Ideas make future

MASTER unit ignition & injection

FAQ EN

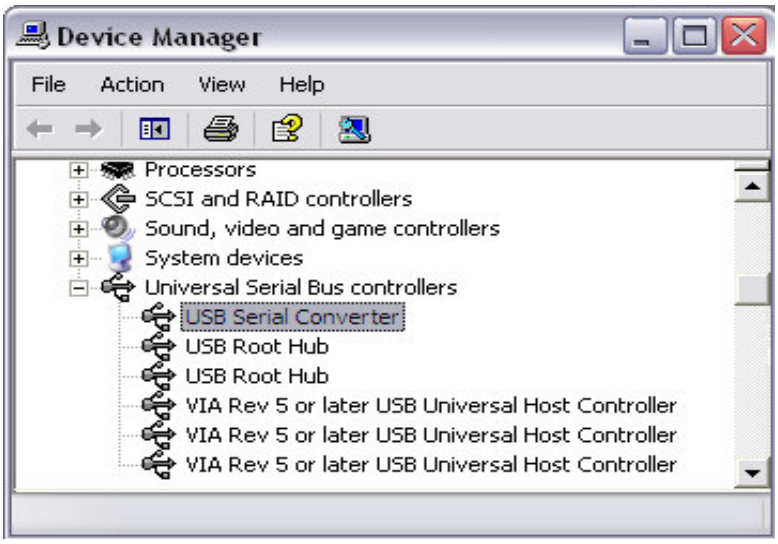
Rev 8.43

1. Diagnosis of MASTER unit and communication with PC

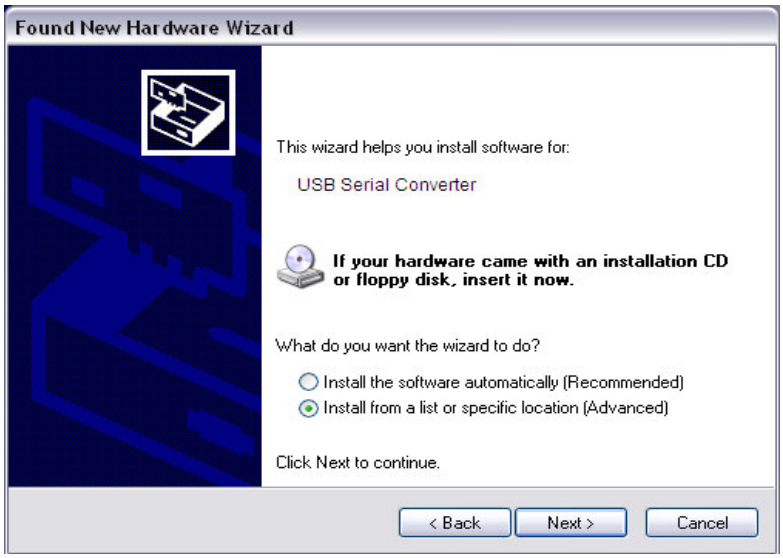
1.1) Supply - The basic condition for correct functioning of MASTER unit or communication is power connection in range 7-24V with regard to the MASTER unit type. The presence of power supply and correct work is indicated by the flashing blue LED.

1.2) Function – Fault condition you can notice immediately after switching on when the red LED would lit permanently, but the blue LED would not blink at all. This is likely to be incorrectly recorded or corrupted firmware FPGA or CPU. Please download the latest firmware from the site of www.imfsoft.com at Software section. Make upgrade of firmware using 'Infomation' icon at MASTER control application and there below press *Firmware upgrade.*

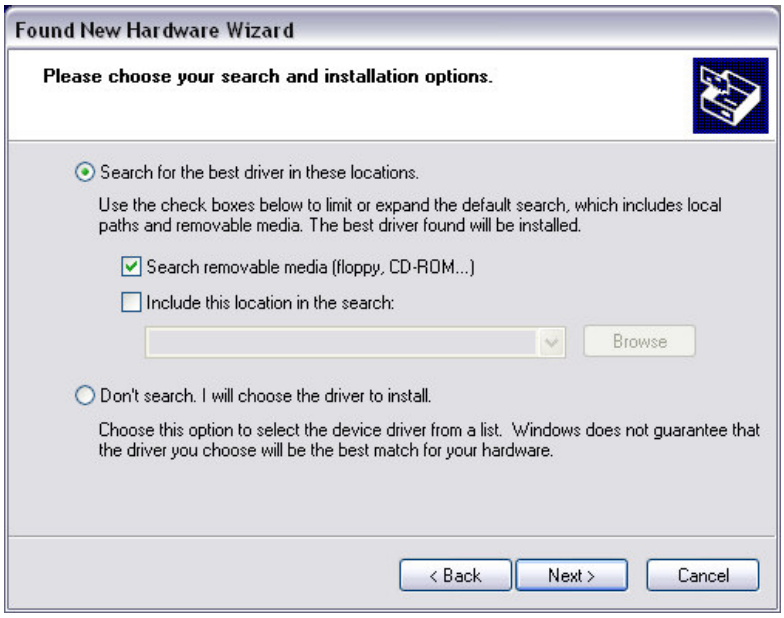
1.3) Driver - If the supply is alright, then blue LED is blinking. You have a connection using the USB cable between the PC and MASTER unit but communication would still do not work properly? Then it is necessary to verify correct installation of USB driver.
Please look into *Control panel -> System -> Hardware -> Hardware administrator* you will see the name of just installed driver *USB Serial Converter*.



1.4) Installation - If the installation is not done correctly, it means the *USB device* is displayed with a question mark, then start the installation manually over the selection of *Properties -> Update Driver* or using the *Control Panel -> Add Hardware*. It will appear the *New Hardware Wizard.*



According to the Guide choose *Install hardware that I manually select from a list (Advanced)* and click *Next.* In the next step choose *Search removable media* such as disc or *CD-ROM.* Insert the installation CD (provided with the MASTER unit) in CD ROM drive and press *Next*.



In the following window you might see information about possible driver incompatibility with windows system. In this case press *Next* or *Continue* again.

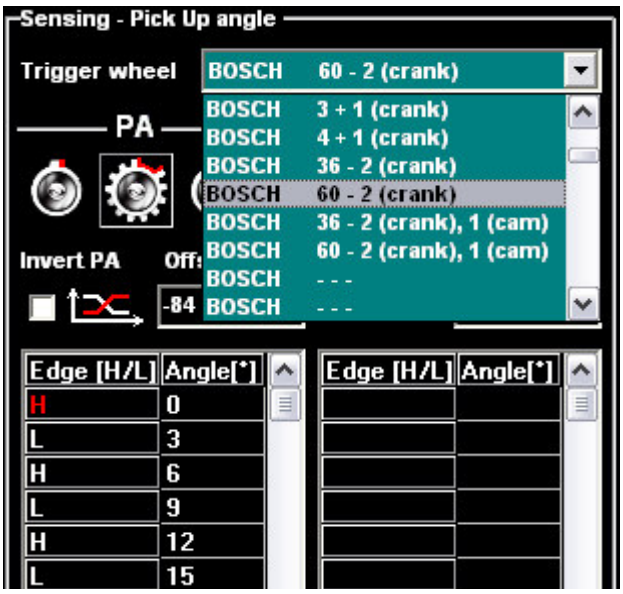
The setup will be now done and the driver will be registered in the Windows system.

Warning: MASTER unit must be connected to the computer.

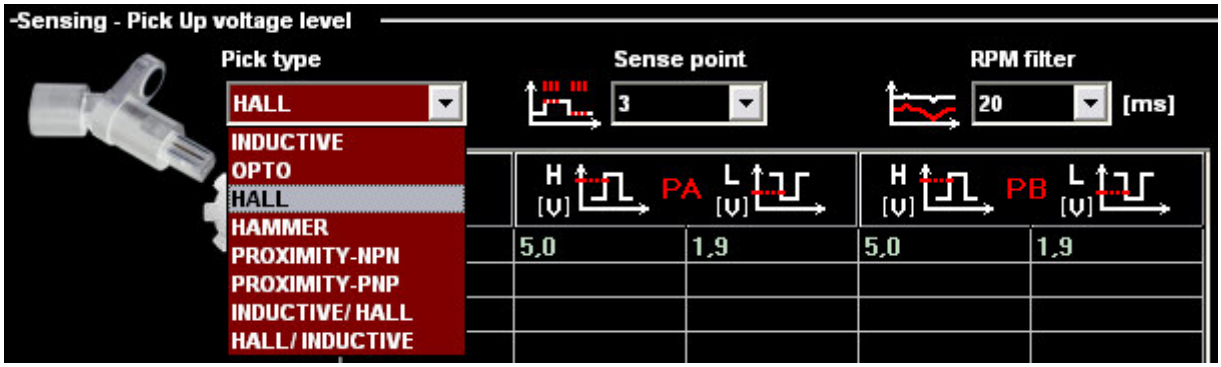
2. Wiring diagrams and rotation sensing

2.1) Schematics – at MasterSchemeV8_43.PDF document there are available diagrams for different combination of Coils, PickUp and their accessories. It is advisable to choose the nearest suitable diagram or carry out simple intersection of several different schematics. For each of the schematics is available MASTER unit configuration (.ig), which you can upload via USB to the unit. To accelerate the understanding of the opportunities and service of application you can watch training video.

2.2) Sensing wheel – At MASTER Control application in *Configuration of Pick Up sensor* you can choose one of present sensing wheel like BOSCH 60-2, BOSCH 36-2, BOSCH 2+1, BMW 36-1, FORD 36-1, SUZUKI 24-2, YAMAHA 16-2, HARLEY 32-2. Alternatively manually enter your own type of sensing wheel or request technical support for an addition of a new type of sensing wheel to the list. Correct choice can be quickly checked by recording the current configuration to the MASTER, after that you spin for few seconds engine and finally you read oscilloscope record. For more information, see below.

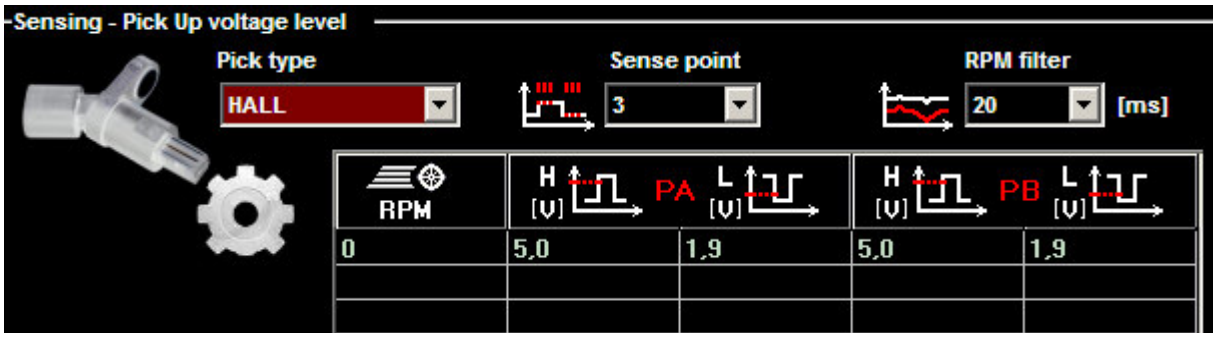


2.3) Rotation sensor - MASTER unit supports all known types of sensors and automatically adjust the sensing voltage levels, according to entered sensor type. The voltage levels can be also manually tuned as needed.

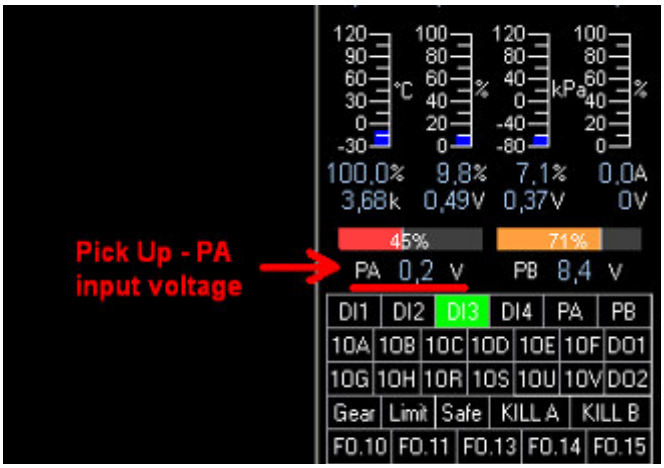


2.4) Possible faults of HALL, OPTO or PROXIMITY – PickUp sensing:

- Faulty wiring – Power, Ground, Signal
- Damage to the sensor itself – HALL, OPTO or PROXIMITY are sensitive to overvoltage
- Too big distance from the rotating plate – suitable distance is aprox. among 0.3 to 0.7 mm
- Inappropriate material of rotating plate – must be ferromagnetic (iron) for HALL
- Electrical function of PickUp sensor can be easily verified at the Online Visualization by viewing item PickUp PA (PB), which displays the current voltage value for the closed state (voltage approx. 0.2V) and open state (approx. 8.2V) of the PickUp sensor
- In a case that PickUp sensor does not react, it is possible to check ECU unit. The sensor have to be disconnected and you make manual excitation of input PA (PB). Input PA (PB) can be connected to G (ground) using clamp and now there must be the voltage change, when connection is made (voltage about 0.2V) and after disconnection (voltage about 8.2V).
- Faulty setting of angle of teeth egdes. The right setting can be seen at the Oscilloscope record in the curve Engine Angle A, which must steady growth in the angle 0-360°, see Figure 3.
- The function of switching and off may be reversed. You can use function for signal Invert 
- EngineAngleA (or B) curve must increase linearly from 0 to 360°, if there occur rapid changes in the curve then there is an error in teeth angle setting or Invert PA or Invert PB see Figure.3.
- Cables leading to the sensor are recommended shielded or twisted, where the shield is connected to the minus pole or minus can be used as a conductor. Cables of PickUp sensor must not lead concurrently with ignition coils cables not even with HV cables leading to plug cups.
- Inappropriate reading levels – recommended level Tooth H = 5.0V and Tooth L = 1.9V



Verification of PickUp functions by Online Visualization

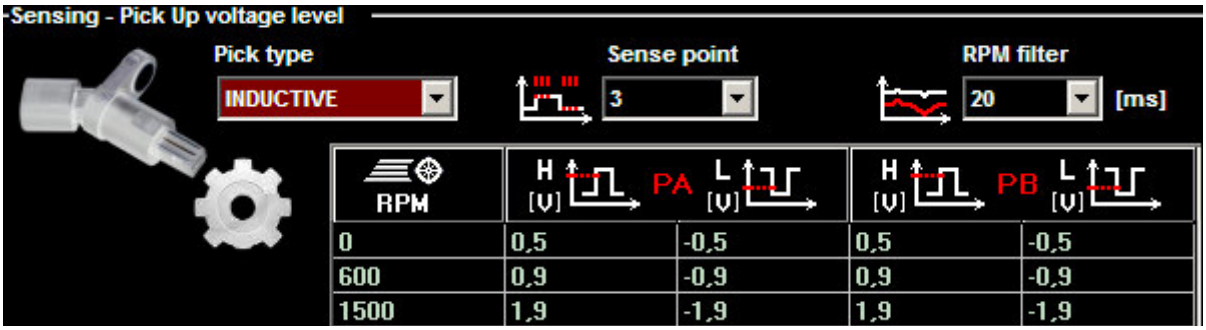


2.5) Possible faults of INDUCTIVE – PickUp sensing:

- Faulty wiring – (Ground and Signal) Sensing failure by wires confusion, see page below with oscilloscopic screen, Figure 1.

  Correction is possible by signal Inversion PA or PB 
- Damage to the PickUp sensor itself – short-circuit or interruption of coils, resistance can be measured (0.5 to 5kOhm)
- Too big distance from the rotating plate – suitable distance from 0.3 to 0.5 mm
- Inappropriate material of rotating plate – must be ferromagnetic (iron)
- Inappropriate levels of PickUp sensing – Fault sensing from low signal level see Figure.2.
- EngineAngleA (or B) curve must increase linearly from 0 to 360°, if there occur rapid changes in the curve then there is an error in teeth angle setting, see Figure.3.
- In a case that PickUp sensor does not react, you can check ECU unit function. The sensor have to be disconnected and manual excitation of input PA (PB) will be done. To input PA (PB) and to ground (G) can be connected an external source, for instance pencil battery 1,5V or even power supply 6/12V.
- Cables leading to the sensor are recommended shielded or twisted, where the shield is connected to the minus pole or minus can be used as a conductor. Cables of PickUp sensor must not lead concurrently with ignition coils cables not even with HV cables leading to plug cups.
- It is advisable to set voltage limits with 50% reserve for potentional voltage changes due to temperature, gap or sensor aging. For instance for signal ±5.0V is recommended sensing voltage of ±2,0V.

  Recommended levels: to start Tooth H = +0.5V and Tooth L = -0.5V
  to run Tooth H = +1.9V and Tooth L = -1.9V



RPM	H [V]	PA L [V]	H [V]	PB L [V]
0	0,5	-0,5	0,5	-0,5
600	0,9	-0,9	0,9	-0,9
1500	1,9	-1,9	1,9	-1,9

Pick up signal inversion PA or PB 

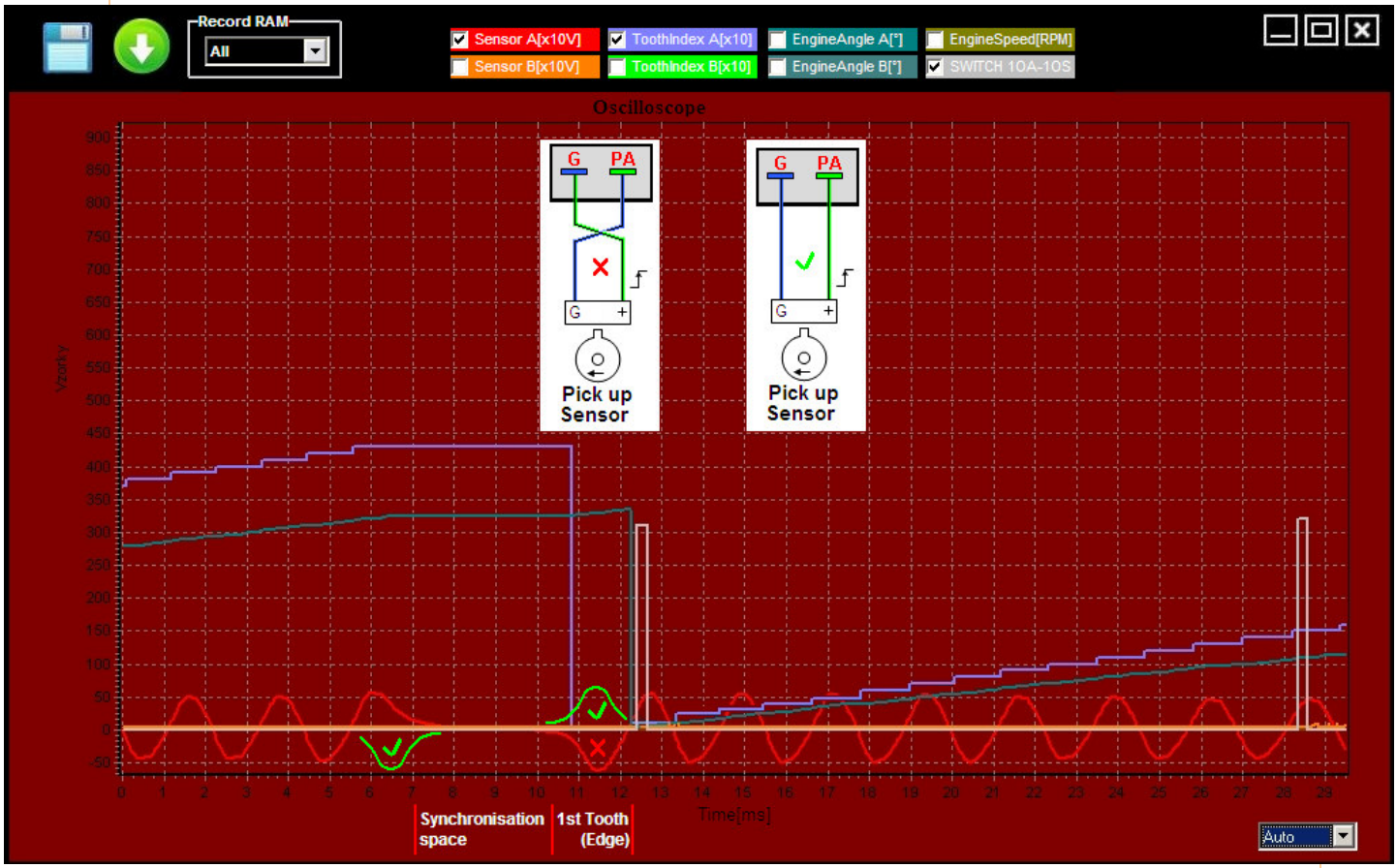
Tooth[H/L]	Angle[°]
H	0
L	30
H	60
L	90
H	120
L	150
H	180
L	210
H	240
L	270

Tooth[H/L]	Angle[°]
L	0
H	30
L	60
H	90
L	120
H	150
L	180
H	210
L	240
H	270

Figure 1. INDUCTIVE Pickup – Failure sensing due to wiring error

- The level of the sensing edge must match the entry in table of teeth. The first edge after missing teeth (sync gap), when the signal goes to level H or L, see the table below screen.
- Possible repair can be done by replacing wires (INDUCTIVE sensor)

  or possible use signal Inversion PA or PB 



First edge after gap H (goes up)

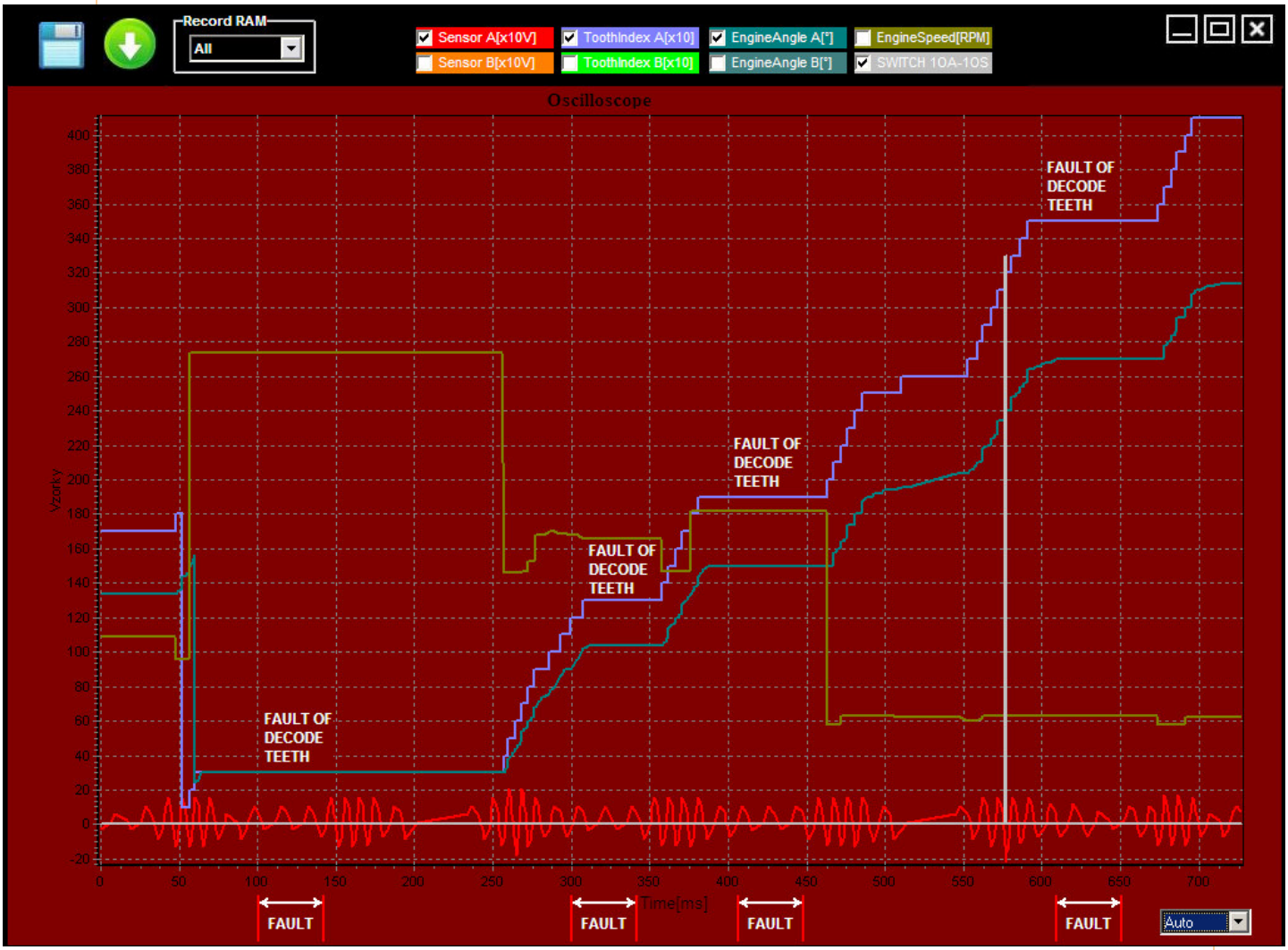
Tooth[H/L]	Angle[°]
H	0
L	30
H	60
L	90
H	120
L	150
H	180
L	210
H	240
L	270

First edge after gap L (goes down)

Tooth[H/L]	Angle[°]
L	0
H	30
L	60
H	90
L	120
H	150
L	180
H	210
L	240
H	270

Figure 2. INDUCTIVE PickUp – Failure sensing due to low level signal

- The actual pick-up signal level is smaller than the specified sensing level
- The disorder is manifests in a way that the signal is sensed, but there's no teeth counting (blue line)
- It can also be a very weak signal from the sensor which can be caused by:
  - Too big space between pick-up and rotating plate – suitable distance from 0.5 to 1.0 mm
  - Sensor fault – break or short circuit – a suitable resistance 0.5 to 5kohm
  - Too low engine speed



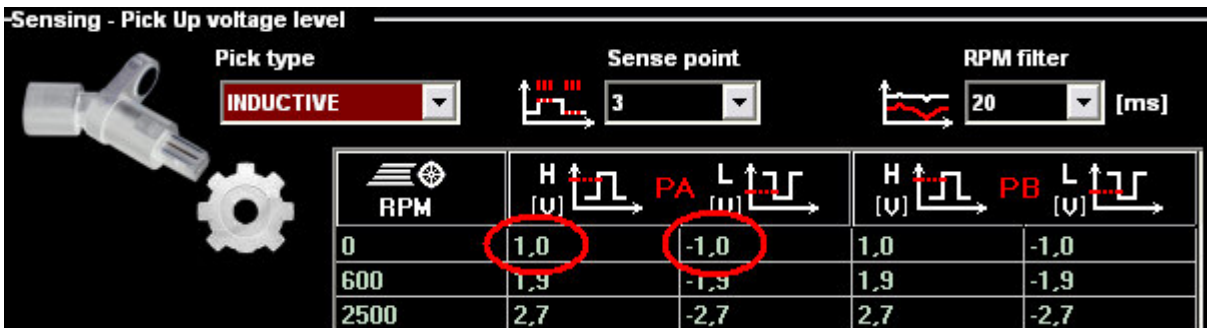


Figure 3. HALL PickUp – sensing with the correct setting angle of teeth edge

Angle of engine rotation A and B (EngineAngle A[°] and EngineAngle B[°])
EngineAngleA (or B) curve must increase linearly from 0 to 360°, if there occur rapid changes in the curve then there is an error in teeth angle setting or Invert PA or Invert PB.

3. How to understand the oscilloscope record?

Oscilloscope record displays variables related to the sensing and its signal evaluation

3.1) Visualized data

- Rotation sensor voltage, PA, PB [V]
- Tooth index of rotating plate, Tooth index A-B [-]
- Current angle of motor rotation, Angle A-B [°]
- Engine speed, Speed A-B [%]
- Outputs switching 1OA-1OS [-]

3.2) Voltage sensing PA and PB (Sensor A [x10V] and Sensor B [x10V])

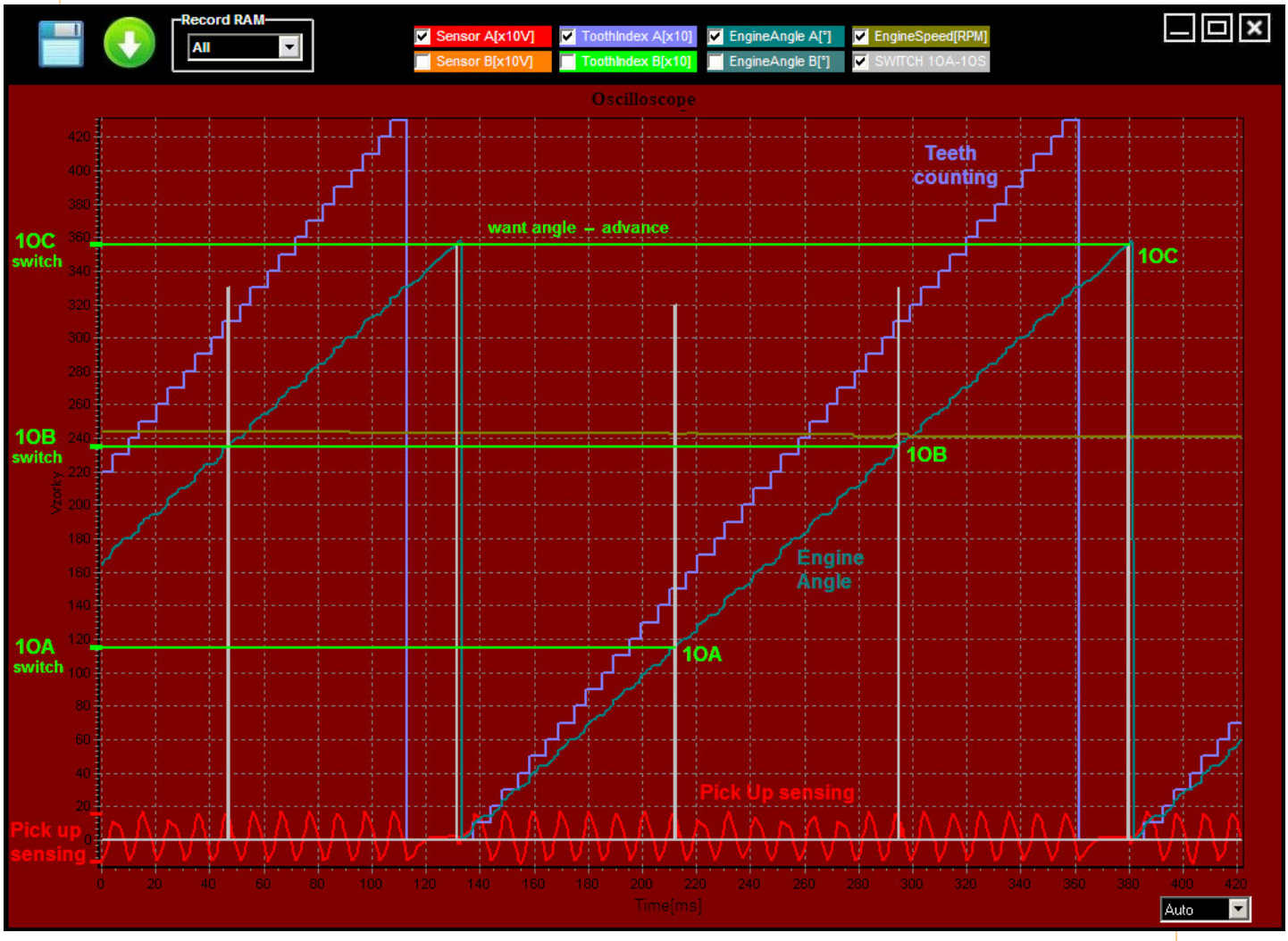
The curve shows the progress of voltage sensing, thus voltage levels of sensor that are magnified 10 times, i.e. 20 = 2V. According to the signal waveform and to number of pulse signals you can detect: the type of sensor HALL/ INDUCTIVE and number of teeth and also their angles according to the ratio of each tooth time and period.

3.3) Angle of engine rotation A and B (EngineAngle A[°] and EngineAngle B[°])

Angle of engine rotation A and B (EngineAngle A[°] and EngineAngle B[°])
EngineAngleA (or B) curve must increase linearly from 0 to 360°, if there occur rapid changes in the curve then there is an error in teeth angle setting or Invert PA or Invert PB..

3.4) Switching of 1OS to 1OA output (SWITCH 1OA-1OS)

Intersection position of switching curve and engine rotation curve indicates actual angle of switched output. Distinction of the actual output is indicated by pulse height.



4. General question

4.1) What is the difference between common ignitions and ECU MASTER?

Common Ignition:

- For every one pulse from the sensor is generated single spark
- For two or more cylinders, ignition requires two sensors
- Universal communicates via RS232, for PC without RS232 is a need to buy USB/RS232 converter
- Primary resistance of induction (TCI) coils > 2,5 Ohm/12V or > 1.5 Ohm/6V

ECU MASTER unit CDI / TCI:

- More version for induction (TCI) and capacitive (CDI) coils or combined
- Power range depending on the unit type from 3.5 to 36 V (depends on the type)
- The mathematical model of the real engine rotation, 64bit
- Adjustable sensing values, A/D signal conversion
- Integrated oscilloscope ± 25.5V, 1Msps
- Based on FPGA and microprocessor technology for high accuracy and operational performance
- Preset angular maps of teeth, voltage levels for different speeds, have filtered
- Optional sensors : inductive, Hall, Optical, Hammer, Proximity
- Optional 5D advance maps of ± 360 ° and injection 0...60 ms
- Possibility to control ignition together with injection
- Integrated adjustable CDI converter 350V/100W (CDI versions)
- Many of the extra functions - speed regulation, turbo, cooling temperature, strangler, charging, etc.
- Variant “P sensor“ is with integrated pressure sensor from -80 to +150 kPa
- Measuring of board voltage, unit temperature, voltage, current and load of integrated CDI converter
- Galvanically isolated USB for application settings
- Memory 8MB for firmware and records
- Easy firmware update available from the Web

4.2) What is the difference between the output option TCI and CDI?

TCI - Induction (transistor)

This is output for inductive type of ignition coil having a primary winding resistance 0.2 to 5ohm . Energy for spark is stored in large induction coil. In case of inductive coils with primary resistance higher than 2 ohms may spark energy decrease with increasing speed. The advantage is lower weight and simplicity of ignition unit. Spark contains several jumps, so it may look more intensively.
Please note: Output TCI (switching transistor) is also suitable for switching injection coils, tachometer switching, fuel pumps switching, cooling switching, switching of indicator lights like shifting and many others.

CDI - Capacitive (thyristor)

These are outputs for capacitive coil type ignition with primary winding resistance less than 1ohm. Energy for spark is stored in the capacitors contained in the ignition unit. Benefits are much smaller size, lighter weight of coils, spark energy is constant despite speed changes and energy efficiency. The disadvantage is complicated ignition solution, which must include converter for 350V or external magneto.
The spark has a high slope and energy in a single jump, therefore, has a higher precision and ignition speed. Appropriate use is mainly for motorcycle engines, high speed sports car motors or combustion gas engine.

4.3) Do you organize some training courses?

To understand unit application we have a basic training video for servicing MASTER Control, as well as wiring diagrams, including configuration files and frequently asked questions FAQ. Also you can find contacts for consultation or assembly of units at our websites; we will them gradually expand. If you can not find agent from your country, feel free to contact us in case you would like to become one of them. Training with us can also be arranged, but rather for a group of people.

4.4) Can be the configuration loaded while engine runs?

 **RAM**  **FLASH**

Yes, it is possible to playback even if the engine is running. For recording, you can choose a RAM (temporary) or FLASH (permanent). In MASTER Control application is an option RAM/FLASH in the upper right corner. The choice of RAM is also convenient for tuning because of speed, as transmitted are only changes of configuration and these changes are not permanent. After the shutdown is configuration FLASH loaded similalry like from a hard disc. That's why is necessary to record changes to the FLASH memory - for permanent changes in the end of the tuning.

4.5) Is basic advance curve available?

Yes, basic configuration is available for each of the schema from document MasterSchemeV8_43.PDF containing different motors and their accessories. It is advisable to choose the nearest suitable schema or carry out simple intersection of several different diagrams. For each of the schema is available MASTER unit configuration (.ig), which you can upload via USB to the unit. To accelerate the understanding of the opportunities and service of application you can view training video.

5. Sensors and sensing wheels

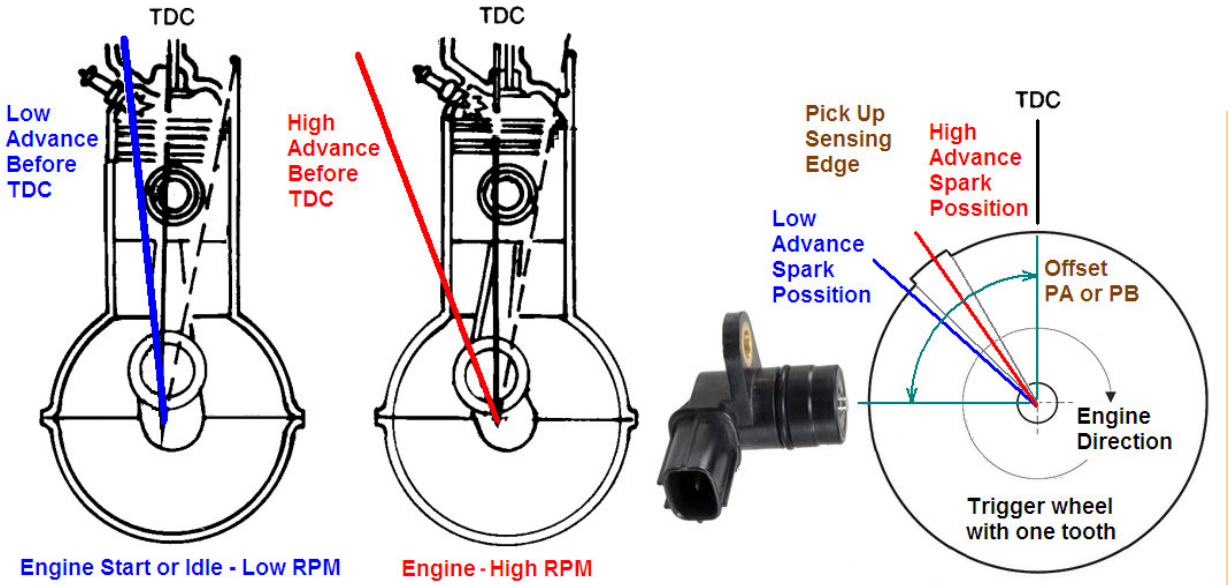
5.1) What type of sensing plate should be used?

Sensing wheel (Trigger Wheel, Cog wheel) can be almost any, but must have at least as many teeth as cylinders, or there should be used more rotation sensors (Pick-ups). For sequential ignition or injection is required synchronization gap or synchronization tooth. In MASTER Control application there are preset trigger wheels such as BOSCH 60-2, BOSCH 36-2, BOSCH 2+1, BMW 36-1, FORD 36-1, SUZUKI 24-2, YAMAHA 16-2, HARLEY 32-2.
Different shapes of sensing wheels can also be found via web search under the name "Trigger Wheel". We offer two rotating trigger wheel with 12-2 teeth or 6-1.

5.2) What is the suitable position for sensing teeth?

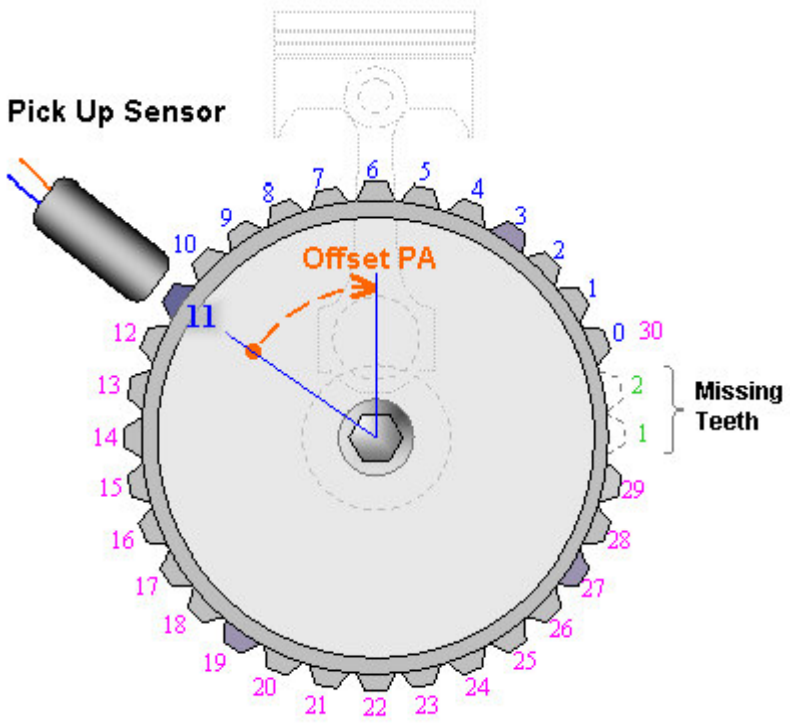
One tooth sensing

If sensing plate has only a single tooth then is appropriate to have the first edge of the tooth at the maximum advance eg 45 ° before TDC for four-stroke engines and approximately 35 ° for two-stroke engine.
The second edge of the sensing tooth is suitable to use for synchronization to start the engine and therefore somewhere in position 10° before top dead center. MASTER unit will then have enough information for accurate advance control of the start and engine running. The desired advance must not be greater (the spark must not be before) than the first or second edge of the scanning tooth comes to the pick up sensor. Regulation of advance would then be very inaccurate, bbecause it would work without synchronization.
One tooth sensing with a single sensor can only be used for single-cylinder engines or two-cylinder engines with WASTE SPARK ignition (one spark to the compression other to the exhaust) .
If a distributor is used then sensor mounted in splitter should generate one pulse for every desired spark.



More teeth sensing

In the case of disc having more teeth (Trigger Wheel) with a sync gap is appropriate location 90° of sync gap before top dead center of the first cylinder or directly into the TDC. In sequential ignition or even fuel injection solution must trigger wheel contain at least as many teeth as engine cylinders. Where again one edge of each tooth can be used for running the engine and the second for its start. A higher number of teeth means greater precision in advance control – MASTER unit receives continuous information about the current position of the engine to update its mathematical model of the engine. Examples are BOSCH 60-2, BMW 36-1 or FORD 36-1 sensing wheels.



5.3) Can I preserve original distributor?

MASTER unit can be used with the original distributor including sensing. It is suitable to remove centrifugal and vacuum regulation, which work with high mechanical inaccuracies.
The disadvantage of sensing in distributor is the will in gear drive of the distributor and the following loss of energy while distributing sparks to each cylinder. Therefore, if it is possible, we recommend to remove the distributor for coils with two, four or six leads of WASTE SPARK system.

5.4) Is possible to control the turbocharged engine with MASTER unit?

Ignition and injection MASTER units are designed for naturally aspirated and turbocharged engines. The limitation is only in the number of inputs and outputs that MASTER units provide.

5.5) What is the suitable position for the rotation sensor?

Rotation sensor can be placed anywhere on the crankshaft or camshaft, or you can use the original distributor. For sensing you can use any type of sensor HALL, INDUCTIVE, OPTO and PROXIMITY PNP or NPN. We offer pick-up wheels with 5 and 10 teeth with synchronization gap and various types of sensors.

5.6) Is this combination possible: inductive PickUp – crankshaft and HALL - cam?

General sensing of crankshaft and cam together is possible. MASTER supports sequential ignition and even sequential fuel injection when the individual turns are distinguished by typing /1 and /2. Different types of sensor at inputs PA and PB are supported too (eg. Inductive / HALL). For simplicity, we recommend a simpler system WASTE spark, in this case you sense only crank or only cam shaft.

5.7) Is it possible to connect pressure sensing in suction to unit?

Yes, there is available MASTER – P sensor with integrated pressure sensor. Underpressure sensor is necessary especially for injection systems, where underpressure helps to calculate the engine load and thus to determine the optimum injection time.

5.8) Is it possible to connect a tachometer?

Yes it is possible to connect a tachometer to any TCI output 1OA-1OS or DO1, DO2. These outputs generate a voltage in level of the power supply 12V/24V which is formed by Pull up resistance 1kOhm. At software MASTER Control there is function FO.5 which can be directed to the desired output.

5.9) To increase reliability can be two sensors connected to the MASTER unit?

MASTER unit is able to operate and switch separately two groups of outputs, where:
PA - switches to group 1OA, 1OC, 1OE, 1OG, 1OR
PB - switches to group 1OB, 1OD, 1OF, 1OH, 1OS
The unit is also able to work in redundancy mode, when it works with one sensor PA and the other PB is a backup in case of failure PA. Switching is automatic while engine runs.

5.10) What type of sensor should be used for: damper position, water and oil temp?

You can use any sensor in the range of 0-5V or 0-10kOhm. In this range sensors can be calibrated. Recommendations: sensor BOSCH, SKODA or original to your engine.

5.11) It is possible to connect a broadband lambda probe?

Yes, it is available LAMDA control module (our production), which directly controls the broadband LAMDA probe of type LSU4.2 or LSU4.9. LAMBDA control module can be used as an expansion module of basic MASTER unit or it is also available in a separate housing, which can be connected via bus SAE J1939.
Measured values of LAMDA control module can be visualized within your own application or directly at MASTER control. Furthermore is possible to regulate injection time using function FI.9.

6. Ignition coils

6.1) What is the difference between output option TCI and CDI?

TCI - Induction (transistorized)

This is an output for inductive ignition coil having a primary winding resistance of 0.2 to 5ohm . Energy for spark is stored in large induction coil. In the case of inductive coils with primary resistance bigger than 2 ohms can decreases energy of spark with increasing speed. The advantage is low weight and simplicity of unit. Spark contains several jumps so it can look more intensive.

Please note: Output TCI (switching transistor) is also suitable for switching injection coils, tachometer switching, fuel pumps switching, cooling switching, switching of the shift indicators and many others.

CDI - Capacitive (drives thyristor)

It is an output for capacitive ignition coil with primary winding resistance less than 1ohm. Energy for spark is stored in ECU's capacitors. Benefits: much smaller size and lighter weight of coils, spark energy is constant despite change in speed and energy efficiency. The disadvantage is complicated ignition unit, which must include the converter to 350V or external magneto.

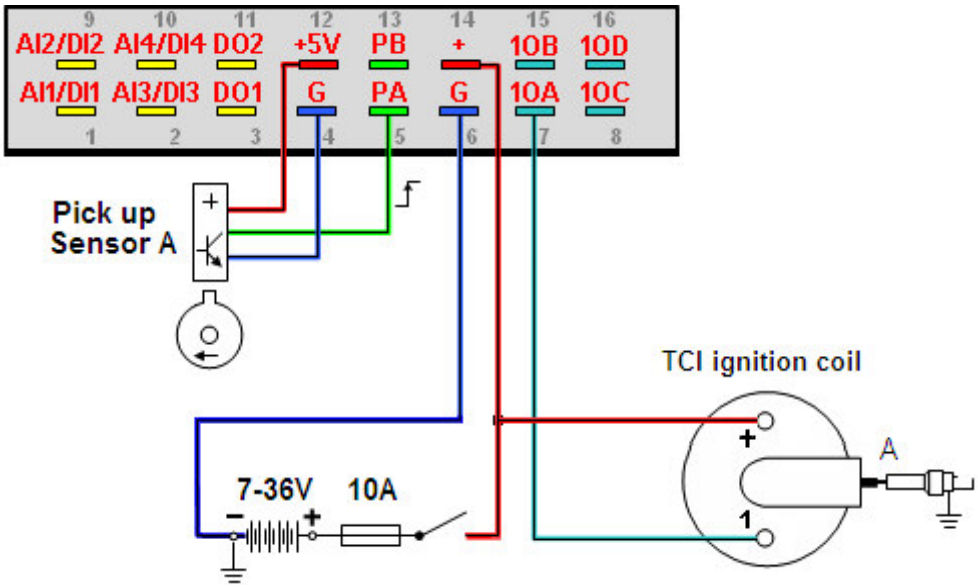
The spark has a high slope and energy in a single jump, therefore it has a higher precision and inflammation speed. Appropriate use is mainly for motorcycle engines, high speed sports car motors or gas combustion.

6.2) The correct wiring TCI or CDI coil

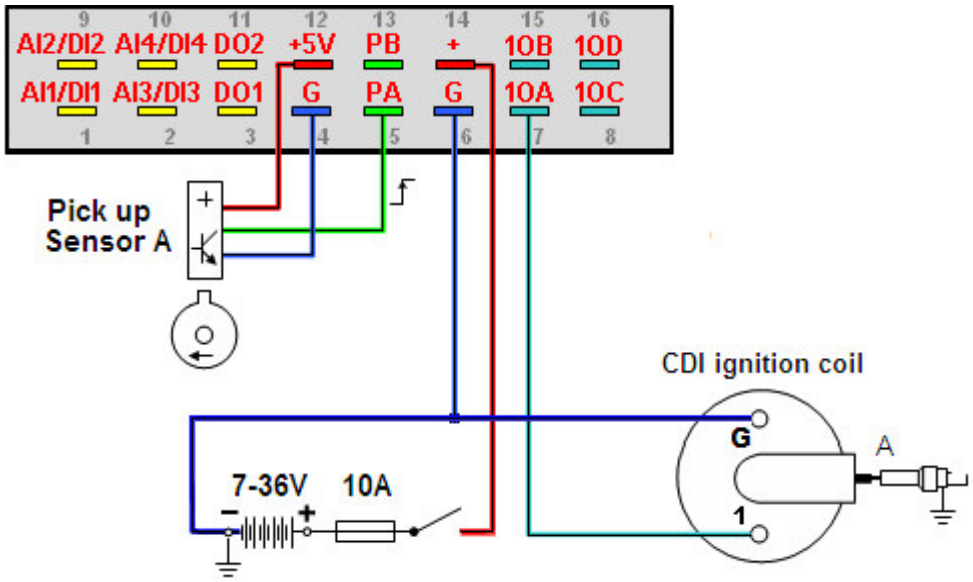
TCI - Induction (transistor)

TCI ignition coil - we connect as one wire to the power supply 12/24V and second wire to the TCI transistor outputs 1OA to 1OS, depending on MASTER unit type. Possible incorrect wiring of the power wires (like connection to the earth) causes no flashover, since the coil has no power.

Wires of ignition outputs 1OA to 1OS should not be run concurrently with wires from the sensors as it may interfere with each other, or even damage.



CDI - Capacitive (thyristor)
Ignition coil CDI - we connect as one wire to the ground (to car frame) and the other wire to the CDI capacitive outputs 1OA to 1OS (depending on MASTER unit type). The ignition itself is source of spark energy and generates pulses from charged capacitors.
Beware of systems with a plus on earth (skeleton)! CDI coil connected to the power supply 12/24V can damaged over time all systems connected to 12/24V, such as rotation sensors or other control units. The danger is caused by the ignition pulses 350V which do not go to earth but through the 12V/24V power.
Wires of spark outputs 1OA to 1OS should not be run concurrently with wires from the sensors, as may occur mutual distraction, or even damage.



6.3) Is it possible to connect Digital coil to the MASTER unit?
Yes, digital coils can be connected to the output of TCI type. Digital coils contain their own transistor therefore are usually switched by active signal, ie. the coil is switched if input control voltage is present. To control these coils is therefore necessary to turn on the inversion of outputs; or prefer to order MASTER unit inverted outputs from manufacture.

6.4) What coil is suitable for four-cylinder engine?
We recommend connection with double terminal coil, (for example PX202 CDI) you need 2 pieces of these coils or one four-terminal coil (eg Tesla CL400 plus connector from our menu). In these systems two cylinders always ignite together, it is called WASTE SPARK (one spark to the fire and the other to the exhaust).

6.5) Which unit is suitable as replacement for distributor of 8-cylinder engine?
We recommend to use MASTER 10xTCI; or even MASTER 4xTCI if using WASTE SPARK coils. MASTER ignition unit is designed to work without distributor, ECU itself solves the distribution of pulses to the coil based on information about the current rotation of the crankshaft. For this distribution it is a need to have sensing wheel (trigger wheel) with more teeth and a gap for synchronization eg 6-1, 12-2, 36-1 (also marked as 5+1, 10+2, 35+1).
Parameters for petrol or gas injection can be scanned with analog inputs 0 -5V, 0 - 10k (throttle open , temperature) and with integrated pressure sensor. MASTER units with integrated pressure sensor are indicated with – "P sensor", for example MASTER 4xTCI P sensor.

6.6) For single point injection what kind of unit shall be used?
For single point and multiple point injection can be used MASTER unit in variant 4xTCI P sensor, MASTER 2xCDI 2xTCI P sensor - both with integrated pressure sensor or even MASTER MINI.

6.7) Outputs TCI, CDI and MASTER unit variations

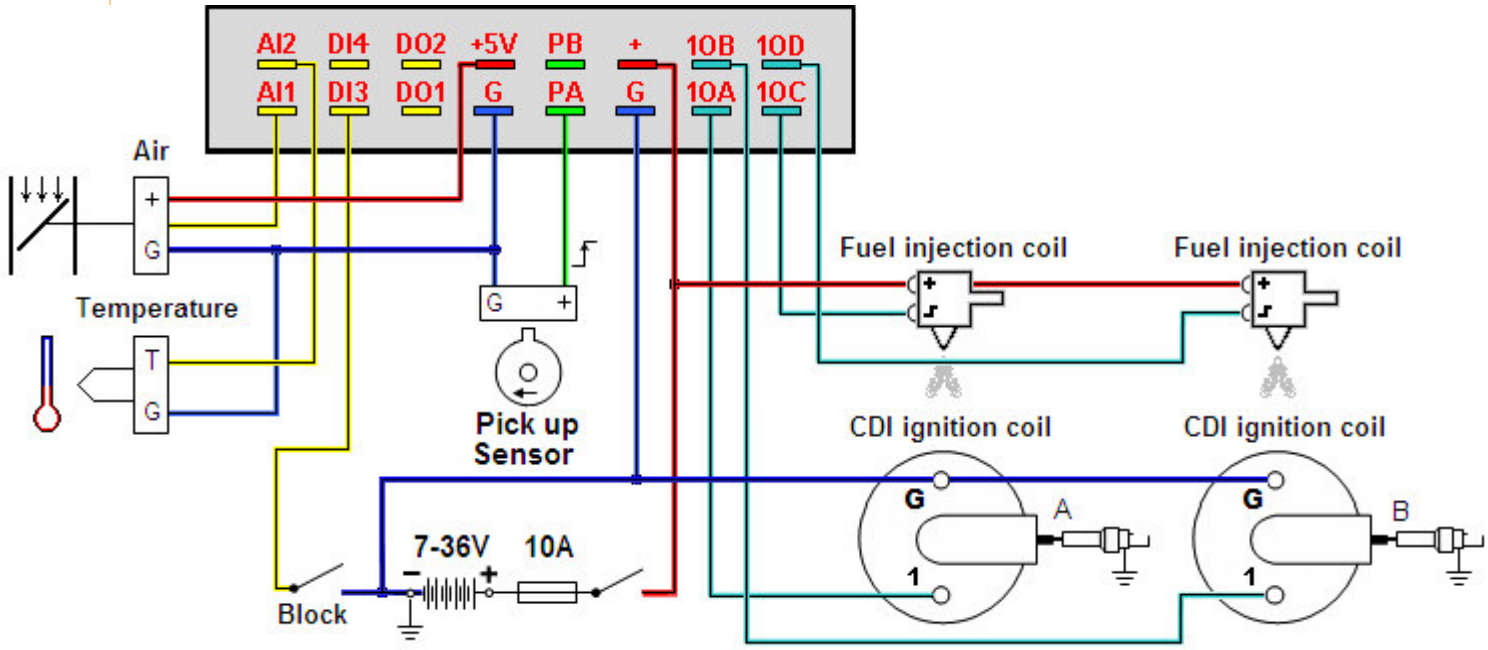
The table below contains list of available MASTER units and its output utilization

MASTER type	1OA	1OB	1OC	1OD	1OE	1OF	1OG	1OH	1OR	1OS
3xTCI (MINI)	*TCI*	*TCI*	*TCI*							
1xCDI 3xTCI	*CDI*	*TCI*	*TCI*	*TCI*						
2xCDI 2xTCI	*CDI*	*CDI*	*TCI*	*TCI*						
3xCDI 1xTCI	*CDI*	*CDI*	*CDI*	*TCI*						
4xTCI	*TCI*	*TCI*	*TCI*	*TCI*						
4xCDI	*CDI*	*CDI*	*CDI*	*CDI*						
2xCDI 8xTCI	*CDI*	*CDI*	*TCI*	*TCI*	*TCI*	*TCI*	*TCI*	*TCI*	*TCI*	*TCI*
3xCDI 7xTCI	*CDI*	*CDI*	*CDI*	*TCI*	*TCI*	*TCI*	*TCI*	*TCI*	*TCI*	*TCI*
4xCDI 6xTCI	*CDI*	*CDI*	*CDI*	*CDI*	*TCI*	*TCI*	*TCI*	*TCI*	*TCI*	*TCI*
5xCDI 5xTCI	*CDI*	*CDI*	*CDI*	*CDI*	*CDI*	*TCI*	*TCI*	*TCI*	*TCI*	*TCI*
6xCDI 4xTCI	*CDI*	*CDI*	*CDI*	*CDI*	*CDI*	*CDI*	*TCI*	*TCI*	*TCI*	*TCI*
8xCDI 2xTCI	*CDI*	*CDI*	*CDI*	*CDI*	*CDI*	*CDI*	*CDI*	*CDI*	*TCI*	*TCI*
10xTCI	*TCI*	*TCI*	*TCI*	*TCI*	*TCI*	*TCI*	*TCI*	*TCI*	*TCI*	*TCI*
10xCDI	*CDI*	*CDI*	*CDI*	*CDI*	*CDI*	*CDI*	*CDI*	*CDI*	*CDI*	*CDI*

7. Functions/ Settings

7.1) How does excitation block function FI.8 work?

MASTER units have inputs DI1 to DI4. You can block the excitation for the duration of the signal either by grounded input (DI3, DI4) or by connecting an external voltage (DI1, DI2).
MASTER unit allows also to switch only half of the cylinders, this function is used for multiple cylinder engines.
Wiring of Block excitation is disclosed in document MasterSchemeV8_43.PDF (e.g., Schema 20, 21, 25, 26)



7.2) How does the speed limitation function FI.6 work?

MASTER units have inputs DI1 to DI4. You can limit the speed by set value for the duration of the signal either by grounded input (DI3, DI4) or by connecting an external voltage (DI1, DI2).

The function is used in conjunction with the shift lever or clutch for fast gear shifts - function is called CLUTCH MASTER.
The wiring is identical with Excitation block wiring, see Figure above.

7.3) How to connect a temperature sensor?

MASTER unit has inputs AI1 to AI4. You can connect a voltage (AI1, AI2) or a resistance (AI3, AI4) signal to them. Temperature sensors are usually resistive so can be connected to the input AI3 or AI4.
For different types of sensors you can make your own calibration,
Wiring of temperature sensor is shown at Figure above.

7.4) How to connect the TPS sensor?

MASTER unit has inputs AI1 to AI4 which can be connected to a voltage (AI1, AI2) or resistance signal (AI3, AI4). Suitable input must then be chosen according to the nature of the TPS sensor signal - Voltage/Resistance.
The measured signal of TPS sensor is converted to a value from 0-100%, which is further used to calculate the Engine Load.
TPS wiring is shown in document MasterSchemeV8_43.PDF (eg Schema 25, 26, 35, 36)