

Basic Load

General Description

The basic load can be configured through the SCADA widget to emulate different mechanical behaviours. The widget is grouped into three sections: a trace graph for load speed and torque; a group for controlling the load; and a group for parametrizing the load. They are described in details below.



Figure 1 - Widget for basic load.

Table 1 – Controls for basic load.

Signal	Description
ConstantLoad	Specifying amount of constant load torque, independent of motor speed.
LinearLoad	Specifying amount of linear load profile. A value of 0.20 results in loading the motor with 20 % of its nominal torque at nominal speed and 10 % at half of the nominal speed.
SquareLoad	Specifying amount of square (quadratic) load profile. A value of 0.80 results in loading the motor with 80 % of its nominal torque at nominal speed and 20 % at half of the nominal speed.
ConstantSpeed	Specifying constant motor speed independent of load torque.
RampTime	Is used in 'constant load' and 'constant speed' modes to set the duration when changing operating points for the load. E.g., a value of 4 seconds results in a duration of 2 seconds when the commanded change is half the nominal value.
LoadMode	Setting the behaviour of the mechanical load; torque or speed mode.
DisturbanceMode	Specifying the type of disturbance: Sine, Square, Random noise. The random noise is normal distributed with mean zero.
MechanicalBrakeControl	Controlling the mechanical brake when parameter 'Brake Output' is set to 'SCADA'

Table 2 – Parameters for basic load.

Signal	Description
InertiaFactor	Inertia seen by motor, relative to nominal motor inertia. A value of 10 yields a load inertia 10-times the value of the motor.
Inertia	Inertia seen by motor.
TotalInertia	Total inertia as sum of the two values above.
FrictionFactor	Friction related to speed, relative to nominal motor torque and speed. A value of 0.05 yields 5 % frictional torque at nominal speed.
ConstantLoadMode	Frictional - taking sign of speed into consideration. Potential - acting without sign of the speed.
ConstLoadSpeedThreshold	Band around zero speed where the constant load torque is ramped from positive to negative (or vice versa). For frictional torque mode only.
DisturbanceAmplitude	Amplitude of applied disturbance, in per unit of nominal motor torque.
DisturbanceFrequency	Frequency of applied disturbance.
StartDuration	Duration of start sequence where the motor speed is equal to 'start speed'. Set to zero (0) to disable. See NOTE 1
StartSpeed	Speed at start sequence, specified at nominal torque. A value of 10 PRM gives 10 RPM at nominal motor torque and 18 RPM at 180 % motor torque, etc.
WindMillingSpeed	Free-spinning speed of rotor. Set to zero (0) to disable. See NOTE 2
BrakeOutput	Source for controlling the mechanical brake. SCADA, digital output from drive or relay signal from drive.
BrakeEngageTime	Duration it takes for the brake to engage. Brake force is linear increased during the period.
BrakeReleaseTime	Duration it takes for the brake to release. Brake force is linear decreased during the period

NOTE 1 - High start torque

Modelling loads which require a large amount of motor torque at start to accelerate. This could be loads like; compressor pump-out, sticky conveyer-belts, etc.

The speed is kept constant at 'StartSpeed' until the 'StartDuration' has elapsed.

Normal speed reversal, where both motor torque and speed reach zero, will reenable the 'high start torque' sequence.

NOTE 2 - Windmilling

Modelling free-spinning behavior of fan / pump when motor is powered off. Can be used to test flying-start operation of drive.

Version	Date	Comment
1.0	19-12-2022	Document Created
1.1	23-05-2023	Added new SCADA signals
1.2	15-09-2023	Added 'StartDuration' and 'StartSpeed'
1.3	25-09-2023	Added 'WindMillingSpeed'