Appendix C MTL Power Supplies for Non-Incendive Fieldbus Applications

The MTL9111-NI and the MTL9112-NI Power Supplies can be used to power field devices in Zone 2 / Division 2 hazardous areas for conventional Non-Incendive and FNICO (Fieldbus Non-Incendive COncept) applications. The MTL9111-NI power supply can power up to nine (9) 20 mA devices in Gas Group IIC/Groups A-D and the MTL9112-NI power supply can power up to sixteen (16), 20 mA devices in Gas Group IIB/Groups C and D. Ensure that the fieldbus devices and all components used in the application are rated and certified for Non-Incendive applications in these Gas Groups. With the exception of NI power supplies, many fieldbus components (H1 card, terminators, and wiring components) are the same for Non-Incendive installations and other types of fieldbus installations.

The MTL9111-NI and 9112-NI power supplies can be used in either of the following applications:

- Conventional Non-Incendive circuits. For Non-Incendive/ExnL applications in which the wiring is energy limited; cable parameters must be considered.
- FNICO circuits in which cable parameter calculations are not required. FNICO is similar to FISCO and is described in MTL Application Note AN9027.

The MTL9111-NI and 9112-NI power supplies have a host side terminator switch and a host side power switch on the front of the unit. The terminator on the field side is permanently connected. Both power supplies are fieldbus repeater power supplies that repeat the fieldbus signal from the field to the host and power both the fieldbus segment and the host.

Refer to the MTL documentation and/or visit the DeltaV website (www.easydeltav.com) and follow the links to MTL for additional information on their products.

Note *The Series 2 H1 card requires a power supply for each port in Non-Incendive applications. The MTL9111-NI and 9112-NI Power Supplies can provide this power.*

DC Power Considerations for Non-Incendive Power Applications

The available current to power a field device depends on the length and resistance characteristics of the fieldbus cable. Table 10 shows the maximum distances in meters for a given load on the 9111-NI power supply and Table 11 shows the same information for the 9112-NI power supply. The following assumptions are made:

- MTL9111-NI Power Supply voltage is 12 VDC at 180 mA at 0° C
- MTL9112-NI Power Supply Voltage is 12.8 VDC at 320 mA at 0° C
- Minimum Device Voltage = 9.5 VDC (.5V device margin)
- Each device has an average load of 20 mA
- Fieldbus Type A 18 AWG cable @ 22 ohms/km is used
- Cable Resistance (Type A) = 22 Ohms/km x 2 (loop) = 44 Ohms/ km
- Devices are connected on one end of the cable and the fieldbus power supply is connected on the other end of the cable
- Maximum Distance (km) = (Allowed Loop V drop / Loop current) / Loop resistance per km

There will be different restrictions and limitations on your segment if these assumptions do not hold for your segment layout. If your devices average more than 20 mA per device, reduce the maximum cable length indicated in the table for that number of devices or reduce the number of devices on that segment.

Table 10 Distance per Load on 9111-NI Power Supply

Number of field devices	Power Supply Load (mA)	Maximum Distance (meters)
1	20	1000
2	40	1000
3	60	940
4	80	710
5	100	560
6	120	470
7	140	400
8	160	350
9	180	310

Table 11 Distance per Load on the 9112-NI Power Supply

Number of field devices	Power Supply Load (mA)	Maximum Distance (meters)
1	20	1900
2	40	1870
3	60	1250
4	80	930
5	100	750
6	120	620
7	140	530
8	160	460
9	180	410
10	200	370
11	220	340
12	240	310
13	260	280
14	280	260
15	300	250
16	320	230

Warning In any hazardous area installation it is important to read and follow the device manufacturer's design and installation documents. Failure to follow the documentation could result in an unapproved and unsafe application. Additionally, in hazardous locations follow your plant's procedures for making the area safe during installation and maintenance operations.

Host Power

Both the MTL9111-NI and 9112-NI power supplies can provide power to the host in the safe area. The supplies are rated at 30 mA and are capable of providing host power for either the simplex or redundant Series 2 H1 cards. The distance between the host and the NI power supply can exceed 1000 meters.

Installing the Non-Incendive Power Supplies

The MTL9111-NI and 9112-NI power supplies install on a DIN Rail and are powered by a typical bulk 24 VDC power supply. The power supplies connect to the segment wiring to power the fieldbus devices that are not self-powered. On the top of each supply is a 3 pin connector for connection to the safe area host fieldbus and a 3 pin connector for connection to the safe area 24 V power. On the bottom of each supply is a 3 pin connector for connection to the NI area. The following figure shows the connectors.

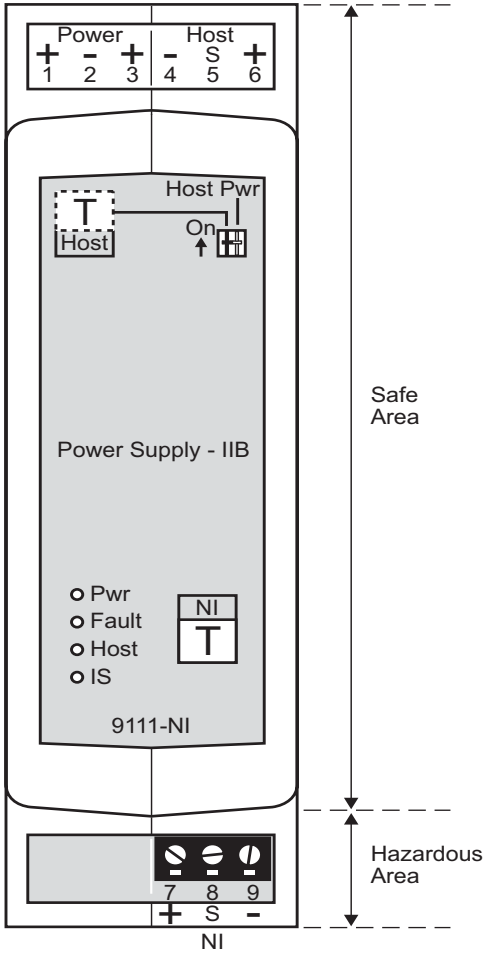

Figure 20 Connectors on the MTL 9111 and 9112-NI Power Supplies

Note *The hazardous area wiring must remain separated from the safe area wiring. This includes the shield drain wires as they must be separate wires all the way to the ground connection.*

➢ **To wire the safe area**

The 24 VDC power input and host connectors are on the top of the power supply.

1. Connect the primary power supply positive (+) wire to pin 1.
2. Connect the primary power negative (-) 24 V return to pin 2.
3. Connect a secondary power supply positive (optional) (+) wire to pin 3.

If using a primary and secondary 24 VDC power supply, be sure to connect the power supply returns together.

4. Connect the host segment negative (-) to pin 4.
5. Connect the host segment shield to pin 5.
6. Connect the host segment positive (+)

➢ **To wire the hazardous area**

The NI field connector is on the bottom of the power supply.

1. Connect the NI area fieldbus segment positive (+) wire to pin 7.
2. Connect the NI area fieldbus segment shield (S) wire to pin 8 and to a shield ground connection.
3. Connect the NI area fieldbus segment negative (-) wire to pin 9.

Switches

The power supplies have a switchable host side terminator and host power switch. (The field side terminator is permanently connected.)

- Host terminator ON is the upper position; host terminator OFF is the lower position
- Host power ON is the upper position; host power OFF is the lower position

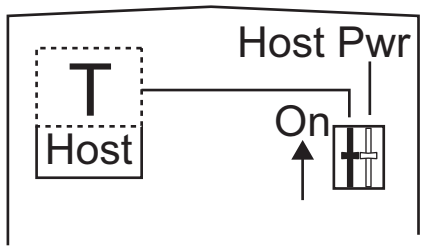

Figure 21 Terminator and Power Switches

The segment layout determines the location of the terminator and if the switchable terminator on the power supply is used. Be sure that two terminators are on the host side and two terminators are on the fieldbus side of each power supply. Similarly, the use of the switchable power capability is dependent upon the needs of the particular NI application. The Series 2 H1 card requires power; therefore, the host power switch should be ON. If more than one NI power supply is connected to the same segment (as in Figure 22), host power should be provided by one unit only. Be sure the additional unit's host power switches are in the OFF position.

Non-Incendive Application Examples

The following two figures show the use of the MTL9111-NI and MTL9112-NI power supplies in NI applications. If a Megablock with short circuit protection is used, the number of devices and total cable length may have to be reduced to ensure that only a single device is affected if a short circuit condition occurs.

Application Example with two MTL9111-NI Power Supplies

The following figure shows an NI application that uses two MTL9111-NI power supplies to power up to 16 devices on the segment. The maximum cable length on the MTL9111-NI portion of the segment is 1900 meters *and* the maximum total cable length per segment is 1900 meters.

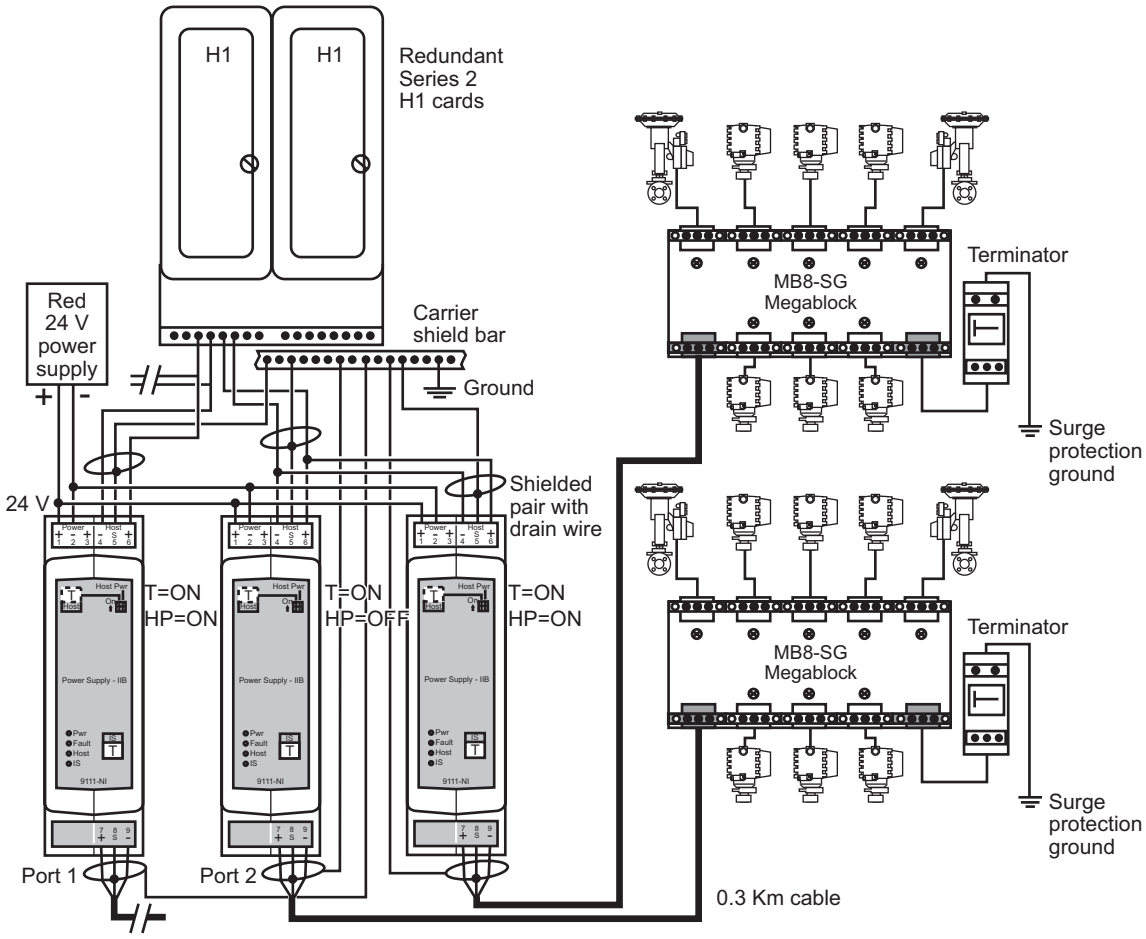

Figure 22 16 Non-Incendive Devices on a Segment with two MTL9111-NI Power Supplies

Note *Ensure that all components are rated and certified for Non-Incendive applications.*

Application Example with one MTL9112-NI Power Supply

The following figure shows an NI application that uses one MTL9112-NI power supply to power up to 16 devices on the segment. The maximum cable length on the MTL9112-NI portion of the segment is 1900 meters *and* the maximum total cable length per segment is 1900 meters.

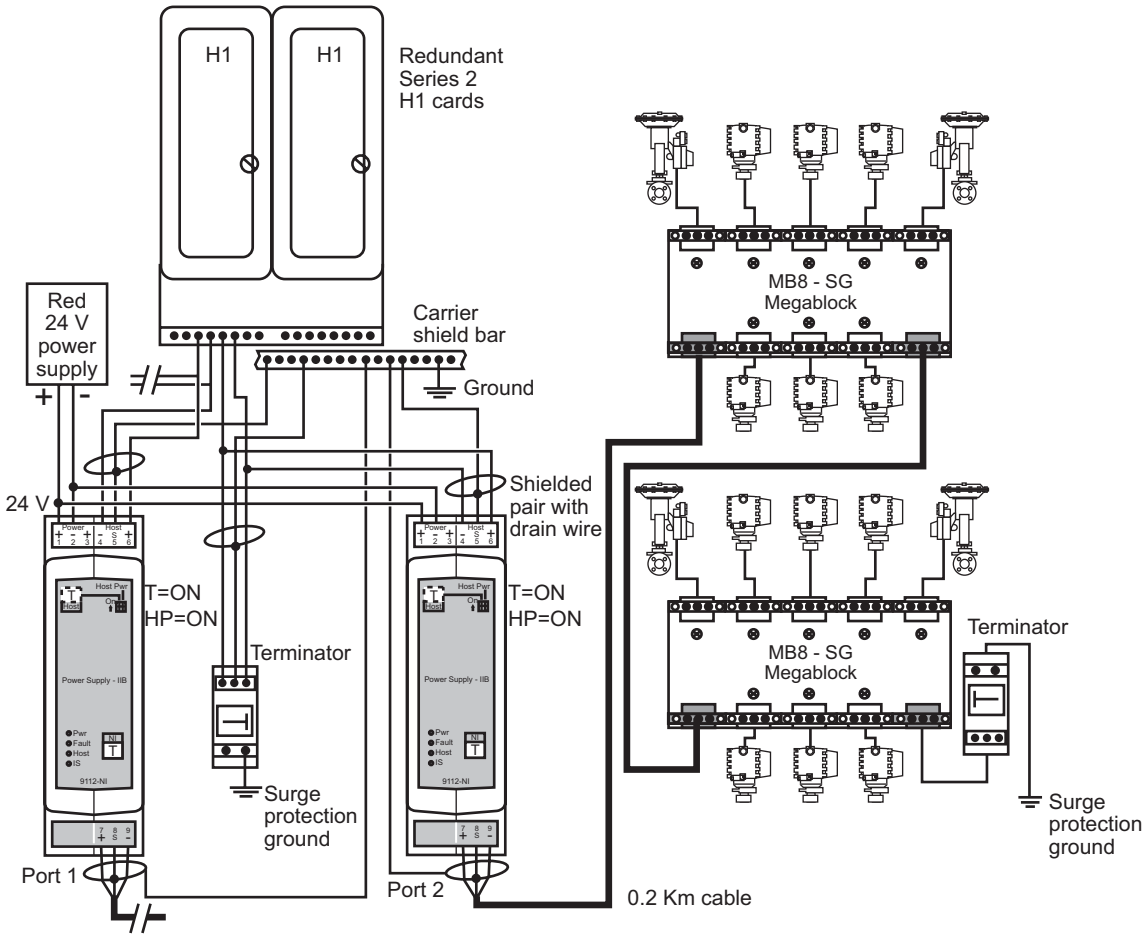

Figure 23 16 Non-Incendive Devices on a Segment with one MTL9112-NI Power Supply

Note *Ensure that all components are rated and certified for Non-Incendive applications.*