Dave Polka

Training Manager

ABB E-Clipse
Bypass Certified
Start-up Training

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Scope of Product

Frames

- V1 thru V4 (Vertical)

    - 1 to 60 HP @ 480V

    - 1 to 25 HP @ 208V

    - 1 to 60 HP @ 600V

- B1 thru B4 (Standard Bypass [Box])

    - 1 to 400 HP @ 480v

    - 1 to 150 HP @ 208V

    - 1 to 150 HP @ 600V

- Configurations

    - Circuit Breaker – VCR; BCR

    - Disconnect – VDR; BDR

Scope of Product

- Vertical

  - Enclosure

    - UL Type 1 - Ex. ACH550-VCR-023A-4

  - Options

    - Fig communications modules

    - Service switch

- Standard Bypass (Box)

  - Enclosure

    - UL Type 1 - Ex. ACH550-BCR-023A-4

    - UL Type 12 - Ex. ACH550-BCR-023A-4+B055

  - Options

    - FXXX-01 communications modules
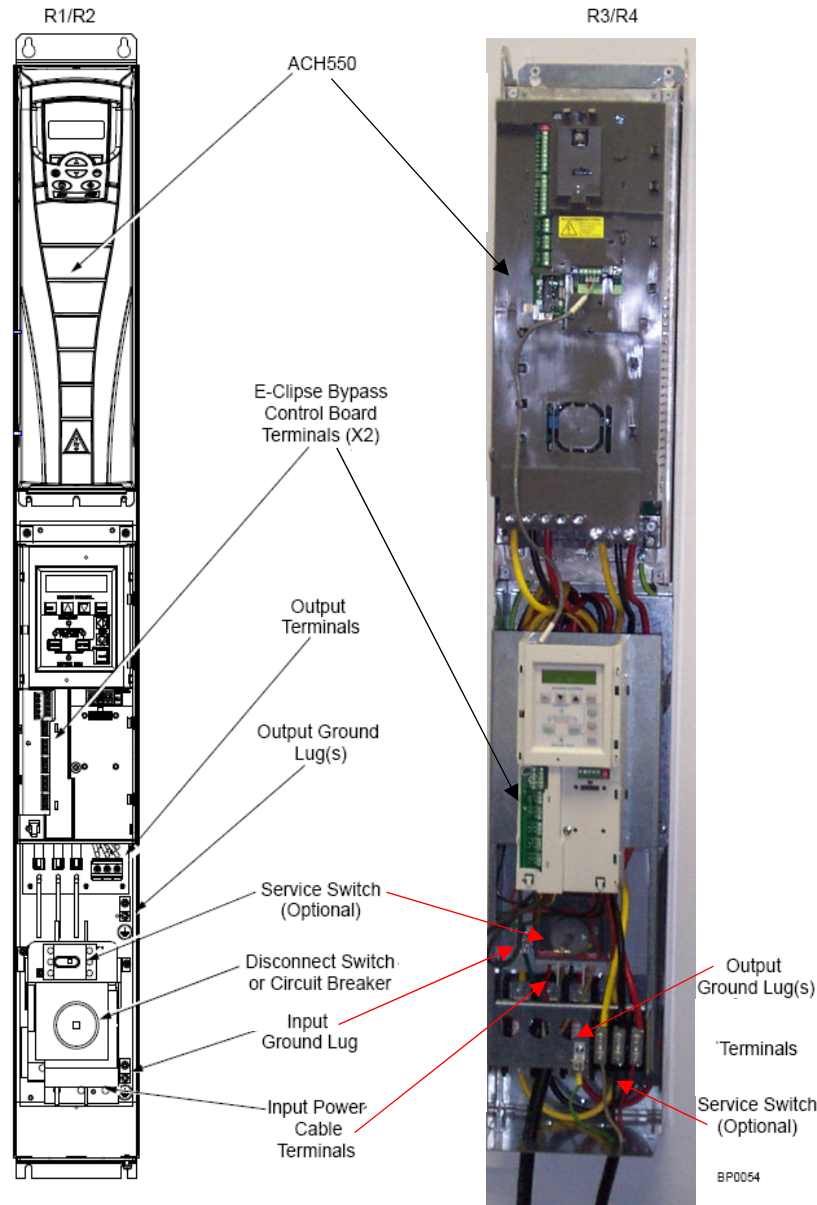
    - Service switch

    - AC Line Reactor

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Scope of Product

- **Release for sales date**
  - March 1, 2008

- **Not included at release but planned**
  - FLON, FENA, FDNA, & FPBA

- **Differences from current product**
  - No AC line reactor in vertical bypass (VCR,VDR)
  - Up to 200 HP in B3 wall mounted design
  - All three drive relays free for customer use
  - Standard ABB 115 VAC contactor coils 1 – 400 HP
  - Customer serial communications connection accomplished on bypass, not VFD
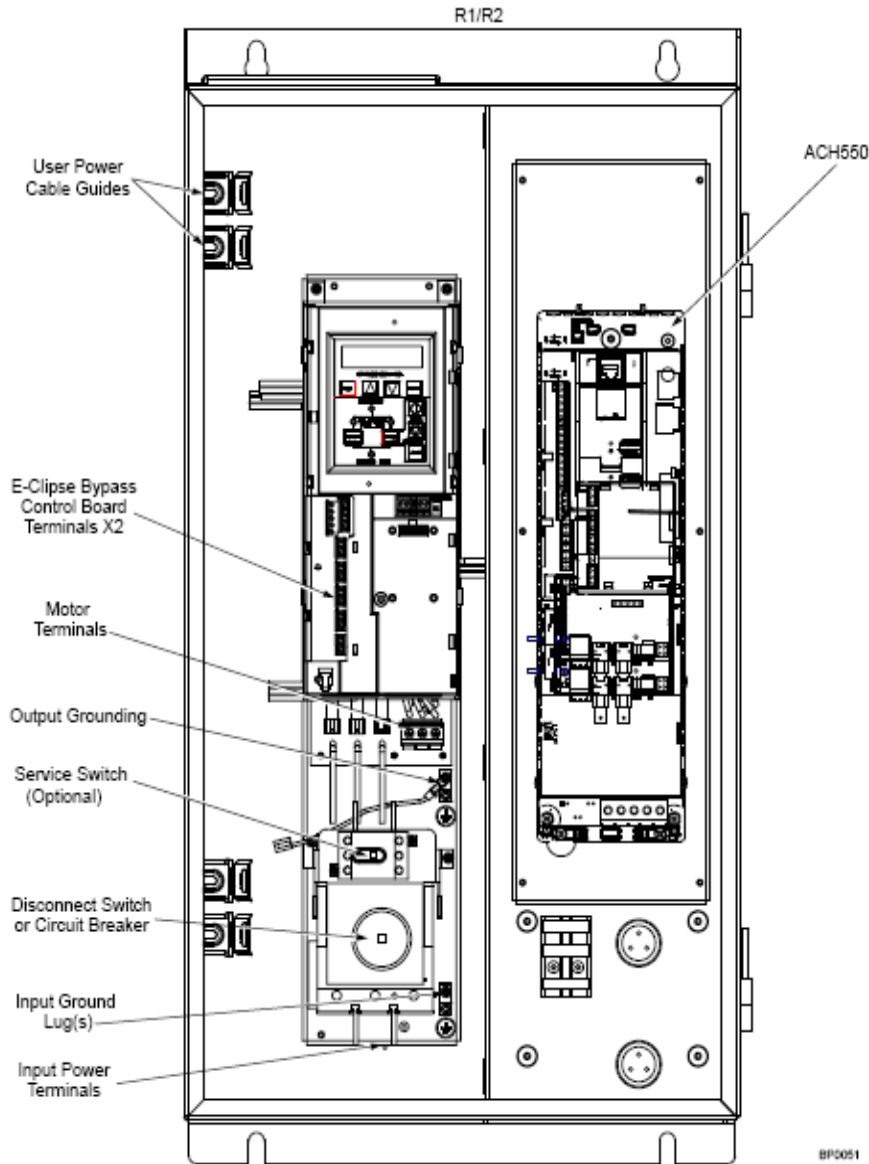
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E-Clipse Bypass - Assembly View

1. Base

2. Contactor Sub-assembly

3. Support Plate

4. Bypass Control Module

5. Drive

6. Plastic Cover

EXPLD STATE: PP-PRES

E-Clipse Bypass Overview – "V" Style (Vertical)

R1/R2

ACH550

R3/R4

E-Clipse Bypass
Control Board
Terminals (X2)

Output
Terminals

Output Ground
Lug(s)

Service Switch
(Optional)

Disconnect Switch
or Circuit Breaker

Input
Ground Lug

Input Power
Cable
Terminals

Output
Ground Lug(s)

Terminals

Service Switch
(Optional)

BP0054

Take care not to "over tighten"
Input
Or
Output
Terminals
(Torque tool use
is recommended)

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E-Clipse Bypass Overview – "B" Style (Box)

R1/R2

User Power
Cable Guides

ACH550

E-Clipse Bypass
Control Board
Terminals X2

Motor
Terminals

Output Grounding

Service Switch
(Optional)

Disconnect Switch
or Circuit Breaker
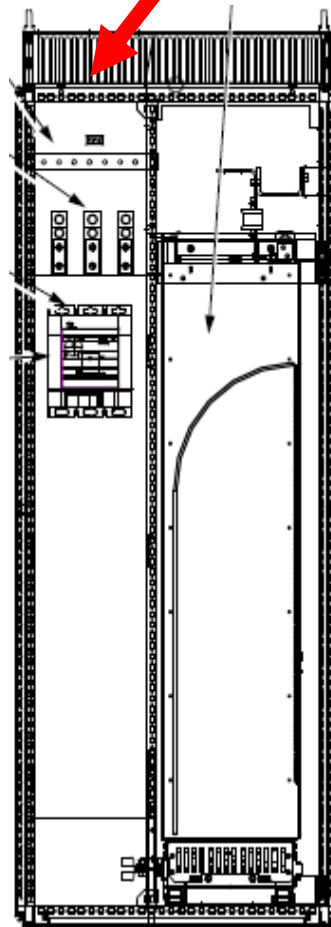
Input Ground
Lug(s)

Input Power
Terminals

BP0051

Take care not to "over tighten"
Input
Or
Output
Terminals
(Torque tool use
is recommended)

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E-Clipse Bypass Wiring

All "B" or Cabinet Drives require
Top Entry/Exit
(Removable Plate do not drill holes with plate in place – move to bench)

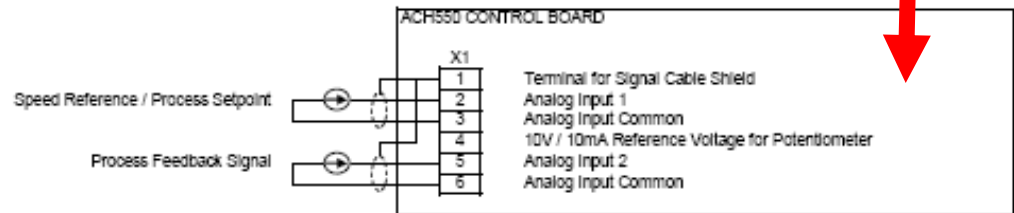All "V" Drives require Bottom Entry/Exit
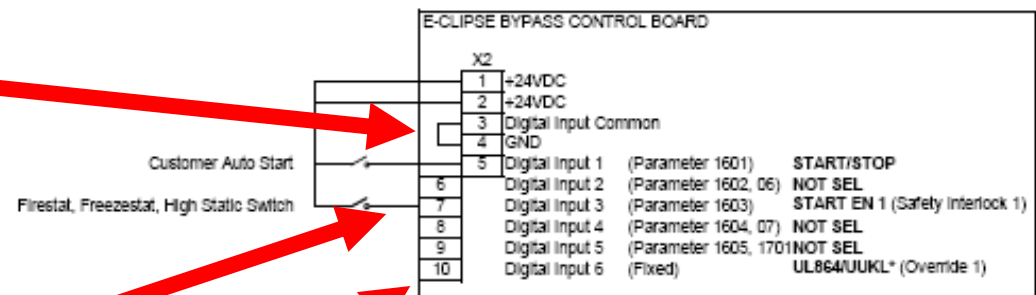
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Initial Control Wiring

Only Analog Ref or PID feedback is connected to Base Drive Control Board (SMIO)

DCOM / GND Jumper & START EN 1 Jumper Installed At Factory

All system wiring is connected to the Eclipse Control Board

(RBCU Module = the RBIO Board + Power Supply Board)

DI6 (Override 1) Not programmable (Ignores low Priority Safeties)

HVAC Default

Drive Control Board

ACH550 CONTROL BOARD

X1

Speed Reference / Process Setpoint

1	Terminal for Signal Cable Shield
2	Analog Input 1
3	Analog Input Common
4	10V / 10mA Reference Voltage for Potentiometer
5	Analog Input 2
6	Analog Input Common

Process Feedback Signal

E-CLIPSE BYPASS CONTROL BOARD

X2

Customer Auto Start

Firestat, Freezestat, High Static Switch

1	+24VDC		
2	+24VDC		
3	Digital Input Common		
4	GND		
5	Digital Input 1	(Parameter 1601)	START/STOP
6	Digital Input 2	(Parameter 1602, 06)	NOT SEL
7	Digital Input 3	(Parameter 1603)	START EN 1 (Safety Interlock 1)
8	Digital Input 4	(Parameter 1604, 07)	NOT SEL
9	Digital Input 5	(Parameter 1605, 1701	NOT SEL
10	Digital Input 6	(Fixed)	UL864/UUKL* (Override 1)

X2

11	Relay Output 1 (Parameter 1401)	BYP NOT FLT
12	Default Operation: Bypass Not Faulted	11 connected to 13
13	Bypass Faulted	11 connected to 12
14	Relay Output 2 (Parameter 1404)	SYS RUNNING
15	Default Operation: System Running	14 connected to 16
16		
17	Relay Output 3 (Parameter 1407)	SYS STARTED
18	Default Operation: System Started	17 connected to 19
19		
20	Relay Output 4 (Parameter 1410)	BYPASS SEL
21	Default Operation: Bypass Selected	20 connected to 22
22		
23	Relay Output 5 (Parameter 1413)	BYPASS AUTO
24	Default Operation: Bypass in Auto	23 connected to 25
25		

Bypass Control Board (RBIO)

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E-Clipse Bypass – Overview

- **There are four Macros in the E-Clipse Bypass**

- **All Macros – Start / Stop DI1; DI6 = Smoke Control**

    - HVAC default Macro = 1 safety

    - Damper Macro = 2 safeties & damper end-switch

    - Retrofit Macro = same as current E-Bypass (1 safety, damper end-switch, Override 1 and Override 2)

    - Smoke Control Macro = 1 damper end-switch, two high priority safeties, one low priority safety (three total) and Override 1 (Smoke Control)

- **See E-Clipse User's Manual for wiring details / examples**

E-Clipse Bypass – Overview

- Warning: DI 6 activation **<u>always</u>** configures I/O as shown in the Smoke Control Macro diagram

- Closing DI6 **<u>will</u>** place the E-Clipse Bypass into Automatic Smoke Control Mode!

  - Closing DI6 may override your previous programming of DI1 through DI5!

  - This was done to satisfy UL864 / UUKL Smoke Control listed devices requirements. However, the RBCU is not presently UL864 / UUKL Listed.
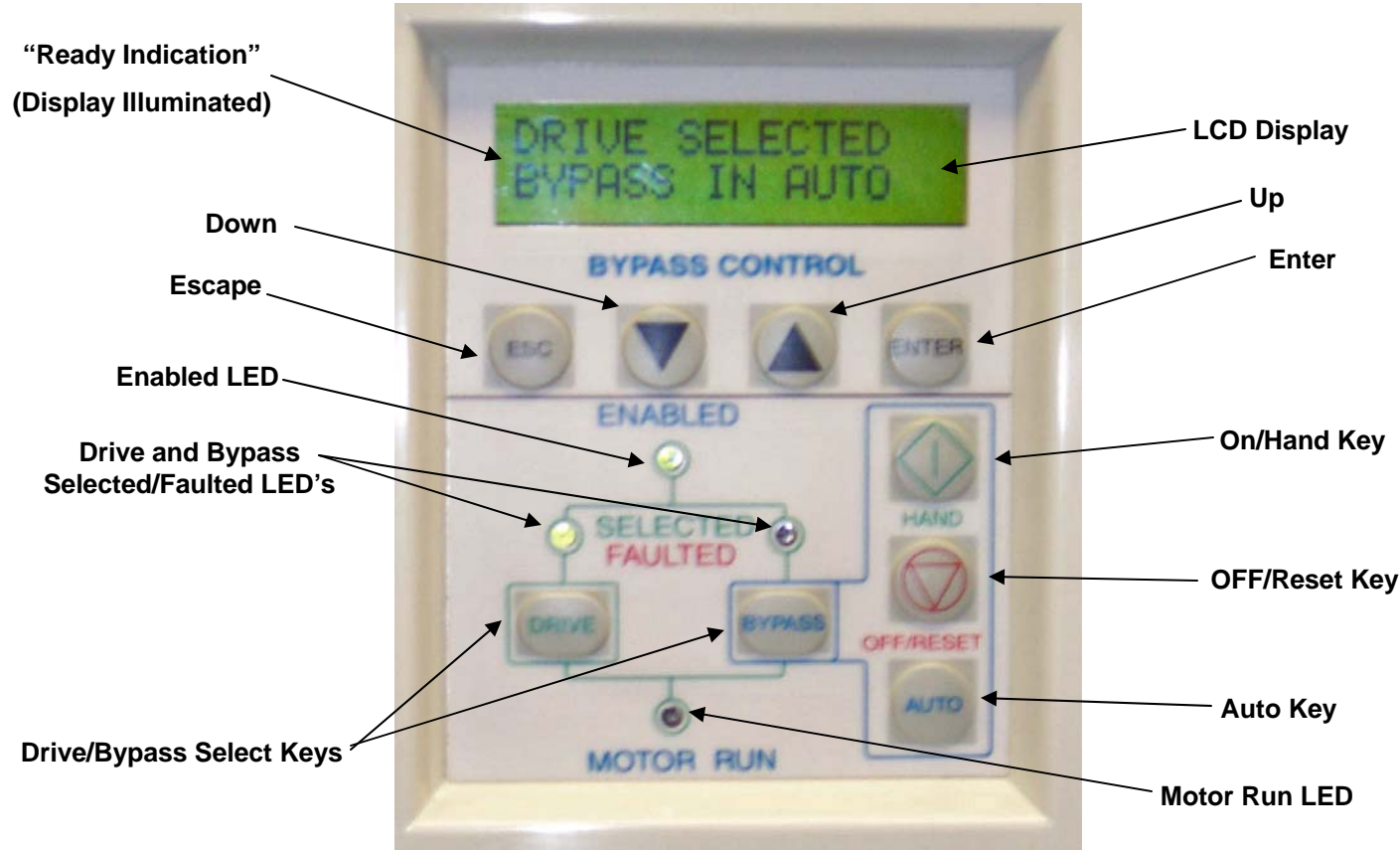
E-Clipse Bypass – Set-up and Procedures

- **Review the E-Clipse Bypass User Manual for complete information**
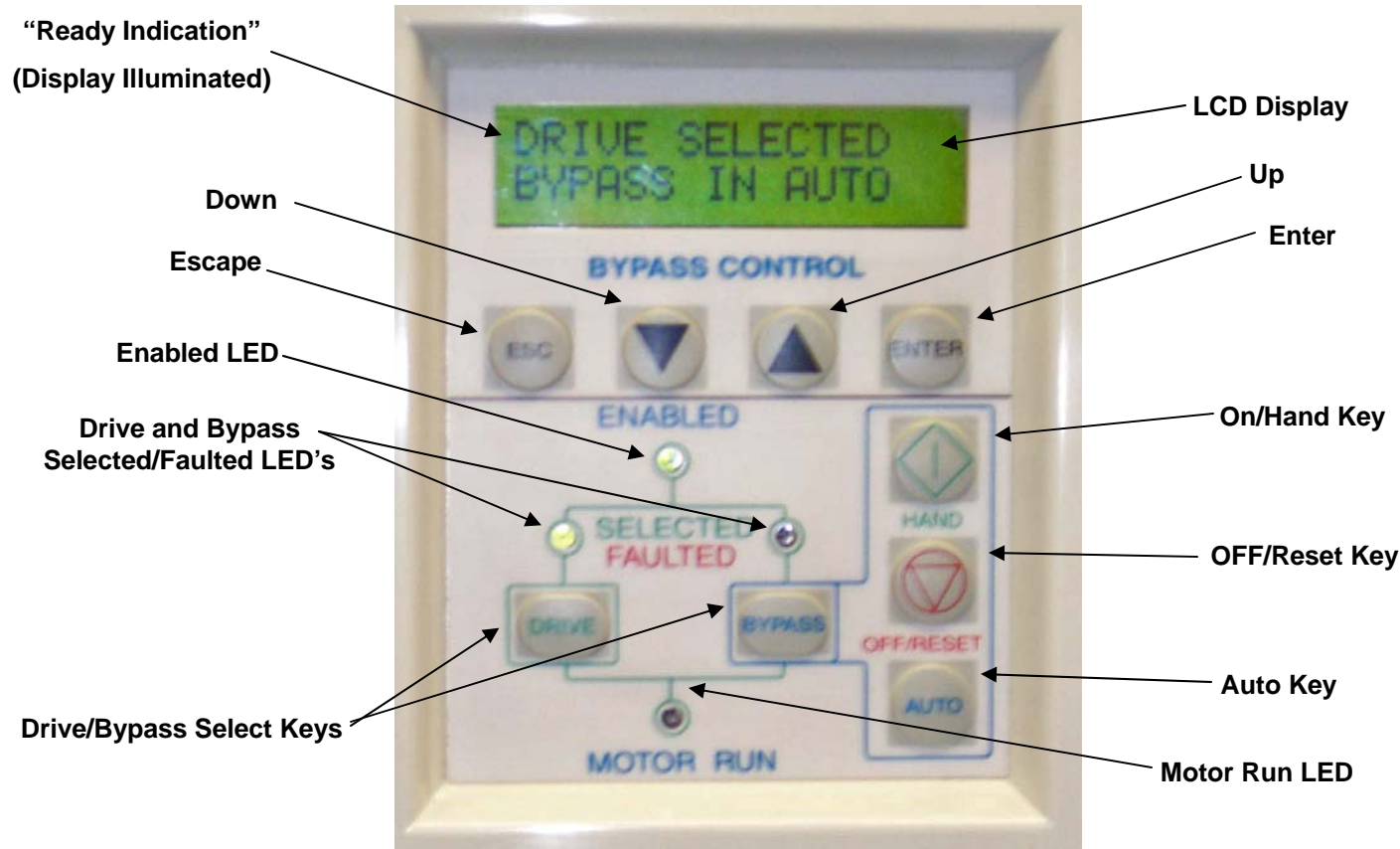
- **Bypass product has a display & menu structure similar to the drive**

  - Programmable relays, fault transfers, DIs, etc.

  - Firmware version and unit serial number are available from the keypad

    - From the "Home" screen, press the Up and Down arrows simultaneously to view Firmware Version and S/N

  - Field loading of new firmware is possible – However, NPCU-01 RS-232 / 485 adapter DOES NOT WORK

Keypad Use

- Bypass product has a display & menu structure similar to the drive
  - Programmable relays, fault transfers, DIs, etc. are programmed through Bypass Keypad
  - Press "Escape" to cancel programming choice

"Ready Indication"
(Display Illuminated)

LCD Display

Down

Up

Escape

Enter

Enabled LED

On/Hand Key

Drive and Bypass
Selected/Faulted LED's

OFF/Reset Key

Drive/Bypass Select Keys

Auto Key

Motor Run LED

Keypad Description

- LEDs are very similar in form & function to the current E-Bypass keypad
  - Main difference is that the Ready LED on E-Bypass is replaced with the LCD illumination on E-Clipse Bypass
 - Also, Automatic Transfer LED is replaced by LCD text message

"Ready Indication"
(Display Illuminated)

LCD Display

Down

Up

Escape

Enter

Enabled LED

On/Hand Key

Drive and Bypass
Selected/Faulted LED's

OFF/Reset Key

Drive/Bypass Select Keys

Auto Key

Motor Run LED

Jumpers and Switches

- The E-Clipse Bypass ships with DCOM / GND Jumper & START EN 1 Jumper installed at the factory
- Therefore, the E-Clipse Bypass will run out of the box!
- If your customer has normally closed (N.C.) safety input(s), remove the jumper from DI3 (Pin X2:7) and insert customer safety contact.
- If customer has more than one safety input and / or Damper End-switch either use another bypass Macro or individually program DIs in Group 16

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Jumpers and Switches
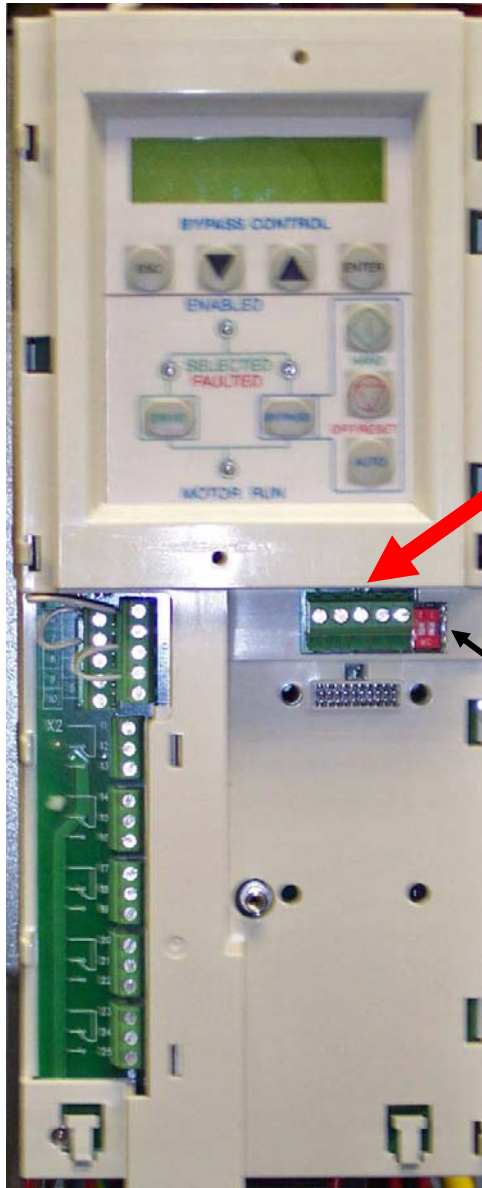
All EFB (ModBus, N2, FLN, & BACnet) communications is connected to X2: 26 - 30 on the Bypass Board (RBIO)

Set SW1 *(Comm DIP SW)* for "Terminated" on the first & last device on the network
(verify use with EFB Protocol Manual)
These are the only switches on the E-Clipse Bypass

Termination resistors are passive, 120 Ohm resistors on E-Clipse
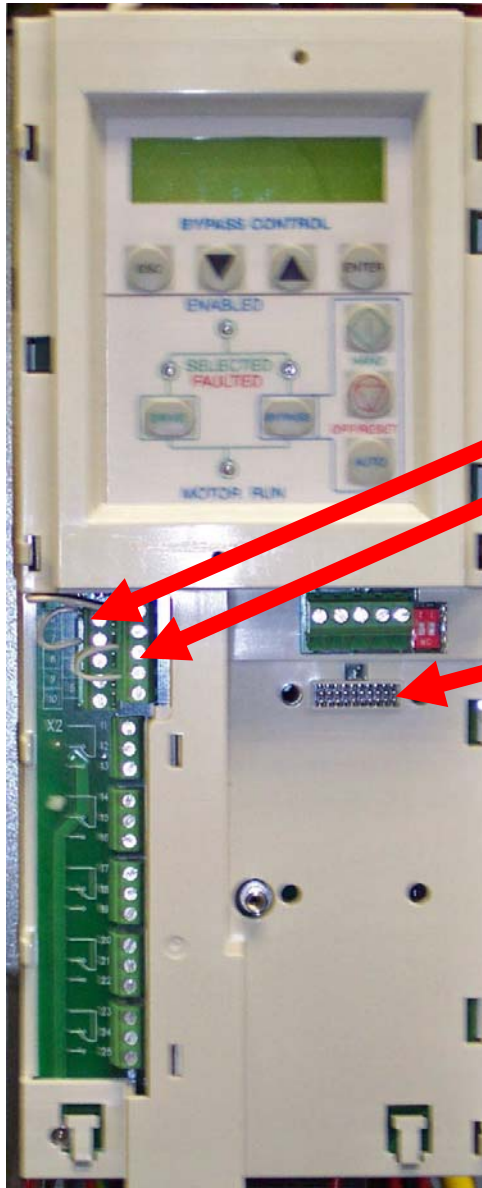
Serial Communications Termination Resistors

SW1

ON=Terminated

OFF=Not Terminated

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Jumpers and Switches

Factory Installed DCOM & Safety Jumpers

Fieldbus Adapters (FBAs) connected here.

Ex. FLON-01 = LonWorks, FENA-01 = EtherNet,

FDNA-01 = DeviceNet, & FPBA-01 = Profibus

E-Clipse Bypass – Programming Notes

In general, any adjustments related to motor data and motor speed are entered using the drive keypad. All other adjustments are entered using the bypass keypad.

- 1. Steps in Drive / Bypass Set-up (drive keypad):
  - Enter the motor Data through the Drive Keypad (Group 99)
    - The bypass reads this data from drive and uses same to set I^2T Motor Overload protection – no user bypass OL set-up required
  - Adjust Reference Group (Group 11) - if required
  - Adjust Analog Input Group (Group 13) - if required
- DO NOT adjust Group 16 – this is set by E-Clipse Macro

ABB
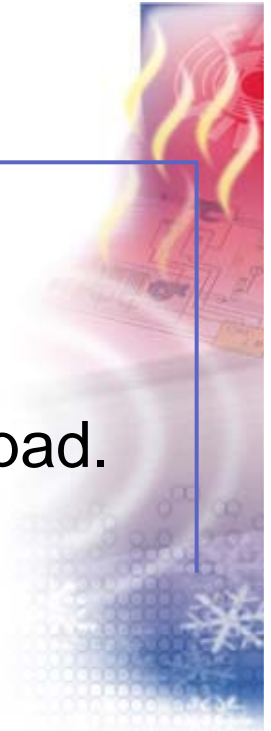
E-Clipse Bypass – Programming Notes

- Steps in Drive / Bypass Set-up (drive keypad cont.):

  - Enter minimum frequency - if any (2007)

  - Adjust accel/decel rates -if required (2202, 2203)

  - Adjust PID loop - if used (Group 40)

- DO NOT adjust Groups 51 or 53 – these are set by E-Clipse Macro. Customer serial communications adjustments are made from the bypass keypad

Most other adjustments are accomplished using the bypass keypad

- 2. Select bypass macro (if required) from bypass keypad group (Group 99)

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E-Clipse Bypass – Programming Notes

- **3. NOTE: You must run the motor in drive mode before attempting bypass operation** (panel will indicate as pictured)

    If bypass run is selected before running

    drive, fault 3013 will appear

    "DRIVE 1st START"

    Reset fault and run motor in drive mode.

- **4. Bump motor in drive Hand**

    or Auto mode

    - Note motor rotation direction

- **5. Bump motor in bypass**

    - Note motor rotation direction

E-Clipse Bypass – Programming Notes

- **6. If motor runs in the correct direction in drive and bypass**

   Proceed to step 7.

  - **If motor runs in incorrect direction in both modes Swap any 2 <u>motor</u> leads**

  - **If motor runs one direction in drive mode & the other in bypass mode you will get the following indication on the bypass keypad "PHASE SEQ" Swap any 2 <u>input</u> power leads**

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E-Clipse Bypass – Programming Notes

- ## 7. Go to STARTUP PARAMS

  Scroll down and make appropriate changes if required

  NOTE: Parameter 1613 BP DISABLE (Bypass Disable) will disable bypass operation in any mode

  NOTE: Parameter 1616 DISP ALRMS (Display Alarms) will keep several alarms silenced

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E-Clipse Bypass – Programming Notes

- **Communication Set-up**

- **8. Are you using serial communications?**

  - If no, go to step 9

  - If yes – select protocol from bypass keypad (Group 98)

    - STARTUP PARAMS or to 9802 Comm. Protocol Select

      - Select desired protocol (Embedded Fieldbus)

        - 1= STD MODBUS; 2= N2, 3=FLN; 4 = EXT. FBA; 5 = BACNET

- **NOTE: The E-Clipse Bypass communicates to the VFD using ModBus. No communications settings are required from the drive keypad.**

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E-Clipse Bypass – Programming Notes

If you unintentionally change drive comm settings – from the drive keypad:

Set 9802 = ModBus

Set 9902 = E-Clipse

Cycle power

Accomplish these steps <u>in this order</u> if you receive a "Drive Link Lost" Warning or a "Drive Setup" Warning

See E-Clipse Bypass User's Manual for details

E-Clipse Bypass – Communications Set-up

- **Communication Set-up (continued)**

- **Are you controlling drive speed via communication?**

    - If yes

        - Go to <u>drive</u> parameter 1103 REF 1 SELECT

            - 8 = COMM

        - For PID control, go to <u>drive</u> parameter 1102 EXT1 / EXT 2 SEL

            - 7 = EXT 2, or

            - 8 = COMM (if you wish to switch between EXT1 & EXT2 via communications)

        - 4010 SET POINT SEL

            - 8 = COMM

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E-Clipse Bypass – Communications Set-up

- **Communication Set-up (continued)**

- **Are you starting and stopping via communication?**

  - If yes

    - Go to bypass parameter 1625 Comm CTL

      - 0 = DRIVE ONLY (Default); 1 = SYSTEM (Drive & bypass)

    - Go to bypass parameter 1601 START / STOP

      - 2 = COMM

      - With 1601 set for COMM, if 1625 set for DRIVE ONLY, the only way to start the bypass is locally, using the Hand Key on the bypass keypad

      - If 1625 set for SYSTEM, and 1601 set for COMM, both drive & bypass may be started via serial communications

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E-Clipse Bypass – Communications Set-up

Set-up Drive external communications (through bypass)

- Bypass parameter 5302
    - Set desired drive unique network ID (must be different than bypass node number) Default = 1 for most protocols

- **For BACnet only, you must set additional parameters**
    - Set desired Baud Rate 5303 = 9.6; 19.2; 38.4; or 76.8 kB
        - On ModBus systems, you may also need to set baud rate
    - BACnet Drive Device Object Instance ID – Bypass parameter 5311 / 5317
        - Set desired drive Device Object Instance ID

- Cycle power if no communications is required to bypass objects (points)

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E-Clipse Bypass – Communications Set-up
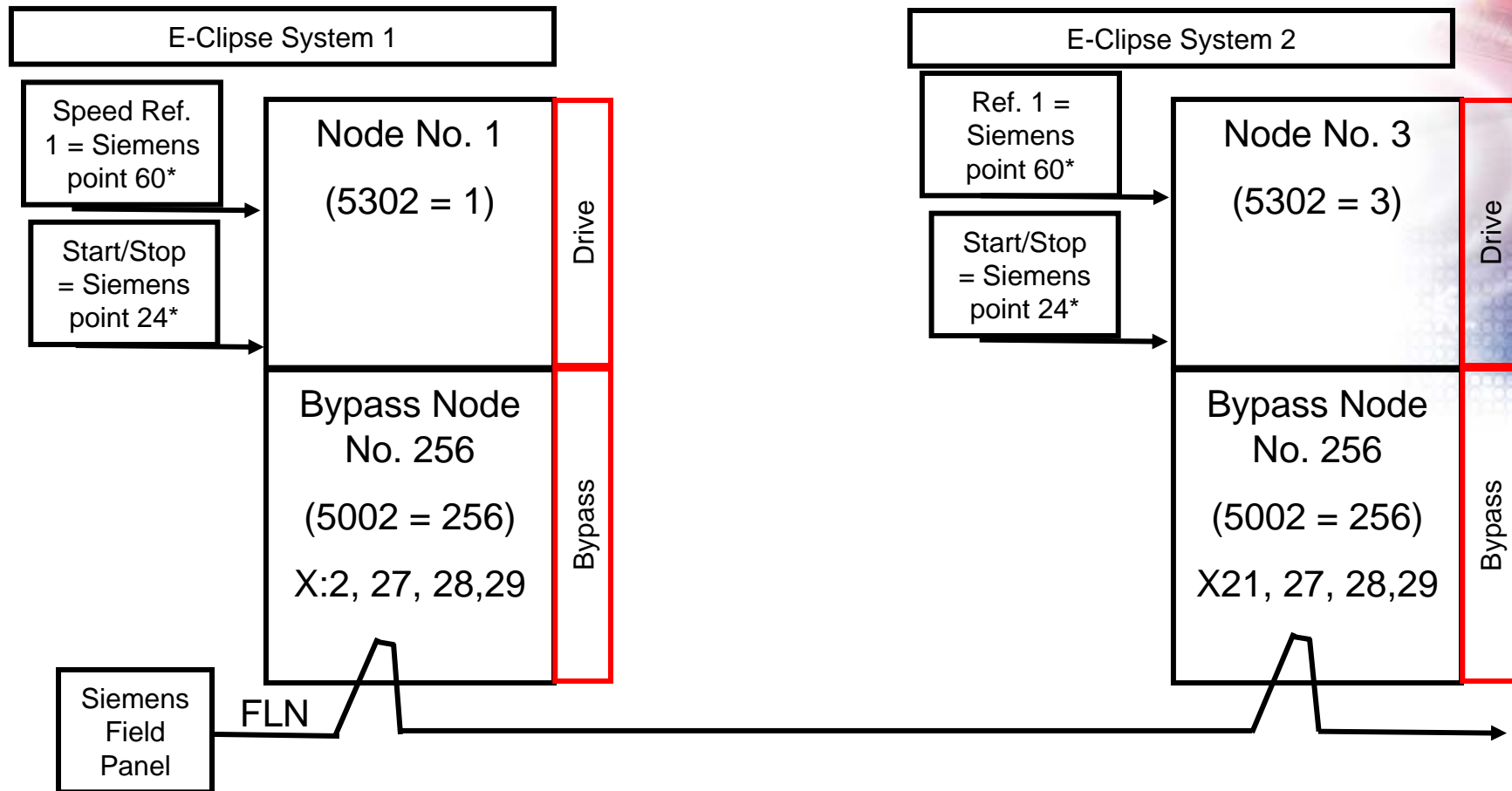
Set-up <u>bypass</u> external communications (if required)

- Bypass parameter 5002
    - Set desired bypass unique network ID (must be different than drive node number) Default = 256 for most protocols
    - Address 256 is out of range for most protocols. Therefore, with address 256, most communication systems will not see the bypass.

- For BACnet only, you must set additional parameters
    - BACnet Bypass Device Object Instance ID – Bypass parameter 5011 / 5017
        - For BACnet systems, you will need to coordinate with the comms system integrator and set 5011 for a unique bypass Device Object Instance ID

- Cycle power

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Siemens FLN Example 1625 = 0 (Drive Only)

E-Clipse System 1

Speed Ref. 1 = Siemens point 60*

Start/Stop = Siemens point 24*

Node No. 1

(5302 = 1)

Drive

Bypass Node No. 256

(5002 = 256)

X:2, 27, 28,29

Bypass

E-Clipse System 2

Ref. 1 = Siemens point 60*

Start/Stop = Siemens point 24*

Node No. 3

(5302 = 3)

Drive

Bypass Node No. 256

(5002 = 256)

X21, 27, 28,29
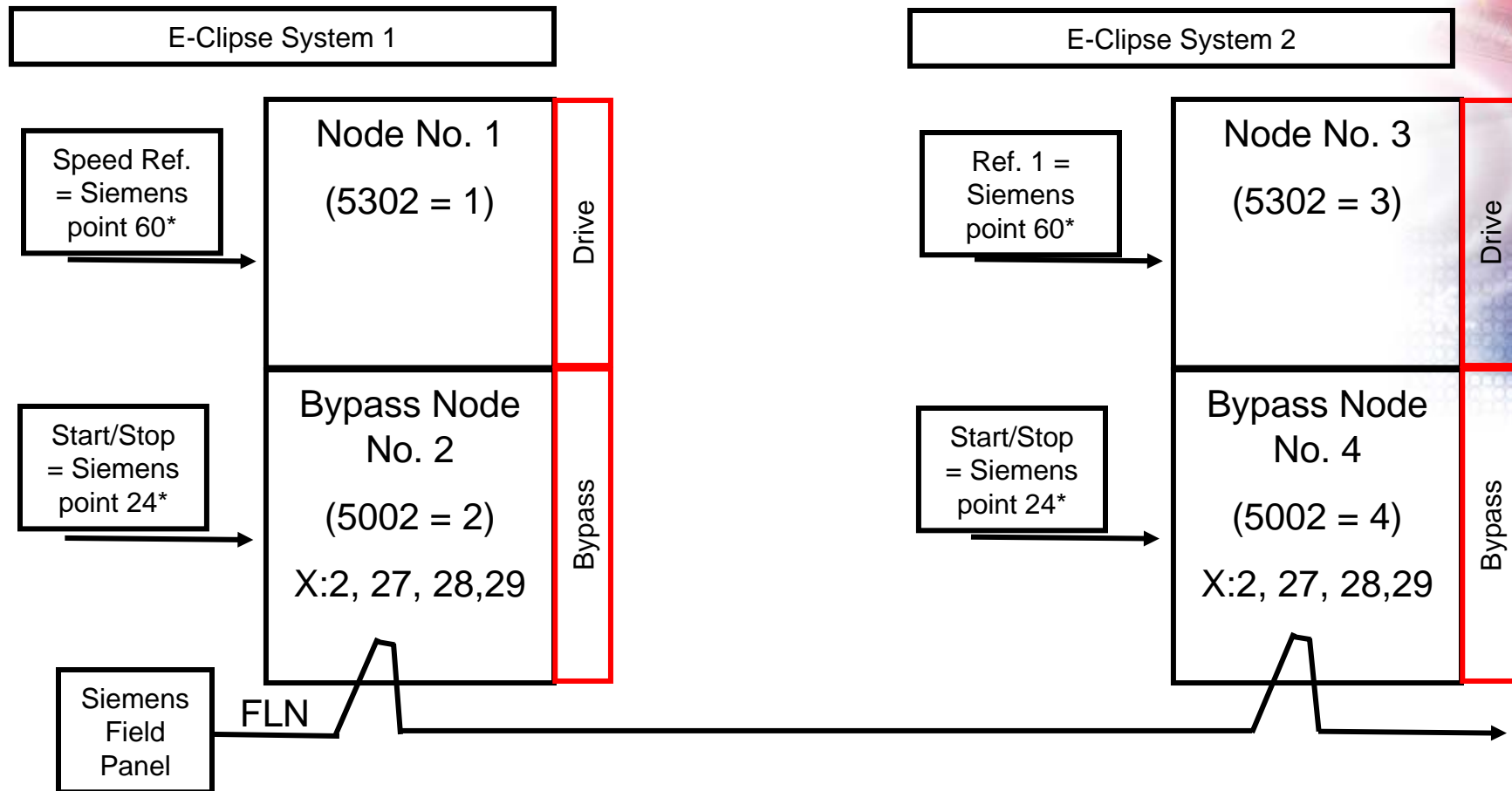
Bypass

Siemens Field Panel

FLN

- No Bypass communications or control 95 VFD points available. No bypass information available[1].
- Siemens command points 24 & 60 come from Field Panel via FLN to bypass X2: 28 & 29 and are routed to VFD.
- [1]Address 256 and higher are not recognized by Modbus, N2 or FLN. Therefore, no system address conflicts exist.

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Example System (Drive & Bypass) Monitoring / Control

Siemens FLN Example 1625 = 1 (system)

E-Clipse System 1	E-Clipse System 2

Speed Ref. = Siemens point 60* →

Node No. 1

(5302 = 1)

Drive

Ref. 1 = Siemens point 60* →

Node No. 3

(5302 = 3)

Drive

Start/Stop = Siemens point 24* →

Bypass Node No. 2

(5002 = 2)

X:2, 27, 28,29

Bypass

Start/Stop = Siemens point 24* →

Bypass Node No. 4

(5002 = 4)

X:2, 27, 28,29

Bypass

Siemens Field Panel

FLN

- Bypass communications and/or control. 95 VFD & 45 bypass points available

- Siemens command points 24 & 60 come from Field Panel via FLN to bypass X2: 28 & 29 and are routed to VFD and bypass
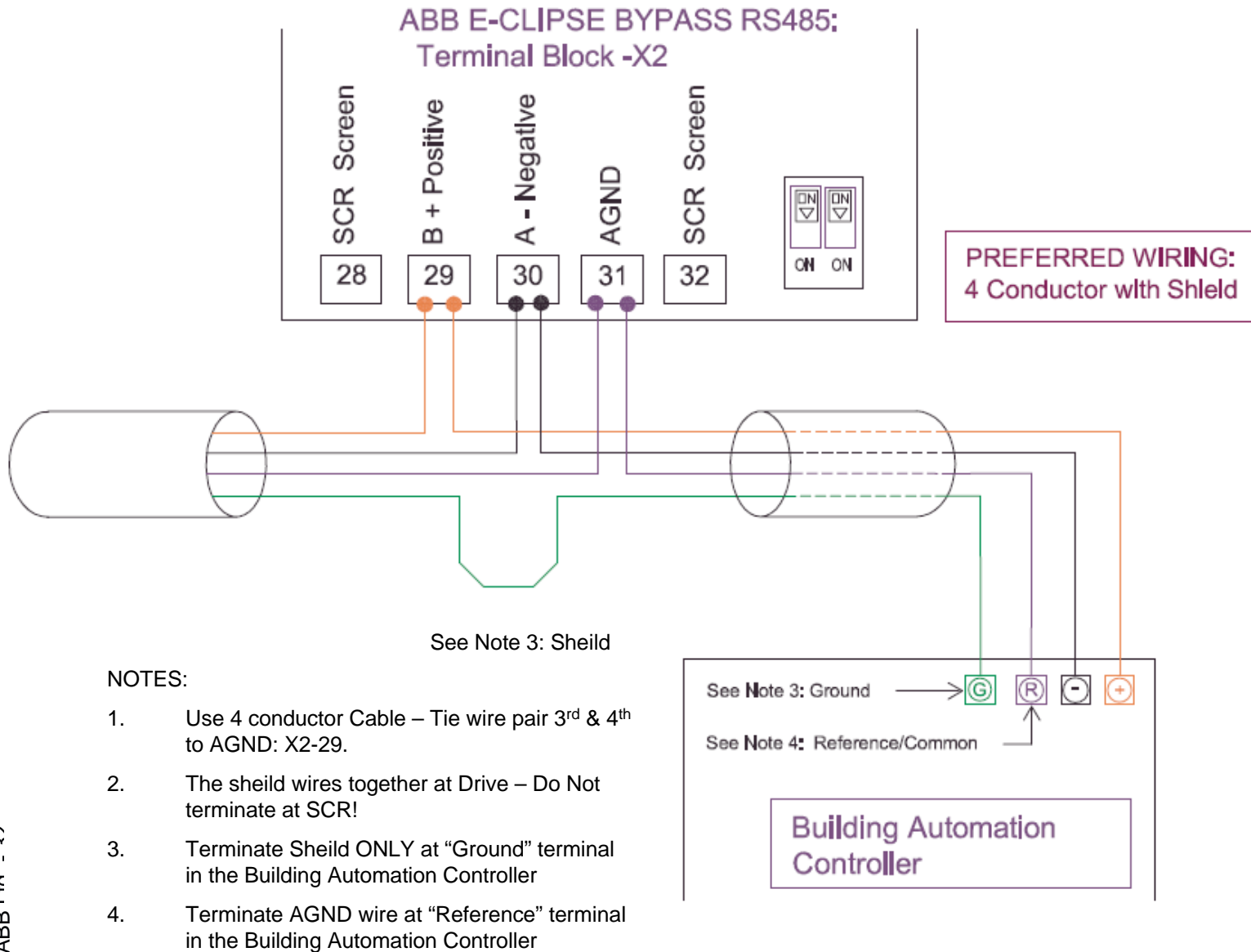
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E-Clipse Bypass – Communications Set-up

NOTE: when the 45 Bypass communications points are being monitored or controlled over the serial link, the E-Clipse System (drive and bypass) now consumes two addresses on the serial communications system. In the past, an ABB drive has only required one network address. Coordination with the temperature control contractor on acceptable network addresses is very crucial.

The translation between the bypass and the drive is transparent to the user. The system was designed for 100% backwards compatibility.

E-Clipse & VFD Serial Communications Wiring

ABB E-CLIPSE BYPASS RS485:
Terminal Block -X2

SCR Screen	B + Positive	A - Negative	AGND	SCR Screen
28	29	30	31	32

ON ON

PREFERRED WIRING:
4 Conductor with Shield

See Note 3: Sheild

See Note 3: Ground → G R – +

See Note 4: Reference/Common

Building Automation Controller

NOTES:

1. Use 4 conductor Cable – Tie wire pair 3rd & 4th to AGND: X2-29.

2. The sheild wires together at Drive – Do Not terminate at SCR!

3. Terminate Sheild ONLY at "Ground" terminal in the Building Automation Controller

4. Terminate AGND wire at "Reference" terminal in the Building Automation Controller

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E-Clipse Bypass – Programming Notes

- 9. The basic start-up is now complete. Review the E-Clipse Bypass User's Manual for additional information on advanced set-up. Highlights as follows:

  - Group 14 – used for programming changes to the bypasses five relay outputs

  - Group 16 – system control, automatic transfer to bypass on selected VFD faults, bypass run delay, and other advanced features; review Manual

  - Group 30 – fault function set-up; review Manual

  - Group 33 – System Information (Firmware version, serial number, manufacture date, etc.)

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Notes

Thank you for your Attention !

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