User Manual





MIZ-21C

ZEC-DOC-USER-MANUAL-MIZ-21C (180 - 1030496 - 1 - A) - 1

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1. Safety Precautions and Symbols

This section contains the most important precautions to follow, and identifies and explains the various safety symbols found on the instrument. Before turning on the instrument, make sure that these safety precautions are taken, as described below.

Safety Indications

The purpose of the various safety indications is to ensure operator safety and instrument integrity.



WARNING! The Warning sign denotes a hazard. It calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, could result in severe personal injury or death.

> Do not proceed beyond a Warning sign until the indicated conditions are fully understood and met.



The Caution sign denotes a hazard. It calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, could result in *material* damage or loss of data.

Do not proceed beyond a Caution sign until the indicated conditions are fully understood and met

Intended Use

The MIZ-21C is designed to perform nondestructive inspections on industrial and commercial materials.



Do not use the MIZ-21C for any purpose other than the intended use.

Use of equipment and accessories

Zetec provides a series of eddy current probes and accessories that allow the MIZ-21C to perform a wide range of eddy current inspections. Contact Zetec with questions on compatibility of third party products to ensure safe operation of the MIZ-21C.



Always use equipment and accessories that meet Zetec's specifications. Using incompatible equipment could cause malfunction and/or equipment damage, or injury.

Repair and modification

The MIZ-21C does not contain user-serviceable parts. Opening the instrument might void the warranty. Contact Zetec to arrange for service should your MIZ-21 need maintenance or repair.



To prevent human injury and/or equipment damage, do not disassemble, modify, or attempt to repair the instrument.

Safe Workplace Operation

The MIZ-21C instrument is a handheld instrument that requires user interaction for operation. Before performing an inspection with the MIZ-21C, secure the workplace and ensure proper personal protection equipment appropriate for the work activity is in place.

Warning!

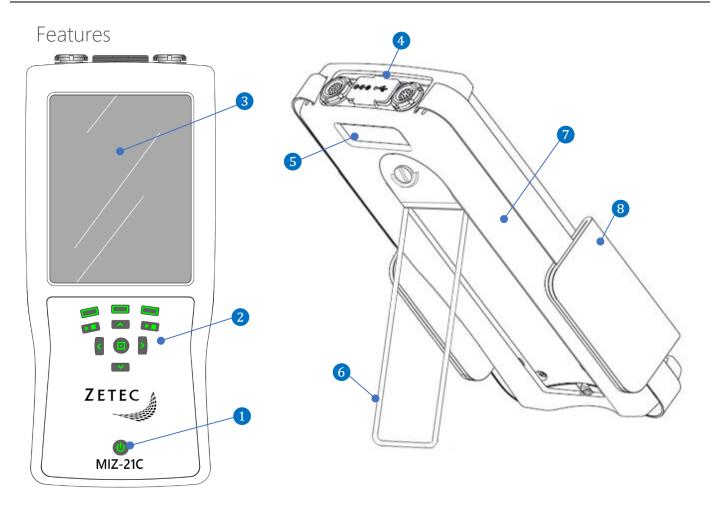


Use of the MIZ-21C may require user attention and interaction. Always use the proper safety precautions and personal protection equipment appropriate for the jobsite to avoid personal injury or death while operating the equipment.

General Precautions

- Before turning on the instrument, carefully read the instructions in this user manual.
- *Never* touch connector pins, whether the instrument is turned on or not, a shock potential may be present.
- Be familiar with this user manual and keep it available for future reference.
- Follow operation procedures carefully.
- Heed the safety warnings found on the instrument and in this manual.
- The MIZ-21C has been designed for non-destructive evaluations of industrial and commercial materials. Do not use the MIZ-21C for any other purpose than the stated intended use.
- Only use cables and accessories approved by ZETEC for this instrument.
- MIZ-21C shall only be connected to the supplied power adapter and cables for charging and/or operating from mains power. The mains plug shall only be inserted in a socket outlet provided with a protective earth contact and of the type indicated on the rating plate of the supplied power adapter.
- If the equipment is used in a manner not specified by ZETEC, Inc., the protection provided on the equipment may be impaired.
- Do not install substitute parts or perform unauthorized modifications to the instrument.
- The MIZ-21C instrument must be serviced by the manufacturer only. For any problem or question regarding this instrument, contact ZETEC, Inc., or an authorized ZETEC, Inc. representative.

2. Features and Layout



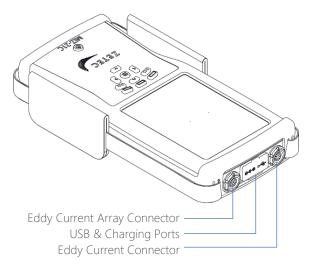
1 Power Button



- **3** System Display
- 4 Connector Panel

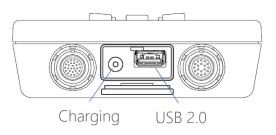
- **5** Product Information and Serial Number
- 6 Instrument Stand
- 7 Protection Cover
- 8 Hand Strap

Connector Panel



The charging port is to attach the power adapter supplied with the MIZ-21C. The charging port can be used to recharge the internal batteries as well as powering the instrument for longer term operation or when the battery level is lower than is required for the inspection.

The connectors accept a broad line of probes supplied by Zetec. The connector is designed for easy connection and retention of the probe connector during operation. Gently insert the probe connector into the MIZ-21C by aligning the red dots and inserting until seated. To remove the connector, grasp the probe connector housing by the no-slip surface and gently pull to release the latch and allow the connector to be removed



The USB connector can be used to attach peripherals such a mouse, keyboard, headphones, or storage device. The USB connector also supports the connection of a USB hub so several peripherals can be connected at once.

CAUTION! Charging Port

MIZ-21C shall only be connected to the supplied power adapter and cables for charging and/or operating. Use of an improper power adapter may result in loss of data or damage to the instrument.

MIZ-21C Models

The MIZ-21C is offered in three different models with varying features suited for multiple applications. Throughout this manual, references may be provided on features not included on your specific model. Compare the model information tag on the back of the MIZ-21C with the following table to understand your exact features. Contact Zetec with any questions that may arise about models and features.

Feature	MIZ-21C-SF	MIZ-21C	MIZ-21C-ARRAY
Conductivity	~	¥	✓
Single Frequency	~	¥	\checkmark
Dual Frequency		¥	\checkmark
Rotating Scanner		¥	\checkmark
Eddy Current Array			\checkmark

Touch Control

The MIZ-21C display includes Touch UI that allows the user to interact with the software application in some very useful ways. Throughout the software applications various gestures of Touch UI are enabled depending on the current screen and action. Below are the gestures used with the MIZ21C.



Single Tap on most screens allows you to select a menu item or move features on the data screen.



Double Tap is used on select screens to provide deeper functionality. For example, double tapping on the C-Scan display from an array technique will launch a menu with display options for the C-Scan.



Pinch and Zoom provides additional features for interacting directly with the screen image. For example, pinch and zoom on the 2D calibration Lissajous screen can be used to adjust the display scale.



Touch control can be disabled by selecting the Tools menu and navigating to the Touch Screen preference menu.

Control Buttons

Incorporated into the front panel of MIZ-21C are several user control buttons which provide an alternative to on screen software buttons for many functions. This can be useful when the job requires the use of gloves that may not be compatible with the touch enabled display screen. The table below provides information on the use of the Control Buttons.

	Cursor Movement provides up, down, left, right movement of the active screen item along with select button in center. Holding the select button is also used to capture a screenshot.
	Function Buttons corresponding to the three software buttons on the lower extent of the screen. Either the touch screen or function button can be selected with the same effect. The functions vary based on the current screen.
7 -	Start and Stop Acquire associated with record and stop while acquiring data or play and stop when reviewing recorded data. The two start and stop buttons have the same function and are positioned for ease of left or right hand operation.

Display Navigation

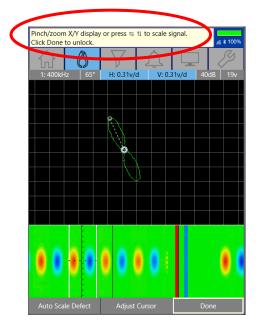
The system can be navigated by directly touching the appropriate item on the screen or by the control keys. The initial screen presents the application options for the MIZ-21C. The right arrow screen symbol indicates there is further navigation from this menu choice. Selecting a menu choice can be performed by the touch screen method or through the control buttons.

Touch Screen	Control Button
Directly select the menu item on the screen	Move the highlight up or down by using the up/down cursor buttons C. Chose the menu item by either the select or right arrow button



Control Hints

The MIZ-21C is disigned to be intiutive and simple to operate. Throughout the application, Control Hints are provided on the status bar so the user can see how to use the current feature.



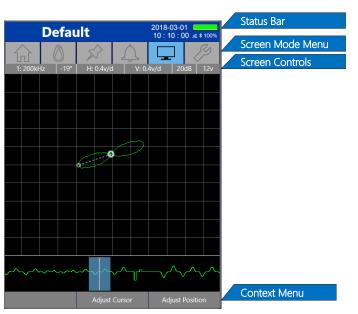
4. General Data Display Layouts

Display modes are set according to the Application Type in use. The MIZ-21C produces both 2-Dimensional and 3-Dimensional data screens. The content of the screen is automatically adjusted depending on the current mode to provide the user with the most relevant controls for operation.

During acquisition, some menu items are automatically hidden to maximize the viewable area for live data. Once data acquisition has halted, menus and components reappear to assist the user in the review of data. Depending on the application type in use, the MIZ-21C will either display a 2D or 3D type of screen.

Application Type	2D	3D
Bolt Holes		\checkmark
Conductivity and Coating Thickness	\checkmark	
Sub-Surface	\checkmark	
Surface Array		\checkmark
Surface Cracks	\checkmark	

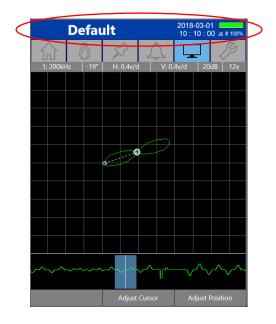
Common Data Display Features



Across the different data display types, the MIZ-21C presents some common interface components. The interface components noted to the left are visible an 2D and 3D data screens when not actively acquiring data. While acquiring data, the data display area is maximized for the best visibility and these features are hidden.

The sections below will provide general information on these common interface components.

Status bar



The Status Bar displays general system status including date, time, battery status. Wi-Fi and Bluetooth status are also present for units where this feature is available.

The main title area displays the current technique name in use. When edits have been applied to the saved technique, an asterisk appears next to the name to indicate it has been modified.

This area is also used to show operational hints, when available.

Screen Mode Menu

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	1 20	0kHz	-19°	H:	0.4v/d		V: 0.	4v/d	20	dB 1	2
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				6	2						
	~~~	~~	~~~~	~		~~	ľ	$\neg$		~~	
					Adjust	Curso			djust F	osition	

This feature is a menu across the top of many screens for quick access to the various screen modes. The active screen mode will be highlighted to indicate the current screen mode.

Main Menu Navigation

Directly select the menu item on the screenNavigate by using the left or right cursor button	Touch Screen	Control Button
	menu item on the	left or right cursor

	Home recalls the current technique page
$\langle \rangle$	Calibrate displays the calibration contextual menu
Ś	<b>Underlay Tool</b> in 2D mode, displays menu to capture and display a reference Lissajous signal under the active data in Sub-Surface Techniques
$\nabla$	Filter displays the contextual menu to adjust mixes, cursor position, and filters.
Ŷ	Alarm displays a contextual menu and screen options to define an alarm box based on signal response
	<b>Display</b> displays the contextual menu to adjust modes of display, cursor position, and position of displayed data on screen.
ß	<b>Tools</b> displays contextual menus to save the data file, make measurements of signals, and access the tools menu. See page 21 for more information on the Tools Menu.

#### The Screen Controls Menu

		Defa	ult		2018-03 10 : 10	-01 : 00 🧟 \$ 100%		
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			Adjust	Cursor	Adjus	t Position		

On the acquisition screen when acquisition is not active, the Screen Controls Menu is active to allow for direct adjustment of signals. Moving from left to right, the control options are channel, phase, scale, gain, and drive. How adjustments are made varies depending on the selection. The table below explains how to adjust the signal for the various modes.

Phase and Data Scale settings are a function of the calibration to display the data appropriately for the inspection.

Gain and Drive are a function of the technique and changing these values will modify the current technique. To keep Gain and Drive changes, the technique must also be saved.

Control	Adjustment
Channel	Select the on-screen menu to toggle through channels or use the up and down arrow keys 🛢.
Phase	Select the on-screen menu to enable phase adjustment mode. Adjustment of the phase angle is through direct rotation of the signal on the screen with your finger or using the D buttons for coarse adjustment or buttons for fine adjustment. The context menu at the bottom of the screen will be active during phase adjustment and clicking the "Done" button will save the changes. Phase is a function of the calibration.
Data Scale	Select the on-screen menu to enable scale adjustment mode. The scale of a signal can be adjusted directly on the screen through a "Pinch and Zoom" gesture or using the screen buttons. The context menu at the bottom of the screen will be active during scale adjustments. Clicking the "Done" button will save changes.
	In addition to using the manual scale features, Auto Scale Defect will automatically set the defect within the parameters of the technique. Data Scale is a function of the calibration.
Gain	Select the on-screen menu to enable the settings menu for the eddy current drive gain. Changes to the gain value will be applied the next time the acquisition is started with the start/stop acquire button PD . Gain is a function of the technique.
Drive	Select the on-screen menu to enable the settings menu for the eddy current drive voltage. Changes to the drive voltage value will be applied the next time the acquisition is started with the start/stop acquire button PD . Drive is a function of the technique.

Context Menu

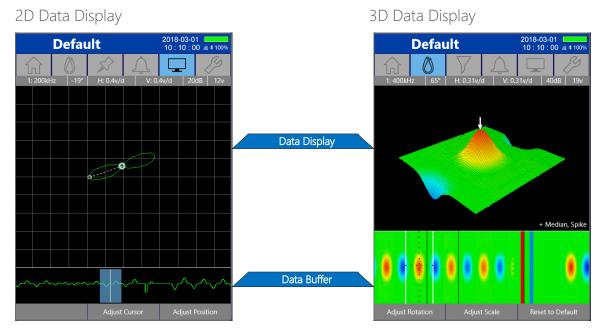
C	Defau		2018-03-0 10 : 10 : 0	1 00 <i>@</i> * 100%		
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1: 200kHz	-19°	H: 0.4v/c	I V: 0.	.4v/d 20	ldB 12v	
		6				
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			Ň I			
		Adjust	Cursor	Adjust Position		

This feature is a three-option menu across the bottom of many screens that changes based on the current screen mode. The context menu is a screen soft key that correlates to the three keypad buttons directly below the screen.

Navigation between the different screen modes can be performed by either the touch screen or control buttons.

Context Menu Navigation

)	Touch Screen	Control Button	
	Directly select the	Select by function button	
	menu item on the	🔲 directly below the	
	screen	screen option	



The data display areas appear differently for the general 2D and 3D data types however the layout is similar. The display areas represent the portion of the data that is within the Lissajous Data Window. The Lissajous Data Window is represented by the blue shaded area of the 2D display or the white dotted boundary lines of the 3D display.

Data Display Area

5. Getting Started

Before first use, read the safety precautions on page 3 to ensure safe operation.

The following information provides general steps to quickly start operating the MIZ-21C.

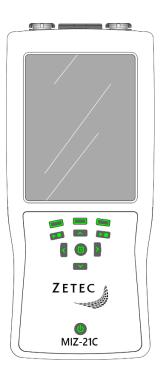
Powering Up the Instrument



With batteries fully charged, momentarily press the power button on the front panel to power up the MIZ-21C. It will take several seconds to boot as the system starts.

Powering Down the Instrument

Press and hold the power button for 2 seconds to power down the MIZ-21C.



Selecting an Application



Once the MIZ-21C is fully powered up, the initial display will show the various application types supported by the MIZ-21C. The MIZ-21C organizes techniques under application categories to quickly identify the best technique for inspection requirements. Select the category to view avilable techniques currently loaded.

Touch Screen	Control Button
Directly select the menu item on the screen	Move the highlight up or down by using the up/down cursor buttons . Chose the menu item by either the select or right arrow button .

Selecting a Technique

The technique screen will display a list of techniques currently avaliable on the MIZ-21C. When the technique is highlighted and the technique parameters are set correctly for the application, start acquisition using the start/stop acquire button .

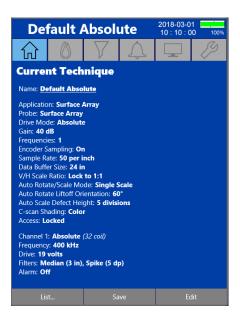
To view and edit the technique, select the technique on the screen or use the right arrow on the keypad.

Default techniques are locked; however, a copy can be made from any technique and modified for use. The Copy button in the Context Menu allows for copying and naming a new technique based on the current selection.

To return to the Application Screen, select Application.... In the Context Menu.



Viewing a Technique



When viewing a techique, you can scroll up or down on the screen or use the up/down cursor buttons reveal to view all the current settings.

To Return to the list of techniques, select List... from the Context Menu.

To modify a technique, select Edit from the Context Menu.

Editing a Technique

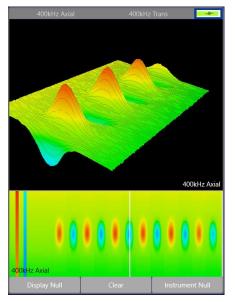
The technique editing screen will present all of the user configurable features in a menu driven list. Select any feature to enter changes to values.

Modified techniques can be run in acqusition mode without saving by pressing Start/Stop Acquire button **PD**. Edited techniques that have not been saved will append an asterisk to the technique name at the top of the screen to note the technique is not saved.

A modified technique can be saved at any time by selecting Save from the context menu in the editing screen. If the technique is currently locked, a prompt will display a choice to save a copy of the technique or cancel. Locked techniques cannot be changed.

Touch screen or press 11 to navigate list. Touch screen or press 11 to select. Click again to unlock. (4 \$ 100%)				
命 💧	∇		S)	
Current Technique				
Name: Default Absolute			\geq	
Application: Surface Array				
Probe: Surface Array			>	
Drive Mode: Absolute			>	
Gain: 40 dB			>	
Frequencies: 1			>	
Encoder Sampling: On			>	
Sample Rate: 50 per inch			>	
Data Buffer Size: 24 in			\geq	
List	Save	Edi	it	

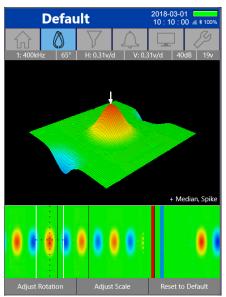
Acquiring Data



With an active technique selected and an appropriate probe attached, press the Start/Stop Acquire button **P** to initiate acquisition and start scanning the specimen.

While acquiring, use the Context Menu buttons to perform Display Null, Instrument Null, and Clear the data buffer.

Calibrating Data



Press the Start and Stop Acquire button **b** to halt acquisition. The data review page will immediately be displayed in the Calibrate menu mode. The Calibrate mode provides tools to adjust settings such as scale and rotation. The lower portion of the display shows the Data Buffer (see page 16) for selecting a data segment for calibration.

In addition, the Screen Controls Menu (see page 15) provides additional tools.

The Context Menu (see page 16) on the bottom of the screen provides the tools for calibrating the data.

6. Tools Menu

Touch screen or press 11 to navigate list. Touch screen or press to select. Click again to unlock.					
ŵ (3	\bigtriangledown	Ĵ		ß
Tools and Options					
System Language: English			>		
Screen Brightness: 70%			>		
Audio: Volume 75%			\geq		
Length Unit: in				>	
Coating Thickness Unit: mils				>	
Conductivity Unit: %IACS			\geq		
Measurement Type: Volts Peak to Peak			>		
Lissajous Data Window: 13% of buffer			>		
Grid Options: On			>		
				Do	one

The Tools Menu provides a collection of tools and options for operation of the MIZ-21C. Some options are specific to application types. Below is a brief description of the Tools Menu features.

System Language

The MIZ-21C offers several user language choices and can be set under this menu item.

Screen Brightness

Controls the backlight screen brightness. The MIZ-21C system will also auto dim the screen to different levels based on inactivity.

Audio

Sets the volume for alarms and prompts when used.

Length Unit

Sets the unit of measure for linear references.

Coating Thickness Unit

Sets the unit of measurement for conductivity shim thickness settings displayed values for coating thickness.

Conductivity Unit

Sets the scale standard in %IACS or mS/m (millisiemens per meter) for conductivity values.

Lissajous Data Window

Sets the percentage of the data file that will be visible in the data display area (see page 16) to control the overlap of signals in the display area.

Grid Options

Turns gridlines on or off for the display modes that contain gridlines such as the Lissajous display.

Acquisition Direction

Flips the direction of how C-Scan and data buffer windows scroll data onto the screen depending on the preference of the operator.

Array Coil Orientation

This feature sets the direction of travel for a surface array probe when encoder sampling is turned on in the technique.

Write To

Configures the data to be directly acquired to the internal drive storage or to an externally attached USB drive.

Touch Screen

The touch UI mode of the display can be enabled or disabled with this feature.

Network

When connected through a hardware network connection with a USB to Ethernet adapter, this section will display the IP address for the MIZ-21C

Hardware Diagnostics

The MIZ-21C has built-in hardware diagnostics to test system performance. The Quick Diagnostics performs checks of many features without the need for external equipment. The Standard Diagnostics and Surface Array Diagnostics require the addition of a hardware load plug which places an impedance load on the system to test a greater portion of the system. Any of the diagnostic tests will provide visual feedback during execution and a viewable report when complete.

File Management

From this option, recorded data files can be viewed, deleted, or copied to an attached external USB drive.

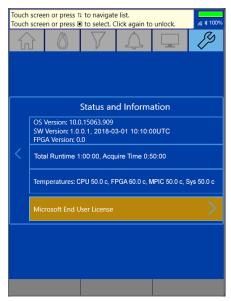
In addition, File Management allows for browsing saved screen shots (see page 24).

System Updates

System Updates provides several functions:

- 1. Adjusts the data and time settings of the operating system.
- 2. Updates Software and Firmware from updates provided by Zetec on a USB drive
- 3. Factory reset should be used with caution. All user applied changes to the system settings will be reset along with the deletion of all data files and screen shots on the system.

Status and Information

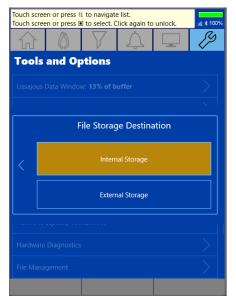


This option provides a report of current version numbers of the operating system, MIZ-21C software, MIZ-21C firmware, and MIZ-21C FPGA program. In addition, the current runtime of the system and temperatures of critical components are displayed.

Screenshots

Screen shots can be taken of data screens by pressing the Select button not the control button panel for 2 seconds. Captured screens can be viewed by the File Management option in the Tools section.

Saving files to USB



The destination for Data files and screenshots can be configured by selecting Save File option on the tools menu. Selecting this option will present a choice to save files to the internal or external (USB) storage.

USB storage is available when a USB device is attached to the USB port on the connector panel (see page 7). This setting can be changed at any time to direct the location to store files.

8. Additional Learning

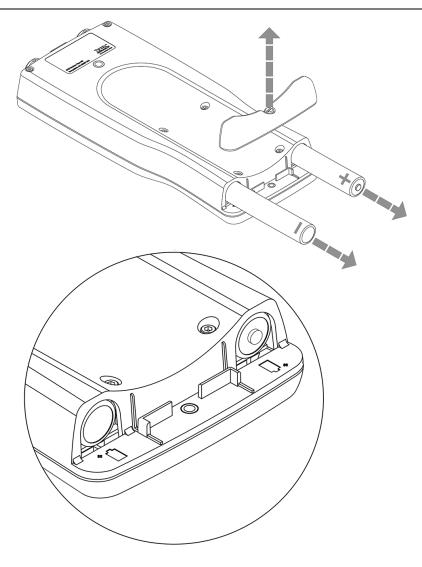
This manual provides the basics of operation. Zetec offers training videos to provide advanced information on setup and use of the MIZ-21C instruments to help users become proficient in operation of the MIZ-21C. Please visit <u>http://www.zetec.com/miz-21c-training/</u> to explore the various videos available.

9. Battery Replacement

For the best performance and safe operation, only use MIZ-21C replacement batteries sold by Zetec.

To replace batteries, remove the battery cover by releasing the retention screw and lifting the cover as shown to expose batteries. Ensure to install batteries with correct polarity direction as shown in the illustration.

The MIZ-21C has polarity direction icons molded into the housing as shown in the inset as a reminder of the correct polarity direction for installed batteries.





The MIZ-21C uses specialized Li-Ion batteries for high performance and safe operation. When replacing batteries, only use batteries designed for the MIZ-21C and supplied by Zetec. Use of any other batteries may result in damage to the MIZ-21C or personal injury.

10. Specifications

•	
Size (H × W × D)	267 × 122 × 38 mm (10.5 × 4.8 × 1.5 in)
Weight (including batteries and cover)	1.22 kg (2.7 lb)
Multi-Touch Display	5.7 in (480 x 640 pixels)
Operating Temperature Range	-10°C to 45°C (14°F to 113°F)
Storage Temperature Range	-20°C to 70°C (-4°F to 158°F) (w/out batteries)
Relative Humidity	95% non-condensing
Battery Charger Input /Output	100 to 240 VAC, Auto-Switching, 50 to 60 Hz / 15 VDC, 2.67A
Battery Life	8 hr per charge
Eddy Current Connector	18-Pin Lemo
Eddy Current Array Connector	26-Pin Lemo
Connectivity	USB 2.0, Wi-Fi, Bluetooth
Encoders	2 axes, quadrature
Probe Recognition and Setup	Automatic, Zetec Coil ID Chip
Coil Inputs	MIZ-21C-SF: 1, MIZ-21C: 1, MIZ-21C-ARRAY: 3
Frequencies Per Timeslot	MIZ-21C-SF: 1, MIZ-21C: 2, MIZ-21C-ARRAY: 2
Data Channels	MIZ-21C-SF: 32, MIZ-21C: 64, MIZ-21C-ARRAY: 192
Maximum Probe Coils	MIZ-21C-SF: 2, MIZ-21C: 2, MIZ-21C-ARRAY: 32
Frequency Range	5 Hz to 10 MHz
Generator Output	Up to 19 Vpp
Injection Modes	Continuous and Super-Multiplex
Receiver Gain	10 – 53 dB, 43 dB range
Data Resolution	16 bits
Acquisition / Sampling Rate	Up to 25,000 per second
Probe Drive	50 Ohm
Filters	Adjustable CC, Median, High Pass, Low Pass, Bandpass, Spike
Alarms	Adjustable Box, Audio adjustable volume, Headphone support
Conductivity Frequency	60, 120, 240 and 480 kHz
Conductivity Specification	Digital readout in 0.9 to 110 %IACS (0.5 to 70 MS/m), Accuracy within $\pm 0.5\%$ IACS from 0.9% to 65% IACS and within $\pm 1.0\%$ of values over 65%
Non-Conductive Coating Thickness	Can measure non-conductive coating thickness from 0 mm to 1.000 mm. Accuracy of 0.025 mm (±0.001 in.) over a 0 mm to 0.64 mm range
Rotating Scanner	MIZ-21C-SF: No, MIZ-21C: Yes, MIZ-21C-ARRAY: Yes Zetec Rotating Scanner, Others
Maximum Data File Size	60 MB
Languages	English, Spanish, French, German, Chinese
Storage	8 GB SSD Internal, Any size through USB expansion
Instrument Calibration	ISO/IEC 17025:2005, Meets or exceeds manufacturer's requirements

11. Warranty

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