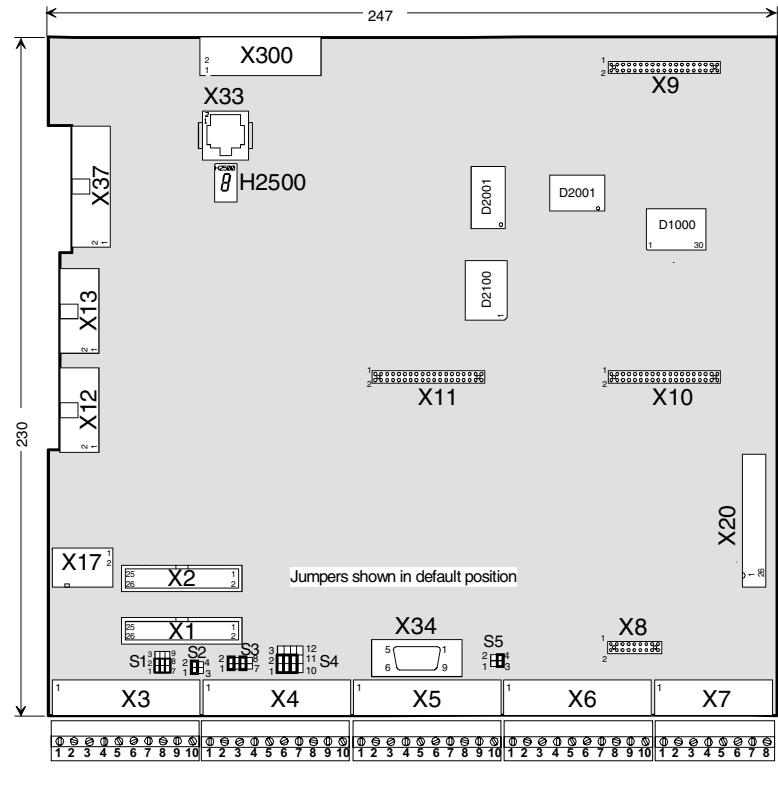


Control Board SDCS-CON-4

Layout of the control board SDCS-CON-4



Memory circuit

SDCS-CON-4 board is equipped with FlashPROM which contains the firmware plus the stored parameters. Parameters handled by DCS800 panel or DWL, PCtool or by Serial communication parameter service are stored immediately in the FlashPROM.

Parameters handled by cyclic serial communication (dataset table Group 90 - 92) are not stored in the Flash PROM. They must be stored by means of ParApplSave (16.6) service.

The faultlogger entries are stored in the FlashPROM during power down (auxiliary power supply OFF).

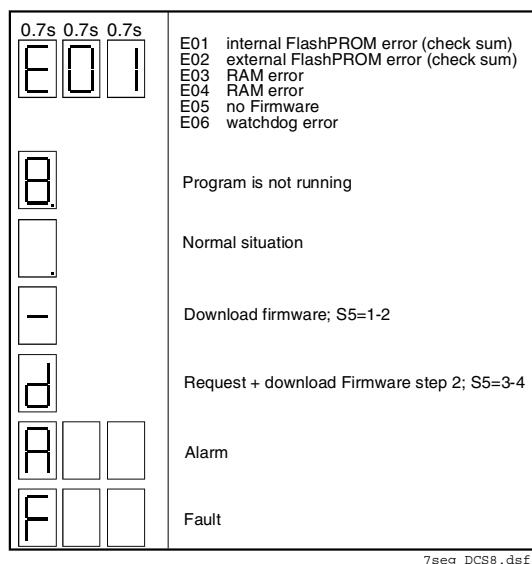
Watchdog function

The control board has an internal watchdog. The watchdog controls the running of the control board program. If the watchdog trips, it has the following effects:

- Writing to FPROM is disabled.
- Thyristor firing control is reset and disabled.
- Digital outputs are forced low.
- Programmable analogue outputs are reset to zero, 0V.

Seven segment display

A seven segment display is located on the control board SDCS-CON-4 and it shows the state of drive.



7seg_DCS8.ds1

Terminal description

X37: Connector is used for supply of SDCS-CON-4 from SDCS-POW-1, SDCS-POW-4, SDCS-PIN-4 supply voltage can be measured to ground.

X37:3= 48V

X37:5=24V

X37:7=15V

X37:11=-15V

X37:13=5V encoder

X37:23=5V CPU

Supply voltage monitoring

5V CPU is monitored by 4.75 V and forces CPU to reset. In parallel the CPU monitors Powerfail signal from power supply (SDCS-PIN-4 or SDCS-POW-1).

X12: and **X13:** connector are used for measurement voltage, current and temperature and firing thyristors of SDCS-PIN-51/PIN-41, SDCS-PIN-4.

see chapter *Technical data*

X17: and **X300:** are routine test connectors.

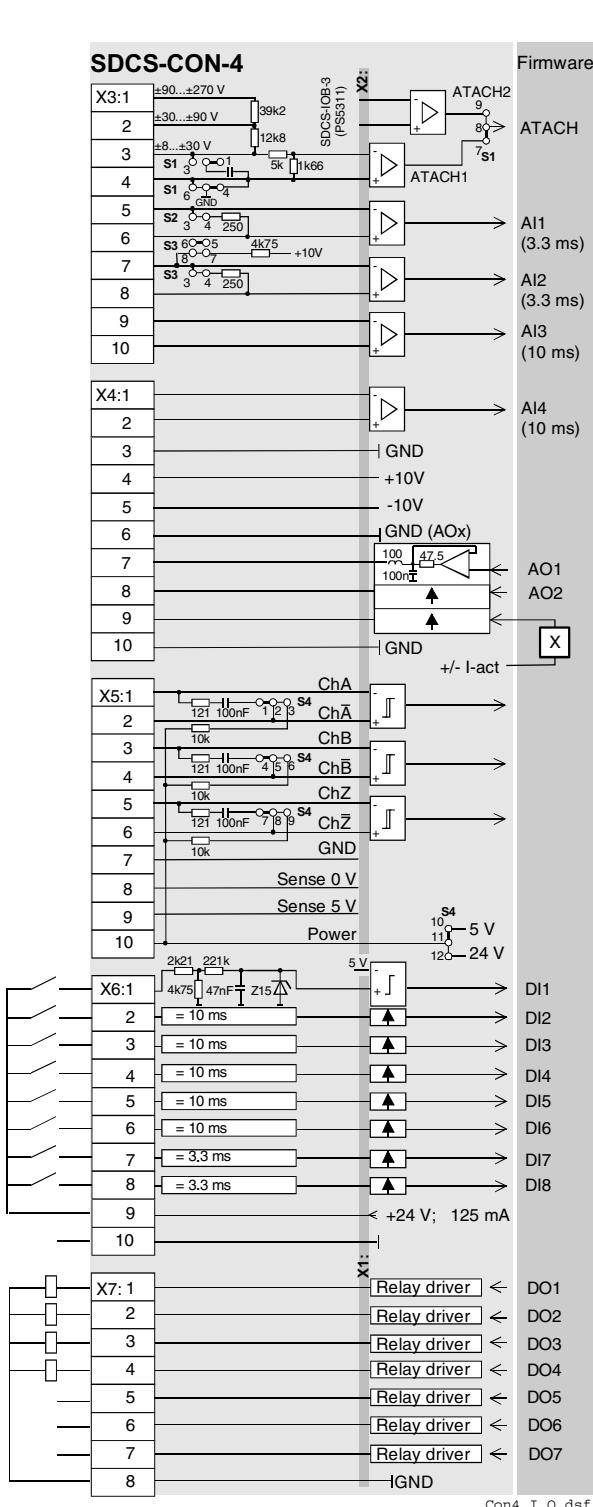
X1: and **X2:** are used to connect SDCS-IOB-2 and SDCS-IOB-3 board.

see chapter *Technical data*

X33: is used to connect DCS800 Panel. It can be connected direct via 40 mm jack or via CAT 1:1 cable (RJ45).

X34: is used for download firmware and for DWL and IEC1131 programming connection.

Digital and analogue I/O connection of the SDCS-CON-4



Resolution [bit]	Input/output values Hardware	Scaling by	Common mode range	Remarks
15 + sign	$\pm 90 \dots 270$ V $\pm 30 \dots 90$ V $\pm 8 \dots 30$ V	Firmware	± 15 V	
15 + sign	-10...0...+10 V	Firmware	± 15 V	
15 + sign	-10...0...+10 V	Firmware	± 15 V	
15 + sign	-10...0...+10 V	Firmware	± 15 V	
15 + sign	-10...0...+10 V	Firmware	± 15 V	

		Power	
	+10 V	≤ 5 mA	for ext. use
	-10 V	≤ 5 mA	e.g. refer. pot.
11 + sign	-10...0...+10 V	Firmware	≤ 5 mA
11 + sign	-10...0...+10 V	Firmware	≤ 5 mA
	-10...0...+10 V	Firmware	≤ 5 mA
	+ Hardw.		3 V -> nom. ?? motor curr.

Encoder supply	Remarks
5 V 24 V	Inputs not isolated Impedance = 120Ω , if selected max. frequency ≤ 300 kHz ≤ 250 mA ≤ 200 mA

Input value	Signal definition by	Remarks
0...7.3 V 7.5...50 V	Firmware	-> "0" status -> "1" status

Output value	Signal definition by	Remarks
50 * mA 22 V at no load	Firmware	Current limit for all 7 outputs = 160 mA Do not apply any reverse voltages!

* short circuit protected ① gain can be varied in 15 steps between 1 and 4 by software parameter

Digital I/O board SDCS-IOB-2

As described at the beginning of the chapter, there are various options for configuring the inputs/outputs.

The board IOB-2x has 8 digital inputs and 8 digital outputs.

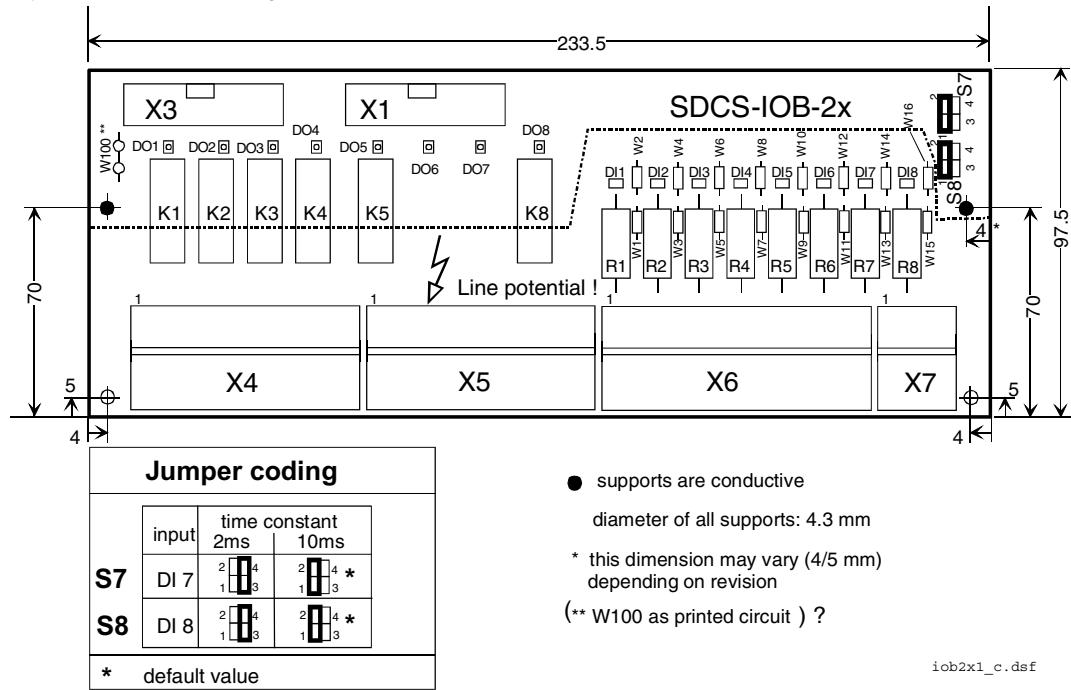
There are three different types existing, which differ at the input voltage level:

SDCS-IOB-21 24...48V DC
SDCS-IOB-22 115 V AC
SDCS-IOB-23 230 V AC

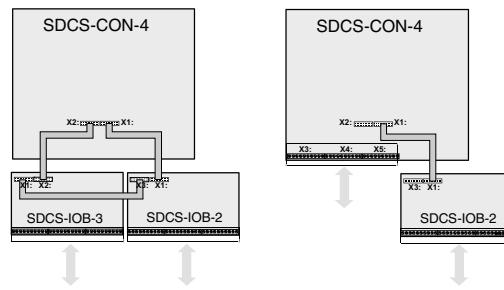
The inputs are filtered and galvanically isolated by using optocouplers. Inputs can form two galvanically separated groups by using either X7:1 or X7:2.

If these boards are in use, they have to be mounted outside the DCS module. They must be mounted in a way, that the conductive supports have a good connection to ground of the installation.

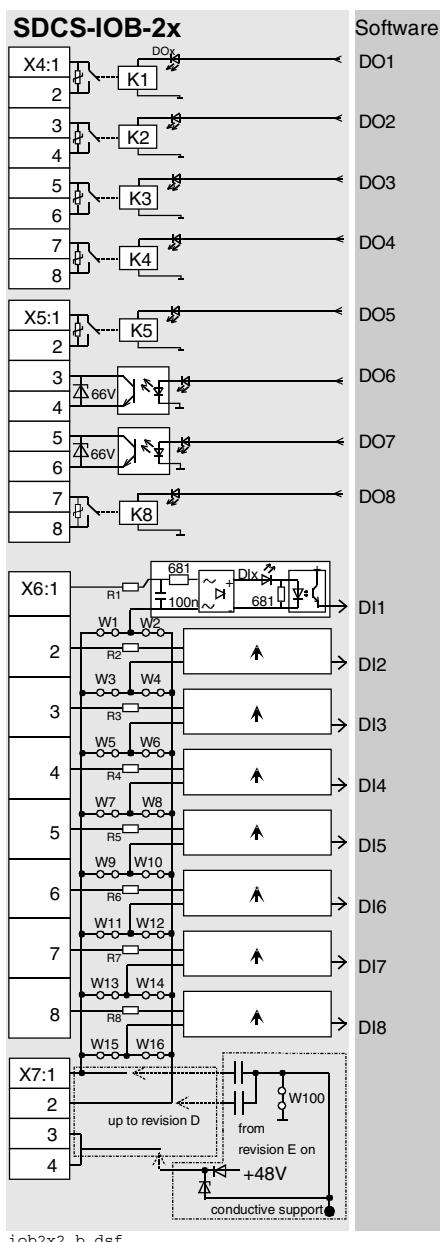
Layout and jumper settings of the SDCS-IOB-2x board



I/O via SDCS-IOB-2x / IOB-3 and SDCS-CON-4



The cable length between X1:/X1: and X2:/X2: is max. 1.7 m and between X1:/X3: is max. 0.5 m because of EMC reasons.



iob2x2_b.ds1

Note:

When the SDCS-CON-4 control board with the SDCS-IOB-2 I/O board is installed, terminals X6: and X7: on the SDCS-CON-4 must not be used.

Output value	Signal definition by	Remarks
K1..K5, K8	Firmware	<p>potential-isolated by relays (NO contact element) Contact ratings: AC: $\leq 250 \text{ V}/\leq 3 \text{ A}/$ DC: $\leq 24 \text{ V}/\leq 3 \text{ A}-$ or $\leq 115/230 \text{ V}/\leq 0.3 \text{ A}-$ MOV-protected (275 V)</p>
K6, K7	Firmware	<p>potential-isolated by optocoupler Switching capacity: $\leq 50 \text{ mA}$ external voltage: $\leq 24 \text{ V}$</p>

X4:; X5: are screw-clamp terminal types for leads up to 4 mm² cross-sectional area.

Default values are shown within the software diagrams.

The ground potential of the digital outputs may vary within $\pm 100 \text{ V}$ to each other.

Input value	Signal definition by	Remarks
Channel	Firmware	potential-isolated by optocoupler
1...8		(24...48V-)
IOB-21		$R1...R8 = 4.7 \text{ k}\Omega$
0...8 V		-> "0 signal"
18...60 V		-> "1 signal"
IOB-22		(115V-)
0...20 V		$R1...R8 = 22 \text{ k}\Omega$
60...130 V		-> "0 signal"
IOB-23		-> "1 signal"
0...40 V		(230 V~)
90...250 V		$R1...R8 = 47 \text{ k}\Omega$
		-> "0 signal"
		-> "1 sig."
		including tolerance; absolute max. values

X6: / X7: are screw-clamp terminal types for leads up to 4 mm² cross-sectional area

Input resistance: see diagram.

Input smoothing time constant: see diagram.

Smoothing time constant of channel 7 and 8 can be changed; see fig. before.

Power supply for digital inputs: 48V / $\leq 50\text{mA}$; not galv. isolated from the DCS electronics!

If the inputs are supplied from the internal +48 V (X7:3 and/or X7:4) a connection must be done from either X7:1 and/or X7:2 to ground of the DCS 500 module. In default condition ground is identical to the converter's frame.

If the inputs are supplied by any external source (+48 V DC, 115 V AC or 230 V AC) the neutral line / - line must be connected to either X7:1 or X7:2. If the inputs should be controlled with the same voltage level, but from two different voltage sources, having probably two different ground levels, the first neutral line should be connected to X7:1 and the second to X7:2. In this case the jumpers Wx connecting the inputs to X7:2, but controlled by the source, connected to X7:1, must be cut off.

The same method is needed for the other jumpers Wx.

High frequency grounding is done by 100 nF capacitor.

Analogue and encoder I/O board SDCS-IOB-3

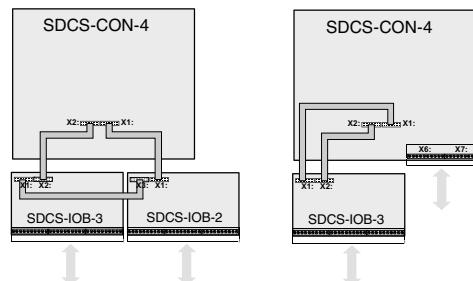
As described at the beginning of the chapter, there are various options for configuring the inputs/outputs.

The board SDCS-IOB-3 consists of the 5 analogue inputs, 3 analogue outputs, the galvanically isolated pulse encoder interface and a current source for temperature measuring devices.

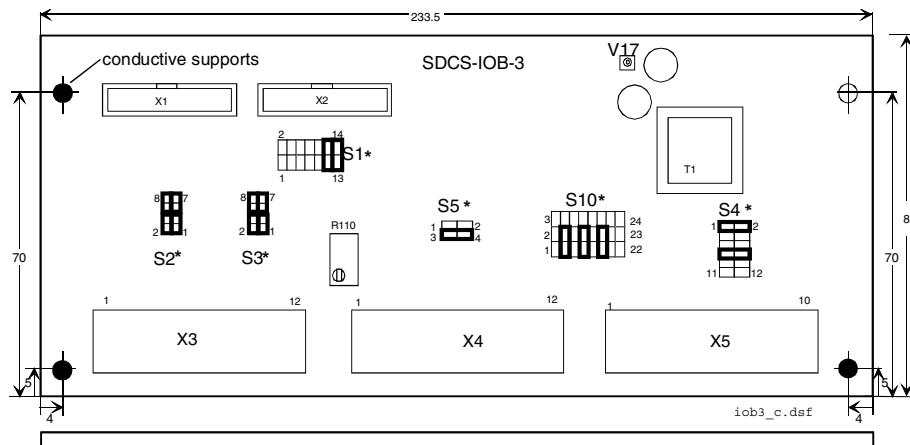
If these boards are in use, they have to be mounted outside the DCS module. They must be mounted in a way, that the conductive supports have a good connection to ground of the installation.

The cable length between X1:/X1: and X2:/X2: is max. 1.7 m and between X1:/X3: is max. 0.5 m because of EMC reasons.

I/O via SDCS-IOB-2x / IOB-3 and SDCS-CON-4



Layout and jumper settings of the SDCS-IOB-3x board

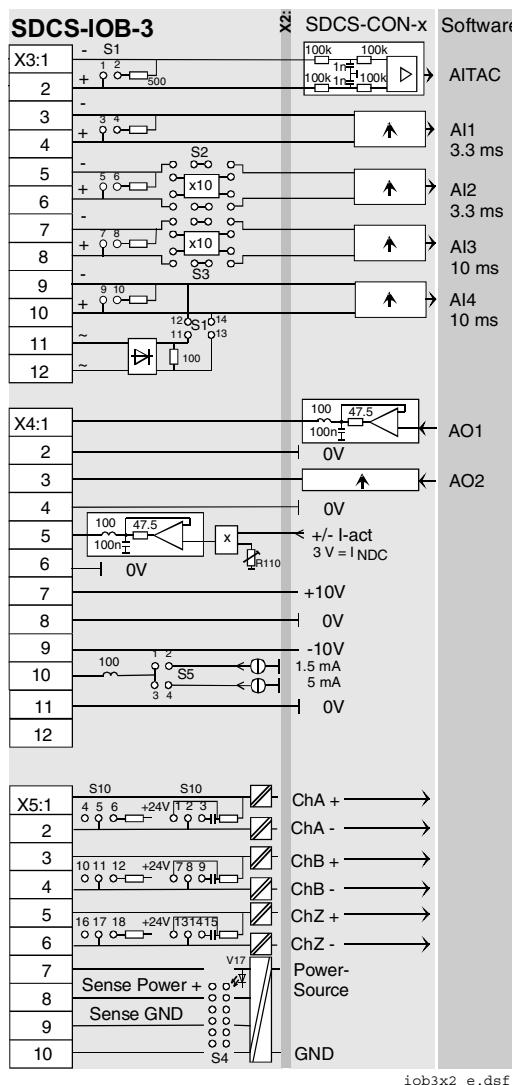


Jumper coding					
Functionality of analogue inputs					
S1 Ch activation of 500 between input terminal S2 AITAC S1:1-2 YES S3 AI1 S1:3-4 YES S4 AI2 S1:5-6 S5 AI3 S1:7-8 S6 AI4 S1:9-10 YES					
S10 Characteristics for pulse encoder inputs single ended: 5 V * 12/24 V differential: 5 V 12/24 V * 13 mA 					
S4 Pulse encoder supply S5 Temperature sensor supply PTC 1.5 mA PT100 5 mA * 					
* default value					

Note:

When the SDCS-CON-4 control board with the SDCS-IOB-3 I/O board is installed, analogue tacho input at SDCS-CON-4 should be used:

Terminals X3:, X4: and X5: on the SDCS-CON-4 must not be used.



Resolution [bit]	Input/output values Hardware	Scaling by	Com- mon mode range	Remarks
15 + sign	-10...0...+10 V	Firmware	±20 V	①②③⑥
15 + sign	-10...0...+10 V	Firmware	±20 V	①②③
15 + sign	-10...0...+10 V	Firmware	±40 V	①②③④⑤
15 + sign	-10...0...+10 V	Firmware	±40 V	①②③④⑤
15 + sign	-10...0...+10 V	Firmware	±40 V	①②③

11 + sign	-10...0...+10 V	Firmware	Power ≤ 5 mA*	
11 + sign	-10...0...+10 V	Firmware	≤ 5 mA*	
analogue	-10...0...+10 V	R110	≤ 5 mA*	gain: 0.5...5
	$R_i = 3 \Omega$		≤ 5 mA*	for external use e.g. reference pot.
	1.5 mA		5 mA	Curr. source for PTC or PT100

Encoder supply	Remarks
	Inputs not isolated Impedance = 120 Ω, if selected max. frequency ≤ 300 kHz
5 V 12 V / 24 V	≤ 250 mA * ≤ 200 mA * Sense lines for GND and supply to correct voltage drops on cable (only if 5V/12V enc. is in use)

- ① total smoothing time ≤ 2 ms
- ② -20...0...+20 mA by setting S1
- ③ 4...20 mA by ② + Software function
- ④ -1...0...-1 V by setting S2/S3 (CMR ±10 V)
- ⑤ -2...0...-2 mA by setting S2/S3 + S1 (CMR ±10 V)
- ⑥ designated for PT100 evaluation per firmware and hardware
- ⑦ If the input is used for tacho feedback and the tacho voltage needs to be scaled, the board PS5311 must be ordered separate. If this input is used for feedback signals, there is a need for additional margin for overshoot measurement. This margin is set by software and results e.g. in the 8 to 33 volts at PS5311.

* short circuit proof

⑦ **Residual current detection** is selected as default. The jumpers S1:11-12 and S1:13-14 are set, inputs X3:9 and X3:10 and jumper S1:9-10 must not be used and inputs X3:11 and X3:12 serve as input for the current signal taken from a diode bridge to 100 W resistor. Voltage will appear across the resistor, if the sum of the 3-phase current is not zero. In case AI4 should be used for a different purpose, use the inputs/jumpers accordingly and take the block diagram as a help.

Restrictions using jumper S1, S2 or S3:

The selection for the burden resistor across the input terminals can be done independent from S2 or S3 settings for inputs AI1AC, AI1, AI2, AI3 and AI4. If the gain is set to 10 by using S2 or S3 and the 500 W burden resistor is activated, the input signal level is changed to -2 mA...0...+2 mA.

For input AI4 there are the following configurations available:

- input range "20mA", or
- input range "10V", or
- earth fault monitoring if I_{sum} not equal to zero via X3:11 and X3:12

Technical data

Power Supply Board SDCS-POW-4

The SDCS-POW-4 board is designed for DCS800 converter modules D5...D7 and is mounted on the electronic support. This board is used for all types of modules independent from current or voltage range.

The SDCS-POW-4 works on a switched mode basis in fly back configuration. It generates all necessary DC voltages for the SDCS-CON-4 and all other electronic boards. The input voltage automatically is detected either to 230 V AC or to 115 V AC. The following figure shows the instructions for the selection of the AC input voltage and for the selection of the encoder supply voltage.