STARTCO®
ENGINEERING LTD.

406 Jessop Avenue Saskatoon, Saskatchewan Canada S7N 2S5 Ph: (306) 373-5505 Fx: (306) 374-2245 www.startco.ca

MPS PROFIBUS-DP INTERFACE

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TABLE OF CONTENTS

LIST OF TABLES

DISCLAIMER

1. GENERAL

The Profibus-DP slave interface provides access to meter data, set points, starter control functions and provides reset control. Data from the MPS (input to the network) is in the form of a fixed block of 64 bytes defined as an assembly. This assembly consists of the values of the parameters defined by the User-Defined Registers in the MPS. The format of this assembly is a function of the data selected and can represent 8-bit, 16-bit, and 32-bit values. The end user can configure the User Registers to select any meter, status, or set-point value in the MPS up to a total of 64 bytes.

Data to the MPS (output from the network) is in the form of a fixed block of 8 bytes. This output assembly is used to send control commands and set points to the MPS.

The Profibus Extended User Parameters are not implemented on the Profibus interface.

See Appendix E and F of the MPS Motor Protection System Manual for the MPS Register table and data formats.

2. INTERFACE CONNECTOR

A D-SUB connector is used for the Profibus network.

TABLE 2.1 CONNECTOR TERMINATION

PIN	FUNCTION
1	NC
2	NC
3	B-Line, RS-485
4	RTS
5	GND
6	+5
7	NC
8	A-Line, RS-485
9	NC

A network termination is required on both ends of the network as per the RS-484 specification. A 120- or 150-ohm resistor is used. Additional signals are provided on the D-SUB, however, in normal applications, only the A-line, B-line, and cable shield are used.

3. NETWORK SETTINGS

Automatic baud rate detection from 9.6 kilobits to 12 Megabits per second is provided. The MPS baud rate set point is not used.

The slave address is selected using the OPI *Setup* | *Hardware* | *Network Comms* menu. The address range is 1 to 125 and the default address is 125.

4. COMMUNICATION STATUS AND TIMEOUT

The status of the Profibus communication module is viewed using the *Metering* | *Comm State* menu. The status of the module is indicated as “Profibus: ONLINE” when the module is operating properly, and as “Profibus: OFFLINE” when the module is not operating properly. If the MPS indicates ONLINE but the module LED is RED, verify that the slave address is correct. If the slave address in the MPS is changed, the module must be re-initialised. The module is initialised on power up or can be initialised using the OPI. To initialise the module using the OPI, first disable the module by selecting *None* in the *Setup* | *Hardware* | *Network Type* menu and then select *Anybus* to enable the module.

In applications where the MPS start/stop functions are controlled by the network, the MPS can be configured to trip or alarm on loss of communication-writes to the module. This feature is enabled using the *Setup* | *Hardware* | *Network Comms* | *Network Error* menu.

Communication status for writes to the module is displayed in the *Metering* | *Comm* State menu. Writes to the OUPUT memory buffer are indicated by “Output: NO” or “Output: YES”. If the module is receiving output from the network, then “Output YES” will be displayed.

4.1 MODULE ERRORS

Module errors are typically the result of interface errors. When a module error occurs, “*Anybus Error!*” is displayed along with an error code. Error code “1” is displayed if the network type is set to *Anybus* with no module installed. *Anybus* should not be selected if there is no Anybus module installed. If a module is installed and errors persist, contact Startco Engineering Ltd.

5. LED INDICATION

Module LED's can be viewed through access holes on the side of the MPS-CTU. Red indicates that the module is disabled, has an incorrect address, or is not connected. Green indicates that the module is ON-LINE with a valid slave address and data exchange is possible.

6. GSD FILE

A configuration tool uses a gsd file to configure the network. The input and output area sizes required by the MPS must be setup within the configuration phase. The configuration tool must be set up with module byte sizes such that the INPUT size is 64 bytes (data from the MPS into the network) and the total OUTPUT size is 8 bytes (data from the network to the MPS).

The MPS uses the standard gsd file for the Anybus Profibus module. This file is available from www.anybus.com or startco.ca.

7. INPUT DATA FROM MPS

Input data from the MPS is a fixed block of 32 words (64 bytes) representing the values of the parameters defined by the User-Defined Register block in the MPS. The User Registers are configured using the MPS menu system or by using the SECOMM PC program. The user-register table in the MPS contains 32 pointers to the MPS Registers. For register definitions see MPS manual Appendix E. The data from these registers is used to build the 64-byte assembly. For example, to configure an assembly to read the first four RTD temperatures in RTD Module 1, enter register numbers 902, 903, 904, 905, 906, 907, 908, 909 in the User-Defined data area. In the resulting assembly, the first 8 words (16 bytes) will contain the four float values of the RTD temperatures. The remaining values are a function of the corresponding User-Register pointers. To prevent a read error, unused User-Defined data must be set to a valid MPS Register number.

NOTE: To maintain compatibility with the Profibus standard, the word order for float values is reversed from what is indicated in MPS Appendix E, however, the User-Register values are still specified in sequence (902, 903...) as per the manual.

8. OUTPUT DATA TO MPS

Output data to the MPS is defined as a fixed block of 4 words (8 bytes). This assembly is used to send control commands and set points to the MPS. For control commands, only 4 of the 8 bytes are used. For set points, all 8 bytes are used. Unused bytes are ignored.

For all output formats, the first 16-bit word is defined as the Request Header. A transition from zero signals the MPS to process the assembly. In applications where the assembly is not written as one packet, this value, specifically the low-order byte, must be updated last to prevent the MPS from using incomplete assembly data.

8.1 CONTROL COMMAND AND TIMEOUT FORMAT

Control commands are issued to the MPS using a 2-word command sequence, as shown in Table 8.2. The first word is the Request Header (word 1). The second word is the MPS Command (word 2). The Request Header must be zero except when the MPS Command action is to be taken. The Request Header must transition from 0 to 3 (0x0003) for the command sequence to be accepted. Once a valid command has been sent, the Request Header should be set to zero.

Byte order is in "big-endian" format where the high byte is followed by the low byte.

To prevent a trip or alarm on loss of communications, the Control Command is used to write new data to the OUTPUT memory buffer of the MPS at an interval less than the MPS trip time of 3 seconds. At regular intervals thereafter, write an incrementing value to the MPS Command(word 2) while keeping the Request Header (word 1) at 0. Keeping the Request Header at 0 prevents the MPS from interpreting the Command data as a valid control command. Incrementing the Command data ensures that a "changed data" event is posted to indicate valid communications. Reading data from the module is not sufficient to satisfy the timeout timer.

TABLE 8.1 MPS COMMAND TABLE

COMMAND CODE	ACTION
0x0000	STOP
0x0001	START1
0x0002	START2
0x0003	Reset Trips
0x0004	Set Real-Time Clock
0x0005	Clear Data-Logging Records
0x0006	Clear Trip Counters
0x0007	Clear Energy Totals
0x0008	Clear Running Hours
0x0009	Emergency I^2t and Trip Reset
0x000A	Select Local Control
0x000B	De-select Local Control
0x000C	Re-enable Temperature Protection

TABLE 8.2 MPS COMMAND ASSEMBLY

BYTE NUMBER	DESCRIPTION
0	Request Header (High)
1	Request Header (Low)
2	MPS Command (High)
3	MPS Command (Low)
4-7	Not used

8.2 SET-POINT COMMAND FORMAT

Since MPS configuration is only required on commissioning, it is recommended that MPS set points be set using the menu system or the SECOMM PC program via the RS-485 interface. Once set points are configured, the MPS is enabled for Profibus operation.

NOTE: RS-485 and Profibus communications are mutually exclusive.

In process-control applications where a set point must be changed dynamically, the PLC would use the command buffer to send set points to the MPS.

The first word (byte 0,1) is the Request Header. This value must transition from 0 to 19 (0x0013 hex) to send a 1-word set point and from 0 to 35 (0x0023 hex) to send a 2-word set point. The second word (byte 2,3) is the MPS Register number of the set point to be changed. This must be a valid set point with write access (MPS Appendix E WRITE access column should indicate R/W). The remaining bytes contain the set-point data and the format depends on the set-point data. For word set points (short, 16-bit), byte 4 is the high byte, byte 5 is the low byte, and byte 6 and 7 are not used. For float set points (IEEE 32-bit), byte 4 is the high byte and byte 7 is the low byte of the 4-byte float value. Character values are set using one or two word values consisting of a pair of characters where the high byte is the first character and the low byte is the second character.

TABLE 8.3 MPS SET-POINT ASSEMBLY

BYTE NUMBER	DESCRIPTION
0	Request Header (High)
1	Request Header (Low)
2	Destination Register (High)
3	Destination Register (Low)
4-7	Set-Point Data. 2 bytes for words, 4 bytes for floats