Technical Manual

Battery Charger

Valid for:

CH4656

CH4666

CH2410

Please Note:

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Doc. No.: M4656COM Issue: C/0508

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BATTERY CHARGER

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1 INTRODUCTION

1.1 GENERAL DESCRIPTION

The Battery Charger is designed as a stand alone unit.

The Battery Charger is designed with four separately fused output lines to ensure independent supply for connected equipment if battery and Battery Charger is used in an uninterruptible power supply (UPS) configuration.

Furthermore the Battery Charger includes the following features:

- 115V/230V selectable input.
- Encapsulation class IP22.
- Galvanic isolated AC alarm output.
- Protected Battery monitoring output.
- Indication of float charge or main charge.
- Charges open or sealed lead-acid batteries.
- Easy connection.
- Easy access to fuses.
- Vertical or horizontal mounting.
- IEC 945 approved.

1.2 TECHNICAL DATA

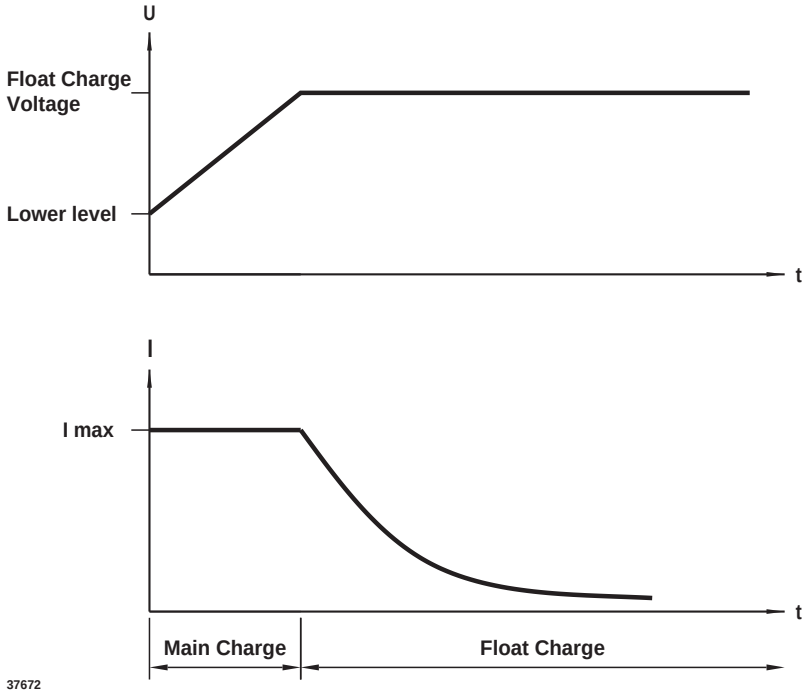
AC input voltages:	115V, range 88V - 132V or 230V, range 176V - 264V. Manual setting.
AC input frequency:	50/60 Hz ± 6%
Float charge voltage:	Adjustable 26.8V - 28.8V to voltage specified by battery manufacturer. Potentiometer located under cover.
Main charge current:	10A continuous.
Charger type:	Automatic, with float charging. IE characteristic.
Battery type:	Lead-acid, open or sealed.
Nominal battery capacity:	20 - 120 Ah
Nominal charging time:	10 hours to 80% capacity, 120 Ah battery.
Battery monitoring:	Protected output.
AC Mains Alarm output:	Relay contacts 5-50mA, 10-32V. Closed in alarm condition. Alarm in case of AC supply failure.
Protection:	The Charger output is current limited and protected against polarity reversal, short circuit, over voltage and over temperature.
Operating temperature:	- 20° to + 55° C.
Dimensions:	HxWxD: 110x370x260 mm.
Weight:	Approx. 5 kg.
Compass safe distance:	Standard: 1.4 m. Steering: 1.0 m.

2 TECHNICAL DESCRIPTION

2.1 PRINCIPLE OF OPERATION

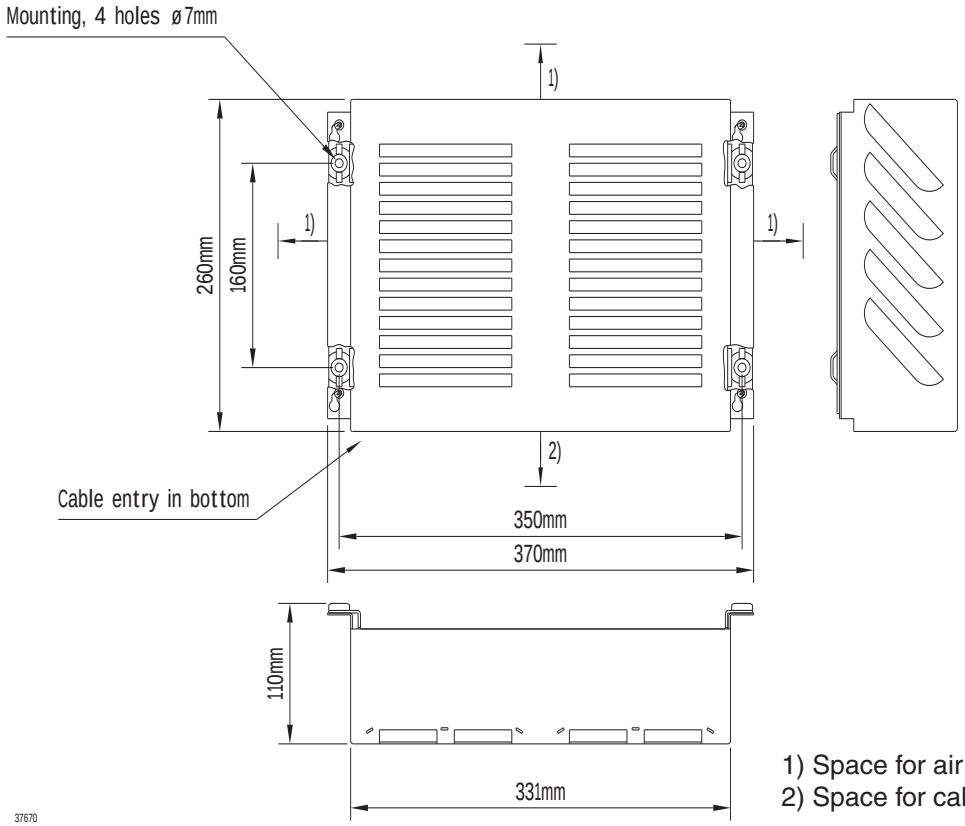
When charging the Battery Charger is operating as a constant current generator until the battery voltage reaches the voltage level set by the float voltage potentiometer. At this level the Battery Charger is changing state to a constant voltage generator to maintain a constant voltage to the battery.
Four DC outputs are connected directly to the battery making it possible to use the Battery Charger and the battery in an uninterruptible power supply (UPS) configuration.
If the battery is loaded more than the Battery Charger can supply (>10A) power is taken from the battery discharging it. In periods of less consumption the battery is recharged.

TYPICAL CHARGE CURVE



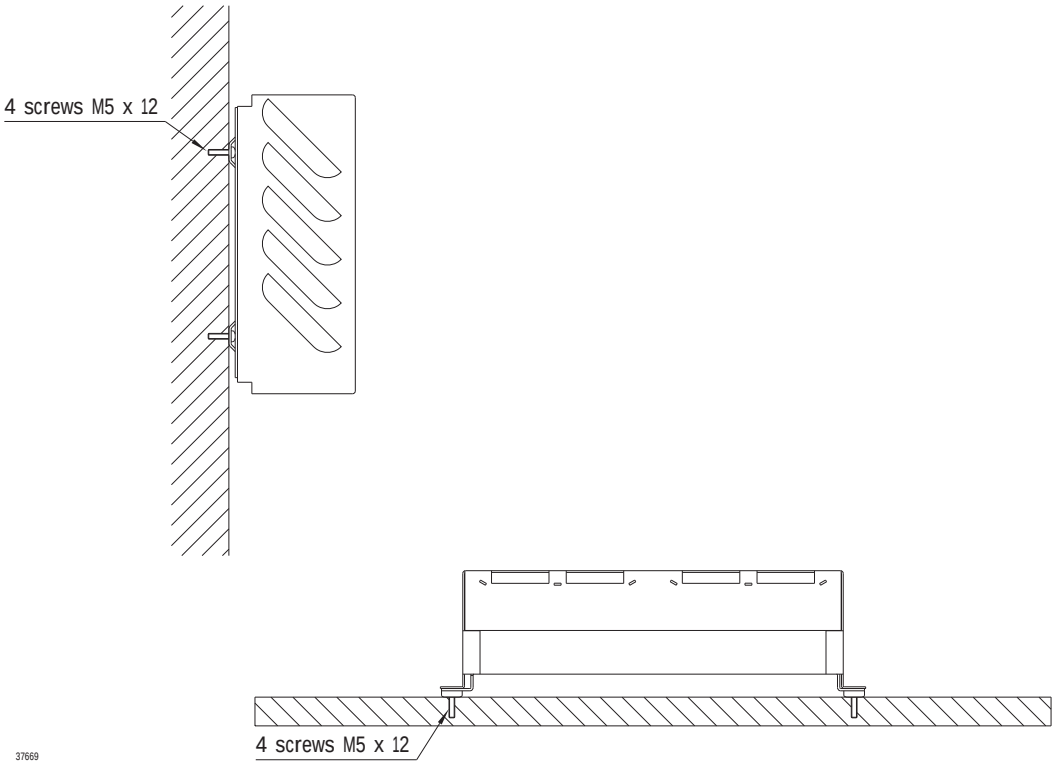
3 INSTALLATION

3.1 OUTLINE AND DIMENSIONS

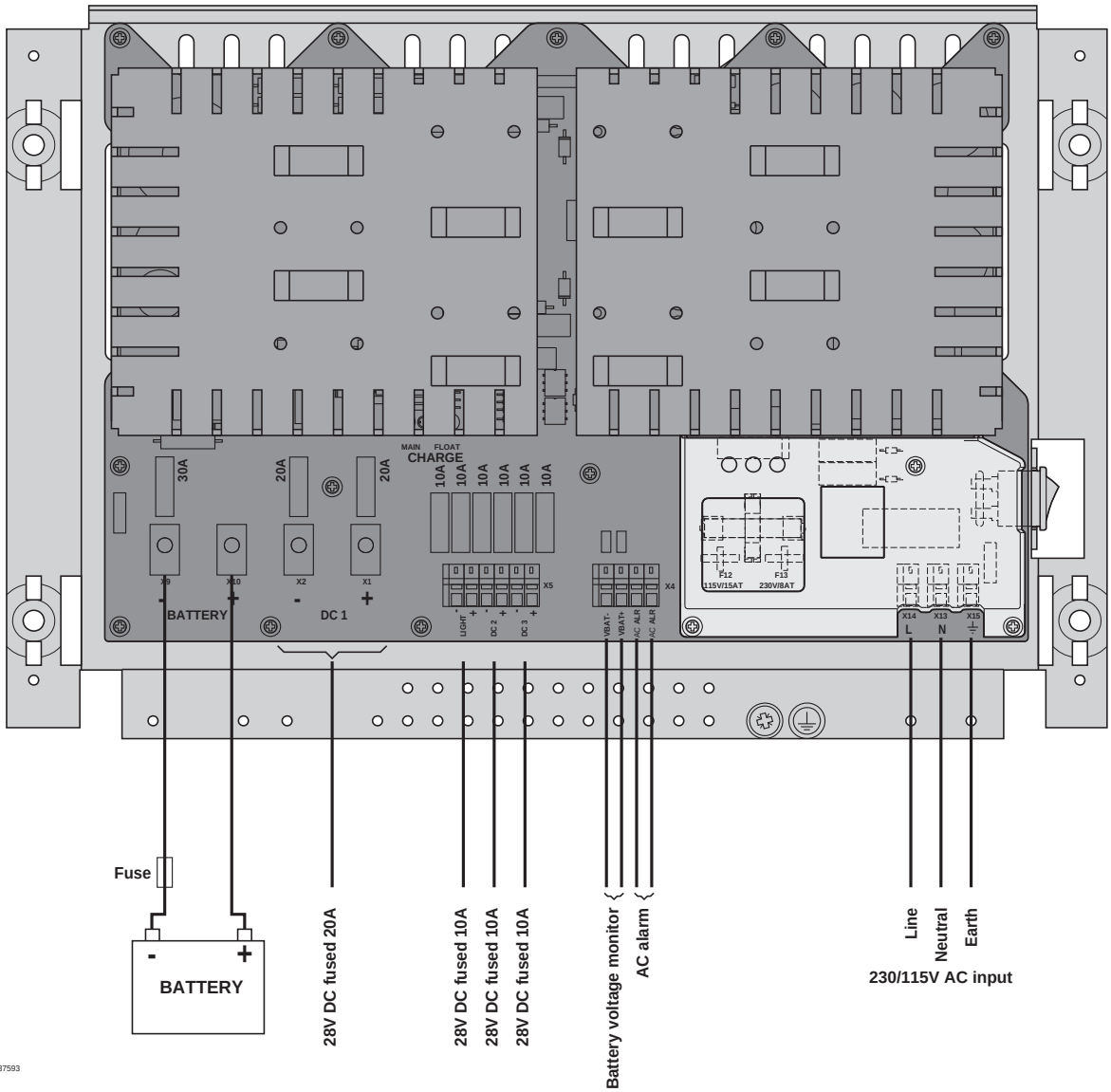


1) Space for air flow min. 200mm
2) Space for cable 250mm

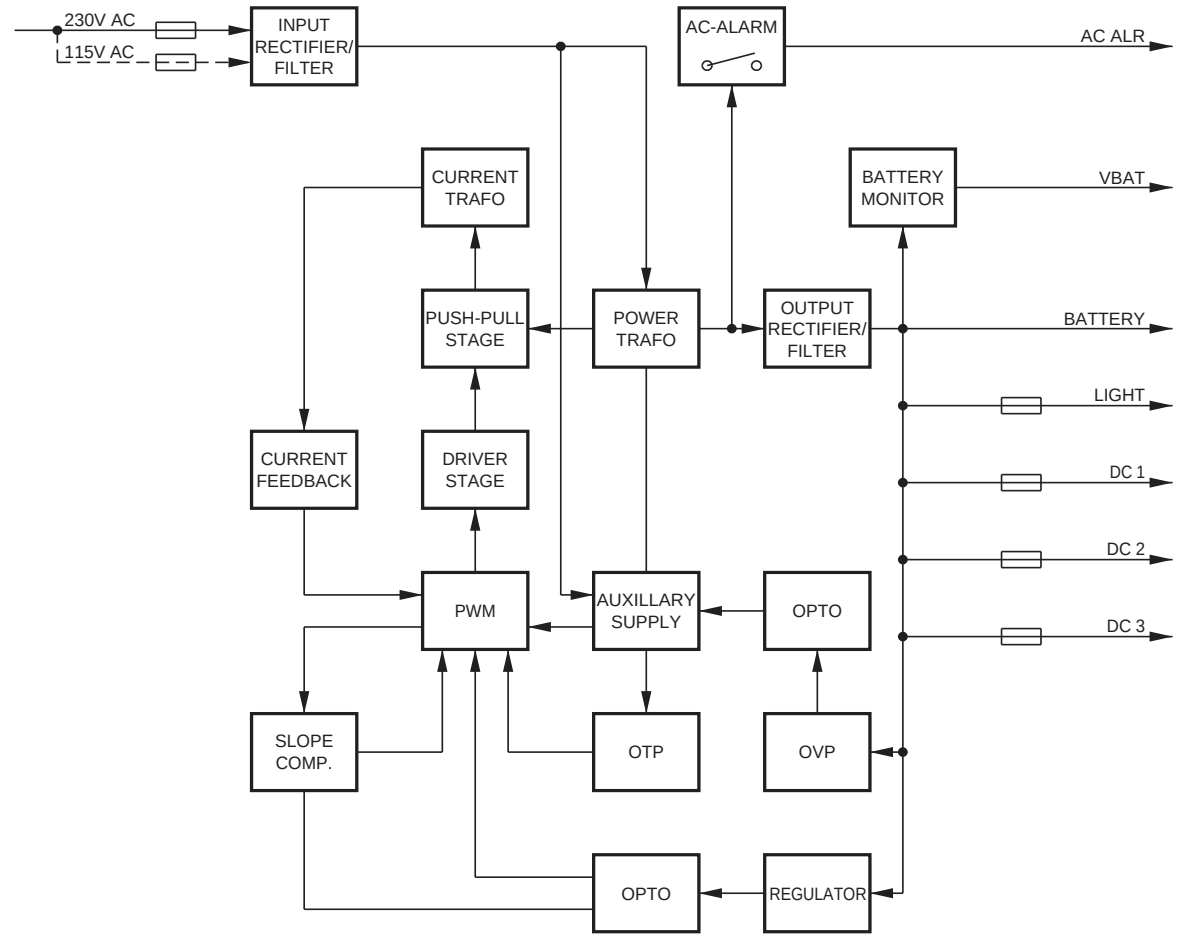
9.2 MOUNTING POSSIBILLITIES



3.3 INSTALLATION WIRING



3.4 BLOCK DIAGRAM



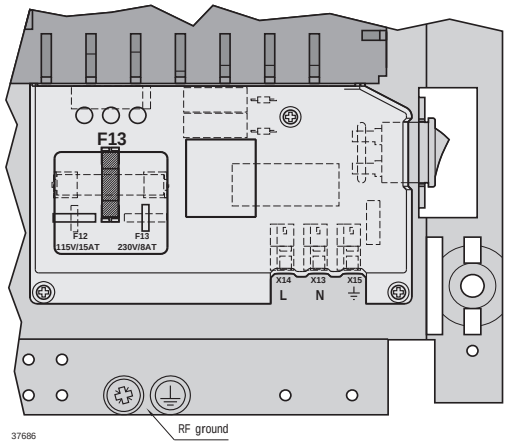
3.5 AC SUPPLY VOLTAGE SETTING

Before connecting the Charger to the AC mains, be sure that the Charger is set to the correct voltage and that the fuse rating corresponds to the setting used.

The voltage setting is selected by changing the fuse located under the front cover. The equipment is normally set to 230V. To select a different voltage insert the appropriate fuse.

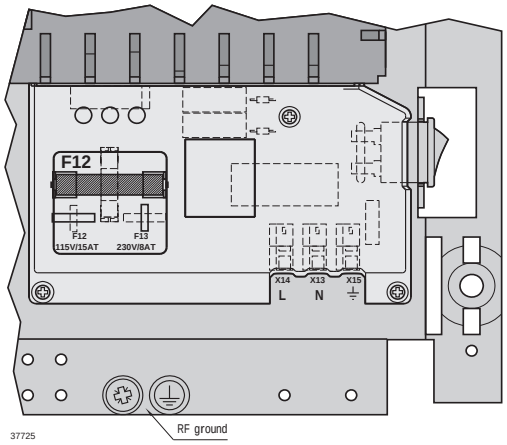
Take care that the power is switched off before changing the fuse.

Fuse setting for 230V



Setting	Voltage range	Fuse rating
230V	176 - 264V	F13 - 8AT

Fuse setting for 115V



Setting	Voltage range	Fuse rating
115V	88 - 132V	F12 - 15AT

Caution:
Incorrect setting of the mains voltage may damage the AC Power Supply assembly.

3.6 CONNECTIONS

AC INPUT
The AC supply leads are connected to the terminal block as indicated. Screened power supply cable may be used as required by some administrations. The cable is fastened and the screen connected by a cable clamp on the main chassis below the terminal block.

Terminal	Designation	Description
X13	N	Neutral
X14	L	Line
X15	⏚	Protective Earth

Recommended cable type: 3 x 1.5 mm² screened.

BATTERY

The battery is connected to the battery terminals located to the left on the connection area. It is recommended to have fuses at the battery. The cable dimension depends on current consumption and permissible voltage drop in the cable.
The table below shows the necessary cable cross section for a voltage drop of 1% at 10A and external fuse ratings.

Max. cable length to battery	Recommended Screened multiwire	External fuses
7 metres	2 x 10 mm²	40A
11 metres	2 x 16 mm²	50A
17 metres	2 x 25 mm²	63A

Terminal	Designation	Description
X9	BATTERY -	Input from Battery
X10	BATTERY +	

OUTPUTS

Terminal	Designation	Description
X1	DC 1 +	28V DC or Battery
X2	DC 1 -	voltage

Terminal	Designation	Description
X5 - 1	LIGHT -	Emergency Light.
X5 - 2	LIGHT +	28V DC or Battery voltage

Terminal	Designation	Description
X5 - 3	DC 2 -	28V DC or Battery
X5 - 4	DC 2 +	voltage

Terminal	Designation	Description
X5 - 5	DC 3 -	28V DC or Battery
X5 - 6	DC 3 +	voltage

Terminal	Designation	Description
X4 - 1	VBAT -	Protected Battery
X4 - 2	VBAT +	monitor output.

Terminal	Designation	Description
X4 - 3	AC ALR	Galvanically isolated AC alarm output.
X4 - 4	AC ALR	Relay contacts 5 - 50mA, 10 - 32V. Closed in alarm condition. Alarm in case of AC supply failure.

RF GROUND TERMINAL

The RF ground terminal is placed to the right on the cable-clamping bar.

Terminal	Designation	Description
⏚	RF ground	Grounding screw for cable lug.

RF grounding requires special attention. Each equipment should have its own individual low-inductance earth connection.

CABLE SCREEN

The cable screen of each cable should be connected to the cable-clamping bar.

3.7 FLOAT CHARGE VOLTAGE ADJUSTMENT

1. Connect a voltmeter to the “- Battery +” terminals X9 and X10 located to the left on the connection area.

2. Connect the mains to the unit.

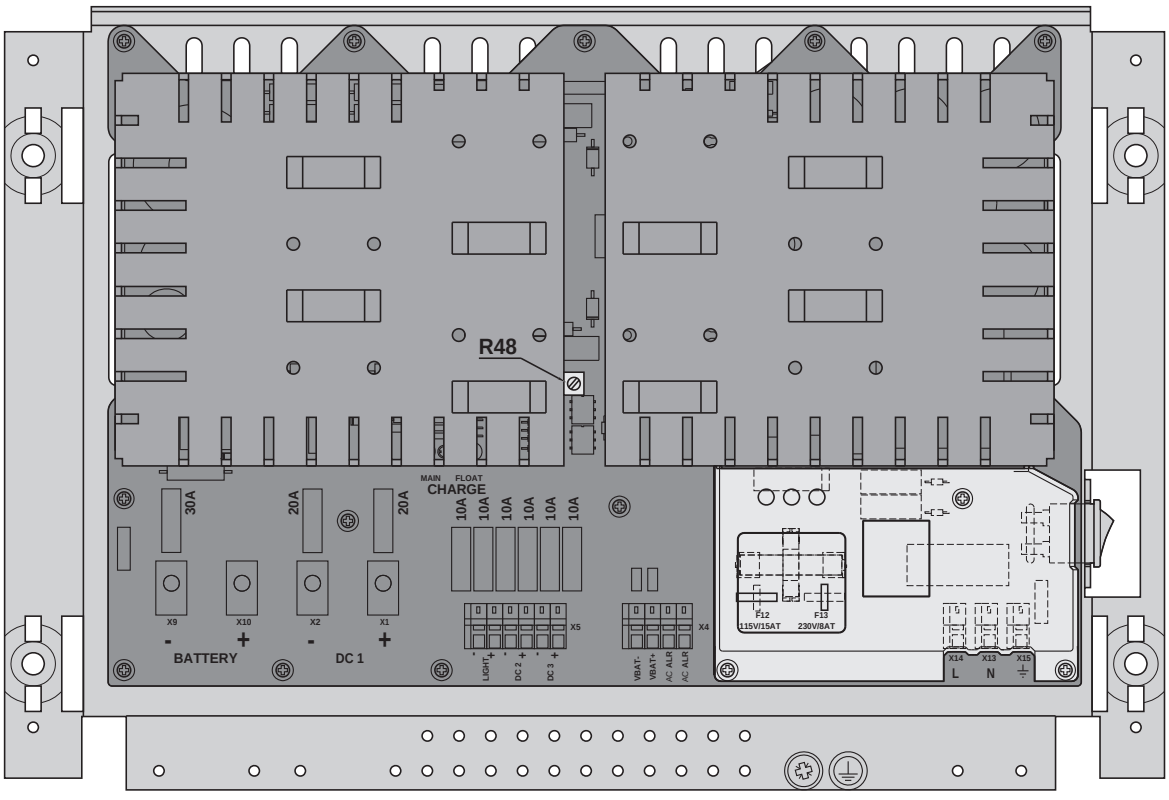
3. Adjust the potentiometer R48 located between the two aluminium covers (refer to the figure below) until the charge voltage prescribed by the battery manufacturer is read on the voltmeter (range 26.6V DC - 28.8V DC).

4. Disconnect all instruments.

5. Disconnect the mains to the unit.

6. Connect the battery to the “- Battery +” terminals located to the left on the connection area.

7. Connect the mains to the unit.



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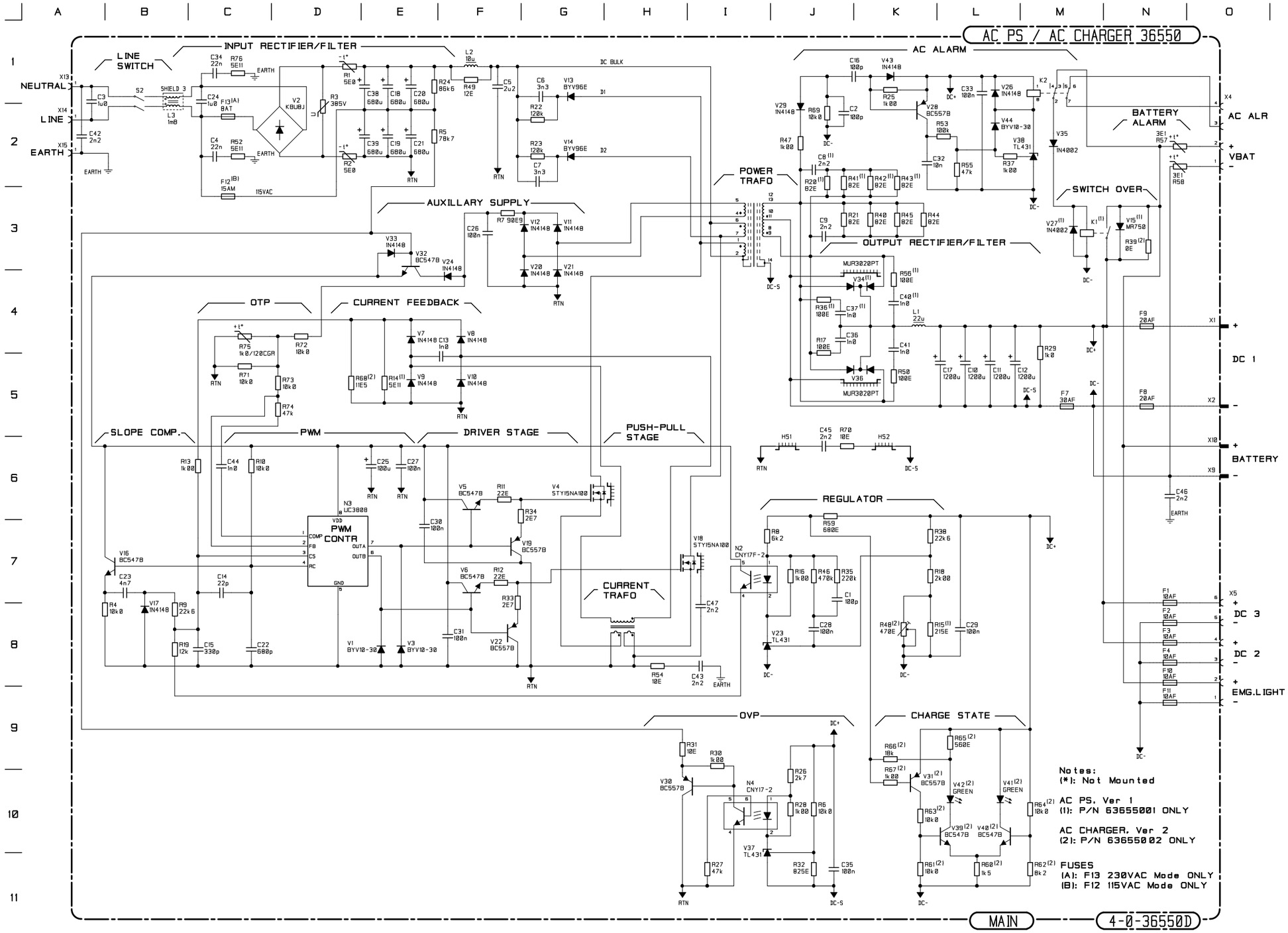
4 SCHEMATIC DIAGRAM AND COMPONENT LOCATION

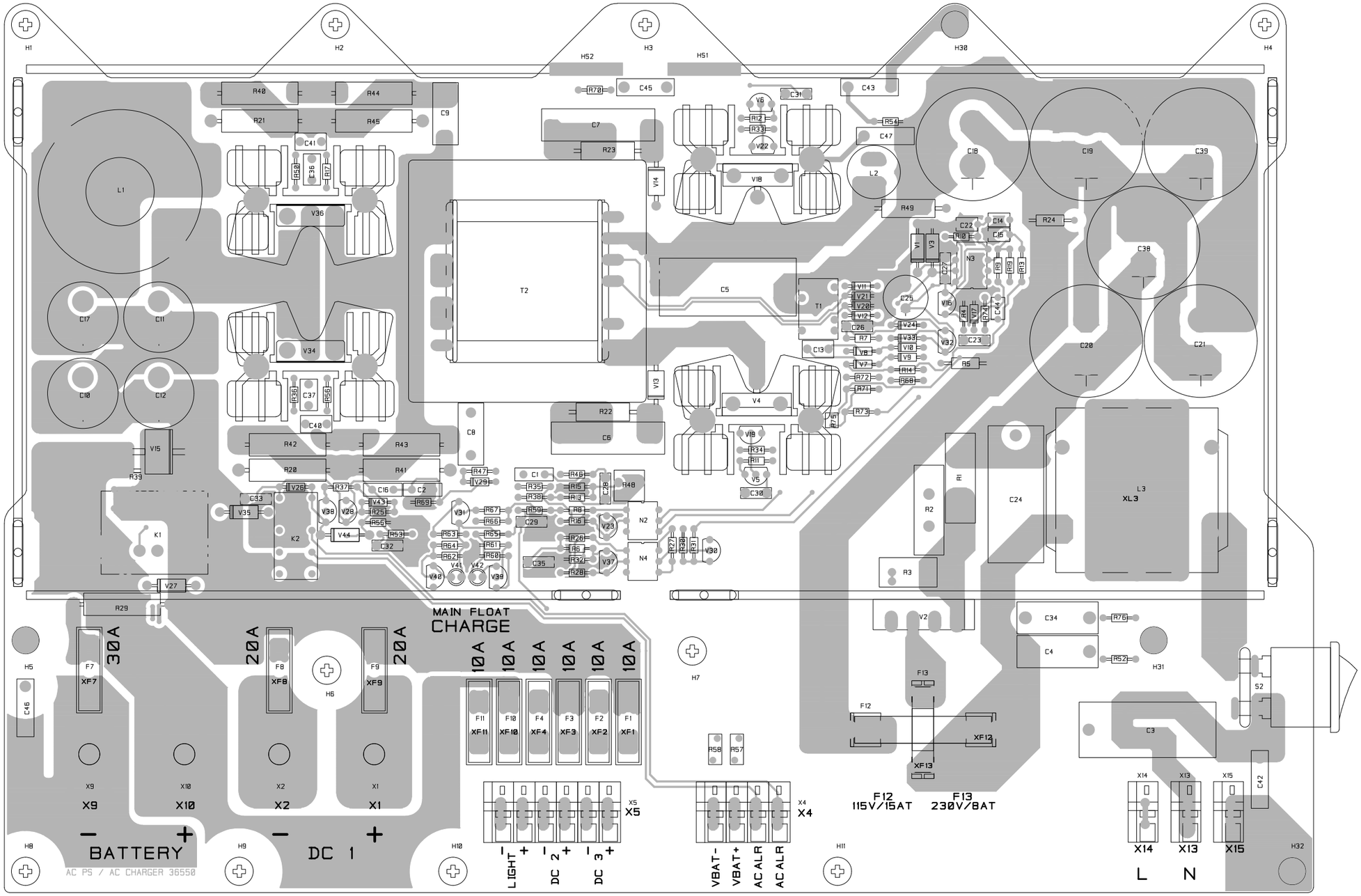
4.1 POWER SUPPLY UNIT

SCHEMATIC DIAGRAM



This diagram is valid for PCB 36550D

COMPONENT LOCATION



Not mounted components;
C8, C37, C40,
K1,
R14, R15, R20, R36,
R41, R42, R43, R56,
V15, V27, V34

Seen from komponent side with upper side tracks
PCB rev. 36550D

5 PARTS LIST

BATTERY CHARGER 36550		T&T A/S	5-6-36550D/4-0-36550D	63655002
POSITION	DESCRIPTION	MANUFACTURER	TYPE	PART NO.
C1	CAPACITOR CERAMIC 100pF 5% NPO 50VDC	KCK	RT-HE80 SK CH 101 J	15.136
C2	CAPACITOR CERAMIC 100pF 5% NPO 50VDC	KCK	RT-HE80 SK CH 101 J	15.136
C3	CAPACITOR CLASS X2 1u0F 20% 275VAC	PHILIPS	2222 336 23105(24105)	13.931
C4	CAPACITOR CLASS Y2 22nF 20% 250VAC	PHILIPS	2222 336 60223 (61223)	13.908
C5	CAPACITOR MKT 2u2F 20% 400VDC	ARCOTRONICS	R60 M R 4220 CK M	11.200
C6	CAPACITOR KP 3n3F 5% 1600VDC	PHILIPS	2222 376 95332	13.326
C7	CAPACITOR KP 3n3F 5% 1600VDC	PHILIPS	2222 376 95332	13.326
C8	Not used			
C9	CAPACITOR MKP 2n2F 10% 630VDC	PHILIPS	2222 375 10222 (12222)	13.403
C10	CAPACITOR ELECTROLYTIC 1m2F 20% 50VDC	NICHICON	UPL1H122MHH	14.721
C11	CAPACITOR ELECTROLYTIC 1m2F 20% 50VDC	NICHICON	UPL1H122MHH	14.721
C12	CAPACITOR ELECTROLYTIC 1m2F 20% 50VDC	NICHICON	UPL1H122MHH	14.721
C13	CAPACITOR CERAMIC 1n0F 10% CL2 500VDC	KCK	RT-HM60 SK YB 102 K	15.160
C14	CAPACITOR CERAMIC 22pF 5% NP0 50VDC	PHILIPS	2252 305 12 229	16.667
C15	CAPACITOR CERAMIC 330pF 5% NP0 50VDC	PHILIPS	2252 305 12 331	16.681
C16	CAPACITOR CERAMIC 100pF 5% NPO 50VDC	KCK	RT-HE80 SK CH 101 J	15.136
C17	CAPACITOR ELECTROLYTIC 1m2F 20% 50VDC	NICHICON	UPL1H122MHH	14.721
C18	CAPACITOR ELECTROLYTIC 680uF 20% 200VDC	PANASONIC	ECEC 2D A 681 C B	14.793
C19	CAPACITOR ELECTROLYTIC 680uF 20% 200VDC	PANASONIC	ECEC 2D A 681 C B	14.793
C20	CAPACITOR ELECTROLYTIC 680uF 20% 200VDC	PANASONIC	ECEC 2D A 681 C B	14.793
C21	CAPACITOR ELECTROLYTIC 680uF 20% 200VDC	PANASONIC	ECEC 2D A 681 C B	14.793
C22	CAPACITOR CERAMIC 680pF 5% NP0 50VDC	PHILIPS	2252 305 12 681	16.685
C23	CAPACITOR MKT 4n7F 10% 63VDC	BC Components	2222 370 35472	11.374
C24	CAPACITOR CLASS X2 1u0F 20% 275VAC	PHILIPS	2222 336 23105(24105)	13.931
C25	ELECTROLYTIC CAPACITOR 100uF 20% 50VDC	ELNA	RJJ 50V 101 M H4 T2	14.653
C26	CAPACITOR MKT 100nF 10% 63VDC	BC Components	2222 370 75104 (78104)	11.136
C27	CAPACITOR MKT 100nF 10% 63VDC	BC Components	2222 370 75104 (78104)	11.136
C28	CAPACITOR MKT 100nF 10% 63VDC	BC Components	2222 370 75104 (78104)	11.136
C29	CAPACITOR MKT 100nF 10% 63VDC	BC Components	2222 370 75104 (78104)	11.136
C30	CAPACITOR MKT 100nF 10% 63VDC	BC Components	2222 370 75104 (78104)	11.136
C31	CAPACITOR MKT 100nF 10% 63VDC	BC Components	2222 370 75104 (78104)	11.136
C32	CAPACITOR MKT 10nF 5% 63VDC	BC Components	2222 370 36103	11.134
C33	CAPACITOR MKT 100nF 10% 63VDC	BC Components	2222 370 75104 (78104)	11.136
C34	CAPACITOR CLASS Y2 22nF 20% 250VAC	PHILIPS	2222 336 60223 (61223)	13.908
C35	CAPACITOR MKT 100nF 10% 63VDC	BC Components	2222 370 75104 (78104)	11.136
C36	CAPACITOR CERAMIC 1n0F 10% CL2 500VDC	KCK	RT-HM60 SK YB 102 K	15.160
C37	Not used			
C38	CAPACITOR ELECTROLYTIC 680uF 20% 200VDC	PANASONIC	ECEC 2D A 681 C B	14.793
C39	CAPACITOR ELECTROLYTIC 680uF 20% 200VDC	PANASONIC	ECEC 2D A 681 C B	14.793
C40	Not used			
C41	CAPACITOR CERAMIC 1n0F 10% CL2 500VDC	KCK	RT-HM60 SK YB 102 K	15.160
C42	CAPACITOR CLASS Y2 2n2F 20% 250VAC	BC Components	2222 336 63222 (64222)	13.901
C43	CAPACITOR CLASS Y2 2n2F 20% 250VAC	BC Components	2222 336 63222 (64222)	13.901
C44	CAPACITOR CERAMIC 1n0F 5% NP0 50VDC	PHILIPS	2252 305 12 102	16.687
C45	CAPACITOR CLASS Y2 2n2F 20% 250VAC	BC Components	2222 336 63222 (64222)	13.901
C46	CAPACITOR CLASS Y2 2n2F 20% 250VAC	BC Components	2222 336 63222 (64222)	13.901
C47	CAPACITOR CLASS Y2 2n2F 20% 250VAC	BC Components	2222 336 63222 (64222)	13.901
F1	ATO BLADE FUSE 10AF RED COLOURED RED	LITTELFUSE	257010	45.663
F2	ATO BLADE FUSE 10AF RED COLOURED RED	LITTELFUSE	257010	45.663
F3	ATO BLADE FUSE 10AF RED COLOURED RED	LITTELFUSE	257010	45.663
F4	ATO BLADE FUSE 10AF RED COLOURED RED	LITTELFUSE	257010	45.663
F7	ATO BLADE FUSE 30AF COLOURED GREEN	LITTELFUSE	257030	45.667
F8	ATO BLADE FUSE 20AF COLOURED YELLOW	LITTELFUSE	257020	45.665
F9	ATO BLADE FUSE 20AF COLOURED YELLOW	LITTELFUSE	257020	45.665
F10	ATO BLADE FUSE 10AF RED COLOURED RED	LITTELFUSE	257010	45.663
F11	ATO BLADE FUSE 10AF RED COLOURED RED	LITTELFUSE	257010	45.663
F12	FUSE 15AM Ø6.3x32mm	LITTELFUSE	311015	45.630
F13	FUSE 8AT 250V 5x20mm	ELU	179 120 8AT	45.519
HS1	Cooling chassis PS4655 / CH4656 / CH4657	T&T A/S	1-2-36892E	236892
HS2	Cooling chassis PS4655 / CH4656 / CH4657	T&T A/S	1-2-36892E	236892
K1	Not used			
K2	RELAY DPDT 24VDC/1ADC	MEISEI	M4-24H	78000044
L1	Choke fixed toroidal 22uH/25ADC 8%	FLUX	FT 12300031-1	20.238
L2	CHOKE FIXED 10uH 20%/5ADC	SUMIDA	RCH-110 100M	74011007
L3	Choke Dual 2x1.8mH/10DAC	THAI LIN	TL85-100-182	20.056
N2	OPTOCOUPLER IC/IF 63-125% CNY17F-2	SIEMENS	CNY17F-2	32.534
N3	PWM Controller, L.Pow. Curr.Mode, UCC3808-1	UNITRODE	UCC3808N-1	31.179
N4	OPTO COUPLER CNY17-2	SIEMENS	CNY17-2	32.530
R1	RESISTOR NTC 5 OHM 20% 8.5A	SIEMENS	B57364-S509-M55	07.305
R2	RESISTOR NTC 5 OHM 20% 8.5A	SIEMENS	B57364-S509-M55	07.305
R3	RESISTOR VDR 385V 10%	PHILIPS	2322 594 53816 (03817)	06.507
R4	RESISTOR MF 10k0 OHM 1% 0.25W	PHILIPS	2322 157 11003	02.235
R5	RESISTOR MF. 78k7 OHM 1% 0.6W	PHILIPS	2322 156 17873	03.242
R6	RESISTOR MF 10k0 OHM 1% 0.25W	PHILIPS	2322 157 11003	02.235
R7	RESISTOR MF. 90R9 1% 0.25W	PHILIPS	2322 157 19099 (29099)	02.246

POSITION	DESCRIPTION	MANUFACTURER	TYPE	PART NO.
R8	RESISTOR MF 6k2 OHM 5% 0.33W	PHILIPS	2322 187 73622	02.491
R9	RESISTOR MF. 22k6 1% 0.25W	PHILIPS	157 12263 (22263)	02.253
R10	RESISTOR MF 10k0 OHM 1% 0.25W	PHILIPS	2322 157 11003	02.235
R11	RESISTOR MF 22 OHM 5% 0.33W	PHILIPS	2322 187 73229	02.432
R12	RESISTOR MF 22 OHM 5% 0.33W	PHILIPS	2322 187 73229	02.432
R13	RESISTOR MF 1k00 OHM 1% 0.25W	PHILIPS	2322 157 11002	02.200
R14	Not used			
R15	Not used			
R16	RESISTOR MF 1k00 OHM 1% 0.25W	PHILIPS	2322 157 11002	02.200
R17	RESISTOR MF 100 OHM 5% 0.33W	PHILIPS	2322 187 73101	02.448
R18	RESISTOR MF. 2k00 1% 0.25W	PHILIPS	2322 157 12002 (22002)	02.250
R19	RESISTOR MF 12k OHM 5% 0.33W	PHILIPS	2322 187 73123	02.498
R20	Not used			
R21	RESISTOR PMF 82 OHM 5% 3W	PHILIPS	2322 195 13829	04.672
R22	RESISTOR PMF 120k OHM 5% 2W	PHILIPS	2322 194 13124	04.236
R23	RESISTOR PMF 120k OHM 5% 2W	PHILIPS	2322 194 13124	04.236
R24	RESISTOR MF. 86k6 OHM 1% 0.6W	PHILIPS	2322 156 18663	03.244
R25	RESISTOR MF 1k00 OHM 1% 0.25W	PHILIPS	2322 157 11002	02.200
R26	RESISTOR MF 2k7 OHM 5% 0.33W	PHILIPS	2322 187 73272	02.482
R27	RESISTOR MF 47k OHM 5% 0.33W	PHILIPS	2322 187 73473	02.512
R28	RESISTOR MF 1k00 OHM 1% 0.25W	PHILIPS	2322 157 11002	02.200
R29	RESISTOR PMF 1k0 OHM 5% 3W	PHILIPS	2322 195 13102	04.699
R30	RESISTOR MF 1k00 OHM 1% 0.25W	PHILIPS	2322 157 11002	02.200
R31	RESISTOR MF 10 OHM 5% 0.33W	PHILIPS	2322 187 73109	02.424
R32	RESISTOR MF 825 OHM 1% 0.25W	PHILIPS	2322 157 18251	02.224
R33	RESISTOR MF 2R7 OHM 5% 0.33W	PHILIPS	2322 187 73278	02.410
R34	RESISTOR MF 2R7 OHM 5% 0.33W	PHILIPS	2322 187 73278	02.410
R35	RESISTOR MF 220k OHM 5% 0.33W	PHILIPS	2322 187 73224	02.528
R36	Not used			
R37	RESISTOR MF 1k00 OHM 1% 0.25W	PHILIPS	2322 157 11002	02.200
R38	RESISTOR MF. 22k6 1% 0.25W	PHILIPS	2322 157 12263 (22263)	02.253
R39	PLUG 1 POLE F.PCB 4.8X0.8mm	RADIO PARTS A/S	136-2141	75000151
R40	RESISTOR PMF 82 OHM 5% 3W	PHILIPS	2322 195 13829	04.672
R41	Not used			
R42	Not used			
R43	Not used			
R44	RESISTOR PMF 82 OHM 5% 3W	PHILIPS	2322 195 13829	04.672
R45	RESISTOR PMF 82 OHM 5% 3W	PHILIPS	2322 195 13829	04.672
R46	RESISTOR MF 470k OHM 5% 0.33W	PHILIPS	2322 187 73474	02.536
R47	RESISTOR MF 1k00 OHM 1% 0.25W	PHILIPS	2322 157 11002	02.200
R48	PRESET SEALED 470R 20% 0.3W	TOCOS	GF06P-501-M	58324701
R49	RESISTOR PMF 12 OHM 5% 2W	PHILIPS	2322 194 13129	04.136
R50	RESISTOR MF 100 OHM 5% 0.33W	PHILIPS	2322 187 73101	02.448
R52	RESISTOR MF. 5R11 1% 0.25W	PHILIPS	2322 157 15118 (25118)	02.242
R53	RESISTOR MF 100k OHM 5% 0.33W	PHILIPS	2322 187 73104	02.520
R54	RESISTOR MF 10 OHM 5% 0.33W	PHILIPS	2322 187 73109	02.424
R55	RESISTOR MF 47k OHM 5% 0.33W	PHILIPS	2322 187 73473	02.512
R56	Not used			
R57	RESISTOR PTC 3.1 OHM 250mA/50V	BOURNS	MF-R025	72090000
R58	RESISTOR PTC 3.1 OHM 250mA/50V	BOURNS	MF-R025	72090000
R59	RESISTOR MF 680 OHM 5% 0.33W	PHILIPS	2322 187 73681	02.468
R60	RESISTOR MF 1k5 OHM 5% 0.33W	PHILIPS	2322 187 73152	02.476
R61	RESISTOR MF 10k0 OHM 1% 0.25W	PHILIPS	2322 157 11003	02.235
R62	RESISTOR MF 8k2 OHM 5% 0.33W	PHILIPS	2322 187 73822	02.494
R63	RESISTOR MF 10k0 OHM 1% 0.25W	PHILIPS	2322 157 11003	02.235
R64	RESISTOR MF 10k0 OHM 1% 0.25W	PHILIPS	2322 157 11003	02.235
R65	RESISTOR MF 560 OHM 5% 0.33W	PHILIPS	2322 187 73561	02.466
R66	RESISTOR MF 18k OHM 5% 0.33W	PHILIPS	2322 187 73183	02.502
R67	RESISTOR MF 1k00 OHM 1% 0.25W	PHILIPS	2322 157 11002	02.200
R68	RESISTOR MF. 11R5 1% 0.25W	PHILIPS	2322 157 11159 (21159)	02.244
R69	RESISTOR MF 10k0 OHM 1% 0.25W	PHILIPS	2322 157 11003	02.235
R70	RESISTOR MF 10 OHM 5% 0.33W	PHILIPS	2322 187 73109	02.424
R71	RESISTOR MF 10k0 OHM 1% 0.25W	PHILIPS	2322 157 11003	02.235
R72	RESISTOR MF 10k0 OHM 1% 0.25W	PHILIPS	2322 157 11003	02.235
R73	RESISTOR MF 10k0 OHM 1% 0.25W	PHILIPS	2322 157 11003	02.235
R74	RESISTOR MF 47k OHM 5% 0.33W	PHILIPS	2322 187 73473	02.512
R75	RESISTOR PTC 1kO/120centigrade	PHILIPS	2322 671 91107	07.104
R76	RESISTOR MF. 5R11 1% 0.25W	PHILIPS	2322 157 15118 (25118)	02.242
S2	Rocker Switch w. lamp, 4pol, DPST, 6A/250VAC, PCB	Legion Electronic Co	LECR9Y2KDFR7FR1	43.056
T1	Transformer Current Sense 1:1:50, 12A	FLUX	FT 28001201	22.209
T2	Transformer SMPS 370W	FLUX	14410040-1	22.215
V1	DIODE SCHOTTKY 30VDC/1A	PHILIPS	BYV10-30 133(113)	27.611
V2	DIODE BRIDGE 600V/8A KBU8	GENERAL INSTRUM	KBU8J(K,M)	27.112
V3	DIODE SCHOTTKY 30VDC/1A	PHILIPS	BYV10-30 133(113)	27.611
V4	Cooling assembly PR31/50 for STY15NA100, MAX247	T&T A/S	0-0-36759	736759
V5	TRANSISTOR AF BC547B NPN TO-92	PHILIPS	BC547B-126	28.067
V6	TRANSISTOR AF BC547B NPN TO-92	PHILIPS	BC547B-126	28.067
V7	DIODE 1N4148 HIGH SPEED	PHILIPS	1N4148-143	25.131
V8	DIODE 1N4148 HIGH SPEED	PHILIPS	1N4148-143	25.131
V9	DIODE 1N4148 HIGH SPEED	PHILIPS	1N4148-143	25.131
V10	DIODE 1N4148 HIGH SPEED	PHILIPS	1N4148-143	25.131

POSITION	DESCRIPTION	MANUFACTURER	TYPE	PART NO.
V11	DIODE 1N4148 HIGH SPEED	PHILIPS	1N4148-143	25.131
V12	DIODE 1N4148 HIGH SPEED	PHILIPS	1N4148-143	25.131
V13	Diode Avalance F.Rec. 1000V/1A BYV96E, MUR1100	PHILIPS	BYV96E -153(133)	83100960
V14	Diode Avalance F.Rec. 1000V/1A BYV96E, MUR1100	PHILIPS	BYV96E -153(133)	83100960
V15	Not used			
V16	TRANSISTOR AF BC547B NPN TO-92	PHILIPS	BC547B-126	28.067
V17	DIODE 1N4148 HIGH SPEED	PHILIPS	1N4148-143	25.131
V18	Cooling assembly PR31/50 for STY15NA100, MAX247	T&T A/S	0-0-36759	736759
V19	TRANSISTOR AF BC557B NPN TO-92	MOT.	BC557BZL1	28.091
V20	DIODE 1N4148 HIGH SPEED	PHILIPS	1N4148-143	25.131
V21	DIODE 1N4148 HIGH SPEED	PHILIPS	1N4148-143	25.131
V22	TRANSISTOR AF BC557B NPN TO-92	MOT.	BC557BZL1	28.091
V23	DIODE SHUNT REGULATOR PROGRAMMABLE	MOTOROLA	TL431CLP RA	85004310
V24	DIODE 1N4148 HIGH SPEED	PHILIPS	1N4148-143	25.131
V26	DIODE 1N4148 HIGH SPEED	PHILIPS	1N4148-143	25.131
V27	Not used			
V28	TRANSISTOR AF BC557B NPN TO-92	MOT.	BC557BZL1	28.091
V29	DIODE 1N4148 HIGH SPEED	PHILIPS	1N4148-143	25.131
V30	TRANSISTOR AF BC557B NPN TO-92	MOT.	BC557BZL1	28.091
V31	TRANSISTOR AF BC557B NPN TO-92	MOT.	BC557BZL1	28.091
V32	TRANSISTOR AF BC547B NPN TO-92	PHILIPS	BC547B-126	28.067
V33	DIODE 1N4148 HIGH SPEED	PHILIPS	1N4148-143	25.131
V34	Not used			
V35	DIODE RECTIFIER 1N4002 100V/1A	MOTOROLA	1N4002(03/04/05/06/07)RL	25.100
V36	Cooling assembly PR31/50 for MUR 3020PT, TO218	T&T A/S	0-0-36822	736822
V37	DIODE SHUNT REGULATOR PROGRAMMABLE	MOTOROLA	TL431CLP RA	85004310
V38	DIODE SHUNT REGULATOR PROGRAMMABLE	MOTOROLA	TL431CLP RA	85004310
V39	TRANSISTOR AF BC547B NPN TO-92	PHILIPS	BC547B-126	28.067
V40	TRANSISTOR AF BC547B NPN TO-92	PHILIPS	BC547B-126	28.067
V41	DIODE LIGHT EMITTING GREEN 4mCd/10mA	TEMIC	TLHG 4401 AS 12 Z (21Z)	82300014
V42	DIODE LIGHT EMITTING GREEN 4mCd/10mA	TEMIC	TLHG 4401 AS 12 Z (21Z)	82300014
V43	DIODE 1N4148 HIGH SPEED	PHILIPS	1N4148-143	25.131
V44	DIODE SCHOTTKY 30VDC/1A	PHILIPS	BYV10-30 133(113)	27.611
X1	Connection Element w. 5x10mm Screw and Accessories	T&T A/S	0-0-37559	737559
X2	Connection Element w. 5x10mm Screw and Accessories	T&T A/S	0-0-37559	737559
X4	TERMINAL BLOCK PCB VERS. 4 POLES 1.5mm²	PTR	AK 3000/04-5.0-SLADE GREY	81.134
X5	TERMINAL BLOCK PCB VERS. 6 POLES 1.5mm²	PTR	AK 3000/06-5.0-SLADE GREY	81.136
X9	Connection Element w. 5x10mm Screw and Accessories	T&T A/S	0-0-37559	737559
X10	Connection Element w. 5x10mm Screw and Accessories	T&T A/S	0-0-37559	737559
X13	TERMINAL BLOCK PCB VERS. 1 POLE 1.5mm²	PTR	AK 3000/01-5.0-SLADE GREY	81.131
X14	TERMINAL BLOCK PCB VERS. 1 POLE 1.5mm²	PTR	AK 3000/01-5.0-SLADE GREY	81.131
X15	TERMINAL BLOCK PCB VERS. 1 POLE 1.5mm²	PTR	AK 3000/01-5.0-SLADE GREY	81.131
XF1	FUSE HOLDER 1 POLE ATO BLADE FUSES	PUDENZ	178.6165.0001 (.0002)	78.499
XF2	FUSE HOLDER 1 POLE ATO BLADE FUSES	PUDENZ	178.6165.0001 (.0002)	78.499
XF3	FUSE HOLDER 1 POLE ATO BLADE FUSES	PUDENZ	178.6165.0001 (.0002)	78.499
XF4	FUSE HOLDER 1 POLE ATO BLADE FUSES	PUDENZ	178.6165.0001 (.0002)	78.499
XF7	FUSE HOLDER 1 POLE ATO BLADE FUSES	PUDENZ	178.6165.0001 (.0002)	78.499
XF8	FUSE HOLDER 1 POLE ATO BLADE FUSES	PUDENZ	178.6165.0001 (.0002)	78.499
XF9	FUSE HOLDER 1 POLE ATO BLADE FUSES	PUDENZ	178.6165.0001 (.0002)	78.499
XF10	FUSE HOLDER 1 POLE ATO BLADE FUSES	PUDENZ	178.6165.0001 (.0002)	78.499
XF11	FUSE HOLDER 1 POLE ATO BLADE FUSES	PUDENZ	178.6165.0001 (.0002)	78.499
XF12	FUSE CLIP 1/4" PCB TYPE	LITTELFUSE	102 071	78.389
XF13	FUSECLIP FOR 20x5mm FUSELINK	LITTEL FUSE	111501	78.396
XL3	Shield for Choke TL 85	T&T A/S	1-2-36919A	236919

6 ACCESSORIES INCLUDED

DESIGNATION	QUANTITY	PART NUMBER
Fuse 8AT, for 230V	1	45.519
Fuse 15AT, for 115V	2	45.630
Fuse auto blade 10A	2	45.663
Fuse auto blade 20A	2	45.665
Fuse auto blade 30A	1	45.667
Screw M4x30	11	87.363
Screw M4x20	17	87.359
Screw M5x12	5	87.453
Sheet metal screw 5.5x25	5	88.252
Cable clamp, 4 holes	4	204712
Cable clamp, 3 holes	8	204713
Technical Manual	1	M4656COM

Technical Manual

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