11 Technical Data

Mains Connection

Voltage U_1:
3 phase, 380 V, 400 V and 415 V*)
3 phase, 440 V, 460 V, 480V and 500 V*)
3 phase, 575 V and 600 V*)
± 10% permitted tolerance

*) U_{1max} = 415 V; 500 V; 600 V

Frequency f_1: 48 ... 63 Hz

Power factor: for fundamental ≈0.98
total ≈0.95 at nominal point

Motor Connection

Output voltage U_2: 3~, 0 ... U_1 (U_{max} at field weakening point)

Output frequency f_2: 0 ... 120 Hz, 150 Hz

Frequency resolution: 0.01 Hz

Switching frequency: 3 kHz

Continuous output current:
Constant torque: SAMI GS rated I_N

Squared torque: SAMI GS rated I_{NSQ}

Overload capacity:

Constant torque: 1.5 * I_N,
for 1 min every 10 min

Squared torque: 1.1 * I_{NSQ},
for 1 min every 10 min

Starting duty: 2.0 * I_N (approx. 1.4 * I_{NSQ}) up to 20 Hz

Field weakening point: 30...180 Hz, adjustable

Acceleration time: 1.0 to 1800 s/120 Hz

Deceleration time: 1.0 to 1800 s/120 Hz

Environmental limits

Ambient operating temperature with I_N:

0 to +40 °C

Ambient operating temperature with I_{NSQ}:

0 to +40 °C, except
0 to +35 °C ACS 502 in IP 54 enclosure

Storage temperature: -40 to +70 °C

Cooling method: Internal fan

Corrosiveness of cooling air: up to G1 as specified in ISA-S71.04

Relative humidity: max. 95 %, no condensation allowed

Altitude: max. 1000 m above sea level (100 % load), 1 % derating every 100 m above 1000 m

External control connections

Two programmable Analogue Inputs:

Voltage reference: 0(2) ... 10 V, 200 kΩ
single ended

Current reference: 0(4) ... 20 mA, 250Ω
single ended

Potentiometer reference:
10 V -0/+1 %, 10 mA

Auxiliary voltage: +24 V DC, max. 200 mA

Six programmable Digital Inputs

Two programmable Analogue Outputs

0(4) ... 20 mA, 500Ω

Three programmable Relay Outputs

max. switching voltage 300 V DC/250 V AC

max. switching current: 8 A/24 V DC,
0.4 A/250 V DC

max. switching power 2000 VA/250 V AC

max. continuous current 2 A

Serial link bus:
RS 485, ACS 500 protocol, max. 31 ACS 500 series units. Auxiliary voltage supply for remote control panel SAGS 700 PAN.

Protections

Overcurrent trip limit: 3.75∗ I_N instantaneously

Current regulation limit:
0.5 to 2.0 ∗ I_N up to 37 Hz, above 1.5 ∗ I_N

Current switch-off limit:
3.75 ∗ I_N instantaneously

Overvoltage trip limit: 1.3 ∗ U_{1max}

Undervoltage trip limit: 0.65 ∗ U_N

Overtemperature limit: +85 °C heatsink

Undertemperature limit: -10 °C heatsink

Auxiliary voltage: short circuit protected

Microprocessor fault: protected

Motor stall protection

Motor overtemperature protection

Prevention of start at earth fault (earthed mains)

12 Options

For brief system description and list of possible built-in options, see sections 3.1 and 3.2 of this manual.

The following options are available:

Remote control box

SACE 11 BOX, SACE 12 BOX,
SACE 20 BOX, SACE 21 BOX

A remote control box is an external control device connected to the terminal block of the Control Interface Card or an Optional Control Card.

Remote control panel

SACE 11 PAN, SACE 12 PAN

A remote control panel is an external control device connected to the terminal block of the Control Interface Card or an Optional Control Card. The panel is mounted in the operator's control desk or cubicle.

Remote control panel SAGS 700 PAN

A remote control panel can be used to control a maximum of 31 SAMI GS frequency converters, individually or all together. The panel is connected on terminal X51 to RS 485 interface. In addition to Standard Control Panel functions, the panel also has additional features such as network control, up- and down-loading of parameters (e.g. between drives) and common drive control for all connected drives. The panel functions as a master controller for bus-connected drives, but it can be set to a HOLD state where it cannot send or receive messages.

For further information please refer to the User Manual EN 5805758-4.

Input/Output Extension Card SNAT

7520 IOE

SNAT 7520 IOE is an input/output extension card with three digital and two analogue inputs, two analogue and two relay outputs.

It can be used, for example, with PFC-Control when more than 3 motors are to be controlled. In general, it can be used in applications requiring galvanically isolated inputs and outputs.

For further information please refer to the Installation and Operation Guide EN 5805784-3.

Bus Adapter and Pulse Tachometer Interface Card SNAT 7610 BAC

SNAT 7610 BAC is a serial communication bus adapter and pulse tachometer interface card. In addition, SNAT 7610 BAC enables a speed control Application Macro to be used.

The tachometer interface includes three galvanically isolated tachometer signal channels.

The iSBX bus connector on this card enables connection of an optional ABB serial communication board (e.g. RS 232/20mA Comboard SNAT 7690).

For further information please refer to the Installation and Operation Guide EN 5805783-5.

12.1 Fuse Switches and Contactors

The fuse switch (Q1) and line contactor (K1) ratings are as follows:

ACS 502- ACS 503-	Fuse Load Switch Type Q1	Fuse Load Switch Current A (AC3)	Fuse Load Switch Voltage V	Contactor Type K1	Contactor Current A(AC3)	Contactor Voltage V
051-3-/061-5-	OESA 00-160	160	660	OKYM 63W22	135	1000
061-3-/071-5-	OESA 00-160	160	660	OKYM 63W22	135	1000
071-3-/100-5-	OESA 00-160	160	660	OKYM 110W22	200	1000
100-3-/120-5-	OESA 250 D3	250	660	OKYM 110W22	200	1000
120-3-/140-5-	OESA 250 D3	250	660	OKYM 175W22	400	1000
140-3-/170-5-	OESA 400 D3	400	660	OKYM 175W22	400	1000
170-3-/210-5-	OESA 400 D3	400	660	OKYM 175W22	400	1000
210-3-/260-5-	OESA 400 D3	400	660	OKYM 6W22	600	1000
260-3-/320-5-	OESA 630 D3	630	660	OKYM 6W22	600	1000

The fuse ratings are in Table 5-1. Auxiliary contactor (K2) rating is 25 A 660 V in all cases (Type OK 0W01).

12.2 Braking Choppers and Resistors

Effective motor braking and thus short acceleration times are achieved by using a dynamic braking device, which consists of a chopper and a resistor. The Chopper is built in to the Converter Module, and there is a separate name plate for it on the left side of the Converter Module. The Resistor is assembled outside the Converter Module.

The standard ratings for the chopper and resistor are as follows:

SAMI type ACS 50x	Chopper type ACS 50x	P_{max} kW	Resistor type SAFUR...	R ohm	E_R (pulse) MJ	P_R (cont.) kW
051-3-...	SAGS 201 BR	78	80F500	6.0	2.4	6.0
061-3-...	SAGS 201 BR	78	80F500	6.0	2.4	6.0
071-3-...	SAGS 300 BR	118	125F500	4.0	3.6	9.0
100-3-...	SAGS 400 BR	118	125F500	4.0	3.6	9.0
120-3-...	SAGS 400 BR	147	200F500	2.7	5.4	13.5
140-3-...	SAGS 400 BR	147	200F500	2.7	5.4	13.5
170-3-...	SAGS 400 BR	147	200F500	2.7	5.4	13.5
210-3-...	SAGS 400 BR	147	160F415	2.4	6.0	15
260-3-...	SAGS 500 BR	155	160F415	2.4	6.0	15
061-5-...	SAGS 201 BR	114	80F500	6.0	2.4	6.0
071-5-...	SAGS 201 BR	114	80F500	6.0	2.4	6.0
100-5-...	SAGS 300 BR	171	125F500	4.0	3.6	9.0
120-5-...	SAGS 400 BR	171	125F500	4.0	3.6	9.0
140-5-...	SAGS 400 BR	171	125F500	4.0	3.6	9.0
170-5-...	SAGS 400 BR	178	200F500	2.7	5.4	13.5
210-5-...	SAGS 400 BR	178	200F500	2.7	5.4	13.5
260-5-...	SAGS 400 BR	178	200F500	2.7	5.4	13.5
320-5-...	SAGS 500 BR	185	200F500	2.7	5.4	13.5

Definitions for symbols:

P_{max}	The maximum braking power of the braking chopper (optional).
Resistor type	Type designation of the standard resistor assembly.
R	Total resistance of the standard resistor assembly. **Note!** This is also the absolute minimum value of resistance allowed for the corresponding chopper.
E_R (pulse)	Maximum energy that the standard resistor assembly will withstand. This energy will heat the resistor element from 40 °C to the maximum allowed.
P_R (cont.)	The maximum average power dissipation of the standard resistor assembly. **Note!** If the energy E_R is dissipated once every 400 seconds, this rating will be fully utilised.

To increase the power rating of the resistor, four resistor assemblies should be used (two in series, two in parallel). However, it is not a standard solution and must be engineered separately.

When the chopper is active, the DC-link voltage varies in 400 V units between about 670 V and 700 V and in 500 V units between about 810 V and 845 V.

The switching frequency of the chopper varies between 0 Hz and about 500 Hz, depending on the actual braking power.

Note! The Chopper Control Card SNAT 7800 BRC inside the Converter Module has a fault relay output that is wired to the control circuit of the Rectifier bridge. Under a fault condition the trigger pulses for the rectifier thyristor will be terminated. The resistor (SAFUR...) has a thermal switch that is wired to trip the contactor in case of over-temperature.

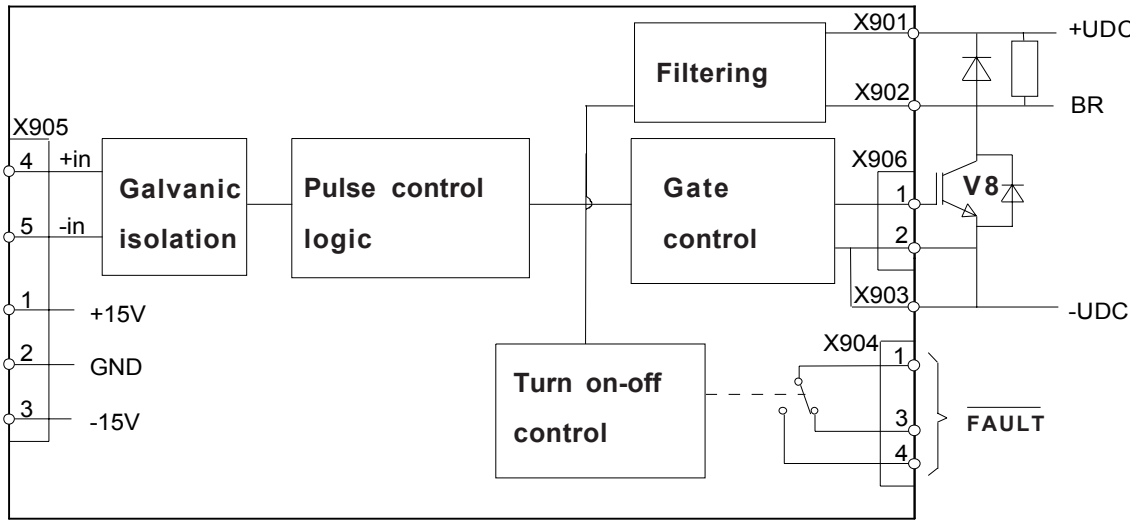


Figure 12-1 Chopper Control Card SNAT 7800 BRC.

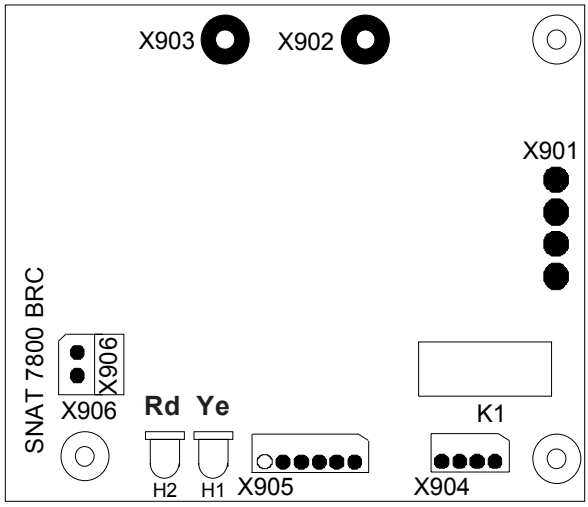


Figure 12-2 Layout SNAT 7800 BRC.

H1 = Yellow LED -> braking

H2 = Red LED -> fault

The reasons for the fault indication are:

U_{CE} (V8) > 15 V with on-pulse

U_{CE} (V8) < 15V with off-pulse

A fault on the brake chopper switches the input bridge off. This may lead to an undervoltage trip on the SAMI GS. The reasons for this fault condition may be:

1. Braking resistor is missing
2. IGBT is broken
3. IGBT does not get a gate pulse (check the cable between SNAT 7800 BRC and the IGBT).

12.3 Earth Fault Protection

The Earth Fault Protection Card SNAT 7670 EFS enables fault-current detection for both floating and earthed networks. The toroidal-core transformer T10 measures the currents at the inverter input (1000/5A).The connections for SNAT 7670 EFS are shown in Figure 12-3.

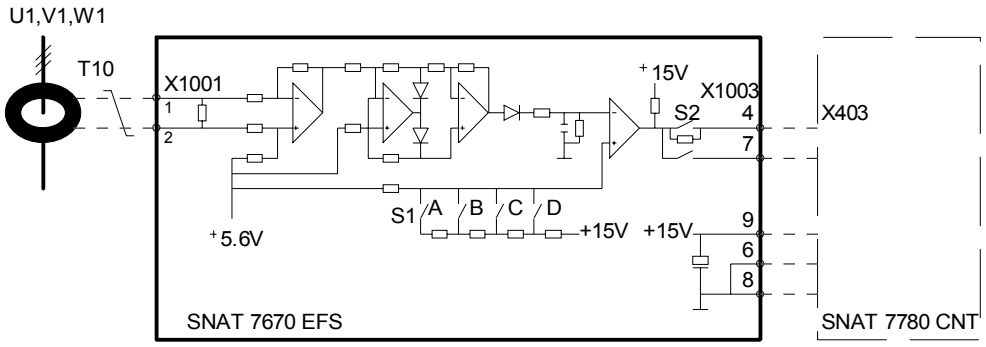
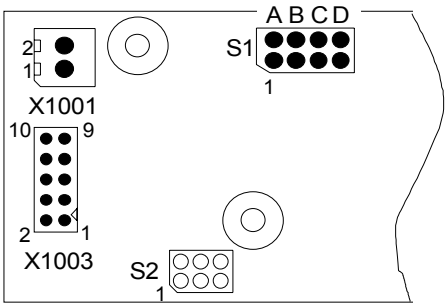


Figure 12-3. Connections of SNAT 7670 EFS.



The jumper switch S1 defines the response threshold of the system.
S1 = open: I1pp < 2.5 A most sensitive, not recommended position.
S1 = A: I1pp > 2.5 A
S1 = B: I1pp > 5.0 A
S1 = C: I1pp > 7.5 A
S1 = D: I1pp > 10.0 A

S2 not fitted/not used

Figure 12-4. Switch setting of SNAT 7670 EFS.

12.4 RFI Filter

The RFI filter, specially designed for the ACS 503 range, is connected to the SAMI GS input terminals to minimise radio frequency interference (conductive or radiative) to nearby equipment. By using the filter the conductive interference level is below EN 55011 (CISPR 11) and VDE 0875/curve G.

It is delivered in an additional 400 mm wide cabinet situated on the left hand side (600 mm for ACS 503-210...260-3, ACS 503-260...320-5).

12.5 ACS 506

ACS 506 is a SAMI GS frequency converter with a 12 pulse rectifier which reduces the harmonic distortion caused by the unit. ACS 506 is available as an IP 00 module including a rectifier module, a converter module and DC chokes. ACS 506 is available only in 400 V range and can be equipped with the same option cards as ACS 504.
For further information, contact ABB sales representative.

13 Glossary

Brake control

If the deceleration time (Group 21) is set very short and the motor load has high inertia, the DC bus voltage will rise too high causing an overvoltage trip during braking. If the deceleration time cannot be set longer, an optional brake control device (dynamic braking device) must be used.

DC bus

Intermediate DC link where the mains voltage is rectified and filtered. The nominal DC bus voltage corresponds to $1.35 * U_1$.

Default

Value provided for a parameter as a part of the program when the drive is initiated (= factory setting).

EEPROM

Electrically Erasable Programmable Read Only Memory. Memory that can be changed with an electrical signal, but retains the data when power is removed. The parameters and the control programs are stored in the EEPROM.

Field weakening point

Refer to page 60.

IR compensation

Refer to page 60.

Joystick control

Refer to page 41.

Living zero

Setting the minimum value of an Analogue Input to 4 mA (2 V) provides the operator with a "living zero" function. The existence of a control signal can then be supervised by setting the parameter 32.2 AI <2V/4mA FUNC to WARNING or FAULT, which causes a warning/fault indication when the input is less than 4 mA (2 V).

Memory

Place where data and instructions are stored for use by the program.

Parameter

A memory address that is used to store data for use by the program. The complete table of parameters is presented on pages 35-38.

Slip compensation

Refer to page 61.