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Lenze

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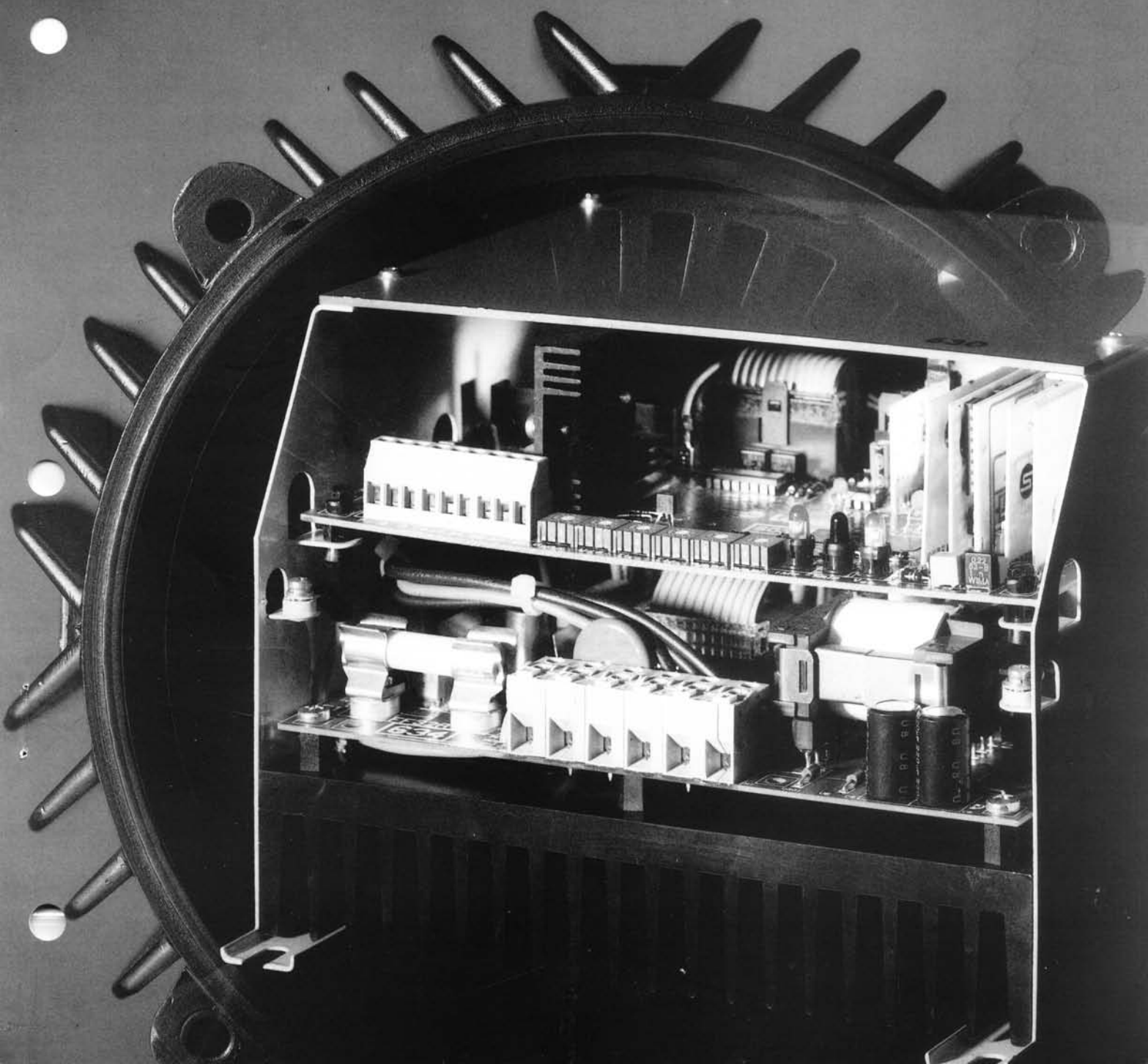
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Antriebstechnik

Service instructions

Inverter drives

Range 630



26.10.1989

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1. General information



Caution: The modules are fitted with C-MOS and MOS components which are sensitive against electrostatic influences

Please note the following information, when the controller is handled and checked; otherwise these circuits may be destroyed.

- Make sure that there is a potential compensation (charge accumulation between controller, tools, measuring instruments, and personnel before servicing.
- The modules must be touched at the edges, never at the components and their connections.
- Caution: Controller is carrying mains potential up to 20s after switching-off
- The phase current should be measured with a moving iron instrument and the voltage with a moving coil instrument.

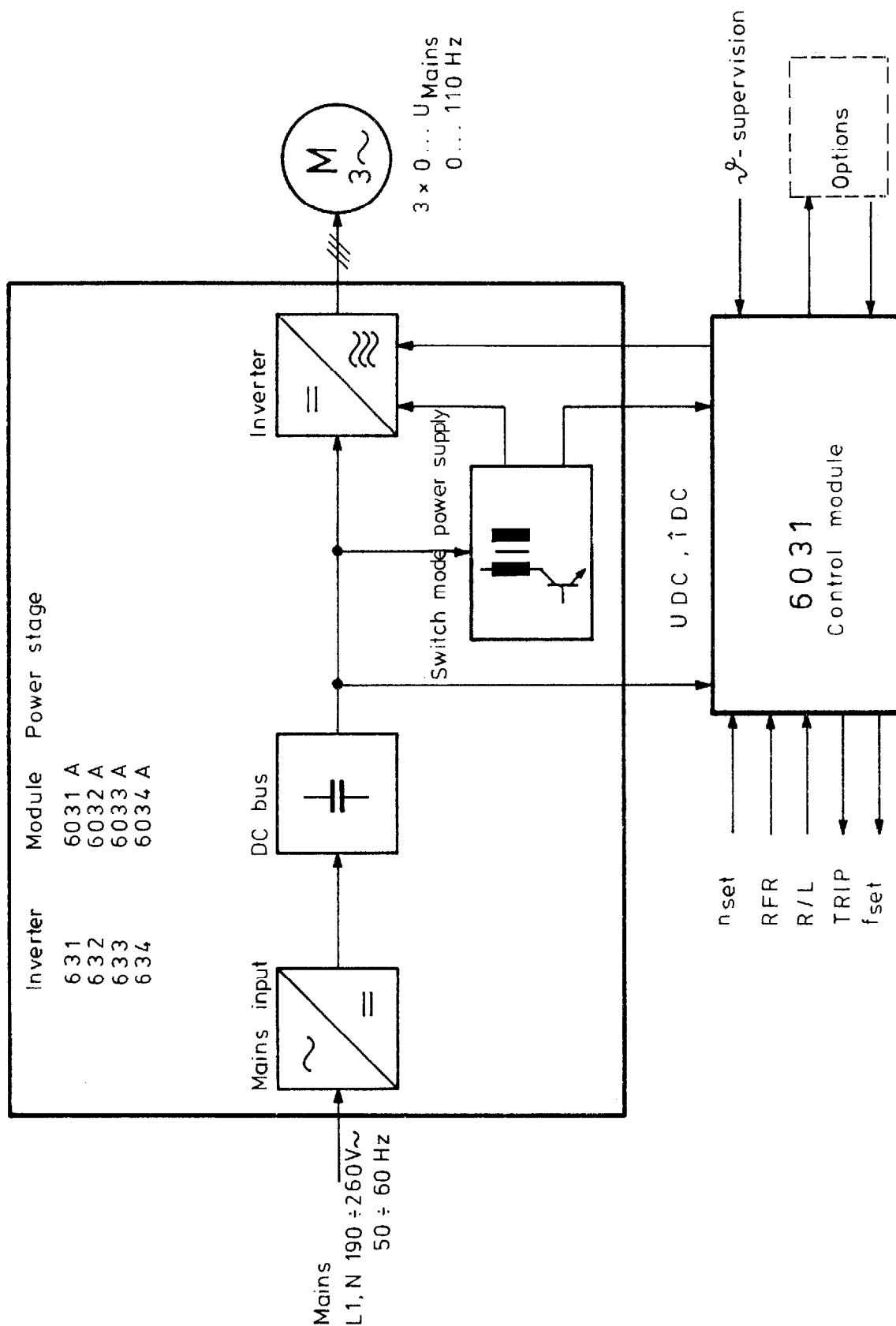
2. Technical data

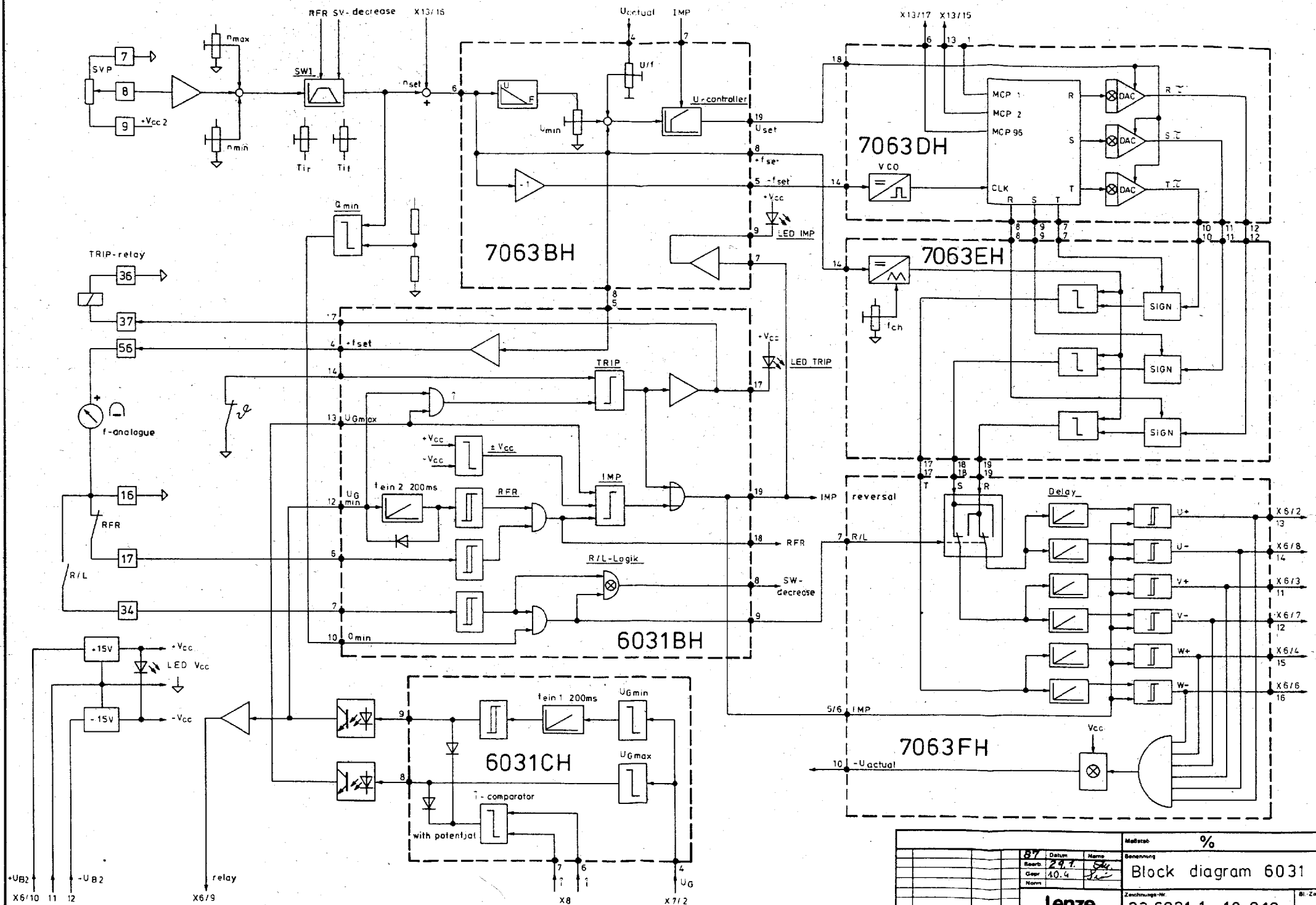
Type		631	632	633	634
Output power	S/kVA	1.3	1.5	2.6	3.6
Rated motor power	P/kW	0.55	0.75	1.5	2.2
Mains voltage	$U_{\text{mains}}/\text{V}$	$L_1 N 190 - 260 \pm 0\% 50 - 60$			
Rated mains current	$I_{\text{mains}}/\text{A}$	7.0	9.0	15.0	17.0
Output voltage	$U_{\text{phase}}/\text{V}$	$3 \times 0 \dots U_{\text{mains}}$			
Rated output current	I_N/A	3.4	4.0	7.0	9.5
Max. unit current	I_{max}/A	5.4	6.4	11.2	15.0
Power loss $f_d=50\text{Hz}, I=I_N$	P_V/W	50	70	90	150
Output frequency	f_d/Hz	0 ... 110			
Master voltage	U_{LN}/V	0 ... 10			
Master current	I_{LN}/mA	0 .. 20 or 4 ... 20			
Ambient temperature	$T_u/^\circ\text{C}$	0 ... 45			
Dimensions	HxBxD mm	155 x 202 x 230			
Weight	kg	2.2	2.9	4.0	4.0

Fuses, mains chokes

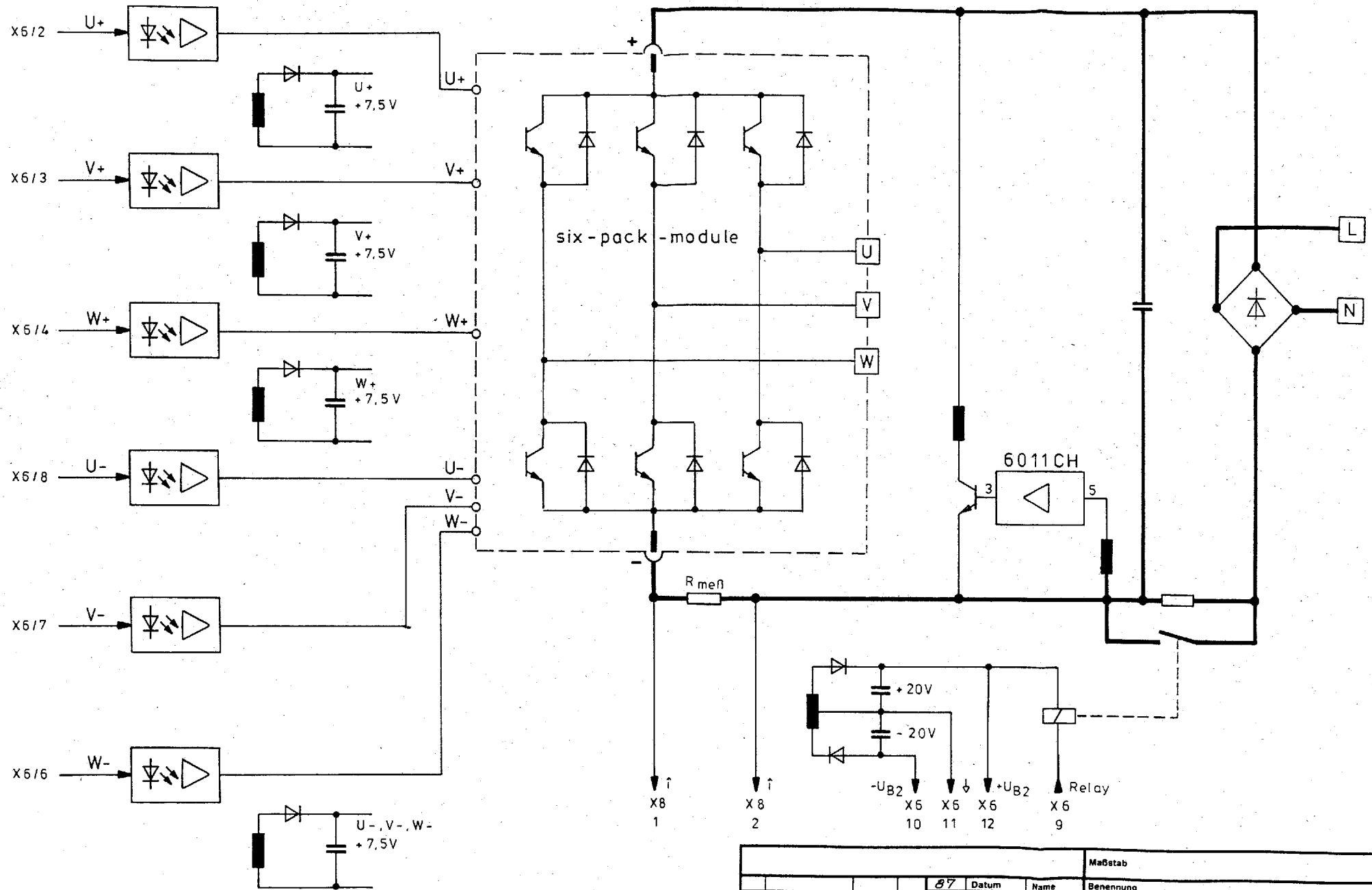
	631	632	633	634
Mains fuses F1	FF12.5A	FF16A	FF25A	FF30A
Part no.	6.3x32 324 808	6.3x32 305 725	10x38 307 308	10x38 321 554
Control fuse F2	F1A 5x20 321 660			
Part no.				
Mains chokes	5mH, 9A	5mH, 9A	3.5mH, 14A	1.6mH, 17A
Part no.	323 330	323 330	323 331	323 361
Controller part no.	326 442	326 443	326 444	326 445

3. Block diagram 631 - 634





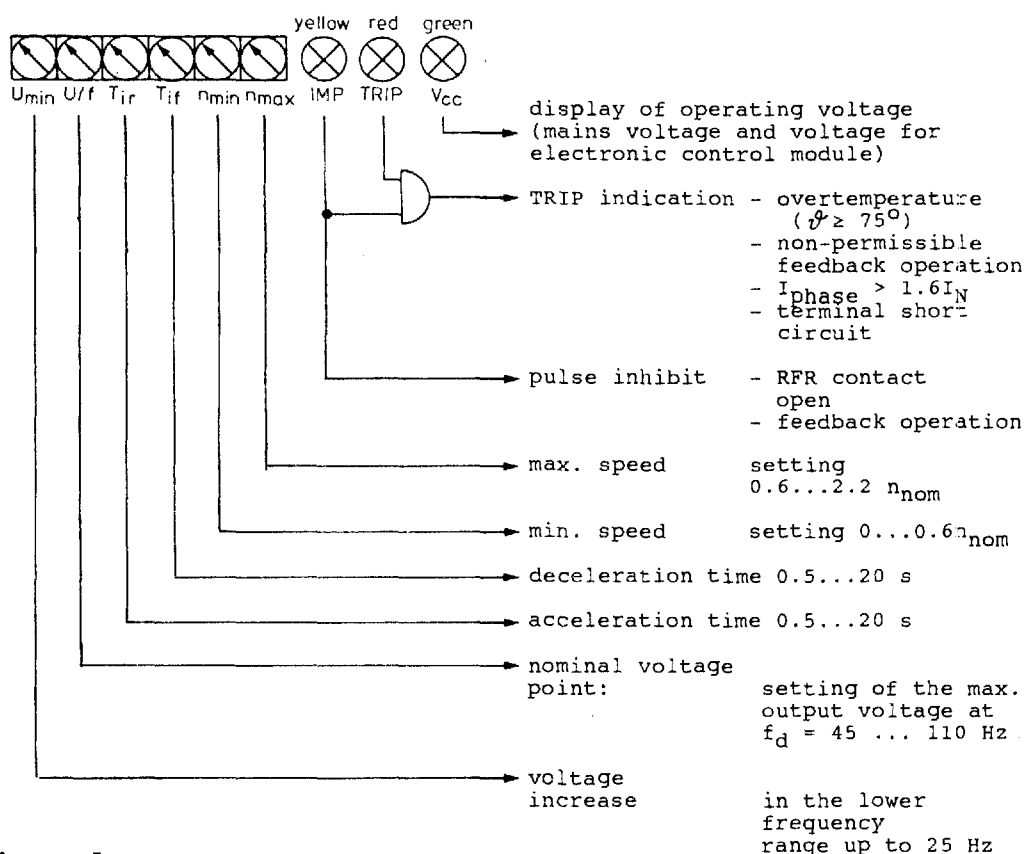
BY			Mallstrab		%	
Datum			Benennung			
Gez.			33.6031.1 - 10.010		Bl. Zahl	
Norm			Zeichnungs-nr.		Bl.	
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					haben wir uns	



				Maßstab	
		87	Datum	Name	Benennung
		Bearb.	3.4.	<i>E. K.</i>	Block diagram
		Gepr.	10.4.	<i>For</i>	Power stage 630
		Norm			Zeichnungs-Nr.
				Lenze	
				33.630.31 - 10.011	
				Bl.-Zahl	
				Bl.	
Zust.	Änderung	Datum	Name	Urspr.	Für diese Zeichnung behalten wir uns alle Rechte vor

4. Trimmers, display of operational status

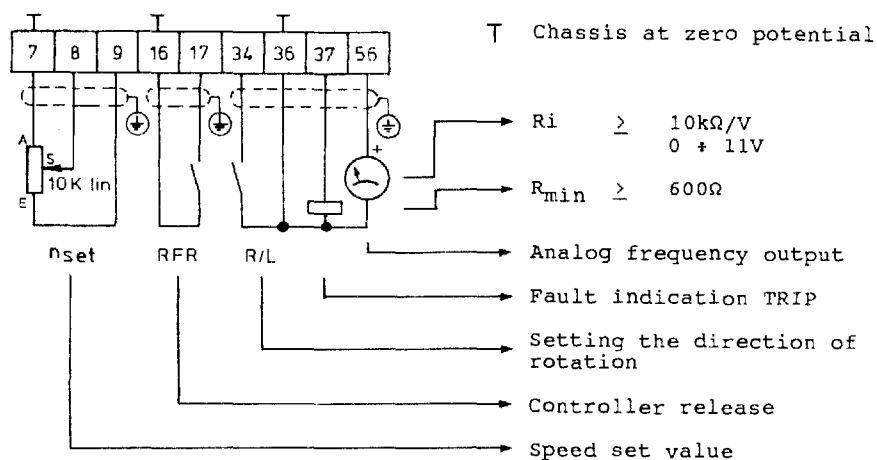
Fig. 21



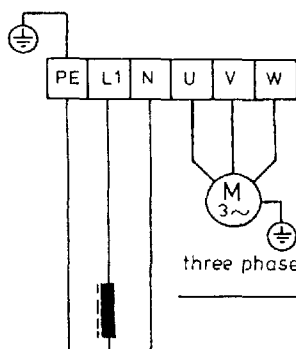
5. Connecting plan

Control module 6031

All control terminals are free of mains potential. Screen control cables. Apply screen on one side of the inverter to PE.



Power stage

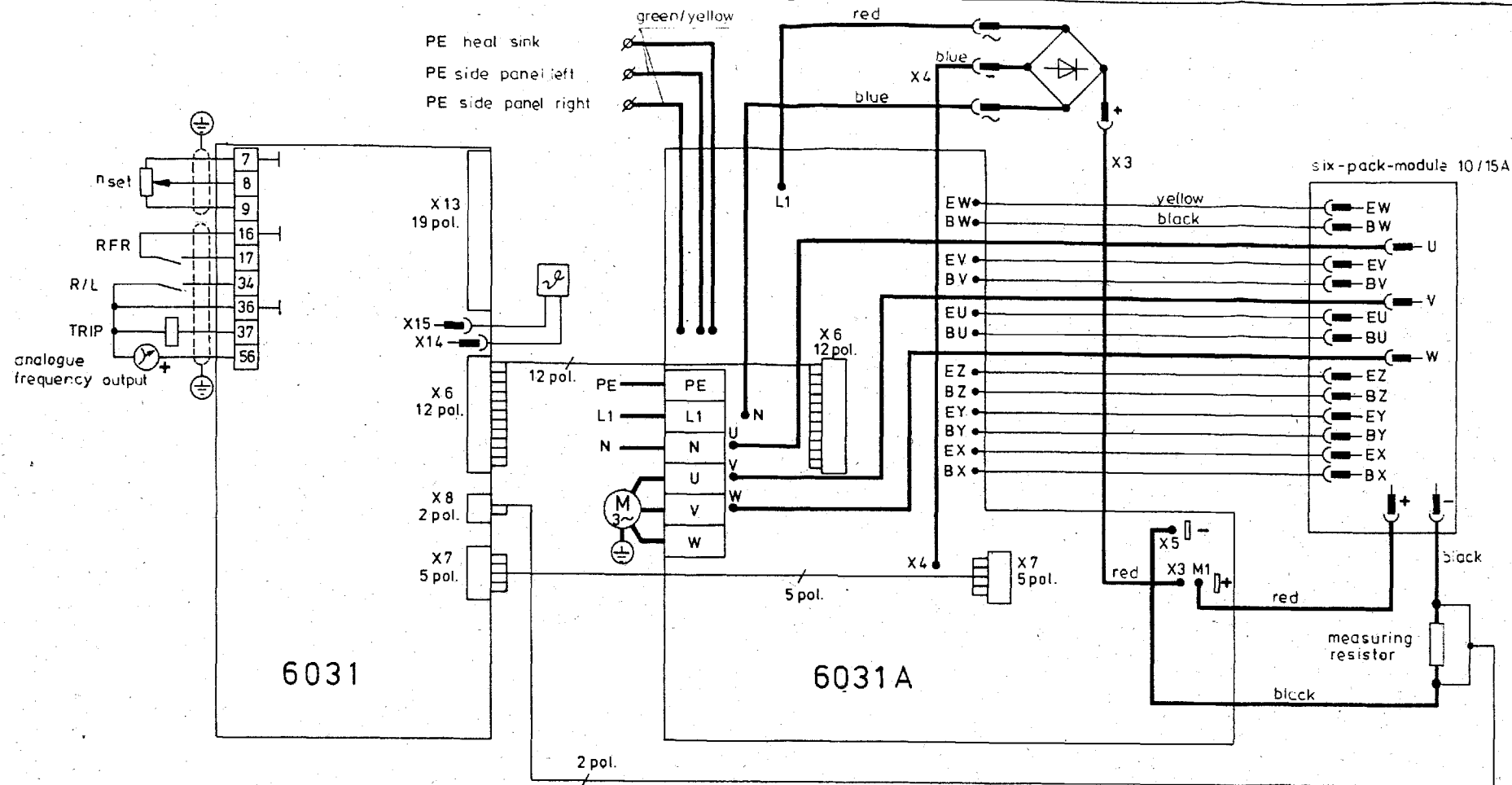


Caution:

- Terminals carry mains potential up to 20 s after switching off
 - Do not switch in the motor phases (if necessary, please consult manufacturer)
- Operate unit 634 only with allocated mains choke 1.6mH/17 A, part no: 323 361

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$U_{\text{mains}}: 190 - 260 \text{ V} \pm 0\%$



pin	X 13
1	+UB2 ≈ 20V
2	+Vcc2 = 15V
3	GND 2 1
4	-Vcc2 = -15V
5	Qmin, f _{Qmin} ≈ 13V, f < Qmin ≈ -13V
6	Uset 0 ÷ 10V
7	fset 0 ÷ 11V
8	nset, ULeit 0 ÷ 11V
9	RFR: L=0V=ON, H=+15V=OFF
10	IMP: L=0V=ON, H=15V=OFF
11	R/L: R=H=15V, L=0V
12	TRIP: L=0V=OFF, H=15V=ON
13	L=0V=DN, H=15V=OFF
14	f _{ch} ≈ 350Hz ÷ 4KHz
15	nset, ULeit 0 ÷ 11V

pin	X 13
16	summation for nset
17	96 x f _d : 0 ÷ 10,5 KHz
18	comp. for SW1 + 12V acceleration
19	-12V deceleration
	active L= 0V → WR inhibited
	H=15V → WR released

pin	X 6
1	opto coupler current U ₊ , V ₊ , W ₊
2	triggering U ₊
3	" V ₊
4	" W ₊
5	opto coupler current U ₋ , V ₋ , W ₋
6	triggering U ₋
7	" V ₋
8	" W ₋
9	relay ON = 0V
10	OFF = 20V
11	+UB2 ≈ 20V
12	GND 2 1
	-UB2 ≈ -20V

pin	X 8
1	I _z DC link current
2	GND 1 1

pin	X 14
1	OFF ≈ 15V = TRIP
2	ON ≈ 0V
3	GND 2 1

pin	X 7
1	GND1 1
2	U _z ≈ 8,4V
3	+UB1 ≈ 7V
4	GND 1 for 6011CH
5	-UB1 ≈ -7,5V

Connections of the modules

name of the connectors on print	EW	BW	EV	BV	EU	BU	EZ	BZ	EY	BY	EX	BX
name on module of Mitsubishi 10A part no. 326530	EW	BW	EV	BV	EU	BU	EW	BW	EV	BV	EU	BU
Toshiba 15A " " 326538	EW	BW	EV	BV	EU	BU	-	BZ	E-	BY	-	BX
Fuji 15A " " 326537	EW	BW	EV	BV	EU	BU	-	BZ	EC	BY	-	BX

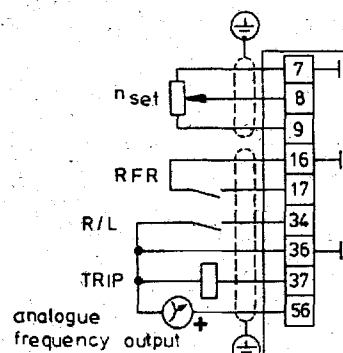
1. connect spade connectors U, V, W, + and - according to drawing
2. spade connectors existing on the module, but not indicated in the drawing are not connected

basic connections

U+ BU → EU	ON ≈ +2,0V
	OFF ≈ -1,4V
V+ BV → EV	ON ≈ +2,0V
	OFF ≈ -1,4V
W+ BW → EW	ON ≈ +2,0V
	OFF ≈ -1,4V
U- EX → EX	ON ≈ +2,0V
	OFF ≈ -1,4V
V- BY → EY	ON ≈ +2,0V
	OFF ≈ -1,4V
W- BZ → EZ	ON ≈ +2,0V
	OFF ≈ -1,4V



A7			Datum		Name		Maßstab		%	
Bezeichnung			30.1		Sk.		Overall connecting plan 631			
Gepr.			11.4				Lenze		33.631.33 - 00.001	
Hörn.									Bl-Zahl	
									01	



6031

PE heat sink
PE side panel left
PE side panel right

X13
19 pol.

X15
X14

X6
12 pol.

X8
2 pol.

X7
5 pol.

2 pol.

green/yellow

red

blue

blue

blue

blue

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6032A

six-pack-module 15A

EW BW EV BV EU BU EZ BZ EY BY EX BX

EW BW EV BV EU BU EZ BZ EY BY EX BX

EW BW EV BV EU BU EZ BZ EY BY EX BX

EW BW EV BV EU BU EZ BZ EY BY EX BX

EW BW EV BV EU BU EZ BZ EY BY EX BX

EW BW EV BV EU BU EZ BZ EY BY EX BX

EW BW EV BV EU BU EZ BZ EY BY EX BX

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EW BW EV BV EU BU EZ BZ EY BY EX BX

EW BW EV BV EU BU EZ BZ EY BY EX BX

EW BW EV BV EU BU EZ BZ EY BY EX BX

EW BW EV BV EU BU EZ BZ EY BY EX BX

Connections of the modules

name of the connectors on print	EW	BW	EV	BV	EU	BU	EZ	BZ	EY	BY	EX	BX
name on module of	EW	BW	EV	BV	EU	BU	EZ	BZ	EY	BY	EX	BX
Mitsubishi 15A part no. 326 531	EW	BW	EV	BV	EU	BU	EZ	BZ	EY	BY	EX	BX
Toshiba 15A " " 326 538	EW	BW	EV	BV	EU	BU	EZ	BZ	EY	BY	EX	BX
Fuji 15A " " 326 537	EW	BW	EV	BV	EU	BU	EZ	BZ	EY	BY	EX	BX

- 1 connect spade connectors U, V, W, + and - according to drawing
- 2 spade connectors existing on the module, but not indicated in the drawing are not connected.

basic connections

U+ BU → EU	ON ≈ +2,0V	OFF ≈ -1,4V
V+ BV → EV	ON ≈ +2,0V	OFF ≈ -1,4V
W+ BW → EW	ON ≈ +2,0V	OFF ≈ -1,4V
U- BX → EX	ON ≈ +2,0V	OFF ≈ -1,4V
V- BY → EY	ON ≈ +2,0V	OFF ≈ -1,4V
W- BZ → EZ	ON ≈ +2,0V	OFF ≈ -1,4V



pin	X 13
1	+U _{B2} ≈ 20V
2	+V _{cc2} = 15V } total charge
3	GND 2 L } 50 mA
4	-V _{cc2} = -15V
5	G _{min} , f _Q min ≈ 13V, f _Q ≈ -13V
6	U _{set} 0 ÷ 10V
7	f _{set} 0 ÷ 11V
8	nset, U _{Leit} 0 ÷ 11V
9	RFR : L=0V=ON, H=+15V=OFF
10	IMP : L=0V=ON, H=+15V=OFF
11	R/L : R=H=15V, L=L=0V
12	TRIP : L=0V=OFF, H=15V=ON
13	TRIP : L=0V=ON, H=15V=OFF
14	f _{ch} ≈ 350Hz ± 4 KHz
15	nset ; U _{Leit} 0 ÷ 11V

pin	X 13
16	summation for nset
17	96 x f _Q = 0 ÷ 10,5 KHz
18	comp. for SWI +12V acceleration -12V deceleration
19	active L= 0V → WR inhibited H=15V → WR released

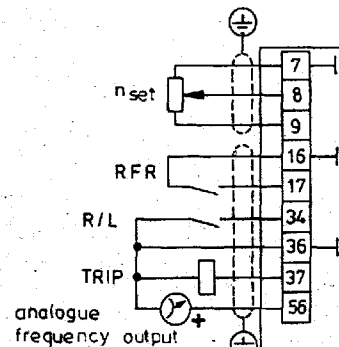
pin	X 6
1	opto coupler current U _Y , V _W
2	triggering U+
3	" V+
4	" W+
5	opto coupler current U _Y , V _W
6	triggering U-
7	" V-
8	" W-
9	relay ON = 0V OFF ≈ 20V
10	+U _{B2} ≈ 20V
11	GND 2 L
12	-U _{B2} ≈ -20V

pin	X 8
1	I _Z OC link current
2	GND 1 L

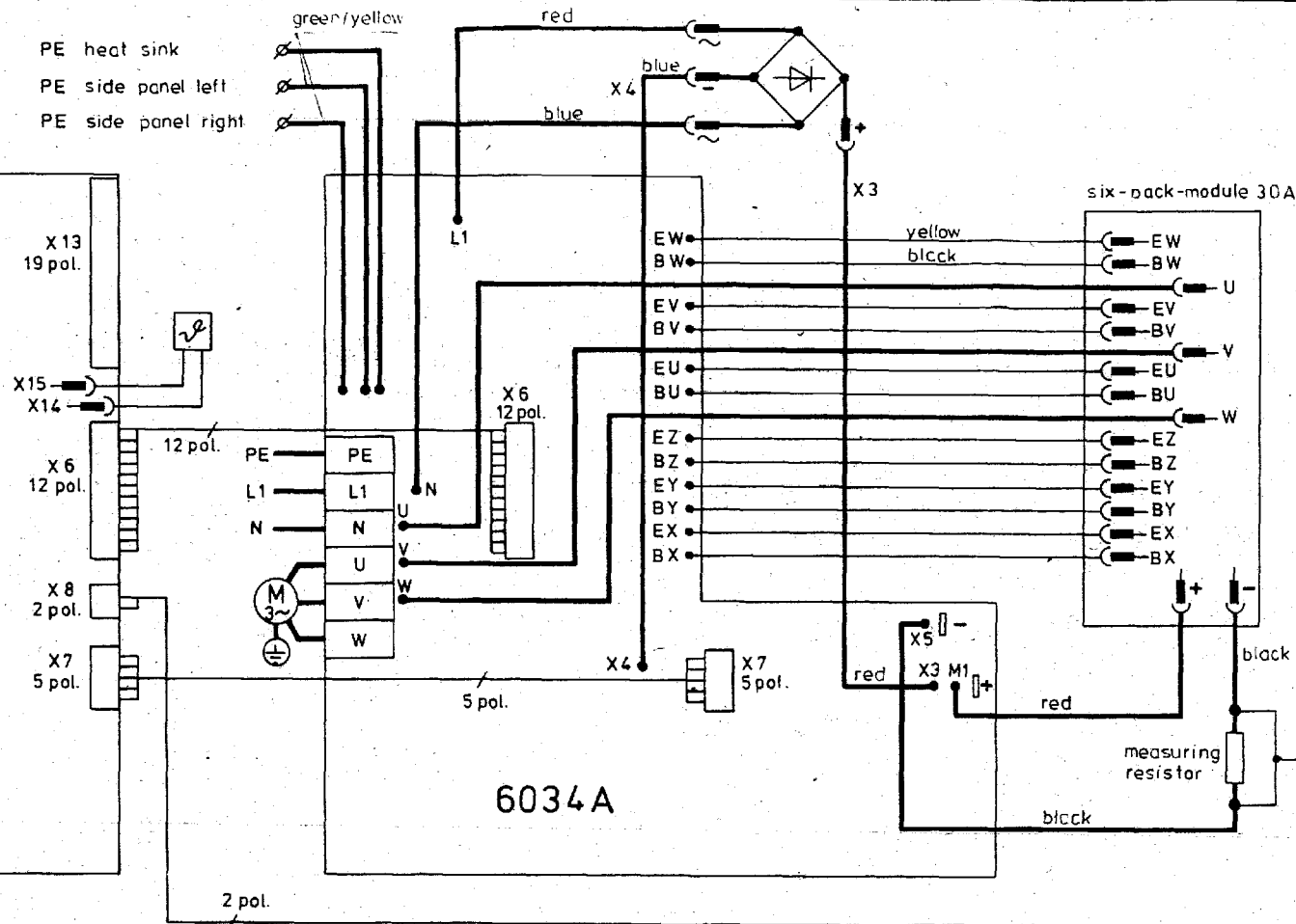
pin	X 14
1	OFF ≈ 15V = TRIP
2	ON ≈ 0V
3	GND 2 L

pin	X 7
1	GND 1 L
2	U _Z ≈ 8,4V
3	+U _{B1} ≈ 7V
4	GND 1 for 6011CH
5	-U _{B1} ≈ -7,5V

Maßstab			%
30.7	Datum	Name	Benennung
30.7	30.7	30.7	Overall connecting plan 632
Lenze			Zeichnungs-Nr. 33.632.33 - 00.001
Bl.-Zahl			Bl.-Zahl



6031



6034A

pin	X 13
1	+UB2 ≈ 20V
2	+Vcc2 ≈ 15V
3	GND 2 L
4	-Vcc2 ≈ -15V
5	Qmin, I > Qmin ≈ 13V, f < Qmin ≈ -13V
6	Uset 0 ÷ 10V
7	fset 0 ÷ 11V
8	nset, ULeit 0 ÷ 11V
9	RFR : L = 0V = ON, H = +15V = OFF
10	IMP : L = 0V = ON, H = 15V = OFF
11	R/L : R = 15V, L = 0V
12	TRIP : L = 0V = OFF, H = 15V = ON
13	W : L = 0V = ON, H = 15V = OFF
14	fch ≈ 350Hz ÷ 4 KHz
15	nset, ULeit 0 ÷ 11V

pin	X 13
16	summation for nset
17	96 x f _d : 0 ÷ 10.5 KHz
18	comp. for SWI + 12V acceleration
19	-12V deceleration
	active L = 0V → WR inhibited
	H = 15V → WR released

pin	X 6
1	opto coupler current U-V, W+
2	triggering U+
3	" V+
4	" W+
5	opto coupler current U-Y, W-
6	triggering U-
7	" V-
8	" W-
9	relay ON = 0V
10	OFF ≈ 20V
11	+UB2 ≈ 20V
12	GND 2 L
	-UB2 ≈ -20V

pin	X 8
1	I ₂ DC link current
2	GND 1 L

pin	X 14
1	OFF ≈ 15V = TRIP
2	0 ÷ ≈ 0V
3	GND 2 L

pin	X 7
1	GND 1 L
2	U ₂ ≈ 8.4V
3	+UB1 ≈ 7V
4	GND 1 for 6011CH
5	-UB1 ≈ -7.5V

Connections of the modules

name of the connectors on print	EW	BW	EV	BV	EU	BU	EZ	BZ	EY	BY	EX	BX
Toshiba 30A part-no. 326 534	EW	BW	EV	BV	EU	BU	EZ	BZ	EY	BY	EX	BX
Fuji 30A " " 326 541	EW	BW	EV	BV	EU	BU	EZ	BZ	EY	BY	EX	BX

1. connect spade connectors U, V, W, + and - according to drawing

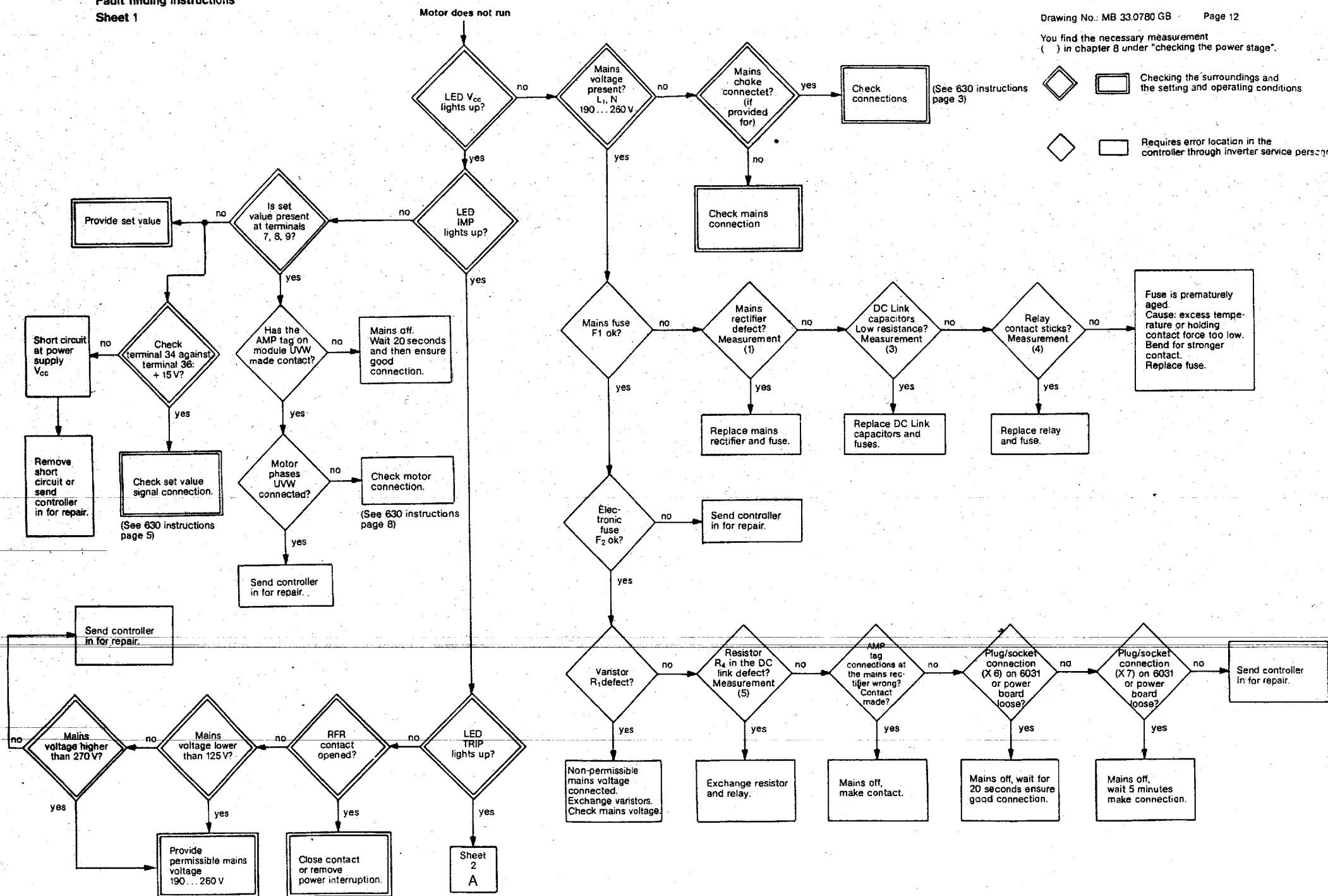
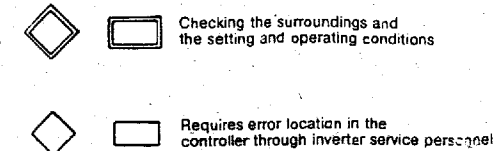
basic connections

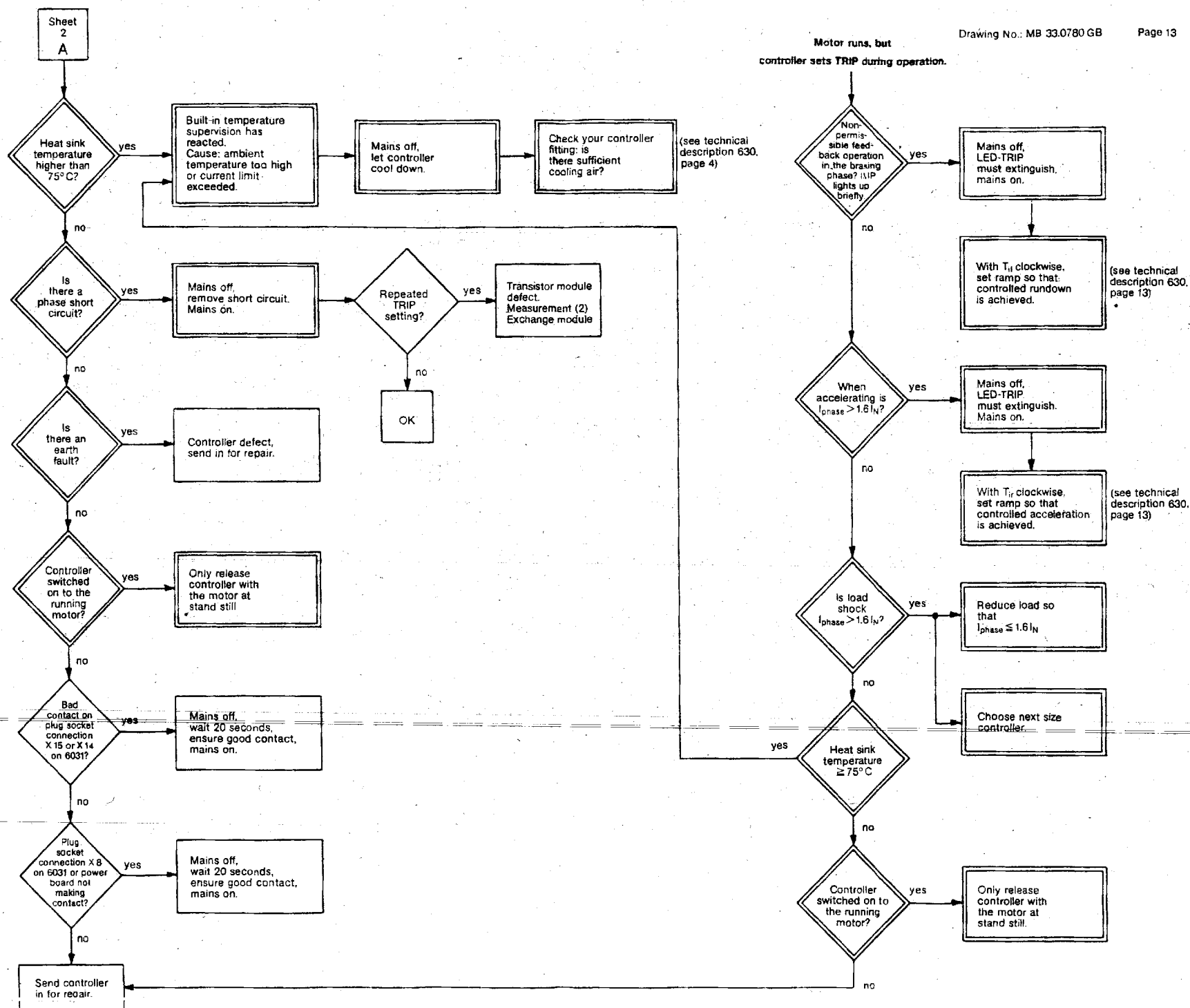
U + BU → EU	ON ≈ +2,0V
	OFF ≈ -1,4V
V + BV → EV	ON ≈ +2,0V
	OFF ≈ -1,4V
W + BW → EW	ON ≈ +2,0V
	OFF ≈ -1,4V
U - BX → EX	ON ≈ +2,0V
	OFF ≈ -1,4V
V - BY → EY	ON ≈ +2,0V
	OFF ≈ -1,4V
W - BZ → EZ	ON ≈ +2,0V
	OFF ≈ -1,4V



Madetop %			
Benennung	Datum	Rev.	Benennung
Overall connecting plan 634	30.7	1	
Zeichnungs-Nr.	33.634.33	00.001	
Lenze			

You find the necessary measurement
() in chapter 8 under "checking the power stage".





8. Checking the power stage

The power stage was measured with an ohmmeter (analog multiple measuring instrument e.g. type Metavo 3 of Metrawatt) or with a digital multimeter (e.g. Fluke 77) when no voltage is applied at the controller).

Power supply cable and motor cable must be disconnected. The listed resistances stand for the nominal state. When they vary, there is a fault.

Operate digital multimeter in the measuring range $\rightarrow$.

For the values marked with * the measuring instrument shows a small resistance at first, but then the stated final values are attained after a short time (approx. 1-2 s, depending on the measuring current).

+ and - refer to the two AMP plugs on the power board in the area of the DC link capacitors.

Caution: The positive pole of the internal accumulator of the used analog instrument is applied at the negative measuring terminal. Instruments of other manufacturers may be different (positive pole of the internal accumulator at the positive measuring terminal).

8. Measurement (1) Mains rectifier

positive connection of the ohmmeter at controller terminal	negative connection of the ohmmeter at controller terminal	displayed analog value	displayed voltage
L ₁	+ AMP plug	$R > 10 \text{ k}\Omega^*$	0.4-0.6V
N	+ AMP plug	$R > 10 \text{ k}\Omega^*$	0.4-0.6V
+ AMP plug	L ₁	$R < 1 \text{ k}\Omega$	OL
+ AMP plug	N	$R < 1 \text{ k}\Omega$	OL
- AMP plug	L ₁	$R > 10 \text{ k}\Omega^*$	0.4-0.6V
- AMP plug	N	$R > 10 \text{ k}\Omega^*$	0.4-0.6V
L ₁	- AMP plug	$R < 1 \text{ k}\Omega$	OL
N	- AMP plug	$R \rightarrow 1 \text{ k}\Omega$	OL
L ₁	PE	$R \rightarrow \infty$	OL
N	PE	$R \rightarrow \infty$	OL
PE	L ₁	$R \rightarrow \infty$	OL
PE	N	$R \rightarrow \infty$	OL

8.2 Measurement (2) Inverter

positive connection of the ohmmeter at controller terminal	negative connection of the ohmmeter at controller terminal	displayed analog value	displayed voltage
U	+ AMP plug	$R > 10 \text{ k}\Omega^*$	0.4-0.6V
V	+ AMP plug	$R > 10 \text{ k}\Omega^*$	0.4-0.6V
W	+ AMP plug	$R > 10 \text{ k}\Omega^*$	0.4-0.6V
+ AMP plug	U	$R < 1 \text{ k}\Omega$	OL
+ AMP plug	V	$R < 1 \text{ k}\Omega$	OL
+ AMP plug	W	$R < 1 \text{ k}\Omega$	OL
- AMP plug	U	$R > 10 \text{ k}\Omega^*$	0.4-0.6V
- AMP plug	V	$R > 10 \text{ k}\Omega^*$	0.4-0.6V
- AMP plug	W	$R > 10 \text{ k}\Omega^*$	0.4-0.6V
U	-U AMP plug	$R < 1 \text{ k}\Omega$	OL
V	-U AMP plug	$R < 1 \text{ k}\Omega$	OL
W	-U AMP plug	$R < 1 \text{ k}\Omega$	OL
PE	U	$R \rightarrow \infty$	OL
PE	V	$R \rightarrow \infty$	OL
PE	W	$R \rightarrow \infty$	OL
U	PE	$R \rightarrow \infty$	OL
V	PE	$R \rightarrow \infty$	OL
W	PE	$R \rightarrow \infty$	OL

8.3 Measurement (3) DC link capacitors

positive connection of the ohmmeter at controller terminal	negative connection of the ohmmeter at controller terminal	displayed analog value	displayed voltage
+ AMP plug	- AMP plug	$R < 1 \text{ k}\Omega^*$	0.6-1.2V
- AMP plug	+ AMP plug	$R > 10 \text{ k}\Omega^*$	OL

8.4 Measurement (4) (5)

Relay, switch-on resistor

Operate digital multimeter in the Ω measuring range

positive connection of the ohmmeter at controller terminal	negative connection of the ohmmeter at controller terminal	displayed analog value	displayed digital value
- rectifier	- AMP plug	631 } $\approx 4.5\Omega$ 632 }	631 } $\approx 4.5\Omega$ 632 }
		633 } $\approx 7.5\Omega$ 634 }	633 } $\approx 7.5\Omega$ 634 }

When the display shows 0Ω the relay contact sticks or the protective switch-on resistor R4 is of low resistance.

When the display shows ∞ or $> 1\text{ M}\Omega$ the protective switch-on resistor R4 is of high resistance.

9. List of units, components, hybrids

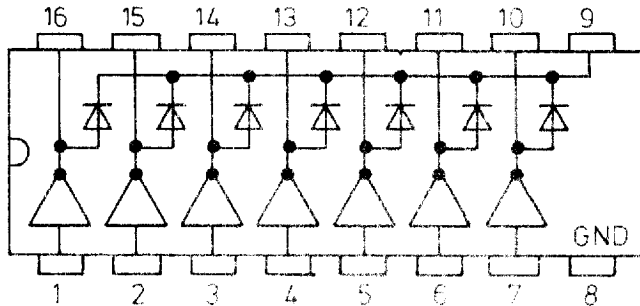
Integrated product	part.no	Description	Parts to be used				mother boards, mother units
			631	632	633	634	
631	326 442	frequency inverter 631					631,632,633,634 631 632 633 634 6031 6031 6031A, 6032A 6033A, 6034A 6031 6031 6031
632	326 443	frequency inverter 632					
633	326 444	frequency inverter 633					
634	326 445	frequency inverter 634					
6031	326 446	control board 631-634	1x	1x	1x	1x	
6031A	326 447	power board for 631	1x				
6032A	326 448	power board for 632		1x			
6033A	326 449	power board for 633			1x		
6034A	326 450	power board for 634				1x	
6031BH	326 433	CW/CCW switching thick layer hybrid	1x	1x	1x	1x	
6031CH	326 435	I and U supervision thick layer hybrid	1x	1x	1x	1x	
6011CH	326 431	switch mode power supply thick layer hybrid	1x	1x	1x	1x	
7063BH	326 087	U controller thick layer hybrid	1x	1x	1x	1x	
70630H	326 089	sinus 1 thick layer hybrid	1x	1x	1x	1x	
7063EH	326 090	sinus 2 thick layer hybrid	1x	1x	1x	1x	
7063FH	326 091	sinus 3 thick layer hybrid	1x	1x	1x	1x	
<u>Options</u>							
6035A	326 624	PLC option	1x	1x	1x	1x	631,632,633,634
60310H	328 590	clamp hybrid	1x	1x	1x	1x	6031
6031C	328 935	clamp option	1x	1x	1x	1x	631,632,633,634
6030	328 894	hand held terminal for diagnosis	1x	1x	1x	1x	631,632,633,634
6030	328 897	current transformer	1x	1x	1x	1x	631,632,633,634

10. Fitted components

10.1 Analog integrated circuits

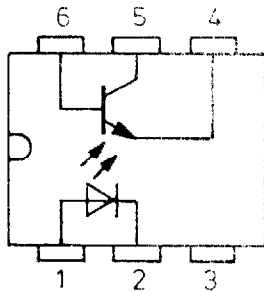
Darlington array

ULN 2004



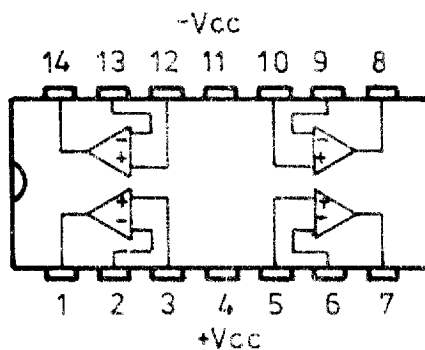
opto coupler

CNY17-III

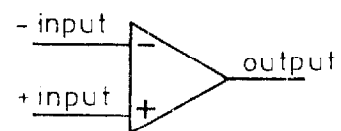


x operational amplifier

LM 348 N



part no. 307 900

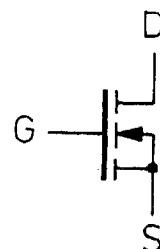
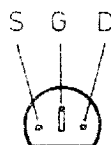
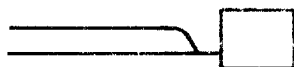


10.2 Discrete small power semiconductors

MOS-FET transistor n-channel

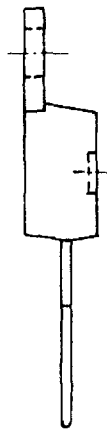
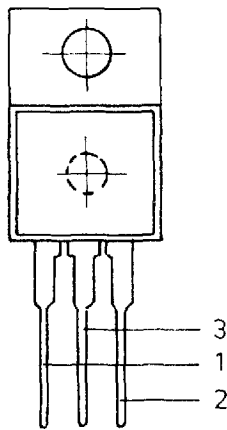
BS 170

part no. 321 940



Positive fixed voltage controller +15V
78 M 15 CKC

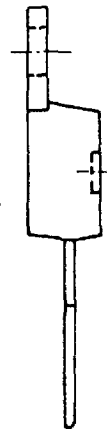
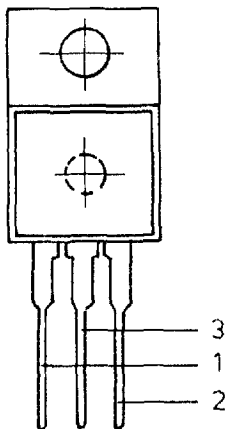
part no. 307 168



1 = input
2 = output
3 = GND

Negative fixed voltage controller -15V
79 M 15 AUC

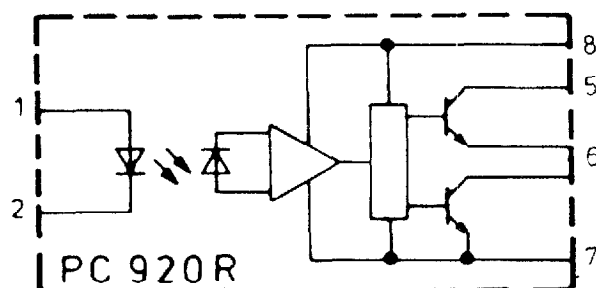
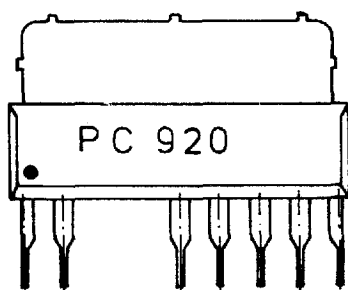
part no. 307 899



1 = GND
2 = output
3 = input

Driver components PC 920

part no. 326 412

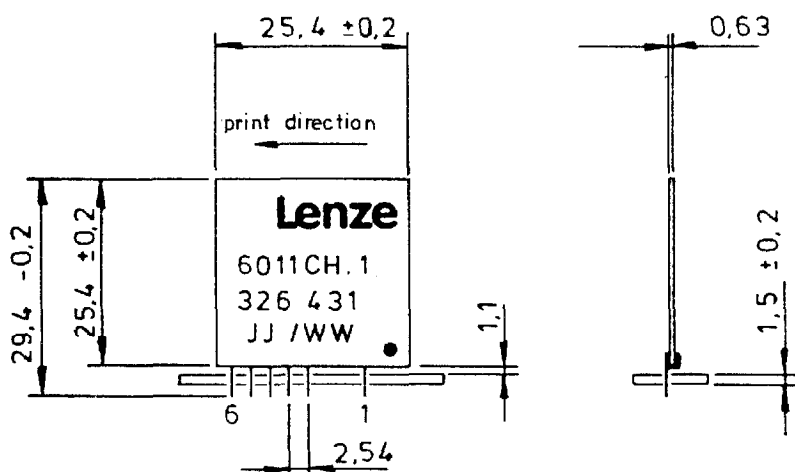


10.3 Hybrids

Hybrid 6011CH

switch mode power supply control

scale 1:1



connecting pins are crimped

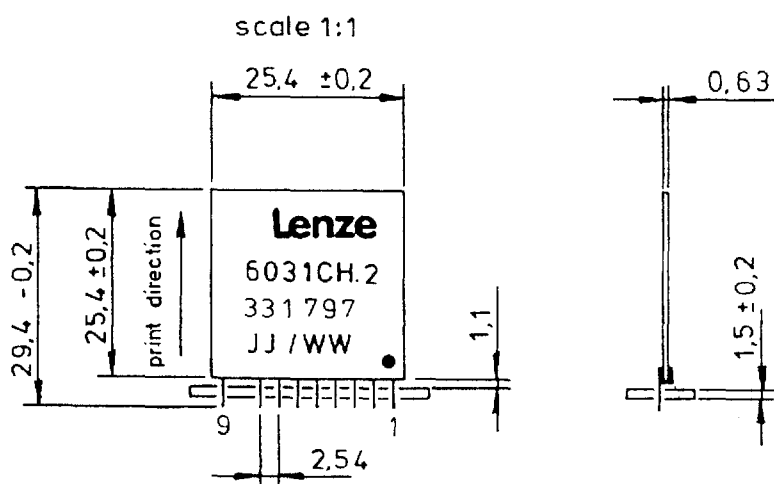
part no. 326 431

pin	
1	+ U_G (0-385V)
2	switch-on lock $\perp$ — switch mode power supply on +0.7V — switch mode power supply off
3	basis of the switch mode power supply transistor
4	GND1 DC link ground $\perp$
5	control winding $\left\{ \begin{array}{l} U \\ -7.5V \end{array} \right.$
6	- $U_B = 7.5 V \pm 2\%$

 $20 \text{ kHz} \leq f \leq 30 \text{ kHz}$

Hybrid 6031CH

Supervision power stage



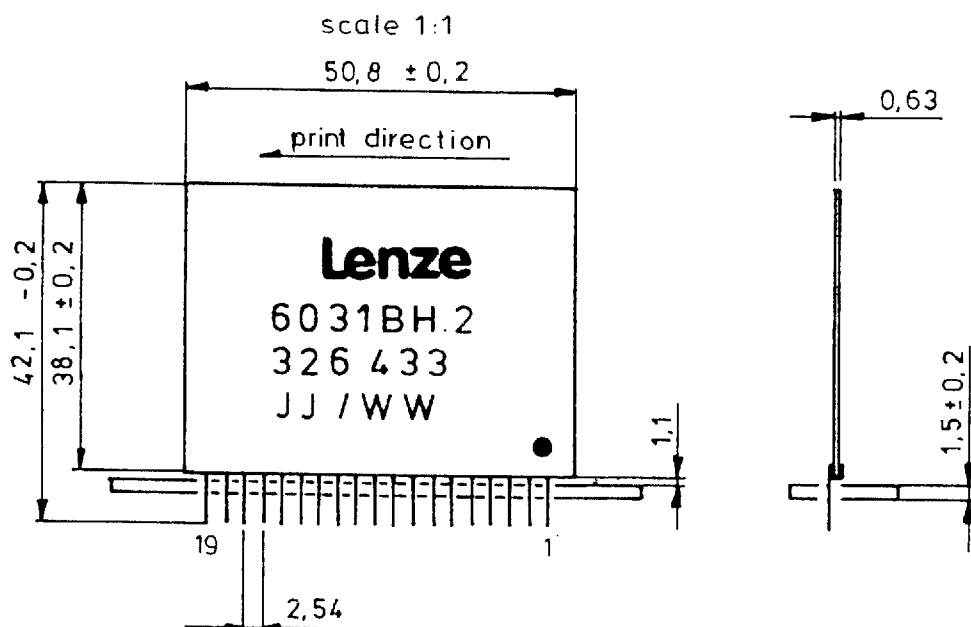
connecting pins are crimped

part no. 331 797

pin	
1	$+U_{B1} = +6.5V \pm 5\%$
2	GND1 $\perp$
3	$-U_{B1} = -7.5V \pm 2\%$
4	U_2 , 8V at 310V DC
5	capacitor for mains switch-on time $t_1 \approx 350$ ms
6	I_Z DC link current
7	GND1 $\perp$
8	U_{Gmax} : -7.5V = OFF, +6.5V = ON
9	U_{Gmin} : -7.5V = OFF, +6.5V = ON

hybrid 6031BH

supervision logic



connecting pins are crimped

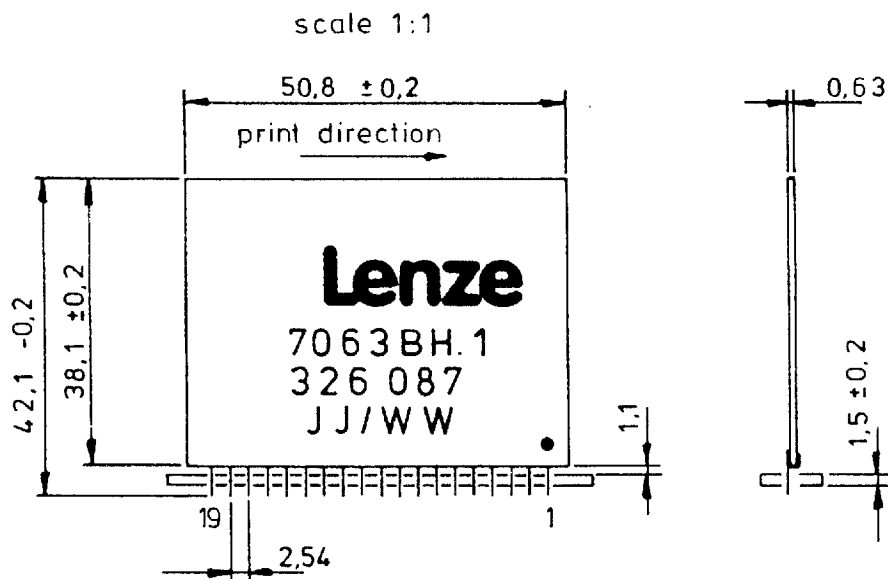
part no. 326 433

pin	
1	+V _{CC2} = 15V ± 5%
2	GND2 ⊥
3	-V _{CC2} = -15V ± 5%
4	f _{set} : 0 ÷ 11V
5	f _{set} : 0 ÷ 11V
6	RFR: L = 0V = ON, H = 15V = OFF
7	CW/CCW: CW = H = 15V, CCW = L = 0V
8	set value decrease: 0V = active
9	CW/CCW: CW = H = 15V, CCW = L = 0V
10	Q _{min} : f < Q _{min} ≈ 13V, f > Q _{min} = 0V
11	RFR: L = 0V = ON, H = 15V = OFF
12	U _{Gmin} : L = 0V, H = 12V = OFF
13	U _{Gmax} : L = 0V, H = 12V = OFF
14	ψ : L = 0V, H = 12V = OFF
15	capacitor for mains switch-on time t ₂ ≈ 150ms
16	TRIP memory = 15V
17	TRIP indication: L = 0V = OFF, H = 15V = ON
18	IMP: L = 0V = OFF, H = 15V = ON
19	IMP: L = 0V = ON, H = 15V = OFF

Lenze

hybrid 7063BH

voltage controller



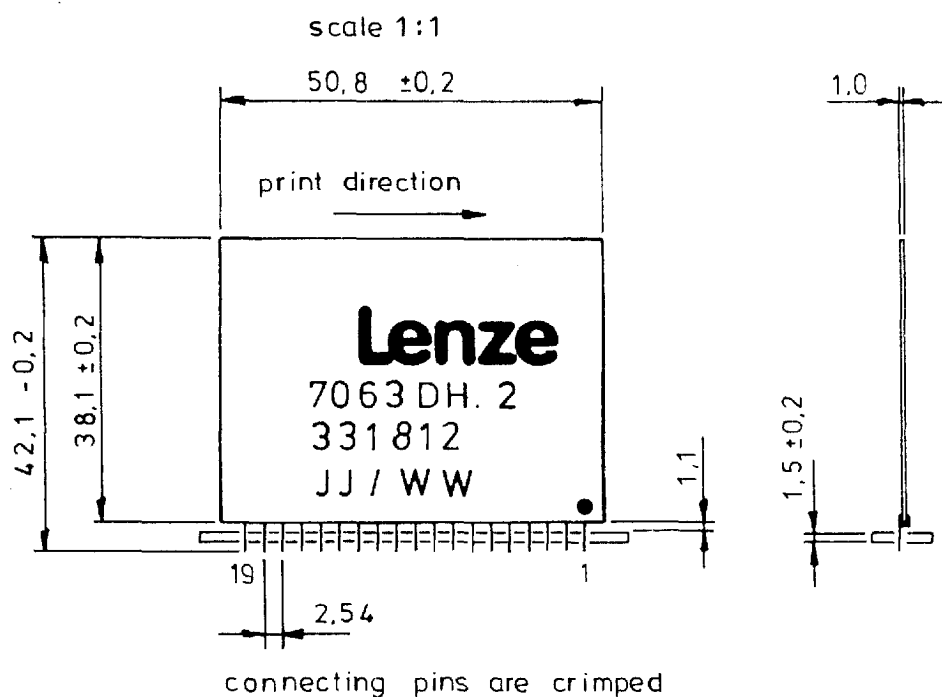
connecting pins are crimped

part no. 326 087

pin	
1	$+V_{cc2} = 15V \pm 5\%$
2	GND2 $\perp$
3	$-V_{cc2} = -15V \pm 5\%$
4	$-U_{actual}: 0 \div -7.5V$
5	$-n_{nominal}: 0 \div -11V$
6	summation point: 0V
7	IMP: L = 0V = ON, H = 15V = OFF
8	$+n_{nominal}: 0 \div 11V$
9	IMP: -13V = OFF, +13V = ON
10	n.c.
11	$U_{min}: 0 \div 0.8V$
12	$U_{min}: 0 \div 0.8V$
13	n.c.
14	n.c.
15	$-V_{cc2} = -15V$
16	n.c.
17	PI connection U controller
18	n.c.
19	$U_{nominal}: 0 - 10V$

hybrid 7063DH

sinus 1



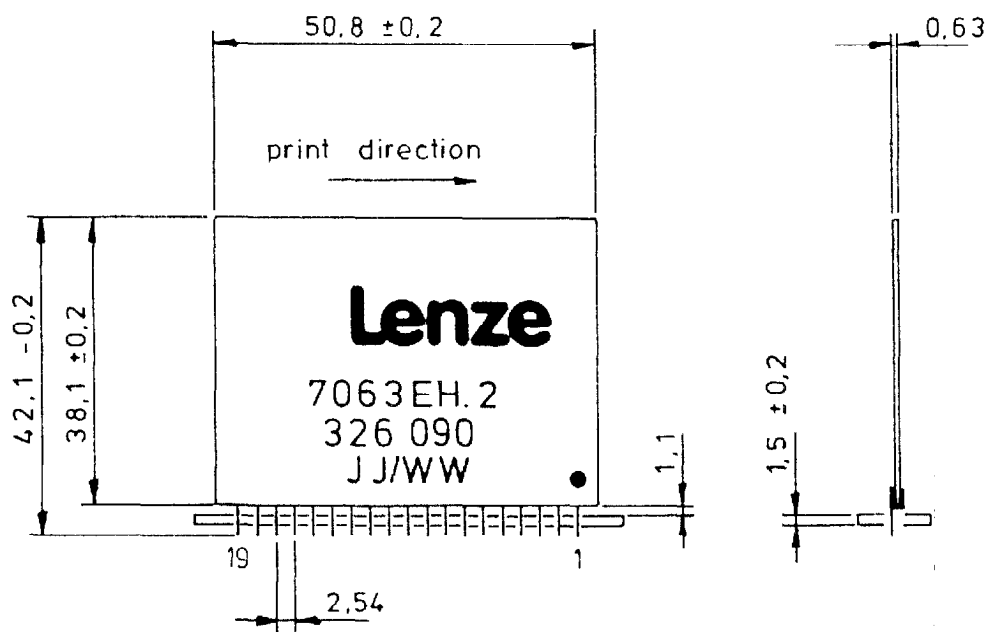
part no. 331 812

pin	
1	$+V_{CC} = 15V \pm 5\%$
2	GND2 $\perp$
3	$-V_{CC} = -15V \pm 5\%$
4	$+V_{CC} = 15V$
5	96 fd 0 ÷ 10.5 kHz
6	96 fd 0 ÷ 10.5 kHz
7	phase T:
8	phase R:
9	phase S:
10	phase T:
11	phase S: $\hat{U} 0 \div 10V \perp$
12	phase R:
13	6xfd: 0 ÷ 660 Hz
14	$-n_{nominal}: 0 \div -11V$
15	saw tooth: 96 fd $\perp$ -10V
16	0V
17	one shot: 96 fd $\perp$ 10V
18	$U_{nominal}: 0 \div 10V$
19	1xfd: 0 ÷ 110 Hz

hybrid 7063EH.2

sinus 2

scale 1:1



connecting pins are crimped

part no. 326 090

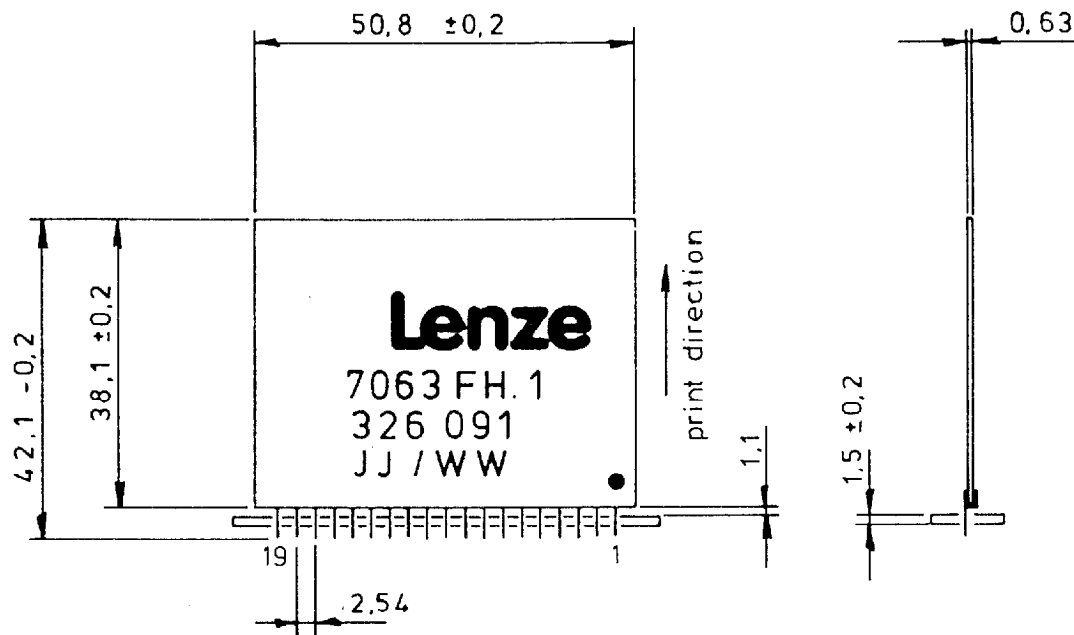
pin

1	$+V_{CC} = 15V \pm 5\%$	
2	GND2	$\perp$
3	$-V_{CC} = -15V \pm 5\%$	
4	square wave: 350 Hz ÷ 4 kHz, $\pm (2V \div 8V)$	$\perp$
5	0V	
6	fch $\approx$ 350 Hz ÷ 4 kHz	$\perp$
7	phase T:	
8	phase R:	
9	phase S:	
10	phase T:	} U 0 ÷ -10V $\perp$
11	phase S:	
12	phase R:	
13	fmin: -1.95V	
14	$+n_{nominal}: 0 \div +5.5V$	
15	n.c.	
16	fch: 350 Hz ÷ 4 kHz	$\perp$
17	phase T:	}
18	phase S:	
19	phase R:	

hybrid 7063FH

sinus 3

scale 1:1

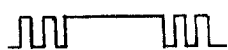


connecting pins are crimped

part no. 326 091

pin

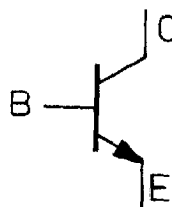
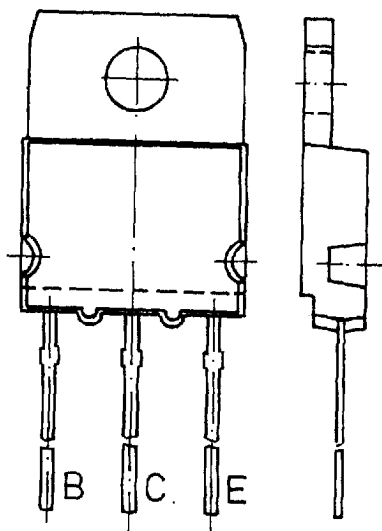
1	$+V_{CC} = 15V \pm 5\%$
2	GND2 $\perp$
3	$-V_{CC} = -15V \pm 5\%$
4	$-V_{CC} = -15V$
5	IMP: L = 0V = ON, H = 15V = OFF
6	IMP: L = 0V = ON, H = 15V = OFF
7	CW/CCW: CW = H = 15V, CCW = L = 0V
8	0V
9	n.c.
10	$-U_{actual}: 0 \div -7.5V$
11	phase V+
12	phase V-
13	phase U+
14	phase U-
15	phase W+
16	phase W-
17	phase T
18	phase S
19	phase R



10.4 Power semiconductors

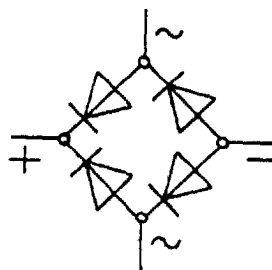
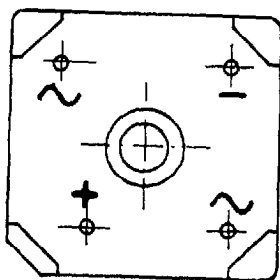
Switch mode power supply transistor S911T (BU908)

part no. 328 635



mains rectifier 36MB80A

part no. 308 302

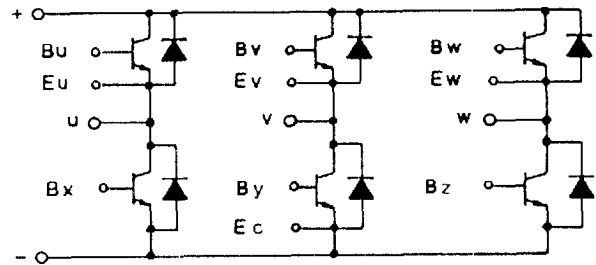
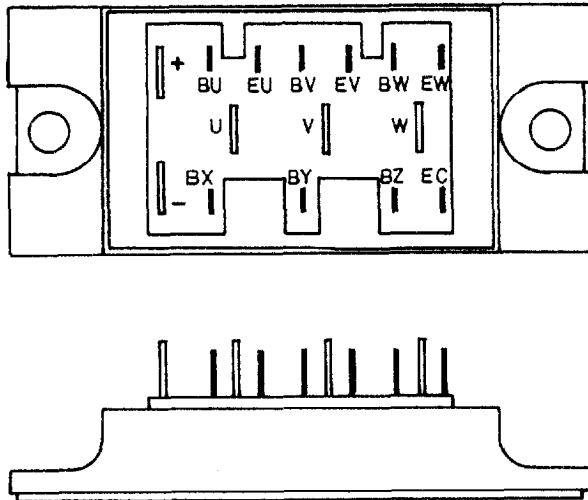


Transistor modules (only use modules according to Lenze specification with Lenze part no.)

Transistor module 631

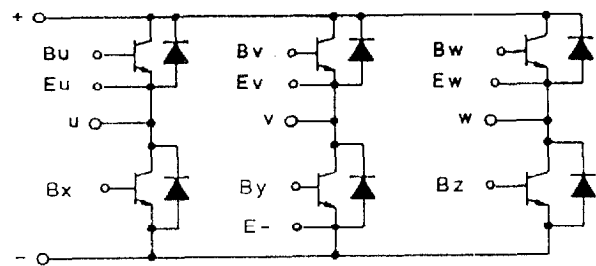
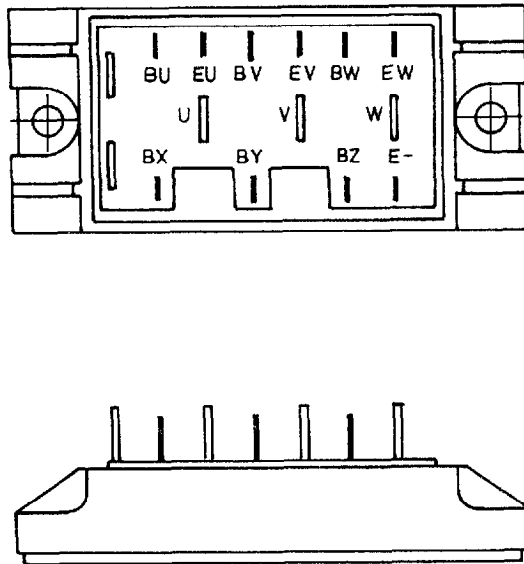
Fuji 6DI15A-050

part no. 326 537



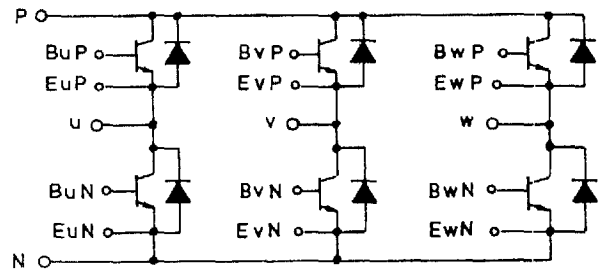
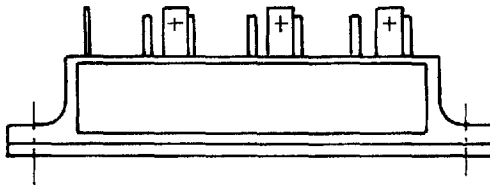
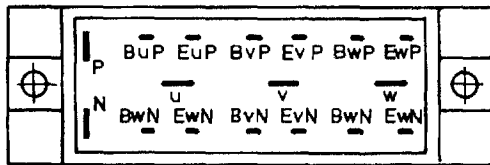
Toshiba: MG15G6EL1

part no. 326 538



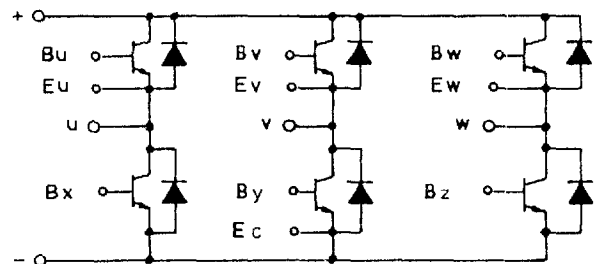
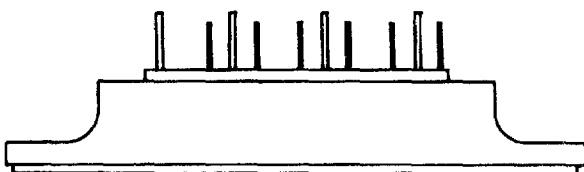
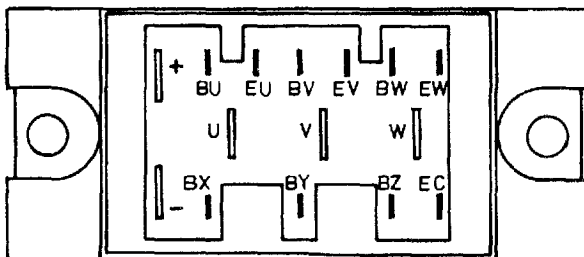
Mitsubishi: QM10TB-H

part no. 326 530

**Transistor modules 632**

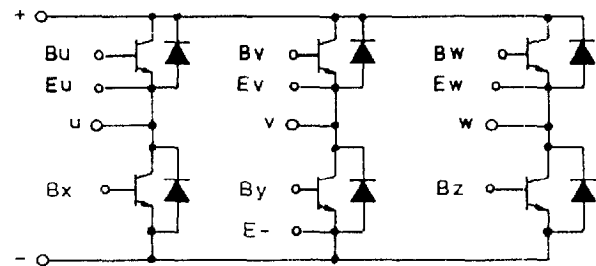
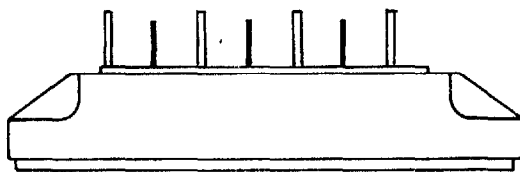
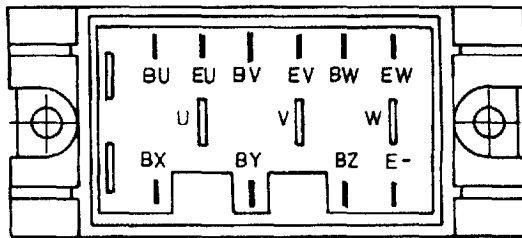
Fuji 6DI15A-050

part no. 326 537



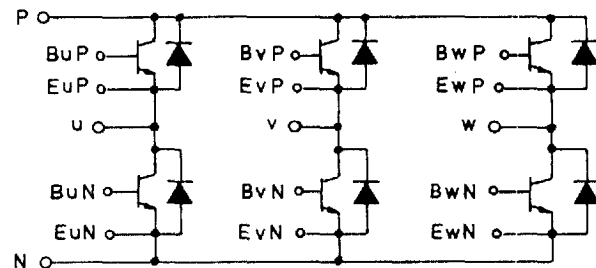
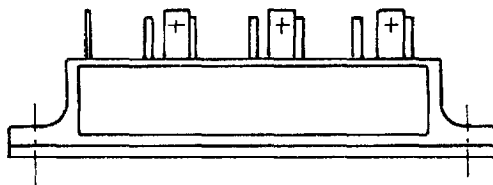
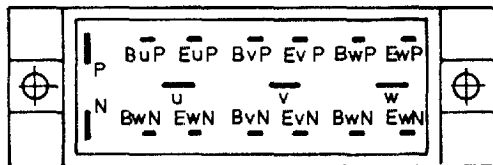
Toshiba: MG15G6EL1

part no. 326 538



Mitsubishi: QM15TB-H

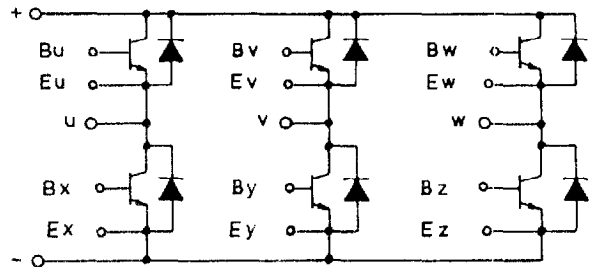
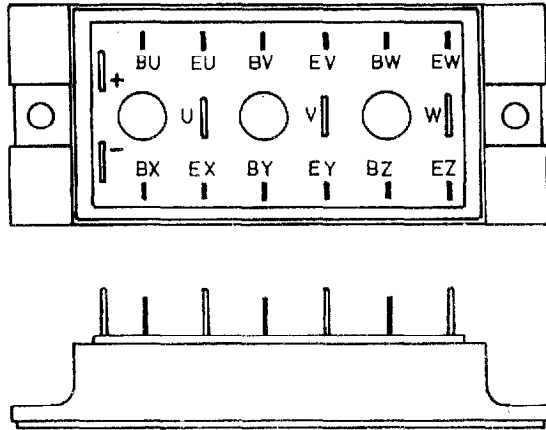
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Transistor modules 633

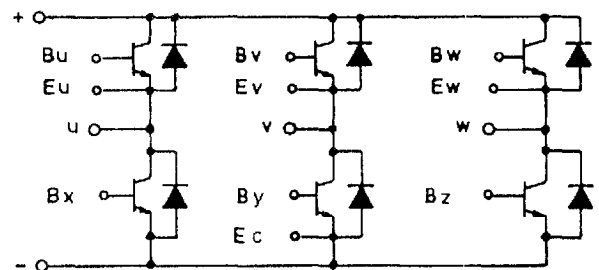
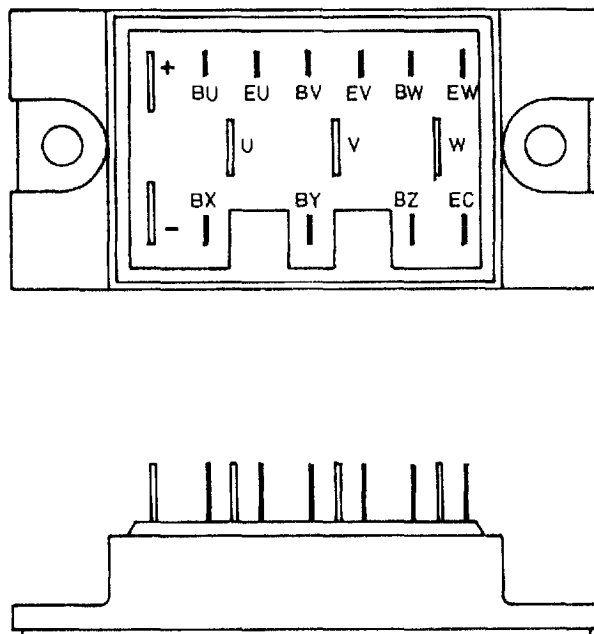
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part no. 326 539



Fuji: 6DI20C-050

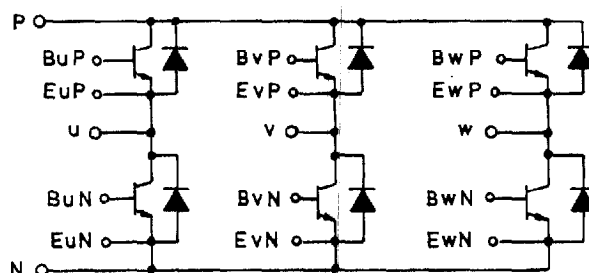
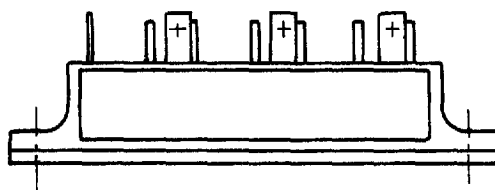
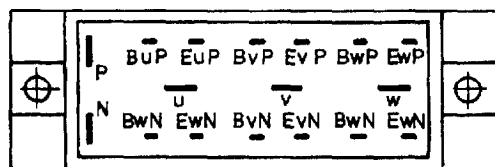
part no. 326 540



Transistor modules 633

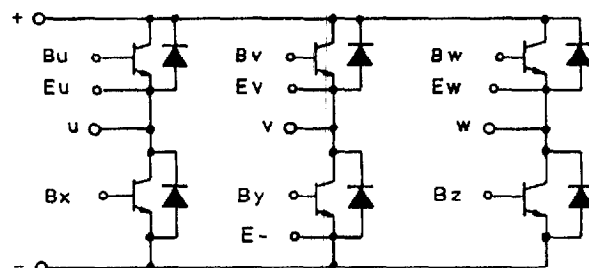
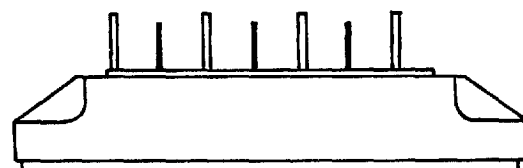
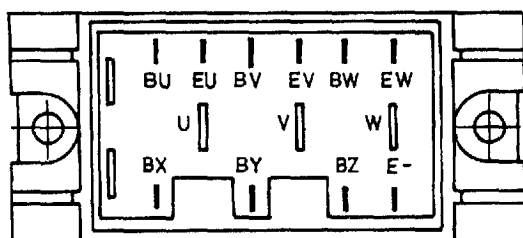
Mitsubishi: QM20TB-H

part no.



Toshiba: MG20G6EL1

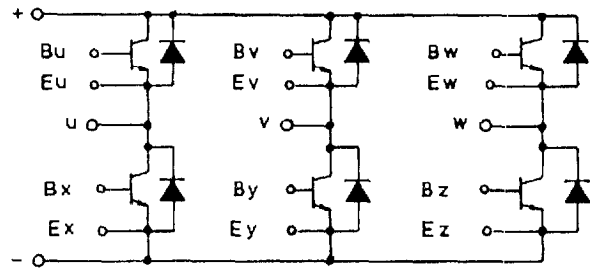
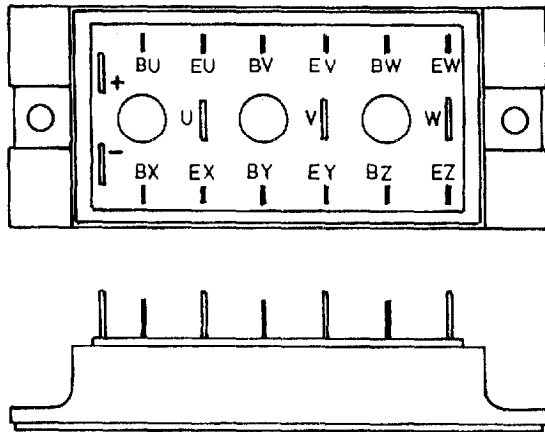
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Transistor modules 634

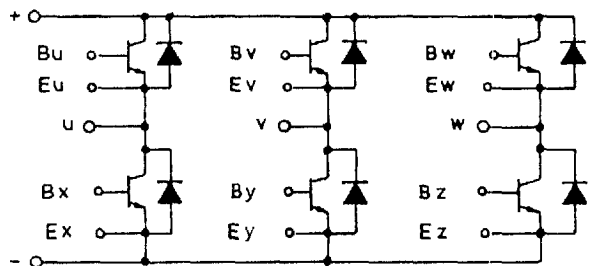
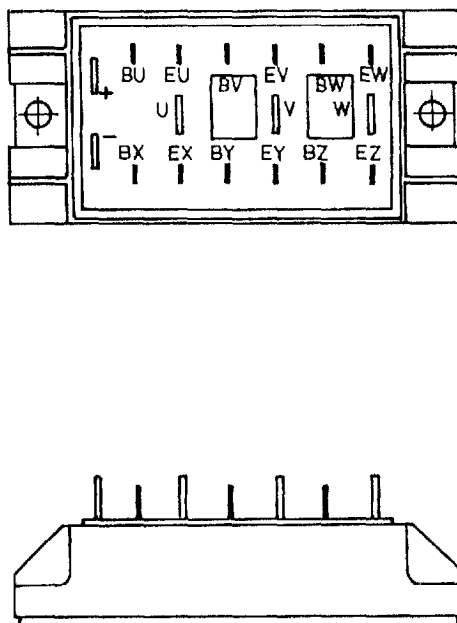
Fuji: 6DI30B-050

part no. 326 541



Toshiba: MG30G6EL2

part no. 326 534



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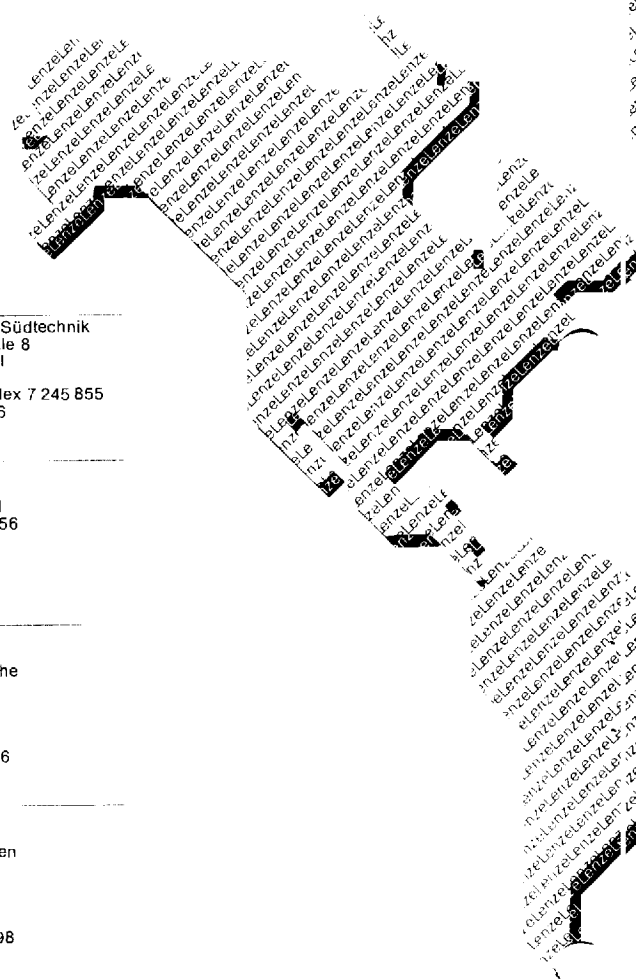
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