

TS-CPM
Cathodic Protection Monitor

**User's
Guide**

for
Tank Sentinel®
Automatic Tank Gauges



INCON®

INTELLIGENT CONTROLS

Part Number: 000-1065 Rev. A

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NOTE



See the **Table of Contents** to find topics within this manual. Also see the **Tank Sentinel Installation Guide** (PN: 000-1050), and any applicable **Application Notes** and **Technical Bulletins** that may accompany this product for additional details.

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Table of Contents

NOTICE	2
Need Help ? Contact INCON at:	2
Office Hours:	2
Contact – Sales & 24 hour Technical Service:	2
P Preface	4
Graphic Symbol Conventions	4
Page Numbering Conventions – Example:	4
Page Layout Convention – Example:	4
NOTES	4
TS-CPM Overview	5
TS-CPM Alarms (are produced if):	5
1 Installation & Wiring	6
Before Installation	6
Materials Required	6
Tools Required	6
Figure 1.1 TS-CPM Installation & Wiring Diagram	7
Installation	7
Wiring	7
2 Setup and Programming	8
Setup and Programming	8
Traversing Menus:	8
Character input / editing:	8
CPM Menu	9
Figure 2.1 Example Survey Report	9
CPM Worksheet # 1 – Output Groups – Line Leak Tests	11
3 TS-CPM Reports & Operation	12
Types of TS-CPM Reports	12
Alarm Report	12
CPM Status Report	12
CPM Monthly Report	13
NOTE	13
Verify Operation	14



Chapter Contents:	Page Numbering Conventions
Graphic Symbol Conventions	TS-CPM Alarms (produced)
Page Layout Conventions	

Graphic Symbol Conventions

NOTE



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



CAUTION or **WARNING** messages are highlighted by the WARNING graphic and contain instructions that must be followed to avoid faulty equipment operation, or an 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!

— ❖ — End of Chapter symbol

NOTES



Page Numbering Conventions – Example:

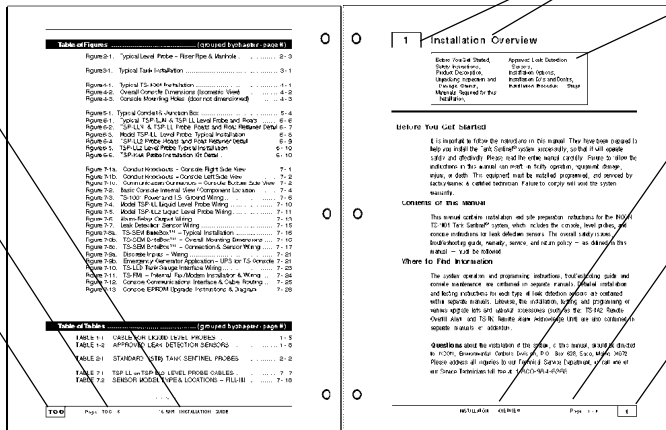
Page 1 - 1 = Chapter 1 page 1... Page 3.1 - 2 = Chapter 3 . Section 1 – Page 2

Page Layout Convention – Example:

Chapter Name and Manual Name

Chapter-Page Number

Chapter Number



Chapter Number & Name (TOP LEFT FIRST PAGE)

Chapter Contents

Chapter Name and Manual Name

Chapter-Page Number

Chapter Number


TS-CPM Overview

Corrosion is the major source of leaks from USTs. Cathodic Protection Rectifier units prevent corrosion on the metal parts of underground storage tanks (USTs) from electrolytic ground-currents. The Cathodic Protection Rectifier induces a DC voltage that reverses the naturally occurring flow of ions from the metal tank to the electrolyte-rich earth (ground).

A Cathodic Protection Rectifier supplies a low (+) DC voltage level to an Anode that is installed near the tanks, and a (–) negative return for grounded USTs and fuel lines. The corrosive action will now occur at the anode instead of at the tanks or fuel lines. Over time, the anode will corrode and the surface area will decrease, and the number of electrons it can supply is reduced. The corrosion process will eventually occur once again at the tank or fuel lines when the current is reduced because of a corroded anode.

The purpose of the TS-CPM is to monitor the DC voltage and current from the Cathodic Protection Rectifier unit. The status or health of the system is determined by these parameters. Low anode current indicates a corroded anode and therefore, a lower level of protection from corrosion.

The Tank Sentinel tank gauge can produce an alarm when the current output falls below a certain setpoint. Usually this set to a value that is 80% of the required current output of the Cathodic Protection Rectifier for each site. This alarm will indicate that the anode needs to be replaced or that the CPR should be adjusted.

NOTE  Current Output requirements may differ from site to site depending on the resistivity of the soil.

TS-CPM Alarms (are produced if):

- TS-CPM Unit Fails or if Communication is Lost (CPM Failure)
- Voltage is Lost at the Anode (CPM Failure)
- Anode Current is Low (CPM Current Low)

The tank gauge produces TS-CPM Alarm Reports if Report Alarms is **enabled**. Alarms can automatically be faxed or modem'd to remote locations. Like other alarms, the TS-CPM alarms can also activate an output group (see the Setup & Programming Manual about Output Groups). A monthly voltage, current, and operational status of the TS-CPM will be added to the Regulatory Report.

See also Chapter 3 in this manual about Reports and Operation.



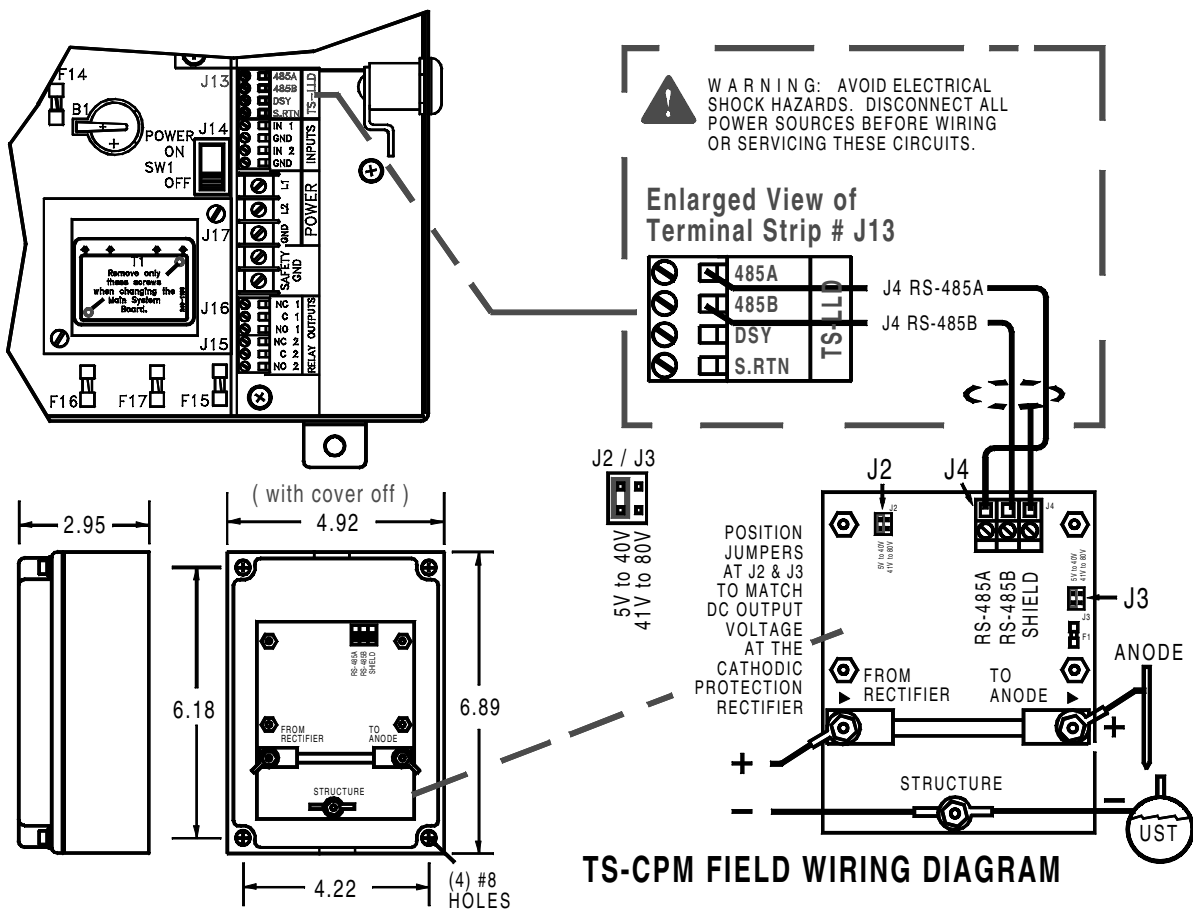


Figure 1.1 TS-CPM Installation & Wiring Diagram

Installation



- 1.) Mount the TS-CPM (level) near the CP Rectifier using #8 fasteners per **Figure 1.1**
- 2.) Turn off all power going to the Tank Sentinel console, and to the Cathodic Protection Rectifier unit (make sure that no AC or DC voltage is present)
- 3.) Reposition the blue jumper links at J2 & J3 based on the DC voltage readings that were taken on the last survey (the jumper should be over the left two pins for 5 to 40 VDC operation, or over the right two pins for 41 to 80 VDC operation).

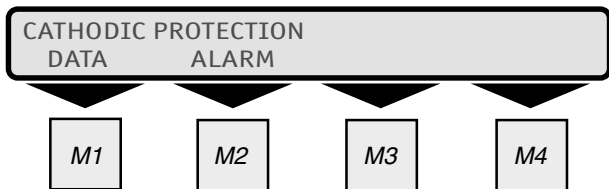
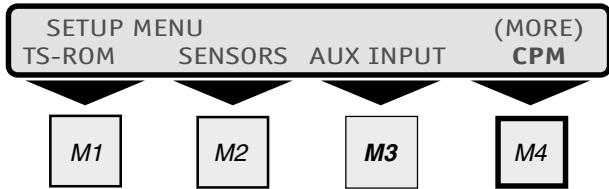
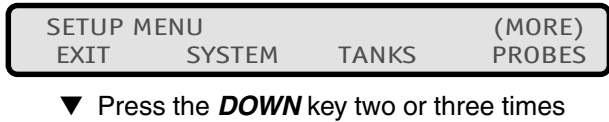
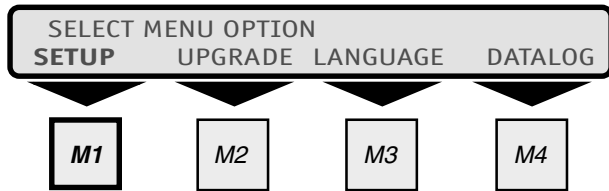
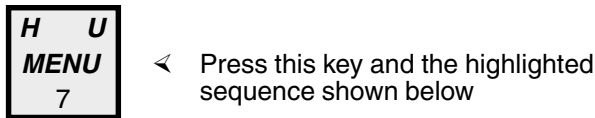
Wiring

- 1.) Run and wire, twisted shielded-pair cable, from J4 to J13 as shown in **Figure 1.1**
- 2.) Run wire from the DC output of the Cathodic Protection Rectifier to the TS-CPM (or splice into the existing wiring) and from the TS-CPM to the anode and to the structure (tank / line) as shown in **Figure 1.1** (a T-fitting could be used here)
- 3.) Verify that all wiring is correct
- 4.) Turn all of the power back on for the Tank Sentinel console, and for the Cathodic Protection Rectifier unit

— ❖ —

Chapter Contents:	Figure 2.1 Example Survey Report
Setup and Programming	CPM Output Group Worksheet #1
CPM Menu	

Setup and Programming



The TS-CPM is programmed from the CPM menu, which is under Setup. To reach this menu, press the Menu Key **M1** then the Down Key ▼ until CPM is displayed.

Press the menu key (**M1** thru **M4**) that is below the text: CPM. Two submenus are shown under the Cathodic Protection Menu. Press **M1** to access the DATA menu and **M2** for the ALARM menu.

Push **M1** under the DATA menu and select ENABLE. Then select YES under the CPM ENABLE menu, only when a CPM unit is/will be attached to the Tank Sentinel tank gauge.

Press **M2** under the ALARM menu and select AMPS.

Traversing Menus:

- 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

Character input / editing:

- Press **M1** to move the cursor left ←
- Use **M2** to move the cursor right →
- Press **M4** to backspace (delete) one character to the left □←

CPM Menu

- 1) Before programming reference the State and Local Regulations about the interval of Cathodic Protection Monitoring / Survey Reporting and requirements.
- 2) Enter 80% of the output amperage level that was documented on the last UST 3-6 Month(Iy) Survey Report and use this value as the current limit (amp) alarm setpoint... See Figure 2.1 below.

For Example: 80% of 4.2 amps = 3.36 (used for the current alarm set-point)

Figure 2.1 Example Survey Report

**3-6 MONTH SURVEY REPORT
CATHODIC PROTECTION SYSTEM
UNDERGROUND FUEL STORAGE TANKS
RECTIFIER OPERATING RECORD**

Rectifier Unit No.: Petro Store Number 08 - Livings, Texas

Type of Rectifier Unit: Air Cooled

Rectifier Mfg. By: Wayne Broyles

AC Line Input: 120 Single Phase

Rated DC Output: 20 Volts 10 Amperes

Date 12/12/02

RECORD OF READINGS AND INSPECTIONS

Date	Tap Setting		DC Output		P/S		Remarks	By
	Course	Fine	Volt	Ampere	On	Off		
12/28/99	C	3	12.8	4.2			3-6 month readings	PW
							Assume .01 OHM	
							Shunt Value	

SETUP Press the MENU key
Press the DOWN key ▼ 3 x to show the CPM menu

CPM

DATA

CATHODIC PROTECTION DATA

ENABLE Select enable if you are/have installed a TS-CPM unit.
CPM ENABLE
NO UP/DN ▲ ▼ to show choices, **ENTER** to select
YES Choose Yes if A TS-CPM is connected to the tank gauge

ADDRESS future... accessing this menu is not required
CPM SENSOR ADDRESS
112 _____ *Keep the default value (112)*

CONFIG future... accessing this menu is not required
CPM SENSOR SETUP
CHECKING ADDRESS (checks for CPM address)

ALARM

CATHODIC PROTECTION ALARM (input 80% of the of the output amperage
AMPS level that was documented on the last, UST
Survey Report)
CPM CURRENT LIMIT
+10.0000 _____ 0.0000 to 10 amps... record the current value here

CPM CURRENT LIMIT OUTPUT GROUP

NONE Optional... choose one and record your selection in
A to FF the Worksheet on the following page ►
ALL GROUPS (TS-CPM hardware or communications failures are
system failure alarms, current alarms are AMP alarms)

CPM Worksheet # 1 – Output Groups – Line Leak Tests

Fill-in the worksheet below. Compare assignments with other worksheets in the Setup Programming Manual/Addenda to uncover conflicts **before** programming the output devices.

OG = Output Group	- Output Group Assignment <u>WORKSHEET</u> Output Group choices -		
CPM:			NONE
AMPS OG			A
(Current Limit OG)			B
			C
			D
			E
			F
			G
			H
			I
			J
			K
			L
			M
			N
			O
			P
			Q
			R
			S
			T
			U
			V
			W
			X
			Y
			Z
			AA
			BB
			CC
			DD
Example:			
AMPS OG	A	Activates Solid Annunciator (same as System Fail)	EE
			FF
			ALL
Output Devices: Modulated Annunciator, Solid Annunciator, Relay 1, Relay 2, I/O Output Module Channel # 1 to # __ (record all OG Assignments in the vertical column)			



TS-CPM Reports & Operation

Chapter Contents:	CPM Status Report
Types of TS-CPM Reports	Monthly Report (P/O) Regulatory Report
Alarm Report	Verify Operation

Types of TS-CPM Reports

Two types of reports are available on demand, and one is available on alarm.

Alarm Report

The CPM alarm report (at right) is generated when the current level is below the setpoint that was programmed in Chapter 2. A CPM failure will be produced if communication is lost between the tank gauge and the TS-CPM unit (this may also be a result to the TS-CPM losing power). Alarm report(s) will only be produced when SETUP> SYSTEM> REP ALARM> (report alarms) is ENABLED.

```

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ALARM REPORT

2/1/2002      05:55 AM
CPM CURRENT LOW

2/1/2002      08:35 PM
CPM FAILURE

```

CPM Status Report

The CPM Status Report is available on demand for printing at the tank gauge printer, or for faxing. A normal CPM Status Report is shown at right. This time-stamped report shows the voltage, current, and operational status for the unit, it would show ALARM for the STATUS when in alarm.

It can be produced by:

- Pressing the REPORT key>
- DOWN key 2 or 3 times>
- Pushing the menu key (**M1** through **M4**) that is directly below the CPM text>
- Pushing **M1** below the displayed PRINTER text, or by pushing **M2** below the displayed FAX text.

```

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ALARM REPORT

1/10/2002     08:02 AM

CATHODIC PROTECTION

VOLTAGE      15.0 V
CURRENT      10.0 A
STATUS       OK

```

CPM Monthly Report

The Regulatory Report now includes a Monthly CP Status Report, which is updated on the first day of every month. Up to 12 months of Monthly CP reports are included in the Regulatory Report (CPM must be enabled).

This report is available on demand for printing at the tank gauge printer, or for faxing, or it can be sent via modem to a site when the Regulatory Report is programmed properly.

A monthly CPM Status Report is shown at right. This report can be automatically FAX'd to remote locations when the tank gauge is equipped with an optional Fax-Modem. To do this see the Comm Ports menu and Reports menu in the Setup Programming Manual (INCON Part Number 000-1053).

```

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3/12/2002      4:10 PM


REGULATORY REPORT

:

MONTHLY CP

3/1/2002      12:00AM
VOLTAGE      15.0 V
CURRENT      10.0 A
STATUS       OK

2/1/2002      12:00AM
VOLTAGE      15.2 V
CURRENT      9.9 A
STATUS       OK
    
```

NOTE  The TS-CPM programmed settings will appear on the Setup Report. These are:

- Enabled = YES or NO
- Address = 112 (default value)
- Current (Alarm Limit) = Programmed Value
- Current OG (output group) = Programmed OG

```

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SYSTEM SETUP REPORT

:

CATHODIC PROTECTION

ENABLED      YES
ADDRESS      112
CURRENT      8.0
CURRENT OG   NONE
    
```



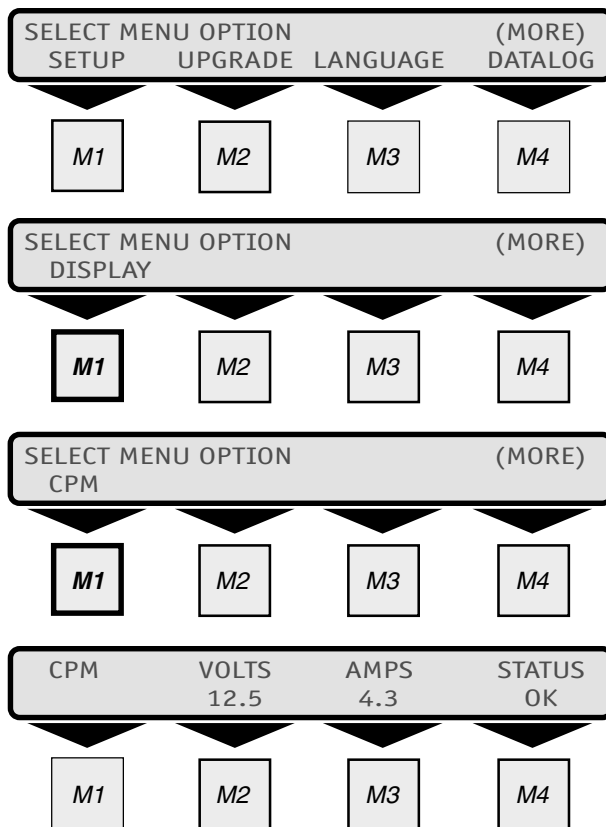
Verify Operation

To verify that the TS-CPM is one of the installed options, press the CHECK key, the M4 key, and then the DOWN key. The tank gauge will display either OPERATIONAL, TROUBLE, or NOT INSTALLED for the TS-CPM.

NOT INSTALLED is displayed when the unit is not installed, or if the TS-CPM is not enabled in the SETUP> CPM> DATA> ENABLE menu (*when the unit is installed, verify that the TS-CPM is enabled!*).

Checking Displayed Values

After the TS-CPM has been installed, programmed and enabled, you can verify its operation from the console. Press the MENU key, and then the DOWN key to show these menus:



Press the DOWN key to show:

Press the M1 key to show:

Press the M1 key to show:

NOTE... STATUS will show either OK for normal conditions, or ALARM for Alarm conditions. When the Voltage or Current cannot be read it will show CPM FAI (for a CPM failure).



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