



FieldServer
FS-8700-03 DF1
Driver Manual
(Supplement to the FieldServer Instruction Manual)

APPLICABILITY & EFFECTIVITY

Effective for all systems manufactured after January 2019.

Driver Revision: 1.02
Document Revision: 1.B

Technical Support

Please call us for any technical support needs related to the FieldServer product.

Sierra Monitor Corporation
1991 Tarob Court
Milpitas, CA 95035

Website: www.sierramonitor.com

U.S. Support Information:

+1 408 964-4443

+1 800 727-4377

Email: support@sierramonitor.com

EMEA Support Information:

+44 2033 1813 41

Email: support.emea@sierramonitor.com

TABLE OF CONTENTS

- 1 Allen Bradley DF1 Description 4**
- 2 Driver Scope of Supply 4**
 - 2.1 Supplied by Sierra Monitor Corporation 4
 - 2.2 Provided by the Supplier of 3rd Party Equipment..... 4
- 3 Hardware Connections..... 5**
- 4 Data Array Parameters 6**
- 5 Configuring the FieldServer as a DF1 Client 7**
 - 5.1 Client Side Connection Parameters 7
 - 5.2 Client Side Node Parameters 8
 - 5.3 Client Side Map Descriptor Parameters 9
 - 5.3.1 FieldServer Specific Map Descriptor Parameters 9
 - 5.3.2 Driver Related Map Descriptor Parameters 9
 - 5.3.3 Map Descriptor Example 9
- 6 Configuring the FieldServer as a DF1 Server 10**
 - 6.1 Server Side Connection Parameters 10
 - 6.2 Server Side Node Parameters..... 11
 - 6.3 Server Side Map Descriptor Parameters..... 12
 - 6.3.1 FieldServer Specific Map Descriptor Parameters 12
 - 6.3.2 Driver Specific Map Descriptor Parameters 12
 - 6.3.3 Map Descriptor Example 12
- Appendix A. Troubleshooting..... 13**
 - Appendix A.1 Continuous Map Descriptors 13
 - Appendix A.2 Checksum 13
 - Appendix A.3 Reading B File Types..... 13
- Appendix B. Reference..... 14**
 - Appendix B.1 Command Support..... 14
 - Appendix B.2 Error Messages..... 15

1 ALLEN BRADLEY DF1 DESCRIPTION

The DF1 driver allows the FieldServer to transfer data to and from devices over RS-232 using DF1 protocol. The FieldServer can emulate either a Server or Client.

The information that follows describes how to expand upon the factory defaults provided in the configuration files included with the FieldServer.

2 DRIVER SCOPE OF SUPPLY

2.1 Supplied by Sierra Monitor Corporation

| Part # | Description |
|------------|-----------------------------------|
| FS-8915-10 | UTP cable (7 foot) for RS-232 use |
| FS-8917-06 | RJ45 to DB9M connection adapter |

2.2 Provided by the Supplier of 3rd Party Equipment

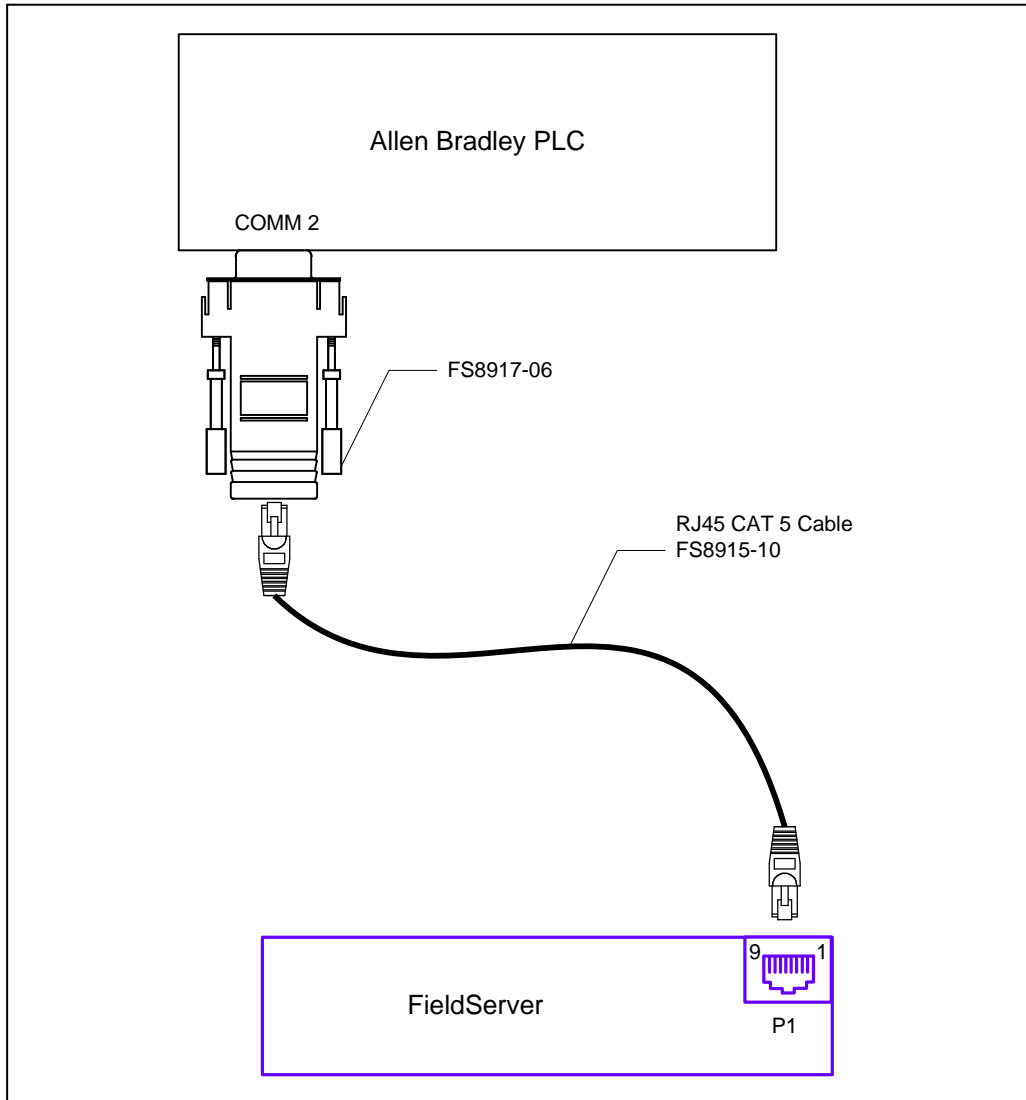
| Part # | Description |
|--------|--|
| | AB DF1 compatible PLC, e.g. SLC5/03, PLC 5/40, etc. ¹ |
| | DF1 Client, e.g. Wonderware, Intellution FIX, GE Cimplicity, etc. ² |

¹ If FieldServer used as Allen Bradley DF1 Client.

² If FieldServer used as Allen Bradley DF1 Server.

3 HARDWARE CONNECTIONS

It is possible to connect an Allen Bradley PLC to any of the RS-232 ports. These ports simply need to be configured for an Allen Bradley PLC in the configuration file.



FS-8917-06 Pinouts

| FS Function | RJ45 Pin# | DB9F Pin# | Color |
|-------------|-----------|-----------|-------|
| RX | 1 | 3 | White |
| GND | 4 | 5 | Green |
| TX | 8 | 2 | Blue |

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, Byte, Uint16, Uint32, Sint16, Sint32 |
| 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 , Float , 200
DA_AO_01 , Float , 200
DA_DI_01 , Bit , 200
DA_DO_01 , Bit , 200

```

5 CONFIGURING THE FIELDSEVER AS A DF1 CLIENT

For detailed information on FieldServer configuration, 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 DF1 Server.

The configuration file tells the FieldServer about its interfaces, and the routing of data required. In order to enable the FieldServer for DH+ communications, the driver independent FieldServer buffers need to be declared in the “Data Arrays” section, the destination device addresses need to be declared in the “Client Side Nodes” section, and the data required from the servers needs to be mapped in the “Client Side Map Descriptors” section. Details on how to do this can be found below.

NOTE: In the following tables, * indicates an optional parameter with the **bold** legal value as the default.

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-P2 ³ |
| Baud* | Specify baud rate. | 300 to 115200; 9600 |
| Parity* | Specify parity. | Even, Odd, None |
| Data_Bits* | Specify data bits. | 8 |
| Stop_Bits* | Specify stop bits. | 1 , 2 |
| Protocol | Specify protocol used. | DF1_FD, DF1_HD_MASTER, DF1_HD_SLAVE |
| Checksum | Specify Checksum – refer to Appendix A.2 . | BCC , CRC-16 |

Example

```

// Client Side Connections

Connections
Port          , Protocol  , Baud    , Parity   , Data_Bits , Stop_Bits
P1            , DF1_FD   , 38400   , None     , 8         , 1
    
```

³ 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 | Node ID of physical Server node (PLC). | 1-255 |
| Protocol | Specify protocol used. | DF1_FD, DF1_HD_MASTER, DF1_HD_SLAVE |
| Port | Specify which port the device is connected to the FieldServer. | P1-P2 ⁴ |
| PLC_Type | Specify PLC Communications type. | PLC3, PLC5, SLC5, Control_Logix |

Example

```
// Client Side Nodes

Nodes
Node_Name , Node_ID , Protocol , PLC_Type , Port
PLC_01 , 1 , DF1_FD , SLC5 , P1
```

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.

5.3 Client Side Map Descriptor Parameters

5.3.1 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 Client Map Descriptor. | Rdbc, Wrbc, Wrbcx |

5.3.2 Driver Related 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 |
| File_Type | File type in PLC. | N, F, B, I, O ⁵ |
| File_Number | File Number in PLC. | 0-255 |
| Address | Starting address of read block. | 0 – 255 |
| Length | Length of read block. | 1-255 |
| Scan_Interval | Rate at which data is polled. | 0-32000s, 1.0s |
| Data_Array_Low_Scale* | Scaling zero in Data Array. | -32767 to 32767, 0 |
| Data_Array_High_Scale* | Scaling max in Data Array. | -32767 to 32767, 100 |
| Node_Low_Scale* | Scaling zero in Connected Node. | -32767 to 32767, 0 |
| Node_High_Scale* | Scaling max in Connected Node. | -32767 to 32767, 100 |

5.3.3 Map Descriptor Example

```
// Client Side Map Descriptors
Map_Descriptors
Map_Descriptor_Name , Data_Array_Name , Data_Array_Offset , Function , Node_Name , File_Type
CMD_AI_01 , DA_AI_01 , 0 , Rdbc , PLC 1 , N
CMD_AO_01 , DA_AO_01 , 0 , Rdbc , PLC 1 , N
CMD_DI_01 , DA_DI_01 , 0 , Rdbc , PLC 1 , B
CMD_DO_01 , DA_DO_01 , 0 , Rdbc , PLC 1 , B

, File_Number , Address , Length , Scan_Interval
, 10 , 0 , 16 , 1.0s
, 11 , 0 , 16 , 1.0s
, 12 , 0 , 16 , 1.0s
, 13 , 0 , 16 , 1.0s
```

⁵ Not all PLC's can support all File_Types. Refer to DFS for further information.

6 CONFIGURING THE FIELDSEVER AS A DF1 SERVER

For detailed information on FieldServer configuration, 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 DF1 Client.

The configuration file tells the FieldServer about its interfaces, and the routing of data required. In order to enable the FieldServer for DF1 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: In the following tables, * indicates an optional parameter with the **bold** legal value as the default.

6.1 Server Side Connection Parameters

| Section Title | | |
|---------------|--|-------------------------------------|
| Connections | | |
| Column Title | Function | Legal Values |
| Port | Specify which port the device is connected to the FieldServer. | P1-P2 ⁶ |
| Baud* | Specify baud rate. | 300 to 115200; 9600 |
| Parity* | Specify parity. | Even, Odd, None |
| Data_Bits* | Specify data bits. | 8 |
| Stop_Bits* | Specify stop bits. | 1, 2 |
| Protocol | Specify protocol used. | DF1_FD, DF1_HD_MASTER, DF1_HD_SLAVE |
| Checksum | Specify Checksum – refer to Appendix A.2 . | BCC , CRC-16 |

Example

```

// Server Side Connections

Connections
Port          , Protocol  , Baud   , Parity  , Data_Bits , Stop_Bits
P1            , DF1_FD   , 38400 , None   , 8         , 1
    
```

⁶ Not all ports shown are necessarily supported by the hardware. Consult the appropriate Instruction manual for details of the ports available on specific hardware.

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 | Node ID of physical Server node. | 1-255 |
| Protocol | Specify protocol used. | DF1_FD, DF1_HD_MASTER, DF1_HD_SLAVE |
| PLC_Type | Specify PLC Communications type. | PLC3, PLC5, SLC5 |

Example

```
// Server Side Nodes

Nodes
Node_Name      , Node_ID  , Protocol  , PLC_Type
DF1_Srv_11    , 11      , DF1_FD   , SLC5
```

6.3 Server Side Map Descriptor Parameters

6.3.1 FieldServer Specific Map Descriptor Parameters

| Section Title | | |
|---------------------|---|---|
| Map_Descriptors | | |
| 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. | Passive |

6.3.2 Driver Specific Map Descriptor Parameters

| Section Title | | |
|------------------------|----------------------------------|---|
| Map_Descriptors | | |
| Column Title | Function | Legal Values |
| Node_Name | Name of Node to fetch data from. | One of the node names specified in Section 6.2 |
| File_Type | File type in PLC. | N, F, B, I, O ⁷ |
| File_Number | File number in PLC. | 0-255 |
| Address | Starting address of read block. | 0 - 255 |
| Length | Length of read block. | 1 - 255 |
| Data_Array_Low_Scale* | Scaling zero in Data Array. | -32767 to 32767, 0 |
| Data_Array_High_Scale* | Scaling max in Data Array. | -32767 to 32767, 100 |
| Node_Low_Scale* | Scaling zero in Connected Node. | -32767 to 32767, 0 |
| Node_High_Scale* | Scaling max in Connected Node. | -32767 to 32767, 100 |

6.3.3 Map Descriptor Example

```
// Server Side Map Descriptors

Map_Descriptors
Map_Descriptor_Name , Data_Array_Name , Data_Array_Offset , Function , Node_Name , File_Type
SMD_AI_01           , DA_AI_01           , 0                , Passive , DF1_Srv_11 , N
SMD_AO_01           , DA_AO_01           , 0                , Passive , DF1_Srv_11 , N
SMD_DI_01           , DA_DI_01           , 0                , Passive , DF1_Srv_11 , B
SMD_DO_01           , DA_DO_01           , 0                , Passive , DF1_Srv_11 , B

, File_Number , Address , Length
, 10          , 0       , 200
, 11          , 0       , 200
, 12          , 0       , 200
, 13          , 0       , 200
```

⁷ Not all PLC's can support all File_Types. Refer to DFS for further information.

Appendix A. Troubleshooting

Appendix A.1 Continuous Map Descriptors

The Driver is not able to split data between 2 Data Arrays when writing, or to read a Server mapping that is discontinuous.

For example, on the Server Side:

Server map 1: N21: 0-31

Server map 2: N21: 32-100

This will panic the FieldServer and crash RS view as the DH+ will attempt to map N21: 0-100. If set up as Server Map 1: N21: 0-100, no problems are experienced.

Similarly, on the Client Side, it is not possible to read sections (e.g. 32bits to one array and then 16bits from the same file type to another array etc.). Read Blocks must be contiguous.

Appendix A.2 Checksum

It is possible to specify a checksum parameter for the serial connection.

Example

```
// Client Side Connections
Connections
Port          , Protocol  , Baud   , Parity  , Data_Bits , Stop_Bits , Checksum
P1            , DF1_FD   , 38400 , None   , 8         , 1         , CRC-16
```

Appendix A.3 Reading B File Types

It is advisable to read all data from one B type file into the same data array in one contiguous read if possible. Doing otherwise may result in problems when reading these points.

Appendix B. Reference

Appendix B.1 Command Support

The following commands are supported by the FieldServer for the various PLC types:

| PLC_Type | File_Type | FNC | Read | FNC | Write | Typical Command |
|----------|-----------|-----|------------------------------|-----|-------------------------------|-----------------|
| PLC3 | N | 1 | Range Read | 0 | Range Write | N7: 3, L5 |
| | F | 1 | Range Read | 0 | Range Write | F12: 3, L5 |
| | B | 1 | Range Read | 2 | Bit Write | B3/4: 5, L5 |
| PLC5 | N | 1 | Range Read | 0 | Range Write | N7: 3, L5 |
| | F | 1 | Range Read | 67 | Typed Write | F12: 3, L5 |
| | B | 1 | Range Read | 26 | Read Modify Write | B3/4: 5, L5 |
| SLC5 | N | A2 | Protected Typed Logical Read | AA | Protected Typed Logical Write | N7: 3, L5 |
| | F | A2 | Protected Typed Logical Read | AA | Protected Typed Logical Write | B3/4: 5, L7 |
| | B | A2 | Protected Typed Logical Read | AB | Protected Typed Logical Write | B3/4: 5, L8 |
| | I | A2 | Protected Typed Logical Read | - | - | I: 13, L5 |
| | O | A2 | Protected Typed Logical Read | - | - | O: 13, L5 |

Appendix B.2 Error Messages

DF1 Rem STS err F0-> Extended error code – Refer to following table.

| EXT STS Codes for CMD 0F | |
|--------------------------|---|
| Hex Code | Explanation |
| 0 | Not used |
| 1 | A field has an illegal value |
| 2 | Less levels specified in address than minimum for any address |
| 3 | More levels specified in address than system supports |
| 4 | Symbol not found |
| 5 | Symbol is of improper format |
| 6 | Address doesn't point to something usable |
| 7 | File is wrong size |
| 8 | Cannot complete request, situation has changed since the start of the command |
| 9 | Data or file is too large |
| A | Transaction size plus word address is too large |
| B | Access denied, improper privilege |
| C | Condition cannot be generated - resource is not available |
| D | Condition already exists - resource is already available |
| E | Command cannot be executed |
| F | Histogram overflow |
| 10 | No access |
| 11 | Illegal data type |
| 12 | Invalid parameter or invalid data |
| 13 | Address reference exists to deleted area |
| 14 | Command execution failure for unknown reason; possible PLC-3 histogram overflow |
| 15 | Data conversion error |
| 16 | Scanner not able to communicate with 1771 rack adapter |
| 17 | Type mismatch |
| 18 | 1771 module response was not valid |
| 19 | Duplicated label |
| 22 | Remote rack fault |
| 23 | Timeout |
| 24 | Unknown error |
| 1A | File is open; another node owns it |
| 1B | Another node is the program owner |
| 1C | Reserved |
| 1D | Reserved |
| 1E | Data table element protection violation |
| 1F | Temporary internal problem |

These codes are for passthru from a DH+ link to a remote I/O link.