



PoKeys plugin for Mach4

PoKeys device setup

Version: 8/4/2015

SAFETY INFORMATION



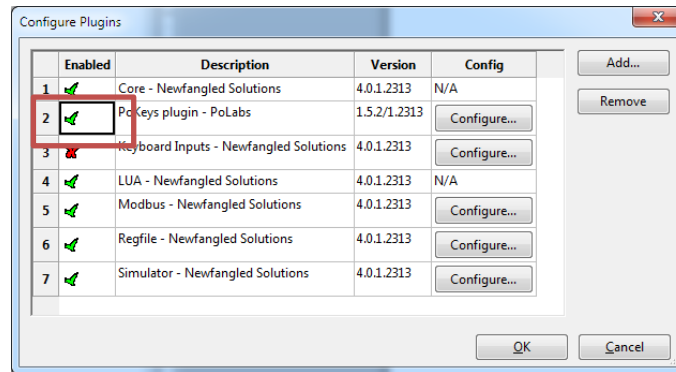
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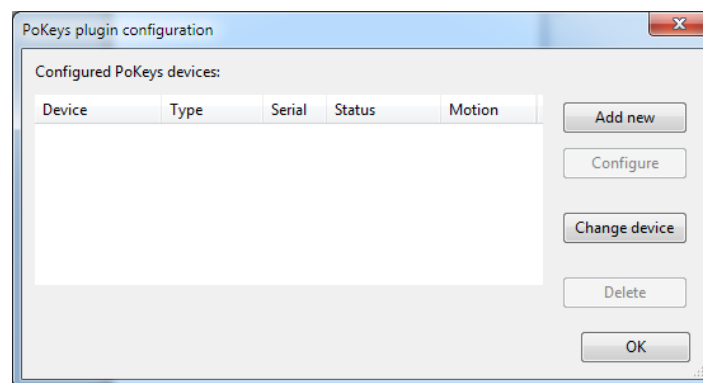
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Adding and configuring a new PoKeys device with Mach4

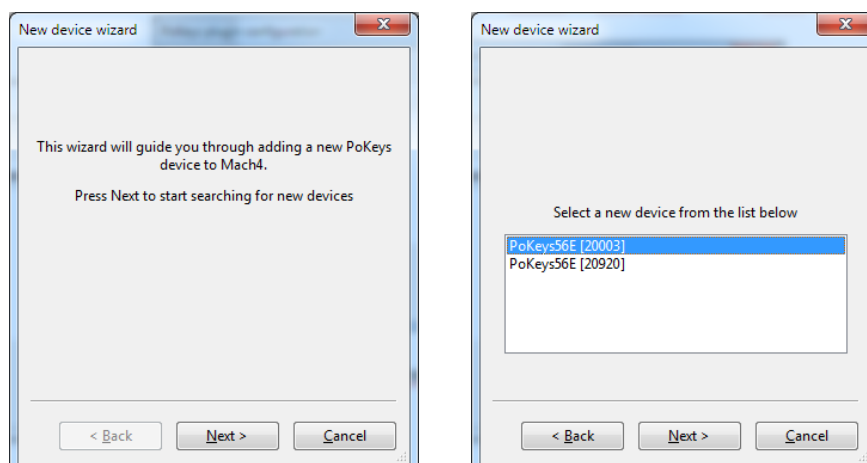
1. Start Mach4
2. Open Plugins > Configure plugins and enable PoKeys plugin



3. Click Configure... Main PoKeys plugin configuration screen will appear, where you can manage your PoKeys devices in Mach4



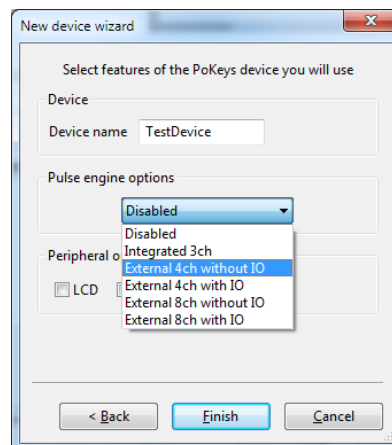
4. In order to add new device, click 'Add new' and follow the wizard



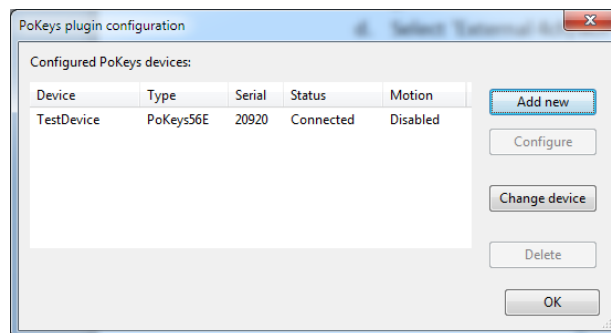
5. In the last step of the wizard, give a unique name can be assigned to your PoKeys device in Mach4 environment. By default, the name is constructed in the format PoKeys_{serial number}. Pulse engine options:

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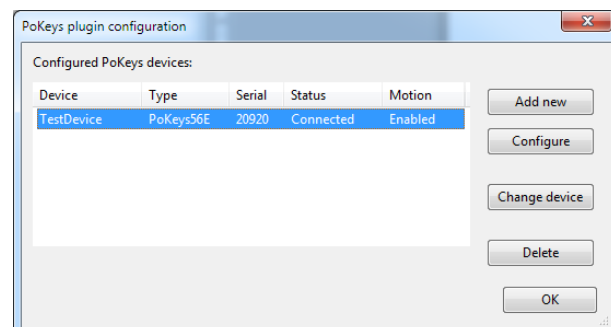
- Select Disabled if you won't be using the PoKeys Pulse engine as external motion controller in Mach4. PoKeys device can still be used as I/O device and/or pendant.
- Select 'Integrated 3ch' if you will be using internal pulse generator with STEP/DIR signals available directly on PoKeys pins
- Select 'External 4ch/8ch' without IO if you will be using simple external pulse generators that output STEP/DIR signals only (e.g. PoExtBusOC16CNC)
- Select 'External 4ch/8ch with IO' if you will be using more advanced external pulse generators with additional IO capability (e.g. PoKeysCNCaddon)



- If LCD or PoPendant1 will be used with this PoKeys device in Mach4, select LCD or/and PoPendant options to load the default configuration for those.
- After clicking on Finish, the device will now appear listed in the list of configured PoKeys devices. In order to finish the setup of new device, **Mach4 must be restarted.**

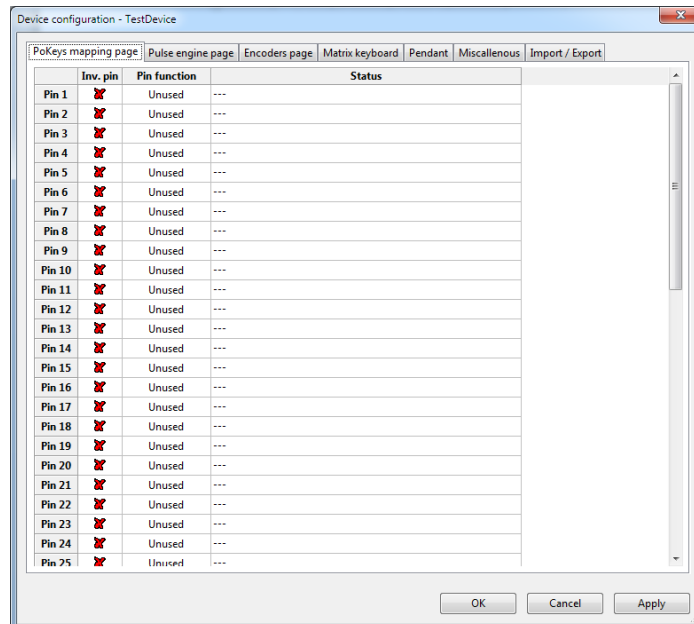


- After restart, the device in the list should appear with the status 'Connected' and motion 'Enabled' (if Pulse engine was activated).



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9. Continue by configuring the device. Select the device in the list and click Configure (or double-click the device in the list). The device configuration dialog will appear with configuration option divided into the following sections:
 - a. PoKeys mapping page: here, PoKeys pins can be assigned different pin functions and their state can be inverted. If PoKeys pins are assigned to a specific IO in Mach4 configuration screen, this mapping will appear under 'Status'.



b. Pulse engine: the PoKeys Pulse engine is setup here.

- Pulse engine configuration: select the type of pulse engine
- Default IO: if external pulse generator with IO was selected in pulse engine configuration, the default IO will map the Limit-, Limit+ and Home inputs to the external pulse generator IO.
- Probing input: select the pin you wish to use as a probing input. Based on your probe input type, you may need to select 'Invert polarity'
- Invert emergency stop input: PoKeys expects NC (normally-close) switch type to be used as E-Stop. If NO (normally-open) switch is used, 'Invert emergency stop input' must be enabled
- Enable safety charge pump: enable the 5 kHz square-wave signal on the charge pump pin when the Pulse engine is in running state
- Drive output pins from Mach4: allow Mach4 to control axis driver enable signals. This option is suggested to be enabled to use the consecutive enabling of axis drivers (and thus avoiding high inrush currents due to all drivers enabling at the same time)
- Axis options: here the standard signals for each axis can be configured. Since stepper drivers differ in the enable signal state, make sure that 'Inv. en.' (invert enable signal) option is properly configured for your drivers (PoStep25 requires the signals to be inverted).

Device configuration - TestDevice

PoKeys mapping page | **Pulse engine page** | Encoders page | Matrix keyboard | Pendant | Miscellaneous | Import / Export

Pulse engine configuration: External 8ch with IO | Default IO

Probing input: Disabled | ☐ Invert polarity

☐ Invert emergency stop input

☐ Enable safety charge pump

☐ Enable charge pump in emergency

☐ Drive output enable pins from Mach4

Buffer size: Maximum (recommended)

	Enable out	Inv. en.	Limit-	Inv.-	Limit+	Inv.+	Home	Inv.H
Axis 1	Ext. dedicated	<input checked="" type="checkbox"/>	Disabled	<input checked="" type="checkbox"/>	Disabled	<input checked="" type="checkbox"/>	Disabled	<input checked="" type="checkbox"/>
Axis 2	Ext. dedicated	<input checked="" type="checkbox"/>	Disabled	<input checked="" type="checkbox"/>	Disabled	<input checked="" type="checkbox"/>	Disabled	<input checked="" type="checkbox"/>
Axis 3	Ext. dedicated	<input checked="" type="checkbox"/>	Disabled	<input checked="" type="checkbox"/>	Disabled	<input checked="" type="checkbox"/>	Disabled	<input checked="" type="checkbox"/>
Axis 4	Ext. dedicated	<input checked="" type="checkbox"/>	Disabled	<input checked="" type="checkbox"/>	Disabled	<input checked="" type="checkbox"/>	Disabled	<input checked="" type="checkbox"/>
Axis 5	Ext. dedicated	<input checked="" type="checkbox"/>	Disabled	<input checked="" type="checkbox"/>	Disabled	<input checked="" type="checkbox"/>	Disabled	<input checked="" type="checkbox"/>
Axis 6	Ext. dedicated	<input checked="" type="checkbox"/>	Disabled	<input checked="" type="checkbox"/>	Disabled	<input checked="" type="checkbox"/>	Disabled	<input checked="" type="checkbox"/>
Axis 7	Ext. dedicated	<input checked="" type="checkbox"/>	Disabled	<input checked="" type="checkbox"/>	Disabled	<input checked="" type="checkbox"/>	Disabled	<input checked="" type="checkbox"/>
Axis 8	Ext. dedicated	<input checked="" type="checkbox"/>	Disabled	<input checked="" type="checkbox"/>	Disabled	<input checked="" type="checkbox"/>	Disabled	<input checked="" type="checkbox"/>

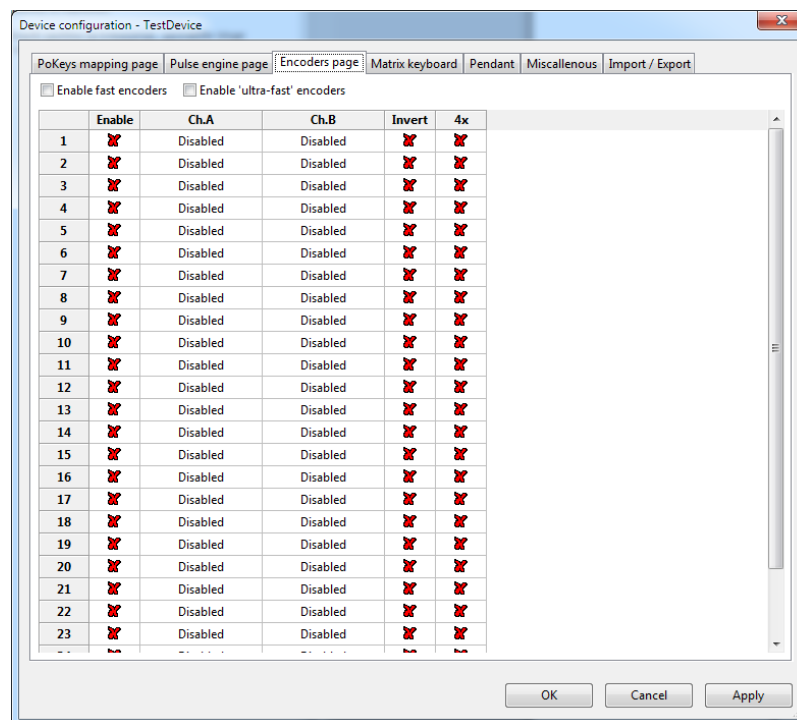
☒ Automatically map Mach4 signals

☐ Update RAW position registers

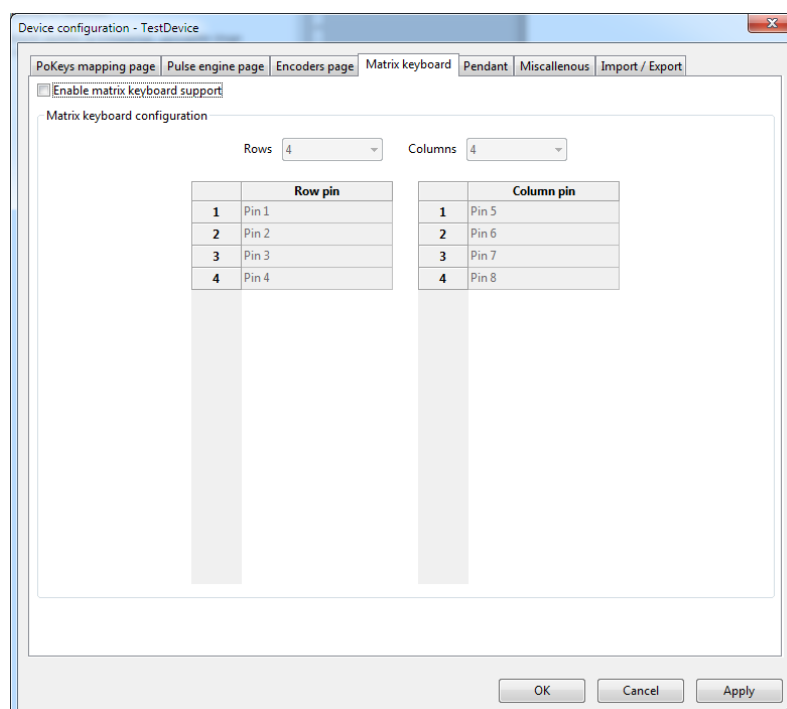
OK Cancel Apply

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- c. Encoders page: here the encoders (e.g. MPGs) are configured with standard settings available. We suggest using 'Fast encoders' option with MPGs (first three encoder rows when the option is enabled) and standard encoders for various other adjustment knobs (spindle or feed speed adjustment knob, etc.).

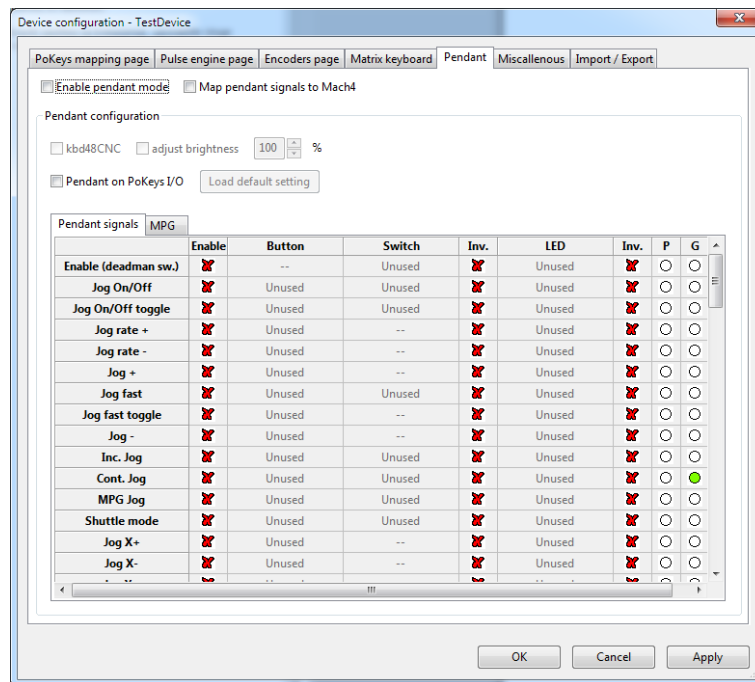


- d. Matrix keyboard: in case of larger array of switches (not to be used as axis limit or home switches), matrix keyboard feature can be used to read them all

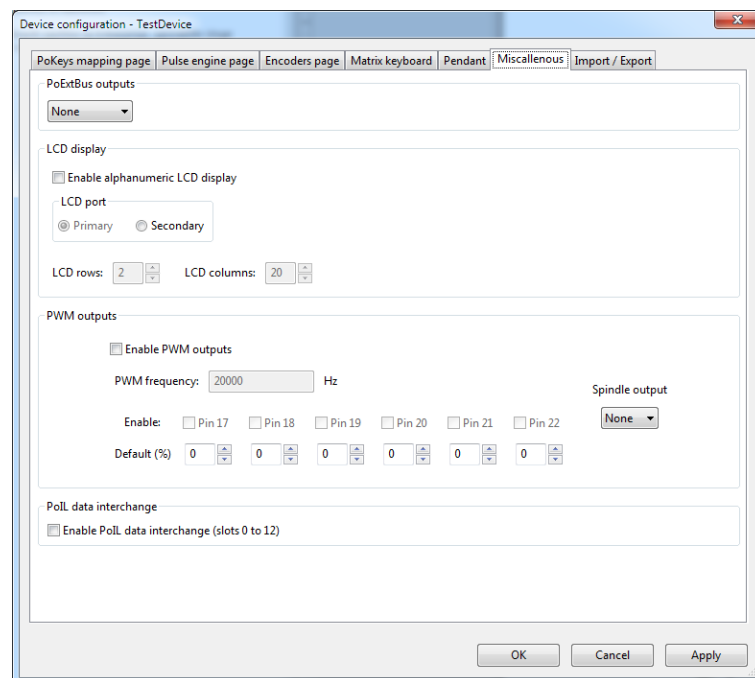


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- e. Pendant: PoKeys input and outputs can be used for pendant functionality. Please take a look at the separate manual on Mach4 and PoKeys pendant functionality.

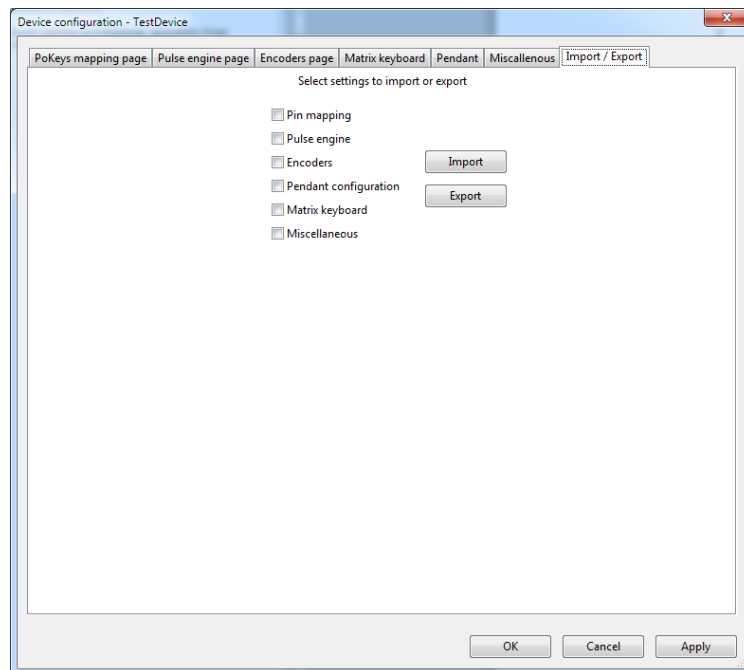


- f. Miscellaneous: this page contains additional settings for other peripherals. PoExtBus outputs can be enabled here, as well as the support for alphanumeric LCD display, PWM outputs and PoIL data interchange.

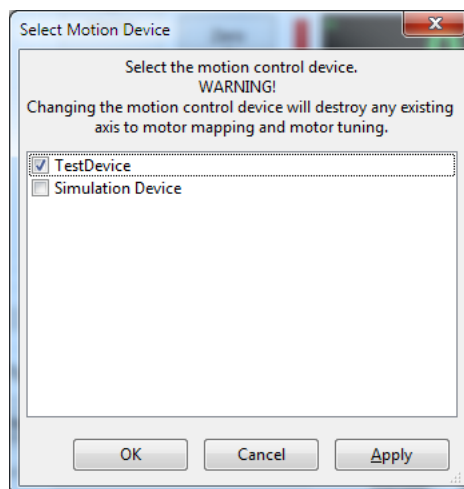


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- g. Import/Export: the import/export page is used to import or export PoKeys device configuration from or to a file. Select which settings you would like to import or export and click the appropriate Import or Export button.

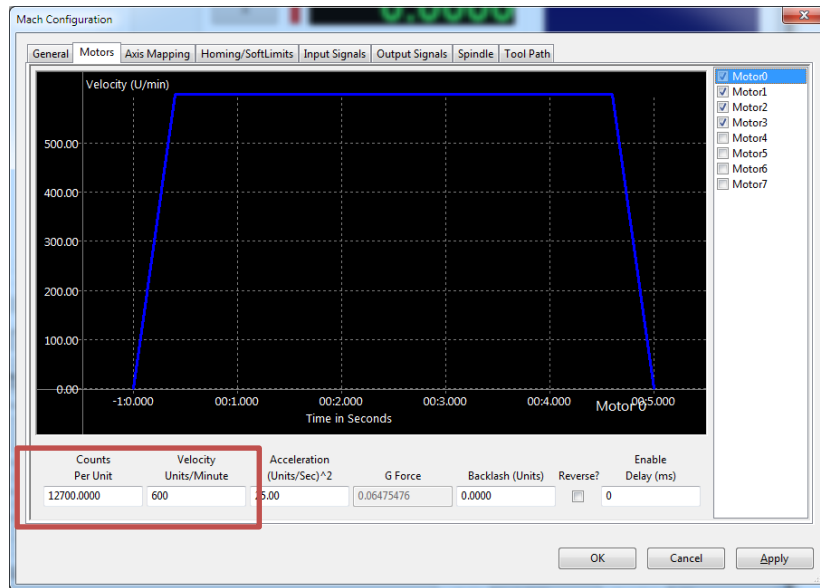


10. The PoKeys plugin configuration allows you to transfer the configuration from one device to another (in the case if PoKeys device needs to be changed). Select the device to change and click on 'Change device'. Follow the wizard to select the new device. When finished, restart Mach4 for the changes to be applied. This operation can also be performed if the original device is not present.
11. In order to use PoKeys device as motion controller for Mach4, select your PoKeys device in Mach4's dialog: Configure > Selection Motion dev. **Restart of Mach4 is advised after changing the motion device.**



12. Configure motor parameters - open Config > Mach dialog and switch to Motors tab.

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Configure the 'Counts Per Unit' field based on your machine configuration. The 'Velocity' field must obey the PoKeys pulse generator limitation on the maximum step frequency:

Generator type	Maximum step frequency
Internal 3 channel	25 kHz
External 4/8 channel	125 kHz

The maximum 'Velocity' value can be calculated using the following formula

$$V_{max} = \frac{60 * f_{max}}{N_{unit}}$$

where f_{max} is the maximum step frequency of the PoKeys pulse engine (see table above) and N_{unit} is the 'Counts per Unit' of your machine.

Example: let the machine's Counts per Unit be 24000 and external pulse generator is used (PoExtBusOC16CNC, PoKeysCNCaddon, etc.). The maximum velocity is then $V_{max} = \frac{60 * 125000}{24000} = 312.5 \text{ Units/Minute}$.

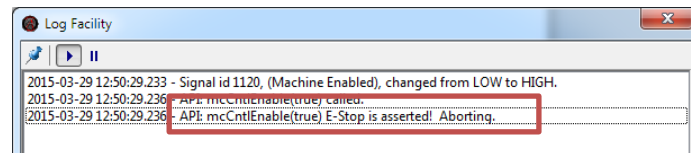
13. You are now ready to use your PoKeys device.

Troubleshooting:

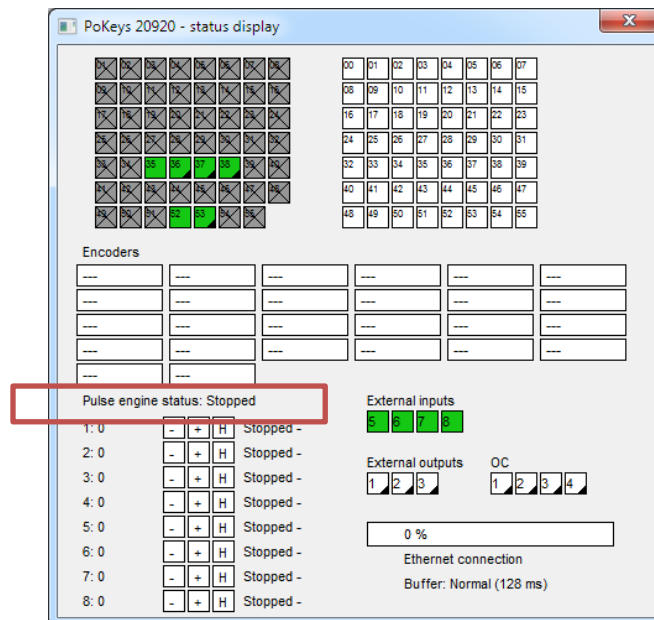
Problem: After clicking the 'Enable' button, Mach4 will show 'E-stop condition!' in the status bar and PoKeys device will not start the axis drivers.

Reason: E-stop switch is not properly configured.

Indications: Mach4 logging screen will show the following information



PoKeys plugin diagnostic screen (accessible via Diagnostics > PoKeys plugin) will list the Pulse engine as 'Stopped'.



Solution: Check that you have the emergency switch polarity properly configured. Open the PoKeys device configuration dialog, go to Pulse engine page and check the 'Invert emergency switch polarity'.

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