A Sierra Monitor Company

Driver Manual

(Supplement to the FieldServer Instruction Manual)

FS-8700-19 Metasys® N2 by Johnson Controls

APPLICABILITY & EFFECTIVITY

Effective for all systems manufactured after March 2011

Driver Version:	1.04
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1 METASYS® N2 BY JOHNSON CONTROLS DESCRIPTION

The Metasys® N2[1] by Johnson Controls network supports communications with a diverse range of devices. Many N2 compatible devices use their own version of the protocol and care must be taken to ensure that the device of interest is covered by the FieldServer implementation.

At present the FieldServer Metasys® N2 driver will support communications with the following devices or classes of devices when acting as a Client:

- N2Open-compliant devices. N2Open is a published N2-compatible protocol enabling 3rd party device vendors to integrate with N2.
- VMA 1400 series (with restrictions)
- DX9100 and XT9100

When acting as a Server the FieldServer Metasys® N2 driver can emulate an N2Open device only.

FieldServer Mode	Nodes	Comments
Client	1	Only 1 client node allowed on Multidrop systems. Can communicate with: • N2Open • VMA 1400 series (AI,BI,AO,BO and custom types) • DX9100 / XT9100
Server	255	

2 DRIVER SCOPE OF SUPPLY

2.1 Supplied by FieldServer Technologies for this driver

FieldServer Technologies PART #	Description
FS-8917-16	RJ45 to terminal connector cable.

2.2 Provided by the Supplier of 3rd Party Equipment

2.2.1 Hardware

PART #	DESCRIPTION
	Metasys® NCU or other device

2.2.2 Required 3rd Party Software

Depending on application, JCI software may be necessary

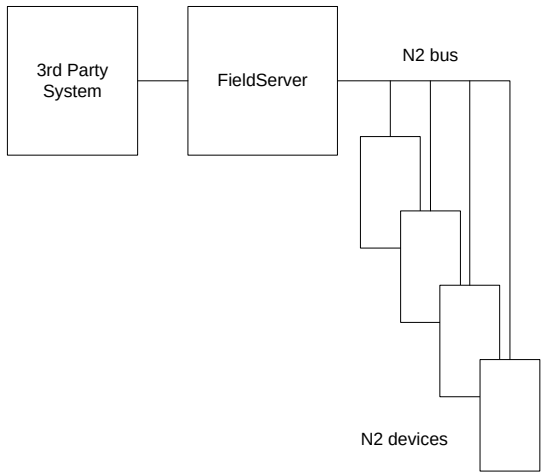
2.2.3 Required 3rd Party Configuration

Depending on application, third party devices may need configuration

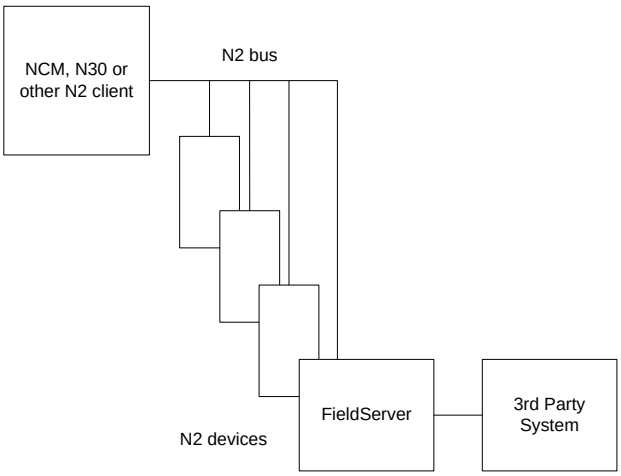
[1] Metasys® and N2OPEN as used in this document are a trademarks of Johnson Controls Inc

3 HARDWARE CONNECTIONS

FieldServer as a Client



FieldServer as a Server



3.1 Hardware Connection Tips / Hints

- When using the FS-X40 ensure that the FieldServer is connected to the network using one or both of the RS-485 ports marked R1 and R2. If more ports are required, P1-P8 may be used in conjunction with an RS-232-to-RS-485 converter.
- When using the FS-X20, ensure that the serial port is configured as an RS-485 port. Refer to Appendix B.2 for more information.
- Only one N2 Client may be connected to a N2 network. If the FieldServer is to act as a Client, ensure that no other Clients are connected to the same N2 network.
- **Note:** Interceptor mode is no longer supported for this driver.

4 DATA ARRAY PARAMETERS

Data Arrays are "protocol neutral" data buffers for storage of data to be passed between protocols. It is necessary to declare the data format of each of the Data Arrays to facilitate correct storage of the relevant data.

Section Title
Data_Arrays

Column Title	Function	Legal Values
Data_Array_Name	Provide name for Data Array	Up to 15 alphanumeric characters
Data_Array_Format	Provide data format. Each Data Array can only take on one format.	Float, Bit, UInt16, SInt16, Byte
Data_Array_Length	Number of Data Objects. Must be larger than the data storage area required by the Map Descriptors for the data being placed in this array.	1-10, 000

Example

```
//  Data Arrays
Data_Arrays
Data_Array_Name   , Data_Array_Format   , Data_Array_Length
DA_AI_01          , UInt16,             , 200
DA_AO_01          , UInt16              , 200
DA_DI_01          , Bit                 , 200
DA_DO_01          , Bit                 , 200
```

5 CONFIGURING THE FIELDSERVER AS A METASYS® N2 CLIENT

For a detailed discussion on FieldServer configuration, please refer to the FieldServer Configuration manual. The information that follows describes how to expand upon the factory defaults provided in the configuration files included with the FieldServer (See ".csv" sample files provided with the FieldServer).

This section documents and describes the parameters necessary for configuring the FieldServer to communicate with a Metasys® N2 Server.

5.1 Client Side Connection Parameters

Section Title		
Connections		
Column Title	Function	Legal Values
Port	Specify which port the device is connected to the FieldServer	P1-P8, R1-R2[2]
Protocol	Specify protocol used	Metasys_N2
Baud*	Specify baud rate	**9600** (Vendor Limitation**)**
Parity*	Specify parity	**None** (Vendor Limitation
Data_Bits*	Specify data bits	**8** (Vendor Limitation
Stop_Bits*	Specify stop bits	**1** (Vendor Limitation
Poll _Delay*	Time between internal polls	**0**
Line_Drive_On*	Duration of RTS assert before start of transmission	**0.001s**
Line_Drive_Off*	Duration of RTS assert after end of transmission	**0.000s**

Example

```
//        Client Side Connections

Connections
Port    , Protocol
R1      , Metasys_N2
```

[2] Not all ports shown are necessarily supported by the hardware. Consult the appropriate Instruction manual for details of the ports available on specific hardware.

5.2 Client Side Node Parameters

Section Title
Nodes

Column Title	Function	Legal Values
Node_Name	Provide name for node	Up to 32 alphanumeric characters
Node_ID	Station address of physical Server node	1-255
Protocol	Specify protocol used	Metasys_N2
Connection	Specify which port the device is connected to the FieldServer	P1-P8, R1-R2[1]
Node_Type	Identify type of device If this parameter is omitted the driver treats the configuration as a N2Open configuration and marks the Node_Type as N2OpenClient when using Ruinet to check the Node parameters. If the Node_Type is specified as N2Open then the driver still acts as N2 Open configuration but some legacy port expander functionality used in some legacy advanced configuration is enabled.	**N2OpenClient**, DX9100, VMA, N2Open

Example

```
// Client Side Nodes

Nodes
Node_Name    , Node_ID    , Protocol      , Connection    , Node_Type
PLC 1        , 1          , Metasys_N2    , P8            , VMA
```

5.3 Client Side Map Descriptor Parameters

5.3.1 FieldServer Related Map Descriptor Parameters

Column Title	Function	Legal Values
Map_Descriptor_Name	Name of this Map Descriptor	Up to 32 alphanumeric characters
Data_Array_Name	Name of Data Array where data is to be stored in the FieldServer	One of the Data Array names from Section 4
Data_Array_Offset	Starting location in Data Array	0 to (Data_Array_Length-1) as specified in Section 4
Function	Function of Client Map Descriptor	Rdbc, Wrbc, Wrbx, Arcs, Cos_Poller[3], Cos_Read[3].

[3] Applicable to COS function for N2Open – Refer to Appendix A.3

5.3.2 Driver Specific Map Descriptor Parameters

5.3.2.1 N2Open Map Descriptor Parameters

Column Title	Function	Legal Values
Node_Name	Name of Node to fetch data from	One of the Node Names specified in Section 5.2
Data_Type	Data type If the vendor device lists a point as BD, use Data_Type=Byte. If the vendor device lists a point as ADI, use Data_Type=Integer. If the vendor device lists a point as ADF, use Data_Type=Float_Reg.	AI, Ana_Input, AO, Ana_Output, DI, Dig_Input, DO, Dig_Output, Float_Reg, Integer, Byte, Flag
Length	Length of Map Descriptor	1
Address	Starting address of read block	1-256
MN2_Function*	Can be used to specify an N2-specific function, e.g. COS. Refer to Appendix A.3 to for more information. May also be used to specify all attributes or write the internal parameters for selected data types. Refer to Appendix A.5	COS, Override, Release, Read_All_Attribs (applicable only for Data_Type AI, Ana_Input, AO, Ana_Output, DI, Dig_Input, DO, Dig_Output,) Write_Attribs (applicable only for Data_Type AI, Ana_Input, AO, Ana_Output, DI, Dig_Input, DO, Dig_Output,) Write (This is applicable only for internal parameters i.e. if Data_Type is Float_Reg, Integer , Byte or Flag)
MN2_Attribute*	Used to specify the attribute if an attribute other than Current Value is to be accessed.	Refer to Appendix C.2
MN2_Normal*	This function allows the user to specify the normal state value. Applicable only to digital points (i.e. Data_Type DI or DO). If MN2_Normal is set to 0, the point will be in alarm when the value changes to 1. See Example 5.3.5.	**0** , 1
MN2_Lo_Alm_Limit*	This function allows the user to specify the low alarm limit. Applicable only to analog input points (i.e. Data_Type AI).	Any float value, **0.0**
MN2_Hi_Alm_Limit*	This function allows the user to specify the high alarm limit. Applicable only to analog input points (i.e. Data_Type AI). See Example 5.3.5	Any float value, **0.0**
MN2_Lo_Wrn_Limit*	This function allows the user to specify the low warning limit. Applicable only to analog input points (i.e. Data_Type AI). See Example 5.3.5	Any float value, **0.0**

Column Title	Function	Legal Values
MN2_Hi_Wrn_Limit*	This function allows the user to specify the high warning limit. Applicable only to analog input points (i.e. Data_Type AI). See Example 5.3.5	Any float value, **0.0**
MN2_Differential	This function allows the user to specify the deadband. If the current value changes within this band the point status will not be updated and there will be no COS report for the change. Applicable only to analog input points (i.e. Data_Type AI).	Any float value, **0.0**

5.3.2.2 VMA Map Descriptor Parameters

Column Title	Function	Legal Values
Node_Name	Name of Node to fetch data from	One of the Node Names specified in Section 5.2
Data_Type	Data type	AI, Ana_Input, AO, Ana_Output, DI, Dig_Input, DO, Dig_Output,, Driver (used for ADF, ADI and BD)
Length	Length of Map Descriptor	1
Address	Starting address of read block	1-256
MN2_Type	Data type specifier to be set when Data_Type has been set to Driver	5-7
MN2_Function*	Used to specify an N2-specific function, e.g. COS. Refer to Appendix A.3 for more information.	COS, **Override**, Release

5.3.2.3 DX9100 Map Descriptor Parameters

Column Title	Function	Legal Values
Node_Name	Name of Node to fetch data from	One of the Node Names specified in Section 5.2
Length	Length of Map Descriptor	1
Address	Starting address of read block	0 - 2397

For DX9100 addresses please refer to the DX9100 user documentation. This lists the name, function (read/write) and data format of all available points. Alternatively, obtain assistance from FieldServer Technical Support.

5.3.3 Timing Parameters

Column Title	Function	Legal Values
Scan_Interval*	Rate at which data is polled	≥0.001s,-

5.3.4 Map Descriptor Example – N2Open

```
//  Client Side Map Descriptors

Map_Descriptors
Map_Descriptor_Name   , DA_Name      , DA_Offset , Function    , MN2_Function , Node_Name , Address , Data_Type , Scan_Interval
AI_READ               , DA_AI3       , 0         , RDBC        , -            , Node_A    , 1       , Ana_Input , 5s
COS_POLLER            , DA_COS       , 0         , COS_Poller  , -            , Node_A    , -       , -         , 30s
AI_BY_COS             , DA_AI3       , 1         , COS_Read    , -            , Node_A    , 1       , Ana_Input , -
BI_BY_COS             , DA_BI        , 3         , COS_Read    , -            , Node_A    , 2       , Dig_Input , 10
AI_1_Release          , DA_Release   , 0         , Wrbx        , Release      , Node_A    , 1       , Ana_Input , -
```

Normal read Map Descriptor. Note RDBC function, Data_Type and Address specification.

COS_Poller Map Descriptor. This only specifies the Function, Node and Scan_Interval.

COS_Read Map Descriptor sets point type the same as normal read Map Descriptor. Optional Scan_Interval.

Release function used in conjunction with Wrbc. If the Data Array value specified in this Map Descriptor is changed, then a Release command is sent to the specified point.

Note: To get change of state (COS) reports from an analog port, the warning/alarm levels need to be configured. If the alarm/warning values are not known, then it would be better to configure an Rdbc Map Descriptor which reads the analog input directly. Limits will then not be required.

5.3.5 Map Descriptor Example - Client Side COS_READ Map Descriptor for Analog Input point

```
Map_Descriptors
Map_Descriptor_Name , Data_Array_Name , Location , Function , Node_Name , Data_Type , Address , MN2_Normal , MN2_Lo_Alm_Limit , MN2_Lo_Wrn_Limit , MN2_Hi_Wrn_Limit , MN2_Hi_Alm_Limit , MN2_Differential
CMD_AI_01_COS       , DA_AI_01       , 1        , COS_Read , MN2_11    , Ana_Input , 1       , -          , 1                , 2                , 3                , 4                , 1
```

5.3.6 Map Descriptor Example - VMA

```
//  Client Side Map Descriptors

Map_Descriptors
Map_Descriptor_Name   , DA_Name   , DA_Offset   , Function   , MN2_Function   , Node_Name   , Address   , Data_Type   , MN2_Type   , Scan_Interval
AI_READ               , DA_AI3    , 0           , Rdbc       , -              , Node_VMA    , 1         , Ana_Input   , -          , 5s
AO_WRITE              , DA_AO     , 0           , Wrbx       , -              , Node_VMA    , 3         , Ana_Output  , -          , 30s
AO_Release            , DA_AO     , 0           , Wrbx       , Release        , Node_VMA    , 3         , Ana_Output  , -          , -
Special_type          , DA_DRV    , 10          , Rdbc       , -              , Node_VMA    , 23        , Driver      , 5          , 10s
```

Override release function configured as Wrbx.

Driver type 5 (ADF) configured here.

5.3.7 Map Descriptor Example - DX9100

```
//  Client side Map Descriptors

Map_Descriptors
Map_Descriptor_Name   , DA_Name   , DA_Offset   , Function   , Node_Name   , Address   , Scan_Interval
D191_ZN1-T            , DA_AI3    , 0           , Rdbc       , Node_DX     , 1223      , 5s
D191_ZN1-S            , DA_AO3    , 0           , Wrbx       , Node_DX     , 1225      , -
```

The address alone is sufficient to specify the DX9100 point.
The Data Type is determined by the device.

6 CONFIGURING THE FIELDSERVER AS A METASYS® N2 SERVER

For a detailed discussion on FieldServer configuration, please refer to the FieldServer Configuration Manual. The information that follows describes how to expand upon the factory defaults provided in the configuration files included with the FieldServer (See ".csv" files on the driver diskette).

This section documents and describes the parameters necessary for configuring the FieldServer to communicate with a Metasys® N2Open Client. **Note that only the N2Open variation of the N2 protocol may be used when configuring the FieldServer as a Server**.

The configuration file tells the FieldServer about its interfaces, and the routing of data required. In order to enable the FieldServer for Metasys® N2 communications, the driver independent FieldServer buffers need to be declared in the "Data Arrays" section, the FieldServer virtual node(s) needs to be declared in the "Server Side Nodes" section, and the data to be provided to the Clients needs to be mapped in the "Server Side Map Descriptors" section. Details on how to do this can be found below.

Note that in the tables, * indicates an optional parameter, with the bold legal value being the default.

6.1 Server Side Connection Paramaters

Section Title		
Connections		
Column Title	**Function**	**Legal Values**
Port	Specify which port the device is connected to the FieldServer	P1-P8, R1-R2[4]
Protocol	Specify protocol used	Metasys_N2
Baud*	Specify baud rate	**9600** (Vendor Limitation**)**
Parity*	Specify parity	**None** (Vendor Limitation
Data_Bits*	Specify data bits	**8** (Vendor Limitation
Stop_Bits*	Specify stop bits	**1** (Vendor Limitation
Poll _Delay*	Time between internal polls	**0**
Line_Drive_On*	Duration of RTS assert before start of transmission	**0.001s**
Line_Drive_Off*	Duration of RTS assert after end of transmission	**0.000s**
Server_Hold_Timeout*	Specifies time FieldServer will reserve Server side connection while waiting for the Client side to update data in Data_Array.	**< 0.175s**[5]

Example

```
//        Client Side Connections

Connections
Port    , Protocol
P1      , Metasys_N2
```

[4] Not all ports shown are necessarily supported by the hardware. Consult the appropriate Instruction manual for details of the ports available on specific hardware.
[5] Can be set to >0.175s if the Client has been set to timeout after >200ms. Refer to Appendix C for more information.

6.2 Server Side Node Parameters

Section Title
Nodes

Column Title	Function	Legal Values
Node_Name	Provide name for node	Up to 32 alphanumeric characters
Node_ID	Station address of physical Server node	1-255
Protocol	Specify protocol used	Metasys_N2
Node_Type	Identify type of device. This parameter need not be specified. The Server side of the driver can only operate as an N2 Server and the option for setting it to N2Open is purely for backward compatibility.	**N2OpenServer**, N2Open

Example

```
//  Client Side Nodes

Nodes
Node_Name    , Node_ID    , Protocol
PLC 1        , 1          , Metasys_N2
```

6.3 Server Side Map Descriptor Parameters

6.3.1 FieldServer Specific Map Descriptor Parameters

Column Title	Function	Legal Values
Map_Descriptor_Name	Name of this Map Descriptor	Up to 32 alphanumeric characters
Data_Array_Name	Name of Data Array where data is to be stored in the FieldServer	One of the Data Array names from Section 4
Data_Array_Offset	Starting location in Data Array	0 to (Data_Array_Length -1) as specified in Section 4
Function	Function of Server Map Descriptor	Passive

6.3.2 Driver Specific Map Descriptor Parameters

Column Title	Function	Legal Values
Node_Name	Name of Node to fetch data from	One of the node names specified in Section 6.2.
Data_Type	Data type If the vendor device lists a point as BD, use Data_Type=Byte. If the vendor device lists a point as ADI, use Data_Type=Integer. If the vendor device lists a point as ADF, use Data_Type=Float_Reg.	AI, Ana_Input, AO, Ana_Output, DI, Dig_Input, DO, Dig_Output, Float_Reg, Integer, Byte, Flag
Length	Length of Map Descriptor	1 - 256
Address	Starting address of read block	1 - 256

6.3.3 N2Open Specific Map Descriptor Parameters

Column Title	Function	Legal Values
MN2_Attribute*	Used to specify the attribute if an attribute other than Current Value is to be accessed.	Refer to Appendix C.2
MN2_Normal*	This function allows the user to specify the status of a point. See Example 6.3.5	**0** , 1
MN2_Lo_Alm_Limit*	This function allows the user to specify the low alarm limit. Applicable only to analog input points (i.e. Data_Type AI). See Example 6.3.5	Any float value, **0.0**
MN2_Hi_Alm_Limit*	This function allows the user to specify the high alarm limit. Applicable only to analog input points (i.e. Data_Type AI). See Example 6.3.5	Any float value, **0.0**
MN2_Lo_Wrn_Limit*	This function allows the user to specify the low warning limit. Applicable only to analog input points (i.e. Data_Type AI). See Example 6.3.5	Any float value, **0.0**
MN2_Hi_Wrn_Limit*	This function allows the user to specify the high warning limit. Applicable only to analog input points (i.e. Data_Type AI). See Example 6.3.5	Any float value, **0.0**

6.3.4 Map Descriptor Example

```
//  Server Side Map Descriptors

Map_Descriptors
Map_Descriptor_Name   , Data_Array_Name   , Data_Array_Offset   , Data_Type   , Function   , Node_Name   , Address   , Length
A1                    , DA_AI3            , 10                  , Ana_Input   , Passive    , Node_A      , 1         , 256
```

The Data_Array_Offset sets the start of the data range covered by the Server Map Descriptor. The number of points included is determined by the Length field.

The Passive function tells the FieldServer that this Map Descriptor makes data available to a Client sending polls to the FieldServer.

Note that a single Server Map Descriptor of length 256 can represent all possible points of one type (e.g. AI).

6.3.5 Map Descriptor Example – N2 Open Server Side Map Descriptor for Analog Input point

On the Server Side, the MN2 parameters are used to determine the status of the point. Specify these parameters to set initial limits. N2open client can update these parameters at any time.

```
Map_Descriptors
Map_Descriptor_Name , Data_Array_Name , Location , Function , Node_Name , Data_Type , Address , MN2_Normal , MN2_Lo_Alm_Limit , MN2_Lo_Wrn_Limit , MN2_Hi_Wrn_Limit , MN2_Hi_Alm_Limit , MN2_Differential
SMD_AI_01           , DA_AI_01      , 1          , Passive    , MN2_11     , Ana_Input , 1         , -           , 1               , 2               , 3               , 4               , 1
```

Appendix A. Useful Features

Appendix A.1. Writing to DX9100 Binary Outputs

When writing to DX9100 Binary Outputs, it is important to understand that each binary output has three bits associated with it as described in the table below:

Bit	Description	Address[6]
Output status bit	The status bit will indicate the actual status of the output in the field. This bit cannot be modified by the FieldServer as it is read only, and is meant for actual status display.	Address 5
Output control bit	The control bit will allow the FieldServer to write a command to the DX9100 for the associated output. This command will only execute if the override is enabled by the override bit.	Low byte of Address 1
Override bit	The override bit must be set to enable an output to be written to by the FieldServer. If this is not set, then the control bit will be ignored.	High byte of Address 1

The example below illustrates the mapping required for DX9100 Binary Outputs. Note that since all 6 outputs are packed into word format when transmitted, a Packed_Bit Array is required to access the bits individually.

In this Example, the status for BO3-BO8 can be found in offsets 0-5 of DA_PO1_02, the control bits can be found in offsets 0-5 of DA_PO1_01, and the override bits can be found in offsets 8-13 of DA_PO1_01.

```
Data_Arrays
Data_Array_Name   , Data_Format   , Data_Array_Length
DA_PO1_01         , Packed_Bit    , 100
DA_PO1_02         , Packed_Bit    , 100
```

```
Map_Descriptors
Map_Descriptor_Name   , Data_Array_Name   , Data_Array_Offset   , Function   , Node_Name   , Address   , Scan_Interval
CMD_DO1_05            , DA_PO1_01         , 0                   , Rdbc       , Dev_30      , 0001      , 1.0s   // DO3 - DO8 Set and Enable
CMD_DO1_06            , DA_PO1_02         , 0                   , Rdbc       , Dev_30      , 0005      , 1.0s   // DO3 - DO8 Status
```

[6] Binary Outputs start at address 3, so the first bit of each of these addresses will represent B03

Appendix A.2. Managing Analog Inputs and Outputs for DX9100.

Relative offset for viewing an AI is 7

Relative offset for viewing and forcing an AO is 6

Appendix A.3. Using Override and Release – N2Open

It is not normally necessary to use the Override command explicitly as the FieldServer automatically uses this command when the Current Value attribute of a point is written. For any other attribute it uses the Write command. It will sometimes be necessary to send a Release command to an overridden point, however. To do this, a Map Descriptor must be configured with **Function** set to **Wrbx** and **MN2_Function** set to **Release**. Then, when any value is stored to the Map Descriptor data location, the Release command will be sent to the N2Open point specified by the Map Descriptor.

Appendix A.4. Using Change of State (COS) – N2Open

If a large number of points are to be monitored, optimal efficiency is achieved by using the COS mechanism instead of reading each individual point directly. A N2Open device responds to a COS poll with a change record if a change has taken place. On startup the device will report the state of all its points when it receives a COS poll.

Two kinds of Map Descriptors are required for everyNode that is to be monitored using COS:

A COS polling Map Descriptor with **Function** set to **COS_Poller**.

A **COS_Read** (i.e. **Function** set to **COS_Read**) Map Descriptor for every point on that node that is to be monitored. Any COS records received will be stored to the matching Map Descriptor data location.

Note that the COS_Read Map Descriptor has an optional scan_interval. If a value is set the Map Descriptor will poll at that rate in addition to receiving COS data. This can be used if the values are to be refreshed continually even if they don't change. If the scan_interval is not configured (through omitting the column, or by setting the value to '-') the COS_Read Map Descriptor will not cause active polls once the value has been initialized. See Section 5.3.4 for example.

Appendix A.4.1. Important Note on COS Operation in N2Open

Please be aware that N2Open devices will only report value changes under the following conditions:

Point Type	Conditions that will trigger a COS report
AI	Point status change (e.g. override) Change in alarm or warning status NB: no value changes within the normal band are reported by COS!
AO	Point status change (e.g. override) NB: no value changes within the normal band are reported by COS!
BI, BO	Point status change (e.g. override); includes current value (On/Off)
ADI, ADF, BD	None; COS cannot be used with internal data types.

Appendix A.5. Read/Write All Attributes – N2 Open

This optional command allows the user to read all attributes rather than specifying the attribute number. (Note: It is possible that the N2Open Server will not support these commands.

Appendix A.5.1. Map Descriptor Example 1 - Read all attributes for an Analog Input.

All 14 attributes will be stored at sequential locations in the Data Array starting from the offset specified in the Map Descriptor.

```
Map_Descriptors
Map_Descriptor_Name  , Data_Array_Name  , Data_Array_Offset  , Function  , Node_Name  , Address  , Data_Type  , Mn2_Function  , Scan_Interval  , Length
CMD_AI_01            , DA_AI_01        , 0                 , Rdbc      , MN2_01     , 03       , Ana_Input  , Read_All_Attribs , 5.0s          , 14
```

Appendix A.5.2. Map Descriptor Example 2 - Read all attributes for an Binary Input.

All 4 attributes will be stored at sequential locations in the Data Array starting from the offset specified in the Map Descriptor.

```
Map_Descriptors
Map_Descriptor_Name  , Data_Array_Name  , Data_Array_Offset  , Function  , Node_Name  , Address  , Data_Type  , Mn2_Function  , Scan_Interval  , Length
CMD_DI_01            , DA_DI_01        , 0                 , Rdbc      , MN2_01     , 03       , Dig_Input  , Read_All_Attribs , 5.0s          , 4
```

Appendix A.5.3. Map Descriptor Example 3 - Read all attributes for an Analog Output.

All 4 attributes will be stored at sequential locations in the Data Array starting from the offset specified in the Map Descriptor.

```
Map_Descriptors
Map_Descriptor_Name  , Data_Array_Name  , Data_Array_Offset  , Function  , Node_Name  , Address  , Data_Type  , Mn2_Function  , Scan_Interval  , Length
CMD_AO_01            , DA_AO_01        , 0                 , Rdbc      , MN2_01     , 04       , Ana_Output , Read_All_Attribs , 5.0s          , 4
```

Appendix A.5.4. Map Descriptor Example 4 - Read all attributes for a Digital Output.

All 7 attributes will be stored at sequential locations in the Data Array starting from the offset specified in the Map Descriptor.

```
Map_Descriptors
Map_Descriptor_Name  , Data_Array_Name  , Data_Array_Offset  , Function  , Node_Name  , Address  , Data_Type  , Mn2_Function  , Scan_Interval  , Length
CMD_DO_01            , DA_DO_01        , 0                 , Rdbc      , MN2_01     , 03       , Dig_Output , Read_All_Attribs , 5.0s          , 7
```

Appendix A.5.5. Write All Attributes (Applicable only to Data_Type AI,DI. AO, DO).

This optional command allows the user to write all attributes (except status and current value) rather than specifying the attribute number. Note: It is possible that the N2Open Server will not support these commands.

Appendix A.5.6. Map Descriptor Example 5 - Write all attributes for an Analog Input.

This Map Descriptor will issue an optional command to write all the attributes for an Analog Input. The Driver will pick attribute values from the Data Array starting from the specified offset in the following order. All reserved attributes will have the value 0.

- attribute 1 (configuration)
- attribute 8 (low alarm limit)
- attribute 9 (low warning limit)
- attribute 10 (hi warning limit)
- attribute 11 (hi alarm limit)
- attribute 12 (differential)

```
Map_Descriptors
Map_Descriptor_Name   , Data_Array_Name   , Data_Array_Offset   , Function   , Node_Name   , Address   , Data_Type   , Mn2_Function   , Scan_Interval   , Length
CMD_AI_01             , DA_AI_01          , 0                  , Wrbx       , MN2_01      , 03        , Ana_Input   , Write_Attribs   , 1.0s            , 6
```

Appendix A.5.7. Map Descriptor Example 6 - Write all attributes for an Binary Input.

This Map Descriptor will issue an optional command to write all the attributes for a Binary Input. The Driver will pick attribute values from the Data Array starting from the specified offset.. All reserved attributes will have the value 0.

```
Map_Descriptors
Map_Descriptor_Name   , Data_Array_Name   , Data_Array_Offset   , Function   , Node_Name   , Address   , Data_Type   , Mn2_Function   , Scan_Interval   , Length
CMD_DI_01             , DA_DI_01          , 0                  , Wrbx       , MN2_01      , 03        , Dig_Input   , Write_Attribs   , 1.0s            , 1
```

Appendix A.5.8. Map Descriptor Example 7 - Write all attributes for an Analog Output.

This Map Descriptor will issue an optional command to write all the attributes for an Analog Output. The Driver will pick attribute values from the Data Array starting from the specified offset.. All reserved attributes will have the value 0.

```
Map_Descriptors
Map_Descriptor_Name   , Data_Array_Name   , Data_Array_Offset   , Function   , Node_Name   , Address   , Data_Type    , Mn2_Function   , Scan_Interval   , Length
CMD_AO_01             , DA_AO_01          , 0                  , Wrbx       , MN2_01      , 04        , Ana_Output   , Write_Attribs   , 1.0s            , 1
```

Appendix A.5.9. Map Descriptor Example 8 - Write all attributes for an Analog Input.

This Map Descriptor will issue an optional command to write all the attributes for a Binary Output. The Driver will pick attribute values from the Data Array starting from the specified offset in the following order. All reserved attributes will have the value 0.

- attribute 1 (configuration)
- attribute 3 (minimum ontime)
- attribute 4 (minimum offtime)
- attribute 5 (max cycles/hr)

```
Map_Descriptors
Map_Descriptor_Name   , Data_Array_Name   , Data_Array_Offset   , Function   , Node_Name   , Address   , Data_Type   , Mn2_Function   , Scan_Interval   , Length
CMD_DO_01             , DA_DO_01          , 0                  , Wrbx       , MN2_01      , 03        , Dig_Output   , Write_Attribs   , 1.0s            , 4
```

Appendix A.6. Write Internal Parameters – N2 Open

This is applicable only for internal parameters i.e. if Data_Type is Float_Reg, Integer , Byte or Flag. The following Map Descriptor will read the internal Float every second and whenever the specified offset is updated, the driver will issue a write command to N2Open Server. Note: It is possible that the N2Open Server will not support these commands.

```
Map_Descriptors
Map_Descriptor_Name   , Data_Array_Name   , Data_Array_Offset   , Function   , Node_Name   , Address   , Data_Type   , Mn2_Function   , Scan_Interval
CMD_FREG_01           , DA_FREG_01        , 0                  , Wrbc       , MN2_01      , 5         , Float_Reg    , Write_Attribs   , 1.0s
```

Use Wrbc to write continuously or Wrbx to write on trigger

Appendix A.7. ADI, ADF and BD types: using the "Driver" Data_Type and MN2_Type fields

The VMA protocol uses a byte value to specify the data types. The standard types **AI**, **AO**, **DI** and **DO** correspond to a byte value of 1 through 4 respectively. The types **ADF**, **ADI** and **BD** are believed to correspond to a byte value of 5 through 7 respectively. If the user wishes to use any other type value based on knowledge of a particular VMA configuration, then that value may also be specified here. Refer to Section 5.3.6 for a specific example.

Driver Data_Type		
MN2_Type values		
Point Type	**Known Value**[7]	**Suggested Value**[8]
AI	1	
AO	2	
BI	3	
BO	4	
ADF		5
ADI		6
BD		7

If a large number of points are to be monitored, optimal efficiency is achieved by using the COS mechanism instead of reading each individual point directly. An N2Open device responds to a COS poll with a change record if a change has taken place. On startup the device will report the state of all its points when it receives a COS poll.

Three kinds of Map Descriptors are required for every node that is to be monitored using COS:

- A COS initialization Map Descriptor with **Function** set to **ARS** and **MN2_Function** set to **COS_Enable**. This Map Descriptor enables COS polling of those points on the VMA for which Passive Map Descriptors exist.
- A COS polling Map Descriptor with **Function** set to **rdbc** and **MN2_Function** set to **COS**.
- A **Passive** (i.e. **Function** set to **Passive**) Map Descriptor for every point on that node that is to be monitored. Any COS records received will be stored to the matching Map Descriptor data location.

See example in Section 5.3.6

Appendix A.8. Using Override and Release - VMA

It is normally not necessary to use the Override command explicitly as the FieldServer automatically uses this command when the Current Value attribute of a point is written. For any other attribute it uses the Write command. It will sometimes be necessary to send a Release command to an overridden point, however. To do this, a Map Descriptor must be configured with **Function** set to **Wrbx** and **MN2_Function** set to **Release**. Then, when any value is stored to the Map Descriptor data location, the Release command will be sent to the VMA point specified by the Map Descriptor.

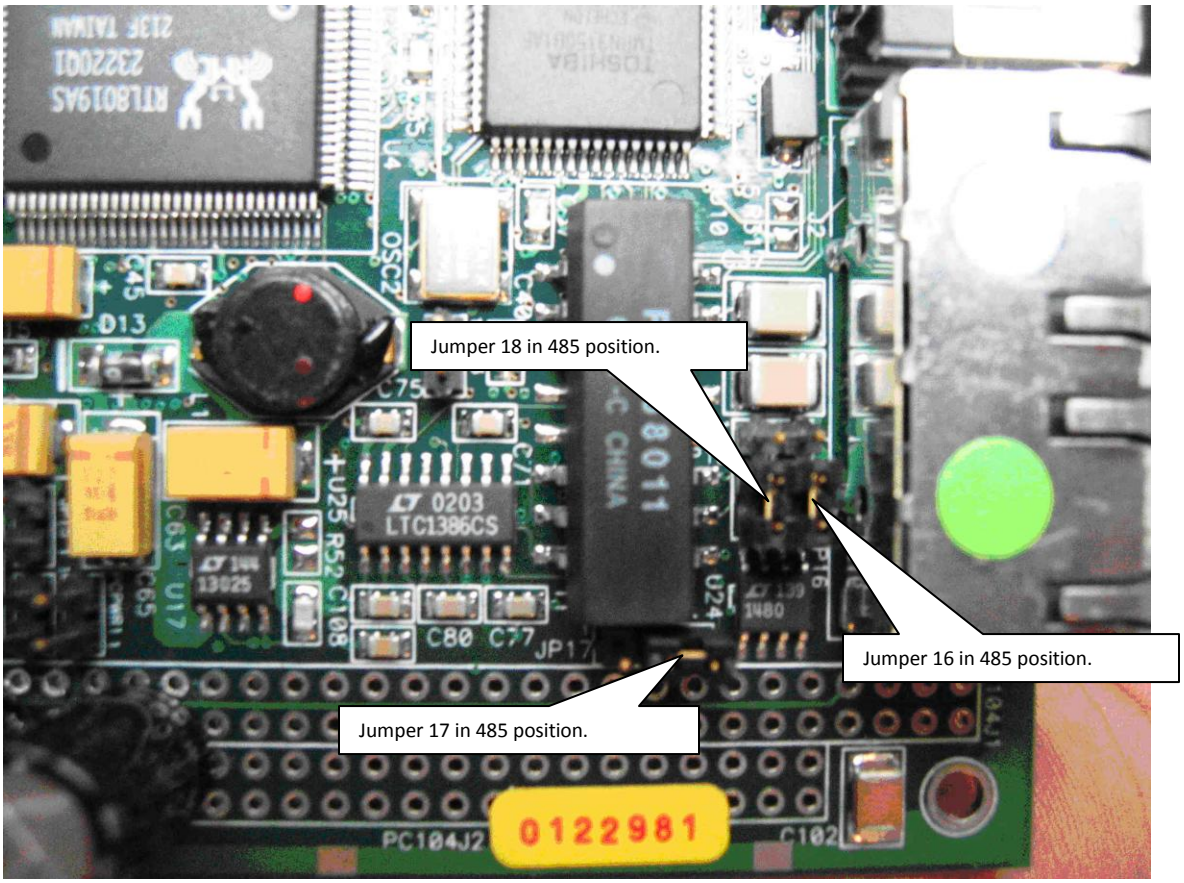
Note: The VMA Release function only works for analog and binary inputs (**AI** and **BI**). Outputs may be restored to their original value using an explicit write command.

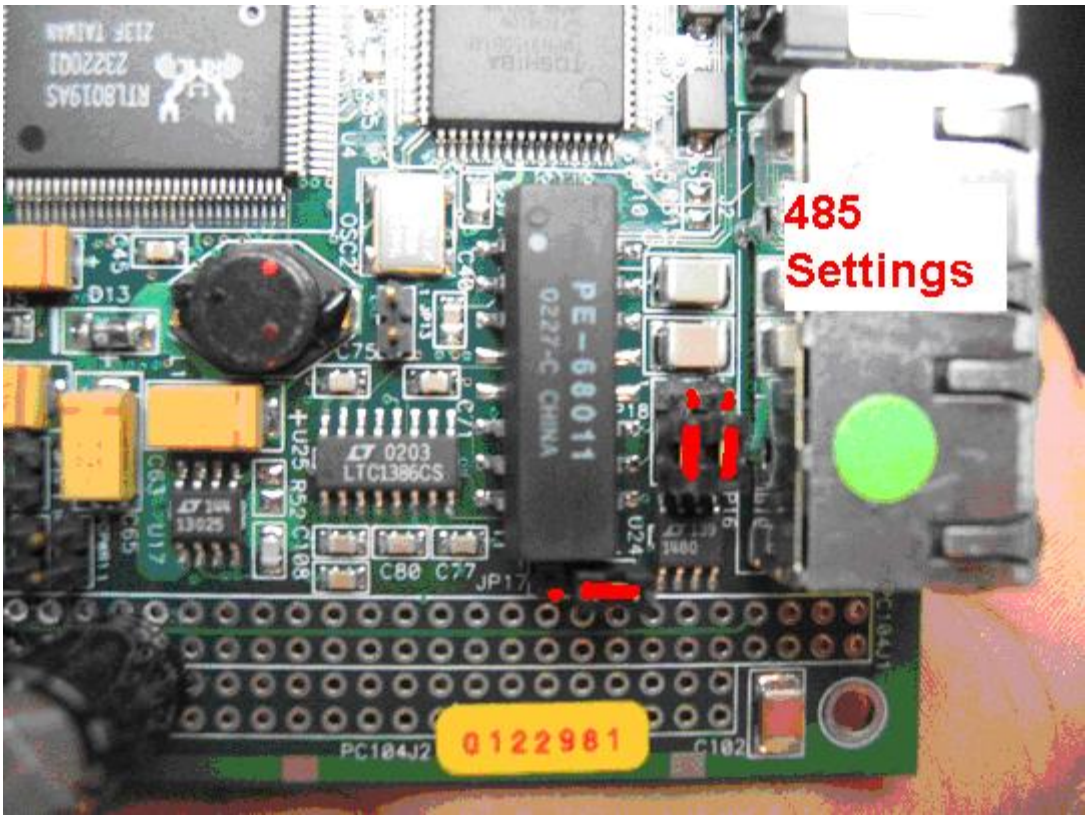
[7] For information only. Do not use Driver type for these, but specify AI, AO, BI or BO directly in the Data_Type field.
[8] These values are believed to be correct for the corresponding point types, but no guarantee can be given at this time.

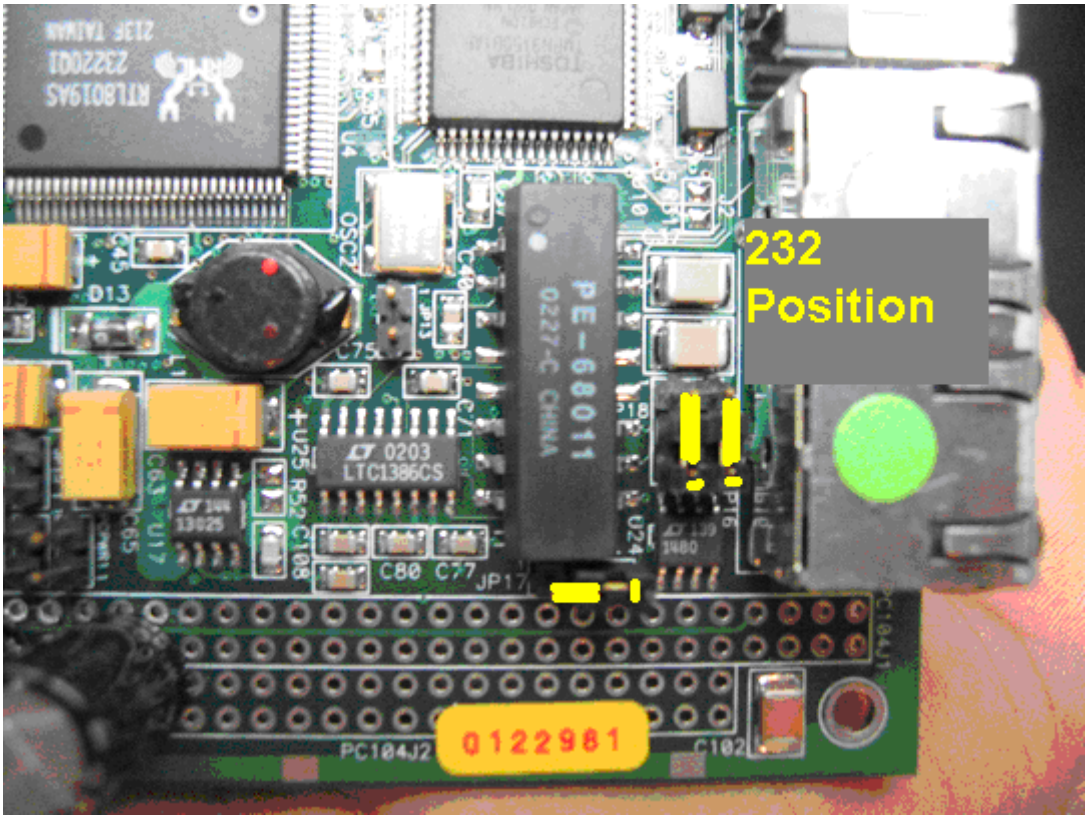
Appendix A.9. Setting up FS-B20 for RS-485

Appendix A.9.1. Jumper Settings:

Jumpers jp16, jp17, and jp18 need to be transferred from pins 1-2 to pins 2-3 in order to enable RS-485. These jumpers can be found just behind the RJ45 ports inside the box

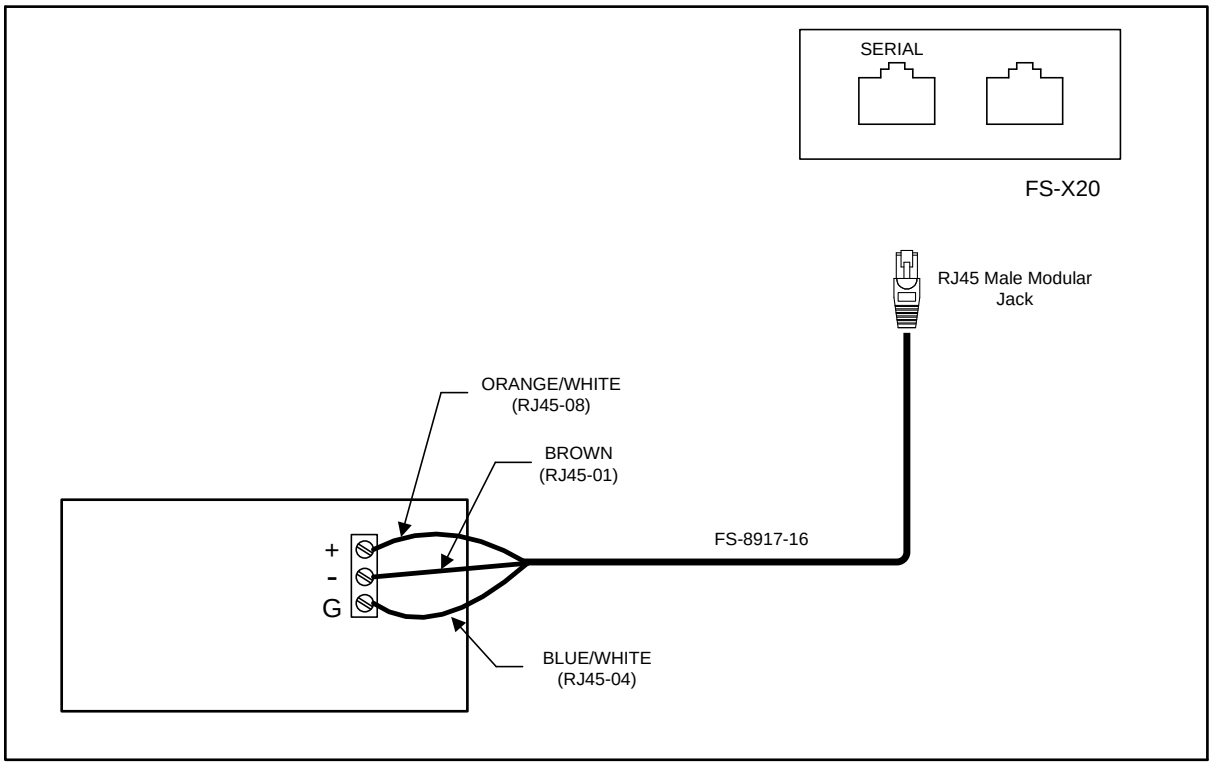



485
Settings


232
Position

Appendix A.9.2. Hardware connections

The FS-8917-16 pigtail cable is typically used for this port arrangement. Connection is depicted in the following diagram.



Appendix A.9.3. Configuration Settings

- The Port address in the Configuration needs to be set to R1 instead of P1.
- Line_Drive_On and Line_Drive_Off need to be defined in the connections section of the configuration file. These need to be set to at least 0.001s. Refer to Sections 0 and 6.1 for more information.

Appendix B. Troubleshooting tips

Appendix B.1. Offline Behavior

When the Client node on the FieldServer goes offline, the corresponding data objects on the FieldServer are also marked offline. If a client polls a virtual FieldServer node for this particular data, therefore, an offline response will be returned by the FieldServer. A request from a master device for a FieldServer to identify itself would be met by a valid response, however. This could lead to confusion and status toggling. This can be addressed using Responsible Map Descriptors and by configuring the virtual FieldServer using the Offline_Method option. Please refer to the Configuration Manual for further information.

Appendix B.2. Tip on Overrides

It is important that there be only one device (including the slave device itself) updating a point which is in overridden mode. The reason for this is that the value of the point could be changed by an update from a non-Metasys® Server before the override is released by the Metasys® Master. In this case, the FieldServer would respond to a poll from the Master with this changed data.

Override Behavior is different for different data types.

Data Type	Override Behavior
AI, DI	The FieldServer accepts the override command but will not issue a Write command to the Client Side. Subsequent values will update the overwritten value on the FieldServer only. On poll, the FieldServer will respond with the last overwritten value.
AO, DO, Float_Reg, Integer, Byte, Flag	The FieldServer accepts the override comment and issues a Write command to the Client Side. Subsequent values will update the overwritten value on the Client. On poll, the FieldServer will respond with the current value.

Appendix B.3. MN2Open Test Tool

The N2 server configuration should number all points of each point type (e.g. analog input) consecutively, starting from 1. There should be no gaps in the configured address space.

Appendix C. Reference

Appendix C.1. Error Messages

Error Message	Description and Action
MN2:#01 WARN. Server_Hold_Timeout is %0.3fs For N2Open Slave typical value is %0.3fs	Typically N2open Clients are configured to timeout after 200ms. If a FieldServer is configured as a Server the Server_Hold_Timeout time should be set to 0.175s or less otherwise the response will be suppressed. This message is printed if the Server_Hold_Timeout is set for >0.175s. If the Client's timeout is >200ms this message may be ignored.

Appendix C.2. Listing of Supported Attributes – N2Open

Data Type	Attribute No.	Attribute
Analog Input	1	Object Configuration
	2	Object Status
	3	Analog Input Value
	4	Low Alarm Limit
	5	High Alarm Limit
	6	Low Warn Limit
	7	High Warn Limit
	8	Differential
Binary Input	1	Object Configuration
	2	Object Status
Analog Output	1	Object Configuration
	2	Object Status
	3	Current Value
Binary Output	1	Object Configuration
	2	Object Status
	3	Minimum On-Time
	4	Minimum Off-Time
	5	Maximum Cycles/Hour
Internal Float	1	Object Status
	2	Current Value
Internal Integer	1	Object Status
	2	Current Value
Internal Byte	1	Object Status
	2	Current Value

Appendix C.3. Metasys® DX9100 Memory Map

Module	Module	Module	Module	Module	Module	Module	Module	Module	Module	Module	Module
Programmable modules											
1	2	3	4	5	6	7	8	9	10	11	12
64	160	256	352	448	544	640	736	832	928	1024	1120
0040H	00A0H	0100H	0160H	01C0H	0220H	0280H	02E0H	0340H	03A0H	0400H	0460H
Analog input modules											
1	2	3	4	5	6	7	8				
1216	1232	1248	1264	1280	1296	1312	1328				
04C0H	04D0H	04E0H	04F0H	0500H	0510H	0520H	0530H				
Analog output modules											
1	2	2	9	10	11	12	13	14			
1344	1360	or later (new for version 6.0):	2304	2320	2336	2352	2368	2384			
0540H	0550H		0900H	0910H	0920H	0930H	0940H	0950H			
Digital output modules											
3	4	5	6	7	8						
1376	1392	1408	1424	1440	1456						
0560H	0570H	0580H	0590H	05A0H	05B0H						
Extension modules											
1	2	3	4	5	6	7	8				
1472	1552	1632	1712	1792	1872	1952	2032				
05C0H	0610H	0660H	06B0H	0700H	0750H	07A0H	07F0H				
Time schedule modules											
1	2	3	4	5	6	7	8				
2112	2128	2144	2160	2176	2192	2208	2224				
0840H	0850H	0860H	0870H	0880H	0890H	08A0H	08B0H				
Optimal start / stop module											
1	2										
2240	2272										
08C0H	08E0H										

Relative Item	Signal Condition	Read/Write	Johnson Tag	Description
General control module				
0	Byte	Read	UNIT	Device model. For DX-9100 always 5
1	Word	Write	SUP	Supervisory central control
2	Byte	Read	MNT	Maintenance control
3	Word	Read	DIAG	Diagnistics
4	Byte	Read	DICT	Digital input counters
5	Byte	Read	TOS	Triac output status
6	Byte	Read	DIS	Digital input status
7	Word	Read	AIS	Analog input status
8	Word	Read	LRST1	Logic results 37637
9	Word	Read	LRST2	Logic results 17-32
10	Word	Write	LCOS1	Logic constants 37637
11	Word	Write	LCOS2	Logic constants 17-32
12	-	-	-	Spare
13	LONG	Write	CNTR1	DI1 pulse count
14	LONG	Write	CNTR2	DI2 pulse count
15	LONG	Write	CNTR3	DI3 pulse count
16	LONG	Write	CNTR4	DI4 pulse count

Relative Item	Signal Condition	Read/Write	Johnson Tag	Description
17	LONG	Write	CNTR5	DI5 pulse count
18	LONG	Write	CNTR6	DI6 pulse count
19	LONG	Write	CNTR7	DI7 pulse count
20	LONG	Write	CNTR8	DI8 pulse count
21	Word	Write	PASS	Password code
22	Byte	Write	PC1	Prescaler DI1 counter
23	Byte	Write	PC2	Prescaler DI2 counter
24	Byte	Write	PC3	Prescaler DI3 counter
25	Byte	Write	PC4	Prescaler DI4 counter
26	Byte	Write	PC5	Prescaler DI5 counter
27	Byte	Write	PC6	Prescaler DI6 counter
28	Byte	Write	PC7	Prescaler DI7 counter
29	Byte	Write	PC8	Prescaler DI8 counter
30	Byte	Write	UIA	User interface address
31	Word	Write	ALD@	Alarm disable condition source
32	Byte	Write	DXS1	DX-9100 type settings
33	Word	Write	ALG	Standard algorithm type
34	FP	Write	ACO1	Analog constant 1
35	FP	Write	ACO2	Analog constant 2
36	FP	Write	ACO3	Analog constant 3
37	FP	Write	ACO4	Analog constant 4
38	FP	Write	ACO5	Analog constant 5
39	FP	Write	ACO6	Analog constant 6
40	FP	Write	ACO7	Analog constant 7
41	FP	Write	ACO8	Analog constant 8
42	Byte	Write	PLCNT	PLC control and status
43	Word	Read	PLCPC	PLC program counter
Programmable Module Type				
0	Byte	Write	PMTYP	Programmable module type
1	Word	Write	PMOPT	Programmable module options
2	Byte	Write	PMF1	Function channel number 1 - F1
3	Byte	Write	PMF2	Function channel number 2 - F2
4	Byte	Write	PMF3	Function channel number 3 - F3
5	Byte	Write	PMF4	Function channel number 4 - F4
6	Byte	Write	PMF5	Function channel number 5 - F5
7	Byte	Write	PMF6	Function channel number 6 - F6
8	Byte	Write	PMF7	Function channel number 7 - F7
9	Byte	Write	PMF8	Function channel number 8 - F8
10	Word	Write	PMI1@	Input connection - I1@
11	Word	Write	PMI2@	Input connection - I2@
12	Word	Write	PMI3@	Input connection - I3@
13	Word	Write	PMI4@	Input connection - I4@
14	Word	Write	PMI5@	Input connection - I5@
15	Word	Write	PMI6@	Input connection - I6@
16	Word	Write	PMI7@	Input connection - I7@
17	Word	Write	PMI8@	Input connection - I8@
18	Word	Write	PMI9@	Input connection - I9@
19	Word	Write	PMI10@	Input connection - I10@
20	Word	Write	PMI11@	Input connection - I11@

Relative Item	Signal Condition	Read/Write	Johnson Tag	Description
21	Word	Write	PMI12@	Input connection - I12@
22	Word	Write	PMI13@	Input connection - I13@
23	Word	Write	PMI14@	Input connection - I14@
24	Word	Write	PMI15@	Input connection - I15@
25	Word	Write	PMI16@	Input connection - I16@
26	FP	Write	PMK01	Module constant - K1
27	FP	Write	PMK02	Module constant - K2
28	FP	Write	PMK03	Module constant - K3
29	FP	Write	PMK04	Module constant - K4
30	FP	Write	PMK05	Module constant - K5
31	FP	Write	PMK06	Module constant - K6
32	FP	Write	PMK07	Module constant - K7
33	FP	Write	PMK08	Module constant - K8
34	FP	Write	PMK09	Module constant - K9
35	FP	Write	PMK10	Module constant - K10
36	FP	Write	PMK11	Module constant - K11
37	FP	Write	PMK12	Module constant - K12
38	FP	Write	PMK13	Module constant - K13
39	FP	Write	PMK14	Module constant - K14
40	FP	Write	PMK15	Module constant - K15
41	FP	Write	PMK16	Module constant - K16
42	FP	Write	PMK17	Module constant - K17
43	FP	Write	PMK18	Module constant - K18
44	FP	Write	PMK19	Module constant - K19
45	FP	Write	PMK20	Module constant - K20
46	FP	Write	PMK21	Module constant - K21
47	FP	Write	PMK22	Module constant - K22
48	FP	Write	PMK23	Module constant - K23
49	FP	Write	PMK24	Module constant - K24
50	FP	Write	PMK25	Module constant - K25
51	FP	Write	PMK26	Module constant - K26
52	FP	Write	PMK27	Module constant - K27
53	FP	Write	PMK28	Module constant - K28
54	FP	Write	PMK29	Module constant - K29
55	FP	Write	PMK30	Module constant - K30
56	FP	Write	PMK31	Module constant - K31
57	FP	Write	PMK32	Module constant - K32
58	FP	Write	PMK33	Module constant - K33
59	FP	Write	PMK34	Module constant - K34
60	FP	Write	PMOU1	Output channel 1
61	FP	Write	PMOU2	Output channel 2
62	FP	Write	PMOU3	Output channel 3
63	FP	Write	PMOU4	Output channel 4
64	FP	Write	PMOU5	Output channel 5
65	FP	Write	PMOU6	Output channel 6
66	FP	Write	PMOU7	Output channel 7
67	FP	Write	PMOU8	Output channel 8
68	FP	Write	PMAX1	Auxiliary output 1
69	FP	Write	PMAX2	Auxiliary output 2

Relative Item	Signal Condition	Read/Write	Johnson Tag	Description
70	Byte	Write	PMHDC	Hold mode control/status
71	Byte	Write	PMDO	Logic output control and status
72	Word	Read	PMST	Programmable module status
73	LONG	Write	PMAC1	Accumulator channel 1
74	LONG	Write	PMAC2	Accumulator channel 2
75	LONG	Write	PMAC3	Accumulator channel 3
76	LONG	Write	PMAC4	Accumulator channel 4
77	LONG	Write	PMAC5	Accumulator channel 5
78	LONG	Write	PMAC6	Accumulator channel 6
79	LONG	Write	PMAC7	Accumulator channel 7
80	LONG	Write	PMAC8	Accumulator channel 8
Analog Input Modules				
0	Word	Write	AIT	Analog inout type
1	FP	Write	HR	High range input
2	FP	Write	LR	Low range input
3	FP	Write	HIA	High alarm limit
4	FP	Write	LOA	Low alarm limit
5	FP	Write	FTC	Filter constant
6	FP	Write	ADF	Differential on alarm limit (units)
7	FP	Read	AI	Analog input value
8	FP	Read	AI%	Analog input %
9	FP	Read	ADC	Analog input in counts
10	Byte	Read	AIST	Analog input status
Analog Output Modules				
0	Byte	Write	AOT	Analog output type
1	Word	Write	AO@	Source of analog output module
2	Word	Write	AOF@	Output forcing logic connection
3	FP	Write	HRO	Output high range
4	FP	Write	LRO	Output low range
5	FP	Write	OFL	Output % value in forcing mode
6	FP	Write	OUT	Output module output value %
7	Byte	Write	AOC	Analog output control and status
8	FP	Write	HLO	Output high limit
9	FP	Write	LLO	Output low limit
10	Word	Write	INC@	DDC increase logic connection
11	Word	Write	DEC@	DDC decrease logic connection
12	Word	Write	ENL@	Limit function enable logic connection
Digital Output Modules				
0	Byte	Write	DOT	Digital output options
1	Word	Write	DO@	Source of digital output module
2	Word	Write	FB@	Source of feedback signal
3	Word	Write	DOF@	Output forcing logic connection
4	FP	Write	HRO	Output high range
5	FP	Write	LRO	Output low range
6	FP	Write	FST	PAT output full stroke time/DAT cycle
7	FP	Write	DB	PAT deadband
8	FP	Write	HLO	Output high limit
9	FP	Write	LLO	Output low limit
10	FP	Write	OFL	Output % value in forcing mode

Relative Item	Signal Condition	Read/Write	Johnson Tag	Description
11	FP	Write	OUT	Output module output value %
12	Byte	Write	DOC	Logic output control and status
13	Word	Write	INC@	DDC increase logic connection
14	Word	Write	DEC@	DDC decrease logic connection
15	Word	Write	ENL@	Limit function enable logic connection
Extension Modules				
0	Word	Write	XTIOMAP	Extension module I/O map
1	Word	Write	XTIOTYP	Extension module I/O type
2	Word	Write	XTIOMOD	Extension module I/O mode
3	Byte	Write	XTADX	Extension module address 0-255
4	Word	Write	XTI1@	Point connection - I1
5	Word	Write	XTI2@	Point connection - I2
6	Word	Write	XTI3@	Point connection - I3
7	Word	Write	XTI4@	Point connection - I4
8	Word	Write	XTI5@	Point connection - I5
9	Word	Write	XTI6@	Point connection - I6
10	Word	Write	XTI7@	Point connection - I7
11	Word	Write	XTI8@	Point connection - I8
12	FP	Write	XTHR01	High output range point 1
13	FP	Write	XTLR01	Low output range point 1
14	FP	Write	XTHR02	High output range point 2
15	FP	Write	XTLR02	Low output range point 2
16	FP	Write	XTHR03	High output range point 3
17	FP	Write	XTLR03	Low output range point 3
18	FP	Write	XTHR04	High output range point 4
19	FP	Write	XTLR04	Low output range point 4
20	FP	Write	XTHR05	High output range point 5
21	FP	Write	XTLR05	Low output range point 5
22	FP	Write	XTHR06	High output range point 6
23	FP	Write	XTLR06	Low output range point 6
24	FP	Write	XTHR07	High output range point 7
25	FP	Write	XTLR07	Low output range point 7
26	FP	Write	XTHR08	High output range point 8
27	FP	Write	XTLR08	Low output range point 8
28	FP	Write	XTHIA1	High alarm limit point 1
29	FP	Write	XTLOA1	Low alarm limit point 1
30	FP	Write	XTHIA2	High alarm limit point 2
31	FP	Write	XTLOA2	Low alarm limit point 2
32	FP	Write	XTHIA3	High alarm limit point 3
33	FP	Write	XTLOA3	Low alarm limit point 3
34	FP	Write	XTHIA4	High alarm limit point 4
35	FP	Write	XTLOA4	Low alarm limit point 4
36	FP	Write	XTHIA5	High alarm limit point 5
37	FP	Write	XTLOA5	Low alarm limit point 5
38	FP	Write	XTHIA6	High alarm limit point 6
39	FP	Write	XTLOA6	Low alarm limit point 6
40	FP	Write	XTHIA7	High alarm limit point 7
41	FP	Write	XTLOA7	Low alarm limit point 7
42	FP	Write	XTHIA8	High alarm limit point 8

Relative Item	Signal Condition	Read/Write	Johnson Tag	Description
43	FP	Write	XTLOA8	Low alarm limit point 8
44	Word	Read	XTAIS	Extension module alarms
45	FP	Read	XTAI1	Analog input value 1
46	FP	Read	XTAI2	Analog input value 2
47	FP	Read	XTAI3	Analog input value 3
48	FP	Read	XTAI4	Analog input value 4
49	FP	Read	XTAI5	Analog input value 5
50	FP	Read	XTAI6	Analog input value 6
51	FP	Read	XTAI7	Analog input value 7
52	FP	Read	XTAI8	Analog input value 8
53	FP	Write	XTAO1	Analog output value 1
54	FP	Write	XTAO2	Analog output value 2
55	FP	Write	XTAO3	Analog output value 3
56	FP	Write	XTAO4	Analog output value 4
57	FP	Write	XTAO5	Analog output value 5
58	FP	Write	XTAO6	Analog output value 6
59	FP	Write	XTAO7	Analog output value 7
60	FP	Write	XTAO8	Analog output value 8
61	LONG	Write	XTDIC1	Digital input 1 pulse count
62	LONG	Write	XTDIC2	Digital input 2 pulse count
63	LONG	Write	XTDIC3	Digital input 3 pulse count
64	LONG	Write	XTDIC4	Digital input 4 pulse count
65	LONG	Write	XTDIC5	Digital input 5 pulse count
66	LONG	Write	XTDIC6	Digital input 6 pulse count
67	LONG	Write	XTDIC7	Digital input 7 pulse count
68	LONG	Write	XTDIC8	Digital input 8 pulse count
69	Byte	Write	XTCNT	Extension module hold control
70	Byte	Write	XTDO	Logic outputs control and status
71	Byte	Read	XTDI	Logic inputs status
72	Byte	Read	XTSTC	Extension module local status
Time schedule modules				
0	Word	Write	TSOPT	Time schedule options LSB
1	Word	Write	TSEX@	External extension logical connection
2	Word	Write	TSON@	On forcing logical connection
3	Word	Write	TSOF@	Off forcing logical connection
4	FP	Write	TSXTM	Extension time (min)
5	FP	Write	TSTIM	Time to next event (min)
6	Byte	Write	TSSTA	Time schedule status