



# TRITONE TRANSCEIVER

User Guide Version 2.2



# TABLE OF CONTENTS

1	Overview: Tone Sender, Receiver, Meter, and TDR.....	3
2	Connections .....	3
3	Operation .....	4
3.1	Power.....	4
3.2	Battery Level .....	4
3.3	Configuration - System.....	4
3.3.1	Backlight.....	4
3.3.2	Contrast.....	5
3.3.3	Volume .....	5
4	Sending Tone .....	5
4.1	Frequency Selection.....	5
4.2	Level Selection.....	5
4.3	Tone Mode Selection .....	6
4.3.1	Smplx 1T .....	6
4.3.2	Smplx 3T.....	7
4.3.3	TRI-PLEX.....	7
4.3.4	Cable Identification.....	8
5	Probe.....	8
5.1	DAP-125 Probe .....	8
5.2	TONE Function .....	8
5.2.1	Squelch .....	9
5.3	DSL FREQ Mode .....	9
5.4	DSL SCAN Mode .....	10
6	Meter Functions.....	10
6.1	Three Terminal Metering.....	10
6.2	Meter Connections.....	10
6.3	Meter – DC.....	11
6.4	Meter – Noise (AC) .....	11
6.5	Time Domain Reflectometer (TDR).....	11

6.5.1 Connections ..... 12

6.5.2 TDR Measurement ..... 12

    6.5.2.1 Velocity of Propagation (VOP)..... 12

    6.5.2.2 Gain..... 13

    6.5.2.3 Range ..... 13

    6.5.2.4 Pulse Width..... 13

    6.5.2.5 ZOOM..... 13

    6.5.2.6 TDR Examples..... 14

7 Specifications ..... 15

8 Warranty ..... 16

## 1 OVERVIEW: TONE SENDER, RECEIVER, METER, AND TDR

The TriTone Transceiver is designed for identifying cables and cable pairs by generating identification tone at 577Hz or 987Hz at one of three amplitudes; Normal, High, and Maximum. The TriTone Transceiver provides Simplex and Triplex tone modes allowing the user to select the best mode for the application.

The TriTone Transceiver tone is used with existing amplifier probes; filtered, tunable, or unfiltered. Receivers with aerial coils and hand coils that are compatible with 577 Hz or 987 Hz can also be used to receive TriTone Transceiver tone.

The TriTone Transceiver includes automatic visual and audible short/ground indications to assist in confirming pair identification.

The TriTone Transceiver includes a tone amplifier and internal speaker for receiving tone sent on cable and pairs. The tone can be from another TriTone Transceiver or other tone source sending 577Hz or 987Hz tone. The DAP-125 differential amplifier probe is provided for superior tone reception and pair identification.

The TriTone Transceiver also includes an option to probe for HDSL, T1, or VDSL signals on pairs to identify pairs with data (Special Circuits). A DSL Scan feature allows probing for DSL type circuits without specifying a particular mode.

Metering functions built into the TriTone Transceiver allow the user to check DC and AC voltages (noise) on the pair. This is helpful in identifying the type of service on the pair or possible defects such as foreign voltage or excessive noise.

Finally, the TriTone Transceiver includes a TDR. This is helpful when selecting a vacant pair for assignment. The TDR provides length and fault status.

## 2 CONNECTIONS

The TriTone Transceiver has a Pair Cord, with Red and Black needle clips, DAP-125 Probe, Ground Cord, and charger. Connect the Pair Cord assembly or DAP-125 and the Ground Cord to the jacks located on the top of the TriTone Transceiver. The ground cord is only needed when sending tone.



The Pair Cord clips and Ground should be connected to the pair and shield of the cable as needed when sending tone.

Pair Identification, SMPLX 1T, SMPLX 3T, and TRI-PLEX	Black clip to Tip wire, Red clip to Ring wire, and Ground clip to shield/ground
Pair Identification, Metallic	Green Ground clip to Tip wire and Red Clip to Ring wire
Meter	Black clip to Tip wire, Red clip to Ring wire, and Ground clip to shield/ground*
TDR	Black clip to Tip wire and Red clip to Ring wire

*A wire connected to a suitable ground can be connected to the ground binding post on the TriTone Transceiver in place of the ground cord if needed. This can be used when the best ground is some distance from the testing point. Using the shortest ground possible improves meter measurements.*

*\*The Ground clip is not required if  $T \Rightarrow G$  or  $R \Rightarrow G$  measurements are not needed.*

## 3 OPERATION

The following information describes the operation of the controls on the TriTone Transceiver.

### 3.1 POWER

The [PWR/CLR] key used to turn the unit on and off.

- Press and hold the key for 1 to 2 seconds to turn the unit on.
- Press and hold the key for approximately 3 seconds to turn the unit off.
- The [PWR/CLR] key is also used to terminate any function and return to the main menu.

### 3.2 BATTERY LEVEL

A battery level indicator is displayed in the top, left corner of the display. The batteries are rechargeable by plugging the supplied charger into the connector on the top of the unit. When only one bar is shown in the battery level indicator, the unit should be charged as soon as practical.

*The unit may be used while power is supplied to the charge connector if an external power source is available; however, **the power supply should not be used when using the AC noise meter function.***

### 3.3 CONFIGURATION - SYSTEM

#### 3.3.1 BACKLIGHT

The display backlight can be adjusted for various light conditions. Note that lower backlight settings will extend the battery duration.

- Press [CFG], then [F1] BCKLTE.
- Use the [F2] ▼ and [F3] ▲ keys to adjust the backlight
- Press [F1] Set to save the setting.

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### 3.3.2 CONTRAST

The display contrast can be adjusted as needed. Temperature may affect the contrast. The contrast may need to be turned down in hot conditions or turned up in cold conditions.

- Press [CFG], then [F2] CONTRST.
- Use [F2] ▼ and [F3] ▲ keys to adjust the contrast
- Press [F1] Set to save the setting.

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### 3.3.3 VOLUME

The key push beep and probe volumes are adjustable as needed. *The probe volume is adjustable in the probe function.*

- Press [CFG], then [F3] VOLUME
- Use [F2] ▼ and [F3] ▲ keys to adjust the KeyPush volume
- Press [F1] Set to save the setting

## 4 SENDING TONE

The TriTone Transceiver provides tone sending options for identification of cables or cable pairs.

### 4.1 FREQUENCY SELECTION

The TriTone Transceiver generates 577 Hz or 987 Hz tone. Select a tone that is compatible with the tone probe(s) that will be used. The TriTone Transceiver retains the previous selection when the power is turned on. *The frequency can be set from the Main screen or any tone operating screen.*

- Press the [FREQ] key
- Use [F2] ▼ and [F3] ▲ keys to select the desired frequency
- Press [F1] SET.

### 4.2 LEVEL SELECTION

The TriTone Transceiver offers transmit tone levels at Normal, High, and Maximum. The lowest level that allows identification of the cable pairs should normally be used. Higher tone levels may increase inductive coupling to adjacent pairs and make it more difficult to identify the correct pair.

High tone levels can aid in the location of cables. The high levels provide more signal outside the cable.

The TriTone Transceiver tone transmit voltage Tip or Ring to Ground levels are:

- NORM – 5V ac peak-to-peak
- HI – 10Vac peak-to-peak
- MAX – 20Vac peak-to-peak

*Note: Tip to Ring voltages in TriPlex mode are 2x the Tip or Ring to Ground Levels.*

The TriTone Transceiver retains the previous selection when the power is turned on. *The Level can be set from the Main screen or any tone operating screen.*

- Press [LEVEL], use [F2] ▼ and [F3] ▲ to select the desired level
- Press [F1] SET.

## 4.3 TONE MODE SELECTION

TriTone Transceiver provides three tone mode options; SMPLX 1T, SMPLX 3T, and TRI-PLEX. The mode is selected by pressing the Function keys, [F1], [F2], or [F3] as shown on the TONE screen.

- From the Main screen, press [F1] SEND
- Press [F1] SMPLX 1T, [F2] SMPLX 3T, or [F3] TRIPLEX

### 4.3.1 SMPLX 1T

SMPLX 1T applies tone to the Tip to Ground and the Ring to Ground at the same time. The tone is balanced and in phase on the Tip and Ring eliminating audible tone between the Tip and Ring on balanced pairs.

*The amount of tone heard Tip to Ring (metallic) will vary depending on the balance of the pair and the tone voltage. The tone heard increases on unbalanced pairs as the tone level is increased.*

Simplex tone is commonly used to locate cable pairs. The tone depends on a good ground or shield to conduct the tone efficiently.

*Missing or poor bonds, open shields, and grounds can significantly reduce the amount of tone on the pair and make it more difficult to locate pairs.*

*Simplex tone is applied to both the Tip to Ground and Ring to Ground simultaneously and can be heard even if one side of the pair is open.*



SMPLEX iT mode displays an analog meter of the DC voltage between the Black (TIP) and the Red (RING) clips. The indicated voltage decreases if a short is applied to the pair at the far-end to confirm the pair identity. A beep is heard if the voltage drop indicates a short.

In the case of a pair with one side open, the good side of the pair can be grounded and the TriTone Transceiver will provide a beep confirmation.

### 4.3.2 SMPLX 3T

SMPLX 3T applies tone in the same manner as the SMPLX iT mode. This mode includes a digital meter that displays the DC voltage between the TIP and RING as well as the AC voltages between the TIP and Ground and the RING and Ground.

The DC voltage, T to R, will decrease if a short is applied to the pair at the far-end to confirm the pair identity. A beep is heard and a visual indication, **BUZZ**, is displayed between **T** and **R** if the voltage drop indicates a short or ground on one side.

*In the case of a pair with one side open, the good side of the pair can be grounded and the TriTone Transceiver will provide a visual and audible confirmation.*



### 4.3.3 TRI-PLEX

*Triplex tone is a unique tone mode that minimizes cross-coupled tone to adjacent pairs.*

Triplex mode applies tone to the pair Tip to Ground, Ring to Ground, and Tip to Ring simultaneously but the tones are 180 degrees out of phase. TriPlex tone mode can be heard, Tip to Ring, on balanced pairs. This tone can also be heard even when the grounds or bonds are missing.

*This tone mode is useful any time high-levels of tone is coupled to adjacent pairs, including wet sections.*

Begin by using either of the SMPLX modes to identify the most likely pairs. Then use the TRI- PLEX mode to identify and confirm the actual pair.





Since cross-coupling is minimized, the amplifier probe must be very close or touching the pair to hear the tone. To confirm the correct pair is found, place the probe tip between the Tip and Ring wires. There should be a significant increase in tone on only the correct pair.

## 4.3.4 CABLE IDENTIFICATION

Tone can be used to locate cables. Connect the Green Ground clip to the shield/ground and the Red clip to a vacant cable pair, both the Tip and the Ring. A hand-coil probe and amplifier may be required to pick up the tone in the cable.

# 5 PROBE

The following describes the use of the three Probe functions: Tone, DSL frequency, and DSL Scan.

## 5.1 DAP-125 PROBE

Connect at DAP-125 tone probe to the connector at the top of the TriTone Transceiver. A ground connection is not required.

*The DAP-125 tip is a unique design that enhances the amplification of the difference in tone signal from one side to the other. Placing either side flat against the pair(s) will amplify the tone signal. Placing the tip between the Tip and Ring wires of the pair produces a much louder tone only on the correct pair when using TriPlex tone.*

## 5.2 TONE FUNCTION

This mode is used to locate cables or cable pairs. A suitable tone source that sends 577Hz or 987Hz tone, such as a TriTone 3, D-105, another TriTone Transceiver, or other tone source, is required.

*The TriTone Transceiver cannot be used to send and receive tone at the same time.*

- From the Main screen, press [F2] PROBE, then
- Press [F1] TONE.

The Tone screen displays the **Gain**, **Volume**, currently selected Frequency, and the signal level.

The bar graph shows a relative tone level from 0 to 100 and a numeric % value below the graph. These indications are useful in showing the differences in tone levels between two cables or pairs.

The tone is also heard from the internal speaker.

Frequency is changed by pressing the [FREQ] key. This toggles between 577Hz and 987Hz.

GAIN or VOLUME is changed by pressing the [LEVEL] key to select the needed option. The selected option has a box around the value and the name is displayed above the [F1] key. The value is changed by pressing [F2] ▼ or [F3] ▲.

Gain increases the sensitivity of the amplifier. This helps when the tone is weak such as identifying cables. Volume just makes the sound from the speaker louder. This helpful in noisy areas. If the tone is faint, increase the GAIN rather than the volume. If you can hear tone but it is not loud enough, increase the VOLUME.

### 5.2.1 SQUELCH

The Squelch feature may help when tone is present on a number of pairs and it is not easy to determine which pair has the strongest tone by listening.

*Always Reset the squelch when beginning to probe for pairs to ensure any tone on the pairs can be heard.*

- Press the [LEVEL] key until **SET SQL** is displayed above the [F1] key and [F2] **RST SQL** is displayed.
- Press [F2] to reset the squelch. This allows any tone to be heard.
- Place the probe near the one pair that has strong tone and press the [F1] **SET SQL**.
  - The squelch is set and v symbol moves to the current tone level. Now only tone that is stronger than the set level will be heard. Probe for pairs that have stronger tone. *Tone will only be heard if a tone stronger than the set SQL level is present.*
  - If more than one pair has tone, place the probe near one of pairs and press [F1] **SET SQL** setting a new level and retest the pairs. Repeat this process until only one pair is heard.
- Pressing [F2] RST SQL at any time clears the squelch and any tones on the pairs is heard. This is done when identifying another pair.

*The display will indicate received tone levels even though the speaker is silent until a stronger tone is received.*

### 5.3 DSL FREQ MODE

The DSL Frequency mode allows the user to probe for one of three digital modes, HDSL, T1, VDSL. This can be used to identify potential special circuits prior to transfers or other operations.

- Press [F2] Probe
- Press [F2] DSL FREQ.
  - The Rcv XXXX screen displays the **Gain**, **Volume**, currently selected digital mode, and the signal level.
  - The bar graph shows a relative tone level from 0 to 100 and a numeric % value below the graph. These indications are useful in showing the difference in tone level on two or more pairs or compare coupled tone to actual tone on a pair.
  - Rcv mode is changed by pressing the [FREQ] key. This toggles between **HDSL**, **T1**, and **VDSL**.
  - **GAIN** or **VOLUME** is changed by pressing the [LEVEL] key. The currently selected option has a box around the value and the selection

is displayed above the [F1] key. The value is changed by pressing [F2] ▼ or [F3] ▲.

## 5.4 DSL SCAN MODE

The DSL Scan mode allows the user to probe for a variety of digital modes on pairs. This can be used to identify potential special circuits prior to transfers or other operations. The specific mode is not identified.

- Press [F2] Probe
- Press [F3] DSL SCAN.
  - The DSL SCAN screen displays the Gain, Volume, and the signal level at a range of frequencies.  
The bar graph shows a relative tone level at selected frequencies in the range. *Any signals displayed may indicate a special circuit.*
  - GAIN or VOLUME is changed by pressing the [LEVEL] key. The currently selected option has a box around the value and the selection is displayed above the [F1] key. The value is changed by pressing [F2] ▼ or [F3] ▲.

## 6 METER FUNCTIONS

The TriTone Transceiver includes metering to allow the user to assess the *preliminary* status of cable pairs.

*Any indications of problems on the pair should be further investigated following local practice.*

VDC shows the DC voltage on the pairs and helps identify POTS, Special Circuits, and DC faults such as foreign voltage.

VAC is used to assess noise on the pair. Noise is a common cause of voice and data problems on a pair.

TDR shows the approximate length of open pairs and estimates distance to resistive faults.

### 6.1 THREE TERMINAL METERING

The TriTone Transceiver DC and AC meters use a three terminal meter display. This allows the TriTone Transceiver to display the measurements Tip to Ring, Tip to Ground, and Ring to Ground simultaneously.

### 6.2 METER CONNECTIONS

The pair clips and the ground cord are used for DC and AC meter functions. Connect the Green ground, Black (Tip), and Red (Ring) clips as you would for sending tone.

## 6.3 METER – DC

The DC meter shows DC voltage on cable pairs. This voltage may indicate a working pair or a DC fault on the pair. Wet cables frequently show DC voltages on vacant pairs. DC may also be an indication of a short or cross with another pair.

- From the Main screen, press **[F3]** METER

The meter defaults to DC voltage. The display indicates the VDC T⇌R, T⇌G, and R⇌G. The readings are updated approximately once per second. A small dot at the upper left, just outside the box, blinks each time the value is refreshed.

*Ensure good connections are made to the pair wires and ground.*

## 6.4 METER – NOISE (AC)

The AC meter displays noise on the cable pair. Noise Tip to Ring is an indication of balance problems on the pair and noise Tip to Ground or Ring to Ground indicates problems with bonds and shields.

- From the Main screen, press **[F3]** METER
- Press **[F1]** to toggle to the AC mode.  
The meter display indicates the voltage in VAC T⇌R, T⇌G, and R⇌G. The readings are updated approximately every three seconds. A small dot at the upper left, just outside the box, blinks each time the value is refreshed.
- Press **[F3]** to toggle units from RMS or DB  
The units, VAC are RMS values and correspond to normal indications of AC voltage using a multimeter. Noise is typically specified in DB. The units in the measurement windows are the current measurement units.

*Ensure good connections are made to the pair wires and ground.*

## 6.5 TIME DOMAIN REFLECTOMETER (TDR)

The TDR is a pulse type TDR used to determine length of open pairs and locate cable faults by analysis of the impedance of the line.

A TDR requires the user to enter the velocity of propagation (VOP). The distance indication will be in error if this value is incorrect. The VOP can be set by pressing the **[CFG]** key from the TDR screen, pressing **[F1]** VOP, and selecting a standard cable type or entering the Custom VOP value.

**ESTIMATED DISTANCES WILL BE INCORRECT IF THE VOP IS NOT SET PROPERLY.**

The measurements are continuous allowing observation of changes in the pair over time and testing additional pairs by moving the clips.

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## 6.5.1 CONNECTIONS

Connect the red pair test cord to the TriTone Transceiver and the test clips to the pair to be tested.

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## 6.5.2 TDR MEASUREMENT

- From the Main screen, press [F3] METER
- Press [F3] TDR
- Press [F1] 0-1Kft, [F2] 0-4Kft, or [F3] 0-8Kft.  
The TDR screen displays and prompts for a distance range. Select the shortest range that includes the fault for the best resolution. If the fault distance is unknown, select the largest range, [F3] 0-8KFT.

The result screen is a graph of the TDR response.

The cursor is a vertical line on the screen and the distance from the TriTone Transceiver to the position of the cursor is displayed at the lower left corner of the screen. If the distance is not displayed, press [F1].

Move the cursor to the left or right using the [F2]< and [F3]> keys to position the cursor to the beginning of a sharp increase or decrease in the horizontal line. This is a change in the impedance. A sharp rise is a higher impedance (open) and a sharp fall is a lower impedance (short). Other changes in the line indicate other conditions on the line. Refer to 6.5.2.6 below for examples.

The distance to the fault is read with the cursor at the point where the change just starts to occur.

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### 6.5.2.1 VELOCITY OF PROPAGATION (VOP)

The VOP must be set for the type cable you are testing for the distance readings to be accurate.

**ALWAYS VERIFY THE VOP SETTING. ESTIMATED DISTANCES WILL BE INCORRECT IF THE VOP IS NOT SET PROPERLY.**

- From the TDR display, press the [CFG] key
- Press [F1] VOP
- Use [F2] ▼ and [F3] ▲ keys to move the box to the gauge and type cable then press [F1] Set to save the setting.
  - Note: If the cable is not one of the provided options, select the closest option available but the distance reading will not be exact. The other option is to use the CUSTOM option and set the value of VOP for the cable in known.

### 6.5.2.2 GAIN

The Gain can be adjusted to help identify cable faults. Gain changes the vertical scale making small changes larger and easier to identify.

- Press [LEVEL]
- Use [F2] ▼ and [F3] ▲ keys to increase or decrease the gain.
- Press [F1] to display the distance to the cursor.

### 6.5.2.3 RANGE

Once the fault is identified, the range can be reduced if the fault is within a lower range to improve the resolution. The range may be increased if no fault is observed on the current range. The three ranges are 0 – 1KF, 0 – 4KFt, and 0 – 8KFt.

- Press [FREQ],
- Use [F2] ▼ and [F3] ▲ keys. The ranges change up or down one range for each key press.
- Press [F1] to display the distance to the cursor.

### 6.5.2.4 PULSE WIDTH

The pulse width (PW) adjusts how much energy is in the pulse. Increasing the pulse width can be helpful when the fault is farther away.

- Press [CFG]
- [F3] PW
- Use [F2] ▼ and [F3] ▲ keys. The current pulse width is displayed on the left side of the display PW=X.
- Press [F1] to display the distance to the cursor.

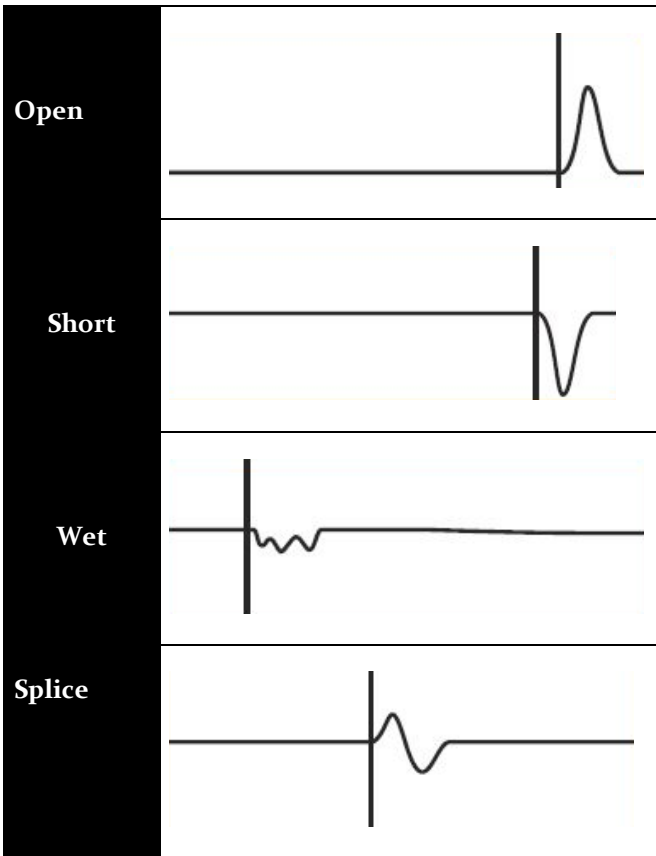
### 6.5.2.5 ZOOM

The ZOOM feature shows an expanded portion of the display at the current cursor position. ZOOM is helpful for better placement of the cursor for fault distance measurement. Position the cursor close to the change in level then use the Zoom function.

- Press [CFG]
- [F2] ZOOM
- The display now shows more detail of the display at the area the cursor was positioned.
- [F1]< and [F3]> keys to move the window to the desired portion of the display.
- Press [F1] to display the distance then adjust the cursor as needed.

## 6.5.2.6 TDR EXAMPLES

Some sample TDR indications.



## 7 SPECIFICATIONS

- Dimensions: 6.25"x4"x1.5", excluding carry bag
- Weight: Approx. 1lb.
- Power: Rechargeable
- Operating Temperature: -20° to 50° C, non-condensing
- Tone Frequencies: 577 Hz, 987 Hz
- Output Voltage Levels:

Level	Simplex	TRI-PLEX R -> T
Normal	5 Vpp	10 Vpp
High	10 Vpp	20 Vpp
Maximum	20 Vpp	40 Vpp

\*TriPlex applies Tone TR, TG, and RG. The TG and RG voltages are the same for TriPlex and Simplex.

- Meter
 

DC	+/- 100V
AC	30Vrms, -70db to 20db
- TDR:
 

50FT	to 1.1 KFT	2%, +/- 10 FT
250 FT	to 4.3 KFT	2%, +/- 40 FT
250 FT	to 8.6 KFT	2%, +/- 100 FT



## 8 WARRANTY

The TriTone Transceiver is warranted against defects in materials and workmanship for a period of one year from the date of purchase. Contact your local sales representative or the manufacturer for a Return Authorization (RA) number and instructions on returning the product for service. Products cannot be processed unless accompanied by an RA number.

The user is responsible for determining the applicability of the product for any application. The manufacturer is not responsible for any damages, direct or consequential, resulting from the use of its products. Users are required to follow all work safety procedures when using this product.

Damages due to impact, battery failure, flooding, or normal wear are excluded.

The manufacturer will determine, exclusively at its own discretion, whether repairs or replacement of the product is required for any warranty claim. In no case will the liability of the manufacturer exceed the original purchase price of the product.

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