KMS UEGO CAN controller

Part nr: 01-01-01-0010

Kronenburg Management Systems

This document contains detailed information about the KMS UEGO CAN controller. Additional information, user manuals, wiring examples and software can be found on our website: http://kms.vankronenburg.nl or on the software CD included with the ECU.

1. Contents of the package

- 1 UEGO CAN controller (84mm long x 35mm width x 24mm height incl. connector)
- 1 UEGO CAN controller wiring loom (with connectors attached)

- 1 CAN extension hub 2m

- 1 Adapter (for easy ground fitting)
- 1 Welding bung stainless steel (M18 x1,5)
- 1 Instruction manual
- 1 Wide-band lambda sensor LSU 4.9
- 1 Contra connector (to attach the 3 pole connector)

2. Installation of the UEGO CAN controller

The KMS UEGO CAN controller is splash waterproof. However it's best to place your KMS UEGO CAN controller in a dry place where temperatures don't exceed 65°C.

Warning: don't place the UEGO CAN controller and wires near any 'high powered' cables (sparkplug leads, etc), because of electrical interference.

Included with the KMS UEGO CAN controller is a wiring loom which consists out of a main connector and four separate connectors with wires. The function and connection/wiring of these connectors is as follows:

- 12 pole connector: Main connector
  Connect to UEGO CAN controller

Pin Nr. KMS	Colour	Function	Details
1	Red	12V supply	
2	Green	Can Low (-)	
3	Black	Heater ground	
4	Blue	Ipr	Sensor calibration
5	White	H-	Sensor heater ground
6	Red	Ip	Sensor Signal
7	Black	Ground	
8	White	Can High (+)	
9	White	Sensor signal	Analog signal output (type C)
10	Black	Un	Sensor reference voltage supply
11	Grey	H+	Sensor heater voltage supply
12	Yellow	Vm	Sensor reference ground

- Single connector: heater ground
  Connect to ground (chassis)

- 3 pole connector (superseal): power/ground for the CAN controller and analog signal output to KMS ECU's → Connect as following:

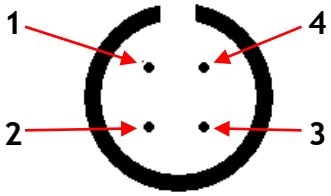
Connector pin	Wire colour	Function	MD35 pin nr	MP25 pin nr
Pin 1	Red	+ 12V	12V Aux supply	12V Aux supply
Pin 2	White	Signal out	31: Lambda signal 1 32: Lambda signal 2	1: Lambda signal 4: Analog aux input
Pin 3	Black	Ground	23: ECU ground	25: ECU ground

- 6 pole connector: to lambda sensor
  Connect to wide-band lambda sensor.

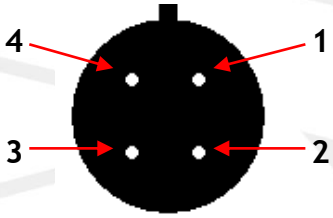
- 4 pole connector: CAN connector
  For connection to CAN display, ECU CAN input, etc.

Pin nr	Colour	Function
1	Red	12V supply
2	Black	Ground
3	White	Can High (+)
4	Green	Can Low (-)

Front of the male CAN connector:



Front of the female CAN contra connector:

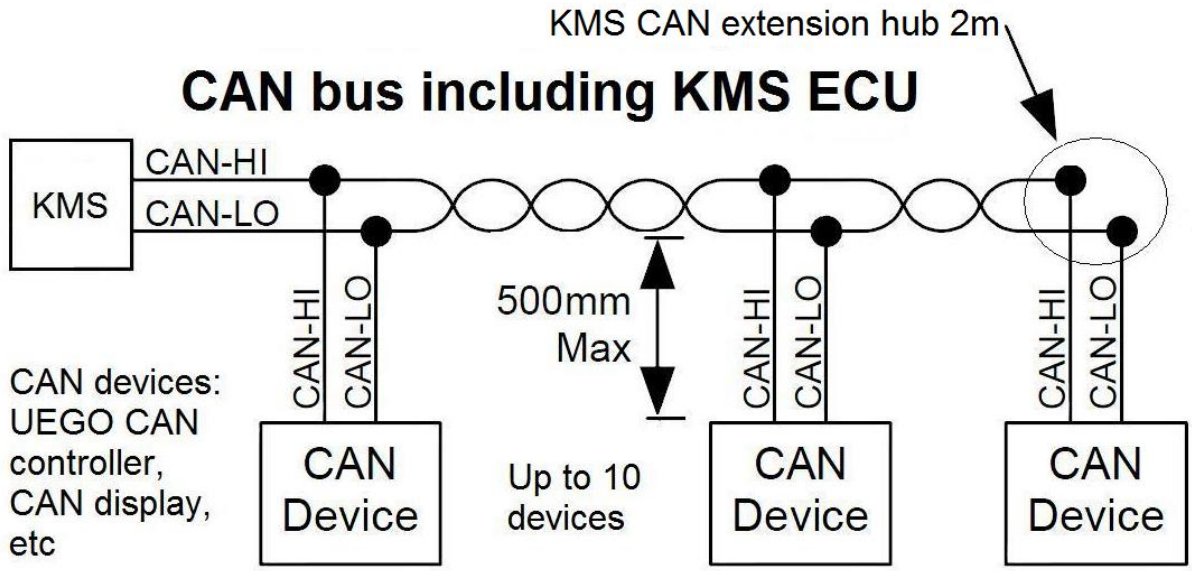


The CAN connection hub included in the package can be used to connect the KMS UEGO CAN controller to the CAN bus. For every CAN device that's connected to the CAN bus, a CAN connection hub will be needed.

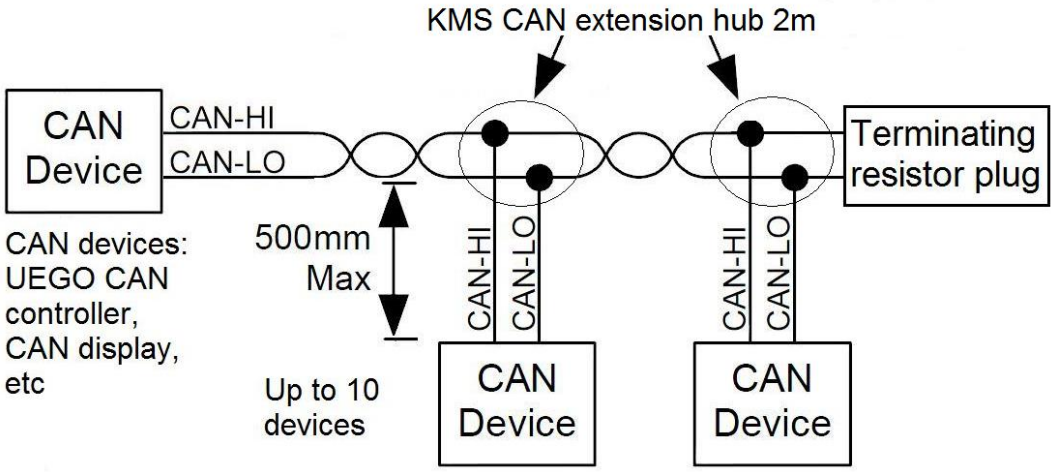
3. Wiring of the CAN bus

The KMS UEGO CAN controller can communicate via CAN communication through the CAN bus (grey wire) which consists of two pair of twisted wires (green and white, red and black). Up to 10 CAN devices may be connected to the CAN bus. These devices must be placed within 0,5m of the CAN bus.

If the CAN Bus is connected to the KMS MP25, MA25(M), IA23 or FA23 ECU (using the serial to CAN converter) or the KMS MD35 ECU, it is not necessary to use a CAN terminating resistor plug. The KMS MD35 ECU and serial to CAN converter already have a terminating resistor. When using the UEGO CAN controller separately on a standalone CAN bus (for example in combination with a KMS CAN display), it is necessary to use a CAN terminating resistor plug on one end of the CAN bus. The following page contains drawings showing the correct wiring of the CAN bus.



Standalone CAN bus excluding KMS ECU



4. Installation of the lambda sensor

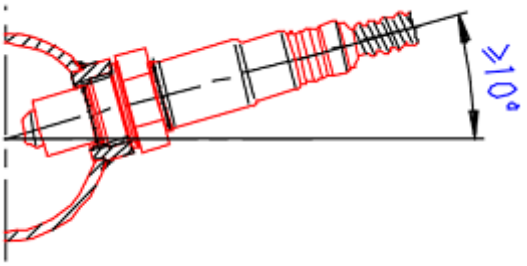
The lambda sensor used for the KMS UEGO CAN controller is a 6 wire LSU4.9 wideband Lambda sensor. The sensor included in this kit has the following specifications:

- Thread: M18x1,5
- Spanner size: 22 Hexagon
- Maximum continuous operating temperature: 930 °C
- Maximum temperature: 1030 °C (maximum 10 minutes)
- Mounting torque: 60 Nm max
- Sensor warm-up will take about 20 seconds. Accurate measurement is possible when exhaust gas temperature is at room temperature.
- Sensor lifetimes differ for every application, but will dramatically decrease by the following factors:
  - Leaded fuel
  - Contaminants such as silicon, lead, oil, etc. (use sensor-friendly sealants)
  - Exposure to exhaust fumes without any heating control active
  - Incorrect placement in the exhaust that can overheat the sensor (for correct placement see page 5)

Warning: The Lambda sensors are factory calibrated with a trimming resistor placed in the sensor connector, so the connector must not be cut off.

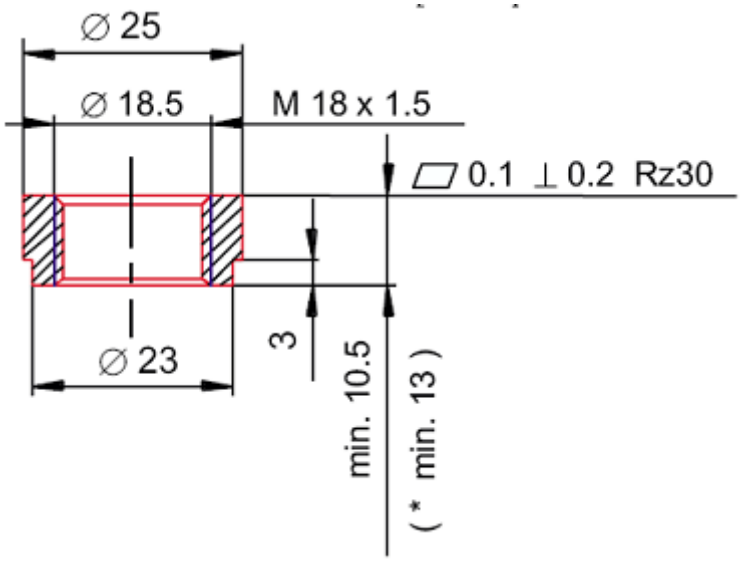
The Lambda sensor should be fitted to the exhaust system with the sensor tip in the exhaust gas flow. When fitting the Lambda sensor, the following factors need to be taken into account:

- Installation angle should be inclined at least 10° towards horizontal (electrical connection upwards). Thus preventing the collection of liquids between sensor housing and sensor element during the cold start phase.



- For hot applications (temperature of hexagon above 500°C *) the thread boss should be at least 13 mm or longer to avoid overheating of the protection tube welding and to cool down the sensor hexagon.

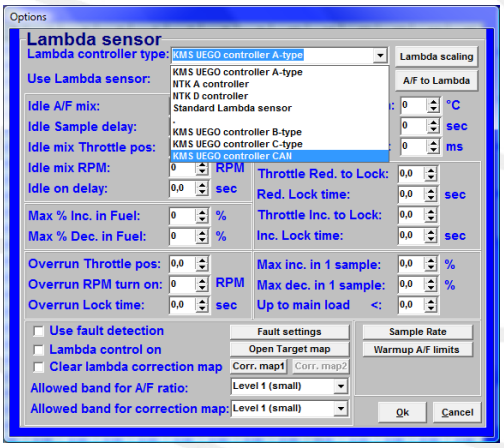
Recommended material for the thread boss in the exhaust pipe : Temperature resistant stainless steel.



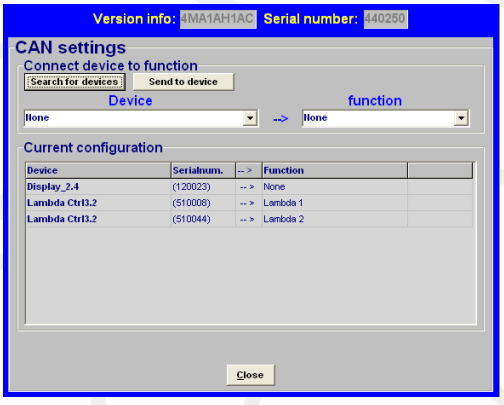
- Place the sensor at least 1 meter from the open end of the exhaust system to avoid incorrect readings due to outside oxygen.
- If possible, do not place the sensor near exhaust slip joints. It's possible for some applications to allow air to enter resulting in incorrect readings.

5. Software settings

Attention: After connecting the UEGO CAN controller, the lambda control settings must be set up correctly. When using the UEGO CAN controller to operate by CAN communication, you must set it to KMS UEGO controller CAN. When operating by serial (RS232) communication, you must set the controller type to KMS UEGO controller C-type. See appendix for signal voltages.



For adjustment of the lambda controller type, open the KMS Motormanagement software, then go to options (F4) → Lambda control → Lambda controller type → KMS UEGO controller CAN.



Using two or more CAN controller on the CAN bus, means that the CAN controllers must be defined in the software. Therefore you must first update the firmware. Please contact us for the latest firmware update and procedures. After updating the firmware set the lambda controller to the right type, as described above. Next, switch the ignition off and on. Then go to options (F4) → CAN setting → Search for devices. After the devices are found, you can choose the functions (lambda 1, lambda 2, etc) for the different CAN devices.

6. AFR ratio

Lambda is a measure of the Air to Fuel Ratio (AFR) that is independent of the type of fuel being used. The lambda value of the new UEGO CAN controller can vary between minimum 0,65 and maximum 1,5 lambda. This means the Air to fuel ratio for petrol lies between 9,5 and 22,1. The following table shows the AFR ratio's for different fuels compared to the lambda value.

Lambda	Air to fuel ratio				
	Petrol	Diesel	LPG	E85	Methanol
0.65	9.6	9.5	10.1	6.3	4.2
0.70	10.3	10.2	10.9	6.8	4.5
0.75	11.0	10.9	11.6	7.3	4.8
0.80	11.8	11.6	12.4	7.8	5.1
0.85	12.5	12.3	13.2	8.3	5.4
0.90	13.2	13.1	14.0	8.8	5.8
0.95	14.0	13.8	14.7	9.3	6.1
1.00	14.7	14.5	15.5	9.8	6.4
1.05	15.4	15.2	16.3	10.3	6.7
1.10	16.2	16.0	17.1	10.8	7.0
1.15	16.9	16.7	17.8	11.2	7.4
1.20	17.6	17.4	18.6	11.7	7.7
1.25	18.4	18.1	19.4	12.2	8.0
1.30	19.1	18.9	20.2	12.7	8.3
1.35	19.8	19.6	20.9	13.2	8.6
1.40	20.6	20.3	21.7	13.7	9.0
1.45	21.3	21.0	22.5	14.2	9.3
1.50	22.1	21.8	23.3	14.7	9.6
1.55	22.8	22.5	24.0	15.1	9.9
1.60	23.5	23.2	24.8	15.6	10.2

7. Fault tracing

The UEGO CAN controller has a LED light for a simple fault tracing. The function of the LED light is described below:

LED function	Problem
LED continuously on	- No problem, controller is ok and ready to be used.
1 puls	- Heating of the sensor, controller is ok but cannot be used until heating is finished.
4 pulses	- Sensor short to 12 volt.
5 pulses	- Sensor not connected.
6 pulses	- Heater ground not connected (pin 3 of the 12 pole connector).

Appendix: Signal voltages serial communication

Air/fuel ratio	CAN controller Type C mVolt	Air/fuel ratio	CAN controller Type C mVolt	Lambda	CAN controller Type C mVolt	Lambda	CAN controller Type C mVolt
9,5	797	15,9	3171	0,65	847	1,08	3190
9,6	856	16,0	3185	0,66	931	1,09	3207
9,7	914	16,1	3196	0,67	1014	1,10	3228
9,8	972	16,2	3207	0,68	1086	1,11	3245
9,9	1021	16,3	3222	0,69	1165	1,12	3265
10,0	1072	16,4	3235	0,70	1241	1,13	3281
10,1	1126	16,5	3247	0,71	1318	1,14	3298
10,2	1172	16,6	3259	0,72	1394	1,15	3317
10,3	1226	16,7	3271	0,73	1470	1,16	3335
10,4	1279	16,8	3282	0,74	1547	1,17	3351
10,5	1333	16,9	3294	0,75	1623	1,18	3364
10,6	1386	17,0	3308	0,76	1699	1,19	3378
10,7	1440	17,1	3321	0,77	1776	1,20	3391
10,8	1493	17,2	3332	0,78	1852	1,21	3405
10,9	1539	17,3	3343	0,79	1931	1,22	3418
11,0	1593	17,4	3353	0,80	1992	1,23	3432
11,1	1646	17,5	3363	0,81	2056	1,24	3445
11,2	1699	17,6	3372	0,82	2119	1,25	3459
11,3	1753	17,7	3380	0,83	2183	1,26	3472
11,4	1799	17,8	3390	0,84	2242	1,27	3486
11,5	1852	17,9	3399	0,85	2304	1,28	3499
11,6	1907	18,0	3409	0,86	2361	1,29	3513
11,7	1955	18,1	3418	0,87	2419	1,30	3526
11,8	1998	18,2	3426	0,88	2476	1,31	3540
11,9	2043	18,3	3436	0,89	2529	1,32	3553
12,0	2081	18,4	3445	0,90	2576	1,33	3567
12,1	2125	18,5	3455	0,91	2619	1,34	3580
12,2	2170	18,6	3464	0,92	2667	1,35	3594
12,3	2212	18,7	3472	0,93	2710	1,36	3607
12,4	2254	18,8	3482	0,94	2755	1,37	3621
12,5	2291	18,9	3491	0,95	2802	1,38	3634
12,6	2332	19,0	3501	0,96	2846	1,39	3648
12,7	2373	19,1	3510	0,97	2887	1,40	3661
12,8	2413	19,2	3519	0,98	2921	1,41	3668
12,9	2447	19,3	3528	0,99	2958	1,42	3682
13,0	2492	19,4	3537	1,00	3000	1,43	3692
13,1	2524	19,5	3546	1,01	3022	1,44	3704
13,2	2557	19,6	3556	1,02	3047	1,45	3714
13,3	2589	19,7	3565	1,03	3068	1,46	3724
13,4	2619	19,8	3573	1,04	3092	1,47	3734
13,5	2652	19,9	3583	1,05	3115	1,48	3744
13,6	2680	20,0	3592	1,06	3135	1,49	3754
13,7	2710	20,1	3602	1,07	3171	1,50	3764
13,8	2742	20,2	3611				
13,9	2774	20,3	3619				
14,0	2806	20,4	3629				
14,1	2836	20,5	3638				
14,2	2865	20,6	3648				
14,3	2890	20,7	3657				
14,4	2914	20,8	3667				
14,5	2935	20,9	3676				
14,6	2962	21,0	3682				
14,7	2992	21,1	3688				
14,8	3011	21,2	3695				
14,9	3027	21,3	3702				
15,0	3042	21,4	3708				
15,1	3058	21,5	3715				
15,2	3073	21,6	3722				
15,3	3090	21,7	3730				
15,4	3106	21,8	3736				
15,5	3121	21,9	3744				
15,6	3133	22,0	3749				
15,7	3146	22,1	3756				
15,8	3158						