DEUTZ Display

Installation and User Instructions
for Deutz Display Application Software on Deutz CAN Display

Table of Contents

1   Glossary

CAN	Controller Area Network (also frequently referred to as CANbus). A serial communications protocol originally defined by Bosch for automotive use
Deutz Display	Generic Engine Module
HMI	Human-Machine Interface
J1587	SAE engine data transmission protocol using J1708 (similar to RS-485)
J1939	SAE engine data transmission protocol using CAN 2.0B
LCD	Liquid Crystal Display
RS-232	A standard defining an electrical interface for serial communications
RS-485	A standard defining a differential electrical interface for serial communications
SAE	Society of Automotive Engineers Inc
'Soft' Keys	General-purpose push-button keys whose function changes according to use. The current function is always displayed above the key as an icon on the LCD.

2   Introduction

This document contains all the information necessary to install and use the Deutz Generic Engine Monitor (Deutz Display).

The Deutz Display can be ordered together with all Deutz engines with electronic governor and probably activated CAN-Bus!

Please read through the whole of this Installation and use Manual prior to use.

CONTRAST RESET.
If the display contrast was to be set so that the display was unreadable and so could not be adjusted back, press all four grey keys together. This will reset the contrast to a central value and will reset the lighting to full. All other settings will not be lost.

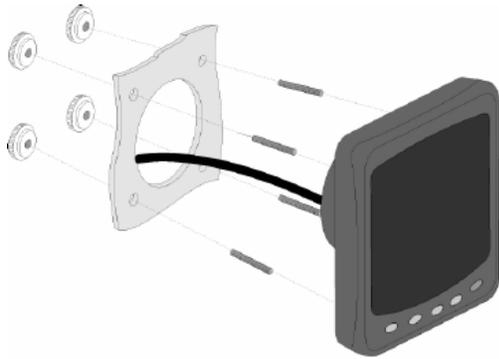# 3   Installation Instructions

3.1   On Dash Mounting

Figure 3.1.1: Front Mounting

▶ Decide on a location.

Allow adequate clearance behind the unit for cable connections to ensure that the cables are not unduly stressed. Ensure that there is sufficient length of cable to remove the unit for servicing purposes.

Most units will be mounted in a bulkhead *(see figure 3.1.1*) and that method is described here. Note: Certain hardware platforms may be mounted from the rear of a panel using a REAR Mounting Bracket.

▶ Using the supplied template (*see figure 3.1.2*) as a guide, cut out the hole for the back and drill the four ø 4.3 mm (0.170") holes for the studs.

▶ Screw the four studs into the rear case, longer M4 studs can be used if required (not supplied).

▶ Connect the cable to the rear of the unit.

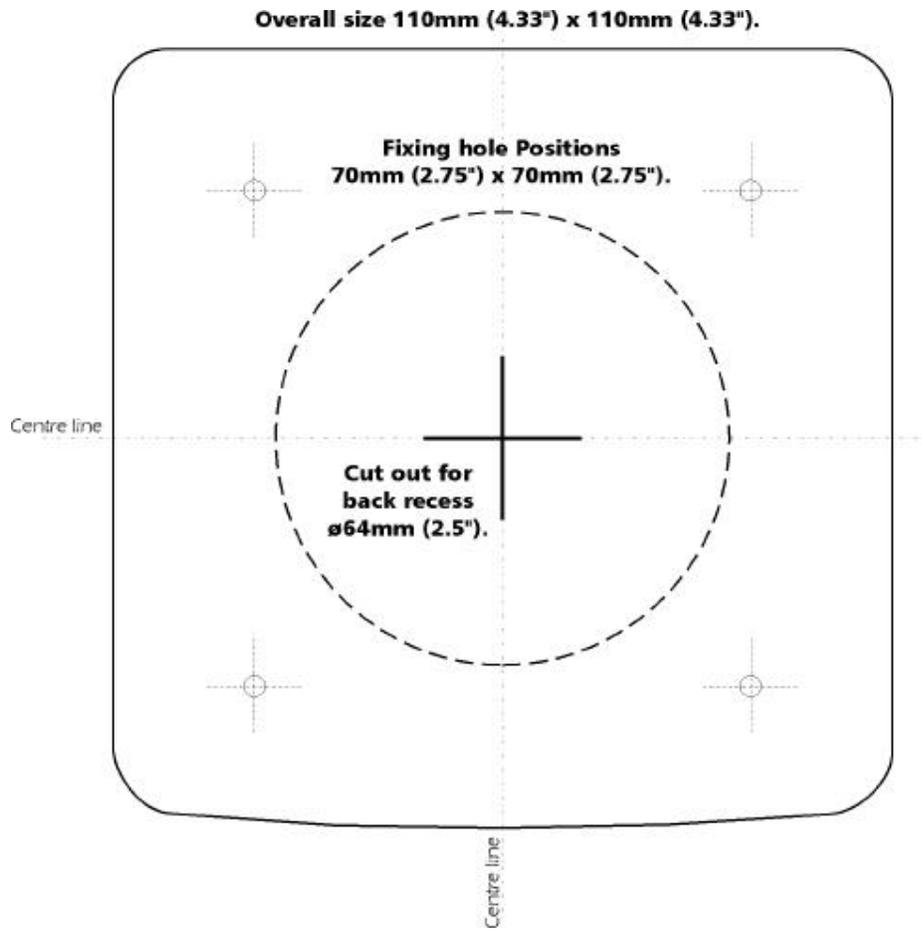▶ Place the unit into position, then secure it by screwing the thumbnuts onto the studs.

Overall size 110mm (4.33") x 110mm (4.33").

**Fixing hole Positions
70mm (2.75") x 70mm (2.75").**

Centre line

**Cut out for
back recess
ø64mm (2.5").**

Centre line

Figure 3.1.2 : Mounting Template

3.2   Connection

▶ The Deutz Display connector is a Deutsch DT04 12PA connected as shown below. The mating connector is the Deutsch DT06 12SA which also requires: Wedgelock: W12S (one per connector). Pin Sockets: 0462-201-1631 (note different finishes and termination methods are available for this part, refer to Deutsch directly for details) Sealing Plugs: 114017 (one per unused pin location)

▶ A Deutsch DT06 12SA plug is included.

▶ The Deutsch website address is: www.deutschecd.com.

Pin Number	Signal
1	Power -ve
2	Power(+ve
3	No Connedtion
4	No Connedtion
5	No Connedtion
6	No Connedtion
7	CAN LO
8	CAN HI
9	No Connedtion
10	No Connedtion
11	No Connedtion
12	No Connedtion
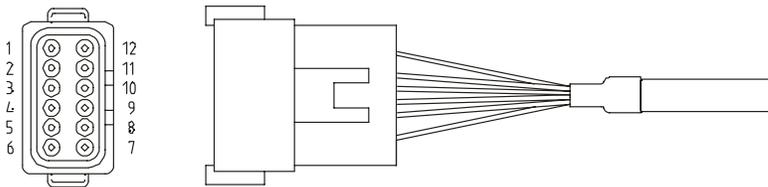
4   Maintenance

▶ Clean as required using a soft, damp cloth. Do not use abrasive materials or solvents as this may damage the unit.

▶ No other user maintenance is applicable. Should the unit require any further attention, please contact your supplier or local distributor.

5 General Description

The Deutz Display is a compact, robust panel-mountable module that enables a user to remotely request and display engine data. The unit utilises an industry-standard protocol to connect to the engine via an SAE J1939 CAN data link.

Key 1   Key 5

Figure 5.1: 'Soft' Keys

The Deutz Display incorporates a graphics LCD with five 'soft' keys mounted at the bottom of the LCD, providing a very flexible and intuitive Human-Machine Interface (HMI) *(see figure 5. 1)*.

Associated with the 'soft' keys is a graphical menu structure that uses easily understood icons to indicate the key's current function. This enables the operator to select the required engine data and display it in the following formats:

▶ Analogue gauges
▶ Digital data
▶ Graphs
▶ Multi-data (a combination of the above)
▶ Current active alarm messages

Additionally, various diagnostic screens are accessible, allowing detailed investigation of the engine's data stream

6   Getting Started

Figure 6.1: The Start-up Screen

▶ Install the unit according to the Installation Instructions found in a previous section of this document.

▶ After power is applied the start-up screen shown below (*see figure 6.1*) will be displayed for approximately 7 seconds. If the unit bleeps with a low-pitched tone, the self-test has failed. Refer to the User Guide section for further details.

▶ Once the self-test is complete, the display will change to show the default engine data screen.

▶ Should the screen need adjusting to improve legibility, press key 5 to select the contrast and lighting menu. The setting of brightness and contrast is described in greater detail in a later section.

▶ If the Deutz Display is connected to an active stream of engine data, it will now start displaying readings on the gauges shown on the LCD screen. For further operating instructions, please refer to the following section of this document.

7   User Guide

7.1   General

On power-up the Deutz Display performs a series of self-test routines. The progress of these is shown in the lower right-hand corner of the display. In the unlikely event of a fault occuring the unit will emit a low-toned bleep. The user can attempt to rectify the fault by reverting to the factory defaults (see the appropriate section for details of how this is done). Should the fault persist please contact your supplier or local distributor for further guidance.

▶ Following successful self-test, Deutz Display will commence to display engine data using the configuration settings held in its non-volatile memory.

▶ Press any of the four key #1 to key #4 to make the menu bar visible on the LCD. Press the key below the relevant icon to select a display mode.

▶ A folded page icon with an arrow on the page indicates that pressing the associated key will step through the various displays associated with a particular display format.

▶ The menu bar will disappear after approximately five seconds of key inactivity.

▶ Some of the displayed data can be customised to show, for example, metric or imperial units. In addition, it is possible for the user to define the full-scale reading of several gauges to suit the engine in use. Use of the configuration menu is described in a later section.
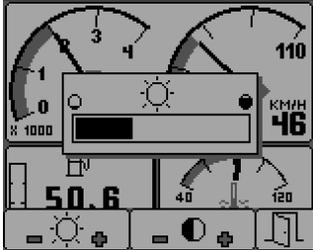
7.2   Setting Display Contrast and Lighting
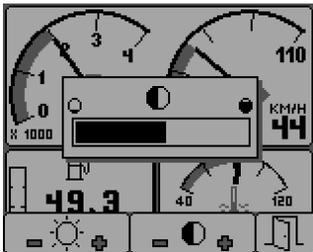
▶ Pressing the right-hand blue key when the menu icons are not on display will bring up the lighting and contrast menu.

Figure 7.2.1: Lighting Adjust

▶ The LCD has four back-light levels that allow the display to be read in the dark. The appropriate level is selected by pressing key #1 to decrease the illumination or key #2 to increase it (*see figure 7.2.1*).

Figure 7.2.2: Contrast Adjust

▶ Adjusting the contrast of the LCD to an optimum level ensures that the display is clearly legible and that grey-scales are appropriately displayed. Contrast is reduced by pressing key #3 (which will tend to lighten the display) and increased by pressing key #4 (which will tend to darken the display) (*see figure 7.2.2*).

▶ The contrast and lighting menu is exited by pressing key #5.

▶ The chosen settings are stored in non-volatile memory and will be automatically reinstated whenever the Deutz Display is powered up.

CONTRAST RESET.
If the display contrast was to be set so that the display was unreadable and so could not be adjusted back, press all four grey keys together. This will reset the contrast to a central value and will reset the lighting to full. All other settings will not be lost.
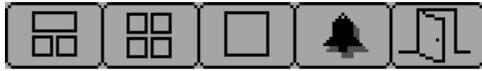
7.3   Using the Soft Keys

Figure 7.3.1: Main key Menu

▶ The use of 'soft' keys vastly simplifies the Deutz Display operator interface by ensuring the user is only presented with active keys that are appropriate to the current function. This is achieved by using the LCD to display icons that represent the current function of each key. Positioning the icons above the appropriate key allows each key's function to change whilst ensuring that the operator is always presented with a clear and unambiguous understanding of what each key-press will do (*see figure 7.3.1*).

7.4   The Main Engine Display

This display incorporates three independent windows and is intended to show the most important and frequently accessed engine data.

▶ To select the main engine display, press any of the four grey keys to show the top-level menu icons and then press key #1 (the left-hand key).
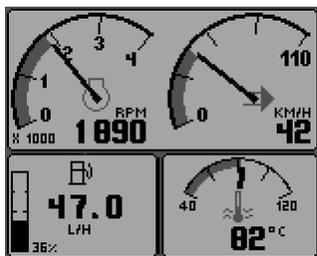
▶ The main window, at the top of the display, shows two gauges; engine rpm on the left and speed on the right. Note that if speed data is not available the right-hand gauge will display engine oil pressure.

Figure 7.4.1: Main Screen

▶ The window at the bottom-right of the display shows the coolant temperature.

▶ The window at the bottom-left of the display gives access to the fuel computer data and is similar to an automotive in-car fuel computer. Various parameters can be displayed by repeated presses of key #1 (the left-hand key) which sequentially steps the window through the displays shown below. Note that fuel data parameters can only be shown if the required data is being received from the engine.

Figure 7.4.2. Main Screen (without Speed)

▶ Instantaneous Fuel Rate

The instantaneous fuel rate received from the engine displayed as a volume per hour.

▶ Average Fuel Rate per hour

If total fuel consumption and fuel rate are being received then the average will be calculated since the last trip fuel and trip hours **reset**. This is displayed in units of volume per hour.

▶ Average Fuel Consumption per distance

If vehicle speed is being received then the average will be calculated since last trip fuel **reset**. This is displayed in units of volume per distance.

▶ Trip Fuel

If total fuel used is received from engine then this will be calculated since the last **reset**.

▶ Engine Hours

Total engine hours received from engine.

▶ Trip Engine Hours

Engine hours since last **reset**. Calculated from Total Engine hours.

▶ To carry out a 'reset' for each **reset** -able fuel computer parameter allow the menu bar to disappear and press and hold key [1] for at least 3 seconds.

▶ Note: If the menu bar is not allowed to disappear then the display will move to the next parameter before the 'reset'.

7.5   The Quad Display

This display gives the user quick access to four screens, each displaying four gauges. The first screen shows four digital gauges, whilst the second and third screens each show four analogue gauges. Example displays are shown below.
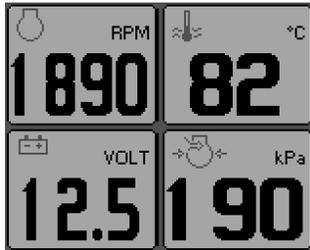

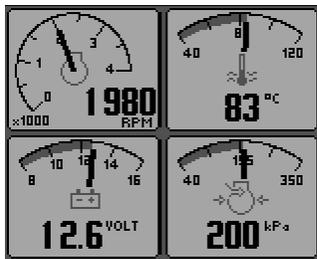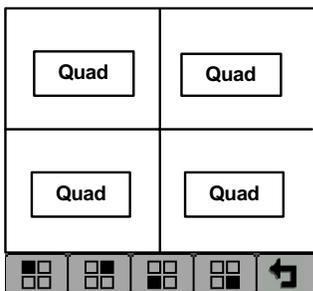*Figure 7.5.1: Representative view of first screen, showing four digital gauges.*

*Figure 7.5.2: Representative view of second and third screens showing four analogue gauges.*


▶ To select the quad display, press any of the four grey keys to show the top-level menu icons and then press key #2.

▶ The screens are displayed sequentially in response to repeated presses of key #2.

▶ Using the adjust mode, each individual gauge displayed on the screens can be configured by the user to show a different engine parameter selected from an extensive list. The adjust mode is entered by pressing key #5 when the Deutz Display is running in quad display mode and the menu is visible (if the menu isn't visible, simply press any of the grey keys to make it re-appear).

▶ In adjust mode, the menu will appear as shown on the left side.

▶ Pressing key #1 will cycle the top-left display through all available engine parameters, key #2 will cycle the top-right display etc. The adjust mode is exited by pressing key #5.

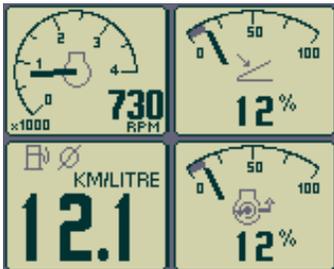▶ For a list of engine parameters that can be displayed see section 7.7.

Quad 1
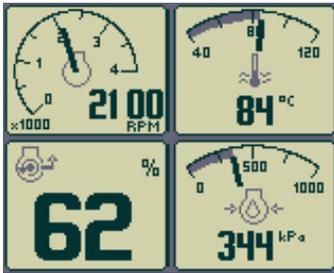
▶ Starting from the top left clockwise: RPM, coolant temp, percentage torque at RPM, oil pressure
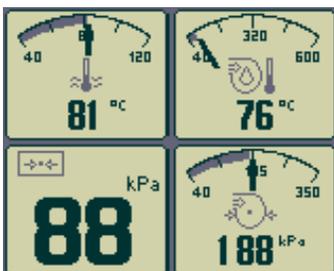
Quad 2
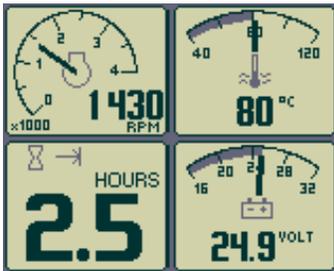
▶ Starting from the top left clockwise: RPM, coolant temp, coolant temp, engine hours, battery voltage

Quad 3

▶ Starting from the top left clockwise: RPM, accelerator pedal percentage, fuel rate, percentage torque at RPM

Quad 4

▶ Starting from the top left clockwise: Coolant temp, boost temperature, ambient pressure, boost pressure

7.6   The Graph Display

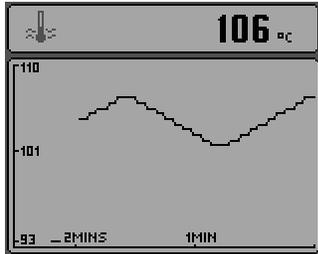The graph display shows data trends in one large window and is analogous to a traditional data plotter.

Figure 7.6.1: Representative view of the graph display, showing coolant temperature.

▶ This mode is selected by pressing any of the four grey keys to show the top-level menu icons and then pressing key #3.

▶ Data is shown in graph form, with the most recent data scrolling from the right of the display towards the left. The viewed time range can be adjusted in the configuration menu from 2, 10 or 30 minutes up to 1, 2, 4 or 8 hours. See other section of this document for further details.

▶ The maximum and minimum values of the Y axis (defining the span of readings displayed) are adjusted automatically to give the optimum view of the visible data.

▶ The data to be displayed can be selected by repeatedly pressing key #3 whilst in the graph display mode.

▶ For a list of engine parameters that can be displayed see section 7.7.

7.7   The Quad and Graph Parameters

Following is a list of engine parameters that can be displayed in the Quad and Graph screens:

	Parameter	Quad	Graph	Icon
a)	Engine Speed (rpm)	✓	✓	
b)	Coolant Temperature	✓	✓	
c)	Battery Voltage	✓	✓	
d)	Turbo Pressure	✓	✓	
e)	Coolant Pressure	✓	✓	
f)	Fuel Pressure	✓	✓	
g)	Engine Oil Pressure	✓	✓	
h)	Transmission Oil Pressure	✓	✓	
i)	Transmission Oil Temperature	✓	✓	
j)	Exhaust Temperature	✓	✓	
k)	Engine Oil Temperature	✓	✓	
l)	Inlet Manifold Temperature	✓	✓	
m)	Engine Torque (actual)	✓	-	
n)	Accelerator Position	✓	-	
o)	Fuel Rate	-	✓	

7.8   The Alarm Display Screen

The Deutz Display recognises alarm messages received from the engine via the data link. When a new alarm is received the Deutz Display will start to beep, a flashing pop-up window will appear with the latest alarm details.
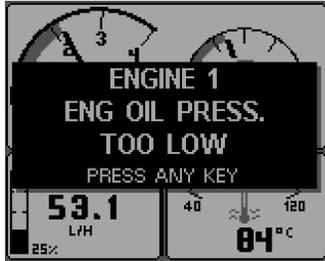

Figure 7.8.1: A representative alarm pop-up message, showing low engine oil pressure.

Figure7.8.2: The alarm list screen, showing unacknowledged alarm conditions.

Figure 7.8.3: The alarm list screen, showing that alarm conditions have been acknowledged. Note that the exit key (key #5) has now been activated.

▶ Pressing any key will display the alarm list screen which contains details of all previous alarms. Those that have already been acknowledged are shown as black text on a grey background. New alarms, that have not yet been acknowledged, are shown as highlighted grey text on a black background. If engine hours data is available, the list will also indicate the engine hours when the alarm message was first received.

▶ When first entering the alarm page the list will automatically go to the most recent alarm received. If the list is longer than the screen size, the alarm list can be scrolled up and down using keys #1 and #2.

▶ The screen cannot be exited until all alarms have been acknowledged by pressing key #3. Alarm messages will be automatically cleared from the list if no longer received.

▶ The alarm list screen can be viewed, at any time, by pressing key #4.

7.9   Pop-up Messages and Warnings

In the configuration menu (see section 7.10), the user can set the engine service interval in hours. When the Deutz Display determines that an engine service is due, it will display a "SERVICE REQUIRED" message overlaying the start-up screen which appears for seven seconds following power-up.
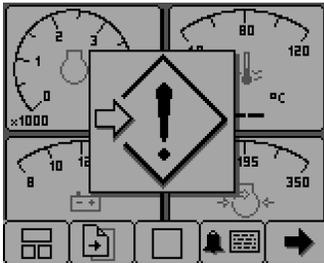

Figure 7.9.1: The communications failure icon

▶ Should the Deutz Display not detect valid engine data, a flashing pop-up window will appear displaying a "Communications Failure" icon denoting this fault condition. Once engine data transmissions have been detected the pop-up window will disappear and normal data display will continue.

7.10   Secure Settings – PIN

In order to make the settings of the CANtrak more secure, Deutz would like to be able to enter a PIN code upon entry to the configuration menu (this is entered by holding down the 5th key). This will be a 4 digit code that has to be entered on a pop up screen when the configuration menu is entered. The mechanism for entering the pin will be as follows:
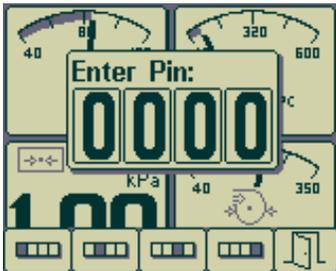
▶ **Entering the Configuration Screen**

On the left is the screen layout used to enter the PIN.

To enter the first digit the first key must be pressed the correct number of times (e.g. To enter 2 it should be pressed twice, to enter 5, five times.). This will be repeated for every digit which can be entered using the appropriate key. Once all digits have been entered the fifth key is used to enter the information. The default number for each digit is zero. The default PIN will be set to "1111" unless otherwise specified by Deutz.
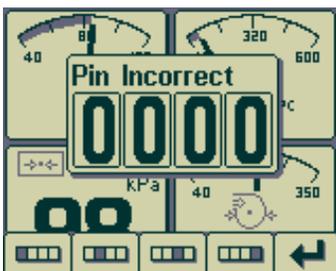
▶ **Incorrect Pin Entry**

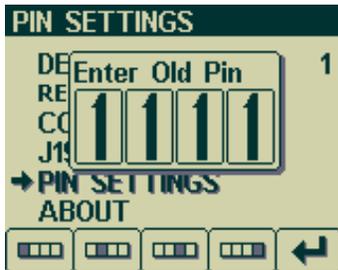If the pin is entered incorrectly the screen shown on the left will be seen.

After 3 seconds this screen will disappear and return to the previous screen.

► **Entering the Screen by Accident**

As it may be possible to enter the Pin entry screen by accident (holding down key 5) upon entry the user can exit out of this screen by pressing the 5th key straight away. If the user presses any other key and then the 5th key, the Pin Incorrect screen will be shown for 3 seconds before returning to the previous screen.

► **Changing the Pin**

Once the user has successfully entered the Pin the configuration menu will be shown as normal. From here the user can change the Pin by entering the following menu "SYSTEM->PIN SETTINGS". Entering this screen will display as shown on the left.

This prompts the user to enter the current pin, if this is not entered correctly a Pin Incorrect screen (as shown previously) will be seen for 3 seconds after which the unit will return to the configuration screen.

If the pin is entered correctly the following screen will be seen.

This prompts the user to enter the new pin. Once this is entered (by pressing the 5th key) the following screen will be seen:

This is now prompting the user to confirm the new pin by re-entering it. Once this has been completed a Pin Correct/Pin Incorrect screen will be seen for 3 seconds before returning to the configuration screen.

7.11 Configuration

The configuration mode allows the user to set various operating parameters and modes of the Deutz Display. These include such choices as imperial or metric units, scale limits for the speedometer gauges, engine service interval etc.
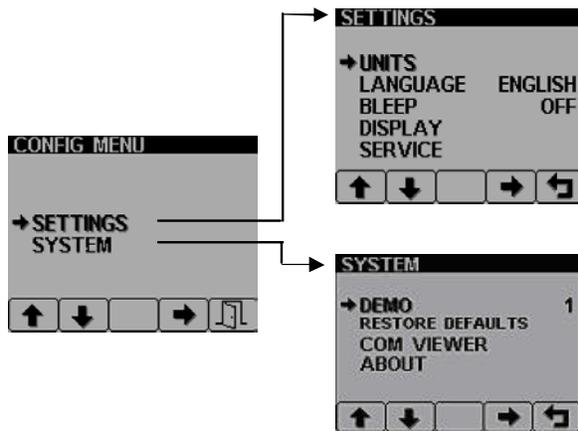

Figure 7.10.1: The top-level configuration menu and SETTINGS and SYSTEM sub-menus.

▶ The configuration menu is entered by pressing and holding key #5 (the blue key) for at least 3 seconds when the Deutz Display is in its normal operating mode. The top-level configuration menu will be displayed on the LCD, as shown below.

▶ Keys #1 and #2 allow the operator to move up and down the menu whilst key #4 enters the highlighted menu item. Key #5 exits the configuration menu and saves all configuration data into non-volatile memory.

▶ The SETTINGS sub-menu allows the Deutz Display to be configured according to the user's preferences whilst SYSTEM accesses maintenance and low-level system configuration settings.
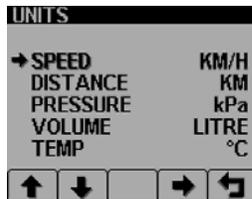

▶ Selecting UNITS from the SETTINGS sub-menu gives access to five parameters which can be displayed in units selected from a list. Use the up and down keys (key #1 and key #2) to select the required parameter, then press key #4 to cycle through the permitted units of measurement. Pressing key #5 returns the user to the main SETTINGS menu.

▶ The LANGUAGE sub-menu allows the user to select which language Deutz Display uses to display messages and prompts. Use the up and down keys (key #1 and key #2) to high-light the required language and then press key #4 to select it. Pressing key #5 returns the user to the main SETTINGS menu.

▶ BLEEP selects whether each key press is acknowledged with an audible bleep. Note that, even with BLEEP switched off, the audible alarm will still sound if an alarm condition occurs.

```
DISPLAY

→MAX RPM          4000
 MAX SPEED  110 KM/H
 GRAPH RANGE  2MINS

[↑] [↓] [−] [+] [↩]
```
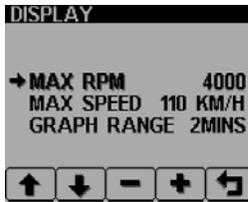
► The DISPLAY sub-menu allows the user to define the maximum rpm shown on the tachometer, the maximum speed shown on the speedometer and the speed with which the display scrolls when using Deutz Display in the graph display mode (see section 7.6 for further details of the graph mode).

```
SERVICE

SERVICE     50HOURS

    NEXT SERVICE IN
        25HOURS

[−] [+] [HOLD
        RESET] [ ] [↩]
```

► SERVICE allows the user to set the engine service interval so that the Deutz Display can, on power-up, remind the operator when a service becomes due. See section 7.9 for details of the pop-up message that signals this event.

► DEMO, the first item on the SYSTEM menu, allows the Deutz Display to run in a demonstration mode, showing its capabilities even if not connected to a valid engine data stream. There are three different demo modes. DEMO 1 has speed data simulated by the Deutz Display, DEMO 2 does not generate simulated speed data, DEMO 3 simulates various alarm conditions. For normal use, the demo mode must be switched to OFF.

▶ RESTORE DEFAULTS allows the user to reset all configuration data to the factory defaults. The user may select either metric or imperial units: the default values for each is shown below.

Setting	Metric	Imperial
Language	German	
Max RPM	3000	
Max Speed	110 KmH	70 MPH
Graph range	2 mins	
Speed	KmH	MPH
Distance	Km	Miles
Pressure	bar	PSI
Volume	L	Gal
Temperature	°C	°F

▶ Selecting COM VIEWER allows the user to examine the most recent messages in the CAN bus receive buffer. This is intended for use only as a diagnostic tool.

▶ The ABOUT screen shows the following information about the Deutz Display:

ID NO: Unique identifying number of the display

BAD EE: Number of writes on the EEPROM

PART No: Software part number

VERS: Software version number

CHKSM: Flash memory checksum

SOURCE: Display the source of received data

LABEL: Allocated Label on the bus. Each unit on the same bus should have a different label.