



HYUNDAI KIA MOTORS

Installation manual
PART 2/2

MANUFACTURER	Hyundai / Kia
ENGINE DISPLACEMENT	998 cc
NUMBER OF VALVES	12
ENGINE CODE / NUMBER - OUTPUT	1.0T-GDI G3LC - 74kW / 88kW
FIRING ORDER	1-2-3
VEHICLE CATEGORIES	M
TRANSMISSION	MT
VERSION	AFC-2.1 DI-LPG
TYPE VSI INJECTOR	KN9 - 63cc
TYPE INJECTION MODULE	Type 2 Gen2
PETROL ECU MANUFACTURER / CODE	ONLY : Kefico 39110-04GB5 / CPEGD 2.20.2
MODEL YEAR:	2016-2017
SYSTEM APPROVAL NUMBER (R115)	E4-#115R-000031 / VSI-LPG 45
LOCATION R115 SYSTEM STICKER	right side, centre door post
ENGINE SET NUMBER	349/121001/A
MANUAL NUMBER	076/0991200
DATE	21-2-2019

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FOR EXPLANATION AND CIRCUIT DIAGRAMS SEE : INSTALLATION MANUAL GENERAL PART 1 / 2	



General instructions

- The installation of the system shall be done in accordance with the installation manual provided by Prins Autogassystemen.
- This manual is based on Dutch regulations, always install the system in accordance to the local regulations.
- Always download the “general manual 1/2 “ from our [website](#) for basic instructions and diagrams.
- Always disconnect the battery when installing the LPG system. Make sure the ignition key is outside the car. Be aware of central door locking, radio / telephone memory code, alarm system.
- Do not place the main fuse into the fuse holder before having completed the installation of the VSI system.
- The VSI computer has to be activated by means of the diagnosis software.
- In the unlikely event the VSI computer fails, it will automatically switch over to petrol. Never disconnect the VSI computer connector, unless you have removed the main fuse.
- When installing the VSI wiring harness, ensure that it does not run near any of the ignition components.
- Solder and insulate all electrical connections.
The wires in the loom are provided with numbers and text.
The text on the wire explains the function of the wire.
The wire harness is not model specific, therefore it may be necessary to adjust the length of the wires.
Ensure maximum care is taken when connecting the wiring.
Make professional joints using solder and shrink sleeve. Do not stretch the wiring harness.
- No component of the LPG-system shall be located within 100 mm of the exhaust or similar heat source, unless such components are adequately shielded against heat.
- Remove any internal burrs after having shortened the LPG pipe.
(This guarantees the maximum flow through the pipe without pollution.)
- If holes have to be drilled (wear safety glasses) for installing brackets, etc., the drilled holes must always be treated with an anti-corrosion agent, after the chips have been removed (especially when mounting an exterior filler into body work).
- After having completed the installation, check the whole system for gas leakage; use a gas leak detection device. Also check for any leak of engine coolant, petrol and air.
- Fitting and maintenance is only allowed by Prins Autogassystemen selected LPG engineers.
- Failure to follow the instructions in this manual can result in a poor or non-working LPG-installation or a dangerous situation.
- For maintenance instructions and filter registration see owner's manual.
- Prins Autogassystemen is not responsible for any damages to people or objects as a result of changes to Prins products.
- [Check our website regularly for diagrams, certificates, updates, info-bulletins and product information.](#)

Please fill in the [warranty portal](#) completely within 14 days after installation.

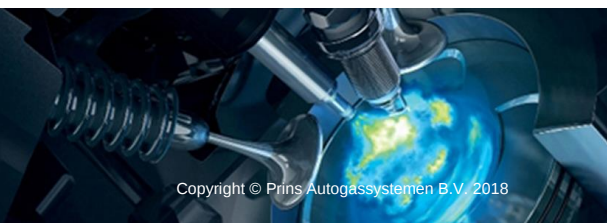


Required equipment / tools / materials for installing a complete system

- Complete workshop toolbox (wrenches, screwdrivers, cutters, pliers, ratchet, sockets)
- Car lift
- Portable computer
- Vehicle fuel system scan tool or OBD scan tool Prins (part nr. 099/99928)
- Exhaust gas analyser
- Multimeter
- Oscilloscope
- Prins diagnostic software
- Prins diagnostic tool
- Torque wrench (5-50Nm)
- Torque wrench (200-250Nm)
- Portable light
- Assortment drill bits 4 to 12 mm
- Assortment cutters (Ø20, 30, 50, 70 mm)
- Portable drill or pneumatic drill
- Thread cutting device (male M6x1, M8x1, M10x1)
- Air gun
- Vacuum cleaner
- Safety goggles
- Hot air gun
- Soldering iron, soldering tin
- Wire-stripping pliers
- Adhesive tape
- Adhesive sealant
- Thread locking compound
- Anti-corrosion agent / black body coating
- Gas leak detection device or foam leak spray
- Shrink sleeves

Vehicle check

- Check the vehicle drivability on petrol
- Check the fuel system for error codes (scan tool)
- Check if the catalytic converter is in good condition (exhaust gas analyser)
- Check the condition of the ignition system (spark plugs, cables, coil)



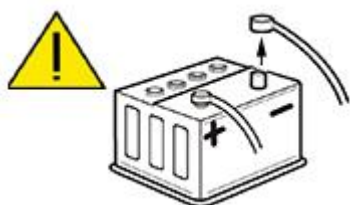
Tightening moments

	Nm	Spanner mm
M 4 x 0,7	3.3	7
M 5 x 0,8	6.5	8
M 6 x 1,0	11.3	10
M 7 x 1,0	14.5	11
M 8 x 1	24.5	13
M 8 x 1,25	27.3	13
M 10 x 1	52	15-16-17
M 10 x 1,5	54	15-16-17

EXPLANATION OF SYMBOLS :

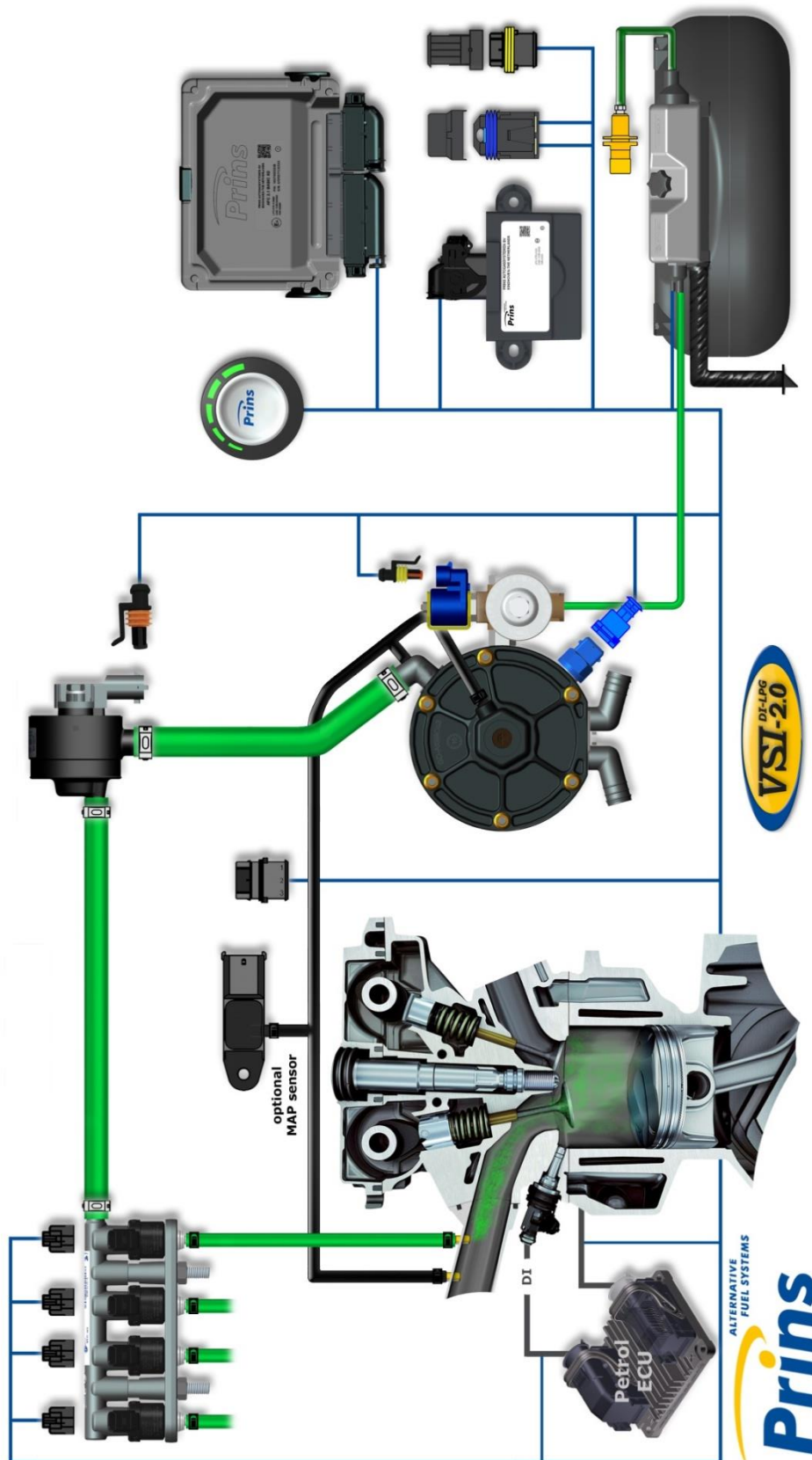


= IMPORTANT, CAUTION



= WEAR SAFETY GOGGLES

Base diagram



VSI approval numbers

	
Reducer VSI LPG Prins : E4-67R-010054 Lock-off valve OMB : E8-67R-014327 Lock-off valve Valtek : E4-67R-010041	Injector rail Prins : LPG E4-67R-010093 CNG E4-110R-000021
	
Filter unit T1 / T2 Prins : LPG E4-67R-010096 CNG E4-110R-000028 Filter unit Keihin: LPG E4-67R-010177 CNG E4-110R-000091	Injector Keihin KN9 : LPG E4-67R-010310 CNG E4-110R-000295
	
Prins AFC : E4-67R-010098 E4-10R-030507	Tubithor : LPG E13-67R-010145 CNG E13-110R-000017 Rubia : LPG E4-67R-010068 CNG E4-110R-000003 WinLas : LPG E37-67R-010140 CNG E37-110R-000012

Water connections

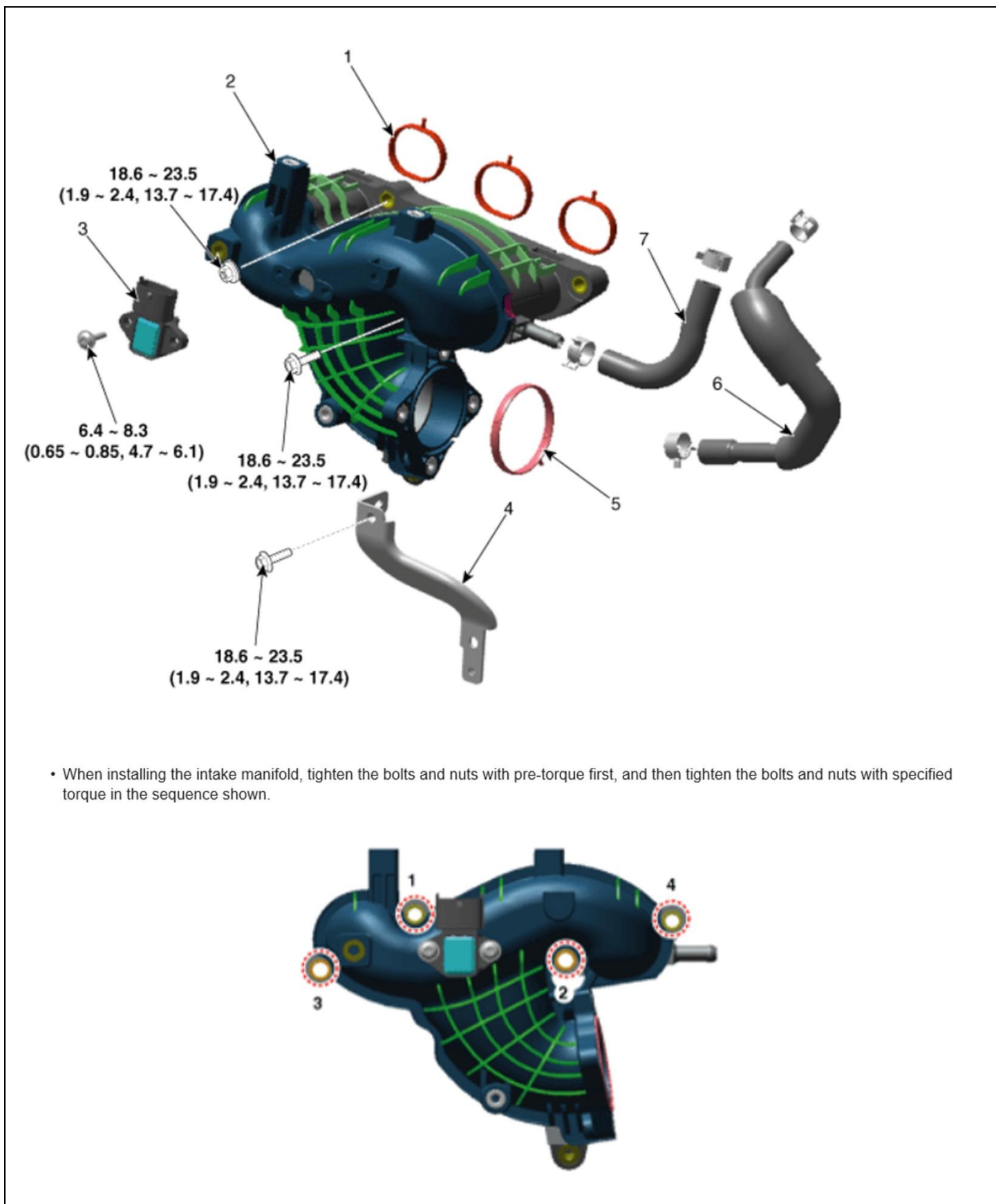
Example from Hyundai i20 Active.



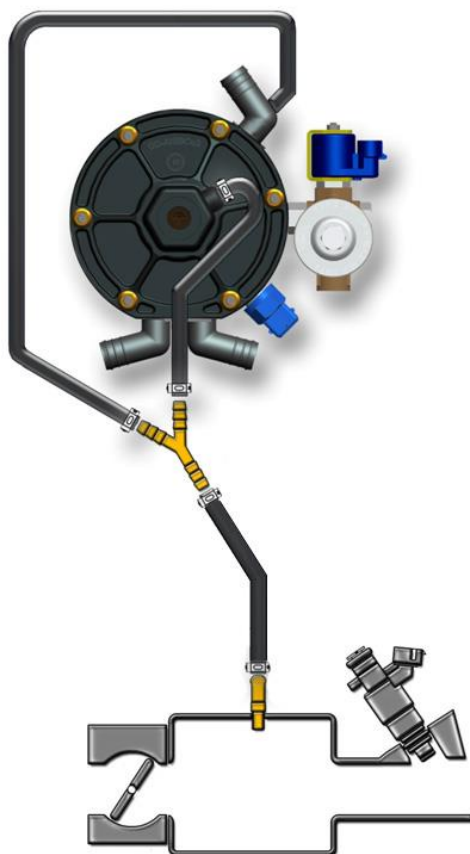
Cut and rotate top heater hose
Pipe connection 16x20mm



Inlet manifold



Overpressure / MAP connection



Remove the inlet manifold.

Drill **1** hole of **5mm** in the inlet manifold. Cut **M6x1** thread in these holes.

Place the VSI couplings with a lock compound in the inlet manifold.
Watch out that the lock compound doesn't come inside the VSI couplings.



Mounting the inlet manifold couplings

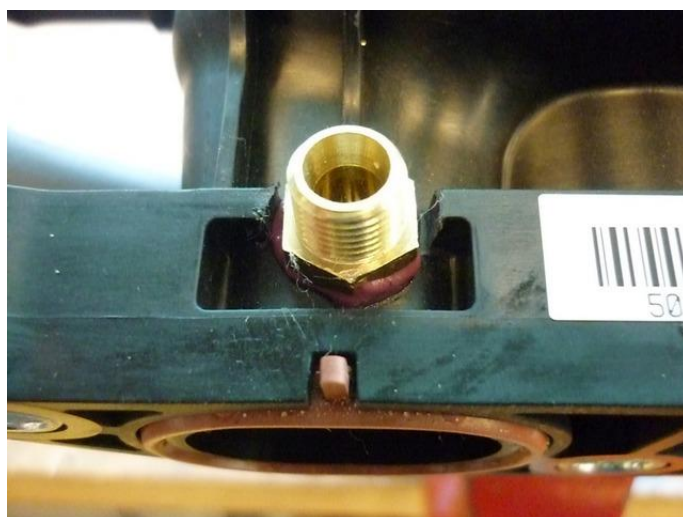
Remove the inlet manifold.

Drill 4 holes of **8.5mm** in the inlet manifold. Cut **M10x1** thread in these holes.

Place the VSI couplings with a lock compound in the inlet manifold.

Watch out that the lock compound doesn't come inside the VSI couplings.

Place the inlet manifold back on the engine.



First drill **4mm** holes into the manifold as shown.

Clear area around drilled hole, mill or Dremel.

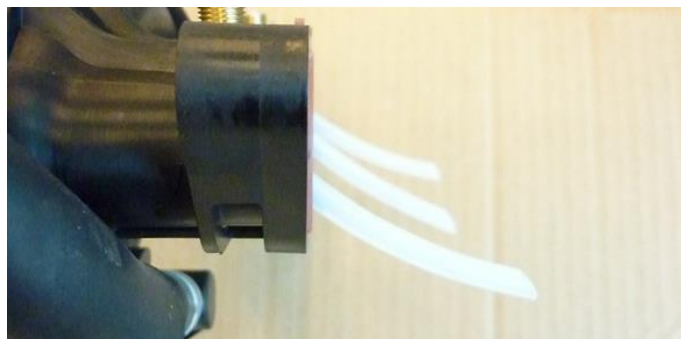
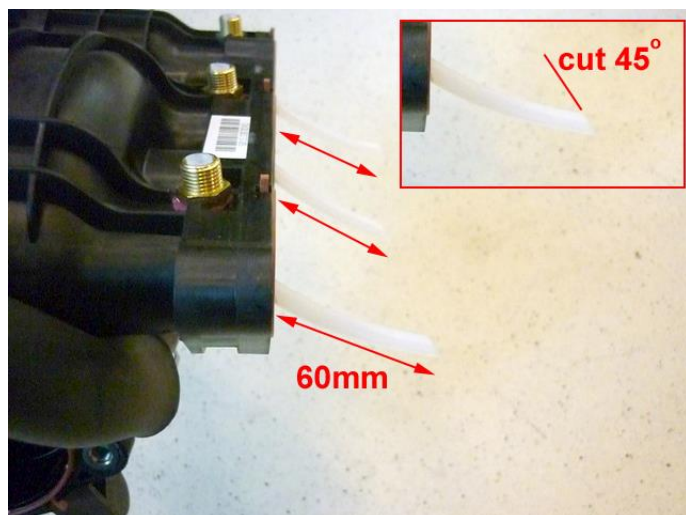
Drill up to **8.5mm** and cut **M10x1**.

Place the couplings with a lock compound in the inlet manifold.

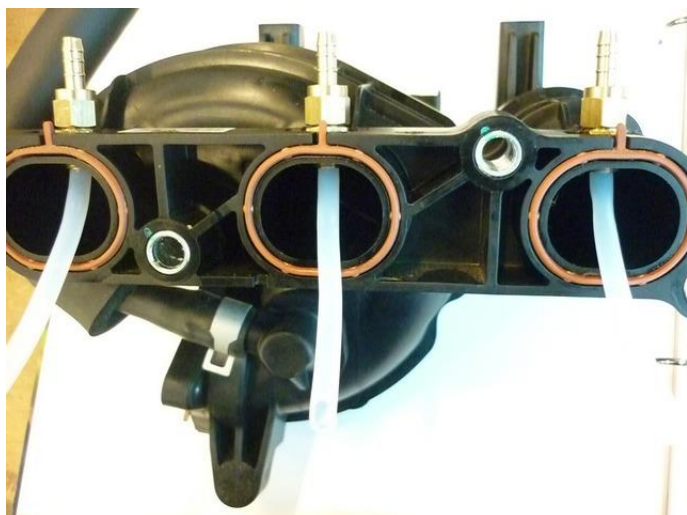
Watch out that the lock compound doesn't come inside the VSI couplings.

Place the inlet manifold back on the engine.

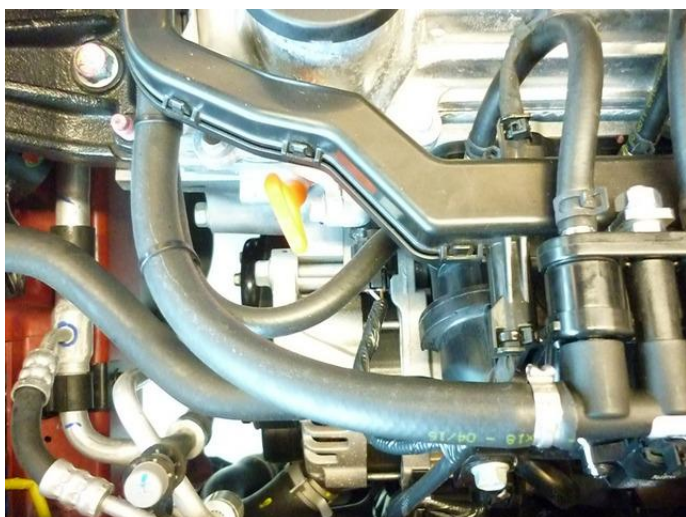
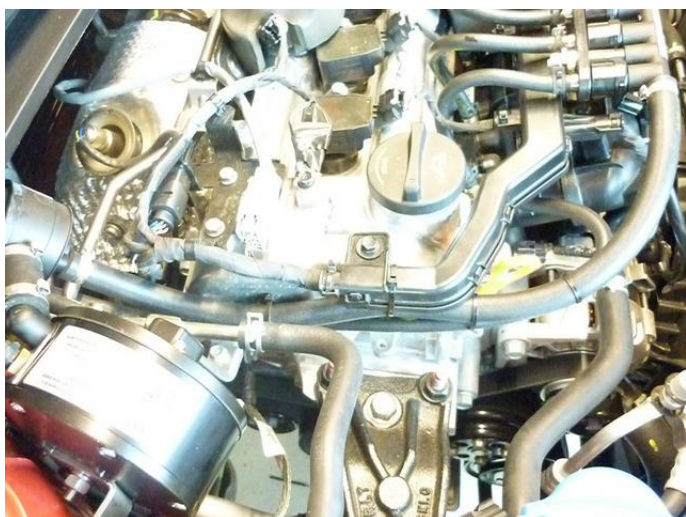
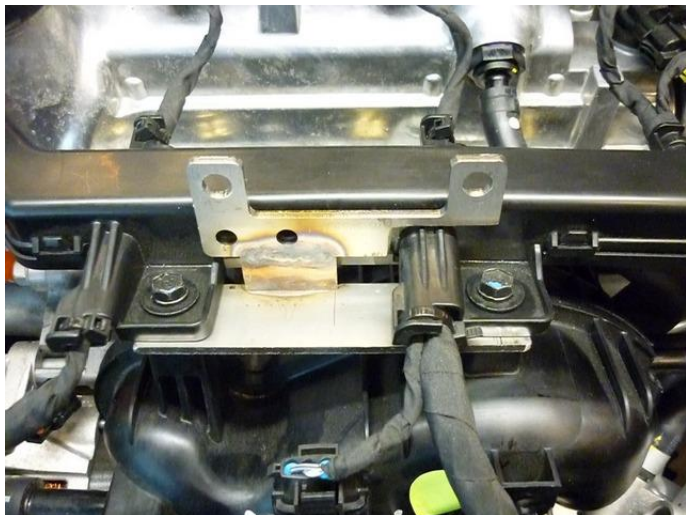
Mounting the inlet manifold hoses



Mounting the inlet manifold hoses



Mounting the VSI injector rail



LPG hoses

Hose (Ø..mm)	From component	To component	Hose length (cm)
16	Reducer	Prins filter unit	± 5
11	Prins filter unit	VSI injector rail	± 70
5	Reducer overpressure	Y-piece	± 10
5	Reducer MAP connection	Y-piece	± 10
5	Y-piece	Inlet manifold coupling (vacuum)	± 70
5	VSI injector 1	Inlet manifold coupling cyl.1	± 22
5	VSI injector 2	Inlet manifold coupling cyl.2	± 22
5	VSI injector 3	Inlet manifold coupling cyl.3	± 22
6		PTFE hose cyl.1	15 cut on length
6		PTFE hose cyl.2	15 cut on length
6		PTFE hose cyl.3	15 cut on length

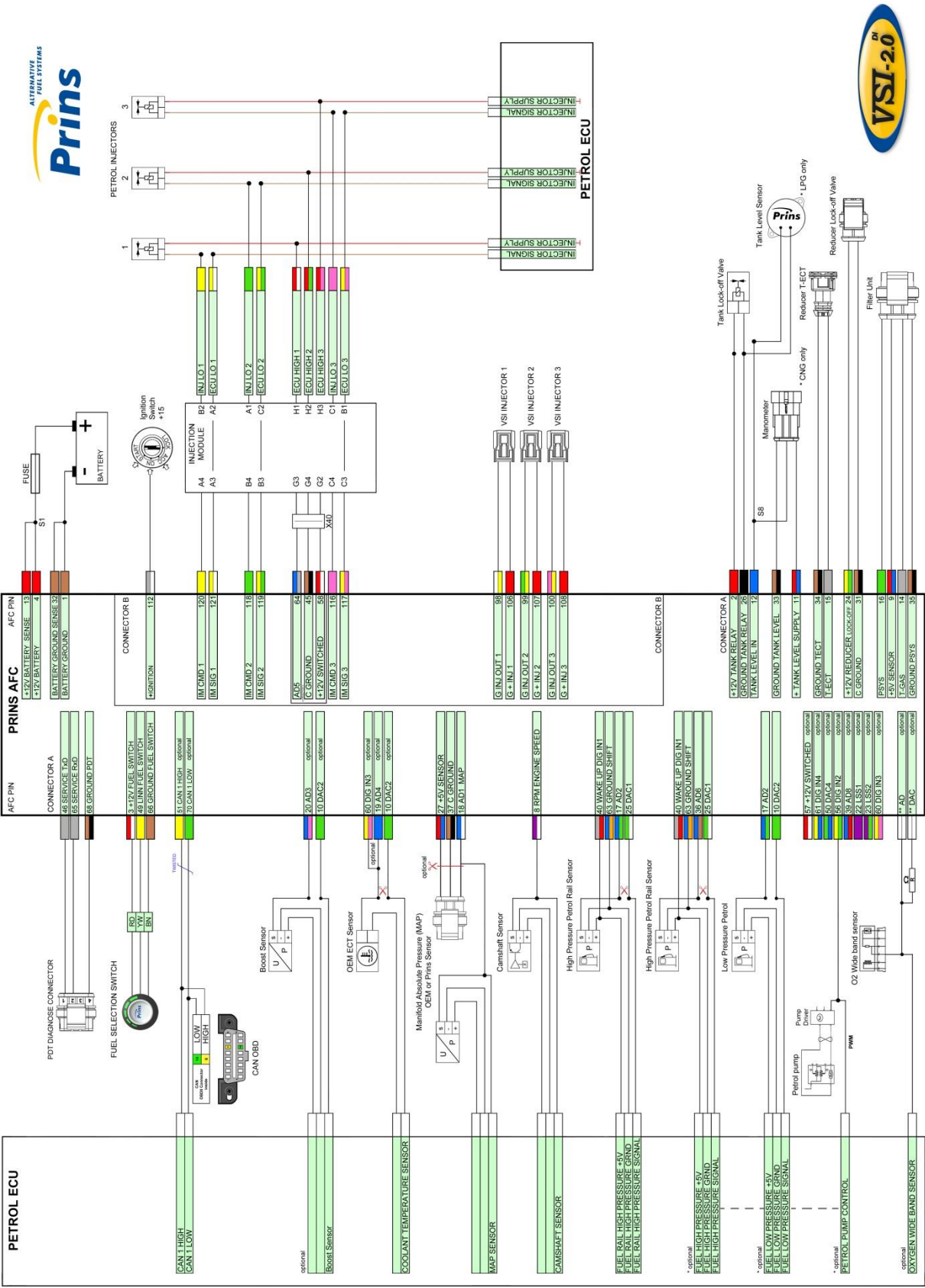
General info.

Cut the LPG hoses on length.
Cut the nylon hoses on length.

Please observe that there is no damage or fouling to the hoses.



Basic Wiring Diagram



Electrical connections – Insulate

10	DAC2	Green	<i>Insulate</i>
19	AD4	Blue	<i>Insulate</i>
20	AD3	Blue–pink	<i>Insulate</i>
22	LSS1	Purple	<i>Insulate</i>
23	LSS2	Purple-green	<i>Insulate</i>
36	AD6	Blue-brown	<i>Insulate</i>
38	AD7	Blue-light Blue	<i>Insulate</i>
39	AD8	Blue-red	<i>Insulate</i>
43	+12 Valve 2	Red-white	<i>Insulate</i>
50	DAC4	Green-blue	<i>Insulate</i>
60	DIG IN3	Yellow-pink	<i>Insulate</i>
61	DIG IN4	Yellow-blue	<i>Insulate</i>
62	C Ground	Brown-black	<i>Insulate</i>
74	DAC3	Green-pink	<i>Insulate</i>
<i>Insulate additional loose wires</i>			

3-pole connector		
11 + manometer	red	<i>Cut off connector and insulate wires</i>
12 tank level in	blue	
33 ground manometer	brown	

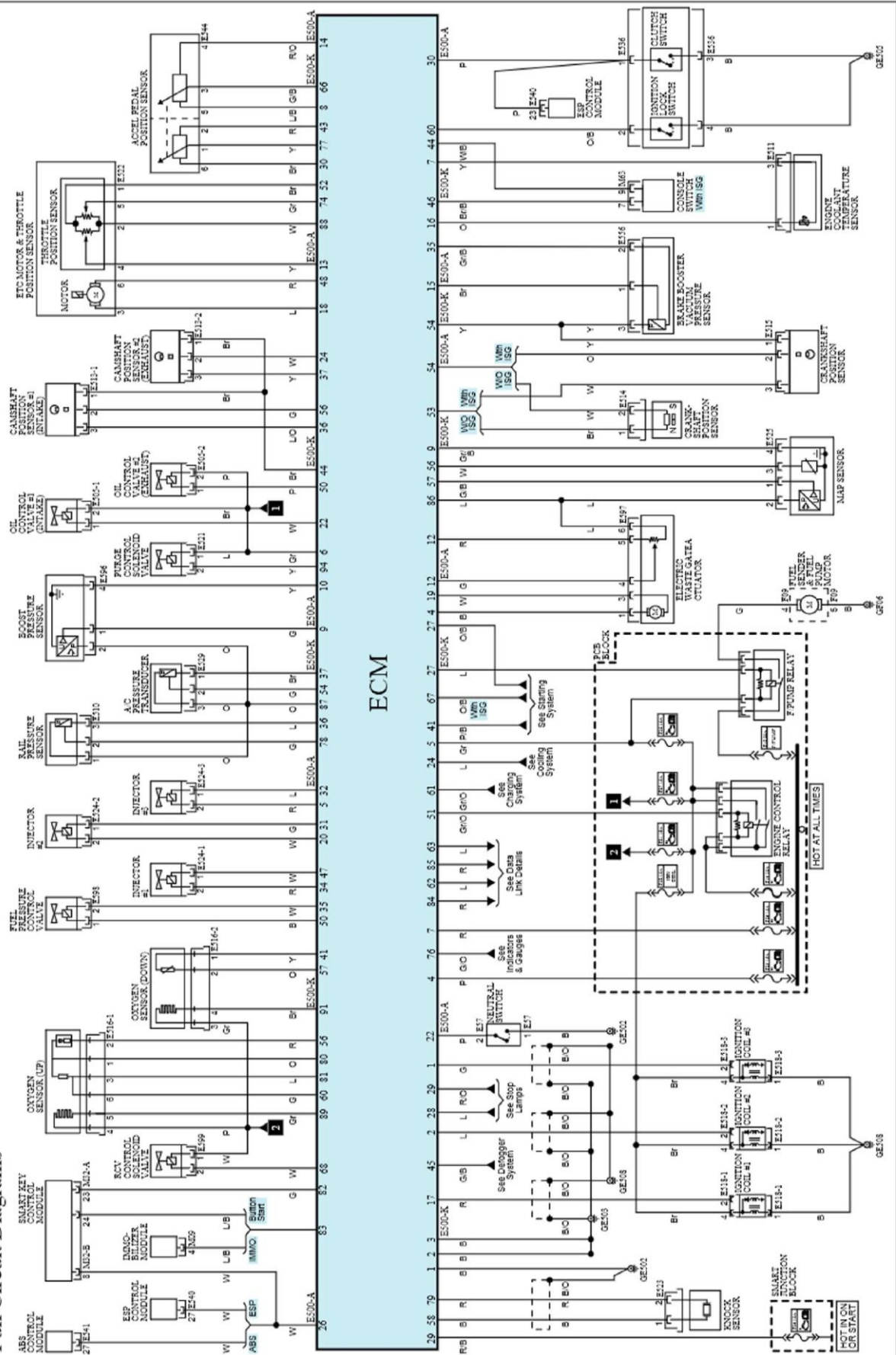


Wiring diagram Petrol ECU

SD313-43

Engine Control System (G3LC : KAPPA 1.0L T-GDI) (2)

Full Circuit Diagrams



Electrical connections Petrol ECU

2016 > G 1.0 T-GDI > G 1.0 T-GDI > Schematic Diagrams > Engine Electrical System

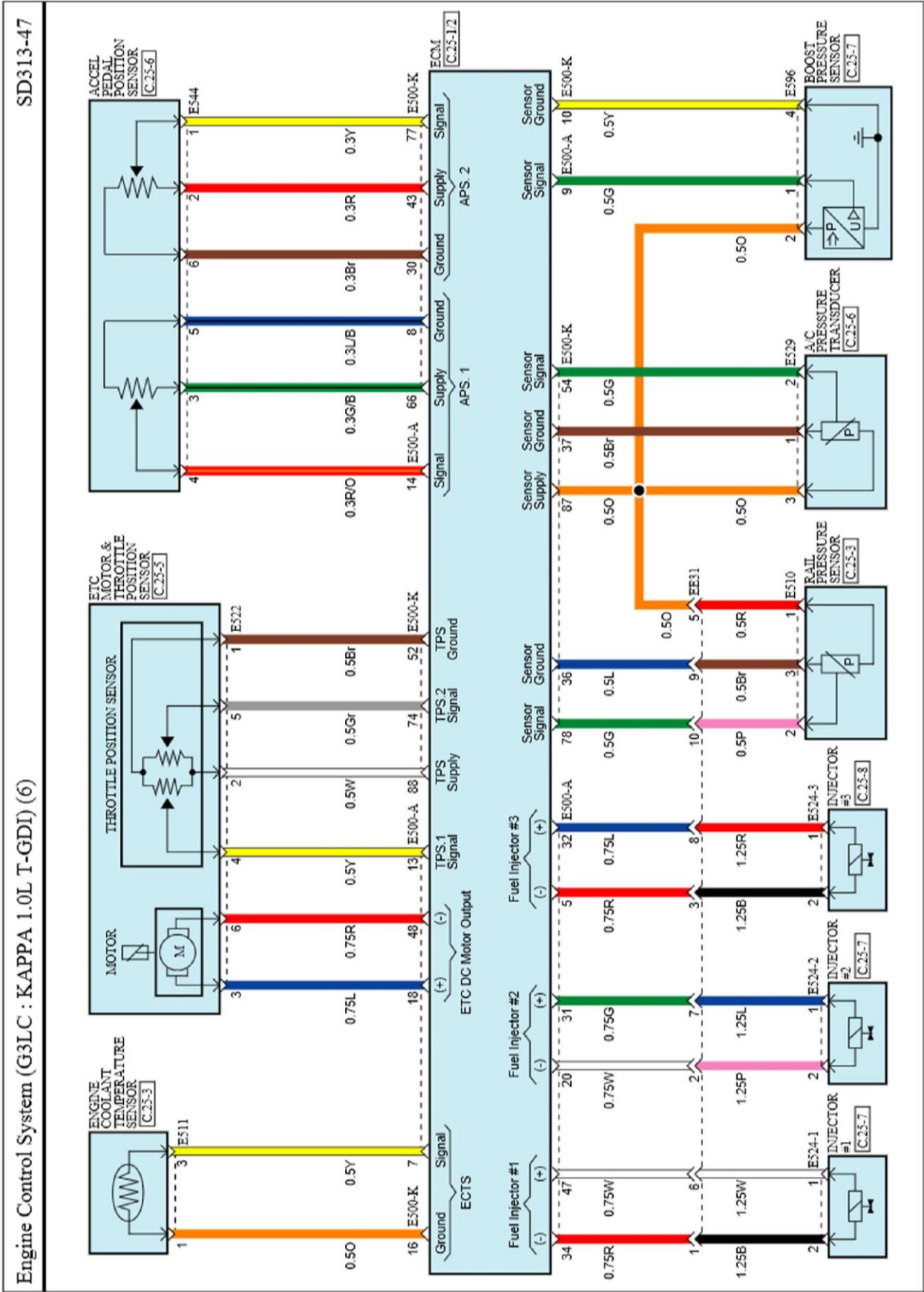
E500-A

PIN	COLOR	DESCRIPTION	PIN	COLOR	DESCRIPTION
1	G	Ignition Coil #3 Control	31	G	Injector #2 Control (+)
2	L	Ignition Coil #2 Control	32	L	Injector #3 Control (+)
3	-	-	33	-	-
4	B	EWGA DC Motor (+)	34	R	Injector #1 Control (-)
5	R	Injector #3 Control (-)	35	W	FPCV (-)
6	-	-	36	L/O	CMPS (Intake) Ground
7	Y	ECTS Signal	37	Y	CMPS (Exhaust) Ground
8	-	-	38	-	-
9	G	BPS Signal	39	-	-
10	-	-	40	-	-
11	-	-	41	Y	O2 Sensor (Down) Signal
12	G	EWGA Sensor F/B Signal	42	-	-
13	Y	TPS. 1 Signal	43	-	-
14	R/O	APS. 1 Signal	44	W/B	ISG OFF Switch
15	Br	BVS Signal	45	G/B	Electric Load Defroster
16	-	-	46	-	-
17	R	Ignition Coil #1 Control	47	W	Injector #1 Control (+)
18	L	ETC DC Motor Output (+)	48	R	ETC DC Motor Output (-)
19	W	EWGA DC Motor (-)	49	-	-
20	W	Injector #2 Control (-)	50	B	FPCV (+)
21	-	-	51	-	-
22	P	Neutral Switch	52	-	-
23	-	-	53	Br. W	CKPS Ground
24	W	CMPS (Exhaust) Signal	54	W, O	CKPS Signal
25	-	-	55	-	-
26	W	Vehicle Speed Input	56	W	CMPS (Intake) Signal
27	O/B	Engine Start Switch	57	O	O2 Sensor (Down) Ground
28	L	Brake Test Switch	58	-	-
29	R/O	Brake Light Switch	59	-	-
30	P	Clutch Switch	60	O/B	Ignition Lock Switch

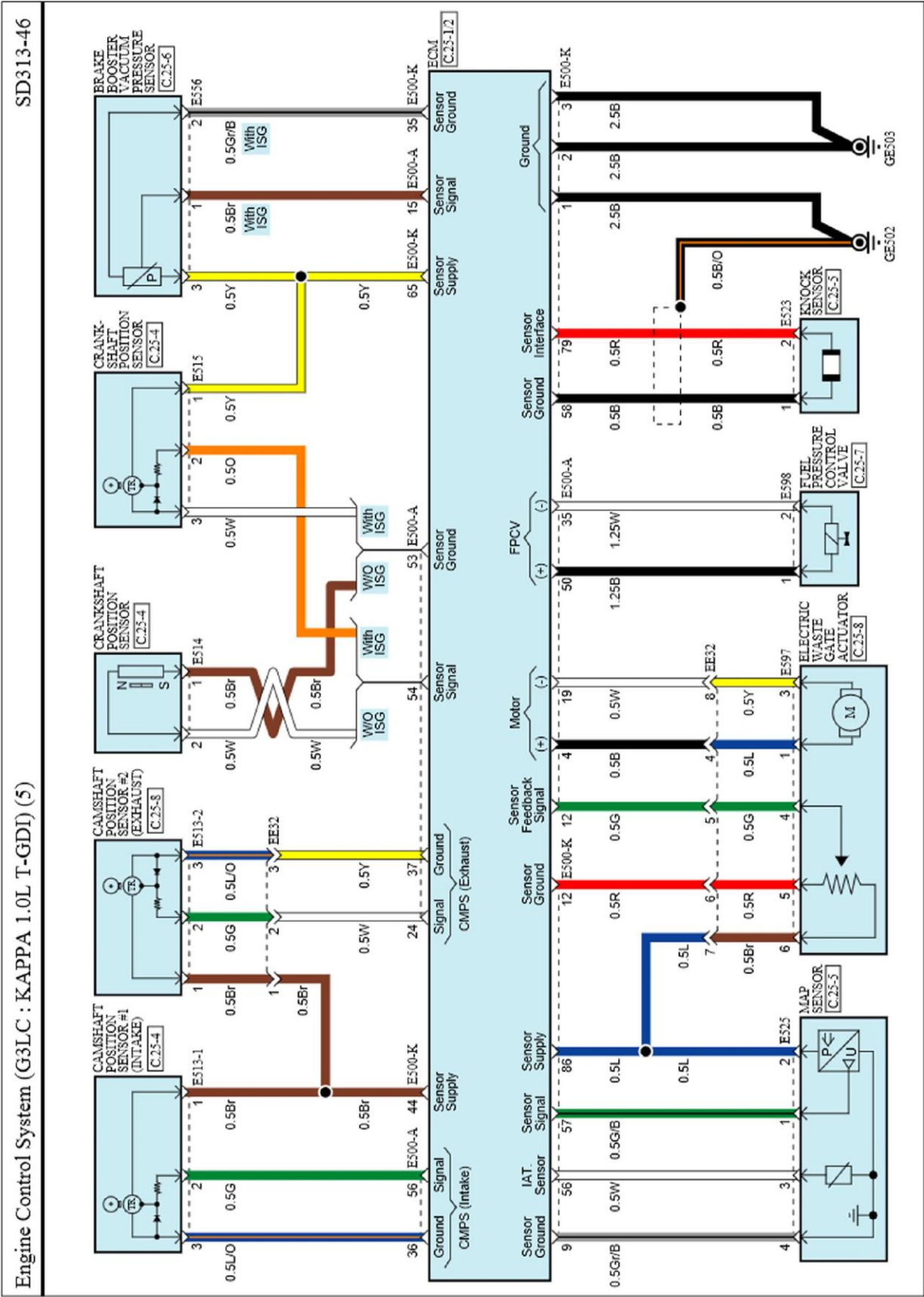
E500-K

PIN	COLOR	DESCRIPTION	PIN	COLOR	DESCRIPTION	PIN	COLOR	DESCRIPTION
1	B	Ground	33	-	-	65	Y	Sensor Supply (CKPS/BVS)
2	B	Ground	34	-	-	66	G/B	APS. 1 Supply
3	B	Ground	35	Gr/B	BVS Ground	67	O/B	Start Relay Control (High)
4	P	Memory Power	36	L	RPS Ground	68	W	Turbo Dump Valve
5	Gr	Engine Control Relay 'ON' Input	37	Br	APT Ground	69	-	-
6	Gr	Engine Control Relay 'ON' Input	38	-	-	70	-	-
7	R	Memory Power	39	-	-	71	-	-
8	L/B	APS. 1 Ground	40	-	-	72	-	-
9	Gr/B	MAP Sensor Ground	41	P/B	Start Relay Control (Low)	73	-	-
10	Y	BPS Ground	42	-	-	74	Gr	TPS. 2 Signal
11	-	-	43	R	APS. 2 Supply	75	-	-
12	R	EWGA Sensor Ground	44	Br	CMPS (INEX) Supply	76	G/O	Analog Fuel Level (Fuel Sender)
13	-	-	45	-	-	77	Y	APS. 2 Signal
14	-	-	46	Br/B	ISG OFF Switch IND.	78	G	RPS Signal
15	-	-	47	-	-	79	R	Knock Sensor Interface
16	O	ECTS Ground	48	-	-	80	O	O2 Sensor (Up) Virtual Ground
17	-	-	49	-	-	81	L	O2 Sensor (Up) Pumping Current
18	-	-	50	O	OCV #2 Control (Exhaust)	82	Gr	Engine RPM Output
19	-	-	51	Gr/O	Engine Control Relay Control	83	L/B	IMMO. Data Line
20	-	-	52	Br	TPS Ground	84	R	CCP-CAN (High)
21	-	-	53	-	-	85	R	C-CAN (High)
22	W	OCV #1 Control (Intake)	54	G	APT Signal	86	L	Sensor Supply (MAP/EWGA)
23	-	-	55	-	-	87	O	Sensor Supply (RPS/APT/BPS)
24	L	Cooling Fan Controller (FAN)	56	W	IAT. Signal	88	W	TPS Supply
25	-	-	57	G/B	MAP Sensor Signal	89	Gr	O2 Sensor (Up) Heater
26	-	-	58	B	Knock Sensor Ground	90	-	-
27	L	Fuel Pump Relay Control	59	R	O2 Sensor (Up) Nernst Voltage	91	Br	O2 Sensor (Down) Heater
28	-	-	60	G	O2 Sensor (Up) Trim Resistor	92	-	-
29	R/B	ON/START Input	61	Gr/O	LIN Communication	93	-	-
30	Br	APS. 2 Ground	62	L	CCP-CAN (Low)	94	Y	PCSV Control
31	-	-	63	L	C-CAN (Low)			
32	-	-	64	-	-			

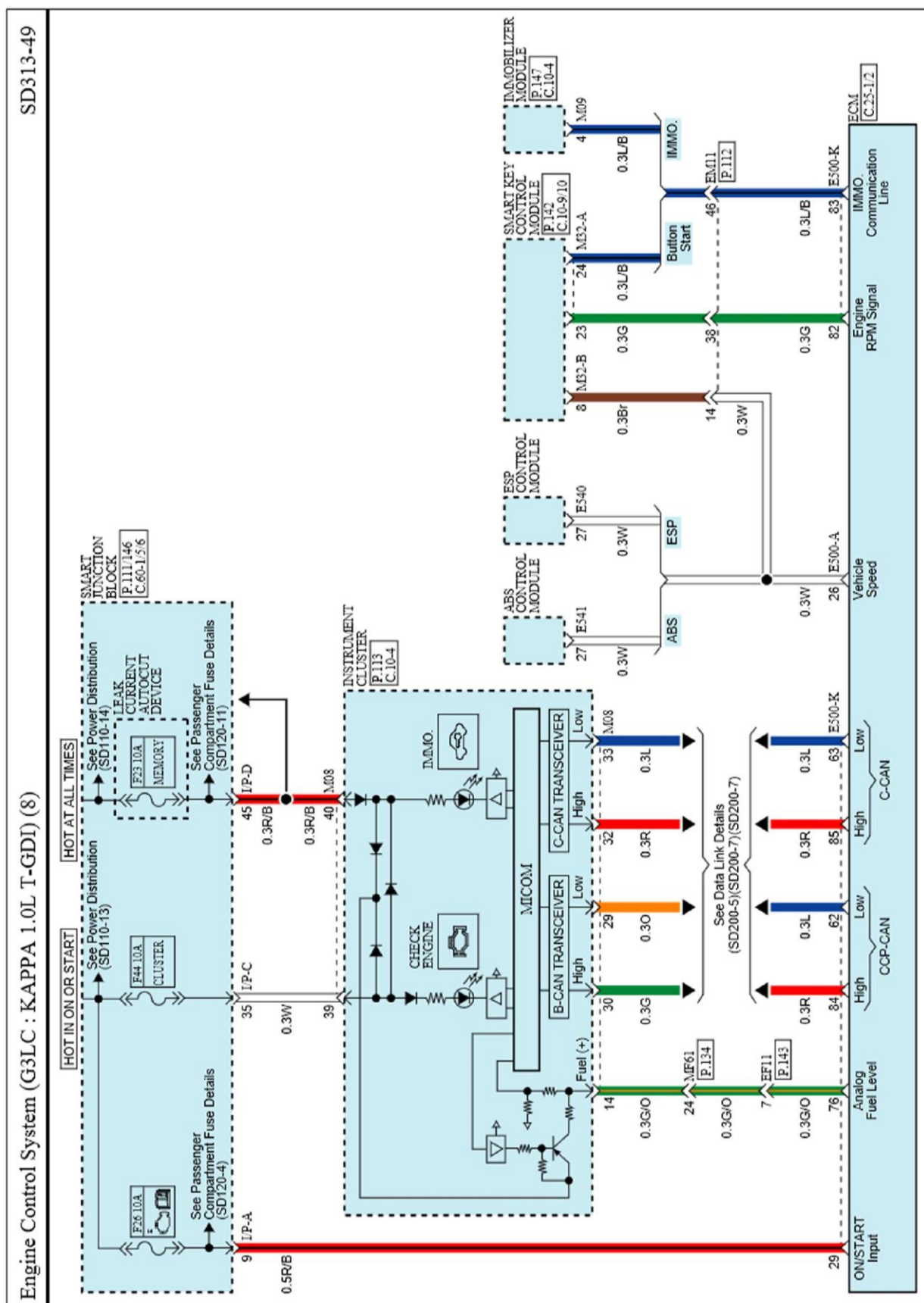
Wiring diagram Injectors / Rail pressure sensor



Wiring diagram MAP sensor / Camshaft sensor

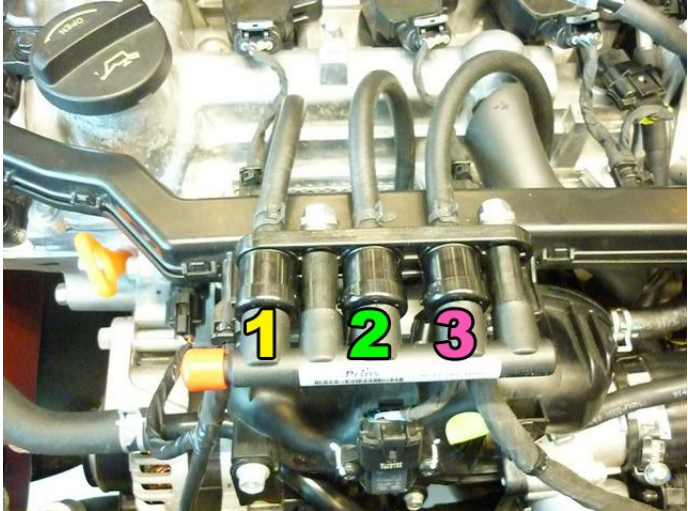


Wiring diagram C-CAN High/Low



Electrical connections

Check and measure the wiring in case of changes in the cars wiring colours.

Wire number / code	Wire colour	Connection
32 Ground sense 1 Ground battery	Brown Brown	Connect to the '-' of the battery; use a ring terminal. Wire location : next to fuse box, original batt-ground 
4 +12V Battery	Red	Do not place the fuse in the holder before having completed the installation of the LPG system. use a ring terminal Wire location : in fuse box. 
98 98 G INJ OUT 1 106 106 G + INJ 1	White-yellow red	Connector VSI-injector to cylinder 1. Timing belt side
99 99 G INJ OUT 2 107 107 G + INJ 2	Green-yellow red	Connector VSI-injector to cylinder 2.
100 100 G INJ OUT 3 108 108 G + INJ 3	Pink-yellow red	Connector VSI-injector to cylinder 3.
		

Electrical connections

Check and measure the wiring in case of changes in the cars wiring colours.



For measuring the petrol injectors :

Interrupt each petrol injector control wire (injector min)

Each VSI wire has a petrol injector / cylinder number printed on the wire, connect this wire to the corresponding petrol injector / cylinder.

Connect the **bicoloured** VSI measuring wire to the **ecu side**, (wire code: ecu-lo).

Connect the **corresponding full coloured** VSI wire to the **petrol injector side** (wire code: inj-lo).

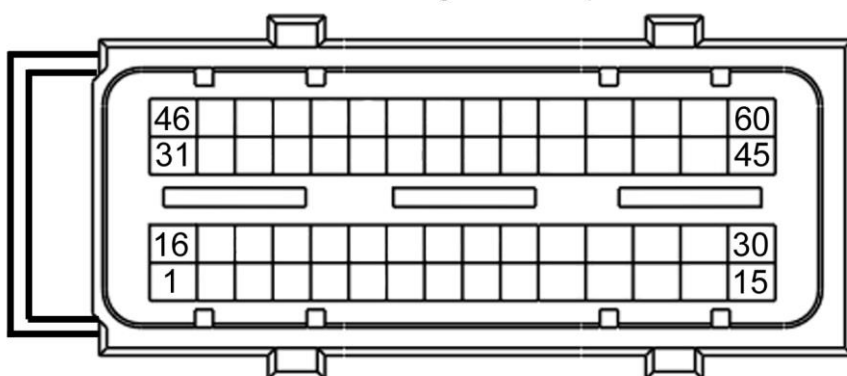
See diagrams: Installation manual general part 1 / 2.

Attention:

Each bicoloured measuring wire corresponds to a specific LPG injector and petrol injector / cylinder number. Do not interchange the wires.

VSI measure wire nr. :	Full coloured / Bicoloured Module position	Interrupt petrol injector wire
VSI wire inj/ecu-lo-1 Petrol injector cyl. 1	white / white-yellow B2 / A2	Colour : red Location : Petrol ECU, P60 , E500-A, pin 34
Module wire pos. H1 ECU HIGH A (cil. 1)	red-white H1	Colour : white Location : Petrol ECU, P60 , E500-A, pin 47
VSI wire inj/ecu-lo-2 Petrol injector cyl. 2	green / green-yellow A1 / C2	Colour : white Location : Petrol ECU, P60 , E500-A, pin 20
Module wire pos. H2 ECU HIGH A (cil. 2)	red-green H2	Colour : green Location : Petrol ECU, P60 , E500-A, pin 31
VSI wire inj/ecu-lo-3 Petrol injector cyl. 3	pink / pink-yellow C1 / B1	Colour : red Location : Petrol ECU, P60 , E500-A, pin 5
Module wire pos. H3 ECU HIGH A (cil. 3)	red-pink H3	Colour : blue Location : Petrol ECU, P60 , E500-A, pin 32

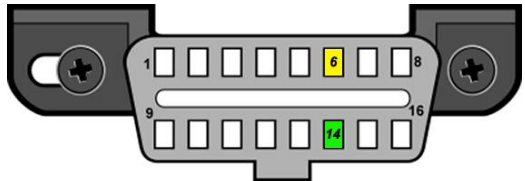
60P wiring view / top view



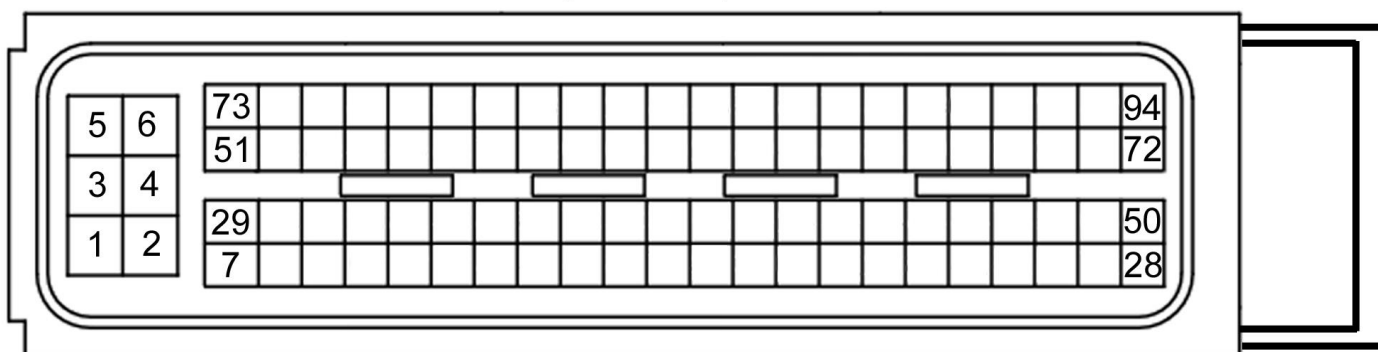
8	RPM engine speed	Purple-white	For measuring the engine speed.(cam intake) Wire colour : white or green Wire location : Petrol ECU, P60 , E500-A, pin 56
56	DI2	Yellow-green	Fuel Pressure Control Valve (FPCV). Wire colour : black Wire location : Petrol ECU, P60 , E500-A, pin 50

Electrical connections

Check and measure the wiring in case of changes in the cars wiring colours.

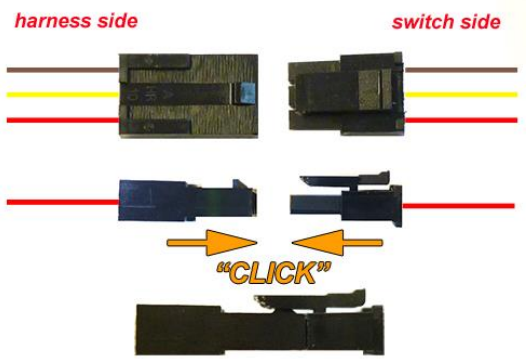
112 + Ignition	Red-grey	Make a connection to ignition + / contact +. Do not place the fuse in the holder before having completed the installation of the LPG system. Wire colour : red-black Wire location : Petrol ECU, P94, E500-K, pin 29
63 Ground shift	Blue-orange	High pressure petrol sensor signal ground. Wire colour : blue Wire location : Petrol ECU, P94, E500-K, pin 36
3-pole connector 27 +5V Sensor 37 C ground 18 AD1	Cut-off connector Red-blue Brown-black Blue-white	For measuring the inlet manifold pressure (MAP). Insulate Insulate Wire colour : green-black Wire location : Petrol ECU, P94, E500-K, pin 57
17 AD2 25 DAC1	Blue-green Green-white	High pressure petrol sensor signal interruption. Sensor side. ECU side. Wire colour : green Wire location : Petrol ECU, P94, E500-K, pin 78
40 Wake-up	Grey-red	High pressure petrol sensor 5Volt supply / car wake-up. Wire colour : orange Wire location : Petrol ECU, P94, E500-K, pin 87
51 CAN1 High 70 CAN1 Low	Yellow Green	Connect to EOBD diagnose connector OR to Petrol ECU Pin : 6 Pin : 14 
51 CAN1 High 70 CAN1 Low	Yellow Green	Twisted Red, Petrol ECU, P94, E500-K, pin 63 Twisted Blue, Petrol ECU, P94, E500-K, pin 85

94P wiring view / top view



Electrical connections

Driver room

3-pole micro connector		Connect to switch.
66 Ground fuel switch	Brown-black	
3 +12V fuel switch	Red-white	Connect the 3-pole connector to the Prins fuel selection switch
49 LIN fuel switch	Yellow	
		

Electrical connections

Connectors in wiring loom

2-pole blue connector 15 T-ECT 34 Ground T-ECT	Grey Brown-black	For measuring the engine coolant temperature (Tect). Connect the connector to the reducer temperature sensor.
4-pole connector 35 Ground Psys 14 T-Gas 9 +5 Volt sensor 16 Psys	Brown-black Grey Red-blue Green	For measuring gas pressure and temperature. Connect the connector to the filter unit sensor.
2-pole connector 24 +12V reducer lock-off 31 C Ground	Yellow-green Brown-black	Connect the connector to the reducer lock-off valve.
4-pole connector 46 Service TxD 65 Service RxD 68 Ground PDT	Grey Grey Brown-black	Diagnose connector.
Tank wiring loom 2 +12V Tank relay 12 Tank level IN 26 Ground tank relay	red blue black	Connect to the tank lock-off. Connect the tank level gauge. Connect to the tank lock-off.
Wiring loom link 45 C ground 58 +12V switched 64 AD5	Brown-black Red-white Blue-grey	Connection from AFC connector A to connector B.

Optional:

3-pole connector 11 + manometer 12 tank level in 33 ground manometer	red blue brown	Cut off connector and insulate wires
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Checklist after installation

1. Connect the Prins Diagnostic Tool and run the VSI diagnostic program.
Install the VSI fuse, turn the ignition key in the accessory position.
When working on the car, beware of moving and rotating parts in the engine compartment.
2. When commissioning the LPG system, you must activate the VSI computer with the diagnostic software. When the VSI computer has not been activated, the switch will keep blinking.
To activate the VSI computer, select function activate ECM in the diagnostic software.
3. Check whether the program in the VSI computer matches with the car (dedicated engine set) :
Refer the car description in the diagnostic software (Basic → Identification) and compare these with the set number.
4. The system will switch over to LPG as soon as the temperature of the coolant becomes higher than parameter 70 - Switch over ECT.
5. Check all components and connections for any gas leakage (use a LPG leak detector device or a fluid detection like soap). Caution for moving and rotating parts in the engine compartment !
6. Let the engine run warm on petrol >80°C.
Check if the evaporator heats up.
Check the engine signals, petrol injection time, RPM, ECT, lambda, MAP signal, petrol pressure signal.
Let the engine run idle on LPG.
Adjust the evaporator pressure. Refer to Basic → System in the diagnostic software for the idle level value set.
Adjust the evaporator pressure in such a way that the pressure measured (P-sys) equals the idle level value.
Turn the socket-head screw at the front of the evaporator to adjust the pressure.
An error code will be generated whenever the pressure variation is too high.
7. Use the diagnostic software to check again all input and output signals.
8. Check the system for error codes and solve these, if required.
Check the petrol ECM for EOBD error codes.
Place the protection connector on the VSI communication connector.
9. Take a test drive and check the drivability on LPG and petrol.

