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MARTINDALE ELECTRIC

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Website: www.martindale-electric.co.uk

FD550 / FD650
FUSE FINDERS

FD550

INSTRUCTION MANUAL

FD650

MARTINDALE ELECTRIC

⚠

ALWAYS READ THESE INSTRUCTIONS BEFORE PROCEEDING

Thank you for buying one of our products. For safety and a full understanding of its benefits please read this manual before use. Technical support is available from 01923 441717 and support@martindale-electric.co.uk

CONTENTS

MARTINDALE ELECTRIC

Specification
FD550 & FD650
Fuse Finders

SAFETY

Conforms to BS EN 61010-1, CAT III 300V (FD500/T & FD600/T)
CAT IV 600V (FD650/R)
Class II, double insulation

EMC

Conforms to BS EN 61326-1

SPECIFICATION FOR TL83 TEST LEAD

Maximum voltage: 300V AC/DC
Maximum current: 0.5A continuous
Connector: IEC320 C13 connector
Fuse: F 500mA, 600V, 50kA, 6.3 x 32mm

Environmental

Temperature (Operating & Storage)	0°C to 40°C
Altitude	up to 2000m
Pollution degree	2

Safety

Conforms to BS EN 61010-031, CAT II 300V
Class II, double insulation

MARTINDALE ELECTRIC

Specification
FD550 & FD650
Fuse Finders

Table 1 - Typical Sensing Distances for Energised Cables at 50Hz

Cable type	at 115 V	at 230 V
Flat 1mm² twin & earth	3 mm	23 mm
Flat 2.5mm² twin & earth	3 mm	23 mm
Round 1.5mm²	2 mm	18 mm

Power: 9V, PP3 alkaline battery (IEC 6LR61, NEDA 1604A)
Low battery level: Approx. 6.9V
Low battery indication: Flashing green battery LED
Auto power down current drain: Typically 20µA

GENERAL

Dimensions: 65 x 65 x 50mm (FD500/T & FD600/T)
202 x 32 x 22mm (FD650/R)
Weight: Approx. 60g (FD500/T & FD600/T)
Approx. 135g, including battery (FD650/R)
Includes:
FD550: FD500/T, FD650/R, 9V PP3 battery, Instructions
FD650: FD600/T, FD650/R, Carry case, EX332 Mains lead, TL83 test lead, 9V PP3 battery, Instructions

ENVIRONMENTAL

Temperature & Humidity (Operating): -10°C to 40°C, non-condensing
(Storage): -10°C to 50°C, non-condensing
Altitude: up to 2000m
Pollution degree: 2

1. SAFETY INFORMATION: Always read before proceeding.

⚠ REMEMBER: SAFETY IS NO ACCIDENT

These instructions contain both information and warnings that are necessary for the safe operation and maintenance of this product. It is recommended that you read the instructions carefully and ensure that the contents are fully understood. Failure to understand and to comply with the warnings and instructions can result in serious injury, damage or even death.

Particular attention should be paid to the Warnings, Precautions and Technical Specifications.

Please keep these instructions for future reference. Updated instructions and product information are available at: www.martindale-electric.co.uk

1.1 Meaning of Symbols and Markings

⚠ **Caution - risk of danger & refer to instructions**

⚠ **Caution - risk of electric shock**

Equipment protected by double or reinforced insulation (Class II)

CAT II **(Measurement Category II)** is applicable to test and measuring equipment connected directly to utilization points (socket outlets and similar points) of the low-voltage MAINS installation.

CAT III **(Measurement Category III)** is applicable to test and measuring equipment connected to the distribution part of the building's low-voltage MAINS installation.

CAT IV **(Measurement Category IV)** is applicable to test and measuring equipment connected at the source of the building's low-voltage MAINS installation.

For further information on measurement categories see page 17 or visit www.martindale-electric.co.uk/measurement_categories.php

Equipment complies with relevant EU Directives

End of life disposal of this equipment should be in accordance with relevant EU Directives

1.2 Precautions

This product has been designed with your safety in mind, but please pay attention to the following warnings and cautions before use.

⚠ Warnings

In order to avoid the danger of electrical shock, it is important that proper safety measures are taken when working with voltages exceeding 30V AC rms, 42V AC peak or 60V DC.

Where applicable other safety measures such as the use of protective gloves, goggles etc. should be employed.

These units must only be used by a skilled and competent person who is familiar with the relevant regulations, the safety risks involved and the consequent normal safe working practices, and under the conditions and for the purposes for which they have been constructed and specified.

Before each use the transmitter, receiver and any associated test leads and accessories should be examined for damage, cracks, cuts or scratches. **Do not use** if damaged in any way.

Make sure the units and test leads are dry, clean and free from dust, grease and moisture while in use to avoid the danger from electric shock due to surface leakage.

MARTINDALE ELECTRIC

Specification
FD550 & FD650
Fuse Finders

FD550

FD650

ELECTRICAL

Transmitter (FD500/T & FD600/T)

Power:	From mains
Nominal supply voltage:	230V
Supply frequency range:	30 - 70Hz
Power consumption:	Approx. 1W
Internal fuse rating:	500 mA (Not user serviceable)
Earth leakage:	Nil
Switching frequency:	Approx. 5Hz

Receiver (FD650/R)

Fuse Finder Function

Tracing depth:	Up to 10cm, depending on local conditions
Sensitivity threshold setting:	Automatic or manual push button

Voltage Detector Function

Voltage range:	40V - 600V AC
Frequency range:	50Hz - 1kHz
Voltage sensitivity:	Table 1 below gives the typical distance at which he FD650/R will illuminate the first bar graph LED and activate the buzzer.

Always test the voltage detector function of the receiver on an appropriate proving device or a known good voltage source before and after using it to determine if a hazardous voltage exists in a circuit to be tested. **Do not use** the receiver if it does not function correctly during proving.

Testing for a voltage that exceeds the specified limits of the receiver may damage the receiver and may expose the operator to a shock hazard. Always check the unit's specified limits before use.

The transmitter **must only** be used on CAT III installations up to 300V to earth, and the receiver on CAT IV installations up to 600V to earth, and both within the operating temperature and humidity range specified.

When the FD600/T transmitter is used in combination with test leads, the measurement category of the combination is the lower measurement category of either the FD600/T or the test leads used. Likewise if test lead accessories such as crocodile clips are also used, the measurement category will be the lowest measurement category in that combination.

Do not use the receiver if the battery compartment cover is not fitted.

Always keep your fingers behind the finger guard of the FD650/R.

When using test leads / crocodile clips, always keep your fingers behind the finger guard on the test lead probe or crocodile clip.

⚠ Cautions

Avoid severe mechanical shock or vibration and extreme temperature.

To avoid possible corrosion from a leaking battery, remove the battery if discharged, or when the receiver is not in use for an extended period.

2. INTRODUCTION

2.1 Inspection

Examine the shipping carton for any sign of damage. Inspect the units and any accessories for damage. If there is any damage then consult your distributor immediately.

2.2 Description

The FD650/R is a combined fuse finder receiver (when used in combination with the FD500/T or FD600/T transmitter) and AC voltage detector.

As a fuse finder, the FD650/R can be operated with either manual or automatic setting of its sensitivity threshold to find the fuse or circuit breaker that produces the maximum signal.

In manual mode, the press of a push-button will set the sensitivity threshold to bring the detected signal to mid-scale on the bar graph.

In automatic mode the FD650/R will automatically set the sensitivity threshold every time a signal of a greater magnitude is detected, to bring it onto the bar graph scale.

In either mode the buzzer will continue to sound when a signal is present, even when the signal is too small to be shown on the bar graph due to the sensitivity setting.

When in the voltage detector mode, the FD650/R employs the bar graph to show the detected signal and at the same time activates the buzzer. The voltage detector function also has a built in test signal to check the operation of its circuitry.

Measurement Categories

Measurement categories are determined by the potential for dangerous transient impulses on the mains supply system, the magnitude of which depends on the amount of damping of the transient energy due to the location within the system and the system voltage. Short-circuit current levels are also a factor.

Test equipment used for measuring mains circuits will be marked with one or more of three measurement categories, **CAT II, CAT III** or **CAT IV**, to identify on which installations of a mains supply system it can safely be used.

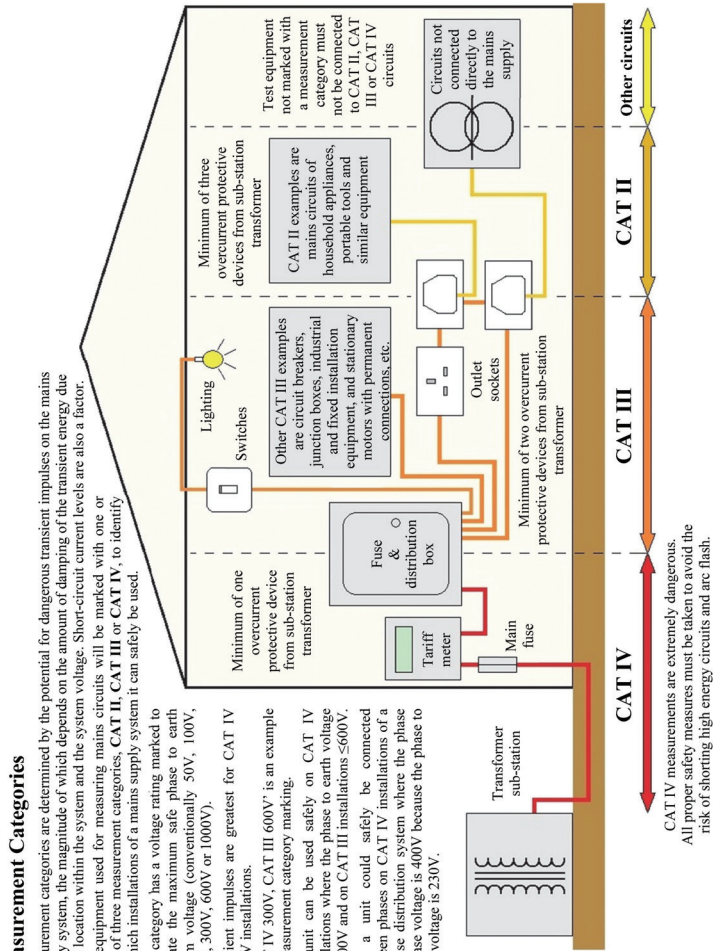
Each category has a voltage rating marked to indicate the maximum safe phase to earth system voltage (conventionally 50V, 100V, 150V, 300V, 600V or 1000V).

Transient impulses are greatest for CAT IV 1000V installations.

'CAT IV 300V, CAT III 600V' is an example of measurement category marking.

The unit can be used safely on CAT IV installations where the phase to earth voltage is ≤300V and on CAT III installations ≤600V.

Such a unit could safely be connected between phases on CAT IV installations of a 3-phase distribution system where the phase to phase voltage is 400V because the phase to earth voltage is 230V.



5. WARRANTY AND LIMITATION OF LIABILITY

This Martindale product is warranted to be free from defects in material and workmanship under normal use and service. The warranty period is 2 years and begins on the date of receipt by the end user. This warranty extends only to the original buyer or end-user customer, and does not apply to fuses, disposable batteries, test leads or to any product which, in Martindale's reasonable opinion, has been misused, altered, neglected, contaminated, or damaged by accident or abnormal conditions of operation, handling or storage.

Martindale authorised resellers shall extend this warranty on new and unused products to end-user customers only but have no authority to extend a greater or different warranty on behalf of Martindale. Martindale's warranty obligation is limited, at Martindale's option, to refund of the purchase price, free of charge repair, or replacement of a defective product which is returned to Martindale within the warranty period.

This warranty is the buyer's sole and exclusive remedy and is in lieu of all other warranties, expressed or implied, including but not limited to any implied warranty of merchantability or fitness for a particular purpose. Martindale shall not be liable for any special, indirect, incidental or consequential damages or losses, including loss of data, arising from any cause or theory.

Since some jurisdictions do not allow limitation of the term of an implied warranty, or exclusion or limitation of incidental or consequential damages, the limitations and exclusions of this warranty may not apply to every buyer. If any part of any provision of this warranty is held invalid or unenforceable by a court or other decision-maker of competent jurisdiction, such holding will not affect the validity or enforceability of any other provision or other part of that provision.

Nothing in this statement reduces your statutory rights.

Other features of the FD650/R are Auto Power-down and Low Battery Indication.

A single push-button switch controls all other operations of the FD650/R.

2.3 Accessories

The FD550 comprises an FD500/T transmitter and FD650/R receiver and comes with the following accessories:

- 9V PP3 battery
- Instructions

The FD650 comprises an FD600/T transmitter and FD650/R receiver and comes with the following accessories:

- Carry case
- Mains lead (Martindale EX332)
- TL83 test lead
- 9V PP3 battery
- Instructions

2.4 Battery Installation

Refer to Section 4.1 (Battery Replacement) for the battery installation instructions for the FD650/R.

3. OPERATION

3.1 Description of Receiver and Transmitter Elements

1	Finger guard
2	Buzzer
3	Battery LED (green)
4	Automatic mode LED (red)
5	Signal / VAC Bargraph (6 LED's)
6	Function switch
7	SET / PROVE press button

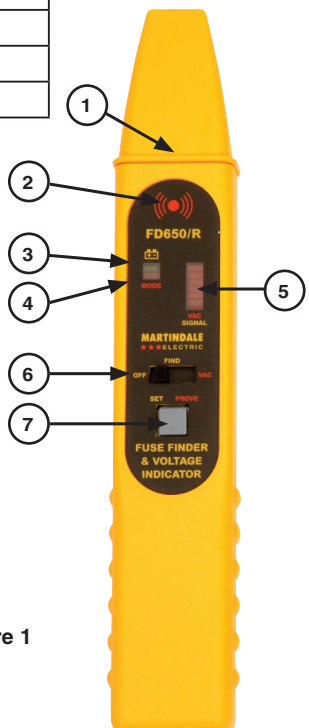


Figure 1

4.3 Repair & Service

There are no user serviceable parts in this unit other than those that may be described in section 4. Return to Martindale Electric if faulty. Our service department will quote promptly to repair any fault that occurs outside the guarantee period.

Before the unit is returned, please ensure that you have checked the:

- unit
- leads
- battery
- poor connections

4.4 Storage Conditions

The instrument should be kept in warm dry conditions away from direct sources of heat or sunlight, and in such a manner as to preserve the working life of the unit. The battery should be removed from the FD650/R. It is strongly advised that the unit is not kept in a tool box where other tools may damage it.

4. MAINTENANCE

4.1 Battery Replacement (FD650/R)

⚠ To avoid shock or injury, remove the FD650/R from the vicinity of any external circuits before proceeding.

The battery compartment is underneath the unit.

To gain access, undo the screw securing the compartment cover, then slightly lift the screw end of the cover, slide forward and remove the cover.

Fit a new 9V PP3 battery (IEC 6LR61, NEDA 1604A).
Replace the battery cover and screw.

4.2 Cleaning

⚠ To reduce the risk of surface leakage, this instrument must be kept in a clean condition.

Prior to cleaning, ensure that the instrument is disconnected from any voltage source.

If contamination is found, clean with a damp soft cloth and if necessary a mild detergent or alcohol. Do not use abrasives, abrasive solvents, or detergents which can cause damage to the unit. If a mild detergent is used, the unit should subsequently be thoroughly cleaned with a water dampened soft cloth. After cleaning, dry and allow to remain in a dry environment for 2 hours before use.

3.2 Low Battery Indication

If the green battery LED on the receiver flashes, the battery needs replacing (See section 4.1 Battery Replacement).

3.3 Auto Power Off

The receiver will automatically power off after approximately 5 minutes if a valid signal is not present.

The power down mode can only be reset by switching the unit **OFF** and then on again.

The power down function can be deactivated by holding down the **press button switch** while switching the FD650/R on.

3.4 Set/Prove Push-button

The push-button is used to set the following:

- Deactivation of auto power off function.

When the FD650/R is set to the **FIND** function:

- Automatic threshold mode - hold down for 2 seconds;
- Automatic mode bar graph centring - momentarily press to set the bar graph indication to the centre of the scale;
- Manual mode threshold - momentarily press to set a new threshold in the presence of a signal;
- Threshold sensitivity reset - with the receiver out of signal range, momentarily press to set the sensitivity threshold to the power-up default level.

When the FD650/R is set to the **ACV** function:

- Activation of the test signal.

3.5 Buzzer

An internal buzzer is used to indicate a signal has been detected.

In the fuse finder function the buzzer will continue to sound even if the LED's are not illuminated, provided that a signal is present.

3.6 Use of the TL83 Test Lead (FD600/T only)

If you are using the FD600/T with the TL83 lead, plug the TL83 lead into the FD600/T IEC inlet socket, connect the black crocodile clip to neutral and red to live of the circuit under test, in that order.

3.6.1 Fuse Replacement

⚠ To avoid shock, injury or damage, remove the test leads from any circuits before proceeding.

Replace only with the fuse specified.

Unscrew the crocodile clip and remove the faulty fuse

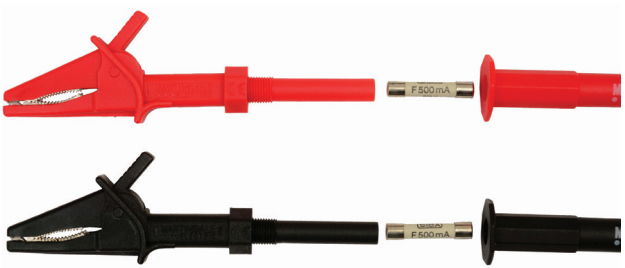


Figure 2

Replace with an F 500mA, 600V, 50kA, 6.3 x 32mm fast acting ceramic fuse and replace the crocodile clip.

Martindale order code: FUSE500 (Pack of 3)

3.7 Using the FD550 or FD650 as a Fuse Finder

3.7.1 Pre-Check of the FD550 or FD650

Plug the FD500/T or FD600/T transmitter into a known socket and ensure the **red ON** LED is illuminated.

Grip the voltage indicator fully and firmly around the hand grip to obtain optimum and consistent sensitivity. A loose grip during testing may reduce the unit's sensitivity.

Switch the FD650/R **OFF/FIND/VAC** switch to **VAC** and verify the green battery indicator is continuously illuminated.

Taking all necessary safety precautions and referring to section 3.8.3, apply the FD650/R probe tip to the wiring, cable or area you wish to test for voltage.

If the wiring or cabling is live the **VAC** bar graph will display an indication and an audible tone will be emitted from the FD650/R.

3.8.3 Voltage Testing Considerations

From some directions the neutral and earth conductors in cables will shield the live, so it is important that a cable is probed from all directions.

When testing for the presence of voltage in multi-core cables always run the probe tip of the voltage indicator along a short length of cable so as to overcome the natural twist in conductors.

⚠ Be aware that if the presence of AC voltage is not indicated, voltage could still be present. The unit indicates active voltages in the presence of electrostatic fields. If the field strength is low the unit may not indicate. This could be due to factors such as:

- Low mains voltage (<40V AC rms)
- Thickness and types of insulation
- Shielded wire/cables
- Distance from the voltage source
- Low battery

If testing at locations with high background noise levels, always determine whether the buzzer is perceptible before relying solely on the buzzer indication.

Switch off/remove the fuse/circuit breaker that shows the maximum signal strength and check that the FD650/R bar graph is no longer illuminated and the audible tone is no longer present. Go to the transmitter, if the correct fuse/circuit breaker has been switched off/ removed then the **red ON** LED should no longer be illuminated.

3.8 Using the FD650/R as a Voltage Detector

3.8.1 Pre-Check of the FD650/R

Switch the FD650/R **OFF/FIND/VAC** switch to **VAC** and verify the **green** battery indicator is continuously illuminated. If the **green** battery indicator is flashing the battery is low and should be replaced (see section 4.1).

Press the FD650/R **TEST** button and verify all 6 segments of the FD650/R **VAC** bar graph are illuminated and an audible tone is present.

Before and after use, prove the voltage indicator is functioning correctly on a known good voltage source.

⚠ Warning

If the voltage source exceeds the specified limits of the voltage indicator the unit may be damaged and the operator exposed to a shock hazard. Always check the voltage magnitude of the voltage source before proceeding with a proving check.

Do not use if the pre-check fails.

3.8.2 Locating Live Wiring/Cabling

⚠ Warning

Non-contact voltage indicators are not suitable to determine if a circuit is not hazardous live. A double pole voltage test should always be used for that purpose.

Switch the FD650/R receiver to **FIND** and verify the **green battery** LED is continuously illuminated. If the **green battery** LED is flashing the battery is low and should be replaced (see section 4.1).

Hold the FD650/R in close proximity to the transmitter and verify illumination of the FD650/R **SIGNAL** bar graph and that an audible tone is present. The number of illuminated LED's of the bar graph will depend on the FD650/R position and orientation with respect to the transmitter.

Do not use if the pre-check fails.

3.7.2 Locating a Fuse or Circuit Breaker

Plug the FD500/T or FD600/T into a socket of the circuit to be traced and ensure the red **ON** indicator is illuminated. If you are using the FD600/T with TL83 leads refer to section 3.6.

Switch the FD650/R to **FIND** and verify the **green battery** indicator is continuously illuminated.

The FD650/R will default to the manual threshold mode (see section 3.7.3). The FD650/R can alternatively be operated in the automatic threshold mode (see section 3.7.4).

3.7.3 Use in Manual Threshold Mode

Hold the FD650/R receiver in close proximity to the fuse box suspected of housing the fuse or circuit breaker being sought. If the signal is present an audible tone will be emitted from the FD650/R.

Hold the FD650/R against the first fuse or circuit breaker of the box as shown in figure 3. The orientation of the FD650/R in relation to the fuse / breaker must be as shown in figure 3 and it should be held in the centre of the fuse or circuit breaker.

Figure 3

✓

Correct

The receiver must be held in this orientation in relation to the breaker to find the correct fuse/circuit breaker. If the individual breakers were horizontal, the receiver would have to be rotated through 90° (in either direction).

Figure 4

✗

Wrong

Depending on the signal strength the bar graph may be activated. Press the **SET** button to set the sensitivity and the lower 3 to 4 LED's of the bar graph will be illuminated.

Move along the row of fuses/circuit breakers, stopping at the centre of each fuse/circuit breaker and noting the signal strength on the bar graph display.

Every time this signal causes the bar graph to exceed 3 to 4 illuminated LED's, press the **SET** button to set the new sensitivity threshold.

Be sure to check all the fuses/circuit breakers, and then go back over all the fuses/circuit breakers. Only one fuse/circuit breaker should

now show a signal strength indication on the bar graph. If this is not the case, then repeat the above procedure until only a single fuse/circuit breaker causes an indication.

Switch off/remove the fuse/circuit breaker that shows the maximum signal strength and check that the FD650/R bar graph is no longer illuminated and the audible tone is no longer present when the fuse/circuit breaker location is re-checked.

Go to the transmitter, if the correct fuse/circuit breaker has been switched off/removed then the **red ON** LED should no longer be illuminated.

3.7.4 Use in Automatic Threshold Mode

With the selector switch set to **FIND**, hold down the **SET** button for approximately 2 seconds until the red **MODE** LED is illuminated.

Hold the FD650/R receiver in close proximity to the fuse box suspected of housing the fuse, or circuit breaker, being sought. If the signal is present an audible tone will be emitted from the FD650/R.

Hold the FD650/R against the first fuse or circuit breaker of the box as shown in figure 3. The orientation of the FD650/R in relation to the fuse / breaker must be as shown in figure 3 and it should be held in the centre of the fuse or circuit breaker.

The FD650/R will automatically set the sensitivity threshold to show a signal strength indication on the bar graph. The signal strength indication on the bar graph may be centred to display 3 to 4 illuminated LED's at any time by pressing the **SET** button.

Be sure to check all the fuses/circuit breakers, and then go back over all the fuses/circuit breakers maintaining uniform proximity during and after each pass to prevent incorrect re-setting of the receiver sensitivity. Only one fuse/circuit breaker should now show a signal strength indication on the bar graph. If this is not the case then repeat the above procedure, until only a single fuse/circuit breaker causes an indication.