

# Unit Scaling

Read selected    Reset selected    Synchronize units with motor    Reset units in motor    Transfer scaling to motor

Enable Unit Scaling

Select Preset or Register: Velocity

Unit Scaling Factor

Scaling Unit: mm/s

**Method 1 - Calculate**

Application Types: Rotary Disc

Motor Resolution: 8192 Counts (per revolution)

Motor Sampling Time: 1.300049 ms

Gear Ratio (Optional): 1 : 1

Travel per revolution: 328.57142 mm/s

Unit Scaling Factor: ? 0.271091

**Method 2 - Absolute**

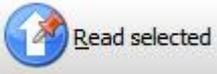
Unit Scaling Factor: 0.271091

Register Information: Clear

```
14:44:40.993 READ REGISTER VALUE: Register '236 - Setup Bits special' = 28(0x1c)
14:44:33.973 READ & WRITE SCALING FACTORS: Register '226 - Abs. Enc. Pos.' Read = 1.000000 Write = 1.000000
14:44:33.973 READ & WRITE SCALING FACTORS: Register '225 - Abs Enc. offset' Read = 1.000000 Write = 1.000000
14:44:33.973 READ & WRITE SCALING FACTORS: Register '224 - Analog output offset' Read = 1.000000 Write = 1.000000
14:44:33.973 READ & WRITE SCALING FACTORS: Register '223 - Analog output' Read = 1.000000 Write = 1.000000
14:44:33.973 READ & WRITE SCALING FACTORS: Register '221 - Analog input 3 offset' Read = 1.000000 Write = 1.000000
```

Unit scaling is the functionality to manipulate raw register or preset (see definition on preset below) values by internal motor register scaling so the behavior will fit any bespoke solution.

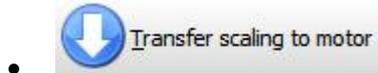
The tool button are (only enabled in online mode and if unit scaling is enabled):

-  Read selected
  - Either reads the register raw value(s) or reads the unit scaling setup (if any) for the selected register of preset.
-  Reset selected
  - Reset the unit scaling setup for the selected register or preset.
-  Synchronize units with motor

Read the unit scaling from the motor and override the current setup in MacTalk.



Reset the unit scaling in the motor.



Transfer the unit scaling setup to the motor.

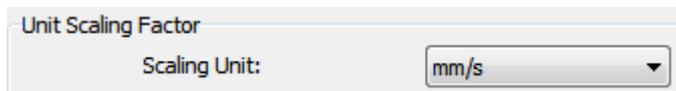
The factory setting contains of all available registers for current motor type and four JVL presets:

1. Torque preset
2. Acceleration preset
3. Velocity preset
4. Position preset

A preset is just a collection of related registers that can be unit scaled uniformly.

To enable unit-scaling check on the '**Enable Unit Scaling**' check box. Once checked on (and with a connected motor) MacTalk will read the unit scaling setup from the motor (if any) and update the user interface (in offline mode i.e. with no motor connected the functionality can still be used experimentally).

When the user selects a preset or a register, the content of the '**Scaling Unit**' combo box is updated accordingly.



The selected unit (here 'mm/s') is unit of measurement that show up in the user interface when the unit-scaling setup is enabled and finally transferred to the motor.

There are two different methods the user can choose between when defining the unit scaling:

- 1. Method 1 – Calculate**
- 2. Method 2 – Absolute**

### Method 1 – Calculate

This method 1 is the most intuitive way to define the unit scale factor i.e. from the given motor parameters; wizard will calculate the unit scaling for you.

Here the calculation falls into two categories: those that are time depended (velocity or acceleration) and those that are not.

Let go through a real world example:

With motor characteristics:

Motor resolution = 8192 counts/rev

Motor sampling time = 1.3 milliseconds

Motor gear ratio = 1 (1:1)

Velocity/Acceleration:

The user want to calculate velocity from RPM to mm/s (see screenshot above):

**Method 1 - Calculate**

Application Types: Rotary Disc

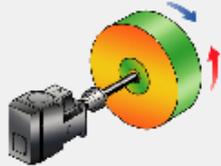
Motor Resolution: 8192 Counts (per revolution)

Motor Sampling Time: 1.300049 ms

Gear Ratio (Optional): 1 : 1

Travel per revolution: 628.57142 mm/s

Unit Scaling Factor: 0.271091



$RPM2CountsprSample = 60s / (Motor\ sampling\ time * Motor\ resolution * 16 * Motor\ gear\ ratio) = (60 * 1000) / (1.3 * 8192 * 16 * 1) = 2.839833\ counts/sample.$

Rotary disk with diameter = 200mm

RotaryDisktravellLength = 200mm \* Pi = 628.57142 mm

Unit-scaling factor =  $60 * RPM2CountsprSample / RotaryDisktravellLength = (60 * 2.839833) / 628.57142 = 0.271091$

Position:

The user want the tooth belt system to travel 1000 mm for each motor revolution:

**Method 1 - Calculate**

Application Types: Tooth Belt or Rack Pinion

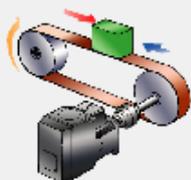
Motor Resolution: 8192 Counts (per revolution)

Motor Sampling Time: 1.300049 ms

Gear Ratio (Optional): 1 : 1

Travel per revolution: 1000 mm

Unit Scaling Factor: 8.192000



Unit-scaling factor =  $(Motor\ resolution * Motor\ gear\ ratio) / travel = (8192 * 1) / 1000 = 8.192$

Method 2 – Absolute

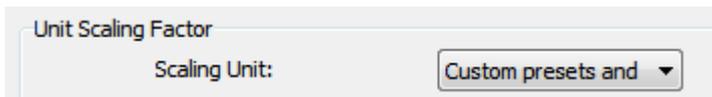
**Method 2 - Absolute**

Unit Scaling Factor: 2.712081

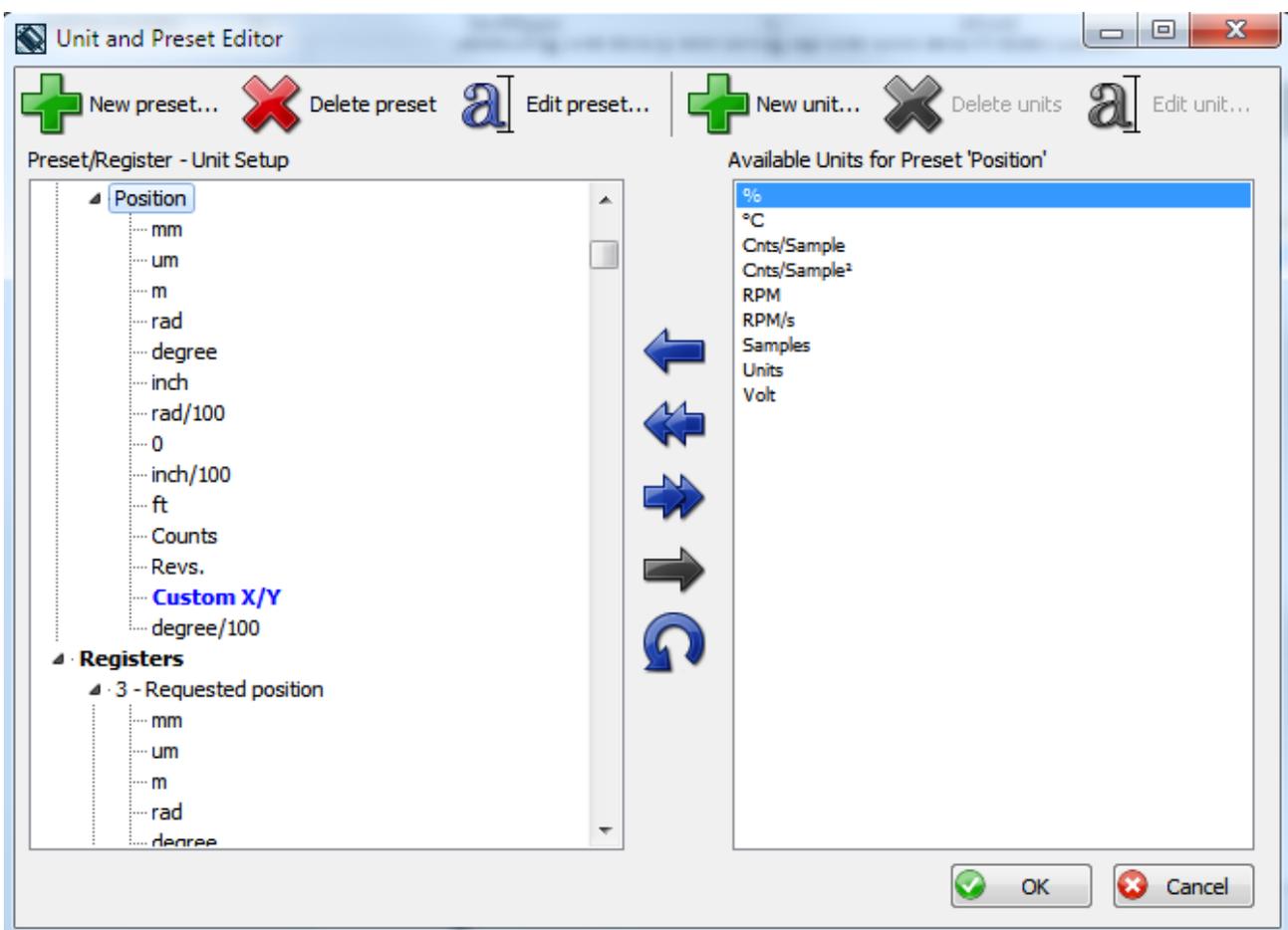
Very straight fort and simple – just define the unit-scaling factor as an absolute number. You will use this method if you already knows exactly the value in advance.

### Advanced section

For individual registers, the torque, or position preset the user can also define own units or new presets by selecting the last entry in the 'Scaling Unit' combo box:



Selecting the entry will bring up the Unit and Preset Editor:



In here (new) units can attached to an individual register or a (new) preset.

New unit can be defined, existing ones deleted or edited.

New preset can be defined, existing ones deleted or edited.