TECHNICAL NOTE
MOTION PRODUCT AND ENGINEERING GROUP

YASKAWA
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Subject: **MP920 and V7 communication**

Product: **MP920**

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The following describes the steps required to configure V7 inverters and the MP920's serial port 2 to communicate via RS-485 or RS-422. A converter is required to convert the MP920' serial port from RS-232 to RS-485/422. Communication could be established without a converter using a 217 I/F module.

A. MP 920 Serial communications setup:

Log on to CPU1 and open the Module Configuration. Open the communication port settings from MP920 slot and view serial port-two settings by clicking on the CIR#02 tab. The MP920's serial port is configured as shown below. Attached is a sample configuration and program file, CPU1.
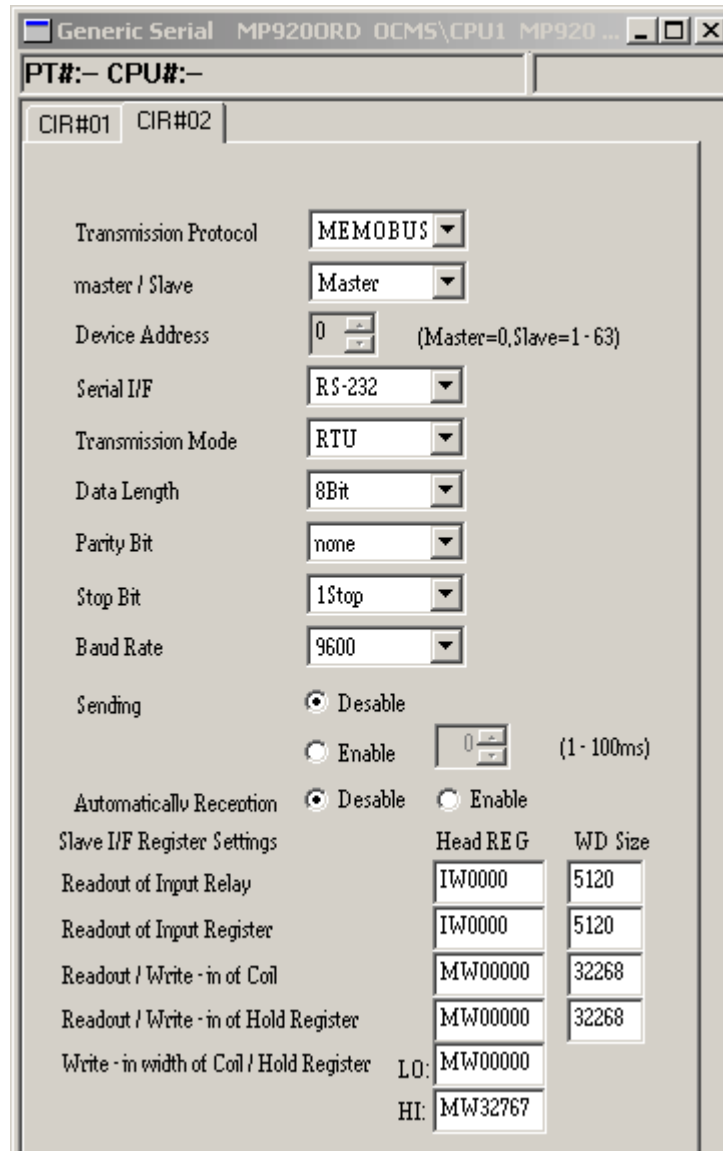
The baud rate and parity are selectable and must match the parameter setting in the V7 Inverter according to the following tables.

MP920 Parity Bit field	V7 Inverter n155
Even	0
Odd	1
None	2

MP920 Baud Rate field	V7 Inverter n154
9600	2
19.2K	3

B. V7 Inverter Parameter Settings:

The following parameters must be set in the V7 inverter to control the inverter with Modbus communications.

n001 = 4   Allows read and write access to parameters 2 through 179
n003 = 2   Selects Modbus as the operation method for run and stop commands.
n004 = 6   Selects Modbus as the operation method for the frequency command.
n151 = 4   Sets Modbus timeout to disabled. When this parameter is not 4, Modbus commands must be sent to the Inverter at least every 2 seconds, or the inverter will alarm or fault.
n152 =   Selects frequency reference units.
n153 = 1   Sets Modbus slave address
n154 = 2   Sets the Modbus baud rate to 9600.
n155 = 2   Sets the Modbus parity to none.
n157 = 0   Sets the Modbus RTS control for RS-232, -485, or multiple –422.

C. MP 920 Ladder communication set up:
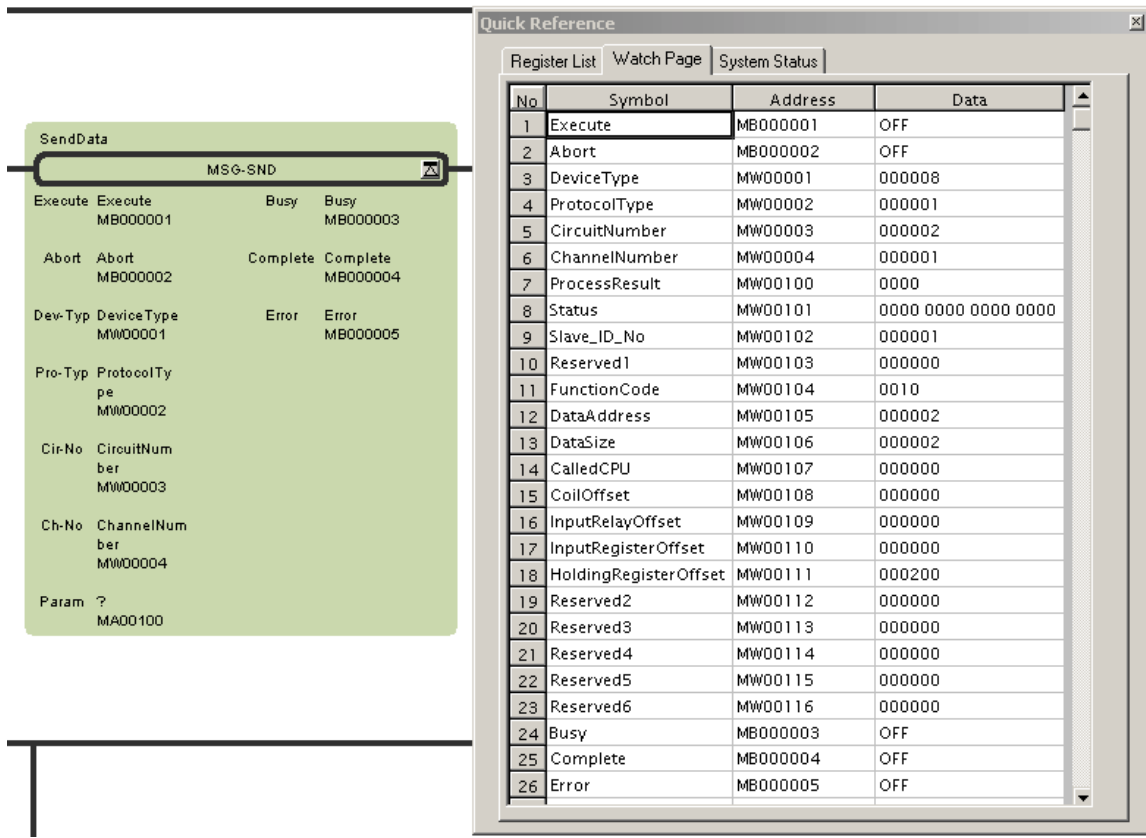
The MP920 master communicates to the Inverter slaves through a Message-Send block.
Only one Message-Send block may be active on a serial port at any time. A single
Message-Send block is limited to sending/receiving 8 words of data to/from an Inverter at
one time. More details on the MSG-SND command can be found in appendix A in
Machine Controller MP920 User's Manual Communication Module, SIEZ-C887-2.6.

Message-Send control registers

Name	Register	Value	Description
Execute	MB000001	Input Bit	Held on to execute the block
Abort	MB000002	Input Bit	Held on to abort the block
DeviceType	MW00001	8	Device type is serial port
ProtocolType	MW00002	1	Protocol is Memobus
CircuitNumber	MW00003	2	Circuit is serial port 2
ChannelNumber	MW00004	1	Channel is one
Busy	MB000003	Output Bit	Block is busy with execute or abort
Complete	MB000004	Output Bit	Block has completed execute or abort

| Error | MB000005 | Output Bit | Block had an error with execute or abort |
| Parameter | MA00100 | Address | Pointer to Parameter table |

The Message-Send control registers are used to specify device characteristics (type of device, protocol, physical and logical port numbers) and provide control and status bits. The example registers above contain values to use the Memobus protocol on serial port 2 of the MP920. The parameter register is a pointer to the parameter table. In the above example, the memory address MA00100 is used. This specifies that the first parameter is located in MW00100, the second in MW00101, the third in MW00103, ….

To execute the Message-Send function:
1.   Set control registers (usually set once).
2.   Set parameter registers (Set to different values for different slaves, different addresses, …).
3.   Turn the execute bit on and hold it until the complete or error bit is set. If complete bit is set, the message was sent and/or data was received. If error bit is set, abort and retry message.

To abort the Message-Send function, turn the abort bit on and hold it until the complete bit is set.

Note: During setup it is sometimes desirable to have the Master send messages continually. If the abort bit is set, after the busy and execute bits have been on for a period of time (timer), and then reset, the controller will pulse the messages out, even if they are not received. The example ladder is shown below.
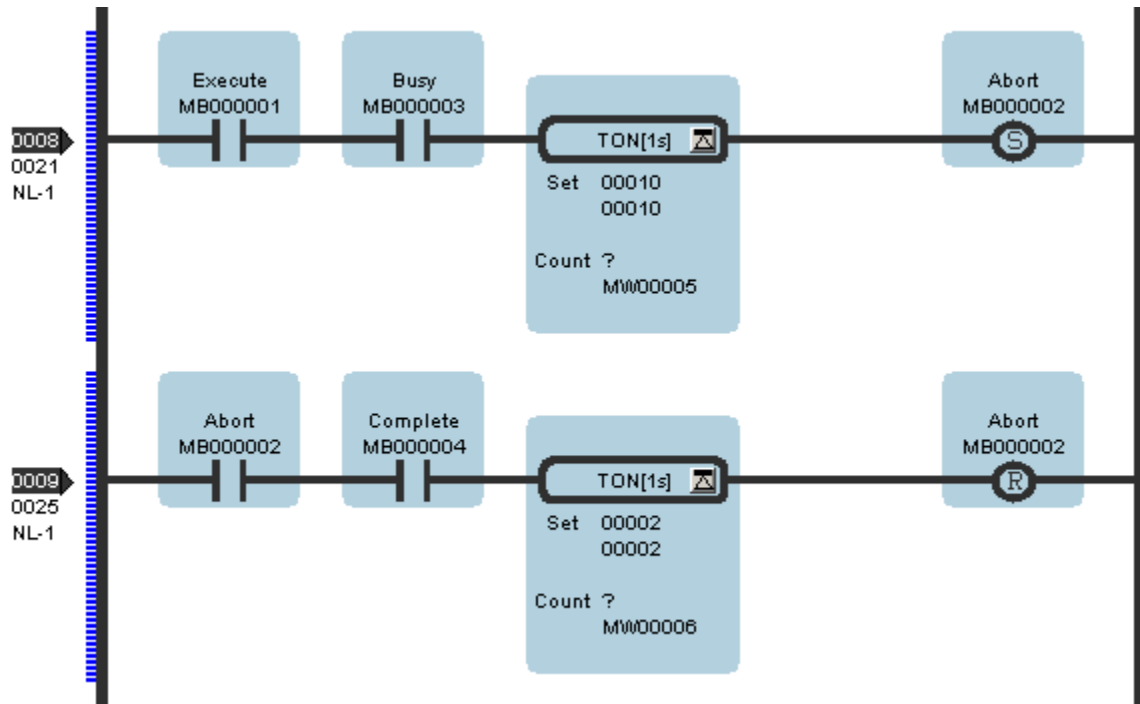
Message-Send parameters

Name	Register	Value	Description
ProcessResult	MW00100		
Status	MW00101		
Slave_ID_No	MW00102	1	Modbus slave number
Reserved1	MW00103	N/A	Reserved for system use
FunctionCode	MW00104	16	Write multiple registers
DataAddress	MW00105	1	Starting Slave address
DataSize	MW00106	2	Number of words
CalledCPU	MW00107	0	Always set to zero
CoilOffset	MW00108	0	N/A for inverters
InputRelayOffset	MW00109	0	N/A for inverters
InputRegisterOffset	MW00110	0	N/A for inverters
HoldingRegisterOffset	MW00111	200	MP 920 offset
Reserved2	MW00112	N/A	Reserved for system use
Reserved3	MW00113	N/A	Reserved for system use
Reserved4	MW00114	N/A	Reserved for system use
Reserved5	MW00115	N/A	Reserved for system use
Reserved6	MW00116	N/A	Reserved for system use

The Message-Send parameters specify what type of operation to perform, where to get/store the data, which slave to communicate with, and report status/result information. The parameters that must be set to communicate with a slave are:

Parameter 2, Slave_ID_No   Specifies which slave to talk to
Parameter 4, FunctionCode   Modbus function code 3 = read, 16 = write
Parameter 5, DataAddress   Specifies the slave starting memory address
Parameter 6, DataSize   Specifies the number of words (MAX = 8)
Parameter 7, CalledCPU   Always set to zero for MP920
Parameter 11, HoldingRegisterOffset   **MP 920 offset. The MP920 offset plus the DataAddress specifies the starting address in the MP920**

Address Examples:

Starting Slave address 2	MP 920 offset 0	Number of words 2
MP 920 address	Slave address	
MW00002 ?	02	
MW00003 ?	03	

Starting Slave address 1	MP 920 offset 200	Number of words 2
MP 920 address	Slave address	

| MW00201 ? | 01 |
| MW00202 ? | 02 |

The parameter values above are set for the master to communicate with slave number one, to perform a write operation, starting at slave memory address number one, transfer two words, and get these two words from MW00201 and MW00202.

Parameters 3 and 12 ~ 16 are reserved for the system and should not be used. Erroneous operation could occur if these registers are used elsewhere in the program.

Parameters 0 and 1 indicate the result and status as follows:

Process Result (Parameter 0)
Only the upper byte of the process result is set
- 00xx: Message-Send is busy (BUSY bit on)
- 10xx: Message-Send has ended (COMPLETE bit on)
- 8xxx: Message-Send has an error (ERROR bit on)

Error Codes

- 81xx: Function code error
The sending of an unused function code was attempted. Or, an unused function code was received.

- 82xx: Address setting error
The data address, coil offset, input relay offset, input register offset, or hold register offset setting is out of range.

- 83xx: Data size error
The size of the sent or received data is out of range.

- 84xx: Line No. error
The line No. is out of range.

- 85xx: Channel No. error
The channel No is out of range.

- 86xx: Station address error
The station No. is out of range.

-88xx: Transmission unit error
An error response was returned from the transmission unit.

- 89xx: Device selection error
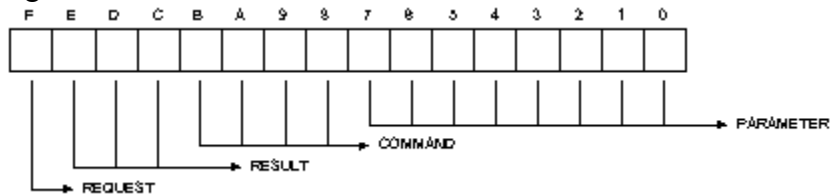A non-applicable device is selected.

Status (Parameter 1)

Bit Assignment

COMMAND

Code	Symbol	Meaning
1	U_SEND	Send generic message
2	U_REC	Receive generic message
3	ABORT	Forced interruption
8	M_SEND	Send MEMOBUS instruction ... completed upon receipt of response.
9	M_REC	Receive MEMOBUS instruction ... accompanies sending of response.
C	MR_SEND	Send MEMOBUS response.

RESULT

Code	Symbol	Meaning
0	—	Executing
1	SEND_OK	Sending has been completed correctly.
2	REC_OK	Receiving has been completed correctly.
3	ABORT_OK	Completion of forced interruption
4	FMT_NG	Parameter format error
5	SEQ_NG, or INIT_NG	Command sequence error The token has not been received yet. Not connected to a transmission system.
6	RESET_NG, or O_RING_NG	Reset state Out-of-ring. The token could not be received even when the token monitor time was exceeded.
7	REC_NG	Data receive error (Error detected by a program of a lower rank)

PARAMETER

One of the error codes is indicated if RESULT = 4 (FMT_NG). Otherwise, this indicates the address of the called station.

Code	Error
00	No errors
01	Station address is out of range.
02	Monitored MEMOBUS response receiving time error
03	Resending count setting error
04	Cyclic area setting error
05	Message signal CPU No. error
06	Message signal register No. error
07	Message signal word count error

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REQUEST
1 = Request
0 = Completion of receipt report