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HIGH SIERRA ELECTRONICS, INC
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RWIS One

RWIS integrated with LT1 Logging Transceiver

Installation and Quick Start Guide

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700-RWIS ONE-IG Rev2 11 Jan 2021

Contents

Chapter 1 DESCRIPTION

1.1 GENERAL

This installation guide provides step by step instructions for integrating an HSE Fixed Surface Sentinel (FSS) and TraffiCalm controller / collaborators with an FTS LT1 system. The FSS collects road weather data which is both saved/transmitted by the LT1 and used to trigger the TraffiCalm products to flash warning signs to drivers. The data transmitted by the LT1 is stored, collected and displayed in FTS360. The FSS alert threshold values are user settable and are customizable to specific road conditions. Whereas this document details how to integrate the TraffiCalm controller, further information on TraffiCalm collaborators can be found on the TraffiCalm site. Collaborators are easily substituted based on the necessary warnings and road characteristics.

IMPORTANT! This guide must be used in conjunction with the following manuals:

-High Sierra Electronics Surface Sentinel Instruction Manual
Download at: https://hsierra.com/download/manual-5439-00-surface-sentinel/

-TraffiCalm Systems Installation Manual for the collaborator in use
Download at: https://trafficalm.com/resources/

-TraffiCalm Flashing Sign Systems TC Connect Manual
Download at: https://trafficalm.com/wp-content/uploads/2020/04/029-04993-0000-Rev-D-Intelligent-Gen2-Software-Manual.pdf

Details of LT1 Operation and the FTS360 Config App can be found on the FTS Support website (http://support.ftsinc.com/) in the following manuals:

- LT1 Operator's Manual (700-LT1-Man)
  https://support.ftsinc.com/products/dataloggers/lt1-cell/

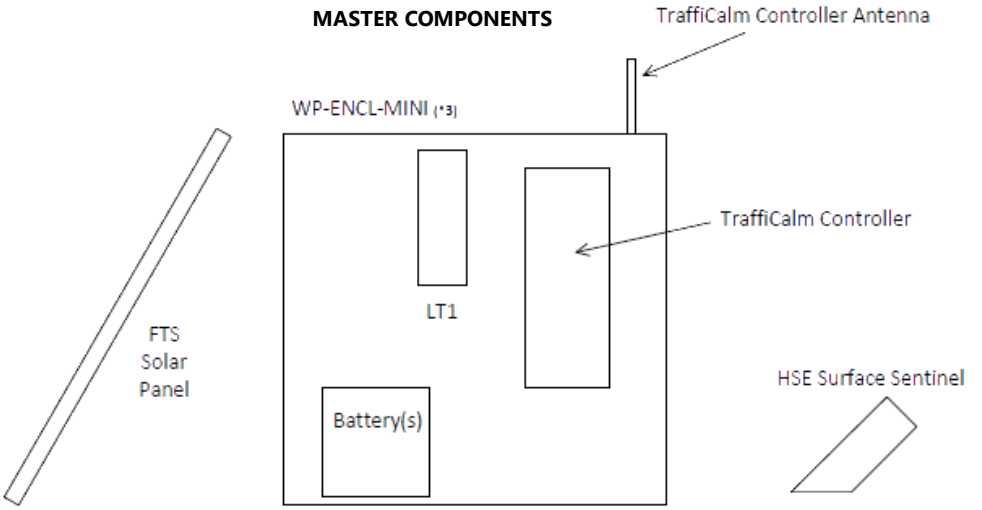
- FTS360 and FTS360 Config App (FCA) User Manual (700-FTS360-Man)
  https://s3.amazonaws.com/Product_Software/700-FTS360-Man.pdf

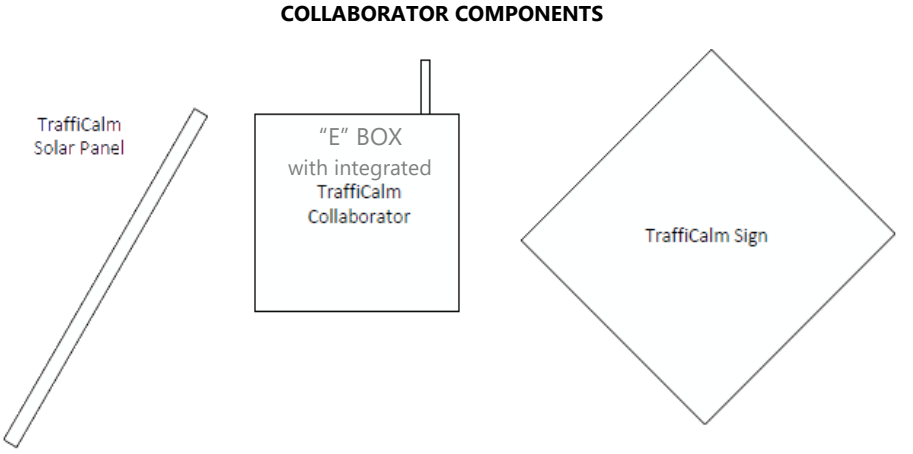
Downlaod the FTS360 Config App at Download on the App Store | Get it on Google play | Download on the Windows Store

1.2 BASIC ASSEMBLY COMPONENTS

There are two parts of the system: the master components and the collaborator components.

Each portion may be mounted on its own pole or the individual components of each portion can be mounted close to each other on separate poles, depending on the site characteristics.

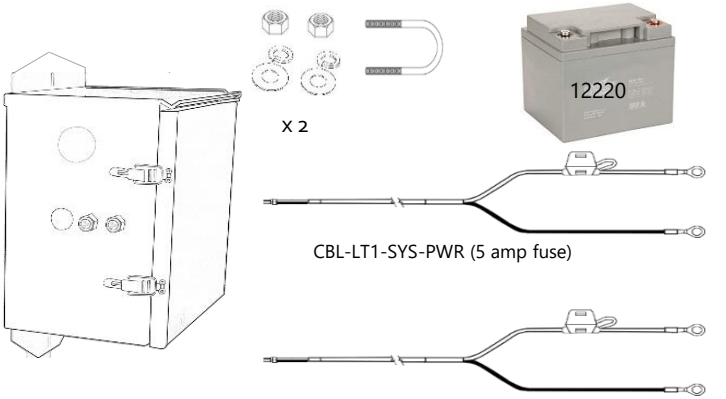




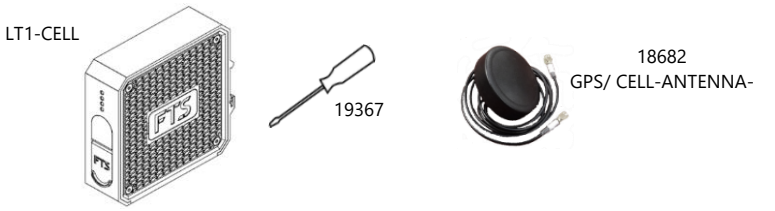
1.3 DETAILED PARTS

Prior to assembling, examine the shipment and confirm all the parts arrived and are undamaged.

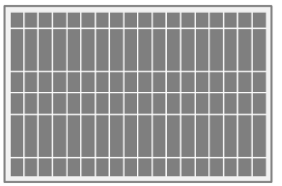
LT1 ENCLOSURE-AND BATTERY	
ITEM	**PART #**
Enclosure complete with: • LT1 Ground Cable 1(attached in enclosure) • 2 x U-Bolts with mounting hardware Battery (12V) LT1-to Battery cable (5 amp fuse) Controller to Battery cable (7.5 amp fuse)	WP-ENCL-MINI 19465 19480 12220 CBL-LT1-SYS-PWR CBL-TFC-PWR

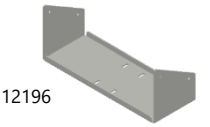


LT1-CELL-BNDL or LT1-CELL-VZ-BNDL	
ITEM	**PART #**
LT1-CELL-BNDL/LT1-CELL-VZ-BNDL complete with: • 4 pin power terminal block • 8 pin data terminal block • 4 GB SD Card (inserted) Slot Screwdriver Integrated Cellular/GPS antenna	 LT1-4PIN LT1-8PIN 19100 19367 18682
OPTIONAL: SIM card (inserted) with purchase of FTS cellular plan	



SOLAR-PANEL-BNDL	
ITEM	**PART #**
20W solar panel complete with: • mounting bracket • hose clamps	12221 12196 11117



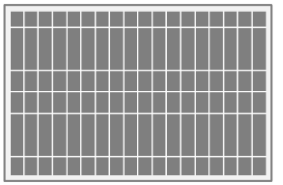


12196

11117

SURFACE SENTINEL	
ITEM	**PART #**
SURFACE SENTINEL (SDI-12, fixed) complete with • 33 ft cable with tinned leads MOUNTING BRACKET (1-2" POLE MOUNT)	SDI-SENTINEL-FL SENTINEL-MOUNT-2IN

TRAFFICALM FLASHING SIGN SYSTEM	
ITEM	**PART #**
TraffiCalm intelligent sign system complete with • "E" box with integrated battery, collaborator and antenna • 36" Flasher ring, amber • 50W solar panel • Controller and Antenna	TFC-COLL-50W-36RING 21038 21041 21040 21039



"E "BOX

CONTROLLER AND ANTENNA:
(to be installed in the LT1 Enclosure)

1.4 REQUIRED TOOLS AND EQUIPMENT

The following tools are required:

- ☐ ¼" flathead screwdriver
- ☐ #1,#2, #3 Phillips screwdriver
- ☐ 3/8" wrench (or adjustable)
- ☐ 6/8" wrench (or adjustable)
- ☐ Adjustable wrench
- ☐ 5/16" socket wrench
- ☐ 7/16" socket wrench
- ☐ 7/64" hex driver
- ☐ 9/64" hex driver
- ☐ Voltmeter
- ☐ Cable ties
- ☐ Locks (optional)

Tools and equipment as required for unique site characteristics such as to install pole assembly (if not already installed), the earth ground system, etc.

1.5 FOR LT1: PRIOR TO PROCEEDING TO THE FIELD

IMPORTANT! Prior to proceeding to the field the following MUST be completed

THE FTS 360 ADMINISTRATOR MUST:

- ☐ Initialize FTS360 (https://360.ftsinc.com/signup or login if FTS initialized FTS360 on your behalf)
- ☐ Create a Technician account for the field technician

THE FIELD TECHNICIAN MUST:

- ☐ Be invited to Join FTS360 by Administrator
- ☐ Download the FCA onto the smart device that will be used in the field (available in the Apple App Store or Google Play. Search for FTS360Config)
- ☐ CELL only: Provision the SIM card. Ensure the APN for the SIM card is entered (Go to the FTS Config App's dashboard and select "Cellular" to view/input APN information).
- ☐ Test the LT1*
- ☐ Log onto the FTS360 Config App, synchronize with FTS360. **DO NOT LOGOUT**
- ☐ Ensure the SD Card and, for cellular units, the provisioned SIM card are inserted
- ☐ Bring the required tools/locks for the enclosure

* Details of testing the LT1 are found in the LT1 User's Manual (700-LT1-Man)

1.6 SITE SELECTION

Select a site which allows for installation of the supporting structure which is oriented so that the solar panel will have maximum sun exposure and antennas will not be blocked by geographical features, excessive tree canopy, or other obstructions.

Ensure there is a clear line of sight between the controller antenna (located on top of the LT1 enclosure) and the collaborator.

Heated equipment, or structures, large reflective surfaces, or direct sunlight arriving at the Surface Sentinel's IR sensor can cause significant error in the surface temperature measurement. Refer to the surface Sentinel Instruction Manual for details.

Chapter 2 SETTING UP THE MASTER COMPONENTS

When setting up the system, set up and configure the master components first. If the collaborator components are set up and configured first, the collaborator will trigger a response until connectivity is achieved with the controller.

2.1 MOUNTING THE MASTER COMPONENTS

1) Position the LT1 enclosure on the pole, slide the U-bolts around the mast and through the mounting bracket holes. Place a flat washer, a split ring washer and a hex nut on the U-bolt posts and then tighten.

2) Position the solar panel on the pole for maximum sun exposure and secure with the clamps.

3) Mount the Surface Sentinel in accordance with height, angle, and site considerations as outlined in the surface Sentinel instruction Manual.

4) Feed the solar panel and Surface Sentinel cables through the cable glands on the side of the enclosure

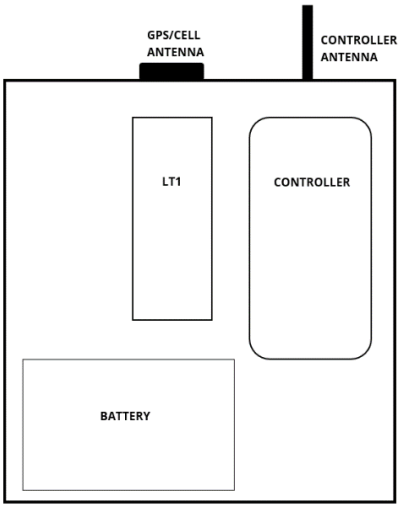
> DO NOT ATTACH THE SOLAR PANEL CABLE TO THE CONTROLLER AT THIS TIME
> Electrical connections to the controller regulator should be done in the correct sequence to prevent any damage to the system. See Section 2.2

4) Place the battery in the bottom left corner of the enclosure

5) Mount the LT1 on the left side of the DIN rail

6) Mount the dual cell/GPS antenna on the top of the enclosure and attach the cellular and GPS cable to their respective jacks on the LT1

7) Mount the Controller beside the LT1, on the right side of the DIN rail and attach the antenna to the top of the enclosure.



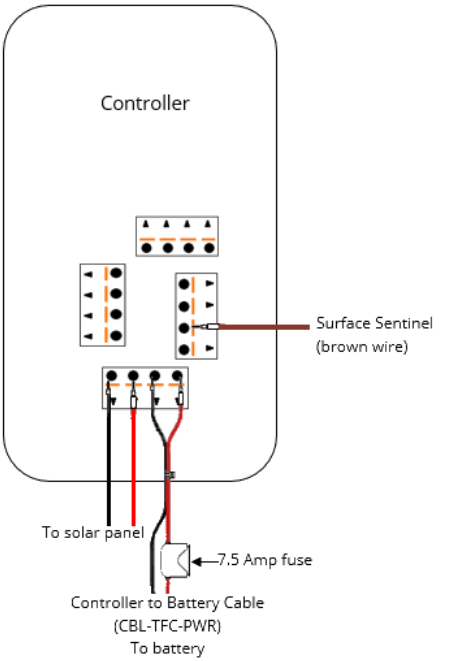
2.2 WIRING THE MASTER COMPONENTS

IMPORTANT:

- Electrical connections must be done in the order indicated to prevent any damage to the system
- REMOVE the terminal blocks indicated from the Controller and LT1 BEFORE wiring and re-insert in the order indicated in the directions

1) Remove the power terminal block from the Controller and wire the solar panel and "Controller to Battery Cable" (CBL-TFC-PWR) with7.5 Amp fuse as shown,

2) Remove the input terminal block and wire the Surface Sentinel input wire to the Controller's terminal block as shown



DO NOT insert the terminal blocks at this time

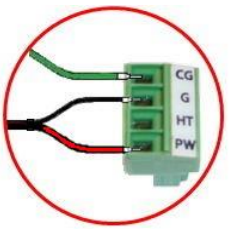
NOTES:

- Terminal block wiring diagrams are shown on the label of the controller
- Two of the terminal blocks are not used for this application

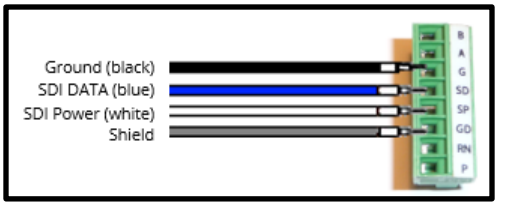
3) Remove the 4-pin power terminal block from the LT1. Attach the flying leads from the "LT1 to Battery Cable" (CBL-LT1-SYS-PWR) with 5 Amp fuse and the enclosure grounding wire from the enclosure's grounding lug as shown.

Enclosure grounding wire

LT1 TO BATTERY CABLE
(CBL-LT1-SYS-PWR)
Black wire to G pin
Red wire to PW pin



4) Remove the LT1's 8-pin data terminal block. Connect the Surface Sentinel as shown.



5) Connect the LT1's power cable to the battery as follows: black to the negative, then red to the positive

6) Connect the Controller's power cable to the battery as follows: black to the negative, then red to the positive,

7) Insert the Power terminal blocks in the LT1 and Controller, followed by the sensor terminal blocks.

8) **IMPORTANT!** An external earth ground wire **MUST** be attached between the earth grounding system and the exterior grounding lug on the back of the enclosure to provide protection from lightning and other electrostatic discharge.

2.3 CONFIGURING THE SURFACE SENTINEL WITH THE FTS360 CONFIG APP

Detailed information on FTS360 and the FTS360 Config App can be found in the FTS360 User Manual. Details of LT1 operations can be found in the LT1 Operator's Manual. See p.1 for links.

2.3.1 LT1 LED STATUS INDICATORS

Once power is supplied, the LT1 will boot up, and establish a GPS fix. The green LEDs indicate the status of the system. Once System Status and BLE Status are blinking and Telemetry Status is solid, you can connect to the LT1 using a smart device and the FTS360 Config App. A GPS fix is not required in order to configure the sensor.

	System Status	**Blinking every second**: System OK **Off:** System powered down/failure
	Telemetry Status	**Solid On**: System OK. Cellular link established **Blinking**: Obtaining network connection **Off:** System in low power mode/no link/fault
	BLE Status	**Solid On**: BLE connection established **Blinking:** System OK (module powered and communicating to MCU*, module broadcasting beacon signal) **Off:** system in low power mode/no beacon signal transmission/fault
	GPS Status	**Solid On:** System OK. Module powered and communicating to MCU*, fix established. **Blinking**: Obtaining GPS fix. **Off**: System in low power mode/fault.

*MCU= microcontroller unit

1) Connect to Station

a) Open the FTS360 Config App. It should automatically discover the LT1 Station. If the station is not discovered, press the "Scan" bar.

The first time a station is connected to the FTS360 Config App, it is identified by its serial number. Any configuration which happens in the field will be saved to that station. Once synchronization happens, the station's name can be changed from the serial number to a user-friendly name using the station edit function in FTS360 or the FTS360 Config App.

b) Select "Connect" to display the Station Dashboard (the BLE Status light on the LT1 will become solid "On" when connectivity established). If there are several stations discovered, ensure you connect to the correct one.

2). Add the Surface Sentinel to the Station: Select the Add Sensor bar. A drop-down menu will appear. Select "HSE Surface Sentinel"

3) Confirm/ChangeSurface Sentinel Settings: The Surface Sentinel provides an alarm output which triggers the TraffiCalm response (e.g. flashes sign). The alarm output requires an alarm condition setting, threshold value and hysteresis value applied.

The surface Sentinel is shipped with the following default settings:

Alarm Condition Setting	1 (Low Surface Temperature Alarm)
Alarm Threshold Value	0° Celsius
Temperature Hysteresis Value	2° Celsius
Fan Power	Off
SDI-12 Address	0

Note that a complete list and details of the Surface Sentinel SDI-12 commands, including the data points measured (Measurement command), are found in the Surface Sentinel manual (https://hsierra.com/download/manual-5439-00-surface-sentinel/)

If you desire to confirm or change any of the default values, you must do so by entering Transparent Mode on the FTS360 Configuration App and using the SDI-12 commands in the following steps.

a) Select the SDI-12 Transparent Mode button. Note that you are not required to complete the command with an ! as the app recognizes and adds it automatically when transmitting the command. In the commands, the 'a' must be replaced by the sensor's address.

b) Read the alarm condition setting: aXRA!

Set the alarm condition: aXWAx! In which the x is replaced with the condition number.

Condition	Description
1	Low Surface Temperature Alarm
2	High surface Temperature Alarm
3	Frost Warning

c) **Read/Set the alarm threshold value:** the x.x in the commands should be replaced with the desired value

To read a low surface temperature threshold value: **aXRL!**
To read a high surface temperature threshold value: **aXRH!**

To set a low surface temperature threshold value: **aXWLx.x!**
To set a high surface temperature threshold value: **aXWHx.x!**

d) **Read/write the Temperature Hysteresis Value:** the hysteresis value is used to define the conditions to deactivate the alarm (details and formula are found in the Surface Sentinel Instruction Manual)

aXRQ! - returns the current value
aXWQx.x! - replace the x.x with the desired temperature value

e) **Optimize fan power usage:** The fan is used to reduce artificial heating of an air temperature sensor from solar radiation. The fan should be turned off to conserve power if the surface temperature is the only measurement being used. There are a variety of options available to minimize the fan's draw on voltage. Refer to the Surface Sentinel Installation Manual for details.

e.g. To turn fan off: **aXWP0!**

4) **Test the sensor:** Select the Test Sensor bar to trigger a reading and display the data point(s).

NOTE: New sensors should always be tested prior to leaving the site to ensure they are operating as desired.

2.4 SYNCHRONIZE AND DISCONNECT

1). **Synchronize the FCA with FTS360:** Select the Sync Data feature to save changes. If you are not in an area where you can access the Internet to perform a data sync before leaving the site, as soon as you have internet access you should open the FTS360 Config App to sync the configuration back to the FTS360.

IMPORTANT! Changes made to a station working offline using the FTS360 Config App, will not be reflected in FTS360 until the field device is synchronized with FTS360.

Until synchronization occurs, FTS360 will operate based on the previous configuration. As such, new data transmitted will be stored but not displayed until FTS360 receives the updated configuration.

2). Disconnect: Select the "Disconnect" button on the FTS360 Config App screen. Note that any changes made that were not saved before disconnection will have to be repeated and saved.

2.5 CONFIGURE THE CONTROLLER

Before configuring, note the ID of each collaborator (found on a sticker on the individual units).

Connect to the controller by following the directions in the TD Connect Guide (Note: it can take up to 20 seconds to connect to the controller):
https://trafficalm.com/wp-content/uploads/2020/04/029-04993-0000-Rev-D-Intelligent-Gen2-Software-Manual.pdf

1) From the **Setup** page, set up the controller with the following options:
   - Input Operated
   - Standard Flash

2) Set up each collaborator with the following options:
   - Flasher Only/Input Activated

3) Save the settings

4) In Advanced Settings:
   - Set the controller Power Type to AGM
   - Set the Collaborator(s) Power Type to Crystal Lead Battery (extended)

5) Exit Setup

6) Leave the Controller powered on

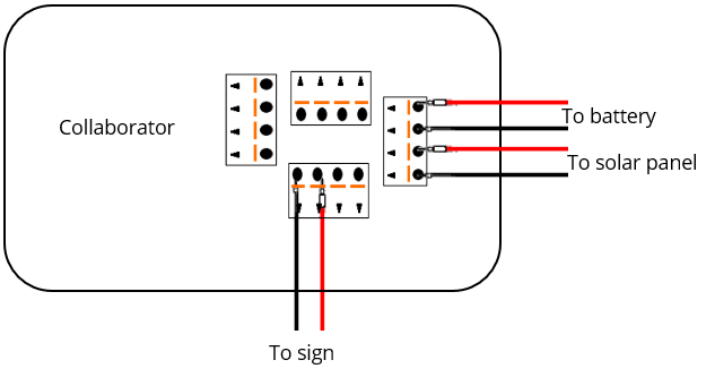
NOTE: The collaborator(s) will come online as they are set up and powered

Chapter 3 SETTING UP THE COLLABORATOR COMPONENTS

1) Follow the TraffiCalm Flashing Sign System Installation Manual to install the components.

2) Remove the Power and Flasher Output terminal blocks from the collaborator.

3) Wire the sign to Flasher Output A as shown.
4) Wire the battery and solar panel to the Power terminal block as shown.



5) Insert the Flasher Output terminal block followed by the Power terminal block.
6) Once the collaborator is powered on, re-connect to the Controller using TC Connect.

- Open the **Status** screen and scroll down to Collaborator Status to confirm Collaborator connectivity

DOCUMENT REVISION HISTORY

Revision	Date	Description
1		Original
2		Updated battery cables

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