

T Series
(Series 2)
**OPERATING
INSTRUCTIONS**
(T2000/T3500)

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EC DECLARATION OF CONFORMITY

1. MANUFACTURER

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2. PRODUCTS

T3500
T2000
T1500
T1000
T500
T4-250

3. STANDARDS

Safety	-	EN 60065: 2003
Relevant Specification used as Basis of Tests	-	EN55103-1:1996 EN55103-2:1996

4. CATEGORY

Professional apparatus for use in Commercial Light Industrial and controlled EMC environments.

5. CE MARKING

All products are marked in accordance with the relevant statutory requirements.

6. SIGNATORIES

I.R. McCarthy (Managing Director)

T.A. Clarke (Technical Director)

TECHNICAL SPECIFICATION

Main Specifications - T series Amplifiers

Parameter (Units)	T3500	T2000	T1500	T1000	T500	T4250
Output Power (per channel) (Watts)						
8 ohms	1000	625	575	450	215	160
4 ohms	1850	1150	1025	750	375	300
2 ohms	NA	2100	1750	1150	N/A	475*
Output Power (bridged) (Watts)						
8 ohms	3700	2300	2050	1500	750	600
4 ohms	NA	4200	3500	2300	N/A	950*
THD+N: (%)(4 ohms)						
@1kHz (@1dB below max output power) <	0.008	0.008	0.008	0.008	0.008	0.008
@20Hz to 20kHz (@3dB below max output power) <	0.05	0.03	0.03	0.03	0.03	0.03
Gain Options (dB)	32/36	32/36	32	32	32	32
Sensitivity Options (for maximum power) (dBu)	9.0/5.0	7.5/3.5	5.5	3.5	2	2
Sensitivity Options (for maximum power) (Volts)	2.2 / 1.4	1.8/1.2	1.4	1.2	1	1
Frequency Response - 20Hz to 20kHz (dB)	+0 / -0.5	+0 / -0.5	+0 / -0.5	+0 / -0.5	+0 / -0.5	+0 / -0.5
Power Consumption: Nominal @ 240v (4 ohms)(Amps)	4.2	2.8	2.5	1.9	1	1.5
Power Consumption: Nominal @ 120v (Amps)(4 ohms)	8.4	5.6	5	3.8	2	3
Dimensions: (mm)						
Amplifier: H x W x D	88x482x460	88x482x460	88x482x428	88x482x428	88x482x428	88x482x428
Boxed (shipping UK): H x W x D	230 x 580 x 560					
Boxed (shipping - all except UK): H x W x D	250 x 610 x 600					
Weight: (Kgs)						
Amplifier:	22.7	20.42	17.72	13.8	12.58	13.94
Boxed:(shipping)	24.8	22.2	19.26	15.34	14.12	15.8
Additional Specifications						
Input Impedance - Active balanced (k ohms)	20	20	20	20	20	20
Input CMRR (dB)	>60	>60	>60	>60	>60	>60
Hum & Noise (dB below max output)	-106	-106	-105	-104	-103	-104
Damping Factor: @1kHz into 8 ohms	>400	>400	>400	>400	>400	>400
Signal Limiters - (set to prevent excessive clipping)	Yes	Yes	Yes	Yes	Yes	Yes
Protection: Short circuit / DC output / Temperature	Yes	Yes	Yes	Yes	Yes	Yes
Mains in-rush control.	Yes	Yes	Yes	Yes	Yes	Yes
Output Power (watts) into 8 ohms						
Sine wave @ 1kHz	900	550	475	350	175	150
Continuous music with Crest Factor of 2.8 (9dB)	950	600	550	400	200	160
Continuous music with Crest Factor of 4.8 (14dB)	1000	625	575	450	215	160
Continuous music with Crest Factor of 7.8 (18dB)	1050	650	625	450	225	175
Output Power (watts) into 4 ohms						
Sine wave @ 1kHz	1600	1025	875	550	300	260
Continuous music with Crest Factor of 2.8 (9dB)	1700	1075	975	625	350	260
Continuous music with Crest Factor of 4.8 (14dB)	1850	1150	1025	750	375	300
Continuous music with Crest Factor of 7.8 (18dB)	1900	1175	1125	825	400	300
Output Power (watts) into 2 ohms						
Sine wave @ 1kHz	NA	1725	1375	825	N/A	400*
Continuous music with Crest Factor of 2.8 (9dB)	NA	1850	1600	1050	N/A	460*
Continuous music with Crest Factor of 4.8 (14dB)	NA	2100	1750	1150	N/A	475*
Continuous music with Crest Factor of 7.8 (18dB)	NA	2300	1900	1350	N/A	600*

* Channels C & D only

Power requirements

T3500 and T2000 are fitted with either a 100/120V/130v or 220/230/240V tapped transformer according to customer requirements.

This amplifier will only operate to its very high specification if it is installed and operated as described in this manual.

INTRODUCTION

Your *T Series* power amplifier is a no compromise, high quality, class AB power amplifier. There is no dynamic switching of the audio or power rails (a very common method of achieving extra power at the expense of audio quality) thus ensuring optimum sonic performance.

Fan speed is varied as required to keep the amplifier within its temperature limits. Signal limiters are included to protect speakers from clipped signals.

The amplifiers include full DC and short circuit protection to ensure trouble-free service even in 'harsher' environments.

Installation Instructions: ELECTRICAL

The amplifier has been manufactured to comply with your local power supply requirements, but before connecting the unit to the supply, ensure that the voltage (printed on the rear panel) is correct.

Make sure power outlets conform to the power requirements listed on the back of the unit. Damage caused by connecting to improper AC voltage is not covered by the warranty.

SAFETY WARNING

Apparatus with CLASS I construction shall be connected to a MAINS socket outlet with a protective earthing connection.

Where a MAINS plug or appliance coupler is used as the disconnect device, it should remain readily operable.

Where the amplifier is mounted in a rack and permanently connected to the mains, then the rack should be installed with a readily accessible connector or an ALL POLE circuit breaker with 3mm breaking distances.

This unit is fitted with a 3-wire power cord. For safety reasons, **THE EARTH LEAD SHOULD NOT BE DISCONNECTED IN ANY CIRCUMSTANCE**. If ground loops are encountered consult the section on 'Input Connections' later in this manual.

THE WIRING COLOURS ARE:

230V AREAS: EARTH = GREEN AND YELLOW
NEUTRAL = BLUE
LIVE = BROWN

120V AREAS: EARTH = GREEN
NEUTRAL = WHITE
LIVE = BLACK

WARNING To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture.

WARNING To prevent injury, this apparatus must be securely attached to the rack in accordance with the installation instructions

WARNING Apparatus with CLASS I construction shall be connected to a MAINS socket outlet with a protective earthing connection

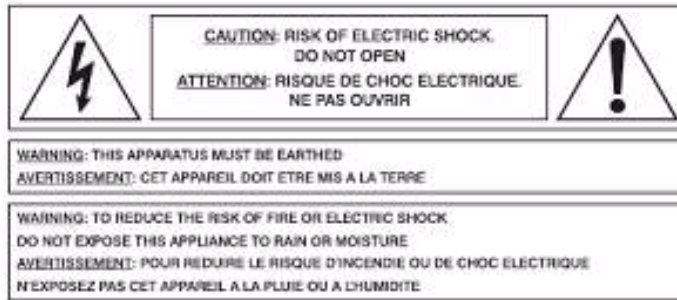
TO AVOID ELECTRICAL SHOCK DO NOT REMOVE COVERS. REFER ALL SERVICING TO QUALIFIED PERSONNEL.

DO NOT USE THE UNIT IF THE ELECTRICAL POWER CORD IS FRAYED OR BROKEN. The power supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords and plugs and the point where they exit from the appliance.

ALWAYS OPERATE THE UNIT WITH THE AC GROUND WIRE CONNECTED TO THE ELECTRICAL SYSTEM GROUND. Precautions should be taken so that the means of grounding of a piece of equipment is not defeated.

DO NOT REMOVE THE LID. Removing the lid will expose you to potentially dangerous voltages. There are no user serviceable parts inside.

IMPORTANT SAFETY INSTRUCTIONS



The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

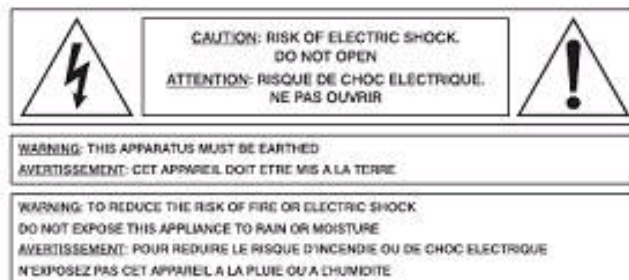
WARNING: Apparatus with CLASS I construction shall be connected to a MAINS socket outlet with a protective earthing connection.

WARNING: To prevent injury, this apparatus must be securely attached to the rack in accordance with the installation instructions.

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Clean only with a dry cloth.
7. Do not block any ventilation openings, install in accordance with the manufacturer's instructions.
8. Do not install near any heat sources, such as radiators, heat registers, stoves or other apparatus (including amplifiers) that produce heat.
9. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles and the pint where they exit from the apparatus.
10. The mains circuit breaker shall remain readily accessible.
11. Only use attachments/accessories specified by the manufacturer.
12. Use only with the cart, tripod, bracket or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from a tip over.
13. Disconnect this apparatus during lightning storms or when unused for a long period of time.
14. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as if the power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
15. Do not expose this equipment to dripping or splashing and ensure that no objects filled with liquids, such as vases, are placed on the equipment.
16. To completely disconnect this equipment from the AC mains, disconnect the power cord from the mains circuit breaker.
17. Where the amplifier is mounted in a rack and permanently connected to the mains, then the rack should be installed with a readily accessible connector or an ALL POLE circuit breaker with 3mm breaking distances.
18. This unit is fitted with a 3-wire power cord. For safety reasons, THE EARTH LEAD SHOULD NOT BE DISCONNECTED IN ANY CIRCUMSTANCE.
19. The cooling fans suck cool air in through the front and blow hot air out at the rear of the unit through the ventilating grills. The front and rear of the amplifier should have free exposure to the air (i.e. in a rack leave the front and rear doors off), with 2cm air gap at the sides and top. IF AIR IS NOT ALLOWED TO ESCAPE FROM THE REAR, OVER-HEATING WILL OCCUR. Take care when mounting other equipment in the same rack.
20. The mains switch on the amplifiers only switches one pole of the mains supply, therefore for units with a detachable cord to be fully disconnected from the mains, the mains disconnect device (ie mains plug or mains coupler) should remain readily operable. For units with a fixed mains lead the external all pole circuit breaker with 3mm breaking distances is the disconnect device and therefore the installation of the amplifier shall be carried out in accordance with all the applicable installation rules.



INSTRUCTIONS DE SÉCURITÉ IMPORTANTES



Le symbole représentant un éclair fléché dans un triangle équilatéral a pour but d'alerter l'utilisateur de la présence d'une « tension dangereuse » non isolée à l'intérieur du boîtier, pouvant être d'une force suffisante pour constituer un risque d'électrocution.



Le point d'exclamation dans un triangle équilatéral a pour but d'alerter l'utilisateur de la présence d'instructions importantes concernant le fonctionnement et la maintenance, dans la documentation qui accompagne l'appareil.

ATTENTION: Appareils de construction de CLASSE I doit être raccordé au réseau électrique via une prise de courant reliée à la terre.

ATTENTION: Pour éviter toute blessure, cet appareil doit être solidement fixé à la torture, conformément aux instructions d'installation.

1. Lisez ces instructions.
2. Gardez ces instructions.
3. Faites attention à tous les avertissements.
4. Suivez toutes les instructions.
5. N'utilisez pas cet appareil près de l'eau.
6. Faites le ménage seulement avec un tissu sec.
7. Ne bloquez pas d'ouvertures de ventilation, installez conformément aux instructions du fabricant.
8. N'installez près d'aucunes sources de chaleur, comme les radiateurs, les registres de chaleur, les cuisinières ou d'autre appareil (en incluant des amplificateurs) qui produisent la chaleur.
9. Protégez la corde de pouvoir d'être marché sur ou pincé particulièrement aux prises de courant, les réceptacles d'avantage et la pinte où ils sortent de l'appareil.
10. Le disjoncteur de conduite principale restera sans hésiter accessible.
11. Utilisez seulement des attachements/accessoires spécifiés par le fabricant.
12. Utilisez seulement avec le chariot, le trépied, la parenthèse ou la table spécifiée par le fabricant, ou vendu avec l'appareil. Quand un chariot est utilisé, utilisez la prudence en déplaçant la combinaison de chariot/appareil pour éviter la blessure d'un bout.
13. Débranchez cet appareil pendant les tempêtes de foudre ou quand neuf pendant un long terme de temps.
14. Renvoyez tout l'entretien au personnel de service qualifié. L'entretien est exigé quand l'appareil a été nui de toute façon, comme si la corde de pouvoir provision ou la prise de courant sont nuis, le liquide a été déversé ou les objets sont tombés dans l'appareil, l'appareil a été exposé pour pleuvoir ou l'humidité, n'opère pas normalement, ou a été baissé.
15. N'exposez pas cet équipement au fait de tomber goutte à goutte ou au fait d'éclabousser et garantisiez qu'aucun objet rempli des liquides, comme les vases, n'est placé sur l'équipement.
16. Pour complètement débrancher cet équipement de la conduite principale de courant alternatif, débranchez la corde de pouvoir du disjoncteur de conduite principale.
17. Où l'amplificateur est monté dans un égouttoir et en permanence raccordé à la conduite principale, alors l'égouttoir devrait être installé avec un connecteur sans hésiter accessible ou TOUT le disjoncteur de PÔLE avec 3 millimètres cassant des distances.
18. Cette unité est correspondue avec une corde de pouvoir de 3 fils. Pour les raisons de sécurité, L'AVANCE DE TERRE NE DEVIENDRA ÊTRE DÉBRANCHÉE DANS AUCUNE CIRCONSTANCE.
19. Les ventilateurs engloutissent l'air frais par le front et soufflent l'air chaud à l'arrière de l'unité par les grils aériers. Le front et l'arrière de l'amplificateur devraient avoir l'exposition libre à l'air (c'est-à-dire dans un égouttoir omettent les portes de devant et arrière), avec le trou aérien de 2 centimètres aux côtés et au haut. Si on NE PERMET PAS QUE D'AIR S'ÉCHAPPE DE L'ARRIÈRE, LE FAIT DE SURCHAUFFER SE PRODUIRA. Faites attention en montant d'autre équipement dans le même égouttoir.
20. L'interrupteur principal sur les amplificateurs ne coupe qu'un pôle de l'alimentation secteur. le cordon IEC permettra de déconnecter l'appareil de l'alimentation secteur, pour cette raison l'accès à ces fiches (fiche mâle ou femelle) doit être facilités. Pour les appareils avec un câble d'alimentation fixe sans fiche secteur, le dispositif de coupure omnipolaire ayant une distance d'ouverture de contact d'au moins 3mm, sera le dispositif permettant la déconnexion complète de l'appareil. Pour cette raison l'installation et le raccordement de l'amplificateur devra ce faire conformément au réglementation en vigueur.



INSTALLATION: MECHANICAL

To ensure that this equipment performs to specification, it should be mounted in a suitable rack or enclosure as described below. Like all high power amplifiers, it should be kept away from other equipment which is sensitive to magnetic fields. Also, this amplifier may suffer a substantial reduction in performance if it is subjected to, or mounted close to equipment which radiates high RF fields.

Warning: To prevent injury, this apparatus must be securely attached to the rack in accordance with the installation instructions

When mounting the amplifier in a rack or enclosure, ensure that:-

1. The rear of the unit is adequately supported. The brackets which are supplied fit standard 19 inch (483mm) rack mounting systems. **THE FRONT PANEL IS NOT CAPABLE OF SUPPORTING THE UNIT ON ITS OWN.**
2. **THERE IS ADEQUATE VENTILATION.** The cooling fans suck cool air in through the front and blow hot air out at the rear of the unit through the ventilating grills. The front and rear of the amplifier should have free exposure to the air (ie in a rack leave the front & rear doors off), with 2cm air gap at the sides. **IF AIR IS NOT ALLOWED TO ESCAPE FROM THE REAR, OVER-HEATING WILL OCCUR.** Take care when mounting other equipment in the same rack.
3. The rack unit has a separate earth connection (technical earth).

ALSO SEE MAINTENANCE SECTION, page 10.

CONNECTIONS

INPUTS

The inputs are made via 3-pin XLR connectors, which are electronically balanced and should be connected via a high grade twin core screened cable, as follows :-

- PIN1 - Screen (see note)
- PIN2 - Hot (signal +)
- PIN3 - Cold (signal -)

The amplifier is designed to operate with fully balanced equipment and ground loops or loss of performance may be experienced if connected to unbalanced sources. If it is unavoidable however, the following wiring should be used. The cable should still be twin core plus screen.

- PIN1 - Screen - connected to the chassis of the unbalanced equipment - or left disconnected at the unbalanced end.
- PIN2 - Signal Hot
- PIN3 - Signal Cold

NOTE: This amplifier is wired to the latest industry recommendations. PIN1 is connected directly to the chassis/mains earth. If ground loops (mains hum) are encountered remove the screen connection from the other end of the cable and leave it open circuit. If problems persist, consult your dealer/supplier, **DO NOT TAMPER WITH OR ALTER ANY GROUND (EARTH) CONNECTIONS INSIDE THE AMPLIFIER.**

For bridged operation input should be made to channel A only and the rear panel switch set for bridged mode.

OUTPUTS

The speaker outputs are via Neutrik Speakon connectors. 2 pole (NL2FC) or 4 pole (NL4FC) connectors can be used.

Terminations are as follows :-

HOT	Pin	+1
COLD	Pin	-1

Additionally Channel A Speakon connector carries Channel B output on Pins +2 & -2 to allow easy bi-amping or bridged operation.

HOT	Pin	+2
COLD	Pin	-2

(See also Bridged operation Page 7)

NOTE: 1. There must be no shared connections between channels.

NOTE: 2. Because the currents involved are very high, the speaker cables should conform to the following minimum requirements, otherwise the losses will cause the cables to get hot and audio power will be reduced:

T2000, 16A: T3500, 20A - into 4ohm speaker loads

NOTE: Do not connect the inputs/outputs to any other voltage source such as a battery, mains source or power supply, regardless of whether the amplifier is turned on or off.

Do not run the output of any amplifier channel back into another channel's input and do not parallel or series-connect an amplifier output with any other amplifier output.

BRIDGED (MONO) OPERATION

Supply the signal to Channel A input only & push in the rear panel switch marked 'Bridged Mono'

Use Channel A Output Speakon connector and connect as follows:

HOT	Pin	+2
COLD	Pin	-1

When operating in bridged mode, the minimum impedances are doubled. The minimum load in bridged mode is: 8 ohms - T3500, 4 ohms - T2000.

LINK SOCKET

Each channel is provided with a 3-pin XLR connector marked 'LINK' which allows the input signal to be linked to further amplifiers etc. The connections are the same as for the input XLR.

OPERATION

Read all documentation before operating your equipment and retain all documentation for future reference.

Do not spill water or other liquids into or on the unit and do not operate the unit while standing in liquid.

Do not block fan intake or rear ventilation outlets or operate the unit in an environment which could impede the free flow of air around the unit.

If the unit is used in an extremely dusty or smoky environment, it should be cleaned of any collected debris at regular intervals. (See Maintenance section.)

It is important that the power output of your amplifier is matched to the power handling capacity of your loudspeaker. If not, damage to the loudspeaker could occur.

SWITCHING ON

At 'switch-on' the protection circuit will initially activate whilst the circuits stabilise. Assuming no faults are detected after a few seconds only the 'POWER' LED (and 'SIGNAL' indicators if signal is applied) will illuminate.

PANEL CONTROLS AND INDICATORS

Level controls

These are analogue controls allowing precise level settings. Note that in 'BRIDGED' mode only 'channel A' control is active.

Signal Indicators (blue LED)

These are active from a minimum output level of approximately 10 Watts and are an indication only of signal presence.

Limiters (amber LED)

The *T Series* amplifiers incorporate signal limiters, which are preset to prevent clipping with high levels of drive. The amber LEDs on the front panel illuminate to indicate operation of the limiters.

Temperature Control

The cooling fans respond to temperature sensors within the unit to maintain a safe operating temperature. In the event of excessive temperature, the protection circuit will operate, disabling the output. The red Audio-Protect (A/P) LED will indicate this condition (see fault indicator).

Normal dynamic signals will not cause the amplifier to overheat unless the ventilation is inadequate. (See installation section and maintenance section.)

Fault Indicator (Audio Protection – red LED)

If the outputs are shorted or if DC is present, the protection circuit will disengage the outputs and the A/P LED will illuminate. The amplifier will continue to be monitored and depending on the type of fault, will either reset after the fault has cleared or require manual resetting by switching off at the mains switch and then on again after a few seconds. (See also temperature control above)

Temperature related faults will reset if the unit has cooled sufficiently.

Output short circuits will require manual reset after clearing the fault.

Bridged LED (green)

This indicates the position of the switch on the rear panel and is illuminated when bridged mode is selected with the switch pressed in.

100V LINE OPERATION

When using the *T Series* with 'line' transformers, it is recommended that the frequency response is altered to prevent saturation of the transformer core with large signals. This could trigger a fault condition since it would be seen by the amplifier protection circuit as a short circuit on the output.

The T3500 and T2000 should be fitted with a suitable cross-over card set to roll off the LF response to be -3dB @ 63Hz.

MAINTENANCE - (ENSURE THAT ELECTRICAL POWER TO THE UNIT IS DISCONNECTED BEFORE CARRYING OUT ANY MAINTENANCE.)

The filter behind the air intake apertures on the front of *T Series* amplifiers should be cleaned or replaced periodically, e.g. 12-24 months. (Filters in amplifiers located in more 'dirty' atmospheres may require more frequent maintenance). The filter should be 'dry' cleaned, using a vacuum cleaner preferably. Running the unit without a filter is not recommended unless it is within a 'clean room'. Replacement filter material is available.

No other regular maintenance is required.

If you have any doubt about carrying out this procedure, refer to a service engineer or contact your dealer.

IF YOUR AMPLIFIER DEVELOPS A FAULT, PLEASE REFER TO YOUR SUPPLIER FOR SERVICE AND TECHNICAL SUPPORT. DO NOT ATTEMPT TO REPAIR THE FAULT YOURSELF AS THIS WILL INVALIDATE THE WARRANTY.