A/F-Knock Amp.

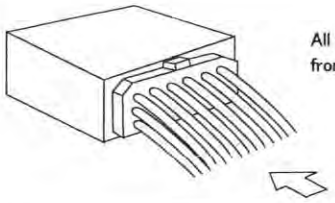
Installation Manual

Pursuing the Ultimate in Engine Performance and Efficiency.
HKS Company Limited.

E84111-K00040-00
Ver.3-1.01

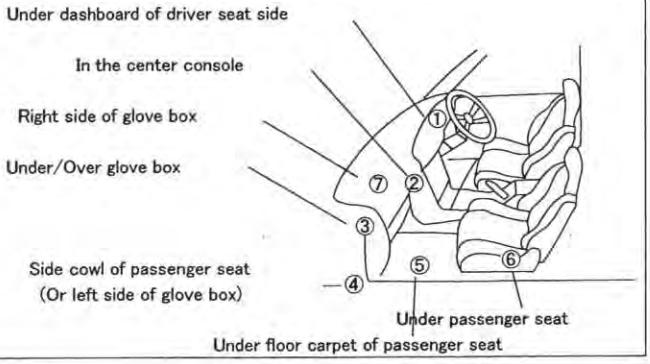
Read this entire manual to understand how the A/F-Knock Amp. functions before beginning the installation process. Do not attempt to install or adjust the A/F-Knock Amp. without thorough knowledge of how this unit works. This manual assumes that you have the knowledge in the operation of tools and equipment that are necessary to safely perform service operations on your vehicle. This manual also assumes that you are familiar with typical automotive systems and basic service and repair procedures. Always have access to a factory repair manual as some of the procedures and specifications required for the proper installation of this product may be referenced to the factory repair manual. To avoid the risk of personal injury, follow the lifting, supporting, and safety precautions contained in the factory repair manual.

LOCATION OF ECU

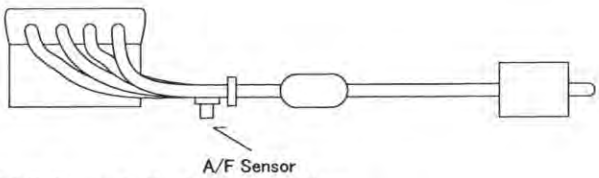


All pin layout figures are viewed from the wire-side of the harness.

Location of ECU



Installation Location of A/F Sensor



Do not install A/F Sensor to the following locations.

- Location with exposure to water·····Temperature of the sensor will bevery high during operation. When suddenly cooled with water, the sensor can become damaged.
- Location where exhaust gas temperatures frequently reach in excess of 800° Celsius.The sensor can wear out quickly.

Wiring and Setting for Each Vehicle

For Vehicles with F-CON V Pro Ver. 3.1 or Later

Wiring

- Refer to a diagram and connect wires (White, Gray) of knock sensor.
- Connect Standard Signal Input (Brown) wire to Pin#61 or 55 of F-CONV Pro.
- To log and monitor Knock Level with F-CON V Pro PowerWriter, connect Knock Voltage Output (Purple) wire to one of Pin#15, 23 or 24 of F-CON V Pro.

Setting of A/F-Knock Amp.

- Set items P10-P18 as follows.

P10	Number of cylinders	Number of engine cylinders4or6
P11	Standard Signal Type	0
P12	Standard Signal Input	—
P13	Standard Signal Setting 1	—
P14	Standard Signal Setting 2	—
P15	Knocking Detection Timing	—
P16	Number of Knocking Sensor	Number of connected knock sensor1or2
P17	Knock Voltage Output Setting	0
P18	Engine Cylinder Bore Diameter	Engine Cylinder Bore (mm) Stock Cylinder Bore is written in the Vehicles setup reference chart.

※It is not needed to set for the items shown 「—」.
When P18 is changed, sometimes it does not changed or the value will be smaller. It is no problem.

Setting of F-CON V Pro PowerWriter

- Open "Ignition 2" tub of "Parameter Setting".
  Input as follows.
  4500 in "Knock Level 100 Voltage"
  500 in "Knock Level 0 Voltage"
  -10 in "Knock Detect Timing".
  Set "Knock Detect Port" as follows.
  If only one Knock Sensor is connected.···Set Port 1 for all "Ignition #1-#6".
  If two Knock Sensors are connected.···Set Port 1 for "Ignition #1,#3,#5".
  Set Port 2 for "Ignition #2, #4, #6".
- If "F-CON V Pro Standard Signal Input (Brown wire)" is connected to the pin for "Twin Injector Adaptor (Pin#61)", select "Not Select" for "Twin Injector Adaptor" in "Twin INJ" of "Parameter Setting".
- If "F-CON V Pro Standard Signal Input (Brown wire)" is connected to the pin for "Option Switch Output 2 (Pin#55)", select "Knock Timing" for "OPT Switch Output" in "OPT1" of "Parameter Setting".
- According to wire connection of "Knock Voltage Output (Purple wire), change setting in "Control" of "Parameter Setting" as follows.

  Fuel GCC Input (15 Pin)·····Set "Knock" for "Fuel GCC".
  Voltage Input 1 (23 Pin)····Set "Knock" for "Voltage 1".
  Voltage Input 2 (24 Pin)····Set "Knock" for "Voltage 2".

- Add Knock Level for Data Monitor
  Link and show Data Monitor and select Knock Level for "View Item" in "Setting".

With above settings, Knock Level will be shown in Data Monitor and Log.
※ It is not possible to log with Unit Log.

For Vehicles without F-CON V Pro Ver. 3.1 or Later

Wiring

- Refer to Vehicles Chart and confirm the car which A/F-Knock Amp. will be installed, is listed.
  If Standard Signal Setting is "Knocks", only Knocking sound Monitor Function can be used for the vehicle. (It is not possible to show Knock Level.)
- Refer to a wiring diagram and connect all wires.

Setting of A/F-Knock Amp.

- Refer to Standard Signal Setting of vehicles chart and set setting items P10-P18 as follows.

	Vehicle Reference Number													
	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭
P10	6	6	4	4	6	4	6	4	4	4	4	6	4	4
P11	3	2	3	2	1	1	1	7	2	6	5	4	4	8
P12	5	14	5	14	0	0	0	6	14	9	7	0	0	0
P13	56	11	50	11	110	110	110	23	9	16	0	1	0	0
P14	1	10	1	10	48	18	48	20	25	0	10	75	5	5
P15	10	10	10	10	10	10	10	10	10	10	10	10	10	10
P16	2	2	1	1	2	1	1	1	1	1	1	1	1	1
P17	0	0	0	0				0	0	0	0	0	0	0
P18	Cylinder Bore Diameter (mm)													

※When P18 is changed, sometimes it does not change or the value will be smaller. It is no problem.

MITSUBISHI

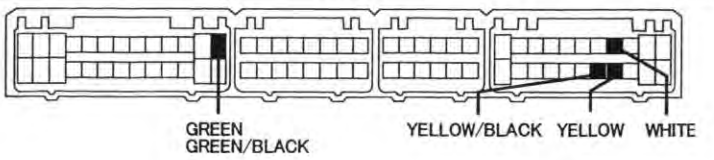
■GTO

YEAR	MODEL	ENGINE	BORE Dia.	PIN LOCATION	ECU	Std.SIGNAL
90.10～	Z15A·Z16A	6G72 DOHC T/C	91	M-2	②	⑫
90.10～	Z16A	6G72 DOHC	91	M-2	②	⑫

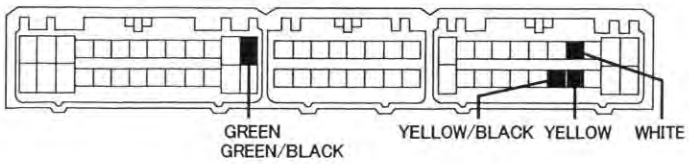
■LANCER、MIRAGE

YEAR	MODEL	ENGINE	BORE Dia.	PIN LOCATION	ECU	Std.SIGNAL
01.2～	CT9A	4G63 DOHC T/C	85	M-1	③	⑬
96.8～'01.1	CN9A·CP9A	4G63 DOHC T/C	85	M-1	④	⑬
92.10～'96.7	CD9A·CE9A	4G63 DOHC T/C	85	M-2	④	⑬

M－1



M－2



HONDA

■S2000

YEAR	MODEL	ENGINE	BORE Dia.	PIN LOCATION	ECU	Std.SIGNAL
99.4～	AP1	F20C	87	H-3	④	⑧

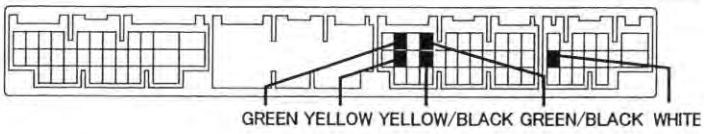
■INTEGRA

YEAR	MODEL	ENGINE	BORE Dia.	PIN LOCATION	ECU	Std.SIGNAL
95.9～'98.8	DC2	B18C VTEC(M/T)	81	H-1	④	⑨

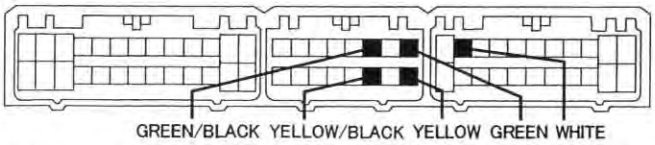
■CIVIC

YEAR	MODEL	ENGINE	BORE Dia.	PIN LOCATION	ECU	Std.SIGNAL
95.9～'00.8	EK4·EK9	B16A VTEC	81	H-1	④	⑨
91.9～'95.8	EG6·EG9	B16A VTEC	81	H-2	④	⑨

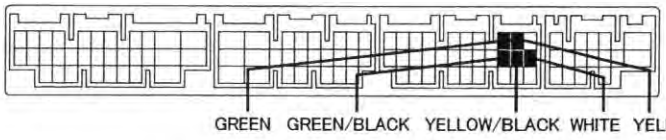
H－1



H－2



H－3



MAZDA

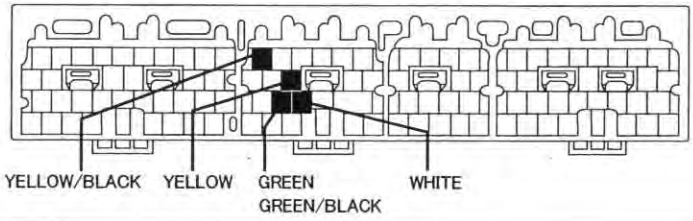
■ROADSTER

YEAR	MODEL	ENGINE	BORE Dia.	PIN LOCATION	ECU	Std.SIGNAL
97.12～'00.6	NB8C	BP-ZE	83	MA-4	⑤	⑭
97.12～	NB6C	B6-ZE	78	MA-4	⑤	⑭

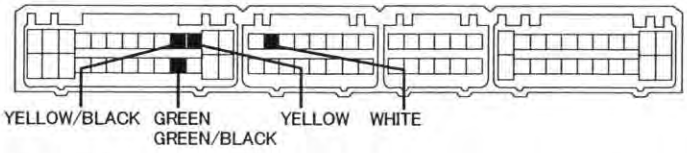
■RX-7

YEAR	MODEL	ENGINE	BORE Dia.	PIN LOCATION	ECU	Std.SIGNAL
86.1～	FD3S	13B-REW	－	MA-1	④	Knocks
91.11～'95.12	FD3S	13B-REW	－	MA-2	④	Knocks
89.3～'91.10	FC3S	13B-T	－	MA-3	④	Knocks

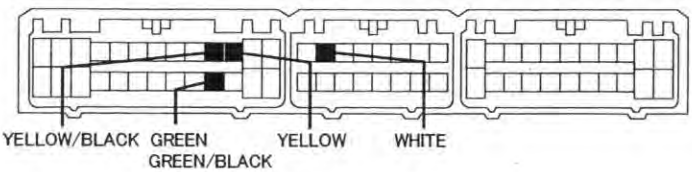
MA－1



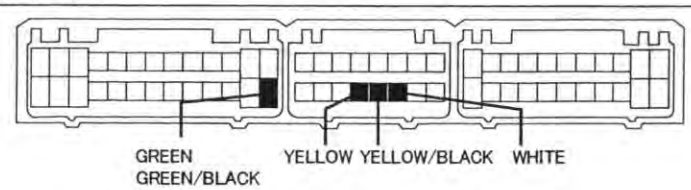
MA－2



MA－3



MA－4



TOYOTA

■ARISTO

YEAR	MODEL	ENGINE	BORE Dia	PIN LOCATION	ECU	Std.SIGNAL
'97.8～	JZS161	2JZ-GTE VVTi	86	T-6	Engine room	①

■SUPRA

YEAR	MODEL	ENGINE	BORE Dia	PIN LOCATION	ECU	Std.SIGNAL
'97.8～	JZA80	2JZ-GTE VVTi	86	T-6	⑤	①
'93.5～'97.7	JZA80	2JZ-GTE	86	T-1	⑤	②

■SOARER

YEAR	MODEL	ENGINE	BORE Dia	PIN LOCATION	ECU	Std.SIGNAL
'96.8～'01.3	JZZ30	1JZ-GTE VVTi	86	T-5	⑤	①
'91.5～'96.7	JZZ30	1JZ-GTE	86	T-2	⑤	②

■MARK Ⅱ、CHASER、CRESTA

YEAR	MODEL	ENGINE	BORE Dia	PIN LOCATION	ECU	Std.SIGNAL
'00.10～	JZX110	1JZ-GTE VVTi	86	T-6	Engine room	①
'96.9～'00.9	JZX100	1JZ-GTE VVTi	86	T-5	②	①
'92.10～'96.8	JZX90	1JZ-GTE	86	T-2	②	②
'90.8～'92.9	JZX81	1JZ-GTE	86	T-3	③	②

■ALTEZZA

YEAR	MODEL	ENGINE	BORE Dia	PIN LOCATION	ECU	Std.SIGNAL
'98.10～	SXE10	3S-GE VVTi	86	T-7	Engine room	③

■CELICA

YEAR	MODEL	ENGINE	BORE Dia	PIN LOCATION	ECU	Std.SIGNAL
'94.2～' 99.8	ST205	3S-GTE	86	T-4	②	④

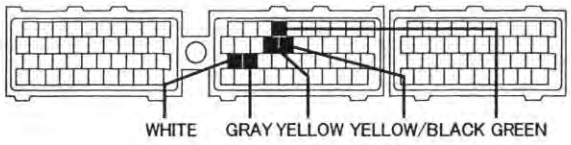
■MR2

YEAR	MODEL	ENGINE	BORE Dia	PIN LOCATION	ECU	Std.SIGNAL
'93.10～' 99.9	SW20	3S-GTE	86	T-4	Rear trunk	④

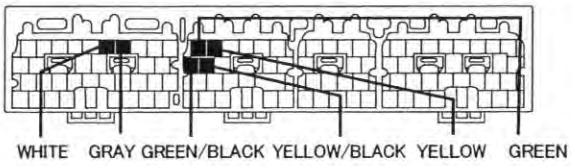
■COROLLA LEVIN、SPRINTER TRUENO

YEAR	MODEL	ENGINE	BORE Dia	PIN LOCATION	ECU	Std.SIGNAL
'95.5～'00.7	AE111	4A-GE	81	T-8	②	④
'91.6～'95.4	AE101	4A-GZE	81	T-8	②	④
'91.6～'95.4	AE101	4A-GE(A/T)	81	T-8	②	④
'91.6～'95.4	AE101	4A-GE(M/T)	81	T-9	②	④
'89.5～'91.5	AE92	4A-GE	81	T-9	②	④

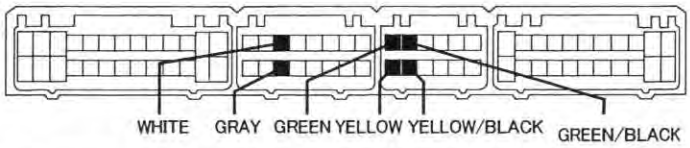
T－1



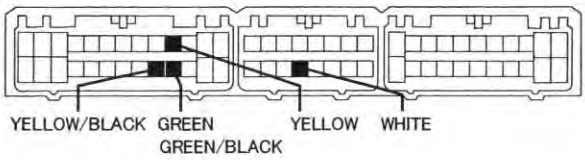
T－2



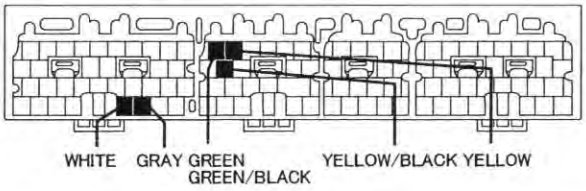
T－3



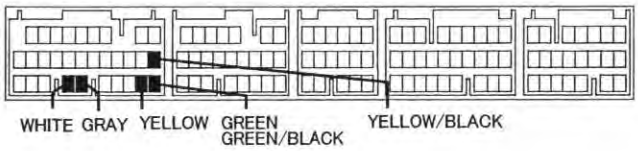
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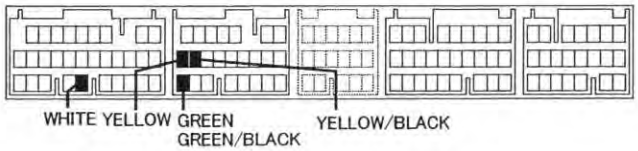
T－5



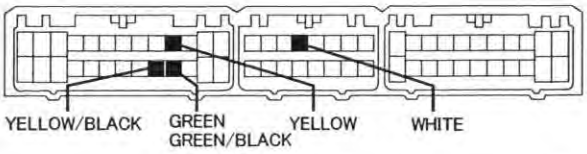
T－6



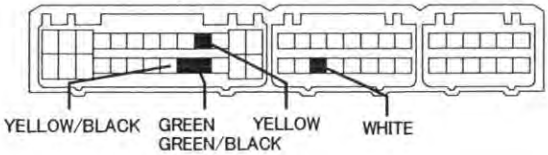
T－7



T－8



T－9



NISSAN

■FAIRLADY Z

YEAR	MODEL	ENGINE	BORE Dia.	PIN LOCATION	ECU	Std.SIGNAL
'89.7～'98.9	Z32	VG30DETT	87	N-4	⑤	⑦

■SKYLINE

YEAR	MODEL	ENGINE	BORE Dia.	PIN LOCATION	ECU	Std.SIGNAL
'99.1～	BNR34	RB26DETT	86	N-5	④	⑤
'95.1～'98.12	BCNR33	RB26DETT	86	N-1	④	⑤
'89.8～'94.12	BNR32	RB26DETT	86	N-1	④	⑤
'98.5～'01.5	ER34	RB25DET	86	N-3	④	⑤
'93.8～'98.4	ECR33	RB25DET	86	N-1	④	⑤
'89.5～'93.7	HCR32	RB20DET	78	N-1	④	⑤

■CEFIRO

YEAR	MODEL	ENGINE	BORE Dia.	PIN LOCATION	ECU	Std.SIGNAL
'88.9～'94.7	A31	RB20DET	78	N-1	④	⑤

■SILVIA

YEAR	MODEL	ENGINE	BORE Dia.	PIN LOCATION	ECU	Std.SIGNAL
'99.1～	S15	SR20DET	86	N-2	④	⑥
'96.6～'98.12	S14	SR20DET	86	N-2	④	⑥
'93.10～'96.5	S14	SR20DET	86	N-4	④	⑥
'91.1～'93.9	PS13	SR20DET	86	N-2	④	⑥
'88.5～'90.12	S13	CA18DET	83	N-4	④	⑥

■180SX

YEAR	MODEL	ENGINE	BORE Dia.	PIN LOCATION	ECU	Std.SIGNAL
'96.8～	RPS13	SR20DET	86	N-2	④	⑥
'91.1～'96.7	RPS13	SR20DET	86	N-2	④	⑥
'89.3～'90.12	RS13	CA18DET	83	N-4	④	⑥

SUBARU

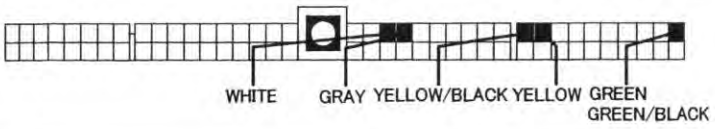
■LEGACY

YEAR	MODEL	ENGINE	BORE Dia.	PIN LOCATION	ECU	Std.SIGNAL
'01.5～	BH5・BE5	EJ206・EJ208	92	F-5	⑤	⑩
'98.6～'01.4	BH5・BE5	EJ206・EJ208	92	F-4	⑤	⑪
'96.6～98.11	BD5・BG5	EJ20R・EJ20H(M/T)	92	F-3	⑤	⑪
'93.10～96.5	BD5・BG5	EJ20H	92	F-2	⑤	⑪

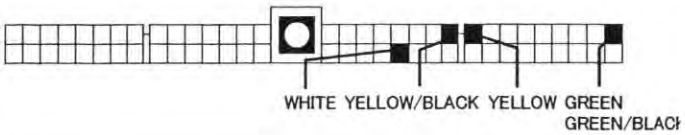
■IMPREZA

YEAR	MODEL	ENGINE	BORE Dia.	PIN LOCATION	ECU	Std.SIGNAL
'00.10～	GDB・GGB	EJ207	92	F-5	⑤	⑩
'00.8～	GDA・GGA	EJ205	92	F-5	⑤	⑩
'98.9～'00.10	GC8・GF8	EJ205・EJ207	92	F-4	⑤	⑪
'96.9～'98.8	GC8・GF8	EJ20G・EJ20K	92	F-3	⑤	⑪
'92.10～'96.8	GC8・GF8	EJ20G	92	F-1	⑤	⑪

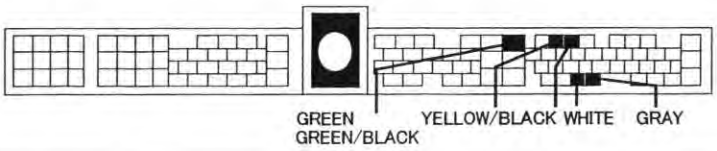
N−1



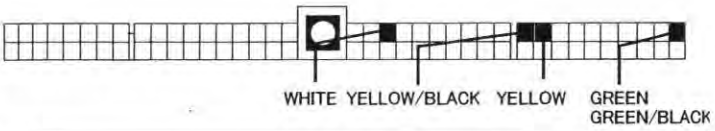
N−2



N−3



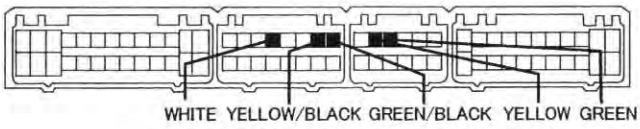
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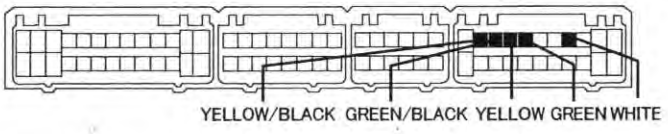
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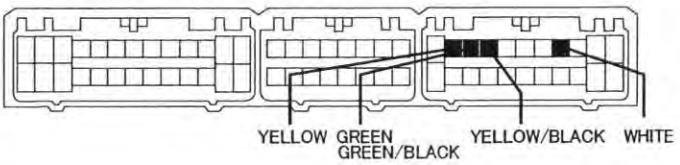
F−1



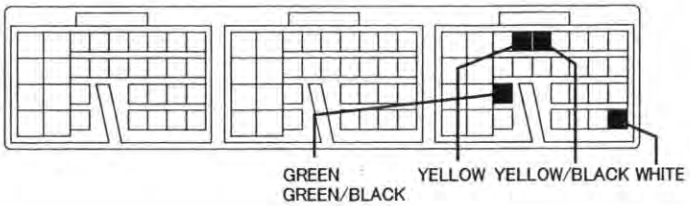
F−2



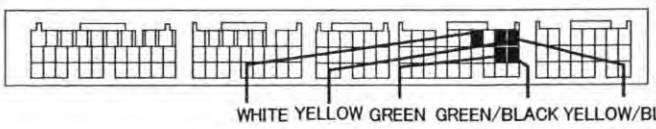
F−3



F−4



F−5



A/F-Knock Amp.

Operations Manual

Pursuing the Ultimate in Engine Performance and Efficiency.
HKS Company Limited.

E84111-K00030-00
Ver.3-1.01

Read this entire manual to understand how the A/F-Knock Amp.Black Limited functions before beginning the installation process. Do not attempt to install or adjust the A/F-Knock Amp.Black Limited without thorough knowledge of how this unit works. This manual assumes that you have the knowledge in the operation of tools and equipment that are necessary to safely perform service operations on your vehicle. This manual also assumes that you are familiar with typical automotive systems and basic service and repair procedures. Always have access to a factory repair manual as some of the procedures and specifications required for the proper installation of this product may be referenced to the factory repair manual. To avoid the risk of personal injury, follow the lifting, supporting, and safety precautions contained in the factory repair manual.

Name of Product	A/F-Knock Amp.Black Limited
Usage	To measure the A/F and knock level
Application	For Japanese vehicles with 12V negative ground
Code Number	４４００６－ＡＫ００２
Remarks	For the A/F Amp・・・・Unleaded gasoline engine vehicles For the Knock Amp・・・・4-cylinder or 6-cylinder gasoline engine vehicles with the F-Con V Pro installed or for vehicles listed in the installation manual.

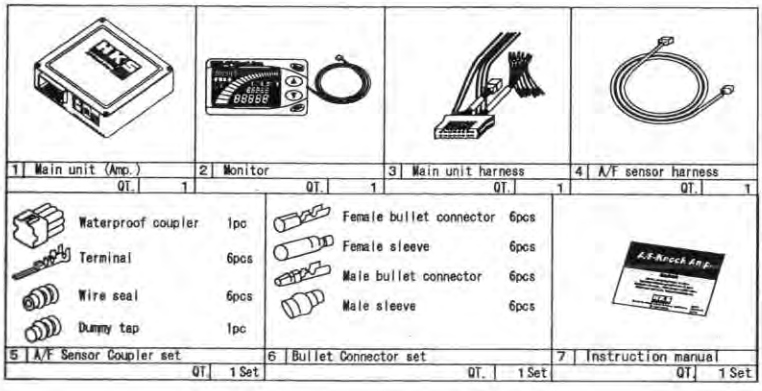
- The HKS A/F Knock Amp. Black Limited can convert each sensor signal to the air/fuel ratio using the A/F sensor, and the engine knock level using the factory knock sensor.
- The HKS A/F Knock Amp. Black Limited can display the air/fuel ratio and the engine knock level on the monitor and output the voltage.
- Connecting the HKS A/F Knock Amp. Black Limited with the HKS F-Con V Pro will allow the user to monitor the air flow and the engine knock level, as well as data logging via the F-Con V Pro Power Writer software.

A/F function is designed to work with the following A/F sensors.

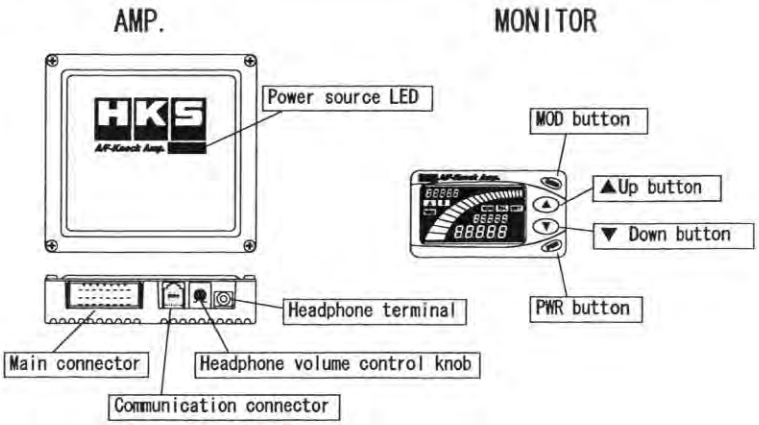
A/F Sensor Manufacturer	Manufacturer Part Code
NISSAN	22693-0M500
MITSUBISHI	MD178976
HONDA	36531-P07-003 or 36531-P07-013
HKS	G83371-K00010-00

Parts List

Please check if the following items are contained in the box.



Name of parts



Installation

⚠WARNING

- This product is for use with Japanese DC12V negative ground vehicles.
- Disconnect the negative terminal of the battery before installation to avoid fire hazards.
- The A/F sensor will become extremely hot after connecting to a power source. Allow plenty of time for the sensor to cool before attempting to touch it.

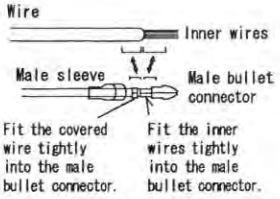
1. Disconnect the Battery Terminal

(1) Disconnect the negative battery cable from the battery.

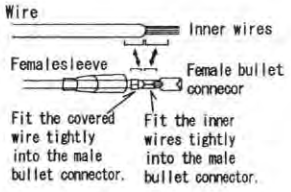
2. Wiring

2.1. Connecting bullet connecter

(1) Male bullet connecter
①Cut the wire.
②Strip the cover of the wire.
③Insert the wire through the male sleeve.
④Fit the inner wires tightly into the male bullet connector.
⑤Fit the covered wire tightly into the male bullet connector.
⑥Insulate the staked part by the sleeve.



(2) Female bullet connecter
①Cut the wire.
②Strip the cover of the wire.
③Insert the wire through the Female sleeve.
④Fit the inner wires tightly into the Female bullet connector.
⑤Fit the covered wire tightly into the Female bullet connector.
⑥Insulate the staked part by the sleeve.

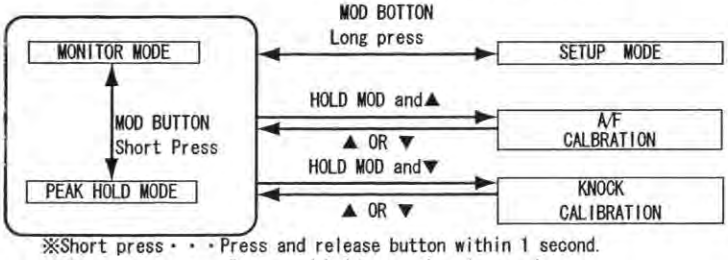


How to use

1. Monitor

1.1. Menu Navigation

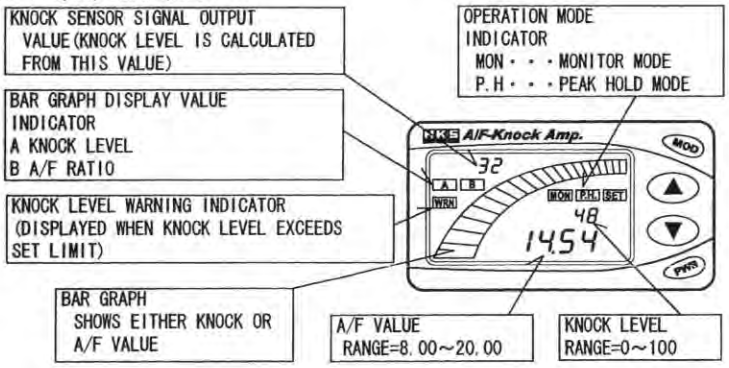
Monitor can indicate the A/F value and the knock level. Also, the data setting for AMP can be modified in this menu.
Switching modes and using each function can be controlled by touching buttons.
To navigate the menu system, follow the flow chart shown below.



※Short press・・・Press and release button within 1 second.
Long press ・・・Press and hold more than 1 second.
Press and hold PWR to turn on or off the monitor.

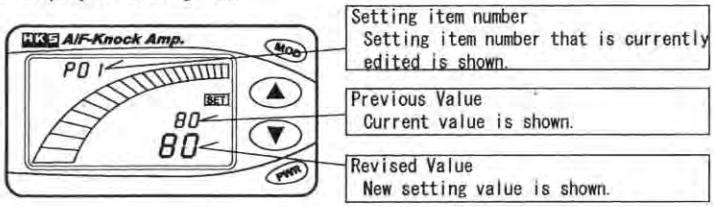
- Monitor Mode
  Normal mode. It shows A/F value and Knock Level.
- Peak Hold Mode
  It shows maximum A/F value and Knock Level since ignition would be on.
- Setting Mode
  To check or change basic setting of A/F-Knock Amp.
- A/F Calibration Mode
  Calibration for difference of each individual A/F Sensor with sensor output in atmosphere.
- Knock Calibration Mode
  Initial setting to judge knocking with knock sensor signal.

1.2. Display Description



- Pressing▲or▼during MONITOR MODE will change the contents of the Bar graph.
- Pressing ▲ or ▼ during PEAK HOLD MODE will reset the peak hold value.
- Pressing POWER button will turn the display unit ON or OFF.

1.3. Display of Setting Mode



- During Monitor Mode, if MOD Button is pressed and hold, it will be changed to Setting Mode.
- Select the next setting item with MOD Button and the previous setting item with PWR Button. Then, change the setting value with ▲▼ Buttons.
- ▲▼ If ▲▼ Buttons are pressed and hold, value is changed 10 each.
- If MOD Button is pressed and hold again, the setting value will be renewed and returns to Monitor Mode.
  When A/F-Knock Amp will be used, please always confirm setting values.

1.4. Parameter Setup

All parameters are changed using SETUP mode shown in section 1.1.
Please refer to the relevant section for details on each setup parameter.

Setting No.	Setting Description	Setup Req.	Range	Notes
	Display Parameter Setup			
P01	Knock warning level	◎	0～100	Refer to section 1.4 for display parameter setup.
P02	A/F bar graph scale	◎	0～20	
P03	Display sampling rate	◎	10msec	
	Knock Sensor Calibration			
P04	Knock level 100 setting	●	0～65535	Auto setup during knock sensor calibration. Refer to section 3.2
P05	Knock level filter multiplier	●	10～200[÷10]	
P06	Knock level filter offset	●	0～65535	
P07	Knock amp gain	●	1～255	
	A/F Sensor Calibration			
P08	A/F voltage output @0.5v	○	8～22[A/F ratio]	Refer to section 2.1 for A/F sensor calibration
P09	A/F voltage output @4.5v	○	8～22[A/F ratio]	
	Vehicle Setup Parameters			
P10	No. of cylinders		1～12	Refer to section 3.4 for vehicle setup
P11	Crank pos. signal type	●	0～99	
P12	Crank pos. signal input	●	0～15	
P13	Crank pos. signal setup 1	●	0～719	
P14	Crank pos. signal setup 2	●	0～719	
P15	Knock detection timing	●	0～30	
P16	No. of knock sensors	●	0～9	
P17	Knock voltage output setup	●	0～1	
P18	Cylinder bore diameter	●	70～109	

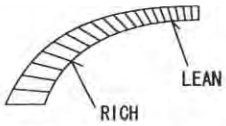
◎・・・Required for display setup
●・・・Required for knock amp function
○・・・Required for A/F amp function

Display Parameter Setup

P01 Knock warning level
Allows user to set warning level between 0~100. If knock level exceeds this value, display will flash and produce warning sound for 2 seconds.

P02 A/F bar graph scale

P02Setting	RICH	LEAN
0	14.5	15.5
1	13.5	15.5
2	12.5	15.5
3	11.5	15.5
4	10.5	15.5
5	9.5	15.5
6	13.5	14.5
7	12.5	14.5
8	11.5	14.5
9	10.5	14.5
10	9.5	14.5
11	12.5	13.5
12	11.5	13.5
13	10.5	13.5
14	9.5	13.5
15	11.5	12.5
16	10.5	12.5
17	9.5	12.5
18	10.5	11.5
19	9.5	11.5
20	9.5	10.5



The A/F bar graph consists of a 20 bar indicator. By selecting a P02 setting from the table on the left, the user may select the scale of the graph. Note that in the table, "rich" corresponds to 4 bars being lit and "lean" corresponds to 16 bars being lit. All other values are interpolated linearly between these two points.

e.g. By setting P02 to number 10, the graph would indicate an A/F value of 9.5. When 4 bars are lit and an A/F of 14.5 when 16 bars are lit.

P03 Display sampling rate
Allows the user to set the data sampling frequency in milliseconds.
Please set according to users requirements.

2. A/F Amp. Function

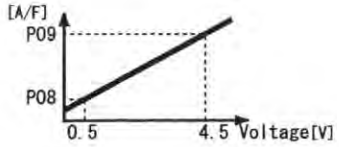
2.1. A/F Sensor Calibration

Follow the steps below to calibrate the A/F sensor.

①Complete wiring installation shown in section 2.3.
②Expose the A/F sensor to the open atmosphere.
③Turn on ignition and leave the sensor to stand for 10mins.
WARNING:SENSOR WILL REACH VERY HIGH TEMPERATURES. Please ensure battery voltage is greater than 12v. Otherwise, charge battery until output voltage is greater than 12v.
④Ensure that the power LED is on and press MOD and ▲ together. The display should change from monitor mode to calibration mode.
⑤Press ▲ to begin calibration. The LED should flash during calibration and will take~5 seconds. At any time, press ▼ to end calibration. The display should return to monitor mode.

. Setting

P08 = A/F ratio at 0.5v
P09 = A/F ratio at 4.5v



When A/F value will be output (Pink wire), set following parameters.
Enter Parameter setup mode and set values for P08 and P09.
Where:P08=A/F ratio at o.5V P09=A/F ratio at 4.5V

With F-CON V Pro
Set 8 in P08 and 20 in P09.
Use F-CON V Pro PowerWriter. Set "A/F" in "Ignition GCC Input" of Parameter Setting and select "HKS" in "A/F Conversion Table".

. Sensor warm up time
A/F sensor will not operate until the sensor element reaches operating temperature.
Typical warm up time is <100 seconds. During warm up period, the power LED will flash and the A/F value will not be displayed on the monitor.

Knock Sensor Calibration

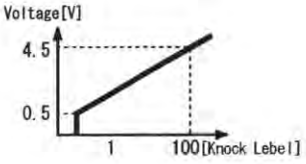
3.1. Setting Items
Refer to Parameter Setup in section 1.4

Select knock calibration mode shown in section 1.1 and follow the steps below to automatically calibrate knock sensor and knock level. After calibration, parameter settings P04 - P07 will be automatically set.

. Setting Items for Knock Amp. Function
Find out the setting for knocking judging conditions by the self-learning mode.
Convert the knock sensor's signal to the knock level 0 to 100 by the knocking judging conditions.
Keep your mind that sometimes the knock level does not go up enough even when the knocking would cause the damage on the engine.
After setting the item P10 to P18 referring to the installation manual, to confirm if the setting is correct, turn the ignition off, and turn it on again.
IMPORTANT: Complete vehicle setup shown in section 3.4
①Start the engine.
②Press and hold MOD and ▼
③Hold the engine at 1000rpm in neutral gear and ensure there is no knocking by installing a set of headphones into the Knock Amp.
④Press ▲ to initialise self-learning mode. Press ▼ to stop at anytime.
⑤Self-learning mode will finish in 5 seconds and return to monitor mode. At this point, P04-P07 will be updated.
⑥For additional fine tuning of knock sensor calibration, follow the steps shown below.
- In neutral gear, rev the engine to 4000rpm and ensure there is no knock.
- If knock indicator shows a value greater than 0, increase parameter P06 (knock filter offset) to a higher value until knock level reads 0.
- Rev the engine over 4000rpm in neutral gear and ensure there is no knocking.
- If knock indicator shows a value greater than 0, increase parameter P05 (knock filter multiplier) by increments of 0.1 units until knock level reads a value of 0.
- Run the engine under high load in high gear and ensure there is no knocking. If knock indicator shows a value great than 0, increase parameter P05 by increments of 0.1 units until knock level reads 0.

⑦Knock level sensitivity
- knock sensitivity is set very high at factory settings. The knock indicator will read 100 under minor knock levels.
- By adjusting parameter P04, sensitivity can be adjusted. Doubling the value of P04 will half the sensitivity e.g. after doubling value P04, knock level 80 will become equivalent to knock level 40.

3.3. Knock voltage output
This output is required for data logging facility when used with HKS F-con V pro ECU. Please contact HKS for further details.
Note: When calibrating knock sensor settings, please double check all settings are correct before and after turning the unit ON/OFF.



3.4 Vehicle Setup
Please find the appropriate ECU diagram for your vehicle in the leaflet included. The translation for the table is as follows.
*This example is for Honda S2000

Year of Manufactur	Chassis Code	Engine Code	Bore Diameter (mm)	ECU Reference	ECU Location	Vehicle Setup Reference
e	AP1	F20C	87	H-3	4	8

To setup parameters P10 to P18, cross-reference the Vehicle Setup Reference number to this table

	Vehicle Reference Number													
	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭
P10	6	6	4	4	6	4	6	4	4	4	4	6	4	4
P11	3	2	3	2	1	1	1	7	2	6	5	4	4	8
P12	5	14	5	14	0	0	0	6	14	9	7	0	0	0
P13	56	11	50	11	11	11	11	23	9	16	0	1	0	0
P14	1	10	1	10	04	01	04	20	25	0	10	75	5	5
P15	10	10	10	10	8	8	8	10	10	10	10	10	10	10
P16	2	2	1	1	10	10	10	1	1	1	1	1	1	1
P17	0	0	0	0	2	1	1	0	0	0	0	0	0	0
P18	Cylinder Bore Diameter (mm)													

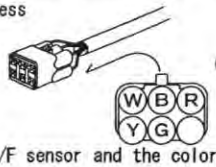
P04 Knock Level 100
P05 Knock Level Multipliers
P06 Knock Level Offset
P07 Knock Amp Gain
] Set these in Knock CalibrationInitial Study Mode After setting P10 - P18, set these referring to 3.2 below.

P10 Cylinders Number
P11 Standard Signal Type
P12 Standard Signal Input
P13 Standard Signal Setting 1
P14 Standard Signal Setting 2
P15 Knock Detect Timing
P16 Knock Sensors Number
P17 Knock Voltage Output Setting
P18 Engine Cylinder Bore Diameter
] See the installation manual.

2.2. Modification of A/F Sensor Connector

(1)The diagram of A/F Sensor connector of A/F Sensor Harness is as follows.

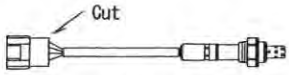
A/F sensor harness



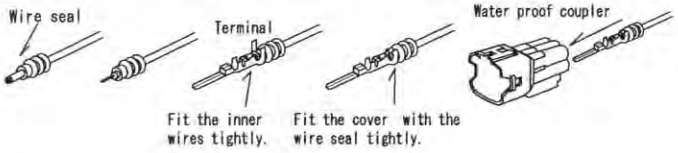
The color of the A/F sensor and the color of the A/F sensor harness should match with the table below. To match colors, use the waterproof coupler, the terminal, and the wire seal to modify wires.
For wiring of A/F harness, locate the 6-pin A/F wiring plug and refer to the following table.

A/F Sensor Harness	HKS G83371-K00010-00	NISSAN 22693-OM500	HONDA 36531-P07-003	HONDA 36531-P07-013	MITSUBISHI MD178976
White	White	White	White	White	White
Black	Black	Black	Black	Black	Black and Brown
Red	Red	Red	Red	Gray	Red
Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Green	Orange	Orange	Green	Blue	Green

①Cut all wires at the A/F sensor connector as shown below.



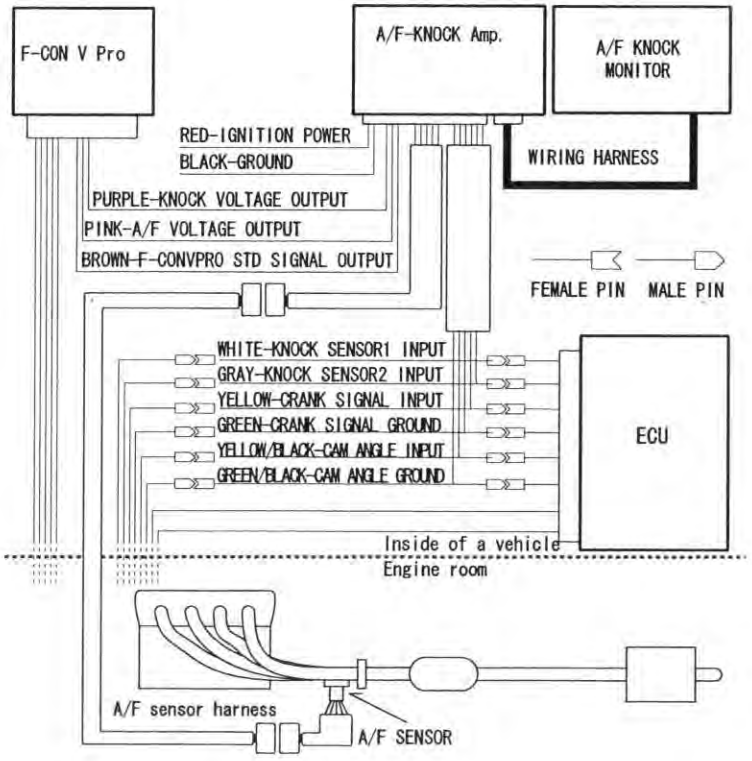
②Insert the wire into the wire seal.
If it's necessary to bundle 2 wires, insert 2 wires into one wire seal.
③Strip the cover.
④Fit the inner wires tightly into the terminal.
⑤Fit the cover and the wire seal tightly into the terminal.
⑥Insert the terminal into the waterproof coupler till it's locked.
The position of the terminal must be referred to the color table above.
⑦If there is an empty position in the coupler, insert a dummy tap.



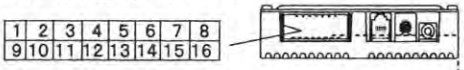
2.3. Wiring

Wiring Diagram

Please refer to the ECU pin-out diagram suitable for your engine and refer to the diagram below.



Above wiring diagram shows all wires, although each function requires different wire connection as follows.



Connector of A/F-Knock Amp.

REQUIRED WIRING FOR VARIOUS FUNCTIONS	A/F OUTPUT	KNOCK LEVEL OUTPUT: With F-CON V PRO *1	KNOCK LEVEL OUTPUT: Without F-CON V Pro *2	KNOCK SOUND MONITOR
1 Black Ground	●	●	●	●
2 Red IGN power	●	●	●	●
3 Yellow Cam angle input			●	
Black			●	
4 Green Crank position signal			●	
ground				
5 White Knock sensor 1 input		●	●	●
6～1 — A/F sensor harness	●			
0 Green Cam angle ground			●	
11 Black			●	
Yellow Crank position signal input			●	
12 Grey Knock sensor 2 input		○	○	○
13 Brown F-con V pro signal input		●		
14 Pink A/F voltage output	●			
15 Purple knock voltage output		●		

●····· Required
○·····Required for 2 knock sensors
※1····Use F-CON V Pro Ver. 3.1 or later.
※2····Applicable vehicles are limited. Refer to installations manual.

IG Power Supply must be connected to a wire that is more than 5[A] such as cigar lighter socket. (Do not use for ECU wire.)
Please make sure that ground wire is connected to body ground point properly. Otherwise, A/F and Knock Level might not be correct.

A/F Output ··· In case, monitor A/F value and output the voltage.

- ●Connect Amp. and A/F Sensor with Unit Harness and A/F Sensor Harness.
- ●Each A/F Sensor has different output characteristics. When a new sensor will be used, always perform atmosphere calibration as referring to "Usage 2. A/F Amp. Function".
- ●To log, monitor, feedback A/F Value with PowerWriter, connect "A/F Voltage Output Pink" wire to "Ignition GCC Input (Pin#16)".

Knock Level Output ··· In case, monitor Knock Level and output the voltage.

For vehicles with F-CON V Pro Ver. 3.1 or later.

- ●Refer to Installations Manual and connect wire of Knock sensor.
- ●Connect "F-CON V Pro Standard Signal Input Brown" wire to either "Twin Injector Adaptor Pin (Pin#61)" or "Option Switch Output 2 (Pin#55)". Select one of them that is currently not used. When it is connected to Pin#55, set F-CON V Pro inside Jumper Switch JP5 (Option Switch Output 2) to "1-2" (Use).
- ●To log and monitor Knock Level, connect "Knock Voltage Output Purple wire" to one of "Fuel GCC Input (Pin#15)", "Voltage Input 1 (Pin#23)" or "Voltage Input 2 (Pin#24)" of F-CON V Pro.

For vehicles without F-CON V Pro Ver. 3.1 or later

- ●Refer to Installations Manual and connect wires of Knock Sensor, Camshaft Angle and Crankshaft Angle.

Knock Sound Monitor···To hear Knock sensor signal with a headphone.

- ●Connect Power Supply and Knock Sensor and set Monitor Settings of "Number of Knock Sensor".
- ●If wire connection of Knock Sensor is 1, set 1 for "Number of Knock Sensor". If it is 2, set 2. (Refer to "How to use 1. Monitor".)
- ●Connect a headphone to headphone connector and adjust volume with Headphone volume adjustment volume.

2. A/F Sensor Installation

To install the A/F sensor onto the exhaust pipe, use M18xP1.5 bolts and weld the O2 sensor boss onto the pipe.
The O2 sensor boss is available separately (see the table below).
The O2 sensor must be calibrated before the actual use.
Please see section 2. A/F Amp Function on page 6.

The following HKS parts are available for installation of A/F sensor

Product Name	Product Code	Note
A/F sensor harness	44999-AK002	
A/F Sensor Coupler set	44999-AK003	
Boss + 5 bolt set	44999-AK001	02 Sensor Bolt and 5 Bolt Set

3. After Installation

(1)Insulate unused wires to prevent them from a short circuit.
(2)Make sure if all wiring is correct.
(3)Connect the negative battery cable back to the battery.