Multitel

IO GATEWAY INSTALLATION GUIDE

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CONTROL SHEET

Issue	Date MM/DD/YYYY	Description	Originator
1	06/06/2020	iO Gateway v1.0, v1.1, v1.2	SB

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1. HARDWARE INSTALLATION

1.1 PREPARING TO INSTALL IO GATEWAY

In accordance with Articles 100-16, 100-17, and 110-18 of the National Electrical Code, ANSI/NFPA # 70 1987 this equipment shall be installed in a restricted access area. It should be installed by qualified personnel as close as possible to the equipment to be monitored to reduce cabling and installation time. These are maximum distances that shall not be exceeded to maintain the highest level of performance possible.

Table 1 - Maximum Distances

Description	Cabling	Maximum Distance
Logic Ground	24, 26	2000 ft
Input Power	22, 20 twisted pairs	250 ft
Ethernet	Cat-5	328 ft*
RS-485	22, 24 twisted pairs	Up to 4000 ft**

NOTE *

Ethernet Maximum Distance is specified at 328 ft but depending on the configuration it could be possible to reach greater distances but it is not guaranteed. It is recommended to use a booster or a router/switch at each 328ft to stabilize the network.

NOTE **

RS-485 Maximum Distance will depend on the baud rate. The greater the baud rate is the lower the maximum distance will be.

Before proceeding with iO Gateway's installation it is important to have a good understanding of the possible device relationships and interconnections with third-party smart devices. This type of information can be found in engineering or interconnection diagrams, methods of procedure, or other specific application guides.

For additional support please do not hesitate to contact the Multitel Customer Service Engineering Group at support@multitel.com.

1.1.1   EQUIPMENT SUPPLIED BY MULTITEL

Each iO Gateway is supplied with the following items:
- 1 x 7 pin screw type modular connectors
- 2 x 3 pin screw type modular connectors
- 1 x ring terminal for wire range 18-14 for ground lug
- 1 x hexagon locknut #8-32
- 1 x tooth lock washer #8

IMPORTANT NOTE:

Before proceeding with the installation make sure that all material has been received

and is in good condition.

1.1.2   REQUIRED TOOLS AND/OR MATERIAL NOT SUPPLIED BY MULTITEL

- 2x Cat-5 Cables
- 2x RS-485 Cables
- Ground cable #14 AWG and ground lugs
- Terminal lugs (fork type or others) #22-16
- In-line fuse holders (to protect iO Gateway from signals connected to the shunts or any point other than ground Multitel ordering code: FSBL-TL)
- Fuses, 1 1/3 amp
- Safety glasses or goggles
- Anti-static wrist strap
- Computer to access the web interfaces of iO Gateway
- Standard installation tools (various screwdrivers, long nose, cutters, etc.)
- Digital voltmeter/multimeter, 3½ digit (or better)
- Ammeter 31/2 digits (or better).
- Crimping tool for the terminal lugs of certain accessories (fork type or others)
- Blade screwdriver 3/32" (2.4mm)

1.2 MOUNTING IO GATEWAY

iO Gateway is designed to be installed in a Telecom Central Office environment but is also suitable for other industrial sectors. The iO Gateway must be rack-mounted and its chassis should be located as close as possible to the equipment and the monitoring that has to be physically connected to the system.

1.2.1 RACK MOUNTING

Please note iO Gateway mounting solutions are not included and need to be purchased as an option. There are two types of mounting options: Standalone and Mounted.

1.2.2 STANDALONE

iO Gateway must be installed in standard 19" or 23" telecommunication relay racks. The provided mounting brackets adapt rack mounting for European and North American relay rack standards and provide a flush installation. The 19" bracket can support up to 3x iO Gateway or SMX Modules. A 4" extension ear is provided for installation on a 23" rack.   Also provided is 3x plates used to cover unused modules.

Figure 1 - iO Gateway Standalone Rack

1.2.3 MOUNTED WITH FUSION

If you have acquired the iO Gateway with a FUSION or you already have a FUSION mounted. This solution is preferable since it requires only a 1U space rack. The mounting option provides support that is connected to the FUSION and rack. An extension ear is also provided for 23" rack installation.

Figure 2 - iO Gateway Mounted with FUSION

1.2.4 CHASSIS GROUND

Once the iO Gateway is installed and secured in the rack, the chassis must be connected to a reliable ground source. The ground wire shall be installed in accordance with local electrical safety standards.

•   For NEC-compliant grounding, a size 14 AWG (22 mm) or larger copper wire and an appropriate user-supplied ring terminal with an inner diameter of 1/4 inch (5 to 7 millimeters) are used for the installation.

•   For EN/IEC 60950-compliant grounding a size 18 AWG (12 mm) or larger copper wire and an appropriate user-supplied ring terminal is used for the installation.


IMPORTANT NOTE:

iO Gateway must be grounded. NEVER remove the ground conductor or operate the

equipment in the absence of a suitably installed ground conductor. It may be necessary

to contact the appropriate electrical inspection authority or an electrician to ascertain that

a suitable grounding is available.

Follow these steps to install the ground connection:
1. Strip one end of the ground wire to the length required for the ground lug or terminal.
2. Crimp the ground wire to the ground lug or ring terminal using a proper wire crimper of the appropriate size.
3. Attach the ground lug or ring terminal to the chassis as shown in the figure below. Use the nut and lock washer provided. Tighten the nut securely.

Figure 3 - Ground Connection

Use tooth disc and Nut.

Use Ring Connector and #14 AWG solid wire to attached to Frame Ground
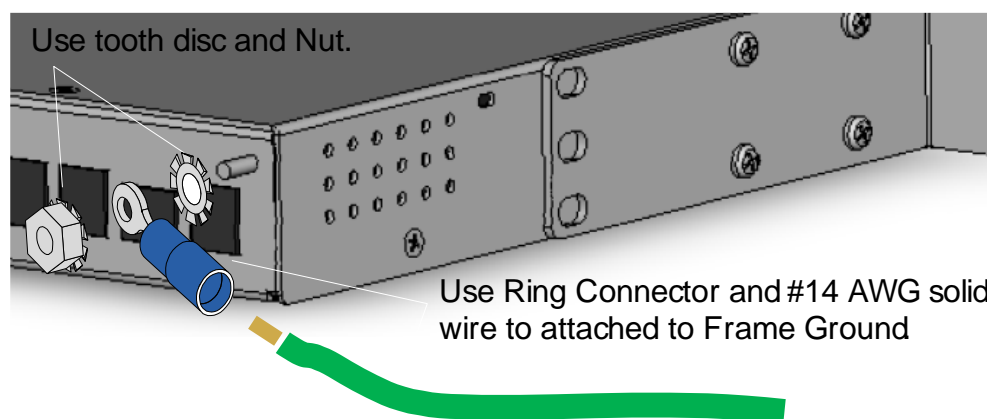
1.3 DEVICES CONNECTION TO IO GATEWAY

Devices that are not manufactured by Multitel can be connected to iO Gateway. These devices are commercially available and should be qualified before being installed by competent personnel. Each device carries its own technical specifications that are not made available in this user guide. Please refer to the manufacturer's technical documentation for each equipment specifications.

Following are the technical limitations when connecting a device to the iO Gateway:
- The industry-standard Modbus TCP/IP and SNMP protocols are supported;
- Communication ports are available on Ethernet 1/Ethernet 2 and/or both RS-485 ports;
- Ethernet Speed can be adjusted from 10 Mbps, 100 Mbps, or 1Gbps (only Ethernet 1). An Automatic speed option can also be selected.
- Each Equipment Polling Rate and Time Out can be adjusted.

1.3.1 ETHERNET PORT CONNECTION

iO Gateway comes with two separate Ethernet ports, a 10/100Mbps port is available on the front panel and a 1Gbps port is available on the back panel. iO Gateway can support up to 128x devices with Modbus TCP/IP and in up to 128x devices with SNMP protocol. Please note that these numbers might not be achieved because of the limitation of the device computing power. The actual limit will depend on the number of data points of each device, and their polling rate.
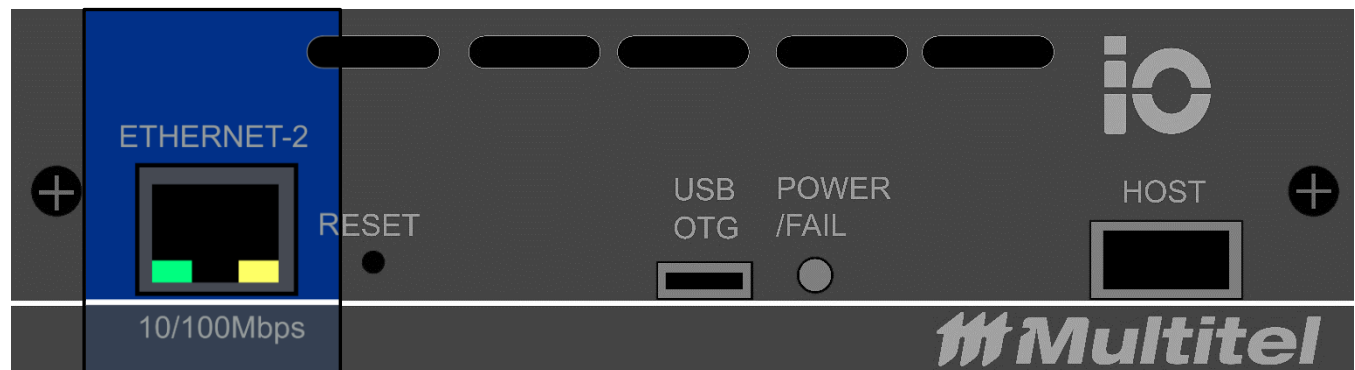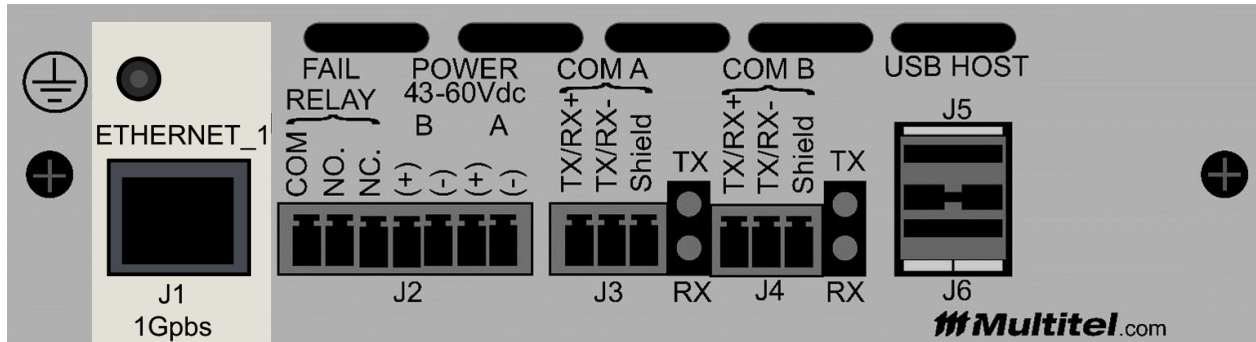
Figure 4 - iO Front Ethernet Port

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Figure 5 - Back Ethernet Port

Multitel recommends the use of a straight Cat-5 cable. Both Ethernet ports come with RJ45 connectors. Commercial Cat-5 cable can be used or Cat-5 cable can be made using the following pinout.

Table 2 - RJ45 Connectors Pinout

PIN	Name	Type
1	TX "+" Transmit Data – Positive	OUT
2	TX "-" Transmit Data – Negative	OUT
3	RX "+" Receive Data - Positive	IN
4	Not Used	N/A
5	Not Used	N/A
6	RX "-" Receive Data – Negative	IN
7	Not Used	N/A
8	Not Used	N/A

1.3.2 RS-485 PORTS CONNECTION

iO Gateway can support up to 64 Modbus RTU devices connection on each RS-485 port. The actual limit will depend on the number of data points of each device, and the polling rate.

Please refer to the vendor's technical documentation for installation, wiring, and Modbus RTU registry instructions.

RS-485 wiring can be complex when multiple devices are connected. When running wires for long distances, RS-485 networks should always be wired in a bus (or daisy-chain) configuration. The bus should start at the iO Gateway and then be run to each meter in turn. Branches and "home-run" wiring (i.e. each module is wired back to iO Gateway individually) should be avoided.   For best results, especially when running longer distances, shielded twisted-pair cables should be used to prevent interference. **NB: Shielded cable should be connected to ground at one end only.**

RS-485 connectors are found on the backplate of the iO Gateway module. There are two independent RS-485 connectors: COM A and COM B. The block used to connect to the COM ports need to be a 3x position terminal block header, male pins, shrouded (4 Side) 0.138" (3.50mm) 90°, right angle through holes.

<div align="center">Figure 6 - RS-485 Connectors</div>
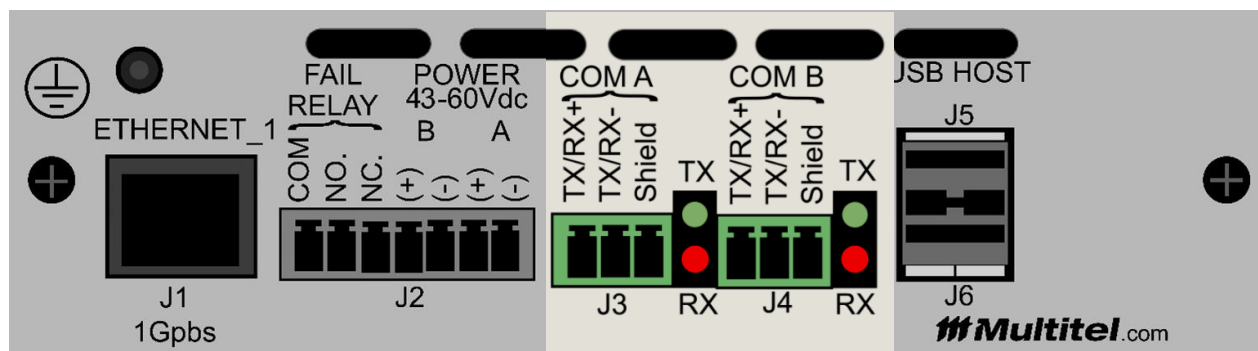
The following table presents the pinout of the two RS-485 connectors.

<div align="center">Table 3 - RS-485 Connectors Pinout</div>

| Connectors	PIN	Name	Type
J3	1	TX/RX+ COM A	IN
	2	TX/RX- COM A	IN
	3	Shield - COM A	IN
J4	4	TX/RX+ COM B	IN
	5	TX/RX- COM B	IN
	6	Shield - COM B	IN

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2. POWERING IO GATEWAY

iO Module must be powered with a -48Vdc feed with an input voltage range of -40Vdc to -60Vdc. Please note that the startup voltage must be greater than -43 Vdc to start the iO Gateway.

Table 4 - iO Gateway Power Requirements

Typical Input Voltage	Input Voltage Range	Max Current	Max Power Consumption	Fuse
-48Vdc	-40 Vdc to -60 Vdc	300 mA at 48Vdc	14.4 W	1 1/3 A Max.

Figure 7 - iO Gateway Power Input
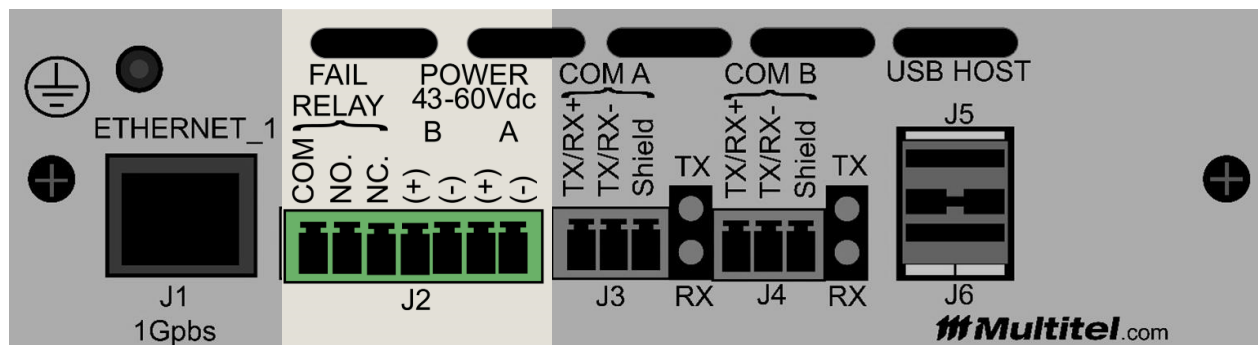
2.1 WIRING POWER INPUT

iO Gateway is powered by a continuous -48Vdc power source. The module is equipped with A & B feed positions for power redundancy. Power Input status can be found in the **General Parameters – System Information.** A readily accessible disconnect device shall be incorporated within the power wiring in order to disconnect the equipment from the 48Vdc supply for servicing.

Using a wire-stripping tool, strip each of the four wires coming from the DC-input power source to 0.25 in (6.3 mm) + 0.02 in (0.5 mm). Do not strip more than 0.29 in (7.4 mm) of insulation from the wire. Stripping more than the recommended amount of wire can leave

exposed wire from the terminal block plug after the installation. Insert wires into the terminal block according to the following table.

Connectors	PIN	Name	Description	Type
J2	4	BRG - B	Battery return ground "B" feed	IN
	5	BATT FEED - B	Battery -48V "B" feed	IN
	6	BRG - A	Battery return ground "A" feed	IN
	7	BATT FEED - A	Battery -48V "A" feed	IN

NOTE:

The pin numbering for the connector is from left to right.

3. INSTALLATION CHECKLIST

iO Gateway installation can be tested using this checklist :

QUESTIONS	Y/N
Are the frame grounds connected?	
Are both "A" and "B" feeds powered?	
Are there any bare ended power cables?	
Are there any loose cables and are all cables attached or tie-wrapped together?	
Have all mounting screws been tightened?	
Is the iO Gateway POWER/FAIL LED on the front panel solid green?	
Are the cable designations clear and self-explanatory?	
Are the unit IP addressed labeled?	
Have the distribution fuse locations been assigned and designated?	
Are all measurement readings calibrated?	
Is the polarity for each input signal correct?	

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