

## Objective

The 3 phase 590Plus drive can be used to control motor fields for high current or bi-directional applications.

Applications include:

- High current motor fields.
- Generator fields.
- Alternator exciter windings.
- Magnet coils.

The 590+ field control provides the following advantages:

- High current capability.
- 2 or 4 Quadrant operation.
- Field forcing for fast response.

The 590+ has a software setup to optimize the control of large inductance loads with long time constants.

## Procedure:

Note: A normal constant horsepower field controller will use a non-regenerative (591+) controller, and a generator field controller, which needs to be bi-directional, will use a regenerative (590+) controller.

Setup for 2 Quadrant operation.

2 Quadrant operation provides unidirectional field current but applies negative volts for forcing when reducing the current.

## Hardware:

1. A latching circuit may be required to ensure that the SCRs turn on with the long time constant. This should comprise a resistor and capacitor in series across the load. 1000ohms and 0.5uF is typical for the Frame 1, 35Amp 590+ at 460VAC. Less resistance and greater capacitance may be necessary at higher powers.
2. If a DC contactor is used between the drive and the inductive load a discharge resistor should be used with the normally closed DB pole to limit the voltage across the load if the contactor opens under load.

If you have questions, please call the Product Support Group at (704) 588-3246.

**Software:**

The following RESERVED Menu parameters must be set:

- 3 PHASE FIELD (tag476)= ENABLED
- I LOOP PI MODE (tag 163)= 1 (Increases the current loop gain by 10 times)
- SYSTEM HEALTH INHIBIT(tag 211) = 0X0002 (Disables missing pulse alarm)
- CUR CONTROL MODE = standard firing (tag 166) or SEL INT/CUR/SPD (tag166) = 3 (disables 210 deg firing), (depending on the firmware version of the drive, this parameter can be labeled as either)

Note: If a 590+ regenerative drive is being used, the following additional parameters must be set:

- MIN BS DEAD TIME (tag 101) = 6 (Maximum bridge switch time)
- SCAN THRESHOLD (tag 223) = 0 (Removes the scan)
- ZCD THRESHOLD (tag 214) = 3 (Zero current detector sensitivity)

Note: A regenerative controller will have a delay of a few seconds between removing the Start or Enable and re-Starting or Enabling. This is because the SCR firing is suspended and the current will decay slowly. An alternative is to interlock removal of the Start with detection of zero current using a digital output.

The Field should be controlled in Current control using the Current Demand Isolate (located in the Current Loop block) and the demand connected to the direct Analog Input 2 terminal A3. The drive standard Field control (Field Enable in the Field Control block) should be disabled unless required for another motor.

The Program Stop B8 should not be used, it can be permanently connected to 24V (C9).The Start/Stop C3 should be tied to Coast Stop, B9 and both toggled for start/stop. This immediately switches off the current when the start/ stop goes low.

**Commissioning:**

The current loop tuning can be done manually as the Autotune probably will not work. The Discontinuous current is likely to be less than 5% and this parameter can be left at 0% if control is not required in this region. If control is required at very low currents, measure the level where the current becomes continuous and enter this value in the Current Loop menu.

Cycle the current demand between 10% and 50% and adjust the Current loop Proportional and Integral gains to give the best response using an oscilloscope connected to the IA Test point on the control board.

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## Applications:

1.

Use as a high current field controller with a 590+ armature controller. The Field control, standby and Field weakening are performed in the armature controller, but the actual field current is generated by the external field controller.

The Field Control and Field Weakening should be Enabled in the Armature controller but the Field Fail should be inhibited.

The Field Demand, Tag 183, should be connected to an analog output and this should be wired to the analog input A3 of the Field Controller.

The Field controller, which uses its armature circuit for the field should have its Field Disabled. Start/Stop should be controlled by the drive isolate relay (timed from the E Stop). The Field controller health should be interlocked with the armature controller. This can be via a digital input that enables the Field Fail Inhibit when the Field is healthy. Thus a fault in the field controller will cause a Field Fail in the armature controller.

2 .

Use as a complete field controller with standby, field weakening and delayed turn off. This could be with an armature fed from a dc source other than a SSD drive. For this application, external armature voltage sensing is required. This is available on all 590+ frames except Frame 1.

The 590+ field control is self contained. It uses its own Field control except the Field Demand, Tag 183 is connected internally to the Additional Demand in the armature current loop and the I DMD Isolate is set True to disconnect the Speed loop. The Field Fail must be inhibited as the Field hardware circuit is not used.

The motor armature should be connected to the field controller, external armature sensing so that the motor terminal volts can be controlled above base speed.

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