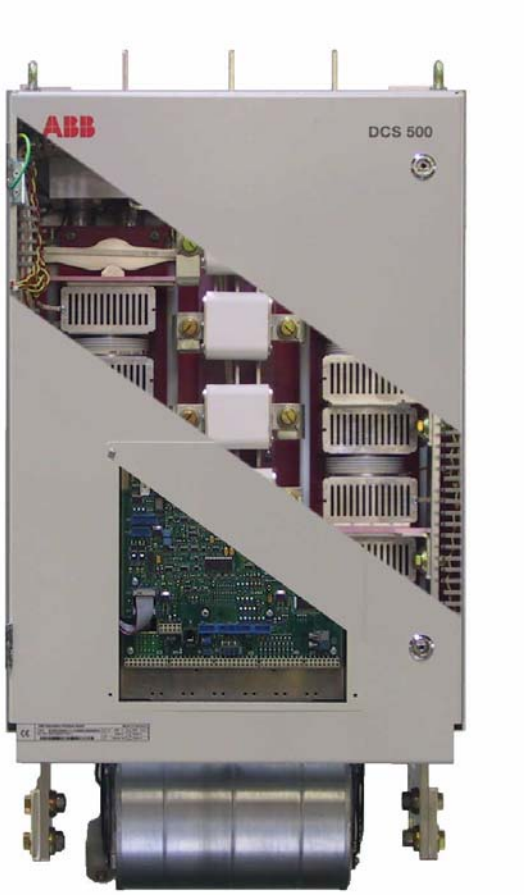
DCS Thyristor Power Converters

for DC drive systems

25 to 5200 A

Technical Data

DCS 400
DCS 500B
DCS 600
DCF 500B
DCF 600



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5.4 Power Interface SDCS-PIN 41/SDCS-PIN-48/SDCS-PIN-5x

The Power Interface of DCS converter modules model A5/A6/A7 and C4 from 900 A up to 5200 A consists of two boards - the Measuring board SDCS-PIN-51 and the Pulse transformer board SCDS-PIN-41.
The following figures show the different connections between the SDCS-PIN-41 and SDCS-PIN-51 board depending on the application 2- or 4-quadrant and the construction type.

Converters, delivered from 1998 on, will be equipped with SDCS-PIN-41A, which is a full replacement for converters, already in use.

Converters delivered from middle 2005 will be equipped with SDCS-PIN-48, which is a full replacement for converters already in use.

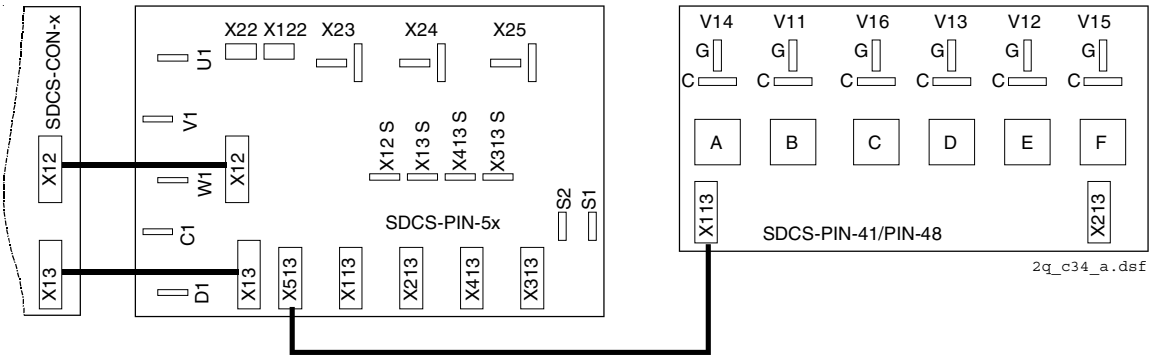


Fig. 5.4/1 **2-Quadrant** application, no parallel thyristors - Construction type **A5/A6/A7 (C4)**

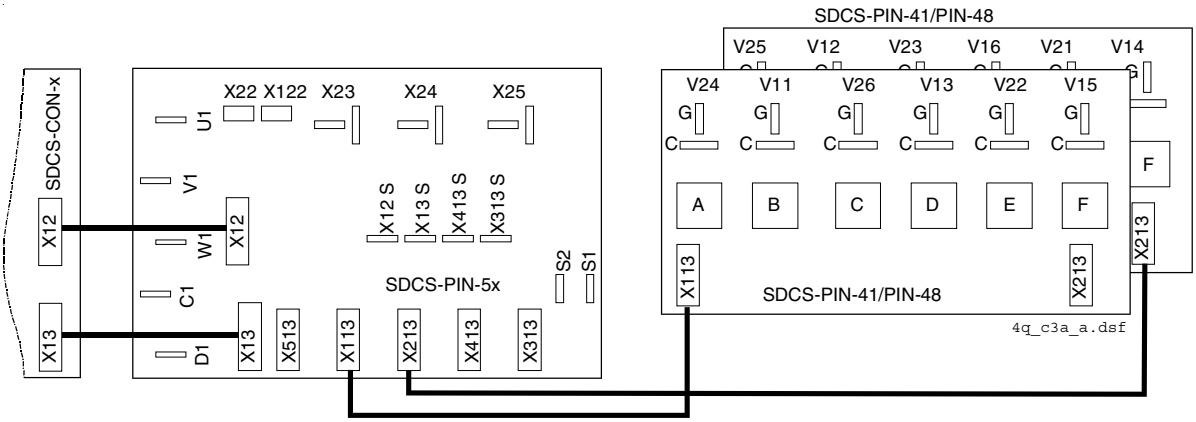


Fig. 5.4/2 **4-Quadrant** application, no parallel thyristors - Construction type **A5/A6/A7**

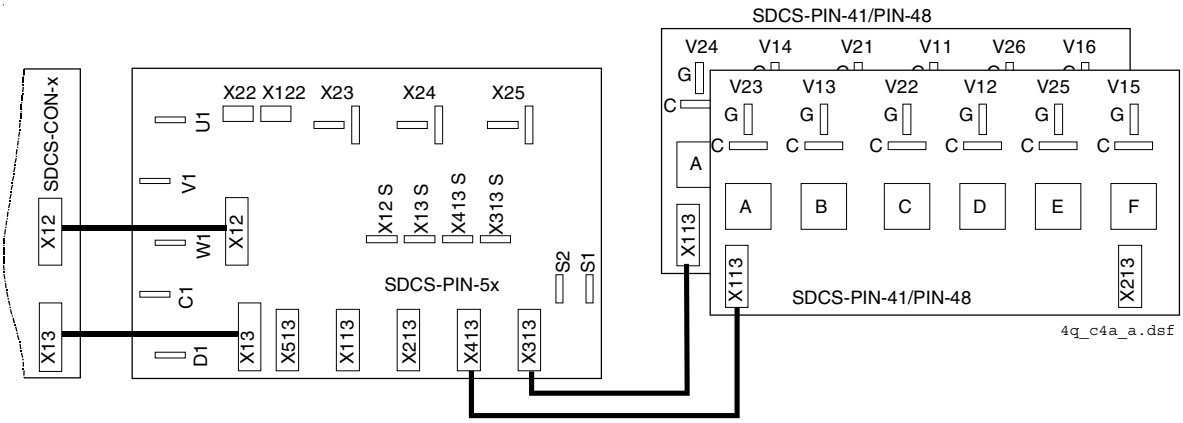
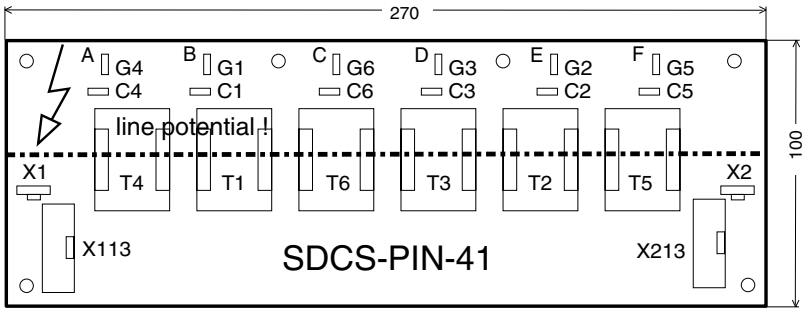


Fig. 5.4/3 **4-Quadrant** application, no parallel thyristors - Construction type **C4**

Pulse transformer board SDCS-PIN-41/PIN-41A/PIN-48



The board consists of six pulse transformers with amplifiers.

Fig. 5.4/4 Layout of the SDCS-PIN-41/PIN-41A/PIN-48 pulse transformer board

Measuring board SDCS-PIN-51
This board is always used together with SDCS-PIN-41 board. On this board there are the circuits located needed for current, voltage and temperature measuring and for hardware coding.

The current is measured by current transformers at the main AC inputs, rectified by a diode bridge and scaled with burden resistors to 1.5 V as rated current. The nominal current is adjusted by cutting out resistors (R1 ... R21) from the board according to the current coding table. The resistors R22 ... R26 are used for the current equal to zero detection. These resistors must be cut off too, according to the current coding table.

Voltages (U1, V1, W1 and C1(+) and D1(-)) are measured by using high ohm resistor chains. Scaling of AC and DC voltage is done by activating 1 MΩ resistors (= cutting out short circuit wires, which are represented by low ohmic resistors). The voltage measurement uses 5 resistor:

U1: W1 to W5
V1: W6 to W11
W1: W12 to W16
C1(+): W17 to W21
D1(-): W22 to W26

If there is a need for voltage adaptation, all 5 chains must be handled in the same way.

Note! Actual voltage signals U1, V1, W1, C1(+) and D1(-) of the main circuit are not galvanically isolated from the control board. Because of that a current of less than 1 mA will flow to earth.

When galvanically isolated measurement is needed, please contact your ABB representative.

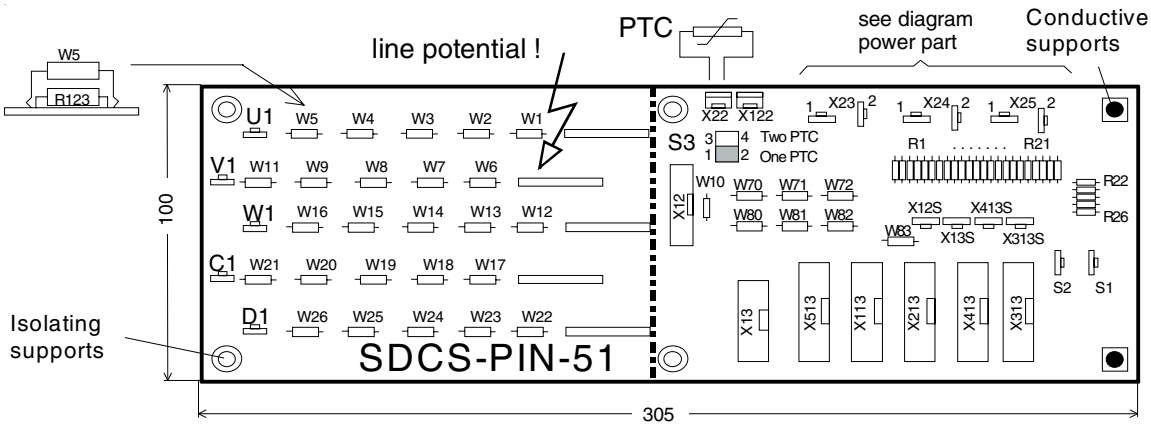
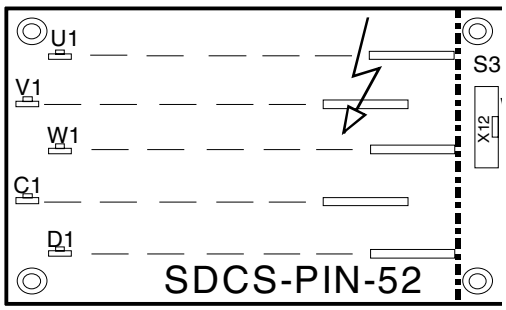


Fig. 5.4/5 Layout of the SDCS-PIN-51 board



In the past some converters for line voltages lower/equal 500 V had been equipped with SDCS-PIN-52 boards. The SDCS-PIN-51 board serves as a spare part for those converters.

Figure 5.4/6 Layout of the SDCS-PIN-52

Current coding

Construction type			A5				A6				A7					
Current transf. ratio			2500:1				2500:1				4000:1					
Rated current [A]			900	1200	1500	2000	1900	2050	2500	3000	2050	2600	3300	4000	4800	5200
R1-R4	18 Ω	Rated current scaling	○—○	○—○	○—○	○—○	○—○	○—○	○—○	○—○	○—○	○—○	○—○	○—○	○—○	○—○
R5	18 Ω		○✕○	○—○	○—○	○—○	○—○	○—○	○—○	○—○	○—○	○—○	○—○	○—○	○—○	○—○
R6	18 Ω		○✕○	○✕○	○—○	○—○	○—○	○—○	○—○	○—○	○—○	○—○	○—○	○—○	○—○	○—○
R7	18 Ω		○✕○	○✕○	○—○	○—○	○—○	○—○	○—○	○—○	○✕○	○—○	○—○	○—○	○—○	○—○
R8	18 Ω		○✕○	○✕○	○✕○	○—○	○—○	○—○	○—○	○—○	○✕○	○✕○	○—○	○—○	○—○	○—○
R9	18 Ω		○✕○	○✕○	○✕○	○—○	○—○	○—○	○—○	○—○	○✕○	○✕○	○—○	○—○	○—○	○—○
R10	18 Ω		○✕○	○✕○	○✕○	○✕○	○✕○	○✕○	○—○	○—○	○✕○	○✕○	○✕○	○—○	○—○	○—○
R11	18 Ω		○✕○	○✕○	○✕○	○✕○	○✕○	○✕○	○—○	○—○	○✕○	○✕○	○✕○	○—○	○—○	○—○
R12	18 Ω		○✕○	○✕○	○✕○	○✕○	○✕○	○✕○	○—○	○—○	○✕○	○✕○	○✕○	○—○	○—○	○—○
R13	18 Ω		○✕○	○✕○	○✕○	○✕○	○✕○	○✕○	○✕○	○—○	○✕○	○✕○	○✕○	○✕○	○—○	○—○
R14	18 Ω		○✕○	○✕○	○✕○	○✕○	○✕○	○✕○	○✕○	○—○	○✕○	○✕○	○✕○	○✕○	○—○	○—○
R15	18 Ω		○✕○	○✕○	○✕○	○✕○	○✕○	○✕○	○✕○	○✕○	○✕○	○✕○	○✕○	○✕○	○✕○	○—○
R16	18 Ω		○✕○	○✕○	○✕○	○✕○	○✕○	○✕○	○✕○	○✕○	○✕○	○✕○	○✕○	○✕○	○✕○	○✕○
R17	33 Ω		○✕○	○—○	○✕○	○—○	○✕○	○—○	○✕○	○—○	○✕○	○—○	○—○	○✕○	○—○	○—○
R18	68 Ω		○—○	○✕○	○✕○	○✕○	○✕○	○—○	○✕○	○✕○	○✕○	○—○	○—○	○✕○	○✕○	○✕○
R19	120 Ω		○✕○	○—○	○—○	○✕○	○—○	○—○	○✕○	○✕○	○—○	○✕○	○—○	○✕○	○✕○	○✕○
R20	270 Ω		○—○	○—○	○—○	○—○	○—○	○✕○	○—○	○✕○	○—○	○—○	○✕○	○—○	○✕○	○—○
R21	560 Ω		○✕○	○✕○	○✕○	○—○	○✕○	○✕○	○—○	○✕○	○✕○	○✕○	○✕○	○—○	○✕○	○✕○
R22	47 Ω	Zero current detection	○—○	○—○	○—○	○—○	○✕○	○✕○	○✕○	○✕○	○✕○	○✕○	○✕○	○✕○	○✕○	○—○
R23	47 Ω		○✕○	○✕○	○—○	○—○	○✕○	○✕○	○—○	○—○	○✕○	○✕○	○✕○	○—○	○—○	○—○
R24	47 Ω		○✕○	○✕○	○✕○	○✕○	○—○	○—○	○—○	○—○	○—○	○—○	○—○	○—○	○—○	○—○
R25	47 Ω		○✕○	○✕○	○✕○	○✕○	○—○	○—○	○—○	○—○	○—○	○—○	○—○	○—○	○—○	○—○
R26	100 Ω		○✕○	○—○	○✕○	○—○	○—○	○—○	○✕○	○—○	○✕○	○✕○	○—○	○✕○	○—○	○✕○

code_tab_PIN1_PIN20_PIN51_d.dsf

Voltage coding

Construction type	A5		A6 / A7				A7	A7
Conv. nom. voltage [V] ①	Y=4 (400V) Y=5 (500V)	Y=6 (600V) Y=7 (690V)	Y=4 (400V) Y=5 (500V)	Y=6 (600V)	Y=7 (690V)	Y=8 (790V)	Y=9 (1000V)	Y=1 (>1000V)
Value f. conv. nom. volt at SET(TINGS) block	**0** = HW type coding		500	600	690	800	1000	
Measuring board SDCS	PIN-51	PIN-51	PIN-51	PIN-51	PIN-51	PIN-51	PIN-51	see chapter Galvanic isolation
W1, 6, 12, 17, 22	○—○	○✕○	○—○	○✕○	○✕○	○✕○	○✕○	
W2, 7, 13, 18, 23	○—○	○✕○	○—○	○—○	○✕○	○✕○	○✕○	
W3, 8, 14, 19, 24	○—○	○—○	○—○	○—○	○—○	○✕○	○✕○	
W4, 9, 15, 20, 25	○—○	○—○	○—○	○—○	○—○	○—○	○✕○	
W5, 11, 16, 21, 26							○✕○	

① the converters can be used at lower line voltage then specified by the y-value without hardware modifications, if the nominal line voltage applied to the converter is not lower than 45% for y=5...9 and not lower than 55% for y=4.

HW type coding

Construction type	A5						A6 / A7
Current [A]	1200	1500	2000	900	1500	2000	>2000 *
Voltage max. [V]	500	500	500	600/690	600/690	600/690	all *
W70	○—○	○—○	○—○	○—○	○—○	○—○	○—○
W71	○✕○	○✕○	○✕○	○✕○	○✕○	○✕○	○—○
W72	○—○	○—○	○—○	○—○	○—○	○—○	○—○
W80	○—○	○✕○	○—○	○—○	○✕○	○✕○	○—○
W81	○—○	○—○	○✕○	○—○	○—○	○✕○	○—○
W82	○—○	○—○	○—○	○✕○	○✕○	○✕○	○—○
W83	○—○	○—○	○—○	○—○	○—○	○—○	○—○

* see Software description

Temp. sensor coding

R 57 as a temp. sensor for A5, A6, A7
S3 4 ○ ○ 3   2 ○—○ 1

2 Q - 4 Q coding

	2-Q	4-Q
W10	○✕○	○—○

○✕○ indicates a removed jumper

Table 5.4/1 Settings of the SDCS-PIN-51 board if a DCS converter is equipped with it by ABB

Board used as a spare part:
- default: all jumpers Wxx, Rxx are in ○—○ condition
- ensure the correct converter type related settings

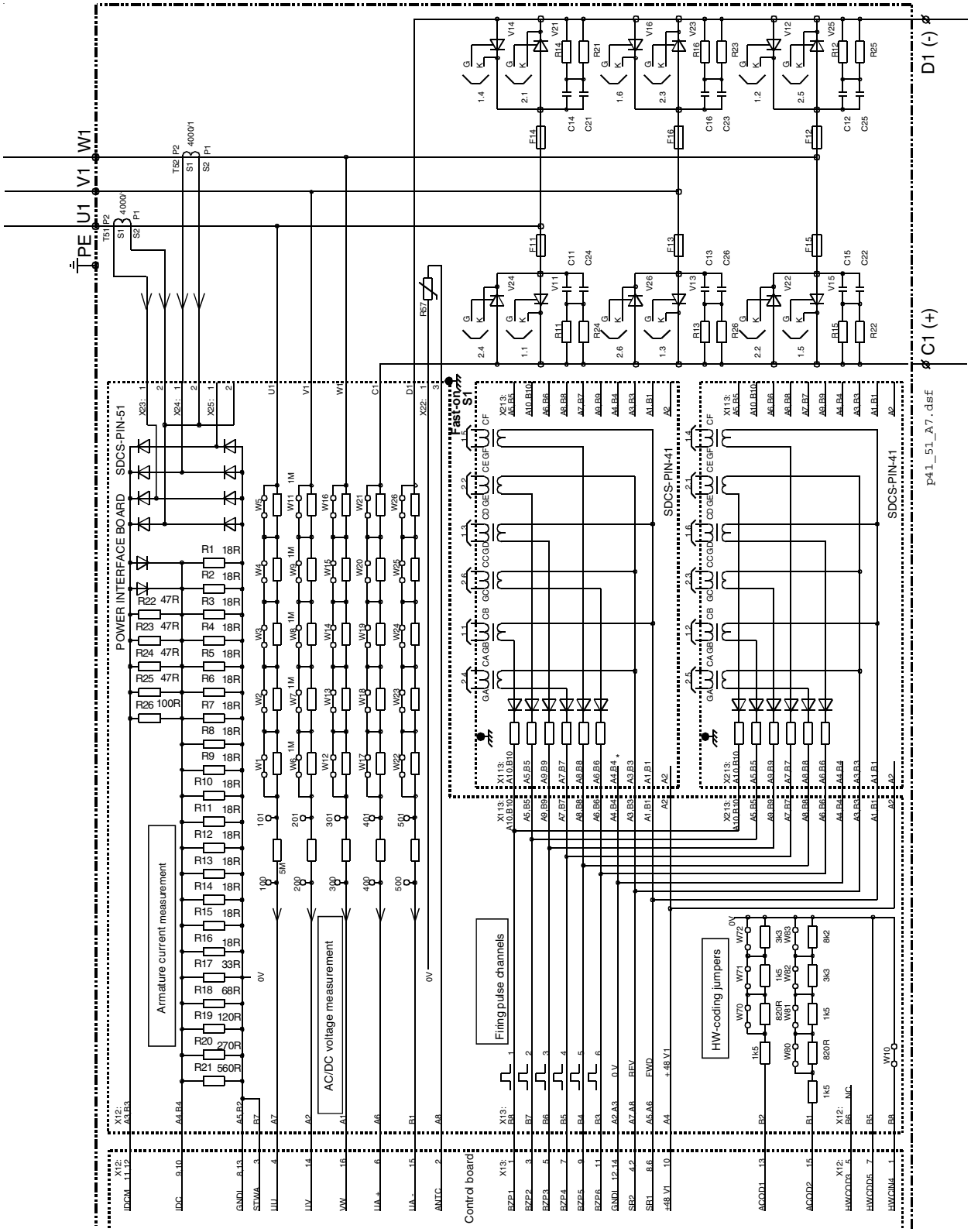


Fig. 5.4/7 Typical armature circuit thyristor converter diagram with SDCS-PIN-41 and SDCS-PIN-51 boards for a 4-Q A7 type converter

5.5 Zero current detection SDCS-CZD-01A

This board is used for fast zero current detection especially for three phase field converter in **M**otor **G**enerator application. The board provides a safe zero current detection also for other very high inductive loads.

The board is located on SDCS-CON-2 board and plugged on X12, X13 and X17.
X17: is only used for mechanical reasons. The electrical function (connection to IOE-1) is unchanged.

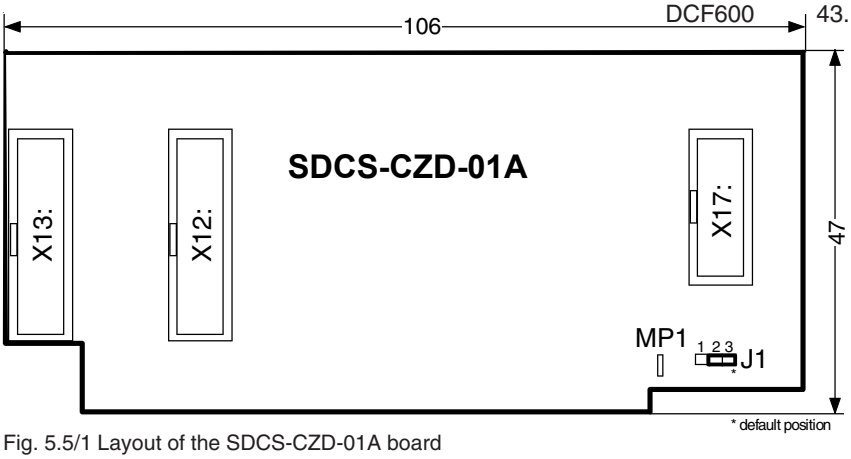
All DCS/DCF converter are equipped with a zero current detection by monitoring the current signal to a certain level.

The CZD-01A board has in addition a cathode / anode voltage measurement of all thyristors. The voltage measurement provides a sharp detection of DC load condition.

Basically two conditions need to be fulfilled to get a signal current equal to zero:
- the current detection has to indicate current equal to zero AND
- the voltage detection has to indicate current equal to zero

The activation of the board must be set in the software via parameter:

DCF500B	4.19	ZERO CUR DETECT
DCF600	43.14	ZERO CUR DETECT



With jumper J1 (not available with SDCS-CZD-01) the voltage detection can be set to two modes:
with J1 in position 1-2:
all thyristors (V11/V13/V15) AND all thyristors (V12/V14/V16) must have blocking voltage
with J1 in position 2-3 (parking; default)
all thyristors (V11/V13/V15) OR all thyristors (V12/V14/V16) must have blocking voltage

Fig. 5.5/1 Layout of the SDCS-CZD-01A board

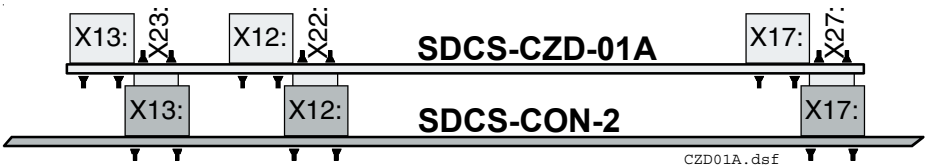


Fig. 5.5/2 Connection between the SDCS-CZD-01A and SDCS-CON-2 board

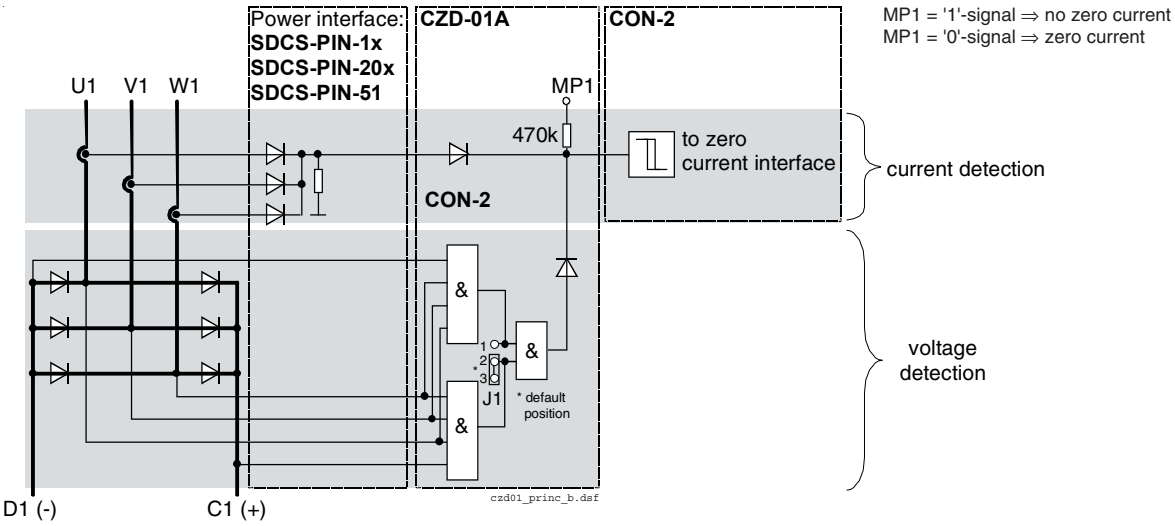


Fig. 5.5/3 Principle diagram of SDCSCZD-01A