CC-Link Adapter User Manual

FnIO S-Series

NA-9131

List of Revisions

No.	Date	Version	Revision
1	2007.12.15	1.00	created

Contents

1. Product Specifications

1) General Specifications

Item		Specifications	Remarks
Temperature	Operating	0℃ to +60℃ (32°F to 140°F) -20℃ to +60℃ (-4°F to 140°F)	Analog I/O Discrete I/O
	Storage	-40℃ to +85℃ (-40°F to 185°F)	
Humidity	Operating	5 to 90% RH (Non-condensing)	
	Storage	5 to 90% RH (Non-condensing)	
Vibration immunity		10 TO 55Hz,double amplitude of 0.75mm, 10minutes on each of 3 axes (X,Y,Z)	
Shock Immunity		Peak acceleration and duration 15g/11ms, 3 times on each of 3 axes (X,Y,Z)	
Capsuling		Din rail or screw tightening	

2) CC-Link Communication Specification

Item	Specification	Remarks
Protocol Version	Version 1	
Station Type	Remote Device Station	
Number of Nodes	42 Node/Max	Rotary switch
Communication speed	156, 625, 2500, 5000, 10000 kbps	
I/O Data Size	System area : 16point RX/RY : 112point (4station occupied) RWr/RWw : 16channel (4station occupied)	
Number of Expansion I/O	Max. 32 Slots	
Isolation	System power : Non-isolation System to Logic : Isolation	
System Power	Supply voltage : 24Vdc nominal Voltage range : 11 to 28.8 Vdc	

2. CC-Link Setting

CC-Link setting include the following configurations:

- **Node Address setting**
- **Baudrate select switch setting**
- **Process image**
- **Power setting**
- **CC-Link Ver.1**

1) Node Address Setting

- NA-9131 Node address is determined by the node address rotary switch on the front panel of adapter module.
- Set node address is recognized on the power-on of adapter module.

Ex) When node address is set as 27:
Device MAC ID Setting :(2*10 + 1*7)= 27

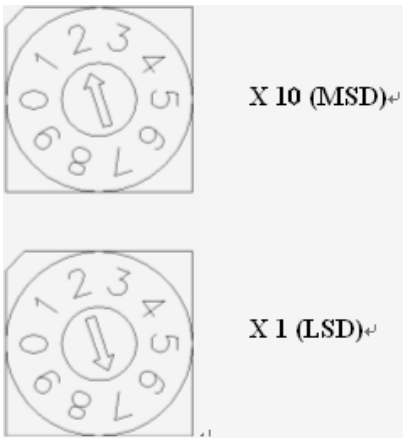


Figure 2.1 Rotary switch

* Every CC-Link Adaptor has MAC ID from 0 to 63

2) Baudrate Select Switch Setting

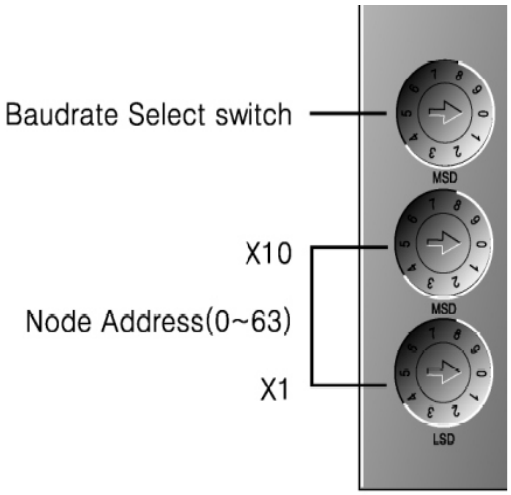


Figure 2.2 Baudrate select switch

Baudrate	Fixed Addressing	Auto Addressing
156Kbps	0	5
625Kbps	1	6
2.5Mbps	2	7
5Mbps	3	8
10Mbps	4	9

- Fixed Addressing : station 4 occupied
- Auto Addressing : auto setting from station 1 to station4 depending on expansion I/O Size

3) Process Image

◆ **Remote input area**

Address	Setting	Size	Signal name
RXm0~RXmF	station 1	2Byte	Discrete input
RX(m+1)0~RX(m+1)F	station 2	6Byte	
RX(m+2)0~RX(m+2)F	station 2		
RX(m+3)0~RX(m+3)F	station 3	10Byte	
RX(m+4)0~RX(m+4)F	station 3		
RX(m+5)0~RX(m+5)F	station 4	14Byte	
RX(m+6)0~RX(m+6)F	station 4		
RX(m+n)0~RX(m+n)F	n=1,3,5,7 (station1,2,3,4)	2Byte	System Area

m : Register number that was introduled by head station number
n : Final register number for occupied number
station 1 : 16Point(n=1)
station 2 : 48Point(n=3)
station 3 : 80Point(n=5)
station 4 : 112Point(n=7)

◆ **Remote output area**

Address	Setting	Size	Signal name
RYm0~RYmF	Station 1	2Byte	Discrete input
RY(m+1)0~RY(m+1)F	Station 2	6Byte	
RY(m+2)0~RY(m+2)F	Station 2		
RY(m+3)0~RY(m+3)F	Station 3	10Byte	
RY(m+4)0~RY(m+4)F	Station 3		
RY(m+5)0~RY(m+5)F	Station 4	14Byte	
RY(m+6)0~RY(m+6)F	Station 4		
RY(m+n)0~RY(m+n)F	n=1,3,5,7 (Station1,2,3,4)	2Byte	System Area

◆ **RWr/RWw Area**

Address	Setting	Size	Signal name	Address	setting	Size	Signal name
RWrm0	Station 1	4Word	Analog Input	RWwm0	Station 1	4Word	Analog Output
…				…			
RWrm3				RWwm3			
RWrm4	Station 2	8Word		RWrm4	Station 2	8Word	
…				…			
RWrm7				RWwm7			
RWrm8	Station 3	12Word		RWwm8	Station 3	12Word	
…				…			
RWrm11				RWwm11			
RWrm12	Station 4	16Word		RWwm12	Station 4	16Word	
…				…			
RWrm15				RWwm15			

4) Power Setting

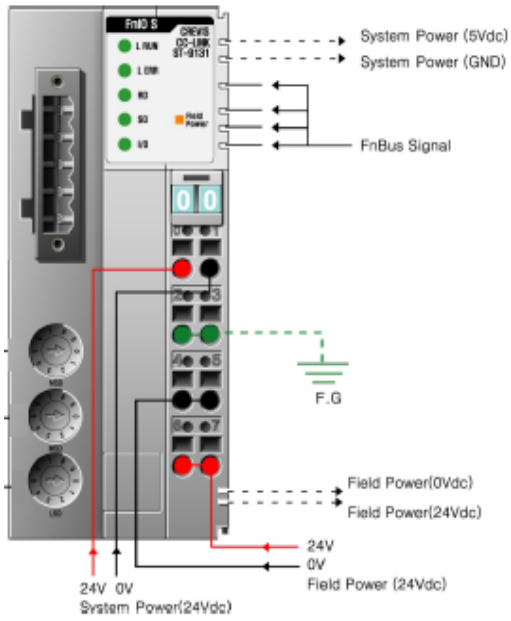


Figure 2.3 Power setting

	System, Field Power
Supply Voltage	24Vdc nominal
Voltage Range	11~28.8Vdc

5) CC-Link Ver.1 Specification

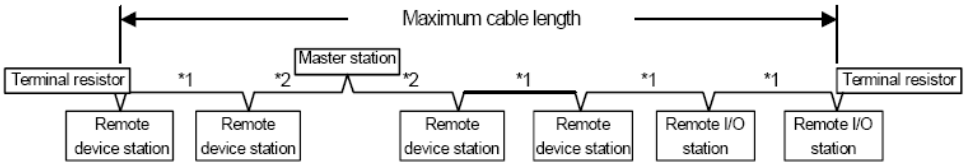
Items		Specification
Max.No of Link Point		Remote In/Output (RX,RY) : 2048 points /each Remote Resister (RWw) : 256 words Remote Resister (RWr) : 256 words
Link Point per Station		Remote In/Output(RX,RY) : 32 points /each Remote Resister (RWw) : 4 words Remote Resister (RWr) : 4 words
Link Point no. of each occupied station	station 1	Remote In/Output(RX,RY) : 32 points /each Remote Resister (RWw) : 4 words Remote Resister (RWr) : 4 words
	station 2	Remote In/Output(RX,RY) : 64points /each Remote Resister (RWw) : 8 words Remote Resister (RWr) : 8 words
	station 3	Remote In/Output(RX,RY) : 96 points /each Remote Resister (RWw) : 12 words Remote Resister (RWr) : 12 words

	station 4	Remote In/Output (RX,RY) : 128 points/each Remote Resister (RWw) : 16 words Remote Resister (RWr) : 16 words
No. of Connected Modules		Total Station number (1×a)+(2×b)+(3×c)+(4×d)≤64 a: Module no.occupied in station 1, b: Module no.occupied in station 2 c: Module no.occupied in station 3, d: Module no.occupied in station 4 Connected module no. (16×A)+(54×B)+(88×C)≤2304 A: Remote I/O station No. …… Max.64 B: Remote Device Station no. …… Max.42 C: Local Station,Waiting Master Station, Intelligent Device Station… Max. 26

3. CC-Link Network Installation

CC-Link Network Set up is like following figure

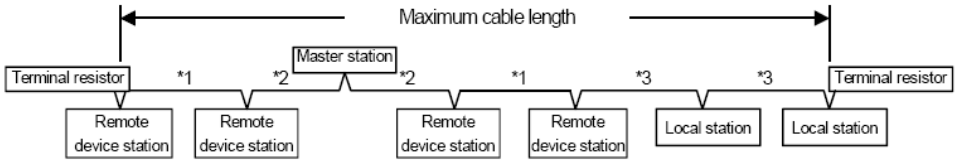
<System configured with only Remote I/O station and /or Remote device>



*1: Cable length between Remote I/O, Remote device and Remote I/O, Remote device.
*2: Cable length between Master and next station.

Figure 3.1 in case of system configured with only Remote I/O station and/or Remote device station

<System including Local station and/ or Intelligent device station >



*1: Cable length between Remote I/O, Remote device and Remote I/O, Remote device.
*2: Cable length between Master and next station.
*3: Cable length between Local, Intelligent device and next station.

Figure 3.2 in case of system including Local and/or intelligent device

1) The maximum length of network for each cable type is as follows

◆ **In case of CC-Link dedicated cable (Characteristic Impedance : 100Ω)**

Communication Speed		156 Kbps	625 Kbps	2.5 Mbps	5Mbps		10Mbps		
Station-to-Station cable length	Between Master/Local, Intelligent device station and adjacent stations ※2,※3	1m or more							
		2m or more							
	Between Remote I/O, Remote device and Remote I/O, Remote device stations (shortest cable) ※1	30cm or more	30cm or more	30cm or more	60cm or more	30~ 59cm	1m or more	60~ 99cm	30~ 59cm
Max. transmission distance		1200m	600m	200m	150m	110m	100m	80m	50m

* : Upper line includes only Remote I/O, Remote device station. Lower line includes Local, Intelligent device station.

◆ **In case of CC-Link dedicated high performance cable (Characteristic Impedance: 130Ω)**

Communication speed		156 Kbps	625 Kbps	2.5 Mbps	5Mbps		10Mbps						
Station to Station cable length	between Master/Local, Intelligent device station and adjacent stations ※2,※3	1M or more											
		2M or more											
	Between Remote I/O, Remote device and Remote I/O, Remote device stations (shortest cable)※1	30cm or more	30cm or more	30cm or more	60cm or more	30cm or more	1.0M or more	70cm or more	40~ 69cm	30~ 39cm	40cm or more	30~ 39cm	30cm or more
Max.No. of remote stations		64	64	64	64		64				48		32
Max. transmission distance		1200	900m	400m	-	160m	-	100m	30m	20m	100m	80m	100m
		1200	600m	200m	150m	110m	80m	50m	-	-	-	-	-

* : Upper line includes only Remote I/O, Remote device station. Lower line includes Local, Intelligent device station.

2) Network construction concept

Node	There are Master and Slave for Node. The master controls CC-Link and arranges external I/O. The Slave connect to external I/O. You can arrange Master and Slave in any position of Node as the above picture.
Trunk Line/ Branch Line	a Trunk line means the cable attached terminal resistor on both edges. a Branch line means the cable branched off from trunk line. (Branch length : Max. 6M)
Terminal Resistor	The resisters are attached at both edges of cable. The resister reduces reflected wave at terminal point and prevents disturbance of signal. Use resisters suitable for cable used. CC-Link dedicated cable 110Ω±5% 1/2W CC-Link dedicated high flexible cable 130Ω±5% 1/2W
Connection Type	CC-Link basic connection is multi drop connection. And T-branch connection is available in case of 625Kbps or less of communication speed or in case of using repeater .

3) CC-Link Cable Specification

CC-Link dedicated cable shall be used in CC-Link system.

Specification of CC-Link dedicated cable is as follow

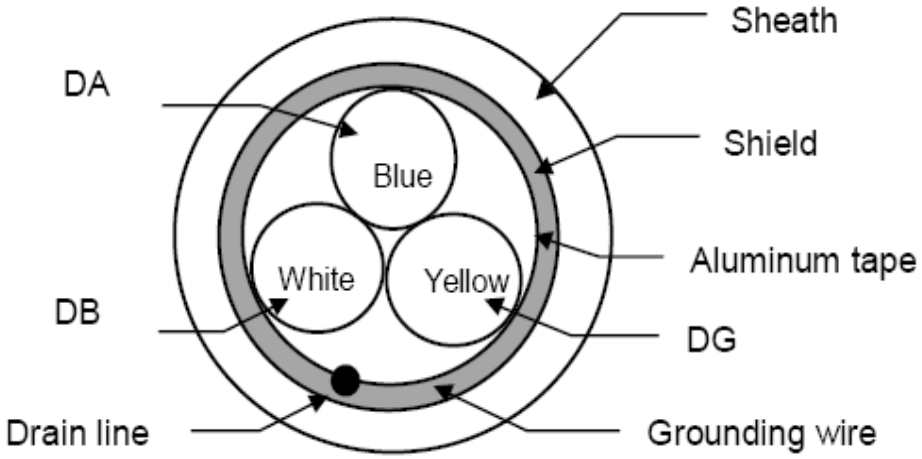


Figure 3.3 CC-Link Cable

◆ **The color of isolator and terminal connector**

Color of isolator	Terminal
Blue	DA
White	DB
Yellow	DG
Grounding wire(Shield)	SLD

◆ **Specification of CC-Link dedicated cable**

Item		Specifications
Cable Type		Shield twisted cable
Finish outer diameter		8.0mm or less
Drain line		20 lines/0.18 mm or 24 lines/0.18mm Insert separately or in a bundle between the ground cable bundle and aluminum tape.
Conductor resistance(20℃)		37.8Ω/km
Insulation resistance		10000MΩ · km or more
Withstand voltage		500VDC 1minute
Electrostatic capacity(1kHz)		60nF/km or less
Characteristic impedance	1MHz	110±15Ω
	5MHz	110±6Ω
Attenuation amount	1MHz	1.6dB/100mor less
	5MHz	3.5dB/100mor less

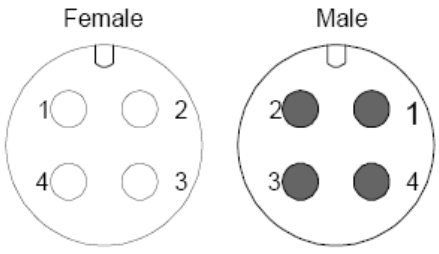
4) Connector

Recommended specifications of connector relaying between CC-Link dedicated cables are as followings

◆ **M12(Micro) type(4cores)**

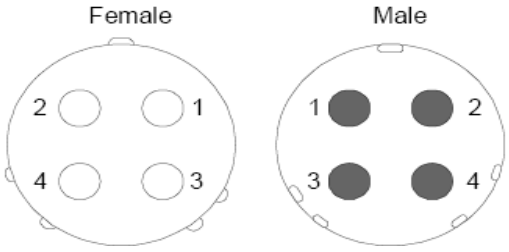
	M12(Micro)type
Resistance of conductor	5m ohm or less
Thickness of Gold plate	0.1 micro m or more
Type of water proof	IP67(JIS C 0920)
Pin position	1pin : SLD 2pin : DB 3pin : DG 4pin : DA

Pin position



◆ **Easy connection water proof type (4cores)**

	Easy connection water proof type
Contact resistance	5m ohm or less
Thickness of gold plate	0.5 micro m or more
Type of Water proof	IP67 (JIS C 0920)
Conducts	Pin position

4 conductors	1pin : SLD 2pin : DB 3pin : DG 4pin : DA	

5) Minimum radius of bending cable

Please keep the minimum radius of bending in using CC-Link dedicated cable.
When it is used with less than min. radius by constraint, it may cause pulling out from connector and cable, breaking of cable, etc..

Minimum radius of Bending cable	Connecting	Major diameter of cable× 10 or more
	Stable	Major diameter of cable× 4 or more

connecting : Minimum radius of bending cable permitted in only connecting
stable : Minimum radius of bending cable at stable permits the characteristic for long period.

6) Terminator Resistors

Specification of terminator Resistors are as follows Resistance Spec. :

- CC-Link dedicated cable 110Ω±5% 1/2W
- CC-Link dedicate high performance cable 130Ω±5% 1/2W

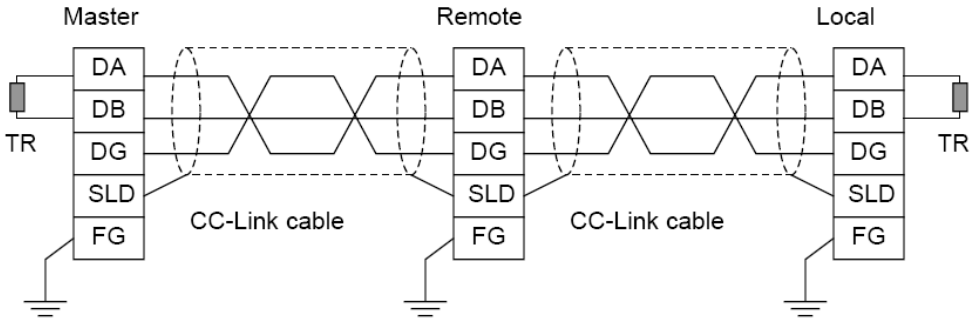


Figure 3.4 Connection of terminal resister

◆ **T-Branch connection**

- When repeater is not used

  Please connect terminal resister, 110Ω±5% 1/2W between DA and DB on each edge of trunk line. (Do Not use CC-Link dedicated high performance cable)

- When repeater is used

  Please use Terminal resistor included in Repeater unit.

7) Connection of shield line with ground

- Connect both edges of shield wire for CC-Link dedicated cable with "SLD" of each module.
- Connect "FG" of each module independently.
- Always ground the FG terminal to the protective ground conductor
  (Ground resistance 100Ω or less)
- If not use ground independently, use common ground according to the Figure 3.5

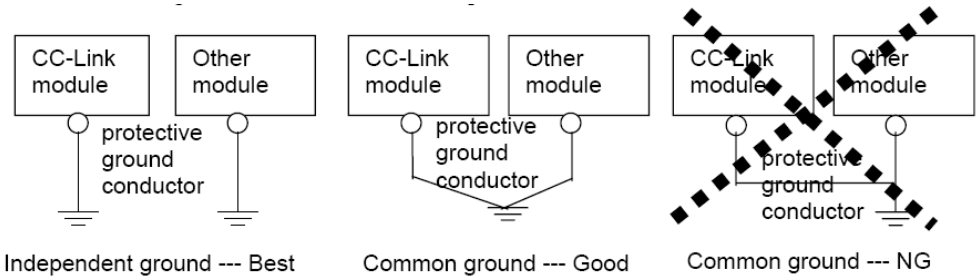


Figure 3.5 Shield line with ground

8) Process and connection of CC-Link dedicated cable

Process CC-Link dedicated cable according to the table, As well, refer to the table for the length of removed cable coat, the length of removed signal wire coat and terminal process of signal wire.

The length of removed cable coat	The length of removed signal wire coat	Terminal process of signal wire
50mm	3mm	Pressure terminal

◆ **Removing cable coat**

Remove CC-Link dedicated cable coat not to scratch shield mesh. But not remove extra amounts not to cause short.

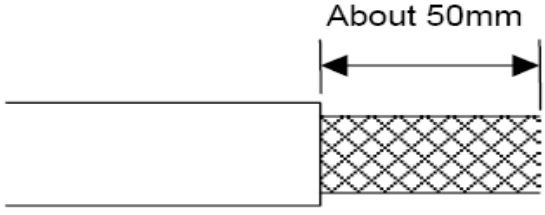


Figure 3.6 Removed cable coat

◆ **Process shield**

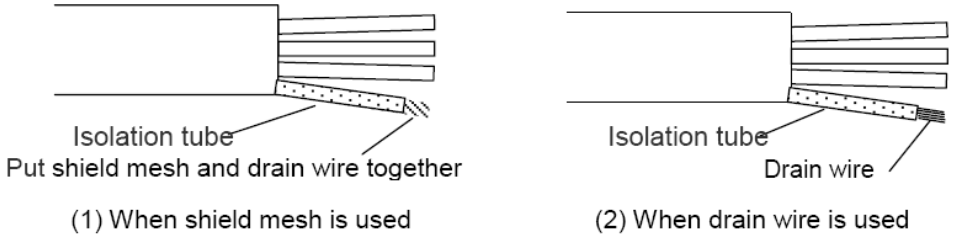
Ravel shield mesh carefully. As well as signal wire, there is one bare drain wire (stranded wire or each wire). Process the shield according to any of followings.

(1) When shield mesh is used

Coat with isolation tube after putting tightly shield mesh and drain wire together.

(2) When drain wire is used

Coat drain wire with isolation tube after trimming off the a excess shield mesh.



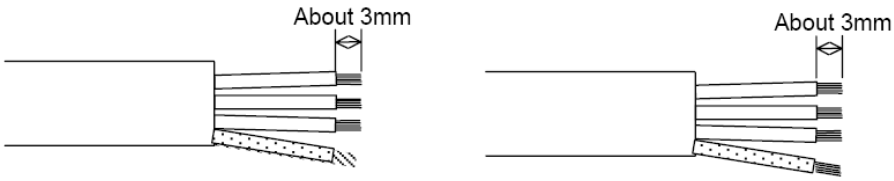
(1) When shield mesh is used (2) When drain wire is used

Figure 3.7 Process shield

◆ **Remove signal wire coat**

Remove coat of signal wire according to size of Pressure terminal.

Put tightly bear signal wire together.



(1) When shield mesh is used (2) When drain wire is used

Figure 3.7 Remove signal wire coat

◆ **Connection pressure terminal**

Connect signal wire removed coat, shield wire with pressure terminal differently.

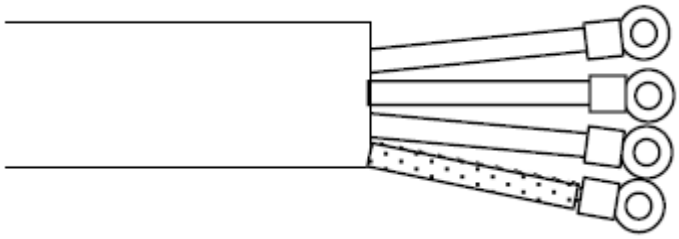


Figure 3.8 Connection pressure terminal

◆ **Connection terminal**

Connect signal wire attached pressure terminal with each terminal then drive a screw in tightly. Refer to the table as to name of terminal and color of cable conductor

Terminal	Signal conductor
DA	Blue
DB	White
DG	Yellow
SLD	Ground(Shield)

4. Check Operation Status

When all installation and configuration processes are complete, the adaptor module Indicator LED and Field Power LED shall be lit in a green color. If not, it indicates that an error has occurred. See the following table for proper measures.

Status Indicator LED

1) L RUN LED

Status	State	To indicate
Not Powered Not On-Line	Off	Device is not on-line or may be not powered Resetting Hardware
Connection-Timeout	Off	Device is Timeout
On-Line, Connection	Green On	Device is on-line and allocated to a master

2) L ERR LED

Status	State	To indicate
Fail	On	CRC error
Switch Setting error	On	Invalid MAC ID
Communication error	On	Baudrate switch setting error
Setting change	Flashing	Switch setting has been changed from the setting at the reset cancelation
Device Operational	Off	The unit is operating in normal condition

3) RD LED

Status	State	To indicate
Connection	On	Detecting the carrier for channel 1 or 2
Unable detect	Off	Unable to detect carriers neither for channel 1 or 2

4) SD LED

Status	State	To indicate
Connection	On	During transmission
Not transmission	Off	Other than listed in the left

5) Field Power LED

Status	State	To indicate
Not supplied Field Power	Off	Not supplied 24Vdc field power
Supplied Field Power	Green	Supplied 24Vdc field power

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