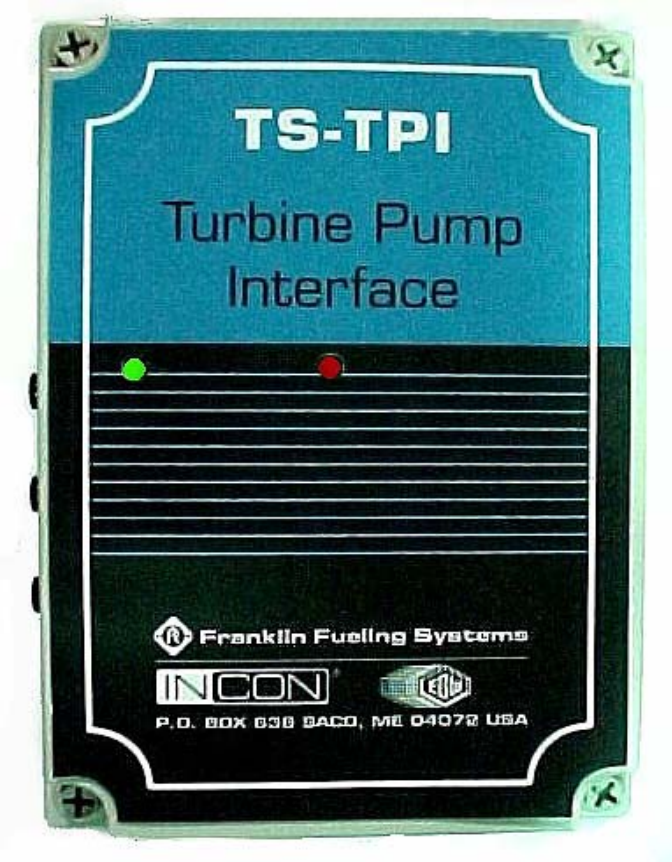
TS-TPI Turbine Pump Interface
Installation and Wiring Guide



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Part Number: 000-0042 Rev. A

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NOTE

Use the **Table of Contents** to find topics within this manual. Separate installation instructions are provided for: the **Needle Valve (PN 000-0045),** the **Calibration Kit (PN 000-0043),** and the **LSU Transducer (PN 000-0058)**.

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Franklin Fueling Systems

FE PETRO EBW APT INCON

Table of Contents

1 SAFETY

Graphic Symbol Conventions

Through out this User Guide these symbols will highlight information for your safety and the proper functioning of this equipment. Read carefully the steps in this guide and pay special attention to the steps where you see these symbols.

NOTE

Important information, tips, and hints are highlighted by the note graphic.

CAUTION messages are highlighted by the CAUTION graphic and contain instructions that should be followed to avoid faulty equipment operation, or environmental hazards, or personnel injury!

WARNING **messages are highlighted by the WARNING graphic and contain instructions that must be followed to avoid faulty equipment operation, or explosion or shock hazards. If ignored, severe injury or death** *may* **result!**

DANGER **messages are highlighted by the DANGER graphic and contain instructions that** must be followed **to avoid an explosion or electrical shock hazard. If ignored, severe injury or death** *will* **result!**

ELECTRICAL DANGER **messages are highlighted by the ELECTRICAL DANGER graphic and contain instructions that** must be followed **to avoid an electrical shock. If ignored, severe injury or death** *may* **result and even severe damage to electronic equipment.**

Safety First – Before Working on this Equipment

CAUTION **This equipment is designed to be installed in association with volatile hydrocarbon liquids such as gasoline and diesel fuel. Installing or working on this equipment means working in an environment in which these highly flammable liquids or vapors are present. This presents a real risk of severe injury or death if these instructions and standard industry practices are not followed.**

- ☐ Lock out and Tag circuit breakers before installation or service of this and associated equipment
- ☐ Restrict access to the work area to only certified and trained installers or service personnel
- ☐ Identify and mark the perimeter of the work area with signs, safety-cones and colored safety tape
- ☐ Prevent unauthorized vehicle access (block access) into the work areas by using barriers, barricades, and service trucks
- ☐ Use only non-sparking tools when working in these Hazardous Areas
- ☐ Check for presence of hydrocarbon vapors in containment sumps before entering and periodically there after.

ELECTRICAL DANGER **ALWAYS lock out and tag electrical circuit breakers while installing or servicing this equipment, pumps and related equipment. A potentially lethal electrical shock hazard and the possibility of an explosion or fire from a spark can result if the electrical circuit breakers are accidentally turned on during installation or servicing.**

ELECTRICAL DANGER Verify that no voltage exists before working-on, or wiring-to circuits described in this manual, otherwise lethal electrical-shock-hazards could exist, which may cause injury or death. *Note: circuit breaker contact(s) can fail to open even when the circuit breaker lever indicates off.*

ELECTRICAL DANGER **Electronic line leak detectors start submersible pumps automatically to run leak-tests at full line pressure. Automatic pump starts occur between periods of product dispensing when there is no product being dispensed.** BEFORE performing any installation or service (such as replacing fuel-filters) – tag and lock-out all electrical power sources to the submersible pump(s), pump controllers, and dispensers and relieve fuel-line pressure**.** Failure to turn off power and relieve fuel-line pressure before work is started can result in: Electrical shock, fuel spills, and fire or explosion hazard that may result in injury or death.

WARNING DO NOT smoke while working on or near this equipment. Highly flammable vapors may be present in the environment where this equipment is installed or serviced. Failure to follow this instruction could result in a serious fire or explosion.

WARNING Follow all federal, state, and local laws governing the installation of this product and the entire system. When no other regulations apply, follow NFPA 30, 30A, and 70 from the National Fire Protection Association. Failure to do so could result in serious property damage, environmental-contamination, and severe injury or death.

WARNING **Turn off all pump power and relieve pipeline pressure (reference and follow the pump manufacturer's directions about how to do this). The pipeline from the submersible pump to the dispenser, may be under pressure. If the line leak detector/plug (or any other part of the submersible pump and fuel line) is removed without first relieving pressure, then a product spill will occur. This can cause an environmental, fire, or explosion hazard, and may result in injury or death.**

WARNING **Avoid personnel injury or property damage: keep moving vehicles and unauthorized personnel out of the hazardous work area. Use Safety Cones, Barricades, Warning Signs, and Safety Tape, and block access with Barricades / service trucks to the work area to avoid injury or property damage.**

WARNING **Allow no source of combustion near the work area. Be careful not to cause sparks when working on fuel dispensing equipment. Failure to follow these directions may cause an explosion hazard, which could result in property damage and death.**

WARNING **These containment sumps can trap dangerous amounts of hydrocarbon vapors. If these vapors are inhaled they could cause dizziness or unconsciousness. If the vapors were ignited they could explode causing serious injury or death.**

CAUTION **Refer to all applicable Federal, State, City and local codes, your National Electric Code (NEC), and the Automotive and Marine Service Station Code (NFPA 30A in the USA) before installation or maintenance. *This installation is designed for submersible pumps which have a Pump Control box in the station.*** If a pump control box does not exist, then the system must be retrofitted to add a pump control box in the facility to comply with Codes.

CAUTION **Before entering a containment sump check for the presence of hydrocarbon vapors, if vapor levels are unsafe ventilate the sump with fresh air. While working in the sump periodically check the atmosphere in the sump, if vapors reach unsafe levels exit the sump and ventilate it.**

CAUTION **ALWAYS have a second person standing by for assistance when working in or around a containment sump. Electronic and electrical petroleum monitoring equipment is often housed in containment sumps designed to trap hazardous liquid spills and prevent contamination of the environment.**

CAUTION **Petroleum is carcinogenic – use adequate protection to avoid health hazards. ALWAYS cleanup and dispose of used absorbent/rags and petroleum resistant gloves in approved waste containers. Cleanup refuse and dispose of these immediately to avoid personnel injury from vapors or direct skin contact to also avoid possible fire or environmental safety hazards.**

2 TS-TPI INSTALLATION & WIRING

Overview

The TS-TPI Turbine Pump Interface is a communication device that allows the INCON TS-1001, TS-2001 Automatic Tank Gauge (ATG) or other devices to communicate with the turbine pump controllers (TPC). The TS-TPI is available as a stand alone unit, which requires its own input power, and as an integrated factory installed option in the TS-LS300 AutoLearn Line Leak Detector. The TS-TPI allows the ATG or other device to receive pump status information and, depending on the type of TPC, controls the pump.

In this chapter a brief description of each application is presented as well as the wiring of each component for the particular application. Please contact Franklin Fueling System Technical Support, (800)984-6266 if the TS-TPI is to be used in any other application.

Specific details of installation and the general programming instructions for the ATG is found in the Tank Sentinel Installation Guide (part number 000-1050). Specific programming instructions concerning the TS-TPI with the ATG will be covered in this Guide.

Look for your specific application on the following pages. Wire the components according to the wire diagram and then go to the next chapter “Tank Sentinel/TS-TPI Interface” for information on the features of the TS-TPI. The rest of the chapters provide instruction for programming the ATG to take full advantage of the TS-TPI.

Here are the application options covered in this guide:

- TS-ATG with TS-TPI and TS-LS300 AutoLearn Console
- TS-ATG with TS-TPI, TS-LS300 AutoLearn Console and TPCs
- TS-ATG with TS-TPI and two TS-LS300 AutoLearn Consoles
- TS-ATG with TS-TPI, two TS-LS300 AutoLearn Consoles and TPCs
- TS-ATG with Stand alone TS-TPI and TPCs
- Stand alone TS-TPI with TPCs

ELECTRICAL DANGER **Verify that no voltage exists before working-on, or wiring-to circuits described in this manual, otherwise lethal electrical-shock-hazards could exist, which may cause injury or death.** ***Note: circuit breaker contact(s) can fail to open even when the circuit breaker lever indicates off.***

ELECTRICAL DANGER **BEFORE performing any installation or service lock-out and tag all electrical power sources to the submersible pump(s), pump controllers, and dispensers and relieve fuel-line pressure**. Electronic line leak detectors start submersible pumps automatically to run leak-tests. Automatic pump starts occur between periods of product dispensing when there is no product being dispensed.

TS-TPI specifications:

Input power: 120 - 240 Vac 50/60 hz (note: stand alone TS-TPI only. the integrated TS-TPI/TS-LS300 does not require any additional power connection to the TS-TPI)

For indoor installation only, operating temperature 40 - 105° F (4 - 41° C)

Use Belden Cable #9365 - 18 AWG or equivalent

TS-TPI revision 2.3 or higher for use with MagVFC, STP-SCI, STP-SCIII, STP-SC, and IST-VFC controllers. Limited functions available with STP-SCIII, STP-SC and IST-VFC controllers. See Troubleshooting section for details.

Integrated TS-TPI/TS-LS300 uses PORT 1 exclusively for TS-LS300 communication and is not available for TPC connections. The stand alone TS-TPI can use PORT1 for TPC connections.

Integrated TS-TPI / TS-LS300 with Automatic Tank Gauge TS-1001, TS2001

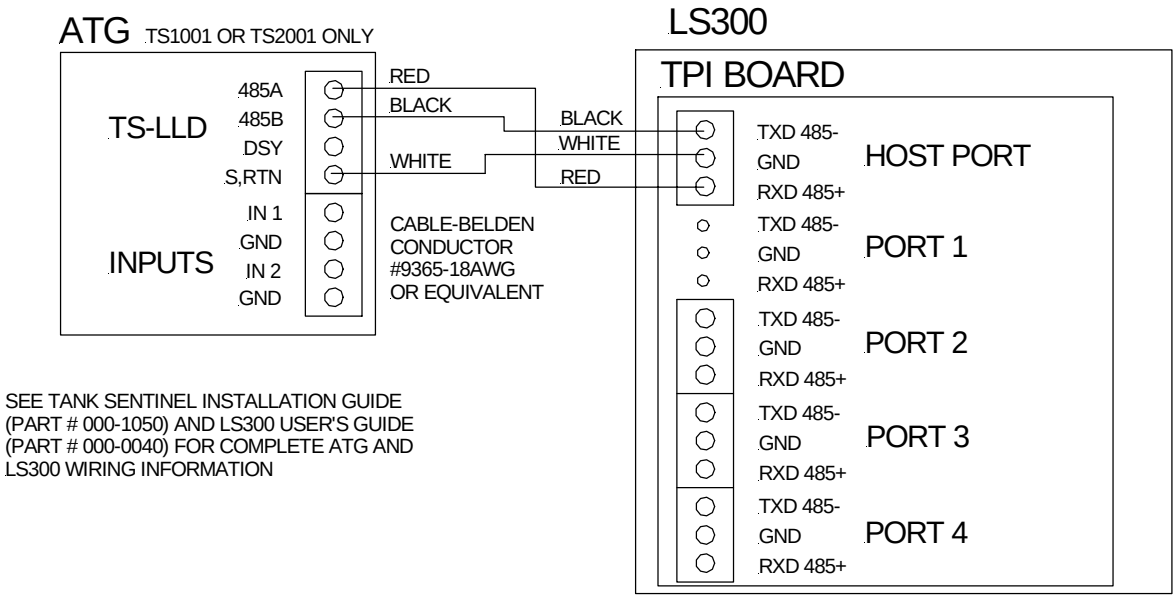


Figure 2-1

- This application provides communication between ATG and TS-LS300 only. The Line Leak detector option is required on the ATG for operation.
- See Tank Sentinel Installation Guide and TS-L300 AutoLearn Installation Guide for specific instructions for each component

Integrated TS-TPI / TS-LS300 to Automatic Tank Gauge TS-1001, TS2001 and TPCs

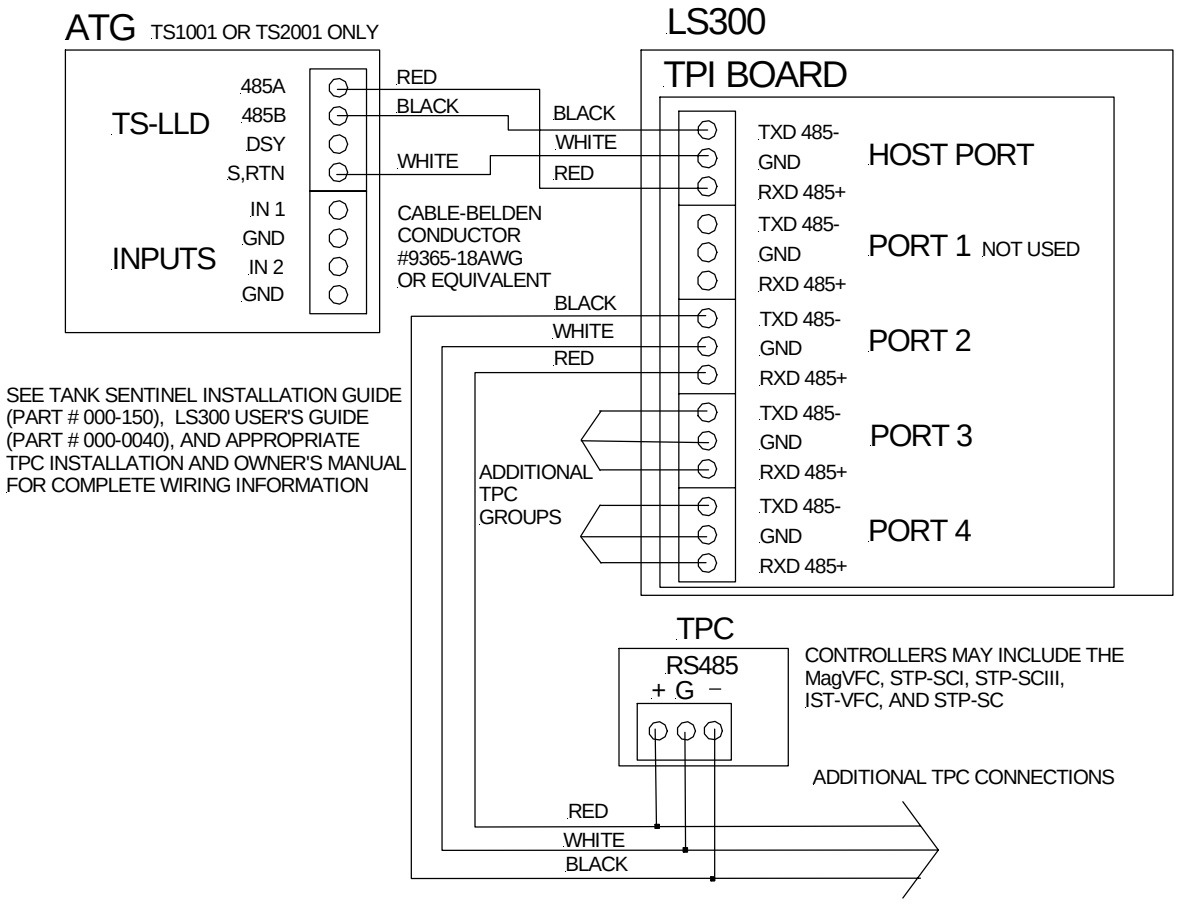


Figure 2-2

- This application provides communication between ATG, TS-LS300, and TPCs. The Line Leak detector option is required on the ATG for full communication with TS-LS300.
- See Tank Sentinel Installation Guide and TS-L300 AutoLearn Installation Guide for specific instructions for each component
- Connect TPCs so all Stand alone TPCs are on the same port and Master/Slave configured units are on their own port. Address TPCs so controllers on same port have unique addresses. If similar type stand alone TPCs are installed on the same port as Master/Slave TPCs the stand alone TPCs will be seen as Slave units.

TS-TPI / two TS-LS300 with Automatic Tank Gauge TS-1001, TS2001

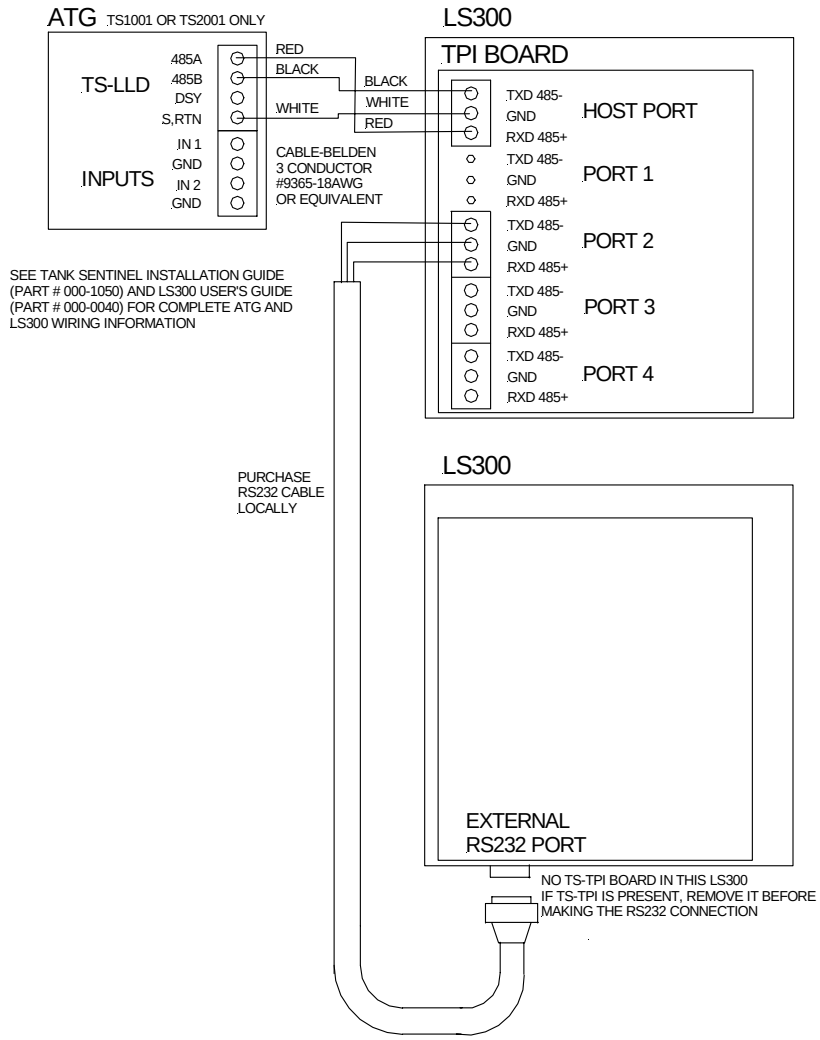


Figure 2-3

- Provides communication between ATG and both TS-LS300 consoles. ATG requires the Line Leak detection option for full operation of TS-LS300 and ATG communication.
- Only one TS-LS300 has TS-TPI installed, if both have a TPI board remove the TPI from one of the TS-LS300
- The RS232 cable is supplied by the customer
- TS-TPI configuration switch SW1 pole 3 is ON. See Figure 2-7 for more details and switch settings on TS-TPI

Wire diagram for TS-TPI with two TS-300 AutoLearn to Automatic Tank Gauge TS-1001, TS2001 and TPCs

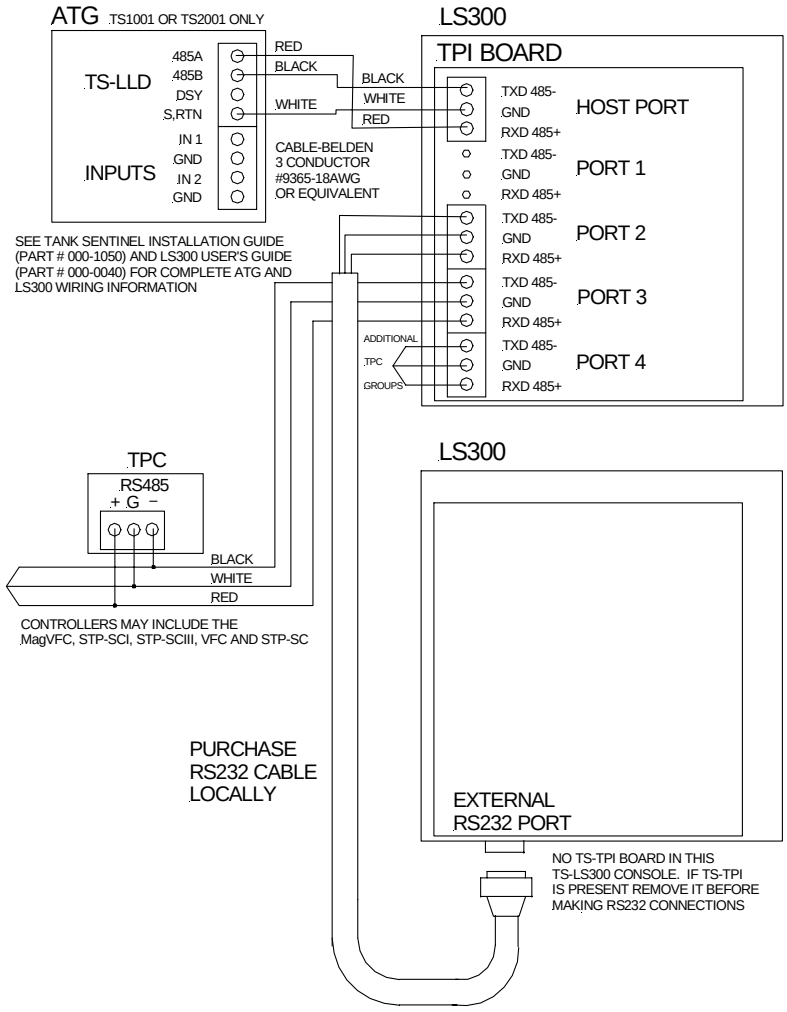


Figure 2-4

- Provides communication between ATG, TPCs, and both TS-LS300 consoles. ATG requires the Line Leak detection option for full operation of TS-LS300 and ATG communication.
- Only one TS-LS300 has TS-TPI installed, if both have a TPI board remove the TPI from one of the TS-LS300
- The RS232 cable is supplied by the customer
- Connect TPCs so all Stand alone TPCs are on the same port and Master/Slave configured units are on their own port. Address TPCs so controllers on same port have unique addresses. If similar type stand alone TPCs are installed on the same port as Master/Slave TPCs the stand alone TPCs will be seen as Slave units.
- TS-TPI configuration switch SW1 pole 3 is ON. See Figure 2-7 for more details and switch settings on TS-TPI

Stand AloneTS-TPI with Automatic Tank Gauge TS-1001 or TS2001 and TPCs

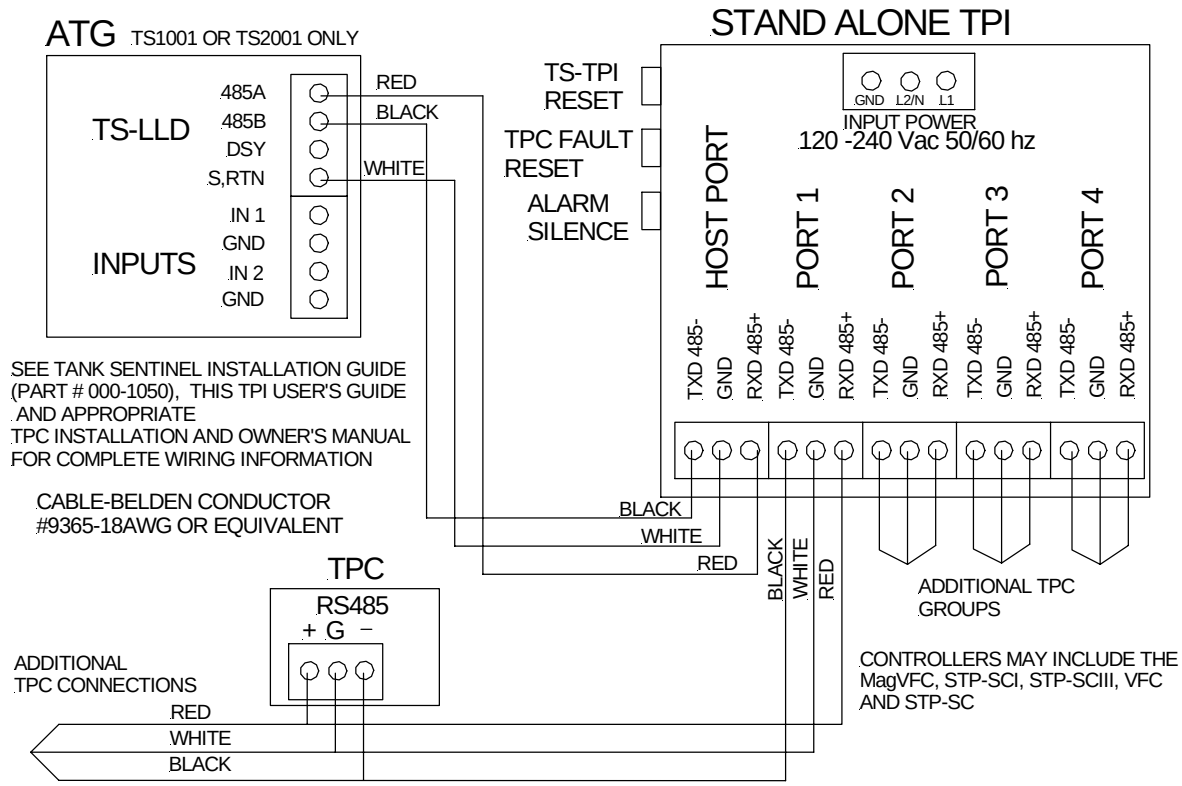


Figure 2-5

- Communication between ATG and TPCs, no additional ATG options required for full operation
- Stand Alone TS-TPI requires separate 120 - 240 vac, 50/60 hz, power
- See Tank Sentinel Installation Guide for specific ATG instructions
- TPCs that can be installed are MagVFC, IST-VFC, STP-SCI, STP-SC and STP-SCIII. Available functions are limited on the IST-VFC, STP-SC and the STP-SCIII controllers, see troubleshooting section for details
- Connect TPCs so all Stand alone TPCs are on the same port and Master/Slave configured units are on their own port. Address TPCs so controllers on same port have unique addresses. If similar type stand alone TPCs are installed on the same port as Master/Slave TPCs the stand alone TPCs will be seen as Slave units.

Stand AloneTS-TPI with TPCs

SPECIFICATIONS
Input power:
120 - 240 Vac 50/60 hz

Indoor installation only.
Operating temperature:
40 - 105° F (4 - 41° C)

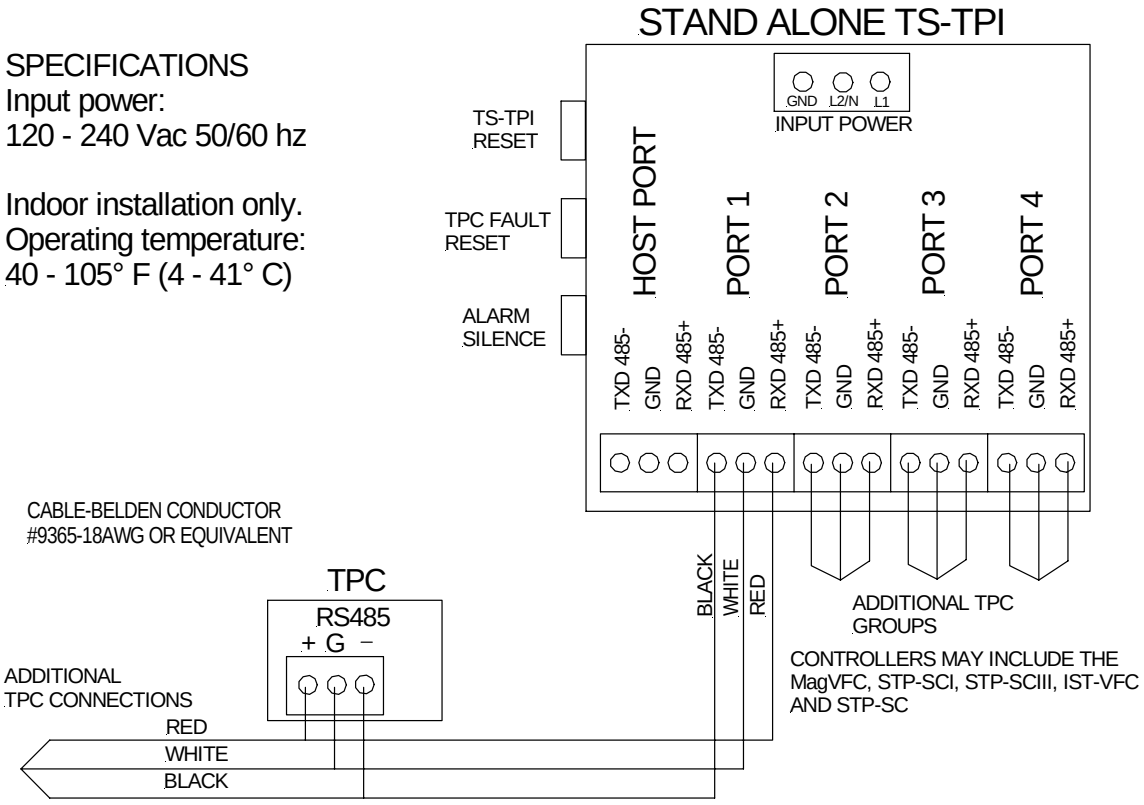


Figure 2-6

- Communication between TS-TPI and TPCs. Use this application for remote controller fault indication and controller fault reset.
- Stand Alone TS-TPI requires separate 120 - 240 vac, 50/60 hz, power
- TS-TPI reset switch will reset the TS-TPI in the event of a communication conflict.
- The TPC fault reset will reset a pump controller that is in a fault conditon. It will only reset controllers that are indicating a fault alarm. If none of the controllers are in alarm no reset will take place.
- Alarm Silence button will silence the audible alarm but not clear the fault.
- Connect TPCs so all Stand alone TPCs are on the same port and Master/Slave configured units are on their own port. Address TPCs so controllers on same port have unique addresses.

TPI Configuration Switch

Locate the single dip switch on the TS-TPI board labeled SW1.

This set of switches sets how the various ports communicate. The host (ATG) and Pump Controllers all communicate using RS-485 connections. The TS-LS300 communicates using RS-232.

The Factory default setting is switches 1, 2 and 3 are OFF and switch 4 is ON. When a second TS-LS300 is used (more than 4 pipelines at a site) switch 3 is set to the ON positon, see Figure 2-7

SW1	Stand Alone TS-TPI	TS-TPI in TS-LS300	Two TS-LS300 in use
1	OFF	OFF	OFF
2	OFF	OFF	OFF
3	OFF	OFF	ON
4	ON	ON	ON

Figure 2-7

3 TANK SENTINEL/TS-TPI INTERFACE

Overview

The Turbine Pump Interface (TS-TPI) hardware has been developed to facilitate communications of the Turbine Pump Controllers (TPC) operating conditions with the INCON Tank Sentinel Automatic Tank Gauge (ATG) consoles via the RS-485 port.

The integration of ATG, TS-TPI and TPC allows the ATG to intervene when pumps experience certain fault conditions by resolving the fault and enabling the pump to continue dispensing fuel. In addition to this, the ATG keeps an alarm history to aid in troubleshooting. A technician can review an alarm history report at the site or remotely via System Sentinel® and System Sentinel Anyware®.

The TS-TPI requests status and fault conditions of the TPCs. This information is transmitted to the ATG on demand. The ATG can then make this status available for purposes of:

- Displaying, Printing and Faxing Pump Controller Status
- Resetting Pump Controllers
- Making Pump Controller Status available to System Sentinel® and System Sentinel Anyware®
- Basic Operation Features

There are several basic operation features listed below and detailed further in separate chapters of this manual.

Monitor, Record and Reset Pump Controller Faults

The primary feature is that the ATG maintains the state of the Pump controller such that it continues to run and function without user intervention. The Pump Controller will stop a pump when a fault condition exists. The ATG monitors pump controllers through the RS-485 port for fault conditions. When fault conditions are received, the ATG will manage them by reporting alarms, silencing the audible alarms on the controllers, and resetting the controller when appropriate.

Fault Diagnostic Capabilities

The secondary feature provides fault detection diagnostics. The ATG will take control of the pumps when certain fault conditions are active in the ATG. For example, if a site has multiple tanks of the same product and one of the tanks gets overfilled, the ATG will make the over filled tank the priority tank, even if it is not programmed as the priority tank, until the over fill conditon is corrected. Pump Controller alarms have been added to the alarm processing code of the tank gauge.

Level Management

The third feature allows a customer to utilize the ATG to control the “mode” the pumps use to draw down product in two or more tanks with the same product. The “Leveling Mode” alternates the pumps so that the tank levels are equal as the tanks are being drawn down. The “Priority Mode” gives one pump priority over the others while it draws product down. A pump remains in “Priority Mode” until an user specified reserve percentage level is reached. The tank gauge then gives priority to another pump and it then draws down the product from another tank.

In “Leveling Mode”, the ATG keeps the levels on multiple tanks the same and in the “Priority Mode”, a specified tank will draw down to its reserve percentage before other tanks are called upon.

The ATG also performs tank level management by generating alarms to warn the operator of High and High High product limits, Low and Low Low product limits, water levels limits and even an obstruction on the pump motor. The ATG can shut down pumps, turn on pumps and change priority based on the active alarm at the ATG. For example, if the water level in the tank is within two inches of the user defined pump height the ATG will indicate the “Pump in Water” alarm and shut down the pump. The ATG will prevent the pump from operating until the water level is reduced.

For Overfill Management the ATG will generate an alarm to warn the operator when the product level in the tank exceeds the High or High High limits. If these conditions occur, the ATG will change the tank priority in the group and make it the primary tank so it will be the first tank to draw down product until the product level drops below the High level limit.

TS-LS300 report, Leak Test Initiating Capabilities

The TS-TPI allows the TS-LS300 AutoLearn Line leak detection to communicate product pipeline status. The ATG can respond to TS-LS300 alarms and print reports of pipeline status. Reports can be scheduled by the end user. The user can schedule precision line tests at any time in the ATG. Then the ATG, communicating throught the TS-TPI, will initiate the line test. These tests are in addition to the tests the TS-LS300 will do automatically.

TS-TPI Setup Programing Operations

The ATG Setup Programming menus allow for the TS-TPI feature to be enabled. An Auto-configuration (AUTO CFG) is then performed, which sets up the TS-TPI system for the first time, adding menus to the setup display. The ATG will detect the number of pump controllers that are connected and will configure the ATG to monitor them.

The AUTO CFG updates the system configuration with the number of pump controllers connected, what type of controller, how the controllers are grouped and how the associated pumps are to be managed.

The user Configuration menus control the pump name, tank association, pump height, pump mode and reserve setting.

Data Display and Reports

On the ATG a pump controller Display menu is available from the console to allow viewing of live and updated information about the pump controller. The ATG will also monitor the pump controllers for information such as: status, faults, volts, amps, watts, frequency, flow, pressure, temperature, dip switch settings, and software version.

The Pump Controller Status Report provides the same information found in the Display menu. A separate TPI setup Report shows the various Group, Pump and Tank associations.

Diagnostic Operations

A pump controller Diagnostic menu is available on the console display to allow a user to reset a pump controller from the ATG. Another diagnostic function that is available is the ability to enable automatic calibration of the pump controller and its pumps.

Remote Management

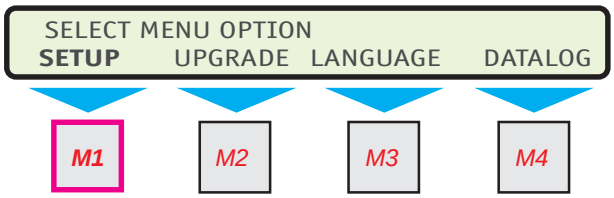
The remote management feature allows an interface within System Sentinel or System Sentinel Anyware to acquire and display pump controller status. This feature allows the user to remotely poll data from the ATG including pump controller status and alarms. A pump Controller Interface screen in Site Link shows controller status.

TS-TPI Menu

NOTE Prior to Enabling TPI, the System configuration for Number of Tanks is required. Refer to the Tank Sentinel Setup Programming Guide.

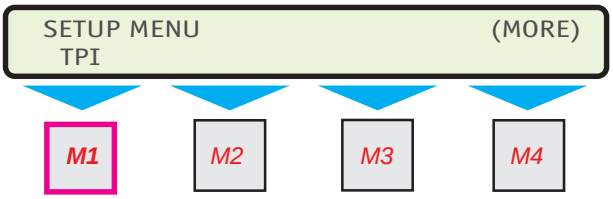
H U
MENU
7

Press this key and follow the highlighted sequence below...



1) Press the M1 key to display the SETUP menu.

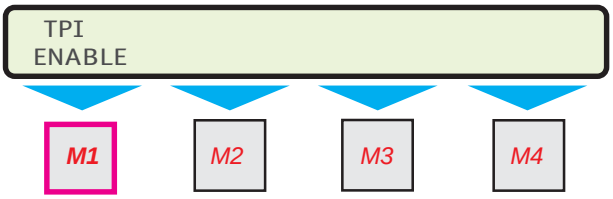
Here is the main SETUP MENU display



2) Press the DOWN key several times until the TPI menu name is displayed.

"TPI" may be aligned with any of the menu keys (M1--M4), depending on what other features are programmed on enabled. for this example TPI is aligned with M1

3) Press the M1 key to display the TPI menu



Here is the TPI ENABLE menu.

4) Press the M1 key to display the TPI ENABLE user entry field. The default selction is NO. Choose YES to enable TPI programming and subsequent menus.

5) Use the UP/DOWN keys to change the selection to YES.

6) Press the ENTER key to accept the entry.

The display returns to the TPI menu, which now shows the Pump and GROUP menus.

TS-TPI PUMP Menu(s)

- AUTO CFG (user entry)
- NO PUMPS “READ ONLY”
- PUMP N Menus (both)

NOTE Before preforming AUTO CFG verify all TPCs dip switches are set correctly. If TPC switches are changed after AUTO CFG the ATG will need to be Cold Booted and the AUTO CFG procedure repeated.

AUTO CFG (user entry)

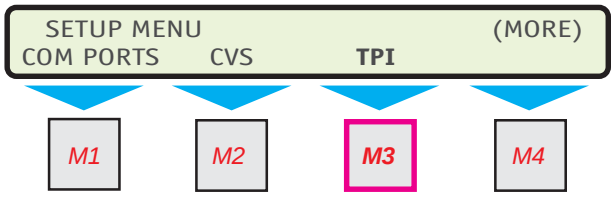
Description of Steps:

1) Press the MENU key to display the SELECT MENU OPTION menu.

2) Press the M1 key under the word SETUP to display the SETUP MENU menu.

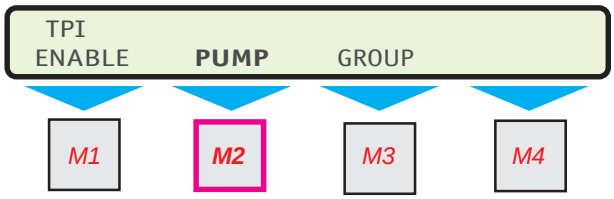
3) Press the DOWN key until the TPI menu is displayed (TPI appears as the last menu item). TPI may be aligned with any of the menu keys (M1 -- M4), depending on what other features are programmed or enabled.

4) Press the M3 key to display the TPI menu.



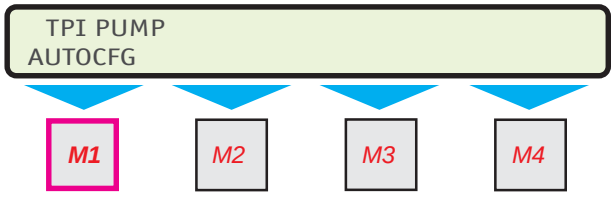
Here is the main TPI menu, which shows ENABLE, PUMP and GROUP...

5) Press the M2 key to display the PUMP menu.



Here is the TPI PUMP menu, which only shows AUTO CFG

6) Press the M1 key to start the AUTO CFG process.



Here is the TPI PUMP menu, which now shows AUTO CFG, PUMP1, PUMP2, ...

Please read the following note about Auto-Configuration for your better understanding of this feature.

AUTO-CONFIGURATION NOTE

The AUTO CFG function is used to invoke the routines which query the TPI for the number of pump controllers attached to the TS-TPI and other controller and pump related information.

When AUTO CFG is started, the tank gauge scans the TS-TPI for all the pump controllers attached to the TS-TPI. For each controller found, a corresponding pump number will be displayed (e.g. if the TS-TPI finds two controllers, there will be a Pump 1 and a Pump 2). Their types will be stored in the TYPE Menu configuration and the number of controllers will be stored in the NO. PUMPS configuration.

The Auto-Configuration process will automatically update the following READ ONLY configuration settings:

- NO. PUMPS (in System Menu)
- PUMP TYPE
- PUMP GROUP
- PUMP ADDRESS
- GROUP TYPE

See the Tank Sentinel Setup Programming Guide for more information on programming the ATG to include Lines for TS-LS300 PROGRAMMING.

Number of Pumps Menu

NO.PUMPS "READ ONLY"

Description of Steps:

The *number of pumps* information is displayed under the SYSTEM menu. Return to the main SETUP MENU display, which shows...

1) Press the M2 key to display the SYSTEM menu.

2) Press the DOWN key until NO.PUMPS is displayed...

3)Press the M3 key to display the number of pumps information...

The number represents the number of pump controllers that the TPI device has detected.

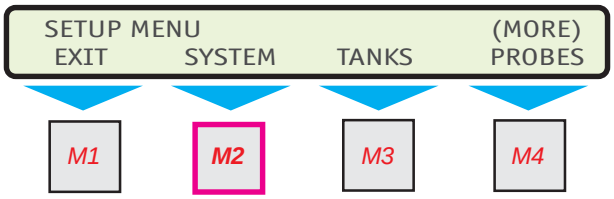
The data on display "2" was generated from Auto-Configuration.

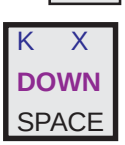
```
NUMBER OF PUMPS                READ ONLY
  2
```

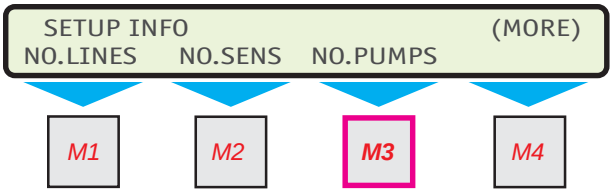
4) Press the CANCEL key twice, to return to the SETUP MENU menu.

READ ONLY NOTE

Fields that display the words "READ ONLY" in the upper right corner have been automatically filled in by the Auto-Configuration process. These fields are not editable. The next Auto-Configuration process will over-write these fields and values.







NOTE NO.PUMPS may be aligned with any of the menu keys (M1--M4), depending on what other features are programmed or enabled. For this example, the menu is aligned with the M3 key.

PUMP N Menu(s)

- NAME (user entry)
- TYPE “READ ONLY”
- GROUP “READ ONLY”
- ADDRESS “READ ONLY”
- TANK (user entry)
- HEIGHT (user entry)

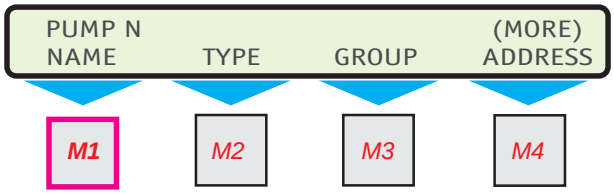
NAME (user entry)

Description of Steps:

NOTE ***In the following examples, “N” represents any pump number - 1, 2, 3 and so on.***

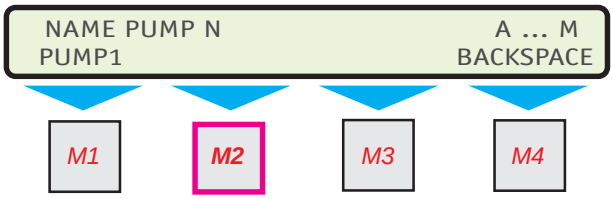
The PUMP N menu displays six subsequent fields, including TANK and HEIGHT (scroll down)...

1) Press the M1 key to display the NAME PUMP N user entry field...



The default name of “PUMP 1 is displayed...

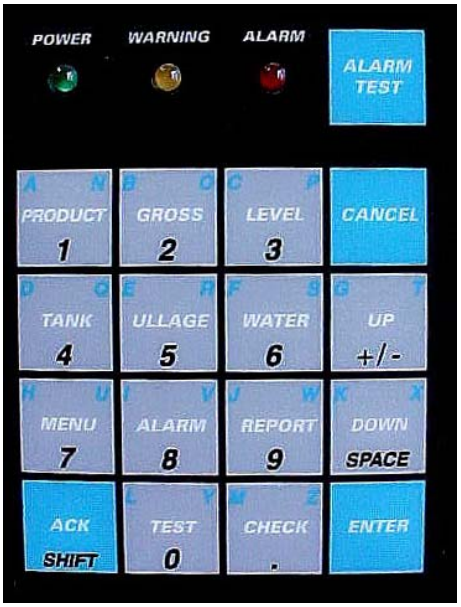
2) Press the M4 key to backspace and erase the “PUMP 1” default name.



3) Use the keypad to enter a unique name for each pump, up to 8 characters long (See NOTE below).

Remember:

Use the SHIFT key to change the keypad for A...M to N...Z and to (numeric) 1-9, 0, ., =/-, and SPACE (a blank space)



4) Press the ENTER key to accept the data entry.

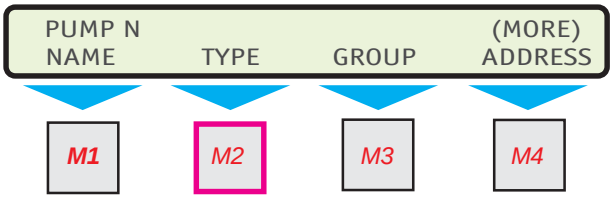
The display returns to the PUMP N menu.

Repeat the user entry steps for each pump.

NOTE The Pump name can be up to 8 alpha/numeric characters. This alias is used throughout the system in the display and reports. An example name would be UNLEADED. The name is not automatically updated or over-written by an AUTO CFG operation.

TYPE “READ ONLY”

Description of Steps:



1) Press the M2 key to display the TYPE PUMP N “READ ONLY” field...

In this example, the type “VFC” is displayed...

There are five types of controller displays VFC, SC, SCIII, SCI and VFCIV. The displayed TYPE PUMP coresponds with the following FE Petro controllers:

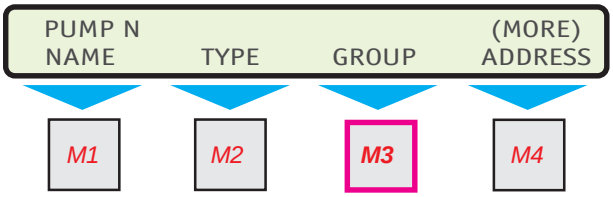
SC	STP-SC
SCI	STP-SCI
SCIII	STP-SCIII
VFC	IST-VFC
VFCIV	MagVFC

2) Press the CANCEL key to return to the PUMP N menu.

GROUP “Read Only”

Description of Steps:

1) Press the M3 key to diplay the GROUP PUMP N “READ ONLY” field...



In this example, the group “2” is displayed...

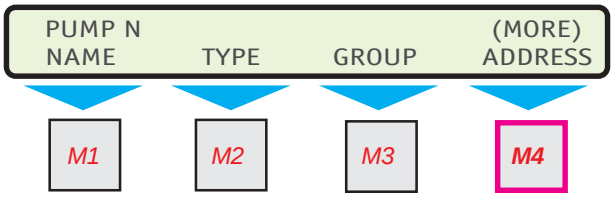
2) Press the CANCEL key to return to the PUMP N menu.

This menu item defines which pump is connected to which TS-TPI port number. A group number of 1, 2, 3, or 4 will indicate that the pump is on that port number. The TS-LS300 occupies Group 1 in the factory installed TS-TPI/TS-LS300, therefore the first pump group is Group 2 and is connected on PORT 2. The Stand Alone TS-TPI has all ports and therefore all groups available to TPCs.

ADDRESS “READ ONLY”

Description of Steps:

1) Press the M4 key to display the ADDRESS PUMP N “READ ONLY” field...



In this example, address “0” is displayed...

The address range is from 0-31.

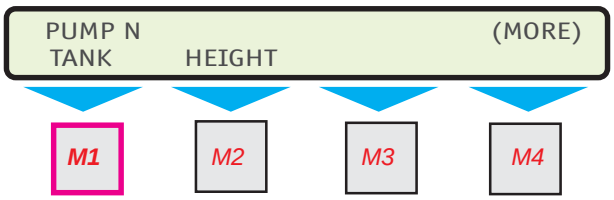
2) Press the CANCEL key to return to the PUMP N menu.

Press the DOWN key to display the TANK and HEIGHT user entry menus...

TANK (user entry)

Description of Steps:

1) Press the M1 key to display the TANK ASSOCIATION PUMP N user entry field...



The default TANK ASSOCIATION number “0” is displayed...

The user selects the tank number associated with PUMP N. The values range from 0-8(0=none, or the maximum number of tanks available for the ATG model)

NOTE: This will allow a pump to be associated with a tank. If the pump is not associated with a tank (i.e. for level monitoring by the tank gauge), then NONE may be chosen, but this will disable some features of the pump controller interface for that controller. If a tank has multiple pumps in it, more than one controller may be associated with the tank.

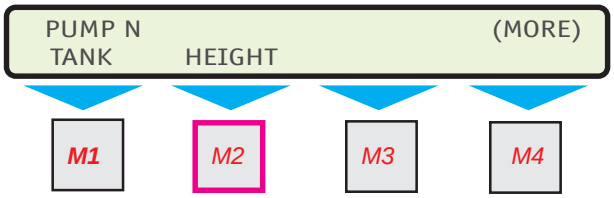
2) Use the keypad to enter the tank number.

In the event that a number is already entered and needs to change, press the M4 key to backspace and erase the entry. The default “0” tank number will be displayed.

3) Press the ENTER key to accept data entry.
The display returns to the PUMP N menu. Repeat the user entry steps for each pump.

HEIGHT (user entry)

1) Press the M2 key to display the HEIGHT PUMP N user entry field...



The default HEIGHT of "+7.0"(inches) is displayed...

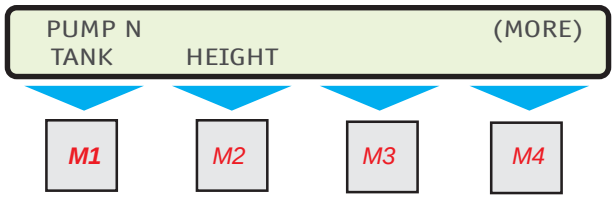
2) Press the M4 key to backspace and erase the "+7.000000" default height number.

NOTE: HEIGHT is the distance (in inches or millimeters) between the bottom of the pump to the bottom of the TANK. this allows the pump height to be set by the user, which affects the handling of the DRY TANK, BLOCKED INTAKE, and PUMP IN WATER alarms. This variable defaults to 7 inches and is user-programmable.

3) Use the keypad to enter the height value.

4) Press the ENTER key to accept data entry.

The display returns to the PUMP N menu showing TANK and HEIGHT.
To repeat these steps for the next pump:



Press the CANCEL key to display the TPI PUMP menu, which displays AUTO CFG, PUMP 1, PUMP2, ...

Repeat each PUMP N Menu step for every pump number.

When these entries are completed...

Press the CANCEL key to display the main TPI menu, which displays ENABLE, PUMP and GROUP.

TPI Group Menu

- TYPE “READ ONLY”
- MODE (user entry)
- RESERVE (user entry)

GROUP MENU NOTES

The Group menu is not available when pump controllers are not connected/programmed with the TS-TPI device. The Group menu name appears on the display but it does not function.

Group 1 is removed from the display if one LS-300 is connected to the TS-TPI. Groups 1 and 2 are removed when two LS300s are connected. All Groups are displayed if zero LS-300s are connected.

TYPE “READ ONLY”

Description of Steps:

Here is the main TPI menu, displaying ENABLE, PUMP and GROUP...

1) Press the M3 key to display the TPI GROUP menu...

Here is the TPI GROUP menu displaying GROUP numbers 1 to 4 (zero LS-300s)

2) Press the (M) key of the group number to be displayed. For this example, press M2 to display the GROUP 2 menu...

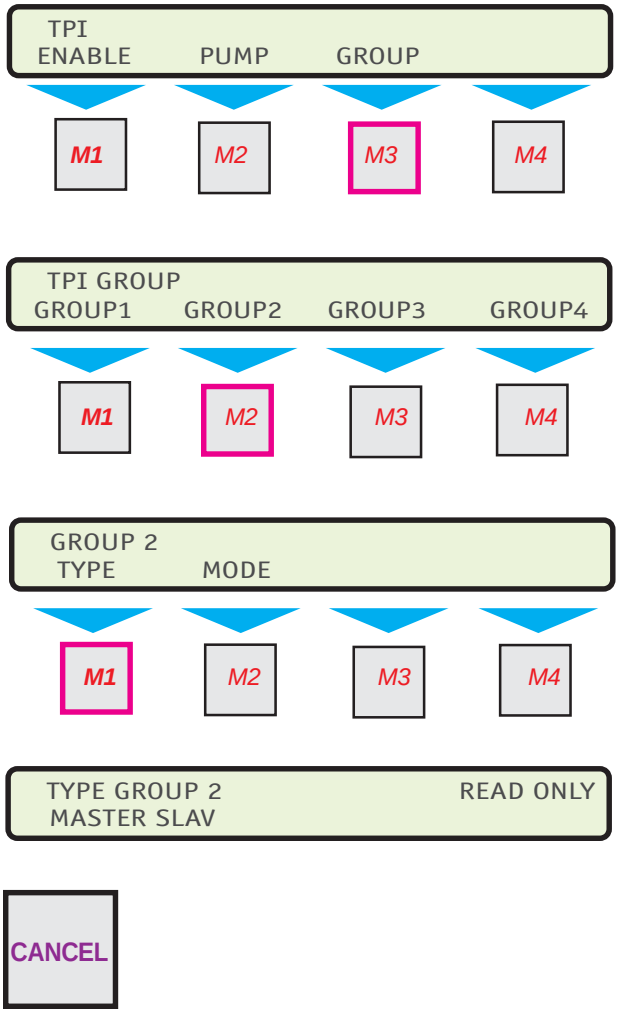
Here is the GROUP 2 menu displaying TYPE and MODE...

3) Press the M1 key to display the TYPE of group as detected during Auto-Configuration. This is a READ ONLY field.

In this example, the type “MAST SLAV” is displayed...

4) Press the CANCEL key to return to the GROUP 2 menu.

To repeat the user entry steps for each group, press CANCEL again to display the TPI Group menu.



NOTE NOTE: Please read the MODE Notes to gain a better understanding of the MODE and RESERVE features.

MODE “User Entry” Note

(Mode functions are not available with STP-SC, STP-SCIII or IST-VFC)

MODE allows the operator to select which Level Management mode to use for a particular group. The choices are NONE, LEVELING, and PRIORITY:

- Selecting NONE means NO level management mode for the Group (no Reserve to enter). This is used for Groups with TPCs configured as stand alone controllers.
- Selecting the LEVELING mode seeks to maintain an equal level of fuel in each tank by placing pump controllers associated with the tank containing the most amount of fuel to priority. This will force the pump with the highest level of fuel to activate when the dispenser switch is activated (no Reserve to enter).
- Selecting the PRIORITY option enables a mode that seeks to drain one tank before the other tank(s). Only when the PRIORITY mode is selected the RESERVE menu will appear.

Reserve Configuration Note

RESERVE is set after choosing the PRIORITY MODE. This entry sets the reserve level of fuel remaining in the tank. The programming defines this percentage as an “empty” tank and is programmed in % full.

For example, setting the Reserve to 20% means, when the tank is 20% full it is considered “empty”. This will trigger two events; the ATG will change the priority of the pumps so a pump starts pumping fuel from a different tank and lowers the priority of the pump in the tank that has reached its Reserve. This helps to prevent the faults Dry Run and PUMP in Water. If all tanks reach the Reserve level the pumps will function in leveling mode.

Mode Type and Reserve Note

The STND ALON “type” designated the GROUP as a Stand Alone Group without any Master/Slave associations. Members of the group consists of only one pump and one controller. The menus MODE and RESERVE are not enabled for Stand Alone TYPE. This completes Setup Programming for this type.

The MAST SLAV ‘type’ designates the GROUP as a Master/Slave configuration. The group consists of more than one pump controller. This “type” is further defined by the kind of Level Management “mode” either Leveling or Priority. If Priority is selected, the user is required to enter a value for RESERVE.

MODE (user entry)

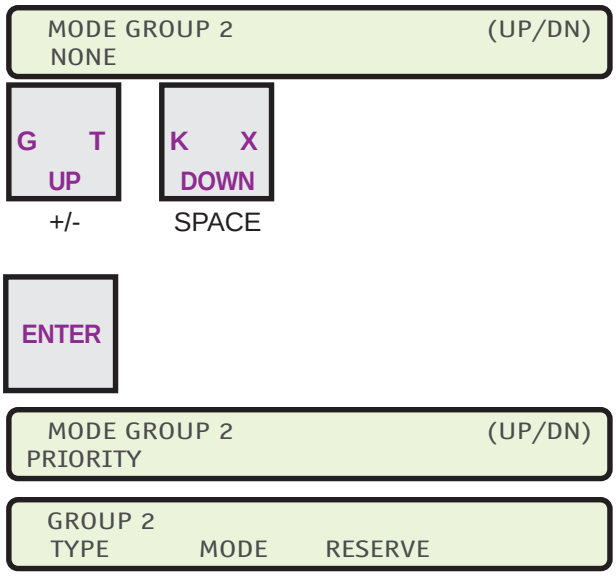
Description of Steps:

Here is the MODE GROUP 2 user entry field display. NONE is the default setting...

1) Use the UP/DOWN keys to change the default mode and scroll through the other modes - LEVELING and PRIORITY...

2) Press the ENTER key to accept data entry. This entry returns the display to the GROUP N menu.

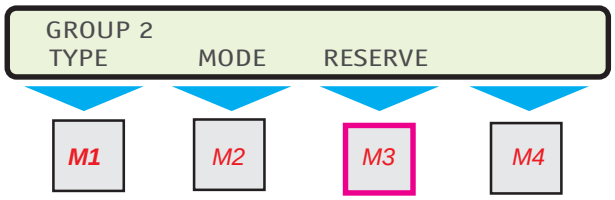
If PRIORITY is selected, Proceed to the RESERVE menu, which is described next...



RESERVE (user entry)

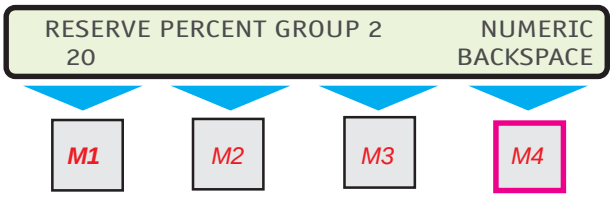
Description of Steps:

Here is the GROUP 2 main menu, displaying TYPE, MODE and RESERVE...



1) Press the M3 key to display the RESERVE menu...

Here is the RESERVE user entry field displaying the “percent full” value for GROUP 2 (in Priority mode). The default setting is 20.



2) Press the M4 key to backspace and erase the default percent value. this will clear the field.

3) Use the keypad to enter a percent value for each group.

4) Press the ENTER key to accept data entry. This entry returns the display to the GROUP N menu, displaying TYPE, MODE, and RESERVE.

5) Press the CANCEL key to return to the TPI GROUP menu, displaying GROUP 1 to GROUP 4.

Proceed to the next group number menu.

Repeat the steps above to set the reserve percent for each group that is in Priority Mode.

When set up programming is completed, follow the Exiting Setup Mode steps (next section) to return the Tank Sentinel to the Run Mode.

Exiting Setup Mode

EXIT SETUP (user entry)

Description of Steps:

1)Press the CANCEL key to return to the main TPI menu, which displays ENABLE, PUMP and GROUP.

This completes the Setup Programming for the TPI device.

2) Press the CANCEL key to return to the TPI SETUP MENU menu, which displays TPI.

3) Press the CANCEL key to return to the main SETUP MENU menu, which displays EXIT, SYSTEM, TANKS and PROBES.

4) Press the M1 key under the word EXIT to return the ATG to RUN MODE.

LN (Line) Test Menu

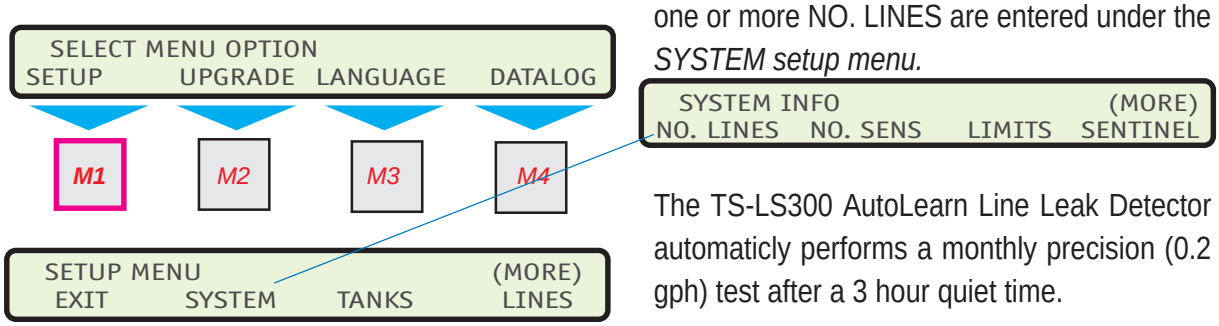
NOTE

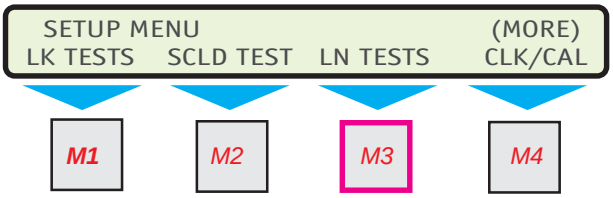
Disregard this Chapter if the LN TESTS menu does not appear. Note that the position of this menu can be displaced by other menus.

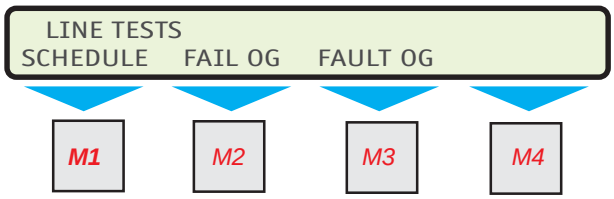
The LN TESTS and LINES menu, only appear if one or more NO. LINES are entered under the *SYSTEM setup menu.*

H U
MENU
7

Press this key and follow the highlighted sequence below







The TS-LS300 AutoLearn Line Leak Detector automaticly performs a monthly precision (0.2 gph) test after a 3 hour quiet time.

With this menu you may control the time this happens or schedule it to happen at a different time or day than tank leak tests run (to avoid affecting tank leak test results).

Character input / editing:

- Push ***UP/DOWN*** ▲ ▼ keys to show more menus or menu selections.
- Use menu keys ***(M1*** to ***M4)*** to access menus.
- Press ***ENTER*** to accept a selection or input a value into the setup configuration memory.
- Press ***CANCEL*** to cancel data entry
- Press ***M1*** to move the cursor left _⇦
- Use ***M2*** to move the cursor right ⇨_
- Press ***M4*** to backspace (delete) one character to the left ⇦

NOTE

The TS-LS300 will run the Gross , Monthly and Annual line leak tests automaticly. Scheduling tests is not required. See the TS-LS300 User Guide for details of the different Line Leak Tests performed.

Line Leak Test Requirements & Notes:

1) Inform the Site Personnel to: (If the store closes at night - not 24-hour) **Leave the Pump Controllers power on at night with dispenser power off**. The Submerged Turbine Pump (STP) must be able to turn on to run the pressurized line leak tests.

2) It is recommended that Line Leak Tests and Tank Leak Tests should not be scheduled to run at the same time.

3) **Note:** The Monthly (0.2 gph) precision Line Leak Test will begin after 3 hours of **quiet-time** between product dispensing. (The line leak detector can start the pump at any time to run pressurized line leak tests.)

4) **The annual (0.1) precision line leak test requires 6 hours of quiet-time** (after the final dispense) **before it will begin testing**. Make sure to take this into account when scheduling a Annual precision 0.1 Line Leak Test.

5) **Note:** See the TS-LS300 AutoLearn User's Guide or consult INCON Technical Service for Special Applications (for example: manifolded lines, nonstandard pumps, etc.).

6) Before programming, reference the State and Local Regulations about line leak testing, type / precision of the tests, test frequency, and reporting requirements... adhere to these requirements.

LN Line (leak) Tests Menu

*** Only the No. of lines that are programmed in System menu will be displayed**

SCHEDULE — Press the ***M1*** key.

SELECT A LINE

LINE 1 — Use (***M***) keys to select a LINE#.

LINE 2 * — Use ***UP/DOWN*** ▲ ▼ keys to show more choices.

: *

LINE 8 *

LINE TEST SCHEDULE N — **Program a Schedule and Time for each Line#**

SCHED 0.1 — **0.1 = Precision Annual Line Leak Test**

NONE — No schedule / not scheduled

DAILY

MONDAY — Use ***UP/DOWN*** ▲ ▼ keys to show more choices.

:

SUNDAY — Press ***ENTER*** to accept this data.
1 ST DAY — Dispensing during the test will abort the test*
:
30 TH DAY — ***NOTE:*** *February does not have 30 days !*
LAST DAY

TIME 0.1 — ***See Test Requirements and Notes !***
0.1 GPH LINE TEST TIME N
00:00:00 24 HOUR FORMAT — See TABLE 5-1
Use Keypad to input 24-hour time data.
Press ***ENTER*** to accept this data.

TABLE 5-1 24 Hour Input Format
HH:MM:SS
00:00:00 = midnight 22:00:00 = 10 pm + 12 (hours)
(add 12 hours to pm times starting at 1 pm to 11:59 pm)
02:05:00 = 2:05 am

NOTE

Both the 0.1 & 0.2 gph line leak tests can be programmed for a particular Line or all Lines. But, the schedule and times must be different ! Also see Test Requirements and Notes.

SCHED 0.2 — **0.2 = Monthly Compliance Line Leak Test**
NONE — *No schedule / not scheduled*
DAILY
MONDAY — Use ***UP/DOWN*** ▲▼ keys to show more choices.
:
SUNDAY — Press ***ENTER*** to accept this data.
1 ST DAY — Dispensing during the test will abort the test*
:
30 TH DAY — ***NOTE:*** *February does not have 30 days !*
LAST DAY

TIME 0.2 — ***See Test Requirements and Notes !***
0.1 GPH LINE TEST TIME N
00:00:00 24 HOUR FORMAT — See TABLE 5-1
Use Keypad to input 24-hour time data.
Press ***ENTER*** to accept this data.

LN Line (leak) Tests Menu

*** Only the No. of lines that are programmed in System menu are displayed**

FAIL OG	**Will go Active when any (3 gph, 0.2 gph, and 0.1 gph)**
LINE TEST FAIL OUTPUT GROUP	**Line Leak Test fails**
LINE 1	
LINE 2 *	Press (***M***) key to select a LINE#.
: *	Use ***UP/DOWN*** ▲▼ keys to show more choices.
LINE 8 *	
LINE TEST FAIL OUTPUT GROUP N	(32 Output Groups (OGs) available...*See Tank Sentinal Setup Programming Guide, Worksheet 12-1)*
NONE	Not assigned to an Output Group (OG).
GROUP A-FF	One OG selected (A=1st OG, FF=32nd OG)
ALL GROUPS	All OGs selected
	Use ***UP/DOWN*** ▲▼ keys to choose an OG.
	Press ***ENTER*** to accept this data.

FAULT OG	**Will go active when a fault (TS-LLD flashing alarm**
LINE TEST FAIL OUTPUT GROUP	**error-code) occurs**
LINE 1	
LINE 2 *	Press (***M***) key to select a LINE#.
: *	Use ***UP/DOWN*** ▲▼ keys to show more choices.
LINE 8 *	
LINE TEST FAULT OUTPUT GROUP N	(32 Output Groups (OGs) available...*See Tank Sentinal Setup Programming Guide, Worksheet 12-1)*
NONE	Not assigned to an Output Group (OG).
GROUP A-FF	One OG selected (A=1st OG, FF=32nd OG)
ALL GROUPS	All OGs selected
	Use ***UP/DOWN*** ▲▼ keys to choose an OG.
	Press ***ENTER*** to accept this data.

6 TS-TPI DATA AND REPORTS

Overview

The INCON Tank Sentinel displays, prints and faxes data and report information for the user. This chapter describes the DISPLAY and DIAG (Diagnostic) menus, that feature comprehensive user-interface data and report functions.

TPI Status Display Notes

The Display function allows a user to view current information from pump controllers on a real time basis. The TPI periodically collects data from each pump controller. The Tank Sentinel, in turn, periodically collects the data from the TPI and stores it internally. The Tank Sentinel Display interface allows this data to be viewed at any time.

To access the Display function, the user first presses the MENU key and then DISPLAY key. Amongst the option keys displayed, the user must select the PUMPS, which will cause a list of the attached pump controllers to be presented. Once the user selects a pump, the console will proceed to display the real time data for that pump controller.

See Appendix A at the back of this manual for Status Code definitions and Pump Controller Fault Code definitions.

Tank Sentinel Keypad & Menu Navigation

Character input/editing:

- Use UP or DOWN keys to display more menus- (MORE) or selections (UP/DN)
- Press the CANCEL key to cancel data entry
- Use the ENTER key to accept data entry
- Press menu keys (M1 to M4) to access menus.
- Press M4 to backspace (delete) one or more characters to the left
- Use M2 to move the cursor right
- Press M1 to move the cursor left

PUMPS (Data Display)

NOTE

- "(Data Display)" means only data will appear in the display - there are no entries to make.
- "(User Interface)" means the user must make entries to implement the feature.

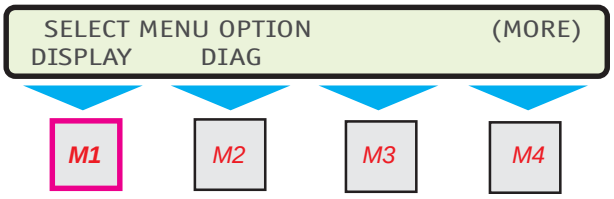
Descriptions of Steps:

1) Press the MENU key and follow the highlighted sequences...

The SELECT MENU OPTION menu is shown.

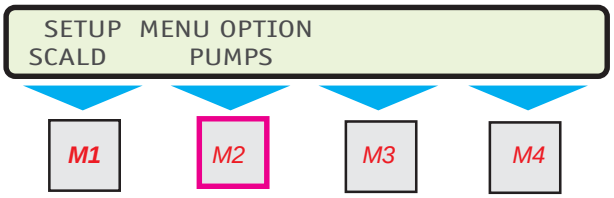
2) Press the DOWN key once...

Here is the second SELECT MENU OPTION menu.



3) Press the M1 key to show the DISPLAY menu.

Here is the main DISPLAY menu.

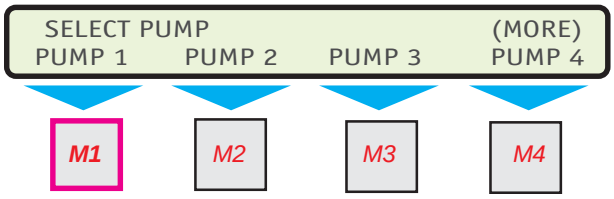


4) Press the M2 key to display the SELECT PUMP menu.

The SELECT PUMP menu displays all of the pump numbers that are communicating with the Tank Sentinel.

PUMPS may be aligned with any of the menu keys (M1 - M4), depending on what other features are programmed or enabled. For this example, PUMPS is aligned with the M2 key.

5) Press the (M) key under each pump number to display the data. In this example, press the M1 key for PUMP 1.



Pump DISPLAY examples:

Each controller type will vary in the available data that can be displayed. The example below is for the SCI controller.

Here is the first display of three possible (typical) data displays...

NOTE See Appendix A for Status Code and Fault Code definitions.

PUMP1	STATUS	FAULT	VOLTS	CVOLT 1
PUMP N	0071	00	204	201

Press the DOWN key to scroll through the data displays.

PUMP1	AMPS	C AMPS1	WATTS	C WATTS
PUMP N	6.5	6.5	1140	1140

PUMP1	DIPSW	SREV
PUMP N	FFFB	103

6) Press the CANCEL key to return to the SELECT PUMP menu.

The display returns to the SELECT PUMP menu.

Repeat the data display steps for each pump.

Use the CANCEL key to return to the SELECT MENU OPTION display.

NOTE **Please read the Notes on the following page to gain a better understanding of the Diagnostic feature.**

TPI Diagnostic Function Notes

The diagnostic function allows the user to command the pump controllers from the Tank Sentinel console. The user is able to issue resets to clear faults and enable calibration.

To access this function, the user first presses the MENU key, then DIAG, then PUMPS and then PUMP #. The tank gauge allows the user to select a pump number and will then display the diagnostic function keys RESET and CALIBRT.

DANGER!
The potential for electric shock exists! Verify the site is safe! -- before proceeding with a Reset operation.

If the user selects the RESET function, the Tank Sentinel will ask, "ARE YOU SURE?" and if the user presses the ENTER key, then the reset will be performed. Pressing ENTER in response to the question will issue the reset to the controller. If the user is not sure about the reset, perhaps due to a safety concern, then the user should press the CANCEL key to abort this operation.

The CALIBRT function is for STP-SCI TPC only. For details of the calibration process see the STP-SCI Installation and Owner's manual. When a user selects the CALIBRT function, the Tank Sentinel asks "ARE YOU SURE?" Pressing ENTER enables calibration on the selected pump controller. Pressing cancel aborts the operation. When calibration is enabled, the STP-SCI memory is erased. For proper calibration no product flow can go out of the pump. Close a ball valve at the pump discharge or turn down the pump's clamp valve before calibrating. During the calibration process the TPC takes a snap shot of the voltage, current and power of the pump. These values are displayed as are the Calibrated status values in the Display Menu.

DIAG Menu

PUMPS (User Interface)

Description of Steps:

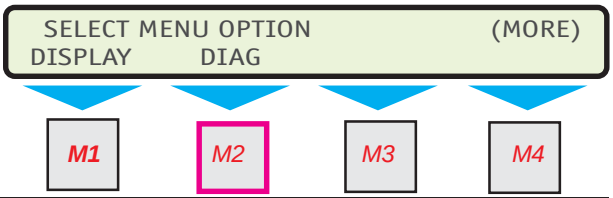
1) Press the MENU key and follow the highlighted sequences...

The SELECT MENU OPTION menu is shown.

2) Press the DOWN key once...

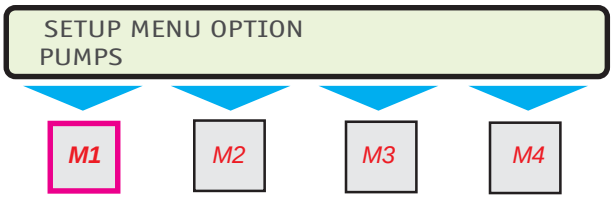
Here is the second SELECT MENU OPTION menu.

3) Press the M2 key to show the DIAG menu. Here is the main DIAG menu.



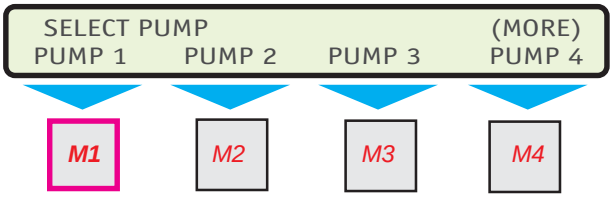
4) Press the M1 key to display the SELECT

PUMP menu.

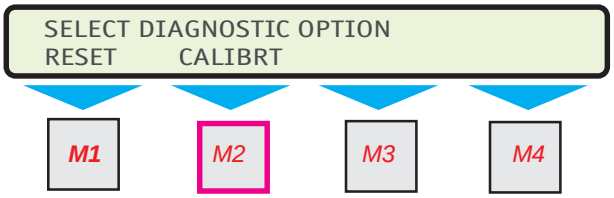


The SELECT PUMP menu displays all of the pump numbers that are communicating with the Tank Sentinel.

5) Press the (M) key under each pump number to display the SELECT DIAGNOSTIC OPTION menu. In this example, Press the M1 key for the PUMP 1 options.



Here is the DIAGNOSTIC OPTION MENU.



RESET Menu

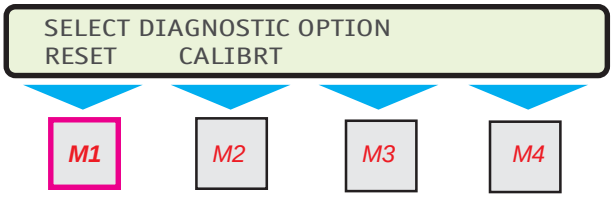
RESET (User Interface)

Description of Steps:

Here is the SELECT DIAGNOSTIC C menu displaying RESET and CALIBF

DANGER!
The potential for electric shock exists!
Verify the site is safe! -- before proceeding with a Reset operation.

1) Press the M1 key under the word RESET.



The RESET PUMP N display asks if the user is sure before resetting a pump controller; giving the user a chance to press CANCEL to abort the reset operation.

2) Press the ENTER key to reset the pump controller.

Press the CANCEL key to abort the reset operation.

DANGER!
The potential for electric shock exists!
Verify the site is safe! -- before proceeding with a Reset operation.

After entering a reset, the display will flash the word DONE... for a few seconds then it will automatically return to the SELECT DIAGNOSTIC OPTION menu, displaying RESET and CALIBRT.

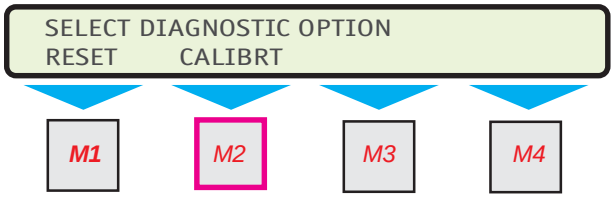
CALIBRT Menu

NOTE ☞ ***In the following examples, "N" represents any pump number - 1, 2, 3 and so on.***

CALIBRT (User Interface)

Description of Steps:

Here is the SELECT DIAGNOSTIC OPTION menu displaying RESET and CALIBRT.



1) Press the M2 key under CALIBRT.

The CALIBRATE PUMP N display asks if the user is sure before enabling automatic calibration for a particular pump controller; giving the user a chance to press CANCEL to abort the calibration process.

2) Press the ENTER key to enable calibration for the pump controller.

- Press the CANCEL key to abort the process.

(For STP-SCI controller only) After enabling calibration, the display will flash the word DONE... for a few seconds and then it will automatically return to the SELECT DIAGNOSTIC OPTION menu, displaying RESET and CALIBRT.

Follow the Calibration Procedure steps below to complete STP-SCI calibration. For further details on the calibration process see the STP-SCI Installation and Owner's manual.

Calibration Procedure

1) Prevent product flow out of the STP by closing a ball valve at the pump discharge.

2) When calibration is enabled, the green, red and yellow LEDs on the pump controller will blink.

3) Turn on the hook signal to begin calibration process. The controller takes a snap shot of the voltage, current and power (these are the Calibration status values seen in the Display Menu mentioned earlier).

4) The calibration process is complete when the red LED stops flashing. The green LED will remain flashing on stand alone TPCs and the green and yellow remain flashing in Master/Slave or Alternating configured TPCs.

5) Turn off the hook.

6) Verify that the Tank Sentinel display has returned to the RUN MODE, showing SYSTEM, TANK, SENSOR, etc. are all OKAY.

7) Refer to the STP-SCI Installation and Owner's Manual Troubleshooting Guide if the pump does not start or an alarm condition is present on the controller.

Pump Controller Status Report

A Pump Status report indicates the current state of the pumps. This report is designed to facilitate troubleshooting at the site. This is the same information as found in the pump section of the programming and the DISPLAY pump status real time interface. The information can be polled and stored in System Sentinel or printed at the site by a technician when required.

The following is a representation of a new pump controller status report. Only values available for a specific controller would be printed.

INCON
INTELLIGENT CONTROLS
INC
P.O. BOX 638
SACO ME 04072
1-800-984-6266

06/12/2002	6:45 PM
PUMP CONTROLLER STATUS	
PUMP 1	REGULAR 1
TYPE	SCI
GROUP	1
GROUP TYPE	MAST SLAV
STATUS	61
FAULT	00
VOLTS1	204
CVOLTS1	201
AMPS1	0.1
CAMPS1	6.5
:	:
:	:
SOFTWARE VERSION	3.XXX

How to print the report:

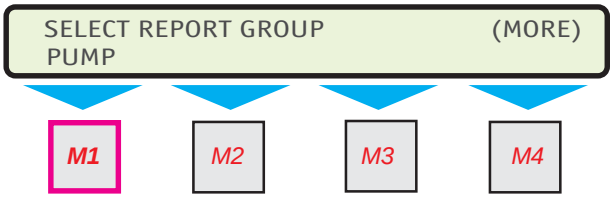
Description of Steps:

Here is the Tank Sentinel display in RUN MODE, showing SYSTEM, TANK, SENSOR, etc. are all OKAY...

1) Press the REPORT key to display the SELECT REPORT GROUP menu...

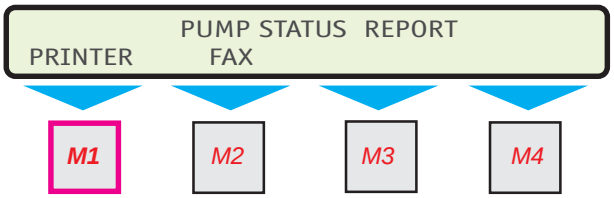
2) Press the DOWN key twice to show the PUMP menu selection...

Here is the SELECT REPORT GROUP menu showing the PUMP menu selection...



3) Press the M1 key to display the PUMP STATUS REPORT selection menu...

Here is the PUMP STATUS REPORT display, showing two choices - PRINTER or FAX ...



4) Print the report to the console printer or a fax-modem with the programmed fax telephone number.

(See the Tank Sentinel Setup Programming Guide 000-1053, for instructions on how to enter a fax-modem telephone number into the programming.)

The Tank Sentinel display returns to the RUN MODE.

System Setup Report Additions -- TPI/Pump Controller Setup

Tank Sentinel Setup reports show the entire configuration of the Tank Sentinel programming.

The TPI/Pump Controller section is located in the System Setup Report, below the Sensors section and above (before) the Cathodic Protection section. Here is a sample of how it looks:

TPI	
ENABLED	YES
ADDRESS	80
PUMP CONTROLLERS	
NUMBER OF PUMPS	5
PUMP 1	
NAME	PUMP 1
TYPE	SCI
GROUP	1
ADDRESS	0
TANK	1
PUMP HEIGHT	7.00 IN
PUMP GROUPS	
GROUP 1	
PUMPS	1, 2
TYPE	MAST SLAV
MODE	PRIORITY
RESERVE	20
TANKS	1, 2

Please Note:

- PUMP HEIGHT will be in inches or centimeters, depending on what Units are set in the program.
- If TPI is not enabled, then this data will not be displayed or printed.

The SYSTEM Setup report includes the information about TPI and Pump Controllers. Here is how to access it...

How to print the report:

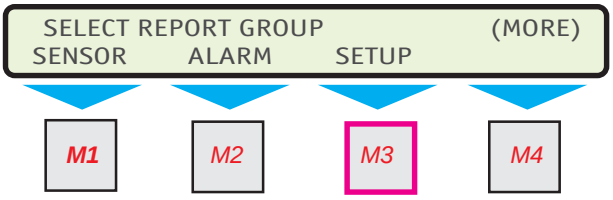
Description of Steps:

Here is the Tank Sentinel display in RUN MODE, showing SYSTEM, TANK, SENSOR, etc. are all OKAY...

1) Press the REPORT key to display the SELECT REPORT GROUP menu...

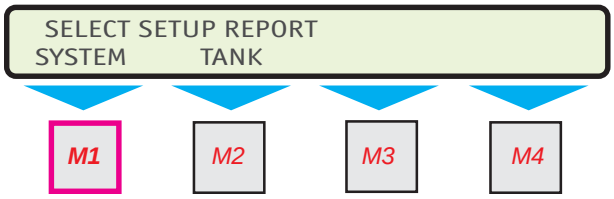
2) Press the DOWN key to show the SETUP menu selection...

Here is the SELECT REPORT GROUP menu showing the SETUP menu selection...



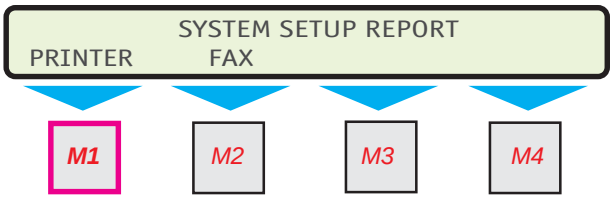
3) Press the M3 key to display the SELECT SETUP REPORT selection menu...

Here is the SELECT SETUP REPORT display, showing SYSTEM, TANK, etc. ...



4) Press the M1 key to display the SYSTEM SETUP REPORT selection menu...

Here is the SYSTEM SETUP REPORT display, showing two choices - PRINTER or FAX...



5) Print the report to the console printer or via a fax-modem to a programmed fax telephone number.

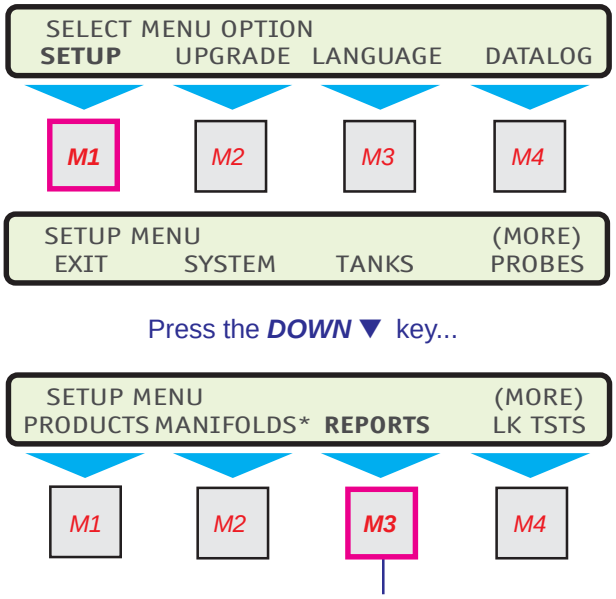
(See the Tank Sentinel Setup Programming Guide 000-1053, for instructions on how to enter a fax-modem telephone number into the programming.)

The Tank Sentinel display returns to the RUN MODE.

Reports Menu

H U
MENU
7

Press this key in the highlighted sequence shown below



Press the ***DOWN*** ▼ key...

Press the ***DOWN*** ▼ key until the Line Comp, Line Diag, Line Hist and Line Test menus are shown.

Use this menu to program reports to print or FAX automatically on a schedule *(faxing requires an optional Fax/Modem device).* See Tank Sentinel Setup Programming Guide Chapters 1, 10, 11 and 12 about Tank and Line Test Reports & Scheduling.

See TABLE 7.1 – *The SHIFT* selection allows *2 or 3 scheduled reports to print or Fax per day ...only one report will print if two report-times are duplicated / identical.*

The asterisked (*) menus are hardware or software dependent and may or may not appear.

Push ***UP/DOWN*** ▲▼ keys to show more menus or menu selections.

To access menus, press the corrsponding (**M**) key below each menu name.

— Continued on next page —

TABLE 7.1 Typical Report Schedule

NONE (no schedule)	
SHIFT	1ST DAY
DAILY	:
MONDAY	30TH DAY
:	LAST DAY
SUNDAY	(Feb. does not have 30 days)

TABLE 7.2 24 Hour Time Input Format

HH:MM:SS

00:00:00 = midnight

22:00:00 = 10 pm + 12 (hours)

(add 12 hours to pm times starting at 1 pm to 11:59 pm)

02:05:00 = 2:05 am

Reports Schedule Menu

Line Compliance Report:

The Line Compliance Report will include one year's worth of 0.2 gph monthly compliance tests for a selected line, or all lines. The most recent test is shown first and the oldest test last. After a year, the oldest test will be dropped when a new test passes.

Follow the following steps to schedule the line compliance report. All other line reports follow this same process. The rest of this section of the manual will only describe the report. To schedule the diferent line reports follow this same process under each of the report menus.

LINE COMP — * **Only with Line Leak Detector(s)**

LINE COMPLIANCE — Use ***UP/DOWN*** ▲▼ to show choices.

SCHEDULE

NONE — (select schedule – see **TABLE 7.1**)

TIME 1

00.00.00 _____ to 23.59.59 (input time – see **TABLE 7.2**)

TIME 2

00.00.00 _____ to 23.59.59 (input shift # 2 time... N/A if not SHIFT)

TIME 3

00.00.00 _____ to 23.59.59 (input shift # 3 time... N/A if not SHIFT)

FAX

NO _____ or YES (yes requires *optional* fax / modem)

PRINTER

YES _____ or NO Press ***ENTER*** to accept this data.

Line Diagnostics Report:

This report is typically used by service technicians to diagnose line test issues. This report is not typically scheduled.

Line Test Report:

This report shows the latest line leak tests for a selected line or all lines. The number of passed Gross (3 gph) line tests passed for the day is shown first and is followed by the most recent Annual (0.1 gph) or Monthly (0.2 gph) line test results.

Line Test History Report:

This report shows a history of line test reports

8 TROUBLESHOOTING

This section is to aid in troubleshooting the TS-TPI and the integrated system that it is connected to. Two models of the TS-TPI are available, the factory installed option in the TS-LS300 AutoLearn and the TS-TPI stand alone unit. These troubleshooting steps will apply to both models unless otherwise indicated in the section.

The TS-TPI has a number of LEDs as indicator lights to help communicate the status of the TS-TPI and the equipment it is connected to.

The green LED is the power indicator, when it is on there is power to the TS-TPI.

The red LED is the TPC fault indicator, when it is on the TS-TPI received a signal indicating that one or more of the TPCs connected to it are in alarm.

The yellow LEDs are Port communication indicators, one yellow LED per port, under normal operation and conditions each yellow LED will be blinking. If any port has a steady on or steady off LED that indicates a problem with that port.

NOTE: The yellow communication LED closest to the HOST port typically blinks so rapidly that it appears solid on. If nothing is connected to a PORT the yellow LED for that port still blinks.

When the TS-TPI is used as a stand alone unit connected to TPCs only the TS-TPI functions as a remote pump controller status. The red LED when off indicates the controllers are not in alarm. If the red LED is on a controller is in an alarm condition. The TS-TPI can reset the TPC that is in alarm by pressing the Fault reset button. This will send a reset command to the controller that has the alarm only. If the Fault reset button is pushed and no alarms exist at the TPCs there is no reset command sent.

When the TS-TPI is used in conjunction with an ATG more information for troubleshooting can be viewed at the ATG. Status codes can be shown for each pump connected to the system. To view Status and Fault codes, access the display menu on the Tank Sentinel console:

1) Press the MENU key. Display shows SELECT MENU OPTION.

2) Press the DOWN key until DISPLAY appears.

3) Press the (M1 - M4) key below DISPLAY. Display shows PUMPS

4) Press the (M1 - M4) key below PUMPS. Display shows pump names.

5) Press the (M1 - M4) key below pump name. Display shows TPI codes.

PUMP1	STATUS	FAULT	VOLTS	CVOLT 1
PUMP N	0071	00	204	201

INCON Tank Sentinel consoles display Status and Fault codes from TS-TPI devices. These codes describe current operating conditions of pumps and pump controllers. Codes are displayed as Hexa-decimal (HEX) computer code digits. A listing of common code names and meanings are in this section. Use this information to troubleshoot fault conditions.

Status Codes

During normal operation

21 TPC is ready to run, no hook signal is detected, and low priority

31 TPC is ready to run, a hook signal is detected, and low priority

61 TPC is ready to run, no hook signal is detected, and priority

71 TPC is ready to run, a hook signal is detected, and priority

See chapter 3 “Level management” for details on “priority” and “low priority.”

- If the Status code is an even number this indicates the TPC is not detected by the TS-TPI. This indicates a communication problem between the TS-TPI and the TPC.
- If the last digit is greater than 8, the TPC is in an alarm condition. See the Fault code on ATG display and compare it with the table for the particular model controller in use or see the troubleshooting guide in the Installation and Owner’s manual for the specific TPC.
- If the last digit is 5 the TPC is in calibration mode
- If the last digit is 3 the controller needs help (master/slave and alternating configurations only)
- For specific code interperatation please contact INCON Technical Support.

Fault Codes

Fault codes vary based on controllers in service. Reading only the least significant digit refer to the table for the particular TPC in use.

IST-VFC

HEX VALUE	DECIMALVALUE	FAULT CODE DESCRIPTIONS
0	0	No Fault
1	1	Under Load (Dry Run or Tank Empty)
2	2	Under Voltage (low / fluctuating input voltage)
3	3	Locked Up (rotor locked)
4	4	Open Circuit (IST-VFC motor)
5	5	Ripple (capacitor bank bad)
6	6	Shorted (short circuit in connections)
7	7	Over Temp (excessive operating temperature)

STP-SCI or STP-SC

HEXVALUE	DECIMALVALUE	FAULT CODE DESCRIPTIONS
0	0	No Fault
1	1	Under Load (Dry Run or Tank Empty)
2	2	Under Voltage (low / fluctuating input voltage)
3	3	Locked Rotor
4	4	Open Circuit (or Locked Rotor or Relay Fault)
8	8	Uncalibrated (new installation)
9	9	Extended Run (continuous hook signal greater than 60 minutes without pumping product)
A	10	Relay Fault (relay contact failure)

STP-SCIII

HEXVALUE	DECIMALVALUE	FAULT CODE DESCRIPTIONS
0	0	No Fault
1	1	Under Load (Dry Run or Tank Empty)
2	2	Under Voltage (low / fluctuating input voltage)
3	3	Over Load / Locked Rotor
4	4	Open Circuit (or Locked Rotor or Relay Fault)
8	8	Uncalibrated (new installation)
9	9	Extended Run (continuous hook signal greater than 60 minutes without pumping product)
A	10	Relay Fault (relay contact failure)
B	11	L2 Open (L2 input leg not connected)
C	12	Over Voltage (voltage too high)
D	13	Voltage Unbalance Warning
E	14	Load Unbalance Warning

MagVFC

HEXVALUE	DECIMALVALUE	FAULT CODE DESCRIPTIONS
0	0	No Fault
1	1	Under Load (Dry Run or Tank Empty)
2	2	Under Voltage (low / fluctuating input voltage)
3	3	Locked Up (rotor locked)
4	4	Open Circuit
5	5	Ripple (capacitor bank bad)
6	6	Shorted (short circuit in connections)
7	7	Over Temp (excessive operating temperature)
8	8	Over Speed (excessive operating speed)
9	9	Extended Run
A	10	Locked rotor while PMA is running
E	14	Short Circuit (upper rail short)

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