



A Sierra Monitor Company

Driver Manual
(Supplement to the FieldServer Instruction Manual)

FS-8700-07 Bacnet Arcnet

APPLICABILITY & EFFECTIVITY

Effective for all systems manufactured after May 1, 2001

Instruction Manual Part Number FS -8700-07

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1. BACnet Description

The BACnet Arcnet driver allows the FieldServer to transfer data to and from devices using BACnet protocol over an Arcnet highway. The Arcnet card is included with the FieldServer. 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. Hardware/Software

Supplied by FieldServer Technologies

FieldServer Technologies PART #	DESCRIPTION
FS-8917-02	RJ45 to DB9F connector adapter
FS-25030	RG62 cable
FS-52189	Qty two T pieces
FS-52191	Qty two 93 ohm Terminating resistors

Provided by user

PART #	DESCRIPTION
	Building control unit (BCU) ¹
	BACnet client such as a workstation ²

¹ If FieldServer used as BACnet Client.

² If Fieldserver used as BACnet Server.

3. FieldServer as a BACnet Client

3.1 Hardware Connections

It is possible to connect a BACnet device to any of the eight RS232 ports or two RS485 ports. These ports just need to be configured for BACnet in the configuration file.

Configure the PLC according to manufacturer’s instructions

3.2 Configuration File Structure

Refer to section 4.1 of the Instruction Manual for a description of the operation principle of the FieldServer. The following tables describe parameters that need to be filled out in the configuration file. For convenience, a few example parameters already exist in the supplied PRIMSERV.CSV and SECDSERV.CSV files.

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

3.2.1 Data Arrays

Section Title		
Data_Arrays		
Column Title	Function	Legal Values
Data_Array_Name	Provide name for Data Array	Up to 15 alphanumeric characters
Data_Format	Provides data format	FLOAT, BIT, UINT16, UINT32, SINT16, SINT32Packed_Bit, Byte, Packed_Byte, Swapped_Byte
Data_Array_Length	Number of Data Objects	1-10,000

Example

```
// Data Arrays

Data_Arrays
Data_Array_Name, Data_Format, Data_Array_Length
DA_AI_01, Float, 200
DA_AO_01, Float, 200
DA_DI_01, Bit, 200
DA_DO_01, Bit, 200
```

3.2.2 Client Side Connections

Section Title		
Connections		
Column Title	Function	Legal Values
Adapter	Adapter name	Arcnet
Protocol	Specify Protocol Used	BACnet

Example

```
// Client Side Connections

Connections
Adapter, Protocol
Arcnet, Bacnet
```

3.2.3 Client Side Nodes

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 (the BCU)	1-65535
Protocol	Specify protocol used	BACnet
Adapter	Specify port Adapter used	Arcnet

Example

```
// Client Side Nodes

Nodes
Node_Name, Node_ID, Protocol, Adapter
BCU_1, 1, Bacnet, Arcnet
```

3.2.4 Client Side Map Descriptors

Section Title		
Map_Descriptor		
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 Client Map Descriptor	RDBC
Node_Name	Name of Node to fetch data from	One of the node names specified in "Client Node Descriptor" above
Data_Type	Data type in PLC	AI, AO, BI, BO
Object_ID	Address of read block	1, 2, 3,
Property	The BACnet property to be read	Present_Value
Data_Array_Low_Scale*	Scaling zero in Data Array	-32767 to 32767, default 0
Data_Array_High_Scale*	Scaling max in Data Array	-32767 to 32767, default 10000
Node_Low_Scale*	Scaling zero in Connected Node	-32767 to 32767, default 0
Node_High_Scale*	Scaling max in Connected Node	-32767 to 32767, default 100
Scan_Interval	Seconds per scan	0-32000 default 20

Example

```
// Client Side Map Descriptors

Map_Descriptors
Map_Descriptor_Name, Data_Array_Name, Data_Array_Offset, Function, Node_Name, Data_Type, Object_ID, Property, Scan_Interval
CMD_AI_01, DA_AI_01, 0, RDBC, BCU_1, AI, 1, Present_Value, 20.000s
CMD_AI_02, DA_AI_01, 1, RDBC, BCU_1, AI, 2, Present_Value, 20.000s
CMD_AI_03, DA_AI_01, 2, RDBC, BCU_1, AI, 3, Present_Value, 20.000s
CMD_AO_01, DA_AO_01, 0, RDBC, BCU_1, AO, 1, Present_Value, 30.000s
CMD_AO_02, DA_AO_01, 1, RDBC, BCU_1, AO, 2, Present_Value, 30.000s
CMD_AO_03, DA_AO_01, 2, RDBC, BCU_1, AO, 3, Present_Value, 30.000s

Map_Descriptors
Map_Descriptor_Name, Data_Array_Name, Data_Array_Offset, Function, Node_Name, Data_Type, Object_ID, Property, Scan_Interval
CMD_DI_01, DA_DI_01, 0, RDBC, BCU_1, DI, 1, Present_Value, 15.000s
CMD_DI_02, DA_DI_01, 1, RDBC, BCU_1, DI, 2, Present_Value, 15.000s
CMD_DI_03, DA_DI_01, 2, RDBC, BCU_1, DI, 3, Present_Value, 15.000s
CMD_DO_01, DA_DO_01, 0, RDBC, BCU_1, DO, 1, Present_Value, 30.000s
CMD_DO_02, DA_DO_01, 1, RDBC, BCU_1, DO, 2, Present_Value, 30.000s
CMD_DO_03, DA_DO_01, 2, RDBC, BCU_1, DO, 3, Present_Value, 30.000s
```

4. FieldServer as a BACnet Server

4.1 Hardware Connections

It is possible to connect a BACnet device to any of the eight RS232 ports or two RS485 ports. These ports just need to be configured for BACnet in the configuration file.

Configure the PLC according to manufacturer’s instructions

4.2 Configuration File Structure

Refer to section 4.1 of the Instruction Manual for a description of the operation principle of the FieldServer. The following tables describe parameters that need to be filled out in the configuration file. For convenience, a few example parameters already exist in the supplied PRIMSERV.CSV and SECDSERV.CSV files.

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

4.2.1 Data Arrays

Section Title		
Data_Arrays		
Column Title	Function	Legal Values
Data_Array_Name	Provide name for Data Array	Up to 15 alphanumeric characters
Data_Format	Provides data format	FLOAT, BIT, UINT16, UINT32, SINT16, SINT32
Data_Array_Length	Number of Data Objects	1-10,000

Example

```
// Data Arrays

Data_Arrays
Data_Array_Name,      Data_Format,  Data_Array_Length
DA_AI_01,             Float,        200
DA_AO_01,             Float,        200
DA_DI_01,             Bit,          200
DA_DO_01,             Bit,          200
```

4.2.2 Server Side Connections

Section Title		
Connections		
Column Title	Function	Legal Values
Adapter	Adapter name	Arcnet
Protocol	Specify Protocol used	BACnet

Example

```
// Server Side Connections

Connections
Adapter, Protocol
Arcnet, Bacnet
```

4.2.3 Server Side Nodes

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	(Note 1)
Protocol	Specify protocol used	BACnet

Note 1: This Node_ID needs to match the DIP settings on the Arcnet adapter board installed in the FieldServer. Factory DIP switch settings are for station 11, but can be changed as indicated in the Driver Reference section.

Example

```
// Server Side Nodes

Nodes
Node_Name, Node_ID, Protocol
Virtual_BCU_11, 11, Bacnet
```


4.2.4 Server Side Map Descriptors

Section Title		
Map_Descriptors		
Column Title	Function	Legal Values
Map_Descriptor_Name	Name of this Map Descriptor	Note that this name will appear in the Trane Tracer Summit Workstation System
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 Client Map Descriptor	Server
Node_Name	Name of Node to fetch data from	One of the node names specified in "Client Node Descriptor" above
Data_Type	Data type in PLC	AI, AO, BI, BO
Object_ID	Address of the object	1, 2, 3, ...
Property	The object property to read	Present value
Units	The object units	(Note 2)
Data_Array_Low_Scale*	Scaling zero in Data Array	-32767 to 32767, default 0
Data_Array_High_Scale*	Scaling max in Data Array	-32767 to 32767, default 10000
Node_Low_Scale*	Scaling zero in Connected Node	-32767 to 32767, default 0
Node_High_Scale*	Scaling max in Connected Node	-32767 to 32767, default 100

Example

```
// Server Side Map Descriptors

Map_Descriptors
Map_Descriptor_Name,Data_Array_Name,Data_Array_Offset,Function,Node_Name,Data_Type,Object_ID,Property,Units,Data_Array_Low_Scale,Data_Array_High_Scale,Node_Low_Scale,Node_High_Scale
SMD_AI_01, DA_AI_01, 0, Server, Virtual_BCU_11, AI, 1, Present_Value, Deg_F, 0, 10000, 0, 100
SMD_AI_02, DA_AI_01, 1, Server, Virtual_BCU_11, AI, 2, Present_Value, Deg_F, 0, 10000, 0, 100
SMD_AI_03, DA_AI_01, 2, Server, Virtual_BCU_11, AI, 3, Present_Value, Deg_F, 0, 10000, 0, 100
SMD_AO_01, DA_AO_01, 0, Server, Virtual_BCU_11, AO, 1, Present_Value, %RH, 0, 10000, 0, 100
SMD_AO_02, DA_AO_01, 1, Server, Virtual_BCU_11, AO, 2, Present_Value, %RH, 0, 10000, 0, 100
SMD_AO_03, DA_AO_01, 2, Server, Virtual_BCU_11, AO, 3, Present_Value, %RH, 0, 10000, 0, 100

Map_Descriptors
Map_Descriptor_Name,Data_Array_Name,Data_Array_Offset,Function,Node_Name,Data_Type,Object_ID,Property
SMD_DI_01, DA_DI_01, 0, Server, Virtual_BCU_11, DI, 1, Present_Value
SMD_DI_02, DA_DI_01, 1, Server, Virtual_BCU_11, DI, 2, Present_Value
SMD_DI_03, DA_DI_01, 2, Server, Virtual_BCU_11, DI, 3, Present_Value
SMD_DO_01, DA_DO_01, 0, Server, Virtual_BCU_11, DO, 1, Present_Value
SMD_DO_02, DA_DO_01, 1, Server, Virtual_BCU_11, DO, 2, Present_Value
SMD_DO_03, DA_DO_01, 2, Server, Virtual_BCU_11, DO, 3, Present_Value
```

Note 2: Units

Degrees-Fahrenheit	bars
%RH	pounds-force-per-sq-inch
square-meters	centimeters-of-water
square-feet	inches-of-water
milliamperes	millimeters-of-mercury
milliamps	centimeters-of-mercury
amperes	inches-of-mercury
amps	Degrees-Celsius
ohms	Deg-C
kilohms	Degrees-Kelvin
megohms	Deg-K
Volts	Deg-F
Millivolts	Degrees-days-Celsius
kilovolts	Degrees-days-Fahrenheit
megavolts	years
volt-amperes	months
volt-amps	weeks
kilovolt-amperes	days
kilovolt-amps	hours
megavolt-amperes	minutes
megavolt-amps	seconds
volt-amperes-reactive	meters-per-second
kilovolt-amperes-reactive	kilometers-per-hour
megavolt-amperes-reactive	feet-per-second
degrees-phase	feet-per-minute
power-factor	miles-per-hour
joules	cubic-feet
kilojoules	cubic-meters
kilojoules-per-kilogram	imperial-gallons
megajoules	liters
watt-hours	us-gallons
kilowatt-hours	cubic-feet-per-minute
btus	cubic-meters-per-seconds
therms	cubic-meters-per-hour
ton-hours	imperial-gallons-per-min
joules-per-kilogram-dry-air	liters-per-second
joules-per-kilogram-dry-air	liters-per-minute
joules-per-degree-kelvin	liters-per-hour
btus-per-pound-dry-air	us-gallons-per-minute
cycles-per-second	PercentRH
cycles-per-minute	No Units
hertz	ohms
kilohertz	joules-per-kilogram-dry-air
megahertz	per-hour
per-hour	meters
% RH	kilograms-per-second
PercentRH	kilograms-per-minute
Percent RH	kilograms-per-hour
%RH	pounds-mass-per-minute

<p>millimeters meters inches feet watts-per-square-foot watts-per-square-meter lumens luxes foot-candles kilograms kg pounds_mass tons milliwatts watts kilowatts megawatts btus-per-hour horsepower hp tons-refrigeration Pascals hectopascals Kilopascals KPa millibars</p>	<p>pounds-mass-per-hour foot-candles grams-of-water-per-kilogram-dry-air weeks days degrees-angular degrees-Celsius-per-hour degrees-Celsius-per-minute degrees-Fahrenheit-per-hour degrees-Fahrenheit-per-minute kilowatt-hours-per-square-meter kilowatt-hours-per-square-foot megajoules-per-square-meter megajoules-per-square-foot no-units parts-per-million parts-per-billion percent percent-per-second per-minute per-second psi-per-degree-Fahrenheit radians revolutions-per-minute watts-per-square-meter-degree-kelvin</p>
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4.3 Driver Reference Section

4.3.1 Arcnet Adapter Card

4.3.2 Indicator Lights

There is a dual LED located at the PCX backplate. The yellow LED indicates that the PCX is being accessed via its I/O address. The green LED indicates that the PCX is receiving ARCNET traffic on the network.

4.3.3 Node ID Switch

An 8-bit DIP switch is used to set the ARCNET node address. Any value except zero is a valid ARCNET node address. The node ID switch SW1 is read right to left (when viewing the board installed in the FieldServer) with the MSB to the far right (position 1) and the LSB to the far left (position 8). A logic “1” occurs when the switch is moved away from the board (switch is opened). The figure below shows the node ID switch. In this example, the switch is set to the hexadecimal address 11 on the FieldServer (the factory default).



4.3.4 Arcnet cable

The cable to be used with the with the Arcnet card is a RG-62/u cable with BNC connectors. Cable length can be from 6 ft (2 m) between any two nodes or up to 1000ft (305 m) overall. Maximum nodes per segment are 8. It has a 5.5 dB/1000ft max.

4.3.5 Debugging a BACnet connection: Hints and tips

- Disconnect the FieldServer from the BACnet network when transferring BCU images to the BCU.
- Should duplicate object instances be accidentally configured in the FieldServer, then the second call of the instance will overwrite the first one. This may be the cause of a problem where a BACnet Object is being “lost.”
- If “Virtual_BCU_...” is not being indicated as the device description for the FieldServer on the BACnet SCADA system, then the FieldServer is not communicating to the SCADA system. If the present value’s name is being indicated, but the present value shows question marks, then it is most likely that the client side of the FieldServer is not communicating.
- If new points are added to the FieldServer it is important to restart Summit Workstation or BCU, otherwise these new points might not be seen by the FieldServer.
- Poll only the Modbus addresses that exist in the device when communicating with Liebert systems. Polling addresses that are not configured in these systems will cause the connection to fail. The newer versions of Lieberts do not suffer from this problem. Please contact your Lieberts supplier for more information.