

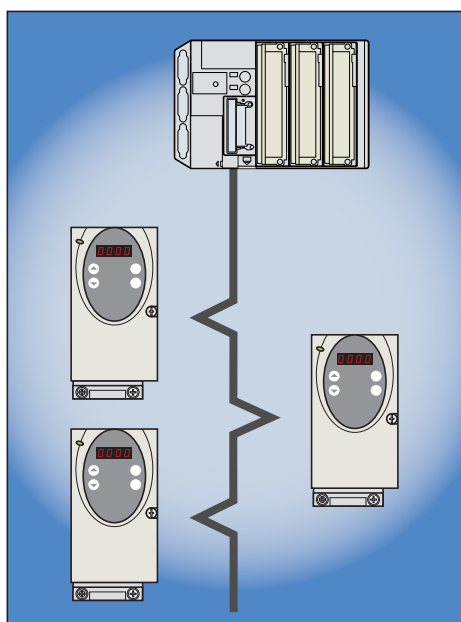
Altivar[®] 21

APOGEE[®] FLN P1 card

User's manual

VW3A21314

10/2009



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NOTE

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The products described in this document may be changed or modified at any time, either from a technical point of view or in the way they are operated. Their description can in no way be considered contractual.

1. Important Information

NOTICE

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of this symbol to a Danger or Warning safety label indicates that an electrical hazard exists, which will result in personal injury if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

DANGER

DANGER indicates an imminently hazardous situation, which, if not avoided, **will result** in death or serious injury.

WARNING

Warning indicates a potentially hazardous situation, which, if not avoided, **can result** in death, serious injury, or equipment damage.

CAUTION

CAUTION indicates a potentially hazardous situation, which, if not avoided, **can result** in injury or equipment damage.

PLEASE NOTE

The word "drive" as used in this manual refers to the controller portion of the adjustable speed drive as defined by NEC.

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

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2. Before you begin

Read and understand these instructions before performing any procedure with this drive.

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Read and understand this manual before installing or operating the Altivar 21 drive. Installation, adjustment, repair, and maintenance must be performed by qualified personnel.
- The user is responsible for compliance with all international and national electrical code requirements with respect to grounding of all equipment.
- Many parts of this drive, including the printed circuit boards, operate at the line voltage. DO NOT TOUCH. Use only electrically insulated tools.
- DO NOT touch unshielded components or terminal strip screw connections with voltage present.
- DO NOT short across terminals PA/+ and PC/- or across the DC bus capacitors.
- Before servicing the drive:
 - Disconnect all power, including external control power that may be present.
 - Place a "DO NOT TURN ON" label on all power disconnects.
 - Lock all power disconnects in the open position.
 - WAIT 15 MINUTES to allow the DC bus capacitors to discharge. Then follow the "Bus Voltage Measurement Procedure" page [10](#) to verify that the DC voltage is less than 45 V. The drive LED is not an indicator of the absence of DC bus voltage.
- Install and close all covers before applying power or starting and stopping the drive.

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

DANGER

UNINTENDED EQUIPMENT OPERATION

- Test and ensure that any changes made to the parameter settings do not present any danger to personnel and equipment during drive operation.
- Do not use this APOGEE® FLN P1 option card with ATV21 drive firmware earlier than Version 1.8IE04. These versions will not detect an inoperative card.

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

WARNING

DAMAGE DRIVE EQUIPMENT

Do not operate or install any drive that appears damaged.

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

2. Before you begin

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.^a
- Each implementation of an ATV21 APOGEE® FLN P1 option card must be individually and thoroughly tested for proper operation before being placed into service.

Failure to follow these instructions can result in death, serious injury, or additional equipment damage.

- a. 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 ICS 7.1 (latest edition), "Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable-Speed Drive Systems."

3. Introduction

Thank you for purchasing the APOGEE® FLN P1 option card (VW3A21314) for Altivar 21 drive.

IMPORTANT: This communication option card is fully supported with the version V1.8 IE 04 and above of the Altivar 21 firmware.

By installing this board onto an Altivar 21 drive, data communication can be made with a host computer or other device via APOGEE® FLN P1 network.

The communication card has a connector for connection to the network.

Data exchanges give access to all Altivar 21 functions:

- Control (start, stop, reset, setpoint)
- Monitoring (status, current, voltage, thermal state...)
- Diagnostics (alarms)

The integrated display terminal can be used to access numerous functions for communication configuration and diagnostics.

4. Documentation structure

■ APOGEE® FLN P1 manual

The present APOGEE® FLN P1 user manual describes:

- connection to APOGEE® FLN P1
- configuration of the communication-specific parameters via the integrated HMI
- diagnostics
- networks variables drive

You will also find important information in other Altivar 21 technical documents. They are available on the Web site www.schneider-electric.com and on the CDROM delivered with each drive.

■ ATV21 user manual

This manual describes:

- How to assemble the drive
- How to connect the drive
- The functions and the parameters of the drive
- How to use the drive HMI

If you use the Parameter access function of (MBOX PARAM, MBOX DATA), you will find in this manual the address and possible values of the parameters of the drive.

■ Other field bus manuals

- LonWorks®
- BACnet
- Metasys® N2
- Modbus®

5. Hardware setup

5.1. Receipt

Electrostatic Precautions

⚠ CAUTION

STATIC SENSITIVE COMPONENTS

The APOGEE® FLN P1 option card can be damaged by static electricity. Observe the electrostatic precautions below when handling circuit boards or testing components.

Failure to follow these instructions can result in injury or equipment damage.

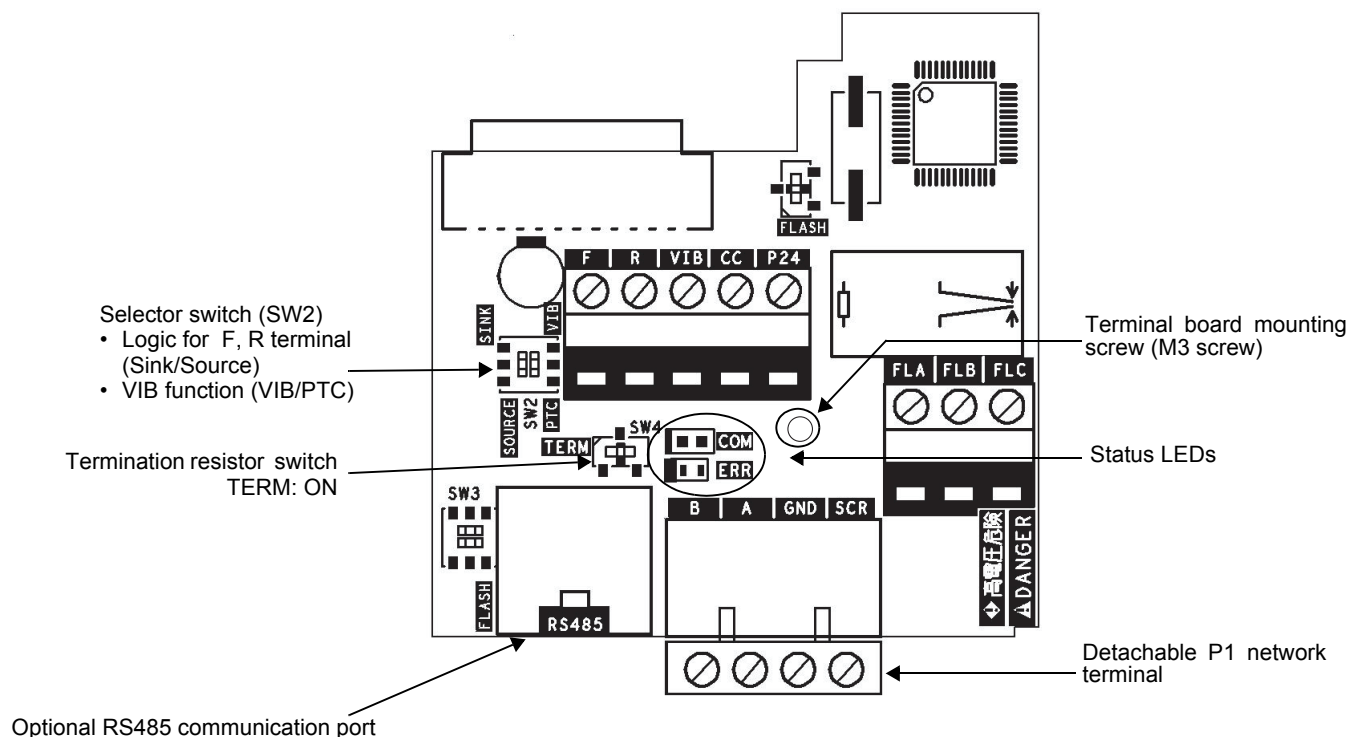
Observe the following precautions for handling static-sensitive components:

- Keep static-producing material such as plastic, upholstery, and carpeting out of the immediate work area.
- Store the APOGEE® FLN P1 card in its protective packaging when it is not installed in the drive.
- When handling the APOGEE® FLN P1 card, wear a conductive wrist strap connected to the card through a minimum of 1 megohm resistance.
- Avoid touching exposed conductors and component leads with skin or clothing.

Inspecting the APOGEE® FLN P1 Card

- Check that the card reference printed on the label is the same as that on the delivery note corresponding to the purchase order.
- Remove the option card from its packaging and inspect it for damage. If any damage is found, notify the carrier and your Schneider Electric representative.
- To store the card, replace it in its protective packaging and store it at - 25 to 70 °C (- 13 to + 158 °C).

5.2. Hardware description



5.3. Use of RS485 communication port

Serial communication (2-wire RS485) option can be used. However, while it is connected, the internal communication line is switched to RS485 then the communication via APOGEE® FLN P1 network is disabled. In this case, communication error trip time (**F B 0 3**) is also active.

5. Hardware setup

5.4. Bus voltage measurement procedure

Before working on the drive, remove all power and wait 15 minutes to allow the DC bus to discharge. Then measure the DC bus voltage between the PA/+ and PC/- terminals.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

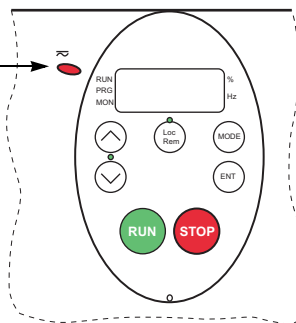
Read and understand the precautions in "Before you begin" on [page 5](#) before performing this procedure.

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

The DC bus voltage can exceed 1,000 Vdc. Use a properly rated voltage-sensing device when performing this procedure. To measure the DC bus voltage:

- 1 Disconnect all power.
- 2 Wait 15 minutes to allow the DC bus to discharge.
- 3 Measure the voltage of the DC bus between the PA/+ and PC/- terminals to ensure that the voltage is less than 45 Vdc.
- 4 If the DC bus capacitors do not discharge completely, contact your local Schneider Electric representative. Do not repair or operate the drive.

The capacitor charging LED on the drive is not an indicator of the absence of DC bus voltage. It only indicates when the capacitor is at full charge.



5. Hardware setup

5.5. Installing the card in the drive

⚠ DANGER

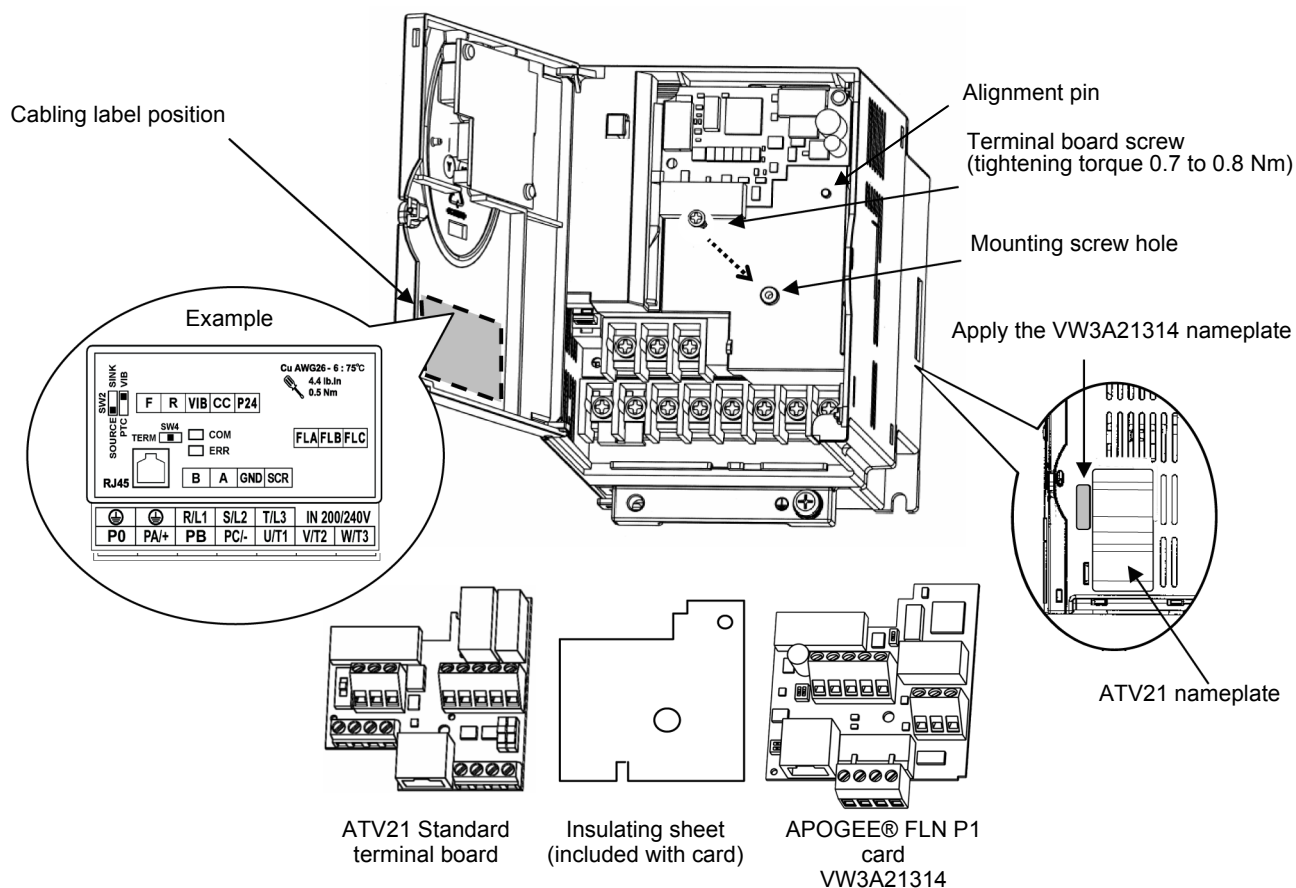
HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Read and understand the precautions in "Before you begin" on [page 5](#) before performing this procedure.

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

Install the APOGEE® FLN P1 card into the ATV21 drive as follows:

- 1 Remove power from the ATV21 drive and wait 15 minutes to allow the DC bus to discharge.
- 2 Follow the DC bus voltage measurement procedure [page 10](#) to verify that the DC voltage is less than 45 VDC.
- 3 Open the ATV21 front cover, then remove the terminal board screw and the ATV21 standard terminal board (see following figure). Keep the terminal board parallel with its mounting surface when removing it from the drive.
Note: Retain the terminal board screw for securing APOGEE® FLN P1 card once installed. Discard the standard terminal board or save it for future use.
- 4 Make the power and control wiring connections to the drive before installing APOGEE® FLN P1 card. Refer to ATV21 Installation Manual for wiring instruction.
- 5 Install the insulating sheet into the drive, aligning it with the terminal board screw hole and the drive's alignment pin.
- 6 Keeping the APOGEE® FLN P1 card parallel to the mounting surface, install it over the insulating sheet and secure it with the M3 screw removed in Step 3. Torque the screw to 0.7 to 0.8 Nm (6.2 - 7.1 lb-in).
- 7 Place the cabling label for APOGEE® FLN P1 card over the standard cabling label on the inside front cover of the drive. See example below.
- 8 Place the APOGEE® FLN P1 card nameplate near the drive nameplate. Be careful not to cover the vents on the ATV21 enclosure. See example below.



5. Hardware setup

5.6. Description of terminals

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Do not change switch settings while power is on.

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

⚠ DANGER

UNINTENDED EQUIPMENT OPERATION

Remove the motor cables before setting the VIB function parameter.. Otherwise, the motor may unexpectedly start.

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

Terminal symbol	Function	Electrical specifications	Internal circuits
F	Multifunctional programmable logic input. It has forward rotation function in default setting. ON: forward rotation drive OFF: slowdown and stop	Input for voltage-free contact 24VDC, 5mA or less.	
R	Multifunctional programmable logic input. It has reverse rotation function in default setting. ON: reverse rotation drive OFF: slowdown and stop	SINK/SOURCE can be selected with SW2.	
VIB	Multifunction programmable analog input. It has speed setpoint function in the default setting. (0 to 50Hz frequency with 0 to 10VDC input). In addition, this terminal can be used as PTC input by setting switch SW2 and the parameters (F645 and F646).	10VDC Internal impedance: 30 kohm	
CC	Control circuit equipotential terminal	-	-
P24	24 VDC power supply output	24VDC-50mA	
FLA FLB FLC	Multifunctional programmable relay contact outputs. Default setting is set to detect the activation of the drive protection function. Contact across FLA-FLC is closed and FLB-FLC is open during normal operation.	30VDC-0.5A 250VAC-1A (cos φ = 1) 250VAC-0.5A (cos φ = 0.4)	
B	APOGEE® FLN P1	RS485 transmission data, reception data.	
A			
GND			
SCR		APOGEE® FLN P1 communication shield terminal. This terminal is not connected to other circuits in the board. Ground this terminal in a location separated from the ground of the power line.	

6. Connecting to the bus

6.1. Cable routing practices

■ Recommendations for wiring the option card to the APOGEE® FLN P1 network

Connections	2 wires differential
Maximum devices per segment	32
Maximal cable length	1200 m

Install a line terminator at both ends of the line.

Note: A terminating resistor is built into the option card and can be enabled or disabled via the SW4 switch.

WARNING

IMPROPER WIRING PRACTICES

- Follow the wiring practices described in this document in addition to those already required by the National Electrical Code and local electrical codes.
- Check the power connections before energizing the drive.
- If replacing another drive, verify that all wiring connections to the ATV21 drive comply with all wiring instructions in this manual.

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

When wiring Altivar 21 drives to a APOGEE® FLN P1 network, follow all wiring practices required by national and local electrical codes. Also observe the following guidelines:

- 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 to protect the cable. These structures must 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 1 m (3.3 ft) from the following equipment:
 - air conditioners and large blowers,
 - elevators and escalators,
 - radios and televisions,
 - intercom and security systems,
 - fluorescent, incandescent, and neon lighting fixtures.
- Maintain a minimum separation of 3 m (9.8 ft) from the following equipment:
 - line and motor power wiring,
 - transformers,
 - generators,
 - 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 wiring. Do not run control, network and power wiring in the same conduit.
- Separate non-metallic conduits or cable trays carrying power wiring from metallic conduit carrying low-level control network wiring by at least 305 mm (12 in.).
- Separate metallic conduits carrying power wiring or low-level control network wiring by at least 76 mm (3 in.).
- Whenever power and control wiring cross, the metallic conduits and non-metallic conduits or trays must cross at right angles.
- If necessary, use filters to attenuate conducted emissions from the drive to the line to prevent interference with telecommunication, radio, and sensitive electronic equipment. Consult the Altivar catalog for selection and application of these filters.

6. Connecting to the bus

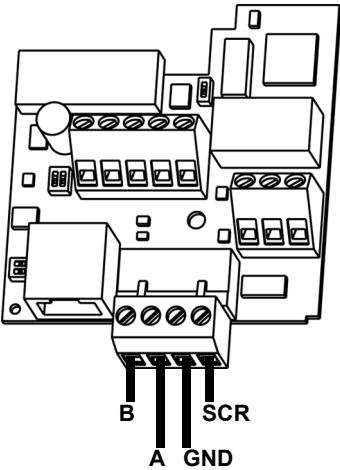
6.2. Card connector pinout

Observe the following recommendations for wiring the APOGEE® FLN P1 card network terminal to the network:

- Connections: 2-wire differential, common, and shield
- Maximum devices per segment: 32
- Maximum cable length: 1200 m (3637 ft)
- Line terminators: install line terminators at both ends of the line

Refer to the following figure for the pinout of the APOGEE® FLN P1 network terminal. When wiring the terminal:

- 1 Strip the cable sheath back approximately 10 mm (0.40 in.).
- 2 Use a flat blade screwdriver with a 0.6 mm (0.02 in.) thick and 3.5 mm (0.14 in.) wide blade for making the connections to the terminals.
- 3 Use a torque wrench to tighten the terminals to 0.5 to 0.6 N•m (4.4–5.3 lb-in.).



Contact	Signal
B	+
A	-
GND	Common
SCR	Shield

7. Configuration

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.^a
- Each implementation of an ATV21 APOGEE® FLN P1 option card must be individually and thoroughly tested for proper operation before being placed into service.

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

a. 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 ICS 7.1 (latest edition), "Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable-Speed Drive Systems."

7.1. Configuration of the internal communication

Set up the drive parameters as follows. To update, cycle the power of drive. If these parameters are set to incorrect values, the APOGEE® FLN P1 card cannot work normally.

Parameter	Function	Description
<i>F603</i>	Emergency stop selection	0: Coast stop 1: Slowdown stop 2: Emergency DC braking
<i>F800</i>	Communication rate	Set "1: 19200 bps" (default).
<i>F801</i>	Parity	Set "1: Even" (default).
<i>F803</i>	Communication error trip time	Set communication time out period.
<i>F851</i>	Drive behavior after a communication interruption	0: Communication release. Drive ramps to a stop. Serial control is relinquished to sources defined by <i>EN0d</i> and <i>FN0d</i> 1: None (continued operation) 2: Deceleration stop 3: Coast stop 4: Network error (<i>Err8</i> trip)

WARNING

LOSS OF CONTROL

Refer to "Serial Communication Parameters" in the Altivar® 21 Programming manual, for more information on how to set the serial communication parameters to stop the drive when the option card is deactivated by an unusual event such as tripping, an operating error, a power outage, or a failure.

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

7. Configuration

7.2. Function

In the absence of valid command and frequency reference from the network, the drive is controlled by the selection of (CND) and (FND). While there is a valid command and reference from the network, the (CND) and (FND) settings are not in control.

7.3. Communication parameters

Configure the following parameters. Select APOGEE® FLN P1 communication protocol: F829 = 3.

These parameters can only be modified when the motor is stopped.

Modifications will be taken into account by the drive after the power is cycled.

Parameter	Possible values	Default value
Remote mode start/stop control source (CND)	0: Control terminal logic input 1: Graphic display terminal 2: Serial communication	(0)
Remote mode primary speed reference source (FND)	1: VIA 2: VIB 3: Graphic display terminal 4: Serial communication 5: +/- speed from external contact	(1)
F829 Communication protocol	0: Toshiba drive protocol 1: Modbus® RTU protocol / Lonworks protocol 2: Metasys® N2 protocol 3: APOGEE® FLN P1 protocol 4: BACnet protocol	(1)
F890 Address	Set FLN device (VW3A21314) address Setting range: 0 to 99	(99)
F891 Network Baud rate	0: 9600 bps 1: 4800 bps 2: 9600 bps 3: 19200 bps 4: 38400 bps 5: 57600 bps 6: 76800 bps Other parameters are fixed. 8bit, no parity, 1stop	(0)
F892 Network communication error trip time	0: No action Unit 0.1 sec, Setting range: 20 - 600 (2 - 60 s)	(100)
F897 Version	The software version of VW3A21314.	(100)
FA15 Frame counter	Displays the total number of frames received by the communication card since the last power ON (0 - 999). These values can be monitored by the graphic terminal display (monitor mode).	-
FA16 Invalid Frame counter	Displays the total number of bad frames received by the communication card since the last power ON (0 - 999). These values can be monitored by the graphic terminal display (monitor mode).	-

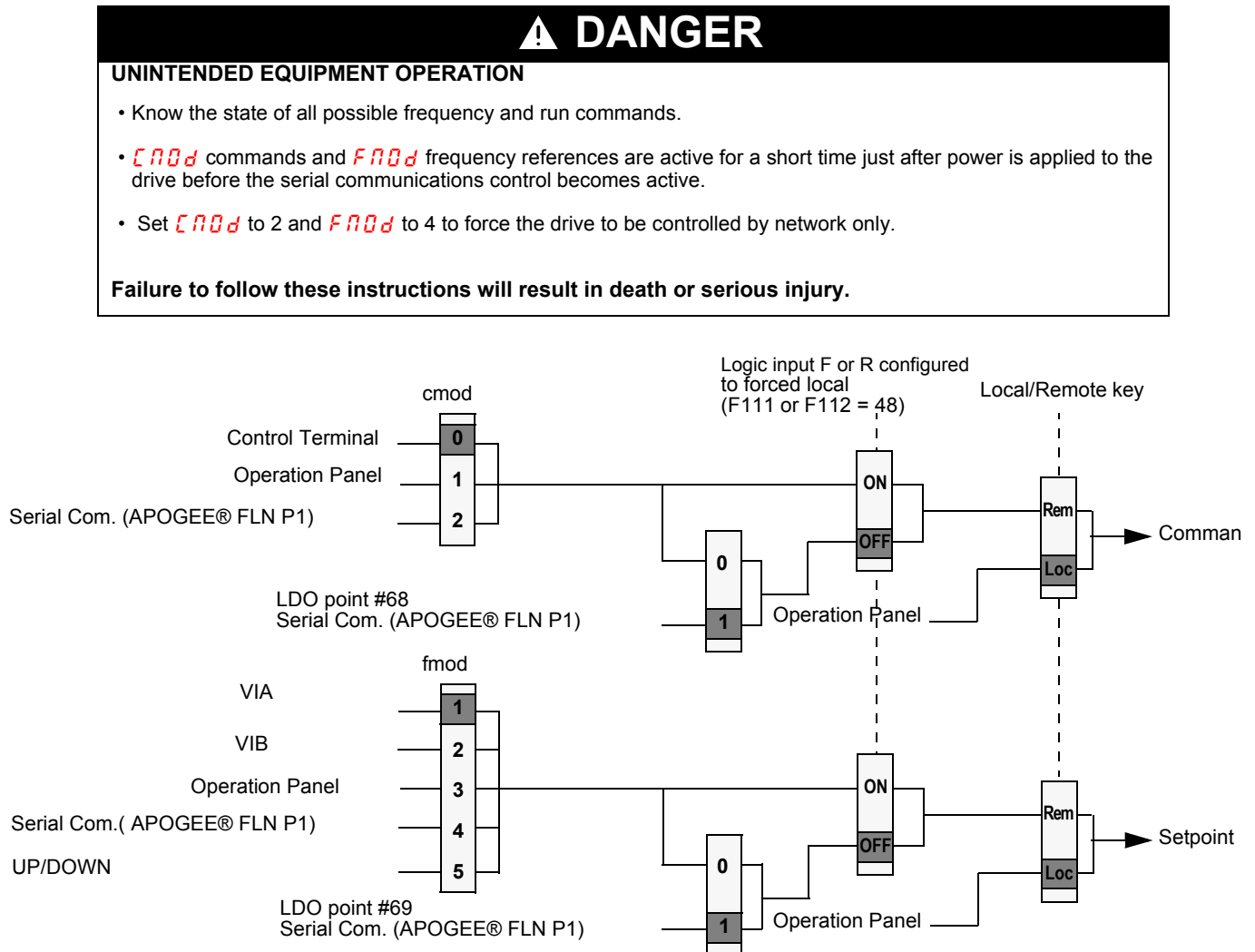
When FMOD = 4 or CMOD = 2 (serial communication), the drive will respond to network commands regardless of the setting of FLN LOC CTL (LDO point #68) or FLN LOC REF (LDO point #69).

7. Configuration

7.4. Command and speed reference selection

The LED above the LOC/REM key indicates whether the drive is in Local or Remote mode. Refer to the programming manual for the location of the LOC/REM LED, and a description of its states. In remote mode, the start/stop commands and speed reference are taken from the APOGEE® FLN P1 network.

The following diagram illustrates switching between the command and speed reference sources. Refer to the Altivar 21 programming manual for a detailed description of the parameters.



7. Configuration

7.5. Communication interruptions

Parameters F803, F851, and F892 determine how the drive responds to a communication interruption. A communication interruption may cause unpredictable operation if these parameters are not set properly. Refer to following table.

A communication error (Err 5) is triggered within the time period defined by parameter F803 if the APOGEE® FLN P1 card is deactivated by an event such as a disconnected cable or a power outage. A network error (Err 8) is triggered if the network does not receive a APOGEE® FLN P1 message of any type within the time period defined by parameter F892.

The setting of parameter F851 defines how the drive responds to a communication interruption.

Communication interruption behaviour

Parameter		Possible value	Default value
Communication error trip time	F803	1-100 seconds (1)	3
Drive behavior after a communication interruption	F851	0: Communication release. Drive ramps to a stop. Serial control is relinquished to sources defined by FMOd and CMOd. 1: No action. Last commanded operation continues. 2: Deceleration stop. Drive ramps to a stop. Serial control is maintained. 3: Drive removes power from the motor which coasts to a stop. Serial control is maintained. 4: Drive ramps to a stop. An Err 5 (communication error) or Err 8 (network error) is displayed. Restarting the drive requires a reset by one of the following means: • Cycling drive power • Initiating a reset command signal to a user-programmed logic input through terminals F, R, or RES • Pressing the Stop button on the keypad, if the Stop button is configured as a reset. See the ATV21 programming manual, for configuring reset options.	1
Network communication error trip time	F892	0: No action Unit 0.1 sec, Setting range: 20 - 600 (2 - 60 s)	100

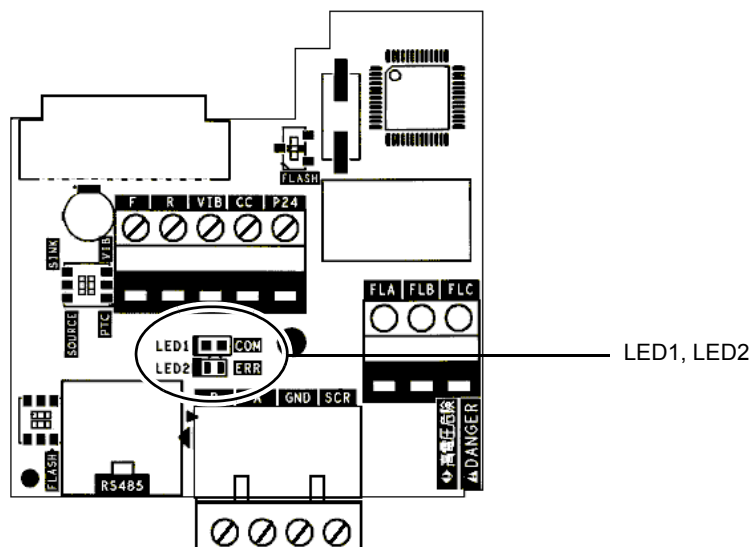
(1) To avoid too many Err 8 fault, choose a communication error trip time upper or equal to 2 seconds.

 WARNING
LOSS OF CONTROL Know and understand the setting of parameter F851. This parameter controls the behavior of the drive in the event of a network communication loss. If the value of F851 is 0, 1, 2, or 3, the drive will not trip on an Err8. Failure to follow these instructions can result in death, serious injury, or equipment damage.

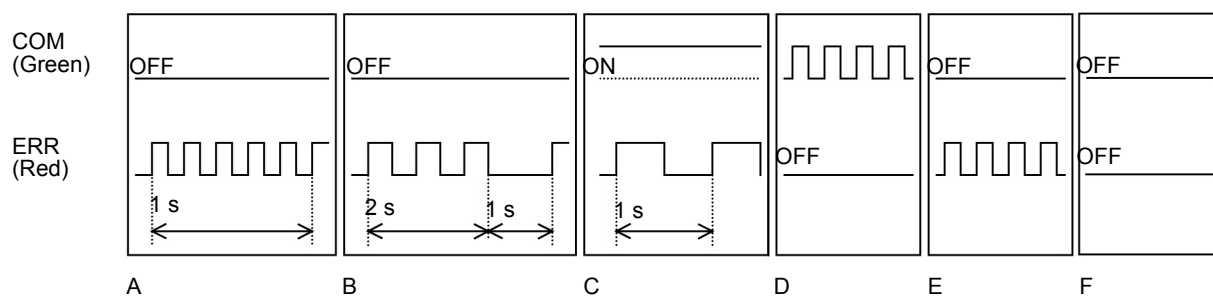
7. Configuration

7.6. LEDs

The APOGEE® FLN P1 card has 2 LEDs, COM and ERR which are located on the communication card.



■ Functions



■ LEDs Indication Table

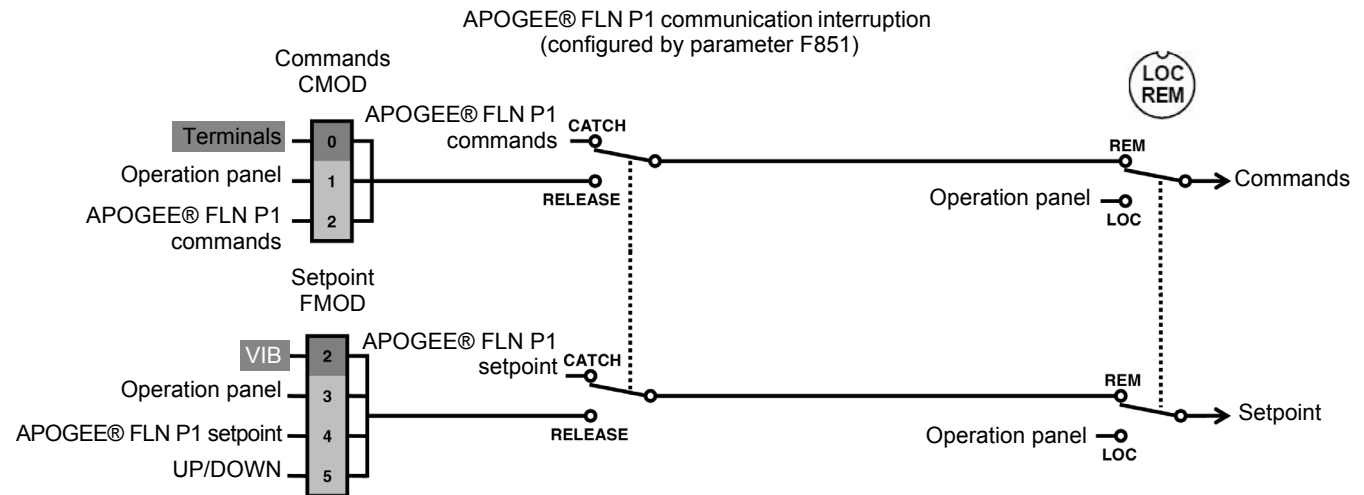
State	LEDs	Comment
A	COM LED: OFF ERR LED: Flashing 5 times in 1 second	Hardware analysis needed.
B	COM LED: OFF ERR LED: 3 times in 2 seconds, Off for 1 second	Communication loss detected. Check the condition of the network and connection of the cable.
C	COM LED: ON ERR LED: OFF 0.5 s, ON 0.5 s	Invalid configuration detected, or there is an option connected to the RS485 communication port.
D	COM LED: Flashing ERR LED: -	Valid message received for this node
E	COM LED: - ERR LED: Flashing	Invalid message received (any node)
F	COM LED: OFF ERR LED: OFF	No communication with the drive (e.g. : drive power is off) or the baud rate is set incorrectly.

7. Configuration

• Example:

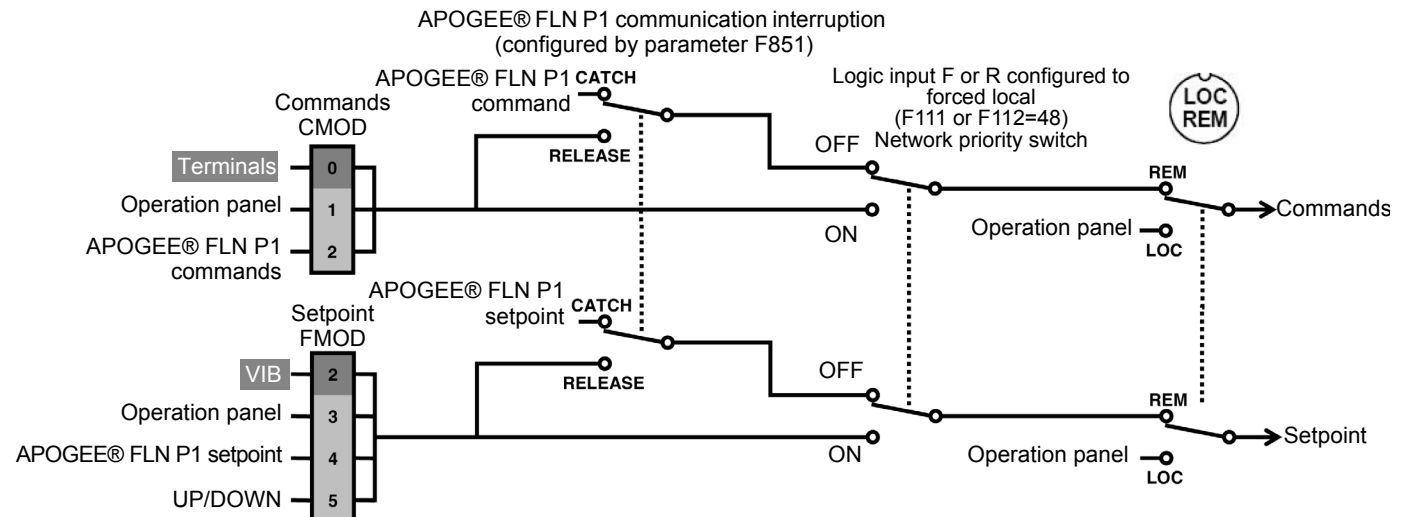
If you want the drive to switch to terminal control in case of APOGEE® FLN P1 communication interruption, configure:

Parameter	Value	Description
F851	0	Communication release (no trip)
CNDd	0	Terminals
FNDd	2	VIB



To allow switching between network and terminal control, assign the forced local function to:

- Logic input F by setting parameter F111 to 48, or
- Logic input R by setting parameter F112 to 48



8. Network objects

This database features 63 logical points: 19 Logical Analog Inputs (LAI), 16 Logical Analog Outputs (LAO), 16 Logical Digital Inputs (LDI) and 12 Logical Digital Outputs (LDO). These points configure, control or monitor the operation of the drive.

■ Point Summary

Point Number	Point Type	Point Name	Factory Default	Engr. Units	Slope	Intercept	ON Text	OFF Text
01	LAO	CTLR ADDRESS	99	-	1	0	-	-
02	LAO	APPLICATION	2738	-	1	0	-	-
03	LAI	FREQ OUTPUT	0	HZ	0.1	0	-	-
04	LAI	PCT OUTPUT	0	PCT	0.1	0	-	-
05	LAI	SPEED	0	RPM	1	0	-	-
06	LAI	CURRENT	0	A	0.1	0	-	-
07	LAI	TORQUE	0	PCT	0.1	-200	-	-
08	LAI	POWER	0	KW	0.1	0	-	-
09	LAI	DRIVE TEMP	0	PCT	0.1	0	-	-
10	LAI	DRIVE KWH	0	kWH	1	0	-	-
11	LAI	DRIVE MWH	0	MWH	1	0	-	-
12	LAI	RUN TIME	0	H	1	0	-	-
13	LAI	DC BUS VOLT	0	V	1	0	-	-
14	LAI	OUTPUT VOLT	0	V	1	0	-	-
15	LAI	PRC PID FBCK	0	PCT	0.1	0	-	-
16	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
17	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
18	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
19	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
20	LAO	OVRD TIME	1	H	1	0	-	-
21	LDI	FWD.REV	FWD	-	1	0	REV	FWD
22	LDO	CMD FWD.REV	FWD	-	1	0	REV	FWD
23	LDI	STOP.RUN	STOP	-	1	0	RUN	STOP
24	LDO	CMD STP.STRT	STOP	-	1	0	RUN	STOP
25	LDI	EXT1.2 ACT	EXT1	-	1	0	EXT2	EXT1
26	LDO	EXT1.2 CMD	EXT1	-	1	0	EXT2	EXT1
27	LDI	DRIVE READY	NOTRDY	-	1	0	READY	NOTRDY
28	LDI	AT SETPOINT	NO	-	1	0	YES	NO
29	LDO	DAY.NIGHT	DAY	-	1	0	NIGHT	DAY
30	LAO	CURRENT LIM	0	A	0.1	0	-	-
31	LAO	ACCEL TIME 1	300	S	0.1	0	-	-
32	LAO	DECEL TIME 1	300	S	0.1	0	-	-
33	LDI	HANDAUTO ACT	AUTO	-	1	0	HAND	AUTO
34	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
35	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
36	LDI	FLN LOC ACT	AUTO	-	1	0	FLN	AUTO
37	LDI	CTL SRC	NO	-	1	0	YES	NO
38	LDI	FLN REF1 SRC	NO	-	1	0	YES	NO
39	LDI	FLN REF2 SRC	NO	-	1	0	YES	NO
40	LDO	DO 1 COMMAND	OFF	-	1	0	ON	OFF
41	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
42	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
43	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
44	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
45	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

8. Network objects

Point Number	Point Type	Point Name	Factory Default	Engr. Units	Slope	Intercept	ON Text	OFF Text
46	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
47	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
48	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
49	LDO	RESET KWH	NO	-	1	0	RESET	NO
50	LAO	PRC PID GAIN	10	PCT	0.1	0	-	-
51	LAO	PRC PID ITIM	600	S	0.1	0	-	-
52	LAO	PRC PID DTIM	0	S	0.1	0	-	-
53	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
54	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
55	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
56	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
57	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
58	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
59	LDO	LOCK PANEL	UNLOCK	-	1	0	LOCK	UNLOCK
60	LAO	INPUT REF1	0	PCT	0.1	0	-	-
61	LAO	INPUT REF2	0	PCT	0.1	0	-	-
62	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
63	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
64	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
65	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
66	LAO	SPD OUT MIN	0	PCT	0.1	0	-	-
67	LAO	SPD OUT MAX	1000	PCT	0.1	0	-	-
68	LDO	FLN LOC CTL	AUTO	-	1	0	FLN	AUTO
69	LDO	FLN LOC REF	AUTO	-	1	0	FLN	AUTO
70	LDI	DI 1 ACTUAL	OFF	-	1	0	ON	OFF
71	LDI	DI 2 ACTUAL	OFF	-	1	0	ON	OFF
72	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
73	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
74	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
75	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
76	LDI	DO 1 ACTUAL	OFF	-	1	0	ON	OFF
77	LDI	DO 2 ACTUAL	OFF	-	1	0	ON	OFF
78	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
79	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
80	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
81	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
82	LAI	AI 1 ACTUAL	0	PCT	0.1	0	-	-
83	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
84	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
85	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
86	LDI	OK.ALARM	OK	-	1	0	ALARM	OK
87	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
88	LAI	ALARM WORD 1	-	-	1	0	-	-
89	LAI	ALARM WORD 2	-	-	1	0	-	-
90	LAI	LAST FAULT	-	-	1	0	-	-
91	LAI	PREV FAULT 1	-	-	1	0	-	-
92	LAI	PREV FAULT 2	-	-	1	0	-	-
93	LDI	OK.FAULT	OK	-	1	0	FAULT	OK
94	LDO	RESET FAULT	NO	-	1	0	RESET	NO
95	LAO	MBOX PARAM	-	-	1	0	-	-
96	LAO	MBOX DATA	-	-	1	0	-	-
97	LDO	MBOX READ	DONE	-	1	0	READ	DONE
98	LDO	MBOX WRITE	DONE	-	1	0	WRITE	DONE
99	LAO	ERROR STATUS	-	-	1	0	-	-

8. Network objects

8.1. Logical Analog Input (LAI) Summary

Logical Analog Input (LAI) points are used for monitoring drive status items such as output frequency, current and voltage. The APOGEE® FLN P1 card supports 19 different logical analog input points. Change of value (COV) of LAI points can be enabled (LAI points are capable of being characterized). LAI points will respond to write point and memorize point commands, but will not change their actual values or indicate override active.

■ Logical Analog Input (LAI) Summary

Point Number	Point Name	Factory Default	Engr. Units	Slope	Intercept	Min	Max
03	FREQ OUTPUT	0	HZ	0.1	0	0	32767
04	PCT OUTPUT	0	PCT	0.1	0	0	32767
05	SPEED	0	RPM	1	0	0	32767
06	CURRENT	0	A	0.1	0	0	32767
07	TORQUE	0	PCT	0.1	-200	0	32767
08	POWER	0	KW	0.1	0	0	32767
09	DRIVE TEMP	0	PCT	0.1	0	0	255
10	DRIVE KWH	0	kWH	1	0	0	32767
11	DRIVE MWH	0	MWH	1	0	0	32767
12	RUN TIME	0	H	1	0	0	32767
13	DC BUS VOLT	0	V	1	0	0	32767
14	OUTPUT VOLT	0	V	1	0	0	32767
15	PRC PID FBCK	0	PCT	0.1	0	0	32767
82	AI 1 ACTUAL (VIB)	0	PCT	0.1	0	0	32767
88	ALARM WORD 1	-	-	1	0	0	32767
89	ALARM WORD 2	-	-	1	0	0	32767
90	LAST FAULT	-	-	1	0	0	32767
91	PREV FAULT 1	-	-	1	0	0	32767
92	PREV FAULT 2	-	-	1	0	0	32767

8. Network objects

■ LAI Point Descriptions

Logical Analog Input (LAI) Point Descriptions

Point Number	Point Name	Description
03	FREQ OUTPUT	The output frequency applied to the motor, in Hertz.
04	PCT OUTPUT	The ratio of output frequency or speed to the corresponding base frequency, depending on control mode.
05	SPEED	The calculated speed of the motor, in RPM. Use parameter F856 to configure the number of motor pole pairs.
06	CURRENT	The measured output current.
07	TORQUE	The calculated output torque of the motor as a percentage of nominal torque.
08	POWER	The measured output power in kW. The FLN point definition also supports horsepower by selecting English units.
09	DRIVE TEMP	The calculated thermal state of the drive.
10	DRIVE KWH	The drive's cumulative power consumption in kilowatt-hours. This value may be reset by commanding FLN point 49, RESET KWH.
11	DRIVE MWH	The drive's cumulative power consumption in megawatt hours. This value may be reset by commanding FLN point 49, RESET KWH.
12	RUN TIME	The drive's cumulative run time in hours. This value may be reset by commanding FLN point 48, RESET RUN TIME.
13	DC BUS VOLT	The DC bus voltage level of the drive.
14	OUTPUT VOLT	The AC output voltage applied to the motor.
15	PRC PID FBCK	The ratio of PID feedback signal to the corresponding ul (base frequency).
82	AI 1 ACTUAL	Indicates the input level of VIB terminal.
88	ALARM WORD 1	This point is a bit-field indicating active alarms in the drive.
89	ALARM WORD 2	This point is a bit-field indicating active alarms in the drive.
90	LAST FAULT	This point is first in the drive's detected fault log and indicates the most recent event declared.
91	PREV FAULT 1	This point is second in the drive's detected fault log and indicates the previous event declared.
92	PREV FAULT 2	This point is last in the drive's detected fault log and indicates the oldest event in the log.

8. Network objects

8.2. Logical Analog Output (LAO) Summary

Logical Analog Output (LAO) points are used for setting and monitoring control points such as the drive's frequency command and configuration parameters.

The APOGEE® FLN P1 card supports 16 different logical analog output points (12 of them are for the ATV21 parameters and commands, while the others are reserved for maintaining compliance). The values of logical analog output points can be modified by write point or memorize point commands. Release commands will not cause the logical analog output points to automatically return to their pre-override values. LAO points do not support COV (Change Of Value).

■ Logical Analog Output (LAO) Summary

Point Number	Point Name	Factory Default	Engr. Units	Slope	Intercept	Min	Max
01	CTLR ADDRESS	99	-	1	0	0	99
02	APPLICATION	2738	-	1	0	0	32767
20	OVRD TIME	1	H	1	0	0	255
30	CURRENT LIM	110	A	0.1	0	0	32767
31	ACCEL TIME 1	300	S	0.1	0	0	32767
32	DECEL TIME 1	300	S	0.1	0	0	32767
50	PRC PID GAIN	10	PCT	0.1	0	0	255
51	PRC PID ITIM	600	S	0.1	0	0	32767
52	PRC PID DTIM	0	S	0.1	0	0	32767
60	INPUT REF1 *	0	PCT	0.1	0	0	32767
61	INPUT REF2 *	0	PCT	0.1	0	0	32767
66	SPD OUT MIN	0	PCT	0.1	0	0	32767
67	SPD OUT MAX	1000	PCT	0.1	0	0	32767
95	MBOX PARAM	-	-	1	0	0	32767
96	MBOX DATA	-	-	1	0	0	32767
99	ERROR STATUS	-	-	1	0	0	255

* 100% = ω_L (Base frequency), F_H (Maximum frequency) limits this value.

8. Network objects

■ LAO Point Descriptions

Logical Analog Output (LAO) Point Descriptions

Point Number	Point Name	Description
01	CTLR ADDRESS	The FLN address of the drive. It can be set from the FLN network and by the panel
02	APPLICATION	The Application ID for APOGEE® FLN P1 CARD
20	OVRD TIME	1 of the 5 mandatory FLN points required for compatibility with Siemens control systems. It has no functionality in the drive application.
30	CURRENT LIM	Sets the output current limit of the drive.
31	ACCEL TIME 1	Sets the acceleration time for ramp 1.
32	DECEL TIME 1	Sets the deceleration time for ramp 1.
50	PRC PID GAIN	Sets the proportional gain of the PID.
51	PRC PID ITIM	Sets the integration time of the PID.
52	PRC PID DTIM	Sets the derivation time of the PID.
60	INPUT REF1	Sets setpoint 1. This setpoint is enabled at #26 EXT1.2 CMD = 0.
61	INPUT REF2	Sets setpoint 2. This setpoint is enabled at #26 EXT1.2 CMD = 1.
66	SPD OUT MIN	Sets the minimum output speed of the drive as a percentage of the motor nominal rating.
67	SPD OUT MAX	Sets the maximum output speed of the drive as a percentage of the motor nominal rating.
95	MBOX PARAM	Sets the parameter to be used by the message box function. Refer to section 5.
96	MBOX DATA	Sets or indicates the data value of the message box function. Refer to section 5.
99	ERROR STATUS	1 of the 5 mandatory FLN points required for compatibility with Siemens control systems. It has no functionality in the drive application.

8. Network objects

8.3. Logical Digital Input (LDI) Summary

Logical Digital Input (LDI) points are used for drive status monitoring such as terminal ON/OFF conditions and status. The APOGEE® FLN P1 CARD supports 16 different logical digital input points. LDI points support COV (LDI points are capable of being characterized). LDI points will respond to write point and memorize point commands, but will not change their actual values or indicate that an override is active.

Point Number	Point Name	Factory Default	Slope	Intercept	ON (1) Text	OFF (0) Text
21	FWD.REV	FWD	1	0	REV	FWD
23	STOP.RUN	STOP	1	0	RUN	STOP
25	EXT1.2 ACT	EXT1	1	0	EXT2	EXT1
27	DRIVE READY	NOTRDY	1	0	READY	NOTRDY
28	AT SETPOINT	NO	1	0	YES	NO
33	HANDAUTO ACT	AUTO	1	0	HAND	AUTO
36	FLN LOC ACT	AUTO	1	0	FLN	AUTO
37	CTL SRC	NO	1	0	YES	NO
38	FLN REF1 SRC	NO	1	0	YES	NO
39	FLN REF2 SRC	NO	1	0	YES	NO
70	DI 1 ACTUAL (F)	OFF	1	0	ON	OFF
71	DI 2 ACTUAL (R)	OFF	1	0	ON	OFF
76	DO 1 ACTUAL (FL)	OFF	1	0	ON	OFF
77	DO 2 ACTUAL (RY)	OFF	1	0	ON	OFF
86	OK.ALARM	OK	1	0	ALARM	OK
93	OK.FAULT	OK	1	0	FAULT	OK

8. Network objects

■ LDI Point Descriptions

Logical Digital Input (LDI) Point Descriptions

Point Number	Point Name	Description
21	FWD.REV	Indicates the rotational direction of the motor, regardless of control source.
23	STOP.RUN	Indicates the run status of the drive, regardless of control source.
25	EXT1.2 ACT	Indicates whether channel 1 or channel 2 is the active control source.
27	DRIVE READY	Indicates the drive is ready to accept a run command.
28	AT SETPOINT	Indicates the drive has reached its commanded setpoint.
33	HANDAUTO ACT	Indicates whether the drive is in local (HAND) or remote (AUTO) control.
36	FLN LOC ACT	Indicates if the drive has been placed in "FLN LOCAL" mode by commanding either point 68 (FLN LOC CTL) or point 69 (FLN LOC REF). Commanding either of these points to FLN removes control from its normal source and places it under FLN control. Note that the HAND mode of the panel has priority over FLN local control.
37	CTL SRC	Indicates if the FLN network is a source for control inputs.
38	FLN REF1 SRC	Indicates if the FLN network is the source for setpoint 1.
39	FLN REF2 SRC	Indicates if the FLN network is the source for setpoint 2.
70	DI 1 ACTUAL	Indicates the status of digital Input 1. This value depends on the status of the F terminal on the APOGEE® FLN P1 CARD.
71	DI 2 ACTUAL	Indicates the status of digital Input 2. This value depends on the status of the R terminal on the APOGEE® FLN P1 CARD.
76	DO 1 ACTUAL	Indicates the status of digital output 1. This value depends on the status of the FL terminal on the APOGEE® FLN P1 CARD.
77	DO 2 ACTUAL	Indicates the status of digital output 2. This value depends on the status of the RY terminal of the APOGEE® FLN P1 CARD. Note: This relay does not physically exist on the option card (it is a virtual relay). The user can use the network object to monitor the status of the drive.
86	OK.ALARM	Indicates the current state of the drive.
93	OK.FAULT	Indicates the current state of the drive.

8. Network objects

8.4. Logical Digital Output (LDO) Summary

Logical Digital Output (LDO) points are used for executing drive commands such as RUN/STOP and trip clear. The APOGEE® FLN P1 card supports 12 different logical digital output points (11 are for drive control, one special point is reserved for maintaining compliance). The values of logical digital output points can be modified by write point or memorize point commands. Release commands will not cause the logical digital output points to automatically return to their pre-override values. LDO points do not support COV.

Point Number	Point Name	Factory Default	Slope	Intercept	ON (1) Text	OFF (0) Text
22	CMD FWD.REV	FWD	1	0	REV	FWD
24	CMD STP.STRT	STOP	1	0	RUN	STOP
26	EXT1.2 CMD	EXT1	1	0	EXT2	EXT1
29	DAY.NIGHT	DAY	1	0	NIGHT	DAY
40	DO 1 COMMAND (FL) *	OFF	1	0	ON	OFF
49	RESET KWH	NO	1	0	RESET	NO
59	LOCK PANEL	UNLOCK	1	0	LOCK	UNLOCK
68	FLN LOC CTL	AUTO	1	0	FLN	AUTO
69	FLN LOC REF	AUTO	1	0	FLN	AUTO
94	RESET FAULT	NO	1	0	RESET	NO
97	MBOX READ	DONE	1	0	READ	DONE
98	MBOX WRITE	DONE	1	0	WRITE	DONE

* Set the parameter **F 132** = 38 (39) for FL terminal.

8. Network objects

■ LDO Point Descriptions

Logical Digital Output (LDO) Point Descriptions

Point Number	Point Name	Parameter
22	CMD FWD.REV	Commanded from the FLN network to change the rotational direction of the drive. This command is active only if the drive is configured for control from the FLN network.
24	CMD STP.STRT	Commanded from the FLN network to start the drive. This command is active only if the drive is configured for control from the FLN network.
26	EXT1.2 CMD	Commanded from the FLN network to select channel 1 or channel 2 as the active control source (0 = #60 INPUT REF1, 1 = #61 INPUT REF2).
29	DAY.NIGHT	1 of the 5 mandatory FLN points required for compatibility with Siemens control systems. It has no functionality in the drive application.
40	DO 1 COMMAND	Controls the output state of FL terminal.
49	RESET KWH	Commanded by the FLN network to reset the cumulative kilowatt-hour counter (1 = RESET, 0 = NO). The control input is rising-edge sensitive, so, once the command is issued, this point automatically returns to its inactive state. This momentary operation avoids any need for an explicit command to clear the point before a subsequent reset can be issued.
59	LOCK PANEL	Commanded from the FLN network to lock the panel and help prevent parameter changes (1 = LOCK, 0 = UNLOCK).
68	FLN LOC CTL	Commanded from the FLN network to temporarily remove start/stop control of the drive from its normal source and place it under FLN network control. This functionality is analogous to placing the drive in HAND mode at the panel, with the control being taken by the FLN network instead. HAND mode at the panel has priority over this point. Thus, this point is only effective in temporarily taking control from the digital inputs or some other internal control functionality.
69	FLN LOC REF	Commanded from the FLN network to temporarily remove input setpoint control of the drive from its normal source and place it under the FLN network control. This functionality is analogous to placing the drive in HAND mode at the panel, with the setpoint control being taken from the FLN network instead. HAND mode at the panel has priority over this point. Thus, this point is only effective in temporarily taking control from the analog inputs or some other internal control functionality.
94	RESET FAULT	Commanded from the FLN network to reset the drive (1 = RESET, 0 = NO). The control input is rising-edge sensitive, so, once the command is issued, this point automatically returns to its inactive state. This momentary operation avoids any need for an explicit command to clear the point before a subsequent reset can be issued.
97	MBOX READ	Refer to section 8.6 .
98	MBOX WRITE	Refer to section 8.6 .

8. Network objects

8.5. Message box Function Points

Use the APOGEE® FLN P1 points described below to read from and write drive parameters.

ATV21 Parameter Access Point Table

Point Number	Point Type	Point Name	Note
95	LAO	MBOX PARAM	Contains the hexadecimal address of the parameter to be accessed.
96	LAO	MBOX DATA	The read value is set.
97	LDO	MBOX READ	The parameter value specified by MBOX PARAM is read when set to 1.
98	LDO	MBOX WRITE	The value of MBOX DATA is written to the parameter specified by MBOX PARAM when set to 1.

Example 1: Read the deceleration time (d E L, Comm. No. 0010)

- 1 Write "16" as the communication address to [MBOX PARAM \(LAO #95\)](#).
*Write the communication address as the decimal equivalent of the parameter's hexadecimal address 0x0010 = 16 dec.
- 2 Write "1" to [MBOX READ \(LDO #97\)](#).
- 3 The read value is set to [MBOX DATA \(LAO #96\)](#). The unit of the return value is 0.1s.

Example 2: Write "50.0Hz" to VIB input point 2 (F 2 I 3, Comm. No. 0213)

- 1 Write "531" as the communication address to [MBOX PARAM \(LAO #95\)](#).
* 0x0213 = 531 dec.
 - 2 Write "5000" to [MBOX DATA \(LDO #96\)](#).
* 5000 = 50.00Hz, unit is 0.01Hz
 - 3 Write "1" to [MBOX WRITE \(LDO #98\)](#).
- * The time from receipt of the last character of a message to the transmission of the first character of the response is about 40ms.
* A response is "NAK (error code = 0x00FE)" when a communication address does not exist.

8.6. FLN P1 Error Codes

When an operation as a result of a P1 command is unsuccessful, error code NAK is returned. Below is a list of possible error codes that can be returned by a FLN device.

■ FLN P1 Error Code

Error Code	Description
0x00D7	Operator priority too low. A number of situations can return this error code.
0x00F9	Invalid point number.
0x00FB	No COVs to report.
0x00FC	Request Characterization.
0x00FD	Invalid command.
0x00FE	Invalid value. *

* Including the response for Dump Memory command (0x0018) and Modify Memory command (0x0019). APOGEE® FLN P1 card does not support these commands.

9. Reports

The APOGEE® FLN P1 card is able to generate 6 predefined reports:

- Device
- Startup
- Overview
- Drive I/O
- Drive Config
- Process PID

These reports are initiated from the P1 controller, please refer to the manufacturer instructions before proceeding.

Here is an example of report.

```
01/01/2002 TUE                      TEC REPORT DISPLAY REPORT                      23:01
-----
Search for <ATV21:STARTUP>
TEC name
:Suffix (Description)                Value                State    Priority
-----
ATV21
[21] :FWD.REV                        FWD                  -N-      NONE
[22] :CMD FWD.REV                    FWD                  -N-      NONE
[23] :STOP.RUN                       RUN                  -N-      NONE
[24] :CMD STP.STRT                   RUN                  -N-      OVRD
[36] :FLN LOC ACT                     OFF                  -N-      NONE
[60] :INPUT REF1                      65.9 PCT             -N-      OVRD
[61] :INPUT REF2                      0.0 PCT              -N-      NONE
[68] :FLN LOC CTL                     OFF                  -N-      NONE
[69] :FLN LOC REF                     OFF                  -N-      NONE
[94] :RESET FAULT                     NO                    -N-      OVRD

End of report
```