

Digital Drive Controller, DDC

The standard control functions of the drive section are located in the Digital Drive Controller DDC. DDC uses the TC-link protocol and includes torque and speed control loops, internal start/stop logic, power stage, motor and cable protection, internal fault diagnostics, and trend logging.

Board id	Type Designation	Name of the Board
A1	SNAT 603 CNT	Motor Control Board
A1.1	SNAT 609 TAI	Tacho & I/O Interface
A2	SNAT 7261 INT	Main Circuit Interface (IGBT)
A2	SNAT 607 MCI	Main Circuit Interface (GTO)
A2.1	SNAT XXXV SCL (IGBT) SNAT XXXX-VB SCL (GTO)	Matching Board (where xxx=output power from the converter type code and v=voltage class)
A3	SAFT 11_ POW	Auxiliary Voltage Source (GTO)
A4...A6	SNAT xyz PTR	IGBT Protection Board (where xyz = output power from the converter type code) (IGBT)
A4...A6	SNAT 63_ PAC	Pulse Amplifier Board (GTO)
A7	SNAT 617 CHC	Chopper Control Board (GTO)
A8	SNAT 620 PCB	Parallel Connection Board for parallel inverters (GTO)
A9	SNAT 604 IFS	Inhibition of False Start Relay Board (IGBT)
A10	SNAT 602 TAC	Terminal Block Board

Following tables show which boards are included in each inverter.

IGBT Electronic Boards for 400V (380, 415V) Units										
Output Power→	9	16	25	50	70	100	150	215	270	330
Board↓										
SNAT 603 CNT	X	X	X	X	X	X	X	X	X	X
SNAT 609 TAI	X	X	X	X	X	X	X	X	X	X
SNAT 7261 INT	X	X	X	X	X	X	X	X	X	X
SNAT XXXV SCL	X	X	X	X	X	X	X	X	X	X
SNAT xyz PTR	X	X	X	X						
SNAT 604 IFS	X	X	X	X	X	X	X	X	X	X
SNAT 602 TAC	X	X	X	X	X	X	X	X	X	X

IGBT Electronic Boards for 500V (440, 460V) Units										
Power→	10	20	32	56	100	115	170	260	315	400
Board↓										
SNAT 603 CNT	X	X	X	X	X	X	X	X	X	X
SNAT 609 TAI	X	X	X	X	X	X	X	X	X	X
SNAT 7261 INT	X	X	X	X	X	X	X	X	X	X
SNAT xxxv SCL	X	X	X	X	X	X	X	X	X	X
SNAT xyz PTR	X	X	X	X						
SNAT 604 IFS	X	X	X	X	X	X	X	X	X	X
SNAT 602 TAC	X	X	X	X	X	X	X	X	X	X

GTO Electronic Boards for 400V (380, 415V) Units						
Output Power→	400	500	640	800	1210	1600
Board↓	R2	R3	R3	R4	2R3	2R4
SNAT 603 CNT	X	X	X	X	X M	X M
SNAT 609 TAI	X	X	X	X	X M	X M
SNAT 607 MCI	X	X	X	X	2X	2X
SNAT XXXX-VB SCL	X	X	X	X	2X	2X
SAFT 110 POW	X			X		2X
SAFT 111 POW		X	X	X	2X	2X
SNAT 632 PAC	3X					
SNAT 633 PAC		3X	3X		6X	
SNAT 634 PACC				3X		6X
SNAT 617 CHC	X	X	X	X	2X	2X
SNAT 620 PCB					XM	XM
SNAT 602 TAC	X	X	X	X	XM	XM

2X = 2 pc XM = 1 pc in Master

GTO Electronic Boards for 500V (440, 460V) Units						
Output Power→	500	630	790	1000	1510	2000
Board↓	R2	R3	R3	R4	2R3	2R4
SNAT 603 CNT	X	X	X	X	X M	X M
SNAT 609 TAI	X	X	X	X	X M	X M
SNAT 607 MCI	X	X	X	X	2X	2X
SNAT XXXX-VB SCL	X	X	X	X	2X	2X
SAFT 110 POW	X			X		2X
SAFT 111 POW		X	X	X	2X	2X
SNAT 632 PAC	3X					
SNAT 633 PAC		3X	3X		6X	
SNAT 634 PACC				3X		6X
SNAT 617 CHC	X	X	X	X	2X	2X
SNAT 620 PCB					XM	XM
SNAT 602 TAC	X	X	X	X	XM	XM

2X = 2 pc XM = 1 pc in Master

GTO Electronic Boards for 690V (575, 660V) Units													
Output Power→	40	100	160	260	315	420	500	630	800	1040	1370	2000	2500
Board↓	RG1	RG1	RG1	RG1	RG1	RG1	RG2	RG2	RG3	RG3	RG4	2RG3	2RG4
SNAT 603 CNT	X	X	X	X	X	X	X	X	X	X	X	XM	XM
SNAT 609 TAI	X	X	X	X	X	X	X	X	X	X	X	XM	XM
SNAT 607 MCI	X	X	X	X	X	X	X	X	X	X	X	2X	2X
SNAT XXXX-VB SCL	X	X	X	X	X	X	X	X	X	X	X	2X	2X
SAFT 112 POW	X	X	X	X	X	X	X	X			X		2X
SAFT 113 POW									X	X	X	2X	2X
SNAT 630 PAC	3X	3X	3X	3X									
SNAT 631 PAC					3X	3X							
SNAT 632 PAC							3X	3X					
SNAT 633 PAC									3X	3X		6X	
SNAT 634 PACC											3X		6X
SNAT 617 CHC	X	X	X	X	X	X	X	X	X	X	X	2X	2X
SNAT 620 PCB												XM	XM
SNAT 602 TAC	X	X	X	X	X	X	X	X	X	X	X	XM	XM

2X = 2 pc XM = 1 pc in Master

The control program of the ACV 700 is stored in two EPROM memory circuits and the control parameters are stored in one EEPROM memory circuit. The circuits are mounted on the SNAT 603 CNT Motor Control Board. The structure of the drive's control section is as follows:

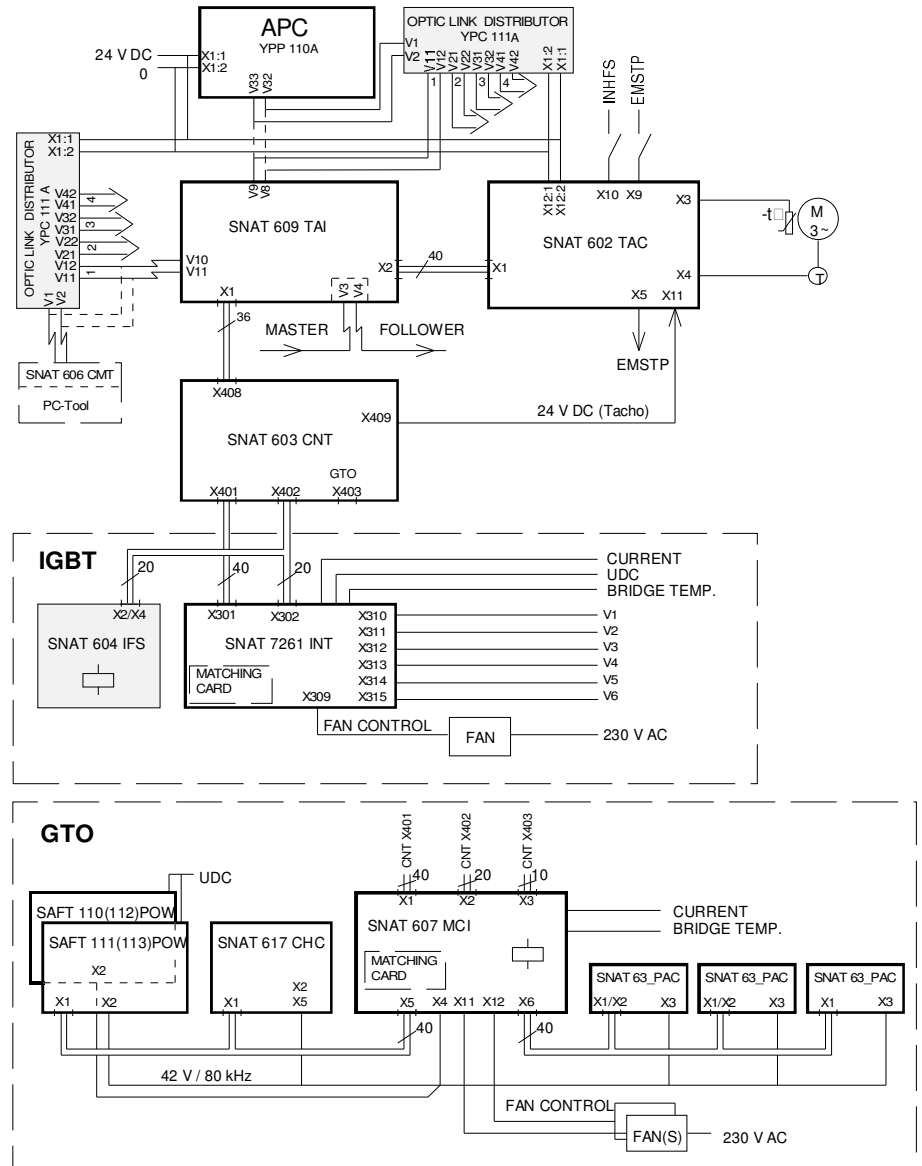


Figure 2 - 15 Drive system control boards (61038361.drw).

**Motor Control Board
SNAT 603 CNT**

Motor Control Board SNAT 603 CNT contains the DDC program and is stored in two EPROM circuits. Both vector and scalar controls are included in the DDC program. The parameters are stored in one EEPROM circuit. The board is used for both IGBT and GTO

inverters. The board is connected to the TAI-board with a 64-pole flat cable.

When used with an IGBT power stage inverter, it is also connected to SNAT 7261 INT with 20-pole and 40-pole flat cables. When used with a GTO power stage inverter, it is also connected to SNAT 607 MCI with 10-pole, 20-pole and 40-pole flat cables.

Tacho & I/O Interface SNAT 609 TAI

This board includes the I/O-circuits for SNAT 603 CNT. The I/O-signals are led to SNAT 603 CNT with a 36-pole flat cable. Field I/O-signals and tachometer signals are connected to SNAT 602 TAC and then led to SNAT 609 TAI with a 40-pole flat cable.

Connection to the APC is through a fibre optic link.

Jumper settings:

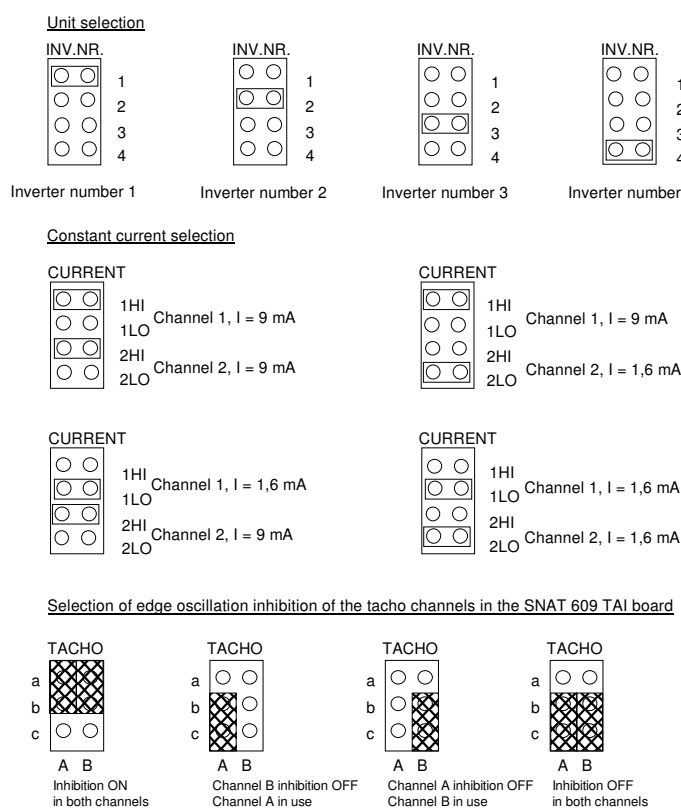


Figure 2 - 16 *Jumper settings for the SNAT 609 TAI.
(601jump.drw).*

Main Circuit Interface SNAT 7261 INT (IGBT)

The board is a main circuit interface for IGBT power stage inverters. The board includes the following functions: IGBT drives, power supply, fan control, current and voltage measurement, matching and motor control and connections, temperature measurement and fault detection.

Connection to Motor Control SNAT 603 CNT with a 40-pole ribbon cable. Connection to Inhibition of False Start SNAT 604 IFS with a 20-pole ribbon cable. Connections to IGBT Protection Boards SNAT XYZ PTR (XYZ=output power of the inverter unit) with 2-pole cables or connection to the protection circuits of the IGBTs with two- or three-pole cables.

**Main Circuit
Interface SNAT
607 MCI (GTO)**

The board is a main circuit interface for GTO-power stage inverters. The board includes the following functions: 42 V at 80 Hz output for the pulse amplifiers, fan control, current and voltage measurement, matching and motor control and connections, temperature measurement, fault detection and prevention of unexpected start-up.

Connection to Motor Control board SNAT 603 CNT with a 40-pole ribbon cable, 20-pole ribbon cable and with a 10-pole ribbon cable. Connections to Chopper SAFT 125 CHC or SNAT 617 CHC and Auxiliary Voltage Source SAFT 11_ POW with a 40-pole ribbon cable. Connections to Pulse Amplifiers SNAT 63_ PAC with a 40-pole ribbon cable.

**Matching Board
SNAT xyzv SCL**

Functions:

- Voltage scaling for the converter type coding.
- Current scaling for the converter type coding and for motor control board.
- Inverter type coding for voltage and current measurement information for the motor control board.

Connected to and mounted on the Main Circuit Interface SNAT 7261 INT or SNAT 607 MCI.

Type designation:

- Each converter size has its own matching board type where xyz is the output power from the converter type code and v is the voltage class (i.e. 400 V is 3 and 500 V is 5).

**Auxiliary Power
Board
SAFT 11_ POW
(GTO)**

For GTO power stage inverters.

Functions:

- The power is supplied to the board from the intermediate DC circuit through the main circuit interface board.
- The power supply board supplies stabilised and filtered ± 14 V, +5 V to the main circuit interface board and 42 V, 80 kHz for the pulse amplifiers.
- The board is at the main circuit potential.

Connection to the Main Circuit Interface SNAT 607 MCI.

- Protection Board
SNAT xyz PTR
(IGBT)** For IGBT-power stage inverters to protect the IGBTs.
- Connections:
- Connection to SNAT 7261 INT.
 - Connection onto the IGBT module.
- Pulse Amplifier
Board
SNAT 63_ PAC
(GTO)** For GTO-power stage inverters.
- The pulse amplifier board (one board per phase) gives the turn-on and turn-off pulses to the GTOs in the order determined by the main circuit interface board.
 - Connection to the Main Circuit Interface Board, SNAT 607 MCI with a 40-pole ribbon cable.
- Chopper Control
Board
SNAT 617 CHC
(GTO)** For GTO-power stage inverters.
- The board contains the control/supervision logic of the GTO in the chopper.
- Connection to the Main Circuit Interface Board SNAT 607 MCI and to the Power Supply Board SAFT 11_ POW with a 40-pole ribbon cable. The board is used to match two parallel connected GTO power stage inverters to each other.
- Parallel
Connection
Board
SNAT 620 PCB
(GTO)**
- Inhibition of
False Start Relay
Board SNAT 604
IFS (IGBT)** The board is used for relay secured inhibition of false start for IGBT-power stage inverters.
- Connection to the Motor Control Board SNAT 603 CNT and Main Circuit Interface Board SNAT 7261 INT with a 20-pole ribbon cable.
- TAI-Terminal
Block Board
SNAT 602 TAC** The board is used for connecting the field I/O-signals to the Tacho & I/O board.
- If the SNAT 602 TAC should be connected to the APC, see Chapter "**APC Terminal Block Board, SNAT 602 TAC**".
- Connection to the Tacho & I/O Interface Board SNAT 609 TAI with a 40-pole ribbon cable.
 - Connection to the Inhibition of False Start Board SNAT 604 IFS (IGBT power stage).
 - Connection to Motor Control Board SNAT 603 CNT.

External Connections	Function
3 digital inputs	Isolated inputs, control voltage 220 VAC/110 VAC/24 VDC. +24 VDC/20 mA control voltage outlets.

3 digital outputs	Programmable relay outputs, change-over contacts. Max. voltage 250 VAC, max. current 8 A at 250 VAC.
2 analogue inputs	Input ranges -10 to +10 V, 0 to 20 mA (0 to +2 V, 0 to + 10 V and 4 to 20 mA by software scaling). Input impedance 800 k Ω . Constant current sources 1.6 mA and 9.1 mA for Pt100 or PTC. Resolution 12 bits, accuracy ± 1.0 %.
2 analogue outputs	Output ranges -10 ... +10 V, 0 ... 20 mA. Resolution 8 bits.
1 pulse encoder input	Differential or single ended tachometers. (+ 5 V / + 12 V / + 24 V). 3 channels A, B and Z. +12 V and +24 V control voltage outlets.
1 emergency stop input	220 VAC/ 110 VAC/ 24 VDC. +24 VDC/ 20 mA control voltage outlet. Linking to other groups.
1 emergency stop output	Relay output, change-over contacts. Max. voltage 250 VAC, max. current 8 A at 250 VAC.
1 inhibition of false start input	220 VAC. Linking to other groups.
1 inhibition of false start output	Relay output 1 A for 220 VAC signal lamp. Linking to other groups.