INSTRUCTION MANUAL

for the

Whessoe Varec Model 6840

Tank Polling Unit (TPU)

Document Number 33-10495

Installation, Operation, Maintenance and Troubleshooting

Whessoe Varec
10800 Valley View Street
Cypress, CA 90630-5016 USA
Phone (714) 761-1300 Fax (714) 952-2701

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Acknowledgments

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The Whessoe Varec Model 6840 Tank Polling Unit (TPU) has not been tested by Whessoe Varec under all possible operational conditions, and Whessoe Varec may not have all the data relative to your application. The information in this instruction manual is not all inclusive and does not and cannot take into account all unique situations. Consequently, the user should review this product literature in view of his/her application. If you have any further questions, please contact Whessoe Varec for assistance.

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Safety Precaution Definitions

CAUTION
Damage to equipment may result if this precaution is disregarded.

WARNING
Direct injury to personnel or damage to equipment or data may result if this precaution is not followed.

Safety Precautions

CAUTION
Read and understand this instruction manual before installing, operating or performing maintenance on the Whessoe Varec Model 6840 Tank Polling Unit. Follow all precautions and warnings noted herein when installing, operating or performing maintenance on this equipment.

WARNING
Do not apply power to the Whessoe Varec Model 6840 Tank Polling Unit until all wiring connections have been made. Power to the TPU must be OFF before performing service.

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List of Illustrations

SECTION 1 - INTRODUCTION

Using This Manual

This manual is designed to assist the user with the installation, operation, maintenance and troubleshooting of the Whessoe Varec Model 6840 Tank Polling Unit (TPU), and is organized accordingly.

- Section 1 - Introduction
- Section 2 - Installation
- Section 3 - Operation
- Section 4 - Maintenance and Troubleshooting
- Section 5 - Specifications and References

Getting Acquainted with the Tank Polling Unit

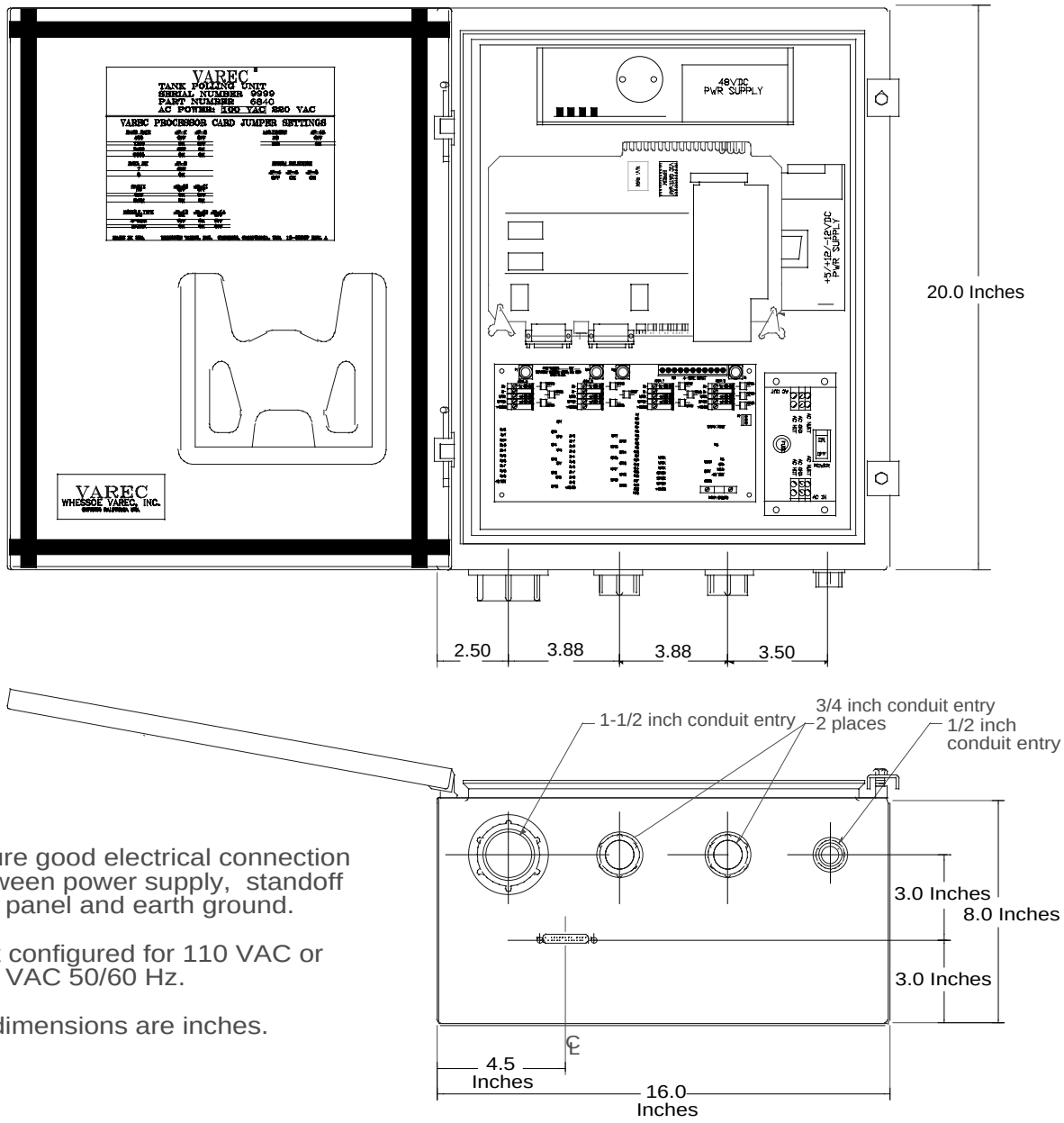
The Whessoe Varec Model 6840 Tank Polling Unit (TPU) is designed to provide a rugged, reliable interface between Whessoe Varec field transmitters and a host computer. The TPU operates as a slave to the host computer. The TPU polls specific transmitters using either the Mark/Space or MODBUS protocol and responds to the host computer with the requested data. Any computer supporting asynchronous serial communication on an RS232 or EIA485 electrical interface can be a host.

A cable connects the TPU and the serial communication port of the host computer. Maximum length of the cable is 50 feet for RS232 and 5000 feet for EIA485 communication. Line drivers or modems can be installed for longer distances. Low capacitance cable may be used for greater distances in certain installations.

The TPU provides 48 VDC to the field transmitters, eliminating the need to run AC or DC power to the field instruments. The 3 Amp power supply is sufficient for up to 96 4-Wire Transmitters.

Use of transmitter boards other than those manufactured by Whessoe Varec can cause power problems. Imitations of Varec transmitters usually draw considerable power and can seriously downgrade system performance. Whessoe Varec does not warranty operation of the Tank Polling Unit when used with equipment not manufactured by Whessoe Varec.

Limiting resistors are found on the 4-Wire daughter board module. Transient and surge protection via gas caps are standard.



Insure good electrical connection between power supply, standoff and panel and earth ground.

Unit configured for 110 VAC or 220 VAC 50/60 Hz.

All dimensions are inches.

Figure 1-1 Whessoe Varec Model 6840 Tank Polling Unit

SECTION 2 - INSTALLATION

Overview

The reliability and functionality of the Whessoe Varec Model 6840 Tank Polling Unit is dependent upon proper installation and location. Install the TPU to minimize vibration, shock and temperature fluctuations.

Configuration requirements for the processor board and TPU include jumper block settings for host serial port settings and other functions. The software data base resides in NVRAM (Non-Volatile Random Access Memory) on the processor board to prevent loss of data when power is turned off.

Commissioning

The Whessoe Varec Model 6840 Tank Polling Unit can be commissioned either before or after installation. Whessoe Varec recommends commissioning the TPU on the test bench prior to installation. This ensures that all TPU components are functioning correctly and provides the user with operational experience.

Standard Equipment

After unpacking, verify receipt of the following:

- Whessoe Varec Model 6840 Tank Polling Unit
- Instruction manual (P/N 33-10495)
- TPU to computer serial cable (50 ft) for RS232 (P/N 120-02-073)
- Eight-foot power cord (P/N P108-07-003)

TPU Jumper Block Settings

The following are the jumper block settings for the Tank Polling Unit. Refer to Figure 2-1, *Jumper Block Locations.*

- Baud Rate

JP8	**JP7**	
OFF	OFF	300
OFF	ON	1200
ON	ON	9600

- Parity

JP11	**JP10**	
OFF	OFF	None
OFF	ON	Odd
ON	OFF	not used
ON	ON	Even

- Mark/Space Communication Speed

JP13	
OFF	Low Speed
ON	High Speed

- Auto Configuration

JP14	
OFF	No Auto Configuration
ON	Enable Auto Configuration

- MODBUS Address (1-247)

JP22	**JP21**	**JP20**	**JP19**	**JP18**	**JP17**	**JP16**	**JP15**	
OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	1
OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	2
OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF	4
OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF	8
.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.
ON	ON	ON	ON	OFF	ON	ON	ON	247

- Reserved

JP1, JP3, JP9, JP12

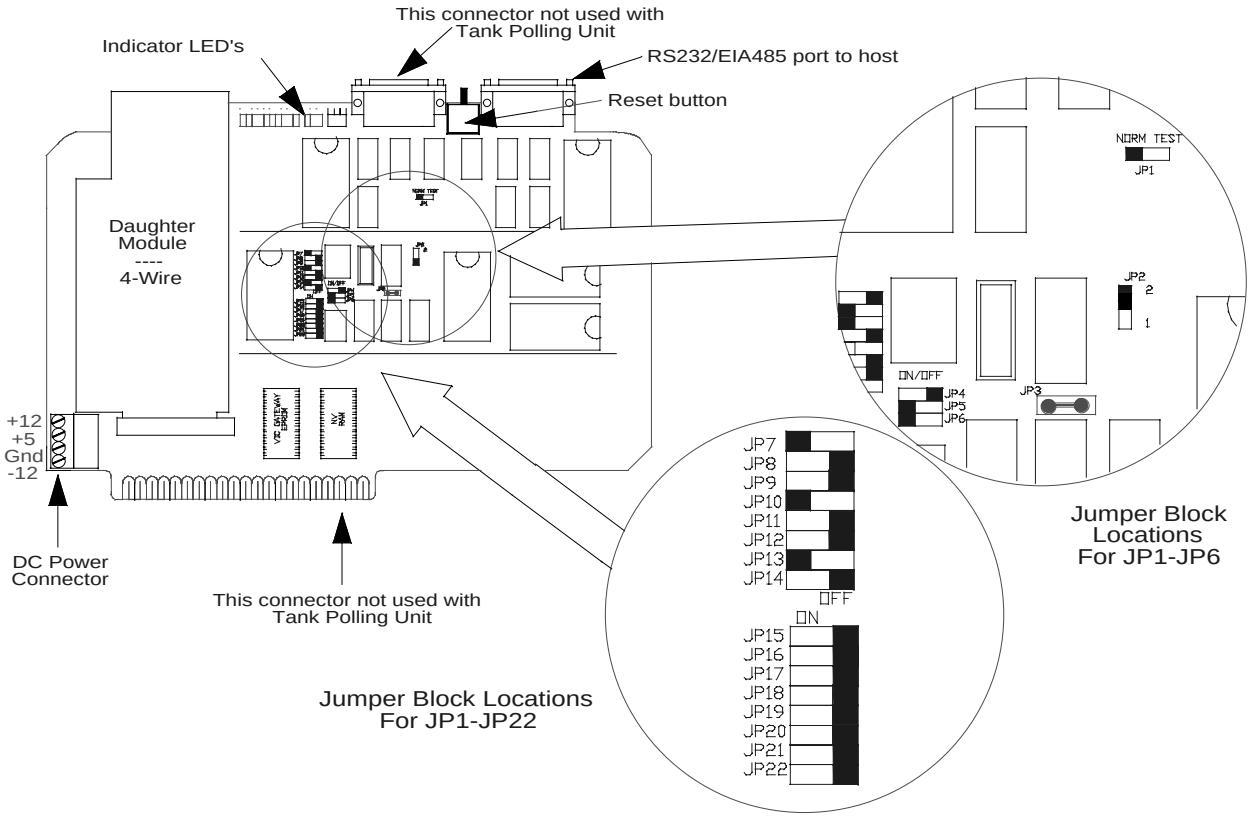


Figure 2-1 Jumper Block Locations

4-Wire Transmitter Wiring

For a 4-wire transmitter gauging system, connect a 4-wire transmitter to the TPU as shown in Figure 2-2, Wiring with 4-Wire Transmitters. Wiring is identical for use with 4-Wire Servo Gauges. The wiring is also similar when wiring the Whessoe Varec Model 4100 Multifunction Transmitter (MFT) or Model 4200 Hydrostatic Interface Unit (HIU). When using the MFT and HIU, care should be given to the power consumption of the transmitters. Each MFT draws about 30 mA, and possibly more depending on the number of HART devices attached to the MFT. It is possible to exceed the 3 Amp maximum load available.

Following are examples of wiring with Series 1900 4-Wire Transmitters, Model 4100 Multifunction Transmitters, Model 6500 Servo Gauges and Model 6603 Tankside Receivers.

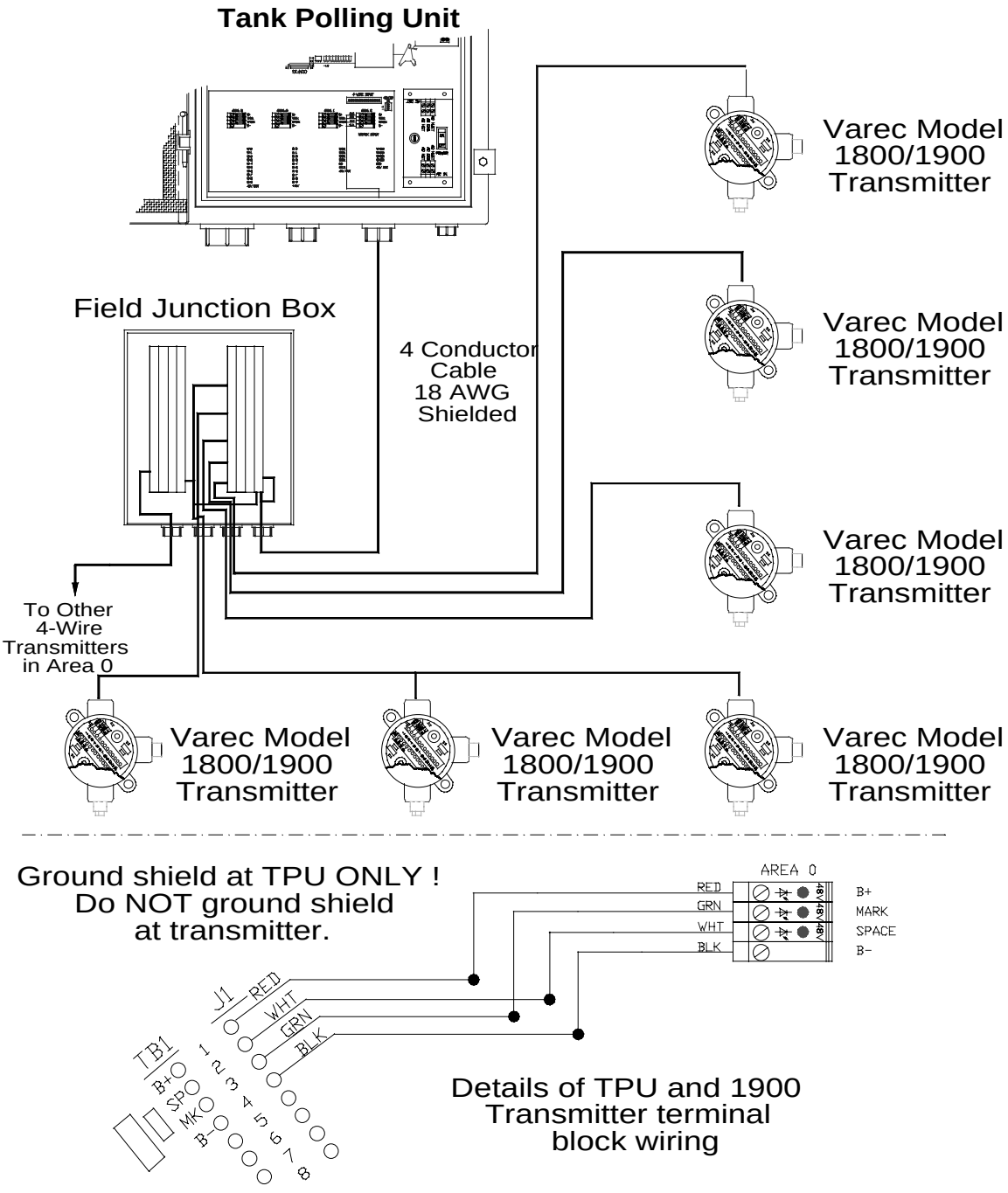


Figure 2-2 Wiring with 4-Wire Transmitters

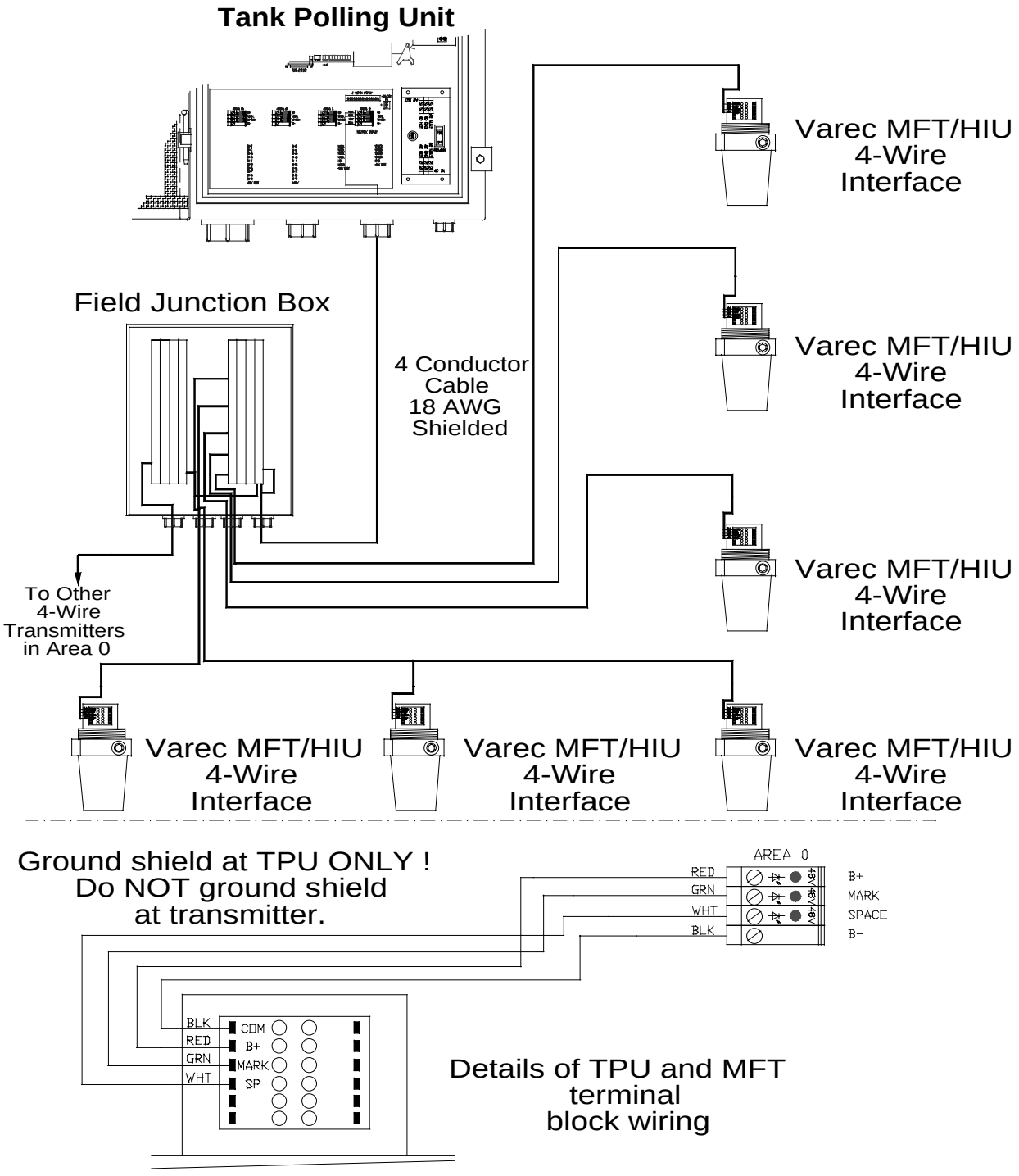


Figure 2-3 Wiring with Multifunction Transmitters

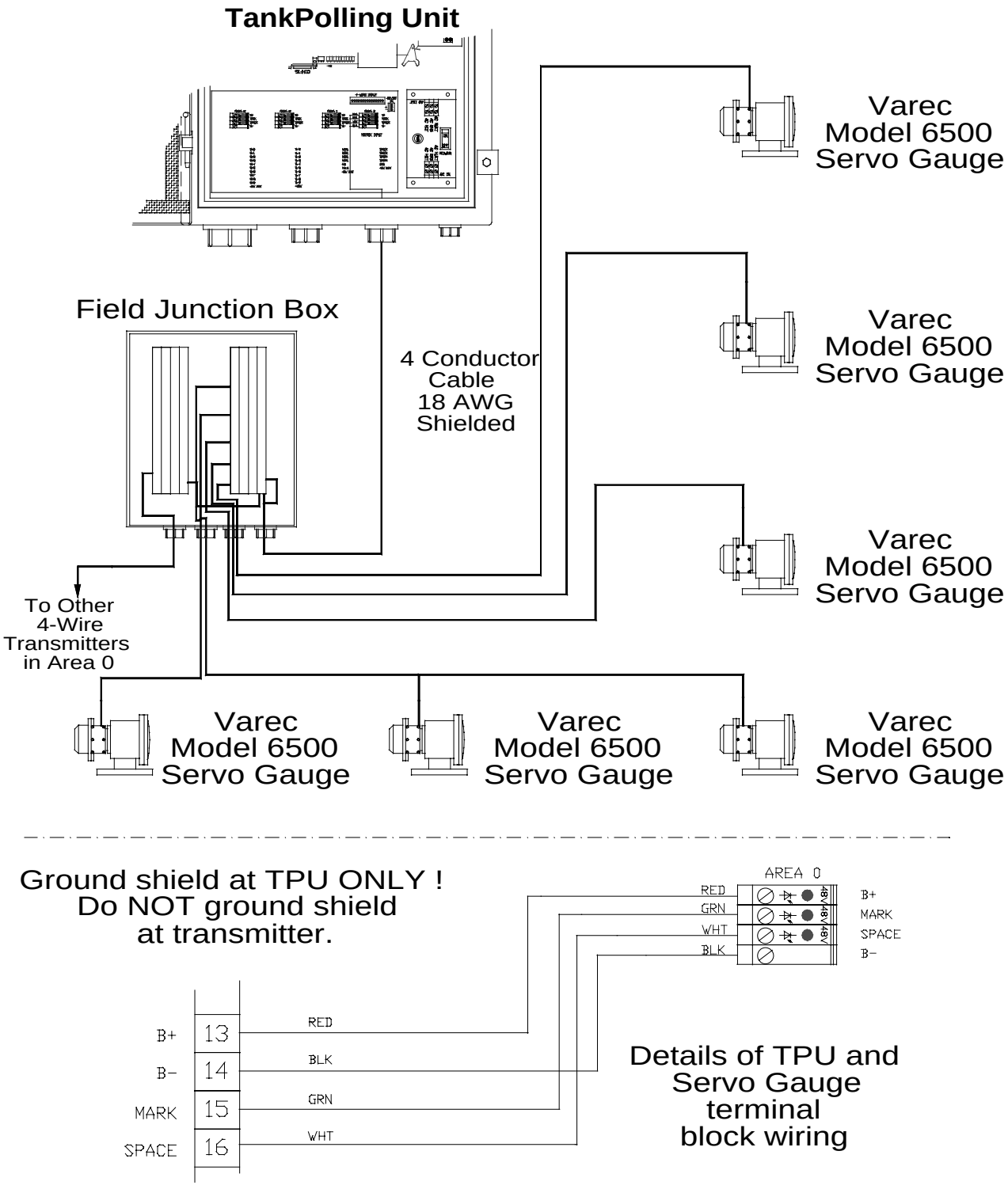


Figure 2-4 Wiring with Servo Gauges

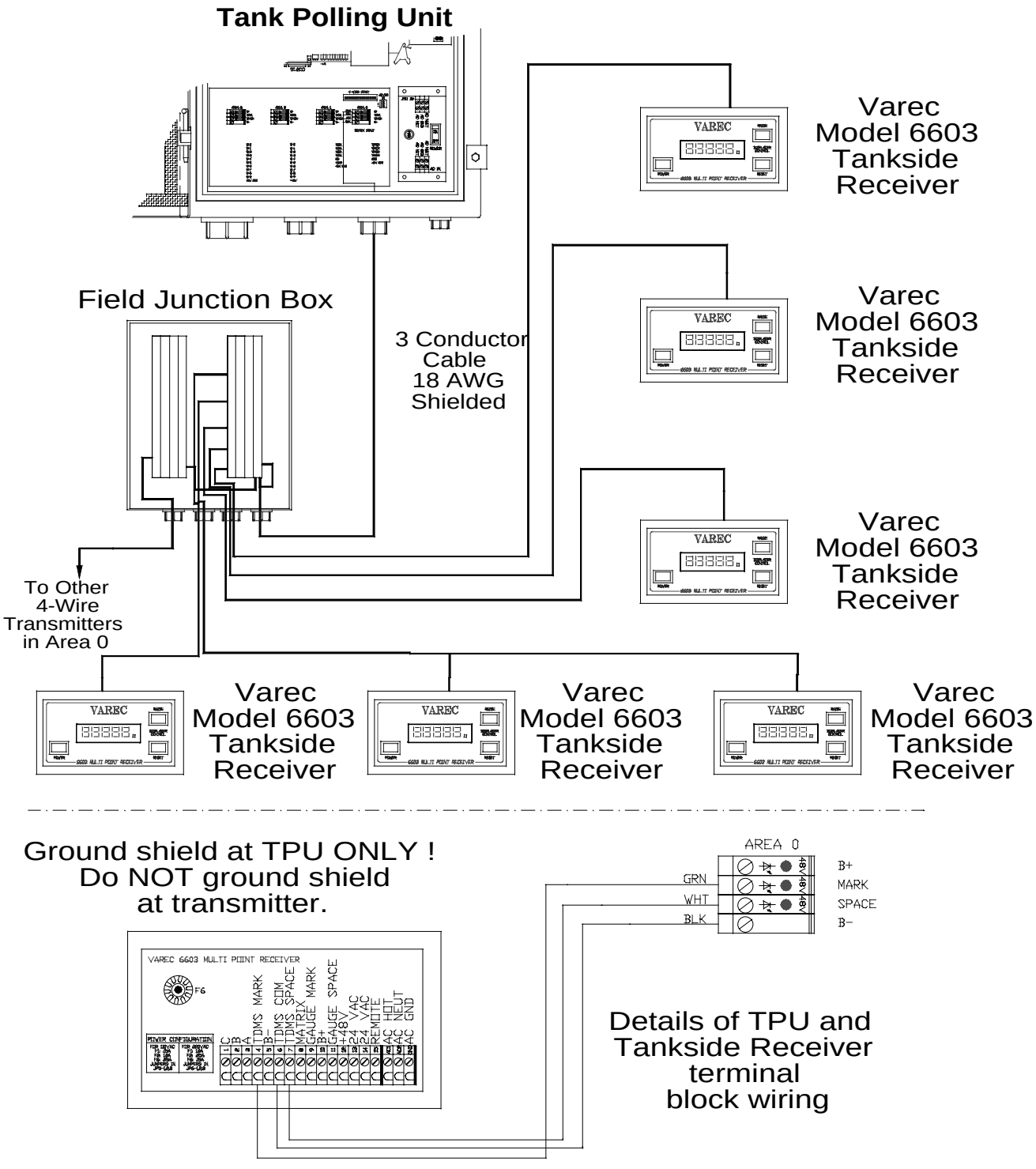


Figure 2-5 Wiring with Model 6603

TPU to Computer Communications

The processor board has a serial connector for use with either an RS232 or EIA485 communication interface

EIA485 Interface

Refer to Figure 2-6, *EIA485 Pin Assignments* for the TPU, for information on how to connect the processor board's serial port to an EIA485 communication interface.

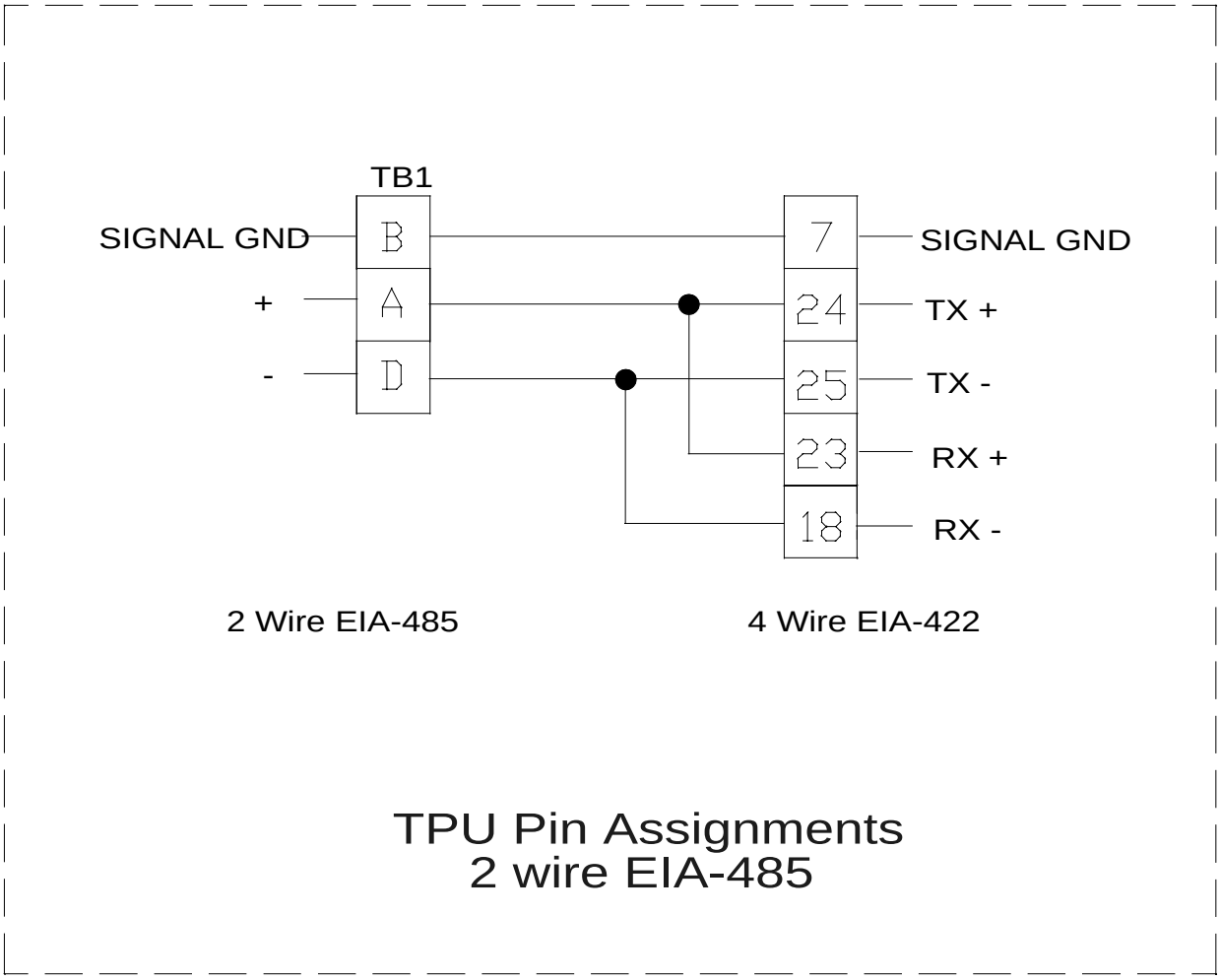


Figure 2-6 EIA485 Pin Assignments for the TPU

RS232 Interface

Connect the supplied cable between the TPU and the serial communication port of the host computer. Figure 2-7 shows the wiring diagram of the 25-pin to 25-pin cable. If the computer has a 9-pin RS-232 connector an adapter is required. It is very important that the shield of the cable be connected to pin 1 on both ends of the cable.

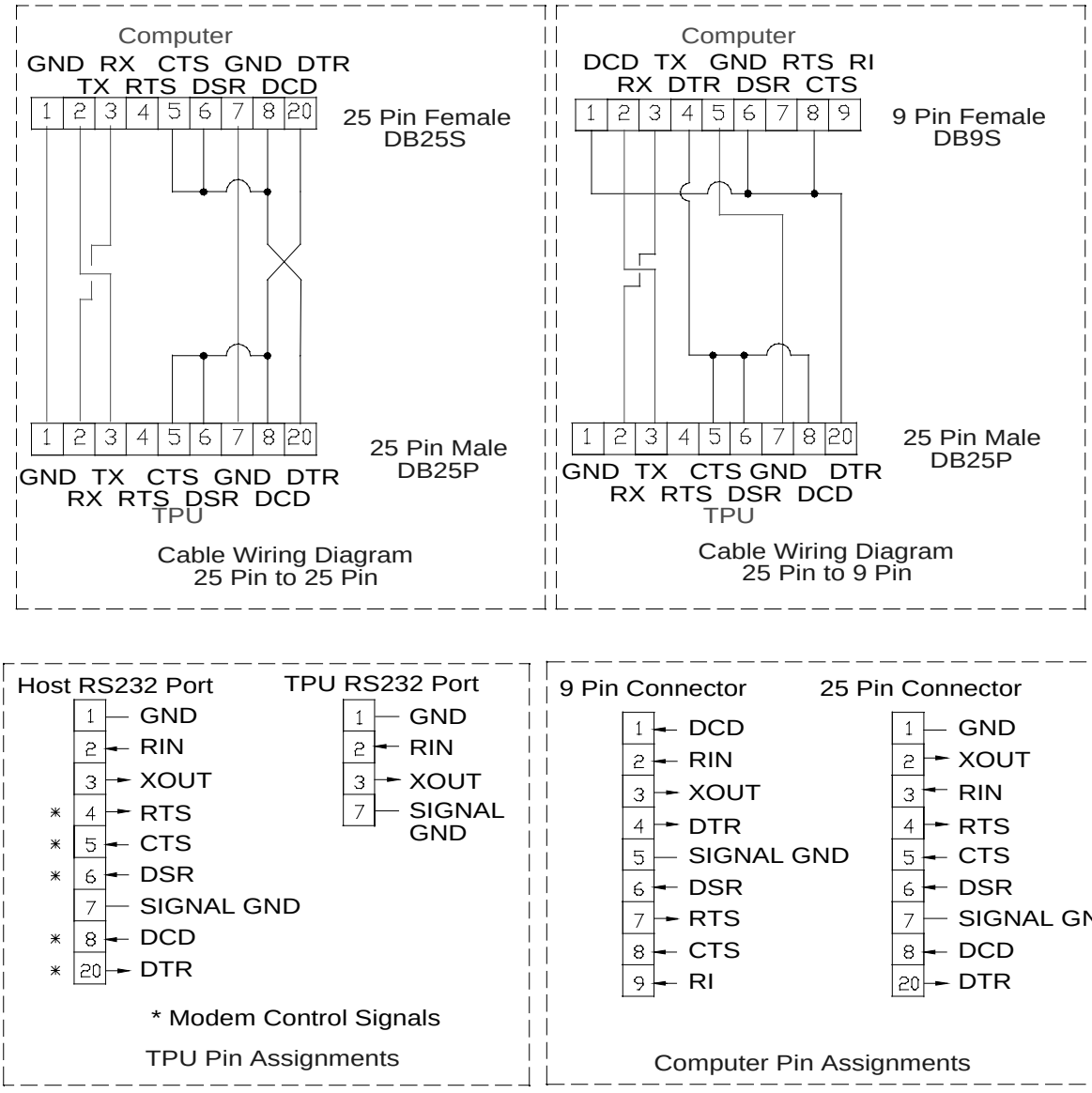


Figure 2-7 RS232 Pin Assignments for the TPU

TPU to Modem Communications

The TPU can be connected to a line driver or modem. This allows location of the TPU at a remote site from the computer. The supplied cable is not designed for this connection. The wiring of the cable will depend on the communications device used. Usually pins 1-8 and 20 are required to set all the necessary handshake lines.

The TPU is a DTE device and can be connected directly to another DCE device, such as a modem. The TPU operates in half-duplex mode. CTS and RTS must be asserted (high) before the TPU will communicate. If CTS (pin 5) and RTS (pin 4) are not connected, pull-up resistors in the TPU will hold the signals high.

Figure 2-8 shows a wiring diagram example of a 25-pin to 25-pin TPU to modem cable.

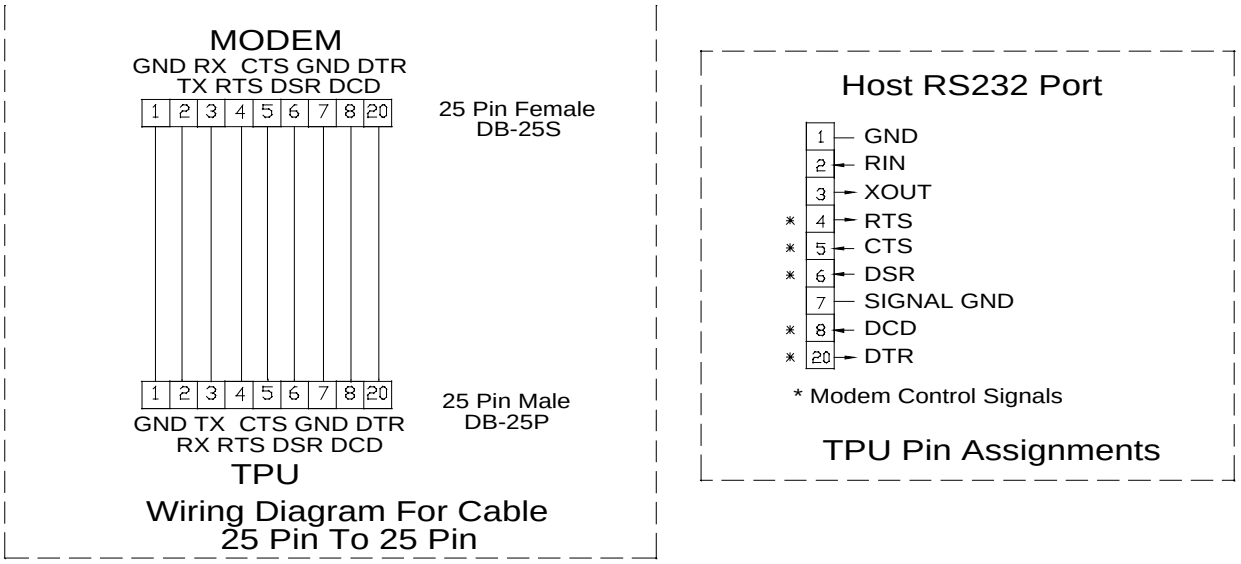


Figure 2-8 RS232 Modem Cable

Starting the System on the Test Bench

Connect AC power to all test bench system equipment and turn on all power switches. The power cord is included with the TPU to facilitate bench starting. Connect the black wire to AC HOT, white wire to AC NEUT, and green wire to AC GND. For 220 VAC applications be sure and follow local electrical codes. Figure 2-10 shows the details of the power panel assembly. The required fuse is 1 Amp for 110 VAC service and 2 Amp for 220 VAC service. The part numbers for these fuses are shown in *Recommended Spare Parts* in Section 5, *Specifications and References.*

Mechanical Installation

The Whessoe Varec Model 6840 Tank Polling Unit is designed to be wall mounted. The basic overall dimensions relative to installation are indicated in Figure 2-9, Basic Installation Dimensions.

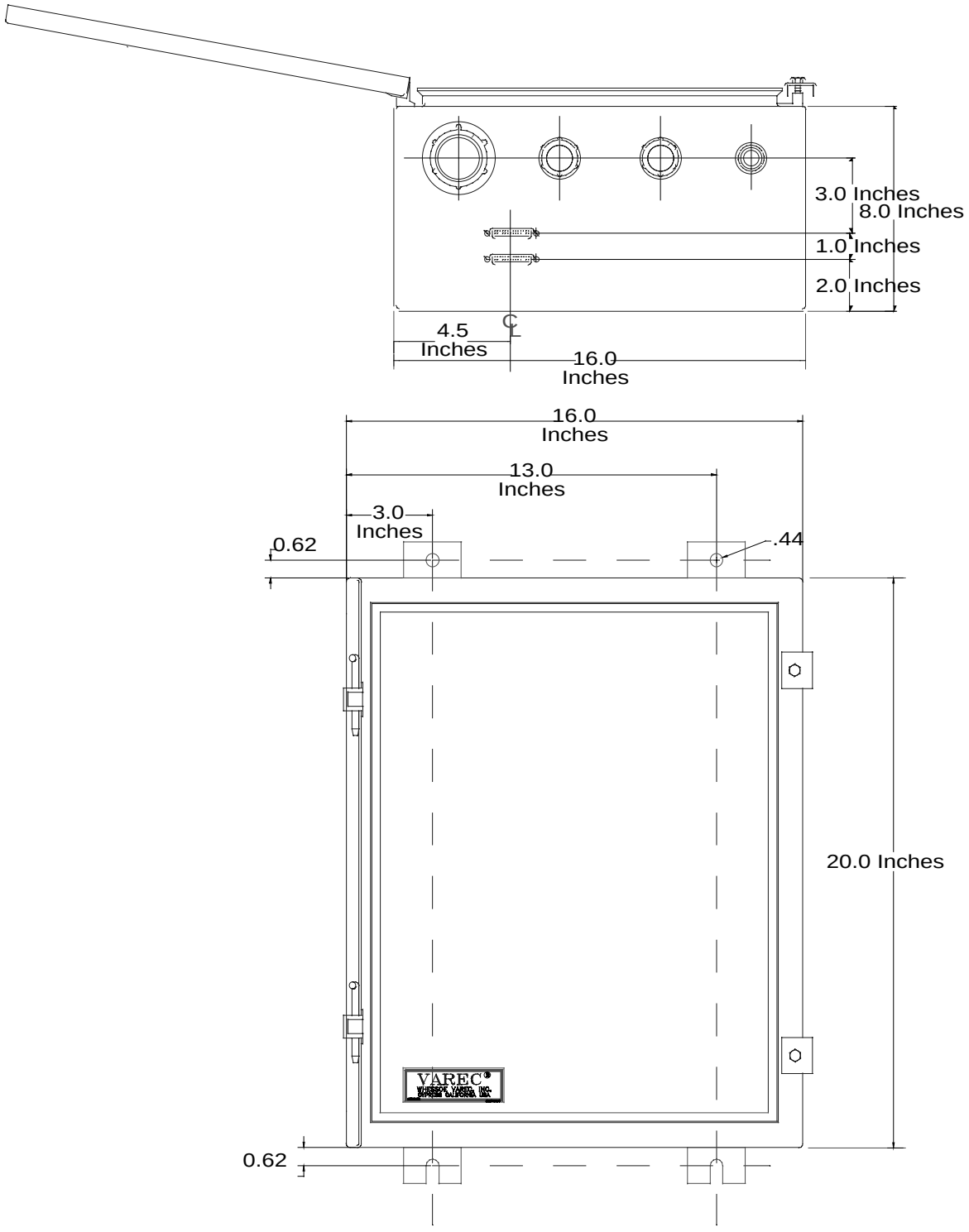


Figure 2-9 Basic Installation Dimensions

Environmental

Mount the TPU to minimize ambient temperature changes. The ambient temperature operating range of the TPU is +32 to +158 ºF (0 to 70 ºC). In addition, mount the TPU to avoid vibration, shock and any contact with corrosive atmospheres.

Accessibility

When choosing a location for installation, take into account the requirement for access to the TPU. Wiring connections are made through the conduit hubs on the bottom of the housing. Mount the TPU so that the bottom of the housing is accessible for wiring or conduit tubing to be routed to the conduit hubs. There are two 3/4 inch and one 1-1/2 inch NPT threaded conduit hubs. Refer to Figure 2-9 for dimensional layout and assignment suggestions. Provide at least 17 inches (432 mm) of space in front of the TPU for access and service.

Mounting

The Whessoe Varec Model Tank Polling Unit weighs 38 pounds (17.3 kg). This weight must be securely supported. Verify that the mounting-foot kit is installed according to the instruction sheet supplied with it. Mount the TPU to a panel, wall or equipment rack using four 5/16 inch (M8) bolts. Refer to Figure 2-9 for the mounting hole pattern and clearance around the unit.

Electrical Installation

All of the electrical connections to the Varec 6820 Series Tank Scanning Unit are made on the power panel located inside the enclosure. The primary AC fuse is located on the power panel. Be sure and replace the fuse with the same rating.

Uninterruptable Power Supply (UPS) Considerations

In many years of field experience, we have found that the use of an UPS with the gauging system greatly improves its reliability. In addition to providing constant power, the UPS provides transient over-voltage protection and ground termination. Large UPS systems that may be in place may not be suitable if they are powering equipment that generates noise or power surges. A separate UPS that powers the gauging system exclusively is ideal. Refer to TPU, IFU (if used) and computer based display system (if used) specifications for sizing of the UPS for your requirements.

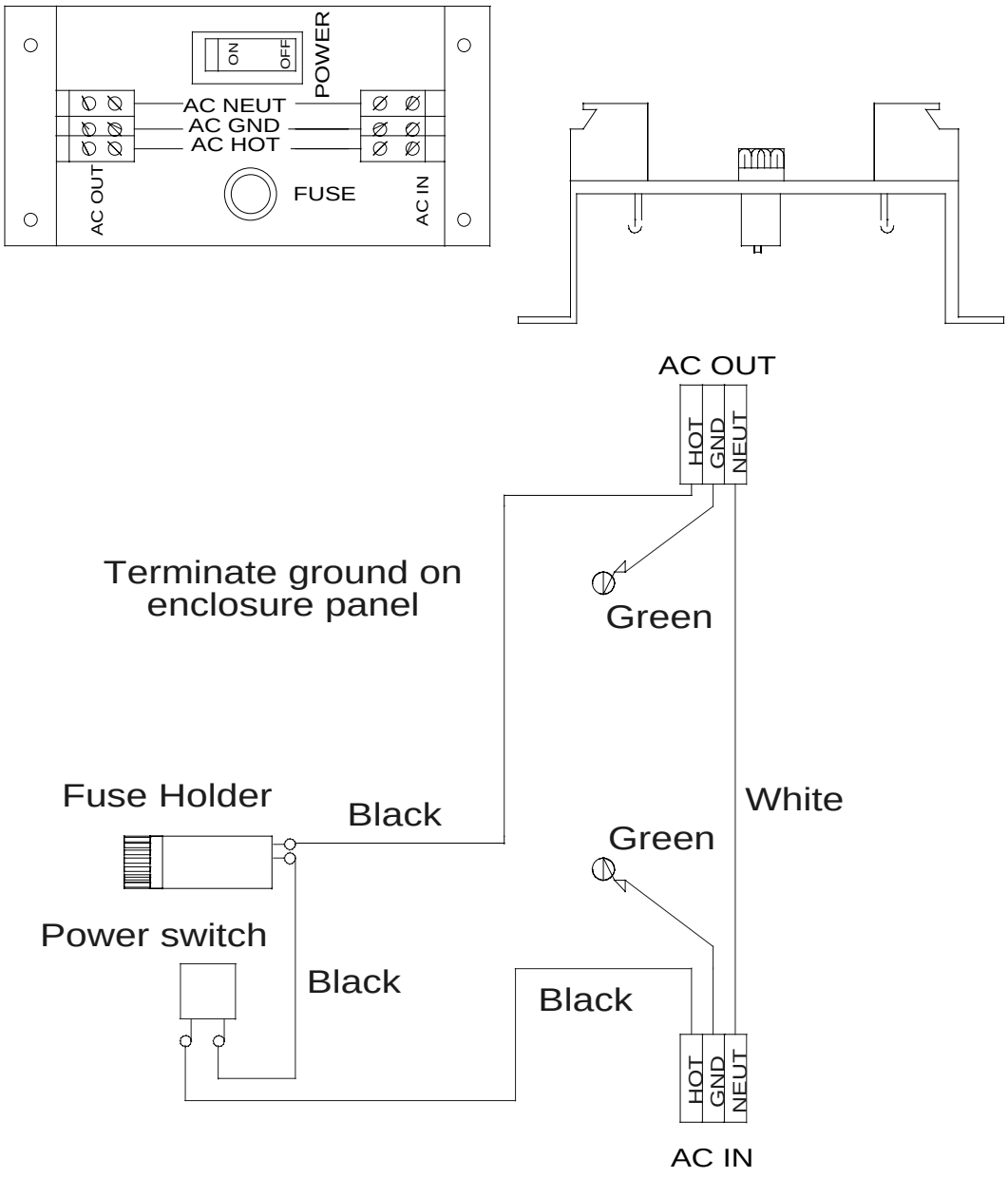


Figure 2-10 Power Panel Assembly

Wire and Cable Installation

To reduce the possibility of signal interference, route the transmitter wiring and the AC wiring through different conduit hubs located on the bottom of the unit. The computer and IFU cables connect to 25-pin connectors on the bottom of the unit. Reference Figures 2-2 through 2-6 for conduit and cable connector locations.

Conduit connections on the enclosure should be plugged and sealed to avoid moisture accumulation on the interior of the housing.

CAUTION

If the connections are not sealed, install the wiring with a drip loop. The bottom of the drip loop should be lower than the conduit connections or the TPU enclosure.

System Grounding Considerations

Proper grounding of the gauging system components is crucial to the reliability of the system as a whole. The grounding technique used must minimize the ground potential difference between the components and not introduce or allow ground currents to flow. Figures 2-11 and 2-12 show recommended ground connections for different system configurations.

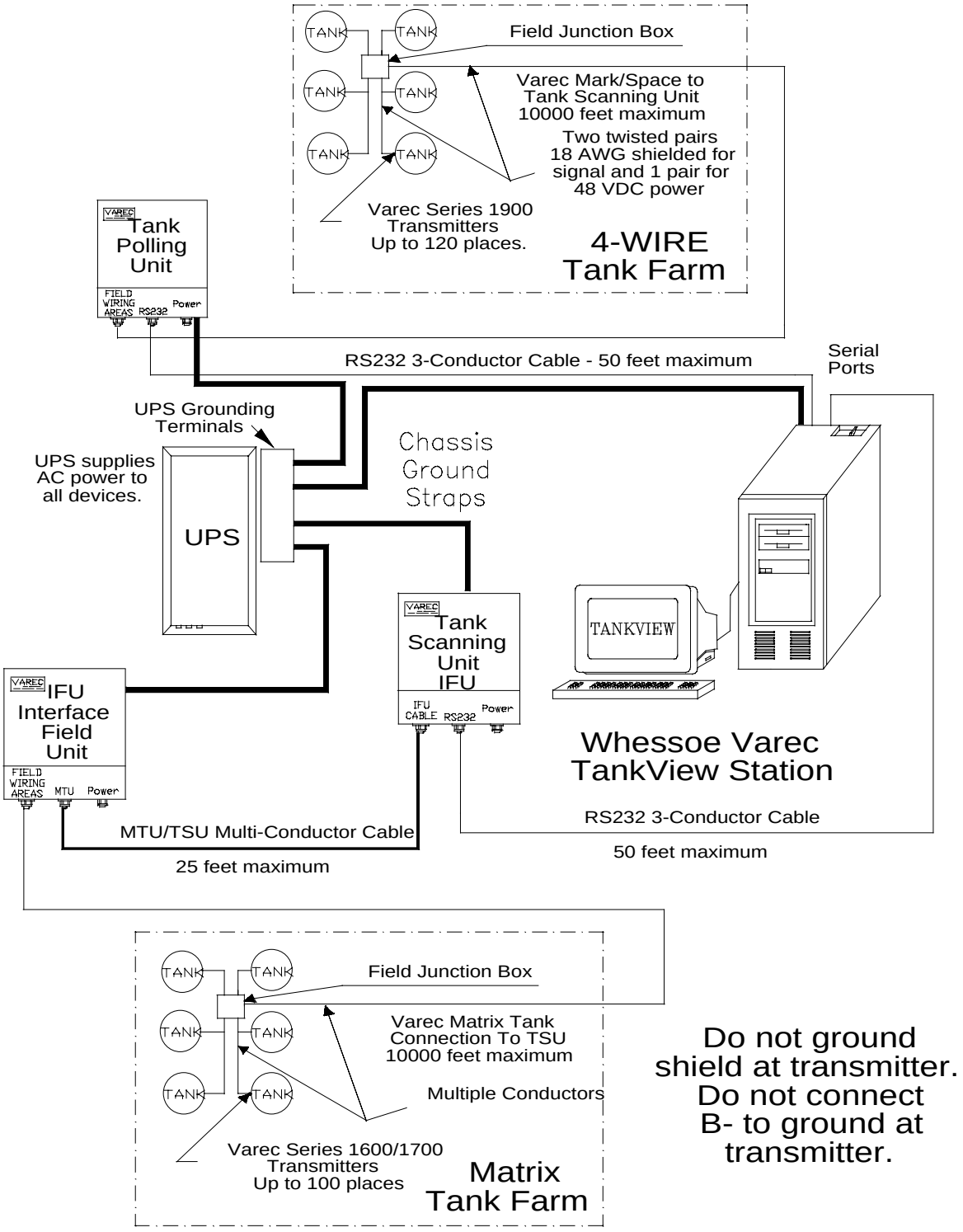


Figure 2-11 Proper System Grounding With UPS

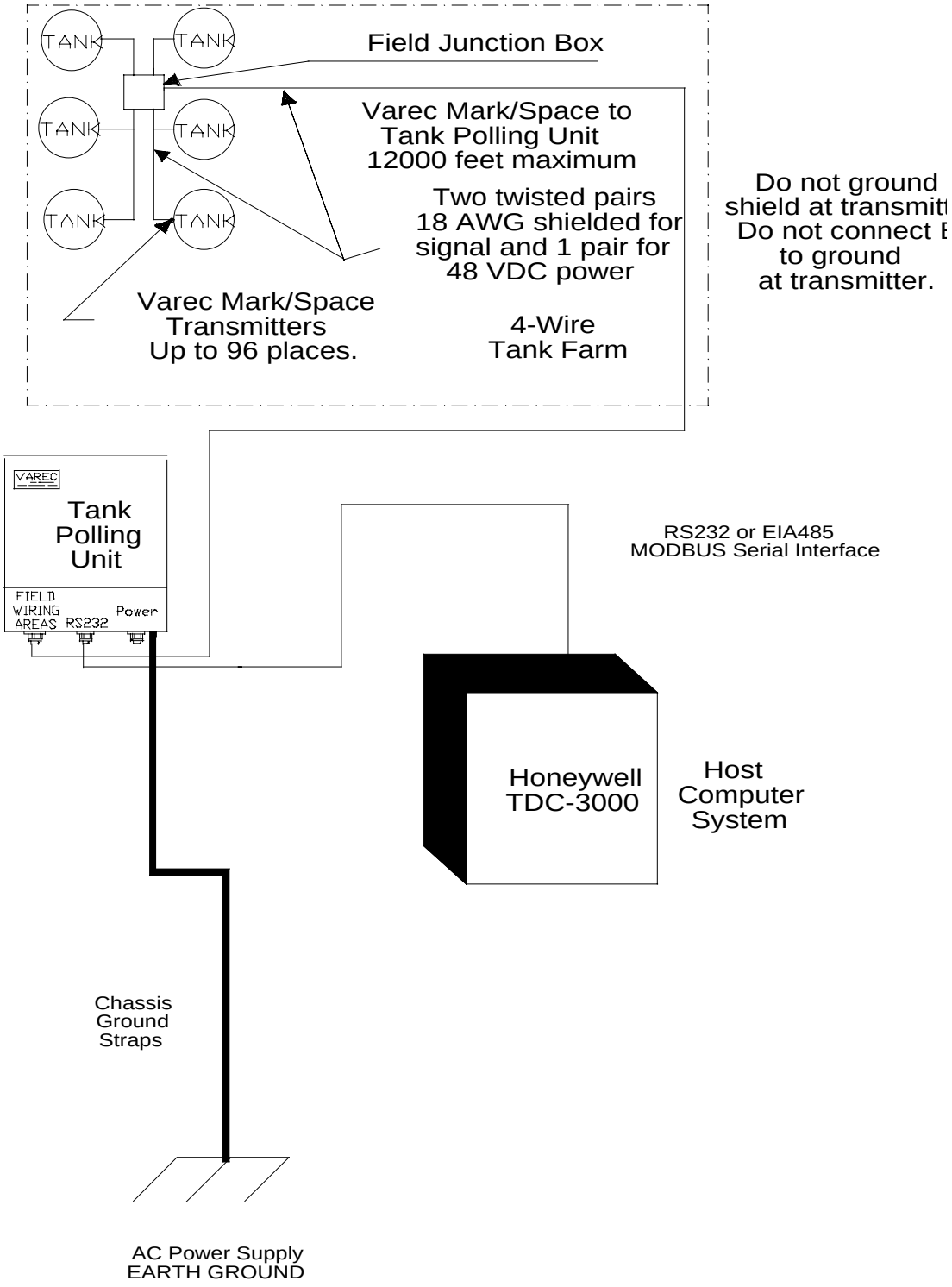


Figure 2-12 Proper System Grounding With Host Computer

4-Wire Transmitter Wiring Considerations

The method of field wiring between the TPU and the 4-Wire transmitters has a considerable impact on system performance. Wiring problems are the main cause of system faults.

The 4-Wire TPU supports up to a total of 96 4-Wire transmitters distributed over four separate groups called areas. While it is possible to connect all 96 4-Wire transmitters to a single area, the resulting large physical size of this single data bus makes the gauging system particularly susceptible to total failure due to wiring faults, lightning or damaged 4-Wire transmitters. Whessoe Varec recommends not more than 24 transmitters be connected to any single area.

When practical, the 4-Wire transmitter configuration should be split into four small groups and connected to the four areas provided. Each area has surge and transient protection and is individually fused. The TPU termination board connections have built-in LED indicators that show activity. This feature greatly aids troubleshooting.

All field wiring for 4-Wire transmitters is made on the termination board. Most wiring terminals have a built-in LED to show activity.

Use the following installation guidelines:

- All 4-Wire transmitters connected to the same area must have a unique address setting. Refer to the Whessoe Varec Model 1800, 4100, 4200 or 1900 4-Wire transmitter manual for details.
- Limit the number of 4-Wire transmitters on any area to 24 or less.
- Use 18 gauge wire or larger.
- Limit the distance from the 4-Wire transmitter to the TPU to under 10,000 feet.
- Use shielded twisted-pair wire for power and communication lines.
- Ground all shields at one location at the TPU. *Do not* ground the shield in the field.
- Use wire with an insulation rating of 300 V or greater.
- *Do not* run the transmitter power or data wires in the same conduit with AC power lines.
- Avoid aerial wiring.
- The use of field junction boxes is recommended to facilitate field wiring. The junction boxes should contain terminal strips that have isolation switches. This permits easy troubleshooting of field transmitter problems.

Every gauging system is unique, and the guidelines listed above are general in nature. For a detailed evaluation of an existing or proposed installation, contact Whessoe Varec.

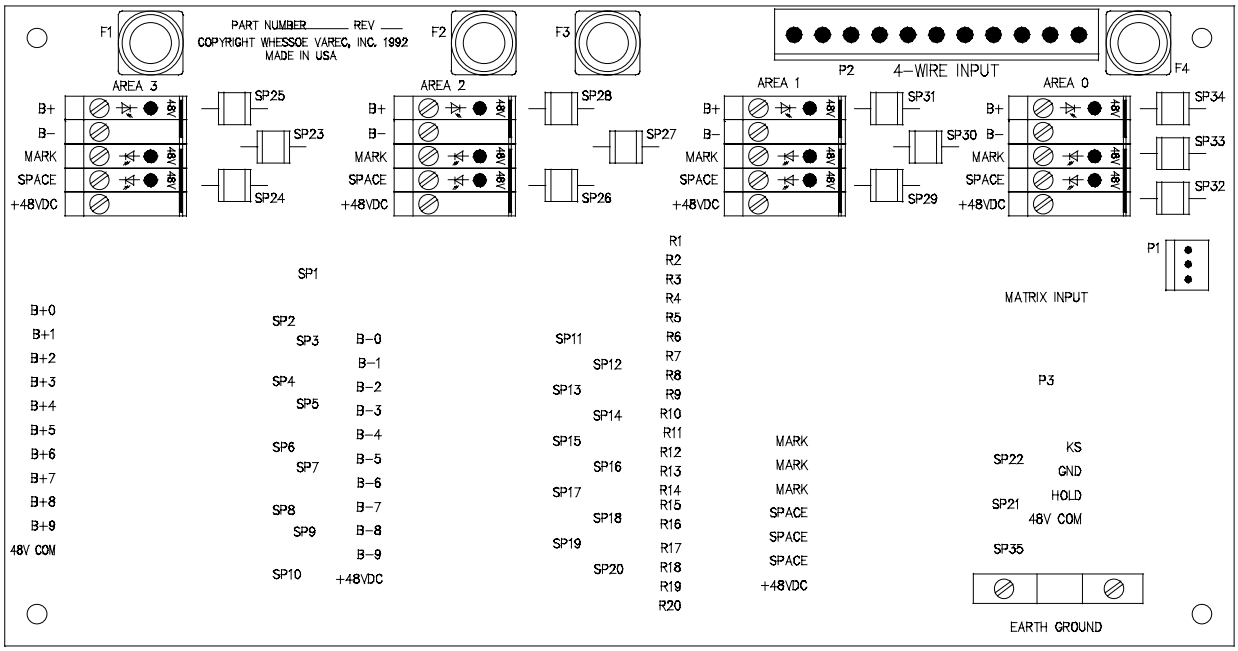


Figure 2-13 4-Wire Termination Board Assembly

Termination Board Pin Assignments

P1 - Power Connector

1 Earth Ground
2 + 48 VDC
3 48 VDC Common

P2 - 4-Wire Connector

1 Space - Area 3
2 Mark - Area 3
3 B+ - Area 3
4 Space - Area 2
5 Mark - Area 2
6 B+ - Area 2
7 Space - Area 1
8 Mark - Area 1
9 B+ - Area 1
10 Space - Area 0
11 Mark - Area 0
12 B+ - Area 0
13 B- - 48 VDC Common
14 B- - 48 VDC Common
15 + 48 VDC

System Installations

The TPU is only a part of any tank gauging system. Figure 2-14 shows some of the various ways the TPU is connected in a system. Please contact Whessoe Varec for detailed drawings for specific applications.

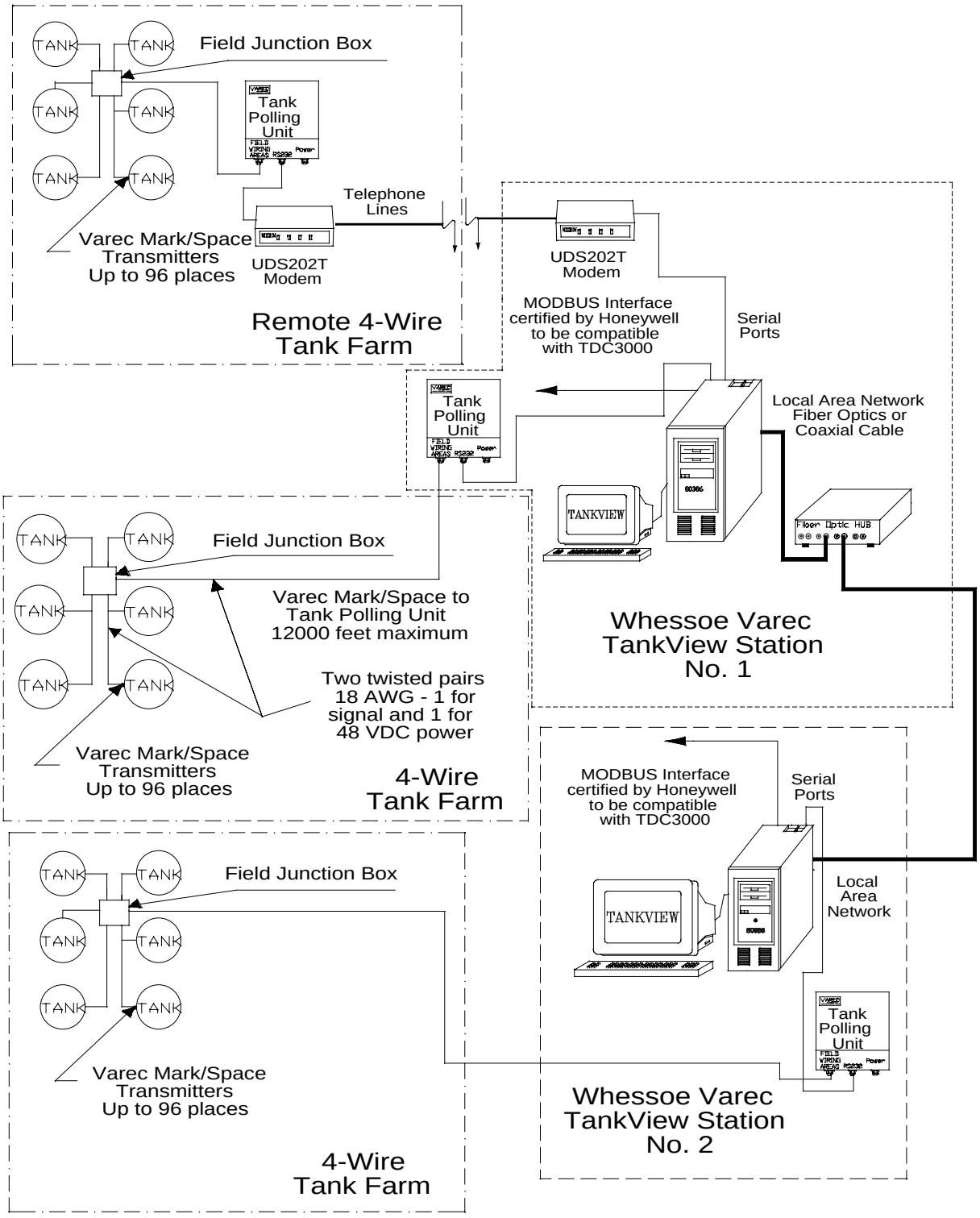


Figure 2-14 TPU Applications

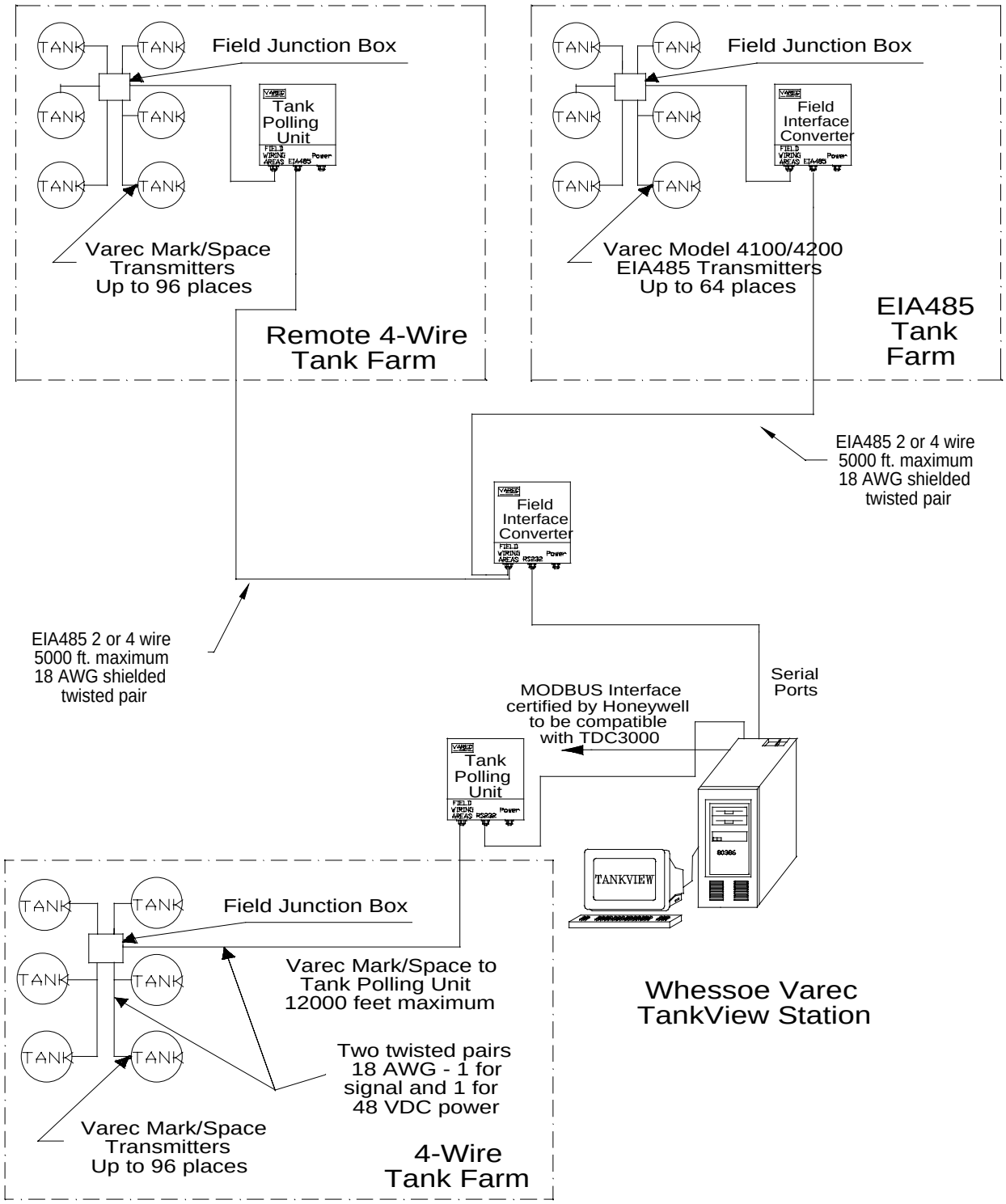


Figure 2-15 TPU Applications

SECTION 3 - OPERATION

Overview

The Whessoe Varec Model 6840 Tank Polling Unit (TPU) supports a maximum of 96 devices distributed over four Mark/Space communication areas, including Whessoe Varec Models 1800/1900 Transmitters, the 4100 Multifunction Transmitter (MFT) and the 4200 Hydrostatic Interface Unit (HIU).

A TPU implementation of the MODBUS protocol provides a standard form of digital communications. An effort has been made to parallel current MODBUS implementations to the greatest extent possible so that the TPU communicates with existing MODBUS masters.

Check compatibility carefully to ensure that the TPU is properly configured for the data format expected by the host computer.

The TPU maintains a database of each device it is responsible for. Once added to the database, each device is continuously and automatically polled. Data from each device is stored into the on-board memory. A host computer requesting real-time data on a device has instant access to that data since it is already in memory.

Mark/Space Communication

The TPU communicates with Mark/Space devices at low or high speed. If JP13 is in the OFF position, communication defaults to low speed. If JP13 is in the ON position, communication defaults to high speed. The TPU can additionally be told to override the default communication speed setting on a device by device basis.

In each scan slot, the communication speed can be set to Default, High or Low. When set to Default, the communication speed is determined by JP13.

The TPU attempts communication up to three times with each device before reporting a failure. If a device does fail to communicate, the TPU continues to attempt communication using a single try mechanism.

Host Communications

The processor board of the TPU communicates to the computer via Port 1, the RS232 I/O Port. Port 2 is used for configuration with the Varec System VI. The small red button located between the two port connectors is a reset button. It will initiate a software reset to the processor board and daughter module. Figure 4-2 shows the LED arrays found on the processor board. The LED array marked 7 through 0 is not used. The dual array next to Port 2 has the labels T and R. This stands for transmit and receive on Port 1. When the TPU is operating and in communication with a host computer, the LED will be blinking as data is transmitted and received. If the LEDs are not blinking, no communication is taking place.

LED Functionality

There are eight LEDs on the Gateway processor board (see Figure 4-2). During reset or power-up initialization, all LEDs are turned ON. They are used to display status conditions and are assigned as follows:

- LED 0 Indicates the Tank Polling Unit is in Auto Configuration Mode.
- LED 1 Indicates a hardware failure. This is turned ON if either the EPROM checksum is bad or the RAM test failed.
- LED 2 Indicates the NVRAM configuration checksum is bad.
- LED 3 - LED 7 Unused.

Auto Polling Traditional 1800/1900 Transmitters

The TPU supports Whessoe Varec's Model 1800 and 1900 traditional transmitters. These transmitters return level and temperature to a host computer when polled on the Mark/Space bus.

The transmitters are available with the following types of encoders:

- English Fractional
- English Decimal
- 0-20 Meters
- 0-30 Meters

The transmitters can return temperature in either °C or °F. The Model 1800 has two temperature ranges: -99 to +299 and -199 to +199. The temperature range of the Model 1900 is -799 to +799.

When a TPU receives a reply from a traditional transmitter, it does not know the type of level or temperature format. The level is read and converted for each of the four different encoder types. The temperature is read and converted for each of three temperature ranges.

The four level and three temperature formats are each mapped into their own separate register. It is up to the host computer to decide which format it wants to read. This actually depends upon user configuration information telling the host computer the type of transmitter connected.

Auto Polling MODBUS Transmitters

The Whessoe Varec Model 4100 MFT and Model 4200 HIU are examples of MODBUS Transmitters. These devices actually communicate via MODBUS messages on the Mark/Space bus. They accept a MODBUS message in a Mark/Space message frame. When a reply is sent, it is a MODBUS reply in a Mark/Space message frame.

The TPU basically envelopes a host computer's MODBUS request into a Mark/Space message frame and sends it on the Mark/Space bus. When a reply is received, the Mark/Space message frame is stripped and only the MODBUS message is passed to the host computer. The TPU does not assume any knowledge of the register content.

The host computer configures the TPU to auto-poll two ranges of MODBUS registers. The first range is an Integer Register Range. The second range is a Floating Point Register Range. The TPU has a total storage capacity of 50 integer registers. A floating point register is considered two integer registers. As an example, if 20 integer registers are auto polled, the TPU allows up to 15 floating point registers.

When the TPU receives a request for register data that is being auto polled, the data comes directly out of the TPU's memory. If the register request falls outside the range being polled, the message is passed on to the device on the Mark/Space bus. When a reply is received or a timeout condition occurs, the TPU replies to the host computer.

Auto Configuration

The TPU can automatically scan the field and identify connected devices on each of the areas. Auto configuration can be initiated from the host computer or via jumper JP14 on the TPU processor board.

To initiate Auto Configuration via JP14, it must be moved from the OFF to the ON position. The TPU looks for that specific transition. This prevents repeated entry into auto configuration mode if JP14 is left in the ON position.

To initiate Auto Configuration from the host computer, you must write a value of 0 into integer register 50 (40051).

While in Auto Configuration Mode, LED 1 is ON. The TPU locates all Mark/Space devices with an address between 1 and 247. The TPU ignores any Mark/Space device that has the same address as its own. Once a particular address is detected on one area, it is not searched on any of the other areas.

The Auto Configuration sequence polls each device address using a maximum of two tries to ensure the device is detected. If the device answers, it is further identified by a second poll to be a traditional level or a MODBUS device.

Note
The TPU scans about one thousand addresses over four Mark/Space areas. *Auto Configuration can take 7 to 8 minutes to complete.* While the TPU is in the auto configuration mode any read/write requrest will be responded to by device busy status.

Auto Configuration has the following limitations. These limitations do not apply if the TPU is configured via the host computer where a MODBUS address can be associated with any Mark/Space address between 0 - 999. Auto Configuration is not required while using the Whessoe Varec TankView system as TankView automatically configures the TPU.

- Mark/Space devices cannot have the same address as the TPU's MODBUS address.
- Mark/Space addresses must be unique across all four areas.
- Mark/Space devices with addresses of 0 or 248 to 999 are not detected.

MODBUS Host Communications

The TPU only supports MODBUS RTU communications. It does *not* support the ASCII MODBUS format. Each transmitter is addressed as a different MODBUS device. The TPU answers to its own address plus the MODBUS addresses that are configured in its scan table. To communicate with a Mark/Space device, that device must be in the TPU's scan table. The TPU's scan table contains 96 scan slots. Each scan slot is basically a configuration record describing each Mark/Space device the TPU is responsible for. The scan table allows a MODBUS address between 1 and 247 to be associated with a Mark/Space address between 0 - 999.

Note
If the TPU was auto configured, the Mark/Space address is always mapped to the same MODBUS address. That is, only Mark/Space addresses 1 - 247 can be used with the Auto Configuration feature.

Register Maps

MODBUS is a protocol in which data within a particular device is organized into registers. Each register has a number, essentially an address. The TPU basically has three different register maps as follows:

- **TPU Register Map.** This register map contains configuration data for the TPU, including such items as what transmitters to poll and the default scaling factors for traditional transmitters. This map is accessed via the TPU's MODBUS address. This is the address set up via jumpers on the TPU's processor board.

- **Traditional Transmitter Register Map.** This register map contains the level and temperature data formatted in each of the available formats. It is accessed via the MODBUS address assigned to the Mark/Space device in its scan slot.

- **MODBUS Device Register Map.** This register map is actually the register map of the Mark/Space MODBUS device. Consult the particular device's register map for more information. It is accessed via the MODBUS address assigned to the Mark/Space device in its scan slot.

For example, given the following configuration:

TPU's jumpers are set for MODBUS address 1
Scan Slot #1: MODBUS Address = 2, Mark/Space Address = 900
The device is a traditional level transmitter.
Scan Slot #2: MODBUS Address = 3, Mark/Space Address = 901
The device is a Varec 4100 MFT.

Then:
Scan slot data is accessed via MODBUS address 1
Traditional level and temperature information is accessed via MODBUS address 2
MFT MODBUS registers are accessed via MODBUS address 3.

Scan Table of Mark/Space Devices

The scan table contains a maximum of 96 entries. Each entry corresponds to a Mark/Space device connected to the TPU.

Slot (1-96): One slot is assigned to each Mark/Space device connected to the TPU.

Area/Mode: A value selecting an area and a mode of operation in the TPU. Area is in MSB (byte) (0-3) and mode is in LSB (byte) (0 = Auto Poll, 1= No Auto Poll).

MODBUS Address (1-247): MODBUS address assigned to a Mark/Space device. This is the MODBUS address to obtain tank data from for this transmitter.

Mark/Space Address (0-999): A unique device address on the Mark/Space field communications bus.

Speed/Device Type: The speed and type of device to be scanned. Speed is in MSB (byte) (0 = default)(use switch setting), 1 = high, 2 = low). Device type is in LSB (byte) (0 = MODBUS device, 1 = traditional device).

MODBUS First Integer Register and MODBUS Number of Integer Registers: These registers are used with MODBUS device types and Function Codes 3, 4, 6 and 16 (see Table 3-1, *MODBUS Functions*). The data polled from a MODBUS device at the defined registers may contain integer, character, coded or floating point data in the two 16-bit format.

MODBUS First Float Register and MODBUS Number of Float Registers: These registers are used with MODBUS device types and Function Codes 65 and 66 (see Table 3-1, *MODBUS Functions*). The data polled from a MODBUS device at the defined registers may only contain floating point data in the 32-bit format. This data can also be obtained in the integer register format when the correct registers are polled.

Traditional Level Zero, Traditional Level Full Scale, Traditional Temperature Zero and Traditional Temperature Full Scale: These registers are only used with traditional Mark/Space devices and allow individual scaling of the integer values from a traditional level transmitter. The global scaling registers (addresses 0006 to 0033) are used if zero and full scale are both 0.0, otherwise individual scalings are used.

Data Types and Communication Examples

Note
In all communication examples, the error check value is dependent on the mode of transmission.

Integer Data

A whole number between 0 and the maximum MODBUS integer, a user-configurable variable that is a whole number between 0 and 65,535 (inclusive).

The following example shows the request for one register starting at register 56 (38h). For this example, assume:

minimum = 1 meter
maximum = 15 meters
maximum MODBUS integer = 65,534

Host Request

Address	Function Code	Start Reg H	Start Reg L	# of Reg H	# of Reg L	Error Check
01	03	00	38	00	01	xx

TPU Response

Address	Function Code	Byte Count	Data MSB	Data LSB	Error Check
01	03	02	41	24	xx

Integer Data
Hexadecimal: 4124
Decimal: 16,676

The data returned for data address 56 (38h) is 16,676 (4124h). This value must be scaled to give it meaning using the following formula.

$$\text{result} = \frac{\text{data} \times (\text{max} - \text{min})}{\text{max integer value}} + \text{min}$$

$$\text{result} = \frac{16{,}676 \times (15 - 1)}{65{,}534} + 1$$

result = 4.54 meters

Character Data

Returned in registers in ASCII data format. Used for date, software version, etc.

The following example shows character data (TEST) being written to the TPU:

Host Request

Address	Function Code	Start Reg H	Start Reg L	# of Reg H	# of Reg L	
01	10	00	6B	00	02	
Byte Count	Data H	Data L	Data H	Data L	Error Check	
04	54	65	73	74	xx	

TPU Response

Address	Function Code	Start Reg H	Start Reg L	# of Reg H	# of Reg L	Error Check
01	10	00	6B	00	02	xx

Character Data
Hexadecimal: 54 65 73 74
ASCII: T E S T

Code Data

Coded data represents an enumerated value.

The following example shows coded data at data address 88 (58h).

Host Request

Address	Function Code	Start Reg H	Start Reg L	# of Reg H	# of Reg L	Error Check
01	03	00	58	00	01	xx

TPU Response

Address	Function Code	Byte Count	Data MSB	Data LSB	Error Check
01	03	02	00	0B	xx

Coded Data
Hexadecimal: 0B
Decimal: 11

Floating Point Data

Floating point data is used to transmit numbers formatted using the IEEE 754 Floating Point Format.

The Two 16-bit Registers Format

Function codes 03 and 04 are used to read floating point registers in this format. Function codes 06 and 16 (10h) are used to write floating point registers in this format.

The following example shows a floating point register read.

Host Request

Address	Function Code	Start Reg H	Start Reg L	# of Reg H	# of Reg L	Error Check
01	03	01	60	00	02	xx

TPU Response

Address	Function Code	Byte Count	Data MSB	Data	Data	Data LSB	Error Check
01	03	04	42	C8	00	00	xx

Floating Point Data
Hexadecimal: 42 C8 00 00
Decimal: 100.00

The One 32-bit Register Format (Read)

Function code 65 (41h) is used to read floating point registers in this format.

The following example shows a floating point register read.

Host Request

Address	Function Code	Start Reg H	Start Reg L	# of Reg H	# of Reg L	Error Check
01	41	00	1A	00	01	xx

TPU Response

Address	Function Code	# Reg H	# Reg L	Data MSB	Data	Data	Data LSB	Error Check
01	41	00	01	42	C8	00	00	xx

Floating Point Data
Hexadecimal: 42 C8 00 00
Decimal: 100.00

The One 32-bit Register Format (Write)

Function code 66 (42h) is used to write multiple floating point registers in this format.

The following example shows a floating point register write.

Host Request

Address	Function Code	Start Reg H	Start Reg L	# of Reg H	# of Reg L
01	42	00	1A	00	01
Data MSB	Data	Data	Data LSB	Error Check	
42	C8	00	00	xx	

TPU Response

Address	Function Code	# of Reg H	# of Reg L	Error Check
01	42	00	01	xx

Floating Point Data
Hexadecimal: 42 C8 00 00
Decimal: 100.00

Table 3-1 MODBUS Functions

Function Code	Function	Information Type	MODBUS Nomenclature
01	Read	Bits	Read Output Status
02	Read	Bits	Read Input Status
03	Read	Integer, Code, Status Word, Floating Point	Read Output Registers
04	Read	Integer, Code, Status Word, Floating Point	Read Input Registers
05	Write	Bits	Force Single Output Status
06	Write	Integer, Code, Status Word	Preset Single Register
08	n/a	Repeat of Loopback Message	Loopback Test
15	Write	Bits	Force Multiple Outputs
16	Write	Integer, Code, Status Word, Floating Point	Preset Multiple Registers
65	Read	Floating Point	Read Floating Point Registers
66	Write	Floating Point	Write Floating Point Registers

Table 3-2 General TPU MODBUS Registers (TPU Register Map)

Data	Address	Read	Read/Write	Type
TPU Status Bit 0 Auto Configure in Process (cannot be read during autoconfig) Bit 1 EEPROM Checksum Failure Bit 2 RAM Failure Bit 3 ROM Checksum Failure Bits 4 - 15 Reserved	0000	30001	40001	Code
Reserved	0001	30002	40002	Code
Maximum Number of Slots in Scan Table	0002	30003	40003	Integer
Number of Integer Registers Allowed in Scan Table	0003	30004	40004	Integer
Number of FP Registers Allowed in Scan Table	0004	30005	40005	Integer
Maximum Integer for Traditional Level and Temperature	0005	30006	40006	Integer
FP Traditional Level 17-bit Metric Zero	0006	30007	40007	Float
FP Traditional Level 17-bit Metric Full Scale	0008	30009	40009	Float
FP Traditional Level 18-bit Metric Zero	0010	30011	40011	Float
FP Traditional Level 18-bit Metric Full Scale	0012	30013	40013	Float
FP Traditional Level English Fractional Zero	0014	30015	40015	Float
FP Traditional Level English Fractional Full Scale	0016	30017	40017	Float
FP Traditional Level English Decimal Zero	0018	30019	40019	Float
FP Traditional Level English Decimal Full Scale	0020	30021	40021	Float
FP Traditional 1800 Temperature (-199 to +199) Zero	0022	30023	40023	Float
FP Traditional 1800 Temperature (-199 to +199) Full Scale	0024	30025	40025	Float
FP Traditional 1800 Temperature (-99 to +299) Zero	0026	30027	40027	Float
FP Traditional 1800 Temperature (-99 to +299) Full Scale	0028	30029	40029	Float
FP Traditional 1900 Temperature (-799 to +799) Zero	0030	30031	40031	Float
FP Traditional 1800 Temperature (-799 to +799) Full Scale	0032	30033	40033	Float
Software Revision String (bytes 1 and 2)	0034	30035	40035	Character
Software Revision String (bytes 3 and 4)	0035	30036	40036	Character
Software Revision String (bytes 5 and 6)	0036	30037	40037	Character
Software Revision String (bytes 7 and 8)	0037	30038	40038	Character
Scan Table Entry Being Scanned	0038	30039	40039	Integer
Last Received Mark/Space Message Length	0039	30040	40040	Integer
Auto Poll Inhibit	0040	30041	40041	Integer
Initiate Auto Configure	0050	30051	40051	Integer
Number of MODBUS Host Polls Received	0051	30052	40052	Integer
Number of bad MODBUS Host Polls Received	0052	30053	30053	Integer
Number of Illegal or Unsupported MODBUS Host Requests	0053	30054	40054	Integer
Number of bad CRCs Received From MODBUS Host	0054	30055	40055	Integer
Number of Illegal Data Register MODBUS Host Requests Received	0055	30056	40056	Integer
Number of Device Failures Sent to MODBUS Host	0056	30057	40057	Integer
Reserved	0057	30058	40058	Integer
Reserved	0058	30059	40059	Integer
Reserved	0059	30060	40060	Integer
Reserved	0060	30061	40061	Integer
Number of Mark/Space Polls Issued on Area 0	0061	30062	40062	Integer
Number of No Responses on Mark/Space Area 0	0062	30063	40063	Integer
Number of Bad Responses on Mark/Space Area 0	0063	30064	40064	Integer
Number of Receive Overflows on Mark/Space Area 0	0064	30065	40065	Integer
Number of Mark/Space Polls Issued on Area 1	0065	30066	40066	Integer
Number of No Responses on Mark/Space Area 1	0066	30067	40067	Integer
Number of Bad Responses on Mark/Space Area 1	0067	30068	40068	Integer
Number of Receive Overflows on Mark/Space Area 1	0068	30069	40069	Integer

Table 3-2 General TPU MODBUS Registers (TPU Register Map) [continued]

Data	Address	Read	Read/Write	Type
Number of Mark/Space Polls Issued on Area 2	0069	30070	40070	Integer
Number of No Responses on Mark/Space Area 2	0070	30071	40071	Integer
Number of Bad Responses on Mark/Space Area 2	0071	30072	40072	Integer
Number of Receive Overflows on Mark/Space Area 2	0072	30073	40073	Integer
Number of Mark/Space Polls Issued on Area 3	0073	30074	40074	Integer
Number of No Responses on Mark/Space Area 3	0074	30075	40075	Integer
Number of Bad Responses on Mark/Space Area 3	0075	30076	40076	Integer
Number of Receive Overflows on Mark/Space Area 3	0076	30077	40077	Integer

Table 3-3 Scan Table of Mark/Space Devices (TPU Register Map)

Data	Address	Read Only	Read/Write	Type
Slot 1				
Area/Mode	100	30101	40101	Integer
MODBUS Address	101	30102	40102	Integer
Mark-Space Address	102	30103	40103	Integer
Speed/Device Type	103	30104	40104	Integer
MODBUS First Integer Register	104	30105	40105	Integer
MODBUS Number Integer Registers	105	30106	40106	Integer
MODBUS First Float Register	106	30107	40107	Integer
MODBUS Number Float Registers	107	30108	40108	Integer
Traditional Level Zero	108	30109	40109	Float
Traditional Level Full Scale	110	30111	40111	Float
Traditional Temperature Zero	112	30113	40113	Float
Traditional Temperature Full Scale	114	30115	40115	Float
Slot 2				
Area/Mode	116	30117	40117	Integer
MODBUS Address	117	30118	40118	Integer
Mark-Space Address	118	30119	40119	Integer
Speed/Device Type	119	30120	40120	Integer
MODBUS First Integer Register	120	30121	40121	Integer
MODBUS Number Integer Registers	121	30122	40122	Integer
MODBUS First Float Register	122	30123	40123	Integer
MODBUS Number Float Registers	123	30124	40124	Integer
Traditional Level Zero	124	30125	40125	Float
Traditional Level Full Scale	126	30127	40127	Float
Traditional Temperature Zero	128	30129	40129	Float
Traditional Temperature Full Scale	130	30131	40131	Float
Slot 3				
Area/Mode	132	30133	40133	Integer
MODBUS Address	133	30134	40134	Integer
Mark-Space Address	134	30135	40135	Integer
Speed/Device Type	135	30136	40136	Integer
MODBUS First Integer Register	136	30137	40137	Integer
MODBUS Number Integer Registers	137	30138	40138	Integer
MODBUS First Float Register	138	30139	40139	Integer
MODBUS Number Float Registers	139	30140	40140	Integer
Traditional Level Zero	140	30141	40141	Float
Traditional Level Full Scale	142	30143	40143	Float
Traditional Temperature Zero	144	30145	40145	Float
Traditional Temperature Full Scale	146	30147	40147	Float
Slot 4				
Area/Mode	148	30149	40149	Integer
MODBUS Address	149	30150	40150	Integer
Mark-Space Address	150	30151	40151	Integer
Speed/Device Type	151	30152	40152	Integer
MODBUS First Integer Register	152	30153	40153	Integer
MODBUS Number Integer Registers	153	30154	40154	Integer
MODBUS First Float Register	154	30155	40155	Integer
MODBUS Number Float Registers	155	30156	40156	Integer
Traditional Level Zero	156	30157	40157	Float
Traditional Level Full Scale	158	30159	40159	Float
Traditional Temperature Zero	160	30161	40161	Float
Traditional Temperature Full Scale	162	30163	40163	Float

Table 3-3 Scan Table of Mark/Space Devices (TPU Register Map) [continued]

Data	Address	Read Only	Read/Write	Type
Slot 5				
Area/Mode	164	30165	40165	Integer
MODBUS Address	165	30166	40166	Integer
Mark-Space Address	166	30167	40167	Integer
Speed/Device Type	167	30168	40168	Integer
MODBUS First Integer Register	168	30169	40169	Integer
MODBUS Number Integer Registers	169	30170	40170	Integer
MODBUS First Float Register	170	30171	40171	Integer
MODBUS Number Float Registers	171	30172	40172	Integer
Traditional Level Zero	172	30173	40173	Float
Traditional Level Full Scale	174	30175	40175	Float
Traditional Temperature Zero	176	30177	40177	Float
Traditional Temperature Full Scale	178	30179	40179	Float
Slot 6				
Area/Mode	180	30181	40181	Integer
MODBUS Address	181	30182	40182	Integer
Mark-Space Address	182	30183	40183	Integer
Speed/Device Type	183	30184	40184	Integer
MODBUS First Integer Register	184	30185	40185	Integer
MODBUS Number Integer Registers	185	30186	40186	Integer
MODBUS First Float Register	186	30187	40187	Integer
MODBUS Number Float Registers	187	30188	40188	Integer
Traditional Level Zero	188	30189	40189	Float
Traditional Level Full Scale	190	30191	40191	Float
Traditional Temperature Zero	192	30193	40193	Float
Traditional Temperature Full Scale	194	30195	40195	Float
Slot 7				
Area/Mode	196	30197	40197	Integer
MODBUS Address	197	30198	40198	Integer
Mark-Space Address	198	30199	40199	Integer
Speed/Device Type	199	30200	40200	Integer
MODBUS First Integer Register	200	30201	40201	Integer
MODBUS Number Integer Registers	201	30202	40202	Integer
MODBUS First Float Register	202	30203	40203	Integer
MODBUS Number Float Registers	203	30204	40204	Integer
Traditional Level Zero	204	30205	40205	Float
Traditional Level Full Scale	206	30207	40207	Float
Traditional Temperature Zero	208	30209	40209	Float
Traditional Temperature Full Scale	210	30211	40211	Float
Slot 8				
Area/Mode	212	30213	40213	Integer
MODBUS Address	213	30214	40214	Integer
Mark-Space Address	214	30215	40215	Integer
Speed/Device Type	215	30216	40216	Integer
MODBUS First Integer Register	216	30217	40217	Integer
MODBUS Number Integer Registers	217	30218	40218	Integer
MODBUS First Float Register	218	30219	40219	Integer
MODBUS Number Float Registers	219	30220	40220	Integer
Traditional Level Zero	220	30221	40221	Float
Traditional Level Full Scale	222	30223	40223	Float
Traditional Temperature Zero	224	30225	40225	Float
Traditional Temperature Full Scale	226	30227	40227	Float

Table 3-3 Scan Table of Mark/Space Devices (TPU Register Map) [continued]

Data	Address	Read Only	Read/Write	Type
Slot 9				
Area/Mode	228	30229	40229	Integer
MODBUS Address	229	30230	40230	Integer
Mark-Space Address	230	30231	40231	Integer
Speed/Device Type	231	30232	40232	Integer
MODBUS First Integer Register	232	30233	40233	Integer
MODBUS Number Integer Registers	233	30234	40234	Integer
MODBUS First Float Register	234	30235	40235	Integer
MODBUS Number Float Registers	235	30236	40236	Integer
Traditional Level Zero	236	30237	40237	Float
Traditional Level Full Scale	238	30239	40239	Float
Traditional Temperature Zero	240	30241	40241	Float
Traditional Temperature Full Scale	242	30243	40243	Float
Slot 10				
Area/Mode	244	30245	40245	Integer
MODBUS Address	245	30246	40246	Integer
Mark-Space Address	246	30247	40247	Integer
Speed/Device Type	247	30248	40248	Integer
MODBUS First Integer Register	248	30249	40249	Integer
MODBUS Number Integer Registers	249	30250	40250	Integer
MODBUS First Float Register	250	30251	40251	Integer
MODBUS Number Float Registers	251	30252	40252	Integer
Traditional Level Zero	252	30253	40253	Float
Traditional Level Full Scale	254	30255	40255	Float
Traditional Temperature Zero	256	30257	40257	Float
Traditional Temperature Full Scale	258	30259	40259	Float
Slot 11				
Area/Mode	260	30261	40261	Integer
MODBUS Address	261	30262	40262	Integer
Mark-Space Address	262	30263	40263	Integer
Speed/Device Type	263	30264	40264	Integer
MODBUS First Integer Register	264	30265	40265	Integer
MODBUS Number Integer Registers	265	30266	40266	Integer
MODBUS First Float Register	266	30267	40267	Integer
MODBUS Number Float Registers	267	30268	40268	Integer
Traditional Level Zero	268	30269	40269	Float
Traditional Level Full Scale	270	30271	40271	Float
Traditional Temperature Zero	272	30273	40273	Float
Traditional Temperature Full Scale	274	30275	40275	Float
Slot 12				
Area/Mode	276	30277	40277	Integer
MODBUS Address	277	30278	40278	Integer
Mark-Space Address	278	30279	40279	Integer
Speed/Device Type	279	30280	40280	Integer
MODBUS First Integer Register	280	30281	40281	Integer
MODBUS Number Integer Registers	281	30282	40282	Integer
MODBUS First Float Register	282	30283	40283	Integer
MODBUS Number Float Registers	283	30284	40284	Integer
Traditional Level Zero	284	30285	40285	Float
Traditional Level Full Scale	286	30287	40287	Float
Traditional Temperature Zero	288	30289	40289	Float
Traditional Temperature Full Scale	290	30291	40291	Float

Table 3-3 Scan Table of Mark/Space Devices (TPU Register Map) [continued]

Data	Address	Read Only	Read/Write	Type
Slot 13				
Area/Mode	292	30293	40293	Integer
MODBUS Address	293	30294	40294	Integer
Mark-Space Address	294	30295	40295	Integer
Speed/Device Type	295	30296	40296	Integer
MODBUS First Integer Register	296	30297	40297	Integer
MODBUS Number Integer Registers	297	30298	40298	Integer
MODBUS First Float Register	298	30299	40299	Integer
MODBUS Number Float Registers	299	30300	40300	Integer
Traditional Level Zero	300	30301	40301	Float
Traditional Level Full Scale	302	30303	40303	Float
Traditional Temperature Zero	304	30305	40305	Float
Traditional Temperature Full Scale	306	30307	40307	Float
Slot 14				
Area/Mode	308	30309	40309	Integer
MODBUS Address	309	30310	40310	Integer
Mark-Space Address	310	30311	40311	Integer
Speed/Device Type	311	30312	40312	Integer
MODBUS First Integer Register	312	30313	40313	Integer
MODBUS Number Integer Registers	313	30314	40314	Integer
MODBUS First Float Register	314	30315	40315	Integer
MODBUS Number Float Registers	315	30316	40316	Integer
Traditional Level Zero	316	30317	40317	Float
Traditional Level Full Scale	318	30319	40319	Float
Traditional Temperature Zero	320	30321	40321	Float
Traditional Temperature Full Scale	322	30323	40323	Float
Slot 15				
Area/Mode	324	30324	40324	Integer
MODBUS Address	325	30325	40325	Integer
Mark-Space Address	326	30326	40326	Integer
Speed/Device Type	327	30327	40327	Integer
MODBUS First Integer Register	328	30328	40328	Integer
MODBUS Number Integer Registers	329	30329	40329	Integer
MODBUS First Float Register	330	30330	40330	Integer
MODBUS Number Float Registers	331	30331	40331	Integer
Traditional Level Zero	332	30332	40332	Float
Traditional Level Full Scale	334	30334	40334	Float
Traditional Temperature Zero	336	30336	40336	Float
Traditional Temperature Full Scale	338	30338	40338	Float
Slot 16				
Area/Mode	340	30341	40341	Integer
MODBUS Address	341	30342	40342	Integer
Mark-Space Address	342	30343	40343	Integer
Speed/Device Type	343	30344	40344	Integer
MODBUS First Integer Register	344	30345	40345	Integer
MODBUS Number Integer Registers	345	30346	40346	Integer
MODBUS First Float Register	346	30347	40347	Integer
MODBUS Number Float Registers	347	30348	40348	Integer
Traditional Level Zero	348	30349	40349	Float
Traditional Level Full Scale	350	30351	40351	Float
Traditional Temperature Zero	352	30353	40353	Float
Traditional Temperature Full Scale	354	30355	40355	Float

Table 3-3 Scan Table of Mark/Space Devices (TPU Register Map) [continued]

Data	Address	Read Only	Read/Write	Type
Slot 17				
Area/Mode	356	30357	40357	Integer
MODBUS Address	357	30358	40358	Integer
Mark-Space Address	358	30359	40359	Integer
Speed/Device Type	359	30360	40360	Integer
MODBUS First Integer Register	360	30361	40361	Integer
MODBUS Number Integer Registers	361	30362	40362	Integer
MODBUS First Float Register	362	30363	40363	Integer
MODBUS Number Float Registers	363	30364	40364	Integer
Traditional Level Zero	364	30365	40365	Float
Traditional Level Full Scale	366	30367	40367	Float
Traditional Temperature Zero	368	30369	40369	Float
Traditional Temperature Full Scale	370	30371	40371	Float
Slot 18				
Area/Mode	372	30373	40373	Integer
MODBUS Address	373	30374	40374	Integer
Mark-Space Address	374	30375	40375	Integer
Speed/Device Type	375	30376	40376	Integer
MODBUS First Integer Register	376	30377	40377	Integer
MODBUS Number Integer Registers	377	30378	40378	Integer
MODBUS First Float Register	378	30379	40379	Integer
MODBUS Number Float Registers	379	30380	40380	Integer
Traditional Level Zero	380	30381	40381	Float
Traditional Level Full Scale	382	30383	40383	Float
Traditional Temperature Zero	384	30385	40385	Float
Traditional Temperature Full Scale	386	30387	40387	Float
Slot 19				
Area/Mode	388	30389	40389	Integer
MODBUS Address	389	30390	40390	Integer
Mark-Space Address	390	30391	40391	Integer
Speed/Device Type	391	30392	40392	Integer
MODBUS First Integer Register	392	30393	40393	Integer
MODBUS Number Integer Registers	393	30394	40394	Integer
MODBUS First Float Register	394	30395	40395	Integer
MODBUS Number Float Registers	395	30396	40396	Integer
Traditional Level Zero	396	30397	40397	Float
Traditional Level Full Scale	398	30399	40399	Float
Traditional Temperature Zero	400	30401	40401	Float
Traditional Temperature Full Scale	402	30403	40403	Float
Slot 20				
Area/Mode	404	30405	40405	Integer
MODBUS Address	405	30406	40406	Integer
Mark-Space Address	406	30407	40407	Integer
Speed/Device Type	407	30408	40408	Integer
MODBUS First Integer Register	408	30409	40409	Integer
MODBUS Number Integer Registers	409	30410	40410	Integer
MODBUS First Float Register	410	30411	40411	Integer
MODBUS Number Float Registers	411	30412	40412	Integer
Traditional Level Zero	412	30413	40413	Float
Traditional Level Full Scale	414	30415	40415	Float
Traditional Temperature Zero	416	30417	40417	Float
Traditional Temperature Full Scale	418	30419	40419	Float

Table 3-3 Scan Table of Mark/Space Devices (TPU Register Map) [continued]

Data	Address	Read Only	Read/Write	Type
Slot 21				
Area/Mode	00420	30421	40421	Integer
MODBUS Address	00421	30422	40422	Integer
Mark-Space Address	00422	30423	40423	Integer
Speed/Device Type	00423	30424	40424	Integer
MODBUS First Integer Register	00424	30425	40425	Integer
MODBUS Number Integer Registers	00425	30426	40426	Integer
MODBUS First Float Register	00426	30427	40427	Integer
MODBUS Number Float Registers	00427	30428	40428	Integer
Traditional Level Zero	00428	30429	40429	Float
Traditional Level Full Scale	00430	30431	40431	Float
Traditional Temperature Zero	00432	30433	40433	Float
Traditional Temperature Full Scale	00434	30435	40435	Float
Slot 22				
Area/Mode	00436	30437	40437	Integer
MODBUS Address	00437	30438	40438	Integer
Mark-Space Address	00438	30439	40439	Integer
Speed/Device Type	00439	30440	40440	Integer
MODBUS First Integer Register	00440	30441	40441	Integer
MODBUS Number Integer Registers	00441	30442	40442	Integer
MODBUS First Float Register	00442	30443	40443	Integer
MODBUS Number Float Registers	00443	30444	40444	Integer
Traditional Level Zero	00444	30445	40445	Float
Traditional Level Full Scale	00446	30447	40447	Float
Traditional Temperature Zero	00448	30449	40449	Float
Traditional Temperature Full Scale	00450	30451	40451	Float
Slot 23				
Area/Mode	00452	30452	40452	Integer
MODBUS Address	00453	30453	40453	Integer
Mark-Space Address	00454	30454	40454	Integer
Speed/Device Type	00455	30455	40455	Integer
MODBUS First Integer Register	00456	30456	40456	Integer
MODBUS Number Integer Registers	00457	30457	40457	Integer
MODBUS First Float Register	00458	30458	40458	Integer
MODBUS Number Float Registers	00459	30459	40459	Integer
Traditional Level Zero	00460	30460	40460	Float
Traditional Level Full Scale	00462	30462	40462	Float
Traditional Temperature Zero	00464	30464	40464	Float
Traditional Temperature Full Scale	00466	30466	40466	Float
Slot 24				
Area/Mode	00468	30469	40469	Integer
MODBUS Address	00469	30470	40470	Integer
Mark-Space Address	00470	30471	40471	Integer
Speed/Device Type	00471	30472	40472	Integer
MODBUS First Integer Register	00472	30473	40473	Integer
MODBUS Number Integer Registers	00473	30474	40474	Integer
MODBUS First Float Register	00474	30475	40475	Integer
MODBUS Number Float Registers	00475	30476	40476	Integer
Traditional Level Zero	00476	30477	40477	Float
Traditional Level Full Scale	00478	30479	40479	Float
Traditional Temperature Zero	00480	30481	40481	Float
Traditional Temperature Full Scale	00482	30483	40483	Float

Table 3-3 Scan Table of Mark/Space Devices (TPU Register Map) [continued]

Data	Address	Read Only	Read/Write	Type
Slot 25				
Area/Mode	00484	30485	40485	Integer
MODBUS Address	00485	30486	40486	Integer
Mark-Space Address	00486	30487	40487	Integer
Speed/Device Type	00487	30488	40488	Integer
MODBUS First Integer Register	00488	30489	40489	Integer
MODBUS Number Integer Registers	00489	30490	40490	Integer
MODBUS First Float Register	00490	30491	40491	Integer
MODBUS Number Float Registers	00491	30492	40492	Integer
Traditional Level Zero	00492	30493	40493	Float
Traditional Level Full Scale	00494	30495	40495	Float
Traditional Temperature Zero	00496	30497	40497	Float
Traditional Temperature Full Scale	00498	30499	40499	Float
Slot 26				
Area/Mode	00500	30501	40501	Integer
MODBUS Address	00501	30502	40502	Integer
Mark-Space Address	00502	30503	40503	Integer
Speed/Device Type	00503	30504	40504	Integer
MODBUS First Integer Register	00504	30505	40505	Integer
MODBUS Number Integer Registers	00505	30506	40506	Integer
MODBUS First Float Register	00506	30507	40507	Integer
MODBUS Number Float Registers	00507	30508	40508	Integer
Traditional Level Zero	00508	30509	40509	Float
Traditional Level Full Scale	00510	30511	40511	Float
Traditional Temperature Zero	00512	30513	40513	Float
Traditional Temperature Full Scale	00514	30515	40515	Float
Slot 27				
Area/Mode	00516	30517	40517	Integer
MODBUS Address	00517	30518	40518	Integer
Mark-Space Address	00518	30519	40519	Integer
Speed/Device Type	00519	30520	40520	Integer
MODBUS First Integer Register	00520	30521	40521	Integer
MODBUS Number Integer Registers	00521	30522	40522	Integer
MODBUS First Float Register	00522	30523	40523	Integer
MODBUS Number Float Registers	00523	30524	40524	Integer
Traditional Level Zero	00524	30525	40525	Float
Traditional Level Full Scale	00526	30527	40527	Float
Traditional Temperature Zero	00528	30529	40529	Float
Traditional Temperature Full Scale	00530	30531	40531	Float
Slot 28				
Area/Mode	00532	30533	40533	Integer
MODBUS Address	00533	30534	40534	Integer
Mark-Space Address	00534	30535	40535	Integer
Speed/Device Type	00535	30536	40536	Integer
MODBUS First Integer Register	00536	30537	40537	Integer
MODBUS Number Integer Registers	00537	30538	40538	Integer
MODBUS First Float Register	00538	30539	40539	Integer
MODBUS Number Float Registers	00539	30540	40540	Integer
Traditional Level Zero	00540	30541	40541	Float
Traditional Level Full Scale	00542	30543	40543	Float
Traditional Temperature Zero	00544	30545	40545	Float
Traditional Temperature Full Scale	00546	30547	40547	Float

Table 3-3 Scan Table of Mark/Space Devices (TPU Register Map) [continued]

Data	Address	Read Only	Read/Write	Type
Slot 29				
Area/Mode	00548	30549	40549	Integer
MODBUS Address	00549	30550	40550	Integer
Mark-Space Address	00550	30551	40551	Integer
Speed/Device Type	00551	30552	40552	Integer
MODBUS First Integer Register	00552	30553	40553	Integer
MODBUS Number Integer Registers	00553	30554	40554	Integer
MODBUS First Float Register	00554	30555	40555	Integer
MODBUS Number Float Registers	00555	30556	40556	Integer
Traditional Level Zero	00556	30557	40557	Float
Traditional Level Full Scale	00558	30559	40559	Float
Traditional Temperature Zero	00560	30561	40561	Float
Traditional Temperature Full Scale	00562	30563	40563	Float
Slot 30				
Area/Mode	00564	30565	40565	Integer
MODBUS Address	00565	30566	40566	Integer
Mark-Space Address	00566	30567	40567	Integer
Speed/Device Type	00567	30568	40568	Integer
MODBUS First Integer Register	00568	30569	40569	Integer
MODBUS Number Integer Registers	00569	30570	40570	Integer
MODBUS First Float Register	00570	30571	40571	Integer
MODBUS Number Float Registers	00571	30572	40572	Integer
Traditional Level Zero	00572	30573	40573	Float
Traditional Level Full Scale	00574	30575	40575	Float
Traditional Temperature Zero	00576	30577	40577	Float
Traditional Temperature Full Scale	00578	30579	40579	Float
Slot 31				
Area/Mode	00580	30581	40581	Integer
MODBUS Address	00581	30582	40582	Integer
Mark-Space Address	00582	30583	40583	Integer
Speed/Device Type	00583	30584	40584	Integer
MODBUS First Integer Register	00584	30585	40585	Integer
MODBUS Number Integer Registers	00585	30586	40586	Integer
MODBUS First Float Register	00586	30587	40587	Integer
MODBUS Number Float Registers	00587	30588	40588	Integer
Traditional Level Zero	00588	30589	40589	Float
Traditional Level Full Scale	00590	30591	40591	Float
Traditional Temperature Zero	00592	30593	40593	Float
Traditional Temperature Full Scale	00594	30595	40595	Float
Slot 32				
Area/Mode	00596	30597	40597	Integer
MODBUS Address	00597	30598	40598	Integer
Mark-Space Address	00598	30599	40599	Integer
Speed/Device Type	00599	30600	40600	Integer
MODBUS First Integer Register	00600	30601	40601	Integer
MODBUS Number Integer Registers	00601	30602	40602	Integer
MODBUS First Float Register	00602	30603	40603	Integer
MODBUS Number Float Registers	00603	30604	40604	Integer
Traditional Level Zero	00604	30605	40605	Float
Traditional Level Full Scale	00606	30607	40607	Float
Traditional Temperature Zero	00608	30609	40609	Float
Traditional Temperature Full Scale	00610	30611	40611	Float

Table 3-3 Scan Table of Mark/Space Devices (TPU Register Map) [continued]

Data	Address	Read Only	Read/Write	Type
Slot 33				
Area/Mode	00612	30613	40613	Integer
MODBUS Address	00613	30614	40614	Integer
Mark-Space Address	00614	30615	40615	Integer
Speed/Device Type	00615	30616	40616	Integer
MODBUS First Integer Register	00616	30617	40617	Integer
MODBUS Number Integer Registers	00617	30618	40618	Integer
MODBUS First Float Register	00618	30619	40619	Integer
MODBUS Number Float Registers	00619	30620	40620	Integer
Traditional Level Zero	00620	30621	40621	Float
Traditional Level Full Scale	00622	30623	40623	Float
Traditional Temperature Zero	00624	30625	40625	Float
Traditional Temperature Full Scale	00626	30627	40627	Float
Slot 34				
Area/Mode	00628	30629	40629	Integer
MODBUS Address	00629	30630	40630	Integer
Mark-Space Address	00630	30631	40631	Integer
Speed/Device Type	00631	30632	40632	Integer
MODBUS First Integer Register	00632	30633	40633	Integer
MODBUS Number Integer Registers	00633	30634	40634	Integer
MODBUS First Float Register	00634	30635	40635	Integer
MODBUS Number Float Registers	00635	30636	40636	Integer
Traditional Level Zero	00636	30637	40637	Float
Traditional Level Full Scale	00638	30639	40639	Float
Traditional Temperature Zero	00640	30641	40641	Float
Traditional Temperature Full Scale	00642	30643	40643	Float
Slot 35				
Area/Mode	00644	30645	40645	Integer
MODBUS Address	00645	30646	40646	Integer
Mark-Space Address	00646	30647	40647	Integer
Speed/Device Type	00647	30648	40648	Integer
MODBUS First Integer Register	00648	30649	40649	Integer
MODBUS Number Integer Registers	00649	30650	40650	Integer
MODBUS First Float Register	00650	30651	40651	Integer
MODBUS Number Float Registers	00651	30652	40652	Integer
Traditional Level Zero	00652	30653	40653	Float
Traditional Level Full Scale	00654	30655	40655	Float
Traditional Temperature Zero	00656	30657	40657	Float
Traditional Temperature Full Scale	00658	30659	40659	Float
Slot 36				
Area/Mode	00660	30661	40661	Integer
MODBUS Address	00661	30662	40662	Integer
Mark-Space Address	00662	30663	40663	Integer
Speed/Device Type	00663	30664	40664	Integer
MODBUS First Integer Register	00664	30665	40665	Integer
MODBUS Number Integer Registers	00665	30666	40666	Integer
MODBUS First Float Register	00666	30667	40667	Integer
MODBUS Number Float Registers	00667	30668	40668	Integer
Traditional Level Zero	00668	30669	40669	Float
Traditional Level Full Scale	00670	30671	40671	Float
Traditional Temperature Zero	00672	30673	40673	Float
Traditional Temperature Full Scale	00674	30675	40675	Float

Table 3-3 Scan Table of Mark/Space Devices (TPU Register Map) [continued]

Data	Address	Read Only	Read/Write	Type
Slot 37				
Area/Mode	00676	30677	40677	Integer
MODBUS Address	00677	30678	40678	Integer
Mark-Space Address	00678	30679	40679	Integer
Speed/Device Type	00679	30680	40680	Integer
MODBUS First Integer Register	00680	30681	40681	Integer
MODBUS Number Integer Registers	00681	30682	40682	Integer
MODBUS First Float Register	00682	30683	40683	Integer
MODBUS Number Float Registers	00683	30684	40684	Integer
Traditional Level Zero	00684	30685	40685	Float
Traditional Level Full Scale	00686	30687	40687	Float
Traditional Temperature Zero	00688	30689	40689	Float
Traditional Temperature Full Scale	00690	30691	40691	Float
Slot 38				
Area/Mode	00692	30693	40693	Integer
MODBUS Address	00693	30694	40694	Integer
Mark-Space Address	00694	30695	40695	Integer
Speed/Device Type	00695	30696	40696	Integer
MODBUS First Integer Register	00696	30697	40697	Integer
MODBUS Number Integer Registers	00697	30698	40698	Integer
MODBUS First Float Register	00698	30699	40699	Integer
MODBUS Number Float Registers	00699	30700	40700	Integer
Traditional Level Zero	00700	30701	40701	Float
Traditional Level Full Scale	00702	30703	40703	Float
Traditional Temperature Zero	00704	30705	40705	Float
Traditional Temperature Full Scale	00706	30707	40707	Float
Slot 39				
Area/Mode	00708	30709	40709	Integer
MODBUS Address	00709	30710	40710	Integer
Mark-Space Address	00710	30711	40711	Integer
Speed/Device Type	00711	30712	40712	Integer
MODBUS First Integer Register	00712	30713	40713	Integer
MODBUS Number Integer Registers	00713	30714	40714	Integer
MODBUS First Float Register	00714	30715	40715	Integer
MODBUS Number Float Registers	00715	30716	40716	Integer
Traditional Level Zero	00716	30717	40717	Float
Traditional Level Full Scale	00718	30719	40719	Float
Traditional Temperature Zero	00720	30721	40721	Float
Traditional Temperature Full Scale	00722	30723	40723	Float
Slot 40				
Area/Mode	00724	30725	40725	Integer
MODBUS Address	00725	30726	40726	Integer
Mark-Space Address	00726	30727	40727	Integer
Speed/Device Type	00727	30728	40728	Integer
MODBUS First Integer Register	00728	30729	40729	Integer
MODBUS Number Integer Registers	00729	30730	40730	Integer
MODBUS First Float Register	00730	30731	40731	Integer
MODBUS Number Float Registers	00731	30732	40732	Integer
Traditional Level Zero	00732	30733	40733	Float
Traditional Level Full Scale	00734	30735	40735	Float
Traditional Temperature Zero	00736	30737	40737	Float
Traditional Temperature Full Scale	00738	30739	40739	Float

Table 3-3 Scan Table of Mark/Space Devices (TPU Register Map) [continued]

Data	Address	Read Only	Read/Write	Type
Slot 41				
Area/Mode	00740	30741	40741	Integer
MODBUS Address	00741	30742	40742	Integer
Mark-Space Address	00742	30743	40743	Integer
Speed/Device Type	00743	30744	40744	Integer
MODBUS First Integer Register	00744	30745	40745	Integer
MODBUS Number Integer Registers	00745	30746	40746	Integer
MODBUS First Float Register	00746	30747	40747	Integer
MODBUS Number Float Registers	00747	30748	40748	Integer
Traditional Level Zero	00748	30749	40749	Float
Traditional Level Full Scale	00750	30751	40751	Float
Traditional Temperature Zero	00752	30753	40753	Float
Traditional Temperature Full Scale	00754	30755	40755	Float
Slot 42				
Area/Mode	00756	30757	40757	Integer
MODBUS Address	00757	30758	40758	Integer
Mark-Space Address	00758	30759	40759	Integer
Speed/Device Type	00759	30760	40760	Integer
MODBUS First Integer Register	00760	30761	40761	Integer
MODBUS Number Integer Registers	00761	30762	40762	Integer
MODBUS First Float Register	00762	30763	40763	Integer
MODBUS Number Float Registers	00763	30764	40764	Integer
Traditional Level Zero	00764	30765	40765	Float
Traditional Level Full Scale	00766	30767	40767	Float
Traditional Temperature Zero	00768	30769	40769	Float
Traditional Temperature Full Scale	00770	30771	40771	Float
Slot 43				
Area/Mode	00772	30773	40773	Integer
MODBUS Address	00773	30774	40774	Integer
Mark-Space Address	00774	30775	40775	Integer
Speed/Device Type	00775	30776	40776	Integer
MODBUS First Integer Register	00776	30777	40777	Integer
MODBUS Number Integer Registers	00777	30778	40778	Integer
MODBUS First Float Register	00778	30779	40779	Integer
MODBUS Number Float Registers	00779	30780	40780	Integer
Traditional Level Zero	00780	30781	40781	Float
Traditional Level Full Scale	00782	30783	40783	Float
Traditional Temperature Zero	00784	30785	40785	Float
Traditional Temperature Full Scale	00786	30787	40787	Float
Slot 44				
Area/Mode	00788	30789	40789	Integer
MODBUS Address	00789	30790	40790	Integer
Mark-Space Address	00790	30791	40791	Integer
Speed/Device Type	00791	30792	40792	Integer
MODBUS First Integer Register	00792	30793	40793	Integer
MODBUS Number Integer Registers	00793	30794	40794	Integer
MODBUS First Float Register	00794	30795	40795	Integer
MODBUS Number Float Registers	00795	30796	40796	Integer
Traditional Level Zero	00796	30797	40797	Float
Traditional Level Full Scale	00798	30799	40799	Float
Traditional Temperature Zero	00800	30801	40801	Float
Traditional Temperature Full Scale	00802	30803	40803	Float

Table 3-3 Scan Table of Mark/Space Devices (TPU Register Map) [continued]

Data	Address	Read Only	Read/Write	Type
Slot 45				
Area/Mode	00804	30805	40805	Integer
MODBUS Address	00805	30806	40806	Integer
Mark-Space Address	00806	30807	40807	Integer
Speed/Device Type	00807	30808	40808	Integer
MODBUS First Integer Register	00808	30809	40809	Integer
MODBUS Number Integer Registers	00809	30810	40810	Integer
MODBUS First Float Register	00810	30811	40811	Integer
MODBUS Number Float Registers	00811	30812	40812	Integer
Traditional Level Zero	00812	30813	40813	Float
Traditional Level Full Scale	00814	30815	40815	Float
Traditional Temperature Zero	00816	30817	40817	Float
Traditional Temperature Full Scale	00818	30819	40819	Float
Slot 46				
Area/Mode	00820	30821	40821	Integer
MODBUS Address	00821	30822	40822	Integer
Mark-Space Address	00822	30823	40823	Integer
Speed/Device Type	00823	30824	40824	Integer
MODBUS First Integer Register	00824	30825	40825	Integer
MODBUS Number Integer Registers	00825	30826	40826	Integer
MODBUS First Float Register	00826	30827	40827	Integer
MODBUS Number Float Registers	00827	30828	40828	Integer
Traditional Level Zero	00828	30829	40829	Float
Traditional Level Full Scale	00830	30831	40831	Float
Traditional Temperature Zero	00832	30833	40833	Float
Traditional Temperature Full Scale	00834	30835	40835	Float
Slot 47				
Area/Mode	00836	30837	40837	Integer
MODBUS Address	00837	30838	40838	Integer
Mark-Space Address	00838	30839	40839	Integer
Speed/Device Type	00839	30840	40840	Integer
MODBUS First Integer Register	00840	30841	40841	Integer
MODBUS Number Integer Registers	00841	30842	40842	Integer
MODBUS First Float Register	00842	30843	40843	Integer
MODBUS Number Float Registers	00843	30844	40844	Integer
Traditional Level Zero	00844	30845	40845	Float
Traditional Level Full Scale	00846	30847	40847	Float
Traditional Temperature Zero	00848	30849	40849	Float
Traditional Temperature Full Scale	00850	30851	40851	Float
Slot 48				
Area/Mode	00852	30853	40853	Integer
MODBUS Address	00853	30854	40854	Integer
Mark-Space Address	00854	30855	40855	Integer
Speed/Device Type	00855	30856	40856	Integer
MODBUS First Integer Register	00856	30857	40857	Integer
MODBUS Number Integer Registers	00857	30858	40858	Integer
MODBUS First Float Register	00858	30859	40859	Integer
MODBUS Number Float Registers	00859	30860	40860	Integer
Traditional Level Zero	00860	30861	40861	Float
Traditional Level Full Scale	00862	30863	40863	Float
Traditional Temperature Zero	00864	30865	40865	Float
Traditional Temperature Full Scale	00866	30867	40867	Float

Table 3-3 Scan Table of Mark/Space Devices (TPU Register Map) [continued]

Data	Address	Read Only	Read/Write	Type
Slot 49				
Area/Mode	00868	30869	40869	Integer
MODBUS Address	00869	30870	40870	Integer
Mark-Space Address	00870	30871	40871	Integer
Speed/Device Type	00871	30872	40872	Integer
MODBUS First Integer Register	00872	30873	40873	Integer
MODBUS Number Integer Registers	00873	30874	40874	Integer
MODBUS First Float Register	00874	30875	40875	Integer
MODBUS Number Float Registers	00875	30876	40876	Integer
Traditional Level Zero	00876	30877	40877	Float
Traditional Level Full Scale	00878	30879	40879	Float
Traditional Temperature Zero	00880	30881	40881	Float
Traditional Temperature Full Scale	00882	30883	40883	Float
Slot 50				
Area/Mode	00884	30885	40885	Integer
MODBUS Address	00885	30886	40886	Integer
Mark-Space Address	00886	30887	40887	Integer
Speed/Device Type	00887	30888	40888	Integer
MODBUS First Integer Register	00888	30889	40889	Integer
MODBUS Number Integer Registers	00889	30890	40890	Integer
MODBUS First Float Register	00890	30891	40891	Integer
MODBUS Number Float Registers	00891	30892	40892	Integer
Traditional Level Zero	00892	30893	40893	Float
Traditional Level Full Scale	00894	30895	40895	Float
Traditional Temperature Zero	00896	30897	40897	Float
Traditional Temperature Full Scale	00898	30899	40899	Float
Slot 51				
Area/Mode	00900	30901	40901	Integer
MODBUS Address	00901	30902	40902	Integer
Mark-Space Address	00902	30903	40903	Integer
Speed/Device Type	00903	30904	40904	Integer
MODBUS First Integer Register	00904	30905	40905	Integer
MODBUS Number Integer Registers	00905	30906	40906	Integer
MODBUS First Float Register	00906	30907	40907	Integer
MODBUS Number Float Registers	00907	30908	40908	Integer
Traditional Level Zero	00908	30909	40909	Float
Traditional Level Full Scale	00910	30911	40911	Float
Traditional Temperature Zero	00912	30913	40913	Float
Traditional Temperature Full Scale	00914	30915	40915	Float
Slot 52				
Area/Mode	00916	30917	40917	Integer
MODBUS Address	00917	30918	40918	Integer
Mark-Space Address	00918	30919	40919	Integer
Speed/Device Type	00919	30920	40920	Integer
MODBUS First Integer Register	00920	30921	40921	Integer
MODBUS Number Integer Registers	00921	30922	40922	Integer
MODBUS First Float Register	00922	30923	40923	Integer
MODBUS Number Float Registers	00923	30924	40924	Integer
Traditional Level Zero	00924	30925	40925	Float
Traditional Level Full Scale	00926	30927	40927	Float
Traditional Temperature Zero	00928	30929	40929	Float
Traditional Temperature Full Scale	00930	30931	40931	Float

Table 3-3 Scan Table of Mark/Space Devices (TPU Register Map) [continued]

Data	Address	Read Only	Read/Write	Type
Slot 53				
Area/Mode	00932	30933	40933	Integer
MODBUS Address	00933	30934	40934	Integer
Mark-Space Address	00934	30935	40935	Integer
Speed/Device Type	00935	30936	40936	Integer
MODBUS First Integer Register	00936	30937	40937	Integer
MODBUS Number Integer Registers	00937	30938	40938	Integer
MODBUS First Float Register	00938	30939	40939	Integer
MODBUS Number Float Registers	00939	30940	40940	Integer
Traditional Level Zero	00940	30941	40941	Float
Traditional Level Full Scale	00942	30943	40943	Float
Traditional Temperature Zero	00944	30945	40945	Float
Traditional Temperature Full Scale	00946	30947	40947	Float
Slot 54				
Area/Mode	00948	30949	40949	Integer
MODBUS Address	00949	30950	40950	Integer
Mark-Space Address	00950	30951	40951	Integer
Speed/Device Type	00951	30952	40952	Integer
MODBUS First Integer Register	00952	30953	40953	Integer
MODBUS Number Integer Registers	00953	30954	40954	Integer
MODBUS First Float Register	00954	30955	40955	Integer
MODBUS Number Float Registers	00955	30956	40956	Integer
Traditional Level Zero	00956	30957	40957	Float
Traditional Level Full Scale	00958	30959	40959	Float
Traditional Temperature Zero	00960	30961	40961	Float
Traditional Temperature Full Scale	00962	30963	40963	Float
Slot 55				
Area/Mode	00964	30965	40965	Integer
MODBUS Address	00965	30966	40966	Integer
Mark-Space Address	00966	30967	40967	Integer
Speed/Device Type	00967	30968	40968	Integer
MODBUS First Integer Register	00968	30969	40969	Integer
MODBUS Number Integer Registers	00969	30970	40970	Integer
MODBUS First Float Register	00970	30971	40971	Integer
MODBUS Number Float Registers	00971	30972	40972	Integer
Traditional Level Zero	00972	30973	40973	Float
Traditional Level Full Scale	00974	30975	40975	Float
Traditional Temperature Zero	00976	30977	40977	Float
Traditional Temperature Full Scale	00978	30979	40979	Float
Slot 56				
Area/Mode	00980	30981	40981	Integer
MODBUS Address	00981	30982	40982	Integer
Mark-Space Address	00982	30983	40983	Integer
Speed/Device Type	00983	30984	40984	Integer
MODBUS First Integer Register	00984	30985	40985	Integer
MODBUS Number Integer Registers	00985	30986	40986	Integer
MODBUS First Float Register	00986	30987	40987	Integer
MODBUS Number Float Registers	00987	30988	40988	Integer
Traditional Level Zero	00988	30989	40989	Float
Traditional Level Full Scale	00990	30991	40991	Float
Traditional Temperature Zero	00992	30993	40993	Float
Traditional Temperature Full Scale	00994	30995	40995	Float

Table 3-3 Scan Table of Mark/Space Devices (TPU Register Map) [continued]

Data	Address	Read Only	Read/Write	Type
Slot 57				
Area/Mode	00996	30997	40997	Integer
MODBUS Address	00997	30998	40998	Integer
Mark-Space Address	00998	30999	40999	Integer
Speed/Device Type	00999	31000	41000	Integer
MODBUS First Integer Register	01000	31001	41001	Integer
MODBUS Number Integer Registers	01001	31002	41002	Integer
MODBUS First Float Register	01002	31003	41003	Integer
MODBUS Number Float Registers	01003	31004	41004	Integer
Traditional Level Zero	01004	31005	41005	Float
Traditional Level Full Scale	01006	31007	41007	Float
Traditional Temperature Zero	01008	31009	41009	Float
Traditional Temperature Full Scale	01010	31011	41011	Float
Slot 58				
Area/Mode	01012	31013	41013	Integer
MODBUS Address	01013	31014	41014	Integer
Mark-Space Address	01014	31015	41015	Integer
Speed/Device Type	01015	31016	41016	Integer
MODBUS First Integer Register	01016	31017	41017	Integer
MODBUS Number Integer Registers	01017	31018	41018	Integer
MODBUS First Float Register	01018	31019	41019	Integer
MODBUS Number Float Registers	01019	31020	41020	Integer
Traditional Level Zero	01020	31021	41021	Float
Traditional Level Full Scale	01022	31023	41023	Float
Traditional Temperature Zero	01024	31025	41025	Float
Traditional Temperature Full Scale	01026	31027	41027	Float
Slot 59				
Area/Mode	01028	31029	41029	Integer
MODBUS Address	01029	31030	41030	Integer
Mark-Space Address	01030	31031	41031	Integer
Speed/Device Type	01031	31032	41032	Integer
MODBUS First Integer Register	01032	31033	41033	Integer
MODBUS Number Integer Registers	01033	31034	41034	Integer
MODBUS First Float Register	01034	31035	41035	Integer
MODBUS Number Float Registers	01035	31036	41036	Integer
Traditional Level Zero	01036	31037	41037	Float
Traditional Level Full Scale	01038	31039	41039	Float
Traditional Temperature Zero	01040	31041	41041	Float
Traditional Temperature Full Scale	01042	31043	41043	Float
Slot 60				
Area/Mode	01044	31045	41045	Integer
MODBUS Address	01045	31046	41046	Integer
Mark-Space Address	01046	31047	41047	Integer
Speed/Device Type	01047	31048	41048	Integer
MODBUS First Integer Register	01048	31049	41049	Integer
MODBUS Number Integer Registers	01049	31050	41050	Integer
MODBUS First Float Register	01050	31051	41051	Integer
MODBUS Number Float Registers	01051	31052	41052	Integer
Traditional Level Zero	01052	31053	41053	Float
Traditional Level Full Scale	01054	31055	41055	Float
Traditional Temperature Zero	01056	31057	41057	Float
Traditional Temperature Full Scale	01058	31059	41059	Float

Table 3-3 Scan Table of Mark/Space Devices (TPU Register Map) [continued]

Data	Address	Read Only	Read/Write	Type
Slot 61				
Area/Mode	01060	31061	41061	Integer
MODBUS Address	01061	31062	41062	Integer
Mark-Space Address	01062	31063	41063	Integer
Speed/Device Type	01063	31064	41064	Integer
MODBUS First Integer Register	01064	31065	41065	Integer
MODBUS Number Integer Registers	01065	31066	41066	Integer
MODBUS First Float Register	01066	31067	41067	Integer
MODBUS Number Float Registers	01067	31068	41068	Integer
Traditional Level Zero	01068	31069	41069	Float
Traditional Level Full Scale	01070	31071	41071	Float
Traditional Temperature Zero	01072	31073	41073	Float
Traditional Temperature Full Scale	01074	31075	41075	Float
Slot 62				
Area/Mode	01076	31077	41077	Integer
MODBUS Address	01077	31078	41078	Integer
Mark-Space Address	01078	31079	41079	Integer
Speed/Device Type	01079	31080	41080	Integer
MODBUS First Integer Register	01080	31081	41081	Integer
MODBUS Number Integer Registers	01081	31082	41082	Integer
MODBUS First Float Register	01082	31083	41083	Integer
MODBUS Number Float Registers	01083	31084	41084	Integer
Traditional Level Zero	01084	31085	41085	Float
Traditional Level Full Scale	01086	31087	41087	Float
Traditional Temperature Zero	01088	31089	41089	Float
Traditional Temperature Full Scale	01090	31091	41091	Float
Slot 63				
Area/Mode	01092	31093	41093	Integer
MODBUS Address	01093	31094	41094	Integer
Mark-Space Address	01094	31095	41095	Integer
Speed/Device Type	01095	31096	41096	Integer
MODBUS First Integer Register	01096	31097	41097	Integer
MODBUS Number Integer Registers	01097	31098	41098	Integer
MODBUS First Float Register	01098	31099	41099	Integer
MODBUS Number Float Registers	01099	31100	41100	Integer
Traditional Level Zero	01100	31101	41101	Float
Traditional Level Full Scale	01102	31103	41103	Float
Traditional Temperature Zero	01104	31105	41105	Float
Traditional Temperature Full Scale	01106	31107	41107	Float
Slot 64				
Area/Mode	01108	31109	41109	Integer
MODBUS Address	01109	31110	41110	Integer
Mark-Space Address	01110	31111	41111	Integer
Speed/Device Type	01111	31112	41112	Integer
MODBUS First Integer Register	01112	31113	41113	Integer
MODBUS Number Integer Registers	01113	31114	41114	Integer
MODBUS First Float Register	01114	31115	41115	Integer
MODBUS Number Float Registers	01115	31116	41116	Integer
Traditional Level Zero	01116	31117	41117	Float
Traditional Level Full Scale	01118	31119	41119	Float
Traditional Temperature Zero	01120	31121	41121	Float
Traditional Temperature Full Scale	01122	31123	41123	Float

Table 3-3 Scan Table of Mark/Space Devices (TPU Register Map) [continued]

Data	Address	Read Only	Read/Write	Type
Slot 65				
Area/Mode	01124	31125	41125	Integer
MODBUS Address	01125	31126	41126	Integer
Mark-Space Address	01126	31127	41127	Integer
Speed/Device Type	01127	31128	41128	Integer
MODBUS First Integer Register	01128	31129	41129	Integer
MODBUS Number Integer Registers	01129	31130	41130	Integer
MODBUS First Float Register	01130	31131	41131	Integer
MODBUS Number Float Registers	01131	31132	41132	Integer
Traditional Level Zero	01132	31133	41133	Float
Traditional Level Full Scale	01134	31135	41135	Float
Traditional Temperature Zero	01136	31137	41137	Float
Traditional Temperature Full Scale	01138	31139	41139	Float
Slot 66				
Area/Mode	01140	31141	41141	Integer
MODBUS Address	01141	31142	41142	Integer
Mark-Space Address	01142	31143	41143	Integer
Speed/Device Type	01143	31144	41144	Integer
MODBUS First Integer Register	01144	31145	41145	Integer
MODBUS Number Integer Registers	01145	31146	41146	Integer
MODBUS First Float Register	01146	31147	41147	Integer
MODBUS Number Float Registers	01147	31148	41148	Integer
Traditional Level Zero	01148	31149	41149	Float
Traditional Level Full Scale	01150	31151	41151	Float
Traditional Temperature Zero	01152	31153	41153	Float
Traditional Temperature Full Scale	01154	31155	41155	Float
Slot 67				
Area/Mode	01156	31157	41157	Integer
MODBUS Address	01157	31158	41158	Integer
Mark-Space Address	01158	31159	41159	Integer
Speed/Device Type	01159	31160	41160	Integer
MODBUS First Integer Register	01160	31161	41161	Integer
MODBUS Number Integer Registers	01161	31162	41162	Integer
MODBUS First Float Register	01162	31163	41163	Integer
MODBUS Number Float Registers	01163	31164	41164	Integer
Traditional Level Zero	01164	31165	41165	Float
Traditional Level Full Scale	01166	31167	41167	Float
Traditional Temperature Zero	01168	31169	41169	Float
Traditional Temperature Full Scale	01170	31171	41171	Float
Slot 68				
Area/Mode	01172	31173	41173	Integer
MODBUS Address	01173	31174	41174	Integer
Mark-Space Address	01174	31175	41175	Integer
Speed/Device Type	01175	31176	41176	Integer
MODBUS First Integer Register	01176	31177	41177	Integer
MODBUS Number Integer Registers	01177	31178	41178	Integer
MODBUS First Float Register	01178	31179	41179	Integer
MODBUS Number Float Registers	01179	31180	41180	Integer
Traditional Level Zero	01180	31181	41181	Float
Traditional Level Full Scale	01182	31183	41183	Float
Traditional Temperature Zero	01184	31185	41185	Float
Traditional Temperature Full Scale	01186	31187	41187	Float

Table 3-3 Scan Table of Mark/Space Devices (TPU Register Map) [continued]

Data	Address	Read Only	Read/Write	Type
Slot 69				
Area/Mode	01188	31189	41189	Integer
MODBUS Address	01189	31190	41190	Integer
Mark-Space Address	01190	31191	41191	Integer
Speed/Device Type	01191	31192	41192	Integer
MODBUS First Integer Register	01192	31193	41193	Integer
MODBUS Number Integer Registers	01193	31194	41194	Integer
MODBUS First Float Register	01194	31195	41195	Integer
MODBUS Number Float Registers	01195	31196	41196	Integer
Traditional Level Zero	01196	31197	41197	Float
Traditional Level Full Scale	01198	31199	41199	Float
Traditional Temperature Zero	01200	31201	41201	Float
Traditional Temperature Full Scale	01202	31203	41203	Float
Slot 70				
Area/Mode	01204	31205	41205	Integer
MODBUS Address	01205	31206	41206	Integer
Mark-Space Address	01206	31207	41207	Integer
Speed/Device Type	01207	31208	41208	Integer
MODBUS First Integer Register	01208	31209	41209	Integer
MODBUS Number Integer Registers	01209	31210	41210	Integer
MODBUS First Float Register	01210	31211	41211	Integer
MODBUS Number Float Registers	01211	31212	41212	Integer
Traditional Level Zero	01212	31213	41213	Float
Traditional Level Full Scale	01214	31215	41215	Float
Traditional Temperature Zero	01216	31217	41217	Float
Traditional Temperature Full Scale	01218	31219	41219	Float
Slot 71				
Area/Mode	01220	31221	41221	Integer
MODBUS Address	01221	31222	41222	Integer
Mark-Space Address	01222	31223	41223	Integer
Speed/Device Type	01223	31224	41224	Integer
MODBUS First Integer Register	01224	31225	41225	Integer
MODBUS Number Integer Registers	01225	31226	41226	Integer
MODBUS First Float Register	01226	31227	41227	Integer
MODBUS Number Float Registers	01227	31228	41228	Integer
Traditional Level Zero	01228	31229	41229	Float
Traditional Level Full Scale	01230	31231	41231	Float
Traditional Temperature Zero	01232	31233	41233	Float
Traditional Temperature Full Scale	01234	31235	41235	Float
Slot 72				
Area/Mode	01236	31237	41237	Integer
MODBUS Address	01237	31238	41238	Integer
Mark-Space Address	01238	31239	41239	Integer
Speed/Device Type	01239	31240	41240	Integer
MODBUS First Integer Register	01240	31241	41241	Integer
MODBUS Number Integer Registers	01241	31242	41242	Integer
MODBUS First Float Register	01242	31243	41243	Integer
MODBUS Number Float Registers	01243	31244	41244	Integer
Traditional Level Zero	01244	31245	41245	Float
Traditional Level Full Scale	01246	31247	41247	Float
Traditional Temperature Zero	01248	31249	41249	Float
Traditional Temperature Full Scale	01250	31251	41251	Float

Table 3-3 Scan Table of Mark/Space Devices (TPU Register Map) [continued]

Data	Address	Read Only	Read/Write	Type
Slot 73				
Area/Mode	01252	31253	41253	Integer
MODBUS Address	01253	31254	41254	Integer
Mark-Space Address	01254	31255	41255	Integer
Speed/Device Type	01255	31256	41256	Integer
MODBUS First Integer Register	01256	31257	41257	Integer
MODBUS Number Integer Registers	01257	31258	41258	Integer
MODBUS First Float Register	01258	31259	41259	Integer
MODBUS Number Float Registers	01259	31260	41260	Integer
Traditional Level Zero	01260	31261	41261	Float
Traditional Level Full Scale	01262	31263	41263	Float
Traditional Temperature Zero	01264	31265	41265	Float
Traditional Temperature Full Scale	01266	31267	41267	Float
Slot 74				
Area/Mode	01268	31269	41269	Integer
MODBUS Address	01269	31270	41270	Integer
Mark-Space Address	01270	31271	41271	Integer
Speed/Device Type	01271	31272	41272	Integer
MODBUS First Integer Register	01272	31273	41273	Integer
MODBUS Number Integer Registers	01273	31274	41274	Integer
MODBUS First Float Register	01274	31275	41275	Integer
MODBUS Number Float Registers	01275	31276	41276	Integer
Traditional Level Zero	01276	31277	41277	Float
Traditional Level Full Scale	01278	31279	41279	Float
Traditional Temperature Zero	01280	31281	41281	Float
Traditional Temperature Full Scale	01282	31283	41283	Float
Slot 75				
Area/Mode	01284	31285	41285	Integer
MODBUS Address	01285	31286	41286	Integer
Mark-Space Address	01286	31287	41287	Integer
Speed/Device Type	01287	31288	41288	Integer
MODBUS First Integer Register	01288	31289	41289	Integer
MODBUS Number Integer Registers	01289	31290	41290	Integer
MODBUS First Float Register	01290	31291	41291	Integer
MODBUS Number Float Registers	01291	31292	41292	Integer
Traditional Level Zero	01292	31293	41293	Float
Traditional Level Full Scale	01294	31295	41295	Float
Traditional Temperature Zero	01296	31297	41297	Float
Traditional Temperature Full Scale	01298	31299	41299	Float
Slot 76				
Area/Mode	01300	31301	41301	Integer
MODBUS Address	01301	31302	41302	Integer
Mark-Space Address	01302	31303	41303	Integer
Speed/Device Type	01303	31304	41304	Integer
MODBUS First Integer Register	01304	31305	41305	Integer
MODBUS Number Integer Registers	01305	31306	41306	Integer
MODBUS First Float Register	01306	31307	41307	Integer
MODBUS Number Float Registers	01307	31308	41308	Integer
Traditional Level Zero	01308	31309	41309	Float
Traditional Level Full Scale	01310	31311	41311	Float
Traditional Temperature Zero	01312	31313	41313	Float
Traditional Temperature Full Scale	01314	31315	41315	Float

Table 3-3 Scan Table of Mark/Space Devices (TPU Register Map) [continued]

Data	Address	Read Only	Read/Write	Type
Slot 77				
Area/Mode	01316	31317	41317	Integer
MODBUS Address	01317	31318	41318	Integer
Mark-Space Address	01318	31319	41319	Integer
Speed/Device Type	01319	31320	41320	Integer
MODBUS First Integer Register	01320	31321	41321	Integer
MODBUS Number Integer Registers	01321	31322	41322	Integer
MODBUS First Float Register	01322	31323	41323	Integer
MODBUS Number Float Registers	01323	31324	41324	Integer
Traditional Level Zero	01324	31325	41325	Float
Traditional Level Full Scale	01326	31327	41327	Float
Traditional Temperature Zero	01328	31329	41329	Float
Traditional Temperature Full Scale	01330	31331	41331	Float
Slot 78				
Area/Mode	01332	31333	41333	Integer
MODBUS Address	01333	31334	41334	Integer
Mark-Space Address	01334	31335	41335	Integer
Speed/Device Type	01335	31336	41336	Integer
MODBUS First Integer Register	01336	31337	41337	Integer
MODBUS Number Integer Registers	01337	31338	41338	Integer
MODBUS First Float Register	01338	31339	41339	Integer
MODBUS Number Float Registers	01339	31340	41340	Integer
Traditional Level Zero	01340	31341	41341	Float
Traditional Level Full Scale	01342	31343	41343	Float
Traditional Temperature Zero	01344	31345	41345	Float
Traditional Temperature Full Scale	01346	31347	41347	Float
Slot 79				
Area/Mode	01348	31349	41349	Integer
MODBUS Address	01349	31350	41350	Integer
Mark-Space Address	01350	31351	41351	Integer
Speed/Device Type	01351	31352	41352	Integer
MODBUS First Integer Register	01352	31353	41353	Integer
MODBUS Number Integer Registers	01353	31354	41354	Integer
MODBUS First Float Register	01354	31355	41355	Integer
MODBUS Number Float Registers	01355	31356	41356	Integer
Traditional Level Zero	01356	31357	41357	Float
Traditional Level Full Scale	01358	31359	41359	Float
Traditional Temperature Zero	01360	31361	41361	Float
Traditional Temperature Full Scale	01362	31363	41363	Float
Slot 80				
Area/Mode	01364	31365	41365	Integer
MODBUS Address	01365	31366	41366	Integer
Mark-Space Address	01366	31367	41367	Integer
Speed/Device Type	01367	31368	41368	Integer
MODBUS First Integer Register	01368	31369	41369	Integer
MODBUS Number Integer Registers	01369	31370	41370	Integer
MODBUS First Float Register	01370	31371	41371	Integer
MODBUS Number Float Registers	01371	31372	41372	Integer
Traditional Level Zero	01372	31373	41373	Float
Traditional Level Full Scale	01374	31375	41375	Float
Traditional Temperature Zero	01376	31377	41377	Float
Traditional Temperature Full Scale	01378	31379	41379	Float

Table 3-3 Scan Table of Mark/Space Devices (TPU Register Map) [continued]

Data	Address	Read Only	Read/Write	Type
Slot 81				
Area/Mode	01380	31381	41381	Integer
MODBUS Address	01381	31382	41382	Integer
Mark-Space Address	01382	31383	41383	Integer
Speed/Device Type	01383	31384	41384	Integer
MODBUS First Integer Register	01384	31385	41385	Integer
MODBUS Number Integer Registers	01385	31386	41386	Integer
MODBUS First Float Register	01386	31387	41387	Integer
MODBUS Number Float Registers	01387	31388	41388	Integer
Traditional Level Zero	01388	31389	41389	Float
Traditional Level Full Scale	01390	31391	41391	Float
Traditional Temperature Zero	01392	31393	41393	Float
Traditional Temperature Full Scale	01394	31395	41395	Float
Slot 82				
Area/Mode	01396	31397	41397	Integer
MODBUS Address	01397	31398	41398	Integer
Mark-Space Address	01398	31399	41399	Integer
Speed/Device Type	01399	31400	41400	Integer
MODBUS First Integer Register	01400	31401	41401	Integer
MODBUS Number Integer Registers	01401	31402	41402	Integer
MODBUS First Float Register	01402	31403	41403	Integer
MODBUS Number Float Registers	01403	31404	41404	Integer
Traditional Level Zero	01404	31405	41405	Float
Traditional Level Full Scale	01406	31407	41407	Float
Traditional Temperature Zero	01408	31409	41409	Float
Traditional Temperature Full Scale	01410	31411	41411	Float
Slot 83				
Area/Mode	01412	31413	41413	Integer
MODBUS Address	01413	31414	41414	Integer
Mark-Space Address	01414	31415	41415	Integer
Speed/Device Type	01415	31416	41416	Integer
MODBUS First Integer Register	01416	31417	41417	Integer
MODBUS Number Integer Registers	01417	31418	41418	Integer
MODBUS First Float Register	01418	31419	41419	Integer
MODBUS Number Float Registers	01419	31420	41420	Integer
Traditional Level Zero	01420	31421	41421	Float
Traditional Level Full Scale	01422	31423	41423	Float
Traditional Temperature Zero	01424	31425	41425	Float
Traditional Temperature Full Scale	01426	31427	41427	Float
Slot 84				
Area/Mode	01428	31429	41429	Integer
MODBUS Address	01429	31430	41430	Integer
Mark-Space Address	01430	31431	41431	Integer
Speed/Device Type	01431	31432	41432	Integer
MODBUS First Integer Register	01432	31433	41433	Integer
MODBUS Number Integer Registers	01433	31434	41434	Integer
MODBUS First Float Register	01434	31435	41435	Integer
MODBUS Number Float Registers	01435	31436	41436	Integer
Traditional Level Zero	01436	31437	41437	Float
Traditional Level Full Scale	01438	31439	41439	Float
Traditional Temperature Zero	01440	31441	41441	Float
Traditional Temperature Full Scale	01442	31443	41443	Float

Table 3-3 Scan Table of Mark/Space Devices (TPU Register Map) [continued]

Data	Address	Read Only	Read/Write	Type
Slot 85				
Area/Mode	01444	31445	41445	Integer
MODBUS Address	01445	31446	41446	Integer
Mark-Space Address	01446	31447	41447	Integer
Speed/Device Type	01447	31448	41448	Integer
MODBUS First Integer Register	01448	31449	41449	Integer
MODBUS Number Integer Registers	01449	31450	41450	Integer
MODBUS First Float Register	01450	31451	41451	Integer
MODBUS Number Float Registers	01451	31452	41452	Integer
Traditional Level Zero	01452	31453	41453	Float
Traditional Level Full Scale	01454	31455	41455	Float
Traditional Temperature Zero	01456	31457	41457	Float
Traditional Temperature Full Scale	01458	31459	41459	Float
Slot 86				
Area/Mode	01460	31461	41461	Integer
MODBUS Address	01461	31462	41462	Integer
Mark-Space Address	01462	31463	41463	Integer
Speed/Device Type	01463	31464	41464	Integer
MODBUS First Integer Register	01464	31465	41465	Integer
MODBUS Number Integer Registers	01465	31466	41466	Integer
MODBUS First Float Register	01466	31467	41467	Integer
MODBUS Number Float Registers	01467	31468	41468	Integer
Traditional Level Zero	01468	31469	41469	Float
Traditional Level Full Scale	01470	31471	41471	Float
Traditional Temperature Zero	01472	31473	41473	Float
Traditional Temperature Full Scale	01474	31475	41475	Float
Slot 87				
Area/Mode	01476	31477	41477	Integer
MODBUS Address	01477	31478	41478	Integer
Mark-Space Address	01478	31479	41479	Integer
Speed/Device Type	01479	31480	41480	Integer
MODBUS First Integer Register	01480	31481	41481	Integer
MODBUS Number Integer Registers	01481	31482	41482	Integer
MODBUS First Float Register	01482	31483	41483	Integer
MODBUS Number Float Registers	01483	31484	41484	Integer
Traditional Level Zero	01484	31485	41485	Float
Traditional Level Full Scale	01486	31487	41487	Float
Traditional Temperature Zero	01488	31489	41489	Float
Traditional Temperature Full Scale	01490	31491	41491	Float
Slot 88				
Area/Mode	01492	31493	41493	Integer
MODBUS Address	01493	31494	41494	Integer
Mark-Space Address	01494	31495	41495	Integer
Speed/Device Type	01495	31496	41496	Integer
MODBUS First Integer Register	01496	31497	41497	Integer
MODBUS Number Integer Registers	01497	31498	41498	Integer
MODBUS First Float Register	01498	31499	41499	Integer
MODBUS Number Float Registers	01499	31500	41500	Integer
Traditional Level Zero	01500	31501	41501	Float
Traditional Level Full Scale	01502	31503	41503	Float
Traditional Temperature Zero	01504	31505	41505	Float
Traditional Temperature Full Scale	01506	31507	41507	Float

Table 3-3 Scan Table of Mark/Space Devices (TPU Register Map) [continued]

Data	Address	Read Only	Read/Write	Type
Slot 89				
Area/Mode	01508	31509	41509	Integer
MODBUS Address	01509	31510	41510	Integer
Mark-Space Address	01510	31511	41511	Integer
Speed/Device Type	01511	31512	41512	Integer
MODBUS First Integer Register	01512	31513	41513	Integer
MODBUS Number Integer Registers	01513	31514	41514	Integer
MODBUS First Float Register	01514	31515	41515	Integer
MODBUS Number Float Registers	01515	31516	41516	Integer
Traditional Level Zero	01516	31517	41517	Float
Traditional Level Full Scale	01518	31519	41519	Float
Traditional Temperature Zero	01520	31521	41521	Float
Traditional Temperature Full Scale	01522	31523	41523	Float
Slot 90				
Area/Mode	01524	31525	41525	Integer
MODBUS Address	01525	31526	41526	Integer
Mark-Space Address	01526	31527	41527	Integer
Speed/Device Type	01527	31528	41528	Integer
MODBUS First Integer Register	01528	31529	41529	Integer
MODBUS Number Integer Registers	01529	31530	41530	Integer
MODBUS First Float Register	01530	31531	41531	Integer
MODBUS Number Float Registers	01531	31532	41532	Integer
Traditional Level Zero	01532	31533	41533	Float
Traditional Level Full Scale	01534	31535	41535	Float
Traditional Temperature Zero	01536	31537	41537	Float
Traditional Temperature Full Scale	01538	31539	41539	Float
Slot 91				
Area/Mode	01540	31541	41541	Integer
MODBUS Address	01541	31542	41542	Integer
Mark-Space Address	01542	31543	41543	Integer
Speed/Device Type	01543	31544	41544	Integer
MODBUS First Integer Register	01544	31545	41545	Integer
MODBUS Number Integer Registers	01545	31546	41546	Integer
MODBUS First Float Register	01546	31547	41547	Integer
MODBUS Number Float Registers	01547	31548	41548	Integer
Traditional Level Zero	01548	31549	41549	Float
Traditional Level Full Scale	01550	31551	41551	Float
Traditional Temperature Zero	01552	31553	41553	Float
Traditional Temperature Full Scale	01554	31555	41555	Float
Slot 92				
Area/Mode	01556	31557	41557	Integer
MODBUS Address	01557	31558	41558	Integer
Mark-Space Address	01558	31559	41559	Integer
Speed/Device Type	01559	31560	41560	Integer
MODBUS First Integer Register	01560	31561	41561	Integer
MODBUS Number Integer Registers	01561	31562	41562	Integer
MODBUS First Float Register	01562	31563	41563	Integer
MODBUS Number Float Registers	01563	31564	41564	Integer
Traditional Level Zero	01564	31565	41565	Float
Traditional Level Full Scale	01566	31567	41567	Float
Traditional Temperature Zero	01568	31569	41569	Float
Traditional Temperature Full Scale	01570	31571	41571	Float

Table 3-3 Scan Table of Mark/Space Devices (TPU Register Map) [continued]

Data	Address	Read Only	Read/Write	Type
Slot 93				
Area/Mode	01572	31573	41573	Integer
MODBUS Address	01573	31574	41574	Integer
Mark-Space Address	01574	31575	41575	Integer
Speed/Device Type	01575	31576	41576	Integer
MODBUS First Integer Register	01576	31577	41577	Integer
MODBUS Number Integer Registers	01577	31578	41578	Integer
MODBUS First Float Register	01578	31579	41579	Integer
MODBUS Number Float Registers	01579	31580	41580	Integer
Traditional Level Zero	01580	31581	41581	Float
Traditional Level Full Scale	01583	31583	41583	Float
Traditional Temperature Zero	01585	31585	41585	Float
Traditional Temperature Full Scale	01587	31587	41587	Float
Slot 94				
Area/Mode	01588	31589	41589	Integer
MODBUS Address	01589	31590	41590	Integer
Mark-Space Address	01590	31591	41591	Integer
Speed/Device Type	01591	31592	41592	Integer
MODBUS First Integer Register	01592	31593	41593	Integer
MODBUS Number Integer Registers	01593	31594	41594	Integer
MODBUS First Float Register	01594	31595	41595	Integer
MODBUS Number Float Registers	01595	31596	41596	Integer
Traditional Level Zero	01596	31597	41597	Float
Traditional Level Full Scale	01598	31599	41599	Float
Traditional Temperature Zero	01600	31601	41601	Float
Traditional Temperature Full Scale	01602	31603	41603	Float
Slot 95				
Area/Mode	01604	31605	41605	Integer
MODBUS Address	01605	31606	41606	Integer
Mark-Space Address	01606	31607	41607	Integer
Speed/Device Type	01607	31608	41608	Integer
MODBUS First Integer Register	01608	31609	41609	Integer
MODBUS Number Integer Registers	01609	31610	41610	Integer
MODBUS First Float Register	01610	31611	41611	Integer
MODBUS Number Float Registers	01611	31612	41612	Integer
Traditional Level Zero	01612	31613	41613	Float
Traditional Level Full Scale	01614	31615	41615	Float
Traditional Temperature Zero	01616	31617	41617	Float
Traditional Temperature Full Scale	01618	31619	41619	Float
Slot 96				
Area/Mode	01620	31621	41621	Integer
MODBUS Address	01621	31622	41622	Integer
Mark-Space Address	01622	31623	41623	Integer
Speed/Device Type	01623	31624	41624	Integer
MODBUS First Integer Register	01624	31625	41625	Integer
MODBUS Number Integer Registers	01625	31626	41626	Integer
MODBUS First Float Register	01626	31627	41627	Integer
MODBUS Number Float Registers	01627	31628	41628	Integer
Traditional Level Zero	01628	31629	41629	Float
Traditional Level Full Scale	01630	31631	41631	Float
Traditional Temperature Zero	01632	31633	41633	Float
Traditional Temperature Full Scale	01634	31635	41635	Float

Table 3-4 Floating Point Registers (TPU Register Map)

Data	Address	Read/Write
Slot 1		
Traditional Level Zero	00054	50055
Traditional Level Full Scale	00055	50056
Traditional Temperature Zero	00056	50057
Traditional Temperature Full Scale	00057	50058
Slot 2		
Traditional Level Zero	00062	50063
Traditional Level Full Scale	00063	50064
Traditional Temperature Zero	00064	50065
Traditional Temperature Full Scale	00065	50066
Slot 3		
Traditional Level Zero	00070	50071
Traditional Level Full Scale	00071	50072
Traditional Temperature Zero	00072	50073
Traditional Temperature Full Scale	00073	50074
Slot 4		
Traditional Level Zero	00078	50079
Traditional Level Full Scale	00079	50080
Traditional Temperature Zero	00080	50081
Traditional Temperature Full Scale	00081	50082
Slot 5		
Traditional Level Zero	00086	50087
Traditional Level Full Scale	00087	50088
Traditional Temperature Zero	00088	50089
Traditional Temperature Full Scale	00089	50090
Slot 6		
Traditional Level Zero	00094	50095
Traditional Level Full Scale	00095	50096
Traditional Temperature Zero	00096	50097
Traditional Temperature Full Scale	00097	50098
Slot 7		
Traditional Level Zero	00102	50103
Traditional Level Full Scale	00103	50104
Traditional Temperature Zero	00104	50105
Traditional Temperature Full Scale	00105	50106
Slot 8		
Traditional Level Zero	00110	50111
Traditional Level Full Scale	00111	50112
Traditional Temperature Zero	00112	50113
Traditional Temperature Full Scale	00113	50114

Table 3-4 Floating Point Registers (TPU Register Map) [continued]

Data	Address	Read/Write
Slot 9		
Traditional Level Zero	00118	50119
Traditional Level Full Scale	00119	50120
Traditional Temperature Zero	00120	50121
Traditional Temperature Full Scale	00121	50122
Slot 10		
Traditional Level Zero	00126	50127
Traditional Level Full Scale	00127	50128
Traditional Temperature Zero	00128	50129
Traditional Temperature Full Scale	00129	50130
Slot 11		
Traditional Level Zero	00134	50135
Traditional Level Full Scale	00135	50136
Traditional Temperature Zero	00136	50137
Traditional Temperature Full Scale	00137	50138
Slot 12		
Traditional Level Zero	00142	50143
Traditional Level Full Scale	00143	50144
Traditional Temperature Zero	00144	50145
Traditional Temperature Full Scale	00145	50146
Slot 13		
Traditional Level Zero	00150	50151
Traditional Level Full Scale	00151	50152
Traditional Temperature Zero	00152	50153
Traditional Temperature Full Scale	00153	50154
Slot 14		
Traditional Level Zero	00158	50159
Traditional Level Full Scale	00159	50160
Traditional Temperature Zero	00160	50161
Traditional Temperature Full Scale	00161	50162
Slot 15		
Traditional Level Zero	00166	50167
Traditional Level Full Scale	00167	50168
Traditional Temperature Zero	00168	50169
Traditional Temperature Full Scale	00169	50170
Slot 16		
Traditional Level Zero	00174	50175
Traditional Level Full Scale	00175	50176
Traditional Temperature Zero	00176	50177
Traditional Temperature Full Scale	00177	50178

Table 3-4 Floating Point Registers (TPU Register Map) [continued]

Data	Address	Read/Write
Slot 17		
Traditional Level Zero	00182	50183
Traditional Level Full Scale	00183	50184
Traditional Temperature Zero	00184	50185
Traditional Temperature Full Scale	00185	50186
Slot 18		
Traditional Level Zero	00190	50191
Traditional Level Full Scale	00191	50192
Traditional Temperature Zero	00192	50193
Traditional Temperature Full Scale	00193	50194
Slot 19		
Traditional Level Zero	00198	50199
Traditional Level Full Scale	00199	50200
Traditional Temperature Zero	00200	50201
Traditional Temperature Full Scale	00201	50202
Slot 20		
Traditional Level Zero	00206	50207
Traditional Level Full Scale	00207	50208
Traditional Temperature Zero	00208	50209
Traditional Temperature Full Scale	00209	50210
Slot 21		
Traditional Level Zero	00214	50215
Traditional Level Full Scale	00215	50216
Traditional Temperature Zero	00216	50217
Traditional Temperature Full Scale	00217	50218
Slot 22		
Traditional Level Zero	00222	50223
Traditional Level Full Scale	00223	50224
Traditional Temperature Zero	00224	50225
Traditional Temperature Full Scale	00225	50226
Slot 23		
Traditional Level Zero	00230	50231
Traditional Level Full Scale	00231	50232
Traditional Temperature Zero	00232	50233
Traditional Temperature Full Scale	00233	50234
Slot 24		
Traditional Level Zero	00238	50239
Traditional Level Full Scale	00239	50240
Traditional Temperature Zero	00240	50241
Traditional Temperature Full Scale	00241	50242

Table 3-4 Floating Point Registers (TPU Register Map) [continued]

Data	Address	Read/Write
Slot 25		
Traditional Level Zero	00246	50247
Traditional Level Full Scale	00247	50248
Traditional Temperature Zero	00248	50249
Traditional Temperature Full Scale	00249	50250
Slot 26		
Traditional Level Zero	00254	50255
Traditional Level Full Scale	00255	50256
Traditional Temperature Zero	00256	50257
Traditional Temperature Full Scale	00257	50258
Slot 27		
Traditional Level Zero	00262	50263
Traditional Level Full Scale	00263	50264
Traditional Temperature Zero	00264	50265
Traditional Temperature Full Scale	00265	50266
Slot 28		
Traditional Level Zero	00270	50271
Traditional Level Full Scale	00271	50272
Traditional Temperature Zero	00272	50273
Traditional Temperature Full Scale	00273	50274
Slot 29		
Traditional Level Zero	00278	50279
Traditional Level Full Scale	00279	50280
Traditional Temperature Zero	00280	50281
Traditional Temperature Full Scale	00281	50282
Slot 30		
Traditional Level Zero	00286	50287
Traditional Level Full Scale	00287	50288
Traditional Temperature Zero	00288	50289
Traditional Temperature Full Scale	00289	50290
Slot 31		
Traditional Level Zero	00294	50295
Traditional Level Full Scale	00295	50296
Traditional Temperature Zero	00296	50297
Traditional Temperature Full Scale	00297	50298
Slot 32		
Traditional Level Zero	00302	50303
Traditional Level Full Scale	00303	50304
Traditional Temperature Zero	00304	50305
Traditional Temperature Full Scale	00305	50306

Table 3-4 Floating Point Registers (TPU Register Map) [continued]

Data	Address	Read/Write
Slot 33		
Traditional Level Zero	00310	50311
Traditional Level Full Scale	00311	50312
Traditional Temperature Zero	00312	50313
Traditional Temperature Full Scale	00313	50314
Slot 34		
Traditional Level Zero	00318	50319
Traditional Level Full Scale	00319	50320
Traditional Temperature Zero	00320	50321
Traditional Temperature Full Scale	00321	50322
Slot 35		
Traditional Level Zero	00326	50327
Traditional Level Full Scale	00327	50328
Traditional Temperature Zero	00328	50329
Traditional Temperature Full Scale	00329	50330
Slot 36		
Traditional Level Zero	00334	50335
Traditional Level Full Scale	00335	50336
Traditional Temperature Zero	00336	50337
Traditional Temperature Full Scale	00337	50338
Slot 37		
Traditional Level Zero	00342	50343
Traditional Level Full Scale	00343	50344
Traditional Temperature Zero	00344	50345
Traditional Temperature Full Scale	00345	50346
Slot 38		
Traditional Level Zero	00350	50351
Traditional Level Full Scale	00351	50352
Traditional Temperature Zero	00352	50353
Traditional Temperature Full Scale	00353	50354
Slot 39		
Traditional Level Zero	00358	50359
Traditional Level Full Scale	00359	50360
Traditional Temperature Zero	00360	50361
Traditional Temperature Full Scale	00361	50362
Slot 40		
Traditional Level Zero	00366	50367
Traditional Level Full Scale	00367	50368
Traditional Temperature Zero	00368	50369
Traditional Temperature Full Scale	00369	50370

Table 3-4 Floating Point Registers (TPU Register Map) [continued]

Data	Address	Read/Write
Slot 41		
Traditional Level Zero	00374	50375
Traditional Level Full Scale	00375	50376
Traditional Temperature Zero	00376	50377
Traditional Temperature Full Scale	00377	50378
Slot 42		
Traditional Level Zero	00382	50383
Traditional Level Full Scale	00383	50384
Traditional Temperature Zero	00384	50385
Traditional Temperature Full Scale	00385	50386
Slot 43		
Traditional Level Zero	00390	50391
Traditional Level Full Scale	00391	50392
Traditional Temperature Zero	00392	50393
Traditional Temperature Full Scale	00393	50394
Slot 44		
Traditional Level Zero	00398	50399
Traditional Level Full Scale	00399	50400
Traditional Temperature Zero	00400	50401
Traditional Temperature Full Scale	00401	50402
Slot 45		
Traditional Level Zero	00406	50407
Traditional Level Full Scale	00407	50408
Traditional Temperature Zero	00408	50409
Traditional Temperature Full Scale	00409	50410
Slot 46		
Traditional Level Zero	00414	50415
Traditional Level Full Scale	00415	50416
Traditional Temperature Zero	00416	50417
Traditional Temperature Full Scale	00417	50418
Slot 47		
Traditional Level Zero	00422	50423
Traditional Level Full Scale	00423	50424
Traditional Temperature Zero	00424	50425
Traditional Temperature Full Scale	00425	50426
Slot 48		
Traditional Level Zero	00430	50431
Traditional Level Full Scale	00431	50432
Traditional Temperature Zero	00432	50433
Traditional Temperature Full Scale	00433	50434

Table 3-4 Floating Point Registers (TPU Register Map) [continued]

Data	Address	Read/Write
Slot 49		
Traditional Level Zero	00438	50439
Traditional Level Full Scale	00439	50440
Traditional Temperature Zero	00440	50441
Traditional Temperature Full Scale	00441	50442
Slot 50		
Traditional Level Zero	00446	50447
Traditional Level Full Scale	00447	50448
Traditional Temperature Zero	00448	50449
Traditional Temperature Full Scale	00449	50450
Slot 51		
Traditional Level Zero	00454	50455
Traditional Level Full Scale	00455	50456
Traditional Temperature Zero	00456	50457
Traditional Temperature Full Scale	00457	50458
Slot 52		
Traditional Level Zero	00462	50463
Traditional Level Full Scale	00463	50464
Traditional Temperature Zero	00464	50465
Traditional Temperature Full Scale	00465	50466
Slot 53		
Traditional Level Zero	00470	50471
Traditional Level Full Scale	00471	50472
Traditional Temperature Zero	00472	50473
Traditional Temperature Full Scale	00473	50474
Slot 54		
Traditional Level Zero	00478	50479
Traditional Level Full Scale	00479	50480
Traditional Temperature Zero	00480	50481
Traditional Temperature Full Scale	00481	50482
Slot 55		
Traditional Level Zero	00486	50487
Traditional Level Full Scale	00487	50488
Traditional Temperature Zero	00488	50489
Traditional Temperature Full Scale	00489	50490
Slot 56		
Traditional Level Zero	00494	50495
Traditional Level Full Scale	00495	50496
Traditional Temperature Zero	00496	50497
Traditional Temperature Full Scale	00497	50498

Table 3-4 Floating Point Registers (TPU Register Map) [continued]

Data	Address	Read/Write
Slot 57		
Traditional Level Zero	00502	50503
Traditional Level Full Scale	00503	50504
Traditional Temperature Zero	00504	50505
Traditional Temperature Full Scale	00505	50506
Slot 58		
Traditional Level Zero	00510	50511
Traditional Level Full Scale	00511	50512
Traditional Temperature Zero	00512	50513
Traditional Temperature Full Scale	00513	50514
Slot 59		
Traditional Level Zero	00518	50519
Traditional Level Full Scale	00519	50520
Traditional Temperature Zero	00520	50521
Traditional Temperature Full Scale	00521	50522
Slot 60		
Traditional Level Zero	00526	50527
Traditional Level Full Scale	00527	50528
Traditional Temperature Zero	00528	50529
Traditional Temperature Full Scale	00529	50530
Slot 61		
Traditional Level Zero	00534	50535
Traditional Level Full Scale	00535	50536
Traditional Temperature Zero	00536	50537
Traditional Temperature Full Scale	00537	50538
Slot 62		
Traditional Level Zero	00542	50543
Traditional Level Full Scale	00543	50544
Traditional Temperature Zero	00544	50545
Traditional Temperature Full Scale	00545	50546
Slot 63		
Traditional Level Zero	00550	50551
Traditional Level Full Scale	00551	50552
Traditional Temperature Zero	00552	50553
Traditional Temperature Full Scale	00553	50554
Slot 64		
Traditional Level Zero	00558	50559
Traditional Level Full Scale	00559	50560
Traditional Temperature Zero	00560	50561
Traditional Temperature Full Scale	00561	50562

Table 3-4 Floating Point Registers (TPU Register Map) [continued]

Data	Address	Read/Write
Slot 65		
Traditional Level Zero	00566	50567
Traditional Level Full Scale	00567	50568
Traditional Temperature Zero	00568	50569
Traditional Temperature Full Scale	00569	50570
Slot 66		
Traditional Level Zero	00574	50575
Traditional Level Full Scale	00575	50576
Traditional Temperature Zero	00576	50577
Traditional Temperature Full Scale	00577	50578
Slot 67		
Traditional Level Zero	00582	50583
Traditional Level Full Scale	00583	50584
Traditional Temperature Zero	00584	50585
Traditional Temperature Full Scale	00585	50586
Slot 68		
Traditional Level Zero	00590	50591
Traditional Level Full Scale	00591	50592
Traditional Temperature Zero	00592	50593
Traditional Temperature Full Scale	00593	50594
Slot 69		
Traditional Level Zero	00598	50599
Traditional Level Full Scale	00599	50600
Traditional Temperature Zero	00600	50601
Traditional Temperature Full Scale	00601	50602
Slot 70		
Traditional Level Zero	00606	50607
Traditional Level Full Scale	00607	50608
Traditional Temperature Zero	00608	50609
Traditional Temperature Full Scale	00609	50610
Slot 71		
Traditional Level Zero	00614	50615
Traditional Level Full Scale	00615	50616
Traditional Temperature Zero	00616	50617
Traditional Temperature Full Scale	00617	50618
Slot 72		
Traditional Level Zero	00622	50623
Traditional Level Full Scale	00623	50624
Traditional Temperature Zero	00624	50625
Traditional Temperature Full Scale	00625	50626

Table 3-4 Floating Point Registers (TPU Register Map) [continued]

Data	Address	Read/Write
Slot 73		
Traditional Level Zero	00630	50631
Traditional Level Full Scale	00631	50632
Traditional Temperature Zero	00632	50633
Traditional Temperature Full Scale	00633	50634
Slot 74		
Traditional Level Zero	00638	50639
Traditional Level Full Scale	00639	50640
Traditional Temperature Zero	00640	50641
Traditional Temperature Full Scale	00641	50642
Slot 75		
Traditional Level Zero	00646	50647
Traditional Level Full Scale	00647	50648
Traditional Temperature Zero	00648	50649
Traditional Temperature Full Scale	00649	50650
Slot 76		
Traditional Level Zero	00654	50655
Traditional Level Full Scale	00655	50656
Traditional Temperature Zero	00656	50657
Traditional Temperature Full Scale	00657	50658
Slot 77		
Traditional Level Zero	00662	50663
Traditional Level Full Scale	00663	50664
Traditional Temperature Zero	00664	50665
Traditional Temperature Full Scale	00665	50666
Slot 78		
Traditional Level Zero	00670	50671
Traditional Level Full Scale	00671	50672
Traditional Temperature Zero	00672	50673
Traditional Temperature Full Scale	00673	50674
Slot 79		
Traditional Level Zero	00678	50679
Traditional Level Full Scale	00679	50680
Traditional Temperature Zero	00680	50681
Traditional Temperature Full Scale	00681	50682
Slot 80		
Traditional Level Zero	00686	50687
Traditional Level Full Scale	00687	50688
Traditional Temperature Zero	00688	50689
Traditional Temperature Full Scale	00689	50690

Table 3-4 Floating Point Registers (TPU Register Map) [continued]

Slot 81		
Traditional Level Zero	00694	50695
Traditional Level Full Scale	00695	50696
Traditional Temperature Zero	00696	50697
Traditional Temperature Full Scale	00697	50698
Slot 82		
Traditional Level Zero	00702	50703
Traditional Level Full Scale	00703	50704
Traditional Temperature Zero	00704	50705
Traditional Temperature Full Scale	00705	50706
Slot 83		
Traditional Level Zero	00710	50711
Traditional Level Full Scale	00711	50712
Traditional Temperature Zero	00712	50713
Traditional Temperature Full Scale	00713	50714
Slot 84		
Traditional Level Zero	00718	50719
Traditional Level Full Scale	00719	50720
Traditional Temperature Zero	00720	50721
Traditional Temperature Full Scale	00721	50722
Slot 85		
Traditional Level Zero	00726	50727
Traditional Level Full Scale	00727	50728
Traditional Temperature Zero	00728	50729
Traditional Temperature Full Scale	00729	50730
Slot 86		
Traditional Level Zero	00734	50735
Traditional Level Full Scale	00735	50736
Traditional Temperature Zero	00736	50737
Traditional Temperature Full Scale	00737	50738
Slot 87		
Traditional Level Zero	00742	50743
Traditional Level Full Scale	00743	50744
Traditional Temperature Zero	00744	50745
Traditional Temperature Full Scale	00745	50746
Slot 88		
Traditional Level Zero	00750	50751
Traditional Level Full Scale	00751	50752
Traditional Temperature Zero	00752	50753
Traditional Temperature Full Scale	00753	50754

Table 3-4 Floating Point Registers (TPU Register Map) [continued]

Data	Address	Read/Write
Slot 89		
Traditional Level Zero	00758	50759
Traditional Level Full Scale	00759	50760
Traditional Temperature Zero	00760	50761
Traditional Temperature Full Scale	00761	50762
Slot 90		
Traditional Level Zero	00766	50767
Traditional Level Full Scale	00767	50768
Traditional Temperature Zero	00768	50769
Traditional Temperature Full Scale	00769	50770
Slot 91		
Traditional Level Zero	00774	50775
Traditional Level Full Scale	00775	50776
Traditional Temperature Zero	00776	50777
Traditional Temperature Full Scale	00777	50778
Slot 92		
Traditional Level Zero	00782	50783
Traditional Level Full Scale	00783	50784
Traditional Temperature Zero	00784	50785
Traditional Temperature Full Scale	00785	50786
Slot 93		
Traditional Level Zero	00790	50791
Traditional Level Full Scale	00791	50792
Traditional Temperature Zero	00792	50793
Traditional Temperature Full Scale	00793	50794
Slot 94		
Traditional Level Zero	00798	50799
Traditional Level Full Scale	00799	50800
Traditional Temperature Zero	00800	50801
Traditional Temperature Full Scale	00801	50802
Slot 95		
Traditional Level Zero	00806	50807
Traditional Level Full Scale	00807	50808
Traditional Temperature Zero	00808	50809
Traditional Temperature Full Scale	00809	50810
Slot 96		
Traditional Level Zero	00814	50815
Traditional Level Full Scale	00815	50816
Traditional Temperature Zero	00816	50817
Traditional Temperature Full Scale	00817	50818

Table 3-5 TPU Register Defaults in Automatic Configuration

Data	Default Value
Maximum Integer for Traditional	9999
Traditional Level 17-bit Metric Zero	0
Traditional Level 17-bit Metric Full Scale	40
Traditional Level 18-bit Metric Zero	0
Traditional Level 18-bit Metric Full Scale	40
Traditional Level English Fractional Zero	0
Traditional Level English Fractional Full Scale	80
Traditional Level English Decimal Zero	0
Traditional Level English Decimal Full Scale	80
Traditional 1800 Temperature (-199 to 199) Zero	-200
Traditional 1800 Temperature (-199 to 199) Full Scale	200
Traditional 1800 Temperature (-99 to 299) Zero	-100
Traditional 1800 Temperature (-99 to 299) Full Scale	300
Traditional 1900 Temperature (-799 to 799) Zero	-800
Traditional 1900 Temperature (-799 to 799) Full Scale	800
Auto Poll Inhibit	0

Additional Register Mapping

Table 3-6 Traditional Level and Temperature Integer Data
(Traditional Transmitter Register Map)

Data	Address	Read	Read/Write	Type
Level 17-bit Metric in Meters	0000	30001	40001	Integer
Level 18-bit Metric in Meters	0001	30002	40002	Integer
Level English Fractional in Feet	0002	30003	40003	Integer
Level English Decimal Feet	0003	30004	40004	Integer
Temperature 1800 (-199 to 199)	0004	30005	40005	Integer
Temperature 1800 (-99 to 299)	0005	30006	40006	Integer
Temperature 1900 Format	0006	30007	40007	Integer
Contact Switch Values	0060	30061	40061	Integer
Raise/Reset	0061	30062	40062	Integer

Table 3-7 Traditional Level and Temperature Floating Point Data
Two 16-bit Registers Format
(Traditional Transmitter Register Map)

Data	Address	Read	Read/Write	Type
Level 17-bit Metric in Meters	0020	30021	40021	Float
Level 18-bit Metric in Meters	0022	30023	40023	Float
Level English Fractional in Feet	0024	30025	40025	Float
Level English Decimal in Feet	0026	30027	40027	Float
Temperature 1800 (-199 to 199)	0028	30029	40029	Float
Temperature 1800 (-99 to 299)	0030	30031	40031	Float
Temperature 1900 Format	0032	30033	40033	Float

Table 3-8 Traditional Level and Temperature Floating Point Data
One 32-bit Register Format
(Traditional Transmitter Register Map)

Data	Address	Read	Read/Write	Type
FP Level 17-bit Metric in Meters	0069	30070	40070	Integer
FP Level 18-bit Metric in Meters	0070	30071	40071	Integer
FP Level English Fractional in Feet	0071	30072	40072	Integer
FP Level English Decimal in Feet	0072	30073	40073	Integer
FP Temperature 1800 (-199 to 199)	0073	30074	40074	Integer
FP Temperature 1800 (-99 to 299)	0074	30075	40075	Integer
FP Temperature 1900 Format	0075	30076	40076	Integer

SECTION 4 - MAINTENANCE AND TROUBLESHOOTING

Maintaining the Tank Polling Unit

The Whessoe Varec Model 6840 Tank Polling Unit (TPU) has been designed with high-reliability components. Dust and dirt should not be allowed to collect in the housing. The conduit entries should be inspected periodically to insure water does not intrude into the unit. All wiring connections should be examined for corrosion and all screw connections tightened.

It is recommended that the desired system configuration be verified when a problem occurs or when the configuration is in doubt. Refer to Section 2, *Installation*.

Diagnostics and Error Status Reporting

The TPU has many ways to report errors to a host computer. The following lists error conditions and how they are reported:

Mark/Space device communication failure: This error condition is reported by responding with a MODBUS error status of Device Failure (04) when that device's address is polled by the host computer.

Bad traditional level data: If the traditional device is returning an invalid Gray code, the scaled integer register corresponding to that level format has a value of Full Scale +1. For example, if the full scale value is set to 9999, 10000 is returned. The floating point register format returns a special value with all bits set to 1 (FFFFFFFFh).

Bad traditional temperature or no temperature data: A traditional level device may not have temperature or may return a temperature that is out of range. The scaled integer register corresponding to a particular temperature range will have a value of Full Scale + 1. The floating point register format of that temperature returns a special value with all bits set to 1 (FFFFFFFFh).

The host is asking for too many registers: The TPU has a transmit buffer capacity of 256 characters. A MODBUS error of Bad Data Value (03) is returned.

The host is asking for a register address that is out of range: The TPU returns a MODBUS error of Bad Address (02).

EPROM checksum or RAM failure: The TPU performs a checksum test on its EPROM and RAM on power-up. If there is a failure, Mark/Space devices are not auto polled, the TPU will not answer to any MODBUS address other than its MODBUS address, and always returns a MODBUS error of Device Fail (04).

Host tries to communicate with TPU during Auto Configuration Mode: While in Auto Configuration Mode, the TPU always returns a MODBUS error of Busy (06).

Troubleshooting the Tank Polling Unit

For other than fuse replacement, it is recommended that all troubleshooting and repairs be performed by a factory trained service technician.

Input Voltage Fuse

The input voltage fuse is located on the power panel. Replace the fuse as follows:

1. Disconnect the AC power cord from the AC source.
2. Unscrew the fuse holder.
3. Remove the defective fuse and discard.
4. Insert a fuse of the same value and rating.
5. Screw fuse holder back in place.
6. Re-connect the AC power to the AC source.

4-Wire Interface Module Fuses

Two versions of the termination board exist. The newer version has area fuses mounted on the termination board as shown in figure 4-2. The fuses are located at the top of the board. They are clearly marked as to area fused. Fuses located on the 4-wire interface module are bypassed and not in the circuit.

The older termination has no fuses and the areas are protected by the fuses on the 4-wire interface module. The 4-wire interface module has a fuse for each of the +48 VDC outputs for areas 0-3 as shown in Figure 4-1.

- Area 0 - F2
- Area 1 - F3
- Area 2 - F4
- Area 3 - F1

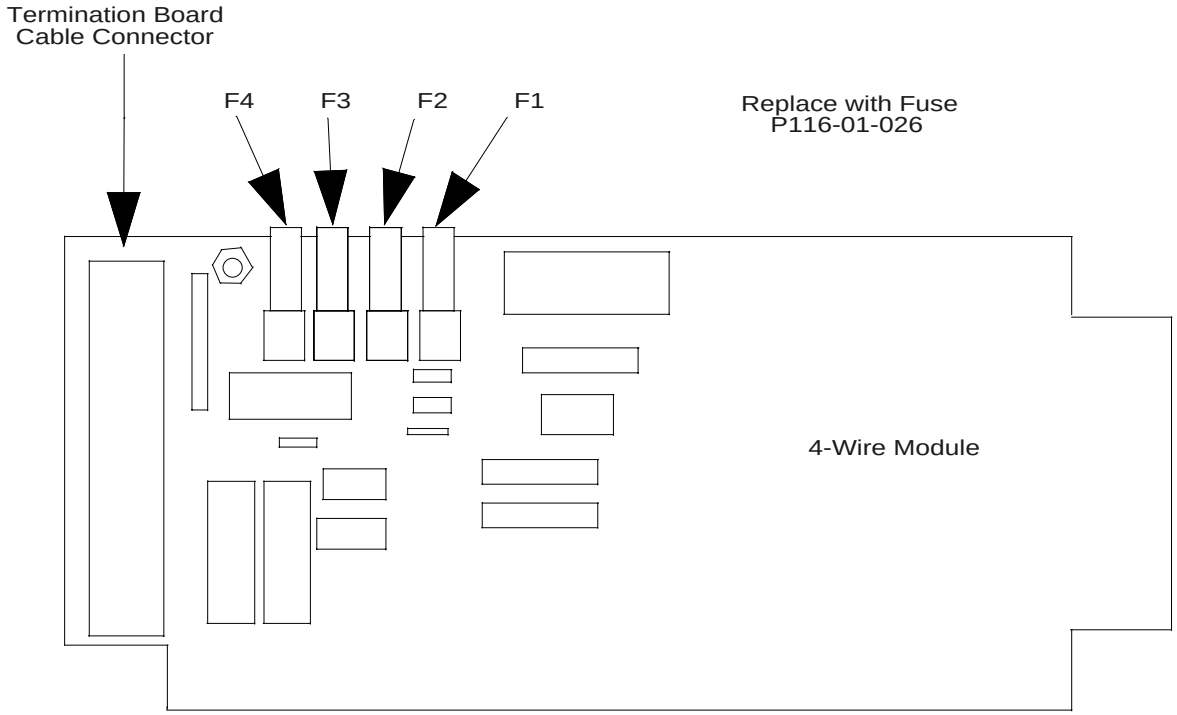


Figure 4-1 4-Wire Interface Module Area Fuses

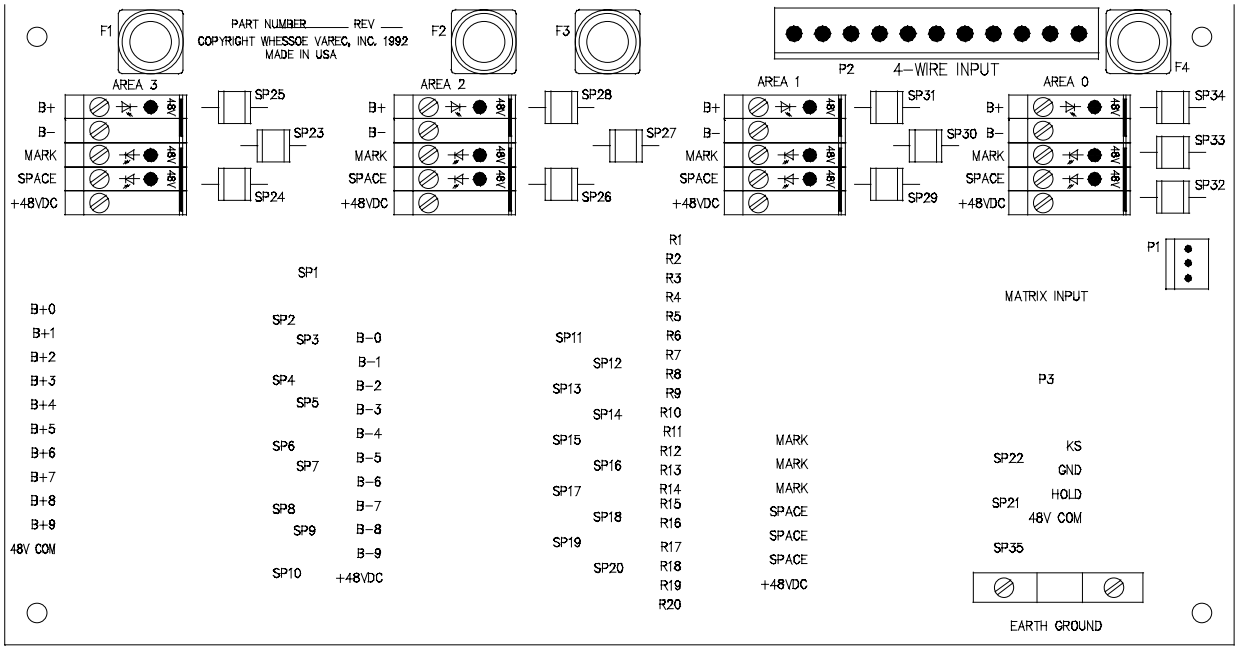


Figure 4-2 Termination Board Area Fuses

LED Functionality

There are eight LEDs on the Gateway processor board. During reset or power-up initialization, all LEDs are turned ON. They are used to display status conditions and are assigned as follows:

- LED 0 Indicates the Tank Polling Unit is in Auto Configuration Mode.
- LED 1 Indicates a hardware failure. This is turned ON if either the EPROM checksum is bad or the RAM test failed.
- LED 2 Indicates the NVRAM configuration checksum is bad.
- LED 3 - LED 7 Unused.

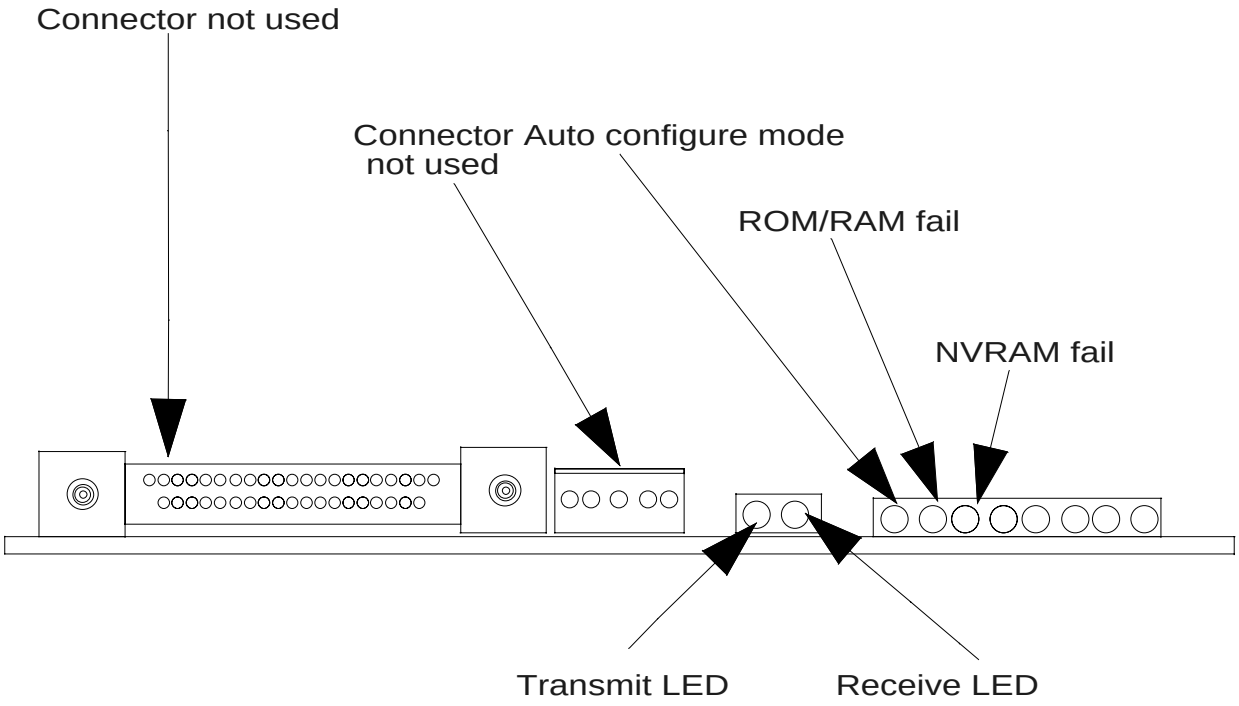


Figure 4-3 Processor Board LED Indicators

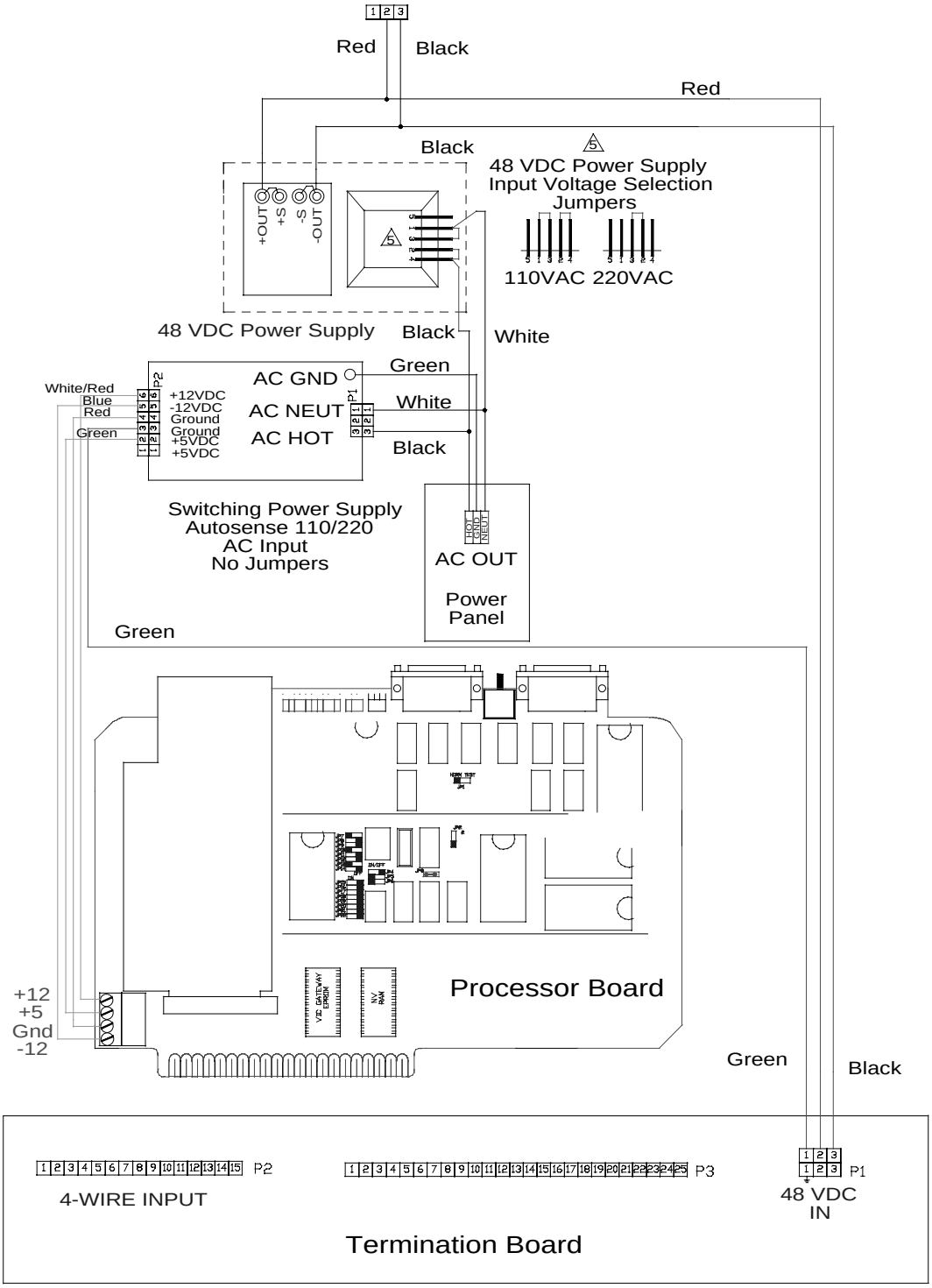


Figure 4-4 TPU Electrical Wiring Diagram

SECTION 5 - SPECIFICATIONS AND REFERENCES

Recommended Spare Parts

The design of the Whessoe Varec Model 6840 Tank Polling Unit requires only a minimum number of spare parts be inventoried. It is not necessary to stock a quantity of spare parts equal to the number of tank scanning units in a given field. Review the service history for quantities selection.

Whessoe Varec stocks spares for the Tank Scanning Unit. It is advised that the customer also maintain an inventory of critical items to minimize potential down time. Contact the Whessoe Varec Product Service Group for further details. The following spare parts may be stocked:

Description	**Whessoe Varec Part Number**
2-Amp Fuse (220 VAC)	P116-01-008
1-Amp Fuse (125 VAC)	P116-01-003
5/12/-12 Volt Switching Power Supply	P112-01-009
48-Volt Power Supply	P112-02-017
4-Wire Module	08-06841
Microfuse for 4-Wire Module	P116-01-026
Processor Board	08-10499
Jumpers for Processor Board	P108-38-017
4-Wire Termination Board	08-09774
4-Wire Termination Board Cable	06-09776
TPU/Host Communications Cable	P120-02-073
Internal 25 Conductor Cable	P120-02-074

Specifications and Physical Characteristics

Microprocessor:
Intel 8085

Clock Speed:
5.0 MHz

Serial Ports:
One (RS232 and EIA485)

Port Configuration:
Data Base Configuration
Tank Communication

Non-Volatile Random Access Memory (NVRAM):
48 K

Read Only Memory (ROM):
32 K

Serial Port Baud Rates:
300, 1200, 2400 and 9600

Protocol:
MODBUS and Mark/Space

Field Device I/O and Power Support:
Varec 4-Wire Transmitters

Power Supply:
110 or 220 VAC, 50/60 Hz

Power Consumption:
200 Watts maximum

Power Output:
48 Volts DC to Whessoe Varec Transmitters at 3 Amps

Service Conditions

Operating Temperature Range:
0 ºC to +70 ºC (+32 ºF to +158 ºF)

Operating Humidity Range:
5% to 95% Relative Humidity Non-Condensing

Dimensions and Weights

NEMA 12 General Purpose Wall Mount Enclosure:

Height	- 20 inches (508 mm)
Width	- 16 inches (406 mm)
Depth	- 8.2 inches (210 mm)

Net Weight:
38 lb. (17.3 kg)

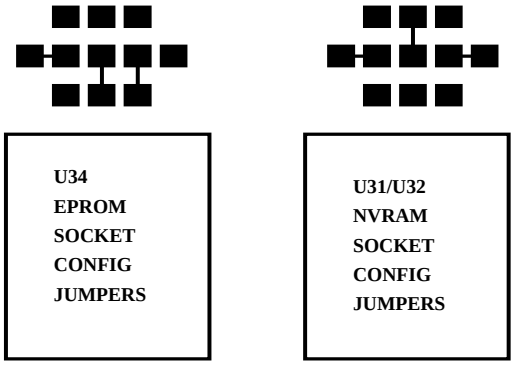
Shipping Weight:
55 lb. (25 kg)

Processor Board Configuration

The firmware in the Tank Polling Unit expects the processor board to be configured as follows:

- The Tank Polling Unit's EPROM must be plugged into the U34 socket.
- Two 8 KB x 8 RAM chips are required in U31 and U32. The firmware expects 16 KB of RAM. The first RAM chip, U31, must be NVRAM. The second RAM chip can be either NVRAM or RAM.
- Jumpers JP4, JP5 and JP6 must be all set to ON. This selects U34 as the EPROM socket and enables U32 and U31 for memory.
- JP2 must be plugged into the '2' position to enable 5 MHz operation.

The jumper configurations for the EPROM and NVRAM memory sockets are as follows:



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