

# RelayDoc™ User Manual

For Models: Portable RelayDoc (PRD)



## Publication History\* \*\*

Version	Comment	Author	Approved	Date	Class
0.1		John Zhang		15Mar2013	Draft
0.2		Michelle Gersbach		30Sep2013	Preliminary
0.3		Michelle Gersbach		15Oct2013	Preliminary
1.11		John Zhang		05May2014	Preliminary
1.13		John Zhang		03Jun2014	Preliminary
1.23		Adam Shipway		01Jul2016	Issued
1.24		Adam Shipway	LI	08Nov2016	Issued
1.25	Image corrected	Adam Shipway		14Sep2017	Issued
1.3	Updated for RelayDoc-BT	Yvie Hough		20May2019	Draft
1.4	Updated for PRD	Callum Gersbach		22May2019	Issued

\*The latest version of this User Manual is available at [www.mrd.com.au](http://www.mrd.com.au)

\*\*Note: RelayDocs in service may not have the latest software.

## RelayDoc™ User Manual

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	Installation Guide	<a href="http://www.mrd.com.au/">www.mrd.com.au/</a>
	Datasheet	<a href="http://www.mrd.com.au/">www.mrd.com.au/</a>
	EU Declaration	<a href="http://www.mrd.com.au/">www.mrd.com.au/</a>



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## 1. INTRODUCTION

Your new RelayDoc is a portable automated relay testing device, capable of assessing the health of Q style, B style, PN style, P03000 and more relays. By using multiple criteria points such as Coil Resistance, Contact resistance, switch time and switch voltage/current, the RelayDoc can give you a clearer picture than ever of the health of your relays. Once the RelayDoc has analysed the relay it will generate a full report with both simple Pass/Fail indications and detailed values for diagnosis which will be stored permanently on the device and can be uploaded to an external web server for remote access and record-keeping if required.

Thanks to the RelayDoc testing, diagnosing and proving the health of your relay assets has never been easier.

### 1.1 PACKAGE CONTENTS

Your new RelayDoc includes:

- RelayDoc
- Power Supply
- Android Tablet
- RelayDoc App (TrackSense) – Sign into the Google Playstore for updates or to download to new device
- User Manual - Available In-App in the support centre
- Warranty Statement
- EU Declaration of Conformity

If any items are missing, please contact your RelayDoc supplier.

## 2. PRODUCT DESCRIPTION

### 2.1 FUNCTION

RelayDoc automates the process of Relay Testing and the subsequent generation and management of Relay Test Reports.

A Test Profile is stored for each unique Relay Type. The profile specifies the method and parameters for the individual tests listed below. When a Relay is inserted, RelayDoc:

- Identifies the apparent contact configuration (normally open and normally closed contacts)
- Attempts to match the Relay to a stored Profile, and requests user confirmation if none or more than one match is found
- Requests selection of the correct Coil Resistance if more than one option exists

The RelayDoc stores one default Relay Test Process, which is restored at Power ON. The Default Test Process is changeable within usage sessions, selecting from the following tests:

- Coil Resistance
- Contact Conditioning – **WARNING**: To avoid unnecessary risk of damage to relays, MRD suggests only turning this on for individual relays as required.
- Contact Resistance
- Contact Switch Time
- Operate Voltage and Current
- Release Voltage and Current

Test Reports can be stored and viewed locally or exported to a remote server. RelayDoc, by default, uses a Web Server to enable remote examination and control of the stored reports.

## 2.2 FEATURES



#	Feature	Benefit
1	Android Tablet	Easy to use controls Easy navigation On-device Report viewing
1	Network Connected	Simple connection to a local network using WiFi
1	Web Server Upload	Remote viewing of on-device reports Data downloads to remote databases
1	Default Relay Test	Easily revert to a standard test method
1	PIN Security	Limits user access to on-device settings
2	Portable, Robust Enclosure	Can be used as a relocatable device
4	9-36V DC Input Power	Easily connect to any mains supply using provided power supply unit

#	Connectors	Purpose
3	Power Switch	Easy power-off without cable disconnection for permanent installations
4	Power Input Amphenol (LTW BD-02)	(9-36V DC, ≤10W)
5	USB Type A	Charging Android Device
6	D-Sub 15 Pin Female	Calibration and Verification
7	External Relay Test Base	Connection to External Relay Test Bases
8	Test Base Extension	Extra I/O needed only for BR930 and B2 style relays

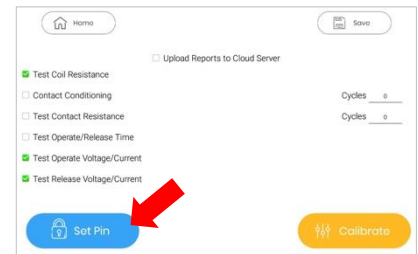
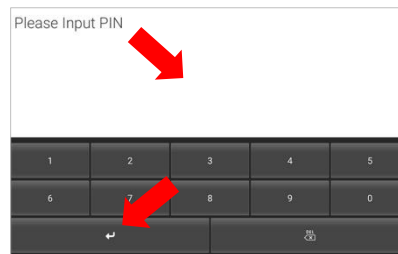
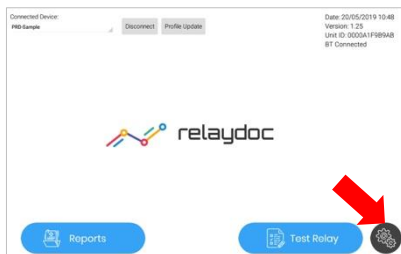


## 3. GENERAL SETUP

### 3.1 PERSONAL IDENTIFICATION NUMBER (PIN)

A four-digit PIN is required to view or change any settings on the RelayDoc. To change the PIN:

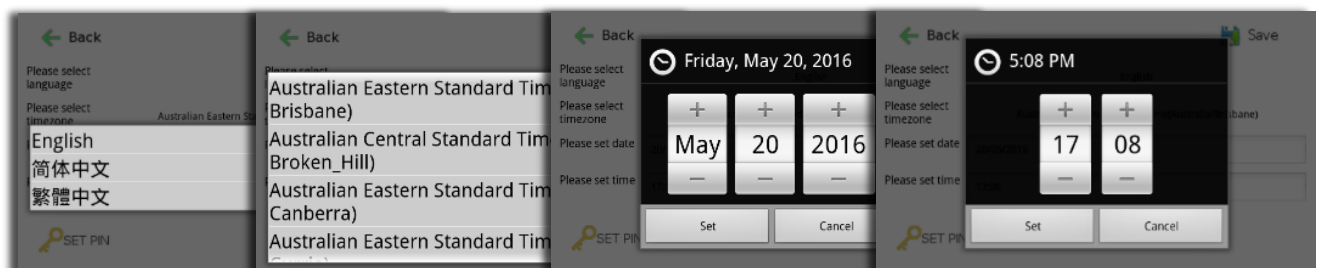
- Touch the Settings Icon on the Home Page and enter the current PIN (0000 by Factory Default)
  - Correct PIN will advance to Settings Page
  - Incorrect PIN will “shake” the dots
  - To Exit, touch Carriage Return Arrow anytime
- Touch “Advanced” icon
- Touch “Set PIN” icon
- Set & confirm the new PIN
  - The new PIN must differ from the current PIN
  - The dots will “shake” if the PIN is not different



### 3.2 ADVANCED SETTINGS

RelayDoc has settable Language, Location, Date and Time. To change settings:

- Touch the Settings Icon on the Home Page
- Enter the current PIN
- Touch “Advanced” icon
- A menu of settings will appear. Touch the item to be changed
  - Language- Select from the scrollable list
  - Time zone- Select from the scrollable list
  - Date- Set using the Rollover
  - Time- set 24hr time using the Rollover

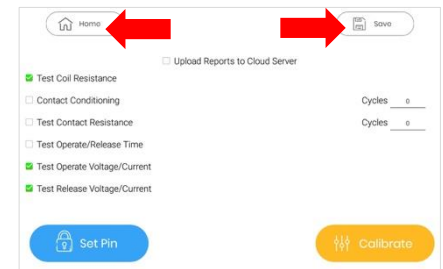




## 3.3 RELAY TEST PROCESS SETTINGS

RelayDoc stores the last used process as the Default Relay Test Process. To change and save the Default Test Process:

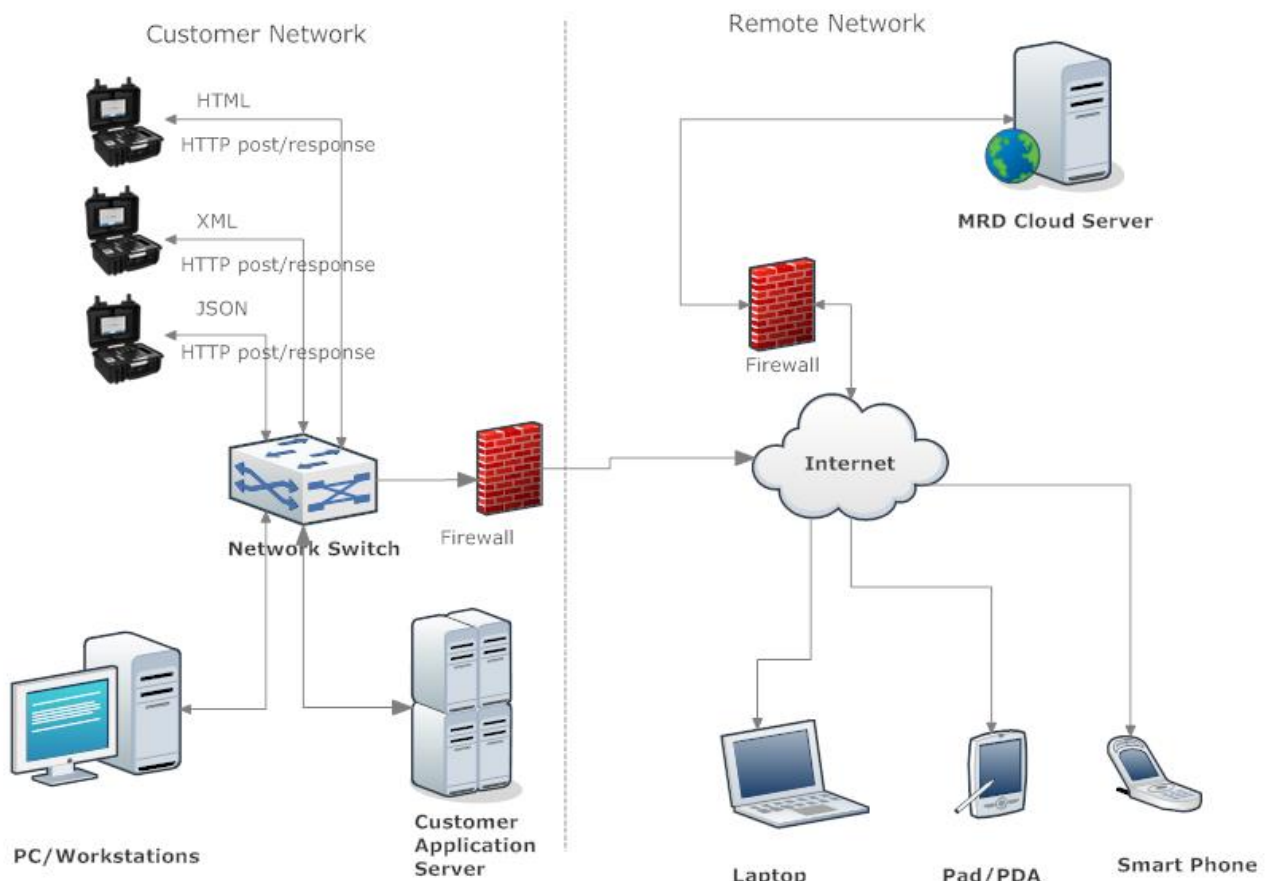
- Touch the Settings Icon on the Home Page
- Enter the current PIN. The Settings Page will appear
- On the left side of page, select the Tests to be completed
- Enter the number of cycles if requested (Note: Contact Conditioning default is 20 cycles)
- On the right-hand side of page, select the tests to be included in the Default Test Process
- To Save- Touch "Save"; "OK" on the confirmation screen; "Home" to Exit
- To Exit without saving- Touch "Home". The current and default test processes will not be changed.



Please refer to Section 6 for more information about the function of each of the Test Processes.

## 3.4 NETWORK INFRASTRUCTURE

RelayDoc supports XML/HTML/JSON protocols to exchange data with external application servers, if installed. RelayDoc also posts reports to the MRD Cloud server. Typical installation architecture is:







## 4. SOFTWARE UPDATES

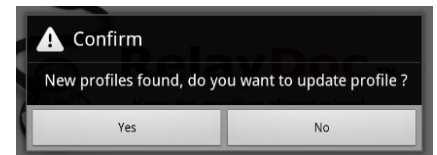
### 4.1 IP ADDRESS

The RelayDoc gets its internet connection through any Bluetooth connected Android device. Once connected to the internet, the Android device will attempt to receive an IP address from the router and will then display it on the home-screen of the RelayDoc application.

### 4.2 PROFILE UPDATES

When the RelayDoc has access to the MRD Web Server unapplied Profile Updates will be detected and RelayDoc will prompt the operator.

- Touch “Yes” to download and install updates
- Touch “No” to ignore



Profile Updates can be forced via the button on the main screen.

### 4.3 APPLICATION UPGRADES

The RelayDoc Application software can be updated from the Google Playstore on the tablet provided, or on any Android device with the application installed. Firmware updates can be downloaded and installed from within the Calibration menu, in settings.

### 4.4 REPORT UPLOAD TO RELAYDOC WEB SERVER

Relay Doc supports the HTTP/HTTPS protocol for data interface. If RelayDoc is connected to the internet, and it is configured to upload the report, the test reports will be automatically uploaded to the MRD Cloud Server.

Uploaded reports are in JSON format, including the test report data and an array of detailed test results data.

### 4.5 APK SIDE LOADING

If for any reason your tablet is unable to update or download the RelayDoc Application (Isolated Network Restrictions etc.) you can contact your RelayDoc supplier to receive the most up-to-date APK package.

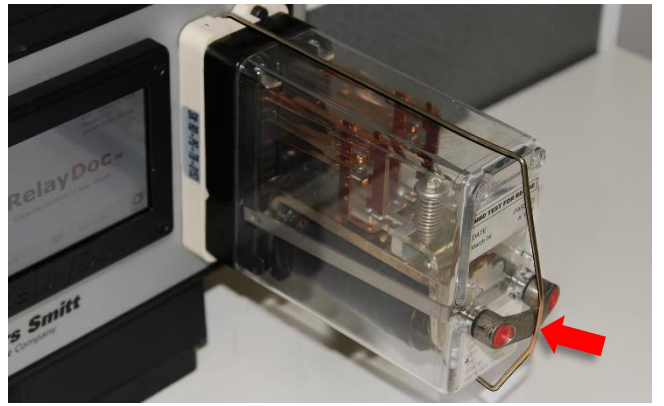
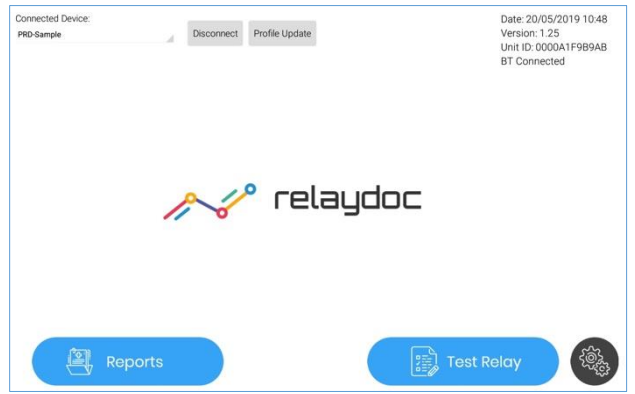
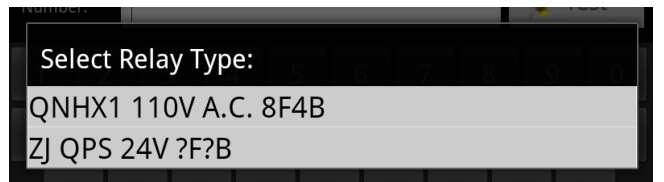

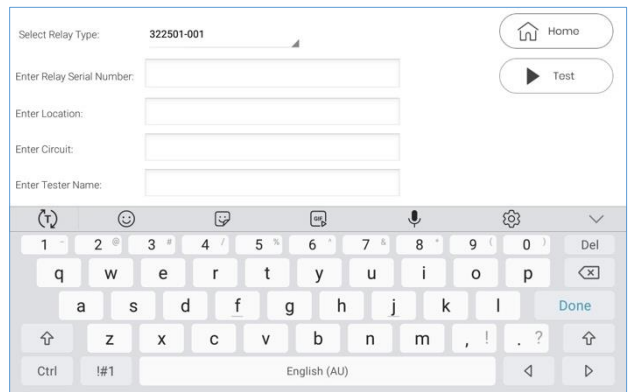
To install the package,

1. connect the tablet to your computer via a USB cable.
2. Navigate to the tablet's file directory (In windows, ex. 'This PC > Galaxy Tab Active 2').
3. Copy the .APK file into any directory within the Tablet's directory (Such as 'downloads').
4. Unlock the tablet and open the 'My Files' application.
5. Navigate to the directory where the .APK has been stored (EX. 'Downloads').
6. Click on the .APK file, then press 'install'.
7. The Android device will install the .APK, and you will now have the RelayDoc App on your main screen.


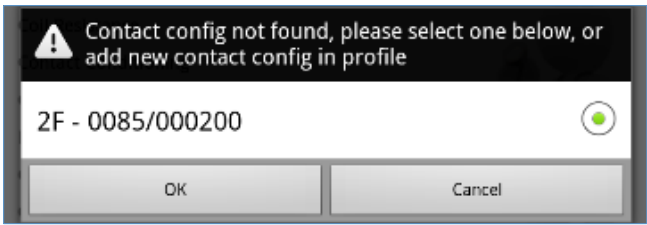

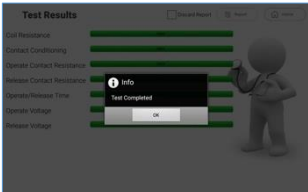
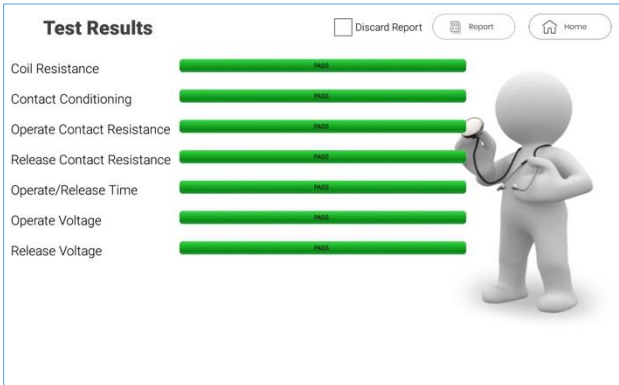


## 5. TESTING RELAYS

To test a relay:

1	Insert Relay into Relay Test Base	
2	Touch "Test Relay" on the Home Page	
3	Select the Relay Type via the drop-down menu	
4	Select the correct Coil Resistance (if prompted)	
5	Enter the Relay Serial Number, Location, Circuit Number and Test Officer's name using the Virtual Keyboard or Bar Code Reader. Touch "Test" to continue or "Home" to abort	



6	<p>If a Latching Relay is detected, the “Latch off” Checkbox will be displayed: Turn Coil Latching ON or OFF as required. Touch the check box.</p>	
6	<p>If the Contact Configuration does not match the selected Relay Profile, RelayDoc will prompt the user to select from a list</p>	
7	<p>As each test occurs, progress and status are displayed.</p> <p>Touch “Cancel” to abort any test. The RelayDoc will beep three times.</p> <p><i>Note: The report is written incrementally: results are added as each test is completed</i></p>	
8	<p>At successful completion, the RelayDoc will beep three times. Touch “OK” to return to the Test Results</p>	
9	<p>Touch “Report” to view the Test Results, or touch “Home” to Exit.</p>	



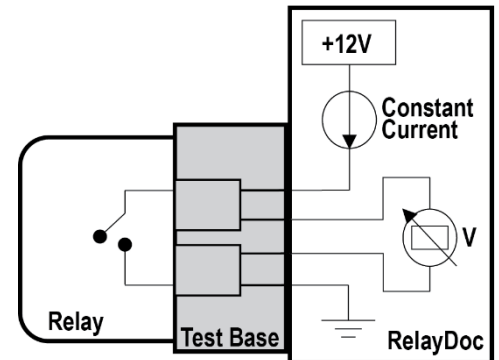
## 6. TEST FUNCTIONALITY

### 6.1 COIL RESISTANCE

The Coil Resistance Test passes a precise constant current through the coil. The voltage drop across the coil is measured and the coil resistance is calculated. The result is recorded.

The coil resistance measurement uses two different scales to generate high precision results.

Scale	Current	Range	Precision
1	10mA	0 – 500 $\Omega$	1 $\Omega$
2	1mA	500 – 10 k $\Omega$	1 $\Omega$



### 6.2 CONTACT RESISTANCE

The contact resistance test passes a precise constant current through each contact. The voltage drop across each contact is measured and the contact resistance is calculated. Accurate results are the result of using a Four Wire Kelvin measurement method up to the Test Base contact. This eliminates any resistance error from cables or connections between the RelayDoc and the EUT.

The RelayDoc manages the Contact Resistance Measurement, automatically increasing the applied current in stages until the measured resistance is in one of the ranges shown right.

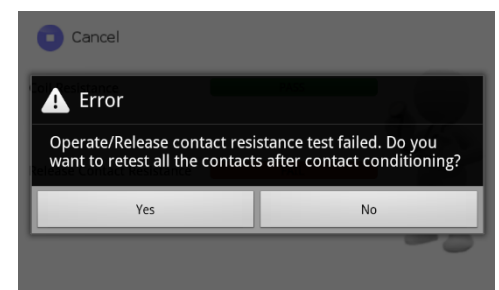
Measured resistance over 500 $\Omega$  is defined to be OPEN state.

Stage	Current	Range	Precision
1	100mA	0-5 $\Omega$	0.001 $\Omega$
2	10mA	5-50 $\Omega$	0.01 $\Omega$
3	1mA	50-500 $\Omega$	0.1 $\Omega$

### 6.3 CONTACT CONDITIONING

Contact Conditioning is a flash cleaning method. In the RelayDoc implementation, a Constant Current Source (CCS) provides 100mA through each of the relay contacts. There is a short current surge as the contact opens or closes and the resulting plasma arc cleans the contact surface.

If it fails an initial resistance test, RelayDoc will ask the operator to authorise Contact Cleaning and re-test of any failed relays, prior to creating the Test Report. Only Relays that fail the initial test will be conditioned and re-tested.



The Operator may select Contact Conditioning to be included in the current Test Process, in which case the software will not offer conditioning following a Resistance Test failure.

### 6.4 CONTACT SWITCH TIME

This test is performed by measuring the time it takes for a relay contact to change state from Open to Close or vice versa. Open and Close values are factory set. Users cannot adjust the settings.

### 6.5 OPERATE VOLTAGE AND CURRENT

The Relay Operate voltage and current are measured using a Ramp Method: The coil supply is swept from zero up to nominal rated voltage/current, while monitoring from an open to closed contact state.

### 6.6 RELEASE VOLTAGE AND CURRENT

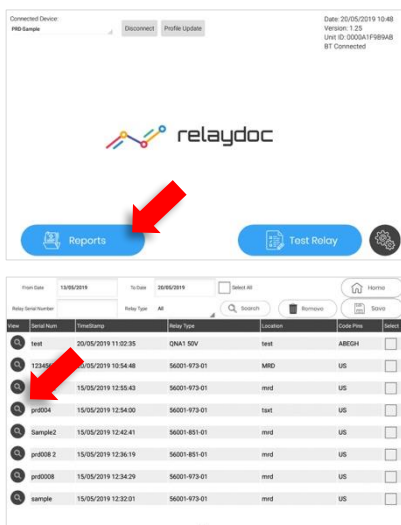
The Relay Release voltage and current are measured using a Ramp Method: The coil supply is swept from the nominal rated voltage/current to zero, while monitoring from a closed to open contact state.

## 7. TEST REPORTS

### 7.1 VIEWING SAVED REPORTS

To view a saved report:

- Touch “Reports” on the Home Page
- Find the required report in the list
- Touch the “magnifying Glass” icon to open the report. The Report will open
- Scroll to the bottom of the report. Touch “Detail” to reveal the complete Contact Resistance Test details
- Touch “Hide” to collapse the details
- Touch “Back” to return to the Reports Page



Back

RelayDoc Test Report

Notes

Details

Save

Report Number: 304  
Date: 20/05/2019  
RelayDoc ID: 27.25  
Relay Type: QNA1 50V  
Test Specification: BR931A  
Contact Config: 8F8B  
Coil Type: SINGLE  
Coil Voltage(V): 50.0  
Coil Resistance(Ω): 940.0  
Pin Code: 24  
Code Pins: ABEGH  
Relay Serial Number: test  
Location: test  
Circuit: test  
Tester Name: t

Notes:

**Test Results**

Parameter	Min	Max	Result	Pass/Fail
Coil Resistance A(Ω)	846	1034	974.1	PASS
Coil Power A(W)	0	3	2.566	PASS
Operate Voltage Ramp A(V)	7.5	40	33.01	PASS
Release Voltage Ramp A(V)	7.5	40	11.73	PASS
Operate Time A(s)	0	0.514	See table below	PASS
Release Time A(s)	0	0.37	See table below	PASS
Operate Contact Resistance A(Ω)	0	1	See table below	PASS
Release Contact Resistance A(Ω)	0	1	See table below	PASS

(\*) applies to front contact only

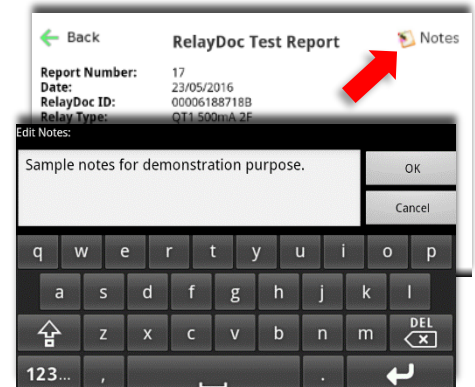
Contact Results									
Contact	Type	Operate Contact Resistance A(Ω)			Release Contact Resistance A(Ω)			Operate Time A(s)	Release Time A(s)
		Min	Avg	Max	Min	Avg	Max		
A:1-2	Front	0.316	0.316	0.316	OPEN	OPEN	OPEN	0.266	0.062
A:3-4	Front	0.329	0.329	0.329	OPEN	OPEN	OPEN	0.27	0.062
A:5-6	Back	OPEN	OPEN	OPEN	0.244	0.244	0.244	0.224	0.071
A:7-8	Back	OPEN	OPEN	OPEN	0.152	0.152	0.152	0.225	0.074
B:1-2	Front	0.254	0.254	0.254	OPEN	OPEN	OPEN	0.268	0.061
B:3-4	Front	0.215	0.215	0.215	OPEN	OPEN	OPEN	0.269	0.062
B:5-6	Back	OPEN	OPEN	OPEN	0.056	0.056	0.056	0.239	0.071
B:7-8	Back	OPEN	OPEN	OPEN	0.09	0.09	0.09	0.241	0.07
C:1-2	Front	0.355	0.355	0.355	OPEN	OPEN	OPEN	0.268	0.062
C:3-4	Front	0.061	0.061	0.061	OPEN	OPEN	OPEN	0.267	0.061
C:5-6	Back	OPEN	OPEN	OPEN	0.177	0.177	0.177	0.214	0.099
C:7-8	Back	OPEN	OPEN	OPEN	0.091	0.091	0.091	0.239	0.07
D:1-2	Front	0.032	0.032	0.032	OPEN	OPEN	OPEN	0.27	0.062
D:3-4	Front	0.205	0.205	0.205	OPEN	OPEN	OPEN	0.266	0.061
D:5-6	Back	OPEN	OPEN	OPEN	0.037	0.037	0.037	0.233	0.072
D:7-8	Back	OPEN	OPEN	OPEN	0.186	0.186	0.186	0.24	0.077



## 7.2 ADDING NOTES TO REPORTS

To add notes to a report:

- Open the required report
- Touch “Notes” in the top right corner of the page
- Type Notes using the Virtual Keyboard
- Touch “OK” to Return to the Report



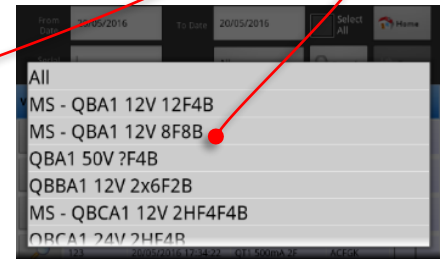
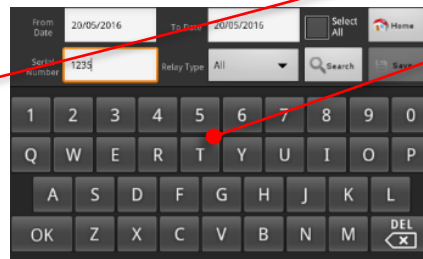
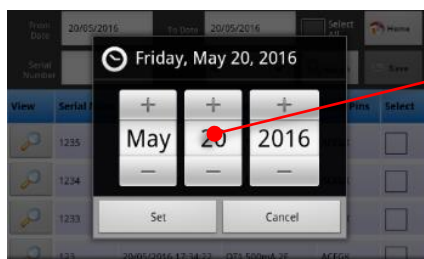
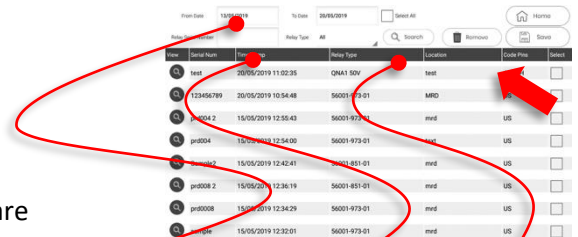
## 7.3 FILTERING REPORTS

Reports can be isolated from long lists using filtering. Filter reports by:

- Relay Type
- Relay Serial Number
- Range of Test Dates

To filter reports:

- Open the Reports Menu
- Select a Relay Type from the drop-down list, or
- Enter a Serial Number into the text box, or
- Enter a range of dates, using the rollovers
- Touch “Search” to complete the search. Found items are displayed in the Report List.



## 8. MAINTENANCE

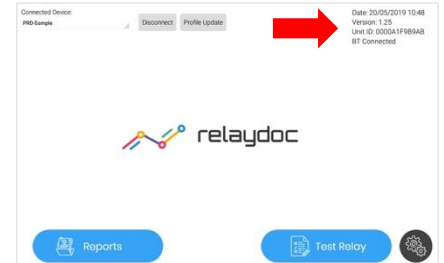


**WARNING:** The RelayDoc contains no user serviceable parts! Do not open the case. Opening the case will void warranty, void calibration, and may result in damage to the unit.

### 8.1 GENERAL MAINTENANCE

The RelayDoc requires very little maintenance. Complete the following items on an as required basis.

- Clean Relay Contacts with Contact Cleaner and cotton buds
- Wipe down the external surfaces with a just-damp soft cloth



### 8.2 CALIBRATION

Calibration is required every 12 months.

Calibration must be done by trained Operators, using the RelayDoc Calibration Kit (part number RDCK). RDCK is available for purchase from MRD, otherwise return the unit annually for calibration.

Please contact your RelayDoc provider for further information.



## 9. TECHNICAL DATA

### Power Supply

Supply Voltage	9-36V DC
Power consumption (Typical)	<10W
Power consumption (Peak)	<45W
Power Connector	Amphenol LTW BD-02

### Output to Relay

Maximum Power	35W
Maximum Current	1A
Maximum Voltage	110V DC

### Measurement Tolerance

Contact Resistance	1% +0.01Ω
Coil Resistance	1% +1Ω
Coil Voltage	1% +0.1V
Coil Current	1% +1mA

### Physical properties

Dimensions (When closed)	360 x 304 x 194mm (L x W x D)
Weight (Device only)	5.8kg typical
Wall Mount	Recommended
Mounting System	Using 4x fasteners
Tabletop usage	Optional
Flammability Rating (Enclosure)	UL94-V0

### EMC Performance

	Standard Test	Result
<b>Immunity</b>		
ESD	IEC 61000-4-2	B 6kV/8kV
Radiated Radio Frequency	IEC 61000-4-3	A
Electromagnetic Field	IEC 61000-4-3	A
Fast Transient/Burst	IEC 61000-4-4	B
Surge	IEC 61000-4-5	B
Conducted disturbance	IEC 61000-4-6	A
<b>Interference emission</b>		
HF Radiation	EN 50121-4 &	Pass
HF Conducted	EN61000-6-3	Pass

### Warranty

Duration	Twelve Months
Type	Parts & Labour, Return to Supplier
Other	Unlimited Support by Telephone & Email



## 10. WARRANTY

*Congratulations on choosing an MRD Portable RelayDoc.*

*MRD Products are designed and manufactured to the highest standards: your PRD is backed with a ONE YEAR Warranty covering materials or manufacturing defects, commencing on the date of customer receipt.*

Please record your product details below.

Model	Serial Number	HW Version	Date of Purchase	Supplier
PRD	_____	_____	___/___/20___	

### Conditions

MRD warrants your new RelayDoc-BT device shall be free of material or manufacturing defects and shall operate as designed, when installed, used, and maintained according to the applicable Installation Guide, Technical Data Sheet, and User Manual.

This warranty does not cover:

- Normal wear and tear
- Problems not caused by materials or manufacturing defects
- Damage caused in-transit, by fluid ingress, by accident, or intentionally
- Damage resulting from installations or applications not expressly approved by MRD
- Devices that are altered in any way, including software or removal of the serial number
- Any other event, act, default or omission beyond MRD's control.

In the event of a possible warranty claim, immediately **stop using the device and contact your supplier for assistance**. It may be possible to solve the problem without returning the device.

### Returns

Do not return the device unless authorised by your supplier. If a return is required, it is your responsibility to pack the device for safe shipping, and to ship the device as instructed by your supplier. Return shipping is at your expense.

MRD will inspect returned devices. We will repair or replace devices or parts of devices that are found defective due to material or manufacturing faults. We will quote to repair other problems, if requested. We will return devices determined to be No Fault Found, at your expense.

### Limited Liability

The benefits provided by this warranty are in addition to other rights and remedies available to the consumer under the law. In no instance shall MRD be liable for consequential damages.

### For Australia Only

MRD Rail Technologies Pty Ltd goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.



This warranty is offered by:

**MRD Rail Technologies Pty Ltd**  
235 South St, Cleveland. QLD.  
4163. Australia.  
+61 7 3821 5151  
support@mrd.com.au

## END OF MANUAL

