VVDED300028US R6/00
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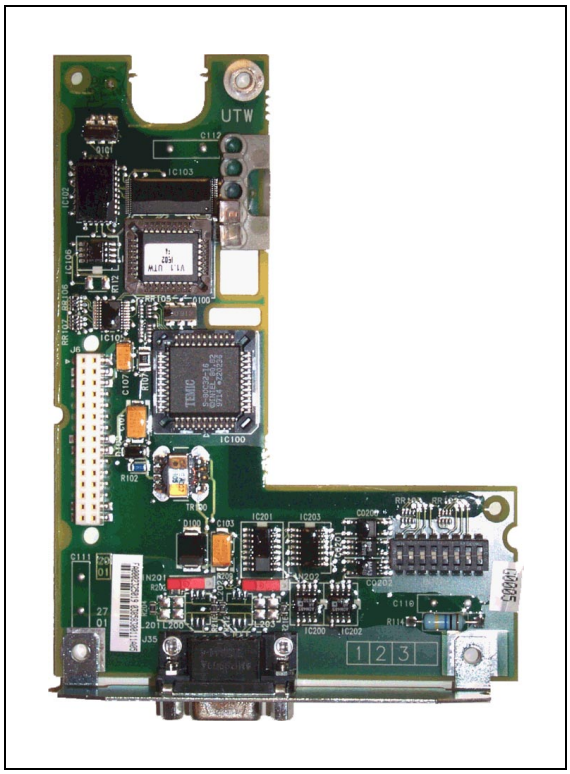
Raleigh, NC, USA

Instruction Bulletin

ALTIVAR® 58 Adjustable Speed Drive Controllers

METASYS® N2 Communication Option VW3A58354U

Retain for future use.



Telemecanique

SQUARE D

⚠ DANGER

HAZARDOUS VOLTAGE

- Read and understand this bulletin in its entirety before installing or operating ALTIVAR 58 drive controllers. Installation, adjustment, repair, and maintenance of the drive controllers must be performed by qualified personnel.
- Disconnect all power including external control power that may be present before servicing the drive controller. WAIT THREE MINUTES for the DC bus capacitors to discharge. Then follow the DC bus voltage measurement procedure on page 6 to verify that the DC voltage is less than 45 V. The drive controller LEDs are not accurate indicators of the absence of DC bus voltage.
- DO NOT short across DC bus capacitors or touch unshielded components or terminal strip screw connections with voltage present.
- Install and close all covers before applying power or starting and stopping the drive controller.
- User is responsible for conforming to all applicable code requirements with respect to grounding all equipment.
- Many parts in this drive controller, including printed wiring boards, operate at line voltage. DO NOT TOUCH. Use only electrically insulated tools.

Before servicing the drive controller:

- Disconnect all power.
- Place a “DO NOT TURN ON” label on the drive controller disconnect.

Lock disconnect in open position.

Failure to follow this instruction will result in death or serious injury.

SECTION 1: INTRODUCTION

PRODUCT OVERVIEW

The ALTIVAR 58 (ATV58) family of adjustable frequency AC drive controllers is used for controlling three-phase asynchronous motors. They range from:

- 1 to 75 hp (0.75 to 55 kW) constant torque (100 hp variable torque), 460 V, three-phase input
- 0.5 to 7.5 (0.37 to 5.5 kW) constant torque, 230 V, single-phase input
- 2 to 40 hp (1.5 to 30 kW) constant torque (50 hp variable torque), 230 V three-phase input

The VW3A58354U METASYS N2 communication option allows the ATV58 drive controller to be integrated as a slave into Johnson Control's METASYS building automation network. As an application specific controller on the network, the ATV58 drive controller can receive and respond to data messages. The data exchange allows the network to access ATV58 functions such as:

- Downloading adjustment parameters
- Command and control
- Monitoring
- Diagnostics

⚠ WARNING

LOSS OF CONTROL

- The designer of any control scheme must consider the potential failure modes of control paths and, for certain critical control functions, provide a means to achieve a safe state during and after a path failure. Examples of critical control functions are emergency stop and overtravel stop. Separate or redundant control paths must be provided for critical control functions.
- System control paths may include communication links. Consideration must be given to the implications of unanticipated transmission delays or failures of the link.[1]

Failure to follow this instruction can result in death, serious injury, or equipment damage.

1. For additional information, refer to NEMA ICS 1.1 (latest edition), "Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control" and to NEMA ICS7.1 (latest edition), "Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable-Speed Drive Systems."

This bulletin explains how to integrate an ATV58 drive controller into a METASYS N2 network with the ATV58 N2 communication option installed. Use this bulletin to install, wire, and configure the N2 option card.

SEPARATE EQUIPMENT REQUIRED

To use the N2 communication option, the following separate equipment must be supplied by the installer for each drive controller:

- For a drive controller installation that needs an end-of-line termination, use a 9-pin male D-shell connector (for example, Phoenix Contact connector SUBCON 9/M-SH 27 61 50 9) along with a 120 Ω resistor and a 0.001 µF capacitor. See "End of Line Termination" on page 10 for more details.
- For a drive controller installation that does not need an end-of-line termination, use a 9-pin male D-shell connector suitable for daisy chaining devices in series (for example, Phoenix Contact connector SUBCON-PLUS-M2 27 61 83 9).

- A Hand/Off/Auto operator must be installed as illustrated on page 14. **For a 22 mm operator**, use:
  - — One ZB4BD3 selector switch
  - — One ZB4BZ009 collar
  - — One ZBE1026P contact block
  - — Two ZBE1016P contact blocks

  For a 30 mm operator, use:
  - — One 9001 KS42B selector switch
  - — One 9001 KA32 contact block
  - — One 9001 KA33 contact block

DRIVE FIRMWARE COMPATIBILITY

The N2 communication option is compatible with ATV58 drive controllers loaded with firmware version V3.1 IE14 and later. The label indicating the firmware version is located on the main control board just above the keypad port. See Figure 3.

REVISION LEVEL

This is the first release of this instruction bulletin.

RECEIVING, PRELIMINARY INSPECTION, AND STORAGE

After receiving the VW3A58354U communication option card:

- Ensure that the catalog number printed on the box label is the same as the number on the packing slip and corresponding purchase order. Contact your local Square D representative if there are any errors.
- Observe the following precautions for handling static sensitive components as the card is removed from its packaging for inspection.
  - — Keep static producing material (plastic, upholstery, carpeting, etc.) out of the immediate work area.
  - — Avoid touching exposed conductors and component leads with skin or clothing.
- If any damage is found, notify the carrier and you local Square D representative. Do not install a damaged card.
- To store the option card, replace it in its original package (including the anti-static bag) and store it at -13 to 158 °F (-25 to 70 °C).

ENVIRONMENTAL SPECIFICATIONS

The environmental characteristics of the N2 option card are coordinated with those of the ATV58 drive controller. For further information, see the Installation Guide supplied with the drive controller.

If the N2 option card is installed in an ATV58 Type H drive controller, the drive controller enclosure rating is changed to IP10 (except on models ATV58HU09M2, ATV58HU18M2, and those with the conduit connection kit in place).

USING THIS MANUAL

To prepare the ATV58 drive controller for connection to an N2 network, consult the following sections:

- “Section 2: Hardware Setup and Wiring” on page 5
- “Section 3: Control Modes” on page 13
- “Section 4: Configuration” on page 17
- “Section 5: N2 Network Information” on page 26
- “Section 6: Minimum Startup Procedure” on page 39

Refer to “Section 8: Troubleshooting” on page 41 for troubleshooting assistance.

For information about specific drive controller parameters, refer to the Keypad Display Instruction Bulletin, VVDED397047US (latest revision). For information on the installation, start-up, wiring, and maintenance of the drive controller, refer to the Installation Guide delivered with the drive controller.

Refer to the METASYS Network Technical Manual 636 from Johnson Controls, Inc. for specific information on wiring and programming an N2 network.

The following tools are available for programming the ATV58 drive controller with the N2 communication option installed:

- Keypad Display, VW3A58101U
- Test and Commissioning Software, VW3A58104
- Programming and Diagnostics Terminal, VW3A58102L1U

Refer to the instruction bulletins shipped with each of these tools and with the drive controller for information on start up and programming.

SECTION 2: HARDWARE SETUP AND WIRING

STATIC PRECAUTIONS

Observe the following precautions for handling static sensitive components when removing the card from its packaging for installation.

- Keep static producing material (plastic, upholstery, carpeting, etc.) out of the immediate work area.
- Avoid touching exposed conductors and component leads with skin or clothing.

BOARD LAYOUT

Figure 1 identifies the location of the diagnostic LEDs (1), the slide switches (2), the DIP switches (3), the N2 port (4), the main control board connector (5), the three mounting screw holes (6), the N2 card label (7), and the EEPROM label (8).

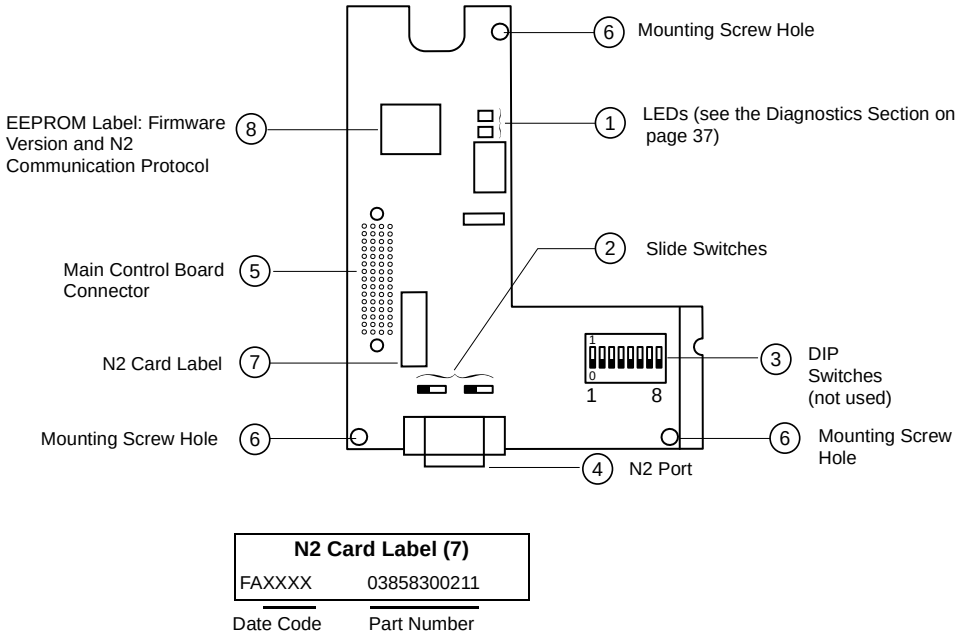


Figure 1: Board Layout

ON-BOARD SWITCHES

The two slide switches must *both* be set to the *left* position as illustrated below.

The DIP switches are not used and their settings are irrelevant.

BUS VOLTAGE MEASUREMENT PROCEDURE

Before installing the VW3A58354U communication card, measure the bus voltage as described in this section.

⚠ DANGER

HAZARDOUS VOLTAGE

- Read and understand the bus voltage measurement procedure before performing the procedure. Measurement of bus capacitor voltage must be performed by qualified personnel.
- Do not short across DC bus capacitors or touch unshielded components or terminal strip screw connections with voltage present.
- Many parts in this drive controller, including printed wiring boards, operate at line voltage. DO NOT TOUCH. Use only electrically insulated tools.

Electrical shock will result in death or serious injury.

The DC bus voltage level is determined by monitoring the (+) and (–) measurement points. Their location varies by drive controller model number as listed in Table 1 and shown in Figure 2. The drive controller model number is listed on the nameplate.

Table 1: (+) and (–) Measurement Points

Drive Controller ATV58•	(+) Measurement Point		(–) Measurement Point	
	Terminal Block or Connector	Terminal Designation	Terminal Block or Connector	Terminal Designation
U09M2• and U18M2•	J2	(+)	J2	(–)
U29M2• to D12M2•	J2	PA	J18	7
U18N4• to D23N4•				
D16M2• to D46M2•	J2	(+)	J2	(–)
D28N4• to D79N4•				

To measure the DC bus capacitor voltage:

1. Disconnect all power from the drive controller including external control power that may be present on the control board and the option board terminals.
2. Wait 3 minutes for the DC bus capacitors to discharge.

The J18 connector is in the upper left hand corner of the main control board behind the flexible shield. Use a thin probe to access the connector pin.

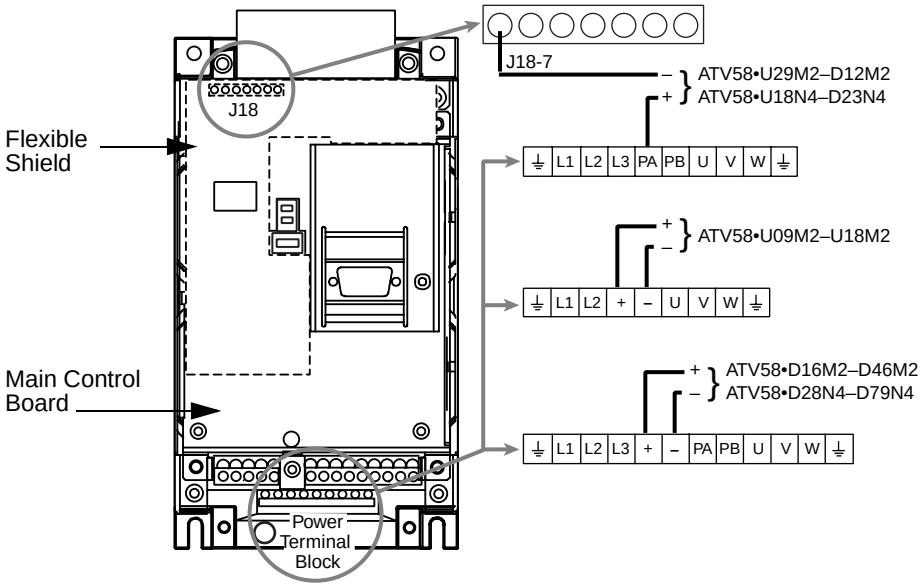


Figure 2: DC Bus Voltage Measurement Point Locations (ATV58HU09M2 shown)

3. Read the model number of the drive controller from the nameplate and identify the corresponding (+) and (–) measurement points from Table 1 and Figure 2.
4. Open the door or cover of the drive controller.
5. Set the voltmeter to the 1000 Vdc scale. Measure the voltage between the (+) and (–) measurement points identified in step 3. Verify that the DC bus voltage has discharged below 45 V before servicing the drive controller.
6. If the DC bus capacitors will not discharge below 45 V, contact your local Square D representative. **Do not operate the drive controller.**

7. Replace all doors or covers after servicing the drive controller.

CARD INSTALLATION

To install the VW3A58354U communication card, consult Figure 3 and follow these steps:

1. Verify that DC bus voltage is not present. See “Bus Voltage Measurement Procedure” on page 6.
2. Place the 50/60 Hz switch in the position corresponding to the motor as indicated in the drive controller installation guide.
3. Open the flexible protective cover (1) over the option card connector.
4. Mount the option card on the control card support by plugging it into the connector (2). Secure it with the three screws provided (3).
5. Replace all doors or covers after installing the card.
6. Affix the supplied self-adhesive label (4) on the cover of the drive controller just above the existing POWER and FAULT label. It should line up with the LEDs on the N2 option card.

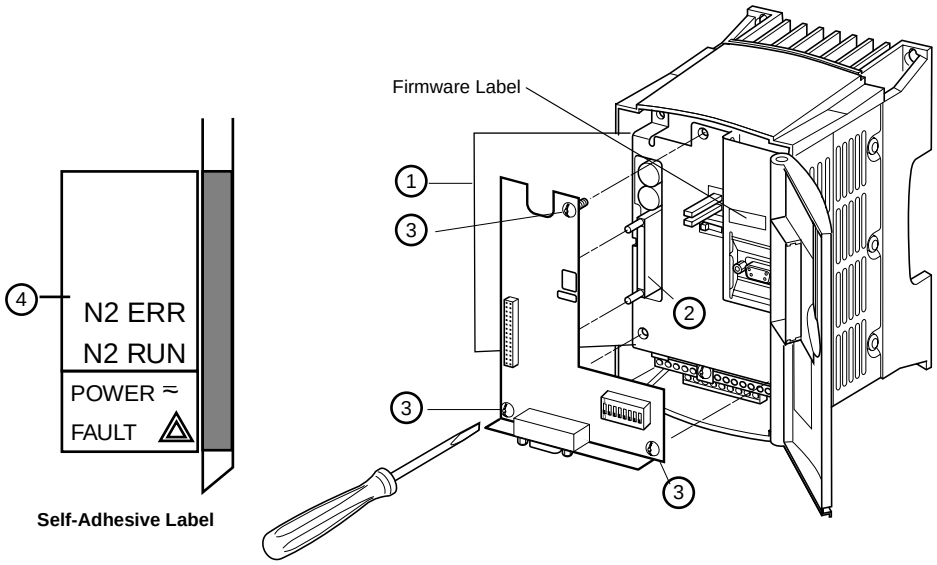
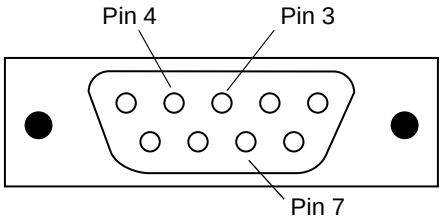


Figure 3: Installing the Card in the ALTIVAR 58 Controller

WIRING

N2 Port Pinout

Figure 4 illustrates the N2 port when viewing the bottom of the N2 option card.



Pin 3: N2-
Pin 4: REF
Pin 7: N2+

Figure 4: N2 Port Pinout

Cable Connectors

For a drive controller installation that does not need an end-of-line termination, use a 9-pin male D-shell connector suitable for daisy chaining devices in series (example: Phoenix Contact connector SUBCON-PLUS-M2 27 61 83 9).

For an installation that needs an end-of-line termination, use a 9-pin male D-shell connector (example: Phoenix Contact connector SUBCON 9/M-SH 27 61 50 9) along with a 120 Ω resistor and a 0.001 µF capacitor. See the following section for more details.

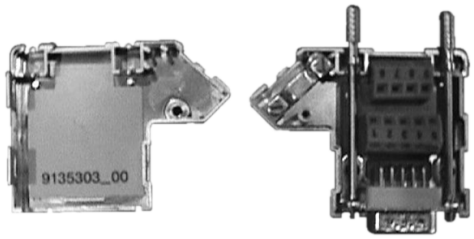


Figure 5: Phoenix Contact Connector SUBCON 9/M-SH 27 61 50 9

End of Line Termination

If the ATV58 drive controller with the N2 option card is an end of line device, attach the following circuit to the N2+ and N2- terminals. Refer to METASYS N2 network installation documents to determine the need for an end-of-line termination.

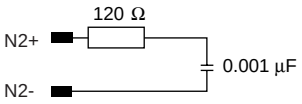


Figure 6: End of Line Termination

Shield Termination

When shielded cable is used, terminate the shield at the shield terminal screw designated “S” as illustrated in Figure 7.

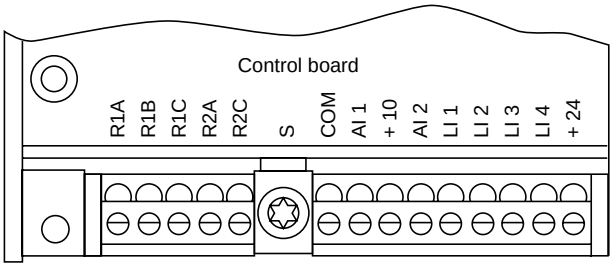


Figure 7: Location of ATV58 Control Terminals

See the drive controller installation manual for more detail.

Wiring Example

Figures 8 and 9 provide examples of wiring schemes for applications requiring end of line termination and for those that do not. For further N2 network wiring requirements and procedures, refer to the appropriate METASYS N2 network installation documentation.

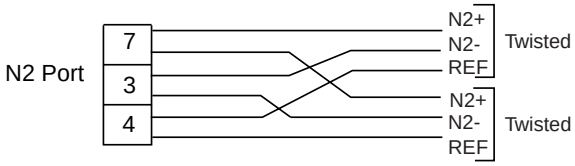


Figure 8: No End of Line Termination

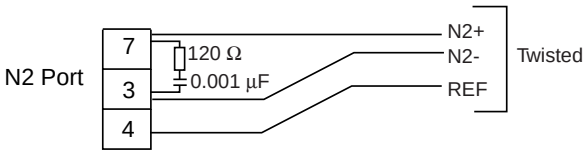


Figure 9: End of Line Termination

Cable Routing Practices

When wiring the ATV58 drive controllers to an N2 network, follow all wiring practices required by national and local electrical codes.

Avoid areas of high temperature, moisture, vibration, or other mechanical stress. Secure the cable where necessary to prevent its weight and the weight of other cables from pulling or twisting the cable. Use cable ducts, raceways, or other structures for protecting the cable. These structures should be used for signal wiring paths and should not contain power wiring.

Avoid sources of electrical interference that can induce noise into the cable. Use the maximum practicable separation from such sources.

When planning cable routing within a building, follow these guidelines:

- Maintain a minimum separation of 3.3 ft (1 m) from the following equipment: air conditioners, elevators, escalators, large blowers, radios, and televisions; intercom and security systems; and fluorescent, incandescent, and neon lighting fixtures.
- Maintain a minimum separation of 10 ft (3 m) from the following equipment: power wiring, transformers, generators, and alternators.

When wiring in electrical equipment rooms or large electrical equipment line-ups, observe the following guidelines for cable segregation and separation of circuits:

- Use metallic conduit for drive controller wiring. Do not run control network and power wiring in the same conduit.
- Separate non-metallic conduits or cable trays used to carry power wiring from metallic conduit carrying low-level control network wiring by at least 12 in (305 mm).
- Separate metallic conduits carrying power wiring or low-level control network wiring by at least 3 in (80 mm).
- Cross the metallic conduits and non-metallic conduits at right angles whenever power and control network wiring cross.
- Attenuate conducted emissions from the drive controller to the line in some installations to prevent interference with telecommunication, radio, and sensitive electronic equipment. Such instances may require attenuating filters. Consult the ATV58 catalog for selection and application of these filters.

SECTION 3: CONTROL MODES

HAND/OFF/AUTO (HOA)

When the ATV58 drive controller is powered up, it defaults to local (hand) control. See the discussion of local and remote control on page 15. After the drive controller recovers from a power up sequence (including such unplanned events as an AC line power disturbance), it immediately responds to local controls that may be active before the N2 communication board has initialized and assumed control of the drive controller. **This will result in unintended equipment operation. It is therefore required that all local run and start commands to the drive controller be removed when the system is in the remote (auto) mode.**

While it is possible to stop the drive controller in the remote (auto) mode by activating one of the local stop commands (such as the keypad display stop button), commands sent over the N2 network can restart the drive controller if the drive controller is not in a forced local condition. See the discussion of forced local on page 15. **It is therefore necessary to put the drive controller into the forced local mode when the control switch is in the hand or off position.**

⚠ WARNING

LOSS OF CONTROL

The user must provide a Hand/Off/Auto switch with the following functionality:

- In Hand mode, forced local must be enabled.
- In Off mode, all run terminal inputs must be disabled via open circuit and forced local must be enabled.
- In Auto mode, the run terminal inputs must be disabled via open circuit and forced local must be disabled.

Failure to follow these instructions can result in death or serious injury.

See Figures 10 and 11 for assistance in designing Hand/Off/Auto control. For the Run Reverse and Forced Local functions, select any unused logic inputs on the main control board. Assign a logic input to the Run Reverse function only if appropriate for the application.

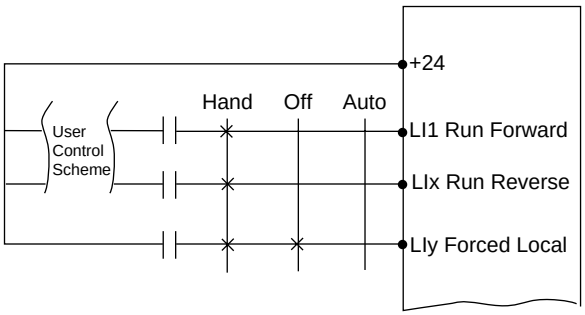


Figure 10: Example 2-Wire Control

NOTE: While the HOA switch is in the auto position, removal of the local run forward or run reverse commands will not stop the drive controller.

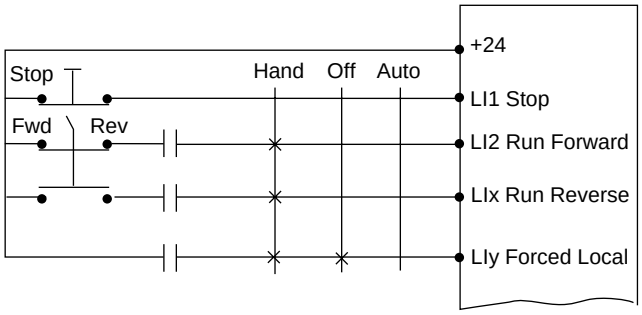


Figure 11: Example 3-Wire Control

LOCAL AND REMOTE

The ATV58 drive controller can be commanded in local and remote control modes.

Local (Hand) Control

- The drive is controlled by operators such as push buttons, switches, and a speed potentiometer that are wired to the drive controller terminal block or
- The drive is controlled by the digital keypad display buttons.

See the keypad display manual VVDED397047US (latest revision) for more details on how to select between the two modes of local control.

Remote (Auto) Control

- The drive is controlled by the N2 serial network.

The speed reference and the start/stop control cannot come from separate sources.

FORCED LOCAL

Switching between local and remote control is achieved by a switch wired to a logic input on the controller terminal block as illustrated in Figures 10 and 11 on page 14. The logic input must be assigned to the function “Forced Local”.

When the logic input assigned to forced local is active (high), all control of the drive is assigned to the selected local (hand) control mode. In this case, command requests by the N2 network are refused. Command parameters can be monitored. All other parameters can be read/write accessed.

⚠ WARNING

UNINTENDED EQUIPMENT ACTION

When in forced local mode, all commands from the communication ports are ignored.

Failure to consider the implications of unanticipated operation can result in death, serious injury, or equipment damage.

When the logic input is not active (low), all control of the drive is transferred to the N2 network if wired as shown in Figures 10 or 11. The only local (hand) controls that are still monitored by the drive controller

include the logic input assigned to Forced Local and any input assigned to a drive stop function. Examples include the stop button on the keypad display, logic input one (LI1) which is assigned to the function STOP if the ATV58 drive controller is configured for 3-wire control, and any logic input assigned to the functions freewheel stop, DC injection braking, and fast stop. See the keypad display manual VVDED397047US (latest revision) for more details.

SECTION 4: CONFIGURATION

INITIAL POWER-UP

When an ATV58 drive controller is powered up for the first time with the N2 option card installed, the following will happen:

- The green N2 RUN LED will be lit continuously. The red N2 ERR LED will flash on and off once per second. This indicates that the N2 option card is not configured and will not join the N2 network. This is called the Initialization Configuration Error State.
- Menu 8 – Application will become available in the test and commissioning software, on the keypad display, and on the programming / diagnostic terminal.

If a replacement N2 option card is installed on a drive controller that already has a valid configuration, the drive controller will detect no error upon power up and will be ready to join the network. The on board LEDs will flash the signal indicating it is ready to connect.

CONFIGURATION MENU

To configure the controller to respond to the N2 network, select Menu 8 – Application on the keypad, the programming / diagnostic terminal, or in the test and configuration software.

Modification to parameters in Menu 8 – Application is only permitted when the drive controller is stopped with the forced local input not active.

- The keypad access lock switch may not be in the total unlock mode. See the keypad display instruction bulletin, VVDED397047US, for more information.
- Access may be blocked by a password. See the keypad display instruction bulletin, VVDED397047US, for more information.
- The ATV58 drive controller may be loaded with a version of firmware that is incompatible with the N2 communication card. The firmware version is indicated on a label located on the main control board above the keypad port. The N2 communication card is compatible with firmware version V3.1 IE14 or later. If the label indicates an earlier firmware version, replace either the main control board or the drive controller.

If parameter 1 in Menu 8 – Application is set to 3, ENT is pressed, and the drive controller successfully enters the configuration mode (indicated by parameter 1 returning to the value 0), the drive controller will go offline, stop the drive controller, and clear any overrides that have been sent over

the network. The LED flash patterns indicate that the drive controller is in the configuration state. Refer to Table 10 on page 39.

If a forced local command is received while selections are being made in Menu 8 – Application, the drive reverts to local control and will respond to local operators. While in this state, the configuration of the N2 option card can be completed, validated, and saved. The available parameters and their functions are listed in Table 2.

Table 2: Menu 8—Application Parameters

Parameter	Display	Name	Value [1]	Description
1	001	Parameter Store Command	1	Command to verify and store a configuration just entered. Display changes to 0 or 2 after the verification is complete.
			3	Command to enter configuration mode
		Parameter Store Status	0	Initial power up state, no validation command issued or valid configuration accepted and stored
			2	Invalid configuration entered
			99	Drive controller is running and configuration is not possible
2	002	N2 Device Address		1 to 255 (0 not a valid address)
3	003	ATV58 Response To Network Error Or Time Out	1	Drive fault
			2	Release serial link control
			3	Run at last commanded speed
			4	Run at low speed (LSP) [2]
			5	Run at high speed (HSP) [2]
			6	Execute fast stop [2]
			7	Execute freewheel stop [2]
			8	Execute stop with DC injection braking [2]
			9	Run at network error speed set by parameter 4 (described below)

⚠ WARNING

UNINTENDED EQUIPMENT ACTION

- Do not configure the ATV58 drive controller to operate at any speed when network error or time out occurs unless this presents no hazard for personnel or equipment.
- Place the ATV58 drive controller in forced local state before removing the network cable from the N2 port on the communication option card.

Failure to follow these instructions can result in death or serious injury.

[1] It is possible to enter other values; however, only the ones listed in this table are valid. Entering other values will result in an invalid configuration. **No modifications should be made to parameters 6–20 since they are reserved for internal drive controller use.**

[2] See the ATV58 keypad display instruction bulletin, VVDED397047US (latest revision) for a description of ATV58 parameters and functions.

Table 2: Menu 8—Application Parameters (Continued)

Parameter	Display	Name	Value [1]	Description
4	004	Network Error or Time-Out Speed (see value 9 of parameter 3 on page 19).		Low speed (LSP) to high speed (HSP) in 0.1 Hz steps [2]
5	005	Loss of Network Time Out	1	0.25 s
			2	0.50 s
			3	0.75 s
			4	1 s
			5	5 s
			6	10 s
			7	20 s
			8	30 s
			9	40 s
			10	50 s
			11	60 s
			12	Disabled
6–20	006–020	Do not modify the content of these parameters. They are reserved for internal drive controller use.		

[1] It is possible to enter other values; however, only the ones listed in this table are valid. Entering other values will result in an invalid configuration. **No modifications should be made to parameters 6–20 since they are reserved for internal drive controller use.**

[2] See the ATV58 keypad display instruction bulletin, VVDED397047US (latest revision) for a description of ATV58 parameters and functions.

⚠ WARNING

UNINTENDED EQUIPMENT ACTION

Writing to parameters in Menu 8—Application that are designated as reserved may cause unintended equipment operation.

Failure to follow this instruction can result in death or serious injury.

SAVING A CONFIGURATION

Configuration changes that are not validated and saved will be lost if power is removed from the drive controller. Upon power up, the last valid saved configuration is loaded into the N2 option card and is used to control its operation.

Save changes to the N2 option card configuration by setting parameter 1 in Menu 8 – Application to 1. If the configuration has been properly saved, the drive controller will write a 0 to parameter 1 and this will be displayed on the keypad.

NOTE: If power is briefly interrupted to the drive controller while it is validating and saving a configuration, the LEDs on the N2 option card may indicate that it is in an Initialization Configuration Error State. When power is restored, the correct configuration will again need to be entered, validated, and saved.

CONFIGURATION VALIDATION

Setting parameter 1 to 1 after changing the N2 option card configuration (in Menu 8—Application) also checks the validity of the settings before storing them to memory. If a parameter has been set to an invalid value, the display for parameter 1 changes to 2, and the parameters with invalid settings are rewritten to a value of 0.

When alerted of an invalid configuration, examine the parameters that were programmed and now contain a 0. Review Table 2 on page 19 to determine the correct setting required.

After the corrections have been made, validate and save the changes by setting parameter 1 to 1.

NOTE: Setting parameter 1 in Menu 8—Application to a value of 1 when the drive controller is not in the configuration mode will not validate and save a new N2 card configuration.

FACTORY RESET

To complete a factory reset of the ATV58 drive controller with the N2 option card installed, follow the factory reset instructions in the Keypad Display Instruction Bulletin, VVDED397047US (latest revision). Then cycle power to the drive controller.

This will result in all of Menu 8 —Application parameters being set to zero. In this mode, all of the N2 option card functions are disabled and the card will contain an invalid configuration.

COMMUNICATION BUS MONITORING

After the ATV58 drive controller has joined the network, it must receive valid message packets at regular intervals determined by the time entered into parameter 5 of Menu 8—Application. If this does not occur, the red N2 ERR LED will indicate a Network Error State (see Table 10 on page 39) and the drive controller will take the action determined by the setting of parameter 3 of Menu 8. The drive controller will continue with this action until network communication has been reestablished and the unit has been brought back online, until a stop command is issued, or until the drive controller is put into the forced local mode.

Two network error conditions are possible. These are explained in the following two sections.

First Network Error Condition

In the first network error condition, the network master places the drive controller off-line and sends it an “Identify Self” message. This indicates that the network master is not in control of the ATV58 drive controller. In this situation, the drive controller will:

- Wait 2 seconds before it initiates a network error response and
- Continue responding the to an “Identify Self” message.

If the controller receives a valid N2 message with the correct address within the two seconds, it will reset the 2 second timer and continue to operate. If the 2 seconds expire without a valid response from the network after an “Identify Self” message, the drive controller will:

- Enter a network error state indicated by the red N2 ERR LED
- Take the action determined by parameter 3 of Menu 8
- Continue to respond to any “Identify Self” messages received. If it receives a valid N2 message with the correct address from the network master, the drive controller will clear the Network Error State fault, rejoin the network, and respond to current commands.
- Respond to a local stop command (example: keypad stop button) or respond to all local controls if forced local is activated. While in the local control mode, it will continue to monitor its network connection status and clear the Network Error State fault if valid communication is reestablished.

Second Network Error Condition

In the second network error condition, the drive controller either has not received a message within the time period set by parameter 5 in Menu 8—Application or all of the messages it received during that time period were invalid. Noise on the communication network could cause such invalid message reception. When this condition occurs, the drive controller will:

- Enter a network error state indicated by the red N2 ERR LED.
- Take the action determined by parameter 3 of Menu 8.
- Continue to monitor its network connection status. If it receives a valid N2 message from the network master, the drive controller will clear the Network Error State fault, rejoin the network, and respond to current commands.
- Respond to a local stop command (example: keypad stop button) or respond to all local controls if forced local is activated. While in the local control mode, it will continue to monitor its network connection status and clear the Network Error State fault if valid communication is reestablished.

General Network Error Principles

Regardless of the source of the network error, if the setting of parameter 3 of Menu 8 calls for a drive controller response to a network error other than fault and if the drive controller is currently being commanded to stop or is stopped when the network fault condition occurs, the drive controller will not transition to the programmed alternate running mode but will remain in the stopped condition and annunciate a network error with the LED. There will be no fault on the keypad display.

If the setting of parameter 3 of Menu 8 calls for the drive controller to fault in the event of a network error, the drive controller is under serial link control, and is not in forced local mode when the network fault condition occurs, the drive controller will:

- Issue an EPF fault to be displayed on the keypad and use the red N2 ERR LED to indicate a network error (see Table 10 on page 39),
- Be prevented from operating in the serial link mode and not clear the EPF fault until the network error condition is resolved.

- Respond to local controls if forced local is activated. In this case, the EPF fault can be cleared (fault must be reset) but the red N2 ERR LED will continue to indicate a network error. If the network error is not cleared and the forced local state is released, the drive will again indicate an EPF fault.

COMMUNICATION TIME OUT DISABLE

When parameter 5 in Menu 8—Application is set to 12, the drive's ability to detect a network communication error is disabled. No control commands will be received over the N2 network during this loss of communication. Disabling communication fault detection will result in the drive controller not faulting when there is a loss of communication. The drive will continue to follow the last valid command it received over the N2 network.

Do not use this function during normal network operation. This function is intended for use during start-up and troubleshooting. Alternate control paths must be provided for starting, stopping, and controlling the motor.

⚠ WARNING

LOSS OF CONTROL

Provide alternate control paths (Start, Stop, and Speed):

- When disabling communication loss detection.
- When motor control is required while a communication fault exists.

Failure to follow this instruction can result in death or serious injury.

OPTIMIZING NETWORK PERFORMANCE

1. When structuring the information exchange requirements for a network, consider the speed of the communication required to implement the application properly. Use the communication method which best matches the speed requirements of the information exchange. Communicate information only when required by the application. Minimize network traffic by design. For example, when controlling a simple process requiring only a few control functions, send only those registers. This minimizes network traffic and maintains best overall network speed.
2. For better network security, keep drive controllers and their associated control devices on the same local network. As far as possible, minimize or eliminate the need for drive controller controls to cross repeaters.
3. Use distributed control where possible. The ALTIVAR 58 drive controller has a large number of application functions which can be used in conjunction with network communications. Where possible, use these functions to allow local control by the speed controller while using the network to communicate supervisory information. This minimizes the information exchange burden on the network and unburdens the controlling device.
4. Understand the failure possibilities of the designed network. Provide control redundancies and contingencies appropriate for the intended application.
5. Follow the wiring practices described in section 1. Improperly installed network wiring can cause noisy or intermittent data transmission with resulting loss of network speed and deterioration of security.

SECTION 5: N2 NETWORK INFORMATION

INTRODUCTION

The ATV58 N2 communication option makes available over the network a series of analog and binary I/O points and analog data integer (ADI) points for use in controlling and monitoring the drive controller. The ATV58 implementation of N2 network communications is summarized in the following sections.

Analog input (AI) points are used to monitor the drive controller's output frequency and the status of its analog input ports. All analog input points support high and low alarm limits, high and low warning limits and differential values. Change of state (COS) alarm and warning functions are also enabled. Overriding of analog inputs is not supported. An analog input will return an acknowledgment of the override command but its actual value will not change and it will not set an override active flag.

Analog output (AO) points are used for commanding and adjusting such drive controller parameters as commanded frequency, high and low speed limits and PI setpoint. Overriding of analog outputs will be accepted and acknowledged with the active override flag set. All scaling and range limitations listed in Table 4 will apply. Upon release of the override command, the AO point will reset the active override flag, retain the override value, and not return to its pre-override value.

Binary input (BI) points are used to monitor various drive conditions. Include are such items as: drive up to speed, drive faulted, drive in forced local state, state of drive during current or most recent fault condition, etc. Overriding of binary inputs is not supported. A binary input will return an acknowledgment of the override command but its actual value will not change and it will not set an override active flag.

Binary output (BO) points are used to command such drive controller actions as: start, stop, and reset fault. Overriding of binary outputs will be accepted and acknowledged with the active override flag set. All scaling and range limitations listed in Table 6 will apply. Upon release of the override command, the BO point will reset the active override flag, retain the override value, and not return to its pre-override value.

ADI read/write points are used to provide precise control and adjustment of the drive controller. This includes such items as: frequency loop gain, profile, low speed run time, PI regulator proportional, and integral gain factors. Overriding of ADI read/write points will be accepted and acknowledged. All scaling and range limitations listed in Table 7 will

apply. **The ADI read/write point will retain this value until overridden again or adjusted through the keypad.**

NOTE: The active override flag will not be set because entries made locally through the keypad display will also be able to adjust the values of the drive registers represented by these ADI read/write points

ADI read only points are used to expand the monitoring of the drive controller. Included are such items as: input line voltage, motor current, drive thermal state, fault history. **Only an acknowledgement will be sent in response to an override command. No values will be changed, nor will an active override flag be set.**

JCI-use-only attributes and status flags of any point region are not supported.

I/O POINT MAP

Table 3: Analog Input Points

Network Point Type	Network Point Address	Units	Point Description	Range / Value	Notes
AI	1	0.1 Hz	Output frequency	0 to 500 Hz	Output frequency applied to the motor
AI	2	%	Signal at AI1 analog input terminal	0 - 100%	0% = 0 VDC, 100% = 10 VDC
AI	3	%	Signal at AI2 analog input terminal	0 - 100%	0% = mA value set by CrL, 100% = mA value set by CrH

Table 4: Analog Output Points

Network Point Type	Network Point Address	Units	Point Description	Range / Value	Notes
AO	1	0.1 Hz	Speed reference command	0 to HSP	HSP = high speed setting, negative values not accepted
AO	2	0.1 Hz	(HSP) High speed setting	LSP to TFR	LSP = low speed setting, TFR = maximum speed setting
AO	3	0.1 Hz	(LSP) Low speed setting	0 to HSP	HSP = high speed setting
AO	4	0.1 s	(ACC) Acceleration rate	0 to 9999	Primary acceleration rate
AO	5	0.1 s	(DEC) Deceleration rate	0 to 9999	Primary deceleration rate
AO	6	0.001	PI setpoint in serial link mode	0 to 10,000	Corresponds to 0 to 10 V analog signal

Table 5: Binary Input Points

Network Point Type	Network Point Address	Units	Point Description	Range / Value	Notes
BI	1		Drive fault state	0 or 1	0 = Drive OK, 1 = Drive fault present
BI	2		Signal at LI1 logic input terminal	0 or 1	0 = low or off, 1 = high or on
BI	3		Signal at LI2 logic input terminal	0 or 1	0 = low or off, 1 = high or on
BI	4		Signal at LI3 logic input terminal	0 or 1	0 = low or off, 1 = high or on
BI	5		Signal at LI4 logic input terminal	0 or 1	0 = low or off, 1 = high or on
BI	6		State of R1 output relay	0 or 1	0 = deenergized, 1 = energized
BI	7		State of R2 output relay	0 or 1	0 = deenergized, 1 = energized
BI	8		Drive ready state	0 or 1	0 = drive not ready (faulted or running), 1 = drive ready
BI	9		Drive running state	0 or 1	0 = drived stopped, 1 = drive running

Table 5: Binary Input Points (Continued)

Network Point Type	Network Point Address	Units	Point Description	Range / Value	Notes
BI	10		Drive fast stop state	0 or 1	0 = fast stop in progress, 1 = no fast stop
BI	11		State of catch on the fly	0 or 1	0 = Controlled stop, catch on the fly possible 1 = Freewheel stop, catch on the fly not possible
BI	12		Drive forced local state	0 or 1	0 = local forcing in progress, 1 = no forced local
BI	13		Drive up to speed	0 or 1	0 = drive not up to speed, 1 = drive up to speed
BI	14		Validity of last commanded speed	0 or 1	0 = OK, 1 = not OK, commanded speed < LSP or > HSP
BI	15		State of keypad stop key	0 or 1	drive stopped by keypad, 0 = no, 1 = yes
BI	16		Direction of motor rotation	0 or 1	0 = forward, 1 = reverse
BI	17		Fault reset possible	0 or 1	0 = no, 1 = yes
BI	18		Motor state	0 or 1	0 = motor stopped, 1 = motor running
BI	19		State of DC injection braking	0 or 1	0 = no braking, 1 = braking in progress
BI	20		Drive transient state	0 or 1	drive at steady speed operation, 0 = yes, 1 = no
BI	21		Motor thermal overload alarm	0 or 1	0 = no alarm, 1 = alarm active
BI	22		Excessive braking alarm	0 or 1	0 = no alarm, 1 = alarm active
BI	23		Drive acceleration state	0 or 1	0 = not accelerating, 1 = accelerating
BI	24		Drive deceleration state	0 or 1	0 = not decelerating, 1 = decelerating
BI	25		Current limit alarm	0 or 1	0 = no alarm, 1 = alarm active

Table 5: Binary Input Points (Continued)

Network Point Type	Network Point Address	Units	Point Description	Range / Value	Notes
BI	26		State of terminal block control	0 or 1	0 = not active, 1 = active
BI	27		State of keypad control	0 or 1	0 = not active, 1 = active
BI	28		State of Modbus control through keypad port	0 or 1	0 = not active, 1 = active
BI	29		State of serial control through option card	0 or 1	0 = not active, 1 = active
BI	30		Motor direction commanded	0 or 1	0 = forward, 1 = reverse
BI	31		Drive state during historical fault #1 (most recent or current fault)	0 or 1	0 = drive not ready (faulted or running), 1 = drive ready
BI	32			0 or 1	Fast stop, 0 = in progress, 1 = not active
BI	33			0 or 1	Freewheel stop, 0 = not active, 1 = in progress
BI	34			0 or 1	Local forcing, 0 =in progress, 1 = not active
BI	35			0 or 1	0 = forward motor direction, 1 = reverse motor direction
BI	36			0 or 1	0 = motor stopped, 1 = motor running
BI	37			0 or 1	DC injection braking, 0 = not active, 1 = in progress
BI	38			0 or 1	Motor thermal overload, 0 = no alarm, 1 = alarm active
BI	39			0 or 1	Excessive braking, 0 = no alarm, 1 = alarm active
BI	40			0 or 1	Drive accelerating, 0 = no, 1 = yes

Table 5: Binary Input Points (Continued)

Network Point Type	Network Point Address	Units	Point Description	Range / Value	Notes
BI	41		Drive state during historical fault #1 (most recent or current fault)	0 or 1	Drive decelerating, 0 = no, 1 = yes
BI	42			0 or 1	Current limit, 0 = no alarm, 1 = alarm active
BI	43			0 or 1	Reserved
BI	44			0 or 1	Terminal block control, 0 = not active, 1 = active
BI	45			0 or 1	Keypad control, 0 = not active, 1 = active
BI	46			0 or 1	Modbus control through keypad port, 0 = not active, 1 = active
BI	47			0 or 1	Serial control through option card, 0 = not active, 1 = active
BI	48			0 or 1	Motor direction commanded, 0 = forward, 1 = reverse

Table 6: Binary Output Points

Network Point Type	Network Point Address	Units	Point Description	Range / Value	Notes
BO	1		Run / Stop command	0 or 1	0 = stop, 1 = run (also enables serial link control)
BO	2		Forward / Reverse command	0 or 1	0 = forward, 1 = reverse
BO	3		Serial link control release command	0 or 1	0 = no change commanded, 1 = serial link control released
BO	4		Fault reset command	0 or 1	0 = no action, 1 = reset fault
BO	5		DC injection brake command	0 or 1	DC injection brake commanded, 0 = no, 1 = yes
BO	6		Fast stop command	0 or 1	Fast stop commanded, 0 = no, 1 = yes

Table 7: ADI Points (Read/Write)

Network Point Type	Network Point Address	Units	Point Description	Range / Value	Notes
ADI	1	%	(UFR) IR Compensation	0 to 800	Maximum = 0 if drive in VT configuration, maximum = 150 if SPC parameter set to NO in keypad DRIVE menu
ADI	2	%	(FLG) Gain	0 to 100	
ADI	3	%	(PFL) Profile	0 to 100	Minimum = 100 if drive not in VT configuration and NLD parameter set to NO
ADI	4	%	(STA) Stability	0 to 100	
ADI	5	0.1 A	(ITH) Motor overload setting	Drive dependant	Range is 25 to 136% of drive controller's constant torque rated output current. Set for motor full load amps
ADI	6	%	(SLP) Slip Compensation	0 to 150	Maximum = 0 if drive in VT configuration

Table 7: ADI Points (Read/Write) (Continued)

Network Point Type	Network Point Address	Units	Point Description	Range / Value	Notes
ADI	7	0.1 s	(AC2) Acceleration rate	0 to 9999	These functions are commanded through terminal block inputs. Verify terminal block assignments
ADI	8	0.1 s	(DE2) Deceleration rate	0 to 9999	
ADI	9	0.1 Hz	(JOG) Jog frequency	0 to 100	
ADI	10	0.1 s	(JGT) Jog delay	0 to 20	
ADI	11	0.1 Hz	(SP2) Preset Speed 2	LSP to HSP	
ADI	12	0.1 Hz	(SP3) Preset Speed 3	LSP to HSP	
ADI	13	0.1 Hz	(SP4) Preset Speed 4	LSP to HSP	
ADI	14	0.1 Hz	(SP5) Preset Speed 5	LSP to HSP	
ADI	15	0.1 Hz	(SP6) Preset Speed 6	LSP to HSP	
ADI	16	0.1 Hz	(SP7) Preset Speed 7	LSP to HSP	
ADI	17	0.1 A	(IDC) DC injection brake current level by logic input	Drive dependant	Range is 10 to 136% of drive controller's constant torque rated output current
ADI	18	0.1 s	(TDC) DC injection brake time	0 to 301	Range is 0 to 30.0 seconds. 301 = continuous DC injection braking
ADI	19	0.1 s	(TLS) Low speed run time	0 to 9999	Range is 0.1 to 999.9 seconds. 0 = no delay set (unlimited time)
ADI	20	0.1 Hz	(BRL) Brake release frequency	0 to 100	Controlled through terminal block output
ADI	21	0.1 Hz	(BEN) Brake engage frequency	0 to LSP	
ADI	22	0.01 s	(BRT) Brake release time	0 to 500	
ADI	23	0.01 s	(BET) Brake engage time	0 to 500	
ADI	24	0.1 A	(IBR) Brake release current	Drive dependant	Range is 0 to 136% of drive controller's constant torque rated output current

Table 7: ADI Points (Read/Write) (Continued)

Network Point Type	Network Point Address	Units	Point Description	Range / Value	Notes
ADI	25	%	(TL2) Torque limit 2	0 to 200	Commanded through terminal block input
ADI	26	0.01	(RPG) Proportional gain for PI regulator	1 to 10,000	PI regulator control is only available if the drive is configured for VT operation and only if AI2 is assigned to PI regulator control
ADI	27	0.01 / s	(RIG) Integral gain for PI regulator	1 to 10,000	
ADI	28	0.1	(FBS) Feedback scaling factor for PI regulator	10 to 1000	
ADI	29	0.1 A	(CTD) Current threshold attained	Drive dependant	Range is 25 to 136% of drive controller's constant torque rated output current. Controls R2 relay output if assigned to this function (CTA)
ADI	30	%	(TTD) Motor thermal threshold attained	0 to 118	Controls R2 relay output if assigned to this function (TSA)
ADI	31	0.1 Hz	(FTD) Frequency threshold attained	LSP to HSP	Controls R2 relay output if assigned to this function (FTA)
ADI	32	0.1 Hz	(JPF) skip frequency	0 to HSP	
ADI	33		(PIC) Inversion of PI feedback signal	0 or 1	Inversion, 0 = no, 1 = yes
ADI	34	0.1 A	(SDC) Automatic DC injection brake current level at stop	Drive dependant	Range is 10 to 136% of drive controller's constant torque rated output current
ADI	35	0.01	(USC) Machine speed coefficient	1 to 10,000	For keypad display of machine speed

Table 8: ADI Points (Read Only)

Network Point Type	Network Point Address	Units	Point Description	Range / Value	Notes
ADI	36	0.1 Hz	Commanded frequency recognized by drive controller	0 to 500	
ADI	37	1 RPM	Motor estimated speed	Motor dependant	Based on scale factor (NSP) configured in drive controller.
ADI	38	0.1 A	Motor current	Load dependant	
ADI	39	0.1V	Input line voltage	System dependant	
ADI	40	%	Motor thermal state	Load dependant	100% = nominal motor thermal state, 118% = motor overload trip.
ADI	41	%	Drive thermal state	Load and ambient dependant	100% = nominal drive thermal state, 118% = drive overheating trip.
ADI	42		Internal drive state	0 or 1	Bit 0 to 2, reserved
					Bit 3, drive output frequency equals HSP, 0 = no, 1 = yes
					Bit 4, drive up to speed, 0 = no, 1 = yes
					Bit 5, drive output frequency ≥ frequency threshold (FTD), 0 = no, 1 = yes
					Bit 6, motor current ≥ current threshold (CTD), 0 = no, 1 = yes
					Bit 7 to 15, reserved

Table 8: ADI Points (Read Only)

Network Point Type	Network Point Address	Units	Point Description	Range / Value	Notes
ADI	43		Historical fault #1 (most recent or current fault)	0 or 1	Bit 1, INF, Internal fault
					Bit 2, EEF, EEPROM fault
					Bit 3, CFF, Configuration fault
					Bit 4, CFI, Configuration fault
					Bit 5, SLF, Serial link fault, keypad port
					Bit 6, ILF, Internal communication fault
					Bit 7, CNF, Serial link fault, option card
					Bit 8, EPF, External fault
					Bit 9, OCF, Overcurrent fault
					Bit 10, CRF, Precharge relay fault
					Bit 11, SPF, Speed feedback fault
					Bit 12, ANF, Ramp not followed
					Bit 13, LFF, Loss of follower fault
					Bit 14, TSF, Motor thermal sensor fault
					Bit 15, OTF, Motor overheating fault (motor thermal sensor)
					Bit 16, OHF, Drive controller overheating fault
					Bit 17, OLF, Motor overload fault
					Bit 18, OBF, Overbraking fault
					Bit 19, OSF, AC line overvoltage fault
					Bit 20, OPF, Motor phase loss fault
					Bit 21, PHF, Input phase loss fault
					Bit 22, USF, AC line undervoltage fault
					Bit 23, SCF, Motor short circuit fault
					Bit 24, SOF, Overspeed fault
ADI	44		Historical fault # 2	0 or 1	Same format as ADI43

Table 8: ADI Points (Read Only)

Network Point Type	Network Point Address	Units	Point Description	Range / Value	Notes
ADI	45		Drive state during historical fault #2	0 or 1	Bit 0, 0 = drive not ready (faulted or running), 1 = drive ready
					Bit 1, Fast stop, 0 = in progress, 1 = not active
					Bit 2, Freewheel stop, 0 = not active, 1 = in progress
					Bit 3, Local forcing, 0 =in progress, 1 = not active
					Bit 4, 0 = forward motor direction, 1 = reverse motor direction
					Bit 5, 0 = motor stopped, 1 = motor running
					Bit 6, DC injection braking, 0 = not active, 1 = in progress
					Bit 7, Motor thermal overload, 0 = no alarm, 1 = alarm active
					Bit 8, Excessive braking, 0 = no alarm, 1 = alarm active
					Bit 9, Drive accelerating, 0 = no, 1 = yes
					Bit 10, Drive decelerating, 0 = no, 1 = yes
					Bit 11, Current limit, 0 = no alarm, 1 = alarm active
					Bit 12, Reserved
					Bit 13 = 0 and Bit 14 = 0, terminal block control active
					Bit 13 = 1 and Bit 14 = 0, keypad control active
					Bit 13 = 0 and Bit 14 = 1, Modbus control through keypad port active
					Bit 13 = 1 and Bit 14 = 1, serial control through option card active
					Bit 15, Motor direction commanded, 0 = forward, 1 = reverse
ADI	46		Historical fault #3	0 or 1	Same format as ADI43
ADI	47		Drive state during historical fault #3	0 or 1	Same format as ADI45
ADI	48		Historical fault #4	0 or 1	Same format as ADI43
ADI	49		Drive state during historical fault #4	0 or 1	Same format as ADI45

Table 8: ADI Points (Read Only)

Network Point Type	Network Point Address	Units	Point Description	Range / Value	Notes
ADI	50		Historical fault #5	0 or 1	Same format as ADI43
ADI	51		Drive state during historical fault #5	0 or 1	Same format as ADI45
ADI	52		Historical fault #6	0 or 1	Same format as ADI43
ADI	53		Drive state during historical fault #6	0 or 1	Same format as ADI45
ADI	54		Historical fault #7	0 or 1	Same format as ADI43
ADI	55		Drive state during historical fault #7	0 or 1	Same format as ADI45
ADI	56		Historical fault #8	0 or 1	Same format as ADI43
ADI	57		Drive state during historical fault #8	0 or 1	Same format as ADI45
ADI	58		Drive I/O configuration customized	0 or 1	0 = no, 1 = yes
ADI	59	%	Motor torque	Load dependant	100% = nominal motor torque
ADI	60	0.1 Hz	Speed ramp output	-5000 to 5000	Frequency command to gating control
ADI	61	0.01	(USP) Machine speed, lower digits	Programming & speed dependant	Combining ADI 61 and 62 = USP display on keypad. USP = output frequency times scaling factor USC
ADI	62	0.01	(USP) Machine speed, upper digits		
ADI	63	%	Output Power	Load dependant	100% = nominal motor power

I/O Point Information and Update Times

For more information on the description, purpose and functionality of the ATV58 parameters defined as I/O points, consult the ATV58 keypad display instruction bulletin, VVDED397047US (latest revision). Table 9 lists update times for ATV58 N2 option I/O points.

Table 9: I/O Point Update Times

Point Type	Typical	Maximum
AI	20–40 ms	2 seconds
AO	25–65 ms	3 seconds
BI	20–40 ms	2 seconds
BO	25–45 ms	2 seconds
ADI (read)	20–240 ms	12 seconds
ADI (write)	25–65 ms	3 seconds

SECTION 6: MINIMUM STARTUP PROCEDURE

The minimum requirements to command the drive controller from the N2 network:

- Ensure that the N2 network master controller is installed and operating and that the network cable has been run out to the ATV58 drive controller.
- Install the N2 option card in drive controller.
- Attach the label to the door of the drive controller.
- Wire the N2 option card to network cable. Include end off line termination if needed.
- Wire in the Hand/Off/Auto selector switch.
- Make the necessary selections in drive controller keypad display Menu 8—Applications.
- Select the logic input for forced local in Menu 5 – I/O.
- Ensure that the HOA switch is in the Auto position.
- Send a start command: set Binary Output 1 to one.
- Send a speed reference: set Analog Output 1 to a value greater than zero.

SECTION 7: DIAGNOSTICS

LED STATES

The N2 communications option card has two LEDs to indicate the status of the card and the communication link.

Table 10 shows the various states of the LEDs and what they indicate. Suggested corrective actions are also provided.

Table 10: What LED States Indicate

Green RUN LED	Red ERR LED	What is Indicated	Corrective Action
Intermittent flash	Intermittent flash	Green LED will flash whenever valid N2 message is received	Normal operation, No action required
		Red LED will flash whenever invalid N2 message is received	

Table 10: What LED States Indicate (Continued)

Green RUN LED	Red ERR LED	What is Indicated	Corrective Action
ON	Flashing, On 0.5 s, Off 0.5 s	Initialization configuration error state: 1. New card installed, 2. Invalid configuration on power up	Reenter option card configuration in Menu 8 - Application, validate and save
Flashing, On 0.5 s, Off 0.5 s	Flashing, On 0.5 s, Off 0.5 s	Configuration state: N2 option card is being programmed through Menu 8 - Application	Enter valid configuration, validate and save or cycle power on drive controller to exit configuration state
Flashing, 3 times in 2 seconds, off for 1 second	OFF	Ready to connect state: ATV58 N2 Option card is attempting to join the network	Verify that the N2 network is setup to recognize this drive controller and its address. Verify that wiring and end of line termination are correct
OFF	Flashing, 3 times in 2 seconds, off for 1 second	Network error state: ATV58 N2 option card was connected to network and has either received Identify Self Message from the network master, or has not received valid message within time-out period programmed in Menu 8—Application.	Check all wiring between network master and drive controller. Verify that the loss of time-out period programmed in Menu 8—Application is appropriate for the application. Possible N2 network equipment failure. Reset by cycling power.
OFF	Flashing, 5 times per second	Option board error state: internal communication error between N2 option card and drive controller main control board.	Remove power from drive controller. Perform Bus Voltage Check. Verify N2 option card is properly seated. Reapply power to drive controller. If problem persists, replace N2 option card.

SECTION 8: TROUBLESHOOTING

Table 11: Configuration Fault (CFF – Keypad Display)

Possible Cause	Corrective Action
N2 Option card has been removed from the drive controller or the N2 card is installed on a drive controller that has just had another style card removed.	Press the ENT key to perform a factory reset. Scroll to Menu 8—Application. Enter the configuration mode. Make appropriate selections for the application and set parameter 1 to 1 to validate and save the configuration. Reset the fault by cycling power to the drive controller.

Table 12: External Fault (EPF – Keypad Display)

Possible Cause	Corrective Action
N2 Option card is in Network Error State and the drive controller has been configured to fault.	Follow suggestions in LED state table for Network Error State.

Table 13: Internal Fault (ILF – Keypad Display) and Fast Red LED Flash

Possible Cause	Corrective Action
N2 card is not properly seated on the main control board in the drive controller.	Perform the bus voltage measurement procedure on page 6 to ensure that hazardous voltage is not present in the drive controller. With the drive controller door open, reinstall the N2 option card. Make sure that the three mounting screws are tight.
N2 option card is defective and has quit communicating with the main control board in the drive controller.	Replace the N2 option card.

Table 14: The Drive Controller is Not Operating as Programmed

Possible Cause	Corrective Action
The configuration was not properly saved. The N2 option card has reverted to the last known configuration when power to the drive controller was cycled.	Reenter the desired configuration. Validate and save the configuration by setting parameter 1 in Menu 8 – Application to 1. Wait for this parameter to reset to 0.

APPENDIX: ATV58 DATA DEFINITION LANGUAGE

This appendix lists the data definition language files for ATV58 drive controllers to be used with network controller units. It is intended for users who are defining the I/O points of the ATV58 drive controller to the network controller units.

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ATV58 Variable Frequency Drive

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CSMODEL "ATV58","VND"

AITITLE "Analog Inputs"
BITITLE "Binary Inputs"
AOTITLE "Analog Outputs"
BOTITLE "Binary Outputs"
ADTITLE "Internal Parameters"

CSAI "AI1",N,N,"FREQ OUT","Hz"
CSAI "AI2",N,N,"ANLG 1","%"
CSA1 "AI3",N,N,"ANLG 2","%"

CSBI "BI1",N,N,"FAULTED","OK","FLT",
CSBI "BI2",N,N,"LI1","OFF","ON",
CSBI "BI3",N,N,"LI2","OFF","ON",
CSBI "BI4",N,N,"LI3","OFF","ON",
CSBI "BI5",N,N,"LI4","OFF","ON",
CSBI "BI6",N,N,"R1 COIL","OFF","ON",
CSBI "BI7",N,N,"R2 COIL","OFF","ON",
CSBI "BI8",N,N,"READY","NRDY","RDY",
CSBI "BI9",N,N,"RUN/STOP","STOP","RUN",
CSBI "BI10",N,N,"EMER STP","YES","NO",
CSBI "BI11",N,N,"FREEWHL","OFF","ON",
CSBI "BI12",N,N,"FORCE LO","FLO","NFLO",
CSBI "BI13",N,N,"SETPOINT","TRAN","STDY"
CSBI "BI14",N,N,"LFRD","OK","NTOK"
CSBI "BI15",N,N,"STOP KEY","OFF","ON"
CSBI "BI16",N,N,"DIRECTN","FWD","REV"
```

```
CSBI "BI17",N,N,"FLT RST","NO","YES"
CSBI "BI18",N,N,"MTR ST","STOP","RUN"
CSBI "BI19",N,N,"DCI","NO","YES"
CSBI "BI20",N,N,"STDY ST","STDY","TRAN"
CSBI "BI21",N,N,"THRM LD","NO","YES"
CSBI "BI22",N,N,"EXCS BRK","NO","YES"
CSBI "BI23",N,N,"ACCEL","NO","YES"
CSBI "BI24",N,N,"DECEL","NO,","YES"
CSBI "BI25",N,N,"CURR ALM","NO","YES"
CSBI "BI26",N,N,"TERM BLK","NO","YES"
CSBI "BI27",N,N,"KEYPD","NO"," KEY"
CSBI "BI28",N,N,"BSL","NO","BSL"
CSBI "BI29",N,N,"FSL","NO","FSL"
CSBI "BI30",N,N,"ROTATION","FWD","REV"
CSBI "BI31",N,N,"DRV HST","NRDY","RDY"
CSBI "BI32",N,N,"ESTP HST" ,"YES","NO"
CSBI "BI33",N,N,"FRWL HST","YES","NO"
CSBI "BI34",N,N,"FLO HST","YES","NO"
CSBI "BI35",N,N,"ROT HST","FWD","REV"
CSBI "BI36",N,N,"MTR HST","STOP","RUN"
CSBI "BI37",N,N,"DCI HST","NO","YES"
CSBI "BI38",N,N,"THRM HST","NO","YES"
CSBI "BI39",N,N,"EBRK HST","NO","YES"
CSBI "BI40",N,N,"ACC HST","NO","YES"
CSBI "BI41",N,N,"DEC HST","NO","YES"
CSBI "BI42",N,N,"CLMT HST","NO","YES"
CSBI "BI43",N,N,"FREE","FREE","FREE"
CSBI "BI44",N,N,"TRM HST","NO","YES"
CSBI "BI45",N,N,"KEY HST","NO","YES",
CSBI "BI46",N,N,"BSL HST","NO","YES",
CSBI "BI47",N,N,"FSL HST","NO","YES",
CSBI "BI48",N,N,"DIR HST","FWD","REV",

CSAO "AO1",Y,Y,"LFR","Hz"
CSAO "AO2",Y,Y,"HSP","Hz"
CSAO "AO3",Y,Y,"LSP","Hz"
CSAO "AO4",Y,Y,"ACC","s"
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CSAO "AO5",Y,Y,"DEC","s"
CSAO "AO6",Y,Y,"PISP",""

CSBO "BO1",Y,Y,"RN / STP","STP","RN",
CSBO "BO2",Y,Y,"REV/FWD","FWD","RN",
CSBO "BO3",Y,Y,"SER CTRL","NO","REL",
CSBO "BO4",Y,Y,"FLT RST","NO","RFLT",
CSBO "BO5",Y,Y,"DC BRAKE","OFF","ON",
CSBO "BO6",Y,Y,"FAST STP","OFF","ON",

CSAD "ADI1",Y,Y,"IR COM",""
CSAD "ADI2",Y,Y,"FRQ L G" ,"%"
CSAD "ADI3",Y,Y,"U/F GRP",""
CSAD "ADI4",Y,Y,"STAB","%"
CSAD "ADI5",Y,Y,"ITH",""
CSAD "ADI6",Y,Y,"SLIPCOMP",""
CSAD "ADI7",Y,Y,"ACC 2","S"
CSAD "ADI8",Y,Y,"DEC 2","S"
CSAD "ADI9",Y,Y,"JOG FRQ","Hz"
CSAD "ADI10",Y,Y,"JOG DEL","S"
CSAD "ADI11",Y,Y,"PRESET2","Hz"
CSAD "ADI12",Y,Y,"PRESET3","Hz"
CSAD "ADI13",Y,Y,"PRESET4","Hz"
CSAD "ADI14",Y,Y,"PRESET5","Hz"
CSAD "ADI15",Y,Y,"PRESET6","Hz"
CSAD "ADI16",Y,Y,"PRESET7","Hz"
CSAD "ADI17",Y,Y,"DCI CURR","A"
CSAD "ADI18",Y,Y,"DCI TIME","S"
CSAD "ADI19",Y,Y,"MXTM LSP","S"
CSAD "ADI20",Y,Y,"BRL TH","Hz"
CSAD "ADI21",Y,Y,"BEN TH","Hz"
CSAD "ADI22",Y,Y,"BRL TM","S"
CSAD "ADI23",Y,Y,"BEN TM","S"
CSAD "ADI24",Y,Y,"BRL C TH","A"
CSAD "ADI25",Y,Y,"TRQ2 LIM","%"
CSAD "ADI26",Y,Y,"PiP GAIN",""
CSAD "ADI27",Y,Y,"PiI GAIN",""
CSAD "ADI28",Y,Y,"PiFB",""
```

```
CSAD "ADI29",Y,Y,"CURR TH","A"
CSAD "ADI30",Y,Y,"THRM TH","%"
CSAD "ADI31",Y,Y,"FRQ TH","Hz"
CSAD "ADI32",Y,Y,"SKIP FRQ","Hz"
CSAD "ADI33",Y,Y,"PI ERR",""
CSAD "ADI34",Y,Y,"C INJ STP",""
CSAD "ADI35",Y,Y,"MACH SPD",""
CSAD "ADI36",N,N,"FREQ CMD","Hz"
CSAD "ADI37",N,N,"MTR SPD","RPM"
CSAD "ADI38",N,N,"MTR CURR","A"
CSAD "ADI39",N,N,"BUS VOLT","V"
CSAD "ADI40",N,N,"MTR THRM","%"
CSAD "ADI41",N,N,"DRV THRM","%"
CSAD "ADI42",N,N,"ETI2",""
CSAD "ADI43",N,N,"FLT 1",""
CSAD "ADI44",N,N,"FLT 2",""
CSAD "ADI45",N,N,"ST FLT 2",""
CSAD "ADI46",N,N,"FLT 3",""
CSAD "ADI47",N,N,"ST FLT 3",""
CSAD "ADI68",N,N,"FLT 4",""
CSAD "ADI69",N,N,"ST FLT 4",""
CSAD "ADI70",N,N,"FLT 5",""
CSAD "ADI71",N,N,"ST FLT 5",""
CSAD "ADI72",N,N,"FLT 6",""
CSAD "ADI73",N,N,"ST FLT 6",""
CSAD "ADI74",N,N,"FLT 7",""
CSAD "ADI75",N,N,"ST FLT 7",""
CSAD "ADI56",N,N,"FLT 8",""
CSAD "ADI57",N,N,"ST FLT 8",""
CSAD "ADI58",N,N,"CUST",""
CSAD "ADI59",N,N,"MTR TRQ","%"
CSAD "ADI60",N,N,"RAMP OUT","Hz"
CSAD "ADI61",N,N,"Mac1 LOW",""
CSAD "ADI62",N,N,"Mac2 LOW",""
CSAD "ADI63",N,N,"OUT PWR","%"
```

ALTIVAR 58 METASYS N2 Communication Option

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