Technical description
V-8211 digital armature Rw 1

All technical questions to
RW Superbike-Shop
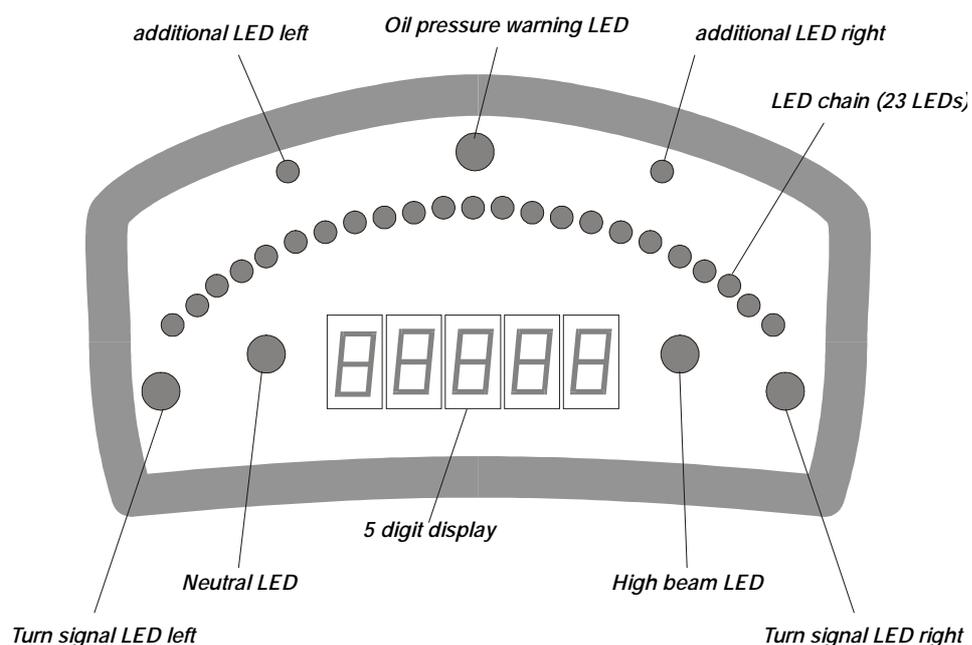82467 Garmisch-P., Loisachauen 15a
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Functions

- RPM is always visible on the LED chain (23 LEDs)
- At critical RPM the LED chain flashes
- Speedometer, RPM, kilometers or trip kilometers on 5 digit display
- Odometer with 1 km resolution
- Trip odometer with 100 m resolution
- RPM with resolution 100 rpm, to max. 25500 rpm
- Speedometer with resolution 5 kmh, to max. 995 kmh
- Brightness of the display adjustable
- Oil pressure warning lamp
- Oil pressure check is also displayed on digit display
- Turn signal, neutral and high beam warning lamp
- 2 additional control LEDs for any applications e.g. load check
- Operation and programming of the device with a single button
- All-important adjustments are customer programmable
- No power supply necessary when the ignition is turned off

additional LED left   *Oil pressure warning LED*   *additional LED right*

LED chain (23 LEDs)

5 digit display

Neutral LED   *High beam LED*

Turn signal LED left   *Turn signal LED right*

Operation

When the device is switched on, all LEDs light up and the device version is displayed (e.g. 4--01) for short time; afterwards the display switches into a test mode. In this test mode a counter that increases each second runs in the 5-digit display. At the same time the LED chain runs constantly. The oil pressure LED functions as in normal operation.

If the engine is started, the display switches immediately into genuine operation, in which the LED chain shows the RPM, and the speed is shown in the 5-digit display.

Switching the display

By pressing the SET button, you can choose between 4 functions:

- - Speedometer (on the middle 3 displays, resolution 5 kmh)
- - Tachometer (all 5 digits, resolution 100 rpm)
- - Kilometer (all 5 digits, resolution 1 km)
- - Trip kilometer (all 5 digits with one decimal, resolution 100m)

Reseting the trip kilometer

If you want to reset the trip kilometer, press the SET button while you switch the ignition on and keep pressing the SET button until the LED chain begins to run.

Adjusting the brightness

When the ignition is turned on, the display automatically starts in "day operation" mode (the display lights up with highest possible brightness). In genuine operation, by pressing the SET button (longer than one second) you can toggle between "day operation" and "night operation" (lower brightness). The brightness for "night operation" can be programmed at 16 levels (see programming guidance).

Parameter adjustment:

In order to adjust the device to different ignitions, speedometer pulse generators, speed range etc. can be programmed several parameters.

You can enter the programming mode by pressing the SET button (after switching on the ignition, before the engine is started) longer than 1.5 seconds. The right digit shows the number of the current parameter, and the left 3 digits display the value of the parameter.

You can increase the value of the parameter with short pressings of the SET button. Changing to the next parameter is achieved by pressing the SET button longer than 1 second. In this manner you can adapt all 7 parameters to your vehicle.

If a parameter value is modified, you have to switch to the next parameter, to store the modified value!

Parameter outline:

Parameter 1 PAR_BRIGHT: Brightness for night operation

With this parameter you can adjust the 16 levels of brightness of the LED displays for "night operation". The parameter value 0 corresponds to the lowest, the value 15 of the highest brightness.

Parameter 2 PAR_RPMB: Time base for LED chain

With this parameter you can program the range of the LED chain.

You must know the following values:

- Number of ignition impulses (**IMPULSE**) from an ignition coil for each crankshaft rotation i.e.:
  Engine with 4 cylinders: 1 impulse for each rotation
  Engine with 1 cylinder: 1 or 0.5 impulse for each rotation
  2-cylinder Harley with original ignition: 1 impulse for each rotation
  2-cylinder Harley with Single-Fire ignition: 0.5 impulse for each rotation

- How many rotations (**RPM**) are to be displayed per LED e.g.:
  250 rpm (full display 5750 rotations)
  333.33 rpm (full display 7666 rotations)
  500 rpm (full display 11500 rotations)
  666.66 rpm (full display 15333 rotations)
  1000 rpm (full display 23000 rotations)

You can calculate the value of the parameter **PAR_RPMB** with the following formula:

PAR_RPMB = 12000 ÷ (**IMPULSE** x **RPM**)

Example:

RPM = 500 (full display 11500 rotations)
IMPULSE = 1 (i.e. Z1000 4 cylinder engine)
PAR_RPMB = 12000 ÷ (1 x 500)
PAR_RPMB = 24
You program the value 24.

Parameter 3 PAR_RPM7: Time base for RPM on 5 digit display

With this parameter you can program the RPM range on 5 digit display.

You must know the following values:

- Number of ignition impulses (**IMPULSE**) from an ignition coil for each crankshaft rotation i.e.:
  Engine with 4 cylinders: 1 impulse for each rotation
  Engine with 1 cylinder: 1 or 0.5 impulse for each rotation
  2-cylinder Harley with original ignition: 1 impulse for each rotation
  2-cylinder Harley with Single-Fire ignition: 0.5 impulse for each rotation

You can calculate the value of the parameter **PAR_RPM7** with the following formula:

PAR_RPM7 = 120 ÷ **IMPULSE**

Exemple:

IMPULSE = 1 (i.e. Z1000 4 cylinder engine)
PAR_RPM7 = 120 ÷ 1
PAR_RPM7 = 120
You program the value 120.

Parameter 4 PAR_TEIL: Speedometer impulse adjustment

This value should only be changed if more than 5 impulses per wheel rotation are produced. From the factory it is set at 1. With the parameter **PAR_TEIL** the device can be adapted to special pulse generators. If the parameter **PAR_TEIL** is changed, the values of **PAR_KM** and **PAR_KMI** must be modified as well.

In order to adjust this parameter, you must know how many impulses per wheel rotation (**KMIMP**) the pulse generator produces.

You should use the following values:

KMIMP	PAR_TEIL
1 to 5	1
6 to 10	2
11 to 15	3
16 to 20	4
21 to 25	5
26 to 30	6
31 to 35	7
36 to 40	8
41 to 45	9
46 to 50	10
51 to 55	11
56 to 60	12
61 to 65	13
66 to 70	14
a.s.f.	

Example: With newer Harleys the electronic pulse generator supplies i.e. 68 impulses per wheel rotation. In this case you program the parameter **PAR_TEIL** to 14.

Parameter 5 PAR_KM: Number of impulses per 100 m distance

With this parameter you can program the km and trip km display on your device. If you know how many impulses your pulse generator supplies (100m distance), then program the appropriate value.

If you do not have this data, you must know the following values:

- Wheel diameter in millimeters (**DIAM**) or
- Wheel perimeter (**PERIM**)
- Number of impulses per wheel rotation (**KMIMP**)
- The parameter **PAR_TEIL**

You can calculate the value of the parameter **PAR_KM** with the following formula:

PAR_KM = (31830.91 x (**KMIMP** ÷ **PAR_TEIL**)) ÷ **DIAM**

DIAM = **PERIM** ÷ 3.1416

Example:

DIAM = 533mm
KMIMP = 2 (pulse generator with 2 magnets)
PAR_TEIL = 1
PAR_KM = (31830.91 x (2 ÷ 1)) ÷ 533
PAR_KM = 119.44

You program the value 119.

Parameter 6 PAR_KMI: Time base for speedometer display

With this parameter you can program the speedometer display on your device. The parameter **PAR_KMI** indicates the time interval (in 5 ms steps) between 2 impulses from the puls generator at 5 kmh.

If you do not have this data, you must know the following values:

- Wheel diameter in millimeters (**DIAM**) or
- Wheel perimeter (**PERIM**)
- Number of impulses per wheel rotation (**KMIMP**)
- The parameter **PAR_TEIL**

You can calculate the value of the parameter **PAR_KMI** with the following formula:

PAR_KMI = (0.45239 x **DIAM**) ÷ (**KMIMP** ÷ **PAR_TEIL**)

DIAM = **PERIM** ÷ 3.1416

Example:

DIAM = 533 mm
KMIMP = 2 (pulse generator with 2 magnets)
PAR_TEIL = 1
PAR_KMI = (0.45239 x 533) ÷ (2 ÷ 1)
PAR_KMI = 120.56

You program the value 121.

Parameter 7 PAR_OVER: Setting of RPM red-line warning signal

For the RPM indication on the LED chain you can set the value (**RRPM**) at which the critical (red) area begins. If this number of rotations is reached, the RPM indication (LED chain) begins to flash automatically.

Calculate the parameter **PAR_OVER**:

Example: You have choosen the parameter 2 (**PAR_RPMB**) to 500 rpm per LED. Now you want, the LED chain to begin to flash at 9800 rpm.

PAR_OVER = **RRPM** ÷ **RPM**

Example:

RPM = 500
RRPM = 9800
PAR_OVER = 9800 ÷ 500 = 19.6

You program the value 19.

The number of rotations at which the display begins to flash is:
RRPM = **RPM** x **PAR_OVER**
RRPM = 500 x 19 = 9500

Vehicle data

Please enter your data here.

IMPULSE (Ignition impulses of an ignition coil per crankshaft rotation)	
RPM (RPMs per LED of the LED chain)	
KMIMP (Number of impulses per wheel rotation)	
PERIM (Wheel perimeter in mm)	
DIAM (Wheel diameter in mm) = **PERIM** ÷ 3.1416	
RRPM (Critical number of rotations)	

From these data you got the following parameter values:

PAR_BRIGHT	
PAR_RPMB = 12000 ÷ (**IMPULSE** x **RPM**)	
PAR_RPM7 = 120 ÷ **IMPULSE**	
PAR_TEIL	
PAR_KM = (31830.91 x (**KMIMP** ÷ **PAR_TEIL**)) ÷ **DIAM**	
PAR_KMI = (0,45239 x **DIAM**) ÷ (**KMIMP** ÷ **PAR_TEIL**)	
PAR_OVER = **RRPM** ÷ **RPM**	

Technical data

Operating voltage:	9 - 16V DC
max. current input:	200mA

Inventory of included items:

- Speedometer/Tachometer
- 2 M6 Socket-head cap screws, shims, lock washers
- Impulse generator with 2 magnets (Part number: V-6489)
- 15 pole mini MNL pin housing and contact pins (Part number: V-6488)
- Description
- Mini push buttom switch for SET button (Part number: V-1376)
- 1 brake cleaner for the cleaning of the front disk (Part number: V-0582-DT)

Notes:

Mounting the pulse generator

The assembly of the pulse generator must be executed very precisely to ensure accurate functioning.

Please note the following illustration of the pulse generator. The distance between magnets and sensor may not exceed 2mm. 2 magnets must be installed oppositely onto the rim or brake disk. The magnets must be installed parallel to the spokes. If the magnets are glued on e.g. on the brake disk, the magnets without plastic shrouds should be installed. The sensor should be installed parallel to the magnets at the fork boot. The magnets must be installed centrally in relation to the sensor.

Both cables of the sensor should be led up to the plug of the device and the ground should be directly connected to the device ground (black cable). The polarity of the two cables of the pulse generator is interchangeable. The sensor is a so-called REED contact, i.e. with a OHM meter it can be checked if the contact is closed or opened. If a magnet is exactly at the sensor, then there should be nearly 0 Ohm between the two cables.

To check that the pulse generator is correctly installed, proceed as follows:

- The wheel, on which the customer is installed, should turn freely.
- Program the parameter 5 PAR_KM to the value 1.
- Start the engine to enter the genuine mode.
- Switch the display over to the trip odometer.
- If the parameter PAR_TEIL = 1 then do the following:
  When you turn the wheel, the trip odometer should increase by exactly 0.1 (100m) each time a magnet passes the sensor. If the trip odometer does not increase or increases by 0.2 or more, then the position of the pulse generator is not correct.
  Correct the position of the sensor or the magnets until the desired result is obtained. If the parameter PAR_TEIL is adjusted to a value other than 1, then the trip odometer should only increase when the magnet has passed the sensor the number of times to which PAR_TEIL. is set.
- Switch the ignition off and on.

- Now program all parameters to the correct values.

Distance:
max. 2mm
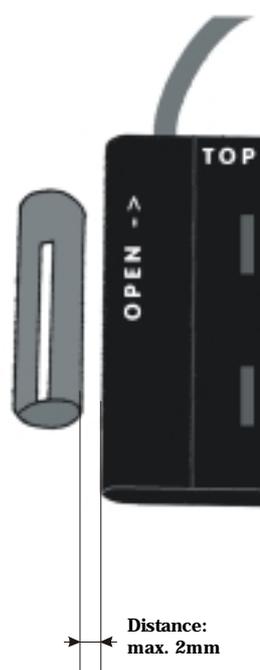
Electronic pulse generator

There are different electronic pulse generators available. With so-called Hall sensors no magnets are needed. With these sensors the rate can be taken directly from the gear rim screws or brake disk fixing bolts (for example). For further information contact X-MAS Motorcycle Electrics.

Electrical wiring

The wiring of the Tachos must be executed very carefully. The top side of the speedometer is 100% waterproof. The lower surface of the speedometer is splash-proof.

Always use the plug enclosed with the device!

Mounting of the speedometer/tachometer

The device is to be mounted using the two threads M6. The screws on the lower surface of the housing, as well as the frame cover, may never be loosened or tightened more strongly. If this is not considered, the warranty is void.

Cleaning of the display

The display of the device is made of a very sensitive polarized material which is not resistant to gasoline. To clean the disk, use only very soft cloths (e.g. paper tissues). To clean strong dirt, the brake cleaner V-0582-DT (available at Rw) can be used. If other cleaning agents are used, the warranty is void.

Important tips

Without a special adapter the tachometer is only suitable for contact and transistor ignitions. If the motorcycle is equipped with a CDI (condenser) ignition, like most Enduros, a special adapter (V-5383) must be used (not in the included inventory)

In order to avoid disturbances of the device, only supressed spark plugs and sparks may be used.

Supressed sparks can be recognized with most manufacturers (e.g. NGK, Bosch, Champion, Accel, Nippon Denso) by an ' R ' in the designation.

The warranty is void in the following cases:

1) Opening or processing the housing

2) Mechanical damage to the housing

3) Damage by false wiring

4) If you do not use the provided multiple plug

If you use another plug (!! also in the case of warranty!!), repairs will cost at least

 40,00 €extra.

Vehicle information

Ducati Monster

With most Ducatis, the oil pressure and neutral switch are 2-pole switches and they do NOT go against ground. That means the positive (+) pin of the switch must be wired to ground.

Honda CBR

The ignition impulse link of the original electronic tachometer cannot be used. The ignition input of the speedometer/tachometer must be taken from the negative (-) link of one of the two ignition coils.

Harley

With newer Harleys an original electronic pulse generator is installed in the transmission. The speedometer can operate problem-free with this pulse generator. The pulse generator supplies 68 impulses per wheel rotation. The 3 cables of the pulse generator must be attached to the following cables:

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red...............pin 5 (red) +12V
black. ..........pin 6 (black) ground
white ...........pin 15 (yellow) pulse generator
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If it should come to problems with the speed display at higher speed, a resistor (1kOhm / 0.25 Watts) between the red and white cables must be attached.

Electrical wiring

Link plugs:

Mini MNL 15 poles, on device side contact pins in the socket housing

cable colour	plug link	Description
white	1	additional LED left, - link
yellow	2	additional LED left, + link
green	3	additional LED right, + link
blue	4	additional LED right, - link
red	5	+12V with approx. 1A secured, switched by the ignition switch
black	6	- ground (i.e. frame) and - ground for pulse generators and SET button.
brown	7	Ignition (of the minus link of an ignition coil)
grey	8	Neutral switch
mint	9	no link
pink	10	High beam
orange	11	Turn signal of right
violet	12	Turn signal of left
red/blue	13	SET button (switches against ground)
green/brown	14	Oil pressure switch
yellow/red	15	Pulse generator (switches against ground)

IMPORTANT TIPS

The ground of the SET button and the pulse generator should be connected directly to the device ground (black cable).

The yellow/red cable (link 15, pulse generator) may be never connected with +, otherwise the device is destroyed.

Connection diagram

Speedometer/Tachometer

Speedometer/Tachometer		
red 5	Fuse 1A	Ignition switch	+ Battery 12 V
grey 8	neutral switch
pink 10	high beam
orange 11	right turn signal
violet 12	left turn signal
green/ 14 brown	oil pressure switch
brown 7	negative link of an ignition coil
yellow/ 15 red	tacho pulse generator
black 6	- ground (frame or negative pole battery)
red/ 13 blue	SET-button
white 1	- link LED left
yellow 2	+ link LED right
blue 4	- link LED left
green 3	+ link LED right