

# FLYBOX®



## Vigilus

## *Installation manual*

Revision 1.1, 13/7/2020  
For firmware version 2.14

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# ***SECTIONS***

**MECHANICAL INSTALLATION**

**ELECTRICAL INSTALLATION**

**TECHNICAL SPECIFICATIONS**

Thank you for purchasing a Flybox® product. We hope it fully satisfy you and makes your flights pleasant and secure.

Developing Vigilus, our intent was to create a compact but complete Engine Information System , easy to install and use.

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## SYMBOLS USED IN THE MANUAL



**NOTE:** Used to highlight important informations.

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**CAUTION:** Used to warn the user and indicate a potentially hazardous situation or improper use of the product.

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**WARNING:** Used to indicate a dangerous situation that can cause personal injury or death if the instruction is disregarded.

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**NOTE:** Keep this manual in the aircraft.

This document must accompany the instrument in the event of change of ownership.

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**NOTE:** This device is intended for installation onto non type certified aircraft only, because it has no aviation certifications. Refer to your local aviation authorities to check if this device may be installed in your aircraft.

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**CAUTION:** Read entirely this manual before installing the instrument in your aircraft, and follow the installation and operating instructions described here.

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**CAUTION:** The pilot must understand the operation of this instrument prior to flight, and must not allow anyone to use it without knowing the operation. Don't use this instrument in flight until you are sure of the correct operating of the same.

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**CAUTION:** When the installation is finished you must do a test, prior to flight, switching on all the possible source of electric noise and checking the properly operation of this instrument.

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**CAUTION:** The software of this instrument can be subject to change, update, addition or removal of functions, so also the operating mode of the instrument can be subject to change. Always refer to the installation and operating manual updated with the software version used in your instrument. To obtain updated manuals, please visit [www.flyboxavionics.it](http://www.flyboxavionics.it).



**WARNING:** For safety reasons, the Vigilus operational procedures must be learned on the ground.

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**WARNING:** Do not solely rely on this instrument to determine the primary engine informations. Always compare the informations provided with other primary instruments to recognize eventual malfunctions.

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**WARNING:** Responsibility for installation lies entirely with the installer. Responsibility for operations lies entirely with the operator. Responsibility for any calibration, settings or any other customization lies with the person performing these operations.

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**WARNING:** It's up to the installer to check the correctness of the settings for its engine, even using one of the Vigilus preset, because engine manufacturers may change parameters without notice. The engine preset of the Vigilus are a help but needs to be checked by the installer.

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**IMPORTANT:** If you do not agree with the notices above do not install this instrument in your aircraft, but return the product for a refund.

*Microel s.r.l. reserves the right to change or improve its products. Information in this document is subject to changes without notice.*

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## SECTION 1

### 1.1 INVENTORY OF MATERIALS

#### 1.1.1 KIT CONTENTS

In this section are listed all the material supplied with the Vigilus+Remote Module kit. Use this list to verify that all the kit components have been delivered correctly.

<b>Factory cod</b>	<b>QTY</b>	<b>Description</b>
DBMIVIGILUS	1	VIGILUS INSTRUMENT
DBMIMRM	1	REMOTE MODULE UNIT
CNNVL16PMICROPR	1	16P CONNECTOR RECEPTACLE HOUSING
CNNVL22PMICROPR	1	22P CONNECTOR RECEPTACLE HOUSING
CNNVL24PMICROPR	2	24P CONNECTOR RECEPTACLE HOUSING
CNNVLCTMICROPR	86	CRIMP CONTACTS
ACCPANNO	1	MICROFIBRE CLOTH

### **1.1.2 OPTIONAL MATERIAL**

In this section are listed the optional material that can be ordered. For updated list & prices consult the web page:

<http://www.flyboxavionics.it/en/vigilus.html>

<b>Flybox P/N</b>	<b>Description</b>
652010	Wiring harness Vigilus-Remote Module for Rotax 912/914
652011	Wiring harness Vigilus-Remote Module for Rotax 912iS
503010	Flybox TFTHP fuel flow transducer
651055	Software key for fuel computer activation
601010	EGT probe with 2.5 m cable + coupling to weld
651012	Separable cable for EGT probe
601020	OAT probe (Outside air temp.)
601030	CAT probe (Carburetor/airbox air temp.)
601041	Fuel pressure transducer with 2.0 m cable + fitting
601060	Ammeter probe +/- 50 A
602000	Oil pressure probe, Rotax 4-20mA compatible
603000	Hand crimping tool for Microfit contacts

## 1.2 INSTALLATION PREPARATION

The following sections provides electrical and mechanical information needed for planning the installation of the Vigilus and Remote module system.

It's recommended to read completely this document before beginning the installation, to become familiar with all aspects of the installation.

### **The installation consists of the following steps:**

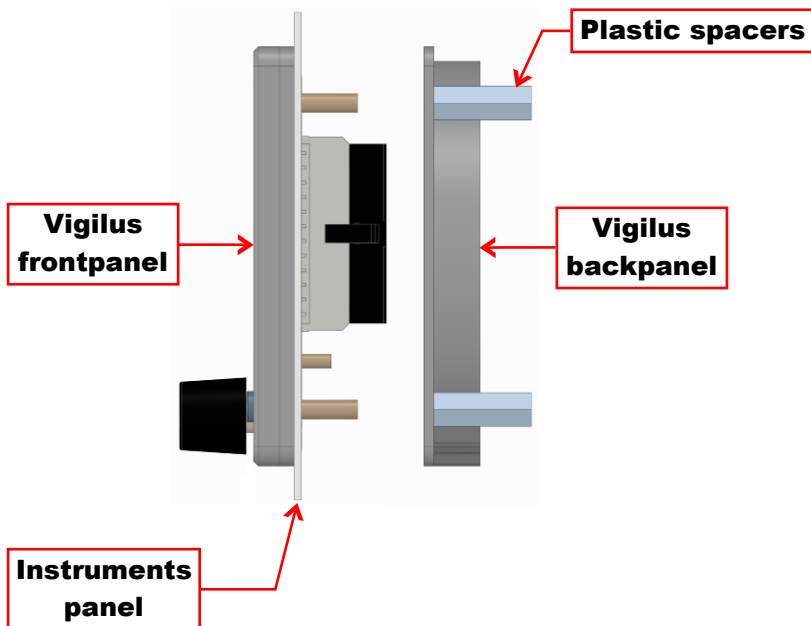
- 1- Inventory of all needed parts
- 2- Planning/layout of the installation
- 3- Mount Vigilus in a suitable location following the instructions in chap.1.3.
- 4- Mount the remote module in a suitable location following the instructions in chap.1.4.
- 5- Assemble the wiring harness, cables and connectors.
- 6- Assemble the pneumatic hoses for the MAP connection on the remote module.
- 7- Connect the connectors on the remote module and on the Vigilus.
- 8- Software configuration of the Vigilus (refer to operating manual).

## 1.3 VIGILUS MECHANICAL INSTALLATION

Vigilus can be installed in a standard 3 1/8" panel cutout; it's recommended to choose a position that permits optimal display visibility.

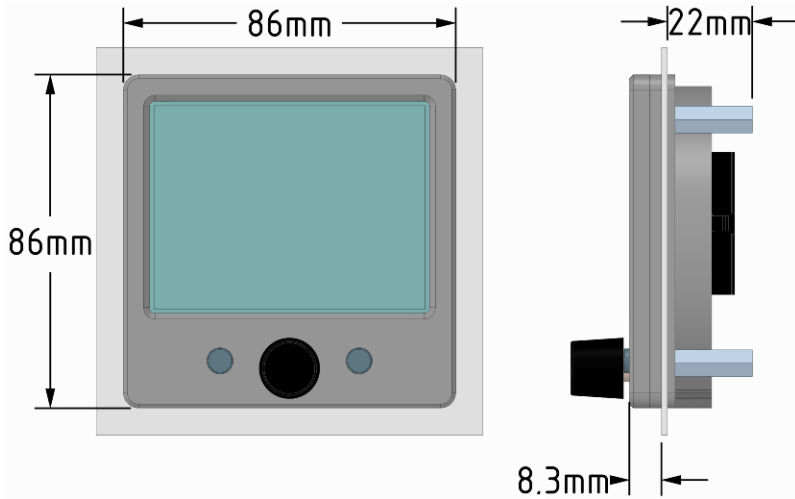
To install it perform this operations:

- 1- Unscrew the four plastic spacers on the backpanel.
- 2- Remove the backpanel.
- 3- Insert the Vigilus frontpanel on a 3 1/8" panel cutout.
- 4- From the back of the instruments panel, reinstall the Vigilus backpanel, screwing the four plastic spacers previously removed.



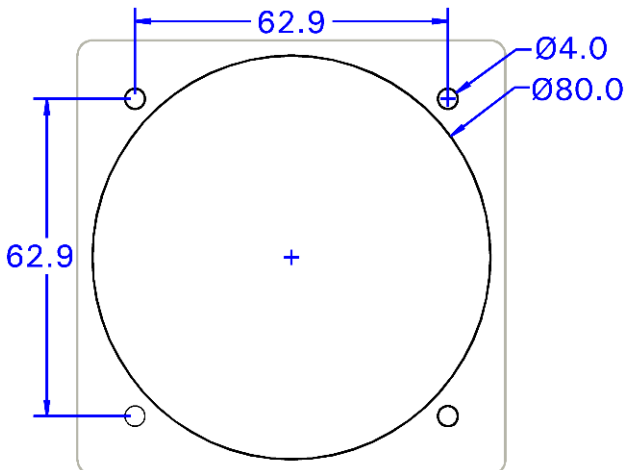
**NOTE:** Vigilus can be installed on instrument panel with thickness from 1.5 to 4 mm.

#### DIMENSIONS



**WEIGHT: 185 g**

#### PANEL CUT-OUT



All dimensions are in millimeters

**COOLING REQUIREMENTS**

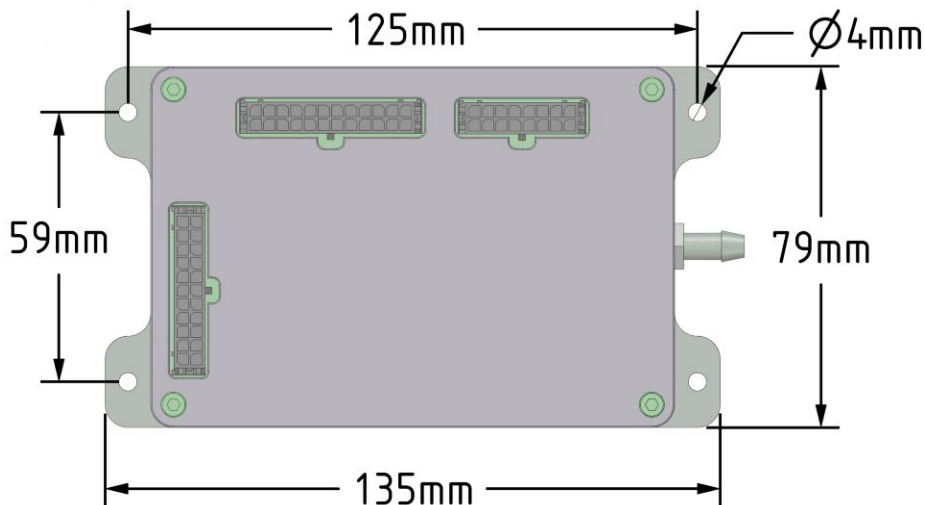
No cooling air is required for Vigilus, however, as with all electronic equipment, lower operating temperatures extends equipment life.

Avoid installing Vigilus near heat sources. If this is not possible, it is highly recommended that the air behind the panel be kept moving (by ventilation or a fan). Allow adequate space for installation of cables and connectors.

## **1.4 REMOTE MODULE MECHANICAL INSTALLATION**

- The remote module can be installed using the four holes in the mounting tabs; the holes is suitable for M4 screws.
- The max length of the CAN-bus that connects the remote module to the Vigilus is 20 meters.
- When choosing a location where to install the remote module, consider that the operating temperature range is -20~+70°C.
- Choose a location protected from dust and atmospheric agents such as sun and rain.
- Do not rivet the remote module to the aircraft as this will hinder future removal if necessary.

**DIMENSIONS**



**WEIGHT: 185 g**

**COOLING REQUIREMENTS**

No cooling air is required for the Remote Module, however, as with all electronic equipment, lower operating temperatures extends equipment life.

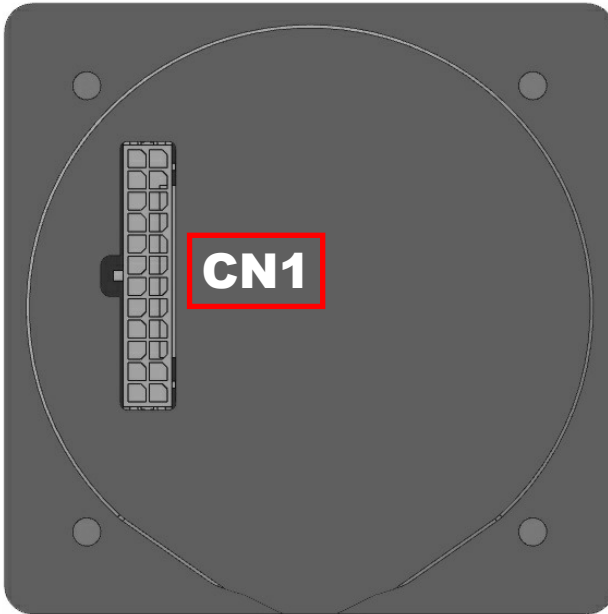
Avoid installing it near heat sources. If this is not possible, ensure that additional cooling is provided. Allow adequate space for installation of cables and connectors.



## SECTION 2

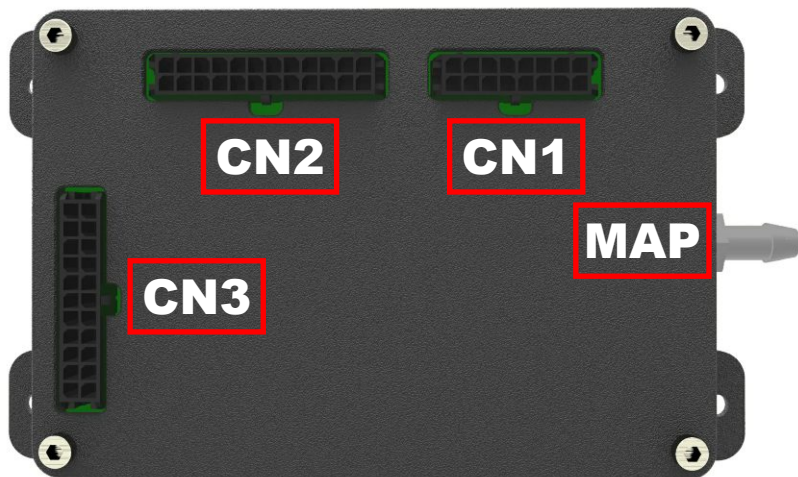
### 2.1 ELECTRICAL INSTALLATION

- On the Vigilus back there is a 24-pin Microfit connector, supplied with the corresponding receptacles connector (Molex 43025-2400) and the crimp pin contacts (Molex 43030-0007).



**Vigilus connector**

- On the remote module there are 3 Microfit connectors, each supplied with the corresponding receptacle and crimp pin contacts (Molex 43030-0007); receptacle codes are:
  - CN1: 16-pin Microfit connector (Molex 43025-1600)
  - CN2: 24-pin Microfit connector (Molex 43025-2400)
  - CN3: 22-pin Microfit connector (Molex 43025-2200)



**Remote module connections**



**WARNING:** To avoid damage to the Vigilus/Remote module, take precautions to prevent Electro-Static Discharge (ESD) when handling connectors and associated wiring. ESD damage can be prevented by touching an object that is on the same electrical potential as the Vigilus/Remote module before handling them.

**CRIMP TOOLS**

Recommended crimp tools are listed in the following table; equivalent tools may also be used.

Contact type	Contact P/N	Recommended hand crimping tools	Recommended extraction tools
Micro-Fit 3.0 crimp terminal, 20-24AWG	Molex 43030-0007	Flybox 603000 Molex 63819-0000	Molex 11-03-0043

## **POWER SPECIFICATIONS**

Vigilus and remote module are capable of operating at either 14 or 28 VDC. On the following table are listed the power requirements for Vigilus and remote module; the specified current draw is measured with the display backlight set to maximum brightness and with the optional USB video adapter plugged in on the Vigilus and without any sensor attached to the remote module.

<b>Power supply</b>	<b>Vigilus</b>	<b>Remote Module</b>	<b>Total (Vig+R.M.)</b>
<b>14 V</b>	200 mA	50 mA	250 mA
	2.8 W	0.7 W	3.5 W
<b>28 V</b>	100 mA	25mA	125 mA
	2.8 W	0.7 W	3.5 W



**WARNING:** Voltage peaks on the supply line that exceeds the operating limits can damage the device.

## **GENERAL WIRING HINTS**

- It is recommended that Vigilus and remote module be installed prior to constructing the wiring harnesses and cables.
- Use aeronautic cable for the wiring.
- Take care to properly insulate any exposed wire to avoid short circuits between any of the wires.
- Do not solder thermocouple wires terminations. If it is necessary to split in separable harnesses the thermocouples connections, you must use proper cables and connectors, available also from **FLYBOX®** (see section "Separable connections for thermocouples").
- All cable routing should be kept as short and as direct as possible.

- Check that there is ample space for the cabling and mating connectors.
- Avoid sharp bends in cabling.
- Avoid routing near aircraft control cables.
- Avoid routing cables near heat sources, RF sources, EMI interference sources, power sources or near power for fluorescent lighting.

The installer shall supply and fabricate all of the cables, unless a pre-wired cable has been ordered.

If no pre-wired cable has been ordered, the required connectors and associated crimp contacts are supplied with the Vigilus kit. Contacts for the connectors must be crimped onto the individual wire of the wiring harness.



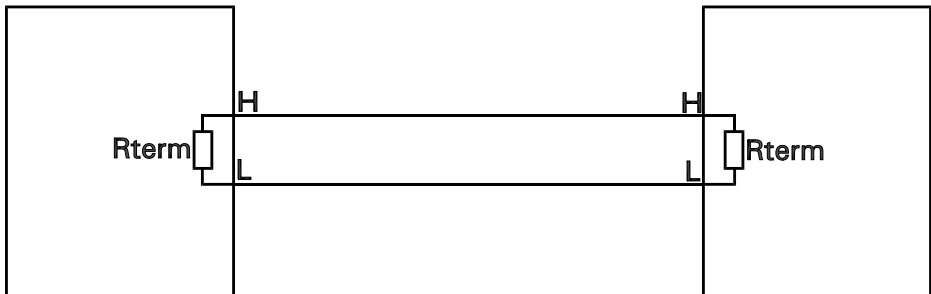
**WARNING:** Check wiring connections for errors before connecting any wiring harnesses. Incorrect wiring could cause internal component damage.

## **CAN-BUS INFORMATIONS**

Vigilus have two CAN bus (Controller Area Network) interfaces. The first is used to communicate with the remote module while the second is used to communicate with the engine ECU (this one is applicable only for certain engines, for example Rotax 912iS and EPAPower engines).

The basic electrical architecture of a CAN bus consists of a single twisted or shielded wire pair with a device connected at each end. Each end must be terminated with a 120 ohm resistor, that in the case of Vigilus and remote module is integrated inside the instruments so that the installer should simply connect together two pin on the connector to perform the required terminations.

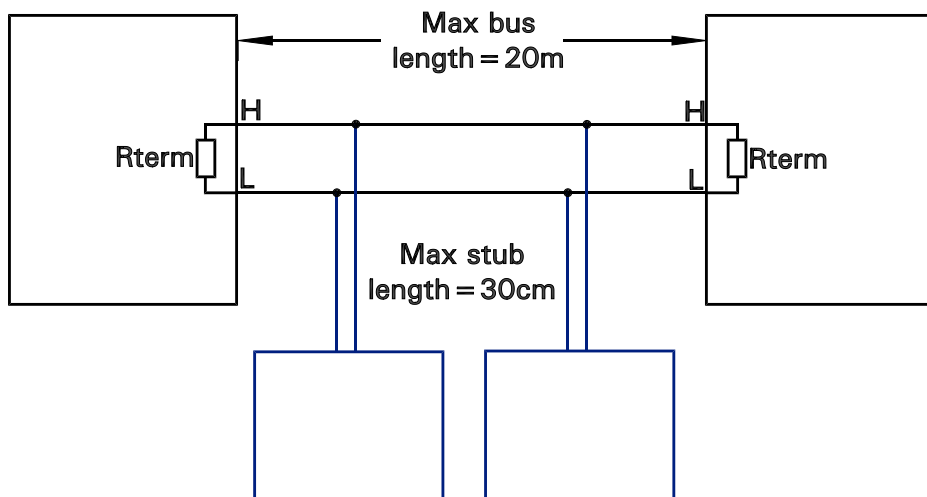
The maximum length from end to end of the CAN bus is 20 meters.



***Basic CAN bus architecture***

Other devices can be connected to the bus through short stub (also called “node”) connections. This device must not be terminated with the resistor and the maximum length should not exceed 30cm.

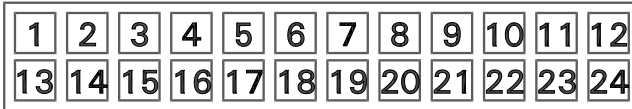
One stub or node must serve to connect only one device; multiple devices must be connected to the bus in a daisy-chain configuration as in this examples picture:



***CAN bus node connections***

The wiring for the CAN bus connections can be twisted pair or shielded twisted-pair. We recommend the use of shielded wires for better performance, connecting the shield to the ground of both devices on the terminated ends of the bus. It's important also that all the devices connected to a CAN bus share the same power ground reference. This means that the power ground of the various devices must be connected to a single ground point (do not use aircraft structure as a power ground).

## 2.2 ELECTRICAL INSTALLATION - ROTAX 912 (A/F/S/UL/ULS/ULSFR) and ROTAX 914 VERSION



### VIGILUS CONNECTOR CN1

24 pin microfit connector, view from wiring side

PIN#	Description
1	GND Main supply
2	CAN1 L signal for remote module connection
3	CAN1 H signal for remote module connection
4	CAN 1 termination
5	CAN 1 termination
6	CAN2 L signal (Not used)
7	CAN2 H signal (Not used)
8	CAN 2 termination (Not used)
9	CAN 2 termination (Not used)
10	Low-level audio output for intercom connection
11	Audio Input
12	Microphone input
13	+12V Main supply
14	COM2 TX (not used)
15	COM2 RX (not used)
16	GND for COM2 (not used)

<b>PIN#</b>	<b>Description</b>
<b>17</b>	Not used
<b>18</b>	GPS serial input (connect to GPS TX signal)
<b>19</b>	GND for GPS input
<b>20</b>	USB-D+
<b>21</b>	USB-D-
<b>22</b>	USB-VCC
<b>23</b>	USB-GND
<b>24</b>	GND for audio output

**SIGNALS EXPLANATION:**

● **Power supply (PIN#1-13):**

Vigilus is capable of operating at either 14 or 28 VDC. AWG22 wire is enough, it's recommended to insert a 2A circuit breaker on the positive wire that supply both Vigilus and remote module.

● **CAN BUS #1 (PIN#2-3-4-5):**

This CAN bus is used exclusively for communication with the remote module; use shielded or twisted wire pair, AWG24 is enough. Max length of this bus is 20 meters.

The CAN bus termination (jump wire pin#4 with pin#5) is required.

● **CAN BUS #2 (PIN#6-7-8-9):**

The second CAN bus line is not used for this type of engine.

● **Audio output (PIN#10-24):**

This is a low-level audio output for intercom and is used to have the vocal alarm on the earphone.

It's required to use shielded cable, AWG24 is enough.



- **Audio input (PIN#11):**

Audio input is actually not used but will be used on future software releases for audio recording of radio/pilot/copilot messages. This audio input have to be connected to the “Lineout” of the intercom, if available.

It’s required to use shielded cable (connect the shield to the ground of Vigilus on one end and to the ground of the intercom on the other end), AWG24 is enough.

- **Microphone input (PIN#12):**

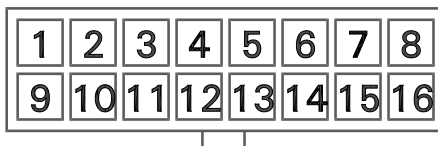
Microphone input is actually not used but will be used on future software releases for vocal checklist recording. It’s required to use shielded cable (connect the shield to the ground of Vigilus on one end and to the negative wire of the microphone on the other end), AWG24 is enough.

- **GPS serial input (PIN#18-19):**

Connect this pin to the GPS “TX” signal of an external GPS. The GPS signal is used for displaying the actual time, for the “RANGE” and “RESERVE” functions on the optional fuel computer page and to have the date/time reference on the datalogger data. It’s required to use shielded cable, AWG24 is enough.

- **USB (PIN#20-21-22-23):**

Connect these pins to the USB receptacle included in the Vigilus kit. The USB port is used for software updates, for backup/restore of the settings, to download the datalogger data and to connect the optional video input adapter.



**REMOTE MODULE CONNECTOR CN1**

16 pin microfit connector, view from wiring side

<b>PIN#</b>	<b>Description</b>
1	CAN 1 termination
2	CAN1 H signal for Vigilus connection
3	Programmable output3 (active low, 300mA / 4W max)
4	Programmable output1 (active low, 300mA / 4W max)
5	RPM signal input
6	Not used
7	Not used
8	+12V Main supply
9	CAN 1 termination
10	CAN1 L signal for Vigilus connection
11	Programmable output4 (active low, 300mA / 4W max)
12	Programmable output2 (active low, 300mA / 4W max)
13	Rotor tachometer input (for helicopter only)
14	RPM output (not used for this engine)
15	GND
16	GND Main supply

**SIGNALS EXPLANATION:****● Power supply (PIN#8-16):**

The remote module is capable of operating at either 14 or 28 VDC. AWG22 wire is enough, it's recommended to insert a 2A circuit breaker on the positive wire that supply both Vigilus and remote module.

To avoid errors in the measurements it is essential that the ground of the remote module share the same ground of all the engine sensors (so that there is virtually no measurable voltage between these grounds). Be sure that any ground wire of the remote module is routed to the engine block, and the engine block must have a connection to the negative of the battery.

**● CAN BUS (PIN#1-2-9-10):**

This CAN bus is used exclusively for communication with Vigilus; use shielded or twisted wire pair, AWG24 is enough. Max length of this bus is 20 meters.

The CAN bus termination (jump wire pin#1 with pin#9) is required.

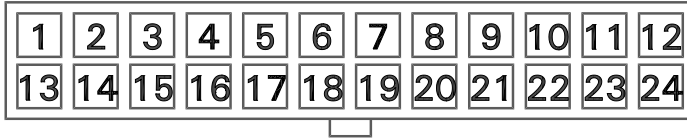
**● Programmable output (PIN#3-4-11-12):**

When an alarm occur on the Vigilus, it can be set to activate one of these four programmable output. The outputs are suitable to connect for example a lamp, led or buzzer. Maximum current for every output is 300mA / 4W. Output type is active low (pulled to ground when active).

**● RPM signal input (PIN#5):**

This RPM input support Rotax 912/914 pickup and other similar types of tachometer transducer. Connect the transducer output to pin #5 of CN1 remote module connector and transducer ground to aircraft ground (Rotax pickup has a single wire to be connected to pin #5 of CN1 remote module connector).

- **Rotor tachometer input-for helicopter only (PIN#13):**  
This rotor tachometer input support push-pull type sensors with 0-12volt output. It's possible also to use open-collector type sensors but it's required to connect a 10 Kohm pull-up resistor between this signal and +12V.



**REMOTE MODULE CONNECTOR CN2**  
24 pin microfit connector, view from wiring side

<b>PIN#</b>	<b>Description</b>
<b>1</b>	CHT6 thermocouple J (-) (Not used)
<b>2</b>	CHT5 thermocouple J (-) (Not used)
<b>3</b>	CHT4 thermocouple J (-) (connect to ground for other sensor types)
<b>4</b>	CHT3 thermocouple J (-) (connect to ground for other sensor types)
<b>5</b>	CHT2 thermocouple J (-) (connect to ground for other sensor types)
<b>6</b>	CHT1 thermocouple J (-) (connect to ground for other sensor types)
<b>7</b>	EGT6 thermocouple K (-) (Not used)
<b>8</b>	EGT5 thermocouple K (-) (Not used)
<b>9</b>	EGT4 thermocouple K (-)
<b>10</b>	EGT3 thermocouple K (-)
<b>11</b>	EGT2 thermocouple K (-)
<b>12</b>	EGT1 thermocouple K (-)
<b>13</b>	CHT6 sensor input + (Not used)
<b>14</b>	CHT5 sensor input + (Not used)

<b>PIN#</b>	<b>Description</b>
<b>15</b>	CHT4 sensor input: Rotax, PT1000 or thermocouple J (+)
<b>16</b>	CHT3 sensor input: Rotax, PT1000 or thermocouple J (+)
<b>17</b>	CHT2 sensor input: Rotax, PT1000 or thermocouple J (+)
<b>18</b>	CHT1 sensor input: Rotax, PT1000 or thermocouple J (+)
<b>19</b>	EGT6 thermocouple K (+) (Not used)
<b>20</b>	EGT5 thermocouple K (+) (Not used)
<b>21</b>	EGT4 thermocouple K (+)
<b>22</b>	EGT3 thermocouple K (+)
<b>23</b>	EGT2 thermocouple K (+)
<b>24</b>	EGT1 thermocouple K (+)

**SIGNALS EXPLANATION:**

● **CHT negative inputs (PIN#3-4-5-6):**

The negative inputs of the CHT is used only if using J-type thermocouples. For the other type of sensor, included Rotax standard sensors, these pins must be connected to ground (connect it to the same ground that supply power to the remote module).

● **CHT positive inputs (PIN#15-16-17-18):**

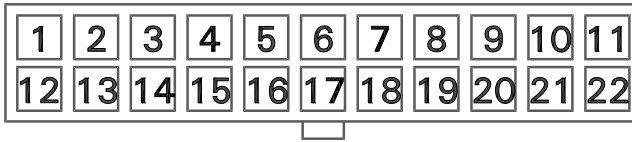
Connect to these pins the single wire of the Rotax CHT sensors, one wire of the PT1000 resistive sensors (the other wire must be connected to ground) or the positive wire of the J-type thermocouple.

● **EGT negative inputs (PIN#9-10-11-12):**

Connect to these pins the negative wire of the thermocouples.

● **EGT positive inputs (PIN#21-22-23-24):**

Connect to these pins the positive wire of the thermocouples.



**REMOTE MODULE CONNECTOR CN3**  
22 pin microfit connector, view from wiring side

<b>PIN#</b>	<b>Description</b>
1	Digital input#2 (not used)
2	Fuel flow #2 sensor input (not used)
3	Analog input #1 (not used)
4	Left tank fuel level sensor input
5	Main tank fuel level sensor input
6	Connect to pin#17 if using 4-20mA oil press. Sensor
7	Oil temperature sensor input
8	Outside air temperature sensor input (PT1000)
9	Carburetor/Airbox temperature sensor input (PT1000)
10	GND for sensors supply
11	+12V for sensors supply
12	Digital input#1 (not used)
13	Fuel flow #1 sensor input
14	Analog input #2 (not used)
15	Right tank fuel level sensor input
16	Oil pressure sensor input
17	Connect to pin#6 if using 4-20mA oil press. sensor

<b>PIN#</b>	<b>Description</b>
<b>18</b>	Gearbox temperature input (for helicopter only)
<b>19</b>	Current sensor signal input
<b>20</b>	Fuel pressure sensor signal input
<b>21</b>	GND for sensors supply
<b>22</b>	+12V for sensors supply

**SIGNALS EXPLANATION:**

● **Digital inputs (PIN#1-12):**

This digital inputs will be used in future software releases to connect external button used to remotely operate the Vigilus.

● **Analog inputs (PIN#3-14):**

This analog inputs are actually not used.

● **Fuel level sensor inputs (PIN#4-5-15):**

This fuel level sensor inputs support resistive (with max resistance of 300 ohm) or capacitive (0-5V) sensors.

If you install only 1 tank fuel level sensor (Main Tank) connect it to pin #5 of CN3 connector; if you install 2 tank fuel level sensors (Left and Right Tanks) connect the Left on pin #4 and the Right on pin #15 of CN3 connector.

● **Jumper wire for oil pressure selection (PIN#6-17):**

If you use 4-20mA type oil pressure sensor (Rotax 956413 or Flybox 602000) connect pin6 with pin17 with a jumper wire. If you use VDO type oil pressure sensor (Rotax 956415) leave unconnected both pin6 and pin17.

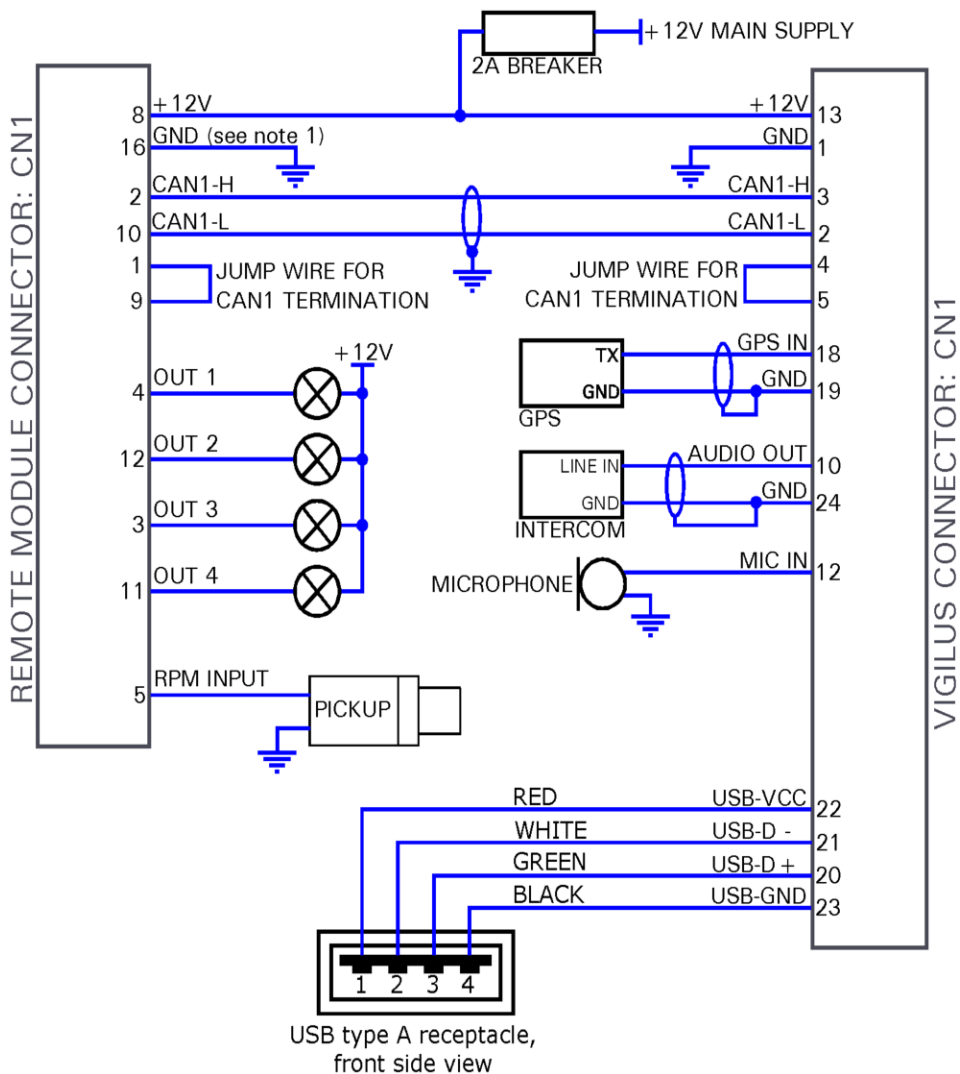
● **Oil pressure sensor input (PIN#16):**

Support Rotax, Jabiru and Flybox sensors. See chap.2.4 for further details.

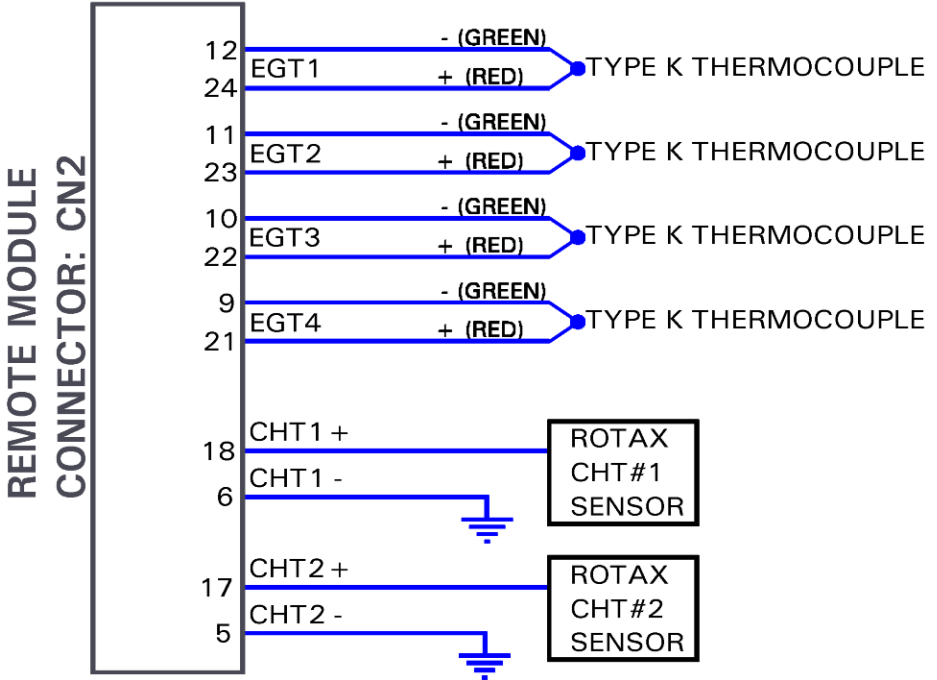


- **Oil temperature sensor input (PIN#7):**  
Support Rotax, Jabiru and PT1000 sensors. See chap.2.4 for further details.
- **OAT - Outside air temperature (PIN#8):**  
Support PT1000 sensors. See chap.2.4 for further details.
- **CAT - Carburetor/Airbox temperature (PIN#9):**  
Support PT1000 sensors. See chap.2.4 for further details.
- **Fuel flow sensor input (PIN#13):**  
Support Flybox 503010, Floscan 200 and other sensors with pulse output open-collector type. See chap.2.4 for Flybox sensor installation details.
- **Current sensor input (PIN#19):**  
Support Flybox 601060 sensor. See chap.2.4 for further details.
- **Fuel pressure sensor input (PIN#20):**  
Support Flybox 601041 sensor. See chap.2.4 for further details.

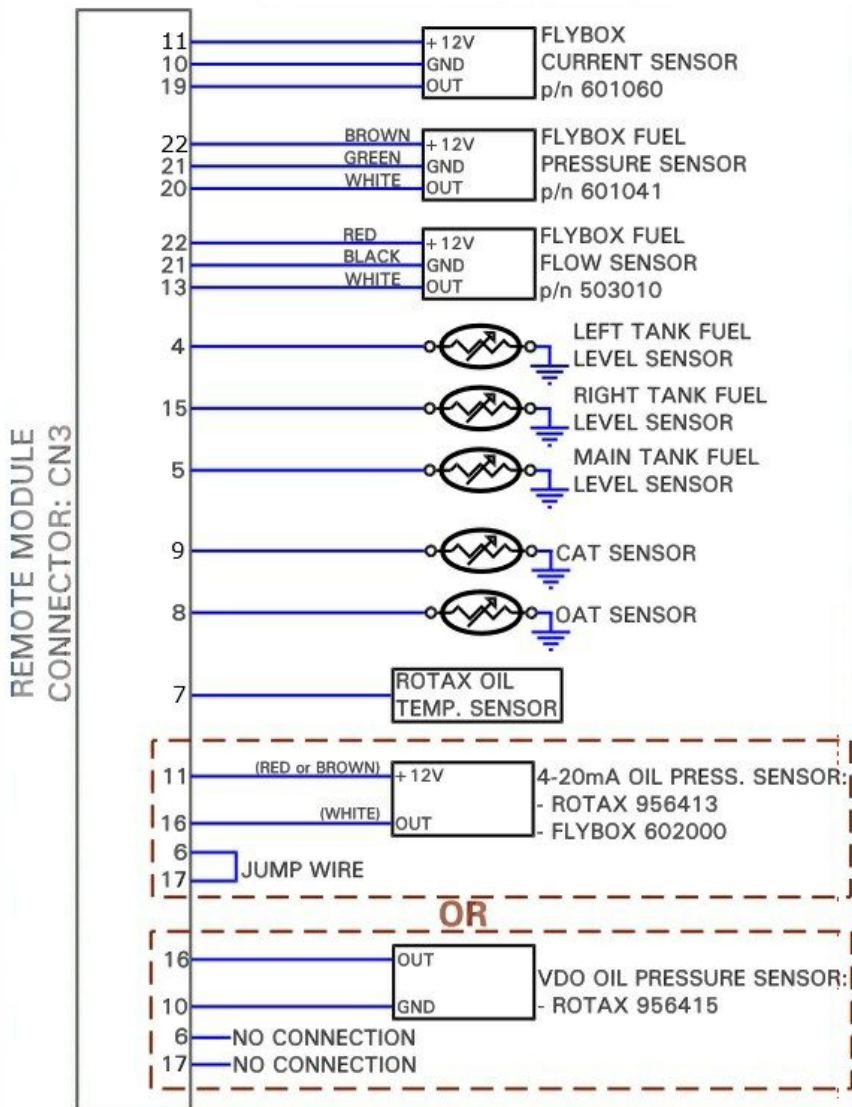
**VIGILUS CN1 AND REMOTE MODULE CN1 CONNECTION DRAWING**



## REMOTE MODULE CN2 CONNECTION DRAWING



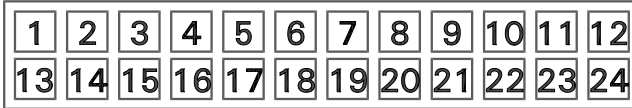
## REMOTE MODULE CN3 CONNECTION DRAWING



**NOTE:**

1. It is essential that all the engine sensors and the remote module share the same ground, and that there is virtually no measurable voltage between these grounds. Be sure that any ground wire of the remote module is routed to the engine block, and the engine block must have a connection to the negative of the battery. Errors in the measurements are usually caused by points in the aircraft where there is insufficient grounding.
2. RPM input, oil temperature, oil pressure, CHT1 and CHT2 from ROTAX standard sensors; all the rest from optional sensors.

## 2.3 ELECTRICAL INSTALLATION - ROTAX 912iS VERSION)



### VIGILUS CONNECTOR CN1

24 pin microfit connector, view from wiring side

PIN#	Description
1	GND Main supply
2	CAN1 L signal for remote module connection
3	CAN1 H signal for remote module connection
4	CAN 1 termination
5	CAN 1 termination
6	CAN2 L signal for connection with Rotax 912iS ECU
7	CAN2 H signal for connection with Rotax 912iS ECU
8	CAN 2 termination (Not used)
9	CAN 2 termination (Not used)
10	Low-level audio output for intercom connection
11	Audio input
12	Microphone input
13	+12V Main supply
14	COM2 TX (not used)
15	COM2 RX (not used)
16	GND for COM2 (not used)

<b>PIN#</b>	<b>Description</b>
<b>17</b>	Not used
<b>18</b>	GPS serial input (connect to GPS TX signal)
<b>19</b>	GND for GPS input
<b>20</b>	USB-D+
<b>21</b>	USB-D-
<b>22</b>	USB-VCC
<b>23</b>	USB-GND
<b>24</b>	GND for audio output

**SIGNALS EXPLANATION:****● Power supply (PIN#1-13):**

Vigilus is capable of operating at either 14 or 28 VDC. AWG22 wire is enough, it's recommended to insert a 2A circuit breaker on the positive wire that supply both Vigilus and remote module.

**● CAN BUS #1 (PIN#2-3-4-5):**

This CAN bus is used exclusively for communication with the remote module; use shielded or twisted wire pair, AWG24 is enough. Max length of this bus is 20 meters.

The CAN bus termination (jump wire pin#4 with pin#5) is required.

**● CAN BUS #2 (PIN#6-7):**

The second CAN bus line is used to receive the engine data from the Rotax 912iS ECUs; use shielded or twisted wire pair, AWG24 is enough. Max stub length is 60 cm.

- **Audio output (PIN#10-24):**

This is a low-level audio output for intercom and is used to have the vocal alarm on the earphone.

It's required to use shielded cable, AWG24 is enough.

- **Audio input (PIN#11):**

Audio input is actually not used but will be used on future software releases for audio recording of radio/pilot/copilot messages. This audio input have to be connected to the "Lineout" of the intercom, if available.

It's required to use shielded cable (connect the shield to the ground of Vigilus on one end and to the ground of the intercom on the other end), AWG24 is enough.

- **Microphone input (PIN#12):**

Microphone input is actually not used but will be used on future software releases for vocal checklist recording. It's required to use shielded cable (connect the shield to the ground of Vigilus on one end and to the negative wire of the microphone on the other end), AWG24 is enough.

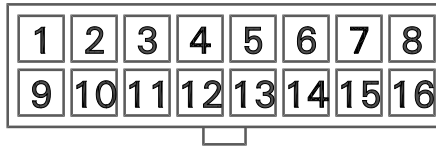
- **GPS serial input (PIN#18-19):**

Connect this pin to the GPS "TX" signal of an external GPS. The GPS signal is used for displaying the actual time, for the "RANGE" and "RESERVE" functions on the optional fuel computer page and to have the date/time reference on the datalogger data. It's required to use shielded cable, AWG24 is enough.

- **USB (PIN#20-21-22-23):**

Connect these pins to the USB receptacle included in the Vigilus kit. The USB port is used for software updates, for backup/restore of the settings, to download the datalogger data and to connect the optional video input adapter.



**REMOTE MODULE CONNECTOR CN1**

16 pin microfit connector, view from wiring side

<b>PIN#</b>	<b>Description</b>
1	CAN 1 termination
2	CAN1 H signal for Vigilus connection
3	Programmable output3 (active low, 300mA / 4W max)
4	Programmable output1 (active low, 300mA / 4W max)
5	Not used
6	Not used
7	Not used
8	+12V Main supply
9	CAN 1 termination
10	CAN1 L signal for Vigilus connection
11	Programmable output4 (active low, 300mA / 4W max)
12	Programmable output2 (active low, 300mA / 4W max)
13	Rotor tachometer input (for helicopter only)
14	RPM signal out
15	GND
16	GND Main supply

**SIGNALS EXPLANATION:**

● **Power supply (PIN#8-16):**

The remote module is capable of operating at either 14 or 28 VDC. AWG22 wire is enough, it's recommended to insert a 2A circuit breaker on the positive wire that supply both Vigilus and remote module.

To avoid errors in the measurements it is essential that the ground of the remote module share the same ground of all the engine sensors (so that there is virtually no measurable voltage between these grounds). Be sure that any ground wire of the remote module is routed to the engine block, and the engine block must have a connection to the negative of the battery.

● **CAN BUS (PIN#1-2-9-10):**

This CAN bus is used exclusively for communication with Vigilus; use shielded or twisted wire pair, AWG24 is enough. Max length of this bus is 20 meters.

The CAN bus termination (jump wire pin#1 with pin#9) is required.

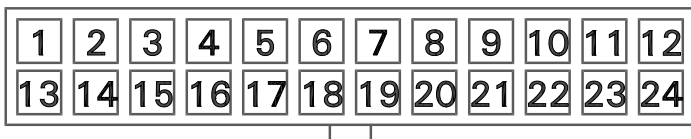
● **Programmable output (PIN#3-4-11-12):**

When an alarm occur on the Vigilus, it can be set to activate one of these four programmable output. The outputs are suitable to connect for example a lamp, led or buzzer. Maximum current for every output is 300mA / 4W. Output type is active low (pulled to ground when active).

● **RPM output (PIN#14):**

The RPM Signal Out (under development, not yet implemented) is useful to connect propeller controller or analog tachometer. The signal is a square wave with amplitude 0~12 V.

- **Rotor tachometer input-for helicopter only (PIN#13):**  
This rotor tachometer input support push-pull type sensors with 0-12volt output. It's possible also to use open-collector type sensors but it's required to connect a 10 Kohm pull-up resistor between this signal and +12V.

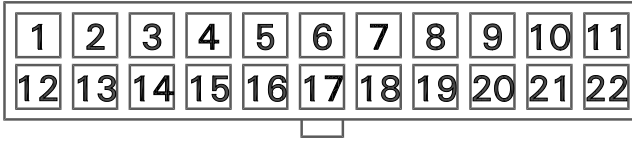


**REMOTE MODULE CONNECTOR CN2**

24 pin microfit connector, view from wiring side



**For the Rotax 912iS no connection is required on this connector.**

**REMOTE MODULE CONNECTOR CN3**

22 pin microfit connector, view from wiring side

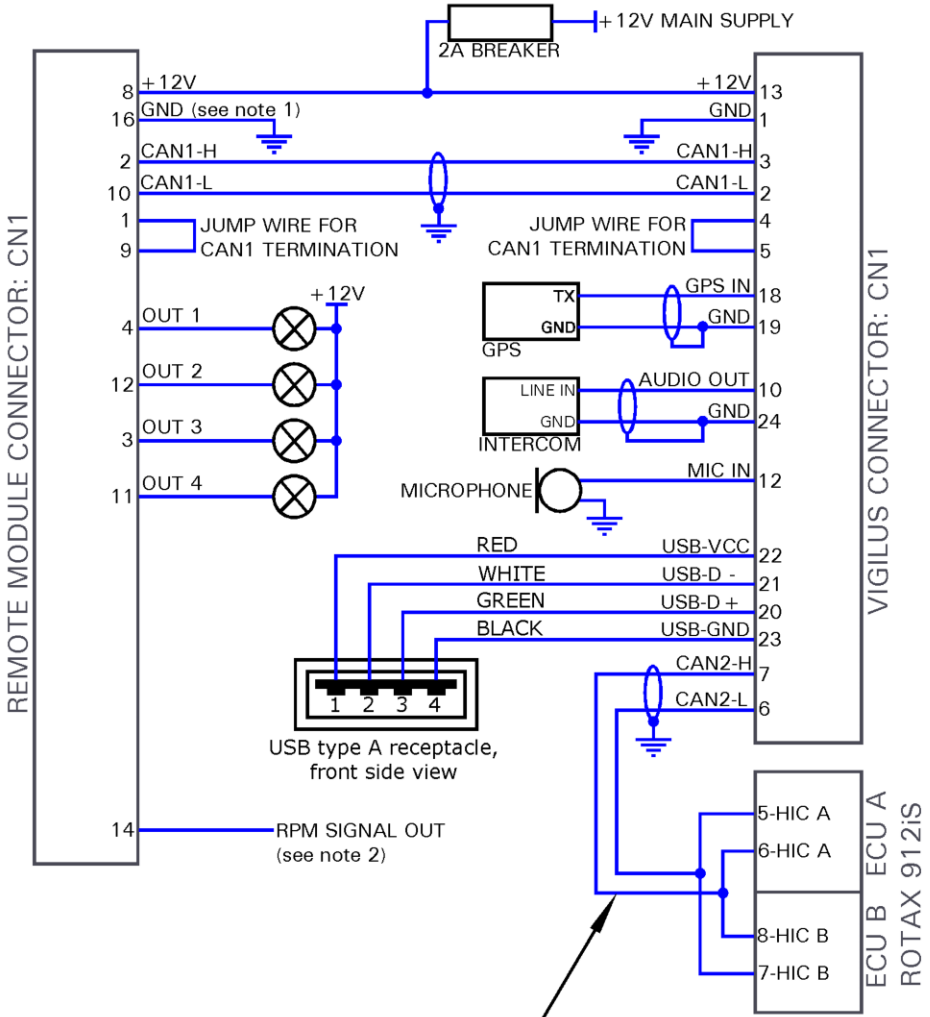
<b>PIN#</b>	<b>Description</b>
1	Digital input#2 (not used)
2	Fuel flow #2 sensor input (not used)
3	Analog input #1 (not used)
4	Left tank fuel level sensor input
5	Main tank fuel level sensor input
6	Not used
7	Not used
8	Outside air temperature sensor input (PT1000)
9	Not used
10	GND for current sensor
11	+12V for current sensor
12	Digital input#1 (not used)
13	Fuel flow #1 sensor input (not used)
14	Analog input #2 (not used)
15	Right tank fuel level sensor input
16	Not used
17	Not used

<b>PIN#</b>	<b>Description</b>
<b>18</b>	Gearbox temperature input (for helicopter only)
<b>19</b>	Current sensor signal input
<b>20</b>	Fuel pressure sensor signal input
<b>21</b>	GND for fuel pressure sensor
<b>22</b>	+12V for fuel pressure sensor

**SIGNALS EXPLANATION:**

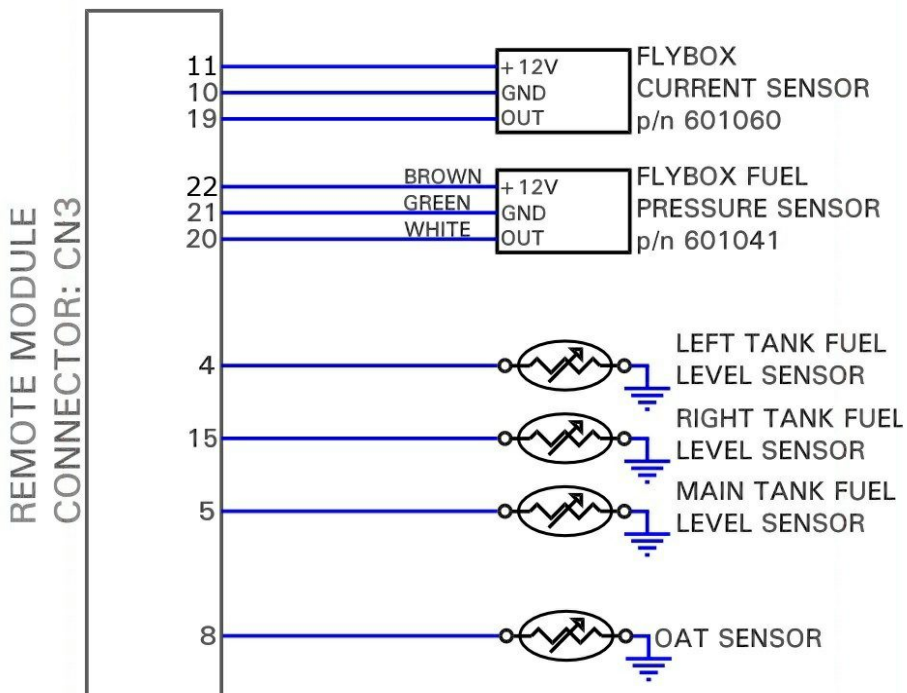
- **Digital inputs (PIN#1-12):**  
This digital inputs will be used in future software releases to connect external button used to remotely operate the Vigilus.
- **Analog inputs (PIN#3-14):**  
This analog inputs are actually not used.
- **Fuel level sensor inputs (PIN#4-5-15):**  
This fuel level sensor inputs support resistive (with max resistance of 300 ohm) or capacitive (0-5V) sensors.  
If you install only 1 tank fuel level sensor (Main Tank) connect it to pin #5 of CN3 connector; if you install 2 tank fuel level sensors (Left and Right Tanks) connect the Left on pin #4 and the Right on pin #15 of CN3 connector.
- **OAT - Outside air temperature (PIN#8):**  
Support PT1000 sensors. See chap.2.4 for further details.
- **Current sensor input (PIN#19):**  
Support Flybox 601060 sensor. See chap.2.4 for further details.
- **Fuel pressure sensor input (PIN#20):**  
Support Flybox 601041 sensor. See chap.2.4 for further details.

## VIGILUS CN1 AND REMOTE MODULE CN1 CONNECTION DRAWING



Keep connections between ECUs and Vigilus as short as possible.  
Max stub length = 60cm

### REMOTE MODULE CN3 CONNECTION DRAWING





**NOTE:**

1. It is essential that all the engine sensors and the remote module share the same ground, and that there is virtually no measurable voltage between these grounds. Be sure that any ground wire of the remote module is routed to the engine block, and the engine block must have a connection to the negative of the battery. Errors in the measurements are usually caused by points in the aircraft where there is insufficient grounding.
2. The RPM Signal Out (under development, not yet implemented) is useful to connect propeller controller or analog tachometer. The signal is a square wave with amplitude 0~12 V.
3. If you install only 1 tank fuel level sensor (Main Tank) connect it to pin #5 of CN3 connector; if you install 2 tank fuel level sensors (Left and Right Tanks) connect the Left on pin #4 and the Right on pin #15 of CN3 connector.
4. RPM, MAP, oil pressure and temperature, MT-manifold temperature, WT-water/coolant temperature, EGT1/2/3/4 temperatures and fuel flow are read from the Rotax ECU; all the rest from optional sensors.

## 2.4 SENSORS INSTALLATION

### CHT SENSORS

In the remote module up to 6 CHT sensors can be connected; the supported types of sensor are:

**- ROTAX 912/914 preinstalled CHT sensors:**

Rotax install 2 CHT sensors with a single wire each. Connect the first sensor to pin #18 of CN2 remote module connector; connect the second sensor to pin #17.

**- ROTAX 912iS:**

No additional sensors are required: with Rotax 912iS the coolant temperature is measured by the ECU and sent, using the CAN bus connection, to the Vigilus.

Only if you need to install additional coolant or cylinder head temperature sensors you can use the free inputs CHT2-CHT3-CHT4.

**- J-type thermocouples:**

Thermocouple probes have a two wires connection: positive wire and negative wire. The positive wire are connected to pins #13 to #18 (CHT6 to CHT1) of CN2 remote module connector, the negative wires are connected to pins #1 to #6 (CHT6 to CHT1).

**- PT1000 resistive sensors:**

This two wire resistive sensors must be connected between ground (GND) and pins #13 to #18 (CHT6 to CHT1) of CN2 remote module connector.



**NOTE:** It's not possible to mix different type of CHT sensors (i.e. 2 Rotax + 2 thermocouples).

### EGT SENSORS (not required for ROTAX 912iS)

In the remote module up to 6 EGT sensors can be connected; the supported types of sensor is:

#### **- K-type thermocouples**

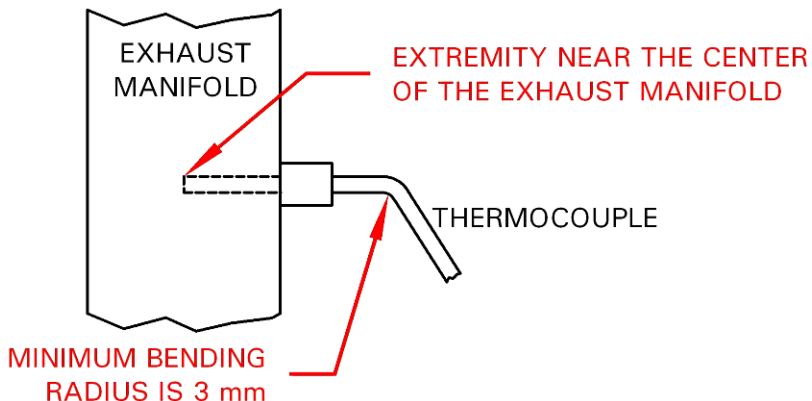
Thermocouple probes have a two wires connection: positive wire and negative wire. The positive wire are connected to pins #19 to #24 (EGT6 to EGT1) of CN2 remote module connector, the negative wires are connected to pins #7 to #12 (EGT6 to EGT1).

### Flybox® EGT thermocouples

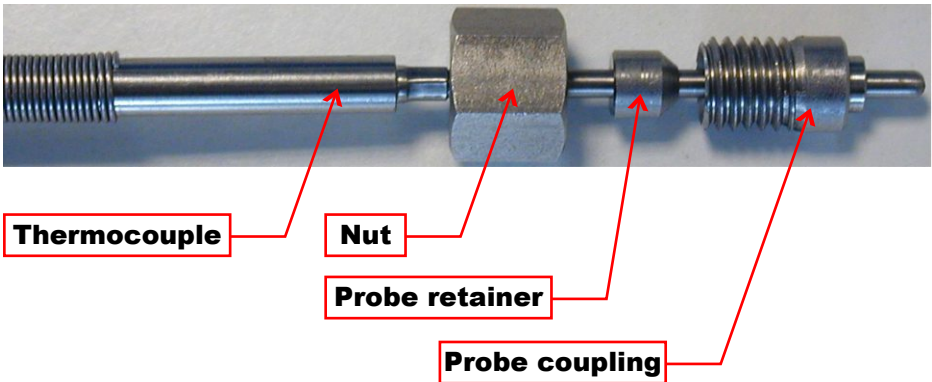
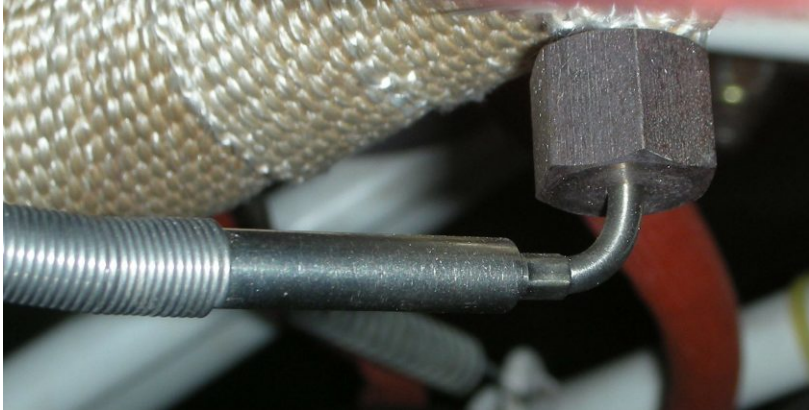
Flybox® EGT thermocouples are K-type; positive wire is RED, negative is GREEN.

#### **INSTALLATION NOTES:**

- Drill a 6 mm diameter hole in the exhaust manifold (at the position indicated by the engine's manufacturer) and weld the furnished probe coupling.
- Insert the thermocouple (with the nut and the probe retainer) in the probe coupling and position its extremity near the center of the exhaust manifold.



- Fix the thermocouple in this position by blocking the nut. Note that if required the thermocouple can be bended but with a minimum radius of 3 mm.



**OIL TEMP. SENSOR** (not required for ROTAX 912iS)

The supported types of oil temperature sensors are:

**- ROTAX preinstalled sensor:**

Rotax oil temperature sensor has a single wire. Connect it to pin #7 of CN3 remote module connector.

**- JABIRU preinstalled sensor:**

Jabiru oil temperature sensor has a single wire. Connect it to pin #7 of CN3 remote module connector.

**- PT1000 resistive sensor:**

This two wire resistive sensor must be connected between aircraft ground (GND) and pin #7 of CN3 remote module connector.

**OIL PRESS. SENSOR** (not required for ROTAX 912iS)

The supported types of oil pressure sensors are:

**- ROTAX 4-20mA (P/N 956413):** installed on 912/914 engines produced after 2008/05. Connect red wire to pin#11 of CN3 remote module connector; connect white wire to pin#16. Connect pin#6 to pin#17 of CN3 remote module connector.

**- Flybox® P/N 602000:** compatible with the Rotax 4-20mA sensors. Connect brown wire to pin#11 of CN3 remote module connector; connect white wire to pin#16. Connect pin#6 to pin#17 of CN3 remote module connector.

**- ROTAX resistive sensors (ROTAX P/N 956415):** installed on 912/914 engines produced before 2008/05. Connect signal wire to pin#16 of CN3 remote module connector; connect ground wire (if present) to pin#10 of CN3 remote module connector.

**- JABIRU** oil pressure sensor: connect signal wire to pin#16 of CN3 remote module connector.

**OUTSIDE AIR TEMPERATURE SENSOR (OAT)**

The supported types of OAT sensors are:

- **PT1000 resistive sensors:** Connect one wire to pin #8 of CN3 remote module connector and the other wire to aircraft ground.

- **Flybox® OAT sensor (P/N 601020):**



Flybox® OAT sensor is a PT1000 and can be fixed with a 5 mm countersunk screw.

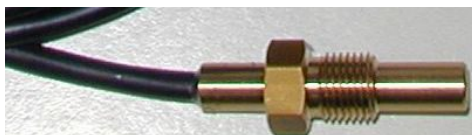
For optimal outside temperature indication it must not be installed in direct sunlight locations or near heat sources.

**AIRBOX/CARBURETOR TEMPERATURE SENSOR (CAT)** (not required for ROTAX 912iS)

The supported types of CAT sensors are:

- **PT1000 resistive sensors:** Connect one wire to pin #9 of CN3 remote module connector and the other wire to aircraft ground.

- **Flybox® CAT sensor (P/N 601030):**



Flybox® CAT sensor is a PT1000 with a M10x1 thread.

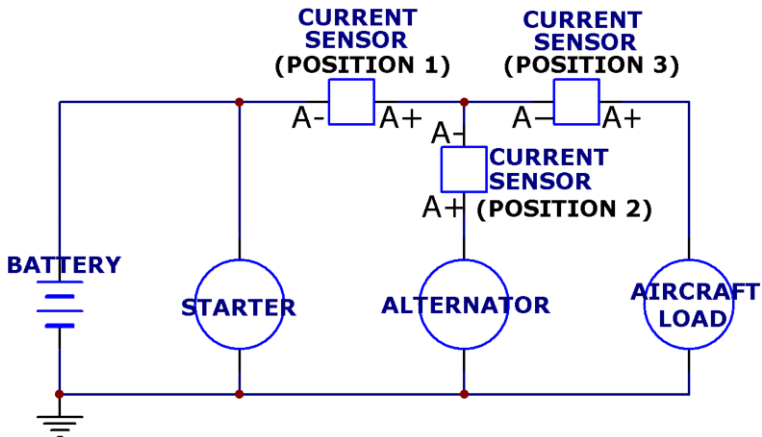
### RPM PICKUP INPUT (not required for ROTAX 912iS)

Standard RPM input support Rotax 912/914 pickup and other similar types of tachometer transducer. Connect the transducer output to pin #5 of CN1 remote module connector and transducer ground to aircraft ground (Rotax pickup has a single wire to be connected to pin #5 of CN1 remote module connector).

### CURRENT SENSOR

The current sensor supplied by Flybox® (P/N 601060) is able to measure current between -50 and +50 Amperes. It must not be installed between battery and starter circuit because of the high current flowing into this path.

The current sensor can be installed in one of the three locations as shown in the simplified electrical diagram below:

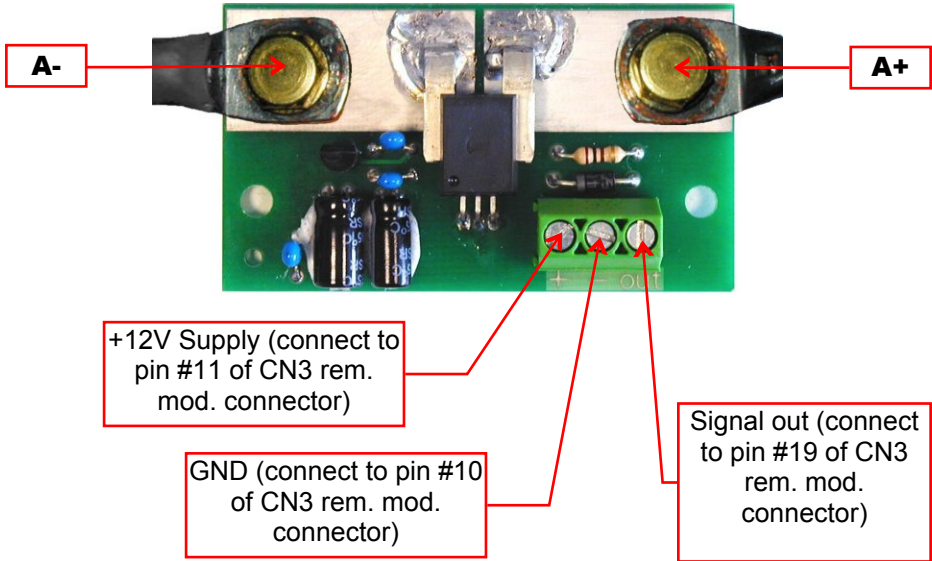


Position 1: in this position the current sensor measure current flow into or out of your battery (indicator show both positive and negative currents).

Position 2: in this position the current sensor measure only the current that the alternator supply to both battery and aircraft loads.

Position 3: in this position the current sensor measure the current flowing into the aircraft loads.

● **Electrical connections:**



● **Current sensor auto-calibration**

The auto-calibration is useful to eliminate eventual reading errors caused by harness or sensor itself. The procedure is the following:

- 1 - Connect only the 3 wire from the current sensor to the Vigilus and leave disconnected the 2 cable "A+" and "A-".
- 2 - Turn-on the Vigilus.
- 3 - Go in the MAIN MENU → SETTINGS → INSTRUMENTS → AMP → AMP OFFSET and click "ENTER" to edit the value; click again "ENTER" to store current calibration or press the "ESC" pushbutton to exit without saving. Vigilus have now stored the calibration value and you can turn it off and restore the harness, by reconnecting the two cable to the current sensor.



### FUEL FLOW SENSOR

The TFTHP flowmeter is developed to measure low range (3.6~120 l/hour) of fuel flow with high resolution output. It has high chemical resistance and it is suitable for aggressive liquids. The case can be opened for periodic monitoring and eventual replacement of the tube.



#### **Recommendation of installation and use:**

- Check flow direction (arrow on sensor).
- Never clean the sensor with compressed air.
- Install a filter in the fuel line before the sensor.
- Oil the fittings before mounting the tubes.
- The tubes before and after the sensor should be straight for at least 5 cm.
- Connection of fuel flow are suitable for 6 mm tubes.
- Use only spring band clamps of the type depicted on the right, with the appropriate diameter, in order to avoid deformation of the plastic fittings.



- Protect the sensor from high temperature with a firesleeve material.
  - Check for leakage after system start.
  - Inspect the fuel sensor every year or every 100 hours of aircraft use for leakage and aging.
- To inspect and clean the sensor, open it, remove the sensor tube from the fuel system and look inside the two fittings to

check for material integrity, aging and deformation. In case of any anomaly of the sensor tube, it must be replaced. Verify that the sensor tube is clean and without any obstruction. If necessary clean with a flow of fuel in the opposite direction.

- The fuel flow transducer must be installed before the carburetor and after the eventual return line (Vapor lock).
- Don't fix it mechanically to the airplane structure to avoid vibrations damage.
- Mount the transducer lower than the carburetor, or no more higher than 10 cm every 30.

### ● **Electrical connections:**

**RED WIRE:** +12V (connect to pin#22 of CN3 remote module connector).

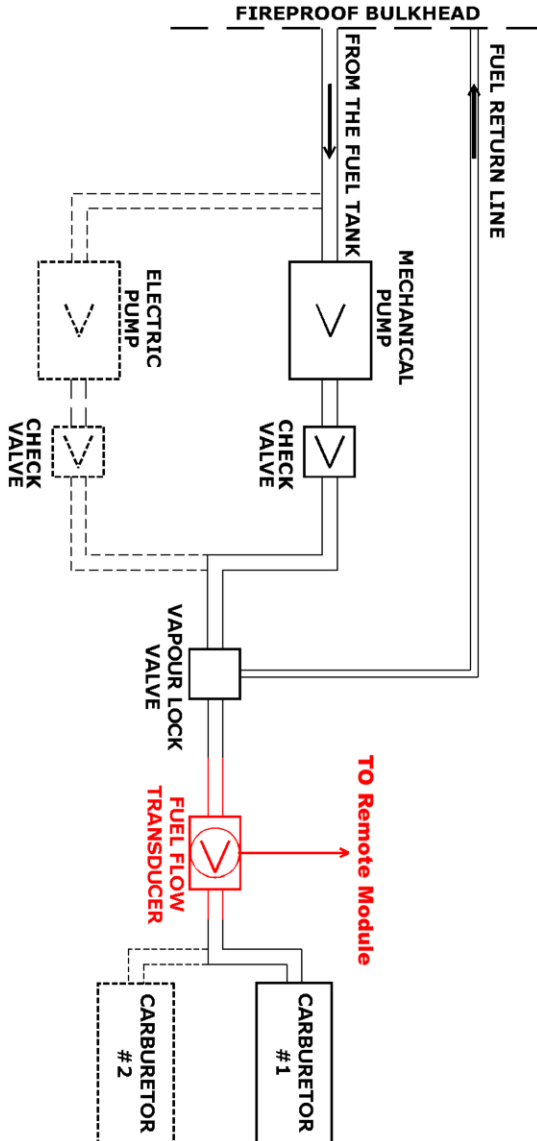
**BLACK WIRE:** GND (connect to pin#21 of CN3 remote module connector).

**WHITE WIRE:** signal (connect to pin#13 of of CN3 remote module connector).



**WARNING:** After completing the installation, verify that the engine is working properly at every RPM speed; verify also that at full RPM the fuel pressure after the fuel flow transducer never drop below the minimum pressure indicated in your engine's manual.

- Typical example installation of the fuel flow transducer on carbureted engines:

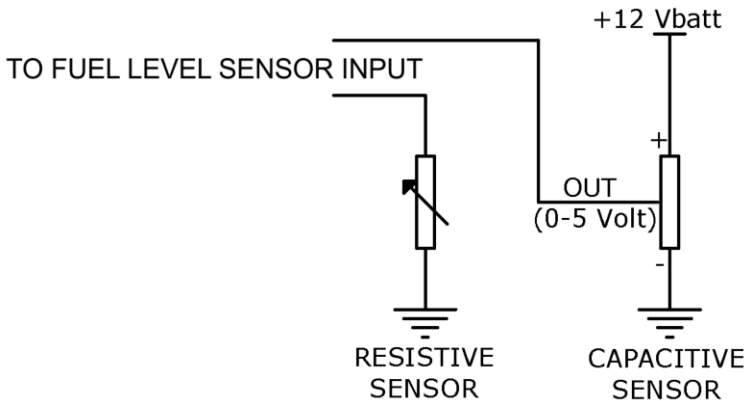


## FUEL LEVEL SENSORS

- The remote module have 3 fuel level inputs that can be connected to both resistive sensors (with max resistance of 300 ohm) and capacitive sensors (with output voltage of 0~5 Volt).
- Resistive sensors can be of two types, both supported by the remote module: resistive sensors that increase resistance as you add fuel and resistive sensors that decrease resistance as you add fuel.
- It's also possible to install a mixed type of sensors (i.e. 1 resistive + 1 capacitive).
- **CAUTION:** Resistive type fuel level sensors connected to Vigilus must not be connected to any other instrument. Disconnect any previously used instrument.



### • **Fuel level sensors connection:**

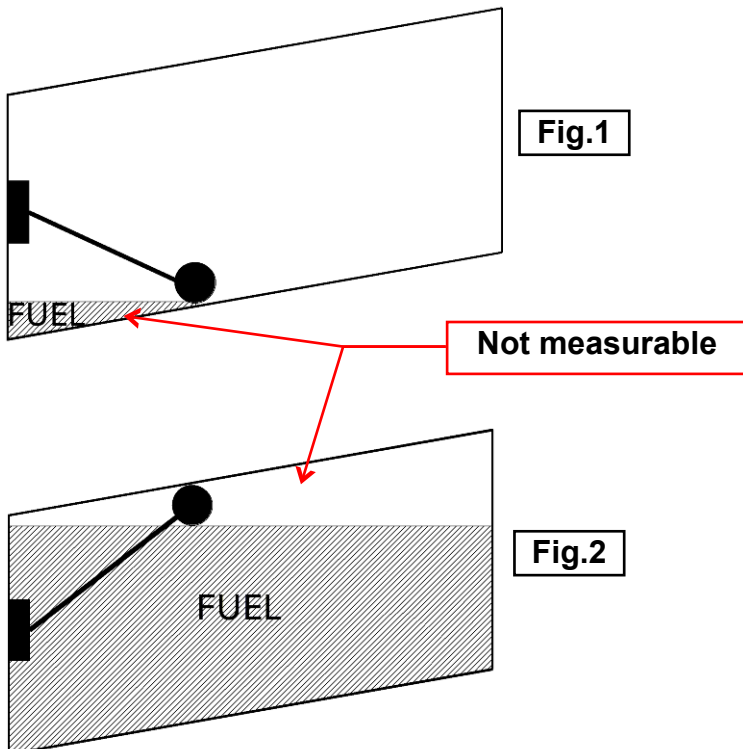


**NOTE:** Refer to fuel level sensors manual for the detailed electrical and mechanical installation.

Make sure that the fuel level sensors are mounted so that all the fuel in the tank can be measured. If the fuel sensor cannot measure completely the fuel in the tank, the instrument will display inaccurate readings.

For example (**fig.1**) if a fuel sensor cannot measure the lowest part of the tank that contains 7 liters, the instrument will display "0" (zero) for fuel level of 7 liters and below.

Another example (**fig.2**) is if a tank can holds 40 liters of fuel but at 25 liters the fuel is at the top of the sensor, the maximum that the instrument will display is 25 liters.



### MAP CONNECTION (not required for ROTAX 912iS)

- Connect the pipe fitting on the remote module to the manifold pressure lines; the pipe fitting of the remote module is suitable for pipe with internal diameter of 4 mm.
- With the MAP connected the pressure line must never exceed the pressure of 400kPa/118 In.Hg to avoid damage to the sensor.



**CAUTION:** Take care to properly executing this connection because an improper installation can cause fuel vapour leakage. It's recommended to insert a restrictor valve to the pipe so that only little quantity of fuel vapour can exit in case of leakage.

### FUEL PRESSURE SENSOR

The fuel pressure transducer+fitting is supplied by Flybox® (P/N 601041); the electrical connections are:

- White wire (signal out) to pin #20 of CN3 remote module connector
- Green wire (GND) to pin #21 of CN3 remote module connector
- Brown wire (+12V Supply) to pin #22 of CN3 remote module connector

The pressure range accepted is from 0 to 4 bar.



**NOTE:** an improper wiring can cause damage to the fuel pressure transducer.

#### ● **Mechanical installation hints:**

- Screw tight the transducer to the fitting; no other seal material is required because the sealing is ensured by the green fuel-resistant gasket of the transducer.
- To check that no screw out occur you must mark with a permanent pencil the transducer and fitting:



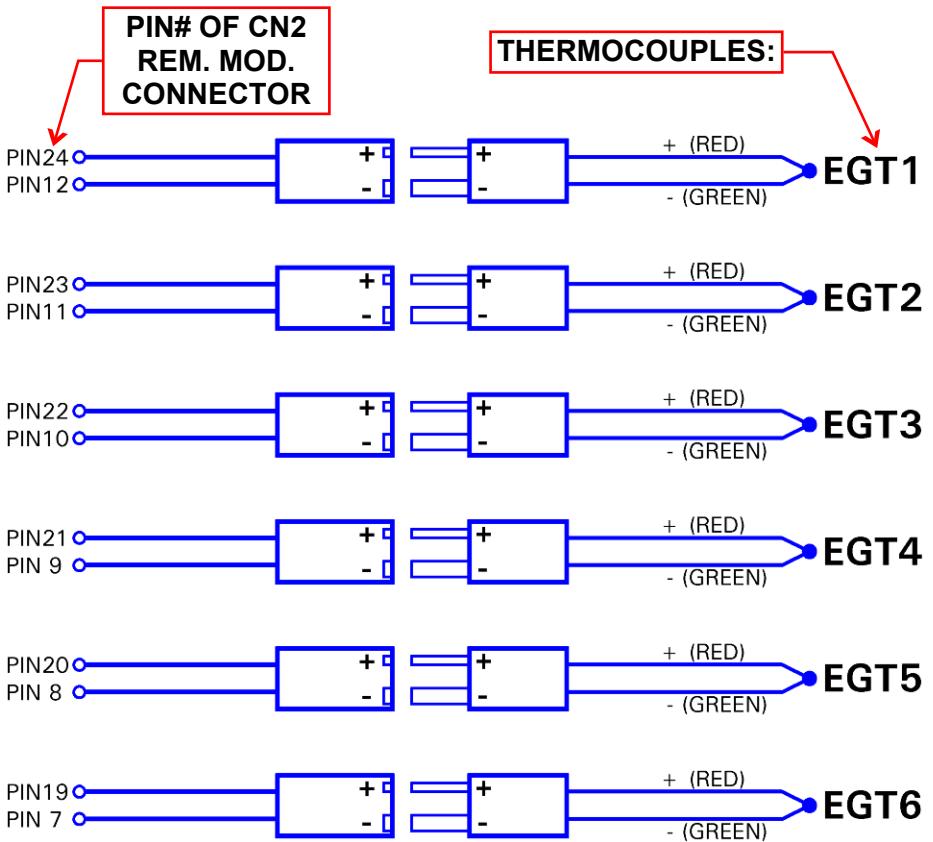
**USB VIDEO INPUT ADAPTER** (not yet available)

Vigilus can be supplied with the optional USB video input adapter. Connect the USB plug to the USB receptacle of the Vigilus connector harness; connect the camera that you intend to use in the **yellow RCA plug**. Leave unconnected the white and red RCA plugs.

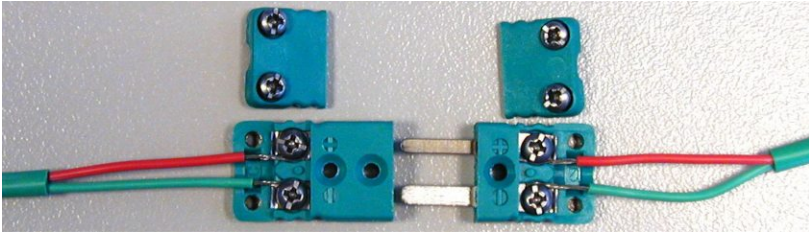
Video signal of the camera must be PAL composite video (CVBS). Use shielded cable to connect the camera.

**SEPARABLE CONNECTIONS FOR THERMOCOUPLES**

If it is necessary to split the thermocouples connections in separable harnesses, you must use proper cables and connectors, available also from **FLYBOX®** with ord.cod.651012. The connections are the following:







**NOTE:** Wires' color are referred to **FLYBOX®** supplied thermocouples, other thermocouples may have different colors coding. In case of wrong wiring the temperature indication will not be correct.



**NOTE:** If you have bought the ready to use wiring for Vigilus+Remote module (ord.cod.652010), you have already included two of this separable connections (EGT1 and EGT2).

## APPENDIX “A” - Optional wiring 652010 FOR VIGILUS + REMOTE MODULE (ROTAX 912/914 VERSION)

- Connector: “VIGILUS CN1” - Microfit 24 poles receptacle

PIN #	LABEL	LENGTH.	NOTE
1	GND	0.5 m	
2 (WHITE) 3 (BLUE)	CAN 1	1.5 m	Shield is connected to ground (pin 16)
4-5			Jumper wire between pin 4-5 for CAN1 termination
10	AUDIO OUT	0.5 m	Shield is connected to ground (pin 24)
11	AUDIO IN	0.5 m	Shield is connected to ground (pin 24)
13	+12V	0.5 m	
18	GPS TX	0.5 m	Shield is connected to ground (pin 19)
20-21-22-23		1.0 m	[USB CABLE WITH USB CONNECTOR]

- **Connector: “REM. MOD. CN1”** - Microfit 16 poles receptacle

PIN #	LABEL	LENGTH.	NOTE
1-9			Jumper wire between pin 1-9 for CAN1 termination
2 (BLUE) 10 (WHITE)	CAN 1	1.5 m	Shield is connected to ground (pin 15)
4	OUT 1	0.5 m	
5	RPM	2 m	
8	+12V	0.5 m	
15			[Ground shield]
16	GND	0.5 m	

- **Connector: “REM. MOD. CN2”** - Microfit 24 poles receptacle

PIN #	LABEL	LENGTH.	NOTE
5			This pin is connected to ground (pin 15 of REM.MOD. CN1)
6			This pin is connected to ground (pin 15 of REM.MOD. CN1)
12	EGT 1	0.2 m	Green wire → to - of thermocouple connector receptacle
24	“	0.2 m	Red wire → to + of thermocouple connector receptacle
11	EGT 2	0.2 m	Green wire → to - of thermocouple connector receptacle
23	“	0.2 m	Red wire → to + of thermocouple connector receptacle
17	CHT2	2.0 m	
18	CHT1	2.0 m	

- Connector: “REM. MOD. CN3” - Microfit 22 poles receptacle

PIN #	LABEL	LENGTH.	NOTE
1	IN2	2.0 m	
3	IN3	2.0 m	
4	TLV.L	0.5 m	
5	TLV.M	0.5 m	
6-17			See note 1
7	OIL T.	2.0 m	
8	OAT	2.0 m	
9	CAT	2.0 m	
10	SHUNT -	1.0 m	
11	SHUNT +	1.0 m	
11	OIL P.+	2.0 m	
12	IN1	2.0 m	
13	F/F S	0.5 m	
14	IN4	2.0 m	
15	TLV.R	0.5 m	
16	OIL P.	2.0 m	
19	SHUNT S	1.0 m	
20	F.P. S	2.0 m	
21	F.P. -	2.0 m	
21	F/F -	0.5 m	
22	F.P. +	2.0 m	
22	F/F +	0.5 m	

**NOTE1:** The jumper wire between pin 6-17 is needed for the 4-20mA oil pressure sensor (ROTAX 956413 or FLYBOX 602000).

**WARNING:** Insulate not used wires.

## **APPENDIX “B” - Optional wiring 652011 FOR VIGILUS + REMOTE MODULE (ROTAX 912iS VERSION)**

- **Connector: “VIGILUS CN1”** - Microfit 24 poles receptacle

PIN #	LABEL	LENGTH.	NOTE
1	GND	0.5 m	
2 (WHITE) 3 (BLUE)	CAN 1	1.5 m	CAN bus line for remote module connection
4-5			Jumper wire between pin 4-5 for CAN1 termination
6 (WHITE) 7 (BLUE)	CAN 1	0.5 m	CAN bus line for Rotax 912iS ECU connection
10	AUDIO OUT	0.5 m	Shield is connected to ground (pin 24)
11	AUDIO IN	0.5 m	Shield is connected to ground (pin 24)
13	+12V	0.5 m	
18	GPS TX	0.5 m	Shield is connected to ground (pin 19)
20-21-22-23		1.0 m	[USB CABLE WITH USB CONNECTOR]

**Rotax912iS version**

- **Connector: “REM. MOD. CN1”** - Microfit 16 poles receptacle

PIN #	LABEL	LENGTH.	NOTE
1-9			Jumper wire between pin 1-9 for CAN1 termination
2 (BLUE) 10 (WHITE)	CAN 1	1.5 m	Shield is connected to ground (pin 15)
4	OUT 1	0.5 m	
8	+12V	0.5 m	
14	RPM OUT	0.5 m	
16	GND	0.5 m	

- **Connector: “REM. MOD. CN2”** - Microfit 24 poles receptacle

PIN #	LABEL	LENGT H.	NOTE
			This connector is supplied but it's not used for 912iS engines

- **Connector: “REM. MOD. CN3”** - Microfit 22 poles receptacle

PIN #	LABEL	LENGTH.	NOTE
1	IN2	2.0 m	
3	IN3	2.0 m	
4	TLV.L	0.5 m	
5	TLV.M	0.5 m	
8	OAT	2.0 m	
10	SHUNT -	1.0 m	
11	SHUNT +	1.0 m	
12	IN1	2.0 m	
14	IN4	2.0 m	
15	TLV.R	0.5 m	
19	SHUNT S	1.0 m	
20	F.P. S	2.0 m	
21	F.P. -	2.0 m	
22	F.P. +	2.0 m	

**WARNING:** Insulate not used wires.

## **TECHNICAL SPECIFICATIONS**

### **VIGILUS:**

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- 3.5" TFT color LCD screen.
- Display brightness: 1000nits, adjustable.
- Standard 3 1/8" (80mm) panel mount
- Dimensions: 86 x 86 x 30.3 mm
- Weight: 185 g
- Supply voltage: 10 ~ 30 V=
- Supply current: 200mA Max
- Operational temperature range: -20 ~ +70°C
- Audio LineIn and LineOut for intercom
- Microphone input
- 2 CAN Bus communication interfaces
- GPS input: standard RS-232, data format: NMEA-0183, sentences required: \$GPRMC and \$GPRMB
- 1 USB port
- Internal storage for 100 hours of datalog
- Optional video input from Flybox® USB video adapter



**REMOTE ENGINE MODULE:**

- Dimensions: 135 x 79 x 20 mm
- Weight: 185 g
- Supply voltage: 10 ~ 30 V=
- Supply current: 50mA Max
- Operational temperature range: -20 ~ +70°C
- 1 CAN Bus communication interface
- 4 programmable outputs (active low, 300mA / 4W max)

**SENSORS INPUTS:**

- Current input from Flybox® sensor
- 2 Fuel flow inputs from Flybox® transducer
- Fuel pressure from Flybox® transducer
- RPM tachometer input
- Rotor tachometer input for helicopter version
- Oil pressure from Flybox®, ROTAX or JABIRU sensors
- 2 Oil temperature inputs from ROTAX, JABIRU or PT1000 sensors
- Carburetor/Airbox from PT1000 sensor
- Outside air temperature from PT1000 sensor
- 6 Cylinder head temperature from ROTAX, J-type thermocouples or PT1000 sensors
- 6 Exhaust gas temperature from K-type thermocouples
- 3 inputs for fuel level sensors: resistive (300 ohm max) or capacitive (0-5V)

## **WARRANTY**

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This product is warranted to be free from defects for a period of 12 months from the user invoice date.

The warranty only cover the manufacture's defects; shall not apply to product that has been improper installed, misused or incorrect maintenance, repaired or altered by non-qualified person.

<b>Date</b>	<b>Revision</b>	<b>Description</b>
<b>7/2017</b>	1.0	First official release

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