	70	0x46	Clear Waveform Data
0	0	0	71	0x47	Clear Maintenance Timer
0	0	0	72	0x48	Clear RTD Maximums
0	0	0	73	0x49	Reset Motor Information
0	0	0	74	0x4A	Auto Mode
0	0	0	75	0x4B	Manual Mode
0	0	0	80	0x50	Trigger Waveform Capture
0	0	0	81	0x51	Start Datalog
0	0	0	82	0x52	Stop Datalog

Extended Profibus DPV1 functionality

MM300 supports DP-V1 extended functionality (acyclic operations), which allows access to any memory mapped address, including:

- Actual Value reading
- Parameter reading
- Parameter writing
- Execute command

These operations can be started by a Profibus Master Class I or Class II using specific operations based on the DP-V1 slot and Index message parameters.

The maximum message size that can be exchanged through DPV1 is limited to 244 bytes (122 words).

The MM300 memory is mapped in 16 bits variables, thus, only communication data exchange with even data quantities is accepted.

The security functionality implemented on MM300 is strictly applicable. Parameter write access is controlled by passwords as defined in Security Section of the MM300 Instruction Manual.

Acyclic Read Operation (Modbus functions 03H and 04H)

Profibus DPV1 acyclic read operations can be executed against the complete memory map, as defined for Modbus communication. Due to the high number of variables and parameters that can be reached and the Profibus DPV1 limited address format, this access must be executed in the following way:

1. Define the memory address based on the Modbus Memory Map (0 based addressing)
2. Add code 3000H to access the Actual Values area or 4000H to access the Setpoint area
3. Split the composed 32 bits word found above (DWORD) into 2x16 bits words format
These words will be used to define the DP-V1 Slot (most significant word) and Index (least significant word).

Read Actual Value examples (Modbus function 04H):

Data to be Read	Actual Value Address (hex)	DPV1 Composed Address (hex)	DPV1 Parameters (hex)		Length (bytes)
			Slot	Index	
Product Information - firmware version	0002	$0002 + 3000 = 3002$	30	02	2
Product Information - serial number	0007	$0007 + 3000 = 3007$	30	07	12
Product Information - serial number and order code	0007 to 000D	$0007 + 3000 = 3007$	30	07	44
Last Trio Data - cause of last trip	00B9	$00B9 + 3000 = 30B9$	30	B9	2
Contact Status - Contact Input 7-1	01CH	$011C + 3000 = 311C$	31	1C	2
User Map Values 1 to 32	020B	$020B + 3000 = 320B$	32	0B	64

Read Set Point examples (Modbus function 03H):

Data to be Read	Setpoint Address (hex)	DPV1 Composed Address (hex)	DPV1 Parameters (hex)		Length (bytes)
			Slot	Index	
Communication Settings- slave address	00AB	$00AB + 4000 = 40AB$	40	AB	2
Motor Data Setup- motor name	011C	$011C + 4000 = 411C$	41	1C	20
Auto/Manual Control- all data	0623 - 0633	$0623 + 4000 = 4623$	46	23	17

Error codes:

Profibus DPV1 Error Code	Cause
Invalid slot	Wrong code was added to the slot. Ensure 3000H or 4000 was added to the memory map address issued to the device.
Invalid index	An invalid memory area was defined. It can be caused by a base invalid memory address or a request to read a reserved memory area. Ensure the base address is correct and that a valid length was specified.

Parameter Acyclic Write Operation (Modbus function 10H)

The DP-V1 addressing principle defined for reading operations is applicable for parameter acyclic writing. The only difference is that set point data address must be added to 1000H.

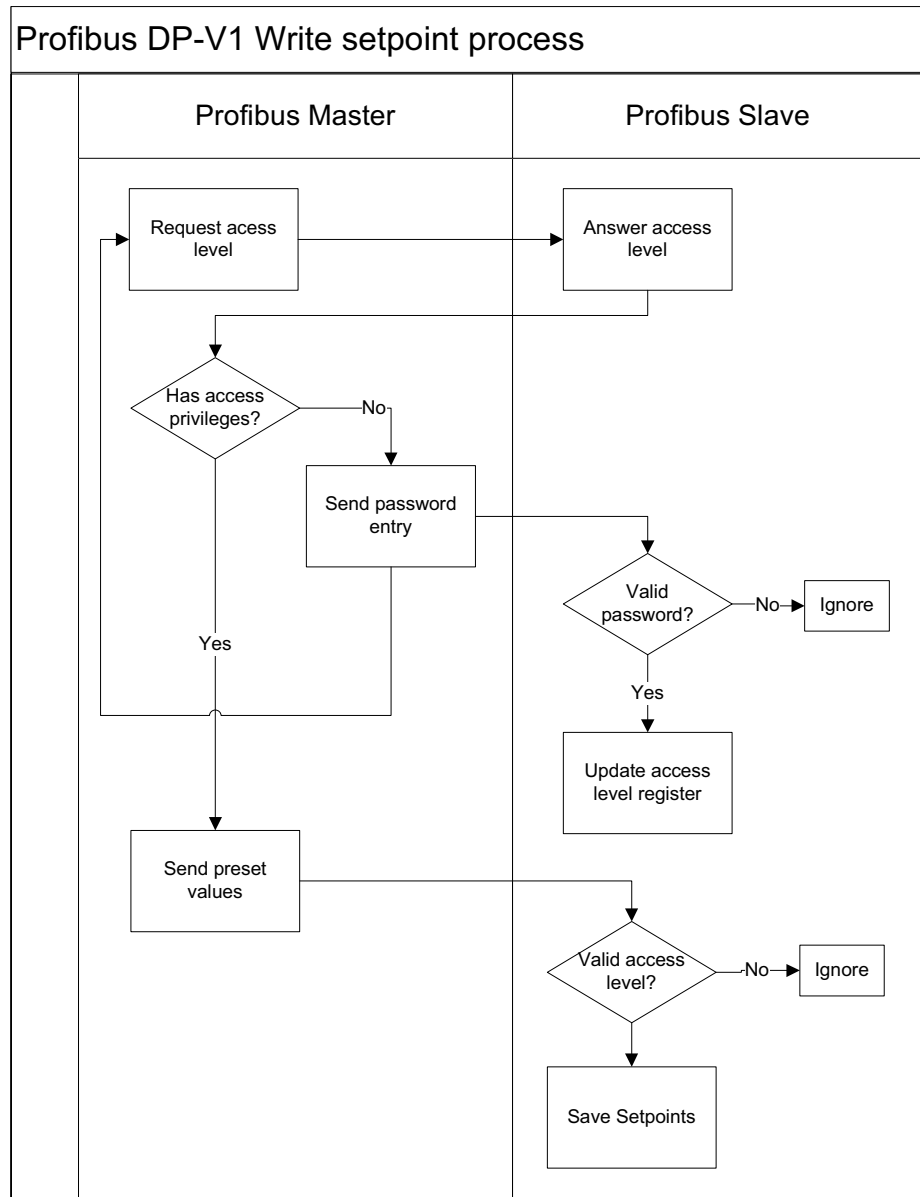
Write Set Point examples:

Data to be Read	Setpoint Address (hex)	DPV1 Composed Address (hex)	DPV1 Parameters (hex)		Length (bytes)
			Slot	Index	
Communication Settings- slave address	00AB	$00AB + 1000 = 10AB$	10	AB	2
Motor Data Setup- motor name	011C	$011C + 1000 = 111C$	11	1C	20
Security - passcode entry	0457	$0457 + 1000 = 1457$	14	57	2

The following sequence must be followed to issue a parameter set command when security is enabled.

Any rejected message, considering a valid address was defined, is answered with "Writing error" status.

When a valid password is received by the device, it enables the associated access level for 5 minutes. It's disabled automatically after this period. Also, it can be disabled when master issues a 0000H password entry.



Example: Request to change Modbus slave address id to 254: access level 1 is required (consider password 11111 (2B67 in hexadecimal format) allow access to security level 1).

Step	Direction	Description	Parameter Address (hex)	Profibus DPV1 Message (hex)			
				Slot	Index	Length (bytes)	Data
1	Master -> Slave	Request current security access level	012D	31	2D		None
	Slave -> Master	Answer: current security access level		31	2D	2	Access level
2	Master -> Slave	Send password	0457	14	57	2	2B 67
		entry					
	Slave -> Master	Write success		14	57	0	None
3	Master -> Slave	Request current security access level	012D	31	2D	2	None
	Slave -> Master	Answer: current security access level		31	2D	2	Access level
4	Master -> Slave	Send setpoint (e.g.: Modbus slave address)	00AB	50	AB	2	00 FE
	Slave -> Master	Write success		50	AB	0	None

Error codes:

Profibus DPV1 Error Code	Cause
Invalid slot	Wrong code was added to the slot. Ensure a valid mask was added to the memory map address issue to the device.
Invalid index	An invalid memory area was defined. Ensure the base address is correct and that a valid length was specified.
Writing error	Ensure a valid writing buffer length was defined without access to a reserved memory area. Also, check if a passcode message was issued previously. If a valid slot, index and length is supplied, the answer is always a Success message, even if access is forbidden. This behavior was designed as it to avoid Profibus Master blocking while waiting the device to process the message internally.

Execute Operation Command (Modbus function 05H)

The Execute Operation defined for Modbus function code 05H is also available as Profibus DP-V1 command. The command syntax has a fixed slot = 50H and index = 00H. The required command must be encoded as data values (16 bits).

The complete MM300 command set is available through this function. The original execute command table is copied here with corresponding Profibus DP-V1 format :

Operation Code (decimal)	Command	Profibus DPV1 (hex)			
		Slot	Index	Length (bytes)	Data
1	Reset	50	00	02	00 01
2	Lockout Reset	50	00	02	00 02
3	Stop	50	00	02	00 03
4	Start A	50	00	02	00 04
5	Start B	50	00	02	00 05
96	Clear Last Trip Data Prompt	50	00	02	00 60
97	Reset MWh and Mvarh Meters	50	00	02	00 61
99	Clear Counters	50	00	02	00 63
100	Clear Event Records	50	00	02	00 64

Operation Code (decimal)	Command	Profibus DPV1 (hex)			
		Slot	Index	Length (bytes)	Data
102	Clear Maintenance Info.	50	00	02	00 66
103	Clear Datalog	50	00	02	00 67
112	Clear RTD Maximums	50	00	02	00 70
113	Reset Motor Information	50	00	02	00 71
114	Auto Mode	50	00	02	00 72
115	Manual Mode	50	00	02	00 73
121	Start Datalog	50	00	02	00 79
122	Stop Datalog	50	00	02	00 7A

**Preset Single Register
(store single setpoint
– Modbus function
06H)**

The Preset Single Register Modbus function was implemented. The DP-V1 addressing principle defined for reading operations is applicable. The only difference is that set point data address must be added to 6000H.

Note that the security access procedure defined in the section PARAMETER ACYCLIC WRITE OPERATION must be followed.

Data to be read	Set Point address (hex)	DPV1 composed address (hex)	DPV1 Parameters (hex)		Length (bytes)
			Slot	Index	
Set Modbus address	00AB	00AB + 6000 = 60AB	60	AB	2
Set Current Sensing - CT Primary	010A	010A + 6000 = 610A	61	0A	2

Profibus DPV1-Diagnostics

MM300 DPV1 diagnosis data is structured as shown below:
The extended diagnosis consists of Process Alarms and Diagnostic Alarms.
Trip, Alarm, and Control status are categorized as Process Alarms, as these provide information pertaining to the Motor health that MM300 is controlling and monitoring. Messages are categorized as Diagnostic Alarms as these provide detailed MM300 diagnostic information.
The detailed message layout explaining what information each bit provides is as follows:

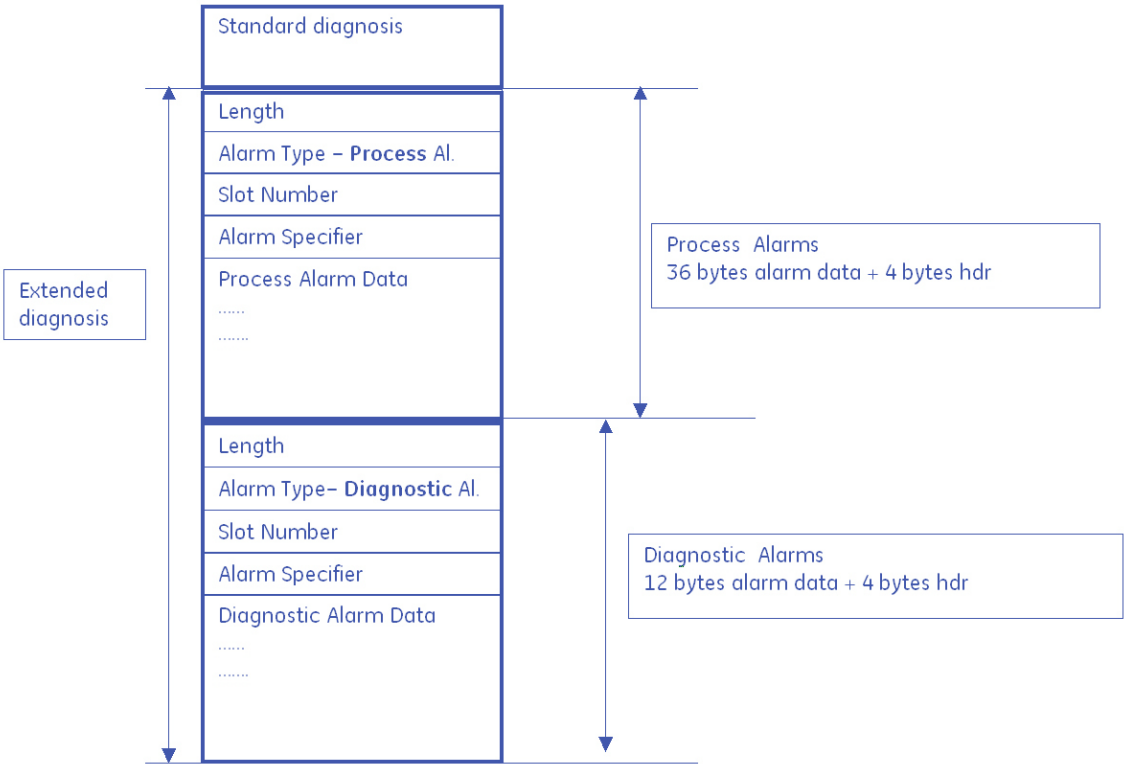


Table 4-8: DPV1 diagnostic alarms

		Byte	Bit	GSE Bit #		Ext. Diag Byte
	Standard Diagnosis	0			Station Status 1	
		1			Station Status 2	
		2			Station Status 3	
		3			Master Address	
		4			Man Id	
		5			Man Id	
		6			Length	0

		Byte	Bit	GSE Bit #		Ext. Diag Byte
	Alarm Type	7	0	0	Alarm Type - Process Alarm	1
		7	1	1		1
		7	2	2		1
		7	3	3		1
		7	4	4		1
		7	5	5		1
		7	6	6		1
		7	7	7		1
	Slot Number	8	0	8	Slot Number	2
		8	1	9		2
		8	2	10		2
		8	3	11		2
		8	4	12		2
		8	5	13		2
		8	6	14		2
		8	7	15		2
	Alarm Specifier	9	0	16	Alarm Specifier	3
		9	1	17		3
		9	2	18		3
		9	3	19		3
		9	4	20		3
		9	5	21		3
		9	6	22		3
		9	7	23		3
0		10	0	24	Reserved	4
1		10	1	25	Reserved	4
2		10	2	26	Reserved	4
3		10	3	27	Reserved	4
4		10	4	28	Reserved	4
5		10	5	29	Reserved	4
6		10	6	30	Reserved	4
7		10	7	31	Reserved	4
8		11	0	32	Reserved	5
9		11	1	33	Reserved	5
10		11	2	34	Reserved	5
11		11	3	35	Reserved	5
12		11	4	36	Reserved	5
13		11	5	37	Reserved	5
14		11	6	38	Reserved	5
15		11	7	39	Reserved	5
16		12	0	40	Reserved	6
17		12	1	41	Reserved	6
18		12	2	42	Reserved	6
19		12	3	43	Reserved	6
20		12	4	44	Reserved	6

		Byte	Bit	GSE Bit #		Ext. Diag Byte
21		12	5	45	Reserved	6
22		12	6	46	Reserved	6
23		12	7	47	Reserved	6
24		13	0	48	Reserved	7
25		13	1	49	Reserved	7
26		13	2	50	Reserved	7
27		13	3	51	Reserved	7
28		13	4	52	Reserved	7
29		13	5	53	Reserved	7
30		13	6	54	Reserved	7
31		13	7	55	Reserved	7
32		14	0	56	Reserved	8
33		14	1	57	Reserved	8
34		14	2	58	Reserved	8
35		14	3	59	Reserved	8
36		14	4	60	Reserved	8
37		14	5	61	Reserved	8
38		14	6	62	Reserved	8
39		14	7	63	Reserved	8
40		15	0	64	Reserved	9
41		15	1	65	Reserved	9
42		15	2	66	Reserved	9
43		15	3	67	Reserved	9
44		15	4	68	Reserved	9
45		15	5	69	Reserved	9
46		15	6	70	Reserved	9
47		15	7	71	Reserved	9
48		16	0	72	Reserved	10
49		16	1	73	Reserved	10
50		16	2	74	Reserved	10
51		16	3	75	Reserved	10
52		16	4	76	Reserved	10
53		16	5	77	Reserved	10
54		16	6	78	Reserved	10
55		16	7	79	Reserved	10
56		17	0	80	"Aux U/V Trip"	11
57		17	1	81	"Emergency Stop"	11
58		17	2	82	"Fuse Fail Trip"	11
59		17	3	83	"OpenControl Circuit"	11
60		17	4	84	"Thermistor Trip"	11
61		17	5	85		11
62		17	6	86		11
63		17	7	87	"Self Test Trip"	11
64		18	0	88	"Process I Lock F Trip"	12
65		18	1	89	"Process I Lock G Trip"	12

		Byte	Bit	GSE Bit #		Ext. Diag Byte
66		18	2	90	"Process I Lock H Trip"	12
67		18	3	91	"Process I Lock I Trip"	12
68		18	4	92	"Process I Lock J Trip"	12
69		18	5	93	"Hard Wired Trip"	12
70		18	6	94	"Field Trip"	12
71		18	7	95	"MCC Trip"	12
72		19	0	96	"RTD 6 Trip"	13
73		19	1	97	"Comm Fail Trip"	13
74		19	2	98	"Relay Not Configured"	13
75		19	3	99	"Process I Lock A Trip"	13
76		19	4	100	"Process I Lock B Trip"	13
77		19	5	101	"Process I Lock C Trip"	13
78		19	6	102	"Process I Lock D Trip"	13
79		19	7	103	"Process I Lock E Trip"	13
80		20	0	104	"Mechanical Jam Trip"	14
81		20	1	105	"UnderCurrent Trip"	14
82		20	2	106	"Unbalance Trip"	14
83		20	3	107	"RTD 1 Trip"	14
84		20	4	108	"RTD 2 Trip"	14
85		20	5	109	"RTD 3 Trip"	14
86		20	6	110	"RTD 4 Trip"	14
87		20	7	111	"RTD 5 Trip"	14
88		21	0	112	"Any Trip"	15
89		21	1	113	"Thermal O/L Trip"	15
90		21	2	114	"Ground Fault Trip"	15
91		21	3	115	"Acceleration Trip"	15
92		21	4	116	"Phase Reversal Trip"	15
93		21	5	117	"UnderPower Trip"	15
94		21	6	118	"UnderVoltage Trip"	15
95		21	7	119	"OverVoltage Trip"	15
96		22	0	120	Reserved	16
97		22	1	121	Reserved	16
98		22	2	122	Reserved	16
99		22	3	123	Reserved	16
100		22	4	124	Reserved	16
101		22	5	125	Reserved	16
102		22	6	126	Reserved	16
103		22	7	127	Reserved	16
104		23	0	128	Reserved	17
105		23	1	129	Reserved	17
106		23	2	130	Reserved	17
107		23	3	131	Reserved	17
108		23	4	132	Reserved	17
109		23	5	133	Reserved	17
110		23	6	134	Reserved	17

		Byte	Bit	GSE Bit #		Ext. Diag Byte
111		23	7	135	Reserved	17
112		24	0	136	Reserved	18
113		24	1	137	Reserved	18
114		24	2	138	Reserved	18
115		24	3	139	Reserved	18
116		24	4	140	Reserved	18
117		24	5	141	Reserved	18
118		24	6	142	Reserved	18
119		24	7	143	Reserved	18
120		25	0	144	Reserved	19
121		25	1	145	Reserved	19
122		25	2	146	Reserved	19
123		25	3	147	Reserved	19
124		25	4	148	Reserved	19
125		25	5	149	Reserved	19
126		25	6	150	Reserved	19
127		25	7	151	Reserved	19
128		26	0	152	Reserved	20
129		26	1	153	Reserved	20
130		26	2	154	Reserved	20
131		26	3	155	Reserved	20
132		26	4	156	Reserved	20
133		26	5	157	Reserved	20
134		26	6	158	Reserved	20
135		26	7	159	Reserved	20
136		27	0	160	Reserved	21
137		27	1	161	"Self Test Alarm"	21
138		27	2	162	"Comm Fail Alarm"	21
139		27	3	163	Reserved	21
140		27	4	164	Reserved	21
141		27	5	165	Reserved	21
142		27	6	166	Reserved	21
143		27	7	167	Reserved	21
144		28	0	168	"Welded Contactor"	22
145		28	1	169	Reserved	22
146		28	2	170	Reserved	22
147		28	3	171	Reserved	22
148		28	4	172	"Load Increase Alarm"	22
149		28	5	173	"Drive Greasing Alarm"	22
150		28	6	174	"Contactor Inspect Alarm"	22
151		28	7	175	"Max Stopped Alarm"	22
152		29	0	176	"Aux U/V Alarm"	23
153		29	1	177	"External Stop Alarm"	23
154		29	2	178	"Fuse Fail Alarm"	23
155		29	3	179	"Open Ctrl Cct Alarm"	23

		Byte	Bit	GSE Bit #		Ext. Diag Byte
156		29	4	180	"Thermistor Alarm"	23
157		29	5	181	Reserved	23
158		29	6	182	"External Start A Alarm"	23
159		29	7	183	"External Start B Alarm"	23
160		30	0	184	"Process I Lock F Alarm"	24
161		30	1	185	"Process I Lock G Alarm"	24
162		30	2	186	"Process I Lock H Alarm"	24
163		30	3	187	"Process I Lock I Alarm"	24
164		30	4	188	"Process I Lock J Alarm"	24
165		30	5	189	"Drive Failed to Start"	24
166		30	6	190	"Inverter Failed"	24
167		30	7	191	"Drive Stop Failed"	24
168		31	0	192	"RTD 6 Alarm"	25
169		31	1	193	Reserved	25
170		31	2	194	"RTD Open/Short Alarm"	25
171		31	3	195	"Process I Lock A Alarm"	25
172		31	4	196	"Process I Lock B Alarm"	25
173		31	5	197	"Process I Lock C Alarm"	25
174		31	6	198	"Process I Lock D Alarm"	25
175		31	7	199	"Process I Lock E Alarm"	25
176		32	0	200	Reserved	26
177		32	1	201	"UnderCurrent Alarm"	26
178		32	2	202	"Unbalance Alarm"	26
179		32	3	203	"RTD 1 Alarm"	26
180		32	4	204	"RTD 2 Alarm"	26
181		32	5	205	"RTD 3 Alarm"	26
182		32	6	206	"RTD 4 Alarm"	26
183		32	7	207	"RTD 5 Alarm"	26
184		33	0	208	"Any Alarm"	27
185		33	1	209	"Thermal Level Alarm"	27
186		33	2	210	"Ground Fault Alarm"	27
187		33	3	211	"Acceleration Alarm"	27
188		33	4	212	"Phase Reversal Alarm"	27
189		33	5	213	"UnderPower Alarm"	27
190		33	6	214	"UnderVoltage Alarm"	27
191		33	7	215	"OverVoltage Alarm"	27
192		34	0	216	Reserved	28
193		34	1	217	Reserved	28
194		34	2	218	Reserved	28
195		34	3	219	Reserved	28
196		34	4	220	Reserved	28
197		34	5	221	Reserved	28
198		34	6	222	Reserved	28
199		34	7	223	Reserved	28
200		35	0	224	Reserved	29

		Byte	Bit	GSE Bit #		Ext. Diag Byte
201		35	1	225	Reserved	29
202		35	2	226	Reserved	29
203		35	3	227	Reserved	29
204		35	4	228	Reserved	29
205		35	5	229	Reserved	29
206		35	6	230	Reserved	29
207		35	7	231	Reserved	29
208		36	0	232	Reserved	30
209		36	1	233	Reserved	30
210		36	2	234	Reserved	30
211		36	3	235	Reserved	30
212		36	4	236	Reserved	30
213		36	5	237	Reserved	30
214		36	6	238	Reserved	30
215		36	7	239	Reserved	30
216		37	0	240	Reserved	31
217		37	1	241	Reserved	31
218		37	2	242	Reserved	31
219		37	3	243	Reserved	31
220		37	4	244	Reserved	31
221		37	5	245	Reserved	31
222		37	6	246	Reserved	31
223		37	7	247	Reserved	31
224		38	0	248	Reserved	32
225		38	1	249	Reserved	32
226		38	2	250	Reserved	32
227		38	3	251	Reserved	32
228		38	4	252	Reserved	32
229		38	5	253	Reserved	32
230		38	6	254	Reserved	32
231		38	7	255	Reserved	32
232		39	0	256	Reserved	33
233		39	1	257	Reserved	33
234		39	2	258	Reserved	33
235		39	3	259	"Comm Stop"	33
236		39	4	260	"Fuse Fail Inhibit"	33
237		39	5	261	"Phase Reversal Inhibit"	33
238		39	6	262	"Low Aux Voltage Inhibit"	33
239		39	7	263	"UV Restart Inhibit"	33
240		40	0	264	Reserved	34
241		40	1	265	Reserved	34
242		40	2	266	Reserved	34
243		40	3	267	Reserved	34
244		40	4	268	"UV Restart"	34
245		40	5	269	Reserved	34

		Byte	Bit	GSE Bit #		Ext. Diag Byte
246		40	6	270	Reserved	34
247		40	7	271	Reserved	34
248		41	0	272	Reserved	35
249		41	1	273	Reserved	35
250		41	2	274	Reserved	35
251		41	3	275	Reserved	35
252		41	4	276	Reserved	35
253		41	5	277	Reserved	35
254		41	6	278	Reserved	35
255		41	7	279	Reserved	35
256		42	0	280	"Process I Lock F Stop"	36
257		42	1	281	"Process I Lock G Stop"	36
258		42	2	282	"Process I Lock H Stop"	36
259		42	3	283	"Process I Lock I Stop"	36
260		42	4	284	"Process I Lock J Stop"	36
261		42	5	285	"HW Stop"	36
262		42	6	286	"Field Stop"	36
263		42	7	287	"MCC Stop"	36
264		43	0	288	Reserved	37
265		43	1	289	Reserved	37
266		43	2	290	Reserved	37
267		43	3	291	"Process I Lock A Stop"	37
268		43	4	292	"Process I Lock B Stop"	37
269		43	5	293	"Process I Lock C Stop"	37
270		43	6	294	"Process I Lock D Stop"	37
271		43	7	295	"Process I Lock E Stop"	37
272		44	0	296	"Forward Limit"	38
273		44	1	297	"Reverse Limit"	38
274		44	2	298	"Starts/Hr Inhibit"	38
275		44	3	299	"Time Between Inhibit"	38
276		44	4	300	Reserved	38
277		44	5	301	Reserved	38
278		44	6	302	Reserved	38
279		44	7	303	Reserved	38
280		45	0	304	"Any Stop"	39
281		45	1	305	"Thermal Inhibit"	39
282		45	2	306	Reserved	39
283		45	3	307	Reserved	39
284		45	4	308	Reserved	39
285		45	5	309	"Restart Inhibit"	39
286		45	6	310	Reserved	39
287		45	7	311	Reserved	39
288		46	0	312	Length	40
289		46	1	313		40
290		46	2	314		40

		Byte	Bit	GSE Bit #		Ext. Diag Byte
291		46	3	315		40
292		46	4	316		40
293		46	5	317		40
294		46	6	318		40
295		46	7	319		40
296		47	0	320	Alarm Type - Diagnostic alarm	41
297		47	1	321		41
298		47	2	322		41
299		47	3	323		41
300		47	4	324		41
301		47	5	325		41
302		47	6	326		41
303		47	7	327		41
304		48	0	328	Slot Number	42
305		48	1	329		42
306		48	2	330		42
307		48	3	331		42
308		48	4	332		42
309		48	5	333		42
310		48	6	334		42
311		48	7	335		42
312		49	0	336	Alarm Specifier	43
313		49	1	337		43
314		49	2	338		43
315		49	3	339		43
316		49	4	340		43
317		49	5	341		43
318		49	6	342		43
319		49	7	343		43
320		50	0	344	Reserved	44
321		50	1	345	Reserved	44
322		50	2	346	Reserved	44
323		50	3	347	Reserved	44
324		50	4	348	Reserved	44
325		50	5	349	Reserved	44
326		50	6	350	Reserved	44
327		50	7	351	Reserved	44
328		51	0	352	Reserved	45
329		51	1	353	Reserved	45
330		51	2	354	Reserved	45
331		51	3	355	Reserved	45
332		51	4	356	Reserved	45
333		51	5	357	Reserved	45
334		51	6	358	Reserved	45
335		51	7	359	Reserved	45

		Byte	Bit	GSE Bit #		Ext. Diag Byte
336		52	0	360	Reserved	46
337		52	1	361	Reserved	46
338		52	2	362	Reserved	46
339		52	3	363	Reserved	46
340		52	4	364	Reserved	46
341		52	5	365	Reserved	46
342		52	6	366	Reserved	46
343		52	7	367	Reserved	46
344		53	0	368	Reserved	47
345		53	1	369	Reserved	47
346		53	2	370	Reserved	47
347		53	3	371	Reserved	47
348		53	4	372	Reserved	47
349		53	5	373	Reserved	47
350		53	6	374	Reserved	47
351		53	7	375	Reserved	47
352		54	0	376	Reserved	48
353		54	1	377	Reserved	48
354		54	2	378	Reserved	48
355		54	3	379	Reserved	48
356		54	4	380	Reserved	48
357		54	5	381	Reserved	48
358		54	6	382	Reserved	48
359		54	7	383	Reserved	48
360		55	0	384	Reserved	49
361		55	1	385	Reserved	49
362		55	2	386	Reserved	49
363		55	3	387	Reserved	49
364		55	4	388	Reserved	49
365		55	5	389	Reserved	49
366		55	6	390	Reserved	49
367		55	7	391	Reserved	49
368		56	0	392	Reserved	50
369		56	1	393	Reserved	50
370		56	2	394	Reserved	50
371		56	3	395	"IO Input Overvoltage"	50
372		56	4	396	"IO Frequency Error"	50
373		56	5	397	Reserved	50
374		56	6	398	Reserved	50
375		56	7	399	Reserved	50
376		57	0	400	"Internal Temperature High"	51
377		57	1	401	"IO Communication Failure"	51
378		57	2	402	"Metering Failure"	51
379		57	3	403	Reserved	51
380		57	4	404	"Clock Error"	51

		Byte	Bit	GSE Bit #		Ext. Diag Byte
381		57	5	405	"Calibration Error"	51
382		57	6	406	"EEPROM Error"	51
383		57	7	407	"IO Input Read Error"	51
384		58	0	408	Reserved	52
385		58	1	409	Reserved	52
386		58	2	410	Reserved	52
387		58	3	411	Reserved	52
388		58	4	412	Reserved	52
389		58	5	413	Reserved	52
390		58	6	414	Reserved	52
391		58	7	415	Reserved	52
392		59	0	416	Reserved	53
393		59	1	417	Reserved	53
394		59	2	418	Reserved	53
395		59	3	419	Reserved	53
396		59	4	420	Reserved	53
397		59	5	421	Reserved	53
398		59	6	422	Reserved	53
399		59	7	423	Reserved	53
400		60	0	424	Reserved	54
401		60	1	425	Reserved	54
402		60	2	426	Reserved	54
403		60	3	427	Reserved	54
404		60	4	428	Reserved	54
405		60	5	429	Reserved	54
406		60	6	430	Reserved	54
407		60	7	431	Reserved	54
408		61	0	432	Reserved	55
409		61	1	433	"Transfer Timer"	55
410		61	2	434	"FLA Not Set"	55
411		61	3	435	"CT Type Not Set"	55
412		61	4	436	"Starter Type Not Set"	55
413		61	5	437	"No Control Source"	55
414		61	6	438	"Clock Not Set"	55
415		61	7	439	"FLA Too High"	55

I&M (Identification & Maintenance) records

I&M records can be read using the following sequence of Reads and Writes from the Profibus Master.

Send a Write Call-REQ-PDU i.e., DPV1 write request (MS1 and MS2) to the MM300, on slot 0, index 255 and FI_Index = 65000

	Content	Size	Coding	Notes
DPV1 Header	Function Number	1 Octet	5Fh	fixed
	Slot Number	1 Octet	0	variable
	Index	1 Octet	255	fixed
	Length	1 Octet	04	Call Header
Call Header	Extended Function Number	1 Octet	08h	fixed
	Reserved	1 Octet	00h	fixed
	FI_Index	2 Octets	65000	sub index

The MM300 will reply with Write Call-Res-PDU:

	Content	Size	Coding	Notes
DPV1 Header	Function Number	1 Octet	5Fh	fixed
	Slot Number	1 Octet	0	variable (same as that in request)
	Index	1 Octet	255	fixed
	Length	1 Octet	04	Call Header

Send a Read-REQ-PDU i.e., DPV1 Read request (MS1 and MS2) to MM300, on slot 0, index 255 and Length = 68:

	Content	Size	Coding	Notes
DPV1 Header	Function Number	1 Octet	5Eh	fixed
	Slot Number	1 Octet	0	variable
	Index	1 Octet	255	fixed
	Length	1 Octet	68	Call Header & Body

The MM300 will reply with a Read-Res-PDU:

	Content	Size	Coding	Notes
DPV1 Header	Function Number	1 Octet	5Eh	fix
	Slot Number	1 Octet	0	variable
	Index	1 Octet	255	fix
	Length	1 Octet	68	Call Header & Body
Call Header	Extended Function Number	1 Octet	08h	fix
	Reserved	1 Octet	00h	fix
	FI_Index	2 Octets	65000	sub index
Body	IM Function	64 Octets		I&M record

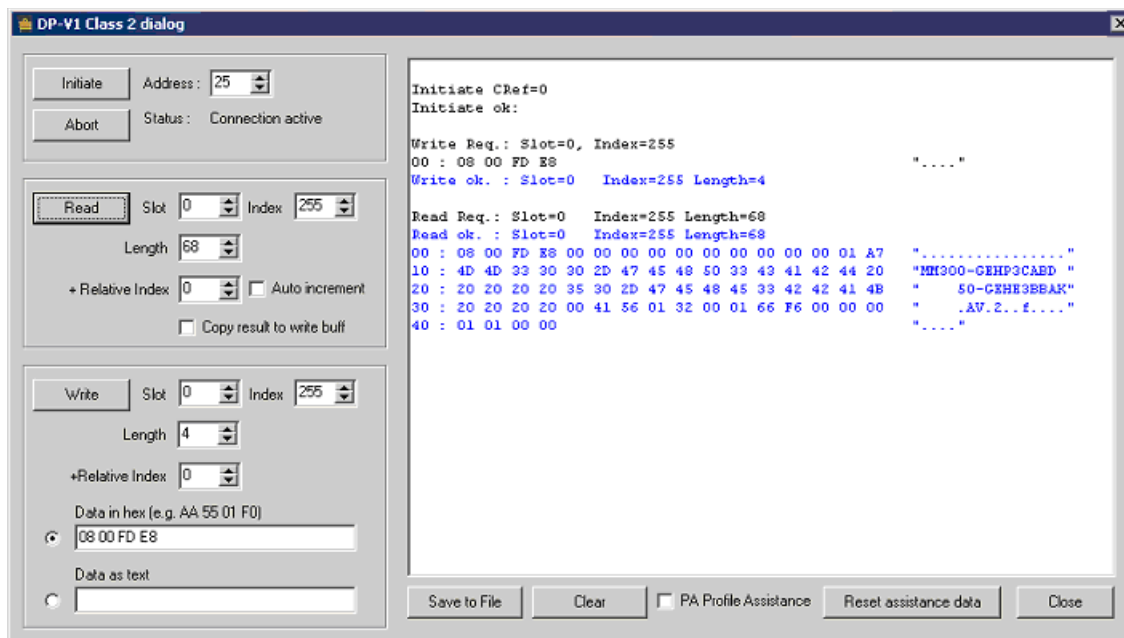
The 64 octets of I&M record in I&M0 response structure are formatted as follows:

Structure Element	Size in Bytes	Example Retrieved Data
Manufacture Specific Data (10 Bytes)	10	00 00 00 00 00 00 00 00 00 00
Manufacture ID (2 Bytes, Provided by PNO)	2	0x01A7
Order ID (20 Bytes, Order Code of device)	20	MM300-GEHP3CABD
Serial No. (16, Bytes, Serial No. of MM300 device)	16	50-GEHE3BBAK
Hardware Revision (2 Bytes, Hardware Revision of MM300 device)	2	0X00041
Software Revision (4 Bytes, Comms Firmware Revision)	4	V1.50.0
Revision Counter (2 Bytes, Profibus Library revision)	2	0x0166
Profile ID (2 Bytes, Generic for MM300)	2	0xF600
Profile Specific Type (2 Bytes, No Profile Specific type for MM300)	2	0x0000
IM Version (2 Bytes)	2	V1.1
IM Supported (2 Bytes, Currently only I&M0)	2	0x0000

Figure 4-8: I&M0 example on MS1 connection

Info Panel		Live list		Messages	Messages (with view filter applied)	Station statistics view	Data inspection			
Frame structure SD2 message Source address: 25 Destination address: 2 Frame type: Response message		Setup Search		Search Up		Search Down				
		Frame#	Frame	Addr	Service	Msg type	Req/Res	BAPI	Data len	Data
PROFIBUS DPV1 C1 Message: Read_Res[4] Start=0 Index=255 Length=68 Data: 00 00 FD E8 00 00 00 00 00 00 00 00 00 01 A7 40 40 30 30 30 20 47 45 48 50 33 43 41 42 44 20 20 20 20 20 35 30 20 47 45 48 45 33 42 42 41 40 32 00 01 66 F6 00 00 00 01 01 00 00 Extended function: Call_Res (Read Call) Call_Index: 65000 Record: I&M0 Manual Spec. Data: 00 00 00 00 00 00 00 00 00 00 MANUFACTURER_ID: 0x01A7 ORDER_ID: MM300-GEHP3CABD SERIAL_NUMBER: 50-GEHE3BBAK HARDWARE_REVISION: 0x0041 SOFTWARE_REVISION: V1.50.0 REVISION_COUNTER: 358 PROFILE_ID: 0xF600 PROFILE_SPECIFIC_TYPE: 0x0000 IM_VERSION: V1.1 IM_SUPPORTED: 0x0000 Response flags set		12129	SD2	2->25	SD2_LOW	DPV1_Write_Req	Req	51->51	0	5F 00 FF 04 08 00 FD E8
		12107	SD2	2->25	DL	DPV1_Write_Res	Res	51->51	4	5F 00 FF 04
		33585	SD2	2->25	SD2_LOW	DPV1_Read_Req	Req	51->51	4	5E 00 FF 44
		34664	SD2	2->25	DL	DPV1_Read_Res	Res	51->51	72	5E 00 FF 44 08 00 FD E8 00 00 00 00 00 00 0...
		5524	SD2	2->25	SD2_LOW	DPV1_Write_Req	Req	51->51	0	5F 00 FF 04 08 00 FD E8
		56132	SD2	2->25	DL	DPV1_Write_Res	Res	51->51	4	5F 00 FF 04
		7606	SD2	2->25	SD2_LOW	DPV1_Read_Req	Req	51->51	4	5E 00 FF 44
		7763	SD2	2->25	DL	DPV1_Read_Res	Res	51->51	72	5E 00 FF 44 08 00 FD E8 00 00 00 00 00 00 0...
		9823	SD2	2->25	SD2_LOW	DPV1_Write_Req	Req	51->51	0	5F 00 FF 04 08 00 FD E8
		59132	SD2	2->25	DL	DPV1_Write_Res	Res	51->51	4	5F 00 FF 04
MANUFACTURER_ID: 0x01A7 ORDER_ID: MM300-GEHP3CABD SERIAL_NUMBER: 50-GEHE3BBAK HARDWARE_REVISION: 0x0041 SOFTWARE_REVISION: V1.50.0 REVISION_COUNTER: 358 PROFILE_ID: 0xF600 PROFILE_SPECIFIC_TYPE: 0x0000 IM_VERSION: V1.1 IM_SUPPORTED: 0x0000 Response flags set		11806	SD2	2->25	SD2_LOW	DPV1_Read_Req	Req	51->51	4	5E 00 FF 44
		12064	SD2	2->25	DL	DPV1_Read_Res	Res	51->51	72	5E 00 FF 44 08 00 FD E8 00 00 00 00 00 00 0...
		14134	SD2	2->25	SD2_LOW	DPV1_Write_Req	Req	51->51	0	5F 00 FF 04 08 00 FD E8
		14213	SD2	2->25	DL	DPV1_Write_Res	Res	51->51	4	5F 00 FF 04
		16232	SD2	2->25	SD2_LOW	DPV1_Read_Req	Req	51->51	4	5E 00 FF 44
		16269	SD2	2->25	DL	DPV1_Read_Res	Res	51->51	72	5E 00 FF 44 08 00 FD E8 00 00 00 00 00 00 0...
		18440	SD2	2->25	SD2_LOW	DPV1_Write_Req	Req	51->51	0	5F 00 FF 04 08 00 FD E8
		18617	SD2	2->25	DL	DPV1_Write_Res	Res	51->51	4	5F 00 FF 04
		20593	SD2	2->25	SD2_LOW	DPV1_Read_Req	Req	51->51	4	5E 00 FF 44
		20668	SD2	2->25	DL	DPV1_Read_Res	Res	51->51	72	5E 00 FF 44 08 00 FD E8 00 00 00 00 00 00 0...
MANUFACTURER_ID: 0x01A7 ORDER_ID: MM300-GEHP3CABD SERIAL_NUMBER: 50-GEHE3BBAK HARDWARE_REVISION: 0x0041 SOFTWARE_REVISION: V1.50.0 REVISION_COUNTER: 358 PROFILE_ID: 0xF600 PROFILE_SPECIFIC_TYPE: 0x0000 IM_VERSION: V1.1 IM_SUPPORTED: 0x0000 Response flags set		22740	SD2	2->25	SD2_LOW	DPV1_Write_Req	Req	51->51	0	5F 00 FF 04 08 00 FD E8
		22817	SD2	2->25	DL	DPV1_Write_Res	Res	51->51	4	5F 00 FF 04
		24692	SD2	2->25	SD2_LOW	DPV1_Read_Req	Req	51->51	4	5E 00 FF 44
		24969	SD2	2->25	DL	DPV1_Read_Res	Res	51->51	72	5E 00 FF 44 08 00 FD E8 00 00 00 00 00 00 0...
		27041	SD2	2->25	SD2_LOW	DPV1_Write_Req	Req	51->51	0	5F 00 FF 04 08 00 FD E8
		27119	SD2	2->25	DL	DPV1_Write_Res	Res	51->51	4	5F 00 FF 04
		29195	SD2	2->25	SD2_LOW	DPV1_Read_Req	Req	51->51	4	5E 00 FF 44
		29270	SD2	2->25	DL	DPV1_Read_Res	Res	51->51	72	5E 00 FF 44 08 00 FD E8 00 00 00 00 00 00 0...
		31341	SD2	2->25	SD2_LOW	DPV1_Write_Req	Req	51->51	0	5F 00 FF 04 08 00 FD E8
		31417	SD2	2->25	DL	DPV1_Write_Res	Res	51->51	4	5F 00 FF 04
MANUFACTURER_ID: 0x01A7 ORDER_ID: MM300-GEHP3CABD SERIAL_NUMBER: 50-GEHE3BBAK HARDWARE_REVISION: 0x0041 SOFTWARE_REVISION: V1.50.0 REVISION_COUNTER: 358 PROFILE_ID: 0xF600 PROFILE_SPECIFIC_TYPE: 0x0000 IM_VERSION: V1.1 IM_SUPPORTED: 0x0000 Response flags set		31497	SD2	2->25	SD2_LOW	DPV1_Read_Req	Req	51->51	4	5E 00 FF 44
		33574	SD2	2->25	DL	DPV1_Read_Res	Res	51->51	72	5E 00 FF 44 08 00 FD E8 00 00 00 00 00 00 0...
		35645	SD2	2->25	SD2_LOW	DPV1_Write_Req	Req	51->51	0	5F 00 FF 04 08 00 FD E8
		38702	SD2	2->25	DL	DPV1_Write_Res	Res	51->51	4	5F 00 FF 04
		37790	SD2	2->25	SD2_LOW	DPV1_Read_Req	Req	51->51	4	5E 00 FF 44
		37875	SD2	2->25	DL	DPV1_Read_Res	Res	51->51	72	5E 00 FF 44 08 00 FD E8 00 00 00 00 00 00 0...
		39946	SD2	2->25	SD2_LOW	DPV1_Write_Req	Req	51->51	0	5F 00 FF 04 08 00 FD E8
		40023	SD2	2->25	DL	DPV1_Write_Res	Res	51->51	4	5F 00 FF 04
		42096	SD2	2->25	SD2_LOW	DPV1_Read_Req	Req	51->51	4	5E 00 FF 44
		42174	SD2	2->25	DL	DPV1_Read_Res	Res	51->51	72	5E 00 FF 44 08 00 FD E8 00 00 00 00 00 00 0...
MANUFACTURER_ID: 0x01A7 ORDER_ID: MM300-GEHP3CABD SERIAL_NUMBER: 50-GEHE3BBAK HARDWARE_REVISION: 0x0041 SOFTWARE_REVISION: V1.50.0 REVISION_COUNTER: 358 PROFILE_ID: 0xF600 PROFILE_SPECIFIC_TYPE: 0x0000 IM_VERSION: V1.1 IM_SUPPORTED: 0x0000 Response flags set		44245	SD2	2->25	SD2_LOW	DPV1_Write_Req	Req	51->51	0	5F 00 FF 04 08 00 FD E8

Figure 4-9: I&MO example on MS2 connection



The MM300 supports the mandatory I&M0 record. It does not support the optional I&M1, I&M2, I&M3 and I&M4 records. Requests for these I&M Records would result in an error response from the MM300.

DeviceNet protocol

To enable the DeviceNet physical interface, ensure that switches 1 and 2 of the DIP switch communications card (on the CPU module) are on. The external connections through the fieldbus interface are as follows.

Table 4-9: Fieldbus interface external connections (DeviceNet)

Path	Connection (external)	Wire color
V-	Pin 3, CAN_GND	Black
L	Pin 2, CAN_L	Blue
C	Pin 5, CAN_SHLD	Bare
H	Pin 7, CAN_H	White
V+	Pin 9, CAN_V	Red

The module status (MS) and network status (NS) LEDs indicate the status of the Fieldbus interface.

Table 4-10: DeviceNet LED indications

LED	LED operation	Description
MS	Green on, red on, green on	Device self-test
	Flashing green	Device in standby state
	Green on	Device operational
	Flashing red	Recoverable fault
	Red on	Unrecoverable fault
NS	Flashing green	Online, not connected
	Green on	Online, connected
	Flashing red	Connection timeout
	Red on	Critical link failure
	Red and green	Network access detected

When used for DeviceNet, the fieldbus port has the following characteristics.

- Baud rate: 125, 250, and 500 kbps
- MAC ID: 0 to 63
- Vendor ID: 928
- Product Code: 0x4D42
- Message types: poll, and explicit messaging



NOTE

The ODVA cable assembly length (0.4 meter) must be considered in calculating the network drop length budget to the node.

DeviceNet power supply configuration

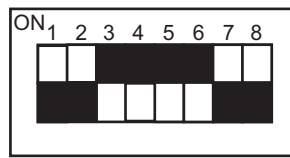
The DeviceNet port uses external voltage to power the electronics. The figures below show the configuration of the comms board option/power supply switch.



NOTE

Devicenet supports external power only.

Figure 4-10: Comms board power supply configuration



DEVICENET WITH EXTERNAL SUPPLY

 = switch position

853846A1.CDR

Protocol Options				
	SW1	SW2	SW3	SW4
DeviceNet	ON	ON	OFF	OFF
Profibus	OFF	OFF	ON	ON

Supply Options				
	SW5	SW6	SW7	SW8
External Supply	OFF	OFF	ON	ON

Other switch combinations are **not allowed**.

DeviceNet setup and configuration (typical)

Hardware Setup

Consider the example of a DeviceNet network containing the following devices:

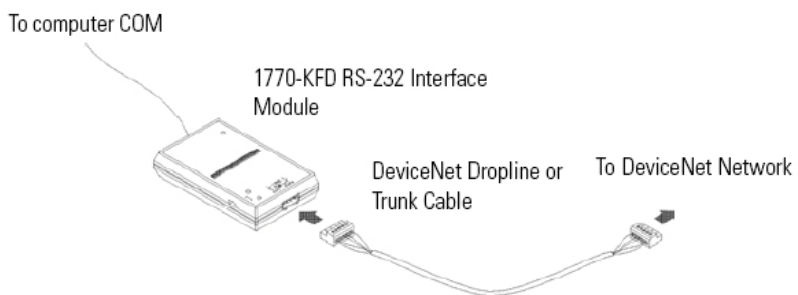
- A computer running RSNetWorx™ for DeviceNet software
- A 1747-SDN-communication module interfacing an SLC 500 processor with the DeviceNet network
- 1770 KFD RS232 to DeviceNet module
- MM300 Relay.

Wiring up the network



Ensure that power to the devices is switched off while making the connections. Make sure each end of the DeviceNet trunk cable is properly terminated with a 120-ohm resistor.

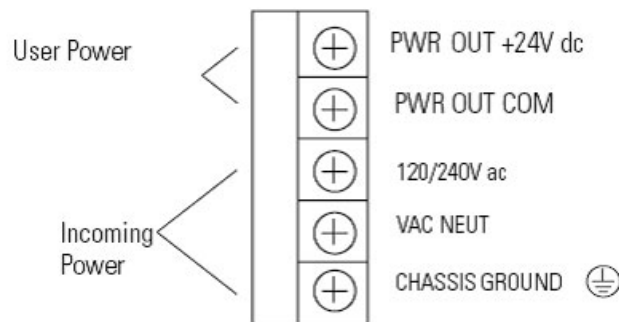
1. Connect the RS-232 connector on the 1770-KFD-communication interface module to one of the serial ports on your computer workstation (COM1).



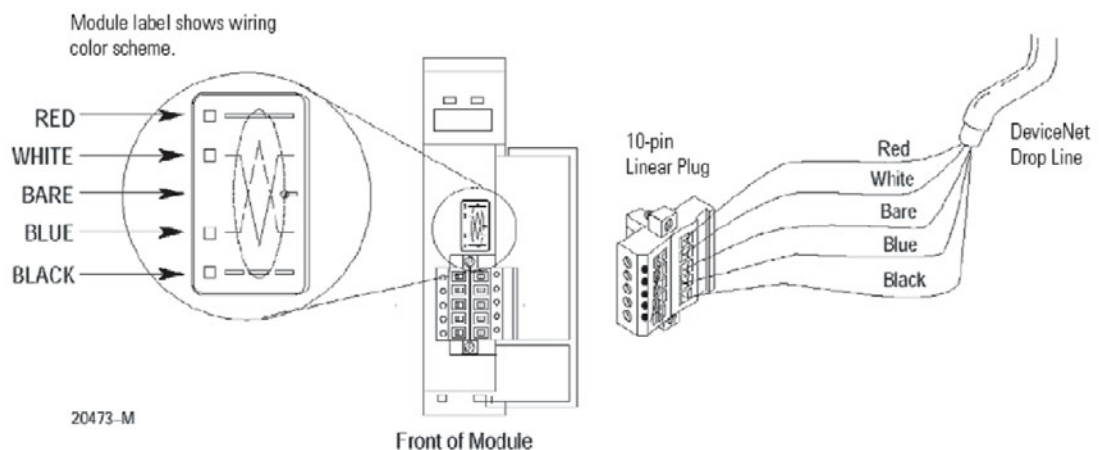
- Connect the DeviceNet connector on the 1770-KFD module to a DeviceNet cable. The terminal designations are as shown in the table below:

Terminal	Signal	Function	Color
1	V-	Common	Black
2	CAN_L	Signal Low	Blue
3	Drain	Shield	Non-insulated
4	CAN_H	Signal High	White
5	V+	Power Supply	Red

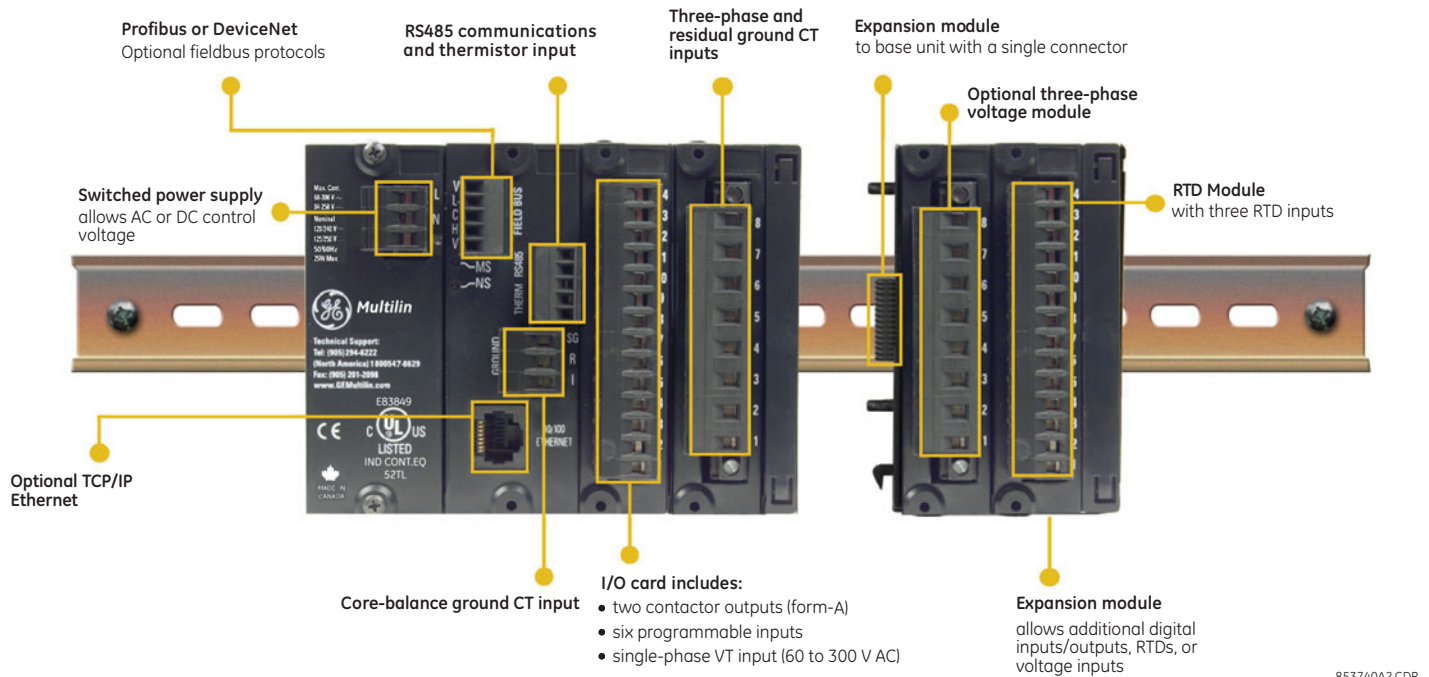
- Connect the power adapter to the 1770 KFD module.
- Connect the power out and power out common signals from the PLC power to the V- and V+ terminals of the DeviceNet network. The terminal designations on the power supply are shown below:



- Locate the DeviceNet port connector on the front of the 1747 SDN DeviceNet scanner module and insert the 10-pin linear plug into the connector. Connect the other end of the DeviceNet cable into this connector.



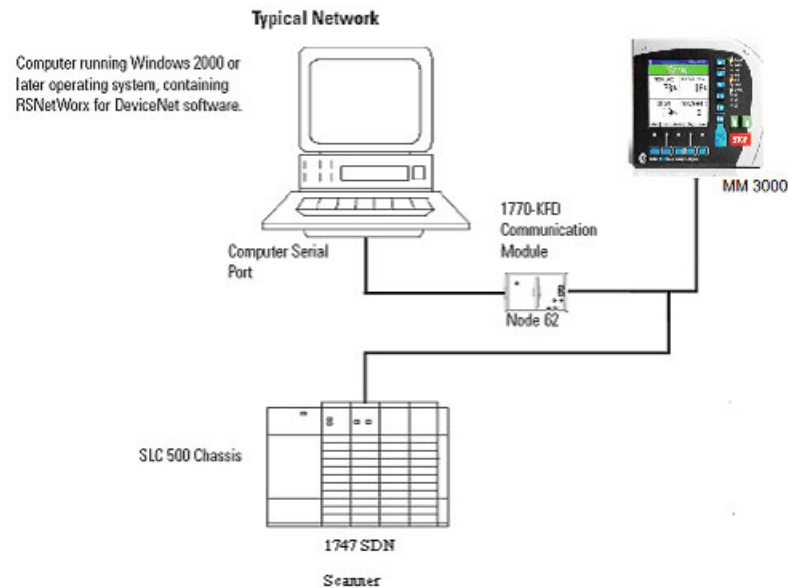
- Locate the DeviceNet connector on the MM300 (see top left-hand corner of the diagram below) and connect it to the scanner using the DeviceNet Cable.



Terminal designations are as shown in the table below:

Terminal	Function	Color
V-	Common	Black
L	Signal Low	Blue
C	Shield	Non insulated
H	Signal High	White
V+	Power Supply	Red

7. After the connections are complete, the network will look something like this:



Powering up the network

1. Before switching ON the network power make sure that the MACID of MM300 is set to something other than 63.
2. Switch on the power supply to the chassis that will power up the device.
3. Switch on the power to the 1770 KFD module and the MM300 relay.



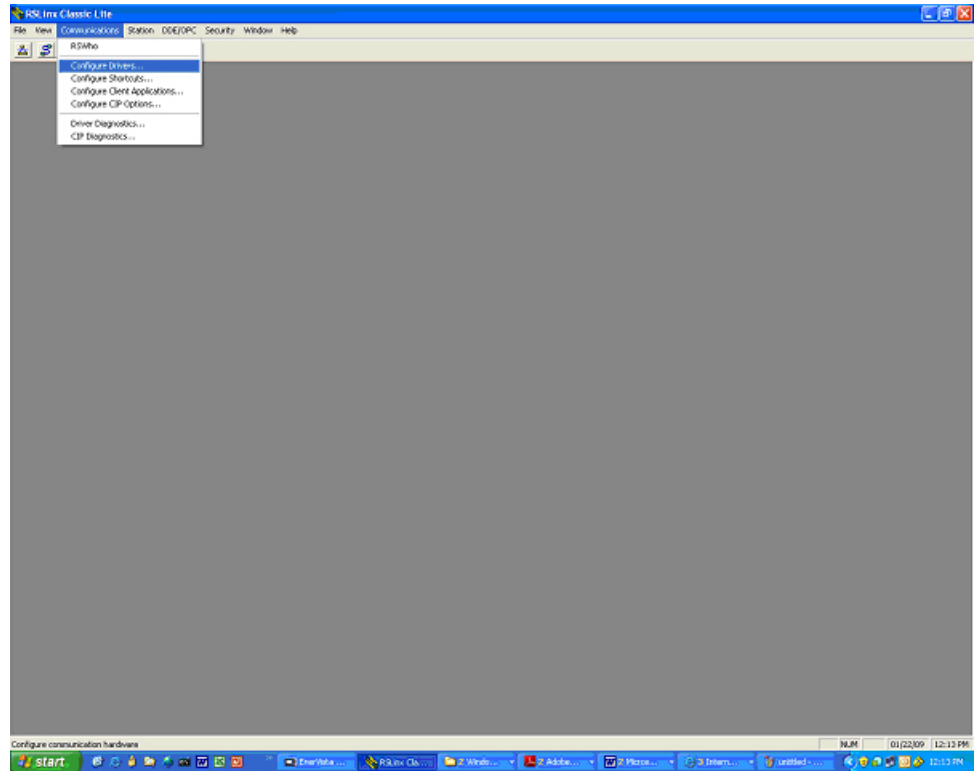
NOTE

External power must be present on the DeviceNet port of the MM300 really at power-up, in order to correctly initialize and operate.

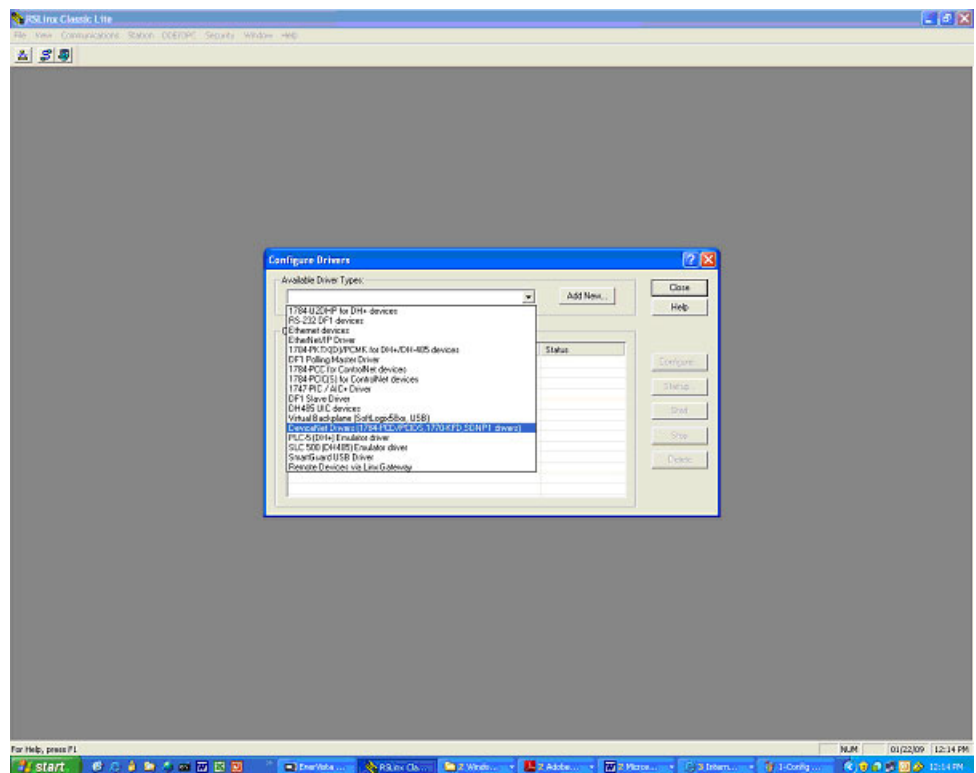
Configuring the driver using RSLinx

After the network is setup the first task is to configure the DeviceNet driver on the PC. Follow these steps to configure the DeviceNet driver:

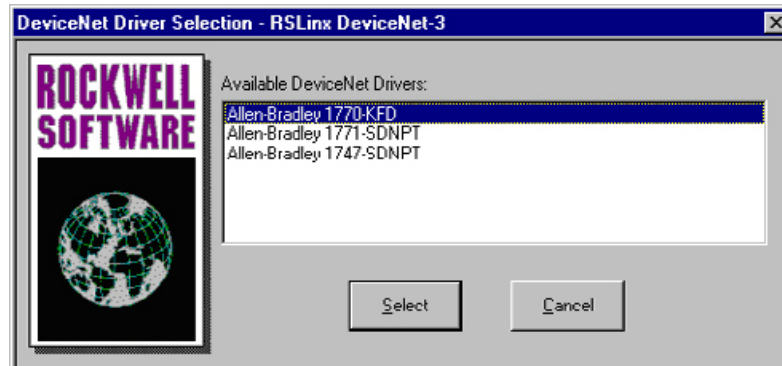
1. Start **RSLinx** software. The RSLinx main dialog opens.
2. Select **Configure Drivers** from the Communication menu.



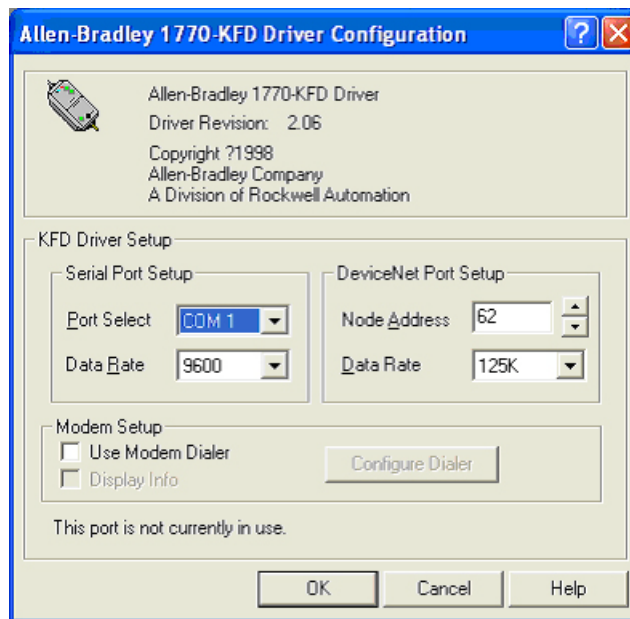
The following dialog appears:



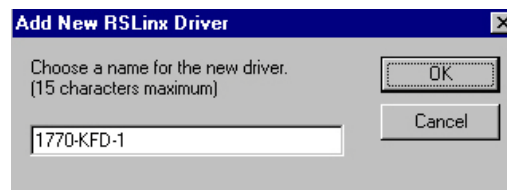
3. Select **DeviceNet Drivers** from the above pull-down menu and Click **Add/New**. The following menu will appear:



4. Select the **Allen-Bradley™ 1770-KFD** driver. The Driver Configuration dialog appears:



5. Configure the driver using the settings above as a guide, and click on **OK**. The software takes a few seconds to configure the driver. When it is complete, the following prompt appears:



This dialog will only appear if there is at least one active node on the DeviceNet network, so ensure that the network power is on and that the MM300 relay and the scanner are on the DeviceNet network.

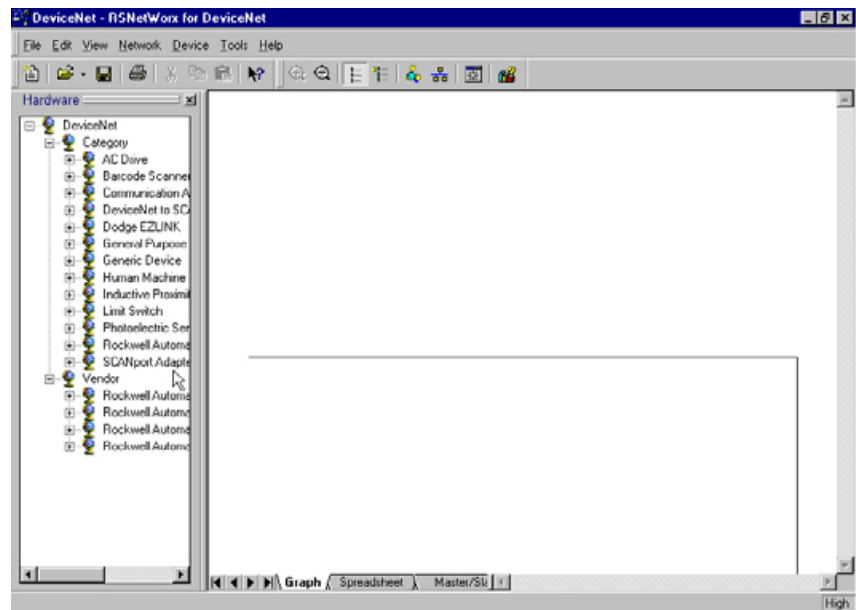
6. Select the default driver name, **1770-KFD-1**, and click **OK**. Close the RSLinx software.

Configuring the network and going online

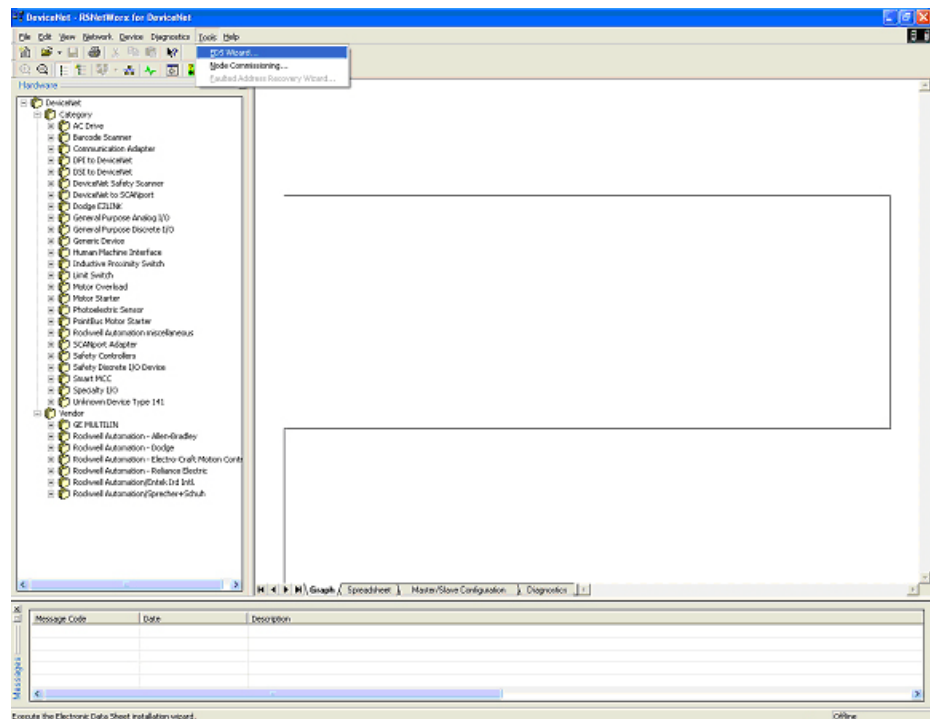
The next step is to configure the network with RSNetWorx for DeviceNet software using the driver that was just configured.

Follow these steps to set up an online connection to the DeviceNet network, using the 1770-KFD driver:

1. Start **RSNetWorx for DeviceNet** software. The following dialog appears:

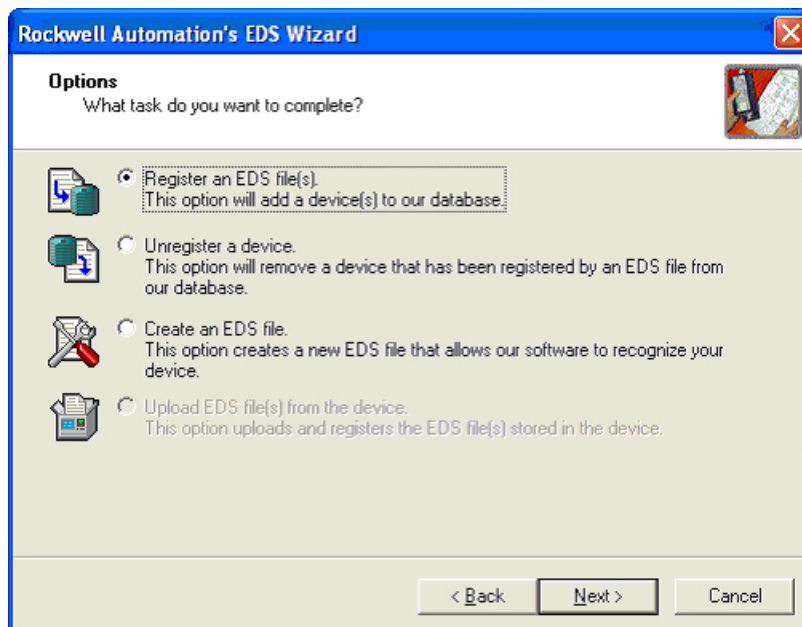


2. From the File menu, choose **New**.
3. Highlight DeviceNet Configuration and click **OK**.
4. Next step is to register the EDS file for the MM300. Select the **EDS Wizard** from the **Tools** menu as shown below:

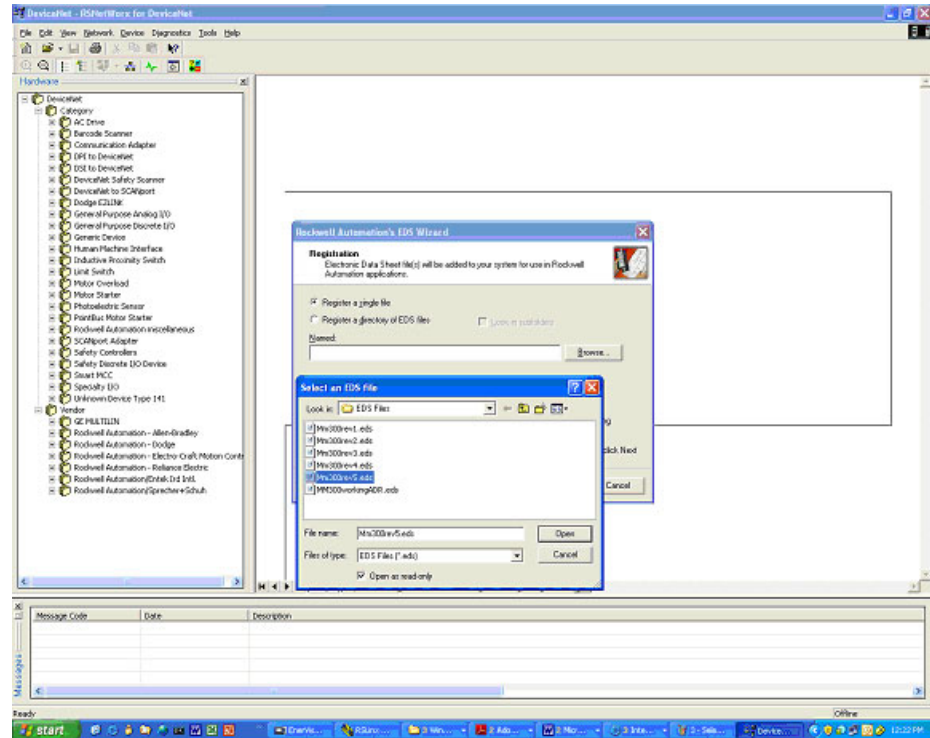




5. Press **Next**



6. Click on **Register an EDS file**:



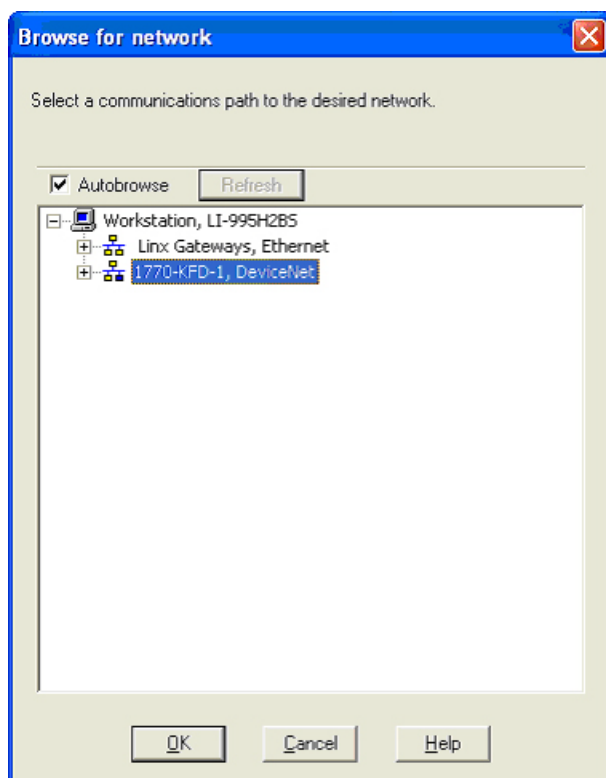
7. Browse and select the EDS file for MM300. Make sure that the Icon file is present in the same folder as the EDS file.
8. **Save** the DeviceNet file after registering the EDS file. Close the RSNetworx software and reboot the PC.



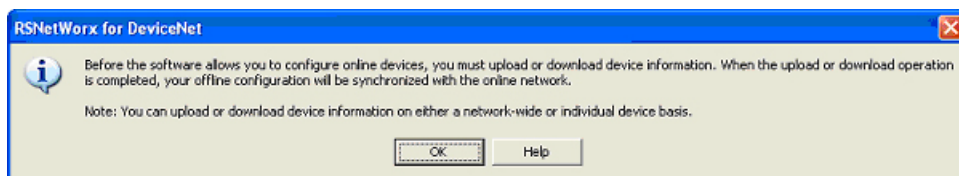
NOTE

You must reboot the PC to make sure that the EDS file is registered correctly.

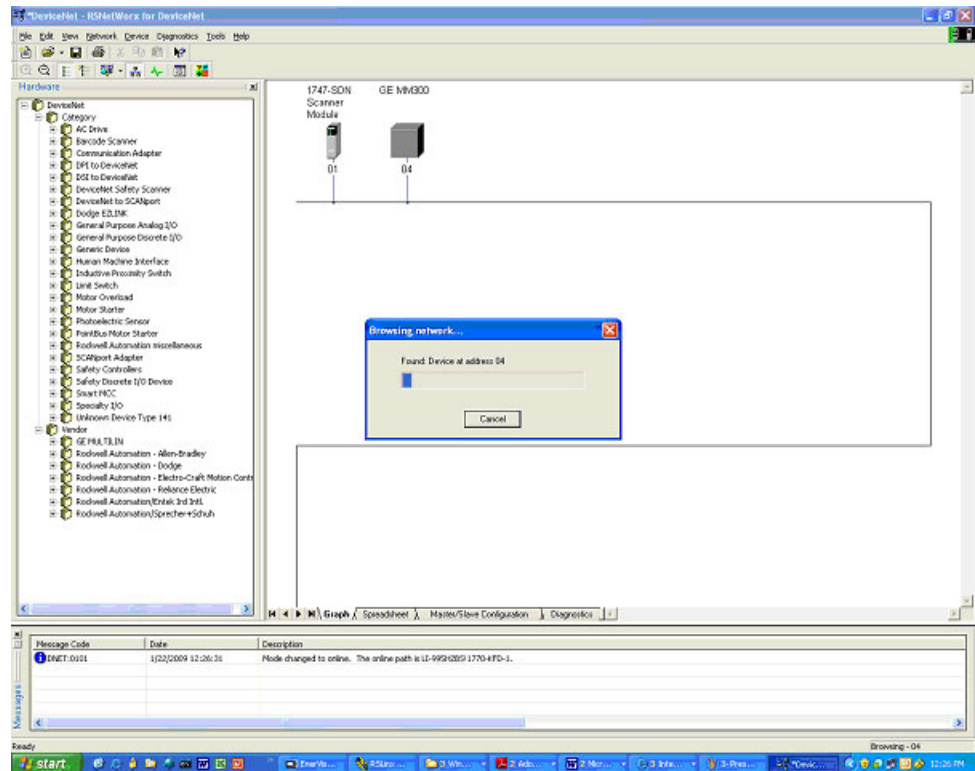
9. After rebooting the PC, restart the RSNetworx software and open the recently saved DeviceNet file.
10. Click  Online on the toolbar. List of the available drivers in RSLinx software appears, as shown below:



11. Select the 1770-KFD-1, DeviceNet driver and click **OK**. You will be prompted to upload or download devices before going online.



12. Click **OK** to upload the devices and go online. RSNetWorx for DeviceNet software begins browsing for network devices.

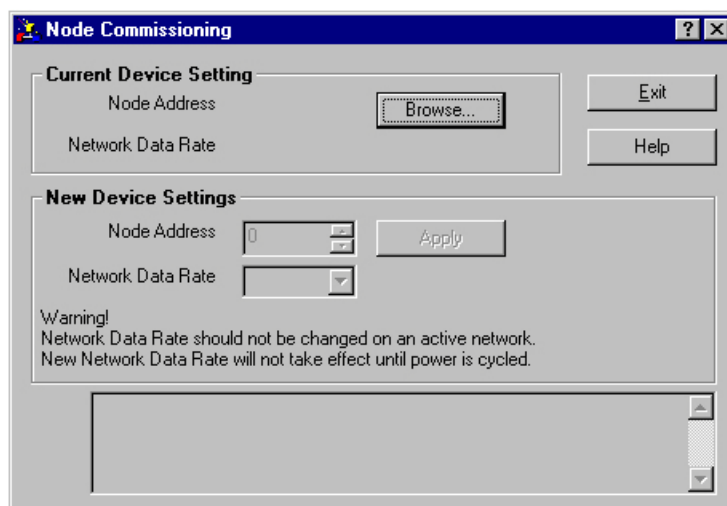


13. When the software has finished browsing, the network displayed on your screen should appear similar to the one shown below. MM300, Scanner and the 1770 KFD modules will appear with MACIDs just below each device.
14. After the network is uploaded, the next step is to set the node address of the 1747 SDN scanner and to configure the scan list.

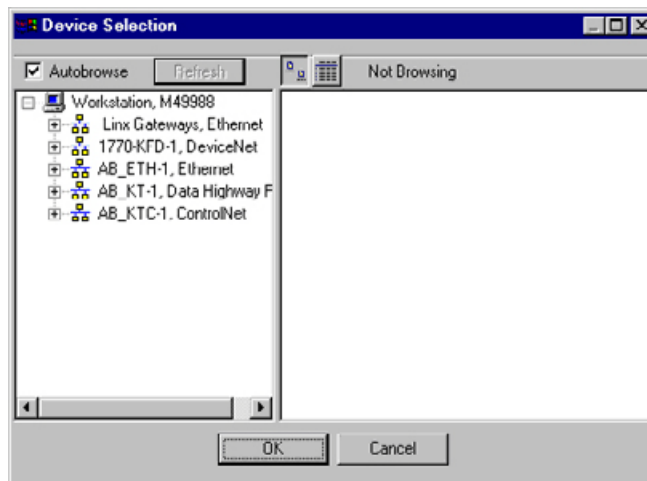
Set the 1747 SDN Node Address

Once the devices are uploaded, their node addresses appear to the right of their icons. To change a module's node address, use the following procedure:

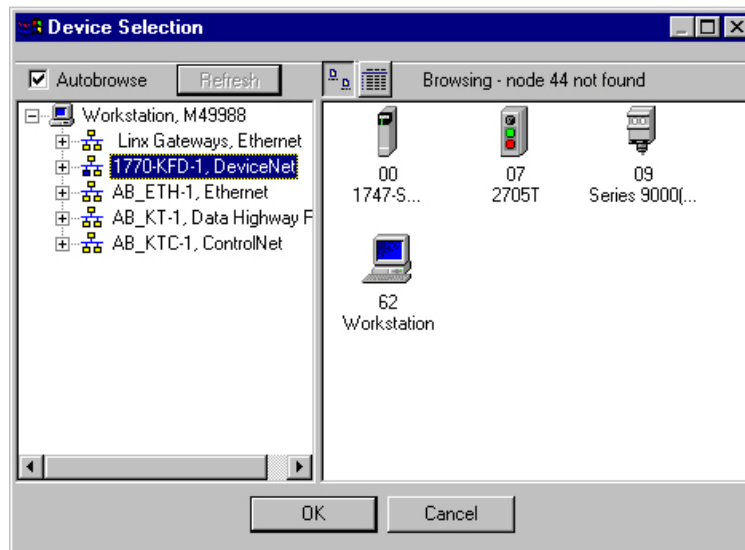
1. From the **Tools** menu, choose **Node Commissioning**. The Node Commissioning dialog appears:



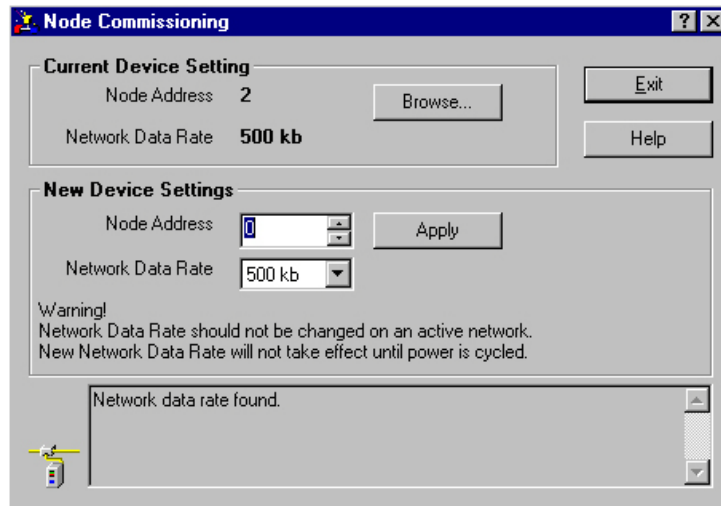
- Click **Browse**. The Device Selection dialog appears:



- Select the **1770-KFD** driver. The devices on the network appear in the right panel of the dialog:



- From the right panel, select the device you are commissioning and click **OK**. The Node Commissioning dialog appears with the current settings for your 1747-SDN module. The dialog should look similar to the one shown below:



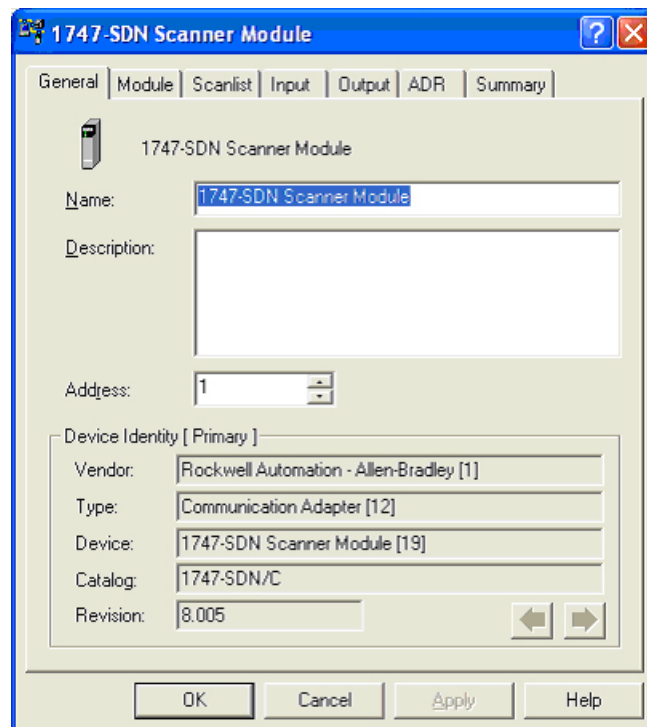
5. Enter 0 in the New Device Settings: Node Address box.
6. Click **Apply** and exit the dialog.



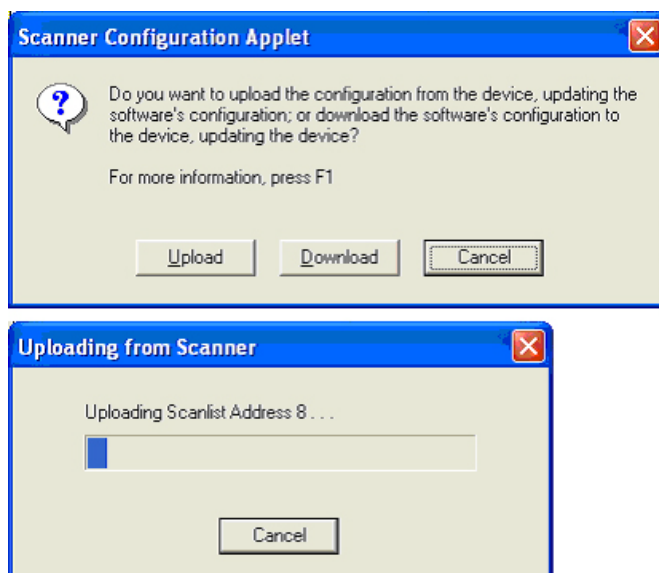
The network must not be active when performing node commissioning on the 1747-SDN module. Make sure the processor is in **Program** mode. (Note that this applies only to the 1747-SDN module. You may commission other devices with the processor in **Run** mode.)

Setting up the scan list for the scanner

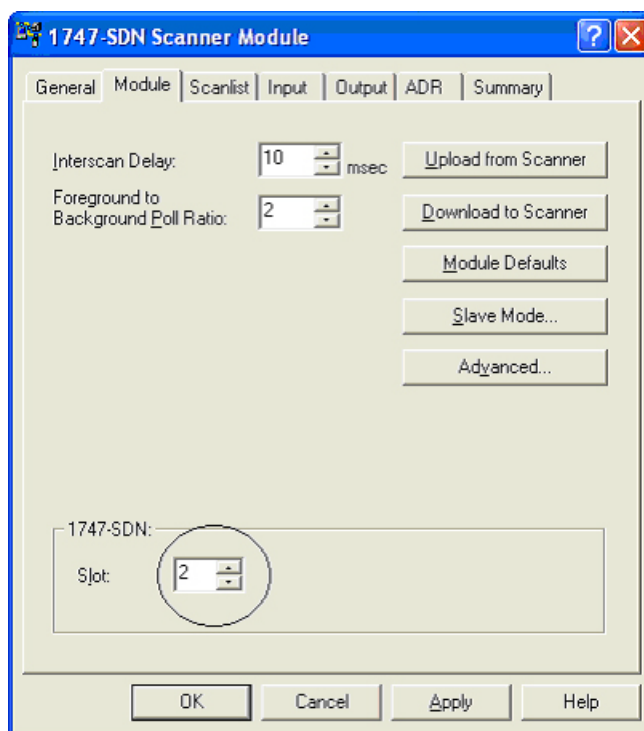
1. After setting node address of the scanner click on **Single Browse** from the network menu. The 1747 SDN module should appear with the new node ID.
2. Double-click the **1747-SDN module** icon. The following dialog will appear:



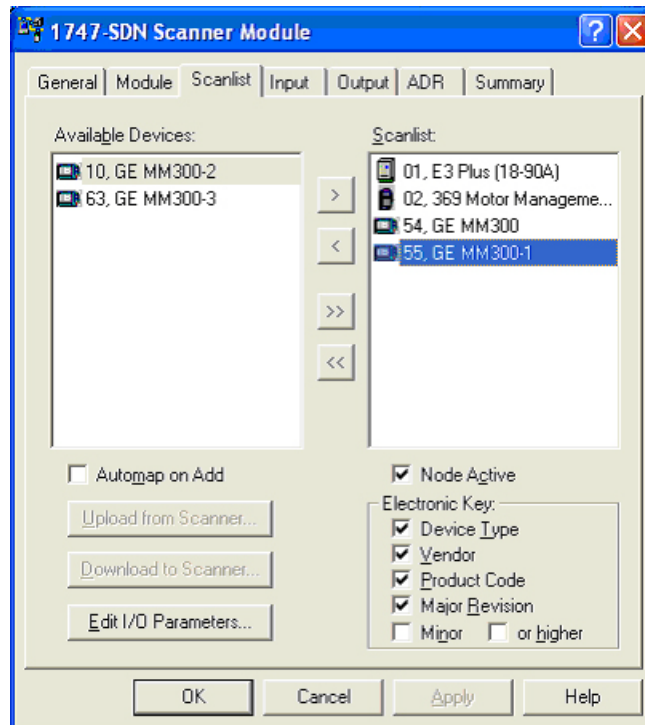
3. Click the **Module** tab. You will receive the following prompt:



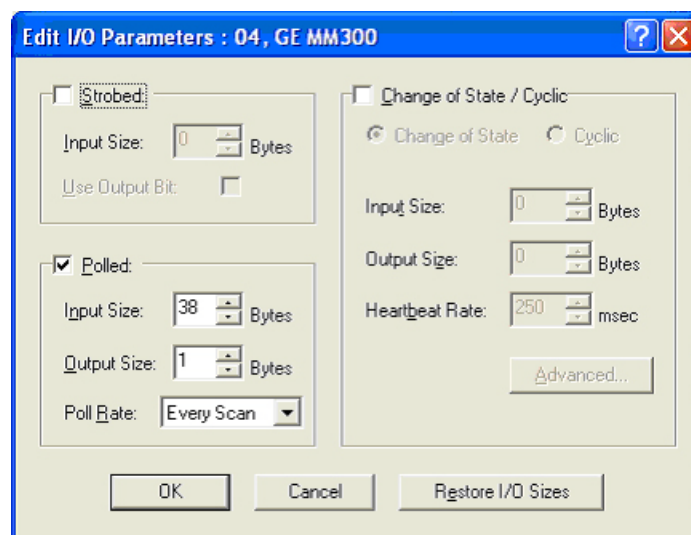
4. Click **Upload**. After uploading, the following dialog will appear:



5. Verify the 1747-SDN-module slot number is correct for the system.
6. Select the **Scanlist** tab. The MM300 relay will be seen in the **Available Devices** list.
7. Verify that the **Automap on Add** box is NOT checked.

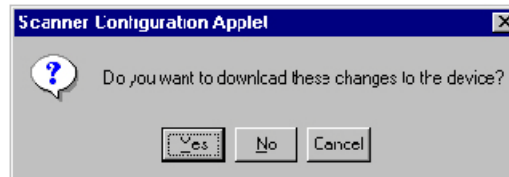


8. Click the double arrow (>>) to move the MM300 from the **Available Devices** list to the **Scanlist**. Select **Major Revision** as the part of the electronic key for MM300.
9. Double-click **MM300** in the Scanlist. The Edit I/O Parameters dialog (shown below) appears for the MM300.
10. The I/O parameters define the configuration for the device in terms of how much and what data the device exchanges with the 1747-SDN module. By default, the MM300 will send 38 bytes of input data and will receive 1 byte of output data from the poll connection.
11. Verify that the MM300 parameters are set as shown below:



12. Click **OK** to close the MM300 Edit I/O Parameters dialog.
13. Click **OK** again.

14. You will be prompted to download the changes to the 1747-SDN module:



15. Click **Yes** to download the new configuration.
The next step is to enable the ADR for the MM300 relay.

DeviceNet setup and configuration (ADR)

Overview of ADR

Auto-Device Replacement, or ADR, is feature of Allen-Bradley scanners that automates the replacement of a failed device on a DeviceNet network, returning it to the prior level of operation without having to use a software tool. It consists of two distinct features:

Configuration Recovery, or CR, refers to the scanner's ability to store a device's configuration. With this feature enabled, the scanner will download this stored configuration to the device before it begins to exchange I/O data with that device.

Auto Address Recovery, or AAR, refers to the ability of the scanner to change a device's node address from 63 (the default address) to that desired by the scanner. For example, when the scanner loses a connection to the device at node address #37, it will continually query the device's identity at node address #63. When a device is found that matches the Electronic Key of the devices that the scanner lost at node address #37, it will attempt to change its node address to node address #37. Upon success, the device's configuration will be downloaded.

There are some restrictions to keep in mind:

- Both CR and AAR can only be used with devices that are in the scanlist of the scanner.
- AAR can only be enabled for a device if CR is also enabled.
- CR cannot be enabled for devices that have no writeable parameters.
- AAR will not work for devices that do not support changing the node address over the network.
- In the MM300, only the contents of the A1 object are supported by ADR.

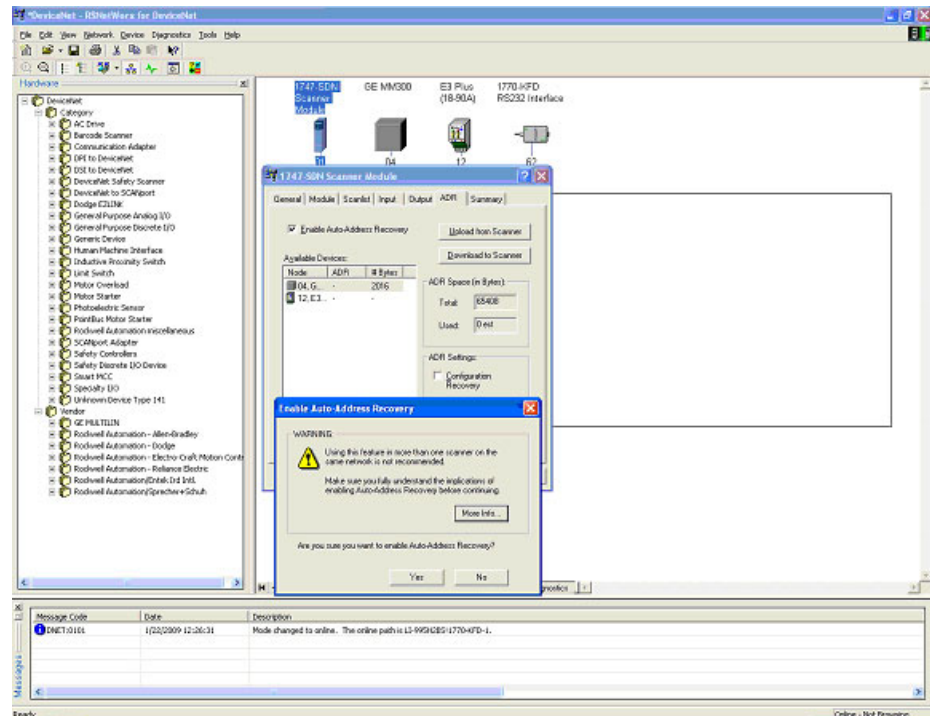
Enabling ADR



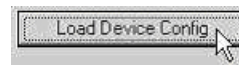
NOTE

Before proceeding to the next step ensure that the MM300 relay and the network are configured as desired. These configurations will be then stored in the scanner for the ADR feature.

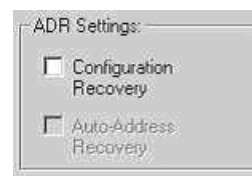
1. Start **RSNetworkx** and open the existing project file. If no project exists, create a new file.
2. Browse or go On-Line with a network that is configured as desired
3. Once the network appears on the screen, Right Click the mouse (Do NOT right click on a device).
4. Click **Upload from Network**.
5. **Save** File when all devices have been uploaded.
6. Double Click on **Scanner**.
7. Click on the **ADR** tab.
8. Click on the **Enable Auto Address Recovery** box.

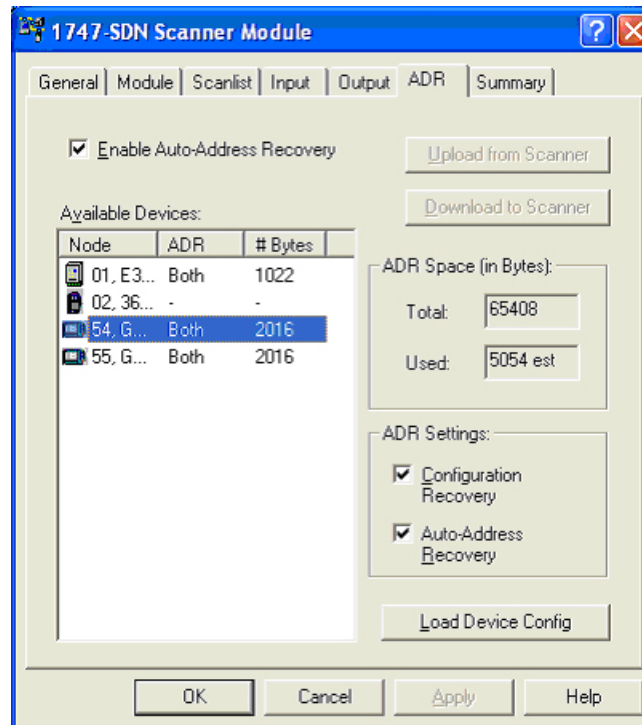


9. Click on the device to be configured for ADR then the **Load Device Config** button.



10. This will enable the **Configuration Recovery** check box. Click the box to enable it. If the device also has **Auto-Address Recovery** and if this option is also desired, then click it too.





11. Download this information to the Scanner (1747-SDN), i.e. click the **Download to Scanner** button on the Module tab.
12. Click on **OK**
13. **Save** File
14. There should be no error codes on the scanner if the devices have been configured correctly.



NOTE

Important points to be noted while enabling ADR for the MM300 relay:

1. When using Automatic Device Replace (ADR), loading the configuration into the RSNetWorx software-based project is an important step prior to downloading to the master scanner. This configuration is not actually uploaded from the individual devices, but is taken from the configuration data currently stored in the RSNetWorx project. A common mistake when using ADR is to not upload the configuration into the project and SAVE it to the project before downloading it to the scanner. This will cause old device configurations or factory defaults to be accidentally downloaded to the scanner. So always remember to UPLOAD the MM300 configuration into the RSNetWorx and SAVE the file before enabling ADR.
2. The MM300 does not support auto baud detection. So in a situation where the faulted device is replaced with a new device with default settings, ensure that the baud rate of the MM300 is same as that of the scanner.
3. In a situation where ADR is enabled on more than one MM300 with the same electronic key, and more than one MM300 device fails at the same time, the scanner will disable the Automatic Address Recovery (AAR) feature, if it has been enabled for those devices. However, the Configuration Recovery (CR) feature will still be active. In this case, a software tool must be used to change the node's address. The Node Commissioning Tool that ships with RSNetWorx for DeviceNet can be used to change a node's address.

4. Considering the scanner's limited memory for storage of the ADR configuration, more than one scanner will be required if there are many MM300 relays in the DeviceNet network.

DeviceNet Communications

The MM300 profile is an extension of the Communications Adapter Device Profile (0xC0). It is a group 2 only server. The MAC ID and baud rate are programmable through the EnerVista MM300 Setup software and the Graphical Control Panel. The MM300 supports the following DeviceNet object classes.

CLASS	OBJECT
01H	Identify
02H	Message Router
03H	DeviceNet
05H	Connection
A0H	Generic Data - Polling/Explicit
B1H	Explicit Control Writes
B0H	Analog Data - Explicit
A1H	Configuration Data - Explicit
A2H	Analog Data - Explicit

The MM300 supports poll and explicit messaging types.

The Poll function consumes one byte of control data (described under User Object Class B1h, Instance 01h, Attribute 01h) and produces 38 bytes of status and metering data as described in User Object Class A0h, Instance 01h, Attribute 01h.

USINT, UINT, UDINT and DINT, stated in this document, stand for the following data types :

USINT = Unsigned integer byte

UINT = Unsigned integer word

UDINT = Unsigned integer double word

DINT = Signed integer double word

Poll data

The Polling function consumes one byte of control data and produces 38 bytes of status and metering data as described in User Object Class A0h, Instance 01h, Attribute 01h. The control data format is as follows:

Table 4-11: Data Value, polled output data

VALUE		DESCRIPTION
Dec	Hex	
1	0x01	Reset
2	0x02	Lockout Reset
3	0x03	Stop
4	0x04	Start A
5	0x05	Start B
66	0x42	Clear Last Trip Data Prompt
67	0x43	Reset MWh and Mvarh Meters
68	0x44	Clear Counters
69	0x45	Clear Event Records
70	0x46	Clear Waveform Data

VALUE		DESCRIPTION
Dec	Hex	
71	0x47	Clear Maintenance Timer
72	0x48	Clear RTD Maximums
73	0x49	Reset Motor Information
74	0x4A	Auto Mode
75	0x4B	Manual Mode
80	0x50	Trigger Waveform Capture
81	0x51	Start Datalog
82	0x52	Stop Datalog

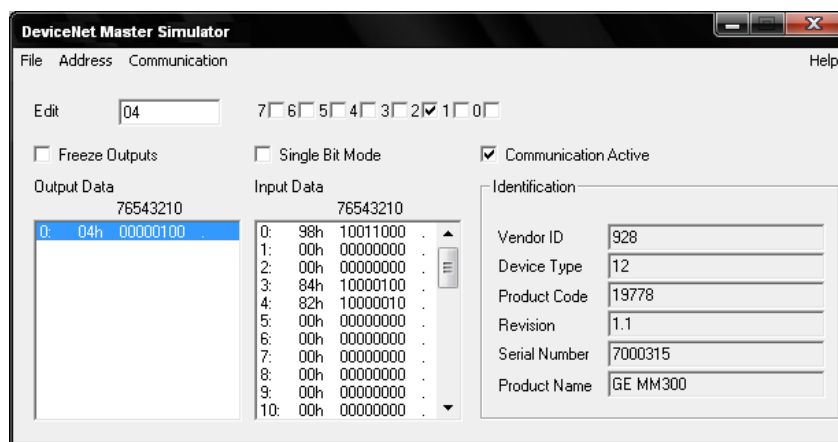
Commands are actioned on a change in Output data.

The example diagram below shows the MM300 polled I/O data read/written using a DeviceNet master simulator. In this example, the "Start A" command has been sent via Output data. In reading the Input data and interpreting the first byte value (98h) based on the data format for that byte (FC129) the following is true:

- Auto control is enabled
- Contactor A is energized
- Drive Available is true

In the event that there is a communication fault, and a pre-fault polled output command caused the MM300 to start a motor, the motor will continue to run even after the communication fault. To prevent this situation from occurring when remote communication is used with the device the user must ensure that the 'Comm Failure Trip' feature is configured. Refer to the MM300 Instruction manual, page 90 - Communications Setpoints, under the **Home > Setpnts > Cfg > Comms** HMI page, for more information.

Figure 4-11: DeviceNet polled I/O data



Identity Object (Class Code 01H)

Table 4-12: Identity Object, Class Code 01h, Services:

CODE	SERVICES AVAILABLE TO THIS OBJECT	
	NAME	DESCRIPTION
0x05	Reset	Reset the device to power up configuration
0x0E	Get_Attribute_Single	Returns the contents of the given attribute

Table 4-13: Identity Object, Class Code 01h, Attributes:

ATTRIBUTE	ACCESS	NAME/DESCRIPTION	DATA TYPE	VALUE
01h	Get	Revision of Identity Object	UINT	1

Table 4-14: Identity Object, Class Code 01h, Instance 01h, Attributes:

ATTRIBUTE	ACCESS	NAME/DESCRIPTION	DATA TYPE	VALUE
01h	Get	Vendor ID	UINT	928
02h	Get	Device Type	UINT	12
03h	Get	Product Code	UINT	0x4D42
04h	Get	Revision (Major, Minor)	USINT	1.1

Message Router (Class Code 02H)

The message router (class code 2) object provides a messaging connection point through which a client may address a service to any object or instance residing in the physical device. There is no external visible interface to the message router object.

DeviceNet Object (Class Code 03H)

Table 4-15: Identity Object, Class Code 03h, Services:

CODE	SERVICES AVAILABLE TO THIS OBJECT	
	NAME	DESCRIPTION
0x0E	Get_Attribute_Single	Returns the contents of the given attribute
0x10	Set_Attribute_Single	Sets the contents of the given attribute

Table 4-16: Identity Object, Class Code 03h, Attributes:

ATTRIBUTE	ACCESS	NAME/DESCRIPTION	DATA TYPE	VALUE
01h	Get	Revision of DeviceNet Object	UINT	1

Table 4-17: Identity Object, Class Code 03h, Instance 01h, Attributes:

ATTRIBUTE	ACCESS	NAME/DESCRIPTION	DATA TYPE	VALUE
01h	Get	MAC ID	USINT	0 to 63
02h	Get	Baud Rate	USINT	0 = 125 kbps 1 = 250 kbps 2 = 500 kbps
05h	Get	Allocation Choice	BYTE	Bit 0: Explicit Messaging Bit 1: polled I/O Bit 6: acknowledge suppression
		Master's MAC ID	USINT	0 to 63: address; 255 = unallocated

DeviceNet Connection Object (Class Code 05H)

Table 4-18: Connection Object, Class Code 05h, Services:

CODE	SERVICES AVAILABLE TO THIS OBJECT	
	NAME	DESCRIPTION
0x05	Reset	Reset the device to power up configuration
0x0E	Get_Attribute_Single	Returns the contents of the given attribute
0x10	Set_Attribute_Single	Sets the contents of the given attribute

Table 4-19: Connection Object, Class Code 05h, Instance 01h (Explicit Message Connection):

ATTRIBUTE	ACCESS	NAME/DESCRIPTION	DATA TYPE	VALUE
01h	Get	State	BYTE	0x03
02h	Get	Instance type	BYTE	0x00
03h	Get	Export class trigger	BYTE	0x83
04h	Get	Produced connection ID	UINT	10xxxxxx011, xxxxxx - MAC ID
05h	Get	Consumed connection ID	UINT	10xxxxxx100, xxxxxx - MAC ID
06h	Get	Initial comm. characteristics	USINT	0x21
07h	Get	Produced connection size	UINT	0x00EF
08h	Get	Consumed connection size	UINT	0x00EF
09h	Get/Set	Expected package rate	UINT	0x0000
0Ch	Get/Set	Watchdog timeout action	USINT	0 = transition to time-out 1 = auto delete 2 = auto reset 3 = deferred delete
0Dh	Get	Produced path length	UINT	0x0000
0Eh	Get	Produced path	BYTE [6]	<null>
0Fh	Get	Consumed path length	UINT	0x0000
10h	Get	Consumed path	BYTE [6]	<null>

Table 4-20: Connection Object, Class Code 05h, Instance 02h (Polled Input/Output Connection):

ATTRIBUTE	ACCESS	NAME/DESCRIPTION	DATA TYPE	VALUE
01h	Get	State	BYTE	0x03
02h	Get	Instance type	BYTE	0x01
03h	Get	Export class trigger	BYTE	0x82
04h	Get	Produced connection ID	UINT	MAC ID
05h	Get	Consumed connection ID	UINT	MAC ID
06h	Get	Initial comm. characteristics	USINT	0x01
07h	Get	Produced connection size	UINT	0x0026
08h	Get	Consumed connection size	UINT	0x0001
09h	Get/Set	Expected package rate	UINT	0x0000
0Ch	Get/Set	Watchdog timeout action	USINT	0x00
0Dh	Get	Produced path length	UINT	0x0006
0Eh	Get	Produced path	BYTE [6]	variable
0Fh	Get	Consumed path length	UINT	0x0006
10h	Get	Consumed path	BYTE [6]	variable

DeviceNet Motor Data - Explicit Object (Class Code A0H)

Table 4-21: Motor Data Object, Class Code A0h, Services:

CODE	SERVICES AVAILABLE TO THIS OBJECT	
	NAME	DESCRIPTION
0x0E	Get_Attribute_Single	Returns the contents of the given attribute

Table 4-22: Motor Data Object, Class Code A0h, Attributes:

ATTRIBUTE	ACCESS	NAME/DESCRIPTION	DATA TYPE	VALUE
01H	Get	Revision of Motor Data Object	UINT	1

Table 4-23: Motor Data Object, Class Code A0h, Instance 01h, Attributes, Get Access:

ATTRIBUTE	NAME/DESCRIPTION	SIZE IN BYTES	FORMAT
01H	Motor Data	38	See below
02H	Digital Data	9	See below
03H	Summary of Motor Data	7	See below
04H	Reserved	NA	NA
05H	Motor status	1	FC129 (low byte only)
06H	Motor load (%)	2	F1
07H	Cause of last trip	2	FC134
08H	Thermal capacity used (%)	2	F1
09H	Current metering	8	See below
0AH	Average Line Voltage (V)	2	F1
0BH	Power metering	6	See below
0CH	Contact Input Status	8	BIT per input
0DH	Contact Output Status	4	BIT per output
0EH	RTD metering	3	See below

DATA FORMAT, SUMMARY OF MOTOR DATA		
ITEM DESCRIPTION	SIZE IN BYTES	FORMAT
Motor status	1	FC129 (low byte only)
Motor load (%)	2	F1
Cause of last trip	2	FC134
Thermal capacity used (%)	2	F1

DATA FORMAT, MOTOR DATA		
ITEM DESCRIPTION	SIZE IN BYTES	FORMAT
Motor status	1	FC129 (low byte only)
Motor load (%)	2	F1
Cause of last trip	2	FC134
Thermal capacity used (%)	2	F1
Average phase current (A)	4	F10
Ground current (A)	4	F10
Average Line Voltage (V)	2	F1
Real power (kW)	4	F13
Power factor	2	F21

DATA FORMAT, MOTOR DATA		
ITEM DESCRIPTION	SIZE IN BYTES	FORMAT
Contact Input Status	8	BIT per input
Contact Output Status	4	BIT per output
Local hottest RTD number	1	Unsigned 8 bit integer
Local hottest RTD temperature	2	F4

DATA FORMAT, DIGITAL DATA		
ITEM DESCRIPTION	SIZE IN BYTES	FORMAT
Motor status	1	FC129 (low byte only)
Contact Input Status	8	BIT per input

DATA FORMAT, CURRENT METERING		
ITEM DESCRIPTION	SIZE IN BYTES	FORMAT
Average phase current (A)	4	F10
Ground current (A)	4	F10

DATA FORMAT, POWER METERING		
ITEM DESCRIPTION	SIZE IN BYTES	FORMAT
Real power (kW)	4	F13
Power factor	2	F21

DATA FORMAT, RTD METERING		
ITEM DESCRIPTION	SIZE IN BYTES	FORMAT
Local hottest RTD number	1	Unsigned 8 bit integer
Local hottest RTD temperature	2	F4

DeviceNet - Explicit Configuration Data Object (Class Code A1H, Services)

Table 4-24: Explicit Configuration Data Object, Class Code A1h, Services:

CODE	SERVICES AVAILABLE TO THIS OBJECT	
	NAME	DESCRIPTION
0x0E	Get_Attribute_Single	Returns the contents of the given attribute
0x10	Set_Attribute_Single	Sets the contents of the given attribute

Table 4-25: Explicit Configuration Data Object, Class Code A1h, Attributes:

ATTRIBUTE (HEX VALUE)	DESCRIPTION	UNIT	FORMAT CODE	MIN	MAX	FACTOR Y DEFAULT	SIZE IN BYTES
1	Modbus Slave ID	None	F1	1	254	254	2
2	RS485 Baud Rate	None	FC101	0	4	4	2
3	Phase CT Type	None	FC105	0	3	0	2
4	CT Primary	Amps	F1	5	1000	5	2
5	Ground CT Type	None	FC104	0	2	2	2
6	High Speed CT Primary	Amps	F1	5	1000	5	2

ATTRIBUTE (HEX VALUE)	DESCRIPTION	UNIT	FORMAT CODE	MIN	MAX	FACTOR Y DEFAULT	SIZE IN BYTES
7	CT Primary Turns	Amps	F1	1	10	1	2
8	3 Phase Voltage Connection	None	FC106	0	1	0	2
9	Aux VT Connection	None	FC176	0	8	0	2
0A	Aux VT Primary	Volts	F1	110	690	415	2
0B	Aux VT Secondary	Volts	F1	110	300	110	2
0C	Supply Frequency	Hz	FC107	0	1	0	2
0D	Starter Type	None	FC139	0	7	0	2
0E	Motor FLA	Amps	F2B	5	10001	10001	2
0F	High Speed FLA	Amps	F2B	5	10001	10001	2
10	Motor Name Plate Voltage	Volts	F1	100	690	690	2
11	Change Over Current	FLA	F2B	10	51	15	2
12	Transfer Time	Seconds	F1	0	125	1	2
13	High Speed Start Block	None	FC126	0	1	1	2
14	Ramp Up Time	Seconds	F1	0	125	1	2
15	Ramp Down Time	Seconds	F1	0	125	1	2
16	Precontactor Time	Seconds	F1	0	60	0	2
17	Motor Rating	Kw	F2B	3	11001	11001	2
18	High Speed Motor Rating	Kw	F2B	3	11001	11001	2
19	IL Ignore In Test	None	FC126	0	1	0	2
1A	IL A Function	None	FC140	0	3	0	2
1B	IL A Inst Alarm	None	FC126	0	1	0	2
1C	IL A Startup Override	Seconds	F1	0	3600	0	2
1D	IL A Running Override	Seconds	F1B	0	3601	0	2
1E	IL A Healthy State	None	FC116	0	1	1	2
1F	IL B Function	None	FC140	0	3	0	2
20	IL B Inst Alarm	None	FC126	0	1	0	2
21	IL B Startup Override	Seconds	F1	0	3600	0	2
22	IL B Running Override	Seconds	F1B	0	3601	0	2
23	IL B Healthy State	None	FC116	0	1	1	2
24	Comms Ok Evaluation	None	FC131	1	64	1	2
25	Overload Pickup Level	FLA	F3	101	125	101	2
26	Unbalance K Factor	None	F1	0	19	0	2
27	Cool Time Constant Running	Mins	F1	1	1000	15	2
28	Cool Time Constant Stopped	Mins	F1	1	1000	30	2
29	Hot Cold Safe Stall Ratio	Percent	F1	1	100	75	2
2A	Thermal Capacity Alarm Level	Percent	F1B	10	101	101	2
2B	Standard Overload Curve	None	F1	1	15	4	2
2C	Reserved						
2D	Mechanical Jam Level	FLA	F3B	101	451	451	2
2E	Mechanical Jam Delay	Seconds	F2	1	300	1	2
2F	Acceleration Alarm Timer	Seconds	F2B	5	2501	2501	2
30	Acceleration Trip Timer	Seconds	F2B	5	2501	2501	2

ATTRIBUTE (HEX VALUE)	DESCRIPTION	UNIT	FORMAT CODE	MIN	MAX	FACTOR Y DEFAULT	SIZE IN BYTES
31	Current Unbalance Alarm Level	Percent	F1B	4	41	15	2
32	Current Unbalance Alarm Delay	Seconds	F1	1	60	1	2
33	Current Unbalance Trip Level	Percent	F1B	4	41	30	2
34	Current Unbalance Trip Delay	Seconds	F1	1	60	1	2
35	Ground Alarm Level	PercentFLA	F1B	10	101	101	2
36	CBCT Ground Alarm Level	Amps	F2B	5	151	151	2
37	Ground Alarm Delay On Start	Seconds	F1	0	60	10	2
38	Ground Trip Level	PercentFLA	F1B	10	101	101	2
39	CBCT Ground Trip Level	Amps	F2B	5	151	151	2
3A	Ground Trip Delay On Start	Seconds	F2	0	100	0	2
3B	Ground Alarm Delay On Run	Seconds	F1	0	60	10	2
3C	Ground Trip Delay on Run	Seconds	F2	0	50	0	2
3D	Reserved						
3E	Reserved						
3F	Reserved						
40	Reserved						
41	Reserved						
42	Reserved						
43	Current Cutoff Level	Amps	F2	0	10	2	2
44	UV Restart Inhibit	None	FC142	0	0xE000	0	2
45	Lockout Reset	None	FC142	0	0xE000	0	2
46	Access Switch	None	FC142	0	0xE000	0	2
47	Field Permissive	None	FC142	0	0xE000	0	2
48	Comms Permissive	None	FC142	0	0xE000	0	2
49	Forward Limit	None	FC142	0	0xE000	0	2
4A	Reverse Limit	None	FC142	0	0xE000	0	2
4B	Remote Reset	None	FC142	0	0xE000	0	2
4C	MCC Permissive	None	FC142	0	0xE000	0	2
4D	Hard Wired Start A	None	FC142	0	0xE000	0	2
4E	Hard Wired Start B	None	FC142	0	0xE000	0	2
4F	Hard Wired Stop	None	FC142	0	0xE000	0	2
50	Hard Wired Permissive	None	FC142	0	0xE000	0	2
51	Field Start A	None	FC142	0	0xE000	0	2
52	Field Start B	None	FC142	0	0xE000	0	2
53	Field Stop	None	FC142	0	0xE000	0	2
54	Contactor Status A	None	FC142	0	0xE000	0	2
55	Contactor Status B	None	FC142	0	0xE000	0	2
56	Auto/Manual Switch	None	FC142	0	0xE000	0	2
57	Test Switch	None	FC142	0	0xE000	0	2
58	Process Interlock A	None	FC142	0	0xE000	0	2
59	Process Interlock B	None	FC142	0	0xE000	0	2

ATTRIBUTE (HEX VALUE)	DESCRIPTION	UNIT	FORMA T CODE	MI N	MAX	FACTOR Y DEFAULT	SIZE IN BYTES
5A	Self Test Action	None	FC111	0	1	0	2
5B	Comms Start Cntrl	None	FC126	0	1	0	2
5C	Comms Stop Mode	None	FC172	0	1	0	2
5D	Hard Wired Start Ctrl	None	FC126	0	1	0	2
5E	Hard Wired Stop Mode	None	FC172	0	1	0	2
5F	Hard Wired Stop Actn	None	FC174	0	1	0	2
60	Hard Wired 2W/3W	None	FC173	0	1	1	2
61	Field Start Ctrl	None	FC126	0	1	0	2
62	Field Stop Mode	None	FC172	0	1	0	2
63	Field Stop Action	None	FC174	0	1	0	2
64	Field 2W/3W	None	FC173	0	1	1	2
65	MCC Start Ctrl	None	FC126	0	1	0	2
66	MCC Stop Mode	None	FC172	0	1	0	2
67	MCC Stop Action	None	FC174	0	1	0	2
68	Test Auto Mode	None	FC175	0	2	1	2
69	Test Manual Mode	None	FC175	0	2	0	2
6A	External Stop Action	None	FC174	0	1	0	2
6B	Auto Manual Key	None	FC126	0	1	0	2
6C	NTP IP address 1	None	FC150	0	0xFFFF	0	2
6D	NTP IP address 2	None	FC150	0	0xFFFF	0	2
6E	Ethernet IP address 1	None	FC150	0	0xFFFF	0	2
6F	Ethernet IP address 2	None	FC150	0	0xFFFF	0	2
70	Ethernet Subnet Mask 1	None	FC150	0	0xFFFF	0xFFFF	2
71	Ethernet Subnet Mask 2	None	FC150	0	0xFFFF	0xFC00	2
72	Ethernet Gateway Addr 1	None	FC150	0	0xFFFF	0	2
73	Ethernet Gateway Addr 2	None	FC150	0	0xFFFF	0	2
74	IL A Name 1	None	F22				2
75	IL A Name 2	None	F22				2
76	IL A Name 3	None	F22				2
77	IL A Name 4	None	F22				2
78	IL A Name 5	None	F22				2
79	IL A Name 6	None	F22				2
7A	IL A Name 7	None	F22				2
7B	IL A Name 8	None	F22				2
7C	IL A Name 9	None	F22				2
7D	IL A Name 10	None	F22				2
7E	IL B Name 1	None	F22				2
7F	IL B Name 2	None	F22				2
80	IL B Name 3	None	F22				2
81	IL B Name 4	None	F22				2
82	IL B Name 5	None	F22				2
83	IL B Name 6	None	F22				2
84	IL B Name 7	None	F22				2
85	IL B Name 8	None	F22				2
86	IL B Name 9	None	F22				2

ATTRIBUTE (HEX VALUE)	DESCRIPTION	UNIT	FORMAT CODE	MIN	MAX	FACTOR Y DEFAULT	SIZE IN BYTES
87	IL B Name 10	None	F22				2
88	Thermal Lockout Trip	None	FC126	0	1	1	2
89	Unbalance Lockout Trip	None	FC126	0	1	0	2

DeviceNet - Explicit Motor Analog Data Object (Class Code A2H, Services)

Table 4-26: Explicit Motor Analog Data Object, Class Code A2h, Services:

CODE	SERVICES AVAILABLE TO THIS OBJECT	
	NAME	DESCRIPTION
0x0E	Get_Attribute_Single	Returns the contents of the given attribute

Table 4-27: Explicit Motor Analog Data Object, Class Code A2h, Attributes:

ATTRIBUTE NO. (HEX VALUE)	DESCRIPTION	UNIT	FORMAT CODE	SIZE IN BYTES
1	Phase A current	Amps	F10	4
2	Phase B current	Amps	F10	4
3	Phase C current	Amps	F10	4
4	Average Phase current	Amps	F10	4
5	Ground Current	Amps	F10	4
6	Motor Load	%	F1	2
7	Current Unbalance	%	F1	2
8	Vab	Volts	F1	2
9	Vbc	Volts	F1	2
A	Vca	Volts	F1	2
B	Average Line Voltage	Volts	F1	2
C	Van	Volts	F1	2
D	Vbn	Volts	F1	2
E	Vcn	Volts	F1	2
F	Va1 angle	Degree	F1	2
10	Vb1 angle	Degree	F1	2
11	Vc1 angle	Degree	F1	2
12	System Frequency	Hz	F3	2
13	Power factor	None	F21	2
14	Real Power	Kw	F13	4
15	Reactive Power	Kvar	F13	4
16	Apparent Power	Kva	F2	2
17	MWh Consumption	Mwh	F17	4
18	Mvarh Consumption	Mvarh	F17	4
19	Hottest Stator RTD	None	F1	1
1A	Hottest Stator RTD Temp	Deg C	F4	2
1B	RTD 1 Temperature	Deg C	F4	2
1C	RTD 2 Temperature	Deg C	F4	2
1D	RTD 3 Temperature	Deg C	F4	2
1E	RTD 4 Temperature	Deg C	F4	2

ATTRIBUTE NO. (HEX VALUE)	DESCRIPTION	UNIT	FORMAT CODE	SIZE IN BYTES
1F	RTD 5 Temperature	Deg C	F4	2
20	RTD 6 Temperature	Deg C	F4	2
21	Learned Acceleration Time	Secs	F2	2
22	Learned Starting Current	Amps	F10	4
23	Learned Starting Capacity	%	F1	2
24	Learned Average Motor Load	%FLA	F3	2
25	Number of motor starts	None	F1	2
26	Number of UV Restarts	None	F1	2
27	Motor Running Hours	Hours	F9	4
28	Cause of Last Trip	None	FC134	2
29	Time of Last Trip	None	F19	4
2A	Date of Last Trip	None	F18	4
2B	Phase A Pre Trip Current	Amps	F10	4
2C	Phase B Pre Trip Current	Amps	F10	4
2D	Phase C Pre Trip Current	Amps	F10	4
2E	Pre Trip Ground Current	Amps	F10	4
2F	Pre Trip Motor Load	%	F1	2
30	Pre Trip Current Unbalance	%	F1	2
31	Pre Trip Vab Voltage	Volts	F1	2
32	Pre Trip Vbc Voltage	Volts	F1	2
33	Pre Trip Vca Voltage	Volts	F1	2
0x	Pre Trip Van Voltage	Volts	F1	2
35	Pre Trip Vbn Voltage	Volts	F1	2
36	Pre Trip Vcn Voltage	Volts	F1	2
37	Pre Trip System Frequency	Hz	F3	2
38	Pre Trip Real Power	Kw	F13	4
39	Pre Trip Reactive Power	Kvar	F13	4
3A	Pre Trip Apparent Power	Kva	F2	2
3B	Pre Trip Power Factor	None	F21	2
3C	Trip Status 3	None	FC185	4
3D	Trip Status 2	None	FC184	4
3E	Trip Status 1	None	FC183	4
3F	Alarm Status 3	None	FC181	4
40	Alarm Status 2	None	FC180	4
41	Alarm Status 1	None	FC179	4
42	Overload Lockout Block	Reserved		2
43	Start Timer 1	Secs	F1	2
44	Start Timer 2	Secs	F1	2
45	Start Timer 3	Secs	F1	2
46	Start Timer 4	Secs	F1	2
47	Start Timer 5	Secs	F1	2
48	Time Between Starts Lockout Time	Secs	F1B	2
49	Restart Block Lockout	Secs	F1	2
4A	Starts Hour Block Lockout Time	Secs	F1	2
4B	Motor Status	None	FC129	1
4C	Motor Thermal Capacity Used	%	F1	2

ATTRIBUTE NO. (HEX VALUE)	DESCRIPTION	UNIT	FORMAT CODE	SIZE IN BYTES
4D	Contact Input 64 - 33 Status	None	FC168	4
4E	Contact Input 32-1 Status	None	FC167	4
4F	Contact Output 32-1 Status	None	FC167	4

DeviceNet - Explicit Motor Analog Data Object, Class Code B0H, Services

Table 4-28: Explicit Motor Analog Data Object, Class Code B0h, Services:

CODE	SERVICES AVAILABLE TO THIS OBJECT	
	NAME	DESCRIPTION
0x0E	Get_Attribute_Single	Returns the contents of the given attribute

Table 4-29: Explicit Motor Analog Data Object, Class Code B0h, Attributes:

ATTRIBUTE	DESCRIPTION	SIZE IN BYTES
01H Currents	Currents	20
02H	Reserved	6
03H	Motor load	4
04H	Line voltages	8
05H	Phase voltages	8
06H	Phase voltage angles	6
07H	Frequency	2
08H	Power	14
09H	Energy	12
0AH	Local hottest stator RTD and temperature	3
0BH	Local RTD temperatures	12
0CH	Learned data	10
0DH	Motor statistics	8
0EH	Cause of trip	2
0FH	Last trip date and time	8
10H Currents	Last pre-trip currents	16
11H	Last pre-trip motor load	4
12H	Last pre-trip line voltages	6
13H	Last pre-trip phase voltages	6
14H	Last pre-trip frequency	2
15H	Last pre-trip power	12
16H	Trip diagnostic data	12
17H	Alarm diagnostic data	12
18H	Start block status data	18
19H	All actual values	211

Table 4-30: Data Formats, Explicit Motor Analog Data Object

ATTRIBUTE		ITEM DESCRIPTION	SIZE IN BYTES	FORMAT
01 H	Currents	Ia	4	F10
		Ib	4	F10
		Ic	4	F10
		Iavg	4	F10
		Igrd	4	F10
03 H	Motor load	Motor Load	2	F1
		I Unb	2	F1
04 H	Line voltages	Vab	2	F1
		Vbc	2	F1
		Vca	2	F1
		Average Line Voltage	2	F1
05 H	Phase voltages	Van	2	F1
		Vbn	2	F1
		Vcn	2	F1
		Reserved	2	NA
06 H	Phase voltage angles	Va Angle	2	F1
		Vb Angle	2	F1
		Vc Angle	2	F1
07 H	Frequency	Frequency	2	F3
08 H	Power	Power Factor	2	F21
		Real Power	4	F13
		Reserved	2	NA
		Reactive Power	4	F13
		Apparent Power	2	F2
09 H	Energy	MWh Consumption	4	F17
		Mvarh Consumption	4	F17
		Reserved	2	NA
		Reserved	2	NA
0A H	Local hottest stator RTD and temperature	Hottest Stator RTD	1	Unsigned 8 bit integer
		Hottest Stator RTD Temp	2	F4

ATTRIBUTE		ITEM DESCRIPTION	SIZE IN BYTES	FORMAT
0B H	Local RTD Temperatures	RTD 1 Temp	2	F4
		RTD 2 Temp	2	F4
		RTD 3 Temp	2	F4
		RTD 4 Temp	2	F4
		RTD 5 Temp	2	F4
		RTD 6 Temp	2	F4
0C H	Learned data	Learned Acceleration Time	2	F2
		Learned Starting Current	4	F10
		Learned Starting Capacity	2	F1
		Average Motor Load Learned	2	F3
0D H	Motor Statistics	Number of Motor Starts	2	F1
		Number of UV Restarts	2	F1
		Motor Running Hours	4	F9
0E H	Cause of Trip	Cause of Last Trip	2	FC134
0F H	Last trip date and time	Time of Last Trip	4	F19
		Date of Last Trip	4	F18
10 H	Last pre-trip currents	Pre Trip Ia	4	F10
		Pre Trip Ib	4	F10
		Pre Trip Ic	4	F10
		Pre Trip Igrd	4	F10
11 H	Last pre-trip motor load	Pre Trip Motor Load	2	F3
		Pre Trip Current Unbalance	2	F1
12 H	Last pre-trip line voltages	Pre Trip Vab	2	F1
		Pre Trip Vbc	2	F1
		Pre Trip Vca	2	F1
13 H	Last pre-trip phase voltages	Pre Trip Van	2	F1
		Pre Trip Vbn	2	F1
		Pre Trip Vcn	2	F1
14 H	Last pre-trip frequency	Pre Trip System Frequency	2	F3
15 H	Last pre-trip power	Pre Trip Real Power	4	F13
		Pre Trip Reactive Power	4	F13
		Pre Trip Apparent Power	2	F2
		Pre Trip Power Factor	2	F21

ATTRIBUTE		ITEM DESCRIPTION	SIZE IN BYTES	FORMAT
16 H	Trip diagnostic data	Trip Status 3	4	FC185
		Trip Status 2	4	FC184
		Trip Status 1	4	FC183
17 H	Alarm diagnostic data	Alarm Status 3	4	FC181
		Alarm Status 2	4	FC180
		Alarm Status 1	4	FC179
18 H	Start block status data	Reserved	2	F1
		Start Timer 1	2	F1
		Start Timer 2	2	F1
		Start Timer 3	2	F1
		Start Timer 4	2	F1
		Start Timer 5	2	F1
		Time Between Starts Lockout	2	F1B
		Restart Block Lockout	2	F1
		Starts/Hour Block	2	F1
19 H	All of the above items from attributes 01H-18H			

DeviceNet - Explicit Motor Object, Class Code B1H

Table 4-31: Explicit Motor Control Object, Class Code B1h, Services:

CODE	SERVICES AVAILABLE TO THIS OBJECT	
	NAME	DESCRIPTION
0x10	Set_Attribute_Single	Sets the contents of the given attribute

Table 4-32: Explicit Motor Control Object, Class Code B1h, Attributes:

ATTRIBUTE	ACCESS	DESCRIPTION	DATA TYPE	VALUE
01H	Set	Control Command	BYTE	See below

Table 4-33: Explicit Motor Control Data Format

VALUE		DESCRIPTION
Dec	Hex	
1	0x01	Reset
2	0x02	Lockout Reset
3	0x03	Stop
4	0x04	Start A
5	0x05	Start B
66	0x42	Clear Last Trip Data Prompt
67	0x43	Reset MWh and Mvarh Meters
68	0x44	Clear Counters
69	0x45	Clear Event Records
70	0x46	Clear Waveform Data
71	0x47	Clear Maintenance Timer
72	0x48	Clear RTD Maximums
73	0x49	Reset Motor Information

VALUE		DESCRIPTION
Dec	Hex	
74	0x4A	Auto Mode
75	0x4B	Manual Mode
80	0x50	Trigger Waveform Capture
81	0x51	Start Datalog
82	0x52	Stop Datalog

MM300 Motor Management Relay

Appendix

A.1 Change notes

A.1.1 Revision history

Table A-1: Revision History

MANUAL P/N	RELEASE DATE
1601-9025-A1	27 July 2007
1601-9025-A2	25 January 2008
1601-9025-A3	11 June 2008
1601-9025-A4	17 October 2008
1601-9025-A5	2 June 2009
1601-9025-A6	15 April 2010
1601-9025-A7	8 June 2010
1601-9025-A8	28 February 2013
1601-9025-A9	2 February 2016
1601-9025-AA	31 May 2016
1601-9025-AB	11 May 2018

Table A-2: Major Updates for MM300 Comm Guide-AB

Section Number	CHANGES
	Manual revision number from AA to AB,
Chapter 2	Updated Modbus Map Securityt section, Passcode entries ,for the firmware 1.71 change to passcode security.

Table A-3: Major Updates for MM300 Comm Guide-AA

Section Number	CHANGES
	Manual revision number from A9 to AA,
Chapter 2	Updated Modbus Map to include Update TCU Using Reset Key, Thermal O/L Lockout Trip, Current Unbalance Lockout Trip. Removed Demand Metering entries.
Chapter 4	Added Devicenet (A1H) entries Thermal Lockout Trip, Unbalance Lockout Trip.

Table A-4: Major Updates for MM300 Comm Guide-A9

Section Number	CHANGES
	Manual revision number from A8 to A9, updated cover format and front matter contact information. Added EAC logo. Changed branding to Grid Solutions.
Appendix A.2	Added Warranty section
4.3	Added Extended Profibus DPV1 functionality

Table A-5: Major Updates for MM300 Comm Guide-A8

Section Number	CHANGES
	Manual revision number from A7 to A8
	Add Profibus DP Termination section
	Add DB9 signal pin applicability table to Profibus DP section
	Remove rows 30400, 30405, 30406, 30408 to 30410 from Modbus table
	Add note for 30391 and 30398
	Change parameters for 30384, 30385, 30389, 30391, 30398
4.4	Updated F18, F19

Table A-6: Major Updates for MM300 Comm Guide-A7

Section Number	CHANGES
	Manual revision number from A6 to A7
	Remove unsupported DeviceNet and Profibus commands

Table A-7: Major Updates for MM300 Comm Guide-A6

Section Number	CHANGES
	Manual revision number from A5 to A6
	Modbus Memory Map Changes
	Format Codes Changes
General	Minor Corrections and Updates

Table A-8: Major Updates for MM300 Comm Guide-A5

Section Number	CHANGES
	Manual revision number from A4 to A5
2.1.1 Electrical Interface	Section updated
4.1.6 Profibus DPV0 Diagnostics	Added DPV0 Diagnostic Alarm table
4.2 Profibus DPV1	New section added
4.3.1 DeviceNet PS Config	New section added
General	Updates and section formatting changes

Table A-9: Major Updates for MM300 Comm Guide-A3

Section Number	CHANGES
	Manual revision number from A2 to A3
2.4 Format Codes	FC179, FC180, FC184, FC191, and FC192 changes
4.2.5 DeviceNet Object	Table 21 corrected
4.2.6 DeviceNet Conn. Obj.	Table 23 title corrected
4.1.4 Profibus Input Data	Table updated
4.1.6 Profibus DP Diagnostics	Section updated - added graphics and text updates
4.1.6 Profibus DP Diagnostics	Extended Diagnostics table updated
4.2 DeviceNet Protocol	Section updated - added graphics and text updates
4.1 Profibus Protocol	Added sections: Power Supply Configuration, DP-parameterization, DP-configuration,
4.1 Profibus Protocol	Order changed: Input-Output-Diagnostics

A.2 Warranty

For products shipped as of 1 October 2013, GE warrants most of its GE manufactured products for 10 years. For warranty details including any limitations and disclaimers, see our Terms and Conditions at <https://www.gegridsolutions.com/multilin/warranty.htm>. For products shipped before 1 October 2013, the standard 24-month warranty applies.