MOTORTECH® Ignition Controllers: Setting Up and Mounting Pickups

This application note contains information on the installation and set-up of pickups for the ignition controllers MIC3+, MIC4, MIC5, MIC500, and MIC850.

The application note is aimed at personnel tasked with the setup, operation, maintenance, and repair of gas engines. A certain level of technical knowledge with respect to the operation of gas engines and basic knowledge of electronic ignition systems are necessary.

Risk of destruction!

Improper installation and use of the pickups may damage or destroy the engine and the pickups. Observe therefore the specifications of the engine manufacturer and the pickup manufacturers.

Comply with manufacturer's documentation

This application note is an addition to the manufacturer's documentation of the ignition controller and the pickups. Read and understand the manufacturer's documentation of the products prior to start-up.

Function

For precise ignition timing control, ignition controllers require information on the speed of the engine and on the upper dead center of the first cylinder in firing order. Ignition controllers receive this information via one or more pickups in the engine, which register events on the crankshaft and/or camshaft and pass on these events as signals to the ignition controller for further evaluation.

Preparation

1. *MIC3+, MIC4, MIC5, MIC850*:
   In accordance with the specifications of the engine manufacturer, determine how many pickups you need for the required trigger information (see table) and at which positions you want to install them in the engine. On the MIC3+, there are up to two inputs available for trigger signals, on the MIC4, MIC5, and MIC850 up to three inputs.

   MIC500:
   The MIC500 receives all required trigger information (see table) from one pickup. With a 2-stroke engine you install the pickup on the crankshaft and with a 4-stroke engine on the camshaft. Additionally, observe the specifications of the engine manufacturer.

Trigger information

Information	Description
Cam	Registration of the camshaft stroke via a single event that is always installed on the camshaft.
Reset	Registration of the reset position via a single event
Trigger	Registration of the engine speed via a uniformly distributed number of events

2. When determining the installation location for each pickup, observe the following:
   - The installation location for the pickup must have adequate mechanical strength and must not exceed the specified temperature range.
   - At the installation location, a perpendicular alignment of the pickup to the trigger or triggers must be possible.
   - Depending on the engine, an opening for the pickup may have to be drilled into the engine housing, the coupling or the flywheel bell housing and the opening has to be provided with a suitable mounting option (thread, bracket etc.).
   - Ensure good accessibility to facilitate the calibration.

3. *MIC3+, MIC4, MIC5, MIC850*:
   Check whether the engine already provides suitable triggers. Then determine for each position the kind of triggers and the event type to be used for triggering:

Event type	Meaning
Single event	Disc that supplies a single event and is used for isolated determination of the reset position or the camshaft stroke.
N	Disc, which causes a uniformly distributed number (N) of events (per rotation) and is used for determining the speed. Recommendation: magnetic pickup
N+1	Disc of type N with one additional event signaling the reset position or the camshaft stroke. Recommendation: inductive pickup
N+1 extended index range	Corresponds to N+1, but the permitted range for the reset position is expanded to 75 % of the tooth period. Note that an incorrect direction of rotation of the engine cannot be detected by this setting.
N-1	Disc of type N with one missing event signaling the reset position or the camshaft stroke.
N-2	Disc of type N with two consecutive missing events signaling the reset position or the camshaft stroke.

MIC500:
Depending on the number of outputs to be ignited, the MIC500 supports triggering by respective N+1 event types. Make the selection based on the configuration table in section *Set Sequence Number* of your MIC500 operating manual. Also check whether the engine already provides suitable triggers.

4. If necessary, set up further triggers, for example by mounting pins, screws, and trigger discs or drilling holes.

5. Select the pickup type depending on the triggering:

Pickup	Supply	Type of triggering
Magnetic	Passive	Holes*, pins, slots, screws, teeth
Inductive	Active	Holes*, pins, slots, screws
Hall effect	Active	Magnets

*as of 8 mm (0.32") diameter (recommendation)

6. When selecting the pickups, make sure that their resolution is sufficient, as otherwise proper functioning with the ignition controller cannot be ensured. Pickups from MOTORTECH are generally suitable.

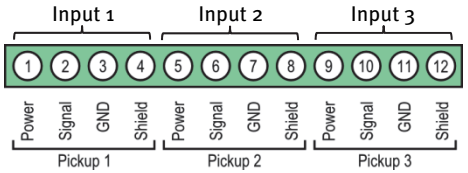
Mounting

First, note section *Preparation* on page 1. Then mount each pickup as described below:

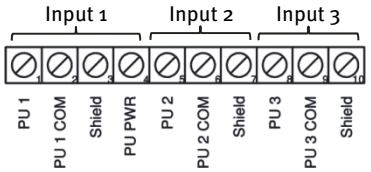
1. While the engine is not running, screw the pickup perpendicular to the highest point of the respective disc. A If the triggers are holes or countersunk magnets, it is the surface of the disc itself. (a) If the triggers are pins, screws or teeth, you screw the pickup perpendicular to the highest event. (b)
2. Then, unscrew the pickup counterclockwise by 1 turn (inductive, Hall effect) or by a ¾ turn (magnetic). B
3. For optimal trigger signals, the focal point of the pickup must lie directly on the event. C In case you receive faulty pickup signals after start-up, you need to fine adjust the distance of the pickup to the triggering. On this, observe the instructions given in the respective operating manual in the sections *Pickup Trace* (MIC3+, MIC4, MIC5), *Check of Pickup Signals* (MIC850), and *Testing Pickup Signal* (MIC500).
4. In accordance with the instructions of the manufacturer, secure the position of the pickup by tightening its locknut.
5. In accordance with the instructions of the manufacturer, secure the cable at the connector of the pickup by tightening the connector.
6. If you use pickups with a separated amplifier, make sure that the amplifier is mounted at a suitable position in accordance with the specifications of the manufacturer.

7. Wire the pickup to the ignition controller (see section *Input and Output Wiring on the Controller* in the operating manual of your ignition controller). For later configuration via the MICT, note the respective connection position.

MIC4 and MIC5 with service cover:



MIC850:

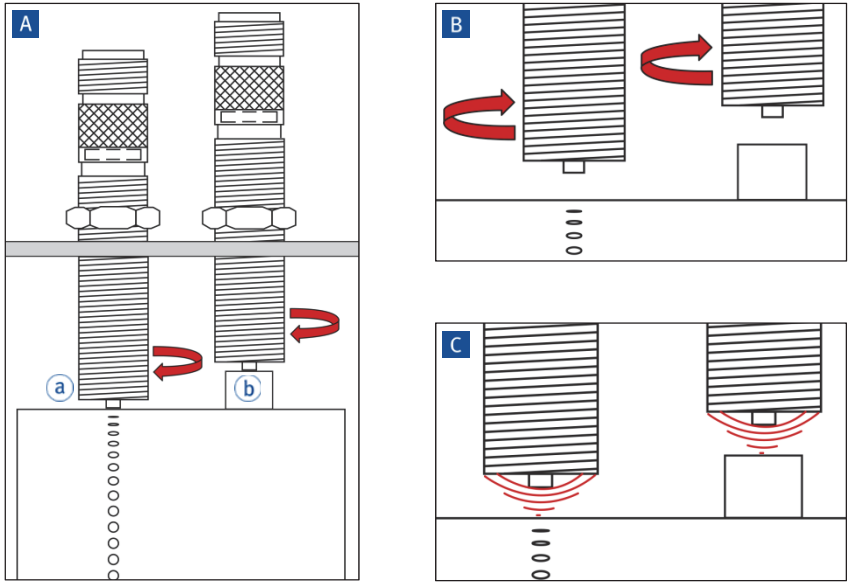


MIC4 and MIC5 without service cover, MIC3+:

The pickups are connected via the input harness. Further information can be found in the wiring diagram of the input harness.

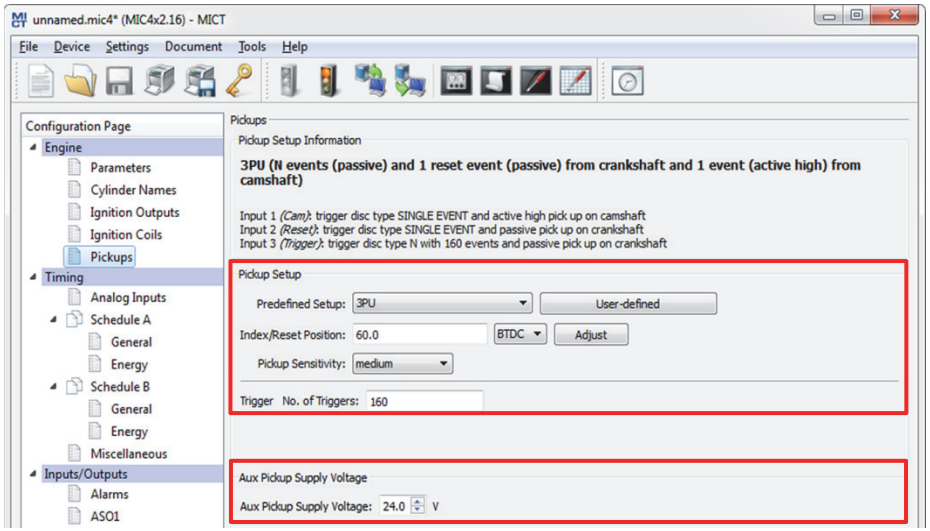
MIC500:

The pickup is connected via the harness. Further information can be found in the wiring diagram of the harness.



Settings

MIC3+, MIC4, MIC5, MIC850:
Configure the pickup settings via the configuration software MICT in the view *Engine – Pickups* in the area *Pickup Setup Information*.



Via *Predefined Setup*, you can set the following configurations:

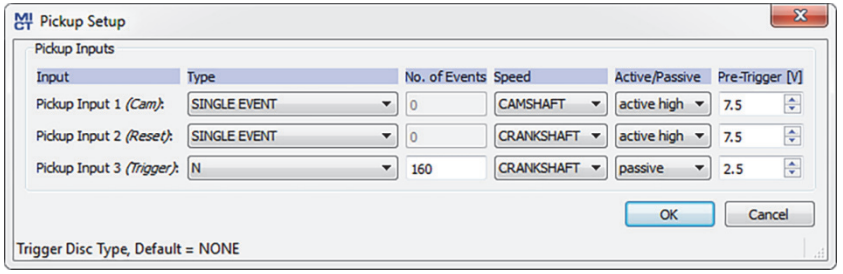
Name	Input 1 (Cam)	Input 2 (Reset)	Input 3 (Trigger)
1PU	N+1, CAMSHAFT, active high	–	–
2PU	–	SINGLE EVENT, CAMSHAFT, active high	N, CAMSHAFT, passive
2PU	–		N, CRANKSHAFT, passive
3PU	SINGLE EVENT, CAMSHAFT, active high	SINGLE EVENT, CRANKSHAFT, passive	N, CRANKSHAFT, passive

After having selected the configuration, if necessary change the *Index/Reset Position*, the *Pickup Sensitivity*, the *No. of Triggers*, and the *Aux. Pickup Supply Voltage*.

With MOTORTECH pickups, set the auxiliary pickup supply voltage to 24 V. With pickups from other manufacturers, make the setting in accordance with the manufacturer's instructions.

Via the entry *Pickup Sensitivity*, you set predefined values for the signal-to-noise ratio of the pickups. You can find more information on setting up the signal-to-noise ratio in the section *Pickup Sensitivity* in the operating manual of your ignition controller.

If required, you can carry out user-defined pickup settings in the following window by clicking on *User-defined* (entries vary):



Active pickups (inductive, Hall effect): For holes as triggers use *active low*, for all other triggers use *active high*.

If necessary, adjust the pickup sensitivity level for each input via the entry *Pre-Trigger*.

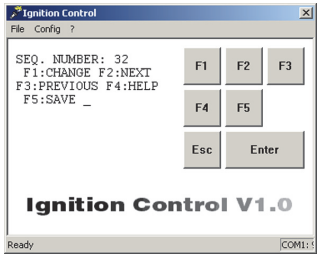
Faulty pickup signals on MIC3+, MIC4, MIC5, and MIC850

If you get faulty pickup signals on one or more inputs in spite of correct installation and configuration, observe the instructions given in section *Pickup Input Errors* in the operating manual of your ignition controller and additionally in section *Check of Pickup Signals* with the MIC850.

MIC500:
Via the configuration software Ignition Control, set the sequence number that corresponds to your triggering and application. Select the appropriate sequence number based on the configuration table in section *Set Sequence Number* of the MIC500 operating manual.

In Ignition Control, proceed as follows:

Open parameterization level ->
[F2] to SEQ. NUMBER -> [F1] ->
Enter Sequence number ->
[Enter] -> [F5]



Faulty pickup signals on MIC500

If you get faulty pickup signals in spite of correct installation and configuration, observe the instructions given in sections *Pickup Input Errors* and *Testing Pickup Signal* in the MIC500 operating manual.