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# Quick Installation Guide

## Marine Pro.

### RIO 412 Exhaust Temp. Monitor



# auto MASKIN



## **Quick Installation Guide**

### **RIO 412 – Exhaust Temperature Monitor**

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|          |               |
|----------|---------------|
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| Revised  | Installation  |

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# Document Information

## About this manual

This manual has been published primarily for professionals and qualified personnel.

The user of this material is assumed to have basic knowledge in marine systems, and must be able to carry out related electrical work.

Work on the low-voltage circuit should only be carried out by qualified and experienced personnel.

Installation or work on the shore power equipment *must only* be carried out by electricians authorized to work with such installations.

## Responsibilities

It is the *sole responsibility of the installer* to ensure that the installation work is carried out in a satisfactorily manner, that it is operationally in good order, that the approved material and accessories are used and that the installation meet all applicable rules and regulations.

**Note!** Auto-Maskin continuously upgrades its products and reserves the right to make changes and improvements without prior notice.

All information in this manual is based upon information at the time of printing.

For updated information, please contact your local distributor.

## Ordering information

The **Marine Pro** range includes the 200- and 400 Series of compatible panels.

| Item                                     | Part #  |
|------------------------------------------|---------|
| DCU 208 - Engine Control Unit            | 1006480 |
| DCU 210 - Engine Control Unit            | 1006481 |
| RP 210 - Remote Panel                    | 1006482 |
| DMU 206 - Engine CAN bus Reader          | 1006483 |
| RIO 410 - I/O Expansion Unit             | 1006453 |
| RIO 412 - Exhaust Temp. Monitoring       | 1006454 |
| RIO 425 - Generator Interface            | 1006409 |
| SDU 410 - Safety Unit                    | 1006451 |
| RP 410 - Remote Panel                    | 1006452 |
| Ethernet Switch - 5 channels, 24V        | 1050165 |
| J1939 CAN bus Cable                      | 1009110 |
| IP Camera - for RP 210/410 remote panels | 1121258 |
| MK-14 Relay expansion (400 Series only)  | 1121341 |

## About the RIO 412

The RIO 412 is a twenty channel K-type thermocouple unit.

It will convert the temperature at each thermocouple channel into a value that can be read on a SAE J1939 CAN bus address.

The unit can be used stand-alone, or it can be linked into the Auto-Maskin 200- or 400 Series of engine panels; DCU.

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## Matching firmware

If the RIO 412 is to be connected to a DCU 410 engine panel, then the firmware requirement in the DCU engine panel must be the following or newer.

| Panel              | Firmw. | Release   |
|--------------------|--------|-----------|
| DCU 200/400 Series | 2.3    | Aug. 2011 |

## Unwrapping

The package includes:

- This Quick Installation Guide
- The RIO 412 unit
- A 40-pin connector for the 20 TC-channels
- An 8-pin connector for power supply and communication
- A plastic bag with various Deutsch® connector fastening material





# Installation

The RIO 412 is normally installed in a steel enclosure close to the engine. Operating temperature is -40 to +85 °C, and non-condensing humidity shall be less than 95%.

Note that if the ambient temperature were to exceed 120 °C, then the device would NOT be expected to return to proper operation.

**Note!** In case of electrical disturbances (AC voltage) on the chassis, the RIO 412 should be isolated in the installation.

# Dimensions

See unit dimensions below.

# Electrical Connections

## Power supply

Supply Voltage: 9-60 VDC (12V, 24V or 48V nominal)

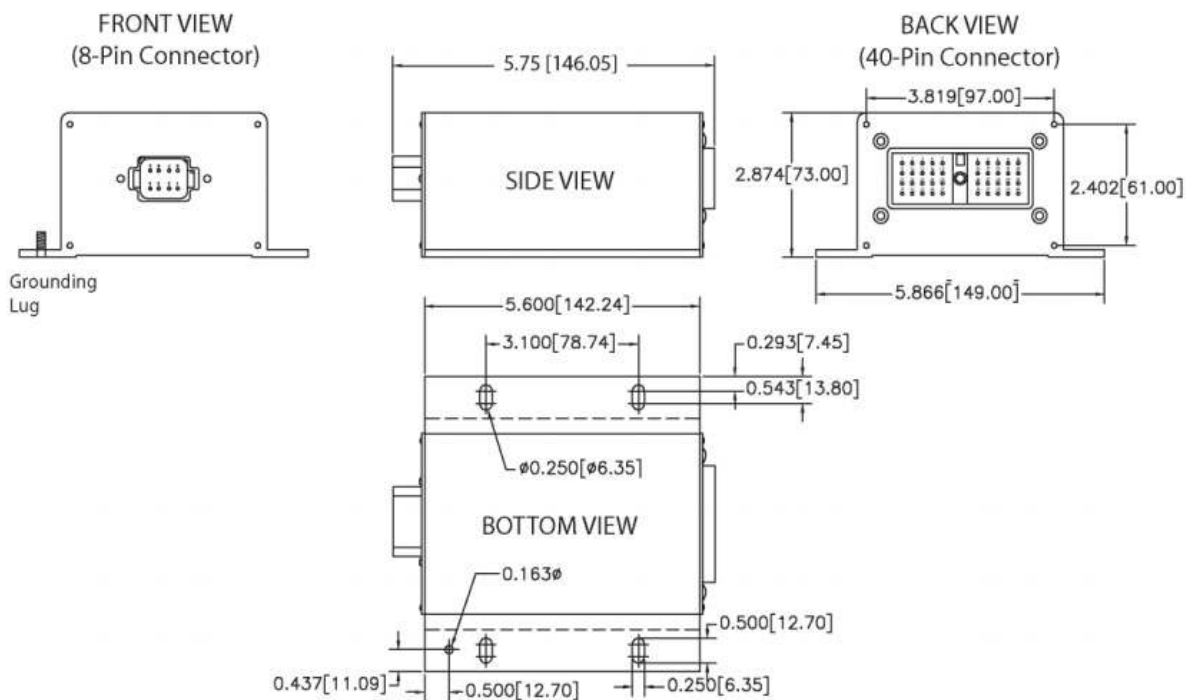
## Thermocouple type

The RIO 412 is configured to accept K-type thermocouples only.

For other types, please contact your distributor.

## Source address

The RIO 412 source address is 235 (0xEB).

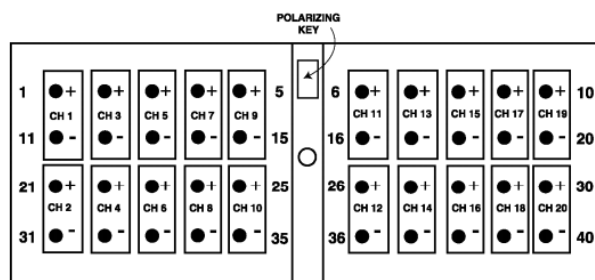
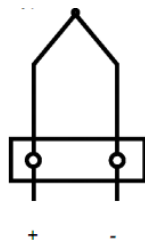


Dimensions: inches [mm]

## Cylinder probe connection

Connect cylinder sensor 1 to channel 1, etc. Connect turbo sensors from channel 20 and downwards.

|            |            |
|------------|------------|
| Cylinder 1 | Channel 1  |
| Cylinder 2 | Channel 2  |
| etc.       | etc.       |
| Turbo 1    | Channel 19 |
| Turbo 2    | Channel 20 |



FRONT VIEW OF  
MODULE MOUNTED CONNECTOR  
DEUTSCH P/N: DRC13-40PA

## Addressing

The table below summarizes the twenty channels and the corresponding SAE J1939 CAN bus addresses.

| Ch. # | SPN  | PGN    |
|-------|------|--------|
| 1     | 1137 | 0xfea3 |
| 2     | 1138 | 0xfea3 |
| 3     | 1139 | 0xfea3 |
| 4     | 1140 | 0xfea3 |
| 5     | 1141 | 0xfea2 |

| Ch. # | SPN  | PGN    |
|-------|------|--------|
| 6     | 1142 | 0xfea2 |
| 7     | 1143 | 0xfea2 |
| 8     | 1144 | 0xfea2 |
| 9     | 1145 | 0xfea1 |
| 10    | 1146 | 0xfea1 |
| 11    | 1147 | 0xfea1 |
| 12    | 1148 | 0xfea1 |
| 13    | 1149 | 0xfea0 |
| 14    | 1150 | 0xfea0 |
| 15    | 1151 | 0xfea0 |
| 16    | 1152 | 0xfea0 |
| 17    | 1153 | 0xfe9f |
| 18    | 1154 | 0xfe9f |
| 19    | 1155 | 0xfe9f |
| 20    | 1156 | 0xfe9f |

## Connecting to the DCU engine panel

The RIO 412 can be connected to an Auto-Maskin DCU in the 200- or 400 Series.

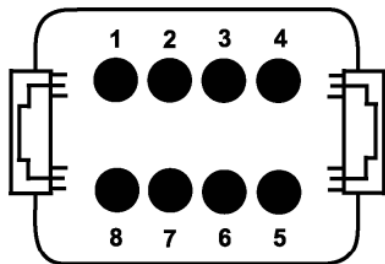
## Communication

Connect the RIO 412 CAN bus interface to either the DCU 210/208 or the DCU 410/408 as follows:

| DCU    | RIO 412 | 410 | 210 |
|--------|---------|-----|-----|
| CAN-H  | 2       | 51  | 27  |
| CAN-L  | 3       | 50  | 26  |
| Shield | 5       | 49  | 25  |

Make sure the CAN bus is *terminated* at each bus end.

**Note!** To achieve successful communication, make sure to load an EGT template in the DCU Interface **Design** section, and add at least one J1939 CAN bus thermocouple signal.



FRONT VIEW  
MODULE MOUNTED CONNECTOR  
DEUTSCH P/N: DT13-08PA

- 1 = PWR+      5 = SHIELD
- 2 = CAN-H    6 = RS-232 GND
- 3 = CAN-L    7 = RS-232 TXD
- 4 = PWR-     8 = RS-232 RXD

(Mating plug is DT06-08SA with wedgelock W8S and sockets 0462-201-16)

### CAN bus termination

Make sure the CAN bus is terminated with a 120 ohm (1/4 W) resistor at each bus end.

### Configuration example

Below is a screenshot from the DCU 410, where one channel is being configured.

**Note!** For more information about configuring the DCU 410, see the *DCU 410 Installation and Configuration Manual*, 1100269.

figuration j1939

**Exhaust Gas Temp Cyl 20 (PGN: 0xfe9f, SPN: 1156)**

[assign custom name](#)

**General**  
Channel Use: DCU+RP+Silent Event

**Sensor**  
Sensor Unit: Celsius  
Sensor Range Min: -273.00  
Sensor Range Max: 1734.97

**Display**

|                        |                                              |                                          |
|------------------------|----------------------------------------------|------------------------------------------|
|                        | <b>US</b>                                    | <b>Metric</b>                            |
| Display Unit:          | Fahrenheit                                   | Celsius                                  |
| Display Range Min:     | 0.00                                         | 0.00                                     |
| Display Range Max:     | 1500.00                                      | 800.00                                   |
| Display Major Divider: | 250.00                                       | 200.00                                   |
| Display Minor Divider: | 125.00                                       | 100.00                                   |
| Display Multiplier:    | 1                                            | 1                                        |
|                        | <input type="button" value="Update Metric"/> | <input type="button" value="Update US"/> |

**Alarming (in Metric Units)**  
Event: None  
Use As Additional Run: No **Note!** Run = No Alarm

### Renaming channels

If the sensor is not used for exhaust temperature but eg. turbo temperature, then the channel can be renamed to reflect this.

In the screenshot above, choose the **assign custom name** selection.

See the screenshot below for an example on how it is done. Here, the signal on channel 20 is being renamed to **Turbo**.

**Exhaust Gas Temp Cyl 20**

New Language: English

New Text: Turbo

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## Assign the signal to an instrument

### One signal

Finally, the signal can be assigned to an instrument. In the screenshot below, the signal **Turbo** is being assigned to slot 1 in Template 18.

#### Current template

#### Template 18



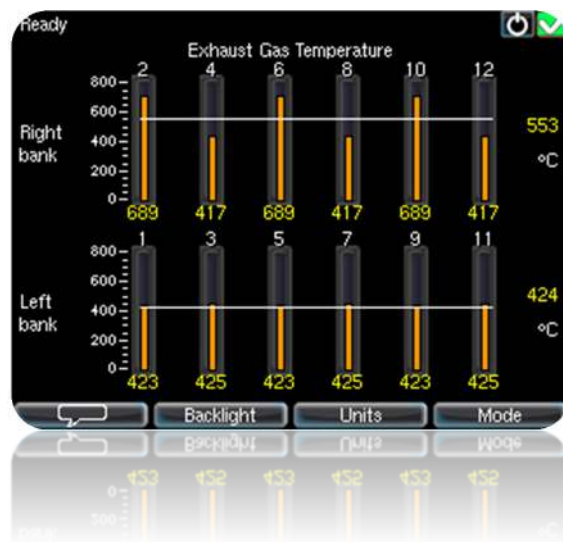
#### Populate Slots

|         |                      |
|---------|----------------------|
| Slot 1: | <input type="text"/> |
| Slot 2: | <input type="text"/> |
| Slot 3: | Turbo                |
| Slot 4: | Engine Speed         |
| Slot 5: | Input Voltage        |
| Slot 6: | Engine Hours         |
| Slot 7: | <input type="text"/> |

Submit Delete Current Page

## Several signals

More typically, the signals from all cylinders are being used in an EGT template, and the end result may be as in the screenshot from a DCU 410 below.



The DCU template calculates the running average per bank, and displays the average bank value on the right-hand side.

