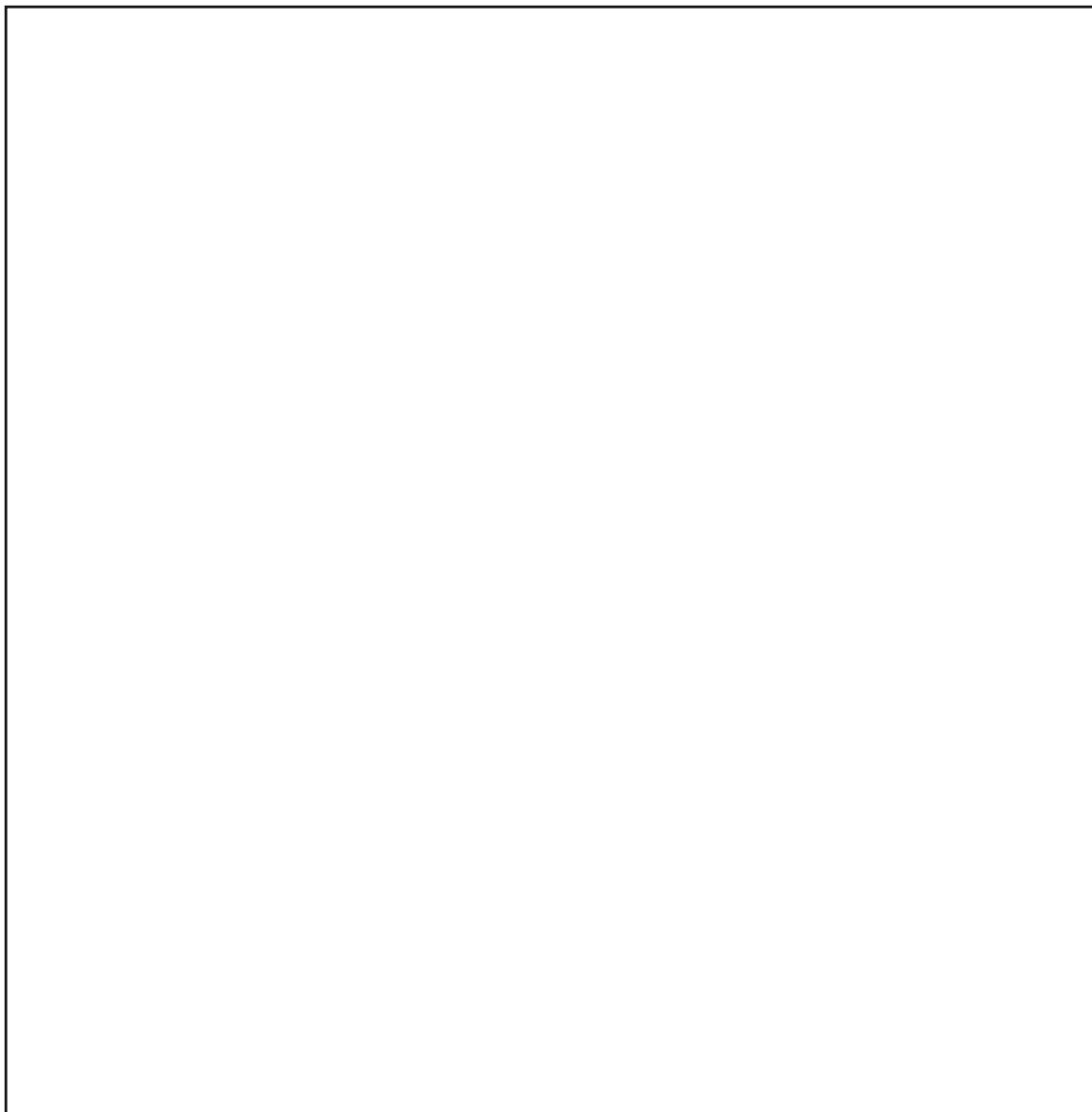


SAMI GS

Frequency converters ACS501
2.2 to 75 kW

User's Manual

EN 60019134



2 Delivery Checks

Check that the device does not show any signs of damage and that the delivery is complete (refer to the type designation code presented below). In the event of damage, please contact your insurance company or the supplier. If the delivery is not in compliance with the order, please contact the supplier immediately.

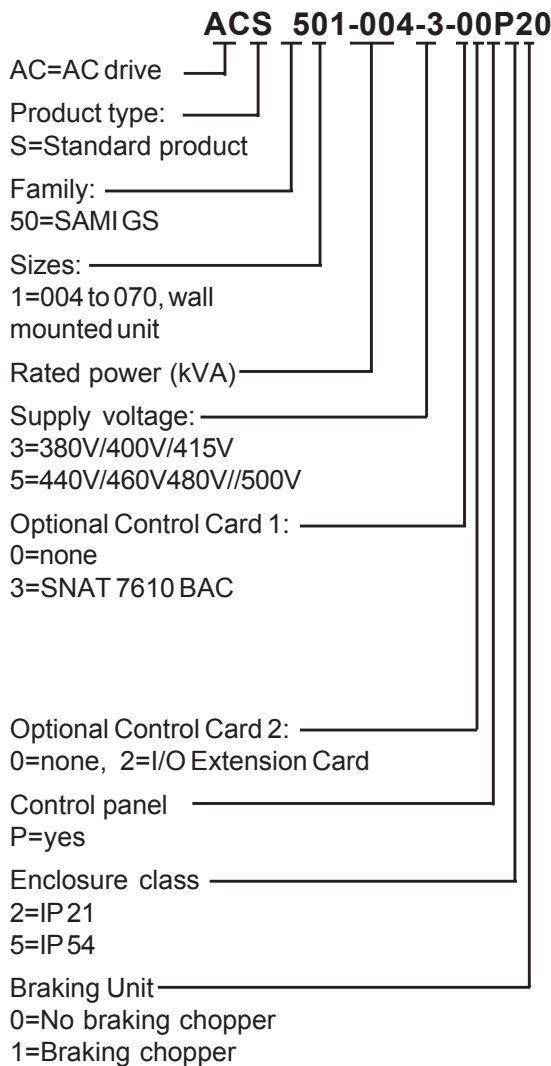


Figure 2-1. Type designation code.

Note! Do not destroy the packing. The template printed on the protective cardboard can be used for marking the fixing points of the SAMI GS on the wall.

If the device is stored before commissioning, check that the environmental conditions in the storage room are acceptable (temperature -40°C to +70°C; relative humidity < 95%, no condensation allowed).

The guarantee covers defects in manufacture. The manufacturer carries no responsibility for damage occurred during transport or unpacking.

Under no circumstances shall the manufacturer be liable for damages and failures due to misuse, abuse, improper installation or abnormal conditions of temperature, dust or corrosives or failures due to operation above rated capacities. Nor shall the manufacturer be liable for consequential and incidental damages.

The period of manufacturer's guarantee is 12 months from commissioning and not more than 24 months from the date of delivery.

Local ABB companies or distributors may have a different guarantee period, which is specified in their sales terms and conditions and guarantee terms.

If any queries arise concerning the SAMI GS, please contact your Distributor or ABB local office.

SAMI GS

**Table 3-1. SAMI GS frequency converter types for 50 Hz and 60 Hz supplies.
Mains voltage 380 V/ 400 V/ 415 V.**

Type designation	SAMI's input current I_1 , output current I_N & I_{NSQ} and motor power P_N & P_{NSQ}							
	Constant torque applications				Squared torque applications			
	Rated input current I_1/A	Rated output current I_N/A	Short term overload current ¹⁾ A	Max rated motor P_N/kW	Rated input current I_{1SQ}/A	Rated output current I_{NSQ}/A	Short term overload current ¹⁾ A	Max rated motor P_{NSQ}/kW
ACS501-004-3	4.7	6.2	9.3	2.2	6.2	7.5	8.3	3.0
ACS501-005-3	6.2	7.5	11.3	3.0	8.1	10.0	11.0	4.0
ACS501-006-3	8.1	10.0	15.0	4.0	11.0	13.2	14.5	5.5
ACS501-009-3	11.0	13.2	19.8	5.5	15.0	18.0	19.8	7.5
ACS501-011-3	15.0	18.0	27.0	7.5	21.0	24.0	26	11.0
ACS501-016-3	21.0	24.0	36.0	11.0	28.0	31.0	34	15.0
ACS501-020-3	28.0	31.0	46.5	15.0	34.0	39.0	43	18.5
ACS501-025-3	34.0	39.0	58.0	18.5	41.0	47.0	52	22.0
ACS501-030-3	41.0	47.0	70.5	22.0	55.0	62.0	68	30.0
ACS501-041-3	55.0	62.0	93.0	30.0	67.0	76.0	84	37.0
ACS501-050-3	72.0	76.0	114	37.0	85.0	89.0	98.0	45.0
ACS501-060-3	85.0	89.0	134	45.0	101	112	123	55.0

**Table 3-2. SAMI GS frequency converter types for 50 Hz and 60 Hz supplies.
Mains voltage 440 V/ 460 V/ 480 V/ 500 V.**

Type designation	SAMI's input current I_1 , output current I_N & I_{NSQ} and motor power P_N & P_{NSQ}							
	Constant torque applications				Squared torque applications			
	Rated input current I_1/A	Rated output current I_N/A	Short term overload current ¹⁾ A	Max rated motor P_N/kW	Rated input current I_{1SQ}/A	Rated output current I_{NSQ}/A	Short term overload current ¹⁾ A	Max rated motor P_{NSQ}/kW
ACS501-005-5	4.7	6.2	9.3	3.0	6.2	7.5	8.3	4.0
ACS501-006-5	6.2	7.5	11.3	4.0	8.1	10.0	11.0	5.5
ACS501-009-5	8.1	10.0	15.0	5.5	11.0	13.2	14.5	7.5
ACS501-011-5	11.0	13.2	19.8	7.5	15.0	18.0	19.8	11.0
ACS501-016-5	15.0	18.0	27.0	11.0	21.0	24.0	26	15.0
ACS501-020-5	21.0	24.0	36.0	15.0	28.0	31.0	34	18.5
ACS501-025-5	28.0	31.0	46.5	18.5	35.0	39.0	43	22.0
ACS501-030-5	35.0	39.0	58.0	22.0	41.0	47.0	52	30.0
ACS501-041-5	41.0	47.0	70.5	30.0	55.0	58.0	64	37.0
ACS501-050-5	55.0	58.0	87.0	37.0	63.0	65.0	72	45.0
ACS501-060-5	63.0	65.0	97.5	45.0	81.0	84.0	93	55.0
ACS501-070-5	81.0	84.0	126	55.0	101	112	123	75.0

¹⁾ Allowed for one minute every ten minutes.

SAMI GS

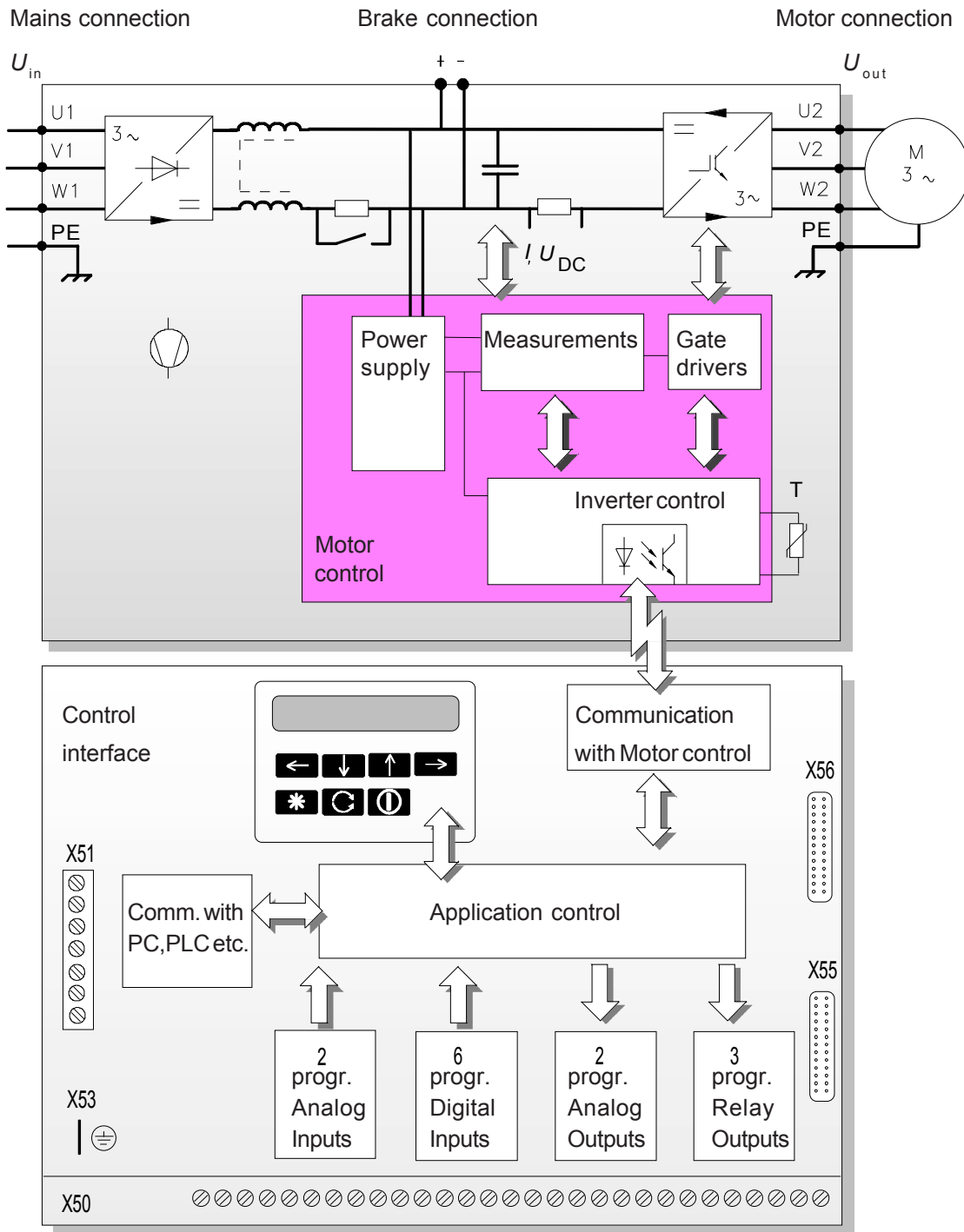


Figure 3-1. SAMI GS block scheme.

4 Mechanical Installation

SAMI GS is mounted on a wall in a vertical position using four fixing notches at the top and bottom of the unit. When choosing the mounting location pay attention to the cooling needs of the SAMI GS.

4.1 Cooling

SAMI GS frequency converters are provided with a cooling fan(s) on the bottom of the unit.

The ambient operating temperature for constant torque drives, when the load current is (I_N) and switching frequency $f_s = 3$ kHz, is 0 ... 45°C, except for ACS 501-006-3 and 009-5 0 ... 40°C. See fig. 4-2 output current derating curves.

The ambient operating temperature for squared torque drives, when the load current is (I_{NSQ}) and switching frequency $f_s = 3$ kHz, is 0 ... 40°C, except for ACS 501-006-3 and 009-5 0 ... 35°C. See fig. 4-2 output current derating curves.

The cooling air must be clean and free from corrosive materials. Where necessary the cooling air should be filtered.

If the cooling air contains dust, clean the cooling surfaces of the unit regularly using compressed air and a brush.

If the cooling ability is reduced too much, the thermal protection operates causing a fault indication and stopping the frequency converter. SAMI GS can be started again when the temperature of the cooling element has fallen below the tripping level^{*)} (+70 °C).

The temperature of the cooling element can be read from the control panel display (Operating Data, parameter 8, SAMI TEMPERATURE).

^{*)}for types ACS 501-050-3, 060-3, 060-5 and 070-5, the tripping level is +75°C.

Table 4-1. Required cooling air.

Type ACS 501-	[m ³ /h]
004-3...006-3, 005-5...009-5 009-3, 011-3, 011-5, 016-5 102 016-3, 020-3, 020-5, 025-5 406 025-3...060-3, 030-5...070-5	51 560

Figure 4-1. Power dissipation as a function of the switching frequency for different ACS 501 types. Output power in the following curves is P_{NSQ} .

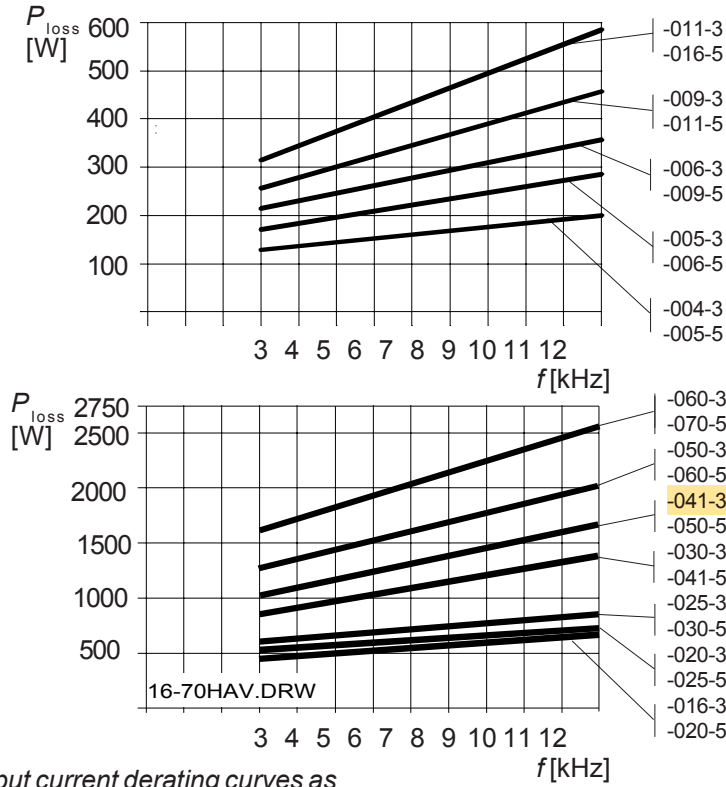
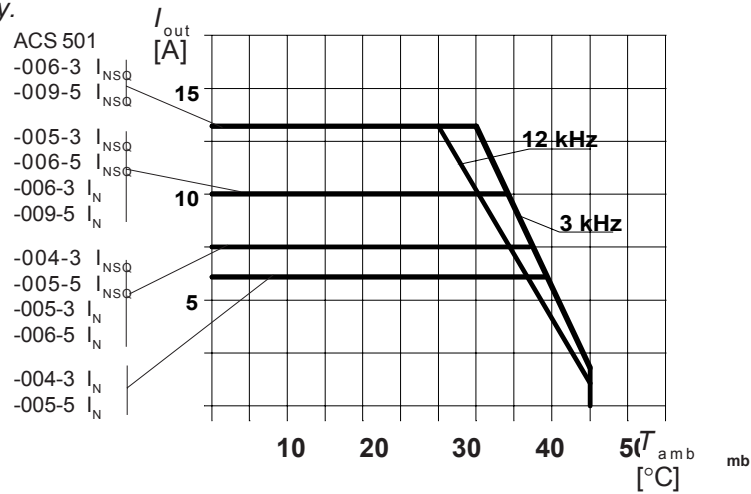
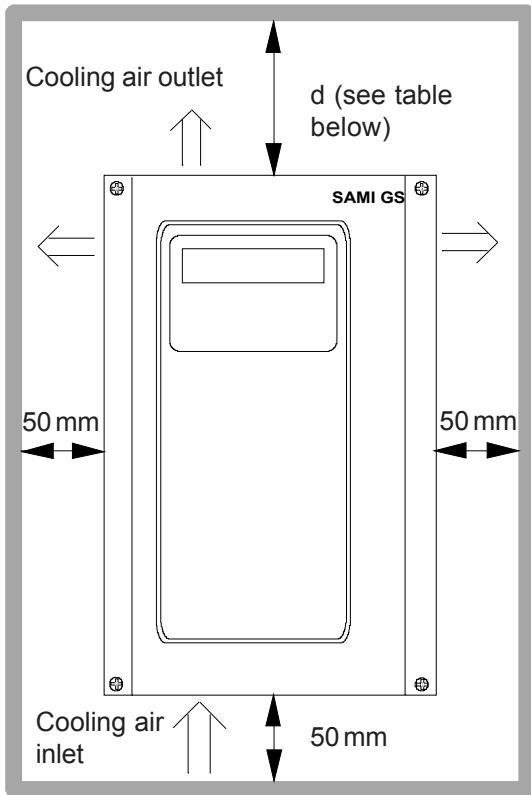


Figure 4-2. Output current derating curves as a function of ambient temperature and switching frequency.





4.2 Mounting

Note! Do not handle or lift the drive using the front cover. Use the bottom part for handling.

To ensure safe installation, check that the surface mounting is flat. Mark the fixing points of SAMI GS on the wall using the template printed on the protective cardboard package as a guide. The maximum size of the fixing screws is 6 mm (15/64") for ACS 501-004-3...006-3 and ACS 501-005-5...009-5 units and 8 mm (5/16") for 009-3...060-3 and 016-5...070-5 units.

Fix the screws to the marked positions.

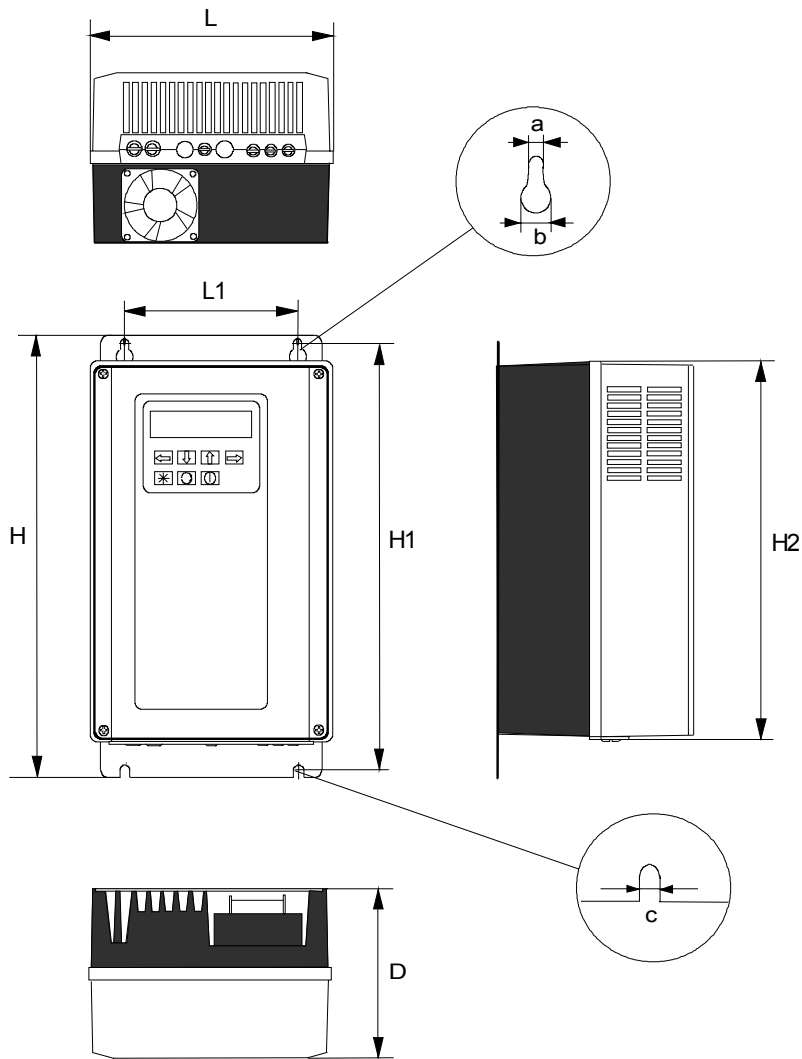
Attach the unit by the fixing notches and tighten the screws.

Note! If multiple units are installed adjacent or above each other, the following minimum distances apply:
 - units side by side, clearance 100 mm - units above each other, clearance 300 mm

Type	d/[mm]
ACS501-004...011-3	150
ACS501-005...016-5	150
ACS501-016...060-3	250
ACS501-020...070-5	250

Figure 4-3. Space requirement for adequate cooling.

SAMI GS



	ACS501-004...006-3	ACS501-009...011-3	ACS501-016...020-3	ACS501-025...041-3	ACS501-050,060-3
	005...009-5 (mm)	011...016-5 (mm)	020...025-5 (mm)	030...050-5 (mm)	060,070-5 (mm)
L	200	250	300	350	350
L1	150	175	225	275	275
H	362	425	507	603	603
H1	350	400	480	575	575
H2	312	380	460	551	551
D	188	208	249	262	307
a	7	9	9	9	9
b	14	18	18	18	18
c	7	9	9	9	9
Weight /kg	abt. 7.2	abt. 12	abt. 22	abt. 36	abt. 40

Figure 4-4. Dimensions of the SAMI GS unit. (Drawing presents 004...006-3)

5 Power Connections

5.1 Mains Cable

SAMI GS is rated for a 380 V/400 V/415 V or 440 V/460 V/480 V/500 V 3-phase system. A 4-conductor screened cable (three phase with Protective Earth) is recommended for the mains cabling. The cables and fuses are to be dimensioned in accordance with the output current. See Table 5-1 for minimum dimensions. When dimensioning cables, always pay attention to local authority regulations. **Note!** Remove all the compensation capacitors from the line side so that they are not powered up at the same time as the SAMI GS.

5.2 Motor Cable

A 4-conductor screened cable is recommended due to the rapid voltage changes

occurring in variable frequency motor drive systems.

To avoid disturbances

Install the motor cable away from other cable routes. Avoid long parallel runs with other cables (see page 20).

Disturbances caused by radiation from the motor cable can be reduced by mounting chokes in the motor cable. These chokes may reduce the motor voltage and the maximum. The rapid voltage changes cause capacitive current through the motor cable stray capacitances. This current rises as the switching frequency and cable length increase.

This phenomenon can cause substantially higher current measured by the SAMI GS than the actual motor current, and can cause overcurrent tripping. This means that when

Table 5-1. Mains & motor cables and fuse recommendations according to output current (I_N , I_{NSQ}).

Type ACS 501-	I_N (A)	Fuse (A)	Cu-cable (mm ²)	I_{NSQ} (A)	Fuse (A)	Cu-cable (mm ²)	Max. Cable (Cu or Al) (mm ²)
004-3/005-5	6.2	10	3*1.5+1.5	7.5	10	3*1.5+1.5	3*2.5+2.5
005-3/006-5	7.5	10	3*1.5+1.5	10.0	10	3*1.5+1.5	3*2.5+2.5
006-3/009-5	10.0	10	3*1.5+1.5	13.2	16	3*2.5+2.5	3*2.5+2.5
009-3/011-5	13.2	16	3*2.5+2.5	18.0	25	3*6.0+6.0	3*6.0+6.0
011-3/(016-5)	18.0	25	3*6.0+6.0	24.0 (26.0)	25	3*6.0+6.0	3*6.0+6.0
016-3/020-5	24.0	25	3*6.0+6.0	31.0	35	3*10+10	3*10+10
020-3/025-5	31.0	35	3*10+10	39.0	50	3*16+16	3*16+16
025-3/030-5	39.0	50	3*16+16	47.0	50	3*16+16	3*35+16
030-3/(041-5)	47.0	50	3*16+16	62.0 (58.0)	63	3*25+16	3*35+16
041-3/(050-5)	62.0 (58.0)	63	3*25+16	76.0 (65.0)	80	3*35+16	3*35+16
050-3/(060-5)	76.0 (65.0)	80	3*35+16	89.0 (84.0)	100	3*50+25	3*70+35
060-3/(070-5)	89.0 (84.0)	100	3*50+25	112	125	3*70+35	3*70+35

Table 5-2. Maximum recomm. length of the motor cable in accord. with switching frequency.

Switching frequency [kHz]	004...011-3/005...016-5			016-3...020-3/020...025-5			025-3...060-3/030-5...070-5	
	Screened cable [m]	Unscreened cable [m]		Screened cable [m]	Unscreened cable [m]		Screened cable [m]	Unscreened cable [m]
1	100	100	150	200	250		150	200
12	50	75		75	100		150	200

Connect the power cables in accordance with the following drawings. Attach the front part of the cable entry insulator with the screws (A) and attach the front cover of the unit by the four screws.

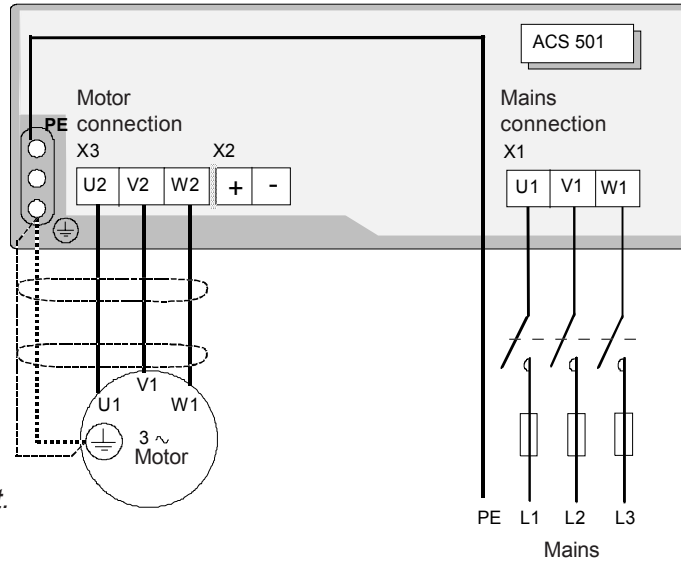


Figure 5-2. Standard Unit.

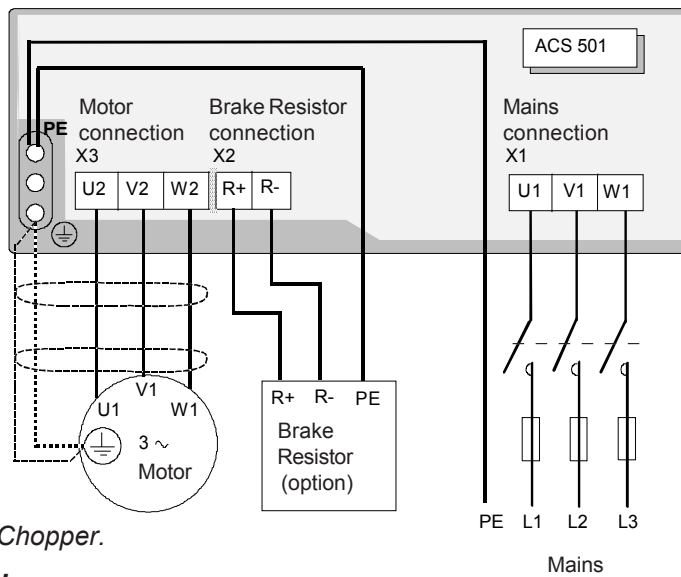


Figure 5-3.
Unit with internal Braking Chopper.



WARNING!

The brake control terminals carry a dangerous DC voltage (>500V). Only an ABB dynamic braking device should be connected to terminal X2.

Note! If the motor cable has a separate screen in addition to the earth wire, the screen is connected to the PE terminal at the frequency converter end and on the motor side.

6 Control Connections

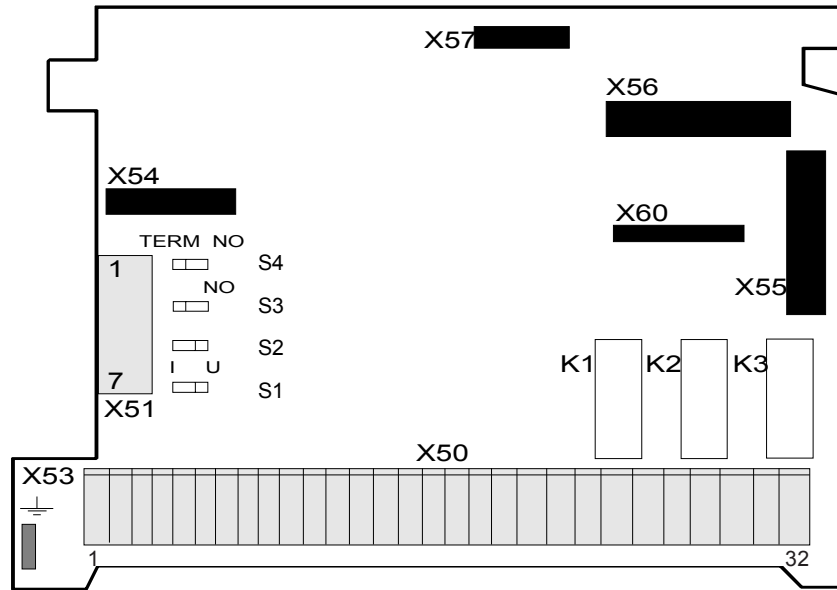


Figure 6-1. Control Interface Card SNAT 7640.

The Analogue Input signal selection is done with jumpers S1 (AI1) and S2 (AI2):
I = 0(4) - 20mA, V = 0(2) - 10V.

X50 = screw terminal, X53 = earthing connector, X54 = connection to Motor Control Card,
X55 and X56 = option card connectors.

X51 for RS 485 connection. Jumpers S3 and S4 are set to TERM in the last SAMI GS unit of a
RS 485 chain.

The available control places for SAMI GS are:

- Keypad (see Section 7, page 22)
- The X50 screw terminal on the Control Interface Card SNAT 7600/7640 in the Control Unit.
- The RS 485 serial communication bus; terminals X51 on Control Interface Card.

External control devices, for example a PLC or a remote control panel SACE 11 PAN, are connected to the screw terminal X50 according to the connection diagram of each Application Macro. The connection

diagrams for Application Macros are presented in the Application Macro Manual.

The X50 connection diagram based on factory settings is presented in Section 6.2 on page 21. The terminal functions can be altered by means of parameter settings (refer to Section 9).

Some basic functions are selected by setting the jumpers on the Control Interface Card. Refer to Figure 6-1.

The Control Interface Card is accessible after removing the front cover of the SAMI GS.

6.1 Control Cables

Control cables for the SAMI GS should be 0.5 - 1.0 mm² screened, multi-core cables.

The cable screens should be earthed at the PE of the frequency converter chassis.

When planning the cabling between the SAMI GS and an automation device, such as a PLC, attention should be given to interference suppression, signal levels, galvanic isolation, etc. These cables should be separated from the mains and motor cables and not running in parallel with them (minimum separation 300 mm if parallel run ≤ 10 m; add 300 mm for every 10 m). There should be no additional control components (contactors or relays) inside the SAMI GS and no control cables other than those of the SAMI GS.

The control connections of the SAMI GS are galvanically isolated from mains potential and have a 10 M Ω resistance from the inverter frame i.e. PE. Because of this, there is no need to connect X50/2,4,6 and 8 (logic GND) to TE or PE. However, it could prove useful to do this if EMC problems occur.

Analogue input and output signals:

A separate twisted pair must always be used for each individual signal.

Digital inputs:

It is strongly recommended to use screened cables for digital inputs (DI). An external +24V supply for the digital inputs (DI1 to DI6) must not be used.

Relay outputs:

If relay outputs (RO) operate on 24 V DC, the signals can be routed to the same cable used for the digital inputs. If twisted cables are used, digital output and input should never be in the same pair. If 110 V/230 V AC is connected to a relay output, a separate cable without screen can be used for these signals.

Note! If the relay outputs are used to control inductive loads (e.g. relays, contactors) they

must be protected by using varistors or RC units (AC) or a diode (DC). The protection components should be installed onto the coil of the relay or contactor being controlled and not on the terminals of X50. When using an RC unit, note that the leakage current of the RC circuit must be less than the holding current of the controlled contactor or relay.