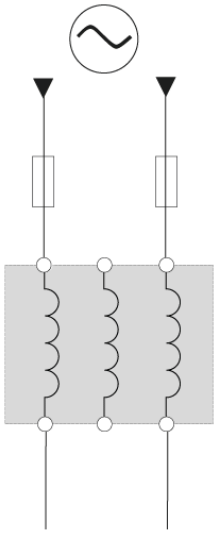
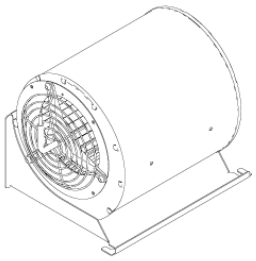
Altivar process ATV630
Variable Speed Drives

Single Phase S7B (Blower drive setup) Application note

10/2019







EAV64364O1

www.schneider-electric.com

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 contained herein. If you have any suggestions for improvements or amendments or have found errors in this publication, please notify us.

You agree not to reproduce, other than for your own personal, noncommercial use, all or part of this document on any medium whatsoever without permission of Schneider Electric, given in writing. You also agree not to establish any hypertext links to this document or its content. Schneider Electric does not grant any right or license for the personal and noncommercial use of the document or its content, except for a non-exclusive license to consult it on an "as is" basis, at your own risk. All other rights are reserved.

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.

© 2019 Schneider Electric. All rights reserved.

Table of Contents

	Safety Information	**5**
	About the Book	**11**
Chapter 1	**Application Description and Settings**	**15**
	Application Description	16
	Settings	18

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, service, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



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



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

⚠ DANGER

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

⚠ WARNING

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

⚠ CAUTION

CAUTION indicates a hazardous situation which, if not avoided, **could 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.

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 product may only be used in compliance with all applicable safety standard and local regulations and directives, the specified requirements and the technical data. The product must be installed outside the hazardous ATEX zone. 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). Any use other than the use explicitly permitted is prohibited and can result in hazards.

Product Related Information

⚠⚠ 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 drive 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.
- Only use properly rated, electrically insulated tools and measuring equipment.
- 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 drive 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 drive system:
  - Disconnect all power, including external control power that may be present. Take into account that the circuit breaker or main switch does not de-energize all circuits.
  - Place a **Do Not Turn On** label on all power switches related to the drive system.
  - Lock all power switches in the open position.
  - Wait 15 minutes to allow the DC bus capacitors to discharge.
  - Follow the instructions given in the chapter "Verifying the Absence of Voltage" in the installation manual of the product.
- Before applying voltage to the drive system:
  - Verify that the work has been completed and that the entire installation cannot cause hazards.
  - If the mains input terminals and the motor output terminals have been grounded and short-circuited, remove the ground and the short circuits on the mains input terminals and the motor output terminals.
  - Verify proper grounding of all equipment.
  - Verify that all protective equipment such as covers, doors, grids is installed and/or closed.

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

Damaged products or accessories may cause electric shock or unanticipated equipment operation.

⚠⚠ DANGER

ELECTRIC SHOCK OR UNANTICIPATED EQUIPMENT OPERATION

Do not use damaged products or accessories.

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

Contact your local Schneider Electric sales office if you detect any damage whatsoever.

This equipment has been designed to operate outside of any hazardous location. Only install this equipment in zones known to be free of a hazardous atmosphere.

⚠ DANGER

POTENTIAL FOR EXPLOSION

Install and use this equipment in non-hazardous locations only.

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

Your application consists of a whole range of different interrelated mechanical, electrical, and electronic components, the drive being just one part of the application. The drive by itself is neither intended to nor capable of providing the entire functionality to meet all safety-related requirements that apply to your application. Depending on the application and the corresponding risk assessment to be conducted by you, a whole variety of additional equipment is required such as, but not limited to, external encoders, external brakes, external monitoring devices, guards, etc.

As a designer/manufacturer of machines, you must be familiar with and observe all standards that apply to your machine. You must conduct a risk assessment and determine the appropriate Performance Level (PL) and/or Safety Integrity Level (SIL) and design and build your machine in compliance with all applicable standards. In doing so, you must consider the interrelation of all components of the machine. In addition, you must provide instructions for use that enable the user of your machine to perform any type of work on and with the machine such as operation and maintenance in a safe manner.

The present document assumes that you are fully aware of all normative standards and requirements that apply to your application. Since the drive cannot provide all safety-related functionality for your entire application, you must ensure that the required Performance Level and/or Safety Integrity Level is reached by installing all necessary additional equipment.

⚠ WARNING

INSUFFICIENT PERFORMANCE LEVEL/SAFETY INTEGRITY LEVEL AND/OR UNINTENDED EQUIPMENT OPERATION

- Conduct a risk assessment according to EN ISO 12100 and all other standards that apply to your application.
- Use redundant components and/or control paths for all critical control functions identified in your risk assessment.
- If moving loads can result in hazards, for example, slipping or falling loads, operate the drive in closed loop mode.
- Verify that the service life of all individual components used in your application is sufficient for the intended service life of your overall application.
- Perform extensive commissioning tests for all potential error situations to verify the effectiveness of the safety-related functions and monitoring functions implemented, for example, but not limited to, speed monitoring by means of encoders, short circuit monitoring for all connected equipment, correct operation of brakes and guards.
- Perform extensive commissioning tests for all potential error situations to verify that the load can be brought to a safe stop under all conditions.

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

Drive systems may perform unexpected movements because of incorrect wiring, incorrect settings, incorrect data or other errors.

⚠ WARNING

UNANTICIPATED EQUIPMENT OPERATION

- Carefully install the wiring in accordance with the EMC requirements.
- Do not operate the product with unknown or unsuitable settings or data.
- Perform a comprehensive commissioning test.

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

⚠ 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.

The temperature of the products described in this manual may exceed 80 °C (176 °F) during operation.

⚠ WARNING

HOT SURFACES

- Ensure that any contact with hot surfaces is avoided.
- Do not allow flammable or heat-sensitive parts in the immediate vicinity of hot surfaces.
- Verify that the product has sufficiently cooled down before handling it.
- Verify that the heat dissipation is sufficient by performing a test run under maximum load conditions.

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

Machines, controllers, and related equipment are usually integrated into networks. Unauthorized persons and malware may gain access to the machine as well as to other devices on the network/fieldbus of the machine and connected networks via insufficiently secure access to software and networks.

⚠ WARNING

UNAUTHORIZED ACCESS TO THE MACHINE VIA SOFTWARE AND NETWORKS

- In your hazard and risk analysis, consider all hazards that result from access to and operation on the network/fieldbus and develop an appropriate cyber security concept.
- Verify that the hardware infrastructure and the software infrastructure into which the machine is integrated as well as all organizational measures and rules covering access to this infrastructure consider the results of the hazard and risk analysis and are implemented according to best practices and standards covering IT security and cyber security (such as: ISO/IEC 27000 series, Common Criteria for Information Technology Security Evaluation, ISO/ IEC 15408, IEC 62351, ISA/IEC 62443, NIST Cybersecurity Framework, Information Security Forum - Standard of Good Practice for Information Security).
- Verify the effectiveness of your IT security and cyber security systems using appropriate, proven methods.

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

⚠ WARNING

LOSS OF CONTROL

Perform a comprehensive commissioning test to verify that communication monitoring properly detects communication interruptions

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

NOTICE

DESTRUCTION DUE TO INCORRECT MAINS VOLTAGE

Before switching on and configuring the product, verify that it is approved for the mains voltage.

Failure to follow these instructions can result in equipment damage.

About the Book

At a Glance

Document Scope

The purpose of this document is to show how to supply an ATV630 frame size 7B internal three-phase blower by a single-phase supply.

The document is structured in two main parts which are:

- Application Description: this part provides the application and architecture selected for this application note,
- Settings: this part provides the steps to achieve before supplying an ATV630 frame size 7B internal blower by an external supply.

Validity Note

Original instructions and information given in the present document have been written in English (before optional translation).

This document is valid for the Altivar Process ATV630 single phase drives of frame size 7B.

For product compliance and environmental information (RoHS, REACH, PEP, EOLI, etc.), go to *www.schneider-electric.com/green-premium*.

The technical characteristics of the devices described in the present document also appear online. To access the 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. ● Do not include blank spaces in the reference or product range. ● To get information on 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 may need to scroll down to see the datasheet.
6	To save or print a datasheet as a .pdf file, click **Download XXX product datasheet**.

The characteristics that are presented in the present document 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 document and online information, use the online information as your reference.

Related Documents

Use your tablet or your PC to quickly access detailed and comprehensive information on all our products on www.schneider-electric.com.

The internet site provides the information you need for products and solutions:

- The whole catalog for detailed characteristics and selection guides,
- The CAD files to help design your installation, available in over 20 different file formats,
- All software and firmware to maintain your installation up to date,
- A large quantity of White Papers, Environment documents, Application solutions, Specifications... to gain a better understanding of our electrical systems and equipment or automation,
- And finally all the User Guides related to your drive, listed below:

Title of Documentation	Catalog Number
Digital Catalog for Industrial Automation	*Digit-Cat*
Catalog: Altivar Process ATV600 variable speed drives	*DIA2ED2140502EN* (English), *DIA2ED2140502FR* (French)
ATV600/ATV900 Getting Started - Video	FAQ *FA364431* (English) 
ATV600 Getting Started	*EAV63253* (English), *EAV63254* (French), *EAV63255* (German), *EAV63256* (Spanish), *EAV63257* (Italian), *EAV64298* (Chinese), *EAV63253PT* (Portuguese), *EAV63253TR* (Turkish)
ATV600 Getting Started Annex (SCCR)	*EAV64300* (English)
ATV630, ATV650 Installation Manual	*EAV64301* (English), *EAV64302* (French), *EAV64306* (German), *EAV64307* (Spanish), *EAV64310* (Italian), *EAV64317* (Chinese), *EAV64301PT* (Portuguese), *EAV64301TR* (Turkish)
ATV600 Programming Manual	*EAV64318* (English), *EAV64320* (French), *EAV64321* (German), *EAV64322* (Spanish), *EAV64323* (Italian), *EAV64324* (Chinese), *EAV64318PT* (Portuguese), *EAV64318TR* (Turkish)
SoMove: FDT	*SoMove_FDT* (English, French, German, Spanish, Italian, Chinese)
ATV600: DTM	*ATV6xx_DTM_Library_EN* (English - to be installed first), *ATV6xx_DTM_Lang_FR* (French), *ATV6xx_DTM_Lang_DE* (German), *ATV6xx_DTM_Lang_SP* (Spanish), *ATV6xx_DTM_Lang_IT* (Italian), *ATV6xx_DTM_Lang_CN* (Chinese)

(Other option manuals and Instruction sheets are available on *www.schneider-electric.com*)

Title of Documentation	Reference Number
Digital Catalog for Industrial Automation	*Digit-Cat*
ATV320 Catalog	*DIA2ED2160311EN* (English), *DIA2ED2160311FR* (French)
ATV320 Getting Started	*NVE21763* (English), *NVE21771* (French), *NVE21772* (German), *NVE21773* (Spanish) *NVE21774* (Italian), *NVE21776* (Chinese), *NVE21763PT* (Portuguese)
ATV320 Getting Started Annex (SCCR)	*NVE21777* (English)
ATV320 Installation manual	*NVE41289* (English), *NVE41290* (French), *NVE41291* (German), *NVE41292* (Spanish), *NVE41293* (Italian), *NVE41294* (Chinese), *NVE41289PT* (Portuguese), *NVE41289TR* (Turkish)
ATV320 Programming manual	*NVE41295* (English), *NVE41296* (French), *NVE41297* (German), *NVE41298* (Spanish), *NVE41299* (Italian), *NVE41300* (Chinese)
SoMove: FDT	*SoMove_FDT* (English, French, German, Spanish, Italian, Chinese)
ATV320: DTM	*ATV320_DTM_Library* (English, French, German, Spanish, Italian, Chinese)

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

Terminology

The technical terms, terminology, and the corresponding descriptions in this manual normally use the terms or definitions in the relevant standards.

In the area of drive systems this includes, but is not limited to, terms such as **error, error message, failure, fault, fault reset, protection, safe state, safety function, warning, warning message**, and so on.

Among others, these standards include:

- IEC 61800 series: Adjustable speed electrical power drive systems
- IEC 61508 Ed.2 series: Functional safety of electrical/electronic/programmable electronic safety-related
- EN 954-1 Safety of machinery - Safety related parts of control systems
- ISO 13849-1 & 2 Safety of machinery - Safety related parts of control systems
- IEC 61158 series: Industrial communication networks - Fieldbus specifications
- IEC 61784 series: Industrial communication networks - Profiles
- IEC 60204-1: Safety of machinery - Electrical equipment of machines – Part 1: General requirements

In addition, the term **zone of operation** is used in conjunction with the description of specific hazards, and is defined as it is for a **hazard zone** or **danger zone** in the EC Machinery Directive (2006/42/EC) and in ISO 12100-1.

Contact Us

Select your country on:

www.schneider-electric.com/contact

Schneider Electric Industries SAS

Head Office

35, rue Joseph Monier

92500 Rueil-Malmaison

France

Chapter 1
Application Description and Settings

What Is in This Chapter?

This chapter contains the following topics:

Topic	Page
Application Description	16
Settings	18

Application Description

Introduction

The method to generate a three-phase supply from a single-phase one is by using an auxiliary drive (Blower supply).

This Application Note describes how to supply the internal blower of an ATV630C25N4MN or ATV630C31N4MN by an ATV320U30N4•.

In this example the internal blower of an ATV630 (ATV630C31N4MN) is supplied by an ATV320 (ATV320U30N4B). Additional components are indicated. A synchronization scheme between the main drive and the blower supply is proposed. This synchronization allows to turn the blower on-off synchronized with the run order of the main drive.

The following parts of this Application Note describe the commissioning procedure for this architecture.

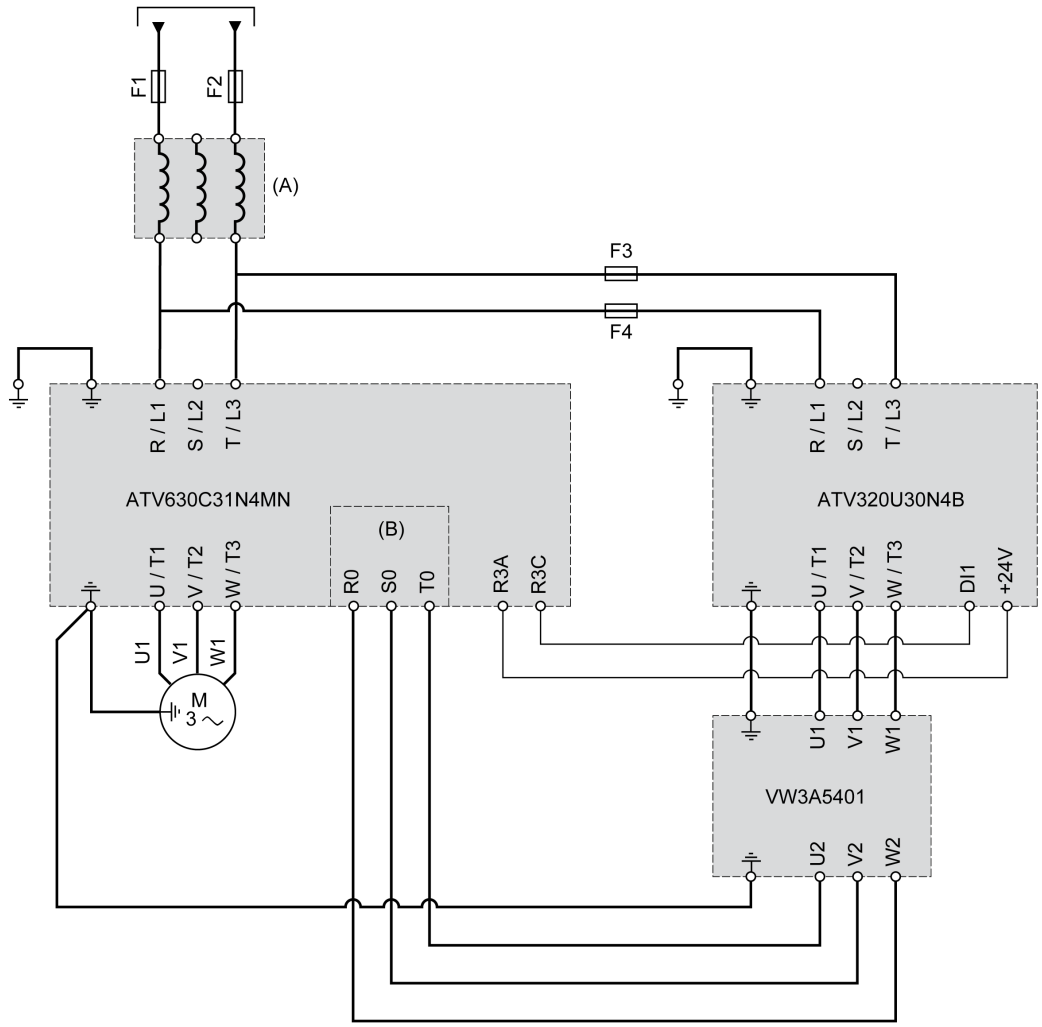
Example of Architecture

The architecture used as an example for this application note is the following.

Short description	Catalog number	Quantity
Main variable speed drive (refer to getting started manual for output current in single-phase supply application)	ATV630C25N4MN or ATV630C31N4MN	1
AC line choke	Inductance per phase: 38-50 µH Rated current: > 500 A rms Saturation current: > 1000 A pk	1
Branch circuit protection for the main drive	Refer to the ATV600 Getting started annex *EAV64300* (English)	
Auxiliary variable speed drive (Blower supply)	ATV320U30N4B or ATV320U30N4C **NOTE:** Use only these catalog numbers.	1
Output sinus filter (1)	*VW3A5401*	1
Branch circuit protection for the auxiliary drive	Refer to the ATV320 Getting started annex *NVE21777* (English)	
(1) The internal three-phase blower used in our drives has not been designed to withstand high dV/dt nor high THDv. So an additional output sinus-filter is required in conjunction with the blower supply.		

NOTE: Please refer to the ATV630 installation manual *(see page 12)* (Connecting Fans for a Separate Power Supply on frame sizes 7A and 7B) for information on how to supply the internal blower from an external supply.

The following diagram shows the architecture used in this application note.



(A) Line choke. Please refer to the **Example of Architecture** section *(see page 16)*.

(B) Fan power supply terminals. Please refer to the ATV630-650 Installation manual *(see page 12)*.

F1, F2 Fuses. Input line protection for the main drive. Please refer to the ATV600 Getting started annex *EAV64300*

F3, F4 Fuses. Input line protection for the auxiliary drive. Please refer to the ATV320 Getting started annex *NVE21777*.

Settings

Introduction

This section describes the initial steps to perform before supplying an ATV630C25N4MN or AT630C31N4MN internal blower by an ATV320U30N4•.

The values of parameters given in this part correspond to the architecture selected for this Application Note.

NOTE:

- Settings may vary according to the architecture needs.
- Before starting the drive configuration. Ensure that the drive is reset to factory settings.

Blower Characteristics

The following table shows two different possibilities depending on the mains voltage they are connected.

Rated nominal motor voltage	Rated motor power		Nominal motor current		Nominal motor speed	
	1 blower	2 blowers (1)	1 blower	2 blowers (1)	1 blower	2 blowers (1)
Vdc	kW (HP)	kW (HP)	A	A	rpm	rpm
400	0.5 (0.67)	1 (0.67)	0.78	1.56	2700	2700
480	0.56 (0.75)	1.12 (0.75)	0.76	1.52	2960	2960
(1) There are two similar blowers inside of the ATV630C25N4MN or ATV630C31N4MN.						

Multiply by 2 the nominal power and the nominal current to obtain the equivalent characteristics for 2 identical blowers. The other parameters are not impacted.

ATV320 Parameter Configuration

Perform the following instructions to set the ATV320 parameters. Refer to the ATV320 Programming manual *(see page 12)*.

Step	Action	Value
1	Perform a reset to “Factory Settings (All)	–
2	Set **[Std motor frequency]** bFr	60Hz NEMA

Set the **Motor Data** as follows:

Step	Parameter	Value
1	**[Rated motor power]** nPr	1.5 HP
2	**[Nominal motor current]** ncr	1.7 A
3	**[Noiminal motor speed]** nSP	2960 rpm
4	**[Motor thermal current]** ItH	1.5 A

NOTE: Do not perform an Autotune. Performing an autotune can trigger an error oCF due to the sinus filter.

Set up the **drive parameters** as follows:

Step	Action	Value
1	**[Low speed]** LSP	60 Hz
2	**[Internal Current Limit]** cLI	2 A
3	**[Switch. Freq type]** SFt	SFr Type 2
4	**[Type of 2 wire control]** tCt	Level
5	**[Output phase loss]** oPL **NOTE:** This is needed if a drive is being used with a small motor.	No
6	**[Auto DC injection]** AdC	No

ATV630 Parameter Configuration

Perform the following instructions to set the ATV630. Refer to the ATV600 Programming manual *(see page 12)*.

Step	Action	Comment
1	Enter the **[R3 Configuration]** r 3 - menu	**[Complete settings]** ➡ **[Input/Output]** ➡ **[Relay]** ➡ **[R3 configuration]**
2	Set **[R3 Assignment]** r 3 to r u n.	This allows the blower to run if the motor is running.