

Altivar 61/71

Variable speed drives
for synchronous and asynchronous motors

POWERLINK Communication Manual

VW3A3321

07/2013



The information provided in this documentation contains general descriptions and/or technical characteristics of the performance of the products contained herein. This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications. It is the duty of any such user or integrator to perform the appropriate and complete risk analysis, evaluation and testing of the products with respect to the relevant specific application or use thereof. Neither Schneider Electric nor any of its affiliates or subsidiaries shall be responsible or liable for misuse of the information that is contained herein. If you have any suggestions for improvements or amendments or have found errors in this publication, please notify us.

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All pertinent state, regional, and local safety regulations must be observed when installing and using this product. For reasons of safety and to help ensure compliance with documented system data, only the manufacturer should perform repairs to components.

When devices are used for applications with technical safety requirements, the relevant instructions must be followed.

Failure to use Schneider Electric software or approved software with our hardware products may result in injury, harm, or improper operating results.

Failure to observe this information can result in injury or equipment damage.

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Table of Contents



	Safety Information	5
	About the Book	7
Chapter 1	ATV61/71 POWERLINK Overview	11
	Overview	12
	Control terminals	13
	LED indicators	16
	POWERLINK interface	18
Chapter 2	Parameters	19
	Parameters	19
Chapter 3	Glossary	21
	Acronyms	21

Safety Information



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 safety label indicates that an electrical hazard exists, which will result in personal injury if the instructions are not followed.



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

DANGER

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

WARNING

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

CAUTION

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

NOTICE

NOTICE is used to address practices not related to physical injury.

PLEASE NOTE

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

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.

About the Book



At a Glance

Document Scope

The purpose of this document is to:

- show how to install the POWERLINK module on Altivar 61/71.
- show how to configure the drive to use POWERLINK fieldbus.

NOTE: Read and understand this document and all related documents (see below) before installing, operating, or maintaining your ATV61/71.

Validity Note

This documentation is valid for the Altivar 71 POWERLINK fieldbus.

The technical characteristics of the devices described in this manual also appear online. To access this information online:

Step	Action
1	Go to the Schneider Electric home page www.schneider-electric.com .
2	In the Search box type the reference of a product or the name of a product range. <ul style="list-style-type: none">• Do not include blank spaces in the model number/product range.• To get information on a grouping similar modules, use asterisks (*).
3	If you entered a reference, go to the Product datasheets search results and click on the reference that interests you. If you entered the name of a product range, go to the Product Ranges search results and click on the product range that interests you.
4	If more than one reference appears in the Products search results, click on the reference that interests you.
5	Depending on the size of your screen, you maybe need to scroll down to see the data sheet.
6	To save or print a data sheet as a .pdf file, click Download XXX product datasheet .

The characteristics that are presented in this manual should be the same as those characteristics that appear online. In line with our policy of constant improvement, we may revise content over time to improve clarity and accuracy. If you see a difference between the manual and online information, use the online information as your reference.

Related Documents

Title of Documentation	Reference Number
ATV61 Quick Start guide	S1B86974
ATV71 Quick Start guide	S1B86982
ATV61 Installation manual > 75 kW	1760655
ATV71 Installation manual > 75 kW	1755849
ATV61 Installation manual 0.37 to 75 kW	1760643
ATV71 Installation manual 0.37 to 75 kW	1755843
ATV61 Programming manual	1760649
ATV71 Programming manual	1755855
ATV61 Communication Parameters manual	1760661
ATV71 Communication Parameters manual	1755861
ATV61/71/LIFT safety manual	S1A91443
XDD File	NA
ATV61/71 certificates, see www.schneider-electric.com	NA

You can download these technical publications and other technical information from our website at www.schneider-electric.com.

Product Related Information

The information provided in this manual supplements the product manuals.

Carefully read the product manuals before using the product.

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

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Only appropriately trained persons who are familiar with and understand the contents of this manual and all other pertinent product documentation and who have received safety training to recognize and avoid hazards involved are authorized to work on and with this product system. Installation, adjustment, repair, and maintenance must be performed by qualified personnel.
- The system integrator is responsible for compliance with all local and national electrical code requirements as well as all other applicable regulations with respect to grounding of all equipment.
- Many components of the product, including the printed circuit boards, operate with mains voltage. Do not touch. Use only electrically insulated tools.
- Do not touch unshielded components or terminals with voltage present.
- Motors can generate voltage when the shaft is rotated. Prior to performing any type of work on the product system, block the motor shaft to prevent rotation.
- AC voltage can couple voltage to unused conductors in the motor cable. Insulate both ends of unused conductors of the motor cable.
- Do not short across the DC bus terminals or the DC bus capacitors or the braking resistor terminals.
- Before performing work on the product system:
 - Disconnect all power, including external control power that may be present.
 - Place a "Do Not Turn On" label on all power switches.
 - Lock all power in the open position.
 - Wait 15 minutes to allow the DC bus capacitors to discharge. The DC bus LED is not an indicator of the absence of DC bus voltage that can exceed 800 Vdc. Measure the voltage on the DC bus between the DC bus terminals using a properly rated voltmeter to verify that the voltage is ≤ 42 Vdc
 - Measure the voltage on the DC bus between the DC bus terminals using a properly rated voltmeter to verify that the voltage is ≤ 42 Vdc
 - If the DC bus capacitors do not discharge properly, contact your local Schneider Electric representative. Do not repair or operate the product.

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

DANGER

UNINTENDED EQUIPMENT OPERATION

- Read and understand this manual before installing or operating the drive.
- Any changes made to the parameter settings must be performed by qualified personnel.

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

DANGER

DAMAGED DRIVE EQUIPMENT

Do not operate or install any drive or drive accessory that appears damaged.

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

WARNING

LOSS OF CONTROL

- The designer of any control scheme must consider the potential failure modes of control paths and, for critical control functions, provide a means to achieve a safe state during and after a path failure. Examples of critical control functions are emergency stop, overtravel stop, power outage, and restart.
- Separate or redundant control paths must be provided for critical control functions.
- System control paths may include communication links. Consideration must be given to the implications of unanticipated transmission delays or failures of the link.
- Observe all accident prevention regulations and local safety guidelines.¹
- Each implementation of the product must be individually and thoroughly tested for proper operation before being placed into service.

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

1. For USA: Additional information, refer to NEMA ICS 1.1 (latest edition), "Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control" and to NEMA ICS 7.1 (latest edition), "Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable Speed Drive Systems."

Qualification of personnel

Only appropriately trained persons who are familiar with and understand the contents of this manual and all other pertinent product documentation are authorized to work on and with this product. In addition, these persons must have received safety training to recognize and avoid hazards involved. These persons must have sufficient technical training, knowledge, and experience and be able to foresee and detect potential hazards that may be caused by using the product, by changing the settings and by the mechanical, electrical, and electronic equipment of the entire system in which the product is used.

All persons working on and with the product must be fully familiar with all applicable standards, directives, and accident prevention regulations when performing such work.

Intended use

The functions described in this manual are only intended for use with the basic product; you must read and understand the appropriate product manual. The product may only be used in compliance with all applicable safety regulations and directives, the specified requirements, and the technical data. Prior to using the product, you must perform a risk assessment in view of the planned application. Based on the results, the appropriate safety measures must be implemented. Since the product is used as a component in an entire system, you must ensure the safety of persons by means of the design of this entire system (for example, machine design).

Operate the product only with the specified cables and accessories. Use only genuine accessories and spare parts. Any use other than the use explicitly permitted is prohibited and can result in hazards. Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. The product must NEVER be operated in explosive atmospheres (hazardous locations, Ex areas).

Chapter 1

ATV61/71 POWERLINK Overview

What Is in This Chapter?

This chapter contains the following topics:

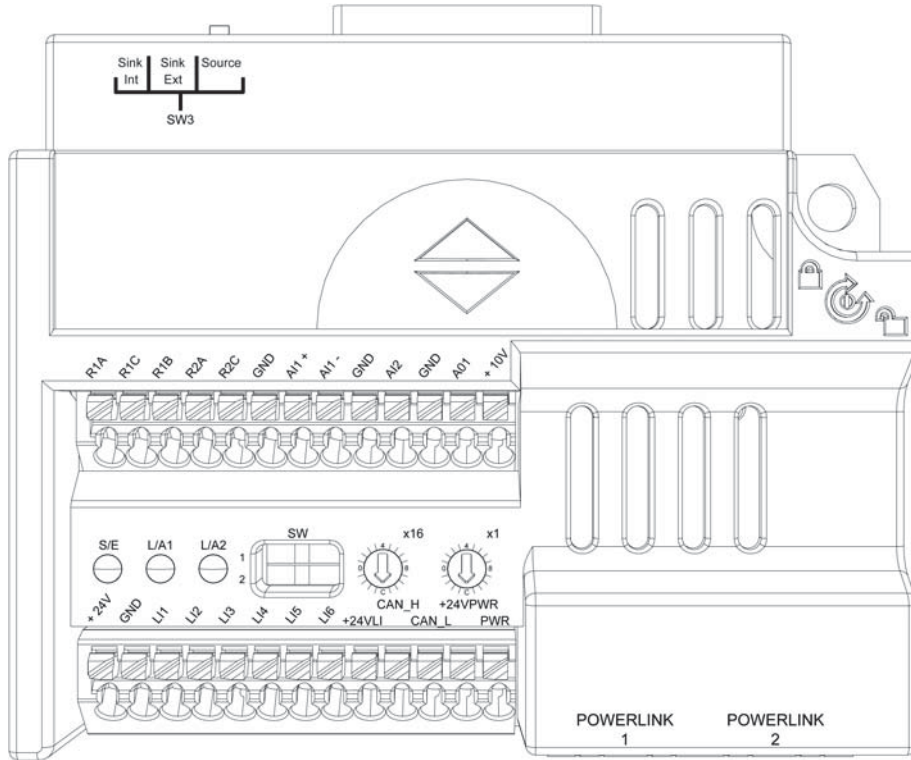
Topic	Page
Overview	12
Control terminals	13
LED indicators	16
POWERLINK interface	18

Overview

Description

The **VW3A3321** communication card is used to connect an ATV61/71 drive to Ethernet POWERLINK fieldbus system.

Description



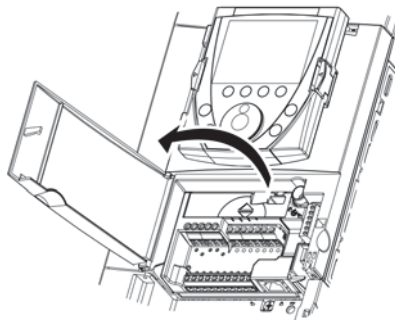
Software and protocols supported

NOTE: The **VW3A3321** POWERLINK card is compliant with an ATV61/71.

Control terminals

Access

To access the control terminals, open the cover on the control front panel.



Removing the terminal card

⚠ CAUTION

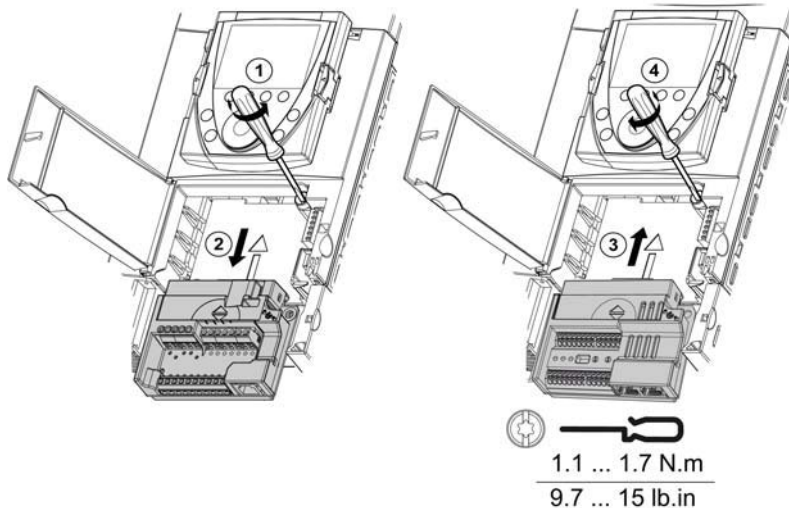
IMPROPERLY SECURED TERMINAL CARD

When replacing the control terminal card, it is essential to fully tighten the captive screw.

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

To make it easier to wire the drive control section, the control terminal card can be removed.

Step	Action
1	Undo the screw until the spring is fully extended.
2	Remove the card by sliding it downwards.
3	Put the new card by sliding it upwards.
4	Aim the screw



Cable cross section

Push-in connection terminal

Conductor cross section		mm ²	AWG
Solid	-	Min. 0.5 mm ²	min. AWG 20
Stranded		Max. 1.5 mm ²	max. AWG 15
Stranded	With ferrule without plastic sleeve	Min. 0.5 mm· Max. 1 mm·	min. AWG 20 max. AWG 17
	With ferrule with plastic sleeve	Min. 0.5 mm· Max. 0.5 mm·	min. AWG 20 max. AWG 20

Characteristics and functions of the control terminals

Terminal	Function	Electrical characteristics
R1A R1B R1C	Common point C/O contact (R1C) of programmable relay R1	<ul style="list-style-type: none"> Minimum switching capacity: 3 mA for 24 Vdc Maximum switching capacity on resistive load: 5 A for 250 Vac or 30 Vdc Maximum switching current on inductive load ($\cos \varphi = 0.4$ L/R = 7 ms): 2 A for 250 Vac or 30 Vdc Reaction time: 7 ± 0.5 ms Service life: 100,000 operations at max. switching power
R2A R2C	N/O contact of R2 programmable relay	<ul style="list-style-type: none"> Reaction time: 7 ± 0.5 ms Service life: 100,000 operations at max. switching power
GND	Analog I/O common	0 V
AI1+ AI1 -	Differential analog input AI1	<ul style="list-style-type: none"> -10 Vdc to +10 Vdc (max. safe voltage 24 V) Reaction time: 2 ± 0.5 ms, 11-bit resolution + 1 sign bit
GND	Analog I/O common	0 V
AI2	Depending on software configuration: Analog voltage input Or Analog current input	<ul style="list-style-type: none"> -10 Vdc to +10 Vdc (max. safe voltage 24 V), impedance 30 kΩ Or Analog input X - Y mA, X and Y can be programmed 0...20 mA Impedance 250 Ω Reaction time: 2 ± 0.5 ms.
GND	Analog I/O common	0 V
AO1	Depending on software configuration: Analog voltage output or Analog current output or Logic output	<ul style="list-style-type: none"> Analog output 0 Vdc to +10 Vdc, load impedance greater than 50 kΩ Or Analog output X - Y mA, X and Y can be programmed 0...20 mA Maximum load impedance 500 Ω 10-bit resolution, reaction time: 2 ± 0.5 ms Or logic output: 0 V/+10 V or 0 mA/20 mA.
+ 10 V	+ 10 Vdc power supply for reference potentiometer 1 to 10 kW	<ul style="list-style-type: none"> +24 Vdc (10.5 ± 0.5 V) 10 mA max.
+ 24 V	Input for external +24 Vdc control power supply	<ul style="list-style-type: none"> +24 Vdc (min. 19 V, max. 30 V) Power 30 Watts
GND	Logic input common and 0 V of P24 external power supply	0 V
LI1 LI2 LI3 LI4 LI5	Programmable logic inputs	<ul style="list-style-type: none"> +24 Vdc (max. 30 V) Reaction time: 2 ± 0.5 ms
SW3	Switch 3	<p>State 0:</p> <ul style="list-style-type: none"> Source (factory setting) ≤ 5 Vdc Sink Int or Sink Ext ≥ 16 Vdc <p>State 1:</p> <ul style="list-style-type: none"> Source (factory setting) ≥ 11 Vdc Sink Int or Sink Ext ≤ 10 Vdc

Terminal	Function	Electrical characteristics
LI6	Depending on the position of switch SW1: <ul style="list-style-type: none"> ● Programmable logic input or <ul style="list-style-type: none"> ● Input for PTC probes 	Switch SW1 in right position → LI (factory setting) <ul style="list-style-type: none"> ● Same characteristics as logic inputs LI1 to LI5 Or Switch SW1 in left position → PTC <ul style="list-style-type: none"> ● Trip threshold 3 kΩ, reset threshold 1.8 kΩ ● Short-circuit detection threshold < 50 Ω
+ 24 VLI	+24 Vdc logic input power supply NOTE: Only switch SW3 with the power off.	Switch SW3 in Source or Sink Int position <ul style="list-style-type: none"> ● +24 Vdc power supply (min. 21 V, max. 27 V), protected against short-circuits and overloads Switch SW3 in Sink Ext position <ul style="list-style-type: none"> ● Input for external +24 Vdc power supply for the logic inputs
CAN_L	CANopen Low	-
CAN_H	CANopen High	Monitoring only
24 VPWR	24 Vdc power supply for Power Removal, safety function input	Monitoring only
PWR	Power Removal safety function input When PWR is not connected to the 24 V, the motor cannot be started (compliance with functional safety standard EN 954-1, ISO 13849-1 and IEC/EN 61508).	<ul style="list-style-type: none"> ● 24 Vdc Power supply (max. 30 V) ● State 0 if < 2 V, state 1 if > 17 V ● Reaction time: 10 ms

LED indicators

Description



Operation

Figure	LED	Color	Status	Description
Status/Error	S/E	Green / red	-	Status/Error LED.
Link/A1	L/A1	Green	On	A link to the remote station has been established
			Blinking	A link to the remote station has been established. The LED blinks when Ethernet activity is present on the bus.
Link/A2	L/A2	Green	On	A link to the remote station has been established
			Blinking	A link to the remote station has been established. The LED blinks when Ethernet activity is present on the bus.

S/E-LED description

The status/error LED is a green/red dual LED. The color green (status) is superimposed on the color red (error detected)

Figure	Description
On	<p>The POWERLINK interface has encountered an error (failed Ethernet frames, increased number of collisions on the network, etc.). If an error occurs in the following states, then the green LED blinks over the red LED:</p> <ul style="list-style-type: none"> ● BASIC_ETHERNET ● PRE_OPERATIONAL_1 ● PRE_OPERATIONAL_2 ● READY_TO_OPERATE <p>① Status ok : Green ② Status Error: Red ③ LED S/E</p>
OFF NOT_ACTIVE	<p>The bus is monitored for POWERLINK frames. If a frame is not received within the configured time window (timeout), the drive goes directly into BASIC_ETHERNET status (flickering). If, however, POWERLINK communication is detected during this time, the CN goes directly into the PRE_OPERATIONAL_1 status (single flash).</p>
Blinking green (approx. 10 Hz) BASIC_ETHERNET	<p>The drive is in BASIC_ETHERNET status, and is operated purely as an Ethernet TCP/IP device. If POWERLINK communication is detected while in this status, the CN goes into the PRE_OPERATIONAL_1 state (single flash). A lit red LED in this state indicates manager failure.</p>
Single flash (approx. 1 Hz) PRE_OPERATIONAL_1	<p>The drive status is PRE_OPERATIONAL_1. The CN waits until it receives an SoC frame and then switches to PRE_OPERATIONAL_2 status (double flash). A lit red LED in this state indicates manager failure.</p>

Figure	Description
Double flash (approx. 1 Hz) PRE_OPERATIONAL_2	The drive status is PRE_OPERATIONAL_2. In this status the CN is normally configured by the manager. After this, a command changes the status to READY_TO_OPERATE (triple flash). A lit red LED in this state indicates manager failure.
Triple flash (approx. 1 Hz) READY_TO_OPERATE	The drive status is READY_TO_OPERATE. The configuration of the CN is complete. Normal cyclic and asynchronous communication. The PDO data sent corresponds to the PDO mapping used. However, cyclic data is not yet evaluated. A lit red LED in this state indicates manager failure.
On - OPERATIONAL	The drive status is OPERATIONAL.
Blinking (approx. 2.5 Hz) STOPPED	The drive status is STOPPED. No output data is produced and no input data is received. Only the appropriate command from the manager can enter or leave this state.

System interruption indication

Incorrect configuration or internal fault detected, can trip a system interruption. The error is displayed via the red error LED using 4 switch-on phases. The switch-on phases are either 150 ms or 600 ms long. Error code outputs are repeated cyclically after 2000 ms.

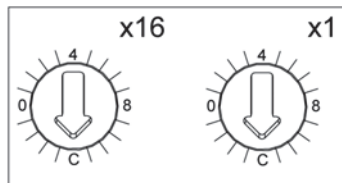
Description	Alarm code display by the red status LED									
RAM error detected	X	X	X	Y	-	X	X	X	Y	-
Bus Error detected	Y	X	X	X	-	Y	X	X	X	-

Legend:

- X: LED ON for 150 ms
- Y: LED ON for 600 ms
- -: LED OFF for 2000 ms

Station Number

The station number for the POWERLINK station is set using the 2 number switches. Station numbers are permitted between \$01 and \$EF.



Switch position	Description
\$00	Reserved, switch position is not permitted.
\$01 - \$EF	Station number for POWERLINK station. Operation as controlled node.
\$F0 - \$FF	Reserved, switch position is not permitted.

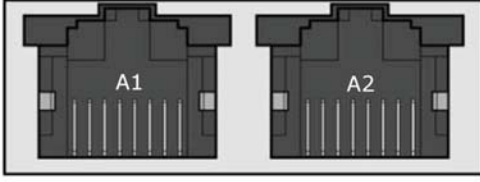
POWERLINK interface

POWERLINK Module Mounting

- Check that the card catalog number marked on the label is the same as that on the delivery note corresponding to the purchase order.
- Remove the communication module from its packaging and check that it has not been damaged in transit.

RJ45 Socket port

The VW3A3321 option card is equipped with 2 RJ45 female sockets for the POWERLINK connection. The following table describes the pin out of the ATV61/71 RJ45 connector:

Interface	Pin Assignments		
Application interface POWERLINK	PIN	Ethernet	
 <p>8 7 6 5 4 3 2 1 8 7 6 5 4 3 2 1</p> <p>Port A1 / Port A2</p>	1	RxD	Receive Data
	2	RxD\	Receive Data\
	3	TxD	Transmit Data
	4	Termination	-
	5	Termination	-
	6	TxD\	Transmit Data\
	7	Termination	-
	8	Termination	-

Cable Specifications

- Connection accessories may be ordered separately (consult our catalog).
- Use the Schneider Electric cable with 2 pairs of shielded twisted conductors (reference: TSXCSA100, TSXCSA200, TSXCSA500).
- Keep the Modbus cable separated from the power cables (30 cm (11.8 in.) minimum).
- Make any crossovers of fieldbus cable and the power cables at right-angles, if necessary.

For more information, refer to the TSX DG KBL E manual: "Electromagnetic compatibility of industrial networks and fieldbuses".

Chapter 2

Parameters

Parameters

Factory setting parameters

When using POWERLINK, the drive operates a setting at the first connection of the module. The setting is changed automatically for following parameters Fr1, Cd1, Cd2.

The settings will be the following in the Command Menu **[Command]** (C L L -)

Menu	Parameter	Value
[1.6 COMMAND] (C L L -)	[Ref.1 channel] (F r 1)	[CANopen] (C H n)
	[Cmd channel 1] (C d 1)	[CANopen] (C H n)
	[Cmd channel 2] (C d 2)	[Terminals] (T E r)

From the drive side, POWERLINK channel is equivalent to the CANopen channel. Set CANopen channel to select POWERLINK channel during drive configuration. POWERLINK communication interruptions will be shown as CANopen communication interruption on the drive.

Downloading the XDD File

The XDD file of the **VW3A3321** communication card can be downloaded from www.schneider-electric.com

Chapter 3

Glossary

Acronyms

Term	Definition
PLC	Programmable Logic Controller
PDO	Process Data Objects
LED	Light Emitting Diode
CAN	Controller Area Network is an internally standardized serial bus system

