

PROFIBUS

USER'S MANUAL

FUSION SCR POWER CONTROLLERS



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WARNING: The Control Concepts, Inc. power controllers use power thyristors to switch voltage to the connected load. Line voltage must be assumed at the output terminals at all times, even when the control signal has been removed and the load voltage appears to be off. It has been mandated by the National Electrical Code and the Occupational Safety and Health Act of 1970 that a physical disconnect be opened ahead of all remotely actuated controls before performing any maintenance work on the controller or its connected load.

PROPRIETARY DATA

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1. OVERVIEW

In general, FUSION parameters are all 16 bit integer values. However, there are some parameters such as Load Power Zone 1 which use two registers for the value (32 bit value.) These long word situations are clearly documented with HI and LO word parameters.

Some values may have digits to the right of the decimal point. The decimal point, or resolution, will not be part of the message. A parameter with one decimal place will be scaled x10, two decimal places scaled x100.

Example: 5.00 must be scaled and sent as 500. When reading, it will also need to be scaled using a x100 “scale factor.”

The Digital Setpoints and Digital System Command are the only parameters that can be set via the PLC at this time. Maximum supported sampling rate is 10 Hz.



FUSION controllers contain nonvolatile EEPROMs, and writing too frequently to an individual parameter may wear out the EEPROM and cause the controller to fail.

Control Concepts recommends allowing an average of five minutes between consecutive writes to an individual parameter within the range of 1-199, with the exception of digital setpoint commands 100-107 and the digital system command 129. Digital setpoints and digital system command may be written continually.

2. FUSION PROFIBUS WIRING

Pin Assignment of the Bus Connector

9-Pin D-Sub, Female Connector

PIN	Description
1	Shield
3	Rx/TX+ (B)
5	DGND
6	+5vdc
8	Rx/Tx- (A)

2.1 LED Indicators

Activity (yellow)

- OFF = No activity, no communications
- Flash every 1/2 second = No PROFIBUS activity, but the ASIC is communicating with the microprocessor
- Flashing = PROFIBUS communication is active

Bus Error (red)

- OFF = No bus error, OK
- ON = Bus Error

3. CONNECTION SETTINGS

Use the Control Panel software and USB connection to setup the PROFIBUS settings for the power controller. After connecting the power controller to Control Panel, select the device and open the “Communication” category as shown in Figure 3.00.

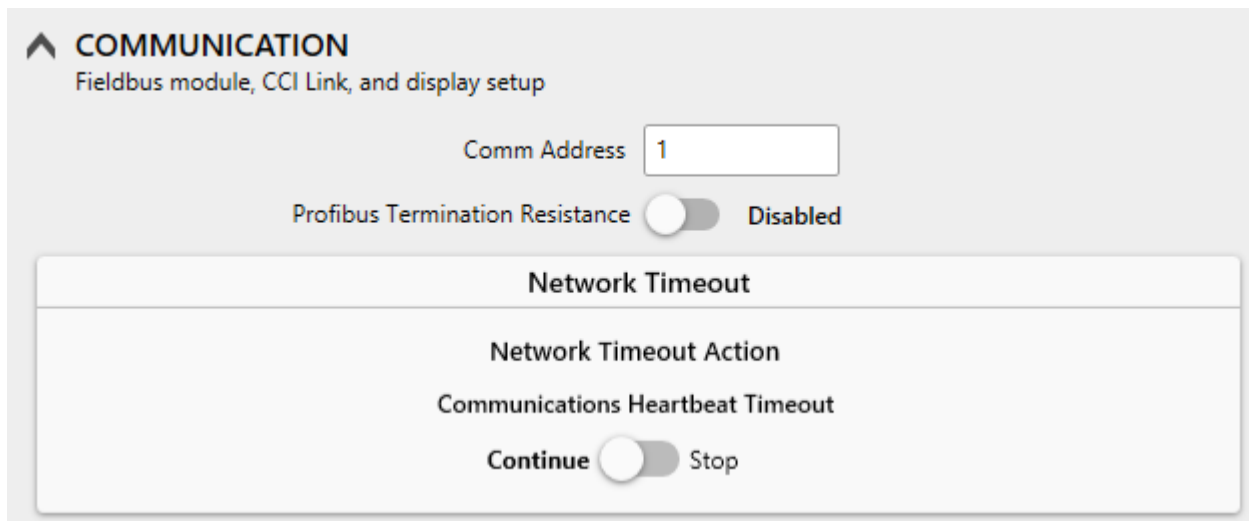


Figure 3.00: Use Control Panel to adjust the PROFIBUS Settings for the power controller

3.1 PROFIBUS Settings

- Connect a USB cable to the FUSION controller and open the Control Panel software.
- Click the “Connect” button to establish communications with the FUSION controller.
- Select the “Digital Comm” tab. Set the **Comm Address** (SP-120) to the desired PROFIBUS station address.
- Set the **PROFIBUS Termination Resistance Enable** (SP-3411) value appropriately. Enable the termination resistors only if the FUSION controller is the last node physically located at the end of the network trunk line and the cable doesn’t have built-in termination resistors.

SP-120 Comm Address sets the PROFIBUS network Station Address for the FUSION controller

Units: N/A
Minimum: 1
Maximum: 125
Default: 1



It is not recommended that the PROFIBUS master set the slave’s station address, but it is recommended that SP-120 above be used to set the slave’s address.

XP-3411 Profibus Termination resistor enable is used to enable and disable termination resistors

Units: N/A
 Minimum: 0
 Maximum: 1
 Default: 0
 Selections:
 0 = Disabled
 1 = Enabled

Monitor Parameters

MP-323 Network Status

Units: N/A
 Minimum: 0000_0000 = 0
 Maximum: 1111_1111 = 255
 Representation:
 Bit
 MSB 7 = CRC Error
 6 = PROFIBUS Timeout or Bus Error
 5 = Data Exchange state
 4 = Wait for parameterization state
 3 = Parity Error
 2 = Framing Error
 1 = Overrun Error
 LSB 0 = Valid Address received with message error

3.2 Network Timeout

Network Timeout Action [SP 128]

The network timeout action specifies the behavior that should occur when the device loses communication with the PLC. If “Communications Heartbeat Time” is set to “Stop”, the device will enter an inhibit state and stop outputting during a timeout event. If “Comm. Heartbeat Time” is set to “Continue”, the device will continue operating normally, and a warning alarm will activate.

An additional option is to have the controller notify an external signaling device, such as a light tower or alarm system, when a network timeout occurs. To do so, locate Relay 1 and Relay 2 alarms in the “Alarm Relays” category in Control Panel. Check “Communications Error” in the “System Relay Mask” section to receive notifications in the event of a digital communication failure.

Clear timeout and restore communications

To restore communication when a network timeout occurs and the controller enters the warning or inhibit state (based on the Network Timeout Action setting), address the problem and confirm communication between the PLC and the controller. After communication has been reestablished, cycle run/reset on P1 to clear the fault. These two steps must occur in sequence.)

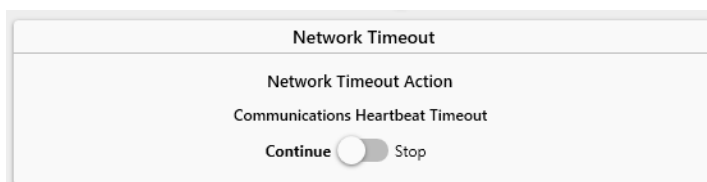


Figure 3.01: Select “Stop” for the “Communications Heartbeat Timeout” to have the device stop outputting when a network timeout occurs.

4. PARAMETER LISTS

Structure of the Data Unit

4.1 Output Data - Sent to the FUSION

9 Words (18 bytes) Refer to the parameter list on the following page for more details.

Word	Description
0	Digital Setpoint 1 Zone 1 (SP-100)
1	Digital Setpoint 2 Zone 1 (SP-101)
2	Digital Setpoint 1 Zone 2 (SP-102)
3	Digital Setpoint 2 Zone 2 (SP-103)
4	Digital Setpoint 1 Zone 3 (SP-104)
5	Digital Setpoint 2 Zone 3 (SP-105)
6	Digital Setpoint 1 Zone 4 (SP-106)
7	Digital Setpoint 2 Zone 4 (SP-107)
8	Digital System Command (SP-129)

4.2 Input Data - Received from the FUSION

82 Words (164 bytes)

Word 0 (First 2 bytes) “Modbus Status”

Status of the communications between the PROFIBUS ASIC and the FUSION microprocessor.

Byte 0 = Message exception code

The exception code corresponding to the last message transaction.

Exception Code	
Code	Description
0	OK
1	Invalid Function (not supported)
2	Invalid Parameter number
3	Invalid Data value (out of range)
4	Slave device failure (out of range)
5	Acknowledge (processing the request)
6	Slave device busy (try again later)
7	Negative Acknowledge (can't process the request)

Byte 1 = Communication Status code

State of communications between the PROFIBUS ASIC and the FUSION microprocessor.

0 = OK, communicating

2 = Timeout, loss of communications (Note: response data will be all 0's)

Word 1	Digital Setpoint 1 Zone 1 (SP-100)	Word 9	SP-129 Digital System Command
Units:	% of Full Scale	Units:	N/A
Minimum:	0.00	Minimum:	0000 _h = 0
Maximum:	100.00	Maximum:	FFFF _h = 65535
Default:	0.00	Default:	0000 _h = 0
Word 2	Digital Setpoint 2 Zone 1 (SP-101)	<u>Bit Definitions:</u>	
Units:	% of Full Scale	BIT 15 = Analog Select Zone 4	
Minimum:	0.00	BIT 14 = Analog Select Zone 3	
Maximum:	100.00	BIT 13 = Analog Select Zone 2	
Default:	0.00	BIT 12 = Analog Select Zone 1	
Word 3	Digital Setpoint 1 Zone 2 (SP-102)	BIT 11 = Relay2 (0 = OFF, 1 = ON)	
Units:	% of Full Scale	BIT 10 = Relay1 (0 = OFF, 1 = ON)	
Minimum:	0.00	BIT 9 = RESERVED (should be set = 0)	
Maximum:	100.00	BIT 8 = RESERVED (should be set = 0)	
Default:	0.00	BIT 7 = Setpoint 2 Select Zone 4	
Word 4	Digital Setpoint 2 Zone 2 (SP-103)	BIT 6 = Setpoint 2 Select Zone 3	
Units:	% of Full Scale	BIT 5 = Setpoint 2 Select Zone 2	
Minimum:	0.00	BIT 4 = Setpoint 2 Select Zone 1	
Maximum:	100.00	BIT 3 = RUN Request Zone 4	
Default:	0.00	(0 = Stop/1 = RUN)	
Word 5	Digital Setpoint 1 Zone 3 (SP-104)	BIT 2 = RUN Request Zone 3	
Units:	% of Full Scale	(0 = Stop/1 = RUN)	
Minimum:	0.00	BIT 1 = RUN Request Zone 2	
Maximum:	100.00	(0 = Stop/1 = RUN)	
Default:	0.00	BIT 0 = RUN Request Zone 1	
Word 6	Digital Setpoint 2 Zone 3 (SP-105)	(0 = Stop/1 = RUN)	
Units:	% of Full Scale	Word 10	Line Frequency
Minimum:	0.00	Units:	Hz
Maximum:	100.00	Minimum:	0.0
Default:	0.00	Maximum:	99.9
Word 7	Digital Setpoint 1 Zone 4 (SP-106)	Word 11	Line Voltage A
Units:	% of Full Scale	Units:	RMS Volts
Minimum:	0.00	Minimum:	0.0
Maximum:	100.00	Maximum:	999.9
Default:	0.00	Word 12	Load Voltage A
Word 8	Digital Setpoint 2 Zone 4 (SP-107)	Units:	Volts RMS or Average
Units:	% of Full Scale	Minimum:	0.0
Minimum:	0.00	Maximum:	999.9
Maximum:	100.00	Word 13	Load Current A
Default:	0.00	Units:	Amps RMS or Average
		Minimum:	0.0
		Maximum:	9999.9

Word 14 Load Resistance A (Not Active)
Units: Ohm
Minimum: 0.0
Maximum: 9999.9

Word 15 Heatsink temp A (Not Active for Compact FUSION)
Units: Degrees C
Minimum: 0.0
Maximum: 999.9

Word 16 Line Voltage B
Units: RMS Volts
Minimum: 0.0
Maximum: 999.9

Word 17 Load Voltage B
Units: Volts RMS or Average
Minimum: 0.0
Maximum: 999.9

Word 18 Load Current B
Units: Amps RMS or Average
Minimum: 0.0
Maximum: 9999.9

Word 19 Load Resistance B (Not Active)
Units: Ohm
Minimum: 0.0
Maximum: 9999.9

Word 20 Heatsink temp B
Units: Degrees C
Minimum: 0.0
Maximum: 999.9

Word 21 Line Voltage C
Units: RMS Volts
Minimum: 0.0
Maximum: 999.9

Word 22 Load Voltage C
Units: Volts RMS or Average
Minimum: 0.0
Maximum: 999.9

Word 23 Load Current C
Units: Amps RMS or Average
Minimum: 0.0
Maximum: 9999.9

Word 24 Load Resistance C (Not Active)
Units: Ohm
Minimum: 0.0
Maximum: 9999.9

Word 25 Heatsink temp C (Not Active for Compact FUSION)
Units: Degrees C
Minimum: 0.0
Maximum: 999.9

Word 26 Line Voltage D
Units: RMS Volts
Minimum: 0.0
Maximum: 999.9

Word 27 Load Voltage D
Units: Volts RMS or Average
Minimum: 0.0
Maximum: 999.9

Word 28 Load Current D
Units: Amps RMS or Average
Minimum: 0.0
Maximum: 9999.9

Word 29 Load Resistance D (Not Active)
Units: Ohm
Minimum: 0.0
Maximum: 9999.9

Word 30 Heatsink temp D
Units: Degrees C
Minimum: 0.0
Maximum: 999.9

Word 31 Load Power Zone 1 HI (MSW)
Units: Watts or VA
Minimum: -99
Maximum: 99

Word 32 Load Power Zone 1 LO (LSW)

Units: Watts or VA
Minimum: 0
Maximum: 65535

Word 33 Power Factor Zone 1

Units: N/A
Minimum: 0.00
Maximum: 9.99

Word 34 Controller State Zone 1

Units: N/A
Minimum: 0
Maximum: 2
Representation:
0 = STOP
1 = RUN
2 = FAULT

Word 35 Output% Zone 1

Units: % ON
Minimum: 0.0
Maximum: 999.9

Word 36 Setpoint Reference Zone 1 HI (MSW)

Units: V, A, W
Minimum: -99
Maximum: 99

Word 37 Setpoint Reference Zone 1 LO (LSW)

Units: V, A, W
Minimum: 0
Maximum: 65535

Word 38 Feedback Zone 1 HI (MSW)

Units: V, A, W
Minimum: -99
Maximum: 99

Word 39 Feedback Zone 1 LO (LSW)

Units: V, A, W
Minimum: 0
Maximum: 65535

Word 40 Control Loop Error Zone 1 HI (MSW)

Units: V, A, W
Minimum: -99
Maximum: 99

Word 41 Control Loop Error Zone 1 LO (LSW)

Units: V, A, W
Minimum: 0
Maximum: 65535

Word 42 Warning Alarm Zone 1

Units: N/A
Minimum: 00000000 = 0
Maximum: 11111111 = 255
Representation:

Bit
MSB 7 = not used
6 = not used
5 = Load Imbalance (Not Active)
4 = Shorted SCR
3 = Heatsink Temp
2 = Power Limit
1 = Current Limit
LSB 0 = Voltage Limit

Word 43 Load Power Zone 2 HI (MSW)

Units: Watts or VA
Minimum: -99
Maximum: 99

Word 44 Load Power Zone 2 LO (LSW)

Units: Watts or VA
Minimum: 0
Maximum: 65535

Word 45 Power Factor Zone 2

Units: N/A
Minimum: 0.00
Maximum: 9.99

Word 46 Controller State Zone 2

Units: N/A

Minimum: 0

Maximum: 2

Representation:

0	=	STOP
1	=	RUN
2	=	FAULT

Word 47 Output% Zone 2

Units: % ON

Minimum: 0.0

Maximum: 999.9

Word 48 Setpoint Reference Zone 2 HI (MSW)

Units: V, A, W

Minimum: -99

Maximum: 99

Word 49 Setpoint Reference Zone 2 LO (LSW)

Units: V, A, W

Minimum: 0

Maximum: 65535

Word 50 Feedback Zone 2 HI (MSW)

Units: V, A, W

Minimum: -99

Maximum: 99

Word 51 Feedback Zone 2 LO (LSW)

Units: V, A, W

Minimum: 0

Maximum: 65535

Word 52 Control Loop Error Zone 2 HI (MSW)

Units: V, A, W

Minimum: -99

Maximum: 99

Word 53 Control Loop Error Zone 2 LO (LSW)

Units: V, A, W

Minimum: 0

Maximum: 65535

Word 54 Warning Alarm Zone 2

Units: N/A

Minimum: 00000000 = 0

Maximum: 11111111 = 255

Representation:

Bit		
MSB	7	= not used
	6	= not used
	5	= Load Imbalance (Not Active)
	4	= Shorted SCR
	3	= Heatsink Temp
	2	= Power Limit
	1	= Current Limit
LSB	0	= Voltage Limit

Word 55 Load Power Zone 3 HI (MSW)

Units: Watts or VA

Minimum: -99

Maximum: 99

Word 56 Load Power Zone 3 LO (LSW)

Units: Watts or VA

Minimum: 0

Maximum: 65535

Word 57 Power Factor Zone 3

Units: N/A

Minimum: 0.00

Maximum: 9.99

Word 58 Controller State Zone 3

Units: N/A

Minimum: 0

Maximum: 2

Representation:

0	=	STOP
1	=	RUN
2	=	FAULT

Word 59 Output% Zone 3

Units: % ON

Minimum: 0.0

Maximum: 999.9

Word 60 Setpoint Reference Zone 3 HI (MSW)
 Units: V, A, W
 Minimum: -99
 Maximum: 99

Word 61 Setpoint Reference Zone 3 LO (LSW)
 Units: V, A, W
 Minimum: 0
 Maximum: 65535

Word 62 Feedback Zone 3 HI (MSW)
 Units: V, A, W
 Minimum: -99
 Maximum: 99

Word 63 Feedback Zone 3 LO (LSW)
 Units: V, A, W
 Minimum: 0
 Maximum: 65535

Word 64 Control Loop Error Zone 3 HI (MSW)
 Units: V, A, W
 Minimum: -99
 Maximum: 99

Word 65 Control Loop Error Zone 3 LO (LSW)
 Units: V, A, W
 Minimum: 0
 Maximum: 65535

Word 66 Warning Alarm Zone 3
 Units: N/A
 Minimum: 00000000 = 0
 Maximum: 11111111 = 255
 Representation:

Bit		
MSB	7	= not used
	6	= not used
	5	= Load Imbalance
	4	= Shorted SCR
	3	= Heatsink Temp
	2	= Power Limit
	1	= Current Limit
LSB	0	= Voltage Limit

Word 67 Load Power Zone 4 HI (MSW)
 Units: Watts or VA
 Minimum: -99
 Maximum: 99

Word 68 Load Power Zone 4 LO (LSW)
 Units: Watts or VA
 Minimum: 0
 Maximum: 65535

Word 69 Power Factor Zone 4
 Units: N/A
 Minimum: 0.00
 Maximum: 9.99

Word 70 Controller State Zone 4
 Units: N/A
 Minimum: 0
 Maximum: 2
 Representation:

0	=	STOP
1	=	RUN
2	=	FAULT

Word 71 Output% Zone 4
 Units: % ON
 Minimum: 0.0
 Maximum: 999.9

Word 72 Setpoint Reference Zone 4 HI (MSW)
 Units: V, A, W
 Minimum: -99
 Maximum: 99

Word 73 Setpoint Reference Zone 4 LO (LSW)
 Units: V, A, W
 Minimum: 0
 Maximum: 65535

Word 74 Feedback Zone 4 HI (MSW)
 Units: V, A, W
 Minimum: -99
 Maximum: 99

Word 75 Feedback Zone 4 LO (LSW)

Units: V, A, W

Minimum: 0

Maximum: 65535

Word 76 Control Loop Error Zone 4 HI (MSW)

Units: V, A, W

Minimum: -99

Maximum: 99

Word 77 Control Loop Error Zone 4 LO (LSW)

Units: V, A, W

Minimum: 0

Maximum: 65535

Word 78 Warning Alarm Zone 4

Units: N/A

Minimum: 00000000 = 0

Maximum: 11111111 = 255

Representation:

Bit	
MSB	7
	= not used
	6 = not used
	5 = Load Imbalance (Not Active)
	4 = Shorted SCR
	3 = Heatsink Temp
	2 = Power Limit
	1 = Current Limit
LSB	0 = Voltage Limit

Word 79 Model - Config Data

Units: CODED

Minimum: 0000

Maximum: FFFF

Default: 0000

Word 80 Inhibit Alarm Status

Units: N/A

Minimum: 00000000 = 0

Maximum: 11111111 = 255

Representation:

Bit	
MSB	7
	= Watchdog Timeout
	6 = Memory Error
	5 = not used
	4 = not used
	3 = Line Phase Loss
	2 = PLL Lock Loss
	1 = Heatsink Over-Temp
LSB	0 = Current Trip

Word 81 (MP-344) Zone Status

Units: N/A

Minimum: 000000000000 = 0

Maximum: 111111110000 = 4080

Bit	
MSB	15
	= not used
	14 = not used
	13 = not used
	12 = not used
	11 = Fuse D (0 = Fuse OK, 1 = Fuse Open)
	10 = Fuse C (0 = Fuse OK, 1 = Fuse Open)
	9 = Fuse B (0 = Fuse OK, 1 = Fuse Open)
	8 = Fuse A (0 = Fuse OK, 1 = Fuse Open)
	7 = Zone 4: (0 = Not at Setpoint, 1 = at Setpoint)
	6 = Zone 3: (0 = Not at Setpoint, 1 = at Setpoint)
	5 = Zone 2: (0 = Not at Setpoint, 1 = at Setpoint)
	4 = Zone 1: (0 = Not at Setpoint, 1 = at Setpoint)
	3 = Zone 4: (0 = Normal, 1 = FAULT)
	2 = Zone 3: (0 = Normal, 1 = FAULT)
	1 = Zone 2: (0 = Normal, 1 = FAULT)
LSB	0 = Zone 1: (0 = Normal, 1 = FAULT)

5. ADDING FUSION TO A NETWORK

FUSION supports PROFIBUS DP-V0 cyclic data exchange with a class 1 master. It does not support PROBIUS DP-V1 or DP-V2.

Install the GSD file (CCI_3218.GSD) and insert the “Connect/Fusion” device into the network

Select module 1 with the descriptor: “(Fusion) 82 Word In, 9 Word Out”

