

Torque control and Analog output PST Softstarters



Torque control

Torque control and Analog output

This document describes the major features of the new functions Torque control and Analog output. It briefly describes how to use the two functions and how the new parameters are used.

All PST(B) softstarters with the symbol for torque control includes both of these functions.



Torque control

With the torque control function it is possible to start and stop motors with a more linear acceleration than when using the normal voltage ramps. During start this can be used to reduce the wear on the equipment driven by the motor. During stop, controlling the torque is especially useful for pump applications where voltage ramps can lead to a sudden torque drop which may result in water hammering and pressure surges. Torque control will keep these problems to an absolute minimum.

The parameters related to torque control and the easiest way of reaching them are described below.

Start Mode

Path in menu: Menu/SETTINGS/Functional Settings/Torque Control/Start Mode

Using the PST softstarter it is possible to choose between two different types of start ramps. These are voltage ramp and torque ramp.

Voltage ramp

When using the voltage ramp, the voltage is increased linearly from the start level to full voltage during start. Since the torque depends on both the voltage and the current, the torque curve does not always follow the voltage curve. This has the effect that the torque curve will not increase or decrease linearly.

Torque ramp

When using the torque ramp, the output voltage to the motor is controlled so that the torque will follow a predefined optimal curve from the start level to full voltage during start. This has the benefit that the mechanical starting behavior of the equipment driven by the motor will be much softer than when using voltage ramp.

Parameter text	Default value	Setting range	Description
Start Mode	Volt	Volt, Torque	Type of start ramp

Stop Mode

Path in menu: Menu/SETTINGS/Functional Settings/Torque Control/Stop Mode

Using the PST softstarter it is possible to choose between two different types of stop ramps. These are voltage ramp and torque ramp.

Voltage ramp

When using the voltage ramp, the voltage is decreased linearly from full voltage to the end voltage during stop. Since the torque depends on both the voltage and the current, the torque curve does not always follow the voltage curve. This has the effect that the torque curve will not increase or decrease linearly.

Torque ramp

When using the torque ramp, the output voltage to the motor is controlled so that the torque will follow a predefined optimal curve from full voltage to end voltage during stop. This has the benefit that the mechanical stopping behavior of the equipment driven by the motor will be much softer than when using voltage ramp. This can be especially useful in pump applications where a sudden stop can cause water hammering and pressure surges.

Parameter text	Default value	Setting range	Description
Stop Mode	Volt	Volt, Torque	Type of stop ramp

Tune torque control

Path in menu: Menu/SETTINGS/Functional Settings/Torque Control/Tune T-Ctrl

With this parameter it is possible to change the speed of the regulator that regulates the voltage so that the torque will follow the predefined torque curve. In most cases, this parameter will not have to be changed from its default value which is 100%. If a dip occurs in the torque curve during stop, increasing this parameter can solve the problem. This parameter should not be set too high though, since this can cause the torque of the motor to oscillate around the predefined torque curve. If this is the case, decrease this parameter.

Parameter text	Default value	Setting range	Description
Tune T-Ctrl	100%	30...300%	The speed of the regulator

Analog output



Torque limit

Path in menu: Menu/SETTINGS/Functional Settings/
Torque Control/Torque Limit

It is possible to limit the starting torque during start by setting this parameter. When the torque limit is reached, the output voltage stays stable until the torque falls below the limit, then the ramping continues. Limiting the torque will minimize stress and wear on the equipment driven by the motor.

Torque limit is only available when start mode is set to torque.

Parameter text	Default value	Setting range	Description
Torque Limit	150%	20...200%	Level of the torque limit compared to the nominal torque of the motor

Analog output

With the PST(B) softstarter it is possible to use an analog output signal. The purpose of this output signal is that the user can use the output as an input to an analog meter or to the analog input on a PLC device.

If the analog output is used, the cables shall be connected to terminals 23 and 24; the same terminals as the PTC input. Since the same terminals are used for both of these functions, only one of these functions can be used at the same time.

There are several parameters to set when using the analog output. These parameters and the easiest way of reaching them are described below.

Analog output

Path in menu: Menu/SETTINGS/Functional Settings/
Analog Output/Analog Out

With this parameter it is possible to enable the analog output.

When sequence start is used, the analog output is only active for the last started motor.

Parameter text	Default value	Setting range	Description
Analog Out	No	Yes, No	Enable analog output

Analog output, reference

Path in menu: Menu/SETTINGS/Functional Settings/
Analog Output/Anl Ref

With this parameter it is possible to set the unit and the range of the signal to output. This selected range will be the physical output from the softstarter. This range should be selected to suit the analog meter or the PLC that uses this signal as it's input. The possible options are:

- 0-10 V
- 0-20 mA
- 4-20 mA

If for instance 4-20 mA is selected, then this range will represent 0-100% of the output signal, for instance the current of the motor.

Parameter text	Default value	Setting range	Description
Anl Ref	4-20mA	0...10V, 0...20mA, 4...20mA	Which type of output signal should represent the value given by the analog output

Analog output, type of value

Path in menu: Menu/SETTINGS/Functional Settings/
Analog Output/Anl Type

With this parameter it is possible to set which type of value that should be the output of the analog output. The possible types of values are:

- I Amp Current of the motor
- U Volt Main voltage
- P kW Active power kW
- P hp Active power hp
- Q kVAr Reactive power
- S kVA Apparent power
- TmpMot Calculated temperature of the motor
- TmpSCR Calculated temperature of the SCR
- cosPhi Power factor

Parameter text	Default value	Setting range	Description
Anl Type	I Amp	I Amp, U Volt, P kW, P hp, Q kVAr, S kVA, TmpMot, TmpSCR, cosPhi	Which type of value to output from the analog output

Analog output

Analog output, range

Path in menu: Menu/SETTINGS/Functional Settings/
Analog Output/Anl Range

With this parameter it is possible to set the value that will be represented as the maximum value by an analog meter or by a PLC. If for instance this parameter is set to 20000A, then 0-20000A will be represented by 0-100% by a PLC or an analog meter.

If the actual value happens to be greater than the selected maximum value then the actual value will still only be represented as the selected maximum value. This can be useful if for instance very large currents occur during start and only the currents during continuous run are of interest.

The possible range and the unit depend on which type of output is selected. The range for the different output types are listed below:

· Current of the motor	I Range Max	1-20000 A
· Main voltage	U Range Max	1-1000 V
· Active power kW	kW Range Max	0,1-3000 kW
· Active power hp	hp Range Max	0,1-4000 hp
· Reactive power	Q Range Max	0,1-3000 kVAr
· Apparent power	S Range Max	0,1-3000 kVA

Only the valid parameter is displayed. If for instance I Amp is selected as output type, then only I Range Max will appear. If TmpMot, TmpSCR or cosPhi is selected as output type, this range parameter will not appear at all. When selecting TmpMot or TmpSCR the range will always be 0-100% and when selecting cosPhi the range will be 0-1.

Parameter text	Default value	Setting range	Description
I Range Max	PST(B) size dependent	0...20000 A	Upper limit of the current for analog output
U Range Max	600 V	0-1000 V	Upper limit of the main voltage for analog output
kW Range Max	PST(B) size dependent	0,1-3000 kW	Upper limit of the active power for analog output, in kW
hp Range Max	PST(B) size dependent	0,1-4000 hp	Upper limit of the active power for analog output, in hp
Q Range Max	PST(B) size dependent	0,1-3000 kVAr	Upper limit of the reactive power for analog output
S Range Max	PST(B) size dependent	0,1-3000 kVA	Upper limit of the apparent power for analog output



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