ALTERNATORS
**Description**

A compact alternator for sport cars.
Rewound stator with flexible connections to bridge.
Upgraded and ruggedized rectifier bridge to deal with harsh vibrational environment.
Sealed high speed & quality bearings.
Stiffer brush springs for harsh vibrational environment.
Brackets modified to prevent stator rotation.
The rear bracket can be supplied as shown or rotated by increments of 90°.*
Connection by spade connector or dedicated loom.*
* Contact factory for these options.

**Main Features**

- 40 A / 90 A output
- 18000 rpm max speed
- Clockwise rotation
- 2.6 Kg weight

**Benefits**

- High output to weight ratio
- Integral voltage regulator

**Typical Applications**

Touring car
Single seater
A93/40-90 A
Wound field alternator
13.5 V - 40 A or 90 A

**Dimensions**

![Dimensions Diagram]

**Technical Characteristics**

- Cut in speed: 1150 (40 A) 2400 (90 A) rpm
- Maximum speed: 18000 rpm
- Rotation: Clockwise only
- Operating temperature (ambient): Up to 90 °C
- Regulated voltage: 13.5 V
- Weight: 2.6 Kg

**Application Schematics**

![Application Schematic]

For further information, please contact:

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Jan 2016
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Specifications are subject to change without prior notice.
A92-A00
Permanent magnet alternator
13.5 V - 22A

Description
A lightweight permanent magnet alternator for motorbike applications. Rare earth magnets and aircraft quality stator laminations allow maximum output with minimum size.

The technology used allows it to be very small along the axial direction.

Regarding stator and shaft coupling styles:
- other shapes available
- custom shapes available with minimum tooling cost (contact factory for MOQ and prices)

Main Features
- 22 A output
- 18000 rpm max speed
- Clockwise or anti clockwise rotation available
- 0.8 kg weight

Benefits
- High output to weight ratio
- High resistance to vibrations

Typical Applications
SBK
A92-A00
Permanent magnet alternator
13.5 V - 22A

Dimensions

Technical Characteristics

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cut in speed</td>
<td>2000 rpm</td>
</tr>
<tr>
<td>Maximum speed</td>
<td>18000 rpm</td>
</tr>
<tr>
<td>Rotation</td>
<td>Clockwise or anti clockwise rotation available</td>
</tr>
<tr>
<td>Operating temperature (ambient)</td>
<td>Up to 90 °C</td>
</tr>
<tr>
<td>Regulated voltage</td>
<td>13.5 V</td>
</tr>
<tr>
<td>Weight</td>
<td>0.8 Kg</td>
</tr>
</tbody>
</table>

Application Schematics

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Specifications are subject to change without prior notice
Description
A lightweight permanent magnet alternator for formula1 and top motorcycle applications.

Rare earth magnets and aircraft quality stator laminations allow maximum output with minimum size.

Machined housing and military grade stator winding allow maximum reliability even at temperatures above 100 °C.

Contact factory for suitable voltage regulators and for higher output current.

Main Features
- 22 A output
- 19000 rpm max speed
- Clockwise and counterclockwise rotation
- 750 g weight

Benefits
- High output to weight ratio
- High resistance to vibrations
- No electronics on alternator

Typical Applications
MotoGP
Race motorcycle application
**ALTERNATORS**

**A45 L**
Permanent magnet alternator
13.5 V - 22 A

---

**Dimensions**

---

**Technical Characteristics**

- Cut in speed: 2000 rpm
- Maximum alternator speed: 19000 rpm
- Rotation: Clockwise or counterclockwise
- Operating temperature max.: copper: 200 °C, bearings: 150 °C
- Regulated voltage: 13.5 V
- Connector Type (*): AS6.08-98SN
- Cable length (*): 500 mm
- Weight (approx.): 750 g

(*): Different cable length and connector type are available on customer request

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**Application Schematics**

---

**For further information, please contact:**

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page 2 of 2

Specifications are subject to change without prior notice.
FOX442
Power distribution unit
12 V – 42 high-current output
-Available soon-

Description
FOX442 is a high reliability, solid-state, vehicle electric power management system. Based on state-of-art MOSFET technology, FOX442 manages up to 200 A current though 42 independently controlled 22.5 / 15 / 7.5 A rated outputs. It is currently been used as a main power distribution unit in different vehicles submitted to high levels of vibration and mechanical shocks.
FOX442 is perfectly integrated with Magneti Marelli ECU’s and SP-WRC2 Switch Panel unit.
FOX442 allows the user to use switching strategies defined in ECU SW through commands received through CAN line or eventually through strategies coded in the Switch Panel SW.
Self-protection strategies include fully configurable trip, inrush and low-current circuit protection.
FOX442 monitors in real time the current level and state of all the 42 outputs. This can be sent through CAN to be used by other devices in order to establish more complex reliability strategies or diagnose & maintenance operations.
FOX442 is delivered in a high quality, lightweight sealed box with integral heat sink machined from billet aluminum. Connectors are high quality and reliable AS Deutsch Motorsport series. With its enlarged cooling radiator surface it is suitable for heavy duty conditions with limited possibility of heat dissipation caused by high ambient temperature etc. and frequently or permanently under high current load.

Main Features
- 42 Output power channels
- PC tool to set up the current protection limits on single channels
- Software group to enable outputs for higher current ratings
- Trip current & time protection
- Inrush current & time protection
- Low current protection
- Flexibility to add or modify device commands without any harness modification
- Simplification and flexibility of control panels
- 2 CAN communication bus

Benefits
- Full management (On-Off / current reading / status) of 42 power devices
- All electrical load currents and status on SYSMA and WintTAX4 Tools
- Over-heat, over-current and short-circuit protection strategy
- Test functions for check-list and calibration
- Harness design simplification with weight and cost saving
- Very compact design and easy to install

Typical Applications
One-make race series
Rallies
GT
Le Mans series
VOLTAGE REGULATORS

FOX442
Power distribution unit
12 V – 42 high-current output

Technical Characteristics

**Inputs**
- Analogue Single-ended ................................................. 12
- NTC internal temperature sensor ..................................... 2
- Barometric pressure ....................................................... 1
- Battery voltage reread ...................................................... 1
- Digital input (4 On-Off + 1 ENCP) ................................. 5

**Outputs**
- High Side Outputs 7.5 A (max. for each output) ............ 22
- PWM capability up to 500Hz
- Half Bridge Outputs 7.5 A (max. for each output) ............ 6
- High PPM capability with freewheeling
- High Side Outputs 15 A (max. for each output) ............ 8
- Four Outputs include recirculation diode
- High Side Outputs 22.5 A (max. for each output) ............ 6

**Communications**
- CAN line (1 Mbit/s (‘)) ...................................................... 2
  * Configurable on request 2.0A or 2.0B

**Connectors**
- Deutsch Auto sport AS214-35PN (37 Pin) .................... 1
- Deutsch Auto sport AS018-32SN (32 Pin) .................... 1
- Deutsch Auto sport AS018-32SA (32 Pin) .................... 1

**Other Characteristics**
- Power supply .......................................................... 8 to 18 V
- Operating temperature range (internal) .................. -30 to 85 °C
- Protection class (‘) .................................................. IP 65
- Dimensions without connectors ...... 175.9 x 106.9 x 28.3 mm
- Weight (approx.) ........................................................ 710 g
  * IP65 on request

**Dimensions**

**Application Schematics**

For further information, please contact:

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March 2016

Specifications are subject to change without prior notice
Description

PDU12-42HD is a high reliability, solid-state, vehicle electric power management system. Based on state-of-art MOSFET technology, PDU12-42HD manages up to 200 A current though 42 independently controlled 22 / 15 / 7 A rated outputs. It is currently been used as a main power distribution unit in different vehicles submitted to high levels of vibration and mechanical shocks.

PDU12-42HD is perfectly integrated with Magneti Marelli ECUs and SP-WRC2 Switch Panel unit.

PDU12-42HD allows the user to use switching strategies defined in ECU SW through commands received through CAN line or eventually through strategies coded in the Switch Panel SW.

Self-protection strategies include fully configurable trip, inrush and low-current circuit protection.

PDU12-42HD monitors in real time the current level and state of all the 42 outputs. This can be sent through CAN to be used by other devices in order to establish more complex reliability strategies or diagnose & maintenance operations.

PDU12-42HD is delivered in a high quality, lightweight sealed box with integral heat sink machined from billet aluminum. Connectors are high quality and reliable AS Deutsch Motorsport series. With its enlarged cooling radiator surface it is suitable for heavy duty conditions with limited possibility of heat dissipation caused by high ambient temperature etc. and frequently or permanently under high current load.

Main Features

- 42 Output power channels
- PC tool to set up the current protection limits on single channels
- Software group to enable outputs for higher current ratings
- Trip current & time protection
- Inrush current & time protection
- Low current protection
- Flexibility to add or modify device commands without any harness modification
- Simplification and flexibility of control panels
- 1 Ethernet line
- 1 CAN communication bus

Benefits

- Full management (On-Off / current reading / status) of 42 power devices
- All electrical load currents and status on SYSMA and WintTAX4 Tools
- Over-heat, over-current and short-circuit protection strategy
- Test functions for check-list and calibration
- Harness design simplification with weight and cost saving
- Very compact design and easy to install

Typical Applications

One-make race series
Rallies
GT
Le Mans series
Technical Characteristics

**Inputs**
- Analogue Single-ended ................................................... 8
- NTC internal temperature sensor ....................................... 6

**Outputs**
- Outputs 7 A .................................................................. 26
  - max continuous current per output ......................... 7,5 A
- Outputs 15 A .............................................................. 8
  - max continuous current per output ....................... 15,0 A
- Outputs 22 A .............................................................. 6
  - max continuous current per output ....................... 22,5 A
- Outputs elmot 7 A with electric brake functionality .......... 2
  - max continuous current per output ......................... 7,5 A
- Total output performance
  - max continuous current overall (*) ......................... 200 A
  * With proper installation and under optimal cooling conditions

**Communications**
- Ethernet line (10/100 Mbit/s) ............................................. 1
- CAN line (1 Mbit/s (\*) ) ................................................... 1
  * Configurable on request 2.0A or 2.0B

**Connectors**
- Deutsch Auto sport AS214-35PN (37 Pin) .................... 1
- Deutsch Auto sport AS018-32SN (32 Pin) .................... 1
- Deutsch Auto sport AS018-32SA (32 Pin) .................... 1

**Other Characteristics**
- Power supply .......................................................... 8 to 18 V
- Operating temperature range (internal) ................... -40 to 85 °C
- Protection class (*) .................................................... IP 64
- Dimensions
  - without connectors ........................................... 210 x 123 x 35 mm
- Weight (approx.) ................................................... 980 g
  * IP65 on request

Dimensions in millimetres

Application Schematics

For further information, please contact:

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Jan 2016
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Specifications are subject to change without prior notice.
Description

BVRM04 is a compact lightweight voltage regulator for permanent magnet alternators.

The device has a power box section which provides 4 power outputs controlled by an on board microprocessor.

Internal signals of temperature, voltage and current are sampled and available to the ECU via CAN.

BVRM04 provides a PWM output controlled by software which can be used to reduce the load of the electrical fuel pump.

Main Features

- Power box with:
  - 2 high side driver 20 A
  - 1 high side driver 5 A
  - 1 PWM output (low side driver) 10A, 20 kHz
- Availability of internal signals: load current, battery current and output/input voltage
- Availability of critical internal temperatures
- Small dimension & weight

Benefits

- Output voltage settable from 10 V to 16 V
- Improved efficiency (88-93 %)
- PWM output usable also to drive electrical fuel pump

Typical Applications

In MotoGP and motorbike coupled with permanent magnet alternator supplying maximum rectified voltage of 180 V
VOLTAGE REGULATORS

BVRM-04
Small size voltage regulator
14 V - 30 A

Dimensions

Technical Characteristics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum continuous output current</td>
<td>30 A</td>
</tr>
<tr>
<td>Peak output current (1)</td>
<td>35 A</td>
</tr>
<tr>
<td>Max output power continuous</td>
<td>420 W</td>
</tr>
<tr>
<td>Nominal output voltage</td>
<td>14 V</td>
</tr>
<tr>
<td>Output voltage ripple</td>
<td>2%</td>
</tr>
<tr>
<td>Protection class</td>
<td>IP 65</td>
</tr>
<tr>
<td>Operating temperature (2)</td>
<td>90°C</td>
</tr>
</tbody>
</table>

Weight

560 ± 50 gr

(1) As peak we can consider 10 sec 35A and following 50 sec 30A load.
(2) Refer to spec, maximum 90°C on TBOX NTC
100°C on TMOSFET/TBRIDGE

Pinout

AS007-35PN

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PHASE 1</td>
</tr>
<tr>
<td>2</td>
<td>PHASE 1</td>
</tr>
<tr>
<td>3</td>
<td>PHASE 2</td>
</tr>
<tr>
<td>4</td>
<td>PHASE 2</td>
</tr>
<tr>
<td>5</td>
<td>PHASE 3</td>
</tr>
<tr>
<td>6</td>
<td>PHASE 3</td>
</tr>
</tbody>
</table>

AS214-35 PN

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PIN</th>
<th>SIGNAL</th>
<th>PIN</th>
<th>SIGNAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>HS 1</td>
<td>14</td>
<td>GND</td>
<td>27</td>
<td>GND</td>
</tr>
<tr>
<td>2</td>
<td>HS 1</td>
<td>15</td>
<td>VBATT</td>
<td>28</td>
<td>VBATT</td>
</tr>
<tr>
<td>3</td>
<td>OUT4 (PWM LS)</td>
<td>16</td>
<td>VBATT</td>
<td>29</td>
<td>VBATT</td>
</tr>
<tr>
<td>4</td>
<td>OUT4 (PWM LS)</td>
<td>17</td>
<td>JUMP BATT</td>
<td>30</td>
<td>HS 2</td>
</tr>
<tr>
<td>5</td>
<td>OUT4 (PWM LS)</td>
<td>18</td>
<td>JUMP BATT</td>
<td>31</td>
<td>P LATCH 2</td>
</tr>
<tr>
<td>6</td>
<td>OUT3 (HS)</td>
<td>19</td>
<td>HS 1</td>
<td>32</td>
<td>CODE LOAD</td>
</tr>
<tr>
<td>7</td>
<td>HS 2</td>
<td>20</td>
<td>HS 1</td>
<td>33</td>
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</tr>
<tr>
<td>8</td>
<td>HS 2</td>
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<td>not used</td>
<td>34</td>
<td>not used</td>
</tr>
<tr>
<td>9</td>
<td>HS 2</td>
<td>22</td>
<td>CAN-L</td>
<td>35</td>
<td>GND</td>
</tr>
<tr>
<td>10</td>
<td>GND</td>
<td>23</td>
<td>JUMP BATT</td>
<td>36</td>
<td>P LATCH 1</td>
</tr>
<tr>
<td>11</td>
<td>GND</td>
<td>24</td>
<td>VBATT</td>
<td>37</td>
<td>CAN-H</td>
</tr>
<tr>
<td>12</td>
<td>GND</td>
<td>25</td>
<td>not used</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>GND</td>
<td>26</td>
<td>GND</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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For further information, please contact:

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April 2016
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IGNITION COILS
Description
A compact high energy cost effective double ended ignition coil for inductive ignition systems to be used with std. ignition modules.
Particularly suitable for four cylinder engines with “wasted spark” arrangement.

Main Features
- Simple ignition system design mainly on 4 cylinder engines

Benefits
- Low cost

Typical Applications
Atmospheric and blown engines
F3 - IRL – GT - Rally
## Technical Characteristics

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal supply voltage</td>
<td>12 V</td>
</tr>
<tr>
<td>Charge current</td>
<td>6 A</td>
</tr>
<tr>
<td>Dwell</td>
<td>&lt; 3.5 ms</td>
</tr>
<tr>
<td>Rise time</td>
<td>&lt; 19 μs</td>
</tr>
<tr>
<td>Sec. Voltage (under 1 MΩ)</td>
<td>&gt; 25 kV</td>
</tr>
<tr>
<td>Spark duration</td>
<td>2.1 ms</td>
</tr>
<tr>
<td>Combustion energy</td>
<td>60 mJ</td>
</tr>
<tr>
<td>Connector type</td>
<td>Minitimer 3 ways</td>
</tr>
<tr>
<td>Weight</td>
<td>403 g</td>
</tr>
</tbody>
</table>

## Dimensions

Dimensions in millimetres

![Dimensions Diagram](image.jpg)

For further information, please contact:

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http://www.magnetimarelli.com
Description
A high power inductive ignition coil with subcompact dimensions particularly suitable for static ignition of multi-cylinder engines.

The small dimensions allow direct mounting in the cylinder head thus eliminating the need for H.V. leads.

Contact the factory for the design of different plug positions and suitable ignition drivers.

Main Features
- Modular design
- Different plug position possible
- Different plug diameters possible
- Possibility to choice all combination between coil head and rubber part

Benefits
- Small dimensions
- Low weight
- Low cost

Typical Applications
Atmospheric and blown engines
F3 - IRL – GT - Rally

Typical Performance
**IGNITION COILS**

**BAE403 RI**
Inductive ignition racing coil

---

**Technical Characteristics**

- **Nominal supply voltage**: 13.5 V
- **Charge current**: 9 A
- **Dwell**: 1.4 ms
- **Rise time**: < 7.5 μs
- **Sec. Voltage (1 MΩ +20 pF load)**: 30 kV
- **Spark duration**: 450 μs
- **Spark current**: 120 mA
- **Combustion energy**: 54 mJ
- **Weight**: 180 g

---

**Dimensions**

Dimensions in millimetres

---

**Application Schematics**

---

For further information, please contact:

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Jan 2016
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Specifications are subject to change without prior notice
Description
A high power inductive ignition coil with sub compact dimensions particularly suitable for static ignition of multi-cylinder engines.

The small dimensions allow direct mounting in the cylinder head thus eliminating the need for H.V. leads.

Contact the factory for the design of different plug positions and suitable ignition drivers.

Main Features
- Modular design
- Different plug position possible
- Different plug diameters possible
- Possibility to choose all combination between coil head and rubber part

Benefits
- Small dimensions
- Low weight
- Low cost

Typical Applications
Atmospheric and blown engines
F3 - IRL – GT - Rally
Technical Characteristics

Nominal supply voltage ........................................ 6-16 V
Charge current ...................................................... 7.3 A
Dwell ................................................................. 2.6 - 3.2 ms
Rise time (2 – 15kV on 1 MΩ +25 pF load ) ......... ≤ 15 μs
Sec. Voltage (1 MΩ +25 pF load) ......................... 27 kV
Spark duration (Vzener = 800V) ......................... ≥ 2 ms
Spark current ...................................................... 60 - 120 mA
Combustion energy ............................................ ≥ 70 mJ
Weight ............................................................... 240 g

Dimensions

Dimensions in millimetres

Application Schematics

For further information, please contact:

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Jan 2016
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page 2 of 2

Specifications are subject to change without prior notice
Description

A high power inductive ignition coil with sub compact dimensions particularity suitable for multi-cylinder engines.

The small dimensions allow direct mounting in the cylinder head thus eliminating the need for H.V. leads.

The cigar shape with small diameter gives more freedom to the design of cylinder head on custom engines.

Modular design allows the user to adjust the length for his application or this can be done at the factory prior to dispatch.

Contact the factory for the design of different plug positions and suitable ignition drivers.

Main Features

- High spark current
- Modular design
- Different plug position possible
- Different plug diameters possible

Benefits

- High performance
- Wide application range
- Small dimensions
- Low weight
- Low cost
- Same technology as F1 coils

Typical Applications

Atmospheric and mild blown engines
MotoGP - SBK - F3 – CART - IRL - GT

Typical Performance
IGNITION COILS

Ø 19.5-21 A
Inductive cigar coil
13.5 V - 21 A

Dimensions

Technical Characteristics

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal supply voltage</td>
<td>13.5 V</td>
</tr>
<tr>
<td>Charge current</td>
<td>21 A</td>
</tr>
<tr>
<td>Dwell</td>
<td>390 μs</td>
</tr>
<tr>
<td>Rise time</td>
<td>2.3 μs</td>
</tr>
<tr>
<td>Sec. Voltage (1 MΩ load)</td>
<td>29.5 kV</td>
</tr>
<tr>
<td>Spark duration (Zener 1000V)</td>
<td>245 μs</td>
</tr>
<tr>
<td>Combustion energy</td>
<td>24 mJ</td>
</tr>
<tr>
<td>Min. coil length (min. 83 mm working point)</td>
<td>115 mm</td>
</tr>
<tr>
<td>Max. coil length (max. 107.5 mm working point)</td>
<td>140 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>100 g</td>
</tr>
</tbody>
</table>

Application Schematics

For further information, please contact:

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Jan 2016
rel. 9.2
page 2 of 2

Specifications are subject to change without prior notice.
Description

A high power inductive ignition coil with sub compact dimensions particularly suitable for multi-cylinder engines.

The small dimensions allow direct mounting in the cylinder head thus eliminating the need for H.V. leads.

The cigar shape with small diameter gives more freedom to the design of cylinder head on custom engines.

Modular design allows the user to adjust the length for his application or this can be done at the factory prior to dispatch.

Contact the factory for the design of different plug positions and suitable ignition drivers.

Main Features

- High spark current
- Modular design
- Different plug position possible
- Different plug diameters possible

Benefits

- High performance
- Wide application range
- Small dimensions
- Low weight
- Low cost
- Same technology as F1 coils

Typical Applications

Atmospheric and mild blown engines

MotoGP - SBK - F3 – CART - IRL - GT
IGNITION COILS

C35 000
Inductive Cigar Coil Ø 20
13.5 V - 22 A

Dimensions

Dimensions in millimetres

Technical Characteristics

- Nominal supply voltage .................. 13.5 V
- Charge current .................................. 22 A
- Dwell .............................................. 575 μs
- Rise time ........................................... 2 μs
- Sec. Voltage (0.5 MΩ) .................... 31 kV
- Spark duration (Zener 1000V) .......... 285 μs
- Combustion energy ............................ 31 mJ
- Min. coil length (min. 83 mm working point) .... 115 mm
- Max. coil length (max. 107.5 mm working point) .. 140 mm
- Weight ........................................... 105 g

Application Schematics

For further information, please contact:

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Specifications are subject to change without prior notice
Technical Characteristics

Nominal supply voltage ................................ ...... 13.5 V
Charge current ................................ ...................... 22 A
Dwell ................................ ................................ ... 575 μs
Rise time ................................ ............................. ...
Sec. Voltage (0.5 MΩ) ................................ ...........31 kV
Spark duration (Zener 1000V) ............................. 285 μs
Combustion energy ................................ ...............31 mJ
Min. coil length (min. 83 mm working point) .......... 115 mm
Max. coil length (max. 107.5 mm working point) .. 140 mm
Weight ................................ ................................ . 105 g

Application Schematics

BATTERY
SPARK
PLUG
IGNITION COIL
ENGINE CONTROL UNIT

INJECTORS
Description

The IWP “Pico” top feed injector is a standard production component, tested and selected for racing applications.

The characteristics of the injector are a fast pulse response, high precision, high dynamic range and optimum fuel atomization. These are achieved by a high performance ON-OFF actuating electromagnet with opposing expansion poles that moves an internal injector valve on high-precision ground cylindrical slides, and a high precision nozzle.

The injector has a stainless steel body, a fuel-resistant plastic connector, martensitic stainless steel internal valve and an electromagnet with a low carbon content stainless steel armature.

The electrical connection to the control unit is via a Mini-Timer plastic plug.

Main Features

- Pressure range .................. 0.3 to 0.5 MPa
- Static flow range ............... 0.33 to 0.51 L/min
- Driver current .................... 0.8 A
- Spray shape ...................... single spray or cone spray

Benefits

- Methanol
- Multihole spray shaping
- On off driven
- High precision
- Small dimension & weight

Typical Applications

In professional circuit and rally applications
Touring car
INJECTORS

IWP
Pico Top Feed Racing Injector
Up to 0.5 MPa - Up to 0.51 L/min

Technical Characteristics

<table>
<thead>
<tr>
<th>Specification</th>
<th>Range/Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure range</td>
<td>0.3 to 0.5 MPa</td>
</tr>
<tr>
<td>Static flow range</td>
<td>0.33 to 0.51 L/min</td>
</tr>
<tr>
<td>Driver current</td>
<td>0.8 A</td>
</tr>
<tr>
<td>Spray type</td>
<td>multihole</td>
</tr>
<tr>
<td>Spray shape</td>
<td>single spray or cone spray</td>
</tr>
<tr>
<td>Power supply</td>
<td>8 to 16 V</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>-30 to 110 °C</td>
</tr>
<tr>
<td>Connector type</td>
<td>AMP Junior 2 ways minitimer</td>
</tr>
<tr>
<td>Weight</td>
<td>35 g</td>
</tr>
</tbody>
</table>

Dimensions

Dimensions in millimetres

IWP Family

<table>
<thead>
<tr>
<th>Injector</th>
<th>IWP043</th>
<th>IWP069</th>
<th>IWP189</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal pressure</td>
<td>500</td>
<td>300</td>
<td>300 kPa</td>
</tr>
<tr>
<td>Static flow rate</td>
<td>421.1</td>
<td>482.5</td>
<td>510.5 cm³/min</td>
</tr>
<tr>
<td>Spray shape</td>
<td>Single spray</td>
<td>Single spray</td>
<td>Cone spray</td>
</tr>
</tbody>
</table>

Application Schematics

For further information, please contact:

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Specifications are subject to change without prior notice
Description

IWPR injector has been developed to meet the market requirements for a cheap and reliable injector for medium & low level race injection systems.

It is available in the basic configuration, customized in spray shape and in fuel flow and selected in narrow precision classes.

Main Features

- Delivery pressure range 0.3 to 1(\(^\ast\)) MPa
- Static flow range 0.15 to 1.0 L/min
- Driver current 0.8 A

(\(^\ast\)) > 0.8 MPa with supply voltage > 8 V

Benefits

- Multi-hole spray shaping
- Under request, custom spray configuration can be studied
- On/Off driven
- High precision
- Can be used also with methanol
- Small dimension & weight

Typical Applications

In circuit and rallies medium & low level application
Race motorcycle application

Typical Performance

![Typical Performance Graph]

Dynamic flow vs pulse width @ 100 Hz
Technical Characteristics

Delivery pressure range ................. 0.3 to 1(*) MPa
Static flow range ......................... 0.15 to 1.0 L/min
Driver current .................................. 0.8 A
Single Jet bent angle....................... 0° to 15°
Power supply ............................... 8 to 16 V
Operating temperature range .......... -20 to 120 °C
Connector type ............ AMP Junior 2 ways minitimer
Weight ........................................ 35 g

(*) > 0.8 MPa with supply voltage > 8 V

Dimensions

Dimensions in millimetres

IWPR Family

<table>
<thead>
<tr>
<th>Injector</th>
<th>IWPR1</th>
<th>IWPR2</th>
<th>IWPR3</th>
<th>IWPR4</th>
<th>IWPR6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal pressure</td>
<td>1000</td>
<td>1000</td>
<td>1000</td>
<td>1000</td>
<td>1000</td>
</tr>
<tr>
<td>Static flow rate</td>
<td>690</td>
<td>935</td>
<td>740</td>
<td>1005</td>
<td>1160</td>
</tr>
<tr>
<td>Spray shape</td>
<td>Single spray</td>
<td>Single spray</td>
<td>Single spray</td>
<td>Twin jet</td>
<td>Single spray</td>
</tr>
</tbody>
</table>

Note: flow rate in n-heptane

For further information, please contact:

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INJECTORS

GPI
Grand Prix Fuel Injector
Up to 1.5 MPa - Up to 2.2 L/min
Multihole technology

Description
GPI injector has been developed to meet the market requirements for a cost effective injector for high performance racing injection systems.

Incorporating Formula 1 technology, it is available in basic configuration or customized in spray shape and flow rate and will be selected in narrow precision classes.

Main Features
- Delivery pressure range 0.3 to 1.5 MPa
- Static flow range 0.15 to 2.2 L/min
- Spray pattern multihole
- Driver On/Off or Peak & Hold

Benefits
- Multihole spray shaping
- Custom spray configurations can be developed on request
- On/Off or Peak & Hold driven
- High precision
- Suitable for use with Methanol
- Small dimension & weight

Typical Applications
IRL
In circuit and rallies application
Race motorcycle application

Typical Performance

Dynamic flow vs pulse width

![Graph showing dynamic flow vs pulse width for different pressures.](image)

- 5 bar
- 8 bar
- 10 bar

0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0
Pulse width [ms]

0 50 100 150 200 250 300 350 400 450 500
Dynamic flow [cc/min @ 100 Hz]
INJECTORS

GPI
Grand Prix Fuel Injector
Up to 1.5 MPa - Up to 2.2 L/min
Multihole technology

Technical Characteristics

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delivery pressure range</td>
<td>0.3 to 1.5 MPa</td>
</tr>
<tr>
<td>Static flow range</td>
<td>0.15 to 2.2 L/min</td>
</tr>
<tr>
<td>Driver current</td>
<td>&lt; 3 A</td>
</tr>
<tr>
<td>Spray angle</td>
<td>up to 75°</td>
</tr>
<tr>
<td>Power supply</td>
<td>8 to 16 V</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>-20 to 120 °C</td>
</tr>
<tr>
<td>Connector type</td>
<td>cable 2 x 0.3 mm²/37</td>
</tr>
<tr>
<td>Weight</td>
<td>38 g</td>
</tr>
</tbody>
</table>

Note: on request possibility to arrive up to 3 MPa

Application Schematics

Dimensions

Dimensions in millimetres

GPI Family

For more information regarding the spray angle, please contact us.

<table>
<thead>
<tr>
<th>Injector</th>
<th>GPI 001</th>
<th>GPI 002</th>
<th>GPI 003</th>
<th>GPI 004</th>
<th>GPI 011</th>
<th>GPI 017</th>
<th>GPI 018</th>
<th>GPI 019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal pressure</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0.3</td>
<td>0.5</td>
<td>MPa</td>
</tr>
<tr>
<td>Static flow rate</td>
<td>1155</td>
<td>740</td>
<td>1158</td>
<td>1053</td>
<td>1061</td>
<td>719</td>
<td>149</td>
<td>60 cm³/min</td>
</tr>
<tr>
<td>Spray shape</td>
<td>Circular cone</td>
<td>Circular cone</td>
<td>Circular cone</td>
<td>Twin jet</td>
<td>Circular cone</td>
<td>Twin jet</td>
<td>Cone</td>
<td>Cone</td>
</tr>
</tbody>
</table>
PRESSURE REGULATORS
Description

The RPM series is a family of constant fuel regulating devices for fuel-rail co-axial mounting.

The regulator comprises a sealing valve joined to an elastic membrane which by means of a compression spring compensates the pressure inside the regulator, adjusting the fuel flow.

The body and the cover are made of stainless steel, as are all internal parts in contact with fuel, the membrane is fabric-reinforced vulcanized-rubber.

A version is available that is compatible with methanol fuels.

Main Features

- Fast response
- Very good precision
- Good integration
- Can be installed on the engine or in the tank

Benefits

- Little dimensions
- Low weight
- Cost effective solution

Typical Applications

In circuit and rallies medium level
SBK & motorcycles race
PRESSURE REGULATORS

RPM 58-74
Fuel pressure regulator
350 to 500 kPa - 5 to 300 L/h

Dimensions

Technical Characteristics

Set up pressure range.......................... 350 to 500 kPa
Flow range ........................................ 5 to 300 L/h
Adjustment slope (20 L/h to 170 L/h) ........... < 0.2 kPa/(L/h)
Max. vibration (peak)............................. < 30 g
Temperature range.............................. -10 to 110 °C
Fuel filter mesh dimension...................... 100 μm
Fuel.................................................. commercial and F1
Weight............................................... 37 g

RPM Family

<table>
<thead>
<tr>
<th>Fuel pressure regulator</th>
<th>RPM58</th>
<th>RPM74</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal pressure</td>
<td>350</td>
<td>500</td>
</tr>
<tr>
<td>Flow rate</td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>Methanol resistant</td>
<td>no</td>
<td>yes</td>
</tr>
</tbody>
</table>

Application Schematics

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Specifications are subject to change without prior notice
Description
GPR fuel pressure regulator has been developed to meet the market requirements for a cost effective regulator for high performance racing injection systems.
It combines good precision, high flow handling capability, little dimension and fast response.
The GPR design can be installed on the engine or in the tank assembly.
The regulator can be used also with supercharged engines.

Main Features
- Fast response
- High precision
- Good integration
- Can be installed on the engine or in the tank

Benefits
- Small dimensions
- Low weight
- Cost effective solution

Typical Applications
IRL
In circuit and rallies application
Race motorcycle application

Typical Performance

![Flow Rate on by-pass (l/h)]

![Pressure (% on nominal)]

REGULATION CURVE
PRESSURE REGULATORS

GPR
High performance for racing injection systems
0.5 to 3 MPa - 25 to 600 L/h

Dimensions

Technical Characteristics

Set up pressure range.................................0.5 to 3 MPa
Flow range .............................................25 to 600 L/h
Regulation slope......................................< 0.01 %/(L/h)
Max. vibration (peak)..............................60 g
Temperature range.................................-10 to 110 °C
Fuel....................................................commercial, methanol and F1
Weight....................................................< 60 g

Application Schematics

GPR Family

<table>
<thead>
<tr>
<th>Fuel pressure regulator</th>
<th>GPR001.1</th>
<th>GPR002.1</th>
<th>GPR003.1</th>
<th>GPR004.1</th>
<th>GPR005</th>
<th>GPR006.1</th>
<th>GPR008</th>
<th>GPR009</th>
<th>GPR010</th>
<th>GPRT01</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal pressure</td>
<td>500</td>
<td>1000</td>
<td>2000</td>
<td>3000</td>
<td>800</td>
<td>3000</td>
<td>1500</td>
<td>600</td>
<td>1000</td>
<td>600</td>
</tr>
<tr>
<td>@ Flow rate</td>
<td>250</td>
<td>60</td>
<td>60</td>
<td>250</td>
<td>250</td>
<td>60</td>
<td>60</td>
<td>250</td>
<td>105</td>
<td>200</td>
</tr>
</tbody>
</table>

For further information, please contact:

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FUEL PUMPS
**Description**

A compact gear fuel pump coupled with a rugged dc motor allows reliable operation with limited current absorption.

The installation must be done inside the fuel tank.

**Main Features**

- Suitable to be PWM controlled

**Benefits**

- Low weight
- Total efficiency about 60%

**Typical Applications**

MotoGP - SBK
MGP01
Electrical fuel pump
110 L/h @ 1 MPa

Dimensions

Dimensions in millimetres

Technical Characteristics

Supply Voltage ...................................................... 13.5 V
Flow rate
   @ 1 MPa ...................................................... 110 L/h
   @ 0.5 MPa ...................................................... 118 L/h
Consumption
   @ 1 MPa ...................................................... 4.3 A
   @ 0.5 MPa ...................................................... 2.7 A
Weight .................................................................... 526 g

Other Information

Joined with the MVRM 01 motorcycle voltage regulator the pump can be PWM controlled in order to achieve the fuel flow requirement. Reducing the duty cycle the electrical power consumption and the heat release to fuel can be reduced.

A closed loop control on the fuel pressure can be perform with the MVRM 01 voltage regulator as well.

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Specifications are subject to change without prior notice
Description
A compact lightweight low pressure fuel pump for catchtank filling.
A rugged dc motor allows reliable operation with limited current absorption.

Main Features
- The pump has a NRV valve to prevent catchtank emptying
- Special design and surface treatment of moving parts allow reliable operation also with partially empty tank
- A sock filter (MM part no. 83811099200) must be applied to the inlet port

Benefits
- Self priming
- Fuel delivery capability up to 120 L/h @ 50 kPa
- Customizable inlet and outlet ports
- Dry operation possible without damage

Typical Applications
Race motorcycle application

Typical Performance @ 13.5 V

(Test fluid Metryl 421)
FLP 004
Fuel lift pump
120 L/h @ 50 kPa

Dimensions

Dimensions in millimetres

Technical Characteristics

Fuel delivery 13.5 V (@ 50 kPa)............................. 120 L/h
Nominal supply voltage ......................................... 13.5 V
Current consumption 13.5 V (@ 50 kPa) ................. 0.8 A
Weight.................................................................... 170 g

Application Schematics
PB3000
Brushless fuel lift pump
270 L/h @ 50 kPa

Description
A compact lightweight low pressure fuel pump for catchtank filling.
Incorporates a rugged brushless motor with integrated controller for reliable operation with limited current absorption and long service life.

Main Features
- Brushless motor ensures extended operating life, even with aggressive fuel components
- Integrated motor controller allows pump delivery control via CAN messages, PWM signal or voltage level
- Non-return valve prevents catchtank emptying
- Special design and surface treatment of moving parts allows reliable operation also with partially empty tank
- Status monitoring via CAN detects dry running
- A sock filter (MM part no. 83811099200) must be applied to the inlet port

Benefits
- Extended service life
- Fuel delivery control
- Self priming
- Fuel delivery capability up to 270 L/h @ 50 kPa
- Customizable inlet and outlet ports (on request)
- Dry operation possible without damage

Typical Applications
F1, Sports car, Touring car, MotoGP Bikes
Pressurised fuel cells in general

Typical Performance at 13.5 V

Tested at 13.5 V, 8500 rpm
Test fluid: Metryl 421
PB3000
Brushless fuel lift pump
270 L/h @ 50 kPa

Technical Characteristics

- Fuel delivery (8500 rpm, 50 kPa) .................. 270 L/h
- Nominal supply voltage .......................... 13.5 V
- Current consumption (13.5 V, 8500 rpm, 50 kPa) .... 2.4 A
- Weight ................................................. 260 g
- CAN communication line (@ 1 Mbit/s) ................. 1
- PWM input (@ 100 Hz) ................................. 1

Connector Pin Out

<table>
<thead>
<tr>
<th>Description</th>
<th>N° Pin</th>
<th>Colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ V Batt</td>
<td>1</td>
<td>Red</td>
</tr>
<tr>
<td>CAN H</td>
<td>2</td>
<td>Yellow</td>
</tr>
<tr>
<td>CAN L</td>
<td>3</td>
<td>Blue</td>
</tr>
<tr>
<td>Control input (0-Vbatt)</td>
<td>4</td>
<td>White</td>
</tr>
<tr>
<td>- V Batt</td>
<td>5</td>
<td>Black</td>
</tr>
</tbody>
</table>

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Specifications are subject to change without prior notice
Description
A compact single piston, cam driven fuel pump equipped with an electronic regulating valve which allows flow rate and pressure control.

Main Features
- Fuel pressure up to 20 MPa
- Flow control with electromagnetic actuator on inlet valve
- Plunger seal (7 mm³ / min)
- Two fixation points
- Plunger diameter φ10 mm
- Up to four lobes driving cam
- Up to 14000 piston stroke per minute
- Peak & Hold or On/Off driver for flow control

Benefits
- Volumetric efficiency about 90%
- Suitable for flex fuel applications (Ethanol)
- World wide fuel compatible (full stainless steel)
- Integrated relief valve, pressure balanced
- Outlet check valve
- Integrated variable feed pressure damper
- Compact dimensions and lightweight

Typical Applications
In circuit and rallies application

Typical Performance

Test conditions:
- Fluid: Exsos D40
- Fluid temperature: 23 °C
- Feed pressure: 5 bar
- Ambient temperature: 23 °C

Pump configuration:
- N° lobes: 3
- Stroke: 5mm
PHP 2XX
Racing GDI pump
190 L/h @ 20 MPa

Dimensions

Dimensions in millimetres

Technical Characteristics

Inlet valve characteristics:
- Supply Voltage: 12 V
- Resistance: 1.2 Ω
- Inductance: 1.55 mH
- Electrical Connector MLK (optional Kompact, USCAR, Sumitomo, etc.)

Flow rate
- @ 20 MPa: 190 L/h

Weight (Approx.): 600 g

Application Schematics

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Description
A compact lightweight low pressure fuel pump for catchtank filling.
A rugged dc motor allows reliable operation with limited current absorption.

Main Features
- The pump has a NRV valve to prevent catchtank emptying
- Special design and surface treatment of moving parts allow reliable operation also with partially empty tank
- A sock filter (MM part no. 83811099200) must be applied to the inlet port

Benefits
- Self priming
- Fuel delivery capability up to 280 L/h @ 150 kPa
- Customizable inlet and outlet ports
- Dry operation possible without damage

Typical Applications
F1 application

Typical Performance @ 13.6 V
(Test fluid Metryl 421)
**PUMPS**

**PS 4100**

Fuel lift pump

280 L/h @ 150 kPa

**Dimensions**

![Diagram of PS 4100](image)

**Technical Characteristics**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel delivery 13.6 V (@ 150 kPa)</td>
<td>280 L/h</td>
</tr>
<tr>
<td>Nominal supply voltage</td>
<td>13.6 V</td>
</tr>
<tr>
<td>Current consumption 13.6 V (@ 150 kPa)</td>
<td>4.2 A</td>
</tr>
<tr>
<td>Weight</td>
<td>185 g</td>
</tr>
</tbody>
</table>

**Application Schematics**

![Application Schematics](image)

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April 2016
rel. 08

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GEAR & CLUTCH CONTROL
Description

The EGA is an electric push/pull actuator to be coupled with a ratchet of a sequential gearbox in order to replace the normal input lever. This is provided with an elastic element that prevent actuator damage and allows to store energy during the first movement so to be released during gearshift. Controlled by GCC 110 electronic unit, the EGA performs quick up-shift and down-shift and can also make an "half-shift" to find neutral position if required.

The EGA is available with connector wire in-line or rotated by 90° (L version).

Main Features

- Compact
- High push/pull force
- Very reliable
- Shaft position sensor integrated

Benefits

- Keep always hands on steering wheel
- Quick shift
- Simple lay-out
- Easy to install

Typical Applications

- Formula car
- Touring car
- GT car
- Rally car

Typical Performance

- Gearshift allowed in 100 ms
- Barrel movement in 40 ms
ELECTRIC ACTUATORS

EGA 2.0
Electric Gearshift Actuator

Dimensions

Dimensions in millimetres

Technical Characteristics

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stroke</td>
<td>±18 mm</td>
</tr>
<tr>
<td>Force</td>
<td>min. 750 N</td>
</tr>
<tr>
<td>Current draw</td>
<td>max peak 70 A</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>max 100 °C</td>
</tr>
<tr>
<td>Supply Voltage</td>
<td>12-14 Vdc</td>
</tr>
<tr>
<td>Weight</td>
<td>3 Kg</td>
</tr>
</tbody>
</table>

Application schematics

For further information, please contact:

Magneti Marelli S.p.A.
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Viale Aldo Borletti, 61/63
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sales@magnetimarelli.com
http://www.magnetimarelli.com

Specifications are subject to change without prior notice
Description

The EGA is an electric push/pull actuator to be coupled with a ratchet of a sequential gearbox in order to replace the normal input lever. This is provided with an elastic element that prevent actuator damage and allows to store energy during the first movement so to be released during gearshift. Controlled by GCC 110 electronic unit, the EGA performs quick up-shift and down-shift and can also make an "half-shift" to find neutral position if required.

The EGA is available with connector wire in-line or rotated by 90° (L version).

Main Features

- Compact
- High push/pull force
- Very reliable
- Shaft position sensor integrated

Benefits

- Keep always hands on steering wheel
- Quick shift
- Simple lay-out
- Easy to install

Typical Applications

- Formula car
- Touring car
- GT car
- Rally car

Typical Performance

- Gearshift allowed in 100 ms
- Barrel movement in 40 ms
ELECTRIC ACTUATORS

EGA 2.0.1 L
Electric Gearshift Actuator

Dimensions

Dimensions in millimetres

Technical Characteristics

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stroke</td>
<td>±18 mm</td>
</tr>
<tr>
<td>Force</td>
<td>min. 750 N</td>
</tr>
<tr>
<td>Current draw</td>
<td>max peak 70 A</td>
</tr>
<tr>
<td>Operating temp</td>
<td>max 100 °C</td>
</tr>
<tr>
<td>Supply Voltage</td>
<td>12-14 VDC</td>
</tr>
<tr>
<td>Weight</td>
<td>3 Kg</td>
</tr>
</tbody>
</table>

Application schematics

For further information, please contact:

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Specifications are subject to change without prior notice
**Description**

The ECA 2.0 is an electric master cylinder actuator to be coupled with standard hydraulic slave cylinder in place of the pedal master cylinder. This can work with clutches with a max spring load of 4000N. Controlled by GCC 110 electronic unit, the ECA 2.0 could be operated by means of either paddles on steering wheel or automatically if required.

**Main Features**

- Compact
- Can operate with high clutch spring load
- Very reliable
- Internal piston position sensor integrated

**Benefits**

- No more clutch pedal necessity
- Quick response for fast shift
- Simple lay-out
- Easy to install

**Typical Applications**

- Formula car
- Touring car
- GT car
- Rally car

**Typical Performance**

- Complete clutch open in 100 ms
- Gearshift allowed in 80 ms
ELECTRIC ACTUATORS

ECA 2.0
Electric Clutch Actuator

Dimensions in millimetres

### Technical Characteristics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal master cylinder stroke</td>
<td>7.5 mm</td>
</tr>
<tr>
<td>Internal master cylinder diameter</td>
<td>Φ 19 mm</td>
</tr>
<tr>
<td>Max pressure</td>
<td>5200 KPa</td>
</tr>
<tr>
<td>Current draw</td>
<td>peak 50 A</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>max 100 °C</td>
</tr>
<tr>
<td>Supply Voltage</td>
<td>12-14 VDC</td>
</tr>
<tr>
<td>Weight</td>
<td>3.15 Kg</td>
</tr>
</tbody>
</table>

### Application Schematics

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Specifications are subject to change without prior notice
**Description**

The ESA is an electric push/pull actuator to be coupled with a ratchet of a sequential gearbox in order to replace the normal input lever. Controlled by GCC 110 electronic unit, the EGA performs quick up-shift and down-shift and can also make an "half-shift" to find neutral position if required.

**Main Features**

- Compact
- High push/pull force
- Shaft position sensor integrated

**Benefits**

- Keep always hands on steering wheel
- Quick shift
- Simple lay-out
- Easy to install

**Typical Applications**

- Formula car
- Touring car
- GT car
- Rally car

**Typical Performance**

- Barrel movement in ~35 ms
- Next gearshift allowed in ~100 ms
ELECTRIC ACTUATORS

ESA
Electric Shaft Actuator

Dimensions

![Dimensions Diagram]

Dimensions in millimetres

Technical Characteristics

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stroke</td>
<td>±18 mm</td>
</tr>
<tr>
<td>Force</td>
<td>~800 N</td>
</tr>
<tr>
<td>Current draw</td>
<td>max peak 70 A</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>max 100 °C</td>
</tr>
<tr>
<td>Supply Voltage</td>
<td>12-14 Vdc</td>
</tr>
<tr>
<td>Weight</td>
<td>1.4 Kg</td>
</tr>
</tbody>
</table>

Application schematics

![Application Schematics]

For further information, please contact:

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Specifications are subject to change without prior notice
Description

GCC-110 is a power unit module that can be used as an input/output expansion of the engine control unit to drive Electric Actuators with high current peak needs.

The logic core of the GCC-110 comprises a high performance PowerPC microcontroller able to drive the actuators with its advanced gear and clutch strategy.

The unit can be setup in Master mode (gear and clutch strategy inside the unit) or in Slave mode (gear and clutch strategy from the ECU through CAN line).

Main Features

- 3 Single-ended
- 1 High current H-Bridge for actuator
- 2 Digital input
- 1 CAN communication bus

Benefits

- Power unit can be dislocated from main actuator
- Accurate actuator control by means of high computation power
- Very compact design and easy to install

Typical Applications

- Formula car
- Touring car
- GT car
- Rally car
### Technical Characteristics

**Inputs**
- Analogue Single-ended: 3
- On-Off digital: 2
- NTC internal temperature sensor: 2
- "Code Load" enable pin: 1

**Outputs**
- H-Bridge: 1
- Vref: 1

**Communications**
- CAN line (1 Mbit/s (*)): 1
- Configurable on request

**Logic Core**
- Microcontroller (32bit PowerPC CPU @ 132 MHz): 1
- Flash E2PROM (microcontroller): 1.5 Mbyte
- RAM memory (microcontroller): 64 Kbyte

**Other Characteristics**
- Power supply: 8 to 18 V
- Operating temperature range (internal): -20 to 85 °C
- Protection class: IP 64
- Connectors: 7-1390476-6 (80 ways)
- Dimensions with connectors: 180 x 96 x 41 mm
- Weight (approx.): 450 g

### Dimensions

**Dimensions in millimetres**

**Application Schematics**

- **ELECTRIC ACTUATOR**
- **GEAR AND CLUTCH**
- **ELECTRONIC CONTROL UNIT**
- **PADDLES ON STEERING WHEEL**
- **GEARBOX**
- **ELECTRIC ACTUATOR**

---

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Specifications are subject to change without prior notice
SENSORS
OLRx User
Optical Lap trigger Receiver
(Connector Included)

**Description**

The OLRx User is an infra-red optical beacon receiver used in combination with the OLTx IR binary coded sequence transmitters.

The OLRx User triggers a 5 V pulse only when the received matching team-code is recognised.

This IR beacon receiver is compatible with most of the Magneti Marelli data loggers, dashboards and ECUs, for which the end-of-lap reference is of the outmost importance.

An indicator LED on the back end of the receiver lights and flashing during normal operation.

**Main Features**

- IR optical receiver
- Received team-code recognition
- LED for easy check-up and installation

**Benefits**

- Compatible with Magneti Marelli data loggers, dashboard and ECUs
- Compact, robust design
- CAN interface for code transmission
- Sector time detected

**Typical Applications**

MotoGP
Professional circuit and rally applications
Race motorcycle application
Touring car
OLRx User
Optical Lap trigger Receiver
(Connector Included)

Dimensions

Dimensions in millimetres

Technical Characteristics

Range ............................................................... 1 to 25 m
Detection angle ............................................ see Fig. 1
Code detect time ................................................ 5 ms
Output
  sleep mode .................................................... 0 V
  trigger ......................................................... 5 V
  duration .................................................... 5 to 1275 ms
Blue LED .............................................. code detection indicator
Power supply (V DC) ................................... 10 to 15 V
Current @ 13.2 V ............................................. 75 mA
Protection ................................................ polarity inversion
Ambient operating temperature ...................... -20 to 85 °C
Container ........................................ black anodised aluminium
Connector (on request) ...................... LEMO PHG0B305 5 pole
Cable length ................................................ 300 mm
Dimensions (approx.) (see drawing) .......... 34 x 34 x 22 mm
Weight (approx.) ........................................ 38 g

Detection angle

Fig. 1 - Horizontal Directivity

Cable Pin Out

<table>
<thead>
<tr>
<th>Pin</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin 1</td>
<td>V Bat</td>
<td>Power supply</td>
</tr>
<tr>
<td>Pin 2</td>
<td>CAN H</td>
<td>Reserved MM</td>
</tr>
<tr>
<td>Pin 3</td>
<td>CAN L</td>
<td>Reserved MM</td>
</tr>
<tr>
<td>Pin 4</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>Pin 5</td>
<td>OUT</td>
<td>Signal</td>
</tr>
</tbody>
</table>

Spectral Sensitivity

Figure 11: Relative Spectral Sensitivity vs. Wavelength

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Specifications are subject to change without prior notice
Description
The OLRx User is an infra-red optical beacon receiver used in combination with the OLTx IR binary coded sequence transmitters.

The OLRx User triggers a 5 V pulse only when the received matching team-code is recognised.

This IR beacon receiver is compatible with most of the Magneti Marelli data loggers, dashboards and ECUs, for which the end-of-lap reference is of the utmost importance.

An indicator LED on the back end of the receiver lights and flashing during normal operation.

Main Features
- IR optical receiver
- Received team-code recognition
- LED for easy check-up and installation

Benefits
- Compatible with Magneti Marelli data loggers, dashboard and ECUs
- Compact, robust design
- CAN interface for code transmission
- Sector time detected

Typical Applications
MotoGP
Professional circuit and rally applications
Race motorcycle application
Touring car
OLRx User
Optical Lap trigger Receiver

Dimensions

Dimensions in millimetres

Technical Characteristics

Range ............................................................... 1 to 25 m
Detection angle ............................................ see Fig. 1
Code detect time ........................................................ 5 ms
Output
  sleep mode .......................................................... 0 V
  trigger .................................................................. 5 V
  duration.................................................... 5 to 1275 ms
Blue LED.................................................. code detection indicator
Power supply (V DC)....................................... 10 to 15 V
Current @ 13.2 V ..................................................... 75 mA
Protection .................................................. polarity inversion
Ambient operating temperature ..................... -20 to 85 °C
Container .............................................. black anodised aluminium
Connector (on request).............. LEMO PHG0B305 5 pole
Cable length........................................................... 300 mm
Dimensions (approx.) (see drawing) .......... 34 x 34 x 22 mm
Weight (approx.)....................................................... 30 g

Detection angle

Fig. 1 - Horizontal Directivity

Cable Pin Out

<table>
<thead>
<tr>
<th>Color</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>VBAT</td>
<td>Power supply</td>
</tr>
<tr>
<td>Yellow</td>
<td>CAN-H</td>
<td>Reserved MM</td>
</tr>
<tr>
<td>Green</td>
<td>CAN-L</td>
<td>Reserved MM</td>
</tr>
<tr>
<td>Black</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>Blue</td>
<td>OUT</td>
<td>Signal</td>
</tr>
</tbody>
</table>

Spectral Sensitivity

Figure 11. Relative Spectral Sensitivity vs. Wavelength

For further information, please contact:

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Specifications are subject to change without prior notice
OLTx
Optical Lap trigger transmitter

Description
The OLTx is a 27-LED infra-red optical transmitter unit used in telemetry and data acquisition systems.

The device continuously transmits a coded infra-red signal to trigger the OLRx on-board receiver which provides the data acquisition system with a spatial reference point.

The unit is enclosed in a watertight polycarbonate container.

Connection to an external battery (not supplied) is made via Deutsch IMC100 4 pin.

Main Features
- IR optical transmitter
- Coded binary sequence (team-code) modulator
- Led indicator function

Benefits
- Light, compact, robust design
- CAN code programmable

Typical Applications
MotoGP
Professional circuit and rally applications
Race motorcycle application
Touring car
OLTx
Optical Lap trigger transmitter

**Technical Characteristics**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>1 to 25 m</td>
</tr>
<tr>
<td>Cone angle @ distance x</td>
<td>See Fig.1</td>
</tr>
<tr>
<td>Power supply (V DC)</td>
<td>10 to 15 V</td>
</tr>
<tr>
<td>Current @ 13.2 V</td>
<td>250 mA</td>
</tr>
<tr>
<td>Protection</td>
<td>Polarity inversion</td>
</tr>
<tr>
<td>Ambient operating temperature</td>
<td>-20 to 85 °C</td>
</tr>
<tr>
<td>Battery connector</td>
<td>IMC14-2204X</td>
</tr>
<tr>
<td>Container</td>
<td>Sealed polycarbonate</td>
</tr>
<tr>
<td>Mating connector (on request)</td>
<td>IMC16-2204X</td>
</tr>
<tr>
<td>Cable length</td>
<td>1 m</td>
</tr>
<tr>
<td>Dimensions (approx.)</td>
<td>65 x 50 x 35.5 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>75 g</td>
</tr>
</tbody>
</table>

**Dimensions**

Dimensions in millimetres

**Detection angle**

![Fig. 1 – Relative Radiant Intensity vs Angular Displacement](image)

**Connector Pin Out**

<table>
<thead>
<tr>
<th>Pin</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>VBatt</td>
<td>+12 Volt</td>
</tr>
<tr>
<td>2</td>
<td>CAN H</td>
<td>Reserved MM</td>
</tr>
<tr>
<td>3</td>
<td>CAN L</td>
<td>Reserved MM</td>
</tr>
<tr>
<td>4</td>
<td>GND</td>
<td>Ground</td>
</tr>
</tbody>
</table>

For further information, please contact:

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Specifications are subject to change without prior notice
**PS1 CONNECTOR**

1 MPa pressure sensor

---

**Description**

Gauge amplified pressure sensor.
Particularly suited for use in the harsh automotive environment.
The kit includes a mating part connector.

---

**Main Features**

- Compatible with most fluids in automotive environment
- Fast response time

---

**Benefits**

- Small size
- High output
- High reliability

---

**Typical Applications**

- Oil pressure
- Fuel pressure
## Technical Characteristics

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td>5 V</td>
</tr>
<tr>
<td>Supply current</td>
<td>&lt; 15 mA</td>
</tr>
<tr>
<td>Null offset</td>
<td>0.5 V</td>
</tr>
<tr>
<td>Full scale output (@ Nominal Pressure)</td>
<td>4.5 V</td>
</tr>
<tr>
<td>Nominal pressure</td>
<td>1 MPa</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>-40 to 140 °C</td>
</tr>
<tr>
<td>Response time</td>
<td>&lt; 2 ms</td>
</tr>
<tr>
<td>Accuracy (f.s.o. and Null offset)</td>
<td></td>
</tr>
<tr>
<td>@ -40 °C to 0 °C</td>
<td>max. ± 3 % f.s.o.</td>
</tr>
<tr>
<td>@ 0 °C to 90 °C</td>
<td>max. ± 1.5 % f.s.o.</td>
</tr>
<tr>
<td>@ 90 °C to 125 °C</td>
<td>max. ± 3 % f.s.o.</td>
</tr>
<tr>
<td>Burst Pressure</td>
<td>3 x Nominal Pressure</td>
</tr>
<tr>
<td>Vibrations range tested</td>
<td></td>
</tr>
<tr>
<td>@ 147 Hz to 1000 Hz</td>
<td>30 g</td>
</tr>
<tr>
<td>@ 1000 Hz to 2000 Hz</td>
<td>20 g</td>
</tr>
<tr>
<td>Protection class</td>
<td>IP 67</td>
</tr>
<tr>
<td>Weight (approx.)</td>
<td>47 g</td>
</tr>
</tbody>
</table>

## Dimensions

- Dimensions in millimetres

For further information, please contact:

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Specifications are subject to change without prior notice.
Description

Ratiometric absolute pressure sensor.
Particularly suited for use in the harsh automotive environment.
The kit includes a mating part connector.

Main Features

- Fast response time

Benefits

- Small size
- High output
- High reliability

Typical Applications

Manifold pressure in turbocharged engines
**Technical Characteristics**

- **Supply Voltage**: 5±0,25 V
- **Current consumption**: < = 16 mA
- **Null offset**: 0.5 V
- **Type of output signal**: Ratiometric
- **Full scale output (@ Nominal Pressure)**: 4.5 V
- **Nominal pressure (absolut)**: 2 MPa
- **Operating temperature range**: -40 to 125 °C
- **Response time (10% to 90% span)**: 1.5 ms
- **Total accuracy**
  - @ -40 °C to -20 °C: max. ± 3.0 % f.s.o.
  - @ -20 °C to 0 °C: max. ± 2.0 % f.s.o.
  - @ 0 °C to 90 °C: **max. ± 1.0 % f.s.o.**
  - @ 90 °C to 125 °C: max. ± 2.0 % f.s.o.
- **Burst Pressure**: 3 x Nominal Pressure
- **Vibrations range tested (EN 60068 – 2 -64)**
  - @ 20… Hz to 2000 Hz: 10 g rms
- **Protection class (EN 60529)**: up to IP 69K
- **Weight (approx.)**: 50 g

**Notes:**

- **Installation torque max**: 15 Nm
- **Weight (approx.)**: 50 g
- **Burst Pressure**: 3 x Nominal Pressure
- **Vibrations range tested (EN 60068 – 2 -64)**
  - @ 20… Hz to 2000 Hz: 10 g rms
- **Protection class (EN 60529)**: up to IP 69K
- **Weight (approx.)**: 50 g

For further information, please contact:

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sales@magnetimarelli.com
http://www.magnetimarelli.com
**Description**

Ratiometric absolute pressure sensor. Particularly suited for use in the harsh automotive environment. The kit includes a mating part connector.

**Main Features**

- Fast response time

**Benefits**

- Small size
- High output
- High reliability

**Typical Applications**

Manifold pressure in turbocharged engines
PSA04-083813291400

0,4 MPa pressure sensor

Technical Characteristics

Supply Voltage ........................................ 5±0,25 V
Current consumption ................................ < = 10 mA
Null offset ............................................. 0.5 V
Type of output signal ................. Ratiometric
Full scale output (@ Nominal Pressure) ........ 4.5 V
Nominal pressure (absolut) ....................... 0.4 MPa
Operating temperature range .......... -40 to 125 °C
Response time (10% to 90% span) .......... 1.5 ms
Total accuracy
@ -40 °C to -20 °C ................................ max. ± 3.0 % f.s.o.
@ -19 °C to -1 °C ................................ max. ± 2.0 % f.s.o.
@ 0 °C to 90 °C .................................. **max. ± 1.0 % f.s.o.
@ 91 °C to 125 °C ................................ max. ± 2.0 % f.s.o.
Burst Pressure ....................... 3 x Nominal Pressure
Vibrations range tested (EN 60068 – 2-64)
@ 20… Hz to 2000 Hz ..................... 10 g rms
Protection class (EN 60529) .......... up to IP 69K
Weight (approx.) ...................... 50 g

**Tolerance precision must be considered as initial value.
Tolerance increases at a rate of 1% per annum.

Notes:

Installation torque max ....................... 15 Nm
This value depends from the strength class of the material with which the sensor is coupled.

It is recommended to use a Oring 8,1x1,6 FKM.

Dimensions in millimetres

For further information, please contact:

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Specifications are subject to change without prior notice
PSA05
0,5 MPa pressure sensor
High Accuracy

Description
Ratiometric absolute pressure sensor.
Particularly suited for use in the harsh automotive environment.
The kit includes a mating part connector.

Main Features
- Fast response time

Benefits
- Small size
- High output
- High reliability

Typical Applications
Manifold pressure in turbocharged engines
Technical Characteristics

Supply Voltage ........................................ 5±0,25 V
Current consumption .................................. \( \leq 16 \) mA
Null offset ................................................. 0.5 V
Type of output signal ………………….. Ratiometric
Full scale output (@ Nominal Pressure) ............. 4.5 V
Nominal pressure (absolut ) .................... 0.5 MPa
Operating temperature range ................ -40 to 125 °C
Response time ( 10% to 90% span ).......... 1.5 ms
Total accuracy
@ -40 °C to -20 °C ................................ max. ± 3.0 % f.s.o.
@ -20 °C to 0 °C .................................. max. ± 2.0 % f.s.o.
@ 0 °C to 90 °C .................................. **max. ± 0.5 % f.s.o.
@ 90 °C to 125 °C ................................ max. ± 2.0 % f.s.o.
Burst Pressure ......................... 3 x Nominal Pressure
Vibrations range tested ( EN 60068 – 2 -64)
@ 20… Hz to 2000 Hz ................................ 10 g rms
Protection class (EN 60529 ) ............... up to IP 69K
Weight (approx.) ........................................ 50 g

**Tolerance precision must be considered as initial value.
Tolerance increases at a rate of 1% per annum.

Notes:

Installation torque max ……………………………..15 Nm
This value depends from the strength class of the material with which the sensor is coupled.

It is recommended to use a Oring 8,1x1,6 FKM.
Oring not included.

For further information, please contact:

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http://www.magnetimarelli.com
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Specifications are subject to change without prior notice
**PSA05**

0,5 MPa pressure sensor

---

**Description**

Ratiometric absolute pressure sensor. Particularly suited for use in the harsh automotive environment. The kit includes a mating part connector.

---

**Main Features**

- Fast response time

---

**Benefits**

- Small size
- High output
- High reliability

---

**Typical Applications**

Manifold pressure in turbocharged engines
**PSA05**

0,5 MPa pressure sensor

---

**Technical Characteristics**

Supply Voltage ........................................ 5±0,25 V
Current consumption .................................. <= 16 mA
Null offset .............................................. 0.5 V
Type of output signal .................................. Ratiometric
Full scale output ( @ Nominal Pressure) ........... 4.5 V
Nominal pressure (absolut ) .......................... 0.5 MPa
Operating temperature range ...................... -40 to 125 °C
Response time (10% to 90% span) ................. 1.5 ms
Total accuracy

@ -40 °C to -20 °C .......................... max. ± 3.0 % f.s.o.
@ -20 °C to 0 °C .............................. max. ± 2.0 % f.s.o.
@ 0 °C to 90 °C ................................ **max. ± 1.0 % f.s.o.
@ 90 °C to 125 °C .............................. max. ± 2.0 % f.s.o.
Burst Pressure ...................................... 3 x Nominal Pressure

Vibrations range tested (EN 60068 – 2-64)

@ 20… Hz to 2000 Hz ........................... 10 g rms

Protection class (EN 60529) .................. up to IP 69K

Weight (approx.) ........................................... 50 g

**Tolerance precision must be considered as initial value. Tolerance increases at a rate of 1% per annum.**

---

**Notes:**

Installation torque max .............................. 15 Nm

This value depends from the strenght class of the material with which the sensor is coupled.

It is recommended to use a Oring 8,1x1,6 FKM.

Oring not included.

---

**For further information, please contact:**

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Specifications are subject to change without prior notice
PS25
25 MPa pressure sensor

Description
Gauge amplified pressure sensor.
Particularly suited for use in the harsh automotive environment.
The kit includes a mating part connector.

Main Features
- Compatible with most fluids in automotive environment
- Fast response time

Benefits
- Small size
- High output
- High reliability

Typical Applications
Hydraulic circuit pressure
PS25
25 MPa pressure sensor

Technical Characteristics

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
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<tr>
<td>Power supply</td>
<td>5 V</td>
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<tr>
<td>Supply current</td>
<td>&lt; 15 mA</td>
</tr>
<tr>
<td>Null offset</td>
<td>0.5 V</td>
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<tr>
<td>Full scale output (@ Nominal Pressure)</td>
<td>4.5 V</td>
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<tr>
<td>Nominal pressure</td>
<td>25 MPa</td>
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<tr>
<td>Operating temperature range</td>
<td>-40 to 125 °C</td>
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<tr>
<td>(200 h @ 140°C accumulated over life time)</td>
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</tr>
<tr>
<td>Response time</td>
<td>&lt; 2 ms</td>
</tr>
<tr>
<td>Accuracy (f.s.o. and Null offset)</td>
<td></td>
</tr>
<tr>
<td>@ -40 °C to 0 °C</td>
<td>max. ± 3 % f.s.o.</td>
</tr>
<tr>
<td>@ 25 °C to 90 °C</td>
<td>max. ± 2 % f.s.o.</td>
</tr>
<tr>
<td>@ 90 °C to 125 °C</td>
<td>max. ± 3 % f.s.o.</td>
</tr>
<tr>
<td>Burst Pressure</td>
<td>2 x Nominal Pressure</td>
</tr>
<tr>
<td>Vibrations range tested</td>
<td></td>
</tr>
<tr>
<td>@ 147 Hz to 1000 Hz</td>
<td>20 g</td>
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<td>@ 1000 Hz to 2000 Hz</td>
<td>20 g</td>
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<td>Protection class</td>
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<tr>
<td>Weight (approx.)</td>
<td>45 g</td>
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</table>

Dimensions in millimetres

For further information, please contact:

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Specifications are subject to change without prior notice
Description
The ATS 04 is a low cost analogue temperature sensor with an NTC sensing element.

Main Features
- Sensing element exposed to airflow for fast response time
- Mini-Timer connector

Benefits
- High signal level
- Low cost

Typical Applications
Touring cars intake air temperature

Typical Performance

Characteristic curve
ATS 04
3 kΩ Air Temperature Sensor

**Dimensions**

![Diagram of ATS 04 sensor with dimensions]

**Technical Characteristics**

- **Resistance (@ 25 °C):** 3 kΩ
- **Input voltage:** 5 V
- **Accuracy from nominal values:**
  - @ -40 °C to 125 °C: 5%
- **Connector (2 ways):** Mini-Timer
- **Weight:** 25 g

**Application Schematics**

![Application schematic for ATS 04 sensor]

For further information, please contact:

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Specifications are subject to change without prior notice
Description
A miniature sensor designed for fast response temperature measurement.
Suitable for air, water, oil & fuel temperature measurement.

Main Features
- AISI 303 housing for improved mechanical strength
- Splash resistant to standard motorsport fluids
- Miniature tip
- High strength MFA coated leads

Benefits
- High signal level
- Miniature dimensions
- Low weight

Typical Applications
Racing engines
**NTC M6**
10 kΩ Air-fluid temperature sensor

**Dimensions**

![Dimensions Diagram]

**Technical Characteristics**

- Typical application: Air, oil, water and fuel temp.
- Temperature range: -20 to 200 °C
- Protection class: IP 65
- Cable: n°2 AWG 22
- Weight (with cable): 24 g

**Temperature resistance table**

<table>
<thead>
<tr>
<th>°C</th>
<th>Ohm</th>
<th>°C</th>
<th>Ohm</th>
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<td>80</td>
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</tbody>
</table>

**Suggested housing & OR**

![Viton Diagram]

- Viton: Ø4.48 x 1.78
- Ø3.2 x 6.5 x 6.5
- M6 x 1

---

For further information, please contact:

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Specifications are subject to change without prior notice.
Description
A cost effective miniature sensor designed for fast response temperature measurement.
Suitable for air, water, oil & fuel temperature measurement.

Main Features
- Brass housing for cost reduction
- Splash resistant to standard motorsport fluids
- Miniature tip
- High strength MFA coated leads

Benefits
- Cost effective solution
- High signal level
- Small dimensions
- Low weight

Typical Applications
Racing engines
**NTC M8**

10 kΩ Air-fluid temperature sensor

### Technical Characteristics

- **Typical application**: Air, oil, water and fuel temp.
- **Temperature range**: -20 to 200 °C
- **Protection class**: IP 65
- **Cable**: n°2 AWG 22
- **OR Material**: Viton
- **Weight (with cable)**: 26 g

### Temperature resistance table

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<tr>
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</tr>
</tbody>
</table>

### Suggested housing

**Dimensions in millimetres**

For further information, please contact:

**Magneti Marelli S.p.A.**
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Specifications are subject to change without prior notice
Description
A miniature sensor designed for fast response temperature measurement.
Suitable for air, water, oil & fuel temperature measurement.

Main Features
- AISI 303 housing for improved mechanical strength
- Splash resistant to standard motorsport fluids
- Miniature tip
- High strength MFA coated leads

Benefits
- High signal level
- Little dimensions
- Low weight

Typical Applications
Racing engines

Application Schematics
PT1000 M6
Air-fluid temperature sensor

Dimensions

Technical Characteristics

Typical application: Oil, water and fuel temp.
Temperature range: -20 to 200 °C
Accuracy: ± 1 °C
Weight (including 1 m length cable): 16 g

Temperature resistance table

<table>
<thead>
<tr>
<th>°C</th>
<th>Ohm</th>
<th>°C</th>
<th>Ohm</th>
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</tbody>
</table>

Suggested housing

Dimensions in millimetres

For further information, please contact:

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page 2 of 2

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Description
A low cost sensor designed for fast response temperature measurement.
Suitable for air, water, oil & fuel temperature measurement.

Main Features
- Brass housing for cost reduction
- Splash resistant to standard motorsport fluids
- Miniature tip
- High strength MFA coated leads

Benefits
- Low cost
- High signal level
- Little dimensions
- Low weight

Typical Applications
Racing engines

Application Schematics
**PT1000 M8**  
Air-fluid temperature sensor

### Technical Characteristics

Typical application: Oil, water and fuel temp.  
Temperature range: -20 to 200 °C  
Accuracy: ± 1 °C  
Weight (including 1m length cable): 26 g

### Temperature resistance table

<table>
<thead>
<tr>
<th>°C</th>
<th>Ohm</th>
<th>°C</th>
<th>Ohm</th>
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</table>

### Suggested housing

Dimensions in millimetres

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For further information, please contact:

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Specifications are subject to change without prior notice
TC-K
K-Type Thermocouple
Exhaust Gas Temp. Sensor (Cr/Al)

Description
Reinforced sheathed k-type thermocouple for exhaust gas temperature, low response time.

Extension cable 1500mm compensated can be purchased as option (p/n 083813295400).

Main Features
- MgO insulation
- Strength at very high pressure and temperature, compensated cable with Kapton insulation and stainless steel braid

Benefits
- Small dimensions
- Low weight
- Fast response time

Typical Applications
Exhaust gas temperature measurement on all kind of racing engines
TC-K
K-Type Thermocouple
Exhaust Gas Temp. Sensor (Cr/Al)

Dimensions

Dimensions in millimetres

Technical Characteristics

Typical application ........ Exhaust gas temp.
Thermocouple type .......... K to DIN 43710
Operating temp. range ........... 0 to 1150 °C
Weight .......................................................... 70 g

Application Schematics
Description
Proportional oxygen sensor compatible with controllers built-in most Magneti Marelli ECUs for accurate reading of mixture.

Contact the factory for matching ECUs and/or for stand alone controllers and loom.

Version with special heat resistant sleeves and military connectors are available on request.

Main Features
- High signal level
- Calibrated for rich mixtures typical of racing engines

Benefits
- Available in stock - short delivery time

Typical Applications
Racing engines
Technical Characteristics

Sensor element tip temperature............. 750 to 950 °C
Connector temperature................................. 120 °C
Storage temperature range...................... -40 to 100 °C
Weight...................................................... 100 g

Dimensions

Dimensions in millimetres
**Description**

The LPT 50-150 series, with a measurement range from 50 to 150 mm, is a family of linear potentiometer designed for racing and automotive applications.

The potentiometer is made of aluminum alloy and stainless steel, with Raychem FDR type 55 - 22AWG cable.

Resistant to high temperature, fire, chemical, LPT 50-150 is particularly suited in the harsh automotive environment.

The user can adjust the cable length (max 1 m) for his application and this can be done contacting the company.

**Main Features**

- Resistant to high temperatures, fire and chemical
- Cable length to customer requirements
- Constructed from aluminum alloy and stainless steel
- High strength and durability

**Benefits**

- Wide application range
- Lightweight design
- High reliability
- Designed for rugged applications

**Typical Applications**

Linear travel measurement (e.g. suspension travel measurement)
Dimensions

Dimensions in millimetres

Technical Characteristics

Operating temperature range .......... -30 to 125 °C
Insulation resistance @ 500 Vdc ................. > 100 MΩ
Mechanical range .................. Measurement range + 1 mm
Shaft velocity................................. < 1000 mm/s
Protection class.............................. IP 66
Sealing........................................... “O” ring and shaft lip seal
Cable length (*) .................................... 1 m

(*) Different lengths are available on customer request

Measurement range table

<table>
<thead>
<tr>
<th>Linear Potentiometer</th>
<th>LPT 50</th>
<th>LPT 75</th>
<th>LPT 150</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement range (± 0.5 mm)</td>
<td>50</td>
<td>75</td>
<td>150</td>
</tr>
<tr>
<td>Nominal resistance (± 10 %)</td>
<td>2</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Applied Voltage</td>
<td>&lt; 45</td>
<td>&lt; 65</td>
<td>&lt; 130</td>
</tr>
<tr>
<td>Wiper load</td>
<td>&gt; 500</td>
<td>&gt; 500</td>
<td>&gt; 600</td>
</tr>
<tr>
<td>Non linearity</td>
<td>&lt; ± 0.25</td>
<td>&lt; ± 0.15</td>
<td>&lt; ± 0.15</td>
</tr>
<tr>
<td>Retracted mounting distance</td>
<td>148</td>
<td>173</td>
<td>248</td>
</tr>
<tr>
<td>Weight (approx)</td>
<td>66</td>
<td>73</td>
<td>90</td>
</tr>
</tbody>
</table>

Connecter Pin Out

<table>
<thead>
<tr>
<th>Wire colour table</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
</tr>
<tr>
<td>Black</td>
</tr>
<tr>
<td>White</td>
</tr>
</tbody>
</table>

For further information, please contact:

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sales@magnetimarelli.com
http://www.magnetimarelli.com
Description

The LP75-150 J series, with a measurement range from 75 to 150 mm, is a cost effective family of linear potentiometer designed for racing and automotive applications.

The potentiometer is made of aluminum alloy and stainless steel.

Resistant to high temperature, fire, chemical, LP75-150 J are particularly suited in the harsh automotive environment.

The user can adjust the cable length (1 m max) for his application and this can be done contacting the company.

Main Features

- Resistant to high temperatures, fire and chemical
- Cable length to customer requirements
- Constructed from aluminum alloy and stainless steel
- High strength and durability

Benefits

- Wide application range
- Lightweight design
- High reliability
- Designed for rugged applications

Typical Applications

Linear travel measurement (e.g. suspension travel measurement)
**Technical Characteristics**

- Operating temperature range: -30 to 100 °C
- Insulation resistance @ 500 Vdc: >100 MΩ
- Mechanical range: Measurement range + 5 mm
- Shaft velocity: <5000 mm/s
- Protection class: IP 60
- Cable length (*): 1 m

(*): Different lengths are available on customer request

**Measurement range table**

<table>
<thead>
<tr>
<th>Linear Potentiometer</th>
<th>LP 75 J</th>
<th>LP 100 J</th>
<th>LP 125 J</th>
<th>LP 150 J</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Measurement range</strong></td>
<td>75</td>
<td>100</td>
<td>125</td>
<td>150</td>
</tr>
<tr>
<td><strong>Nominal resistance (± 20 %)</strong></td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td><strong>Independent linearity</strong></td>
<td>&lt;± 0.10</td>
<td>&lt;± 0.10</td>
<td>&lt;± 0.05</td>
<td>&lt;± 0.05</td>
</tr>
<tr>
<td><strong>Retracted mounting distance (-0/+3 adjustable)</strong></td>
<td>203</td>
<td>228</td>
<td>253</td>
<td>278</td>
</tr>
<tr>
<td><strong>Weight (approx)</strong></td>
<td>90</td>
<td>100</td>
<td>110</td>
<td>120</td>
</tr>
</tbody>
</table>

**Wire colour table**

<table>
<thead>
<tr>
<th>Colour</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue</td>
<td>Supply voltage</td>
</tr>
<tr>
<td>Brown</td>
<td>GND</td>
</tr>
<tr>
<td>Yellow</td>
<td>Signal (wiper)</td>
</tr>
</tbody>
</table>
W1051
100° Contactless rotary position transducer

Description
Contactless counterclockwise rotary position sensor.

Main Features
- Contactless technology
- Low weight sensor
- High temperature range

Benefits
- No contact wear
- High precision

Typical Applications
Throttle, pedal, clutch position sensing in racing engines and vehicle

Typical Performance

![Graph of nominal electrical output](image-url)
SENSORS

W1051
100° Contactless rotary position transducer

Technical Characteristics

Typical application.............. Throttle and pedal position

Power supply

- normal working range .................. 5 ± 10 % V
- reverse voltage protection ............. -14.5 V

Operating temperature

- functional ................................ -40 to 150 °C

Spring return torque

- minimum return ...................... 20-50 mN·m
- maximum wind up ....................... 160 mN·m

Vibration range tested (60 Hz to 1500 Hz) ............. 15 g

Protection class ....................... IP 67

Linearity (typ.) ................................ ± 1.5 % f.s.

Electrical angle ................................ 100°

Weight .............................................. 40 g

Dimensions

Dimensions in millimetres

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Description
Contactless clockwise rotary position sensor.

Main Features
- Contactless technology
- Low weight sensor
- Flying lead (Raychem AWG 24)

Benefits
- No contact wear
- High precision

Typical Applications
Throttle and pedal position sensing in racing engines and vehicle

Typical Performance

Graph of nominal electrical output

Output ratio vs. needle travel

Graph of CV rotor rotation from end stop (degrees)

Mechanical travel (118°)
**W1059**

108° Contactless rotary position transducer

### Technical Characteristics

**Typical application**

- Throttle and pedal position

**Power supply**

- Normal working range: \(5 \pm 10\%\) V
- Over voltage: 18 V
- Reverse voltage protection: -14.5 V

**Operating temperature**

- Functional: -30 to 120 °C
- Storage: -40 to 140 °C

**Spring return torque**

- Minimum return: 20 mN·m
- Maximum wind up: 130 mN·m

**Vibration range tested** (30 Hz to 1500 Hz): 15 g

**Protection class**

- Mechanical: IP 55
- Electronic: IP 57

**Linearity** (typical): \(\pm 1.0\%\ f.s.\)

**Electrical angle**: 108°

\[
V_{out} = (0.05 + \text{gradient} \times \text{angle}) \times V_{ref}
\]

**Output gradient**: 0.767 to 0.807

**Weight**: 41 g

### Connector Pin Out

<table>
<thead>
<tr>
<th>Wire colour</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>Supply voltage</td>
</tr>
<tr>
<td>Black</td>
<td>GND</td>
</tr>
<tr>
<td>Blue</td>
<td>Signal</td>
</tr>
</tbody>
</table>

### Dimensions

Dimensions in millimetres

![Image of sensor dimensions]
Description
The OPS04 device is a reliable analogue gauge pressure sensor with fluorosilicone seal. Integral signal conditioning electronics incorporating a custom designed integrated circuit provide an accurate, stable signal over a wide operating temperature range (-40 to 135°C).

Main Features
- Active devices are housed in hermetically sealed plastic protective casing
- Compatible with most fluids in pressure-based standard motorsport systems
- Compact design

Benefits
- Low cost
- High reliability

Typical Applications
Fluids measure
Hydraulic pressure transducers
0.1 to 8.1 MPa

Dimensions

Technical Characteristics

- Power supply (± 0.5 V): 5 V
- Supply current (@ 5 V): < 10 mA
- Null offset (5 V): 0.5 V
- Full scale output (5 V): 4.5 V
- Pressure ranges: 0.1 to 8.1 MPa
- Operating temperature range: -40 to 130 °C
- Response time: less than 10 ms
- Accuracy (including non-linearity, hysteresis and repeatability): 2 % f.s.o
- Burst pressure: 15 MPa
- Weight: 40 g

Dimensions in millimetres

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Description
A cost effective VR sensor for speed detection of toothed wheels.

Main Features
- Case in PA 6.6 GFR, manufactured in silicone sleeving for operation in automotive environment
- High electrical signal level

Benefits
- Available in stock
- Low cost

Typical Applications
Racing engines crank and camshaft speed-position sensing
**SEN 8D**
Ø 15 mm VR revolution sensor

**Technical Characteristics**

- **Typical application**: Crank, Cam, Wheel
- **Max. operating temperature**: 125 °C
- **Air gap**: 0.5 to 1 mm
- **Speed range**: 40 to 12000 rpm
- **Output @ 40 rpm (peak to peak)**: > 400 mV
- **Weight**: 60 g

**Connector Pin Out**

<table>
<thead>
<tr>
<th>PIN</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>Positive</td>
</tr>
<tr>
<td>Not Sig.</td>
<td>GND</td>
</tr>
</tbody>
</table>

For further information, please contact:

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Description
A cost effective VR sensor for speed detection of toothed wheels.

Main Features
- Case in PA 6.6 GFR, manufactured in silicone sleeving for operation in automotive environment
- High electrical signal level

Benefits
- Available in stock
- Low cost

Typical Applications
Racing engines crank and camshaft speed-position sensing

Option
SEN 8K (90° cable exit) available
SEN 8D-8K
 Ø 15 mm VR revolution sensor

Dimensions

**SEN 8D**

![Diagram of SEN 8D sensor]

**Dimensions in millimetres**

**Technical Characteristics**

- **Typical application**: Crank, Cam, Wheel
- **Max. operating temperature**: 125 °C
- **Air gap**: 0.5 to 1 mm
- **Speed range**: 40 to 12000 rpm
- **Output @ 40 rpm (peak to peak)**: > 400 mV
- **Weight**: 60 g

**Application Schematics**

<table>
<thead>
<tr>
<th>PIN</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>Positive</td>
</tr>
<tr>
<td>Not Sig.</td>
<td>GND</td>
</tr>
</tbody>
</table>

For further information, please contact:

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Description
Inductive sensor. This type of sensor is suitable for detecting the rotational speed of moving parts in many applications. Specifically, this sensor is interfaced to a toothed metal wheel; signal output is analog. Suitable for crank, camshaft, wheel speed detection.

Main Features
- Automotive Designed
- Measurement of number of revolutions interfaced to a toothed metal wheel
- Version with different cable length available
- Max speed 7000rpm

Benefits
- Reduced dimensions allow redundant installation in tight spaces
- High resistance to severe vibrations

Typical Applications
WRC
**Dimensions**

![Diagram of an inductive sensor](image)

*Dimensions in millimetres*

**Technical Characteristics**

- **Typical application**: Crankshaft, Camshaft, Wheel*
- **Max. operating temperature**: -30°C +150°C
- **Air gap**: 0.5 to 1.5mm*
- **Speed range**: 40 to 7000 rpm*
- **Output @ 40 rpm (peak to peak)**: 300 mV**
- **Weight**: 70 g

*Note:*
* Contact factory to check toothed wheel arrangement.
** With reference toothed wheel.

**Application Schematics**

![Application schematic](image)
SRA-E R01
DBW control
High number of Inputs/Outputs
Ethernet line

Description
SRA-E is a dedicated Engine Control Unit. A single unit can drive up to eight injectors and six ignition coils. SRA-E can also drive logic command coils (SW option).
Communication from the PC based configuration tool and to other units (such as dashboard and logger) is by the 2 CAN lines and an asynchronous serial line.
Inside the unit there is a high performance RISC microcontroller and an FPGA for diagnostic purposes.
SRA-E provides analogue inputs for single-ended, temperature and knock-sensor as well as an interface for a switching lambda sensor. The unit also provides an H-Bridge output stage for use with suitable “Drive by Wire” actuators.
6 configurable speed sensor inputs (inductive or Hall) provide full flexibility of configuration for engine angle detection as well as other frequency inputs such as wheel or shaft speed.
SRA-EDL16 is a version of the SRA-E with an internal 16 Mbyte data logger.
SRA-E is supplied with the mating connector (loom side).

Main Features
- 8 Single-ended
- 6 Pick-ups or Hall effect
- 6 Inductive or logic command ignition drivers (SW option)
- 8 On/Off injector drivers
- 1 H-Bridge: DC-Motor driver for “Drive by Wire” control
- 4 PWM (Current controlled PWM)
- 1 On/Off or Linear Lambda sensor
- 2 Knock input for detonation control accelerometers
- 2 CAN communication buses
- 1 Ethernet line

Benefits
- Flexible setup by means of a high number of Inputs/Outputs
- The logic command coils option is available on request
- SW selectable NTC/PT1000 temperature sensors
- Floating point data management
- Direct management of Marelli dashboard display
- Compatible with a wide range of professional Marelli software tools
- Easy to install

Typical Applications
One make race series
## Technical Characteristics

### Inputs
- Analogue Single-ended ................................................... 8
- On/Off or Linear Lambda sensor ..................................... 1
- Knock sensor (multiplexed) ............................................. 2
- K-type thermocouple ....................................................... 2
- NTC/PT1000 temperature sensor (selectable) ................. 4
- NTC internal temperature sensor .................................. 1
- V battery injector ............................................................. 1
- VR Pick-ups or Hall effect .............................................. 6
- On/Off digital .................................................................. 2
- Lap Trigger ....................................................................... 1
- “Code Load” enable pin ................................................... 1

### Outputs
- On/Off injector drivers ...................................................... 8
- Inductive or logic command ignition drivers (SW option)... 6
- H-Bridges ........................................................................ 1
- Lambda heater drivers ..................................................... 1
- PWM ............................................................................... 4
- Low-side On/Off .............................................................. 2
- Voltage references .......................................................... 2

### Communications
- CAN line (1 Mbit/s (*))...................................................... 2
- Ethernet line (100 Mbit/s) ................................................ 1
- Serial current loop ........................................................... 1

(* Configurable on request

### Logic Core
- Microcontroller (80 MIPS RISC) ....................................... 1
- FPGA (50k gates) ............................................................ 1
- Flash E2PROM (microcontroller) ....................................... 1 Mbyte
- RAM memory (microcontroller) ....................................... 48 Kbyte
- RAM memory .............................................................. 512 Kbyte
- E2PROM parallel .......................................................... 64 Kbyte
- E2PROM serial ............................................................ 4 Kbyte
- Time keeper ..................................................................... 1

### Other Characteristics
- Power supply .......................................................... 6 to 16 V
- Operating temperature range (internal) ......................... -20 to 85 °C
- Protection class .......................................................... IP 65
- Dimensions with connectors ......................................... 208 x 182.30 x 42 mm
- Weight (approx.) .......................................................... 960 g

## Dimensions

Dimensions in millimetres

## Application Schematics

![Application Schematic Diagram]

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Description

SRA-EDL16 is a dedicated Engine Control Unit. A single unit can drive up to eight injectors and six ignition coils. SRA-EDL16 can drive logic command coils (SW option).

SRA-EDL16 is an engine control unit which includes data logger and a very high speed Ethernet line to download data. Communication from the PC based configuration tool and to other units (such as dashboard and logger) is by the 2 CAN lines and an asynchronous serial line.

Inside the unit there is a high performance RISC microcontroller with a logging capability of 16 Mbyte and an FPGA for diagnostic purposes.

SRA-EDL16 provides analogue inputs for single-ended, temperature and knock-sensor as well as an interface for a switching lambda sensor. The unit also provides an H-Bridge output stage for use with suitable “Drive by Wire” actuators.

6 configurable speed sensor inputs (inductive or Hall) provide full flexibility of configuration for engine angle detection as well as other frequency inputs such as wheel or shaft speed.

SRA-EDL16 is supplied with the mating connector (loom side).

Main Features

- 8 Single-ended
- 6 Pick-ups or Hall effect
- 6 Inductive or logic command ignition drivers (SW option)
- 8 On/Off injector drivers
- 1 H-Bridge: DC-Motor driver for “Drive by Wire” control
- 4 PWM (Current controlled PWM)
- 1On/Off or Linear Lambda sensor
- 2 Knock input for detonation control accelerometers
- 16 Mbyte internal data logger
- Up to 128 logged channels
- Up to 10 Kbyte/s logging rate
- Sampling rates up to 200 Hz
- 2 CAN communication buses
- 1 Ethernet line

Benefits

- No need of external data logger
- Extremely reduce data download time by means of Ethernet link
- The logic command coils option is available on request
- SW selectable NTC/PT1000 temperature sensors
- Flexible setup by means of a high number of Inputs/Outputs
- Floating point data management
- Direct management of Marelli dashboard display
- Pick-up inputs for wheel speed and distance measurement
- Requires WinTAX4 analysis software
- Requires SYSMA logging setup tool
- Easy to install

Typical Applications

One make race series
## Technical Characteristics

### Inputs
- Analogue Single-ended ................................................... 8
- On/Off or Linear Lambda sensor ..................................... 1
- Knock sensor (multiplexed) ............................................. 2
- K-type thermocouple ....................................................... 2
- NTC/PT1000 temperature sensor (selectable)............... 4
- NTC internal temperature sensor .................................. 1
- V battery injector ............................................................. 1
- VR Pick-ups or Hall effect ........................................... 6
- On/Off digital .................................................................. 6
- Lap Trigger ...................................................................... 1
- "Code Load" enable pin ................................................... 1

### Outputs
- On/Off injector drivers...................................................... 8
- Inductive or logic command ignition drivers (SW option).. 6
- H-Bridges ........................................................................ 1
- Lambda heater drivers..................................................... 1
- PWM ............................................................................... 4
- Low-side On/Off .............................................................. 2
- Voltage references ........................................................ 2

### Communications
- CAN line (1 Mbit/s (*))...................................................... 2
- Ethernet line (100 Mbit/s) ................................................ 1
- Serial current loop ........................................................... 1

(*) Configurable on request

### Logic Core
- Microcontroller (80 MIPS RISC)................................. 1
- FPGA (50k gates)............................................................ 1
- Flash E2PROM (microcontroller)................................. 1 Mbyte
- RAM memory (microcontroller)................................. 48 Kbyte
- RAM memory .............................................................. 512 Kbyte
- E2PROM parallel .......................................................... 64 Kbyte
- E2PROM serial ............................................................ 4 Kbyte
- Time keeper ................................................................ 1

### Logging
- Flash disk memory ........................................................ 16 Mbyte
- Logged channels ......................................................... up to 128
- Logging rate ............................................................... up to 10 Kbyte/s
- Sampling rate .............................................................. up to 200 Hz

### Other Characteristics
- Power supply .......................................................... 6 to 16 V
- Operating temperature range (internal)......................... -20 to 85 °C
- Protection class .......................................................... IP 65
- Dimensions with connectors .................................. 208 x 182.30 x 42 mm
- Weight (approx.) ......................................................... 960 g

## Dimensions

Dimensions in millimetres

### Application Schematics

[Diagram of application schematics]

---

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**Description**

SRT-E is an evolution of the SRA Engine Control Unit with greater input/output and communications capability in a reduced package size and having more robust external connections.

SRT-E is a dedicated Engine Control Unit. A single SRT-E can drive up to eight injectors and six ignition coils. It is compatible with a wide range of sensors and actuators (especially F1 products) such as coils, injectors and sensors. SRT-E can also drive logic command coils (HW option -> SRT-L).

Communication from the PC based configuration tool and to other units (such as dashboard and logger) is possible by 2 CAN lines and an asynchronous serial line.

Inside the unit there is a high performance RISC microcontroller and an FPGA for diagnostic purposes.

SRT-E provides analogue inputs for single-ended, temperature and knock-sensor as well as an interface for a linear wide band lambda sensor. The unit also provides 2 H-Bridge output stages for use with suitable “Drive by Wire” or Trumpet Control actuators.

6 configurable speed sensor inputs (up to 3 inductive) provide full flexibility of configuration for engine angle detection as well as other frequency inputs such as wheel or shaft speed.

SRT-EDL64 is a version of the SRT-E Engine Control Unit with an internal 64 Mbyte data logger.

It’s available the DIM-141, an external Magneti Marelli module, to manage GDI and Diesel applications.

**Main Features**

- 14 Single-ended
- 3 Pick-ups or Hall effect
- 3 Hall effect
- 6 Inductive or logic command ignition drivers (HW option)
- 8 On/Off injector drivers
- 2 H-Bridge: DC-Motor driver for “Drive by Wire” control
- 4 PWM
- 2 Linear Lambda
- 2 Knock input for detonation control accelerometers
- 2 CAN communication buses
- 1 Ethernet line

**Benefits**

- Accurate engine control by means of high computation power
- Compatible with F1 products (injectors, coils, sensors, etc.)
- The logic command coils option is available on request
- SW selectable NTC/PT1000 temperature sensors
- Floating point data management
- Direct management of Marelli dashboard display
- Compatible with a wide range of professional software tools
- Introduced circular connectors
- Very compact design and easy to install

**Typical Applications**

Professional circuit and rally applications
One make race series
# ENGINE CONTROL UNIT

## SRT-E

Professional engine control  
High performances

### Technical Characteristics

**Inputs**
- Analogue Single-ended .................................................. 14
- Linear Lambda sensor .................................................... 2
- Knock sensor ................................................................. 2
- K-type thermocouple ...................................................... 2
- NTC/PT100 temperature sensor (selectable) .................... 4
- NTC internal temperature sensor .................................... 1
- V battery injector .......................................................... 1
- VR Pick-ups or Hall effect .............................................. 3
- Hall effect ................................................................. 3
- Lap trigger ................................................................. 1
- "Code Load" enable pin .................................................. 1
- Syncro (Isq9141) ......................................................... 1

**Outputs**
- On/Off injector drivers ................................................ 8
- Inductive or logic command ignition drivers (HW option)  ... 6
- H-Bridges ....................................................................... 2
- Lambda heater drivers .................................................. 2
- PWM .............................................................................. 4
- Voltage references ........................................................ 3

**Communications**
- CAN line (1 Mbit/s (*)) ................................................ 2
- Ethernet line (100 Mbit/s) ............................................. 1
- Serial current loop ........................................................ 1

(*) Configurable on request

**Logic Core**
- Microcontroller (80 MIPS RISC) ....................................... 1
- FPGA (50k gates) ......................................................... 1
- Flash E2PROM (microcontroller) ..................................... 1 Mbyte
- RAM memory (microcontroller) ...................................... 48 Kbyte
- RAM memory ............................................................... 512 Kbyte
- E2PROM ........................................................................ 64 Kbyte
- Time keeper ................................................................. 1

**Other Characteristics**
- Power supply.......................................................... 7 to 16 V
- Operating temperature range (internal) ......................... -20 to 85 °C
- Protection class ...................................................... IP 54

**Dimensions**
- without connectors ........................................... 134 x 132 x 39 mm
- Weight (approx.) ..................................................... 700 g

### Dimensions

Dimensions in millimetres

### Application Schematics

[Application Schematics Diagram]

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Jan 2016  
rel. 15.0

Specifications are subject to change without prior notice
Description

SRG-341 is a dedicated Engine Control Unit. A single unit can drive up to four injectors Peak&Hold GDI with a Magneti Marelli custom Driver. It can drive High Pressure Pump with 8A peak current and 5A hold current. Single unit can drive up to four ignition coils. SRG-341 can also drive logic command coils (SW option).

The logic core is a high performance PowerPC microcontroller and an FPGA for diagnostic purposes. Data logging and Communication Processor is managed from ARM 32-bit Cortex with an internal flash disk up to 1 GB.

Communication from the PC based configuration tool and to other units (such as dashboard and logger) is by the 3 CAN lines, Ethernet line and USB2.0.

SRG-341 provides analogue inputs for single-ended, temperature and knock-sensor as well as an interface for a switching lambda sensor. The unit also provides an H-Bridge output stage for use with suitable “Drive by Wire” actuators.

10 configurable speed sensor inputs (Inductive, Rate or Hall) provide full flexibility of configuration for engine angle detection as well as other frequency inputs such as wheel or shaft speed.

Main Features

- 20 Single-ended
- 10 Variable reluctance frequency inputs or Hall Inputs
- 4 Inductive or logic command ignition drivers (SW option)
- 4 Peak&Hold injector drivers for GDI
- 2 H-Bridge: DC-Motor driver for “Drive by Wire” control
- 2 PWM (Current controlled PWM)
- 2 Linear Lambda Sensor I LIOS
- 1 Knock input for detonation
- 3 CAN line
- 1 Ethernet line
- 1 USB 2.0 line
- Up to 1 GB internal memory for data logging

Benefits

- Integrated solution: the SRG directly drives GDI injectors (no external modules required)
- Flexible setup by means of a high number of Inputs/Outputs
- SW selectable NTC/PT1000 temperature sensors
- Direct management of Marelli dashboard display
- Compatible with a wide range of professional Marelli software tools
- Easy to install
- Matlab/Simulink Platform for application software (on request)

Typical Applications

Fully compatible with the new GRE (Global Race Engine)
### Technical Characteristics

**Inputs**
- Analogue Single-ended ................................................................. 20
- Linear Lambda sensor (IILOS) ........................................................... 2
- Knock sensor .................................................................................. 1
- K-type thermocouple ................................................................. 2
- NTC/PT1000 temperature sensor (each selectable) ...................... 2
- K-type thermocouple ..................................................................... 2
- NTC read injector rail ................................................................... 1
- Internal temperature sensor .......................................................... 4
- Accelerometer sensor XXY axis ...................................................... 1
- VR Pick-ups or Hall effect ............................................................ 4
- VR Rate or Hall effect .................................................................. 4
- Hall effect .................................................................................... 2
- Lap Trigger .................................................................................... 1
- "Code Load" enable pin .................................................................. 1

**Outputs**
- Peak & Hold GDI Injector drivers .................................................. 4
- Inductive or logic command ignition drivers (SW option) ................ 4
- Injector on-off ............................................................................... 4
- H-Bridges .................................................................................... 2
- Lambda heater drivers ................................................................... 2
- PWM 3 A - 1 kHz ........................................................................... 12
- PWM 5 A .......................................................................................... 2
- High side Vbatt 100 mA .................................................................. 4
- Voltage references 70 mA ............................................................. 4

**Communications**
- CAN line (1 Mbit/s) ........................................................................ 3
- Ethernet line (10/100 Mbit/s) .......................................................... 1
- USB 2.0 line .................................................................................... 1
- Synchro (ISO9141) ........................................................................ 1

**Logic Core**
- MICRO CONTROLLER
  - Micro 32bit PowerPC CPU@264MHz ............................................. 1
- Flash EPROM (x32 internal) ............................................................ 4 Mbyte
- RAM memory (x32 internal) ........................................................... 256 Kbyte
- Synchronous SRAM Memory (external x16) .................................. 2 Mbyte
- MRAM memory (external x16) ......................................................... 2 Mbyte

**DATA LOGGING and COMMUNICATION PROCESSOR**
- Micro (ARM–based 32bit @120MHz) ............................................. 1
- Flash EPROM (x32 internal) ............................................................ 1 Mbyte
- RAM memory (x32 internal) ........................................................... 128 Kbyte
- Synchronous SRAM Memory (external x16) .................................. 2 Mbyte
- MRAM memory (external x16) ......................................................... 2 Mbyte
- Flash Disc (external x8) .................................................................. 1 Gbyte
- Time keeper .................................................................................. 1
- JEDI controller injector pick&hold ............................................... 1

**Other Characteristics**
- Power supply ........................................................................... 8 to 16 V
- Operating temperature range (internal) ..................................... -20 to 85 °C
- Protection class .......................................................................... IP 65
- Dimensions
  - With connectors ....................................................................... 196 x 181,7 x 44 mm
  - Weight (approx.) ....................................................................... 1200 g

### Dimensions

- Dimensions in millimetres

### Application Schematics

[Diagram showing connections and components of the Engine Control Unit]

---

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Jan 2016
rev. 2.2
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Specifications are subject to change without prior notice.
Description

SRG-481 is a dedicated Engine Control Unit. A single unit can drive up to eight injectors Peak & Hold GDI with a Magneti Marelli custom Driver and up to eight drive logic command coils. SRG-481 can also be configured to drive up to sixteen on-off injectors by using a combination of Peak & Hold and PWM outputs.

The logic core is a high performance PowerPC microcontroller and an FPGA for diagnostic purposes.

Data logging and Communication side is managed by ARM 32-bit Cortex processor with an internal flash disk up to 1 Gbyte. Communication from the PC based configuration tool and to other units (such as dashboard and logger) is by the 3 CAN lines, Ethernet line and USB2.0. The USB port can be enabled to log data on a remote flash disk (Optional functionality).

SRG-481 provides analogue inputs for single-ended, temperature and knock-sensor as well as an interface for a switching lambda sensor. The unit also provides H-Bridge output stages for use with suitable “Drive by Wire” actuators.

12 configurable speed sensor inputs (Inductive, Rate or Hall) provide full flexibility of configuration for engine angle detection as well as other frequency inputs such as wheel or shaft speed.

Main Features

- 33 Single-ended
- 12 NTC/PT1000
- 6 Differential
- 2 Linear Lambda Sensor ILIOS
- 4 Knock input for detonation
- 12 Configurable speed sensor inputs
- 8 Logic command ignition drivers
- Up to 8 Peak & Hold injector drivers for GDI or 16 PFI
- 4 H-Bridge: DC-Motor driver for “Drive by Wire” control
- 16 PWM (Current controlled PWM)
- 3 CAN line
- 1 Ethernet line
- 1 USB 2.0 line
- Up to 1 Gbyte internal memory for data logging

Benefits

- Integrated solution: the SRG directly drives GDI injectors (no external modules required)
- Flexible setup by means of a high number of Inputs/Outputs
- SW selectable NTC/PT1000 temperature sensors
- Direct management of Marelli dashboard display
- Compatible with a wide range of professional Marelli software tools
- Easy to install
- Matlab / Simulink Platform for application software (on request)

Typical Applications

Fully compatible with the new GRE (Global Race Engine)
**SRG481**

Engine Control Unit

### Technical Characteristics

#### Inputs
- Analogue Single-ended: 33
- NTC/PT100 temperature sensor (each selectable): 12
- Differential: 6
- Linear Lambda sensor (LIO5): 2
- Knock sensor (gain selectable): 4
- NTC internal temperature sensor: 4
- Accelerometer sensor X/Y/Z axis: 1
- VR Pick-ups or Hall effect: 7
- VR Rats or Hall effect: 4
- Hall effect: 1
- On/Off digital: 2
- Lap Trigger: 1
- “Code Load” enable pin: 1

#### Outputs
- Peak & Hold GDI Injector drivers: 8
- Logic command ignition drivers: 8
- Output Pump drivers: 2
- H-Bridges 6A: 2
- H-Bridges 5A: 2
- Lambda heater drivers: 2
- PWM 3A: 14
- PWM 5A: 2
- High side Vbat 100 mA: 4
- Voltage references 70 mA: 8

#### Communications
- CAN line (1 Mbit/s): 3
- Ethernet line (10/100 Mbit/s): 1
- USB 2.0 line: 1
- Syncro (ISO9141): 1

#### Logic Core
- MICRO CONTROLLER
  - Micro 32bit PowerPC CPU@264MHz: 1
  - Flash EPROM (x32 internal): 4 Mbyte
  - RAM memory (x32 internal): 256 Kbyte
  - Synchronous SRAM Memory (external x16): 2 Mbyte
  - IRAM memory (external x16): 512 Kbyte

#### DATA LOGGING and COMMUNICATION PROCESSOR
- Micro (ARM–based 32bit @168MHz): 1
- Flash EPROM (x32 internal): 1 Mbyte
- RAM memory (x32 internal): 128 Kbyte
- Asynchronous SRAM Memory (external x16): 2 Mbyte
- Flash Disc (external x8): 1 Gbyte
- Time keeper: 1
- JEDI controller injector Peak & hold: 2

#### Connectors
- Deutsch Auto sport SOURIAU (66 Pin): 4

#### Other Characteristics
- Power supply: 8 to 18 V
- Operating temperature range (internal): -20 to 85 °C
- Protection class: IP 65
- Dimensions with connectors: 196 x 181,7 x 44 mm
- Weight (approx.): 1770 g

### Dimensions

Dimensions in millimetres

### Application Schematics

For further information, please contact:

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Specifications are subject to change without prior notice.
Marvel6..12 GT
6 to 12 cylinders with double injection and internal data logger

Description
For race applications that need high performances in a limited range of cost MARVEL6/12 GT is the right choice. MARVEL6/12 GT is a modular engine control system that includes an internal data logger.

It integrates two microprocessors and a DSP plus two FPGA to achieve great computation power. High-speed Ethernet line dedicated to data download, while an ARC Net line and two full CAN lines allow connections with others control devices.

It is compatible with a very wide range of actuators/sensors, such as coils, injectors, and is intended for universal installation up to six cylinders engine, applications with double injection or twelve-cylinder engine with single injector. It is possible to select overcurrent and feedback threshold according to the type of coils used.

Output stages provide also a double DC-motor control such as simple Drive by Wire or trumpets control. MARVEL6/12 GT provides some analogue inputs, all of them with 10-bit resolution, including integrated UEGO linear lambda with heater and knock controllers that provide full engine diagnostics and controls.

Note:
For different solution (e.g. 3 CAN lines, Lap trigger pulled down or pulled up, etc) contact our sale department.

Main Features
- 24 Single-ended
- 3 Pick-ups or Hall effect
- 4 Hall effect
- 4 Inductive ignition drivers
- 8 On/Off injector drivers
- 2 H-Bridge: DC-Motor driver for “Drive by Wire” control
- 2 PWM
- 2 Linear Lambda sensor
- 4 Knock input for detonation control accelerometers
- 128 MByte internal data logger
- Up to 512 logged channels
- Up to 64 Kbyte/s logging rate
- Sampling rates up to 1000 Hz
- 4 CAN communication buses
- 1 ARCNet line
- 1 Ethernet line

Benefits
- No need of external data logger
- Accurate engine control by means of high computation power
- Extremely reduce data download time by means of Ethernet link
- Compatible with F1 products (injectors, coils, sensors etc.)
- SW adjustable coil’s overcurrent and feedback threshold
- SW selectable NTC/PT1000 temperature sensor
- Floating point data management
- Direct management of Marelli dashboard display
- Pick-up inputs for wheel speed and distance measurement
- Requires WinTAX4 analysis software
- Requires SYSMA logging setup tool
- Very compact design and easy to install

Typical Applications
Professional circuit and rally applications
MARVEL6..12 GT
6 to 12 cylinders with double injection and internal data logger

Technical Characteristics

Inputs
- Analogue Single-ended
  @10bit .................................................. 20
  @12bit .................................................. 4
- Linear Lambda sensor ........................................ 2
- Knock sensor ............................................... 4
- K-type thermocouple ........................................ 2
- Differential inputs .......................................... 4
- NTC/PT1000 temperature sensor (selectable) ........... 6
- NTC internal temperature sensor ......................... 1
- V battery injector .......................................... 1
- VR Pick-ups or Hall Effect (exclusive) ................. 3
- Hall effect ................................................ 4
- On/Off digital ............................................. 4
- Lap Trigger .................................................. 1
- "Code Load" enable pin .................................... 1

Outputs
- On/Off injector drivers ...................................... up to 12
- Inductive ignition drivers .................................. up to 12
- H-Bridges ...................................................... 2
- Lambda heater drivers ....................................... 2
- PWM ........................................................... 6
- Voltage references ........................................... 6

Communications
- CAN line (1 Mbit/s (*)) .................................... 4
- ARCNet line (10 Mbit/s) ..................................... 1
- Ethernet line (10/100 Mbit/s) ............................. 1
- Serial current loop or RS 485 (exclusive) .............. 1
  * Configurable on request

Logic Core
- Microcontroller (40 MIPS RISC) ......................... 2
- DSP (80 MFLOPS) ......................................... 1
- Dual port RAM (16 Kword) ................................ 1
- FPGA (10k gates) ......................................... 1
- FPGA (100k gates) ........................................ 1
- Flash EEPROM (microcontroller) ....................... 2 x 512 Kbyte
- RAM memory (microcontroller) ......................... 2 x 32 Kbyte
- RAM memory (DSP) ....................................... 512 Kbyte
- Flash EEPROM ........................................... 2 x 512 Kbyte
- RAM memory ............................................... 2 x 512 Kbyte
- E2PROM ..................................................... 512 Kbyte
- Time keeper .................................................. 1

Logging
- Flash disk memory ....................................... 128 MByte
- Logged channels .......................................... up to 512
- Logging rate ................................................ up to 64 Kbyte/s
- Sampling rate .............................................. up to 1000 Hz

Other Characteristics
- Power supply
  Total system operating .................................. 8 to 16 V
  Logic core operating .................................... 6 to 16 V
- Operating temperature range (internal) ............... -20 to 85 °C
- Protection class .......................................... IP 65
- Dimensions
  Without connectors ...................................... 154 x 155 x 40 mm
  Weight (approx.) .......................................... 1050 g

Dimensions

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Specifications are subject to change without prior notice
Description
WRE460 Engine and Vehicle Control Unit is a powerful and complete concentrated system capable of controlling high performance engines up to 6 cylinders. It incorporates a powerful data acquisition unit tailored to racing applications which require high resolution data, high bandwidth and a large number of channels.

The unit can drive both ON-OFF and current-controlled injectors, inductive ignition coils and a large number of additional loads.

An integrated six degree of freedom inertial platform can be used to monitor manage life of the ECU.

The communications capability is assured by 5 CAN lines, 1 Flexray line, 1 full-speed USB line and 1 Gb Ethernet line for fast data download and data transfer to other units.

The logic architecture consists of a powerful dual-core processor for data logging, telemetry and communications, while calculation, control and actuation are managed by a high performance microcontroller for a total computation power of over 2500 Dhrystone MIPS.

WRE460 is equipped with a variety of analogue inputs including single-ended, temperatures, differential and knock together with digital inputs for lap trigger, VRS/Hall rate and Hall inputs.

Main Features
- 42 single-ended @ 12-bit resolution
- 6 differential @ 12-bit resolution
- 10 PT1000/NTC temperature @ 12-bit resolution
- 2 lambda UEGO sensor
- 2 knock interfaces
- 12 pick-ups, Hall effect, VRS or rate input
- 4 wires LVDT sensor input
- 2 lap trigger
- 10 ON/OFF digital inputs
- 8 GB internal storage for data logger
- up to 1024 logged channels
- up to 1MByte/s logging rate
- sampling rates up to 2000 Hz
- 5 CAN communication buses
- 1 full-speed 2.0 USB host line (12 Mb/s)
- 1 Flexray line (10 Mb/s)
- 1 Ethernet line (1 Gb/s)
- 1 RS-232

Benefits
- Complete engine (6 cylinder) and vehicle management
- Data download via Ethernet link
- 6 D.O.F. inertial platform (3-axis accelerometer, 3-axis gyro)
- SW-selectable VRS, Hall and Rate input
- SW-selectable NTC/PT1000 temperature sensor
- Floating-point data management
- Direct management of Marelli dashboard displays
- Pick-up inputs for wheel speed and distance measurement
- WinTAX4 data analysis tool and SYSMA setup tool
- Robust design, easy to install

Typical Applications
Professional circuit and rally applications
Formula series
**ENGINE CONTROL UNIT**

**WRE-460**

Professional engine control unit
Internal data logger

**Technical Characteristics**

**Inputs**
- Analogue single-ended (12-bit resolution) ........................................... 42
- Differential (12-bit resolution) ............................................................ 6
- Knock interface (12-bit resolution) ....................................................... 2
- NTC sensor (4 wires type) ................................................................. 2
- NTC internal temperature sensor ...................................................... 4
- Lambda UEGO (12-bit resolution) ...................................................... 2
- Injector rail supply (12-bit resolution) ................................................ 1
- VRS, Hall effect or rate inputs (*) ....................................................... 12
- Lap trigger (*) .................................................................................. 2
- ON/OFF Digital input ..................................................................... 10
- "Code Load" enable pin .................................................................. 1
- (*) Configurable by software

**Outputs**
- Inductive coil drivers (up to 30A) ...................................................... 6
- On-Off injector drivers (up to 3A) (*) ................................................. 12
- Lambda heater (up to 3A) ............................................................... 2
- H-Bridge driver (up to 5A – 7A peak) ............................................... 2
- On-Off low side drivers (up to 3A) .................................................... 6
- PWM low side drivers (up to 3A) ..................................................... 10
- PWM low side drivers with current monitor (up to 3A) ..................... 6
- Moog valve driver (+/−10mA) ......................................................... 2
- Voltage references (5V, 120mA) .................................................... 6
- Moog valve driver (+/−10mA) ......................................................... 2
- Battery unregulated supply (100mA) ............................................. 3
- (*) 8 could be 6A controlled current on request

**Communications**
- CAN line (1 Mbit/s or lower, configurable) .................................... 5
- Flexray line (10 Mbit/s – dual line) ................................................ 2
- Full Speed USB line (12 Mbit/s) ..................................................... 1
- Ethernet line (1 Gb/s) .................................................................. 1
- RS232 line ..................................................................................... 1

**Logic Core**
- Strategy, Data Logging & Comm. Processor (1920DMIPS) ............. 1
- DDR2 RAM memory (x32) ........................................................... 512 MB
- NOR flash Memory (x16) ............................................................... 12 MB
- MRAM memory (x16) ................................................................. 512 KB
- Synchronous dual port SRAM (x16) ............................................ 128 KB
- Flash disk (SDIO) ................................................................. 8 GB
- Actuation microcontroller @264MHz (623DMIPS) ....................... 1
- Flash EEPROM (x32 internal) ..................................................... 4 MB
- RAM memory (x32 internal) ...................................................... 256 KB
- Synchronous SRAM (x32) (external) ......................................... 2 MB
- MRAM memory (x16) ............................................................... 512 KB
- Time keeper .............................................................................. 1

**Logging**
- Flash disk memory ...................................................................... 8 GB
- Logged channels ........................................................................ up to 1024
- 512 channels ACT and 512 channels STR/TLM
- Logging rate ................................................................................ up to 1 MB/s
- 512 KB/s ACT and 512 KB/s STR/TLM
- Sampling rate .............................................................................. up to 1 kHz

**Other Characteristics**
- Power supply ........................................................................... 8 to 16 V
- Operating temperature range (internal) ..................................... -20 to 85 °C
- Temperature range during data download .......................... 0 to 70 °C
- Protection class ........................................................................... IP 64
- Dimensions without connectors ......................................... 166 x 129 x 44.5 mm
- (*) Connector face
- Weight (approx.) ....................................................................... 1300 g

**Dimensions**

Dimensions in millimetres

![Dimensions Diagram](image)

**Application Schematics**

![Application Schematics](image)

**For further information, please contact:**

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Specifications are subject to change without prior notice
SDL is an evolution of Magneti Marelli successful HRDL-1 to increase logging performances (higher data throughput and logged channels number), the number of inputs (to allow a flexible set up) and to reduce the dimensions and weight.

SDL is intended to enhance the new Magneti Marelli data logger product range, started with RDL. SDL is a versatile data acquisition unit developed for racing applications which require high resolution data from a large number of channels. Interconnection with the box can be obtained using two CAN lines, while the Ethernet line is dedicated to data download.

SDL is provided with analogue inputs including: Single-ended, differential, temperatures and K-type thermocouple. Furthermore the device provides lap trigger and wheel speed inputs.

For further information or different solution, please contact our technical department.

Main Features

- 12 Single ended @ 12 bit resolution
- 4 Single ended @ 10 bit resolution
- 4 Differential @ 12 bit resolution (selectable gain: 1 or 100)
- 1 Pick-ups or Hall effect
- 4 Hall effect
- Up to 64 Mbyte logging memory
- Up to 300 logged channels
- Up to 40 kbyte/s logging rate
- Sampling rates up to 200 Hz
- 2 CAN communication buses
- 1 ARCNet line
- 1 Ethernet line

Benefits

- Data download via Ethernet link
- SW selectable NTC/PT1000 temperature sensor
- Floating point data management
- Direct management of Marelli dashboard display
- Pick-ups inputs for wheel speed and distance measurement
- Requires WinTAX4 analysis software
- Requires SYSMA logging setup tool
- Very compact design
- Robust design, easy to install

Typical Applications

- Professional circuit and rally applications
- One make race series
- Industrial application
- Formula series
Technical Characteristics

**Inputs**

Analogue Single-ended (@ 12 bit resolution) .......... 12
Analogue Single-ended (@ 10 bit resolution) .......... 4
Differential (*) (@ 12 bit resolution) ................. 4
K-type thermocouple ........................................... 2
NTC/PT1000 temperature sensor (selectable) ......... 4
NTC internal temperature sensor ......................... 1
VR Pick-ups or Hall effect .................................... 1
Hall effect ...................................................... 4
Lap trigger (**) ................................................. 1
"Code Load" enable pin ....................................... 1
Syncro (Iso9141) .............................................. 1
(*) Selectable gain: 1 or 100
(**) Configurable on request

**Outputs**

Voltage references ........................................... 4

**Communications**

CAN line (1 Mbit/s (***) ...................................... 2
Ethernet line (100 Mbit/s) ................................... 1
ARCNet line (10 Mbit/s) ...................................... 1
RS 232 ........................................................... 1

(***) Configurable on request

**Logic Core**

Microcontroller (80 MIPS RISC) ......................... 1
Flash E2PROM (microcontroller) ................. 1 Mbyte
RAM memory (microcontroller) .................. 48 Kbyte
RAM memory ................................................. 512 Kbyte
E2PROM ..................................................... 4 Kbyte
Time keeper .................................................. 1

**Logging**

Flash disk memory ..................................... 32 or 64 Mbyte
Logged channels ........................................ up to 300
Logging rate ............................................. up to 40 Kbyte/s
Sampling rate ........................................... up to 200 Hz

**Other Characteristics**

Power supply ............................................. 8 to 18 V
Operating temperature range (internal) .............. -40 to 85 °C
Temperature range during data download .......... 0 to 70 °C
Protection class ......................................... IP 54
Dimensions without connector ....................... 66 x 87 x 35.6 mm
Weight (approx.) ........................................... 230 g

Dimensions

Dimensions in millimetres

**Application Schematics**

For further information, please contact:

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Specifications are subject to change without prior notice
HRDL-14
Miniaturized high-performance racing data logger
Up to 1 Gbyte internal memory

Description
HRDL-14 is an evolution of Magneti Marelli successful DAS4 EVO to increase logging performance (higher data throughput and logged channels number), the number of Inputs (to allow a flexible set up) and to reduce the dimensions and weight.
HRDL-14 is intended to enhance the new Magneti Marelli data logger product range, started with RDL.
HRDL-14 is a versatile data acquisition unit developed for racing applications which require high resolution data from a large number of channels.
Interconnection with the box can be obtained using two CAN lines, a ARCNet line and a RS 232 line while a Ethernet line is dedicated to data download.
On the box is present a high performance RISC microcontroller.
HRDL-14 is provided with analogue inputs including: Single-ended, differential, temperatures and K-type thermocouple.
Furthermore the device provides lap trigger and wheel speed inputs.

Main Features
- 12 Single ended @ 12 bit resolution
- 4 Single ended @ 10 bit resolution
- 4 Differential @ 12 bit resolution (selectable gain: 1 or 100)
- 1 Pick-ups or Hall effect
- 4 Hall effect
- Up to 1 Gbyte internal data logger
- Up to 300 logged channels
- Up to 128 kbyte/s logging rate
- Sampling rates up to 1000 Hz
- 2 CAN communication buses
- 1 ARCNet line
- 1 Ethernet line

Benefits
- Data download via Ethernet link
- SW selectable NTC/PT1000 temperature sensor
- Floating point data management
- Direct management of Marelli dashboard display
- Pick-ups inputs for wheel speed and distance measurement
- Requires WinTAX4 analysis Requires SYSMA logging setup tool
- Very compact design
- Robust design, easy to install

Typical Applications
Professional circuit and rally applications
One make race series
Industrial application
Formula series
**Technical Characteristics**

**Inputs**
- Analogue Single-ended (@ 12 bit resolution) ............. 12
- Analogue Single-ended (@ 10 bit resolution) .......... 4
- Differential (*) (@ 12 bit resolution) .................. 4
- K-type thermocouple ...................................... 2
- NTC/PT1000 temperature sensor (selectable)........... 4
- NTC internal temperature sensor ...................... 1
- VR Pick-ups or Hall effect ................................ 4
- Hall effect ..................................................... 4
- Lap trigger (**) .............................................. 1
- "Code Load" enable pin ..................................... 1
- Syncro (ISO9141) ............................................ 1

* Selectable gain: 1 or 100
** Configurable on request

**Outputs**
- Voltage references ........................................ 4

**Communications**
- CAN line (1 Mbit/s (***) ) .................................. 2
- Ethernet line (100 Mbit/s) ............................... 1
- ARCNet line (10 Mbit/s) ................................. 1
- RS 232 .......................................................... 1

**Logic Core**
- Microcontroller (80 MIPS RISC) .......................... 1
- Flash E2PROM (microcontroller) ......................... 1 Mbyte
- RAM memory (microcontroller) ............................ 48 Kbyte
- RAM memory .................................................. 512 Kbyte
- E2PROM ....................................................... 4 Kbyte
- Time keeper .................................................. 1

**Logging**
- Flash disk memory ......................................... up to 1 Gbyte
- Logged channels ........................................... up to 300
- Logging rate ................................................. up to 128 Kbyte/s
- Sampling rate ............................................... up to 1000 Hz

**Other Characteristics**
- Power supply ............................................... 8 to 18 V
- Operating temperature range (internal) ............... -40 to 85 °C
- Temperature range during data download ............. 0 to 70 °C
- Protection class ............................................. IP 54
- Dimensions without connector ......................... 66 x 87 x 35.6 mm
- Weight (approx.) ............................................ 230 g

**Dimensions**

**Application Schematics**

---

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Specifications are subject to change without prior notice
Description

HDL-240 is the evolution of Magneti Marelli successful data logging modules that increase logging performances (higher data throughput and logged channels number) while reducing dimensions and weight.

HDL-240 is intended to provide a great data logging experience to the user. It works either in stand-alone mode or it can be inserted as expansion to new Racing dashboard family (FBO-D) working in perfect synergy.

HDL-240 is a versatile data acquisition unit developed for racing applications which require high resolution data from a large number of channels, either coming from internal measurements or via CAN or ETH lines.

HDL-240 deploys a modern high performance 32-bit CPU, low consumption, computational power of over 200 DMIPS with hw floating point support.

Main Features

- 16 Single ended @12bit / 2kHz sampling (*)
- 4 Differential @12bit / gain 100
- 2 Thermocouple @12bit
- 4 Temperature (PT1000/NTC)
- 2 Pick-ups, Hall effect or Rate sensor
- 4 Hall effect or Rate sensor
- 32 GByte internal disk for data recording
- Up to 768 logged channels
- Up to 200 kByte/s logging rate
- Sampling rates up to 2000 Hz
- 2x CAN 2.0B communication buses
- 4x Ethernet 100Mbit/s lines
- Three-axial 16g accelerometer
- Fully supported by SYSMA setup tool and WinTAX4 data analysis tool

Benefits

- Data download via Ethernet link
- upgrades HRDL logger with no loom changes (same connector/pinout)
- SW selectable NTC/PT1000 temperature sensor
- SW selectable VRS, Hall or Rate sensor
- Hardware accelerated floating point arithmetic
- Integrates seamlessly with Marelli dashboard displays
- Pick-ups inputs for wheel speed and distance measurement
- Compact design
- Robust design, easy to install

Typical Applications

Suitable for all types of cars and bikes race applications
One maker race series
Industrial application
Formula series

(*) for higher rates, please contact us.
**HDL-240**

High-performance racing data logger with up to 32 GByte internal memory and 4 port ethernet switch. -Available Soon-

### Technical Characteristics

**Inputs**
- Analogue Single-ended (12 bit) ..................................... 16
- Differential (12 bit, gain 100) ................................... 4
- K-type thermocouple (12 bit) ..................................... 2
- NTC/PT1000 temperature sensor (SW selectable) .......... 4
- NTC internal temperature sensor .................................. 1
- VRS Pick-up, Hall or Rate sensor (SW selectable) .......... 2
- Hall effect or Rate sensor (SW selectable) .................... 4
- Lap trigger pull-up/pull-down (SW selectable) ............... 2
- “Code Load” enable pin .................................................. 1

**Outputs**
- Voltage references (5.0V 70 mA max) ......................... 4
- Half Bridge Outputs (2A max current) ............................ 4

**Communications**
- CAN 2.0B lines (1 Mbit/s, SW selectable termination) .... 2
- Ethernet lines (100 Mbit/s) ............................................ 4
- RS 232 ............................................................................ 1

**Logic Core**
- Processor (32-bit CPU) ............................................... 1
- Flash ................................................. 2 MByte
- RAM memory (internal) ............................................. 256 kByte
- RAM memory (external) ............................................. 2 MByte
- E2PROM ............................................. 64 kByte
- Time keeper (with backup battery) .................. 1

**Logging**
- Flash disk memory ........................................... up to 32 GByte
- Logged channels ........................................... up to 768
- Logging rate ........................................... up to 200 kByte/s
- Sampling rate ........................................... up to 2000 Hz

**Other Characteristics**
- Connectors Male (Autosport Souriau)..................66pin size 18
- ........................................................................ 22pin size 12
- Power supply ............................................... 8 to 16 V
- Internal Operating temperature range .................. -20 to 85 °C
- Protection class .................................................. IP 65
- Dimensions without connector .......................... 90 x 110 x 30 mm
- Weight (approx.) ............................................ 200 gr

### Dimensions

**Dimensions in millimetres**

**Application Schematics**

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Description
ELB-110 module is an expansion of the engine control unit and it is aimed to store significant parameters of the specific engine life, which is fixed to.
It can be used for both car and motorbike racing applications.
The module, sealed or mechanically fixed on the engine, is able to send on CAN line the engine identification number and some specific information.
Its record capability can help the engine manufacturer control and analysis.

Main Features
- 4 Kbyte of EEPROM
- 1 CAN line

Benefits
- Easy data storing and reading
- CAN line encryption for proper connection between engine and ECU and protect the recorder data integrity
- High vibration and temperature resistance
- Impossible to open

Typical Applications
- All race applications
DATA LOGGER

ELB-110
Engine Log Book

Technical Characteristics

Inputs
NTC internal temperature sensor............................ 1
"Code Load" enable pin ........................................ 1

Communications
CAN line (1 Mbit/s (*)).............................................. 1

Other Characteristics
Power supply.......................................................... 8 to 16 V
Operating internal temperature ...................... -20 to 120 °C
Protection class..................................................... IP 64
Dimensions without connector and cable........ 50.5 x 77 x 31 mm
Weight (approx.).................................................... 145 g

Dimensions

Dimensions in millimetres

Cable Pin Out

<table>
<thead>
<tr>
<th>Wire Color</th>
<th>Signal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>VBATT_P</td>
<td>Battery Positive Terminal</td>
</tr>
<tr>
<td>Black</td>
<td>VBATT_N</td>
<td>Battery Negative Terminal</td>
</tr>
<tr>
<td>Yellow</td>
<td>CAN_L</td>
<td>Can Line - Low</td>
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<tr>
<td>Green</td>
<td>CAN_H</td>
<td>Can Line - High</td>
</tr>
<tr>
<td>White</td>
<td>ENCP</td>
<td>Enable Code Programming input</td>
</tr>
<tr>
<td>Brown</td>
<td>TERM_1</td>
<td>120Ω Can Termination Input 1</td>
</tr>
<tr>
<td>Orange</td>
<td>TERM_2</td>
<td>120Ω Can Termination Input 2</td>
</tr>
</tbody>
</table>

For further information, please contact:

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RFD is an extension box containing a compact flash allowing to extract quickly the data from the Data Logger (RDL, HRDL) or ECU with internal Data Logger (Marvel) and put them on a PC running Wintax.

Main Features
- Up to 4 Gbyte Removable flash card memory
- Up to 128 kbyte/s logging rate (via ARCNET)
- Up to 40 kbyte/s logging rate (via CAN)
- 1 CAN communication buses
- 1 Ethernet line
- 1 ARCNet line
- 1 RS 232

Benefits
- It’s possible take all data without the needed to be connected to the logger
- All data are immediately available
- Robust design, easy to install

Typical Applications
- Professional circuit and rally applications
- One make race series
- Formula series
DATA LOGGER

RFD
Remote Flash Disk

Technical Characteristics

**Communications**
- CAN line (1 Mbit/s (*))...................................................... 1
- ARCNet line (10 Mbit/s).................................................. 1
- Ethernet line (100 Mbit/s)............................................... 1
- RS232............................................................................. 1
(*) Configurable on request

**Logic Core**
- Microcontroller (80 MIPS RISC)....................................... 1
- Flash E2PROM (microcontroller).................................... 1 Mbyte
- RAM memory (microcontroller)..................................... 48 Kbyte
- RAM memory ................................................................ 512 Kbyte
- E2PROM ....................................................................... 64 Kbyte

**Logging**
- Removable flash card memory .................................. Up to 4 Gbyte
- Logging rate (via ARCNET) ........................................ Up to 128 Kbyte/s
- Logging rate (via CAN)................................................ Up to 40 Kbyte/s

**Other Characteristics**
- Power supply.......................................................... 9 to 18 V
- Operating temperature range (internal).................. -40 to 85 °C
- Dimensions without cable .................................... 108 x 79 x 26 mm
- Cable length................................................................. 0.3 m
- Weight (approx.).......................................................... 240 g

**Pin Out**

<table>
<thead>
<tr>
<th>Loom note</th>
<th>Colour</th>
<th>Description</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>Vbatt +</td>
<td>Supply</td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>Vbatt -</td>
<td>Supply</td>
<td></td>
</tr>
<tr>
<td>Gray</td>
<td>CAN +</td>
<td>Communication with RDL</td>
<td></td>
</tr>
<tr>
<td>Orange</td>
<td>CAN -</td>
<td>Communication with RDL</td>
<td></td>
</tr>
<tr>
<td>Yellow</td>
<td>Codeload</td>
<td>Internal use</td>
<td></td>
</tr>
<tr>
<td>Red</td>
<td>RS232 Rx</td>
<td>Internal use</td>
<td></td>
</tr>
<tr>
<td>Yellow</td>
<td>RS232 Tx</td>
<td>Internal use</td>
<td></td>
</tr>
<tr>
<td>Purple</td>
<td>ARCNet +</td>
<td>Communication with Marvel, HRDL</td>
<td></td>
</tr>
<tr>
<td>Brown</td>
<td>ARCNet -</td>
<td>Communication with Marvel, HRDL</td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>Eth TX +</td>
<td>Internal use</td>
<td></td>
</tr>
<tr>
<td>Green</td>
<td>Eth TX -</td>
<td>Internal use</td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>Eth RX +</td>
<td>Internal use</td>
<td></td>
</tr>
<tr>
<td>Orange</td>
<td>Eth RX -</td>
<td>Internal use</td>
<td></td>
</tr>
</tbody>
</table>

Dimensions

- Dimensions in millimetres

Application Schematics

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Specifications are subject to change without prior notice
Description

The FBO is a dashboard for use either as a stand-alone display unit, or as an integral part of a complete data acquisition and monitoring system for use in the demanding environment found in motorsports vehicles.

The compact dimensions of the FBO make it particularly suitable for car applications. The advanced features of the TFT colour display permits to configure windows with an easily personalised screen layout.

The FBO is a new generation dashboard with a particular attention to connectivity and new technologies. The on-board HW equipment provides all the required standard capabilities while provides a platform for future expansions through new firmware limited only by your imagination.

As part of the Magneti Marelli data acquisition and telemetry system, the FBO (with internal data logger) can communicate over a CAN network with a range of additional data loggers receiving and displaying data from the logger. The USB port can be enabled to log on a remote flash disk. On-board Wi-Fi and BLE connection modules (with internal antennas) allow a large variety of connections starting like PC/tablet link for setup and data analysis.

6 degrees IMU platform and GPS module included. A precise Lap-Trigger functionality based on the GPS module is available (Optional functionality).

Main Features

- 800x480 RGB Transmissive, TFT visible area 98.7 x 57.5mm
- 6.5” or 8.8”, 16:9 diagonal, 16.7M colors
- TFT viewing angle (U/D/L/R): 80/80/80/80°
- On display: bar graph, gear number, speed, lap time, best lap, lap number and many others information on several pages available
- 4 high-brightness warning lights green/red for gear change (with programmable threshold for each gear)
- 2 Single-ended
- 2 Single-ended / Digital Inputs
- 2 Digital Inputs
- 1 Lap Trigger input
- 1 Composite Video input for external camera
- 1 Microphone Input
- 1 Headphone Output
- Interface for secondary screen support
- 1 Internal 3 Axial accelerometer and GPS
- Up to 32Gbyte internal data logger
- USB for data recording on removable pendrive

Main Features

- Wi-Fi 802.11a/b/g/n and Bluetooth 4.0 connectivity
- 2 Can Lines 2.0B (1 Mbit/s)
- 1 Ethernet Line 100 Mbit/s
- 1 USB OTG 2.0 high speed
- 1 RS232 line

Benefits

- Data download via Ethernet link
- Transmit internal inputs and channels over CAN bus
- Easy to use and configure
- Robust design for rugged applications

Typical Applications

- All race applications
FBO
Dashboard with Data Logger, WiFi/Bluetooth, USB, inertial platform and GPS -Available Soon-

Technical Characteristics

**Inputs**
- Single-ended (@ 12 bit) .................................... Up to 4
- Differential microphone .................................... 1
- Internal GPS .................................................. 1
- Internal 3 axial accelerometer (up to 16 g) .......... 1
- Internal 3 axial gyroscope (250°/s) ...................... 1
- Digital Input (Remote push button) .................... Up to 4
- Lap Trigger ..................................................... 1
- “Code Load” enable pin ..................................... 1

**Outputs**
- Voltage references (@ 5 V, 50 mA) .................... 1
- Stereo Headphone ........................................... 1

**Video**
- Analog camera input (composite video) ............. 1
- Secondary Display 720p HD (external) 8bit LVDS .... 1
- Secondary Display 1280p HD (external) VGA ....... 1

**Led**
- Blue Alarm led .............................................. 4

**Communications**
- CAN line ..................................................... 2
- Ethernet line (10/100base T) ............................ 1
- USB (2.0 OTG) high speed ............................... 1
- 802.11a/b/g/n Wi-Fi 5GHz (internal antenna) ....... 1
- BT/BT Low Energy 4.0 (internal antenna) .......... 1
- RS232 line .................................................. 1

**Logic Core**
- ARM® Cortex®-A9 multicore (1000 DMIPS) ......... 1
- RAM DDR3 (x64) ........................................... 2 GByte
- e-MMC system disk ......................................... 4 GByte
- e-MMC Automotive disk (for data recording) ....... 32 GByte
- Time keeper* (external with Lithium battery) ....... 1
  (* with temperature compensated crystal)

**Connectors**
- Deutsch Auto sport AS114-35PN (37 Pin) ........... 1
- SMA (Male) for external monitor (720p HD) ....... 1
- SMA (Male) for camera input ........................... 1
- SMA (Male) for ANTENNA GPS ....................... 1

**Other Characteristics**
- Power supply ................................................ 8 to 16 V
- Operating internal temperature (Excl. Ethernet) -20/+85 °C
- Protection class ............................................. IP 64
- Visible area LCD .......................................... 98.7 x 57.5 mm
- Dimensions without wiring ............................. 155 x 95 x 30 mm
- Weight (approx.) ........................................... 505 g

**Logging**
- Flash disk memory ........................................ up to 32 GByte
- Logged channels .............................................. up to 768
- Logging rate .................................................. up to 200 kByte/s
- Sampling rate ............................................... up to 2000 Hz

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Specifications are subject to change without prior notice
The DDU 310-DL128 is a combined dashboard and input module for use either as a stand-alone display unit, or as an integral part of a complete data acquisition and monitoring system for use in the demanding environment found in motorsports vehicles.

The DDU 310-DL128 is equipped with a comprehensive range of analogue and digital inputs and ten-page liquid crystal display with configurable windows for an easily configured and personalised screen layout. A graphical bar indicator is typically used for representing engine revs.

A fast Ethernet bus is used for graphical layout load, channels’ configuration and data download. As part of the Magneti Marelli data acquisition and telemetry system, the DDU 310-DL128 (with internal data logger) can communicate over a CAN network with a range of additional data loggers receiving and displaying data from the logger as well functioning as an additional input module.

**Main Features**

- 5 Single-ended
- 1 Pick-ups or Hall effect
- 3 Hall effect
- 128 Mbyte internal data logger
- Up to 128 logged channels
- Up to 48 Kbyte/s logging rate
- Sampling rates up to 1000 Hz
- Page and channel name labels
- Transmit internal diagnostic over CAN bus
- 48 alarm channels with programmable thresholds
- Display dedicated to 48 internal channels
- Lap time message displayed on dedicated page
- PC interface via Ethernet for loading graphical layout
- Easy to use and configure by SYSMA tool
- Designed for rugged applications

**Benefits**

- TFT 6.2” transflective dot matrix color display
- Graphical engine revolution counter with configurable non-linear scale
- Alarm condition displays channel name and value (with priorities for multiple alarms)
- Backlight regulation (8 steps)
- Inputs configurable to suit all sensors in the product range
- 2 push-button on the front panel for page selection, alarm level set, rpm/speed conversions, message hold time
- 6 high-brightness warning lights yellow/red for gear change (with programmable threshold) and 2 blue for general alarm condition indication
- 2 outputs for external warning lamps with short-circuit protections
- Floating point data management
- Pick-up inputs for wheel speed and distance measurement

**Typical Applications**

- MotoGP
- Professional circuit and rally applications
- One make race series
- Race motorcycle application
- Touring car
## Technical Characteristics

### Inputs
- Single-ended ................................................................. 5
- NTC/PT1000 temperature sensor ........................................ 2
- NTC internal temperature sensor ..................................... 1
- VR Pick-ups or Hall effect (RPM) ..................................... 1
- Hall effect (wheelspeed) .................................................. 3
- On/Off digital (page scroll and confirm) ......................... 2
- Lap Trigger ................................................................. 2
- "Code Load" enable pin ................................................... 1

### Outputs
- Voltage references (@ 5 V) ............................................. 1
- Low-side (@ 12 V) .......................................................... 2
- Shift Lamp (adjustable brightness) ............................... 6
- Alarm (adjustable brightness) ........................................ 2

### Communications
- CAN line (1 Mbit/s (*) ) .................................................. 2
- Ethernet line (10/100base T) .......................................... 1
- RS232 ......................................................................... 1

(*) Configurable on request

### Logic Core
- Microcontroller A (80 MIPS RISC) ............................... 1
- Microcontroller B (64 MIPS RISC) ............................... 1
- FPGA (50k gates) ....................................................... 1
- Graphic display controller .......................................... 1
- DPR ................................................................. 32 Kbyte
- Flash E2PROM (microcontroller A) ......................... 1 Mbyte
- RAM memory (microcontroller A) ........................... 48 Kbyte
- Flash memory (microcontroller B) .......................... 512 Kbyte
- Ram memory (microcontroller B) .......................... 32 Kbyte
- Flash NV Ram ..................................................... 32 Mbyte
- RAM memory ....................................................... 512 Kbyte
- E2PROM ............................................................... 32 Kbyte
- Time keeper ............................................................ 1

### Logging
- Flash disk memory ................................................ 128 Mbyte
- Logged channels ................................................... up to 128
- Logging rate ........................................................... up to 48 Kbyte/s
- Sampling rate ........................................................ up to 1000 Hz

### Other Characteristics
- Power supply ........................................................ 10 to 18 V
- Operating internal temperature ......................... 0 to 60 °C
- Protection class ..................................................... IP 65
- Transflective dot matrix color display ................. TFT 6.2"

### Dimensions

**Without connector**
- 188 x 110 x 34.4 mm

**With connector**
- 188 x 110 x 59.2 mm

**Weight (approx.)**
- 580 g

---

## Application Schematics

**Stand-Alone Mode**

EXTERNAL INPUT

![Dashboard with Data Logger](image)

ETHERNET

(Direct and Configure)

DASHBOARD with DATA LOGGER

**CAN Communication Mode**

EXTERNAL INPUT

![Dashboard with Data Logger](image)

ETHERNET

(Direct and Configure)

DASHBOARD with DATA LOGGER

CAn BUS

ECU

ADDITIONAL DEVICE FOR DATA LOGGING

---

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Specifications are subject to change without prior notice
Description

The MDU 220 is a combined dashboard and input module for use either as a stand-alone display unit, or as an integral part of a complete data acquisition and monitoring system for use in the demanding environment found in motorsports vehicles.

The compact dimensions of the MDU 220 make it particularly suitable for motorbike applications. The advanced features of the LCD also make this product suitable for car applications.

The MDU is equipped with a comprehensive range of analogue and digital inputs and it is able to show any element on its display: a bar graph indicator is typically used to show engine revs, two fields are dedicated to show gear number and lap number, then four further fields have configurable labels, one of which allows the user to scroll a list of channels by a button. A final field allows to display the lap time or an alarm (with associated text label) or user configured text messages.

As part of the Magneti Marelli data acquisition and telemetry system, the MDU 220 can communicate over a CAN network with a range of data loggers receiving and displaying data from the logger as well functioning as an additional input module.

Main Features

- Visible area LCD 164 x 67.5 mm
- On display is shown: bar graph, gear number, speed, lap time, best lap, lap number
- 2 push-button on the front panel for page and bar graph selection, temporary alarm disable, brightness regulation
- 6 high-brightness warning lights green/yellow/red for gear change (with programmable threshold for each gear)
- 2 high-brightness warning blue leds and 4 RGB programmable leds for general alarm
- 6 Single-ended
- 3 Pick-ups or Hall effect
- 2 Temperature
- 2 Lap Triggers
- 1 Internal 3 Axial accelerometer

Benefits

- Bar graph with 2 configurable non-linear scale, manually selectable or automatically swapped by condition
- Available 8 brightness steps for backlight regulation
- Alarm channels with programmable thresholds and linkable to leds
- Inputs configurable to suit all sensors in the product range
- 1 output to manage an external warning lamp
- Transmit internal inputs and channels over CAN bus
- Easy to use and configure
- Designed for rugged applications

Typical Applications

- All race applications
**Technical Characteristics**

**Inputs**
- Single-ended (2 @ 12 bit) .........................................................6
- NTC/PT1000 temperature sensor .............................................2
- NTC internal temperature sensor .............................................1
- Internal 3 axial accelerometer (up to 6 g) ..................................1
- VR Pick-ups or Hall effect .......................................................3
- Remote push button ................................................................2
- Lap Trigger ...............................................................................2
- "Code Load" enable pin ..............................................................1

**Outputs**
- Voltage references (@ 5 V, 70 mA) ...........................................1
- External lamps driver ...............................................................1

**Leds**
- Green gear shift leds ..............................................................2
- Yellow gear shift leds .............................................................2
- Red gear shift leds ..................................................................2
- Blue alarm leds ......................................................................2
- RGB functions leds ..............................................................4
- 8 brightness steps for each leds

**Communications**
- CAN line (1 Mbit/s (*)) .............................................................2
- Ethernet line (10/100base T) ....................................................1

(*): 1 Configurable on request as Flex-Ray (10 Mbit/s)

**Logic Core**
- Microcontroller (64 MIPS RISC) ..............................................1
- Flash EPROM (microcontroller) ...............................................1 Mbyte
- RAM memory (microcontroller) .............................................48 Kbyte
- Flash EPROM .........................................................................32 Mbyte
- RAM memory .........................................................................32 Mbyte
- EEPROM .............................................................................32 Kbyte
- Time keeper ...........................................................................1

**Other Characteristics**
- Power supply .......................................................................8 to 18 V
- Max operating internal temperature (Excl. Ethernet) ..............85 °C
- Humidity ................................................................................5-95 %
- Visible area LCD.................................................................164 x 67.5 mm
- Dimensions
  - without connector .............................................................202 x 105 x 19 mm
  - with connector ....................................................................202 x 105 x 23 mm
- Weight (approx.) .................................................................400 g

**Dimensions**

**Application Schematics**

**STAND-ALONE MODE**

**EXTERNAL INPUT**

**ETHERNET**

(Configure)

**DASHBOARD**

**CAN COMMUNICATION MODE**

**EXTERNAL INPUT**

**DASHBOARD**

**CAN BUS**

**DATA LOGGER**

**ETHERNET**

(Configure)
Description

The MDU 230 is a combined dashboard and input module for use either as a stand-alone display unit, or as an integral part of a complete data acquisition and monitoring system for use in the demanding environment found in motorsports vehicles.

The compact dimensions of the MDU 230 make it particularly suitable for motorcycle applications. The advanced features of the LCD also make this product suitable for car applications.

The MDU is equipped with a comprehensive range of analogue and digital inputs and it is able to show any element on its display: a bar graph indicator is typically used to show engine revs, three fields are dedicated to show gear number and lap number and lap time, then two further fields have configurable labels. A dot matrix area can show up to 11 pages (one of them shows date and time) which can display from 1 to 8 channels each. The alarm are visualized in a further page of the dot matrix.

As part of the Magneti Marelli data acquisition and telemetry system, the MDU 230 can communicate over a CAN network with a range of data loggers receiving and displaying data from the logger as well functioning as an additional input module.

Available also a version with integrated GPS: MDU 230-G

Main Features

- Visible area LCD 164 x 67.5 mm
- Dot matrix area resolution: 132 x 64 dots
- On display is shown: bar graph, gear number, speed, lap time, best lap, lap number and 11 pages available in the dot matrix area
- 2 push-button on the front panel for page and bar graph selection, temporary alarm disable, brightness regulation
- 6 high-brightness warning lights green/yellow/red for gear change (with programmable threshold for each gear)
- 2 high-brightness warning blue leds and 4 RGB programmable leds for general alarm
- 6 Single-ended
- 3 Pick-ups or Hall effect
- 2 Temperature
- 2 Lap Triggers
- 1 Internal 3 Axial accelerometer

Benefits

- Bar graph with 2 configurable non-linear scale, manually selectable or automatically swapped by condition
- Available 8 brightness steps for backlight regulation
- Alarm channels with programmable thresholds and linkable to leds
- Inputs configurable to suit all sensors in the product range
- 1 output to manage an external warning lamp
- Transmit internal inputs and channels over CAN bus
- Easy to use and configure
- Designed for rugged applications

Typical Applications

- All race applications
**MDU 230**

Data display unit – LCD
Alphanumeric and Dot matrix area

---

### Technical Characteristics

**Inputs**
- Single-ended (2 @ 12 bit) ......................................................... 6
- NTC/PT1000 temperature sensor ............................................. 2
- Internal 3 axial accelerometer (up to 6 g) ............................. 1
- VR Pick-ups or Hall effect ...................................................... 3
- Remote push button .............................................................. 2
- Lap Trigger ........................................................................... 2
- “Code Load” enable pin .......................................................... 1

**Outputs**
- Voltage references (@ 5 V, 70 mA) ........................................... 1
- External lamps driver............................................................. 1

**Leds**
- Green gear shift leds ............................................................ 2
- Yellow gear shift leds ............................................................ 2
- Red gear shift leds ................................................................ 2
- Blue alarm leds ................................................................... 2
- RGB functions leds .............................................................. 4
- 8 brightness steps for each leds

**Communications**
- CAN line (1 Mbit/s (*)) ......................................................... 2
- Ethernet line (10/100base T) .................................................. 1
- (*) 1 Configurable on request as Flex-Ray (10 Mbit/s)

**Logic Core**
- Microcontroller (64 MIPS RISC) ............................................. 1
- Flash EPROM (microcontroller) ............................................. 1 Mbyte
- RAM memory (microcontroller) ........................................... 48 Kbyte
- Flash EPROM ................................................................. 32 Mbyte
- RAM memory ................................................................. 32 Mbyte
- E2PROM .......................................................................... 32 Kbyte
- Time keeper .................................................................... 1

**Other Characteristics**
- Power supply ................................................................. 8 to 18 V
- Max operating internal temperature (Excl. Ethernet) ............ 85 °C
- Humidity ....................................................................... 5-95 %
- Visible area LCD ........................................................... 164 x 67.5 mm
- Dimensions
  - without connector ...................................................... 202 x 105 x 19 mm
  - with connector .......................................................... 202 x 105 x 23 mm
- Weight (approx.) ............................................................... 400 g

---

### Dimensions

**Dimensions in millimetres**

**Application Schematics**

**STAND-ALONE MODE**

**CAN COMMUNICATION MODE**

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Specifications are subject to change without prior notice
Description

The MPDU is a combined dashboard and input module for use either as a stand-alone display unit, or as an integral part of a complete data acquisition and monitoring system for use in the demanding environment found in motorsports vehicles.

The compact dimensions of the MPDU make it particularly suitable for car applications. The advanced features of the TFT colour display permits to configure windows with an easily personalised screen layout.

The MPDU is equipped with a comprehensive range of analogue and digital inputs. The graphical bar indicator is typically used for representing engine revs.

The alarms are visualized in a special page.

As part of the Magneti Marelli data acquisition and telemetry system, the MPDU (with internal data logger) can communicate over a CAN network with a range of additional data loggers receiving and displaying data from the logger as well functioning as an additional input module. The USB port can be enabled to log on a remote flash disk (Optional functionality).

GPS module included. A precise Lap-Trigger functionality based on the GPS module is available (Optional functionality).

Main Features

- Visible area TFT 98.7 x 57.5 mm
- 4.3", 16:9 diagonal, viewing angle (U/D/L/R): 80/80/80/80 up to 16.7 M colors
- On display is shown: bar graph, gear number, speed, lap time, best lap, lap number and many others information on 12 pages available
- 4 push-button on the front panel for page and bar graph selection, temporary alarm disable, brightness regulation
- 6 high-brightness warning lights green/red for gear change (with programmable threshold for each gear)
- 4 high-brightness warning blue leds
- 6 Single-ended
- 2 Pick-ups or Hall effect
- 2 Temperature
- 2 Digital Inputs
- 2 Lap Triggers
- 1 Internal 3 Axial accelerometer and GPS
- Up to 8Gbyte internal data logger
- 2 Outputs for external warning lamps
- 2 Can Line
- 1 Ethernet Line
- 1 USB (2.0 HS)
- 1 RS232 line (connected to nVIDIA card)

Benefits

- Bar graph with 2 configurable non-linear scale, manually selectable or automatically swapped by condition
- Available 8 brightness steps for backlight regulation
- Alarm channels with programmable thresholds and linkable to leds
- Inputs configurable to suit all sensors in the product range
- Transmit internal inputs and channels over CAN bus
- Easy to use and configure
- Designed for rugged applications
- Requires WinTAX4 analysis software
- Requires SYSMA logging setup tool

Typical Applications

- All race applications
**Technical Characteristics**

**Inputs**
- Single-ended (@ 12 bit)................................. 6
- NTC/PT1000 temperature sensor........................ 2
- Internal GPS.............................................. 1
- Internal 3 axial accelerometer (up to 16 g).......... 1
- VR Pick-ups or Hall effect................................ 2
- Digital Input (Remote push button)..................... 2
- Lap Trigger............................................... 2
- “Code Load” enable pin................................. 1

**Outputs**
- Voltage references (@ 5 V, 50 mA)..................... 1
- External lamps driver (@ 12 V, 150 mA)............... 2

**Leds**
- Green RPM shift leds .................................. 4
- Red RPM shift leds ...................................... 2
- Blue Alarm leds .......................................... 4

**Communications**
- CAN line.................................................. 2
- Ethernet line (10/100 base T)............................ 1
- USB (2.0 HS)............................................... 1
- RS232 line.................................................. 1

**Logic Core**
- Microcontroller (150 DMIPS)........................... 1
- Flash EPROM (microcontroller)........................ 1 Mbyte
- RAM memory (microcontroller).......................... 132 Kbyte
- ARM CortexA9 Dual Core @600 MHz.................... 1
- DDR2 @333 MHz (x32) (on board)...................... 1 Gbyte
- NAND Flash memory ...................................... 512 Mbyte
- e-MMC Automotive memory .............................. Up to 8 Gbyte
- Time keeper (microcontroller)......................... 1

**Connectors**
- Deutsch Auto sport AS114-35PN (37 Pin) ............. 1
- USB-A Female ............................................. 1
- SMA (Male) for ANTENNA GPS.......................... 1

**Other Characteristics**
- Power supply.......................................... 8 to 16 V
- Operating internal temperature (Excl. Ethernet) -20/+85 °C
- Protection class........................................ IP 40
- Visible area LCD ....................................... 98.7 x 57.5 mm
- Dimensions without wiring ............................. 155 x 95 x 30 mm
- Weight (approx.) ........................................ 505 g
- (** approximately 28 cm wiring included)

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Specifications are subject to change without prior notice
DESCRIPTION

The MPDU-I is a combined dashboard and input module for use either as a stand-alone display unit, or as an integral part of a complete data acquisition and monitoring system for use in the demanding environment found in motorsports vehicles.

The compact dimensions of the MPDU-I make it particularly suitable for car applications. The advanced features of the TFT colour display permits to configure windows with an easily personalised screen layout.

The MPDU-I is equipped with a comprehensive range of analogue and digital inputs. The graphical bar indicator is typically used for representing engine revs.

The alarms are visualised in a special page.

As part of the Magneti Marelli data acquisition and telemetry system, the MPDU-I can communicate via CAN network with the Magneti Marelli data loggers receiving and displaying data from the logger as well functioning as an additional input module.

MAIN FEATURES

- Visible area TFT 98.7 x 57.5 mm
- 4.3”, 16:9 diagonal, viewing angle (U/D/L/R): 80/80/80/80 up to 16.7 M colors
- On display is shown: bar graph, gear number, speed, lap time, best lap, lap number and many others information on 12 pages available
- 4 push-button on the front panel for page and bar graph selection, temporary alarm disable, brightness regulation
- 6 high-brightness warning lights green/red for gear change (with programmable threshold for each gear)
- 4 high-brightness warning blue leds
- 5 Single-ended
- 1 Temperature
- 2 Digital Inputs
- 1 Lap Triggers
- 1 Internal 3 Axial Accelerometer
- 1 Can Line
- 1 Ethernet Line

BENEFITS

- Bar graph with 2 configurable non-linear scale, manually selectable or automatically swapped by condition
- Available 8 brightness steps for backlight regulation
- Alarm channels with programmable thresholds and linkable to leds
- Inputs configurable to suit all sensors in the product range
- Transmit internal inputs and channels over CAN bus
- Easy to use and configure
- Designed for rugged applications

TYPICAL APPLICATIONS

- All race applications
# Technical Characteristics

### Inputs
- Single-ended (@ 12 bit) .............................................. 5
- NTC/PT1000 temperature sensor ............................. 1
- NTC internal temperature sensor ............................. 1
- Internal 3 axial accelerometer (up to 16 g) .............. 1
- Lap Trigger ................................................................. 1
- Digital Input (Remote push button) ......................... 2
- “Code Load” enable pin .............................................. 1

### Outputs
- Voltage references (@ 5 V, 50 mA) ......................... 1

### Leds
- Green RPM shift leds ................................................. 4
- Red RPM shift leds ..................................................... 2
- Blue Alarm leds .......................................................... 4

### Communications
- CAN line ..................................................................... 1
- Ethernet line (10/100base T) ................................. 1

### Logic Core
- Microcontroller (150 DMIPS) ...................................... 1
- Flash EPROM (microcontroller) ............................... 1 Mbyte
- RAM memory (microcontroller) ............................... 132 Kbyte
- ARM CortexA9 Dual Core @600MHz ......................... 1
- DDR2 @333MHz (x32) (on board) ............................. 1 Gbyte
- NAND Flash memory ............................... 512 Mbyte
- Time keeper (Microcontroller) ....................... 1

### Connectors
- 192922-1280 ITT-CANNON (19 Pin) ......................... 1
- Ethernet 192922-1190 ITT-CANNON (4 Pin) .............. 1

### Other Characteristics
- Power supply ..................................................... 8 to 16 V
- Operating internal temperature (Excl. Ethernet) -20/+85 °C
- Protection class .................................................... IP 40
- Visible area LCD ......................................... 98.7 x 57.5 mm
- Dimensions without wiring ..................................... 155 x 95 x 30 mm
- Weight (approx.) (**) .................. 480 g
  (**) approximately 28 cm wiring included

### Dimensions

**Stand-alone mode**
- External input
- Ethernet
- Dashboard

**Data Logger**
- CAN
- External input
- Data Logger

**CAN Communication mode**
- CAN
- External input
- Ethernet
- Dashboard

**Application Schematics**

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AUXILIARY MODULES
Description

The AMG-1200-14 is a high specification analogue expansion module for use with Magneti Marelli data loggers and ECUs. The unit has 4 differential analogue inputs with hardware gain for K-type thermocouple, 16 single-ended, 1 Pick-ups and 4 Hall effect. Data analysis is done with 10 and 12 bit A/D. The module communicates over the CAN bus and has a sampling frequency up to 200 Hz for each of channels using a configurable software.

Main Features

- 12 Single ended @ 12 bit resolution
- 4 Single ended @ 10 bit resolution
- 4 Differential @ 12 bit resolution (selectable gain: 1 or 100)
- 1 Pick-ups or Hall effect
- 4 Hall effect
- 2 CAN communication buses
- Setup via Ethernet line

Benefits

- Floating point data management
- More inputs for ECU and Data Logger
- High precision
- ID customizable (using CAN PCMCIA)
- Easy to use and configure
- Robust design and easy to install

Typical Applications

Formula application
Professional circuit and rally applications
Race motorcycle application
Touring car
**Technical Characteristics**

**Inputs**
- Analogue Single-ended (@ 12 bit resolution) ............. 12
- Analogue Single-ended (@ 10 bit resolution) .................. 4
- Differential (*) (@ 12 bit resolution) ......................... 4
- K-type thermocouple ............................................. 2
- NTC/PT1000 temperature sensor (selectable) .............. 4
- NTC internal temperature sensor ......................... 1
- VR Pick-ups or Hall effect .................................. 1
- Hall effect ...................................................... 4
- "Code Load" enable pin ..................................... 1
- Syncro (Iso9141) ........................................... 1

(*) Selectable gain: 1 or 100

**Outputs**
- Voltage references ........................................... 4

**Communications**
- CAN line (1 Mbit/s (***) ) .................................. 2
- Ethernet line (100 Mbit/s) .................................. 1

(***) Configurable on request

**Logic Core**
- Microcontroller (80 MIPS RISC) .......................... 1
- Flash E2PROM (microcontroller) .......................... 1 Mbyte
- RAM memory (microcontroller) ......................... 48 Kbyte
- RAM memory .................................................. 512 Kbyte
- E2PROM .......................................................... 4 Kbyte

**Other Characteristics**
- Power supply ................................................. 8 to 18 V
- Operating temperature range (internal) ................. -40 to 85 °C
- Temperature range during data download .............. 0 to 70 °C
- Protection class .................................................. IP 54
- Dimensions without connector ......................... 66 x 87 x 35.6 mm
- Weight (approx.) ............................................... 230 g

**Dimensions**

**Application Schematics**

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Description

The Lambda Box (AML-140) is a compact and lightweight conditioning unit for 4 linear oxygen sensors of the UEGO type and 2 K-type thermocouples designed to measure engine air to fuel ratio and exhaust gas temperature.

It’s compatible both with NGK UEGO sensor and with Bosch UEGO sensor (tuning necessary).

The compact dimensions allow easy installation not only on the dyno but also on the tight space available on a vehicle.

A smart management of sensor heaters reduces significantly current consumption and avoids use of larger batteries.

The air to fuel and temperature data may be transmitted to Marelli ECU’s by means of a CAN 2.0 communication line (contact factory for additional information).

Main Features

- Compact dimensions
- External lambda heater enable available

Benefits

- Compatible both with NGK UEGO sensor and with Bosch UEGO sensor (tuning necessary)
- On car measures possible
- Possible comparison between dyno and car
- 4 channels allow measure of individual (cylinder per cylinder) lambda values, and the average on tail pipe
- Engine cylinder bank selection is available

Typical Application

Racing and production vehicles
Dyno or car installation possible
AML-140
Oxygen sensor interface

Technical Characteristics

**Inputs**
- Linear Lambda sensor (@ 12 bit resolution) (*) ............. 4
- Digital (engine bank selection) .................................. 1
- Differential (@ 12 bit resolution) .............................. 2
- NTC internal temperature sensor ......................... 1
- “Code Load” enable pin ....................................... 1
- Lambda heater enable ......................................... 1
  (*) Compatible both with NGK UEGO sensor and with
  Bosch UEGO sensor (tuning necessary)

**Outputs**
- Lambda heater drivers........................................... 4

**Communications**
- CAN line (1 Mbit/s (**)) ......................................... 1
  (***) Configurable on request

**Logic Core**
- Microcontroller (132 MHz) .................................... 1
- Flash (microcontroller) ......................................... 1.5 Mbyte
- RAM memory (microcontroller) ............................. 64 Kbyte

**Other Characteristics**
- Power supply ............................................... 8 to 18 V
- Operating temperature ...................................... -20 to 85 °C
- Electrical consumption without load (typ.) ............. 200 mA
- Electrical consumption without load (max.) .......... 350 mA
- Electrical consumption each lambda heater (max.) ... 3 A
- Protection class .............................................. IP 64
- Dimensions without connectors ......................... 45 x 58 x 30 mm
- Weight ......................................................... 130 g

Dimensions

Dimensions in millimetres

Application Schematics

ECU

CAN

4 UEGO
2 TcK

LAMBDA BOX
Description

The AMA-1C1 is a high specification analogue expansion module for use with Magneti Marelli data loggers and ECUs in car and motorbike applications.

The unit has 12 single-ended inputs at 12 bit resolution.

The module has an input sampling frequency software configurable up to 1 kHz using a configurable anti aliasing software filter.

Main Features

- 12 Single-ended inputs @ 12 bit resolution
- 1 CAN communication bus
- 1 Flexray line
- Transmission data through CAN and Flexray line

Benefits

- Floating point data management
- More inputs for ECU and Data Logger
- High precision
- Easy to use and configure
- Robust design and easy to install

Typical Applications

Car and motorbike racing applications
AUXILIARY MODULES

AMA-1C1
Analogue acquisition module

Technical Characteristics

Inputs
- Single-ended (@ 12 bit resolution) ......................... 8
- Digital ............................................................... 2
- NTC internal temperature sensor .......................... 1
- “Code Load” enable pin ....................................... 1
- Syncro (1 High frequency) .................................... 3

Outputs
- Voltage references (5 V) ...................................... Up to 3
- Protected VBAT output ......................................... 1

Communications
- CAN line (1 Mbit/s) ........................................... 1
- Flexray (10 Mbit/s) (2 wires) ................................ 1

Logic Core
- Microcontroller (130 MIPS RISC) ......................... 1
- Flash E2PROM (microcontroller) ............................ 2 Mbyte
- RAM memory (microcontroller) ............................. 64 Kbyte

Other Characteristics
- Power supply .................................................. 8 to 16 V
- Operating internal temperature ...................... -20 to 85 °C
- Electrical consumption without load (typ.) ........... 120 mA
- Electrical consumption without load (max. 8 V) ....... 160 mA
- Protection class .................................................... IP 54
- Connectors ........ MWDM2L-37SCBRR4M-150 (37 ways)

Dimensions
- without connector ........................................ 50 x 60 x 21.5 mm
- Weight (approx.) ............................................... 90 g

Dimensions in millimetres

Application Schematics

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Specifications are subject to change without prior notice
Description

CPS-220 (Car Positioning System) is an integrated measurement unit with internal GPS. It can be used in car and motorbike racing applications.

Main Features

- Internal GPS
- 2 Digital output (1 available for trigger on finish line - the information is based on GPS)
- 2 Single-ended

Benefits

- GPS RAM backup battery available
- Fast GPS synchronization
- Analog Acquisition
- Microcontroller MPC5553 ensures high performance (including digital signal processing instructions)

Typical Applications

All race applications
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CPS-220
Car positioning system

Technical Characteristics

Inputs
Single-ended (@ 12 bit resolution) .................. 2
NTC internal temperature sensor .................. 1
"Code Load" enable pin ............................. 1

Outputs
Digital ...................................................... 2

Communications
CAN line (1 Mbit/s (‘)) ................................. 1
(*) Configurable on request

Other Characteristics
Power supply ........................................... 8 to 16 V
Operating internal temperature ................... 85 °C
Protection class ....................................... IP 64
Dimensions without connector and cable .......... 80 x 55 x 25.6 mm
Cable length (min.) .................................... 500 mm
Weight (with cable) .................................... 152 g

Cable Pin Out

<table>
<thead>
<tr>
<th>Pin Out CPS-220 (Cable)</th>
<th>Function</th>
<th>wire</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inputs</td>
<td></td>
<td></td>
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<tr>
<td>Single ended 12bit</td>
<td>2</td>
<td>2</td>
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<tr>
<td>Outputs</td>
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<tr>
<td>Digital output</td>
<td>2</td>
<td>2</td>
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<tr>
<td>Communication</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAN line</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td></td>
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<tr>
<td>VBAT</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>ENCP</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Analog ground</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

Dimensions

Dimensions in millimetres

For further information, please contact:

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Description

GIP-220 (GPS Inertial Platform) is an integrated measurement unit with internal GPS. It consists of three axial accelerometer and three gyroscopes.

It can be used in car and motorbike racing applications.

In case of motorbike application, the bank angle estimation can be performed. Measurement must be supported by vehicle speed information.

Main Features

- 3 internal accelerometer (up to 6 g)
- 3 internal gyroscope (up to 150 °/s)
- Internal GPS
- 2 Digital output (1 available for trigger on finish line - the information is based on GPS)
- 2 Single-ended

Benefits

- GPS RAM backup battery available
- Fast GPS synchronization
- Analog Acquisition
- Measure of X, Y and Z accelerations
- Measure of Pitch, roll and yaw rates
- Estimation of bike’s Bank Angle (*)
- Microcontroller MPC5553 ensures high performance (including digital signal processing instructions)

(*) for proper computation mandatory installation must be respected (see below)

Typical Applications

All race applications
GIP-220
GPS Inertial platform

Technical Characteristics

Inputs
- Single-ended (@ 12 bit resolution) ............................................ 2
- NTC internal temperature sensor ......................................... 1
- Internal accelerometer (up to 6 g) ........................................ 3
- Internal gyroscope (up to 150 °/s) ......................................... 3
- “Code Load” enable pin ......................................................... 1

Outputs
- Digital ......................................................................................... 2

Communications
- CAN line (1 Mbit/s (*)) .......................................................... 1

(*) Configurable on request

Other Characteristics
- Power supply ........................................................................ 8 to 16 V
- Max operating internal temperature ....................................... 85 °C
- Protection class ....................................................................... IP 64
- Cable length (min.) ................................................................. 50 cm
- Dimensions without connector and cable ............................ 80 x 55 x 25.6 mm
- Weight (with cable) ................................................................. 152 g

Dimensions

- Dimensions in millimetres

- Installation

Mounting
- It is suggested to fix the case by the use of silent block or Velcro for shock absorbing
- It is suggested to be mounted as closed as possible to the COG (Centre Of Gravity)

Orientation
- Main surface must be parallel to the ground
- X, Y and Z axis directions must be respected, as shown in the following picture, with the X axis positive versus to the motorbike forward direction and Z positive versus to the top direction

NOTE: the described orientation is mandatory for proper computation of bank angle

Cable Pin Out

<table>
<thead>
<tr>
<th>Pin Name</th>
<th>Wire Colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>IN SE_1</td>
<td>Brown</td>
</tr>
<tr>
<td>IN SE_2</td>
<td>Violet</td>
</tr>
<tr>
<td>SYNC_1</td>
<td>Orange</td>
</tr>
<tr>
<td>SYNC_2</td>
<td>Yellow</td>
</tr>
<tr>
<td>CAN line - High</td>
<td>Green</td>
</tr>
<tr>
<td>CAN line - Low</td>
<td>Blue</td>
</tr>
<tr>
<td>Power GND</td>
<td>Black</td>
</tr>
<tr>
<td>Analog ground</td>
<td>White</td>
</tr>
<tr>
<td>ENCP</td>
<td>Grey</td>
</tr>
</tbody>
</table>

For further information, please contact:

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**Description**

IPS160 (Inertial Platform System) is an integrated inertial measurement unit improved to be suitable to major stresses of high performance race vehicle in terms of vibration and temperature.

IPS160 incorporates redundant (double) inertial platform having 3-axial accelerometers and 3-axial gyroscopes each; it provides reliable measures even in harsh environments, like high temperature (up to 105°C) or vibration peaks (over 56g peak-to-peak) without any saturation or resonance.

Double CAN communication lines give a fully redundant system, while SW selectable terminations ease loom design/installation.

IPS has its sensors calibrated for offset and gain over temperature.

IPS provides all independent sensor measures as well as advanced measure data fusion of all sensors in order to provide the best and stable acceleration/angular rate measure.

For motorbike application, the bank angle estimation is performed (vehicle speed information has to be provided to the device via CAN Line).

IPS160 mechanical design and loom it back-compatible to Magneti Marelli DIP120 module, making very easy to switch device seamlessly.

**Main Features**

- 2 internal 3-axial accelerometer (scale up to 55 g)
- 2 internal 3-axial gyroscope (scale from 250 °/s, up to 2000 °/s)
- 2 CAN lines

**Benefits**

- Redundant sensors and CAN lines for higher reliable, fault tolerant vehicle design
- Measure of X, Y and Z accelerations
- Measure of pitch, roll and yaw angular rates
- Enhanced measures by means of redundant sensors reading
- Estimation of bike’s Bank Angle (*)
- SW selectable signal bandwidth
- Programmable CAN packets layout
- Power-up self-test and failure diagnostics

(*) for proper computation mandatory installation must be respected (see manual)

**Typical Applications**

All race applications
Vehicle attitude estimation
IPS160
6-axes Inertial Platform System
with full sensor redundancy
-Available Soon-

Technical Characteristics

Inputs
Accelerometer (1mg @ FS 50 g) ......................... 2x 3 axes
Gyroscope (0.01°/s @ FS 250°/s) ...................... 2x 3 axes
Internal microcontroller temperature ................ 1
Internal board temperature ............................. 2
VBATT reading ........................................... 1

Communications
CAN line (1 Mbit/s) with sw selectable termination .... 2

Other Characteristics
Power supply .............................................. 8 to 18 V
Operating internal temperature range ................ 10°C - 105°C
Vibrations range tested ................................. 20g RMS (sin 50-2kHz)
Accelerometer stability ................................... 0.5mg/°C
Gyro stability .............................................. 0.01°/s/°C
Protection class .......................................... IP65
Cable length (min.) ...................................... 50 cm
Max dimensions (without cable) ....................... 38.5 x 50.5 x 16 mm
Weight (with cable) ...................................... 100g

Dimensions

Dimensions in millimetres

33.5
16
51.5

Installation

Mounting
- It may be advisable to fix the case by the use of silent block for shock absorbing
- It is suggested to be mounted as closed as possible to the COG (Centre Of Gravity)
- In general, mounting affects measures quality and overall precision. It is advised to design and verify it carefully

Orientation
- Main surface must be parallel to the ground
- X, Y and Z axis directions must be respected, as shown on module case

NOTE: the described orientation is mandatory for proper computation of bank angle

Cable Pin Out

IPS160 pin out: 8STA61035PN

<table>
<thead>
<tr>
<th>Function</th>
<th>Pin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication</td>
<td></td>
</tr>
<tr>
<td>CAN IMU1 line - High</td>
<td>5</td>
</tr>
<tr>
<td>CAN IMU1 line - Low</td>
<td>6</td>
</tr>
<tr>
<td>CAN IMU2 line - High</td>
<td>12</td>
</tr>
<tr>
<td>CAN IMU2 line - Low</td>
<td>13</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td></td>
</tr>
<tr>
<td>VBATT</td>
<td>1</td>
</tr>
<tr>
<td>Power GND</td>
<td>2</td>
</tr>
<tr>
<td>VBATT</td>
<td>11</td>
</tr>
<tr>
<td>Power GND</td>
<td>10</td>
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<tr>
<td>Not Used</td>
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</tr>
<tr>
<td>NC</td>
<td>3</td>
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<tr>
<td>NC</td>
<td>4</td>
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<td>NC</td>
<td>7</td>
</tr>
<tr>
<td>NC</td>
<td>8</td>
</tr>
<tr>
<td>NC</td>
<td>9</td>
</tr>
</tbody>
</table>

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Description

DIP-120 (Dual Inertial Platform) is an integrated measurement unit improved to be suitable to major stresses of high performance race vehicle.

It’s provided by two inertial platform having three axial accelerometers and three gyroscopes each one.

Voltage supply and Communication Line (CAN) also have been doubled to get a fully redundant system.

It can be used in car and motorbike racing applications. In case of motorbike application, the bank angle estimation can be performed. Measurement must be supported by vehicle speed information to the device via CAN Line.

Main Features

- 2 x 3 internal accelerometer (up to 55 g)
- 2 x 3 internal gyroscope (up to 250 °/s)
- 2 CAN lines
- 2 separated and dedicated supply lines

Benefits

- Doubled system supplying full recovery
- Measure of X, Y and Z accelerations
- Measure of Pitch, roll and yaw rates
- Estimation of bike’s Bank Angle (*)

(*) for proper computation mandatory installation must be respected (see below)

Typical Applications

All race applications
AUXILIARY MODULES

DIP-120
Dual inertial platform

Technical Characteristics

Inputs
NTC internal temperature sensor................................. 1
Internal accelerometer (up to 55 g)............................. 6
Internal gyroscope (up to 250 °/s)............................... 6

Communications
CAN line (1 Mbit/s).................................................... 2

Other Characteristics
Power supply..................................................... 8 to 18 V
Max operating internal temperature......................... 80 °C
Vibrations range tested........................................... 10 g
Protection class.................................................. IP 65
Cable length (min.)................................................ 50 cm
Dimensions (max outline)
without cable.................................................. 55.5 x 50.5 x 33.5 mm
Weight (with cable)................................................. 133 g

Dimensions

Installation

Mounting
- It is suggested to fix the case by the use of silent block or Velcro for shock absorbing
- It is suggested to be mounted as closed as possible to the COG (Centre Of Gravity)

Orientation
- Main surface must be parallel to the ground
- X, Y and Z axis directions must be respected, as shown on module case (see the picture)

NOTE: the described orientation is mandatory for proper computation of bank angle

Cable Pin Out

<table>
<thead>
<tr>
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<th>Pin</th>
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<td>12</td>
</tr>
<tr>
<td>CAN IMU2 line - Low</td>
<td>13</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td></td>
</tr>
<tr>
<td>VBATT IMU1</td>
<td>1</td>
</tr>
<tr>
<td>Power GND IMU1</td>
<td>2</td>
</tr>
<tr>
<td>VBATT IMU2</td>
<td>11</td>
</tr>
<tr>
<td>Power GND IMU2</td>
<td>10</td>
</tr>
<tr>
<td>Not Used</td>
<td></td>
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<tr>
<td>NC</td>
<td>3</td>
</tr>
<tr>
<td>NC</td>
<td>4</td>
</tr>
<tr>
<td>NC</td>
<td>7</td>
</tr>
<tr>
<td>NC</td>
<td>8</td>
</tr>
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<td>9</td>
</tr>
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Specifications are subject to change without prior notice
Description

The AMC 6 ENC slew box is a six potentiometer-like encoders device with a serial interface for connection to a PC allowing rapid calibration of fundamental engine parameters controlled by the ECU.

All potentiometer are programmable with our PC Tools. As default configuration, injection time and spark advance are adjusted with two large knobs allowing smooth and precise regulation, a big central one is reserved for additional regulations (e.g. turbo pressure), three little knobs are for injection phase of the high and low injection banks and additional function (AUX1), defined by the application software on specific requests.

The encoders have the advantage that user doesn’t need to “zero” the knob position from a point to the subsequent, allowing a faster engine mapping.

The AMC 6 ENC contains the current loop/RS 232 interface which connects the PC directly to the ECU and retransmits commands between the two.

AMC 6 ENC back panel holds a couple of DB9 connector, one of them must be connected to the PC (with the provided RS 232 cable) and, if used, the other must be connected direct to the ECU.

Main Features

- Compatible with our PC Tools
- Versatile in software programming of the encoders
- Direct interface with low cost ECU

Benefits

- Fast engine mapping
- More precision calibration
- Easy to use by means of our PC Tools

Typical Applications

Usable as “dyno” in all applications
AMC 6 ENC
Slew box (6-encoders)

Technical Characteristics

Communications
- RS 232 bit rate: 19200 baud
- Serial current loop bit rate: 19200 baud

Other Characteristics
- Power supply: 8 to 14 V
- with adapter (Vac): 220 V
- Frequency: 50 Hz
- PH1, 2 and AUX1 graduated scale: 32 step, 11.25°
- AUX2 graduated scale: 64 step, 5.62°
- Injection: graduated scale: 128 step, 2.81°
- Spark advance: graduated scale: 128 step, 2.81°

Knobs, LEDs and button dimensions
- Injection % & Spark advance: 50 mm
- PH1, 2 and AUX1: 20 mm
- AUX2: 35 mm
- STORE: 12 mm
- BUSY: 5 mm
- POWER: 5 mm

Connectors
- RS 232: DB 9 female
- Serial current loop: DB 9 male

Dimensions
- Dimensions approx. without connectors: 200 x 150 x 38 mm
- Weight (approx.): 1100 g

Application Schematics
Description
Switch Panel 5 has been designed for motorbike application to be handy for rider use and also easy to be installed on the handlebar. Up to 5 separated switches are available. With proper software configuration of ECU it can be used for several purposes, as On/Off switch or +/- level selection of strategy settings.

Main Features
- 5 buttons with dedicated functions
- 4 separate outputs signals to be connected to the ECU

Benefits
- Easy human interface for rider
- Allows enabling/disabling of strategies
- Allows different calibration of strategies
- Depending on SW configuration it can be used in various applications

Typical Applications
All Motorbike racing series
SP5
Switch panel with 5 buttons

Technical Characteristics

Mechanical Characteristics
Buttons................................................................. 5
Protection class.................................................... IP 67
Overall Dimensions ........................................... 82 x 42 mm
Handlebar hole diameter .................................... 22 mm
Weight (approx.).................................................... 110 g
Case ................................................................. Anodized Aluminium

Electric Characteristics
Power supply.......................................................... 5 V

Connector Pin Out

<table>
<thead>
<tr>
<th>Pin</th>
<th>Cable Colour</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Black</td>
<td>GND</td>
</tr>
<tr>
<td>2</td>
<td>Grey</td>
<td>Red / Green buttons</td>
</tr>
<tr>
<td>3</td>
<td>Blue</td>
<td>Blue button</td>
</tr>
<tr>
<td>4</td>
<td>Yellow</td>
<td>Yellow button</td>
</tr>
<tr>
<td>5</td>
<td>White</td>
<td>Black button</td>
</tr>
<tr>
<td>6</td>
<td>Red</td>
<td>Supply Voltage 5V</td>
</tr>
</tbody>
</table>

Application Schematics

![Application Schematics Diagram]

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Specifications are subject to change without prior notice
SP-WRC2 is an intelligent membrane switch panel which enables to control Magneti Marelli Power Boxes with the backlit membrane keyboard buttons and LEDs. As a part of Magneti Marelli power control system it communicates over a CAN with Magneti Marelli ECUs. Layouts (button colours and symbols) can be modified to the customer requirements. 15 or optional 21 buttons with different layouts available upon customer request.

Main Features
- Easy to install
- Easy to use
- 15 membrane buttons with backlighting adjustable via CAN
- 15 LEDs with signal functions attached to buttons state: 3 colour state (green/yellow/red)
- 1 CAN communication bus

Benefits
- Enables intelligent control of electric devices over CAN
- Communicates with Magneti Marelli Power Box – enables intelligent diagnosis functions on controlled devices
- Depending on SW configuration it can be used in various applications

Typical Applications
- Professional circuit and rally applications
- One make race series
- Touring car
### Technical Characteristics

**Inputs**
- Input buttons: 15 (21 optional)
- "Code Load" enable pin: 1

**Outputs**
- Gauge LEDs (R-G dual colour): 15

**Communications**
- CAN line (1 Mbit/s (*)): 1
  (*): Configurable on request

**Other Characteristics**
- Power supply: 8 to 18 V
- Operating temperature range: -20 to 65 °C
- Protection class: IP 65
- Connector: ASL 6 06-05 PN HE
- Dimensions: 150 x 92 x 17.5 mm
- Weight (approx.): 195 g

### Connector Pin Out

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Supply Voltage 12V</td>
</tr>
<tr>
<td>2</td>
<td>CAN H</td>
</tr>
<tr>
<td>3</td>
<td>CAN L</td>
</tr>
<tr>
<td>4</td>
<td>ENCP</td>
</tr>
<tr>
<td>5</td>
<td>GND</td>
</tr>
</tbody>
</table>

### Application Schematics

![Application Schematic](image)

Dimensions in millimetres

---

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Specifications are subject to change without prior notice.
SYSMA is the new Magneti Marelli integrated tool designed for configuring and tuning vehicle control systems for the most advanced levels of motorsport.

SYSMA manages all the configurations files, analyses the measured data and reprograms the Hardware devices also flashing the embedded firmware.

SYSMA allows to compare and merge data versions, importing data between different firmware releases.

SYSMA is a flexible software designed to be opened of the universal standard automotive platforms (ASAM), in order to ease of exchange data between electronic and software suppliers.

SYSMA supports an open architecture in order to permit integration with custom additional software tools. Public services are provided so that other applications can use SYSMA functions to fully control the system.

### Main Features
- Advanced interactive Graphic User Interfaces
- Projects management
- Data Logger Setup, ECU Calibration and Dashboard Editor
- Integrated programming tool for flashing firmware
- Simultaneous monitoring and recording of measurement from ECU and Data Logger
- Save measurement in WinTAX4 data format
- Integrated Math Channels Editor
- System database managements for calibrations and measurement
- Compare and Merge of data versions, importing data between different firmware releases.
- User Level Access management
- Support of Ethernet, CAN and Bluetooth lines
- Compatibility with standard common used CAN Card (Vector, Peak, CanDo)
- External potentiometer management (Desk AMC6 / AMC4)
- Support of standard DBC database format (Communication Database for CAN)
- Complete Customisation: layouts, graphs, math libraries, colours schemes to suit user preferences

### Benefits
- Compatibility with ASAM standards: MCD-3 (test bench interface), MCD-2 MC (ECU description for measurement and calibration system)
- SYSMA in addition to standards implements data formats and protocols dedicated for the Motorsport world and its needs of performances and reliabilities.
- Support of Standard CAN signals (advanced graphic editor for CAN messages)
- OLE/Automation inter-process communication protocol supported
- Interfaced to third party data systems via dedicated APIs
- Open to standard tools: e.g. Excel®, Matlab® and Simulink®
- Extensive contextual HELP

### System Compatibility
- Compatible with: Windows® XP, Windows® Seven, Windows® 8, Windows® 8.1, Windows® 10
- Compatible with Dual & Quad Core processor

### Typical Applications
In all applications with Magneti Marelli proprietary protocol on board
Main characteristics

Setup
The main screen area of SYSMA contains graphic or alphanumeric analysis windows in which logged data may be represented in a variety of different ways. You may save commonly-used combinations of analysis windows as Layouts, which allow the waveforms to be organised into logical screen containers. User-configurable accelerator keys make SYSMA easy to use.

Projects Management
All the system files (ECUs calibration database, Data Logger Tables, firmware, settings…) are included in “projects” files. This means simplicity and reliability of management for data versions.

Data Logger Setup and Monitoring
Sysma integrates all functionalities of logging setup. In a very easy way it allows you to be connected to the Data Logger and to generate and read the measurements logging table.

ECU Measurement and Calibration Management
Sysma integrates all functionalities for ECU Measurements and Calibrations management such as real time display of measurement Parameters, editing, including 2D and 3D maps.

Dashboard Editor
Sysma integrates all functionalities for Dashboard Setup: graphical Dashboards setup, libraries for Bitmap, Font and layouts.

Firmware Code-load
Sysma integrates all functionalities for programming all system devices: ECU, Data Logger, Dashboard and Modules. Automatic project update with new firmware is also supported.

Instruments
The overall appearance of instruments is fully configurable to suit your preferences or to adjust the display to the different brightness scenarios (garage, outdoor etc.) A large variety of styles allows you to customize the instruments appearance and to adapt them in to SYSMA’s layouts.

Maths channels
Virtual channels are generated from user-defined functions of measurements.

A graphical editor, with advanced features, allows complex math expressions to be built up quickly.

For further information, please contact:

Specifications are subject to change without prior notice
## SYSMA License Levels

SYSMA is licensed with five different levels:

- **PRO**: full functionality, designed for advanced teams/users
- **EXPERT**: pro level with ability to manage satellite levels (lock/hide symbols toward SAT)
- **SAT**: manages projects and databases generated from EXPERT level
- **TUNER**: intermediate level with ability to manage Junior level (lock/hide symbols toward JUNIOR)
- **JUNIOR**: basic level, manages projects and databases provided when buying HW or from TUNER

### Licensing

<table>
<thead>
<tr>
<th></th>
<th>PRO</th>
<th>EXPERT</th>
<th>SAT</th>
<th>TUNER</th>
<th>JUNIOR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Installation</strong></td>
<td>Multi Workstations</td>
<td>Multi Workstations</td>
<td>Multi Workstations</td>
<td>Single Workstation - USB Dongle</td>
<td>Unprotected</td>
</tr>
<tr>
<td>Data and licenses encoding</td>
<td>Confidential</td>
<td>Confidential</td>
<td>Confidential</td>
<td>Common</td>
<td>Common</td>
</tr>
</tbody>
</table>

### Projects

- **Edit Projects**: ✔  ✔  ✔  ✔  ✔
- **Create NEW Project**: ✔  ✔  ✔
- **Compatibility A2L Format description for measurement and calibration (ASAM MCD-2 MC)**: ✔  ✔
- **Encrypt project**: Encrypt for SAT  ✔  Encrypt for JUNIOR
- **Symbols Database Editor**: ✔  ✔  ✔
- **Symbols Properties Editor**: ✔  ✔  ✔

### Data Logger

- **Data Logger Setup**: ✔  ✔  ✔  ✔  ✔
- **Measurement Protection Levels**: ✔
- **Measurement Editor**: ✔  ✔  Unlocked only  ✔
- **Support of standard DBC database format**: ✔  ✔  ✔  ✔  ✔
- **Support of Standard CAN signals**: ✔  ✔  ✔  ✔  ✔

### ECU

- **Calibration Protection Levels**: ✔
- **Calibration Values Editor**: ✔  ✔  Unlocked only  ✔
- **Calibration Properties Editor**: ✔  ✔
- **New Calibration Database command**: ✔  ✔  ✔  ✔  ✔
- **Enum format for calibration**: ✔  ✔  ✔  ✔
- **Calibration Breakpoints edit**: ✔  ✔  ✔
- **Import A2L files**: ✔  ✔
- **Import CFG, CFZ, PTA files (Vision Format)**: ✔  ✔  ✔
- **Import & export calibration in CSV format**: ✔  ✔
- **Mapping / Work-point**: ✔  ✔  ✔  ✔  ✔
- **Open Calibration with Excel**: ✔  ✔  ✔  ✔  ✔
- **Read / Write TAB files**: ✔  ✔  ✔  ✔  ✔
### Data Recorder
- Save Oscilloscope data in Wintax4 Format
- External potentiometer management
- Compatibility ASAP3 (ASAM MCD3) test bench interface

### Upload

### Code Load
- Code Load Manager
- Execution of single command

### System
- OLE/Automation
- Customizable Accelerator & Toolbar
- Support of Ethernet, CAN, Bluetooth lines
- APIs for CLX read / write
- External application execution
- Contextual HELP

### Math
- Integrated Math Channels Editor
- Real time Math Channels

### Windows
- Load Instrument window
- Create New Instrument window
- Load Alarms and Diagnostics windows
- Create New Alarms and Diagnostics windows
- Oscilloscope window
- Read / Write window

### Compare & Merge
- Projects Merge
- Compare and Merge data versions
- Check CLX – TPX
- Compare CLX
- Compare CLX – Extended mode
- Compare TPX

### Services
- Software upgrades
- Software assistance
- Customizations (under payment)
WINTAX4 PRO is a complete suite of data analysis tools developed for the most advanced levels of motorsport.

In addition to the full range of powerful analysis functions and display methods, WINTAX4 PRO is designed for a multi-user environment where data is shared and distributed over the trackside network.

When combined with Magneti Marelli’s ground-breaking Telemetry System, WINTAX4 PRO provides highly advanced real time analysis functions as well as a standard interface to team’s proprietary software applications.

Offering data protection, add-on modules and dedicated support to develop innovative and integrated solutions, Magneti Marelli’s flagship data management tool is the ideal solution for the most ambitious development programmes.

All the characteristics of lower WinTAX4 levels are included in WINTAX4 PRO.

Main Features

- Multi channels time & distance graphs
- Multi axes 2d & 3d scatter plots
- Lap-by-lap advanced channels Report and Trend
- Circuit map and GPS data
- Histograms and PSD spectrum analysis
- Gauges, Bargraph and Diagnostics windows
- Real-time and post processing analysis simultaneously
- Multiple overlay and data comparison
- User customisable colour schemes, multi Users configurations, multi languages (IT, UK, FR, JP, DE)
- Import/Export User setup
- Advanced Maths channels with graphical editor
- Multiline Maths channels with support of complex statements
- Real-time Virtual Channels & Digital Filters
- External Math channels definition
- Advanced real-time Events, Alarms and Conditions
- Export to ASCII/CSV/Excel®/Matlab® and bin format
- Excel® shortcuts
- Download data from MM loggers (Eth & Card)
- Data protection

Benefits

- Compatibility with third party systems thanks to WinTAX openness: Import data and extra modules allows you to use WinTAX with any external system
- Advanced windows display for a deep data analysis
- Customisable screen layouts and graphs
- Fast mode: customisable accelerators for repetitive operations

Operating System Compatibility

- Compatible with: Windows® XP Windows® Seven, Windows® 8, Windows® 8.1, Windows® 10
- Compatible with Dual & Quad Core processor

Advanced Features

- Data Video Synchronisation
- Real Time data acquisition from CAN Lines
- OLE/Automation inter-process communication protocol. VBScript, JScript
- Import/export from ASCII format
- Import/export from Matlab format
- Google Earth Map Integration
- Library interface for reading/writing WinTAX4 archives
- Library interface for reading/writing real-time fluxes from third party systems
- WTS real-time telemetry server for garage data distribution
- Data advanced protection: real-time & post-process
- Global channels parameters settings
- Optimised data formats for excellent performances
- Extensive Help with context sensitive links

Typical Applications

F1, WRC, Le Mans Endurance Series, DTM, MotoGP, Superbike, GT, Rally, Touring Car
SOFTWARE TOOLS

WINTAX4 PRO
Data acquisition and analysis
Telemetry Level

Technical Support
This level of license includes the following items:
- Possibility to develop custom solutions
- Continuous dedicated support (advice, feasibility studies, fixes)
- Annual renewal includes confidential updates and fixes
- Multi-user license

Main Characteristic
The main screen area of WINTAX4 can contain any combination of graphs or reports in which logged data may be represented in a variety of different ways. Commonly-used combinations of windows can be saved as user-defined layouts.

Analysis Windows
Graphs windows allow to display data against time & distance with many styles (e.g. overlapped or tiled).
- Advanced scatter 2d/3d waveforms with multi-axes, best-fit line and filtering conditions allows to perform complex analysis.
- Direct link to export data in a Excel® spreadsheet (mouse click).

Maths Channels
Maths channels are generated from user-defined combination of logged or real-time data channels. Very intuitive math editor with ‘auto compose’ and ‘debug formulae’ utilities.
- Multiline expressions with statements support
- Advanced trigonometric, algebraic, Boolean and digital filters are available (IIR, FFT, Butterworth etc.).
- Fast math processing: maths channels are calculated ‘on demand’, this ensures excellent performances.
- Math libraries can be shared between Users.
- External Math functions through optional DLL module.

Events, Alarms & Conditions
Advanced checks for automated monitoring of Engine & Chassis can be displayed into waveforms as graph symbols or as multiline reports in post processing or real-time mode both.

VBScripts & JScript
The internal scripting & macro engine makes WinTAX4 fully open to standard applications for Input / Output. Data sharing to/from Excel® or Matlab® is, for example, very intuitive.
- VBScript®, JScript®, programming languages are supported.
WinTAX4 can be also controlled by other applications allowing automatic procedures useful for example at dyno.

Circuit & Google Earth
WinTAX4 allows to calculate and display an accurate trajectory of the vehicles on the circuit. The circuit map is auto-created from basic logged channels as acceleration, speed and distance or via GPS coordinates.
- Track report channels, useful to identify brakes and acceleration areas, can be displayed over Google Earth background image.

Real-Time analysis
Each waveform can switch from post-processing to real-time mode with quickly configurable shortcuts.
- Each Layout may contain post and real-time windows.
- Advanced ‘real-time freeze’ & ‘real-time compare’ utilities.

WTS (WinTAX Telemetry Server)
WTS is the new real time telemetry data distribution infrastructure. The system distributes real-time live telemetry fluxes over the garage network to an unlimited number of PC clients in a very efficient and reliable way.

Matlab & Simulink Integration
WinTAX4 provides powerful possibilities for interfacing with Matlab and Simulink.

Import & Export from ASCII and Matlab
WinTAX4 provides the possibility to import data saved in any proprietary formats. This allows to make the system fully open and flexible in I/O.

VMS: ECU Virtualization
Simulink-based models of the on-board ECU, running on PC allow the user to simulate or compare controls and strategies in off-line mode against logged data.

External Components
A large suite of external modules, like R&W DLLs, link with commercial weather stations make WinTAX4 at the top ranking of race data analysis tools.

Minimum PC requirements
- Processor: 1 gigahertz (GHz), recommended 4GHz or faster
- RAM: 1 gigabyte (GB), recommended 4GB or greater
- Hard disk space: at least 2GB free
- Ethernet TCP/IP network interface 10/100/1000 Mbit/s

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http://www.magnetimarelli.com

Specifications are subject to change without prior notice
WinTAX4 License Levels

WinTAX4 is licensed with four different levels each characterised by different functions. Starting from JUNIOR level up to the TEAM and PRO formula used by professional data analyst working in Motorsport.

- TEAM & PRO provide powerful features, TEAM & PRO encrypt data ensuring confidentiality
- TEAM & PRO can be managed either with USB dongle protection or password
- USER & USER Real Time are protected by a USB dongle

<table>
<thead>
<tr>
<th>Licensing &amp; Main Features</th>
<th>PRO</th>
<th>TEAM</th>
<th>USER</th>
<th>USER RT</th>
<th>JUNIOR</th>
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<tbody>
<tr>
<td>Data encoding</td>
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<td>Common</td>
<td>Common</td>
<td>Common</td>
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<td>Multi Language</td>
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### Analysis windows

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<th>2 Graph, 16 channels per Graph</th>
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<td>XY</td>
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<td>Unlimited</td>
<td>Unlimited</td>
<td>Unlimited</td>
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<tr>
<td>XYZ</td>
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<td>✓</td>
<td>1 Histogram</td>
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<td>Track</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Basic Track</td>
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<tr>
<td>Compare / Multiple overlay</td>
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<td>✓</td>
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<td>✓</td>
<td>Max 2 Compare</td>
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<tr>
<td>Compare – Difference</td>
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<td>Google Earth Maps</td>
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<tr>
<td>Lap Report</td>
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<td>✓</td>
<td>✓</td>
<td>Basic, Single Lap</td>
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<tr>
<td>Trend</td>
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<td>Gauge/Instrument</td>
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<tr>
<td>Condition/Bitmap/Display</td>
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<td>Alarms</td>
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<td>Events – advanced</td>
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<td>Power Spectrum Density</td>
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<tr>
<td>PSD advanced</td>
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<td>Video management</td>
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### Real Time analysis

<table>
<thead>
<tr>
<th>Feature</th>
<th>Available</th>
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</thead>
<tbody>
<tr>
<td>Real-Time Telemetry</td>
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</tr>
<tr>
<td>Dyno Ethernet Telemetry</td>
<td>✓</td>
</tr>
<tr>
<td>Real-Time Telemetry - basic</td>
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<tr>
<td>Real-Time Maths Channels</td>
<td>✓</td>
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<tr>
<td>CAN Line Analyzer</td>
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### Math analysis

<table>
<thead>
<tr>
<th>Feature</th>
<th>Available</th>
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</thead>
<tbody>
<tr>
<td>Math Channels</td>
<td>✓</td>
</tr>
<tr>
<td>Math Channels Statements</td>
<td>✓</td>
</tr>
<tr>
<td>Lookup Table</td>
<td>✓</td>
</tr>
<tr>
<td>On-demand Math Channels</td>
<td>✓</td>
</tr>
<tr>
<td>FFT – Run AVG Filters</td>
<td>✓</td>
</tr>
<tr>
<td>IIR – Digital Filters</td>
<td>✓</td>
</tr>
<tr>
<td>Maths plug-in (external DLL)</td>
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</tr>
</tbody>
</table>

### Import & Export Data

<table>
<thead>
<tr>
<th>Feature</th>
<th>Available</th>
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</thead>
<tbody>
<tr>
<td>Ole/Automation - Scripts</td>
<td>✓</td>
</tr>
<tr>
<td>Export ASCII</td>
<td>✓</td>
</tr>
<tr>
<td>Import ASCII</td>
<td>✓</td>
</tr>
<tr>
<td>Import/Export Matlab</td>
<td>✓</td>
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### Product Extensions

<table>
<thead>
<tr>
<th>Feature</th>
<th>Available</th>
</tr>
</thead>
<tbody>
<tr>
<td>WinTAX4 Telemetry Server</td>
<td>✓</td>
</tr>
<tr>
<td>Virtual ECU Manager</td>
<td>Optional</td>
</tr>
<tr>
<td>MPS – Pit System</td>
<td>Optional</td>
</tr>
<tr>
<td>WinMeteo</td>
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</table>

### WinTAX4 APIs

<table>
<thead>
<tr>
<th>Feature</th>
<th>Available</th>
</tr>
</thead>
<tbody>
<tr>
<td>TelDataX – to load/read WinTAX4 data archive</td>
<td>Optional</td>
</tr>
<tr>
<td>TelDataZTX – to create/write WinTAX4 data archive</td>
<td>Optional</td>
</tr>
<tr>
<td>TelDSTClient - to access real time stream</td>
<td>Optional</td>
</tr>
<tr>
<td>RT-Plugin - to add real time stream</td>
<td>Optional</td>
</tr>
<tr>
<td>rFactor plug-for real time data</td>
<td>Optional</td>
</tr>
</tbody>
</table>

### Services

<table>
<thead>
<tr>
<th>Feature</th>
<th>Available</th>
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</thead>
<tbody>
<tr>
<td>Software upgrades</td>
<td>✓</td>
</tr>
<tr>
<td>Software assistance</td>
<td>✓</td>
</tr>
<tr>
<td>Customizations (under payment)</td>
<td>✓</td>
</tr>
</tbody>
</table>

For further information, please contact:

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Jan 2016
rel. 01
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