User’s Manual

E-Clipse Bypass Configurations (BCR, BDR, VCR, or VDR) for ACH550 Drives (1…400 HP)

ACH550 Drive Manuals

GENERAL MANUALS

ACH550-UH HVAC User's Manual (1…550 HP)

- Safety
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- Start-Up
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Input Disconnect Configurations (PC or PD) for ACH550 Drives (1…550 HP)

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E-Clipse Bypass Configurations (BCR, BDR, VCR or VDR) for ACH550 Drives (1…400 HP)

- Safety
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- Diagnostics
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Safety

WARNING! The ACH550 adjustable speed AC drive with E-Clipse Bypass should ONLY be installed by a qualified electrician.

WARNING! Even when the motor is stopped, dangerous voltage is present at the Power Circuit terminals U1, V1, W1 and U2, V2, W2 and, depending on the frame size, UDC+ and UDC-, or BRK+ and BRK-.

WARNING! Dangerous voltage is present when input power is connected. After disconnecting the supply, wait at least 5 minutes (to let the intermediate circuit capacitors discharge) before removing the cover.

WARNING! Even when power is removed from the input terminals of the ACH550, there may be dangerous voltage (from external sources) on the terminals of the relay outputs.

WARNING! When the control terminals of two or more drive units are connected in parallel, the auxiliary voltage for these control connections must be taken from a single source which can either be one of the units or an external supply.

WARNING! The ACH550 will start up automatically after an input voltage interruption if the external run command is on.

WARNING! When the ACH550 with E-Clipse Bypass is connected to the line power, the Motor Terminals T1, T2, and T3 are live even if the motor is not running. Do not make any connections when the ACH550 with E-Clipse Bypass is connected to the line. Disconnect and lock out power to the drive before servicing the drive. Failure to disconnect power may cause serious injury or death.

Note! For more technical information, contact the factory or your local ABB sales representative.

Use of Warnings and Notes

There are two types of safety instructions throughout this manual:

- Notes draw attention to a particular condition or fact, or give information on a subject.
- Warnings caution you about conditions which can result in serious injury or death and/or damage to the equipment. They also tell you how to avoid the danger. The warning symbols are used as follows:

Dangerous voltage warning warns of high voltage which can cause physical injury and/or damage to the equipment.

General warning warns about conditions, other than those caused by electricity, which can result in physical injury and/or damage to the equipment.

Table of Contents

Technical Data (Continued)

Installation

Study these installation instructions carefully before proceeding. **Failure to observe the warnings and instructions may cause a malfunction or personal hazard.**

WARNING! Before you begin read "Safety" on page 1.

WARNING! When the ACH550 with E-Clipse Bypass is connected to the line power, the Motor Terminals T1, T2, and T3 are live even if the motor is not running. Do not make any connections when the ACH550 with E-Clipse Bypass is connected to the line. Disconnect and lock out power to the drive before servicing the drive. Failure to disconnect power may cause serious injury or death.

Application

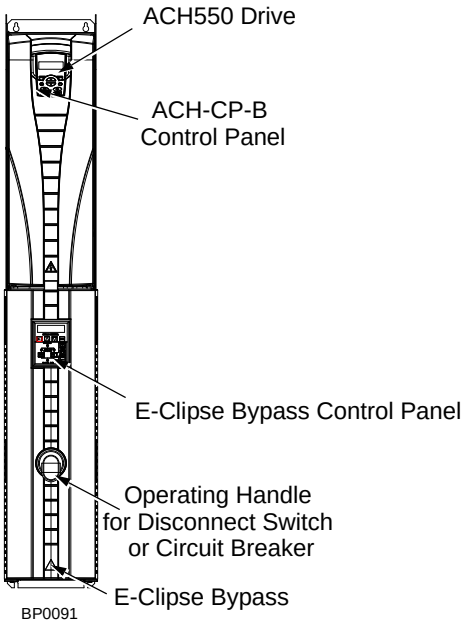
This manual is a supplement to the ACH550-UH User's Manual and documents E-Clipse Bypass configurations.

E-Clipse Bypass Features and Functions

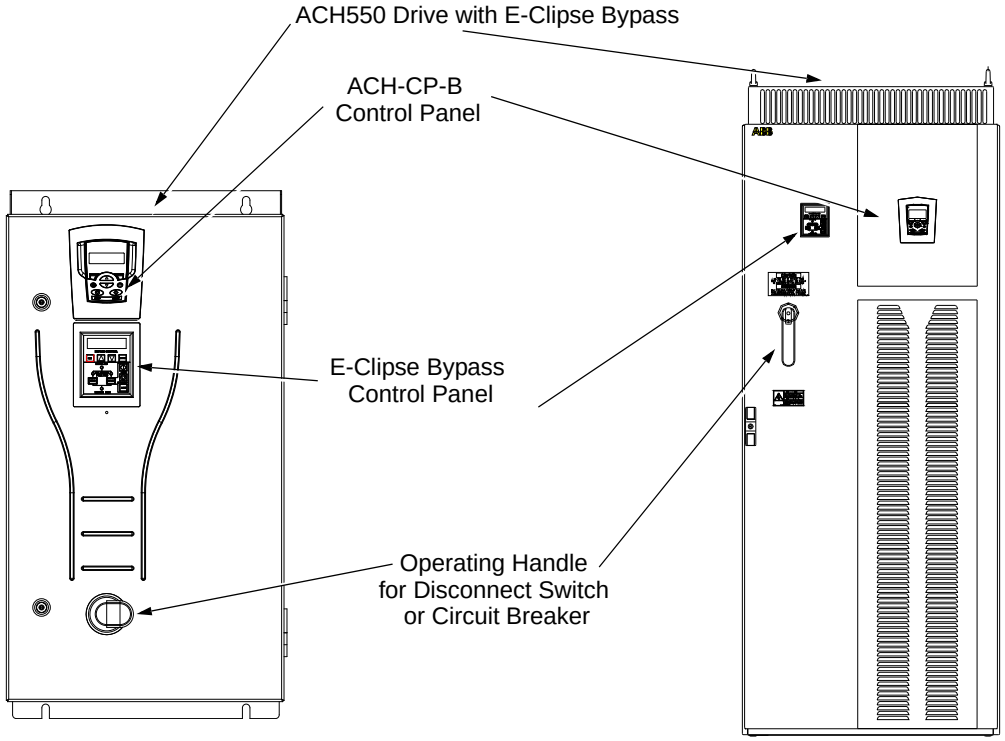
The ACH550 with E-Clipse Bypass is an ACH550 AC adjustable frequency drive in an integrated UL type 1, UL type 12 or UL type 3R package with a bypass motor starter. The ACH550 with E-Clipse Bypass provides:

- Disconnect switch or circuit breaker with door mounted control lever. The lever can be padlocked in the OFF position (padlock not supplied).
- Bypass starter.
- Motor overload protection.
- Local operator panel with indicating lights and multifunction display.
- Provisions for external control connections.
- Embedded communications for major BMS protocols including BACnet, Johnson Controls International N2, Siemens Building Technologies FLN, and Modbus
- Optional fieldbus adaptors for connection to additional BMS protocols including LonWorks and Ethernet
- Optional drive service switch (drive input disconnect), the functional equivalent of a three-contactor bypass arrangement.

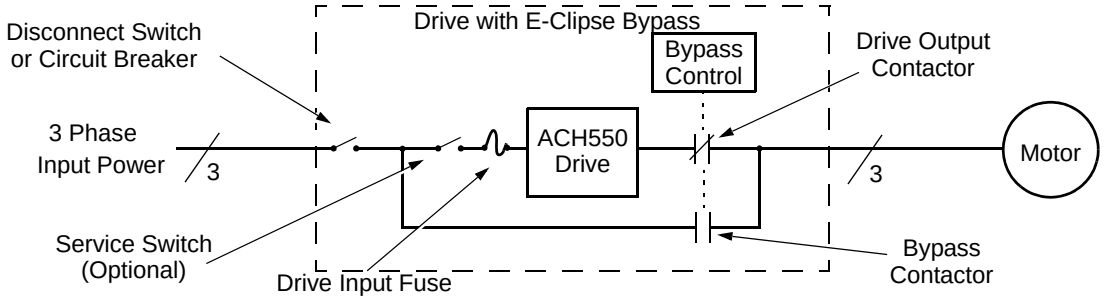
The following shows the front view of the ACH550 E-Clipse Bypass vertical configuration, and identifies the major components.



The following shows the front view of the ACH550 E-Clipse Bypass standard configurations, and identifies the major components.



The following is a typical power diagram.



Installation Flow Chart

The installation of E-Clipse Bypass Configurations for ACH550 drives follows the outline below. The steps must be carried out in the order shown. At the right of each step are references to the detailed information needed for the correct installation of the unit.

Task	Reference in ACH550-UH User's Manual "Installation" section	Reference in this Manual
PREPARE for installation	"Preparing for Installation"	"Drive Identification" on page 8. "Suitable Mounting Location (Supplement to ACH550-UH User's Manual)" on page 9
PREPARE the Mounting Location	"Prepare the Mounting Location"	—
MOUNT the unit	—	"Mount the Drive with E-Clipse Bypass"
REMOVE the covers from Vertical E-Clipse Bypass Unit	"Remove Front Cover"	"Remove Vertical E-Clipse Bypass Cover"
INSTALL wiring	"Wiring Overview" and "Install the Wirings on Vertical Units"	"Installing the Wiring (Supplement to ACH550-UH User's Manual)" starting on page 9.
CHECK jumpers and switches	—	"Check E-Clipse Bypass Jumpers and Switches" on page 25.
CHECK installation	"Check Installation"	"Initial Settings and Checks" on page 19.
RE-INSTALL the covers	"Re-install Cover"	"Re-install Vertical E-Clipse Bypass Cover"
APPLY power	"Apply Power"	—
START-UP	"Start-Up"	"Overview of Bypass Functionality" on page 33.

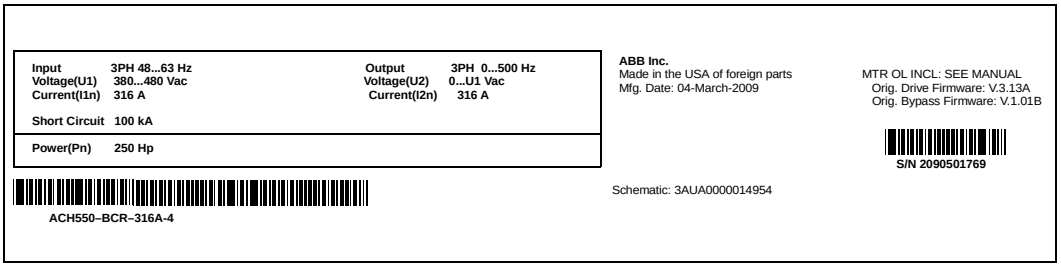
Preparing for Installation (Supplement to ACH550-UH User's Manual)

Drive Identification

Drive Labels

To determine the type of drive you are installing, refer to either:

- Serial number label attached on upper part of the chokeplate between the mounting holes.
- Type code label attached on the heat sink – on the right side of the unit cover.



Type Code

Use the following chart to interpret the type code found on either label.

ACH550-BCR-316A-4+…+…

AC, HVAC Drive – 550 product series

Construction
- UH = Base drive
- BCR = E-Clipse Bypass with circuit breaker
- BDR = E-Clipse Bypass with disconnect switch
- PCR = Drive with circuit breaker
- PDR = Drive with disconnect switch
- VCR = Vertical E-Clipse Bypass with circuit breaker
- VDR = Vertical E-Clipse Bypass with disconnect switch

Output current rating (See Ratings chart for details)

Voltage rating
- 2 = 208…240 VAC
- 4 = 380…480 VAC
- 6 = 500…600 VAC

Enclosure protection class
- No specification = IP 21 / UL type 1
- +B055 = IP 54 / UL type 12
- +B058 = IP 58 / UL type 3R

Line reactor
- +E213 = Line Reactor

Service Switch
- +F267 = Service switch

Fieldbus Adapters
- +K451 = DeviceNet Adapter
- +K452 = LonWorks Adapter
- +K454 = Profibus Adapter
- +K466 = EtherNet Adapter

Ratings and Frame Size

The chart in the “Ratings” section of the ACH550-UH User’s Manual lists technical specifications, and identifies the drive’s frame size – significant, since some instructions in this document vary, depending on the drive’s frame size. To read the Ratings table, you need the “Output current rating” entry from the type code (see above). Also, when using the Ratings tables, note that there are three tables based on the drive’s “Voltage rating”.

Suitable Mounting Location (Supplement to ACH550-UH User’s Manual)

In selecting a suitable mounting location for E-Clipse Bypass configurations, refer to the Technical Data in this manual for the appropriate information on:

- Branch circuit protection
- Dimensions and weights

Installing the Wiring (Supplement to ACH550-UH User’s Manual)

WARNING!

- **Do not connect or disconnect input or output power wiring, or control wires, when power is applied.**
- **Never connect line voltage to drive output Terminals T1, T2, and T3.**
- **Do not make any voltage tolerance tests (Hi Pot or Megger) on any part of the unit. Disconnect motor wires before taking any measurements in the motor or motor wires.**
- **Make sure that power factor correction capacitors are not connected between the drive and the motor.**

Wiring Requirements

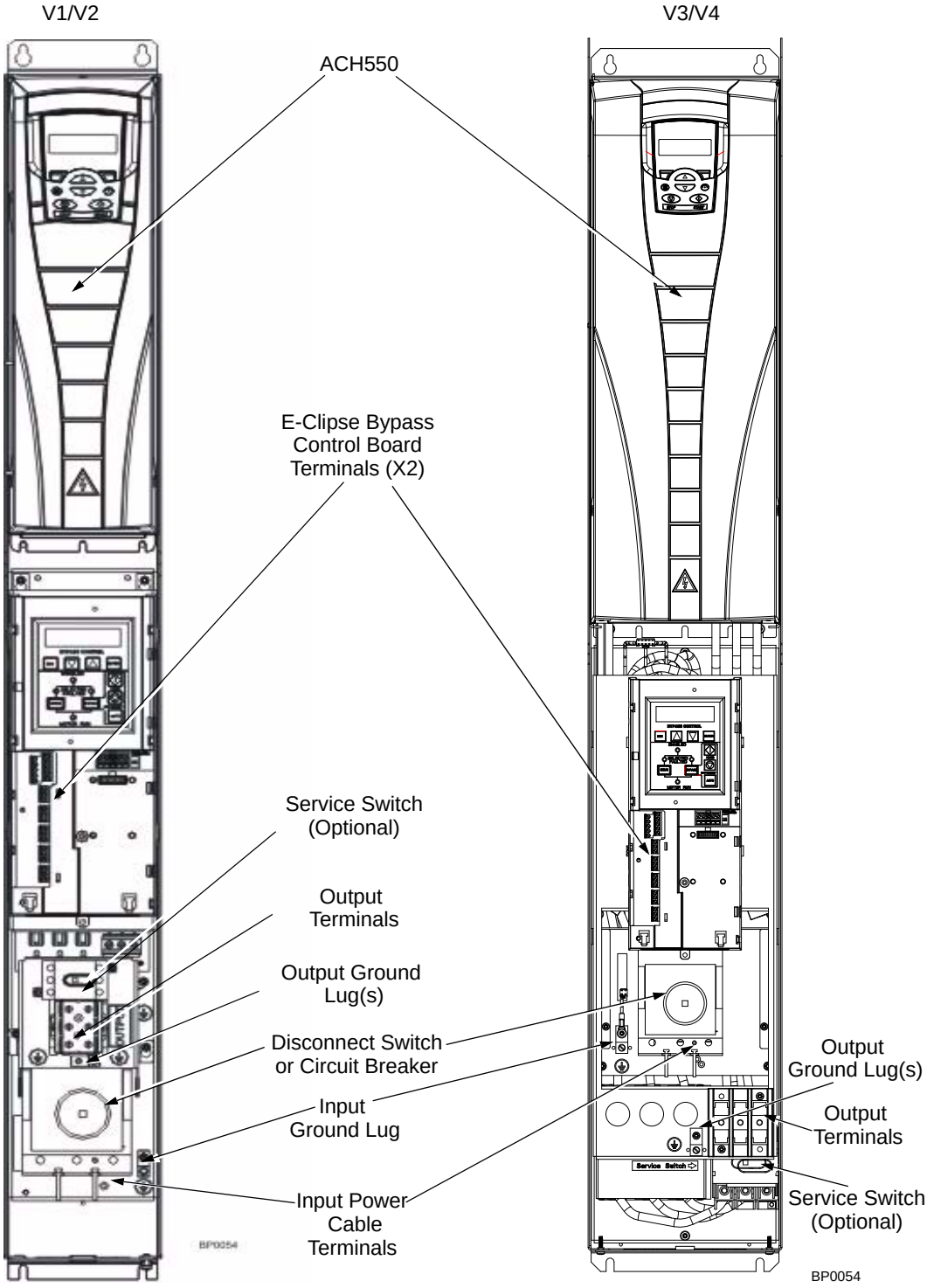
Refer to the “Wiring Requirements” Section in the ACH550 User’s Manual. The requirements apply to all ACH550 drives. In particular:

- Use separate, metal conduit runs to keep these three classes of wiring apart:
  - Input power wiring.
  - Motor wiring.
  - Control/communications wiring.
- Properly and individually ground the drive, the motor and cable shields.
- Use wire ties to permanently affix control/communications wiring to the hooked wire race tie points provided maintaining a minimum 1/4” spacing from power wiring.

Wiring Overview (Supplement to ACH550-UH User's Manual)

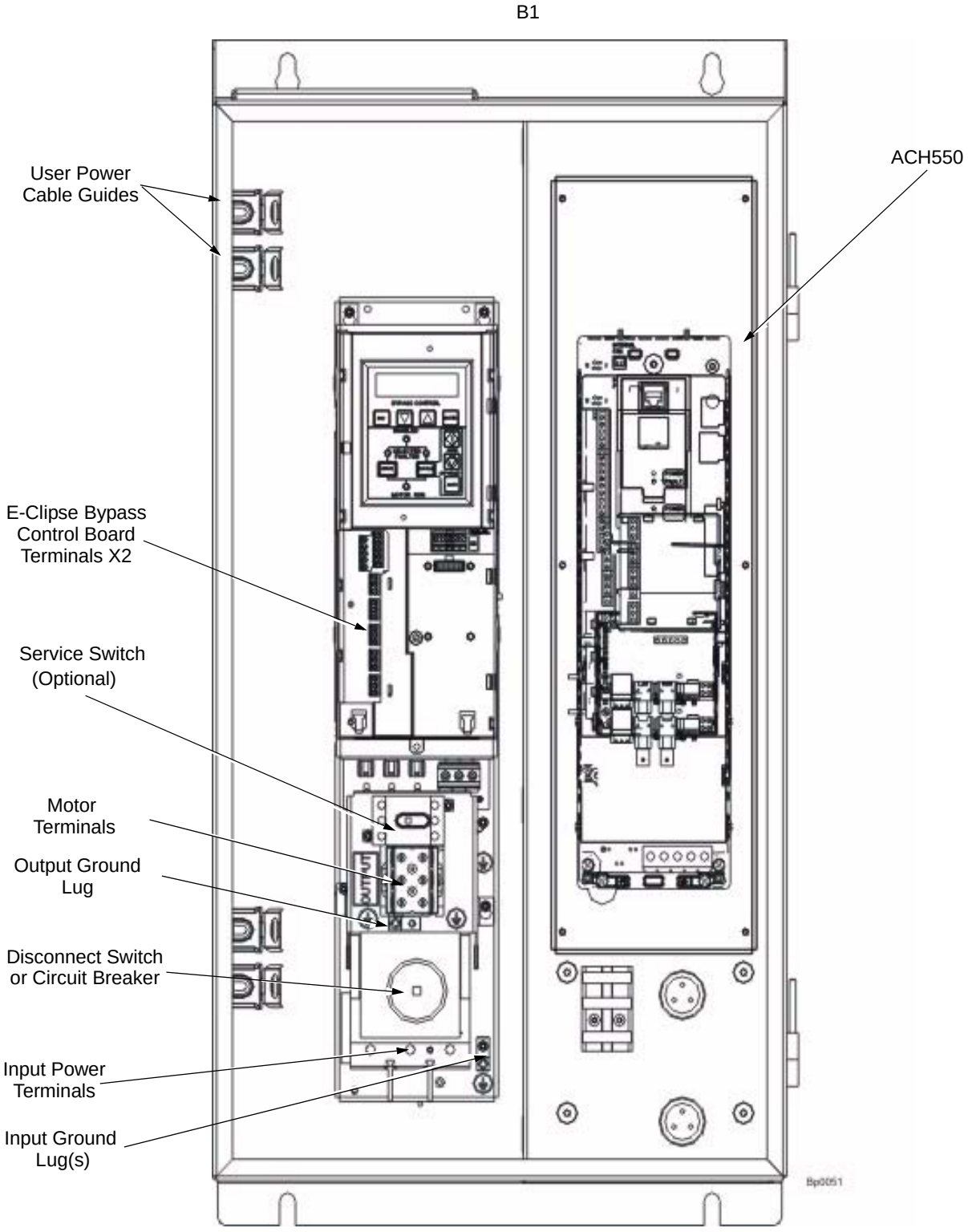
Connection Diagrams – Vertical E-Clipse Bypass

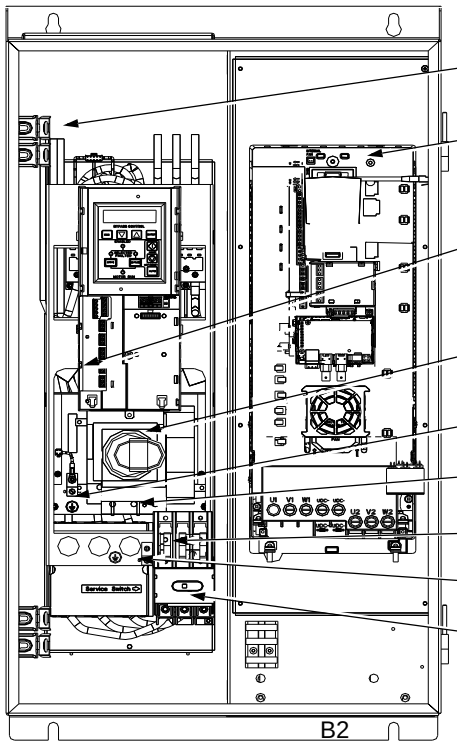
ACH550 Vertical E-Clipse Bypass units are configured for wiring access from the bottom only. The following figure shows the Vertical E-Clipse Bypass wiring connection points. Refer to the ACH550-UH User's Manual for control connections to the drive.



Connection Diagrams – Standard E-Clipse Bypass (Wall Mounted)

ACH550 Standard E-Clipse Bypass units are configured for wiring access from the top. The following figure shows the Standard E-Clipse Bypass (wall mounted) wiring connection points. Refer to the ACH550-UH User's Manual for control connections to the drive.





User Power Cable Guides

ACH550 Drive

E-Clipse Bypass Control Board Terminals (X2)

Disconnect Switch or Circuit Breaker

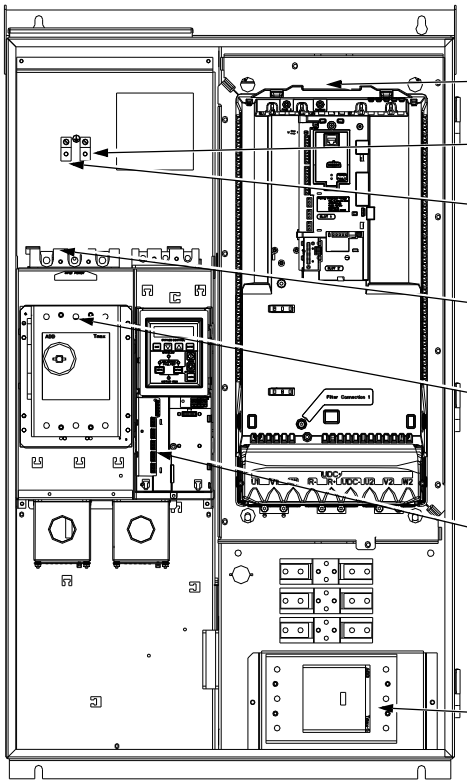
Input Ground Lug

Input Power Terminals

Motor Terminals

Output Ground Lug

Service Switch (optional)



ACH550 Drive

Output Ground Lug

Input Ground Lug

Motor Terminals

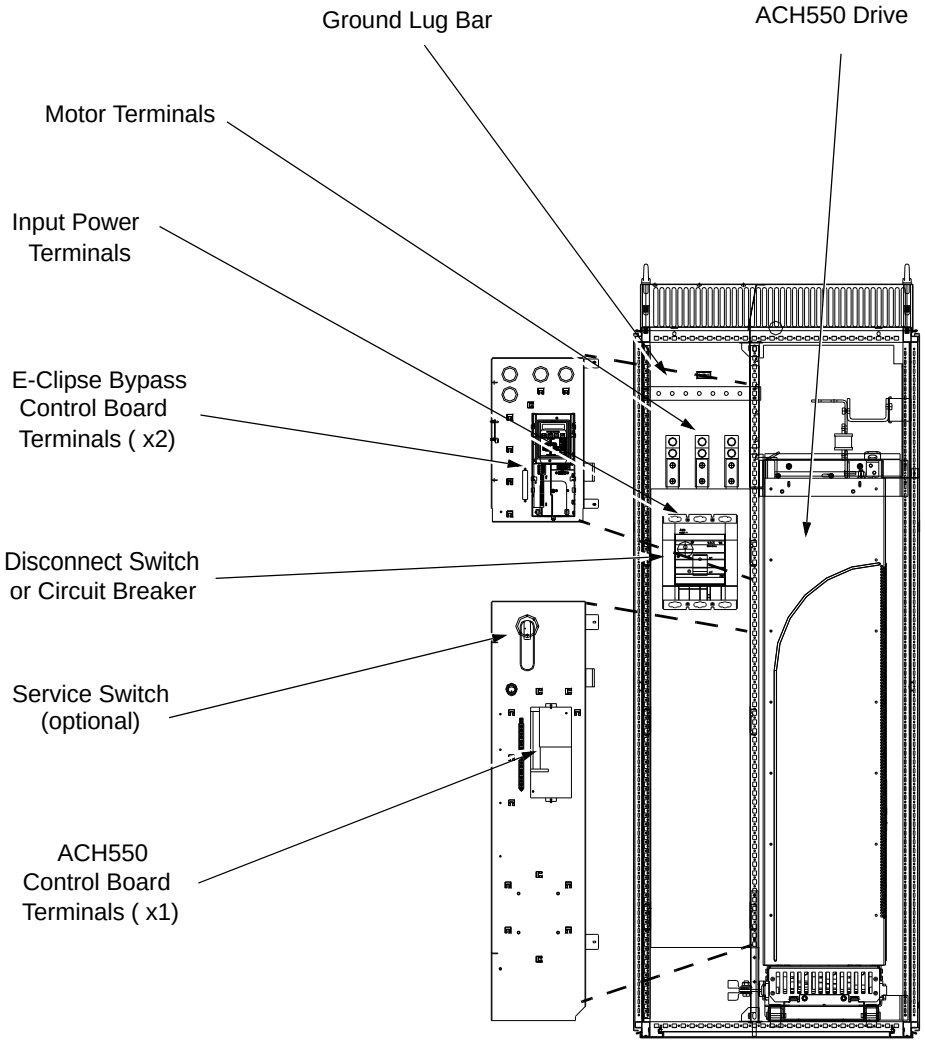
Input Power Terminals

E-Clipse Bypass Control Board Terminals (X2)

Service Switch (optional)

Connection Diagrams – Standard E-Clipse Bypass (R8, Floor Mounted)

ACH550 Standard E-Clipse Bypass units are configured for wiring access from the top. The following figure shows the Standard E-Clipse Bypass (floor mounted) wiring connection points. Refer to the ACH550-UH User's Manual for control connections to the drive.

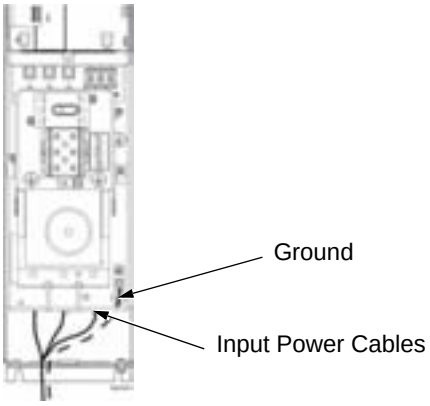


B4

Install the Line Input Wiring (Supplement to ACH550-UH User's Manual)

Line Input Connections – Vertical E-Clipse Bypass Configurations

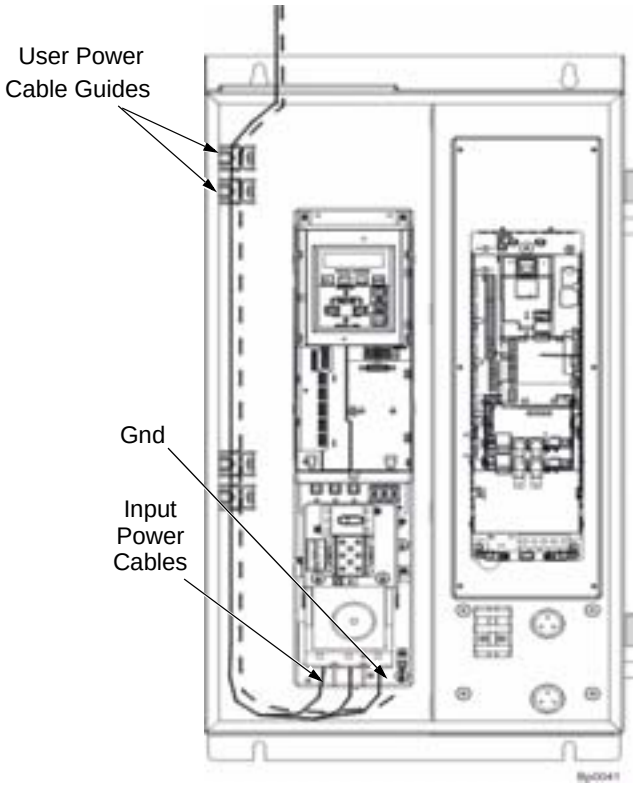
Connect the input power to the terminals at the bottom of the disconnect switch or circuit breaker as shown below. Also see "Connection Diagrams – Vertical E-Clipse Bypass" on page 10. Connect the equipment grounding conductor to the ground lug near the input power connection point.



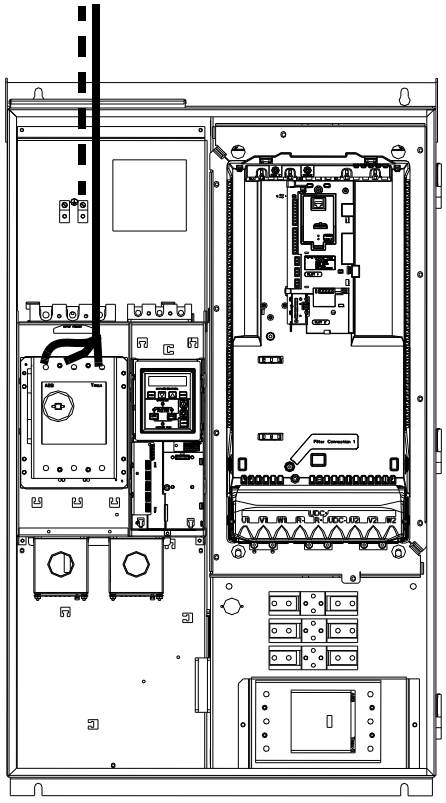
Line Input Connections – Standard E-Clipse Bypass Configurations (Wall Mounted)

Connect input power to the terminals of the disconnect switch or circuit breaker. Connect the equipment grounding conductor to the ground lug at the top of the enclosure. The figure below shows the connection points for Standard E-Clipse Bypass configurations. Also see "Connection Diagrams – Standard E-Clipse Bypass" on pages 10 and 11.

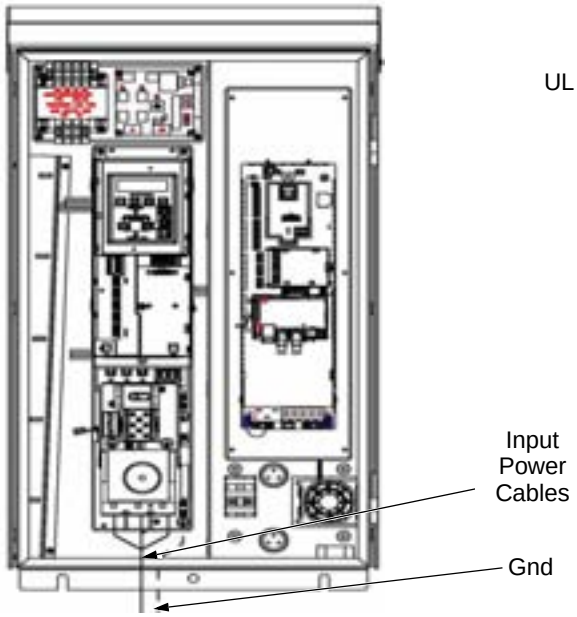
Note! Route cables through the cable guides on the left side of the enclosure. Use separate conduits for input power and motor cables. Follow the guides to separate the cables from each other.



Standard Configuration (B1/B2)



Standard Configuration (B3)



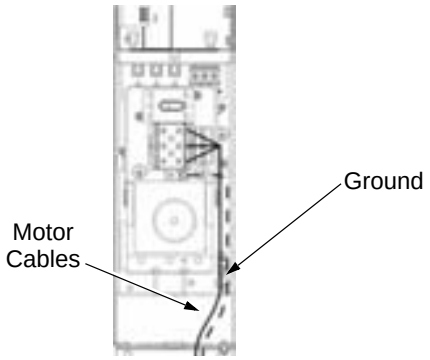
UL Type 3R Configuration (B1/B2)

WARNING! Check the motor and motor wiring insulation before connecting the ACH550 to line power. Follow the procedure in the ACH550-UH User's Manual. Before proceeding with the insulation resistance measurements, check that the ACH550 is disconnected from incoming line power. Failure to disconnect line power could result in death or serious injury.

Install the Motor Wiring (Supplement to ACH550-UH User's Manual)

Motor Connections – Vertical E-Clipse Bypass Configurations

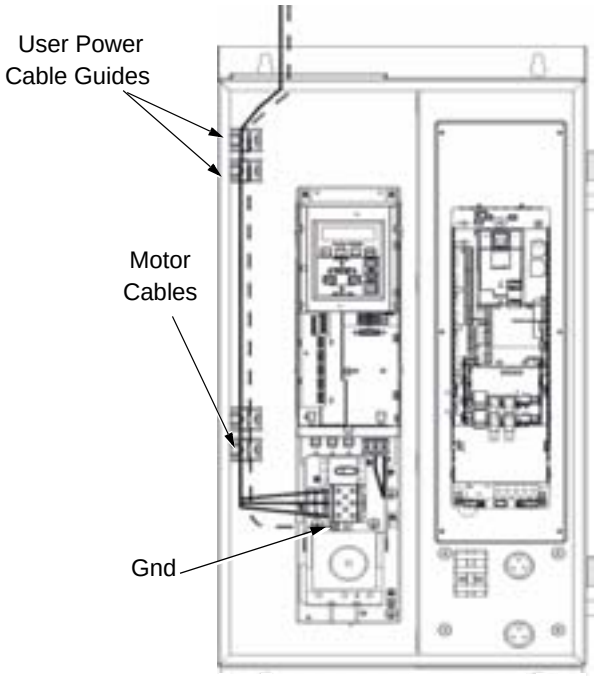
Connect the motor cables to the terminals at the bottom of the bypass section as shown in the figure below. Also see "Connection Diagrams – Vertical E-Clipse Bypass" on page 10. Connect the motor grounding conductor to the ground lug near the motor cable terminal block connection point.



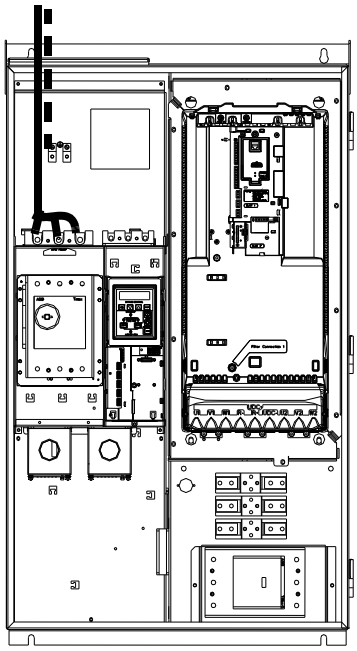
Motor Connections – Standard E-Clipse Bypass Configurations (Wall Mounted)

Connect the motor cables to the output terminal block as shown in the figure below. Also see "Connection Diagrams – Standard E-Clipse Bypass" on pages 10 and 11. The motor grounding conductor can be connected to the ground lug near the terminal block.

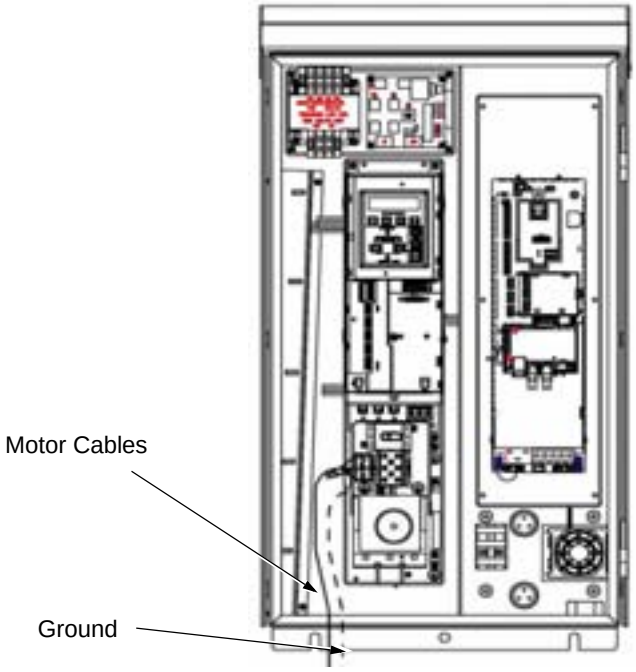
Note! Route cables through the cable guides on the left side of the enclosure. Use separate conduits for input power and motor cables. Follow the guides to separate the cables from each other.



Standard Configuration (B1/B2)



Standard Configuration (B3)



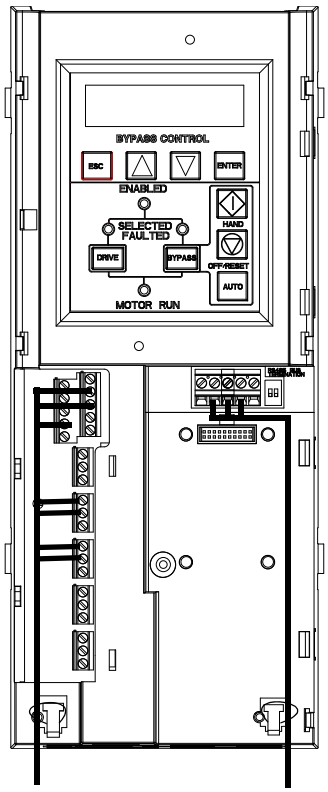
UL Type 3R Configuration (B1/B2)

Install the Control Wiring (Supplement to ACH550-UH User's Manual)

Connect control wiring to terminal block X1 on the ACH550 control board and to terminal block X2 on the E-Clipse Bypass control board. For more information on these connections, refer to the following:

- X1 terminal block location and terminal data are defined in the ACH550-UH User's Manual.
- X2 terminal block location is illustrated in the figures starting with "Connection Diagrams – Vertical E-Clipse Bypass" on page 10.
- X2 terminal data are provided in "Basic Control Connections for E-Clipse HVAC Default" on page 18.
- Basic connections are described in the following paragraphs.
- Alternate configurations using the E-Clipse Bypass macro are described in "E-Clipse Bypass Application Macros" on page 26.
- On Terminal Block X1 inside the ACH550, analog inputs and outputs and additional digital input and relay output connections (AI1, AI2, AO1, AO2, DI1…DI6 and RO1…RO6) are available for use. Refer to the *ACH550-UH User's Manual* for information about control connections on Terminal Block X1.

Note! The E-Clipse Bypass control circuitry uses serial communications connections (X1:28…X1:32) inside the ACH550. These connections are not available for any other purpose and must not be reconfigured.



Basic Connections

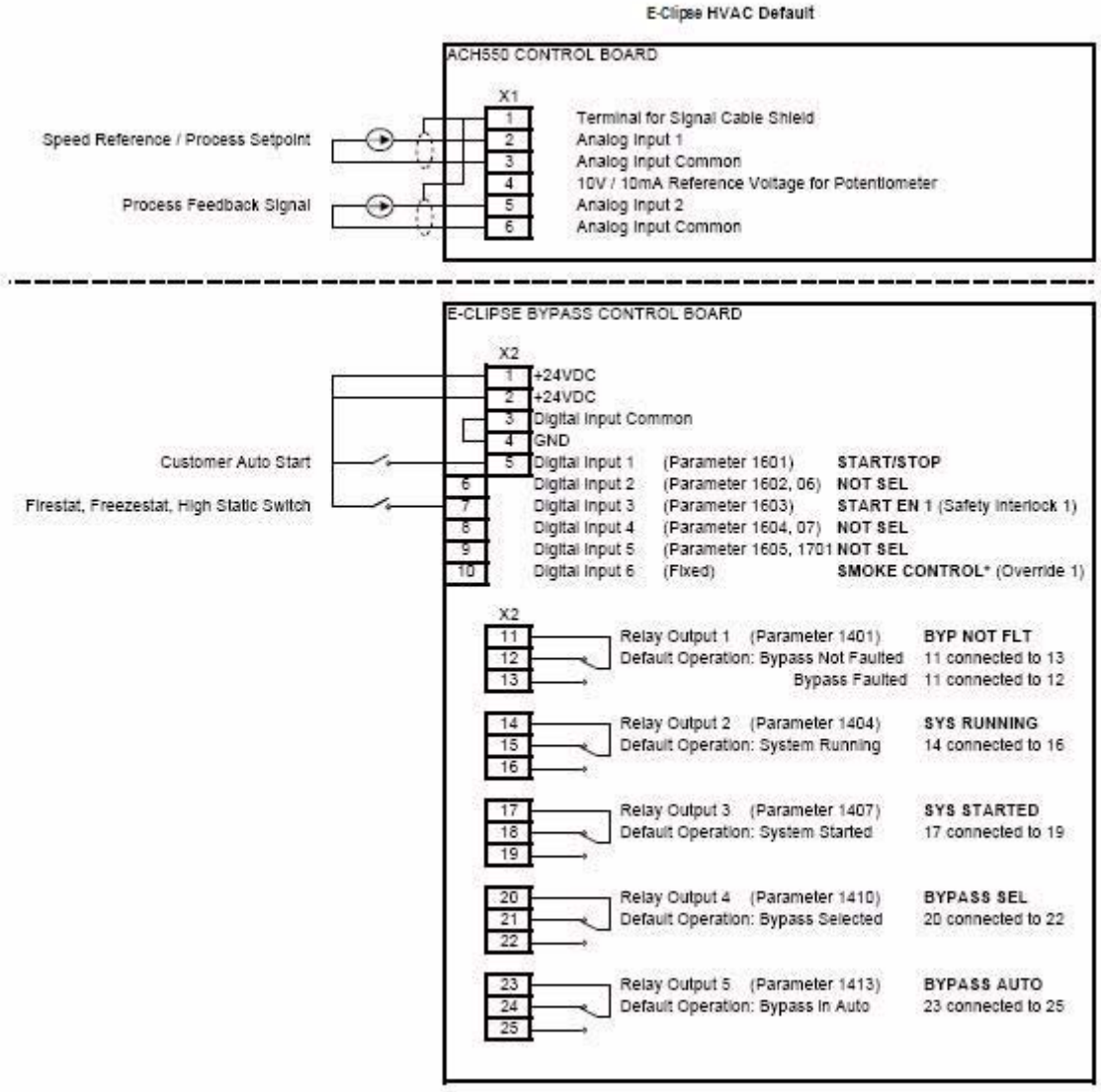
The figure on page18 shows the basic control connections for use with the E-Clipse Bypass HVAC Default macro. These connections are described in the following paragraphs.

In typical installations, only analog input wires connect to the ACH550 terminal block, with other control connections made on the E-Clipse Bypass control board.

Use wire ties to permanently affix control/ communications wiring to the hooked wire race tie points provided, maintaining a minimum 1/4" spacing from power wiring.

Basic Control Connections for E-Clipse HVAC Default

E-Clipse HVAC Default



Parameters Changed Relative to E-Clipse HVAC Default

Parameter Number	Description	Setting

* Smoke Control (Override1) is a fixed input. Closing Digital Input 6 **will** place the E-Clipse Bypass in Smoke Control mode which may reassign the function of the other Digital Inputs. Refer to the Smoke Control (Override1) documentation.

Initial Settings and Checks

Control Panel Settings and Checks

Apply power to the E-Clipse Bypass unit. The ACH550 Control Panel should show the operating status of the drive. If the E-Clipse Bypass Control Panel displays a PHASE SEQ (Phase Sequence) fault, remove power, wait at least 5 minutes and then swap any two input phase wires. If the motor is a standard 208 V, 60 Hz motor connected to a 208 V drive or a 460 V, 60 Hz motor connected to a 480 V drive, the default parameter settings should be suitable for the initial tests described below. If the motor's rating is not 208 V or 460 V, 60 Hz, the MOTOR NOM VOLT and MOTOR NOM FREQ parameters will need to be properly set before proceeding. Refer to the ACH550-UH User's Manual and set the parameters as required.

Note! The settings for ALL external serial communication between the ACH550 with E-Clipse Bypass and any Building Automation System are configured using the E-Clipse Bypass operator panel. DO NOT attempt to configure the external serial communication connection using the ACH550 operator panel!

The settings for internal communication between the ACH550 and the E-Clipse Bypass are configured at the factory and require no adjustment.

Drive Link Recovery Procedure

If the ACH550 Drive communication settings are unintentionally changed during setup a "Drive Link Fault", "Drive Link Error" or "Drive Setup" alarm may be displayed. Should this occur, accomplish the following steps in order.

Using the ACH550 Drive Keypad

1. Set Parameter 9802 to "STD MODBUS"
2. Set Parameter 9902 to "E-CLIPSE"
3. Cycle Power

Following the above steps, in order, should restore proper communications between the ACH550 Drive and the E-Clipse Bypass. Should the E-Clipse Keypad continue to display a "Drive Link Fault", "Drive Link Error" or "Drive Setup" alarm, check the following parameter settings to ensure they have been recovered. If necessary, individually set the correct parameter settings as indicated below and cycle power.

The only ACH550 Drive macro that provides the proper configuration settings by default is the E-Clipse Bypass macro. If any other ACH550 Drive macro is used, that macro should be selected after completing the initial tests. When using any other macro the following ACH550 Drive parameter values must be set and power cycled or the E-Clipse Bypass will not function properly:

- Parameter 9802 must be set to "STD MODBUS"
- Parameter 1001 must be set to "Comm"
- Parameter 1002 must be set to "Comm"
- Parameter 1601 must be set to "Comm"

- Parameter 1608 must be set to “Comm”
- Parameter 5303 must be set to “76.8 kb/s”
- Parameter 5305 must be set to “DCU PROFILE”
- Parameter 5304 must be set to “8 EVEN 1”
- Parameter 5310 must be set to “103”
- Parameter 5311 must be set to “104”
- Power must be cycled

Refer to the *ACH550-UH User’s Manual* for additional information.

Note! Run motor from drive before attempting bypass operation.

System Check: Motor Connected to ACH550 with E-Clipse Bypass

After performing the control panel checks and setting the ACH550 Drive Start-up Data parameters, check the operation of the ACH550 Drive with E-Clipse Bypass with the motor connected as follows:

1. Disconnect and lock out power to the E-Clipse Bypass unit, wait at least five minutes before disconnecting power.
2. Connect the motor to the output terminals.

CAUTION: If the Bypass Override (Override 2) input contact is closed, the motor will start across the line as soon as power is applied.
If the Safety Interlock and Run Enable input contacts are closed and the Smoke Control (Override 1) input contact is closed, the motor will start across the line as soon as power is applied.

If the Start/Stop, Safety Interlock and Run Enable input contacts are closed and the system is in the Bypass mode and in either Hand or Auto, the motor will start across the line as soon as power is applied.

If the Start/Stop, Safety Interlock and Run Enable input contacts are closed and the system is in the Drive mode with the drive in either Hand or Auto mode, the motor will start on the drive as soon as power is applied.

In order to prevent the motor from starting, the system should be in the Drive mode and the drive should be OFF when the power is disconnected at the end of the previous series of control panel settings and checks.

In order to prevent the motor from running without disconnecting the motor, open the Run Enable and Safety Interlock contacts on bypass control board terminals X2:2, X2:3 and X2:4 before applying power. Set the bypass to Drive mode and the drive to OFF.

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3. Apply power to the E-Clipse Bypass unit. The ACH550 Control Panel display should be illuminated. On the bypass control panel, both the display and Enabled LED should be illuminated. If the Enabled LED is not illuminated solid green, check to see

that closed contacts or jumpers connect terminal X2:3 to X2:4 and X2:2 to X2:7 on the bypass control board.

4. The Drive Selected LED should be illuminated. If not, press the Drive Select key to switch to Drive mode. Leave the system in the Drive mode when proceeding to the next step.
5. Press the Hand key on the ACH550 Control Panel. Press and hold the UP key until the motor just starts rotating.

Note! If the ACH550 Control Panel displays an OVERCURRENT or EARTH FAULT, disconnect and lock out power to the E-Clipse Bypass unit. Wait at least 5 minutes. Disconnect the motor leads from the E-Clipse Bypass unit and Megger each motor lead to ground to determine if the motor is good. Check the power leads from the Drive / Bypass to the motor for damaged or improper wiring. If the ACH550 Control Panel displays any other drive faults, correct the fault condition before proceeding to the next step.

CAUTION: Check motor rotation direction as soon as the motor begins to move. If motor does not rotate in the correct direction, shut down the drive, disconnect and lock out power to the drive and wait five minutes. Swap any two motor output wires (T1, T2, and T3). Incorrect motor rotation direction may cause equipment damage.

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6. Increase the speed to 60 Hz or the highest safe operating speed.
7. Press the *OFF* key on the drive control panel. The motor should stop.

CAUTION: Check the motor rotation direction in bypass.

Press the OFF/RESET key and then the Bypass Select key on the bypass control panel. The Bypass Selected LED should illuminate solid green. Press the Hand key and then quickly press the OFF key to "bump" the motor. If the motor turns in the wrong direction, tag out/lock out, then swap any two input power leads at the disconnect switch. Do not swap the motor leads.

If the drive does not operate according to these steps, refer to the ACH550-UH User's Manual.

If the drive operates according to these steps, your ACH550 with E-Clipse Bypass is ready to use with preset or modified macro settings.

Note! The settings for ALL external serial communication between the ACH550 with E-Clipse Bypass and any Building Automation System are configured using the E-Clipse Bypass operator panel. DO NOT attempt to configure the external serial communication connection using the ACH550 operator panel!

The settings for internal communication between the ACH550 and the E-Clipse Bypass are configured at the factory and require no adjustment.

Note! Both the ACH550 Drive and the E-Clipse Bypass include preset application macros. The only ACH550 Drive macro that provides the proper configuration settings by default is the "E-Clipse" macro (9902 = 15). If any other ACH550 drive macro or any modified setting of the "E-Clipse" macro is used the following ACH550 Drive parameter values must be set and power cycled or the E-Clipse Bypass will not function properly:

- Parameter 9802 must be set to “STD MODBUS”
- Parameter 1001 must be set to “Comm”
- Parameter 1002 must be set to “Comm”
- Parameter 1601 must be set to “Comm”
- Parameter 1608 must be set to “Comm”
- Parameter 5303 must be set to “76.8 kb/s”
- Parameter 5304 must be set to “8 EVEN 1”
- Parameter 5305 must be set to “DCU PROFILE”
- Parameter 5310 must be set to “103”
- Parameter 5311 must be set to “104”
- Power must be cycled

Refer to the ACH550-UH User’s Manual for programming instructions.

Note! Run motor from drive before attempting bypass operation.

System Check: Motor Disconnected from the ACH550 with E-Clipse Bypass

If you are familiar with the E-Clipse Bypass operation, you may skip the following section. Otherwise, after performing the system checks and setting the ACH550 Drive Start-up Data parameters, become familiar with the operation of the ACH550 Drive with E-Clipse Bypass without the motor connected as follows:

1. Disconnect and lock out power to the E-Clipse Bypass unit, wait at least five minutes after disconnecting power.
2. Disconnect the motor from the E-Clipse Bypass unit.
3. Apply power to the E-Clipse Bypass unit by turning on the branch circuit disconnect device and the bypass disconnect switch or circuit breaker.

4. The ACH550 Control Panel display should be illuminated. On the E-Clipse Bypass control panel, both the display and *Enabled* LED should be illuminated. If the *Enabled* LED is not illuminated solid green, check to see that closed contacts or jumpers connect terminal X2:3 to X2:4 and X2:2 to X2:7 on the bypass control board.
5. On the E-Clipse Bypass control panel, either the *Drive Selected* or *Bypass Selected* LED should be illuminated. Pressing the *Drive Select* or *Bypass Select* key should switch the bypass back and forth between the *Drive* mode and the *Bypass* mode as indicated by the LEDs above each button. Check that the bypass control panel switches the system between modes. Leave the system in the Bypass mode when proceeding to the next step.
6. Check to see that pressing the:
   - *Auto* key on the bypass control panel causes the bottom line on the E-Clipse Bypass display to indicate "*Bypass in Auto*"
   - Hand key on the bypass control panel generates a Motor Phase Fault.
   - Under normal conditions (motor connected) pressing the Hand key on the bypass control panel causes the bottom line on the E-Clipse Bypass display to indicate "Hand #A Run"
   - OFF key on the bypass control panel causes the bottom line on the E-Clipse Bypass display to indicate "Off Stop"
7. For Steps 8 through 14, ACH550 Drive Parameter 9904 must be set to "Scalar: Freq". After successful completion of Step 13, Parameter 9904 may be set to "Vector: Speed" if very specific application requirements make it necessary to use this type of motor control. Operation using the "Vector: Speed" setting is unnecessary for control of almost all fan and pump applications. Refer to the ACH550-UH User's Manual for details on setting parameters.
8. Press the *Drive Select* key on the E-Clipse Bypass control panel. The *Drive Select* LED should be illuminated.
9. Check to see that pressing the:
   - *Auto* key on the bypass control panel causes the E-Clipse Bypass display to indicate "*Bypass in Auto*"
   - *Hand* key on the bypass control panel causes no change to the E-Clipse Bypass display
   - *OFF* key on the bypass control panel causes the E-Clipse Bypass display to indicate "*Bypass in Off"*
10. Press the *HAND* key on the drive control panel. Note that the top line of the control panel display indicates "HAND" and run as a clockwise rotating arrow. The *Drive Run* LED on the E-Clipse Bypass control panel should be illuminated.
11. Press the *UP* arrow on the drive control panel. Note that the speed reference indication in the top line of the drive control panel display increases from "0.0% SP."
12. In the middle line of the drive control panel display, the output current indication should indicate "0.0 A."

13. Press the *DOWN* arrow on the drive control panel until the speed and frequency indications return to “0.0.”
14. Press the *OFF* key on the drive control panel. Note that the bottom line of the drive contol panel display indicates “Off.”

    If the ACH550 Drive and E-Clipse Bypass operate according to these steps, and you have familiarized yourself with their operation, disconnect and lock out power to prepare for the next test.

WARNING! Wait at least five minutes after disconnecting power from the drive before you attempt to service the drive. Bus capacitors in the intermediate DC circuit must discharge before servicing the drive. Using a meter rated for 1000 VDC, check for zero volts at:

- **Terminals BRK+ to GND and BRK- to GND (frame size R1/R2)**
- **Terminals UC+ and UC- (frame size R3…R8).**

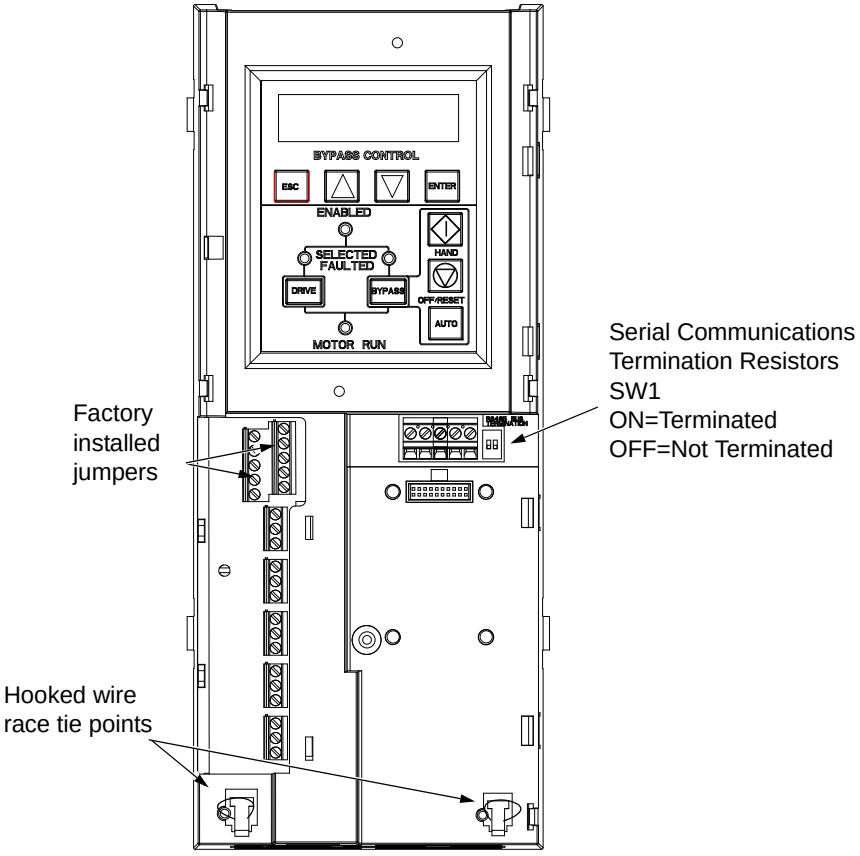
If the drive does not operate according to these steps, refer to the ACH550-UH User’s Manual.

Check E-Clipse Bypass Jumpers and Switches

The settings described in this section are factory set and, for most situations, do not require adjustment. However, it is a good practice to review these settings to confirm that they are appropriate for the configuration installed.

Jumper and Switch Locations

The figure below shows the locations of the SW1 DIP switch on the E-Clipse Bypass control board. The function and setting of this switch is explained in the following paragraph.



DIP Switch Settings

The DIP switch is used to configure the serial communications termination resistors.

To reduce noise on the serial communications network, terminate the EIA-485 network using 120 ohm resistors at both ends of the network. Use the DIP switches to connect or disconnect the on-board termination resistors. Both switches must be positioned in the ON or OFF position to correctly configure the termination resistors.

Circuit Breaker Settings

On some ACH550 E-Clipse Bypasses, the circuit breaker has adjustable settings for instantaneous current protection. The factory default settings are practical for most applications. Refer to the “ABB SACE Instruction Sheet” (supplied with these units) for additional information on the adjustment of these settings.

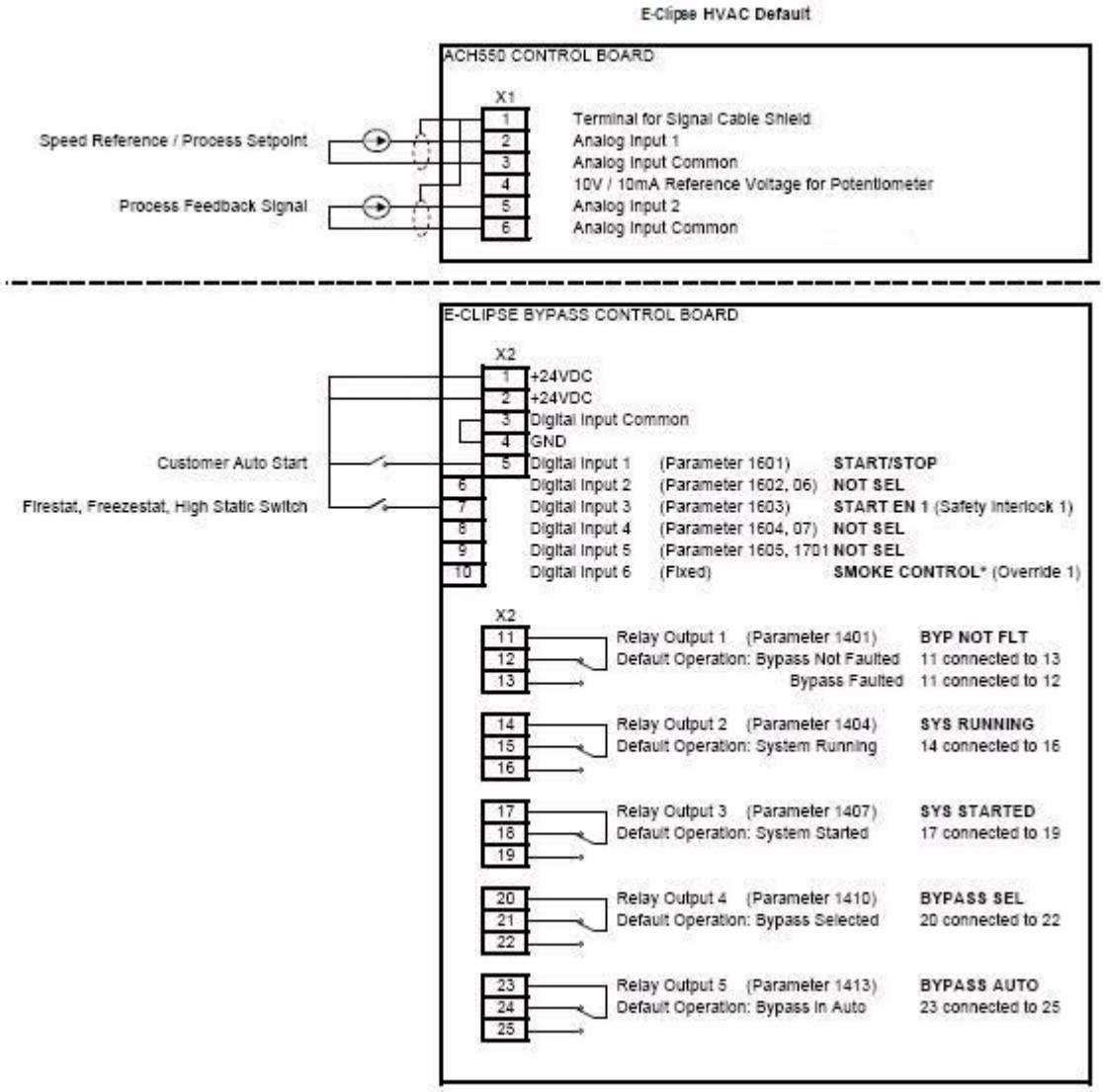
E-Clipse Bypass Application Macros

The following figures show a variety of configurations and connections using the available E-Clipse Bypass Macros. E-Clipse Bypass macros are selected and configured using the E-Clipse Bypass Control Panel.

E-Clipse Bypass macros provide a simple, easy method of configuring the E-Clipse Bypass unit to the most commonly used HVAC applications.

The availability of up to 4 separate safety inputs (START ENABLES) and a run permissive (RUN ENABLE) along with override & automatic transfer capabilities provide unparalleled integration into real world HVAC applications and building automation systems.

E-Clipse HVAC Default

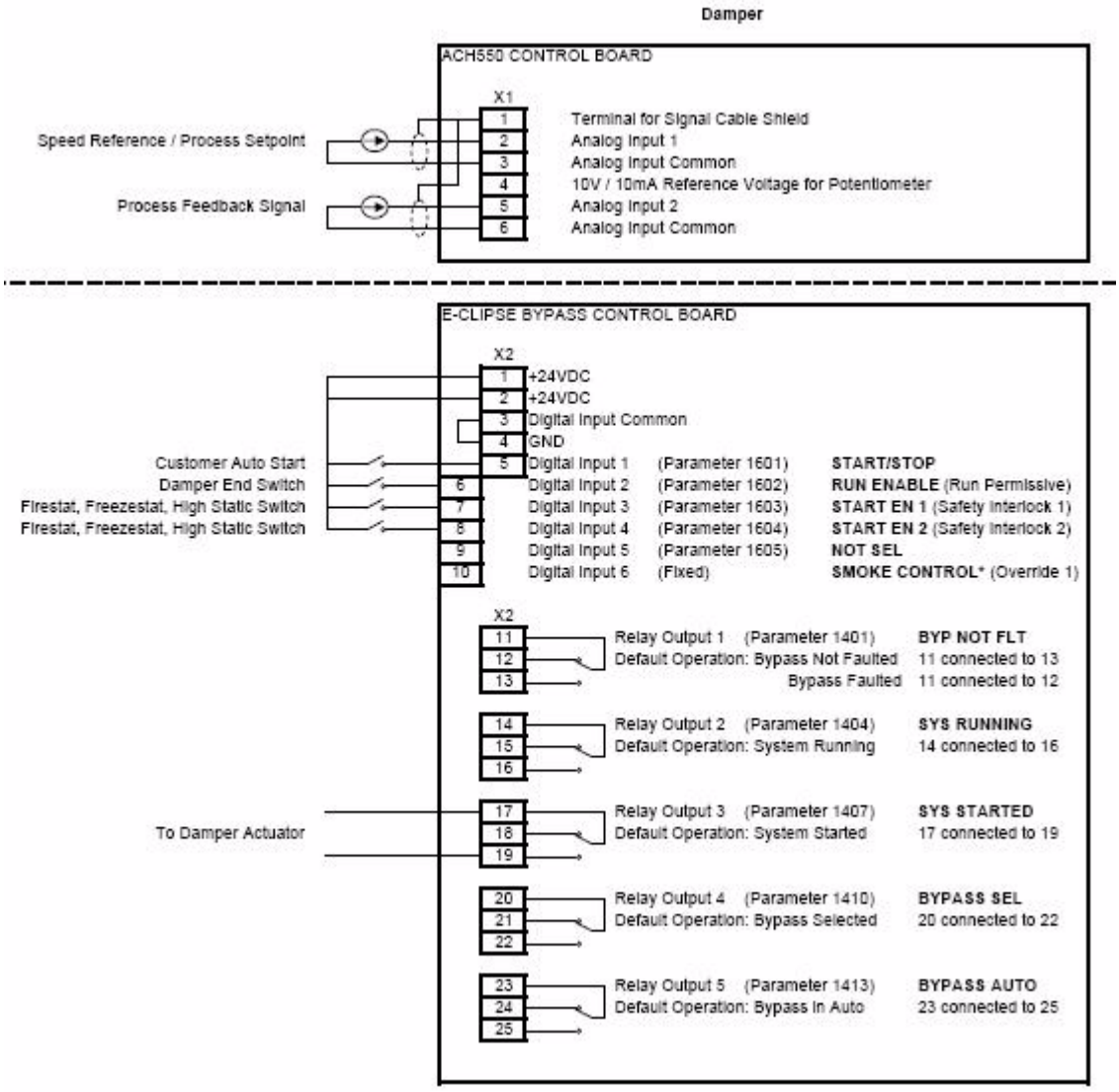


Parameters Changed Relative to E-Clipse HVAC Default

Parameter Number	Description	Setting

* Smoke Control (Override1) is a fixed input. Closing Digital Input 6 **will** place the E-Clipse Bypass in Smoke Control mode which may reassign the function of the other Digital Inputs. Refer to the Smoke Control (Override1) documentation.

Damper

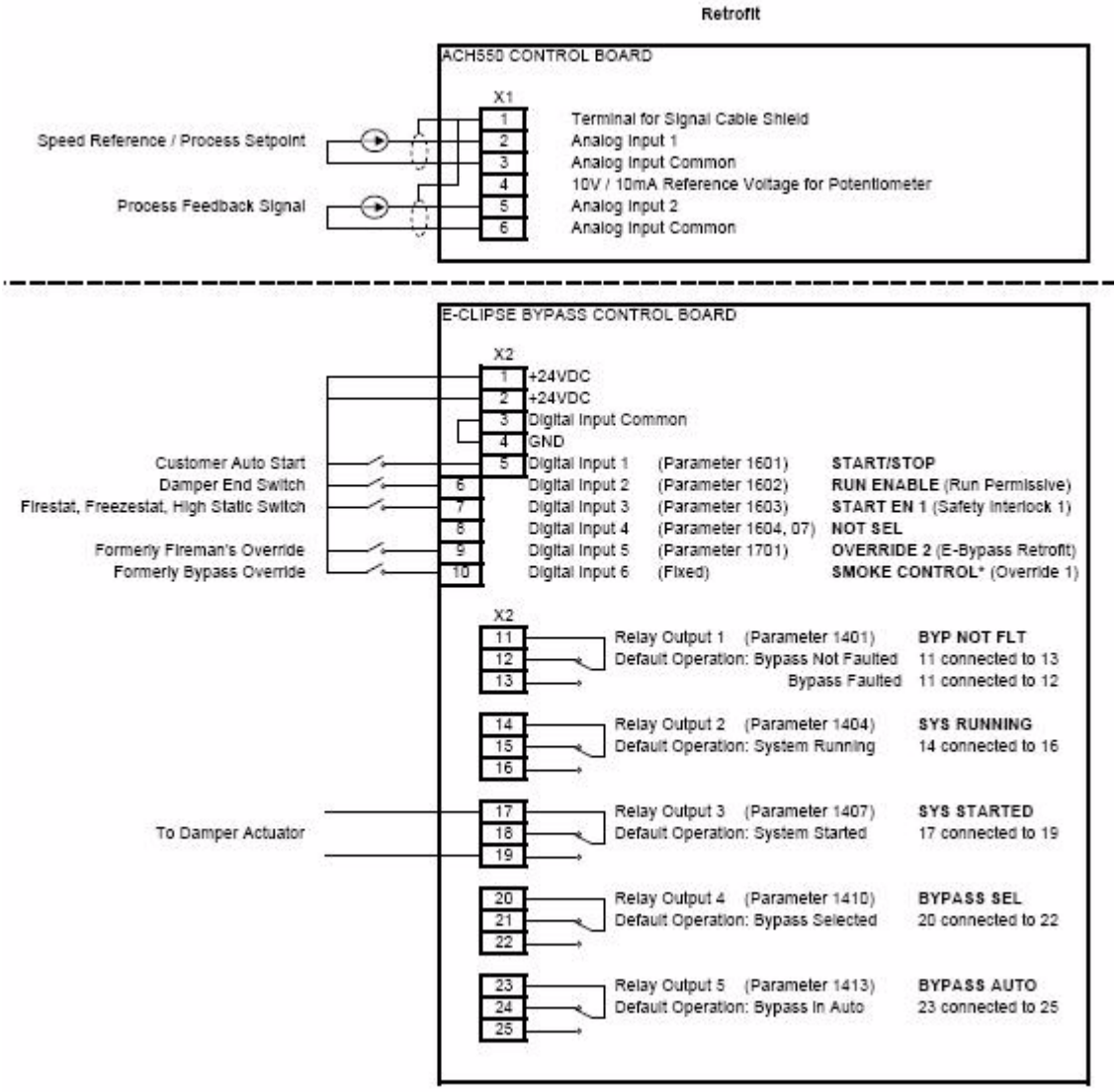


Parameters Changed Relative to HVAC Default

Parameter Number	Description	Setting
1602	Damper End Switch **RUN ENABLE** (Run Permissive)	DI2
1604	Firestat, Freezestat, High Static Switch **START EN 2** (Saftey Interlock 2)	DI4

* Smoke Control (Override1) is a fixed input. Closing Digital Input 6 **will** place the E-Clipse Bypass in Smoke Control mode which may reassign the function of the other Digital Inputs. Refer to the Smoke Control (Override1) documentation.

Retrofit

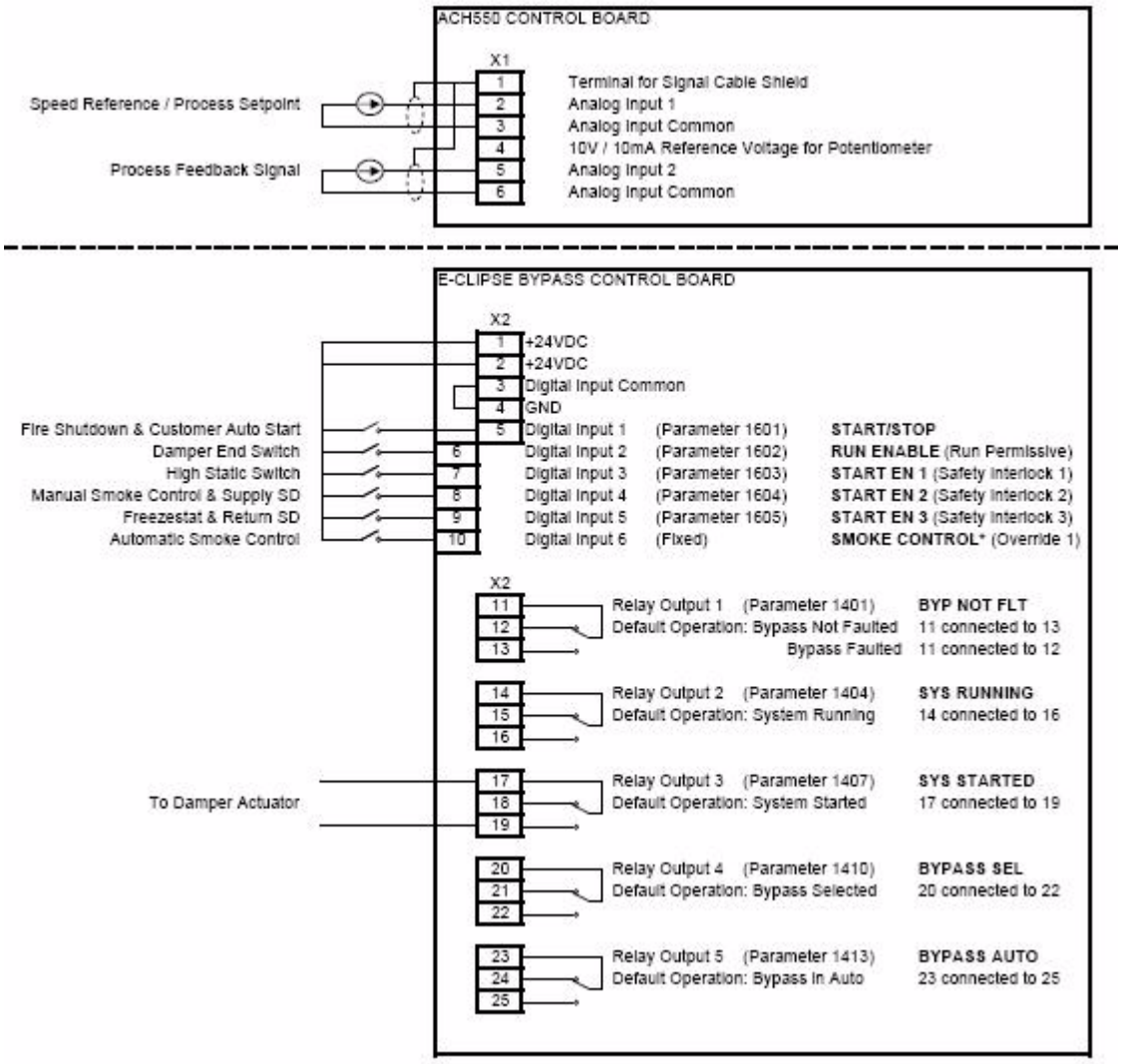


Parameters Changed Relative to HVAC Default

Parameter Number	Description	Setting
1602	Damper End Switch **RUN ENABLE** (Run Permissive)	DI2
1701	Refer to page 36 **OVERRIDE 2** (Bypass Override)	DI5

* Smoke Control (Override1) is a fixed input. Closing Digital Input 6 **will** place the E-Clipse Bypass in Smoke Control mode which may reassign the function of the other Digital Inputs.Refer to the Smoke Control (Override1) documentation.

Smoke Control (Override1)

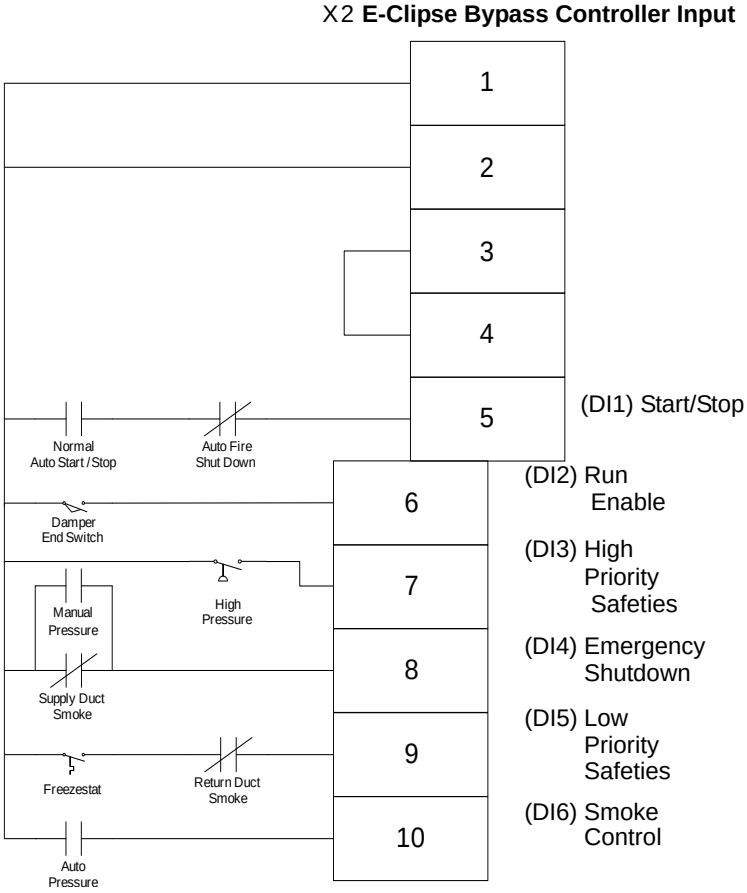


Parameter Number	Description	Setting
1602	Damper End Switch **RUN ENABLE** (Run Permissive)	DI2
1603	High Pressure Switch, High Priority Safties **START EN 1** (Safety Interlock 1)	DI3
1604	Supply Smoke Detector, Emergency Shutdown **START EN 2** (Saftey Interlock 2)	DI4
1605	Freezestat, Low Priority Safties **START EN 3** (Saftey Interlock 2)	DI5

* Smoke Control (Override1) is a fixed input. Closing Digital Input 6 **will** place the E-Clipse Bypass in Automatic Smoke Control mode. Refer to the Smoke Control (Override1) documentation.

Typical Wiring Diagrams Showing a Conventional Starter Wiring and Use of the E-Clipse Bypass

Typical system wiring with use of E-Clipse Bypass:



Normal Operation:

- Close Start/Stop (X2:5)
- Fan starts, assuming that X2: 6, 7, 8, and 9 are all closed

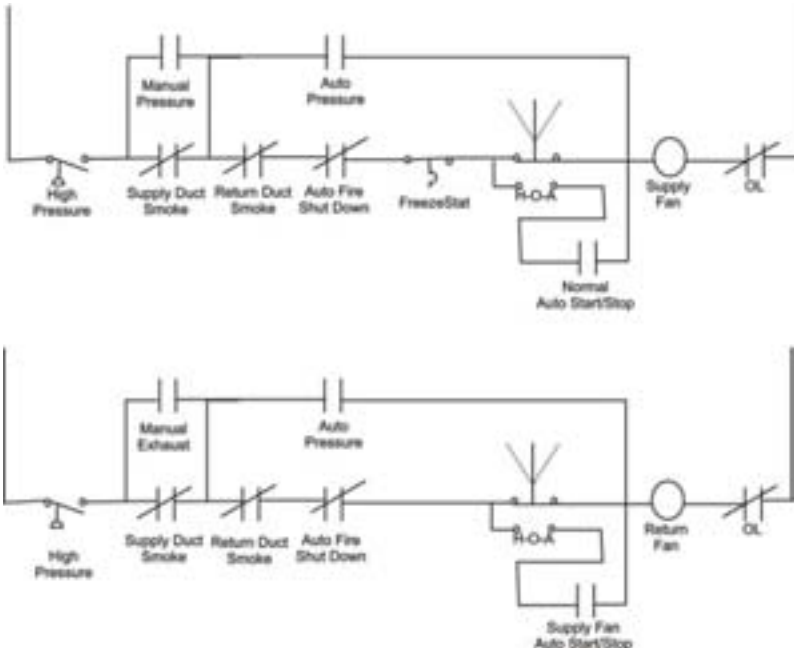
Emergency Shutdown:

- Open auto fire shutdown, unit stops

Smoke Control Mode:

- Close contact on X2:10
- Fan starts regardless of position of internal HOA switch and inputs X2:5 and X2:9
- Inputs X2:6, 7 and 8 followed
- Internal overloads followed

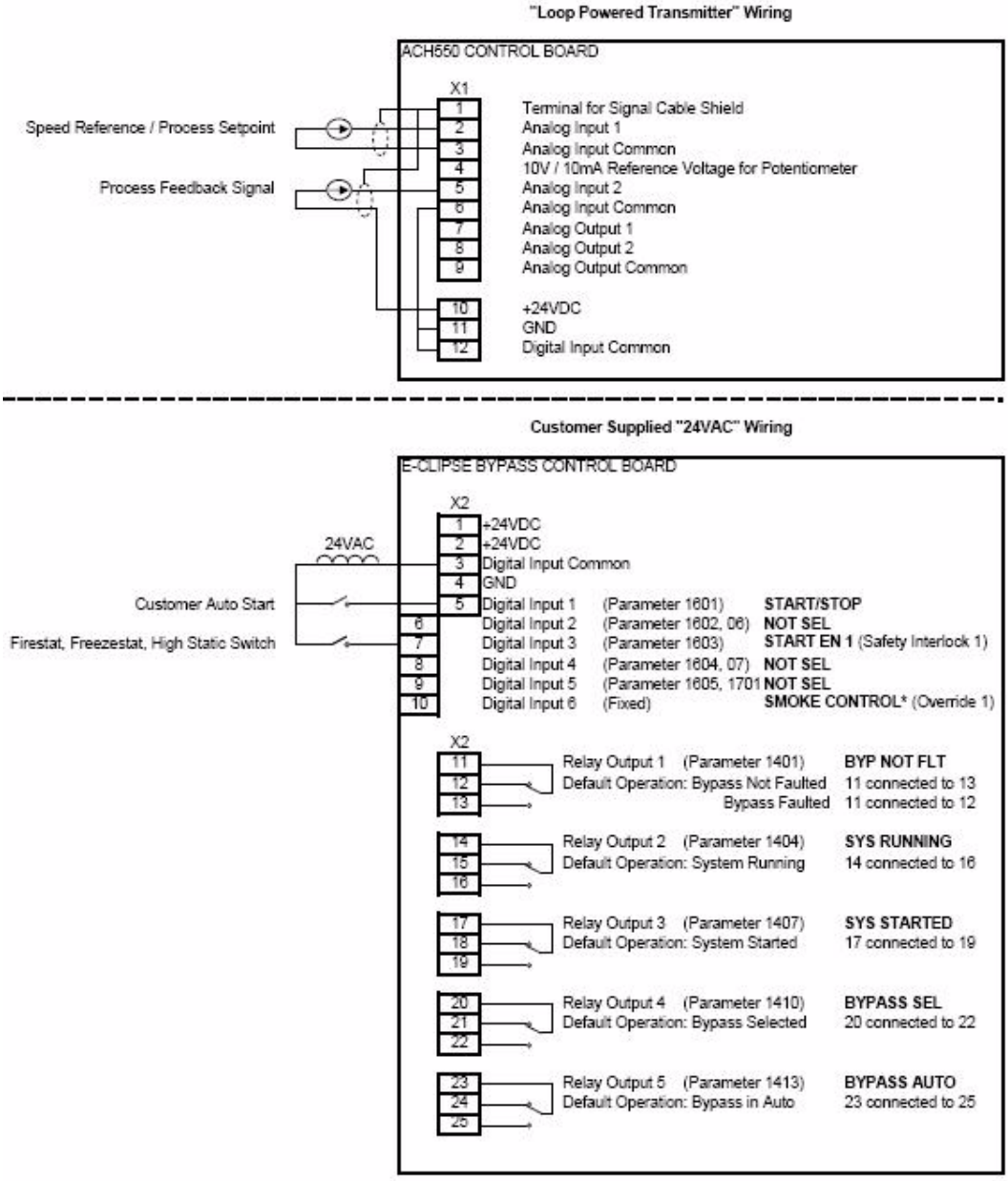
Typical Starter Wiring for a Smoke Control listed System Today:



Notes:

1. Pressure cutouts, duct smoke detectors and auto shutdown are 2-pole.
2. Manual control also activates “auto control” relays.

Alternate Wiring Options



Parameters Changed Relative to E-Clipse HVAC Default

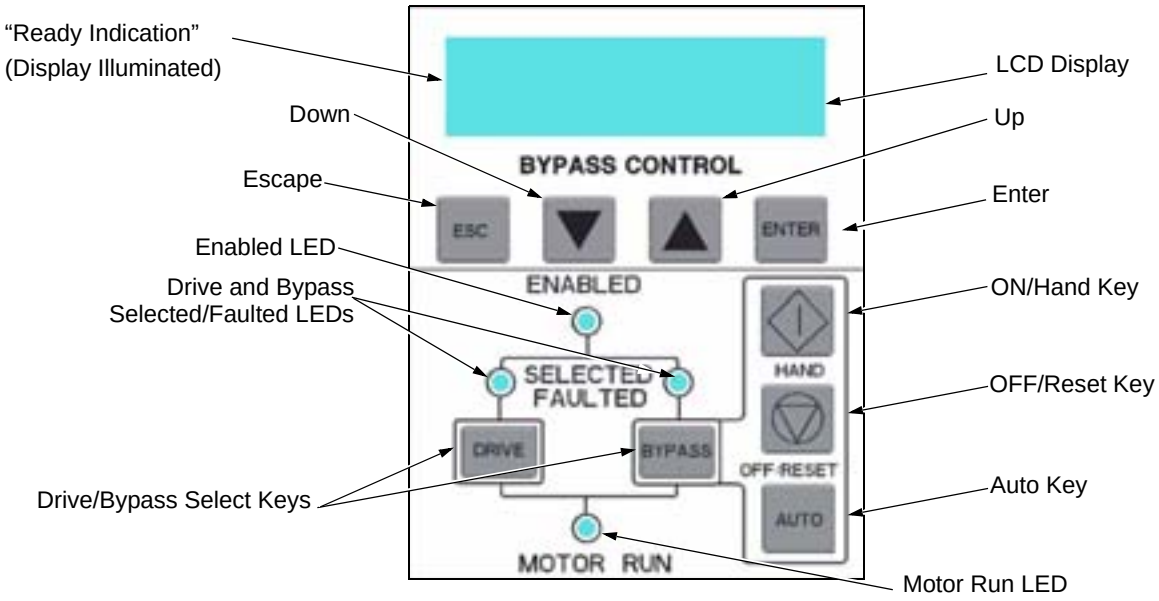
Parameter Number	Description	Setting

* Smoke Control (Override1) is a fixed input. Closing Digital Input 6 **will** place the E-Clipse Bypass in Smoke Control mode which may reassign the function of the other Digital Inputs.Refer to the Smoke Control (Override1) documentation.

Overview of Bypass Functionality

Bypass Control Panel

The figure below shows the bypass control panel and identifies the keys and LED indicating lights. The functions of the various keys and LEDs are described in the following paragraphs.



Ready (Power On) Indication

The *Ready (Power On) indication* is provided by the bypass control panel. The bypass control panel display will be illuminated and text will be displayed when the disconnect switch or circuit breaker is closed and control power is applied to the bypass.

Enabled LED

The *Enabled LED* is illuminated green under the following conditions:

- Both the Safety Interlock(s) and Run Enable contacts are closed.
- The Safety Interlock contact(s) are closed with no Start command present.

The Enabled LED flashes green if the Run Enable contact is open and when the Safety Interlock contact(s) are closed and a Start command is present.

The Enabled LED is illuminated red when the Safety Interlock contact(s) are open.

Motor Run LED

The *Motor Run LED* is illuminated green when the motor is running in either bypass mode or in drive mode. The Motor Run LED flashes green to indicate the system has been placed in an Override condition.

Bypass Faulted LED

The *Bypass Faulted LED* is illuminated or flashes red when the motor or bypass protection functions have shut down the bypass. The specific nature of the fault is indicated on the bypass control display. Refer to the Diagnostics and Troubleshooting section of this manual for more details.

Drive Selected LED

The *Drive Selected LED* is illuminated green when the drive has been selected as the power source for the motor and no drive fault is present

Bypass Selected LED

The *Bypass Selected LED* is illuminated or flashes green when the bypass has been selected as the power source for the motor and no bypass fault is present.

Drive Faulted LED

The *Drive Faulted LED* is illuminated red when the bypass has lost its communications link with the drive or when the motor or drive protection functions have shut down the drive. The specific nature of the fault is indicated on the drive control panel display. Refer to the Diagnostics and Troubleshooting section of the ACH550 User's manual for more details.

Automatic Transfer

The *Automatic Transfer* indication is provided on the bypass control panel. The bypass control display will continuously flash an alarm to indicate the system has automatically transferred to Bypass after a Drive fault. The Bypass Selected LED flashes green when the system has automatically transferred to bypass operation. The bypass event log will also record this event.

Auto Indication

The *Auto Indication* is provided on the bypass control panel default display when the bypass control panel Auto key is pressed. Normally this indicates that the Auto Start contact or serial communications has been selected as the means for starting and stopping the motor in the bypass mode.

Off Indication

The *Off Indication* is provided on the bypass control panel default display when bypass control panel Off key is pressed.

Hand Indication

The *Hand Indication* is provided on the bypass control panel default display when the motor has been started manually in the bypass mode.

Drive Select Key

The *Drive Select Key* selects the drive as the power source for the motor.

Bypass Select Key

The *Bypass Select Key* selects the bypass as the power source for the motor.

Off/Reset Key

The *Off/Reset Key* may be used to manually stop the motor if the motor has been running on bypass power. The Off/Reset key also resets most bypass faults. It may take several minutes before the bypass can be reset after an overload trip. If a bypass fault condition is present the second press of this key places the bypass in the OFF mode.

Auto Key

The *Auto Key* selects the Auto Start contact or serial communications as the means for starting and stopping the motor in the bypass mode.

Hand Key

The *Hand Key* can be used to manually start the motor when the bypass has been selected as the power source for the motor.

Operating Modes

Note! For normal operation with the bypass, place the drive control panel in the Auto mode.

Drive Mode

Under normal conditions the system is in the *Drive* mode. The drive provides power to the motor and controls its speed. The source of the drive's start/stop and speed commands is determined by the *Auto* or *Hand* mode selection of the drive's control panel. Commands come from the bypass control terminals (or serial communication) when the *Auto* mode has been selected or directly from the drive control panel when the *Hand* mode has been selected. The user can normally switch to the *Drive* mode by pressing the *Drive* key on the bypass control panel.

Bypass Mode

In the Bypass mode, the motor is powered by AC line power through the bypass contactor. The source of the bypass start/stop commands is determined by the Auto or Hand mode selection of the bypass' control panel. Commands come from the bypass control terminals (or serial communication) when the Auto mode has been selected or directly from the bypass control panel when the Hand mode has been selected. The user can normally switch to the Bypass mode by pressing the Bypass key on the bypass control panel. Alternative methods of bypass control called Overrides are also available. Refer to the following descriptions of the Override modes.

Smoke Control Mode

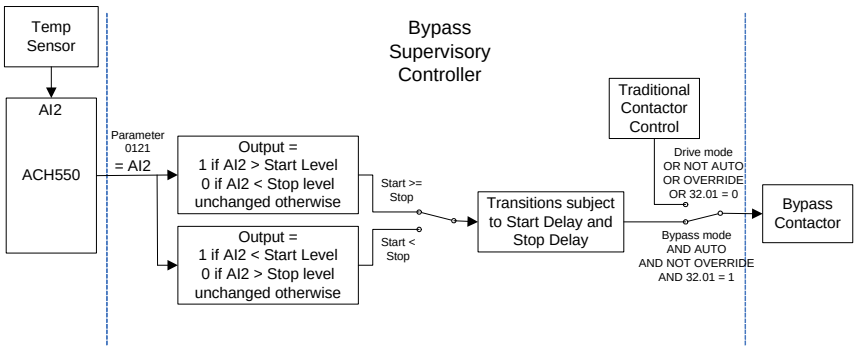
In the Smoke Control (Override 1) mode, the motor is powered by AC line power through the bypass contactor. The source of the start command is internal and unaffected by external stop commands. The system also ignores all commands from either the drive or bypass control panels when in this mode. The user can switch to the Smoke Control mode by closing the Smoke Control input contact (DI6). When the Smoke Control input contact is closed, the system is forced to bypass and runs the motor. The Motor Run LED flashes green when the system is in override. While

in Smoke Control mode, the system does not respond to some inputs and does respond to other inputs. The system will ignore low priority safeties such as FreezeStats and return duct smoke detectors. While in Smoke Control mode, the system will respond to high priority safeties such as high static pressure and damper end-switch proofs. The system will always respond to the electronic motor overload protection included in the bypass controller. See the diagrams on pages 32 and 33 for suggested wiring of typical customer inputs. One diagram is to be used for supply side fans and the other diagram is used for return / exhaust side fans.

Normally when the Smoke Control input contact is switched from closed to open, the system returns to the operating mode that existed prior to entering Override and can again be controlled using the Drive and Bypass keys. The exception to this is when the Bypass Override (Override 2) input contact is closed, in which case the system switches to Bypass Override mode.

Supervisory Mode

In the Bypass Supervisory Mode the bypass has the ability to control a process by cycling the bypass contactor on and off with a hysteresis control. In this mode the motor is powered by AC line power through the bypass contactor. The source of the bypass start/stop commands is determined by the Auto or Hand mode selection of the bypass' control panel. Commands come from the analog input level (AI2) on the ACH550 drive when the Auto mode has been selected or directly from the bypass control panel when the Hand mode has been selected (manual). Bypass supervisory control is enabled and configured in parameter group 32. Once enabled, the user can normally switch to the Supervisory Bypass mode by pressing the Bypass key on the bypass control panel. Alternative methods of bypass control called Overrides are also available. Refer to the following descriptions of the Override modes. The Supervisory control only operates in Bypass / Auto mode. If the user presses the Hand or Off buttons, operation is the same as normal bypass operation. If the user selects Drive mode the Supervisory operation is also stopped. Returning to Bypass / Auto mode will put the bypass back to Supervisory mode.



Bypass Override Mode

In the Bypass Override (Override 2) mode, the motor is powered by AC line power through the bypass contactor. The source of the start command is internal and unaffected by external stop commands. The user can switch to the Bypass Override mode by closing the Bypass Override input contact (DI5 - if programmed). When the

Bypass Override input contact is closed, the system is forced to bypass and does not respond to the Drive and Bypass keys. The Motor Run LED flashes green when the system is in override. While in Bypass Override the system responds to bypass overloads and programmed faults. To satisfy the local AHJ (Authority Having Jurisdiction),The system can be custom programmed to acknowledge or disregard certain faults, safeties and enables. The unit is default programmed to ignore all external safeties and run enables. See Group 17 for programmability of the digital input and fault functions. Normally when the Bypass Override input contact is switched from closed to open, the system switches to the Drive mode and can be controlled using the Drive and Bypass keys. The exception to this is when the Smoke Control (Override 1) input contact is closed, in which case the system remains in Smoke Control mode.

Hand Mode

When the system is in the Bypass mode, the operator can manually start the motor by pressing the Hand key on the bypass control panel. The motor will run and *Hand* is indicated on the bypass control display. In order to run the motor, the Safety Interlock(s) and Run Enable contacts must be closed (green Enabled LED) and any bypass fault must be reset.

Auto Mode

In the Auto mode the bypass start/stop command comes from the Start/Stop input terminal on the bypass control board (or serial communication). The Auto mode is selected by pressing the Auto key on the bypass control panel. *Auto* is indicated on the bypass control display when the bypass is in the Auto mode. If the system is in the Bypass mode, the motor will run across the line if the Auto mode is selected, the Start/Stop, Safety Interlock(s) and Run Enable contacts are closed and any bypass fault is reset.

Off Mode

If the motor is running in the Bypass mode, the operator can manually stop the motor by pressing the Off/Reset key on the bypass control panel. The Hand or Auto indication on the bypass control display will change to Off. The motor can be restarted by pressing the Hand key or the bypass can be returned to the Auto mode by pressing the Auto key. If the system is in the Drive mode, pressing the Off/Reset key will take the bypass out of the Auto mode, but will not affect motor operation from the drive. If the system is switched to the Bypass mode, a motor that is running will stop.

Bypass/Drive Mode Transfers

If the drive is in the Auto mode and the motor is running in the Drive mode, the motor will transfer to bypass operation and continue running if the system is switched to the Bypass mode and the bypass is in the Auto mode with the Start/Stop Input contact closed. If the motor is running in the Bypass mode, the motor will transfer to drive operation and continue running if the system is switched to the Drive mode and the drive is in the Auto mode with the Start/Stop Input contact closed.

Starting the Motor on Application of Power

If the Safety Interlock(s) and Run Enable Input contacts are closed (Start command must also be present in Auto) and the system is in the Bypass mode and in either the

Hand or Auto mode, the motor will start across the line as soon as power is applied. If the system is in the Drive mode with the drive in the Auto mode, the motor will start on the drive as soon as power is applied.

Automatic Transfer Feature

When the Automatic Transfer feature is selected, the system switches to Bypass mode and the motor is automatically transferred to line power if the drive trips out on a protective trip. If automatic restart has been enabled in the drive, the drive will attempt to automatically restart before the motor is transferred to line power. The Automatic Transfer function can be enabled through the bypass control panel. The *Automatic Transfer* indication is provided on the bypass control panel. The control panel display will continuously flash an alarm to indicate the system has automatically transferred to Bypass. The bypass event log will also record this event.

Bypass Control Board Inputs and Outputs

The bypass control board has five programmable and one fixed relay contact (digital) inputs and five programmable relay outputs that are available for connection to external control circuits. The internal 24VDC supply is normally used in conjunction with the relay contact inputs. The input and output functions are described below. Refer to “Installation” for additional information and connection instructions.

Relay Contact (Digital) Inputs

All Relay Contact (Digital) Inputs with the exception of the Override 1 “Smoke Control” Input can be configured to any one of three (3) conditions.

1. “Digital Input” (DI), in which case the bypass system will react to the defined input function during normal operation.
2. “Not Selected”, in which case the bypass system will ignore the defined input function as bypass control, but will continue to pass the operating state of the digital input through serial communications to the building automation system.
3. “Comms”, in which case the bypass system will react to the defined input function over serial communications during normal operation. The bypass system will ignore the digital input as a defined input function, but will continue to pass the operating state of the digital input over serial communications to the building automation system.

Start/Stop (DI1)

The Start/Stop input is connected to a normally open contact that starts and stops the system. When the bypass is in the Drive mode and the drive is in the Auto mode, the Start/Stop input contact controls the motor by starting and stopping the drive. When the bypass is in the Bypass mode and Auto is indicated on the bypass control display, the Start/Stop input contact controls the motor by controlling the bypass contactor.

Run Enable (DI2)

The Run Enable input is connected to the series combination of any external normally closed permissive contacts, such as damper end switches, that must be closed to allow the motor to run. If any of these external contacts are open while a

Start command is present, the Enabled LED will flash green and the motor is prevented from running.

Safety Interlock (DI2…DI5)

The Safety Interlock input(s) are connected to the series combination of any external normally closed interlock contacts, such as Firestat, Freezestat, and high static pressure switches – switches that must be closed to allow the motor to run. If any of these external contacts are open, the Enabled LED is illuminated red, the drive output contactor, bypass contactor, and System Started relay are de-energized preventing the motor from running.

Bypass Fault Reset (DI4)

The Bypass Fault Reset input can be connected to an external contact that is closed to reset a bypass fault. It may take several minutes before the bypass can be reset after an overload trip.

Bypass Override (DI5) (Override 2)

The Bypass Override (Override 2) input can be connected to an external contact that is closed to select the Bypass Override mode. See “Bypass Override Mode” on page 36 for a description of this mode.

Smoke Control (DI6) (Override 1)

The Smoke Control (Override 1) input can be connected to an external contact that is closed to select the Fireman’s Override mode. See "Smoke Control Mode" on page 35 for a description of this mode.

Relay Contact Outputs

System Ready (1) [SYS READY]

If configured for *System Ready,* the relay is energized when the Drive/Bypass System is ready to be started. Two conditions must be met in order for the *System Ready* relay to energize.

- The *Safety Interlock* input contact(s) must be closed and
- There can be no fault present in the selected mode (Drive or Bypass) of the system.

System Running (2) [SYS RUNNING]

If configured for *System Running,* the relay is energized when the Drive/Bypass system is running. The *System Running* relay provides an output when the motor is running whether powered by the drive or the bypass.

System Started (3) [SYS STARTED]

If configured for *System Started*, the relay is energized when the Drive/Bypass system is started. Three conditions must be met in order for the relay to energize.

- A *Start* command must be present,
- The *Safety Interlock* input contact(s) must be closed and

- There can be no fault present in the system. The Start command can come from the bypass control board terminal block, the drive control panel, the bypass control panel, or serial communications, depending on the operational mode selected.
- The System Started relay is ideal for use in damper actuator circuits, opening the dampers only under those conditions where the system is preparing to run the motor. Closing the dampers if the safeties open, the system faults, or when a Stop command is issued.

Bypass Selected (4) [BYPASS MODE]

If configured for *Bypass Selected,* the relay is energized when Bypass Mode has been selected as the method of motor control. The *Bypass Selected* relay is de-energized when Drive Mode has been selected as the method of motor control.

Bypass Run (5) [BYPASS RUN]

If configured for *Bypass Run,* the relay is energized when the bypass is running. The *Bypass Run* relay provides an output only when the motor is running and powered by the bypass. The *Bypass Run* relay is de-energized when the motor is not being run in bypass.

Bypass Fault (6) [BYPASS FLT]

If configured for *Bypass Fault,* the relay is energized when a bypass fault has occurred or when the bypass motor overload/underload protection has tripped. The specific nature of the fault is indicated on the bypass control panel display. The *Bypass Fault* relay is de-energized during normal operation.

Bypass No Fault (7) [BYP NOT FLT]

If configured for *Bypass No Fault,* the relay is energized during normal operation. The *Bypass No Fault* relay is de-energized when power is removed from the system, a bypass fault has occurred or when the bypass motor overload/underload protection has tripped. The specific nature of the fault is indicated on the bypass control panel display.

Bypass Alarm (8) [BYPASS ALRM]

If configured for *Bypass Alarm,* the relay is energized when a bypass alarm is present. The specific nature of the alarm is indicated on the bypass control panel display. The *Bypass Alarm* relay is de-energized during normal operation.

Drive Fault (9) [DRIVE FAULT]

If configured for *Drive Fault,* the relay is energized when a drive fault has occurred. The specific nature of the fault is indicated on the drive control panel display. The *Drive Fault* relay is de-energized during normal control panel.

Drive No Fault (10) [DRV NOT FLT]

If configured for *Drive No Fault*, the relay is energized during normal operation. The *Drive No Fault* relay is de-energized when power is removed from the system, or when a drive fault has occurred. The specific nature of the fault is indicated on the drive control panel display.

Drive Alarm (11) [DRIVE ALARM]

If configured for *Drive Alarm,* the relay is energized when a drive alarm is present. The specific nature of the alarm is indicated on the drive control panel display. The *Drive Alarm* relay is de-energized during normal operation.

Override (12) [OVERRIDE]

If configured for *Override*, the relay is energized when Smoke Control Override or Bypass Override mode is selected and de-energized in all other modes. The *Override* relay is de-energized during normal operation.

Bypass Hand (13) [BYPASS HAND]

If configured for *Bypass Hand*, the relay is energized when the motor is running in Bypass Mode and Hand (manual operation) is selected. The *Bypass Hand* relay is de-energized when Bypass Auto or Bypass Off are selected.

Bypass Off (14) [BYPASS OFF]

If configured for *Bypass Off*, the relay is energized when the bypass control mode *Off* is selected. The *Bypass Off* relay is de-energized when either Bypass Auto or Bypass Hand are selected.

Bypass Auto (15) [BYPASS AUTO]

If configured for *Bypass Auto,* the relay is energized when the bypass control mode *Auto* is selected. The *Bypass Auto* relay is de-energized when either Bypass Off or Bypass Hand are selected.

Communications Control (16) [COMM CTRL]

If configured for *Communications Control*, the relay is energized when the appropriate ON command is provided over the serial communications connection. The relay is de-energized when the appropriate OFF command is provided over the serial communications connection.

System Alarm (17) [SYS ALARM]

If configured for *System Alarm*, the relay is energized when a drive/bypass alarm is present. The specific nature of the alarm is indicated on either the drive control panel display or the bypass control panel display, depending upon the origination of the alarm. The *System Alarm* relay is de-energized during normal operation.

Bypass Fault/Alarm (18) [BYP FLT/ALM]

If configured for *Bypass Fault/Alarm*, the relay is energized when either a bypass fault has occurred, the bypass motor overload/underload protection has tripped or when a bypass alarm condition is present. The *Bypass Fault/Alarm* relay is de-energized during normal operation.

Bypass Overload (19) [BYP OVERLD]

If configured for *Bypass Overload*, the relay is energized when the bypass motor overload level has exceeded the programmed protection setting. The *Bypass Overload* relay is de-energized during normal operation.

Bypass Underload (20) [BYP UNDERLD]

If configured for *Bypass Underload*, the relay is energized when the bypass motor underload level has fallen below the programmed protection setting. This output is often used for broken belt indication. The *Bypass Underload* relay is de-energized during normal operation.

PCB Overtemperature (21) [PCB OVERTMP]

If configured for *PCB Overtemperature*, the relay is energized when the temperature of the bypass control, printed circuit board has exceeded the fixed protection setting. The *PCB Overtemperature* relay is de-energized during normal operation.

System Underload (22) [SYS UNDERLD]

If configured for *System Underload*, the relay is energized when either the drive or bypass motor underload level has fallen below the programmed protection setting. This output is often used for broken belt indication. The *System Underload* relay is de-energized during normal operation.

System Fault (23) [SYSTEM FLT]

If configured for *System Fault*, the relay is energized when either a drive/bypass fault has occurred or the bypass motor overload/underload protection has tripped. The *System Fault* relay is de-energized during normal operation.

System Fault/Alarm (24) [SYS FLT/ALM]

If configured for *System Fault/Alarm,* the relay is energized when either a drive/bypass fault has occurred, the bypass motor overload/underload protection has tripped or when a drive/bypass alarm condition is present. The *System Fault/Alarm* relay is de-energized during normal operation.

System External Control (25) [SYS EXT CTL]

If configured for System External Control, the relay is energized when Auto is selected as the control mode for the selected power source (Drive or Bypass). The System External Control relay is de-energized when either Hand or Off is selected as the control mode for the selected power source.

Systen Overload (26) [SYS OVERLD)

If configured for System Overload, the relay is energized when either the drive or bypass motor overload level has risen above the programmed protection setting. This output is often used for motor overload indication. The System Overload relay is de-energized during normal operation.

Contactor Fault (27) [CONTACT FLT)]

If configured for Contactor Fault, the relay is energized when either a drive contactor/bypass contactor fault has occurred. The Contactor Fault relay is de-energized during normal operation.

Energy Savings Estimator

The ABB E-Clipse Bypass is capable of displaying the estimated energy savings provided by variable frequency drive operation. Additional displays provide estimated dollar savings based upon a user provided cost per kilowatt hour and estimated CO_2 avoidance in tons.

The Energy Savings Estimator feature is activated by enabling the Learn Mode in Parameter 1628 (LEARN MODE). Learn Mode should be activated on a day with typical ambient conditions for best accuracy. For an air conditioning application, if ambient conditions are hotter than normal when Learn Mode is activated; the calculations may estimate more energy savings than actual. Conversely, if Learn Mode is activated when ambient conditions are colder than normal; the calculations may estimate less energy savings than actual. Once the Learn Mode is enabled, the E-Clipse Bypass will keep a running tally of the energy used to run the application for the length of time defined in Parameter 1629. This energy usage becomes the base line for energy savings calculations on this application.

The user can adjust the default Learn Time (48 hours) by adjusting Parameter 1629 (LEARN TIME). The minimum Learn Time setting is 6 minutes (0.1 hour) and the maximum Learn Time setting is 200 hours. It is recommended that the E-Clipse Bypass run in Learn Mode for at least 24 hours for increased accuracy.

The MWh Saved estimation is displayed in megawatt hours in Parameter 0114 (MWH).

The Cost Saved calculation is simply the user provided cost per kilowatt hour in cents per kilowatt hour from Parameter 1627 (COST/KWH), times the energy saved. The Cost Saved estimate is displayed in thousands of dollars (K$) in Parameter 0115 (COST SAVED).

The CO_2 Saved calculation is a constant (0.5 tons per megawatt-hour) times the energy saved. The CO_2 Saved estimate is displayed in tons of CO_2 (tn) in Parameter 0116 (CO2 SAVED). Since the application uses less energy in drive mode, less CO_2 is generated by the power plant supplying power to the site.

Energy Saving Estimator Setup

Verify the connected equipment is ready for operation. Set the following Parameters:

- Parameter 1627 - set to local cost of energy in cents per kilowatt hours
- Parameter 1629 - set to desired hours of initial bypass operation to establish energy usage baseline
- Select Bypass Mode on E-Clipse Keypad
- Parameter 1628 – set to ENABLED
- Start Bypass
- Run Bypass for at least the LEARN TIME set in Parameter 1629
- Select Drive Mode on E-Clipse Keypad
- Operate System normally

Note! The learn mode is terminated by any of the following conditions:

- User clears the learn mode request (Parameter 1628 = NOT SEL)
- The running time in learn mode equals the time set by Parameter 1629
- The user enters drive mode.

At the end of learn mode, the average bypass power is calculated.

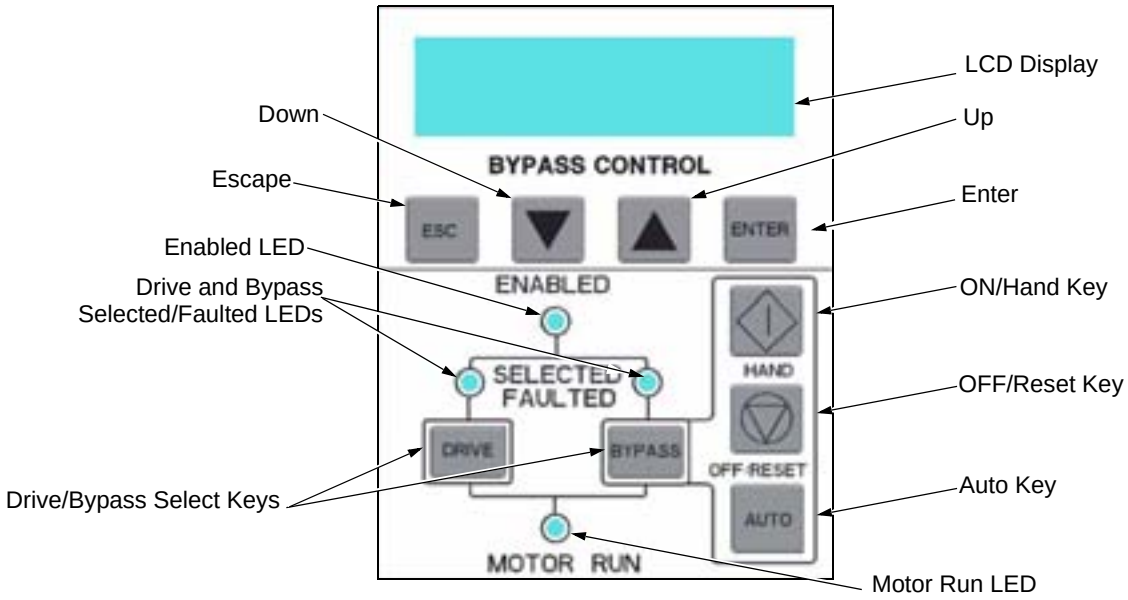
From that point on, whenever the system is operated in drive mode, it keeps a running total of the energy savings.

The energy savings is measured from a certain point in time. This starting point is triggered by any of the following events:

- Learn mode is terminated
- **Drive** parameter 0115 (KWH COUNTER) is reset
- **Bypass** parameter 0114 (KWH SAVED) is reset

Start-up

HVAC Bypass Control Panel Operation



Start-Up can be performed in two ways:

- Using the Start-Up Parameter List
- Changing the parameters individually from the Full Parameter List.

Note! Run motor from drive before attempting bypass operation.

Start-Up by Changing the Parameters from the Start-Up List

To change the parameters, follow these steps:

1	The **Default Display** indicates the **Bypass Control** mode.		DRIVE SELECTED BYPASS IN OFF
2	Press **ENTER** to enter the **Main Menu.**	ENTER	*BYPASS STATUS STARTUP PARAMS
3	Select the **Startup Params** with the **Up/Down** arrows and press **ENTER**.	▼ ▲ ENTER	BYPASS STATUS *STARTUP PARAMS

4	Select the appropriate **Parameter** with the **Up/Down** arrows and press **ENTER**	▼ ▲ ENTER	*1601 START/STOP 1613 BP DISABLE
5	Press the **Up/Down** arrows to change the **Parameter Value**.	▼ ▲	1601 START/STOP [1:DI1]
6	Press **ENTER** to store the modified value or press **ESC** to leave the **Parameter Edit** mode.	ENTER or ESC	*1601 START/STOP 1613 BP DISABLE
7	Press **ESC** to return to the **Main Menu**, and again to return to the. **Default Display**	ESC	DRIVE SELECTED BYPASS IN OFF

Start-Up by Changing the Parameters Individually from the Parameter List

To change the parameters, follow these steps:

1	The **Default Display** indicates the **Bypass Control** mode.		DRIVE SELECTED BYPASS IN OFF
2	Press **ENTER** to enter the **Main Menu.**	ENTER	*BYPASS STATUS STARTUP PARAMS
3	Select the **Parameter List** with the **Up/Down** arrows and press **ENTER**.	▼ ▲ ENTER	STARTUP PARAMS *PARAMETER LIST
4	Select the appropriate **Parameter Group** with the **Up/Down** arrows and press **ENTER**.	▼ ▲ ENTER	14 RELAY OUT *16 SYSTEM CTRL
5	Select the appropriate **Parameter** in a group with the **Up/Down** arrows and press **ENTER**	▼ ▲ ENTER	*1601 START/STOP 1602 RUN ENABLE
6	Press the **Up/Down** arrows to change the **Parameter Value**.	▼ ▲	1601 START/STOP [1:DI1]
7	Press **ENTER** to store the modified value or press **ESC** to leave the **Parameter Edit** mode.	ENTER or ESC	*1601 START/STOP 1602 RUN ENABLE
8	Press **ESC** to return to the listing of **Parameter Groups**, and again to return to the **Main Menu**.	ESC ESC	*16 SYSTEM CTRL 17 OVERRIDE
9	Press **ESC** to return to the **Default Display** from the **Main Menu.**	ESC	DRIVE SELECTED BYPASS IN OFF

Note! In the Parameter Edit mode the current parameter value appears below the parameter name.

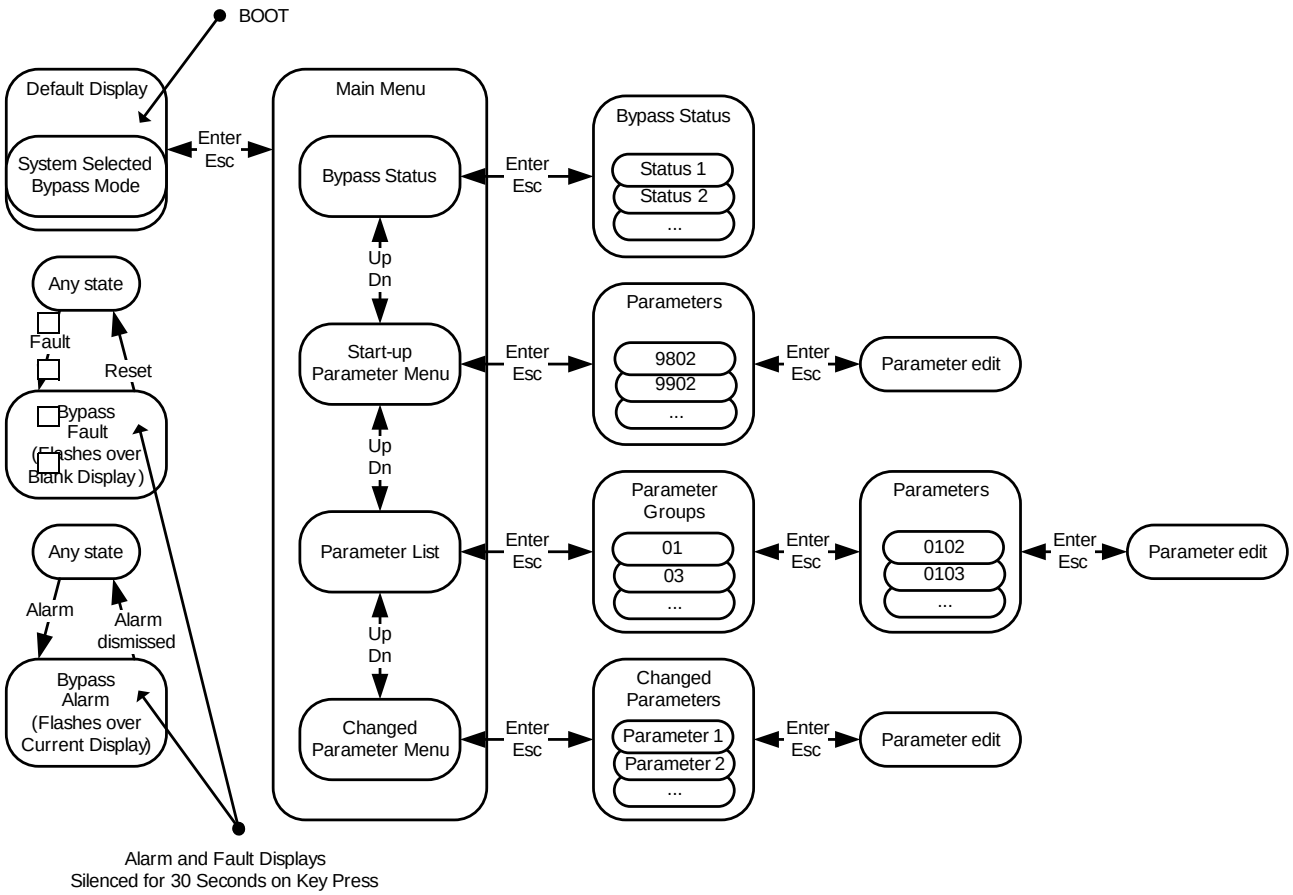
Note! To view the default parameter value, press the **Up/Down** arrows simultaneously. Press **Enter** to restore the default parameter value or press **ESC** to leave the **Parameter Edit** mode.

Modes

The HVAC Bypass Control Panel has several different modes for configuring, operating and diagnosing the bypass. The modes are:

- Default Display mode – Provides (HAND/OFF/AUTO) indication of the bypass operating control mode.
- Bypass Status mode – Provides status indications of the current system operating conditions.
- Start-Up Parameter Mode – Provides a list of parameters or operating conditions that may be configured or viewed during startup.
- Parameter List mode – Used to edit parameter values individually.
- Changed Parameter mode – Displays changed parameters.
- Bypass Fault Display mode – If there is an active bypass fault, the control panel will flash the fault number and fault diagnostic indication in English.
- Bypass Alarm Display mode – If there is an active bypass alarm, the control panel will flash the alarm number and alarm diagnostic indication in English.

The different modes are accessed through the HVAC Bypass Control Panel's menu structure illustrated on the following page.



Bypass Control Panel's Menu Structure

Parameter Descriptions

Parameter Settings

Macro Used

HVAC Default

Damper

Retrofit

Smoke Control

Parameters Changed Relative to Macro Default

Parameter/Code	Custom Value/Setting	Comments

Parameter Descriptions

Parameter Listing

Parameter data is specific to bypass firmware version .

Group 01

Code	Name	Resolution	Range	Default	Description
0101	MOTOR CURR	0.1 A		—	Display motor current in any mode.
0102	INPUT VOLT	1 V		—	Average of line-line input voltages
0103	DI STATUS	1	000000 - 111111	—	DI1-> 110010 <- DI6
0104	RO STATUS	1	00000 - 11111	—	RO1-> 11001 <- RO5
0105	PCB TEMP	0.1 ºC		—	Temperature of bypass board
0106	KW HOURS (R)	1 kWh	0 - 65535	0	Bypass-mode kilowatt hours (resettable).
0107	COMM RO	1	0-FFFFh	—	Serial link control word that can be linked to relay output control (see group 14)
0108	RUN TIME(R)	1 hr	0 - 65535 hr	0	Bypass-mode run time (resettable).
0109	ON TIME 1(R)	1 day	0 - 65535 days	0	Total power on time of bypass, days (resettable)
0110	ON TIME 2(R)	2sec	00:00:00 - 23:59:58	0	Total power on time of bypass, hr:min:sec (resettable)
0111	A-B VOLT	1 V		—	Phase A - Phase B voltage
0112	B-C VOLT	1 V		—	Phase B - Phase C voltage
0113	C-A VOLT	1 V		—	Phase C - Phase A voltage
0114	MWH(R)	0.001 MWH - 1 MWH	0.001 MWH - 65535 MWH	0	Drive kWh savings over bypass operation (resettable)
0115	COST SAVED(R)	0.001 K$ - 1 K$	0.001 K$ - 65535 K$	0	Drive cost savings over bypass operation (reset by parameter 0114)
0116	CO2 SAVED(R)	0.1 tn	0.1 - 6553.5 tn	0	Drive CO2 savings over bypass operation (reset by parameter 0114)

(R) Can be reset by pressing UP and DOWN buttons simultaneously when in parameter set mode.

Group 03

Code	Name	Resolution	Range	Default	Description
0301	FBUS CW 1	—	b0: 1 = Start b1: 1 = Fault reset b2: 1 = Run disable b3: 1 = Field bus local b4: 1 = Start disable 1 b5: 1 = Start disable 2 b6: 1 = Start disable 3 b7: 1 = Start disable 4 b8: 1 = Bypass override b9: 1 = Link On b10 - b15: not used	0	Control word 1 from field bus
0303	FBUS SW 1	—	b0: 1 = Ready b1: 1 = Enabled b2: 1 = Started b3: 1 = Running b4: 1 = Field bus local b5: 1 = Fault b6: 1 = Alarm b7: 1 = Notice b8: 1 = Request control b9: 1 = Override b10: 1 = Powered up b11: 1 = Bypass mode b12: 1 = Panel local mode b13 - 15: not used	0	Status word 1 to field bus
0305	FLT WORD 1	—	b0: 1 = Coil current measurement b1: 1 = Bypass contact stuck b2: 1 = Drive contact stuck b3: 1 = Bypass coil open b4: 1 = Drive coil open b5: 1 = Undervoltage b6: not used b7: 1 = Drive AI2 fault b8: 1 = Motor overload b9: 1 = Input phase A loss b10: 1 = Input phase B loss b11:1 = Input phase C loss 12: 1 = Drive 1st start fault b13: 1 = coil power supply fault b14: not used b15: 1 = Earth fault	0	Bypass fault status, word 1

Group 03

Code	Name	Resolution	Range	Default	Description
0306	FLT WORD 2	—	b0: 1 = Motor Underload b1: 1 = Max cycling fault b2: 1 = Drive link fault b3: 1 = Reverse rotation b4: 1 = Phase A current measurement b5: 1 = Phase C current measurement b6: 1 = Bypass coil shorted b7: 1 = Drive coil shorted b8: not used b9: not used b10: 1 = Invalid sub-assembly b11: 1 = Serial 1 Err b12: 1 = EFB Config File b13: 1 = Force Trip b14: 1 = EFB 1 b15: 1 = EFB 2	0	Bypass fault status, word 2
0307	FLT WORD 3	—	b0: 1 = EFB 3 b1: 1 = Open motor phase b2: not used b3: not used b4: 1 = Control board temperature b5: not used b6: not used b7: not used b8: 1 = RBIO ID error b9: 1 = Stack overflow b10: 1 = Timed scan overflow b11: 1 = Serial flash corrupt b12: 1 = Unknown drive b13: 1 = Unknown bypass b14 - b15: not used	0	Bypass fault status, word 3
0308	ALR WORD 1	—	b0: 1 = Input phase A loss b1: 1 = Input phase B loss b2: 1 = Input phase C loss b3: 1 = Auto transfer active b4: 1 = External Comm Error b5: 1 = Run Enable b6: 1 = PCB Temp b7: 1 = Drive Setup b8: 1 = Bypass run delay b9: 1 = Motor Temp b10: 1 = Underload b11: 1 = Bypass disabled b12: 1 = Drive link error b13: 1 = Drive test b14: 1 = Drive 1st start needed b15: 1 = Low input voltage	0	Bypass alarm status, word 1

Group 03

Code	Name	Resolution	Range	Default	Description
0309	ALR WORD 2	—	b0: not used b1: not used b2: Override 1 b3: Override 2 b4: 1 = Start Enable 1 b5: 1 = Start Enable 2 b6: 1 = Start Enable 3 b7: 1 = Start Enable 4 b8: 1 = Mode auto lock b9: 1 = Mode local lock b10: 1 = Comm config error b11: 1 = FIG parameter configuration b12: 1 = Drive faulted b13 - b15: not used	0	Bypass alarm status, word 2

Group 04

Code	Name	Resolution	Range	Default	Description
0401	LAST FAULT	1	3001 - 3999 See 'Faults' page	0	Last fault declared
0402	F1 TIME 1	1, days ago	0 - 65535	0	Time since last fault, days
0403	F1 TIME 2	2, ago	00:00:00 - 23:59:58	0	Time since last fault, hr:min:sec
0404	F1 VOLTAGE	1V	0 - 1200V	0	Input voltage at last fault
0405	F1 CURRENT	0.1A	0.0 - 6553.5A	0	Motor current at last fault
0406	F1 EVENT 1	—	See parameter 501	0	Last event status before last fault
0407	F1 E1 TIME	2, before	00:00:00 - 23:59:58	0	Time before last fault of last event: hr:min:sec if time < 1 day
		1, days before	0 - 9999		days if time >= 1 day
0408	F1 EVENT 2	—	See parameter 501	0	2nd to last event status before last fault

Group 04

Code	Name	Resolution	Range	Default	Description
0409	F1 E2 TIME	2, before	00:00:00 - 23:59:58	0	Time before last fault of 2nd last event: hr:min:sec if time < 1 day
		1, days before	0 - 9999		days if time >= 1 day
0410	FAULT 2	1	3001 - 3999 See 'Faults' page	0	2nd to last fault
0411	F2 TIME 1	1, days ago	0 - 65535	0	Time since 2nd to last fault, days
0412	F2 TIME 2	2, ago	00:00:00 - 23:59:58	0	Time since 2nd to last fault, hr:min:sec
0413	F2 VOLTAGE	1V	0 - 1200V	0	Input voltage at 2nd to last fault
0414	F2 CURRENT	0.1A	0.0 - 6553.5A	0	Motor current at 2nd to last fault
0415	F2 EVENT 1	—	See parameter 501	0	Last event status before 2nd to last fault
0416	F2 E1 TIME	2, before	00:00:00 - 23:59:58	0	Time before 2nd last fault of last event: hr:min:sec if time < 1 day
		1, days before	0 - 9999		days if time >= 1 day
0417	F2 EVENT 2	—	See parameter 501	0	2nd to last event before 2nd to last fault
0418	F2 E2 TIME	2, before	00:00:00 - 23:59:58	0	Time before 2nd last fault of 2nd last event: hr:min:sec if time < 1 day
		1, days before	0 - 9999		days if time >= 1 day
0419	FAULT 3	1	3001 - 3999 See 'Faults' page	0	3rd to last fault
0420	FAULT 4	1	3001 - 3999 See 'Faults' page	0	4th to last fault
0421	FAULT 5	1	3001 - 3999 See 'Faults' page	0	5th to last fault

Group 05

Code	Name	Resolution	Range	Default	Description
0501	LAST EVENT	—	b0: 1 = Bypass mode b1: 1 = Safeties In b2: 1 = Run Enable b3: 1 = Start b4: 1 = In Auto Transfer b5: 1 = Bypass Override b6: 1 = Fireman's Override b7: 1 = Drive Fault b8: 1 = Bypass Fault b9: 1 = System Started b10: 1 = System Running b11:1 = Drive First Start Completed b12: not used b13: not used b15,b14: 0,0 = Off; 0,1 = Hand, 1,0 = Auto; 1,1 = not valid	0	Status at last event
0502	E1 TIME 1	1, days ago	0 - 65535	0	Time since last event, days
0503	E1 TIME 2	2, ago	00:00:00 - 23:59:58	0	Time since last event, hr:min:sec
0504	EVENT 2	—	See parameter 501	0	Status of 2nd to last event
0505	E2 TIME 1	1, days ago	0 - 65535	0	Time since 2nd last event, days
0506	E2 TIME 2	2, ago	00:00:00 - 23:59:58	0	Time since 2nd last event, hr:min:sec
0507	EVENT 3	—	See parameter 501	0	Status of 3rd to last event
0508	E3 TIME 1	1, days ago	0 - 65535	0	Time since 3rd last event, days
0509	E3 TIME 2	2, ago	00:00:00 - 23:59:58	0	Time since 3rd last event, hr:min:sec
0510	EVENT 4	—	See parameter 501	0	Status of 4th to last event
0511	E4 TIME 1	1, days ago	0 - 65535	0	Time since 4th last event, days
0512	E4 TIME 2	2, ago	00:00:00 - 23:59:58	0	Time since 4th last event, hr:min:sec

Group 14

Code	Name	Resolution	Range	Default	Description
1401	RO1 SELECT	1	0 = NOT SEL 1 = SYS READY 2 = SYS RUNNING 3 = SYS STARTED 4 = BYPASS SEL 5 = BYPASS RUN 6 = BYPASS FLT 7 = BYP NOT FLT 8 = BYPASS ALRM 9 = DRIVE FAULT 10 = DRV NOT FLT 11 = DRIVE ALARM 12 = OVERRIDE 13 = BYPASS HAND 14 = BYPASS OFF 15 = BYPASS AUTO 16 = COMM CTRL 17 = SYS ALARM 18 = BYP FLT/ALM 19 = BYP OVERLD 20 = BYP UNDERLD 21 = PCB OVERTMP 22 = SYS UNDERLD 23 = SYSTEM FLT 24 = SYS FLT/ALM 25 = SYS EXT CTL 26 = SYS OVERLD 27 = CONTACT FLT	BYP NOT FLT (7)	Selects function for digital output. Define the event or condition that activates relay 1.
1402	R1 ON DLY	0.1 sec	0-3600.0s	0s	Delay from active state to active output.
1403	R1 OFF DLY	0.1 sec	0-3600.0s	0s	Delay from inactive state to inactive output.
1404	RO2 SELECT	1	See RO 1 Select.	SYS RUNNING (2)	
1405	R2 ON DLY	0.1 sec	0-3600.0s	0s	Delay from active state to active output.
1406	R2 OFF DLY	0.1 sec	0-3600.0s	0s	Delay from inactive state to inactive output.
1407	RO3 SELECT	1	See RO 1 Select.	SYS STARTED (3)	
1408	R3 ON DLY	0.1 sec	0-3600.0s	0s	Delay from active state to active output.
1409	R3 OFF DLY	0.1 sec	0-3600.0s	0s	Delay from inactive state to inactive output.
1410	RO4 SELECT	1	See RO 1 Select.	BYPASS SEL (4)	

Group 14

Code	Name	Resolution	Range	Default	Description
1411	R4 ON DLY	0.1 sec	0-3600.0s	0s	Delay from active state to active output.
1412	R4 OFF DLY	0.1 sec	0-3600.0s	0s	Delay from inactive state to inactive output.
1413	RO5 SELECT	1	See RO 1 Select.	BYPASS AUTO (13)	
1414	R5 ON DLY	0.1 sec	0-3600.0s	0s	Delay from active state to active output.
1415	R5 OFF DLY	0.1 sec	0-3600.0s	0s	Delay from inactive state to inactive output.

Group 16

Code	Name	Resolution	Range	Default	Description
1601	START/STOP	1	0 = NOT SEL 1 = DI1 2 = COMM	DI 1 (1)	Selects source for system start command.
1602	RUN ENABLE	1	0 = NOT SEL 1 = DI2 2 = COMM	NOT SEL (0)	Selects source for run enable command.
1603	START EN 1	1	0 = NOT SEL 1 = DI3 2 = COMM	DI 3 (1)	Selects source for start enable 1 command.
1604	START EN 2	1	0 = NOT SEL 1 = DI4 2 = COMM	NOT SEL (0)	Selects source for start enable 2 command.
1605	START EN 3	1	0 = NOT SEL 1 = DI5 2 = COMM	NOT SEL (0)	Selects source for start enable 3 command.
1606	START EN 4	1	0 = NOT SEL 1 = DI2 2 = COMM	NOT SEL (0)	Selects source for start enable 4 command.
1607	RESET SRC	1	0 = NOT SEL 1 = DI4 2 = COMM	NOT SEL (0)	Selects source for fault reset command (rising edge).

Group 16

Code	Name	Resolution	Range	Default	Description
1608	AUTO XFR	1	0 = NOT SEL 1 = ENABLE	NOT SEL (0)	Enabled allows auto transfer to bypass on all drive faults except the conditional faults which require an additional enable. NOT SEL prevents auto transfer to bypass for all drive faults including the conditional faults.
1609	OC TRANSFR	1	0 = NOT SEL 1 = ENABLE	NOT SEL (0)	Drive over current causes auto transfer. Requires global auto transfer enable also.
1610	OV TRANSFR	1	0 = NOT SEL 1 = ENABLE	NOT SEL (0)	Drive over voltage causes auto transfer. Requires global auto transfer enable also.
1611	UV TRANSFR	1	0 = NOT SEL 1 = ENABLE	NOT SEL (0)	Drive under voltage causes auto transfer. Requires global auto transfer enable also.
1612	AI TRANSFR	1	0 = NOT SEL 1 = ENABLE	NOT SEL (0)	Drive AI loss causes auto transfer. Requires global auto transfer enable also.
1613	BP DISABLE	1	0 = NOT SEL 1 = DISABLE	NOT SEL (0)	Disables bypass mode.
1614	BP RUN DLY	1 sec	0 - 300 secs	0s	Bypass contactor pick-up delay when starting bypass or transferring from Drive mode.
1615	SAVE PARAM	1	0 = DONE 1 = SAVE	0	Save User Settings (SaveImm + SavePwrd).
1616	DISP ALRMS	1	0 = DISABLE 1 = ENABLE	ENABLE (1)	Enables alarms to be displayed: INP PHASE A LOSS, INP PHASE B LOSS, INP PHASE C LOSS, MTR OVERLOAD, BYPASS DISABLED, DRIVE SETUP, PCB TEMP DRIVE LINK ERROR DRIVE FAULTED
1617	DRIVE TEST	1	0 = DISABLE 1 = ENABLE	DISABLE (0)	Enables drive test mode. Drive contactor is opened.
1618	PASS CODE	1	0 - 65535	0	Enter correct password to here in order to change value of the PAR LOCK. Default password value is "123".

Group 16

Code	Name	Resolution	Range	Default	Description
1619	PAR LOCK	1	0 = LOCKED 1 = OPEN	OPEN (1)	When switched to "LOCKED" prevents parameter changes from panel. Does not affect to Field Bus writes, expect changing the lock value itself: correct password must always be set first, even in case of Field Bus.
1620	RUN EN TXT	1	0 = RUN ENABLE 1 = DAMPER END SWTCH 2 = VALVE OPENING 3 = PRE-LUBE CYCLE	RUN ENABLE (0)	Alternative text choices for alarm 4006.
1621	ST EN1 TXT	1	0 = START ENABLE 1 1 = VIBRATION SWITCH 2 = FIRESTAT 3 = FREEZESTAT 4 = OVERPRESSURE 5 = VIBRATION TRIP 6 = SMOKE ALARM 7 = SAFETY OPEN 8 = LOW SUCTION	START ENABLE 1 (0)	Alternative text choices for alarm 4021.
1622	ST EN2 TXT	1	0 = START ENABLE 2 ...	START ENABLE 2 (0)	Alternative text choices for alarm 4022. See parameter 1621 for range.
1623	ST EN3 TXT	1	0 = START ENABLE 3 ...	START ENABLE 3 (0)	Alternative text choices for alarm 4023. See parameter 1621 for range.
1624	ST EN4 TXT	1	0 = START ENABLE 4 ...	START ENABLE 4 (0)	Alternative text choices for alarm 4024. See parameter 1621 for range.
1625	COMM CTRL	1	0 = DRIVE ONLY 1 = SYSTEM	DRIVE ONLY (0)	Selects comm control mode. In drive only mode, control of drive is made through drive points, and control of bypass over comms is not possible. In system mode, control of system (bypass or drive) is made through bypass points.

Group 16

Code	Name	Resolution	Range	Default	Description
1626	MODE LOCK	1	0 = NOT SEL 1 = AUTO MODE 2 = LOCAL MODE	NOT SEL (0)	When Mode Lock is AUTO MODE, the control panel will not allow switching to Hand or Off. When Mode Lock is LOCAL MODE, the control panel will not allow switching to Auto.
1627	COST/KWH	0.1 c/kWh	0.0 - 100.00 c/kWh	7.0 c/kWh	Cost of energy: cents/kWh
1628	LEARN MODE	1	0 = NOT SEL 1 = ENABLED	NOT SEL (0)	When enabled, bypass learns average power consumption while operating in bypass mode
1629	LEARN TIME	0.1 Hr	0.0 - 200.0 Hr	48.0 Hr	Time that learn mode will be active after it is enabled

Group 17

Code	Name	Resolution	Range	Default	Description
1701	OVERRIDE 2	1	0 = NOT SEL 1 = DI5 2 = COMM	NOT SEL (0)	Selects source for override 2 command.
1702	RUN EN OVR	1	0 = ACKNOWLEDGE 1 = DISREGARD	DISREGARD (1)	Acknowledge or disregard run enable during override 2.
1703	ST EN1 OVR	1	0 = ACKNOWLEDGE 1 = DISREGARD	DISREGARD (1)	Acknowledge or disregard start enable 1 during override 2.
1704	ST EN2 OVR	1	0 = ACKNOWLEDGE 1 = DISREGARD	DISREGARD (1)	Acknowledge or disregard start enable 2 during override 2.
1706	ST EN4 OVR	1	0 = ACKNOWLEDGE 1 = DISREGARD	DISREGARD (1)	Acknowledge or disregard start enable 4 during override 2.
1707	FAULTS OVR	1	0 = ACKNOWLEDGE 1 = DISREGARD	DISREGARD (1)	Acknowledge or disregard overrideable bypass faults during override 2. All faults can be overrode except: 3009, 3021, 3022, 3023, 30234, 3027, 3034, 3101, 3202, 3203, 3204, 3205, 3206

Group 30

Code	Name	Resolution	Range	Default	Description
3001	UL ACTION	1	0 = NOT SEL 1 = FAULT 2 = WARNING	NOT SEL (0)	Selects action to be taken if underload occurs.
3002	UL TIME	1 sec	10 - 400 sec	20 sec	Time below underload level before fault is declared.
3003	UL TRIP %	1%	0 - 100%	20%	Sets power level at which underload is declared.
3004	COMM LOSS	1	0 = NOT SEL 1 = FAULT 2 = CONST SP7 3 = LAST SPEED	NOT SEL (0)	This parameter serves similar purpose as parameter 3018 in drive which specifies behavior if Modbus link goes down. Difference is that this parameter applies in drive and bypass modes and if drive node or bypass node detects a problem.
3005	COMM TIME	0.1s	0.0 - 600.0s	10.0s	Sets the communication fault time used with COMM LOSS parameter.
3006	PHASE LOSS	1	0 = DISABLE 1 = ENABLE	1	Disable for input phase loss.
3007	PHASE SEQ	1	0 = DISABLE 1 = ENABLE	1	Disable for input phase sequence fault.

Group 32

Code	Name	Resolution	Range	Default	Description
3201	SUPER CTRL	1	0 = DISABLE 1 = ENABLE	DISABLE (0)	Enable supervisory control in bypass mode.
3202	START LVL	1%	0 - 100%	70%	Value of drive's AI2 that causes bypass contactor closure. Applies only in supervisory mode.
3203	STOP LEVEL	1%	0 - 100%	30%	Value of drive's AI2 that causes bypass contactor opening. Applies only in supervisory mode.
3204	START DLY	1s	20 - 3600s	40s	Time that close condition must be present before contactor is closed. Applies only in supervisory mode.
3205	STOP DLY	1s	20 - 3600s	60s	Time that open condition must be present before contactor is opened. Applies only in supervisory mode.

Group 32

Code	Name	Resolution	Range	Default	Description
3206	FBK LOSS	1	0 = BYP STOP 1 = BYP START	BYP START (1)	Bypass contactor operation if drive link fault, drive AI2 loss or excessive cycling.

Group 33

Code	Name	Resolution	Range	Default	Description
3301	FW VERSION	hex		—	Revision of main application firmware.
3302	PT VERSION	hex		—	Revision of panel text file.
3303	LP VERSION	—		—	Loading package version.
3304	CB VERSION	—		—	Control board version.
3305	TEST DATE	—		—	
3306	DRIVE TYPE	—		—	Drive Type - copy of drive's parameter 33.04.
3307	SUB ASMBLY	—		—	Bypass Sub assembly type.
3308	PLANT CODE	1	0-9	0	Part of bypass serial number: Shows 1 digit plant code. Identifies the factory where the device was made
3309	MFG DATE	1	0107 - 5299	0	Part of bypass serial number: Shows 4 digit manufacturing date. WWYY. (2 digits for the week number 01-52 and 2 digits for the year)
3310	UNIT NUM	1	00001 - 65535	0	Part of bypass serial number: Shows 5 digit unit number here. Tell sorder number of a unit manufactured during a certain week. Maximum number is 65525.

Group 50

Code	Name	Resolution	Range	Default	Description
5001	BP PROT ID	hex	0x0000 - 0xFFFF	0x0000	Group 50 shall mimic Group 53 except settings shall apply to bypass node.
5002	BP MAC ID	1	0 - 65535	2	Bypass station ID (NODE ADDRESS)
5003	BAUD RATE	0.1 kbit/s	1.2, 2.4, 4.8, 9.6, 19.2, 38.4, 57.6, 76.8	9.6	Read-only copy from Group 53.

Group 50

Code	Name	Resolution	Range	Default	Description
5004	EFB PARITY	1	0=8 NONE 1, 1=8 NONE 2, 2=8 EVEN 1, 3=8 ODD 1	0	Read-only copy from Group 53.
5005	PROFILE	1	0=ABB DRV LIM, 1=DCU PROFILE, 2=ABB DRV FULL	0	Read-only copy from Group 53.
5006	BP OK MSG	1	0 - 65535	0	
5007	BP CRC ERR	1	0 - 65535	0	
5008	UART ERROR	1	0 - 65535	0	Read-only copy from Group 53.
5009	BP STATUS	1	0=IDLE, 1=EXECUT INIT, 2=TIME OUT, 3=CONFIG ERR, 4=OFF-LINE, 5=ON-LINE, 6=RESET, 7=LISTEN ONLY	0	
5010 ... 5018	BP PAR 10 ... BP PAR 18	1	0 - 65535	0	
5019 ... 5020	BP PAR 19 ... BP PAR 20	hex	0x0000 - 0xFFFF	0x0000	
5021 ... 5022	BP PAR 21 ... BP PAR 22	1/256 kWh	1/256 kWh - 8388608 kWh	0 kWh	32 bit number representing energy saved (parameter 0114) by using drive. Calculated: Drive savings (kWh) = (65536 x (parameter 5021 + parameter 5022)) / 256.

Group 51

Code	Name	Resolution	Range	Default	Description
5101	FBA TYPE	1	0 = NOT DEFINED 1 = Profibus 15 = LonWorks 32 = CANOpen 37 = DeviceNet	—	Displays type of attached fieldbus adapter module.
5102 ... 5126	FBA PAR 2 ... FBA PAR 26	1	0 - 65535	0	Fieldbus specific - consult FBA User's Manual.
5127	REFRESH	1	0 = DONE 1 = REFRESH	0	Validates any changed adapter module configuration parameters. After refreshing, value reverts automatically to DONE.

Group 51

Code	Name	Resolution	Range	Default	Description
5128	FBA PAR 28	1	0 - 0xFFFF	0	Parameter table version
5129	FBA PAR 29	1	0 - 0xFFFF	0	Bypass type code
5130	FBA PAR 30	1	0 - 0xFFFF	0	Mapping file version
5131	FBA STATUS	1	0 - 6	0	Fieldbus adapter status
5132	FBA PAR 32	1	0 - 0xFFFF	0	Module common software version
5133	FBA PAR 33		0 - 0xFFFF	0	Module application software version

Group 53

Code	Name	Resolution	Range	Default	Description
5301	DV PROT ID	hex	0x0000 - 0xFFFF	0x0000	All of drive's Group 53 must be replicated on bypass, since drive is configured for Modbus. All Group 53 functionality associated with selection by 98.02 shall be hosted on bypass controller for drive. Similar parameters shall be allocated for bypass.
5302	DV MAC ID	1	0 - 65535	1	Drive station ID (NODE ADDRESS)
5303	BAUD RATE	0.1 kbit/s	1.2, 2.4, 4.8, 9.6, 19.2, 38.4, 57.6, 76.8	9.6	
5304	EFB PARITY	1	0=8 NONE 1, 1=8 NONE 2, 2=8 EVEN 1, 3=8 ODD 1	0	
5305	PROFILE	1	0=ABB DRV LIM, 1=DCU PROFILE, 2=ABB DRV FULL	—	
5306	DV OK MSG	1	0 - 65535	0	
5307	DV CRC ERR	1	0 - 65535	0	
5308	UART ERROR	1	0 - 65535	0	
5309	DV STATUS	1	0=IDLE, 1=EXECUT INIT, 2=TIME OUT, 3=CONFIG ERR, 4=OFF-LINE, 5=ON-LINE, 6=RESET, 7=LISTEN ONLY	0	
5310 ... 5318	DV PAR 10 ... DV PAR 18	1	0 - 65535	0	

Group 53

Code	Name	Resolution	Range	Default	Description
5319 ... 5320	DV PAR 19 ... DV PAR 20	hex	0x0000 - 0xFFFF	0x0000	

Group 54

Code	Name	Resolution	Range	Default	Description
5401 ... 5409	DATA IN 1 ... DATA IN 9	1	0 = Not In Use 1 = Control Word (ABBDP) 2 = Ref 1 (ABBDP) 3 = Ref 2 (ABBDP) 4 = Status Word (ABBDP) 5 = Actual Value 1 (ABBDP) 6 = Actual Value 2 (ABBDP) 10001 - 19999 = Bypass parameter index +10000	—	Figure module support. Specifies addresses of parameters to be read from the drive (IN to network). Only for modules that support the cyclic low scanner function.

Group 55

Code	Name	Resolution	Range	Default	Description
5501 ... 5510	DATA OUT 1 ... DATA OUT10	1	0 = Not In Use 1 = Control Word (ABBDP) 2 = Ref 1 (ABBDP) 3 = Ref 2 (ABBDP) 4 = Status Word (ABBDP) 5 = Actual Value 1 (ABBDP) 6 = Actual Value 2 (ABBDP) 10001 - 19999 = Bypass parameter index +10000	—	Figure module support. Specifies addresses of parameters to be read from the drive (OUT to network). Only for modules that support the cyclic low scanner function.

Group 98

Code	Name	Resolution	Range	Default	Description
9802	COMM PROT SEL	1	0=NOT SEL 1=STD MODBUS 2=N2 3=FLN 4=EXT FBA 5=BACNET	0	This parameter functions in place of drive parameter 98.02 which must be set to Modbus in E-Clipse Bypass system. User fieldbus is set at E-Clipse panel.

Group 99

Code	Name	Resolution	Range	Default	Description
9902	B.P. MACRO	1	1 = HVAC DEFAULT 2 = DAMPER 3 = RETROFIT 4 = SMOKE CONTROL	1	Select bypass macro. Predifined set of parameter values for certain application is loaded in use.

Embedded Fieldbus and Fieldbus Adapters

Note! The settings for ALL external serial communication between the ACH550 with E-Clipse Bypass and any Building Automation System are configured using the E-Clipse Bypass operator panel. DO NOT attempt to configure the external serial communication connection using the ACH550 operator panel!

The settings for internal communication between the ACH550 and the E-Clipse Bypass are configured at the factory and require no adjustment.

For details on serial communications settings, please see either the ACH550 / E-Clipse Bypass EFB Users Manual or the ACH550 / E-Clipse Bypass FBA Users Manual.

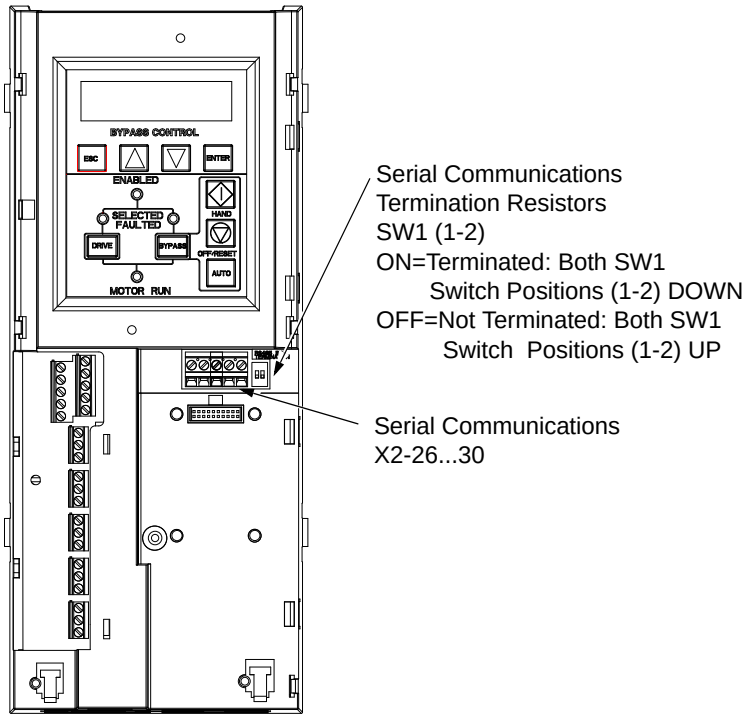
For details on EFB serial communications settings, please see the ACH550 / E-Clipse Bypass EFB Users Manual. In general, EFB external communications Node ID number and baud rate settings for the VFD are set using Group 53 in the E-Clipse bypass menu. Settings for EFB external communications for the bypass are set using Group 50 in the E-Clipse bypass menu structure.

For details on FBA serial communications settings, please see the ACH550 / E-Clipse Bypass FBA Users Manual. In general, FBA external communications settings are set using Group 51 E-Clipse bypass menu structure.

The following section contains the basic start-up procedure of the E-Clipse Bypass Embedded Fieldbus protocols. The E-Clipse Bypass is embedded with BACnet, FLN, Modbus-RTU, and N2 protocols. For a complete list of parameters see Parameter Description section of the E-Clipse Bypass Configuration manual. E-Clipse Bypass parameter groups 14, 16, 17, 50, 53 and 98 can be changed for more specific network configuration. For protocol specific details for the EFB: BACnet, FLN, Modbus-RTU, and N2 download the ACH550 E-Clipse Bypass EFB User's Manual (3AUA0000031267 REVA) from www.abb.us/drives.

EFB Electrical Installation

The figure below shows the locations of the SW1 DIP switch and X2 terminals 26..30 on the E-Clipse Bypass control board. The function and setting of this switch and wire terminal connection are explained in the following section.



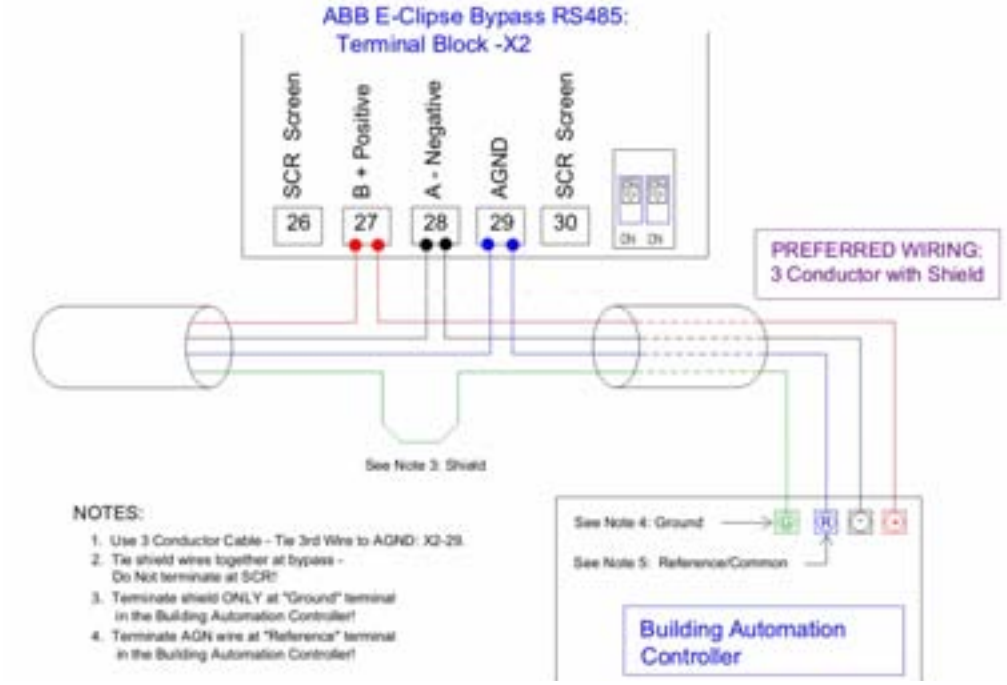
Warning! Connections should be made only while the bypass is disconnected from the power source.

Bypass terminals 26…30 are for EIA 485 communications.

- Use Belden 9842 or equivalent. Belden 9842 is a dual twisted, shielded pair cable with a wave impedance of 120 O.
- Use one of these twisted shielded pairs for the EIA 485 link. Use this pair to connect all A (-) terminals together and all B (+) terminals together.
- Use both of the other wires in the other pair for the logical ground (terminal 29)
- Do not directly ground the EIA 485 network at any point. Ground all devices on the network using their corresponding earthing terminals.
- As always, the grounding wires should not form any closed loops, and all the devices should be earthed to a common ground.
- Connect the EIA 485 link in a daisy-chained bus, without dropout lines.

- To reduce noise on the network, terminate the EIA 485 network using 120 O resistors at both ends of the network. Use the DIP switch to connect or disconnect the termination resistors. See following diagram and table.

Preferred Wiring Diagram (See ACH550 E-Clipse Bypass EFB User's Manual (3AUA0000031267 REVA) for Alternate Wiring:



- Do not connect the shield at the bypass. Tie the shields together at the bypass. Only load the shield connection at the EIA 485 master.
- Use seperate, metal conduit and route wires seperately to keep these three classes of wiring apart:
    - •Input power wiring
    - •Motor wiring
    - •Control/communications wiring

DIP Switch Settings SW1 (1-2)
The DIP switch is used to configure the serial communications termination resistors. To reduce noise on the serial communications network, terminate the EIA-485 network using 120 ohm resistors at both ends of the network. If the E-Clipse Bypass is the last node on the network, use the DIP switches to connect or disconnect the on-board termination resistors. Both SW1 switch positions (1,2) must be set in the ON or OFF position to correctly configure the termination resistors.

EFB Basic Configuration

The ACH550 drive has been programmed at the factory! Do not use drive control panel to program communications unless specified. Follow steps 1 thru 5 as needed based on your network control requirements. See E-Clipse Bypass Configuration manual (3AUA0000016461 REVB): Parameter

Description section, for a complete list of parameters. E-Clipse Bypass parameter groups 14, 16, 17, 50, 53 and 98 can be changed for more specific network configuration.

Download E-Clipse Bypass Embedded Fieldbus User Manual from http://www.abb.us/drives

STEP 1: Establishing bypass communication with building management system
STEP 2: START/STOP control via serial communication controller
STEP 3: Drive reference and/or PID setpoint via serial communication controller
STEP 4: BACnet Set-up
STEP 5: CYCLE POWER to the system: E-Clipse bypass and drive. (Required)
STEP 6: Network Communication Verification

STEP 1: Establishing Bypass Communication

Bypass Parameter	DRIVE (PAR 1625 = 0)	SYSTEM DRV & BYPASS (PAR 1625 = 1)	Description
9802 Comm Prot Sel	Select Communication protocol (0 - 5)	Select Communication protocol (0 - 5)	0 = NOT SEL 1= STD MODBUS 2 = N2 3 = FLN 4 = EXT FBA 5 = BACNET
1625 Comm CTL	0* (Factory setting)	1	0 = DRIVE ONLY (Default) 1= SYSTEM (DRV & BP) Selects comm control mode. In drive only mode, control of by-pass is not possible. When SYSTEM is selected both the bypass and drive can be controlled in selected protocol.
5301 DV PROT ID	READ ONLY	READ ONLY	Do not edit. Contains protocol identification and revision.
5302 DV MAC ID	Set desired drive network ID	Set desired drive network ID	Default: 1: Default 128 in BACnetSets the drives unique node address **Must be set different than 5002**
5001 BP PROT ID	READ ONLY	READ ONLY	Do not edit. Contains protocol identification and revision.
5002 BP MAC ID	N/A	Set desired bypass network ID	Default: 2 Sets the bypass unique node address **Must be set different than 5302**

Note: * If 1625 is set to 0 drive only, bypass control of the motor is from the hand button on the bypass keypad.

STEP 2: START/STOP Control via Serial Communication Controller

Bypass Paremeter	DRIVE	SYSTEM DRV & BYPASS	Description
1601 START/STOP	2	2	0 = NOT SEL 1 = DI1 2 = COMM Selects source for system start command

Note: See E-Clipse Bypass Configuration manual section Parameter Description for complete list of group 16 parameters and settings.

STEP 3: Drive Reference and/or PID Setpoint via Serial Communication Controller

Bypass Paremeter	DRIVE	SYSTEM DRV & BYPASS	Description
1103 REF1 SELECT DRIVE CONTROL PANEL	8	8	Selects the signal source for external reference REF1 = COMM – Defines the fieldbus as the reference source. SEE ACH550-01/02 User Manual for additional information
4010 SET POINT SEL DRIVE CONTROL PANEL	8	8	Defines the reference signal source for the PID controller. Parameter has no significance when the PID regulator is by-passed 8 = COMM – Fieldbus provides set point. SEE ACH550-01/02 User Manual for additional information

STEP 4: BACnet Setup

Bypass Paremeter	DRIVE	SYSTEM DRV & BYPASS	Description
5311 DV PAR11 DRIVE ID	Set DRIVE BACnet device ID	Set DRIVE BACnet device ID	This parameter, together with 5317 sets the DRIVE BACnet device object instance ID
5317 DV PAR17 DRIVE ID	Set DRIVE BACnet device ID	Set DRIVE BACnet device ID	For DRIVE ID's > 65,535 the ID = 5311's value + (10,000 x 5317)
5011 BP PAR11 BYPASS ID	N/A	Set BYPASS BACnet device ID	This parameter, together with 5317 sets the BYPASS BACnet device object instance ID
5017 BP PAR17 BYPASS ID	N/A	Set BYPASS BACnet device ID	For BYPASS ID's > 65,535 the ID = 5311's value + (10,000 x 5317)

Note: See E-Clipse Bypass Configuration manual section Parameter Description for complete list of group 16 parameters and settings.

REQUIRED

STEP 5: CYCLE POWER

ALLOW TIME FOR DC BUS TO DISCHARGE. This is required for serial communication changes to take effect

STEP 6: E-Clipse Bypass

View E-Clipse Bypass Parameter 53.08 UART ERROR. If 53.08 is incrementing up, check the network configuration. (Trunk polarity, Baud rate, Parity, Noise on trunk, or Duplicate addresses).

View Parameter 53.07 CRC ERROR. If it is incrementing up, check protocol and noise on trunk.

View Parameter 53.09, it should be display "ON LINE". If 53.09 displays "IDLE", the drive is not communicating with the controller, verify wiring.

Diagnostics and Troubleshooting

WARNING! Do not attempt any measurement, parts replacement or other service procedure not described in this manual. Such action will void the warranty, may endanger correct operation, and increase downtime and expense.

WARNING! All electrical installation and maintenance work described in this chapter should only be undertaken by qualified service personnel. The Safety instructions on the first pages of this manual must be followed.

Diagnostic Displays

The bypass detects error situations and reports them using:

- The green and red status LEDs on the bypass control panel
- The bypass control panel display

The form of the display depends on the severity of the error. You can specify the severity for many errors by directing the bypass to:

- Ignore the error situation.
- Report the situation as an alarm.
- Report the situation as a fault.

Red – Faults

The bypass signals that it has detected a severe error, or fault, by:

- Enabling the red Faulted LED on the bypass (LED is either steady on or blinking).
- Overriding the control panel display with the display of a fault code.
- Stopping the motor (if it was on).

The message reappears after 30 seconds if the control panel is not touched and the fault is still active. The Faulted LED remains active (either steady on or blinking) even when the fault display is silenced.

Flashing Display – Alarms

For less severe errors, called alarms, the diagnostic display is advisory. For these situations, the bypass is simply reporting that it had detected something “unusual.” In these situations, the bypass overrides the control panel display with the display of an alarm code and/or name.

The alarm code on the display flashes over the current display. Pressing any key silences the alarm message. The message reappears after 30 seconds if the control panel is not touched and the alarm is still active.

Correcting Faults

The recommended corrective action for faults is:

- Use the following “Fault Listing” table to find and address the root cause of the problem.
- Reset the system.

Fault Listing

Fault Code	Fault Name In Panel	Fault	Possible Cause	Corrective Action
3001	COIL CURR FBK	RBCU is sensing abnormal current feedback when neither contactor should be energized	Defective component on RBCU	Change RBCU
3002	BYP CNTACT STUCK	M2 contactor indicates it is not prepared to move on a power up check of the contactor or after contact is commanded to open	Defective Contactor Defective RBCU	Disconnect incoming power from unit Check if contactor armature moves freely. If armature moves freely, then change the RBCU. If armature does not move freely, then change individual contactor (M2) or the complete assembly (RCSA-0x)
3003	DRV CNTACT STUCK	M1 contactor indicates it is not prepared to move on a power up check of the contactor or after contact is commanded to open	Defective Contactor Defective RBCU	Disconnect incoming power from unit Check if contactor armature moves freely. If armature moves freely, then change the RBCU. If armature does not move freely, then change individual contactor (M1) or the complete assembly (RCSA-0x)
3004	BYPASS COIL OPEN	M2 contactor will not close when commanded to do so	Loose J8 connector on RBCU Loose wires on contactor terminals A1 and/or A2 Bad Output on RBCU Bad Contactor	Verify that J8 connector is firmly seated. With incoming power disconnected, check for tightness of A1 and A2 terminals Swap RBCU Change Contactor/ Assembly
3005	DRIVE COIL OPEN	M1 contactor will not close when commanded to do so	Loose J8 connector on RBCU Loose wires on contactor terminals A1 and/or A2 Bad Output on RBCU Bad Contactor	Verify that J8 connector is firmly seated. With incoming power disconnected, check for tightness of A1 and A2 terminals Swap RBCU Change Contactor/ Assembly

Fault Code	Fault Name In Panel	Fault	Possible Cause	Corrective Action
3006	UNDERVOLTAGE	Message only occurs if drive is controlling the motor and the power to the bypass is removed before the drive phases back. Message will appear in the fault log. This message will only appear when drive contactor opens when drive is operating	Loose J7 connector on RBCU unit Loose input wiring Incoming power problems	Check that J7 connector is firmly seated in RBCU Check tightness of incoming connections Check Parameter 0413 to view voltage level at time of trip Check upstream protection
3008	DRIVE AI2 LOSS	Only displayed when in Supervisory mode. Indicates that AI2 on the drive has failed.	Check ACH550 manual for AI2 loss	Check ACH550 manual for AI2 loss
3009	MTR OVERLOAD	Bypass opens on motor overload conditions defined in the drive	Drive Mode: Bad Motor Bad CT's Bad RBCU Bypass mode: Bad motor Bad CT's Bad RBCU Either mode: low input voltage	Check if overload condition exists Drive Mode: Refer to 550 manual for proper troubleshooting techniques Bypass Mode: Check that J2 connector is firmly seated in RBCU Use clamp meter to verify mtr current vs. display in parameter 0101 Check input voltage
3010	INP PHASE A LOSS	Fault will be generated only when trying to close the bypass contactor and the RBCU does not sense voltage on Phase A	Loose J7 connector Loose wiring on Contactor assembly. Blown upstream fuse	Check J7 connector Check yellow wire on input block Check incoming voltage, phase to ground
3011	INP PHASE B LOSS	Fault will be generated only when trying to close the bypass contactor and the RBCU does not sense voltage on Phase B	Loose J7 connector Loose wiring on Contactor assembly. Blown upstream fuse	Check J7 connector Check black wire on input block Check incoming voltage, phase to ground
3012	INP PHASE C LOSS	Fault will be generated only when trying to close the bypass contactor and the RBCU does not senses voltage on Phase C	Loose J7 connector Loose wiring on Contactor assembly. Blown upstream fuse	Check J7 connector Check red on input block Check incoming voltage, phase to ground

Fault Code	Fault Name In Panel	Fault	Possible Cause	Corrective Action
3013	DRIVE 1ST START	Fault generated if attempting to close the bypass contactor with out running the bypass in drive mode first.	NA	Run bypass unit in drive mode before attempting bypass mode
3014	COIL POW SUPPLY	Coil power supply has failed to reach rated voltage	Internal failure on RBCU unit Shorted contactor coil	Cycle power on bypass unit. If contactor coil is shorted, fault 3023 or 3024 will be generated. If 3023 or 3024 is generated, replace respective contactor If 3023 or 3024 is not generated on power up, replace RBCU unit.
3016	EARTH FAULT	Declared if attempting to close the bypass contactor when the drive has earth fault declared	Earth fault in motor	Refer to the ACH550 manual
3017	MTR UNDERLOAD	If motor power(%) level falls below minimum power level establish in parameter 30.03 for the time (s) set in parameter 30.02 fault will be generated. Parameter 30.03 is a percentage of motor power as defined in the drive via parameter 99.09. Fault only applies to bypass mode	Broken belt	Check load Reset bypass keypad Check ACH550 manual, fault code 17, for further action
3018	MAX CYCLE FAULT	Supervisory Mode only. Declared if bypass contactor is closed by supervisory control 16 times within a 1 hour period.	High and low levels of hysteresis band are too tight	Check parameters 32.02-32.05. Increase time delays on parameters 32.04 and 32.05
3019	DRIVE LINK FAULT	Supervisory Mode Only. Fault generated if RS-485 link between drive and bypass stops communicating.	Bad cable between drive and bypass Communication improperly set in drive Parameter 98.02(Modbus) Application Macro in 99.02 set to 15 (text) Check ACH550 E-clipse user manual.	Proper seating of cable in drive and RBCU(connector J3) Check drive parameter 98.02 and 99.02 Check drive Group 53 Follow DriveLink recovery procedure

Fault Code	Fault Name In Panel	Fault	Possible Cause	Corrective Action
3020	PHASE SEQ	Sequence of 3 phase voltage input is such that bypass operation will result in motor rotation opposite of drive forward operation.	Phase sequence unknown at time of wiring	Swap any two of the three input wires to the bypass unit
3021	PH A CURR FBK	Fault is generated when current in Phase A is detected and the bypass contactor is open	Loose CT connection Bad RBCU Bad CT	Check J2 connector for proper seating Check connector on Current Assembly Replace RBCU Replace RCSA unit
3022	PH C CURR FBK	Fault is generated when current in Phase C is detected and the bypass contactor is open	Loose CT connection Bad RBCU Bad CT	Check J2 connector for proper seating Check connector on Current Assembly Replace RBCU Replace RCSA unit
3023	BYP COIL SHORTED	Coil characteristics are checked only on power up and coil current is greater than allowable values	Shorted contactor coil Shorted/damaged cable Bad RBCU	Replace RBCU Replace RCSA unit
3024	DRV COIL SHORTED	Coil characteristics are checked only on power up and coil current is greater than allowable values	Shorted contactor coil Shorted/damaged cable Bad RBCU	Replace RBCU Replace RCSA unit
3027	INVALID SUB ASM	Contactor assembly as recorded in the RBCU unit does not match drive information communicated via 485 link	RBCU unit from a different size bypass used to replace a defective RBCU. Parameters not matched after Firmware change.	Contact ABB at 1-800-HELP-365 Option 4
3028	EXT COMM LOSS	Time between fieldbus messages has exceeded timeout interval set with parameter 3005	Incorrect Communication settings in Group 51 & 53. Poor Connections Noise on Communication Line	Check Group 51 & 53 Tighten Connections Check Communication Cable Grounding
3029	EFB CONFIG FILE	Error reading configuration file for embedded fieldbus	Internal Startup error	Cycle Power Replace RBCU
3030	FORCE TRIP	Fault trip forced by external fieldbus	Overriding Control System tripped E-Clipse unit via fieldbus.	Check Overriding Control System

Fault Code	Fault Name In Panel	Fault	Possible Cause	Corrective Action
3031	EFB 1	Fault code reserved for embedded fieldbus.	For Bacnet: Device object instances for the drive and or bypass are set greater than 4194302 in paramters 5011 5017 and or 5311 5317 respectively	Check Parameters 5011, 5017 and/or 5311, 5317
3034	MTR PHASE	Detects open motor phase. Detection is done by current transformers in bypass unit.	Internal problem Cable problem Motor problem	Check wiring in E-Clipse Unit Check motor cabling Check Motor Check if 3006 is Disabled
3037	PCB TEMP	RBCU unit has reached 190 degrees Fahrenheit, 88 degrees Celsius	Cabinet cooling has failed Ambient conditions too high Bad RBCU unit	Stop drive and let cool down and restart Add additional cooling Replace RBCU
3038	NO DRIVE DATA	No drive data available (Group 112)		
3039	FBA PAR CONF	Non embedded fieldbus has detected an error in Group 51 parameters	Incorrect settings in Group 51	Verify Group 51 parameters
3101	SFLASH CORRUPT	Internal checksum error	NA	Cycle power Replace RBCU Reload firmware
3102	PMAP FILE	Parameter file is corrupt		Cycle Power Contact ABB with information that preceeded fault
3201	T1 OVERLOAD	T1 program cycle is overloaded	NA	Contact ABB with information that proceeded fault Cycle Power Replace RBCU
3202	T2 OVERLOAD	T2 program cycle is overloaded	NA	Contact ABB with information that proceeded fault Cycle Power Replace RBCU
3203	T3 OVERLOAD	T3 program cycle is overloaded	NA	Contact ABB with information that proceeded fault Cycle Power Replace RBCU

Fault Code	Fault Name In Panel	Fault	Possible Cause	Corrective Action
3204	STACK OVERFLOW	Program cycle is overloaded	NA	Contact ABB with information that proceeded fault Cycle Power Replace RBCU
3205	UNKNOWN CB	Bypass control board type is unknown.	Firmware is not compatible with control board in RBCU.	Firmware 93F and greater compatible with all RCBU hardware. Firmware 93D and earlier can only be loaded in RBCU Rev D and earlier.
3206	UNKNOWN DRIVE	Drive reports rating not found in bypass software	Drive does not match drives configured in bypass RBCU	Replace RBCU or reload with most current firmware
3207	UNKNOWN BYPASS	NA	NA	Replace RBCU or load most current firmware Contact ABB at 1-800-HELP-365 option 4 Replace RBCU or load most current firmware

Fault Resetting

Warning! If an external source for start command is selected and it is active, the system may start immediately after fault reset.

Flashing Red LED

To reset the bypass for faults indicated by a flashing red LED:

- Turn off the power for 5 minutes.

Red LED

To reset the bypass for faults indicated by a red LED (on, not flashing), correct the problem and do one of the following:

- From the bypass control panel, press OFF/RESET
- Turn off the power for 5 minutes.

Depending on the value of 1607, FAULT RESET SELECT, the following could also be used to reset the drive:

- Digital input
- Serial communication

When the fault has been corrected, the motor can be started.

Note! For some faults such as motor phase open and motor OC, it is suggested that you check the drive to motor wiring and/or meggar the motor before attempting to restart the system on bypass.

History

For reference, the last five fault codes are stored into parameters 0401, 0410, 0419, 0420 and 0421. For the most recent fault (identified by parameter 0401) and Fault 2 (identified by parameter 0410), the drive stores additional data (in parameters 0402…0409 and 0411…00418 respectively) to aid in troubleshooting a problem. For example, parameter 0405 stores the motor current at the time of the fault.

To clear the fault history (all of the Group 04, Fault History parameters):

1. Using the control panel in Parameters mode, select parameter 0401.
2. Press ENTER.
3. Press Up and Down simultaneously.
4. Press ENTER.

Correcting Alarms

The recommended corrective action for alarms is:

- Determine if the Alarm requires any corrective action (action is not always required).
- Use the following “Alarm Listing” to find and address the root cause of the problem.

Alarm Listing

The following table lists the alarms by code number and describes each.

Alarm Code	Alarm Name In Panel	Alarm	Possible Cause	Corrective Action
4001	INP PHASE A LOSS	Alarm will occur in drive mode. In bypass, alarm will occur if bypass contactor has not closed. Unit will trip on Fault 3010 if the bypass contactor is closed	Loose J8 connector Loose wiring on Contactor assembly. Blown upstream fuse	Check J8 connector Check yellow wire on input block Check incoming voltage, phase to ground
4002	INP PHASE B LOSS	Alarm will occur in drive mode. In bypass, alarm will occur if bypass contactor has not closed. Unit will trip on Fault 3011 if the bypass contactor is closed	Loose J8 connector Loose wiring on Contactor assembly. Blown upstream fuse	Check J8 connector Check black wire on input block Check incoming voltage, phase to ground
4003	INP PHASE C LOSS	Alarm will occur in drive mode. In bypass, alarm will occur if bypass contactor has not closed. Unit will trip on Fault 3012 if the bypass contactor is closed	Loose J8 connector Loose wiring on Contactor assembly. Blown upstream fuse	Check J8 connector Check red wire on input block Check incoming voltage, phase to ground
4004	AUTO TRANSFER	Message is displayed when the drive faults and the bypass switches to bypass mode as configured in Parameter 1608	Drive fault	Check drive
4005	EXT COMM ERR	Time between fieldbus messages has exceeded timeout interval set with parameter 3005	Incorrect Communication settings in Group 51 & 53. Poor Connections Noise on Communication Line	Check Group 51& 53 Tighten Connections Check Communication Cable Grounding
4006	Selected by PAR 1620: RUN ENABLE DAMPER END SWITCH VALVE OPENING PRE-LUBE CYCLE	Alarm will occur when start order is given and the “RUN Enable” is not present	Run Enable condition is not satisfied. Bad 24v supply Bad digital input	Check 24 Volts on RBCU unit Check for 24 volts on respective DI when condition is satisfied Check Parameter 0103 for status of digital input
4007	PCB TEMP	RBCU unit reached 181 degrees Fahrenheit, 83 degrees Celsius	Cabinet cooling has failed Ambient conditions too high Bad RBCU unit	Stop drive and let cool down and restart Add additional cooling Replace RBCU

Alarm Code	Alarm Name In Panel	Alarm	Possible Cause	Corrective Action
4008	DRIVE SETUP	Alarm generated when configuration of drive is such that bypass can not properly control the drive. Specifically, drive parameters 1001,1002,1601, 1608	Incorrect parameters settings	Set Parameter 1001 to “COMM” Set Parameter 1002 to “COMM” Set Parameter 1601 to “COMM” Set Parameter 1608 to “COMM”
4009	BYPASS RUN DELAY	Alarm is generated when a bypass start command is issued and there is non zero time value in bypass parameter 1614	NA	NA
4010	MTR OVERLOAD	Bypass warning if motor overload conditions exist as defined in the drive	Drive Mode: Bad Motor Bad Ct’s Bad RBCU Bypass mode: Bad motor Bad CT’s Bad RBCU Either mode: low input voltage	Drive Mode: Refer to 550 manual for proper troubleshooting techniques Bypass Mode: Check that J2 connector is firmly seated in RBCU Check input voltage Does overload condition exist?
4011	MTR UNDERLOAD	Alarm comes at half the time of a mtr underload fault. See fault 3017 for further text	NA	Parameter 3002 is the time Parameter 3003 is the level
4012	BYPASS DISABLED	Alarm will be generated if parameter 1613 is set to “Disable”	NA	NA
4013	DRIVE LINK ERROR	Same as Fault 3019 however will occur when not in supervisory mode	Bad cable between drive and bypass Communication improperly set in drive Parameter 98.02(Modbus) Application Macro in 99.02 set to 15 (text) Check ACH550 E-clipse user manual.	Proper seating of cable in drive and RBCU(connector J3) Check drive parameter 98.02 and 99.02 Check drive Group 53 Follow DriveLink recovery procedure
4014	DRIVE TEST	Alarm is generated when bypass parameter 1617 is set to “enable”	NA	NA
4015	START DRIVE 1ST	Message displayed on initial “out of box” power up sequence	NA	NA

Alarm Code	Alarm Name In Panel	Alarm	Possible Cause	Corrective Action
4016	INP VOLTAGE LOW	3-Phase input voltage has not reached a sufficient level to enable editing of parameters via the keypad. This message is generated within a few seconds of power up	NA	Loose J7 connector Low input voltage. Incoming voltage has not reached at least 155 VAC within a few seconds of powerup
4019	OVERRIDE 1	Alarm is generated when Smoke Control is active	NA	Check Parameter 0103 and 0104 for digital input status
4020	OVERRIDE 2	Alarm is generated when Fireman's Override is active	NA	Check Parameter 0103 and 0104 for digital input status
4021	Selected by PAR 1621 START ENABLE 1 VIBRATION SWITCH FIRESTAT FREEZESTAT OVERPRESSURE VIBRATION TRIP SMOKE ALARM SAFETY OPEN LOW SUCTION PRES	Alarm will occur when start order is given and the "RUN Enable" is not present	Run Enable condition is not satisfied. Bad 24v supply Bad digital input 24 V common is not tied to Digital input common on bypass when using external 24 v supply	Check 24 Volts on RBCU unit Check for 24 volts on respective DI when condition is satisfied Check Parameter 0103 For status of digital input
4022	Selected by PAR 1622 START ENABLE 2 VIBRATION SWITCH ... LOW SUCTION PRES	Alarm will occur when start order is given and the "RUN Enable" is not present	Run Enable condition is not satisfied. Bad 24v supply Bad digital input 24 V common is not tied to Digital input common on bypass when using external 24 v supply	Check 24 Volts on RBCU unit Check for 24 volts on respective DI when condition is satisfied Check Parameter 0103 For status of digital input
4023	Selected by PAR 1623 START ENABLE 3 VIBRATION SWITCH ... LOW SUCTION PRES	Alarm will occur when start order is given and the "RUN Enable" is not present	Run Enable condition is not satisfied. Bad 24v supply Bad digital input 24 V common is not tied to Digital input common on bypass when using external 24 v supply	Check 24 Volts on RBCU unit Check for 24 volts on respective DI when condition is satisfied Check Parameter 0103 For status of digital input
4024	Selected by PAR 1624 START ENABLE 4 VIBRATION SWITCH ... LOW SUCTION PRES	Alarm will occur when start order is given and the "RUN Enable" is not present	Run Enable condition is not satisfied. Bad 24v supply Bad digital input 24 V common is not tied to Digital input common on bypass when using external 24 v supply	Check 24 Volts on RBCU unit Check for 24 volts on respective DI when condition is satisfied Check Parameter 0103 For status of digital input

Alarm Code	Alarm Name In Panel	Alarm	Possible Cause	Corrective Action
4025	LOCAL DISABLED	Alarm is displayed if MODE LOCK (16.29) is set to AUTO MODE and the Hand or Off key is pressed		
4026	AUTO DISABLED	This alarm is displayed if MODE LOCK (1629) is set to LOCAL MODE and the Auto key is pressed.		
4027	COMM CONFIG ERR	Alarm is displayed if the drive and bypass MAC addresses are equal or invalid.	E-Clipse parameters 5002(BP MAC ID) & 5302 (DV MAC ID) are set to the same value	Change MAC address to unique values
4028	FBA PAR CONF	Non embedded fieldbus has detected an error in Group 51 parameters		Verify Group 51 parameters
4029	DRIVE FAULTED	The drive is faulted.		Reset drive

Bypass Status Listing

Bypass Status (16 Characters)	Condition	Description
DRIVE/BYPASS?	DRIVE SELECTED BYPASS SELECTED	Displays which one is selected, drive or bypass
SAFETIES?	OPEN CLOSED	Displays if safeties (=START ENABLE 1 and/or START ENABLE 2) have been applied, or if they are missing
RUN PERMISSIVES?	OPEN CLOSED	Displays if RUN ENABLE is present or not
START REQUEST?	NOT PRESENT PRESENT	Displays if start request has been applied to the system
AUTO TRANSFER?	NOT TRANSFERRED TRANSFERRED	Displays if the system is in Auto Transfer state or not. Does not reflect to PAR 16.08 AUTO XFER value itself
BYP OVERRIDE 1?	NOT ACTIVATED ACTIVATED	Status of Override 1
BYP OVERRIDE 2?	NOT ACTIVATED ACTIVATED	Status of Override 2
DRIVE FAULTED?	NO YES	Displays if drive is faulted or not
BYPASS FAULTED?	NO YES	Displays if bypass is faulted or not
SYSTEM STARTED?	NO YES	Displays if system is started or not
SYSTEM RUNNING?	NO YES	Displays if system is running or not
BYPASS ALARMS?	NO ALARMS ALARM ACTIVE	Displays if there is an active alarm(s) in bypass or not
HAND/OFF/AUTO?	OFF MODE HAND MODE AUTO MODE	Displays operating mode of the bypass - OFF, HAND or AUTO

Error Messages

#	Error Message	Description
1	CAN'T EDIT PAR IS READ ONLY	Try to save value (=press the ENTER key in Parameter Edit State) of a read-only parameter. E.g. try to change value PAR 01.02 INPUT VOLT
2	CAN'T EDIT WHEN STARTED	Try to change value of a parameter, which is allowed to be changed only when system is not started. E.g. PAR 16.02 RUN ENABLE
3	CAN'T EDIT UP+DOWN ONLY	Try to change value of a "reset only" parameter other than zero. UP+DOWN buttons must be pressed simultaneoulsy for requesting default value of the PAR on the display (value zero), and after that ENTER pressed for saving it (reset the parameter). E.g. PAR 04.01 LAST FAULT
4	CAN'T EDIT INP VOLTAGE LOW	Input voltage too low. Changing of parameters prohibited since system cannot save values to nv-mem w/ insufficient voltage
5	CAN'T EDIT PAR IS HIDDEN	Try to save value (=press the ENTER key in Parameter Edit State) of a hidden parameter. Should not be possible. If hidden parameters are turned visible, this message is not given
6	CAN'T EDIT UNDER LO-LIMIT	Try to save value which is over LO-LIMIT of the parameter. Should not be possible when changing parameters from control panel.
7	CAN'T EDIT UNDER HI-LIMIT	Try to save value which is over HI-LIMIT of the parameter. Should not be possible when changing parameters from control panel.
8	CAN'T EDIT ENUM VAL ONLY	Try to save value which is out of enumerated value list. Should not be possible when changing parameters from control panel.
9	CAN'T EDIT NO DEFAULT	Try to request default value (=press UP and DOWN buttons simultaneously) for a parameter which is defined not to have a default value. Should not be possible when changing parameters from control panel.
10	CAN'T EDIT TRY AGAIN.	Parameter system is busy, e.g. application macro change is in process at the same time when someone is trying to save a value for a parameter. Should not be possible when changing parameters from control panel.

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Technical Data

Input Power Connections (Supplement to ACH550-UH User's Manual)

Branch Circuit Protection

Input power is connected to the ACH550 with E-Clipse Bypass through a door interlocked disconnect switch or circuit breaker. Neither of these inputs are fused. The branch circuit that provides power to the ACH550 with E-Clipse Bypass must include appropriate motor branch circuit protective devices to provide short circuit and ground fault protection for the motor in the bypass mode.

When connected to a 480 VAC power source, the ACH550 with E-Clipse Bypass with the circuit breaker option is suitable for use on a circuit capable of delivering not more than 100,000 RMS symmetrical amperes. When connected to a 240 VAC power source, the ACH550 with E-Clipse Bypass with the circuit breaker option is suitable for use on a circuit capable of delivering not more than 100,000 RMS symmetrical amperes.

Fuses

NOTE! Although fuses listed are similar in function to fuses listed in the ACH550-UH User's Manual, physical characteristics may differ. Fuses from other manufacturers can be used if they meet the ratings given in the table. The fuses recommended in the table are UL recognized.

Drive input fuses are provided to disconnect the drive from power in the event that a component fails in the drive's power circuitry. Since fast-acting fuses are provided, the branch circuit protection will not clear when the drive input fuses blow. If the drive input fuses blow, the motor can be switched to Bypass without replacing fuses or resetting a circuit breaker. The drive's electronic protection circuitry is designed to clear drive output short circuits and ground faults without blowing the drive input fuses. Drive input fuse specifications are listed in the following tables.

208…240 Volt Fuses

208… 240 Volt		Frame Size	Drive Input Fuse Ratings	
HP	Identification		Amps (600V)	Bussmann Type
1	ACH550-xxR-04A6-2	R1	15	KTK-R-15
1.5	ACH550-xxR-06A6-2	R1	15	KTK-R-15
2	ACH550-xxR-07A5-2	R1	15	KTK-R-15
3	ACH550-xxR-012A-2	R1	15	KTK-R-15
5	ACH550-xxR-017A-2	R1	30	KTK-R-30
7.5	ACH550-xxR-024A-2	R2	30	KTK-R-30
10	ACH550-xxR-031A-2	R2	60	JJS-60

208… 240 Volt		Frame Size	Drive Input Fuse Ratings	
HP	Identification		Amps (600V)	Bussmann Type
15	ACH550-xxR-046A-2	R3	100	JJS-100
20	ACH550-xxR-059A-2	R3	100	JJS-100
25	ACH550-xxR-075A-2	R4	100	JJS-100
30	ACH550-xxR-088A-2	R4	200	170M1370 or 170M2617
40	ACH550-xxR-114A-2	R4	200	
50	ACH550-xxR-143A-2	R6	200	
60	ACH550-xxR-178A-2	R6	315	170M1372 or 170M2619
75	ACH550-xxR-221A-2	R6	315	
100	ACH550-xxR-248A-2	R6	315	

380…480 Volt Fuses

380… 480 Volt		Frame Size	Drive Input Fuse Ratings	
HP	Identification		Amps (600V)	Bussmann Type
1/1.5	ACH550-xxR-03A3-4	R1	15	KTK-R-15
2	ACH550-xxR-04A1-4	R1	15	KTK-R-15
3	ACH550-xxR-06A9-4	R1	15	KTK-R-15
5	ACH550-xxR-08A8-4	R1	15	KTK-R-15
7.5	ACH550-xxR-012A-4	R1	15	KTK-R-15
10	ACH550-xxR-015A-4	R2	30	KTK-R-30
15	ACH550-xxR-023A-4	R2	30	KTK-R-30
20	ACH550-xxR-031A-4	R3	60	JJS-60
25	ACH550-xxR-038A-4	R3	60	JJS-60
30	ACH550-xxR-045A-4	R3	60	JJS-60
40	ACH550-xxR-059A-4	R4	100	JJS-100
50	ACH550-xxR-072A-4	R4	100	JJS-100
60	ACH550-xxR-078A-4	R4	100	JJS-100
75	ACH550-xxR-097A-4	R4	200	170M1370 or 170M2617
100	ACH550-xxR-125A-4	R5	200	
125	ACH550-xxR-157A-4	R6	200	
150	ACH550-xxR-180A-4	R6	315	170M1372 or 170M2619
200	ACH550-xxR-246A-4	R6	315	
250	ACH550-xxR-316A-4	R8	400	JJS-400
300	ACH550-xxR-368A-4	R8	400	JJS-400
350	ACH550-xxR-414A-4	R8	600	JJS-600
400	ACH550-xxR-486A-4	R8	600	JJS-600

Fuses, 500…600 Volt, Fuses

500…600 Volt		Frame Size	Drive Input Fuse Ratings	
HP	**Identification**		**Amps (600V)**	**Bussmann Type**
2	ACH550-xxR-02A7-6	R2	30	KTK-R-30
3	ACH550-xxR-03A9-6	R2	30	KTK-R-30
5	ACH550-xxR-06A1-6	R2	30	KTK-R-30
7.5	ACH550-xxR-09A0-6	R2	30	KTK-R-30
10	ACH550-xxR-011A-6	R2	30	KTK-R-30
15	ACH550-xxR-017A-6	R2	30	KTK-R-30
20	ACH550-xxR-022A-6	R3	60	JJS-60
25	ACH550-xxR-027A-6	R3	60	JJS-60
30	ACH550-xxR-032A-6	R4	100	JJS-100
40	ACH550-xxR-041A-6	R4	100	JJS-100
50	ACH550-xxR-052A-6	R4	100	JJS-100
60	ACH550-xxR-062A-6	R4	100	JJS-100
75	ACH550-xxR-077A-6	R6	200	170M1370 or 170M2619
100	ACH550-xxR-099A-6	R6	200	
125	ACH550-xxR-125A-6	R6	200	
150	ACH550-xxR-144A-6	R6	200	

Line Reactor

The ACH550 E-Clipse Bypass may contain optional input line reactors to provide additional input impedance on the VAC line. This impedance is in addition to the approximately 5% equivalent input impedance provided by internal reactors that are standard in the drive.

Drive's Power Connection Terminals

The following tables list power and motor cable terminal sizes for connections to an input circuit breaker or disconnect switch, a motor terminal block and ground lugs. The tables also list torque that should be applied when tightening the terminals.

Vertical Enclosure Terminals, 208…240 Volt Units

208…240 Volt		Frame Size	Maximum Wire Size Capacities of Power Terminals			
HP	Identification		Circuit Breaker	Disconnect Switch	Motor Termination	Ground Lugs
1	ACH550-VxR-04A6-2	R1	#10 35 in-lbs	#10 7 in-lbs	#6 30 in-lbs	#4 35 in-lbs
1.5	ACH550-VxR-06A6-2	R1				
2	ACH550-VxR-07A5-2	R1				
3	ACH550-VxR-012A-2	R1				
5	ACH550-VxR-017A-2	R1				
7.5	ACH550-VxR-024A-2	R2	#8 40 in-lbs	#8 7 in-lbs		
10	ACH550-VxR-031A-2	R2	#2 50 in-lbs		#2 50 in-lbs	#2 50 in-lbs
15	ACH550-VxR-046A-2	R3		#4 18 in-lbs	#2/0 120 in-lbs	
20	ACH550-VxR-059A-2	R3				
25	ACH550-VxR-075A-2	R4	#1 50 in-lbs	#1 55 in-lbs		

Vertical Enclosure Terminals, 380…480 Volt Units

380…480 Volt		Frame Size	Maximum Wire Size Capacities of Power Terminals			
HP	Identification		Circuit Breaker	Disconnect Switch	Motor Termination	Ground Lugs
1/1.5	ACH550-VxR-03A3-4	R1	#10 35 in-lbs	#10 7 in-lbs	#6 30 in-lbs	#4 35 in-lbs
2	ACH550-VxR-04A1-4	R1				
3	ACH550-VxR-06A9-4	R1				
5	ACH550-VxR-08A8-4	R1				
7.5	ACH550-VxR-012A-4	R1				
10	ACH550-VxR-015A-4	R2	#8 40 in-lbs	#8 7 in-lbs		
15	ACH550-VxR-023A-4	R2				
20	ACH550-VxR-031A-4	R3	#3 50 in-lbs		#2 50 in-lbs	#2 50 in-lbs
25	ACH550-VxR-038A-4	R3		#4 18 in-lbs		
30	ACH550-VxR-045A-4	R3				
40	ACH550-VxR-059A-4	R4	#1 50 in-lbs		#2/0 120 in-lbs	
50	ACH550-VxR-072A-4	R4		#1 55 in-lbs		
60	ACH550-VxR-078A-4	R4		#1 70 in-lbs		

Vertical Enclosure Terminals, 500…600 Volt Units

500…600 Volt		Frame Size	Maximum Wire Size Capacities of Power Terminals			
HP	Identification		Circuit Breaker	Disconnect Switch	Motor Termination	Ground Lugs
2	ACH550-VxR-02A7-6	R2	#8 62 in-lbs	#8 7 in-lbs	#6 30 in-lbs	#4 35 in-lbs
3	ACH550-VxR-03A9-6	R2				
5	ACH550-VxR-06A1-6	R2				
7.5	ACH550-VxR-09A0-6	R2				
10	ACH550-VxR-011A-6	R2				
15	ACH550-VxR-017A-6	R2				
20	ACH550-VxR-022A-6	R3	#4 62 in-lbs		#2 50 in-lbs	#2 50 in-lbs
25	ACH550-VxR-027A-6	R3				
30	ACH550-VxR-032A-6	R4	#1 62 in-lbs	#4 18 in-lbs	#2/0 120 in-lbs	
40	ACH550-VxR-041A-6	R4				
50	ACH550-VxR-052A-6	R4		#1 55 in-lbs		
60	ACH550-VxR-062A-6	R4		#1 70 in-lbs		

Standard Enclosure Terminals, 208…240 Volt Units,

208…240 Volt		Frame Size	Maximum Wire Size Capacities of Power Terminals			
HP	Identification		Circuit Breaker	Disconnect Switch	Motor Termination	Ground Lugs
1	ACH550-BxR-04A6-2	R1	#8 40 in-lbs	#8 7 in-lbs	#6 30 in-lbs	#4 35 in-lbs
1.5	ACH550-BxR-06A6-2	R1				
2	ACH550-BxR-07A5-2	R1				
3	ACH550-BxR-012A-2	R1				
5	ACH550-BxR-017A-2	R1				
7.5	ACH550-BxR-024A-2	R2				
10	ACH550-BxR-031A-2	R2/R3	#1 50 in-lbs		#2 50 in-lbs	#2 50 in-lbs
15	ACH550-BxR-046A-2	R3		#4 18 in-lbs	#2 120 in-lbs	
20	ACH550-BxR-059A-2	R3				
25	ACH550-BxR-075A-2	R4		#1 55 in-lbs		

208…240 Volt		Frame Size	Maximum Wire Size Capacities of Power Terminals			
HP	Identification		Circuit Breaker	Disconnect Switch	Motor Termination	Ground Lugs
30	ACH550-BxR-088A-2	R4	350 MCM 274 in-lbs	#1/0 70 in-lbs	#1 53 in-lbs	3 x #3/0 250 in-lbs
40	ACH550-BxR-114A-2	R4		300 MCM 275 in-lbs	250 MCM 300 in-lbs	
50	ACH550-BxR-143A-2	R6				
60	ACH550-BxR-178A-2	R6			400 MCM 375 in-lbs	
75	ACH550-BxR-221A-2	R6	2 x 250 MCM 274 in-lbs	2 x 250 MCM 274 in-lbs	2 x 500 MCM 375 in-lbs	
100	ACH550-BxR-248A-2	R6				

Standard Enclosure Terminals, 380…480 Volt Units

<table>
<tr><th colspan="2">380…480 Volt</th><th rowspan="2">Frame Size</th><th colspan="4">Maximum Wire Size Capacities of Power Terminals</th></tr>
<tr><th>HP</th><th>Identification</th><th>Circuit Breaker</th><th>Disconnect Switch</th><th>Motor Termination</th><th>Ground Lugs</th></tr>
<tr><td>1/1.5</td><td>ACH550-BxR-03A3-4</td><td>R1</td><td rowspan="7">#8
40 in-lbs</td><td rowspan="6">#8
7 in-lbs</td><td rowspan="6">#6
30 in-lbs</td><td rowspan="7">#4
35 in-lbs</td></tr>
<tr><td>2</td><td>ACH550-BxR-04A1-4</td><td>R1</td></tr>
<tr><td>3</td><td>ACH550-BxR-06A9-4</td><td>R1</td></tr>
<tr><td>5</td><td>ACH550-BxR-08A8-4</td><td>R1</td></tr>
<tr><td>7.5</td><td>ACH550-BxR-012A-4</td><td>R1</td></tr>
<tr><td>10</td><td>ACH550-BxR-015A-4</td><td>R2</td></tr>
<tr><td>15</td><td>ACH550-BxR-023A-4</td><td>R2</td></tr>
<tr><td>20</td><td>ACH550-BxR-031A-4</td><td>R3</td><td rowspan="5">#1
50 in-lbs</td><td rowspan="2">#2
50 in-lbs</td><td rowspan="4">#2
50 in-lbs</td></tr>
<tr><td>25</td><td>ACH550-BxR-038A-4</td><td>R3</td><td rowspan="3">#4
18 in-lbs</td></tr>
<tr><td>30</td><td>ACH550-BxR-045A-4</td><td>R3</td></tr>
<tr><td>40</td><td>ACH550-BxR-059A-4</td><td>R4</td><td rowspan="3">#2/0
120 in-lbs</td></tr>
<tr><td>50</td><td>ACH550-BxR-072A-4</td><td>R4</td><td>#1
55 in-lbs</td></tr>
<tr><td>60</td><td>ACH550-BxR-078A-4</td><td>R4</td><td>#1
70 in-lbs</td></tr>
<tr><td>75</td><td>ACH550-BxR-097A-4</td><td>R4</td><td rowspan="4">350 MCM
274 in-lbs</td><td>#1/0
70 in-lbs</td><td>#1
53 in-lbs</td><td rowspan="5">3 x #3/0
250 in-lbs</td></tr>
<tr><td>100</td><td>ACH550-BxR-125A-4</td><td>R5</td><td rowspan="3">300 MCM
275 in-lbs</td><td>250 MCM
300 in-lbs</td></tr>
<tr><td>125</td><td>ACH550-BxR-157A-4</td><td>R6</td><td rowspan="2">400 MCM
375 in-lbs</td></tr>
<tr><td>150</td><td>ACH550-BxR-180A-4</td><td>R6</td></tr>
<tr><td>200</td><td>ACH550-BxR-246A-4</td><td>R6</td><td>2 x 250 MCM
274 in-lbs</td><td>2 x 250 MCM
274 in-lbs</td><td>2 x 500 MCM
375 in-lbs</td></tr>
<tr><td>250</td><td>ACH550-BxR-316A-4</td><td>R8</td><td rowspan="4">2 x 500 MCM
274 in-lbs</td><td rowspan="4">2 x 500 MCM
275 in-lbs</td><td rowspan="4">2 x 600 MCM
500 in-lbs</td><td rowspan="4">5 Bus bar holes
(13/32” bolts)</td></tr>
<tr><td>300</td><td>ACH550-BxR-368A-4</td><td>R8</td></tr>
<tr><td>350</td><td>ACH550-BxR-414A-4</td><td>R8</td></tr>
<tr><td>400</td><td>ACH550-BxR-486A-4</td><td>R8</td></tr>
</table>

Standard Enclosure Terminals, 500…600 Volt Units

<table>
<tr><th colspan="2">500…600 Volt</th><th rowspan="2">Frame Size</th><th colspan="4">Maximum Wire Size Capacities of Power Terminals</th></tr>
<tr><th>HP</th><th>Identification</th><th>Circuit Breaker</th><th>Disconnect Switch</th><th>Motor Termination</th><th>Ground Lugs</th></tr>
<tr><td>2</td><td>ACH550-BxR-02A7-6</td><td>R2</td><td rowspan="6">#8
62 in-lbs</td><td rowspan="6">#8
7 in-lbs</td><td rowspan="6">#6
30 in-lbs</td><td rowspan="6">#4
35 in-lbs</td></tr>
<tr><td>3</td><td>ACH550-BxR-03A9-6</td><td>R2</td></tr>
<tr><td>5</td><td>ACH550-BxR-06A1-6</td><td>R2</td></tr>
<tr><td>7.5</td><td>ACH550-BxR-09A0-6</td><td>R2</td></tr>
<tr><td>10</td><td>ACH550-BxR-011A-6</td><td>R2</td></tr>
<tr><td>15</td><td>ACH550-BxR-017A-6</td><td>R2</td></tr>
<tr><td>20</td><td>ACH550-BxR-022A-6</td><td>R3</td><td rowspan="6">#1
62 in-lbs</td><td rowspan="2">#2
50 in-lbs</td><td rowspan="6">#2
50 in-lbs</td></tr>
<tr><td>25</td><td>ACH550-BxR-027A-6</td><td>R3</td></tr>
<tr><td>30</td><td>ACH550-BxR-032A-6</td><td>R4</td><td>#4
18 in-lbs</td><td rowspan="3">#2
120 in-lbs</td></tr>
<tr><td>40</td><td>ACH550-BxR-041A-6</td><td>R4</td></tr>
<tr><td>50</td><td>ACH550-BxR-052A-6</td><td>R4</td><td>#1
55 in-lbs</td></tr>
<tr><td>60</td><td>ACH550-BxR-062A-6</td><td>R4</td><td>#1
75 in-lbs</td></tr>
<tr><td>75</td><td>ACH550-BxR-077A-6</td><td>R6</td><td rowspan="4">300 MCM
274 in-lbs</td><td>#1/0
70 in-lbs</td><td>#1
53 in-lbs</td><td rowspan="4">3 x #3/0
250 in-lbs</td></tr>
<tr><td>100</td><td>ACH550-BxR-099A-6</td><td>R6</td></tr>
<tr><td>125</td><td>ACH550-BxR-125A-6</td><td>R6</td><td rowspan="2">300 MCM
275 in-lbs</td><td rowspan="2">250 MCM
300 in-lbs</td></tr>
<tr><td>150</td><td>ACH550-Bx-R144A-6</td><td>R6</td></tr>
</table>

Motor Connections (Supplement to ACH550-UH User's Manual)

Motor Terminals

See "Drive's Power Connection Terminals" above.

Bypass Contactors

The bypass circuit available with the ACH550 E-Clipse Bypass includes two contactors. One contactor is the bypass contactor (2M) that can be used to manually connect the motor directly to the incoming power line in the event that the ACH550 is out of service. The other contactor is the ACH550 output contactor (1M) that disconnects the ACH550 from the motor when the motor is operating in the Bypass mode. The drive output contactor and the bypass contactor are interlocked to prevent "back feeding," applying line voltage to the ACH550 output terminals.

Motor Overload Protection

Motor overload protection is set using the ACH550 drive control panel. (Refer to ACH550-UH User's manual.) The overload protection parameters set on the ACH550 drive are used by both the drive and the bypass.

In the *Drive* mode, motor overload protection is provided by the ACH550.

In the *Bypass* mode, motor overload protection is provided by the bypass control board.

⚠ **WARNING: If power is applied and the switches and contacts in the control circuit are commanding the motor to run, the motor will start as soon as the overload protection is reset.**
Use caution when resetting the overload protection to make sure it is safe to start the motor.

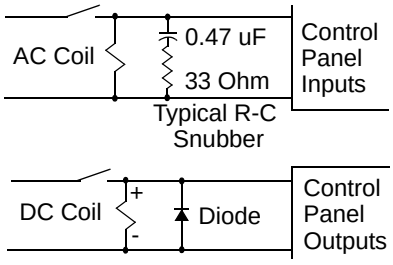
E-Clipse Bypass Control Unit Connections (RBCU) (Supplement to ACH550-UH User's Manual)

Control cable requirements for connections to the E-Clipse Bypass (RBCU) (X2) are the same as those described for the ACH550 control panel (X1). Refer to the ACH550 User's Manual.

Bypass Control Unit Connection Specifications

Control Connection Specifications	
Digital Inputs	Digital input impedance 1.5 kΩ. Maximum voltage for digital inputs is 30 V AC/DC
Relays (Digital Outputs)	• Max. contact voltage: 30 V DC, 250 V AC • Max. contact current / power: 6 A, 30 V DC; 1500 VA, 250 V AC • Max. continuous current: 2 A rms (cos . = 1), 1 A rms (cos . = 0.4) • Minimum load: 500 mW (12 V, 10 mA) • Contact material: Silver-nickel (AgN) • Isolation between relay digital outputs, test voltage: 2.5 kV rms, 1 minute

WARNING! Relay coils generate noise spikes in response to steps in applied power. To avoid drive damage from such spikes, all AC relay coils mounted across control panel inputs require R-C snubbers, and all DC relay coils mounted across control panel outputs require diodes – see figure.



Bypass Control Unit Terminals

The following table provides specifications for the E-Clipse Bypass's control unit terminals

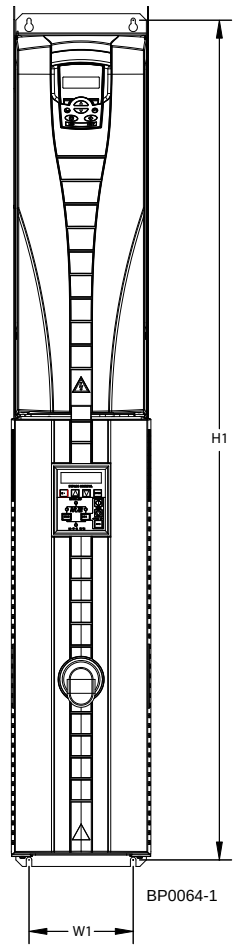
Frame Size	Control			
	Maximum Wire Size		Torque	
	mm^2	AWG	Nm	lb-ft
All	0.12…2.5	26…14	0.4	0.3

Dimensions and Weights (Supplement to ACH550-UH User's Manual)

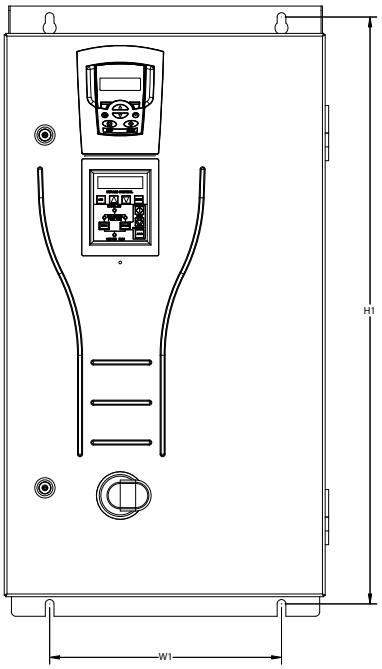
Mounting Dimensions

The following diagram and tables provide mounting point dimensions for wall mounted cabinets.

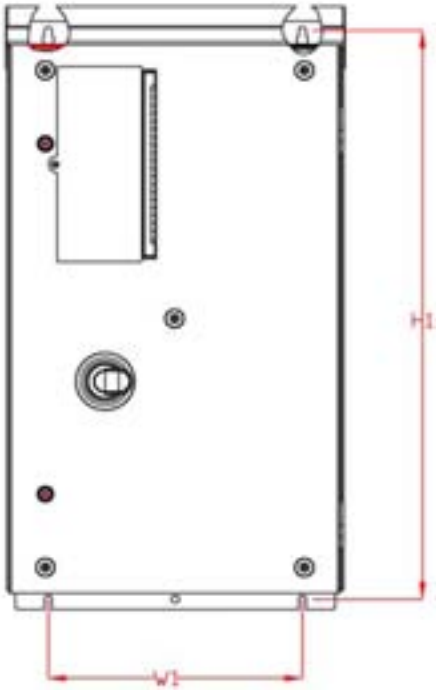
Vertical E-Clipse Bypass



Standard E-Clipse Bypass



UL TYPE 3R E-Clipse Bypass



Vertical Enclosure, V1…V4

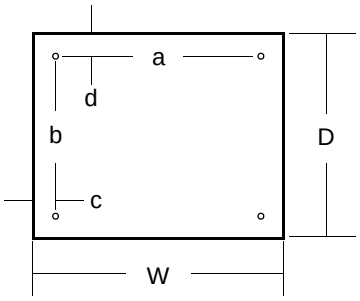
IP 21 / UL type 1 – Mounting Dimensions for each Frame Size								
Ref.	**V1**		**V2**		**V3**		**V4**	
	mm	**in**	**mm**	**in**	**mm**	**in**	**mm**	**in**
W1*	136	5.4	136	5.4	214	8.4	214	8.4
H1*	1004	40	1103	43.4	1180	47	1285	51
Mounting Hardware								
	M6	1/4	M6	1/4	M6	1/4	M6	1/4

Standard Enclosure, B1…B3

Dimensions for Each Frame Size										
IP 21 / UL type 1 and IP 54 / UL type 12 – Mounting							UL Type 3R			
Ref.	B1		B2		B3		B1		B2	
	mm	in	mm	in	mm	in	mm	in	mm	in
W1*	44.3	17.4	400	15.7	600	23.6	320	12.6	400.0	15.7
H1*	810	31.9	918	36.1	1175	46.3	810	31.9	917.9	36.1
Mounting Hardware										
	M10	3/8	M10	3/8	M10	3/8	M10	3/8	M10	3/8

* Measurements are center to center.

Standard Enclosure, B4

IP 21 / UL type 1 and IP 54 / UL type 12 – Dimensions for each Frame Size			
Ref.	B4		Top View
	mm	in	
W	806	31.7	
D	659	25.9	
a	675	26.6	
b	474.5	18.7	
c	55.5	2.2	
d	65.5	2.6	
Mounting Hardware			
	11 mm	13/32	

Weights

The following table lists typical maximum weights for each frame size. Variations within each frame size (due to components associated with voltage/current ratings, and options) are minor.

Vertical Enclosure, V1...V4

Enclosure	Weight							
	V1		V2		V3		V4	
	kg	lb.	kg	lb.	kg	lb.	kg	lb.
IP 21 / UL type 1	18	40	23	50	51	112	59	131

Standard Enclosure, B1...B3

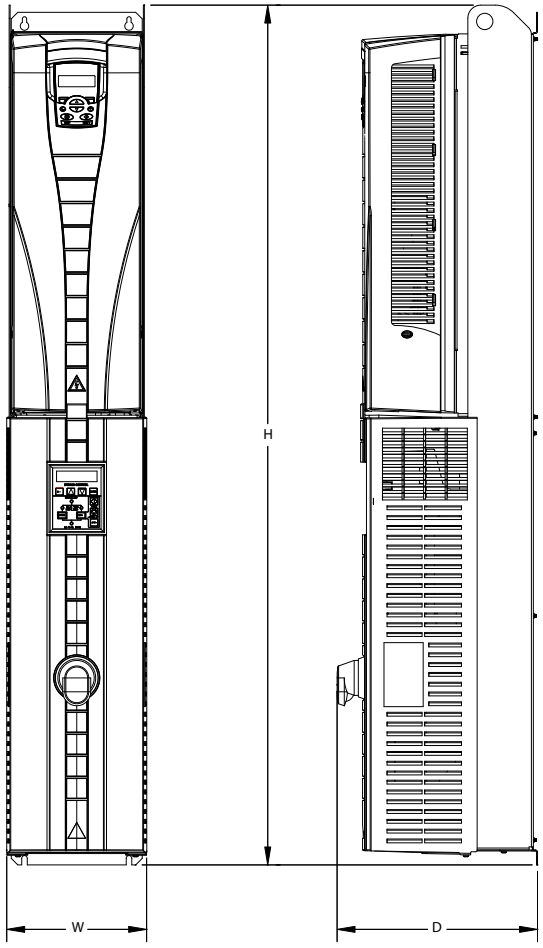
Enclosure	Weight											
	B1/R1		B1/R2		B2/R3		B2/R4		B3/R5		B3/R6	
	kg	lb.	kg	lb.	kg	lb.	kg	lb.	kg	lb.	kg	lb.
IP 21 / UL type 1	35	78	38	84	54	120	63	138	121	266	163	360
IP 54 / UL type 12	35	78	38	84	56	123	64	141	123	271	166	365
IP / UL type 3R	58	128	61	134	80	175	88	193	Consult Factory			

Standard Enclosure, B4

Enclosure	Weight	
	B4	
	kg	lb.
IP 21 / UL type 1	454	1000
IP 54 / UL type 12	474	1045

Outside Dimensions (V1...V4 and B1...B3, Wall Mounted Units)

*Vertical E-Clipse Bypass, **UL type 1**, V1…V4*

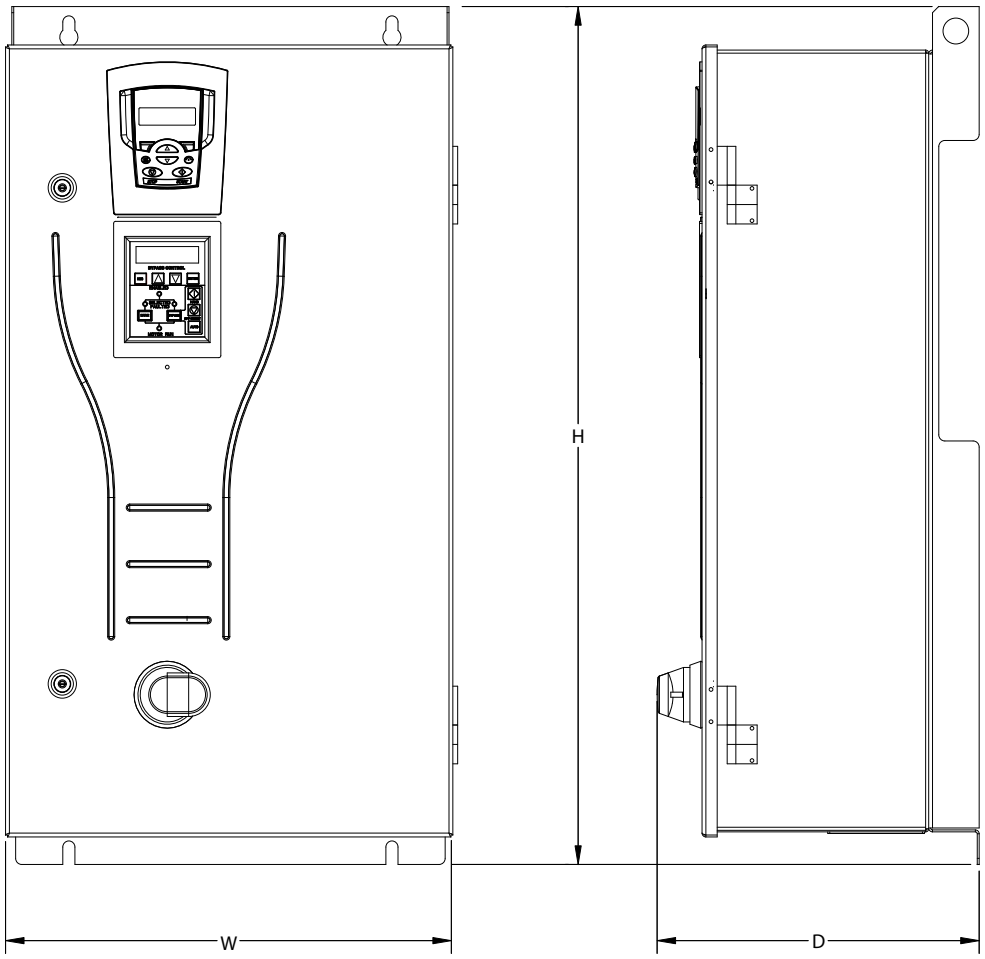


BP0064-2

Vertical E-Clipse Bypass, UL type 1								
Dimensions Ref.	V1		V2		V3		V4	
	mm	in.	mm	in.	mm	in.	mm	in.
W*	136	5.4	136	5.4	214	8.5	215	8.5
H*	1020	40.2	1120	44.1	1211	47.7	1316	51.8
D*	220	8.7	231	9.1	241.6	9.5	271	10.7

* Keep a minimum of two inches of free space on each side and 8 inches of free space above and below all units from non-heat producing sources. Double these distances from heat producing sources

*Standard E-Clipse Bypass, **UL type 1**, B1…B3*

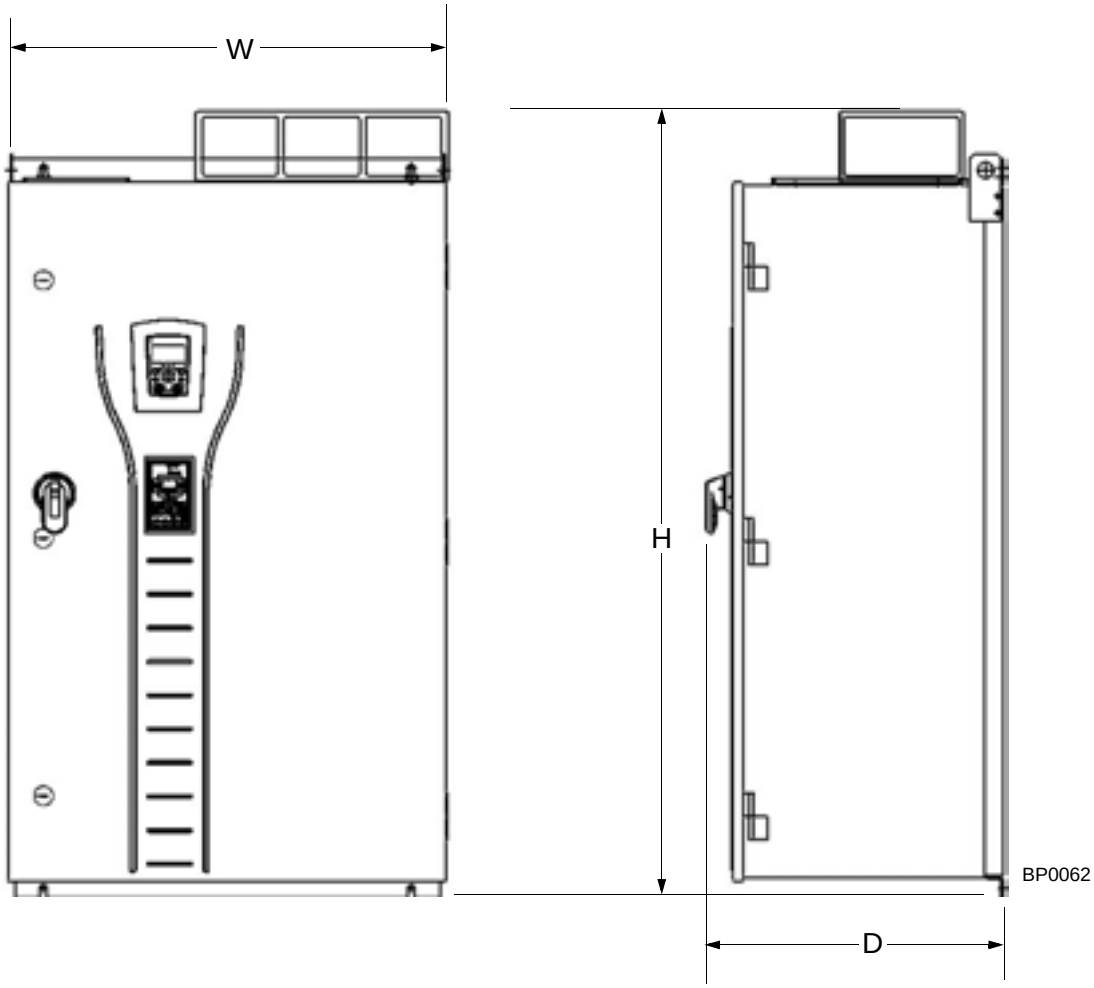


BP0063-2

Standard E-Clipse Bypass, UL type 1, B1...B3						
Dimensions Ref.	B1		B2		B3	
	mm	in.	mm	in.	mm	in.
W	443	17.4	521	20.5	713	28.1
H	849	33.4	957	37.7	1212	47.7
D	344	13.5	389	15.3	485	19.1

* Keep a minimum of 2 inches of free space on each side and 8 inches of free space above and below all units from non-heat producing sources. Double these distances from heat producing sources

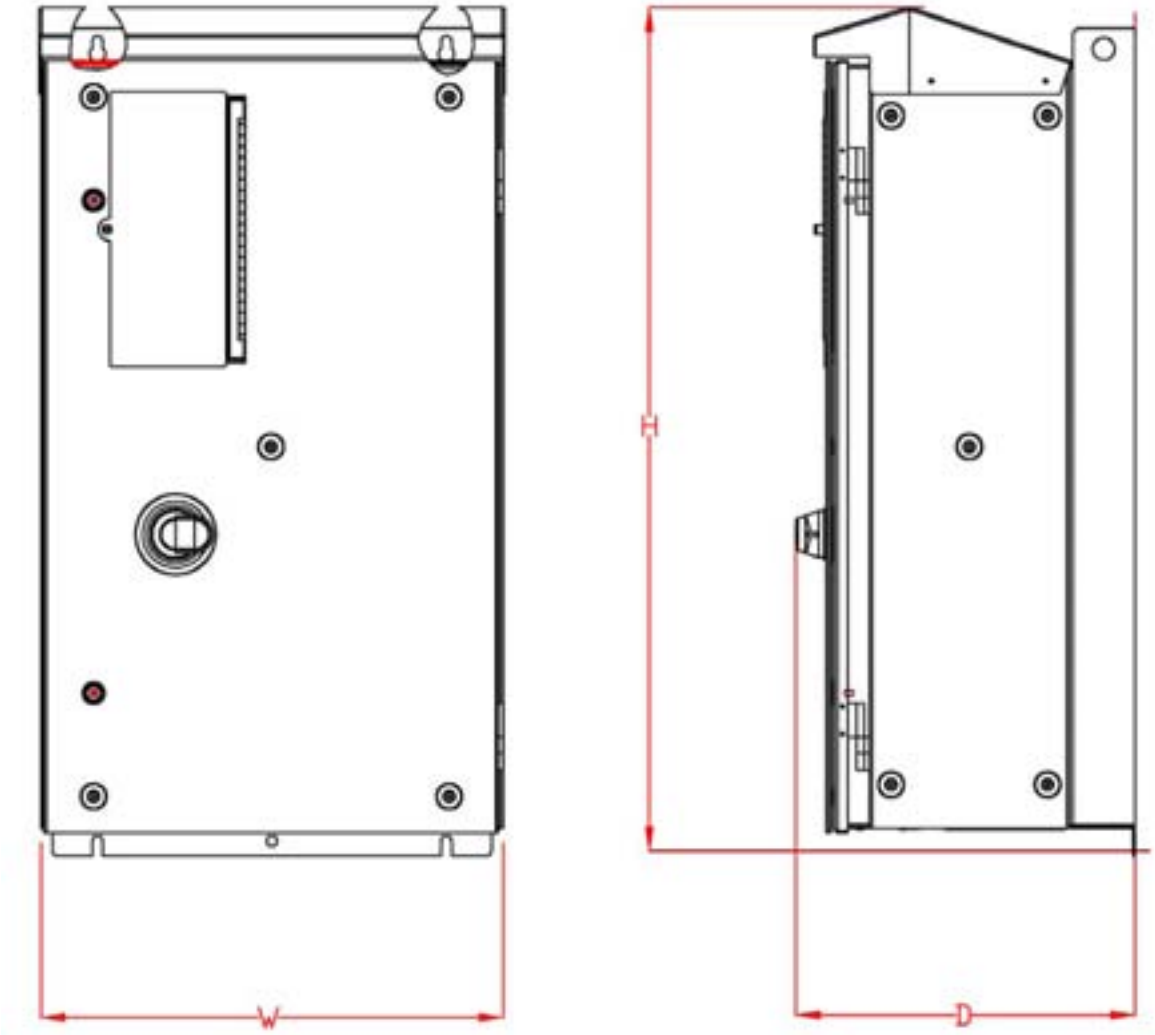
*Standard E-Clipse Bypass, **UL type 12**, B1…B3*



Standard E-Clipse Bypass, UL type 12, B1...B3						
Dimensions Ref.	**B1**		**B2**		**B3**	
	mm	**in.**	**mm**	**in.**	**mm**	**in.**
W	443	17.4	521	20.5	734	28.9
H	849	33.4	957	37.7	1371	54.0
D	344	13.5	389	15.3	485	19.1

* Keep a minimum of 2 inches of free space on each side and 8 inches of free space above and below all units from non-heat producing sources. Double these distances from heat producing sources

*Standard E-Clipse Bypass, **UL type 3R**, B1…B2*

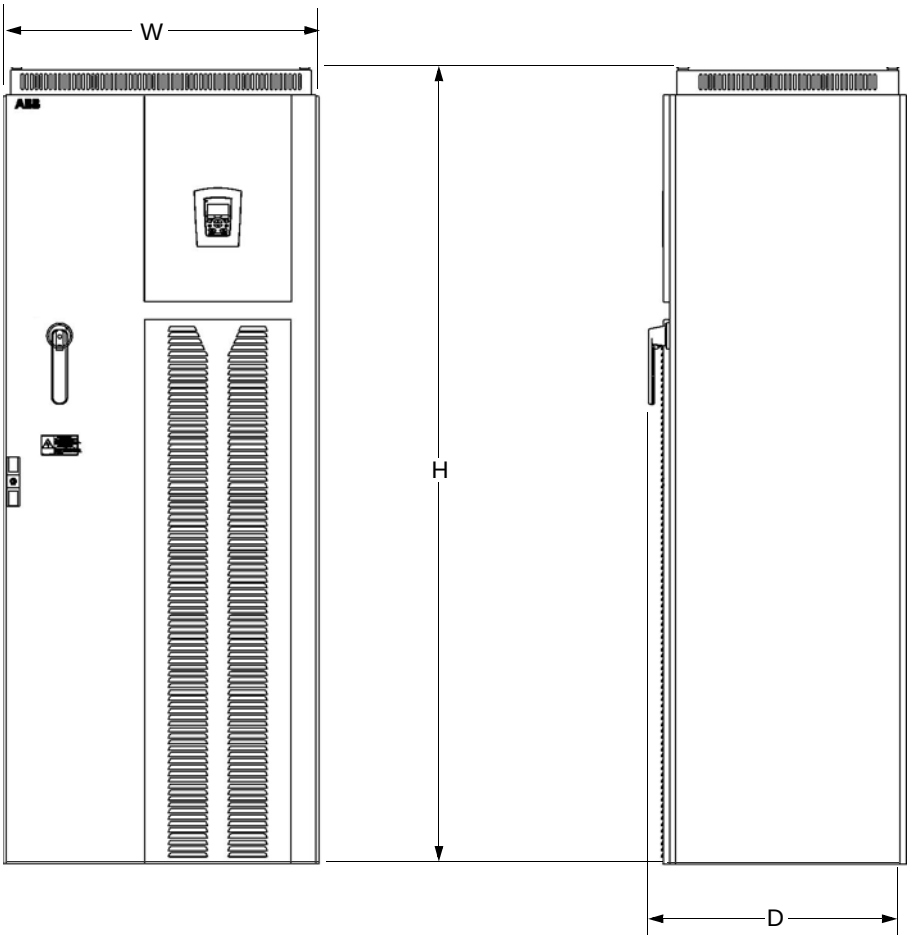


Standard E-Clipse Bypass, UL type 3R, B1...B2				
Dimensions Ref.	B1		B2	
	mm	in.	mm	in.
W	452	17.8	530	21.0
H	865	34.0	968	38.0
D	343	13.5	389	15.0

* Keep a minimum of 2 inches of free space on each side and 8 inches of free space above and below all units from non-heat producing sources. Double these distances from heat producing sources

Outside Dimensions – B4

Outside dimensions for the B4 cabinet are defined below.



Outside Dimensions by Frame Size			
Enclosure	**Ref.**	**B4**	
		mm	**in**
IP 21 / UL type 1	**W**	806	31.7
	H	2065	81.3
	D	659	25.9
IP 54 / UL type 12	**W**	806	31.7
	H	2377	93.6
	D	659	25.9

* Keep a minimum of 2 inches of free space on each side and 8 inches of free space above and below all units from non-heat producing sources. Double these distances from heat producing sources

Applicable Standards

The E-Clipse Bypass configuration conforms to all standards listed for the ACH550-UH.

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SUPERSEDES:JAN 21, 2008

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