ECU MASTER
CDI - TCI
scheme & configuration

Rev 8.43

© IMFsoft, ltd.
### Connector wiring – MASTER front connector (aluminium case)

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<thead>
<tr>
<th>MARKING</th>
<th>DESCRIPTION</th>
<th>RANGE, ACTIVE LEVEL</th>
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<tbody>
<tr>
<td>+</td>
<td>Voltage supply</td>
<td>7 - 36V</td>
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<tr>
<td>G</td>
<td>Power ground</td>
<td>0V</td>
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<td></td>
<td>Sensors ground</td>
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</table>
| 1OA-1OD | Switching coils A-D or user output | CDI - Capacitance, resistance 0.1 - 1.5Ω  
TCI* - Inductive, resistance 0.2 - 25Ω (Pull up 1kΩ)  
TCI* - Injection, resistance 0.2 - 25Ω (Pull up 1kΩ) |
| PA, PB  | Rotation sensor A,B | ±25.5V, minimum ±0.1V, sampling 1MSPS |
| AI1..AI4 / Di1..Di4 | Analog input AI1..4 / Digital input Di1..4 | AI1..AI2: 0-5V; AI3..4: 0-5V/0-10kΩ  
Di1..Di2: 0-16V; Di3..4: 0-16V (Pull up 10kΩ) |
| DO1, DO2 | Digital output DO1..2 | MOSFET BRIDGE 5A/40V (Pull up 1kΩ) |

* TCI - possibility for other use (switching, injector jets, fuel pump, stroboscope, speedometer etc.)

### Connector wiring – MASTER back connector (extended)

<table>
<thead>
<tr>
<th>MARKING</th>
<th>DESCRIPTION</th>
<th>RANGE, ACTIVE LEVEL</th>
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<tbody>
<tr>
<td>G</td>
<td>Power ground</td>
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<td>Sensors ground</td>
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<td>CAN H</td>
<td>CANbus</td>
<td>J1939 / OBD2 and CANopen, 250kbps, 120R</td>
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</table>
| 1OE-1OV | Switching coils E-V or user output | CDI - Capacitance, resistance 0.1 - 1.5Ω  
TCI* - Inductive, resistance 0.2 - 25Ω (Pull up 1kΩ)  
TCI* - Injection, resistance 0.2 - 25Ω (Pull up 1kΩ) |
| AI5     | Analog input AI5 | AI5: 0-5V |
| A+,A-,B+,B- | Stepper Motor | 1.5A, internal control by signal -10U, 10V |

* TCI - possibility for other use (switching, injector jets, fuel pump, stroboscope, speedometer etc.)

### Connector wiring – LAMBDA back connector (extended)

Please find in document LAMBDA controller (1002-0028-14)
**Connector wiring – MASTER MINI (orange plastic case)**

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<tr>
<th>MARKING</th>
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<tr>
<td>+</td>
<td>Voltage supply</td>
<td>3.5 - 25V</td>
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<tr>
<td>G</td>
<td>Power ground</td>
<td>0V</td>
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<td>G</td>
<td>Sensors ground</td>
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<tr>
<td>1OA-1OC</td>
<td>Switching coils A-C or user output</td>
<td>TCI* - Inductive, resistance 0.2 - 25Ω (Pull up 1kΩ) or TCI* - Injection, resistance 0.2 - 25Ω (Pull up 1kΩ)</td>
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<td>+5V</td>
<td>Power sensors output</td>
<td>+5V, 100mA</td>
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<td>PA</td>
<td>Rotation sensor A</td>
<td>±25.5V, minimum ±0.1V, sampling 1Msps</td>
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<tr>
<td>AI1, AI2 / DI1, DI2, DI3</td>
<td>Analog input AI1,2 / Digital input DI1,2,3</td>
<td>AI1: 0-5V/ 0-10kΩ; AI2: 0-5V / DI2: 0-16V; DI1,DI3: 0-16V (Pull up 10kΩ)</td>
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<td>DO1</td>
<td>Digital output DO1</td>
<td>MOSFET 1A/100V (Pull up 1kΩ) - not in Bridge</td>
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* TCI - possibility for other use (switching, injector jets, fuel pump, stroboscope, speedometer etc.)

**MASTER MINI** does not contain these signals: AI3, AI4, D4, PB, 1OD, but all software functions are present. Please choose in **MASTER Control** Application in menu “i” → HARDWARE VARIANT → V7.x

**Connector wiring – MASTER LITE (aluminium case)**

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<td>1OA-1OB</td>
<td>Switching coils A-B or user output</td>
<td>TCI* - Inductive, resistance 0.2 - 25Ω (Pull up 1kΩ) or TCI* - Injection, resistance 0.2 - 25Ω (Pull up 1kΩ)</td>
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<tr>
<td>AI1 / DI1</td>
<td>Analog input AI1 / Digital input DI1</td>
<td>AI1: 0-5V/ 0-10kΩ; DI1: 0-16V (Pull up 10kΩ)</td>
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* TCI - possibility for other use (switching, injector jets, fuel pump, stroboscope, speedometer etc.)

**MASTER LITE** does not contain these signals: AI2, AI3, AI4, D1, D2, D3, D4, PB, 1OC, 1OD, DO1, DO2, but all software functions are present. Please choose in **MASTER Control** Application in menu “i” → HARDWARE VARIANT → V7.x
Outputs plugging – CDI and TCI

The table below describes the arrangement outputs for each type of MASTER unit. Outputs CDI and TCI are arranged in the order and number of signs MASTER, eg. MASTER 2xCDI 2xTCI contains first outputs CDI for 1OA, 1OB and next TCI for 1OC, 1OD.

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| 2* TCI - possibility for other use (switching, injector jets, fuel pump, stroboscope, speedometer etc.)
Installation

Electronic spark ignition unit *ECU MASTER* is powered by safe voltage up to 36V, but there is present a voltage of thousands of volts on ignition coils!!! Therefore, it is necessary to pay maximum attention when manipulating. Any changes to the electrical installation of ignition cannot be carried on unless the power is off!!!

Power supply and all ignition inputs are protected against overvoltage and reverse polarity. Neither overvoltage status nor reverse polarity can last permanently, as it can overload the security elements and cause partial or complete damage to the functionality of the ignition.

Ignition outputs are not protected against short circuit and therefore outputs from 1OA up to 1OV, DO1 or DO2 must not be connected to the power terminal (+). Connection to impedance is also forbidden as it would exceed the amount of allowed current and result in overload and following destruction of certain switching elements in the ignition.

*Spark plug together with cylinder head and engine block must be connected to negative or positive pole of the power. This is necessary to flow of current from secondary winding of ignition coils.*

Aluminium housing if ignition is due to own shielding connected to negative pole. Therefore no other conductor apart from negative pole can be connected to the housing.

Ignition must never be installed at the places with direct exposure to water, chemicals, extreme temperatures and vibrations. The effect of any of these may cause irreversible damage or destruction of ignition functionality.

The correct and reliable function of installed equipment is based on its correct power supply. Power wires (+, G) must have a diameter of 1.5 mm², which is ideal for CDI variant. Variant TCI must follow this condition only in case of ground wire (G). Power supply must always be done through fuse 10A, which protects ignition in case of reverse polarity, overvoltage or other disorders.

Sparks must be provided with shielding caps and ideal use cable with a carbon core. The signal conductor from the rotation sensor cannot be led in parallel way with excitation coil wire (1OA to 1OV), high-voltage conductors or conductors of the alternator excitation. If it is not possible to carry out the wiring in this way it is recommended to lead signal conductor sensors (PA, PB) in twisted (twisted in pair) or shielded conductors in order to eliminate any possible interference of electric-installation.

Connectors crimping

Connector crimping requires a similar procedure as with FASTON connectors, although there is a rubber sealing grommet used here in addition. Regarding tool, it can be done with standard crimping pliers FASTON 1.5mm – 2.5mm. For blocking of unused terminal connectors TYCO it is appropriate to use supplied rubber plugs to comply with IP65 degree of protection.
PickUp Examples – Voltage level and Angle – Configuration

Configuring the scanning of engine rotation is the key part of ignition unit *MASTER ignition*.

1. PickUp Type and Voltage sensing level

<table>
<thead>
<tr>
<th>Pick type</th>
<th>Sense point</th>
<th>RPM filter</th>
</tr>
</thead>
<tbody>
<tr>
<td>HALL</td>
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</tr>
<tr>
<td>RPM</td>
<td>H (U)</td>
<td>L (U)</td>
</tr>
<tr>
<td>0</td>
<td>5.0</td>
<td>1.9</td>
</tr>
<tr>
<td>6000</td>
<td>1.9</td>
<td>1.9</td>
</tr>
<tr>
<td>25000</td>
<td>2.7</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Pick type</th>
<th>Sense point</th>
<th>RPM filter</th>
</tr>
</thead>
<tbody>
<tr>
<td>INDUCTIVE</td>
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<tr>
<td>RPM</td>
<td>H (U)</td>
<td>L (U)</td>
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<td>0.5</td>
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</tr>
<tr>
<td>25000</td>
<td>2.7</td>
<td>2.7</td>
</tr>
</tbody>
</table>

2. PickUp Tooth -> Synchronisation and Setting Angle of Rise (H) and Fall (L) Edges

In case Trigger wheel with one tooth only it is ideal to move this sensing tooth to peak of advance used. For Example set position of tooth to angle -45° (angle before up dead center).

Without synchronisation

![Diagram showing without synchronisation configurations](image)

Without synchronisation

![Diagram showing without synchronisation configurations](image)

Long Space

![Diagram showing long space configurations](image)

Short Space

![Diagram showing short space configurations](image)
**Oscilloscopic record**

Oscilloscopic record is used in order to graphically visualise measured and calculated data. Please use oscilloscope record before you connect output coils. This helps to quickly evaluate the proper and accurate function of ignition unit *MASTER*.

An example to be given; curve angle of engine angular rotation must be regularly and horizontally increased from 0 to 360°. If there is any change of steepness in the curve or the angle is shorten, the problem is to be found either in wrong angle value set up, number of teeth, the type of synchronisation or unsuitable voltage for sensing.

**Visualised data**
- Rotation pick up sensor voltage, PA, PB [V]
- Tooth index of pick up Trigger wheel, Tooth index A-B [-]
- Engine angular rotation, Angle A-B [°]
- Engine speed, Speed A-B [%]
- Outputs switching 1OA-1OV [-]

![Oscilloscope Graph](image)

ECU MASTER scheme & configuration
**Connecting of Pick up sensors PA, PB**

- **Hammer**
- **Hall**
- **Infra**
- **Inductive**

**Analog inputs AI1, AI2, AI3, AI4**

It is possible to connect sensors whose output is either voltage or resistance to analog inputs AI1, AI2, AI3 and AI4, where AI1, AI2 works with voltage 0-5V and AI3, AI4 works with voltage 0-5V or resistance 0-10kΩ. Signal from analog sensors should be lead by Twisted or shielded cable, which helps significantly to eliminate interference.

**Digital inputs DI1, DI2, DI3, DI4**

Change of input status DI3 and DI4 is easily done by input earthing or Bat. supply DI1, DI2.

**Digital outputs DO1, DO2**

Digital outputs can be used for load switching to zero or to supply with maximum current load 5A. Therefore it is possible to connect e.g. relay coil, fuel pump, servo control, indicator of shift revolutions, stroboscope etc.
1. Example connecting of one HALL pickup sensor and one TCI coil

1x HALL pickup sensor connected to PA input
1x TCI coil connected to 1OA output

**MASTER outputs configuration**

- Out setting to angle 0°, where XA is reserved for 1OA
- TCI excitation time 2ms (XTIME)
- Used output 1OA
- Pick up tooth is setuped to peak of advance or use more teeth for a precision sensing

**Example of Configuration FILE [*.ig]:**

Example[01]_LITE_1xHALL_1xTCI
2. Example connecting of one INDUCTIVE pickup sensor and one TCI coil

1x INDUCTIVE pickup sensor connected to PA input
1x TCI coil connected to 1OA output

**MASTER outputs configuration**

- Out setting to angle 0°, where XA is reserved for 1OA
- TCI excitation time 2ms (XTIME)
- Used output 1OA
- Pick up tooth is setuped to peak of advance or use more teeth for a precision sensing

**Example of Configuration FILE ['*.ig']:**

*Example[02]_LITE_1xINDUCTIVE_1xTCI*
3. **Example connecting of one INDUCTIVE pickup sensor, one TCI coil and Advance Switch**

- 1x INDUCTIVE pickup sensor connected to PA input
- 1x TCI coil connected to 1OA output
- 1x SWITCH connected to AI1/DI1 (select advance curve 1 or curve 2)

**Example of Configuration FILE [.ig]:**

```
Example[03]_LITE_1xINDUCTIVE_1xTCI_1xSWITCH
```
4. **Example connecting of one INDUCTIVE pickup sensor, one TCI coil and Temperature measurement**

1x INDUCTIVE pickup sensor connected to PA input  
1x TCI coil connected to 1OA output  
1x TEMPERATURE sensor connected to AI1/DI1 (select advance curve 1 or curve 2)

**MASTER outputs configuration**

- Out setting to angle 0°, where XA is reserved for 1OA  
- TCI excitation time 2ms (XTIME)  
- Used output 1OA  
- Pick up tooth is setuped to peak of advance or use more teeth for a precision sensing

**Example of Configuration FILE [*.ig]:**

Example[04]_LITE_1xINDUCTIVE_1xTCI_1xTEMP
5. Example connecting of one INDUCTIVE pickup sensor and one TCI coil
(Battery PLUS pole connected to case!!)
1x INDUCTIVE pickup sensor connected to PA input
1x TCI coil connected to 1OA output

- Out setting to angle 0°, where XA is reserved for 1OA
- TCI excitation time 2ms (XTIME)
- Used output 1OA
- Pick up tooth is setuped to peak of advance or use more teeth for a precision sensing

Example of Configuration FILE [.ig]:

Example[05]_LITE_1xINDUCTIVE_1xTCI
**ECU MASTER LITE**

6. Example connecting of one **INDUCTIVE** pickup sensor and two **TCI coils**

1x **INDUCTIVE** pickup sensor connected to **PA input**
2x **TCI coils** connected to **1OΑ,1ΟΒ outputs**

**MASTER outputs configuration**

<table>
<thead>
<tr>
<th>Index</th>
<th>Function Name</th>
<th>Description</th>
<th>XA</th>
<th>XB</th>
<th>XC</th>
<th>XD</th>
<th>XE</th>
<th>XF</th>
<th>XG</th>
<th>XH</th>
<th>XL</th>
<th>XS</th>
<th>XTIME</th>
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</thead>
<tbody>
<tr>
<td>F0.1</td>
<td>Capacitive - CDI</td>
<td>KA-out angle 10A,XS=10S,XTIME-switch[us]</td>
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<tr>
<td>F0.3</td>
<td>Injection Coil</td>
<td>KA-injection angle 10A,XS=10S</td>
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<td>F0.4</td>
<td>Integrate Coil</td>
<td>KA-out angle 10A,XS=10S,XTIME-switch[us]</td>
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</table>

- Out setting to angle 0°, where XA is reserved for 1OΑ and XB is reserved for 1ΟΒ
- TCI excitation time 2ms (XTIME)
- Used outputs 1OΑ, 1ΟΒ
- Pick up tooth with length 180° is set up to peak of advance or use more teeth for a precision sensing

**Example of Configuration FILE [*.ig]:**

Example[06]_LITE_1xINDUCTIVE_2xTCI
ECU MASTER LITE

8. Example connecting of one INDUCTIVE pickup sensor, one TCI coils and distributor

1x INDUCTIVE pickup sensor connected to PA input
1x TCI coils connected to 1OA outputs
1x Distributor connected to TCI coils

Example of Configuration FILE [*.ig]:
Example[08]_4xTCI_1xINDUCTIVE_1xTCI_1xDISTRIBUTOR

- Out setting to angle 0° and 180°, where XA is reserved for 1OA
  1OB must be setuped same as 1OA
- TCI excitation time 2ms (XTIME)
- Used outputs 1OA
- Pick up tooth with length 30° is setuped to peak of advance
  or use more teeth for a precision sensing
ECU MASTER LITE

9. Example connecting of one INDUCTIVE pickup sensor and one Integrated coils

1x INDUCTIVE pickup sensor connected to PA
1x Integrated coil connected to 1OA.
Integrated coil works with supply from Magneto or other source

![Diagram of ECU MASTER LITE connection]

**MASTER outputs configuration**

<table>
<thead>
<tr>
<th>Index</th>
<th>Function Name</th>
<th>Description</th>
<th>XA</th>
<th>XB</th>
<th>XC</th>
<th>XD</th>
<th>XF</th>
<th>XG</th>
<th>XR</th>
<th>XS</th>
<th>XTIME</th>
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<tr>
<td>F0.2</td>
<td>Inductive - TCI</td>
<td>XA-out angle 10A, XS-10S, XTIME-excit[ms]</td>
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</tbody>
</table>

- Out setting to angle 0°, where XA is reserved for 1OA
- TCI excitation time 300us
- Used output 1OA
- Pick up tooth is setuped to peak of advance or use more teeth for a precision sensing

**Example of Configuration FILE [.ig]:**

Example[09]_LITE_1xINDUCTIVE_1xTCI_1xINTEGRATED
10. Example connecting of one HALL pickup sensor and TCI coil

1x HALL pickup sensor connected to PA input
1x TCI coil connected to 1OA output

**MASTER outputs configuration**

<table>
<thead>
<tr>
<th>Index</th>
<th>Function Name</th>
<th>Description</th>
<th>XA</th>
<th>XB</th>
<th>XC</th>
<th>XD</th>
<th>XE</th>
<th>XF</th>
<th>XG</th>
<th>XI</th>
<th>XR</th>
<th>XS</th>
<th>XTIME</th>
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<td>Injection Coil</td>
<td>KA-injection angle 10A, XS=10S</td>
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</tbody>
</table>

- Out setting to angle 0°, where XA is reserved for 1OA
- TCI excitation time 2ms (XTIME)
- Used output 1OA
- Pick up tooth is setuped to peak of advance or use more teeth for a precision sensing

**Example of Configuration FILE [*.ig]:**

Example[10]_4xTCI_1xHALL_1xTCI
11. Example connecting of one INDUCTIVE pickup sensor and TCI coil

1x INDUCTIVE pickup sensor connected to PA input
1x TCI coil connected to 1OA output

**MASTER outputs configuration**

- Out setting to angle 0°, where XA is reserved for 1OA
- TCI excitation time 2ms (XTIME)
- Used output 1OA
- Pick up tooth is setuped to peak of advance or use more teeth for a precision sensing

**Example of Configuration FILE [*.ig]:**

Example[11]_4xTCI_1xINDUCTIVE_1xTCI
12. Example connecting of one HALL sensor and TCI coil
(Battery PLUS pole connected to case!!)

1x HALL pickup sensor connected to PA input
1x TCI coil connected to 1OA output

**MASTER outputs configuration**

<table>
<thead>
<tr>
<th>Index</th>
<th>Function Name</th>
<th>Description</th>
<th>XA</th>
<th>XD</th>
<th>XC</th>
<th>XD</th>
<th>XF</th>
<th>XG</th>
<th>XI</th>
<th>XR</th>
<th>XS</th>
<th>XTIME</th>
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<td>F0.2</td>
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<td>XA-out angle 10A, XS-10S, XTIME-excit[ms]</td>
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<td>F0.4</td>
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</tr>
</tbody>
</table>

- Out setting to angle 0°, where XA is reserved for 1OA
- TCI excitation time 2ms (XTIME)
- Used output 1OA
- Pick up tooth is setuped to peak of advance or use more teeth for a precision sensing

**Example of Configuration FILE [*.ig]:**

Example[12]_4xTCI_1xHALL_1xTCI
13. Example connecting of one INDUCTIVE pickup sensor and one TCI coil
(Battery PLUS pole connected to case!!)

1x INDUCTIVE pickup sensor connected to PA input
1x TCI coil connected to 1OA output

Example of Configuration FILE [*.ig]:

Example[13]_4xTCI_1xINDUCTIVE_1xTCI
ECU MASTER 4xTCI

15. Example connecting of one INDUCTIVE pickup sensor and two TCI coils

1x INDUCTIVE pickup sensor connected to PA input
2x TCI coils connected to 1OA, 1OB outputs

MASTER outputs configuration

- Out setting to angle 0°, where XA is reserved for 1OA
  and XB is reserved for 1OB
- TCI excitation time 2ms (XTIME)
- Used outputs 1OA, 1OB
- Pick up tooth with length 180° is setuped to peak of advance
  or use more teeth for a precision sensing

Example of Configuration FILE [*.ig]:

Example[15]_4xTCI_1xINDUCTIVE_2xTCI
16. Example connecting of one INDUCTIVE pickup sensor, one TCI coils and distributor

1x INDUCTIVE pickup sensor connected to PA input
1x TCI coils connected to 1OA outputs
1x Distributor connected to TCI coils

**ECU MASTER outputs configuration**

- Out setting to angle 0° and 180°, where XA is reserved for 1OA
- TCI excitation time 2ms (XTIME)
- Used outputs 1OA
- Pick up tooth with length 30° is set up to peak of advance or use more teeth for a precision sensing

**Example of Configuration FILE [*.ig]:**

Example[16]_4xTCI_1xINDUCTIVE_1xTCI_1xDISTRIBUTOR
17. Example connecting of two INDUCTIVE pickup sensors and two TCI coils
(1OA is coupled with PA and PB is coupled with 1OB)

2x INDUCTIVE pickup sensors connected to PA and PB input
2x TCI coils connected to 1OA, 1OB outputs, where 1OA is coupled with PA and PB with 1OB

**MASTER outputs configuration**

- Outs setting to angle 0°, 0°, where XA is reserved for 1OA and XB is reserved for 1OB
- TCI excitation time 2ms (XTIME)
- Used outputs 1OA, 1OB
- Pickup sensors include the same angle as cylinders and setup to peak of advance or use more teeth for a precision sensing

**Example of Configuration FILE [*.ig]:**

Example[17]_4xTCI_2xINDUCTIVE_2xTCI
19. Example connecting of two INDUCTIVE pickup sensors and two TCI coils
(Pickup sensors PB works as REDUNDANT)

2x INDUCTIVE pickup sensors connected to PA and PB inputs, where PB works as REDUNDANT (PB is automatically used after damage or disconnect PA)
2x TCI coils connected to 1OA, 1OB outputs

**Example of Configuration FILE [*.ig]:**

Example[19]_4xTCI_2xINDUCTIVE_2xTCI_REDUNDANT
ECU MASTER 4xTCI

20. Example connecting of one INDUCTIVE pickup sensor, three TCI double ended coils, Temperature measurement and Blocked run engine signal

1x INDUCTIVE pickup sensors connected to PA input
3x TCI double ended coils connected to 1OA, 1OB, 1OC outputs
1x Temperature sensor
1x Block Run engine signal

MASTER outputs configuration

<table>
<thead>
<tr>
<th>Index</th>
<th>Function Name</th>
<th>Description</th>
<th>XA</th>
<th>XU</th>
<th>XC</th>
<th>XD</th>
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<th>10C</th>
<th>F0.2</th>
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<td>10A</td>
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<td>F0.2</td>
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</tr>
<tr>
<td>F0.3</td>
<td>Injection Coil</td>
<td>KA-injection angle 10A, XS=10S</td>
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<tr>
<td>F0.4</td>
<td>Integrate Coil</td>
<td>KA-out angle 10A, XS=10S, XTIME=switch [ms]</td>
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</tbody>
</table>

- Outs setting to angle 0°, 120°, 240°, where XA is reserved for 1OA
  XB is reserved for 1OB
  XC is reserved for 1OC

- TCI excitation time 2ms (XTIME)
- Used outputs 1OA, 1OB, 1OC
- Trigger wheel should contain more teeth for a precision sensing

Example of Configuration FILE ['*.ig']:

Example[20]_4xTCI_1xINDUCTIVE_3xTCI
21. Example connecting of one INDUCTIVE pickup sensor, four TCI coils, Temperature measurement and Blocked run engine signal

1x INDUCTIVE pickup sensors connected to PA input
4x TCI coils connected to 1OA,1OB,1OC,1OD outputs
1x Temperature sensor
1x Block Run engine signal

**MASTER outputs configuration**

<table>
<thead>
<tr>
<th>Index</th>
<th>Function Name</th>
<th>Description</th>
<th>XA</th>
<th>XB</th>
<th>XC</th>
<th>XD</th>
<th>XF</th>
<th>XC</th>
<th>XL</th>
<th>XS</th>
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<th>F0.2</th>
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</thead>
<tbody>
<tr>
<td>F0.1</td>
<td>Capacitive - CDI</td>
<td>XA-out angle 10A, XS=105, XTIME=switch[us]</td>
<td></td>
<td></td>
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<td></td>
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<td>0</td>
<td>10A</td>
</tr>
<tr>
<td>F0.2</td>
<td>Inductive - TCI</td>
<td>XA-out angle 10A, XS=105, XTIME=excit[ms]</td>
<td>0</td>
<td>60</td>
<td>180</td>
<td>240</td>
<td></td>
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<td></td>
<td></td>
<td>2</td>
<td>10B</td>
</tr>
<tr>
<td>F0.3</td>
<td>Injection Coil</td>
<td>XA-injection angle 10A, XS=105</td>
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<td></td>
<td></td>
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<td>1</td>
<td>20C</td>
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<td>F0.4</td>
<td>Integrate Coil</td>
<td>XA-out angle 10A, XS=105, XTIME=switch[us]</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>20D</td>
</tr>
</tbody>
</table>

- Outs setting to angle 0°,60°,180°,240°, where XA is reserved for 1OA
  XB is reserved for 1OB
  XC is reserved for 1OC
  XD is reserved for 1OD

- TCI excitation time 2ms (XTIME)
- Used outputs 1OA, 1OB, 1OC, 1OD
- Trigger wheel should contain more teeth for a precision sensing

*Example of Configuration FILE [*.ig]:*

Example[21]_4xTCI_1xINDUCTIVE_4xTCI
22. Example connecting of one INDUCTIVE pickup sensor and one Integrate coils

1x INDUCTIVE pickup sensor connected to PA
1x Integrate coil connected to 1OA.

Integrated coil works with supply from Magneto or other source

**Example of Configuration FILE [*.ig]:**

Example[22]_4xTCI_1xINDUCTIVE_1xINTEGRATED
25. Example connecting of one INDUCTIVE sensor, two TCI and two FUEL coils and TPS sensor, Temperature measurement and Blocked run engine signal

1x INDUCTIVE pickup sensor connected to PA input
2x TCI coil connected to 1OA, 1OB outputs
2x FUEL coil connected to 1OC, 1OD outputs
1x TPS sensor
1x Temperature sensor
1x Block Run engine signal

**Example of Configuration FILE [.ig]:**

Example[25]_4xTCI_1xINDUCTIVE_2xTCI_2xFUEL
26. Example connecting of two cooperation INDUCTIVE sensor (crank and cam), two TCI and two FUEL coils and TPS sensor, Temperature measurement and Blocked run engine signal

- 2x INDUCTIVE pickups sensor connected to PA and PB input (crank and cam)
- 2x TCI coil connected to 1OA, 1OB outputs
- 2x FUEL coil connected to 1OC, 1OD outputs
- 1x TPS sensor
- 1x Temperature sensor
- 1x Block Run engine signal

MASTER outputs configuration

- Outs setting to angle 0°, 10°, 290°, 190°, 290°, where XA is reserved for 1OA (TCI)
  XB is reserved for 1OB (TCI)
  XC is reserved for 1OC (FUEL)
  XD is reserved for 1OD (FUEL)

- TCI excitation time 2ms (XTIME)
- Used outputs 1OA, 1OB, 1OC, 1OD
- Trigger wheel should contain more teeth for a precision sensing

Example of Configuration FILE (*.ig):

Example[26]_4xTCI_2xINDUCTIVE_2xTCI_2xFUEL
27. Example connecting of one INDUCTIVE sensor, two TCI and two FUEL coils and two and two DEBUG potentiometers

1x INDUCTIVE pickup sensor connected to PA input
2x TCI coil connected to 1OA, 1OB outputs
2x FUEL coil connected to 1OC, 1OD outputs
2x DEBUG potentiometers

**Example of Configuration FILE [*.ig]:**

Example[27]_4xTCI_1xINDUCTIVE_2xTCI_2xFUEL_DEBUG
**ECU MASTER 2xCDI 2xTCI**

30. Example connecting of one HALL pickup sensor and CDI coil

1x HALL pickup sensor connected to PA input
1x CDI coil connected to 1OA output

### MASTER outputs configuration

<table>
<thead>
<tr>
<th>Index</th>
<th>Function Name</th>
<th>Description</th>
<th>XA</th>
<th>XB</th>
<th>XC</th>
<th>XD</th>
<th>XF</th>
<th>XG</th>
<th>XR</th>
<th>XS</th>
<th>XTIME</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Capacitive - CDI</td>
<td>XA-out angle 1OA, XS=105, XTIME=switch[us]</td>
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<tr>
<td>F0.2</td>
<td>Inductive - TCI</td>
<td>XA-out angle 1OA, XS=105, XTIME=excite[ms]</td>
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<td></td>
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</tr>
<tr>
<td>F0.3</td>
<td>Injection Coil</td>
<td>XA-injection angle 1OA, XS=10S</td>
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</tr>
<tr>
<td>F0.4</td>
<td>Integrate Coil</td>
<td>XA= out angle 1OA, XS=105, XTIME=switch[us]</td>
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<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

- Out setting to angle 0°, where XA is reserved for 1OA
- CDI switch time 300us (XTIME)
- Used output 1OA
- Pick up tooth is setuped to peak of advance or use more teeth for a precision sensing

**Example of Configuration FILE [*.ig]:**

Example[30]_2xCDI_2xTCI_1xHALL_1xCDI
32. Example connecting of one Inductive pickup sensor, CDI coil and Servo

1x Inductive pickup sensor connected to PA input
1x CDI coil connected to 10A output
1x Servo (exhaust throttle) connected to DO1, DO2 outputs

Example of Configuration FILE [*.ig]:

Example[32]_2xCDI_2xTCI_1xINDUCTIVE_1xCDI_1xSERVO
ECU MASTER 2xCDI 2xTCI

35. Example connecting of one INDUCTIVE sensor, two CDI and two FUEL coils and TPS sensor, Temperature measurement and Blocked run engine signal

1x INDUCTIVE pickup sensor connected to PA input
2x CDI coil connected to 1OA, 1OB outputs
2x FUEL coil connected to 1OC, 1OD outputs
1x TPS sensor
1x Temperature sensor
1x Block Run engine signal

<table>
<thead>
<tr>
<th>Index</th>
<th>Function Name</th>
<th>Description</th>
<th>XA</th>
<th>XB</th>
<th>XC</th>
<th>XD</th>
<th>XF</th>
<th>XG</th>
<th>XI</th>
<th>XR</th>
<th>XS</th>
<th>XTME</th>
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<tbody>
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<td>F0.1</td>
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<td>F0.2</td>
<td>Inductive - TCI</td>
<td>KA-out angle 10A_1XS=10S,XTIME=excite [ms]</td>
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<tr>
<td>F0.3</td>
<td>Injection Coil</td>
<td>KA-injection angle 10A_1XS=10S</td>
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<tr>
<td>F0.4</td>
<td>Integrate Coil</td>
<td>KA-out angle 10A_1XS=10S,XTIME=switch [us]</td>
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</tr>
</tbody>
</table>

- Outs setting to angle 0°, 180°, 90°, 240°, where XA is reserved for 1OA (CDI)
  XB is reserved for 1OB (CDI)
  XC is reserved for 1OC (FUEL)
  XD is reserved for 1OD (FUEL)

- CDI excitation time 300us (XTIME)
- Used outputs 1OA, 1OB, 1OC, 1OD
- Trigger wheel should contain more teeth for a precision sensing

Example of Configuration FILE [*.ig]:
Example[35]_2xCDI_2xTCI_1xINDUCTIVE_2xTCI_2xFUEL
36. Example connecting of one INDUCTIVE sensor, two CDI and two FUEL coils and Servo motor, TPS sensor, Temperature measurement and Blocked run engine signal

1x INDUCTIVE pickup sensor connected to PA input
2x CDI coil connected to 1OA, 1OB outputs
2x FUEL coil connected to 1OC, 1OD outputs
1x Servo motor connected to DO1, DO2 outputs (engine speed regulation)
1x TPS sensor
1x Temperature sensor
1x Block Run engine signal

**ECU MASTER outputs configuration**

<table>
<thead>
<tr>
<th>Index</th>
<th>Function Name</th>
<th>Description</th>
<th>XA</th>
<th>XB</th>
<th>XC</th>
<th>XD</th>
<th>XF</th>
<th>XG</th>
<th>XR</th>
<th>XS</th>
<th>XTIME</th>
<th>10A</th>
<th>10B</th>
<th>10C</th>
<th>10D</th>
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<tbody>
<tr>
<td>0.1</td>
<td>Capacitive - CDI</td>
<td>KA-out angle 10A, XS-10S, XTIME-switch [us]</td>
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<td>0.2</td>
<td>Inductive - TCI</td>
<td>KA-out angle 10A, XS-10S, XTIME-exc [ms]</td>
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<tr>
<td>0.3</td>
<td>Injection Coil</td>
<td>KA-injection angle 10A, XS-10S</td>
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<td>250</td>
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<tr>
<td>0.4</td>
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<td></td>
<td>180</td>
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<td></td>
</tr>
</tbody>
</table>

- Outs setting to angle 0°, 180°, 90°, 240°, where XA is reserved for 1OA (CDI)
  XB is reserved for 1OB (CDI)
  XC is reserved for 1OC (FUEL)
  XD is reserved for 1OD (FUEL)

- CDI excitation time 300us (XTIME)
- Used outputs 1OA, 1OB, 1OC, 1OD, DO1, DO2
- Trigger wheel should contain more teeth for a precision sensing

**Example of Configuration FILE [*.ig]:**

Example[36]_2xCDI_2xTCI_1xINDUCTIVE_2xTCI_2xFUEL_1xSERVO
50. Example connecting of one INDUCTIVE pickup sensor, eight TCI coils and Temperature measurement and Blocked run engine signal

1x INDUCTIVE pickup sensors connected to PA input
8x TCI coils connected to 1OA, 1OB, 1OC, 1OD, 1OE, 1OF, 1OG, 1OH outputs
1x Temperature sensor
1x Block Run engine signal

Example of Configuration FILE [* .ig]:
Example[50]_10xTCI_1xINDUCTIVE_8xTCI
ECU MASTER 4xTCI + LAMBDA + WOODWARD

60. Example connecting of one HALL pickup sensor, four TCI coils, two WOODWARDs for speed / gas regulation, one LAMBDA sensor and Temperature measurement

1x HALL pickup sensors connected to PA input
4x TCI coils connected to 1OA, 1OB, 1OC, 1OD outputs
2x WOODWARD connected to DO1 and DO2 outputs controlled by PWM
1x LAMBDA LSU 4.9 with sensor BOSCH 0 281 004 044
1x CANbus J1939

GAS - THROTTLE
Woodward L-Series

AIR - THROTTLE
Woodward L-Series

ECU MASTER scheme & configuration
61. Example connecting of one HALL pickup sensor, four TCI coils and one external LAMBDA controller

1x HALL pickup sensors connected to PA input
4x TCI coils connected to 1OA, 1OB, 1OC, 1OD outputs
1x LAMBDA controller LSU 4.9 with sensor BOSCH 0 281 004 044
1x CANbus J1939