

ARGUS™

## Temperature Compensation Module

018-501-B2



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# *Power*

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## **TEMPERATURE COMPENSATION MODULE**

**#018-501-B2**

**Serial # \_\_\_\_\_**

The following documents and drawings are included in this manual to provide the necessary information required for routine operation and fault diagnosis of the unit:

- Warranty Policy: 048-507-10
- Installation and Operation Instructions: 018-501-C0 Rev D
- Main Parts List: 018-501-20
- Temperature Sensor Assembly Parts List: 747-028-20
- Schematic Drawing: 018-501-05
- Outline Drawing: 018-501-06
- Configuration Schematic Drawing: 022-582-05
- Factory Service Information: 048-527-10

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# WARRANTY AND REPAIR INFORMATION

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- (2) invoice is unpaid, or
- (3) defect is the result of misuse, neglect, improper installation, environmental conditions, non-authorized repair, alteration or accident.

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## Terms of Payment (International)

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To obtain a RMA number for a factory return, customers must call the appropriate location with the product serial and model number, as well as a brief description of the problem, shipment instructions and billing details.

The original packing container should be used whenever possible. Both the shipping documents and the outside of the box must have the RMA # clearly marked and the product shipped prepaid to the Argus factory service center. Argus will endeavor to repair products within five working days of receipt. Repairs to the returned product are warranted for a period of six months. A service charge may be applied if no fault is found in the returned product. Argus will not accept products without an RMA number.

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# IMPORTANT SAFETY INSTRUCTIONS

**SAVE THESE INSTRUCTIONS - This manual contains important safety and operating instructions for the Argus Temperature Compensation Module.**

1. Before using the temperature compensation module on the battery charger, read all instructions and cautionary markings on:
  - (1) temperature compensation module
  - (2) battery charger
  - (3) battery
  - (4) product using battery.
2. Do not expose to rain or snow.
3. Do not operate temperature compensation module if it has received a sharp blow, been dropped, or otherwise damaged in any way; take it to a qualified service center.
4. Do not disassemble temperature compensation module; take it to a qualified service center when service or repair is required. Incorrect reassembling may result in a risk of electrical shock or fire.

## INSTALLATION AND OPERATOR'S MANUAL FOR ARGUS TEMPERATURE COMPENSATION MODULE

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## 1.0 DOCUMENTATION - PART NUMBER INFORMATION

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### 1.1 Introduction

Please read this manual thoroughly prior to operating the temperature compensation module in order to become familiar with the unit's numerous features and operating procedures. To obtain a maximum degree of safety, follow the prescribed sequences as outlined.

This manual incorporates warnings and notes to the user. Points that are vital to the proper operation or safety of the operator are indicated by the heading: **WARNING**. Points that are important to the performance or ease of use of the equipment are covered by a notation that is double underlined.

Items that refer to physical components or features such as indicator lights will be in Bold Italic typeface. Items that refer to states or modes will be in **BOLD UPPERCASE** typeface.

### 1.2 ARGUS Numbering system

ARGUS technologies uses a eight digit drawing number system which is broken into three blocks. The first three digits describe the category of the product ie. rectifier or fuse panel. The next three digits indicate the sequence in which the product number was allocated in a particular category. The last two digits indicate the type of drawing, i.e.:

05	.....	Schematic
06	.....	Outline Drawing
20	.....	Main Assembly

ARGUS Technologies uses a eight digit part numbering system for all components and sub assemblies. Each part is covered by its own unique number. Due to the quantity categories will not be listed within this manual.

## 2.0 GENERAL

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### 2.1 Scope

This instruction manual covers the installation, and operation of Argus Technologies' Temperature Compensation Module (TCM).

### 2.2 Introduction

The TCM connects to the RST series 48V and 24V rectifiers as well as the RSM-48/50 and RSM-24/100 modular rectifiers and provides the compensation necessary to vary the output voltage of the rectifiers over a wide ambient temperature range as desired for a battery string. The Argus rectifiers have excellent temperature regulation which is desired for battery-less loads. When a battery string is connected, the desired charging voltage of the battery string will increase as the temperature decreases. The TCM connects between the rectifier's sense lines and the battery string. When the unit is activated it monitors the battery temperature and adjusts the sense voltage that is sent to the rectifier's sense input. The sense voltage adjustment is dependent on the temperature coefficient reading obtained from the dual remote temperature sensors that are mounted on the batteries. When the temperature drops, the temperature compensation module will drive the rectifier's sense input such that the rectifier's output voltage increases to the appropriate setting.

Form C contacts are provided for the following:

- Low Voltage Alarm/Disconnect (2 sets)
- Over-Voltage Protection Alarm (2 sets)
- Temperature Compensation Failure Alarm (1 set)

The second set of contacts allows the TCM to be connected to a Low Voltage Disconnect device if used, and to a Remote Rectifier Shutdown input available on the Argus series rectifiers.

The TCM incorporates fail-safe circuitry in its design to prevent the TCM from causing the rectifier to be set at a voltage higher than is suitable for the battery at its current temperature which could result in damage. The fail-safe features include dual temperature sensors, temperature sensor fail circuitry, and normally energized relays for the temperature compensation fail alarm and low voltage disconnect alarm.

The TCM is available with the following options:

24V operation . . . . .	List 1
48V operation . . . . .	List 2
12V operation . . . . .	List 3
19" x 1-3/4" rack mounting configuration . . . . .	List 19
19" x 1" rack mounting configuration . . . . .	List 20
23" x 1-3/4" rack mounting configuration . . . . .	List 23
23" x 1" rack mounting configuration . . . . .	List 24
Surface/Wall mount configuration . . . . .	List 25
Temperature sensor, 3/8" lug, 6 foot cable . . . . .	List 71
Temperature sensor, 3/8" lug, 12 foot cable . . . . .	List 72
Temperature sensor, 3/8" lug, 24 foot cable . . . . .	List 73
Temperature sensor, 1/4" lug, 6 foot cable . . . . .	List 81
Temperature sensor, 1/4" lug, 12 foot cable . . . . .	List 82
Temperature sensor, 1/4" lug, 24 foot cable . . . . .	List 83
2.5mV/degC/cell compensation slope . . . . .	List 85
3.5mV/degC/cell compensation slope . . . . .	List 86
4.5mV/degC/cell compensation slope . . . . .	List 87
0degC -> 50degC temperature range . . . . .	List 90
-20degC -> 50degC temperature range . . . . .	List 91
-40degC -> 50degC temperature range . . . . .	List 92



## **2.3 Features of the TCM**

### **2.3.1 Front Panel Indicators**

The indicators located on the front panel provide visual indication of operational status and alarms. The indicators and their associated colours are:

POWER ON LED . . . . .	(green)
SENSOR 1 FAIL LED . . . . .	(red)
SENSOR 2 FAIL LED . . . . .	(red)
SENSORS DISAGREE LED . . . . .	(red)
COMPENSATION FAIL LED . . . . .	(red)
OVP ALARM LED . . . . .	(red)
LV ALARM LED . . . . .	(red)
TEST MODE LED . . . . .	(red)

### **2.3.2 Front Panel Interface**

The TCM front panel interface allows the operator to control the operation of the TCM and are as follows:

- ON/OFF Switch
- OVP Adjustment
- LVA/LVD Adjustment
- NORMAL/TEST Mode Switch
- SENSOR 1 output test jack
- SENSOR 2 output test jack
- COMMON output test jack
- TEST INPUT banana jacks

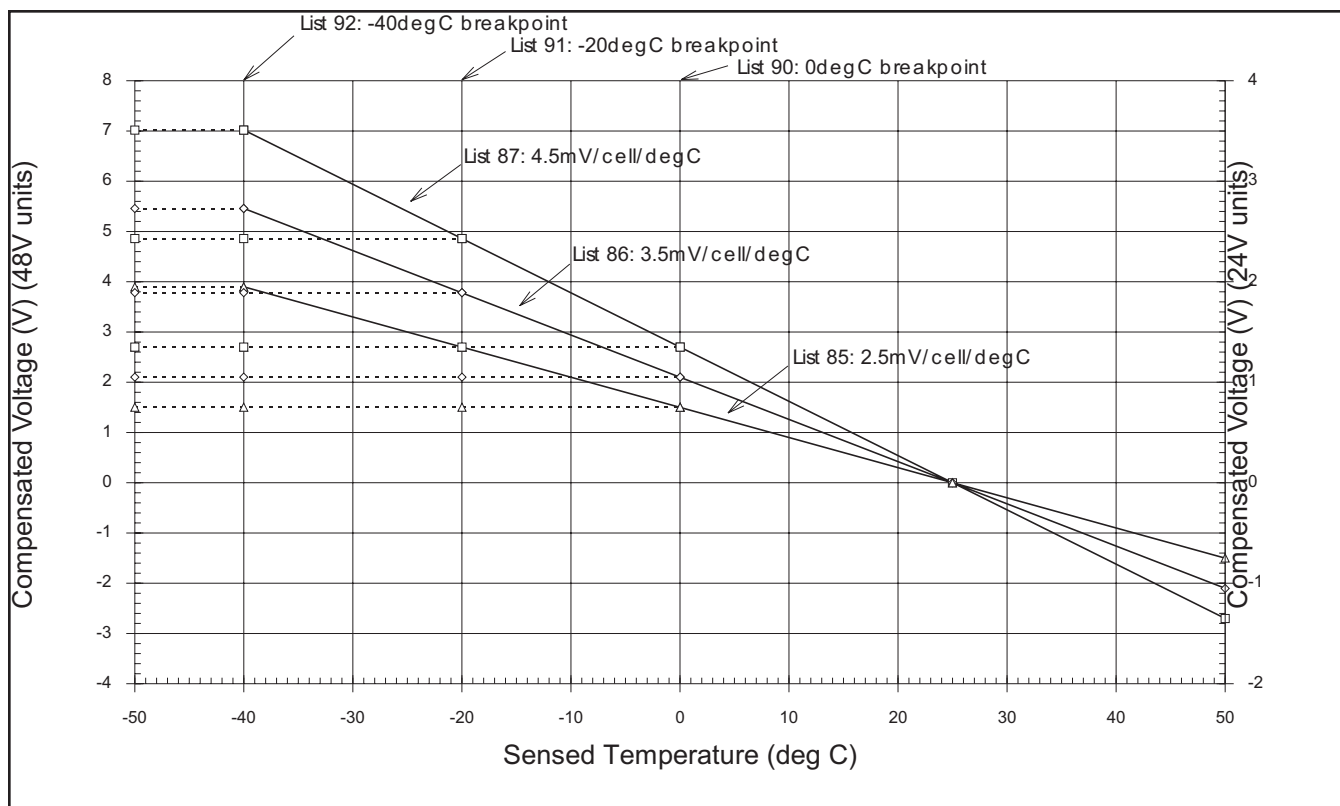
Refer to the outline drawing #D018-501-06 for the locations of the above items.

### **2.3.3 Temperature Compensation**

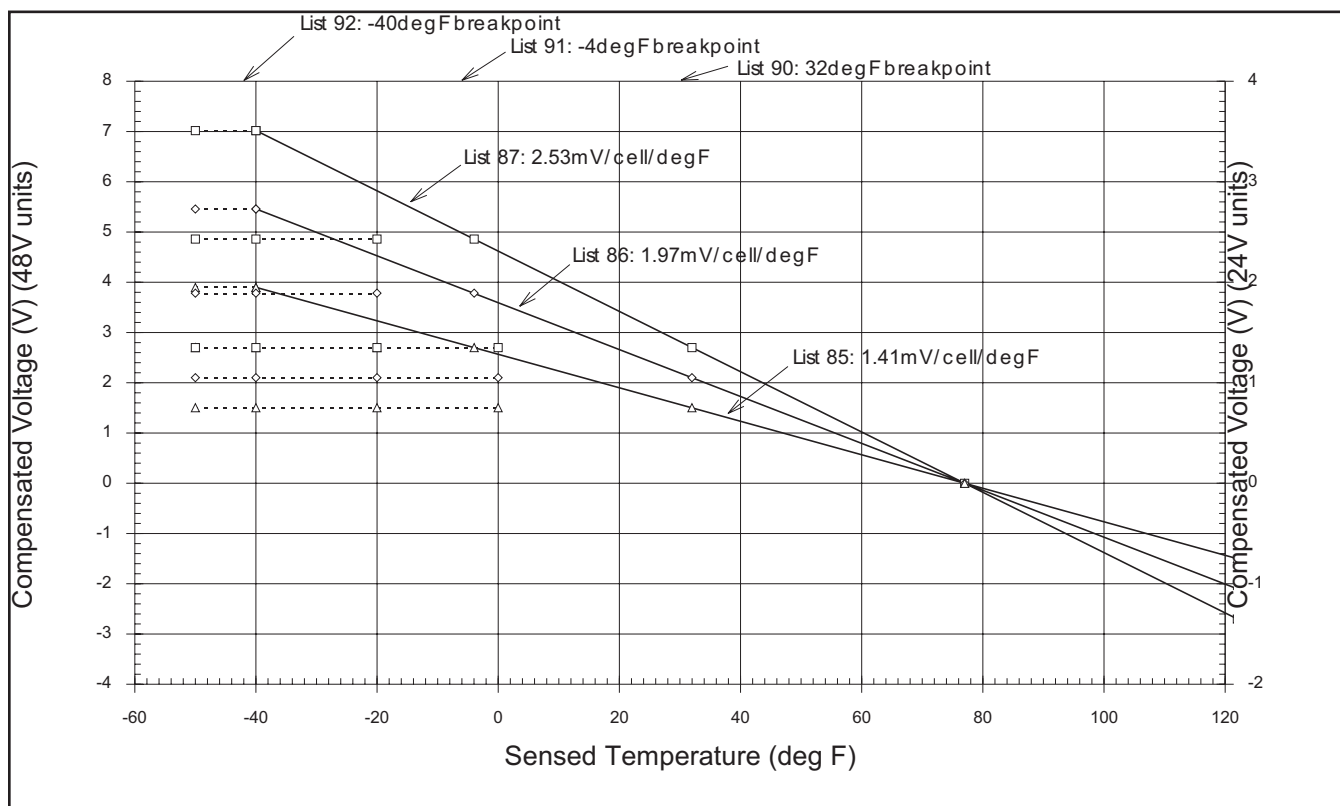
The output of the TCM is sufficient to drive the 50 ohm sense line protection PTC in paralleled rectifiers; TCM output can drive: six RST rectifiers, six RSM cabinets, or twelve RSM 48/100 rectifiers. It will drive the negative sense line input of the rectifiers either positive or negative to cause a corresponding increase or decrease in the output voltage of the rectifiers. The TCM's output will increase the rectifier's output voltage starting from 0 volts change at 25degC (77degF) at a rate of 30mV/degC (17mV/degF) or 42mV/degC (24mV/degF) or 54mV/degC (30mV/degF) for 24 volt systems depending upon the compensation option ordered (List 85, 86, or 87). The rectifier's output will similarly be decreased for temperatures above 25degC (68degF). 48 volt systems will have their output voltage compensated by 60mV/degC (34mV/degF) or 84mV/degC (47mV/degF) or 108mV/degC (61mV/degF).

In order to prevent excessive load voltages at low battery temperatures, the output voltage will be prevented from increasing further at either 0degC (32degF) or -20degC (-4degF) or -40degC (-40degF) depending on the temperature range option ordered (List 90, 91, or 92).

The temperature compensation value is factory set by 'plug-in' resistors. The compensation break point temperature is internally adjusted. Consult the factory if information is desired regarding changing the compensation value or break point of the TCM.



**Figure #1 - Compensation Voltage vs. Sensed Temperature**



**Figure #2 - Compensation Voltage vs. Sensed Temperature**

### **2.3.4 Abnormal Sensor Detection**

Two inputs are provided on the TCM for remote temperature sensors. The higher of the two readings is used to determine the resulting temperature compensation value. If the two sensors do not agree within 5 deg C then the SENSORS DISAGREE LED illuminates. If one of the sensors fails for some reason such as a broken or shorted connection or sensor element then the sensor input will be outside the expected range and the SENSOR FAIL LED illuminates. In both cases, the COMPENSATION FAIL LED will illuminate, temperature compensation will not occur, and the temperature compensation fail relay will be deenergized. In this condition, the TCM is bypassed and the sense lines pass directly through the TCM from the battery to the rectifier sense inputs.

### **2.3.5 Over Voltage Protection**

The battery voltage is monitored by the TCM. If temperature compensation is occurring (PWR LED is on and COMPENSATION FAIL LED is off) and the battery voltage exceeds the desired level by an adjustable value (set by the OVP ADJ control) then the OVP LED will illuminate immediately. An **OVP ALARM** is generated after a delay period of one second and the OVP SHUTDOWN relay is energized. The OVP SHUTDOWN relay form C contacts can be used to send a remote rectifier shutdown signal to the rectifiers as well as a remote alarm indication. The preset OVP voltage level will slide on the same scale as the compensated voltage so if the compensated voltage is 3V above the non-compensated 25 deg C voltage, then the OVP voltage level will be 3V higher than its original setting at 25 deg C.

### **2.3.6 Low Voltage Alarm / Low Voltage Disconnect Option**

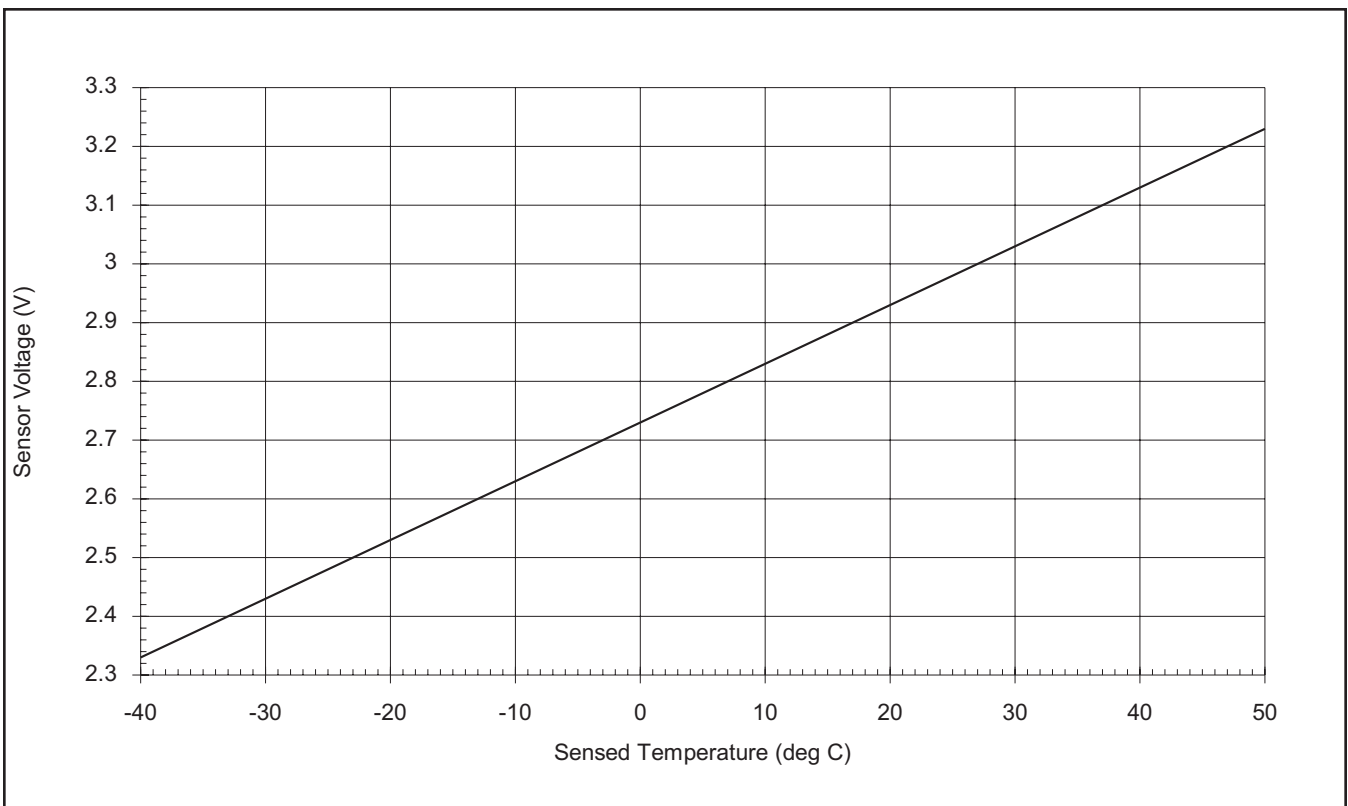
The compensated output voltage is monitored by the TCM. If the output voltage drops to a preset amount below the desired regulating voltage then the LVA LED will illuminate immediately. A **LV ALARM** is generated after a delay period of one second and the LVA relay will be de-energized. The LVA relay form C contacts can be used to control a Load Disconnect Panel. The output voltage has to rise 7V (48V models) or 3.5V (24V models) above the set LVA point before the low voltage alarm is cancelled - this is done to prevent cycling if a LVD panel is used. If a sensor failure is present and no temperature compensation is occurring then the LVA will occur at the same amount below the output voltage. The preset LVA voltage level will slide on the same scale as the compensated voltage so if the compensated voltage is 3V above the non-compensated 25 deg C voltage, then the LVA voltage level will be 3V higher than its original setting at 25 deg C.

### **2.3.7 Compensation Fail Alarm**

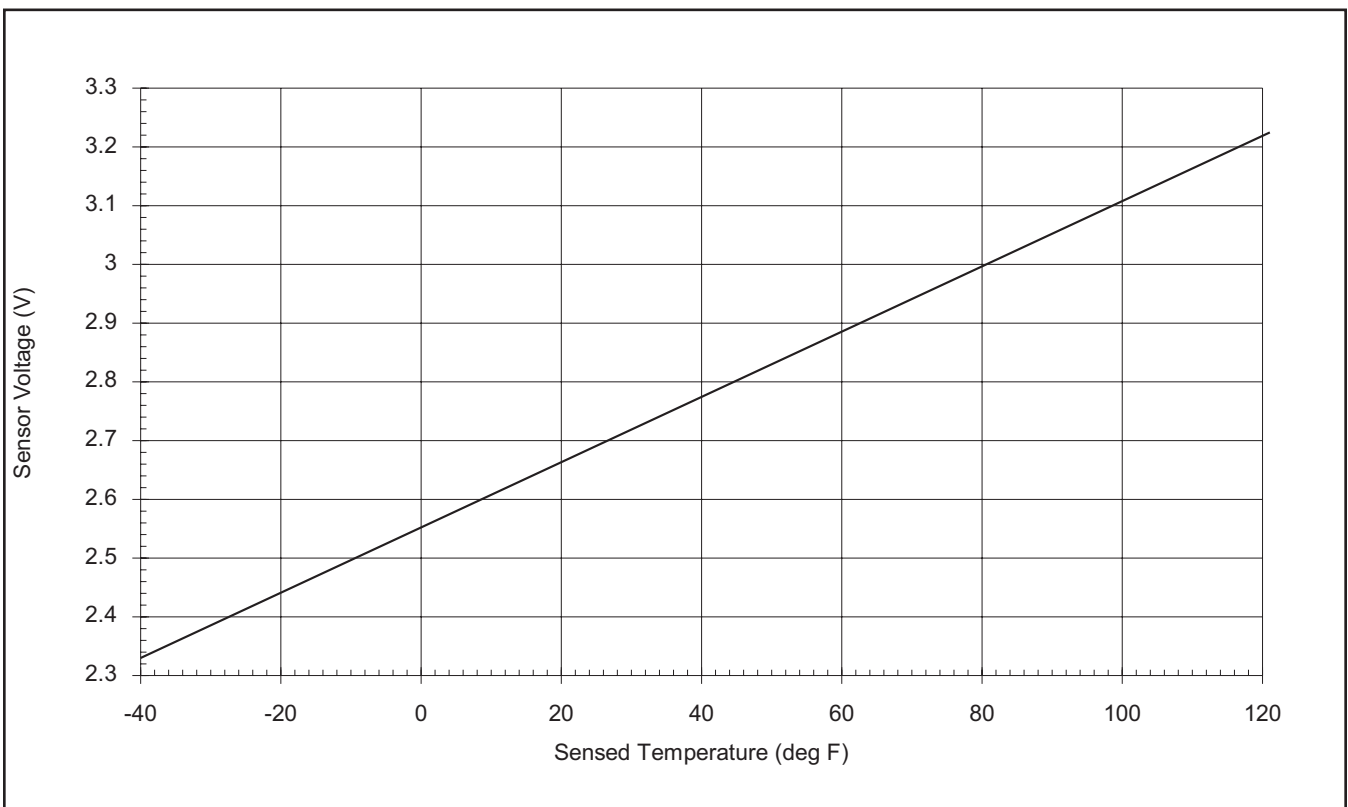
The COMPENSATION FAIL LED will illuminate when the temperature compensation circuit has failed (ie sensor fail). The temperature compensation fail relay will de-energize and its form C contacts can be used to activate a remote alarm. In this condition, the TCM is bypassed and the sense lines pass directly through the TCM from the battery to the rectifier sense inputs.

### **2.3.8 On/Off Switch**

The front panel On/Off power switch will activate the TCM's temperature compensation circuitry and the green POWER LED when turned on. When the unit is switched off, the sense lines from the rectifier are passed through to the battery sense points and thus is equivalent to the TCM not being installed. Note that the On/Off power switch does NOT turn off the OVP and LVA circuitry. These features still function as if at 25 deg C and act as if there is no temperature compensation occurring when the power switch is off.



**Figure #3 - Temperature Sensor Voltage**



**Figure #4 - Temperature Sensor Voltage**

### **2.3.9 Temperature Test Points**

Three 0.060" tip diameter jacks are provided on the front panel for the measurement of the temperature sensor voltages - one COMMON and one for each of SENSOR 1 and SENSOR 2. The actual temperatures being read can be determined by translating the voltage readings to the corresponding temperature value. Refer to Figure 3 (deg C) or Figure 4 (deg F) (Temperature Sensor Voltage). The temperature sensors for the TCM are linear in nature and will increase at a rate of 10mV/Kelvin from 2.73V at 0 deg C to 2.98V at 25 deg C. Note that a difference of 1 Kelvin is the same as a difference of 1 deg C, and that 273 K is equal to 0 deg C.

### **2.3.10 Test Mode**

A front panel NORM/TEST mode switch is provided along with two TEST INPUT 0.060" tip diameter jacks. When the **TEST** mode is selected, the TEST LED illuminates and the TCM monitors the voltage present at the TEST INPUT jacks. A variable power supply and volt meter should be connected to the TEST INPUT jacks to allow adjustment and verification of the OVP and LVA settings by the operator. The output voltage of the variable power supply is varied from an initial setting of 48V (or 24V) and the OVP or LVA LEDS will illuminate immediately when the voltage corresponds to their preset levels. The remote alarm and control relays will not change state when the LEDs illuminate and the TCM will continue to compensate the connected rectifiers as if in the **NORM** mode. When the **NORM** mode is selected, the TCM functions normally.

## **3.0        INSTALLATION INSTRUCTIONS**

---

### **3.1        Tools Required**

- Philips screw driver, #3 (Tip Size 1/4")
- Slotted screw driver (Blade size 1/4")
- Slotted screw driver (Blade size 1/8")
- Slotted screw driver (Blade size .09" x .02") or tweaker
- 4 1/2 Digit Digital Voltmeter
- Adjustable power supply capable of matching the rectifier's output voltage range

### **3.2        Inspection**

All Argus products are shipped in rugged, double walled boxes to minimize shock that may occur during transportation. Packaging assemblies and methods are tested to National Safe Transit Association standards.

Prior to uncrating of the TCM note any damage to the shipping container. Uncrate the unit and inspect the exterior. If any damage is observed, contact the carrier immediately.

Continue the inspection for any internal damage. In the unlikely event of internal damage please inform the carrier and contact Argus Technologies for advice on the impact of any damage.

### **3.3        Preparation/Mounting**

The TCM comes in either a 19" (List 19 or 20) or 23" (List 23 or 24) rack mount chassis or in a surface/wall mount chassis (List 25).

#### **3.3.1      Rack Mounting (List 19/20/23/24)**

The TCM can be ordered with either 1" (List 20 or 24) or 1-3/4" (List 19 or 23) rack spacing for the 19" or 23" rack mounting brackets and occupies 1-3/4" of rack space (or 2" of rack space with 1" spaced racks). The TCM should be mounted to the rack using 2 #12-24 x 1/2" screws in each bracket (one in each bracket if 1" rack spacing mounting used). A captive type of drive such as a Philips head is preferred to reduce the possibility of slippage and scratching of the TCM's exterior.

#### **3.3.2      Surface Mounting (List 25)**

The TCM should be mounted to the surface using 4 suitable screws, 2 on each side of the TCM. A captive type of drive such as a Philips head is preferred to reduce the possibility of slippage and scratching of the TCM's exterior. Be sure not to obstruct the convection cooling vents on the chassis. Leave sufficient room for cable access to the rear sides of the TCM.

### **3.4        Connections**

Turn the power switch of the TCM off if it is not already turned off.

Loosen the two screws at the rear of the TCM that secure the top cover to the chassis and gently remove the top cover by lifting it up slightly and sliding it rearwards to disengage the front of the cover from the chassis.

There are two terminal blocks on the inside rear of the TCM - TB1 and TB2. TB1 is used to connect the rectifier sense lines, battery sense lines, and the various control output lines for the alarms, and TB2 is used to connect the temperature sensors to the TCM. Also note the cable access holes on either side of the chassis.

Refer to the outline drawing #D018-501-06 for the locations of TB-1, TB-2, and the cable access holes.

### **3.4.1 Temperature Sensor Connections**

Mount the two temperature sensors in the SAME location on a suitable surface of one of the batteries in the battery string or on the negative battery post using 1/4" or 3/8" diameter bolts provided with the battery strap. Be sure there is good thermal contact and that there is no excessive contact with outside temperature sources such as cool drafts, etc. Route the temperature sensor cables to the right side (or left side if desired) of the TCM (as viewed from the front) and through the cable access hole in the side of the chassis. Connect the sensors to TB2 according to the following table:

Sensor 1 ....Positive Lead (Red) .....	TB2-4
Sensor 1 ....Negative Lead (Black) .....	TB2-3
Sensor 2 ....Positive Lead (Red) .....	TB2-2
Sensor 2 ....Negative Lead (Black) .....	TB2-1

Refer to the schematic drawing #C018-501-00 for a typical system connection.

The reason for using two sensors is that in case one sensor fails the TCM will not incorrectly compensate the rectifiers and cause battery life degradation or battery failure. If it is desired to connect only one temperature sensor, connect the single sensor to BOTH sets of inputs on TB2 as follows:

Sensor 1 ....Positive Lead (Red) .....	TB2-4, TB2-2
Sensor 1 ....Negative Lead (Black) .....	TB2-3, TB2-1

### **3.4 2 Rectifier Sense Connections**

Refer to the schematic drawing #C018-501-00 for a typical system connection.

Shut down the rectifier(s) that the TCM will be connected to.

Connection of the battery lines from the TCM to a battery voltage monitoring point is required. If the present installation of the rectifier does not have battery sense lines then these must be installed. Suitable points for battery connection would be at the actual battery, or on the power plant battery charge bars. The sense lines from the TCM to the individual rectifiers should be at least #18 AWG. If multiple sense lines are connected in parallel to one pair of sense lines leading to the TCM, then the size of the sense lines should be increased to #16 AWG to handle the current requirements of the TCM driving multiple rectifier sense inputs.

It is recommended that one of the battery sense lines be fused. For negative ground systems, install an inline fuse (1/2A 250V) in the positive battery sense line. For positive ground systems, install an inline fuse (1/2A 250V) in the negative battery sense line.

If the present sense lines from the rectifier(s) are of sufficient size and length and are connected to the battery sense points then disconnect, label the polarities, and temporarily insulate (but do not discard) the cables at the rectifier end. If the present sense lines are of insufficient size, they will have to be discarded and replaced with new ones.

Route the rectifier sense lines to the left (or right if desired) side of the TCM (as viewed from the front) and through the cable access hole in the side of the chassis.

Connect the rectifier sense lines to the corresponding connections on TB1 according to the following table:

Rectifier Positive Sense Line . . . . .	TB1-21
Rectifier Negative Sense Line . . . . .	TB1-22

Connect the battery sense lines (either previously disconnected and temporarily insulated in above procedure, or connected to the power plant charge bars) to the corresponding connections on TB1 according to the following table:

Battery Positive Sense Line . . . . .	TB1-23
Battery Negative Sense Line . . . . .	TB1-24

**WARNING: Be sure to confirm the polarity of the rectifier sense lines and the battery sense lines ! If they are connected backwards, the rectifier will shut down at turn-on due to an OVP alarm. :WARNING**

### **3.4.3 Rectifier Remote Shutdown Connections**

Refer to the schematic drawing #022-582-05 for a typical system connection.

Route the rectifier remote shutdown cables to the left (or right if desired) side of the TCM (as viewed from the front) and through the cable access hole in the side of the chassis.

Normally the rectifier control common will be connected to the ground bar of the power plant and is often an internal connection in the rectifier. Connect the common contact points of the relays (TB1-8 for the OVP alarm, TB1-2 for the optional LV alarm) to the cable coming from the opposite charge bar. Connect the normally open contact of the OVP alarm (TB1-9) to the cable coming from the remote rectifier shutdown input.

### **3.4.4 Load Disconnect Option Connections**

Route the load disconnect control cables to the left (or right if desired) side of the TCM (as viewed from the front) and through the cable access hole in the side of the chassis.

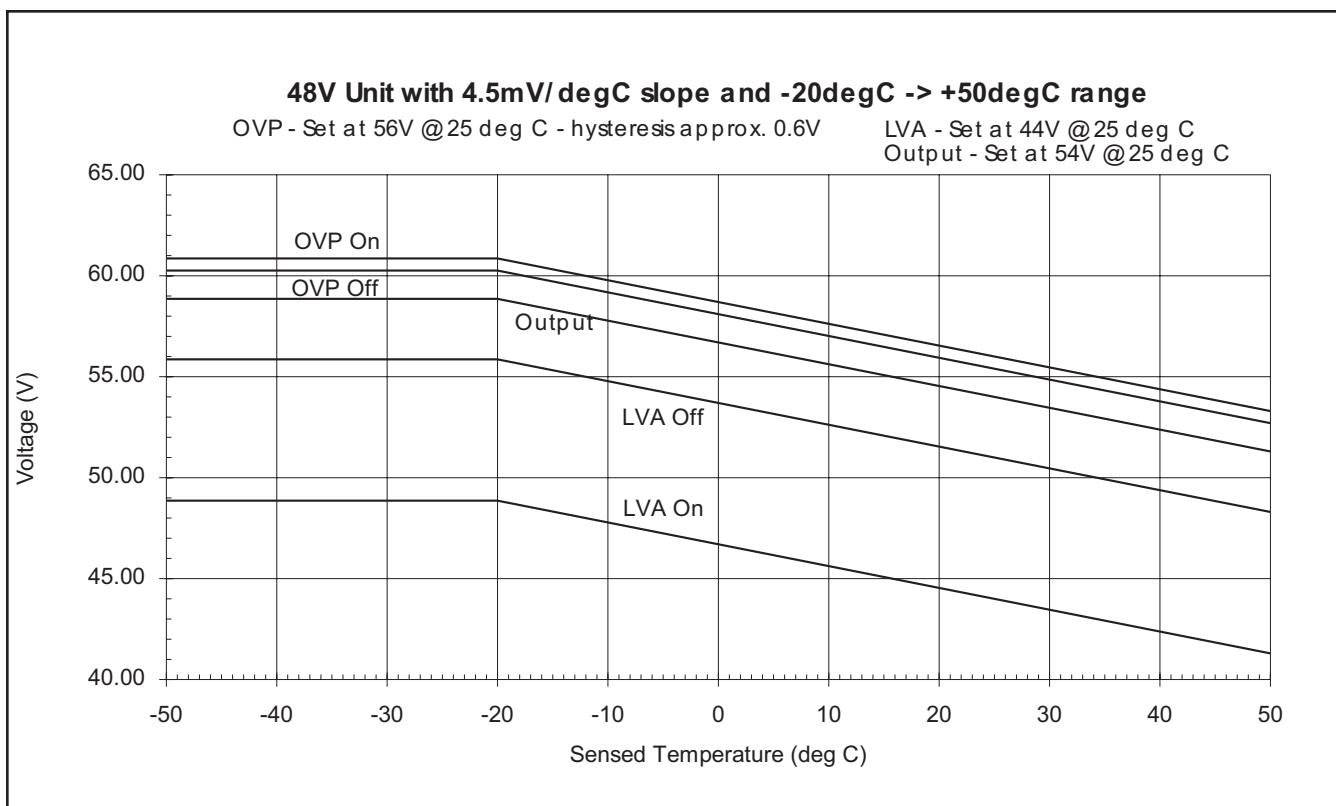
If you have the optional load disconnect feature, set it up as follows: connect the normally open contact of the LV alarm (TB1-1) to the cable coming from the hot side of the coil in the load disconnect panel. The ground side of the coil in the load disconnect panel should already be connected to the ground charge bar.

### **3.4.5 Optional User Connections**

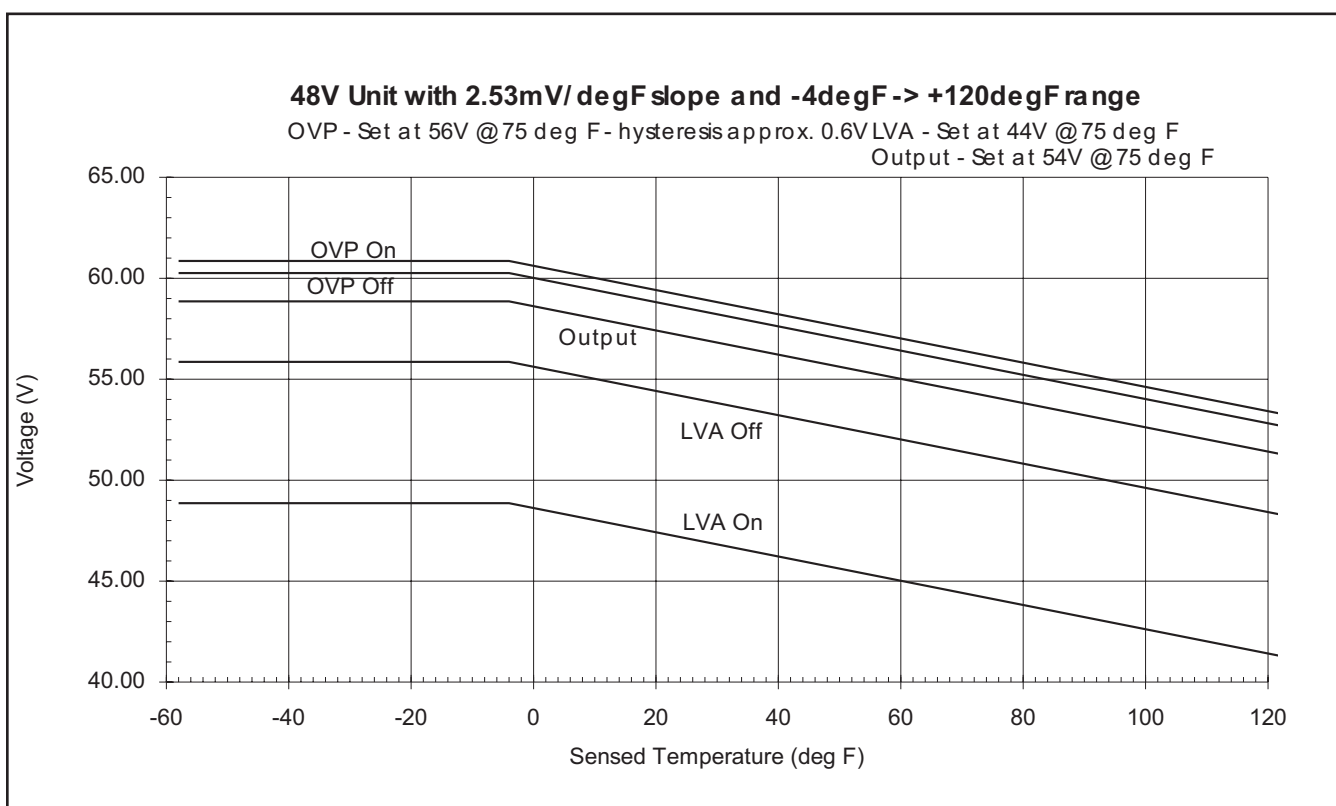
Refer to the schematic drawing #C018-501-00 for the connections mentioned below.

The second set of form C contacts for the the LV and OVP alarms as well as the compensation fail alarm are available for customer use as they see suitable.

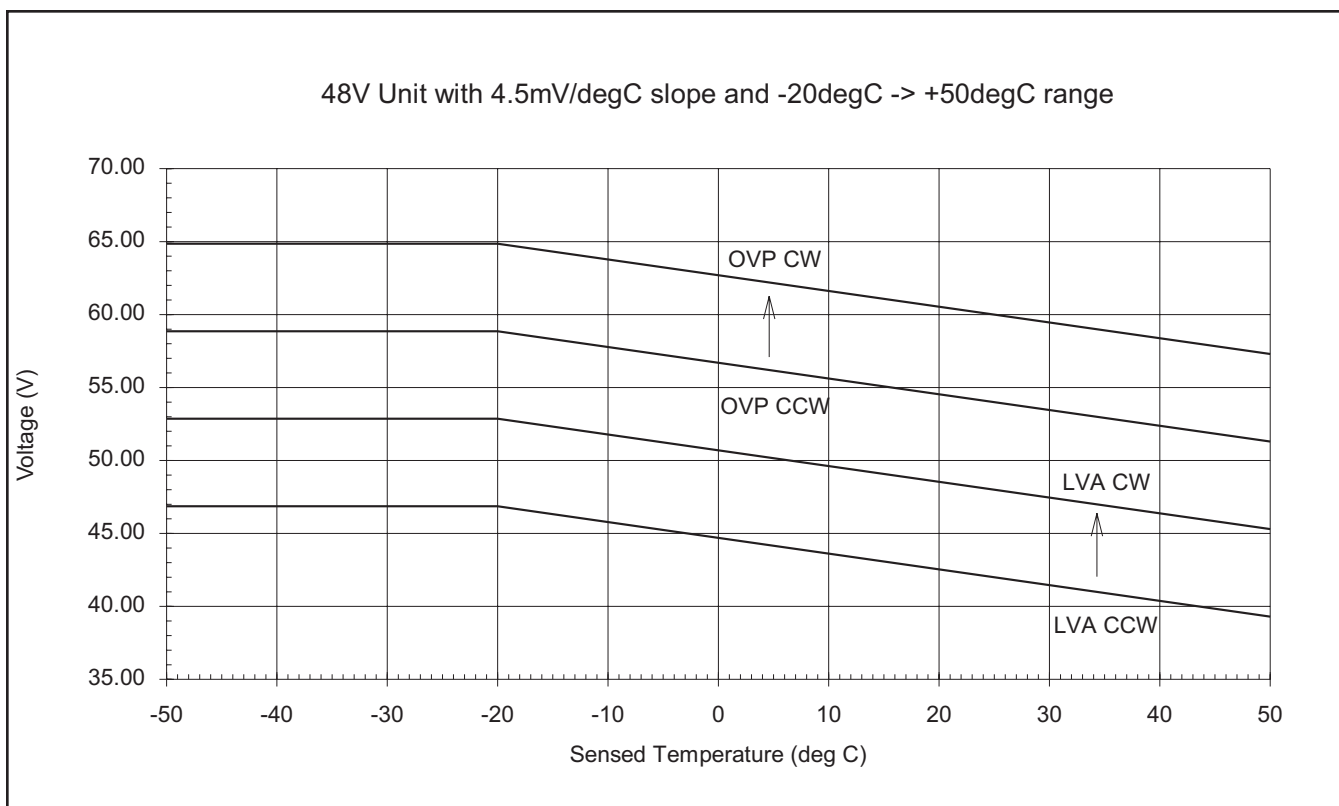




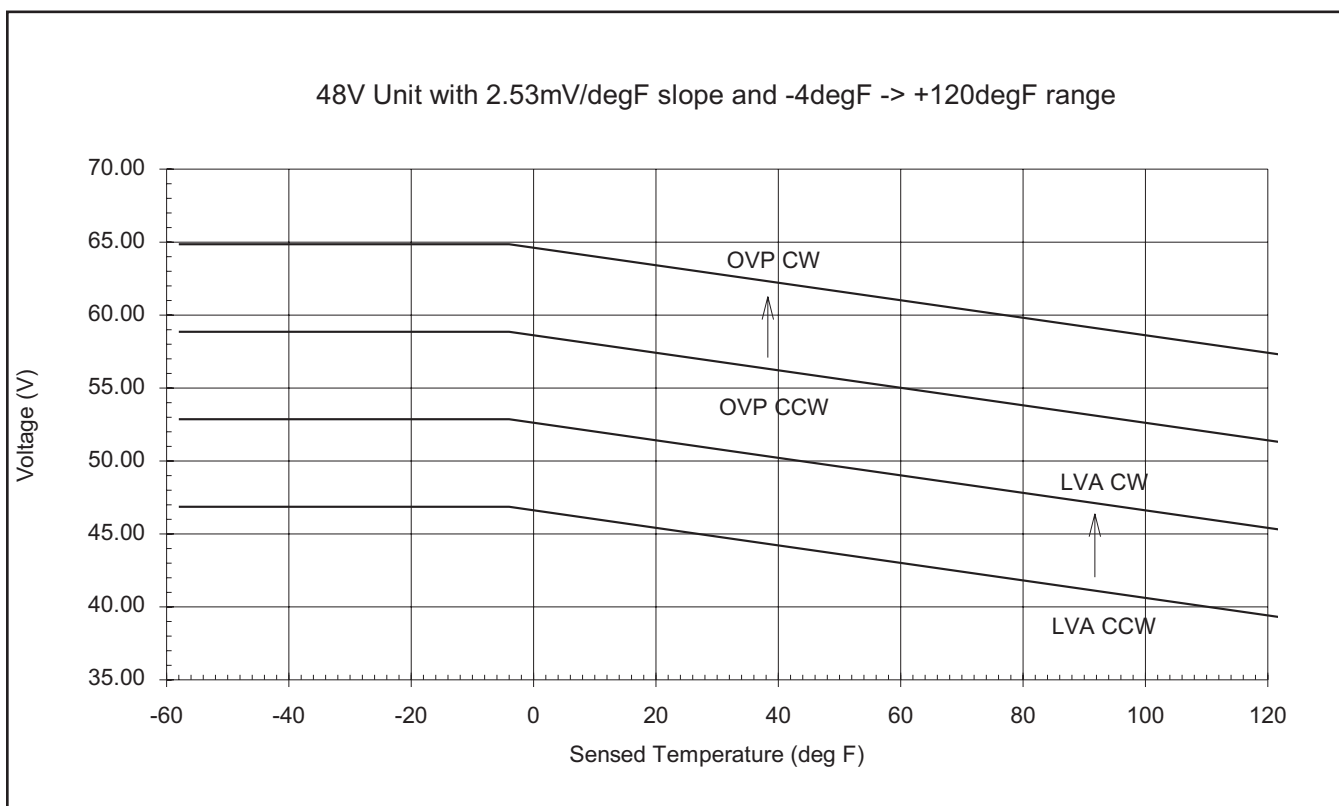
**Figure #5 - Typical Temperature Compensation Operation**



**Figure #6 - Typical Temperature Compensation Operation**



**Figure #7 - OVP and LVA Adjustment Range**



**Figure #8 - OVP and LVA Adjustment Range**

## 4.0 OPERATION

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### 4.1 Initial Check of Temperature Sensors

Read the voltage between the SENSOR COMMON and the SENSOR 1 jacks with a DMM. Perform the same reading between the SENSOR COMMON and the SENSOR 2 jacks. Refer to Figure 3 (degC) or Figure 4 (degF) (Temperature Sensor Voltage) to determine the actual temperature measured by the sensors. Alternatively use the following formula to determine the temperature:

Sensor Temperature (in degC) = [(Sensor Voltage) - 2.73V] x 100 degC/Volt

Confirm that both sensors are reading within 5 degC (or 0.05V). If this condition is not met, then a SENSOR FAIL alarm condition will be generated.

### 4.2 Initial Setup in Test Mode

There are two ways to set the OVP and LVA levels. One is to perform the adjustments with the TCM's power switch off - this will allow the operator to set the OVP and LVA levels as if the battery temperature was 25 deg C. The second way is to perform the adjustments with the TCM's power switch on - this will allow the operator to set the OVP and LVA levels for the battery's current temperature. Refer to Figure 5 (deg C) or Figure 6 (deg F) (Typical Temperature Compensation Operation) to see the affect of temperature compensation on the OVP and LVA levels.

The NORM/TEST mode switch should be in the **TEST** position and the power switch turned either on or off (as explained above) - the TEST LED should be illuminated. Apply a volt meter and a variable power supply to the TEST INPUT jacks. The power supply should be capable of matching the range of voltages that the TCM is expected to monitor - ie for 48V power plants at 25 deg C, the OVP alarm could typically occur at 56V and the LV alarm could occur at typically 44V so the power supply should be adjustable at least from 44V to 56V.

Turn the OVP setting fully clockwise. Turn the LVA setting fully counter-clockwise.

Set the OVP trip to the desired value (usually around 56V at 25 deg C) by setting the TEST INPUT power supply to that voltage and adjusting the OVP setting (approach the set point from the maximum clockwise setting) with a small screwdriver or tweaker until the OVP ALARM LED illuminates.

Set the LV trip to the desired value (usually around 44V at 25 deg C) by setting the TEST INPUT power supply to that voltage and adjusting the LVA setting (approach the set point from the minimum counter-clockwise setting) with a small screwdriver or tweaker until the LV ALARM LED illuminates.

To determine the present OVP setting, vary the TEST INPUT power supply slowly from 40V upwards (to a maximum of 70V) until the OVP ALARM LED illuminates. Then back off the power supply setting slowly until the OVP ALARM LED goes out - the two voltages should be approximately 0.6V apart.

To determine the present LVA setting, vary the TEST INPUT power supply slowly from 60V downwards until the LV ALARM LED illuminates. Then increase the power supply setting slowly until the LV ALARM LED goes out - the two voltages should be approximately 7V apart.

### 4.3 Normal Operation of the TCM

Set the NORM/TEST switch to the **NORM** mode. The TEST, COMPENSATION FAIL, and SENSORS DISAGREE LEDs should not be illuminated during normal operation. If the OVP or LVA LEDs are on, then either one of those conditions is present and the corresponding alarm will be generated. If the SENSORS DISAGREE LED is on, then either of the two temperature sensors has failed or is giving incorrect readings and a temperature compensation fail condition is present.

If the ambient temperature of the batteries is below 25 deg C then the output of the rectifier will be higher than 54V (assuming a 54V set point at 25 deg C). Typical 48V rectifier output values would be 54.5V at 20 deg C and 53.5V at 30 deg C.

If it is desired to check the operation of the TCM dynamically, the sensors can be cooled down temporarily (ie cold spray or an ice cube held against the sensor) - you will then be able to observe the increase in the output voltage of the rectifier.

The LVA and OVP voltage settings will slide on the same scale as the compensated rectifier output voltage. If the rectifier's voltage is 3 volts higher than normal (which would occur at approximately 0 deg C) then the corresponding OVP and LVA levels would be 3 volts higher than at 25 deg C. Refer to Figure 7 (deg C) or Figure 8 (deg F) (OVP and LVA Adjustment Range) to see the affect of temperature compensation on the OVP and LVA levels.

BILL OF MATERIAL  
ASSEMBLY, TEMPERATURE COMPENSATOR

APPROVED: \_\_\_\_\_

ISSUED: \_\_\_\_\_

ITEM	QTY	PART NO.	REV	DESCRIPTION	CIRCUIT DESIGNATION OR REMARKS
------	-----	----------	-----	-------------	-----------------------------------

List 0:

1	1	707-021-20	B	PCB Assembly, Temperature Compensator	
2				See List Options	
3	1	610-188-P1 -343	B	Chassis, Temperature Compensator	DWG (D) 610-188-00
4	1	610-191-P1	B	Cover, Top, Temperature Compensator	DWG (B) 610-191-00
5-9				See List Options	
10-11				NOT USED	
12	5	545-005-10		Test Point, Black	TP1-5
13	2	654-011-10		Led Holder, Black	
14	2	642-009-10		Bushing, Universal, for 0.875" Hole, Nly	
15	2	630-113-10		Fastener, Captive, Southco	
16	2	633-047-10		Retainer, Captive, Southco	
17	6	630-016-10		Screw, Machine, 6-32x5/16	
18	6	633-021-10		Washer, Internal Tooth, #6	
19	1	567-040-10	-	Insulator, Nomex	DWG (B) 567-040-00
20	1	877-035-20	B	Wire Harness, Temp. Compensator	DWG (B) 877-035-04
21-29				NOT USED	
30-36				SEE LIST OPTIONS	

List 1; 24 Volt Operation:

30				Add List 1 To Item 1	
----	--	--	--	----------------------	--

List 2; 48 Volt Operation:

30				Add List 2 To Item 1	
----	--	--	--	----------------------	--

List 3; 12 Volt Operation:

30				Add List 3 to Item 1	
----	--	--	--	----------------------	--

List 19; 19"-1 3/4" Rack Mount Add:

5	2	610-190-P1	-	Bracket, 1 3/4"-19" Rack	DWG (B) 610-190-00
31	4	630-033-10		Screw, Machine, Pan, Phil, #8-32x5/16"	
32	4	633-022-10		Washer, Lock, Internal Tooth, #8	

BILL OF MATERIAL  
ASSEMBLY, TEMPERATURE COMPENSATOR

APPROVED: \_\_\_\_\_

ISSUED: \_\_\_\_\_

ITEM	QTY	PART NO.	REV	DESCRIPTION	CIRCUIT DESIGNATION OR REMARKS
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List 20; 19"-1" Rack Mount, Add:

6	2	610-189-P1	-	Bracket, 1"-19" Rack	DWG (B) 610-189-00
31	4	630-033-10		Screw, Machine, Pan, Phil, #8-32x5/16"	
32	4	633-022-10		Washer, Lock, Internal Tooth, #8	

List 23; 23"-1 3/4" Rack Mount, Add:

7	2	610-202-P1	-	Bracket, 1 3/4"-23" Rack	DWG (B) 610-202-00
31	4	630-033-10		Screw, Machine, Pan, Phil, #8-32x5/16"	
32	4	633-022-10		Washer, Lock, Internal Tooth, #8	

List 24; 23"-1" Rack Mount, Add:

8	2	610-201-P1	-	Bracket, 1"-23" Rack	DWG (B) 610-201-00
31	4	630-033-10		Screw, Machine, Pan, Phil, #8-32x5/16"	
32	4	633-022-10		Washer, Lock, Internal Tooth, #8	

List 25; Surface Mount, Add:

9	2	610-200-P1	-	Bracket, Surface Mount	DWG (B) 610-200-00
33	4	630-031-10		Screw, Machine, Pan, Phil, #8-32x1/4"	
34	4	633-033-10		Washer, Split Lock, #8	

List 71; Temperature Sensor Assembly, 3/8" Lug, 6 Ft, Add:

2	1	747-082-20	A	Assembly, Temp Sensor, 3/8" Lug	DWG (C) 747-082-04
		List 0,71			

List 72; Temperature Sensor Assembly, 3/8" Lug, 12Ft, Add:

2	1	747-082-20	A	Assembly, Temp Sensor, 3/8" Lug	DWG (C) 747-082-04
		List 0,72			

List 73; Temperature Sensor Assembly, 3/8" Lug, 24Ft, Add:

2	1	747-082-20	A	Assembly, Temp Sensor, 3/8" Lug	DWG (C) 747-082-04
		List 0,73			

BILL OF MATERIAL  
ASSEMBLY, TEMPERATURE COMPENSATOR

APPROVED: \_\_\_\_\_

ISSUED: \_\_\_\_\_

ITEM	QTY	PART NO.	REV	DESCRIPTION	CIRCUIT DESIGNATION OR REMARKS
------	-----	----------	-----	-------------	-----------------------------------

LIST 81; Temperature Sensor Assembly, 1/4" Lug, 6 Ft, Add:

2	1	747-028-20	B	Assembly, Temp Sensor, 1/4" Lug List 0,71	DWG (C) 747-028-04
---	---	------------	---	--	--------------------

LIST 82; Temperature Sensor Assembly, 1/4" Lug, 12 Ft, Add:

2	1	747-028-20	B	Assembly, Temp Sensor, 1/4" Lug List 0,72	DWG (C) 747-028-04
---	---	------------	---	--	--------------------

List 83; Temperature Sensor Assembly, 1/4" Lug, 24Ft, Add:

2	1	747-028-20	B	Assembly, Temp Sensor, 1/4" Lug List 0,73	DWG (C) 747-028-04
---	---	------------	---	--	--------------------

List 85; 2.5mV/°C/Cell:

35				Add List 85 to Item 1	
----	--	--	--	-----------------------	--

List 86; 3.5mV/°C/Cell:

35				Add List 86 to Item 1	
----	--	--	--	-----------------------	--

List 87; 4.5mV/°C/Cell:

35				Add List 87 to Item 1	
----	--	--	--	-----------------------	--

List 90; 0°C to 50°C temperature range Voltage adjust:

36				Add List 90 to Item 1	
----	--	--	--	-----------------------	--

List 91; -20°C to 50°C temperature range Voltage adjust:

36				Add List 91 to Item 1	
----	--	--	--	-----------------------	--

List 92; -40°C to 50°C temperature range Voltage adjust:

36				Add List 92 to Item 1	
----	--	--	--	-----------------------	--

References:

REF	018-501-04	A	DWG (D): Assembly, Temperature Compensator
-----	------------	---	--

BILL OF MATERIAL  
ASSEMBLY, TEMPERATURE COMPENSATOR

APPROVED: \_\_\_\_\_

ISSUED: \_\_\_\_\_

ITEM	QTY	PART NO.	REV	DESCRIPTION	CIRCUIT DESIGNATION OR REMARKS
REF		018-501-05	C	DWG (C): Schematic, Temperature Compensator	
REF		018-501-06	B	DWG (D): Outline Drawing, Temperature Compensator	
REF		018-501-A0	A	DOC (A): Acceptance Test Procedure	
REF		080-343-00	B	DWG (B): Silkscreen, Temperature Compensator	

Revisions:

-	92-11-06	First Release
A	93-01-04	Items Affected: 10,11,19,20
B	95-07-25	Revised Per EO's A1-4 Items Affected: 1-9,19,20,31,32, References
C	95-10-31	Revised Per EO B1 List Options 71, 72, 73 Added
D	96-02-19	List 3 (12V) Added



BILL OF MATERIAL  
ASSEMBLY, TEMPERATURE SENSOR

APPROVED: \_\_\_\_\_

ISSUED: \_\_\_\_\_

ITEM	QTY	PART NO.	REV	DESCRIPTION
1	1	172-001-11		IC, Temperature Sensor, LM335A
2-3				NOT USED
4	1	538-009-10		Wire, Terminal Crimp, #6, 1/4", 1-Hole
5	3"	840-003-10		Tubing, Heatshrink, 3/16" Dia., Black
6	2.5"	840-005-10		Tubing, Heatshrink, 3/8" Dia., Black
7	A.R.	971-008-10		Epoxy, 5 Minutes
8	.9"	840-002-10		Tubing, Heat shrink, 1/8" Dia., Black
9	.5"	962-001-10		Tape, Masking, 1/2" Wide
10-20				NOT USED

List 71; 6 Foot Cable, Add:

21	6'	858-023-10	Cable, 2 Conductor, #24 AWG, Stranded, Shielded, UL2464
----	----	------------	---

List 72; 12 Foot Cable, Add:

22	12'	858-023-10	Cable, 2 Conductor, #24 AWG, Stranded, Shielded, UL2464
----	-----	------------	---

List 73; 24 Foot Cable, Add:

23	24'	858-023-10	Cable, 2 Conductor, #24 AWG, Stranded, Shielded, UL2464
----	-----	------------	---

References:

REF	747-028-04	B	DWG (C): Assembly, Temperature Sensor
REF	747-028-F0	B	DOC (A): Assembly Sequence And Notes

Revisions:

-	92-11-06	First Release
A	93-01-19	Items Affected: 4,8,9
B	95-07-18	Revised Per EO's A1-2 Items Affected: 5,6,21-23, References

1

2

3

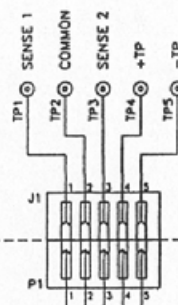
4

5

6

7

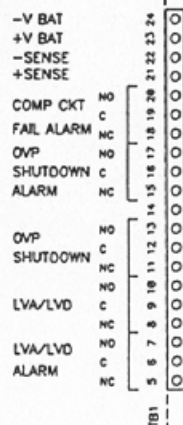
REVISIONS			
LTR	DESCRIPTION	DATE	APPD
B	TB2 WAS TB1; CORRECTED CONNECTIONS	93/10	C.O.D.
C	REV'D PER ED'S A1-A4	95/07	AD



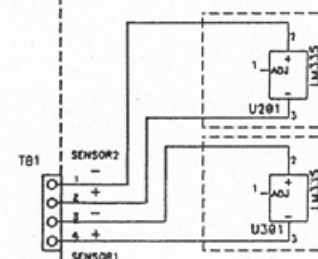
PCB ASSEMBLY, TEMPERATURE COMPENSATOR


PART NO : 707-021-20 24V; LIST1  
48V; LIST2

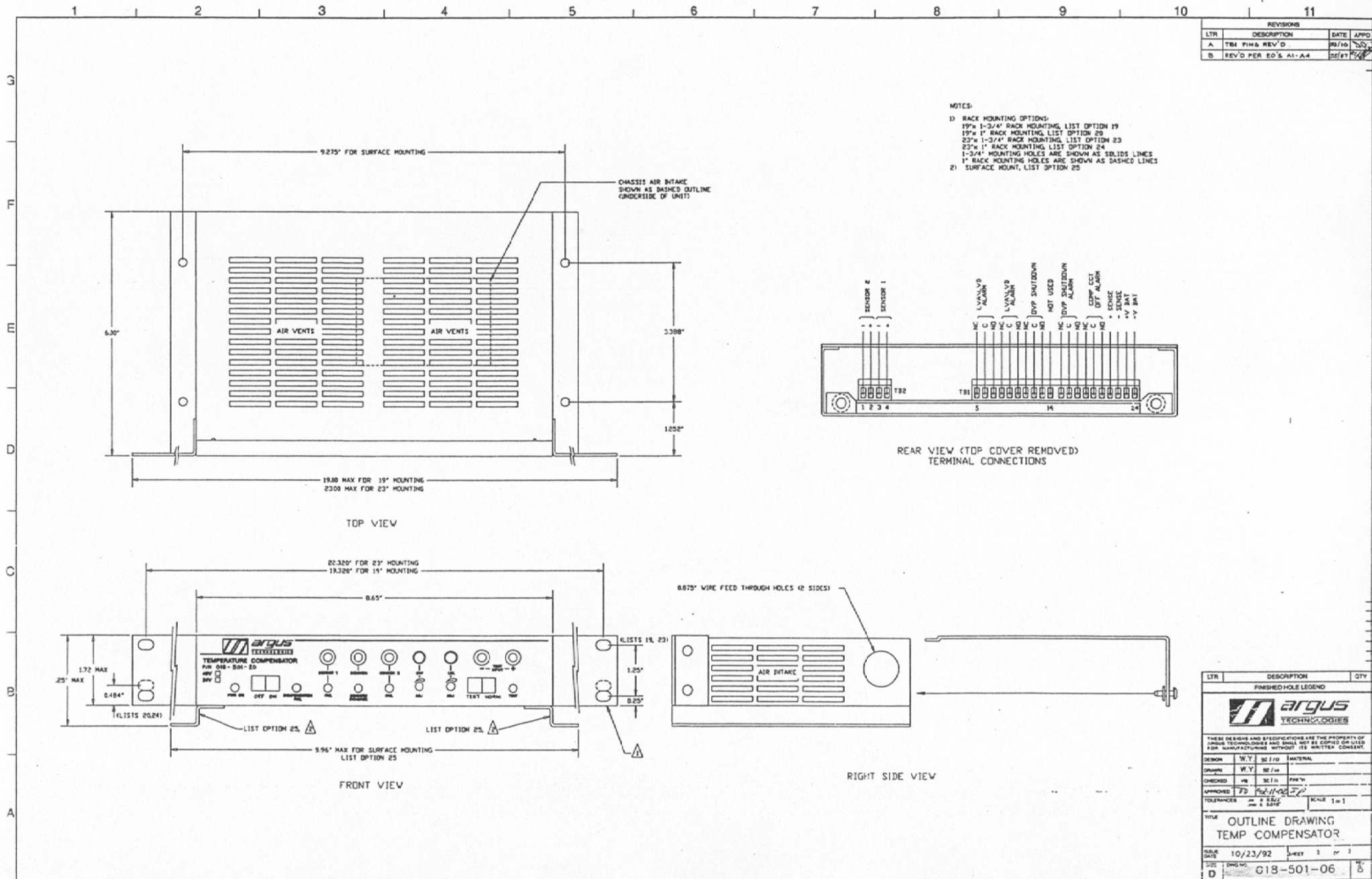
SCHEMATIC; 707-021-05

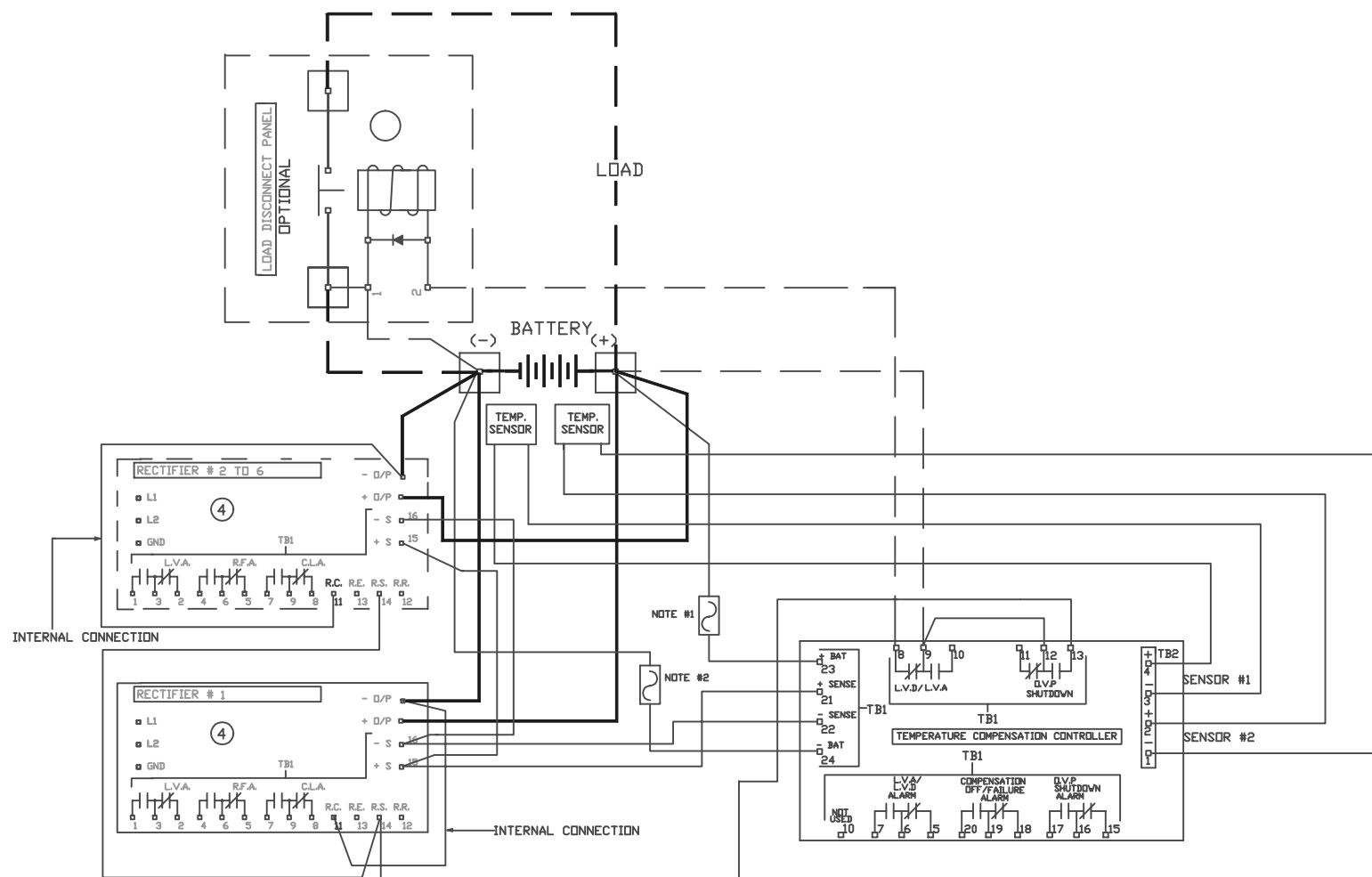


TEMPERATURE SENSORS  
PART NO.: 747-028-20




LTR	DESCRIPTION		QTY
FINISHED HOLE LEGEND			
		<b>argus</b> TECHNOLOGIES	
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DESIGN	CDD	MATERIAL	
DRAWN	CDD		
CHECKED		FINISH	
APPROVED	CDD	93/02	
TOLERANCES			SCALE
TITLE			
SCHEMATIC, TEMPERATURE COMPENSATOR			
ISSUE DATE		SHEET	1 OF 1
SIZE	DWG NO.	REV	
C	018-501-05	C	





NOTES:  
 1) 1/2A 250V INLINE FUSE FOR NEGATIVE GROUND SYSTEMS  
 2) 1/2A 250V INLINE FUSE FOR POSITIVE GROUND SYSTEMS

REVISIONS			
LTR	DESCRIPTION	DATE	APPD
△	FIN NUMBERS REVISED	83/08	DD
△	FUSED MOVED	83/10	DD
△	FUSED MOVED	2002/07	

LTR	DESCRIPTION	QTY
FINISHED HOLE LEGEND		
		
THESE DESIGNS AND SPECIFICATIONS ARE THE PROPERTY OF ARGUS TECHNOLOGIES AND SHALL NOT BE COPIED OR USED FOR MANUFACTURING WITHOUT ITS WRITTEN CONSENT.		
DESIGN	TC	83/08
DRAWN	TC	83/08
CHECKED		
APPROVED		
TOLERANCES	(SEE DRAWING NOTES)	
	FINISH	
	SCALE	N.T.S.
TITLE		
TEMPERATURE COMPENSATION CONFIGURATION		
ISSUE		
DATE		
SIZE	TYPE	DRG NO.
B	1/1	022-582-05
SHEET 1 OF 1		REV

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# FACTORY SERVICE INFORMATION

## Technical Support

Technical support staff are available for answering general questions related to installation, operation and maintenance of Argus products. In Canada and the USA, call Argus toll free 7:30 am to 5:00 pm Pacific Standard Time at:

**+1-888 GO ARGUS**

(+1-888-462-7487)

For emergencies, call +1-888-GO-ARGUS 24 hours a day, seven days a week.  
Customers outside Canada and the USA, call +1-604-436-5547 for technical support.

## Training

Argus offers various levels of product and technical training. These workshops provide a mix of theory and hands on application for qualified customers. Please consult your sales representative for course schedules, locations and costs, or visit our website at [www.argusdcpower.com](http://www.argusdcpower.com).

## Factory Repair and Servicing

All service, beyond initial adjustments, should be carried out by qualified factory service personnel. For these procedures, please contact Argus Technologies at the locations listed to the right.

## Product Returns

Before returning any product for service, please obtain a Return Material Authorization (RMA) number from an Argus factory service representative. The representative will require the model and serial number, as well as a brief description of the problem prior to issuing the RMA number. All material must be pre-authorized before being returned.

See document 048-507-10 "Warranty and Repair Information" for more details.

## Moving and Storage

Units must be suitably packed in the original shipping container (or equivalent) prior to re-shipping. The box should be completely enclosed and constructed of wood or double-wall, corrugated cardboard. At least 3" of foam or shock absorbing packing material must surround the unit.

### Factory Service Centers

#### Canada and International

Argus Technologies Ltd.  
ATTN: RMA Returns  
7033 Antrim Avenue  
Burnaby, BC, V5J 4M5 Canada  
Tel: +1 604 436 5900  
Fax: +1 604 436 1233  
Email: [returns@argusdcpower.com](mailto:returns@argusdcpower.com)

#### USA

Argus Technologies Inc.  
ATTN: RMA Returns  
3116 Mercer Avenue  
Bellingham, WA, 98225 USA  
Tel: +1-360 756 4904  
Fax: +1-360 647 0498  
Email: [returns-usa@argusdcpower.com](mailto:returns-usa@argusdcpower.com)

#### Asia-Pacific

PCM Electronics (Dong Guan) Co., Ltd.  
Hongli Industrial Area, Miaobian, Liaobu Town,  
Dongguan City, Guangdong Province,  
523400 China  
Tel: +86 755 8895 3310  
Fax: +86 755 8895 3307

#### Authorized Service Center

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14071 Argentina  
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Tel: +61 02 9822 8977  
Fax: +61 02 9822 8077

##### Australia/New Zealand

Alpha Power Systems Pty Ltd  
Unit 3, 30 Heathcote Road  
Moorebank, NSW, 2170 Australia  
Tel: +61 02 9602 8331  
Fax: +61 02 9602 9180

##### Century Yuasa

37 - 65 Colbalt Street  
Carole Park QLD 4300  
Australian Sales & Service  
Tel: +61 07 3361 6587  
Fax: +61 07 3361 6705  
New Zealand Sales & Service  
Tel: +64 9 978 6689  
Fax: +64 9 978 6677

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Compower Systems Inc.  
118 Tiffind Road  
Toronto, ON, M1V 5N2 Canada  
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Fax: +1 416 293 0671

##### Europe

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Edinburgh Way  
Harlow, Essex, CM20 2DU UK  
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Fax: +44 1279 423355

##### Mexico & Central America

Technologies Argus First De Mexico SA de CV  
Anatole France No. 17  
Col. Polanco  
Mexico City, 11560 Mexico  
Tel: +52 55 5280 6990  
Fax: +52 55 5280 6585

##### South America

Argus Technologies Argentina  
Santo Tome 2573, Capital Federal  
Buenos Aires, 1416 Argentina  
Tel: +54 11 4504 4698  
Cell: +54 9 11 4993 9996  
E-pager: [541149939996@nextel.net.ar](mailto:541149939996@nextel.net.ar)

##### Turkey

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Inonu cad. Kanarya sok. No:20  
Yenisahra - Kadikoy  
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Tel: +90 216 317 41 42  
Fax: +90 216 472 90 66