SIEMENS

Siemens BT300 Bypass

Operator's Manual

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Building Technologies

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Notice

To the Reader

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Table of contents

How to Use this Manual

About This Manual

This manual is written for the owner and user of the Siemens BT300 Bypass. It is designed to help you become familiar with the Siemens BT300 Bypass and its applications.

This section covers manual organization, document conventions and symbols used in the manual, how to access help, related publications, and any other information that will help you use this manual.

Document Organization

This manual contains the following sections:

- *Safety Instructions* provides general guidelines for your safety and to prevent equipment damage.
- *Bypass Overview* describes both the Conventional and Electronic Bypass devices.
- *Startup Procedures* describes the precautions, installation, preparation, and commissioning procedures.
- *Wiring Diagrams* for power and control wiring of the Bypass.
- *Operation (Electronic Bypass Only)* describes the use of the electronic Bypass.
- *Application Features (Electronic Bypass Only)* describes the electronic Bypass extended features.
- *Troubleshooting* provides guidelines for troubleshooting the Bypass.
- *Technical Information* provides product numbers, power ratings, technical data, and ordering information for accessories and replacement parts.

Document Conventions

The following table lists conventions to help you use this manual in a quick and efficient manner.

Convention	Examples
Numbered Lists (1, 2, 3…) indicate a procedure with sequential steps.	1. Turn OFF power to the field panel. 2. Turn ON power to the field panel. 3. Contact the local Siemens Industry representative.
Conditions that must be completed or met before beginning a task are designated with a ▷. Intermediate results (what will happen following the execution of a step), are designated with a ⇨. Results, which inform the user that a task was completed successfully, are designated with a ⇨.	▷Composer software is properly installed. ▷A Valid license is available. 1. Select **Start** > **Programs** > **Siemens** > **GMS** > **Composer**. ⇨The Project Management window displays. 2. Open an existing project or create a new one. ⇨The project window displays.
Actions that should be performed are specified in boldface font.	Type **F** for Field panels. Click **OK** to save changes and close the dialog box.
Error and system messages are displayed in Courier New font.	The message `Report Definition successfully renamed` displays in the status bar.

New terms appearing for the first time are italicized.	The field panel continuously executes a user-defined set of instructions called the *control program*.
	This symbol signifies Notes. Notes provide additional information or helpful hints.
Cross references to other information are indicated with an arrow and the page number, enclosed in brackets: [→92]	For more information on creating flowcharts, see Flowcharts [→92].
Placeholders indicate text that can vary based on your selection. Placeholders are specified in bold print, and enclosed with brackets [ ].	Type **A C D H [username] [field panel #].**

Safety Symbols

The following table lists the safety symbols used in this manual to draw attention to important information.

Table 1: Warning Symbols.

Symbol	Description
	**DANGER** or **WARNING**: Dangerous voltage is present. **DANGER** ou **AVERTISSEMENT**: Présence de tension dangereuse.
	**WARNING** or **CAUTION** **AVERTISSEMENT** ou **ATTENTION**
	**NOTE** **REMARQUE**

The following table describes the safety notices used in this manual to draw attention to important information.

Table 2: Warning Descriptions.

Warning Type	Description
DANGER	Serious injury, death, or severe equipment damage is imminent if a procedure or instruction is not followed as specified. Le non respect d'une procédure ou instruction peut provoquer instantanément des blessures graves, voir mortelles, ou endommager l'équipement
WARNING	Serious injury, death, or severe equipment damage could occur if a procedure or instruction is not followed as specified. Le non respect d'une procédure ou instruction peut provoquer des blessures graves voir mortelles ou endommager l'équipement.
CAUTION	Minor or moderate injury may occur if a procedure or instruction is not followed as specified. Le non respect d'une procédure ou instruction peut provoquer des blessures mineures ou modérés.
NOTICE	Equipment damage or unwanted operation may occur if a procedure or instruction is not followed as specified. Le non respect d'une procédure ou instruction peut endommager l'équipement ou entraîner un fonctionnement intempestif.

Warning Type	Description
NOTE	Notes provide additional information or helpful hints. Les remarques fournissent des informations supplémentaires ou des conseils utiles.

Getting Help

For more information about BT300 products, contact your local Siemens Industry representative.

Reference Documents

The following documentation is available from your local Siemens Industry, Inc. representative:

- *BT300 Variable Frequency Drive Bypass Installation Instructions* (DPD01375) Siemens BT300 Bypass.
- *BT300 Variable Frequency Drive Installation Manual* (DPD01148), provides installation instructions for the Siemens BT300 HVAC Variable Speed Drive.
- *Siemens BT300 HVAC Drive Operator's Manual (DPD01809)* provides operating instructions and procedures for the BT300 Drive.
- *BT300 VFD Submittal Sheet* (154-126), provides a synopsis of the BT300 Drive product line, accessories, and technical data.
- *BT300 HVAC Drives Conventional Bypass (C-Bypass) Options Submittal Sheet (154-128)* provides a comprehensive overview of the BT300 Conventional Bypass.
- *BT300 HVAC Drives Electronic Bypass (E-Bypass) Options Submittal Sheet* (154-129) provides a comprehensive overview of the BT300 Electronic Bypass.
- *Siemens BT300 I/O Option Boards User's Manual* (DPD01158) provides installation instructions and technical information for the wide selection of expander boards that are available for the BT300 Drive.

Safety Instructions

The following guidelines are provided for your safety, to prevent damage, and to extend the service life of the BT300 Drive and any connected equipment. Read this information carefully. Specific Warnings, Cautions, and Notes are provided in the relevant sections of this manual.

⚠ WARNING

The BT300 Drive uses hazardous voltages and controls potentially dangerous rotating mechanical components.

- Non-compliance with warnings or failure to follow the instructions contained in this manual can result in loss of life, severe personal injury, or serious damage to property/equipment.
- Only authorized personnel should work on this equipment, and only after becoming familiar with all local regulations and ordinances; safety notices; and installation, operation, and maintenance procedures in this manual. Successful and safe operation of this equipment depends upon its proper handling, installation, operation, and maintenance.
- Before carrying out any installation and commissioning procedures, you must read all safety instructions and warnings, including all warning labels attached to the equipment. Make sure that the warning labels are kept in a legible condition and ensure missing or damaged labels are replaced.
- Observe the regulations of Safety Code VBG 4.0 (in particular, "Permissible Deviations when Working with Live Components") whenever measuring or testing is performed on live equipment. Also, use suitable electronic tools.
- Only use the equipment for the purpose specified by the manufacturer. Unauthorized modifications and the use of spare parts and accessories that are not sold or recommended by the manufacturer of the equipment can cause fires, electric shocks, and injuries.
- Prevent the general public from accessing or approaching this equipment

⚠ WARNING

Le variateur Siemens BT300 utilise des tensions dangereuses et commande des pièces mécaniques rotatives potentiellement dangereuses.

- Le non-respect des avertissements et des instructions contenus dans ce manuel peut occasionneré la mort de personnes, des blessures graves, ou des dommages sérieux aux biens et aux équipements.
- Seul le personnel autorisé doit entretenir cet équipement, et cela uniquement après s'être familiarisé avec toutes les ordonnances et réglementations locales en vigueur, de même que les notices de danger, et les procédures d'installation, de fonctionnement et de service de ce manuel. Le fonctionnement fiable et sans faille de cet équipement dépend de son maniement correct, ainsi que de son installation, de sa mise en œuvre et de son service.
- Avant d'effectuer des procédures d'installation et de mise en service, vous devez lire toutes les instructions et avertissements de sécurité, y compris les étiquettes portant les avertissements sur le variateur. Assurez-vous que ces étiquettes demeurent lisibles, et que toute étiquette manquante ou endommagée est remplacée.
- Observer les réglementations du code de sécurité VBG 4.0 (en particulier "*Permissible Deviations when Working with Live Components*"), lorsque des mesures ou des essais sont effectués sur un équipement sous tension. Utiliser également des outils électroniques appropriés.
- N'utiliseré que l'équipement pour l'usage spécifié par le constructeur. Toute modification ou utilisation de pièces de rechange ou d'accessoires non vendus ou recommandés par le constructeur peuvent causer un incendie, des électrochocs, or des blessures.
- Empêcher l'accès de cet équipement au grand public.

NOTE:
Keep these Operating Instructions near the equipment and available to all users.

Bypass Overview

General Description

During normal operation in a typical application, the input contactor (optional) and output contactor close and the BT300 Drive operates the motor.

During bypass operation, the bypass contactor provides the ability to operate the motor on utility power and eliminate the BT300 Drive from the motor control circuit.

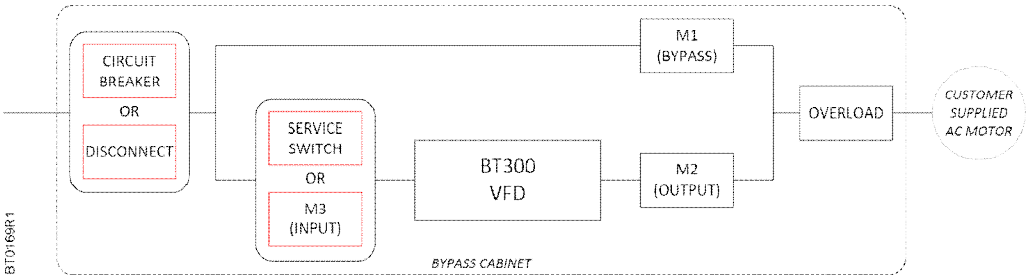


Figure 1: Bypass Contactor Options.

The Siemens BT300 Bypass consists of a BT300 Drive and a bypass enclosure with controls that include the following:

- Control terminals
- Operators (conventional only):
  - "Drive-Off-Bypass" switch
  - "Bypass On" light
  - "Drive Test On-Off" switch (optional)
- Step-down control transformer
- Contactors:
  - Bypass (M1)
  - Output (M2)
  - Input (M3) or Service Switch
- Overload (current) relay
- Disconnect with fuses, or circuit breaker
- Diagnostics board

Operation Overview

- Drive Mode
  - Drive input contactor (M3) or selector switch closes.
  - Drive output contactor (M2) closes.
  - The motor is controlled by the BT300 Drive output.
- Local Bypass Operation
  - Requires a jumper between the bottom two pins (LOC) of jumper block J7 on the Bypass Diagnostic Board. This is the default jumper position from the factory.
  - "Off" opens the drive output contactor and the bypass contactor.

  - "Bypass" closes the bypass contactor (M1) and the bypass indicator is energized.
  - The motor is connected to utility/line power.
- Remote Bypass Operation (electronic only)
  - Requires a jumper between the top two pins (REM) of jumper block J7 on the Bypass Diagnostic Board.
  - "Off" opens the drive output contactor and the bypass contactor.
  - "Bypass" closes the bypass contactor (M1) and the bypass indicator is energized only when the bypass control terminals (customer remote start input) are closed.
  - The motor is connected to utility/line power.
- Safety Input(s)
  - Contact closure required for motor to be run in either Drive or Bypass modes of operation.

⚠ WARNING

This disconnects the 120 Vac control power circuit.
Ceci déconnecte le circuit d'alimentation 120 Vac.

- Essential Services
  - Requires jumper (or contact closure) between pins 5 and 6 of Terminal Block TB1 on the Bypass Diagnostic Board to enable Essential Services.
  - Requires contact closure between pins 7 and 8 of Terminal Block TB1 on the Bypass Diagnostic Board to activate Essential Services.
  - Bypass contactor (M1) is closed regardless of the selected operation.
  - All calls to open the bypass contactor are ignored except the opening of this contact or removal of the main power.
  - The motor is connected to utility/line power.
- Auto-Bypass (electronic only)
  - Requires to be enabled.
  - Bypass operation is automatically initiated in the event of a fault at the BT300 Drive.
  - The motor is connected to utility/line power.
- Interlock (electronic only)
  - Requires to be enabled.
  - Requires interlock device wired to terminals

Start-up Procedures

Safety Precautions

⚠ WARNING

Failure to disconnect input power may cause serious injury or death.

When you connect input power to the Siemens BT300 Bypass, the motor terminals are energized even if the motor is not running. Do not make any connections with input power connected to the Siemens BT300 Bypass. Disconnect and lock out power to the Siemens BT300 Bypass before servicing it.

Si vous ne coupez pas l'alimentation, vous risquez des blessures graves ou mortelles.

Lorsque vous branchez le variateur Siemens BT300 à l'alimentation, les bornes du moteurs sont sous tension, même si le moteur n'est pas mis en route. N'effectuez aucun branchement si l'alimentation est raccordée au variateur Siemens BT300. Débranchez et consignez l'alimentation avant de procéder à un entretient.

⚠ WARNING

After you disconnect input power, allow the power supply to be off for at least five minutes so that the DC bus capacitors can discharge to a safe voltage.

Après avoir débranché l'alimentation, laissez écouler une période d'attente d'au moins cinq minutes, afin que les condensateurs du bus DC puissent décharger en toute sécurité.

Installation Inspection

Inspect the mechanical and electrical installation for compliance with local electrical codes and regulations. After installation, verify that:

- Siemens BT300 Bypass and motor are properly grounded.
- Input power and motor wire sizes are correct and connections are secure.
- Control wiring is correct and connections are secure.
- Control wiring is not routed with power wiring.
- Motor wiring is not routed in the same conduit with power wiring.
- Siemens BT300 Bypass installation environmental conditions are met as follows:
  - Installed in an indoor controlled environment (except NEMA 3R units) that is free of moisture and conductive contaminants such as condensation and dust.
  - Ventilation/cooling is clean and free from corrosive gases.
  - Ambient temperature must be between 14°F and 104°F (-10°C to 40°C).
  - Relative humidity must be between 0% and 95%, non-condensing.
  - The device is not mounted in direct sunlight.

Start-up Procedure, Conventional Bypass (C-Bypass)

NOTE:
Insert an **X** in the Check column when completed; enter **N/A** if not used.

Step	Check	Description
1		Verify that all three input phases are connected to the input fuse block (or circuit breaker depending upon model) and that the motor leads are connected to the output terminals of the overload relay only. **NOTE:** The M1 (Bypass) contactor and the M2 (Output) contactor outputs are connected together at the factory.
2		Verify that all factory connections within the bypass are tight, as factory connections can loosen during shipment.
3		Before applying power, verify the following: - The **DRIVE/OFF/BYPASS** switch is in the **OFF** position. - The **DRIVE TEST** switch (if installed) is in the **OFF** position.
4		Dial in the current limit on the overload, in accordance with the connected motor.
5		Apply power to the drive with C-Bypass option using the main disconnect. Verify that all three phases are present, and that the input voltage is correct for the system.
6		Place the **DRIVE TEST** switch (if installed) in the **ON** position.
7		The keypad illuminates and the Startup Wizard of the drive is active. Complete the Startup Wizard. When prompted for **Bypass Wizard**, answer **YES**. **NOTE:** This should be activated when the unit is first powered up. If not, reset the drive to factory-default to return to a good, known starting configuration. This can be completed by selecting the following: **User Settings** (6)/**Parameter Backup** (6.6)/**Restore Factory Defaults** (6.5.1)/**Activate.** See *Startup Wizard* for detailed information.
8		When executing the Bypass Wizard, select **Conventional**. See *Bypass Wizard* for detailed information.
9		Place the **DRIVE/OFF/BYPASS** switch in the **DRIVE** position.
10		Place the **DRIVE TEST** switch (if installed) in the **OFF** position.
11		“Bump” the unit into Drive mode by completing the following: Press the **HAND/AUTO** button on the drive. Select **Drive**, and press **OK**. Select **Hand**, and press **OK**. When **Activate** displays, press **OK**. Enter a setpoint of at least 5 hertz. Press the green **I** button to start the motor. Verify that the motor rotation is correct for the application. Press the red **O** button to stop the motor. **NOTE:** If the motor rotation is incorrect, do not correct now. Complete Steps 14 and 15 first, and then see Step 16 for corrective actions.
12		Place the **DRIVE/OFF/BYPASS** switch in the **OFF** position. The drive’s keypad should turn off if a Drive Test switch is installed (3-contactor versions).
13		Bump” the unit into Bypass mode by completing the following: Place the **DRIVE/OFF/BYPASS** switch into the **BYPASS** position, and quickly back to the **OFF** position. Verify that the motor rotation is correct for the application. **NOTE:** If the motor rotation is incorrect, do not correct now. See Step 16 for corrective actions.
14		If the motor rotation was incorrect in either Step 13 or 15, remove power to the bypass assembly using the disconnect switch. Wait 5 minutes to allow for the drive's DC Bus to discharge. See *Motor Rotation Correction Wiring* for required changes. Apply power, and repeat Steps 13 through 15 to verify proper rotation again
15		Place the **DRIVE/OFF/BYPASS** switch in the **DRIVE** position.
16		Complete any other required wizards found in the **Quick Setup** (1) menu.

Step	Check	Description
17		Complete any other application specific settings for the site as required.
18		The automatic reset is configured for 30-second intervals and 10 reset attempts. If this is not acceptable, configure the automatic reset settings found in the **Parameters** (3)/**Automatic Reset** (3.10) menu for desired settings.
19		The default display has been configured to wait for 2 minutes of keypad inactivity before switching to the multi-monitor display. If this is not acceptable, see **Timeout Time** (5.7.1) and **Default Page** (5.7.2) for desired settings.
20		Manually run the drive throughout its entire operation range while observing operation. If the drive trips on an over-current during acceleration, adjust the **Accel time 1** (3.4.2). If the drive trips on an over-voltage during deceleration, adjust the **Decel time 1** (3.4.3). If excessive vibration of the driven load is noted at specific input frequencies, use **Prohibited Frequencies** (3.7) to eliminate this vibration.
21		Determine whether the speed reference signal is 0 to 10 Vdc or a 4 to 20 mA. Connect signal wires, and place the DIP switch in the appropriate position. **NOTE:** Ensure that the drive power is off before changing the DIP switches.
22		Verify the speed reference signal for proper polarity and operation.
23		Place the drive in **AUTO** mode at the keypad. Verify that the drive is controlled properly by the building automation system. Observe if the speed command can achieve the minimum and maximum speeds desired. If not, scale as required.
24		Configure the Password and Access Level, if desired. This prevents unauthorized parameterization using the keypad.

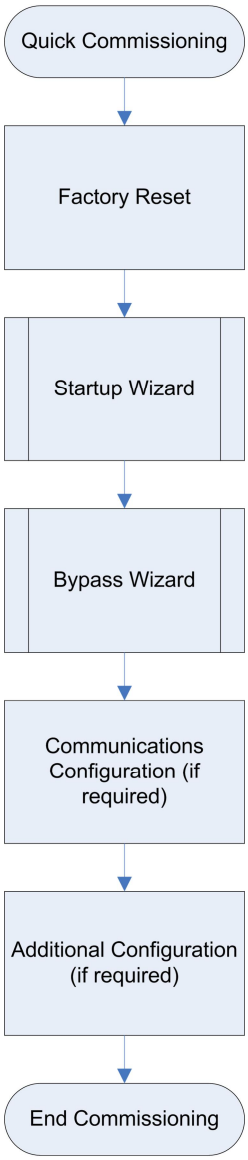
Start-up Procedure, Electronic Bypass (E-Bypass)

NOTE:
Insert an **X** in the Check column when completed; enter **N/A** if not used.

Step	Check	Description
1		Verify that all three input phases are connected to the input fuse block (or circuit breaker depending upon model) and that the motor leads are connected to the output terminals of the overload relay only. **NOTE:** The M1 (Bypass) contactor and the M2 (Output) contactor outputs are connected together at the factory.
2		Verify that all factory connections within the bypass are tight, as factory connections can loosen during shipment.
3		Dial in the current limit on the overload in accordance with the connected motor.
4		Apply power to the drive with E-Bypass option using the main disconnect. Verify that all three phases are present, and that the input voltage is correct for the system.
5		The keypad illuminates and the Startup Wizard of the drive is active. Complete the Startup Wizard. When prompted for **Bypass Wizard**, answer **YES**. **NOTE:** This should be activated when the unit is first powered up. If not, reset the drive to factory-default to return to a good, known starting configuration. This can be completed by selecting the following: **User Settings** (6)/**Parameter Backup** (6.6)/**Restore Factory Defaults** (6.5.1)/**Activate.** See *Startup Wizard* for detailed information.
6		During the execution of the Bypass Wizard, select **Electronic**. **NOTE:** A **Remote Safety 1** and **Remote Safety 2** fault will occur. Press the **Back/Reset** button once to return to the wizard. Configure the **Remote Safety 1** (3.5.1.44) and **Remote Safety 2** (3.5.1.45) once the Bypass Wizard is complete. See *Bypass Wizard* for detailed information..
7		“Bump” the unit into Drive mode by completing the following: Press the **HAND/AUTO** button on the drive. Select **Drive**, and press **OK**. Select **Hand**, and press **OK**. When **Activate** displays, press the **OK** button. Enter a setpoint of at least 5 hertz. Press the green **I** button to start the motor. Verify that the motor rotation is correct for the application. Press the red **O** button to stop the motor. **NOTE:** If the motor rotation is incorrect, do not correct now. Complete Step 10 first, then see Step 11 for corrective actions.
8		"Bump" the unit into Bypass mode by completing the following: Press the **HAND/AUTO** button on the drive. Select **Bypass**, and press **OK**. When **Activate** displays, press **OK**. Then, quickly press the **HAND/AUTO** button on the drive. Select **OFF**, and press **OK**. When **Activate** displays, press **OK**. Verify that the motor rotation is correct for the application. NOTE: If the motor rotation is incorrect, do not correct now. See Step 11 for corrective actions.
9		If the motor rotation was incorrect in either Step 9 or 10, remove power to the bypass assembly using the disconnect switch. Wait 5 minutes to allow for the drive's DC Bus to discharge. See *Motor Rotation Correction Wiring* for required changes. Apply power, and repeat Steps 9 and 10 to verify proper rotation again.
10		Press the **HAND/AUTO** button on the drive. Select **Drive,** and press **OK**. Select **Auto** and press **O**. When **Activate** displays, press **OK.**.
11		Complete any other required wizards found in the **Quick Setup** (1) menu.
12		Complete any other application specific settings for the site as required.

Step	Check	Description
13		The automatic reset is configured for 30-second intervals and 10 reset attempts. If this is not acceptable, configure the automatic reset settings found in the **Parameters** (3)/**Automatic Reset** (3.10) menu for desired settings.
14		The default display has been configured to wait for 2 minutes of keypad inactivity before switching to the multi-monitor display. If this is not acceptable, see **Timeout Time** (5.7.1) and **Default Page** (5.7.2) for desired settings.
15		Manually run the drive throughout its entire operation range while observing operation. If the drive trips on an over-current during acceleration, adjust the **Accel time 1** (3.4.2). If the drive trips on an over-voltage during deceleration, adjust the **Decel time 1** (3.4.3). If excessive vibration of the driven load is noted at specific input frequencies, use **Prohibited Frequencies** (3.7) to eliminate this vibration.
16		Determine whether the speed reference signal is 0 to 10 Vdc or a 4 to 20 mA. Connect signal wires, and place the DIP switch in the appropriate position. **NOTE:** Ensure that the drive power is off before changing the DIP switches.
17		Verify the speed reference signal for proper polarity and operation.
18		Place the drive in **AUTO** mode at the keypad. Verify that the drive is controlled properly by the building automation system. Observe if the speed command can achieve the minimum and maximum speeds desired. If not, scale as required.
19		Configure the Password and Access Level, if desired. This prevents unauthorized parameterization using the keypad.

Quick Commissioning Procedure



It is important to use the quick commissioning procedure as listed in the workflow. The wizards are in place to help minimize the startup time.

Factory Reset

Since it is often unknown if any other users have attempted to run the unit, it is recommended to complete a Factory Reset to return the drive to known factory settings. Do the following to complete a Factory Reset:

At the drive keypad, select:
User Settings > Parameter Backup > Restore Factory Defa > Activate.

The drive restarts, the Siemens splash screen displays, and the Startup Wizard automatically begins. See the *Startup Wizard* (P1.19) section for further details.

Startup Wizard (P1.19)

The Startup Wizard prompts you for the essential information needed by the drive so that it can start controlling the output as desired. Once power is connected to the BT300 HVAC Drive, the Startup Wizard should run automatically. If it is not running, it can be activated in the **Quick Setup (M1)** menu or by completing **Restore Factory Defaults** (P6.5.1)

The following steps are required to successfully complete the Startup Wizard:

Step	Parameter/Question	Settings
1	**Language Selections** (P6.1)	Select the icon for the language you want applied to the keypad. This varies depending upon the language package installed.
2	**Daylight Saving** (P5.5.5)	Select the Daylight Saving Rule 1 = Off 2 = EU 3 = US 4 = Russia
3	**Time** (P5.5.2)	Specify the current time of day in the following format: hh:mm:ss where h = hour, m = minute, s = seconds.
4	**Year** (P5.5.4)	Specify the current year in the following format: yyyy where yyyy = 4-digit year.
5	**Date** (P5.5.3)	Specify the current date in the following format: dd.mm where dd = 2-digit day, mm = 2-digit month.
6	Startup Wizard?	Specify if the Startup Wizard should be activated: **Yes**, **No**

If the option **Yes** is selected for Startup Wizard (recommended), you will be prompted for the following values:

Step	Parameter/Question	Settings
7	Fan or Pump (Application Type)	Pump Automatically sets the following: **Accel Time 1** (P1.13) = 30 **Decel Time 1** (P1.14) = 30 **Start Function** (P3.2.4) = Ramping **Stop Function** (P3.2.5) = Ramping Fan Automatically sets the following: **Accel Time 1** (P1.13) = 120 **Decel Time 1** (P1.14) = 120 **Start Function** (P3.2.4) = Flying Start **Stop Function** (P3.2.5) = Coast to Stop
8	**Motor Nom Voltg** (P3.1.1.1)	Defines nominal motor voltage from motor nameplate data.
9	**Motor Nom Freq** (P3.1.1.2)	Defines nominal motor frequency from motor nameplate data.
10	**Motor Nom Speed** (P3.1.1.3)	Defines nominal motor speed from motor nameplate data.
11	**Motor Nom Currnt** (P3.1.1.4)	Defines nominal motor current from motor nameplate data.
12	**Motor Cos Phi** (P3.1.1.5) (Power Factor)	Defines nominal motor Cos Phi (power factor) from motor nameplate data.

Step	Parameter/Question	Settings
13	**Motor Nom Power** (P3.1.1.6)	Defines nominal motor power from motor nameplate data.
14	**Min Frequency** (P3.3.1)	Minimum allowed frequency reference.
15	**Max Frequency** (P3.3.2)	Maximum allowed frequency reference.
16	**I/O Ctrl Ref** (P3.3.3)	Selects location of frequency setpoint source when in I/O A control. In the following list of possible settings, the main setpoint is selected: 1= Preset Freq 0 2 = Keypad Reference 3 = Fieldbus 4 = AI1 5 = AI2 6 = AI1+AI2 7 = PID 1 Reference 8 = Motor Potentiometer
17	**Accel Time** (P3.4.2)	Defines the time required to increase output frequency from 0 to **Max Frequency** (P3.3.1).
18	**Decel Time** (P3.4.3)	Defines the time required to decrease output frequency from **Max Frequency** (P3.3.1) to 0 frequency.
19	**Ctrl Place Auto** (P3.2.1)	Start/Stop commands are given differently depending upon the control place. This parameter defines whether the Start/Stop command is controlled by digital inputs as defined in **Control Signal 1 A** (P3.5.1.1) and **Control Signal 2 A** (P3.5.1.2) in accordance with **the I/O A Start/Stop Logic** (P3.2.6) or if the Start/Stop command is controlled by the Fieldbus that is in use. Settings: 0 = I/O Control (control is from the physical I/O, PID control, or time channels) 1 = Fieldbus (control is from the configured fieldbus found in Ethernet or RS-485 settings).
20	**Automatic Reset** (P3.10.1)	Determines if the Automatic Reset feature can be used.
21	**Start Function** (P3.2.4)	Defines the start function of the drive. 0 = Ramping Start 1 = Flying Start
22	**Stop Function** (P3.2.5)	Defines the stop function of the drive. 0 = Coast to Stop 1 = Ramping Stop
23	**Motor Switch** (P3.1.2.2)	Prevents the drive from tripping when a motor switch is located between the drive and motor. 0 = No 1 = Yes
24	**Bypass Wizard** (P1.21)	Enable parameter for the Bypass Wizard. This wizard can be activated during the Startup Wizard.

The Startup Wizard is now complete.

Bypass Wizard (P1.21)

The Bypass Wizard is activated in the **Quick Setup (M1)** menu. The wizard assists with configuring the drive for use with the Conventional or Electronic Bypass options. If the **Electronic Bypass** option is selected, additional features can be enabled, if desired. The standard I/O is re-mapped for use with the Electronic Bypass option. Additional parameters are available when the **Electronic Bypass** option is enabled.

The following steps are required to successfully complete the Bypass Wizard:

Step	Parameter/Question	Settings
1	Select the **Bypass** (P3.17.4) mode	Electronic Conventional Disabled

If **Conventional** is selected, the following changes occur automatically, the wizard completes, and the message: `Bypass Wizard is now complete. Press OK to continue.` displays.

- **Control Signal 2 A** (P3.5.1.2) is set to **DigIN Slot0.1** to disable the reverse command on Digital Input 2.
- **Run Interlock 2** (P3.5.1.13) is set to **DigIN SlotA.2** to enable the run interlock on Digital Input 2. The status of the Output Contactor (M2) is factory-wired to digital input 2.
- **Preset Freq Sel0** (P3.5.1.15) is set to **DigIN Slot0.1** to disable the Preset Frequency Selection **0** on Digital Input 4.
- **Overload** (P3.5.1.53) is set to **DigIN SlotA.5** to enable the overload on Digital Input 5. The status of the Overload is factory-wired to Digital Input 5.

If **Electronic** is selected, the following change occurs automatically:

Overload (P3.5.1.53) is set to **DigIN SlotA.5** to enable the overload on Digital Input 5. The status of the Overload is factory-wired to Digital Input 5.

The wizard continues with the following steps:

Step	Parameter/Question	Settings
2	**Bypass Delay** (P3.18.1) Time	Defines the amount of time between the unit being placed into Bypass mode and the M1 contactor closing. Range: 1 to 30 s
3	**Essential Services*** (P3.18.5)	Enabled Disabled

If **Enabled** is selected for Essential Services, Step 4 displays. Otherwise, the wizard jumps directly to Step 5.

Step	Parameter/Question	Settings
4	**Essential Services** Activation (P3.5.1.52)	DigIN SlotA.6
5	**Remote Bypass*** (P3.18.6)	Enabled Disabled

If **Enabled** is selected for Remote Bypass, Step 6 displays. Otherwise, the wizard jumps directly to Step 7.

Step	Parameter/Question	Settings
6	**Command Source** (P3.5.1.1)	Fieldbus CTRL I/O Control
7	**Interlock*** (P3.2.11)	Enabled Disabled

If **Enabled** is selected for Interlock, Step 8 displays. Otherwise, the wizard jumps directly to Step 9.

Step	Parameter/Question	Settings
8	**Interlock Delay** (P3.2.12)	Range: 0 to 120 s
9	**Auto Bypass*** (P3.18.2)	Enabled Disabled

If **Enabled** is selected for Auto Bypass, Step 10 displays. Otherwise, the wizard jumps directly to Step 11.

Step	Parameter/Question	Settings
10	**Auto Bypass Delay** (P3.18.4)	Range: 0 to 30 s
11	**Fault Selection** (P3.18.3)	Select faults to enable Auto Bypass: Any Fault Undervoltage Overvoltage Overcurrent AI Low Unit Temperature Motor Overtemp External Fault Underload Fault

* Feature of the Electronic Bypass Option. For more details, see the *Applications Features (Electronic Bypass Only)* section of this document.

The following message displays: `Bypass Wizards is now complete. Press OK to continue`. The Bypass Wizard is now complete. Any site specific application programming should now be completed.

Communications Configuration

The communications configuration is documented in the *Siemens BT300 HVAC Drive Operator's Manual* (DPD01809).

Additional Configuration

Depending upon the site and the sequence of operation desired, such as auto reset, flying start, skip frequencies, and switching frequency, additional configuration may be required. See the *Siemens BT300 HVAC Drive Operator's Manual* (DPD01809) for further configuration information.

Wiring Diagrams

Power Wiring

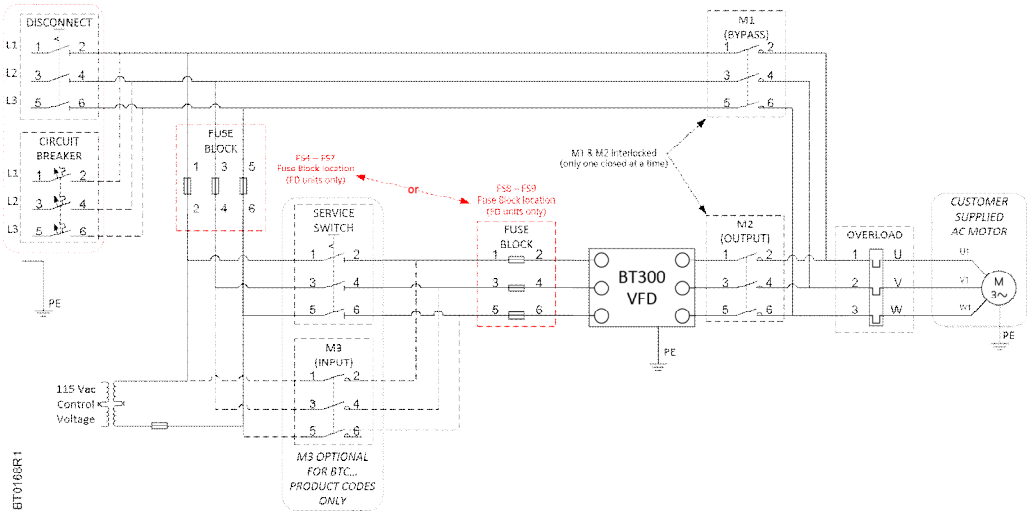


Figure 2: Power Wiring.

Electronic Bypass Control Wiring

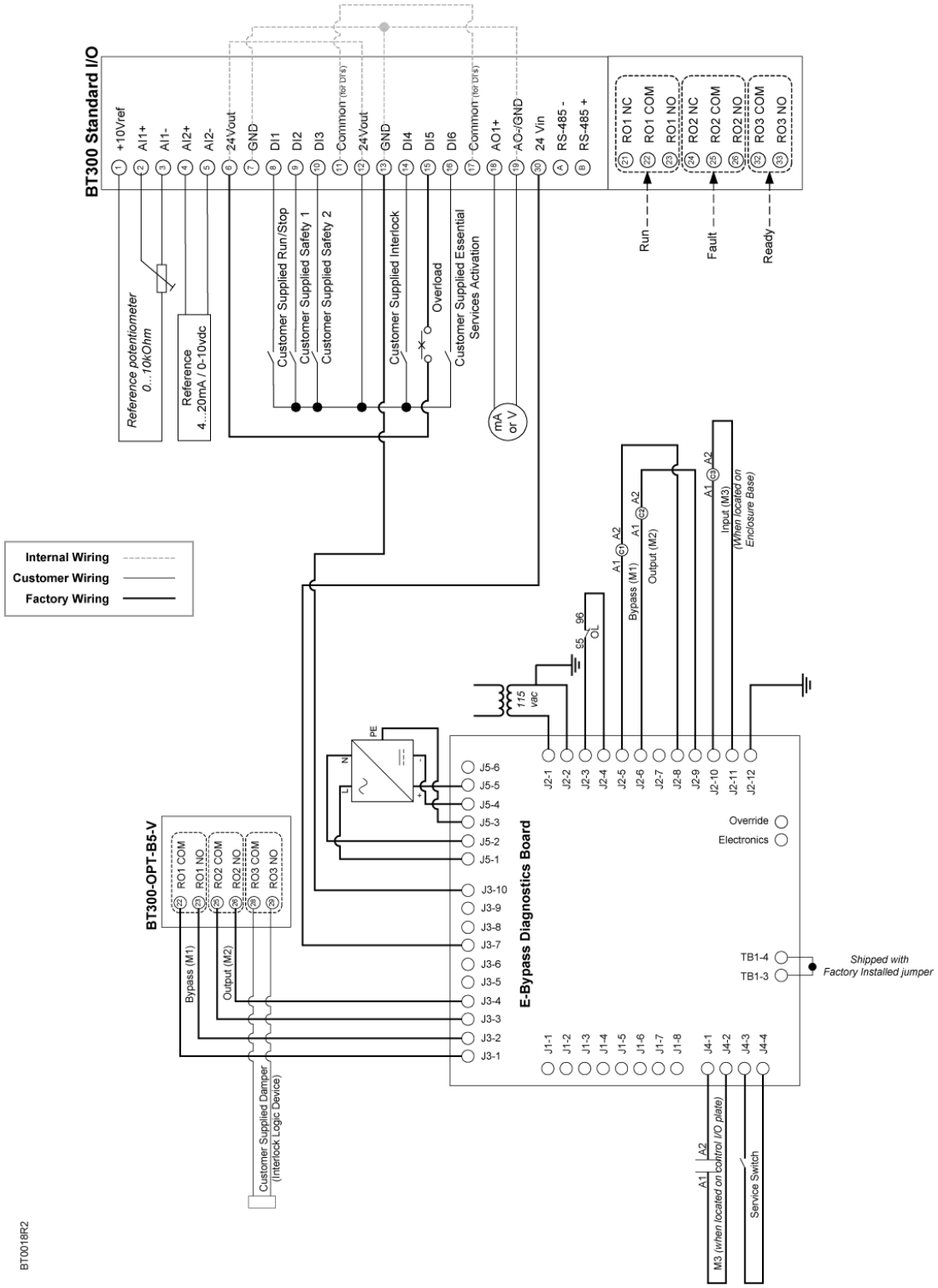


Figure 3: Electronic Bypass Drive Terminations.

Conventional Bypass Control Wiring

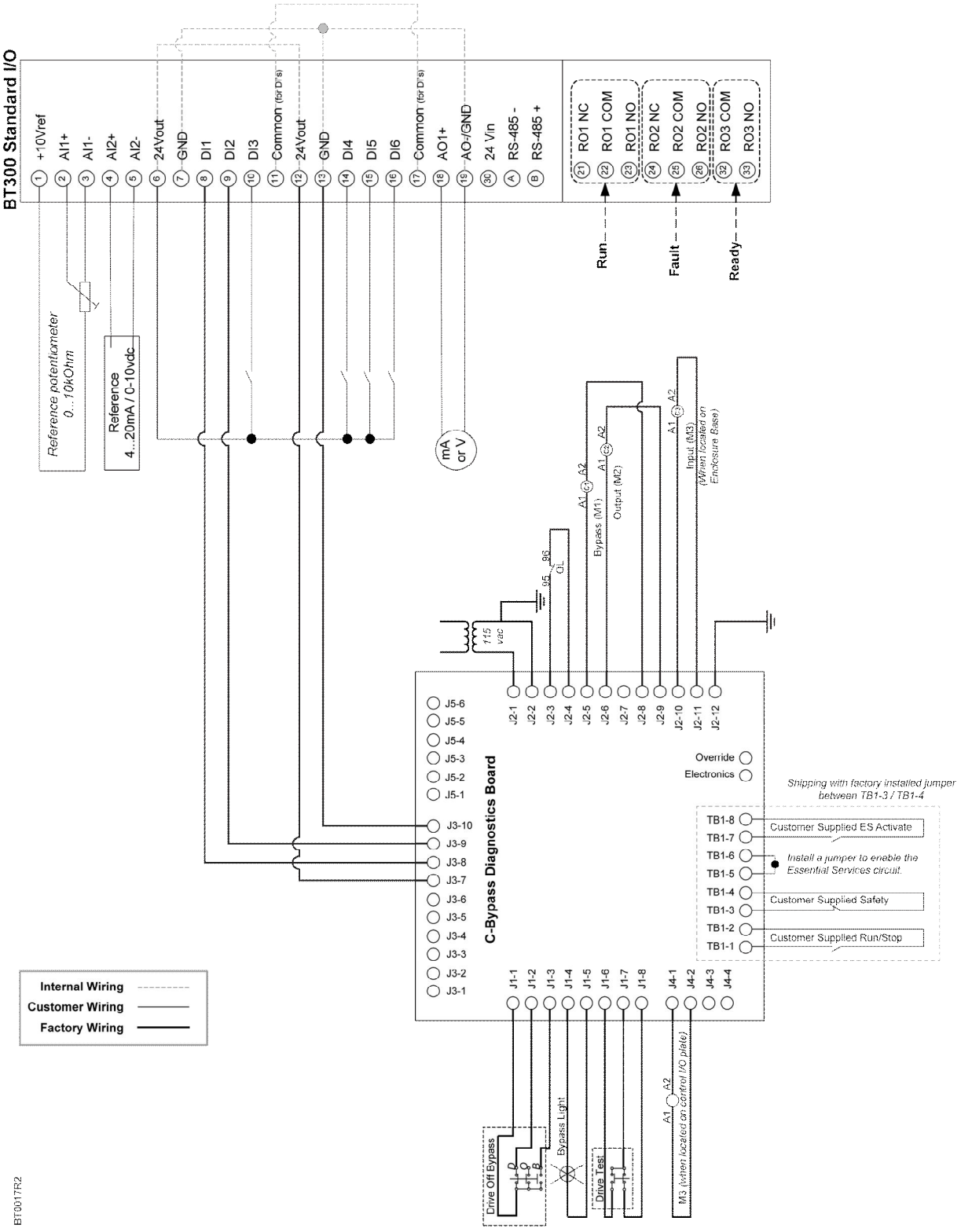


Figure 4: Conventional Bypass Drive Terminations.

Motor Rotation Correction Wiring

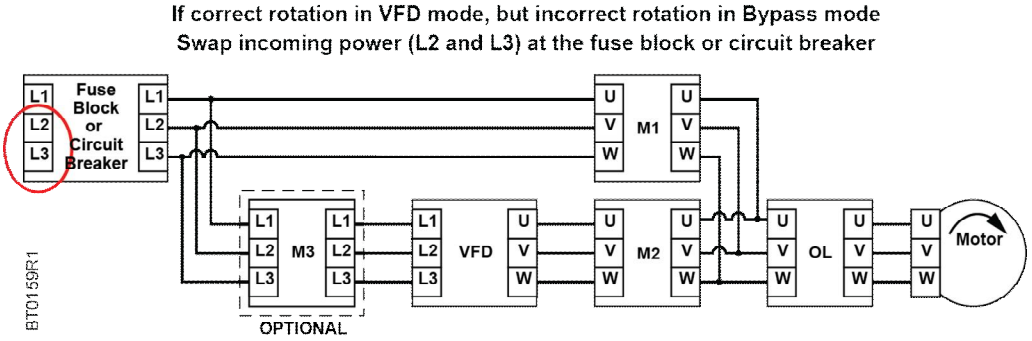


Figure 5: Rotation Correction - VFD Correct, Bypass Reversed.

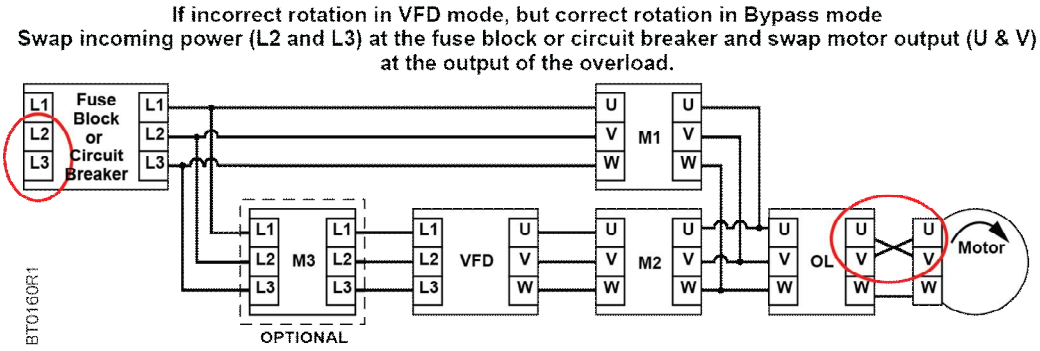


Figure 6: Rotation Correction - VFD Reversed, Bypass Correct.

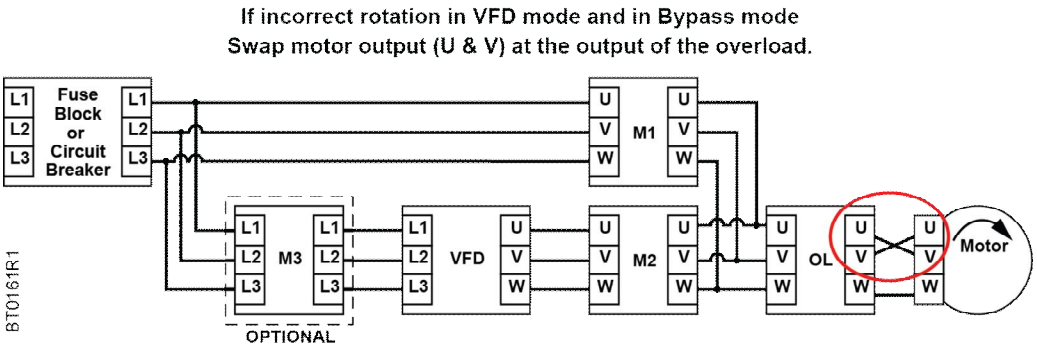


Figure 7: Rotation Correction - VFD Reversed, Bypass Reversed.

Operation (Electronic Bypass Only)

The drive powers up in Drive mode. In this mode the drive can be controlled normally from Auto or Hand control place. In the Drive mode the **Bypass running** relay output signal is off and the drive's output contactor is energized by closing the relay RO2 on OPT-B5 board. Bypass contactor is open. A relay output signal **Drive active** is on when the drive is in Drive mode.

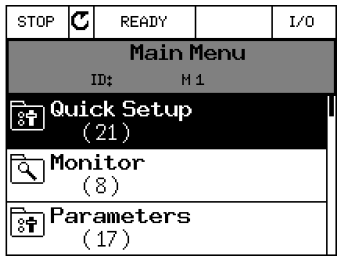
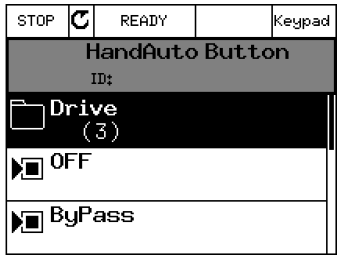
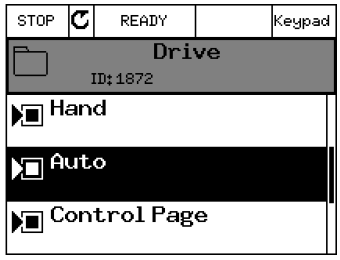
The Drive mode can be entered from the Bypass mode by pressing the **Hand/Auto** button and selecting either **Hand** or **Auto** behind the **Drive** menu.

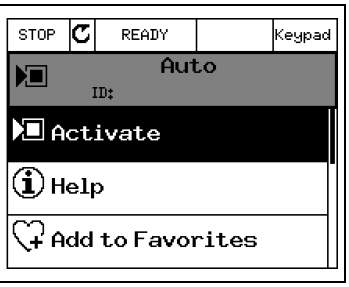
Mode of operation is the same in both the conventional and electronic bypasses. However, there are different methods for determining the modes. The procedures in this section are used to change operational modes.

Drive Mode – Auto

Auto mode is the default mode of operation.

- This mode is used when the drive is to have control of the motor, and the drive is being used with an automation system.
- In Auto mode, the Bypass (M1) contactor is opened and the Output (M2) contactor is closed.

1.	At the drive keypad, press the **Hand/Auto** Hand Auto button.	
2.	Use the **Up** and/or **Down Arrow** buttons to highlight **Drive**, and then press **OK** OK.	
3.	Use the **Up** and/or **Down Arrow** buttons to highlight **Auto**, and then press **OK** OK.	

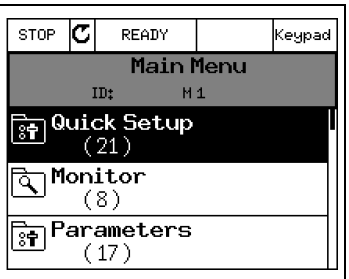
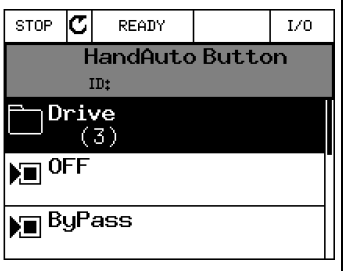
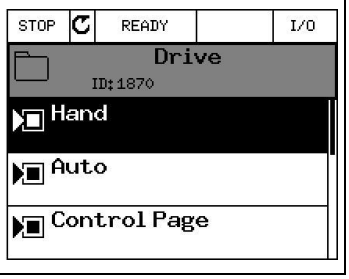
4.	Use the **Up** and/or **Down Arrow** buttons to highlight **Activate**, and then press **OK**.	

The unit is now operating in the Drive mode using I/O or Fieldbus control. The display will return to the default display.

Drive Mode – Hand

Hand mode is used when you want to override the automation system and run the drive in keypad mode.

- You have full control to start/stop the motor, and what the speed reference is from the keypad directly.
- In Hand mode, the Bypass (M1) contactor is opened and the Output (M2) contactor is closed.

1.	At the drive keypad, press the **Hand/Auto** button.	
2.	Use the **Up** and/or **Down Arrow** buttons to highlight **Drive**, and then press **OK**.	
3.	Use the **Up** and/or **Down Arrow** buttons to highlight **Hand**, and then press **OK**.	

4.	Use the **Up** and/or **Down Arrow** buttons to highlight **Activate**, and then press **OK**.	

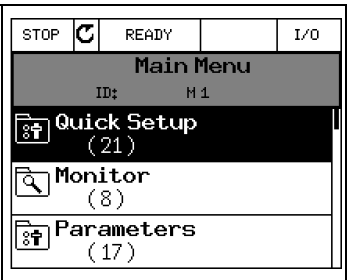
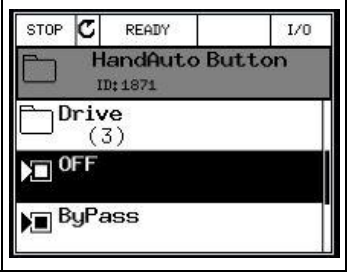
The unit is now operating in Hand mode. The following table outlines the buttons you can use to control the drive.

Button Icon	Button Name	Description
	Start	Start the drive.
	Stop	Stop the drive.
	Up and Down Arrows	Set the desired frequency (changes are immediate).
	OK Button	Once the frequency is set to the desired value, press **OK** to lock the setting.

OFF Mode

OFF mode is used when the operator you want to override the automation system and not allow the motor to run. For example, you want to change filters in an air handling unit and wants to turn the unit off for entry into the system.

In OFF mode, both the Bypass (M1) and the Output (M2) contactors are open to prevent power from getting to the motor.

1.	At the drive keypad, press the **Hand/Auto** Hand Auto button.	
2.	Use the **Up** and/or **Down Arrow** buttons to highlight **Off**, and then press **OK**.	

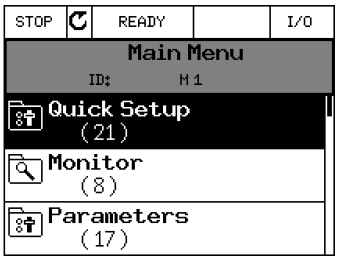
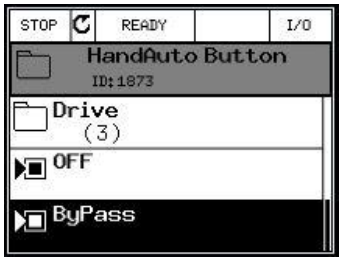
3.	Use the **Up** and/or **Down Arrow** buttons to highlight **Activate**, and then press **OK**.	

The unit is now off. It is not being controlled by the drive or the bypass. The motor will not spin. The display will return to the default display.

Bypass Mode

Bypass mode is used when you want to override the automation system, and have the motor run directly from line voltage at full speed.

This mode would be used when the drive malfunctions and you need the system to run regardless of energy savings.

1.	At the drive keypad, press the **Hand/Auto** button.	
2.	Use the **Up** and/or **Down Arrow** buttons to highlight **Bypass**, and then press **OK**.	
3.	Use the **Up** and/or **Down Arrow** buttons to highlight **Activate**, and then press **OK**.	

The unit is now operating in the Bypass mode. Line supply power is directly supplied to the motor. No speed control is available in this mode. The display will return to the default display.

Bypass-Specific Parameters

The Bypass settings can only be accessed if **Bypass** (P3.17.4) is set to **Electronic**. The best way to set this parameter is by executing the **Bypass Wizard** (P1.21). The bypass settings contain specific information about the Electronic Bypass configuration. These settings are presented in the following table:

Table 3: Bypass Settings.

Structure	Parameter	Unit	Min	Max	Default	ID	Description
P3.18.1	Bypass Delay	s	1	30	1	1818	Defines the time from when the bypass is activated until the **M1** (bypass) contactor is pulled in, and the motor begins to spin.
P3.18.2	AutoBypass	N/A	Disabled	Enabled	Disabled	1813	Enable parameter to the **Auto Bypass** feature. If enabled, when a selected fault (as defined by **AutoByp Faults** [P3.18.3]) occurs, and the amount of time defined in **AutoBypass Delay** (P3.18.4) has passed, the unit automatically switches to Bypass mode of operation. The **M2** (Output) contactor opens, the **M1** (Bypass) contactor closes, and line voltage connects directly to the motor. The motor spins at full speed.
P3.18.3	AutoByp Faults	N/A	N/A	N/A	N/A	1812	Defines the authorized faults for the Auto Bypass feature to activate.
P3.18.4	AutoBypass Delay	s	1	30	1	1817	Defines the delay time from when the drive faults and the bypass is enabled.
P3.18.5	EssentServEnable	N/A	Disabled	Enabled	Disabled	1826	Enable parameter to the **Essential Services** feature. If enabled, when activated by **Essential Services** (P3.5.1.52), an **Essential Services Fault** (83) displays. This is a version of Fire mode that uses bypass instead of the drive for controlling the motor. The unit will automatically switch to Bypass mode of operation. The **M2** (Output) contactor will be opened, the **M1** (Bypass) contactor will be closed, and line voltage will be connected directly to the motor. Motor spins at full speed.
P3.18.6	RemoteBypEnable	N/A	Disabled	Enabled	Disabled	1828	Enable parameter to the **Remote Bypass** feature. If enabled, when the unit is placed in Bypass mode, the **M1** (Bypass) contactor opens/closes in accordance with **Rem. Ctrl. Place** (P3.2.1).

Application Features (Electronic Bypass Only)

During the bypass wizard execution, if the unit is defined to have the Electronic Siemens BT300 Bypass, then the application features can be enabled.

When the Electronic Bypass is enabled in the drive, digital inputs and relay outputs are configured automatically as listed below. The Electronic Bypass is enabled by setting the **Bypass** parameter to **Electronic** value. If the Bypass option is disabled, digital inputs and outputs are set back to factory settings.

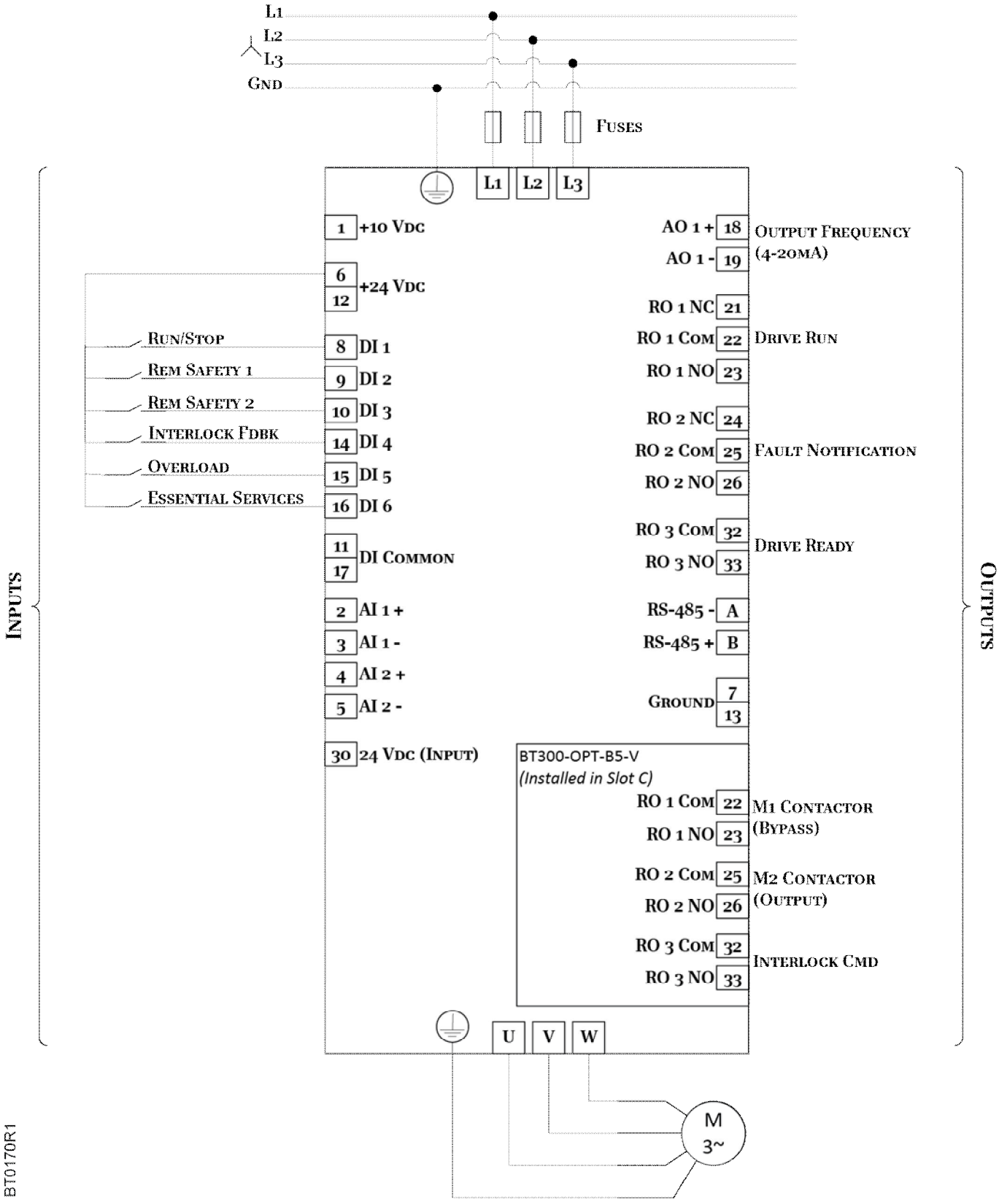


Figure 8: Electronic Bypass Terminations.

Standard I/O Assigned for Bypass

Digital Input 1: Customer Supplied Run/Stop.

Digital Input 2: Remote Safety No. 1.

Digital Input 3: Remote Safety No. 2.

Digital Input 4: Interlock Feedback (if the interlock function is enabled).

Digital Input 5: Overload.

Digital Input 6: Essential Services Activation (if the essential services function is enabled).

Relay Output 1: Run (default value, no change for bypass option).

Relay Output 2: Fault (default value, no change for bypass option).

Relay Output 3: Ready (default value, no change for bypass option).

Additional I/O Assigned for Bypass (OPT-B5)

OPT-B5, Relay Output 1: Bypass contactor control (M1).

OPT-B5, Relay Output 2: Output contactor control (M2).

OPT-B5, Relay Output 3: Damper logic control (if the interlock function is enabled).

NOTE:
The OPT-B5 option card may be installed in any of the three I/O card slots. However, if more than one OPT-B5 card is installed, the card in the lowest lettered slot is assigned to the bypass I/O.

Remote safety No. 1 and No. 2: These inputs trigger a fault on the drive and also open Bypass contactor (**M1**) and Drive output contactor (**M2**).

Interlock start: Feedback signal from a damper or other external actuator. If interlock start functionality is enabled, this input needs to be on in order to start the drive. Interlock start functionality can be activated with a parameter. This digital input is configured by using Drive's existing Run Interlock 1 digital input signal (**P1.3.5.1.12, ID: 1041**).

Remote start: Start command when the Drive is in IO control. When Bypass is active this input is used to close the Bypass contactor if the functionality has been activated with Remote Bypass Enable parameter and the start command source for Auto has been selected as I/O. This digital input is configured by using the drive's existing Ctrl Signal 1A digital input signal **(P1.3.5.1.1, ID: 403**).

Overload trigger: Feedback from an overload relay. Triggerss a fault on the drive and opens a bypass contactor.

Essential services: This input is not automatically configured when the electronic bypass is enabled. If the essential services function is enabled through the **Essential Services Enable** parameter, Digital Input 6 is configured for the function.

- When this input is on, the drive is forced into bypass mode, the drive contactor (**M2**) is opened, and the bypass contactor (**M1**) is closed.
- Essential services functionality must be enabled through the Bypass Wizard or with a separate parameter.
  - When the essential services function is active, all the other commands and safeties, for example Overload, are blocked.
  - If interlock logic is enabled and the essential services function is activated, the bypass contactor (**M1**) closes after ten seconds if the feedback signal is not received from the damper.

Manual Bypass Delay (P3.18.1, ID: 1818)

This parameter defines the delay when switching between Bypass and Drive manually.

Range: 1.0 to 30.0s,

Default: 1.0s (as soon as possible).

Auto Bypass

If the Bypass Wizard was used to configure the Siemens BT300 Bypass and the Auto Bypass feature was enabled, then all required settings are automatically programmed. The Bypass Wizard can be executed again to disable the Auto Bypass feature, if desired.

The *Auto Bypass* feature enables the BT300 Drive to automatically initiate bypass operation when a drive fault occurs.

The following occurs when Auto Bypass is initiated:

1. The BT300 Drive stops delivering power to the output.
2. The output contactor (M2) opens.
3. The bypass contactor (M1) closes.

NOTE:
1. All safety conditions must be met for bypass mode operation.
2. The Electronic Siemens BT300 Bypass returns to VFD mode of operation as soon as the BT300 Drive relay output 2 (drive fault) opens.

Auto Bypass Enable (P3.18.2, ID: 1813)

This parameter defines whether or not the Automatic bypass functionality is activated. When Auto bypass is enabled, flying start is automatically enabled.

0 = Disabled (Default)

1 = Enabled

Auto Bypass Faults (P3.18.3, ID: 1812)

This parameter defines the faults that will cause the drive to be bypassed automatically. One or more check boxes can be selected.

0 = Any fault (Default)

1 = Under-voltage

2 = Over-voltage

4 = Over-current

8 = Analog input low

16 = Unit temperature

32 = Motor Over temperature

64 = External fault

128 = Underload

Auto Bypass Delay (P3.18.4, ID: 1817)

This parameter defines the delay between an active fault and switching to the Bypass. The message `Going to Bypass mode` displays on the keypad during the delay time.

Range: 1.0 to 30.0s,

Default: 1.0s (as soon as possible)

Essential Services

If the Bypass Wizard was used to configure the Siemens BT300 Bypass and the Essential Services feature was enabled, then all required settings will be automatically programmed. The Bypass Wizard can be executed again to disable the Essential Services feature, if desired.

The *Essential Services* feature allows full-power bypass mode control of the motor during an emergency scenario. Activation of essential services overrides any other selected operation. Essential Services ensures that the bypass contactor will not open when a safety input or overload opens. Input line power goes directly to the motor.

- If using both the Interlock and Essential Services features, Essential Services waits ten seconds for the interlock to confirm the safety condition, such as opening a damper. After the ten-second delay, Essential Services controls the motor regardless of the interlock safety condition status.
- Use extreme care when using the Essentials Services mode. All safety circuits are deactivated (including motor overload and safety inputs).

Any time the Essential Services feature is enabled, the Remote Safety on the Relay/Diagnostic board (pins 3 and 4) in the bypass enclosure must have a closed contact or jumper permanently connected. It is recommended that all safety circuits be connected to the I/O terminal strip on the drive controller board or on an I/O option board terminal strip.

Essential Services Enable (P3.18.5)

This parameter defines whether or not the Essential Service functionality is activated.

0 = Disabled (Default)

1 = Enabled

Essential Services Digital Input Configuration: (P3.5.1.52, ID: 1827)

This parameter lets you select a digital input terminal for the Essential services signal. When this feature in enabled, **DigIn SlotA.6** is used by default.

Example BT300 Drive Settings

If the Bypass Wizard was used to configure the Siemens BT300 Bypass and the Essential Services feature was enabled, then all required settings are automatically programmed. The Bypass Wizard can be executed again to enable the Essential Services feature, if desired.

Interlock

If the Bypass Wizard was used to configure the Siemens BT300 Bypass and the Interlock feature was enabled, then all required settings will be automatically programmed. The Bypass Wizard can be executed again to enable the Interlock feature, if desired.

The *Interlock* feature (also known as *damper end switch logic*) enables the BT300 Drive outputs to inhibit motor start until a safety condition (proofing sequence) is confirmed.

Any call to start the motor from the BT300 Drive or bypass does not directly start the motor, but instead initiates the following interlock procedure:

- When in VFD or Bypass mode, any call to start the motor in VFD or bypass mode energizes the BT300 Drive. Relay Output 1 closes and is used to supply power to an external device such as a damper actuator.
- When control of the external device is satisfied, it must supply a contact closure to digital input ## (Interlock Start 1). The motor then starts in the selected mode.

Remote Bypass

If the Bypass Wizard was used to configure the Siemens BT300 Bypass and the Remote Bypass feature was enabled, then all required settings are automatically programmed. The Bypass Wizard can be executed again to disable the Remote Bypass feature, if desired.

Remote Bypass Enable (P3.18.6, ID: 1828)

This parameter defines if the Remote Bypass functionality is enabled.

- If Remote Bypass is enabled, the Bypass start command is given through digital input or Fieldbus Control Word, when the drive is in Bypass mode. The Start command source depends on the parameter P3.2.1 (Ctrl Place Auto).
- If Remote Bypass is disabled, the start command is given from keypad.

0 = Disabled

1 = Enabled

Troubleshooting

Bypass-Specific Fault Codes

Table 4: Fault Codes.

Fault Code	Fault ID	Fault Name	Possible Cause	Possible Remedy
80	1080	Remote Safety 1	Digital input contact closure is missing.	Verify the status of the digital input as defined by **Remote Safety 1** (P3.5.1.44).
	1180	Remote Safety 2	N/A	If not in use, set to a value of **DigIN Slot0.2**.
	1280	Remote Safety 3	N/A	Verify the status of the digital input as defined by **Remote Safety 2** (P3.5.1.45).
	1380	Remote Safety 4	N/A	If not in use, set to a value of **DigIN Slot0.2**.
	1480	Remote Safety 5	N/A	Verify the status of the digital input as defined by **Remote Safety 3** (P3.5.1.46).
	1580	Remote Safety 6	N/A	If not in use, set to a value of **DigIN Slot0.2**.
	1680	Remote Safety 7	N/A	Verify the status of the digital input as defined by **Remote Safety 4** (P3.5.1.47).
	1780	Remote Safety 8	N/A	If not in use, set to a value of **DigIN Slot0.2**.
81	1081	Overload	Overload relay located in bypass cabinet has triggered.	Verify the status of the digital input as defined by **Remote Safety 5** (P3.5.1.48).
82	1082	Bypass Not Possible	The BT300-OPT-B5-V option board is missing, and **Bypass** (P3.17.4) is set to **Electronic**.	If not in use, set to a value of **DigIN Slot0.2**.

General Bypass

Problem Description	Possible Cause
Contactors do not close.	• Main input circuit protection has opened. • Control power fuse has opened. • Safety circuit is open. • Motor overload must be reset. • Loose control wire connection.
Main input fuses blow when the motor is run in bypass.	The short circuit protection supplied by the factory is approximately 1.5 times the NEC listed motor current rating. Some applications and motor characteristics may require up-sizing this protection. If this is required in the field, ensure that there is an appropriate match between the types of fuses and rating with the fuse holder.

Problem Description	Possible Cause
Drive does not start on closing of the run command.	• The Siemens BT300 Bypass is not in Drive - Auto Mode. • Drive output contactor is not closed. • Remote contact is not closed. Replace with jumper to verify. • Run relay has failed. • Loose control wire connection. • The BT300 Drive Digital Input 1 is not programmed properly.

Diagnostic Test Points

The diagnostic board provides a centralized location for diagnostics troubleshooting. The test points on this board make it easier to troubleshoot the bypass components.

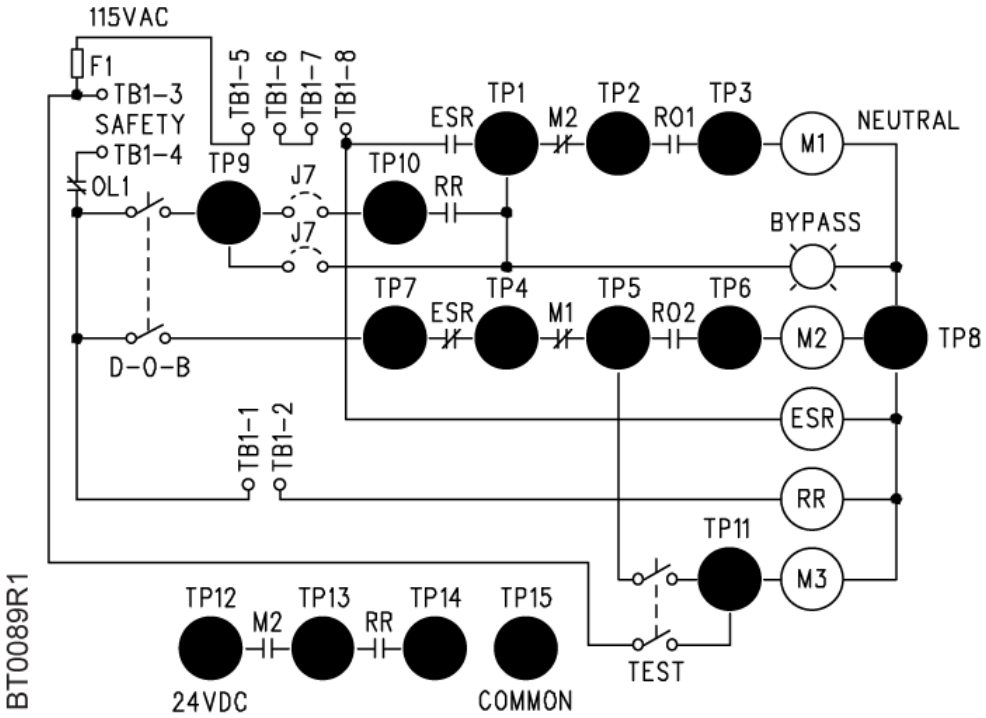


Figure 9: Diagnostic Test Points.

Electronic Bypass Diagnostic Board

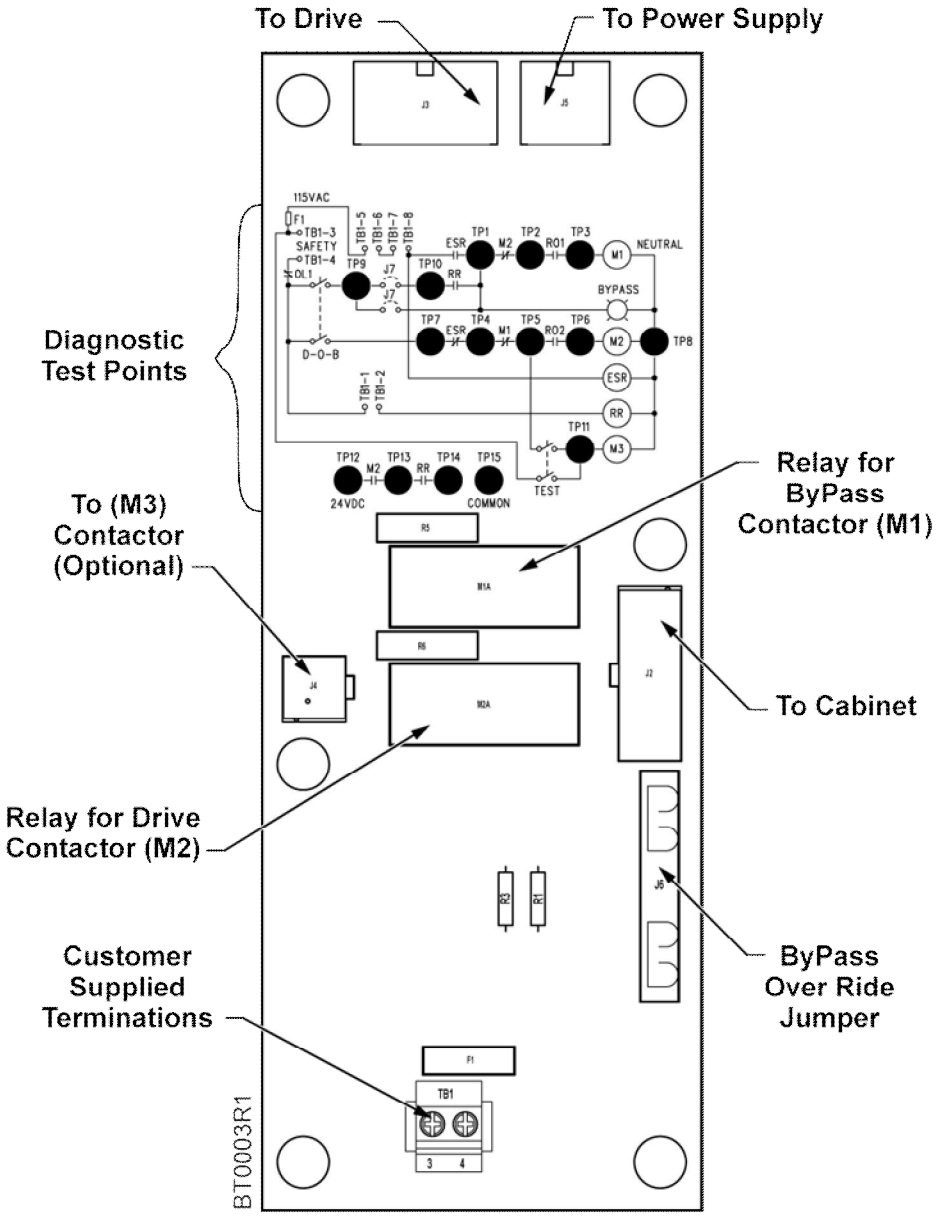


Figure 10: Electronic Bypass Diagnostic Board.

Table 5: Expected Voltages, Electronic Bypass Diagnostic Test Points.

Test Point	Reference	Expected Voltage			Description
		Drive	Off	Bypass/ Essential Services	
TP1	TP8	115 Vac	115 Vac	115 Vac	Point between OL1 term 96 and M2A-B terminal 3.
TP2	TP8	0 Vac	115 Vac	115 Vac	Point between M2A-B terminal 2 and Drive OPT-B5 card terminal 22.
TP3	TP8	0 Vac	0 Vac	115 Vac	Drive OPT-B5 card terminal 23 (M1 coil power).
TP4	TP8	115 Vac	115 Vac	115 Vac	Point between OL1 terminal 96 and M1A-B terminal 3.
TP5	TP8	115 Vac	115 Vac	0 Vac	Point between M1A-B terminal M2 and Drive OPT-B5 card terminal 25.
TP6	TP8	115 Vac	0 Vac	0 Vac	Drive OPT-B5 card terminal 26 (M2 coil power).
TP7	TP8	–	–	–	Not used.
TP8	TP8	0 Vac	0 Vac	0 Vac	Vac Neutral.
TP9	TP8	–	–	–	Not used.
TP10	TP8	–	–	–	Not used.
TP11	TP8	–	–	–	Not used.
TP12	TP15	–	–	–	Not used.
TP13	TP15	–	–	–	Not used.
TP14	TP15	–	–	–	Not used.
TP15	TP15	–	–	–	Not used.

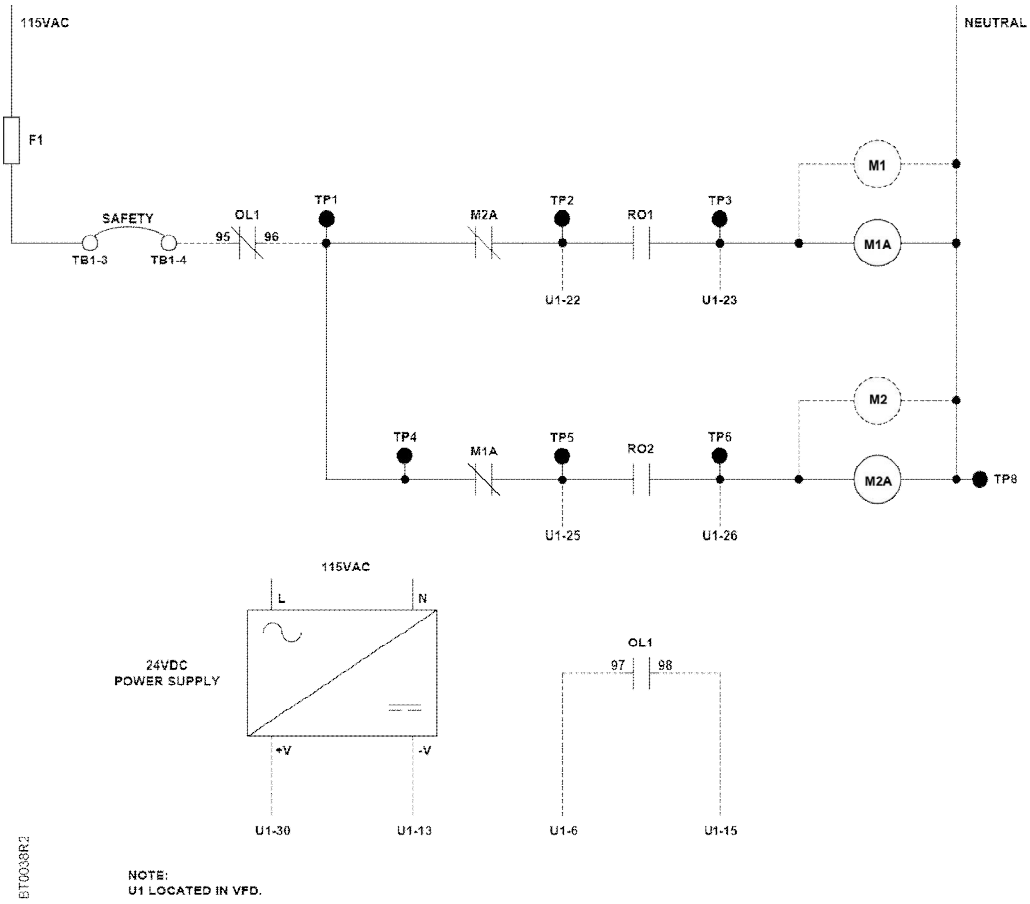


Figure 11: Electronic Bypass Relay/Diagnostic Board Terminations.

Conventional Bypass Diagnostic Board

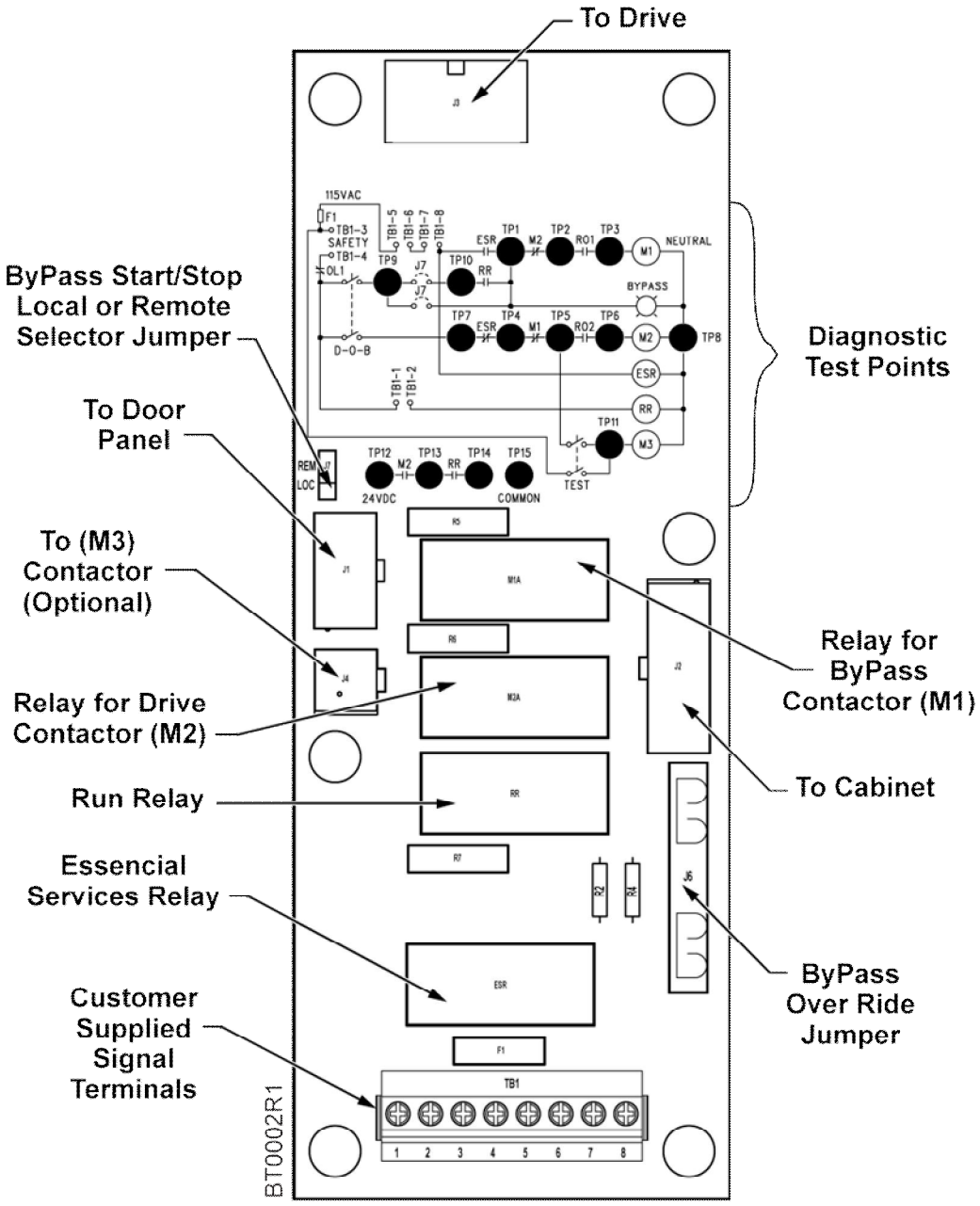


Figure 12: Conventional Bypass Diagnostic Board.

Table 6: Expected Voltages, Conventional Bypass Diagnostic Test Points.

Test Point	Reference	Drive	Off	Bypass	Essential Services	Description
TP1	TP8	0 Vac	0 Vac	115 Vac	115 Vac	Point between ESR-B terminal 4 and M2A-B terminal 3.
TP2	TP8	0 Vac	0 Vac	115 Vac	115 Vac	M1 coil power.
TP3	TP8	0 Vac	0 Vac	115 Vac	115 Vac	M1 coil power.
TP4	TP8	115 Vac	0 Vac	0 Vac	0 Vac	Point between ESR-C terminal 7 and M1A-B terminal 3.
TP5	TP8	115 Vac	0 Vac	0 Vac	0 Vac	M2 coil power.
TP6	TP8	115 Vac	0 Vac	0 Vac	0 Vac	M2 coil power.
TP7	TP8	115 Vac	0 Vac	0 Vac	0 Vac	Point between BOD switch 'Drive' position and ESR-C terminal 6.
TP8	TP8	0 Vac	0 Vac	0 Vac	0 Vac	Vac Neutral.
TP9	TP8	0 Vac	0 Vac	115 Vac	115 Vac (REM) 0 Vac (LOC)	Point between BOD switch 'Bypass' position and LOC/REM jumper.
TP10	TP8	0 Vac	0 Vac	115 Vac (REM) 0 Vac (LOC)	0 Vac	Point between REM jumper and RR-B terminal 3.
TP11	TP8	115 Vac (w/ M3) 0 Vac (No M3)	115 Vac (Test) 0 Vac (Off)	115 Vac (Test) 0 Vac (Off)	115 Vac (Test) 0 Vac (Off)	Point between Test Switch 'Off' position and M3 coil (M3 coil power).
TP12	TP15	24 Vdc	24 Vdc	24 Vdc	24 Vdc	24 Vdc from drive standard I/O terminal 6.
TP13	TP15	24 Vdc (On) 0 Vdc (Off)	0 Vdc	0 Vdc	0 Vdc	Drive standard I/O terminal 9 (DI2 - Drive Contactor (M2) Interlock).
TP14	TP15	24 Vdc (On) 0 Vdc (Off)	0 Vdc	0 Vdc	0 Vdc	Drive standard I/O terminal 8 (DI1 - I/O Start) DI2 must be ON before DI1 can be ON.
TP15	TP15	0 Vdc	0 Vdc	0 Vdc	0 Vdc	Vdc Common from drive standard I/O terminal 13.

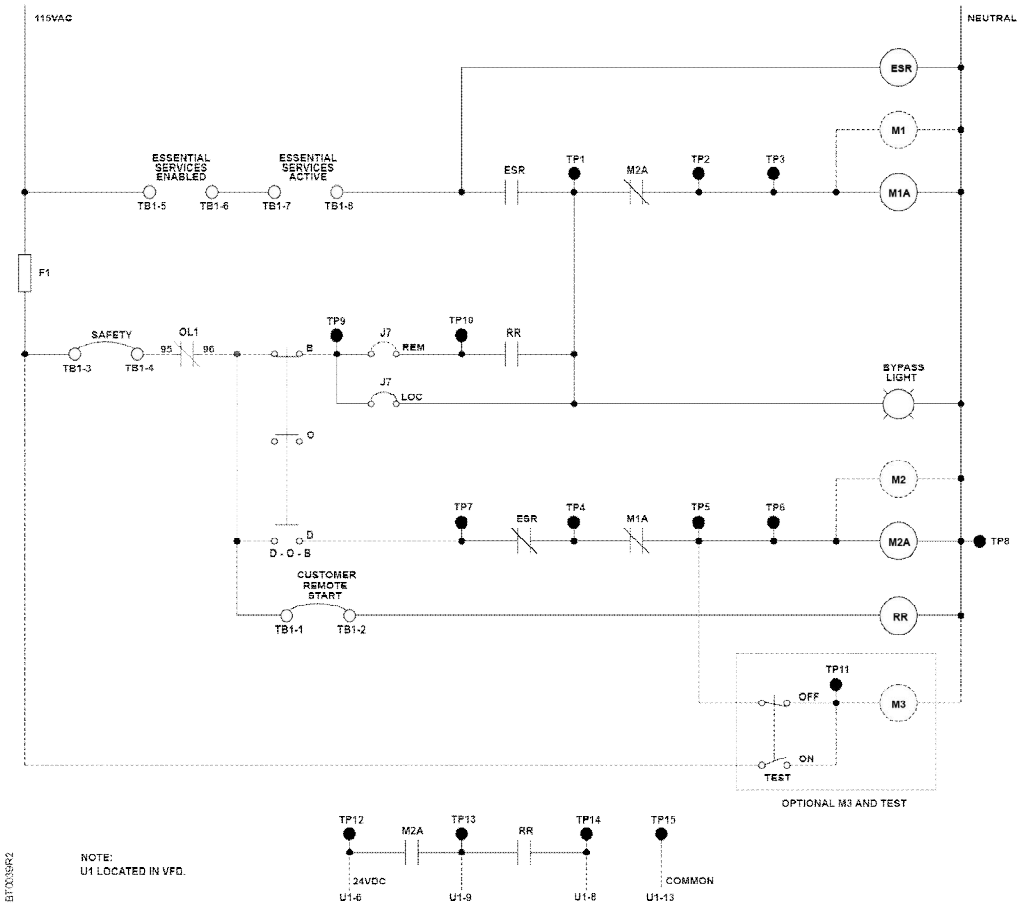
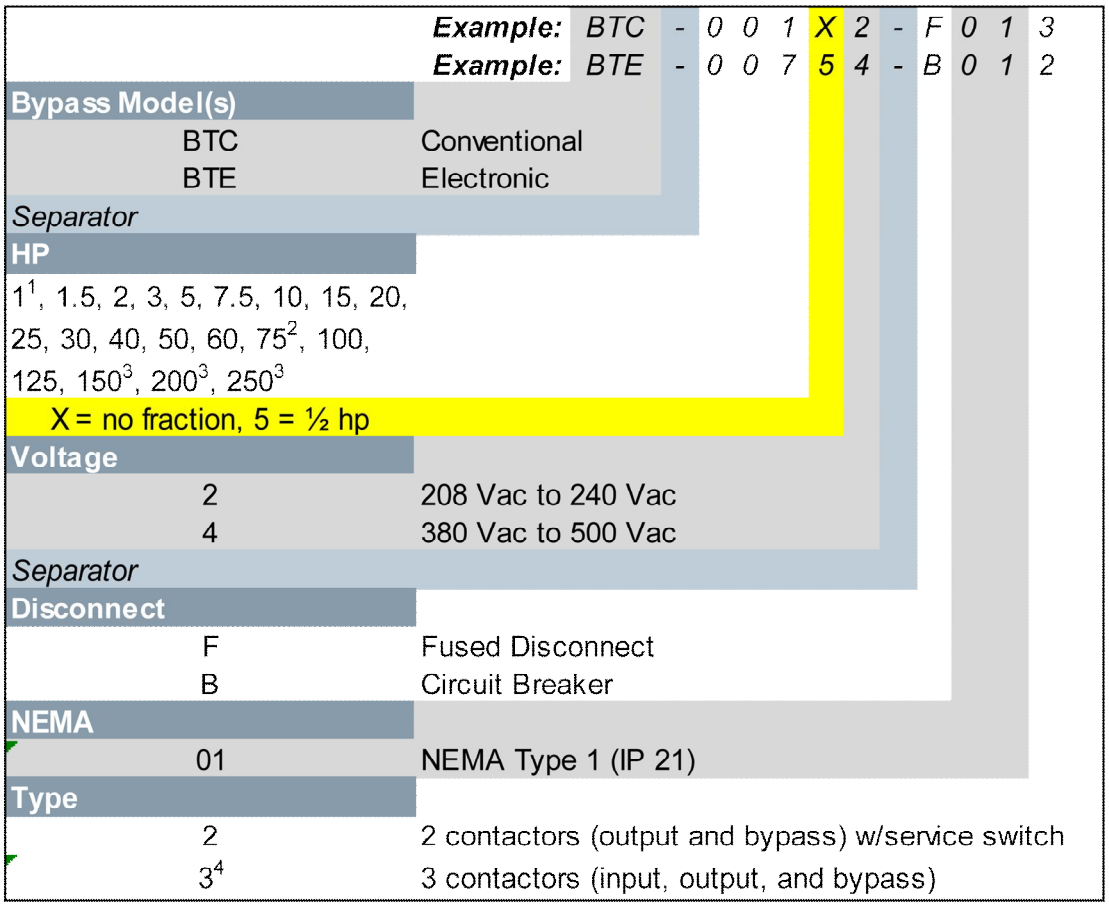


Figure 13: Conventional Bypass Relay/Diagnostic Board Terminations.

Technical Information

Product Numbers



[1] *Available only with voltage code 2.*

[2] *Use with voltages equal to or greater than 230 Vac.*

[3] *Available only with voltage code 4.*

[4] *Available only with BTC models.*

Example Product Numbers:

BTC-001X2-F013

Conventional Bypass, 1 HP, 208-240 Vac, Fused Disconnect, NEMA Type 1, with 3 contactors

BTE-00754-B012

Electronic Bypass, 7.5 HP, 380-500 Vac, Circuit Breaker, NEMA Type 1, with 2 contactors and service switch.

Power Ratings

The following chart shows the BT300 HVAC Drive power ratings in accordance with frame sizes:

		Voltage							
		208-240	380-500	208-240	380-500	208-240	380-500	208-240	380-500
HP	kW	Frame Size		Input Current		Output Current		10% OL Current	
1	0.75	4		4.2		4.8		5.3	
1.5	1.1		4	6.0	3.4	6.7	3.4	7.4	3.7
2	1.5			7.2	4.6	8.0	4.8	8.8	5.3
3	2.2			9.7	5.4	11.0	5.6	12.1	6.2
5	4	5		16.1	9.3	18.0	9.6	19.8	10.6
7.5	5.5			21.7	11.3	24.2	12.0	26.6	13.2
10	7.5		5	27.7	15.4	31.0	16.0	34.1	17.6
15	11	6		43.8	21.3	48.0	23.0	52.8	25.3
20	15			57.0	28.4	62.0	31.0	68.2	34.1
25	18.5	7	6	69.0	36.7	75.0	38.0	82.5	41.8
30	22			82.1	43.6	88.0	46.0	96.8	50.6
40	30			99.0	58.2	105.0	61.0	115.5	67.1
50	37	8	7	135.1	67.5	143.0	72.0	157.3	79.2
60	45			162.0	85.3	170.0	87.0	187.0	95.7
75*	55			200.0	100.6	208.0	105.0	228.8	115.5
100*	75	9	8	253.0	139.4	261.0	140.0	287.1	154.0
125*	90			301.0	166.5	310.0	170.0	341.0	187.0
150	110				199.6		205.0		225.5
200	132		9		258.0		261.0		287.1
250	160				303.0		310.0		341.0

BT0167R1

** For use with 230 Vac and above.*

Technical Data

Table 7: Drive Specifications.

Specification	Description
Input Voltages and Power Ranges (3-phase)	208 to 240 Vac (-10% to +10%): 1 HP to 125 HP (0.75 kW to 90 kW) 4.2 amps to 301 amps 380 to 500 Vac (-10% to +10%): 1.5 HP to 250 HP (1.1 kW to 160 kW) 3.4 amps to 303 amps
Short circuit withstand rating	Disconnect with fuses - 100,000 AIC

Specification	Description
	Circuit Breaker - 65,000 AIC @ 208/240 Vac 18,000 AIC @ 480 Vac
Frequency Reference Analog Input Keypad	Resolution 0.01 to 0.1% (10 bit), accuracy ±1% Resolution 0.01 Hz
Ambient Operating Temperature	14°F (-10°C) (no frost) to 104°F (40°C) up to 122°F (50°C) with derating
Storage Temperature	-40°F (-40°C) (no frost) to 158°F (70°C)
Relative Humidity	0 to 95% rh, non-condensing, non-corrosive
Air quality: Chemical vapors Mechanical particles	IEC 60068-2-60 (H_2S [hydrogen sulfide] and SO_2 [sulfur dioxide]). IEC 60721-3-3, unit in operation, class 3C2 IEC 60721-3-3, unit in operation, class 3S3.
Altitude	100% load capacity (no-derating) up to 3,280 ft (1,000 m) -1% derating for each 328 ft (100 m) above 3,280 ft (1,000 m) **Maximum altitude:** 208 to 240 Vac: 13,123 ft (4,000 m) 380 to 500 Vac: 13,123 ft (4,000 m) **Voltage for relay outputs:** 240 Vac: ≤ 9,842 ft (3,000 m) 120 Vac: ≤ 13,123 ft (4,000 m) **Corner-grounding (380 to 500 Vac systems only):** ≤ 6,562 ft (2,000 m)
Vibration	EN61800-5-1 EN60068-2-6
Seismic	2012 International Building Code (IBC); OSHPD
Shock	EN61800-5-1 EN60068-2-27
Enclosure Class	UL Type 1/IP 21 standard in entire HP/kW range.
Agency Approvals/Conformity	UL 508C; UL; cUL; CE; RoHS compliant; EN61800-5-1 (2007), BTL; and OSHPD
Country Of Origin (COO)	United States of America
Control I/O: (Programmable) Analog Inputs Analog Outputs Digital Inputs Relay Outputs	2 - Voltage (0/2 to 10 Vdc) or current (0/4 to 20 mA) Resolution 0.1%; Accuracy ±1% 1 - Voltage (0/2 to 10 Vdc) or current (0/4 to 20 mA) <500 W; Resolution 0.1%; Accuracy ±1% 6 - Programmable and isolated Positive or Negative logic; 5 kW; 0 to 5 Vdc = **0**; 15 to 30 Vdc = **1** 2 - Form C and 2 Normally Open (programmable) 24 Vdc @ 8A; 250 Vac @ 8A; 125 Vac @ 0.4A
Auxiliary input	24 Vdc ±10%, 250 mA
Auxiliary output	10 Vdc ±3%, 10 mA (short-circuit protected) 24 Vdc ±10%, 250 mA (short-circuit protected)
Embedded Protocols	RS-485: APOGEE P1, BACnet MS/TP, Modbus RTU, Metasys N2 Ethernet: BACnet IP, Modbus TCP

Specification	Description
Protection features	Under-voltage trip limit Over-voltage trip limit Ground fault protection Input (mains) supervision Motor phase supervision Over-current protection Unit over-temperature protection Motor overload protection Motor stall protection Motor underload protection Short-circuit protection of 10 Vdc and 24 Vdc reference voltages

Accessories and Replacement Parts

Table 8: BT300 HVAC Drive Accessories and Replacement Parts (Frame Size-Specific).

Accessory Description		Frame Size		
		4	5	6
NEMA 1 to NEMA 12 Upgrade	NEMA 12 Cover	BT300-CVR-54-FS4	BT300-CVR-54-FS5	BT300-CVR-54-FS6
	NEMA 12 Gland Plate	BT300-EDPLT-54-FS4	BT300-EDPLT-54-FS5	BT300-EDPLT-54-FS6
	Internal Fan (for s/n C1407xxxx and earlier)	BT300-INTFAN-FS4	BT300-INTFAN-FS5	BT300-INTFAN-FS6
	Internal Fan (for s/n C1408xxxx and later)	BT300-INTFAN-456-F	BT300-INTFAN-456-F	BT300-INTFAN-456-F
Accessories Kit		BT300-ACCKIT-FS4	BT300-ACCKIT-FS5	BT300-ACCKIT-FS6
EMC Filter Kit		BT300-EMCKIT-FS4	BT300-EMCKIT-FS5	BT300-EMCKIT-FS6
Flange Mount Kit		BT300-FLG-FS4	BT300-FLG-FS5	BT300-FLG-FS6
Main Fan (heatsink)		BT300-MFAN-FS4	BT300-MFAN-FS5	BT300-MFAN-FS6
NEMA 1 Cover		BT300-CVR-21-FS4	BT300-CVR-21-FS5	BT300-CVR-21-FS6
NEMA 1 Gland Plate		BT300-EDPLT-N1-FS4	BT300-EDPLT-N1-FS5	BT300-EDPLT-N1-FS6
Accessory Description		Frame Size		
		7	8	8
NEMA 1 to NEMA 12 Upgrade	NEMA 12 Cover	BT300-CVR-2154-FS7	BT300-CVR-2154-FS8	N/A
	NEMA 12 Gland Plate	N/A	N/A	N/A
	Internal Fan (for s/n C1407xxxx and earlier)	BT300-INTFAN-FS7	BT300-INTFAN-FS8	BT300-INTFAN-FS9
	Internal Fan (for s/n C1408xxxx and later)			

Accessories Kit	BT300-ACCKIT-FS7	BT300-ACCKIT-FS8	BT300-ACCKIT-FS9
EMC Filter Kit	BT300-EMCKIT-FS7	N/A	BT300-EMCKIT-FS9
Flange Mount Kit	BT300-FLG-FS7	N/A	N/A
Main Fan (heatsink)	BT300-MFAN-FS7	BT300-MFAN-FS8	BT300-MFAN-FS9
NEMA 1 Cover	BT300-CVR-2154-FS7	BT300-CVR-2154-FS8	N/A
NEMA 1 Gland Plate	N/A	N/A	N/A

Table 9: Accessories.

Part Number	Description
BT300-DIAGBD-BTC	Conventional Bypass Diagnostic Board
BT300-DIAGBD-BTE	Electronic Bypass Diagnostic Board
BTE-SW-KIT	Electronic Bypass Override Switch Kit

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