



# **User Manual for CAN-Switchbox from serialnumber (S/N) 900**

(Order-Code #4010)

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Thank you for coosing the TLT-Moto CAN-Switchbox, which is assembled in Germany. This product is continually tested and developed of engineers and technicians who also drive motorcycle.

Please read and follow these instructions when mounting and connection the CAN-Switchbox.

## 1. Function of the CAN-Switchbox

The CAN switch box is able to simulate and replace the original handlebar fittings as well as the speedometer on the current Sportster®, Dyna® and Softail® models with HD-LAN.

A step-by-step conversion is also possible by replacing the handlebar fittings with other buttons in the first step and later the original speedometer. If, for example, the HD speedometer is no longer available, this is automatically recognized by the CAN switch box and our box begins to simulate the speedometer. It sends all the necessary signals to the on-board electronics and the BCM does not recognize any difference to the original version. This means that there are no error messages and the motorcycle can be operated with a third-party speedometer.

It is important here that all functions that are given in the Harley® original version are also retained with our CAN switch box. Most custom conversions try to achieve a "clean" condition. Here comes the compact one The design of the box with only 70x50x20mm is very opposed. It can actually be installed at any point in the motorcycle, preferably in the frame triangle behind the steering head bearing. This would have the advantage that you are directly at the original connection point of the fittings. The connector can thus be used directly, preferably from the right-hand side.

Please note that with the CAN switchbox, the wiring harness can remain completely unchanged and does not have to be laboriously converted. With the optionally available cable kits, not even a plug needs to be changed. Everything remains ORIGINAL.

This CAN switchbox version is suitable for both HD keyless models and HD CAN motorcycles with a conventional ignition lock.

## 2. Connection

The connection of our box is not difficult, but it should be done by an expert. One side of all push-button and switches has to be connected to ground and the other side has to be connected to the CAN-Switchbox, please take a look of the schematic.

The outputs of the CAN-Switchbox switch +12 volts. The outputs for display LEDs **[R7 - R12]** switch to ground (GND). See also the wiring diagram and the pin assignment.

The power supply for the high-power outputs (supply line **[M2]**) should be connected to +12 volt from the ignition.

All associated power outputs are also located on the M bar **[M3-M10]**.

For proper function, a good connection to the vehicle mass is very important, so at least one of the two hexagon threaded bolts should be firmly connected to ground.

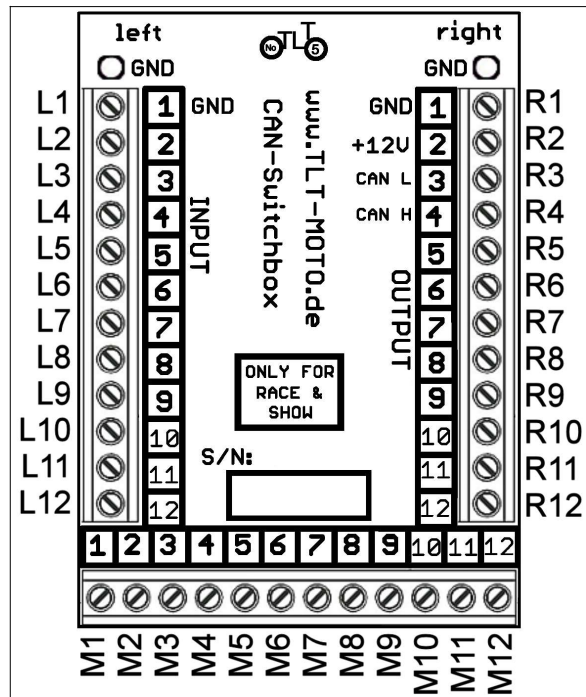
### 2.1 Wiring Diagram

The exact connection name of the CAN switch box is described in more detail in the following table. The pin assignment is shown in figure 2.1 and the following table.

Terminal Block Left (Input)			
	Pin-Nummer	Function	Connection
	L1 - GND	vehicle mass (GND)	
push-button ground inputs	L2 - turn left	Blinker Links on / off	push button turn left
	L3 - turn right	Blinker Rechts on / off	push button turn right
	L4 - start	Start des Motors	push button start
	L5 - kill/run	ignition off / on	push button kill/run
	L6 - clutch	clutch	clutch
	L7 - break	brake	push button brake
	L8 - high beam	high beam on / off	push button high beam
	L9 - horn	Horn	push button horn
	L10 - trip	Trip	push button trip
	L11 - flash	flasher	push button flaher
	L12 - EMC	warning flasher	push button EMC

Terminal Block Left (low power output)			
	Pin-Nummer	Function	Connection
HD-Connector	R1 - GND	GND	[22B-1] Ground (bk or bl tlt-color)
	R2 - +12V	+12 Volt battery	[22B-1] +12V (red tlt-color)
	R3 - CAN L	CAN_Low	[22B-1] CAN Low (green tlt-color)
	R4 - CAN H	CAN_High	[22B-1] CAN High (yellow tlt-color)
Tachio	R5 - speed out	external speedometer	Output external Speedometer
	R6 - RPM out	external RPMmeter	Output external RPM-meter
LED ground output	R7 - turn left LED	turn left output	only for LED (switched to GND)
	R8 - turn right LED	turn right output	only for LED (switched to GND)
	R9 - ABS LED	ABS output	only for LED (switched to GND)
	R10 - neutral LED	neutral output	only for LED (switched to GND)
	R11 - oil LED	oil output	only for LED (switched to GND)
	R12 - high beam LED	high beam output	only for LED (switched to GND)

Terminal Block middle (high power output)			
	Pin-Nummer	Function	Connection
	M1 - GND	GND	vehicle mass (GND)
+12V High Power Outputs	M2 - +12 Volt Power	+12V input for M3 - M9	Please connect with ignition
	M3 - Turn Left Power	Power Output 36 watt	output turn left indicator l.
	M4 - Turn Right Power	Power Output 36 watt	output turn right indicator l.
	M5 - ABS Power-Out	Power Output 36 watt	output ABS indicator light
	M6 - Neutral Pow-Out	Power Output 36 watt	output neutral indicator light
	M7 - Oil Power	Power Output 36 watt	output Öl indicator light
	M8 - High Beam Power	Power Output 36 watt	out. high beam indicator light
	M9 - reserved	reserved to fuel reserve	our S/N #950 and higher, for Milwaukee-Eight only
	M10 - reserved		
		M11 - Trip Switch out	Switched to ground
	M12 - RUN	RUN	[22B-2] Energie Stop



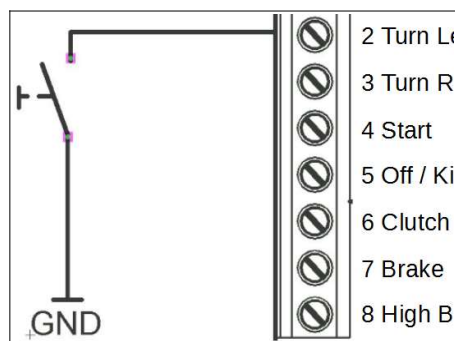
**Figure 2.1 pin assignment**

## 2.2 CAN-Switchbox connection

The contacts **[R1]** (GND), **[R2]** (+ 12V), **[R3]** (CAN-Low), **[R4]** (CAN-High) and **[M12]** (RUN) connect the CAN-Switchbox to the motorcycle. These signals are located on the connectors for the original handlebar fittings. A corresponding set Connection plug is available from TLT-Moto (see Figures 4.1 and 4.2). Will the motorcycle switched off, the CAN switchbox switches itself off after approx. 30 seconds (the Power LED goes out). The CAN switchbox switches itself when required or manually with the KILL / RUN button.

## 2.3 push-button connection

As already mentioned, the buttons are connected to the corresponding input of the CAN switch box connected. One pole of the push button is connected to the input of the box and the other pole with connected to the ground (GND) of the vehicle. The polarity of the button does not have to be respected.

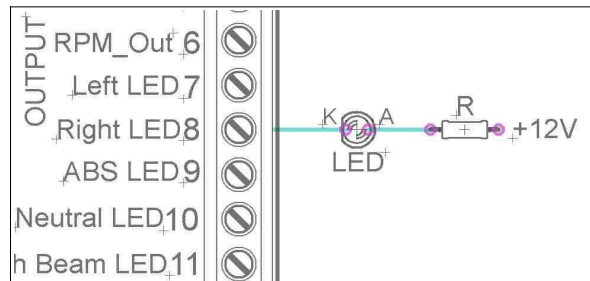


**Figure 2.3 connection of the push-button**

## 2.4 Connection of the LED indicator lights

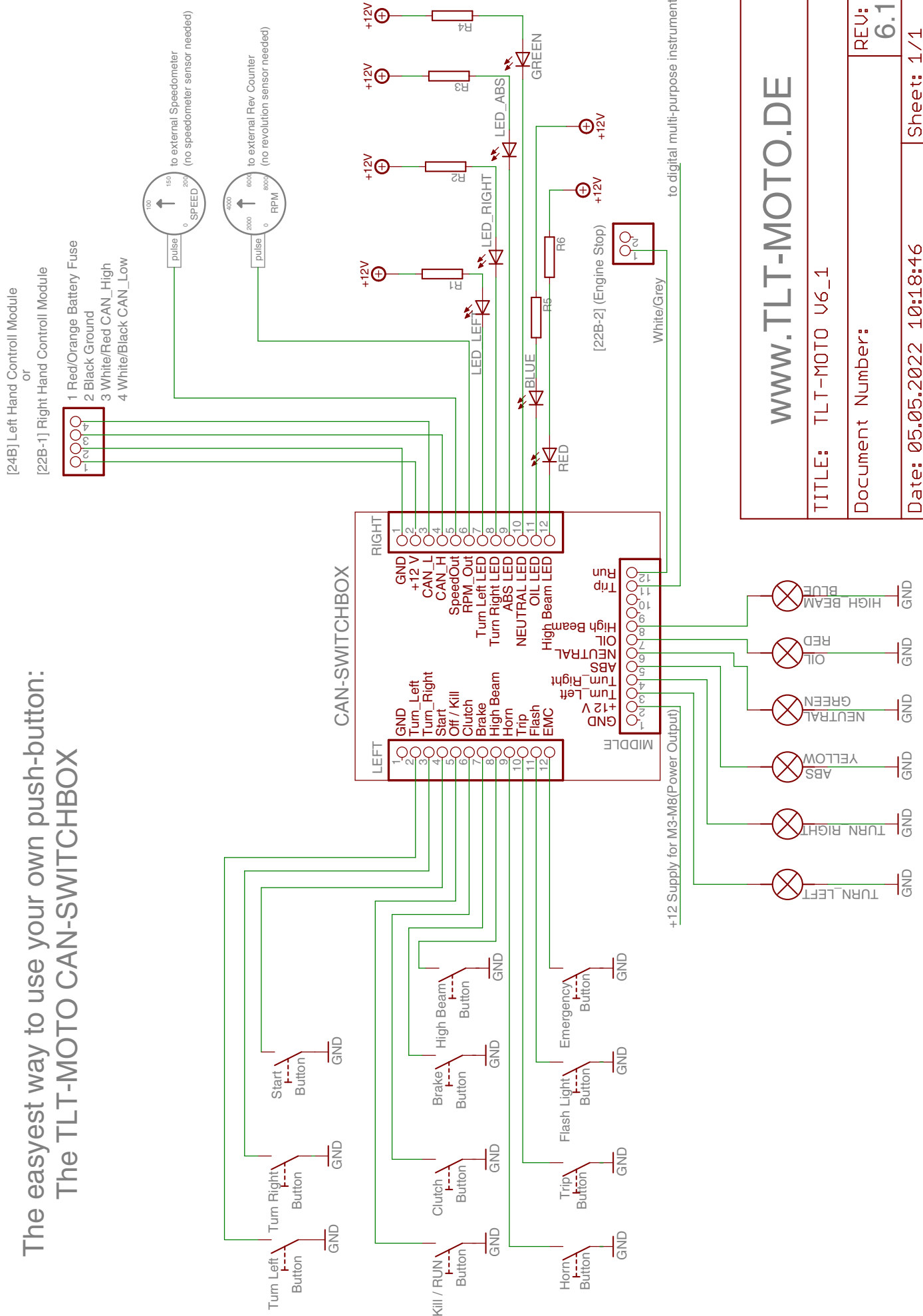
The CAN switchbox switches ground (GND) for the LED lights. These are the outputs [R7] to [R12]. See also chapter 2.6.

Thus, the + pole (anode) of the control LEDs must be connected to +12 volts and the cathode to the corresponding output of the CAN switch box. It is placed on the control LED by the CAN switch box GND. With 12 volt LEDs no series resistor is necessary. Otherwise, a series resistor, see Figure 2.4, is required. Please take care only that all outputs [R5 - R12] may not be loaded with more than 100 mA.



**Figure 2.4 Connection of LED indicator lights**

# The easiest way to use your own push-button: The TLT-MOTO CAN-SWITCHBOX



## 2.5 Connection of the Turn Signals

The + pole of the turn signals is connected to the corresponding output [M3 + M4] of the CAN switchbox. The other pole must again be connected to ground (GND) of the vehicle. The connection of 12 volt LED turn signals is possible without load resistor. Note that these outputs are supplied by a common supply line [M2]. These should be connected + 12V from the ignition.

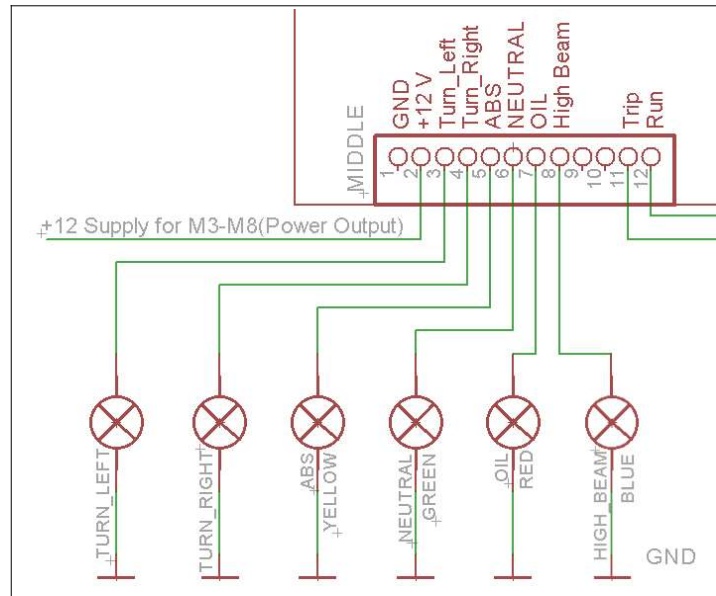


Figure 2.5 Connection of turn signals and indicator lights

## 2.6 Exchange of the original HD speedometer with the CAN-Switchbox

If, for example, only the original speedometer unit is to be replaced, the CAN switchbox can be connected in its place, as can be seen in Figure 2.7.

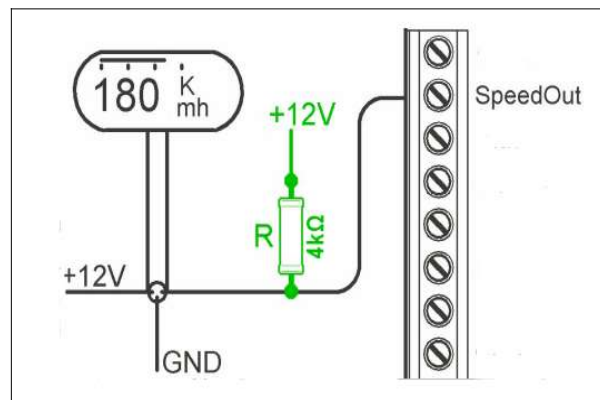
CAN-Switchbox with Cable-Kit				[39B] – HD-Con, Speedometer			
Ground (GND)	R1		BL	7	Ground (GND)		BK/GN
Battery Fuse (+12V)	R2		RT	5	+12V, Battery Fuse		R/O
CAN Low	R3		GN	8	CAN Low		W/BK
CAN High	R4		YE	2	CAN High		W/R

Figure 2.6 Extract from the circuit diagram of a Dyna® model 2012

Figure 2.6 shows the connector [39B] from the original speedometer and which lines are to be connected where. The connection to [22B] is also shown in the connection diagram on the following pages. We also offer two different cable connection kits as optional accessories so that the original HD cable harness does not have to be destroyed.

## 2.7 Connection of a new speedometer or rev counter, e.g. from motogadget®

The CAN-Switchbox provides a pulse signal for the external tachometer **[R5]** (e.g. motoscope®-mini the white line) and also a pulse signal for a RPMmeter **[R6]** (e.g. motoscope®-mini the yellow line). Thus, no pulser must be installed. The CAN-Switchbox provides a clocked ground (GND). This signal is the same as that of most speedometer accessories (eg motoscope® or Chromclassic® from motogadget®). In the rarest cases, a pull-up resistors must be connected to the operating voltage and the outputs SpeedOut or RPMOut (see Fig. 2.6) so that the tacho interprets the signal correctly.



**Figure 2.6 connection without resistor or with a ca. 2-4 kΩ Pull-Up**

If you do not want to activate the menu of the new speedometer with an additional button, the trip input of the speedometer (e.g. motoscope®-mini the green line) can be connected to **[M11]** of the CAN-Switchbox.

Even the 6-fold LED bar from Thunderbike or the motoscope®-mini connect is no problem. Example ways:

Thunderbike 6x LED-bar		
color	function	CAN-Switchbox
white	turn left	R7
gray/pink	turn right	R8
black	abs	R9
gray	neutral	R10
blue	oil	R11
green	high beam	R12
red, pink, brown, yellow, violett, red/blue	switched +12V power	eg. from riding light

motosign-mini (5x LED-bar)		
color	function	CAN-Switchbox
blue, orange	ground	M1
red	switched +12V power	M2 eg. from riding light
violett, brown	turn left or right	M3 + M4 via two diodes
black	abs	M5
white	high beam	M8
yellow	neutral	R10
green	oil	R11

You can get switched +12V e.g. from the riding/DOM light to connect at **[M2]**.



## **2.8 Start and change the CAN-Switchbox mode**

The function of the CAN-Switchbox should correspond to the handling of the keyless version and also that of the original HD control with ignition lock. Therefore it starts in **KILL-Mode**, this is indicated optically by the output LED flashing very quickly (approx. 4Hz). If the CAN-Switchbox is in this mode and no button is pressed, it goes to sleep again after approx. 30 seconds and switches off.

By pressing the KILL / RUN button, the CAN switchbox changes to **RUN-Mode**, the output LED of the box goes out and the BCM activates the ignition.

Pressing the KILL / RUN button again deactivates the ignition of the motorcycle, the CAN switchbox switches back to **KILL-Mode**. The output LED flashes again very quickly and after approx. 30 seconds the motorcycle switches off again.

## **2.9 Special functions and keyboard shortcuts**

When converting the original handlebar fittings usually the number of controls, buttons are reduced. Therefore, some buttons have additional functions so that you can emulate all original functions even with a total of 6 buttons.

### **Thus, the following is possible :**

Left-Hand-Controll-Module:	turn left,	high beam,	horn
Right-Hand-Controll-Module:	turn right,	KILL/RUN (+Start),	Trip

### **List of Implemented Additional Functions :**

**transport mode:** simultaneous pressing of both turn signals

**hazard lights:** with the handbrake held, press both indicators at the same time

**KILL/RUN button:** by briefly pressing the KILL/RUN button you switch between KILL and RUN mode. In RUN mode, the ignition is switched on and the low beam is switched on lights up and the fuel pump works. In KILL mode, the output LED on the CAN switch box flashes very fast (approx. 4Hz). The motorcycle switches off the ignition and everything turns off completely after a while. Should the If the engine has been running before, it will stop

**Start engine with Kill/RUN:** long press the KILL/RUN button (approx. 2-3 sec.) simulates pressing the start button and the engine starts.

**Trip/Menu button simulation:** If the speedometer has been replaced, the so-called Menu button of the new speedometer via the CAN switchbox be operated. For example just the green line of the Connect the mg-scope-mini to the [M11] of the CAN switchbox. So is with original handlebar fittings by pressing the trip the menu button is pressed.

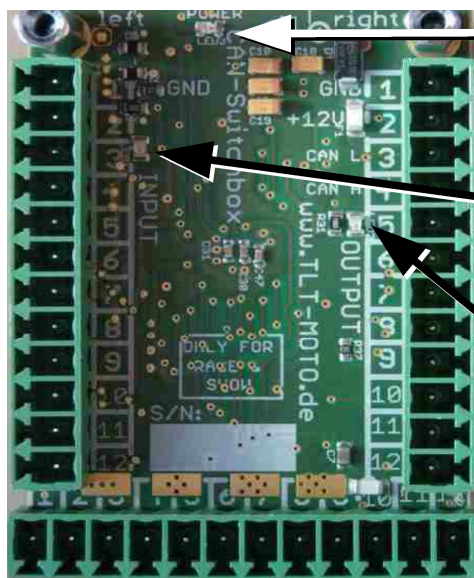
**Attention,** this only works with menu buttons after Switch ground.

### 3 What do the LEDs of the CAN-Switchbox mean?

There are three LEDs on the board to facilitate connection of the CAN-Switchbox. At the top of the board is the **Power-LED**, which lights up as soon as the CAN-Switchbox is active (Figure 3.1).

The **Input-LED** is located on the top left of the CAN switch box. It lights as soon as one of the numerous inputs is connected to ground, but only if the box is connected to the BCM. This means that the input LED is not lit although, for example, the trip input is grounded, but the CAN is not connected or is connected incorrectly.

On the right is the **Output-LED**, which is alternately on / off only when the turn signal is switched on to the beat of the original turn signals. If the output LED flashes very fast, the CAN-Switchbox is in kill / stop mode, the ignition is off.



**Power-LED** , which lights up as soon as the CAN- Switchbox is active and der HD-LAN works.

**Input-LED** lights as long as one of the inputs has connection to ground.

**Output-LED** lights up in time with the turn signals

Figure 3.1 CAN-Switchbox LEDs

### 4 Optional Accessories

To facilitate the connection to the existing motorcycle electronics, we offer a cable connection kit. These kits are optional and must be ordered separately. The following pictures show the two available cable connection kits for direct connection to the original existing HD connectors.

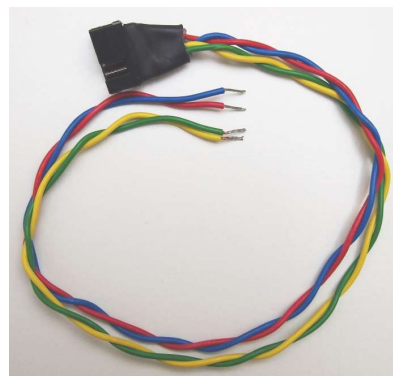
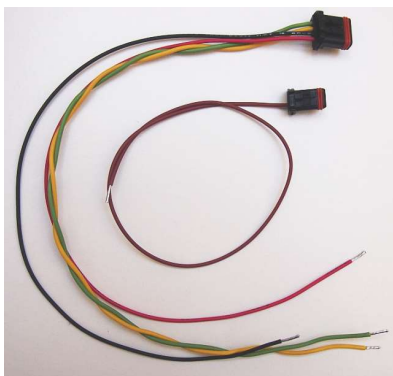


Fig. 3.1 Handlebar-Cable-Kit [22B] Fig. 3.2 Speedometer-Cable-Kit [39B]  
(Order-Code #3001) (Order-Code #3002)

## **5 Technical Data**

length / width / height: 70 mm / 50 mm / 20 mm  
weight: ca. 35 g  
mounting holes: 2 x M3 10 mm  
current: ca. 34 mA (Logik), standby ca. 9  $\mu$ A  
operating voltage: 9 – 18V  
operating temperature: -20°... + 80°C

## **6 Disclaimer**

**THE CAN SWITCHBOX SHOULD NEVER BE OPENED OR CHANGED, IN THIS EVENT WILL VOID ANY WARRANTY. TLT-MOTO ASSUMES NO LIABILITY FOR DIRECT OR INDIRECT DAMAGE OR CONSEQUENTIAL DAMAGES OF ANY KIND CAUSED BY THE USE, THE MOUNTING OR CONNECTION OF THE CAN SWITCHBOX OR THE INCLUDED ACCESSORIES ARE CREATED. UNDER THAT FALL UNDER OTHERWISE ALL DAMAGE TO PERSONS, PROPERTY DAMAGE AND FINANCIAL DAMAGE DAMAGE. ESPECIALLY USE IN THE PUBLIC SECTOR ROAD TRAFFIC IS AT YOUR OWN RISK AND MAY ONLY IN CONNECTION WITH AN ACCEPTANCE FOR EXAMPLE BY THE TÜV OR THE DEKRA SUCCESS. FURTHERMORE IS THE FUNCTION AND THE STRUCTURE PATENT PROTECTED, THEIR REPRODUCTION, ALSO BY PARTIAL FUNCTIONS, WILL BE FOLLOWED BY PENALTIES**

## **Finally**

If you have a motorcycle equipped with the CAN switchbox, then we look forward to a photo of your machine in order to publish it in our gallery.

Please mail photos to [mail@tlt-moto.de](mailto:mail@tlt-moto.de).



rev. 6.09

## **Addendum**

If you have a HD Milwaukee-Eight (from 2018) and a CAN-Switchbox with S/N #950 and larger, you can use [M9] as the connection for the tank reserve display.

## Connect:

	<u>function</u>	<u>color</u>
L1	ground	_____
L2	turn left-switch	_____
L3	turn right-switch	_____
L4	start-switch	_____
L5	kill/run-switch	_____
L6	clutch-switch	_____
L7	break-switch	_____
L8	highbeam-switch	_____
L9	horn-switch	_____
L10	trip-switch	_____
L11	flashlight-switch	_____
L12	emergency-switch	_____

	<u>function</u>	<u>color</u>
R1	ground	_____
R2	+12 Volt	_____
R3	hd-can low	_____
R4	hd-can high	_____
R5	speed-out	_____
R6	rpm-out	_____
R7	turn left led	_____
R8	turn right led	_____
R9	abs led	_____
R10	neutral led	_____
R11	oil led	_____
R12	highbeam led	_____

	<u>function</u>	<u>color</u>
M1	ground	_____
M2	+12Volt power input	_____
M3	turn left power out	_____
M4	turn right power out	_____
M5	abs power output	_____
M6	neutral power out	_____
M7	oil power output	_____
M8	highbeam power out	_____
M9	reserved	_____
M10	reserved	_____
M11	trip switch output	_____
M12	RUN-control	_____