



MIU-100
Modem Interface Unit
Datasheet / Manual / Guide

120 Volt AC
9600 Baud Modem
RS 485 Field Connection
RS 232 Programming Port
Intrinsically Safe and Electrically Isolated Output

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Introduction

Congratulations on your purchase of the MIU-100 modem package. Before installation, insure that all of the components are present.

If you have questions about installation/operation, contact your YZ Sales Representative or contact YZ Customer Service at 281.362.6500.

Theory of Operation

The MIU-100 is a low powered industrial modem package for use with the N-300 NJEX odorant injection systems communication capabilities. The MIU-100 package connects to a standard Public Switched Telephone Network, and provides an intrinsically safe RS-485 communications channel to an N-300 controller. The MIU-100 must be mounted in a "Safe Area". See drawings in this manual for installation examples. The MIU-100 is designed to operate under very low power situations and is available with a 120/240 VAC power supply.

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System Standards

All Telenetics dial-up modems are designed to meet the following Standards:

USA: FCC Part 15, Class I and Part 68

Canada: DCO Standards CS-01, CS-02 and CS-03

CANADIAN DEPARTMENT OF COMMUNICATIONS NOTICE

NOTICE: The Canadian Department of Communications (DOC) label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational and safety requirements. The department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment make sure you are permitted to connect it to the facilities of the local telecommunications company. You must install the equipment using an acceptable method of connection. In some cases you may also extend the company's inside wiring for single line individual service by means of certified connector assembly (telephone extension cord). You should be aware; however, that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designed by the supplier. Any repairs or alterations made by a user to this equipment, or equipment malfunctions, may give the telephone communications company cause to request the user to disconnect the equipment.

For your own protection, make sure that the electrical ground connection 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: Do not attempt to make electrical ground connections yourself, contact the appropriate electric inspection authority or an electrician.

NOTICE: The load number (LN) assigned to each terminal device denotes the percentage of the total load to the telephone loop used by the device, to prevent overloading. The termination on a loop may consist of any combination of devices, subject to the requirement that the total of the load numbers of all devices does not exceed 100.

System Specifications

Operating Temperature	-20 to +85 deg. C.
Operating Humidity	0 to 90% (non-condensing)
Storage Temperature	-55 to +85 deg. C.
Surge Protection	Power supply 8kVrms Analog line 3.75kVac Digital line +/-10kV
Standards	V.34, V.32bis, V.22bis, V.22, Bell-212A, and Bell-103
Modem Line Speeds	14400, 9600, 4800, 2400, 1200, 300 (bps)
DTE Rates	57600, 38400, 19200
Error Correction/Compression	MNP 2, 3, 5 & 10, V.42, V.42bis

Note: The MIU-100 system must be mounted in a "Safe Area" ONLY.

Physical Installation

Mounting

The MIU-100 Panel is designed to mount to a 2" vertical pipe. This pipe is not a part of the MIU-100 system, and is to be provided and installed by the customer at the site, in an appropriate location classified as a "Safe Area". The MIU-100 panel should be attached to the 2" pole utilizing the U-Bolts, and mounting clamps that are provided as a part of the MIU-100 system.

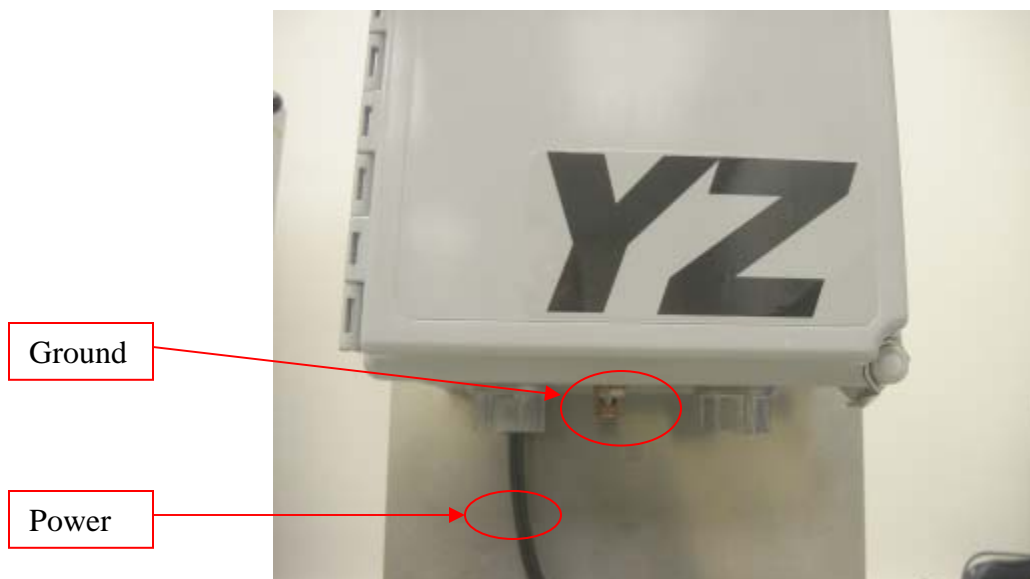


Ground

Connect the ground lug on the bottom of the MPS (MIU Power Supply) to an earthed grounding rod. Resistance from the grounding lug to the grounding rod should be less than 1 ohm.

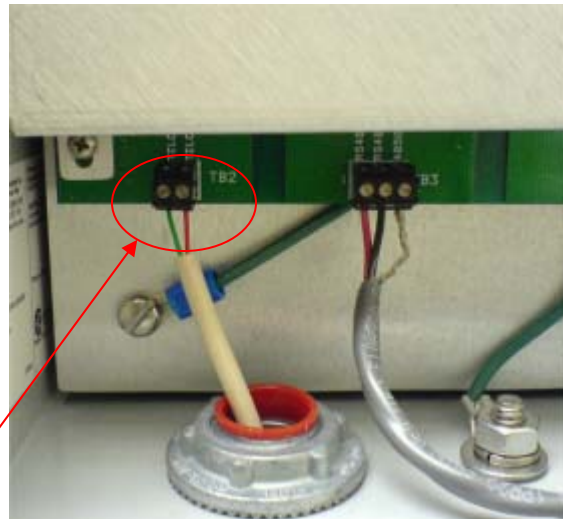
Power

Connect the AC Power to the cable provided. White is neutral, Black is hot, Green is supply ground.



Telephone Line

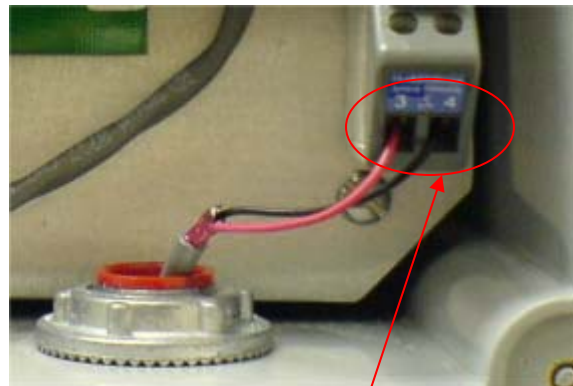
A phone line cable should be installed into the left most Myers hub on bottom of the modem enclosure, and connected to TB2 terminals #1 and #2. TB2-1 should be connected to the phone line green wire, which is designated as the "tip" connection, and TB2-2 should be connected to the phone line red wire, which is designated as the "ring" connection.



TB2

RS-485

An appropriate cable for the RS-485 communications link must now be installed. A typical cable will be Beldon 9841 or equivalent (UL Style 2919). It should be routed to the modem enclosure through the right most Myers hub connection in the bottom of the modem enclosure. Connect the TD (A) signal from the N-300 controller(s) TB1-12 to the channel 3 on the hazardous side of the barrier in the modem enclosure. Connect the TD (B) signal from the N-300 controller(s) TB1-11 to channel 4 on the hazardous side of the barrier in the modem enclosure. Additionally the shield wire in the cable should be connected to TB-1-13 ONLY, and should not be connected to anything at the MIU.



Barrier

Barrier	Wire	N-300 TB1
3	Red	12
4	Black	11
None	Shield	13

Operation

N-300

Verify that the MM-300 is properly set up to communicate with the N-300 controller. Verify that the MODBUS Device Address in the N-300 controller. Verify the N-300 COMM ports are set up for Sentry communication on COMM 2. (Refer to the NJEX System User's Manual for configuration information)

Sentry4

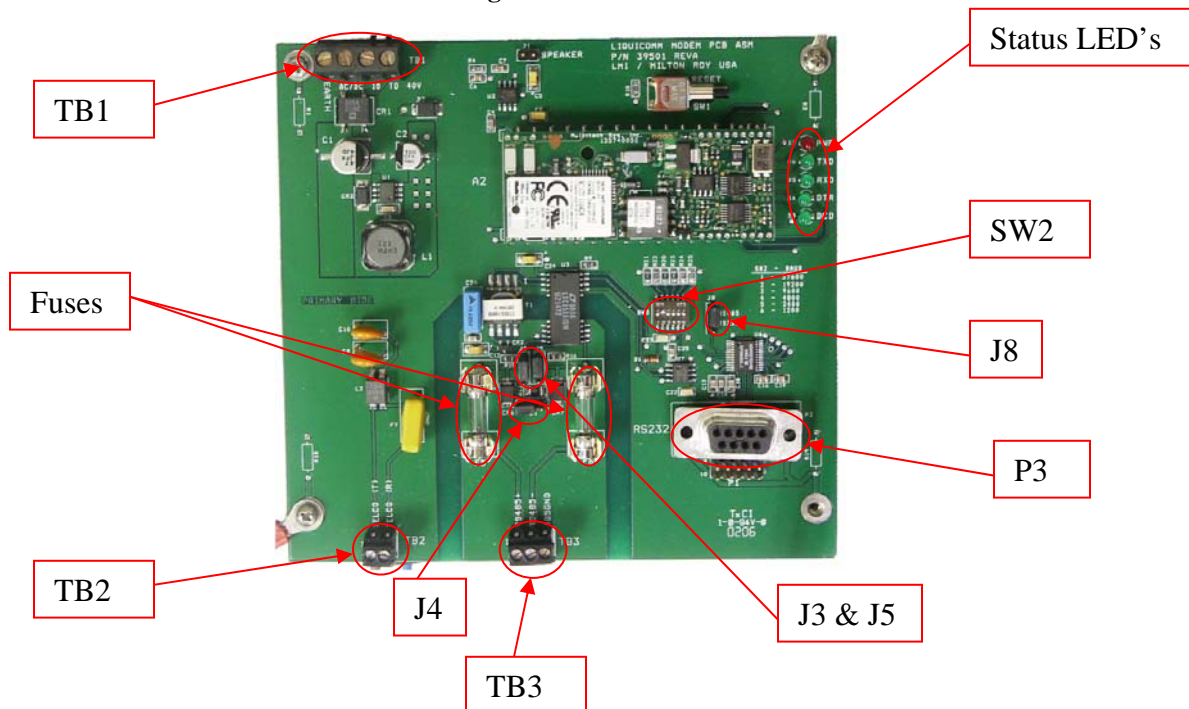
Follow instructions in the SENTRY4 user's manual to set up software to dial the MIU-100, and access the N-300 system(s).

Modem Carrier

LED's indicate Modem Status.

Power:	Red	Indication that the modem has power.
TX Data:	Green	Indication the modem is transmitting data to the host.
RX Data:	Green	Indication the modem is receiving data from the host.
DTR:	Green	Indication the modem is waiting for a host to call.
DCD:	Green	Indication the modem is connected and detects a carrier.

Image 1 Modem Carrier



Troubleshooting

Modem Carrier

Status LED's

	INITIAL POWER UP	CONNECTED DATA PRESENT	CONNECTED NO DATA PRESENT	RS485 WIRING REVERSED OR INCORRECT 485 GND*
POWER	ON	ON	ON	ON
TX DATA	OFF	BLINKING	OFF	ON
RX DATA	OFF	BLINKING	OFF	OFF
DTR	ON	OFF	OFF	ON
DCD	OFF	ON	ON	OFF

Note: The TX and RX LED's should never show activity at the same time. Generally the RX LED will blink to show a query from the software PC, then after a brief delay the TX LED will blink indicating a response from the controller.

* The modem will not usually answer an incoming call when the RS485 wires are reversed or the RS485 ground is connected incorrectly.

Power Connection TB1

Polarity of input does not matter. Power input should be between 10 and 40 Volts AC or DC. TB1 terminals are numbered right to left as viewed in Image 1. TB1-1 and TB1-2 bring power to the Modem carrier board. TB1-3 is not used. TB1-4 brings earth ground to the Modem carrier board. The RED LED will blink or not illuminate at all if the supply voltage isn't stable.

RS 485 Connection TB3

RS485 network connections are fused for safe operation with a 5X20mm 200mA fuse in each signal path. Voltage measured across a fuse indicates a blown fuse. 120 Ohm network termination is controlled by J4. Left J4 position = on. Right J4 position = off. (*This is the default.*) Network Bias is controlled by J3 and J5. Down J3 and J5 position = on. Up J3 and J5 position = off. (*This is the default.*) Bias voltage is isolated. RS485 Baud Rate is controlled by SW2. This adjustment controls the turn around delay for RS485 driver. Only one dip switch should be on at a time. For use with Sentry4 software this must be 9600. (*This is the default.*)

RS232 Connection P3

Connection may be made with a straight through male to female RS232 cable. This connection is used to program the modem module.

PC

Failure to establish a connection

Make sure the PC modem used by Sentry4 is configured with flow control disabled. Configure the modem to limit the maximum connection baud rate to 9600 (V.32b). This is usually necessary if a connection can be readily established when Sentry4 software initiates the call, but a connection cannot be established when the N-300 controller initiates a call (alarm callout).

NOTE: Consult the manual for your PC modem used by Sentry4 for information on configuring the modem settings. A modem initialization string can be entered into Sentry4 modem configuration file "ModemInit.txt" using a text editor. This file is located under the Sentry4 directory.

Make sure that the Sentry4 software is configured with the proper phone number. (Refer to Sentry4 User Manual for assistance.)

Modem Module

Modem Programming

The modem module can be programmed using HyperTerminal or other similar program via serial port on a laptop or PC.

1. Move Jumper J8 on the Modem Carrier Board to the RS232 position. Visually inspect the jumper pins.
2. Plug the standard RS232 DB9 cable from the PC into connector P3 on the Modem Carrier Board.
3. Open the HyperTerminal program on the PC.
 - a. In HyperTerminal, select File then Properties.
 - b. On the "Connect To" tab select the comm. Port you will use from the "Connect Using" drop down menu.
 - c. Under Configure select 9600 baud, 8 data bits, 1 stop bit, none flow control.
 - d. Click the Call icon on the toolbar.
4. Type AT&V and enter.
 - a. The modem should respond by listing the modem parameters as shown below. If not, try a few times, this allows the system to perform auto baud detect if needed.

With the factory programming, the modem response codes and local echo are disabled with commands E0 and Q1. To view responses and commands, set these parameters to E1 and Q0. Make sure these are returned to the proper configuration before putting the unit back into normal service. Failure to do so will cause the communications to fail or be unreliable.

To reprogram a unit from factory default perform the following:

1. Using HyperTerminal, connect to the modem as described earlier.
2. Type AT&F0 and enter. This will reset the modem to factory defaults.
3. Press the reset button the modem.
4. From HyperTerminal enter the following commands press enter after each command.
 - a. AT&K0 – response OK (Disables flow control)
 - b. AT&D0 – response OK (Modem ignores DTR)
 - c. AT&S0=2 – response OK (Auto Answer on ring 2)
 - d. AT+MS=V90,1,9600,9600,9600,56000 – response OK (Establishes preferred connection type and data rates)
 - e. ATE0 – response OK (Disables local command echo)
 - f. ATQ1 – no response will be seen (Disables modem results responses)
 - g. AT&W0 – no response will be seen. (Saves settings to NV memory profile 0)
 - h. AT&V – response will be the parameters listing (Lists stored parameters)

The following commands can be used to query the configuration parameters not listed by the AT&V command.

AT+MS? and enter – The result will be the current modem connection type and data rate information. This parameter is not listed when executing the AT&V command. The proper response should be +MS: V90,1,9600,9600,9600,56000.

The key parameters above are E0, Q1, &D0, &K0, S00:002. The active profile should match stored profile 0.

RS485 network

USING BIASING AND TERMINATION TO IMPROVE COMMUNICATIONS:

The normal default configuration disables the biasing and termination for the RS485 communications hardware. Generally these jumpers can be left in the factory default state but can be useful in improving the communications reliability in noisy environments or when long cable lengths are encountered (max. 4000ft). Enabling the Biasing can help keep the 485 signals referenced to the power and ground of the slave unit. If other attached equipment on the 485 network also support biasing, only enable biasing in one device. Normally only the modem should provide biasing in this situation. Termination places a 120ohm resistor across the + and – 485 signals. When enabling termination, both ends of the network should be terminated at the furthest points. So if multiple devices were on the 485 network, only the modem and device at the other end of the cabling would have termination enabled. Network connections should run from one device to the next.

USING HYPERTERMINAL FOR TROUBLESHOOTING:

HyperTerminal can also be used to monitor the data traffic between the controller and PC while in RS485 normal mode by leaving HyperTerminal running and the RS232 cable connected. Make sure jumper J8 is in the RS485

mode. The data seen will be in ASCII format, and not necessarily useful but the amount of data and any delays or retries can be distinguished. If data is being sent to the controller but nothing sent from the controller as a response, you will see only a few characters of data then a delay then a retry etc. until the connection is terminated. If a modem will not answer, you can go to the RS232 programming mode, and enter the command ATQ0 and ATE1 this will enable the response codes and echo. Now when an incoming call is seen, the modem should send out a RING message to HyperTerminal. If the ring message is not seen, then check the phone line connections and phone line functionality. If the ring message is seen but the modem does not answer, it is usually due to improper RS485 wiring, grounding, or poor system ground.

Also with the ATQ0 and ATE1 settings with jumper J8 in RS232 mode, you can use HyperTerminal to answer the phone manually, and see what connection message if any is received. When the ring message appears in HyperTerminal and the modem does not auto answer, enter the command ATA to answer the call manually. Once the modem negotiates a connection, you should see a connect message. Noisy phone lines may cause the dial in attempt to fail if the modem cannot negotiate the baud rate used by the slave device. In this case, a slower baud rate can be selected for MODBUS (9600, 4800 ... 300). To change the Baud rate, you must first configure the slave baud to the appropriate rate. Next using HyperTerminal enter a +MS command that will allow the modem to connect at the slower rate. For 9600 Baud enter:
+MS=V90,1,9600,9600,9600,56000 – response OK.
For a slower rate, replace the 9600 entries with the new baud rate.
Set the Baud rate selection switch SW2 to the appropriate Baud rate.

The RS485 port of the slave can be tested using a PC and RS232/485 converter. B&B Electronics makes a USB to RS485 converter that is easy to use. The converter plugs directly into a USB port on a PC and wire directly into the slave RS485 terminal block connections. You can then use the host software to directly connect to the slave to verify proper operation of the host and slave.