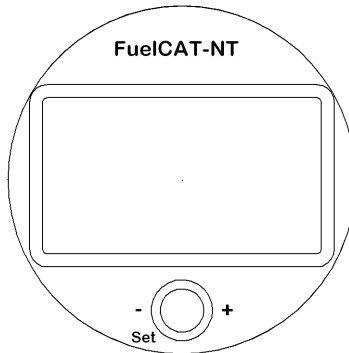


FuelCAT-NT

Instructions for Operation

Software Version 1.3 and up



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Released by: COMCO / IKARUS
Am Flugplatz 11
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1. General description

The FuelCAT-NT is a modern, micro-processor controlled kombi-indicator device for monitoring fuel reserves, fuel consumption, remaining flying time, battery voltage and hours of engine operation. Optionally, fuel pressure can also be included, as well as a flight log. All essential parameters are constantly monitored and warnings are issued when limit values are exceeded. In addition, an external warning lamp or a horn can optionally be connected.

In an 80 mm standard housing, it offers a graphic LC display, on which all important parameters are displayed digitally. In addition, tank contents and consumption are available as bar graphs

Additionally the FuelCAT-NT can easily replace older FuelCAT versions using existing wiring harness and connections, without the need to alter the Instrument panel.

The FuelCAT-NT is very easy to operate.

Easy-to-recognize symbols for the different functions and a logically designed operation of the rotary pushbutton ensure that anyone can operate the device successfully in the minimum time, even without the handbook. Nevertheless these operating instructions should be read carefully before installation and before first use of the device.

The FuelCAT-NT is universally usable.

Various sensors are available to show fuel level; the FuelCAT-NT detects automatically what sensors are connected. The maximum limits in the individual categories of measurement and other system parameters can be easily modified via a special setup screen.

2 alternative different methods of measuring the amount of fuel remaining in the tank are provided.

A) Flow Rate indicator (standard)

This can be fitted universally, as the shape of the tank and the attitude of the aircraft do not affect the reading. However after refuelling it is necessary to set the new amount of fuel correctly. It will be saved when the FuelCAT-NT is switched off.

B) Floating tube indicator (optional)

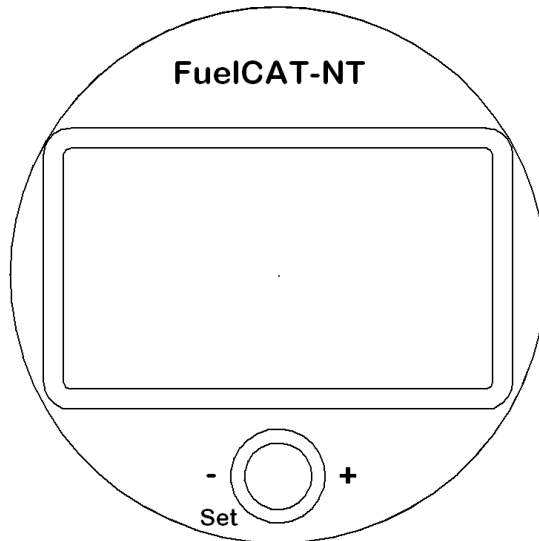
An alternative arrangement for simple tank shapes [canisters, or similar] is available in the form of a floating tube, which works like a swimmer. In this case no setup of fuel quantity is required. This system is less suitable for tanks whose cross-section changes according to the level of fuel.

Fuel pressure sensor (optional)

This sensor will enable you to monitor the fuel pressure at the carburettor. You can check if the fuel pump(s) are working and the fuel filter is ok.

A warning is issued if the pressure drops below a settable threshold while the engine is running.

1.1 Features of Operation and Display



The device has a large LC display with a resolution of 128 x 64 pixels and a combination rotary push button (control knob), for all inputs and confirmations. A brief push on this button is always acknowledged with a short beep, a long press with 2 beeps. If values are changed, turning left decreases the value, turning to the right increases it.

Screen Change:

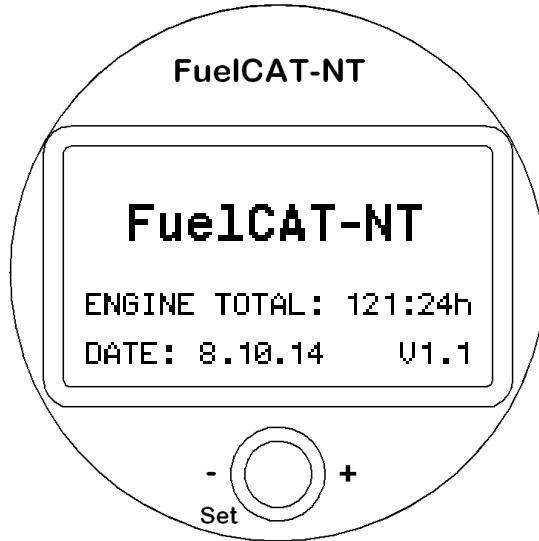
The FuelCAT-NT has 3 main screens, which can be called up from the normal screen. The screen change is accomplished by a long button press (2 x beeps).

After the normal screen, the logbook screen appears, followed by the setup screen. Another long press returns to the normal screen.

Acknowledgments of warnings and error messages:

Warning and error messages are acknowledged by briefly pressing the control button. The unit then returns to the normal screen.

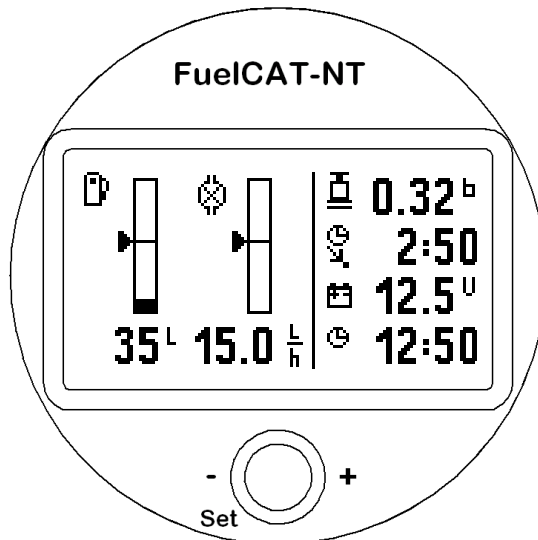
1.2 Start up and Splash screen



After the FuelCAT-NT is switched on, the welcome screen appears. The total motor time (optional), the date and the firmware version are displayed.

After a few seconds, the unit automatically switches to the normal screen. A long press of the control knob can also be used to switch directly to the normal screen.

2 Normal screen



2.1 Fuel gauge



The fuel gauge can be seen on the left side of the screen. The arrow indicates the current tank level. It is also displayed digitally underneath. If the tank drained to 10 % of the tank remains in the tank, a warning message will be issued, which must be confirmed by a press on the control knob. The digital value also flashes. If the tank is empty, that means if the fuel level drops below the measurable level an "R" flashes.

When switched on, the FuelCAT-NT checks whether a floating tube is connected. If this is the case, it is used for the fuel gauge. If the level sensor fails during operation an error message is displayed, the display shows "---" and flashes. If the tank content calculation is carried out without a floating tube and based on the flow measurement, the tank content is stored when the device is switched off.

2.2 Fuel consumption



The consumption indicator is located in the center of the screen. The bar is scaled to a range of 0...30 l / h. The attenuation of the display can be adjusted in the setup screen.

If there is a fuel return in the system, the display can be corrected either by means of a return flow sensor or by means of a correction factor, which is calculated from the fuel pressure. See also the description of the setup screen.

2.3 Clock

The time is shown on the right side of the screen. The setting is made in the setup screen.

2.4 Battery voltage

The battery voltage indicator is located above the time. If the battery is empty or over charging, a warning message is displayed, which must be confirmed by pressing the control button. In addition, the voltage indicator flashes.

2.5 Endurance

The endurance is calculated from the tank content and the current consumption.. When the engine is stopped it will display „--:--“

For the display field in the upper right corner of the display, 4 different values are available

Depending on the setting of the display mode in the setup screen, the following is displayed:

2.6 Fuel pressure (display mode=0)

The display is in bar. If the fuel pressure drops below the limits set in the setup screen when the engine is running, or if it rises above 0,4 bar, warning messages are issued, which must be confirmed by pressing the control knob. In addition, the fuel pressure flashes.

2.7 Fuel consumption (display mode=1)

The added fuel consumption is displayed here. The value is cleared when the device is turned off.

2.8 Return flow rate (display mode=2)



If a backflow turbine is connected, the return rate can be displayed here for test purposes.

2.9 Main Flow rate (display mode=3)



The main flow rate can be displayed for test purposes. If the consumption in a system with return line is corrected by the fuel pressure the uncorrected main flow rate is shown here.

2.10 Important notes concerning the fuel displays

Fuel flow sensors

In the version without immersion tube sensor (Swimmer sensor), the tank content is calculated from the filling quantity adjusted after refueling minus the amount of fuel flowed through the flow sensors and taken into account a possible backflow.

For the accurate tank display, it is therefore indispensable that the flow rate sensor (s) operate with the highest precision, The turbine must be installed exactly in the described position and no gas bubbles may form due to leakage or lack of pressure in the fuel line.

Therefore, after the first flights and before each start, check whether the fuel level in the tank(s) match the display!

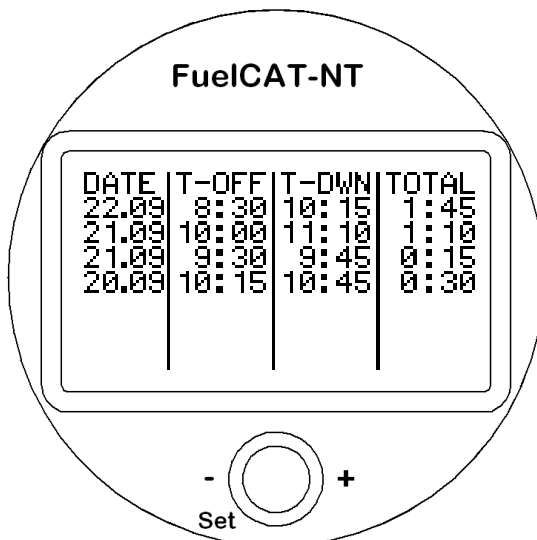
If larger differences occur, then the flow sensors can be calibrated (see setup screen).

Once the tank has been completely drained, it may take several minutes for the flow sensor to fill up completely with fuel and to vent the air bubbles inside. Venting can be accelerated by gently tapping the housing.

Floating tube sensor

If an immersion tube sensor is connected, then the tank content is determined from its signal. In this case the flow transmitter only supplies the information from the current consumption and the amount of fuel consumed.

3. Flight log screen



If a total pressure switch is connected to the FuelCAT-NT, the flights are recorded and displayed on the flight log screen.

The date (DATE), start time (T-OFF), landing time (T-DWN) and flight time (TOTAL) are displayed.

The current flight is always displayed at the top, the older flights below. By turning the control knob, the screen can be scrolled downwards. The last 200 flights are saved. Once the flight book is full, the oldest flight is automatically deleted.

If the device is switched off before a flight is fully registered, only the start time is displayed. Landing and flight time are replaced by dashes. Therefore the device should remain switched on for at least 10 seconds after landing.

The current flight can also be called up during the flight. The start and previous flight times are displayed. After a few seconds, the unit switches back to the normal screen.

4. Setup-screen

On the setup screen, various system parameters can be set and calibrations performed. When the screen is displayed, the top line is highlighted (selected). The selection can be moved up or down by turning the control knob. The bottom of the screen can be scrolled further down.

If a setting is to be made, the corresponding line must first be selected. Then press the control button briefly and the first digit or letter of the value to be set is highlighted.

Now this number or the letter can be changed within the predetermined value range by turning the control knob. If the change is made, jump to the next digit by briefly pressing the control knob, etc.

After the last digit has been entered, you are again in line selection mode. Now either the next line can be selected and changed, or you can return to the normal screen by pressing the control button.

The parameters to be set are (from top to bottom):

4.1 FUEL CONTENT:

Here, the current tank content (for example, after refueling) is entered if no level sensor is connected. If a level sensor is detected, this input is disabled. Range of values: 0 ... tank volume (see 4.8)

4.2 FLOW FACTOR FOR:

Here, the flow meter correction factor for the main fuel flow sensor is set. For details, see 4.15. Range of values: 80..119%

4.3 FLOW FACTOR RET:

Here, the flow meter correction factor for the backflow turbine is set. For details, see 4.15. Range of values: 80..119%

4.4 TIME:

Here the current time is set in the order hours, minutes

4.5 DATE:

Here the current date is set in the order day, month, year

4.6 CALIB. TANK EMPTY:

Here, a tank gauge calibration is carried out with the tank empty. This is necessary if either a level sensor has been connected or replaced.

To do this, change the displayed value from "N" to "Y" and confirm. If the calibration is successful, the message "OK" is displayed, otherwise "ERR". If "ERR" check if the fuel tank has been properly connected and the tank is completely drained.

4.7 CALIB.TANK FULL:

A fuel tank calibration is carried out with the tank full. This is necessary if either a level sensor has been connected or replaced.

To do this, change the displayed value from "N" to "Y" and confirm. If the calibration is successful, the message "OK" is displayed, otherwise "ERR". If "ERR" check if the fuel tank has been properly connected and the tank is full.

4.8 TANK VOLUME TOT:

Here, the entire tank volume can be adjusted. Range of values: 0 ... 199 l

If "0" is set here, the fuel gauge disappears from the normal screen.

4.9 RESERVE VOLUME:

The tank volume, which is below the filling level sensor, i.e., is not detected by the filling level sensor, but can still be used, is set here.

If this level falls below the tank, a flashing "R" appears on the tank gauge in the normal screen. Range of values: 0..9 l

If no level sensor is connected, "0" should be set here.

4.10 PRESS-FLOW-CORR.:

Here, a backflow correction factor is set when the fuel pressure is used instead of a backflow turbine for consumption display correction. Range of values: 0...9.9 l / h

The value should be determined empirically. To start with, the value should be selected so that when the electric fuel pump is switched on (engine not running), the fuel consumption indicator oscillates between 0 and 0.1 l / h.

This value is only used when FUELPRESS WARN > 0

4.11 PROTECTED SETUP:

Access to the PIN-protected area of the setup. If necessary, the display of engine hours on the splash screen can be switched on / off or corrected and the flight log can be deleted.

PIN can be obtained from COMCO Ikarus or Schicke electronic.

4.12 DISPLAY MODE:

Here you can select which value is displayed on the normal screen in the upper right corner. 0 = fuel pressure, 1 = fuel consumption, 2 = return flow, 3 = main flow

4.13 FUEL FLOW DAMPING:

The attenuation for the consumption display (integration time in sec) can be set here. From 0 = no attenuation to 99 = maximum attenuation [new in software V1.2]

4.14 F-PRESS LOWWARN:

The lower warning threshold for the fuel pressure warning is set here. Range of values 0...0.29 bar.

If a fuel pressure sensor is connected, a value > 0 must be set here so that the sensor is recognized. If no sensor is connected, "0, 0" must be set here.

4.15 Remarks on setting the flow rate calibration factor

In the case of a new installation, the fuel flow should be checked for accuracy before the first flight. For this purpose, run a certain amount of fuel through the flow sensor with the Fuel-CAT-NT switched on. To do this, disconnect the fuel hose at the engine and direct the fuel out into a transparent fuel canister with as large volume as possible. The larger the measured quantity, the more accurate the measurement. The calculation of the correction factor is simple:

$$\text{Factor} = \frac{\textit{actualfuelconsumption}}{\textit{indicatedfuelconsumption}}$$

If no return is installed, this factor can also be calculated from the actual fuel consumption and the indicated consumption according to the above formula. Thus, if after a longer flight, more fuel is in the tank than displayed (assuming the display and content have matched before the start of the flight), then the factor must be reduced and vice versa.

Note: The method above can also be used to calibrate the return flow.

5. Tips for troubleshooting

Type of error	What to do
The FuelCAT-NT is switched on, but it does not indicate anything	Check the power supply: <ul style="list-style-type: none">- is the battery connected correctly?- Does the ground cable have contact with the – pole of the battery?- is the fuse blown?
Fuel flow does not indicate anything or heavily fluctuates	Check whether the flow sensor is installed and connected in the correct installation position. Is the fuel system sealed?
Fuel flow indicator does not match actual fuel consumption	Change the calibration factor(s) in the setup screen

6. Warranty Terms

The warranty period for the complete unit is: 2 years from date of purchase

Prerequisites for any warranty service are:

Equipment seals are undamaged

- The device has been properly installed and operated with proper operating voltage
- The device has been used for the intended purpose
- The prescribed fuses were installed
- Free delivery of the devices

Are excluded from the warranty:

- Transport damage
- Damage from external forces (e.g. broken switches, scratched displays, crash, etc.)
- Natural wear and tear
- Damage due to improper installation (e.g. broken or deinsulated wires, contamination of the flow sensor due to missing fuel filters, etc.)
- Damage caused by exposure to high voltages

In case of warranty claim, please send the defective device to:

Schicke electronic GmbH
Kanalstr. 32
D-76356 Weingarten

7. Appendix

- a) Technical data
- b) Wiring schematic

a) Technical data

Device:	Weight (approx.):	0,2	kg
	Dimensions(BxHxT) :	80 x 80 x 30	mm
	Operating voltage:	10...15	V
	Current consumption max.:	0,2	A
	Operating Temperature:	-10...+60	°C

Accuracy:

Range	Resolution	typ./ max. Error	Unit
Battery voltage	0,1	± 0,1	V
Fuel flow	0,1	± 0,5	l/h
Fuel pressure	0,01	±0,1	Bar

The accuracy details refer to the complete device including sensors in the above-mentioned temperature range and correct installation.