

This document set is applicable to the following part number configurations:

 <p>Four Cylinder Exhaust Gas and Cylinder Head Temperature</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">Part Number</th> <th colspan="2">Kit Configuration</th> </tr> <tr> <th>Instrument</th> <th>Thermocouples</th> </tr> </thead> <tbody> <tr> <td>ECT204</td> <td>ECT204</td> <td>-</td> </tr> <tr> <td>ECT204P1XX</td> <td>ECT204</td> <td>4 X A200-TEC15</td> </tr> <tr> <td>ECT204P2XX</td> <td>ECT204</td> <td>4 X A200-TEC20</td> </tr> <tr> <td>ECT204P3XX</td> <td>ECT204</td> <td>4 X A200-TEC25</td> </tr> <tr> <td>ECT204PBXX</td> <td>ECT204</td> <td>4 X A200-TEB</td> </tr> <tr> <td>ECT204XXR2</td> <td>ECT204</td> <td>4 X A200-TCR12</td> </tr> <tr> <td>ECT204XXR4</td> <td>ECT204</td> <td>4 X A200-TCR14</td> </tr> <tr> <td>ECT204XXR8</td> <td>ECT204</td> <td>4 X A200-TCR18</td> </tr> <tr> <td>ECT204XXPB</td> <td>ECT204</td> <td>4 X A200-TCB</td> </tr> <tr> <td colspan="3"> <p>Complete configurations are a combination of the above. Eg: ECT204P2R4 denoting both EGT and CHT thermocouple types.</p> </td> </tr> </tbody> </table>	Part Number	Kit Configuration		Instrument	Thermocouples	ECT204	ECT204	-	ECT204P1XX	ECT204	4 X A200-TEC15	ECT204P2XX	ECT204	4 X A200-TEC20	ECT204P3XX	ECT204	4 X A200-TEC25	ECT204PBXX	ECT204	4 X A200-TEB	ECT204XXR2	ECT204	4 X A200-TCR12	ECT204XXR4	ECT204	4 X A200-TCR14	ECT204XXR8	ECT204	4 X A200-TCR18	ECT204XXPB	ECT204	4 X A200-TCB	<p>Complete configurations are a combination of the above. Eg: ECT204P2R4 denoting both EGT and CHT thermocouple types.</p>		
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ECT204XXXX EXHAUST GAS & CYLINDER HEAD TEMPERATURE

THIS IS A TRANSPORT CANADA APPROVED MANUAL

The following checklist outlines the required articles for all ECT204XXXX series part numbers.

	Documentation	Document Number
<input type="checkbox"/>	Introduction (this document)	S200-ECT204-001
<input type="checkbox"/>	Warranty Statement	S200-AWS
<input type="checkbox"/>	Installation Instructions	S200-ECT204-002
<input type="checkbox"/>	Wiring and Installation Schematic	S200-ECT204-003
<input type="checkbox"/>	Human Interface Definition	S200-HID
<input type="checkbox"/>	Instrument Setup	S200-ECT204-004
<input type="checkbox"/>	Operations Guide	S200-ECT204-005
<input type="checkbox"/>	Product Specifications	S200-ECT204-006
<input type="checkbox"/>	Installation Compliance	S200-ECT204-007
<input type="checkbox"/>	Instructions for Continued Airworthiness	S200-ICA
<input type="checkbox"/>	Authorized Release Certificate	FORM ONE
<input type="checkbox"/>	Permission to Use STC	S200-PTU
<input type="checkbox"/>	Canadian STC and Eligibility List	STC & S200-CEL
<input type="checkbox"/>	FAA STC and Approved Model List	STC & S200-AML

Components

- ECT204 Instrument
- 4 X A200- TEC15/20/25 or TEB Type-K Thermocouples
- 4 X A200- TCR2/4/8 or TCB Type-J Thermocouples
- 4 X Mounting Screws

ECT204XXXX

EXHAUST GAS & CYLINDER HEAD TEMPERATURE

The Fastest Way To Install And Start Using This Product

NOTE: *This product is certified as a primary replacement, new or secondary instrument only when installation is performed in accordance with the documented instructions and procedures.*

1. Review the Warranty Statement before performing any tasks. Do not remove the instrument from the sealed package until you agree with the stated terms.
2. If this instrument is to be installed in a certified aircraft, verify that the aircraft model is listed on the Eligibility List (Canadian registered aircraft) or the Approved Model List (USA and all other countries).

If it is NOT listed, contact your local authority and obtain the necessary requirements or approvals before proceeding further.

For all other vehicles, including experimental aircraft continue with Step 3.

3. Follow the Installation Instructions exactly as noted, referring to the Wiring Diagram as and when required. Note: The installation process has been optimized based on the sequence of components to be installed. Installing the product in any other way will, in all likelihood, take longer and be more complex.

Ensure that **one** of the Intensity Control options has been installed in accordance with document # S200-DDC-INST.

4. Perform the Instrument Setup using the required data as listed in the Instrument Setup procedure.
5. Validate that all functions perform as outlined in the Operations Guide.
6. Complete all regulatory documentation, if required.



NO NONSENSE WARRANTY

Our warranty policy is simple It is even written in plain English!

Please read it BEFORE DOING ANYTHING WITH YOUR NEW INSTRUMENT!

If you require technical support when installing your instrument please call our Technical Support department directly on 416-628-0725

We will:

- Repair or replace (at our discretion) any instrument which becomes defective within a period of 12 (twelve) months of manufacture date. You will pay for the shipping costs to return the instrument to us and we will pay for the shipping costs to return the instrument to you;
- Replace all instruments that fail out of warranty for a flat rate of 50% of the cost of a new instrument, at the time of the failure.

We are not:

- Liable for any costs associated with the installation or removal of any of our instruments, irrespective of the cause;
- Liable for any misuse or non-use of the instrument in whatever form.

We will not:

- Repair or replace your instrument free of charge, under warranty, if it has not been installed by an appropriately licensed person.

If you do not agree with ANY of the above statements, return your new instrument to us immediately for a FULL refund LESS shipping costs.

ALL RETURNS REQUIRE RETURN MATERIAL AUTHORIZATIONS (RMA). WE DO NOT ACCEPT RETURNS WITHOUT RMA NUMBERS. CALL 416-628-0725 FOR AUTHORIZATION.

ECT204XXXX Installation Instructions

1. Install thermocouple probes in accordance with the applicable manufacturer instructions. **Use only ungrounded probes. Type “K” for EGT and Type “J” for CHT.**
2. Connect the wiring supplied with the DB25 interface connector in accordance with the ECT204XXXX Wiring and Installation Schematic. **DO NOT ATTACH THE CONNECTOR TO THE INSTRUMENT UNTIL ALL WIRING HAS BEEN CONNECTED.**
3. Select the instrument location in the aircraft panel.
4. Ensure that the aircraft master switch and/or power to the instrument is **OFF**.
5. Attach the DB25 connector to the instrument. Ensure that the plug is fully inserted into the instrument. Finger tighten the two plug locking screws, then tighten 1/8 turn using a screwdriver. **DO NOT OVERTIGHTEN.**
6. The instrument can be installed with the DB25 connector orientated to the **TOP** or **BOTTOM** of the instrument panel.
7. Install the instrument in the panel, attaching with four 6-32 X 5/16” screws.
8. Initial Power Up Sequence:
 - a. Adjust the instrument intensity control for maximum intensity.
 - b. Apply power to the instrument.
 - c. The instrument display will light up.
 - d. The display may be inverted at this point. Ignore the orientation at this time.
 - e. Turn the instrument **OFF**.
9. If the instrument display does not light up:
 - a. Ensure intensity control is set for maximum.
 - b. Turn off power.
 - c. Disconnect the DB25 connector from the instrument.
 - d. Check intensity control.
 - e. Check the wiring installation and breaker or fuse.
10. Proceed to “Instrument Setup”.

Intensity Control – Installation Options

Applicable to Rev 05 and later 200 Series Instruments

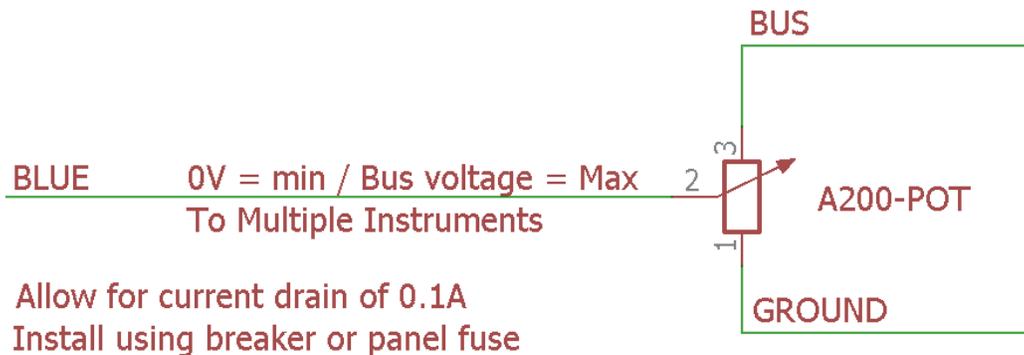
Choose ONE of the options listed below for connection of the BLUE intensity control wire from the instrument harness.

Theory of Operation

- The instrument intensity control is voltage sensitive.
- When the sense input is grounded the instrument display will be at the dimmest intensity. At bus voltage the instrument display will be at the brightest intensity.
- Voltages between these two will vary the display intensity.

1. Preferred Method – Independent Potentiometer

Connect the BLUE wire to P/N A200-POT Rev. 02 as below:



Ensure the “EXTERNAL” option in the Dimmer Control menu is set.

2. Connection of Existing Panel Intensity Control

Confirm the existing panel lighting control meets the following requirements:

- When set for **DAY** operation **BUS** voltage must be output.
- When used at **NIGHT** the output must vary from **0V** (Ground) to **BUS** voltage.

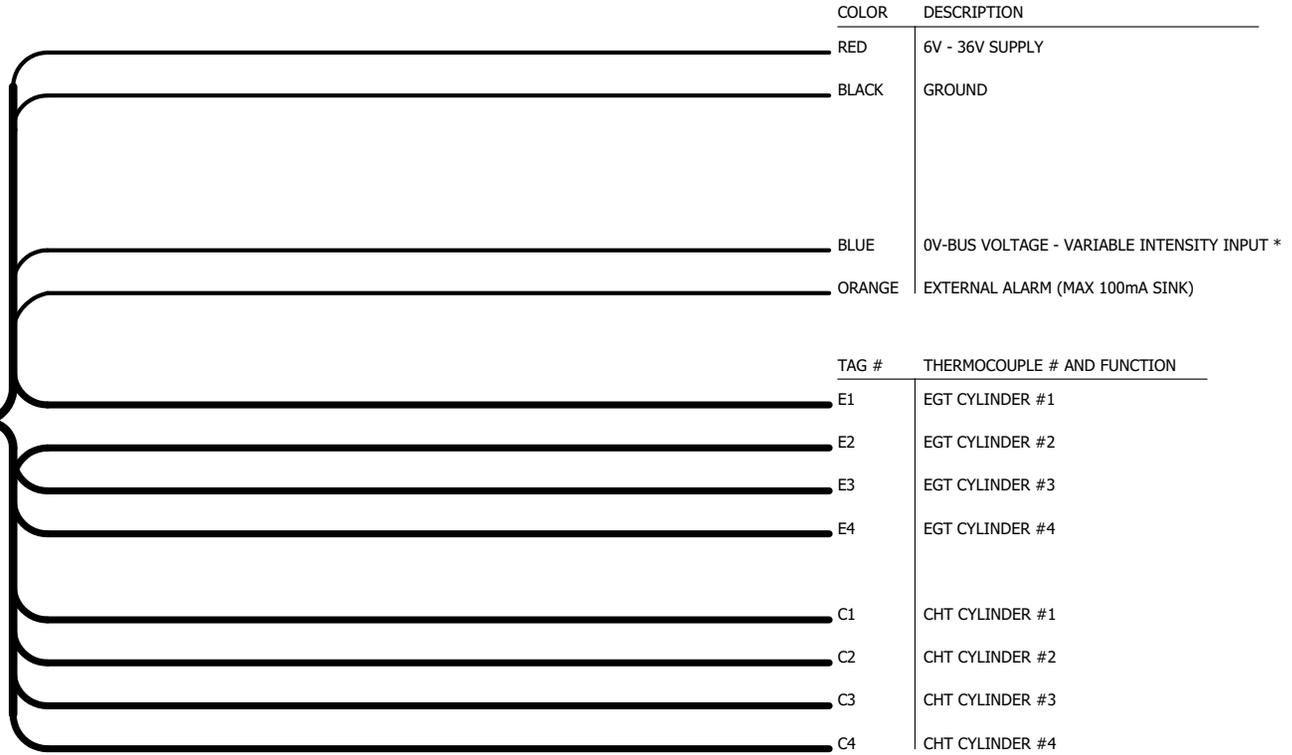
If these requirements are met connect the BLUE wire to the panel lighting control.

Ensure the “EXTERNAL” option in the Dimmer Control menu is set.

3. Day VFR Operation

Do not connect the BLUE wire. Set the intensity using the internal Dimmer Control.

Refer to document S200-HID, Intensity Control section for menu access instructions.



COLOR	DESCRIPTION
RED	6V - 36V SUPPLY
BLACK	GROUND
BLUE	0V-BUS VOLTAGE - VARIABLE INTENSITY INPUT *
ORANGE	EXTERNAL ALARM (MAX 100mA SINK)

TAG #	THERMOCOUPLE # AND FUNCTION
E1	EGT CYLINDER #1
E2	EGT CYLINDER #2
E3	EGT CYLINDER #3
E4	EGT CYLINDER #4
C1	CHT CYLINDER #1
C2	CHT CYLINDER #2
C3	CHT CYLINDER #3
C4	CHT CYLINDER #4

INSTALLATION NOTES:

1. Allow for current drain of 0.1A (100mA)
2. Install using breaker or panel fuse
3. Maximum 7 instruments per 1A of breaker capacity
4. For multiple instrument installations install breakers to comply with redundancy requirements of AC 23.1309-1D Appendix 1

ACCESSORY NOTES:

1. * See S200-DDC-INST for additional intensity control options
2. Thermocouples :
 - Ungrounded Type-K (EGT) & Type-J (CHT)
 - EGT Thermocouple YELLOW to "CHROM +"
 - EGT Thermocouple RED to "ALUMEL -"
 - CHT Thermocouple WHITE to "IRON +"
 - CHT Thermocouple RED to "CONST -"
3. Thermocouple Part Numbers :
 - EGT - A200-TEB / -TEC15 / -TEC20 / -TEC25
 - CHT - A200-TCB / -TCR12 / -TCR14 / -TCR18

ECT204XXXX Wiring and Installation Schematic

200 Series Human Interface Definition

All 200 Series instruments have been designed around a standard Human Interface protocol. This allows identical operation of the two panel switches between all instruments while still allowing multiple functions. This document is a generic outline of the functionality of the switches, based on the various functional states of the instrument.

Top Button

The top button is the action button. It invokes different screen displays, allows selection of values and increments or decrements values. Examples of these actions are:

1. Moving between display screens
2. Selection of an action from a menu
3. Changing a value from within the setup menus
4. Entering a value during flight (clock instrument only)

Bottom Button

The bottom button is the navigation button. It will allow the cursor on the screen to move between allowable selections. Examples of these actions are:

1. Selection of different cylinders (EGT and CHT) in the Single Cylinder mode
2. Selection of different tanks (Fuel Level)
3. Selection of limits and functional items from within the setup menus
4. Time field selection (clock instrument only)

There is one exception to the functionality of the bottom button. This is from the Primary Display (the screen that first comes on from power up). Pressing the button will display the instrument core status and support data.

General

1. Each instrument contains detailed button options in the Operations Guide.
2. During setup, instructions are provided on screen and use of the buttons is as noted in this document.

Intensity Control

Press and hold the top button for 5 seconds to activate the Dimmer Control menu.

Select the "Up Arrow" and press the top button to disable external intensity and increase intensity. Select the "Down Arrow" and press the top button to decrease the intensity and enable external intensity control.

Select the "Save" option and press the top button to save your selection and return to normal operations.

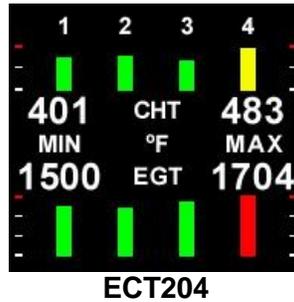
The Dimmer Control menu is not available during instrument setup.

ECT204XXXX Instrument Setup

1. Before proceeding with the instrument setup you will require the following information, as it pertains to the aircraft that the instrument is being installed on:
 - a. Minimum operating CHT and EGT temperature
 - b. Maximum operating CHT and EGT temperature
 - c. CHT and EGT redline temperature
2. This information must be obtained from a current, traceable source for the aircraft that the instrument is being installed on. Some possible sources are:
 - a. Pilot Operating Handbook
 - b. Maintenance Manual
 - c. Aircraft Type Certificate Data Sheet
 - d. Engine Type Certificate Data Sheet
 - e. Manufacturer
3. Then, enter the correct parameters into the instrument as follows:
 - a. Turn off the power to the instrument
 - b. Press and hold both top and bottom buttons and turn on the power to the instrument.
 - c. When instructed, release both buttons.
 - d. In the setup menus, use the bottom button to navigate and the top button to select an option.
 - e. Follow the onscreen instructions. **NOTE: Depending on the installation orientation of the instrument the display may initially be upside down. The first prompt in the setup is to press the button at the top of the instrument. This will orientate it correctly.** Continue with setup.
4. Once all steps of the setup have been completed, the instrument will provide the option to edit any data or to save and exit.
5. If the data entered is correct, choose the "OK" option to save the data and exit setup, otherwise choose "EDIT".
6. Once the instrument has exited the setup it will restart. It is now ready for use.

ECT204XXXX Operations Guide

This manual outlines the operating procedures for all ECT204XXXX series products.

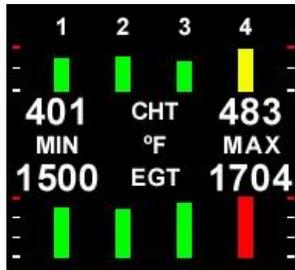


IMPORTANT NOTE

Display functions and option screens will only be available when no alarm or failure conditions exist.

If the instrument display is not in the **MinMax** or **Single Cylinder** mode and an over temperature condition is detected on any cylinder for either CHT or EGT and/or a shock cooling alarm is triggered the instrument will default to the **MinMax** screen. Under these conditions the only available screens will be the **MinMax** and **Single Cylinder** screens.

1. Power Up / Default MinMax Screen



Displays the temperature of all cylinders in a graphic format. Colors are determined by the values set during installation.

Displays the minimum and maximum temperatures in the selected units.

A shock cooling alarm is indicated by a flashing blue boundary box around the effected cylinder.

2. Selection Menu



Press the top button once to reach the function menu.

Use the bottom button to navigate to the required menu function.

Use the top button to select a function.

The display will return to the MinMax screen when the blue activity bar disappears.

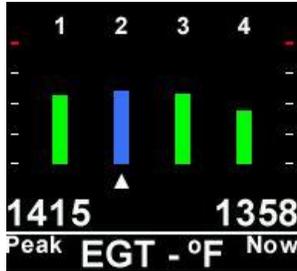
ECT204XXX Operations Guide

3. Mixture ROP

To set engine mixture rich of peak (ROP), select this option from the menu and follow the interactive instructions while leaning the engine.

During the engine leaning process, a trend graph will be displayed of all cylinders, as well as the temperature of the hottest cylinder. The engine must be leaned before the screen has been fully populated with graphic information.

Once leaned, the following screen will be displayed:



The first cylinder to peak will be displayed in blue with an arrow beneath it. **STOP LEANING.**

The temperature at which peak was detected will be indicated on the left side (peak).

The current temperature will be displayed on the right (now).

Using the above image, the engine is presently running 57°F LEAN of peak.

Richen the mixture until the “now” temperature is the same as the peak **OR** until the “now” temperature starts to drop after rising. This is the peak of the ROP condition.

Further richen the mixture to the desired point. For example, if you wanted to run 50°F ROP, richen the mixture until the “now” temperature reaches 1365°F.

Your engine has now been precisely leaned to 50°F ROP.

Press the top button twice to return to the Min/Max screen.

4. Mixture LOP

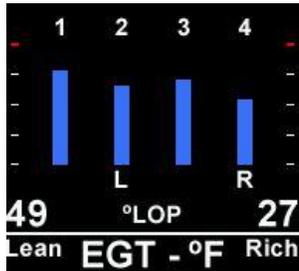
To set engine mixture lean of peak (LOP), select this option from the menu and follow the interactive instructions while leaning the engine.

During the engine leaning process, a trend graph will be displayed of all cylinders, as well as the temperature of the hottest cylinder. The engine must be leaned before the screen has been fully populated with graphic information.

As each cylinder reaches peak it will change color to blue. Continue leaning until ALL cylinders have peaked.

ECT204XXXX Operations Guide

Once they have all peaked, the following screen will be displayed:



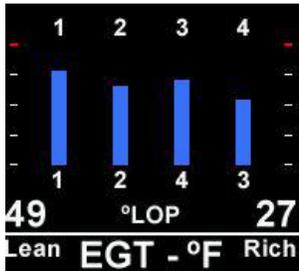
The cylinder with the “R” letter beneath it is the richest cylinder and the “L”, the leanest.

The temperature above the “Lean” text is the temperature of the leanest cylinder and that above the “Rich” text of the richest.

If you wanted to run 50°F LOP then richen the mixture until the value of the leanest (Lean) cylinder is 50°F.

To run 100°F LOP, lean the engine until the leanest cylinder temperature displays 100°F.

All cylinder conditions (LOP) will be between the values of the lean and rich temperatures. Your engine mixture has now been set to the desired LOP value.



Press the bottom button to view the order in which the cylinders peaked.

Press the top button twice to return to the MinMax screen.

5. Single Cylinder

To monitor the temperature on one specific cylinder, select this option from the menu.

The following screen will be displayed:



Use the bottom button to scroll to the desired cylinder (default is 1).

The temperature pair of the selected cylinder will be displayed on the right side of the screen and the cylinder number on the left.

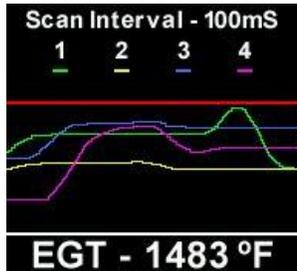
When desired, press the top button to return to the MinMax screen.

ECT204XXXX Operations Guide

6. Trend Graph

To monitor CHT or EGT temperatures graphically, select this option from the main menu, then select either CHT or EGT.

The following screen will be displayed (EGT shown):



The temperature displayed is that of the hottest cylinder.

The “Scan Interval” can be changed by pressing the bottom button.

To freeze the display, press the top button **ONCE**.

To continue displaying temperatures in this mode, press the bottom button **ONCE**, OR, to return to the Menu screen, press the top button once.

WARNING

All leaning and engine operations are to be performed in accordance with the specific instructions pertaining to your aircraft, including those provided by the engine manufacturer. The ECT204XXXX series instruments are only parameter reporting devices which can assist in engine management when used in conjunction with these instructions.

All ECT204XXXX products are certified as primary replacements, or for secondary use as desired.

ECT204XXXX Product Specifications

Certification / Compliance

TSO	C43c (Both CHT and EGT)
Environmental	DO-160F
	A1CAASXXXXXXXXZBXXBBBCSBA1C11XXAX
Software	DO-178B

DC Power Source

Input voltage	6 to 36 VDC
Power consumption	100mA
Load dump tolerance	+60V
Direct spike tolerance	+/- 60V
Cable spike tolerance	> +/- 1KV

Operating Temperature

Constant operating	-15°C to +55°C
Short term operating (1hr)	-40°C to +70°C
Storage	-55°C to +85°C

Signal Input

CHT - 0.0V to 20.255mV, Type-J thermocouple
EGT - 0.0V to 44.866mV, Type "K" thermocouple

Temperature Display

CHT - 100°F to 700°F / EGT - 200°F to 2000°F

Accuracy

SAE AS8005 Class IIa (+/- 1% FS) (CHT and EGT)

Display Units

°F or °C, user selectable

Display

Sunlight readable LCD
80/80/80/80 Degree viewing angle

Annunciator Output

100mA sink with reverse EMF protection

Interface Connector

DB-25

Software Functionality

Primary	All cylinders with Min and Max temperatures
Menu	Function selection
Mixture ROP	Lean engine rich of peak (EGT only)
Mixture LOP	Lean engine lean of peak (EGT only)
Single Cylinder	Display all cylinders, but monitor one
Trend Graph	Graphic display of temperatures

Dimensions

2.45" X 2.45" X 0.96"

Weight (excluding harness)

4.05 oz

Finish

Black anodized 6061 aluminum

ECT204XXXX Installation Compliance

1. Installation Procedures and Limitations

Should your specific aircraft not be listed on our STC Approved Model List (AML), contact your local FSDO or flight authority for installation requirements **BEFORE commencing any installation tasks.**

Installation must be in accordance with the following ECT204XXXX published documents:

- a. Installation Instructions,
- b. Wiring and Installation Schematic, and
- c. Instrument Setup.

2. Installation Location and Visibility

The products are to be installed in existing panel holes and will replace existing instrumentation. As primary replacement products it is recommended and preferred that they be placed in the same panel location as the original equipment. Their visibility and placement relative to other instruments are the same or similar to the existing instruments. Where they are installed in a different location it is the responsibility of the installer to ensure that they are visible to the pilot under all conditions.

3. TSO COMPLIANCE NOTICE

The conditions and tests required for TSO approval of this instrument are minimum performance standards. Those installing this instrument on or in a specific type or class of aircraft, must determine that the aircraft installation conditions are within the TSO standards. TSO articles must have separate approval for installation in an aircraft. The instrument may be installed only according to 14 CFR part 43 or the applicable airworthiness requirement.