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1 Scope

This document contains application notes on the installation and operation of the IMSA Scrutineering System.

2 Contact

For technical information please contact:

SUPPORT.IMSA@US.BOSCH.COM

2.1 Sales

Contact Bosch Motorsport for purchasing information via the contacts above. For non-Bosch third-party parts order information, refer to IMSA documentation.

2.1.1 Track Sales

Customers requiring spare parts purchased and delivered at the racetrack are subject to a 10% service fee.
## 3 Components

### 3.1 Electronic Hardware

Component List:

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>F02U.V03.353-01</td>
<td>Data Logger</td>
<td>Bosch MS6-SCR with USB</td>
</tr>
<tr>
<td>F02U.V0U.267-02</td>
<td>1 Bar Pressure</td>
<td>Air Pressure Sensor</td>
</tr>
<tr>
<td>F02U.V0U.204-01</td>
<td>1 Bar Pressure</td>
<td>Air Pressure Sensor (Automotive connector)</td>
</tr>
<tr>
<td>F02U.V0U.205-01</td>
<td>3.5 Bar Pressure</td>
<td>Boost Pressure Sensor</td>
</tr>
<tr>
<td>F02U.V02.356-01</td>
<td>Temperature Sensor</td>
<td>Air Temperature Sensor</td>
</tr>
<tr>
<td>F02U.V0U.445-01</td>
<td>VMPS</td>
<td>IMU with GPS Sensor</td>
</tr>
<tr>
<td>F02U.V01.342-01</td>
<td>USB Stick</td>
<td>Scrutineering Data USB</td>
</tr>
<tr>
<td>0258.988.001</td>
<td>LSU 4.9</td>
<td>Lambda Sensor</td>
</tr>
<tr>
<td>F02U.00U.081-01</td>
<td>VMPS Antenna</td>
<td>VMPS Antenna kit</td>
</tr>
<tr>
<td></td>
<td>Leaderlight Panel*</td>
<td>Position Display</td>
</tr>
<tr>
<td></td>
<td>X2 Transponder*</td>
<td>Timing Transponder</td>
</tr>
<tr>
<td></td>
<td>Engine Speed**</td>
<td>RPM Sensor</td>
</tr>
<tr>
<td></td>
<td>Fuel Flow*</td>
<td>Fuel Flow Sensor</td>
</tr>
<tr>
<td></td>
<td>MSE System*</td>
<td>Track Condition Radio Yellow Light System</td>
</tr>
<tr>
<td></td>
<td>Primary Torque Sensors***</td>
<td>Drive Shaft Torque Sensors</td>
</tr>
<tr>
<td></td>
<td>XAP NTX*</td>
<td>Marshalling Display</td>
</tr>
<tr>
<td></td>
<td>ADR*</td>
<td>Accident Data Recorder</td>
</tr>
</tbody>
</table>

* Denotes component available from other IMSA suppliers. Please refer to IMSA documentation for ordering information
** Denotes homologated component supplied by GTD Manufacturer
*** Denotes homologated component supplied by GTD-Pro Manufacturer (Delayed Rollout)
^ Denotes component available from IMSA
3.1.1 Logger - MS6 SCR

**Functional Description:** Logger for GTD Class Scrutineering System

**Homologation Mounting Note:**
- Device should be mounted in an easily accessible area that allows access to all main connectors. This device must be mounted away from heat sources. Note maximum temperature range below.
- This device should be mounted to sustain vibrations within the Vibration Profile 1 defined in the appendix.

**Part Number:** F02U.V03.353-01

**Temperature Range:** -20 to 80 °C

**Recommended Inspection:** 2 years or 220 hours

3.1.2 Display - XAP NTX

**Functional Description:** Marshalling Display for IMSA GTD Class Scrutineering System

**NOTE:** Implementation of this device is required on all GTD cars utilizing the new harness, cars utilizing the Adapter Harness do not need to utilize this device.

**Homologation Mounting Note:**
- This device should be mounted so that the display can be easily seen by the driver while on course, and away from any heat sources

**Brightness Control:** Brightness must be commanded via CAN by a value of 0-7, message details found in the DBC

3.1.3 Accident Data Recorder

**Functional Description:** Accident Data Recorder for IMSA GTD Class Scrutineering System

**Homologation Mounting Note:**
- Device should be mounted in an easily accessible area that allows access to all main connectors. This device must be mounted away from heat sources
- See GTD Technical Regulations regarding installation requirements
3.1.4 IMU/GNSS – VMPS

**Functional Description:** 6 axis inertial measurement unit with GNSS.

**Homologation Mounting Note:**
- Device should be mounted in an easily accessible area that allows access to all main connectors. This device must be mounted away from heat sources.
- Device must be installed with supplied mounting hardware.
  - Using provided grommets as shown below.
  - Using 3x M6 bolts or studs, competitors to provide.
- Use of the specified antenna is required.
  - Antenna should be mounted as depicted in the Telemetry section.
  - An SMA cable is provided in the kit. Competitors can supply their own cables that have an impedance of 50Ω and meet or exceed the standards of RG316.
- Device to be mounted:
  - With connector interfaces facing towards the rear of the car
  - Aligned within 1 degree of vehicle centerline
  - Within 0.5 degrees of horizontal
  - Nearest to vehicle center of gravity as possible

**Part Number:** F02U.V0U.445-01

**Antenna Part Number:** F02U.00U.081-01

**Temperature Range:** -40 to 65°C
3.1.5 USB Stick/Diagnostic Port

Functional Description: IMSA Scrutineering USB Stick and Diagnostic Port

Homologation Mounting Note:
- Device and diagnostic connector must be mounted in an area easily accessible via the passenger side door opening.
- Both ports should be mounted securely, so that the USB stick and Diagnostic connector can be inserted and removed with one hand.

Temperature Range: -40 to 85 °C

Removal Note: To remove the USB stick from the connector the collar at the connector end of the USB stick must be pulled away from the connector. Do not pull on the main body to remove.

USB Stick Possession: IMSA will distribute and collect USB Sticks at every race, teams will not receive sticks with scrutineering components nor are they required to purchase these separately.
3.1.6  X2 Transponders

**Functional Description:** CAN based transponder for IMSA GTD Class Scrutineering System

**Homologation Mounting Note:**
- Each car will carry one X2 Transponder.
- Refer to technical regulations for mounting location.

**Temperature Range:** 0 to 60 °C

3.1.7  Leaderlight Panels

**Functional Description:** Leaderlight panels

**Homologation Mounting Note:**
- This device(s) must be fitted securely.
- Refer to technical regulations for mounting location.

The pinout of the leaderlight power connector/s is shown in the table. No changes are allowed to this arrangement. This connector is for providing power to the leaderlights from the team harness.

**Team Harness Connector:** AS(0/1)10-98SN

**Scrutineering Harness Connector:**

<table>
<thead>
<tr>
<th>Connector</th>
<th>AS610-98PN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin #</td>
<td>Signal</td>
</tr>
<tr>
<td>1</td>
<td>LeaderLight-12V</td>
</tr>
<tr>
<td>2</td>
<td>LeaderLight-12V</td>
</tr>
<tr>
<td>3</td>
<td>LeaderLight-12V</td>
</tr>
<tr>
<td>4</td>
<td>LeaderLight-GND</td>
</tr>
<tr>
<td>5</td>
<td>LeaderLight-GND</td>
</tr>
<tr>
<td>6</td>
<td>LeaderLight-GND</td>
</tr>
</tbody>
</table>

3.1.8  CAN Isolation Device

**Functional Description:** CAN Isolation Device used in series with Leaderlight Panels

- CAN Isolation used in series with MoTeC Leaderlight Panels only; not for use with XAP Leaderlight Panels.

**Homologation Mounting Note:**
- This device(s) must be fitted securely.
- Refer to technical regulations for mounting location.
3.1.9 Track Condition Radio

**Functional Description:** Track condition radio system for FCY notification

**Homologation Mounting Note:**
- This device(s) must be fitted securely.
- Refer to technical regulations for mounting location.
3.2 Sensors

This section declares sensors that must be directly connected to the IMSA scrutineering system. IMSA will define required engine sensors and locations for each engine application. These signals will be fed back to the teams via CAN.

For all sensors refer to IMSA Scrutineering System homologation documentation for installation and mounting location with numbering referring to the fed engine bank.

As a reference to the technical regulations, depending on Engine configuration and class, GTD cars may be required to run:

- Driveshaft Torque Sensors (GTD-Pro Delayed Rollout Only)
- Engine Sensors
  - Restrictor Throat Pressure(s) (NA only)
  - Manifold pressure(s) (NA only)
  - Manifold temperature(s)
  - Boost pressure(s) (Turbo only)
  - Lambda(s)
  - Fuel flow meter(s)
  - Engine speed sensor

Sensors must be installed in an IMSA approved location as identified in Scrutineering System homologation documentation with numbering referring to the fed engine bank.
3.2.1 1 Bar Pressure

**Functional Description:** Air pressure sensor

**Use Case:**
- **Manifold Pressure (NA engines):** The sensor must be fitted in each intake manifold downstream the throttle valve, ie: in the intake runners or intake ports, in an IMSA approved location.
- **Restrictor Throat Pressure:**

  **Part Number:** F02U.V0U.267-02 (A/S terminated) or F02U.V0U.204-01 (Automotive Connector)

  **Pressure Range:** 0.1 – 1.15 bar

  **Temperature Range:** -40 to 125°C

3.2.2 3.5 Bar Boost Pressure

**Functional Description:** Boost pressure sensor

**Use Case:**
- **Boost Pressure (Turbo engines):** The sensor must be fitted to measure pressure in each intake manifold downstream the throttle valve in an IMSA approved location.

  **Part Number:** F02U.V0U.205-01

  **Pressure Range:** 0.5 – 3.5 bar

3.2.3 Temp Sensor

**Functional Description:** Temperature sensor

**Use Case:**
- **Manifold Temperature:** On each independent intake manifold in an IMSA approved location close to the Boost/Manifold pressure sensor
- **Intake Temperature:** A single sensor must be installed in an IMSA approved location

  **Part Number:** F02U.V02.356-01

  **Temperature Range:** -55 to 300 °C

  **Thread:** M6 x 1

  **Installation Torque:** 8 Nm
3.2.4 LSU 4.9 Lambda Sensor

**Functional Description:** Exhaust gas lambda sensor

**Use Case:**
- See Appendix for required sensor mounting information.
- One sensor per cylinder bank is required.
- IMSA Sensor should be mounted as close to Team Sensor as possible

**Part Number:** 0258.988.001

**Thread:** M18 x 1.5

**Installation Torque:** 40 to 60 Nm

3.2.5 Engine Speed Sensor

**Functional Description:** Inductive or Hall effect speed sensor

**Use Case:**
- Sensor required by IMSA according to FIA GT3 regulations only for vehicles homologated on or after CY2022.
- Each manufacturer may select a sensor and trigger wheel pattern to be approved by IMSA.
- See below for application recommendation. Trigger wheel must include 30-60 teeth, and must include 1-4 missing teeth in 1 spot around the wheel.
- If choosing an inductive sensor, the depth of the missing tooth gap must be half the depth of the normal gaps

**Recommendation:**
- Bosch P/N: Mini HA-P: F02U.V00.564-02
  - Mini HA-P (Sealed): F02U.V00.500-01
- 60 tooth symmetrical wheel, 2 missing teeth

**Trigger Wheel Recommendation (for HA-P above):**
- Diameter: 162.34mm
- Gap Width: 4.7mm
- Tooth Width: 3.8mm
- Missing Tooth Gap Width: 20.79mm
- Height of tooth: 3.4mm
- Thickness: 12.5mm
- Sensor Air Gap: 0.2 to 1.5mm
3.2.6 Driveshaft Torque Sensors

**Functional Description:** CAN based driveshaft torque sensor for IMSA GTD-Pro Class Scrutineering System

- On driveshaft of each driven wheel
- Team must be able to send CAN message to trigger offset calibration for each sensor
- Driveshaft Torque Sensors will have a delayed rollout for the 2023 season
  - Refer to IMSA guidance for official timing

3.2.7 Fuel Flow Meter

**Functional Description:** CAN based fuel flow meter for IMSA GTD Class Scrutineering System

- On each feed and any return line if applicable.
- Use CAN-ID 0x190 (R=22kohm) for Feed1, 0x194 (R=5.6kohm) for Feed2, 0x198 (R=1.8kohm) for Return line

**Mounting Note:** Refer to technical regulations for mounting location.

**Temperature Range:** 0 to 85 °C
3.3 Sensor Declaration Form

Prior to each event, a Sensor Declaration Form must be submitted via the IWSC regulations.

3.4 Component Seals

All Scrutineering system primary components (MS6, VMPS) must have no evidence of tampering with the device.

3.5 Recommended Mating Connectors

Please see the table below for a summary of recommended mating connectors for scrutineering system sensors.

<table>
<thead>
<tr>
<th>GTD Recommended Mating Connectors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sensor Part Number</strong></td>
</tr>
<tr>
<td>------------------------</td>
</tr>
<tr>
<td>F02U.V03.353-01</td>
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<tr>
<td>F02U.V0U.445-01</td>
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<td>F02U.V01.342-01</td>
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<tr>
<td>0258.988.001</td>
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<tr>
<td>F02U.V00.564-02</td>
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<tr>
<td>or</td>
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<tr>
<td>F02U.V00.500-01</td>
</tr>
<tr>
<td>F02U.V0U.267-01</td>
</tr>
<tr>
<td>F02U.V0U.204-01</td>
</tr>
<tr>
<td>F02U.V0U.205-01</td>
</tr>
<tr>
<td>F02U.V02.356-01</td>
</tr>
</tbody>
</table>
4 System Architecture

4.1 Existing Homologation/New EVO w/o Torque Sensors

Teams running a car homologated in 2022 or earlier, or who are running a new EVO variant for 2023 will be permitted to use an adapter loom for the scrutineering system. This layout is **INCOMPATIBLE** with torque sensors, and not permitted on new homologations. **See Section 4.2 for Torque Sensor Compatible/New Homologation Layout**

**Guidelines:**

- CAN buses must be laid out in a linear fashion, with 120Ω termination resistors are required at both ends of each bus.
- The interfaces for the Scrutineering Harness to Team (contains Torque Master) must follow the specified pinout.

---

**GTD Existing Harness + Blended => Scrutineering System Communication Interfaces (external / public)**

- Use existing Teams CAN
- Existing Scrutineering CAN (Scrutineering 1) is used, with IMU moved to new Scrutineering 2 CAN bus.
- Scrutineering 2 is added for in-cockpit components + X2 backup

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**GTD 2023 Scrutineering System Example Diagram**

- **Team CAN Bus**
  - Scrutineering Public Bus (carried over as is)

- **Scrutineering CAN 1**
  - Existing GT Private Scrutineering Bus (MM5:10 + (T2 removed)

- **Scrutineering CAN 2**
  - New bus – M56 has 3 buses, place in-cockpit devices on own bus

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**Diagram Details:**

- **TorqueMaster** (ICU or equal)
- **Shift System**
- **Scrutineering Logger** (CAN)
- **Diag Port** (Scrutineering CAN 2)
- **Diag Port** (Scrutineering CAN 1)
- **Scrutineering Logger** (CAN 2)
- **Fuel Flow Meter 1**
- **Fuel Flow Meter 2**
- **VMP**
- **Scrut Expan**
- **ADR**
- **TCR**
- **Transponder** (used)

---
4.2 New Homologation/Torque Sensor Compatible

Teams running a newly homologated car for 2023, or who are required by regulation to run driveshaft torque sensors (GTD-Pro Delayed Rollout) are required to build a new loom for 2023.

**Guidelines:**
- CAN buses must be laid out in a linear fashion, with 120Ω termination resistors are required at both ends of each bus.
- The interfaces for the Scrutineering Harness to Team (contains Torque Master) must follow the specified pinout.

4.2.1 Team Connector – Scrutineering Harness (New Loom)

The pinout of the Team Connector is shown in the table. No changes are allowed to this arrangement. Termination of the CAN busses must be done in the car’s loom as depicted in 4.1.3, 4.1.4, 4.1.5 and 4.1.6.

**Team Harness Connector:** AS(0/1)14-35SN

<table>
<thead>
<tr>
<th>Scrutineering Harness Connector:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Connector</strong></td>
</tr>
<tr>
<td><strong>Pin #</strong></td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
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<td>3</td>
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<td>30</td>
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<tr>
<td>31</td>
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<tr>
<td>32</td>
</tr>
</tbody>
</table>
4.2.2 CAN Bus Delta

CAN Bus Delta is the same layout as FIA CAN 1 Public.

- The order of components and compartment interfaces is open to constructors.
- CAN buses must be laid out in a linear fashion, with 120Ω termination resistors required at both ends of each bus.
- The interface for the Scrutineering Harness to Team (contains Torque Master) must follow the specified pinout.
- Only GTD-Pro vehicles will have the Driveshaft Torque Sensor

4.2.3 CAN Bus Echo

CAN Bus Echo is the same layout as FIA CAN 2 Public.

- The order of components and compartment interfaces is open to constructors.
- CAN buses must be laid out in a linear fashion, with 120Ω termination resistors required at both ends of each bus.
- The interface for the Scrutineering Harness to Team (contains Torque Master) must follow the specified pinout.
- Only GTD-Pro vehicles will have the Driveshaft Torque Sensor
4.2.4 CAN Bus Foxtrot

CAN Bus Foxtrot is a private CAN bus for the scrutineering system.
- The order of components and compartment interfaces is open to constructors.
- CAN buses must be laid out in a linear fashion, with 120Ω termination resistors required at both ends of each bus.

4.2.5 CAN Bus Golf

CAN Bus Golf is a private CAN bus for the scrutineering system.
- The order of components and compartment interfaces is open to constructors.
- CAN buses must be laid out in a linear fashion, with 120Ω termination resistors required at both ends of each bus.
4.3 **Driver ID**

The Driver ID will be an input to a dedicated connector on the harness. The Driver ID signal will be controlled by a different resistance value for each driver. The resistor will go between the two pins for Driver ID with nothing else in the circuit. The Driver ID and resistor value pairings are in the table below:

<table>
<thead>
<tr>
<th>ID</th>
<th>Resistor Value (Ohm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>820</td>
</tr>
<tr>
<td>3</td>
<td>2.2K</td>
</tr>
<tr>
<td>4</td>
<td>4.7K</td>
</tr>
<tr>
<td>5</td>
<td>12K</td>
</tr>
</tbody>
</table>

4.4 **Power Supply**

All power supplied should be at least 11.0V and below 15.0V. Power must remain supplied at all times when the car is in pit-lane or on-track. Interruptions of specified scrutineering power may result in IMSA applied penalties.

5 **Loom Certification**

For the 2023 Season only, all current cars are permitted to carryover the 2022 harness utilizing an adapter loom to the new 2023 electronics (Harness Option A). Current cars are permitted to construct a new harness for 2023 electronics (Harness Option B). All new homologations are required to utilize Harness Option B.

All scrutineering and adapter harnesses must be certified for use in 2023 by a Bosch Motorsport approved loom fabricator.

- For Harness Option A, all portions of GTD-PRO and GTD looms should be delivered to Creative Motorsport Solutions by November 23rd.
- For Harness Option B, all portions of GTD-PRO and GTD Looms are to be certified by an approved loom fabricator.

All pieces of the scrutineering loom must be present in order to certify any single piece. For example: team XYZ would like to certify a spare ‘engine’ section of the scrutineering loom; the car has three scrutineering looms pieces (cockpit, engine, rear section). All three pieces must be submitted in order to certify the spare ‘engine’ loom.

IMSA reserves the right to require an additional HiPot inspection at any time. Once certified, looms must be available for re-certification every year; teams must be able to demonstrate annual inspection with passing results.

*All looms will be checked to the wiring diagram in Section 8. Any deviation from this diagram must be approved by IMSA and Bosch.*
6 CAN Specification

There are two IMSA CAN interfaces that may be used for communication; on these buses, the team is required to send all messages specified in the provided DBC.

GTD Manufacturers will be responsible for informing IMSA and Bosch which buses will be used for ECU and team communications. These messages may be on the same bus.

**CAN Buses:**

The CAN buses will be used to transfer vital information between the team and the Scrutineering System. The buses are required to be 1 Mbit and conform to CAN 2.0B specifications.

The DBC file for the transmitted and received channels is available at IMSA.com and bosch-motorsport.com.

---

<table>
<thead>
<tr>
<th>Approved Loom Fabricators</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CMS</strong></td>
<td>Email: <a href="mailto:colin@gomuchfaster.com">colin@gomuchfaster.com</a></td>
</tr>
<tr>
<td>Florida</td>
<td>Phone: +1(813) 482-2178</td>
</tr>
<tr>
<td><strong>DCE Inc.</strong></td>
<td>Email: <a href="mailto:tom@dcemotorsport.com">tom@dcemotorsport.com</a></td>
</tr>
<tr>
<td>North Carolina</td>
<td>Phone: +1(704) 230-4649</td>
</tr>
<tr>
<td><strong>Sakata Motorsport Electronics</strong></td>
<td>Email: <a href="mailto:brian@sakatamotorsport.com">brian@sakatamotorsport.com</a></td>
</tr>
<tr>
<td>California</td>
<td>Phone / Fax: +1(714) 446-9473 / +1(714) 446-9247</td>
</tr>
</tbody>
</table>
7 Display Pages

There are two pages on the display. A mechanic page, used for IMSA safety checks and sensor installation verification, is displayed when the vehicle is stationary. A driver page with alarms and information for the driver is shown while the vehicle is moving.

7.1 Driver Page

7.1.1 Standard

While on track the display will show:

- Current Driver ID
- Current Laptime
- Last Laptime

  - Note: The laptimes shown are calculated internally and are not the timing and scoring laptimes.

7.1.2 Alerts

A series of alerts are set to show on the screen based on scrutineering system status and race control messages. If the Driver ID is changed a banner will appear for a short amount of time showing the new Driver ID based on the resistor connected.

If no resistor is present for the Driver ID, a banner will appear declaring “CHECK DRIVER ID”

A Red Flag block will appear and the LED lights turn on red in the case of a Red Flag as indicated by Race Control. The lights and message will be solid until the track condition is no longer red and the car is moving on track.

Under full course yellow track conditions the LED lights will alternate blinking yellow and off and a message will be displayed on screen. The yellow condition is triggered by the TCR Box and will turn off when the track condition is no longer yellow.

7.1.3 Mechanic Page

While the car is stationary, the display will show the values of the sensors directly connected to the scrutineering logger, USB status, Driver ID, and FCY/Red Flag warnings, to allow for basic diagnosis of the system.
8 Loom Layout
9 Appendix
VMPS Dimensions

VMPS Antenna Dimensions

Dimensions are in mm.
Mounting Instructions:
- Recommended position: 0° to 90° in all directions from vertical; orifice facing downwards.
- Sensor should be mounted on a flat surface, with the base of the sensor sufficiently supported.
- Mounting screw: M6x1.
- Installation torque: 3.3 Nm.
Pin Out:
1. Sens 5V
2. Sens GND
3. Signal
4. N-C
5. N-C

Mating Connector:
ASL106-05SB

Mounting Instructions:
- Recommended position: 0°...180° in all directions from vertical; orifice facing downwards
- Sensor should be mounted on a flat surface, with the base of the sensor sufficiently supported
- Mounting screw: M5x1
- Installation torque: 3.3 Nm
Installation Recommendation

Scale: 3:1

Tightening Torque: 8Nm

Order Number: 02U VO2 356-01 DH
Temperature Range [°C]: -55...300
Temperature Range [°C]: -55...300

Bosch
Temperature Sensor NTC-M55
Temperature Sensor NTC-M55
Fig. 1: LSU4.9 mounting w.r.t. exhaust stream

Fig. 2: LSU4.9 mounting w.r.t. exhaust pipe cross sectional area

Fig. 3: LSU4.9 thread boss

Table 1: Temperature specifications

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Operating Temperatures (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exhaust gas</td>
<td>930 °C</td>
</tr>
<tr>
<td>Fastening 22 mm hex</td>
<td>600 °C</td>
</tr>
<tr>
<td>PTFE formed hose (sensor side)</td>
<td>250 °C</td>
</tr>
<tr>
<td>PTFE formed hose (upperhose crimp)</td>
<td>200 °C</td>
</tr>
<tr>
<td>Cable / protective sleeve</td>
<td>250 °C</td>
</tr>
<tr>
<td>Connector (OEM)</td>
<td>140 °C</td>
</tr>
<tr>
<td>Maximum Temperatures (°C)</td>
<td></td>
</tr>
<tr>
<td>Exhaust Gas</td>
<td>1030 °C</td>
</tr>
<tr>
<td>Fastening 22 mm hex</td>
<td>680 °C</td>
</tr>
</tbody>
</table>

Table 2: Thread boss depth specifications

<table>
<thead>
<tr>
<th>Operating Temperatures (°C)</th>
<th>y (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exhaust gas</td>
<td>&lt; 930  10.5</td>
</tr>
<tr>
<td>Fastening 22 mm hex</td>
<td>&lt; 600  13.0</td>
</tr>
<tr>
<td>Exhaust gas</td>
<td>≥ 930  13.0</td>
</tr>
<tr>
<td>Fastening 22 mm hex</td>
<td>≥ 600  13.0</td>
</tr>
</tbody>
</table>

Pin Out
1 IP
2 VM
3 RH
4 VS
5 IA
6 JS

Mating Connector:
D261 20535b-01

Installation Torque:
40-60 Nm
Vibration Profile 1

**Broadband noise: 8h/direction**

<table>
<thead>
<tr>
<th>Frequency (Hz)</th>
<th>Acceleration density (m/s²)/Hz</th>
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</thead>
<tbody>
<tr>
<td>20</td>
<td>50.4</td>
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<tr>
<td>55</td>
<td>26.0</td>
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<tr>
<td>180</td>
<td>1.0</td>
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<td>300</td>
<td>1.0</td>
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<tr>
<td>360</td>
<td>0.56</td>
</tr>
<tr>
<td>1,000</td>
<td>0.6</td>
</tr>
<tr>
<td>2,000</td>
<td>0.6</td>
</tr>
</tbody>
</table>

Effective value $a_{eq}$ = 55.4 m/s²

**Sine: 8h/direction**

<table>
<thead>
<tr>
<th>Frequency (Hz)</th>
<th>Acceleration peak (m/s²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>50</td>
</tr>
<tr>
<td>180</td>
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<td>250</td>
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<tr>
<td>2,000</td>
<td>60</td>
</tr>
<tr>
<td>Product Description</td>
<td>Part Number</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td><strong>Spec Kit</strong></td>
<td></td>
</tr>
<tr>
<td>GTD Kit (MS6-SCR with USB, VMPS+Antenna)</td>
<td>F02U.V0U.444-01</td>
</tr>
<tr>
<td><strong>Spec Sensors</strong></td>
<td></td>
</tr>
<tr>
<td>Pressure Sensor - 0-1.15 Bar</td>
<td>F02U.V0U.267-03</td>
</tr>
<tr>
<td>Pressure Sensor - 0-1.15 Bar (Automotive Connector)</td>
<td>F02U.V0U.204-01</td>
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<tr>
<td>Pressure Sensor - 0-3.5 Bar</td>
<td>F02U.V0U.205-01</td>
</tr>
<tr>
<td>Temperature Sensor - M6</td>
<td>F02U.V02.356-01</td>
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<tr>
<td>Lambda Sensor</td>
<td>0258.988.001</td>
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<tr>
<td><strong>Individual Spare Parts</strong></td>
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<td>MS6 SCR with USB</td>
<td>F02U.V03.353-01</td>
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<td>VMPS</td>
<td>F02U.V0U.445-01</td>
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<tr>
<td>VMPS Antenna Kit</td>
<td>F02U.00U.081-01</td>
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**Notes**

Credit card/other fees may apply as long as teams have some option to pay the listed price.

Track sales are subject to a 10% surcharge to teams.

Parts are only able to be dispatched after payment has been verified.

Shipping charges are additional to kit/piece prices.

All prices are in USD and are valid until 12/31/2023.

Released 11/28/2022
1. GENERAL. THE SALE OF COMPONENTS, PARTS, OR A SYSTEM INTENDED FOR SERIES PRODUCTION (“SERIAL PRODUCTION PRODUCTS” OR “PRODUCTS”), ALL SAMPLES, PROTOTYPES, NON-PRODUCTION PRODUCTS, AND COMPONENTS (INCLUDING SOFTWARE CONTAINED THEREIN) NOT APPROVED FOR SERIES PRODUCTION OR THAT ARE INTENDED FOR EVALUATION PURPOSES ONLY (“PROTOTYPES”), AND/OR DESIGN AND ENGINEERING OR SIMILAR SERVICES (“SERVICES”) PROVIDED BY ROBERT BOSCH LLC, THROUGH ITS BOSCH ENGINEERING NORTH AMERICA DIVISION (“BOSCH”) TO THE CUSTOMER (“CUSTOMER”) EACH A “PARTY” AND COLLECTIVELY REFERRED TO AS “PARTIES”) IS EXPRESSLY LIMITED TO CUSTOMER’S ACCEPTANCE OF THE TERMS OF BOSCH’S OFFER (ALSO REFERRED TO AS THE “QUOTATION”) AND THESE BOSCH TERMS, EXCLUDING MODIFICATIONS TO THESE BOSCH TERMS SET FORTH IN THE APPLICABLE BOSCH QUOTATION. NO MODIFICATION OR WAIVER OF ANY OF THESE BOSCH TERMS AND NO ADDITIONAL OR DIFFERENT TERMS OR CONDITIONS WILL BE EFFECTIVE UNLESS EXPRESSLY SET FORTH IN BOSCH’S QUOTATION OR AGREED TO IN WRITING SIGNED BY BOSCH. NO ORAL AGREEMENT, COURSE OF PERFORMANCE, OR CUSTOMER’S ACCEPTANCE OF THE BOSCH QUOTATION AND AGREED TO IN WRITING SIGNED BY CUSTOMER’S ACCEPTANCE OF THE PRODUCTS, PROTOTYPES, and/or SERVICES SOLD HEREUNDER WILL CONSTITUTE CUSTOMER’S ACCEPTANCE OF THE BOSCH QUOTATION AND BOSCH TERMS.

2. SCOPE. CUSTOMER acknowledges that Serial Production Products, whether or not modified, are not designed to meet the requirements and standards of motorsport racing. CUSTOMER acknowledges that modified Serial Production Products and CUSTOMER specified Products cannot be tested to the same degree as Serial Production Products and that production of such modified Serial Production Products or CUSTOMER specified Products does not follow the testing and validation standards applicable to Serial Production Products. CUSTOMER acknowledges that the use of the Products in motorsport racing applications will lead to early wear, and that modified Serial Production Products or CUSTOMER specified products are produced with a focus on race performance and not on endurance. The terms of Sections 1 to 2 above apply irrespective of the CUSTOMER’s application of the Products.

3. USE OF THE PRODUCTS. The Products are provided solely for use by (i) racing professionals and CUSTOMER warrants and represents that it possesses the appropriate engineering and professional racing experience to use the Products for motorsport racing and (ii) research institutions trained by professionals. CUSTOMER acknowledges that the use of the Products may be dangerous and that the Products shall not be used in any consumer application. CUSTOMER shall use the Products: (i) only for motorsport racing purposes; (ii) only through engineers and mechanics who are trained and experienced in motorsport racing; (iii) only in vehicles, which are suitable for use in motorsport racing; (iv) only in such single vehicles that are operated by trained, professional motorsport race drivers; and (v) research purposes by trained professionals. CUSTOMER shall not use, nor permit any other party to use, the Products in any vehicle operated on the public roads, or in connection with any consumer application. BOSCH shall not be liable for any use of the Products on the public roads. Should a Product be used on the public roads or in connection with any consumer application, all Product warranties are void.

4. PRICES; TAXES; CURRENCY. All prices are subject to the shipping terms defined in Section 6 below. Bosch reserves the right to adjust prices due to cost increases resulting from variations in labor rates, material costs, or other costs (including but not limited to variations related to tariffs). To the extent the Products contain raw materials, raw material fluctuations will also be reviewed on a quarterly basis. Actual material price increases of 5% or more will be paid in lump sum by CUSTOMER. The prices are exclusive of any applicable Federal, State, Provincial, or local sales, use, and other similar taxes or assessments. Such taxes and assessments will be included in Bosch’s invoice and paid by CUSTOMER. CUSTOMER shall be solely responsible for its tax administration and tax liability based upon governing Federal, State, and local laws that relate to these BOSCH Terms. All prices are subject to adjustment, at any time, by Bosch for changes in volume forecasts, economics, or exchange rates as applicable. To the extent CUSTOMER’s actual purchases fall short of the volume forecasts upon which the prices were based, any price adjustments by Bosch will be retroactive. Prices are per piece in U.S. Dollars or EUR. All North American CUSTOMER facilities will be invoiced in U.S. Dollars. Each payment by CUSTOMER is subject to the terms of Section 8 below and will be made without withholding any taxes, unless required by law. CUSTOMER shall inform Bosch of any withholding tax obligation on payments due to Bosch under an invoice as soon as CUSTOMER becomes aware of such withholding tax obligation. If Bosch believes that it is eligible for exemption from, or reduction of, any U.S. withholding tax (or other withholding or similar tax of one or more other jurisdictions), Bosch will deliver to CUSTOMER a completed, duly executed IRS Form W-8-BEN or Form W-8-BEN-E (or other appropriate documentation that CUSTOMER is required to submit under the laws of such other jurisdiction) valid through the date of payment. In such event, CUSTOMER shall promptly deliver to Bosch a certificate evidencing the payment of any tax actually withheld.

5. CANCELLATIONS AND CHANGES. No cancellations of or changes ordered by CUSTOMER to the Products, Prototypes, and/or Services or any deviations from the delivery terms will be made without Bosch’s written consent and in the event of any such cancellation or change, Bosch will be entitled to all remedies available by law or equity, including without limitation cancellation costs, warehousing fees, and/or increased prices. At a minimum, CUSTOMER will be liable for the following items, or any applicable combination thereof: (a) Products, Prototypes delivered, and/or Services performed prior to cancellation or change that comply with the specifications and other requirements of the Quotation; (b) the reasonable cost of raw materials and components that were purchased by Bosch to meet the requirements of the Quotation and that cannot be returned for refund or credit or immediately used for or sold to any of Bosch’s other CUSTOMERS; (c) the reasonable costs of reassignment of Bosch’s employees specifically dedicated to the satisfaction of Bosch’s obligations under the Quotation, provided Bosch uses reasonable efforts to reassign such employees.

6. SHIPMENT AND DELIVERY. All delivery dates are estimates only. Bosch’s only obligation with respect to delivery dates will be to use reasonable efforts to meet such delivery dates. Unless specified otherwise in the Quotation, the delivery terms will be FCA (as defined in Incoterms® 2010) at the designated Bosch facility. Title and risk of loss to the Products and Prototypes will transfer upon completion of delivery of the Products and Prototypes per the applicable delivery term specified above. Unless otherwise instructed, Bosch will ship via industry standard means for the applicable Products and Prototypes. Bosch will not be liable for any delays, breakage, loss, or damage after having made delivery in good order to the first transportation carrier. All claims for loss or damage in transit are to be made by CUSTOMER directly to the transportation carrier and the appropriate insurance carrier retained by CUSTOMER. CUSTOMER shall not make any deductions of any kind from the invoice amount. Unless otherwise specified in the Quotation, standard packing for domestic shipment is included in the quoted price. When special domestic or export packing is requested, CUSTOMER will be charged for any additional expenses. Shipments will be deemed accepted by CUSTOMER unless written
notice of rejection is received by Bosch within ten (10) days after receipt of the Products and Prototypes by CUSTOMER. For rejected shipments, CUSTOMER will bear the risk of loss or damage to the Products and/or Prototypes in transit. If Bosch reasonably determines that the rejection was improper, CUSTOMER will be responsible for all expenses incurred by Bosch arising from the improper rejection.

7. FORCE MAJEURE. In the event either Bosch or CUSTOMER is unable to fully perform its obligations hereunder (except for CUSTOMER's obligation to pay invoices for Products, Prototypes, and/or Services) due to events beyond its reasonable control, including without limitation, acts of God, action by any governmental authority and/or Services) due to events beyond its reasonable control, including CUSTOMER's obligation to pay invoices for Products, Prototypes, and/or Services) due to events beyond its reasonable control, including referred to herein as a "Force Majeure Event"), that party shall be relieved of its obligations to the extent it is unable to perform such obligations. A Party experiencing a Force Majeure Event shall provide reasonable notice of such Force Majeure Event to the other Party. In the event of Bosch's inability to perform due to a Force Majeure Event, Bosch may allocate available goods and materials among its CUSTOMERs and CUSTOMER will be entitled to reduce its purchase obligations toward Bosch by the quantities purchased from other sources, but shall not have the right to terminate these BOSCH Terms.

8. PAYMENT TERMS. Unless specified otherwise in the Quotation, terms of payment are net thirty (30) days from the date of shipment, with no discount allowed for early payment. Bosch reserves the right to reclaim any Products, Prototypes, and/or Services that have not been paid for in full and Bosch reserves the right to alter or suspend credit terms or require C.O.D. or advance payment whenever Bosch has reasonable doubt as to CUSTOMER's credit worthiness or the ability of CUSTOMER to pay in a timely manner. If CUSTOMER becomes delinquent in payment or refuses to accept C.O.D shipments, Bosch will have the right to, in addition to all other available rights and remedies, cancel any or all CUSTOMER orders, withhold further deliveries, and declare all unpaid amounts for Products, Services, and/or Prototypes previously delivered immediately due and payable. Amounts past due will be subject to an interest charge of 1.5% per month or the maximum rate allowed by law, whichever is less. CUSTOMER shall pay all costs and expenses incurred by Bosch as a result of non-payment or delinquent payment by CUSTOMER, including without limitation collection costs, interest, and reasonable attorneys' fees.

9. WARRANTY

9.1 Unless specified otherwise in BOSCH's quotation, BOSCH warrants that, upon delivery, the Products will be free of defects in materials and workmanship. BOSCH's warranty covers only defects that existed at the time of delivery. The foregoing warranty: (i) is personal to CUSTOMER and does not extend to any subsequent owner of the Products; and (ii) does not cover defects which occur due to the use in a motorsport environment. CUSTOMER acknowledges that the Products are designed for race performance, with reduced durability and stability, and that the extreme wear inherent in a racing environment may result in Product malfunction which will not be covered by the limited warranty set forth above. CUSTOMER does not warrant that modified Serial Production Products or CUSTOMER specified Products will display the features or operational performance requested or expected by CUSTOMER.

9.4 BOSCH will provide free of charge to CUSTOMER, replacement Products or, at BOSCH's option, credit in a fair amount not to exceed the purchase price for Products which prove to be defective under the limited warranty set forth above, provided, however, that CUSTOMER has returned to BOSCH 100% or a statistically relevant share, as mutually agreed upon, of any Products claimed to be defective. BOSCH shall have the right to request reasonable evidence of, and impose reasonable requirements for, submission of a warranty claim including, by way of example and not limitation, prints or diagnostic test results performed at the CUSTOMER's dealer level or by CUSTOMER.

9.5 In the event of (a) improper installation or misuse of the Products, (b) use of Products outside of BOSCH approved applications, specified environments or installation conditions, (c) use of Products for racing or testing applications, (d) failure to maintain Products in accordance with applicable maintenance instructions, or (e) alteration or damage caused to the Product, or similar circumstances, no warranty shall apply and BOSCH shall not be liable for such Products or any damage caused by such products.

9.6 THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES EXPRESS OR IMPLIED INCLUDING OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. THE FOREGOING WARRANTY DOES NOT APPLY TO ANY ISSUES STEMMING FROM CUSTOMER'S USE OF THE PRODUCT IN ANY APPLICATION. THE REMEDIES SET FORTH IN THIS SECTION REPRESENT CUSTOMER'S SOLE AND EXCLUSIVE REMEDIES FOR ANY BOSCH BREACH OF WARRANTY.

10. PROTOTYPE WARRANTY AND USE.

10.1 PROTOTYPES ARE PROVIDED "AS IS" AND ALL WARRANTIES, EXPRESSED OR IMPLIED, ARE DISCLAIMED AND EXCLUDED, INCLUDING WITHOUT LIMITATION WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR FREEDOM FROM THIRD PARTY RIGHTS, WHETHER ARISING BY LAW, COURSE OF DEALING, COURSE OF PERFORMANCE, OR OTHER. BOSCH DOES NOT WARRANT THAT THE PROTOTYPES WILL BE ERROR FREE OR SECURE. PROTOTYPES ARE NOT DESIGNED FOR AND SHOULD NOT BE USED IN ANY FAIL-SAFE APPLICATIONS.

10.2 CUSTOMER acknowledges that Prototypes are intended only for use in evaluation and testing in a suitable and safe evaluation and testing environment and by suitably trained and qualified persons. CUSTOMER shall ensure safe operating conditions for all evaluation and testing purposes at all times during the evaluation and testing. CUSTOMER warrants that no vehicles containing any Prototypes will be driven on public roads, unless and until CUSTOMER and Bosch agree in writing. CUSTOMER shall only use the Prototypes in accordance with written instructions from Bosch. Any use or application of Prototypes, which deviates from written instructions from Bosch, will be considered an impermissible use in breach of these BOSCH Terms. Any use, testing or evaluation of the Prototypes outside the scope of this Section 10.2 or as agreed in writing between the parties shall be at CUSTOMER's sole risk.

11. TERMINATION/CANCELLATION.

11.1 Bosch may terminate the CUSTOMER's purchase order/acceptance of the Quotation: (a) upon written communication to CUSTOMER, in the event that any CUSTOMER breaches any material term of the Quotation or these BOSCH Terms, provided CUSTOMER has not remedied the breach within 30 days of Bosch providing notice to CUSTOMER of such breach; or (b) if CUSTOMER becomes insolvent or makes an assignment for the benefit of creditors, or CUSTOMER institutes any voluntary proceeding under bankruptcy, reorganization, arrangement, readjustment of debt, or insolvency law of any jurisdiction or for the appointment of a receiver or trustee in respect to any of CUSTOMER's property, then termination shall be automatic and immediate; however, in the event any such proceeding is initiated by a third party against CUSTOMER, termination will be automatic if the such proceeding is not dismissed or cured by CUSTOMER within thirty (30) days after the filing thereof. Bosch shall not be liable to CUSTOMER for any claims arising out of or based on termination in accordance with this Section 11.1. In the event that CUSTOMER cancels the program after business award but before the agreed upon end of program duration, CUSTOMER shall reimburse Bosch for reasonable cancellation charges for unrecoverable costs and investments, including without limitation capital equipment, finished Products, cost of all work in process, Bosch paid tooling or licenses (including software licenses and maintenance agreements), engineering costs, application costs, development services, samples, and material obsolescence. CUSTOMER shall pay such cancellation charges in accordance with Section 8.

12. INTELLECTUAL PROPERTY/SOFTWARE.

12.1 INTELLECTUAL PROPERTY RIGHTS. As between Bosch and CUSTOMER, Bosch exclusively owns and shall retain exclusive
ownership of all right, title, and interest, including all worldwide patent, trademark, copyright, trade secret, and other intellectual property and proprietary rights (collectively, “Intellectual Property Rights”) and in and related to (a) the Products; (b) the Prototypes; (c) the Services; and (d) all other ideas, inventions (whether patentable or not), concepts, designs, methods, processes, software (including source code and object code), data, and works of authorship authored, developed, or contributed to by Bosch in connection with the Products, Prototypes, or Services, along with all software, functions, and related documentation provided by Bosch or any division or affiliate thereof. Bosch reserves the right to brand, mark, or label the Products, Services, and Prototypes and accompanying packaging with Bosch trademarks. Products or Services delivered from Bosch to the independent aftermarket will bear the Bosch trademark.

12.2 THIRD PARTY INTELLECTUAL PROPERTY RIGHTS INDEMNIFICATION. Bosch shall indemnify, defend, and hold harmless CUSTOMER against all final judgments of infringement in the United States of the Intellectual Property Rights of any third party registered and published in the United States (specifically excluding claims of infringement of any affiliate of CUSTOMER) and resulting direct damages and expenses (including reasonable attorney’s fees) arising out of use of any Products or Services, unless prior written authorization for such modification or alteration is provided by Bosch in writing; or (ii) use of the Products or Services in combination with any other software, products or services not supplied by Bosch and the use of such combination was not authorized by Bosch; or (iv) CUSTOMER’s designs, specifications, requirements, or instructions; or (v) the application or use of any Products or Services which fails to comply with the specification or written instruction from Bosch; or (vi) the implementation of Standardized Technologies, to the extent the indemnification obligation stems from the Standardized Technologies or implementations thereof (as used herein “Standardized Technologies” means technical specifications or functions (x) adopted by a standards organization (e.g., ETSI or IEEE), (y) defined by research institutes, industrial companies, or market participants to ensure technical conformity or compatibility, or (z) established by common practice in a particular field). For the sake of clarity, no indemnification or warranty is provided for Prototypes.

12.3 Bosch shall be entitled, at its discretion, to: (i) obtain a right of use for a Product or Service alleged to infringe an Intellectual Property Right, (ii) to modify the Product or Service so that it no longer infringes the Intellectual Property Right, or (iii) to replace the Product or Service with an equivalent substitute that no longer infringes the Intellectual Property Right. Bosch reserves the right to carry out the actions of (i)-(iii) in the sentence above at its disposal even if the infringement of the Intellectual Property Right has not been ruled on by a court of law with jurisdiction to decide such infringement in the first instance or with the express written consent of CUSTOMER.

12.4 INDEMNIFICATION FROM CUSTOMER. To the fullest extent permitted by applicable law, and subject to the conditions applicable to claims by CUSTOMER against Bosch under Section 12.2, CUSTOMER shall indemnify, defend, and hold harmless Bosch, its affiliates, and their respective directors, officers, employees, successors, and assigns for all claims, liabilities, damages, costs, and expenses (including reasonable attorney fees) asserted by a third party (specifically excluding any affiliate of Bosch) and incurred by Bosch in connection with such claims (including lawsuits, administrative claims, regulatory actions, and other proceedings to recover for personal injury or death, property damage, or economic losses) to the extent caused by: (i) CUSTOMER’s or Bosch’s infringement or misappropriation of any Intellectual Property Rights of any third party caused by (a) CUSTOMER’s technology, products, or services, or Bosch’s use thereof in accordance with these BOSCH Terms or any applicable Quotation, or (b) any modification or alteration of any Products or Services by CUSTOMER, unless prior written authorization for such modification or alteration is provided by Bosch in writing; or (ii) bodily injury or property damage resulting from CUSTOMER’s integration of the Products or Services into vehicle systems or other components within the vehicle system in a manner that is not approved by Bosch or in compliance with all applicable laws; or (iii) any grossly negligent act or omission of CUSTOMER or any of its employees or agents; or (iv) CUSTOMER’s failure to comply with representations, performance, or obligations under these BOSCH Terms or the applicable Quotation; or (v) any design, hardware, software, data, instructions, requirements, or material expressly required or supplied by CUSTOMER.

12.5 The indemnified Party under Sections 12.2 or 12.4 shall give prompt written notice to the indemnifying Party of the claim for which it seeks indemnification (provided that the failure to give such notice will not relieve the indemnifying Party of its obligations under Sections 12.2 or 12.4, except to the extent that such failure materially prejudices the indemnifying Party’s ability to carry out its obligations under Sections 12.2 or 12.4). The indemnifying Party will assume and direct the defense and settlement of any such claim with counsel of the indemnifying Party’s reasonable choosing; the indemnifying Party will provide the indemnified Party, at the indemnifying Party’s expense, with such information and assistance as may be reasonably necessary for the defense and settlement of the claim. CUSTOMER will not settle or resolve any such claim without the advance written approval of Bosch, and the settlement or resolution includes a full and unconditional release of Bosch with no admission of guilt from Bosch or its affiliates.

12.6 SOFTWARE. Notwithstanding anything to the contrary set forth in an applicable Quotation or these BOSCH Terms, and excluding any OSS (defined below), all Bosch software and firmware that has been loaded onto, incorporated into, or provided by Bosch in connection with the Products, Prototypes, or Services (the “Software”) is and remains owned by Bosch, or its affiliates. All Software is provided with only a limited right to use as delivered in connection with hardware and/or in accordance with the applicable software license provided to CUSTOMER. In the event any Software contains a click-through, pop-up, or other end-user license agreement (collectively, “EULA”), the terms of such EULA shall control over the terms of the applicable Quotation or these BOSCH Terms to the extent the terms of the EULA conflict with the Quotation or these BOSCH Terms. If the end user of CUSTOMER does not accept the EULA at the time of delivery, (i) CUSTOMER shall not use the applicable Software or hardware incorporating such Software for any purpose and return the Software or corresponding hardware within ten (10) days of receipt thereof, and (ii) any use of the Software will be considered an unauthorized use in breach of these BOSCH Terms and the EULA. Unless expressly agreed otherwise, Bosch shall not be responsible for any changes or updates or upgrades to the Software (including, without limitation correcting any bugs identified by Bosch, CUSTOMER, or any third party). Notwithstanding the foregoing sentence, Bosch reserves the right to make the availability of updates, upgrades, and new releases at its sole discretion or conditional upon the existence of a valid service contract.

12.7 OPEN SOURCE SOFTWARE. Products, Prototypes, and Services in which copyrightable material may contain free or open source software (“OSS”). Such OSS is always subject to separate third party OSS licensing terms and conditions (“OSS-Terms and Conditions”). The OSS-Terms and Conditions come into effect between CUSTOMER and the authors of the respective OSS. Under such OSS-Terms and Conditions, Bosch is required to provide the same to CUSTOMER and CUSTOMER itself has to obey all of the OSS-Terms and Conditions and to fulfill all corresponding obligations in case CUSTOMER further disposes of the Products, Prototypes, or Services through sales or other transfer to third parties. Such obligations may include, for example, documentation obligations or obligations to provide the source code of any software integrated in a product in which the OSS has also been integrated by CUSTOMER. An overview about all OSS components contained in the Products, Prototypes, or Services as well as corresponding license text of the OSS-Terms and Conditions (of all open written OSS) are part of Bosch’s documentation of the Product, Prototype, or Service (e.g. as part of the provided documentation, in a display field within a device, etc.). To the extent that new software versions included in Bosch’s Products, Prototypes, and Services may contain other and/or additional OSS, the same terms and conditions apply as stated in this Section 12.7.

12.8 CUSTOMER’S USE OF OPEN SOURCE SOFTWARE. CUSTOMER shall use reasonable commercial efforts to not combine or request or otherwise cause others to combine Bosch Software,
Products, Prototypes, and/or Services with any OSS or other data in any manner that would result in the Bosch Software, Products, Prototypes, and/or Services becoming subject to the terms of an OSS license. For any software provided to Bosch by CUSTOMER or on behalf of CUSTOMER, CUSTOMER shall disclose in writing a list of all applicable OSS-Terms and Conditions and/or third party license terms at the time of delivery of such software to Bosch, and CUSTOMER shall indemnify Bosch for all costs, expenses, and damages caused by CUSTOMER's failure to disclose OSS-Terms and Conditions and/or third party license terms in software provided by CUSTOMER, directed by CUSTOMER, or on behalf of CUSTOMER.

12.9 NO REPRODUCTION. Unless otherwise permissible under law or agreed to by Bosch in writing, CUSTOMER shall not itself and shall not enable or instruct others to copy/reproduce, reverse engineer, decompile, disassemble, translate, or fragment parts of Software or Prototypes provided by Bosch and CUSTOMER shall treat such Software and Prototypes as Confidential Information as defined in Section 12 of these BOSCH Terms.

13. GOVERNMENT CONTRACTS. If Products, Prototypes, and/or Services are purchased under a government contract, sub-contract, CUSTOMER shall promptly notify Bosch of the provisions of any government procurement laws and regulations which are required to be included in the contract covering the Products, Prototypes, and/or Services ordered. If compliance with such provisions increases Bosch’s costs or liability, or encumbers any Bosch Intellectual Property Rights, Bosch will be entitled, at its option, to adjust the prices accordingly, request separate payment of the additional costs, or terminate this Agreement. CUSTOMER shall be responsible for all costs incurred by Bosch related to such compliance.

14. CONFIDENTIAL INFORMATION. Any and all non-public information and data concerning the Products, Prototypes, Services, or any other transaction covered hereunder which Bosch discloses to CUSTOMER, is generated by the Products, Prototypes, or Services, or which CUSTOMER otherwise obtains knowledge of hereunder, and any non-public technical, financial, or business information, trade secrets, orders, content, Prototype, or other information provided by Bosch to CUSTOMER (collectively, “Confidential Information”) remains the exclusive property of Bosch and shall not be disclosed by CUSTOMER to third parties without Bosch’s express written consent. Confidential Information shall be held in confidence and shall not be disclosed and shall not be used except to the extent necessary to carry out CUSTOMER’s obligations or express rights hereunder, unless otherwise authorized by Bosch in writing. For the sake of clarity, CUSTOMER shall have no right whatsoever to such Confidential Information other than to use it for evaluation for the purpose of the transaction covered hereunder. If the CUSTOMER is compelled by law to disclose Bosch’s Confidential Information, and a protective order or other remedy is not obtained, CUSTOMER shall furnish only that portion of the Confidential Information that is legally required and CUSTOMER shall use commercially reasonable efforts to obtain assurance that confidential treatment shall be accorded the Confidential Information. This Section 14 (Confidentiality) shall survive the termination or expiration of any purchase order, accepted Quotation, or other termination of CUSTOMER’s use of or CUSTOMER’s right to use the Products, Prototypes, and/or Services.

15. REMEDIES/LIMITATION OF REMEDIES. Bosch’s rights and remedies set forth herein shall be in addition to any legal or equitable right or remedy available to Bosch. No waiver of any of Bosch’s rights or remedies shall be effective without Bosch’s express written consent. CUSTOMER’s sole and exclusive remedy after acceptance of the Products or Services shall be the remedy available under the respective warranty provision.

16. LIMITATION OF LIABILITY. The liability of BOSCH, and its respective affiliates, officers, directors, employees, shareholders, agents, licensors, or representatives (collectively the "BOSCH Parties") for any claim, regardless of the form of action, whether in contract, tort or negligence, for any damages resulting from or in any manner connected with this Agreement and any Products, shall be limited to the lesser of (i) CUSTOMER’s actual direct damages related thereto, or (ii) the amount of the fees paid by CUSTOMER for the portion of the Products which are in error. In no event shall the liability of the BOSCH Parties exceed the fees paid by CUSTOMER during the period such damages were incurred, such period not to exceed three (3) months, for the specific Products that allegedly give rise to the damages.

In no event shall any of the BOSCH Parties be liable for any indirect, incidental, special or consequential damages including, but not limited to, loss of data, lost business, lost profits and other economic damages, whether foreseeable or not, or even if advised of the possibility of such damages. Without limiting the generality of the foregoing, the BOSCH Parties shall not be liable to CUSTOMER with respect to the quality or sufficiency of any business results or motorsport racing results to be achieved with the use of the Products.

CUSTOMER agrees, acknowledges and confirms that the limitations of liability set out in this Section are fair and reasonable in the commercial circumstances of this Agreement and that BOSCH would not have entered into this Agreement but for CUSTOMER’s agreement to limit the liability of the BOSCH Parties in the manner, and to the extent, provided herein. The limitations of liability set out in this Section shall apply even in the event of a breach of condition, a breach of an essential or fundamental term, or a fundamental breach of this Agreement.

17. EXPORT. CUSTOMER will not sell, distribute, resell, or transfer (hereinafter collectively, “Transfer”) any Product, Prototype, or Services, including commodities, software and technology/technical data, plans, and specifications relating to the Product, Prototype, or Services (collectively, “Export Control Products”) or take any actions in relation to or in furtherance of these BOSCH Terms, which are contrary to U.S. Export Regulations, including but not limited to U.S. Department of Commerce Export Administration Regulations (“EAR”), the U.S. Treasury Office of Foreign Assets Controls (“OFAC”), U.S. Department of State International Traffic in Arms Regulations (“ITAR”), or any other applicable export control, import control, and economic sanction laws and regulations of the US or any country or countries (collectively, “Export/Import Control Laws”). CUSTOMER further acknowledges that Export/Import Control Laws, include but are not limited to, prohibitions against: (a) Transfer any product to U.S. embargoed countries (currently, Cuba, Iran, North Korea, Syria, and Sudan); (b) Transfer of ITAR product to any country with which the U.S. maintains an Arms Embargo; (c) Transfer of certain EAR controlled product for China, Russia, and Venezuela military end-use; (d) Transfer to certain OFAC sanctioned persons or countries; and (e) other restrictions as defined in the Export/Import Control Laws. CUSTOMER will immediately notify Bosch and cease activities with respect to a sale if CUSTOMER knows or has a reasonable suspicion that an Export Control Product has been or may be exported, re-exported, transferred, or released in violation of Export/Import Control Laws. Unless otherwise mutually agreed in writing, CUSTOMER agrees that it will not use an Export Control Product in connection with any activity involving nuclear fission or fusion, any use or handling of any nuclear material, or any nuclear, chemical or biological weapons. CUSTOMER shall defend, indemnify, and hold Bosch harmless from any and all losses suffered by Bosch as a direct result of CUSTOMER’s or its CUSTOMERS’ non-compliance with Export/Import Control Laws. Bosch will not be liable to CUSTOMER for failure to provide Products, Prototypes, Services, transfers, or technical data as a result of any government actions that impacts Bosch’s ability to perform, including: (a) the failure to provide or the cancellation of export or re-export licenses; or (b) any subsequent interpretation of applicable import, transfer, export, or re-export law or regulation after the date of any order or commitment that has a material adverse effect on Bosch’s performance.

18. ELECTRONIC DATA EXCHANGE; VEHICLE DATA; PRIVACY. 18.1 ELECTRONIC DATA EXCHANGE. Bosch supports most electronic data exchange systems. Each party bears responsibility for its data input and for the part of the system for which it is responsible. 18.2 VEHICLE DATA. CUSTOMER hereby grants to Bosch the unlimited right to use and sublicense to Bosch affiliates, agents, consultants, and subcontractors the unlimited right to use Vehicle Data (defined below) or any portion thereof, wherein such use may include, without limitation, copying, aggregating, creating derivatives, and/or
to the other party that it and its employees and agents are and will not disclose Vehicle Data to any third party, other than (i) affiliates, and on a continual basis, if mutually agreed between the parties. Bosch shall not disclose Vehicle Data to any third party, other than (i) affiliates, and (ii) agents, consultants, and subcontractors contractually required to maintain the confidentiality of Vehicle Data. As used herein, “Vehicle Data” means any and all data produced, collected, transmitted, or processed by Bosch’s Products, Prototypes, or Services, including without limitation components, systems, modules and electronic control units.

18.3 PROTECTION OF PERSONAL INFORMATION. The terms of the Data Protection Addendum at, available upon request, are hereby incorporated by reference and shall apply to the extent that Vehicle Data includes Personal Data (as defined below) or Bosch processes Personal Data for or on behalf of CUSTOMER as part of the Services. Bosch and CUSTOMER shall complete Bosch’s Data Protection Addendum. “Personal Data” means any information relating to any identified or identifiable natural person.

19. COMPLIANCE WITH LAWS. Each party represents and warrants to the other party that it and its employees and agents are and will continue to be in compliance with all applicable laws and regulations relating to its performance under the Quotation and these BOSCH Terms, including without limitation laws associated with testing and evaluation of vehicles and Prototypes on a public roadway, and any laws or regulations relating to the processing of Vehicle Data. The applicable laws and regulations that Bosch must comply with are only those jurisdictions set forth in the applicable Quotation.

20. SET-OFF. CUSTOMER is not entitled to and shall not set-off any amounts due or allegedly due from Bosch to CUSTOMER from CUSTOMER’s debts towards Bosch.

21. ASSIGNMENT. Neither Party shall assign its rights or obligations hereunder without the other Party’s prior written consent. A corporate reorganization, which does not result in a change of control or beneficial owner, will not be deemed an assignment.

22. RELATIONSHIP OF THE PARTIES. CUSTOMER and Bosch are independent contracting parties. Nothing hereunder or in the course of performance under the Quotation or these BOSCH Terms will grant either Party the authority to create or assume an obligation on behalf of, or in the name of the other Party or will be deemed to create the relationship of joint venture, partnership, association, or employment between the Parties.

23. SEVERABILITY. In the event that any provision of these BOSCH Terms or the Quotation is declared by a court to be void or unenforceable, the validity of any other provisions and of the entire BOSCH Terms or the Quotation will not be affected thereby.

24. APPLICABLE LAW; ARBITRATION. These BOSCH Terms, the Quotation, and all disputes between the Parties arising out of or related thereto shall be governed by the laws of the State of Michigan except for its choice of law rules; the United Nations Convention on the International Sale of Goods shall not apply. The Parties acknowledge that these BOSCH Terms and the applicable Quotation evidences a transaction involving interstate commerce. The Parties shall first endeavor to resolve through good faith negotiations any dispute arising under or relating to these BOSCH Terms and the applicable Quotation. If a dispute cannot be resolved through good faith negotiations within thirty (30) days either Party may request non-binding mediation by a mediator approved by both Parties. If mediation fails to resolve the dispute within thirty (30) days after the first mediation session, then, upon notice by either Party to the other, any and all disputes, controversies, differences, or claims arising out of or relating to these BOSCH Terms and the applicable Quotation (including the formation, existence, validity, interpretation (including of this Arbitration clause), breach, or termination thereof) shall be resolved exclusively through binding arbitration, except that either Party shall have the right, at its option, to seek injunctive relief, under seal to maintain confidentiality to the extent permitted by law, (i) in either the Michigan Circuit Court for the County of Oakland or the United States Court for the Eastern District of Michigan, or (ii) pursuant to the American Arbitration Association (“AAA”) Optional Rules for Emergency Measures of Protection. A request by a Party to a court of competent jurisdiction for such interim measures shall not be deemed incompatible with, or a waiver of, this agreement to arbitrate. The Parties agree that any ruling by the arbitration tribunal on interim measures shall be deemed to be a final award for purposes of enforcement. The arbitration proceedings shall be conducted in accordance with the Commercial Arbitration Rules of the AAA including application of the Optional Rules for Emergency Measures of Protection as amended from time to time, except as modified by this clause or by mutual agreement of the Parties, and shall be governed by the United States Federal Arbitration Act. Within 14 days after the commencement of arbitration, each Party shall select one person to act as arbitrator and the two selected shall select a third arbitrator within 10 days of their appointment. If the arbitrators selected by the Parties are unable or fail to agree upon the third arbitrator, the third arbitrator shall be selected by the AAA. The arbitration shall be conducted in Detroit, Michigan, and the language of the arbitration shall be English. The arbitrators’ award shall be final and binding. The arbitrators shall issue a written opinion setting forth the basis for the arbitrators’ decision. The written opinion may be issued separately from the award, in the arbitrators’ discretion. Either Party shall bear its own attorney fees and costs, and each Party shall bear one half the cost of the arbitration hearing fees, and the cost of the arbitrators, unless the arbitrators find the claims or defenses to have been frivolous or harassing, in which case the arbitrators may award the party responding to such frivolous or harassing claims/defenses its costs of the arbitration and/or reasonable attorney fees, in the arbitrators’ discretion. Either Party may apply to have the arbitration award confirmed and a court judgment entered upon it. Venue for confirmation of or any challenge to the Arbitration Award shall be in either the Michigan Circuit Court for the County of Oakland or the United States Court for the Eastern District of Michigan and shall be done under seal to maintain confidentiality to the maximum extent permitted by law. The arbitrators shall have no authority to award punitive damages or any other damages excluded herein, to the maximum extent permitted by law. Except as may be required by law, neither a Party nor their counsel nor an arbitrator may disclose the existence, content, or results of any arbitration hereunder without the prior written consent of both Parties.

25. SURVIVAL. Any right or obligation of a Party which, by its nature or context is intended to survive termination or expiration of the applicable Quotation or these BOSCH Terms, will survive any such termination or expiration, including without limitation Sections 14-26.

26. VALIDITY OF QUOTATION. Any Quotations issued subject to these BOSCH Terms will be valid for 30 days from the date of issuance unless stated otherwise in the Quotation.
## Revisions

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| V0.3    | VMPS Drawing Added  
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| V0.4    | Recommended mating connectors added  
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| V0.4.1  | Option added for induction engine speed sensor connector  
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| V0.4.2  | Updated CAN Isolator guidance |
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