CATALOGUE

RACING AHEAD
2017

MOTORSPORT

MAGNETI MARELLI

ALTERNATORS

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*
- *800 g weight*

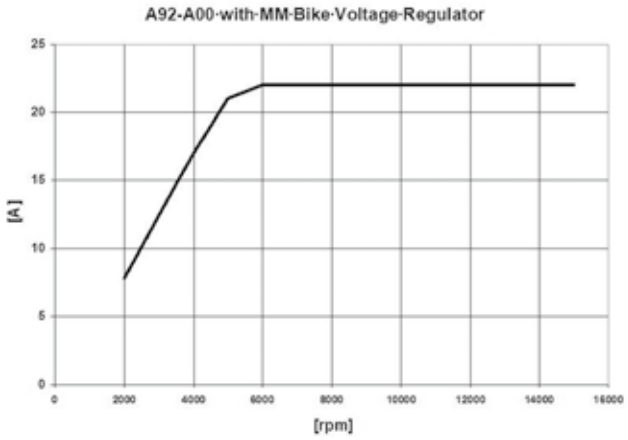
Benefits

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

Typical Applications

Racing bikes

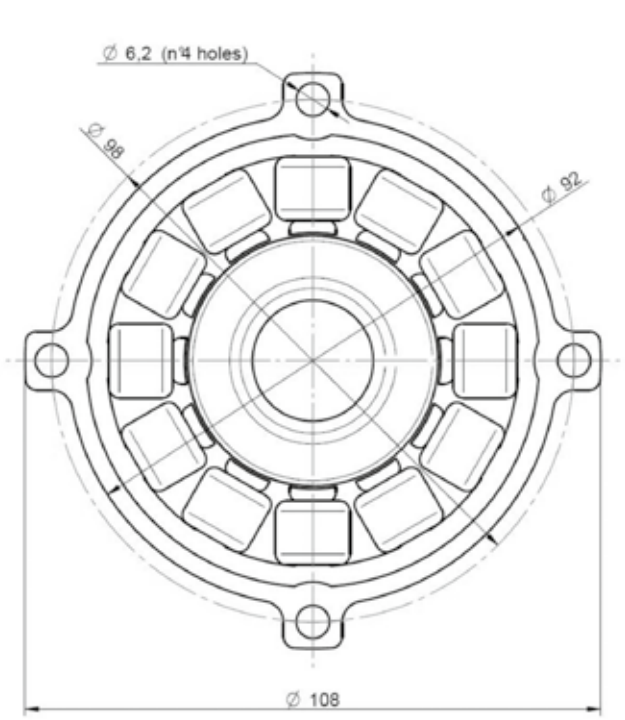
Typical Performance

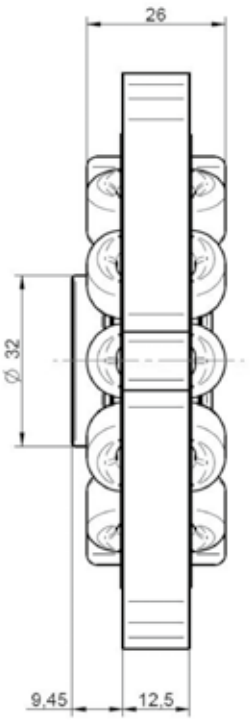


A92-A00

Permanent magnet alternator
13.5 V - 22A

Dimensions





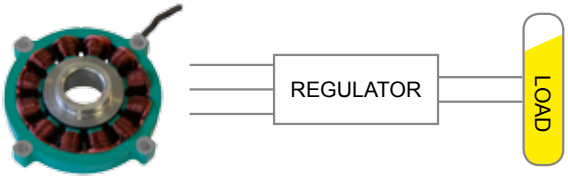
Dimensions in millimetres

Technical Characteristics

Cut in speed	2000 rpm
Maximum speed	18000 rpm
Rotation	Clockwise or anti clockwise rotation available
Operating temperature (ambient)	Up to 90 °C
Regulated voltage	13.5 V
Weight	800 g

Application Schematics

ALTERNATOR



A45 L

Permanent magnet alternator
13.5 V - 22 A

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*

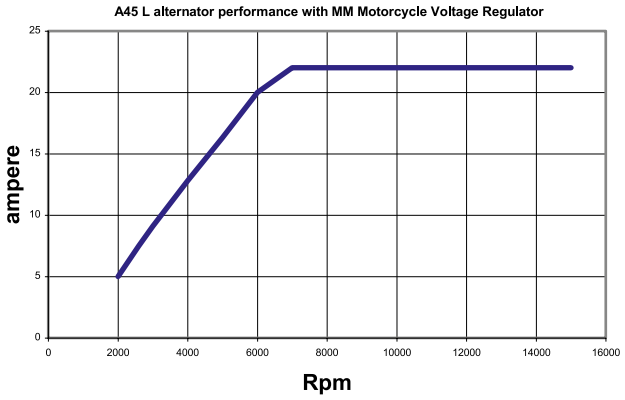
Benefits

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

Typical Applications

MotoGP
Racing bikes

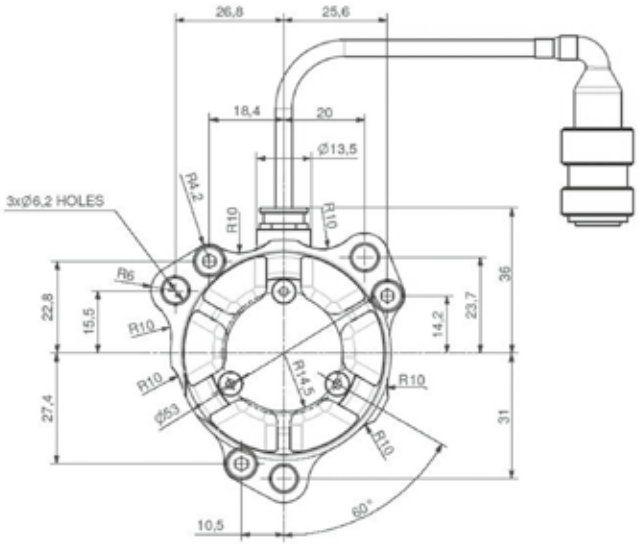
Typical Performance

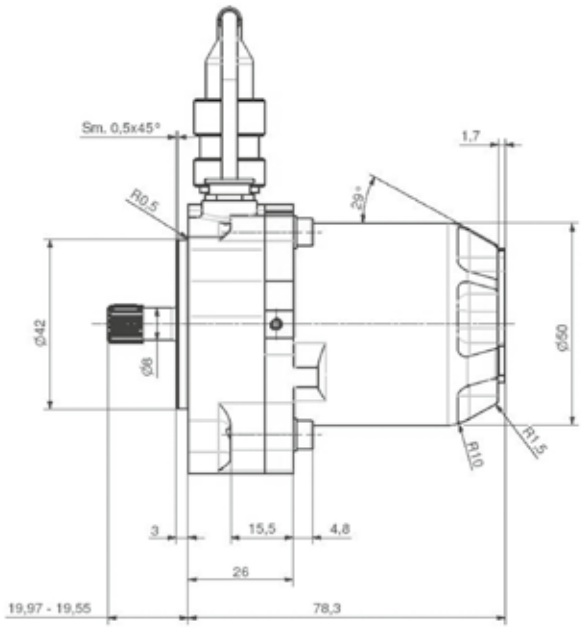


A45 L

Permanent magnet alternator
13.5 V - 22 A

Dimensions





Dimensions in millimetres

Technical Characteristics

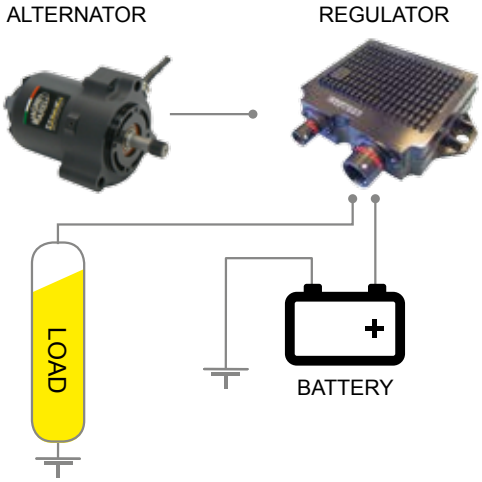
Cut in speed	2000 rpm
Maximum alternator speed	19000 rpm
Rotation	Clockwise or counterclockwise

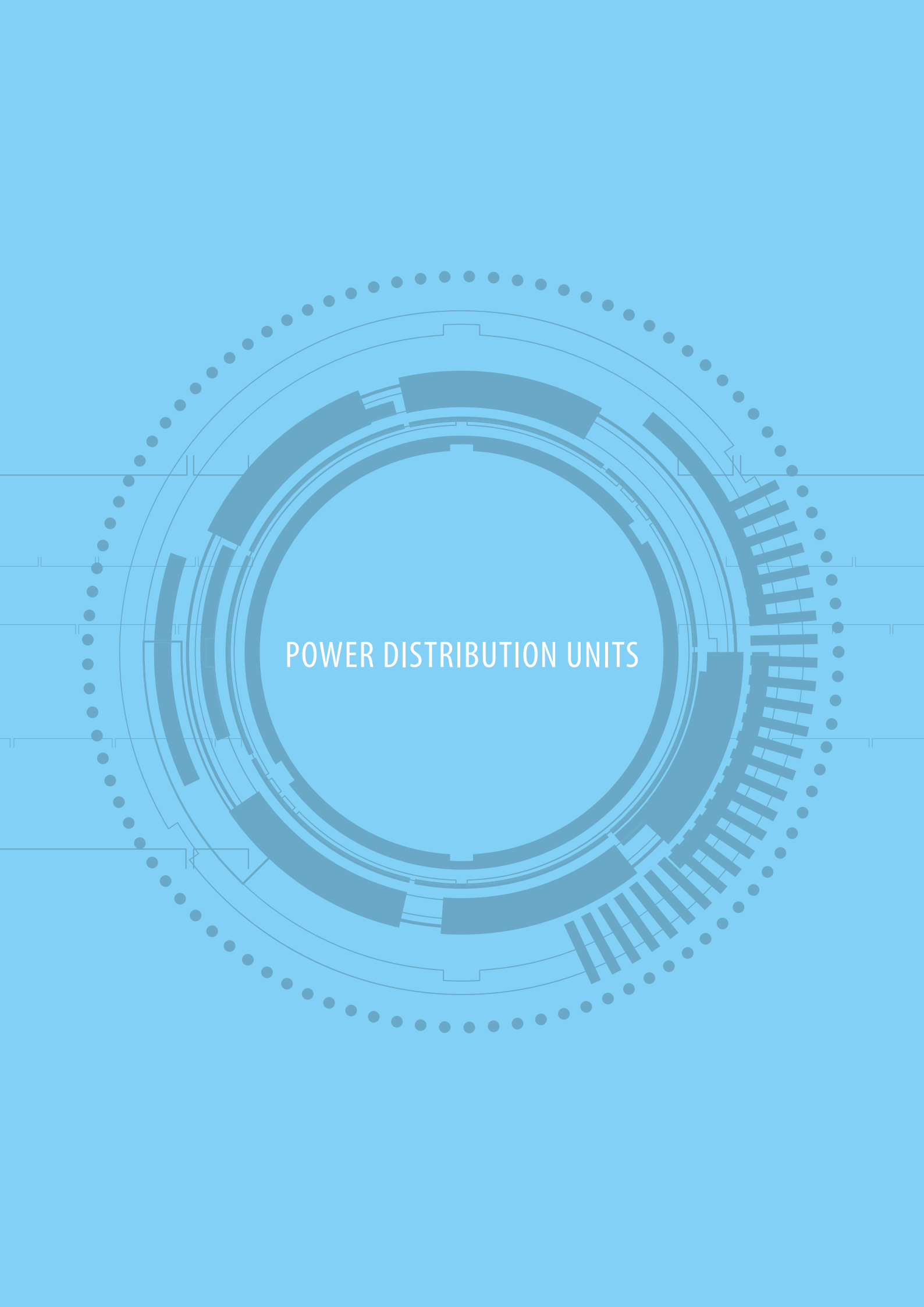
Operating temperature max.

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

Application Schematics




POWER DISTRIBUTION UNITS

FOX442

Power distribution unit
12 V – 42 high-current output

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 ECUs 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
Rally cars
GT cars
Le Mans series

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 PWM 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

Total output performance	
max continuous current overall (*)	200 A

* With proper installation and under optimal cooling conditions

Communications

CAN line (1 Mbit/s (*))	2

* Configurable on request 2.0A or 2.0B

Connectors

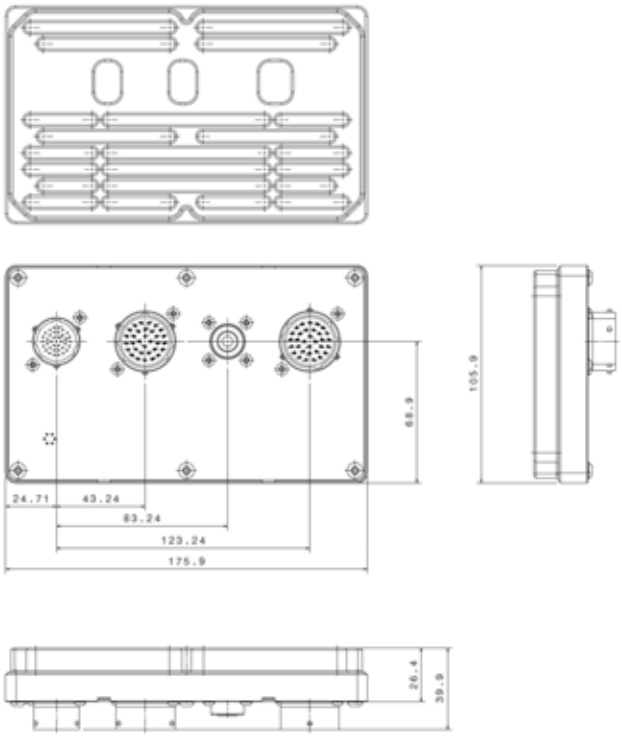
Deutsch Auto sport AS214-35PN (37 Pin)	1
Deutsch Auto sport AS018-32SN (32 Pin)	1
Deutsch Auto sport AS018-32SA (32 Pin)	1

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 105.9 x 26.4 mm
Weight (approx.)	710 g

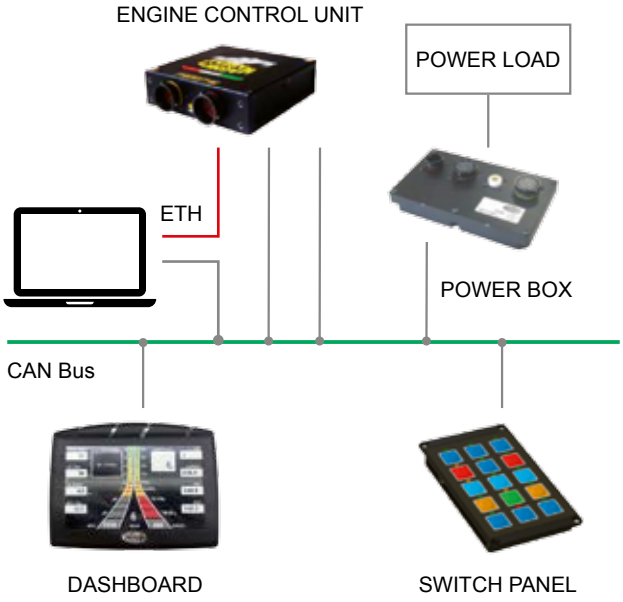
* IP65 on request

Dimensions



Dimensions in millimetres

Application Schematics



PDU12-42HD

Power distribution unit
12 V – 42 high-current output

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
Rally cars
GT cars
Le Mans series

PDU12-42HD

Power distribution unit
12 V – 42 high-current output

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

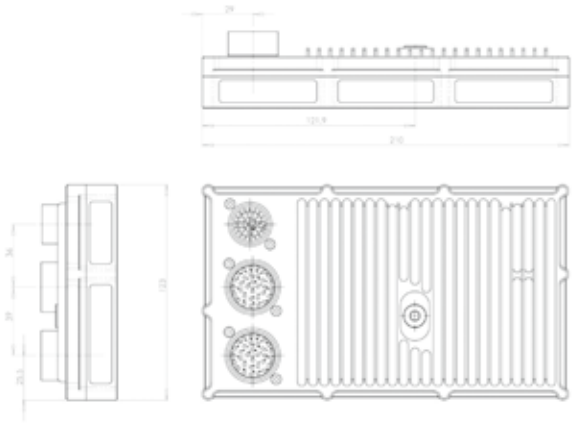
Deutsch Auto sport AS214-35PN (37 Pin)	1
Deutsch Auto sport AS018-32SN (32 Pin)	1
Deutsch Auto sport AS018-32SA (32 Pin)	1

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

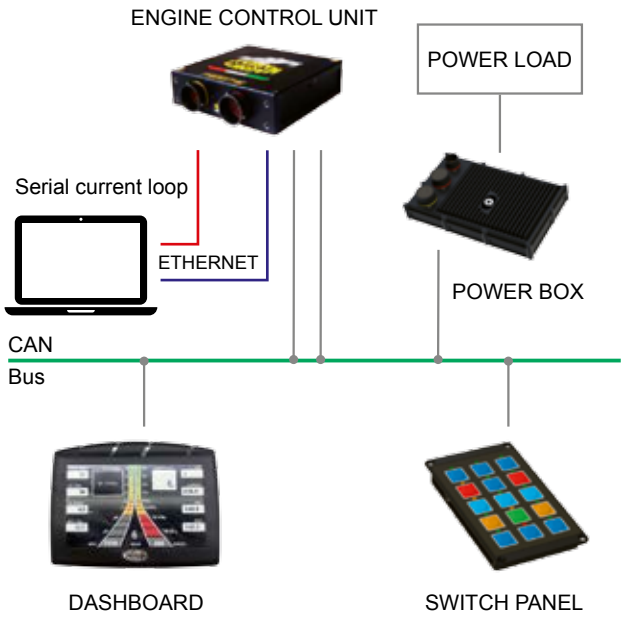
* IP65 on request

Dimensions



Dimensions in millimetres

Application Schematics



BVRM-04

Small size voltage regulator
14 V - 30 A

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*

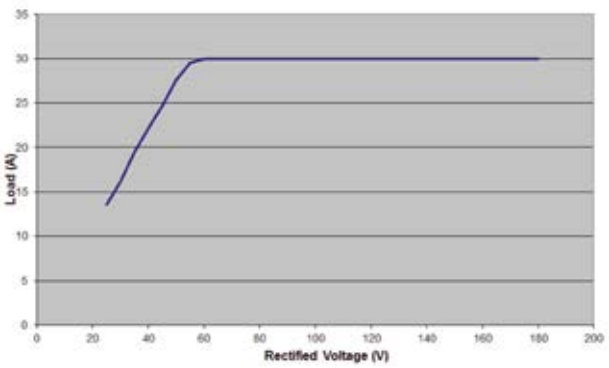
Benefits

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

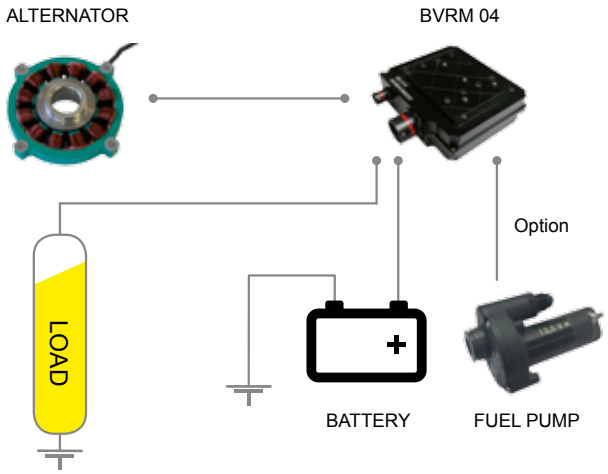
Typical Applications

MotoGP
Racing bikes

Typical Performance



Application Schematics

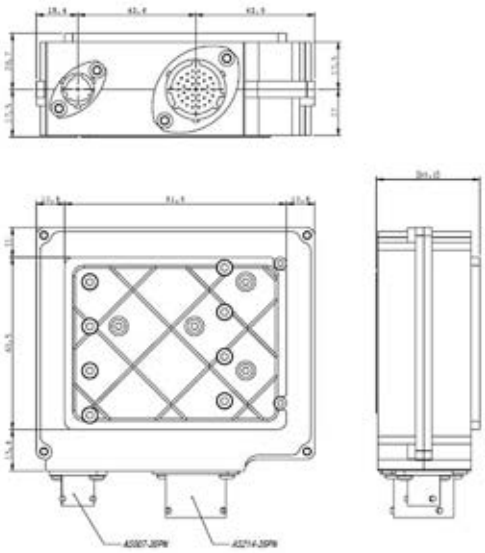


BVRM-04-083804366000

BVRM-04

Small size voltage regulator
14 V - 30 A

Dimensions



Dimensions in millimetres

Technical Characteristics

Maximum continuous output current	30 A
Peak output current (1)	35 A
Max output power continuous	420W
Nominal output voltage	14 V
Output voltage ripple	2%
Protection class	IP 65
Operating temperature(2)	90°C
Weight	560 ± 50 g

(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

AS007-35 PN

PIN	SIGNAL
1	PHASE 1
2	PHASE 1
3	PHASE 2
4	PHASE 2
5	PHASE 3
6	PHASE 3

AS214-35 PN

PIN	SIGNAL	PIN	SIGNAL	PIN	SIGNAL
1	HS 1	14	GND	27	GND
2	HS 1	15	VBATT	28	VBATT
3	OUT4 (PWM LS)	16	VBATT	29	VBATT
4	OUT4 (PWM LS)	17	JUMP BATT	30	HS 2
5	OUT4 (PWM LS)	18	JUMP BATT	31	P LATCH 2
6	OUT3 (HS)	19	HS 1	32	CODE LOAD
7	HS 2	20	HS 1	33	not used
8	HS 2	21	not used	34	not used
9	HS 2	22	CAN-L	35	GND
10	GND	23	JUMP BATT	36	P LATCH 1
11	GND	24	VBATT	37	CAN-H
12	GND	25	not used		
13	GND	26	GND		

IGNITION COILS

BAE403 RI

Inductive ignition racing coil

Description

A high power inductive ignition coil with sub compact dimensions particularity 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.

Main Features

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

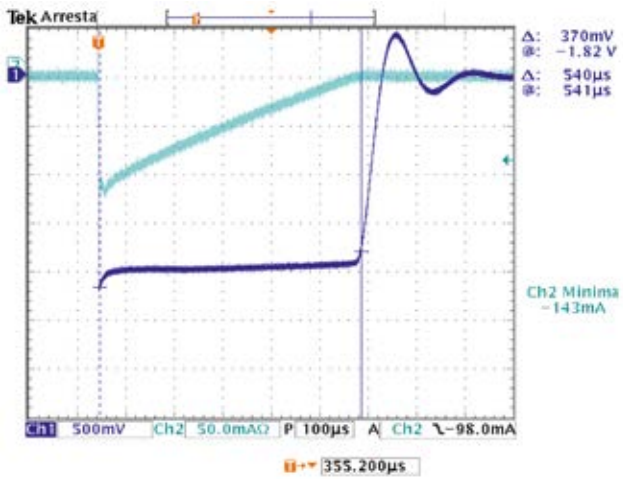
Benefits

- *Small dimensions*
- *Low weight*
- *Low cost*

Typical Applications

Atmospheric and blown engines
Formula 3 cars
IndyCar
GT cars
Rally cars

Typical Performance



BAE403 RI

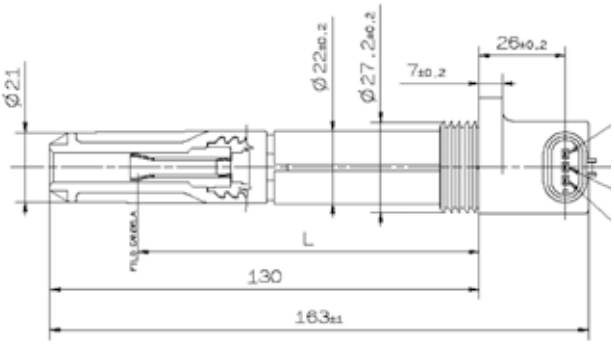
Inductive ignition racing coil

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

Application Schematics

Dimensions



Dimensions in millimetres

BAE709

Inductive ignition racing coil

Description

A high power inductive ignition coil with sub compact dimensions particularity 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.

Main Features

- *Modular design*
- *Different plug position possible*
- *Different plug diameters possible*
- *Possibility to choose combinations between coil head and rubber part*

Benefits

- *Small dimensions*
- *Low weight*
- *Low cost*

Typical Applications

IndyCar
Formula 3
GT cars
Rally cars

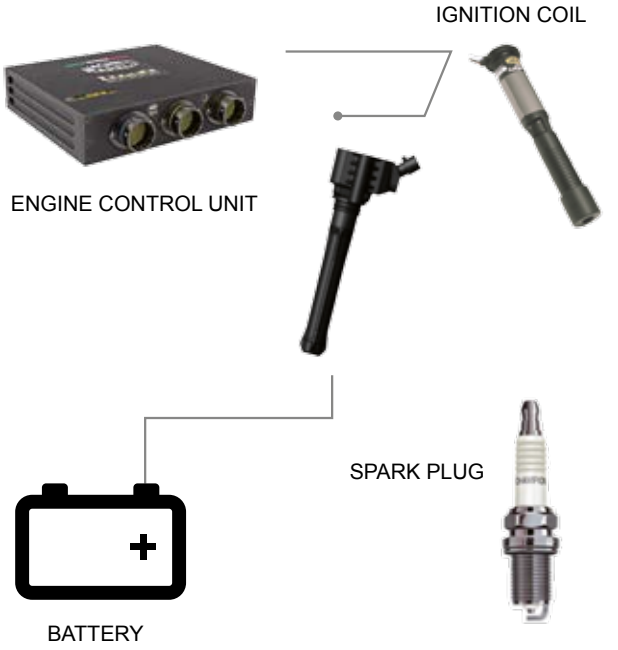
BAE709

Inductive ignition racing coil

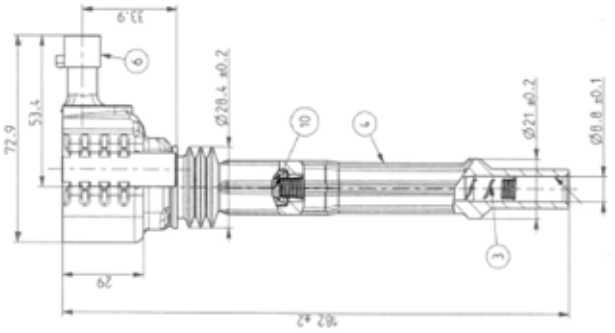
Technical Characteristics

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

Application Schematics



Dimensions



Dimensions in millimetres

Ø 19.5-21 A

Inductive cigar coil
13.5 V - 21 A

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*

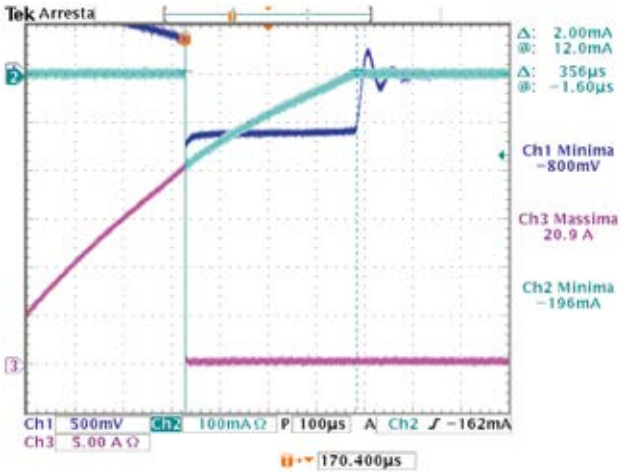
Benefits

- *High performance*
- *Wide application range*
- *Small dimensions*
- *Low weight*

Typical Applications

IndyCar
MotoGP
SBK
Formula 3
GT cars

Typical Performance

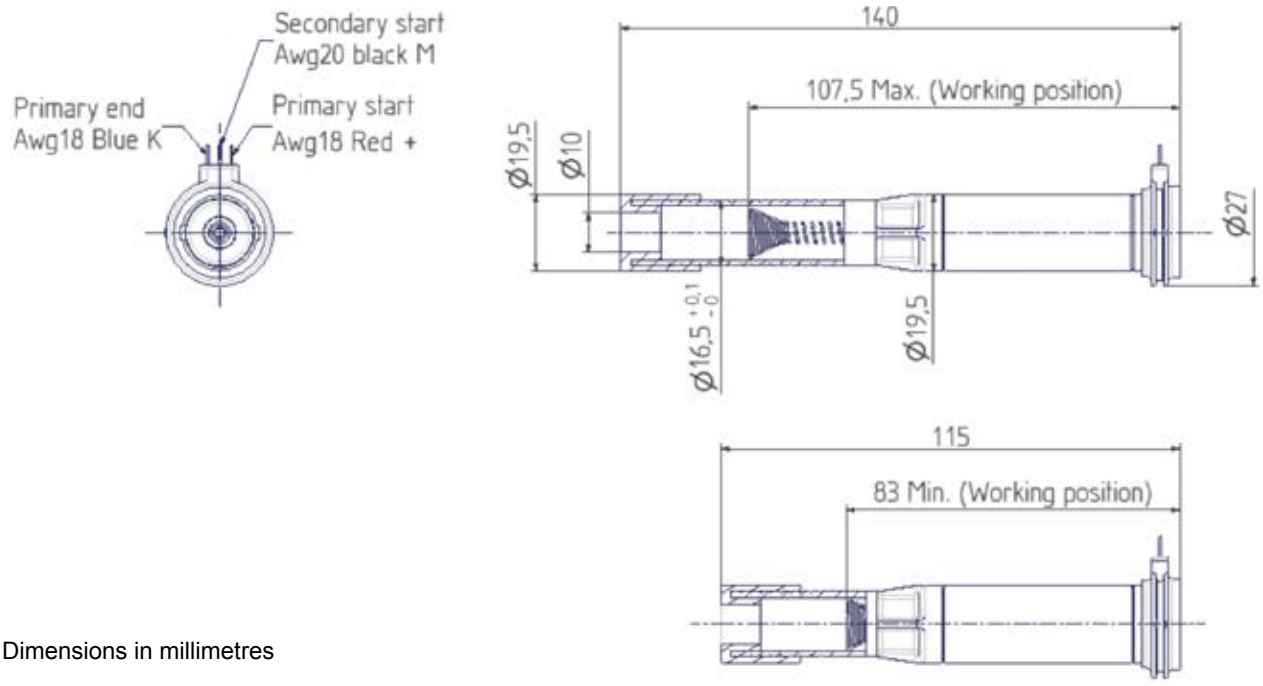


Ø 19.5-21 A-0838XXXXXX00

Ø 19.5-21 A

Inductive cigar coil
13.5 V - 21 A

Dimensions

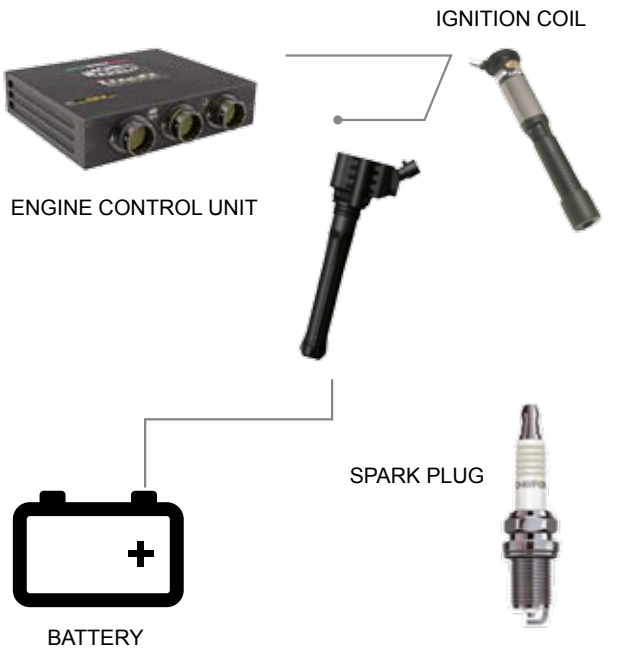


Dimensions in millimetres

Technical Characteristics

Nominal supply voltage	13.5 V
Charge current	21 A
Dwell	390 µs
Rise time	2.3 µs
Sec. Voltage (1 MΩ load)	29,5 kV
Spark duration (Zener 1000V)	245 µs
Combustion energy	24 mJ
Min. coil length (min. 83 mm working point)	115 mm
Max. coil length (max. 107.5 mm working point)	140 mm
Weight	100 g

Application Schematics



C35 000

Inductive Cigar Coil Ø 20
13.5 V - 22 A

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.

Main Features

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

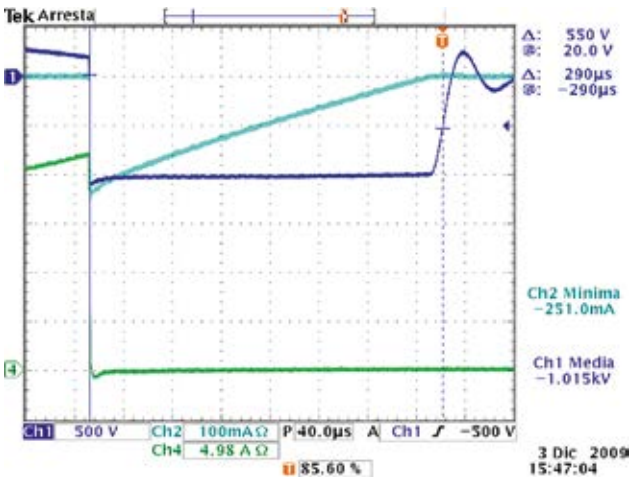
Benefits

- *High performance*
- *Wide application range*
- *Small dimensions*
- *Low weight*

Typical Applications

IndyCar
MotoGP
SBK
Formula 3
GT cars

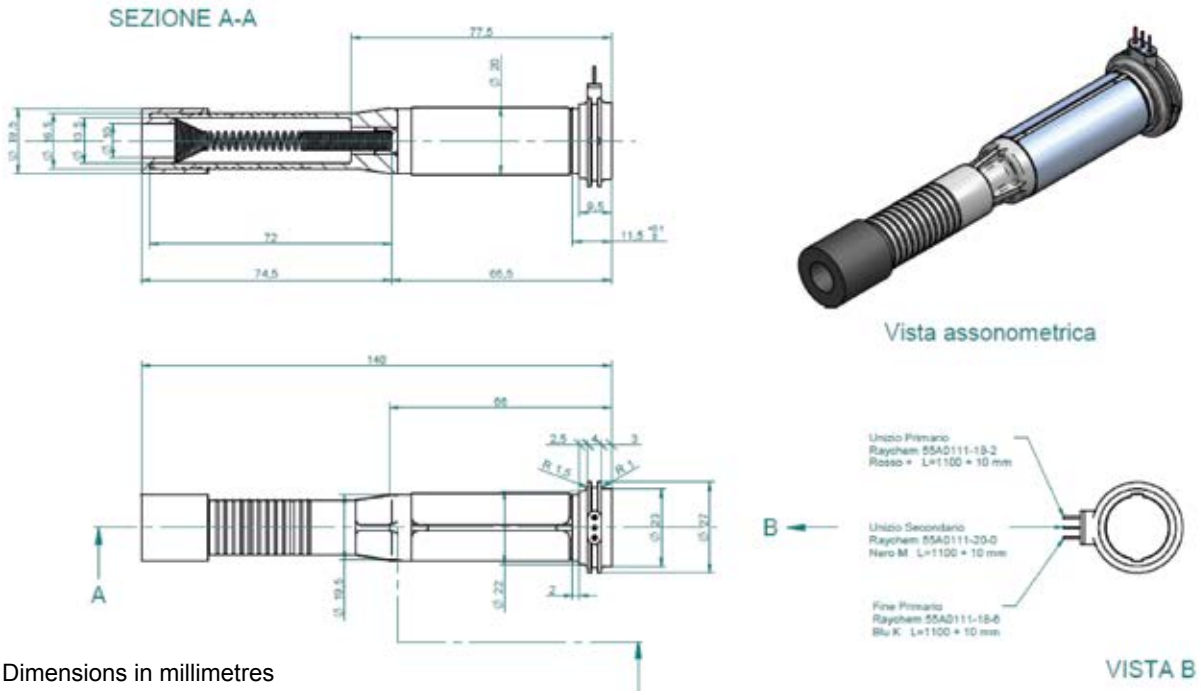
Typical Performance



C35 000

Inductive Cigar Coil Ø 20
13.5 V - 22 A

Dimensions

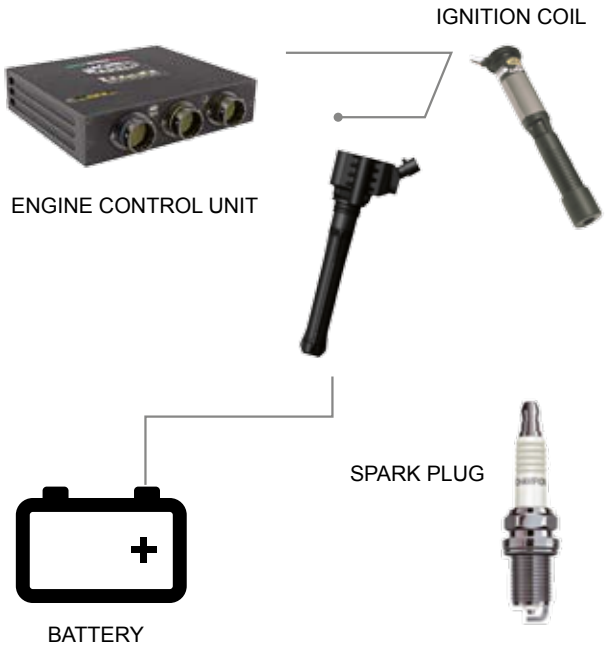


Dimensions in millimetres

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



INJECTORS

IWP

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

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

Rally cars
Touring cars

IWP-0838XXXXXX00

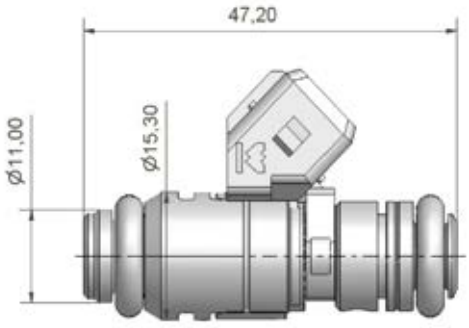
IWP

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

Technical Characteristics

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

Dimensions

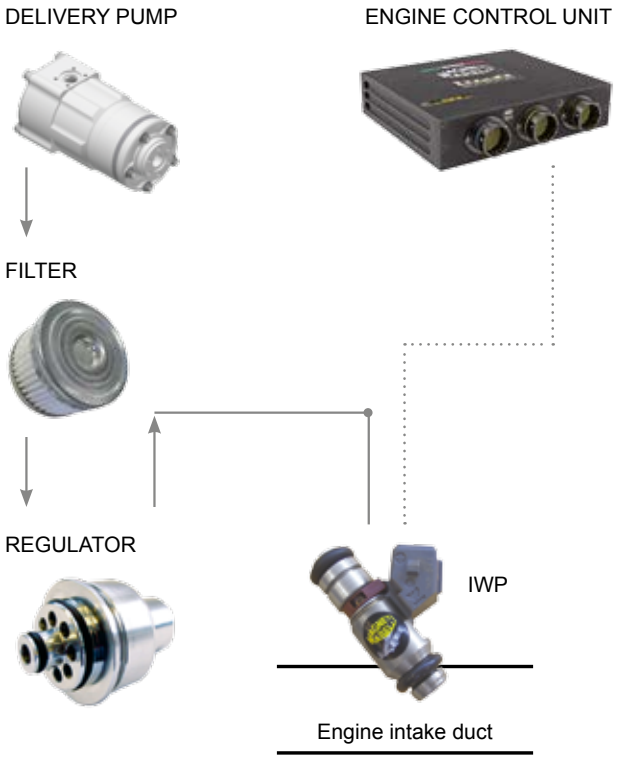


Dimensions in millimetres

IWP Family

Injector	IWP043	IWP069	
Nominal pressure	500	300	kPa
Static flow rate	421.1	482,5	cm3/min
Spray shape	Single spray	Single spray	

Application Schematics



IWPR

Pico Racing Fuel Injector
Up to 1.0 MPa - Up to 1.0 L/min

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

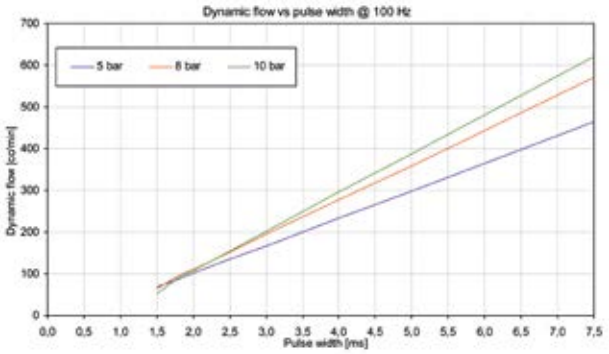
- *Delivery pressure range* *0.3 to 1(*) MPa*
- *Static flow range* *0.15 to 1.0 L/min*
- *Driver current* *0.8 A*

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

Benefits

- *Multihole 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 Performance



Typical Applications

Rally cars
Racing bikes

IWPR-0838XXXXXX00

IWPR

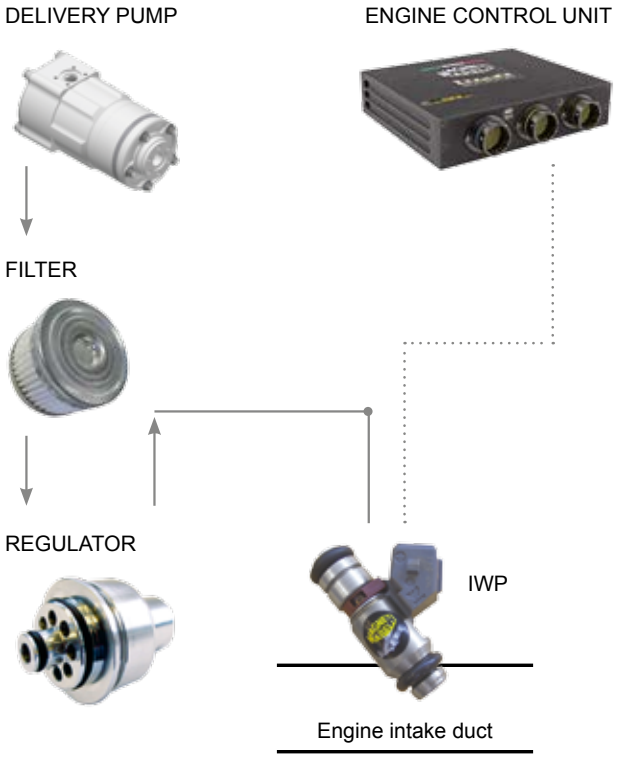
Pico Racing Fuel Injector
Up to 1.0 MPa - Up to 1.0 L/min

Technical Characteristics

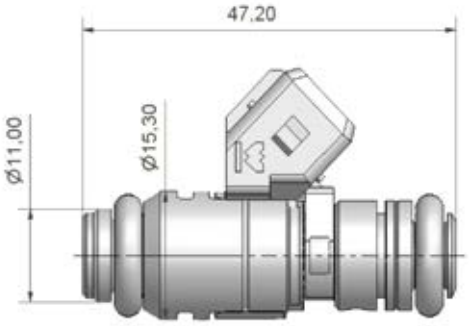
Delivery pressure range	0.3 to 1(*) MPa
Static flow range	0.15 to 1.0 L/min
Driver current	0.8 A
Single Jet bent angle	0° to 15°
Power supply	8 to 16 V
Operating temperature range	- 20 to 120 °C
Connector type	AMP Junior 2 ways minitimer
Weight	35 g

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

Application Schematics



Dimensions



Dimensions in millimetres

IWPR Family

Injector	IWPR2.1	IWPR3	IWPR4	IWPR6.1	
Nominal pressure	1000	1000	1000	1000	kPa
Static flow rate	935	740	1005	1160	cm3/min
Spray shape	Single spray	Single spray	Twin jet	Single spray	

Note: flow rate in n-heptane

PRESSURE REGULATORS

GPR

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

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*

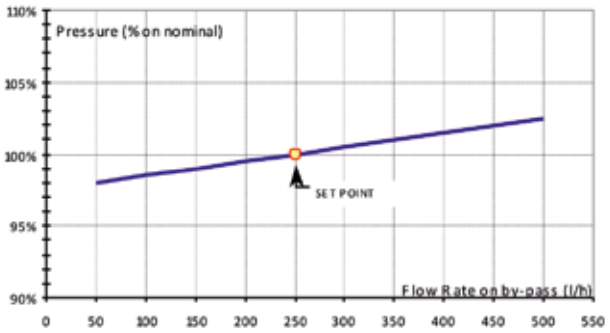
Benefits

- *Small dimensions*
- *Low weight*
- *Cost effective solution*

Typical Applications

Rally cars
Racing bikes

Typical Performance

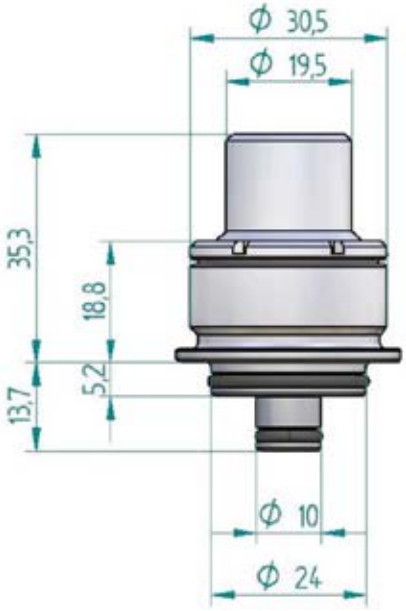


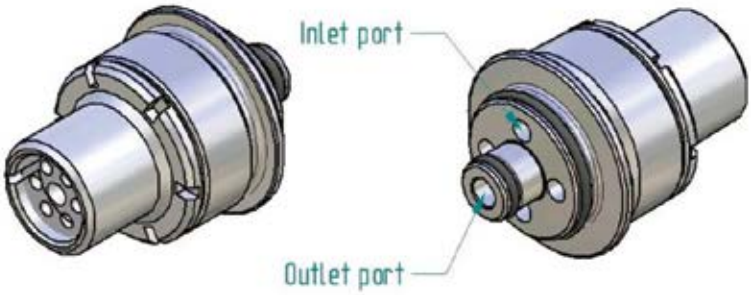
GPR-0838XXXXXX00

GPR

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

Dimensions



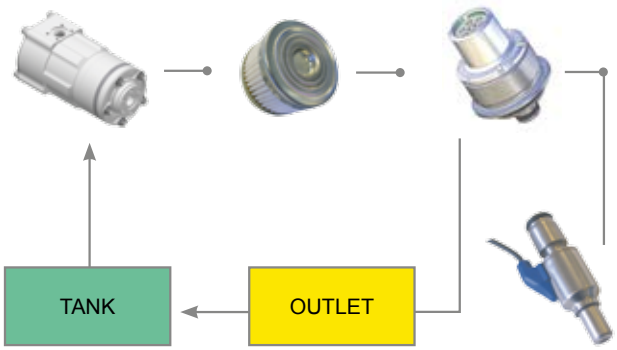


Dimensions in millimetres

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

Fuel pressure regulator	GPR001.1	GPR002.1	GPR003.1	GPR004.1	GPR005	GPR006.1	GPR008	GPR009	GPR010	GPRT01	
Nominal pressure	500	1000	2000	3000	800	3000	1500	600	1000	600	KPA
@ Flow rate	250	60	60	250	250	60	60	250	105	200	L/H

FUEL PUMPS

MGP01

Fuel pump
110 L/h @ 1 MPa

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*

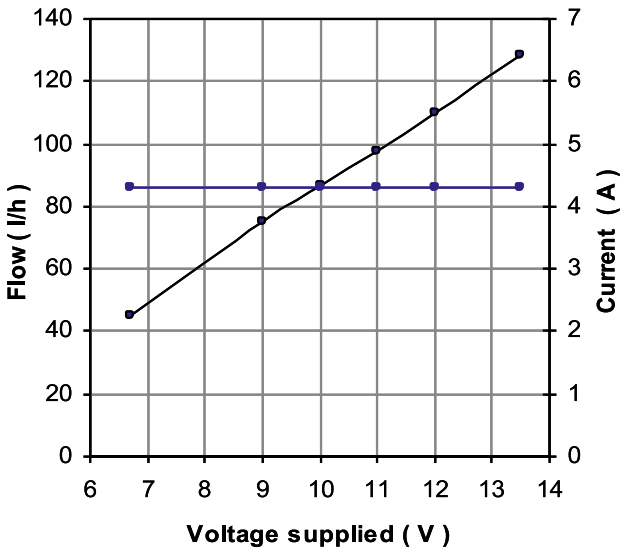
Benefits

- *Low weight*
- *Total efficiency about 60%*

Typical Applications

MotoGP
Racing bikes

Typical Performance at 1 MPa

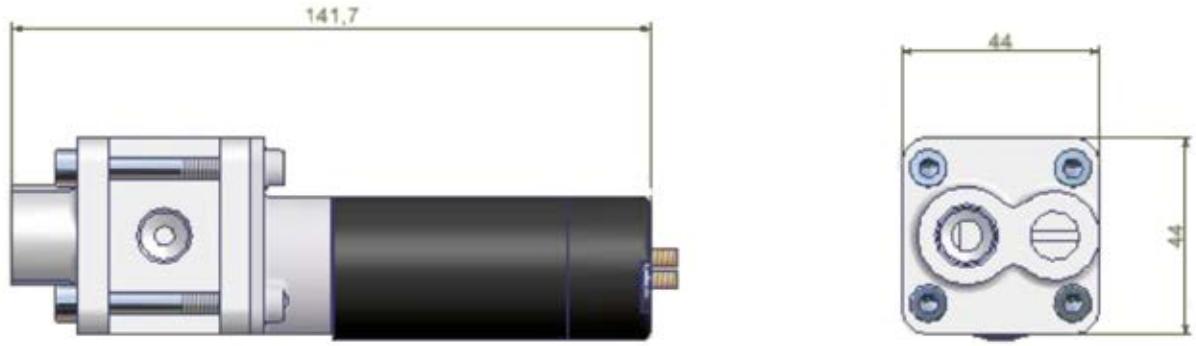


MGP01-083810155902

MGP01

Fuel pump
110 L/h @ 1 MPa

Dimensions



Dimensions in millimetres

Technical Characteristics

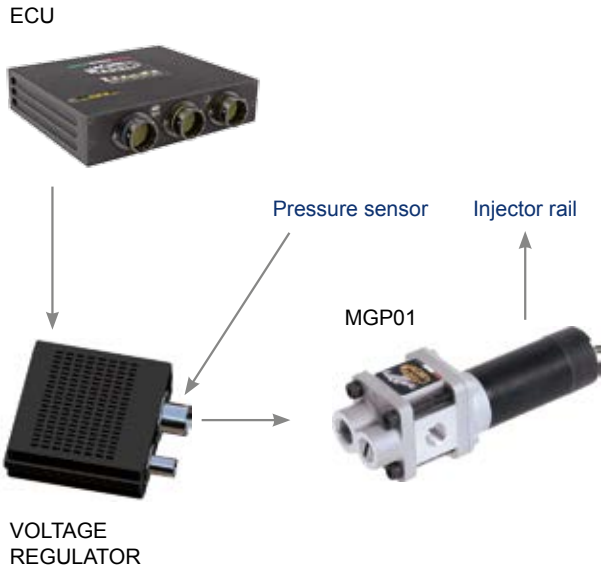
Supply Voltage	13.5 V
Flow rate	
@ 1 MPa	110 L/h
@ 0.5 MPa	118 L/h
Consumption	
@ 1 MPa	4.3 A
@ 0.5 MPa	2.7 A
Weight	526 g

Other Information

Joined with the BVRM 04 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 BVRM 04 voltage regulator as well.

Application Schematics



PS 2100

Fuel lift pump
180 L/h @ 50 kPa

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*

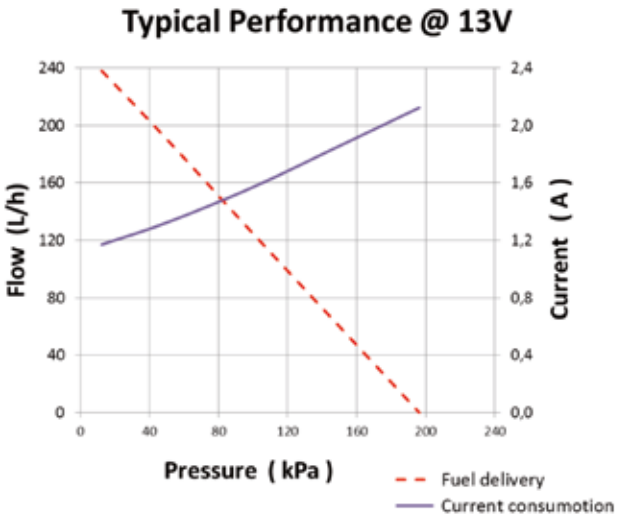
Benefits

- *Self priming*
- *Fuel delivery capability up to 180 L/h @ 50 kPa*
- *Customizable inlet and outlet ports*
- *Dry operation possible without damage*

Typical Applications

F1
Racing bikes

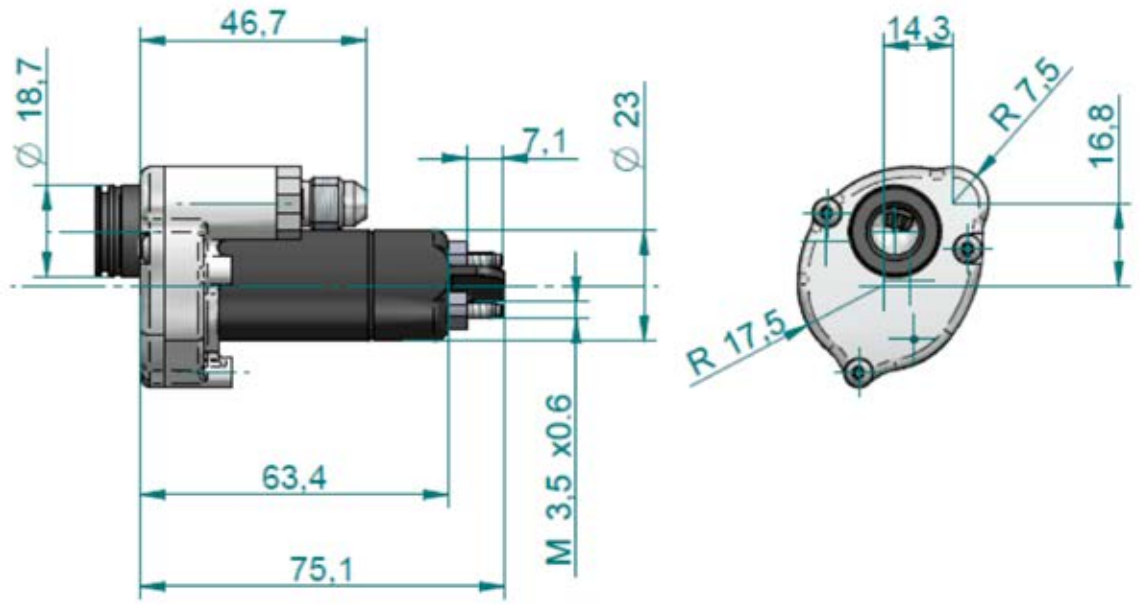
Typical Performance @ 13 V



PS 2100

Fuel lift pump
180 L/h @ 50 kPa

Dimensions

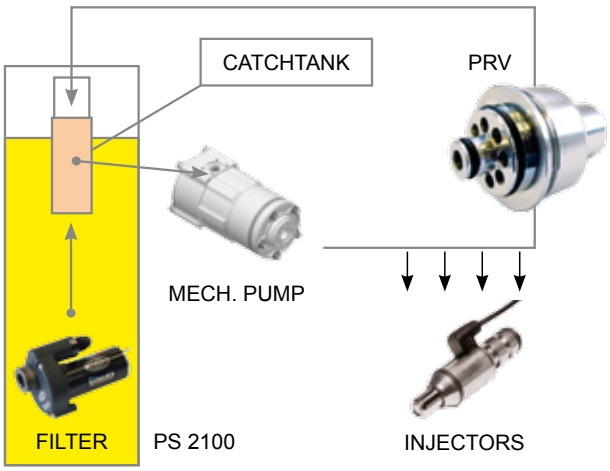


Dimensions in millimetres

Technical Characteristics

Fuel delivery 13 V (@ 50 kPa)	180 L/h
Nominal supply voltage	13 V
Current consumption 13 V (@ 50 kPa)	1.3 A
Weight	160 g

Application Schematics



PS 4100

Fuel lift pump
280 L/h @ 150 kPa

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*

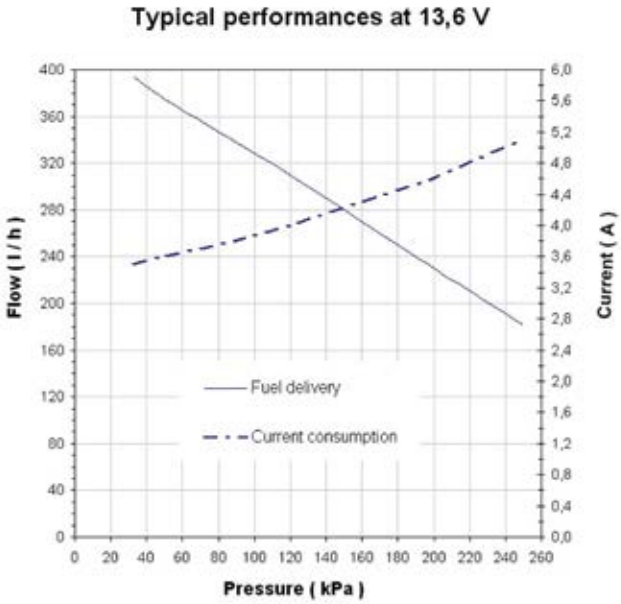
Benefits

- *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



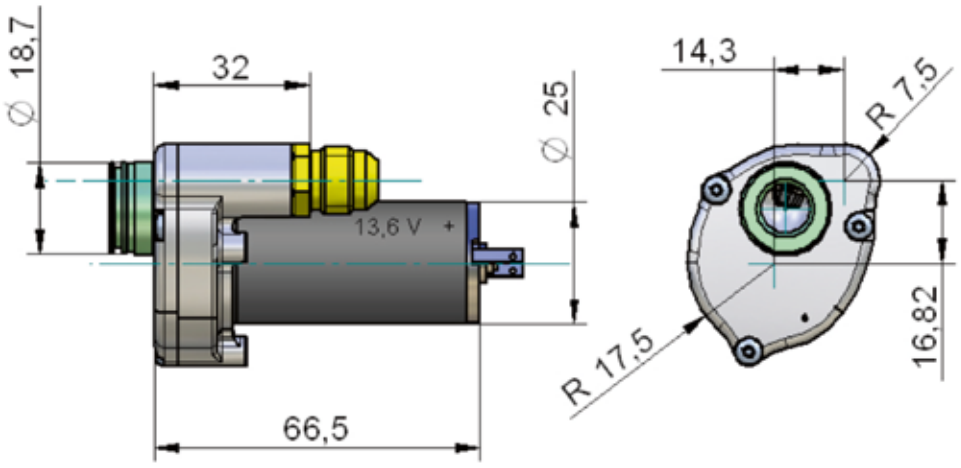
(Test fluid Metryl 421)

PS 4100-083810218300

PS 4100

Fuel lift pump
280 L/h @ 150 kPa

Dimensions

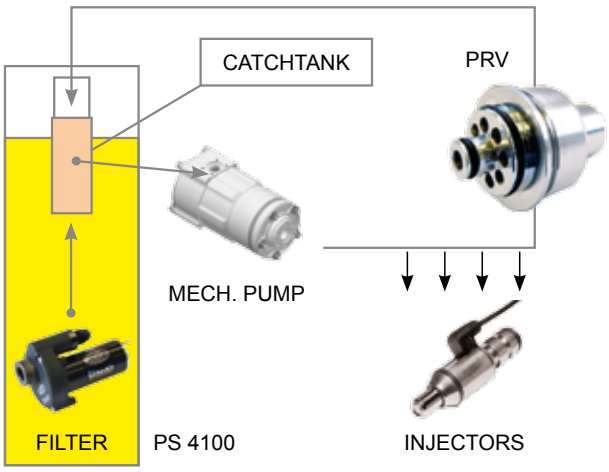


Dimensions in millimetres

Technical Characteristics

Fuel delivery 13.6 V (@ 150 kPa)	280 L/h
Nominal supply voltage	13.6 V
Current consumption 13.6 V (@ 150 kPa)	4.2 A
Weight	185 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*

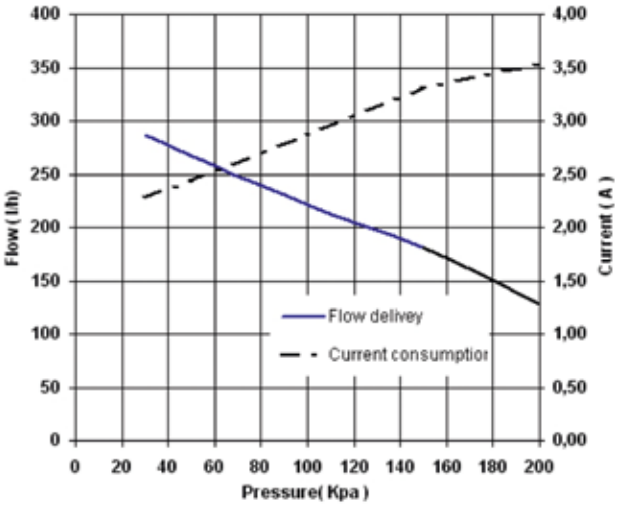
Benefits

- *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

Formula 1,
Sports cars,
Touring cars
MotoGP Bikes
Pressurised fuel cells in general

Typical Performance at 13.5 V



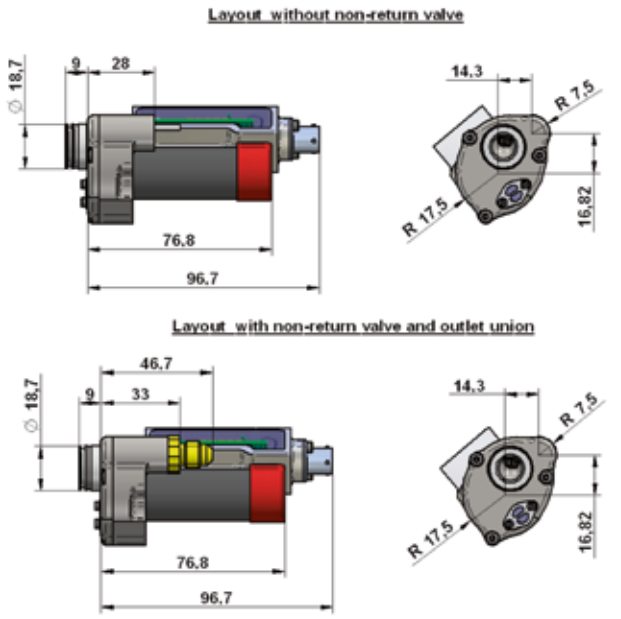
Tested at 13.5 V, 8500 rpm
Test fluid: Metryl 421

PB3000-083810XXXX00

PB3000

Brushless fuel lift pump
270 L/h @ 50 kPa

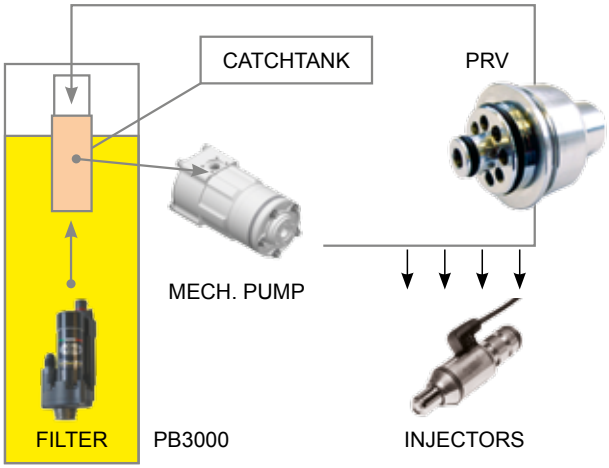
Dimensions



Dimensions in millimetres

Application Schematics

Hydraulic Circuit



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 (@ 1Mbits/s)	1
PWM input (@ 100 Hz)	1

Connector Pin Out

Pin Configuration
Connector ASL006-05PN-HE-952K

Description	N° Pin	Colour
+ V Batt	1	Red
CAN H	2	Yellow
CAN L	3	Blue
Control input (0-Vbatt)	4	White
- V Batt	5	Black

TFP-EXX

Brushless fuel feed pump
180 L/h @ 200-800 kPa

Description

Compact lightweight mid-pressure fuel pump to be used for feeding the high pressure fuel pump in GDI applications. catchtank filling or bridge between catchtank and main pump.

Incorporates a rugged brushless motor with integrated speed controller for reliable operation with limited current absorption and long service life.

Main Features

- *Positive displacement pump specifically designed to feed a high pressure GDI fuel pump*
- *48 V and 13.5 V option available*
- *In-Tank application*
- *Brushless motor ensures extended operating life, even with aggressive fuel*
- *Integrated motor speed controller allows pump flow rate control via CAN messages or PWM signal*
- *Status monitoring & diagnostics via CAN*

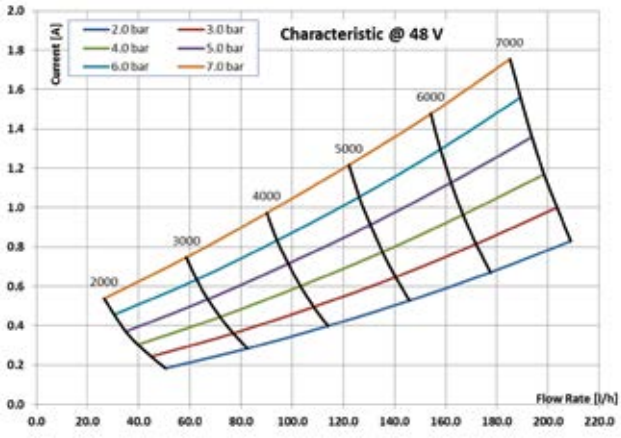
Benefits

- *Extended service life*
- *Fuel On Demand Strategy*
- *Fuel delivery capability up to 180 L/h @ 800 kPa*
- *Very high pump efficiency provides low current consumption in a compact design*
- *Customizable inlet and outlet ports (on request)*

Typical Applications

Formula 1
Rally cars
Prototypes

Typical Performance at 48 V

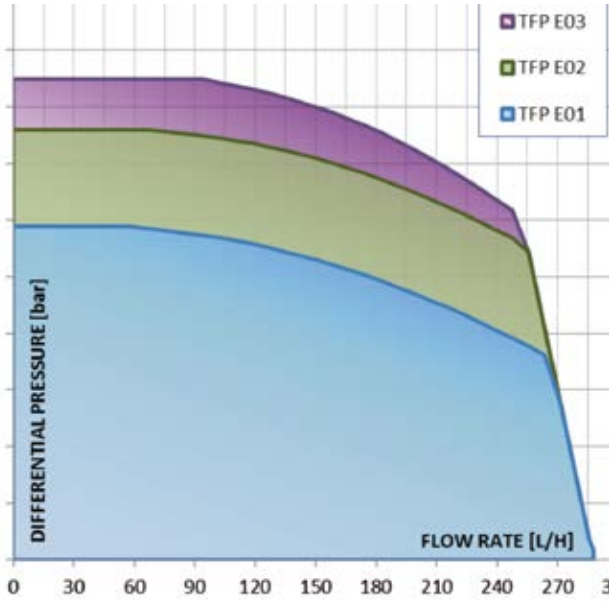


Test fluid: exsol d-40

0838XXXXXX00

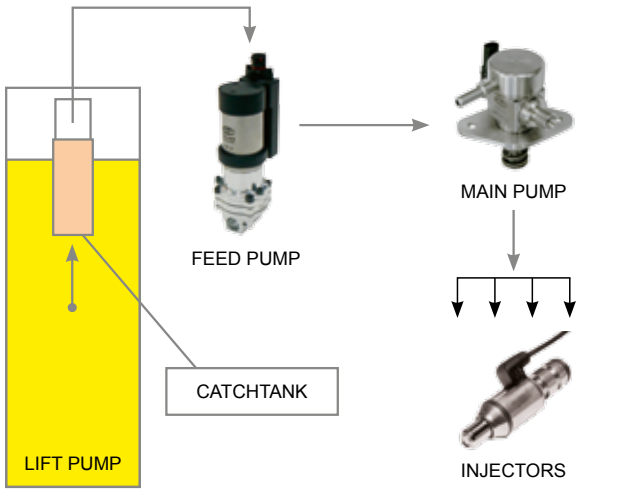
TFP-EXX

Brushless fuel feed pump
180 L/h @ 200-800 kPa



Fluid temperature: 65°C

Application Schematics



Technical Characteristics

Fuel delivery	up to 180 L/h
Fuel pressure	up to 8 bar
Nominal supply voltage	13.5 or 48 V
Current consumption	up to 2.1 A
CAN communication line (@ 1Mbits/s)	1
PWM input (@ 100 Hz)	1

Connector Pin Out

Pin Configuration
Connector ASL006-05PN-HE-952K

Description	N° Pin	Colour
+ V Batt	1	Red
CAN H	2	Yellow
CAN L	3	Blue
Control input (0-Vbatt)	4	White
- V Batt	5	Black

	13,5 V			48 V		
	TFP 4713	TFP 4714	TFP 4695	TFP E01	TFP 4717	TFP 4711
Flow [l/h]	150	150	150	150	150	150
Pressure [bar]	5	7	8	5	7	8
Weight [g]	260	310	350	260	310	350
Size [mm]	38x45x134	38x45x151	38x49x133	38x45x130	38x45x147	38x49x129

PHP 2XX

Racing GDI pump
190 L/h @ 20 MPa

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*

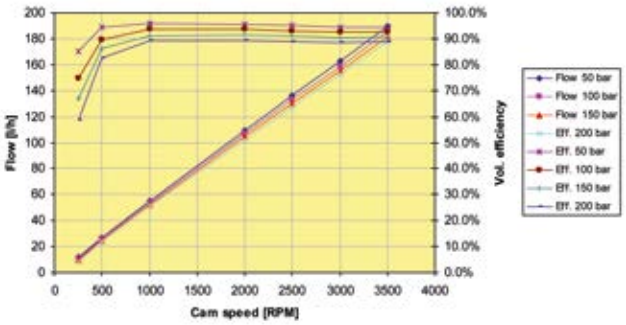
Benefits

- *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

Rally Cars
Touring cars

Typical Performance



Test conditions:

- Fluid: Exssol D40
- Fluid temperature: 23 °C
- Feed pressure: 5 bar
- Ambient temperature: 23 °C

Pump configuration:

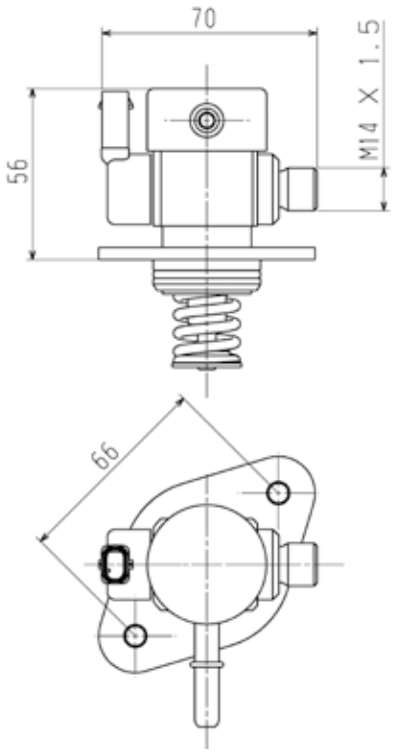
- N° lobes: 3
- Stroke: 5mm

PHP 2XX-0838XXXXXX00

PHP 2XX

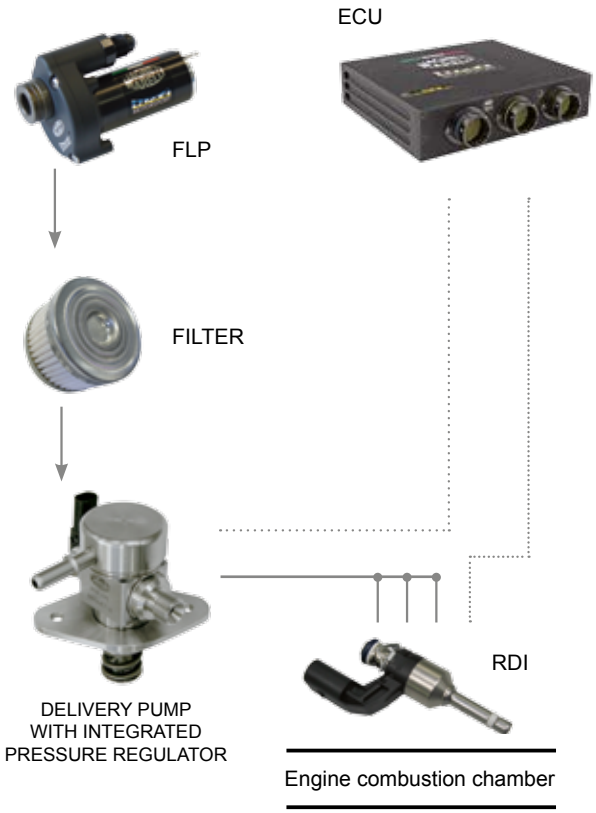
Racing GDI pump
190 L/h @ 20 MPa

Dimensions



Dimensions in millimetres

Application Schematics



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	190L/h
Weight (Approx.)	600 g

ELECTRIC ACTUATORS

EGA 2.0

Electric Gearshift Actuator

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 cars
Touring cars
GT cars
Rally cars

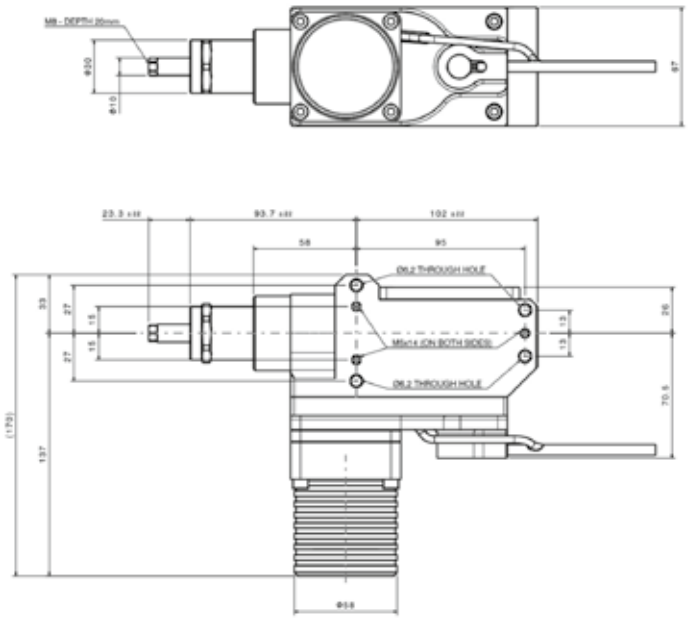
Typical Performance

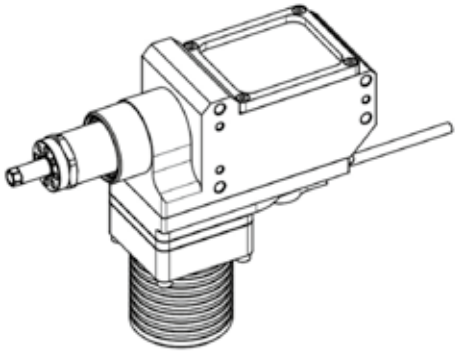
Gearshift allowed in 100 ms
Barrel movement in 40 ms

EGA 2.0

Electric Gearshift Actuator

Dimensions



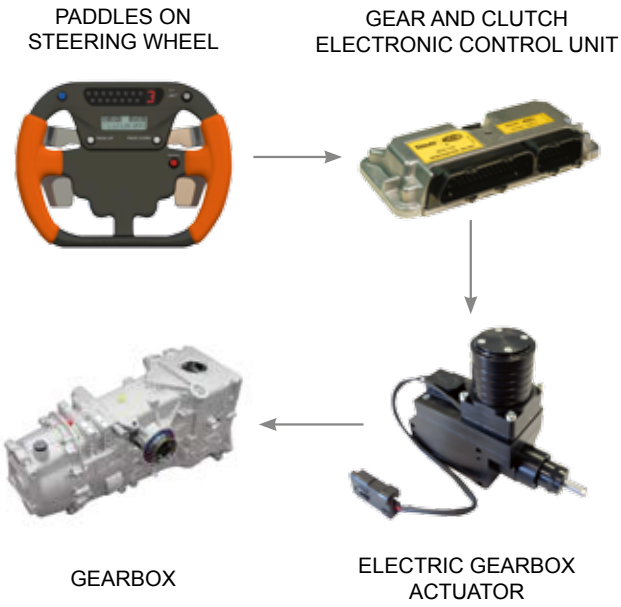


Dimensions in millimetres

Technical Characteristics

Stroke	± 18 mm
Force	min. 750 N
Current draw	max peak 70 A
Operating temperature	max 100 °C
Supply Voltage	12-14 VDC
Weight	3000 g

Application Schematics



EGA 2.0.1 L

Electric Gearshift Actuator

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 cars
Touring cars
GT cars
Rally cars

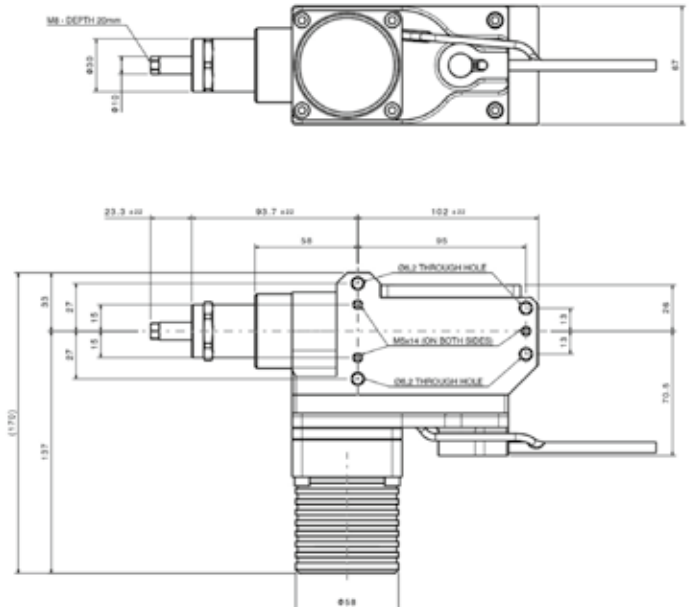
Typical Performance

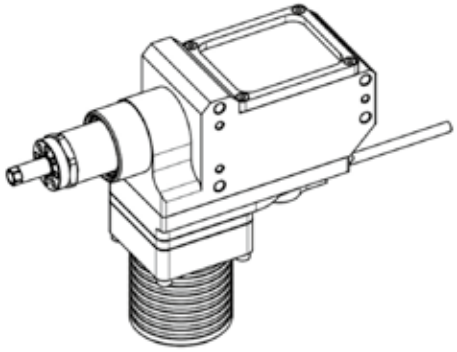
Gearshift allowed in 100 ms
Barrel movement in 40 ms

EGA 2.0.1 L

Electric Gearshift Actuator

Dimensions



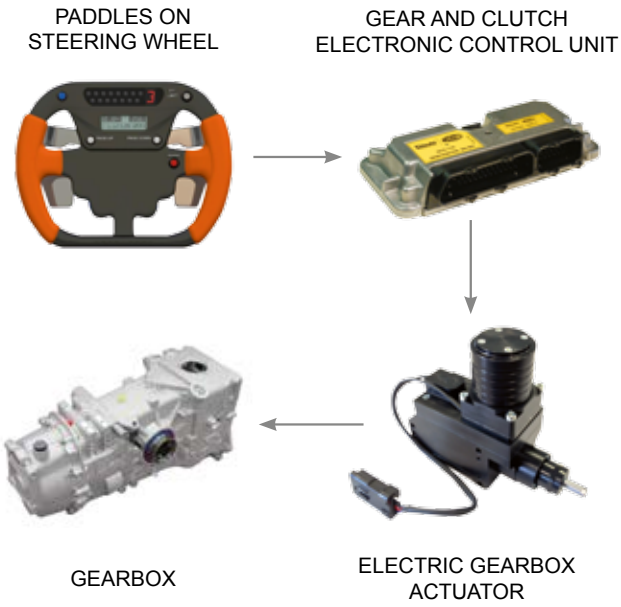


Dimensions in millimetres

Technical Characteristics

Stroke	± 18 mm
Force	min. 750 N
Current draw	max peak 70 A
Operating temperature	max 100 °C
Supply Voltage	12-14 VDC
Weight	3000 g

Application Schematics



ESA

Electric Shaft Actuator

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 cars
Touring cars
GT cars
Rally cars

Typical Performance

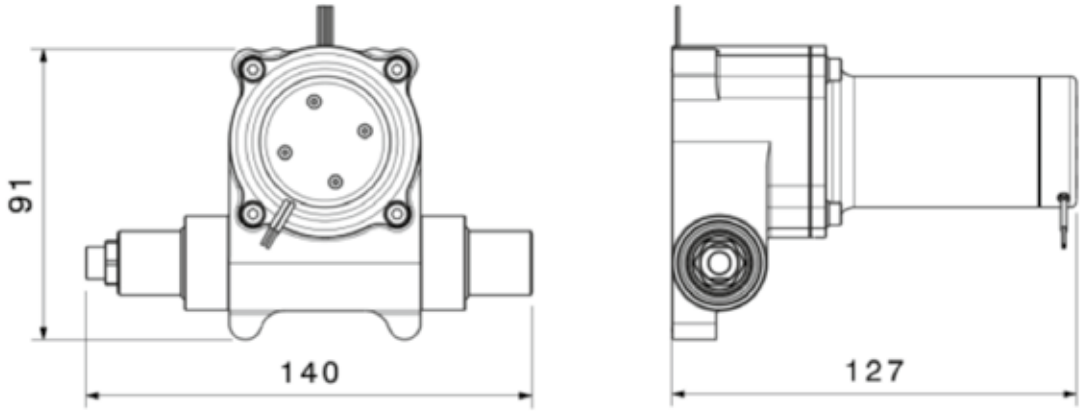
Barrel movement in ~35 ms
Next gearshift allowed in ~100 ms

ESA -083804417100

ESA

Electric Shaft Actuator

Dimensions

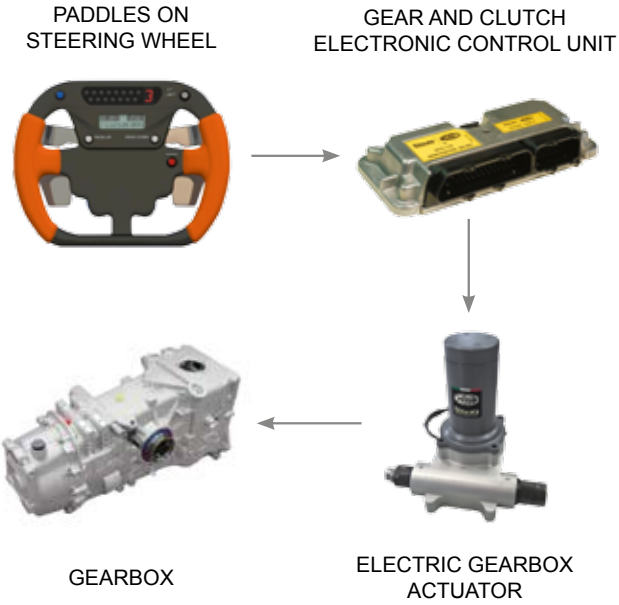


Dimensions in millimetres

Technical Characteristics

Stroke	± 18 mm
Force	~ 800 N
Current draw	max peak 70 A
Operating temperature	max 100 °C
Supply Voltage	12-14 VDC
Weight	1400 g

Application Schematics



GCC-110

Power unit for Electric Actuators

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 it's 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 cars
Touring cars
GT cars
Rally cars

GCC-110

Power unit for Electric Actuators

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

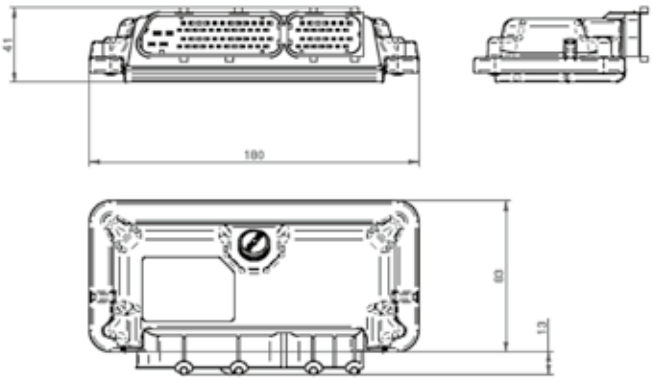
Logic Core

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

Other Characteristics

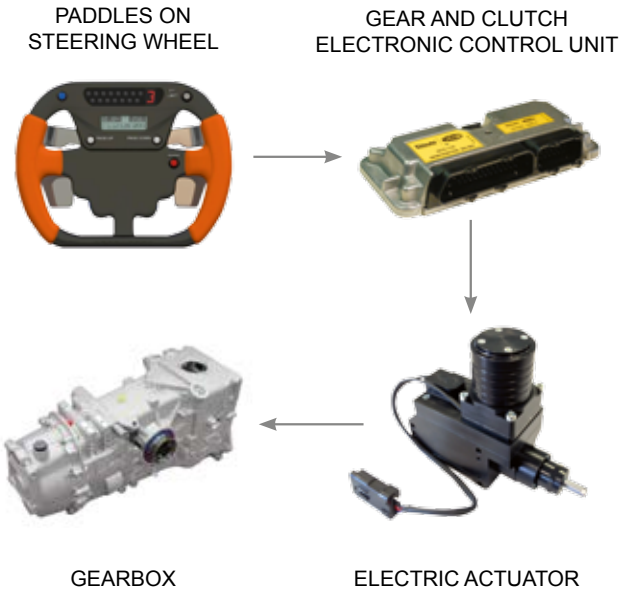
Power supply	8 to 18 V
Operating temperature range (internal)	- 20 to 85 °C
Protection class	IP 64
Connectors	7-1393476-6 (80 ways)
Dimensions	
with connectors	180 x 96 x 41 mm
Weight (approx.)	450 g

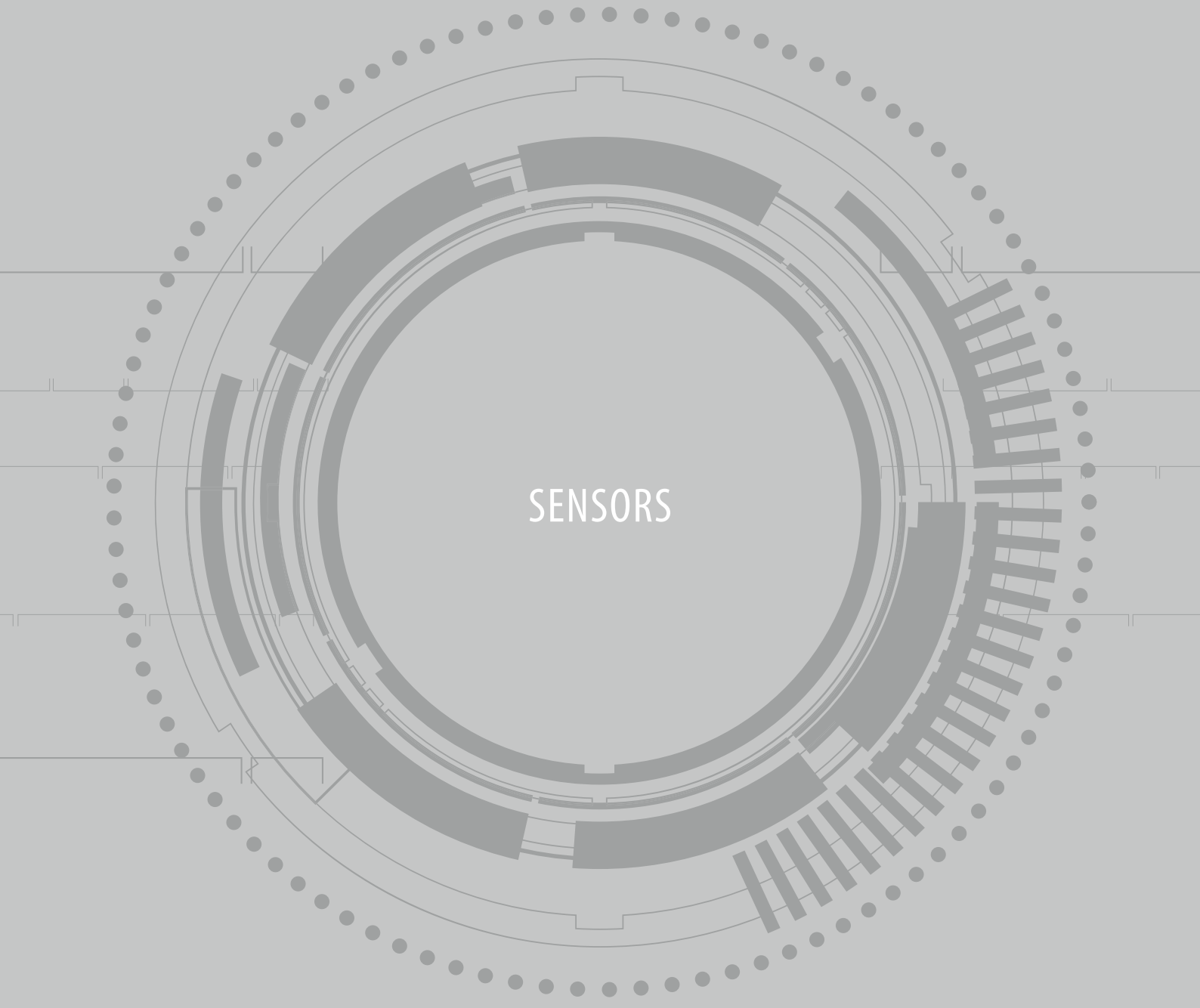
Dimensions



Dimensions in millimetres

Application Schematics




SENSORS

PSA02

0,2 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*
- *Available with cable (length 346mm)*
  Connector type: ASU-603-03-PN.
  Product Number: 83813433700

Benefits

- *Small size*
- *High output*
- *High reliability*

Typical Applications

Manifold pressure in turbocharged engines

PSA02-083813343200

PSA02

0,2 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)	0,2 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

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

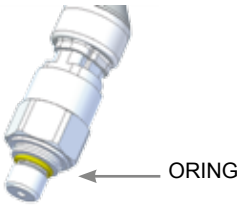
Notes

Installation torque max	15 Nm

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

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

Oring not included.



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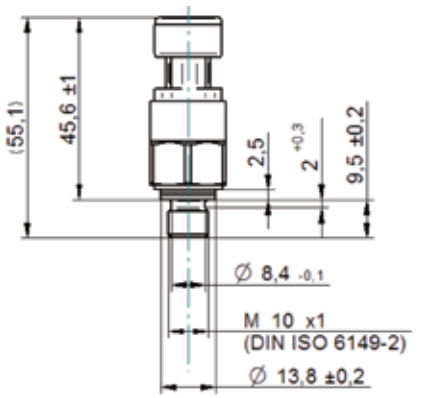
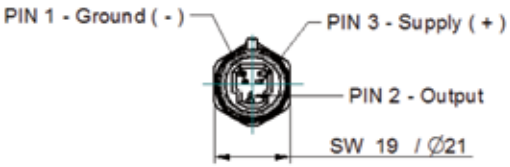




Electrical Connections
Packard Metric Pack Serie 150

Dimensions in millimetres

PSA04

0,4 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*
- *Available with cable (length 150mm)*
  Connector type: ASU-603-03-PB
  Product Number: 83821394900

Benefits

- *Small size*
- *High output*
- *High reliability*

Typical Applications

Manifold pressure in turbocharged engines

PSA04-083813291400

PSA04

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.

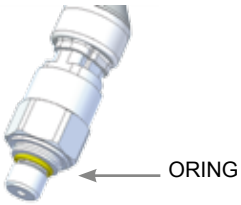
Notes

Installation torque max	15 Nm

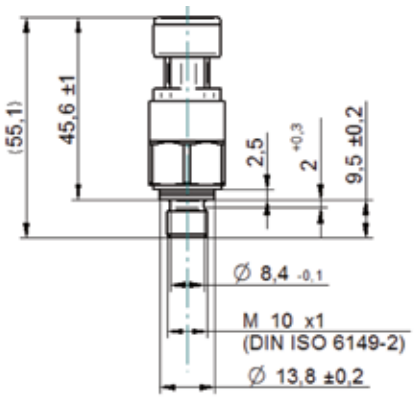
This value depends from the streght class of the material with which the sensor is coupled.

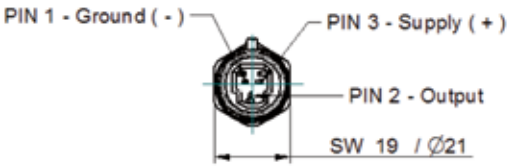
It is recommended to use a Oring 8,1x1,6 FKM.

Oring not included.



Dimensions





Electrical Connections
Packard Metric Pack Serie 150

Dimensions in millimetres

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

PSA05-083813456903

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.

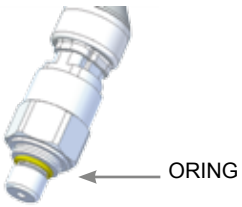
Notes

Installation torque max	15 Nm

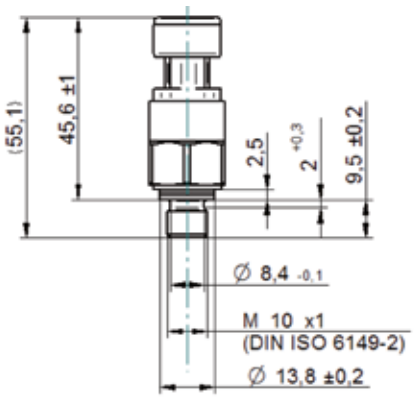
This value depends from the streght class of the material with which the sensor is coupled.

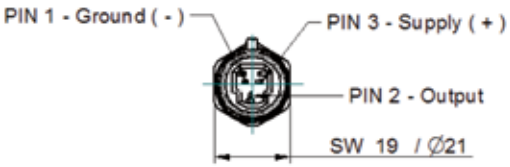
It is recommended to use a Oring 8,1x1,6 FKM.

Oring not included.



Dimensions





Electrical Connections
Packard Metric Pack Serie 150

Dimensions in millimetres

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*
- *Available with cable (length 346mm)*
  Connector type: ASU-603-03-PN.
  Product Number: 83813433800

Benefits

- *Small size*
- *High output*
- *High reliability*

Typical Applications

Manifold pressure in turbocharged engines

PSA05-083813456903

PSA05

0,5 MPa pressure sensor
High Accuracy

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. ± 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.

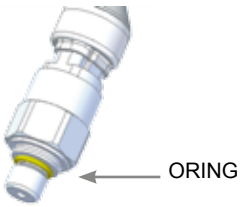
Notes

Installation torque max	15 Nm

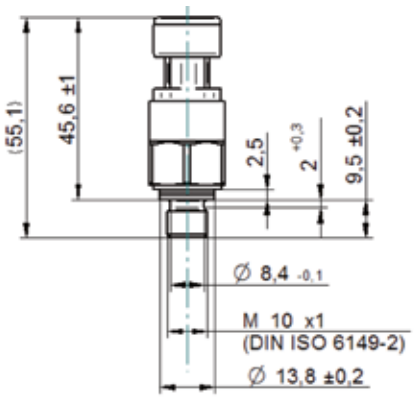
This value depends from the streght class of the material with which the sensor is coupled.

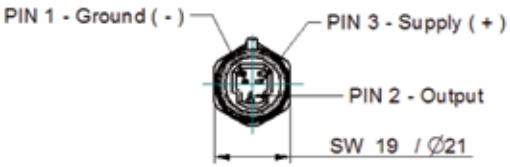
It is recommended to use a Oring 8,1x1,6 FKM.

Oring not included.



Dimensions





Electrical Connections
Packard Metric Pack Serie 150

Dimensions in millimetres

PS1

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

PS1-083813146300

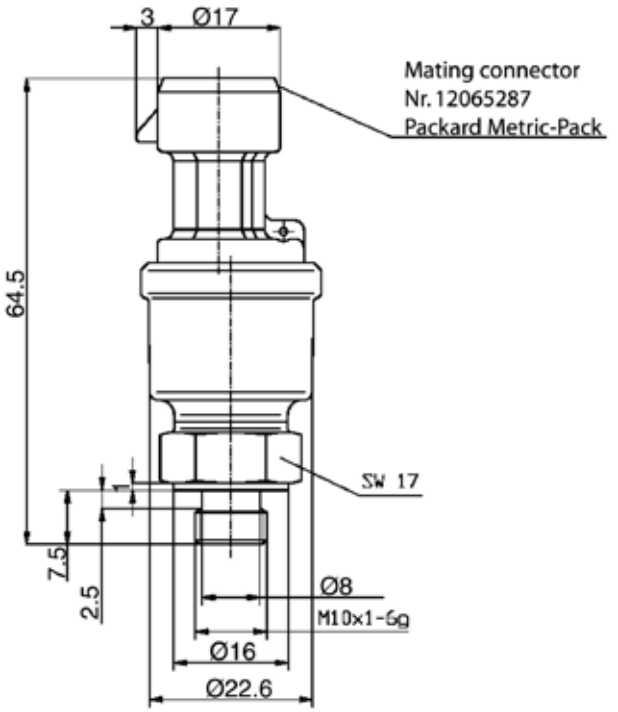
PS1

1 MPa pressure sensor

Technical Characteristics

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

Dimensions



Dimensions in millimetres

PSA2

2 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*
- *Available with cable (length 346mm)*
  Connector type: ASU-603-03-PN.
  Product Number: 83813433900

Benefits

- *Small size*
- *High output*
- *High reliability*

Typical Applications

Manifold pressure in turbocharged engines

PSA2

2 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)	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

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

Notes

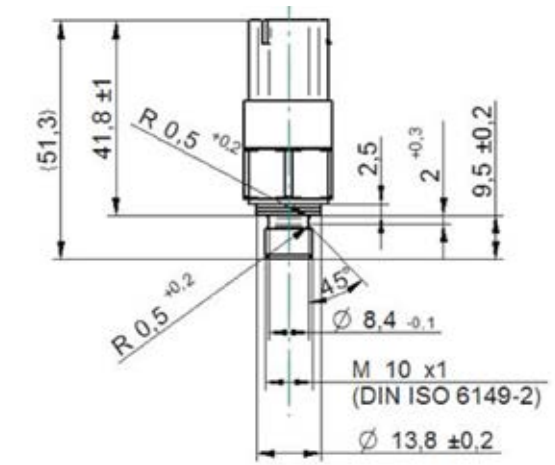
Installation torque max	15 Nm

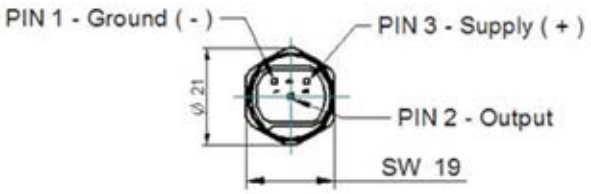
This value depends from the streght class of the material with which the sensor is coupled.

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

Oring not included.

Dimensions





Electrical Connections
AMP Micro Quadlok System (MQS)

Dimensions in millimetres

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

PS25-083813353600

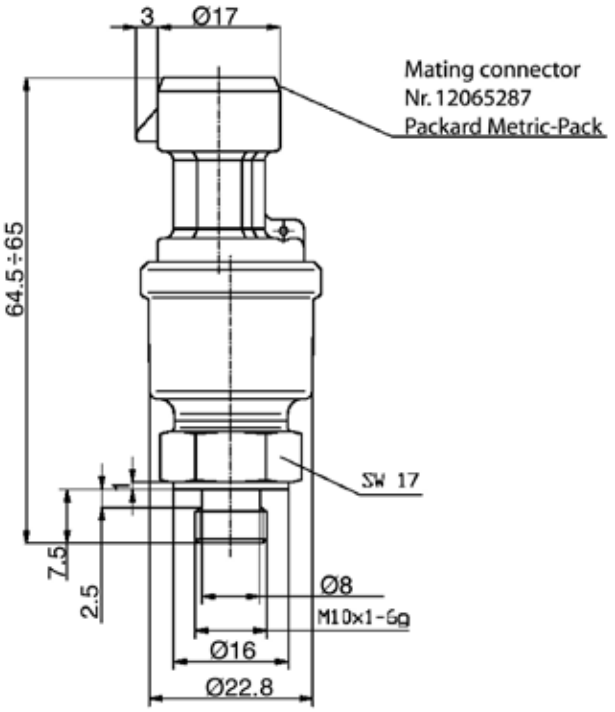
PS25

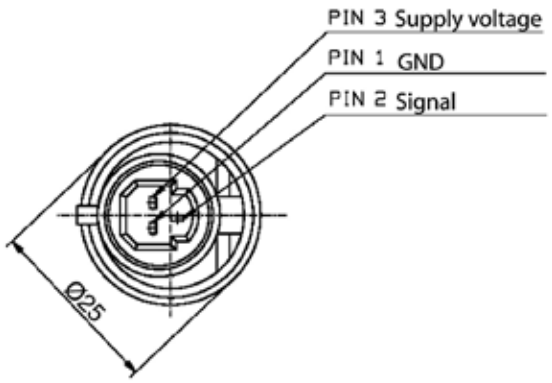
25 MPa pressure sensor

Technical Characteristics

Power supply	5 V
Supply current	< 15 mA
Null offset	0.5 V
Full scale output (@ Nominal Pressure)	4.5 V
Nominal pressure	25 MPa
Operating temperature range	- 40 to 125 °C
(200 h @ 140°C accumulated over life time)	
Response time	< 2 ms
Accuracy (f.s.o. and Null offset)	
@ - 40 °C to 0 °C	max. ± 3 % f.s.o.
@ 25 °C to 90 °C	max. ± 2 % f.s.o.
@ 90 °C to 125 °C	max. ± 3 % f.s.o.
Burst Pressure	2 x Nominal Pressure
Vibrations range tested	
@ 147 Hz to 1000 Hz	20 g
@ 1000 Hz to 2000 Hz	20 g
Protection class	IP 69K
Weight (approx.)	45 g

Dimensions





Dimensions in millimetres

ATS 04

3 kΩ Air Temperature Sensor

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*

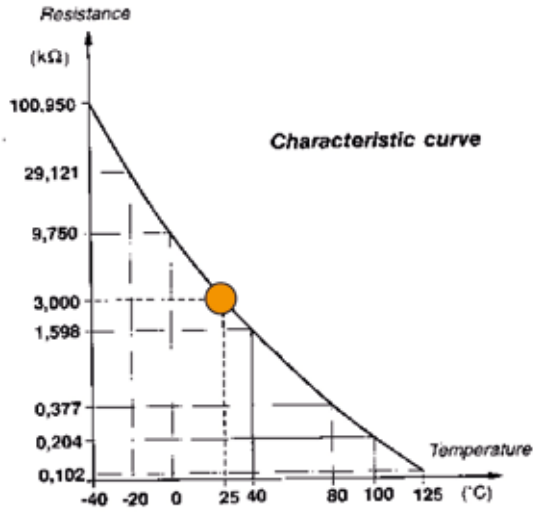
Benefits

- *High signal level*
- *Low cost*

Typical Applications

Touring cars

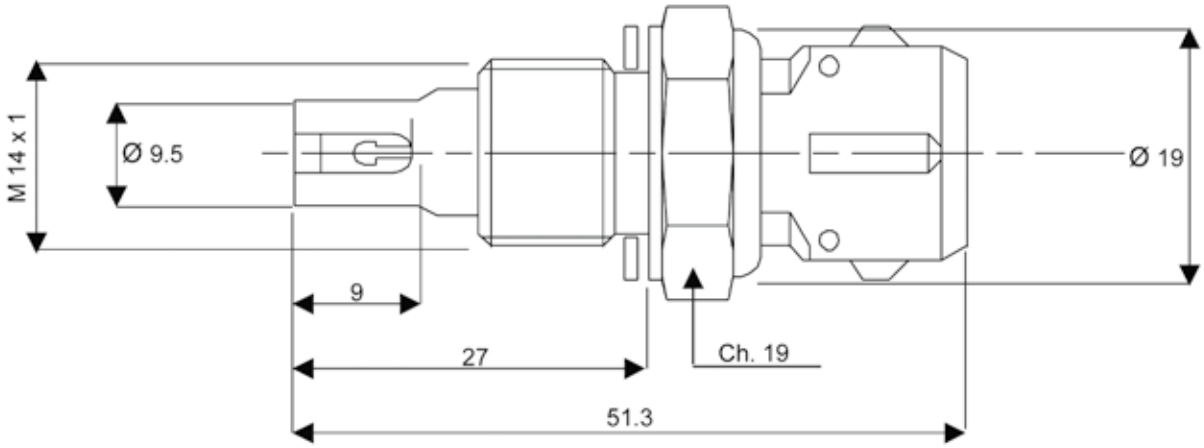
Typical Performance



ATS 04

3 kΩ Air Temperature Sensor

Dimensions



Dimensions in millimetres

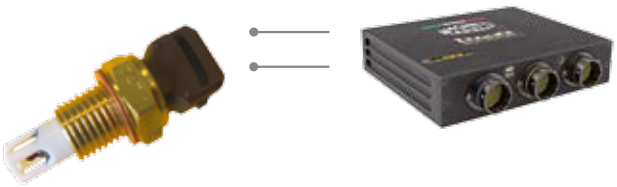
Technical Characteristics

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

ATS 04 SENSOR

ENGINE CONTROL UNIT



NTC M6

10 kΩ Air-fluid temperature sensor

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

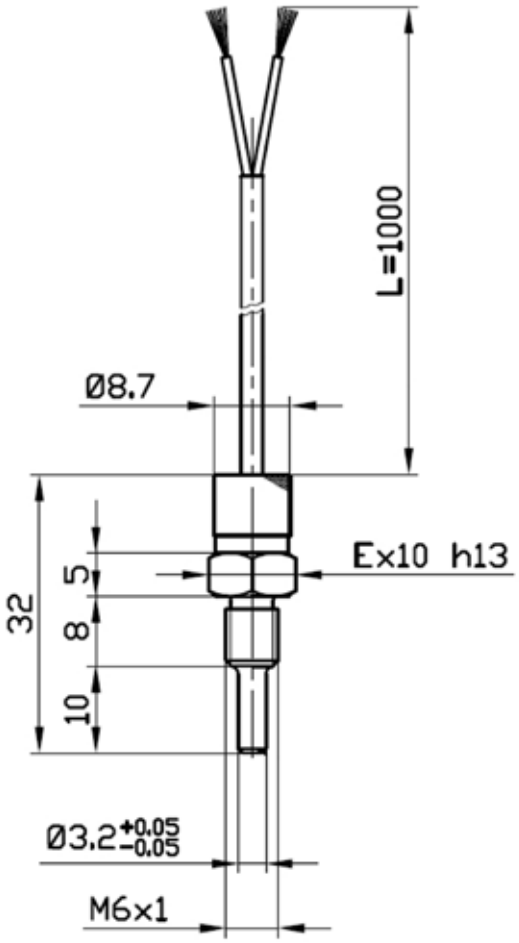
Racing engines

NTC M6-083813294903

NTC M6

10 kΩ Air-fluid temperature sensor

Dimensions



Dimensions in millimetres

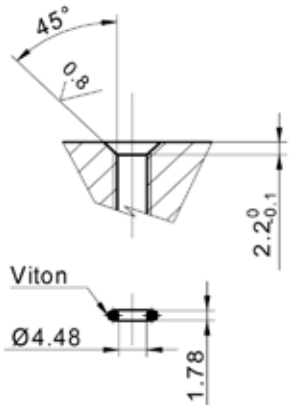
Temperature resistance table

[°C]	[Ohm]	[°C]	[Ohm]
- 40	200460.6	**85**	1451.2
- 35	152692.3	**90**	1269.2
- 30	117165.8	**95**	1114
- 25	90564.5	**100**	981
- 20	70509.8	**105**	866.7
- 15	55286.9	**110**	768.1
- 10	43653.1	**115**	682.9
- 5	34702.3	**120**	608.8
0	27770	**125**	544.3
5	22366.1	**130**	488
10	18126.9	**135**	438.7
15	14780.5	**140**	395.4
20	12123	**145**	357.2
25	10000	**150**	323.5
30	8294.3	**155**	293.6
35	6916.3	**160**	267.1
40	5796.9	**165**	243.6
45	4882.9	**170**	222.5
50	4132.8	**175**	203.7
55	3514.1	**180**	186.9
60	3001.5	**185**	171.8
65	2574.7	**190**	158.2
70	2217.8	**195**	145.9
75	1918	**200**	134.8
80	1665.2		

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

Suggested housing & OR



NTC M8

10 kΩ Air-fluid temperature sensor

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*

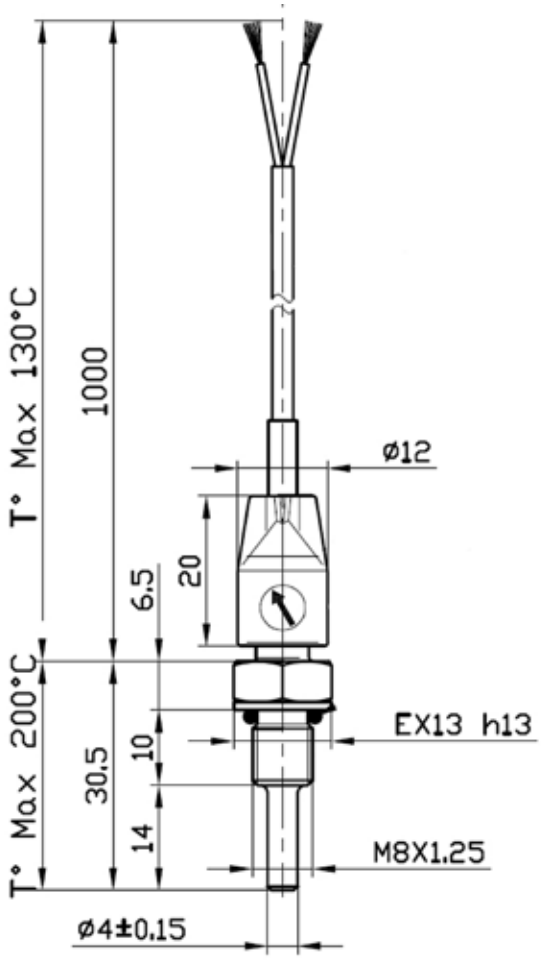
Typical Applications

Racing engines

NTC M8

10 kΩ Air-fluid temperature sensor

Dimensions



Dimensions in millimetres

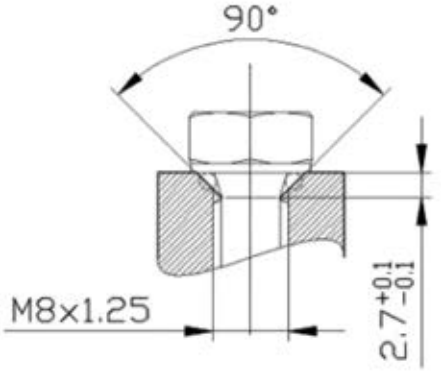
Temperature resistance table

[°C]	[Ohm]	[°C]	[Ohm]
- 40	200460.6	**85**	1451.2
- 35	152692.3	**90**	1269.2
- 30	117165.8	**95**	1114
- 25	90564.5	**100**	981
- 20	70509.8	**105**	866.7
- 15	55286.9	**110**	768.1
- 10	43653.1	**115**	682.9
- 5	34702.3	**120**	608.8
0	27770	**125**	544.3
5	22366.1	**130**	488
10	18126.9	**135**	438.7
15	14780.5	**140**	395.4
20	12123	**145**	357.2
25	10000	**150**	323.5
30	8294.3	**155**	293.6
35	6916.3	**160**	267.1
40	5796.9	**165**	243.6
45	4882.9	**170**	222.5
50	4132.8	**175**	203.7
55	3514.1	**180**	186.9
60	3001.5	**185**	171.8
65	2574.7	**190**	158.2
70	2217.8	**195**	145.9
75	1918	**200**	134.8
80	1665.2		

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

Suggested housing



PT1000 M6

Air-fluid temperature sensor

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

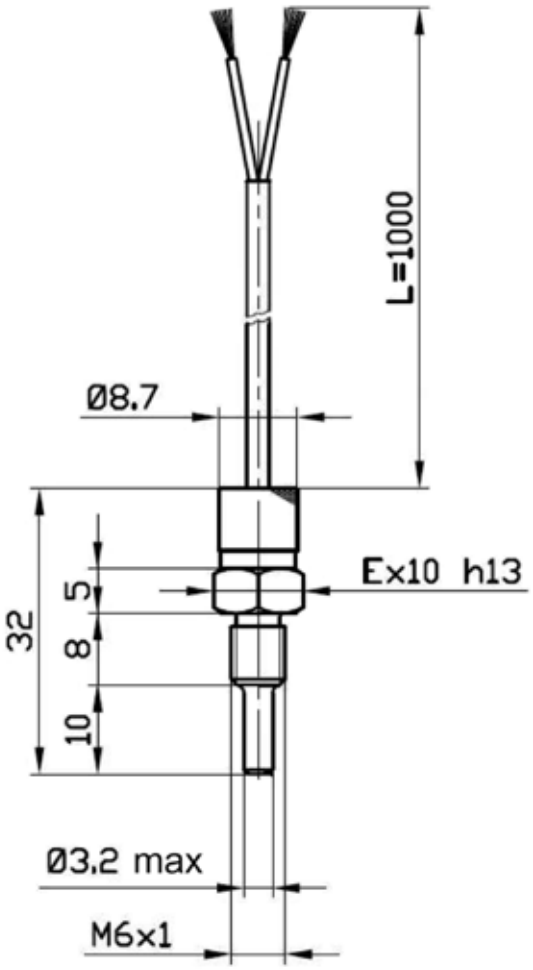
TEMP. SENSOR

ENGINE CONTROL UNIT

PT1000 M6

Air-fluid temperature sensor

Dimensions



Dimensions in millimetres

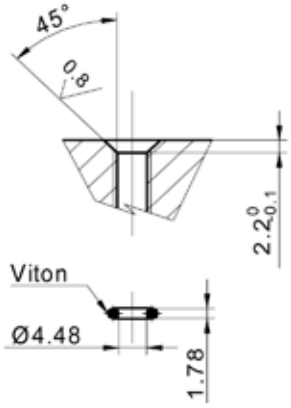
Technical Characteristics

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

°C	Ohm	°C	Ohm	°C	Ohm	°C	Ohm
- 20	921.6	**40**	1156.4	**100**	1385.1	**160**	1610.5
- 10	960.9	**50**	1194.0	**110**	1422.9	**170**	1647.7
0	1000.0	**60**	1232.4	**120**	1460.7	**180**	1684.8
10	1039.0	**70**	1270.8	**130**	1498.3	**190**	1721.7
20	1077.9	**80**	1309.0	**140**	1535.8	**200**	1758.6
30	1116.7	**90**	1347.1	**150**	1573.3	**210**	1795.3

Suggested housing



PT1000 M8

Air-fluid temperature sensor

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

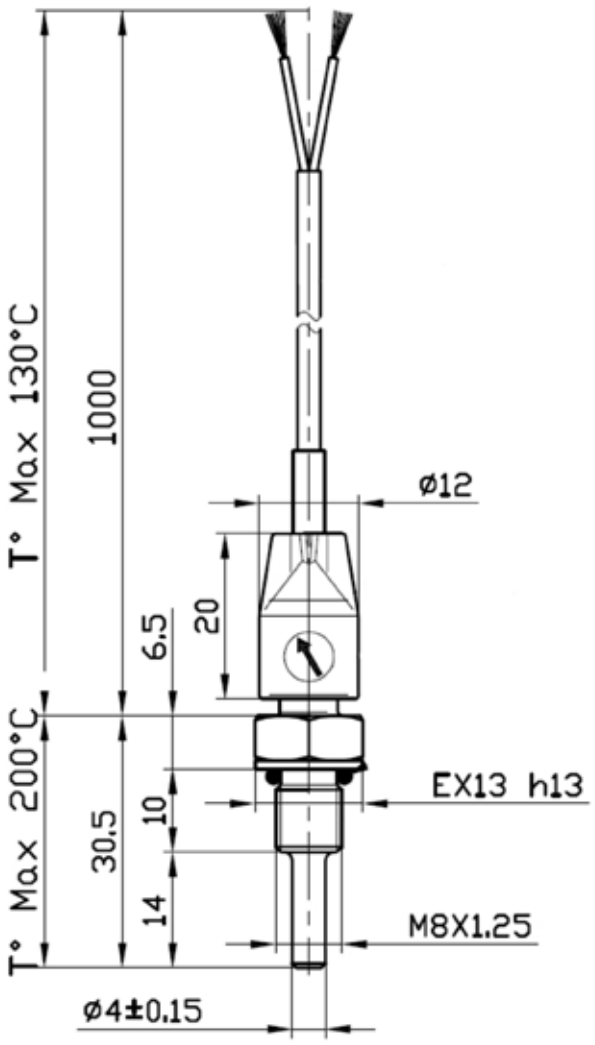
TEMP. SENSOR

ENGINE CONTROL UNIT

PT1000 M8

Air-fluid temperature sensor

Dimensions



Dimensions in millimetres

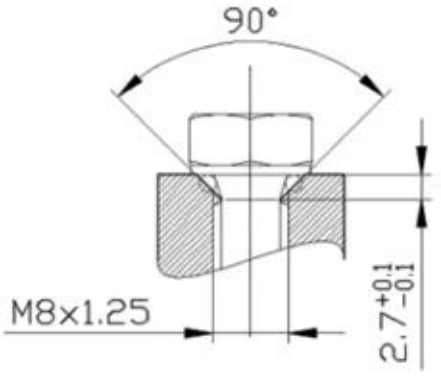
Technical Characteristics

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

°C	Ohm	°C	Ohm	°C	Ohm	°C	Ohm
- 20	921.6	**40**	1156.4	**100**	1385.1	**160**	1610.5
- 10	960.9	**50**	1194.0	**110**	1422.9	**170**	1647.7
0	1000.0	**60**	1232.4	**120**	1460.7	**180**	1684.8
10	1039.0	**70**	1270.8	**130**	1498.3	**190**	1721.7
20	1077.9	**80**	1309.0	**140**	1535.8	**200**	1758.6
30	1116.7	**90**	1347.1	**150**	1573.3	**210**	1795.3

Suggested housing



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

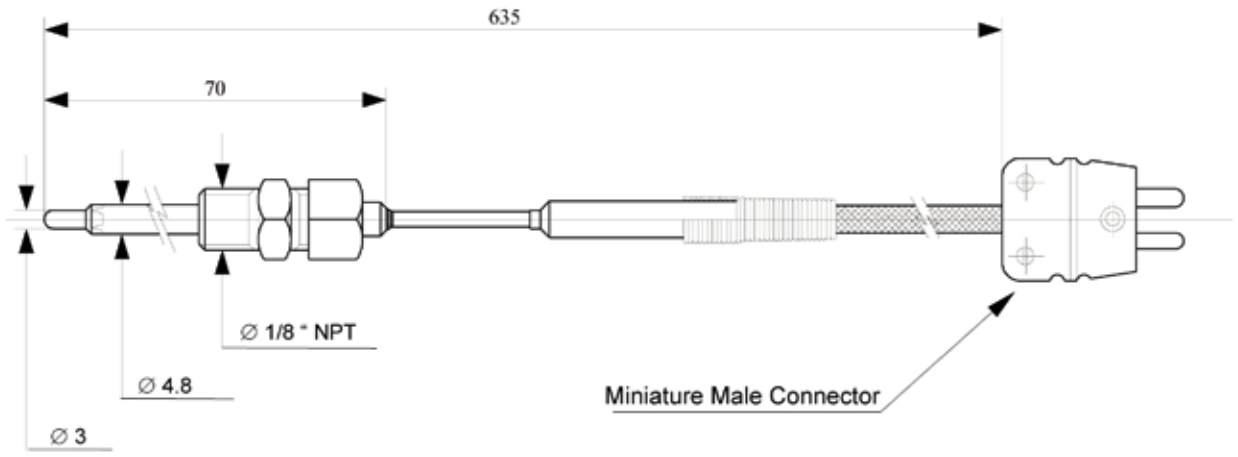
Exhaust gas temperature measurement on all kind of racing engines

TC-K-083813295300

TC-K

K-Type Thermocouple
Exhaust Gas Temp. Sensor (Cr/Al)

Dimensions

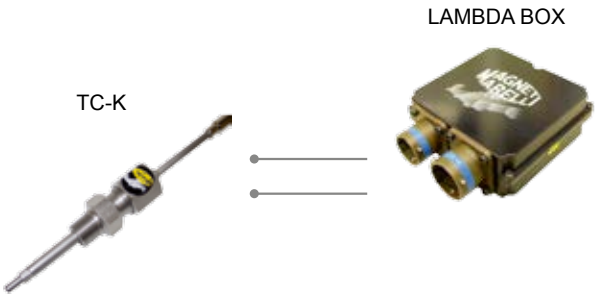


Dimensions in millimetres

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



TL00601

Linear oxygen sensor

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*

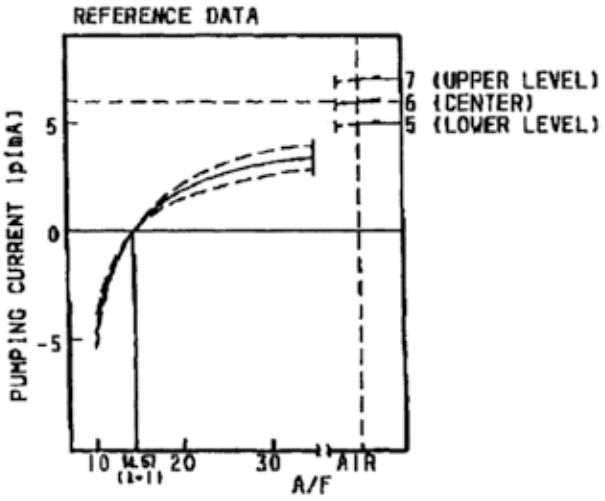
Benefits

- *Rugged design*

Typical Applications

Racing engines

Typical Performance



TL00601-083813124700

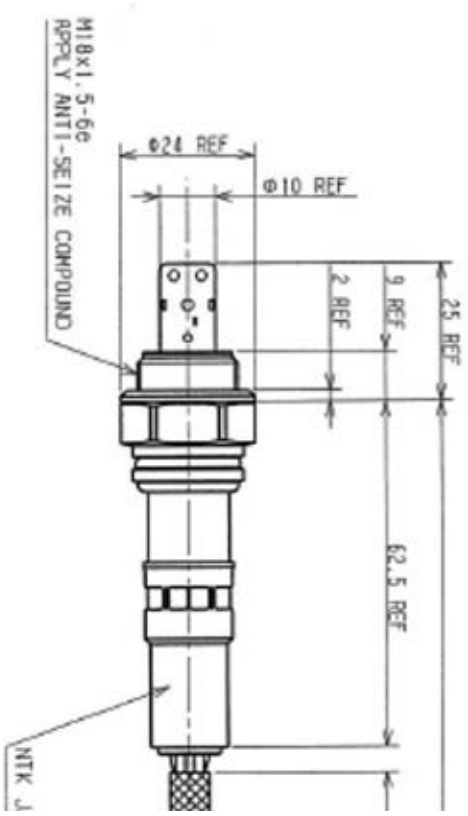
TL00601

Linear oxygen sensor

Technical Characteristics

Sensor element tip temperature.	750 to 950 °C
Connector temperature	120 °C
Storage temperature range	- 40 to 120 °C
Shock resistance	300 m\s^2
Weight (with cable)	110 g

Dimensions



Dimensions in millimetres

LPT 50-150

Linear potentiometer
Measurement range 50-150

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

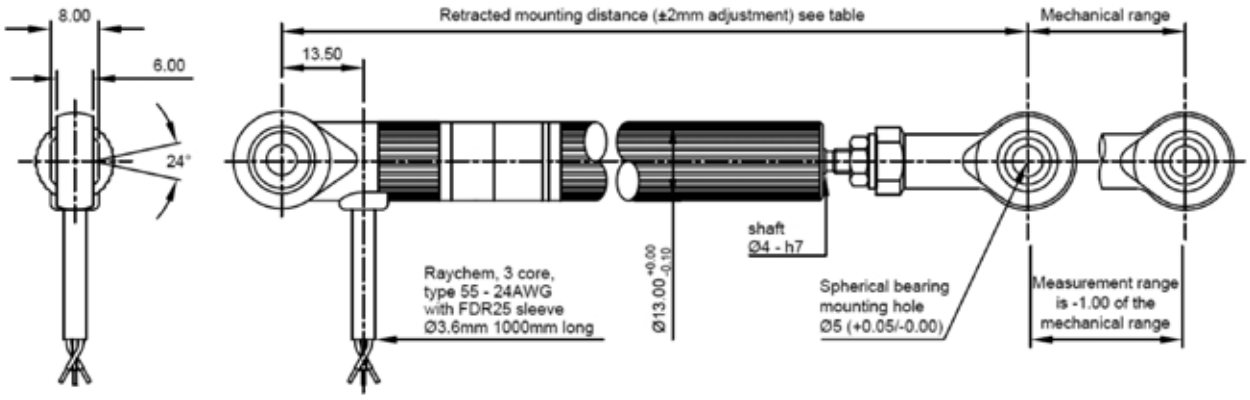
Linear travel measurement (e.g. suspension travel measurement)

LP 75 083813193400 - LP 150 083813195200

LPT 50-150

Linear potentiometer
Measurement range 50-150

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	“0” ring and shaft lip seal
Cable length (*)	1 m

(*) Different lengths are available on customer request

Connector Pin Out

Wire colour table

Red	Supply voltage
Black	GND
White	Signal

Measurement range table

Linear Potentiometer	LPT 50	LPT 75	LPT 150	
Measurement range (± 0.5 mm)	50	75	150	mm
Nominal resistance (± 10 %)	2	3	6	kΩ
Applied Voltage	< 45	< 65	< 130	V
Wiper load	> 500	> 500	> 600	kΩ
Non linearity	< ± 0.25	< ± 0.15	< ± 0.15	% f.s.
Retracted mounting distance	148	173	248	mm
Weight (approx)	66	73	90	g

LP 75-150 J

Linear potentiometer
Measurement range 75-150 mm
Junior series

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

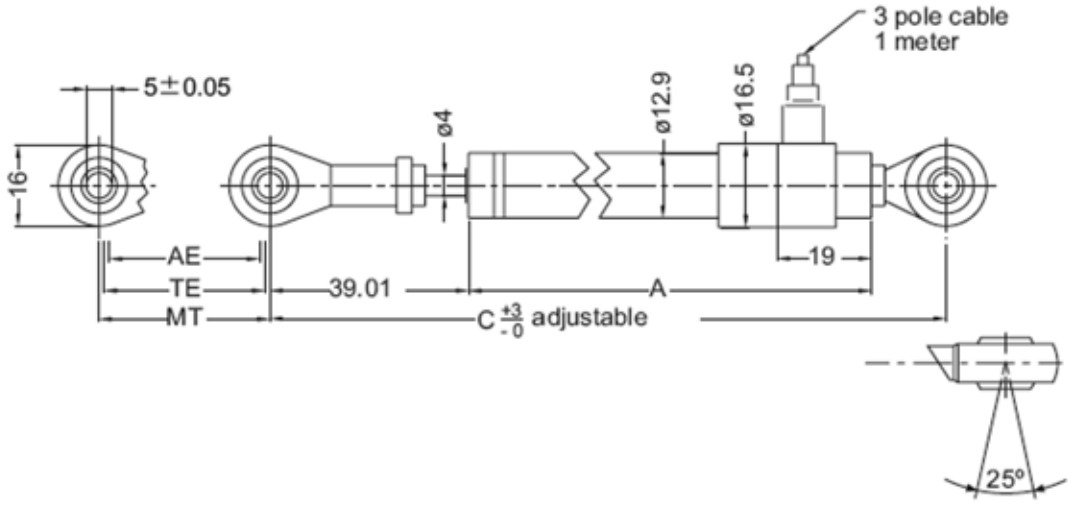
Linear travel measurement (e.g. suspension travel measurement)

LP 75-150 J-0838XXXXX00

LP 75-150 J

Linear potentiometer
Measurement range 75-150 mm
Junior series

Dimensions



Dimensions in millimetres

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

Connector Pin Out

Wire colour table	
Blue	Supply voltage
Brawn	GND
Yellow	Signal (wiper)

Measurement range table

Linear Potentiometer	LP 75 J	LP 100 J	LP 125 J	LP 150 J	
Measurement range	75	100	125	150	mm
Nominal resistance (± 20 %)	3	4	5	5	kΩ
Independent linearity	<± 0.10	<± 0.10	<± 0.05	<± 0.05	% f.s.
Retracted mounting distance (-0/+3 adjustable)	203	228	253	278	mm
Weight (approx)	90	100	110	120	g

W1051

100° Contactless rotary position transducer

Description

Contactless counterclockwise rotary position sensor.

Main Features

- *Contactless technology*
- *Low weight sensor*
- *High temperature range*

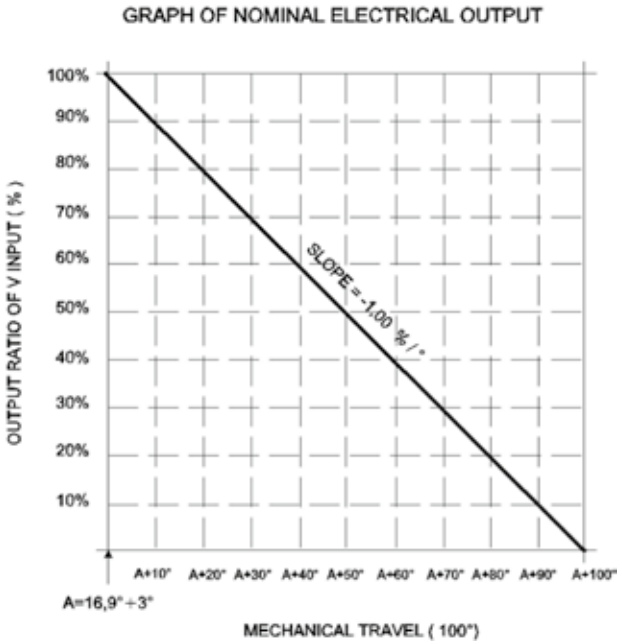
Benefits

- *No contact wear*
- *High precision*

Typical Applications

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

Typical Performance



W1051-083813138100

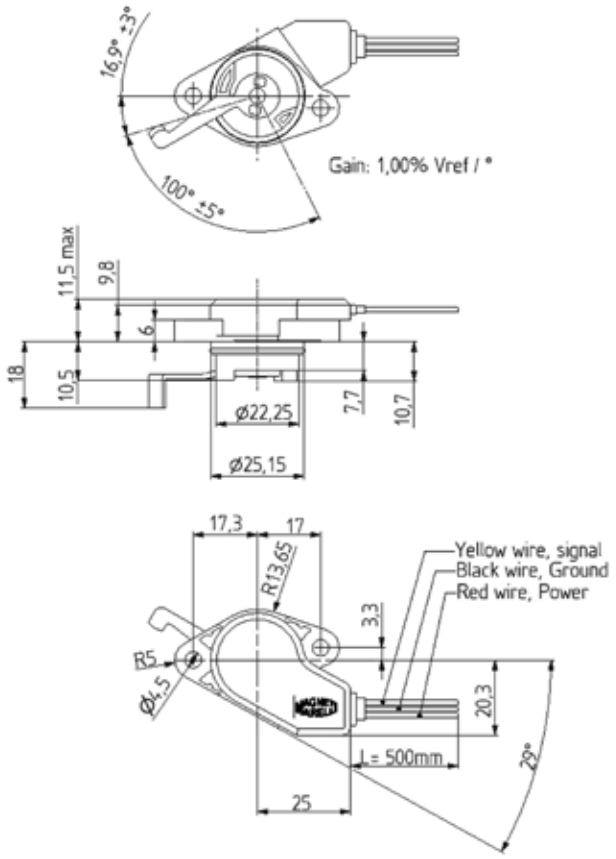
W1051

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

W1059

108° Contactless rotary position transducer

Description

Contactless clockwise rotary position sensor.

Main Features

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

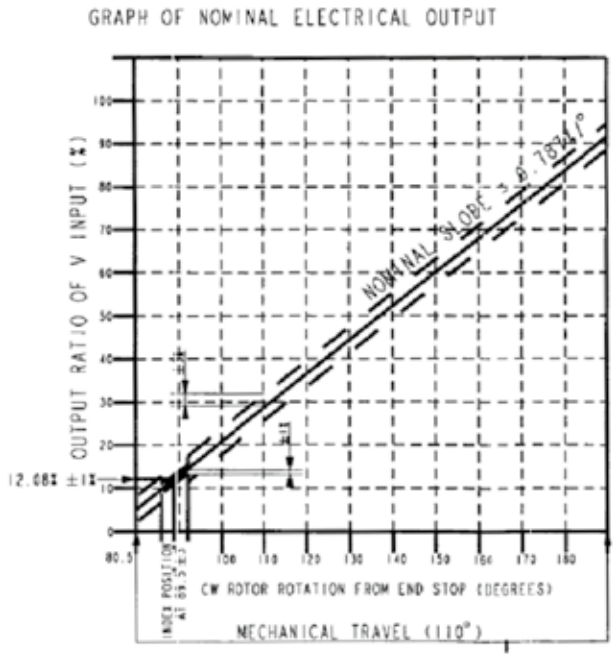
Benefits

- *No contact wear*
- *High precision*

Typical Applications

Throttle and pedal position sensing in racing engines and vehicle

Typical Performance

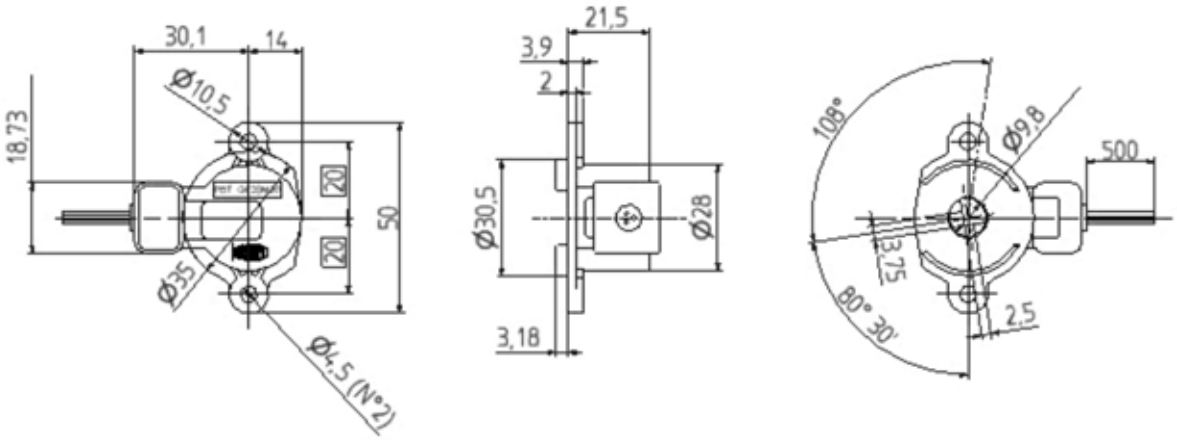


W1059-083813144203

W1059

108° Contactless rotary position transducer

Dimensions



Dimensions in millimetres

Technical Characteristics

Typical application	Throttle and pedal position
Power supply	
normal working range	5 ± 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 (typ.)	± 1.0 % f.s.
Electrical angle	108°
Vout = (0.05 + gradient x angle) x Vref	
Output gradient	0.767 to 0.807
Weight	41 g

Connector Pin Out

Wire colour table

Red	Supply voltage
Black	GND
Blue	Signal

OPS04

Hydraulic pressure transducers 0.1 to 8.1 MPa

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*

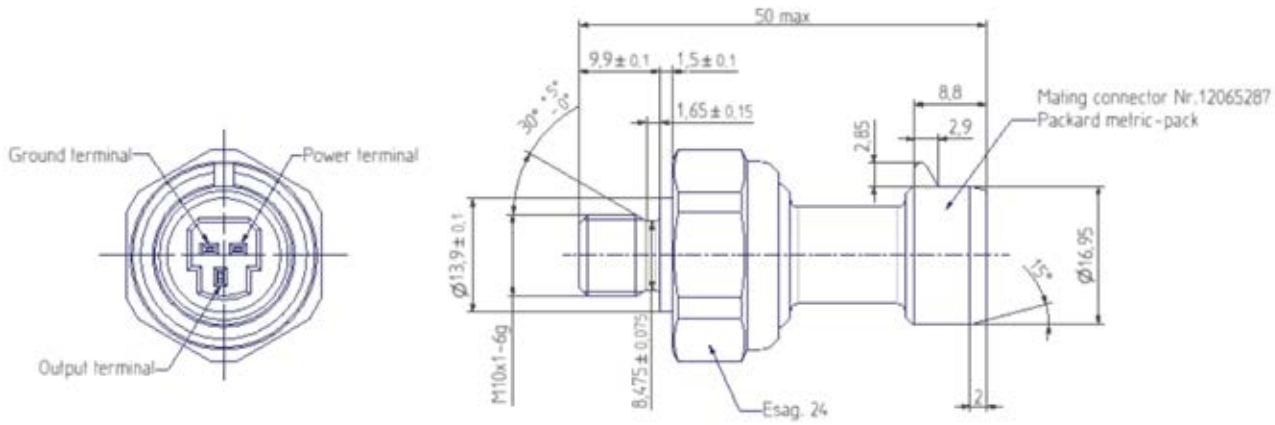
Typical Applications

Fluids measure

OPS04

Hydraulic pressure transducers
0.1 to 8.1 MPa

Dimensions



Dimensions in millimetres

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

SEN 8D-8K

Ø 15 mm VR revolution sensor

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

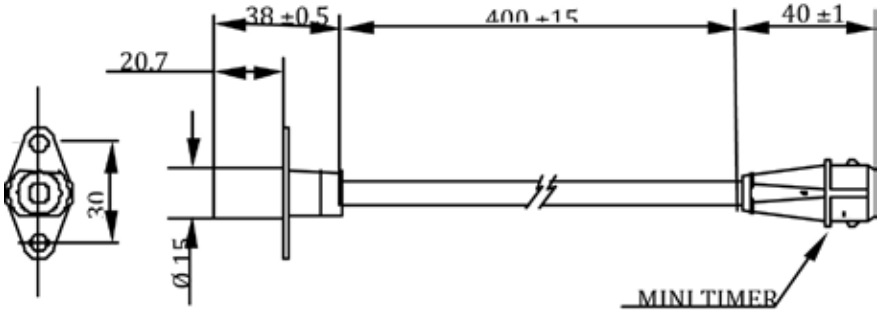
SEN 8K (90° cable exit) available

SEN 8D-8K

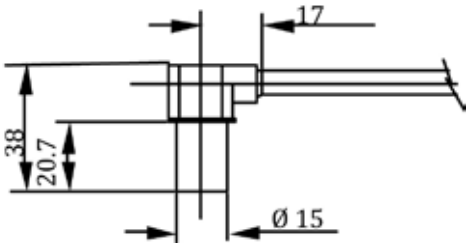
Ø 15 mm VR revolution sensor

Dimensions

SEN 8D



SEN 8K (90° cable exit)



Dimensions in millimetres

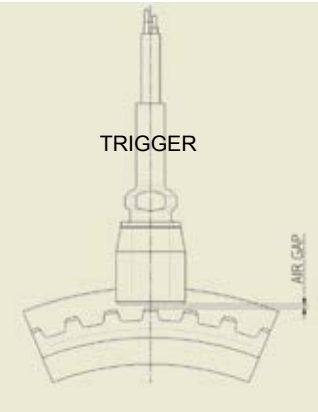
Technical Characteristics

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

Connector Pin Out

PIN	Descriprtion
+	Positive
Not Sig.	GND

Application Schematics

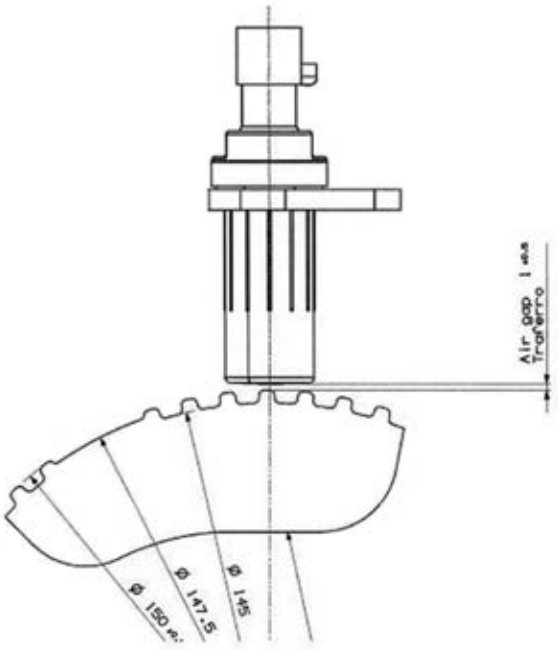


CWM 02

Inductive sensor

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 differenti cable length available*
- *Max speed 7000rpm*

Benefits

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

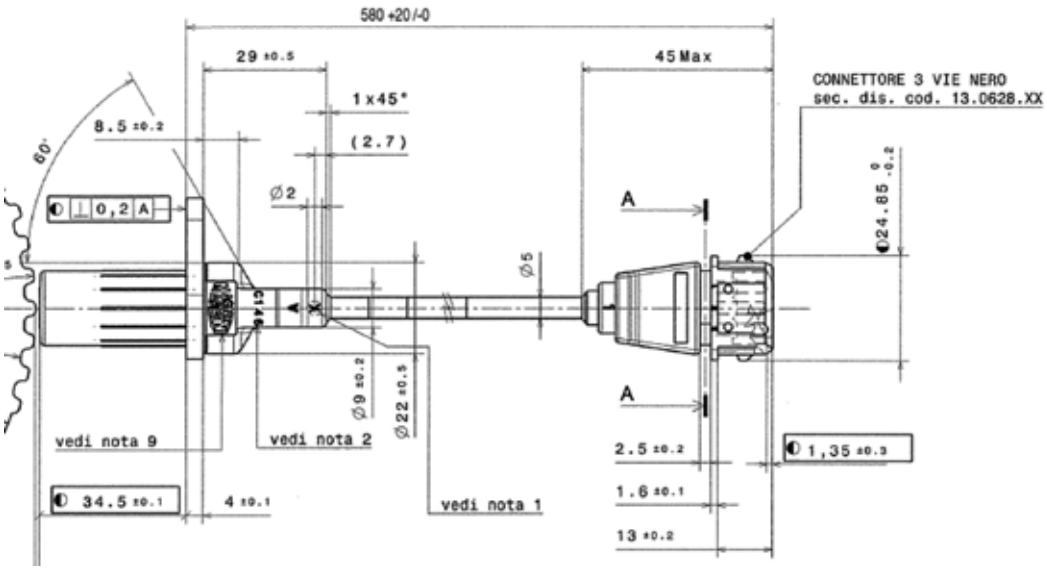
Typical Applications

Rally cars

CWM 02

Inductive sensor

Dimensions



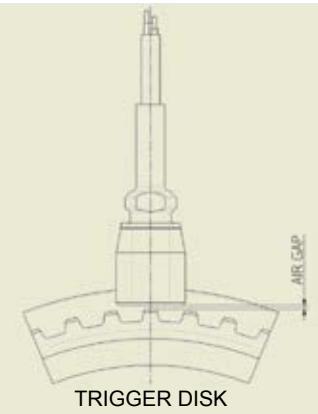
Dimensions in millimetres

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

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

Application Schematics



VR 10

Ø 10 mm
VR revolution sensor

Description

A VR sensor for speed detection of toothed wheels.

Rare earth magnet and high permeability core allow signal detection with large air gaps and low speeds.

Suitable for crank, camshaft, wheel speed detection.

Main Features

- *Stainless steel case*
- *Special HS copper alloy leads for improved reliability*
- *Splash resistant to oil and fuel*
- *Maximum detectable speed 22000 rpm*
- *Contact factory for different case shapes*

Benefits

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

Typical Applications

F1
WRC
MotoGP
Rally cars
Race bikes

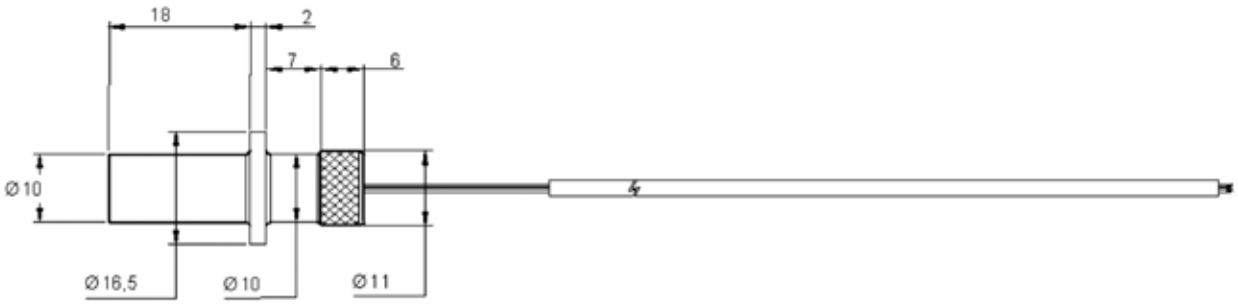
083813381503

VR 10

Ø 10 mm

VR revolution sensor

Dimensions



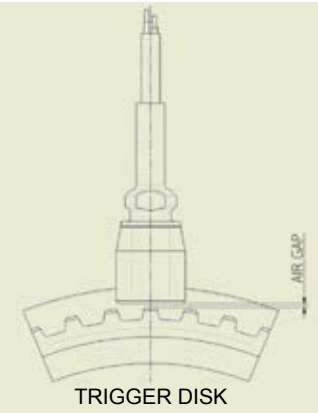
Dimensions in millimetres

Technical Characteristics

Typical application	Crank, Cam, Wheel*
Max. operating temperature	150 °C
Air gap	0.5 to 1 mm*
Speed range	40 to 22000 rpm*
Output @ 40 rpm (peak to peak)	> 400 mV**
Weight	30 g

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

Application Schematics



ENGINE CONTROL UNITS

SRA-E R02

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

SRA-E-083814462800

SRA-E R02

DBW control
High number of Inputs/Outputs
Ethernet line

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

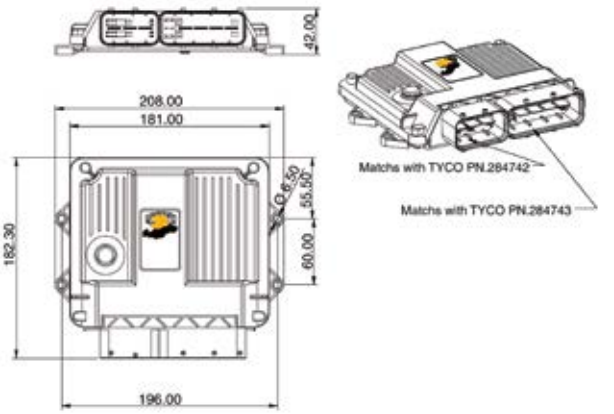
Logic Core

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

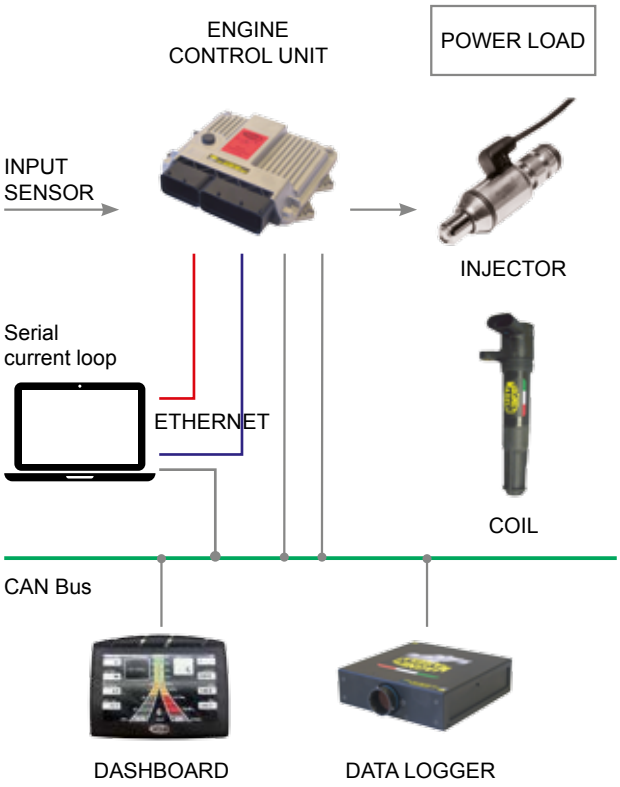
Other Characteristics

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



Application Schematics



SRA-EDL16 R02

ECU with Internal data logger, DBW control, high number of Inputs/Outputs

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 Mb internal data logger*
- *Up to 128 logged channels*
- *Up to 10 Kb/s logging rate*
- *Sampling rates up to 200 Hz*
- *2 CAN communication buses*
- *1 Ethernet line*

Benefits

- *No need of external data logger*
- *Fast data download time with 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
Cars
Bikes

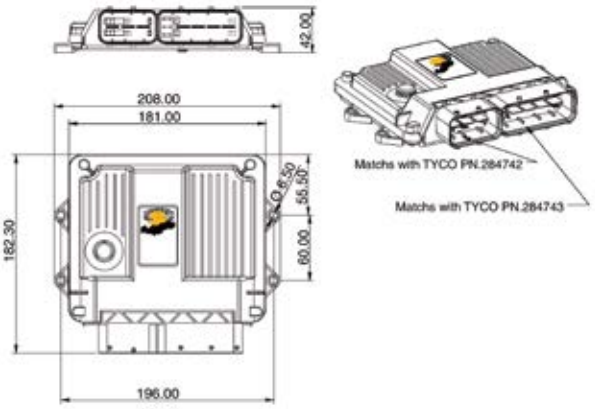
SRA-EDL16 R02

ECU with Internal data logger, DBW control, high number of Inputs/Outputs

Technical Characteristics

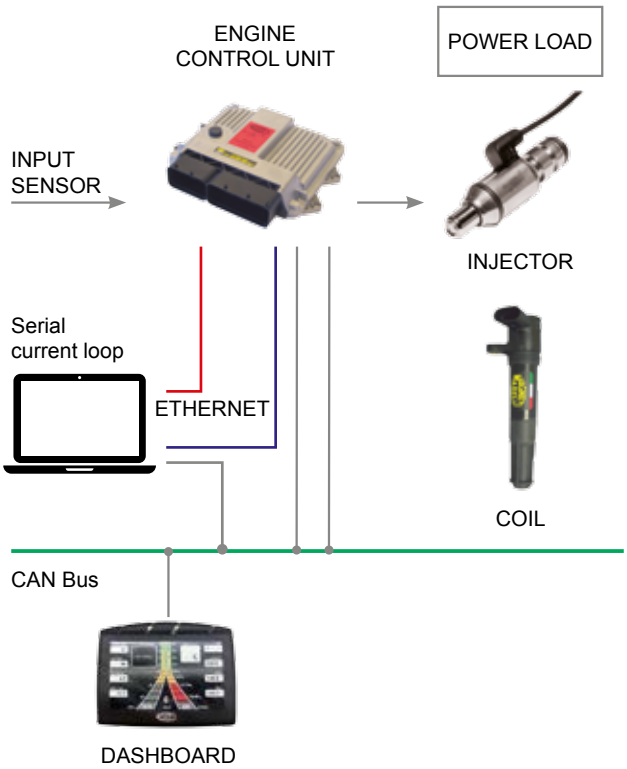
Inputs	
Analogue Single-ended	8
On/Off or Linear Lambda sensor	1
Knock sensor (multiplexed)	2
K-type thermocouple	2
NTC/PT1000 temperature sensor (selectable)	4
NTC internal temperature sensor	1
V battery injector	1
VR Pick-ups or Hall effect	6
On/Off digital	6
Lap Trigger	1
“Code Load” enable pin	1
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 Mb
RAM memory (microcontroller)	48 Kb
RAM memory	512 Kb
E2PROM parallel	64 Kb
E2PROM serial	4 Kb
Time keeper	1
Logging	
Flash disk memory	16 Mb
Logged channels	up to 128
Logging rate	up to 10 Kb/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



SRT-E

High performance ECU

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

SRT-E-0838XXXXX00

SRT-E

High performance ECU

Technical Characteristics

Inputs

Analogue Single-ended	14
Linear Lambda sensor	2
Knock sensor	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	3
Hall effect	3
Lap trigger	1
“Code Load” enable pin	1
Syncro (Iso9141)	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

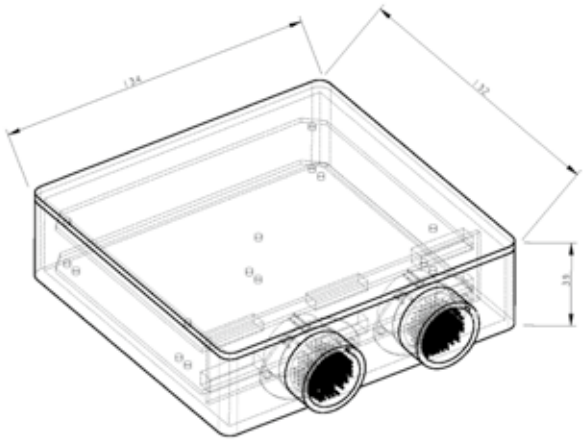
Logic Core

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

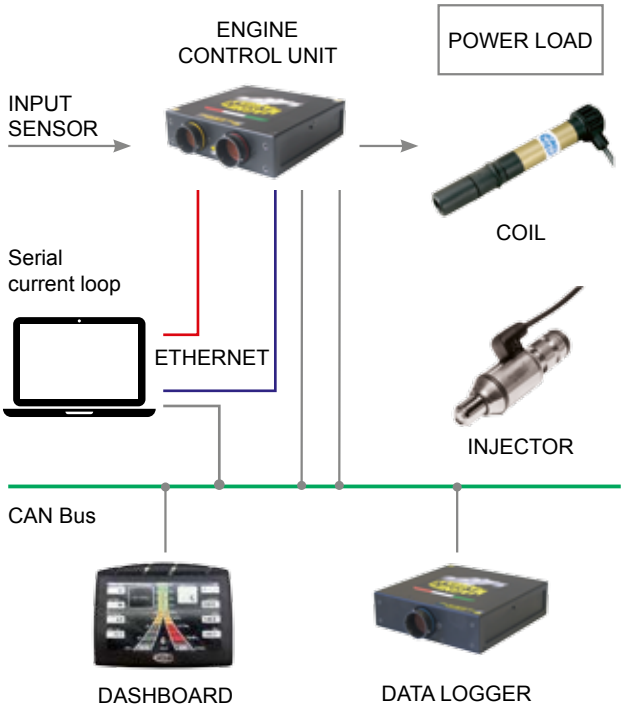
Power supply	7 to 16 V
Operating temperature range (internal)	- 20 to 85 °C
Protection class	IP 54
Dimensions	
without connectors	134 x 132 x 39 mm
Weight (approx.)	700 g

Dimensions



Dimensions in millimetres

Application Schematics



SRG-34X

Engine Control Unit

Description

SRG-34x 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-34x 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-34x 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 ILIOS*
- *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)

SRG-34-083814381000

Technical Characteristics

Inputs

Analogue Single-ended	20
Linear Lambda sensor (ILIOS)	2
Knock sensor	1
K-type thermocouple	2
NTC/PT1000 temperature sensor (each selectable)	6
NTC read injector rail	1
Internal temperature sensor	4
Accelerometer sensor XYX 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 E2PROM (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 E2PROM (x32 internal)	1 Mbyte
RAM memory (x32 internal)	128 Kbyte
Synchronous SRAM Memory (external x16)	2 Mbyte
Flash Disc (external x8)	1 Gbytes
Time keeper	1
JEDI controller injector pick&hold	1

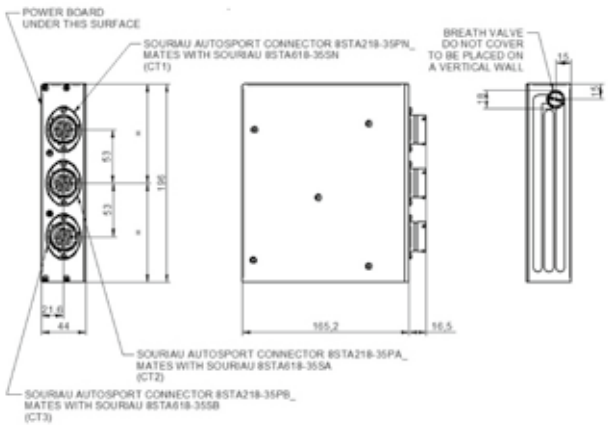
Other Characteristics

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

SRG-34X

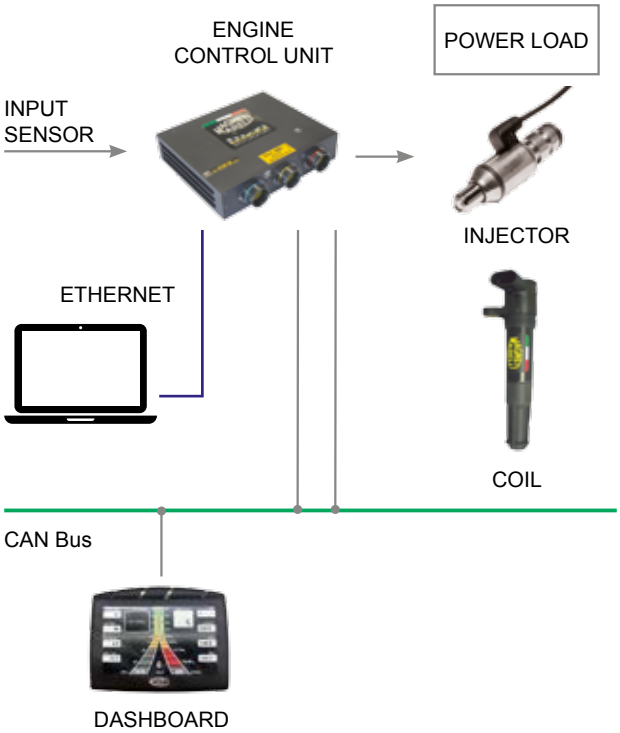
Engine Control Unit

Dimensions



Dimensions in millimetres

Application Schematics



SRG-48X

Engine Control Unit

Description

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-48X 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.

SRG-480 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 **inductive command coils**.

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.

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 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

GT cars
Rally cars

SRG-48-083814426900

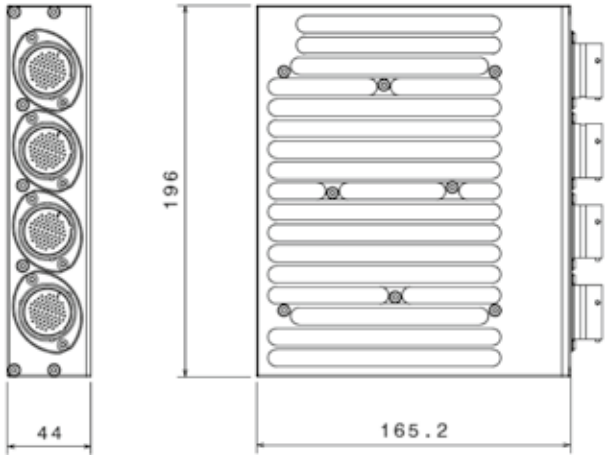
SRG-48X

Engine Control Unit

Technical Characteristics

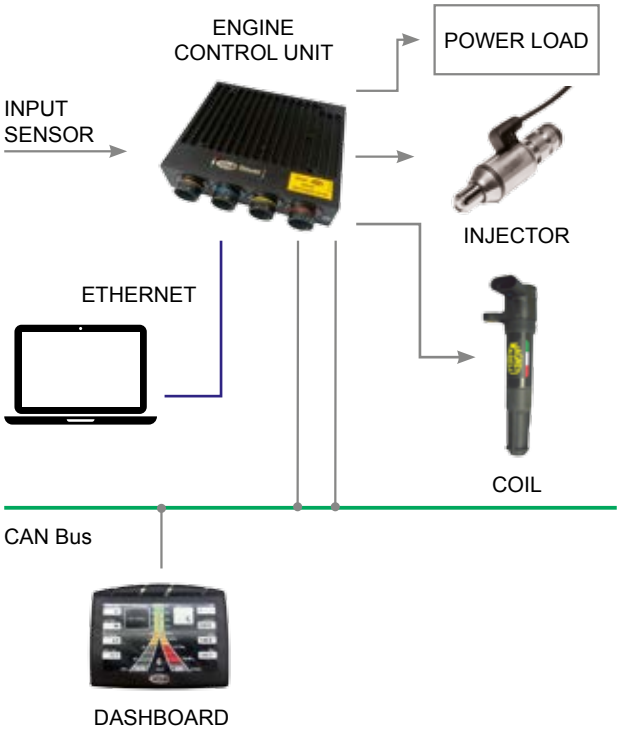
Inputs	
Analogue Single-ended	33
NTC/PT1000 temperature sensor (each selectable)	12
Differential	6
Linear Lambda sensor (ILIOS)	2
Knock sensor (gain selectable)	4
NTC internal temperature sensor	4
Accelerometer sensor XYX axis	1
VR Pick-ups or Hall effect	7
VR Rate or Hall effect	4
Hall effect	1
On/Off 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 3 A	14
PWM 5 A	2
High side Vbatt 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 E2PROM (x32 internal)	4 Mbyte
RAM memory (x32 internal)	256 Kbyte
Synchronous SRAM Memory (external x16)	2 Mbyte
MRAM memory (external x16)	512 Kbyte
DATA LOGGING and COMMUNICATION PROCESSOR	
Micro (ARM–based 32bit @168MHz)	1
Flash E2PROM (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



WRE-460

Professional engine control unit
Internal data logger

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

WRE-460-083814348300

Technical Characteristics

Inputs

Analogue single-ended (12-bit resolution)	42
Differential (12-bit resolution)	6
Knock interface (12-bit resolution)	2
NTC/PT1000 temperature sensor (*)	10
LVDT 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
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)	1
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)	512MB
NOR flash Memory (x16)	12MB
MRAM memory (x16)	512KB
Synchronous dual port SRAM (x16)	128KB
Flash disk (SDIO)	8GB
Actuation microcontroller @264MHz (623DMIPS)	1
Flash EEprom (x32 internal))	4MB
RAM memory (x32 internal)	256kB
Synchronous SRAM (x32) (external)	2MB
MRAM memory (x16)	512KB
Time keeper	1

Logging

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

ENGINE CONTROL UNITS

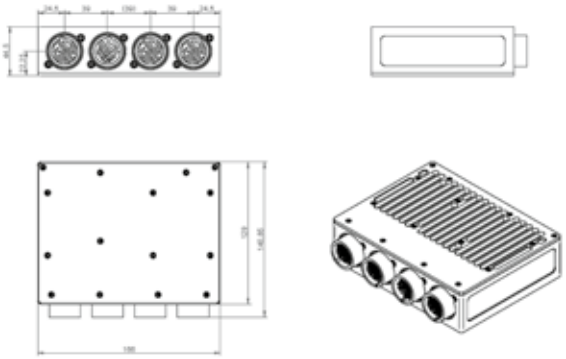
WRE-460

Professional engine control unit
Internal data logger

Other Characteristics

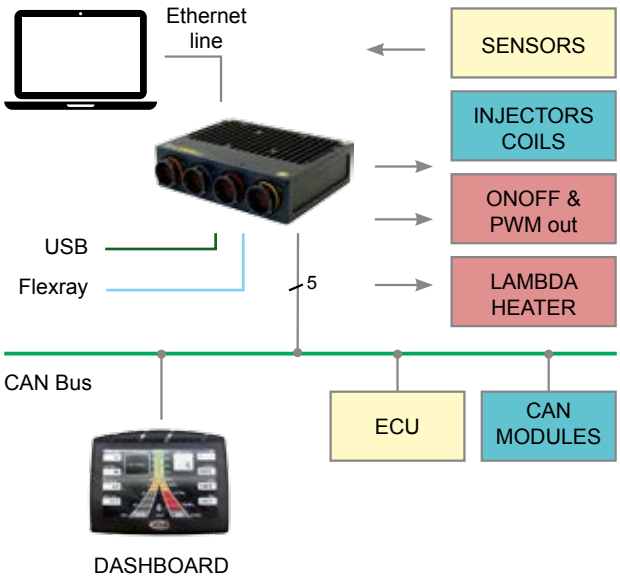
Power supply	8 to 16 V
Operating temperature range (internal)	- 20 to 85 °C
Temperature range during data download	0 to 70 °C
Protection class	IP 64
Dimensions without connectors (* Connector face)	166* x 129 x 44.5 mm
Weight (approx.)	1300 g

Dimensions



Dimensions in millimetres

Application Schematics



MLE-240

Professional engine control unit
Internal data logger

Description

MLE-240 Engine and Vehicle Control Unit is a powerful and complete concentrated system capable of controlling high performance engines up to 4 cylinders. Suitable for motorbike applications.

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 ON-OFF injectors, inductive ignition coils and a large number of additional loads.

The communications capability is assured by 2 CAN lines, 1 100Mb/s 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.

MLE-240 is equipped with a variety of analogue inputs including single-ended, temperatures and differential together with digital inputs for lap trigger, VRS/Hall and Hall/Rate inputs.

Main Features

- *25 single-ended @ 12-bit resolution*
- *1 differential @ 12-bit resolution*
- *4 PT1000/NTC temperature @ 12-bit resolution*
- *4 lambda UEGO sensor with heater*
- *2 pick-ups, VRS or Hall effect, VRS input*
- *4 Hall or rate input*
- *1 lap trigger*
- *2 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 1000 Hz*
- *2 CAN communication buses*
- *1 Ethernet line (100Mb/s)*
- *4 ON-OFF injectors drivers*
- *4 Inductive coils driver*
- *2 Low Side driver with PWM capability*
- *Up to 4 H-Bridge*

Benefits

- *Complete engine (4 cylinder) and vehicle management*
- *Data download via Ethernet link*
- *SW-selectable VRS, Hall 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

Motorbike applications

Technical Characteristics

Inputs

Analogue single-ended (12-bit resolution)	25
Differential (12-bit resolution)	1
NTC/PT1000 temperature sensor (*)	4
NTC internal temperature sensor	4
Lambda UEGO (12-bit resolution)	4
Injector rail supply (12-bit resolution)	1
VRS, Hall effect inputs (*)	2
Hall or Rate inputs (*)	4
Lap trigger (*)	1
ON/OFF Digital input	2
“Code Load” enable pin	1

(*) Configurable by software

Outputs

Inductive coil drivers (up to 30A)	4
On-Off injector drivers (up to 3A)	4
Lambda heater (up to 3A)	4
H-Bridge driver (up to 5A – 7A peak)	3
Half-Bridge driver (up to 7A – 14A peak) (*)	2
PWM low side drivers (up to 3A)	2
Voltage references (5V, 70mA)	4

(*) Can be used together as an H-Bridge or separately

Communications

CAN line (1 Mbit/s or lower, configurable)	2
Ethernet line (100Mb/s)	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

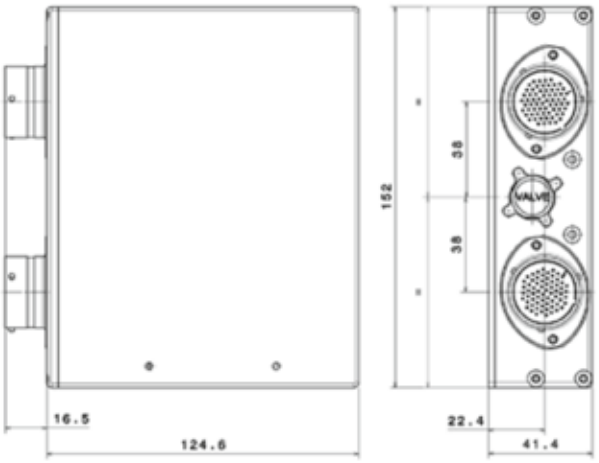
Power supply	8 to 16 V
Operating temperature range (internal)	- 20 to 85 °C
Temperature range during data download	0 to 70 °C
Protection class	IP 64
Dimensions without connectors	152* x 124.6 x 41.4 mm
(* Connector face)	
Weight	900 g

ENGINE CONTROL UNITS

MLE-240

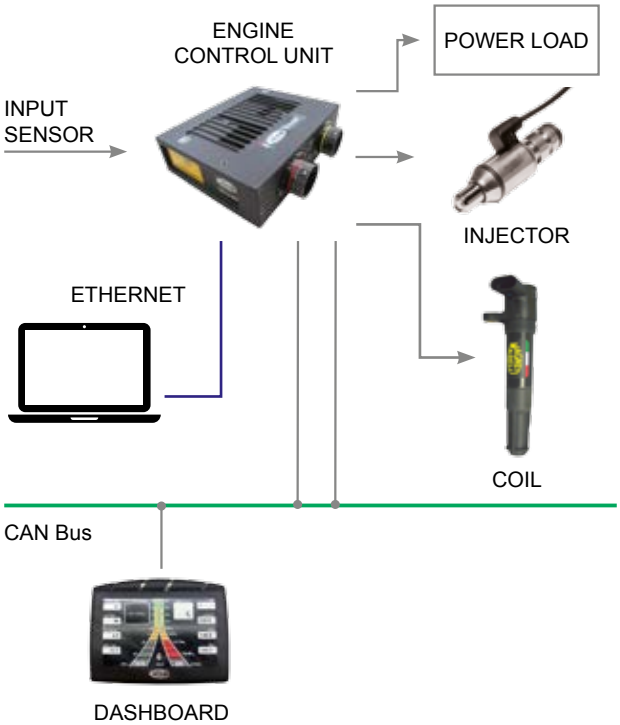
Professional engine control unit
Internal data logger

Dimensions



Dimensions in millimetres

Application Schematics




DATA LOGGERS-DISPLAYS

SDL

Racing Data Logger

Description

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

Rally cars
One make race series
Industrial application
Formula cars

SDL-0838XXXXXX00

SDL

Racing Data Logger

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 M
RAM memory (microcontroller)	48 K
RAM memory	512 K
E2PROM	4 Kb
Time keeper	1

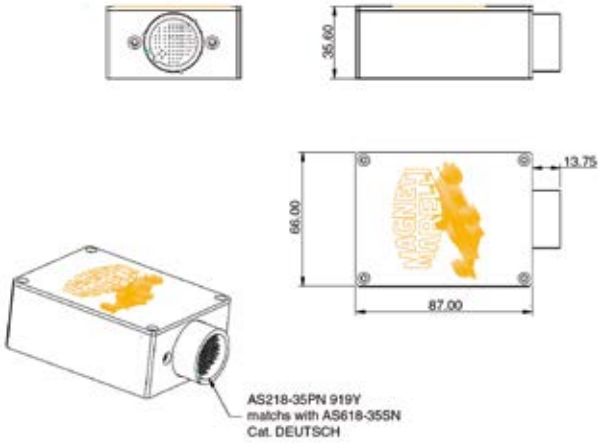
Logging

Flash disk memory	32 or 64 Mb
Logged channels	up to 300
Logging rate	up to 40 Kb/s
Sampling rate	up to 200 Hz

Other Characteristics

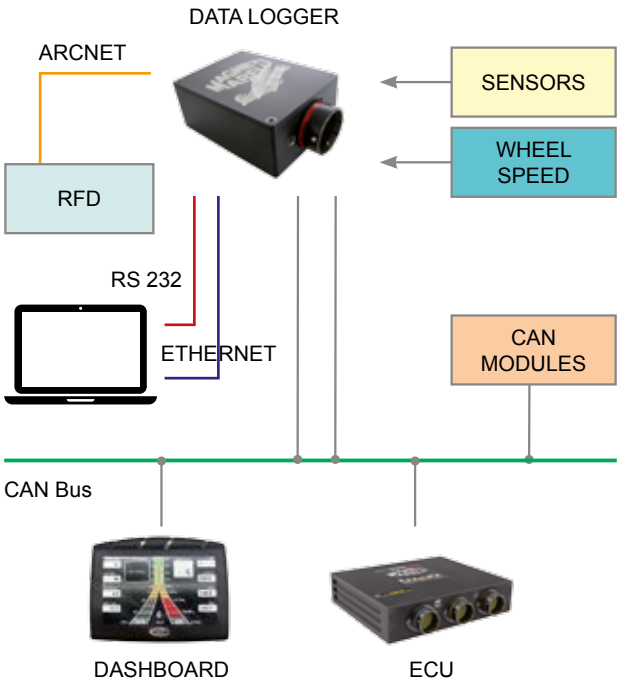
Power supply	8 to 18 V
Operating temperature range (internal)	- 40 to 85 °C
Temperature range during data download	0 to 70 °C
Protection class	IP 54
Dimensions	
without connector	66 x 87 x 35.6 mm
Weight (approx.)	230 g

Dimensions



Dimensions in millimetres

Application Schematics



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 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.
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

Rally cars
One make race series
Industrial application
Formula cars

HRDL-14-083816413600

HRDL-14

Miniaturized high-performance racing data logger
Up to 1 Gbyte internal memory

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
ARCNet line (10 Mbit/s)	1
RS 232	1

(***) Configurable on request

Logic Core

Microcontroller (80 MIPS RISC)	1
Flash E2PROM (microcontroller)	1 Mb
RAM memory (microcontroller)	48 Kb
RAM memory	512 Kb
E2PROM	4 Kb
Time keeper	1

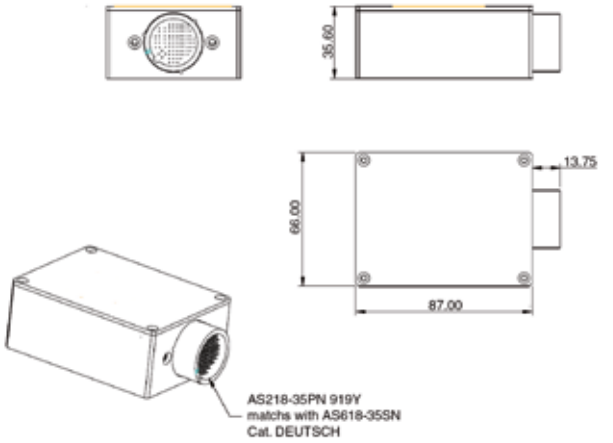
Logging

Flash disk memory	up to 1 Gb
Logged channels	up to 300
Logging rate	up to 128 Kb/s
Sampling rate	up to 1000 Hz

Other Characteristics

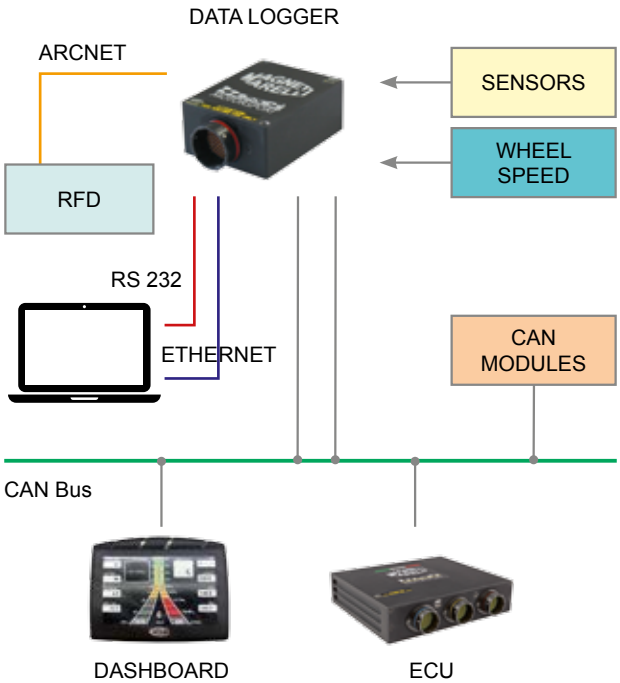
Power supply	8 to 18 V
Operating temperature range (internal)	- 40 to 85 °C
Temperature range during data download	0 to 70 °C
Protection class	IP 54
Dimensions	
without connector	66 x 87 x 35.6 mm
Weight (approx.)	230 g

Dimensions



Dimensions in millimetres

Application Schematics



HDL-240

high-performance racing data logger with 32 Gbyte internal memory, 4-port ethernet switch and USB

Description

HDL-240 is the evolution of Magneti Marelli's successful data logger line offering increased logging performance (data throughput and number of channels) in a smaller, lighter package.
HDL-240 is designed to provide an all-round data logging capability and can operate both in stand-alone mode and as an expansion to the new racing dashboard family (FBO).
This versatile data acquisition unit is specifically developed for racing applications which require high resolution data from a large number of channels, either coming from internal measurements or via CAN or Ethernet lines.
HDL-240 deploys a modern high-performance, low consumption 32-bit CPU, with a computational power of over 200 DMIPS and hardware floating-point support.
Two convenient bi-colour LEDs show logger status/ diagnostic information at a glance (powered, logging, etc.).

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*
- *Data recording on USB pendrive*
- *1024 logged channels*
- *200 kByte/s logging rate*
- *Sampling rates up to 2000 Hz*
- *2x CAN 2.0B communication buses*
- *4x Ethernet 100 Mbit/s lines*
- *Tri-axial 16g accelerometer*
- *2x green/red LEDs on top for visible logger status feedback*
- *Fully supported by SYSMA setup tool and WinTAX4 data analysis tool*

(*) option for higher rates, please contact us.

Benefits

- *Data download via Ethernet link*
- *Upgrades HRDL and HFD loggers with no loom changes*
- *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-up inputs for wheel speed and distance measurement*
- *Compact and robust design, easy to install*

Typical Applications

All race cars/bikes
One-make race series
Industrial applications
Formula cars

HDL-240 - 083817440100

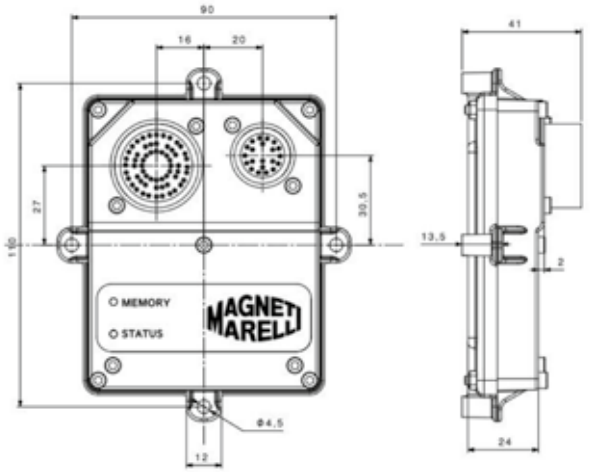
HDL-240

high-performance racing data logger
with 32 Gbyte internal memory,
4-port ethernet switch and USB

Technical Characteristics

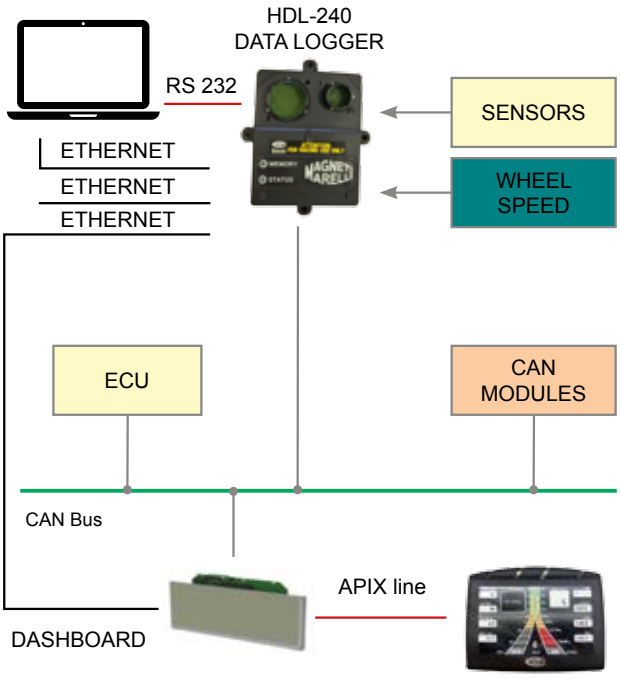
Inputs	
Analogue Single-ended (12 bit)	16
Differential (12 bit, gain 100)	4
K-type thermocouple (12 bit)	2
NTC/PT1000 temperature sensor (SW selectable)	4
Internal temperature	1
VRS Pick-up, Hall or Rate sensor (SW selectable)	2
Hall effect or Rate sensor (SW selectable)	4
Lap trigger pull-up/pull-down (SW selectable)	2
“Code Load” enable pin	1
Outputs	
Voltage references (5.0V 70 mA max)	4
Half-bridge/high-side/low-side outputs (5A max total continuous; full-bridge mode available)	4
Communications	
CAN 2.0B lines (1 Mbit/s, SW selectable termination)	2
Ethernet lines (100 Mbit/s)	4
USB 2.0 full speed (for USB solid state drives)	1
RS 232	1
Logic Core	
Processor (32-bit CPU)	1
Flash 2	MB
RAM memory (internal)	256 kB
RAM memory (external)	32 MB
E2PROM	64 kB
Time keeper (with backup battery)	1
Logging	
Flash disk memory	32 GB
Logged channels	1024
Logging rate	200 kB/s
Sampling rate	up to 2000 Hz
Other Characteristics	
Power supply	8 to 16 V
Internal operating temperature range	- 20 to 85 °C
Protection class	IP 65
2 connectors Souriau 8STA series (1x size18-66 pins and 1x size12-22 pins)	
Dimensions without connector	90 x 110 x 24 mm
Weight (approx.)	200 g

Dimensions



Dimensions in millimetres

Application Schematics



ELB-110

Engine Log Book

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 cars

ELB-110-083823308000

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

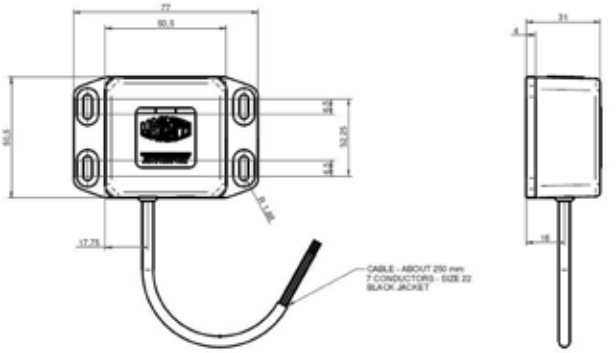
Other Characteristics

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

Cable Pin Out

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

Dimensions



Dimensions in millimetres

FBO

Dashboard with Data Logger, WiFi/Bluetooth, USB, inertial platform and GPS

Description

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.

The FBO is 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 advanced features of the TFT colour display permits to configure windows with an easily personalised screen layout.

As part of the Magneti Marelli data acquisition and telemetry system, the FBO-6 (with internal data logger) can communicate over a CAN network with a range of additional sensor nodes receiving, displaying and logging data. The USB port can be enabled to record on a removable remote USB flash disk. On-board Wi-Fi and BLE connection modules (with internal antennas) allow a large variety of connections, 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).

FBO-6 characteristics are completed with composite video input to acquire video from analog camera, 1 input serial link able to acquire HD video data stream and 1 High definition video output able to drive external monitor. Available 6.5” and 8.8” screen size.

Main Features

- *800x480 RGB Transmissive, TFT visible area 142x85 mm*
- *6,5” , 15:9 diagonal, 16.7M colors*
- *TFT viewing angle (U/D/L/R): 89/89/89/89°*
- *High brightness display max 1000 cd/m2*
- *On display: bar graph, gear number, speed, lap time, best lap, lap number and many others information on several pages available*
- *4 high-brightness red/green/blue warning LED for programmable alarms (eg. for gear change with programmable threshold for each gear)*
- *6 single-ended and 2 temperature (PT1000/NTC) inputs*
- *2 low side outputs (alternatively 2 extra digital inputs)*

- *2 digital Inputs*
- *1 lap trigger input*
- *1 composite Video input for external camera*
- *1 headphone Output/ 1 Microphone Input*
- *USB for data recording on removable pendrive*
- *Interface for secondary screen support*
- *Internal 3 axial accelerometer/gyro/magnetometer*
- *USB for data recording on removable pendrive*
- *Wi-Fi 802.11a/b/g/n and Bluetooth 4.1 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*
- *GPS/GLONASS/BEIDU multi constellation global positioning satellite system*
- *Up to 32Gbyte internal data logger*

Benefits

- *Data download via Ethernet link*
- *Transmit internal inputs and channels over CAN bus*
- *Easy to use and configure*
- *Robust design for rugged applications*
- *FBO input-output capabilities can be extended by adding the HDL-240 expansion hub.*

Typical Applications

All race cars/bikes

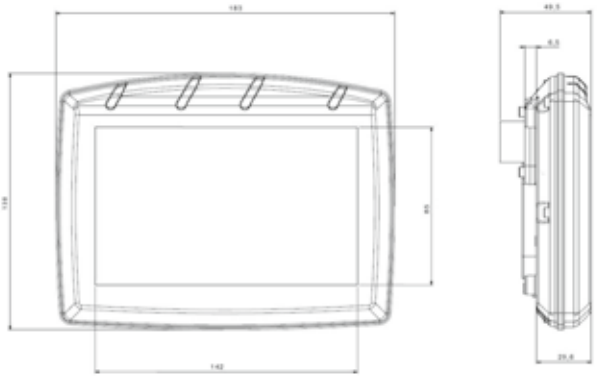
Technical Characteristics

Inputs	
Single-ended (@ 12 bit)	Up to 6
Temperature PT1000/NTC (SW selectable)	2
Differential microphone	1
Internal GPS LEA-M8 – up to 18Hz	1
Internal 3 axial accelerometer (up to 16 g)	1
Internal 3 axial gyroscope (250°/s)	1
Internal magnetometer	1
Digital Input (Remote push button)	Up to 4
Lap Trigger	1
“Code Load” enable pin	1
Outputs	
Low side output (max. 500mA)	Up to 2
Voltage references (@ 5 V, 50 mA)	1
Headphone	1
Video	
Analog camera input (composite video: PAL, NTSC)	1
HD Video data stream input	1
Remote Display 720p HD (external)	1
Led	
Red/Green/Blue Alarm led	4
Communications	
CAN 2.0B line (500kbit/s or 1Mbit/s selectable)	2
Ethernet line (10/100base T)	1
USB (2.0 OTG) high speed	1
802.11a/b/g/n WLAN 2.4/5GHz (internal antenna)	1
BT/BT Low Energy 4.1 (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* (internal with Lithium battery)	1
Connectors	
Deutsch Auto sport AS114-35PN (37 Pin)	1
Rosenberger HSD+2 for remote display (720p HD)	1
Rosenberger HSD for video stream input	1
HD-BNC 75Ω (Male) for camera input	1
SMA 50Ω (Male) for ANTENNA GPS	1
Other Characteristics	
Power supply	8 to 16 V
Operating internal temperature	- 20/+85 °C
Protection class	IP 64
Visible area LCD	142 x 85 mm
Dimensions without wiring	183 x 138 x 30 mm
Weight (approx.)	555 g
Logging	
Flash disk memory	up to 32 GB
Logged channels	up to 768
Logging rate	up to 200 kB/s
Sampling rate	up to 1000 Hz

FBO

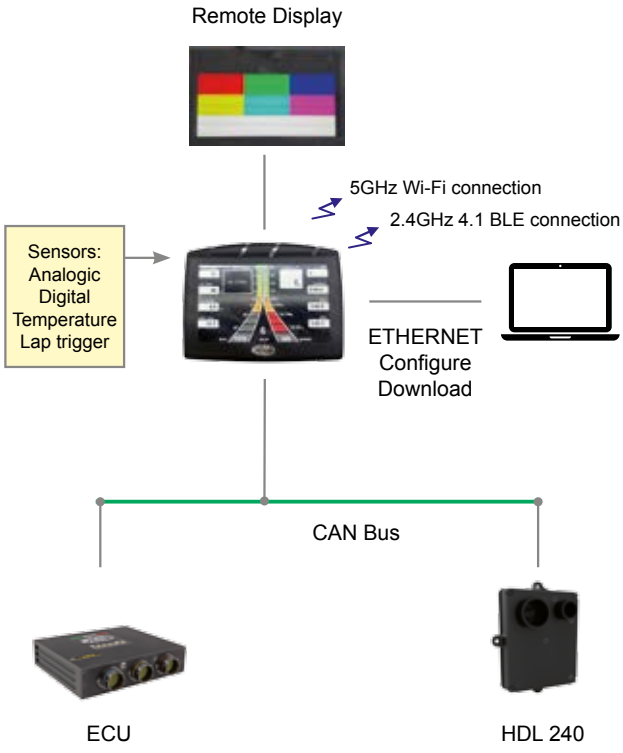
Dashboard with Data Logger, WiFi/Bluetooth, USB, inertial platform and GPS

Dimensions



Dimensions (6.5”screen) in millimetres

Application Schematics



DDU 310-DL128

Dashboard with data logger
TFT color display

Description

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

Rally cars
One make race series
Race bikes
Touring cars

Technical Characteristics

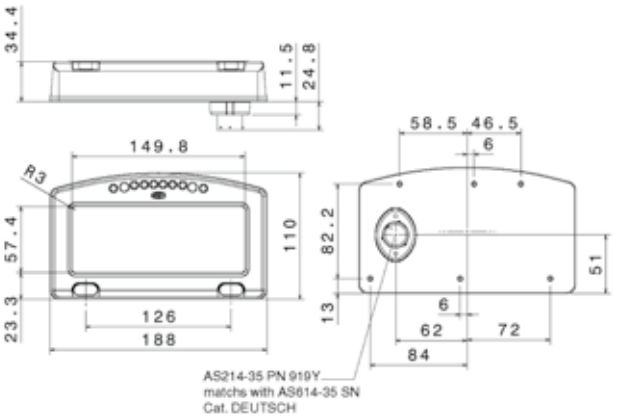
Inputs	
Single-ended	5
NTC/PT1000 temperature sensor	2
NTC internal temperature sensor	1
VR Pick-ups or Hall effect (RPM)	1
Hall effect (wheelspeed)	3
On/Off digital (page scroll and confirm)	2
Lap Trigger	2
“Code Load” enable pin	1
Outputs	
Voltage references (@ 5 V)	1
Low-side (@ 12 V)	2
Shift Lamp (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	Kb
Flash E2PROM (microcontroller A)	1 Mb
RAM memory (microcontroller A)	48 Kb
Flash memory (microcontroller B)	512 Kb
Ram memory (microcontroller B)	4 Kb
Flash NV Ram	32 Mb
RAM memory	512 Kb
E2PROM	32 Kb
Time keeper	1
Logging	
Flash disk memory	128 Mb
Logged channels	up to 128
Logging rate	up to 48 Kb/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

DATA DISPLAYS

DDU 310-DL128

Dashboard with data logger
TFT color display

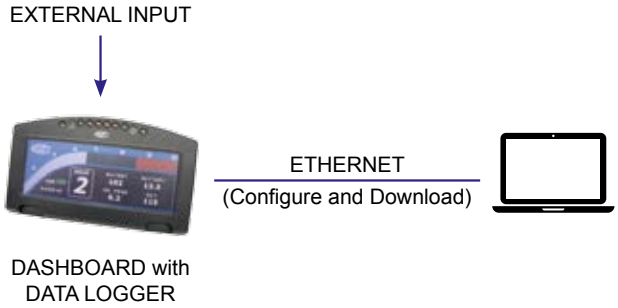
Dimensions



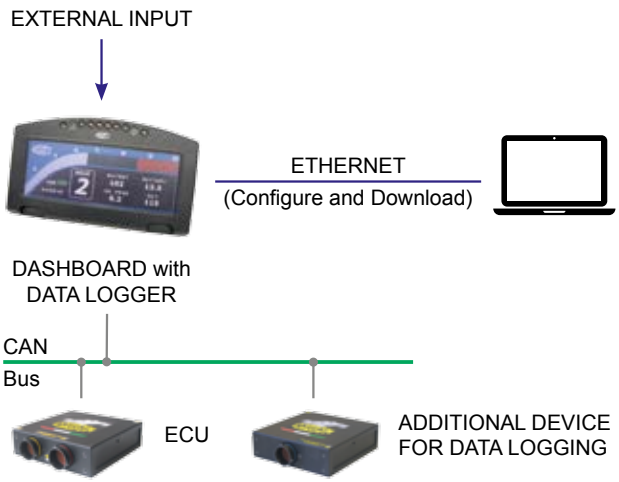
Dimensions in millimetres

Application Schematics

STAND-ALONE MODE



CAN COMMUNICATION MODE



MDU 220

Data display unit
Alphanumeric LCD

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 bikes/cars

MDU 220-083818279600

MDU 220

Data display unit
Alphanumeric LCD

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)

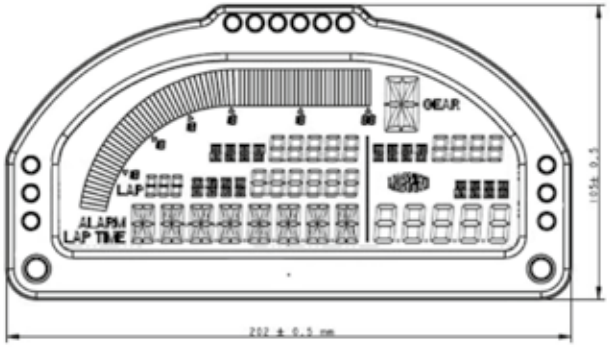
Logic Core

Microcontroller (64 MIPS RISC)	1
Flash EPROM (microcontroller)	1 Mb
RAM memory (microcontroller)	48 Kb
Flash EPROM	32 Mb
RAM memory	32 Mb
E2PROM	32 Kb
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

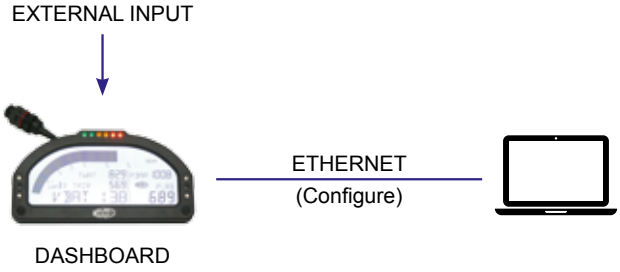
Dimensions



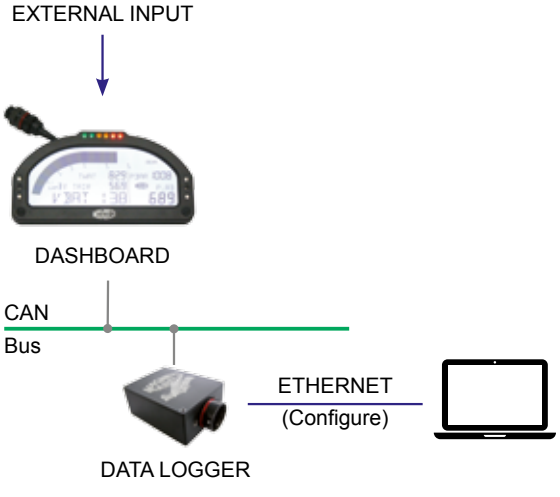
Dimensions in millimetres

Application Schematics

STAND-ALONE MODE



CAN COMMUNICATION MODE



MDU 230

Data display unit – LCD
Alphanumeric and Dot matrix area

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 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, 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

MotoGP
SBK
All race bikes/cars

MDU 230-0838XXXXXX00

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
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)

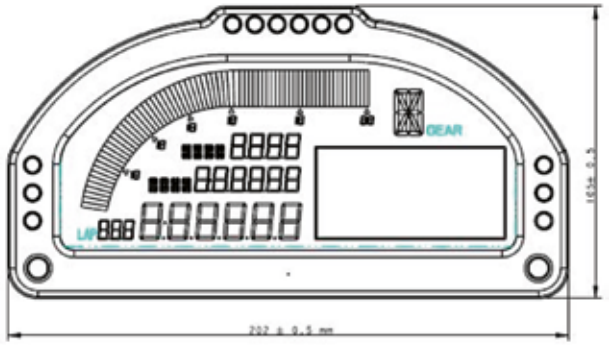
Logic Core

Microcontroller (64 MIPS RISC)	1
Flash EPROM (microcontroller)	1 Mb
RAM memory (microcontroller)	48 Kb
Flash EPROM	32 Mb
RAM memory	32 Mb
E2PROM	32 Kb
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

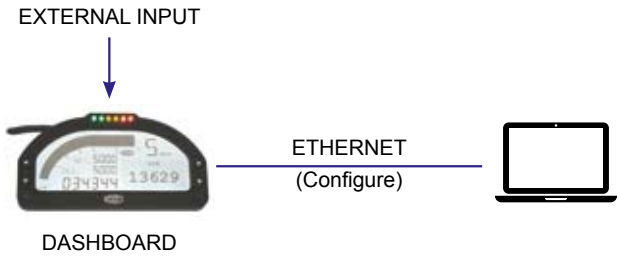
Dimensions



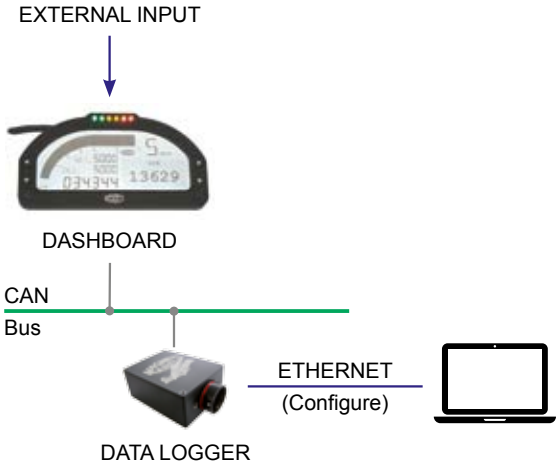
Dimensions in millimetres

Application Schematics

STAND-ALONE MODE



CAN COMMUNICATION MODE



MPDU

Dashboard with Data Logger & GPS TFT color display

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 bikes/cars

MPDU-083818341200

MPDU

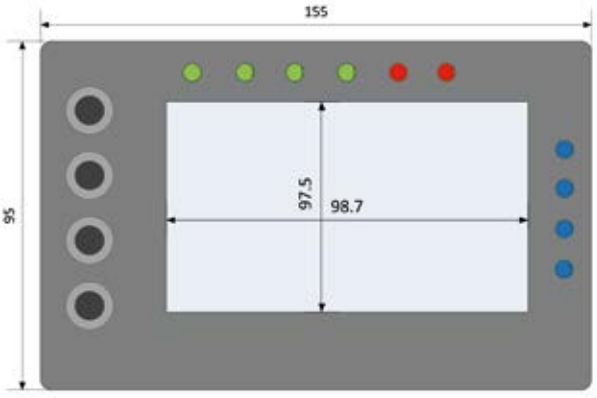
Dashboard with Data Logger & GPS TFT color display

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 (10/100base T)	1
USB (2.0 HS)	1
RS232 line	1
Logic Core	
Microcontroller (150 DMIPS)	1
Flash EPROM (microcontroller)	1 Mb
RAM memory (microcontroller)	132 Kb
ARM CortexA9 Dual Core @600MHz	1
DDR2 @333MHz (x32) (on board)	1 Gb
NAND Flash memory	512 Mb
e-MMC Automotive memory	Up to 8 Gb
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)

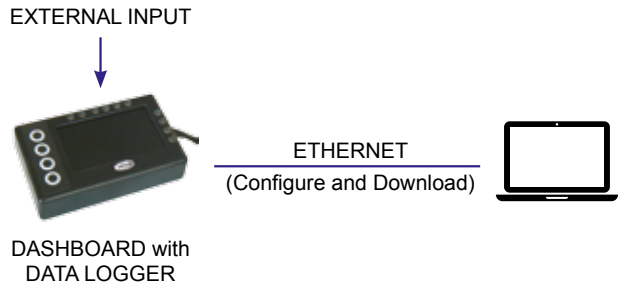
Dimensions



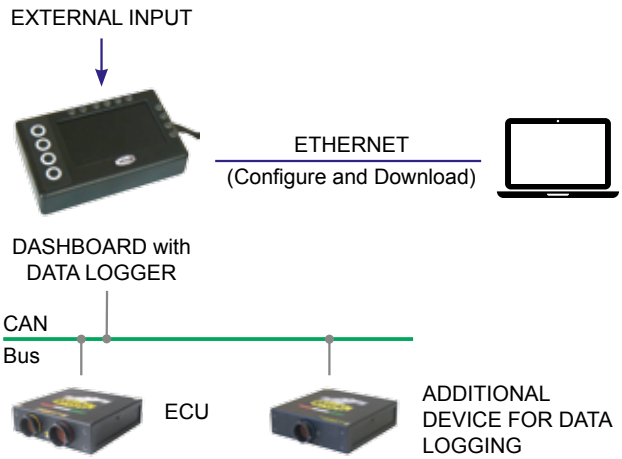
Dimensions in millimetres

Application Schematics

STAND-ALONE MODE



CAN COMMUNICATION MODE



MPDU-I

Dashboard - TFT color display

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 visualized 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 bikes/cars

MPDU-I

Dashboard - TFT color display

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 Mb
RAM memory (microcontroller)	132 Kb
ARM CortexA9 Dual Core @600MHz	1
DDR2 @333MHz (x32) (on board)	1 Gb
NAND Flash memory	512 Mb
Time keeper (Microcontroller)	1

Connectors

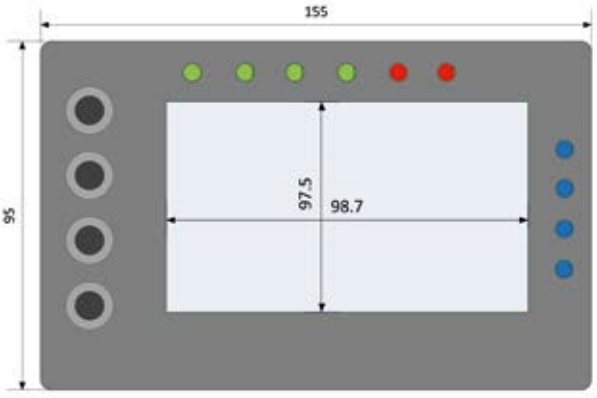
192922-1280 ITT-CANNON (19 Pin)	1
Ethernet 192922-1190 ITT-CANNON (4 Pin)	1

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)

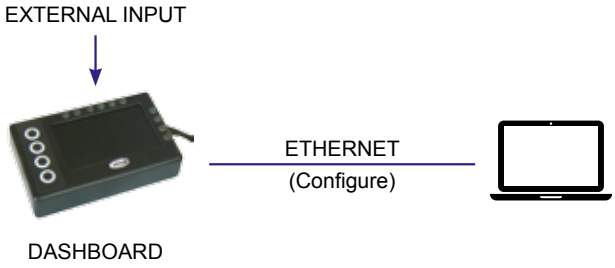
Dimensions



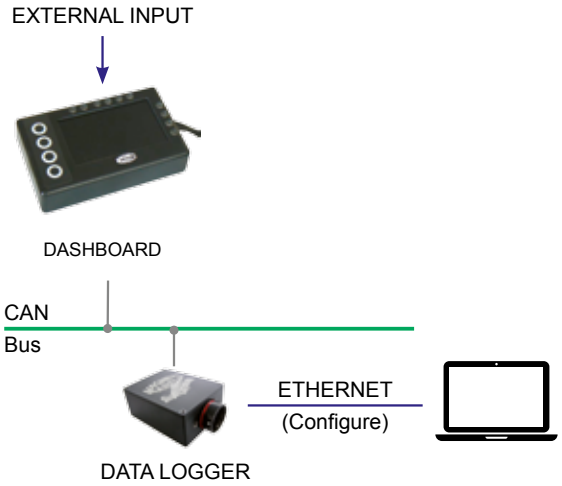
Dimensions in millimetres

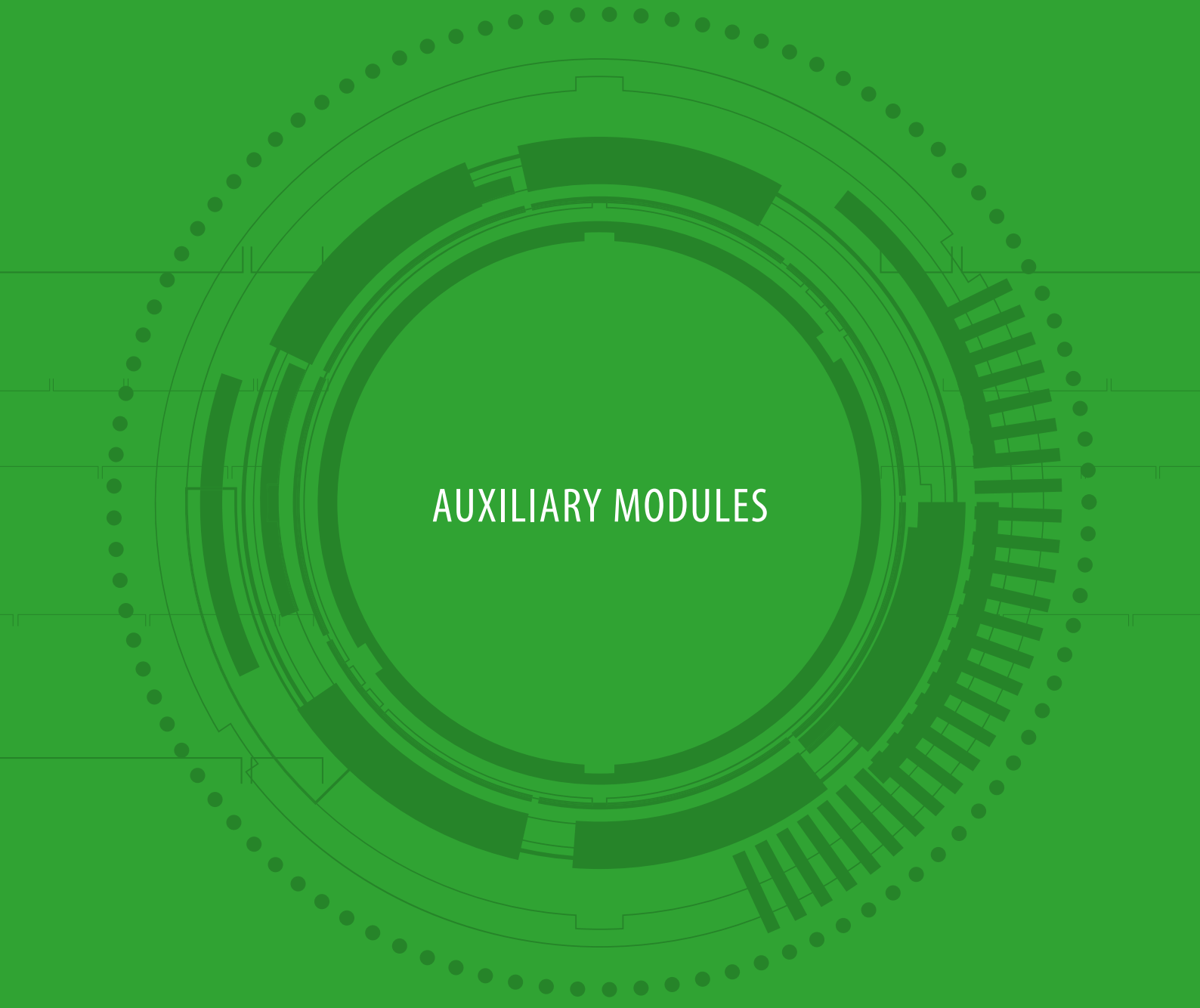
Application Schematics

STAND-ALONE MODE



CAN COMMUNICATION MODE





AUXILIARY MODULES

AMG-1200-14

20 inputs acquisition module

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

AMG-1200-14-083816413700

AMG-1200-14

20 inputs acquisition module

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

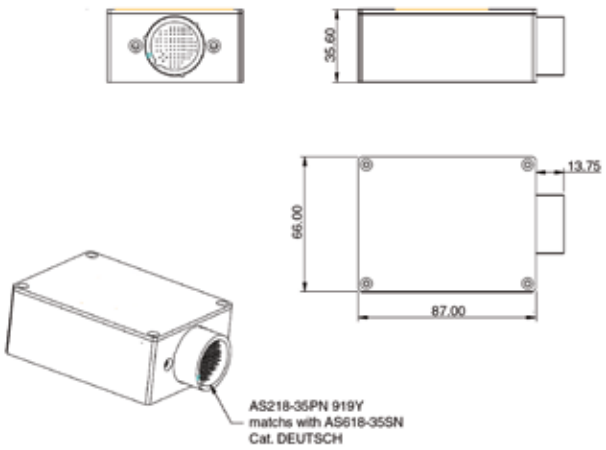
Logic Core

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

Other Characteristics

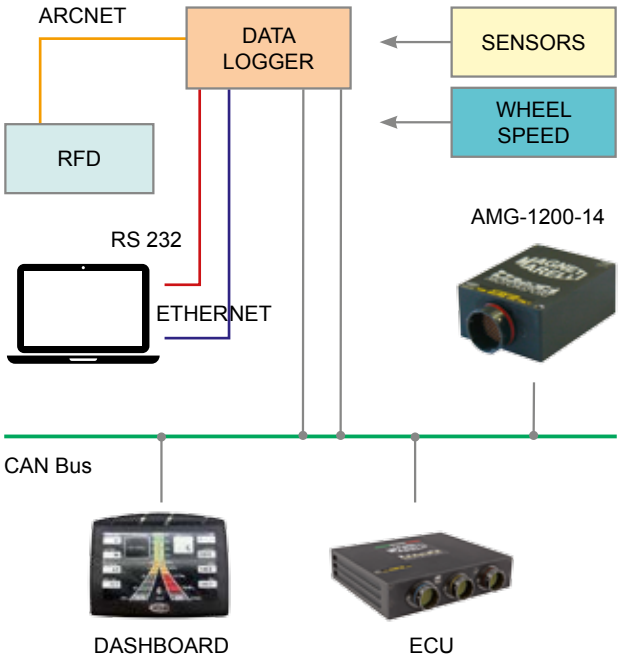
Power supply	8 to 18 V
Operating temperature range (internal)	- 40 to 85 °C
Temperature range during data download	0 to 70 °C
Protection class	IP 54
Dimensions	
without connector	66 x 87 x 35.6 mm
Weight (approx.)	230 g

Dimensions



Dimensions in millimetres

Application Schematics



AML-140

Oxygen sensor interface

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 ECUs 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 Applications

All race bikes/cars

AML-140-083817219000

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

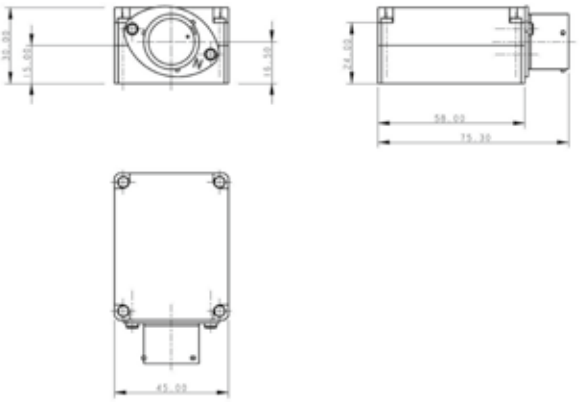
Logic Core

Microcontroller (132 MHz)	1
Flash (microcontroller)	1.5 Mb
RAM memory (microcontroller)	64 Kb

Other Characteristics

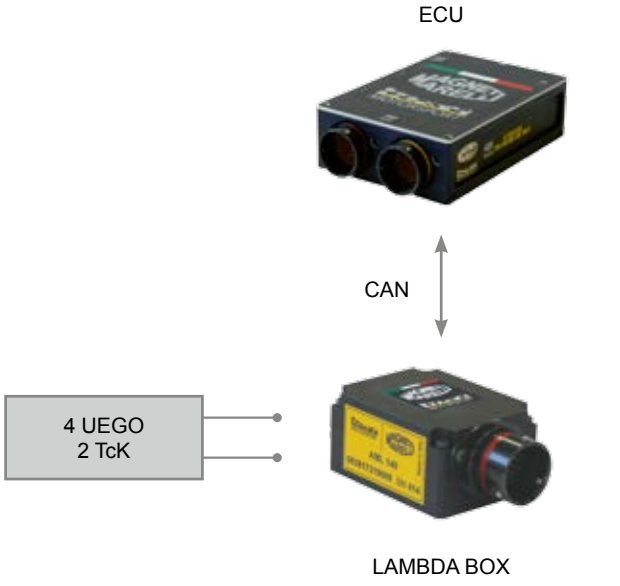
Power supply	8 to 18 V
Operating temperature	- 20 to 85 °C
Electrical consumption without load (typ.)	200 mA
Electrical consumption without load (max.)	350 mA
Electrical consumption each lambda heater (max.)	3 A
Protection class	IP 64
Dimensions	
without connectors	45 x 58 x 30 mm
Weight	130 g

Dimensions



Dimensions in millimetres

Application Schematics



CPS-220

Car positioning system

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

CPS-220-083817297300

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

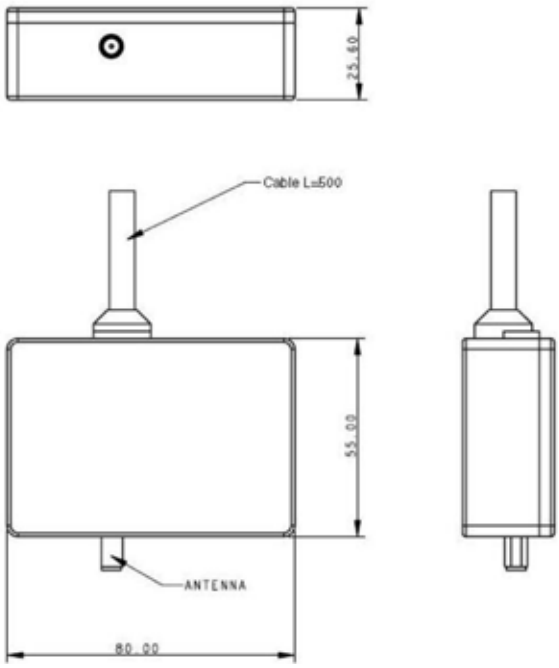
CAN line (1 Mbit/s (*))	1

(*) 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

Dimensions



Dimensions in millimetres

Cable Pin Out

Pin Out CPS-220 (Cable)

	Function	Wire
Inputs		
Single ended 12bit	2	2
Outputs		
Digital output	2	2
Communication		
CAN line	1	2
Miscellaneous		
VBATT ENCP Analog ground	1 1 1	2 1 1
	Total	**10**

CPS-221

Car Positioning System

Description

CPS-221 (Car Positioning System) is an integrated measurement unit with internal GPS sensor.

It can be used both in car and motorbike racing applications.

Main Features

- *Internal GPS*

Benefits

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

Typical Applications

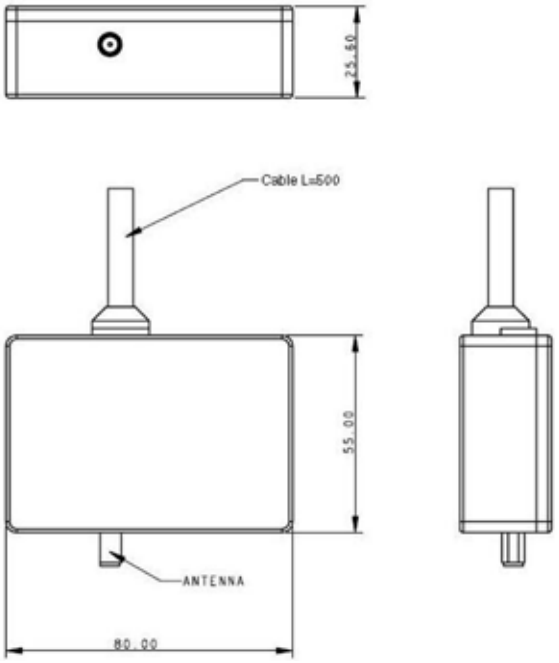
All race cars and bikes

083817341500

CPS-221

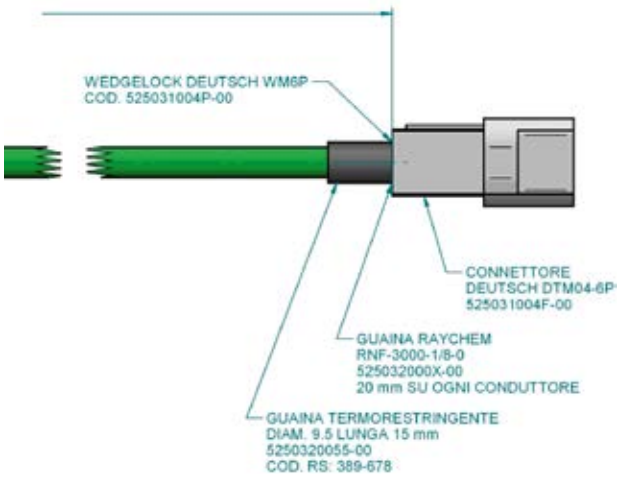
Car Positioning System

Dimensions



Dimensions in millimetres

Connector



Technical Characteristics

Inputs

NTC internal temperature sensor	1
“Code Load” enable pin	1

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 and without connector)	152 g
Exteranl Connector	DEUTSCH DTM04-6P

Cable Pin Out

Pin Out CPS-221 (DEUTSCH DTM04-6P)

	Function	Wire
Communication		
CAN line	1	2
Miscellaneous		
VBATT	1	2
ENCP	1	1
	Total	**5**

GIP-220

GPS Inertial platform

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)*

Typical Applications

All race bikes/cars

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

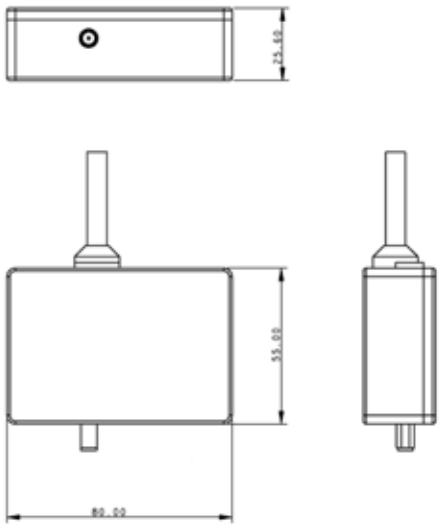
Power supply	8 to 16 V
Max operating internal temperature	85 °C
Protection class	IP 64
Cable length (min.)	50 cm
Dimensions	
without connector and cable	80 x 55 x 25.6 mm
Weight (with cable)	152 g

Cable Pin Out

Pin Out GIP-220 (Cable)

Function	Wire colour
Inputs	
Single ended IN_SE_1	Brown
Single ended IN_SE_2	Violet
Outputs	
Digital output SYNC_1	Orange
Digital output SYNC_2	Yellow
Communication	
CAN line - High	Green
CAN line - Low	Blue
Miscellaneous	
VBATT	Red
Power GND	Black
Analog ground	White
ENCP	Grey

Dimensions



Dimensions in millimetres

Installation

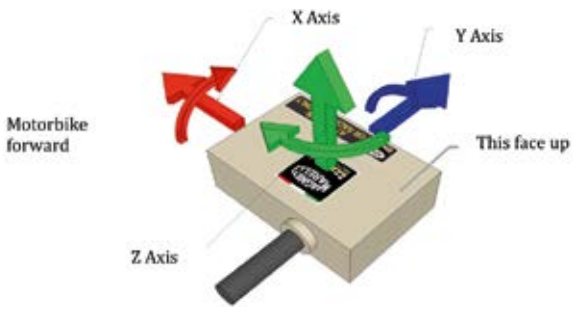
Mounting

- 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



IPS-160

6-axes Inertial Platform System with full sensor redundancy

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 back-compatible to Magneti Marelli DIP120 module, 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*

Typical Applications

All race bikes/cars

IPS-160

6-axes Inertial Platform System
with full sensor redundancy

Technical Characteristics

Inputs

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

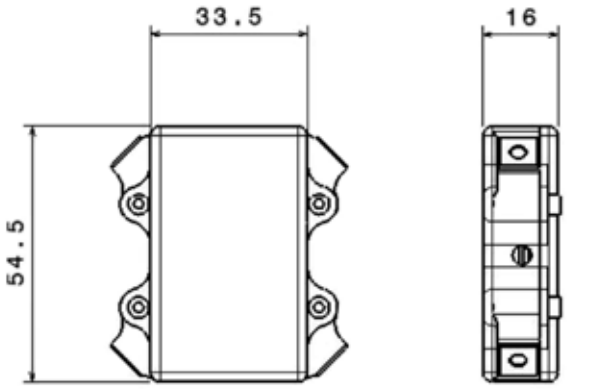
Communications

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)	100 g

Dimensions



Dimensions in millimetres

Cable Pin Out

IPS160 pin out: 8STA61035PN

Function	Pin
Communication	
CAN IMU1 line - High	5
CAN IMU1 line - Low	6
CAN IMU2 line - High	12
CAN IMU2 line - Low	13
Miscellaneous	
VBATT	1
Power GND	2
VBATT	11
Power GND	10
Not Used	
NC	3
NC	4
NC	7
NC	8
NC	9

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

DIP-120

Dual inertial platform

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 axial accelerometer (up to 55 g)*
- *2 x 3 axial 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 (*)*

Typical Applications

All race bikes/cars

DIP-120-083817393600

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

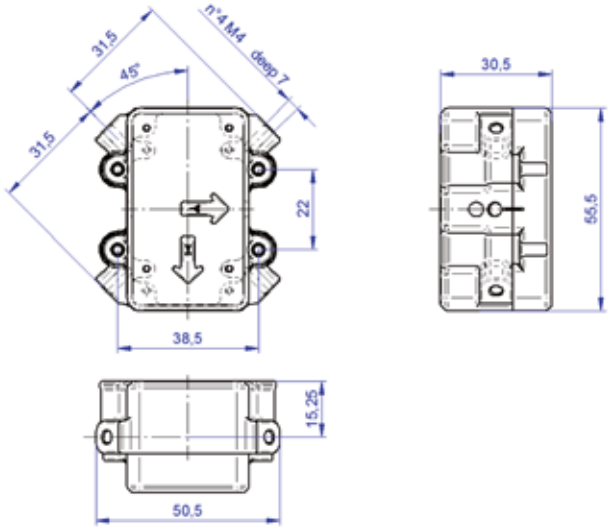
Communications

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



Dimensions in millimetres

Cable Pin Out

DIP-120 pin out: 8STA61035PN

Function	Pin
Communication	
CAN IMU1 line - High	5
CAN IMU1 line - Low	6
CAN IMU2 line - High	12
CAN IMU2 line - Low	13
Miscellaneous	
VBATT IMU1	1
Power GND IMU1	2
VBATT IMU2	11
Power GND IMU2	10
Not Used	
NC	3
NC	4
NC	7
NC	8
NC	9

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

AMC 6 ENC

Slew box (6-encoders)

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.

Main Features

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

Benefits

- *Quick engine mapping*
- *Accurate calibration*
- *Easy to use by means of our PC Tools*

Typical Applications

All race bikes/cars

AMC 6 ENC

Slew box (6-encoders)

Technical Characteristics

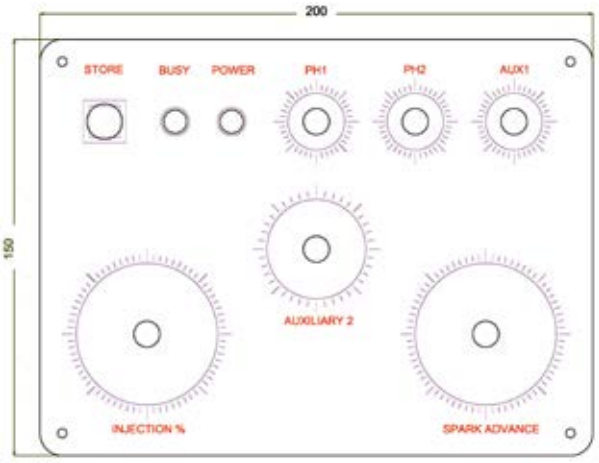
Communications

RS 232	1
bit rate	19200 Bd
Serial current loop	1
bit rate	19200 Bd

Other Characteristics

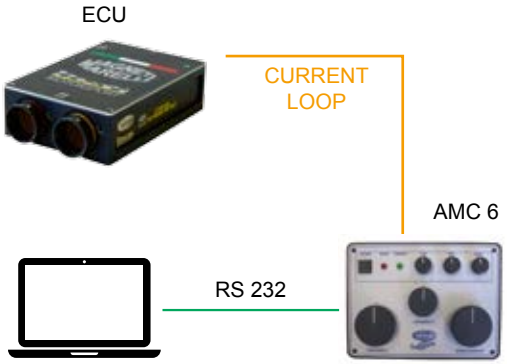
Power supply	8 to 14 V
with adapter (Vac)	220 V
	50 Hz
PH1, 2 and AUX1	graduated scale 32 step, 11.25°
AUX2	graduated scale 64 step, 5.62°
Injection	graduated scale 128 step, 2.81°
Spark advance.	graduated scale 128 step, 2.81°
Knobs, leds and button dimensions	
Injection % & Spark advance	50 mm
PH1, 2 and AUX1	20 mm
AUX2	35 mm
STORE	12 mm
BUSY	5 mm
POWER	5 mm
Connectors	2
RS 232	DB 9 female
Serial current loop	DB 9 male
Dimensions approx.	
without connectors	200 x 150 x 38 mm
Weight (approx.)	1100 g

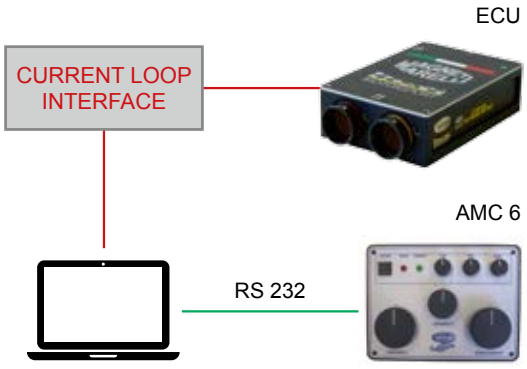
Dimensions

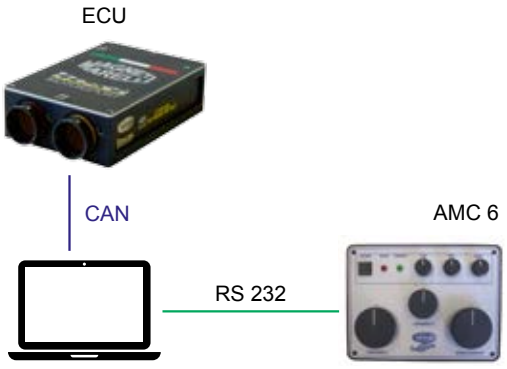


Dimensions in millimetres

Application Schematics







SP5

Switch panel with 5 buttons

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 buttons are available.

With proper software configuration of ECU it can be used for several purposes, as On/Off switch to enable/disable strategies or +/- level selection of strategy settings.

Main Features

- *5 buttons with dedicated functions*
- *4 separate outputs signals (red and green are on the same line) to be connected to the ECU; the outputs has been designed to enter ECU analog input in order to allow c.c. and o.c. diagnostics*

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 race bikes

SP5-083823361000

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

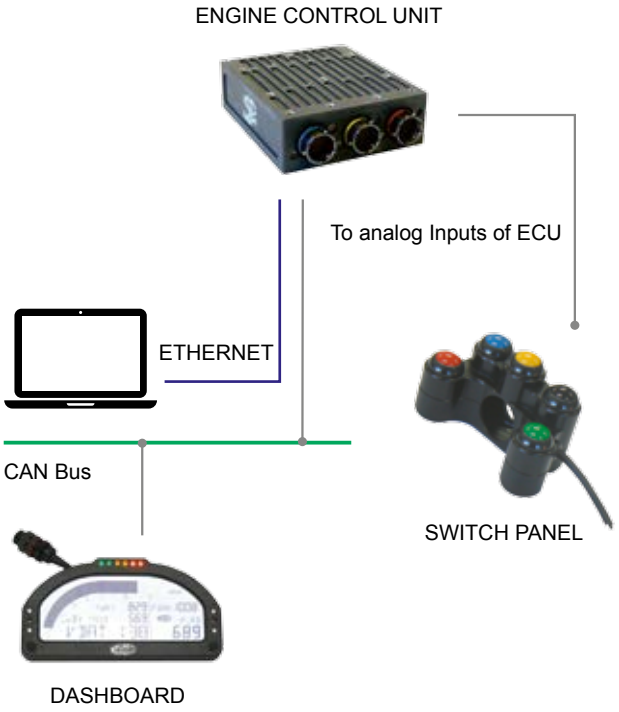
Power supply	5 V

Connector Pin Out

SP-5 PIN OUT: AS607-35PN

Pin	Cable Colour	Function
1	Black	GND
2	Grey	Red / Green buttons
3	Blue	Blue button
4	Yellow	Yellow button
5	White	Black button
6	Red	Supply Voltage 5V

Application Schematics



SP-WRC2

Switch panel with 15 buttons

Description

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 Distribution Unit – enables intelligent diagnosis functions on controlled devices*
- *Depending on SW configuration it can be used in various applications*

Typical Applications

Rally cars
One make race series
Touring cars

SP-WRC2

Switch panel with 15 buttons

Technical Characteristics

Inputs

Input buttons	15 (21 optional)
“Code Load” enable pin	1

Outputs

Gauge LEDs (R-G dual colour)	15

Communications

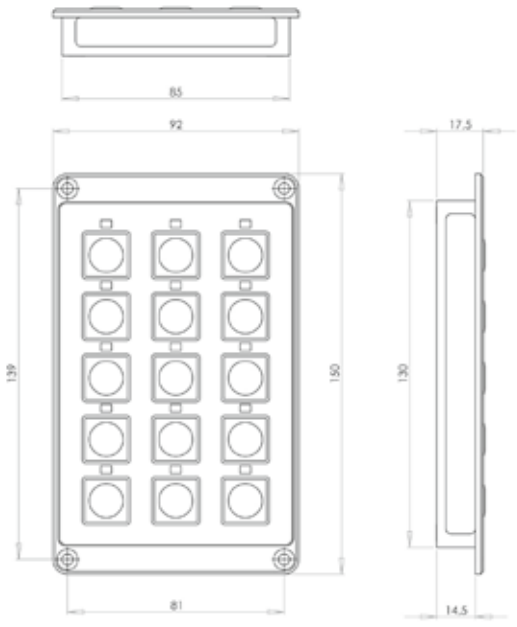
CAN line (1 Mbit/s (*))	1

(*) 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	
without cable and connector	150 x 92 x 17,5 mm
Weight (approx.)	195 g

Dimensions

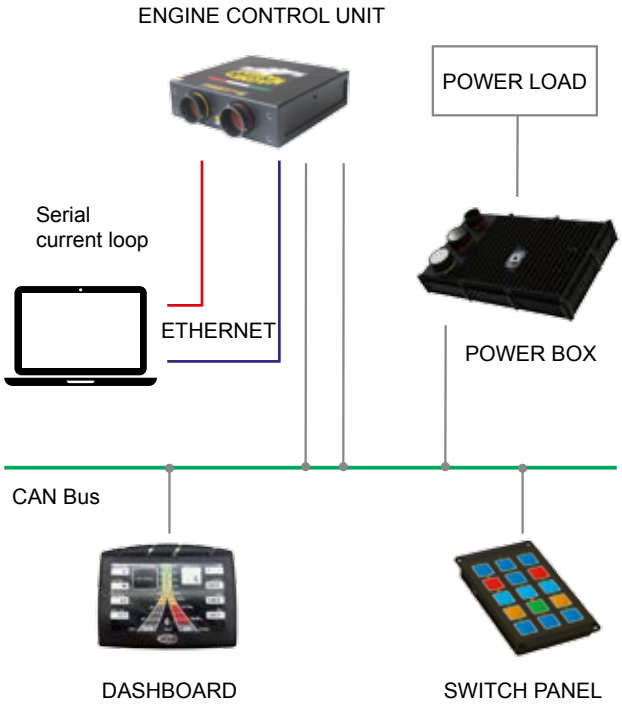


Dimensions in millimetres

Connector Pin Out

ASL 6 06-05 PN HE CONNECTOR PINOUT	
1	Supply Voltage 12V
2	CAN H
3	CAN L
4	ENCP
5	GND

Application Schematics



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*

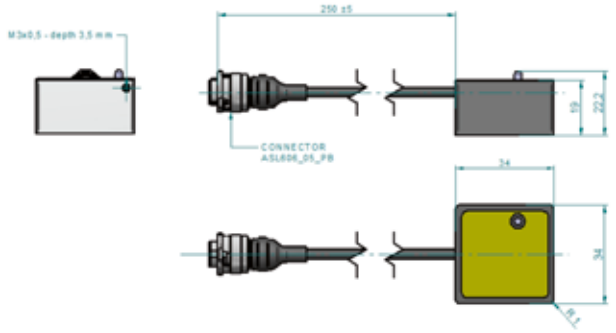
Typical Applications

MotoGP
Rally cars
Racing bikes
Touring cars

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

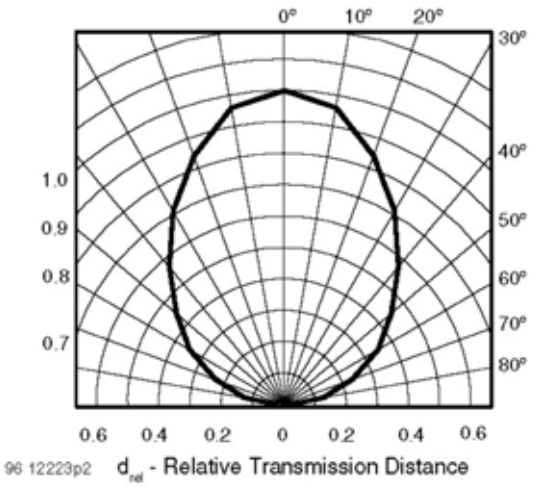


Fig. 1 - Horizontal Directivity

Cable Pin Out

Receiver OLRx User
Connector ASL606_05_PB

Pin	Name	Description
Pin 1	V Bat	Power suppy
Pin 2	CAN H	Reserved MM
Pin 3	CAN L	Reserved MM
Pin 4	GND	Ground
Pin **5**	OUT	Signal

Spectral Sensitivity

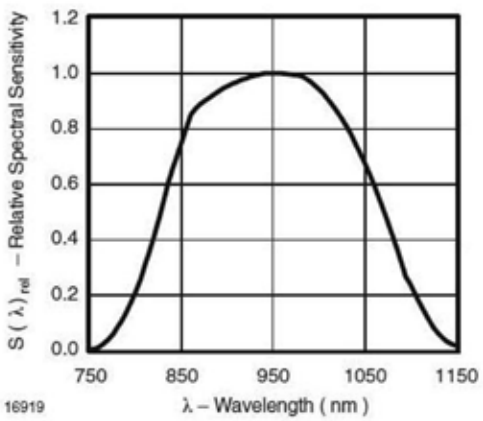


Figure 11. Relative Spectral Sensitivity vs. Wavelength

OLRx User

Optical Lap trigger Receiver

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*

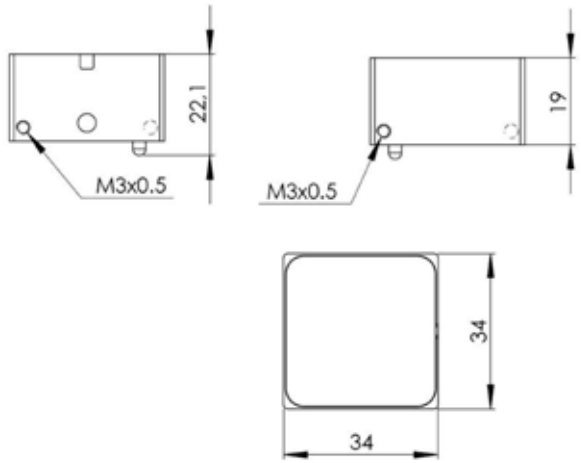
Typical Applications

MotoGP
Rally cars
Racing bikes
Touring cars

OLRx User

Optical Lap trigger Receiver

Dimensions



Dimensions in millimetres

Detection angle

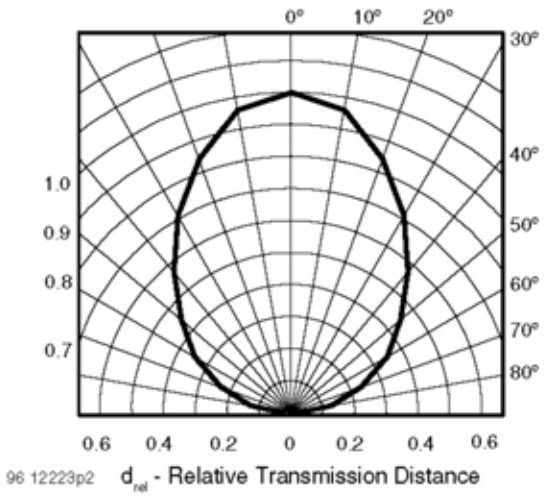


Fig. 1 - Horizontal Directivity

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

Cable Pin Out

Receiver OLRx User

Color	Name	Description
Red	VBAT	Power supply
Yellow	CAN-H	Reserved MM
Green	CAN-L	Reserved MM
Black	GND	Ground
Blue	OUT	Signal

Spectral Sensitivity

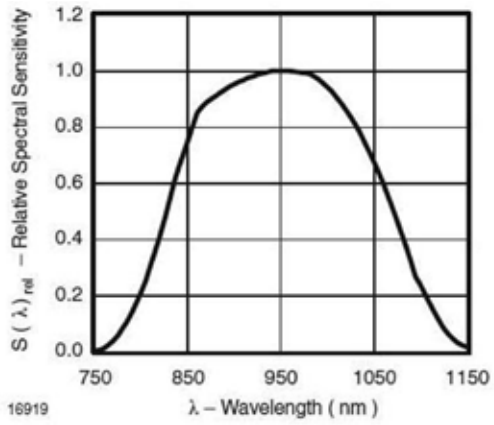


Figure 11. Relative Spectral Sensitivity vs. Wavelength

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*

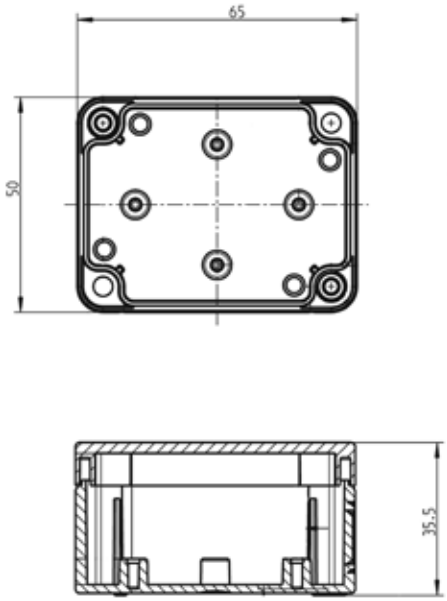
Typical Applications

MotoGP
Rally cars
Racing bikes
Touring cars

OLTx

Optical Lap trigger transmitter

Dimensions



Dimensions in millimetres

Detection angle

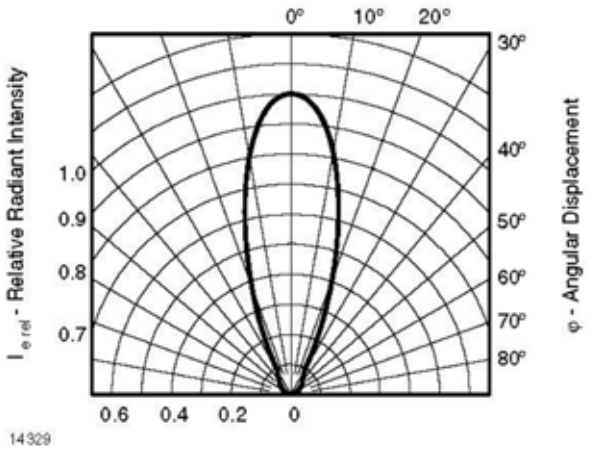


Fig. 1 – Relative Radiant Intensity vs Angular Displacement

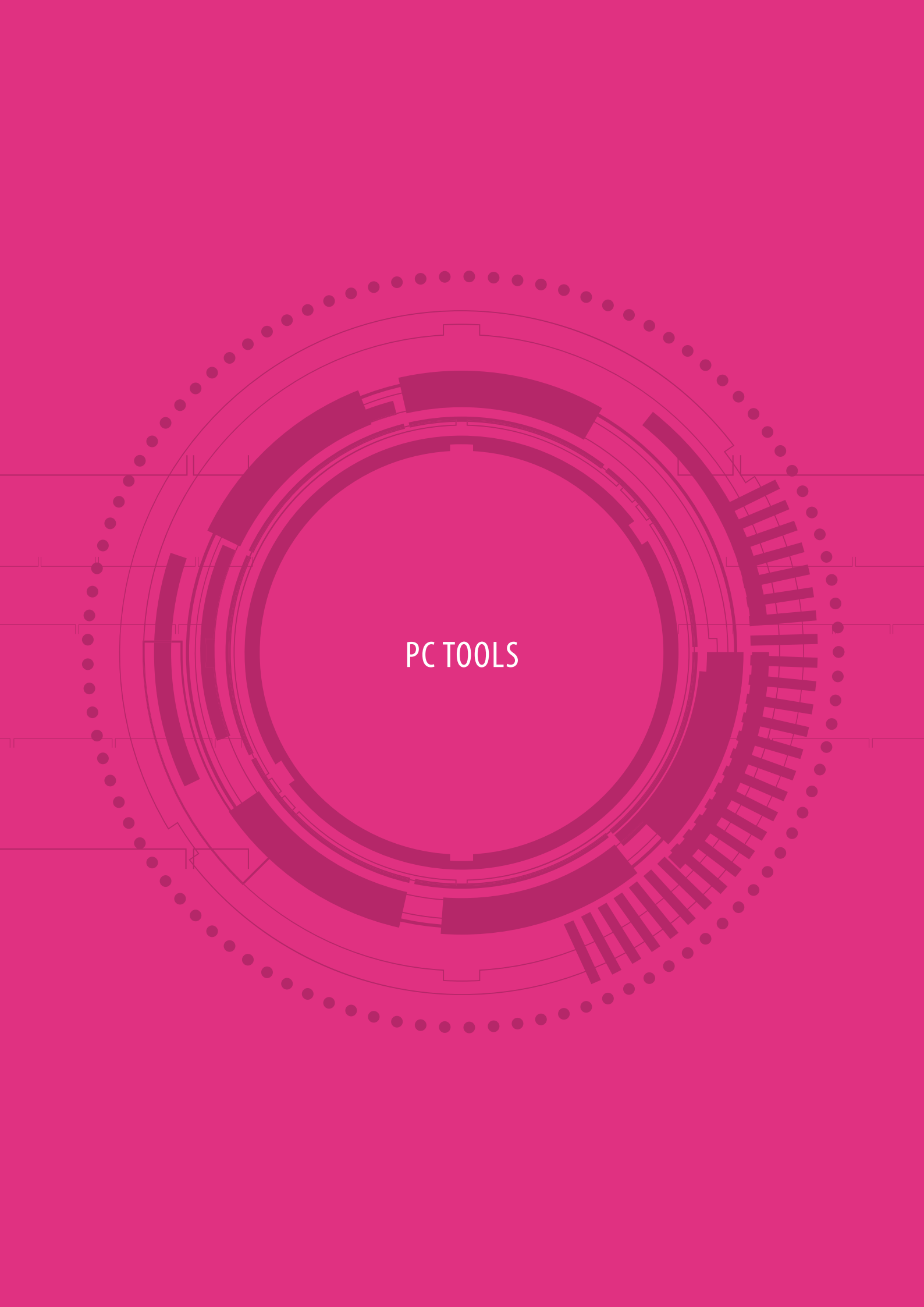
Technical Characteristics

Range	1 to 25 m
Cone angle @ distance x	See Fig.1
Power supply (V DC)	10 to 15 V
Current @ 13.2 V	
power	250 mA
Protection	polarity inversion
Ambient operating temperature	- 20 to 85 °C
Battery connector	IMC14-2204X
Container	sealed polycarbonate
Mating connector (on request)	IMC16-2204X
Cable length	1 m
Dimensions (approx.)	65 x 50 x 35.5 mm
Weight	75 g

Connector Pin Out

Transmitter OLRx

Pin	Name	Description
1	VBatt	+ 12 Volt
2	CAN H	Reserved MM
3	CAN L	Reserved MM
4	GND	Ground


PC TOOLS

SYSMA

Vehicle Tuning & Configuration Tool

Description

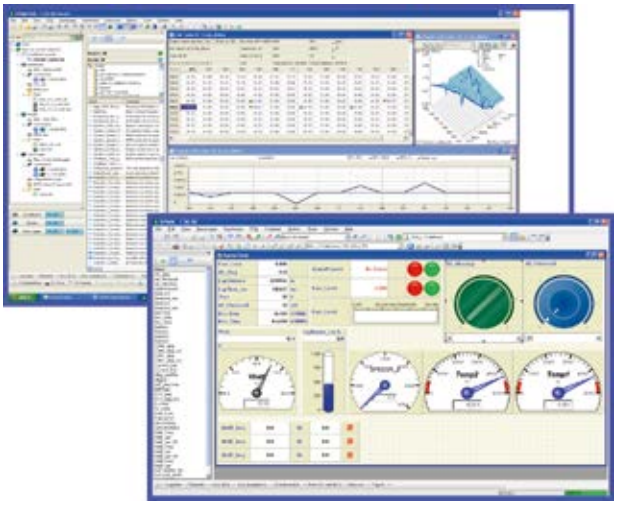
SYSMA is the new Magneti Marelli integrated tool designed for configuring and tuning vehicle control systems for the most advanced levels of motorsport.

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*

Operative System Compatibility

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

Typical Applications

All racing bikes/cars teams

SYSMA

Vehicle Tuning & Configuration Tool

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.

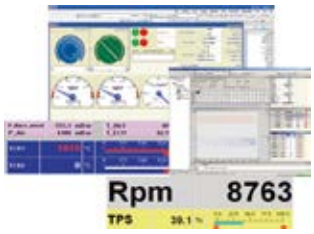
DATA LOGGER SETUP AND MONITORING
Sysma integrates all functionalities of logging setup. In a very easy way it allows you to be connected to the Data Logger and to generate and read the measurements logging table.

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.

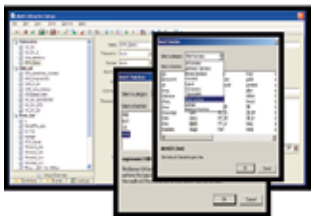
DASHBOARD EDITOR
Sysma integrates all functionalities for Dashboard Setup: graphical Dashboards setup, libraries for Bitmap, Font and layouts.

FIRMWARE CODELOAD
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.

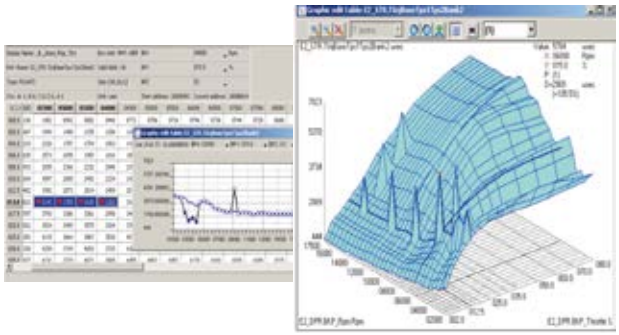


MATHS CHANNELS
Virtual channels are generated from user-defined functions of measurements.
A graphical editor, with advanced features, allows complex math expressions to be built up quickly.



CALIBRATIONS TUNING
Sysma provides a large amount of functionalities which allow editing and managing of the calibration for all system devices:

- *Change values by dragging points on the graph or editing cells*
- *Export/Import calibration values from Excel*
- *Mapping, Work Point, read calibration data from the ECU*



READ/WRITE
This special display allows the administrator to r/w any software variable allocated in the unprotected regions of ECU memory.

DESK POTENTIOMETER SUPPORT
Sysma support external potentiometers (Desk AMC6 / AMC4) where you can modify operating parameters values in faster way through the rotary dials, instead of using the PC keyboard.

SYSMA

SYSMA License Levels

MAPPING FUNCTION
The SYSMA Mapping function lets you directly write correction's values to the maps contained in the ECU.

ASAP3 PROTOCOL SUPPORT
Sysma support bidirectional Asap3 protocol allowing communication with commonly used dynamometric benches.

COMPARE & MERGE
Sysma implements an enhanced integrated compare tool. It allows to compare calibrations & measurements sets as well as the logging tables.
All results are clearly displayed in a report where you can also copy values from compared sets.
The merge utility is dedicated to update user projects to the newer software embedded projects.

OLE AUTOMATION
SYSMA provides powerful possibilities for interfacing with external applications using the Automation Server technology in this way SYSMA can be run and controlled by any program which has the characteristics of Automation controller such as Microsoft Excel®, Matlab®, Simulink®.

SYSMA APIS
The APIs layer allows 3rd party applications to read and write SYSMA measurement and calibrations database

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*

SYSMA

SYSMA License Levels

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

	PRO	EXPERT	SAT	TUNER	JUNIOR
Licensing					
Installation	Multi Workstations	Multi Workstations	Multi Workstations	Single Workstation - USB Dongle	Unprotected
Data and licenses encoding	Confidential	Confidential	Confidential	Common	Common
Projects					
Edit Projects	v	v	v	v	
Create NEW Project	v	v		v	
Compatibility A2L Format description for measurement and calibration (ASAM MCD-2 MC)	v	v			
Encrypt project		Encrypt for SAT		Encrypt for JUNIOR	
Symbols Database Editor	v	v		v	
Symbols Properties Editor	v	v		v	
Data Logger					
Data Logger Setup	v	v	v	v	v
Measurement Protection Levels		v		v	
Measurement Editor	v	v	Unlocked only	v	Unlocked only
Support of standard DBC database format	v	v	v	v	v
Support of Standard CAN signals	v	v	v	v	v
ECU					
Calibration Protection Levels		v		v	
Calibration Values Editor	v	v	Unlocked only	v	Unlocked only
Calibration Properties Editor	v	v		v	
New Calibration Database command	v	v	v	v	Only CAN Signals
Enum format for calibration	v	v	v	v	v
Calibration Breakpoints edit	v	v		v	
Import A2L files	v	v			
Import CFG, CFZ, PTA files					
(Vision Format)	v	v		v	Only PTA Values
Import & export calibration in CSV format	v	v			
Mapping / Work-point	v	v	v	v	
Open Calibration with Excel	v	v	v	v	
Read / Write TAB files	v	v	v	v	

SYSMA

SYSMA License Levels

	PRO	EXPERT	SAT	TUNER	JUNIOR
Data Recorder	v	v	v		
Upload	v	v			
Save Oscilloscope data in Wintax4 Format	v	v	v	v	v
External potentiometer management	v	v	v	v	v
Compatibility ASAP3 (ASAM MCD3) test bench interface	v	v	v	v	
Dashboard					
Dashboard Editor	v	v	v	v	v
Code Load					
Code Load Manager	v	v	v	v	v
Execution of single command	v	v			
System					
OLE/Automation	v	v			
Customizable Accelerator & Toolbar	v	v	v	v	
Support of Ethernet, CAN, Bluetooth lines	v	v	v	v	v
APIs for CLX read / write	v	v			
External application execution	v	v	v	v	
Contextual HELP	v	v	v	v	v
Math					
Integrated Math Channels Editor	v	v	v		
Real time Math Channels	v	v	v		
Windows					
Load Instrument window	v	v	v	v	v
Create New Instrument window	v	v		v	
Load Alarms and Diagnostics windows	v	v	v	v	v
Create New Alarms and Diagnostics windows	v	v		v	
Oscilloscope window	v	v	v	v	
Read / Write window	v	v			
Compare & Merge					
Projects Merge	v	v	v	v	v
Compare and Merge data versions	v	v	v	v	v
Check CLX – TPX	v	v	v	v	v
Compare CLX	v	v	v	v	v
Compare CLX – Extended mode	v	v			
Compare TPX	v	v	V	v	v
Services					
Software upgrades	v	v	v	v	
Software assistance	v	v	v	v	
Customizations (under payment)	v	v	v		

WINTAX4 PRO

Data acquisition and analysis

Telemetry Level

Description

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 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*

Advanced Features

- *F1, WRC, Le Mans Endurance Series, DTM, MotoGP, Superbike, GT, Rally, Touring Car teams*

WINTAX4 PRO

Data acquisition and analysis
Telemetry Level

Technical support

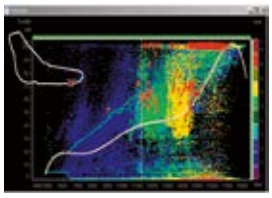
This level of license includes the following items:

- *Possibility to develop custom solutions*
- *Continuous dedicated support (advice, feasibility studies, fixes)*
- *Annual renewal includes confidential updates and fixes*
- *Multi-user license*

Main Characteristics

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 waveforms 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' & and '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*

WINTAX4

WinTAX4 Data Analysis Tools

Magneti Marelli is a complete suite of analysis tools developed for the most advanced levels of motorsport.

Currently WinTAX4 is undoubtedly in the top ranking of PC applications for data acquisition and analysis in Motorsport competitions.

This is the result of more than 20 years of continuous evolution and close partnership with the top teams in F1, DTM, FIA, FOM, WRC, Le Mans Series, GT, MotoGP, SuperBike, AMA, and Powerboats.

When combined with Magneti Marelli's ground-breaking Telemetry System, WinTAX4 provides highly advanced real time analysis functions as well a standard interface to team's proprietary software applications.

With a radio link the race vehicles can even be monitored from remote base stations.

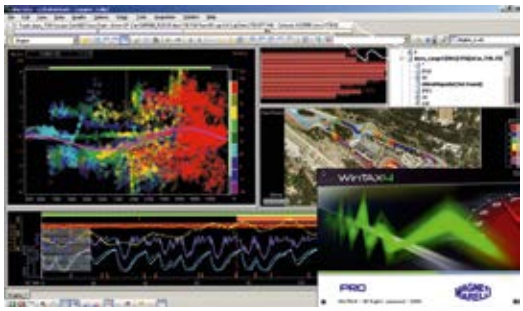
With an Ethernet cable link, the telemetry can be exploited in the laboratory or at the dyno.

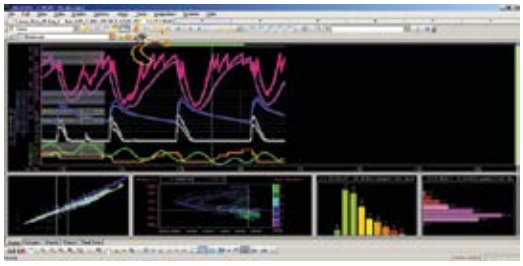
WinTAX is equally suitable as data analysis tool for third party telemetry systems. Its extra modules allow you to decode uploaded data or live telemetry from any external Datalogger.

The integrate CAN lines analyser with support of DBC files is the perfect integrated instrument for monitoring, live, either electronic devices or full car diagnostics from the OBD plug.

Offering data protection, add-on modules and dedicated support to develop innovative and integrated solutions, WinTAX4, Magneti Marelli's flagship data management tool, is the perfect solution for the most ambitious development programmes.

Quick, easy to use, completely customisable WinTAX4 is your essential tool for the race track and the dyno Thanks to its openness WinTAX4 is the ideal tool for the data analysis of third party systems





WINTAX4

WinTAX4 Data Analysis Tools

SUMMARY OF WinTAX4 FEATURES

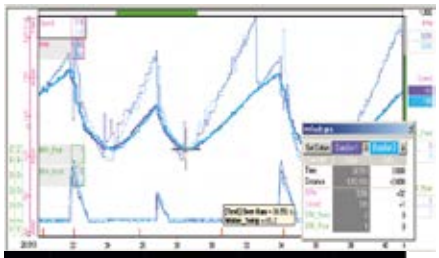
- WinTAX4 is compatible with latest Microsoft Operating systems, both for 32 and 64 bit: Windows® XP, Windows® Seven, Windows® 8, Windows® 8.1, Windows® 10, compatible with dual core and quad core processors
- Complete Customisation: layouts, graphs, mathematical libraries, User privileges, colours schemes to suit user preferences or to adapt to team environment. All custom settings can be shared between users or forced by the team administrator. Global & Local setting levels
- Many analysis and reporting windows: time/distance line, 2d Scatter, 3d Scatter, Bargraph, Frequency, Histogram, Trend, lap by lap Report, Events, Diagnostics, Numeric, Alarms, Pop-up, Gauges
- High performance and reliable data storage system
- Circuit data-mapping and analysis of vehicle's GPS trajectories with satellite images (Google Earth®, Google Maps®)
- Mathematical real-time and post-processing data elaboration via embedded function libraries and via external DLLs
- Open to external commercial tools such as Excel®, Matlab® and Simulink®
- OLE/Automation inter-process communication protocol supported VBScript®, JScript®
- Import/Export of textual data from/to any proprietary format; export to binary format
- Interfaced to third party data systems via dedicated APIs
- ECU virtualisation: Simulink-based model of the on-board ECU, running on PC
- Car modelling and simulation ➞ nterface to ChassisSim®
- Car modelling and simulation ➞ Real-Time interface to rFactor®
- Data-Video synchronisation
- Multicast Real Time telemetry (radio & dyno) data distribution over TCP/IP network
- Multilanguage user interface and extensive Help with context sensitive links: English, French, German, Italian, Japanese
- Multi Installation

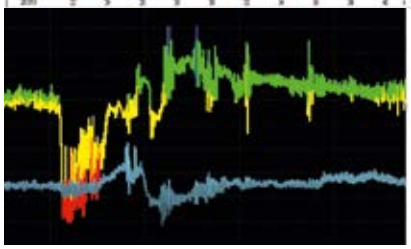
WINTAX4

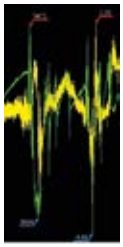
WinTAX4 Analysis Windows

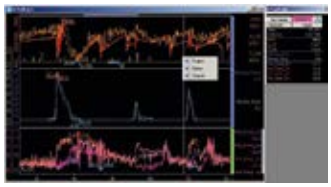
Graph
Shows channels as waveforms against time, absolute-time or distance

- *Controls for channel layouts, lap offset adjustment, navigation and data analysis*
- *Zooms, pan, copy & paste elements and styles from/to other waveforms*
- *Compare data in difference or average mode*
- *Show time variance between compared laps*
- *Display of events, alarms, pop-ups, delta values, slope*
- *Display of Min/Max values up to graphs*
- *Hide channels, blink channels, Multi coloured channels*
- *Open data in Excel®*
- *Open data in Matlab®*







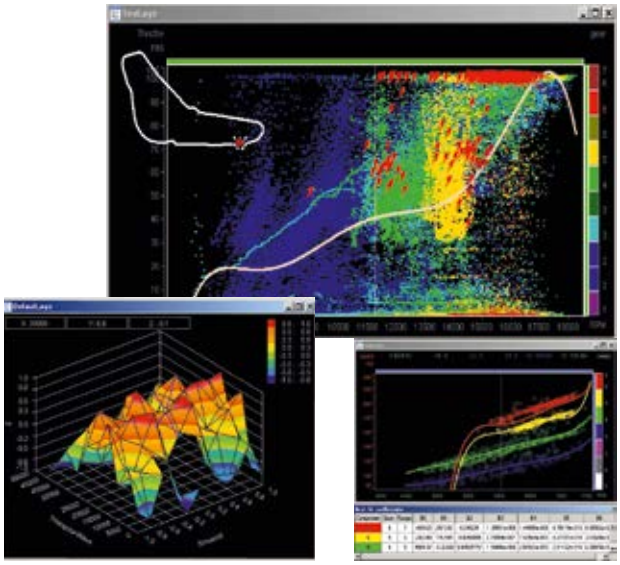


Graph window can be divided in several logical Areas where grouping channels.

Each area can be quickly resized moving splitter bars. Areas can be also displayed or hidden via shortcuts: this allow you to temporary hide from view groups of channels Names of logical Areas are user's definable.

2D-3D Scatter (XY, XYZ)

- *Shows the relationship of pairs of parameters in a cross plot*
- *Advanced 2d, 3d waveforms with multi-axes representation (x & y), best-fit curve, data gating, logarithmic scales, hide channels*
- *Link between XY plots and Graphs and vice versa*
- *Data can be exported in an Excel® spreadsheet just by mouse right click*
- *Multi best fit representation on the 2D display (XY) e.g. separated best fit line of Speed versus Engine revolution for each Gear number. Display of best-fit coefficients*
- *Generate math channel formula from best fit equation*
- *3D view, Smooth view, Density view*



WINTAX4

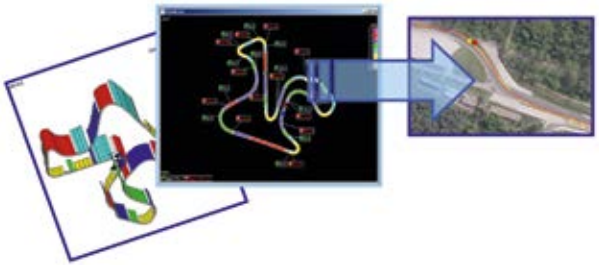
WinTAX4 Analysis Windows

Circuit & Google Earth Maps
WinTAX4 allows you to calculate and display the trajectories of the vehicles along the track. The circuit map is auto-created from basic logged channels such as acceleration, speed and distance or using GPS coordinates. Track report channels, useful to identify for example brakes and acceleration areas, can be displayed over Google Earth background image as gradients of colours

- *Track report channels comparison*
- *Multiple track report channels display*
- *Track report channels displayed in real-time*
- *Track Channels values: values of custom channels are displayed together with cursor when moving. Significant values can be also saved as permanent tooltips on the map*

Sections report channels show statistics in a graphic format along the circuit split areas.

Google Earth integration permits an accurate and realistic analysis of the data.

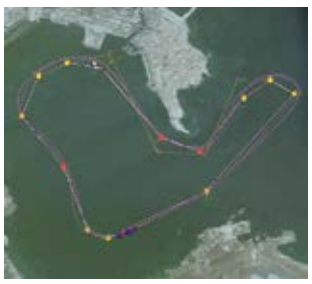


Google Earth images can be used directly in WinTAX4 through a standard commands like zoom, pan, rotate and fine calibration.

Measurement functionality is available on Track displays:

- *distance ("on air") between two points*
- *distance ("on circuit") between two points ➡ distance travelled on track.*
- *distance ("on circuit") between two point with two (or more) trajectories ➡ compare of travelled distance (CAR/Driver versus another CAR/Drive; CAR/Driver versus itself)*

WinTAX4 designed for the Boat applications allows to define the race area and the buoys positioning & style.



WINTAX4

WinTAX4 Analysis Windows

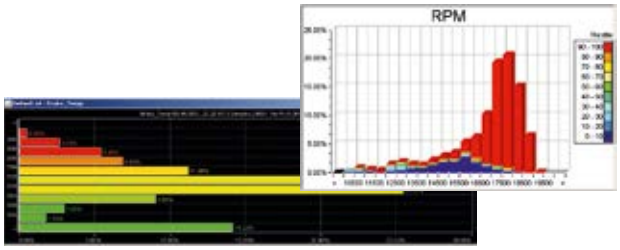
Lap-by-Lap Reports - Sections Time Reports - Trend
Channel reports allow users to view statistical summaries across track sections (or laps, runs, sessions) for any number of configured channels. Statistical functions include: min, max, average, standard deviation along with section start and end values.

In the Lap Report the “statistic” option permits to evidence the absolute MIN, absolute MAX row by row. These information are displayed directly into cells (colours) and as statistics header on bottom of the Lap Report. Background color of cells can be used to display alarm conditions as well as color of text shows the min/max values.

On-Demand virtual channels allow users to enter maths equations for quick data inspection.

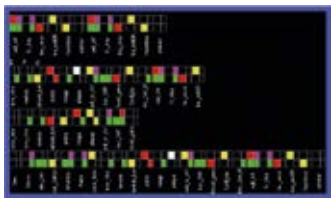
Histograms
Shows the distribution of a parameter against time

- *Horizontal or vertical layout, Bars or Line display mode*
- *Percentages or time values*
- *3D view, compare mode, cumulative mode*
- *Colour channel*



Diagnostics
Shows the status of bit-mapped channels bit per bit

- *Change of status of each bit has a special meaning that can be interpreted independently from the other bits of the channel*
- *Multiplexed bit-mapped diagnostic channels*
- *Each bit can be given labels, colours, latch-up times*



Instruments
The overall appearance of instruments is fully configurable to suit your preferences or to adjust the display to the different brightness scenarios (e.g. pit-lane, indoor garage etc.).

A large variety of styles allows you to customize the instruments appearance and to adapt them into WinTAX4’s layouts.

All parts of instruments are configurable: scale, font, colours, hand, alarm, layout, ticks, and unit.

WINTAX4

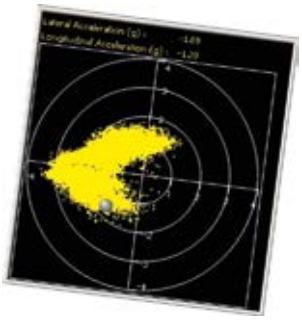
WinTAX4 Analysis Windows

The Steering Wheel is dedicated for steered angle values analysis. You can also compare laps. The “Clockwise” and the “Counter clockwise” mode are supported.

All instruments work in post processing and in real-time mode. Instruments support compare mode.

GG acceleration window

The GG acceleration window is the instrument dedicated of accelerations analysis.



Starting from the lateral and longitudinal acceleration channels it displays the circle of accelerations.

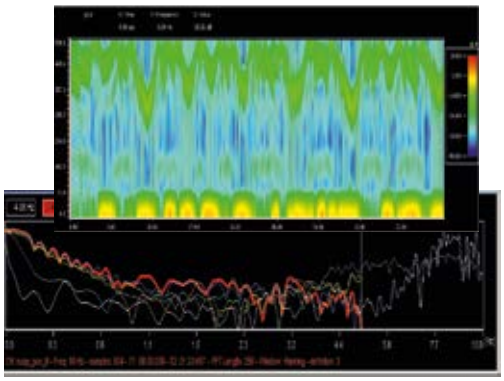
The channels are taken from Wintax4 General Setup as special channels. Locally to window the User can also define custom channels, to suite your preferences or the analysis needs.

The graphic aspect is fully customisable (colours, background, symbols etc.).

FFT Analysis

The power spectral density analysis functions are based on the Fast Fourier Transform (FFT).

Windowing (Rectangular, Hanning, Hamming and Blackman/Harris) allows to reduce both leakage and discontinuity effects of the time interval limits in the power spectrum computation.



In addition to the power spectrum density, the following functions are also included:

- Display of channels Phase & Module: calculation is based on the Fast Fourier Transform algorithm (FFT)
- Display of channels Spectrogram: colour based visualization of the evolution of power spectrum trough time
- Display of channels Power Spectrum Density (PSD)

For each channels it is possible to display simultaneously all types of analysis, for example phase&module and PSD together.

WINTAX4

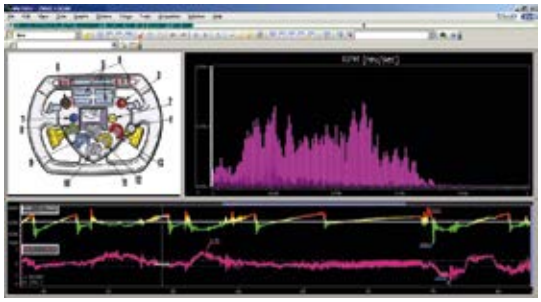
WinTAX4 Analysis Windows

Condition Light window
The Condition Light window can be used to evidence conditions on the data with a clear and immediate output. For example an alarm can be displayed with a custom color and a custom text.

For each step of the configured condition you can define: background color and text (string and font). Up to sixteen status and related setup can be independently configured.

The blink effect allows you to immediately recognize troubles.

Bitmap window
The Bitmap window allows you to insert in WinTAX layouts one or more images.
The standard Jpeg, Bmp, PNG and GIF files are supported.
The Bitmap window can be saved at layout as for all other waveforms.



Display Value window
The Display Value window allows you to display a channel value with a clear graphic format.
The window is fully configurable in term of:

- *background color*
- *text font and color*
- *option to define "display name" different from logged name*
- *7-segments font supported*
- *Enum values supported*
- *Alarms*
- *Real-Time and Post-Processing mode*

WINTAX4

WinTAX4 Analysis Windows

Complete Customisation

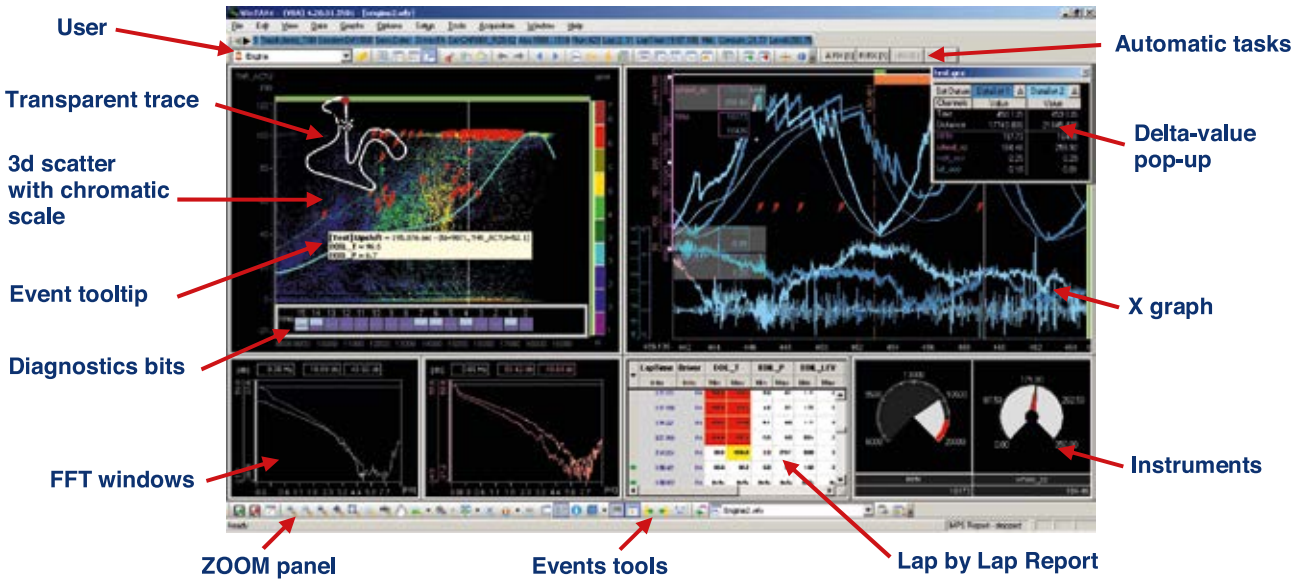
The main screen area of WinTAX4 contains graphic or alphanumeric analysis windows in which logged data may be represented in a variety of different ways. Each User may save commonly-used combinations of analysis windows as Layouts, which allow the waveforms to be organised into logical screen containers.

User-configurable accelerator keys make WinTAX4 easy and fast to use.

Colour schemes of overall WinTAX4 appearance may be changed to suit User preferences or ambient light conditions (e.g. Pitwall, Garage etc.)

Channels Parameters define global settings for all channels e.g. colours, scale, display format, Offset&Gain, Alarm, Filters…

Global settings can be modified locally to each windows making WinTAX4 completely configurable to adapt to every wish. For each window: colours, styles, fonts, scales, filters, channels position…



Import & Export of WinTAX4 settings allows users to share setups. The default factory settings can be changed to suit team needs or preferences. All WinTAX4 can be installed with an identical preconfigured setup.

Playback Function

Replay function for the playback of the logged data with option to:

- *Play, Play speed, Pause*
- *Loop*
- *Rewind*

All WinTAX waveforms support playback.

WINTAX4

WinTAX4 Analysis Windows

Keyboard Accelerators

WinTAX4 provides powerful keyboard shortcuts. Almost all of commands of WinTAX4 are associated to an accelerator. The most important and used commands are “single key” accelerators (e.g. F1, F2, etc.)

WinTAX4 allows you to customise several accelerators following your preferences or needs. The list of all keyboard shortcuts is fully documented into the help guide.

Run Time Analysis

VCH Math Channels
Virtual channels are generated parameters from user-defined functions of logged data channels. A graphical editor, with advanced features (such as find&replace, auto compose, tooltips, import/export from CSV), allows complex math expressions to be built up quickly.

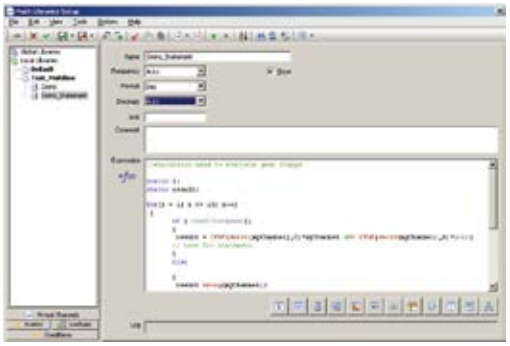
Virtual channels can be organised in libraries, sharable between Users.

Debug Virtual Channels parses complex formulae and allows you to explore them, graphically, to find errors.

Virtual Channels Statements: the virtual channel is a function defined by an expression; any expression performs calculations on data. The statements allow you to control the sequence of expressions evaluation.
Likewise it is also possible to store values in variables, locally to the expression or globally out of the current math formula.

The kinds of statements available in WinTAX4 are:

- *Declaring variables, local and global*
- *Conditional statements*
- *Iteration statements*
- *Control Flow statements*
- *Variables operators*
- *Relational operators*



The main functions available in WinTAX4 are:

- *Trigonometric, Boolean, Math and statistic operators*
- *Digital Low-Pass & High-Pass filters*
- *IIR, Butterworth, FTT, Run Average filters*
- *Digital Filter up to 4th order: digital filter with customisable filter coefficients. Allow you to design Low, High, Pass band e Band stop filters*
- *All math functions work for the real-time and post processing analysis*
- *Unlimited nested VCH formulae*
- *Unlimited number of VCH libraries*
- *Global & Local libraries levels*
- *On-Demand VCH expression: like in Microsoft Excel®, WinTAX4 allows you to define temporary math channels, directly in graphs, with a simple syntax, e.g. A_Y_filtered = Filter (A_Y, 1 Hz)*
- *Custom advanced math formulae can be generated by external applications through the optional MathDLL plug-in*

Fast math processing: maths channels are only calculated if required, this ensures excellent performances.

WINTAX4

WinTAX4 Analysis Windows

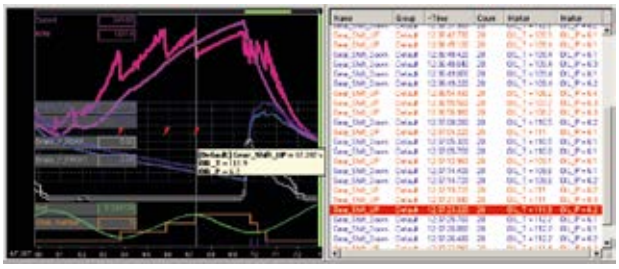
Events & Alarms
Advanced checks (**Events & Alarms**) for automated monitoring of Engine & Chassis can be displayed in waveforms as graph symbols, multiline reports in post processing / real-time mode or as multi pop-up.

Events are basically changes of status of a variable from False to True or vice versa. The variable can be a logged channel, such as a diagnostic or an error flag, or some derived channel which has two meaningful states (e.g. a Boolean condition). When the variable changes state an event is generated.

WinTAX4 provides a powerful graphical events editor to define event conditions. A variety of styles and options can be configured for individual event types.

In the definition of each event it is possible to set up a zoom range that is automatically applied when the event is searched. A time offset parameter is used to place the cursor and centre the zoom at a predefined time before or after the event.

- *It is possible to set up a specific layout which will be opened when the event is detected*
- *Events can be either displayed as icons on graphs or multiline reports*
- *Values of additional channels can also be displayed within events. For each additional marker channels you can also define the length of the interval where statistics, such as min, max or average, should be calculated. When the event occurs, WinTAX4 calculates the instantaneous values as well as a statistic based to samples before and after time/space occurrence of event.*
- *Preconfigured Events, like Gearchange are also available in WinTAX4*



Real time Telemetry

WinTAX4 includes modules for displaying and recording telemetry either from radio or wire link (Dyno cable telemetry).

WinTAX4 supports both wide band and narrow band radio telemetry. Radio telemetry can be distributed to garage network via WinTAX Telemetry Server (WTS) to an unlimited numbers of clients. Telemetry can also be replayed for debugging purposes.

- *Each waveform can switch from post-processing to real-time mode through a quickly configurable shortcuts*
- *Each Layout may contain post and real-time waveforms*
- *Advanced 'real-time freeze' & and 'real-time compare' utilities*

WINTAX4

WinTAX4 Analysis Windows

Communication with other Applications

OLE / Automaton
WinTAX4 provides powerful possibilities for interfacing with external applications using the Automation Server technology (formerly OLE Automation Server). Automation is a protocol which allows an application to make its own objects available for use in other applications, programming tools or via scripting languages.

In this way WinTAX4 can be run and controlled by any program which has the characteristics of Automation controller. Some examples of applications which make great use of Automation are Microsoft Excel®, Access®, Project®, Matlab®, Simulink® and many others written in Visual Basic or Visual C++.

It is possible, for example, to open a WinTAX4 window from an Excel spreadsheet, analyze information via Matlab or run print or copy commands directly from an application written in Visual Basic.

Matlab & Simulink Integration
WinTAX4 provides powerful possibilities for interfacing with Matlab and Simulink. Examples are the dedicated OLE/Automation methods, “GetMatlabValues” and “PutMatlabValues” that allow you to share data between applications (in both directions) in a very simple and efficient way.

Few source code lines in WinTAX4 permit to display the content of Matlab® workspace without loading logged laps WinTAX4 becomes a Matlab displayer.

The telemetry logged data can be also exported as Matlab sessions as well as Matlab files can be imported in WinTAX4 to be displayed and analysed against logged parameters.

Management of multi frequency MAT files: WinTAX4 can import/export MAT binary files which contain arrays with different logging rates.

WinTAX4 is also able to load the Simulink workspaces.

Import / Export WinTAX4 data to / from Simulink workspace: feature to import Simulink “Structure with Time” directly in WinTAX4.

Import & Export ASCII

WinTAX4 provides the possibility to export and import textual data (e.g. CSV, ASCII, and XLS) saved in any proprietary formats.
This makes the system fully open and flexible in I/O from external tools.

An internal wizard, like in Excel®, interprets the text files with a run-time preview. The User can select for example the columns data type, columns separators, channels frequencies and many other options. Import multi files option permits large archives of data coming from other tools to be converted quickly in automated mode.

Import & Export Matlab

WinTAX4 provides the possibility to export and import Matlab® data (mat files).
An internal wizard, like for the Import & Export ASCII interprets the Matlab® files with a run-time preview. Import multi files option permits large archives of data coming from other tools to be converted quickly.

Object Control Window
Custom ActiveX controls or custom embedded programs can be inserted in the Object Control Window.

In other words a custom generic application can run embedded into WinTAX4 ➞ the bitmap shows Excel® running on WinTAX4.

WINTAX4

WinTAX4 Analysis Windows

Video Management

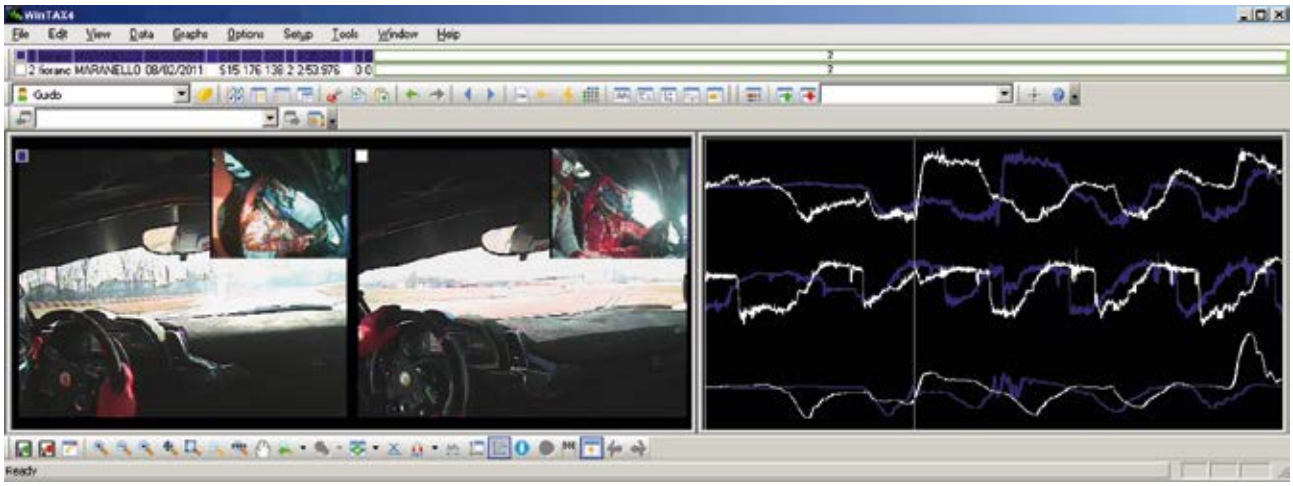
WinTAX4 includes integrated video function. This feature allows a video file to be linked to the logged data from a vehicle, and displayed along with the rest of data within WinTAX4.

You can, as in the picture, have one video on the driver, another out of the car and link them all together with the data.
Once the data and video are loaded, when you overlay laps, you also overlay the video files. You can then see how racing lines differ lap to lap, or how driver technique is affecting lap times.

WinTAX4 automatically links Video and Data by means of a unique accurate timestamp.

You can also manually edit the video sink. WinTAX has a function to unlock the video from the data: they can be manually moved, backward of forward, up to requires sync point. This offset can be saved within data.

The video data format is an open format distributed under request (to use customer's video in WinTAX4).



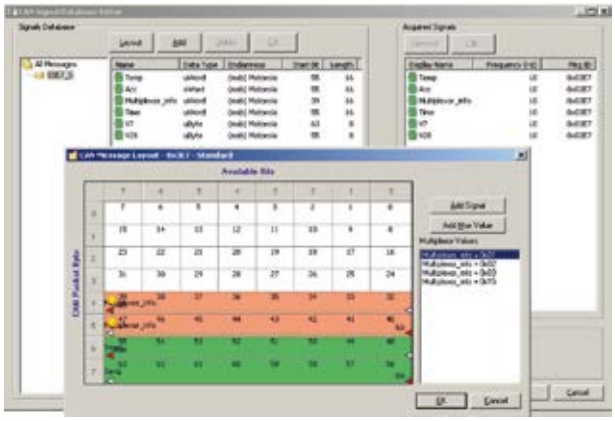
WINTAX4

WinTAX4 Analysis Windows

Data Acquisition from CAN Lines

WinTAX has a function that allows direct acquisition of data from CAN lines. The format of CAN packets is simply configurable either via the internal graphical parser or importing predefined DBC configuration files. In this way WinTAX is able to acquire any kind of CAN data.

- A powerful graphical editor allows you to define the structure of CAN packets to be acquired.
- Multiplexed signals are supported.
- Can Signal Database can be also saved and easily reloaded as needed.
- WinTAX also manages the DBC files for immediate definition of the CAN packets.
- The most commercial PC CAN card such as Vector, Peak, and CanDo are supported.



Product Extensions

A complete suite of add-on modules increase the potential of WinTAX4, as well as the APIs interfaces allow WinTAX4 to be used in conjunction with external applications or third party telemetry systems.

WTS: WinTAX4 Telemetry Server

WTS is the 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.

WTS distributes all “off-car” setup files, synchronising all PC to the same session and vehicle setup.
WTS can distribute simulated data as well as cars data.

WTS provides the option for simultaneously activating more than one Server within the same network. In this scenario it is therefore possible to, for example, configure one WTS Server to manage the data streams of the first vehicle and the other Server to manage data streams relating to the second vehicle or using a second server as backup.

A remarkable intuitive user interface and low system resources are the main characteristics of this WinTAX4 add-on.

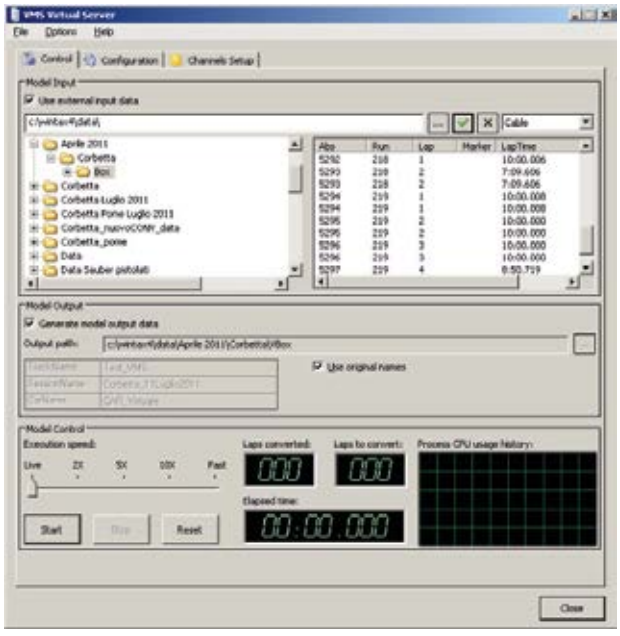
VMS: ECU Virtualization

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.

The WinTAX4 add-on, VMSServer module, is the dedicated Magneti Marelli software to run ECU Simulink® models.

The Simulink® model can be executed in post processing, generating a set of simulated data that are treated by WinTAX4 as a standard logged data (e.g. they can be compared with car logged data).

Several operational modes, such as the play speed, allow you to simulate real uses case.



WINTAX4

WinTAX4 Analysis Windows

MPS4: Pit System

Marelli Pit System tool, for Pitwall applications: graphic tool for intuitive and easy visualization of vehicles position, check the state of engine/car, performances.

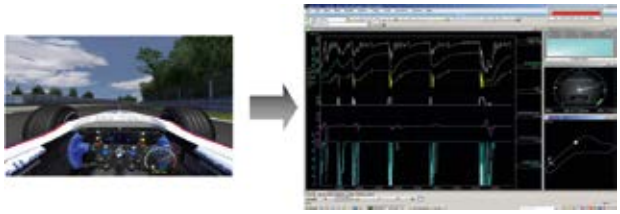
WinMETEO

Meteo data manager for acquiring weather info and synchronise it with logged data.

rFactor: Vehicle & Driver Simulator integration

rFactor is probably one of the world's most advanced and famous racing simulators. It is used by Formula 1 teams both for drivers' training and drivers' capability evaluation.

The real time result of rFactor can be viewed and analyzed in WinTAX4. This allows team engineers, mechanics and drivers to analyze, live, every parameter of the car's performance.



While the driver is running on the Simulator, the data are transmitted through Ethernet to several WinTAX4 workstations to be analyzed.

WinTAX4 APIs

TelDataX
WinTAX4 data access library: allows you to read WinTAX4 data archives from external applications

TelDataZTX
WinTAX4 data generation library: allows you to generate WinTAX4 data archives from external applications

TelDSTClient
Library for reading of WinTAX4 Real-Time Telemetry flux by external applications

TelRTClient
Library for generation of WinTAX4 Real-Time Telemetry flux from external applications

MathDLL
External math channels definition: it is possible to select a series of parametric 'Math Client Functions' in addition to the standard WinTAX4 math functions (e.g. SIN, COS, INTEG, etc.)

rFactor Plug-In
Software plug-in to link rFactor simulation live data stream in WinTAX4. In conjunction with WinTAX4 Telemetry Server allows to display the data generated by rFactor car simulator in WinTAX4 remote workstation while the pilot is driving.

Standard F1 ECU Compatibility

WinTAX4 is fully compatible with the standard Formula1 engine control unit: MESL F1 SECU.
The additional components WTXConverterX and TelDSTClientRAW make WinTAX4 compatible with the standard SECU.

WTXConverterX
Real-time and Cable Converter for MESL data to the Marelli-WinTAX4 format. The Real-time converted flows can be distributed over the garage network through the WTS Server.
The module is unique software to be installed and configured just at first time, and then it automatically converts and distributes the MESL data.

TelDSTClientRAW
Standalone component which connects the WTXConverterX with Marelli radio equipment: MTX transmitter and GRX receiver configured to transport MESL data packets.

WINTAX4

WinTAX4 Analysis Windows

WinTAX4 License Levels

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

- *TEAM & PRO provide powerful features, see the following table for details*
- *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*

	PRO	TEAM	USER	USER RT	JUNIOR
Licensing & Main Features					
Installation	Multi Workstations	Multi Workstations	Single Workstation - USB Dongle	Single Workstation - USB Dongle	Unprotected
Data encoding	Confidential	Confidential	Common	Common	Common
Multi Language	v	v	v	v	Only English
Analysis windows					
Graph	Unlimited	Unlimited	Unlimited	Unlimited	2 Graph, 16 channels per Graph
XY	Unlimited	Unlimited	Unlimited	Unlimited	1 XY, 2 channels
XY advanced features	v	v			
XYZ	v	v	v	v	
XYZ advanced features	v	v			
Histogram	v	v	v	v	1 Histogram
Track	v	v	v	v	Basic Track
Compare / Multiple overlay	v	v	v	v	Max 2 Compare
Compare - Difference	v	v	v	v	
Google Earth Maps	v	v	v	v	
Section Time Report	v	v	v	v	
Lap Report	v	v	v	v	Basic, Single Lap
Trend	v	v	v	v	
Run Preview	v	v	v	v	v
Diagnostics	v	v	v	v	
Gauge/Instrument	v	v	v	v	
Steering Wheel	v	v			
Condition/Bitmap/Display	v	v			
GG Diagram	v	v			
Alarms	v	v	v	v	v
Events	v	v	v	v	
Events - advanced	v	v			
Power Spectrum Density	v	v	v	v	
PSD advanced	v	v			
Video management	v	v	v	v	

WINTAX4

WinTAX4 Analysis Windows

	PRO	TEAM	USER	USER RT	JUNIOR
Real Time analysis					
Real-Time Telemetry	v				
Dyno Ethernet Telemetry	v			v	
Real-Time Telemetry - basic	v			v	
Real-Time Maths Channels	v				
CAN Line Analyzer	v	v			
Math analysis					
Math Channels	v	v	v	v	Max 8 Math
Math Channels Statements	v	v			
Lookup Table	v	v	v	v	
On-demand Math Channels	v	v	v	v	
FFT - Run AVG Filters	v	v	v	v	
IIR - Digital Filters	v	v			
Maths plug-in (external DLL)	v	v			
Import & Export Data					
Ole/Automation - Scripts	v	v			
Export ASCII	v	v	v	v	
Import ASCII	v	v	v	v	
Import/Export Matlab	v	v			
Product Extensions					
WinTAX4 Telemetry Server	v			Optional	
Virtual ECU Manager	Optional	Optional			
MPS - Pit System	Optional				
WinMeteo	Optional				
WinTAX4 APIs					
TelDataX - to load/read WinTAX4 data archive	Optional	Optional			
TelDataZTX - to create/write WinTAX4 data archive	Optional	Optional			
TelDSTClient - to access real time stream	Optional				
RT-PlugIn - to add real time stream	Optional				
rFactor plug - for real time data	Optional	Optional			
Services					
Software upgrades	v	v			
Software assistance	v	v			
Customizations (under payment)	v	v			

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