



Critical Telecom

TelePATH

2.4GHz North

Wireless Phone Link
USER MANUAL

Rev1.0
16 Mar 01

Table of Contents

1) Overview	2
2) Description and Features	2
3) Installation	2
A) TOOLS Required	2
B) Line module and Antenna	2
i) Mounting module.....	2
ii) Mounting Antenna	2
iii) Antenna Connection	3
iv) Tip and Ring Connection.....	3
v) Power and Ground Connections.....	3
vi) Channel Selection.....	3
C) Phone module and Antenna.....	3
i) Mounting module.....	3
ii) Mounting Antenna	3
iii) Antenna Connection	3
iv) Tip and Ring Connection.....	3
v) Power and Ground Connections.....	4
vi) Channel Selection.....	4
D) System Registration	4
i) How can I tell that registering is needed?.....	4
ii) What should I DO?	4
iii) How do I know it WORKED?.....	4
E) Ganged Multiple Line Installations.....	4
i) Registration.....	4
ii) Burst-sync Connections.....	4
iii) Channel Selection.....	5
F) Craft Interface	5
4) Service Information	5
5) Specifications	6
6) Limited Warranty	7
7) Customer Information.....	7
A) Analogue Device Warnings	7
B) Industry Canada Warnings.....	7
C) Radio Interference Statement	8

1) OVERVIEW

Thank you for purchasing a TelePATH North digital wireless link from Critical Telecom. Your new TelePATH North is a carefully engineered, high-quality, durable product. It is designed to deliver the quality and performance you expect from telecommunications equipment.

The TelePATH North digital wireless link is a cost effective solution for point-to-point voice and data communication. The system provides a reliable toll-quality wireless connection between a public telephone and the wire connection back to the central office. The TelePATH North may be used for both temporary and permanent installations where circumstances make conventionally wired installations impractical.

2) DESCRIPTION AND FEATURES

The TelePATH North system consists of two modules, two antennas, and two coaxial cables. Once installed, the components provide a transparent wireless link between a phone and the central office. The "Line module" connects to the central office line. The "Phone module" connects to the phone. Phone and Line modules are similar in appearance but each is clearly labelled to avoid confusion.

The TelePATH North has been specifically designed for use with payphones and supports all of their functions. The dimensions of TelePATH North are shown in figure #5.

The TelePATH Millennium system may be used only with approved antennas (see the Specifications section for a list of approved antennas). Either module may be used with any of the three antennas.

The TelePATH North system must be professionally installed in compliance with Industry Canada's Radio Standards Specification RSS-210, Issue 2, Rev.1, when used in Canada.

3) INSTALLATION

A) TOOLS REQUIRED

- Digital Multi-Meter
- 5/32" Security Allen Key
- 1/8" Width Flat Blade Screw Driver
- #2 Phillips Head Screw Driver
- Cordless Drill with appropriate bits (Optional)
- Static Ground Strap

B) LINE MODULE AND ANTENNA

I) MOUNTING MODULE

Locate the Line module in an area suitable for obtaining access to dial-tone and power. The selected site must also allow for connection to the antenna. Fix the module to the desired location using the two screws provided.

II) MOUNTING ANTENNA

To comply with FCC requirements for RF exposure, antennas must be installed such that no persons will be closer than 20 cm from any part of the antenna while operational. Using the hardware provided, install one antenna in the desired location. For mast type antenna installations keep the mast as close as possible to the Line module. **Masts are not provided as part of the TelePATH North system.** The antenna must be installed at least two meters above grade (as high as possible for optimal system performance).

Where a directional antenna is employed, antenna elements must be oriented vertically (**Figure 1**). The antenna itself should be aligned with the location of the Phone Module Antenna.

Where a Phantom antenna is employed, mounting is possible by drilling a 1" hole through the surface on which the antenna will be mounted provided the surface is no thicker than 1/2". Alternatively, an L bracket with a 1" hole and three mounting holes is supplied.

III) ANTENNA CONNECTION

Connect the Line module to antenna using the coaxial cable provided. For long-term out-door installations it is recommended that the antenna connections be protected from corrosion by some suitable method (i.e. Tape Coat).

IV) TIP AND RING CONNECTION

Route the cable, providing tip and ring signalling from the central office, through the appropriate strain relief connector and terminate the tip and ring wires at the screw terminals labelled "T" and "R" respectively (**Figure 2**). Tighten the strain relief connector onto the cable finger tight. **Do not use a wrench!**

It is recommended that ground strap be used when making connections to the printed circuit boards in the module enclosures. Failure to use a ground strap may result in permanent damage to the module from static discharge!

V) POWER AND GROUND CONNECTIONS

The Line module operates from DC voltages in the range of 10 Vdc to 36 Vdc. Route cable providing the DC power and ground through the appropriate strain relief connector and terminate the wires at the screw terminals labelled "+" and "-". Terminate the earth ground wire at the screw terminal labelled "E" (**Figure 2**). Tighten the strain relief connector onto the cable finger tight. **Do not use a wrench!**

VI) CHANNEL SELECTION

Any of the eight channels may be selected; however, your selection must be the same for both the Line and Phone modules. Using the dip-switches (**Figure 6**), select the desired channel and then momentarily press the button labelled "RESET". If interference is encountered (COM LED does not light), repeat the procedure with a different channel.

C) PHONE MODULE AND ANTENNA

I) MOUNTING MODULE

Locate the Phone module in a secure area suitable for obtaining access to power and the phone (Booth Header, Pedestal module, etc.). The location selected must allow for connection to the antenna. Fix the module to the desired location using the two screws provided.

II) MOUNTING ANTENNA

To comply with FCC requirements for RF exposure, antennas must be installed such that no persons will be closer than 20 cm from any part of the antenna while operational. Using the hardware provided, install the remaining antenna in the desired location. For mast type antenna installations keep the mast as close as possible to the Phone module. **Masts are not provided as part of the TelePATH North system.** The antenna must be installed at least two meters above grade (as high as possible for optimal system performance).

Where a directional antenna is employed, antenna elements must be oriented vertically (**Figure 1**). The antenna should be aligned with the Line Module Antenna.

Where a Phantom antenna is employed, mounting is possible by drilling a 1" hole through the surface on which the antenna will be mounted provided the surface is no thicker than 1/2". Alternatively, an L bracket with a 1" hole and three mounting holes is supplied.

III) ANTENNA CONNECTION

Connect the Phone module to the antenna using the coaxial cable provided. For long-term out-door installations it recommended that the antenna connections be protected from corrosion by some suitable method (i.e. Tape Coat).

IV) TIP AND RING CONNECTION

Route the cable, providing tip and ring signalling to the phone, through the appropriate strain relief connector and terminate wires at the screw terminals labelled "T" and "R" (**Figure 3**). Tighten the strain relief connector onto the cable finger tight. **Do not use a wrench!**

V) POWER AND GROUND CONNECTIONS

The Phone module operates from DC voltages in the range of 10 Vdc to 36 Vdc. Route cable providing the DC power supply and ground through the appropriate strain relief connector and terminate the wires at the screw terminals labelled “+” and “-” (**Figure 3**). The Phone module does not require an earth ground connection. Tighten the strain relief connector onto the cable finger tight. **Do not use a wrench!**

VI) CHANNEL SELECTION

As previously done for the Line module, any of the eight channels may be selected; however, your selection must be the same for both the Line and Phone modules. Using the dip-switches (**Figure 6**), select the desired channel and then momentarily press the button labelled “RESET”. If interference is encountered (COM LED does not light), repeat the procedure with a different channel.

D) SYSTEM REGISTRATION

TelePATH Phone and Line modules must be registered with each other to operate. The registration process keys the installed Line module to its mated Phone module. This feature prevents unauthorized use of a second Phone module on an installed system.

Phone and Line modules with like serial numbers are pre-registered at the factory for easy installation. A Line module may be registered to only one Phone module at one time. Once registered to a new Phone module, the Line module will no longer communicate with the previously registered Phone module. Note that you may re-register pairs as often as you choose.

I) HOW CAN I TELL THAT REGISTERING IS NEEDED?

Registration is needed if dial tone is denied and the COM LED is lit but blinks off very briefly every 2 seconds.

II) WHAT SHOULD I DO?

Initialize the Line module by pressing and holding its REG button (**Figure 2**) until the COM LED goes out for about 1/4 second (takes about 5 seconds).

Complete the registration by briefly pressing the Phone module's REG button (**Figure 3**).

III) HOW DO I KNOW IT WORKED?

After about 5 seconds both the Phone and Line COM LEDs will stop blinking and remain on constantly.

If not successful, press the Phone module's REG button again. If still not successful, repeat the entire process.

E) GANGED MULTIPLE LINE INSTALLATIONS

I) REGISTRATION

The TelePATH North has been designed to accommodate up to eight co-located systems. Co-located TelePATH systems **MUST** be PRE-REGISTERED with each other before performing the burst-sync connections. If modules are not yet registered, perform this task with only one pair powered-up at a time according to the previous section.

In the case of a module replacement, it may be convenient to register the replacement with the remaining module at the remaining module's location. This approach provides easy access to both modules during the registration process.

II) BURST-SYNC CONNECTIONS

In addition to the installation instructions outlined in the previous sections, when employed in a multiple line installation, connections must be made in the following manner:

- Locate the terminal strip marked “G”, “/D”, “D”, and “M” on each of the Line modules.

- Choose one of the Line modules as the “Master” module. The remaining Line modules will be “Slaves” of the “Master”. The master module co-ordinates communication between the modules to prevent RF interference.
- Routing through the appropriate strain relief connectors, run a “Daisy Chain” of jumper wires (in series) from the master Line module’s “G” terminal to each of the slave Line module terminals marked “G” (Ground). Repeat this for both the “/D” and “D” terminals (**Figure 4**).
- For each slave Line module, install a jumper wire between its “G” and “M” terminals. This procedure enables “slave” mode.
- To complete, tighten the selected strain relief connector onto the jumper cables (finger tight).

III) CHANNEL SELECTION

Where TelePATH North systems are co-located, the channel selection must be set as outlined in the previous sections. In addition, the channels selected must be different for each matched set of modules. Assign and set each co-located system to one of the eight available channels ensuring that there is no duplication (**Figure 6**).

F) CRAFT INTERFACE

- Apply power to both Line and Phone modules.
- Verify that the Line module’s PWR LED is continuously lit.
- Verify that the Phone module’s PWR LED is continuously lit.
- Verify that the Line module’s COM LED is lit (indicates that the RF link is active between the Line and Phone modules). Alternatively, verify the Phone module’s COM LED is lit (also indicates that the RF link is active).
- For line of site installations using directional antennas, first visually align the Antennas towards each other. To fine tune the alignment, attach the leads from a digital multi-meter to the terminals marked RSSI on either the Line or Phone modules. Set the meter to read a range of 0 to 1 VDC. For each antenna, move the antenna until the voltage reading reaches a maximum.
- The system should now be operational. Pick up the receiver of the phone being serviced and verify that a call can be completed/

4) SERVICE INFORMATION

Installation assistance may be obtained by calling (306) 382-3301.

With the exception of the five fuses, your TelePATH North does not contain any field serviceable parts.

Should a problem arise beyond replacement of one the fuses:

1. The defective equipment should be removed and replaced.
2. Contact Critical Telecom at (306) 382-3301 to obtain the required RMA (Return Materials Authorization) number, which must appear on all shipping documentation.
3. Pack product and return prepaid to:

Critical Telecom Corp.
#116 – 116 Research Drive
Saskatoon, Saskatchewan
Canada S7N 3R3

During the warranty period, and subject to the terms of the warranty, the equipment will be repaired and replaced at no charge.

5) SPECIFICATIONS

<u>General</u>	Digital voice coding	32 kbps ADPCM
	Voice delay	<10 ms end-to-end
	Signalling	Hook status, Pulse dialing, T&R polarity, Ring cadence
	Data Rate	Up to 14.4 kbps (supports Bell 212A, V.32bis)
	Insertion Loss	3 dB +/- 1 dB
	Co-located pairs	Up to 8 Line modules may be co-located without co-interference
	Dimensions	6.0"x6.5"x2.5" (HxWxD)
	Weight	600 g
	Operating temperature	Extended -40° to 70° C
	Humidity	0 to 95% non-condensing
<u>Radio</u>	Frequency Range	ISM, 2400-2483.5 MHz
	Channels	8
	RF Modulation	GMSK
	Digital Modulation	Direct Sequence Digital Spread Spectrum
	6 dB Bandwidth	500 kHz to 2.4 MHz
	Output power	64 mW (18 dBm +/- 2.5 dBm)
	Receiver sensitivity	-88 dBm @ 10e-3 BER
<u>Phone</u>	Antenna types	6 dBd directional planar (Antenna Specialists ASPPT2988)
	Tip and Ring Interface	625 Ω +/- 125 Ω , loop-start
	Ringing Voltage	> 45 Vrms, 0 Vdc offset @ 1 REN
	Ringing Frequency	20 Hz +/- 1 Hz
	Ringer Waveform	Pseudo-sinusoidal
	On-hook Battery Voltage	-42.75 Vdc to -56 Vdc
	Off-hook DC loop current	25 mA (max)
	Supply Voltage	10 to 36 Vdc
	Supply Power	3.25 W (typical 12 Vdc)
	Power Termination	Screw Terminal (2 position) + / -
	Loop Termination	Screw terminal (2 position) T / R
	Cable Access	Weather resistant strain relief
	Antenna Termination	External reverse TNC connector
<u>Line</u>	Protection	Secondary
	Tip and Ring Interface	600 Ω +/- 100 Ω , loop-start
	Ringing load	< 1 REN
	Ring detect	40 - 120 Vrms
	Supply Voltage	10 to 36 Vdc
	Supply Power	2.0 W (max)
	Power Termination	Screw Terminal (3 position) + / - / Earth ground
	Loop Termination	Screw terminal (2 position) T / R
	Burst-sync Termination	Screw Terminal (4 position) M, D, /D, G
	Cable Access	Weather resistant strain relief
	Antenna Termination	External reverse TNC connector
	Protection	Primary, Secondary
<u>Craft Support</u>	Power On Indicator	Green LED
	Comm. Link Indicator	Green LED
	RF Receive Signal Strength	0 Vdc to 1.2 Vdc
	Registration (REG)	Push-button switch
	System Reset (RESET)	Push-button switch
<u>Certification</u>	FCC	Part 15 Subpart B and C – pending Part 68 Subpart D – pending
	Industry Canada	RSS210 Issue 2, CS03 Issue 8 – pending

6) LIMITED WARRANTY

The TelePATH North product is warranted against manufacturing defects for one year from date of purchase. Within this period Critical Telecom Corp. will repair the product without charge for parts and labour. Warranty does not cover transportation costs. Nor does it cover a product subjected to misuse, accidental damage, or unsuitable operating conditions. Except as provided herein, Critical Telecom makes no warranties, expressed or implied, including warranties of merchantability and fitness for a particular purpose.

7) CUSTOMER INFORMATION

A) ANALOGUE DEVICE WARNINGS

This equipment complies with Part 68 of the Federal Communications Commission (FCC) rules for the United States.

A label is located on the underside of the base unit containing the FCC registration number and Ringer Equivalence Number (REN). You must upon request, provide the following information to your local telephone company:

Facility Interface Code: NE9TM2001

Service Order Code:

USOC Jack Type: RJ-11

REN: 0.4 B

Should you experience trouble with this telephone equipment, please contact:

***Critical Telecom Corp.
#116 – 116 Research Drive
Saskatoon, Saskatchewan
Canada S7N 3R3***

The REN is used to determine the quantity of devices, which may be connected to the telephone line. Excessive RENs on the telephone line may result in the devices not ringing in response to an incoming call. In most, but not all areas, the sum of RENs should not exceed five (5.0). To be certain of the number of devices that may be connected to a line as determined by the total RENs, contact the local telephone company.

If trouble is experienced with this equipment (TelePATH North), for repair or warranty information, please contact Critical Telecom Corp. at (306) 382-3301. If the equipment is causing harm to the telephone network, the telephone company may request that you disconnect the equipment until the problem is resolved.

Your telephone company may discontinue your service if your equipment causes harm to the telephone network. They will notify you in advance of disconnection, if possible. During notification, you will be informed of your right to file a complaint to the FCC.

Occasionally, your telephone company may make changes in its facilities, equipment, operation, or procedures that could affect the operation of your equipment. If so, you will be given advance notice of the change to give you an opportunity to maintain uninterrupted service.

B) INDUSTRY CANADA WARNINGS

NOTICE:

The Industry Canada label identifies certified equipment. This certification means that the equipment meets telecommunications network protective, operational, and safety requirements as prescribed in the appropriate Terminal Equipment Technical Requirements document(s). The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be co-ordinated by a representative designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

Caution: Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

NOTICE: The Ringer Equivalence Number (REN) assigned to each terminal device provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination on a module may consist of any combination of devices subject only to the requirement that the sum of the Ringer Equivalence Number of all the devices does not exceed 5.

C) RADIO INTERFERENCE STATEMENT

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for Class B Digital Device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experience radio/TV technician for help

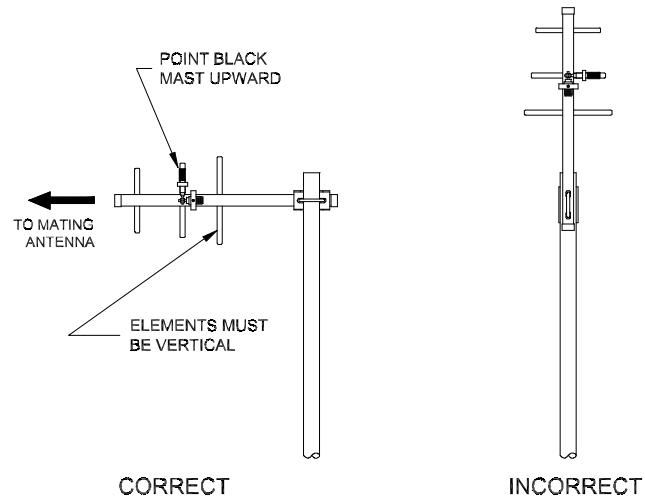
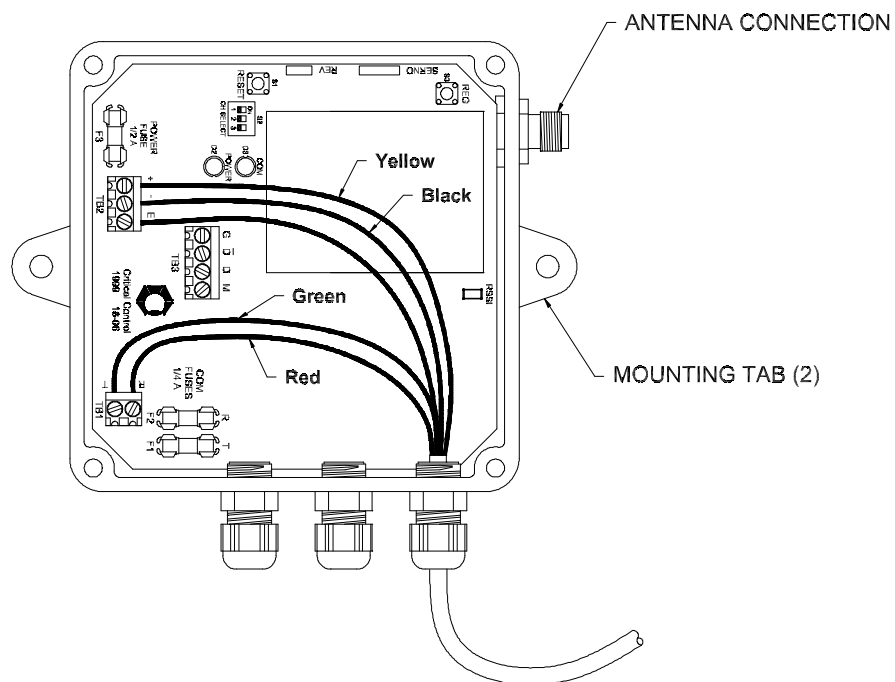
Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This Class B digital apparatus complies with Canadian ICES-003.

(French Version)

L'utilisation de ce dispositif est autorisée seulement aux conditions suivantes: (1) Ils ne doit pas produire de brouillage, et (2) L'utilisateur du dispositif doit être prêt à accepter tout brouillage radioélectrique reçu, même si ce brouillage est susceptible de compromettre le fonctionnement du dispositif.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

**Figure 1: Antenna Orientation****Figure 2: Line Module Wiring**

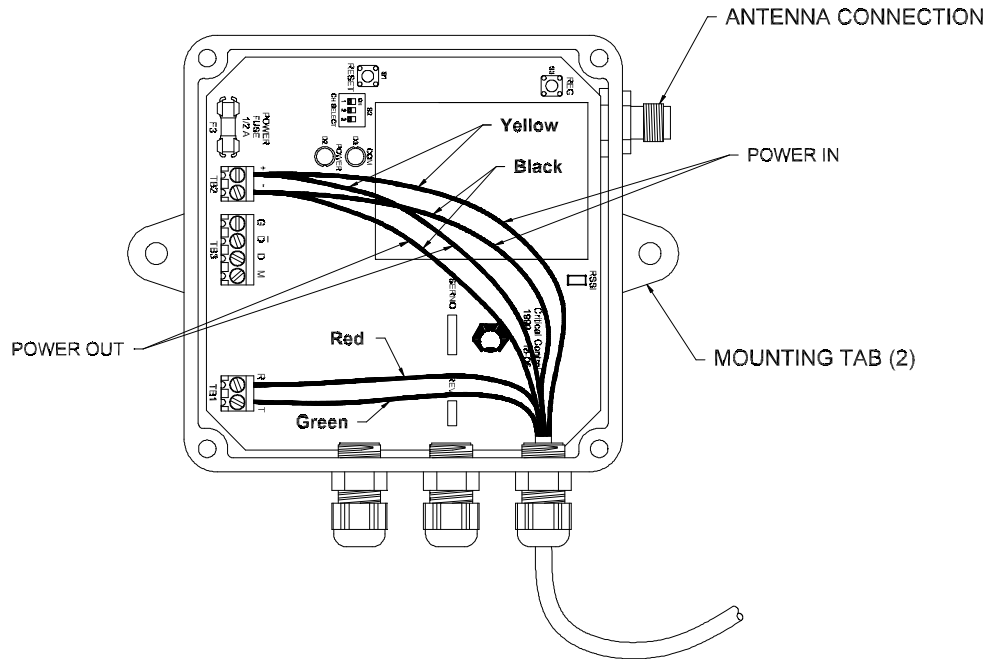


Figure 3: Phone Module Wiring

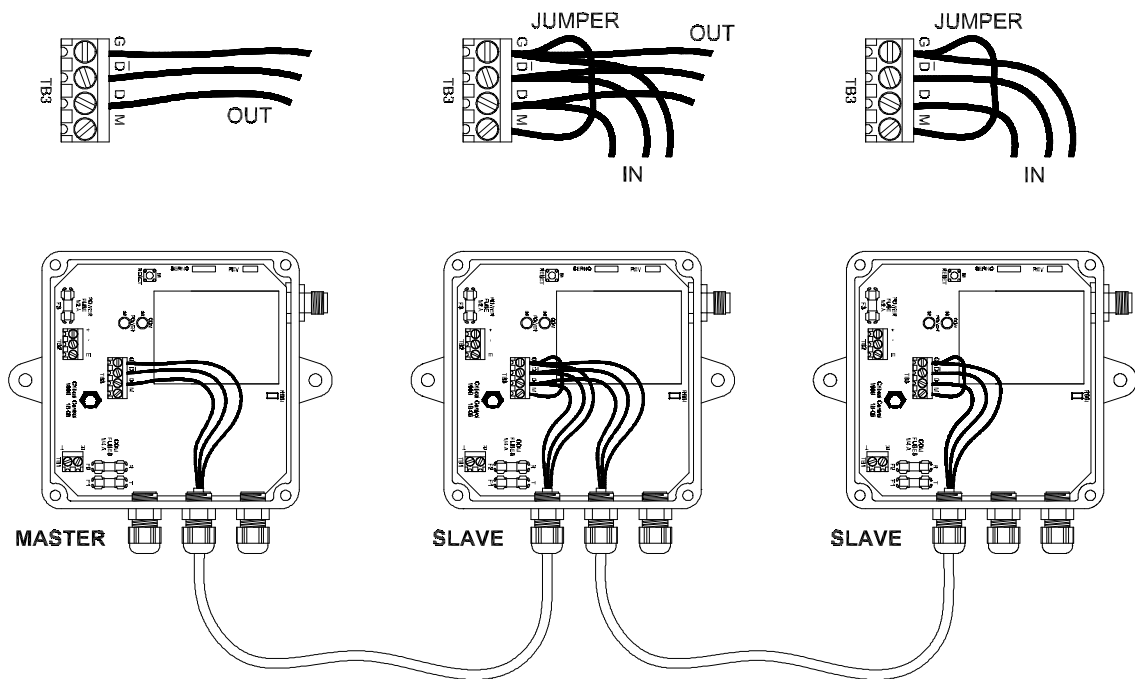
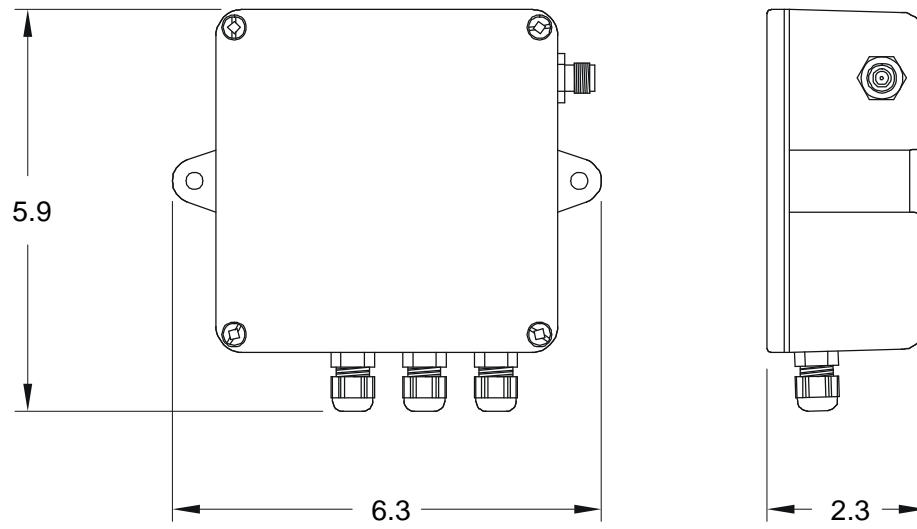


Figure 4: Master – Slave Wiring for Multiple Line Installations

**Figure 5: Enclosure Dimensions**

CH	POSITION
0	ON <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3
1	ON <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3
2	ON <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3
3	ON <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3

CH	POSITION
4	ON <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3
5	ON <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3
6	ON <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3
7	ON <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3

Figure 6: Channel Selection using Dip-switch