

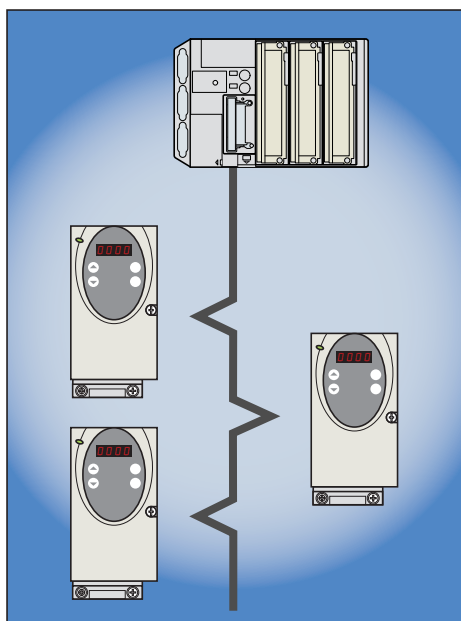
Altivar 21

Metasys N2 card

User's manual

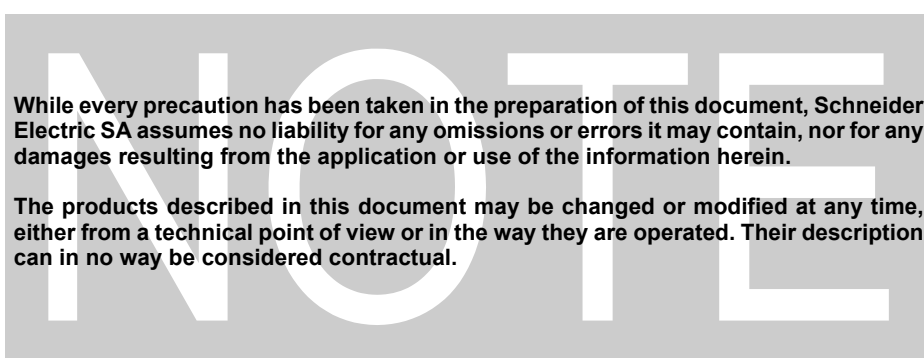
VW3 A21 313

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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 instruction 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, serious injury, or equipment damage.

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

Electrical equipment should be serviced only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material. This document is not intended as an instruction manual for untrained persons.
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2. Before you begin

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

DANGER

HAZARDOUS VOLTAGE

- Read and understand the Installation 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 standards in force concerning protective grounding of all equipment.
- Many parts of this variable speed drive, including the printed circuit cards, 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.
- Install and close all the covers before applying power or starting and stopping the drive.
- Before servicing the variable speed drive
 - Disconnect all power.
 - Place a "DO NOT TURN ON" label on the variable speed drive disconnect.
 - Lock the disconnect in the open position.
- Disconnect all power including external control power that may be present before servicing the drive. **WAIT 15 MINUTES** to allow the DC bus capacitors to discharge. Then follow the DC bus voltage measurement procedure given in the Installation Manual to verify that the DC voltage is less than 45 VDC. The drive LEDs are not accurate indicators of the absence of DC bus voltage.

Electric shock will result in death or serious injury.

CAUTION

DAMAGED EQUIPMENT

Do not install or operate any drive that appears damaged.

Failure to follow this instruction can result in equipment damage.

3. Introduction

Thank you for purchasing the Metasys N2 option card (VW3A21313) for Altivar 21 drive.

By installing this board into the Altivar 21, data communication can be made with a host computer or other device via Metasys N2 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

■ Metasys N2 manual

The present Metasys N2 user manual describes:

- connection to Metasys N2,
- configuration of the communication-specific parameters via the integrated HMI,
- diagnostics,
- networks variables.

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), will find in this manual the address and possible values of the parameters of the drive.

■ Others field bus manuals

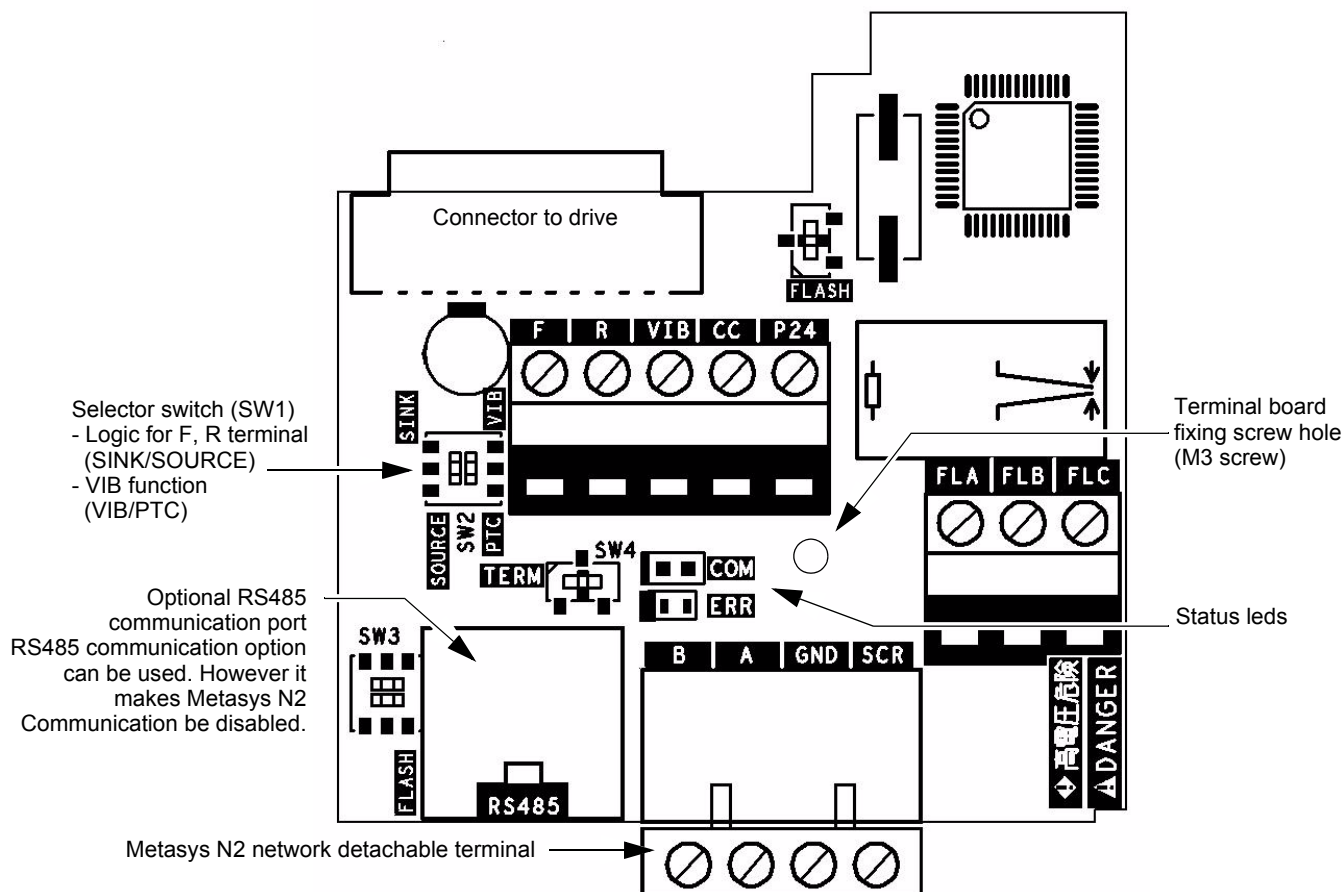
- LonWorks,
- BACnet,
- Etc ...

5. Hardware setup

5. 1. Receipt

- 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 check that it has not been damaged in transit.

5. 2. Hardware description



5. 3. Use of RS485 communication port

Serial communication (2-wire RS485) option can be used for Modbus, or PC software.

One internal communication line is available either for the RS485 communication port or for the Metasys N2 port. So, while RS485 communication is used (connected to the appropriate cable or interface) the Metasys N2 port is disabled.

■ Recommendations for wiring the option card to the Metasys N2 network

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

Install a line terminator at both ends of the line.

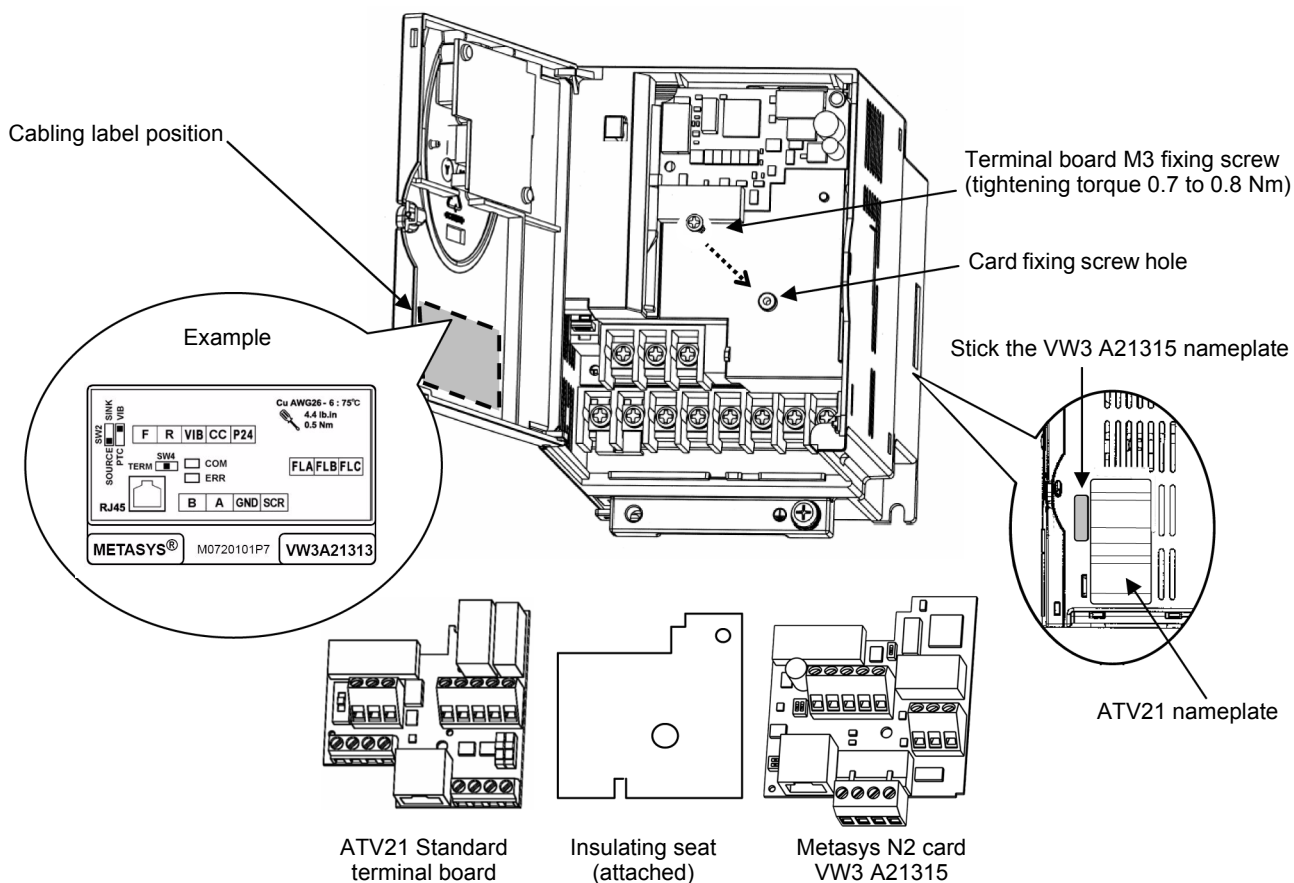
5. Hardware setup

5. 4. Installing the card in the drive

Install the Metasys N2 card in ATV21 as follows.

- 1 Turn off the input power of ATV21 and wait for at least 10 minutes and then check that the CHARGE lamp on ATV21 is no longer lit.
- 2 Open the ATV21 front cover, remove the terminal board fixing screw and take off the ATV21 standard terminal board. (Be careful not to lose the terminal board fixing screw when removed since it may be used again.)
- 3 Perform wiring an inverter before installing Metasys N2 card.
- 4 Please attach the insulating sheet in ATV21. (Fix to the terminal board fixing screw hole and ATV21 catch pin.)
- 5 Install the Metasys N2 card over the insulating sheet and secure it with the board fixing screw (M3 tapping screw tightening torque: 0.7 to 0.8Nm).
- 6 Stick the cabling label for Metasys N2 card on the standard cabling label stuck on the reverse side of the ATV21 front cover. And stick the Metasys N2 card nameplate near the standard nameplate. (Be careful not to cover slits on the ATV21 enclosure.)

Note: To install or remove the terminal board, make it slide in or out in parallel with board.



5. Hardware setup

5. 5. Description of terminals

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	No voltage contact input 24VDC, 5mA or less.	
R	Multifunctional programmable contact input. It has reverse rotation function in default setting. ON: reverse rotation drive OFF: slowdown and stop	SINK/SOURCE can be selected with SW1.	
VIB	Multifunction programmable analog input. It has speed set point 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 the parameters (F545 and F546) and SW1.	10VDC Internal impedance: 30kohm	
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 inverter protection function. Contact across FLA-FLC is closed and FLB-FLC is opened during protection function operation.	30VDC-0.5A 250VAC-1A ($\cos \varphi = 1$) 250VAC-0.5A ($\cos \varphi = 0.4$)	
B	Metasys N2	RS485 transmission data, reception data.	
A			
GND			
SCR		Metasys N2 communication shield terminal. This terminal is not connected to other circuits in this board. Ground this terminal in a location separated from the ground of power line.	

⚠ DANGER

Do not change switch settings while power is on.
It may damage the product or lead to electric shocks and breakdown.

When setting the VIB function, set the parameter after configuring removed motor cables. The motor may suddenly start and that could result in injury.

6. Connecting to the bus

6. 1. Cable routing practices

When wiring Altivar 21 drives to a Metasys N2, 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. Use these structures for signal wiring paths. They 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.

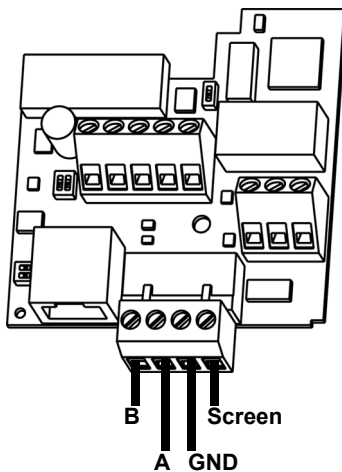
When planning cable routing within a building, follow these guidelines:

- Maintain a minimum separation of 1 m 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 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 used to carry power wiring from metallic conduit carrying low-level control network wiring by at least 300 mm.
- Separate metallic conduits carrying power wiring or low-level control network wiring by at least 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 to the line in some installations to prevent interference with telecommunication, radio, and sensitive electronic equipment. Such instances may require attenuating filters. Consult the Altivar catalog for selection and application of these filters.

6. 2. Card connector pinout



Contact	Signal
B	+
A	-
GND	GND
SCR	Screen

- Cable sheath should be peeled off by about 10 mm.
- For wiring work, use a fat blade screwdriver with a 0.6 mm thick and 3.5 mm width blade.
- Tightening torque for the terminal block is 0.5 to 0.6 Nm.

7. Configuration

7. 1. Configuration of the internal communication

Set up the inverter parameters as follows. To update, reset the power of inverter. If these parameters are set to incorrect value, the Metasys N2 card cannot work normally.

Parameter	Function	Description
<i>F800</i>	Communication speed	Set 1 (19200 bps), default value.
<i>F801</i>	Parity	Set 1 (Even parity)
<i>F803</i>	Communication error trip time	Set communication time out period.
<i>F829</i>	Communication protocol	Set 4 (Metasys N2)
<i>F851</i>	Behaviour at communication fault	Select the inverter action after communication fault. Refer to 7. 5. Communication faults, page 17.



WARNING

Set up Communication fault function ***F803***, (see the ATV21 user manual for details) to stop the inverter when this option card is deactivated by an unusual event such as tripping, an operating error, power outage, failure, etc. Deactivated option card may cause an accident, if the "Communication fault function" is not properly set up.

7. Configuration

7. 2. Function

In addition, the inverter is operated by Command mode selection (**CMD**) and frequency setting mode selection (**FMD**), until operation Command and frequency Command from communication are given. If operation Command and frequency Command are given from communication, regardless of Command mode selection (**CMD**) and frequency setting mode selection (**FMD**), the Command from communication will become effective until power supply OFF, and reset or a standard shipment setup is performed.

7. 3. Communication parameters

Configure the following parameters. Select Metasys N2 communication protocol: F829 = 2. Set the bit rate to 9600 bit/s : F891 = 1. These parameters can only be modified when the motor is stopped. Modifications will be taken into account by the drive after power cycled.

Parameter	Possible values	Default value
Command mode selection (CMD)	0: Terminal board 1: Operation panel 2: Serial communication	(0)
Frequency setting mode selection 1 (FMD)	1: VIA 2: VIB 3: Operation panel 4: Serial communication 5: UP/DOWN from external contact	(1)
Communication protocol selection (F829)	0: Reserved 1: Modbus 2: Metasys N2 3: APOGEE FLN 4: BACnet	(1)
Address (F890)	0 to 255	(0)
Bit rate (F891)	0: AUTO 1: 9600 bit/s 2: 19200 bit/s 3: 38400 bit/s 4: 76800 bit/s 5 and upper: AUTO	(1)
Time - out (F892)	Communication time-out in seconds x 0.1. 1 to 600 (0.1 to 60s)	(100)
Frame counter (FR15)	Displays the total number of frames received by the communication card since the last power ON. 0 to 999 These values can be monitored by panel (monitor mode).	-
Invalid Frame counter (FR16)	Displays the total number of bad frames received by the communication card since the last power ON. 0 to 999 These values can be monitored by panel (monitor mode).	-
Number of motor poles for communication (F856)*	1: 2 poles 5: 10 poles 2: 4 poles 6: 12 poles 3: 6 poles 7: 14 poles 4: 8 poles 8: 16 poles	(2)

* : Set the motor pole number. This parameter is for calculation of min-1 unit motor speed of Metasys N2 data.

7. Configuration

7. 4. Configuration of the control

The ATV21 can receive commands and speed setpoint from the Metasys N2 network or from the terminals (F, R, VIB).

In the default configuration both commands and setpoint comes from the terminals.

The LOC/REM key of the drive HMI is always available to switch the control to the HMI.

Input R can be configured to switch the control from the Metasys N2 to the terminals.

Different possibilities are described below.

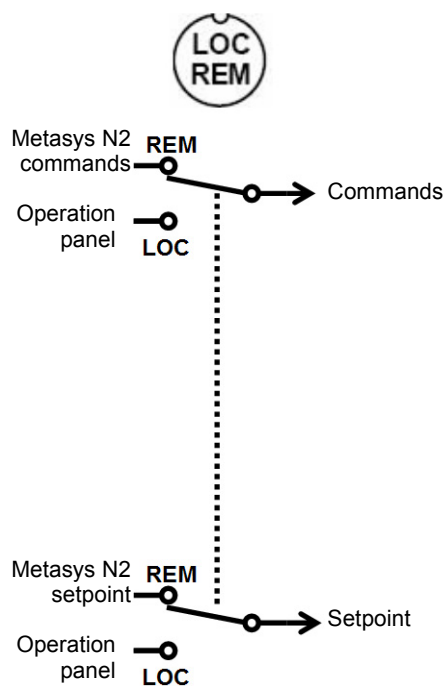
■ Control by the Metasys N2

Commands and setpoint come from the Metasys N2.

The signals wired on the terminals are ignored.

The LOC/REM key is active.

This is default configuration.



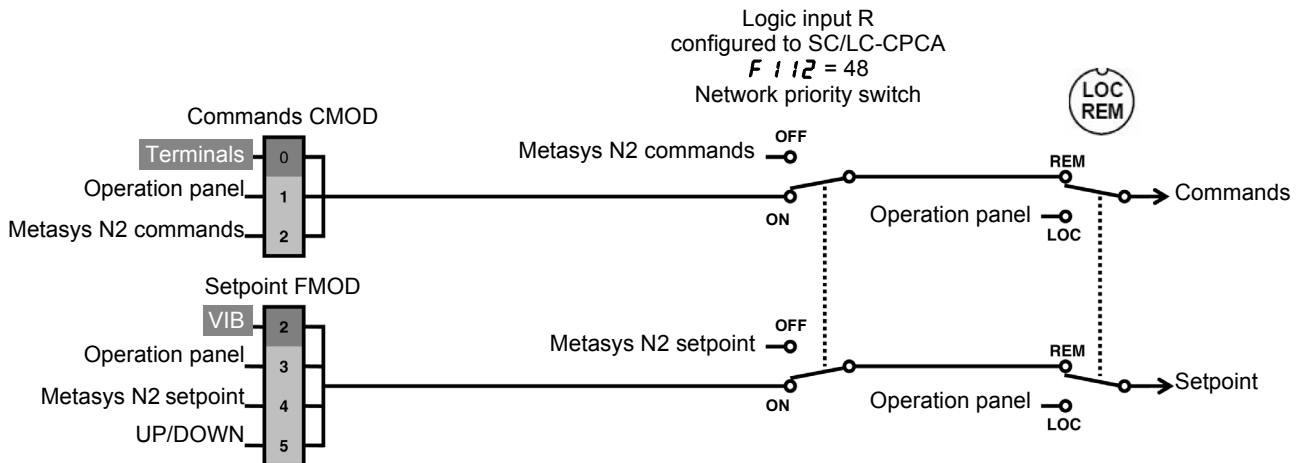
7. Configuration

■ Control by terminals, monitoring by the Metasys N2

Commands and setpoint come from the terminals.
The drive is monitored by the Metasys N2.
The LOC/REM key is active.

The function SC/LC or CPCA is assignment of logic input R (F112 = 48).
The logic input R is ON (connected to P24 or CC depending on SINK/SOURCE selection).

Parameter	Function	Description
<i>CMOD</i>	0	Terminals
<i>FMOD</i>	2	VIB
<i>F112</i>	48	Logic input R configured to "Forced switching from remote to local control" (SC/LC or CPCA)

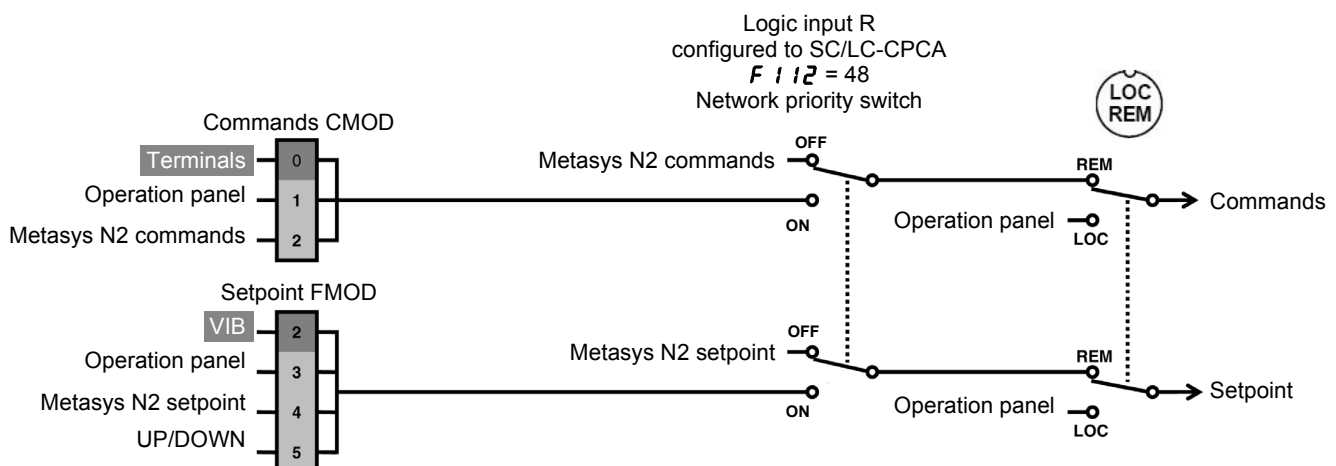


■ Control by the Metasys N2 network, switching to terminals by logic input

Commands and setpoint come from the Metasys N2 network if logic input R is OFF.
Commands and setpoint come from the terminals if logic input R is ON.
The LOC/REM key is active.

The function SC/LC or CPCA is assignment of logic input R (F112 = 48).

Parameter	Function	Description
<i>CMOD</i>	0	Terminals
<i>FMOD</i>	2	VIB
<i>F112</i>	48	Logic input R configured to "Forced switching from remote to local control" (SC/LC or CPCA)



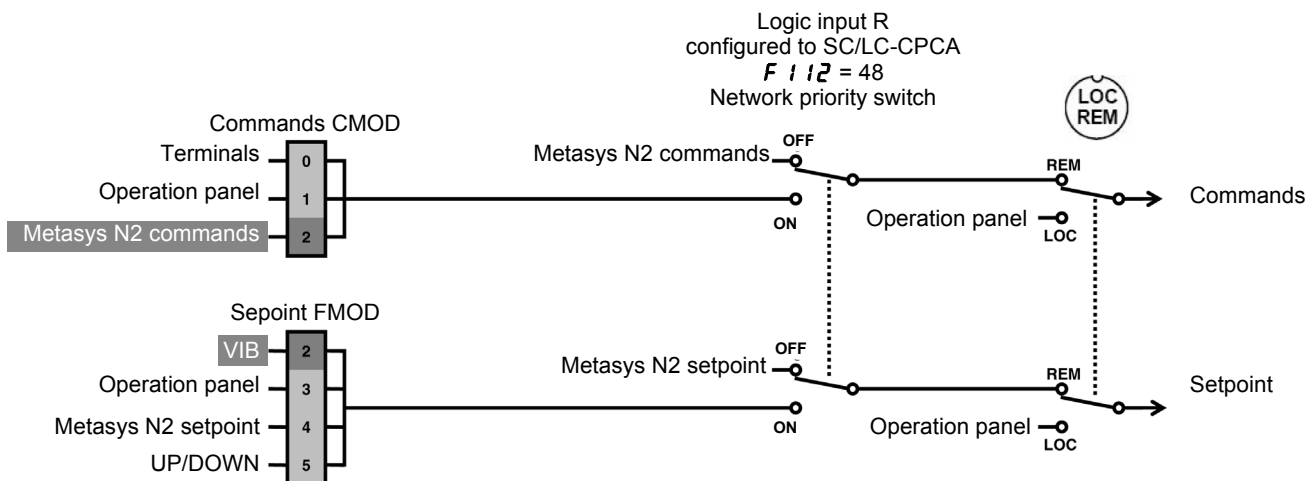
7. Configuration

■ Control by the Metasys N2 network, switching setpoint to terminals by logic input

Commands always come from the Metasys N2.
 Setpoint comes from the Metasys N2 if logic input R is OFF.
 Setpoint comes from the terminals if logic input R is ON.
 The LOC/REM key is active.

The function SC/LC or CPCA is assignment of logic input R (F112 = 48).

Parameter	Function	Description
CNOd	2	Metasys N2
FNOd	2	VIB
F112	48	Logic input R configured to "Forced switching from remote to local control" (SC/LC or CPCA)

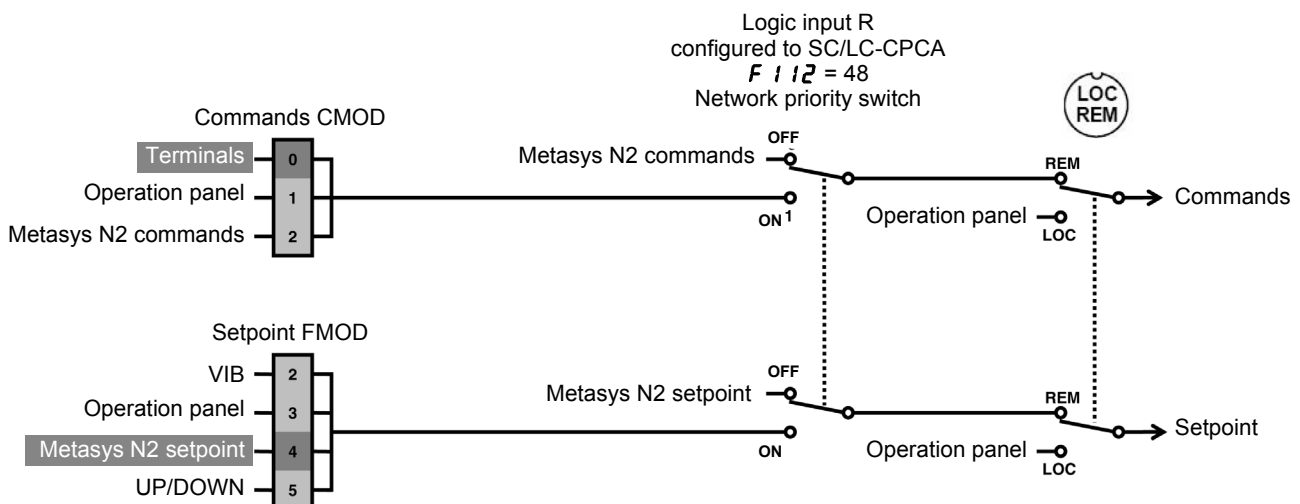


■ Setpoint by the Metasys N2 network, switching commands to terminals by logic input

Setpoint always comes from the Metasys N2.
 Commands come from the Metasys N2 if logic input R is OFF.
 Commands come from the terminals if logic input R is ON.
 The LOC/REM key is active.

The function SC/LC or CPCA is assignment of logic input R (F112 = 48).

Parameter	Function	Description
CNOd	0	Terminals
FNOd	4	Metasys N2 network
F112	48	Logic input R configured to "Forced switching from remote to local control" (SC/LC or CPCA)



7. Configuration

7. 5. Communication faults

A Metasys N2 fault is triggered if the Metasys N2 card does not receive any Metasys N2 messages (regardless of address) at its address within a predefined time period (time out defined by F892). All Metasys N2 request types are taken into account (read, write, etc.). The response of the drive in the event of a Metasys N2 communication fault can be configured by the parameter F851.

Fault Behaviour

Parameter		Possible value	Default value
Fault Behaviour	F851	0: Communication release 1: No action 2: Deceleration stop 3: Coast stop	1

WARNING

If this function is not properly set up, it may cause an accident.

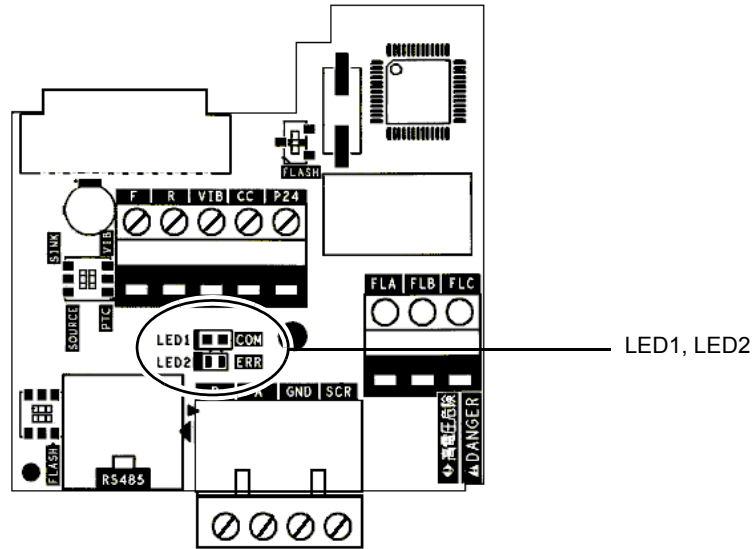
If you configure parameter F851 to the value 0, 1, 2 or 3, the drive will not trip. It will go to the specified fault fallback behaviour.

As soon as the Metasys N2 communication comes back, the drive will restart according to the Metasys N2 control.

7. Configuration

7. 6. LEDs

The Metasys N2 card has 2 LEDs, COM and ERR which are located on the communication card.

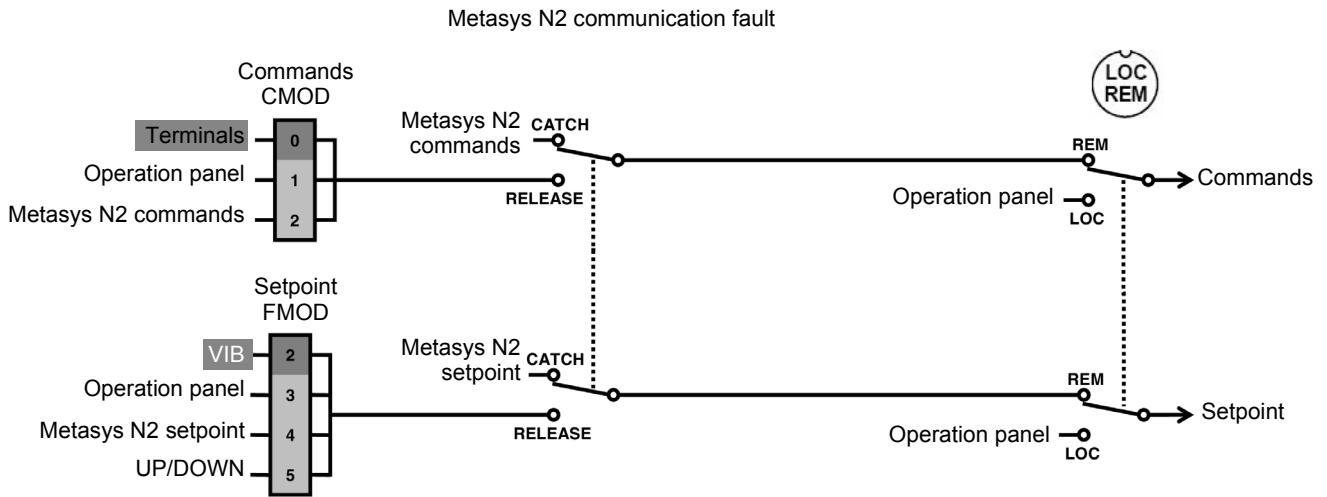


Green RUN LED	Red ERR LED	Meaning	Corrective action
OFF	OFF	Drive not operating or turned off	Check the power supply.
Intermittent flash	Intermittent flash	Green LED will flash whenever valid N2 message is received.	NA
		Red LED will flash whenever invalid N2 message is received.	<ul style="list-style-type: none"> • Check the environment (electromagnetic compatibility). • Check the communication parameter configuration (protocol, speed, format). • Do not forget that the communication parameter configuration is only taken into account by the drive following a power break. • Check that the slave address is unique.
OFF	Flashing, 3 times in 2 seconds, off for 1 second	ATV21 has not received valid message within time-out period.	<ul style="list-style-type: none"> • Check the environment (electromagnetic compatibility). • Check the wiring. • Check that the master is communicating within the time out period (= 10 s).
OFF	Flashing 5 times per second	Option board error state: internal communication error between N2 option card and drive controller main control board.	<ul style="list-style-type: none"> • Check the environment (electromagnetic compatibility). • Check the card/drive connection. • Check that only one communication card has been installed. • Check that no more than two option cards have been installed. • Replace the communication card. • Inspect or repair the drive.
ON	Flashing 0.5 time in 0.5 second	Invalid configuration detected or an option is connected to RJ45	<ul style="list-style-type: none"> • Remove the option • Check the internal communication parameters

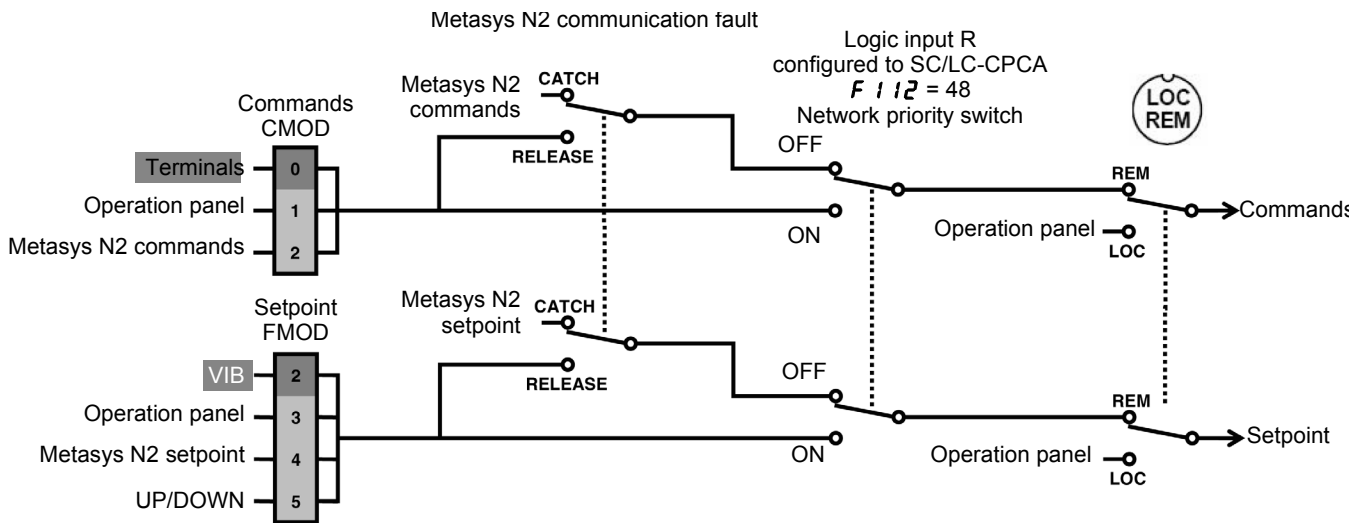
7. Configuration

- Example:
If you want the drive to switch to terminal control in case of Metasys N2 fault, configure:

Parameter	Value	Description
<i>FBS 1</i>	0	Communication release (no trip)
<i>CNOd</i>	0	Terminals
<i>FNOd</i>	2	VIB



- Influence of SC/LC-CPCA
If the function SC/LC-CPCA is activated (parameter F111/112 = 48) the release function also operates.



8. Network objects

8. 1. List of type supported by ATV21

- Drive I/O.
- Control.
- Parameters access.
- Identification.

■ Binary input points

Binary input point summary

The following table summarizes the binary input points supported:

Point Names	ATV61	ID	Description
RO 1 ACT	R1	1	Indicates status of relay R1
RO 2 ACT	R2	2	Indicates status of relay RY
DI 1 ACT	LI1	3	Value of F
DI 2 ACT	LI2	4	Value of R
RUNSTOP		6	Indicates the drive status
FWDREV		7	Indicates the motor rotation direction
FAULT		8	Indicates the drive's fault status
HANDAUTO		9	Indicates if the drive is locally controlled or not.
MAINTREQ		10	Associated with "controller inside" option board
DRIVEREADY		11	The VSD is ready and waits a start command.
ATSETPOINT		12	The VSD has reached the target speed

■ Binary output points

Binary output point summary

The following table summarizes the binary output points supported:

Point Names	ID	Description
RO1 CMD	1	R1 relay out accessible if not assigned
RUNSTOPCMD	3	Commands a drive start
FWDREVCMD	4	Commands a motor direction's change
FAULTRESET	5	Resets fault
MBOXREAD	6	Command to read parameter
MBOXWRITE	7	Command to write parameter
SP1PRESET	8	Preset speed operation frequencies 1
SP2PRESET	9	Preset speed operation frequencies 2
SP3PRESET	10	Preset speed operation frequencies 3
SPTSEL	11	Frequency priority selection
CMDSEL	12	Common priority selection

8. Network objects

■ Analog inputs

ID	Point Names	Description (Code)	Units
1	OUTPUTSPEED	Output speed	rpm
2	OUTPUTFREQ	Output frequency	Hz
3	DCBUSVOLT	DC bus voltage	V
4	OUTPUTVOLT	Motor voltage	V
5	CURRENT	Motor current	A
6	TORQUE	Motor Torque	%
7	POWER	Motor Power	%
8	DRIVETEMP	Drive Thermal State	%
9	KWH	Energy counter	KWh
10	RUNTIME	Operating time	H
11	LASTFLT	Error code	-
12	PREVFLT1	Previous fault (occurred before LASTFLT)	-
13	PREVFLT2	Previous fault (occurred before PREVFLT1)	-
14	MBOXVALUEREAD	Parameter read value	-
16	AO1ACT	Analog output 1 level	%
17	AI2ACT	Analog input value 2	-

■ Analog outputs

ID	Point Names	Description (Code)	Units
1	INPUTREF	Speed reference from Bus	%(1)
2	ACCELTIME	Acceleration time	s
3	DECELTIME	Deceleration time	s
4	MBOXPARAM	Parameter number	-
5	MBOXVALUEWRITE	Parameter writing value	-
6	AO1CMD	Analog 1 output value	-

(1)Range between 0 and TFr.

8. Network objects

8. 2. Additional functions

Besides the services of “datasharing” the communication card provides the following functions.

■ Sync time command

This command is not supported by the VSD, the VSD will return a normal response : <A>,<CR>.

■ Status update request

The form and the version information of connected VSD are returned:

Example:
CHAR 1 Start of message : <A>
CHAR16 Model number : <ATV21XXXXXXXXXX>
CHAR4 Days in service :<0000>
CHAR4 Device status :<0108>
CHAR2 Checksum : <XX>
CHAR1 End of message:CR

■ Identify Device Type Command

This message is sent by the N2 controller, The VSD will start to respond to the request only if it had received this message. This message requests the N2 device to respond with a unique code identifying which kind of N2 device it is.

■ Full parameters access.

By the use of indirect access, it is possible to read or write any of the internal parameters of the VSD. This functionality is assured by these four objects:

MBOXPARAM, MBOXREAD, MBOXWRITE, MBOXDATAREAD, MBOXDATAWRITE.

• Reading

Write the logic address of the parameter to the present value property of the object MBOXPARAM.
Set present value property of the object MBOXREAD to “read”.
The current value of the parameter can be read in the present value property of MBOXDATAREAD.

• Writing a parameter

Write the logic address of the parameter to the present value property of the object MBOXPARAM.
Write the new value in the present value property of the object MBOXDATA.
Set present value property of the object MBOXDATAWRITE to “write”.

Note: MBOXREAD and MBOXWRITE automatically return back to inactive once command sent. Always return 0 when read.

