

KMS

MD35 Wiring

Part nr: 01-01-01-0007



Kronenburg Management Systems

Contents

	page.
1 Pin output	4
2 Main wiring	6
2.1 Main wiring notes	7
2.2 Specification	8
2.2.1 Fuses	8
2.2.2 Wire thickness	8
2.3 Double function wiring	9
2.3.1 Aircos system wiring	9
2.3.2 Diagnostic out wiring	9
2.3.3 A.L.S. wiring	10
2.3.4 Hall → inductive converter	10
3 Appendix A1: Ignition system wiring	11
3.1 1 cylinder engines.....	11
3.1.1 1 cyl. single coil (without amplifier)	11
3.1.2 1 cyl. single coil (with amplifier)	11
3.2 2 cylinder engines.....	11
3.2.1 2 cyl. dis-coil (without amplifier), firing order: 1-2.....	11
3.2.2 2 cyl. dis-coil (with amplifier), firing order: 1-2	12
3.2.3 2 cyl. single coils (without amplifier), firing order: 1-2,	12
3.2.4 2 cyl. single coils (without amplifier), firing order: Simultaneous	12
3.2.5 2 cyl. single coils (with amplifier), firing order: 1-2,	12
3.2.6 2 cyl. single coils (with amplifier), firing order: Simultaneous	13
3.3 3 cylinder engines.....	13
3.3.1 3 cyl. single coils (without amplifier), firing order: 1-2-3	13
3.3.2 3 cyl. single coils (with amplifier), firing order: 1-2-3.....	13
3.4 4 cylinder engines.....	13
3.4.1 Single coil, single distributor (without amplifier)	13
3.4.2 Twin coil, twin distributor (without amplifier)	14
3.4.3 4 cyl. dis-coil (without amplifier), firing order: 1-3-4-2	14
3.4.4 4 cyl. dis-coil (with amplifier), firing order: 1-3-4-2.....	14
3.4.5 4 cyl. single coils (without amplifier), firing order: 1-3-4-2.....	14
3.4.6 4 cyl. single coils (with amplifier), firing order: 1-3-4-2	15
3.4.7 4 cyl. single coils (without amplifier), direct fire (Cam sensor needed).....	15
3.4.8 4 cyl. single coils (with amplifier), direct fire (Cam sensor needed)	15
3.5 5 cylinder engines.....	16
3.5.1 5 cyl. single coils (without amplifier), firing order: 1-2-4-5-3	16
3.5.2 5 cyl. single coils (with amplifier), firing order: 1-2-4-5-3	16
3.6 6 cylinder engines.....	16
3.6.1 Single coil, single distributor (without amplifier)	16
3.6.2 Twin coil, twin distributor (without amplifier)	17
3.6.3 6 cyl. line dis-coil (without amplifier), firing order: 1-5-3-6-2-4	17
3.6.4 V6 dis-coil (without amplifier), firing order: 1-4-3-6-2-5	17
3.6.5 6 cyl. line dis-coil (with amplifier), firing order: 1-5-3-6-2-4.....	17
3.6.6 V6 dis-coil (with amplifier), firing order: 1-4-3-6-2-5	18
3.6.7 6 cyl. line single coils (without amplifier), firing order: 1-5-3-6-2-4.....	18
3.6.8 V6 single coils (without amplifier), firing order: 1-4-3-6-2-5	18
3.6.9 6 cyl. line single coils (with amplifier), firing order: 1-5-3-6-2-4.....	19
3.6.10 V6 single coils (with amplifier), firing order: 1-4-3-6-2-5	19
3.6.11 6 cyl. line single coils (without amplifier), direct fire (Cam sensor needed)	19
3.6.12 V6 single coils (without amplifier), direct fire (Cam sensor needed)	20
3.6.13 6 cyl. line single coils (with amplifier), direct fire (Cam sensor needed)	20
3.6.14 V6 single coils (with amplifier), direct fire (Cam sensor needed).....	20
3.7 8 cylinder engines.....	21
3.7.1 Single coil, single distributor (without amplifier)	21
3.7.2 V8 dis-coils (without amplifier), firing order: 1-5-4-8-6-3-7-2	21
3.7.3 V8 dis-coils (with amplifier), firing order: 1-5-4-8-6-3-7-2.....	21
3.7.4 V8 single coils (without amplifier), firing order: 1-5-4-8-6-3-7-2	22

3.7.5	V8 single coils (with amplifier), firing order: 1-5-4-8-6-3-7-2	22
3.8	10 cylinder engines (equal firing angles: 72°)	23
3.8.1	V10 single coils (without amplifier), firing order: 7-8-5-2-1-10-9-4-6-3	23
3.8.2	V10 single coils (with amplifier), firing order: 7-8-5-2-1-10-9-4-6-3.....	23
3.9	12 cylinder engines	24
3.9.1	V12 single coils (without amplifier), firing order: 1-7-5-11-3-9-6-12-2-8-4-10....	24
3.9.2	V12 single coils (with amplifier), firing order: 1-7-5-11-3-9-6-12-2-8-4-10	25
4	Appendix A2: Analog aux wiring	26
4.1	Analog aux input	27
4.2	Auxiliary (aux) outputs.....	28



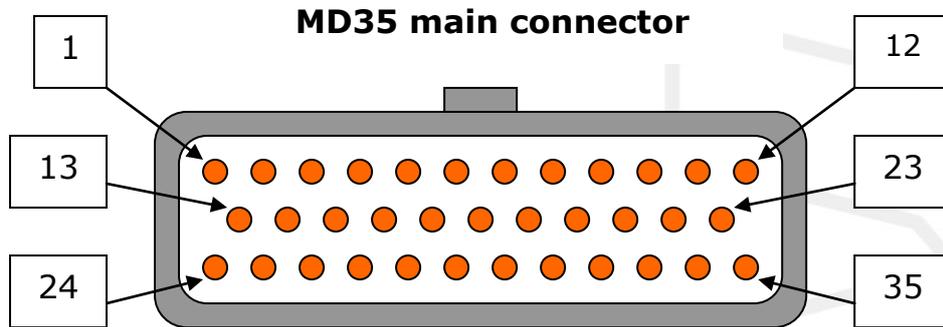
This document contains detailed information on how to connect the KMS MD35 ECU for multiple applications. Additional information, user manuals and software can be found on our website: <http://kms.vankronenburg.nl> or on the software CD included with the ECU.

1 Pin output

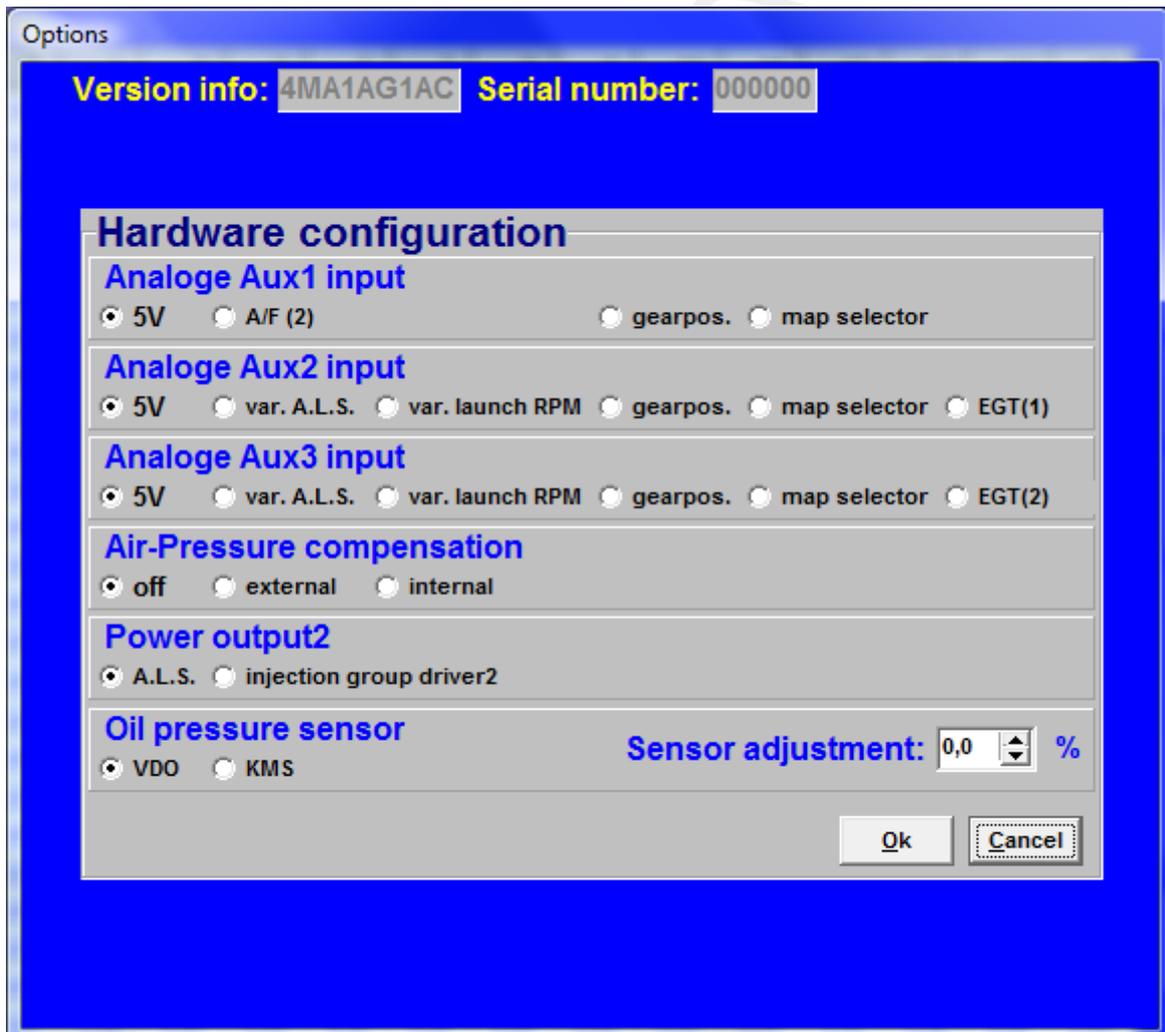
The main connector of the MD35 consists out of 35 pins. Each pin has its own function which can be seen in the overview below including wire colours and thickness.

Pin nr.	Colour	Wire thickness	Function
1	white	0,5 mm ²	CAN High
2	green	0,5 mm ²	CAN Low
3	orange/black	0,5 mm ²	Boost Control
4	yellow/red	0,5 mm ²	Idle Control
5	white/black	0,5 mm ²	Fuel pump relay
6	yellow/green	0,5 mm ²	Diagnostic out / Ignition output 6
7	blue	0,5 mm ²	Aux 1 out
8	pink	0,5 mm ²	Aux 2 out
9	yellow/red	0,5 mm ²	Aux 3 out
10	white/black	0,75 mm ²	Power output2: Injector output 2 / A.L.S.
11	white	0,75 mm ²	Injector output 1
12	red	0,75 mm ²	12V injector supply
13	orange	0,5 mm ²	Ignition output 1
14	green	0,5 mm ²	Ignition output 2
15	purple	0,5 mm ²	Ignition output 3
16	pink	0,5 mm ²	Ignition output 4
17	blue	0,5 mm ²	Ignition output 5
18	red/black	0,5 mm ²	Tacho output
19	black	0,5 mm ²	Sensor ground: water / air / MAP / TPS / etc.
20	yellow	0,5 mm ²	5V sensor supply
21	yellow/black	0,5 mm ²	Launch control
22	green/red	0,5 mm ²	Powershift / Airco
23	black	0,5 mm ²	ECU ground
24	orange/red	0,5 mm ²	Analog aux 3: A.L.S. / launch / gearpos / map selector / EGT(2)
25	purple/red	0,5 mm ²	Analog aux 2: A.L.S. / launch / gearpos / map selector / EGT(1)
26	pink/black	0,5 mm ²	Oil pressure signal
27	grey/blue	0,5 mm ²	Water temperature signal
28	red/blue	0,5 mm ²	Air temperature signal
29	grey/black	0,5 mm ²	MAP signal
30	grey	0,5 mm ²	TPS signal
31	white	0,5 mm ²	Lambda signal 1
32	white/red	0,5 mm ²	Analog aux 1: Lambda signal 2 / gearpos / map selector
33	red	0,5 mm ² (shielded)	Crank-sensor signal inductive
34	red/green	0,5 mm ²	Hall input: Crank / Cam
35	red	0,75 mm ²	12V ECU

The pin numbers can be read on the back of the main connector of the MD35. These numbers can also be seen in the following drawing, seen from the back of the main connector or front of the MD35 ECU.

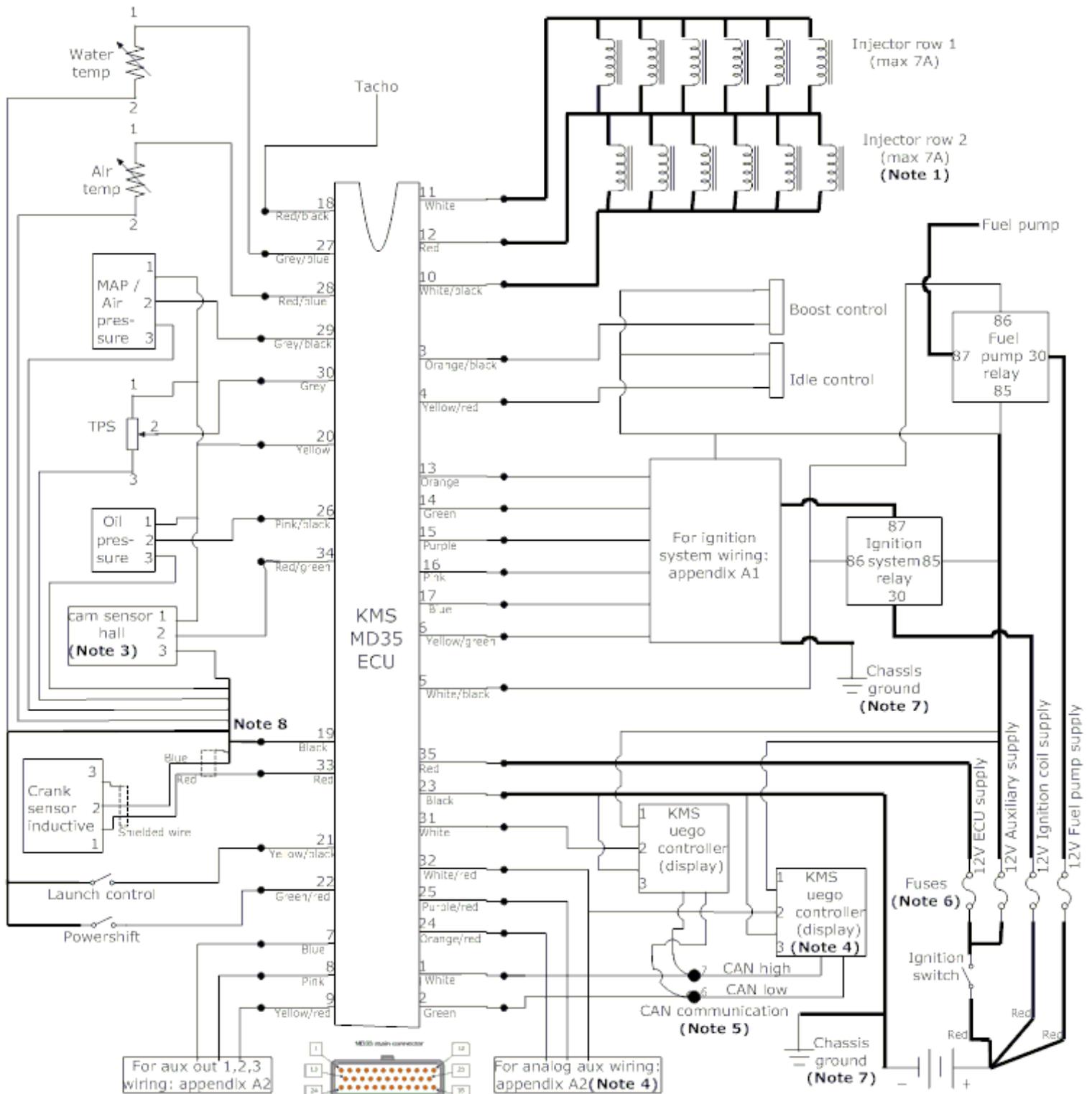


Some functions for certain pin outputs, must be defined in the hardware configuration of the ECU. When you are in the main screen of the software program, go to 'options (F4)' and then click 'hardware configuration'. The following screen will appear where different applications/sensors can be selected for each function/pins.



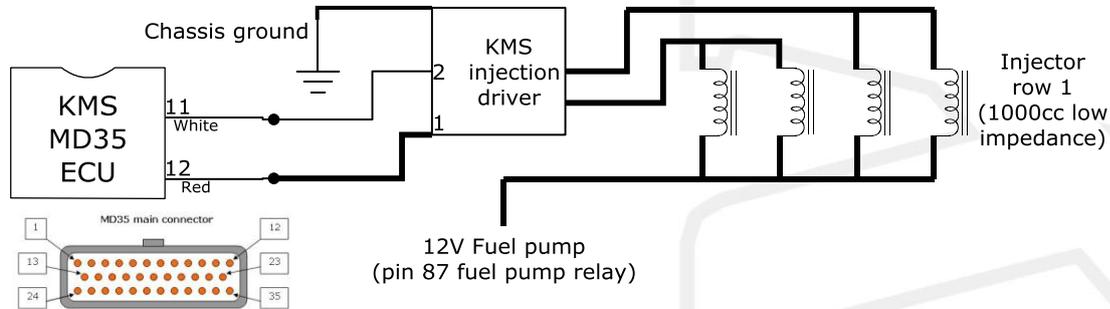
2 Main wiring

Below the main wiring diagram is shown on how to connect the MD35 ECU to different sensor and actuators. This is a universal diagram which can be used for any type of engine, except for the connection of the ignition system and auxiliary analog inputs. These are described in the appendixes for different types of engines and applications. Wire colours are mentioned for each pin of the MD35 ECU and can also be seen on page 3, together with the wire thickness.



2.1 Main wiring notes

Note 1: The injector output can deliver a maximum current of 7A. This means that a maximum of 6 high impedance (≥ 12 Ohm) injectors can be used on one injector output (pin 11 or 12). When using low impedance injectors (< 12 Ohm) or more than 6 high impedance injectors on one injector output, an external KMS injection driver needs to be used. KMS injection drivers can take up to a maximum of 10A per output. For connection of the injection driver, see detailed drawing below. See also chapter 2.2 'Specification'.



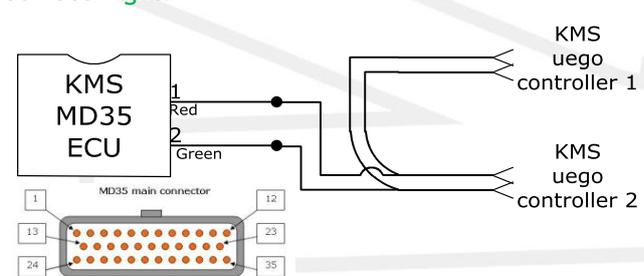
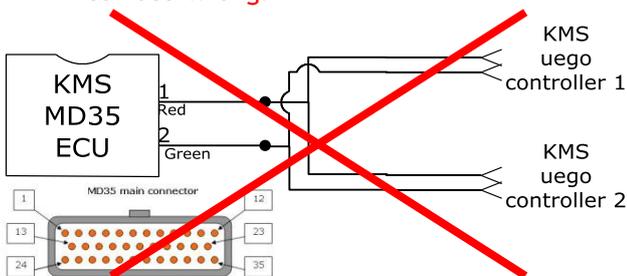
Note 3: A hall sensor can be used for measuring the cam position. Depending on the type of hall sensor being used, a 5 or 12V supply may be needed. When using a hall sensor as crank sensor, the hall sensor should be connected to the hall input (pin 34). See also chapter 2.3.4.

Note 4: Pin 32 can either be used for lambda signal 2 (KMS uego display/controller or standard lambda sensor) or an analog aux 1 function. This must be set in the hardware configuration of the MD35 software. See also appendix A2.

Note 5: When using a KMS uego CAN controller/display, the controller/display can be connected to the MD35 via CAN communication for a more accurate and faster operation of the lambda control. This also makes it possible to connect multiple controllers at the same time on the CAN bus, saving valuable inputs on the MD35 ECU. **Warning:** When connecting multiple controllers on the CAN bus, the CAN wires must not be split/branched in a Y-shape to the connectors. The wires may only be split/branched at the CAN connector in a 'serial' configuration. See drawings below and the manuals of the CAN controller and display for more information:

Incorrect/wrong:

Correct/right:



Note 6: The value/capacity of the fuse is dependent on the total maximum current of the electrical components connected. See chapter 2.2 'Specification' for deterring the fuse values.

Note 7: Preferably put all ground connections (except coil ground!) on the same chassis point, to prevent a difference in potential between the grounds. **Warning:** The coil ground should be connected to the chassis on a separate point to prevent remaining ignition currents from transferring to the ECU system.

Note 8: All sensor grounds (including the shield of the crankshaft wires) must be soldered together at one point as close as possible to the main connector. The connecting point should then be wired to the main connector by one single wire.

2.2 Specification

2.2.1 Fuses

As described before, the value/capacity of the fuse for each voltage supply is dependent on the total maximum current of the electrical components connected. The following steps need to be taken to determine the capacity/value of the fuse for each 12V supply:

1. Calculate the maximum current by adding the currents below for the applications in use.

Application:	Current:
ECU (including all sensors and inputs)	1A
Aux out 1	1A
Aux out 2	1A
Aux out 3	1A
KMS uego display/controller	4A
Boost control	1A
Idle control	1A
EGT (analog aux in)	1A
Single ignition coil	10A/single coil
4 cyl. dis ignition coil	20A
6 cyl. dis ignition coil	30A
Fuel pump	Depending on fuel pump being used, use manufacturers recommendations.
Injectors high impedance (≥ 12 Ohm)	1A/injector
Injectors low impedance (< 12 Ohm)	When using low impedance injectors or more then 6 high impedance injectors on one injector output, measure the resistance over the injectors to determine the current.

2. After calculating the current, multiply this value by 1,2. The result is the **minimum** value/capacity of the fuse. The applied fuse should be the subsequent standard fuse value. (Standard fuse values: 2.5, 5, 7.5, 10, 15, 20, 25)

For example:

12V ECU fuse: $ECU + 8$ high impedance injectors = $9A * 1,2 = 10,8A$: minimum fuse value, so use in this case a 15A fuse for the 12V ECU.

12V Auxiliary supply: (2x) KMS uego display + boost control + idle control + EGT + Auxout1 + Auxout2 + Auxout3 = $14A * 1,2 = 16,8A$: minimum fuse value, so use in this case a 20A fuse for the 12V Auxiliary.

12V Ignition coil supply: (2x) 4 cyl. dis ignition coil = $40A * 1,2 = 48A$. When connecting 2 dis ignition coils, two separate 12V supply's should be made (see also appendix A1): $48A / 2 = 24A$: minimum fuse value, so use in this case two 25A fuses for both 12V Ignition coil supply's.

12V Fuel pump supply: fuel pump = 20A (according to manufacturer).

2.2.2 Wire thickness

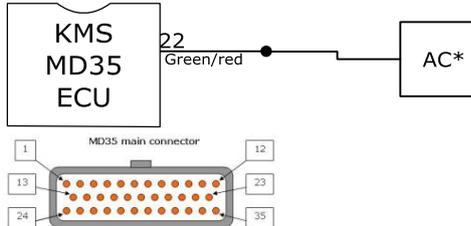
The following wire thicknesses should be maintained for the maximum continuous currents through the wires:

Maximum current:	Wire thickness:
3A	0,5 mm ²
7,5A	0,75 mm ²
15A	1 mm ²
25A	1,5 mm ²

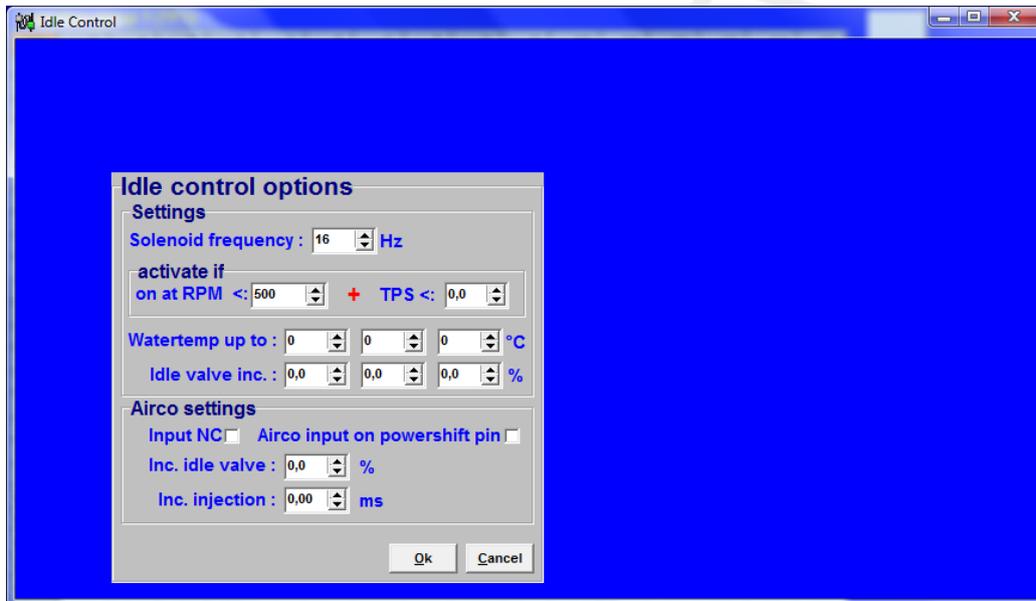
2.3 Double function wiring

2.3.1 Airco system wiring

Compensation of the airconditioning system load on the engine can be controlled by the MD35 ECU by adjusting fuel and idle valve in order to maintain a constant idle R.P.M. of the engine. Therefore the signal wire of the airconditioning should be connected/wired to the MD35 to make sure the ECU knows when the airconditioning is on. The signal wire of the airconditioning should be connected to the powershift (pin 22) connection, meaning that powershift can no longer be used.

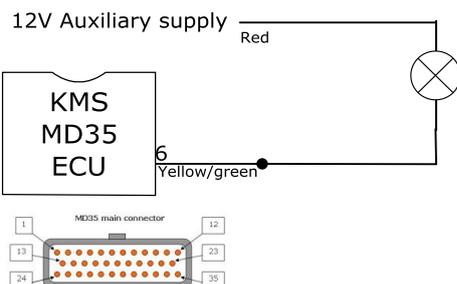


For activating the airconditioning compensation in the software, in the main screen go to the 'idle control tables' (F6) → 'idle control options'. The following screen will appear where airco settings can be made.



2.3.2 Diagnostic out wiring

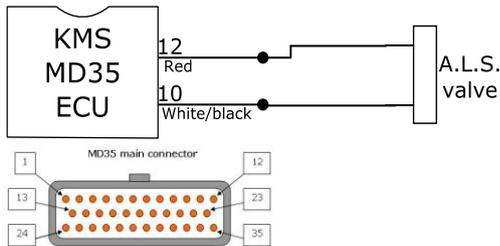
The MD35 has the option to notify that lambda control is deactivated by error. When ignition output 6 is not used, pin 6 will automatically change to a diagnostic output. If you attach the ground of a (diagnostic) light to the diagnostic output (pin6), the light will go on when the lambda control is deactivated or has a problem. Below the wiring of the diagnostic output is shown.



2.3.3 A.L.S. wiring

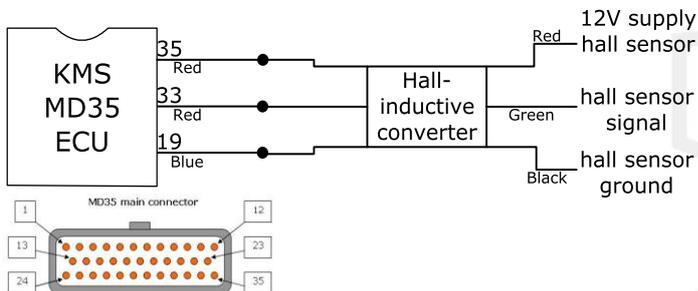
The Anti Lag System (A.L.S.) needs to be connected to the ‘power output2’ (pin 10). This output can also be used as a second injector output. In case the A.L.S. is connected, the output can no longer be used as an injector output. Defining the use of ‘power output2’ can be done in the software under ‘options (F4)’ → ‘Hardware configuration’.

Warning: When using staged or banked injectors make sure that the ‘power output2’ in the hardware configuration is set to ‘injection group driver2’ before the ignition is switched on, to prevent possible flooding of the engine.



2.3.4 Hall → inductive converter

When a hall sensor is used at the crank, a hall-to-inductive converter needs to be used. The converter can be connected directly to the main connector of the ECU or KMS crank signal cable (the black wire, shield ground, of the KMS crank signal cable will not be used in this case) and hall sensor. Wiring of the hall → inductive converter is shown in the illustration below.

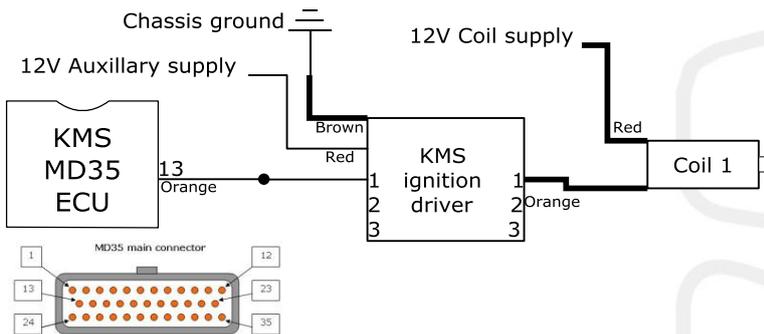


3 Appendix A1: Ignition system wiring

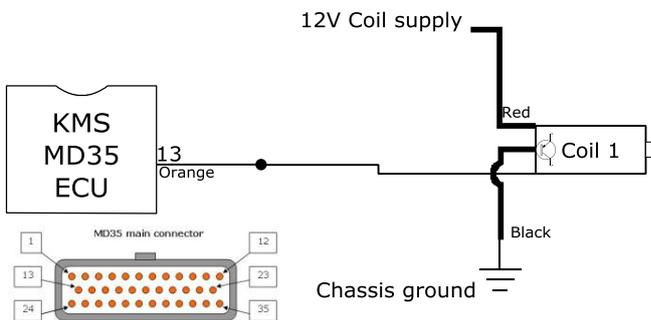
The connection/wiring of the ignition system depends on the type of ignition system and engine being used. The following diagrams illustrate the wiring for different ignition systems on different types of engines.

3.1 1 cylinder engines

3.1.1 1 cyl. single coil (without amplifier)

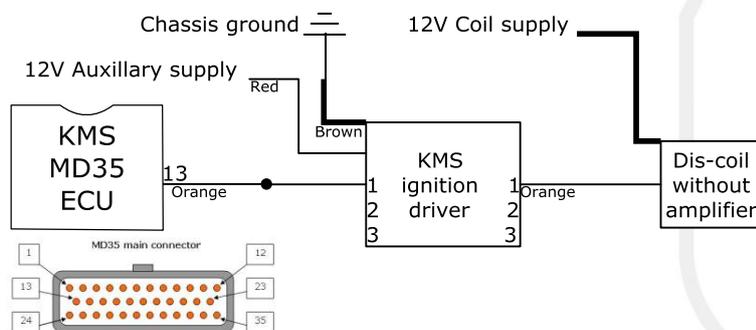


3.1.2 1 cyl. single coil (with amplifier)

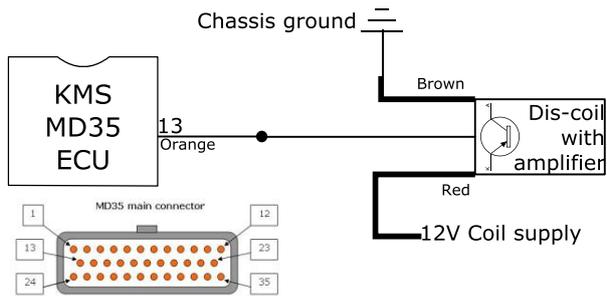


3.2 2 cylinder engines

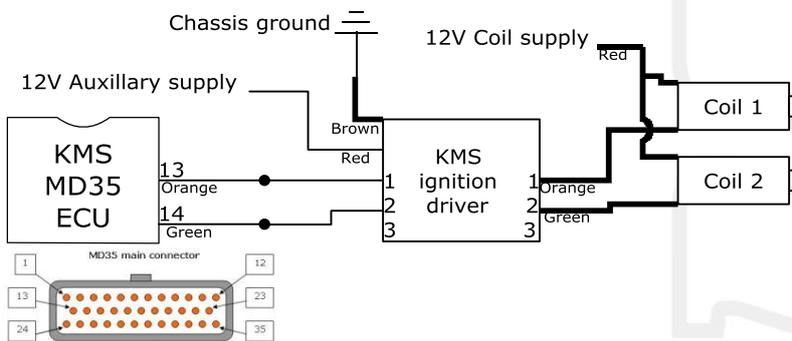
3.2.1 2 cyl. dis-coil (without amplifier), firing order: 1-2



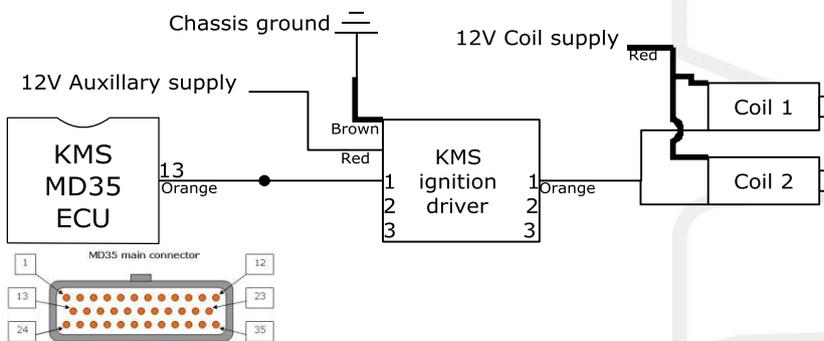
3.2.2 2 cyl. dis-coil (with amplifier), firing order: 1-2



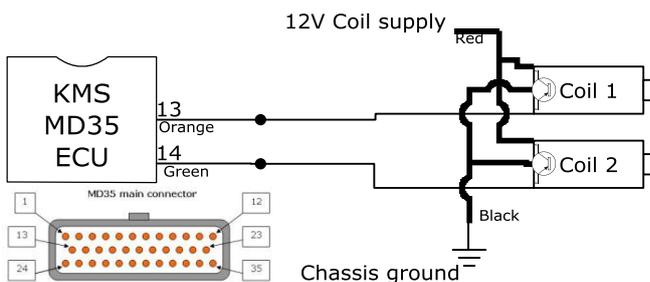
3.2.3 2 cyl. single coils (without amplifier), firing order: 1-2, Firing angle: 45°, 90° or 180°



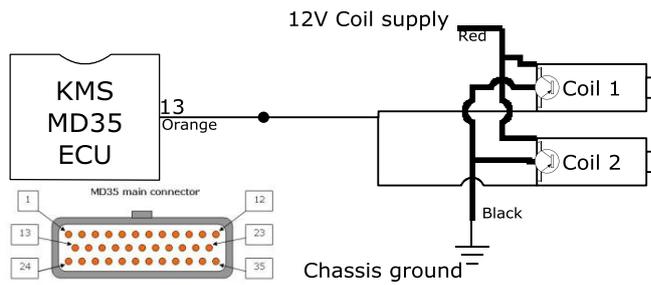
3.2.4 2 cyl. single coils (without amplifier), firing order: Simultaneous



3.2.5 2 cyl. single coils (with amplifier), firing order: 1-2, Firing angle: 45°, 90° or 180°

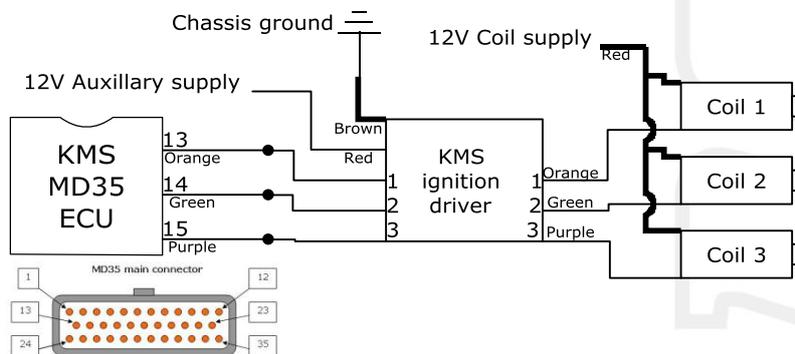


3.2.6 2 cyl. single coils (with amplifier), firing order: Simultaneous

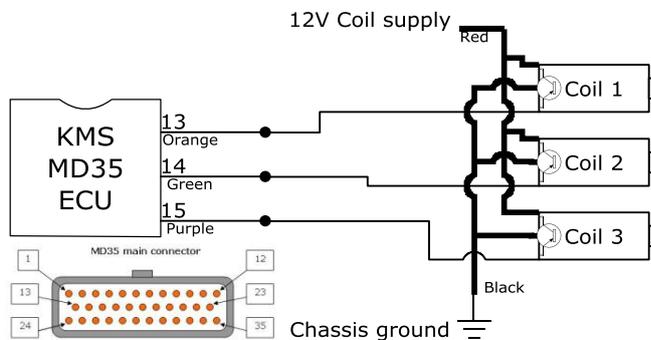


3.3 3 cylinder engines

3.3.1 3 cyl. single coils (without amplifier), firing order: 1-2-3

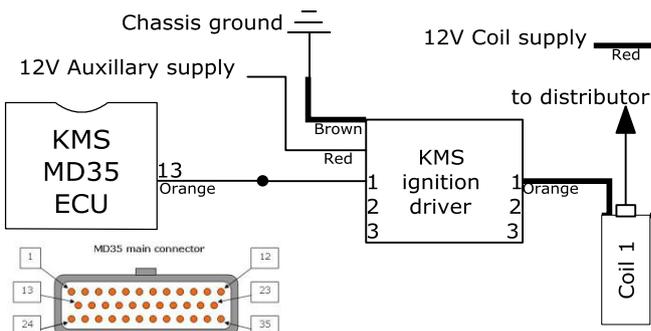


3.3.2 3 cyl. single coils (with amplifier), firing order: 1-2-3

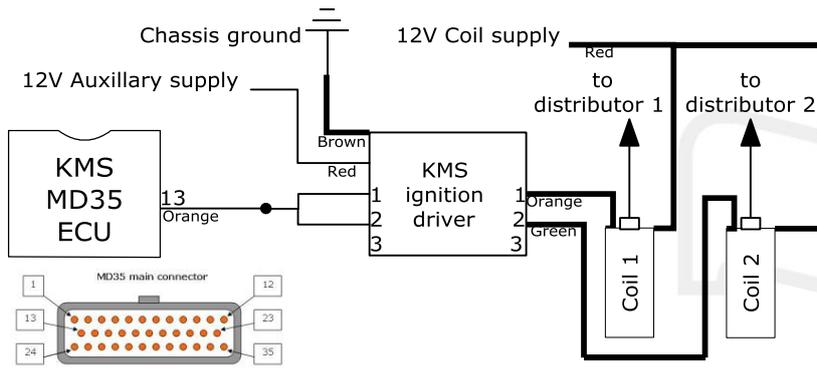


3.4 4 cylinder engines

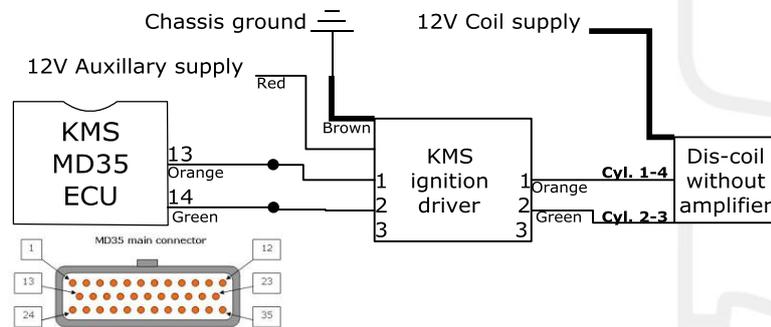
3.4.1 Single coil, single distributor (without amplifier)



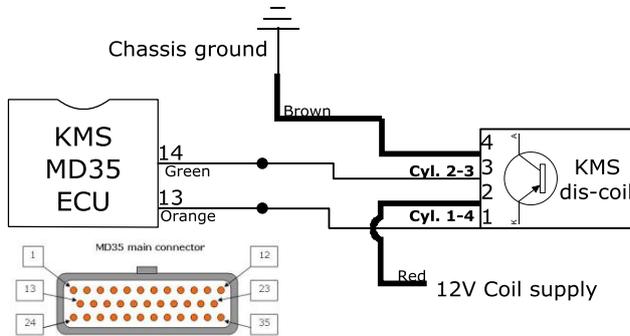
3.4.2 Twin coil, twin distributor (without amplifier)



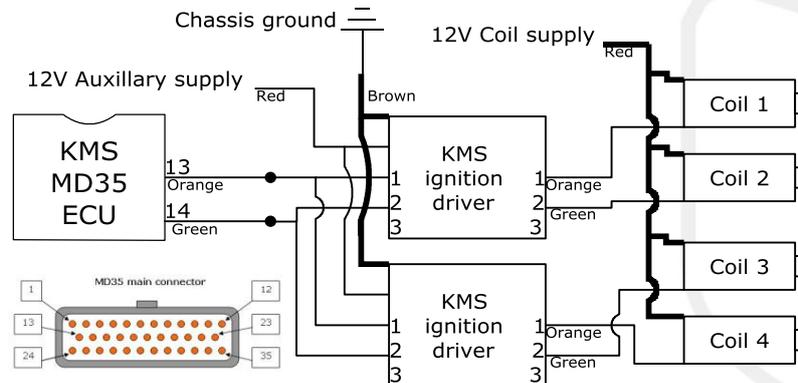
3.4.3 4 cyl. dis-coil (without amplifier), firing order: 1-3-4-2



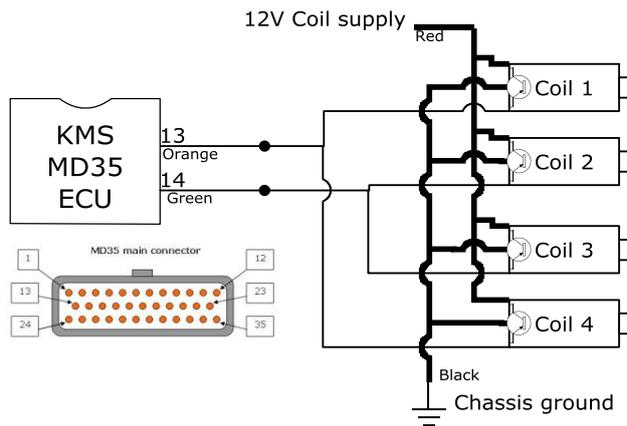
3.4.4 4 cyl. dis-coil (with amplifier), firing order: 1-3-4-2



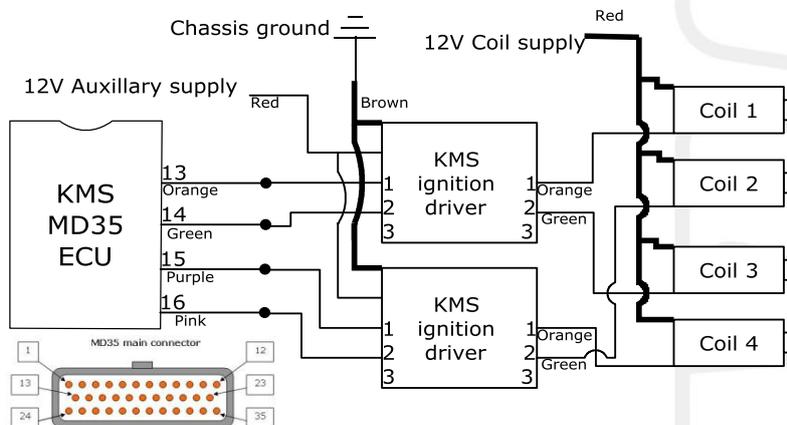
3.4.5 4 cyl. single coils (without amplifier), firing order: 1-3-4-2



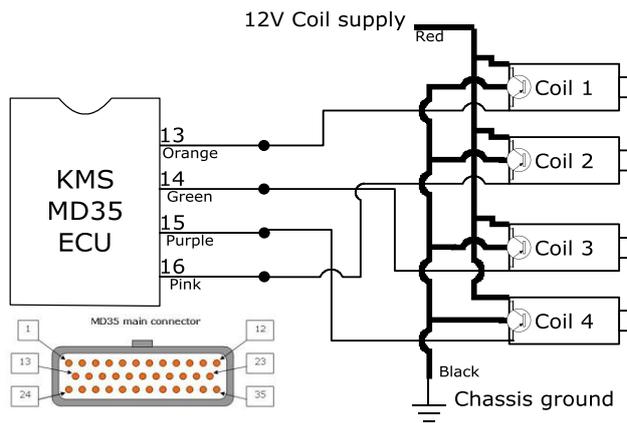
3.4.6 4 cyl. single coils (with amplifier), firing order: 1-3-4-2



3.4.7 4 cyl. single coils (without amplifier), direct fire (Cam sensor needed)

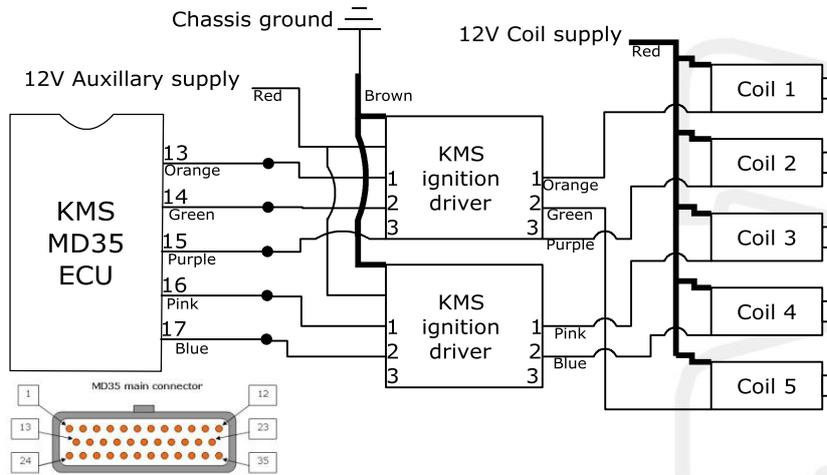


3.4.8 4 cyl. single coils (with amplifier), direct fire (Cam sensor needed)

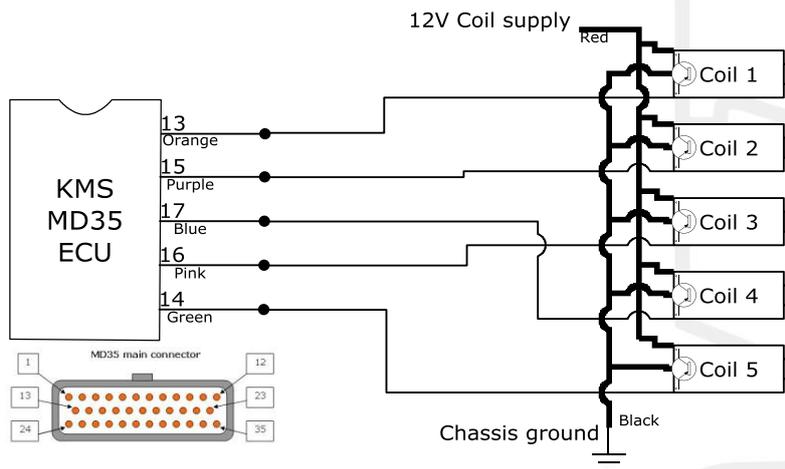


3.5 5 cylinder engines

3.5.1 5 cyl. single coils (without amplifier), firing order: 1-2-4-5-3

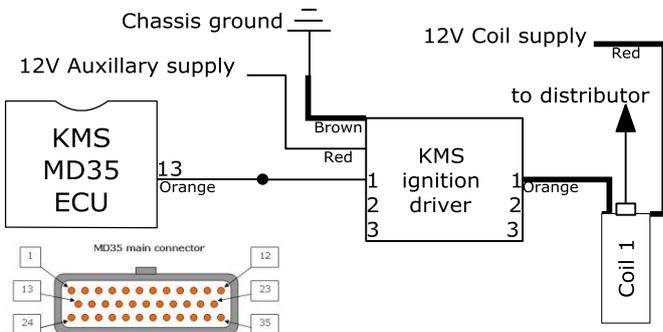


3.5.2 5 cyl. single coils (with amplifier), firing order: 1-2-4-5-3

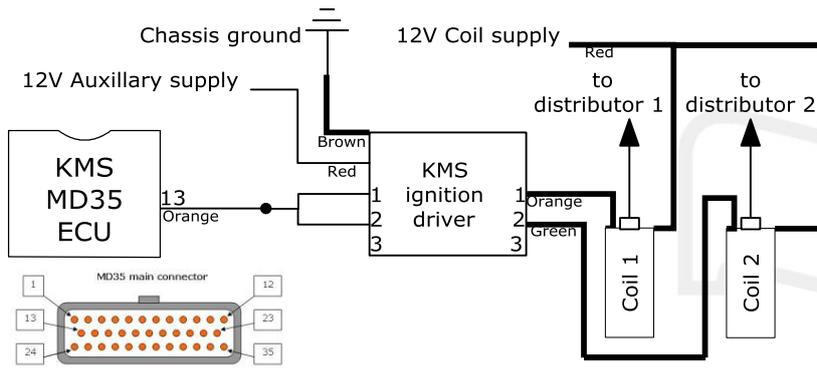


3.6 6 cylinder engines

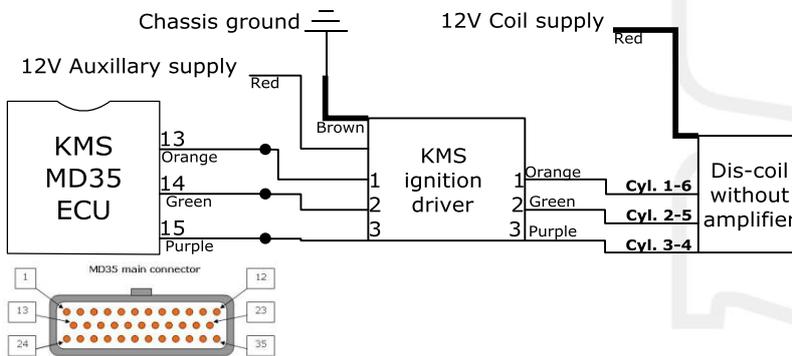
3.6.1 Single coil, single distributor (without amplifier)



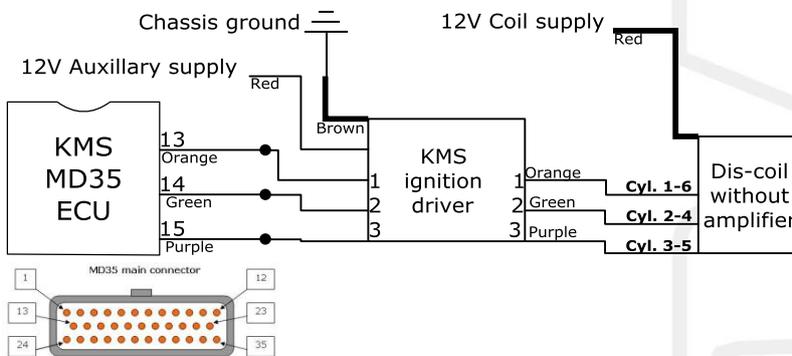
3.6.2 Twin coil, twin distributor (without amplifier)



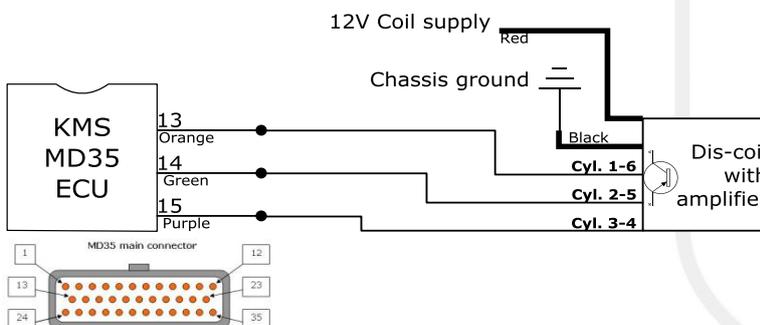
3.6.3 6 cyl. line dis-coil (without amplifier), firing order: 1-5-3-6-2-4



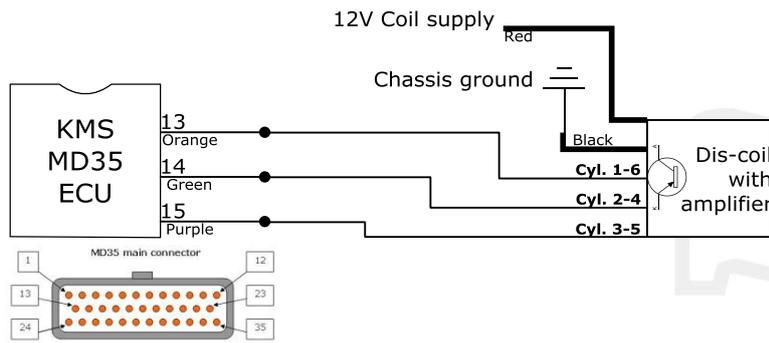
3.6.4 V6 dis-coil (without amplifier), firing order: 1-4-3-6-2-5



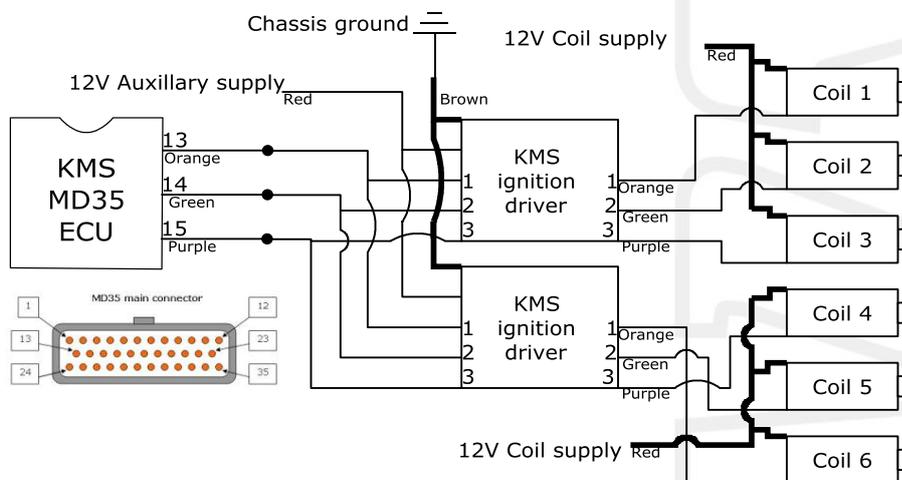
3.6.5 6 cyl. line dis-coil (with amplifier), firing order: 1-5-3-6-2-4



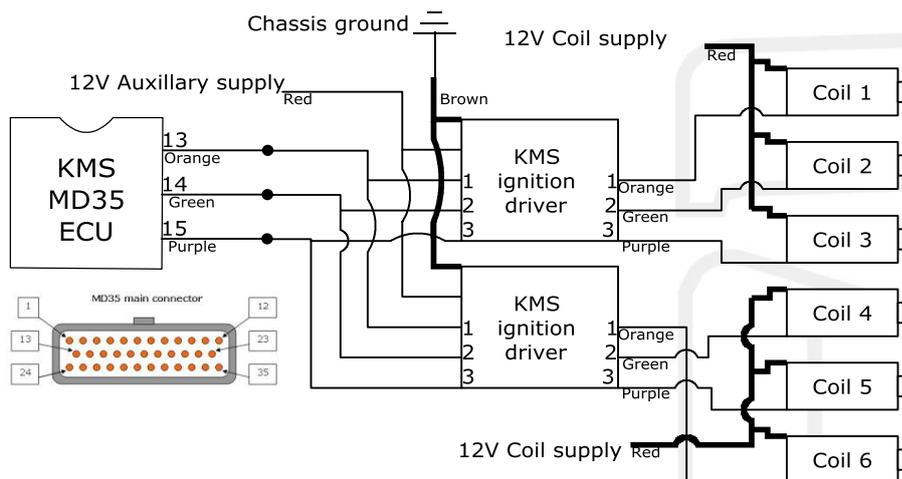
3.6.6 V6 dis-coil (with amplifier), firing order: 1-4-3-6-2-5



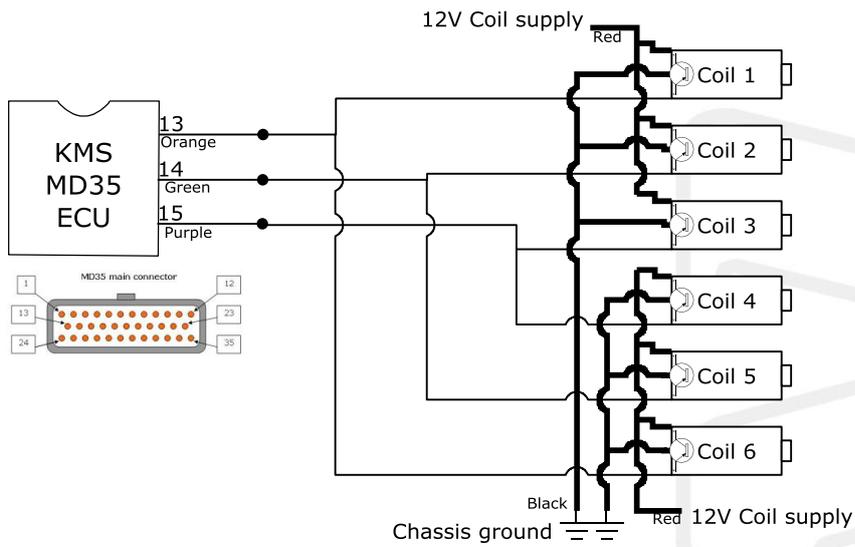
3.6.7 6 cyl. line single coils (without amplifier), firing order: 1-5-3-6-2-4



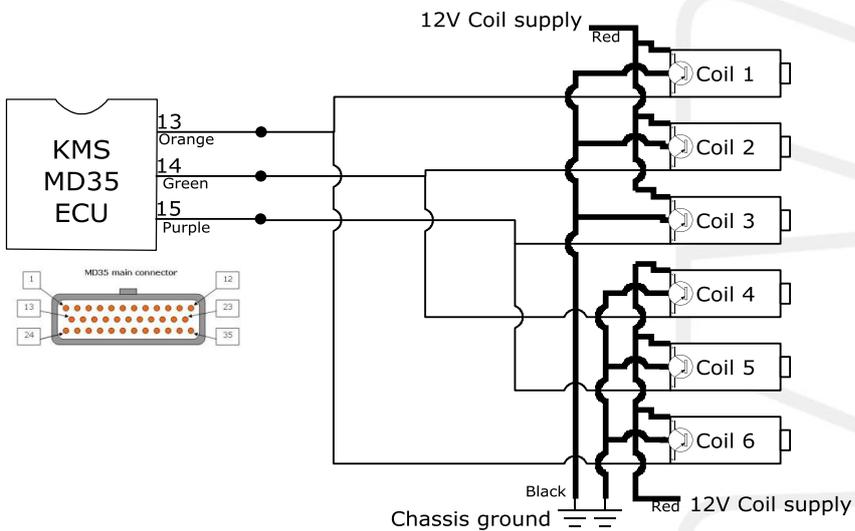
3.6.8 V6 single coils (without amplifier), firing order: 1-4-3-6-2-5



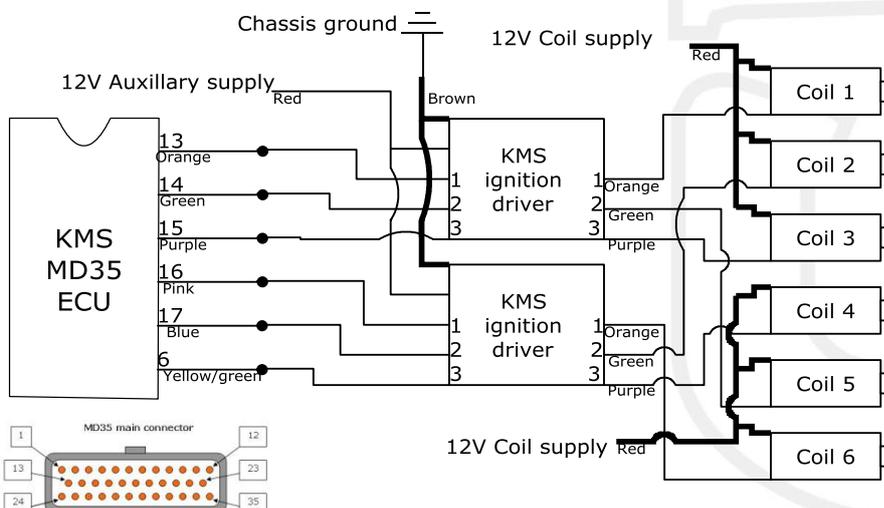
3.6.9 6 cyl. line single coils (with amplifier), firing order: 1-5-3-6-2-4



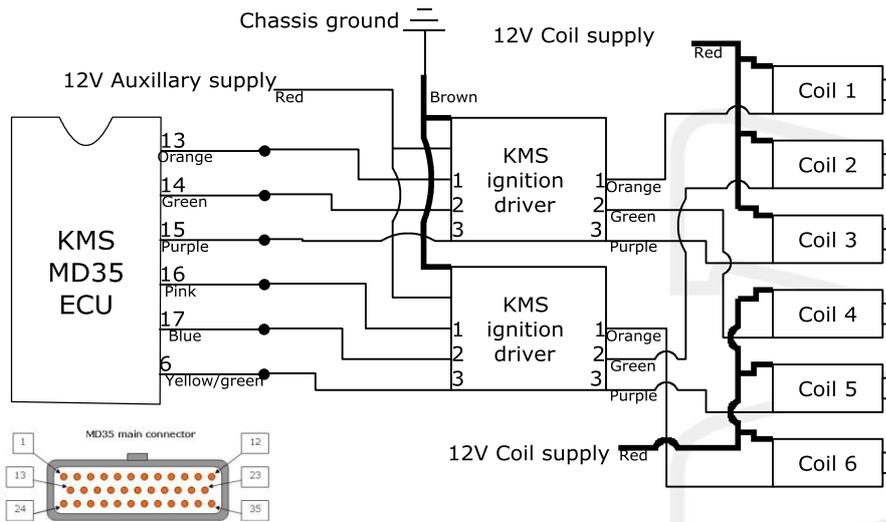
3.6.10 V6 single coils (with amplifier), firing order: 1-4-3-6-2-5



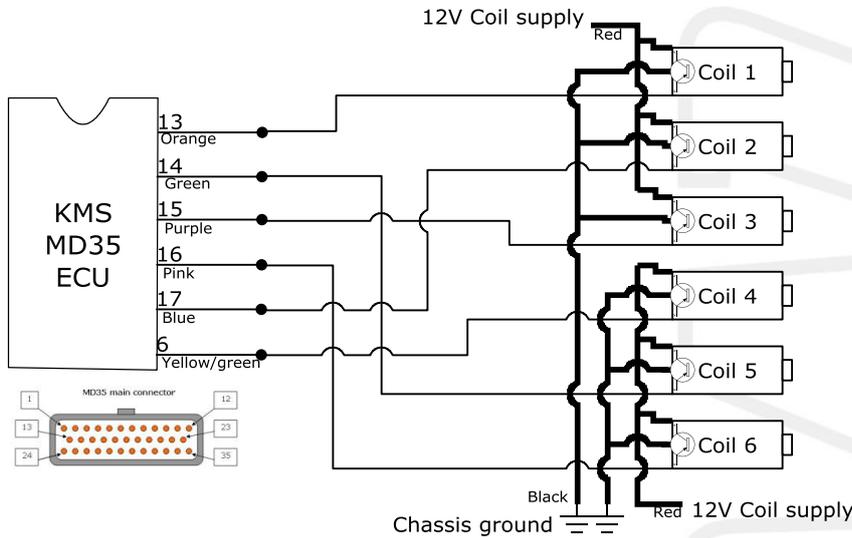
3.6.11 6 cyl. line single coils (without amplifier), direct fire (Cam sensor needed)



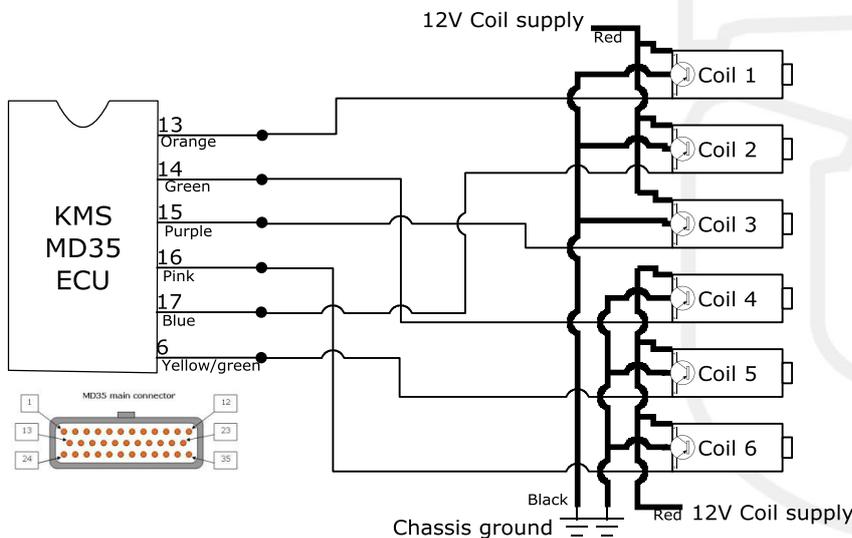
3.6.12 V6 single coils (without amplifier), direct fire (Cam sensor needed)



3.6.13 6 cyl. line single coils (with amplifier), direct fire (Cam sensor needed)

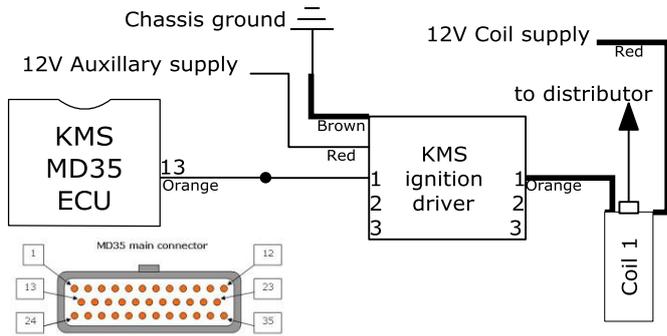


3.6.14 V6 single coils (with amplifier), direct fire (Cam sensor needed)

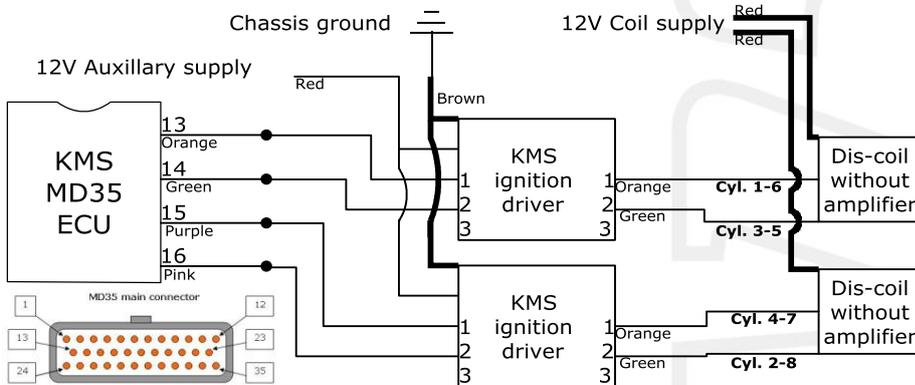


3.7 8 cylinder engines

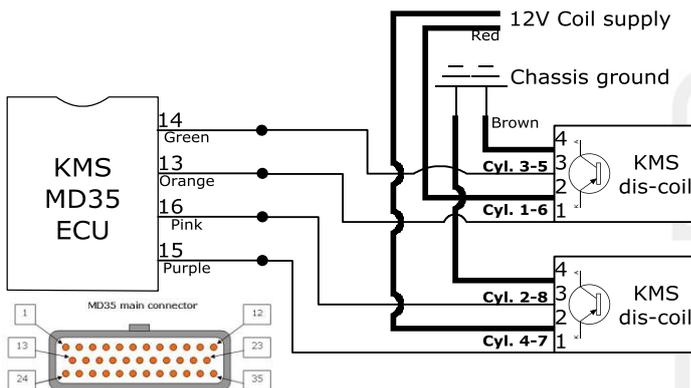
3.7.1 Single coil, single distributor (without amplifier)



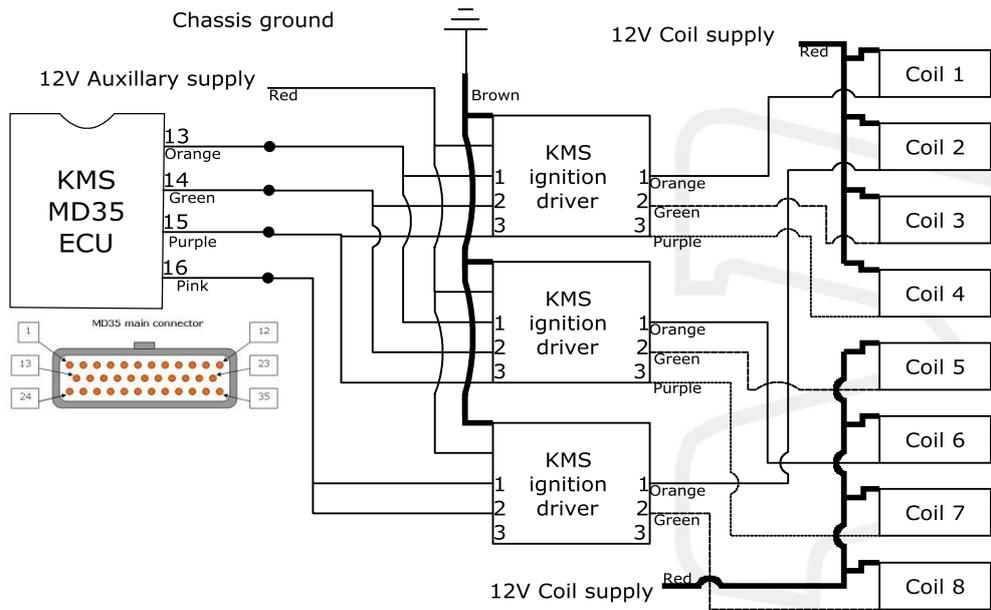
3.7.2 V8 dis-coils (without amplifier), firing order: 1-5-4-8-6-3-7-2



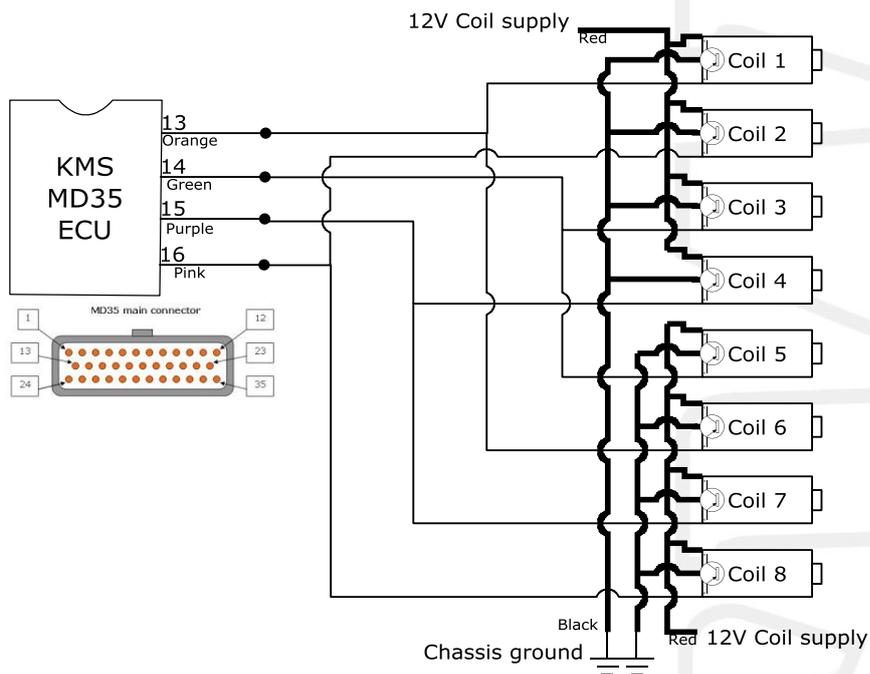
3.7.3 V8 dis-coils (with amplifier), firing order: 1-5-4-8-6-3-7-2



3.7.4 V8 single coils (without amplifier), firing order: 1-5-4-8-6-3-7-2

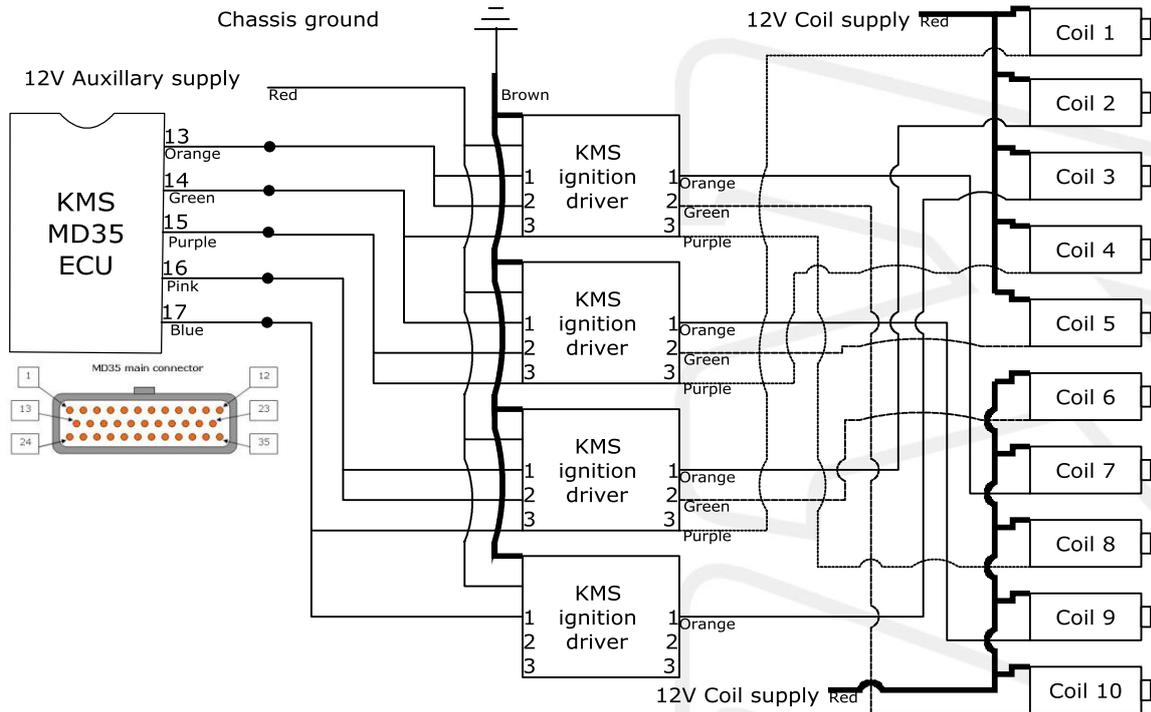


3.7.5 V8 single coils (with amplifier), firing order: 1-5-4-8-6-3-7-2

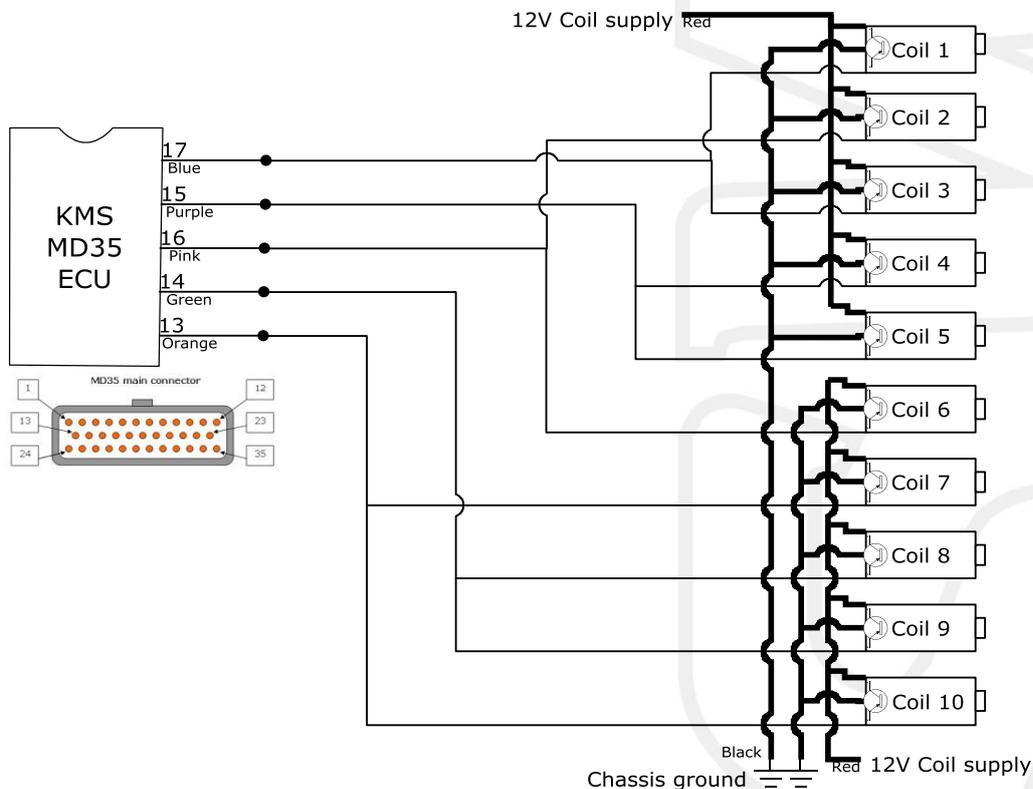


3.8 10 cylinder engines (equal firing angles: 72°)

3.8.1 V10 single coils (without amplifier), firing order: 7-8-5-2-1-10-9-4-6-3

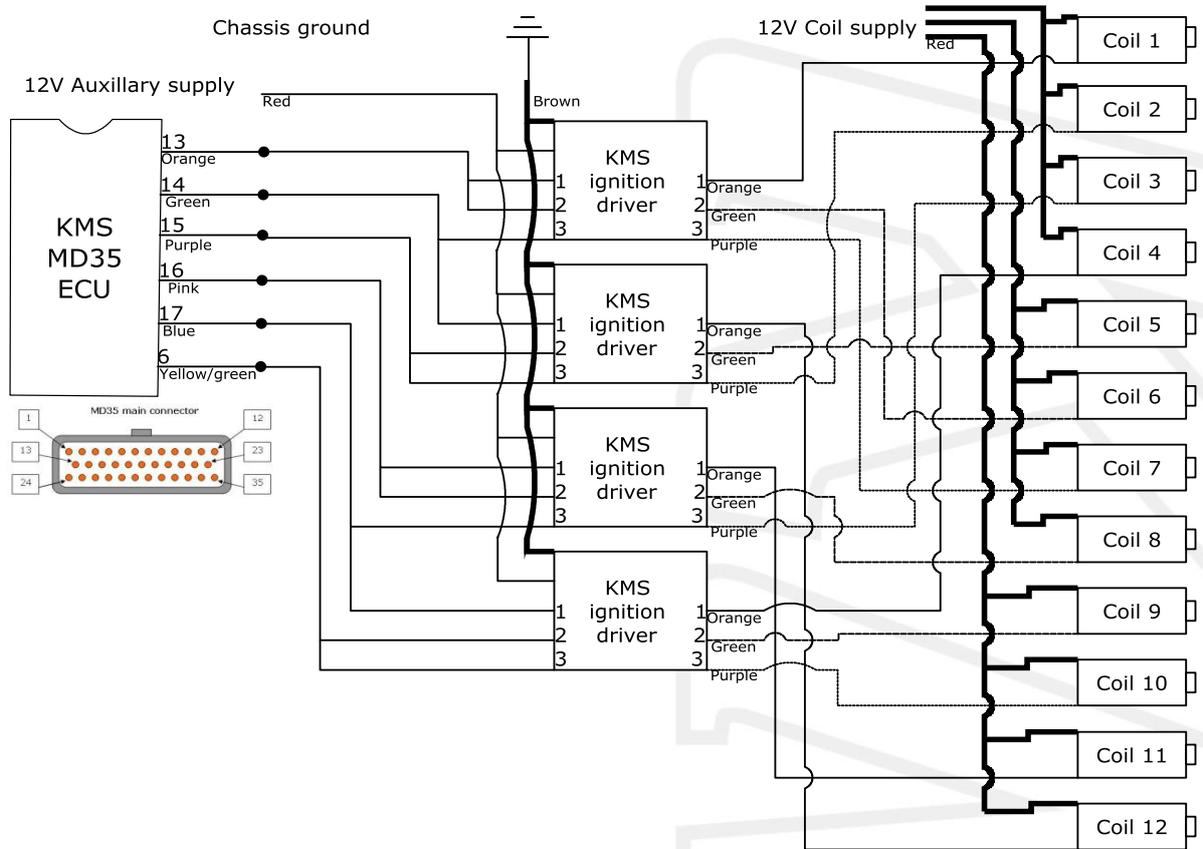


3.8.2 V10 single coils (with amplifier), firing order: 7-8-5-2-1-10-9-4-6-3

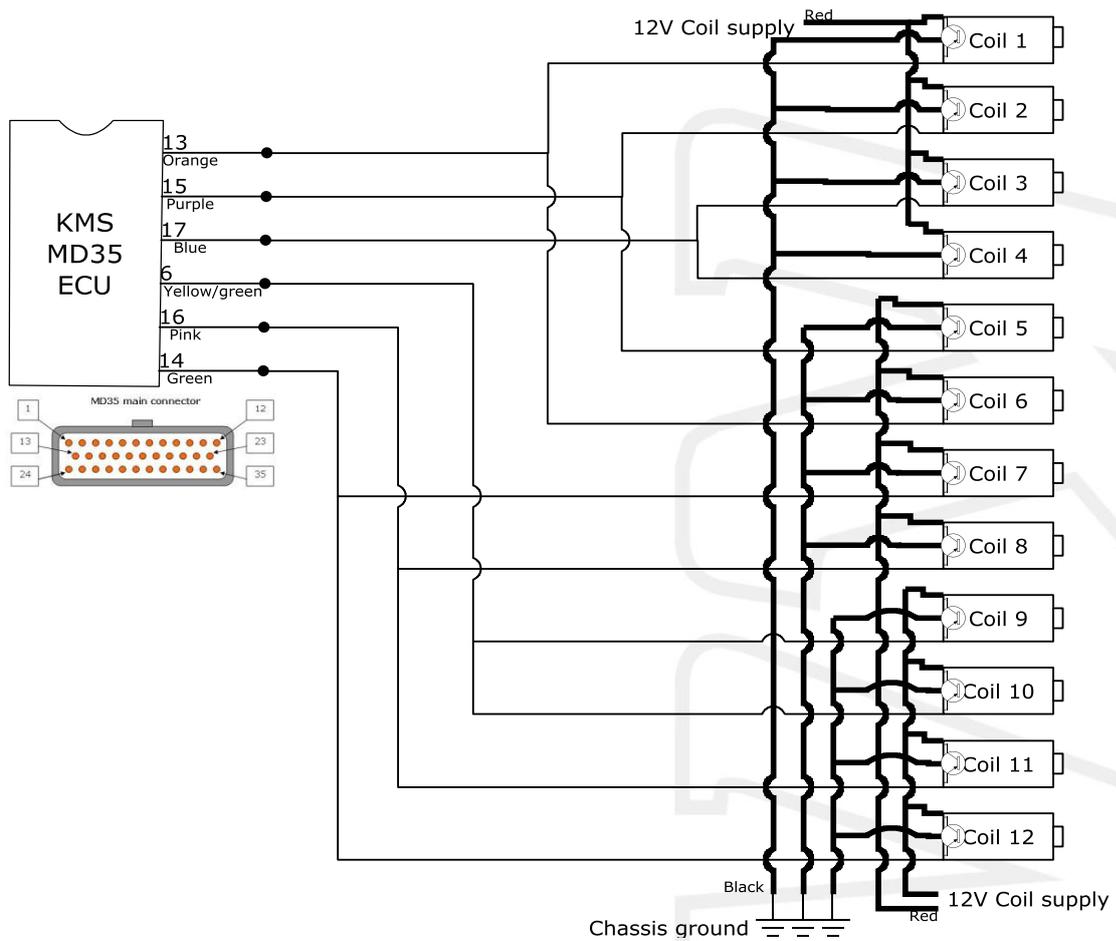


3.9 12 cylinder engines

3.9.1 V12 single coils (without amplifier), firing order: 1-7-5-11-3-9-6-12-2-8-4-10

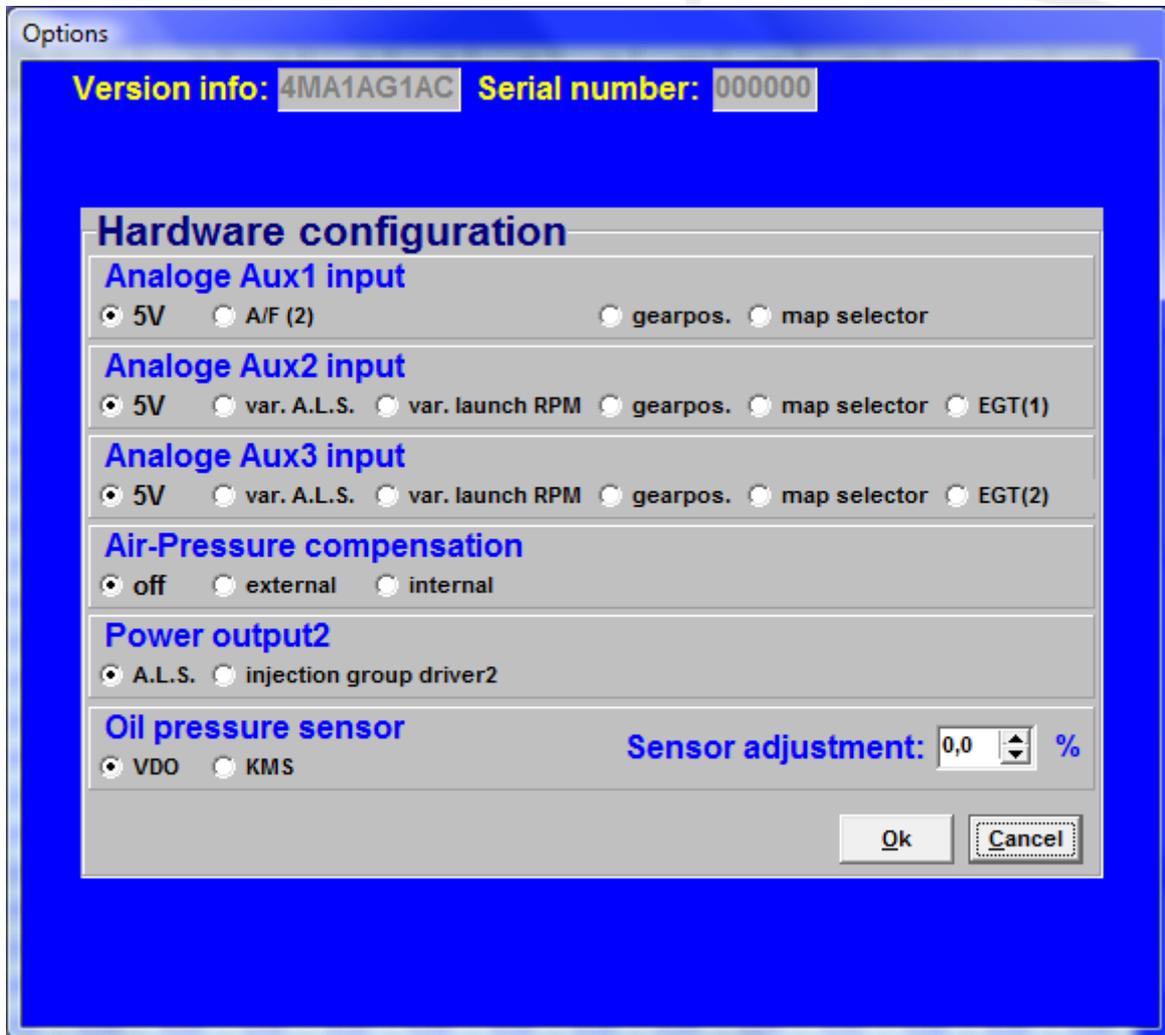


3.9.2 V12 single coils (with amplifier), firing order: 1-7-5-11-3-9-6-12-2-8-4-10



4 Appendix A2: Analog aux wiring

The analog aux inputs can be used for different functions. The chosen functions must be set correctly in the software for each application. When you are in the main screen of the software program, go to 'options (F4)' and then 'hardware configuration'. The following screen will appear.

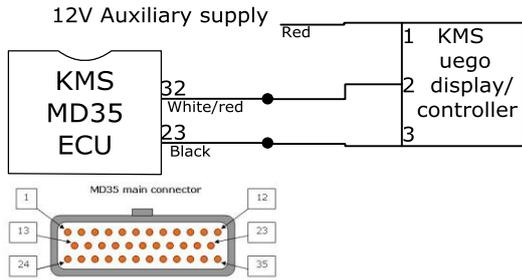


Here the different functions for each analog input can be defined, depending on the way the different functions are connected/wired. The connection/wiring of the analog inputs for different functions are shown in the wiring diagrams on the following pages.

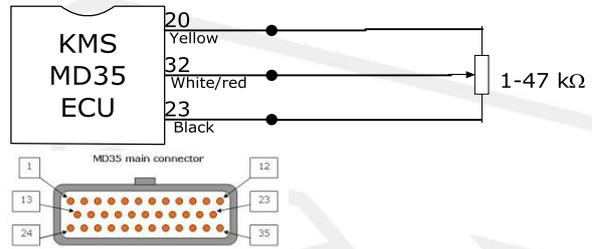
Warning : Be careful with the map selector. Make sure that the settings in both maps are correct and working in the right way on the engine. This option works real-time so it will immediately change your settings of the ECU. The values on the communication bar change to the values for map 1 or map 2 when switching. However the injection and ignition maps have to be uploaded from the ECU if you want to change those values.

4.1 Analog aux input

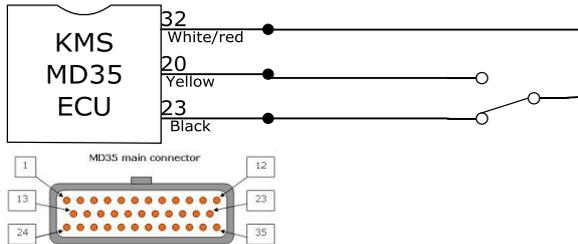
Analog aux in 1: A/F (2)



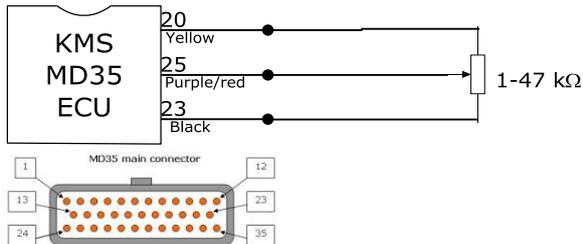
Analog aux in 1: Gear position



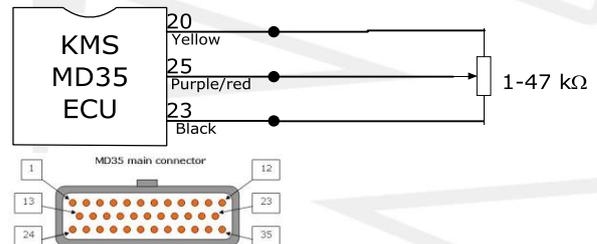
Analog aux in 1: Map selector



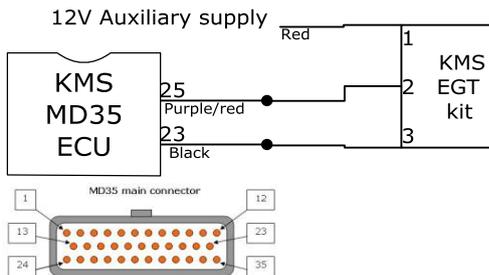
Analog aux in 2: Var. A.L.S. / Var. launch RPM



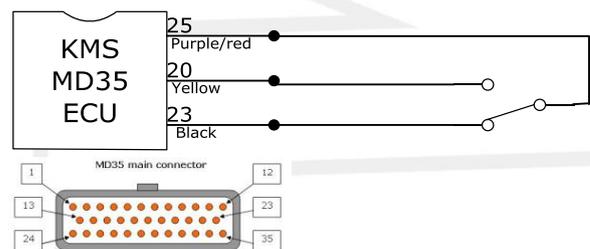
Analog aux in 2: Gear position



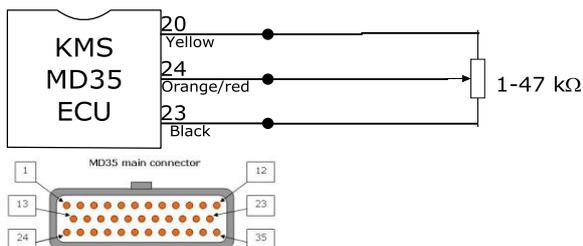
Analog aux in 2: EGT (1)



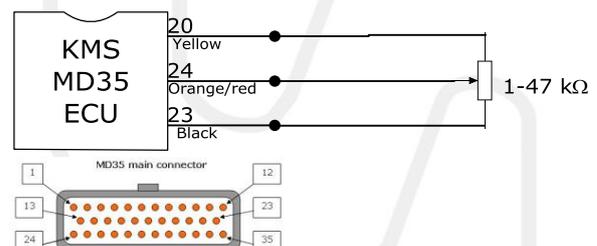
Analog aux in 2: Map selector



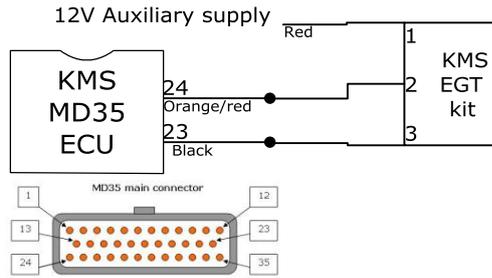
Analog aux 3: Var. A.L.S. / Var. launch RPM



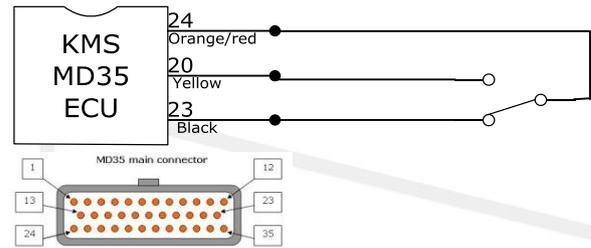
Analog aux 3: Gear position



Analog aux 3: EGT (2)



Analog aux 3: Map selector



4.2 Auxiliary (aux) outputs

Warning: Maximum current: 1A!!! If a higher current is needed, a relay should be used.

The auxiliary outputs can be used to direct many different applications such as NOS, cooling fan, shiftlight, variable inlet systems, cam control, water injection, etc. The following diagram describes the general wiring of these systems, however some applications may deviate from this diagram.

