



A Sierra Monitor Company

Driver Manual
(Supplement to the FieldServer Instruction Manual)
FS-8700-114 X30 DeviceNet Master Adapter
Driver

APPLICABILITY & EFFECTIVITY

Effective for all systems manufactured after September 2008

Driver Version:	1.01
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1. X30 DeviceNet Master Description

The X30 DeviceNet Master Adapter driver can be used to emulate a single Master Scanner station on a DeviceNet network. The FieldServer DeviceNet adapter is implemented as an ODVA profile 12 communications adapter. Standard DeviceNet Baudrates of 125k, 250k and 500kbit/s are supported. The DeviceNet Master Scanner can open IO connections of up to a total of 512 Bytes in each direction to DeviceNet Slaves.

Max Nodes Supported

FieldServer Mode	Nodes	Comments
Client	1	The FieldServer can only emulate one DeviceNet Master station
Server	63	The driver can communicate with up to 63 Slaves as long as the FieldServer point count license is not exceeded

2. Driver Scope of Supply

2.1. Supplied by FieldServer Technologies for this driver

FieldServer Technologies PART #	Description
FS-8700-114	Driver Manual.
X30-DeviceNet-Master	Anybus-M DeviceNet Card

2.2. Provided by the Supplier of 3rd Party Equipment

2.2.1. Required 3rd Party Software

RSNetWorx, RSLogix or another Network Scheduling Tool.

2.2.2. Required 3rd Party Configuration

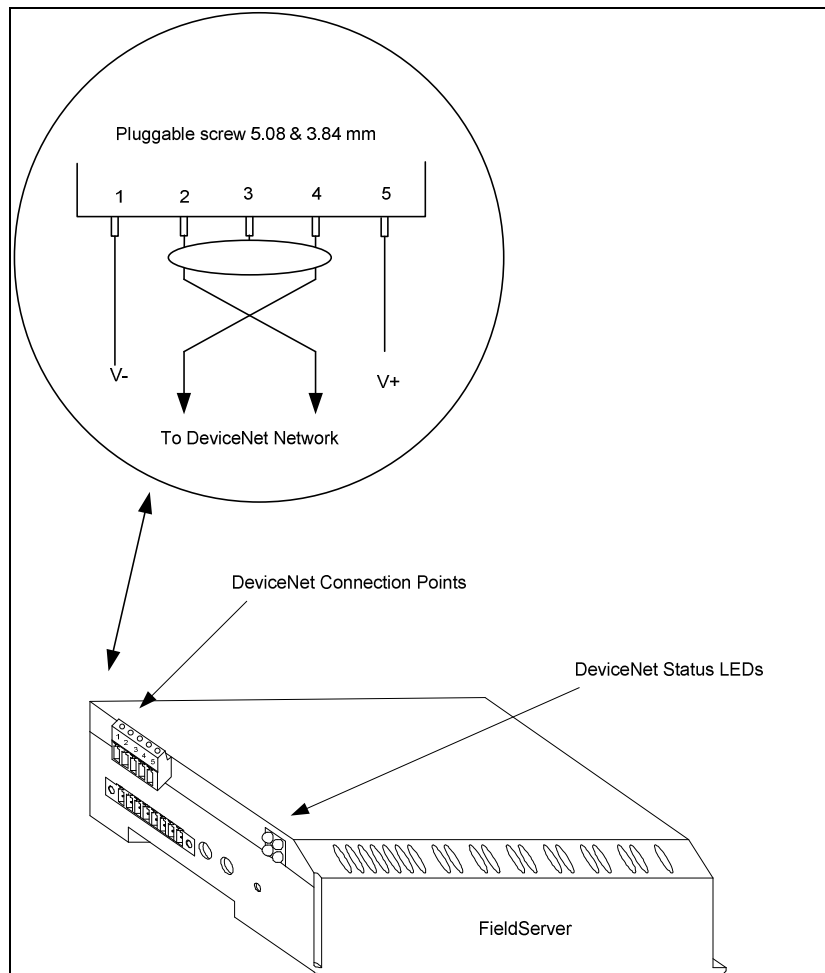
Connection to a properly terminated DeviceNet network.

2.2.3. Optional Items

PART #	Vendor/Manufacturer	Description
-	HMS-Networks	Anybus-M DeviceNet eds file

3. Hardware Connections

The FieldServer is connected to the DeviceNet network as shown in the connection drawing below.



Connector Pinouts

Pin	Signal	Description	Wire color	
1	V-	Negative supply voltage	black	
2	CAN_L	CAN_L Bus line	blue	
3	SHIELD	Cable Shield	(bare)	
4	CAN_H	CAN_H Bus line	white	
5	V+	Positive Supply Voltage	red	

3.1. Hardware Connection Tips / Hints

Use the recommended network cable and terminators as specified by the DeviceNet network organization and/or the manufacturer of your network equipment.

Terminate each end of the DeviceNet network with a 121 Ω resistor

The bus interface shall be supplied with 24DC $\pm$ 10% on the Fieldbus connector

4. Configuring the FieldServer as a DeviceNet Master

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 provided with the FieldServer).

This section documents and describes the parameters necessary for configuring the FieldServer to communicate with a DeviceNet Slave.

The configuration file tells the FieldServer about its interfaces, and the routing of data required. In order to enable the FieldServer for DeviceNet 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.

4.1. DeviceNet Settings

Section Title		
Bridge		
Column Title	Function	Legal Values
System_Station_Address*	DeviceNet MAC ID of the FieldServer	0-63

Note:

The DeviceNet MAC ID can also be set via the DIP switches on the side of the FieldServer but then the system station address parameter must be removed from the configuration file. Refer to Appendix B.1 for more information.

Example

// FieldServer	
Bridge	
Title,	System_Station_Address
DeviceNet_Test,	5

4.2. Client Side Connection Descriptors

Section Title		
Connections		
Column Title	Function	Legal Values
Adapter	Adapter Name	DNet
Protocol	Protocol name	X30_DNet_Master
DNet_Master_Baudrate ¹	Baudrate	125K , 250K , 500K
Command_DA_Name	Commanding Scanner	Name of a data array declared under Data Arrays section, length of 8 - Bit data array type recommended
Status_DA_Name	Provide Scanner status	

Example

// Server Side Connections				
Connections				
Adapter,	Protocol,	DNet_Master_Baudrate,	Command_DA_Name,	Status_DA_Name
DNet,	X30_DNet_Master,	500K,	Command_Reg,	Status_Reg

4.3. Client Side Node Descriptors

Section Title		
Nodes		
Column Title	Function	Legal Values
Node_Name	Provide name for node	Up to 32 alphanumeric characters
Node_ID	MAC ID of Slave to scan	0 - 63
Protocol	Specify protocol used	X30_DNet_Master

Example

// Server Side Nodes			
Nodes			
Node_Name,	Node_ID,	Protocol	
DN1,	01,	X30_DNet_Master	

¹ If System_Station_Address has not been defined in the CSV file, the DIP switch value for both MacID and Baudrate will be used and the baud parameter in the CSV file will be ignored.

4.4. Client Side Map Descriptors

4.4.1. 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 "Data Array" section above
Data_Array_Offset	Starting location in Data Array	0 to maximum specified in "Data Array" section above
Function	Function of Server Map Descriptor	RDBC -Reads data from the remote input buffer WRBC -Writes data to the remote output buffer
Scan_Interval	Buffers Update Period	> 0.001s

4.4.2. Driver Specific Map Descriptor Parameters

Column Title	Function	Legal Values
Node_Name	Name of Node	One of the Node names specified in "Server Node Descriptor" above
DeviceNet_Data_Type	Data Type of remote buffer	Byte, Word, Dword, Float, Bool
Address	Byte offset into remote buffer	RDBC: 0 – 511 WRBC: 0 – 511
Length	Number of DeviceNet_Data_Type items in remote buffer	BYTE: 1 – 512 WORD: 1 – 256 DWORD: 1 – 128 FLOAT: 1 – 128 BOOL: 1 – 4096

4.4.3. Map Descriptor Example.

// Client side Map Descriptors									
Map_Descriptors									
Map_Descriptor_Name,	Data_Array_Name,	Data_Array_Offset,	Function,	Node_Name,	DeviceNet_Data_Type,	Address,	Length,	Scan_Interval	
Get_Data,	Input_Data,	0,	RDBC,	CN1,	WORD,	0,	10,	1s	
Put_Data,	Output_Data,	0,	WRBC,	CN1,	WORD,	0,	10,	1s	

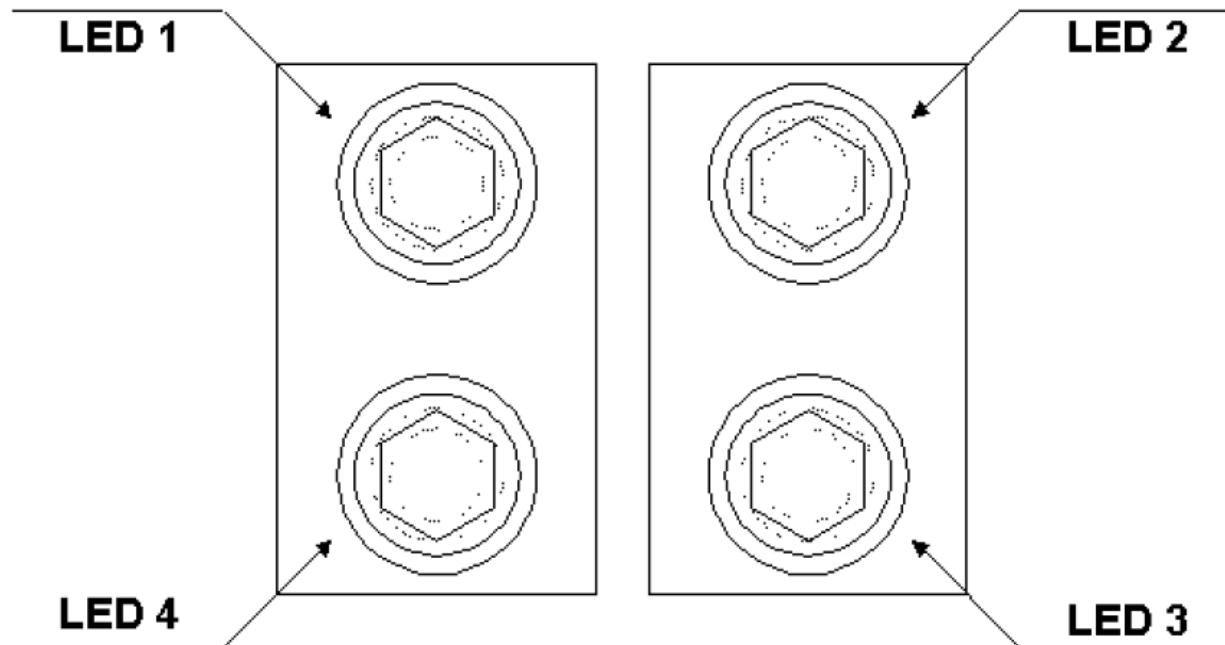
Read function map descriptor gets data from the DeviceNet network and stores it in the Input_Data data array.

Write function map descriptor puts data from the Output_Data array onto the DeviceNet network.

Note that each address refers to an individual remote input and output buffer. Each buffer can contain up to 512 bytes.

Appendix A. Advanced Topics

Appendix A.1. DeviceNet X30 LED indicators



LED 1 – Reserved

LED 2 – Network Status

Color	Frequency	Description
-	Off	No power, not initialized or no connections established
Green	On	Online, one or more connections established
Green	Flashing	Online, no connections established
Red	On	Critical link failure
Red	Flashing	Minor fault, one or more connections have a minor fault

LED 3 – Module Status

Color	Frequency	Description
-	Off	No power or not initialized
Green	On	Module status is OK
Red	On	Major fault
Red	Flashing	Minor fault

LED 4 – Operation Mode

Color	Frequency	Description
-	Off	No power or not initialized
Green	Flashing	Idle mode
Green	On	Run mode

Appendix A.2. Using RSNetWorx

Please refer to the following document on the HMS website, www.anybus.com

ANYBUS-M DEVICENET MASTER/SCANNER APPENDIX Revision 1.02 - Section 5.3
"Configuration with RSNetworx".

Appendix B. Driver Notes

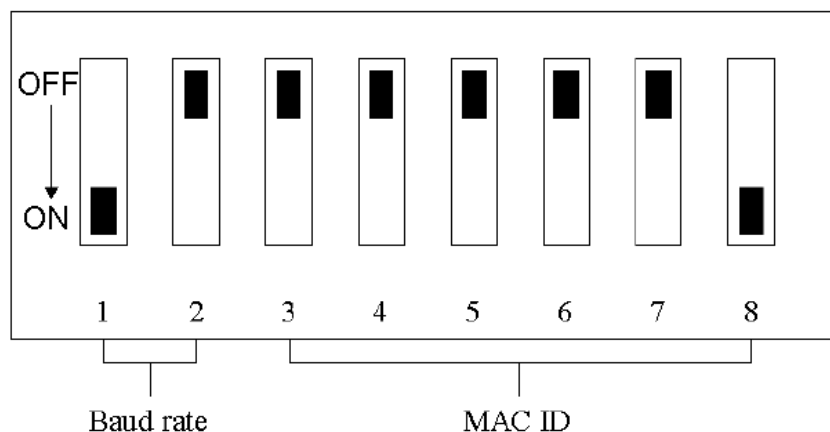
Appendix B.1. Setting the FieldServer's DeviceNet MAC ID and Baudrate

The MAC ID and Baudrate can be set in the FieldServer's CSV file using the System_Station_Address and DNet_Master_Baudrate parameters or it can be set with DIP switches as depicted below.

Note:

The System_Station_Address parameter must be removed from the configuration file if the DIP switch setting is to be used.

If System_Station_Address has not been defined in the CSV file, the DIP switch value for both MacID and Baudrate will be used and the baud parameter in the CSV file will be ignored.



(ON = "1", OFF = "0")

Baudrate [kBit/sec]	DIP 1-2
125	0 0
250	0 1
500	1 0
Reserved	1 1

Address	DIP 3 - 8
0	0 0 0 0 0 0
1	0 0 0 0 0 1
2	0 0 0 0 1 0
3	0 0 0 0 1 1
...	
62	1 1 1 1 1 0
63	1 1 1 1 1 1

Appendix B.2. Using the Command and Status Data Arrays

The Command Data Array controls the Scanner's mode which can be either Run or Idle. The Scanner can only be configured when in Idle mode. A non-zero value at offset zero in the Command Data Array will place the Scanner in Run mode; a value of zero will place it in Idle mode. The Scanner

always powers up in Idle mode and can be set to Run mode automatically with a preload section or from the Server side protocol of the FieldServer. The following preload section can be placed in the configuration file to place the scanner in Run mode at power-up:

Preloads			
Data_Array_Name, Command_Reg,	Preload_Data_Format, Bit,	Preload_Data_Value, 1,	Location 0

Offset zero of the Status Data Array indicates the Scanner's actual mode achieved. A non-zero value indicates the Scanner is in Run mode and a value of zero indicates the scanner is in Idle mode.

Appendix B.3. Master Status Codes

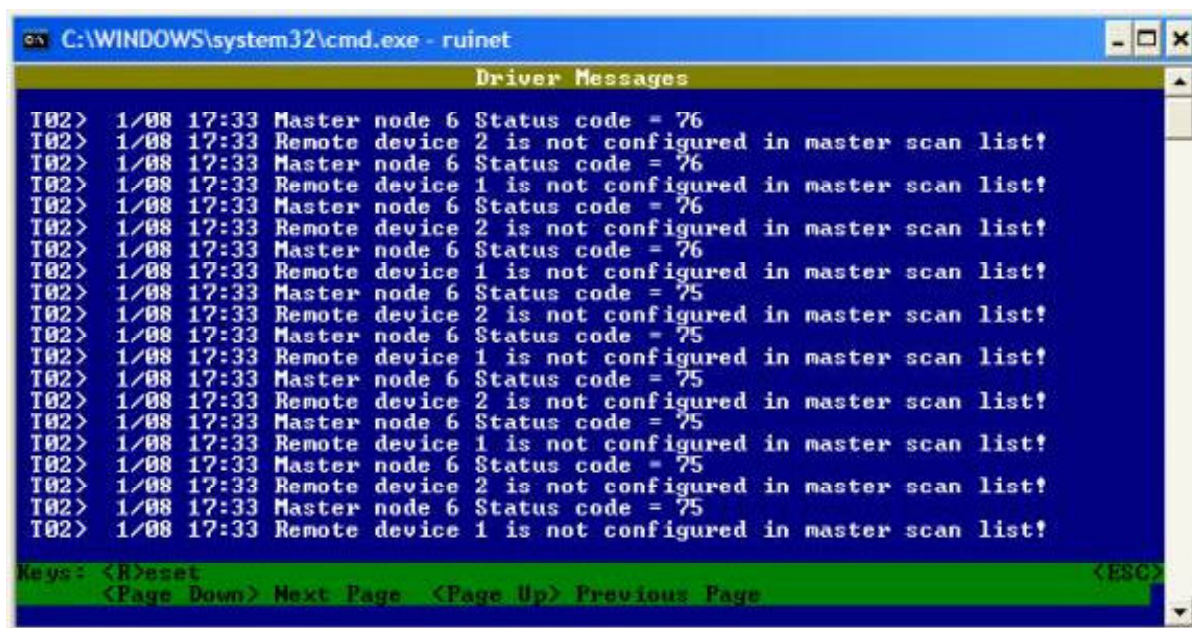
The Master Status codes displayed on the F-screen are depicted below:

Value Dec	Value Hex	Meaning
00	0x00	OK or Not in scan list
70	0x46	Duplicate MAC ID failure
71	0x47	Scanner configuration error
72	0x48	Device communication error
73	0x49	Wrong device type
74	0x4A	Port over-run error
75	0x4B	Network failure
76	0x4C	No CAN messages detected
77	0x4D	Wrong data size
78	0x4E	No such device found
79	0x4F	Transmit failure
80	0x50	Node in IDLE mode
81	0x51	Node in fault mode
82	0x52	Fragmentation error
83	0x53	Unable to initialise node

Value Dec	Value Hex	Meaning
84	0x54	Node not yet initialised
85	0x55	Receive buffer overflow
86	0x56	Node changed to IDLE mode
87	0x57	Shared master error (not used)
88	0x58	Shared choice error (not used)
89	0x59	Keeper object failure (not used)
90	0x5A	CAN port disabled (not used)
91	0x5B	Bus off
92	0x5C	No bus power detected
95	0x5F	Updating flash (not used)
96	0x60	In test mode (not used)
97	0x61	Halted by user cmd. (not used)
98	0x62	Firmware failure (not used)
99	0x63	System failure

Example:

If the Master reports a network failure the following screenshot will be displayed:



```
C:\WINDOWS\system32\cmd.exe - ruinet

Driver Messages

T02> 1/08 17:33 Master node 6 Status code = 76
T02> 1/08 17:33 Remote device 2 is not configured in master scan list!
T02> 1/08 17:33 Master node 6 Status code = 76
T02> 1/08 17:33 Remote device 1 is not configured in master scan list!
T02> 1/08 17:33 Master node 6 Status code = 76
T02> 1/08 17:33 Remote device 2 is not configured in master scan list!
T02> 1/08 17:33 Master node 6 Status code = 76
T02> 1/08 17:33 Remote device 1 is not configured in master scan list!
T02> 1/08 17:33 Master node 6 Status code = 75
T02> 1/08 17:33 Remote device 2 is not configured in master scan list!
T02> 1/08 17:33 Master node 6 Status code = 75
T02> 1/08 17:33 Remote device 1 is not configured in master scan list!
T02> 1/08 17:33 Master node 6 Status code = 75
T02> 1/08 17:33 Remote device 2 is not configured in master scan list!
T02> 1/08 17:33 Master node 6 Status code = 75
T02> 1/08 17:33 Remote device 2 is not configured in master scan list!
T02> 1/08 17:33 Master node 6 Status code = 75
T02> 1/08 17:33 Remote device 1 is not configured in master scan list!

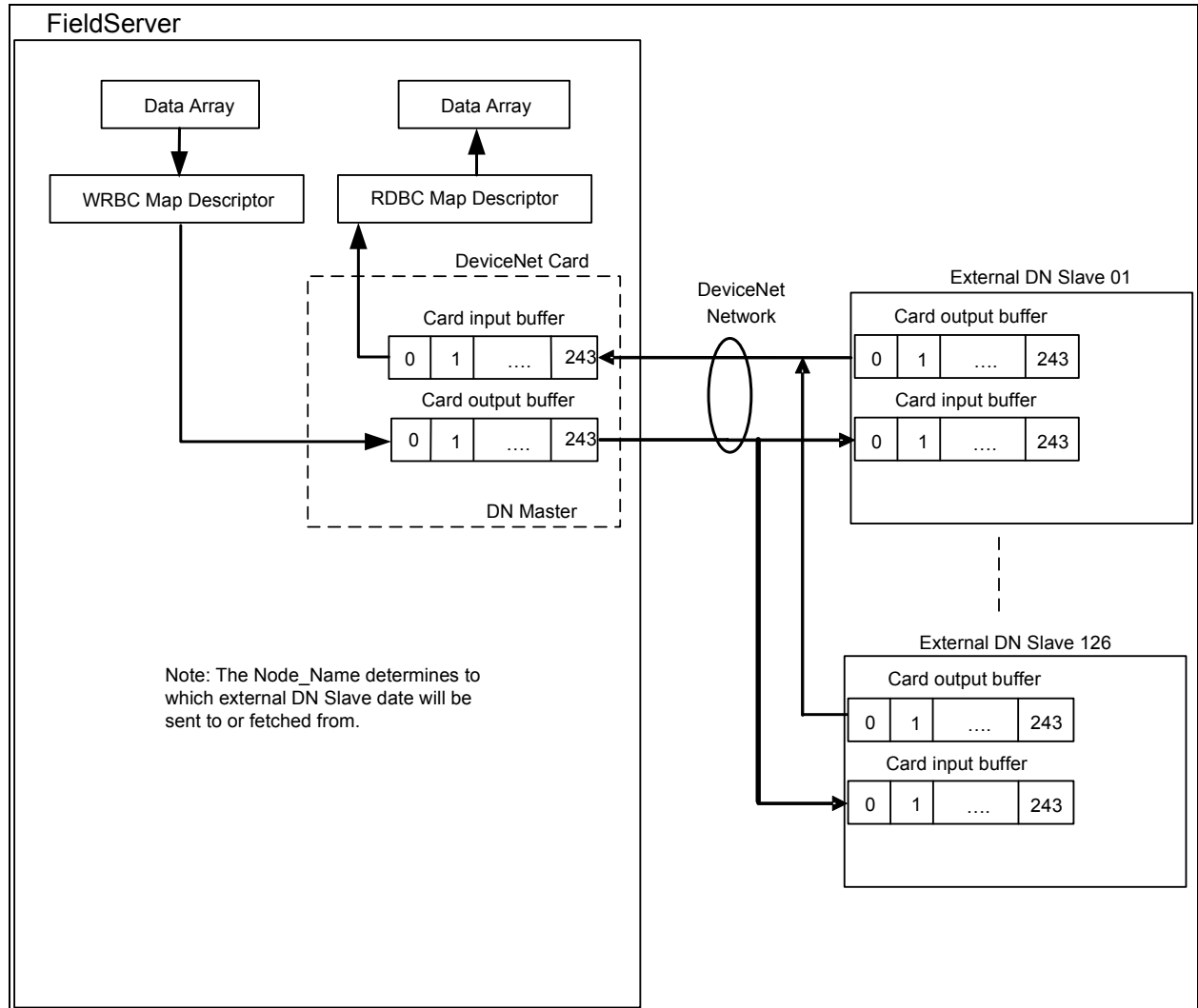
Keys: <R>reset <ESC>
      <Page Down> Next Page <Page Up> Previous Page
```

Appendix B.4. Understanding buffer types and Map Descriptor functions

The diagram below explains the data flows for both buffers when using the FieldServer as a DN Master:

Note that for the Input buffer, the data is coming from the external DN Slave and is transferred into the DN Master card's internal input buffer. The Rdbc (Read Data Block Continuous) Map Descriptor transfers the data from the card buffer into the FieldServer's Data Array packing it correctly according to the specified DeviceNet_Data_Type.

For the Output buffer, the data is written from the FieldServer's Data Array by the WRBC function Map Descriptor (Write Data Block Continuous) into the DN Master card's internal output buffer from where it is transferred across the DeviceNet network to the external DN Slave's input buffer.



Appendix B.5. Accessing Parameter Data in Remote Slaves

The DeviceNet driver only supports IO data. To access parameter data on Slaves it is necessary to refer to the Slave device's user manuals for information on how to map their parameter data to IO data locations.