

**BMW S 1000 RR (2019-*)
M Race Calibration Kit assembly guideline**



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Introduction

This document describes how to fit the M Race Calibration Kit as developed by BMW Motorrad Motorsport. It is to be understood as a guideline and made for professional mechanics with a background in motorsport. It does not substitute active thinking of all mechanics working on the bike.

The technology employed in this motorcycle requires mechanical precision and accurate maintenance. Please ensure to keep mechanical strain due to vibrations down to a minimum (e.g. by not fixing connectors directly to the engine with cable ties, not using any brackets without rubber grommets to clip connectors to, etc.).

Please also try to practice special caution on all HMK connectors (e.g. crank sensor, ignition coils, throttle body, etc.) – they need to be tightened correctly. One needs to be careful when disconnecting those plugs in order to avoid any mechanical damage. Please refer to the attached HMK connector handling for reference.

For optimum engine performance in combination with the dataset of the motorsport kit and its loom design, it is our recommendation to release the bike from the following components:

- ABS system (requires aftermarket brake lines)
- Body-Controller (small control unit on top of the airbox)
- Head- and tail-lights, flash lights, horn
- Fan at the radiator
- The two front lambda probes (the two lambda probes in the rear section of the exhaust pipes must remain on the bike)
- Exhaust flap system
- Standard loom and ECU (to be replaced with kit parts)
- In case a throttle grip with cruise-control (easy check: if you can close the grip beyond its "idle" position more than 1%, it's a cruise control version) is mounted: Replace it with a non cruise control version (BMW 61 31 8534420)
- Ignition key unit
- SAF-suspension components and control unit
- Emergency-Call unit
- Tire pressure control unit
- Theft warning unit
- Air intake flap (!); your intake duct should look similar to Image 1.



Image 1: Intake air duct without air flap.

In general, be careful with any cable ties to place the loom in a defined position. Cable ties should always be fixed to non-vibrating or minimally-vibrating parts (the engine is the major source of vibration – so again, try not to hook up cable ties to the engine). Cable ties should never be tightened firmly around the loom. One needs to leave **clearance between loom / lead and cable tie at all times**. Otherwise, there is a considerable risk of micro cracking wires due to vibration, mechanical strain (impacts, continuous force), and heat.

Watch out for traces of excessive friction on the loom. With the loom scrubbing noticeably on other components, its insulation may be subject to wear and, thus, one may damage the loom in the long term. A typical section of the loom which might show such issues is the engine loom at the back side of the airbox in case it is not guided the way it should be (it may then touch the fuel tank).

No connector should ever be under mechanical tension (pulling force between lead and connector housing). This will increase the risk of electrical defects immensely and should be avoided at all times. In case there seems to be no way to connect two plugs without such tension – sit back, have another look at the respective section of this guideline, and check if the remainder of the loom is put in place correctly. The wiring loom is designed so as to avoid such tension in any cases.

For the sake of our environment, please use 21st century electronic devices (e.g. Android tablet, iPad, etc.) to work your way through this document instead of printing it out.

Engine loom

The engine loom contains the following parts:

- Basic engine module (with ECU-connector)
- Lower engine module (spark plugs, etc.)
- Oil pressure switch module

The kit contains all components, they may however be ordered individually (spare parts).

It is highly recommendable to leave the lower engine module on the engine / prepare spare engines with this loom module in advance, so as to avoid mistakes in time critical situations.

Engine loom assembly

Important notice:

You need to rotate the ignition coils around by 180° so the connector-ends face towards the throttle body (and not the front wheel). Refer to Image 2 below.

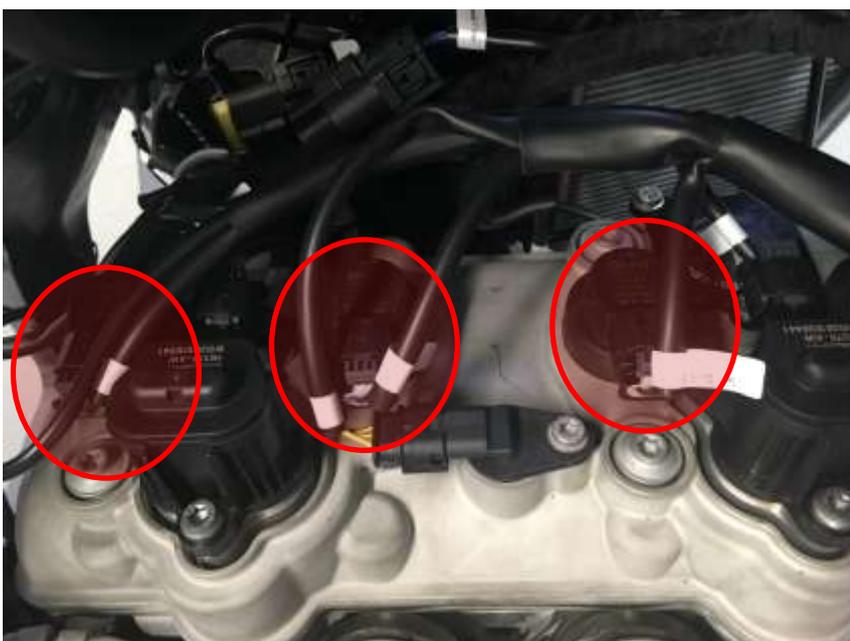


Image 2: Rotated ignition coils (all 4 coils must be rotated).

Some regulations require a warning light in the dashboard, in case the engine is running while there's no oil pressure. Please check your relevant regulation for this necessity. We recommend using it one way or another. To make use of the warning light, you need to fit an oil pressure switch to your bike and hook it up to the engine loom similar to Image 3 and make sure the leads don't touch the header pipes, even with the fairing mounted. Use the inner one (the one that's closer to the oil filter) of the two M10 holes to mount the oil pressure switch.



Image 3: Oil pressure switch.

Make sure to mount the upper injection valves the right way (pay attention to the labels on the loom; refer to Image 4):



Image 4: Upper injection valves and their counting.

The connection between upper and lower engine loom should be similar to Image 5.



Image 5: Upper / lower engine loom on RHS of airbox.

Chassis loom

The chassis loom contains the following parts:

- [Basic Chassis module \(with small ECU-connector\)](#)
- [Front chassis module \(with dash-connector\)](#)
- [Throttle grip chassis module](#)
- [Fuel chassis module \(fuel pump, fuel level\)](#)

The kit contains all components, they may however be ordered individually (spare parts).

Chassis loom assembly

The upper chassis loom should be guided around the airbox as shown in Image 6. The main strand of the loom goes down on the RHS of the airbox. The black 12 pin connector with the label “Front IF I” is guided behind the air filter, under the ECU and on top of the airbox to connect to its



Image 6: Upper chassis loom on top of airbox.

counterpart of the front chassis module on the LHS of the airbox. (red circle) The white 12 pin connector (“Front IF II”) is guided on top of the airbox, in front of the ECU and shall be connected on the LHS of the ECU as well.

The main strand should be guided down the RHS of the airbox (refer to Image 7) and inside the RHS beam of the main frame.



Image 7: Main strand of chassis loom down the RHS of the airbox and into RHS beam of main frame.

In order to place the loom inside the beam of the main frame properly, it is mandatory to take out the throttle body, place the loom into the beam, and put the throttle body back in place.

Looking at the lower front section of the loom, the three connectors “Speed”, “Immobilizer”, and “CAN-term” should be placed under the intake funnel of the airbox, as depicted in Image 8. For reference, this view is in direction of travel right behind the front section of the main frame, you can see the backside of the radiator at point “A” and the RHS fork under point “B”. See Further relevant information on the chassis loom for more information on this section of the loom.

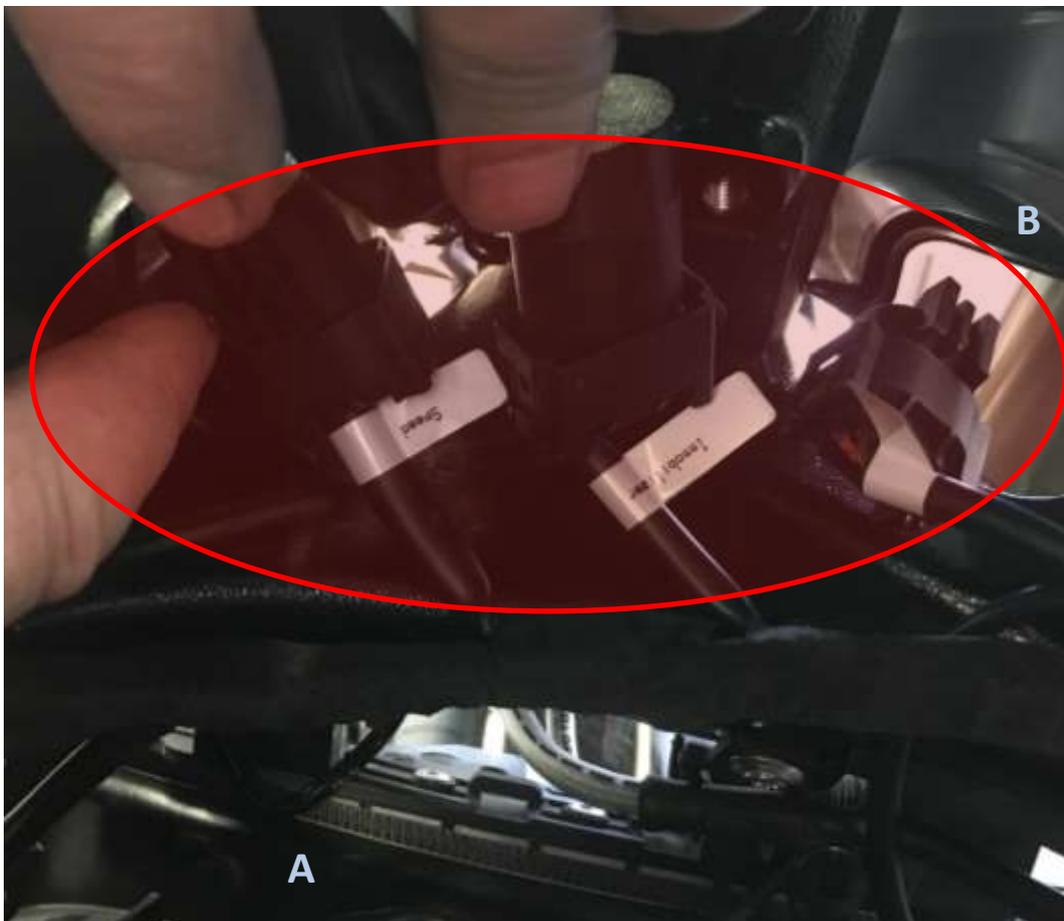


Image 8: Mounting of the chassis loom's lower front section under airbox.

Going further into this direction of the loom, it is necessary to place the generator at the front LHS section of the main frame. It should then be connected as shown in Image 9.



Image 9: Generator on the front LHS section of the main frame.

Please make sure to place the leads for crank shaft sensor and lambda with plenty of clearance to the header pipes, as displayed in Image 10.



Image 10: Leads away from header pipes.

The front suspension potentiometer (optional to the kit) should be placed on the LHS fork leg, so the connector which should exit between headstock and radiator (red circle in Image 11) can be fixed to the LHS steering end stop (around point "A"), in case mounted.



Image 11: Front suspension sensor location.

The front brake pressure sensor (optional to the kit) naturally mounts at the brake pump. The mating connector exits the loom at the RHS fork leg, around the VIN imprint on the main frame, as shown in Image 12.



Image 12: Front brake pressure sensor connector around RHS fork leg.

Back to the center section of the chassis loom, the fuse box should be mounted on the RHS of the airbox, see Image 13.



Image 13: Fuse box on RHS of airbox.

It is recommendable practice to remove the bracket at the RHS of the airbox (red circle in Image 14) and create plenty of room in order to attach the fuse box with velcro tape to the airbox.



Image 14: RHS Airbox bracket to be removed.

Going further back in the main strand of the chassis loom, there is a small, black 2-pin connector to be placed underneath the RHS beam of the main frame (refer to Image 15).



Image 15: 2-pin connector under RHS beam of main frame.

This connector is an access to charge the battery. It fits the standard BMW power outlet plug (61 34 7714741; see Image 16), which is water proof (should you not use it, make sure the connector is otherwise sealed or hidden behind the main frame). The mating connector is included as an interface for the original BMW Motorrad charging device (77 02 8551896). In other words, one can easily charge the bike's battery at all times without being compelled to disassemble parts of the bike.



Image 16: BMW power outlet plug.

In the rear section of the loom (going further back from the airbox), main- and starter-relay as well as the connector for the 2nd lambda probe (red circle in Image 17 below) are placed behind the starter. It is good practice to use the original, white bracket of the relay also for the motorsport kit assembly.

It is recommended to get hold of the lambda connector bracket kit sold by alpha Racing.



Image 17: Main-, starter-relay, and lambda connector behind starter motor.

The connectors for rear brake pressure sensor, rear suspension potentiometer, and diagnostic connector exit the loom at the far rear end of the main frame, RHS of the lean angle sensor (refer to Image 18). Make sure to use the delivered cover for the diagnostic connector, rain drops might otherwise create disadvantageous race results. Try to attach this connector to the rear subframe assembly firmly (velcro tape or bracket) or protect it in other ways (this connector should never be damaged due to a crash as it may hinder the bike from rejoining track activity).



Image 18: Rear sensor interfaces, diagnostic connector.

The main fuse must be secured carefully as any failure of it will stop the electrical system of the bike. This may cause lengthy troubleshooting and signs of nervousness on the face of the rider. The main fuse is subject to extreme mechanical strain on this bike, which is due to vibrations. It is a mandatory measure to secure this fuse with a cable tie (see Image 19) or any similar component to make sure it won't wander out of its designated position. Make sure not to fix it too tightly to any other component.



Image 19: Secured main fuse.

The rainlight (optional to the kit) can be fitted directly to the rear fairing designed by BMW Motorrad Motorsport. It blinks whenever the pitlimiter is active and it is illuminated constantly whenever the rider is in RAIN-mode and/or the rainlight switch (optional to the kit) is activated. See Image 20 for reference.



Image 20: Rainlight, main fuse, and battery.

Front chassis loom assembly

The front chassis loom connects dashboard, gps-unit, ignition switch, and rainlight-switch to the remainder of the loom.

Its main strand is to be guided through the front left air intake duct, as depicted in Image 22 and Image 21.



Image 22: Front chassis loom on RHS of intake air duct.



Image 21: Detailed view of guiding the front loom through the main frame.

The GPS-unit is usually mounted around the dash, under the wind screen. Under painted screens, the GPS-reception may however suffer severely. In such cases, mounting the GPS-unit around the back of the bike (similar to the position of the standard BMW HP4 Race) may be a solution.

Throttle grip module assembly

The throttle grip adapter cable connects the throttle grip with the chassis loom.

It should be guided around the outside of the RHS fork leg and under the upper triple clamp, as shown in Image 23.

It is a clear recommendation to use the “DOMINO RBW 4071.03.00-00” throttle grip (with fly lead - so no more adapter cable necessary). This device is more robust towards vibrations and, thus, may improve reliability.



Image 23: Throttle grip module around fork leg.

The cable is then guided through the LHS intake air duct, next to your vehicle's VIN imprint. See for reference.



Image 24: Throttle grip module through RHS air intake duct.

Fuel chassis module assembly

The fuel chassis module connects the fuel pump and the fuel level sensor with the chassis loom. The mechanics can disconnect this one connector on top of the airbox before lifting the tank, which reduces the risk of the fuel pump not being connected correctly to the loom and improves ergonomics for the mechanics at the same time.

The cable should be guided on top of the upper injection rail and then down between fuel tank and airbox, as shown in Image 25.



Image 25: Fuel chassis module behind airbox.

Chassis loom: Switch units

The RHS switch unit's cable is guided around the RHS fork leg and back to the top of the headstock, refer to Image 27 and Image 26.



Image 27: RHS switch unit between throttle grip and brake pump.

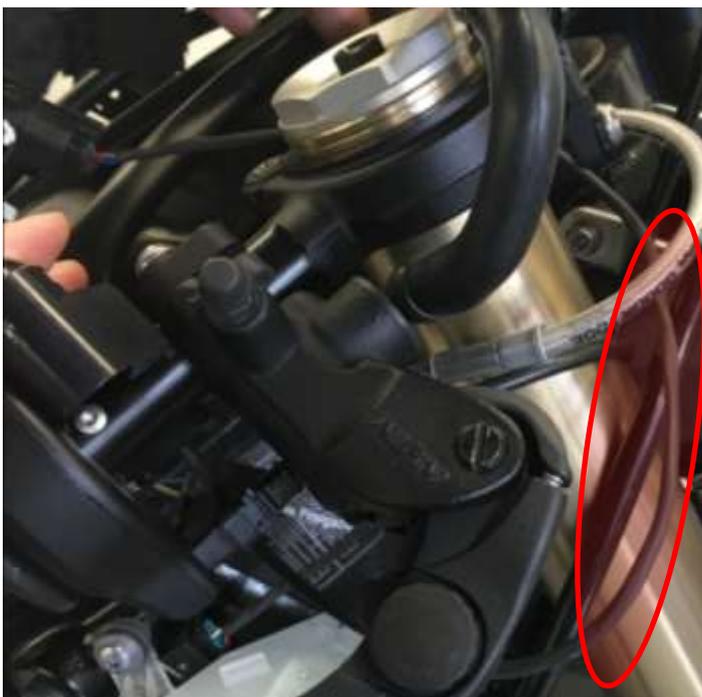


Image 26: Cable guidance of RHS switch unit.

The cable of the LHS switch unit should be guided analogously on the LHS. Please pay attention not to have the cables pushed (or potentially cut) by the tank cover (red circles in Image 28).



Image 28: Switch unit cables and their potential issues.

Temporarily not used connectors

There are several connectors in the loom that are currently (or with standard setup) not used. Those connectors are part of the loom as they may be used in future applications or other championships. These connectors are to be explained in the following to avoid confusion of the mechanics.

The “Heat-Grips” and “EWC-lights” connectors are meant for endurance racing and can normally be neglected, see Image 29.



Image 29: Heat-Grips connector around headstock.

The “Info” connector at the ECU is meant for development purposes mainly and will normally not be used, depicted in Image 30.



Image 30: Info-connector around ECU.

Other currently not used connectors are:

- “Steer”
- “CAN” (spare CAN-access)
- “Ex.Flap”

Further relevant information on the chassis loom

The lean angle sensor is mounted at the rear end of the main frame. Its connector-side must always point to the rear wheel of the bike, in case proper function of the bike is desired (Image 31).



Image 31: Lean angle sensor facing to the rear end of the bike.

When assembling the main chassis loom, the three connectors underneath the air intake duct (refer to Image 8: Mounting of the chassis loom's lower front section under airbox.) were mentioned. These must be connected correctly (watch out not to mix them up while maintaining the bike). The following survey offers a table to ensure all three components are hooked up correctly and how to understand which one may be causing issues:

Label on the loom	Component	Function	Not connected / broken
Speed	Wheelspeed unit (yellow / green sticker around top)	Signal conversion	No wheel speeds.
Immobilizer	Immobilizer (black, complete oval cross section)	Start clearance	Dash shows error message "No start clearance"; starter won't turn.
CAN-term	Cover with integrated resistor (short cover; height = 32mm at highest spot)	Terminate CAN	CAN error. Starter won't turn, LHS switch unit doesn't work, etc.

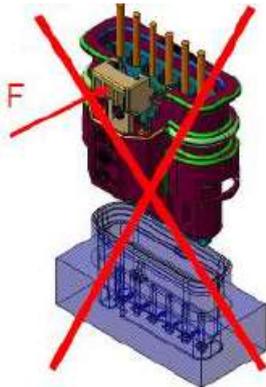
Appendix

HMK connector handling

We would kindly provide you some handling information concerning the HMK connectors to avoid any technical problems during race weekends.

The connectors are used to ensure the connectivity and functionality of the electrics under all conditions. The following instruction must be considered and strictly observed.

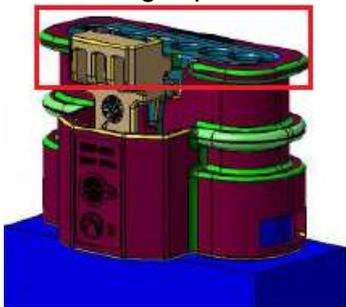
In general the grey security locking mechanism (in CAD drawing below: ochre) may not be pressed while the HMK plug gets connected.



Only press the security locking when you want to remove the connector.

Mounting:

1. Insert the connector in first “pre-lock” position
2. Force the connector housing (dark red) down in “end-lock” position. Now the housing is plane to the connector itself

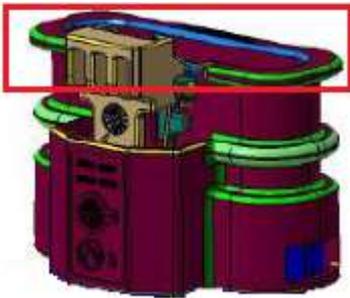


3. Press down the security locking mechanism (ochre)

- Dismounting:
1. Move the security locking (ochre) in the direction of the wiring (without pressing)
 2. Press the security locking onto housing (ochre). While pressing it, pull the housing in the direction of the wiring
→ Connector is back in “pre-lock” position
 3. Press again the security locking and remove the complete connector

Important notice:

Ensure that the connector is in “pre-lock” position when it’s completely removed. This can be confirmed if the housing (dark red) is not plane to the connector (turquoise in previous image).



To make it easier visible in which position the connector is locked (either “pre-lock” or “end-lock”), you could use a marker pen on the female side, see pictures.

“pre-lock” position



“end-lock” position



Connector labels

Connector label	Full name	Loom part
Front IF 1	Front Interface 1 (black) to front loom	Chassis
RHS Switch	Right hand side switch unit	Chassis
Grip IF	Throttle grip interface	Chassis
Info	Rider information interface (currently not in use)	Chassis
Fuel IF	Interface for fuel adapter cable (to fuel pump)	Chassis
Front IF 2	Front interface 2 (white) to front loom	Chassis
Heat-Grips	Interface for heated grips (currently not in use)	Chassis
Steer	Steering angle sensor interface (currently not in use)	Chassis
LHS Switch	Left hand side switch unit	Chassis
P_BR_F	Pressure brake front	Chassis
CAN-term	CAN termination (to terminate with term. Cap)	Chassis
Immobilizer	Immobilizer (to hook up to immobilizer unit)	Chassis
Speed	Wheel speed unit	Chassis
Speed_F	Front wheel speed	Chassis
Susp_F	Front suspension travel sensor	Chassis
EWC-Lights	Endurance vehicle lighting (currently not in use)	Chassis
Generator	Generator	Chassis
Lambda 1	Lambda probe #1 (left hand side)	Chassis
Ex. Flap	Exhaust flap interface (currently not in use)	Chassis
Starter Relais	Starter relay terminal	Chassis
Lambda 2	Lambda probe #2 (right hand side)	Chassis
Main Relais	Main relay	Chassis
Diagnosis	OBD-II diagnostic plug (to hook up to RCK-interface)	Chassis
Speed_R	Rear wheel speed	Chassis
Susp_R	Rear suspension travel sensor	Chassis
P_BR_R	Pressure brake rear	Chassis

Lean angle	Lean angle sensor (Bosch sensorcluster)	Chassis
Rainlight	Rainlight interface	Chassis
CAN	Interface for additional CAN-devices	Chassis
Grip IF G	Throttle grip interface throttle grip side	FWG-cab.
Grip	Throttle grip interface to grip	FWG-cab.
Fuel IF F	Fuel interface: fuel cable side	Fuel-cab.
Fuel Level	Interface to fuel level sensor	Fuel-cab.
Fuel Pump	Interface to fuel pump	Fuel-cab.
Front IF 1 F	Front interface 1 on front loom side (black)	Front-loom
Front IF 2 F	Front interface 2 on front loom side (white)	Front-loom
Dash	Dash interface to MoTeC C-125	Front-loom
Ign-Switch	Ignition main switch	Front-loom
RL-Switch	Rainlight switch	Front-loom
GPS	Interface for MoTeC GPS-unit	Front-loom
Air Temp	Temperature sensor ambient air	Engine main
Trumpets	Trumpets motor (top of airbox)	Engine main
Inj. Valve 8	Injection valve 8 (upper)	Engine main
Inj. Valve 6	Injection valve 6 (upper)	Engine main
Inj. Valve 5	Injection valve 5 (upper)	Engine main
Inj. Valve 7	Injection valve 7 (upper)	Engine main
Inj. Valve 1	Injection valve 1 (lower)	Engine main
Thr LHS	Left hand side throttle body	Engine main
Quickshifter	Interface to quickshift sensor	Engine main
Gear drum	Gear drum potentiometer	Engine main
Coolant Temp	Coolant temperature sensor	Engine main
Inj. Valve 2	Injection valve 2 (lower)	Engine main
Inj. Valve 3	Injection valve 3 (lower)	Engine main
Inj. Valve 4	Injection valve 4 (lower)	Engine main
Fuel pressure	Fuel pressure sensor	Engine main

Thr RHS	Right hand side throttle body	Engine main
E-Interface 2	Engine interface on main loom side 2 (black)	Engine main
E-Interface 1	Engine interface on main loom side 1 (white)	Engine main
E-Interface 2B	Engine interface on lower adapter loom side 2 (black)	Lower engine loom
E-Interface 1B	Engine interface on lower adapter loom side 1 (white)	Lower engine loom
Oil pressure	Interface on lower loom side to oil pressure subloom	Lower engine loom
Ign. Coil 4	Ignition coil 4	Lower engine loom
Ign. Coil 3	Ignition coil 3	Lower engine loom
Ign. Coil 2	Ignition coil 2	Lower engine loom
Ign. Coil 1	Ignition coil 1	Lower engine loom
Cam Act 2	Shift-camshaft actuator 2	Lower engine loom
Cam Sig	Camshaft sensor	Lower engine loom
Cam Pos	Shift-camshaft position sensor	Lower engine loom
Cam Act 1	Shift-camshaft actuator 1	Lower engine loom
Crank Sig	Crank shaft signal	Lower engine loom
Oil pressure B	Interface to lower engine loom on oil pressure subloom side	Oil pressure subloom
Oil pressure switch	Interface to oil pressure switch	Oil pressure subloom

Aftermarket components to enhance loom fitting

alpha Racing Performance Parts

The following parts are available via alpha Racing:

- Motorsport loom connector retainer kit
- ECU bracket kit
- Voltage regulator bracket kit
- Steering stopper kit
- HP Race Calibration Kit 3
- E-throttle kit
- Fast shift sensor
- Switch unit left V3 M RCK
- Dashboard and fairing carrier
- Protective housing for Motec C125 dashboard
- Rainlight switch
- Rain light kit
- GPS-L10 antenna
- Bracket for GPS antenna
- Enet interface cable, Ethernet -> OBD2
- Adapter cable round connector ICOM -> OBD2 plug

More Performance Parts for the BMW S 1000 RR available:

www.shop.alpharacing.com