INTEGRA EMS TL-6760 CONFIGURATION MANUAL

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Please, send your e-mail address to customer@tl-elektronic.com to receive the latest information about software upgrade.

Send your ideas to innovation@tl-elektronic.com
We will evaluate your suggestion and provide an update.

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Record of revision

Revision	Revision Date	Description	ECO#	Insertion date	By
PrA	14.04.2013	Initial version			Hovorka

WARNING: If setup or calibration data is inadvertently or improperly changed, there could be inaccurate readings that may lead to improper operation of the aircraft or engine. This could result in engine damage and/or an emergency situation.

CAUTION: Use the INTEGRA at your own risk. To reduce the risk of unsafe operation, carefully review and understand all aspects of this Configuration Manual and the Flight Manual Supplement, and thoroughly practice basic operation prior to actual use. When in actual use, carefully compare indications from the INTEGRA to all available navigation sources, including the information from other NAVAIDS, visual sightings, charts, etc. For safety, always resolve any discrepancies before continuing navigation.

NOTE: It is the pilot's responsibility for initial missed approach guidance in accordance with published procedure. The unit may not provide correct guidance until established on a defined leg.

NOTE: GPS level of service annunciations are not applicable to the external CDI (or HSI) when VLOC is active.

TL elektronic is fully committed to your satisfaction as a customer. If you have any questions regarding the INTEGRA, please contact our customer service department.

EMS Setup Menu

ⓘ **NOTE:** **This manual assumes that you have read User Manual and you've mastered operation of the Integra.**

Access to this menu:
Press **Menu•Baro** knob, select Enter Setup in menu. When prompt "Are you sure you want to enter to setup" appears, press "Yes". There in Setup mode switch screen to EMS. You should see Menu EMS Setup.

In this menu you can set up many parameters mainly for engine and sensor settings.

- **Menu EMS Setup**
  - *Units*
  - *Configuration & Sensors*
  - *Range and Limits*
  - *Other Settings & Calibration*
  - *External Devices*
  - *EMS Data Sharing*
  - *Language*
  - *Demo Mode*
  - *Exit Menu*

UNITS

You can choose between metric and imperial units or you can define your own unit settings.

- **Menu UNITS**
  - *Metric*
  - *Imperial (UK)*
  - *Imperial (US)*
  - *Custom*

Metric – INTEGRA display units in metric system – (Bar, °C, Pa, litre)
Imperial (US) – INTEGRA display units in metric and imperial system (Bar, °C, Pa, gallons)
Imperial (UK) – INTEGRA display units in imperial system (inHg, F, psi, gallons)
Custom – you can choose individual units for each measure.

- **Menu Custom**
  - *MAN pressure*
  - *Temperature*
  - *Pressure*
  - *Quantity*

.

Available units for measured quantities

Quantities	Selectable Units		
Indicator press of oil	bar		psi
Indicator oil temperature	Celsius		Fahrenheit
Internal air temperature	Celsius		Fahrenheit
Outsider air temperature	Celsius		Fahrenheit
Temperature of cylinders	Celsius		Fahrenheit
Information about fuel, fuel pressure	bar	kg/cm2	psi
Consumption fuel flow and fuel quantity	Litre		GAL
Manifold air pressure	mBar	torr	inHg

EMS CONFIGURATION & SENSORS

In this menu you can properly set all connected sensors.

- **Menu CONFIGURATIONS & SENSORS**
  - *RPM*
  - *MAP*
  - *Rotor RPM*
  - *Oil pressure*
  - *Oil Temperature*
  - *Water CHT Temperature*
  - *Water Aux Temperature*
  - *Left / Total Tank*
  - *Right Tank*
  - *Fuel Pressure*
  - *Fuel Flow*
  - *EGT, CHT number*
  - *EGT, CHT setting*
  - *IAT*
  - *OAT*
  - *Voltage*
  - *Current*

In every menu you can choose if you want to CONNECT or NOT CONNECT a sensor and in some menus you will have a list of sensors in which to choose the appropriate sensor.

RPM	This sensor monitors RPM	
MAP	This sensor monitors manifold pressure	
Rotor RPM	This sensor monitors Rotor RPM	
Oil Pressure	This sensor monitors oil pressure	
Oil Temperature	This sensor monitors oil temperature	
Water CHT Temperature	This sensor monitors CHT Temperature(in meaning used by ROTAX, technically the sensor is placed on engine block). To enable displaying of this info, see section Other Setting & Calibration-Water CHT Temperature Label.	
Water Aux Temperature	This sensor monitors water temperature. To enable displaying of this info, see section Other Setting & Calibration-Water CHT Temperature Label.	
Left / Total tank	This sensor monitors fuel level in left tank	
Right tank	This sensor monitors fuel level in right tank	You can disconnect this tank, so the left tank will be the only one and the main tank.

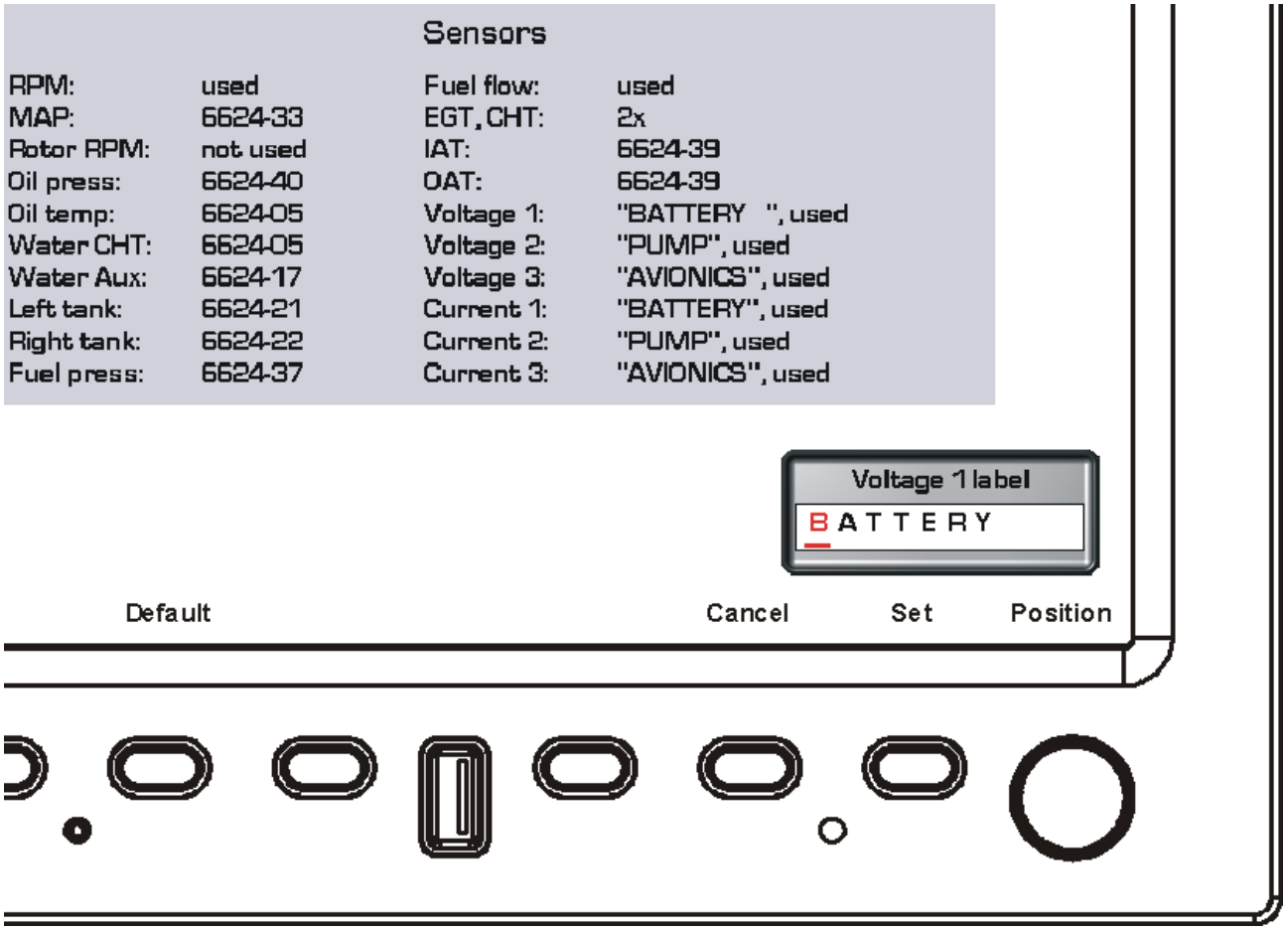
⚠ **CAUTION:** After left or right tank is chosen a warning message is displayed: "**After change sensor you have to recalibrate fuel tank, do you want to continue?**" and two labels are displayed "YES or NO". If you press YES, a list will be shown with possible sensors choices.

Fuel Pressure	This sensor monitors fuel pressure
Fuel flow	This sensor monitors Fuel Flow
EGT, CHT Number	You can set the Cylinder Number to 2, 4 or 6.
IAT	This sensor monitors internal air temperature
OAT	This sensor monitors outside air temperature

Voltage	You can choose where (battery, pump, avionics etc.) you want gauge voltage monitoring. Menu for Voltage is the same as for Current.	• **Menu Voltage**
		  • *Voltage1 – Yes*
		  • *Voltage1 – No*
		  • *Voltage1 – Label*
		  • *Voltage2 – Yes*
		  • *Voltage2 – No*
		  • *Voltage2 – Label*
		  • *Voltage3 – Yes*
		  • *Voltage3 – No*
		  • *Voltage3 – Label*
			VoltageX –Yes
			-Select when Voltage(1,2 or 3) is used
			
			VoltageX –No
			-Select when Voltage(1,2 or 3) is not used
			
			VoltageX –Yes
			-Select when you want to set label of Voltage(1,2 or 3). See next page for description.

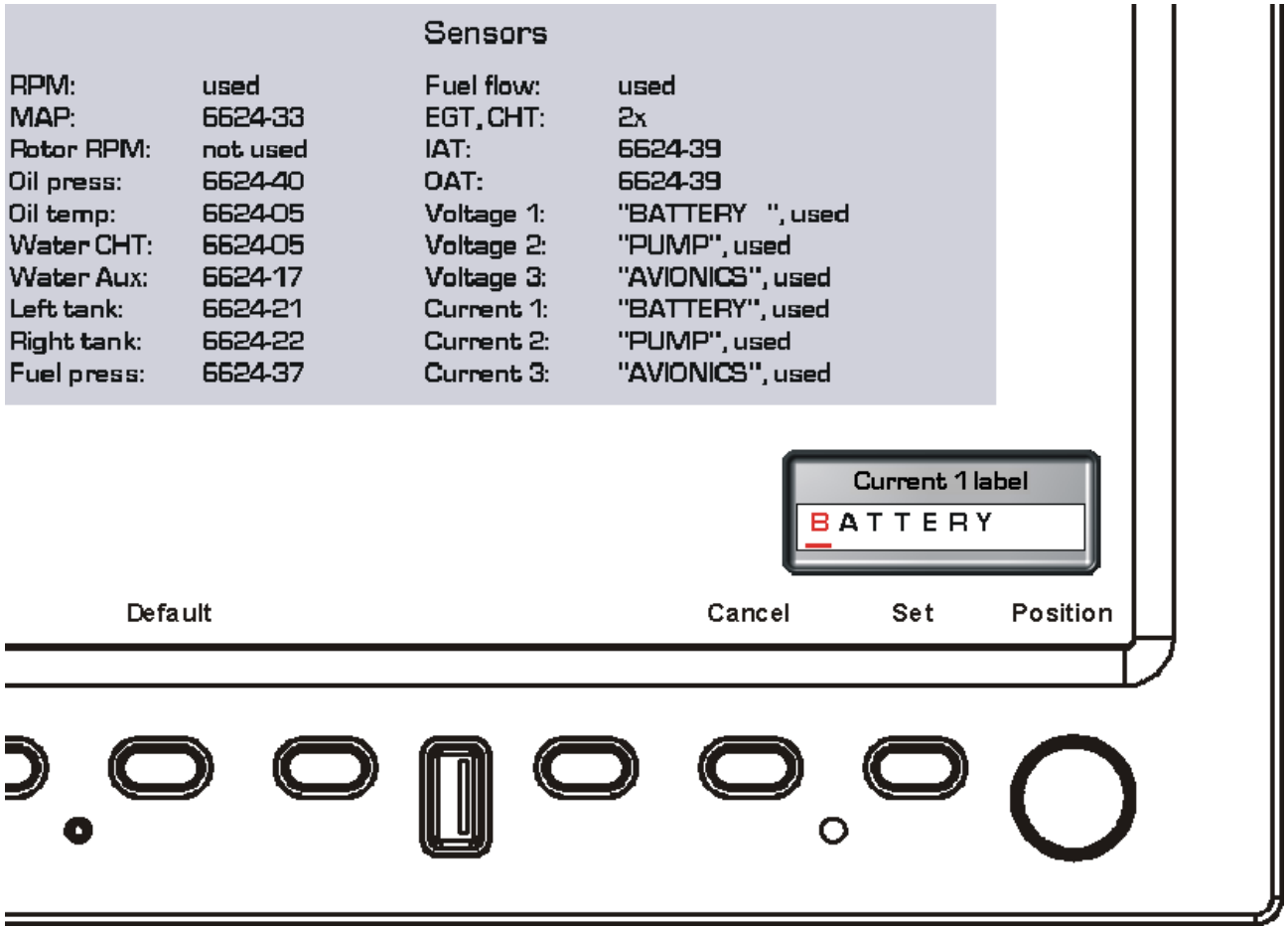
Current	You can choose where (battery, pump, avionics etc.) you want gauge current monitoring. Menu for Current is the same as for Voltage.	• **Menu Current**
		  • *Current1 – Yes*
		  • *Current1 – No*
		  • *Current1 – Label*
		  • *Current2 – Yes*
		  • *Current2 – No*
		  • *Current2 – Label*
		  • *Current3 – Yes*
		  • *Current3 – No*
		  • *Current3 – Label*
			CurrentX –Yes
			-Select when Current(1,2 or 3) is used
			
			CurrentX –No
			-Select when Current(1,2 or 3) is not used
			
			CurrentX –Yes
			-Select when you want to set label of Current(1,2 or 3). See page ***Chyba! Záložka není definována.*** *for description.*

Setting Voltage label



The underlined letter you can change by rotating the right-hand knob. If you get the required letter, just press the knob and the underscore will skip on to the next letter. Press “Set” to accept the new label. Press “Cancel” to skip to previous menu. Press “Default” to reset to default label. For Voltage 1 is default label “BATTERY”, for Voltage 2 – “PUMP”, for Voltage 3 – “AVIONICS”.

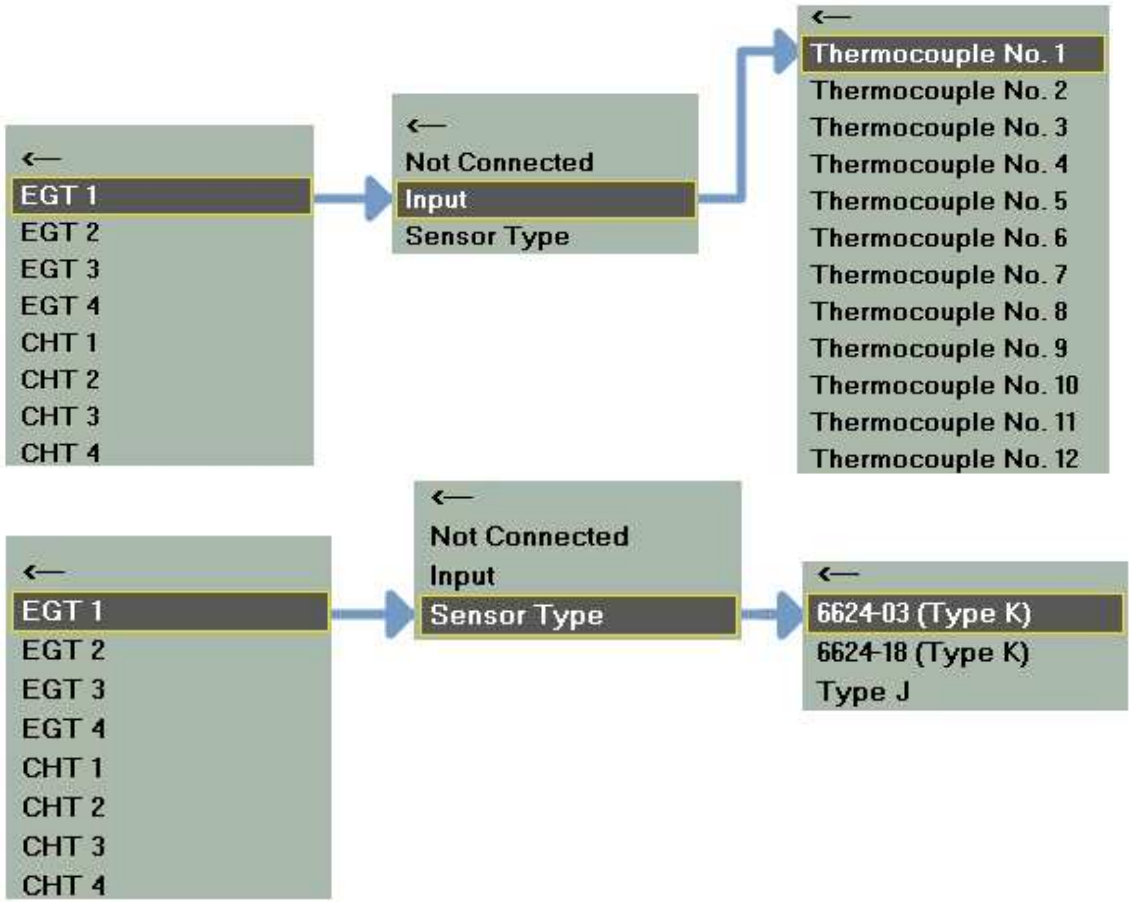
Setting Current label



The underlined letter you can change by rotating the right-hand knob. If you get the required letter, just press the knob and the underscore will skip on to the next letter. Press “Set” to accept the new label. Press “Cancel” to skip to previous menu. Press “Default” to reset to default label. For Current 1 is default label “BATTERY”, for Current 2 – “PUMP”, for Current 3 – “AVIONICS”.

EGT, CHT setting

You can choose and assign Thermocouple and Sensors to EGT and CHT. In this menu choose one EGT or one of CHT. Press the knob and discovers next menu. Now select Input. In this menu select desired thermocouple. Now selected EGT or CHT is associated with this thermocouple. You can do it the same way for every EGT and CHT.



CHT described here means Cylinder Head Temperature(measured by thermocouples under spark plugs not in meaning used by ROTAX).

EMS RANGE AND LIMITS

In this menu you can set minimum and maximum critical values, minimum and maximum warning values and normal values.

- **Menu RANGE AND LIMITS**
  - *RPM*
  - *MAP*
  - *ROTOR RPM*
  - *Oil Pressure*
  - *Oil Temperature*
  - *Water CHT Temperature**
  - *Water Aux Temperature*
  - *Left / Total tank*
  - *Right tank*
  - *Fuel pressure*
  - *Fuel flow*
  - *EGT*
  - *CHT***
  - *Voltage 1*
  - *Current 1*
  - *Voltage 2*
  - *Current 2*
  - *Voltage 3*
  - *Current 3*

	Range	Min Alarm	Min Warn	Norm	Warn	Alarm
RPM [rpm]:	3000			500	2700	2800
MAP [mBar]:	1300		500		1100	
Rotor RPM [rpm]:	1000				700	850
Oil Press [bar]:	8.0			1.0	5.0	6.0
Oil Temp [°C]:	140			60	110	130
Water CHT [°C]:	150			0	110	130
Water Aux [°C]:	160			50	135	145
Left/Total tank [gal]:	11.0	2.2				
Right tank [gal]:	11.0	2.2				
Fuel Press [bar]:	5.00	0.40	0.90		3.50	4.50
Fuel flow [gal/h]:	5.5					4.4
EGT [°C]:	1200				1000	1100
CHT [°C]:	300				250	280
Voltage 1 [V]:	40.0				0.0	0.0
Current 1 [A]:	50.0				0.0	0.0
Voltage 2 [V]:	40.0				0.0	0.0
Current 2 [A]:	50.0				0.0	0.0
Voltage 3 [V]:	40.0				0.0	0.0
Current 3 [A]:	50.0				0.0	0.0

*** Range and Limits for Water Temperature and CHT are same, This CHT refers to temperature measured on engine block-ROTAX meaning of the word CHT**

****refers to temperatures measured by thermocouples under spark candles**

ⓘ **NOTE:** The limits of one each values can´t overlap each other. If you try decrease for example ALARM and it is impossible so you need to decrease WARN at first and than you can set ALARM to lower value.

Available Limits Configuration Table

Indicator	**You can set**					
	Range	Min. Alarm	Min. Warn	Norm	Warn	Alarm
RPM	X			X	X	X
MAP	X		X		X	
Rotor RPM	X	X	X		X	X
Oil Pressure	X	X	X		X	X
Oil Temperature	X	X	X	X	X	X
Water CHT Temperature	X			X	X	X
Water Aux Temperature	X			X	X	X
Left tank / Total Tank	X	X				

Available Limits Configuration Table

Indicator	You can set					
	Range	Min. Alarm	Min. Warn	Norm	Warn	Alarm
Right tank	X	X				
Fuel pressure	X	X	X		X	X
Fuel flow	X					X
EGT	X				X	X
CHT	X				X	X
Voltage 1	X	X	X		X	X
Current 1	X	X	X		X	X
Voltage 2	X	X	X		X	X
Current 2	X	X	X		X	X
Voltage 3	X	X	X		X	X
Current 3	X	X	X		X	X

Example of differences between set values.

Default values are defined

RANGE	MIN ALARM	MIN WARN	NORM	WARN	ALARM
3000	-	-	500	2700	2800

New values are defined:

RANGE	MIN ALARM	MIN WARN	NORM	WARN	ALARM
5000	-	-	1000	3000	4000

Indicator	Function	Recommendation
Warning Oil Pressure	Warning Limit. Useful as a reminder to reduce RPM when warming a cold engine, especially in winter conditions, to avoid excessive oil pressure.	As recommended by engine manufacturer
Alarm Minimum Oil Pressure	Minimum Oil Pressure – This Warns of loss of oil pressure. This is serious. Consider you situation carefully. This may lead to complete engine seizure or it may only be instrument or sensor failure. It requires immediate action but not over-reaction.	As recommended by engine manufacturer
Oil Temperature Warning	Yellow indicator	As recommended by engine manufacturer
Maximum Oil Temp.	Consider setting this limit lower than the maximum to get early warning of abnormal oil temp.	As recommended by engine manufacturer
Normal Oil Temperature	Intended for troubleshooting. Can also indicate reminder that the engine is not warm enough.	Set according to engine manufacturer's recommendation or set based on experience
RPM Alarm Max	Red Line -Warns when the engine has reached maximum RPM	Set according to engine manufacturer's recommendation.
RPM Warning	Yellow Indicator	Set Based on experience
RPM Normal	Green indicator	Set according to engine manufacturer's recommendation.

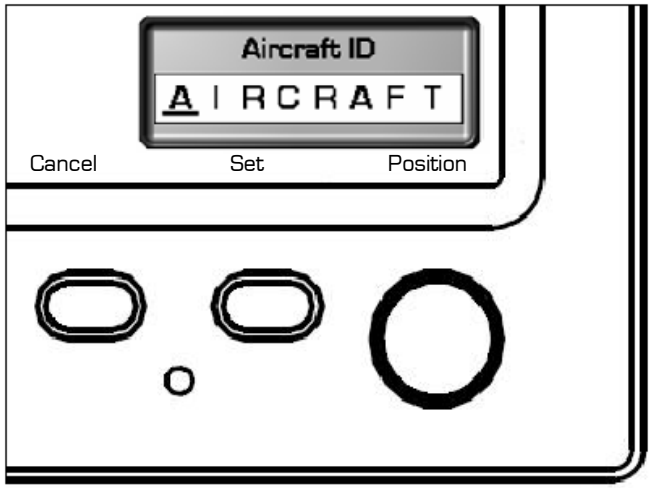
Fuel Right and Left Tank Alarm	Minimum Fuel Quantity	Set for at least enough useable fuel to provide for 30-60 minutes of flight at cruise power.
Fuel Right and Left Tank range	Indicates each tanks capacity	Setting Fuel Tank Range requires Fuel Tank Calibration
Fuel Flow	Generates a warning when the fuel flow (rate of fuel burn) exceeds this limit. Useful for detecting badly leaking fuel lines, loose connections to fuel injectors, etc. Very useful safety feature for all engines, but especially fuel injected engines. Be sure to use it!	Account for max fuel flow rate at full takeoff set max 10%-20% above max rate
EGT Warning	Maximum Exhaust Gas Temp. – Not all engines have published limits, nor do all engines require a maximum EGT limit.	Set limit according to engine manufacturer recommendation, or based on experience.
CHT Warning	Warning Cylinder Head Temperature. Often engines will normally operate significantly lower than the engine manufacturer's limit.	Set according to engine manufacturer's recommendation
CHT Alarm	Consider setting this limit lower than the maximum to get early warning of abnormal CHTs	Set according to engine manufacturer's recommendation

EMS OTHER SETTING & CALIBRATION

- **Menu OTHER SETTING & CALIBRATION**
  - *Aircraft Identification*
  - *Time*
  - *Date*
  - *Backlight Control*
  - *AUX Input/Output*
  - *Fuel Flow*
  - *Fuel Press – set zero pressure*
  - *Fuel Calibration*
  - *Set Unexhaustible Fuel*
  - *RPM Setting*
  - *Rotor RPM Setting*
  - *Engine Time Threshold*
  - *Water CHT Temperature Label*
  - *Main Switch Control*

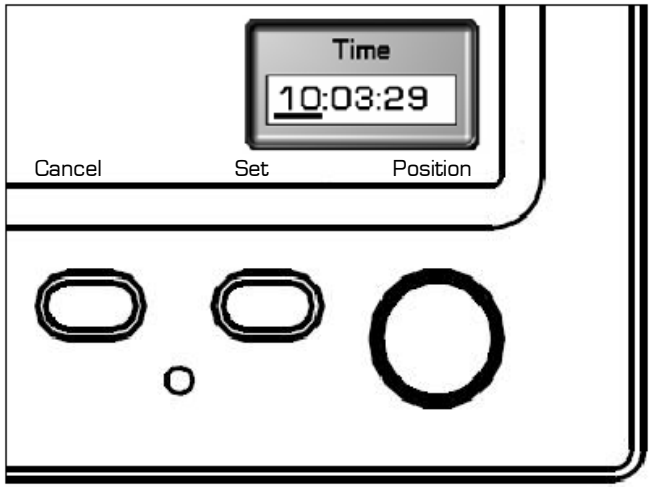
Aircraft identification

The Aircraft ID Box has Letters A-Z, numbers 0-9 blanks and - symbol. The ID can also be shortened to fewer than 8 digits.
The underlined letter you can change just rotate with the right-hand knob. If you get required letter, just press the knob and the underscore will skip on to the next letter. Then press “Set” to enter the new value. Press “Cancel” to skip previous menu.



Time

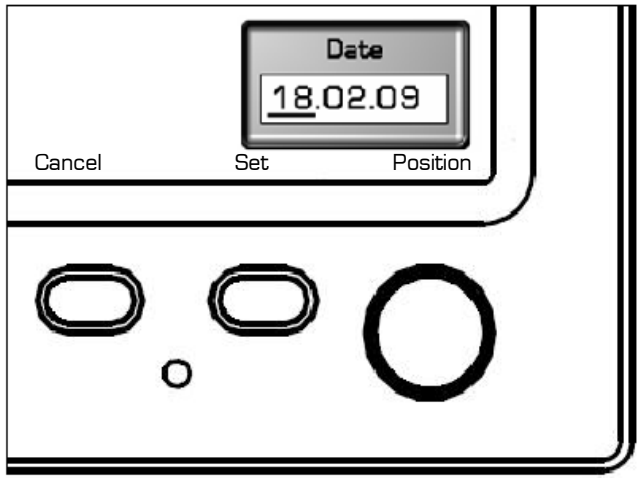
You can set the time. The underlined numbers you can change just rotate with the right-hand knob. If you get required time, just press the knob and the underscore will skip on to the next number. Then press “Set” to enter the new value. Press “Cancel” to skip previous menu.



ⓘ **NOTE:** It is necessary to set UTC (Zulu time) on the INTEGRA Clock.

Date

You can set the date. The underlined numbers you can change just rotate with the right-hand knob. If you get required time, just press the knob and the underscore will skip on to the next number. Then press “Set” to enter the date. Please insert date in the form of DD/MM/YY or day/month/year. Press “Cancel” to skip previous menu.



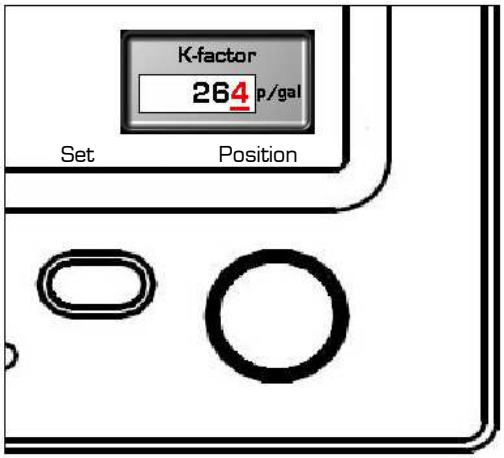
Fuel flow

You can set K-factor and Time of aver flow.

- **Menu Fuel flow**
  - *K-Factor*
  - *Time of Average Flow*

K-factor

You can manually adjust the K-Factor. The K-Factor is a measurement of the pulses per gallon that the flow transducer outputs. Due to variations in the installation of the flow transducer, it may be necessary to adjust the K-Factor for the first few flights in order to get an accurate fuel remaining, fuel used and flow reading. The K-Factor should be changed only when the fuel tanks have been filled accurately on level ground. After a few adjustments of the K-Factor, the fuel remaining and the fuel used as calculated by the INTEGRA should be within a few gallons (or less) of actual and should not need further adjustment. Use the following fields, as necessary, to correct the K-Factor.

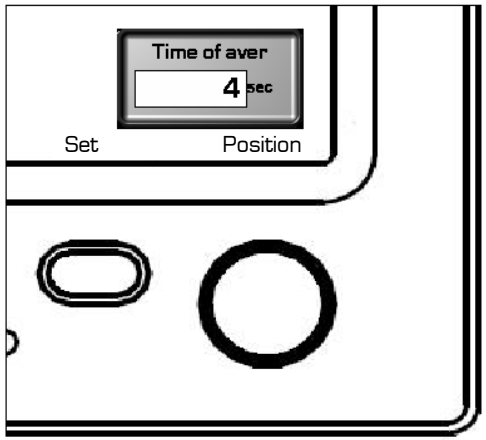


The underlined numbers you can change by rotating the right-hand knob. If you get the required number, just press the knob and the underscore will skip on to the next number. Press “Set” to enter the new value. Press “Cancel” to skip previous menu.

$$\text{K-FACTOR} = \text{Last K-FACTOR} + \frac{(\text{Shown value} - \text{Real value}) \times \text{Last K-FACTOR}}{\text{Real value}}$$

Time of Average Flow

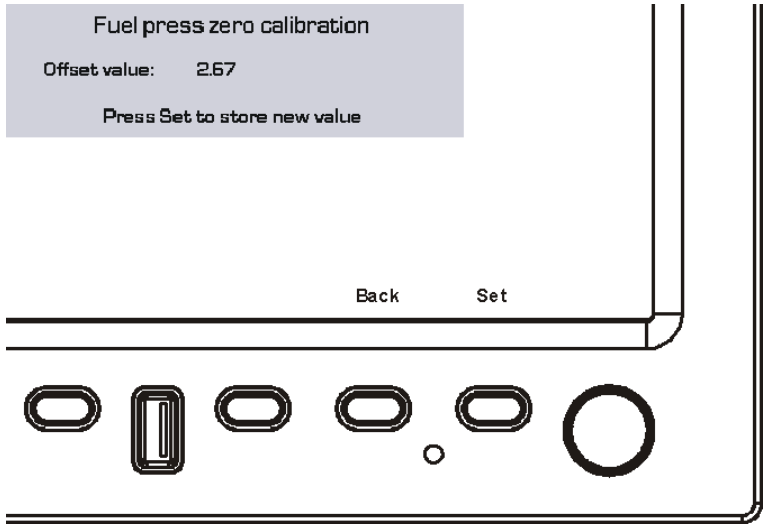
You can set time duration for how long you want average flow of fuel. After this time the INTEGRA will show you average fuel flow.
The numbers of seconds you can change just rotate with the right-hand knob. If you get required number, just press "Set". Press "Cancel" to skip previous menu.



ⓘ **NOTE:** Maximum displaying time which you can set is 10 seconds.

Fuel pressure – set zero

This is function for correction of variance between pressure sensors.



Fuel calibration

Because the shape of the tank can be asymmetric therefore petrol in fuel tanks may not be level. You can set up to 15 steps of fuel calibration.

- **Menu Fuel calibration**
  - *Left tank*
  - *Right tank*

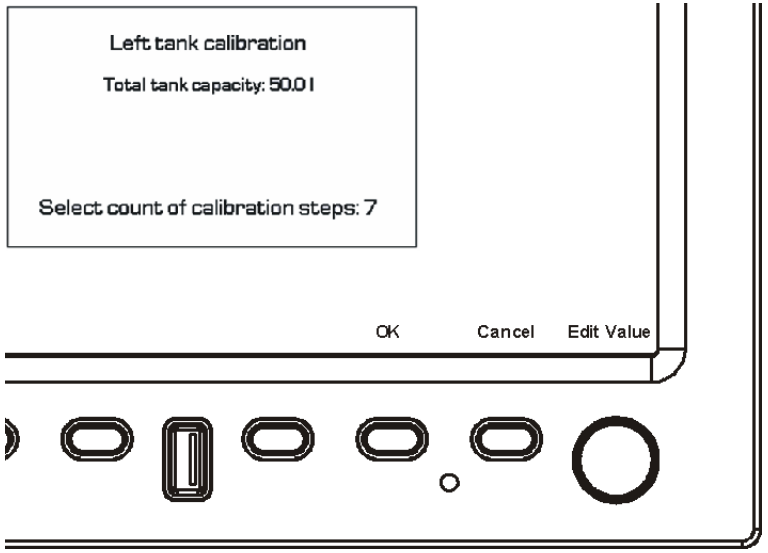
  (Right tank is enable)

  Or

  - *Total tank*

  (Right tank is disable)

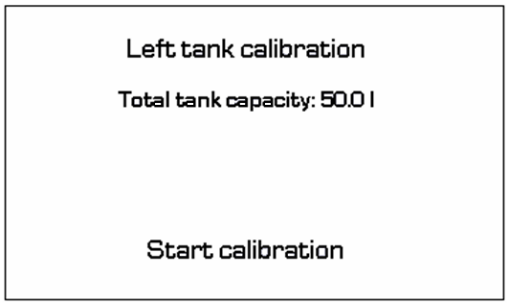
First you choose left or right tank for calibration and press the knob. Now is displayed label and you can choose number of steps merely rotate the knob. When you have set number of steps, press "OK". You can cancel this operation if you press the "Cancel" button.



ⓘ **NOTE:** You can set count of calibration steps in range from 3 to 15.

ⓘ **NOTE:** If you want to change the capacity of the tank:
Enter to Setup – Range and Limits – Left / Total Tank and set the RANGE.

If you press "OK" button the next label with "Start calibration" is displayed. Be sure before starting the calibration that your fuel tank is full.



⚠ **CAUTION:** The INTEGRA must be calibrated to the aircraft fuel system and the INTEGRA's accuracy must be verified before flying the aircraft. The accuracy and proper operation of each function displayed on the INTEGRA should be verified before the aircraft is released for flight.

Set unexhaustible fuel

- **Menu Set Unexhaustible Fuel**
  - *Left tank*
  - *Right tank*

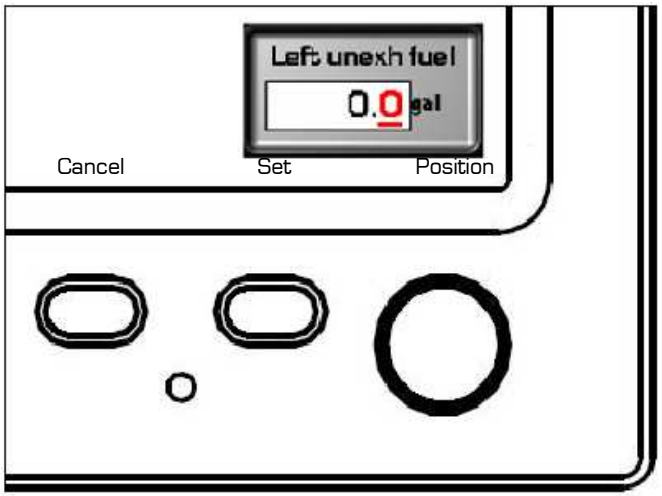
  (Right tank is enable)

  Or

  - *Total tank*

  (Right tank is disable)

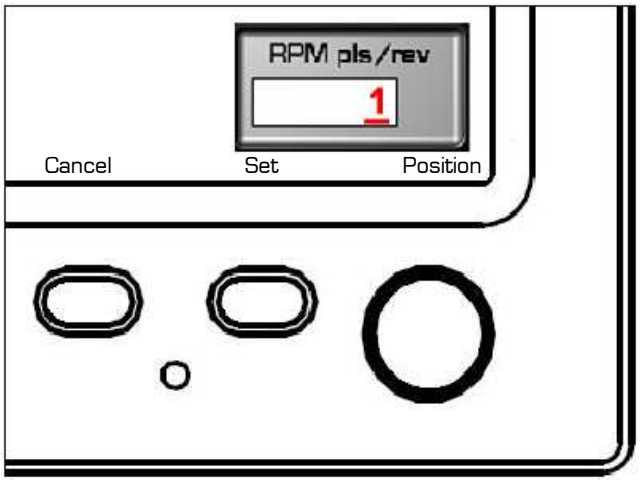
Your fuel tank may contain fuel that cannot be consumed. In this step you may set the quantity of this fuel.
In first step you choose left or right tank. Now the underlined number you can change just rotate with the right-hand knob. If you get the required number, just press the knob and the underscore will skip on to the next number. Press "Set" to enter the new value. Repeat the same procedure for the second tank.



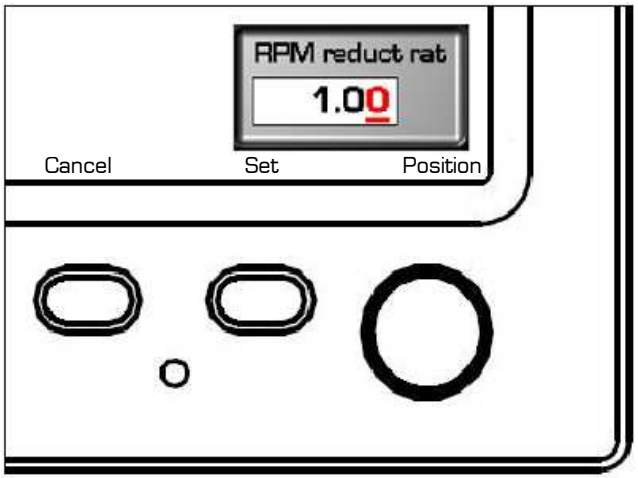
RPM setting

- **Menu RPM setting**
  - *Pulses Per Rev*
  - *Reduction ratio*

You can set number of pulses per rev and you can set reduction ratio.
In both cases the underlined number you can change by rotating the right-hand knob. If you get the required number, just press the knob and the underscore will skip on to the next number. Press “Set” to enter the new value. Press “Cancel” to skip previous menu.



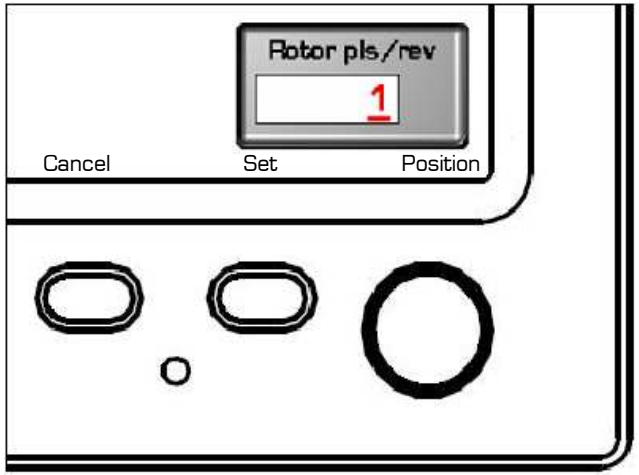
ⓘ **NOTE:** If you are unable to install a sensor directly on your engine and the location of your sensor is affected by a reduction ratio. It is then necessary to enter the correct reduction ratio. If this function is not used then preset reduction ratio to 1.00.



Rotor RPM setting You can set number of pulses.

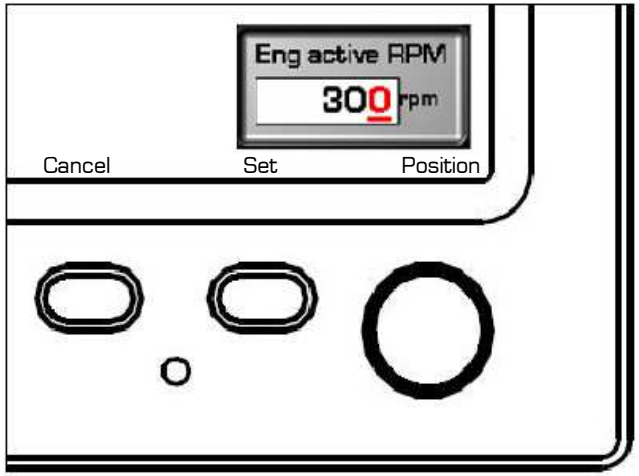
- **Menu Rotor RPM setting**
  - *Pulses Per Rev*

The underlined number you can change by rotating the right-hand knob. If you get the required number, just press the knob and the underscore will skip on to the next number. Press “Set” to enter the new value. Press “Cancel” to skip previous menu.



Engine time Threshold

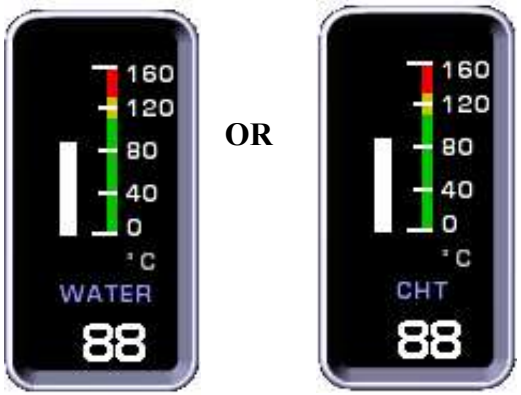
The underlined number you can change by rotating the right-hand knob. If you get the required number, just press the knob and the underscore will skip on to the next number. Press “Set” to enter the new value. Press “Cancel” to skip previous menu.



Water CHT Temperature Label

You can choose whether you want to display WATER TEMPERATURE and/or Cylinder Head Temperature (ROTAX meaning of the word)

- **Menu Water CHT Temperature Label**
  - *WATER*
  - *CHT*



Water Temperature and CHT depiction as it is displayed on EMS screen

The CHT described here represents value measured on engine block with resistance sensor. That's the meaning of CHT used by ROTAX. Don't confuse this CHT with CHT measured by thermocouples under spark plug.

Main Switch Control

If you have Integra connected via external main switch, set in this menu “CONNECTED”. So you can power on or power off Integra via main switch. If you have Integra connected directly to battery power, choose “NOT CONNECTED” in this menu.

- **Menu Main Switch Signal**
  - *Not Connected*
  - *Connected*

EMS EXTERNAL DEVICES

External devices are devices which you can connect on port COM1 or COM2.

- **Menu EXTERNAL DEVICES**
  - *CO Guardian*

CO Guardian

You can connect and disconnect the external CO Guardian device on port COM 1or COM 2.
CO guardian monitors the quantity of CO in the cockpit. If quantity of CO exceeds the preset safe limit the INTEGRA will show you an alert message.

EMS Data Sharing

If you have multiple TL elektronic products in your aircraft, they can be networked together via the TL elektronic iFamily® CanBUS. Units networked via iFamily® have the ability to share information with each other. Any product's data can then be viewed on any other screen in the iFamily® network. For example, EFIS INTEGRA has the ability to display engine monitor information if it is connected to EMS INTEGRA. The iFamily® systems allows you to connect autopilot servos and remote compass.

ⓘ **NOTE:** See Integra **iFamily®** Connection part and Explanation of Possible Connections in User Manual for more information.

- **Menu EMS Data Sharing**
  - *Off*
  - *Low Priority*
  - *High Priority*

Off

The Integra doesn't send EMS data to bus. The Integra is not source of EMS data for other Integra units connected to bus. The Integra only receives EMS data from bus.

Low Priority

The Integra is set as data source with low priority for EMS data shared by bus.

High Priority

The Integra is set as data source with high priority for EMS data shared by bus.

Language

You can switch between languages; the Integra will display button labels, menus, prompts etc. in selected language. Options are: English, Czech, German, French, Russian.

Demo Mode

ⓘ **NOTE: Run of Demo Mode during flight is strictly prohibited because the Integra is not displaying actual flight parameters, but values from internal memory loop.**

This option provides opportunity for trying out features of other versions of the INTEGRA. Of course the opportunity for trying out features of other versions is also available in Integra Demo PC application, which you could obtain from TL-elektronic web site.
After you'll start-up Demo Mode by selecting Demo On, the Integra will be reading input data of sensors from loop in internal memory. After time of loop is up, loop will be automatically start-up again.

- **Menu Demo Mode**
  - *Demo ON*
  - *Demo OFF*
  - *Integra Type*
  - *Reset Time*
  - *Save Setting*

Demo ON / Demo OFF

These two options switch between on-state and off-state of Demo Mode.

Integra Type

In this submenu you can choose simulated Integra unit of specific version. Options are EMS, EFIS, EFIS+EMS and Remote Display.

ⓘ **NOTE: To exit the Remote Display Demo Mode, you'll have to press the right-hand knob and then immediately left knob. This is only way, because Menu Enter Setup is not available for INTEGRA Remote Display.**

Reset Time

This submenu serves for setting reset time of loop. Range is from 30 seconds to 10 minutes.

Save Setting

If you select Save Setting, complete settings of the Integra will be saved. That includes the settings in standard screens (e.g. set of Towing Menu, Highway, Baro Pressure, Nav Source) and in Setup Mode (sensors setting, units etc.).
After count down of Reset Time reaches zero, all settings (that you've made after the Save Setting option selection) will be lost. In other words, settings will revert to state in moment, that you've select Save Setting option.

ⓘ **NOTE:** Running of Demo Mode is indicated by changing of color of the Integra buttons(sequence red-orange-green) and red displayed message Demo Mode.

INTEGRA EMS TL-6760 CONFIGURATION MANUAL

Part Number

TLX-6760X-DC-001-PrA

Europe

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