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APPLICATION NOTE

Drive Applications Support Library

Application Note	AN-V3-078
Title	Bypass Operation
Related Products	V3 Series AC Drives
Level: 3	1 - Fundamental - No previous experience necessary. 2 - Basic - Some basic drives knowledge recommended. 3 - Advanced - Some basic drives knowledge required. 4 - Expert - Good experience in topic of subject matter recommended.

Overview:

The Bypass Control function allows the motor to be operated either from the V3 ECO Series Drive (variable speed control) or direct on line on the incoming supply (fixed speed). Bypass control requires external components and connection in creating the bypass system that are not provided as part of the V3 Drive and are the responsibility of the system designer.

	<p>CAUTION: Circuit examples provided in this manual are for guidance only. System design, installation, commissioning and maintenance must be carried out only by personnel who have the necessary training and experience. The system must be installed only by qualified electrical persons and in accordance with local and national regulations and codes of practice.</p>
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Please note that the acronym VFD (Variable Frequency Drive) is used throughout this document when referring to the drive.


The bypass control function with the V3 ECO Series drive allows the VFD to switch in the bypass circuit automatically should the VFD trip on a fault condition, should Fire Mode be activated (see section 7.8 - Fire Mode function) or manually via an input to the VFD.

Bardac Drives recommends the use of a two contactor bypass arrangement in implementing a bypass circuit. Mechanical as well as electrical inter-locking is recommended to guard against contactor failure and to prevent damage to the system in such events.

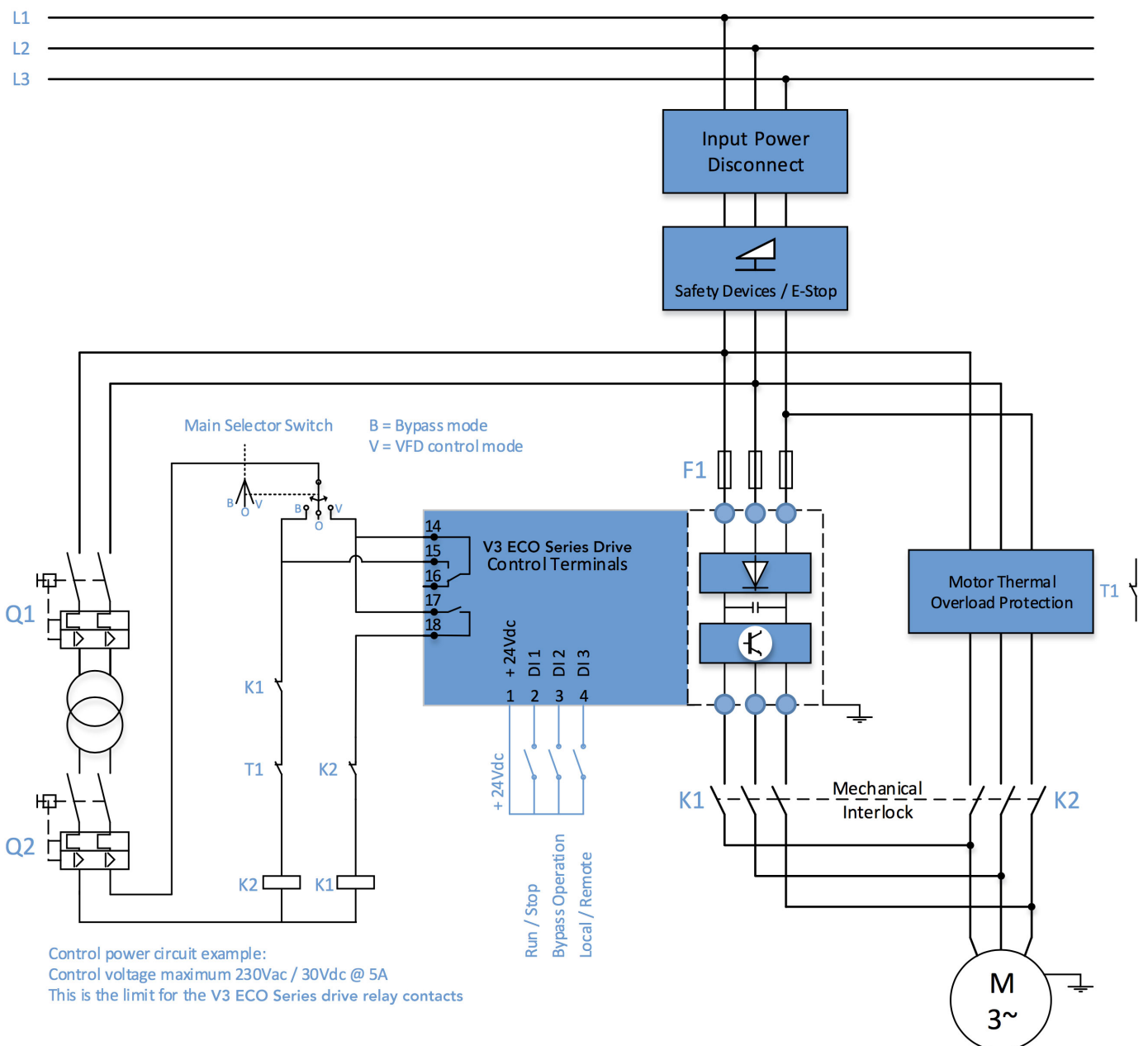
Operational Overview:

The basic configuration for a two contactor bypass circuit is shown below.

Mechanical and electrical Interlocking are shown between the Bypass contactor (K2) and the VFD Output contactor (K1). Electrical Interlocking is also recommended between the Bypass and VFD Output contactors using auxiliary contacts on each device.



CAUTION: The supply voltage for the coil of the contactors must not exceed the rating for the drive control relays contacts (250V AC / 30V DC @ 5A)



The main selector switch selects between the following modes.

System Off	VFD output contactor is open; Bypass contactor is open
Bypass Control	VFD output contactor is open; Bypass contactor is closed, motor running from bypass supply
VFD Control	VFD output contactor is open; Bypass or VFD Output contactor selection is controlled by the VFD

When the Main Selector Switch is set to VFD Control, the selection of the two motor output contactors is controlled by the VFD dependent on the settings configured in the VFD by the user. When V3 ECO Series control (VFD) is selected, it can co-ordinate bypass or VFD control based on the settings and running conditions of the VFD.

The two VFD control relays (relay 1 and relay 2) are automatically configured when Bypass Mode is enabled. Relay 1 is configured for bypass control and is connected to the Bypass Contactor (via interlocks). Relay 2 is configured for VFD control and is connected to the VFD Output Contactor (via interlocks). Under normal operation the VFD will close relay 2, bringing in the VFD Output contactor, and operation of the motor will be as per the logic and speed reference configured in the VFD.

The VFD will switch off the VFD Output contactor and switch in the Bypass contactor if one of the bypass control functions is enabled and the logic to trigger that function becomes true. Bypass control functions include:

Bypass on Fault	VFD will switch to bypass if a trip condition prevents the VFD from operating the motor
Bypass on Fire Mode	VFD will switch to bypass if the Fire Mode function is assigned to a digital input and that input becomes true (can be open active or close active)
Bypass on Input	VFD will switch to bypass if a digital input is assigned to bypass control (through menu 9) and that input becomes true.

Note: A combination of bypass conditions is permitted.

Bypass on Fault

Bypass Mode on Fault is enabled by setting parameter P8-11=1 (enabled). Once enabled the VFD will switch to bypass mode in the event of a trip or fault occurring on the VFD. When a trip occurs the VFD will immediately open the VFD output contactor (VFD output already disabled due to trip), wait a time (defined by P8-13) and then close the bypass contactor. The motor will remain under Bypass control until the enable/run input is removed from the VFD (VFD control terminal 2) at which point the Bypass contactor will be opened. When the run/enable input is closed again the VFD will attempt to run under VFD control (VFD output contactor closed). **It is required that Spin Start (P2-26) be enabled for this function.**

Bypass on Fire Mode

Bypass on Fire Mode is enabled by setting parameter P8-12=1 (enabled). Once enabled, the VFD will switch to bypass mode in the event of the fire mode input becoming active (true). Fire Mode should be configured (see section 7.8. Fire Mode Function) and an input assigned either through parameter P1-13 or through menu 9 (P9-32) prior to enabling Bypass on Fire Mode.

When the Fire Mode input becomes true the VFD will immediately disable its output and open the VFD output contactor, wait a time (defined by P8-13) and then close the bypass contactor. The motor will remain under bypass control until the fire mode input is deactivated. When the Fire Mode input is deactivated the bypass contactor will be opened, there will be a short delay (defined by P8-13) and the VFD Output contactor will close. Provided the enable input is still present then the VFD will take over operation of the motor.

Spin Start (P2-26) MUST be enabled for this function.

Bypass on Input

Bypass mode on Input is enabled by assigning a bypass trigger input in menu 9. Set parameter P9-13 (Bypass Trigger Input) to one of the available digital inputs. Once an input is assigned the VFD will switch to bypass mode in the event of that input becoming active (true).

When the bypass trigger input becomes true the VFD will immediately disable its output and open the VFD output contactor, wait a time (defined by P8-13) and then close the bypass contactor. The motor will remain under bypass control until the bypass trigger input is deactivated. When the bypass trigger input is deactivated the bypass contactor will be opened, there will be a short delay (defined by P8-13), the VFD Output contactor will close and the VFD will take over operation of the motor.

If the enable input is removed from the VFD then the VFD will switch off whichever of the two output contactors is currently on. When the VFD is re-enabled the VFD will look at the status of the bypass input to determine which of the output contactors to operate.

Spin Start (P2-26) MUST be enabled for this function.

In all modes of operation the time period between one of the output contactors switching off and the other switching on is defined by parameter P8-13 (Bypass Contactor Changeover Time). This parameter should be set with a value that ensures the first contactor has time to clear prior to an attempt being made to switch in the second contactor. Additional mechanical or electrical inter-locking should also be provided.

The VFD OLED display will show the following indication whenever bypass mode is activated by the V3 ECO Series drive.



Bypass mode

Quick Setup Overview:

- Set Basic parameters P1-01 to P1-10.
- Set Parameter P1-14 = 201 to allow access to advanced parameters in menu 8 & 9
- Set time delay between switch over of output contactors to safe limit in parameter P8-13 (default 2S).

If Bypass required on Fault:

- Set bypass mode of fault P8-11 to 1 (Enabled)

If Bypass required on Fire:

- Go through Fire mode set up procedure (section 7.8) prior to enabling Fire Mode Bypass Function.
- Set bypass mode of fault P8-12 to 1 (Enabled)

If Bypass required on Input:

- Set bypass trigger input parameter P9-43 to an available digital input
Note: To set menu 9 parameters P1-13 must be set to 0 and input functions programmed manually.

Revision History			
Version	Comments	Author	Date
1.0	Edited with Bardac branding	JPC	03/07/2019
1.0	Document creation	DD (@ IDL)	05/18/2015
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