UL - MIP *flight log*

Operation-
and
Installation Manual

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Summary

1. GENERAL

The **UL-MIP***flight log* is the first step into a new generation of engine control instruments. It superceeds the permanent monitoring of the “clock shop“ called cockpit.

It incorporates all the indicators for engine control, fuel management, engine time registration and flight log into one compact case.
The pilot chooses only those data to show up, which are important for him. Those are indicated on 3 displays. Independently of the display, the microprocessor is permanently checking all critical data (engine speed, cylinder head temperature, etc.) in the background.
As soon as a limit (‘red line’) is exceeded the UL-MIP switches automatically to the concerned data and warns the pilot actively by a flashing display.

So, the Pilot is able to pay more attention to flying than to watching all the engine data.

Further, the integrated flight-log records the latest 50 flights including all informations. So you do not have to ask later for your take off and arrival time. You can easily copy all data to your personal log-book in the evening or whenever you like.

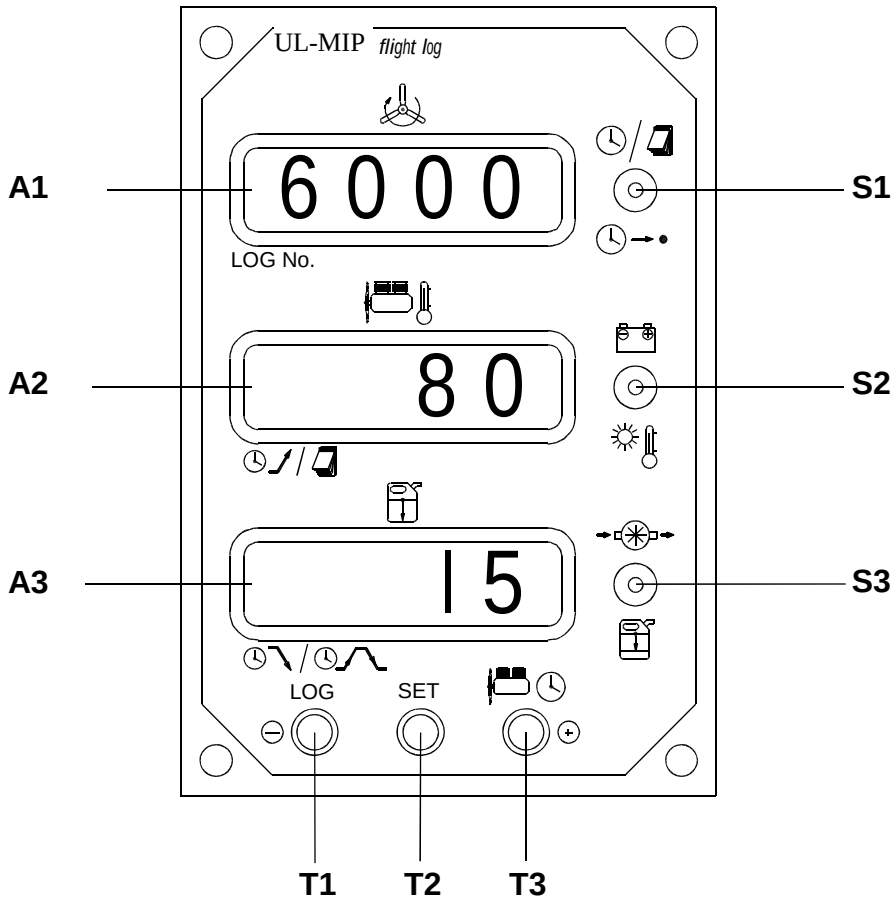
the UL-MIP is very simple to handle
Selfexplaining symbols for all the different functions and logically arranged switches make it very easy and less time consuming for everyone to get familiar with this instrument even without manual.
However it is strongly recommended to read this manual first before installation and operation.

the UL-MIP is universally applicable
You may choose among several sensors for all kinds of engines and fuel systems. The UL-MIP recognizes automatically which of them is connected (except for EGT and oil pressure sensor). There are special menus to adjust the limits and other factors in various cases. This makes it very easy to adapt the UL-MIP to most different engines and fuel systems. There are even two different fuel level indication systems provided:

1. fuel flow measuring (standard)
Its use is very universal, because neither the shape of the tank nor the flight position have any effect on the reading. An optional ‘tank full’ indicator can free you from programming your UL-MIP with the refilled amount of fuel if you fill the tank always to maximum.

2. analog fuel gauge (optional)
There is also an option for using an analog fuel level gauge. It is only recommended for simple shaped tanks (e.g. with a constant cross section from the top to the bottom). This analog fuel level gauge works with a floater. So no programming of the fuel level is required at all.

1.1Operation And Display Elements



S1 switches the upper display **(A1)** to:

Time/Date	up	Ý
Tachometer (RPM)	middle	**o**
Remaining Flight Time	down	ß

S2 switches the middle display **(A2)** to:

Battery Voltage / Oil Pressure	up	Ý
Cylinder head / Coolant Temperature	middle	**o**
Outside / Exhaust Gas / Oil Temperature	down	ß

S3 switches the lower display **(A2)** to:

Fuel Flow	up	Ý
Fuel Level	middle	**o**
Used Amount of Fuel	down	ß

T1 Pushbutton to call the **Flight Log** function (see Ch. 4.)

T2 Pushbutton to call the „SET“-**Menu** (see Ch. 3.)

T3 Pushbutton to call the **Elapsed Engine Time Registration** (see Ch. 2.4)

1.2. Power Up

The UL-MIP may be switched on after the appropriate sensors have been installed and connected to the wiring set as described in the installation manual.

All 3 displays show up with figures "**8**" and a row of colons and decimal points for about 0,5 sec. This is the normal display check routine. At the same time a self-test is performed.

After that the internal time is checked. Certainly it will not be correct if the UL-MIP is switched on for the first time or was disconnected from the battery. Then it switches automatically into „SET"-menu (see Ch. 3), to enter time, date etc.

As soon as the time is entered correctly the UL-MIP will return to normal operation mode.

2. NORMAL OPERATION MODE

Engine and fuel data are registered and displayed in this mode. The pilot chooses with S1, S2 and S3 which data he likes to see on the corresponding displays.

Depending on the type of engine, different limits for RPM, cylinder head temperature, oil pressure, coolant temperature and if necessary exhaust gas temperature may be set. If one of these limits will be exceeded, the corresponding value will be displayed in a flashing mode to warn the pilot. To adjust these limits see chapter 5.

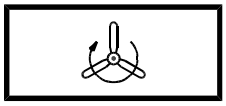
If the measurement is out of range or in case of a defective wiring or sensor the corresponding display flashes an „**O**ver **L**imit“ - warning:

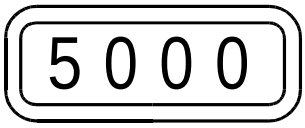
“ - 0 L - “

2.1. Upper Display

The engine speed is the most important indication. Because of that it appears on the upmost display. Time/Date and remaining flight time are only of momentarily interest. That’s why S1 automatically snaps back to the middle (RPM) position.

2.1.1**Tachometer** **S1**: middle **o** symbol:



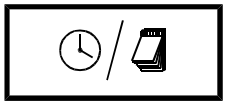


ranges: 900...9000 RPM at 1 and 2 impulses/revolution
600...6000 RPM at 3 ‘’
450...4500 RPM at 4 ‘‘

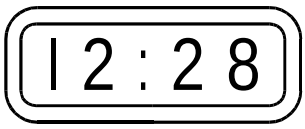
Note: To get the exact reading, the correct number of ignition impulses per revolution must be set, depending on the type of engine and ignition system.
(Default Setting: for 2 - stroke: 2 impulses/revolution; for 4 - stroke: 1 impulse/revolution)

If the engine is turned off, the upper display will show the time instead of the RPM

2.1.2 Time/Date **S1**: up Ý symbol:

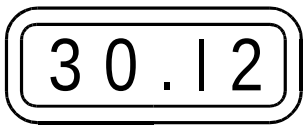


a) engine **running**:
Time and Date show up changing every 2 secs :



Time

Hours **Minutes**



Date

Day **Month**

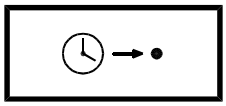
b) engine turned **off**:

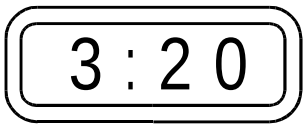
Only the date is shown.

Note: Time and date can be adjusted in the „SET"-menu (see Ch. 3).

The integrated calendar considers the number of days in a month. Only in the case of leap-years adjustments are necessary.

2.1.3 Remaining Flight Time **S1**: down ß symbol:





Hours Minutes

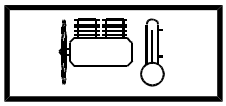
indicates the period, until the remaining fuel is drained at the present consumption.

Note: The display will be blank, when the engine in turned off !

2.2Middle Display

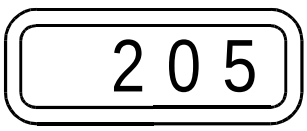
This display area is reserved for all the analog engine related values. The temperatures , the optional oil pressure and the battery voltage, are constantly monitored in the background not to exceed the programmed limits. If one of those limits will be exceeded, the corresponding value will be displayed in a flashing mode to warn the pilot, despite of S2`s position.

2.2.1 Cylinder Head / Coolant Temp. **S2**: middle **o** symbol:



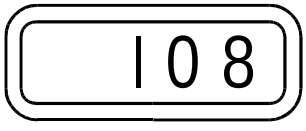
You may either connect a cylinder head temperature sensor for air cooled or a coolant temperature sensor for water cooled engines. While power up the UL-MIP recognizes the type of sensor and indicates the corresponding range.

a) **cylinder head temperature**



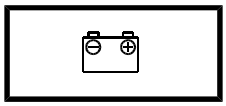
range: -20.....+270 °C

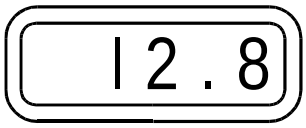
b) **coolant temperature**



range: -20.....+165 °C

2.2.2 Battery Voltage **S2**: up Ý symbol:





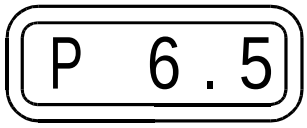
range: 0.....16 V

The battery voltage is measured at the power supply of the UL-MIP´s internal clock (yellow wire at connector pin No. 3). This wire must be connected directly via a fuse to the battery. It must not be connected via a switch (see Ch. 6.1).

The preset minimum and maximum battery voltages are 10.9 V and 14.7 V respectively.

If the voltage drops below 10.9 V or exceeds 14.7 V, the display starts to flash.

2.2.3 Oil Pressure (optional) **S2**: up Ý symbol:



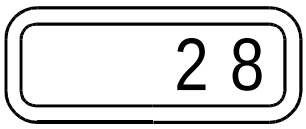
range: 0.....10 bar

If measuring of the oil pressure is switched on in the SET-menu then the oil pressure value is displayed by pressing switch S2 up.

The battery voltage that is usually indicated at this switch position is then called by **pressing switch S2 up and S1 down simultaneously.**

With that trick a maximum of **4** measurements can be shown on the middle display. To indicate the range there is a „**P**“ (= **p**ressure) on the left hand side of the display. This prevents any confusion with other ranges on the middle display.

2.2.4 Outside Air / Oil Temperature **S2**: down ß symbol :



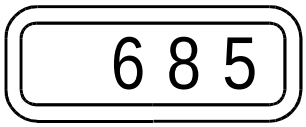
range: -40.....+165 °C

OAT or Oil temperature sensor may be connected alternatively.

Note: The sensor may also be installed e.g. at the carburettor or the intake manifold. In that position the sensor may provide some valuable information, especially when flying under icy conditions.

2.2.5 Exhaust Gas Temperature (EGT) symbol:

(optional instead of Outside Air/ Oil Temp.)



range: 200....800 °C

An external switch is used to select between cylinder 1 or 2.

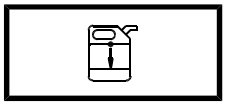
The limit control is only active for the selected cylinder.

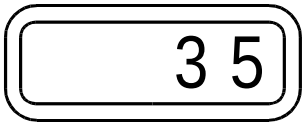
Note: At temperatures below 200 °C the display will be blank !

2.3Lower Display

This display area is reserved for all the fuel data.

2.3.1 Fuel Level **S3**: middle **o** symbol:

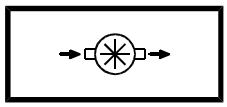


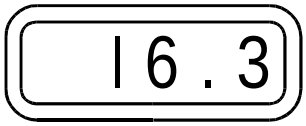


range: 0...99 l

The UL-MIP keeps the latest displayed value in memory after turning off.

2.3.2 Fuel Flow **S3**: up Ý symbol:

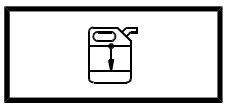


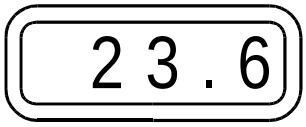


range: 1,8..50 l/Std

The signal is damped. So, the displayed value will follow slowly to sudden changes in engine power setting.

2.3.3 Consumed Fuel **S3**: down ß symbol:





range: 0...99,9 l

This value will be lost when the UL-MIP is turned off.

2.3.4 Important Notes Concerning The Fuel Indications

Fuel Flow Transmitter

In the standard version the actual tank content is calculated by subtracting the amount of fuel that has flown through the flow transmitter from the programmed fuel level after filling the tank.

So for an accurate fuel level indication it is essential that the flow transmitter works precisely.

To achieve that accuracy it is absolutely necessary to install the transmitter strictly in that position described in Ch. 6.6.5.

There must not be any gas bubbles in the fuel line caused by low static pressure or leakage.

Compare the actual fuel level and the indicated fuel content after the first flights and before every take off !

If there are significant differences then you should do an additional calibration (see Ch. 5). After totally draining the fuel tank it may take several minutes until all air bubbles have left the flow transmitter and it is working normally again. You may accelerate this air exhaustion by carefully knocking on the flow transmitter.

„Reserve“ - Indication

If the fuel level drops below the position of the „low fuel“- sensor, the display shows a flashing

“L“ (= Low)

This indication is independent of the presently selected range or the fuel level indication !

Analog Fuel Level Gauge

If you have connected an analog fuel level gauge, then its signal is used to determine the tank content and the „low fuel“- sensor may be omitted.

In this case the flow transmitter provides only the information for the actual flow and the consumed amount of fuel.

The „Reserve“- warning begins to flash automatically at a remaining fuel amount of 5 l.

General Hints

No matter what sensors are used, the tank capacity = maximum consumable amount of fuel, has to be programmed correctly. The adjustment is described in Ch. 5.

The best way to find out this value is, to drain a full tank through the flow transmitter. Then program the indicated consumed fuel in the SET-menu. For safety reasons it is recommended to program a somewhat smaller tank capacity than measured. Then you have some additional spare fuel left when the display reads „0“.

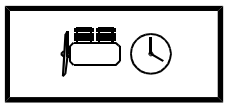
Notes:

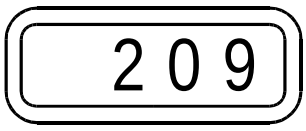
1) If the fuel level measuring is based on the fuel flow sensor then it is necessary to reprogram the fuel level after every changing (filling or draining) the tank content. This is done via SET-menu (see Ch 3). The adjustable value ranges from 0 to the preset tank capacity by steps of 1 l.
   The actual fuel level is always stored while turning off the UL-MIP.

2) If you have installed the optional "tank full" sensor, this adjustment is done automatically every time the tank is **filled up completely** (of course provided that the UL-MIP is turned on). If there is only a supplementary filling, then you have to proceed as described at 1).
   In this case the programmed value for the tank capacity should be equal to the amount of consumable fuel when the tank is filled up to the level of the „tank full"- sensor.
   *Note: When filling up the tank to maximum it will take approx. 3 seconds until the display switches to the full value. The engine **must not** run during that procedure !*

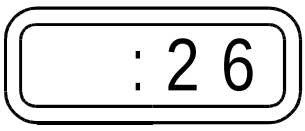
3) If there is an analog fuel level gauge installed, then the fuel level need not be adjusted. In the SET menu the fuel level set up is skipped automatically. However the tank capacity must be entered. After installation the UL-MIP must be calibrated once to the gauge. The procedure is described in chapter 5. If the analog fuel level gauge does not reach to the bottom of the tank, the total tank capacity will not be taken into account. This should be kept in mind when programming the tank capacity. Otherwise the fuel level indication and consumed amount of fuel will not correspond.

2.4 Engine Elapsed Time **T3** symbol:





Hours



Minutes

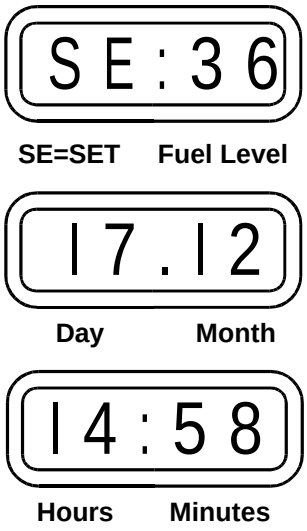
The elapsed time meter adds the runtime of the engine and stores it when the UL-MIP is turned off. It may only be cleared by pressing **T1, T2** and **T3 simultaneously** while **turning the UL-MIP on**. This is to avoid any clearing by accident.
This indication will only be displayed in standard operation mode.

3. SETUP MENU "SET" **T2** symbol: SET

The **red** symbols on the front panel are valid for this menu !

The menu is used to change the actual fuel level and time / date.
It is divided into 5 different setup areas where the adjustable area always shows up in flashing mode.
From standard operation mode just press T2 to enter the SET-menu.

The 3 displays will show up like this:



Key assignment for setting the values (also valid for flight log and system setup menu):

T1 = ⊖ **T2** = next field **T3** = ⊕

S1, S2, S3 have no function.
First the fuel level display flashes. Use T1(-) and T3(+) to set the actual fuel level. The maximum possible fuel level value is equal to the tank capacity. After proceeding by pressing T2 the month value will be flashing. Here you may also do some adjustments using T1(-) and T3(+), etc.
If no corrections are necessary to a value, simply press T2 again to jump to the next area.
After exiting the last setup area UL-MIP will automatically return back to standard operation, the clock will start to run and the adjusted fuel level is stored.
In case an analog fuel gauge is connected then the fuel level display will be blank and the month setup area will be the first to flash when SET is entered.

Note: The SET menu should not be entered while the engine is running, because during this time no engine monitoring or fuel flow measurment will be done.

4. FLIGHT LOG "LOG" **T1** symbol:

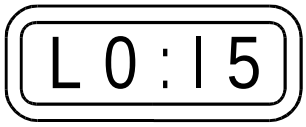
The **green** and **red** symbols on the front panel are valid in this menu !

The flight log stores the last **50** flights with take off and touch down time, take off date, and flight time. There is one page for each flight, consisting of a „front" and a „back" side. On the front side there are take off and touch down time, on the back side date and flight time. The flights are stored in the same order as in a written log (e.g. on page one the latest flight, on page 2 the flight before, a.s.o.). When adding a new flight all the old entries will slide one page backwards. As soon as the oldest flight leaves page 50 it will be lost.

To **call** the LOG function from standard operation mode just **press T1.**

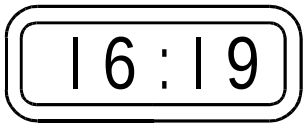
All 3 displays will show the front side of the first flight log page.

If the aircraft is still flying, only the take off time of the present flight is displayed, the touch down time will be blank.



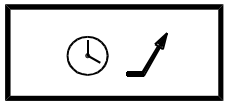
LO=LOG page number.

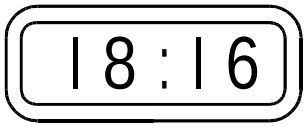
symbol:



take off time

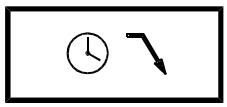
symbol:





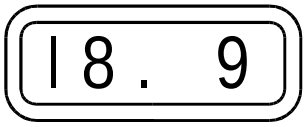
touch down time

symbol:



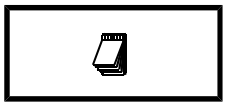
After **3** seconds the displays switches automatically to the back side of that page. The take off time changes to take off date and touch down time to flight time.

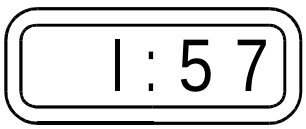
If the aircraft is still flying, the flight time display will be blank.



take off date

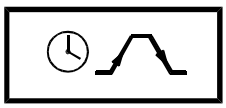
symbol:





flight time

symbol:



After **3** seconds the displays will return back to the front side of the page. So, front and back side are shown alternately.

To **"browse"** through the flight-log use the keys **T1 (-)** and **T3 (+)**.
Pressing T3 (+) will increment the page number, T1 (-) decrement. Every new page will begin with displaying the front side and then after 3 seconds automatically changes to the back side. So it is only possible to glance over the take off and touch down time while browsing quickly through the flight log.
To **leave** the LOG-function there are 2 possibilities:

1) Press **T1 (-)** while page 1 is displayed
2) Press **T3 (+)** while page 50 is displayed

UL-MIP will automatically return to standard operation mode.

Tip: If you want to know your take off time during the flight then just hit T1. The take off time will be shown on the middle display. Another hit on T1 takes you immediately back to standard operation.

All flight log data in memory may be deleted by holding T1 depressed while switching on the UL-MIP

Note: As long as the UL-MIP is in flight log display mode, no engine monitoring or fuel flow measuring will be done. This may cause inaccurate fuel level indications if the engine is running. Therefore the LOG-function should be called only for a short time period during flight !
The flight log registration will work only while engine is running.

5. SYSTEM SETUP MENU

In this menu the following system variables may be set:

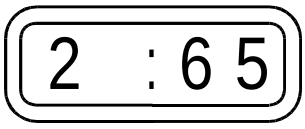
On the first page:	range	
- tank capacity	0...99	litre
- analog fuel level gauge calibration (if applicable)	yes / no	
- upper limit of cylinder head or coolant temperature	80...250	°C
- upper limit of outside air / oil temperature	80...150	°C
- upper limit of exhaust gas temperature (EGT) (if applicable)	500...700	°C
- upper limit of engine speed	1000...8000	rpm
- number of ignition pulses per engine revolution	1...4	
On the second page:		
- calibration factor for the fuel flow transmitter	0,00...2,00	
- oil pressure sensor (if applicable)	yes / no	
- lower limit of oil pressure (if applicable)	1,0...9,9	bar

The tank capacity may be adjusted by steps of 1 l, the temperature limits by steps of 10 °C, the oil pressure limit by steps of 0,1 bar and the rpm limit by steps of 100 rpm.

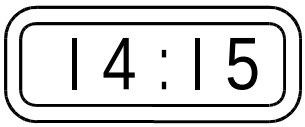
To enter this menu hold T2 depressed while turning on the UL-MIP. This prevents any unintentional changings to those variables.

The menu is divided in 2 pages with 6 or 4 adjustment fields. You will step through the items like in the SET menu with the active area always flashing. For setting and proceeding use the same keys as in the SET menu (T1 = „-“, T2 = „next“, T3 = „+“).

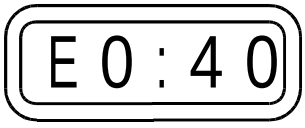
On the first page the 3 displays show up with the following partition of the setup areas:



ignition pulses per revolution | max. RPM x 100



max. EGT/ oil temp. x 10 | max. engine temp. x 10



calibration y / n | tank capacity

The areas are stepped through from the lower right to the upper left corner.

Tank Capacity Area

Use T3(+) and (-)To set the tank capacity. If the fuel level calculation is based on fuel flow measuring then the total amount of fuel that may be drained by the engine should be entered (fuselage tank + wing tanks, if applicable). If an analog fuel level gauge is installed then only the fuselage tank capacity must be programmed.

Hit T2 to continue.

Analog Fuel Level Gauge Calibration Area

If there is no analog fuel level gauge connected, then you step directly to the engine temperature area while this area will be blank. If the UL-MIP has recognized an analog fuel gauge then you will enter this calibration area showing an "**E0**". Calibration is necessary only once for a new installation or after replacing the fuel gauge. In case you don't want to calibrate it just press T2 to skip to the engine temperature area. Hit T3 (+) if you want to calibrate. The display will change to "**E1**". To start the calibration process hit T2. If the calibration is successful (gauge is connected correctly and the tank empty) the calibration area shows "**EE**".

If "**E-**" is indicated no calibration could be processed, because of an error. In that case check the electrical connections of the analog fuel level gauge and make sure that the tank is empty.

After fixing the problems run this menu again and repeat the calibration.

Engine Temperature Area (cylinder head or coolant temperature)

Here the maximum cylinder head or coolant temperature are set. Enter the limit that is given in your engine manual. Both**,** indication and programmed value are divided by 10°C, e.g. "25" means 250 °C.

Outside Air / Oil / EGT Area

The UL-MIP recognizes by the programmed limit if an outside air / oil or EGT sensor is connected. For outside air or oil temperature a value between 80 and 150 °C has to be entered (depending on your engine manual). This is certainly meaningless for the outside air temperature sensor. If an EGT is connected, the limit has to be set between 500 and 700 °C (refering to your engine manual). This adjustment is also done by steps of 10 °C.

RPM Area

Here the max. engine speed may be set in steps of 100 RPM e.g. value "68" means „6800" rpm
(refer to your engine manual for the appropriate value).

Number of Ignition Pulses per Revolution Area

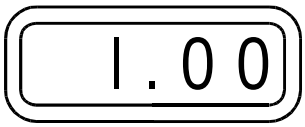
Here the number of ignition pulses or impulses at the output of the built in engine tachometer per revolution may be set. This value depends on the type of the installed ignition system and the rpm pickup.

Here is a list of values for the most common engines:

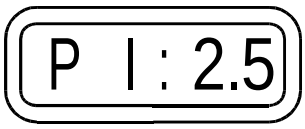
Engine	Ignition System (Manufacturer, System)	Number of impulse per revolution
Rotax 462	Bosch, Interruption	1
Rotax 503	Ducati, electronically	2
Rotax 582	Ducati, electronically	2
Rotax 912	Ducati, electronically	1

If you cannot find out the correct number then you must try. The best is to start with “2“. This value fits to most of the 2-cylinder/2-stroke engines. If the UL-MIP displays only a half of the actual engine speed then the setting has to be changed to “1“.
The value “3“ is only necessary for 3 or 6 cylinder engines, “4“ for 4 or 8 cylinder engines.

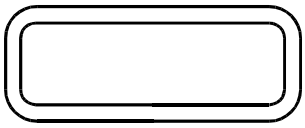
After completing all areas on page 1, the UL-MIP will continue at page 2 after pressing T2:



flow transmitter calibration factor



oil pressure sensor yes/no | min. oil pressure



Unlike on the first page on the second the adjustments are done from the upper to the lower displays.

Flow Transmitter Calibration Factor

If the fuel flow transmitter works inaccurate despite of a correct installation i.e. the actual fuel level does not correspond with the indicated fuel level then this factor may be changed.
The calculation is simple:

factor = (**actually** consumed fuel) / (**indicated** consumed fuel)

E.g.: If there is more fuel left in the tank than is indicated after a long flight then the factor has to be reduced (presumed that the indication and the actual fuel level were equal prior to the flight).
First the digit before the decimal (range 0...2) and then the other digits will be active for setting (range 0...99). This gives a theoretical range of 0 to 2.00.

Note: If it is necessary to enter factors < 0.50 or > 2.00 then it is very likely that the flow transmitter is defect or installed incorrectly.

Oil Pressure Area

The left area indicates whether there is an oil pressure sensor connected or not. To change this setting use the prescribed keys:

P 0 = no oil pressure sensor

P 1 = **oil pressure sensor connected**

If P0 is set then UL-MIP will return to standard operation mode at once.

In case of P1 is set then on the right side of the display the minimum oil pressure limit may be adjusted in steps of 0,1 bar. If the oil pressure value will be lower than this limit while the engine is running then the value will be displayed in flashing mode with a “P“ on the left side of the display to indicate that it is a pressure value and to avoid confusion with the battery voltage display.

After that final settings the UL-MIP will return to standard operation mode.

This concludes the system setup. The UL-MIP is now ready for operation.

6. INSTALLATION MANUAL

Please read this manual carefully before installation !

6.1 Display Unit

The UL-MIP is designed to be mounted in the instrument panel. In the appendix you will find a template to mark the proper outcut.
When choosing the mounting position you should take into account that there shall be at least a distance of 20 cm to the compass and 100 cm to the radio antenna. If these distances are smaller there may be mutual affections which must be checked out.
Consider also that the display unit shall not be exposed too much to the sun light, because of possible over-heating.
To mount the display unit there are 4 screws M3x8 added. These will fit for an instrument panel of max. 3 mm thickness.

Wiring Set

The standard wiring set of the UL-MIP includes:

- 25 pole connector for the UL-MIP
- ground wire (blue), to be connected directly to the (-) pole of the battery or the airframe.
- + 12 V-wire (red), to be connected via a switch to the (+) pole of the battery. Recommended fuse: 0,2 A medium.
- + battery wire (yellow), to be connected directly to the (+) pole of the battery. This wire supplies the internal clock. Therefore it has to be connected permanently to the battery. A fuse of 200 mA is integrated in the wire. The power consumption is very low.
- For 2 stroke engines: Engine speed sensor wire (grey/black) with ignition pulse pickup.
  The end of the black wire has to be wrapped around one of the ignition wires 2-3 times. (At double ignition systems around both ignition wires leading to a cylinder). It may be prolonged or cut if necessary.
- For Rotax 912: This engine has an integrated speed transmitter that has to be connected to the corresponding wires. The polarity does not matter.
- Dynamic air pressure switch is completely connected. This switch is used for the flight log function (see Ch. 6.2.1)
- Wire to the fuel flow transmitter with connector.

The other sensors will be connected depending on the actual configuration.
While laying the wires pay attention not to damage them by crushing , sharp edges or mechanical tension.

6.2 Sensors

All sensors are delivered with long enough wires which may be shortened if necessary. For their electrical connection see wiring diagram in the appendix to this manual.

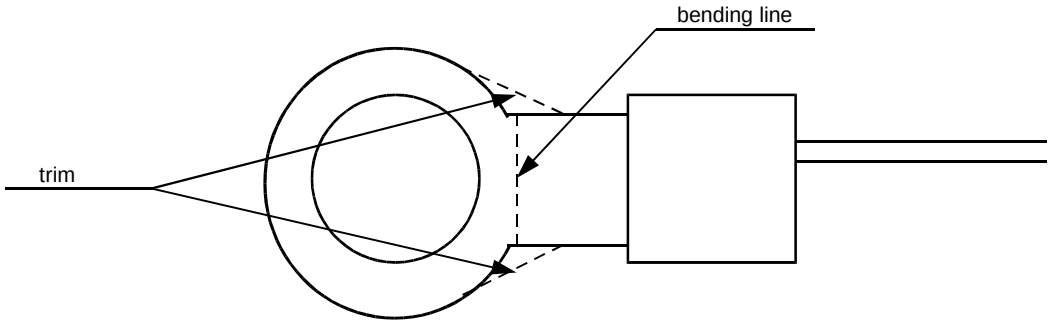
6.2.1 Dynamic Air Pressure Switch

This switch closes contact at an airspeed of 50 km/h. The signal is used to determine the take off and touch down time. The switch is equipped with two pressure ports on the front and on the back side. On the back side there is also a small adjusting screw visible. The dynamic air pressure has to be connected to the front pressure port, marked by a „P“. The port on the back side may be connected to static pressure if available. Normally the cabin pressure is sufficient.
The pressure switch must installed in a position so that the pressure ports point in wing direction. Otherwise g-forces would probably cause misfunctions. A vibration damping should also be provided.

Tip: Mostly the pressure switch can easily be mounted with a ty-rap between the static and dynamic pressure ports of the air speed indicator. This position makes it very easy to connect the pressure ports to the airspeed pressure system.

6.2.2 Cylinder Head Temperature Sensor (for air-cooled engines)

This sensor replaces the copper sealing between the spark plug and cylinder head. Before mounting you should take care that the contact area is free of oil deposit. A good ground connection between engine and battery is also very important. If necessary the sensor may be bended carefully in between the housing and the ring (see scetch). Use a file to rework the transition between ring and sensor box. It should be shaped as shown in the sketch, to prevent the ring from deformation (that would cause leakages at the spark plug),



6.2.3 Coolant and Oil Temperature Sensor

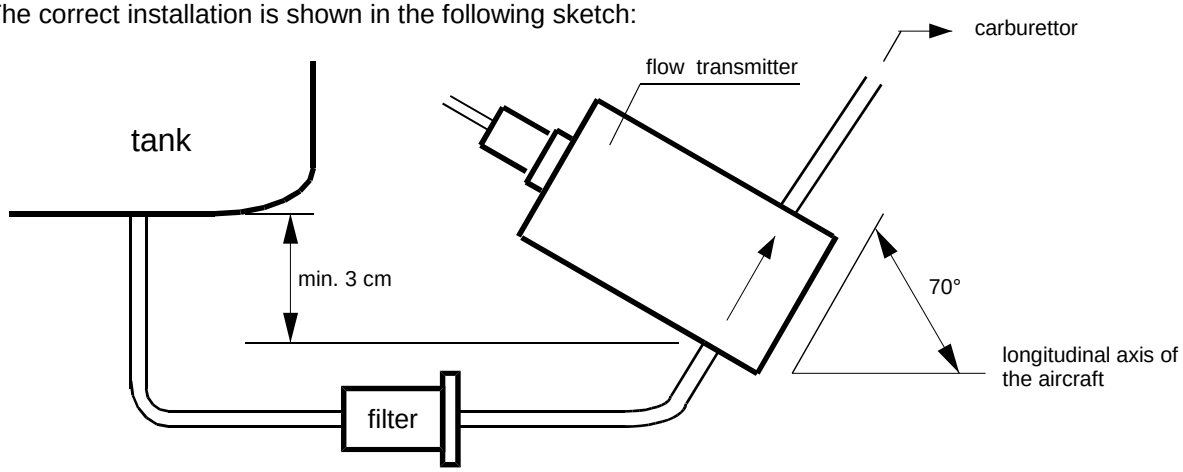
This sensor is obtainable in 2 housings differing mainly in the size of their threat.
For the Rotax 912 a housing with M10 x 1,5 is used. It fits into both oil and cylinderhead/coolant temperature measuring ports.
At most of the other engines the sensor with NPTF 1/8" x 27 threat will fit. This threat is a little bit conical for selfsealing. It also fits into holes with M10 x 1 threat inside. If there is no hole for a coolant temperature sensor then an adapter must be made to install the sensor in a coolant tube near the coolant outlet. Before mounting the sensor`s threat should be wrapped with some sealing tape, e.g. PTFE tape to prevent any leakage. For the electrical connection the polarity does not matter.

6.2.4 Outside Air Temperature Sensor

If the sensor is used for outside air temperature measuring then it should be mounted at a place where it is not directly exposed to the sun light. The best places are the fuselage bottom or the landing gear box. Fix the sensor with e.g. glue, ty-rap, etc.
The sensor also may also be used for other purposes, e.g. to measure the carburettor temperature.

6.2.5 Fuel Flow Transmitter

Inside the fuel flow transmitter is a precise measuring turbine. It`s rotational speed is scanned opto electronically.
The correct installation is shown in the following sketch:



For the accuracy of the fuel level indication the correct installation of the flow transmitter is essential. The installation position (Angle 70°, connector heading up) should comply with this sketch. Otherwise gas bubbles might accumulate inside the turbine. This would disturb the measurement severely or make it even impossible.
Also, the transmitter should be installed at the lowest point of the fuel system, because there is the highest static pressure and therefore the lowest possibility for gas bubbles to develop. If you fix it to any part to the airframe structure then use a suitable piece of foam or rubber to underlay for vibration damping.
Also a fuel filter must be installed between tank and the flow transmitter.

Note: The turbine causes a pressuredrop, depending on the fuel flow speed in the tube. Therefore it is very important to check the fuel pressure at the carburettor after installation. The values must comply with the limits (ref. engine manual). Install an additional fuel pump if necessary.

After totally draining the tank it may take several minutes of engine run until the flow transmitter is air exhausted and works normally. You can accelerate the air exhaustion by carefully knocking on the flow transmitter.

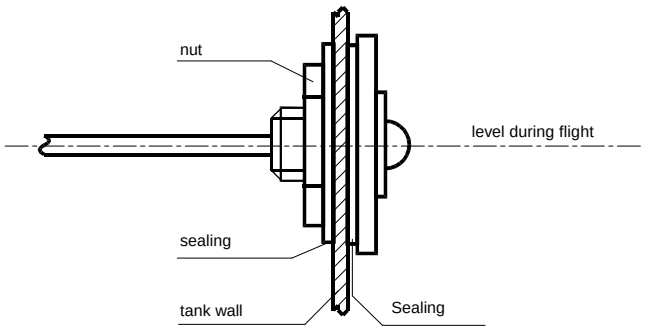
6.2.6 „Low Fuel“ Sensor

This sensor signalizes if the fuel level has dropped below its installation position. To find out where to place it in the tank wall first the necessary amount of spare fuel has to be determined. According to pilot`s experience and depending on the engine, between 5 and 10 litres should be enough to reach the next airfield.
Now, the spare fuel and the cross-section of the tank can be used to calculate the installation height H (in cm) over the tank bottom:

H = (chosen amount of spare fuel [l] x 1000) / (length [cm] x width [cm])

The sensor should be placed where the fuel level is mostly independent of the aircraft`s attitude.
e.g.: If the tank has a rectangular cross-section this position is in the center between front and back side.
For mounting drill a hole with ∅ 12 mm into the wall of the tank (**remove carefully all edges, inside and outside**). Then stick a wire through this hole and lead it to the tank`s inlet. Now, fix the sensor's connector to the wire and pull the sensor backwards into the tank until it gets stuck in the hole (don`t forget the sealing !). Fix it with the nut from the outside while using a pair of pliers to hold it in place. If the hole is too big add silicone for additional sealing. Use Loctite, etc., to secure the nut.

Note: Do not tighten the nut more than 1,5 Nm, otherwise the plastic threat may be damaged !
The sensor must be installed horizontally (This is also valid for the “Tank Full“ sensor).



6.2.7 "Tank Full" Sensor

The "Tank Full" sensor provides a signal to tell the UL-MIP when the tank is full. This signal sets the fuel level display automatically to the programmed maximum. The sensor is basically the same as the „Low Fuel“ sensor, except for the installation place which is at the top of the tank wall. In the system setup menu only the amount of fuel up to the tank full sensor needs to be taken into account !

6.2.8 Analog Fuel Level Gauge

The sensor should be installed at a place where the fuel level is mostly independent of the airplane`s attitude (see Ch. 6.2.6). This is the only way to keep the fuel level indication mostly constant at different airspeeds. For a tank with rectangular cross-section this position is in the middle between the front and the back side (seen in flight direction).
If the tank has an asymmetric shape, then a linear or flight level independent fuel level indication is impossible with an analog fuel level gauge. Then a compensation table is helpful, where the deviation in cruise flight attitude should be noted.
For installation on top of the tank there must be a flat area with a diameter of about 80 mm. In the middle an outcut of Æ 41 mm must be drilled. Then stick the gauge through this hole into the tank. It will be fixed with 5 screws M5 (Don’t forget the sealing and to remove the transport security pin !).
Be sure to connect the shielding of the cable to the housing of the sensor.

6.2.9 2. Cylinder Head Temperature Sensor

If an additional sensor is necessary to monitor the 2. cylinder, then a switch has to be mounted in the instrument panel. (see wiring diagram in appendix.)
Note: The UL-MIP monitors only one of the 2 temperature sensors !

6.2.10 Exhaust Gas Temperature Sensors (EGT)

The EGT-Installation kit includes 2 sensors, an amplifier, a switch and the wiring set.

The sensors are stuck in the exhaust manifold, about 10 cm downstream from the piston`s edge in approx. the middle of the manifold pipes. With the manifold disassembled drill a hole Æ 3,2 mm in each manifold tube at that place. Remove the edges carefully. Now stick in the sensors and fix them with the tube clamps. In case of narrow installation conditions the outstanding sensor tubes may be bended **carefully**. The amplifier must be mounted electrically isolated at a place where it will not warm up. It`s temperature must not exceed 70°C.
Be careful with laying the sensor cables over the engine. Although they are heat resistant they must not touch any hot exhaust parts. Mount the switch in the instrumentpanel close to the UL-MIP.
*Note: EGT and outside air temperature sensor **cannot** be installed at the same time.*

6.2.11 Oil Pressure Sensor

The UL-MIP is calibrated for the oil pressure sensor type 360.081/029/012 from VDO, range 0...10 bar. It is included with the Rotax 912 delivery kit, so only the attached wire needs to be connected. If you want to use a different sensor please consult your dealer.

6.3 First Power Up

After mounting the display unit and installing all the sensors, the UL-MIP is ready for the first turn on.
At first the SET menu is displayed (see Ch. 3).
Set date and time (Skip fuel level setting if not preprogrammed).
Now turn off the UL-MIP and hold T2 depressed while switching it on again. Now you have entered the system setup menu. Here you should check and change the system variables if necessary.
After returning to standard operation mode call again the SET menu to adjust the actual fuel level. Time and date may be skipped this time.
Now check the correct function of the readouts. If everything is working ok then at last check flight log and elapsed engine time indicator if they need to be reset. (see Ch. 4)

After concluding these procedures the UL-MIP is ready for operation.

6.4Tips and Hints for Fixing Problems

Problem	How to fix
The UL-MIP is turned on, but the displays stay blank	Check power supply: - is the battery connected correctly ? - is the blue wire connected to the negative pole of the battery ? - has the fuse blown ?
Indication “OL“ while displaying a temperature	Check wire and sensor with an ohmmeter: - The resistance should range about some kiloohms. - Replace the sensor if shorted or high resistive.
RPM indication are too high or too low or missing at certain engine speeds	Inductive pickup (2-strokes): - increase or decrease number of wraps around the ignition wire. - at some interrupter ignition systems the sensor wire needs to be separated several cm from the ignition wire. - at double ingnition wrap sensor wire around both ignition wires. Engine integrated speed sensor (R 912): - check contacts - consult engine manufacturer
RPM indicates exactly half or twice the value	Change the number of impulses per revolution in the system setup menu.
Date and time are lost when the UL-MIP is turned off	Yellow wire (pin 3) is not permanently connected to +12V. Check connection and fuse (200 mA).
Fuel flow indication displays „0“ or is unstable.	Check installation position and electrical connection. Is the fuel system sealed ?
Fuel flow indication does not correspond with the actually consumed amount of fuel.	Adjust calibration factor in the system setup menu.
Flight log function does not work.	- Is the dynamic air pressure connected correctly to the pressure switch ? - if there is no rpm signal then the flight log does not work.

7. WARRANTY CONDITIONS

Warranty duration: **1 Year** starting from the date of purchase

except for the sensors for cylinder head and exhaust gas temperature. For them the warranty duration is only 6 months.

Requirements for restitution:

- undamaged seals
- the device was properly installed and supplied with the correct voltage
- the correct fuses were installed
- the items are redelivered free of charge
- the registration card which is attached in the appendix has been completed and sent back

excluded from restitution are:

- shipment damages
- damages caused by brute force (e.g. broken switches, scratched displays, crash, etc.).
- damages caused by normal wear.
- damages caused by improper installation (e.g. broken wires, dirt in the flow transmitter caused by missing fuel filter, etc.)
- damages caused by high voltage (e.g. voltage regulator failure)

In case of warranty claim please mail the defective unit to:

Schicke electronic
Kanalstr. 32
D-76356 Weingarten

8. APPENDIX

a) Technical Data

b) Registration Card

c) Template for outcut in the Instrument Panel

d) Wiring diagram

Technical Data

Display Unit:	Weight (approx.):	0,3	kg
	Overall Dimensions(WxHxD):	76 x 112 x 46	mm
	Operation Voltage:	10...15	V
	Current max.:	0,2	A (with sensors)
	Ambient Temperature:	-10...+60	°C

Measuring Tolerances:

Resolution	typical/ max. Tolerance	Dimension	
Engine Speed	10	± 10	r.p.m.
Cylinder Head Temperature	1	± 3 / ± 6	°C
Coolant- / Oil Temperature	1	± 2 / ± 3	°C
Outside AirTemperature	1	± 2 / ± 3	°C
Battery Voltage	0,1	± 0,1	V
Fuel Flow	0,1	± 1,5	l/h
Exhaust Gas Temp. (EGT)	5	± 5 / ±10	°C
Oil Pressure	0,1	±0,2	bar

The tolerances refer to the complete unit including sensor at the given ambient temperature range, correct installation assumed.

Registration Card

Customer data:

Name:.....

Address:.....

City:.....Tel.:.....

UL-MIP data:

Type: .....Serial Number:.....

Installed Options:.....

.....

.....

.....

.....

.....

Defect Description: .....

(For Repairs) .....

.....

.....

.....

.....

.....

.....

.....

Dealer: .....

.....

.....

.....

Date of Purchase: .....

Installation By: .....

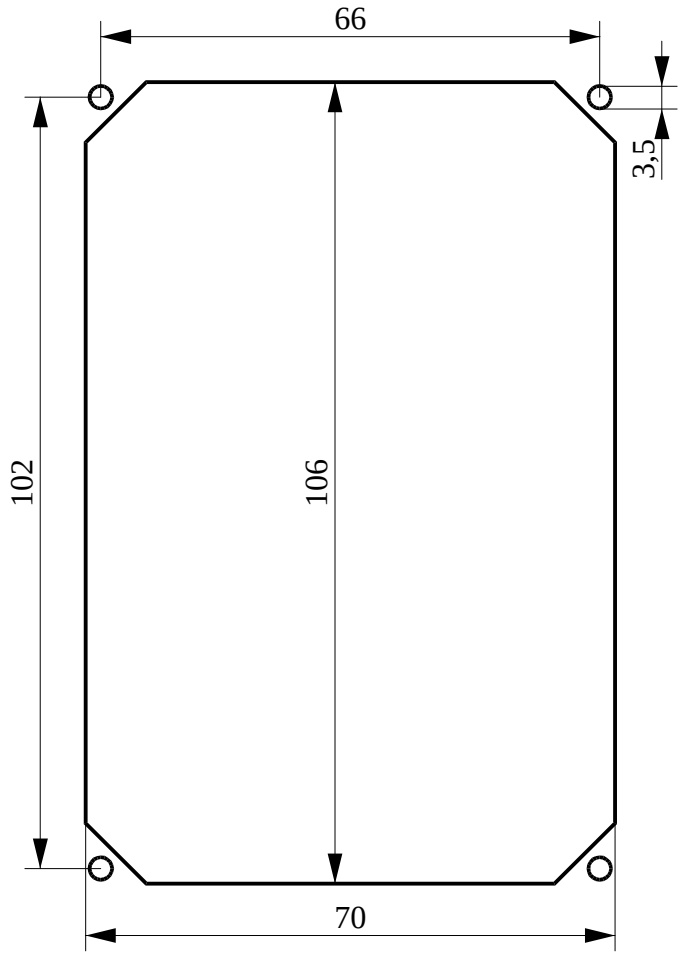
.....

.....

.....

Date Signature

please send or fax to: Schicke electronic Fax: ++49-7244-706446
Kanalstr. 32
D-76356 Weingarten



Template for Cut in the Instrument Panel