

## Motors

### General Description

This document covers the different Danfoss motor components, which all are based on the standard motors also available within the Typhoon HIL environment. In the table below is a description of the different components:

Motor Component Name	Description	Availability
Induction Motor Simplified		
Induction Motor	Variable stator resistance, e.g., for thermal simulation.	Requires HIL configuration with support for Time Varying Elements
Synchronous Motor Simplified		
Synchronous Motor	Variable stator resistance, e.g., for thermal simulation.	Requires HIL configuration with support for Time Varying Elements
Synchronous Motor Nonlinear Simplified		Requires Nonlinear Machines Toolbox
Synchronous Motor Nonlinear	Variable stator resistance, e.g., for thermal simulation.	Requires HIL configuration with support for Time Varying Elements and Nonlinear Machines Toolbox

Common to all motor models are their monitor outputs:

Signal name	Unit
OutputCurrentPct	Percentage of nominal motor current
MotorSpeed	RPM
MotorTorque	Nm
MotorTorqueHBW – High Bandwidth	Nm
MotorTorquePct	Percentage of nominal motor torque
MotorPower	kW
MotorFreq	Hz

### Nonlinear motors

2D flux map can be read directly from the motor data file if available. It is possible to estimate a flux map (without cross-saturation) from the normal motor data when no 2D flux map is present. This is done when the *Calculate fluxmap* check in the motor component is selected, see Figure 1.

General	Electrical	Feedback	Mechanical	Thermal
Calculate fluxmap: <input checked="" type="checkbox"/>				
Stator resistance:		0.295	ohm	
Stator nominal D inductance:		0.0031	H	
Stator nominal Q inductance:		0.0031	H	
Permanent magnet flux:		0.17918	Wb	
Stator current D-axis current vector:		[-11.1, 0.0, 11.1]	A	
Stator current Q-axis current vector:		[-11.1, 0.0, 11.1]	A	
Stator flux D-axis matrix:		21359189188095476]	Wb	
Stator flux Q-axis matrix:		84409999999999996]	Wb	

Figure 1 Calculate flux map

The model has 1 setting for specifying the address of the control unit, which is used to connect the simulated encoder / resolver signals to the relevant encoder/resolver option.

For more information about nonlinear machines in Typhoon HIL Control Center, please refer to the general user manual.

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