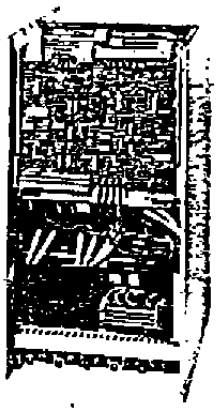
SIEMENS

Thyristor Controlled Machine Tool Drives
Main Spindle Drive 6RA26
2 x 6-pulse; circulating current-free

R18127

Description, Installation, Setting-to-Work — Order Ref. C98130-A1015-A1-02-7519



Order Ref.	Type Ref.
6RA2620-6DV50,V51	D380/ 35 Mreq-GcG 6V50,V51
6RA2625-6DV50,V51	D380/ 65 Mreq-GcG 6V50,V51
6RA2628-6DV50,V51	D380/ 90 Mreq-GcG 6V50,V51
6RA2632-6DV50,V51	D380/130 Mreq-GcG 6V50,V51
6RA2675-6DV50,V51	D380/190 Mreq-GcGF6V50,V51
6RA2677-6DV50,V51	D380/250 Mreq-GcGF6V50,V51
6RA2681-6DV50,V51	D380/360 Mreq-GcGF6V50,V51
6RA2682-6DV50,V51	D380/435 Mreq-GcGF6V50,V51
6RA2683-4DV50,V51	D380/500 Mreq-GcGF4V50,V51
6RA2685-4DV50,V51	D380/650 Mreq-GcGF4V50,V51
6RA2687-4DV50,V51	D380/790 Mreq-GcGF4V50,V51
6RA2690-4DV50,V51	D380/1050Mreq-GcGF4V50,V51
6RA26 . . -6GV50,V51	D500/ 35-435 Mreq-GcG(F)6V50,V51
6RA26 . . -4GV50,V51	D500/500-1050Mreq-GcG F 4V50,V51

DESCRIPTION:

These anti-parallel connected, circulating current-free converters ((B6C)A(B6C)-connection) are mainly used for supplying and controlling separately excited dc motors; in particular those for main spindle drives with ratings from 13 to 525 kW. They completely satisfy the requirements of all modern numerically controlled machine tools. Monitoring and protecting circuits for motor and machine tool are included. The armature supply is obtained from a fully controlled three-phase bridge-connected converter in anti-parallel connection, operating in the circulating current-free mode. Two kinds of field supply arrangements are possible: the field current can either be constant (type ref. V50) or variable (i.e. weak field operation; type ref. V51).

The operational temperature range of the converters is from 0 to + 35°C (0 to + 45°C for naturally ventilated units); that for storing and transport is −30°C to +85°C.

Degree of protection: IP 00 in accordance with IEC 144.

INSTALLATION:

The converters must be mounted vertically in cubicles or machine recesses, the terminals being at the bottom. Unrestricted cooling air flow (entry and exit) is essential. A clear space of at least 100 mm (4 inches) must be provided above and below the unit.

Job No: Date:

Product:

2-2-00

ATS 70/1

	TYPE	SERIAL NR.	COMMISSIONING, SERVICE
MACHINE			Date: by:
MOTOR			Date: by:
SIMOREG	D . . . / . . Mreq-GcG . V5 . -2A	06/	Date: by:
			Date: by:

Enter potentiometer settings:

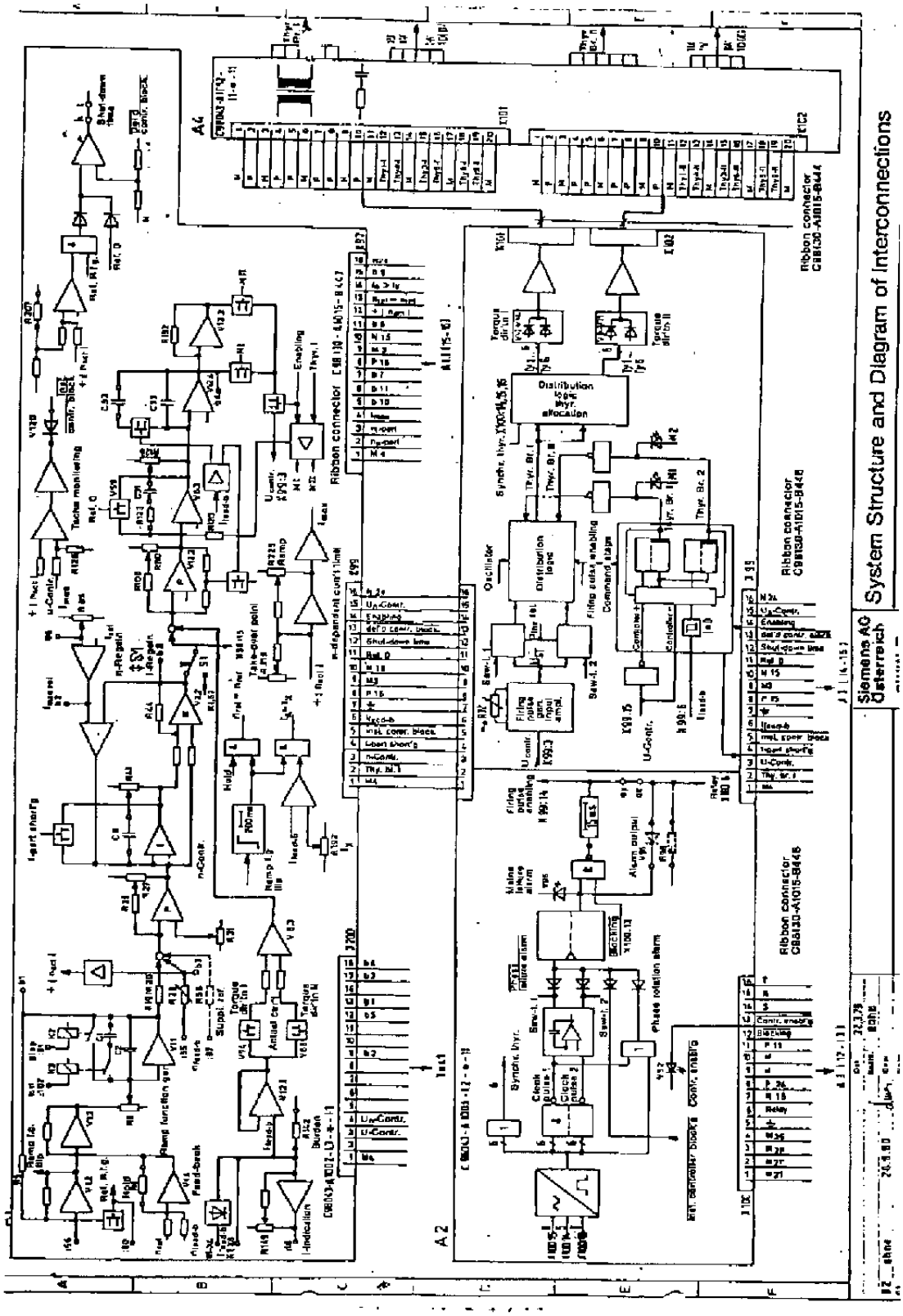
Setting	R8 M_{Ergen}	R28 Tacho	R192 I_x	R149 Iind	R110 Kp-nCont	R41 Tn-nCont	R85 Iref	R27 Kp-nCont	R31 Drift	R218 O-Pt limit	R225 Kp-ndep	R126 Kp, Tn-ncs.
at works	0	0	0	0	0	0	0	0	0	0	0	0
by customer	0	0	0	0	0	0	0	0	0	0	0	0

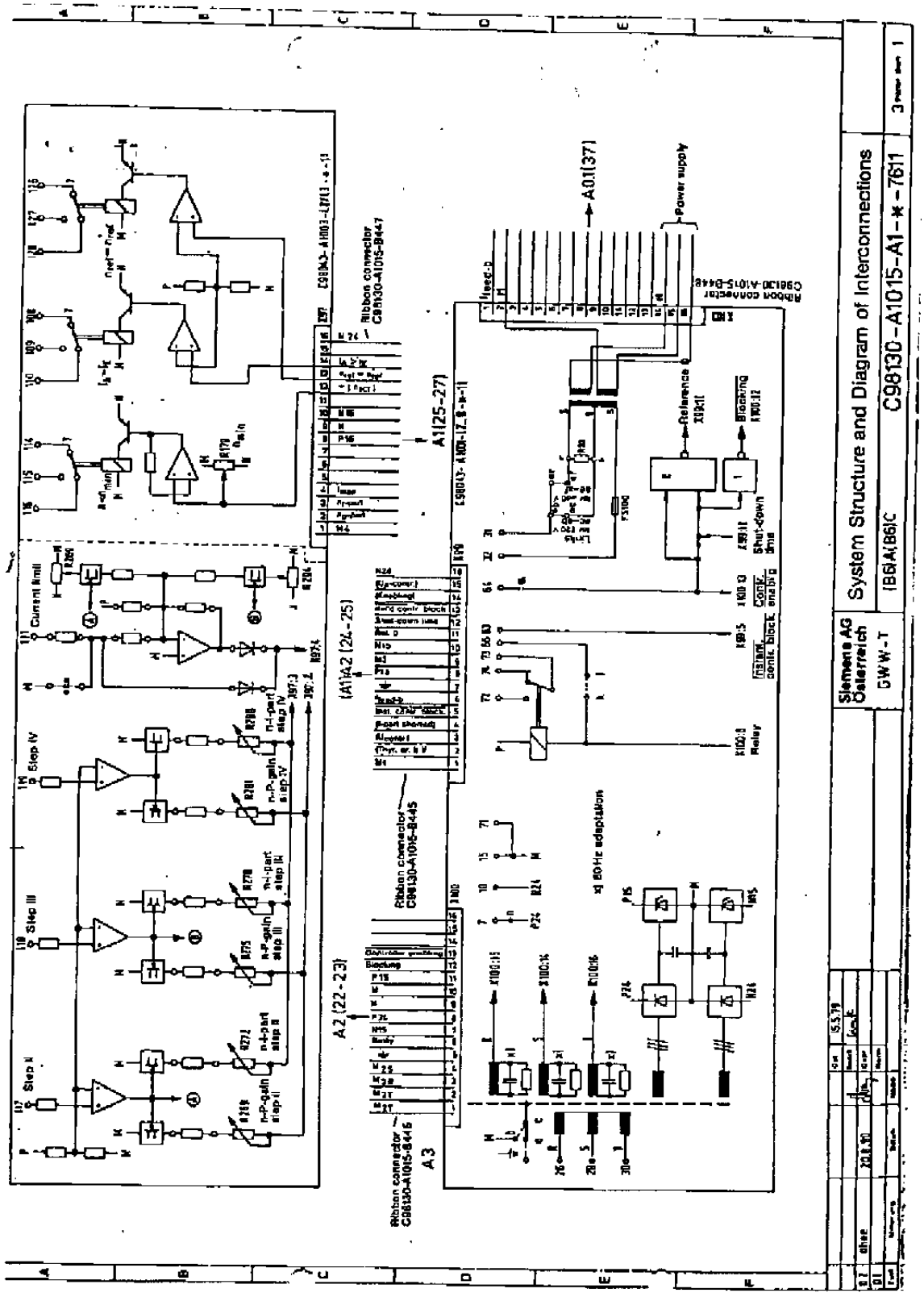
Setting	A1003 R179 $n<n_{min}$	R4 EMF-ref	A 1006 R10 Kp.	R13 min. field	R1 $I_A \cdot R_A$	R77 max. field	A 1005 R72 α_e
at works	0	0	0	0	0	0	0
by customer	0	0	0	0	0	0	0

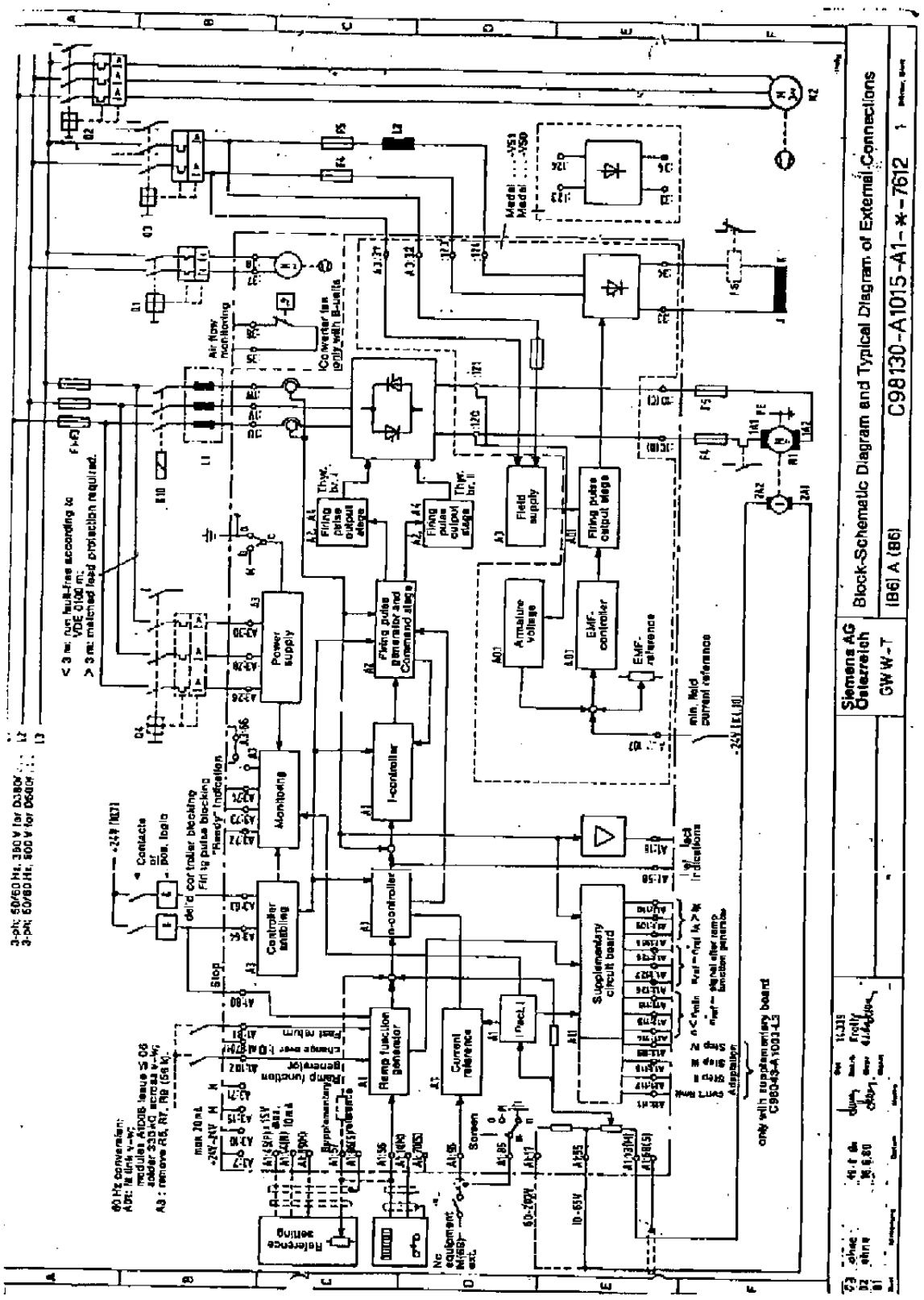
Burden resistance

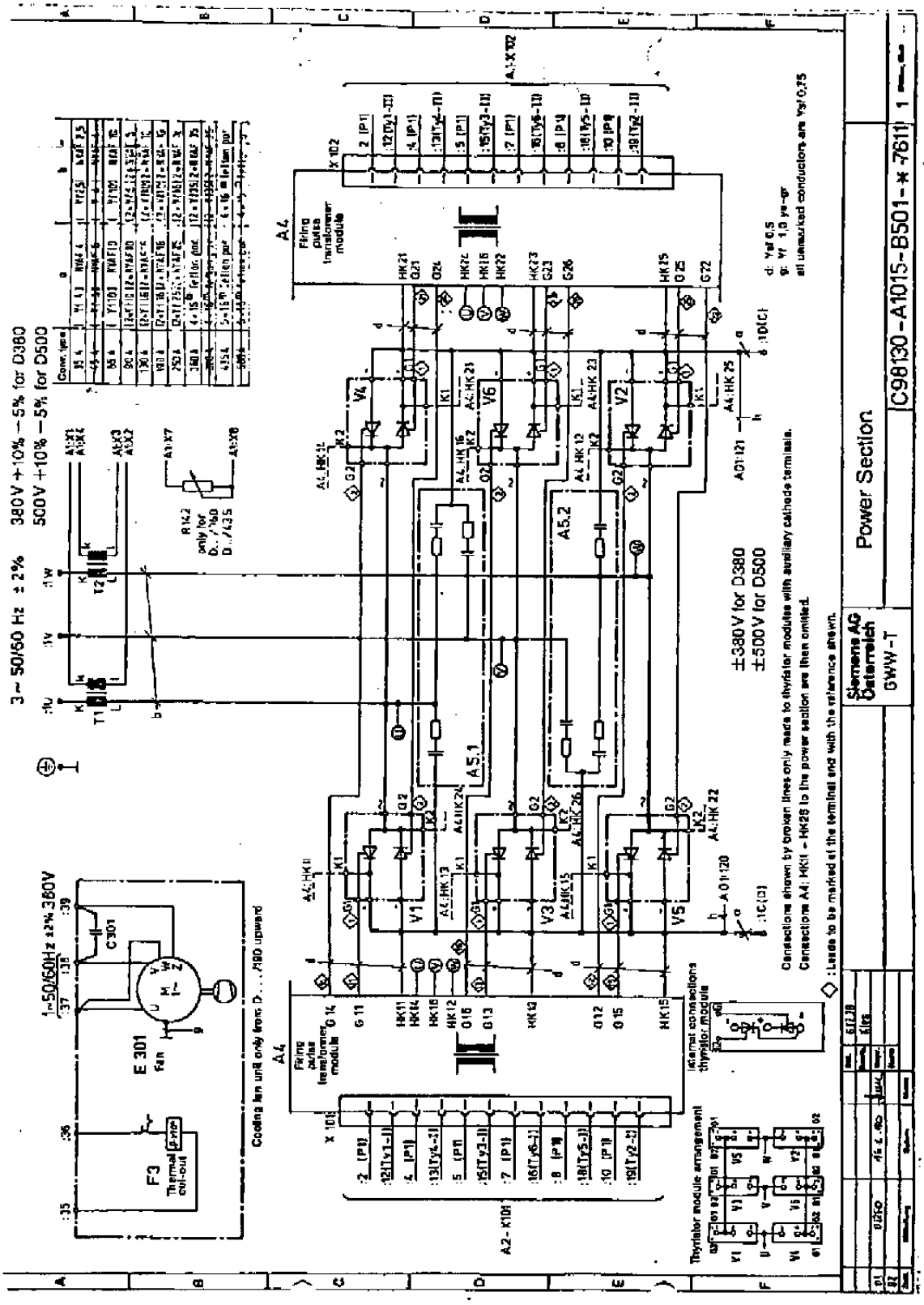
Conv. rated curr	Nr. of wind'gs c. L	GDM6,5/8 BSI372 GRV256 GRV258 Burden resistance R 142 (on A1)	R 142 par. (on A1)	R 142 per (on conv'r)	R 7	effective value	OTHER MODIFICATIONS Compo-nent	Solder point	Action taken
35	2	680		–	–				
45	2	470		–	–				
65	1	560		–	–				
90	1	470		–	–				
130	1	270		–	–				
190	1	180		–	–				
250	1	150		–	–				
360	1		–	33	–				
435	1		–	22	–				
500	1		–	–	22				
650	1		–	–	15				
790	1		–	–	15				
1050	1		–	–	10				

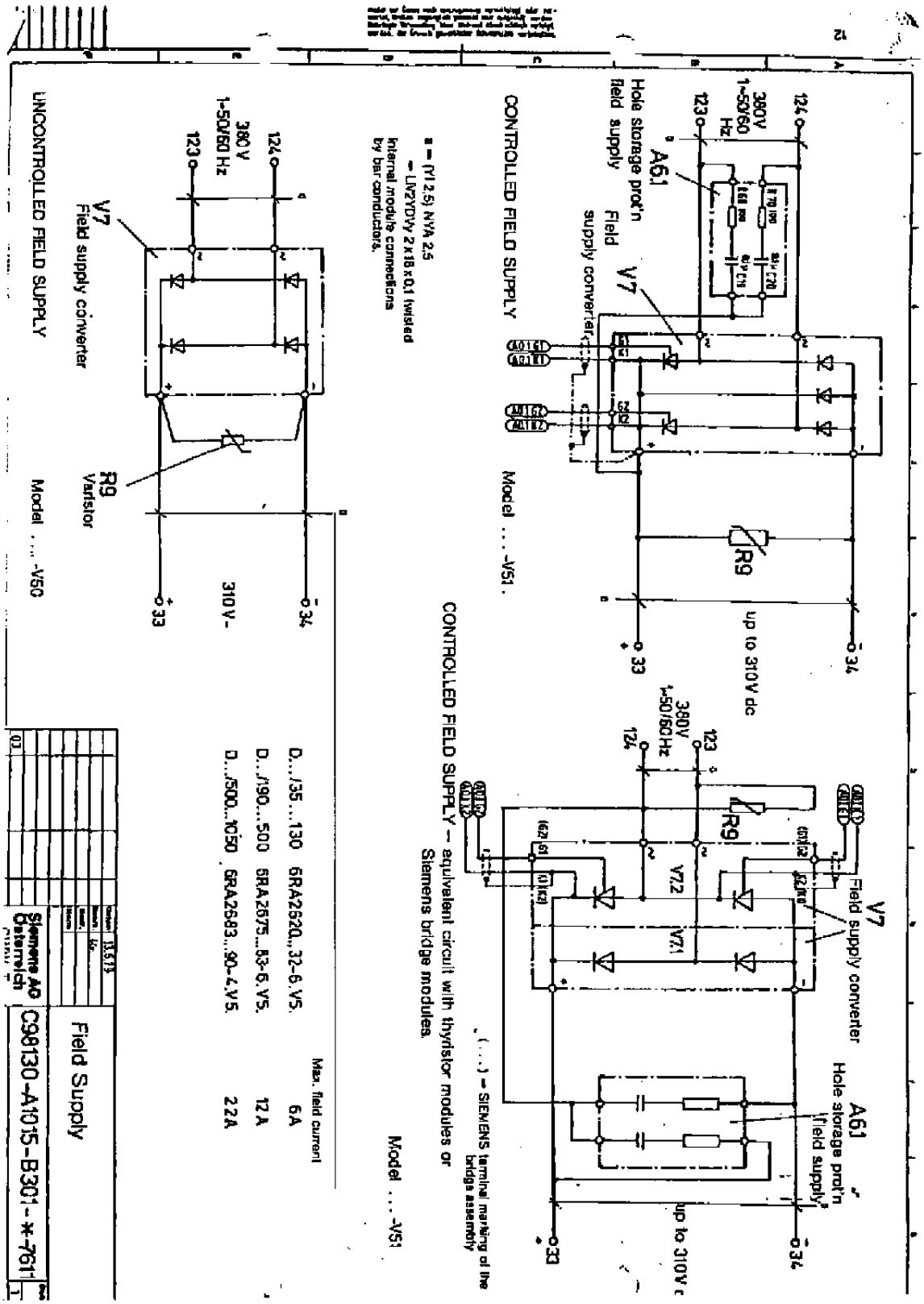
NOTES:

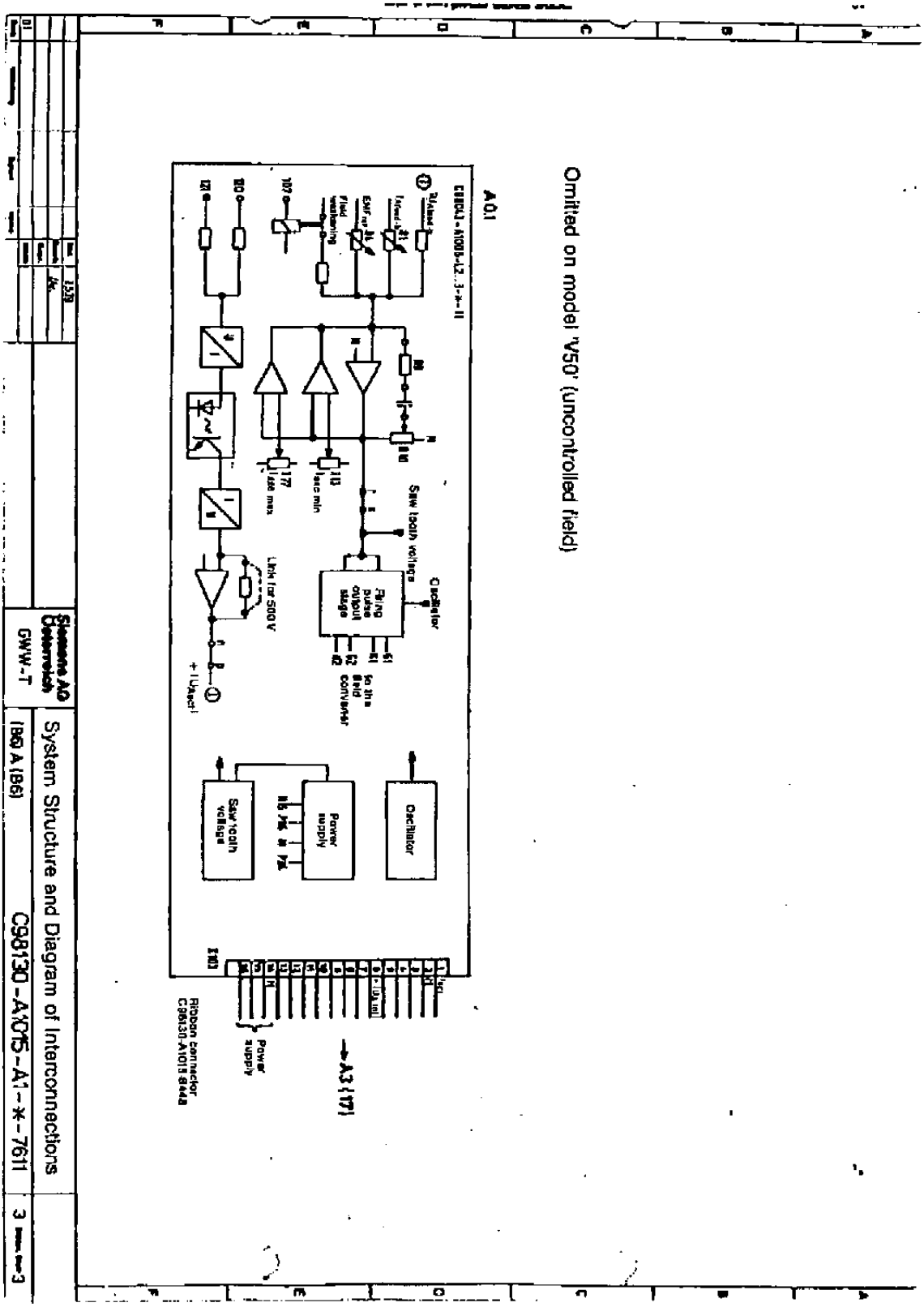

A4
A2
Ribbon connector C88130-A1015-B444
Ribbon connector C88130-A1015-B445
Ribbon connector C88130-A1015-B446
Siemens AG Österreich
System Structure and Diagram of Interconnections


System Structure and Diagram of Interconnections
IBGA/B6IC
C98130-A1015-A1-*-7611
Siemens AG Österreich
GWW-T
A01(37)
Power supply
A1(25-27)
A1(A2 (24-25)
A2 (22-23)
A3
Ribbon connector C98130-A1015-B447
Ribbon connector C98130-A1015-B445
Ribbon connector C98130-A1015-B446
Ribbon connector C98130-A1015-B448
Step IV
Step III
Step II
Current limit
n-part step IV
n-P-gain step IV
n-part step III
n-P-gain step III
n-part step II
n-P-gain step II
Relay
Blocking
Shut-down time
x1 50Hz adaptation


Block-Schematic Diagram and Typical Diagram of External Connections
C98130-A1015-A1-*-7612
Siemens AG Österreich
GW W-T
Power supply
Firing pulse generator and Command stage
I-controller
n-controller
Monitoring
Controller switching
Ramp function generator
Current reference
Supplementary circuit board
Field supply
Firing pulse output stage
Armature voltage
EMF-controller
EMF-reference
Air flow monitoring
Converter fan group with B-cells
Reference setting
Stop
Contact of pos. logic
Screen
only with supplementary board C98043-A1003-L3


Power Section
C98130-A1015-B501-*-7611
Siemens AG Österreich
GWW-T
3~ 50/60 Hz ± 2%
380V +10% −5% for D380
500V +10% −5% for D500
±380V for D380
±500V for D500
A4
A5.1
A5.2
E 301
fan
F3
Thermal cut-out
C301
Cooling fan unit only from D...H80 upward
Connections shown by broken lines only made to thyristor modules with auxiliary cathode terminals.
Connections A4: HK11 – HK26 to the power section are then omitted.
: Leads to be marked at the terminal end with the reference shown.
Thyristor module arrangement
Internal connections thyristor module
Firing pulse transformer module


CONTROLLED FIELD SUPPLY
Model ...-V51.
380V 1~50/60 Hz
123
124
A61
Hole storage prot'n field supply
Field supply converter
V7
R9
up to 310V dc
33
34
CONTROLLED FIELD SUPPLY – equivalent circuit with thyristor modules or Siemens bridge modules.
Model ...-V51
V7.2
V7.1
Field supply converter
Hole storage prot'n field supply
(...) = SIEMENS terminal marking of the bridge assembly
UNCONTROLLED FIELD SUPPLY
Model ...-V50
V7
Field supply converter
R9
Varistor
310V-
D../35...130 6RA2620..32-6.V5. 6A
D../190...500 6RA2675...53-6.V5. 12 A
D../500..1050 6RA2683...90-4.V5. 22A
Max. field current
Siemens AG Österreich
C98130-A1015-B301-*-7611
Field Supply


A0.1
Saw tooth voltage
Oscillator
Firing pulse output stage
Power supply
Saw tooth voltage
Oscillator
Ribbon connector C98130-A1015-B448
Power supply
→A3 (17)
Omitted on model 'V50' (uncontrolled field)
Siemens AG Österreich
GWW-T
System Structure and Diagram of Interconnections
C98130-A1015-A1-*-7611

EXTERNAL CONNECTIONS:

The external connections of the converter must be arranged in accordance with the typical diagram shown on page 7 and, in particular, with the circuit diagram provided by the machine tool maker.

Leads carrying reference and feed-back signals must be screened and run separate from leads at mains potential. The leads which carry the controller enabling signal and those feeding the control system's power supply must be kept well away from leads which carry relay or contactor coil circuit signals. When making connections to the terminals on a circuit board an extra length must be allowed for to form a loop so that the circuit board can be tilted forward. The phase rotation of the supply must be clockwise and phasing must be the same for terminals 26/28/30 and 1U/1V/1W as well as for terminals 123/124 and 31/32.

TERMINAL LIST:

Terminals Number	Terminals Location	Function	Kind*)	Typical voltage	Max. conductor size
POWER SECTION					
1U, 1V, 1W,	Bot. bar	Armature circuit-mains supply	I	3 x 380V or 3 x 380V ac	6 mm² (No. 9 AWG) for size 11A 16 mm² (No. 5 AWG) for sizes 65, 90 and 130A M10 stud terminals for 190–435A units 2xM10 stud terminals for 500–1050A units
1C(D) 1D(C)	Bot. bar	Armature circuit-motor connections	O	±380V or ±500V	16 mm² (No. 5 AWG) for sizes 35, 65 and 130A M10 stud terminals for 190–435A units 2xM12 stud terminals for 500–1050A units
123, 124	Bot. bar	Field circuit-mains supply	I	1 x 380V	4 mm² (No. 11 AWG)
33, 34	Bot. bar	Field circuit-field connections	O	310V dc	4 mm² (No. 11 AWG)
POWER SUPPLIES					
26, 28, 30	T1 on A3	P.S. to electronics	I	3 x 380V	Faston push-on tag 6.3 x 0.8
31, 32	A3	Supply to field control circuit	I	1 x 380V (1 x 220V)	1.5 mm² 1)
37, 38 (39)	Bot. bar	Cooling air fan	I	1x380V,0.45A or 3-ph, 0.45A	4 mm² (No. 11 AWG)
7, 10, 15, 71	A3	Aux. supply	O	±24V dc	1.5 mm² 1)
44, 45, 69	A1	Aux. supply	O	±15V	1.5 mm² 1)
ELECTRONIC SIGNALS					
56, 14, 70	A1	Speed reference	I	±10V	1.5 mm² 1)
57, 66	A1	Additional speed ref.	I	±10V	1.5 mm² 1)
17, 55, 13, 68	A1	Speed feed-back	I	±200V	1.5 mm² 1)
102, 61, 87	A1	Ramp function generator gradient switching	I	24V dc	1.5 mm² 1)
80, 63, 64	A1/A3	Enabling signal	I	12–30Vdc	1.5 mm² 1)
107	A0.1	Field weakening control signal	I	24Vdc	1.5 mm² 1)
96, 85	A1	Max. current reduction	I	10Vdc	1.5 mm² 1)
ALARMS, INDICATIONS					
35, 36	Bot. bar	Air flow failure	O	1 x 220V, ac	4 mm² (No. 11 AWG)
72, 73, 74	A3	Fault (contacts)	O	1 x 220V, ac	1.5 mm² 1)
68	A3	Fault (static)	O	appr. –12V	1.5 mm² 1)
114, 115, 116	A1.1	n below min. speed	O	1 x 220V ac	1.5 mm² 1)
126,127,128	A1.1	n_{ref} reached	O	1 x 220V ac	1.5 mm² 1)
108,109,110	A1.1	Armature current > I_X	O	1 x 220Vac	1.5 mm² 1)
90, 91	A7	Fuse failure (contacts)	O	1 x 220V ac	1.5 mm² only for >500A 1)
97, 99	A7	Fuse failure	O	10V	1.5 mm² only for >500A 1)
INSTRUMENT INDICATIONS					
58	A1	Speed contr. output voltage	O	±10V	1.5 mm² 1)
16	A1	Actual current (feed-b)	O	10V	1.5 mm² 1)

*) I – Input
O – Output

1) Multi-strand without ferrule or with 'boot-lace' ferrule: 1,5 mm² (No. 16 AWG)
Multi-strand with ferrule: 1 mm² (No. 17 AWG)

SERVICING, FAULT FINDING:

Being of an electronic nature, the converter is completely maintenance-free.
Even the bearings of the converter fan are greased for life.
However, occasional cleaning of the unit is advisable to prevent flash-overs and impaired cooling.
Below some possible faults:

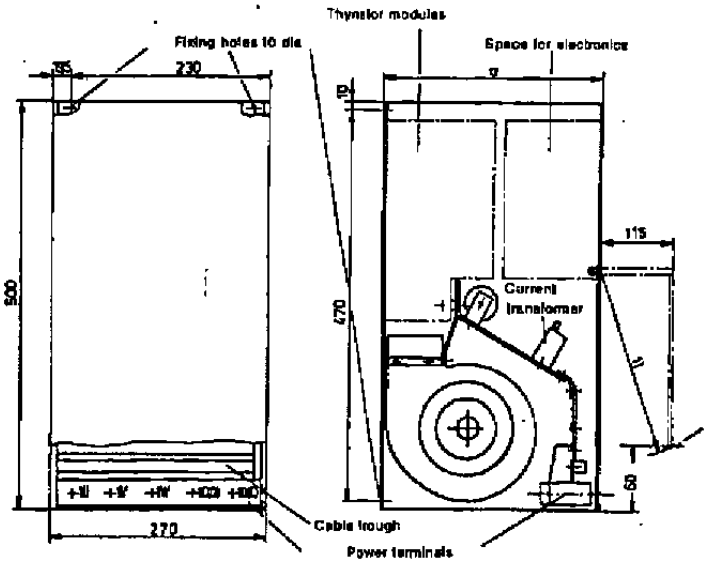
Nature of fault	Likely cause
Drive fails to start LED V96 'Supply Faulty' lights up LED V52 'Controller Enabled' lights up	Supply voltage absent; field supply missing Armature or field circuit broken; tacho circuit broken; tacho faulty or polarity reversed; terminal 63 not enabled; one phase of the supply is faulty; counter-clockwise phase rotation; field current set too low. Terminal 64 not enabled.
Motor runs up to top speed	Armature or tacho connections incorrectly connected; reference setting circuit faulty.
Speed hunts or is unstable	Control system incorrectly optimised; see commissionising instructions; tacho faultly; mechanical fault (tacho coupling, play in gearing); brushes or bearings worn; poor frame connection; noise on the signal leads.
Motor attains set speed too late or not at all	Control system optimising incorrect (ramp function generator, EMF-controller); current limit set too low or inputted too low.
Cutting capacity too low	Control system optimising incorrect (current limit EMF-controller, speed-dependent current limit); faulty design: motor or converter rating too low; gearing or brake defective.
Excessive wear of motor	Control system optimising incorrect (current limit, speed-dependent current limit, tacho voltage matching); noise pick-up by reference and/or feed-back signal leads.
Motor overheats	Control system optimising incorrect (current limit, EMF-controller); motor bearing(s), gearing, coupling or brake defective; motor cooling fan defective or air filter blocked; cut too heavy.

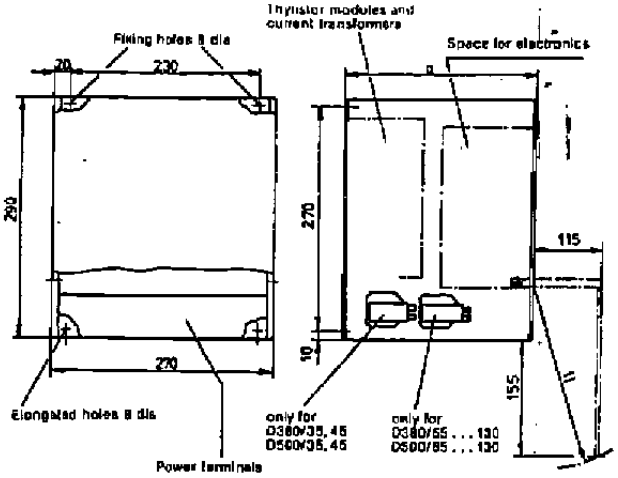
If faults occur which may have their cause in the SIMOREG converter – e.g. inexplicable fuse blowing – consult the nearest SIEMENS office.

NOTE:

For further information consult the following publications:

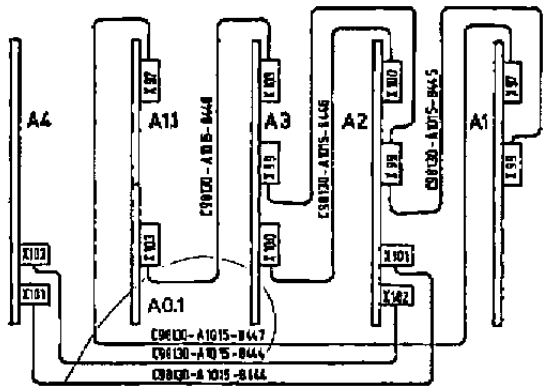
Technical Description: Order ref. E311/222-A
Commissioning Instructions: Order ref. E311-222-C
Book of circuit diagrams: Order ref. C98130-A1015-A1-x-22 (35 – 435A)
Order ref. C98130-A1015-A201-x-22 (500–1050A)





When determining the developed conductor lengths for customer's connections do not overlook the extra length for the loop required for forward tilting of the circuit boards.

Arrangement of circuit boards and ribbon connectors



Conv. type	Rated curr. (A)	Terminal type		Dim'sn a [mm]
		ac	dc	
0.../35	35	SSK 110	SSK 110	230
0.../45	45	SSK 110	SSK 110	230
0.../85	85	SSK 110	SSK 125	300
0.../90	90	SSK 110	SSK 125	300
0.../130	130	SSK 125	SSK 125	300
0.../180	180	Terminal stud M10		300
0.../250	250	— " —		300
0.../360	360	— " —		300
0.../380	380	— " —		300
0.../435	435	— " —		300
0.../500	500	— " —		300

1) Space required for forward tilting of circuit boards = appr. 235 mm from front edge
When operating, minimum clear distance above and below ≥ 100 mm

				Datum	7.12.78
				Name	kl
				Gepr.	
				Norm	
					Siemens AG Österreich GWW-T

Dimension Drawing
Location of Circuit Boards

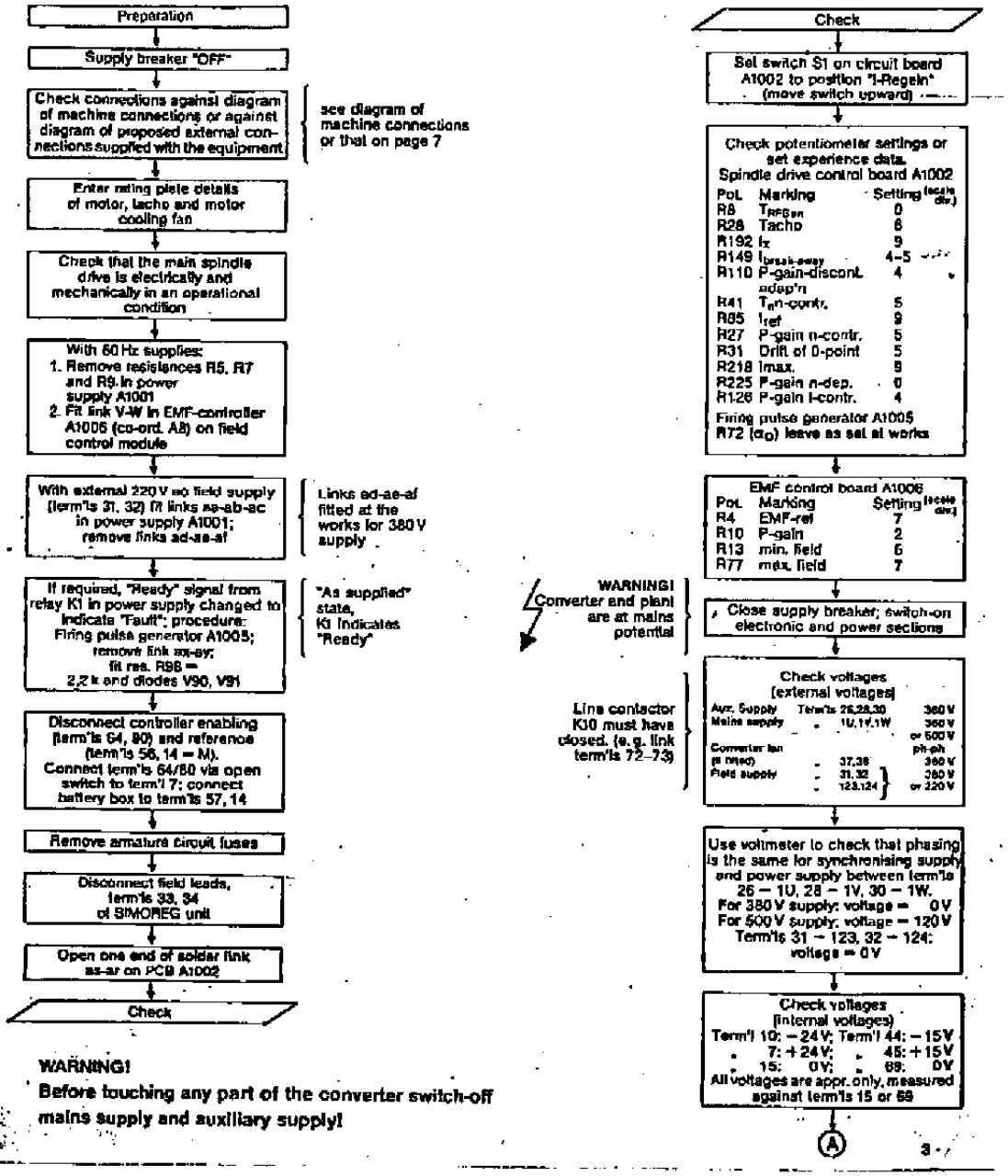
C98130-A1015-A1-⊷-7627

Blatt 1

SETTING-TO-WORK

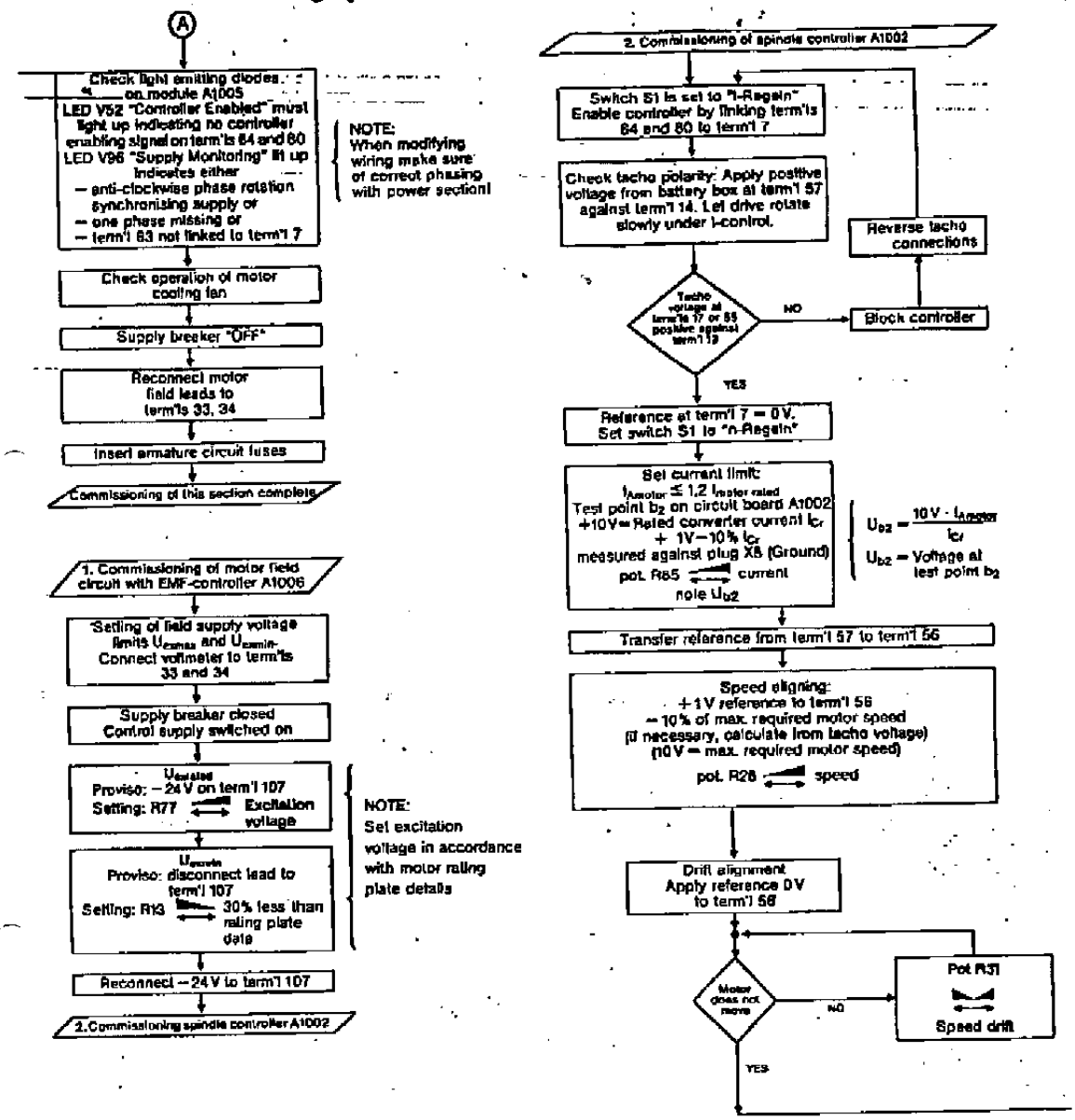
All converters are tested at the works and are set for operation on 50 Hz supplies. However, certain parameters — e.g. setting of current limits, adapting the circuit to the tacho voltage — cannot be set at the works and must be done when the drive is assembled so that they can be matched to the drive requirements. The operating sequence stated below is based on the assumption that the converter is operated in a manner similar to that shown on diagram C98130-A1015-A1-x-12 (page 7). Before commencing commissioning it is essential to check the external wiring, the required protection means and also that the correct equipment — such as ultra-fast semi-conductor fuses — has been fitted.

It is highly recommended that all circuit adjustments and settings are entered on page 14 of this publication and that this sheet is then left with the converter.



WARNING!

Before touching any part of the converter switch-off mains supply and auxiliary supply!



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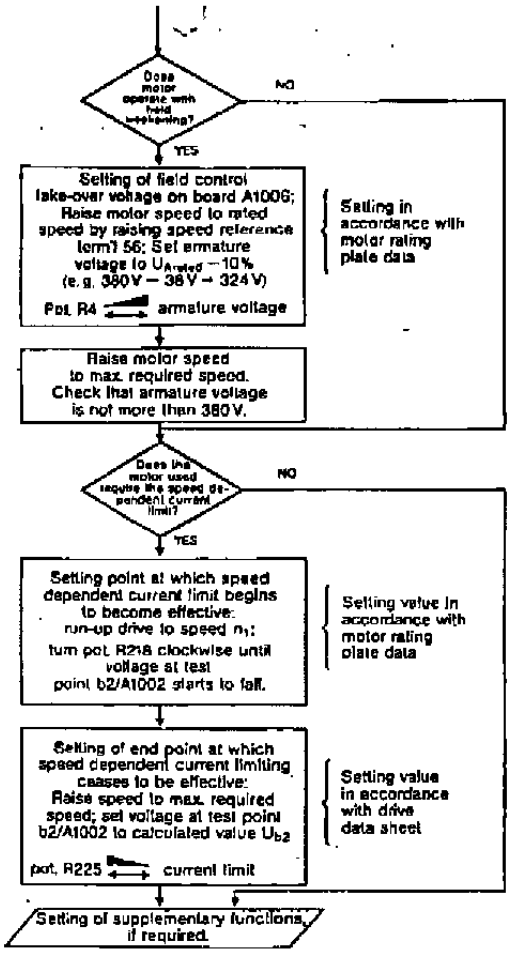

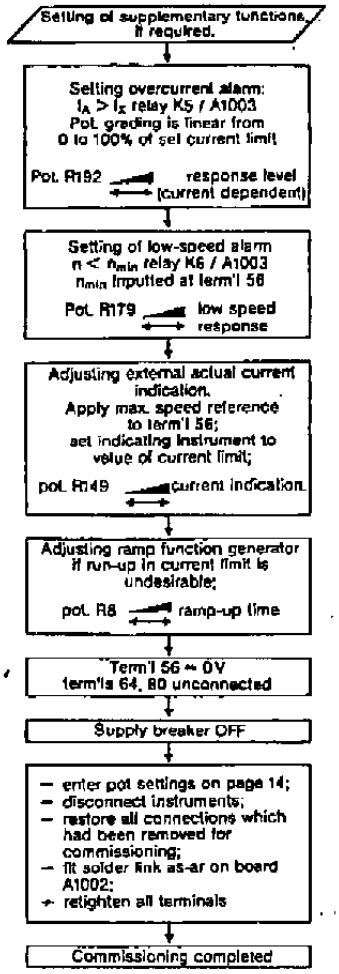

If the operational performance of the drive is unsatisfactory, the drive has to be re-optimised in accordance with the optimising instructions.

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Motor runs up to top speed Speed hunts or is unstable Motor attains set speed too late or not at all Cutting capacity too low Excessive wear of motor Motor overheats	Armature or tacho connections incorrectly connected; reference setting circuit faulty. Control system incorrectly optimised; see commissionising instructions; tacho faulty; mechanical fault (tacho coupling, play in gearing); brushes or bearings worn; poor frame connection; noise on the signal leads. Control system optimising incorrect (ramp function generator, EMF-controller); current limit set too low or inputted too low. Control system optimising incorrect (current limit EMF-controller, speed-dependent current limit); faulty design; motor or converter rating too low; gearing or brake defective. Control system optimising incorrect (current limit, speed-dependent current limit, tacho voltage matching); noise pick-up by reference and/or feed-back signal leads. Control system optimising incorrect (current limit, EMF-controller); motor bearing(s), gearing, coupling or brake defective; motor cooling fan defective or air filter blocked; cut too heavy.

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