

***EFI Technology Inc.
Engine Control System***

Hardware Reference Guide



THIRD ISSUE January 1st 2016

The EFI logo is a trademark of EFI Technology Inc, Torrance CA

© 1993-2016 EFI Technology Inc. All rights reserved.

www.efitechnology.com

Documentation

Copyright

Information in this document is subject to change without notice. Complying with all applicable copyright laws is the responsibility of the user. Without limiting the rights under copyright, no part of this document may be reproduced, stored in or introduced into a retrieval system, or transmitted in any form or by any means (electronic, mechanical, photocopying, recording, or otherwise), or for any purpose, without the express written permission of EFI Technology.

EFI Technology may have patents, patent applications, trademarks, copyrights, or other intellectual property rights covering subject matter in this document. Except as expressly provided in any written license agreement from EFI Technology, the furnishing of this document does not give you any license to these patents, trademarks, copyrights, or other intellectual property.

This program is protected by copyright law and international treaties. Unauthorized reproduction or distribution of this program, or any portion of it, may result in severe civil and criminal penalties and will be prosecuted to the maximum extent possible under law.

© 1993-2016 EFI Technology Inc. All rights reserved.

Disclaimer

EFI Technology Inc makes no representation or warranties of any kind whatsoever with respect to the contents hereof and specifically disclaims any implied warranties of merchantability or fitness for any particular purpose. EFI Technology Inc. shall not be liable for any errors contained herein or for incidental or consequential damages in connection with the furnishing, performance or use of the software, hardware or this written material.

EFI Technology Inc. reserves the right to revise this publication from time to time and to make changes in the content hereof without obligation to notify any person of such revision or changes. A copy of the EFI Technology Inc. Sales Terms and Conditions is available on request and includes a declaration of the warranty and limitation of liability which apply to all EFI Technology Inc. products and services.

Health and Safety

Any hazardous materials used in EFI products are clearly marked with appropriate symbols. Product safety data sheets relating to these materials are available on request.

Field of Use

For the purposes of this document, EFI Technology Inc. understands that the intended Field of Use for this product is Automotive Racing Applications. All other existing or future applications are considered outside of this Field of Use.

Technical Support

EFI Technology Inc. provides a first-line of technical support to its customers with regard to the installation and operation of the Engine Control Systems.

On site support is also available and will be charged on a time and expenses basis or through support contracts established with each customer. This will provide for the following services:

- Support Engineer attendance at all or an agreed to number of races.
- Ongoing system training.
- Assistance with system diagnostics.
- Access to emergency spare components.
- Unlimited telephone technical support.
- Access to restricted EFI web site areas that contain software updates.

Contents

| | |
|---------------------------------------|-----------|
| Hardware Reference Guide | 1 |
| Documentation | 2 |
| Copyright..... | 2 |
| Disclaimer..... | 3 |
| Technical Support | 3 |
| Contents..... | 4 |
| Table of Figures | 6 |
| Introduction | 7 |
| Overview | 7 |
| Specifications | 8 |
| Connector Information | 9 |
| Autosport Connectors | 9 |
| Connector Details | 10 |
| Autosport part numbering | 11 |
| Contact arrangements | 12 |
| Installation..... | 13 |
| Connecting the ECU | 14 |
| Power requirements | 15 |
| Connections | 15 |
| Connection methods..... | 16 |
| Backup battery | 16 |
| Battery Connections | 17 |
| ECU Systems..... | 18 |
| Installation Information | 20 |
| Harness Installation | 20 |
| ECU Installation | 22 |
| ECU Orientation | 23 |
| Instrumentation | 25 |
| Connecting Sensors | 26 |
| Sensor types | 26 |
| Sensor Wiring | 27 |
| Connecting a potentiometer | 27 |
| Connecting a strain gauge..... | 28 |
| Connecting an RTD sensor | 29 |
| Connecting a voltage output..... | 29 |

Appendix 30

Contact Information 31

 Address 31

 Web Information..... 31

Software License Agreement 32

 END-USER LICENSE AGREEMENT 32

 LIMITED WARRANTY 33

Table of Figures

| | |
|------------------------------------------------------|----|
| Figure 1 – R8 ECU | 7 |
| Figure 3 - Autosport Free plug, type 6 | 10 |
| Figure 4 - Autosport Inline receptacle, type 1 | 10 |
| Figure 5 - Connector Part Numbering | 11 |
| Figure 6 - Battery Connections | 16 |
| Figure 7 - ECU Connections | 18 |
| Figure 8 - ECU Orientation | 23 |
| Figure 21 - Connecting a single ended input | 27 |
| Figure 22 - Connecting a single ended input | 28 |
| Figure 23 - Connecting a differential input..... | 28 |
| Figure 24 - Connecting an RTD sensor | 29 |
| Figure 25 - Connecting a voltage output | 29 |

Introduction

Overview

The EFI Engine Control Systems are designed for all levels of professional motorsports and available with up to 4, 8, 12 and 16 injector drives, 22 analog inputs and 4 digital channels. All analog inputs can be configured as 0-5 volt.

Some products have fully integrate chassis control such as transmission shifter, torque converter, shock adjustment, nitrous outputs, chute release etc.

Communications is via Bluetooth, CAN, USB, RS232 or current loop depending on the product and can interface to a wide range of 3rd party data logging systems.

All analog inputs are 0-5 volt or RTD inputs and compatible with most standard engine sensors. Strain gauge inputs require external in-line amplifiers with adjustable gains.

The system uses the latest Power to Win 9.0 software suite compatible with Win 8/10 64-bit operating systems.



Figure 1 – R8 ECU

More Information

There is a wealth of additional information available on the EFI Technology web site at www.efitechnology.com. You can find, updates to the documentation, free downloads, technical articles, engineering information and much more.

Specifications

Connector Information

Autosport Connectors

The EFI Engine Control System uses Deutsch Autosport AS, harsh environment connectors. The AS series is a range of medium and high density circular connectors designed to meet the stringent requirements of the motorsports industry.

Autosport connectors are manufactured using high strength aluminum alloys with black zinc coated shells. Contacts are copper alloy with gold plating and insulators are made with polyamide and fluorinated silicone.

Autosport connectors are used throughout the EFI system, its associated components and harnesses.

Features

- High density arrangements
- Contact sizes 16, 20 & 22
- Positive locking mechanism
- Conductive black zinc finish
- Interfacial and wire sealing
- 100% scoop proof with RFI grounding
- Integral shield and boot location
- In-line and hole mounting styles
- Environmentally sealed
- Standard gold plated contacts
- 5 keyway orientations (color coded)

Contact rating

| | | | |
|----------------|--------|----------|---------|
| Contact size | 22 | 20 | 16 |
| Current rating | 5 amps | 7.5 amps | 20 amps |
| Max wire dia. | 0.4mm | 0.6mm | 1.2mm |

Temperature rating

-55 deg to +175 deg C

Vibration

Greater than 60g RMS in 3 axes

Connector Details

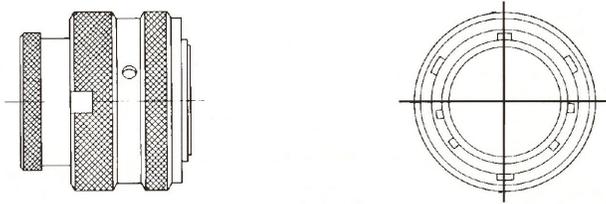


Figure 2 - Autosport Free plug, type 6

Deutsch Autosport connectors use a rotating sleeve to lock the two halves of the connector together. To connect Deutsch Autosport connectors:-

- 1 Make sure that the two connectors are compatible by checking that the number of contacts and the position of the keyways is the same for both connectors.
- 2 Align the keyways, and bring the two halves of the connector together.
- 3 Apply light pressure to the connector as you slowly turn the knurled sleeve.
- 4 When the latches connect with the sleeve, keep turning until you hear the sleeve click.

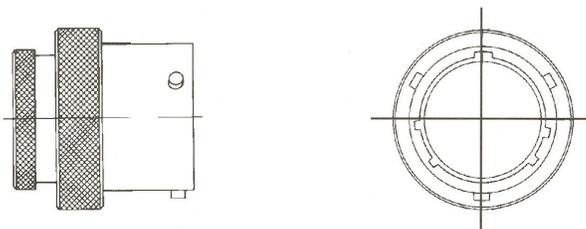


Figure 3 - Autosport Inline receptacle, type 1

The contacts of a Deutsch Autosport connector are labeled on the connector itself. The contact numbers are given on the outside and inside of the connector.

Autosport part numbering

The part number is made up using the AS range reference followed by the style, the shell size, the contact arrangement, the insert type and the shell keyway e.g. AS108-35PN. The modification code is only applicable if a special modification has been made to the connector.

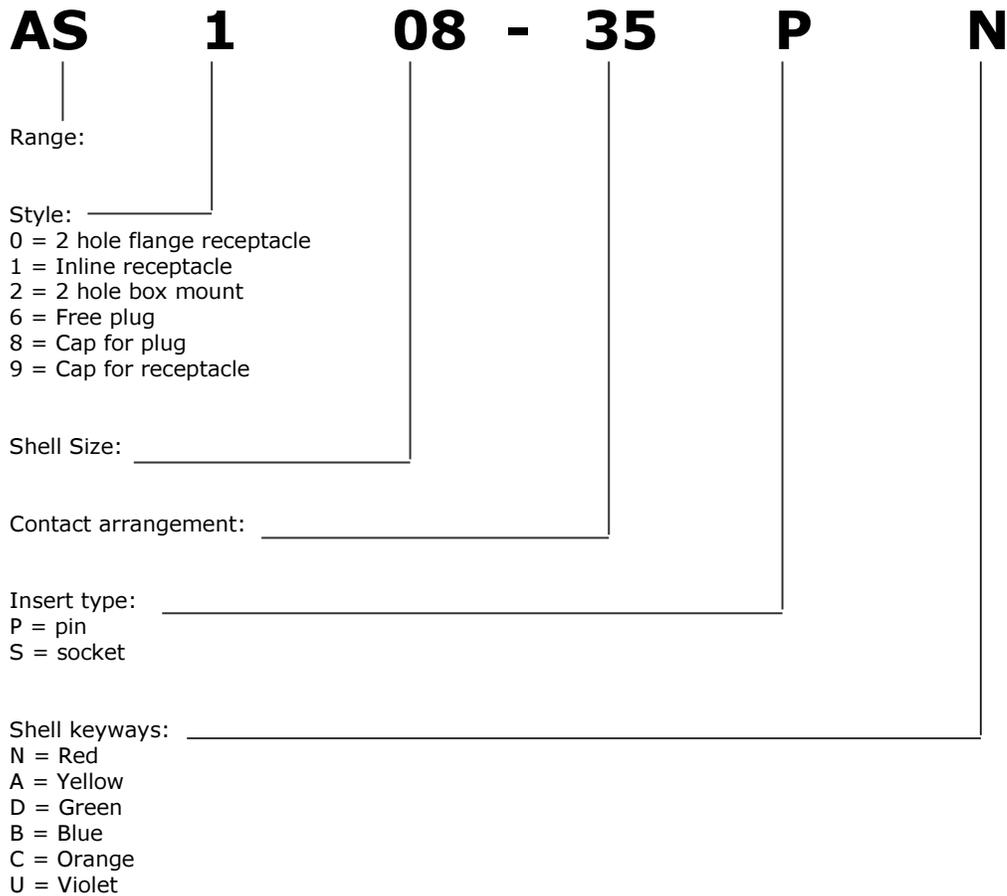


Figure 4 - Connector Part Numbering

Contact arrangements

Deutsch Autosport connector shell size and contact arrangements

The shell size and contact arrangement are shown below. Three sizes of contact are available: sizes 22, 20 and 16. The table below shows which sizes can be fitted.

| Shell size | Contacts | Size 22 | Size 20 | Size 16 |
|------------|----------|---------|---------|---------|
| 08 | 98 | - | 3 | - |
| 08 | 35 | 6 | - | - |
| 10 | 98 | - | 6 | - |
| 10 | 35 | 13 | - | - |
| 12 | 04 | - | - | 4 |
| 12 | 98 | - | 10 | - |
| 12 | 35 | 22 | - | - |
| 14 | 97 | - | 8 | 4 |
| 14 | 19 | - | 19 | - |
| 14 | 35 | 37 | - | - |
| 16 | 08 | - | - | 8 |
| 16 | 26 | - | 26 | - |
| 16 | 35 | 55 | - | - |
| 18 | 32 | - | 32 | - |
| 18 | 35 | 66 | - | - |
| 20 | 16 | - | - | 16 |
| 20 | 39 | - | 37 | 2 |
| 20 | 41 | - | 41 | - |
| 20 | 35 | 79 | - | - |
| 22 | 21 | - | - | 21 |
| 22 | 55 | - | 55 | - |
| 22 | 35 | 100 | - | - |
| 24 | 29 | - | - | 29 |
| 24 | 61 | - | 61 | - |
| 24 | 35 | 128 | - | - |

Installation

Connecting the ECU

The majority of vehicles have the negative terminal of the battery connected to the chassis and is commonly referred to as having a negative earth.

Battery connections are usually made through a Master Switch, which may be fitted in either the negative or positive, or both, supply leads from the battery. The Master Switch disconnects all electrical power in an emergency, and is required by the regulations governing most motor sports.

When connecting an ECU you should make sure that:

- the ECU remains powered up when the engine is turned off
- the ECU does not drain the car battery excessively
- the supply voltage to the ECU remains high enough for correct operation

When connecting an ECU to the battery:

- make all connections to, or as near as possible to, the battery terminals
- use a common point for connections to the battery
- keep the wire between the battery terminal and the connection point as short as is possible. Use heavy gauge wire, or braiding for this connection
- use 20-gauge or 22-gauge wire for connections between an ECU, and the connection point

CAUTION: Before making any connections to the battery, make sure you are confident with any harnessing that you have made. Remove power from the ECU before making any alterations.

Power requirements

The ECU needs a supply voltage greater than 8.0 volts to start-up and between 10.0 volts and 18.0 volts to operate correctly. If the supply voltage is outside the 8.0 volts and 18.0 volts limits, the LCU will not function correctly.

Depending upon the loads that you have connected and number and type of sensors the current consumption is typically between 1 amp and 3 amps. The battery +VE and battery -VE supply lines are fitted with a 5 amp fuse inside the LCU.

Connections

All system battery connections must only be connected to the battery at one point. Multiple connections to a length of wire or the chassis, will introduce noise and reduce the integrity of sensor readings.

The optimum installation utilizes common connection points for the positive and negative terminals of the battery. Connecting equipment at a common point reduces the variation in supply voltage as current returns to the battery from other electrical components.

Connection methods

The most common form of electrical system for vehicles consists of a battery an alternator and electric starter motor. Power to the electrical components is made from the battery through a master Switch that isolates the entire vehicle electrical system. Battery power is then directed to secondary switches for all other device connections.

If your vehicle has this type of electrical system, then connect your logging system using the arrangement shown below. Use 20 or 22 gauge twisted wire to the logger system.

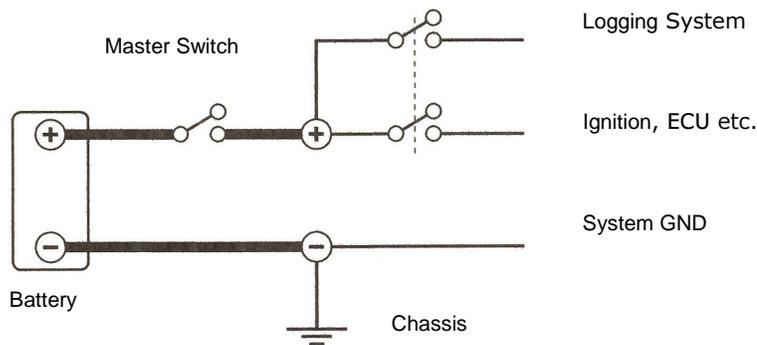


Figure 5 - Battery Connections

Backup battery

Some vehicles fitted with an electrical starter motor may drop the battery to as low as 6 volts during starting conditions. The ECU will not function normally below 8 volts and it may be necessary to install a separate backup battery to maintain sufficient voltage under these conditions.

Battery Connections

The ECU utilizes an internal common input power supply and grounding scheme with redundant connections. The battery connection and pins utilized are listed below.

NOTE: You must fit a backup battery if you are using safety critical or control applications. For further details refer to the section on fitting a backup battery.

Connecting the ECU

The ECU is connected to the battery using pins located on the 79 pin system connector. These battery connections provide all of the power to the ECU and their functions are listed below. It is recommended that at least 3 of the PWR GND pins are utilized for the battery connection.

Battery connections

| Pin | Connection | Function |
|-----|------------|-----------|
| 77 | PWR GND | Battery - |
| 78 | PWR GND | Battery - |
| 79 | PWR GND | Battery - |
| - | - | - |
| 26 | VBATT | Battery + |

The battery input connection is protected by a 5 amp thermal fuse. The input circuit is also protected against reversed battery polarity connections and transient voltages up to 35 volts.

ECU Systems

If your vehicle is fitted with a data logger you can connect it to the ECU to enable them to share information. Data is typically shared using one of the defined ECU communications interfaces.

It is recommended that the ECU and logging system are connected to the battery using common ground connections. If your vehicle has this type of installation then connect the logging system and ECU using the arrangement shown below.

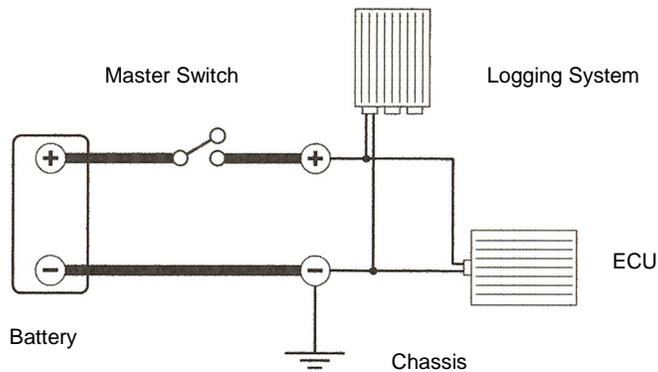


Figure 6 - ECU Connections

Ground loops

The ECU should be connected directly to the negative terminal of the battery but in some cases may be connected inadvertently to chassis ground causing a ground loop causing signal noise and incorrect sensor readings.

Ground loops can also occur if the shell of a connector touches the chassis and it may be necessary to fit rubber insulating material or boots over the connectors.

Testing for ground loops

Ground loops can be avoided by making direct connections to the battery. Before using your System, or if you are having problems with noise appearing in data from sensors, you should test for ground loops.

To test for a ground loop:

1. Disconnect the System connector from the car battery.
2. Measure the resistance between the ECU case and the chassis. If the resistance reading is low, then there is an electrical path to the chassis.
3. Starting with the sensor or junction box that is furthest away from the ECU, unplug ONE component at a time and measure the resistance between the ECU case and the chassis.
4. Repeat step 3 until the resistance reading is infinite.
5. Carefully check the component that you last disconnected for signs of shorting.

If the resistance reading is greater than 10k ohms, then your System is electrically isolated from the chassis. If you are still experiencing noise problems, then you should check that boots are fitted to all connectors, and that no connector is making contact with the chassis through vibration.

Avoiding ground loops

The most common source of a ground loop is a grounded sensor. Ensure that all sensors used are either isolated from the chassis (or engine), or if that is not possible then isolate the shield connection from that sensor.

Installation Information

This section contains general information on how to install the Engine Control System, harnesses and associated equipment into your vehicle.

Harness Installation

The harnesses manufactured by EFI Technology are made from spec 55 military airframe wire that can withstand temperatures up to 150°C. Harnesses are terminated with Deutsch Autosport connectors, are shielded and covered with Raychem heat shrink sleeve unless otherwise specified.

If you are making your own harnesses, then ask EFI for help with selecting suitable wire and connectors. Using poor quality wire and connectors may affect the performance and reliability of your logging System.

CAUTION: Manufacturing your own harnesses may void some of the terms and conditions of your product warranty.

Fitting harnesses

When fitting harnesses to your car, consider the following points:

- Care should be taken when routing wires near the engine. Make sure that your harnesses do not make contact with hot engine components such as exhaust pipes, manifolds, turbochargers or brake components.
- Excessive heat will burn the protective heat shrink layer, and may expose the inner shield and wires. This may lead to intermittent electrical faults and noise.
- When you install your harnesses, make sure that their position will not be affected by localized heating (heat soak) when the car is stationary.
- Remember that brake components frequently get very hot, and it will only be apparent after you have been running your car.

The easiest way to install harnesses is to make all connections to the ECU first, and then work away, towards any junction boxes, auxiliary equipment and sensors. Generally the harnesses become smaller and easier to route further away from the ECU.

Interference

In general, harnesses should not be routed next to sources of electrical interference i.e. ignition coils, plug leads, alternators, fuel pumps, telemetry equipment, especially antennas, and Ignitions. If you have to route a harnesses near any of these, try to avoid parallel runs.

Notes

- Allow harnesses to follow their natural curvature. Do not force them around very tight radii.
- When a harnesses passes through a hole in the chassis or bulkhead, make sure that there is no risk of it being cut or damaged.
- When using tie-wraps avoid attaching harnesses to sharp or abrasive objects.

Manufacturing

When making your own harnesses, use a spare length of cable, and route it exactly as the finished harness. Use off-cuts of cable to create branches and carefully mark the main harness where the branches occur. By spending time adjusting your dummy harness, you can achieve the optimum installation for your vehicle.

If you are supplying a harness specification to EFI, take measurements from the dummy harness to create an engineering drawing. Use the following standards when specifying measurements and dimensions to EFI.

Specify all dimensions:-

- to the end of connectors
- to the centerline of transitions
- to end of terminals or lugs

ECU Installation

When installing the ECU you should consider the following points:

- The ECU is resistant to water, but after prolonged exposure, water, oil and fuel may eventually work their way inside the ECU.
- Select a position where the ECU will not be in constant contact with any fluid.
- The ECU must be protected from vibration. Use anti-vibration mounts.
- Make sure that air can flow over the ECU to keep it below +70°C.
- Do not place the ECU near sources of electrical interference e.g. Ignition coils, plug leads, alternators and telemetry antenna.

ECU Orientation

Orientation

Some ECU's contains three identical accelerometers which are used to measure the lateral, longitudinal and vertical accelerations for each of the axes. The vertical accelerometer is a build option and may not be installed in your ECU.

It is particularly important that the lateral acceleration axis is in the correct orientation for the track mapping feature to function correctly in the analysis program. Please refer to the section later in this chapter if you need to change the standard ECU orientation. The standard ECU orientation and acceleration axes are shown in the figure below.

The ECU orientation is shown with the connectors pointing toward the front of the vehicle with the 66 pin system connector located on the right side of the housing.

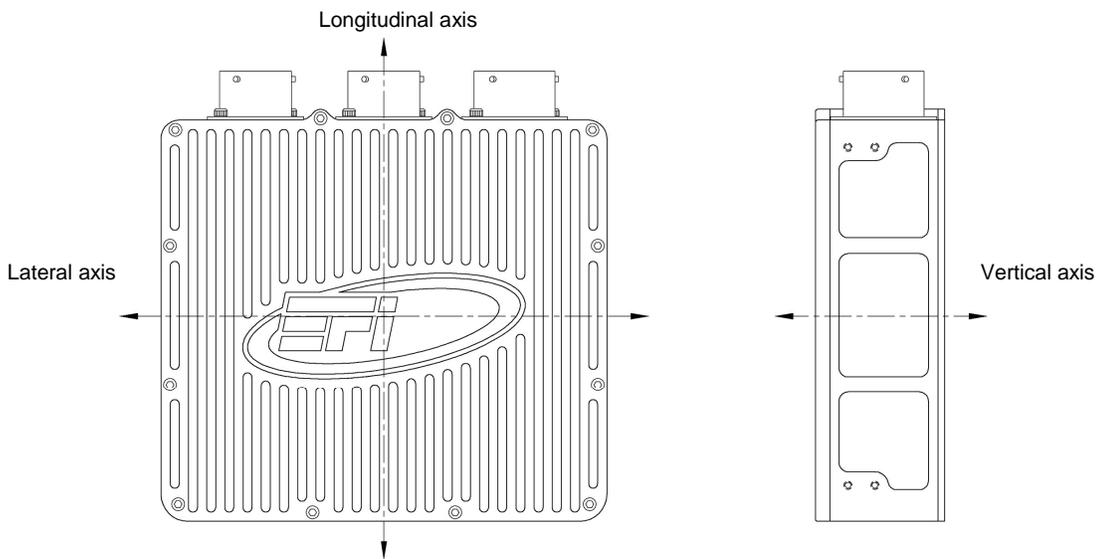


Figure 7 - ECU Orientation

Changing orientation

You can mount the ECU in a different orientation to the standard method. The three axes of acceleration (longitudinal, vertical and lateral) will still be measured, but by a different accelerometer to that used in the standard orientation. The channel names will need to be changed in the Power to Win software to correctly identify each channel.

The accelerometer channel names can be changed in the calibration editor window under channel calibrations. Please refer to the Help file or contact your EFI representative for further information on re-naming the acceleration channels.

Installing an ECU

- Select a suitable dry location for the ECU.
- Make sure that the area does not exceed 70°C.
- Localized heating effects will add to the ambient air temperature.
- Use the mounting lugs and vibration mounts to secure the ECU.
- When you have installed the ECU make sure that air can flow around it.

CAUTION: The ECU housing acts as a heat sink for its internal electronic components. It is Important that air can flow around the sides of the ECU.

Instrumentation

Connecting Sensors

The EFI engine control system uses an Autosport 5 pin connector standard for all sensor connections. The standard pinout for some different sensor types are given in the table below.

Sensor types

5 pin sensor connections

| Pin | Single | Diff | RTD | Therm | Dig |
|-----|--------|------|------|-------|-------|
| 1 | N/C | N/C | N/C | N/C | 12V * |
| 2 | 5V | 5V | N/C | N/C | 5V |
| 3 | SIG+ | SIG+ | RTD+ | SIG+ | SIG |
| 4 | N/C | SIG- | RTD- | SIG- | N/C |
| 5 | GND | GND | N/C | N/C | GND |

* See the section on voltage regulators for information about the supply current available for each of the regulated outputs.

Excitation

The sensor excitation voltage is typically 5 or 12 volts. The ECU also has an adjustable regulator set nominally at 8 volts and a fixed 20 volt 300mA output available.

Inputs

Differential means that there is a signal +ve and signal -ve input. Single ended means that the signal -ve is common with the signal ground input.

Generally only low current sensors should be used with single ended inputs. These types of input are suited to temperature or pressure sensors where the absolute accuracy is not required.

Mode

Unipolar means that the inputs can only measure positive signals. Bipolar means that the input can measure both positive and negative signals.

Gain

Unipolar channels can be configured with gains from 0 to 8. Bipolar channels can be configured with gains from 0 to 1200.

Types

There are two main types of sensor available, absolute and ratio-metric.

Absolute sensors are usually active sensors, such as accelerometers, which have an internal voltage reference or regulator and are unaffected by drift in the excitation voltage.

Ratiometric sensors, such as potentiometers or strain gauges, are affected by the excitation voltage. If you increase the excitation voltage the output signal will also increase proportionally.

In ratio-metric mode the ECU monitors the excitation voltage and compensates for any drift. This is useful for strain gauges or sensors using high gains where the excitation voltage may be higher to increase the output.

In ratio-metric mode the calibration is unchanged even when the excitation is increased. This means you can decrease the gain and improve the signal to noise ratio.

Sensor Wiring

Wiring information for some different sensor types is given in the following figures.

Connecting a potentiometer

Connect a potentiometer to a single ended input as shown below. If an amplifier is installed it should be configured with a gain of 1.

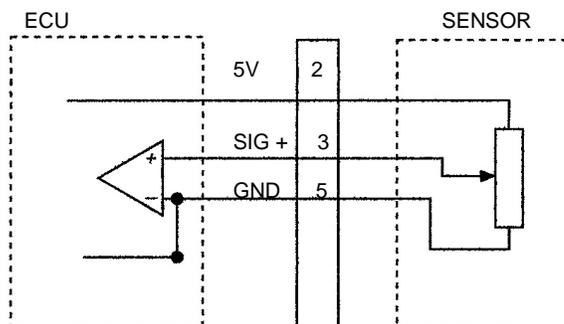


Figure 8 - Connecting a single ended input

Connect a potentiometer to a differential input as shown below.

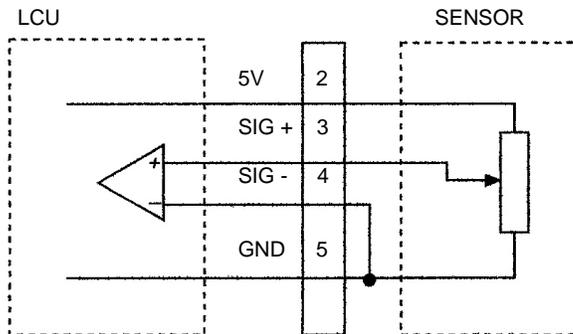


Figure 9 - Connecting a single ended input

Connecting a strain gauge

Connect a strain gauge as shown below. The input amplifier should be configured with a gain from 100 to 1000 and typically with an offset of 2.5 volts.

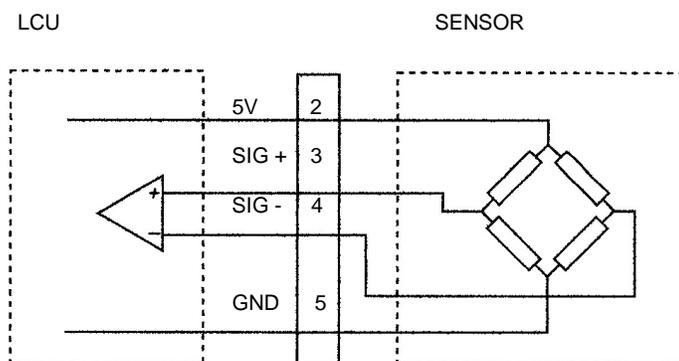


Figure 10 - Connecting a differential input

Connecting an RTD sensor

Connect an RTD as shown below. The input amplifier should be configured with a gain of 100 and use a 3K92 pull-up resistor connected to 5 volts on the input.

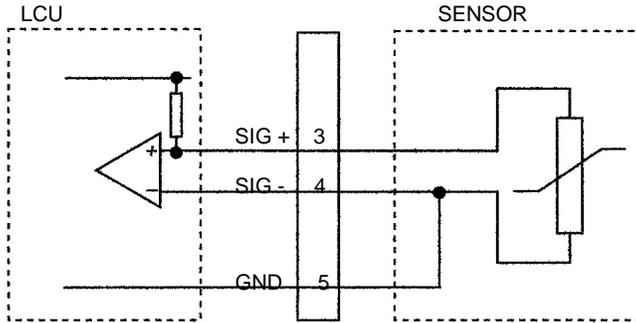


Figure 11 - Connecting an RTD sensor

Connecting a voltage output

Connect 0-5 volt output sensor (e.g. pressure transducer) as shown below. Use either the 5v or 12v excitation voltage as recommended by the sensor manufacturer.

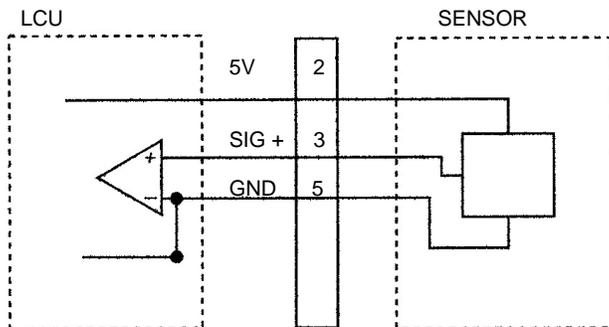


Figure 12 - Connecting a voltage output

Appendix

Contact Information

Address

EFI Technology Inc.
4025 Spencer St. #102
Torrance, CA 90503

Tel 310 793 2505
Fax 310 793 2514

Web Information

| | |
|----------|--------------------------------------------------------------------------|
| Web site | www.efitechnology.com |
| support | support@efitechnology.com |
| sales | sales@efitechnology.com |
| jobs | jobs@efitechnology.com |

Software License Agreement

END-USER LICENSE AGREEMENT

This End-User License Agreement "EULA" is a legal agreement between you and EFI Technology Inc. "EFI" for software products which may include associated software components, media, printed materials and online or electronic documentation "SOFTWARE PRODUCT". By installing, copying, or otherwise using the SOFTWARE PRODUCT, you agree to be bound by the terms of this EULA. If you do not agree to the terms of this EULA, do not install or use the SOFTWARE PRODUCT. If the SOFTWARE PRODUCT was purchased by you, you may return it to your place of purchase for a full refund.

COPYRIGHT

The SOFTWARE PRODUCT and the related documentation is owned by EFI or its suppliers and is protected by United States and international copyright laws. You must treat this Software like any other copyrighted material, EXCEPT you may copy it to a single computer hard disk to be used, or make one (1) archive copy of the Software for the sole purpose of protecting your investment from loss. You agree to use your best efforts to ensure that the provisions of this agreement are not violated by you, your employees, agents, representatives or subcontractors or others in your service. Title to the original and all copies of the Software remains with EFI.

GRANT OF LICENSE

EFI grants you a non-exclusive license to: Use the Software on a single computer terminal connected to a single computer. Make one (1) archive copy of the Software for the sole purpose of protecting your investment from loss provided you include the EFI copyright notice on the copy. Transfer the Software, after written notification to EFI together with this License to another party, but only if the other party agrees to accept the terms and conditions of this Agreement and provided you retain NO copies of the Software including any updates and/or prior versions.

YOU MAY NOT

Use the Software on more than one computer at a time nor on multiple computers in a network. Rent, lease, or sublease any portion of the Software. Make copies of the User's Manual or related documentation. Modify, translate, or merge the Software with any other software. Reverse engineer, reverse assemble, or decompile the Software. Remove or omit any copyright or other proprietary rights notices from the Software.

LIMITED WARRANTY

EFI warrants that the physical diskette(s) and the physical documentation provided are free of defects in material and workmanship, assuming normal use, for a period of ninety (90) days from the date of purchase by you as evidenced by a copy of your receipt. In the event a defect occurs in material or workmanship within the warranty period, EFI will replace the defective diskette or documentation. EFI's entire liability and your sole and exclusive remedy shall be the replacement of the defective diskette or documentation. EFI warrants that it has good title to the Software.

EFI TECHNOLOGY INC. MAKES NO OTHER WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE SOFTWARE IS LICENSED ON AN "AS IS" BASIS. IN NO EVENT WILL EFI TECHNOLOGY INC. BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY NATURE INCLUDING BUT NOT LIMITED TO ANY LOSS OF PROFIT, LOSS OF BUSINESS, INJURY TO REPUTATION, LOSS OF CUSTOMERS, LOSS OF DATA USE, INTERRUPTION OF SERVICE, LOSS OF ANTICIPATORY PROFITS, YOUR INABILITY TO USE THE PRODUCT, OR THE INABILITY OF THE PRODUCT TO OPERATE WITH OR IN CONJUNCTION WITH OTHER PRODUCTS. BUYER'S RECOVERY FROM SELLER FOR ANY CLAIM SHALL NOT EXCEED BUYER'S PURCHASE PRICE FOR THE PRODUCTS IRRESPECTIVE OF THE NATURE OF THE CLAIM, WHETHER IN CONTRACT, TORT, WARRANTY OR OTHERWISE.

GOVERNING LAW

This License Agreement and Limited Warranty shall be construed, interpreted, and governed by the laws of California and any action hereunder shall be brought only in California.

TERMINATION

This license agreement shall terminate upon violation of its terms by you, your employees, agents, representatives, subcontractors or others in your service.

U.S. GOVERNMENT RESTRICTED RIGHTS

The Software and documentation are provided with restricted rights. Use, duplication, or disclosure by the government is subject to restrictions as set forth in subdivision (c)(1)(ii) of The Rights in Technical Data and Computer Software clause at DFARS 52.227-7013 or subparagraphs (c)(1) and (2) of the Commercial Computer Software Restricted Rights at 48 CFR 52.22-19, as applicable. The contractor/manufacturer is EFI Technology Inc. 4025 Spencer St. #102, Torrance, CA 90503.