



ET SERIES

ELECTRONIC TURNTABLE



ET250R2-3D



ET50-3D

USER MANUAL



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SAFETY REGULATIONS

In order to avoid risks for the user's and other people's safety, as well as annulling the warranty, it is advisable to read the suggestions in this section for correct use of the product.

- Do not expose the unit to rain or use it in locations with a high humidity level.
- Ensure that no liquids or solid objects accidentally enter the unit; should this occur, stop using the unit and contact OUTLINE or specialist staff.
- When connecting the unit, ALWAYS check ground connection as required by technical and safety norms.

- If the original connector cable is worn or damaged, it must be replaced with another of the same type (in perfect condition).
- Carry out connections in an orderly manner, only allowing access to experienced specialist staff.
- The unit must only be opened and/or repaired by specialist staff.
- For any requirements of a technical nature, contact OUTLINE or authorized staff.
- The unit is dedicated to moving heavy or bulk objects. For this reason, it must be used under the supervision of experienced personnel.

DISPOSAL OF WASTE MATERIALS



Your product is designed and manufactured with high quality materials and components, which can be recycled and reused. When this crossed-out wheeled bin symbol is attached to a product, it means the product is covered by the European Directive 2012/19/EU and subsequent amendments. This means that the product must NOT be disposed of with other household-type

waste. It is the users' responsibility to dispose of their waste electrical and electronic equipment by handing it over to an approved reprocessor. For more information about where you can send your equipment for recycling, please contact your local distributor. The correct disposal of your old product will help prevent potential negative consequences for the environment and human health.

CONFORMITY AND WARRANTY



All the Outline electro-acoustic and electronic devices are in conformity with the provisions of EC/EU directives (as stated in our CE declaration of conformity).

The CE declaration of conformity is attached to the product warranty certificate and is shipped with the product.

All the Outline electroacoustic and electronic devices are in accordance with the objects stated by below CEE directives:

Safety

73/23 and following modification 93/68 Art. 13

Electromagnetic compatibility

89/336 and following modification 93/68 Art. 5

Standards applied:

Safety: EN 60065

Safety requirements for mains operated electronic and related apparatus for household and similar general use.

Electromagnetic compatibility audio equip.

Emissions - Harmonics: EN 61000-3-2

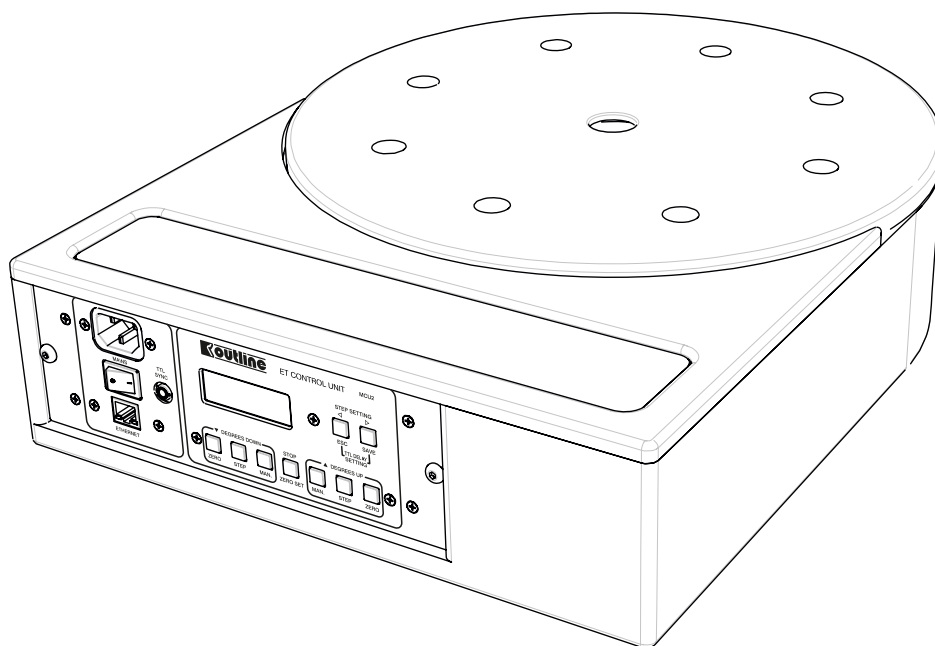
- Voltage fluctuations: EN 61000-3-3

- Radio interferences: EN 55013

Immunity: EN 55020



SYSTEM DESCRIPTION



Outline's restless pursuit of perfection has resulted in the development of two new and improved ET Series products, building on the unparalleled worldwide success of our previous models during the last half century - we are very excited to unveil the brand new ET50-3D and ET250R2-3D.

As a result of years of study and tests, the mechanical sturdiness makes the ET250R2-3D turntable a real rugged tool able to support remarkable loads. The brand new ET50-3D, on the other hand, is designed to move lighter loads faster.

The combined use of two units, backed up by a suitable structure (see the example with the ET250R2-3D on page 13 of this manual), enables to obtain three-dimensional rotation, which is particularly useful to loudspeaker enclosure manufacturers, for example.

The microprocessor-based control unit guarantees utmost precision and, thanks to the network interface in compliance with Ethernet standard, enables the models to be completely controlled via PC. For this purpose, Outline supplies dedicated software that can control up to two units, commanding their synchronized movement.

On request, Outline also provides a dedicated DLL (Dynamic Link Library) for software developers.

For compatibility with some measurement cards on the market, the Outline turntables are equipped with an Input/Output port based on TTL signals through which it is possible to send the unit the rotation command and receive a return pulse when rotation ends.

UNPACKING

After unpacking the unit, check very carefully for any damage. If any damage is found, please notify your dealer.

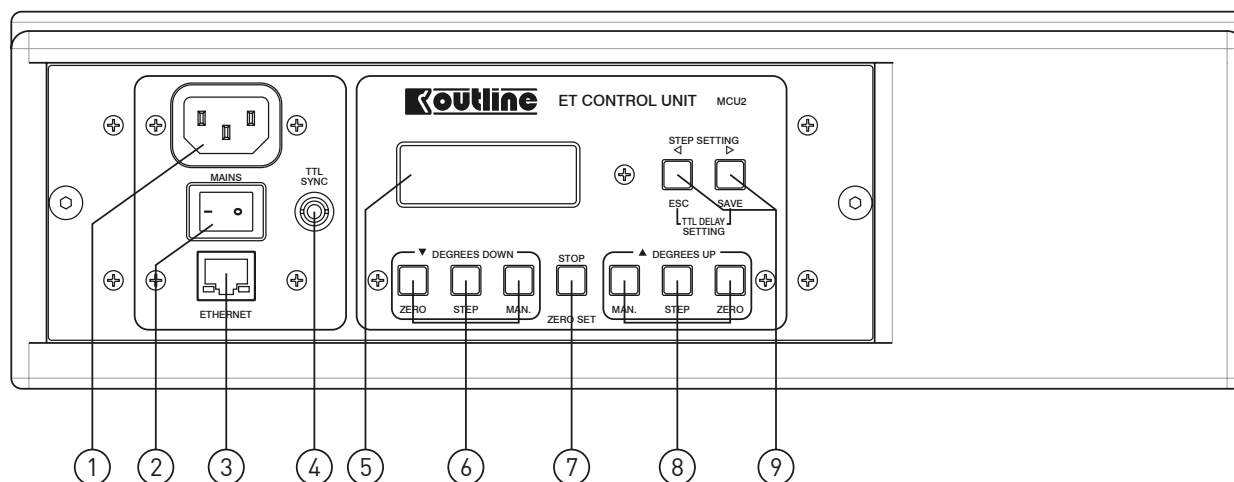
It is advisable to keep the packaging for use in the event of the unit being transported in the future.

The Outline ET unit is supplied with the following accessories:

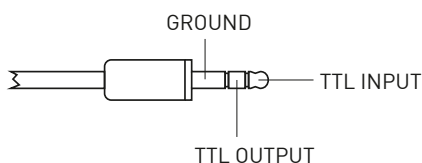
- 1 AC mains power cable
- 1 9-pin male Combicon connector and 1 9-pin female Combicon connector
- Warranty certificate
- Operating manual



FRONT PANEL



1. **MAINS:** mains power connector. Connect using the appropriate cable supplied.
Its switch-mode circuitry enables the unit to be used with any voltage between 90 Vac and 250 Vac.
2. **ON/OFF switch:** this switch can only be used when the unit is powered with the mains power supply [1].
3. **ETHERNET:** RJ45 connector for PC connection.
4. **TTL SYNC:** mini jack connector for connection with some measurement cards. The ET unit moves forward (degrees increase) by the preset step (see point [9]) when it receives a TTL pulse on its input.
Once rotation is finished, after a preset delay (see point [9]), it sends a TTL pulse.
5. **4 digit Display** for displaying the degrees of rotation.
6. **DEGREES DOWN:** buttons for rotating the turntable backwards (degrees decrease).
ZERO: the turntable reaches the position of 0 degrees.
STEP: the turntable rotates by the number of degrees preset using the buttons [9].
MANUAL: the turntable rotates by 0.5 degrees, which is the minimum movement.



7. **STOP/ZERO SET:** this button has a dual function.
When pressed normally, immediately stops the base during rotation.
When pressed and held down for more than 2 seconds, sets the current position as 0 degrees, resetting the display.
8. **DEGREES UP:** buttons for rotating the turntable forward (degrees increase).
ZERO: the turntable reaches the position of 0 degrees.
STEP: the turntable rotates by the number of degrees preset using the buttons [9].
MANUAL: the turntable rotates by 0.5 degrees, which is the minimum movement.
9. **STEP SETTING:** these buttons have a dual function.
Normally used to set the movement step of the turntable (from a minimum of 0.5 degrees to a maximum of 359.5 degrees).
Pressing the two buttons together gives access to the delay setting for the output of the TTL pulse when rotation finishes:
 - Pressing the MAN. buttons increases or decreases the delay by 1 ms.
 - Pressing the STEP buttons increases or decreases the delay by 100 ms.
 - Pressing the SAVE button stores the new value set for the delay.
 - Press the ESC button to exit delay modification procedure, restoring the value already stored.



INSTALLATION MOUNTING

The Outline ET series was designed for horizontal, vertical and upside-down use.

HORIZONTAL USE

The ET250R2-3D and ET50-3D have been tested to support an axial load of 1,000 kg (2,200 lb) and 200 kg (440 lb) respectively. Prepare a suitable level

support to ensure good operation of the unit and avoid it being damaged. The load shall be equally distributed on the plate surface.

UPSIDE-DOWN USE

The ET250R2-3D and ET50-3D have been tested to support an upside-down load of 200 kg (440 lb) and 40 kg (88 lb) respectively. Please note that

the load, especially in this configuration, shall be equally distributed over the anchor points on the plate surface.

VERTICAL USE

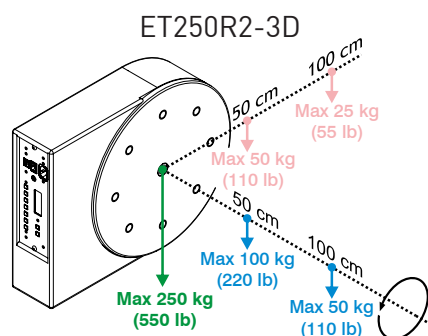
The two models have been tested to support a maximum radial load of 250 kg, with a maximum bending moment of 500 Nm and a torque of 250 Nm for the ET250R2-3D; while the ET50-3D with a maximum bending moment of 50 Nm and a torque

of 50 Nm. It is therefore necessary to check the loads that are applied, taking into consideration the distance of the centre of gravity of the load from the turntable plate.

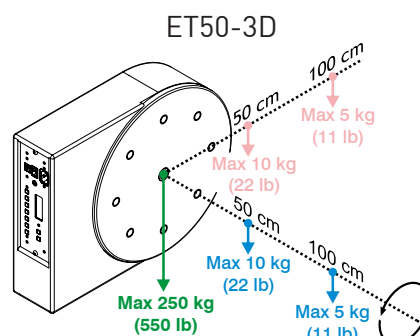
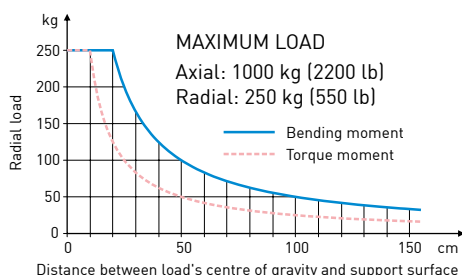
	ET250R2-3D	ET50-3D
Max. Weight (Bending)	50 kgm / d (with a limit of 250 kg)	5 kgm / d (with a limit of 250 kg)
Max. Weight (Torque)	25 kgm / d (with a limit of 250 kg)	5 kgm / d (with a limit of 250 kg)

where d = distance in meters

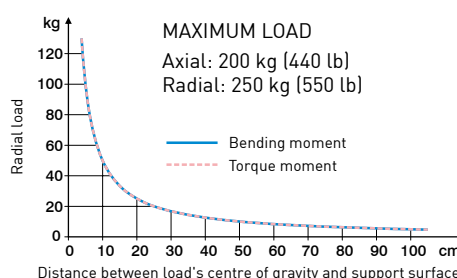
THE MANUFACTURER DECLINES ANY AND ALL RESPONSIBILITY FOR ANY DAMAGE CAUSED BY INCORRECT USE OF THE UNIT OR FAILURE TO COMPLY WITH THE DECLARED PARAMETERS.



ATTENTION: Load must be equally distributed on all fixing points



ATTENTION: Load must be equally distributed on all fixing points



USE OF MOUNTING SCREWS

The Outline ET series turntables have fixing holes on the bottom and on the platter.

The screws for the mounting holes on the top (rotating) side must be M8 (8.8) with an insertion depth between 30 mm to 40 mm from the plate surface.

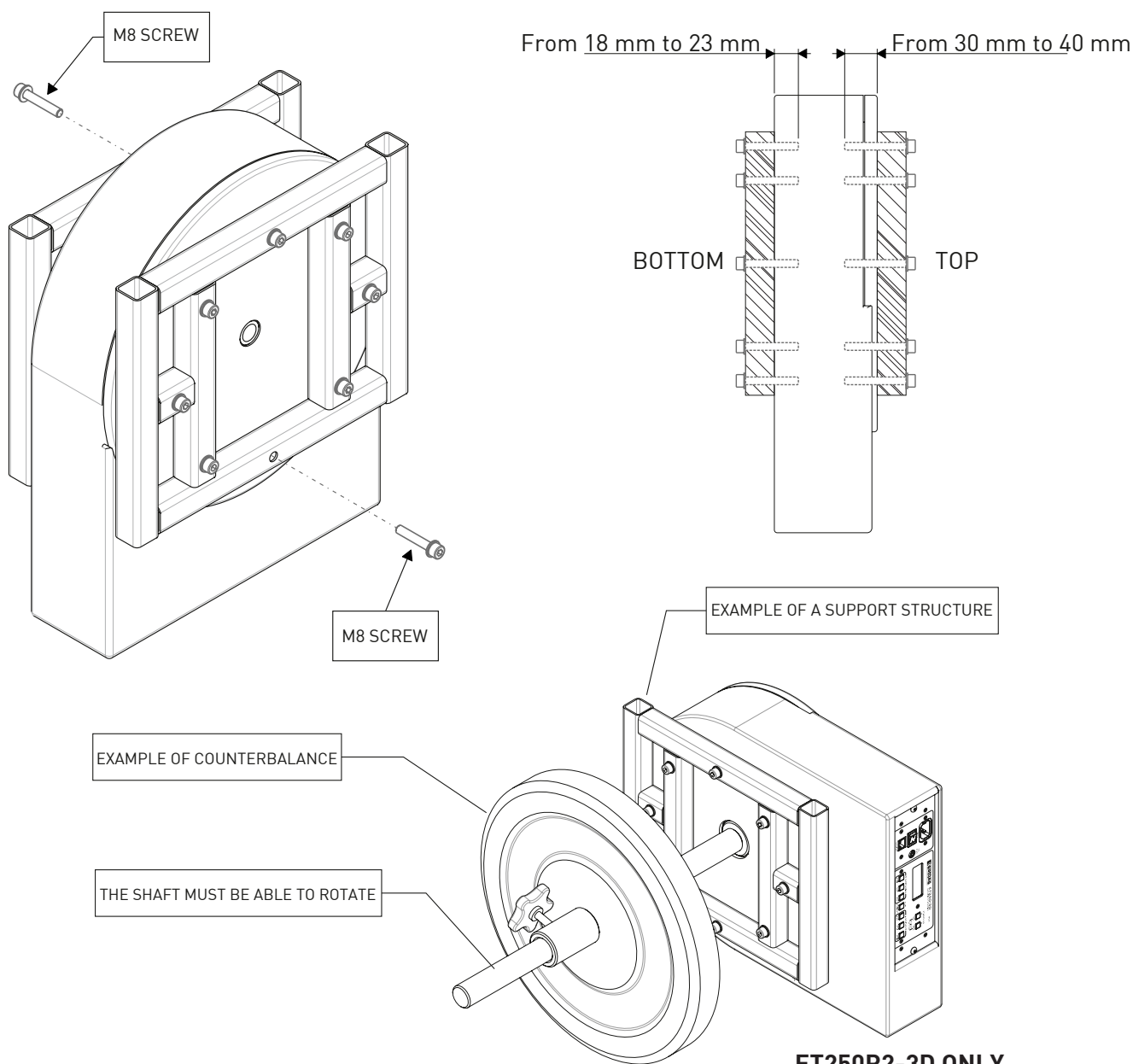
While for the bottom (fixed) side, M8 (8.8) screws must be used with an insertion depth between 18 mm to 23 mm from the base surface. Please, **make sure the screws enter the platter or the base by**

at least the specified minimum value and do not exceed the specified maximum value.

The maximum tightening torque is 20 Nm.

Only the ET250R2-3D has a middle threaded M20 on the bottom which **MUST NOT** be used for fixing, but is designed for the eventual use of a counterweight.

THE MANUFACTURER DOES NOT RESPOND FOR ANY DAMAGE CAUSED BY FAILURE TO OBSERVE THIS RULE.



REMOVING THE CONTROL ELECTRONICS

Like the previous version (Outline ET250-3D), the electronics of the new Outline ET series turntables are built into the body of the mechanism.

However, it is possible to separate the two parts, for example, installing the mechanism in a measurement room and the electronics in another room (in reality, this can be avoided by using remote control via network, as explained further ahead in this manual).

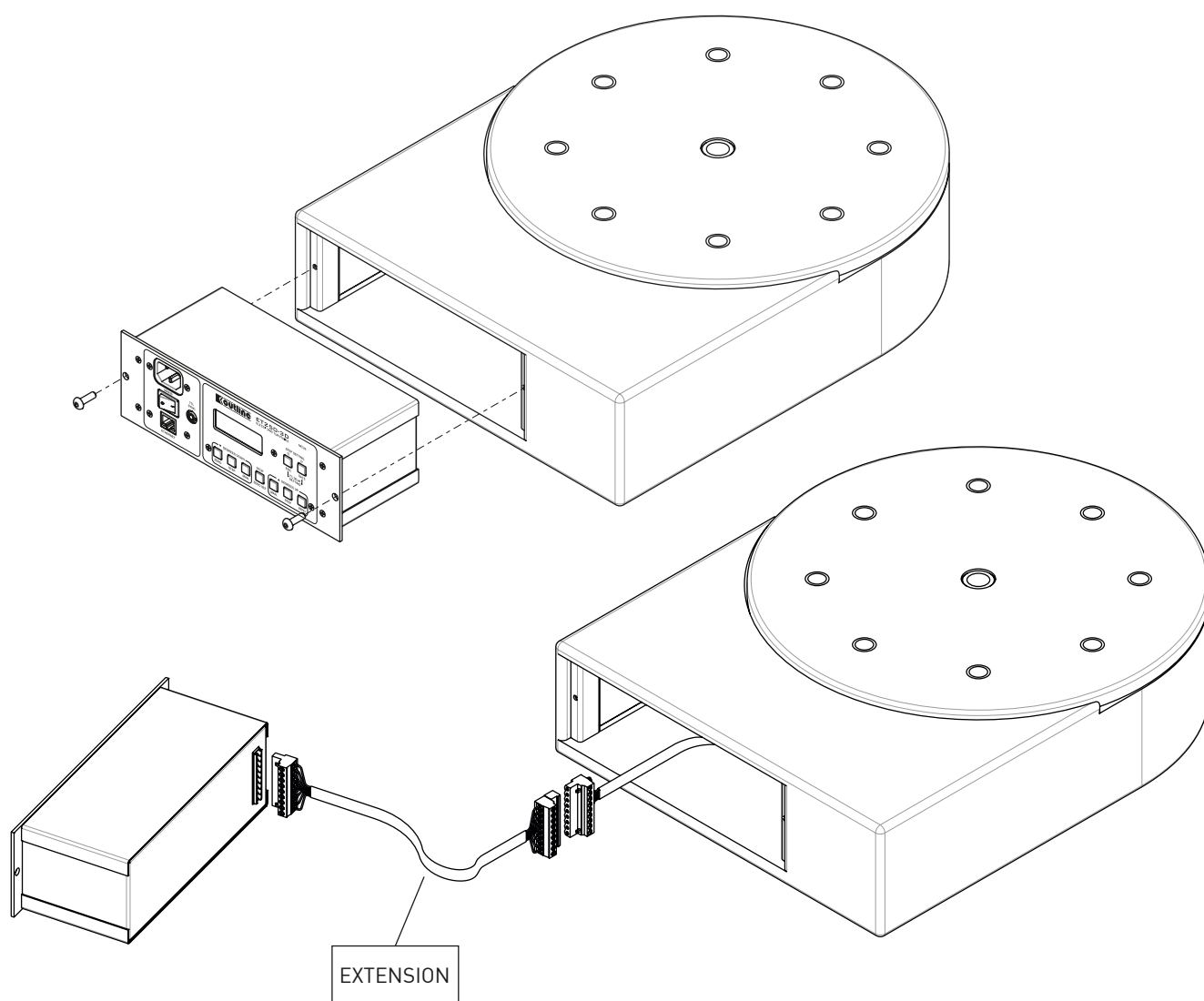
To extract the control electronics, just remove the two fixing screws on the front of the unit, then disconnect the cable on the rear of the electronics and fit an extension cable (made according to

users' needs) between the mechanism and the electronics.

To make the extension cable, use the two 9-pin Combicon connectors (one male and one female) supplied with the unit. Connect the two connectors in parallel, making certain to keep the same wiring sequence.

Attention: use a cable with a sufficiently large cross-section to avoid signal loss.

When using a cable run it is recommended to disable the acceleration flag. If long cable runs are required it is suggested to check the configuration with Outline's technical department by sending an email to info@outline.it.



INSTALLATION PRECAUTIONS

Installation in excessively damp or dusty locations can cause damage to the unit or faulty operation.

MAINS CONNECTION

The Outline ET series turntables are fitted with a 3-conductor cable; the green-and-yellow wire of the mains cord must always be connected to an earth or ground.

This is also necessary in the case of cable

extensions, adaptation of existing mains sockets, adaptors, etc.

This is essential for safety and correct system operation. Inside the unit, the yellow/green wire is connected to the metal chassis.

ATTENTION! THE UNIT MUST ALWAYS BE EARTHED.

THE MANUFACTURER DECLINES ANY AND ALL RESPONSIBILITY FOR ANY DAMAGE CAUSED BY FAILURE TO COMPLY WITH THIS RULE.

MAINS POWER VOLTAGE

The Outline turntables use a switching power system that ensures high efficiency and low heat dispersion. It accepts any input power voltage between 90V AC and 250V AC (nominal), without any adjustment being required.

Outside this range the unit will not work correctly.

If voltage exceeds the maximum limit, it will probably cause damage, whereas excessively low voltage will cause the system to shut down.



STAND-ALONE USE OF THE UNIT

The Outline ET series unit's platter can rotate in both directions (clockwise and counterclockwise).

The minimum movement step is 0.5 degrees and is made by pressing the MANUAL buttons.

The STEP buttons on the other hand are used to rotate the platter with number of degrees that can be set. This value is 5 degrees by default, but can be changed using the STEP SETTING buttons. When pressed once, the stored value is displayed; each

time they are pressed again raises or lowers the value by 0.5 degrees.

There is no absolute "zero" position. When the electronics are switched on, the current position is considered position "zero". However, It is possible to set a new "zero" position, by keeping STOP/ZERO SET pressed for approximately 2 seconds.

The main function of the STOP/ZERO SET button is to immediately stop turntable rotation if necessary.

USE THE UNIT WITH TTL PULSE

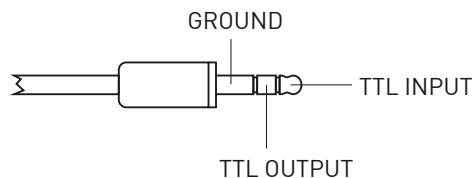
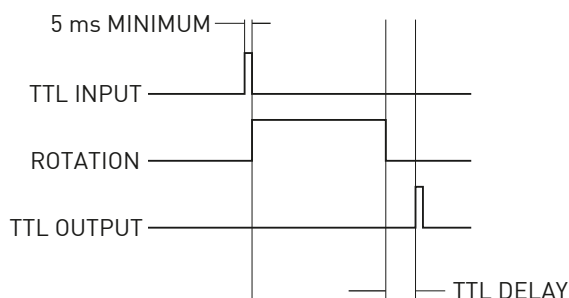
There is a TTL SYNC connector on the front of the control electronics to use the turntable with some measurement cards. With a mini jack connector, it is possible to:

- send a TTL pulse (at least 5 ms) to the turntable (TTL INPUT) which starts rotation (only forwards) with the stored step. This action corresponds exactly to pressing the DEGREES UP - STEP button and allows the measurement card to start turntable rotation.
- receive a TTL pulse from the turntable (TTL output), which indicates that rotation is finished. The measurement card can thus proceed with another acquisition. To allow the load standing on the turntable to come to a

complete standstill at the end of rotation, this pulse is generated after a delay that can be set from 1 to 9999 ms. Default value is 3,000 ms. To change it, press the two TTL DELAY SETTING buttons simultaneously: the delay value will be displayed in milliseconds. Press then MAN. buttons to increase or decrease the delay by 1 ms. Press the STEP buttons to increase or decrease the delay by 100 ms. After finishing setting, press the SAVE button to store the new value or the ESC button to abort modification procedure without storing a new value.



ATTENTION: to avoid damaging either the unit or the measurement card, connection must be carried out with both units switched off.



USE WITH ET COMMANDER SOFTWARE

The Outline ET series turntables is supplied with dedicated software for its complete control. This software can be used to control multiple turntables, specifying the various rotation modes.

INSTALLING THE SOFTWARE ON A PC

The software works on Windows operative systems and is available from Outline's web site (www.outline.it) from the ET series page. The software doesn't require any installation.

Please download the zip file and extract it on your computer in any position (such as C:\temp, administrator rights might be required).

Before using the software, configure the network.

NETWORK CONFIGURATION

Connect the Outline turntable to the ETHERNET network (using the RJ45 connector on the front).

The turntable uses UDP (User Datagram Protocol) network protocol, as per RFC 768 standard.

To enable several devices using this standard to communicate, each must have a valid and unique IP address.

The network address at which the unit is set before leaving the factory is:

- **IP:** 192.168.1.34
- **SUBNET MASK:** 255.255.255.0
- **DEFAULT GATEWAY:** 192.168.1.250
- **BROADCAST IP:** 192.168.1.255

In order for the software to identify the unit on the network, the turntable and the PC must be part of the same subnetwork.

According to factory settings, one possible PC network configuration is:

- **IP:** 192.168.1.10
- **SUBNET MASK:** 255.255.255.0

Once the software has recognized the device, it is possible to change the network configurations.

To check the IP allocated to the Outline turntable, just turn it on by pressing and holding down the STOP button. The stored IP will appear on the display.

If using two Outline units, the IP address of at least one of them MUST be changed. To do this, turn on one unit at a time and change the IP address using the ET Commander software. No other device(s) with the same address(es) can be present on the same subnet.

USING ET COMMANDER SOFTWARE

Start the program by double clicking on the "ETcommander2012.exe" file.

Click on "Scan Net" to look for the connected turntable(s). A window will appear with a list of the network cards installed on the PC; select the one to which the turntable is connect.

Attention: Before running a scan, make certain the turntable is on.

Immediately after OK is pressed, the network is scanned to find any units.

The units found on the network will appear on the list. Click on one unit and click on "Show" in order to show the control panel of that specific unit (you can show at the same time multiple units).

From this panel it is possible to see the actual angle of the turntable, start and stop the turntable movement, change the description, enable or

disable the "acceleration" feature and start a macro.

In order to move the turntable to a specific angle type the desired value in the "Move to (deg.)" area and click on the "Up" or "Down" arrows if you'd like to move to the desired angle increasing or decreasing the degrees (i.e. if you want to make a 180° rotation clockwise o counter-clockwise).

In order to move the turntable with an angular steps, write the step degrees value in the "Move step (deg.)" area and click on the "Up" or "Down" arrows if you'd like to move with the desired angle increment in the two directions.

The "Acceleration" flag enables the turntable to gentle start and stop. When the acceleration is active the turntable rotates at a lower speed at the beginning and at the end of the movement.



This feature might be used in order to have less “shocks”.

The turntables’ network settings (IP address) can

be changed by selecting one unit at a time from the list and clicking on the “Network” button.

FOR SOFTWARE DEVELOPERS

Outline puts at the disposal of software developers a DLL for the total control of the ET series turntables and raw commands in case of

specific control requirements. These details can be requested by sending an e-mail to **info@outline.it**.



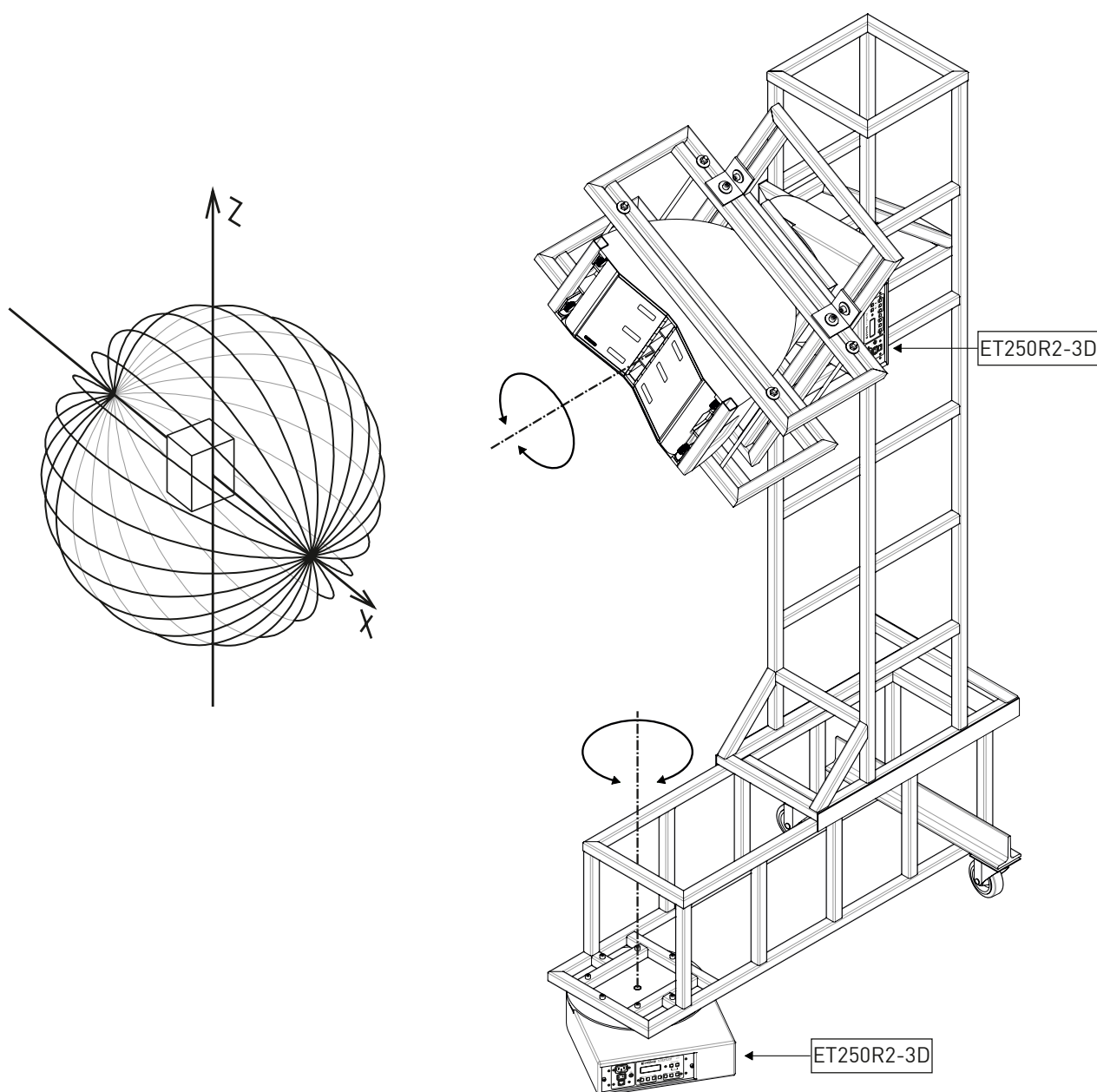
MEASUREMENT EXAMPLE

One example of 3D use of the ET250R2-3D turntables is shown in the illustrations below, intended above all for loudspeaker enclosure manufacturers who need to measure their products' acoustic dispersion.

With a suitable mechanical structure, it is possible to make the two turntables work in a

coordinated manner: one mounted in a horizontal position and the other in a vertical position.

This enables a 3D polar measurement to be produced in a single work session, with an enormous saving of time and greater measurement precision.



TECHNICAL SPECIFICATIONS

ET250R2-3D

ET50-3D

ROTATION DATA

Mounting Condition	Horizontal, Vertical, Upside-down	Horizontal, Vertical, Upside-down
Drive System	Irreversible worm gear	Irreversible worm gear
Direction	Clockwise or counter-clockwise	Clockwise or counter-clockwise
Max speed (tolerance $\pm 10\%$)	0.35 RPM	1.75 RPM
Max Axial Load (only in compression)	1000 kg (2200 lb)	200 kg (440 lb)
Max Axial Load (upside-down)	200 kg (440 lb)	40 kg (88 lb)
Max Radial Load	250 kg (550 lb)	250 kg (550 lb)
Max Torque	25 kgm (250 Nm)	5 kgm (50 Nm)
Max Bending Moment	50 kgm (500 Nm)	5 kgm (50 Nm)
Resolution	0.5°	0.5°
Acceleration and Max Speed	Microprocessor-controlled	Microprocessor-controlled

CONTROL

Local	TTL pulse input and output	TTL pulse input and output
Remote	Standard Ethernet Protocol	Standard Ethernet Protocol

PHYSICAL

Chassis Material	Scratch-Resistant Painted Wood	Scratch-Resistant Painted Wood
Rotating Disc Diameter	350 mm - 13 3/4"	350 mm - 13 3/4"
Top Mounting Holes	8 x M8 on 244 mm Diameter + 1 x M20	8 x M8 on 244 mm Diameter + 1 x M20
Bottom Mounting Holes	8 x M8 on 244 mm Diameter (on chassis) + 1 x M20 (for counterweight use only)	8 x M8 on 244 mm Diameter (on chassis)
Height	107 mm - 4 1/2"	107 mm - 4 1/2"
Width	350 mm - 13 3/4"	350 mm - 13 3/4"
Depth	455 mm - 17 7/8"	455 mm - 17 7/8"
Weight	14.3 kg (31.5 lb)	13.8 kg (30.4 lb)
Colour	Black	Black & Grey

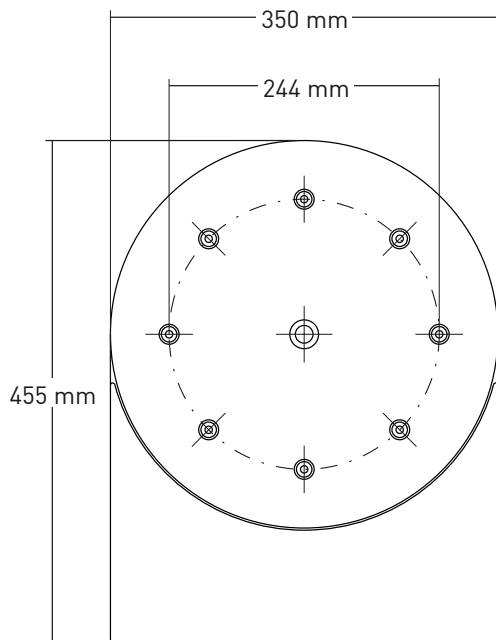
POWER REQUIREMENTS

Mains supply	90/250 V AC - 50/60 Hz	90/250 V AC - 50/60 Hz
Room Temperature	From -5° to 45° C	From -5° to 45° C

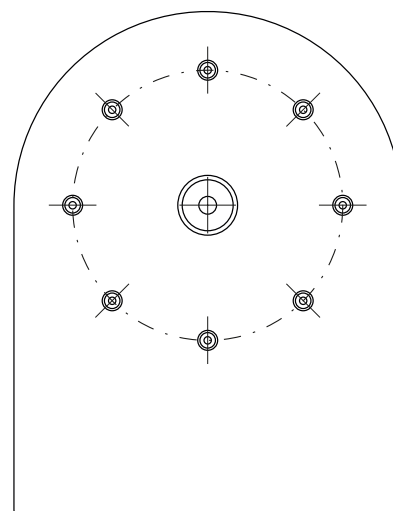
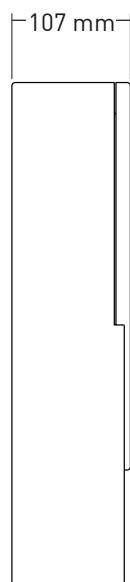


OVERALL DIMENSIONS ET250R2-3D

TOP (ROTATING)

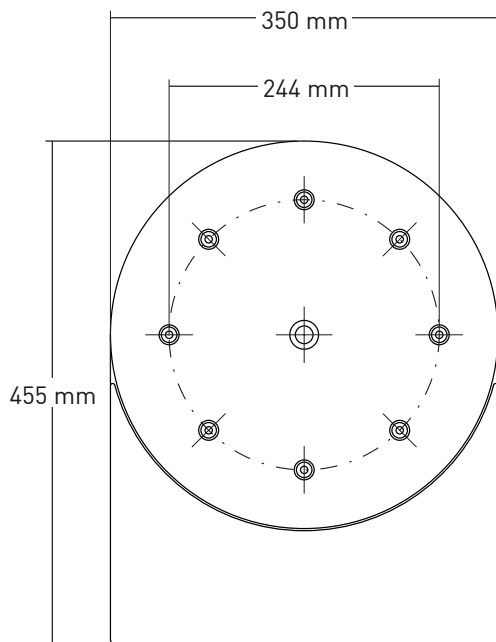


BOTTOM (FIXED)

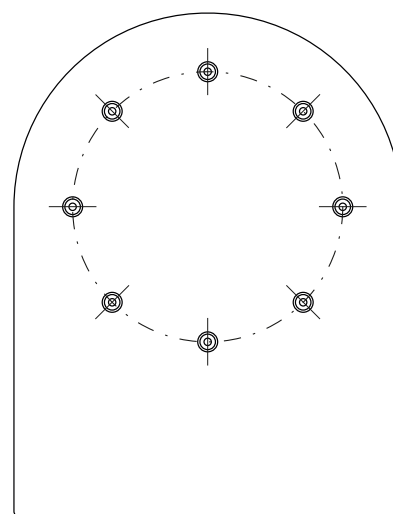
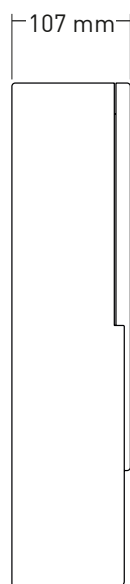


ET50-3D

TOP (ROTATING)



BOTTOM (FIXED)





Outline carries out on-going research for product improvement. New materials, manufacturing methods and design upgrades are introduced to existing products without prior notice as a routine result of this philosophy. For this reason, any current Outline product may differ in some aspect from its description, but will always equal or exceed the original design specifications unless otherwise stated.

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