Altivar 61

LonWorks ® Card

User's manual

VW3 A3 312

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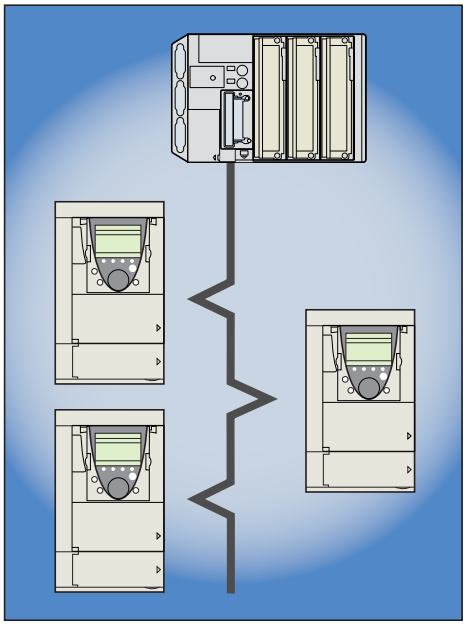

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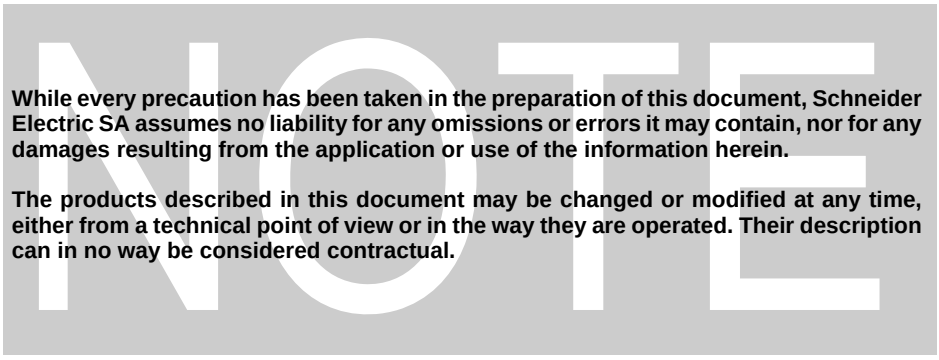
Contents

1. Important information 4
2. Before you begin 5
3. Introduction 6
4. Documentation structure 7
5. Notation 8
6. Hardware setup 9
   6. 1. Receipt 9
   6. 2. Check list 9
   6. 3. Hardware description 9
   6. 4. Installing the card in the drive 9
7. Connecting to the bus 10
   7. 1. Topology 10
   7. 2. Cable routing practices 11
   7. 3. Wiring the LonWorks connector 11
   7. 4. Line Termination 12
8. Configuration 13
   8. 1. Service pin 13
   8. 2. Control 13
      Allowed configurations 13
      Control via LonWorks 13
      Control via LonWorks or via the terminals 14
      Control via LonWorks and setpoint switching 17
   8. 3. Communication scanner 20
   8. 4. Communication faults 21
   8. 5. Monitored parameters 22
9. Diagnostics 23
   9. 1. LEDs of the card 23
   9. 2. Control 24
   9. 3. Communication scanner 25
   9. 4. Communication fault 26
   9. 5. Card fault 26
10. Functional profile 27
11. Network variables and configuration properties 29
   11. 1. List of network variables and configuration properties 29
   11. 2. Commands and setpoints 31
      Drive Speed Setpoint (nviDrvSpeedStpt) 31
      Drive Speed Setpoint Scaling (nviDrvSpeedScale) 31
      Default Value for nviDrvSpeedScale (nciDrvSpeedScale) 31
      Frequency setpoint (nviInvSetFreq) 32
      Reset command (nviResetFault) 32
   11. 3. Status and output velocity 34
      Drive Speed Feedback (nvoDrvSpeed) 34
      Drive Velocity feedback (nvoDrvFeedback) 34
      Output frequency (nvoInvOutFreq) 34
      Drive status (nvoStatusWord) 35
   11. 4. Alarms 37
      Alarm code (nvoDrvAlarm) 37
      Alarm status (nvoAlarmWord) 37
   11. 5. Measurements 38
      Drive Output Current (nvoDrvCurnt) 38
      Drive Output Voltage (nvoDrvVolt) 38
      Drive Output Power (nvoDrvPwr) 38
      Drive Total Running Hours (nvoDrvRunHours) 39
      Energy consumption (nvoDrvEnergy) 39
      Drive thermal state (nvoDrvThermal) 39
      Motor thermal state (nvoMotorThermal) 39
      Torque actual value (nvoTorque) 40
   11. 6. Monitoring of digital inputs 41
      Monitoring of digital input 4 (nvoDigitalIn4) 41
      Monitoring of digital input 5 (nvoDigitalIn5) 41
      Monitoring of drive digital inputs (nvoDigitalInput) 41
   11. 7. Monitoring of analog inputs 42
      Monitoring of analog input 1 (nvoAnalogIn1) 42

Contents

Monitoring of analog input 2 (nvoAnalogIn2) 42
11. 8. Control of digital outputs 43
Control of relay 1 (nviRelay1) 43
Control of relay 2 (nviRelay2) 43
Control relays and digital outputs (nviDigitalOutput) 43
11. 9. Control of analog outputs 44
Control of analog output 1 (nviAnalogOut1) 44
11. 10. Emergency 45
Emergency command (nviEmergOverride) 45
Emergency status (nvoEmergStatus) 45
11. 11. Adjustment 46
Maximum Motor Speed (nciMaxSpeed) 46
Minimum Motor Speed (nciMinSpeed) 46
Nominal Motor Speed in RPM (nciNmlSpeed) 48
Nominal Motor Frequency (nciNmlFreq) 48
Minimum Ramp Up Time (nciRampUpTm) 48
Minimum Ramp Down Time (nciRampDownTm) 48
11. 12. Parameter access 49
Parameter access (nviParamCmd, nvoParamResp) 49
11. 13. Identification 50
Location Label (nciLocation) 50
Identification (nvoTypeVer) 50
11. 14. Network management 51
Send Heartbeat Time (nciSndHrtBt) 51
Receive Heartbeat Time (nciRcvHrtBt) 51
Minimum Send Time (nciMinOutTm) 52
Power supply start waiting time (nciPwUpOutTm) 52
11. 15. Scanner 53
Communication scanner (nviScannerOut1, nvoScannerIn1) 53



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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 personnal 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, in order to completely and correctly utilize excellent performance of this unit.

Besides this user manual, you will find in the chapter "Documentation structure" which manuals we advice you to read to develop software communicating with Altivar 61.

If you need support, please contact our sales offices.

After reading this instruction manual, please keep it handy for future reference

⚠ DANGER

HAZARDOUS VOLTAGE

- Read and understand the Installation Manual before installing or operating the Altivar 61 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 injury or equipment damage.

3. Introduction

Thank you for purchasing the LonWorks® option card (VW3A3312) for Altivar 61 drive.

By Installing this board into the Altivar 61, data communication can be made with a host computer or other device via LonWorks® network.

The communication card has an open-style 3-pin connector for connection to the network. It supports free topology at 78 kbit/s.

Data exchanges give access to all Altivar 61 functions:
- Control (start, stop, reset, setpoint),
- Monitoring (status, current, voltage, thermal state...),
- Diagnostics (alarms).

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

The LonWorks resource files (.XIF...) that provide the network configuration tools (LonMaker...) with device information are available on the Web site www.schneider-electric.com.

The plug-in software tool that provides easy access to setting-up, testing and monitoring the ATV61 drive is also available on the Web site www.schneider-electric.com.

4. Documentation structure

■ LonWorks manual

The present LonWorks user manual describes:
- connection to LonWorks,
- configuration of the communication-specific parameters via the integrated HMI or the graphic HMI,
- diagnostics,
- networks variables.

You will also find important information in other Altivar 61 technical documents. They are available on the Web site www.schneider-electric.com.

■ Installation manual

The installation manual describes:
- how to assemble the drive (particularly how to mount the LonWorks card),
- how to connect the drive.

■ Programming manual

The programming manual describes:
- the functions and parameters of the drive,
- how to use the drive HMI (integrated HMI and graphic HMI).

■ Communication parameters manual

The Communication parameters manual describes:
- the operating modes specific to communication (CiA 402 state chart),
- the interaction between communication and local control (HMI and terminals),
- the drive parameters with specific information for use via a communication network (addresses, formats, etc).

When using the LonWorks card, some sections of the Communication parameters manual are not relevant :
- profiles,
- I/O profile
- DSP 402 profile.

The description of drive parameters is useful only if you use the parameters access function of the LonWorks card (nviParamCmd, nvoParamResp) or the communication scanner function (nviScannerOut1, nvoScannerIn1).

5. Notation

■ Registered trademarks

Echelon®, LonWorks®, LONMARK®, LonTalk®, Neuron® are the registered trademarks or the trademarks of Echelon Corporation in the USA and other countries.

■ Drive terminal displays

The graphic display terminal menus are shown in square brackets.
Example: [1.9 COMMUNICATION].

The integrated 7-segment display terminal menus are shown in round brackets with a "-" at the end.
Example: (COM-).

Parameter names displayed on the graphic display terminal are written in square brackets.
Example: [Fallback speed]

Parameter codes displayed on the integrated 7-segment display terminal are written in round brackets.
Example: (LFF).

■ Formats

Hexadecimal values are written as follows: 16# or 0x
Binary values are written as follows: 2#

■ Abbreviations

O = Optional
M = Mandatory

6. Hardware setup

6. 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.

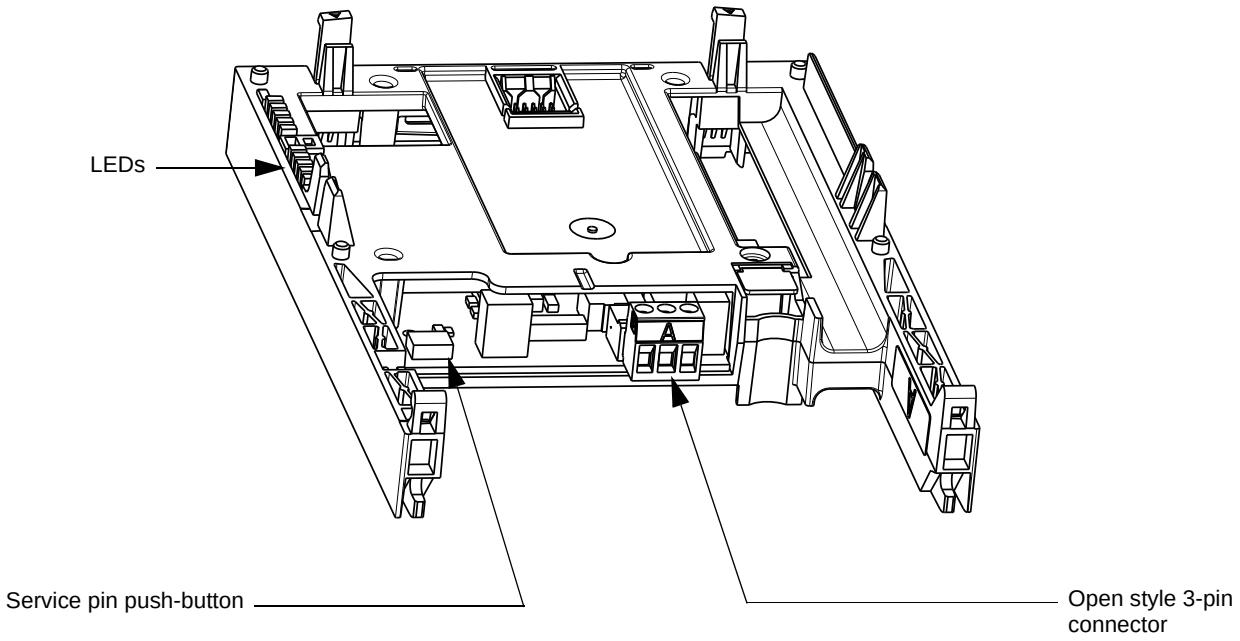
6. 2. Check list

LonWorks card is shipped together with the following accessories. On opening the packing case, check if it contains :

- the mounting instruction sheet,
- the led label,
- the Neuron ID label.

Note: no paper user manual is delivered with the card. The user manuals are available on the Web site www.schneider-electric.com.

6. 3. Hardware description



6. 4. Installing the card in the drive

Refer to the installation manual.

7. Connecting to the bus

7. 1. Topology

The LonWorks communication card supports free topology wiring and operates as well with bus, loop or star topologies:

Free topology system

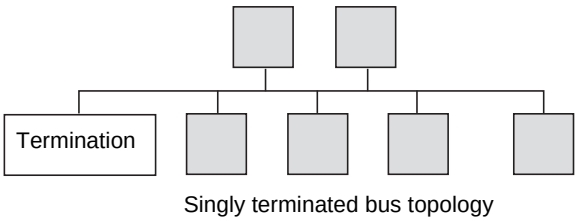
Free topology has many advantages:

1 The installer is free to select the method of wiring that best suits the installation, reducing the need for advanced planning and allowing last minute changes at the installation site.

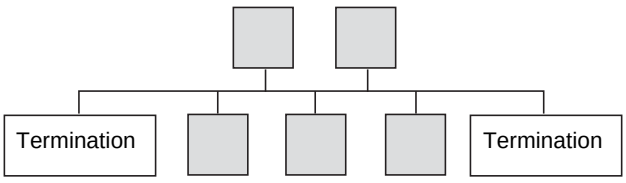
2 If installers have been trained to use one style of wiring for all installations, free topology technology can be introduced without requiring retraining.

3 Retrofit installations with existing wiring plants can be accommodated with minimal, if any rewiring.

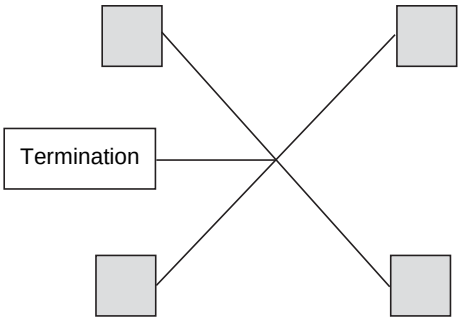
Typical wiring topologies



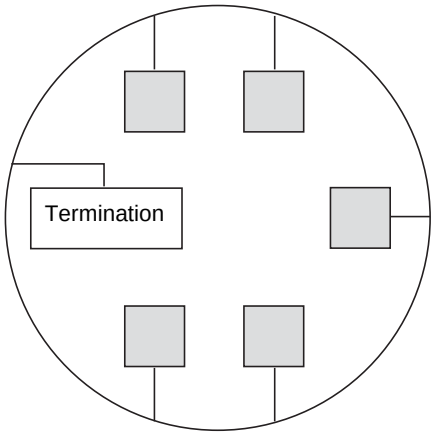
Singly terminated bus topology



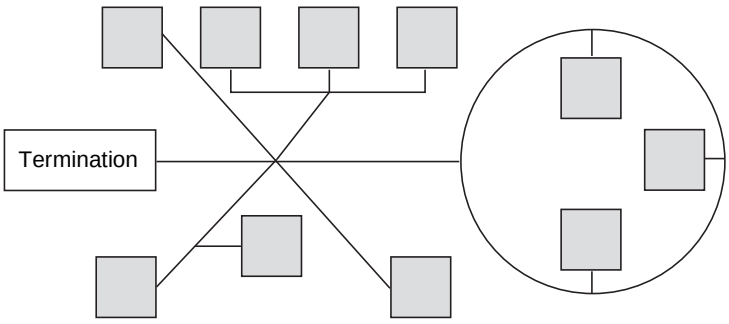
Doubly terminated bus topology



Star topology



Loop topology



Mixed topology

7. Connecting to the bus

7. 2. Cable routing practices

When wiring Altivar 61 drives to a LonWorks 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. 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.

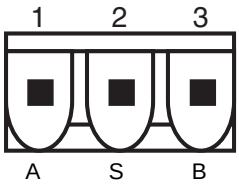
When planning cable routing within a building, follow these guidelines:
- Maintain a minimum separation of 1 m from the following equipment:
  - air conditioners and large blowers,
  - elevators and escalators,
  - radios and televisions,
  - intercom and security systems,
  - fluorescent, incandescent, and neon lighting fixtures.

- Maintain a minimum separation of 3 m from the following equipment:
  - line and motor power wiring,
  - transformers,
  - generators,
  - alternators.

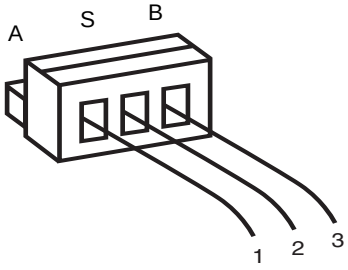
When wiring in electrical equipment rooms or large electrical equipment line-ups, observe the following guidelines for cable segregation and separation of circuits:
- Use metallic conduit for drive wiring. Do not run control network and power wiring in the same conduit.
- Separate non-metallic conduits 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.

7. 3. Wiring the LonWorks connector

The figures and the table below show the pin-outs of the card connectors. The removable LonWorks female connector attaches to the network cable.



LonWorks card male connector



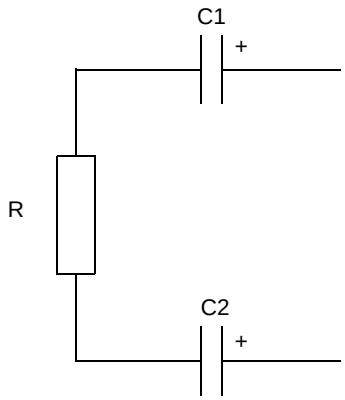
Removable LonWorks female connector

Pin	Name
1	Net A (A)
2	Shield (S)
3	Net B (B)

- 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. 4. Line Termination

The termination is built from the following components, where a total termination impedance of approximately 53 Ω is required.



C1, C2: 100 μF, > 50 V

Tree topology: one termination with R = 52.3 Ω.

Doubly terminated bus topology: two terminations, one on each end of the segment, each with R = 105 Ω.

8. Configuration

8. 1. Service pin

The LonWorks card is equipped with a service pin button.
It is used when installing the card as a LonWorks node.
Pressing the service pin causes the card to send a message over the network so that it can be identified by the network management tool.

8. 2. Control

Numerous configurations are possible. For more information, refer to the Programming Manual and the Communication parameters manual.
The following configurations are just some of the possibilities available.

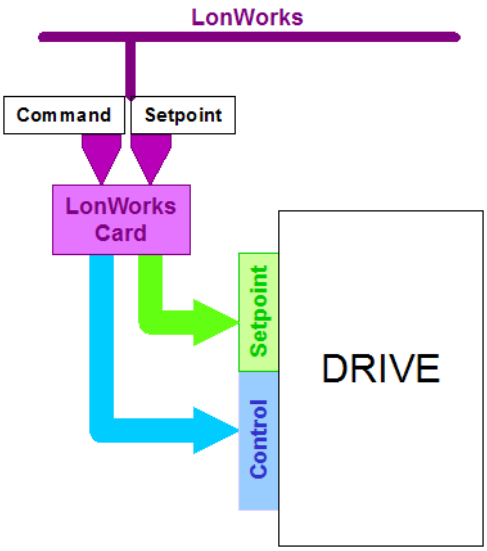
■ Allowed configurations

If the drive is only monitored by LonWorks:
There is no configuration constraint.

If the drive is controlled by LonWorks:
The parameter [Profile] (CHCF) must be configured to [Not separ.] (SIM) or [Separate] (SEP). [Not separ.] (SIM) is the default value.
It is not allowed to configure the parameter [Profile] (CHCF) to the value [8 serie] (S8B) or [I/O profile] (IO).
If a forbidden configuration is done, the drive will trip to [External fault com.] (EPF2).

■ Control via LonWorks

The command and the setpoint come from LonWorks.



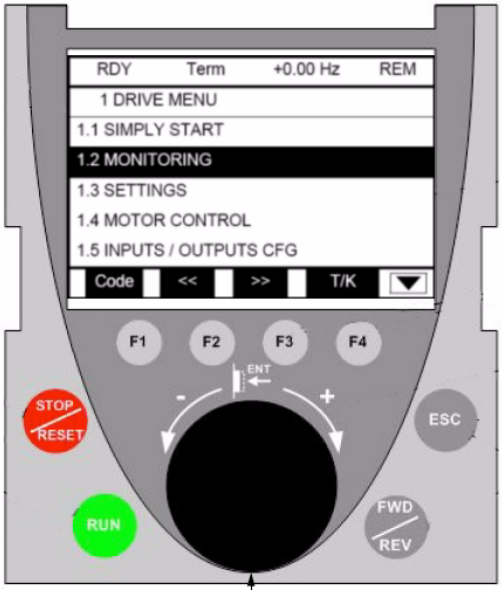
Configure the following parameters:

Parameter	Value	Comment
Profile	Non separate profile	The command and the setpoint come from the same channel.
Setpoint 1 and command configuration	Network card	The setpoint and command come from LonWorks.

Configuration via the graphic display terminal or the integrated display terminal:

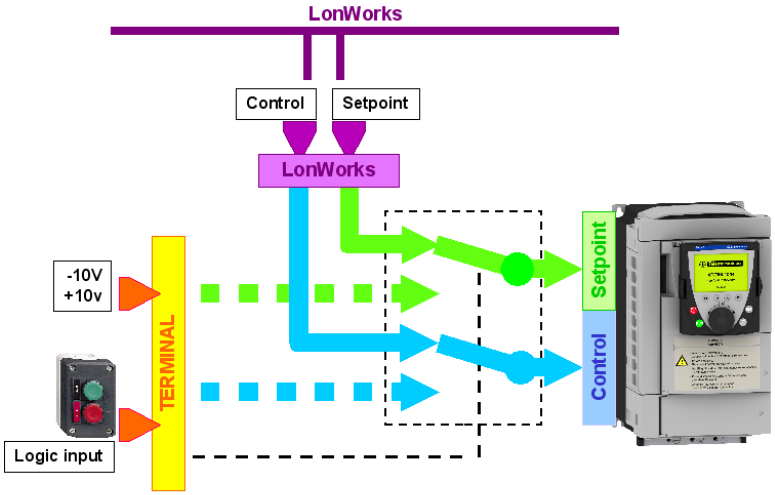
Menu	Parameter	Value
[1.6 - COMMAND] (CTL-)	[Profile] (CHCF)	[Not separ.] (SIM):default value
	[Ref.1 channel] (Fr1)	[Com. card] (nET)

How to switch to the graphic display terminal:
By pressing F4 (T/K) key, the drive will go to local control.
The indication in the right high corner is REM when controlled by LonWorks and LOC when controlled by the display terminal.
In local mode, commands and setpoint come from the display terminal.



■ Control via LonWorks or via the terminals

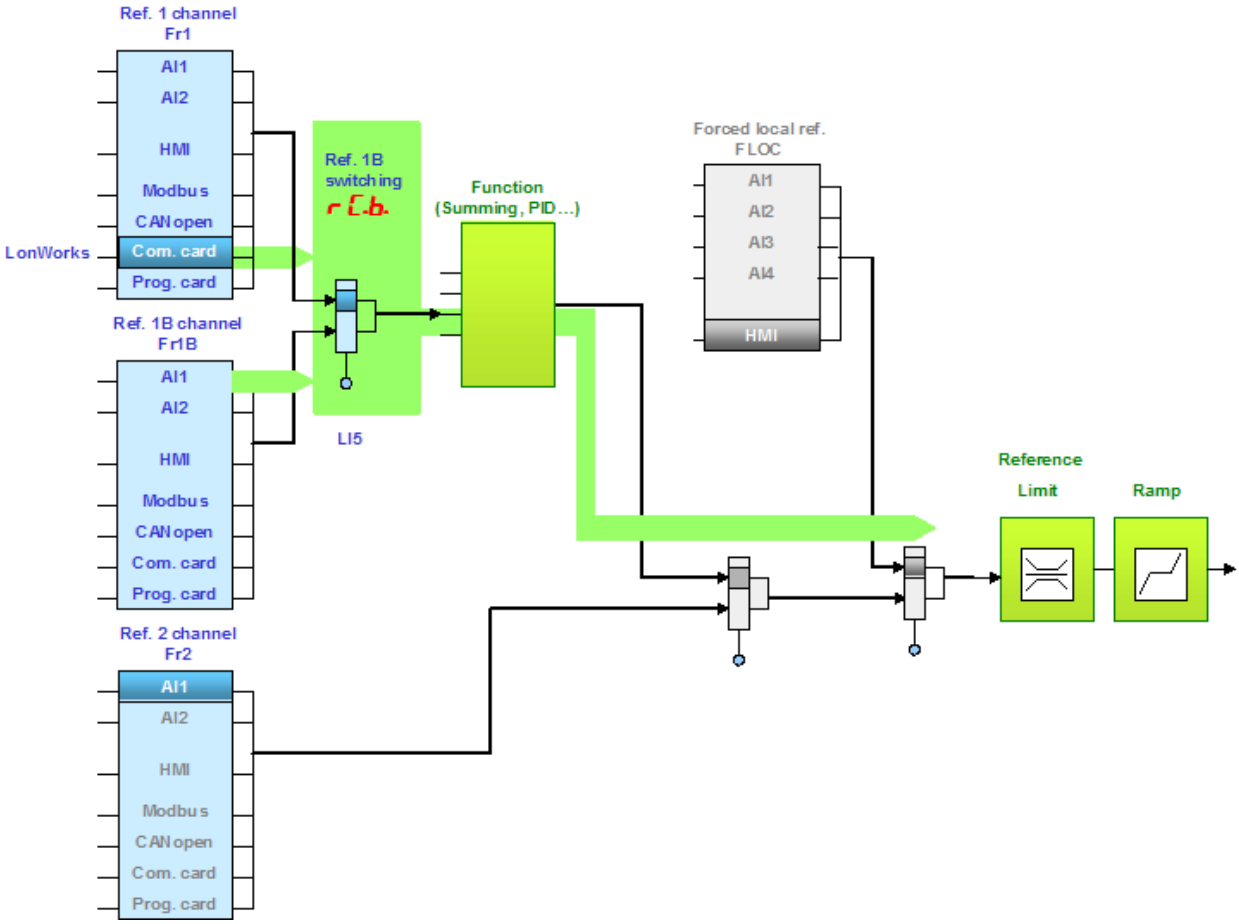
The command and the setpoint both come from LonWorks or the terminals.
Depending on the configuration, the application function are activated or not.



2 different use cases are described below. The setpoint is switched from LonWorks to the terminals. In the first case, the application function applies and not in the second one.

Switching of control and setpoint from LonWorks to the terminals with application function

Input LI5 is used to switch the control and the setpoint between LonWorks and the terminals. When switched to the terminals, the application functions (summing…) remain active.



Configure the following parameters:

Parameter	Value	Comment
Profile	Separate profile	The command and the setpoint can come from different channels.
Setpoint 1 configuration	Network card	Setpoint 1 comes from LonWorks.
Setpoint 1B configuration	Analog input 1 on the terminals	Setpoint 1B comes from input AI1 on the terminals.
Setpoint switching	Input LI5	Input LI5 switches the setpoint (1 ↔ 1B).
Command 1 configuration	Network card	Command 1 comes from LonWorks.
Command 2 configuration	Terminals	Command 2 comes from the terminals.
Command switching	Input LI5	Input LI5 switches the command

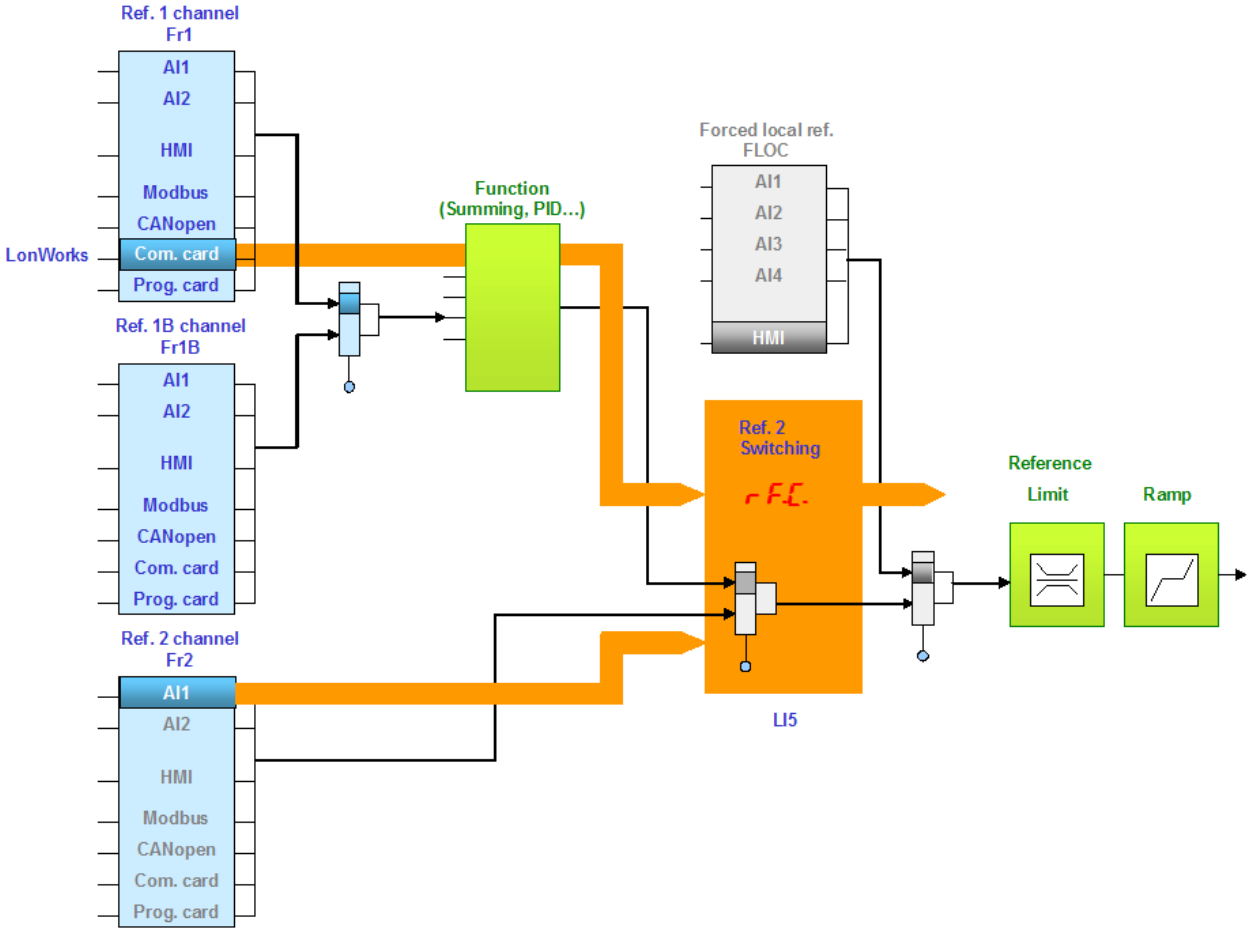
Setpoint 1B is directly connected to the functions of the drive. If switching to the terminals is performed, the functions that affect the reference (summing, PID, etc) are active.

Configuration via the graphic display terminal or the integrated display terminal:

Menu	Parameter	Value
[1.6 - COMMAND] (CtL-)	[Profile] (CHCF)	[Separate] (SEP)
	[Ref.1 channel] (Fr1)	[Com. card] (nEt)
	[Cmd channel 1] (cd1)	[Com. card] (nEt)
	[Cmd channel 2] (cd2)	[Terminals] (tEr)
	[Cmd switching] (CCS)	[LI5] (LI5)
[1.7 - APPLICATION FUNCT.] (FUn-) [REFERENCE SWITCH]	[Ref.1B channel] (Fr1b)	[Ref. AI1] (AI1)
	[Ref.1B switching] (rCb)	[LI5] (LI5)

Switching of control and setpoint from LonWorks to the terminals without application function

Input LI5 is used to switch the control and the setpoint between LonWorks and the terminals. When switched to the terminals, the application functions (summing…) are not active.



Configure the following parameters:

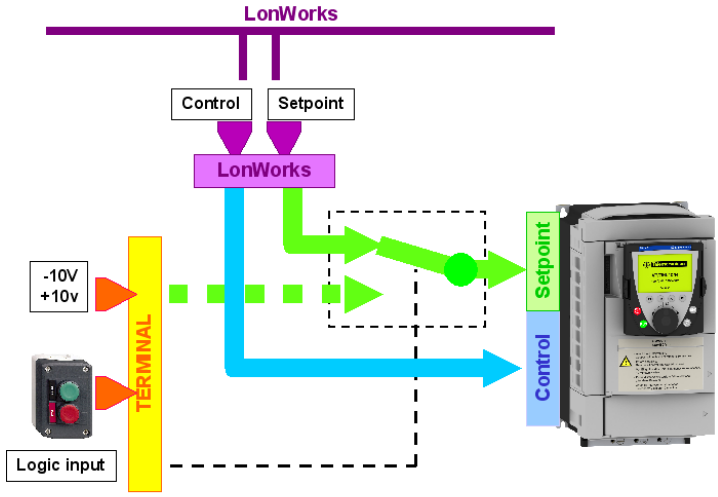
Parameter	Value	Comment
Profile	Non separate profile	The command and the setpoint come from the same channel.
Setpoint 1 configuration	Network card	Setpoint 1 and command 1 comes from LonWorks.
Setpoint 2 configuration	Analog input 1 on the terminals	Setpoint 2 and command 2 comes from input AI1 on the terminals.
Setpoint switching	Input LI5	Input LI5 switches the setpoint (1 ↔ 2) and the command.

Configuration via the graphic display terminal or the integrated display terminal:

Menu	Parameter	Value
[1.6 - COMMAND] (CtL-)	[Profile] (CHCF)	[Not separ.] (SIM):default value
	[Ref.1 chan] (Fr1)	[Com. card] (nEt)
	[Ref.2 chan] (Fr2)	[AI1 ref.] (AI1)
	[Ref.2 switching] (rFC)	[LI5] (LI5)

■ Control via LonWorks and setpoint switching

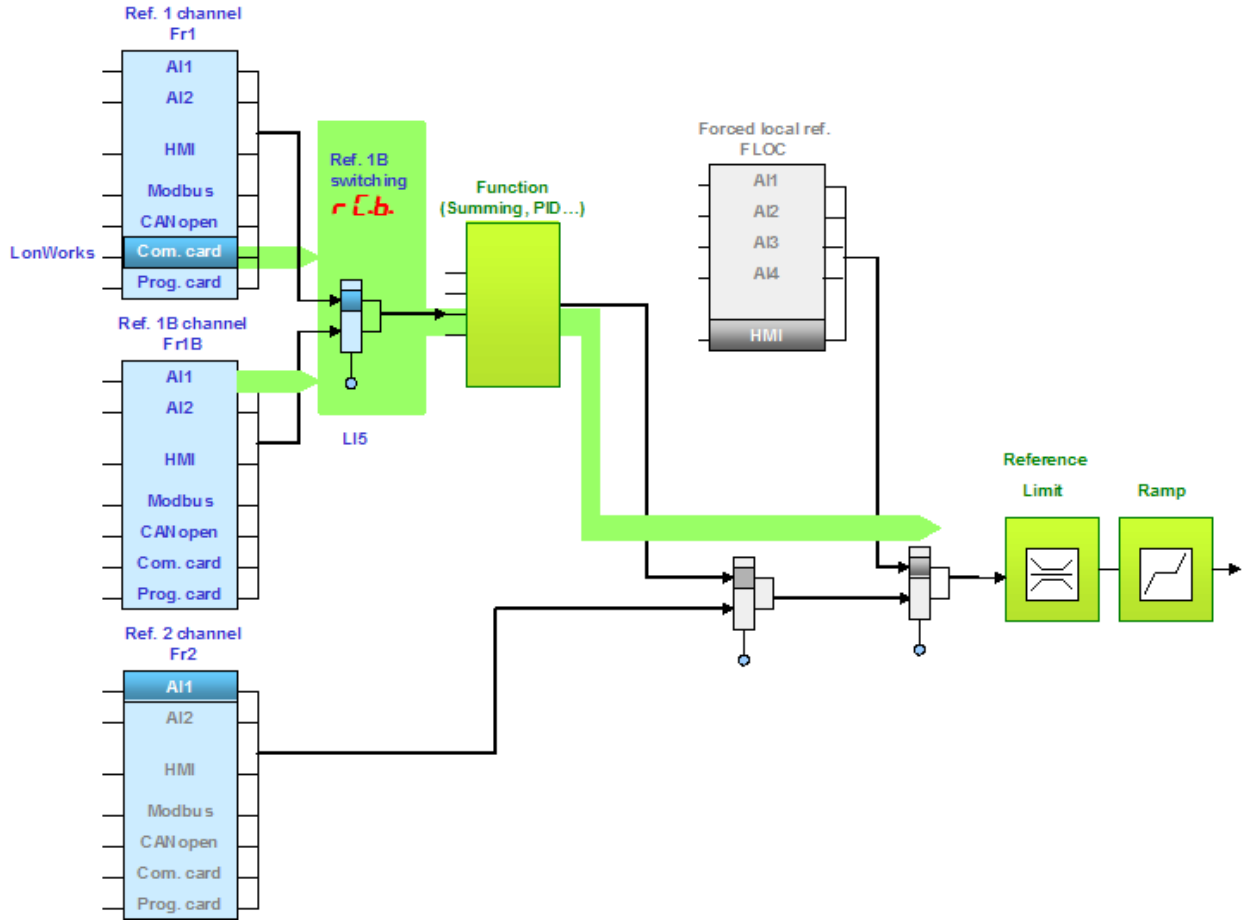
The command comes from LonWorks.
The setpoint comes either from LonWorks or from the terminals.
Depending on the configuration, the application function are activated or not.



2 different use cases are described below. The setpoint is switched from LonWorks to the terminals. In the first case, the application function applies and not in the second one.

Control via LonWorks and switching of the setpoint at the terminals with application function

The command comes from LonWorks. Input LI5 is used to switch the setpoint between LonWorks and the terminals. When switched to the terminals, the application functions (summing…) remain active.



Configure the following parameters:

Parameter	Value	Comment
Profile	Separate profile	The command and the setpoint can come from different channels.
Setpoint 1 configuration	Network card	Setpoint 1 comes from LonWorks.
Setpoint 1B configuration	Analog input 1 on the terminals	Setpoint 1B comes from input AI1 on the terminals.
Setpoint switching	Input LI5	Input LI5 switches the reference (1 ↔ 1B).
Command 1 configuration	Network card	Command 1 comes from LonWorks.
Command switching	Channel 1	Channel 1 is the command channel.

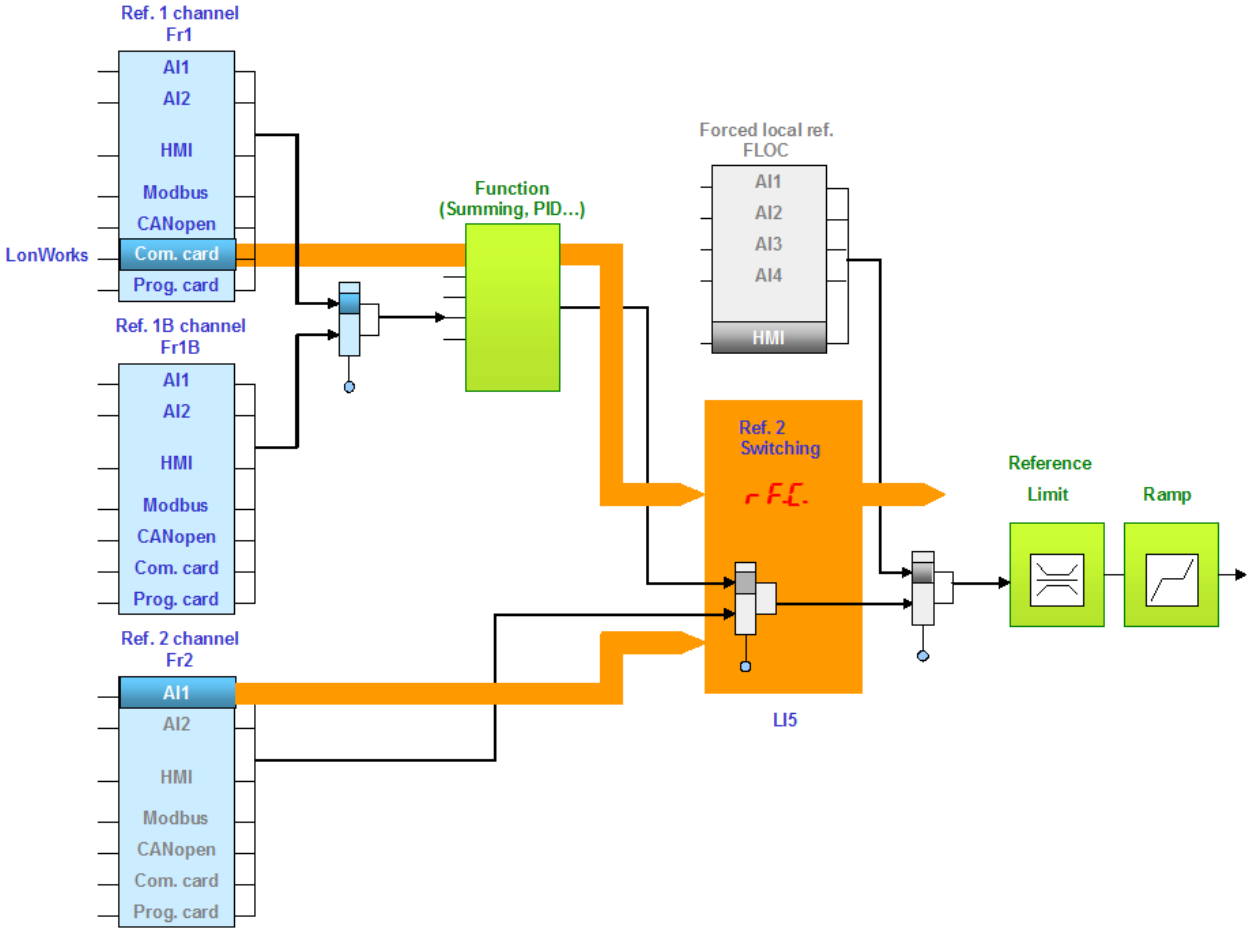
Reference 1B is directly connected to the functions of the drive. If switching to the terminals is performed, the functions that affect the reference (summing, PID, etc) are active.

Configuration via the graphic display terminal or the integrated display terminal:

Menu	Parameter	Value
[1.6 - COMMAND] (CtL-)	[Profile] (CHCF)	[Separate] (SEP)
	[Ref.1 channel] (Fr1)	[Com. card] (nEt)
	[Cmd channel 1] (cd1)	[Com. card] (nEt)
	[Cmd switching] (CCS)	[ch1 active] (Cd1)
[1.7 - APPLICATION FUNCT.] (FUn-) [REFERENCE SWITCH]	[Ref.1B channel] (Fr1b)	[Ref. AI1] (AI1)
	[Ref.1B switching] (rCb)	[LI5] (LI5)

Control via LonWorks and switching of the setpoint at the terminals with application function

The command comes from LonWorks. Input LI5 is used to switch the setpoint between LonWorks and the terminals. When switched to the terminals, the application functions (summing…) are not active.



Configure the following parameters:

Parameter	Value	Comment
Profile	Separate profile	The command and the setpoint can come from different channels.
Setpoint 1 configuration	Network card	Setpoint 1 comes from LonWorks.
Setpoint 2 configuration	Analog input 1 on the terminals	Setpoint 2 comes from input AI1 on the terminals.
Setpoint switching	Input LI5	Input LI5 switches the setpoint (1↔ 2).
Command 1 configuration	Network card	Command 1 comes from LonWorks.
Command switching	Channel 1	Channel 1 is the command channel.

Setpoint 1B is connected to the functions (Summing, etc) that remain active even after switching.

Configuration via the graphic display terminal or the integrated display terminal:

Menu	Parameter	Value
[1.6 – COMMAND] (CtL-)	[Profile] (CHCF)	[Separate] (SEP)
	[Ref.1 chan] (Fr1)	[Com. card] (nEt)
	[Ref.2 chan] (Fr2)	[AI1 ref.] (AI1)
	[Ref 2 switching] (rFc)	[LI5] (LI5)
	[Cmd channel 1] (Cd1)	[Com. card] (nEt)
	[Cmd switching] (CCS)	[ch1 active] (Cd1)

8. 3. Communication scanner

You do not need to read this chapter if you do not intend to use the network variables nviScannerOut1 or nvoScannerIn1.

The network variables communication scanner out 1 (nviScannerOut1) is assigned using the [Scan.Out1 address] (nCA1) parameter. It is configured using the graphic display terminal via the [1.9 - COMMUNICATION] (COM-) menu, [COM. SCANNER OUTPUT] (OCS-) submenu.

The network variable communication scanner in 1 (nvoScannerIn1) is assigned using the [Scan.IN1 address] (nMA1) parameter. It is configured using the graphic display terminal via the [1.9 - COMMUNICATION] (COM-) menu, [COM. SCANNER INPUT] (ICS-) submenu.

Enter the logic address of the parameter (refer to the Communication parameters manual).

If a [Scan.Out1 address] (nCA1) or [Scan.IN1 address] (nMA1) parameter equals zero, the corresponding variable is not used by the drive.

16 assignment parameters exist in the drive, they described in the tables below. Only [Scan. Out1 address] (nCA1) and [Scan. IN1 address] (nMA1) are useful for the LonWorks card.

Configuration parameter name	Default assignment of the output variable	Example of assignment
[Scan. Out1 address] (nCA1)	Control word (CMd)	PID setpoint
[Scan. Out2 address] (nCA2)	Speed reference (LFrd)	Not used
[Scan. Out3 address] (nCA3)	Not used	
[Scan. Out4 address] (nCA4)		
[Scan. Out5 address] (nCA5)		
[Scan. Out6 address] (nCA6)		
[Scan. Out7 address] (nCA7)		
[Scan. Out8 address] (nCA8)		

Configuration parameter name	Default assignment of the input variable	Example of assignment
[Scan. IN1 address] (nMA1)	Status word (EtA)	[PID error]
[Scan. IN2 address] (nMA2)	Output speed (rFrd)	Not used
[Scan. IN3 address] (nMA3)	Not used	
[Scan. IN4 address] (nMA4)		
[Scan. IN5 address] (nMA5)		
[Scan. IN6 address] (nMA6)		
[Scan. IN7 address] (nMA7)		
[Scan. IN8 address] (nMA8)		

Example of configuration via the graphic display terminal:
8503 is the logical address of PID setpoint and 11980 is the logical address of [PID error].

RDY	NET	+0.00Hz	0A
COM. SCANNER INPUT			☐
Scan. IN1 address	:		8503
Scan. IN2 address	:		0
Scan. IN3 address	:		0
Scan. IN4 address	:		0
Scan. IN5 address	:		0
Code		Quick	☑
Scan. IN6 address	:		0
Scan. IN7 address	:		0
Scan. IN8 address	:		0

RDY	NET	+0.00Hz	0A
COM. SCANNER OUTPUT			☐
Scan. Out1 address	:		11980
Scan. Out2 address	:		0
Scan. Out3 address	:		0
Scan. Out4 address	:		0
Scan. Out5 address	:		0
Code		Quick	☑
Scan. Out6 address	:		0
Scan. Out7 address	:		0
Scan. Out8 address	:		0

Note:
Any modification to parameters [Scan.Out1 address] (nCA1) or [Scan.IN1 address] (nMA1) must be made with the motor stopped. The master controller program should be updated to take account of this modification.

8. 4. Communication faults

A LonWorks fault is triggered if the LONMARK card does not receive at least one of the network variables nviDrvSpeedStpt, nviDrvSpeedScale or nviInvSetFreq within a predefined time period (configuration property Receive heartbeat time nciRcvHrtBt, refer to “Network management”, page 50).

The monitoring of the LonWorks communication can be disabled if the configuration property Receive heartbeat time nciRcvHrtBt is set to 0.0.

⚠ WARNING

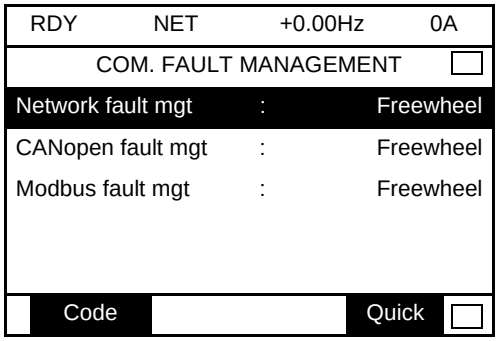
If this function is not properly set up, it may cause an accident.
If you configure the configuration property Receive Heartbeat Time (nciRcvHrtBt) to the value 0.0, the drive will not trip in drive communication fault [Com. network] (CnF).
As soon as the **L**ON**W**ORKS communication comes back, the drive will restart according to the LonWorks control.

This is the default value according to the **L**ON**M**ARK standard.

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

The response of the drive in the event of a **L**ON**M**ARK communication fault can be configured.

Configuration can be performed using the graphic display terminal or integrated display terminal using the [Network fault mgt] (CLL) parameter in the [1.8 FAULT MANAGEMENT] (FLt-) menu, [COM. FAULT MANAGEMENT] (CLL-) submenu.



The values of the [Network fault mgt] (CLL) parameter, which trigger a [Com. network] (CnF) drive fault, are:

Value	Meaning
[Freewheel] (YES)	Freewheel stop (factory setting)
[Ramp stop] (rMP)	Stop on ramp
[Fast stop] (FSt)	Fast stop
[DC injection] (dCI)	DC injection stop

The values of the [Network fault mgt] (CLL) parameter, which do not trigger a drive fault, are:

Value	Meaning
[Ignore] (nO)	Fault ignored
[Per STT] (Stt)	Stop according to configuration of [Type of stop] (Stt).
[fallback spd] (LFF)	Switch to fallback speed, maintained as long as the fault is present and the run command is not disabled.
[Spd maint.] (rLS)	The drive maintains the speed at the time the fault occurred, as long as the fault persists and the run command has not been removed.

The fallback speed can be configured via the [Fallback speed] (LFF) parameter in the [1.8 – FAULT MANAGEMENT] (FLt-) menu.

⚠ WARNING

If this function is not properly set up, it may cause an accident.
If you configure the parameter [Network fault mgt] (CLL), to [Ignore] (nO), [Per STT] (Stt), [fallback spd] (LFF) or [Spd maint.] (rLS) the drive will not trip in drive communication fault [Com. network] (CnF).
As soon as the **L**ON**W**ORKS communication comes back, the drive will restart according to the LonWorks control.

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

8. 5. Monitored parameters

It is possible to select up to 4 parameters to display their values in the [1.2 - MONITORING] menu ([COMMUNICATION MAP] submenu) on the graphic display terminal.

The selection is made via the [6 - MONITORING CONFIG.] menu ([6.3 - COM. MAP CONFIG.] submenu).

Each parameter [Word 1 add. select] ... [Word 4 add. select] can be used to choose the logic address of the parameter. Select an address of zero to disable the function.

In the example given here, the monitored words are:

- Parameter 1 = Motor current (LCr): logic address 3204; signed decimal format
- Parameter 2 = Motor torque (Otr): logic address 3205; signed decimal format
- Parameter 3 = Last fault occurred (LFt): logic address 7121; hexadecimal format
- Disabled parameter: address 0; default format: hexadecimal format

RDY	NET	+0.00Hz	0A
6.3 COM. MAP CONFIG.			☐
Word 1 add. select	:		3204
FORMAT 1	:		Signed
Word 2 add. select	:		3205
FORMAT 2	:		Signed
Word 3 add. select	:		7121
Code		Quick	☑
FORMAT 3	:		Hex
Word 4 add. select	:		0
FORMAT 4	:		Hex

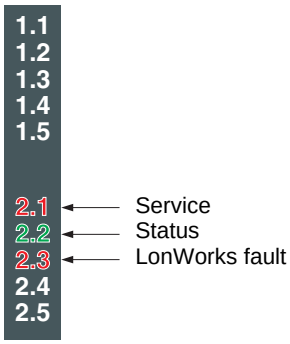
One of the three display formats below can be assigned to each monitored word:

Format	Range	Terminal display
Hexadecimal	0000 ... FFFF	[Hex]
Signed decimal	-32 767 ... 32 767	[Signed]
Unsigned decimal	0 ... 65 535	[Unsigned]

9. Diagnostics

9. 1. LEDs of the card

The LonWorks card of ATV61 is equipped with 3 LEDs (“Service”, “Status”, “Fault”)

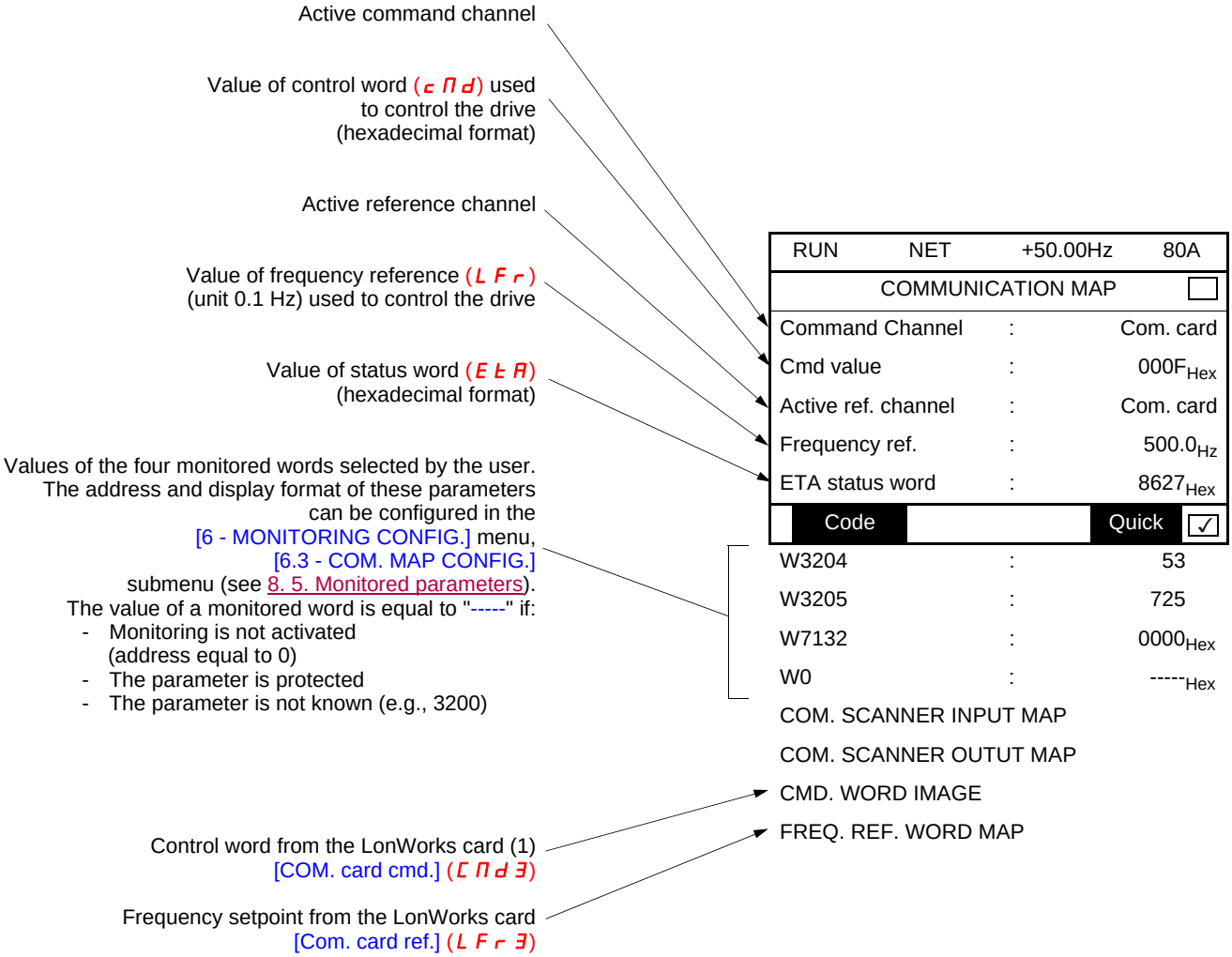


Nb	Name	Colour	State	Description
2.1	Service	Red	Off	Normal state
			Flashing	Not configured (the LonWorks card needs to be commissioned from LonWorks). When a reset command is received, the service led flashes once.
			On	Application less (the software needs to be loaded in the neuron chip of the LonWorks card). Service pin depressed
2.2	Status	Green	Off	Not configured (not commissioned) or fault.
			Flashing	After power up, before the communication starts. Configured (commissioned) but waiting for reset. > If flashing alternatively with fault led during 30s: wink command has been received from LonWorks
			On	Normal state (configured and operational)
2.3	Fault	Red	Off	No fault
			Flashing	LonWorks communication fault: [Com. network] (CnF) > If flashing alternatively with fault: wink command signal has been received
			On	Hardware or software fault of the LonWorks card or in the link between the drive and the LonWorks card: [internal com. link] (ILF)

9. Diagnostics

9. 2. Control

On the graphic display terminal only, the [1.2 - MONITORING] menu ([COMMUNICATION MAP] submenu) can be used to display control diagnostic information between the drive and the network:



The LonWorks card receives commands and setpoint from the network. The format of these variables depends on the definition of the network variables nviDrvSpeedSpt, nviInvSetFreq and nviResetFault.
The LonWorks card processes these network variables and sends the Control word (cMd) and Frequency setpoint (LFr) to the drive.
The parameter (cMd), (LFr) and (EtA) are described in the Communication parameters manual.

9. 3. Communication scanner

You do not need to read this chapter if you do not intend to use the network variables nviScannerOut1 or nvoScannerIn1.

On the graphic display terminal, in the [1.2 - MONITORING] (SUP-) menu ([COMMUNICATION MAP] (COM-) submenu):

- The [COM. SCANNER INPUT MAP] (ISA-) submenu is used to display the value of the 8 communication scanner input variables [Com Scan In● val.] (NM●).
- The [COM SCAN OUTPUT MAP] (OSA-) submenu is used to display the value of the 8 communication scanner output variables [Com Scan Out● val.] (NC●).

Only [Com Scan In1 val.] (NM1) and [Com Scan Out1 val.] (NC1) are useful for the LonWorks card.

Input variable	Scanner parameter
No. 1	[Com Scan In1 val.] (NM1)
No. 2	[Com Scan In2 val.] (NM2)
No. 3	[Com Scan In3 val.] (NM3)
No. 4	[Com Scan In4 val.] (NM4)
No. 5	[Com Scan In5 val.] (NM5)
No. 6	[Com Scan In6 val.] (NM6)
No. 7	[Com Scan In7 val.] (NM7)
No. 8	[Com Scan In8 val.] (NM8)

Output variable	Scanner parameter
No. 1	[Com Scan Out1 val.] (NC1)
No. 2	[Com Scan Out2 val.] (NC2)
No. 3	[Com Scan Out3 val.] (NC3)
No. 4	[Com Scan Out4 val.] (NC4)
No. 5	[Com Scan Out5 val.] (NC5)
No. 6	[Com Scan Out6 val.] (NC6)
No. 7	[Com Scan Out7 val.] (NC7)
No. 8	[Com Scan Out8 val.] (NC8)

Configuration of these variables is described in the "Configuration" section.

Example of communication scanner display on the graphic display terminal:

RUN	NET	+50.00Hz	80A
COM. SCANNER INPUT MAP			☐
Com Scan In1 val.	:		500
Com Scan In2 val.	:		0
Com Scan In3 val.	:		0
Com Scan In4 val.	:		0
Com Scan In5 val.	:		0
Code		Quick	☑
Com Scan In6 val.	:		0
Com Scan In7 val.	:		0
Com Scan In8 val.	:		0

RUN	NET	+50.00Hz	80A
COM SCAN OUTPUT MAP			☐
Com Scan Out1 val.	:		15
Com Scan Out2 val.	:		0
Com Scan Out3 val.	:		0
Com Scan Out4 val.	:		0
Com Scan Out5 val.	:		0
Code		Quick	☑
Com Scan Out6 val.	:		0
Com Scan Out7 val.	:		0
Com Scan Out8 val.	:		0

In this example, only the first input variable and output variable have been configured (because only one is useful for LonWorks).

[Com Scan In1 val.] = [500] PID setpoint = 500
[Com Scan Out1 val.] = [15] [PID error] = 15

9. 4. Communication fault

LonWorks communication faults are indicated by the red ERR LED on the LonWorks card.

In the factory configuration, a communication fault will trigger a resettable [Com. network] (CnF) drive fault and initiate a freewheel stop.

It is possible to change the response of the drive in the event of a LonWorks communication fault (see the Configuration section).
- [Com. network] (CnF) drive fault (freewheel stop, stop on ramp, fast stop or DC injection braking stop)
- No drive fault (stop, maintain, fallback)

The Communication parameters manual contains a detailed description of how to manage communication faults (see the "Communication monitoring" section).
- Following initialization (power-up), the drive checks that at least one command or reference parameter has been written for the first time by LonWorks.
- Then, if a communication fault occurs on LonWorks, the drive will react according to the configuration (fault, maintain, fallback, etc.).

9. 5. Card fault

The [internal com. link] (ILF) fault appears when the following serious problems occur:
- Hardware fault on the LonWorks card
- Dialog fault between the LonWorks card and the drive

The response of the drive in the event of an [internal com. link] (ILF) fault cannot be configured, and the drive trips with a freewheel stop. This fault cannot be reset.

Two diagnostic parameters can be used to obtain more detailed information about the origin of the [internal com. link] (ILF) fault:
- [Internal link fault 1] (ILF1) if the fault has occurred on option card no. 1 (installed directly on the drive)
- [Internal link fault 2] (ILF2) if the fault has occurred on option card no. 2 (installed on option card no. 1)

The LonWorks card can be in position 1 or 2.

The [Internal link fault 1] (ILF1) and [Internal link fault 2] (ILF2) parameters can only be accessed on the graphic display terminal in the [1.10 DIAGNOSTICS] (DGt-) menu, [MORE FAULT INFO] (AF1-) submenu.

Value	Description of the values of the [Internal link fault 1] (ILF1) and [Internal link fault 2] (ILF2) parameters
0	No fault
1	Loss of internal communication with the drive
2	Hardware fault detected
3	Error in the EEPROM checksum
4	Faulty EEPROM
5	Faulty Flash memory
6	Faulty RAM memory
7	Faulty NVRAM memory
8	Faulty analog input
9	Faulty analog output
10	Faulty logic input
11	Faulty logic output
101	Unknown card
102	Exchange problem on the drive internal bus
103	Time out on the drive internal bus (500 ms)

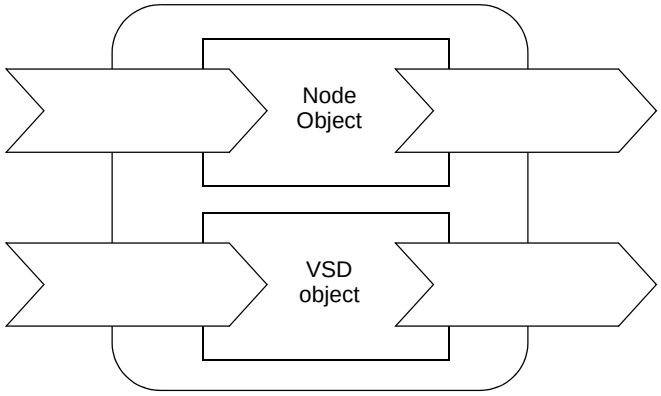
10. Functional profile

■ Objects supported

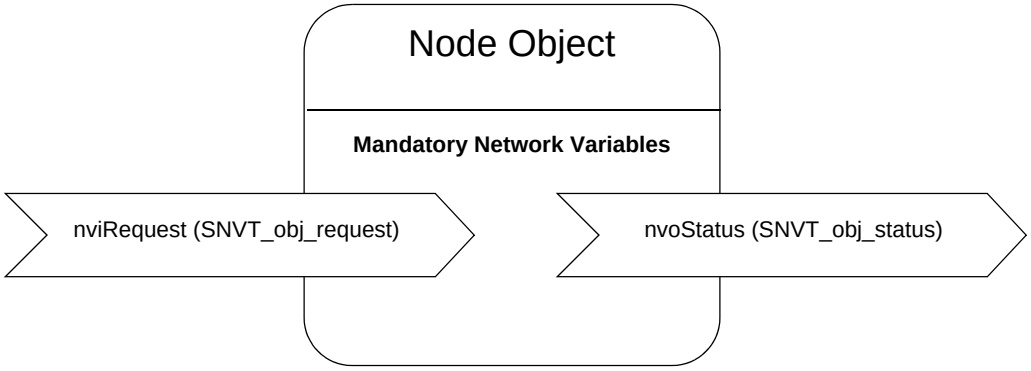
The LonWorks card for ATV61 complies to the LonMark functionnal profile variable Speed Motor Drive (specification 6010-11).

According to this profile 2 objects are supported:

- the node object (specification 0000-20),
- the variable speed motor drive object.

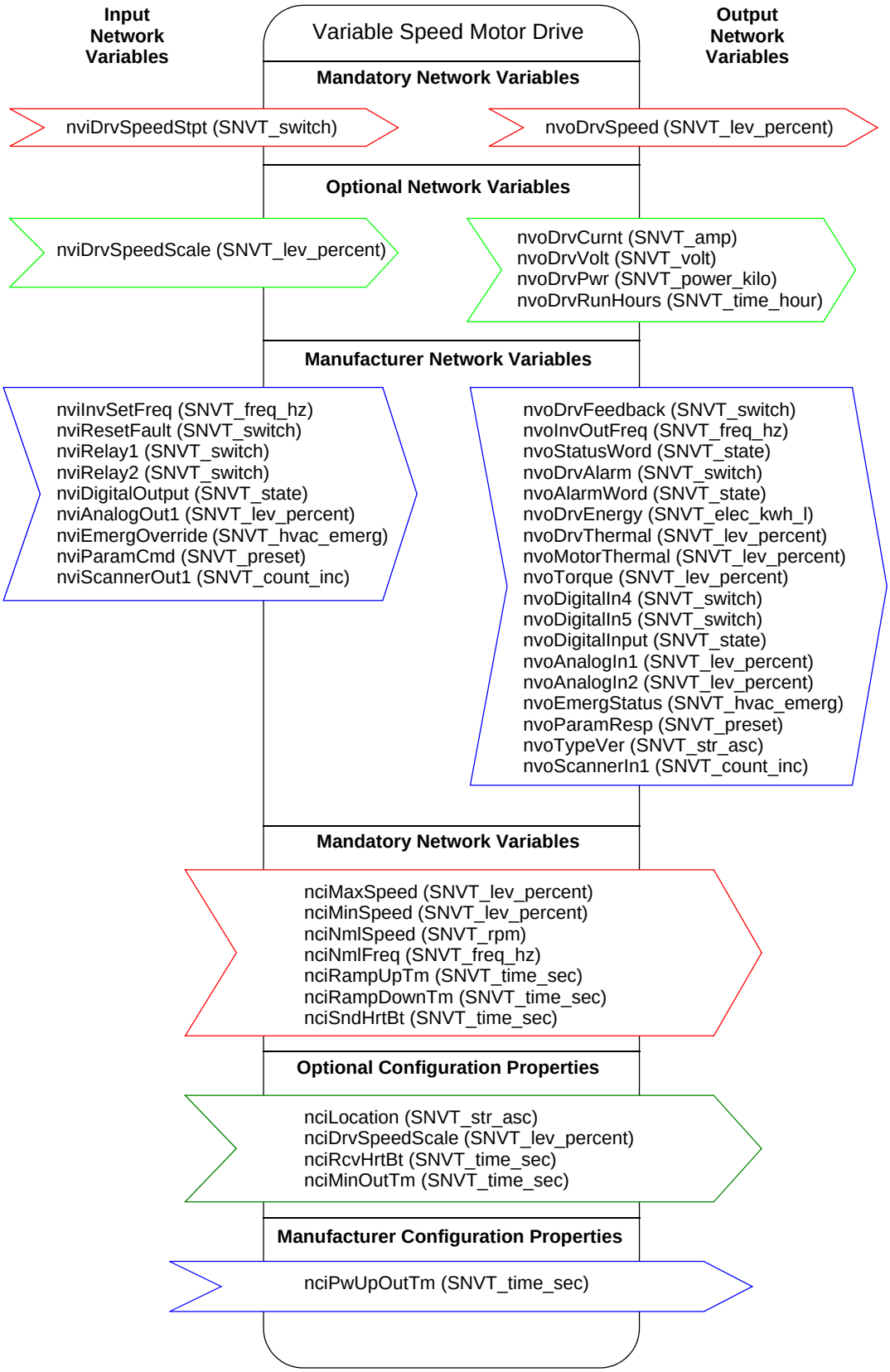


■ LONMARK Node Object profile



10. Functional profile

■ LONMARK Variable Speed Motor Drive profile



Note :
For all Output Network Variables transmission properties, see "Send Heartbeat Time" (nciSndHrtBt) (Page 50) and "Minimum Send Time" (nciMinOutTm) (Page 51).
(nciSndHrtBt) and (nciMinOutTm) are not linked. These two functions are running in parallel without any priority management.

11. Network variables and configuration properties

11. 1. List of network variables and configuration properties

Commands and setpoints

Name	SNVT	Definition	Description
nviDrvSpeedStpt	SNVT_switch	Drive Speed Setpoint	Variable Speed Motor Drive object (M)
nviDrvSpeedScale	SNVT_lev_percent	Drive Speed Setpoint Scaling	Variable Speed Motor Drive object (O)
nciDrvSpeedScale	SNVT_lev_percent	Default Value for nviDrvSpeedScale	Variable Speed Motor Drive object (O)
nviInvSetFreq	SNVT_freq_hz	Frequency setpoint	Manufacturer specific
nviResetFault	SNVT_switch	Fault reset command	Manufacturer specific
nviRequest	SNVT_obj_request	Object Request	Node object (M)

Status and output velocity

Name	SNVT	Definition	Description
nvoDrvSpeed	SNVT_lev_percent	Drive Speed Feedback	Variable Speed Motor Drive object (M)
nvoDrvFeedback	SNVT_switch	Drive velocity feedback	Manufacturer specific
nvoInvOutFreq	SNVT_freq_hz	Output frequency	Manufacturer specific
nvoStatusWord	SNVT_state	Drive status	Manufacturer specific
nvoStatus	SNVT_obj_status	Object Status	Node object (M)

Alarms

Name	SNVT	Definition	Description
nvoDrvAlarm	SNVT_switch	Alarm code	Manufacturer specific
nvoAlarmWord	SNVT_state	Alarm status	Manufacturer specific

Measurements

Name	SNVT	Definition	Description
nvoDrvCurnt	SNVT_amp	Drive Output Current	Variable Speed Motor Drive object (O)
nvoDrvVolt	SNVT_volt	Drive Output Voltage	Variable Speed Motor Drive object (O)
nvoDrvPwr	SNVT_power_kilo	Drive Output Power	Variable Speed Motor Drive object (O)
nvoDrvRunHours	SNVT_time_hour	Drive Total Running Hours	Variable Speed Motor Drive object (O)
nvoDrvEnergy	SNVT_elec_kwh_l	Energy consumption	Manufacturer specific
nvoDrvThermal	SNVT_lev_percent	Drive thermal state	Manufacturer specific
nvoMotorThermal	SNVT_lev_percent	Motor thermal state	Manufacturer specific
nvoTorque	SNVT_lev_percent	Torque	Manufacturer specific

Monitoring of digital inputs

Name	SNVT	Definition	Description
nvoDigitalIn4	SNVT_switch	State of digital input 4	Manufacturer specific
nvoDigitalIn5	SNVT_switch	State of digital input 5	Manufacturer specific
nvoDigitalInput	SNVT_state	State of digital inputs	Manufacturer specific

Monitoring of analog inputs

Name	SNVT	Definition	Description
nvoAnalogIn1	SNVT_lev_percent	Value of analog input 1	Manufacturer specific
nvoAnalogIn2	SNVT_lev_percent	Value of analog input 2	Manufacturer specific

Control of digital outputs

Name	SNVT	Definition	Description
nviRelay1	SNVT_switch	Command of relay 1	Manufacturer specific
nviRelay2	SNVT_switch	Command of relay 2	Manufacturer specific
nviDigitalOutput	SNVT_state	Command of relays and digital outputs	Manufacturer specific

Control of analog outputs

Name	SNVT	Definition	Description
nviAnalogOut1	SNVT_lev_percent	Command of analog output 1	Manufacturer specific

11. Network variables and configuration properties

Emergency

Name	SNVT	Definition	Description
nviEmergOverride	SNVT_hvac_emerg	Emergency command	Manufacturer specific
nvoEmergStatus	SNVT_hvac_emerg	Emergency feedback	Manufacturer specific

Adjustment

Name	SNVT	Definition	Description
nciMaxSpeed	SNVT_lev_percent	Maximum Motor Speed	Variable Speed Motor Drive object (M)
nciMinSpeed	SNVT_lev_percent	Minimum Motor Speed	Variable Speed Motor Drive object (M)
nciNmlSpeed	SNVT_rpm	Nominal Motor Speed in RPM	Variable Speed Motor Drive object (M)
nciNmlFreq	SNVT_freq_hz	Nominal Motor Frequency	Variable Speed Motor Drive object (M)
nciRampUpTm	SNVT_time_sec	Minimum Ramp Up Time	Variable Speed Motor Drive object (M)
nciRampDownTm	SNVT_time_sec	Minimum Ramp Down Time	Variable Speed Motor Drive object (M)

Parameter access

Name	SNVT	Definition	Description
nviParamCmd	SNVT_preset	Parameter access command	Manufacturer specific
nvoParamResp	SNVT_preset	Parameter access response	Manufacturer specific

Identification

Name	SNVT	Definition	Description
nciLocation	SNVT_str_asc	Location Label	Variable Speed Motor Drive object (O)
nvoTypeVer	SNVT_str_asc	Drive identification	Manufacturer specific

Network management

Name	SNVT	Definition	Description
nciSndHrtBt	SNVT_time_sec	Send Heartbeat Time	Variable Speed Motor Drive object (M)
nciRcvHrtBt	SNVT_time_sec	Receive Heartbeat Time	Variable Speed Motor Drive object (O)
nciMinOutTm	SNVT_time_sec	Minimum Send Time	Variable Speed Motor Drive object (O)
nciPwUpOutTm	SNVT_time_sec	Initial inhibition time	Manufacturer specific

Scanner

Name	SNVT	Definition	Description
nviScannerOut1	SNVT_count_inc	Communication scanner out 1 (nC1)	Manufacturer specific
nvoScannerIn1	SNVT_count_inc	Communication scanner in 1 (nM1)	Manufacturer specific

11. 2. Commands and setpoints

■ Drive Speed Setpoint (nviDrvSpeedStpt)

This input network variable provides start/stop control and velocity setpoint.

Name	nviDrvSpeedStpt
SNVT reference	SNVT_switch
SNVT index	95
Definition	Drive Speed Setpoint

Range:

State	Value	Command	Comment
0 (FALSE)	NA	Stop	The drive is stopped, the drive function is disabled and power is not applied to the motor.
0xFF	NA	AUTO (Invalid)	
1 (TRUE)	0	0%	The drive function is enabled and power may be applied to the motor.
1 (TRUE)	1 ... 200	0.5 ... 100.0%	
1 (TRUE)	201 ... 255	100.0%	

Note:
The internal profile of ATV61 in CiA402. The LonWorks card converts LonWorks commands to CiA402 commands.
A "Run" command from LonWorks in converted to a CiA 402 "Operation enable" command.
A "Stop" command from LonWorks is converted to a "Shutdown" command. If the drive is running, a "Halt" command is first applied.

Note:
The network variable nviInvSetFreq permits the control of the drive by a frequency setpoint instead of percentage.

■ Drive Speed Setpoint Scaling (nviDrvSpeedScale)

This input network variable provides scaling for nviDrvSpeedStpt.
Negative values indicate a motor direction in reverse.
For example, if the nviDrvSpeedStpt value is 50% and nviDrvSpeedScale is -150%, then the actual speed setpoint is -75%, or 0.75 times the nominal speed in the reverse direction.

Name	nviDrvSpeedScale
SNVT reference	SNVT_lev_percent
SNVT index	81
Unit	0.005%
Range	-163.840% ... 163.830% 0x7FFF = +163.835%: invalid value
Definition	Drive Speed Setpoint Scaling

Default value is determined by nciDrvSpeedScale. This value will be adopted at power-up and in case of not receiving an update within the specified Receive Heartbeat time.

■ Default Value for nviDrvSpeedScale (nciDrvSpeedScale)

This configuration property is used as the default value for nviDrvSpeedScale.

Name	nciDrvSpeedScale
SCPT reference	SCPTdefScale
SCPT index	162
SNVT reference	SNVT_lev_percent
SNVT index	81
Unit	0.005%
Range	-163.840% ... 163.830% 0x7FFF = +163.835%: invalid value
Definition	Default Value for nviDrvSpeedScale

■ Frequency setpoint (nviInvSetFreq)

This variable is the frequency setpoint alternative to the percentage velocity setpoint (value of SNVT_Swith nviDrvSpeedStpt).

When the setting value of nviDrvSpeedScale is negative, the motor reverse-rotates.
When this variable is invalid data (0x7FFF = 3 276.7 Hz), the drive is operated according to nciDrvSpeedStpt.
The default value is AUTO (0x7FFF = 3 276.7 Hz: invalid).

Name	nviInvSetFreq
SNVT reference	SNVT_freq_hz
SNVT index	76
Unit	0.1 Hz
Range	0.0 ... 500.0 Hz 0x7FFF = 3276.7 Hz: invalid
Definition	Frequency setpoint

Range:
Both tables are equivalent. You may prefer the first or the second.

nviDrvSpeedStpt		**nviInvSetFreq**	**Command**
State	**Value**		
0	NA	NA	Stop
1	0	0x7FFF (default)	0%
	1 to 200		0.5 ... 100.0% nciNmlFreq * value * nviDrvSpeedScale
	201 to 255		100.0% nciNmlFreq * 100% * nviDrvSpeedScale
	NA	0 to 500.0Hz	Follow “nviInvSetFreq"
0xFF	NA	NA	AUTO(Invalid)

nviInvSetFreq	**nviDrvSpeedStpt**		**Command**
	State	**Value**	
0x7FFF (default)	0	NA	Stop
	1	0	0%
	1	1 ... 200	0.5 ... 100.0% nciNmlFreq * value * nviDrvSpeedScale
	1	201 ... 255	100.0% nciNmlFreq * 100% * nviDrvSpeedScale
	0xFF	NA	AUTO (Invalid)
0 ... 500.0Hz	0	NA	Stop
	1	NA	Follow “nviInvSetFreq"
	0xFF	NA	AUTO(Invalid)

■ Reset command (nviResetFault)

The reset command resets the drive when the drive is in fault state and a resettable fault has disappeared.

Name	nviResetFault
SNVT reference	SNVT_switch
SNVT index	95
Format	No / Reset; NA/100%
Definition	Fault reset command

Range:

State	**Value**	**Command**	**Comment**
0	any <> 0xFF	No command	
1	1 ... 0xFE	Reset command	Value must be >0 to perform the reset command, not only state set to 1.
any	0xFF	Invalid (no command)	

Note: The reset command from LonWorks is converted by the LonWorks card to a CiA402 "Fault reset command". If the fault is not present, the drive moves from the state "Fault" to the state "Switch on disabled" (refer to Communication parameter manual).

■ Object request (nviRequest)

This input network variable provides the mechanism to request an operation or a mode for a functional block within the drive.

Name	nviRequest
SNVT reference	SNVT_obj_request
SNVT index	92
Definition	Object request

Member name	Value		Description
object_id			Stores the object ID.
	0	RQ_NORMAL	If the specified functional block was in the disabled or overridden state, this request cancels that state, and returns the functional block to normal operation. If the functional block was already in the normal state, a request to enter the normal state is not an error. After device reset, the state of functional blocks on the device is application-specific. (Mandatory for LonMark Node Object)
	1	RQ_DISABLED	Makes the drive object invalid and brings the motor to a controlled stop. (Mandatory for LonMark Variable Speed Motor Drive profile)
	2	RQ_UPDATE_STATUS	Request the object status (nvoStatus) to be updated. (Mandatory for LonMark Node Object)
	5	RQ_REPORT_MASK	Changes to "1".bit (invalid_id, invalid_request, disabled, comm_failure, in_alarm, report_mask) supported by object status (nvoStatus) (Mandatory for LonMark Node Object)
	7	RQ_ENABLE	Makes the drive object valid. (Mandatory for LonMark Variable Speed Motor Drive profile)
	9	RQ_CLEAR_STATUS	Clears all bits of the object status (nvoStatus) to "0".
	10	RQ_CLEAR_ALARM	Fault reset command. Clears to "0" in_alarm bit of object status (nvoStatus). (Mandatory for LonMark Variable Speed Motor Drive profile)
	3	RQ_SELF_TEST	Not supported.
	4	RQ_UPDATE_ALARM	Not supported.
	6	RQ_OVERRIDE	Not supported.
	8	RQ_RMV_OVERRIDE	Not supported.
	11	RQ_ALARM_NOTIFY_ENABLED	Not supported.
	12	RQ_ALARM_NOTIFY_DISABLED	Not supported.
	13	RQ_MANUAL_CTRL	Not supported.
	14	RQ_REMOTE_CTRL	Not supported.
	15	RQ_PROGRAM	Not supported.
	16	RQ_CLEAR_RESET	Not supported.
	17	RQ_RESET	Not supported.
	255	FF RQ_NUL	Nothing is done.

11. 3. Status and output velocity

■ Drive Speed Feedback (nvoDrvSpeed)

This output network variable provides the speed of the drive as a percentage of the nominal speed.

Name	nvoDrvSpeed
SNVT reference	SNVT_lev_percent
SNVT index	81
Unit	0.005%
Range	-163.840% to 163.830% 0x7FFF = +163.835%: invalid
Definition	Drive Speed Feedback

■ Drive Velocity feedback (nvoDrvFeedback)

This variable monitors Stopped / Running status of the drive and the output velocity of as a percentage of the nominal speed of the drive (unit = 0.5%). It is the output image of nviDrvSpeedStpt.

Name	nvoDrvFeedback
SNVT reference	SNVT_switch
SNVT index	95
Format	Stopped / Running; Actual speed
Unit of value	0.5%
Range of value	0 ... 127.5%
Definition	Drive velocity feedback

State	Description
0 (FALSE)	Stopped
1 (TRUE)	Running

Value	Description
0... 200	0.0 ... 100.0%
201 ... 255	100.5 ... 127.5%

■ Output frequency (nvoInvOutFreq)

This variable monitors the output velocity (0.1 Hz unit) of the drive.

Name	nvoInvOutFreq
SNVT reference	SNVT_freq_hz
SNVT index	76
Unit	0.1Hz
Definition	Output frequency

■ Drive status (nvoStatusWord)

This variable monitors the status of the drive by a bit field.

Name	nvoStatusWord
SNVT reference	SNVT_state
SNVT index	83
Definition	Drive status

Bit nb	Description	Link to ATV61 internal parameter
0	**Fault** 0 : No fault 1 : Fault	Statusword (8603 = 16#219B, ETA) bit 3
1	**Warning** 0 : No warning 1 : Warning	Statusword (8603 = 16#219B, ETA) bit 7
2	**Running** 0 : Stopped 1 : Running	Status word 1 (8602 = 16#219B) bit 2
3	**Rotation** 0 : Forward 1 : Reverse	Statusword (8603 = 16#219B, ETA) bit 15
4	**Ready** 0 : Forward 1 : Reverse	Statusword (8603 = 16#219B, ETA) bit 1
5	**Command from the network** 0 : Not from the network 1 : From the network	Active command channel (8442 = 16#20FA, CCC) bit 9
6	**Setpoint from the network** 0 : Not from the network 1 : From the network	Active setpoint channel (8441 = 16#20F9, CRC) bit 9
7	**At setpoint** 0 : Setpoint not reached (accelerating or decelerating) 1 : Setpoint reached	Statusword (8603 = 16#219B, ETA) bit 10
8	Reserved	
9	Reserved	
10	Reserved	
11	Reserved	
12	Reserved	
13	Reserved	
14	Reserved	
15	Reserved	

■ Object Status (nvoStatus)

This output network variable indicates various status within the drive.

Name	nvoStatus
SNVT reference	SNVT_obj_status
SNVT index	93
Definition	Object Status

Member name	Description
object_id	Returns the value written to object_id of object request (nviRequest). (Mandatory for LonMark Node Object)
invalid_id	1 means requested ID is not implemented in the drive. (Mandatory for LonMark Node Object)
invalid_request	1 means request is not implemented in the drive.
disabled	1 means object disabled.
out_of_limits	Not supported.
open_circuit	Not supported.
out_of_service	Not supported.
mechanical fault	Not supported.
feedback_failure	Not supported.
over_range	Not supported.
under_range	Not supported.
electrical_fault	Not supported.
unable_to_measure	Not supported.
comm_failure	1 reports the [internal com. link] (ILF) fault.
fail_self_test	Not supported.
self_test_in_progress	Not supported.
locked_out	Not supported.
manual_control	Not supported.
in_alarm	1 means the drive is in fault or in alarm condition.
in_override	Not supported.
report_mask	1 means nvoStatus is an event mask. When RQ_REPORT_MASK is required by nvi_request, nvoStatus reports as "1" the supported status bit (invalid_id, invalid_request, disabled, comm_failure, in_alarm, report_mask). (Mandatory for LonMark Node Object)
programming_mode	Not supported.
programming_fail	Not supported.
alarm_notify_disabled	Not supported.
reset_complete	Not supported.

11. 4. Alarms

■ Alarm code (nvoDrvAlarm)

This variable monitors the fault state of the drive.

Name	nvoDrvAlarm
SNVT reference	SNVT_switch
SNVT index	95
Format	Normal / Alarm; don't care

Range:

State	Value	Status
0	0	No fault
1	200 (0xC8)	Fault
-1 (0xFF)	0 ... 200	Invalid

■ Alarm status (nvoAlarmWord)

This variable monitors the fault state of the drive by the bit 0 and additional detail by bits 1 ... 6. Bit 0 is redundant with nvoDrvAlarm.

Name	nvoAlarmWord
SNVT reference	SNVT_state
SNVT index	83
Format	16 booleans

Bit nb	Description	ATV61 mapping
0	Fault 0 : No fault 1 : Fault	Statusword (8603 = 16#219B, ETA) bit 3
1	Supply fault (supply overvoltage, phase loss ...) 0 : No fault 1 : Fault	Altivar fault code (7121 = 16#1BD1, LFT) = 40, 19, 21, 22
2	Drive fault (overheat, power module fault, hardware, memory, internal communication, resistor ...) 0 : No fault 1 : Fault	Altivar fault code (7121 = 16#1BD1, LFT) = 70, 65, 3, 4, 10, 63, 2, 30, 73, 67, 6, 26, 27, 28, 29, 68, 37, 51, 52, 53, 60, 69, 46, 75, 16, 55, 54
3	Motor fault (faults downstream of the drive: braking overvoltage, phase loss, overheating ...) 0 : No fault 1 : Fault	Altivar fault code (7121 = 16#1BD1, LFT) = 9, 23, 31, 32, 24, 25, 18, 17, 20, 33, 15, 48, 50, 56, 44
4	Process fault (overload, underload ...) 0 : No fault 1 : Fault	Altivar fault code (7121 = 16#1BD1, LFT) = 39, 74, 101, 102, 100
5	External fault (inputs, outputs, encoder, contactor, brake, ...) 0 : No fault 1 : Fault	Altivar fault code (7121 = 16#1BD1, LFT) = 62, 61, 58, 11, 8, 59, 64, 13, 71, 72, 14, 47, 49
6	Communication fault 0 : No fault 1 : Fault	Altivar fault code (7121 = 16#1BD1, LFT) = 7, 34, 38, 5, 42, 45
7	Reserved	
8	Reserved	
9	Reserved	
10	Reserved	
11	Reserved	
12	Reserved	
13	Reserved	
14	Reserved	
15	Reserved	

11. 5. Measurements

■ Drive Output Current (nvoDrvCurnt)

This output network variable provides the drive output current (0,1 A).

Name	nvoDrvCurnt
SNVT reference	SNVT_amp
SNVT index	1
Unit	0.1 A
Range	0 ... 3 276.6 0x7FFF = +3 276.7: invalid
Definition	Drive Output Current

■ Drive Output Voltage (nvoDrvVolt)

This output network variable provides the drive output voltage (V).

Name	nvoDrvVolt
SNVT reference	SNVT_volt
SNVT index	44
Unit	V
Range	0 ... 700 V 0x7FFF = +3 276.7 V:invalid
Definition	Drive Output Voltage

■ Drive Output Power (nvoDrvPwr)

This output network variable provides the drive power (0.1 kW).

Name	nvoDrvPwr
SNVT reference	SNVT_power_kilo
SNVT index	28
Unit	0.1 kW
Range	0 ... 6 553.4 kW 0xFFFF = 6 553.5 kW: invalid
Definition	Drive Output Power

■ Drive Total Running Hours (nvoDrvRunHours)

This output network variable provides the total operation time for the motor in running hours.

Name	nvoDrvPwr
SNVT reference	SNVT_time_hour
SNVT index	124
Unit	0.1 H
Range	0 ... 6 553.4 H 0xFFFF = 6 553.5 H: invalid
Definition	Drive Total Running Hours

■ Energy consumption (nvoDrvEnergy)

This variable monitors the energy cumulative consumption of the drive.

Name	nvoDrvEnergy
SNVT reference	SNVT_elec_kwh_l
SNVT index	146
Unit	kWh
Range	-214 748 364.8 ... 214 748 364.6
Definition	Energy consumption

This LonWorks network variable is linked to the drive parameter:
[Consumption] (IPHR) (3209 = 16#0C89)
The unit (Wh, kWh or MWh) depends on the other parameter [Unit] (UNt) (3234 = 16#0CA2)

■ Drive thermal state (nvoDrvThermal)

This variable monitors the thermal state of the drive (%).

Name	nvoDrvThermal
SNVT reference	SNVT_lev_percent
SNVT index	81
Unit	0.005%
Range	0% ... 163 830%
Definition	Drive thermal state

This LonWorks network variable is linked to the drive parameter:
Drive thermal state [Drv. thermal state] (tHd) (3209 = 16#0C89)
Unit 1%

■ Motor thermal state (nvoMotorThermal)

This variable monitors the thermal state of the motor (%).

Name	nvoMotorThermal
SNVT reference	SNVT_lev_percent
SNVT index	81
Unit	0.005%
Range	0% ... 163 830%
Definition	Motor thermal state

This LonWorks network variable is linked to the drive parameter:
[Motor thermal state] (tHr) (9630 = 16#259E)
Unit 1%

■ Torque actual value (nvoTorque)

This variable monitors the motor torque.
The unit is 0.005% of "Nominal motor torque". The "Nominal motor torque" is not accessible as a drive parameter. It is the result of the other characteristics.

Name	nvoTorque
SNVT reference	SNVT_lev_percent
SNVT index	81
Unit	0.005% of Nominal motor torque
Range	0% ... 163 830%

This LonWorks network variable is linked to the drive parameter:
Output torque [Motor torque] (Otr) (3205 = 16#0C85)
Unit 0.01% of Nominal motor torque.

11. 6. Monitoring of digital inputs

■ Monitoring of digital input 4 (nvoDigitalIn4)

This variable monitors the value of digital input 4.

Name	nvoDigitalIn4
SNVT reference	SNVT_switch
SNVT index	95
Definition	Value of the digital input 4

This LonWorks network variable is linked to the drive parameter:
Logic input map (IL1r) (5202 = 16#1452) bit 3.

■ Monitoring of digital input 5 (nvoDigitalIn5)

This variable monitors the value of digital input 5.

Name	nvoDigitalIn5
SNVT reference	SNVT_switch
SNVT index	95
Definition	Value of the digital input 5

This LonWorks network variable is linked to the drive parameter:
Logic input map (IL1r) (5202 = 16#1452) bit 4.

■ Monitoring of drive digital inputs (nvoDigitalInput)

This variable monitors the value of the digital inputs of the drive in a bit field.

Name	nvoDigitalInput
SNVT reference	SNVT_state
SNVT index	83
Format	16 booleans
Definition	Value of the digital inputs

This LonWorks network variable is linked to the drive parameter:
Logic input map (IL1r) (5202 = 16#1452)

Bit nb	Terminal name
0	LI1
1	LI2
2	LI3
3	LI4
4	LI5
5	LI6
6	LI7 (with logic I/O card VW3A3201)
7	LI8 (with logic I/O card VW3A3201)

Bit nb	Terminal name
8	LI9 (with logic I/O card VW3A3201)
9	LI10 (with logic I/O card VW3A3201)
10	LI11 (with extended I/O card VW3A3202)
11	LI12 (with extended I/O card VW3A3202)
12	LI13 (with extended I/O card VW3A3202)
13	LI14 (with extended I/O card VW3A3202)
14	not used
15	not used

11. 7. Monitoring of analog inputs

■ Monitoring of analog input 1 (nvoAnalogIn1)

This variable monitors the analog input 1 (%).

Name	nvoAnalogIn1
SNVT reference	SNVT_lev_percent
SNVT index	81
Unit	0.005%
Range	-163 840% ... 163 830%
Definition	Value of the analog input 1

This LonWorks network variable is linked to the drive parameter:
Standardized image of analog input 1 (AI1r) (5232 = 16#1470).
13 bit resolution (data range -8191 ... 8191).

■ Monitoring of analog input 2 (nvoAnalogIn2)

This variable monitors the analog input 2 (%).

Name	nvoAnalogIn2
SNVT reference	SNVT_lev_percent
SNVT index	81
Unit	0.005%
Range	-163 840% ... 163 830%
Definition	Value of the analog input 2

This LonWorks network variable is linked to the drive parameter:
Standardized image of analog input 2 (AI2r) (5233 = 16#1471).
13 bit resolution (data range -8191 ... 8191).

11. 8. Control of digital outputs

■ Control of relay 1 (nviRelay1)

This variable enables the command of relay 1 of the drive if it is not assigned.

Name	nviRelay1
SNVT reference	SNVT_switch
SNVT index	95
Definition	Command of relay 1

This LonWorks network variable is linked to the drive parameter:
Logic input map (0L1r) (5212 = 16#145C) bit 0.

■ Control of relay 2 (nviRelay2)

This variable enables the command of relay 1 of the drive if it is not assigned.

Name	nviRelay2
SNVT reference	SNVT_switch
SNVT index	95
Definition	Command of relay 2

This LonWorks network variable is linked to the drive parameter:
Logic output map (0L1r) (5212 = 16#145C) bit 1.

■ Control relays and digital outputs (nviDigitalOutput)

This variable enables the command of the relays and digital outputs of the drive if it is they are not assigned.

Name	nviDigitalOutput
SNVT reference	SNVT_state
SNVT index	83
Format	16 booleans
Definition	Command of relays and digital outputs

This LonWorks network variable is linked to the drive parameter:
Logic output map (0L1r) (5212 = 16#145C).

Bit nb	Terminal name
0	R1
1	R2
2	R3 (with logic I/O card VW3A3201)
3	R4 (with extended I/O card VW3A3202)
4	not used
5	not used
6	not used
7	not used

Bit nb	Terminal name
8	LO1 (with logic I/O card VW3A3201)
9	LO2 (with logic I/O card VW3A3201)
10	LO3 (with extended I/O card VW3A3202)
11	LO4 (with extended I/O card VW3A3202)
12	not used
13	not used
14	not used
15	not used

If nviRelay1 and nviDigitalOutput are used at the same time, a logical OR is applied (see table below).
If nviRelay2 and nviDigitalOutput are used at the same time, a logical OR is applied (see table below).

nviRelay1	nviDigitalOutput	R1
0	0x0000	0
1	0x0000	1
0	0x0001	1
1	0x0001	1

nviRelay2	nviDigitalOutput	R2
0	0x0000	0
1	0x0000	1
0	0x0001	1
1	0x0001	1

11. 9. Control of analog outputs

■ Control of analog output 1 (nviAnalogOut1)

This variable enables the command of the analog output 1 (%) if it not assigned.

Name	nviAnalogOut1
SNVT reference	SNVT_lev_percent
SNVT index	81
Unit	0.005%
Range	-163 840% ... 163 830%

This LonWorks network variable is linked to the drive parameter:
Standardized image of analog output 1 (AO1r) (5261 = 16#148D).
13 bit resolution (data range -8191 ... 8191).

11. 10. Emergency

■ Emergency command (nviEmergOverride)

This variable produces an emergency stop of the drive.
The emergency state disappears after the trip has been released by nviEmergOverride with value 0.
Then it is possible to reset the drive by nviResetFault or a local command.

Name	nviEmergOverride
SNVT reference	SNVT_hvac_emerg
SNVT index	103

Value	Action	Comment
0	Drive trip release	EMERG_NORMAL (No Emergency mode)
1	Emergency stop	EMERG_PRESSURIZE (Emergency pressurize mode)
2		EMERG_DEPRESSURIZE (Emergency depressurize mode)
3		EMERG_ PURGE (Emergency purge mode)
4		EMERG_SHUTDOWN (Emergency shutdown mode)
5		EMERG_FIRE
6 ... 0xFF		...

Emergency stop produces a fault [External fault com.] (EPF2).
The reaction of the drive can be configured by the parameter [External fault mgt] (EPL). This parameter is located in the menu [1.8 FAULT MANAGEMENT] (FLt), sub-menu [EXTERNAL FAULT] (EtF-).

■ Emergency status (nvoEmergStatus)

This variable monitors the emergency status of the drive.

Name	nvoEmergStatus
SNVT reference	SNVT_hvac_emerg
SNVT index	103

Value	Action	Comment
0	No emergency stop	EMERG_NORMAL (No Emergency mode)
1	Emergency stop	EMERG_PRESSURIZE (Emergency pressurize mode)
2		EMERG_DEPRESSURIZE (Emergency depressurize mode)
3		EMERG_ PURGE (Emergency purge mode)
4		EMERG_SHUTDOWN (Emergency shutdown mode)
5		EMERG_FIRE
6 ... 0xFF		...

11. 11. Adjustment

■ Maximum Motor Speed (nciMaxSpeed)

This configuration property is used to define the maximum speed of the motor.
The value is entered as a percent of nominal speed in RPM, as defined by the Nominal Speed (nciNmlSpeed) configuration value. The value of the maximum speed must be validated against the value of the minimum speed as follows:
-163.840 ⩽ minimum speed ⩽ maximum speed ⩽ 163 830

Name	nciMaxSpeed
SCPT reference	SCPTmaxSetpoint
SCPT index	50
SNVT reference	SNVT_lev_percent
SNVT index	81
Unit	0.005%
Range	-163 840% ... 163 830% 163 835% = 32 767 = 0x7FFF: invalid
Default value	100 000%
Definition	Maximum Motor Speed

This network variable is not linked to the drive parameter [High speed] (HSP).
See note on next page.

■ Minimum Motor Speed (nciMinSpeed)

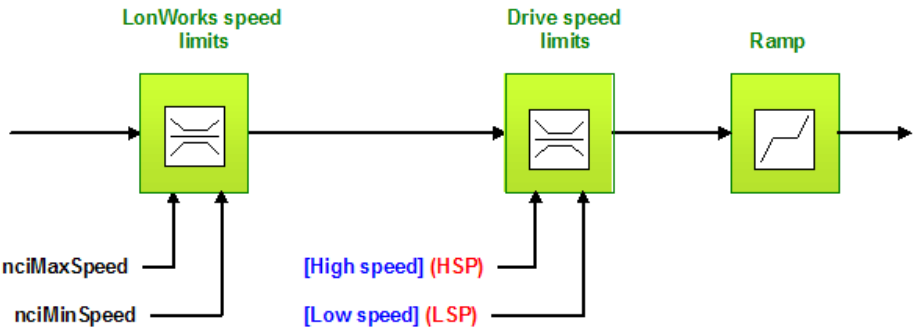
This configuration property is used to define the minimum speed of the motor.
The value is entered as a percent of nominal speed in RPM, as defined by the Nominal Speed (nciNmlSpeed) configuration value. The value of the minimum speed must be validated against the value of the maximum speed as follows:
-163 840 ⩽ minimum speed ⩽ maximum speed ⩽ 163 830

Name	nciMinSpeed
SCPT reference	SCPTminSetpoint
SCPT index	53
SNVT reference	SNVT_lev_percent
SNVT index	81
Unit	0.005%
Range	-163 840% ... 163 830% 163 835% = 32 767 = 0x7FFF: invalid
Default value	0.000%
Definition	Minimum Motor Speed

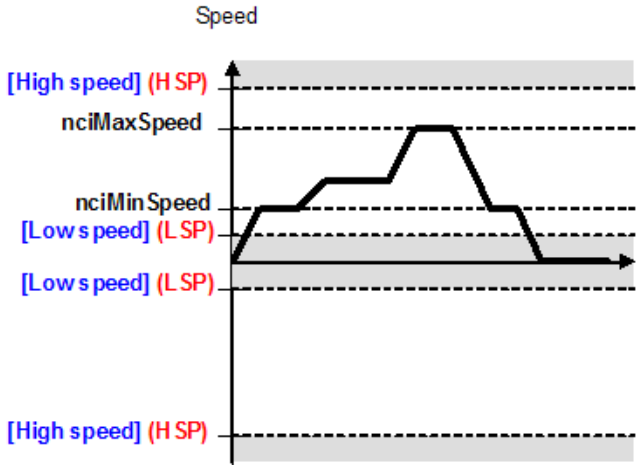
This network variable is not linked to the drive parameter [Low speed] (LSP).
See note on next page.

Note: The drive limits the speed reference by [High speed] (HSP) and [Low speed] (LSP), these 2 parameters are not signed.
For example, if [High speed] (HSP) = 50 Hz and [Low speed] (LSP) = 5Hz, the drive allows reference between 20 Hz and 50 Hz forward or reverse.

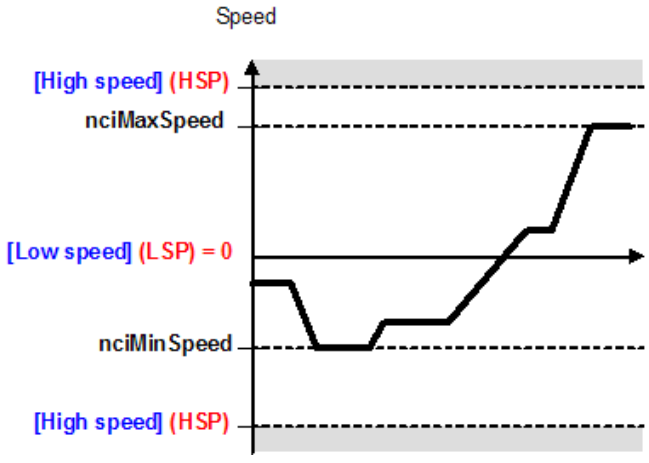
The LonWorks configuration properties nciMaxSpeed and nciMinSpeed are signed.
For example, if nciMaxSpeed = 50 Hz and nciMinSpeed = 5Hz, the LonWorks card limits the reference between 20 Hz and 50 Hz but only forward.

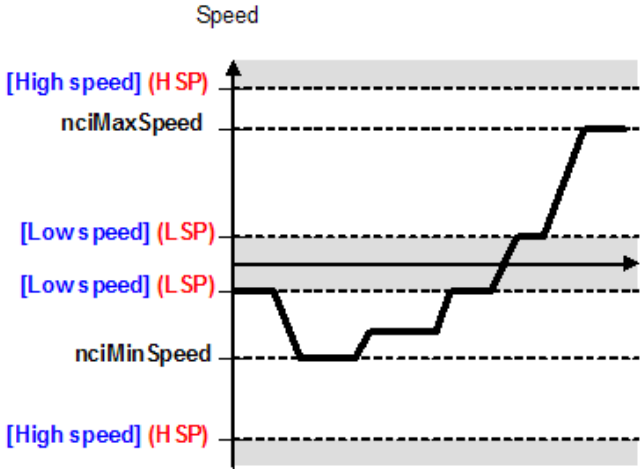


[High speed] (HSP) should be higher or equal to nciMaxSpeed.



If reverse is allowed nciMinSpeed must be negative.





■ Nominal Motor Speed in RPM (nciNmlSpeed)

This configuration property is used to provide the nominal speed of the motor in RPM. This value is necessary to determine the minimum and maximum speed for the motor, based on the configuration properties nciMinSpeed, nciMaxSpeed (entered as percent of nominal speed).

Name	nciNmlSpeed
SCPT reference	SCPTnomRPM
SCPT index	158
SNVT reference	SNVT_rpm
SNVT index	102
Unit	rpm
Range	0 ... 65 535 rpm
Definition	Nominal Motor Speed in RPM

■ Nominal Motor Frequency (nciNmlFreq)

This configuration property is used to provide the nominal frequency of the motor.

Name	nciNmlFreq
SCPT reference	SCPTnomFreq
SCPT index	159
SNVT reference	SNVT_freq_hz
SNVT index	76
Unit	0.1 Hz
Range	0 ... 65 53.5 Hz
Definition	Nominal Motor Frequency

■ Minimum Ramp Up Time (nciRampUpTm)

This configuration property determines the ramp up time of the motor.

Name	nciRampUpTm
SCPT reference	SCPTrampUpTm
SCPT index	160
SNVT reference	SNVT_time_sec
SNVT index	107
Unit	0.1 sec
Range	0 ... 65 53.5 sec
Definition	Minimum Ramp Up Time

■ Minimum Ramp Down Time (nciRampDownTm)

This configuration property determines the ramp down time of the motor.

Name	nciRampDownTm
SCPT reference	SCPTrampUpTm
SCPT index	160
SNVT reference	SNVT_time_sec
SNVT index	107
Unit	0.1 sec
Range	0 ... 65 53.5 sec
Definition	Minimum Ramp Down Time

11. 12. Parameter access

■ Parameter access (nviParamCmd, nvoParamResp)

A controller node can monitor or modify any drive parameter by supporting the Parameter access command and the Parameter access response functions. These functions allow a controller complete access to the features of the drive and the ability to configure drives with predefined settings, using the network variables nviParamCmd and nvoParamResp.

Name	nviParamCmd
SNVT reference	SNVT_preset
SNVT index	94
Format	Structure, 14 bytes
Definition	Parameter access command

Name	nvoParamResp
SNVT reference	SNVT_preset
SNVT index	94
Format	Structure, 14 bytes
Definition	Parameter access response

The following definitions describe how the fields of SNVT_preset are used by the LonWorks card of the drive:

Learn
This field contains the function code for the ATV61. The values for this field are:

Value	**Element**	**Action**
3	LN_REPORT_VALUE	Read command
2	LN_LEARN_VALUE	Write command (to the RAM)

The write command writes the parameter value in RAM. If the drive is powered off, the modification is lost.
If it is necessary to save the parameter value in EEPROM, write value 2 in the parameter 8504 Extended control word (CMi).

Any other value in this field will result in an error message in the Parameter access response.

Selector
This field contains the drive parameter logic address, written in decimal notation, that is to be written or read. Requests for undefined parameters will result in an error message in the Parameter access response.

The controlling device should compare the parameter address of the response message to the requested parameter address to determine that the information received is the requested information and not a response to another controller or from another drive.

The drive parameters are described in the Communication parameters manual, with their logic address and possible values.

Value
This array contains the parameter information to and from the drive. All drive parameters use INT or UINT (16 bit words signed or unsigned).
The most significant byte of data will be stored in value [2] and the least significant byte of data will be stored in value [3].
In the event of an error message, the drive will send 0xFF in value [0] and an error code in value [3].

Error codes

Code	**Meaning**
1	Illegal function for the addressed node
2	Illegal parameter address
3	Illegal data value
6	Busy

Day, Hour, Minute, Second, Millisecond
The time fields are not supported by the ATV61 LonWorks card. The drive will respond to parameter access requests as soon as they are received. Any values in the time fields of the Parameter access command will be ignored. All time fields will be set to “0” in the Parameter access response.

11. 13. Identification

■ Location Label (nciLocation)

This configuration property can be used to provide more descriptive physical location information than can be provided by the Neuron Chip's 6 byte location string. The string may be loaded from LonWorks.

Name	nciLocation
SCPT reference	SCPTLocation
SCPT index	17
SNVT reference	SNVT_str_asc
SNVT index	36
Range	Any NULL terminated ASCII string of 31 bytes total length
Default value	The default value is an ASCII string containing all zeros ("\0").
Definition	Location Label

■ Identification (nvoTypeVer)

This variable provides identification data from the drive (Brand, commercial reference, version).

Name	nvoTypeVer
SNVT reference	SNVT_str_asc
SNVT index	36
Format	ASCII string
Definition	Identification of the drive

The string is composed of:
Brand, space, commercial reference, space, "V", major revision (1 character), ".", minor revision (maximum 2 characters)
Examples:
Telemeca ATV61H037M3 V1.12

11. 14. Network management

■ Send Heartbeat Time (nciSndHrtBt)

This configuration property defines the period of time for automatic update of all the network output variables: all the output variables (Mandatory, Optional and Manufacturer Network output variables) are transmitted at the end of the period even if they didn't change.

If nciSndHrtBt = 0, the send heartbeat function is not activated.

Name	nciSndHrtBt
SCPT reference	SCPTmaxSendTime
SCPT index	49
SNVT reference	SNVT_time_sec
SNVT index	107
Unit	0.1 sec
Range	0.0 ... 6 553.4 sec
Default value	0 (no automatic update)
Definition	Send Heartbeat Time

Note :

It is mandatory to Power Cycle the drive to activate the function after writing a value different from 0.
As soon as the function is activated, every modification is taken into account immediately (even the deactivation by writing 0).

■ Receive Heartbeat Time (nciRcvHrtBt)

This configuration property is used to control the maximum time that elapses after the last update of at least one of the network variables:
- Drive Speed Setpoint (nviDrvSpeedStpt),
- Drive Speed Setpoint Scaling (nviDrvSpeedScale),
- Frequency setpoint (nviInvSetFreq).

When these variables are not updated within the heartbeat time the drive will trip in [Com.network] (CnF) fault and nviDrvSpeed, nviDrvSpeedScale and nviInvSetFreq will return to their initial value.

It is possible to configure another behaviour of the drive, pease refer to “Communication faults”, page 20

Name	nciRcvHrtBt
SCPT reference	SCPTmaxRcvTime
SCPT index	48
SNVT reference	SNVT_str_asc
SNVT index	36
Unit	0.1 sec
Range	0.1 ... 6 553.4 sec 0.0 (no failure detection)
Default value	0.0 (no failure detection)
Definition	Receive Heartbeat Time

⚠ WARNING

If this function is not properly set up, it may cause an accident.
If you configure the configuration property Receive Heartbeat Time (nciRcvHrtBt) to the value 0.0, the drive will not trip in drive communication fault [Com. network] (CnF).
As soon as the **L**ON**W**ORKS communication comes back, the drive will restart according to the LonWorks control.

This is the default value according to the **L**ON**M**ARK standard.

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

■ Minimum Send Time (nciMinOutTm)

This configuration property defines the period of time between automatic output network variable transmissions.
The function Minimum Send Time (nciMinOutTm) allows to prevent the network overloads by reducing the number of emissions.
During the time (nciMinOutTm), no other variable can be transmitted (except if (nciSndHrtBt) expires). At the end of (nciMinOutTm), all the variables which have changed during this period will be transmitted at the same time.
If the value of the data changes several times during the execution of function Minimum Send Time (MinOutTm), only the last value will be sent.
If nciMinOutTm = 0 each output network variable that changes is sent immediately.
Additionally, this network output variable could also be transmitted according to "Send Heart Beat" (nciSndHrtBt) (Page 50) value.

Name	nciMinOutTm
SCPT reference	SCPTminSendTime
SCPT index	52
SNVT reference	SNVT_time_sec
SNVT index	107
Unit	0.1 sec
Range	0.0 to 6 553.4 sec
0.0 disables transmission	
Default value	0.5 sec
Definition	Minimum Send Time

Note :
There is no need of power cycle to take into account a new value of minimum send time. Every modification is taken into account immediately

■ Power supply start waiting time (nciPwUpOutTm)

Waiting time until the drive starts transmission after reset or power on.
When a setting value is 0, transmission will start after the initialization of the LonWorks card is finished.

Name	nciPwUpOutTm
SCPT reference	
SCPT index	
SNVT reference	SNVT_time_sec
SNVT index	107
Unit	0.1 sec
Range	0.0 to 6 553.4 sec 0.0: Transmission starts immediately after initialisation of the LonWorks card is finished.
Default value	0.5 sec
Definition	Power supply start waiting time

11. 15. Scanner

■ Communication scanner (nviScannerOut1, nvoScannerIn1)

These two network variables may be linked to any parameter of the drive by configuration. Refer to 8. 3. Communication scanner.

These network variables allow exchange of drive parameters that are not listed in the LonWorks interface.

When a Controller Inside card is installed in the drive, they enable the controller to communicate with the application of the Controller Inside card.

Name	nviScannerOut1
SNVT reference	SNVT_count_inc
SNVT index	9
Definition	Communication scanner out 1

Name	nvoScannerIn1
SNVT reference	SNVT_count_inc
SNVT index	9
Definition	Communication scanner in 1

These LonWorks network variables are linked to the drive parameters:
nviScannerOut1: Communication scanner, value of write word 1 (nC1) (12761 = 16#31D9).
nvoScannerIn1: Communication scanner, value of read word 1 (nM1) (12741 = 16#31C5).

⚠ WARNING

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

Any drive parameter can be linked to nviScannerOut1 but the user must follow two rules :

1 The user must not link nviScannerOut1 to any command or speed or frequency setpoint parameter of the drive (CMd, CMI, LFR, LFRD).
2 The user must not link nviScannerOut1 to any setting parameter of the drive that is already linked to a network variable.

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