

## DIGITAL DISPLAY SYSTEM (DDS)

### 1. GENERAL DESCRIPTION

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#### Hardware

The DDS is a rugged COTS customisable display system. The overall physical configuration of the DDS is shown in the photo below. The DDS comprises a high contrast monochrome LCD display with board mounted interface connector, conformal coated board, encased in an aluminium billet machined case.



#### Software

The supplied DDS Manager software is a Windows application which enables easy programming of the DDS to customise displayed information and warnings to best meet end user needs.

### 2. FUNCTIONAL DESCRIPTION

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The DDS is the latest evolution of MoTeC's high performance ruggedised display systems. The DDS is a sophisticated programmable display, with a wide range of customisable display options. Key DDS functional features include:

- Customisable screen layout, including measurement units and warnings.
- Configurable curved bar graph which can display any data channel with optional markers.
- Multiple display fields.
- 20 user-defined alarms, for example Low Oil Pressure, Low Fuel, High Coolant Temperature.
- Three individually programmable display screen layers. This enables separate screen layers to be programmed with different data / information for special or specific requirements, e.g. such as Normal OPS, Contingency OPS, Special OPS, Maintenance, etc., thereby showing the driver / crew the most relevant information for the given operation or activity types.
- High contrast full sun readable LCD screen with adjustable backlight intensity.
- Future Proofing:
  - DDS functionally is customisable at the software level
  - the DDS is software expandable to also include data logging functionality

### 3. FUNCTIONAL SPECIFICATIONS

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The DDS directly supports the following functional capabilities:

- Up to 12 analogue inputs.
- 6 digital/speed inputs.
- 8 auxiliary outputs.
- Multiple alarms can be setup to alert users to potential issues with the vehicle. Alarms can be displayed on screen or sent to warning lights, and or to a sound device for audio warning, providing multiple warning options for the driver/crew, and if required also stored in the optional logging functionality. An alarm can be set for any analogue, digital, serial, CAN or calculated channel.
- Limits are fully programmable and can include many complex and nested conditions to ensure that they are only activated at the correct time. When an alarm condition has been detected, a message can be shown on the display and an auxiliary output activated. These outputs can also be used to activate warning devices, or provide control/activation signals for other devices. The alarms remain active until they are either acknowledged by activating a switch, or removed automatically following a user definable period of time.

The DDS can accommodate data from a wide range of channels derived from a mixture of analogue, digital, RS232 serial, CAN data, and calculated internal channels.

Example of typical vehicle sensor / data channels can include:

• Infrared tyre temperatures	• Brake rotor temperatures
• Suspension positions	• Damper velocities
• Suspension forces	• Chassis strain
• Ride heights	• G-forces
• Vehicle yaw / roll / pitch	• Tyre slip angle
• Hydraulic pressures	• Fuel and oil pressures
• Fuel flow and fuel used	• Wheel speeds
• Driveshaft speed	• Engine RPM
• Throttle position	• Steered angle
• Exhaust gas temperatures	• Lambda
• Boost pressure	• Air temperature
• GPS information	

#### **Display**

The DDS uses a high contrast reflective LCD screen which has been custom designed for easy viewing in direct sunlight and artificial light, with an optional adjustable backlight for maximum visibility in low light or night conditions. High temperature tolerance ensures consistent reliability of the DDS in all conditions. The display has three programmable display modes or layers, which operate independently of each other. This allows relevant information to be shown to the driver / crew at the appropriate time without unnecessary on-screen clutter. The 70 segment curved bar graph can be configured to display any channel, with optional peak hold and shift/prompt markers. Each numerical display field is programmable to show any value, and can be overridden by user defined conditions. Thirteen alphanumeric digits along the bottom of the screen can be used to display channel values, messages and warning alarms. There are 20 text lines available, which can be scrolled using an external user control, and there are four programmable overrides.

### **Advanced Maths Function**

Comprehensive range user programmable maths functions/calculations can be performed internally within the DDS for live evaluation and display, providing customisable enhanced driver/crew decision support information. The formulas can include relational and Boolean operators, functions and constants, and can be used to define conditions. Up to 3000 instructions are available, with common expressions using around 15 to 40 instructions.

### **Communication**

**CAN (Controller Area Network) BUS.** The DDS has two standard communication high speed CAN BUS interfaces operating at user selectable speeds of up to 1 Mb/sec. This allows many devices to be connected by a common bus for the sharing of information as part of a larger system. CAN devices include engine management systems, sensors and multi-channel input/output modules. The two independent CAN bus interfaces enable interconnectivity with other devices at two different speeds. This is useful for integrating MoTeC equipment with OEM systems and third party electronics. It also allows those with extensive CAN demands to spread the load over two buses for more manageable data communication.

**SERIAL RS232 Communication.** The RS232 serial port is programmable up to 115,200 baud, and can be used as both a telemetry data (optional) output port and a serial data input port. As a telemetry (optional) port, devices such as GSM/satellite modems and radio modems can be used to facilitate remote connection. As a serial data input port, serial communications Devices, including engine management systems, and GPS systems, which can be connected for display and logging (optional) purposes. Information may be simultaneously received from a device and transmitted to telemetry.

### **Expansion Capabilities**

The DDS can be easily upgraded to further expand its Inputs / Outputs capacity and capabilities with the addition of MoTeC I/O expansion modules.

**4. TECHNICAL SPECIFICATION**

<b>Specifications</b>			
<b>Display Type</b>	Monochrome High contrast LCD (full sun readable), with backlighting	<b>Operating Temp.</b>	Ambient: -10 ° C to 70 ° C Internal: -10 ° C to 80 ° C
<b>Internal Sensors</b>	3-axis G sensor DDS temp. Sensor Sensor supply voltage Battery voltage	<b>Storage Temp.</b>	-30 ° C to 95 ° C
<b>Active Display Area</b>	Pre-configured user customisable	<b>Salt, Fog, Sand, Dust</b>	Resistant – unit 100% enclosed & electronics board is conformal coated
<b>Brightness</b>	Full sun readable and variable backlighting	<b>Humidity</b>	Circuit board conformal coated and inside sealed unit
<b>Input / Output Data Interface</b>	CAN Data BUS, direct from sensors, includes analogue, digital, speed, switch, RS232	<b>Shock</b>	Ruggedised fully solid state – test to application
<b>Connector</b>	Single 37 PIN MIL SPEC / Autosport	<b>Vibration</b>	Ruggedised fully solid state – test to application
<b>External PC Interface</b>	Standard Ethernet connector	<b>Environmental</b>	MIL-STD-810 Test to Application
<b>User Controls</b>	Brightness Display page selection	<b>EMI/EMC</b>	CE certified, MIL-STD-461F Test to Application
<b>Enclosure</b>	Aluminium machined billet, black anodised	<b>Power Input</b>	8 to 32 volt DC
<b>Dimensions (WxHxD)</b>	7.1 x 3.6 x 0.7 in (180 x 91 x 18 mm)	<b>Power Consumption</b>	Operating current 0.15 ampere typical (excluding sensor currents)
<b>Weight</b>	0.849 lbs (385 g)	<b>Power Protection</b>	Reverse battery & Battery transient

All specifications are subject to change without notice.  
For additional information contact MoTeC Pty Ltd.