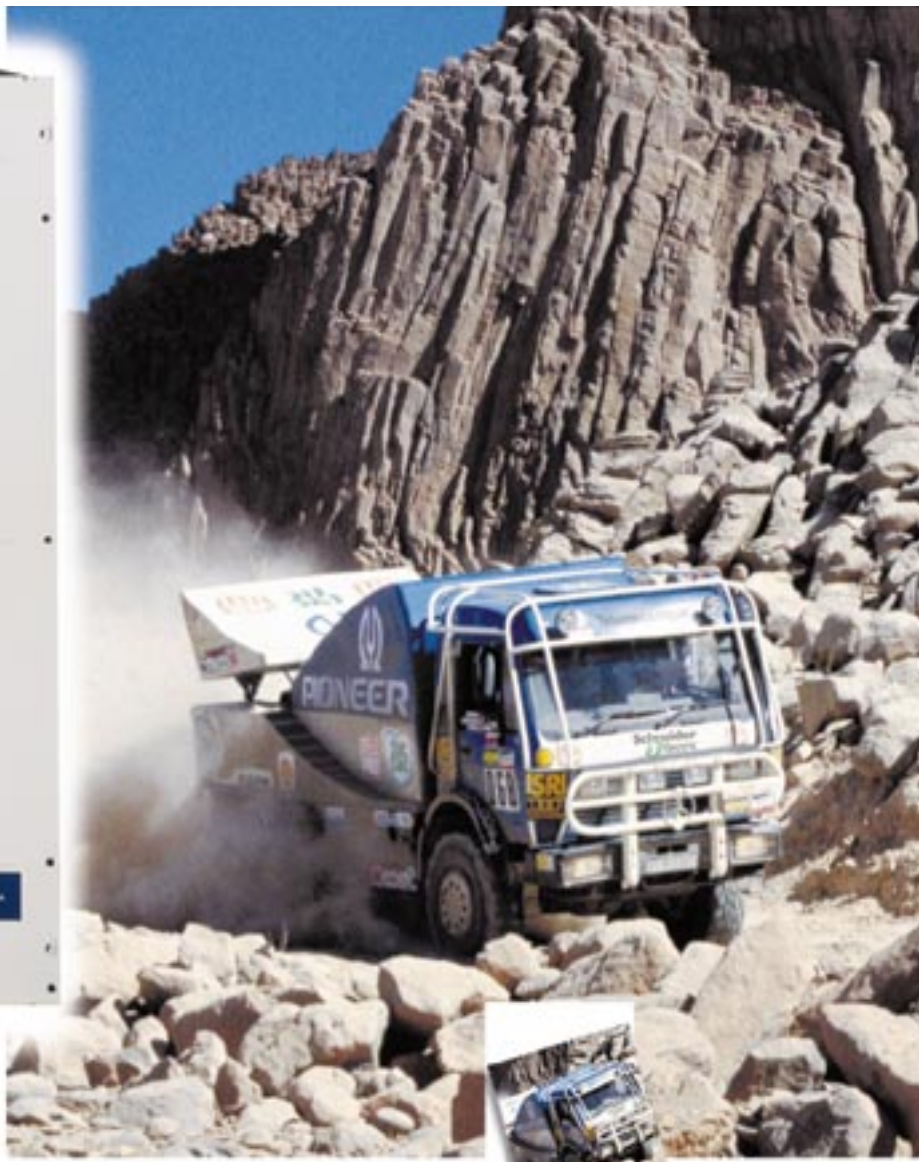
Telemecanique

Altivar 68,
giving you
the *power*

Catalogue
December
99



3-phase speed controller
75 kW to 630 kW, 400/500V

Merlin Gerin
Modicon
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Schneider Electric
We do more with electricity ?

Variable speed controllers for asynchronous motors

Altivar 68

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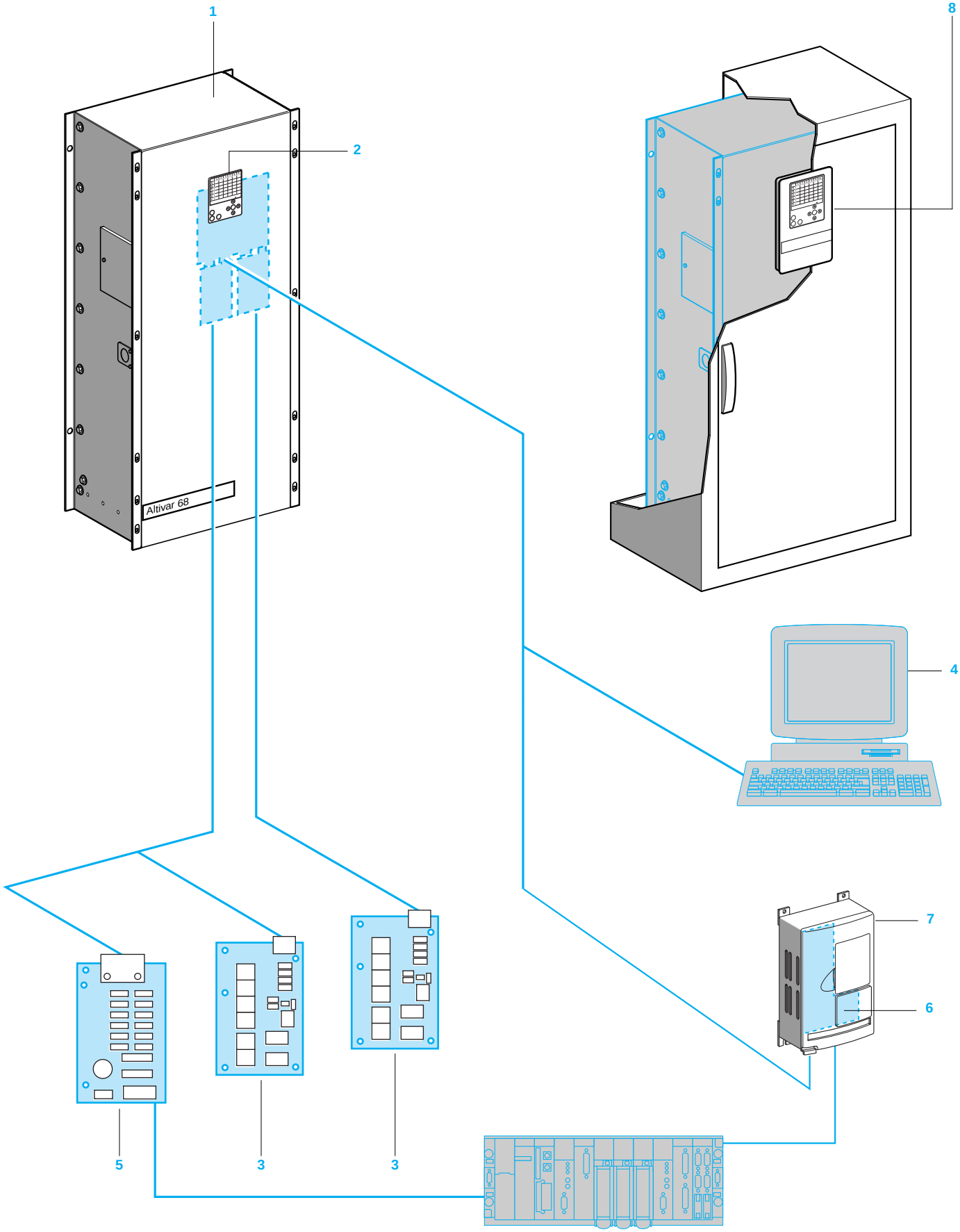
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Altivar 68

Presentation

Applications

A compact and robust speed controller for all types of high-power 3-phase asynchronous motors, the Altivar 68 **1** incorporates the latest technological developments and its innovative functions meet the requirements of the most common applications, notably :
- ventilation, air-conditioning
- pumping
- conveying
- grinding
- handling and lifting

The Altivar 68 has several application-specific preset configurations with few basic parameters, which can be modified using the programming terminal **2** to create additional functions.

It covers a range from 75 to 500 kW for high torque applications and from 90 to 630 kW for standard torque applications for a single voltage range from 400 to 500 V.
In spite of its high performance, it is easy to adjust. The introduction of elements on the motor rating plate and autotuning on stopping make it possible to obtain high torque together with remarkable drive quality, even at very low rotation speeds (< 0.5 Hz).
For applications which require exceptional speed precision even at very low speed, the speed controller can be supplied with an optional encoder feedback card.

Functions

The main functions are :
- dual configuration (2 motors)
- integrated PID controller (flow rate, pressure, speed correction)
- 7 possible preset speeds
- jog operation
- brake release sequences for translational movement and hoisting
- user-definable analogue and logic inputs
- +/- speed
- skip frequencies
- comparator functions
- logic functions
- starting and speed regulation via flux vector control
- 4 energy saving levels for variable torque applications
- protection of motor and speed controller
- automatic catching of spinning load with speed search (catch on the fly)
- high overtorque on start-up
- separate 24 V supply for control circuit

Programming terminal

The Altivar 68 is supplied with a programming graphic terminal which is used to :
- drive the speed controller in local mode
- configure the various parameters
- provide a remote display and indication of the speed controller status

Options

Possible options :
- Additional I/O card **3**, 2 available, if there is no communication card.
- PC-based setup software **4**.
- Profibus **5** and FipIo or Modbus Plus **6** communication cards via the optional module **7**.
- Braking unit and resistors.
- Line chokes for protection against supply overvoltage and reduction of harmonic distortion.
- Radio interference input filters to comply with electromagnetic compatibility.
- Additional motor chokes to limit voltage surges on the motor terminals and when motor cables are very long.
- Remote mounting kit for programming terminal **8** which enables installation of the terminal on the door of the enclosure or operator panel.
- DC bus connection in the form of a mechanical kit for connecting the braking module, several speed controllers connected in parallel, or the optional external load circuit to the DC bus.
- External load circuit to connect several speed controllers in parallel.
- Earth fault detection kit in IT connection to protect the speed controller in the event of a short-circuit between phase and earth.
- Air ducting kit and fan for mounting in an enclosure.

Altivar 68

Characteristics

Environment

Conforming to standards		Altivar 68 electronic variable speed controllers have been designed to conform with national and international standards and to meet recommendations relating to industrial electrical control equipment (IEC, EN, NFC, VDE), notably : - low voltage : EN 50178 - electrical isolation : conforming to EN 50178, PELV - EMC immunity : conforming to IEC 61800-3, (IEC 1000-4-2, IEC 1000-4-3, IEC 1000-4-4) - EMC emission : conforming to IEC 61800-3 - EMC radiated and conducted radio-electric frequency emission : optional suppression filters for industrial environments
Product approval		UL “OPEN DEVICE” To ensure UL conditions, the short-circuit current of the speed controllers should not exceed the values listed below : - **ATV-68●10N4 to ●19N4** speed controllers **:** 10 000 A - **ATV-68●23N4 to ●33N4** speed controllers **:** 18 000 A - **ATV-68●43N4 to ●63N4** speed controllers **:** 30 000 A
CE marking		These speed controllers have been designed to comply with the essential recommendations of the following European directives : - Low Voltage Directive 73/23 EC - EMC Directive 89/336 EC for industrial environments To indicate this, Altivar 68 products are marked with the European community CE marking.
Degree of protection		IP 00 (with front panel protection) Requires the addition of a protective device to prevent direct contact by persons
Maximum ambient pollution		Level 2 conforming to IEC 664-1 and EN 50178
Maximum relative humidity and **Environmental class**		95 % without condensation or dripping water, conforming to IEC 68-2-3 3K3, according to IEC 721-3-3
Ambient air temperature around the device		
Storage	°C	- 25…+ 70
Operation (with a switching frequency of 2.5 kHz, for a higher frequency see below)	°C	Without derating : 0…+ 40 **ATV-68●10N4, ●19N4, ●33N4** and **●63N4** speed controllers 0…+ 45 **ATV-68●13N4, ●15N4, ●23N4, ●28N4, ●43N4,** and **●53N4** speed controllers With current derating of 2 % per °C : + 40…+ 50 **ATV-68●10N4, ●19N4, ●33N4** and **●63N4** speed controllers + 45…+ 55 **ATV-68●13N4, ●15N4, ●23N4, ●28N4, ●43N4,** and **●53N4** speed controllers
Switching frequency	**kHz**	2.5 - 5 - 10 To operate at a fixed frequency of 5 or 10 kHz, select the motor rating according to the derating values given in the table below : Automatic adaptation of the switching frequency if the motor overheats.

Inv = max. nominal current of the speed controller

Speed controller	Max. ambient temperature	Switching frequency 2.5 kHz	5 kHz	10 kHz
ATV-68●10N4	40 °C	Inv	0.80 Inv	0.45 Inv
ATV-68●13N4	45 °C	Inv	0.95 Inv	0.78 Inv
ATV-68●15N4	45 °C	Inv	0.85 Inv	0.58 Inv
ATV-68●19N4	40 °C	Inv	0.80 Inv	0.52 Inv
ATV-68●23N4	45 °C	Inv	Inv	0.80 Inv
ATV-68●28N4	45 °C	Inv	0.86 Inv	0.64 Inv
ATV-68●33N4	40 °C	Inv	0.82 Inv	0.60 Inv
ATV-68●43N4	45 °C	Inv	Inv	0.80 Inv
ATV-68●53N4	45 °C	Inv	0.86 Inv	0.64 Inv
ATV-68●63N4	40 °C	Inv	0.82 Inv	0.60 Inv

Maximum operating altitude	**m**	1000 without derating (above this, derate the current by 1 % per additional 100 m up to 2000 m)
Operating position		Vertical

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Characteristics

Drive characteristics

Output frequency range	**Hz**	0…300 Frequency stability : ± 0.01 % at 50 Hz Resolution : 0.01 Hz
Speed range		1…100 (in high torque configuration)
Speed precision		Without encoder feedback card : - 30 % of nominal slip, speed > 10 % of nominal motor speed - 50 % of nominal slip, speed < 5 % of nominal motor speed With encoder feedback in control mode : ± 0.01 % of high speed
Transient overtorque on start-up		180 % of nominal motor torque (typical value ± 10 %) in high torque configuration
Maximum transient current		- 400, 440 and 500 V : 150 % of nominal current in high torque operation for 60 s then 120 % in continuous operation 120 % of nominal current in standard torque operation (variable torque) for 60 s then 100 % in continuous operation - 460 V : 150 % of nominal current for 60 s, then 100 % in continuous operation Current limitation depends on the heatsink temperature. If a speed controller is used outside its thermal capacity, the speed controller automatically lowers the switching frequency and if necessary the transient limitation current.
Braking torque		Up to 30 % of nominal motor torque without braking unit (typical value) Up to 150 % with one or more additional braking units
Voltage/frequency ratio		**ATV-68C●●N4** : flux vector control without sensor; constant torque or variable torque with configurable energy saving **ATV-68FC●●N4** : flux vector control with sensor for more accurate speed control

Electrical characteristics

3-phase power supply Voltage - frequency			400 V ± 15 %, 50/60 Hz ± 5 % 440 V ± 10 %, 60 Hz ± 5 % 460 V - 10 % to 480 V + 10 %, 60 Hz ± 5 % 500 V - 15 % + 10 %, 50 Hz ± 5 %
Maximum output voltage			Maximum voltage equal to line supply voltage
Speed controller noise level		**dBA** **dBA** **dBA**	**ATV-68●10N4** to **●19N4** : 65 **ATV-68●23N4** to **●33N4** : 72 **ATV-68●43N4** to **●63N4** : 74
Efficiency			97.5 % (including line choke losses), at 50 Hz at nominal load.
Available internal supplies			1 + 10 V output + 2% - 0 %, 10 mA maximum, with short-circuit protection 1 + 24 V output + 25 % -15 % programmable as power supply voltage for logic inputs, 150 mA maximum or as logic output, with short-circuit protection.
Analogue inputs AI	**AIV**		1 analogue voltage input 0…10 V Impedance 100 kΩ Precision ± 0.6 % of full scale (10 V) Linearity error < - 0.15 % with a 1 kΩ reference potentiometer 10-bit resolution (∿ 10 mV) Limit of operation is programmable Acquisition time 5 ms
	AIC		1 analogue current input : 0(4)…20 mA Maximum load : 250 Ω Precision ± 0.9 % of full scale 20 mA 10-bit resolution (∿ 20 µA) Stability ± 0.2 % for a variation of 10 °C Zero current monitoring Limit of operation is programmable Acquisition time 5 ms
Electrical zero volts for control			The electronic zero can be isolated from earth but its potential with respect to earth must not exceed 35 V
Analogue output	**AO1**		1 analogue current output 0(4)…20 mA with programmable operations Maximum external load 600 Ω 10-bit resolution Precision : - frequency, current, voltage : ± 1.5 % - torque, apparent or actual power : ± 5 % Acquisition time 5 ms

Characteristics (continued)

Electrical characteristics (continued)

PTC input	For a maximum of 6 PTC thermistors in series (wiring must be shielded and separated from the motor cabling) Nominal value < 1.5 kΩ De-energisation resistance : 3 kΩ, reinitialisation value : 1.8 kΩ Short-circuit protection < 50 Ω. Measured current approximately 1 mA
DI logic inputs	4 bipolar inputs : positive or negative logic Programmable operations Minimum duration for acceptance : 10 ms Consumption : approx. 8 mA at 24 V State 1 above 15 V, state 0 below 4 V
Common	Common for all logic inputs is situated on the base card. The level of voltage can float up to 35 V with respect to 0 V and earth contact.
Auxiliary power supply	Used to supply the control circuit and option cards via an external + 24 V if the power supply is cut. Consumption : approx. 0.5 A Separated from the internal power supply by a diode
Output relay	Programmable relay Switching voltage : ∿ 250 V, or ⎓ 30 V Switching power : 1250 VA max., 150 W Max. DC current : 3 A Min. switched current (new relay) : ⎓ 24 V, 3 mA In PELV conditions, the external power supply must also be PELV (24 V) Electrical isolation between the line supply and the relay power supply
Signalling	Via 3 indicator lamps on the display module : - controller ready - on - faulty

Characteristics of the encoder feedback card

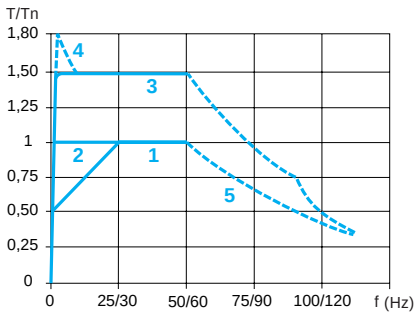
Power supply	Voltage	**V**	+ 12 ± 7 %
	Max. current	**mA**	200
Maximum operating frequency		**kHz**	≤ 300
Encoder output configuration			RS 422 supplied at 5 V, min. period 3 µs for electric 360° and a cyclic ratio of electric 180° ± 10 %
Input signals			A, $\overline{A}$, B, $\overline{B}$ (I and $\overline{I}$)
Recommended type of encoder			The selected incremental encoder, for example XCC-14, XCC-15, XCC-19 (1) with type K output stage, must have an input voltage range of 8 to 30 V.
Recommended number of points/ revolution on the encoder according to the type of motor			2-pole motor : 30 to 2048 points per revolution 4-pole motor : 60 to 4096 points per revolution 6-pole motor : 90 to 4096 points per revolution To obtain an accurate range, the encoder should have more than 200 points/revolution
Max. distance between encoder and controller according to the frequency		**m**	200 at 50 kHz 100 at 100 kHz 50 at 300 kHz
Type of encoder-controller cable			AWG 24 (0.22 mm^2), shielded twisted pair

(1) Please consult our specialist catalogue

Torque characteristics (typical curves)

The curves below define the available continuous torque and transient overtorque, either on a naturally-cooled or a force-cooled motor. The only difference is the ability of the motor to provide a high continuous torque at less than half nominal speed.

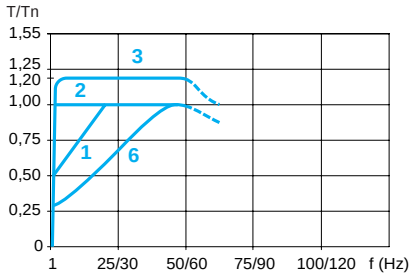
High torque applications



1 Naturally-cooled motor : continuous useful torque
2 Force-cooled motor : continuous useful torque (1)
3 Transient overtorque (1)
4 Possible overtorque at low speed (1)
5 Overspeed torque at constant power (2)

(1) Torque available at zero speed with encoder feedback card.
(2) **Warning** : Check with the manufacturer regarding the mechanical overspeed possibilities of the selected motor.

Standard torque applications



1 Naturally-cooled motor : continuous useful torque (adjustable internal protection)
2 Force-cooled motor : continuous useful torque
3 Overtorque available for max. 60 seconds
6 Typical continuous useful torque in variable torque

Special uses

Motor power rating different from that of speed controller

The speed controller can supply any motor which has a power rating between 20 and 120 % of that for which it is designed. Ensure that the current drawn does not exceed the continuous output current of the controller.

Motors connected in parallel

The speed controller rating must be greater than the sum of the motor currents to be connected to the speed controller. In this case, external thermal protection must be provided for each motor by probes (up to 6 motors) or a thermal overload relay.
If the total length of the motor cables is greater than 50 m (shielded cables) or 80 m (unshielded cables), the fitting of a choke between the speed controllers and the motors is recommended.
Autotuning is necessary for applications which require a high start-up torque (conveyors, lifting). In this case, the motors should be mechanically coupled, should have the same power rating and the same cable length.
Autotuning is not necessary for applications which do not require a high start-up torque (pumps, fans). In this case, the motor power ratings and the cable lengths may be different.
Each motor can be isolated by a contactor during operation. On the other hand, the motor should be reconnected to the speed controller in accordance with the precautions described below : “Coupling a contactor downstream of the speed controller”.
The nominal current set for the speed controller should be equal to the sum of the motor currents.

Coupling a motor downstream of the speed controller

Coupling on the fly is possible if the current peak of the motor to be connected is less than the maximum transient current of the speed controller.
In all cases it is preferable to lock the speed controller before closing the contactor and unlock it after closing the main poles of the contactors.

Connection to an IT network

This type of connection is possible, but radio interference filters cannot be mounted. In addition, if the stray capacitance (or the filter capacitors) between the network and earth are excessive, there is a risk of premature wear on the speed controller in the event of a prolonged earth fault.
For this type of network, it is advisable to use earth fault detection via toroid sensor, kit **VW3-A68190**, see page 23, which will protect the speed controller in the event of an earth fault downstream of the speed controller.

Mounting on DC bus

The Altivar 68 can be mounted on a DC bus or with a common bus. These special applications require the use of a load circuit in parallel, **VW3-A68180**, see page 23.

Possible combinations

Combinations

Line supply Supply voltage 50/60 Hz	Motor Power indicated on plate		ATV-68 controller for applications standard torque (120 % Tn)	high torque (150 % Tn)	Options Line chokes	RFI input filter 400 V	RFI input filter 440…500 V	Motor chokes	Braking unit and resistor
	kW	HP	See p. 10 and 11		See p. 12	See p. 15	See p. 15	See p.16	See p. 18
400 …500 V 3-phase	75	100	–	**ATV-68●10N4**	VW3-A68501	VW3-A68401	VW3-A68415	VW3-A68551	VW3-A68●●●
	90	–	**ATV-68●10N4**	–	VW3-A68501	VW3-A68401	VW3-A68415	VW3-A68551	VW3-A68●●●
	90	125	–	**ATV-68●13N4**	VW3-A68502	VW3-A68402	VW3-A68435	VW3-A68552	VW3-A68●●●
	110	–	**ATV-68●13N4**	–	VW3-A68502	VW3-A68402	VW3-A68435	VW3-A68552	VW3-A68●●●
	110	150	–	**ATV-68●15N4**	VW3-A68503	VW3-A68402	VW3-A68435	VW3-A68552	VW3-A68●●●
	132	–	**ATV-68●15N4**	–	VW3-A68503	VW3-A68402	VW3-A68435	VW3-A68552	VW3-A68●●●
	132	200	–	**ATV-68●19N4**	VW3-A68504	VW3-A68402	VW3-A68435	VW3-A68552	VW3-A68●●●
	160	–	**ATV-68●19N4**	–	VW3-A68504	VW3-A68402	VW3-A68435	VW3-A68552	VW3-A68●●●
	160	250	–	**ATV-68●23N4**	VW3-A68505	VW3-A68403	VW3-A68465	VW3-A68553	VW3-A68●●●
	200	–	**ATV-68●23N4**		VW3-A68505	VW3-A68403	VW3-A68465	VW3-A68553	VW3-A68●●●
	200	300	–	**ATV-68●28N4**	VW3-A68506	VW3-A68403	VW3-A68465	VW3-A68553	VW3-A68●●●
	250	–	**ATV-68●28N4**	–	VW3-A68506	VW3-A68403	VW3-A68465	VW3-A68553	VW3-A68●●●
	250	350	–	**ATV-68●33N4**	VW3-A68507	VW3-A68403	VW3-A68465	VW3-A68553	VW3-A68●●●
	315	–	**ATV-68●33N4**	–	VW3-A68507	VW3-A68403	VW3-A68465	VW3-A68553	VW3-A68●●●
	315	500	–	**ATV-68●43N4**	VW3-A68505 (1)	VW3-A68404	VW3-A68465 (2)	VW3-A68554	VW3-A68●●●
	400	–	**ATV-68●43N4**	–	VW3-A68505 (1)	VW3-A68404	VW3-A68465 (2)	VW3-A68554	VW3-A68●●●
	400	600	–	**ATV-68●53N4**	VW3-A68506 (1)	VW3-A68404	VW3-A68465 (2)	VW3-A68554	VW3-A68●●●
	500	–	**ATV-68●53N4**	–	VW3-A68506 (1)	VW3-A68404	VW3-A68465 (2)	VW3-A68554	VW3-A68●●●
	500	800	–	**ATV-68●63N4**	VW3-A66507 (1)	VW3-A68404	VW3-A68465 (2)	VW3-A68554	VW3-A68●●●
	630	–	**ATV-68●63N4**	–	VW3-A66507 (1)	VW3-A68404	VW3-A68465 (2)	VW3-A68554	VW3-A68●●●

(1) Allow for 2 chokes per speed controller.
(2) Allow for 2 filters per speed controller.

I/O extension card	Communi-cation cards	Programming terminal remote mounting kit	PC-based setup software	DC bus connection	External load circuit	Earth fault detection in IT connection	Air ducting kit to exterior of IP 23 enclosure	External fan IP 23 enclosure
See p. 20	See p. 21	See p. 22	See p. 22	See p. 22	See p. 23	See p. 23	See p. 23	See p. 23
VW3-A68201	VW3-A●830●	VW3-A68800	VW3-A68331	–	VW3-A68180	VW3-A68190	–	VW3-A68820
VW3-A68201	VW3-A●830●	VW3-A68800	VW3-A68331	–	VW3-A68180	VW3-A68190	–	VW3-A68820
VW3-A68201	VW3-A●830●	VW3-A68800	VW3-A68331	VW3-A68802	VW3-A68180	VW3-A68190	VW3-A68801	VW3-A68820
VW3-A68201	VW3-A●830●	VW3-A68800	VW3-A68331	VW3-A68802	VW3-A68180	VW3-A68190	VW3-A68801	VW3-A68820
VW3-A68201	VW3-A●830●	VW3-A68800	VW3-A68331	VW3-A68802	VW3-A68180	VW3-A68190	VW3-A68801	VW3-A68820
VW3-A68201	VW3-A●830●	VW3-A68800	VW3-A68331	VW3-A68802	VW3-A68180	VW3-A68190	VW3-A68801	VW3-A68820
VW3-A68201	VW3-A●830●	VW3-A68800	VW3-A68331	VW3-A68802	VW3-A68180	VW3-A68190	VW3-A68801	VW3-A68820
VW3-A68201	VW3-A●830●	VW3-A68800	VW3-A68331	VW3-A68802	VW3-A68180	VW3-A68190	VW3-A68801	VW3-A68820
VW3-A68201	VW3-A●830●	VW3-A68800	VW3-A68331	VW3-A68802	VW3-A68180	VW3-A68190	VW3-A68801	VW3-A68820
VW3-A68201	VW3-A●830●	VW3-A68800	VW3-A68331	VW3-A68802	VW3-A68180	VW3-A68190	VW3-A68801	VW3-A68820
VW3-A68201	VW3-A●830●	VW3-A68800	VW3-A68331	VW3-A68802	VW3-A68180	VW3-A68190	VW3-A68801	VW3-A68820
VW3-A68201	VW3-A●830●	VW3-A68800	VW3-A68331	VW3-A68802	VW3-A68180	VW3-A68190	VW3-A68801	VW3-A68820
VW3-A68201	VW3-A●830●	VW3-A68800	VW3-A68331	VW3-A68802	VW3-A68180	VW3-A68190	VW3-A68801	VW3-A68820
VW3-A68201	VW3-A●830●	VW3-A68800	VW3-A68331	VW3-A68802	VW3-A68180	VW3-A68190	VW3-A68801	VW3-A68820
VW3-A68201	VW3-A●830●	VW3-A68800	VW3-A68331	VW3-A68802	VW3-A68180	VW3-A68190	VW3-A68801	VW3-A68820
VW3-A68201	VW3-A●830●	VW3-A68800	VW3-A68331	VW3-A68802	VW3-A68180	VW3-A68190	VW3-A68801	VW3-A68820
VW3-A68201	VW3-A●830●	VW3-A68800	VW3-A68331	VW3-A68802	VW3-A68180	VW3-A68190	VW3-A68801	VW3-A68820
VW3-A68201	VW3-A●830●	VW3-A68800	VW3-A68331	VW3-A68802	VW3-A68180	VW3-A68190	VW3-A68801	VW3-A68820
VW3-A68201	VW3-A●830●	VW3-A68800	VW3-A68331	VW3-A68802	VW3-A68180	VW3-A68190	VW3-A68801	VW3-A68820
VW3-A68201	VW3-A●830●	VW3-A68800	VW3-A68331	VW3-A68802	VW3-A68180	VW3-A68190	VW3-A68801	VW3-A68820

Altivar 68
Standard

References

ATV-68C10N4

ATV-68C13N4

ATV-68C33N4

High torque applications (150 % Tn)

Motor Power rating on motor plate (1)		Supply Line current (2)				Altivar 68 Maximum speed controller nominal current				Max. transient current (3)	Power dissipated at nominal load (4)	Reference	Weight
		400 V	440 V	460 V	500 V	400 V	440 V	460 V	500 V				
kW	**HP**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**W**		kg
3-phase power supply 400 V - 15 %...500 V + 10 % 50/60 Hz													
75	100	133	121	116	106	142	129	124	113	213	2050	**ATV-68C10N4**	60.000
90	125	161	146	146	129	172	156	156	137	258	2400	**ATV-68C13N4**	95.000
110	150	194	177	169	157	208	189	180	167	312	2800	**ATV-68C15N4**	95.000
132	200	234	224	225	188	250	240	240	200	375	3250	**ATV-68C19N4**	95.000
160	250	304	282	283	244	325	302	302	260	488	4000	**ATV-68C23N4**	190.000
200	300	378	343	338	304	404	367	361	323	606	5000	**ATV-68C28N4**	190.000
250	350	444	403	388	357	475	431	414	380	713	6200	**ATV-68C33N4**	190.000
315	500	577	552	553	464	617	590	590	494	926	7800	**ATV-68C43N4**	500.000
400	600	717	673	675	577	767	720	720	614	1151	9700	**ATV-68C53N4**	500.000
500	800	845	785	787	680	904	840	840	723	1356	12 000	**ATV-68C63N4**	500.000

Standard torque applications (120 % Tn)

Motor Power rating on motor plate (1)		Supply Line current (2)				Altivar 68 Maximum speed controller nominal current				Max. transient current (5)	Power dissipated at nominal load (4)	Reference	Weight
		400 V	440 V	460 V	500 V	400 V	440 V	460 V	500 V				
kW	**HP**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**W**		kg
3-phase power supply 400 V - 15 %...500 V + 10 % 50/60 Hz													
90	(6)	159	145	(6)	128	170	155	(6)	136	213	2400	**ATV-68C10N4**	60.000
110	(6)	193	175	(6)	155	206	187	(6)	165	258	2800	**ATV-68C13N4**	95.000
132	(6)	234	212	(6)	188	250	227	(6)	200	312	3250	**ATV-68C15N4**	95.000
160	(6)	280	269	(6)	226	300	288	(6)	240	375	3800	**ATV-68C19N4**	95.000
200	(6)	365	338	(6)	293	390	362	(6)	312	488	4700	**ATV-68C23N4**	190.000
250	(6)	453	411	(6)	365	485	440	(6)	388	606	5800	**ATV-68C28N4**	190.000
315	(6)	533	483	(6)	429	570	517	(6)	456	713	7300	**ATV-68C33N4**	500.000
400	(6)	692	662	(6)	556	740	708	(6)	592	926	9100	**ATV-68C43N4**	500.000
500	(6)	860	808	(6)	692	920	864	(6)	736	1151	11 300	**ATV-68C53N4**	500.000
630	(6)	1015	942	(6)	816	1085	1008	(6)	868	1356	14 000	**ATV-68C63N4**	500.000

(1) Power values are given for a switching frequency of 2.5 kHz in steady state. For switching frequencies of 5 or 10 kHz the speed controller must be derated, see page 4.
(2) Typical value with additional choke for a 4-pole motor.
The presumed short-circuit current for a 3-phase power supply of 400 to 500 V is 22,000 A.
(3) For 60 seconds every 10 minutes for a voltage of 400 V (corresponding to 1.5 times the maximum speed controller nominal current).
(4) Power dissipated at maximum nominal current and switching frequency of 2.5 kHz.
(5) For 60 seconds every 10 minutes for a voltage of 400 V (corresponding to 1.2 times the maximum speed controller nominal current).
(6) At 460 V, only high torque is available.

Altivar 68
With integrated encoder feedback card

References

High torque applications (150 % Tn)

ATV-68FC10N4

Motor Power rating on motor plate (1)		Supply Line current (2)				Altivar 68 Maximum speed controller nominal current				Max. transient current (3)	Power dissipated at nominal load (4)	Reference	Weight
		400 V	440 V	460 V	500 V	400 V	440 V	460 V	500 V				
kW	**HP**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**W**		kg
3-phase power supply 400 V - 15 %...500 V + 10 % 50/60 Hz													
75	100	133	121	116	106	142	129	124	113	213	2050	**ATV-68FC10N4**	60.000
90	125	161	146	146	129	172	156	156	137	258	2400	**ATV-68FC13N4**	95.000
110	150	194	177	169	157	208	189	180	167	312	2800	**ATV-68FC15N4**	95.000
132	200	234	224	225	188	250	240	240	200	375	3250	**ATV-68FC19N4**	95.000
160	250	304	282	283	244	325	302	302	260	488	4000	**ATV-68FC23N4**	190.000
200	300	378	343	338	304	404	367	361	323	606	5000	**ATV-68FC28N4**	190.000
250	350	444	403	388	357	475	431	414	380	713	6200	**ATV-68FC33N4**	190.000
315	500	577	552	553	464	617	590	590	494	926	7800	**ATV-68FC43N4**	500.000
400	600	717	673	675	577	767	720	720	614	1151	9700	**ATV-68FC53N4**	500.000
500	800	845	785	787	680	904	840	840	723	1356	12 000	**ATV-68FC63N4**	500.000

ATV-68FC13N4

Standard torque applications (120 % Tn)

Motor Power rating on motor plate (1)		Supply Line current (2)				Altivar 68 Maximum speed controller nominal current				Max. transient current (5)	Power dissipated at nominal load (4)	Reference	Weight
		400 V	440 V	460 V	500 V	400 V	440 V	460 V	500 V				
kW	**HP**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**W**		kg
3-phase power supply 400 V - 15 %...500 V + 10 % 50/60 Hz													
90	(6)	159	145	(6)	128	170	155	(6)	136	213	2400	**ATV-68FC10N4**	60.000
110	(6)	193	175	(6)	155	206	187	(6)	165	258	2800	**ATV-68FC13N4**	95.000
132	(6)	234	212	(6)	188	250	227	(6)	200	312	3250	**ATV-68FC15N4**	95.000
160	(6)	280	269	(6)	226	300	288	(6)	240	375	3800	**ATV-68FC19N4**	95.000
200	(6)	365	338	(6)	293	390	362	(6)	312	488	4700	**ATV-68FC23N4**	190.000
250	(6)	453	411	(6)	365	485	440	(6)	388	606	5800	**ATV-68FC28N4**	190.000
315	(6)	533	483	(6)	429	570	517	(6)	456	713	7300	**ATV-68FC33N4**	500.000
400	(6)	692	662	(6)	556	740	708	(6)	592	926	9100	**ATV-68FC43N4**	500.000
500	(6)	860	808	(6)	692	920	864	(6)	736	1151	11 300	**ATV-68FC53N4**	500.000
630	(6)	1015	942	(6)	816	1085	1008	(6)	868	1356	14 000	**ATV-68FC63N4**	500.000

ATV-68FC33N4

(1) Power values are given for a switching frequency of 2.5 kHz in steady state. For switching frequencies of 5 or 10 kHz the speed controller must be derated, see page 4.
(2) Typical value with additional choke for a 4-pole motor.
The presumed short-circuit current for a 3-phase power supply of 400 to 500 V is 22,000 A.
(3) For 60 seconds every 10 minutes for a voltage of 400 V (corresponding to 1.5 times the maximum speed controller nominal current).
(4) Power dissipated at maximum nominal current and switching frequency of 2.5 kHz.
(5) For 60 seconds every 10 minutes for a voltage of 400 V (corresponding to 1.2 times the maximum speed controller nominal current).
(6) At 460 V, only high torque is available.

Altivar 68
Options : line chokes

Characteristics, references

Presentation of line chokes

Line chokes are essential, except for the ATV-68●10N4 to ●33N4 ratings if the line or transformer impedance is greater than :

- 245 µH for ●10N4 rating
- 120 µH for ●13N4, ●15N4 and ●19N4 ratings
- 60 µH for ●23N4, ●28N4 and ●33N4 ratings

These chokes can be used to provide improved protection against overvoltages on the line supply and to reduce harmonic distortion of the current produced by the speed controller. The recommended chokes are used to limit the line current.

The use of line chokes is also required for all ratings in the following cases :

- Close connection of several speed controllers in parallel
- Line supply with significant interference from other equipment (interference, overvoltages)
- Line supply with a voltage imbalance between phases > 1.8 % of nominal voltage
- Installation of a large number of frequency converters on the same supply
- Reduction of overload in cos φ correction capacitors, if the installation has a power factor correction unit

Characteristics of line chokes

Conforming to standards			IEC 60076 (with HD 398)
Degree of protection			IP 00
Maximum ambient pollution			Level 3
Ambient air temperature around the device	Storage	**°C**	- 25…+ 70
	Operation	**°C**	0…+ 45 Up to + 55 with current derating of 2 % per °C above 45°C
Isolation class			F
Clearance distance in air	Conforming to IEC 60664	**mm**	5.5
Leakage distance in air	Conforming to IEC 60664	**mm**	11.5

References of line chokes

VW3-A6850●

Chokes for high torque or standard torque applications (1)

Number of chokes per speed controller	For controllers	Choke characteristics: Value of choke	Nominal current	Saturation current	Loss	Reference	Weight
		µH	**A**	**A**	**W**		kg
Power supply voltage 400 V - 15 %...500 V + 15 %							
1	**ATV-68●10N4**	220	160	305	220	**VW3-A68501**	35.000
	ATV-68●13N4	155	195	370	220	**VW3-A68502**	35.000
	ATV-68●15N4	120	235	445	220	**VW3-A68503**	40.000
	ATV-68●19N4	98	280	530	245	**VW3-A68504**	50.000
	ATV-68●23N4	66	365	685	270	**VW3-A68505**	50.000
	ATV-68●28N4	49	455	855	270	**VW3-A68506**	55.000
	ATV-68●33N4	38	540	1025	280	**VW3-A68507**	60.000
2	**ATV-68●43N4**	66	365	685	270	**VW3-A68505**	50.000
	ATV-68●53N4	49	455	855	270	**VW3-A68506**	55.000
	ATV-68●63N4	38	540	1025	280	**VW3-A68507**	60.000

(1) Chokes are supplied with 2 additional mounting brackets for mounting on a vertical support.

Altivar 68
Options : reduction of harmonic currents

Presentation

The main solutions for reducing harmonic currents are as follows :

- Line chokes
- Passive filters
- Active compensators also called SineWave active filters, from Merlin Gerin
- Hybrid filters
- Twelve pulse connection

All five solutions can be used on the same installation. It is always easier and less expensive to handle the harmonics at installation level as a whole rather than at the level of each individual unit, particularly when using passive filters and active compensators.

Line chokes

This is an inexpensive solution, which can be applied to each unit individually, but which is of limited efficiency in reducing harmonics because too high an inductance will cause an unacceptable voltage drop.

Example of currents and harmonic levels at 400 V (with line chokes)

Constant torque applications, 400 V/50 Hz (Isc = 22, 000 A, L supply = 33.4 mH)

Speed controller: ATV-68		**●10N4**	**●13N4**	**●15N4**	**●19N4**	**●23N4**	**●28N4**	**●33N4**	**●43N4**	**●53N4**	**●63N4**
Power	kW	75	90	110	132	160	200	250	315	400	500
Line current	A	131.5	159.3	191.9	232.2	286.9	359.8	451.6	567.8	707.3	885.1
H1	A	122.8	148.9	178.1	215.6	266.2	334.8	420.7	534.4	669.2	844.6
H5	%	35.6	35.7	36.7	37.0	36.7	36.5	35.9	32.1	31.1	29.8
H7	%	11.8	11.9	12.7	12.9	12.8	12.6	9.6	9.5	8.9	8.3
H11	%	6.5	6.7	6.7	6.7	6.9	6.8	6.6	6.2	6.0	5.6
H13	%	3.2	3.2	3.3	3.2	3.3	3.3	3.2	3.2	3.2	3.2

Standard torque applications, 400 V/50 Hz (Isc = 22, 000 A, L supply = 33.4 mH)

Speed controller: ATV-68		**●10N4**	**●13N4**	**●15N4**	**●19N4**	**●23N4**	**●28N4**	**●33N4**	**●43N4**	**●53N4**	**●63N4**
Power	kW	90	110	132	160	200	250	315	400	500	630
Line current	A	157.1	189.5	228.2	276.5	341.0	428.0	537.6	678.2	843.6	1057.2
H1	A	148.0	179.2	214.5	259.6	320.4	402.9	506.8	644.8	805.6	1018.2
H5	%	33.0	33.1	34.1	34.4	34.1	34.0	33.3	29.8	28.9	27.6
H7	%	9.9	10.1	10.7	10.8	10.7	10.6	9.9	8.3	8.0	7.7
H11	%	6.0	6.3	6.4	6.3	6.5	6.4	6.1	5.7	5.4	4.9
H13	%	3.2	3.2	3.2	3.1	3.2	3.2	3.2	3.2	3.2	3.2

(1) For a standard 4-pole motor

Altivar 68
Options : reduction of harmonic currents

Presentation (continued)

Passive filters

These work by “trapping” harmonic currents in LC circuits linked to the harmonic numbers to be filtered. The filter thus consists of “steps”, each step corresponding to a harmonic number. Numbers 5 and 7 are the most commonly filtered.

The filter can be installed for a load or for a group of loads. Its design requires a detailed analysis of the supply and a research project. Its size depends on the harmonic range of the load and the impedance of the source.

This type of filtering depends entirely on the source and the loads. It therefore offers very little flexibility and almost no opportunity for upgrading the installation.

Note : This type of filter can also be used to eliminate harmonic distortion which already exists on the line supply. Please consult your Regional Sales Office.

Active compensators

These compensators, connected in parallel on the load and on the line supply, measure harmonic currents emitted by the equipment and automatically generate inverse harmonic currents.

The advantages are as follows :

- independence in relation to the load and to the supply impedance
- adaptive tuning

Please consult your Regional Sales Office.

Hybrid filters

The hybrid filter is a device which comprises a passive filter and an active compensator and provides an excellent compromise for handling harmonics.

Please consult your Regional Sales Office.

Twelve pulse connection

The power supply to the speed controller is provided via a 3-phase transformer with 2 secondary windings : star and delta. This type of mounting reduces current harmonics numbers 5 and 7 on the transformer primary.
Models **ATV-68●43N4** to **●63N4** have 2 inputs on the rectifier bridges which enable them to be connected directly to the transformer. For models **ATV-68●10N4** to **●33N4**, an external option must be used (external diode bridge).

Please consult your Regional Sales Office.

Altivar 68
Options : additional radio interference input filters

Presentation, characteristics, references

Presentation

Function

Additional input filters should be installed if the surrounding environment is subject to electromagnetic interference and radio-electrical frequencies above 150 kHz.
These filters are designed to reduce emissions conducted on the line supply. The motor cables should be shielded and not exceed the maximum length given in the table below.
For the filter to operate efficiently, the installation conditions must be carefully respected.

Use according to the type of network

Use of these filters is only possible on type TN (connected to neutral) and TT (neutral to earth) networks.
These filters are not permitted on IT (impeding or isolated neutral) networks.

Characteristics

Degree of protection			IP 00
Ambient air temperature around the device	Operation	°C	0... + 45 Up to + 55 derating the current by 2 % per °C over 45°C
	Storage	°C	- 25... + 70
Maximum operating altitude	Without derating	m	1000 (above this, derate the current by 1 % per additional 100 m)

References

VW3-A68403

VW3-A68465

Number of filters per speed controller	For speed controllers	Max. length of motor cable (1) With motor choke	Max. length of motor cable (1) Without motor choke	Nominal filter current	Max. filter leakage current On power-up	Max. filter leakage current Continuous	Loss	Reference	Weight
		m	**m**	**A**	**mA**	**mA**	**W**		kg
Power supply voltage 400 V (± 15 %) (2)									
1	**ATV-68●10N4**	120	40	170	500	100	20	**VW3-A68401** (2)	5.000
	ATV-68●13N4	150	40	300	500	100	40	**VW3-A68402** (2)	5.500
	ATV-68●15N4	150	40	300	500	100	40	**VW3-A68402** (2)	5.500
	ATV-68●19N4	100	40	300	500	100	40	**VW3-A68402** (2)	5.500
	ATV-68●23N4	120	40	570	500	100	60	**VW3-A68403** (2)	6.000
	ATV-68●28N4	120	40	570	500	100	60	**VW3-A68403** (2)	6.000
	ATV-68●33N4	120	40	570	500	100	60	**VW3-A68403** (2)	6.000
	ATV-68●43N4	100	40	1100	1000	200	120	**VW3-A68404** (3)	11.000
	ATV-68●53N4	100	40	1100	1000	200	120	**VW3-A68404** (3)	11.000
	ATV-68●63N4	100	40	1100	1000	200	120	**VW3-A68404** (3)	11.000
Power supply voltage 440...500 V (± 15 %) (2)									
1	**ATV-68●10N4**	100	25	180	(4)	6	38	**VW3-A68415**	6.500
	ATV-68●13N4	120	25	320	(4)	6	40	**VW3-A68435**	10.500
	ATV-68●15N4	120	25	320	(4)	6	40	**VW3-A68435**	10.500
	ATV-68●19N4	120	25	320	(4)	6	40	**VW3-A68435**	10.500
	ATV-68●23N4	100	25	600	(4)	6	65	**VW3-A68465**	11.000
	ATV-68●28N4	100	25	600	(4)	6	65	**VW3-A68465**	11.000
	ATV-68●33N4	100	25	600	(4)	6	65	**VW3-A68465**	11.000
2	**ATV-68●43N4**	120	25	600	(4)	6	65	**VW3-A68465**	11.000
	ATV-68●53N4	100	25	600	(4)	6	65	**VW3-A68465**	11.000
	ATV-68●63N4	100	25	600	(4)	6	65	**VW3-A68465**	11.000

(1) If motors are connected in parallel, it is the total length that should be taken into account.
The motor cable lengths are given for a modulation frequency of 2.5 kHz. They should be multiplied by 0.6 for a frequency of 5 kHz and by 0.3 for 10 kHz. If the motor cable is longer, the addition of a motor choke enables the length to be multiplied by 2.5 and the use of a single cable with a larger cross-section instead of several cables in parallel enables it to be multiplied by 1.5 or 2 if it is not shielded. In this case the radiated emissions are not limited.
(2) Filters VW3-A68401 to 403 have 2 parts : the line choke should be mounted between them.
(3) Filter VW3-A68404 has 3 parts : 2 parts similar to those of VW3-A68401 to 403, the third comprising 6 busbars; the line choke should be mounted between the first 2 and the third.
(4) Information not available.

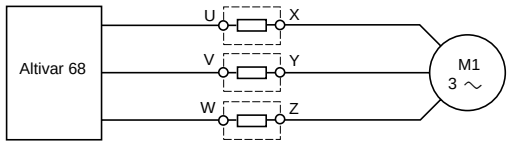
Altivar 68
Options : additional motor chokes

Presentation, characteristics, references

Presentation

The use of an output choke between the speed controller and the motor is recommended for motor cables which are longer than 50 metres (shielded cables) or 80 metres (non-shielded cables). This makes it possible to :

- Limit $\frac{dv}{dt}$ within the following limits :
  - 500 V/µs at 400 V
  - 750 V/µs at 500 V
- Limit overvoltages on the motor terminals to :
  - 1000 V at 400 V
  - 1300 V at 500 V
- Filter interference caused by opening a contactor placed between the filter and the motor
- Reduce the motor earth leakage current

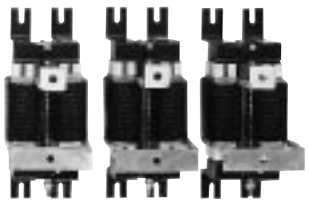


3 single-phase chokes

Characteristics

Ambient air temperature around the device	Storage	**°C**	**-** 25…+ 70
	Operation	**°C**	0…+ 45
Degree of protection			IP 00

References



VW3-A68553

For speed controllers	Maximum length of motor cable (1) non-shielded	shielded	Nominal current	Max. loss	Reference	Weight
	m	**m**	**A**	**W**		kg
Power supply voltage 400 V ± 15 %						
ATV-68●10N4	250	150	170	500	**VW3-A68551**	11.500
ATV-68●13N4	300	200	300	650	**VW3-A68552**	18.000
ATV-68●15N4	300	200	300	650	**VW3-A68552**	18.000
ATV-68●19N4	250	150	300	650	**VW3-A68552**	18.000
ATV-68●23N4	300	250	580	800	**VW3-A68553**	40.000
ATV-68●28N4	300	250	580	800	**VW3-A68553**	40.000
ATV-68●33N4	250	200	580	800	**VW3-A68553**	40.000
ATV-68●43N4	300	250	1085	1000	**VW3-A68554**	110.000
ATV-68●53N4	300	250	1085	1000	**VW3-A68554**	110.000
ATV-68●63N4	250	200	1085	1000	**VW3-A68554**	110.000
Power supply voltage 440 V - 10 %...500 V + 15 %						
ATV-68●10N4	200	150	170	500	**VW3-A68551**	11.500
ATV-68●13N4	250	200	300	650	**VW3-A68552**	18.000
ATV-68●15N4	250	200	300	650	**VW3-A68552**	18.000
ATV-68●19N4	200	150	300	650	**VW3-A68552**	18.000
ATV-68●23N4	280	200	580	800	**VW3-A68553**	40.000
ATV-68●28N4	250	200	580	800	**VW3-A68553**	40.000
ATV-68●33N4	220	180	580	800	**VW3-A68553**	40.000
ATV-68●43N4	280	250	1085	1000	**VW3-A68554**	110.000
ATV-68●53N4	250	200	1085	1000	**VW3-A68554**	110.000
ATV-68●63N4	220	170	1085	1000	**VW3-A68554**	110.000

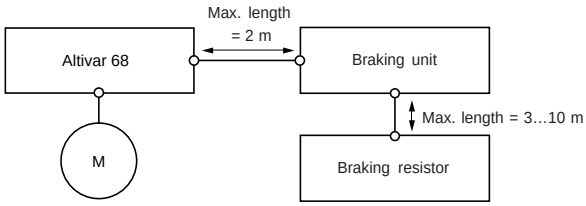
(1) For longer cables, please consult your Regional Sales Office. Choke performance is ensured by not exceeding the cable lengths between the motor and the controller given in the table above. For an application with several motors in parallel, the cable length must include all cabling. If a cable longer than that recommended is used, there is a risk of the filter overheating.

Altivar 68
Options : braking resistors and units

Presentation, characteristics

Presentation

The braking resistor and unit enable the Altivar 68 to operate while braking to a standstill or during “generator” operation, by dissipating the braking energy in the resistor.
The maximum cable length between the speed controller and the braking unit is 2 metres. This cable should be twisted.
The maximum cable length between the braking unit and the resistor is 3 or 10 metres according to the unit used.
Resistors are designed to be mounted on the outside of the enclosure, but should not inhibit natural cooling; air inlets and outlets should not be obstructed in any way. The air should be free of dust, corrosive gas and condensation.



Characteristics of braking units

Type of braking unit		**VW3-A68804**	**VW3-A68741**	**VW3-A68751**
Ambient air temperature				
Operation	°C	0...+ 50	0...+ 45	0...+ 45
Storage	°C	- 25...+ 65	- 25...+ 70	- 25...+ 70
Degree of protection of enclosure		IP 20	IP 20	IP 20
Relative humidity without condensation	%	90	90	90
Maximum operating altitude	m	1000	2000	2000
Vibration resistance	gn	0.2	0.2	0.2
Nominal supply voltage and speed controller power supply voltage (rms value)	V	400 ± 15 %	400 ± 15 %	440 - 10 % ...500 V + 10 %
Pull-in voltage (continuous value)	V	650 ± 1 %	680 ± 1 %	820 ± 1 %
Maximum voltage (continuous value)	V	800	800	920
Thermal protection		Integrated via thermocontact	Integrated via thermal probe	Integrated via thermal probe
Ventilation		Natural	Forced, flow : 450 m³/h	Forced, flow : 450 m³/h
Mounting		Vertical with terminal block on left or right	Vertical	Vertical

Characteristics of braking resistors

Type of braking resistor		**VW3-A68702, VW3-A68703**	**VW3-A68705**	**VW3-A68704**
Ambient air temperature				
Operation	°C	0...+ 50	0...+ 50	0...+ 50
Storage	°C	- 25...+ 75	- 25...+ 75	- 25...+ 75
Degree of protection of enclosure		IP 23	IP 23	IP 23
Maximum voltage	V	950	950	950
Thermal protection		Via thermal overload relay	Via thermal overload relay	Via thermal overload relay

Altivar 68
Options : braking resistors and units

References

VW3-A68804

VW3-A68741

Braking units (1)

Nominal supply voltage	Min. resistance value	Power (2)		Loss	Cable (controller-braking unit)		Reference	Weight
		continuous	max.	at Pn	Cross-section	Max. length		
V	**Ω**	**kW**	**kW**	**W**	**mm²**	**m**		kg
400	4	22	107 (3)	100	16	2	**VW3-A68804**	8.000
	2,2 (star) 6.6 (delta)	150	150	1800	50	2	**VW3-A68741**	60.000
440…500	6 (star) 18 (delta)	75	75	900	25	2	**VW3-A68751**	30.000

Braking resistors

The resistor is a heating element. It is therefore essential to keep it away from other resistors or any other device.

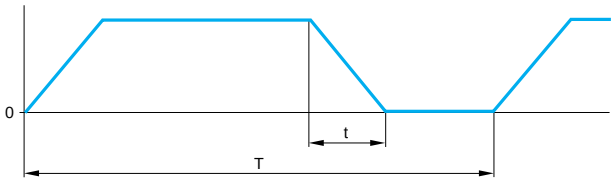
For braking unit	Min. ohmic value (4)	Power (5)		Rating of therm. relay	Cable (braking unit-resistor)		Reference	Weight
		continuous	max.		Cross-section	Max. length		
	Ω	**kW**	**kW**	**A**	**mm²**	**m**		kg
VW3-A68804	12	4	35 (3)	18.5	10	3	**VW3-A68702**	25.000
	8	6	53 (3)	27.5	20	3	**VW3-A68703**	30.000
VW3-A68741	3 x 6.8	30	150	65	50	10	**VW3-A68705**	85.000
VW3-A68751	3 x 12	6	37 (6)	12.5	10	10	**VW3-A68704**	30.000

(1) For ratings **ATV-68●13N4** to **●63N4** braking units should be connected to the DC bus using the DC bus connection kit VW3-A68802, see page 22.
(2) To increase braking power, it is possible to install up to 4 braking units on the same DC bus.
(3) For 3 seconds during a maximum cycle of 1 minute.
(4) Do not use a resistor with a value less than the minimum value given in the table.
(5) To increase braking power, it is possible to install several braking units in parallel on the same braking unit. In this case, do not forget to take into account the minimum resistance value on each unit.
(6) For 4 seconds during a maximum cycle of 1 minute.

Altivar 68
Options : braking resistors and units

Selection

Simplified method for sizing resistors (1)



Load factor : $\frac{t}{T}$

t : braking time in s
T : cycle time in s

Where the maximum frequency does not exceed the nominal frequency (no overspeed), where the load factor is less than 10% and the braking time less than 6s, which is typical for most applications, the calculation is made as follows :

- maximum braking power : $Pb = Pn \times \frac{Tb}{Tn}$
- number of braking units : $n \geq \frac{Pb}{90}$

where Pn = nominal motor power (in kW)
Tb = braking torque
Tn = nominal torque

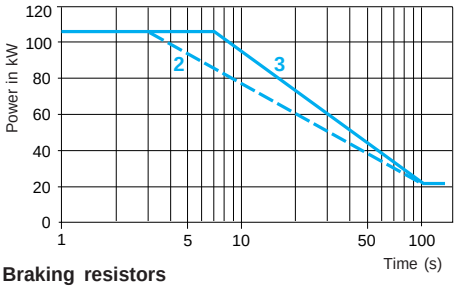
Mount 2 **VW3-A68703** resistors in parallel on each braking unit if $\frac{Pb}{n} < 80$ kW; otherwise use 3 **VW3-A68702** resistors.

Example of calculation :
Motor : Pn = 400 kW — Pb = 400 x 0.8 = 320 kW
Tb = 0.8 Tn — $n = \frac{320}{90} = 3.56$
Braking time t = 4 s — Cycle time T = 60 s
It is therefore necessary to mount on the output of each unit :
- 4 units in parallel on the DC bus and 2 **VW3-A68703** resistors,
- or 3 **VW3-A68702** resistors in parallel.

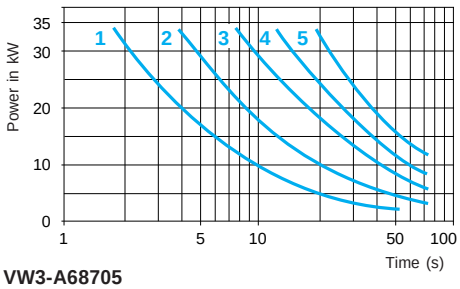
Permissible overload per braking unit and resistors according to time

Cycle time
1 30 s
2 1 minute
3 2 minutes
4 6 minutes
5 30 minutes

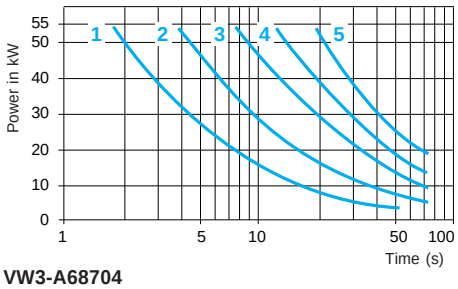
Braking unit
VW3-A68804



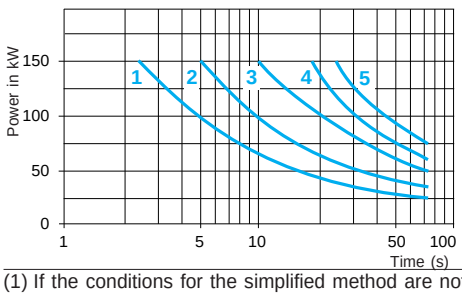
Braking resistors
VW3-A68702



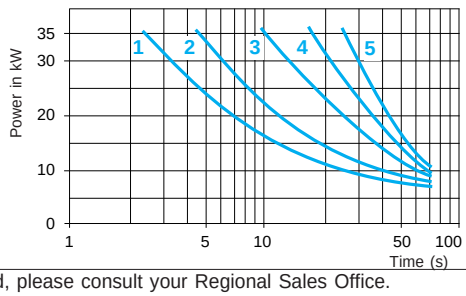
VW3-A68703



VW3-A68705



VW3-A68704



(1) If the conditions for the simplified method are not fulfilled, please consult your Regional Sales Office.

Altivar 68
Options : I/O extension card

Presentation, characteristics, references

Presentation

This card comprises :
- 1 analogue input 0(4)...20 mA
- 1 analogue output 0(4)...20 mA
- 4 logic inputs
- 1 output relay with C/O contact
- 1 output relay with N/O contact

All of these functions have identical characteristics to those of the basic speed controller.
It is possible to mount 2 I/O cards, or 1 I/O extension card and 1 Profibus communication card, to each speed controller via the control card connector.

Characteristics

Analogue input AI2 (differential amplifier)	1 analogue current input : 0(4)...20 mA Load : 250 Ω Precision ± 1.1 % of full scale (20 mA) 10-bit resolution Stability ± 0.2 % for a 10 °C variation Zero current monitoring (detection at 3 mA) Limit of operation is programmable Acquisition time 5 ms
Analogue output AO2	1 analogue current input : 0(4)...20 mA with programmable operations Maximum external load : 600 Ω 10-bit resolution Precision : - frequency, current, voltage : ± 1.5 % - torque, apparent or actual power : ± 5 % Acquisition time 5 ms
Logic inputs DI	4 2-pole inputs DI5 to DI8 : positive or negative logic Programmable operations (1) Minimum duration for acceptance : 10 ms Consumption : approx. 8 mA at 24 V
Relay outputs RL	2 relay outputs RL2 and RL3 Programmable relay Switching voltage : ∿250 V or ⎓30 V Switching power : 1250 VA max., 150 W Max. DC current : 3 A Min. switched current (new relay) : ⎓24 V, 3 mA In PELV conditions, the external power supply must also be PELV (24 V) Electrical isolation between the line supply and the relay power supply RL2 : programmable changeover contact : N/C + N/O RL3 : N/O contact

References

VW3-A68201

Description	For speed controllers	Reference	Weight kg
I/O extension card	ATV-68 all ratings	**VW3-A68201**	0.200

(1) On the 1st I/O extension card, input D15 is assigned to locking the speed controller.

Altivar 68
Options : communication cards

Presentation, characteristics, references

Presentation

Adaptation of the Altivar 68 for communication is possible with the addition of a communication card.
3 models are available : Fipio, Modbus Plus and Profibus DP.
The Fipio and Modbus Plus cards require the use of the VW3-A8300 interface and VW3-A68332 cable.
The Profibus DP card is connected directly to the speed controller.

Functions common to the Fipio, Modbus Plus and Profibus DP cards

- **Control** (accessible in read and write) : run/stop, braking, frequency reference, fault reset, etc.
- **Signalling** (only accessible in read) : speed controller status register, motor speed, motor current, logic I/O status register, fault register, etc.
- **Authorisation** of local control (via terminals)

Functions specific to the Profibus DP card

- **Configuration** (accessible in read and write) : line supply frequency, motor voltage, ramp profile, I/O assignment, etc.
- **Adjustment** (accessible in read and write) : DC injection time and amplitude, thermal protection, speed range, ramp time, current limit, etc.

Characteristics

Protocol	Fipio	Modbus Plus	Profibus DP
Number of speed controllers	62	64	127
Transmission speed	19,200 bps	19,200 bps	1.5 M bps

References

VW3-A68307

Communication cards

Card for protocol	For speed controllers	Reference	Weight kg
Connection to the speed controller using the VW3-A8300 interface and the VW3-A68332 cable			
Fipio : The card is equipped with a male 9-pin SUB-D connector, for a TSX FP ACC 12 mobile connector with TSX FP CC●● connecting cable or TSX FP CA●● tap cable (please consult our specialist catalogue)	ATV-68 all ratings	**VW3-A58301** ▲	0.300
Modbus Plus : The card is equipped with a female 9-pin SUB-D connector, for a Modus Plus tap cable equipped with connectors, reference 990NAD21910 or 990NAD21930, to be connected to a Modbus Plus local site tap, reference 990NAD23000, for connection to the Modbus Plus trunk cable, reference 490NAA271●●. To order Modbus Plus cables and sockets (please consult our specialist catalogue)	ATV-68 all ratings	**VW3-A58302** ▲	0.300
Direct connection to the speed controller			
Profibus DP : The card is equipped with a 9-pin female SUB-D connector for connection using cables equipped with connectors (consult manufacturer's catalogue)	ATV-68 all ratings	**VW3-A68307** ▲	0.300

Communication interface for Fipio and Modbus Plus cards (supply voltage ⎓ 24 V)

Description	For speed controllers	Reference	Weight kg
Mechanical support and interface with the speed controller for the Fipio and Modbus Plus protocol cards	ATV-68 all ratings	**VW3-A8300** ▲	0.300

RS 232 connection cable for speed controller-communication interface

Description	For speed controllers	Reference	Weight kg
3 m long cable equipped with a RJ-45 data socket and a SUB-D connector, to connect the VW3-A8300 communication interface to the speed controller	ATV-68 all ratings	**VW3-A68332** ▲	0.085

Note : The communication cards are equipped with terminals or connectors which are compatible with the corresponding communication bus. They should be connected using the associated PLC accessories.

▲ To be marketed 1st quarter 2000

Altivar 68
Options : programming terminal support, PC-based setup software, DC bus connection

References

Programming terminal remote mounting kit

VW3-A68800

The terminal is supplied with the speed controller.

A terminal support option allows remote location of the speed controller terminal at a maximum distance of 3 metres. This mechanical option supports the control card, the programming terminal and any I/O cards. It is particularly suitable for mounting on the enclosure door.

Description	For speed controllers	Reference	Weight kg
Terminal support with 3m remote location cable	ATV-68 all ratings	**VW3-A68800**	3.000

PC-based setup software

This option is available in the form of a kit which allows an RS 232 C standard link to be established between the Altivar and a PC operating in a Microsoft Windows environment.

Minimum configuration : 486 PC with 8 Mbytes of RAM
Recommended configuration : Pentium 2 with 32 Mbytes of RAM
Possible environment : Windows 95, Windows 98, or Windows NT

Main functions :

- speed controller configuration
- configuration back-up
- print out of complete parameter list
- possibility of loading a configuration from one speed controller to another
- oscilloscope mode for maintenance
- local control

Description	For speed controllers	Reference	Weight kg
PC interconnection kit comprising : - a 3m VW3-A68332 connection cable with 1 9-pin SUB-D socket and 1 RJ45 data socket - 3 x 3" 1/2 1.44 Mb disks - a quick reference guide	ATV-68 all ratings	**VW3-A68331 ▲**	0.250

DC bus connection

This kit can be used to connect the braking unit or external load circuit options to the speed controller DC bus and also to connect several speed controllers in parallel.

Description	For speed controllers (1)	Reference	Weight kg
DC bus connection kit comprising : - 1 U-shaped copper bar - 1 20 mm thick copper bar with fixing nuts	ATV-68●13N4 to ●63N4	**VW3-A68802**	0.250

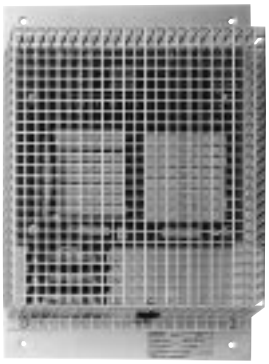
(1) For the ATV-68●10N4 speed controller the DC bus is directly accessible on the power terminals.

▲ To be marketed 1st quarter 2000

Altivar 68
Options : external load circuit, earth and IT connection protection, air ducting kit, fan

References

External load circuit (degree of protection IP 20)



VW3-A68180

This circuit is used when connecting several speed controllers in parallel on the DC bus, the total power of which must not exceed 500 kW (for high torque applications), in order to avoid a possible overload when powering up.

Description	For speed controllers	Reference	Weight kg
External load circuit	ATV-68 all ratings	**VW3-A68180**	3.000

Earth fault detection in IT connection (isolated neutral)

VW3-A68190

This option protects the speed controller in the event of an earth fault between the speed controller and the motor by measuring the differential current and the three network phases.
It is connected to an analogue 0-20 mA input.

Description	For speed controllers	Reference	Weight kg
Detection kit for earth faults comprising : a current transformer with an integrated load block	ATV-68 all ratings	**VW3-A68190**	0.500

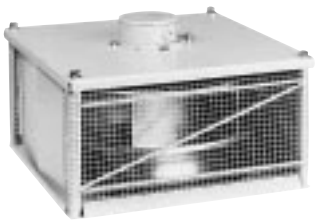
Air ducting kit (IP 23 degree of protection of enclosure)

VW3-A68801

This kit allows evacuation of hot air from the power part to the outside when the speed controller is mounted in an enclosure with an IP 23 degree of protection.
The temperature outside the enclosure must not exceed the max. ambient temperature around the speed controller - 5°C, see speed controller characteristics, page 4 and installation recommendations, page 29.

Description	For speed controllers	Number of kits required per speed controller	Reference	Weight kg
Kit comprises : - a tube - an IP 23 protection grille	ATV-68●13N4 to ●19N4	1	**VW3-A68801**	0.500
	ATV-68●23N4 to ●33N4	2	**VW3-A68801**	0.500
	ATV-68●43N4 to ●63N4	4	**VW3-A68801**	0.500

External fan (IP 23 degree of protection of enclosure)



VW3-A68820

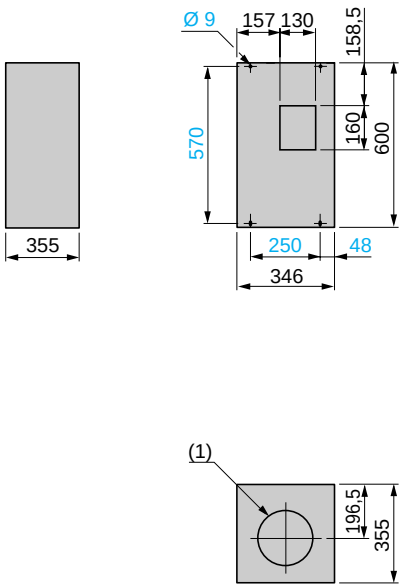
The fan allows the speed controller to be mounted in an enclosure with an IP 23 degree of protection by increasing the evacuation of hot air to the outside. This is used to obtain a maximum temperature outside the enclosure equal to the ambient temperature around the speed controller, see speed controller characteristics, page 4 and installation recommendations, page 29.

Description	For speed controllers	Number of kits required per speed controller	Reference	Weight kg
Ventilation kit comprising : - a fan - an IP 23 protection unit	ATV-68●10N4 to ●33N4	1	**VW3-A68820**	15.000
	ATV-68●43N4 to ●63N4	2	**VW3-A68820**	15.000

Altivar 68

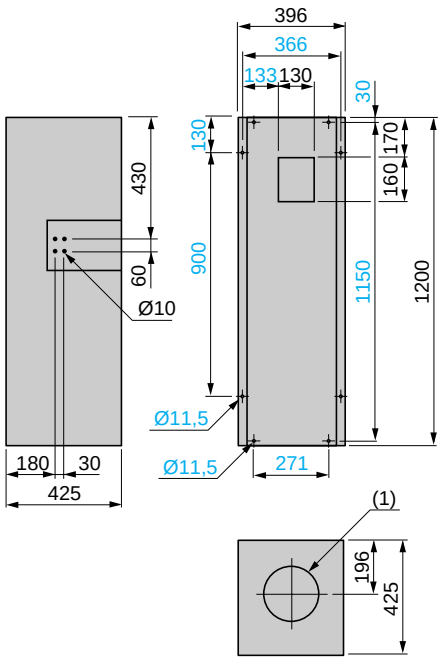
Dimensions

ATV-68●10N4 (Size 2)



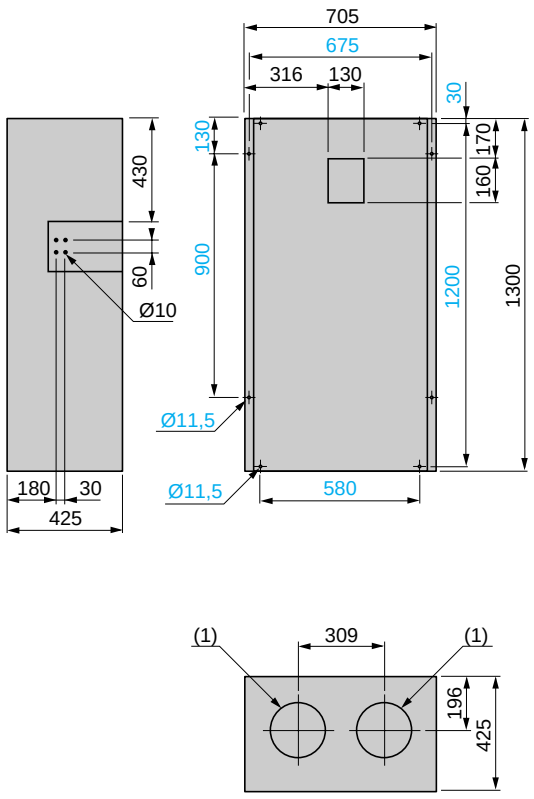
(1) Air outlet Ø 200 mm

ATV-68●13N4 to ●19N4 (Size 3)



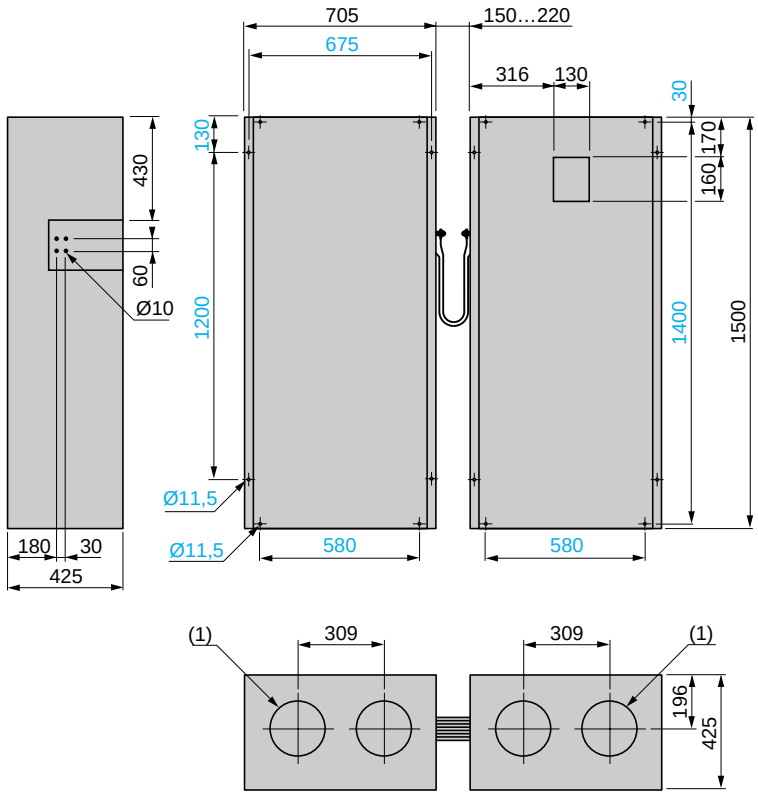
(1) Air outlet Ø 200 mm

ATV-68●23N4 to ●33N4 (Size 4)



(1) Air outlet Ø 200 mm

ATV-68●43N4 to ●63N4 (Size 5)

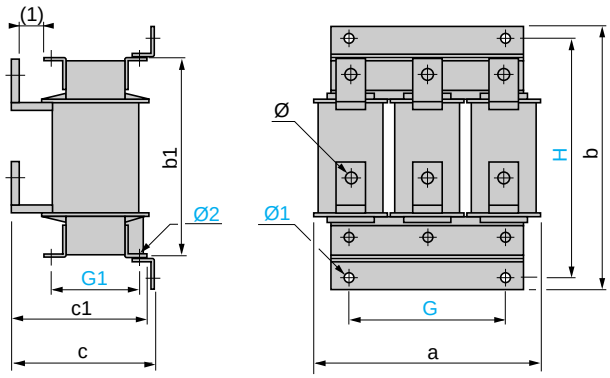


(1) Air outlet Ø 200 mm

Altivar 68

Dimensions (continued)

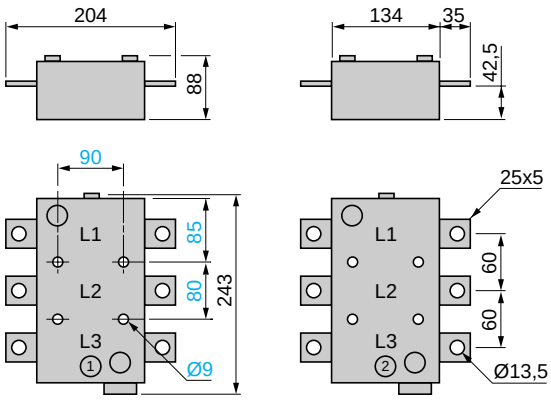
Line chokes
VW3-A68501 to A68507



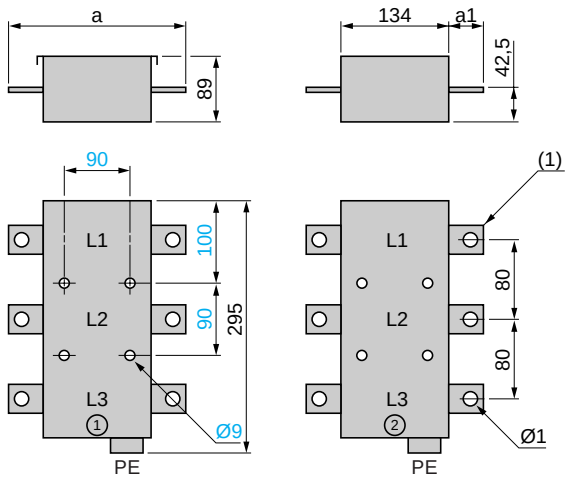
VW3-	a	b	b1	c	c1	G	G1	H	Ø	Ø1	Ø2
A68501	280	305	240	210	200	200	125	275	9	9	9
A68502	280	330	260	210	200	200	125	300	11	9	9
A68503	320	380	300	210	200	225	150	350	11	9	9
A68504	320	380	300	210	200	225	150	350	11	9	9
A68505	320	380	300	250	230	225	150	350	13	11	11
A68506	320	380	300	250	230	225	150	350	13	11	11
A68507	320	380	300	250	230	225	150	350	13	11	11

(1) 25 mm min.

Radio interference input filters
VW3-A68401 (2 elements)

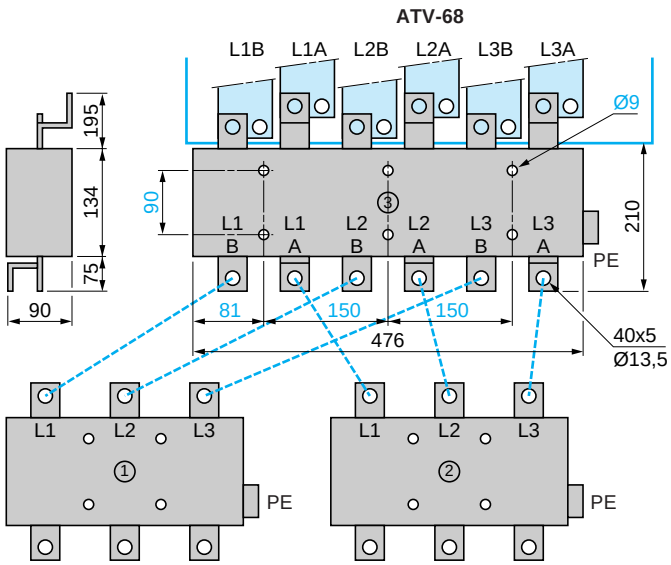


Radio interference input filters
VW3-A68402, A68403 (2 elements)

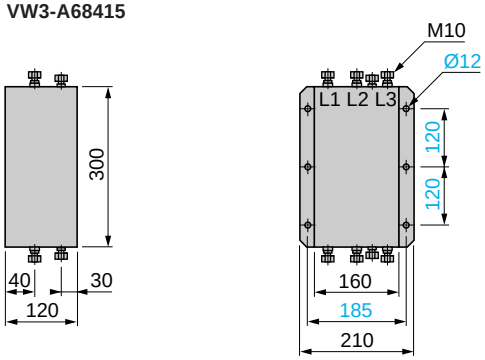


VW3-	a	a1	Ø1	(1)
A68402	204	35	11	30 x 5 bar
A68403	224	40	13.5	40 x 5 bar

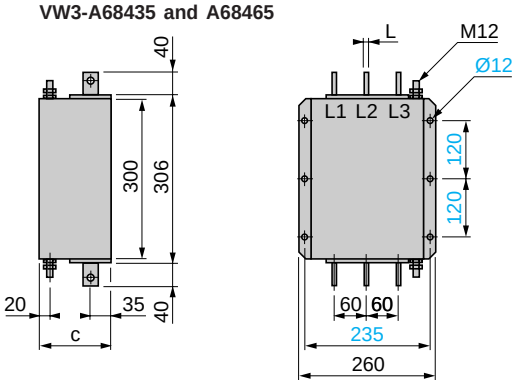
VW3-A68404 (3 elements)



VW3-A68415



VW3-A68435 and A68465

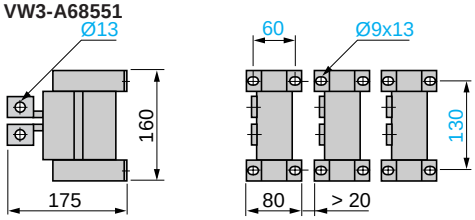


VW3-	c	L
A68435	115	6
A68465	135	8

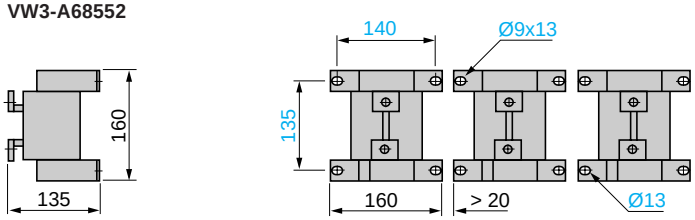
Altivar 68

Dimensions (continued)

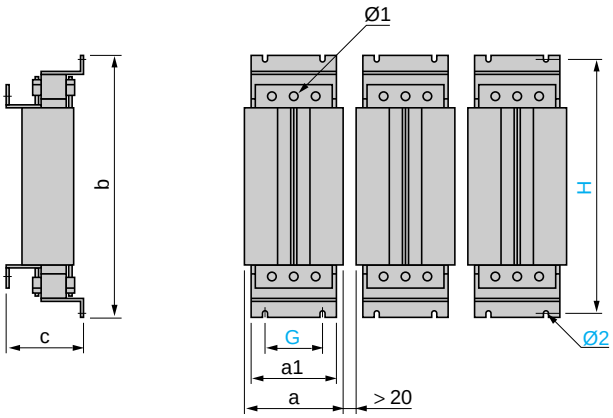
Additional motor chokes
VW3-A68551



VW3-A68552

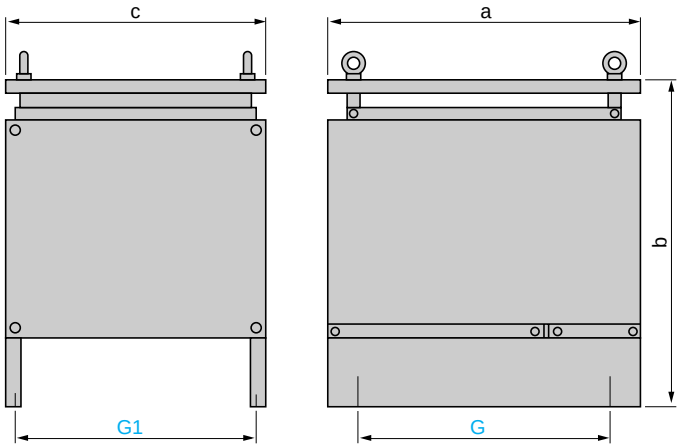


Additional motor chokes
VW3-A68553 and **A68554**



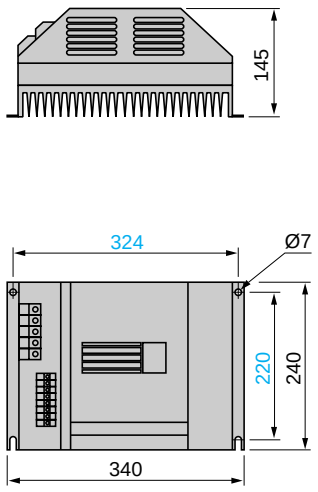
VW3-	a	a1	b	c	G	H	Ø1	Ø2
A68553	185	120	375	155	75	325…345	13	9 x 20
A68554	210	170	475	210	125	425…445	2 x 13	9 x 20

Braking resistors
VW3-A68702 to **A68705**

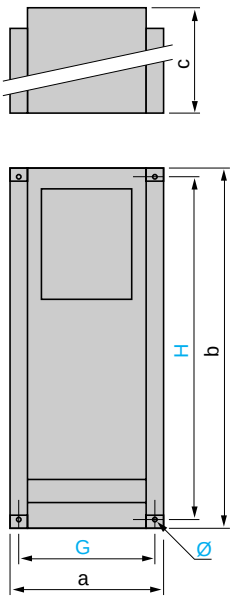


VW3-	a	b	c	G	G1
A68702	480	520	395	380	370
A68703	480	520	395	380	370
A68704	480	520	395	380	370
A68705	795	770	490	770	380

Braking units
VW3-A68804

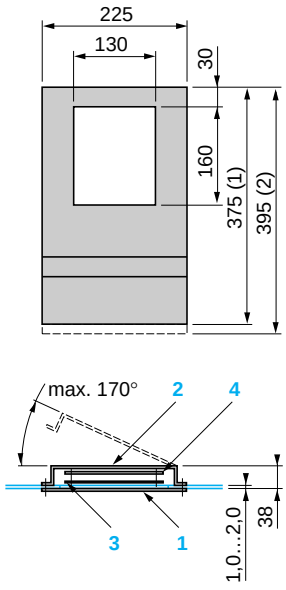


VW3-A687●1

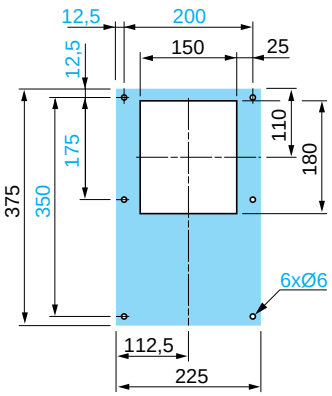


VW3-	a	b	c	G	H	Ø
A68741	350	750	345	310	714	9.5
A68751	220	500	330	195	475	8

Remote mounting kit for programming terminal
VW3-A68800



Cut-out for mounting support

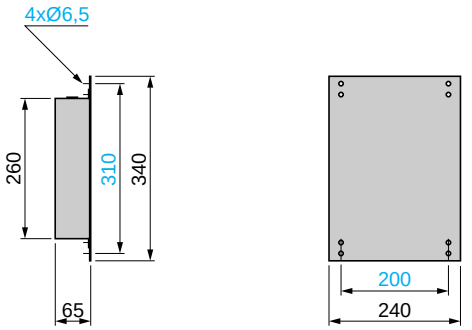


1 Front plate
2 Internal pivoting plate
3 Keyboard membrane
4 Terminal card

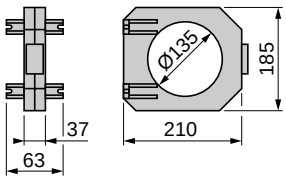
Altivar 68

Dimensions (continued)

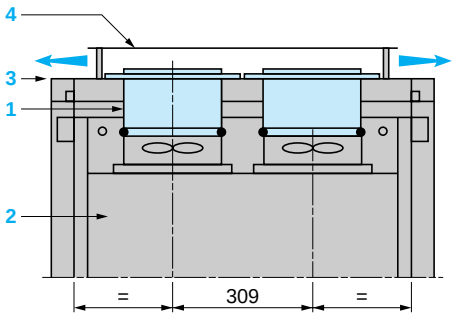
External load circuit
VW3-A68180

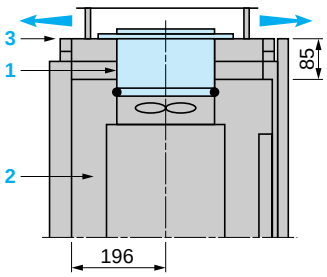


Earth fault detection kit
VW3-A68190

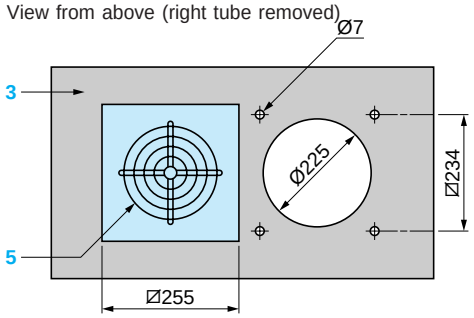


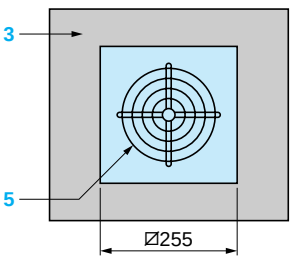
Air ducting kit
VW3-A68801





View from above (right tube removed)

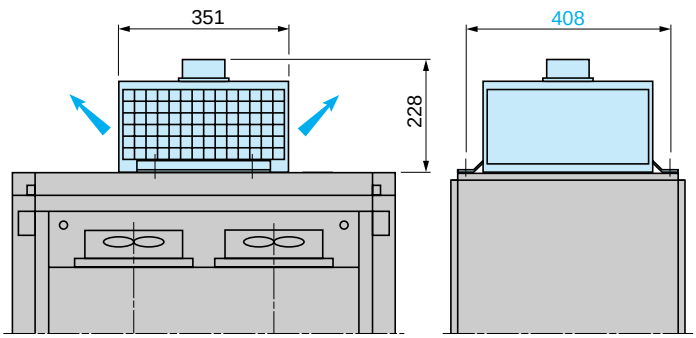




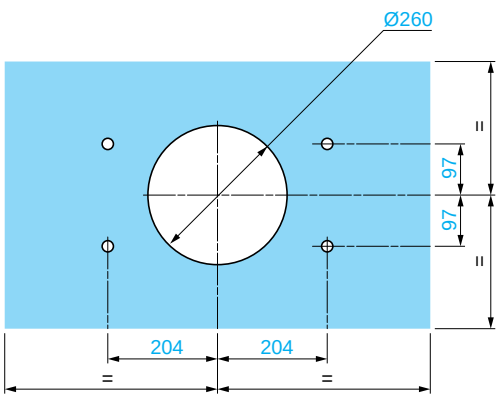
1 VW3-A68801 tube
2 Speed controller size 4 (for size 5, 4 VW3-A68801 tubes are necessary)
3 Enclosure top cover
4 Additional cover grille
5 Cover grille

1 VW3-A68801 tube
2 Speed controller size 3
3 Enclosure top cover
4 Additional cover grille
5 Cover grille

External fan
VW3-A68820

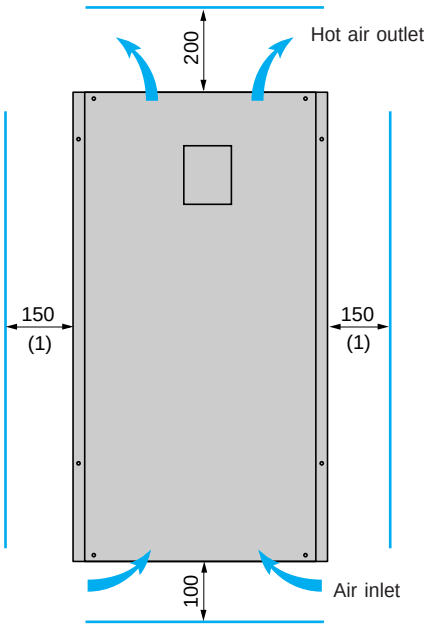


Cut-out for support



Setup and installation recommendations

Installation recommendations for all ratings of ATV-68



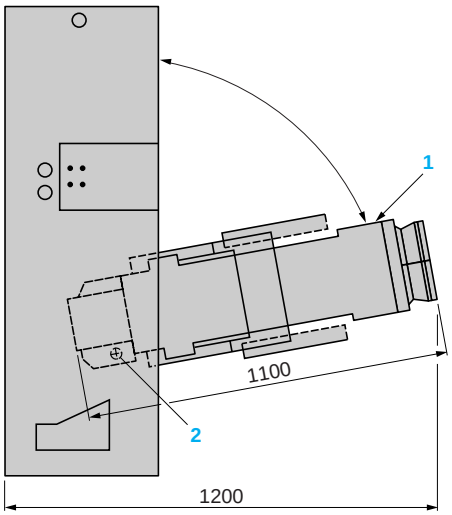
- Observe the minimum dimensions shown opposite when installing.
- Install the Altivar in a vertical position (2).
- Make provision for evacuation of the hot air to the outside of the enclosure.
- Make provision for an air inlet on the door of the enclosure.

Pay attention to the ambient temperature (see Characteristics, page 4).

Avoid harmful environments such as those with high temperature and humidity levels as well as environments containing dust, dirt or corrosive gases. The location must be well ventilated and away from direct sunlight.
Install the equipment against a vertical surface which is fireproof and vibration-free.

(1) Clearances at the sides are only required for access during maintenance. If the equipment can be easily removed, these distances are not necessary.
(2) To ensure convection cooling, the Altivar 68 speed controllers are designed for vertical installation. Observe the minimum recommended clearances, especially if the equipment is enclosed.
The ingress of objects during installation risks causing damage to the installation : ensure that no objects, wires, wire insulation, swarf or dust enter the equipment by covering it when it is not connected to the supply.

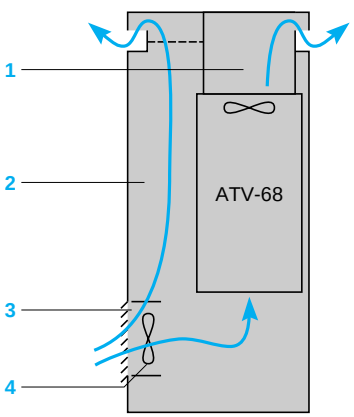
Installation recommendations for ATV-68●13N4 to ●63N4



- The power block is accessed by tilting it forward, for ratings ATV-68●13N4 to ●63N4. For maintenance provide a free space of 1.20 m in front of the Altivar.

1 Power block
2 Rotation axis

Installing the ATV-68●10N4 speed controller in an IP20 or IP23 enclosure For a maximum ambient temperature of + 40 °C outside the enclosure

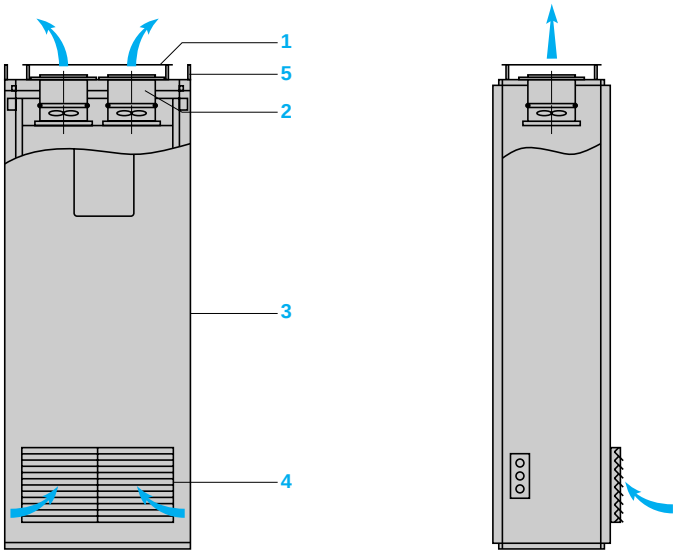


1 Air duct in order to avoid circulation of air from the power part inside the enclosure
2 Open section to facilitate the circulation of air
3 Air inlet (without filter) 6 dm^3
4 Fan

Air flow : 450 m^3/h

Setup and installation recommendations

Installing ATV-68●13N4 to ●63N4 speed controllers in IP 20 or IP 23 enclosures (1)
For a maximum ambient temperature of + 35…+ 40 °C (2) **outside the enclosure**



1 Top cover should be a minimum of 60 mm from the air outlets.
2 Hot air evacuation duct (VW3-A68801) : 1, 2 or 4 outlets in the upper part of the enclosure depending on the rating (internal diameter 195 mm with rubber seal).
3 Partition with holes for cables to pass through, do not obstruct.
4 Speed controller air inlet.
5 Compulsory separator.

The grille in the upper part 1 must be at least 60mm away from the roof of the enclosure and should guarantee air circulation on all sides.
Mounting of separators 5 is essential if the fans of adjacent enclosures create back pressure.
Circulation of air within the enclosure must not be obstructed by the presence of additional components (line chokes, motor chokes, etc., except for radio interference filters and wiring) mounted between the enclosure air inlet and the speed controller air inlet 4 in the lower part and between the speed controller air outlet and enclosure air outlet in the upper part.

No heat source should be mounted under the speed controller!

Surface area of air inlet 4 according to speed controller rating

ATV-68	Surface area in dm² (3)
●13N4 to ●19N4	7
●23N4 to ●33N4	10
●43N4 to ●68N4	20

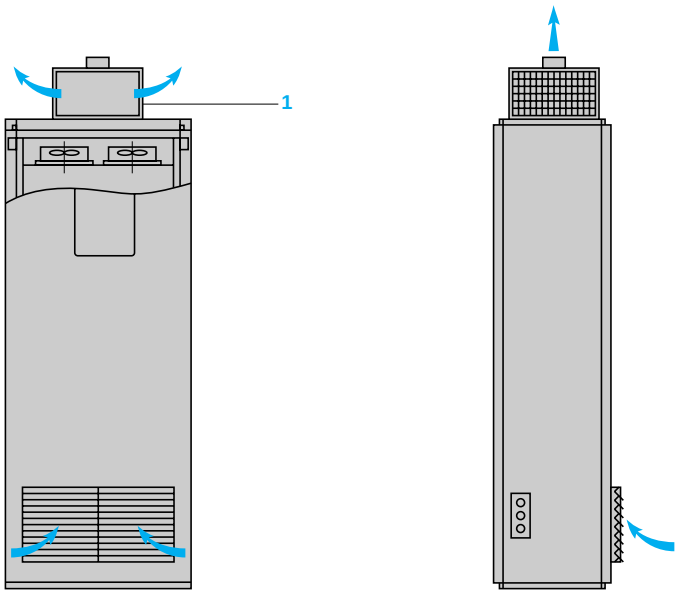
Air circulation around the ventilation outlet should be around 10 m/s (approx. 35 km/h) so that each air duct creates an increase in pressure.

Air flow according to speed controller rating

ATV-68	Flow in m³/h
●13N4 to ●19N4	600
●23N4 to ●33N4	2 x 600
●43N4 to ●68N4	4 x 600

If another enclosure is mounted immediately adjacent to the speed controller, the enclosure partition 3 must be closed to avoid heat exchange.

For a maximum ambient temperature of + 40…+ 45 °C outside the enclosure



The additional fan 1 avoids speed controller derating for an ambient air temperature outside the enclosure of + 40…+ 45 °C, see speed controller characteristics, page 4.

Volume processed > 1500 m³/h

The cooling air flowing through the enclosure fans is evacuated by the additional fan (air duct need not be used).

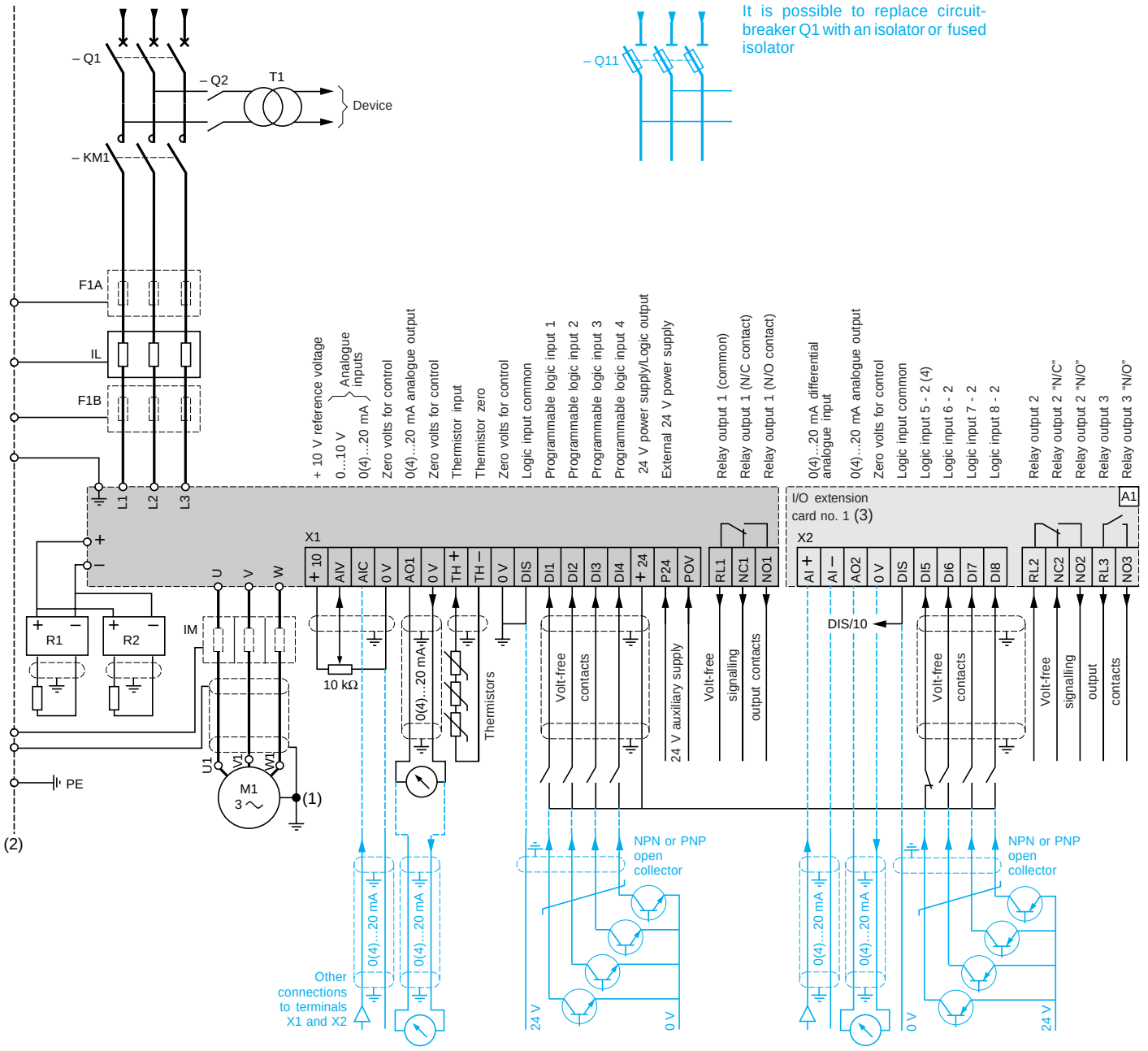
1 Additional fan VW3-A68820.

(1) For IP54 installation, please consult your Regional Sales Office.
(2) To determine the maximum ambient temperature : see speed controller characteristics, page 4 and reduce by 5 °C to take account of the temperature rise due to mounting in an enclosure.
(3) Defined surface area without filter.

Altivar 68

Schemes

Wiring diagram for ATV-68●10N4 to ATV-68●33N4 (supply voltage 400 V)



(1) Motor cable shielding is necessary if the environment is sensitive to radiated interference. At the speed controller end, fix and ground the shielding to the mounting plate using 360° contact stainless steel clamps.
The main function of the motor cable shielding is to limit radio frequency radiation. Therefore use a 4-pole cable for the motor, connecting each end of the shielding. The protection material (copper or steel) is of less importance than the quality of the connection at both ends. An alternative is to use metal trunking of high conductivity ensuring continuity throughout.
(2) Conductive mounting plate (in stainless or galvanised steel) to connect the motor cable shielding ground and to ensure ground equipotentiality between filter, speed controller and shielding.
All connections should be marked --- representing the EMC equipotential required for the flow of high frequency interference : protection connections, ground connections to shielding plates and interconnection of shielding.
They require low impedance at high frequencies; use machine ground wiring or, when this is not possible, large cross-section braiding (as short as possible). They can be in parallel with the normal protective conductor (green/yellow) which ensures safety.
(3) It is possible to mount a second I/O card on the X3 connector.
(4) Not programmable on the first I/O extension card assigned to : “speed controller locking”.

Altivar 68

Combinations

Components to connect to ATV-68●10N4 to ATV-68●33N4 speed controllers

Label	Description
A1	ATV-68 ●10N4 to ●33N4 speed controllers
F1A - F1B	Radio interference input filters in 2 parts, see page 15. Their IL line choke connections must be as short as possible. At 500 V, the filter is a single part, place it at F1B.
IL	Line chokes, see page 12.
IM	Motor chokes, see page 16.
KM1	LC1-F●●● with suppressor (see pages 38 and 39). Optional contactor - Avoid frequent operation of contactor KM1 (risk of premature ageing of filter capacitors). Instead use the speed controller locking function. - In the case of cycles < 60 s, this is essential, to avoid risk of damaging the capacitator load card. - If the safety standards require motor isolation, install a contactor at the speed controller output and lock the speed controller when the contactor is closed.
Q1	Circuit-breaker (see pages 38 and 39).
Q2	GV2-L rated at twice the primary nominal current of T1
Q11	Isolator or fused isolator Fuse rating depends on speed controller and supply voltage

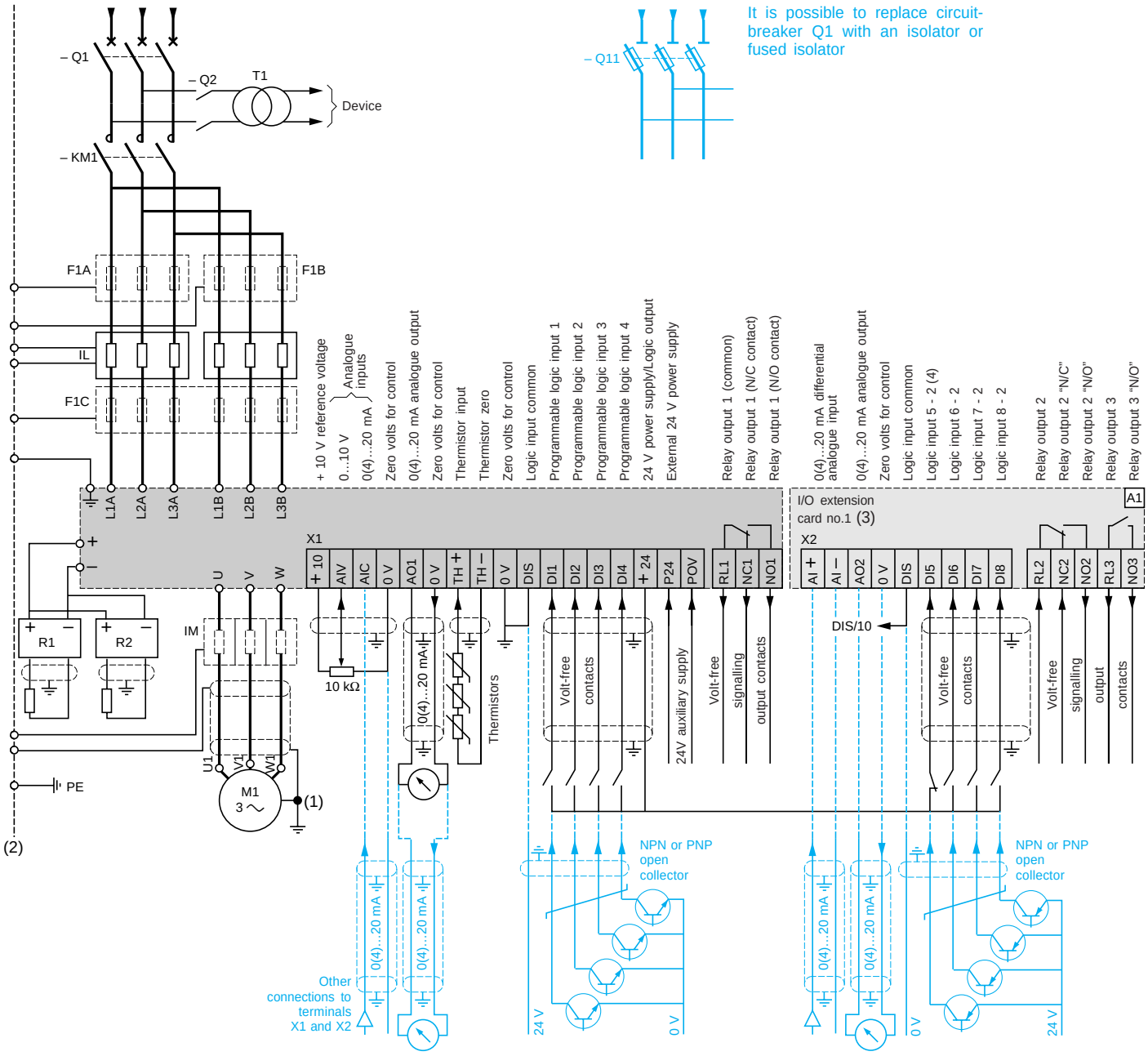
Speed controller	Supply voltage		Maximum tripping value
	400…440 V	500 V	I^2t
ATV-68●10N4	200 A	160 A	75 x 10^3 A^2.s
ATV-68●13N4	250 A	200 A	245 x 10^3 A^2.s
ATV-68●15N4	315 A	250 A	245 x 10^3 A^2.s
ATV-68●19N4	400 A	315 A	245 x 10^3 A^2.s
ATV-68●23N4	500 A	400 A	1000 x 10^3 A^2.s
ATV-68●28N4	630 A	500 A	1000 x 10^3 A^2.s
ATV-68●33N4	800 A	630 A	1000 x 10^3 A^2.s

R1 - R2	Braking units, see page 18.
T1	Control supply transformer, depends on the application.

Altivar 68

Schemes

Wiring diagram for ATV-68●43N4 to ATV-68●63N4 (supply voltage 400 V)



(1) Motor cable shielding is necessary if the environment is sensitive to radiated interference. At the speed controller end, fix and ground the shielding to the mounting plate using 360° contact stainless steel clamps.
The main function of the motor cable shielding is to limit radio frequency radiation. Therefore use a 4-pole cable for the motor, connecting each end of the shielding. The protection material (copper or steel) is of less importance than the quality of the connection at both ends. An alternative is to use metal trunking of high conductivity ensuring continuity throughout.
(2) Conductive mounting plate (in stainless or galvanised steel) to connect the motor cable shielding ground and to ensure ground equipotentiality between filter, speed controller and shielding.
All connections should be marked --- representing the EMC equipotential required for the flow of high frequency interference : protection connections, ground connections to shielding plates and interconnection of shielding.
They require low impedance at high frequencies; use machine ground wiring or, when this is not possible, large cross-section braiding (as short as possible). They can be in parallel with the normal protective conductor (green/yellow) which ensures safety.
(3) It is possible to mount a second I/O card on the X3 connector.
(4) Not programmable on the first I/O extension card assigned to : “speed controller locking”.

Altivar 68

Combinations

Components to connect to ATV-68●43N4 to ATV-68●63N4 speed controllers

Label	Description
A1	ATV-68●43N4 to ●63N4 speed controllers
F1A - F1B - F1C	Radio interference input filters in 3 parts, see page 15. Their IL line choke connections must be as short as possible. At 500 V, these are 2 identical filters : one is connected at F1C for L1A, L2A, L3A, the other at F1C for L1B, L2B, L3B.
IL	Line chokes, see page 12.
IM	Motor chokes, see page 16.
KM1	LC1-F●●● with suppressor (see pages 38 and 39). Optional contactor - Avoid frequent operation of contactor KM1 (risk of premature ageing of filter capacitors). Instead use the speed controller locking function. - In the case of cycles < 60 s, this is essential, to avoid risk of damaging the capacitator load card. - If the safety standards require motor isolation, install a contactor at the speed controller output and lock the speed controller when the contactor is closed.
Q1	Circuit-breaker (see pages 38 and 39).
Q2	GV2-L rated at twice the primary nominal current of T1
Q11	Isolator or fused isolator Fuse rating depends on speed controller and supply voltage

Speed controller	Supply voltage		Maximum tripping value
	400…440 V	500 V	I^2t
ATV-68●43N4	2 x 500 A (1)	2 x 400 A (1)	1000 x 10^3 A^2.s
ATV-68●53N4	2 x 630 A (1)	2 x 500 A (1)	1000 x 10^3 A^2.s
ATV-68●63N4	2 x 800 A (1)	2 x 630 A (1)	1000 x 10^3 A^2.s

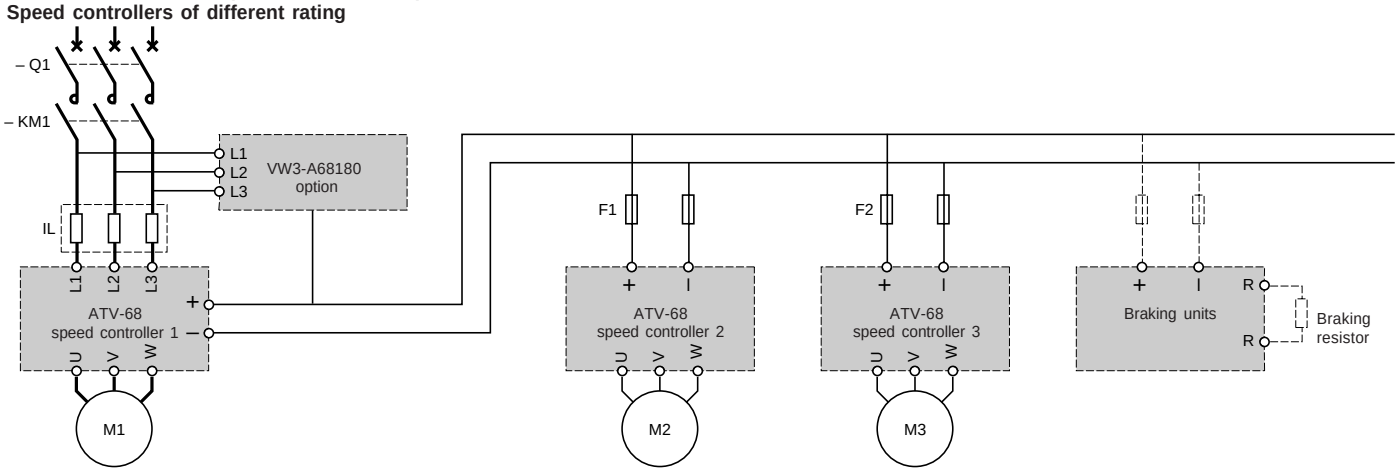
R1 - R2	Braking units, see page 18.
T1	Control supply transformer, depends on the application.

(1) 2 x 3-pole fuses as there are two input bridges.

Altivar 68

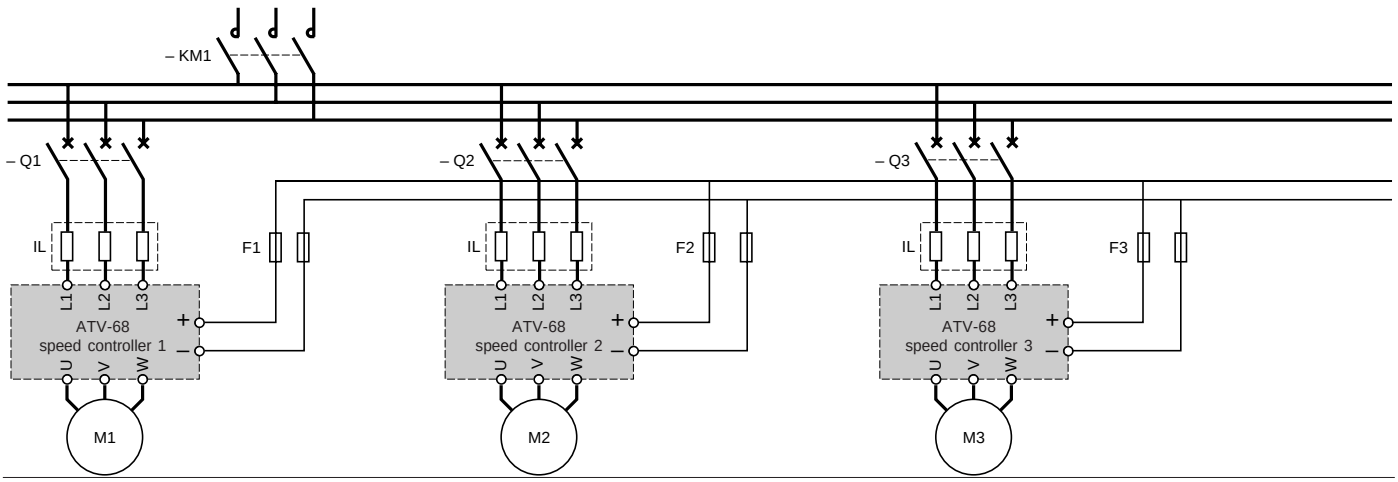
Schemes

Connection of several speed controllers in parallel on the DC bus
Speed controllers of different rating



Label	Description
Speed controller 1	Standard frequency inverter. The Altivar 68, connected directly to the mains supply, determines the maximum motor power possible for speed controllers 1 + 2 + 3.
Speed controllers 2 and 3	Speed controllers powered by the DC bus. Protection should be provided by fast-acting fuses. Contactors on the ⎓ circuit are no use as the switching action may blow the fuses because of a high load current.
VW3-A68180 option	"External load circuit" option. This option is necessary to avoid overloading the Altivar 68 load circuits. This option can be used to load speed controller 1 for a total power of 630 kW. (Standard torque of speed controllers 1 + 2 + 3).
F1, F2	Fast-acting fuses for protection on the DC bus side, see table on opposite page.
Braking unit	Braking unit and braking resistor if necessary.

Connection of several speed controllers in parallel on the DC bus
Speed controllers of same rating



Label	Description
KM1	Using a common line contactor, all Altivar 68 load circuits function in parallel and so cannot be overloaded. **Warning** : If one contactor per speed controller is used, the "external load circuit" option **VW3-A68180** should be connected to each speed controller.
Q1, Q2, Q3	Line-side circuit-breakers for speed controller overload protection. Use the trip contacts acting on the "external fault" logic input or on the line contactor. The line contactor must only be energised if the three circuit-breakers are closed, otherwise there is a risk of speed controller deterioration.
F1, F2, F3	Fast-acting fuses protection on the DC bus side, see table on opposite page.
Speed controllers 1, 2 and 3	Generally the number and size of speed controllers can be freely selected, but only speed controllers of the same size or the first rating of the next size can be used together. Line chokes (IL) must be used.

Altivar 68

Combinations

DC bus fuse size (F1, F2, F3) according to speed controller rating

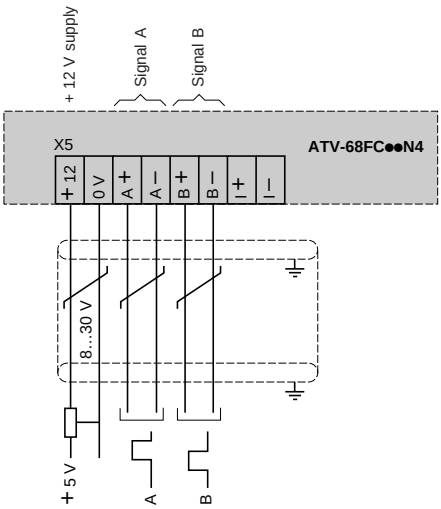
Speed controller	Fast-acting fuses (1)	
	400 and 440 V	460 and 500 V
ATV-68●10N4	250 A	200 A
ATV-68●13N4	315 A	250 A
ATV-68●15N4	400 A	315 A
ATV-68●19N4	500 A	400 A
ATV-68●23N4	630 A	500 A
ATV-68●28N4	800 A	500 A
ATV-68●33N4	800 A	630 A
ATV-68●43N4	1000 A	800 A
ATV-68●53N4	1250 A	1000 A
ATV-68●63N4	1600 A	1250 A

(1) Nominal voltage of fast-acting fuse: 400 V : fast-acting 690 V
440 V : fast-acting 800 V
460 V : fast-acting 800 V
500 V : fast-acting 800 V

Altivar 68

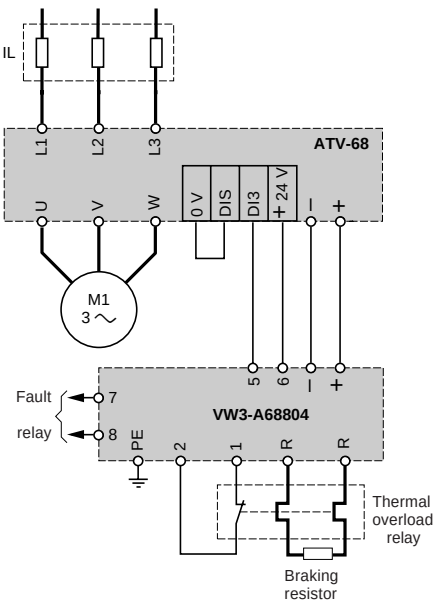
Schemes

Encoder feedback card

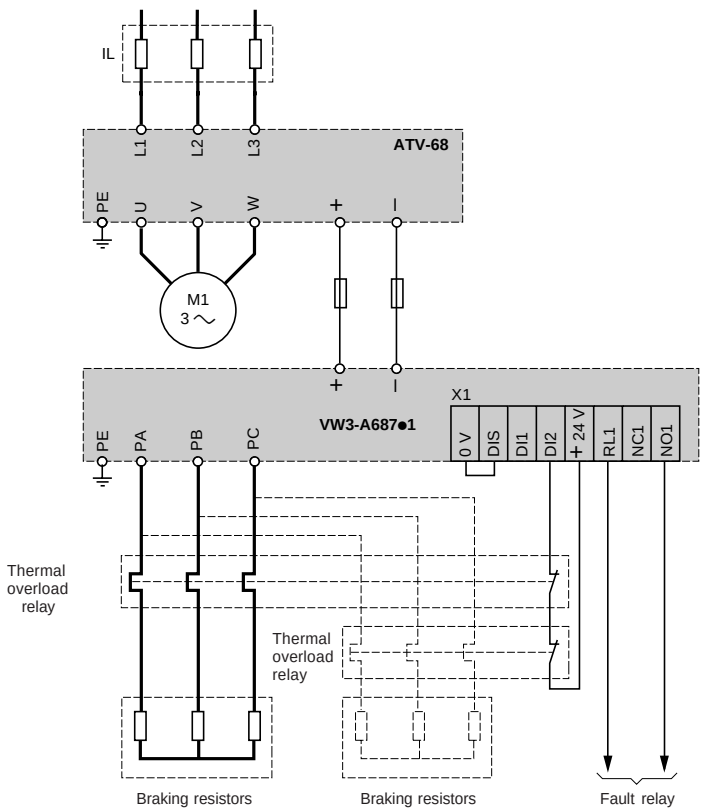


Braking units

VW3-A68804



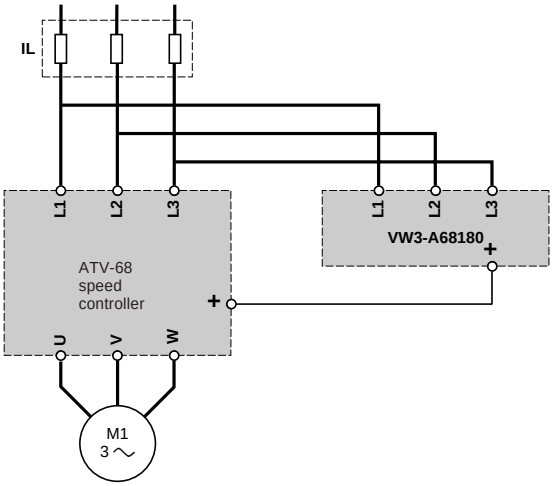
VW3-A687●1



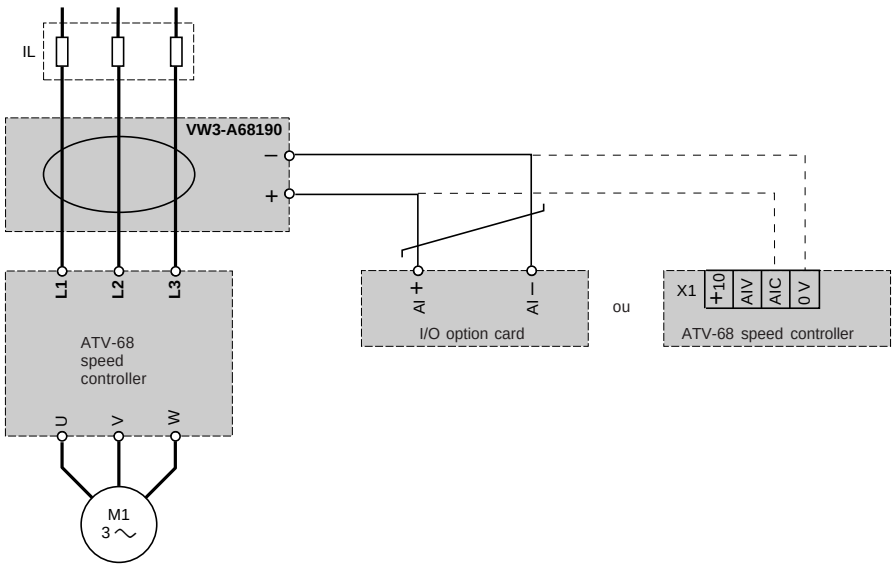
Altivar 68

Schemes

External load circuit
VW3-A68180



Earth fault detection kit
VW3-A68190



Altivar 68
Motor starters

Combinations for customer assembly

Applications

Circuit-breaker-contactor-speed controller combinations ensure service continuity of the installation with optimum safety. The coordination between the circuit-breaker and the contactor reduces maintenance costs in the event of a short-circuit by minimising intervention time and the expense of replacing equipment.
The combinations available provide type 1 or type 2 coordination :
Type 2 coordination : There will be no damage and no loss of settings after a short-circuit. The motor starter should be operational after the electrical fault has been cleared. Electrical isolation provided by the circuit-breaker is maintained after the incident. The risk of soldering the line contactor contacts is accepted, as these can easily be separated.
Type 1 coordination : Electrical isolation provided by the circuit-breaker is maintained after the incident and parts other than the contactor are not damaged following the short-circuit.

The circuit-breaker protects against short-circuits of power supply cables and internal speed controller cables.
The contactor powers up the motor starter as well as isolating the variable speed controller from the line supply, when the motor stops.
The speed controller controls the motor, protects against short-circuits between the speed controller and the motor, and protects the motor cable against overload. This protection against overload is ensured by the speed controller's thermal motor protection. If this is removed, external thermal protection should be provided.

The cause of the trip should be cleared before the installation is powered up again.

NS250HMA
+
LC1-F185●●
+
ATV-68●13N4

3-phase supply voltage 400 V

Standard 4-pole motor 50/60 Hz P	In max.	Circuit-breaker Reference to be completed (1)	Rating	In at 55 °C	Irm	Line contactor Basic reference to be completed	Ie AC-1 at 55 °C	Speed controller Reference to be completed (3)	Line current with choke (4)
kW	**A**		**A**	**A**	**A**		**A**		**A**
For high torque applications									
Type 2 coordination									
75	142	**NS160●MA**	150	160	1350	**LC1-D115●●**	200	**ATV-68●10N4**	133
90	172	**NS250●MA**	220	235	1980	**LC1-F185●●**	275	**ATV-68●13N4**	161
110	208	**NS250HMA**	220	235	1980	**LC1-F185●●**	275	**ATV-68●15N4**	194
132	250	**NS400●MA**	320	390	2880	**LC1-F265●●**	300	**ATV-68●19N4**	234
160	325	**NS400●MA**	320	390	2880	**LC1-F265●●**	300	**ATV-68●23N4**	304
200	404	**NS400●MA**	320	390	2880	**LC1-F400●●**	430	**ATV-68●28N4**	378
220	430	**NS630●MA**	500	585	4500	**LC1-F400●●**	430	**ATV-68●33N4**	402
250	475	**NS630●MA**	500	585	4500	**LC1-F500●●**	580	**ATV-68●33N4**	444
315	617	**NS630●MA**	500	585	4500	**LC1-F500●●**	580	**ATV-68●43N4**	577
Type 1 coordination									
400	767	**C801●STR35ME**	800	770	1600	**LC1-F630●●**	850	**ATV-68●53N4**	717
450	800	**C801●STR35ME**	800	770	1600	**LC1-F630●●**	850	**ATV-68●63N4**	748
500	904	**C1001●STR35ME**	1000	925	2000	**LC1-F800●●**	850	**ATV-68●63N4**	845
For standard torque applications									
Type 2 coordination									
90	170	**NS250●MA**	220	235	1980	**LC1-F185●●**	275	**ATV-68●10N4**	159
110	206	**NS250●MA**	220	235	1980	**LC1-F185●●**	275	**ATV-68●13N4**	193
132	250	**NS250●MA**	220	235	1980	**LC1-F185●●**	275	**ATV-68●15N4**	234
160	300	**NS400●MA**	320	390	2880	**LC1-F265●●**	300	**ATV-68●19N4**	280
200	390	**NS400●MA**	320	390	2880	**LC1-F400●●**	430	**ATV-68●23N4**	365
220	430	**NS630●MA**	500	585	4500	**LC1-F400●●**	430	**ATV-68●28N4**	402
250	485	**NS630●MA**	500	585	4500	**LC1-F500●●**	580	**ATV-68●28N4**	453
315	570	**NS630●MA**	500	585	4500	**LC1-F500●●**	580	**ATV-68●33N4**	533
Type 1 coordination									
400	675	**C801●STR35ME**	800	770	1600	**LC1-F630●●**	850	**ATV-68●43N4**	692
450	860	**C1001●STR35ME**	1000	925	2000	**LC1-F800●●**	850	**ATV-68●53N4**	804
500	855	**C1001●STR35ME**	1000	925	2000	**LC1-F780●●**	1350	**ATV-68●53N4**	860
630	1045	**C1251●STR35ME**	1250	1100	2500	**LC1-F780●●**	1350	**ATV-68●63N4**	1015

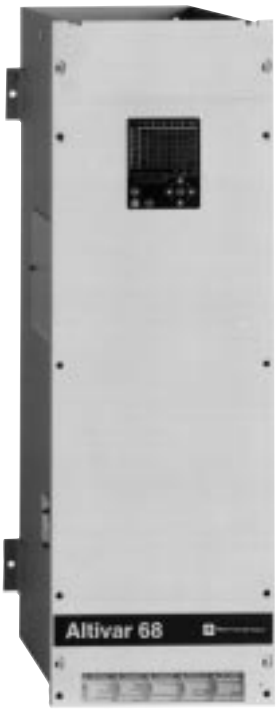
(1) Magnetic circuit-breaker marketed under the Merlin Gerin brand.
Replace the point in the reference with the letter which corresponds to the circuit-breaking performance :
Circuit-breaking performance in kA (at 400 V / 440 V / 500 V)

Circuit-breaker	**N**	**H**	**L**
NS160●MA	35/35/30	70/65/50	130/130/70
NS250●MA	35/35/22	70/65/35	130/130/50
NS400●MA	–	70/65/50	130/130/70
NS630●MA	–	70/65/35	130/130/50
C801● to C1251●	50/42/40	70/65/50	**–**

(2) In order to define the complete reference for contactors : auxiliary contacts, control circuit voltage, and if applicable, number of poles, please consult our specialist catalogue.
(3) Replace the point in the reference according to the type of speed controller required, see pages 10 and 11.
(4) Line current corresponding to the maximum motor current for an ambient temperature of 40 to 45 °C max. depending on the rating (see pages 4, 28 and 29).

Altivar 68
Motor starters

Combinations for customer assembly (continued)



NS250HMA
+
LC1-F185●●
+
ATV-68●13N4

3-phase supply voltage 440 V

Standard		Circuit-breaker				Line contactor	Speed controller		Line
4-pole motor 50/60 Hz		Reference to be completed (1)	Rating	In at 55 °C	Irm	Basic reference to be completed	Ie AC-1 at 55 °C	Reference to be completed (3)	current with choke (4)
P	In max.								
kW	**A**		**A**	**A**	**A**		**A**		**A**
For high torque applications									
Type 2 coordination									
75	129	**NS160●MA**	150	160	1350	**LC1-D115●●**	200	**ATV-68●10N4**	121
90	156	**NS160●MA**	150	160	1350	**LC1-D115●●**	200	**ATV-68●13N4**	146
110	189	**NS250●MA**	220	235	1980	**LC1-F185●●**	275	**ATV-68●15N4**	177
132	240	**NS400●MA**	320	390	2880	**LC1-F265●●**	300	**ATV-68●19N4**	224
160	302	**NS400●MA**	320	390	2880	**LC1-F265●●**	300	**ATV-68●23N4**	282
200	367	**NS400●MA**	320	390	2880	**LC1-F330●●**	360	**ATV-68●28N4**	343
220	391	**NS400●MA**	320	390	2880	**LC1-F400●●**	430	**ATV-68●33N4**	366
250	431	**NS630●MA**	500	585	4500	**LC1-F400●●**	430	**ATV-68●33N4**	403
315	590	**NS630●MA**	500	585	4500	**LC1-F500●●**	580	**ATV-68●43N4**	552
Type 1 coordination									
400	720	**C801●STR35ME**	800	770	1600	**LC1-F630●●**	850	**ATV-68●53N4**	673
450	781	**C801●STR35ME**	800	770	1600	**LC1-F630●●**	850	**ATV-68●63N4**	730
500	840	**C1001●STR35ME**	1000	925	2000	**LC1-F800●●**	850	**ATV-68●63N4**	785
For standard torque applications									
Type 2 coordination									
90	155	**NS160●MA**	150	160	1350	**LC1-D115●●**	200	**ATV-68●10N4**	145
110	187	**NS250●MA**	220	235	1980	**LC1-F185●●**	275	**ATV-68●13N4**	175
132	227	**NS250●MA**	220	235	1980	**LC1-F185●●**	275	**ATV-68●15N4**	212
160	288	**NS400●MA**	320	390	2880	**LC1-F265●●**	300	**ATV-68●19N4**	269
200	362	**NS400●MA**	320	390	2880	**LC1-F330●●**	360	**ATV-68●23N4**	338
220	391	**NS400●MA**	320	390	2880	**LC1-F400●●**	430	**ATV-68●28N4**	365
250	440	**NS630●MA**	500	585	4500	**LC1-F400●●**	430	**ATV-68●28N4**	411
517	517	**NS630●MA**	500	585	4500	**LC1-F500●●**	580	**ATV-68●33N4**	483
Type 1 coordination									
400	708	**C801●STR35ME**	800	770	1600	**LC1-F630●●**	850	**ATV-68●43N4**	662
450	781	**C801●STR35ME**	800	770	1600	**LC1-F630●●**	850	**ATV-68●53N4**	730
500	864	**C1001●STR35ME**	1000	925	2000	**LC1-F800●●**	850	**ATV-68●53N4**	808
630	1008	**C1251●STR35ME**	1250	1100	2500	**LC1-F780●●**	1350	**ATV-68●63N4**	942

3-phase supply voltage 500 V

For high torque applications									
Type 2 coordination									
75	113	**NS160●MA**	150	160	1350	**LC1-D115●●**	200	**ATV-68●10N4**	106
90	137	**NS160●MA**	150	160	1350	**LC1-D115●●**	200	**ATV-68●13N4**	129
110	167	**NS160●MA**	150	160	1350	**LC1-D115●●**	200	**ATV-68●15N4**	157
132	200	**NS250●MA**	220	235	1980	**LC1-F185●●**	275	**ATV-68●19N4**	188
160	260	**NS400●MA**	320	390	2880	**LC1-F265●●**	300	**ATV-68●23N4**	244
200	323	**NS400●MA**	320	390	2880	**LC1-F330●●**	360	**ATV-68●28N4**	304
220	350	**NS400●MA**	320	390	2880	**LC1-F330●●**	360	**ATV-68●33N4**	329
250	380	**NS400●MA**	320	390	2880	**LC1-F330●●**	360	**ATV-68●33N4**	357
315	494	**NS630●MA**	500	585	4500	**LC1-F500●●**	580	**ATV-68●43N4**	464
400	614	**NS630●MA**	500	585	4500	**LC1-F500●●**	580	**ATV68-●53N4**	577
Type 1 coordination									
450	670	**C801●STR35ME**	800	770	1600	**LC1-F630●●**	850	**ATV-68●63N4**	630
500	723	**C801●STR35ME**	800	770	1600	**LC1-F630●●**	850	**ATV-68●63N4**	680
For standard torque applications									
Type 2 coordination									
90	136	**NS160●MA**	150	160	1350	**LC1-D115●●**	200	**ATV-68●10N4**	128
110	165	**NS160●MA**	150	160	1350	**LC1-D115●●**	200	**ATV-68●13N4**	155
132	200	**NS250●MA**	220	235	1980	**LC1-F185●●**	275	**ATV-68●15N4**	188
160	240	**NS250●MA**	220	235	1980	**LC1-F185●●**	275	**ATV-68●19N4**	226
200	312	**NS400●MA**	320	390	2880	**LC1-F265●●**	300	**ATV-68●23N4**	293
220	350	**NS400●MA**	320	390	2880	**LC1-F330●●**	360	**ATV-68●28N4**	329
250	388	**NS400●MA**	320	390	2880	**LC1-F400●●**	430	**ATV-68●28N4**	365
517	456	**NS630●MA**	500	585	4500	**LC1-F500●●**	580	**ATV-68●33N4**	429
400	592	**NS630●MA**	500	585	4500	**LC1-F500●●**	580	**ATV-68●43N4**	556
Type 1 coordination									
450	670	**C801●STR35ME**	800	770	1600	**LC1-F630●●**	850	**ATV-68●53N4**	630
500	736	**C801●STR35ME**	800	770	1600	**LC1-F630●●**	850	**ATV-68●53N4**	692
630	868	**C1001●STR35ME**	1000	925	2000	**LC1-F800●●**	850	**ATV-68●63N4**	816

(1) Magnetic circuit-breaker marketed under the Merlin Gerin brand. Replace the point in the reference with the letter which corresponds to the circuit-breaking performance, see opposite page.
(2) In order to define the complete reference for contactors : auxiliary contacts, control circuit voltage, and if applicable, number of poles, please consult our specialist catalogue.
(3) Replace the point in the reference according to the type of speed controller required, see pages 10 and 11.
(4) Line current corresponding to the maximum motor current for an ambient temperature of 40 to 45 °C max. depending on the rating (see pages 4, 28 and 29).

Altivar 68
Dialogue

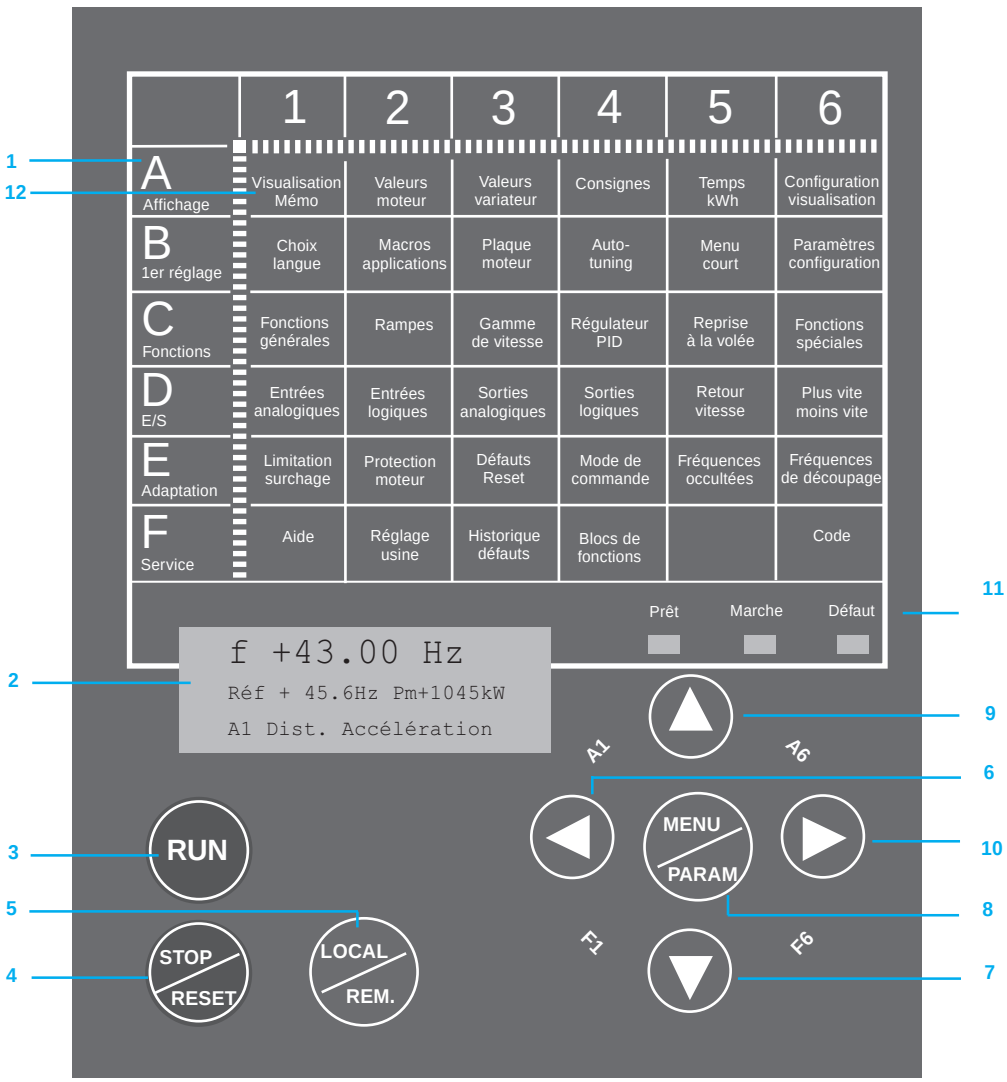
Description

Presentation of the programming terminal

The Altivar 68 has a programming terminal on the front panel which allows :

- local control of the speed controller
- configuration of different parameters
- remote display and signalling of speed controller status

Presentation of the control keypad



1 A summary table for moving around in the menus.
2 Liquid crystal display screen.
3 "Run" key for local mode.
4 "Stop" key in local or remote mode, programmable for fault acknowledgement.
5 "Local/remote" key : choice of terminal or keypad control.

6 "Left" key for menu selection or to move the cursor left and to control reverse rotation in local mode.
7 "Down" key for menu selection or to decrement numeric values or the reference in local mode.
8 "Menu/Parameters" key accesses the parameter settings or exits adjust mode to return to the menu.
9 "Up" key for menu selection or to increment numeric values or the reference in local mode.
10 "Right" key for menu selection or to move the cursor right and to control forward rotation in local mode.
11 Speed controller status display : ready, running or faulty.
12 Basic display menu and parameter storage.

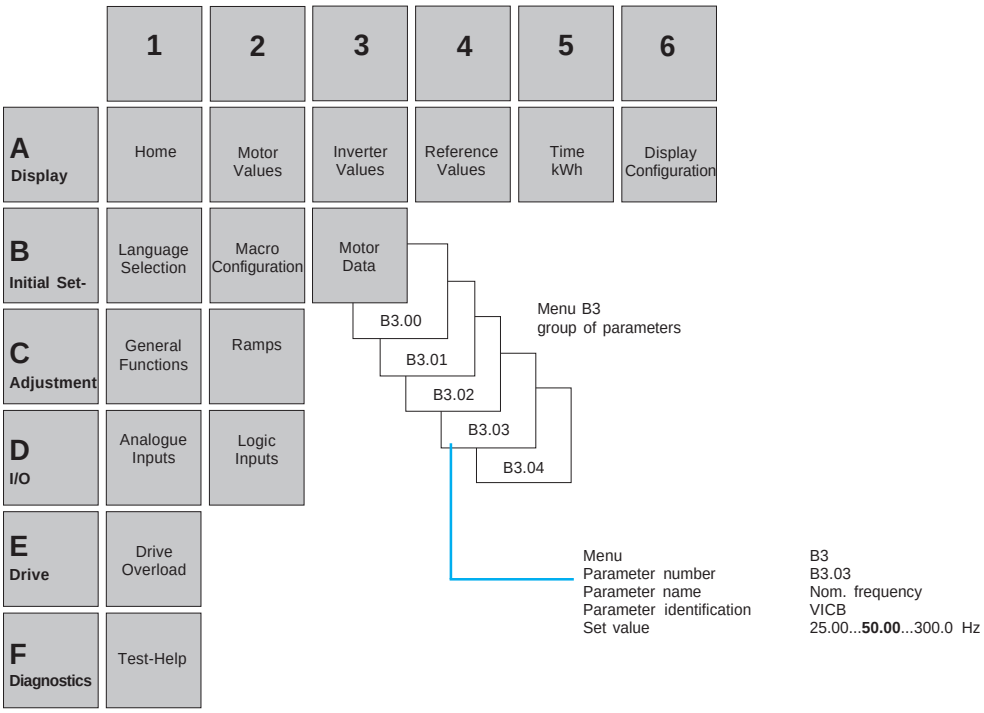
Altivar 68
Dialogue

Description (continued)

Presentation of the programming terminal (continued)

The different menus
The different menus A, B, C, D, E, F define groups of homogenous menus. Each menu contains a group of parameters.

Menu	Function
A1 to A6	Display
B1 to B6	Start-up
C1 to C6	Function groups
D1 to D6	Configuration of the I/O, speed feedback and motorised potentiometer
E1 to E6	Limiting and protection of the speed controller
F1 to F6	Service, help and factory settings, logic blocks and comparators



- Access the parameter menu with the MENU/PARAM key.
- The A1 Home menu has a special function :
  It does not contain parameters, instead it contains the basic display. The modified values are only stored in the speed controller long-term memory when changing to the basic display (MENU/PARAM key).
- Each menu can be accessed using the arrow keys.

Local control
To control the speed controller from the integrated terminal, local operating mode must be activated. The "Local/Remote" key allows this on exiting the basic display. In "local" mode, the following keys are active :

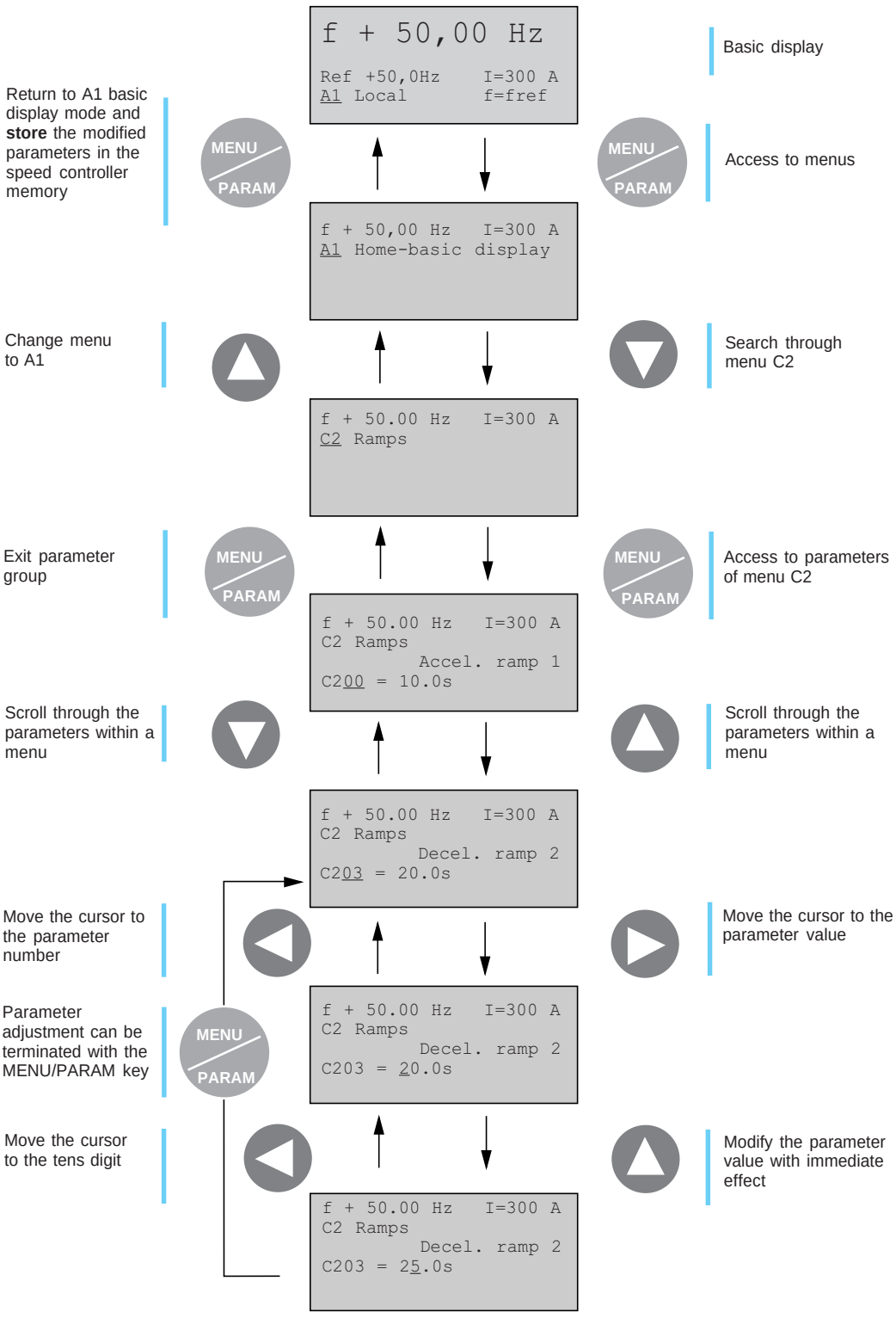
Keys	Basic display	Menu	Parameter group
RUN	Start-up	-	-
STOP RESET	Stop/Reset	(Stop) / Reset	(Stop) / Reset
▲	Increase reference	Menu search	Scrolls through the parameters or increases the value
▼	Decrease reference	Menu search	Scrolls through the parameters or decreases the value
◀	Rotate left	Menu search	Moves the cursor left
▶	Rotate right	Menu search	Moves the cursor left

Altivar 68
Dialogue

Description (continued)

Presentation of the programming terminal (continued)

Example of parameter setting



Cursor = underlined number or letter

Summary of functions

Control keypad key and corresponding function

A Display

A1 Display (basic display, Home function)

A2 Display of motor values : current, speed, etc.

A3 Display of speed controller values : thermal state, etc.

A4 Display of references

A5 Display of the number of operating hours and the KW used

A6 Configuration of the basic display. Display of 3 parameterable values

B Initial set-up

B1 Language selection

B2 Choice of application macro (preset according to the application, 4 possible choices).
Storage of 2 complete adjustment configurations possible with autotuning.

B3 Adjustment of motor parameters

B4 Measurement of motor parameters on request

B5 Access to the main settings in the short menu. This short menu groups all the parameters which are important for the application and different to the factory settings.

C Adjustment

C1 General functions :

- Starting overtorque (up to 180%)
  - adjustment of the range starting overtorque
- Choice of stop mode :
  - freewheel
  - decelerated
  - fast
- Choice of braking mode :
  - no braking unit (standard)
  - with braking unit
  - fast without braking unit. This type of braking is a low cost alternative for simple applications which avoids the use of an external braking unit. A 250 KW motor with a total inertia applied at the motor shaft of 2 to 3 times its inertia can be fast-stopped in 4 seconds. There is an increase in loss in the motor and noise during braking (warning : braking torque is not constant).
- Preset references
- JOG
- Energy saving, for variable torque applications (reduction of magnetising current on applications with quadratic torque)

C2 Selection of acceleration and deceleration ramps :
- 2 ramps.
- Choice of ramp profile, S or U with curve adjustment

C3 Adjustment at low speed and high speed
- Possible to prohibit a direction of rotation

C4 Simple PID controller or PID controller for reference correction

C5 Catch on the fly

C6 Special functions :

- Line contactor control
- Brake logic suitable for hoisting with the brake release pulse, possible management of a closed brake contact, detection of speed deviation between the reference and the speed feedback (adjustment possible), anti-repeat
- Brake logic suitable for translational movement

Summary of functions (continued)

Control keypad key and corresponding function

D I/O

D1 Configuration of the analogue inputs and adjustment of max. and min. signal values on each input :

- Frequency reference (automatic), standard choice
- Manual frequency reference
- PID reference
- PID feedback
- Reference correction
- Torque limitation

D2 Configuration of the logic inputs :

- MAN/AUTO
  This command switches between the references : automatic reference or manual reference.
- LOCAL/REMOTE. This command selects local or remote mode.

  - **Local** corresponds to commands from the graphic terminal keypad and to logic signals sent by the logic inputs assigned to local mode :

  - **Remote** corresponds to logic and analogue signals sent via the terminals (apart from those programmed in local mode) and via the line :
  - run/stop by stay-put control (2-wire control)
  - run/stop by pulse control (3-wire control)
  - remote motorised potentiometer (+/- speed)
  - run/stop by local pulse control (3-wire control)
  - local motorised potentiometer (+/- speed)
  - JOG
  - preset references (8 possible)
  - selection of ramps 1 or 2
  - selection of user macro. Allows control of a motor with 2 completely different configurations or to alternately control 2 motors. The user macro is a complete parameter configuration, including motor parameter measurement and thermal calculation.
  - speed controller locking, freewheel stop

- External event monitoring, with a display of fault type according to configuration :
  - external fault
  - external motor fault
  - external isolation fault
  - external braking unit fault
  - speed controller locking (this input allows monitoring and display on the terminal screen of the state of the accessories around the speed controller which may prevent the speed controller from starting (fuse, contactor, fan, etc.)
  - fault reset
  - external torque limitation
  - PID activation
  - activation of PID controller gains
  - speed regulation or open loop, used to change from encoder feedback mode to open loop mode
  - open brake contact handling
  - emergency stop management in the case of a line contactor controlled by a speed controller
  - parameter locking (this command prohibits parameter modification from the keypad)
  - local forcing (commands are only possible in local mode)

Functions (continued)

Summary of functions (continued)

Control keypad key and corresponding function

D3 Assignment of analogue outputs :

- Output frequency (signed or not signed)
- Motor current
- Torque (signed or not signed)
- Motor power
- Motor voltage
- Speed in rpm (signed or not signed)
- Internal frequency reference
- Torque limitation reference
- PID reference
- PID feedback
- PID error
- References from the line

D4 Assignment of logic outputs

- Brake opening (brake sequence)
- Selection of user macro 1 or 2
- External torque limit activation
- Logic block output
- Comparator block output
- Different speed controller states :
  - ready
  - running
  - ready + RUN
  - fault
  - alarm
  - generator mode
  - line supply present
  - local control mode
  - DC bus charged
  - manual control mode
  - PID activated
  - PID gain enabled
  - speed controller in closed loop

- Monitoring :
  - reference frequency greater than motor frequency (adjustable hysteresis)
  - motor frequency greater than a set level
  - speed controller command word

D5 Encoder feedback

- Choice of control mode :
  - no slip compensation
  - with slip compensation, and possibility of adjusting slip compensation range
  - with encoder feedback

  In encoder feedback mode, adjustment of the number of pulses per revolution and adjustment of the proportional, integral and derivative gain is possible.

D6 Electronic potentiometer (+/- speed)

- Choice of speed or torque reference
- Adjustment of low speed, high speed and acceleration ramps
- Reference storage

  It is possible to adjust a reference in a menu, which is then memorised after a stop command or after a loss of line supply. The reference will be taken into account after a new run command.
- Choice of +/- speed control at the terminals in local or remote mode
- Choice of +/- speed control via the keypad or terminals

Functions (continued)

Summary of functions (continued)

Control keypad key and corresponding function

E Adapting the speed controller to the installation requirements

E1 Overload limitation :

- Adjustment of maximum speed controller current (activation of limitation possible via logic input)
- Adjustment of maximum motor torque (activation of limitation possible via logic input)

E2 Protection adapted to the motor :

- Use of a PTC probe
- Thermal motor protection by calculating I^2t
- Stalled rotor detection, with frequency and stalling time adjustment
- Overspeed protection
- Detection of maximum motor speed

E3 Processing of external faults

- Undervoltage fault :
  - An undervoltage fault need not be considered as a permanent fault or it may be considered as such only when the speed controller is running.
  - adjustment of time delay before acceptance of an undervoltage fault
  - automatic restart (3 times in 5 minutes)
- 4/20 mA loss
- Processing of external faults :
  - acceptance of a time before tripping
  - configuration of acceptance conditions (speed controller running, normally closed or normally open contact, etc.)

E4 Selection of speed controller control modes :

- Selection of frequency reference origin :
  - local and remote
  - local
  - remote
- Control mode :
  - local and remote
  - local
  - remote
- Origin of local and remote control :
  - keypad
  - terminals

E5 Skip frequency

- Hysteresis adjustment

E6 Choice of switching frequency

- 2.5 kHz
- 5 kHz
- 10 kHz

Functions (continued)

Summary of functions (continued)

Control keypad key and corresponding function

F Service

- Possible earth fault test
- Control circuit test

F2 Return to factory settings (except for motor data)

- Return to motor data factory settings
- Return to application program factory settings (all parameters except for motor data and language)

F3 Fault memory

- Fault counter
- Selection of 16 most recent faults, 14 data items relating to the fault are displayed (time, output frequency, current, etc.). This information correspond to the real values 10 ms before the appearance of the fault.

F4 Logic function blocks

The speed controller contains 4 comparator blocks (greater than, less than, equal to and different from) and 2 logic function blocks (AND, OR, equal, different).
The function block output signals can be operated with a time delay.
The block input can be either an external signal or an internal data item from the speed controller.
The block output can be either a logic output or a direct action on the speed controller.

F6 Locking parameter modifications by an access code

- Choice of lock : keypad, line or terminals
- Choice of access code

Altivar 68
Ready-assembled in an enclosure

Presentation, characteristics

Presentation

Altivar 68 speed controllers can be supplied ready-assembled in an enclosure, to facilitate installation and particularly to ensure optimum ventilation.

Two versions are available

- Enclosed Altivar 68 speed controller with IP 23 degree of protection :
  - air inlet via grille on enclosure door
  - air outlet via grille on roof of enclosure

- Enclosed Altivar 68 speed controller with IP 54 degree of protection :
  - air inlet via fan fitted with a filter for ATV-68●10N4 to ●19N4 speed controllers, and via grille with filter in an additional baseplate for ATV-68●23N4 to ●63N4 speed controllers
  - air outlet via grille on the roof of enclosure

The base enclosure comprises

- a switch and fast-acting fuses
- line chokes
- Altivar 68 speed controller

Options

The ready-assembled Altivar 68 can be fitted with the same options as the ATV-68 range, as well as other specific options for mounting in enclosures.

Options common to all ratings :
- programming terminal remote mounting kit
- access window to programming terminal
- switch handle extension
- 400 V or 500 V/230 V transformer
- enclosure lighting
- ⎓ 24 V supply for the speed controller control circuit
- customized terminals
- emergency stop button

Options depending on the speed controller rating :
- protection circuit-breaker with handle extension
- radio interference input filters
- line contactor
- additional motor line chokes
- enclosure baseplate

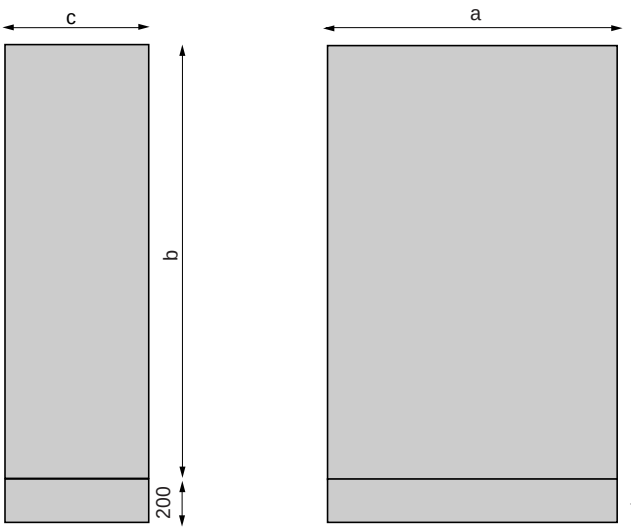
Characteristics

Degree of protection of enclosure	IP 23 or IP 54
Maximum external temperature	+ 35 °C
Line supply connection	Directly to switch or circuit-breaker
Motor connection	Directly to speed controller
Control terminal connection	Directly to speed controller

For additional information Please consult your Regional Sales Office.

Dimensions

Altivar 68 ready-assembled in an enclosure



optional baseplate except for ATV-68●23N4 to ●63N4 in IP 54 enclosure; for these ratings, the baseplate is already included in the dimensions.

Base enclosure

IP 23 degree of protection				IP 54 degree of protection			
With speed controllers	a	b	c	With speed controllers	a	b	c
ATV-68●10N4	600	2060	500	**ATV-68●10N4**	600	2060	500
ATV-68●13N4	800	2060	500	**ATV-68●13N4**	800	2060	500
ATV-68●15N4				**ATV-68●15N4**			
ATV-68●19N4				**ATV-68●19N4**			
ATV-68●23N4	1200	2060	500	**ATV-68●23N4**	1200	2400 (1)	500
ATV-68●28N4				**ATV-68●28N4**			
ATV-68●33N4				**ATV-68●33N4**			
ATV-68●43N4	2400	2060	500	**ATV-68●43N4**	2400	2400 (1)	500
ATV-68●53N4				**ATV-68●53N4**			
ATV-68●63N4				**ATV-68●63N4**			

Enclosure with output filters

IP 23 degree of protection				IP 54 degree of protection			
With speed controllers	a	b	c	With speed controllers	a	b	c
ATV-68●10N4	600	2060	500	**ATV-68●10N4**	600	2060	500
ATV-68●13N4	800	2060	500	**ATV-68●13N4**	800	2060	500
ATV-68●15N4				**ATV-68●15N4**			
ATV-68●19N4				**ATV-68●19N4**			
ATV-68●23N4	1400	2060	500	**ATV-68●23N4**	1400	2400 (1)	500
ATV-68●28N4				**ATV-68●28N4**			
ATV-68●33N4				**ATV-68●33N4**			
ATV-68●43N4	3000	2060	500	**ATV-68●43N4**	3000	2400 (1)	500
ATV-68●53N4				**ATV-68●53N4**			
ATV-68●63N4				**ATV-68●63N4**			

(1) Enclosure supplied with integral baseplate; the baseplate is included in these dimensions.

Schneider Electric worldwide

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Country	Address	
Algeria	■ Schneider Electric Bureau de Liaison Algérie 04 rue du Berry - El Mouradia 16070 Algiers	Tel: (213) 269 80 03 / 08 Fax: (213) 269 80 02
Argentina	■ Schneider Argentina Viamonte 2850 1678 Caseros (provincia Buenos Aires)	Tel: (54) 17 16 88 88 Fax: (54) 17 16 88 77 www.schneider-electric.com.ar
Australia	■ Schneider PTY Ltd 2, Solent circuit Norwest Business Park NSW 2153 Baulkham Hill	Tel: (61) 298 51 28 00 Fax: (61) 296 29 83 40 www.schneider.com.au
Austria	■ Schneider Austria Ges.m.b.H. Birostrasse 11 1239 Wien	Tel: (43) 1 610 540 Fax: (43) 1 610 54 65
Belgium	■ Schneider MGTE N.V. - S.A. Dieweg 3 1180 Brussels	Tel: (32) 2 373 7711 Fax: (32) 2 375 3858 www.schneider-electric.be
Brazil	■ Schneider Electric Brasil S.A. Avenida Das Nações Unidas 23223 Jurubatuba CEP 04795-907 São Paulo-SP	Tel: (55) 115 24 52 33 Fax: (55) 115 22 51 34 www.schneider.com.br
Bulgaria	■ Schneider Electric Expo 2000 Boulevard Vaptzarov 1407 Sofia	Tel: (359) 2 919 42 Fax: (359) 2 962 44 39 www.schneider-electric.bg
Cameroon	■ Schneider Electric SA - Cameroun 16, rue de l'hôtel de ville - BP12087 Douala	Tel: (237) 42 69 30 Fax: (237) 43 11 94
Canada	■ Schneider Canada 19, Waterman Avenue M4 B1Y2 Toronto - Ontario	Tel: (1) 416 752 8020 Fax: (1) 416 752 4203 www.schneider.ca
Chile	■ Schneider Electric Chile S.A. Avda. Presidente Eduardo Frei Montalva, 6115-B Conchali Santiago	Tel: (562) 623 59 59 Fax: (562) 623 59 76 www.schneider-electric.co.cl
China	■ Schneider Beijing Landmark bldg-Room 1801 8 North Dong Sanhuan Rd, Chaoyang District 100004 Beijing	Tel: (86) 10 65 90 69 07 Fax: (86) 10 65 90 00 13 www.schneider-electric.com.cn
Columbia	■ Schneider de Colombia S.A. Calle 45A#102-45 Santafe de Bogota Bogota	Tel: (57) 1 413 80 08 Fax: (57) 1 413 90 12
Costa-Rica	■ Schneider Centroamerica 1,5 km Oueste de la Embajada Americ. Apartado 4123 - 1000 San Jose	Tel: (506) 23 32 60 55 Fax: (506) 23 32 04 26 www.schneider.ca.com
Cote d'ivoire	■ Schneider Electric Afrique de l'Ouest Sarl 18 B.P.2027 Abidjan 18	Tel: (225) 25 69 69 Fax: (225) 25 69 86
Croatia	■ Schneider Electric SA Fallerovo Setaliste 22 10000 Zagreb	Tel: (385) 1 367 100 Fax: (385) 1 367 111
Cuba	■ Schneider Electric Bureau de Liaison de La Havane Calle 36- N°306-Apto1- Entre 3ra y 5ta Avenida Miramar - Playa Habana	Tel: (53) 724 15 59 Fax: (53) 724 12 17
Czech Republic	■ Schneider Electric AS KOVO Building - Jankovcova 2 170 88 Praha 7	Tel: (420) 2 66 78 36 21 Fax: (420) 2 66 78 30 71 www.schneider-electric.cz
Denmark	■ Schneider Electric A/S Baltorpbakken 14 DK - 2750 Ballerup	Tel: (45) 44 68 7888 Fax: (45) 44 68 5255 www.schneider-electric.dk
Dominican Republic	■ Schneider Electric Calle Proyecto 27 de Febrero N° 5 Apto 102 - ENS. Miraflores Santo Domingo	Tel: (1809) 686 82 66 Fax: (1809) 686 81 89
Ecuador	■ Schneider Ecuador Av. de los Shyris y Rio Coca Esq. Edificio Eurocentro - Segundo Piso 6466 Quito	Tel: (593) 2 25 03 23 Fax: (593) 2 43 49 40
Egypt	■ Schneider Egypt 68, El Tayaran Street Nasr City Cairo	Tel: (20) 24 01 01 19 Fax: (20) 24 01 66 87
Finland	■ Schneider Electric Oy Sinikalliontie 16 02630 Espoo	Tel: (358) 9 527 000 Fax: (358) 9 5270 0376 www.schneider-electric.fi
France	■ Schneider Electric SA 5, rue Nadar 92500 Rueil Malmaison	Tel: 33 (0)1 41 29 82 00 Fax: 33 (0)1 47 51 80 20 www.schneider-electric.fr

Country	Address	
Germany	■ Schneider Electric GmbH Gothaer Straße 29 D-40880 Ratingen	Tel: (49) 2102 4040 Fax: (49)2102 404256 www.schneider-electric.de
Greece	■ Schneider Electric AE 14th km - RN Athens-Lamia GR - 14564 Kifissia	Tel: (30) 16 29 52 00 Fax: (30) 16 29 52 10 www.schneider-electric.com.gr
Hong Kong	■ Schneider Electric (Hong Kong) Ltd 20/F, Cornwall House-Taïkoo Place 979 King's Road Quarry Bay - Hong Kong	Tel: (852) 25 65 06 21 Fax: (852) 28 11 10 29
Hungary	■ Merlin Gerin Vertesz XI Kerulet, Fehérvari ut 108 - 112 1116 Budapest	Tel: (36) 1 206 14 10 Fax: (36) 1 206 14 51 www.schneider-electric.hu
India	■ Schneider Electric India Pvt Ltd. 2nd Floor, 1 Dr. Jha Marg. 110020 Okhla New Dehli	Tel: (91) 631 8548 Fax: (91) 631 7161 www.schneider-electric.com
Indonesia	■ Schneider Indonesia Ventura Building 7th Floor Jalan R.A. Kartini - Kav.26 Cilandak 12430 Jakarta	Tel: (62) 217 50 44 06 Fax: (62) 217 50 44 15 www.schneider-electric.co.id
Iran	■ Telemecanique Iran 1047 Avenue VALI ASSR P.O. Box 15875-3547 15116 Teheran	Tel: (98) 218 71 01 42 Fax: (98) 218 71 81 87
Ireland	■ Schneider Electric Ireland Maynooth Road Cellbridge - Co. Kildare	Tel: +353(0) 1 627 40 30 Fax: +353(0) 1 627 08 59 www.schneider-electric.ie
Italy	■ Schneider Electric S.p.A. Centro Direzionale Colleoni Palazzo Sirio - Viale Colleoni, 7 20041 Agrate Brianza (Mi)	Tel: (39) 39 655 8111 Fax: (39) 39 609 1510 www.schneider-electric.it
Japan	■ Schneider Electric Japan Ltd SK Bldg, Sendagaya 4-14-4, Sendagaya Shibuya-Ku - 151 Tokyo	Tel: (81) 354 74 44 74 Fax: (81) 354 74 44 70 www.schneider-electric.co.jp
Kenya	■ Schneider East Africa Power Technics Complex PO Box 46345 - Nairobi	Tel: (254) 2 824 156 Fax: (254) 2 824 157
Kuwait	■ Schneider Electric Kuwait Al Gaas Tower Sharq 2nd Floor PO Box 20092 - 13 061 Safat	Tel: (965) 240 75 46 Fax: (965) 240 75 06
Malaysia	■ Schneider Malaysia Sdn Bhd No.11 Jalan U1/19, Seksyen U1 Hicom-Glenmarie Industrial Park Shah Alam 40150 Selangor Darul Ehsan	Tel: (60) 37 05 11 50 Fax: (60) 37 05 11 70 www.schneider-electric.com.my
Martinique	■ Schneider Electric Immeuble Cottrell ZI de la Lézarde - 97232 Le Lamentin	Tel: (596) 51 06 00 Fax: (596) 51 11 26
Mexico	■ Groupe Schneider Mexico Calz. Rojo Gomez N° 1121 Col. Guadalupe del Moral - México 09300	Tel: (525) 686 3000 Fax: (525) 686 2409 www.schneider-electric.com.mx
Morocco	■ Schneider Electric Maroc 26, rue Ibnou Khalikane Quartier Palmiers 20100 Casablanca	Tel: (212) 299 08 48 to 57 Fax: (212) 299 08 67 and 69
Netherlands	■ Schneider MGTE B.V. Waarderweg 40 - Postbus 836 2003 RV Haarlem	Tel: (31) 23 512 4124 Fax: (31) 23 512 4100 www.schneider-electric.nl
New Zealand	■ Schneider Ltd 14 Charann Place - Avondale P.O. Box 15355 New Lynn - Auckland	Tel: (64) 98 20 18 20 Fax: (64) 98 20 18 21
Nigeria	■ Merlin Gerin Nigeria Ltd Plot 25, Sanni Tola Sonolki Close Off Harold Sodipo Crescent PO Box 12 505 Ikeja - Lagos	Tel: (234) 14 93 63 99 Fax: (234) 14 97 45 99
Norway	■ Schneider Electric Norge A/S Solgaard Skog 2 - Postboks 128 1501 Moss	Tel: (47) 6924 9700 Fax: (47) 6925 7871
Peru	■ Schneider Electric Peru S.A. Fransisco Canaval y Moreyra #452 Piso 15, of.2 San Isidro L - 27 Lima	Tel: (511) 221 54 60 Fax: (511) 221 81 84 www.schneider-electric.com.pe
Philippines	■ Schneider Electric Philippines, Inc 1314 Batangas Street Makati City 1234 Metro-Manila	Tel: (63) 28 44 84 18 Fax: (63) 28 16 00 63

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Country	Address	
Poland	■ Schneider Electric Polska Sp.zo.o. Ul. Domaniewska 41 02-672 - Warszawa	Tel: (48) 22 606 25 00 Fax: (48) 22 606 11 66 (48) 22 606 11 58 www.schneider-electric.pl
Portugal	■ Schneider Electric Portugal Av.do Forte, 3 Edificio Suécia II, Piso 3-A CP 2028 Carnaxide 2795 Linda-A-Velha	Tel: (351) 1 416 5800 Fax: (351) 1 416 5857 www.schneider-electric.pt
Qatar	■ Schneider Electric Qatar Branch c/o Khalifa BinFahred Al Thani Trad. and Co P.O. Box 4484 Doha	Tel: (974) 44 11 92 Fax: (974) 44 12 28
Reunion	■ Schneider Electric Immeuble Futura 190, rue des 2 canons BP 646 97497 Sainte Clothilde	Tel: (262) 28 14 28 Fax: (262) 28 39 37
Roumania	■ Schneider Electric Bd Ficusului n° 42 «Apimondia», Corp.A, et.1, Sector 1 Bucuresti	Tel: (40) 1 203 06 50 Fax: (40) 1 232 15 98
Russia-CIS	■ Schneider Electric CEI 80, Leningradsky Prospekt 125178 Moscow	Tel: (7) 502 224 5050 Tel: (7) 502 224 5033 Tel: (7) 502 224 5034 Fax: (7) 502 224 5220
Saudi Arabia	■ Groupe Schneider Second Industrial City P.O. Box 42472 11541 Riyadh	Tel: (966) 14 98 15 15 Fax: (966) 14 98 38 27
Senegal	■ Schneider Electric Afrique de l'Ouest BP 15952 Dakar-Fann Quartier Almadies Dakar	Tel: (221) 820 68 05 Fax: (221) 820 58 50
Singapore	■ Schneider Electric Singapore Pte Ltd 10 Ang Mo Kio Street 65 #02 - 17/20, Tech Point Singapore 569059	Tel: (65) 484 78 77 Fax: (65) 484 78 00 www.schneider-electric.com.sg
Slovak Republic	■ Schneider Electric Slovakia, spol. s.r.o. Borekova 10 SK-821 06 Bratislava	Tel: (421) 7 552 40 10 Tel: (421) 7 552 40 20 Fax: (421) 7 552 40 00 www.schneider-electric.sk
Slovenia	■ Schneider Electric Techniski Biro - Dunasjka 106 pp 69 61000 Ljubljana	Tel: (386) 61 168 5007 Fax: (383) 61 168 5426
South Africa	■ Schneider Electric South Africa (PTY) Ltd PO Box 482 - Bergviel 2012 CNR Old Pretoria Road &Impala Road Eastgate Ext.8 Sandton	Tel: (27) 11 802 5272 Fax: (27) 11 804 3600 www.schneider-electric.co.za
South Korea	■ Schneider Electric Korea Ltd Seoul 3Floor, Cheil Bldg., 94-46, 7-Ka Youngdeungpodong, Youngdeungpo-ku 150-037 Seoul	Tel: (82) 26 30 97 00 Fax: (82) 26 30 98 00 to 03
Spain	■ Schneider Electric España, S.A. Pl. Dr. Letamendi, 5-7 08007 Barcelona	Tel: (34) 93 484 3100 Fax: (34) 93 484 3308 www.schneider-electric.es
Sweden	■ Schneider Electric AB Djupdalsvägen 17/19 19129 Sollentuna	Tel: (46) 8 623 84 00 Fax: (46) 8 623 84 85 www.schneider-electric.se
Switzerland	■ Schneider Electric (Switzerland) S.A. Schermenwaldstrasse 11 - Postfach 3063 Ittigen	Tel: (41) 31 917 3333 Fax: (41) 31 917 3355 www.schneider-electric.ch
Syria	■ Schneider Electric Syria Shakib Arslan Street Abou Roumaneh - PO Box 33876 - Damas	Tel: +963 11 333 10 26 Fax: +963 11 331 08 67
Taiwan	■ Schneider Electric Taiwan Co Ltd 11F-2, N°51, Keelung Road, Sec.2 110 Taipei	Tel: (886) 2 27 33 14 64 Fax: (886) 2 27 33 64 10
Thailand	■ Schneider Thailand Ltd 75, Sukhumvit 26 rd - 20th Floor Richmond Office Bldg Klongtoey 10110 Bangkok	Tel: (66) 22 60 82 20 Fax: (66) 22 61 18 93 www.schneider-electric.co.th
Tunisia	■ Schneider Electric Sarl 13, rue El Mansourah El Mensah IV Ariana 2080 Tunis	Tel: (216) 175 02 77 Fax: (216) 175 03 42
Turkey	■ Schneider Elektrik A.S. Sanayi Ve Ticaret A.S. Tütüncü Mehmet Efendi Cad. N°:110 Kat: 1-2 81080 Götztepe-Istanbul	Tel: (90) 21 63 86 95 70 Fax: (90) 21 63 86 38 75 www.schneider-electric.com.tr

Country	Address	
Ukraine	■ Schneider Electric Rue Krechtchatik 2 252601 Kiev	Tel: (380) 44 462 04 25 Fax: (380) 44 462 04 24
United Arab Emirates	■ Schneider Electric Abu Dhabi PO Box 29580 - Office Floor 2/Lulu Street Al Marina Plaza Tower Abu Dhabi	Tel: (971) 2 33 94 44 Fax: (971) 2 31 66 06
United Kingdom	■ Schneider Ltd Braywick House East Windsor Road Maidenhead Berkshire SL6 1 DN	Tel: (44) 01628 508 500 Fax: (44) 01628 508 508 www.schneider.co.uk
United States	■ Groupe Schneider North American Division 1415 Roselle Road Palatine - IL 60067	Tel: (1) 847 397 2600 Fax: (1) 847 925 7500 www.squared.com
Uruguay	■ Schneider Uruguay Gabriel Pereira 30398 CP11300 Montevideo	Tel: (598) 27 07 23 92 Tel: (598) 27 08 82 37 Fax: (598) 27 09 07 13
Venezuela	■ Schneider Mg SD TE, S.A. Calle 162 / Piso 2 Edificio Centro Cynamid La Urbina, 1070 - 75319 Caracas	Tel: (58) 2 241 13 44 Fax: (58) 2 243 60 09 www.schneider-electric.com.ve
Vietnam	■ R.R.O. Of Schneider Electric S.A. KM Plazza - 2nd Floor 51-53, Vo Van Tan Street - Q3 Ho Chi Minh City	Tel: (84) 88 29 60 72 Fax: (84) 88 29 60 67
Yugoslav Federation	■ Schneider Electric A.S. Nikole Tesle 3 11181 Beograd	Tel: (381) 11 319 15 03 Fax: (381) 11 319 15 20
Zambia	■ Schneider Zambia Zambia Office c/o Matipi Craft Center Building Plot 1036 Accra Road PO Box 22792 Kitwe	Tel: (260) 222 22 52 Fax: (260) 222 83 89
Zimbabwe	■ Groupe Schneider Zimbabwe Liaison Office 75A Second Street (corner Livingstone Avenue) Harare	Tel: (263) 4 707 179 Tel: (263) 4 707 180 Fax: (263) 4 707 176

For all countries throughout the world or countries not mentioned above (except France), coordination is ensured by :

for Europe: **Schneider Electric Industries SA-Division Europe**
43-45, Bd. Franklin Roosevelt **T : (33)1 41 29 80 00**
92500 Rueil Malmaison Cedex - France **Tf: (33)1 47 32 99 09**

for : Africa - South America - Asia - Caribbean - India - Middle East - Pacific areas
Schneider Electric Industries SA-Division Internationale
World Trade Center **T : (33)4 76 57 60 60**
5, Place Robert Schuman **Tf: (33)4 76 60 63 63**
38000 Grenoble - France

Schneider Electric SA :

Marketing Headquarters
5, rue Nadar
92506 Rueil-Malmaison Cedex
France
Tel. : +33 (0)1 41 29 82 00
Fax : +33 (0)1 47 51 80 20
http://www.schneider-electric.com

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