




Optidrive Applications Support Library

Application Note	AN-ODV-2-078
Title	Bypass Operation
Related Products	Optidrive HVAC
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 Optidrive HVAC (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 Optidrive HVAC and are the responsibility of the system designer.

 **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.**


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

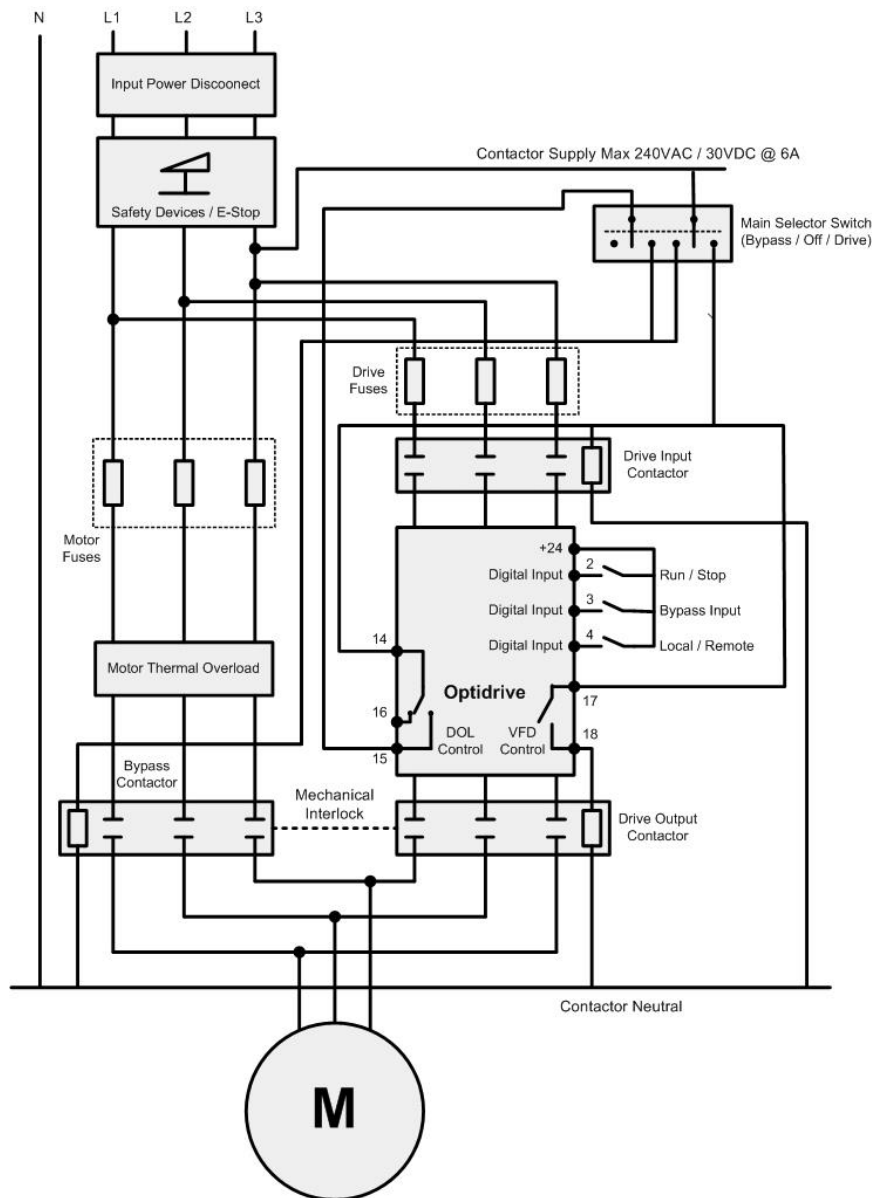
Inverttek Drives Ltd recommended the use of a three contactor bypass arrangement in implementing a bypass circuit. Mechanical as well as electrical inter-locking is recommended to guard against contactor failure and to prevent damage to the system in such events.

Operational Overview

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

Mechanical Interlocking is shown between the Bypass contactor and the Drive Output contactor. Electrical Interlocking is also recommended between the Bypass and Drive Output contacts 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 : Drive is powered off; Bypass contactor is off
- Bypass Control : Drive is powered off; Bypass contactor is on, motor running from bypass supply
- Drive Control : Drive is powered on; Bypass or Drive Output contactor selection is controlled by the drive

When the Main Selector Switch is set to Drive Control, the drive input contactor is switched in such that the drive will power up. Selection of the two motor output contactors is controlled by the drive dependent on the settings provided to the drive by the user. When Optidrive HVAC control is selected the drive can co-ordinate bypass or drive control based on the settings and running conditions of the drive.

The two drive 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 directly to the Bypass contactor. Relay 2 is configured for drive control and is connected directly to the Drive Output Contactor. Under normal operation the drive will close relay 2, bringing in the Drive Output contactor, and operation of the motor will be as per the logic and speed reference configuration of the drive.

The drive will switch off the Drive Output contactor (relay 2) and switch in the Bypass contactor (relay 1) 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	Drive will switch to bypass if a trip condition prevents the drive from operating the motor
• Bypass on Fire Mode	Drive 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	Drive 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 drive will switch to bypass mode in the event of a trip or fault occurring on the drive. When a trip occurs the drive will immediately open the drive output contactor (drive 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 drive (drive control terminal 2) at which point the Bypass contactor will be opened. When the run/enable input is closed again the drive will attempt to run under drive control (drive 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 drive 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 drive will immediately disable its output and open the drive 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 Drive Output contactor will close. Provided the enable input is still present then the drive will take over operation of the motor.

It is required that Spin Start (P2-26) 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 drive will switch to bypass mode in the event of that input becoming active (true).

When the bypass trigger input becomes true the drive will immediately disable its output and open the drive 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 Drive Output contactor will close and the drive will take over operation of the motor.

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

It is required that Spin Start (P2-26) 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 Drive OLED display will show the following indication whenever bypass mode is activated by the Optidrive HVAC control.



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.

Appendix:

Revision History			
Issue	Comments	Author	Date
01	Document Creation	KB	28/04/14