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BIS Z-GW-001-TCP

Subnet16™ TCP/IP Ethernet Gateway

INSTALLATION GUIDE

This document provides instructions and information designed to assist users in the hardware setup of the Subnet16™ TCP/IP Ethernet Gateway. For configuration details see the Gateway Series Reference Manual.

The BIS Z-GW-001-TCP is designed to connect RFID applications to a TCP/IP Ethernet network. The Gateway is an Ethernet node which connects to a Host (PC or PLC) through an Ethernet-compatible network cable.

It supports Subnet16™ Multidrop bus architecture, a subnetwork of up to sixteen processor stations, through an RS485 interface connection.

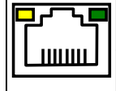
The Ethernet port is also used for establishing a connection with a computer running Windows for the purpose of configuring the Gateway through the Dashboard™ Configuration Tool Utility program.

TECHNICAL DATA

ELECTRICAL FEATURES	
Power Supply	12 - 30 Vdc
DC Input Current max.	200 mA - 100 mA
Communication Interfaces: Host RFID Multidrop Readers Configuration	 Ethernet TCP/IP Subnet16™ (uses RS485 physical layer) Ethernet TCP/IP
Baud Rate	10/100 Mbps
ENVIRONMENTAL FEATURES	
Operating Temperature	-20°to +50 ℃ (-4°to +122 ℉)
Storage Temperature	-20°to +70 ℃ (-4°to +158 ℉)
Humidity max.	90% non condensing
Vibration Resistance EN 60068-2-6	14 mm @ 2 to 10 Hz; 1.5 mm @ 13 to 55 Hz; 2 g @ 70 to 200 Hz; 2 hours on each axis
Shock Resistance EN 60068-2-27	30 g; 11 ms; 3 shocks on each axis
Protection Class EN 60529	IP30
PHYSICAL FEATURES	
Dimensions	100 x 107 x 32 mm (3.9 x 4.2 x 1.3 in)
Weight	256 g (9 oz)
USER INTERFACE	
LED Indicators	Power On, Subnet16™ Bus, Ethernet TCP/IP, Configuration Error

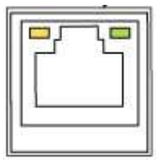
GENERAL VIEW

LED INDICATORS

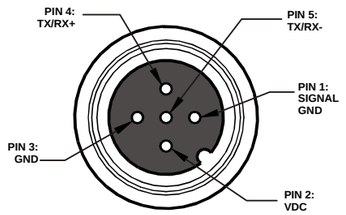
green	**POWER**	The POWER LED is ON whenever power is applied to the Gateway.
amber	Subnet16™ **BUS**	The BUS LED will flash ON and OFF to indicate that data is being transmitted between the Gateway and one or more RFID Processors on the Subnet16™ network.
amber	**ETHERNET**	The ETHERNET LED will flash ON and OFF to indicate that data is being transmitted between the host and the Gateway.
red	**ERROR**	The Error LED is solid red when a Gateway configuration error has occurred, i.e. an invalid or unrecognized command. This LED will be cleared when a valid command is sent.
	**ETHERNET LINK**	The AMBER LED on the left is the 10/100 Indicator LED, which will turn ON whenever an Ethernet link is established and will remain ON for the duration of the connection.
	ETHERNET TRAFFIC	The GREEN LED on the right is the Ethernet Data LED,which will flash ON and OFF when Ethernet traffic is detected by the Gateway (regardless of origin and destination).

CONNECTIVITY

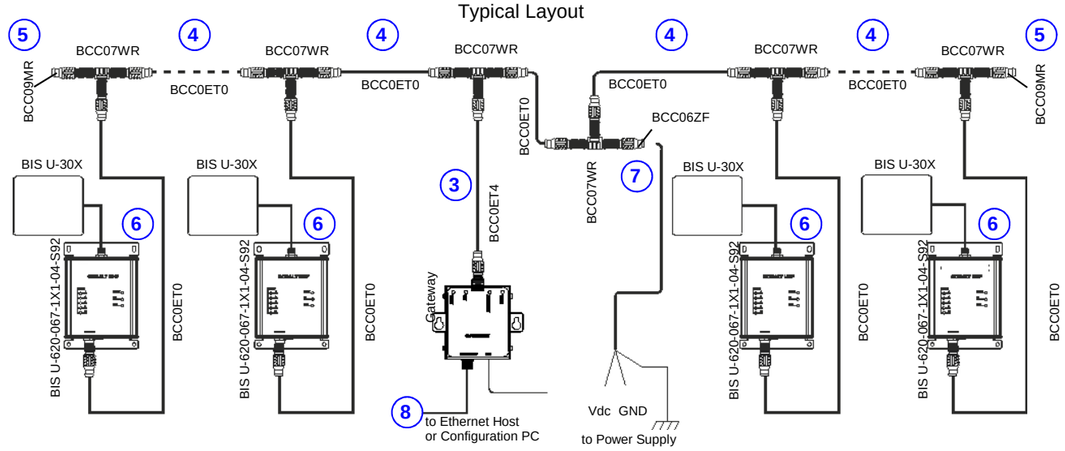
Ethernet
RJ45 Female Connector



Subnet16™
M12 5-pin Female Connector (Data and Power Supply)



Typical Layout



See the Gateway Series Reference Manual for a complete list of accessories including alternative cables and connectors.

HARDWARE REQUIREMENTS

The following components are required for a complete Subnet16™ RFID system:

- One Subnet16™ TCP/IP Ethernet Gateway Interface Module
- One host PC with an Ethernet network connection
- One to 16 RFID Processors (*BIS M-41x, BIS M-62x or BIS U-62x- Series Processors - **RS485 models**)*
- Adequate length cabling, connectors and terminators
- A suitable power supply capable of providing sufficient power to the Gateway and its RFID Processors via Subnet16™ network cabling
- Balluff RFID data carrier or labels: BIS M-1xx or BIS U-1xx

INSTALLATION GUIDELINES

- Do not route cables near unshielded cables or near wiring carrying high voltage or high current. Cross cables at perpendicular intersections and avoid routing cables near motors and solenoids.
- Review the power requirements of your RFID network and provide a suitable power supply.
- Avoid mounting the Processor near sources of EMI (electro-magnetic interference) or near devices that generate high ESD (electro-static discharge) levels. Always use adequate ESD prevention measures to dissipate potentially high voltages.
- If electrical interference is encountered (as indicated by a significant reduction in read/write performance), relocate the Processor to an area free from potential sources of interference.
- Perform a test phase by constructing a small scale, independent network that includes only the essential devices required to test your RFID application (use Balluff approved Subnet16™ cables and accessories).

INSTALLATION

The numbered steps in the following procedure are also indicated in the Subnet16™ network example layout shown in the figure.

1. **Preliminary Notes**: Read this document in its entirety and note the *Installation Guidelines* above.
2. **Mounting**: Mount the Gateway to your chosen location using two M5 (#10) screws, lock washers and nuts. The Gateway may be mounted in any orientation, but should be aligned in such a manner that the LED indicators can be seen during operation.
3. **Gateway Connection**: Attach one end of a 5-pin, male-to-male, M12, ThinNet drop cable (***P/N: BCC0ET4***) to the 5-pin, female, M12 connector on the Gateway. Connect the other end of this 5-pin, male-to-male, M12, ThinNet drop cable to the 5-pin, female, M12 connector on a ***ThinNet to ThinNet Drop-T Connector*** (as per your network and RFID application requirements).
4. **Trunk Wiring**: Attach one end of a male-to-female trunk cable to each mating connector on the Drop-T Connector. Continue connecting trunk cables and Drop-T connectors as needed.

   Note: trunk length should not exceed 300 m for ThickNet and 20 m for ThinNet.
5. **Termination Resistors**: For ThinNet Networks: Connect a Terminating Resistor (***P/N: BCC09MR, male)*** to the first and last Drop-T Connector on the trunk line.

(over)

6. **RFID Processor Connection**: Connect the male end of a 5-pin, male-to-female, ThinNet drop cable to the female end on your Drop-T connector(s). Attach the remaining female end of the ThinNet drop cable to the 5-pin, male, M12 connector on ***BIS U***, ***BIS M-6xx*** or ***BIS M-41x (RS485 models)***. Repeat ***Step 5*** for each RFID Processor you plan to install.

   Note: maximum drop cable length is 2 m.

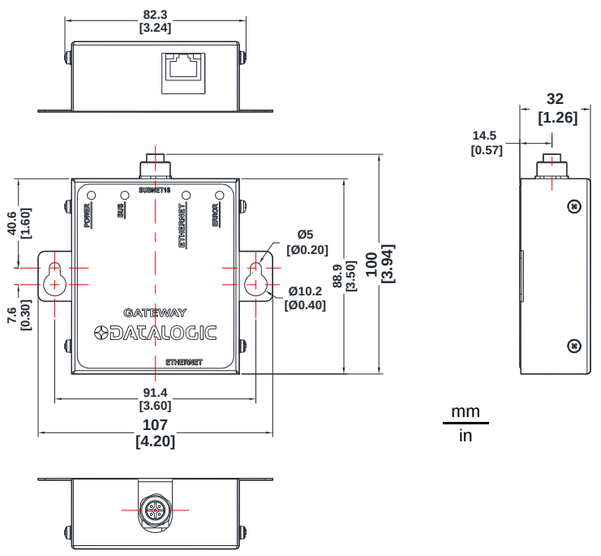
7. **Power Supply Wiring**: For ThinNet Networks: Using a 5-pin, female, M12, ThinNet connector (***P/N: BCC06ZF***), make a power cable and connect it to your power supply (SHIELD wire connected to Earth). Attach the female, ThinNet end to the 5-pin, male, ThinNet end on a Drop-T connector (***P/N: BCC07WR)***.
8. **Host Connection**: Connect the Gateway to your host computer via Category 5e Ethernet cabling. A crossover cable may be required if you are connecting the Gateway directly to a computer (rather than to a switch, network hub or router).
9. **Power On**: Turn the power supply ON. The POWER LED on the Gateway will remain lit while power is applied to the unit.
10. **Automatically Configure Subset16™ Node IDs**: At this point all Processors are powered and should have Node IDs set to 00, (all Processor Node LEDs = OFF), and Subnet16™ baudrate = 9600 (factory defaults).
    a. Place the BIS M- or BIS U-Series Configuration Tag in front of an Processor (the Processor 's RF Activity LED blinks once indicating the tag has been read), and wait for the Gateway to assign a valid Node ID to it. The processor's Node LEDs now indicate a valid Node ID. Remove the Configuration Tag from the processor.
    b. Repeat this step for each node in the Subnet16™ network (one Processor at a time). The first is Node ID 1, then 2 and so on up to 16 (binary).

The Subnet16™ network is now configured with the default values and can communicate with the TCP/IP Ethernet Gateway which in turn communicates with the TCP/IP Ethernet Host.

The BIS Z-GW-001-TCP interface module is designed to receive its IP address via DHCP. After your DHCP server has assigned an IP address to a TCP/IP Gateway, the IP address can be identified through the use of the "***Digi Device Discovery***" software tool.

For further information or for application specific configuration using the Dashboard™ Configuration Tool utility, see the Gateway Series Reference Manual.

DIMENSIONS



POWER REQUIREMENTS

The Gateway requires an electrical supply voltage of 12 to 30 Vdc. In addition, each RFID Processor connected to the Gateway via the Subnet16™ network will also require power. Use a regulated power supply that is capable of delivering the requirements listed in the Technical Features.

NOTE *Power is applied directly to the Subnet16™ Network trunk and distributed through drop cables to the Gateway and RFID Processors. By positioning the power supply near the middle of the network, you can limit voltage drop at the ends, (see example layouts).*

The following information is provided to assist you in determining the power requirements of your RFID application.

Total System Current Consumption

NOTE *The current consumption values of each product are given in the Technical Features paragraph of the relative Installation manual and refer to the min and max input voltage range. These values already include an adequate safety margin. The consumption values given in the following examples have been interpolated for an input voltage of 24 Vdc.*

Max Gateway Current: 200 mA @ 12 Vdc (133 mA @ 24 Vdc).

Max Processor Current: 366 mA @ 24 Vdc for BIS M-6xx-Series, 87 mA @ 24 Vdc for BIS M-41X-Series, etc. (refer to Processor 's spec).

Calculating Total System Current Consumption:

Total System Current Consumption = [Max Gateway Current + (Max Processor Current x Number of Processors)]

Example
A Subnet16™ network powered at 24 Vdc is composed of a BIS Z-GW-001-TCP connecting eight BIS M-41X-485 Processors.

Total System Current Consumption = [0.133 A + (0.087 A X 8)] = 0.829 A

Cable Voltage Drop

In addition, each RFID Processor on the Subnet will experience a certain amount of voltage drop depending on the length of the cable.

Cable Resistance per Meter

- ThinNet = **0.058** ohms per meter per wire
- ThickNet = **0.0105** ohms per meter per wire

Calculating Voltage Drop

Voltage Drop = (Max Processor Current x Number of Processors) x (Cable Resistance per Meter per Wire [1] x Cable length in Meters)

Example
A Subnet16™ network is composed of a BIS Z-GW-001-TCP connecting eight BIS M-41X-485 Processors (87 mA each @ 24 Vdc). A total of 20 meters of ThinNet cables are used to connect the devices, which have Cable Resistance = 0.058 Ohms per meter per wire. The network power is 24 Vdc. [2]

Voltage Drop = [0.133 A GWY + (0.087 A x 8 Processors)] x [(0.058 x 2) x 20 meters] = 1.92 Vdc

24 Vdc - 1.92 = 22.08 Vdc at Processor number 8

[1] The resistance calculation must include both wires (Vdc and GND).

[2] This example assumes the power supply is placed at the end of the network, therefore controller #8 is the worst case. By placing the power supply in the middle of the network the voltage drop at the ends is reduced.

It is recommended that the voltage drop calculation be conducted on the RFID Processor that is farthest from the Gateway, as it will experience the greatest voltage drop.

Max Supported Trunk and Drop Cable Lengths

- ThickNet trunk length up to 300 m.
- ThinNet trunk length up to 20 m.
- ThinNet drop cable length up to 2 m.

Current Rating for Cables

The maximum current rating for the Subnet16™ network using Balluff cables and accessories (BCCxxxx), is **4.0 A**.

COMPLIANCE

This product is intended to be installed by Qualified Personnel only.

This product must not be used in explosive environments.

See the Subnet16™ Gateway Manual for the Declaration of Conformity.

Power Supply

This device is intended to be supplied by a UL Listed or CSA Certified Power Unit with «Class 2» or LPS power source.

CE Compliance

Warning: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

CE

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