Altivar 71W / E5

Guide simplifié
Simplified manual
Kurzanleitung
Guía simplificada
Guida semplificata

09/2009

0,75 ... 75 kW (1 ... 100 HP) / 380 - 480 V

Variateurs de vitesse
pour moteurs asynchrones

Variable speed drives for
asynchronous motors

Frequenzumrichter für
Asynchronmotoren

Variadores de velocidad
para motores asíncronos

Variatori di velocità
per motori asincroni

1760825

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Important information

WARNING

Please read these instructions carefully and examine the device in order to familiarize yourself with it prior to installation, operation or maintenance. The specific messages below can appear in the documentation or on the device. They warn of potential dangers or draw your attention to information that can clarify or simplify a procedure.

This symbol on a hazard or warning label indicates a potential risk of electrocution, which can result in bodily harm in the event of non-compliance with the accompanying instructions.

This symbol indicates a safety hazard. It warns of the potential risk of physical injury.
You must observe all safety instructions accompanied by this symbol in order to avoid situations that can result in serious physical injury or even death.

⚠ DANGER

DANGER indicates a dangerous situation that **will** result in death, serious physical injury or equipment damage.

⚠ WARNING

WARNING indicates a dangerous situation that **can** result in death, serious physical injury or equipment damage.

⚠ CAUTION

CAUTION indicates a potentially dangerous situation that **might possibly** result in bodily harm or equipment damage.

IMPORTANT NOTE

Electrical equipment must only be serviced by qualified personnel. Schneider Electric will not accept any responsibility for consequences associated with the use of this document. This document must not be used as a training guide for beginners.

ENGLISH

Before you begin

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

⚠ DANGER

RISK OF HAZARDOUS VOLTAGE

- Read and understand this manual before installing or operating the ATV71 drive. Installation, adjustment, repair and maintenance must be performed by qualified personnel.
- The user is responsible for compliance with all international and national electrical standards in force concerning protective grounding of all equipment.
- Many parts of this variable speed drive, including the printed circuit boards, operate at the line voltage. DO NOT TOUCH.
  Use only electrically insulated tools.
- DO NOT touch unshielded components or terminal strip screw connections with voltage present.
- DO NOT short across terminals PA and PC or across the DC bus capacitors.
- Install and close all the covers before applying power or starting and stopping the drive.
- Before servicing the variable speed drive
  - Disconnect all power.
  - Place a “DO NOT TURN ON” label on the variable speed drive disconnect.
  - Lock the disconnect in the open position.
- Disconnect all power including external control power that may be present before servicing the drive. Wait for the charging LED to go off. WAIT 15 MINUTES to allow the DC bus capacitors to discharge. Then follow the DC bus voltage measurement procedure on page 53 to verify that the DC voltage is less than 45 V. The drive LEDs are not accurate indicators of the absence of DC bus voltage.

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

⚠ CAUTION

RISK OF IMPROPER DRIVE OPERATION

- If the drive is not powered up for a long period, the performance of its electrolytic capacitors will be reduced.
- If it is stopped for a prolonged period, turn the drive on every two years for at least 5 hours to restore the performance of the capacitors, then check its operation. It is recommended that the drive is not connected directly to the line voltage. The voltage should be increased gradually using an adjustable AC source.

Failure to follow this instruction can result in physical injury and/or equipment damage.

Steps for implementing the drive

■ 1 Take delivery of the drive

- Check that the catalog number printed on the label is the same as that on the purchase order.
- Remove the Altivar from its packaging and check that it has not been damaged in transit.

■ 2 Check the line voltage

- Check that the line voltage is compatible with the voltage range of the drive.

■ 3 Mount the drive (page 51)

- Mount the drive in accordance with the instructions in this document.
- Install any internal and external options.

■ 4 Wire the drive (page 54)

- Connect the motor, ensuring that its connections correspond to the voltage.
- Connect the line supply, after making sure that the power is off.
- Connect the control.
- Connect the speed reference.

Steps 1 to 4 must be performed with the power off

■ 5 Power up without run command

- If you are using a separate power supply for the control section, follow the instructions on page 47.

■ 6 Select the language, (page 68) if the drive has a graphic display terminal

■ 7 Configure the [SIMPLY START] (SIM-) menu (page 70)

- 2-wire or 3-wire control
- Macro configuration
- Motor parameters

☞ **Perform an auto-tuning operation**

- Motor thermal current
- Acceleration and deceleration ramps
- Speed variation range

■ 8 Start

Tip:

- Perform an auto-tuning operation to optimize performance, page 73.

☞ ***Note: Check that the wiring of the drive is compatible with its configuration.***

ENGLISH

Preliminary recommendations

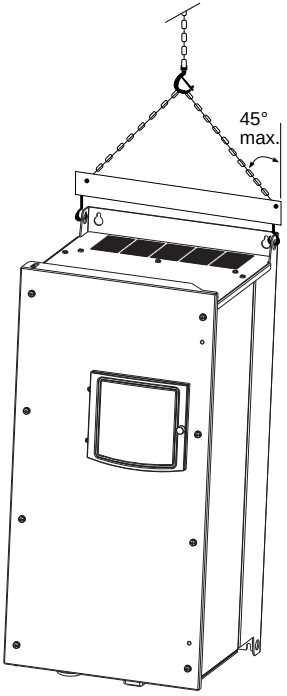
Handling and storage

To protect the drive prior to installation, handle and store the device in its packaging. Ensure that the ambient conditions are acceptable.

⚠ WARNING
DAMAGED PACKAGING If the packaging appears damaged, it can be dangerous to open and handle it. Take precautions against all risks when performing this operation. **Failure to follow this instruction can result in death, serious physical injury or equipment damage.**

⚠ WARNING
DAMAGED EQUIPMENT Do not operate or install any drive that appears damaged. **Failure to follow this instruction can result in death, serious physical injury or equipment damage.**

Handling on installation



A hoist must be used with Altivar 71W and 71E5 drives; for this reason they are supplied with handling "lugs". The precautions illustrated opposite must be observed.

Preliminary recommendations

Precautions

⚠ CAUTION

RISK OF INCOMPATIBILITY WITH THE LINE VOLTAGE

Before turning on and configuring the drive, ensure that the line voltage is compatible with the supply voltage range shown on the nameplate. The drive may be damaged if the line voltage is not compatible.

Failure to follow this instruction can result in physical injury and/or equipment damage.

Separate control section power supply

When the drive control section is powered independently of the power section (P24 and 0 V terminals), whenever an option card is added or replaced, only the power section must be supplied with power next time the drive is powered up.
By default the new card would not be recognized and it would be impossible to configure it, thereby causing the drive to lock in fault mode.

⚠ DANGER

RISK OF UNINTENDED EQUIPMENT OPERATION

- Before turning on and configuring the Altivar 71, check that the PWR (POWER REMOVAL) input is deactivated (at state 0) in order to prevent unintended operation.
- Before turning on or on exiting the configuration menus, check that the inputs assigned to the run command are deactivated (at state 0) since they can cause the motor to start immediately.

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

☞ If the safety of personnel requires the prohibition of unwanted or unintended starts, electronic locking is performed by the Altivar 71's Power Removal function.
This function requires the use of connection diagrams conforming to category 3 of standard EN 954-1 and safety integrity level 2 according to IEC/EN 61508 (consult the catalog).
The Power Removal function takes priority over any run command.

ENGLISH

Drive catalog numbers

ATV71W - Three-phase supply voltage: 380…480 V 50/60 Hz

3-phase motor 380...480 V

Motor		Line supply					Drive			Altivar 71W
Power indicated on plate *(1)*		Max. line current *(2)*		Maximum prospective line Isc	Apparent power	Max. inrush current (3)	Max. available nominal current In *(1)*	Max. transient current for (1)		Reference *(4) (5)*
		380 V	480 V					60 s	2 s	
kW	HP	A	A	kA	kVA	A	A	A	A	
0.75	1	3.7	3	5	2.4	19.2	2.3	3.5	3.8	ATV71W075N4 (U)
1.5	2	5.8	5.3	5	4.1	19.2	4.1	6.2	6.8	ATV71WU15N4 (U)
2.2	3	8.2	7.1	5	5.6	19.2	5.8	8.7	9.6	ATV71WU22N4 (U)
3	–	10.7	9	5	7.2	19.2	7.8	11.7	12.9	ATV71WU30N4 (U)
4	5	14.1	11.5	5	9.4	19.2	10.5	15.8	17.3	ATV71WU40N4 (U)
5.5	7.5	20.3	17	22	13.7	46.7	14.3	21.5	23.6	ATV71WU55N4 (U)
7.5	10	27	22.2	22	18.1	46.7	17.6	26.4	29	ATV71WU75N4 (U)
11	15	36.6	30	22	24.5	93.4	27.7	41.6	45.7	ATV71WD11N4 (U)
15	20	48	39	22	32	93.4	33	49.5	54.5	ATV71WD15N4 (U)
18.5	25	45.5	37.5	22	30.5	93.4	41	61.5	67.7	ATV71WD18N4 (U)
22	30	50	42	22	33	75	48	72	79.2	ATV71WD22N4 (U)
30	40	66	56	22	44.7	90	66	99	109	ATV71WD30N4 (U)
37	50	84	69	22	55.7	90	79	118.5	130	ATV71WD37N4 (U)
45	60	104	85	22	62.7	200	94	141	155	ATV71WD45N4 (U)
55	75	120	101	22	81.8	200	116	174	191	ATV71WD55N4 (U)
75	100	167	137	22	110	200	160	240	264	ATV71WD75N4 (U)

(1) These power ratings and currents are given for an ambient temperature of 50°C (122°F) at the factory-set switching frequency, used in continuous operation (factory-set switching frequency of 4 kHz for ATV71W 075N4 to D30N4 and 2.5 kHz for ATV71W D37N4 to D75N4).
Above this factory setting, the drive will reduce the switching frequency automatically in the event of excessive temperature rise. For continuous operation above the rated switching frequency, derate the rated drive current (see the derating curves in our catalog).

(2) Current for the given motor power on a line supply with the "Max. prospective line Isc" indicated and for a drive without any external options.

(3) Peak current on power-up for the max. voltage (480 V +10%).

(4) These drives can be ordered with a 24 V ⎓ power supply, allowing an additional consumption of 250 mA. In this case, add A24 at the end of the catalog number.
For example, ATV 71W075N4 becomes ***ATV 71W075N4A24.***

(5) ATV●●●N4: IP54 drive (connection plate drilled for cable gland),
ATV●●●N4U: UL Type 12 drive (connection plate for compliance with UL Type 12)

Drive catalog numbers

ATV71E5 - Three-phase supply voltage: 380…480 V 50/60 Hz

Three-phase motor 380...480 V

Motor		**Line supply**					**Drive**			**Altivar 71E5**
Power indicated on plate *(1)*		Max. line current *(2)*		Maximum prospective line Isc	Apparent power	Max. in rush current (3)	Max. available rated current In *(1)*	Max. transient current for (1)		Reference
		380 V	480 V					60 s	2 s	
kW	HP	A	A	kA	kVA	A	A	A	A	
0.75	1	3.7	3	5	2.4	19.2	2.3	3.5	3.8	ATV71E5075N4
1.5	2	5.8	5.3	5	4.1	19.2	4.1	6.2	6.8	ATV71E5U15N4
2.2	3	8.2	7.1	5	5.6	19.2	5.8	8.7	9.6	ATV71E5U22N4
3	–	10.7	9	5	7.2	19.2	7.8	11.7	12.9	ATV71E5U30N4
4	5	14.1	11.5	5	9.4	19.2	10.5	15.8	17.3	ATV71E5U40N4
5.5	7.5	20.3	17	22	13.7	46.7	14.3	21.5	23.6	ATV71E5U55N4
7.5	10	27	22.2	22	18.1	46.7	17.6	26.4	29	ATV71E5U75N4
11	15	36.6	30	22	24.5	93.4	27.7	41.6	45.7	ATV71E5D11N4
15	20	48	39	22	32	93.4	33	49.5	54.5	ATV71E5D15N4
18.5	25	45.5	37.5	22	30.5	93.4	41	61.5	67.7	ATV71E5D18N4
22	30	50	42	22	33	75	48	72	79.2	ATV71E5D22N4
30	40	66	56	22	44.7	90	66	99	109	ATV71E5D30N4
37	50	84	69	22	55.7	90	79	118.5	130	ATV71E5D37N4
45	60	104	85	22	62.7	200	94	141	155	ATV71E5D45N4
55	75	120	101	22	81.8	200	116	174	191	ATV71E5D55N4
75	100	167	137	22	110	200	160	240	264	ATV71E5D75N4

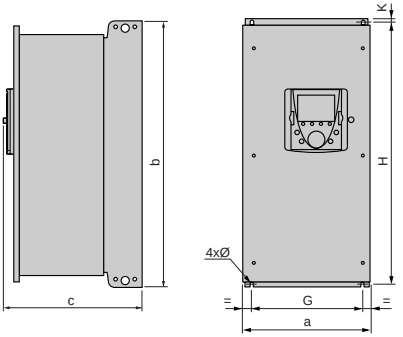
(1) These power ratings and currents are given for an ambient temperature of 50°C (122°F) at the factory-set switching frequency, used in continuous operation (factory-set switching frequency of 4 kHz for ATV71E5 075N4 to D30N4 and 2.5 kHz for ATV71E5 D37N4 to D75N4).
Above this factory setting, the drive will reduce the switching frequency automatically in the event of excessive temperature rise. For continuous operation above the rated switching frequency, derate the rated drive current (see the derating curves in our catalog).

(2) Current for the given motor power on a line supply with the "Max. prospective line Isc" indicated and for a drive without any external options.

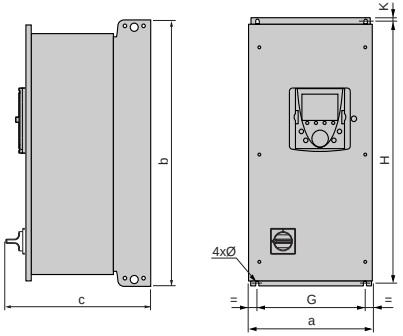
(3) Peak current on power-up for the max. voltage (480 V +10%).

Dimensions

ATV 71W



ATV71E5



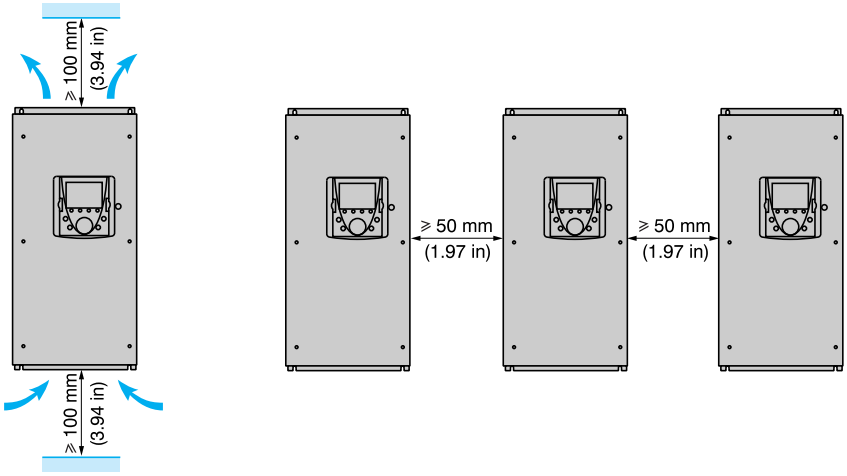
ATV 71W	a mm (in.)	b mm (in.)	c mm (in.)	G mm (in.)	H mm (in.)	K mm (in.)	Ø mm (in.)	Weight kg (lb.)
075N4 to U22N4	240 (9.45)	490 (19.29)	272 (10.71)	200 (7.87)	476 (18.74)	6 (0.23)	6 (0.23)	9 (20)
U30N4, U40N4	240 (9.45)	490 (19.29)	286 (11.26)	200 (7.87)	476 (18.74)	6 (0.23)	6 (0.23)	10 (22)
U55N4, U75N4	260 (10.24)	525 (20.67)	286 (11.26)	220 (8.66)	511 (20.12)	6 (0.23)	6 (0.23)	13 (29)
D11N4	295 (11.61)	560 (22.05)	315 (12.40)	250 (9.84)	544 (21.42)	8 (0.31)	6 (0.23)	17 (38)
D15N4, D18N4	315 (12.40)	665 (26.18)	315 (12.40)	270 (10.63)	647 (25.47)	10 (0.39)	6 (0.23)	26 (58)
D22N4	285 (11.22)	720 (28.35)	315 (12.40)	245 (9.65)	700 (27.56)	10 (0.39)	7 (0.28)	29 (64)
D30N4, D37N4	285 (11.22)	880 (34.65)	343 (13.50)	245 (9.65)	860 (33.86)	10 (0.39)	7 (0.28)	37 (82)
D45N4 to D75N4	362 (14.25)	1000 (39.37)	364 (14.33)	300 (11.81)	975 (38.39)	10 (0.39)	9 (0.35)	62 (137)

ATV 71E5	a mm (in.)	b mm (in.)	c mm (in.)	G mm (in.)	H mm (in.)	K mm (in.)	Ø mm (in.)	Weight kg (lb.)
075N4 to U22N4	240 (9.45)	490 (19.29)	296 (11.65)	200 (7.87)	476 (18.74)	6 (0.23)	6 (0.23)	10 (22)
U30N4, U40N4	240 (9.45)	490 (19.29)	310 (12.2)	200 (7.87)	476 (18.74)	6 (0.23)	6 (0.23)	11 (24)
U55N4, U75N4	260 (10.24)	525 (20.67)	310 (12.2)	220 (8.66)	511 (20.12)	6 (0.23)	6 (0.23)	14 (31)
D11N4	295 (11.61)	560 (22.05)	339 (13.4)	250 (9.84)	544 (21.42)	8 (0.31)	6 (0.23)	18 (40)
D15N4, D18N4	315 (12.40)	665 (26.18)	340 (13.4)	270 (10.63)	647 (25.47)	10 (0.39)	6 (0.23)	27 (60)
D22N4	285 (11.22)	720 (28.35)	335 (13.2)	245 (9.65)	700 (27.56)	10 (0.39)	7 (0.28)	30 (66)
D30N4, D37N4	285 (11.22)	880 (34.65)	383 (15.1)	245 (9.65)	860 (33.86)	10 (0.39)	7 (0.28)	38 (84)
D45N4 to D75N4	362 (14.25)	1000 (39.37)	404 (16)	300 (11.81)	975 (38.39)	10 (0.39)	9 (0.35)	63 (139)

Mounting recommendations

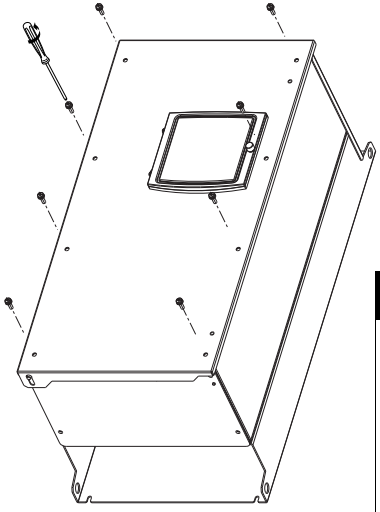
Depending on the conditions in which the drive is to be used, its installation will require certain precautions and the use of appropriate accessories.

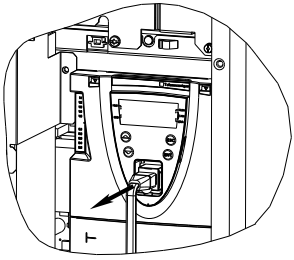
Install the unit vertically:
- Do not place it close to heating elements.
- Leave sufficient free space to ensure that the air required for cooling purposes can circulate from the bottom to the top of the unit.



Opening the drive

To open the drive, remove the front panel and disconnect the graphic display terminal's connection cable as shown below:





⚠ DANGER

RISK OF HAZARDOUS VOLTAGE

- Before replacing the front panel and powering up the drive, reconnect the two ends of the graphic display terminal's connection cable in order to avoid the risk of contact with an item of equipment connected to a power supply with a high voltage rating.

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

Adding control or signaling units on the front of the drive

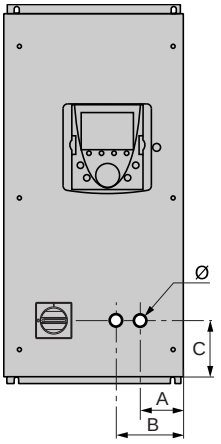
One or two 22 mm diameter control or signaling units can be added on the front of the drive. These units must be positioned as shown on the diagram and table below.

⚠ DANGER

RISK OF HAZARDOUS VOLTAGE

Check that there will be sufficient clearance distance between the equipment that has been added and the drive when the front of the drive is closed.

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



ATV 71W/E5	A mm (in.)	B mm (in.)	C mm (in.)	Ø mm (in.)
075N4 to U22N4	60.5 (2.38)	80 (3.15)	30 (1.18)	22.3 (0.88)
U30N4, U40N4	60.5 (2.38)	80 (3.15)	30 (1.18)	22.3 (0.88)
U55N4, U75N4	60.5 (2.38)	80 (3.15)	30 (1.18)	22.3 (0.88)
D11N4	77 (3.03)	80 (3.15)	30 (1.18)	22.3 (0.88)
D15N4, D18N4	77 (3.03)	81 (3.19)	30 (1.18)	22.3 (0.88)
D22N4	73 (2.87)	119 (4.69)	30 (1.18)	22.3 (0.88)
D30N4, D37N4	69 (2.72)	218 (8.58)	30 (1.18)	22.3 (0.88)
D45N4 to D75N4	102 (4)	280 (11)	30 (1.18)	22.3 (0.88)

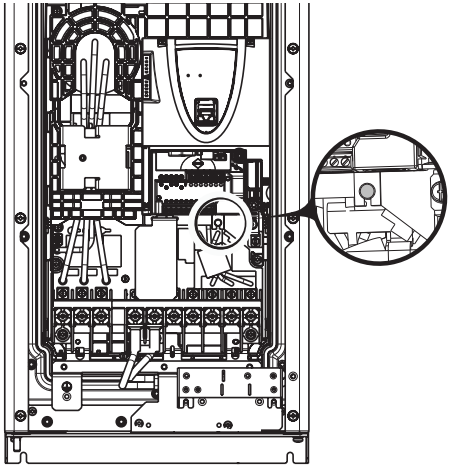
Position of the charging LED

Before working on the drive, turn it off, wait until the red capacitor charging LED has gone out, then measure the DC bus voltage.

Position of the capacitor charging LED

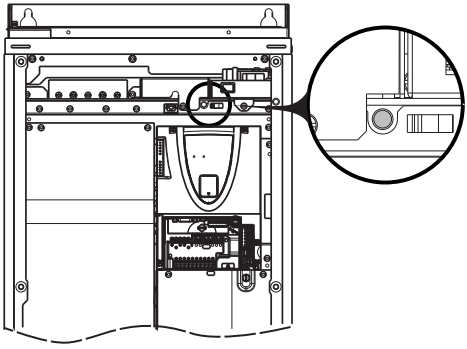
Position of the charging LED for **ATV71● 075N4 to D18N4 drives**

Example: ATV71WD18N4



Position of the charging LED for **ATV71● D22N4 to D75N4 drives**

Example: ATV71WD55N4



Procedure for measuring the DC bus voltage

The DC bus voltage can exceed 1000 V ⎓. Use a properly rated voltage sensing device when performing this procedure. To measure the DC bus voltage:

1. Disconnect the drive power supply.
2. Wait for the capacitor charging LED to go out.
3. Wait 15 minutes to allow the DC bus capacitors to discharge.
4. Measure the voltage of the DC bus between the PA/+ and PC/- terminals to check whether the voltage is less than 45 V ⎓. See page 55 for the arrangement of the power terminals.
5. If the DC bus capacitors have not discharged completely, contact your local Schneider Electric representative (do not repair or operate the drive).

⚠ DANGER

RISK OF HAZARDOUS VOLTAGE

Read and understand the instructions on page 44 before performing this procedure.

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

ENGLISH

Wiring recommendations

Power

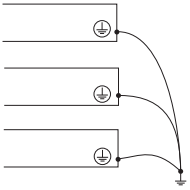
The drive must be connected to the protective ground. To comply with regulations in force concerning high leakage currents (above 3.5 mA), use at least a 10 mm² (AWG 6) protective conductor or 2 protective conductors with the same cross-section as the power section AC supply conductors.

⚠ DANGER

RISK OF HAZARDOUS VOLTAGE

Ground equipment using the provided ground connecting point as shown in the figure below. The drive panel must be properly grounded before power is applied.

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



Check whether the resistance of the protective ground is one ohm or less. Connect a number of variable speed drives to the protective ground, as shown opposite.
Do not lay protective grounding cables in a loop or in series.

⚠ WARNING

IMPROPER WIRING PRACTICES

- The ATV71 drive will be damaged if input line voltage is applied to the output terminals (U/T1,V/T2,W/T3).
- Check the power connections before energizing the ATV71 drive.
- If replacing another drive, verify that all wiring connections to the ATV71 drive comply with all wiring instructions in this manual.

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

When upstream protection by means of a "residual current device" is required by the installation standards, a type A device should be used for single phase drives and type B for 3-phase drives. Choose a suitable model integrating:

- HF current filtering
- A time delay which prevents tripping caused by the load from stray capacitance on power-up. The time delay is not possible for 30 mA devices. In this case, choose devices with immunity against nuisance tripping, for example "residual current devices" with reinforced immunity from the **s.i** range (Merlin Gerin brand).

If the installation includes several drives, provide one "residual current device" per drive.

⚠ WARNING

RISK OF INAPPROPRIATE OVERCURRENTS

- Overcurrent protective devices must be properly coordinated.
- The Canadian Electricity Code and the National Electrical Code require branch circuit protection. Use the fuses recommended on the drive nameplate to achieve published short-circuit current ratings.
- Do not connect the drive to a power feeder whose short-circuit capacity exceeds the drive short-circuit current rating listed on the drive nameplate.

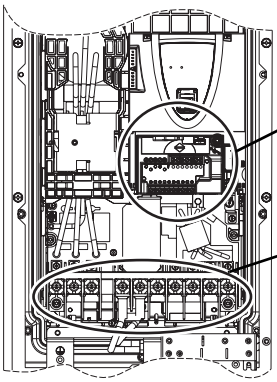
Failure to follow this instruction can result in death, serious physical injury or equipment damage.

Terminals

Access to terminals

The diagrams below illustrate the location of the various terminals on the drive:

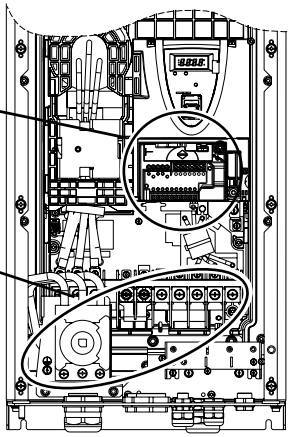
Example: ATV71WD18N4



Control terminals

Power terminals

Example: ATV71E5D18N4



Functions of power terminals

Terminals	Function
⏚	Protective ground connection terminal
R/L1 - S/L2 - T/L3	Power section AC supply
PO	DC bus + polarity
PA/+	Output to braking resistor (+ polarity)
PB	Output to braking resistor
PC/-	DC bus - polarity
U/T1 - V/T2 - W/T3	Outputs to the motor

Only remove the link between PO and PA/+ if a DC choke has been added. The PO and PA/+ terminal screws must always be fully tightened as a high current flows through the commoning link.

Terminals

Characteristics of power terminals

ATV71W	Maximum wire size			Tightening torque
	mm²	AWG	kcmils	Nm (lb.in)
075N4 ... U40N4	4	8		1.4 (12.3)
U55N4, U75N4	6	6		1.4 (12.3)
D11N4	16	4		3 (26.5)
D15N4, D18N4	35	2		5.4 (47.7)
D22N4 ... D37N4	50	1/0		24 (212)
D45N4 ... D75N4	150		300	25 (220)

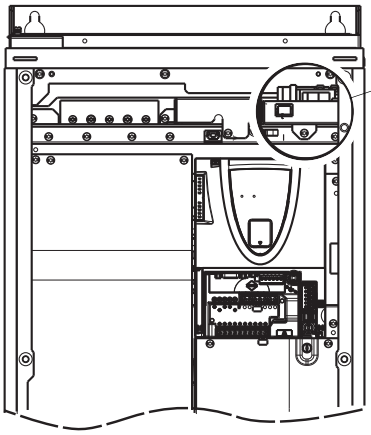
ENGLISH

ATV71E5	R/L1 - S/L2 - T/L3 terminals				Other terminals			
	Maximum wire size			Tightening torque	Maximum wire size			Tightening torque
	mm²	AWG	kcmils	Nm (lb.in)	mm²	AWG	kcmils	Nm (lb.in)
075N4 ... U40N4	10	8		2.1 (18.3)	4	8		1.4 (12.3)
U55N4, U75N4	25	4		5.6 (50)	6	6		1.4 (12.3)
D11N4	25	4		5.6 (50)	16	4		3 (26.5)
D15N4, D18N4	25	4		5.6 (50)	35	2		5.4 (47.7)
D22N4	25	4		5.6 (50)	50	1/0		24 (212)
D30N4 ... D37N4	95	3/0		22.6 (200)	50	1/0		24 (212)
D45N4 ... D75N4	95	3/0		22.6 (200)	150		300	25 (220)

Terminals

Terminals for additional internal 24 V supply on the ATV71W●●●●●A24

Example: ATV71WD45N4A24

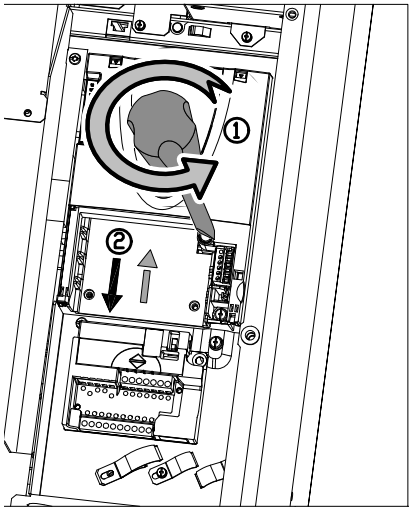


Terminals for internal 24 V supply:
- E0: 0 V
- E24: + 24 V

- Maximum wire size:
  2.5 mm² - AWG 12
- Maximum tightening torque:
  0.5 Nm - 4.43 lb.in

Removing the control terminal card

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

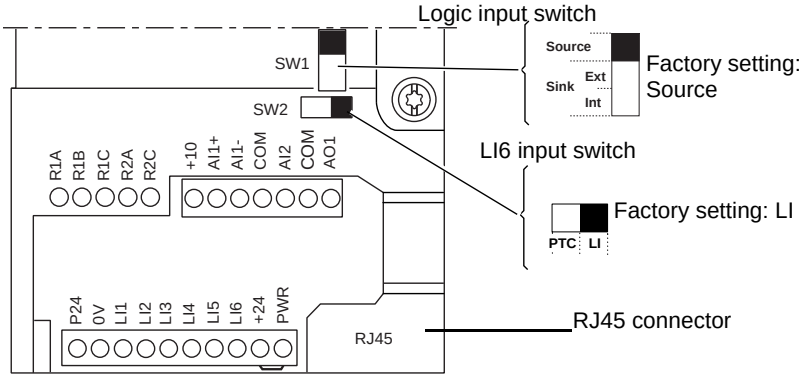


1 Undo the screw until the spring is fully extended.
2 Remove the card by sliding it downwards.

⚠ CAUTION
IMPROPERLY SECURED TERMINAL CARD
When replacing the control terminal card, it is essential to fully tighten the captive screw.
Failure to follow this instruction can result in physical injury and/or equipment damage.

Terminals

Arrangement of the control terminals



- Maximum wire size: 2.5 mm² - AWG 14
- Maximum tightening torque: 0.6 Nm - 5.3 lb.in

Note: The ATV71 is supplied with a link between the PWR and +24 terminals.

Characteristics and functions of the control terminals

Terminals	Function	Electrical characteristics
R1A R1B R1C	Common point C/O contact (R1C) of programmable relay R1	• Minimum switching capacity: 3 mA for 24 V ⎓ • Maximum switching capacity on resistive load: 5 A for 250 V ∿ or 30 V ⎓ • Maximum switching current on inductive load (cos φ = 0.4 L/R = 7 ms): 2 A for 250 V ∿ or 30 V ⎓
R2A R2C	N/O contact of programmable relay R2	
+10	+ 10 V ⎓ power supply for reference potentiometer 1 to 10 kΩ	• + 10 V ⎓ (10.5 V ± 0.5 V) • 10 mA max.
AI1+ AI1 -	Differential analog input AI1	• - 10 to + 10 V ⎓ (max. safe voltage 24 V)
COM	Analog I/O common	0 V
AI2	Depending on software configuration: Analog voltage or current input	• Analog input 0 to + 10 V ⎓ (max. safe voltage 24 V), impedance 30 kΩ or • Analog input X - Y mA, X and Y can be programmed from 0 to 20 mA impedance 250 Ω
AO1	Depending on software configuration: Analog voltage or current output	• Analog output 0 to +10 V ⎓, min. load impedance 50 kΩ or • Analog output X - Y mA, X and Y can be programmed from 0 to 20 mA max. load impedance 500 Ω
P24	Input for external +24 V ⎓ control section power supply	• + 24 V ⎓ (min. 19 V, max. 30 V) • Power 30 W
0V	Logic input common and 0V of P24 power supply	0 V
LI1 to LI5	Programmable logic inputs	• + 24 V ⎓ (max. 30 V) • Impedance 3.5 kΩ
LI6	Depending on the position of the SW2 switch: LI or PTC	SW2 = LI: • Same characteristics as logic inputs LI1 to LI5 SW2 = PTC: • Trip threshold 3 kΩ, reset threshold 1.8 kΩ • Short-circuit detection threshold < 50 Ω
+24	Power supply	SW1 switch in Source or Sink Int position: • Internal + 24 V ⎓ power supply • 200 mA max. SW1 switch in Sink Ext position: • Input for external + 24 V ⎓ power supply for the logic inputs
PWR	Power Removal safety function input	• 24 V ⎓ (max. 30 V) • Impedance 1.5 kΩ

Terminals

Characteristics and functions of the terminals: VW3A3201 option card

Maximum wire size: 1.5 mm² - AWG 16
Maximum tightening torque: 0.25 Nm - 2.21 lb.in

R3A to LI10: Same characteristics as for the control card.

Terminals	Function	Electrical characteristics
TH1+ TH1-	PTC probe input	• Trip threshold 3 kΩ, reset threshold 1.8 kΩ • Short-circuit detection threshold < 50 Ω
LO1 LO2	Open collector programmable logic outputs	• +24 V ⎓ (max. 30 V) • Max. current 200 mA for internal power supply and 200 mA for external power supply
CLO	Logic output common	
0 V	0 V	0 V

Characteristics and functions of the terminals: VW3A3202 option card

Maximum wire size: 1.5 mm² - AWG 16. Maximum tightening torque: 0.25 Nm - 2.21 lb.in

R4A to LI14: Same characteristics as for the control card.

Terminals	Function	Electrical characteristics
TH2 + TH2 -	PTC probe input	• Trip threshold 3 kΩ, reset threshold 1.8 kΩ • Short-circuit detection threshold < 50 Ω
RP	Frequency input	• Frequency range 0 ... 30 kHz • Maximum input voltage 30 V, 15 mA • Add a resistor if the input voltage is greater than 5 V (510 Ω for 12 V, 910 Ω for 15 V, 1.3 kΩ for 24 V) • State 0 if < 1.2 V, state 1 if > 3.5 V
LO3 LO4	Open collector programmable logic outputs	• + 24 V ⎓ (max. 30 V) • Max. current 20 mA for internal power supply and 200 mA for external power supply
CLO	Logic output common	
0 V	0 V	0 V

Characteristics and functions of the terminals: Encoder interface card

Maximum wire size: 1.5 mm² - AWG 16
Maximum tightening torque: 0.25 Nm - 2.21 lb.in

Terminals	Function	Electrical characteristics	
		VW3 A3 401	**VW3 A3 402, VW3 A3 404, VW3 A3 406**
+Vs 0Vs	Encoder power supply	• 5 V ⎓ (max. 5.5 V ⎓) protected against short-circuits and overloads • Max. current 200 mA	• 15 V ⎓ (max. 16 V ⎓) protected against short-circuits and overloads • Max. current 175 mA
A, /A B, /B	Incremental logic inputs	• Max. resolution: 5000 points/rev • Max. frequency: 300 kHz	

Terminals	Function	Electrical characteristics	
		VW3 A3 403, VW3 A3 405	**VW3 A3 407**
+Vs 0Vs	Encoder power supply	• 12 V ⎓ (max. 13 V ⎓) protected against short-circuits and overloads • Max. current 175 mA	• 24 V ⎓ (min. 20 V ⎓, max. 30 V ⎓) protected against short-circuits and overloads • Max. current 100 mA
A, /A B, /B	Incremental logic inputs	• Max. resolution: 5000 points/rev • Max. frequency: 300 kHz	

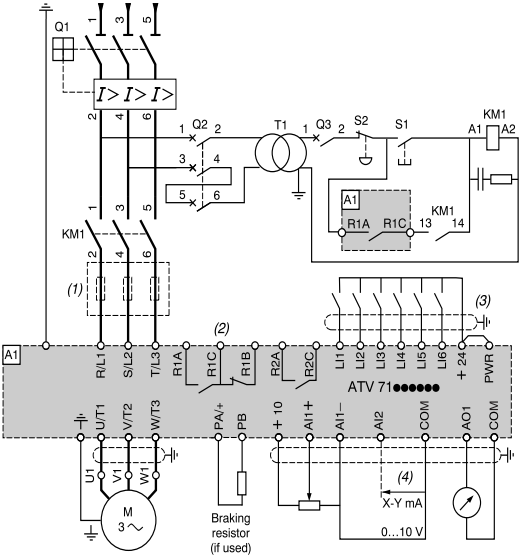
Type of incremental encoder outputs to be used

- RS422 outputs: **VW3 A3 401 - VW3 A3 402**
- Open collector outputs: **VW3 A3 403 - VW3 A3 404**
- "Push-pull" outputs: **VW3 A3 405 - VW3 A3 406 - VW3 A3 407**

Connection diagrams

Diagrams conforming to standards EN 954-1 category 1, IEC/EN 61508 capacity SIL1, stopping category 0 in accordance with IEC/EN 60204-1

Three phase power supply with upstream breaking via contactor



Note: Install interference suppressors on all inductive circuits near the drive or connected on the same circuit, such as relays, contactors, solenoid valves, fluorescent lighting, etc.

Choice of associated components: Please refer to the catalog.

(1) Line choke, if used
(2) Fault relay contacts for remote signalling of the drive status
(3) Connection of the logic input common depends on the position of the SW1 switch
(4) Software-configurable current (0…20 mA) or voltage (0…10 V) analog input

⚠ CAUTION

IMPROPER USE OF A BRAKING RESISTOR

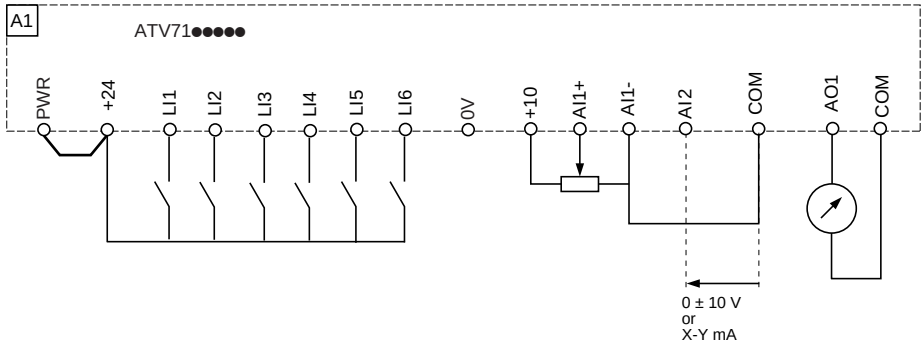
- Only use the braking resistance values recommended in our catalogs.
- Wire a thermal overload relay in the sequence or configure the braking resistor protection (please refer to the Programming Manual) so that the drive power section AC supply is disconnected in the event of a fault.

Failure to follow this instruction can result in physical injury and/or equipment damage.

Connection diagrams

Control connection diagrams

Control card connection diagram



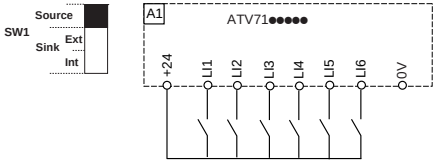
Logic input switch (SW1)

The logic input switch (SW1) is used to adapt the operation of the logic inputs to the technology of the programmable controller outputs.

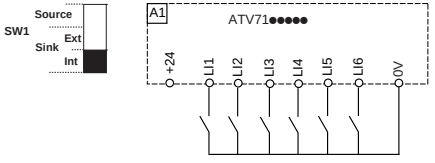
- Set the switch to Source (factory setting) if using PLC outputs with PNP transistors.
- Set the switch to Sink Int or Sink Ext if using PLC outputs with NPN transistors.

Internal power supply

SW1 switch set to "Source" position

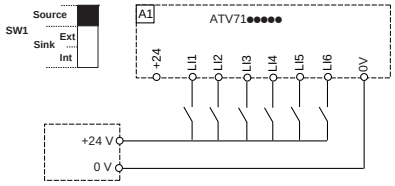


SW1 switch set to "Sink Int" position

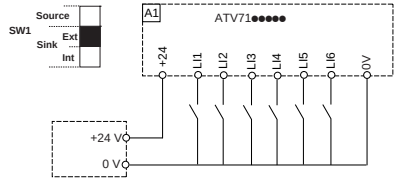


External power supply

SW1 switch set to "Source" position



SW1 switch set to "Sink Ext" position



⚠ WARNING

RISK OF UNINTENDED EQUIPMENT OPERATION

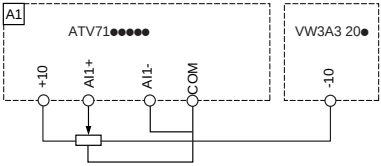
When the SW1 switch is set to "Sink Int" or "Sink Ext", the common must never be connected to ground or the protective ground, as there is then a risk of unintended operation on the first insulation fault.

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

ENGLISH

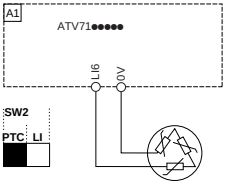
Connection diagrams

Bipolar speed reference



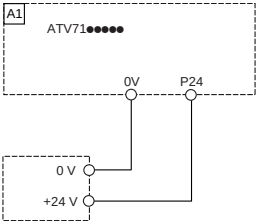
SW2 switch

The LI6 logic input switch (SW2) makes it possible to use the LI6 input:
- Either as a logic input by setting the switch to LI (factory setting)
- Or for motor protection via PTC probes by setting the switch to PTC



Control power supply via an external source

The control card can be powered by an external +24 V ⎓ supply

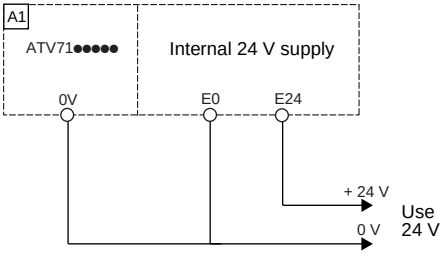


Connection diagrams for option cards

Please refer to the Installation Manual on the CD-ROM supplied with the drive.

Additional internal 24 V supply on ATV71W●●●●●●A24

The 24 V supply is provided by the drive's DC bus.



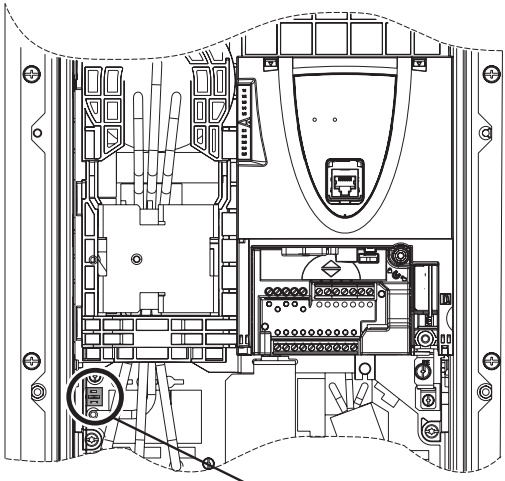
Operation on an IT system

IT system: Isolated or impedance grounded neutral.
Use a permanent insulation monitor compatible with non-linear loads, such as a Merlin Gerin type XM200 or equivalent.

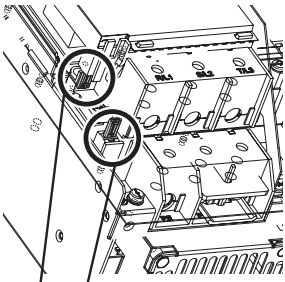
Altivar 71● drives feature built-in RFI filters. These filters must be isolated from ground for operation on an IT system as follows:

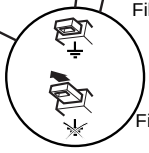
A jumper must be set to disconnect the filters on all ATV71●●●●N4 drives, with the exception of ATV71●D22N4 drives, which have two jumpers head-to-tail.
These jumpers are located on the bottom left near to terminal L1.

Example: ATV71WD18N4



Example: ATV71WD22N4





On ATV71W●●●A24 drives, do not move the 24 V power supply jumper, which is factory-set to disconnected.

⚠ CAUTION

RISK OF DRIVE OVERHEATING

On ATV71●075N4 to U40N4 drives, when the filters are disconnected, the drive switching frequency must not exceed 4 kHz. Please refer to the Programming Manual for the corresponding parameter setting.

Failure to follow this instruction can result in physical injury and/or equipment damage.

Electromagnetic compatibility, wiring

Principle and precautions

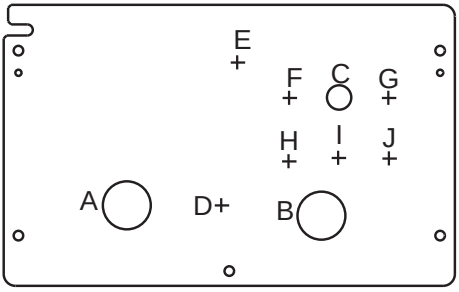
- Grounds between drive, motor and cable shielding must have "high frequency" equipotentiality.
- Use of shielded cables with shielding connected to ground at both ends for the motor cables, braking resistor (if used) and control-signal cables. Metal ducting or conduit can be used for part of the shielding length provided that there is no break in continuity.
- Keep the control circuits away from the power circuits. For control and speed reference circuits, we recommend using shielded twisted cables with a pitch of between 25 and 50 mm (0.98 and 1.97 in.)
- Ensure maximum separation between the power supply cable (line supply) and the motor cable.
- The motor cables must be at least 0.5 m (20 in.) long.
- Do not use surge arresters or power factor correction capacitors on the variable speed drive output.
- The HF equipotential ground connection between the drive, motor and cable shielding does not remove the need to connect the PE protective conductors (green-yellow) to the appropriate terminals on each unit.

Connection plates:

There are connection plates on the lower sections of the variable speed drives.

ATV71E5●●●●● drives:
The plates have 10 or 11 drilled holes, depending on the rating, to allow cables to be routed through them via cable glands. Five cable glands (one of which is metal, for use with the shielded motor cable) and a number of plugs are supplied in a bag.

ATV71W●●●●● drives:
The plates have 3 drilled holes in order to allow the main cables to be routed through them via cable glands. The cable glands must be ordered separately; **they are not supplied with the drive**.
Example: ATV71●D18N4



A: Drilled hole for line supply cable
B: Drilled hole for shielded motor cable (use a metal cable gland)
C: Drilled hole for control cable

The plates also feature markings should drilled holes be required for:
D: DC bus or braking resistor cable
E: Communication option cable
F, G, H, I, J: Control cables

Diameters of holes for ATV71W●●●●●

ATV71W	IP54 drive plates			UL Type 12 drive plates		
	A mm (in)	**B** mm (in)	**C** mm (in)	**A** mm (in)	**B** mm (in)	**C** mm (in)
075N4 to U40N4	20.5 (0.81)	25.5 (1.00)	16.4 (0.65)	27 (1.063)	27 (1.063)	35 (1.375)
U55N4 to U75N4	20.5 (0.81)	25.5 (1.00)	16.4 (0.65)	35 (1.375)	35 (1.375)	35 (1.375)
D11N4 to D18N4	32.5 (1.28)	32.5 (1.28)	16.4 (0.65)	43 (1.688)	43 (1.688)	35 (1.375)
D22N4	40.5 (1.60)	40.5 (1.60)	16.4 (0.65)	49.2 (1.938)	49.2 (1.938)	35 (1.375)
D30N4 to D37N4	50.5 (1.99)	40.5 (1.60)	16.4 (0.65)	61.9 (2.438)	61.9 (2.438)	35 (1.375)
D45N4 to D75N4	63.5 (2.50)	50.5 (1.99)	16.4 (0.65)	74.6 (2.938)	74.6 (2.938)	35 (1.375)

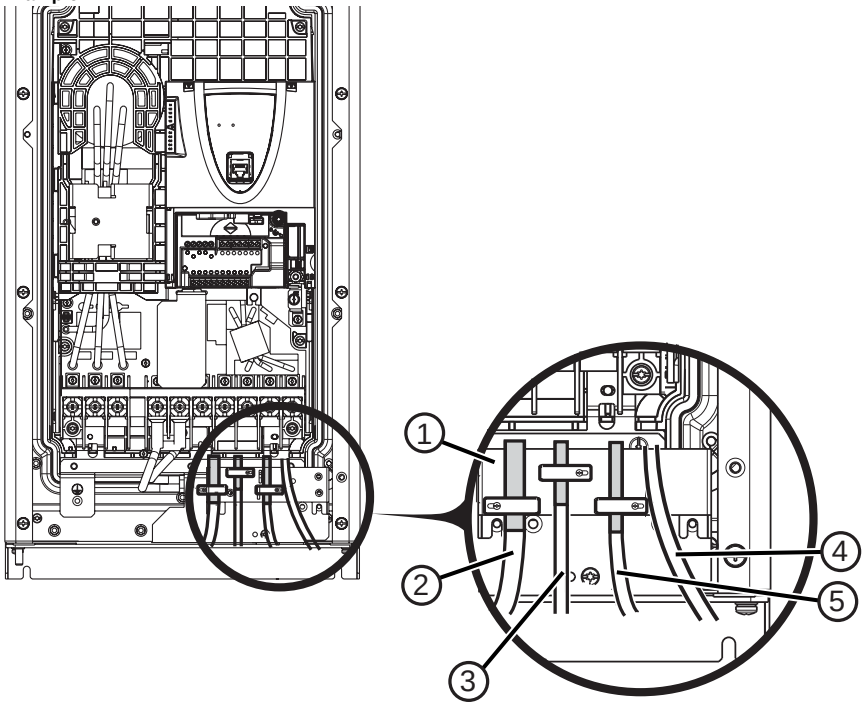
Electromagnetic compatibility, wiring

Installation diagram, control cables

ATV71● 075N4 to D18N4

Fix and ground the shielding of cables **2, 3** and **5** as close as possible to the drive:
- Strip the cable to expose the shielding.
- Use stainless metal cable clamps on the parts from which the shielding has been stripped, to attach them to the plate **1**.
- The shielding must be clamped tightly enough to the metal sheet to ensure proper contact.

Example:



1 Grounded casing

2 Shielded cables for connecting the control-signal section. For applications requiring several conductors, use cables with a small cross-section (0.5 mm^2 - AWG 20).

3 Shielded cables for connecting the encoder

4 Non-shielded wires for relay contact output

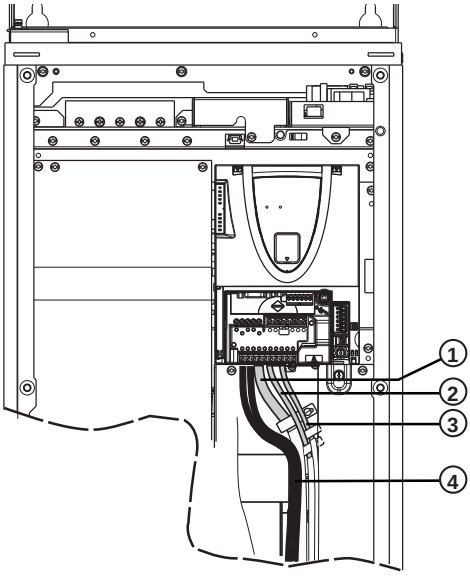
5 Shielded cables for connecting the "Power Removal" safety function input

Electromagnetic compatibility, wiring

Installation diagram, control cables

ATV71● D22N4 to D75N4

Fix and ground the shielding of cables **1, 2** and **3** as close as possible to the drive:
- Strip the cable to expose the shielding.
- Use stainless metal cable clamps to attach the parts from which the shielding has been stripped.
- The shielding must be clamped tightly enough to the metal sheet to ensure proper contact.



1Shielded cables for connecting the control-signal section.
For applications requiring several conductors, use cables with a small cross-section (0.5 mm^2 - AWG 20).

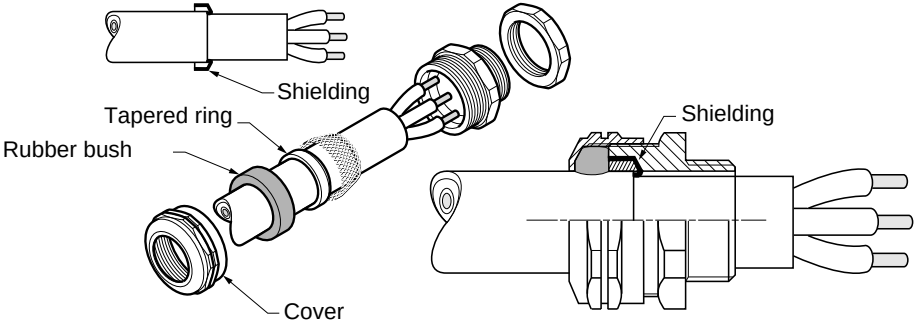
2Shielded cables for connecting the "Power Removal" safety function input

3Shielded cables for connecting the encoder

4Unshielded wires for the relay contact output

Mounting and connecting the shielded motor cable with metal cable gland (not supplied with the drive):

- Prepare the shielded cable by stripping both ends ready for connection.
- Loosen the cover of the cable gland.
- Attach the shielded cable to the cable gland ensuring it is fully in contact (throughout 360°).
- Fold back the shielding and clamp it between the ring and the body of the cable gland, and tighten the cover.



Setup - Preliminary recommendations

Drive settings (factory configuration)

The Altivar 71 is factory-set for the most common operating conditions:
- Macro configuration: Start/Stop
- **Motor** frequency: 50 Hz
- Constant torque application, with sensorless flux vector control
- Normal stop mode on deceleration ramp
- Stop mode in the event of a fault: Freewheel
- Linear, acceleration and deceleration ramps: 3 seconds
- Low speed: 0 Hz
- High speed: 50 Hz
- Motor thermal current = rated drive current
- Standstill injection braking current = 0.7 x rated drive current, for 0.5 seconds
- No automatic starts after a fault
- Switching frequency 2.5 kHz or 4 kHz depending on drive rating
- Logic inputs:
  - LI1: Forward, LI2: Forward (2 operating direction), 2-wire control on transition
  - LI3, LI4, LI5, LI6: Inactive (not assigned)
- Analog inputs:
  - AI1: Speed reference 0 +/-10 V
  - AI2: 0-20 mA, inactive (not assigned)
- Relay R1: The contact opens in the event of a fault (or drive off).
- Relay R2: Inactive (not assigned)
- Analog output AO1: 0-20 mA, inactive (not assigned)

If the above values are compatible with the application, the drive can be used without changing the settings.

Option card factory settings

The option card inputs/outputs are not factory-set.

Power switching via line contactor

⚠ CAUTION
RISK OF EQUIPMENT DAMAGE • Avoid operating the contactor frequently (premature ageing of the filter capacitors). • Cycle times < 60 s can result in damage to the precharge resistor. **Failure to follow this instruction can result in physical injury and/or equipment damage.**

Starting

Important:

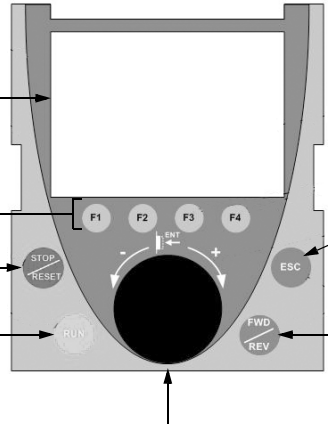
In factory settings mode, the motor can only be supplied with power once the "forward", "reverse" and "DC injection stop" commands have been reset in the following instances: On power-up or a manual fault reset or after a stop command.
If they have not been reset, the drive will display "nSt" and will not start.

Test on low-power motor or without motor, use of motors in parallel

Consult the CD-ROM supplied with the drive.

Graphic display terminal

Description of terminal



1 Graphic display

2 F1, F2, F3, F4 function keys

3 STOP/ RESET button

4 RUN button

7 ESC key: Aborts a value, a parameter or a menu to return to the previous selection

6 Button for reversing the motor direction of rotation

5 Navigation button:

- Press (ENT): - To save the current value
  - To enter the selected menu or parameter
- Turn CW/CCW: - To increment or decrement a value
  - To go to the next or previous line
  - To increase or decrease the reference if control via the display terminal is activated

Note: Buttons 3, 4, 5 and 6 can be used to control the drive directly, if control via the terminal is activated.

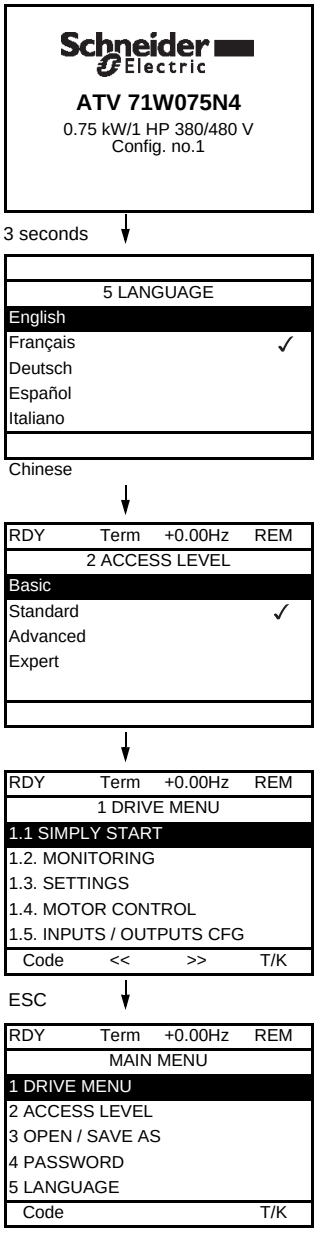
Drive state codes:

- ACC: Acceleration
- CLI: Current limiting
- CTL: Controlled stop on input phase loss
- DCB: DC injection braking in progress
- DEC: Deceleration
- FLU: Motor fluxing in progress
- FRF: Drive at fallback speed
- FST: Fast stop
- NLP: No line power (no line supply on L1, L2, L3)
- NST: Freewheel stop
- OBR: Auto-adapted deceleration
- PRA: Power Removal function active (drive locked)
- RDY: Drive ready
- RUN: Drive running
- SOC: Controlled output cut in progress
- TUN: Auto-tuning in progress
- USA: Undervoltage alarm

The first time the drive is powered up, the user will automatically be guided through the menus as far as [1. DRIVE MENU].
The parameters in the [1.1 SIMPLY START] submenu must be configured and auto-tuning performed before the motor is started up.

Graphic display terminal

Only the [1.1 SIMPLY START] menu is described in this document. To find out the content of the other menus, consult the CD-ROM supplied with the drive.



ENGLISH

[1.1 SIMPLY START] (SIM-) menu

The [1.1-SIMPLY START] (SIM-) menu can be used for fast startup, which is sufficient for the majority of applications.

Note: The parameters of the [1.1 SIMPLY START] (SIM-) menu must be entered in the order in which they appear, as the later ones are dependent on the first ones.
For example [2/3 wire control] (tCC) must be configured before any other parameters.

Macro configuration

Macro configuration provides a means of speeding up the configuration of functions for a specific field of application.

Selecting a macro configuration assigns the Inputs/Outputs in this macro configuration.

Input/ output	[Start/ Stop]	[M. handling]	[Gen. Use]	[Hoisting]	[PID regul.]	[Network C.]	[Mast./ slave]
AI1	[Ref.1 channel]	[Ref.1 channel]	[Ref.1 channel]	[Ref.1 channel]	[Ref.1 channel] (PID reference)	[Ref.2 channel] ([Ref.1 channel] via the bus)	[Ref.1 channel]
AI2	[No]	[Summing ref. 2]	[Summing ref. 2]	[No]	[PID feedback]	[No]	[Torque reference]
AO1	[Motor freq.]	[Motor freq.]	[Motor freq.]	[Motor freq.]	[Motor freq.]	[Motor freq.]	[Sign. torque]
R1	[No drive flt]	[No drive flt]	[No drive flt]	[No drive flt]	[No drive flt]	[No drive flt]	[No drive flt]
R2	[No]	[No]	[No]	[Brk control]	[No]	[No]	[No]
LI1 (2-wire)	[Forward]	[Forward]	[Forward]	[Forward]	[Forward]	[Forward]	[Forward]
LI2 (2-wire)	[Reverse]	[Reverse]	[Reverse]	[Reverse]	[Reverse]	[Reverse]	[Reverse]
LI3 (2-wire)	[No]	[2 preset speeds]	[Jog]	[Fault reset]	[PID integral reset]	[Ref. 2 switching]	[Trq/spd switching]
LI4 (2-wire)	[No]	[4 preset speeds]	[Fault reset]	[External fault]	[2 preset PID ref.]	[Fault reset]	[Fault reset]
LI5 (2-wire)	[No]	[8 preset speeds]	[Torque limitation]	[No]	[4 preset PID ref.]	[No]	[No]
LI6 (2-wire)	[No]	[Fault reset]	[No]	[No]	[No]	[No]	[No]
LI1 (3-wire)	Stop	Stop	Stop	Stop	Stop	Stop	Stop
LI2 (3-wire)	[Forward]	[Forward]	[Forward]	[Forward]	[Forward]	[Forward]	[Forward]
LI3 (3-wire)	[Reverse]	[Reverse]	[Reverse]	[Reverse]	[Reverse]	[Reverse]	[Reverse]
LI4 (3-wire)	[No]	[2 preset speeds]	[Jog]	[Fault reset]	[PID integral reset]	[Ref. 2 switching]	[Trq/spd switching]
LI5 (3-wire)	[No]	[4 preset speeds]	[Fault reset]	[External fault]	[2 preset PID ref.]	[Fault reset]	[Fault reset]
LI6 (3-wire)	[No]	[8 preset speeds]	[Torque limitation]	[No]	[4 preset PID ref.]	[No]	[No]

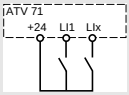
In 3-wire control, the assignment of inputs LI1 to LI6 shifts.

Note: All these can be modified, adjusted and reassigned: Consult the CD-ROM supplied with the drive.

[1.1 SIMPLY START] (SIM-) menu

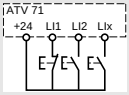
Code	Name/Description	Adjustment range	Factory setting
tCC	❏ **[2/3 wire control]**		[2 wire] (2C)
2C	☐ **[2 wire]** (2C)		
3C	☐ **[3 wire]** (3C)		

2-wire control: This is the input state (0 or 1) or edge (0 to 1 or 1 to 0), which controls running or stopping.



Example of "source" wiring:
LI1: Forward
LIx: Reverse

3-wire control
(Pulse control): A "forward" or "reverse" pulse is sufficient to command starting, a "stop" pulse is sufficient to command stopping.



Example of "source" wiring:

LI1: Stop
LI2: Forward
LIx: Reverse

⚠ WARNING

RISK OF UNINTENDED EQUIPMENT OPERATION

To change the assignment of [2/3 wire control] (tCC) press and hold down the "ENT" key for 2 s.
The following function will be returned to factory settings: [2 wire type] (tCt) (consult the CD-ROM with the drive) along with the functions assigning the logic inputs.
The macro configuration selected will also be reset it if has been customized (loss of custom settings).
Check that this change is compatible with the wiring diagram used.

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

CFG	❏ **[Macro configuration]**		[Start/Stop] (StS)
StS	☐ **[Start/Stop]** (StS): Start/stop		
HdG	☐ **[M. handling]** (HdG): Material handling		
HSt	☐ **[Hoisting]** (HSt): Hoisting		
GEn	☐ **[Gen. Use]** (GEn): General use		
PId	☐ **[PID regul.]** (PId): PID regulation		
nEt	☐ **[Network C.]** (nEt): Communication bus		
MSL	☐ **[Mast./slave]** (MSL): Master/slave		

⚠ WARNING

RISK OF UNINTENDED EQUIPMENT OPERATION

To change the assignment of [Macro configuration] (CFG) press and hold down the ENT key for 2 s.
Check that the selected macro configuration is compatible with the wiring diagram used.

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

ENGLISH

[1.1 SIMPLY START] (SIM-) menu

Code	Name/Description	Adjustment range	Factory setting
CCFG YES	❑ **[Customized macro]** Read-only parameter, only visible if at least one macro configuration parameter has been modified. ☐ **[Yes]** (YES)		
bFr 50 60	❑ **[Standard mot. freq]** ☐ **[50 Hz IEC]** (50): IEC ☐ **[60 Hz NEMA]** (60): NEMA This parameter modifies the presets of the following parameters: [Rated motor power] (nPr), [Rated motor volt.] (UnS), [Rated mot. current] (nCr), [Rated motor freq.] (FrS), [Rated motor speed] (nSP) and [Max frequency] (tFr) below, [Mot. therm. current] (ItH) page 74, [High speed] (HSP) page 74.		[50 Hz IEC] (50)
nPr	❑ **[Rated motor power]** Rated motor power given on the nameplate, in kW if [Standard mot. freq] (bFr) = [50 Hz IEC] (50), in HP if [Standard mot. freq] (bFr) = [60 Hz NEMA] (60).	According to drive rating	According to drive rating
UnS	❑ **[Rated motor volt.]** Rated motor voltage given on the nameplate.	200 to 480 V	400 or 460 V according to [Standard mot. freq] (bFr)
nCr	❑ **[Rated mot. current]** Rated motor current given on the nameplate.	0.25 to 1.5 In (1)	According to drive rating and [Standard mot. freq] (bFr)
FrS	❑ **[Rated motor freq.]** Rated motor frequency given on the nameplate. The factory setting is 50 Hz, or preset to 60 Hz if [Standard mot. freq] (bFr) is set to 60 Hz.	10 to 500 or 1600 Hz according to rating	50 Hz
nSP	❑ **[Rated motor speed]** Rated motor speed given on the nameplate. 0 to 9999 RPM then 10.00 to 96.00 kRPM on the integrated display terminal. If, rather than the rated speed, the nameplate indicates the synchronous speed and the slip in Hz or as a %, calculate the rated speed as follows: • Rated speed = Synchronous speed x $\frac{100 - \text{slip as a \%}}{100}$ or • Rated speed = Synchronous speed x $\frac{50 - \text{slip in Hz}}{50}$ (50 Hz motors) or • Rated speed = Synchronous speed x $\frac{60 - \text{slip in Hz}}{60}$ (60 Hz motors)	0 to 96,000 RPM	According to drive rating
tFr	❑ **[Max frequency]** The factory setting is 60 Hz, or preset to 72 Hz if [Standard mot. freq] (bFr) is set to 60 Hz. The maximum value is limited by the following conditions: • It must not exceed 10 times the value of [Rated motor freq.] (FrS). • Values between 500 Hz and 1600 Hz are only possible in V/F control and for powers limited to 37 kW (50 HP) for the ATV71●●●●. In this case configure [Motor control type] (Ctt) before [Max frequency] (tFr).	10 to 1600 Hz	60 Hz

(1) In corresponds to the rated drive current indicated in the Installation Manual and on the drive nameplate.

[1.1 SIMPLY START] (SIM-) menu

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Code	Name/Description	Factory setting
tUn	❏ **[Auto tuning]**	[No] (nO)
nO	☐ **[No]** (nO): Auto-tuning not performed.	
YES	☐ **[Yes]** (YES): Auto-tuning is performed as soon as possible, then the parameter automatically changes to [Done] (dOnE).	
dOnE	☐ **[Done]** (dOnE): Use of the values given the last time auto-tuning was performed.	
	Caution:	
	• It is essential that all motor parameters ([Rated motor volt.] (UnS), [Rated motor freq.] (FrS), [Rated mot. current.] (nCr), [Rated motor speed] (nSP), [Rated motor power] (nPr)) are configured correctly before starting auto-tuning. If at least one of these parameters is modified after auto-tuning has been performed, [Auto tuning] (tUn) will return to [No] (nO) and must be repeated.	
	• Auto-tuning is only performed if no stop command has been activated. If a "freewheel stop" or "fast stop" function has been assigned to a logic input, this input must be set to 1 (active at 0).	
	• Auto-tuning takes priority over any run or prefluxing commands, which will be taken into account after the auto-tuning sequence.	
	• If auto-tuning fails, the drive displays [No] (nO) and, depending on the configuration of [Autotune fault mgt] (tnL) (consult the CD-ROM supplied with the drive), may switch to [Auto-tuning] (tnF) fault mode.	
	• Auto-tuning may take 1 to 2 seconds. Do not interrupt; wait for the display to change to "[Done] (dOnE)" or "[No] (nO)".	
	⚠ CAUTION **RISK OF EQUIPMENT DAMAGE** During auto-tuning, the drive sends a full-load current to the motor. Before using the auto-tuning function, check that the motor has been dimensioned to support a full-load current. **Failure to follow this instruction can result in physical injury and/or equipment damage.**	
tUS	❏ **[Auto tuning status]**	[Not done] (tAb)
	(for information only, cannot be modified)	
tAb	☐ **[Not done]** (tAb): The default stator resistance value is used to control the motor.	
PEnd	☐ **[Pending]** (PEnd): Auto-tuning has been requested but not yet performed.	
PrOG	☐ **[In Progress]** (PrOG): Auto-tuning in progress.	
FAIL	☐ **[Failed]** (FAIL): Auto-tuning has failed.	
dOnE	☐ **[Done]** (dOnE): The stator resistance measured by the auto-tuning function is used to control the motor.	
PHr	❏ **[Output Ph rotation]**	[ABC] (AbC)
AbC	☐ **[ABC]** (AbC): Forward	
ACb	☐ **[ACB]** (ACb): Reverse	
	This parameter can be used to reverse the direction of rotation of the motor without reversing the wiring.	

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Parameters that can be changed during operation or when stopped

Code	Name/Description		Factory setting
ItH	❑ **[Mot. therm. current]**	0 to 1.5 In (1)	According to drive rating
	Motor thermal protection current, to be set to the rated current indicated on the nameplate.		
ACC	❑ **[Acceleration]**	0.1 to 999.9 s	3.0 s
	Time to accelerate from 0 to the [Rated motor freq.] (FrS) (page 72). Make sure that this value is compatible with the inertia being driven.		
dEC	❑ **[Deceleration]**	0.1 to 999.9 s	3.0 s
	Time to decelerate from the [Rated motor freq.] (FrS) (page 72) to 0. Make sure that this value is compatible with the inertia being driven.		
LSP	❑ **[Low speed]**		0
	Motor frequency at minimum reference, can be set between 0 and [High speed] (HSP).		
HSP	❑ **[High speed]**		50 Hz
	Motor frequency at maximum reference, can be set between [Low speed] (LSP) and [Max frequency] (tFr). The factory setting changes to 60 Hz if [Standard mot. freq] (bFr) = [60 Hz] (60).		

(1) In corresponds to the rated drive current indicated in the Installation Manual and on the drive nameplate.

Faults - Causes - Remedies

Drive will not start, no fault displayed

- If the display does not light up, check the power supply to the drive.
- The assignment of the "Fast stop" or "Freewheel" functions will prevent the drive starting if the corresponding logic inputs are not powered up. The ATV71 then displays [Freewheel] (nSt) in freewheel stop and [Fast stop] (FSt) in fast stop. This is normal since these functions are active at zero so that the drive will be stopped safely if there is a wire break.
- Make sure that the run command input or inputs are activated in accordance with the selected control mode ([2/3 wire control] (tCC) and [2 wire type] (tCt) parameters, page 71).

Faults which cannot be reset automatically

The cause of the fault must be removed before resetting by turning off and then back on.
AnF, brF, ECF, EnF, SOF, SPF and tnF faults can also be reset remotely by means of a logic input or control bit (consult the CD-ROM supplied with the drive).

Fault	Name	Probable cause	Remedy
AI2F	[AI2 INPUT]	• Non-conforming signal on analog input AI2	• Check the wiring of analog input AI2 and the value of the signal.
AnF	[LOAD SLIPPING]	• The encoder speed feedback does not match the reference	• Check the motor, gain and stability parameters • Add a braking resistor • Check the size of the motor/drive/load • Check the encoder's mechanical coupling and its wiring
brF	[MECHANICAL BRAKE FLT]	• The brake feedback contact does not match the brake logic control	• Check the feedback circuit and the brake logic control circuit • Check the mechanical state of the brake
CrF1	[PRECHARGE FAULT]	• Charging relay control fault or precharge resistor damaged	• Check the internal connections • Check/repair the drive
ECF	[ENCODER COUPLING]	• Break in encoder's mechanical coupling	• Check the encoder's mechanical coupling
EEF1 EEF2	[CONTROL EEPROM FLT]	• Internal memory fault	• Check the environment (electromagnetic compatibility) • Turn off, reset, return to factory settings • Check/repair the drive
EnF	[ENCODER FAULT]	• Encoder feedback fault	• Check [Number of pulses] (PGI) and [Encoder type] (EnS) (consult the CD-ROM supplied with the drive) • Check that the encoder's mechanical and electrical operation, its power supply and connections are all correct • Check and, if necessary, reverse the direction of rotation of the motor ([Output Ph rotation] (PHr) parameter on page 73) or the encoder signals
FCF1	[OUTPUT CONT. CLOSED]	• The output contactor remains closed while open conditions are OK	• Check the contactor and its wiring • Check the feedback circuit
ILF	[INTERNAL LINK FAULT]	• Communication fault between option card and drive	• Check the environment (electromagnetic compatibility) • Check the connections • Replace the option card • Check/repair the drive
InF1	[RATING ERROR]	• The power card is different from the card stored	• Check the power card part number
InF2	[INCOMPATIBLE PB]	• Power card is not compatible with the control card	• Check the card's part number and compatibility

Faults - Causes - Remedies

Faults, which cannot be reset automatically (continued)

Fault	Name	Probable cause	Remedy
InF3	[INT. SERIAL LINK FLT]	• Communication fault between the internal cards	• Check the internal connections • Check/repair the drive
InF4	[INTERNAL FLT-Mfg AREA]	• Internal data inconsistent	• Recalibrate the drive (performed by Schneider Electric Product Support)
InF6	[INTERNAL FLT-OPTION]	• The option installed in the drive is unknown	• Check the part number of the option card and its compatibility
InF7	[INTERN. FLT-HARD. INIT]	• The initialization was not performed.	• Remove and restore power to reset the fault.
InF8	[INT. FLT-CONTROL SUP.]	• Control supply is not correct	• Check the control section power supply
InF9	[INTERN. FLT - I MEASURE]	• Current measurement is not correct	• Replace the current sensors, or the power board • Check/repair the drive
InFA	[INTERN. FLT-MAINS CCT]	• Input stage of the drive is not working properly	• Check/repair the drive
InFb	[INTERN. FLT-TH. SENSOR]	• The thermal sensor of the drive is not working properly	• Change the thermal sensor • Check/repair the drive
InFC	[INTERN. FLT-TIME MEAS.]	• Time measuring component failure	• Check/repair the drive
InFE	[CPU FAULT]	• Drive micro-processor fault	• Switch off, then switch on the power. Check/ repair the drive.
OCF	[OVERCURRENT]	• Parameters in the [SETTINGS] (SEt-) and [1.4 MOTOR CONTROL] (drC-) menus are not correct • Inertia or load too high • Mechanical locking	• Check the parameters (consult the CD-ROM supplied with the drive) • Check the size of the motor/drive/load • Check the state of the mechanism
PrF	[POWER REMOVAL FAULT]	• Fault with the drive's "Power removal" safety function	• Check/repair the drive
SCF1	[MOTOR SHORT CIRCUIT]	• Short-circuit or grounding at the drive output • Significant earth leakage current at the drive output if several motors are connected in parallel	• Check the cables connecting the drive to the motor, and the motor insulation • Reduce the switching frequency • Connect chokes in series with the motor
SCF2	[IMPEDANT SH. CIRCUIT]		
SCF3	[GROUND SH. CIRCUIT]		
SOF	[OVERSPEED]	• Instability or driving load too high	• Check the motor, gain and stability parameters • Add a braking resistor • Check the size of the motor/drive/load
SPF	[SPEED FEEDBACK LOSS]	• Encoder feedback signal missing	• Check the wiring between the encoder and the drive • Check the encoder
tnF	[AUTO-TUNING FAULT]	• Motor not connected to the drive • Special motor or motor whose power is not suitable for the drive	• Check that the motor is present during auto-tuning • If an output contactor is being used, close it during auto-tuning • Check that the motor/drive are compatible

Faults - Causes - Remedies

Faults that can be reset with the automatic restart function, after the cause has disappeared

These faults can also be reset by turning the drive off then on again or by means of a logic input or control bit (consult the CD-ROM supplied with the drive).

Fault	Name	Probable cause	Remedy
APF	[APPLICATION FAULT]	• Controller Inside card fault	• Please refer to the card documentation
bLF	[BRAKE CONTROL FAULT]	• Brake release current not reached • Brake control parameters not set when brake logic control is assigned	• Check the drive/motor connection • Check the motor windings • Apply the recommended settings (consult the CD-ROM supplied with the drive)
CnF	[NETWORK FAULT]	• Communication fault on communication card	• Check the environment (electromagnetic compatibility) • Check the wiring • Check the time-out • Replace the option card • Check/repair the drive
COF	[CANopen FAULT]	• Interruption in communication on the CANopen bus	• Check the communication bus • Check the time-out • Consult the CANopen manual
EPF1	[EXTERNAL FAULT LI / Bit]	• Fault triggered by an external device, depending on user	• Check the device which has caused the fault and reset the drive
EPF2	[EXTERNAL FAULT NET.]	• Fault triggered by an external device, depending on user	• Check the device which has caused the fault and reset the drive
FCF2	[OUTPUT CONT. OPENED]	• The output contactor remains opened while close conditions are OK	• Check the contactor and its wiring • Check the feedback circuit
LCF	[LINE CONTACT. FAULT]	• The drive is not powering up although the contactor is controlled.	• Check the contactor and its wiring • Check the time-out (consult the CD-ROM supplied with the drive) • Check the mains/contactor/drive wiring
LFF2 LFF3 LFF4	[AI2 4-20mA loss] [AI3 4-20mA loss] [AI4 4-20mA loss]	• Loss of the 4-20 mA reference on analog input AI2, AI3 or AI4	• Check the connection on the analog inputs
ObF	[OVERBRAKING]	• Braking is too sudden or driving load	• Increase the deceleration time • Add a braking resistor if necessary • Activate the [Dec ramp adapt.] (brA) function (consult the CD-ROM supplied with the drive), if it is compatible with the application
OHF	[DRIVE OVERHEAT]	• Drive temperature too high	• Check the motor load, the drive ventilation and the ambient temperature. Wait for the drive to cool down before restarting.
OLF	[MOTOR OVERLOAD]	• Triggered by excessive motor current	• Check the setting of the motor thermal protection, check the motor load. Wait for the drive to cool down before restarting.
OPF1	[1 MOTOR PHASE LOSS]	• Loss of one phase at drive output	• Check the connections from the drive to the motor

Faults - Causes - Remedies

Faults that can be reset with the automatic restart function, after the cause has disappeared (continued)

These faults can also be reset by turning the drive off then on again or by means of a logic input or control bit (consult the CD-ROM supplied with the drive).

Fault	Name	Probable cause	Remedy
OPF2	[3 MOTOR PHASE LOSS]	• Motor not connected or motor power too low • Output contactor open • Instantaneous instability in the motor current	• Check the connections from the drive to the motor • If an output contactor is being used, consult the CD-ROM supplied with the drive • Test on a low-power motor or without a motor: In factory settings mode, motor phase loss detection is active [Output Phase Loss] (OPL) = [Yes] (YES). To check the drive in a test or maintenance environment, without having to use a motor with the same rating as the drive (in particular for high-power drives), deactivate motor phase loss detection [Output Phase Loss] (OPL) = [No] (nO) (consult the CD-ROM supplied with the drive). • Check and optimize the [Rated motor volt.] (UnS) and [Rated mot. current] (nCr) parameters and perform an [Auto tuning] (tUn) operation.
OSF	[MAINS OVERVOLTAGE]	• Mains supply is too high • Disturbed line supply	• Check the line voltage
OtF1	[PTC 1 OVERHEAT]	• Overheating of the PTC1 probes detected	• Check the motor load and motor size • Check the motor ventilation • Wait for the motor to cool before restarting • Check the type and state of the PTC probes
OtF2	[PTC 2 OVERHEAT]	• Overheating of the PTC2 probes detected	
OtFL	[PTC=LI6 OVERHEAT]	• Overheating of PTC probes detected on input LI6	
PtF1	[PTC1 FAILURE]	• PTC1 probes open or short-circuited	• Check the PTC probes and the wiring between them and the motor/drive
PtF2	[PTC2 FAILURE]	• PTC2 probes open or short-circuited	
PtFL	[LI6=PTC FAILURE]	• PTC probes on input LI6 open or short-circuited	
SCF4	[IGBT SHORT CIRCUIT]	• Power component fault	• Check/repair the drive
SCF5	[LOAD SHORT CIRCUIT]	• Short-circuit at drive output	• Check the cables connecting the drive to the motor, and the motor's insulation • Check/repair the drive
SLF1	[MODBUS COM.]	• Interruption in communication on the Modbus bus	• Check the communication bus • Check the time-out • Consult the Modbus manual

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Faults - Causes - Remedies

Faults that can be reset with the automatic restart function, after the cause has disappeared (continued)

These faults can also be reset by turning the drive off then on again or by means of a logic input or control bit (consult the CD-ROM supplied with the drive).

Fault	Name	Probable cause	Remedy
SLF2	[POWERSUITE COM.]	• Fault communicating with PowerSuite	• Check the PowerSuite connecting cable • Check the time-out
SLF3	[HMI COM.]	• Fault communicating with the graphic display terminal	• Check the terminal connection • Check the time-out
SrF	[TORQUE TIME OUT FLT]	• The time-out of the torque control function is attained	• Check the function's settings • Check the state of the mechanism
SSF	[TORQUE/ I LIMIT FLT]	• Switch to torque limitation	• Check if there are any mechanical problems • Check the limitation parameters (consult the CD-ROM supplied with the drive)
tJF	[IGBT OVERHEAT]	• Drive overload	• Check the size of the load/motor/drive • Decrease the switching frequency • Wait for the motor to cool before restarting

Faults that can be reset as soon as their causes disappear

Fault	Name	Probable cause	Remedy
CFF	[INCORRECT CONFIG.]	• The current configuration is inconsistent (error due to a change of card)	• Check the card • Return to factory settings or retrieve the backup configuration, if it is valid consult the CD-ROM supplied with the drive
CFI	[INVALID CONFIG.]	• Invalid configuration. The configuration loaded in the drive via the serial link is inconsistent.	• Check the configuration loaded previously • Load a compatible configuration
PHF	[INPUT PHASE LOSS]	• Drive incorrectly supplied or a fuse blown • Failure of one phase • 3-phase ATV71 used on a single phase line supply • Unbalanced load This protection only operates with the drive on load	• Check the power connection and the fuses • Reset • Use a 3-phase line • Disable the fault by setting [Input phase loss] (IPL) = [No] (nO) (consult the CD-ROM supplied with the drive).
USF	[UNDERVOLTAGE]	• Line supply is too low • Transient voltage dip • Damaged charge resistor	• Check the voltage and the voltage parameter • Replace the charge resistor • Check/repair the drive

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