

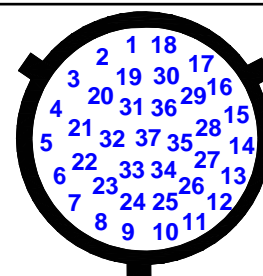
<b>CONSTRUCTIVE DOCUMENTATION</b>	<b>13/10/2004</b>	<b>WIRING</b>	<b>MXL PRO wiring (CAR/BIKES)</b>
Notes: general-purpose wiring for MXL PRO – CAR/BIKE inst. <b>Vers. 1.03</b>			

## WIRING FOR “MXL PRO”



### Logger’s pinout: 37 pins Deutsch connector

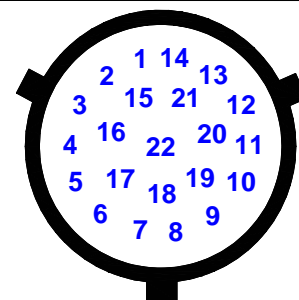
Pin	Signal	Pin	Signal
1	9-15 V Battery input	20	Analog GND
2	Analog input 1	21	V Reference
3	Analog input 2	22	V Reference
4	Analog GND	23	Analog GND
5	Analog GND	24	V Reference
6	V Reference	25	Analog GND
7	V Reference	26	Analog input 8
8	Analog input 3	27	GND
9	Analog input 4	28	Not codified optic lap
10	Analog input 6	29	Magnetic / Opt. codified lap
11	Analog GND	30	Speed 2
12	RPM Square Wave 4-8 V	31	Analog GND
13	RPM Coil – Sq. Wave >8 V	32	Analog input 5
14	+ VB	33	Analog input 7
15	GND	34	V Reference
16	+ VB	35	GND
17	+ VB	36	Speed 1
18	GND	37	GND
19	Analog GND		



37 pins Deutsch male connector pinout: contacts insertion view

## Logger's pinout: 22 pins Deutsch connector

Pin	Signal	Pin	Signal
1	+ VB	12	GND
2	GND	13	+ VB
3	CAN 0+ (Ext. exp. modules)	14	MEM
4	CAN 0- (Ext. exp. modules)	15	VIEW
5	Speed 3	16	GND
6	Speed 4	17	RS232 RX (ECU interface)
7	USB D-	18	RS232 TX (ECU interface)
8	USB D+	19	GND
9	GND	20	CAN 1+ (ECU interface)
10	+ VB	21	CAN 1- (ECU interface)
11	GND	22	



22 pins Deutsch male connector pinout: contacts insertion view

## How to create the “37 Pins Deutsch connector” harness

### How to power the gauge

The gauge must be powered by a **9 ÷ 15 V DC power source**. **Do not exceed these limits.**

We suggest You to use 0.5 mm<sup>2</sup> unifilar wires.

See the following table to correctly connect the power wires.

Pin DEUTSCH connector	Signal	Cable colour
1	9-15V Battery input	Red
15	GND	Black

**We strongly suggest to connect the “Power input” cable to the bike/car master switch.**

If you are not able to power the gauge using the master switch, please connect the red wire to the battery's positive (+) pole and the black one to the negative (-) pole. As the gauge automatically switches on when connected to an external 9-15 V power source, please install an ON/OFF switch along the power cable.

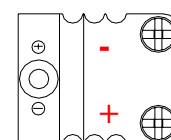
### How to connect a thermocouple

Thermocouples may be connected on anyone of the 8 analog inputs.

We remind You to use **compensated cable** to connect the **DEUTSCH connector** to the **Mignon connector** (shown in the following picture).

See the following table to correctly connect a thermocouple (in this example the thermocouple has been installed on Channel 1).

Pin DEUTSCH	Signal	Pin Mignon	Cable colour
2	An. input 1	+	Yellow
19	An. GND	-	Red



Mignon connector pinout: top side view

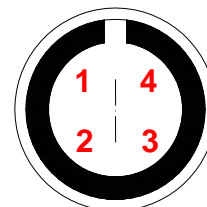
## How to connect a Thermoresistor

Thermo resistors may be connected on anyone of the 8 analog inputs.

We suggest You to use a “ 4 x 0.14 mm<sup>2</sup> ” wire to connect the **DEUTSCH connectors** to the **Binder 719 connector** (shown in the following picture).

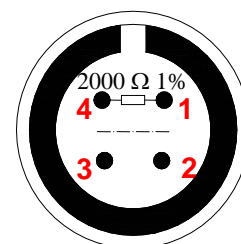
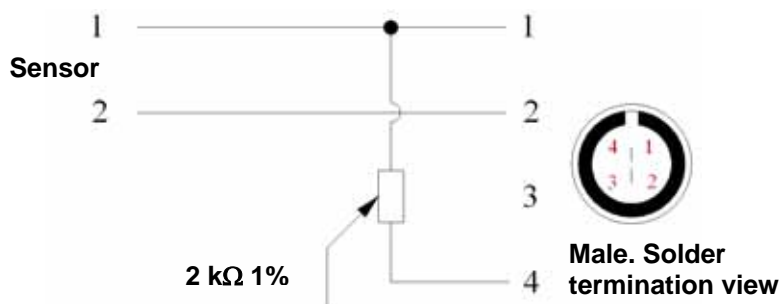
See the following table in order to correctly connect a Thermoresistor (in this example the Thermoresistor has been installed on Channel 2).

Pin DEUTSCH	Signal	Pin Binder	Cable colour
3	An. input 2	1	White
20	An. GND	2	Black
	Not connected	3	
7	V ref.	4	Blue



**Binder 719 female pinout: solder termination view**

If you bought an AIM PT100 thermoresistor for MXL, an SMD resistor is mounted inside the sensor's connector between pins number 1 and 4, as shown in the following pictures. The value of this resistor is **2 kΩ 1%**.



**Binder 719 male: resistor installation**

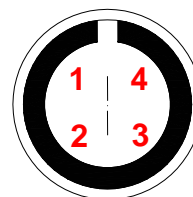
## How to connect a VDO sensor

VDO sensors (pressure and temperature) may be connected on anyone of the 8 analog inputs.

We suggest You to use a “ 4 x 0.14 mm<sup>2</sup> ” wire to connect the **DEUTSCH connectors** to the **Binder 719 connector** (shown in the following picture).

See the following table in order to correctly connect a VDO pressure sensor (in this example the sensor has been installed on Channel 3).

Pin DEUTSCH	Signal	Pin Binder	Cable colour
8	An. input 3	1	White
4	An. GND	2	Black
	n. c.	3	
6	V ref.	4	Blue



**Binder 719 female pinout: solder termination view**

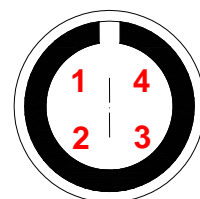
If you bought an AIM VDO pressure sensor, an SMD resistor is mounted inside the sensor's connector between pins number 1 and 4. The value of this resistance is **1.8 kΩ 1%**.

## How to connect a potentiometer

Potentiometers may be connected on anyone of the 8 analog inputs.

See the following table in order to correctly connect a potentiometer (in this example the sensor has been installed on Channel 4).

Pin DEUTSCH	Signal	Pin Binder	Cable colour
9	An. input 4	1	White
5	An. GND	2	Black
	n.c.	3	
6	V ref.	4	Blue



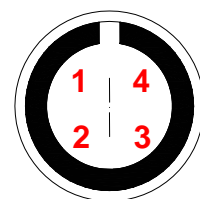
Binder 719 female pinout:  
solder termination view

## How to connect Speed sensors #1 and #2

Your MXL can sample up to 4 speed channels: 2 of them may be connected to the “37 pins Deutsch connector”. In the example below is a correct installation of speed channel #1.

We suggest You to use a “ 4 x 0.14 mm<sup>2</sup> ” wire to connect the **DEUTSCH connectors** to the **Binder 719 connector** (shown in the following picture).

Pin DEUTSCH	Signal	Pin Binder	Cable colour
36	Speed 1	1	White
27	GND	2	Black
14	+ VB	3	Red
	n.c.	4	



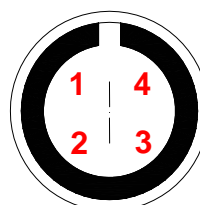
Binder 719 female pinout:  
solder termination view

## How to connect the “on-board” Gear sensor

The gear sensor is usually an “on-board” sensor powered by the vehicle’s battery: in order to correctly sample the engaged gear You only have to connect the gear signal on the correct connector’s pin. See the following table in order to correctly measure the engaged gear.

**Please note: the “on-board gear sensor MUST be connected on channel 8.**

Pin DEUTSCH	Signal	Pin Binder	Cable colour
26	An. input 8	1	White
	n.c.	2	
	n.c.	3	
	n.c.	4	

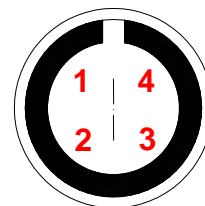


Binder 719 female pinout:  
solder termination view

## How to connect the Gyroscope (bikes) or the Ext. accelerometer (cars)

The Gyroscope/External accelerometer may be connected on any one of the 8 analog inputs. See the following table in order to correctly connect a Gyroscope/External accelerometer (in this example, for instance, the sensor has been installed on Channel 5).

Pin DEUTSCH	Signal	Pin Binder	Cable colour
32	An. input 5	1	White
31	GND	2	Black
17	+ VB	3	Red
	n.c.	4	

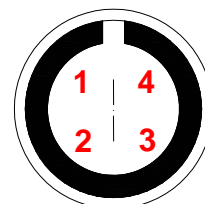


Binder 719 female pinout:  
solder termination view

## How to connect the Lap receiver

See the following table in order to correctly install the lap receiver:

Pin DEUTSCH	Signal	Pin Binder	Cable colour
29	Magnetic / Optic codified lap	1	White
27	GND	2	Black
14	+ VB	3	Red
28	Not codified optic lap	4	Blue



Binder 719 female pinout:  
solder termination view

## How to connect the RPM sensor

The RPM signal may be sampled either from the ECU or from the coil.

- The RPM signal sampled from the ECU is, usually, a 12 Volts square wave signal. Your MXL is able to sample RPM square wave signals down to 8 V.
- The RPM signal sampled from the coil is, usually, a 150 - 400 V signal.

Your MXL can sample both RPM signals using a single RPM input. See the following table in order to correctly measure the RPM channel. We suggest You to use 0.5 mm<sup>2</sup> unifilar wires.

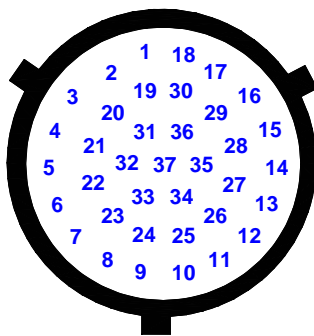
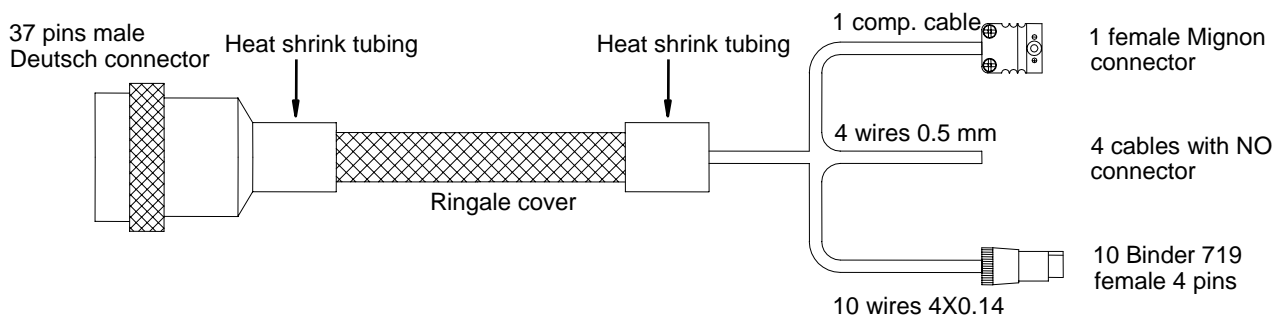
Pin DEUTSCH	Signal	Cable colour
13	RPM 150-400V coil - RPM square wave >8V	White
18	GND	Black

## Example of “37 pins Deutsch connector” harness for MXL PRO

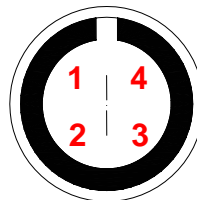
Here below is an **example** of wiring for **MXL PRO** – “37 pins Deutsch connector” harness.

- a thermocouple has been installed on channel “Ch\_1”; we remind You to use a piece of compensated cable.
- a thermoresistor has been installed on channel “Ch\_2”.
- a VDO pressure sensor has been installed on channel “Ch\_3”.
- a potentiometer has been installed on channel “Ch\_4”.
- a gyroscope has been installed on channel “Ch\_5”.
- channel 8 is connected to the “on-board” gear sensor.
- The wirings length is not shown; the customer may set the desired cables’ length.
- It is reminded to use “4 x 0.14” wires to connect the Binders to the DEUTSCH connector.
- It is suggested to use “0.5 mm” wire for the RPM and inputs.

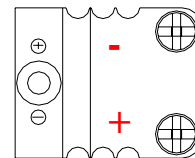
See the following drawing and tables for further information.



37 pins Deutsch male connector pinout: contacts insertion view



4 pins Binder 719 female pinout: solder termination view



Mignon connector pinout: top side view

Channel name	Pin DEUTSCH	Signal	Pin Mignon	Cable colour
Ch_1	2 19	Analog input 1 Analog GND	+ -	Yellow Red



Channel name	Pin DEUTSCH	Signal	Pin Binder	Cable colour
Ch_2	3	Analog input 2	1	White
	20	Analog GND	2	Black
		Not connected	3	
	7	V Reference	4	Blue
Ch_3	8	Analog input 3	1	White
	4	Analog GND	2	Black
		Not connected	3	
	6	V Reference	4	Blue
Ch_4	9	Analog input 4	1	White
	5	Analog GND	2	Black
		Not connected	3	
	6	V Reference	4	Blue
Ch_5	32	Analog input 5	1	White
	31	Analog GND	2	Black
	17	+ VB	3	Red
		Not connected	4	
Ch_6	10	Analog input 6	1	White
	25	Analog GND	2	Black
	17	+ VB	3	Red
	21	V Reference	4	Blue
Ch_7	33	Analog input 7	1	White
	11	Analog GND	2	Black
	17	+ VB	3	Red
	24	V Reference	4	Blue
Ch_8	26	Analog input 8	1	White
		Not connected	2	
		Not connected	3	
		Not connected	4	
Speed 1	36	Speed 1	1	White
	27	GND	2	Black
	14	+ VB	3	Red
		Not connected	4	
Speed 2	30	Speed 2	1	White
	27	GND	2	Black
	14	+ VB	3	Red
		Not connected	4	
Lap	29	Magnetic / Optic codified lap	1	White
	27	GND	2	Black
	14	+ VB	3	Red
	28	Not codified optic lap	4	Blue

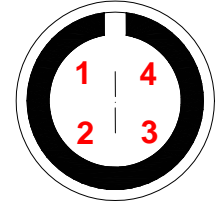
Channel name	Pin DEUTSCH	Signal	Cable colour
RPM	13	RPM 150-400V coil - RPM sq. wave >8V	White
	18	GND	Black
Power	1	9-15V Battery input	Red
	15	GND	Black

## How to create the “22 Pins Deutsch connector” harness

### How to create the USB cable

See the following table in order to correctly create the USB data download cable.

Pin DEUTSCH	Signal	Pin Binder	Cable colour
8	USB D+	1	White
9	GND	2	Black
7	USB D-	3	Red
	Not connected	4	



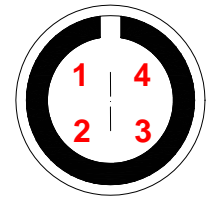
Binder 719 female pinout:  
solder termination view

### How to connect Speed sensors #3 and #4

Your MXL is able to sample up to 4 speed channels: 2 of them may be connected to the “22 pins Deutsch connector”. In the example described here below is shown how to correctly install speed channel #3.

We suggest You to use a “4 x 0.14 mm<sup>2</sup>” wire to connect the **DEUTSCH connectors** to the **Binder 719 connector** (shown in the following picture).

Pin DEUTSCH	Signal	Pin Binder	Cable colour
5	Speed 3	1	White
11	GND	2	Black
10	+ VB	3	Red
	Not connected	4	



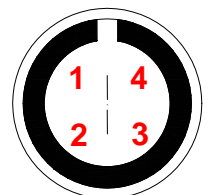
Binder 719 female pinout:  
solder termination view

### How to create the “External expansion modules” cable

Your MXL may be expanded, via CAN protocol, in order to increase the total amount of available input channels.

We suggest You to use a “4 x 0.14 mm<sup>2</sup>” wire to connect the **DEUTSCH connectors** to the **Binder 719 connector** (shown in the following picture).

Pin DEUTSCH	Signal	Pin Binder	Cable colour
3	CAN 0+	1	White
19	GND	2	Black
13	+ VB	3	Red
4	CAN 0-	4	Blue



Binder 719 female pinout:  
solder termination view



## How to connect your MXL to the ECU – CAN protocol

Your MXL is able to sample data incoming from external ECUs (please refer to the user's manual or to **Race Studio 2** for the available ECUs list).

If your ECU is equipped with a CAN communication protocol and is included among the available ECUs list, here below you may find the information you need to create the "ECU-CAN" communication cable.

We suggest You to use 0.5 mm<sup>2</sup> unifilar wires.

Pin DEUTSCH	Signal	Cable colour
20	CAN +	White
2	GND	Black
21	CAN -	Blue

## How to connect your MXL to the ECU – RS232 protocol

Your MXL is able to sample data incoming from external ECUs (please refer to the user's manual or to **Race Studio 2** for the available ECUs list).

If your ECU is equipped with a RS232 (serial) communication protocol and is included among the available ECUs list, here below you find the information you need to create the "ECU-RS232" communication cable.

We suggest You to use 0.5 mm<sup>2</sup> unifilar wires.

Pin DEUTSCH	Signal	Cable colour
17	RS232 RX (for ECU interface)	White
16	GND	Black
18	RS232 TX (for ECU interface)	Blue

## How to remote the gauge's keyboard

Your MXL PRO allows you to remote the keyboard's pushbuttons: in particular you may remote **MEM** and **VIEW** ones.

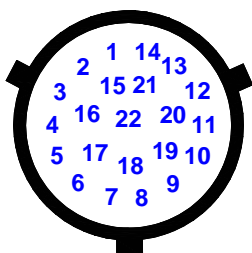
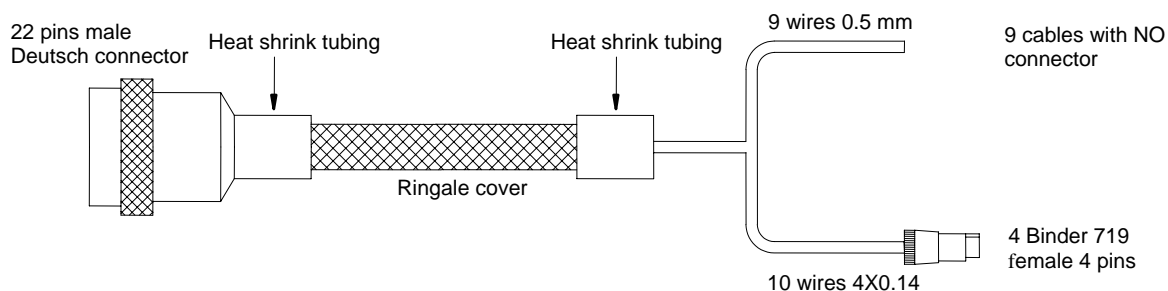
The remote switches for MXL PRO are active low (i.e. they trigger to GND).

It is suggested to use 0.5 mm<sup>2</sup> unifilar wires.

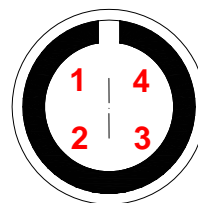
Pin DEUTSCH	Signal	Cable colour
14	MEM	White
12	GND	Black
15	VIEW	Blue

## Example of “22 pins Deutsch connector” harness for MXL PRO

Here below is an **example** of wiring for **MXL PRO** – “22 pins Deutsch connector” harness. See the following drawing and tables for further information.



22 pins Deutsch male connector pinout: contacts insertion view



4 pins Binder 719 female pinout: solder termination view

Channel name	Pin DEUTSCH	Signal	Pin Binder	Cable colour
USB	8	USB D+	1	White
	9	GND	2	Black
	7	USB D-	3	Red
		Not connected	4	
Speed 3	5	Speed 3	1	White
	11	GND	2	Black
	10	+ VB	3	Red
		Not connected	4	
Speed 4	6	Speed 4	1	White
	11	GND	2	Black
	10	+ VB	3	Red
		Not connected	4	
Expansion	3	CAN 0+	1	White
	19	GND	2	Black
	13	+ VB	3	Red
	4	CAN 0-	4	Blue

Channel name	Pin DEUTSCH	Signal	Cable colour
Keyboard	14	MEM	White
	12	GND	Black
	15	VIEW	Blue
CAN	20	CAN +	White
	2	GND	Black
	21	CAN -	Blue
RS232	17	RS232 RX (for ECU interface)	White
	16	GND	Black
	18	RS232 TX (for ECU interface)	Blue

P.S. Please note: An. in the tables is for Analog