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INSTRUCTIONS

GARDCO DISTRIBUTED PRODUCTS



COPLEY



Tapped Density Tester

JV 110i, 210i



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Amendments

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Section 1. – Introduction

Thank you for purchasing a Copley Tapped Density Tester.

To assure functionality and operation, Copley Scientific confirms that a Factory Acceptance Test (FAT) has been performed on this instrument at the site of manufacture prior to shipment.

Section 1.1 – Document Safety Symbols



WARNING

Highlights a hazard that has the potential to cause physical injury



CAUTION REQUIRED

Highlights a hazard that has the potential to cause damage to the Tapped Density Tester, or a hazardous situation where the Tapped Density Tester could be used



INFORMATION

Important information for the correct use of the Tapped Density Tester



Section 1.2 – General Description

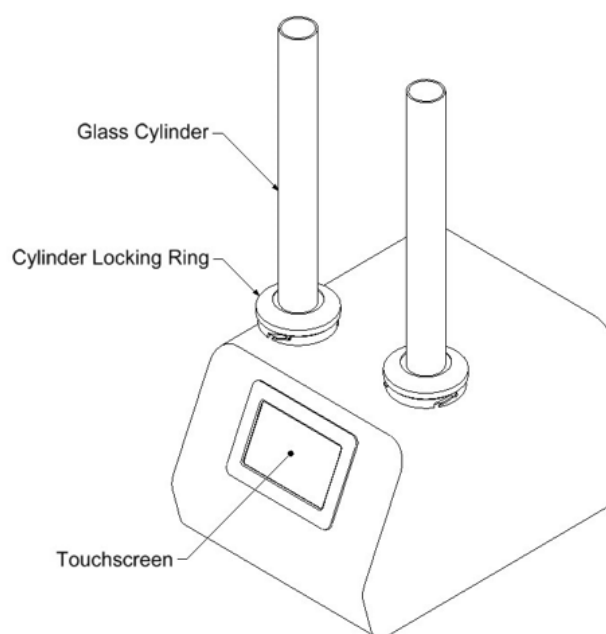
The Tapped Density Tester, model JV 110i/210i, is a user-friendly advanced test instrument for the determination of the tapped density of powders, according to the methods described in:

- **Unit States Pharmacopeia (USP) <616> Tapped Bulk Density (Method 1, 2, 3)**
- **European Pharmacopoeia (Ph. Eur.) 2.9.34 Bulk Density & Tapped Density of Powder (Method 1, 2, 3)**

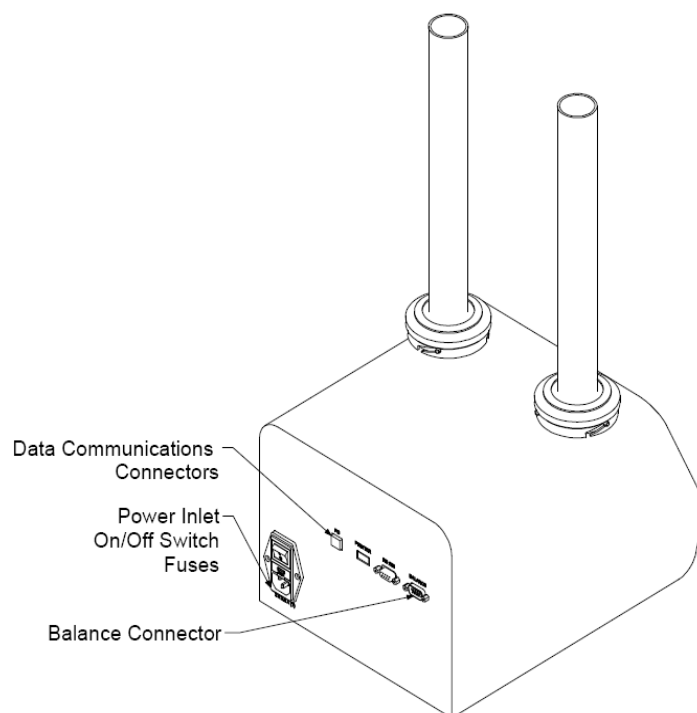
Section 1.3 – Key Features

- **USP/Ph. Eur. Compliant standard 250 mL glass graduated cylinder (1 or 2 depending on model)**
- **Resistive 5-inch touchscreen**
- **Rubber O-Rings (for noise reduction) included**
- **Run-time: 0 to 99 H: 59 M: 59 S/10 to 30,000 taps**
- **PC, Printer and RS-232 report outputs**
- **JV can perform either USP/Ph. Eur. Methods 1, 2 or 3**
- **Variable speed, the tapping frequency can be set with the range of 50 - 300 TPM**
- **Performs calculations of Bulk Density, Tapped Density, Hausner Ratio, and Compressibility index according to Methods 1, 2 or 3**

Section 1.4 – Parts Description



Front View



Rear View



Section 2. – Getting Started

Section 2.1 – Package Contents

Check the individual parts presented in the packaging against the list of components provided in the table below. If any parts are not accounted for, please contact your supplier immediately.

Section 2.1.1 – JV 110i

Model: JV 110i	Method 1	Method 2	Method 3 (3 mm Drop)	Method 3 (14 mm Drop)
Item Description	Quantity			
Tapped Density Tester	1	1	1	1
Power Cable	1	1	1	1
Platform	1 (14 mm Drop)	1 (3 mm Drop)	1 (3 mm Drop)	1 (14 mm Drop)
Test Apparatus	1 (250 mL CLY)	1 (250 mL CLY)	1 (Cup Top + Bottom)	1 (Cup Top + Bottom)
Bayonet Cap	1	1	1	1
Cylinder Clamp O-Ring	1	1	1	1
Noise Reduction O-Ring	1	1	1	1

Section 2.1.2 – JV 210i

Model: JV 210i	Method 2	Method 3 (3 mm Drop)	Method 3 (14 mm Drop)
Item Description	Quantity		
Tapped Density Tester	1	1	1
Power Cable	1	1	1
Platform	2 (3 mm Drop)	2 (3 mm Drop)	1 (14 mm Drop)
Test Apparatus	2 (250 mL CLY)	2 (Cup Top + Bottom)	2 (Cup Top + Bottom)
Bayonet Cap	2	2	2
Cylinder Clamp O-Ring	2	2	2
Noise Reduction O-Ring	2	2	2



Attention! - To perform Method 1 or Method 3 with a 14 mm Drop Platform, on a JV 210i model, only one test station should be used.

Section 2.2 – Unpacking & Assembly

1. Unpack the equipment carefully, report any damage to the JV. Current practice is to report any inconsistencies to the carrier through the delivery note and an email to your supplier.

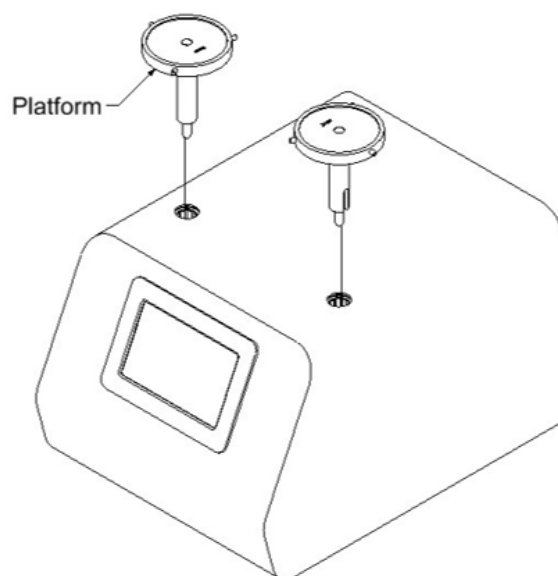


The following assembly process is the same for the 100 and 250 mL Cylinders.



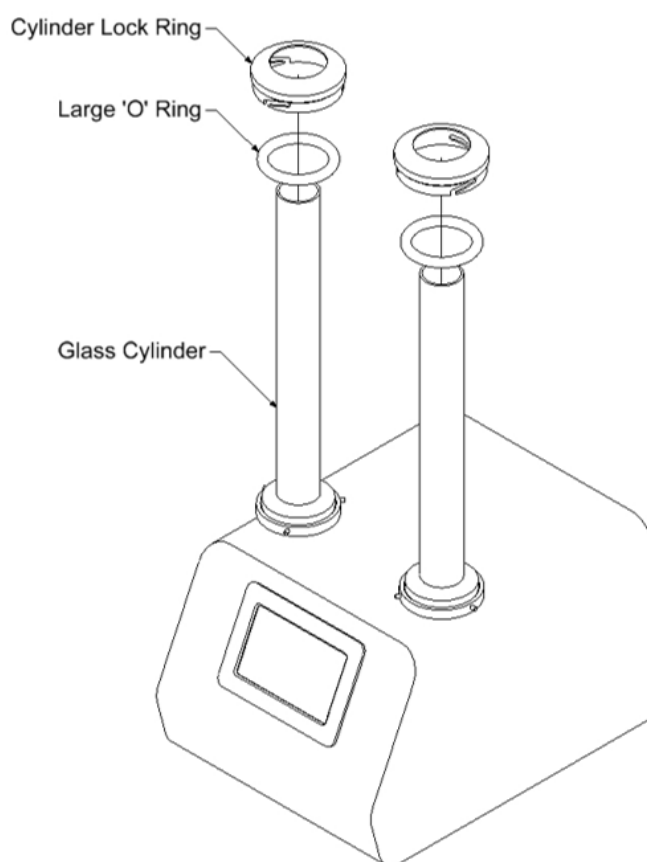
Refer to "Section 7. – Accessories" on page 35 for instructions on how to assemble the 5, 10, 25 and 50 mL Cylinders.

2. Insert the platform(s) into the linear bearing on the top of the JV.



Platform Assembly

3. Place a cylinder onto the platform. Slide the large O-Ring down the length of the cylinder and position at the base. Then, slide the cylinder locking ring down the length of the cylinder and over the large O-ring.

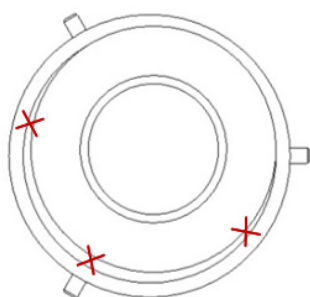


Cylinder Assembly

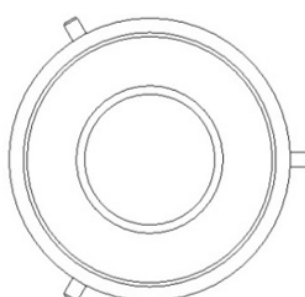
Continue to next page.



Attention! - Positioning the cylinder off-centre when assembled will cause added stress and could potentially lead to the glass cracking during operation.



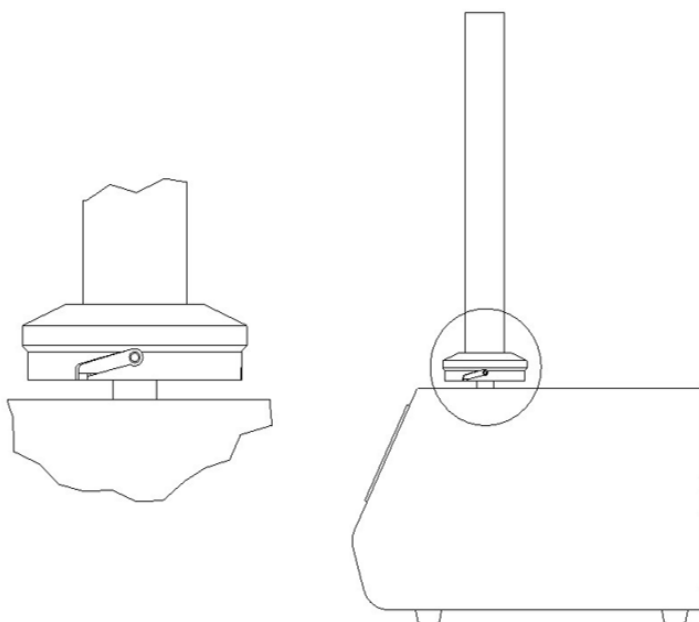
Incorrect Cylinder Placement



Correct Cylinder Placement



4. Align the slots of the locking ring with the pins on the platform and twist until the cylinder is locked into position.



Locking Ring Position



To remove the cylinder, carry out steps 2 to 4 in the reverse order; always remove or attach a cylinder whilst the platform is located in the JV.



The assembly process is the same for the 100 mL cylindrical vessel of stainless steel required for Method 3.

Section 2.3 – Location



Position the JV on a level, vibration-free surface capable of withstanding the weight of the machine, refer to "Section 10. – Specification" on page 47.



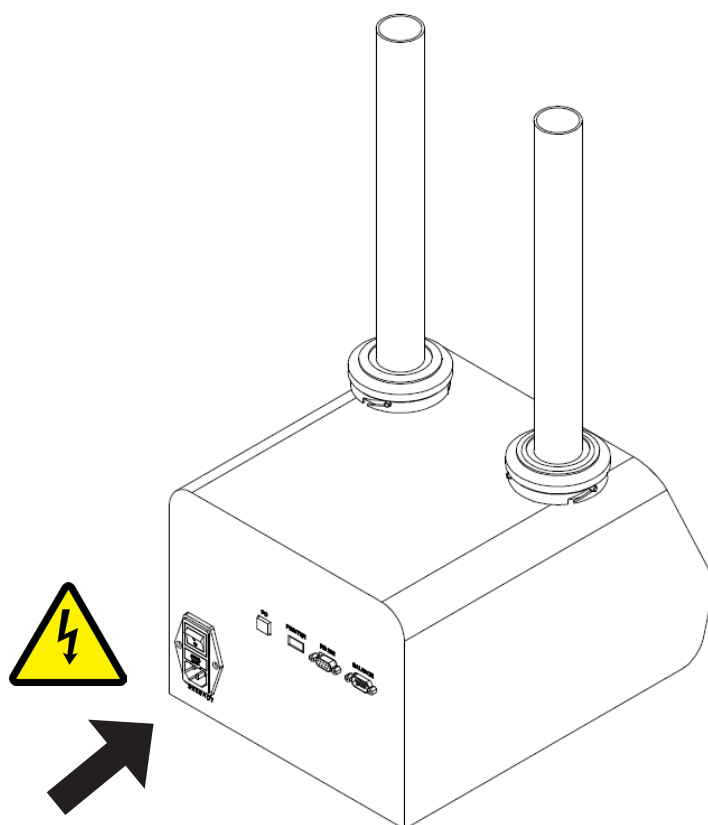
The JV causes vibrations during operation. Because of this function, ensure to position the JV away from any equipment that may be affected by this.

Section 2.4 – Switching On

Insert the mains cable (supplied) into the rear of the JV, connected to a suitable power supply and power-on (see "Section 10. – Specification" on page 47).



The JV will move the cylinder(s) to find its starting position by tapping once during power-on.



Connect Power



Once the JV has initialised, the home screen will become available.

The JV is now ready to start.



All screen images are for illustration only.



Section 3. – Performing a Test



Attention! - During operation, the cylinder/locking ring can present a trapping hazard - keep hands and loose clothing clear.



Attention! - The JV is intended for testing powders in cylinders or stainless steel cups. Do not use liquids in these components as doing so presents a risk of liquid spilling inside the enclosure of the machine.



By default, the JV will be set to the USP/Ph. Eur. Method 1, 2 or 3 (depending on order preference) where the TPM will be locked to the relevant value. Refer to "Section 4.5 – Method Settings" on page 32 for information on how to select a different test method.



The following information demonstrates how to operate the JV whilst it is set in the 'Other' (fixed weight) test method. This method allows the user to set the speed, tap count and test duration manually.

Section 3.1 – Set Calculations

Weight the sample of the powder to be tested.

Pour the sample into the cylinder.

Select the calculator icon from the home screen to go to the calculations screen.

Select the left or right arrows for the applicable cylinder (this applies to a JV 210i model only).



Continue to next page.

Select the 'Weight' icon, enter the sample weight value and then select the 'Accept' button to continue.



The weight will automatically be displayed on this screen when a Kern Balance is connected. Once the weight has stabilised, select the 'Accept' button to continue. For more information on the Kern Balance, please refer to "Section 7.6 – Balance" on page 41.



Section 3.2 – Set Volume

Read the unsettled volume (V_o) to the nearest graduated unit on the cylinder.

Select the ' V_o ' icon and enter the value on the keypad. Select the 'Accept' button to continue.

Repeat this process for the other cylinder (for JV 210i only).

Select the 'Back' button to return to the home screen.



Section 3.3 – Set TPM/Speed

Select the 'TPM/Speed' icon on the home screen, the screen will then change to the display shown below.

Enter the desired value on the keypad and then select the 'Accept' button to continue.



The TPM Value can only be entered or changed when the total tap count is zero.



Section 3.4 – Set Number of Taps

Select the 'Tap Counter' icon from the home screen, the screen will change to the following display shown below.

Enter the desired value on the keypad and then select the 'Accept' button to continue.

Note that the tap range is 10 to 300,000.



When the tap count value is updated, the test duration will be automatically updated.



Section 3.5 – Set Test Duration



Entering a test duration is optional. The test duration may vary slightly from the value entered because the JV is designed to perform a whole number of taps.

Select the 'Timer' icon from the home screen, the screen will then change to the display shown below.

Enter the desired value on the keypad and then select the 'Accept' button to continue.



Section 3.6 – Test Run

When all the parameters have been set, select the 'Run Test' button to begin the test run.



Attention! - The JV produces noise levels above 80 dB(A). Noise exposure can be reduced by wearing appropriate ear protection or by operating the JV inside an acoustic cabinet (refer to "Section 7.3 – Acoustic Cabinet" on page 39).



Section 3.7 – During Test Run

During the test run, the actual value of taps will start to count up towards the set value that was entered during the test setup.

The tap count will continue to increase until the set value has been achieved and the progress bar has been filled.



Section 3.8 – Stopping a Run

To stop a test run, touch the 'Stop' button twice. The first time the button is touched it will turn red, if it is pressed again whilst it is red, the test will stop.

If the stop button is only touched once, the test will carry on as normal, this is to protect against accidental touches.

Note that the reset button will also need to be selected twice to be activated.



Section 3.9 – Subsequent Runs

If any changes are required for the next run, then select the '*Tap Counter*' or '*Timer*' on the home screen and enter a new value on the keypad.

Press the '*Accept*' button to continue.

Select the '*Run Test*' button to begin a new run cycle.

The calculations button can be pressed at this stage to go to the calculations screen and the option to print out an intermediate report will be available.



Refer to "Section 12. – Test Report" on page 55 for a test report example.



Section 3.10 – End of Test

Select the 'Calculator' button to go to the calculations screen.

Read the final tapped volume (V_f) to the nearest graduated unit on the cylinder.

Select the ' V_f ' icon and enter the value on the keypad, select the 'Accept' button to continue.



The system will then automatically calculate the results shown on the right-hand side of the screen from the values entered.

The JV counts the total number of taps since the calculations were last reset.

Repeat this process for the other platform (for JV 210i only).

The equations used to determine the following parameters for a Method 1 & 2 (fixed weight) test are:

- Bulk Density = m/V_o
- Tapped Density = m/V_f
- Hausner Ratio = V_o/V_f
- Compressibility Index = $(V_o - V_f)/V_o \times 100$

Section 3.10.1 – Print & full reset

Press the 'Print' button to print a test report.

This will print a test report relevant to the selected platform.

Navigate between platforms using the left and right arrows to print out a test report relevant to the cylinder that is currently active (for JV 210i only).

Select the 'Calculation/Reset' button twice to begin a new test. Doing this will clear the total tap count and volumes entered and will reset the calculations for both cylinders (for JV 210i only).

Select the 'Back' button to return to the home screen.



Section 3.11 – Fixed Volume Test

The calculations screen shown below is available when operating the JV in either a Method 3 or Other (fixed volume) test method.

For these calculations, the volume is fixed but the weight of the powder changes.

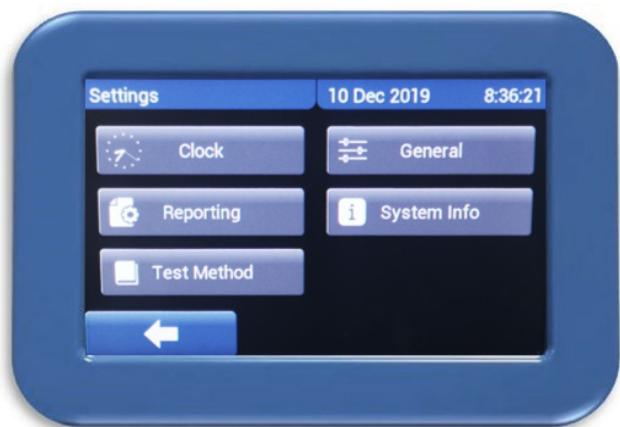


The equations used to determine the following parameters for a Method 3 (fixed volume) test are:

- Bulk Density = m_o/V
- Tapped Density = m_f/V
- Hausner Ratio = m_f/m_o
- Compressibility Index = $(m_f - m_o)/m_f \times 100$

Section 4. – Settings

Select the 'Settings' icon on the home screen to go to the settings menu.

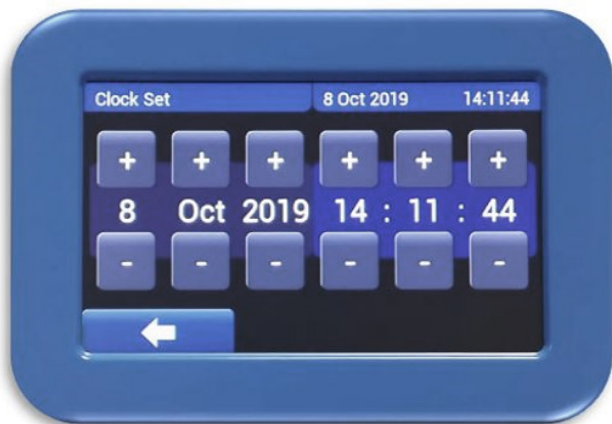


Section 4.1 – Clock

Select the 'Clock Settings' icon to change the date and time.

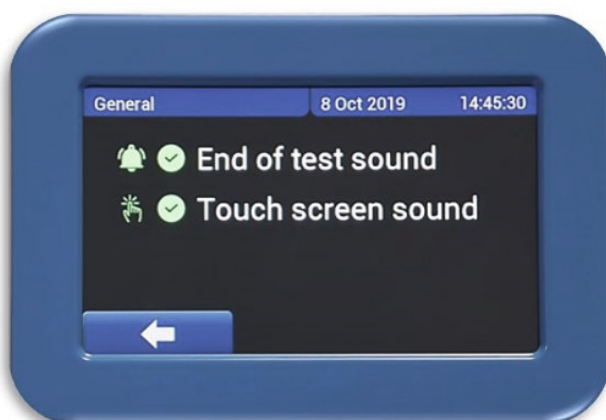


This screen is passcode protected, refer to "Section 16. – Passcode" on page 61.



Section 4.2 – General

Select this sub-menu option to enable/disable the end of run notification sound and the touch screen sound.



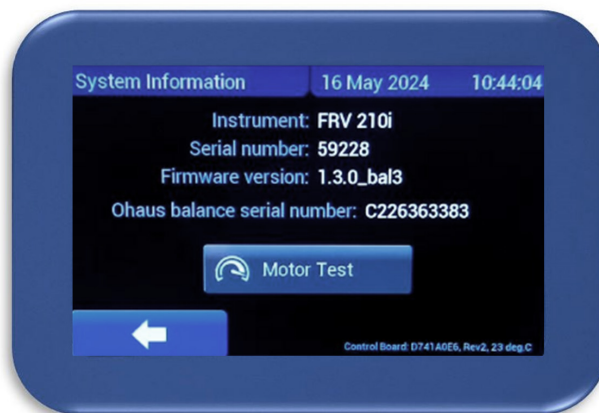
Section 4.3 – Reporting

Select this sub-menu option to enable/disable a report target.



Section 4.4 – System Information

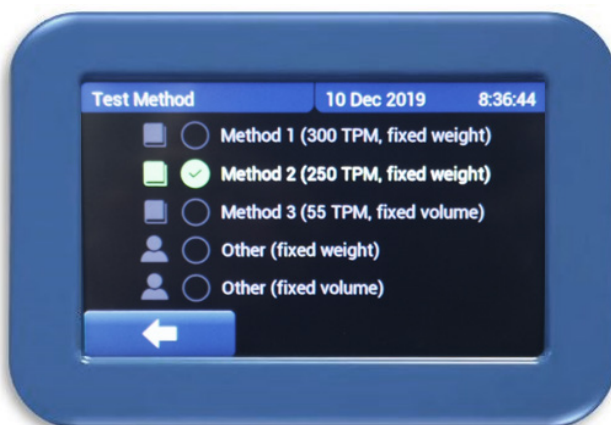
In this sub-menu option, the system information is presented along with access to diagnostic information on the motor.



Section 4.5 – Method Settings

Select this sub-menu option to change the test method. By default, the system will be set to the USP/Ph. Eur. Method 1, 2 or 3 depending on order preference.

- Method 1 - Locks the TPM at 300 and allows the fixed weight calculations to be performed
- Method 2 - Locks the TPM at 250 and allows the fixed weight calculations to be performed
- Method 3 - Locks the TPM at 55 and allows the fixed volume calculations to be performed
- Other (fixed weight) - Allows the user to set the test parameters manually and allows the fixed weight calculations to be performed
- Other (fixed volume) - Allows the user to set the test parameters manually and allows the fixed volume calculations to be performed





Section 5. – Verification

Section 5.1 – Verification of Test Duration

The accuracy of the test duration can be checked using a certified stopwatch.

Section 5.2 – Verification of Tap Frequency

To verify the tap frequency, count the number of taps per minute and compare it with the specification.

Alternatively, a certified tachometer can be used.

Section 5.3 – Verification of Drop Amplitude

The drop distance is factory set and cannot be easily measured without invalidating the warranty.

If you suspect the drop is not correct, then please contact your dealer.

Section 5.4 – Verification of Stroke Height

- Remove the measuring cylinder(s) from the instrument
- Remove any parts that were installed to reduce the noise of the instrument where they affect this measurement
- Fasten a fine propelling pencil (e.g. 0.5 mm) horizontally onto the support platform by means of adhesive tape
- Prepare the JV to run a test at 250 taps/min
- Press a small notebook (e.g. 'Post-it') in a vertical position against the tip of the lead pencil so that the paper will be marked and then start the JV
- Repeat the test several times to avoid faulty markings

Section 6. – Maintenance & Cleaning

Section 6.1 – Maintenance

Copley Scientific recommends carrying out regular protective earth checks on the JV and regular inspection of the mains lead.

No other maintenance tasks are required.

The cams and linear bearings inside the JV will be subjected to wear and may require replacing after a period of use.

Section 6.2 – Cleaning



Attention! - Disconnect the JV from the mains power supply before cleaning.

The enclosure and the display screen should be cleaned with a damp cloth, taking extra to ensure that no water enters the internal environment of the JV.

The cylinders can be cleaned with a mild solution of soapy water.



Attention! - Copley Scientific will accept no responsibility for any damage to the JV when using aggressive solvents without prior consultation.

Section 7. – Accessories

Section 7.1 – Configurations

Refer to the table below for all test method configurations.

Platform		Powder Container						
Drop Height	Mass	Measuring Cylinder						Stainless Steel Cup
		Small Volume Conversion				USP/Ph. Eur. Methods		
		5 mL	10 mL	25 mL	50 mL	100 mL	250 mL	100 mL
3 mm	240 g					Method 2		Method 3
3 mm	450 g						Method 2	Method 3
14 mm	240 g					Method 1		Method 3
14 mm	450 g						Method 1	Method 3

The JV is available in the following configurations:

- JV 110i - Method 1 - 250 mL Cylinder
- JV 110i - Method 2 - 250 mL Cylinder
- JV 110i - Method 3 - 3 mm Drop
- JV 210i - Method 2 - 250 mL Cylinder
- JV 210i - Method 3 - 3 mm Drop
- JV 210i - Method 3 - 14 mm Drop

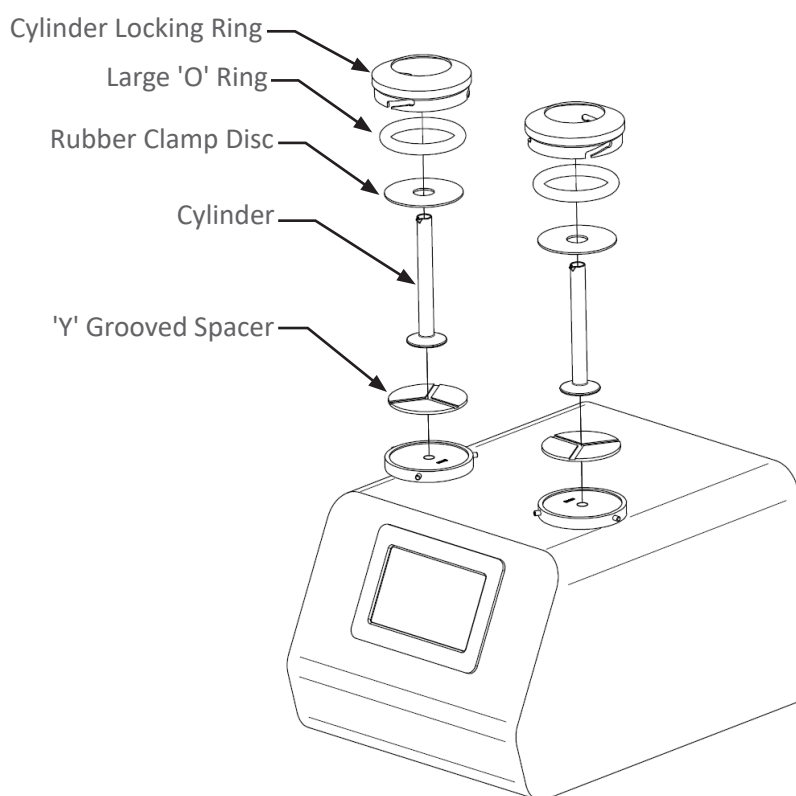
The JV 210i can be used to perform Method 1 or Method 3 (14 mm Drop) using one test station only.

The JV 110i and JV 210i are the same in every aspect except that the 110i model has only one cam and one bearing block.

Refer to "Section 7.5 – Platforms" on page 40 for illustrations on the different platforms available.

Section 7.1.1 – 5 mL & 10 mL cylinder assembly

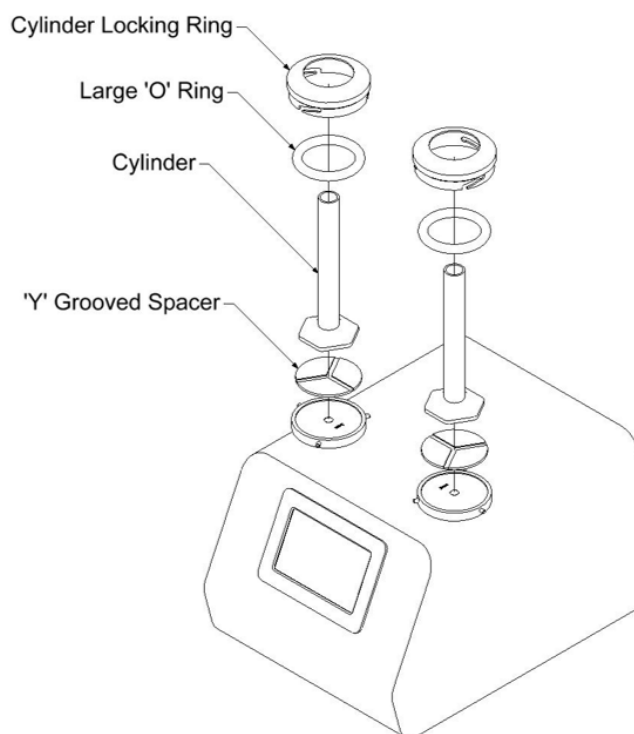
1. Fit the 'Y' grooved spacer disc (groove side facing upwards) onto the platform of the JV.
2. Place the cylinder onto the spacer disc so that the three raised 'feet', on the underside of the cylinder base, align with the grooves on the spacer disc.
3. Slide the rubber clamp disc down the length of the cylinder and position it at the base.
4. Slide the large O-ring down the length of the cylinder and position it on top of the rubber clamp disc.
5. Slide the locking ring down the length of the cylinder and over the large O-ring and rubber clamp disc.
6. Align the slots of the locking ring with the pins on the platform and twist until the cylinder is locked into position.



5 mL & 10 mL Cylinder Assembly

Section 7.1.2 – 25 mL & 50 mL cylinder assembly

1. Fit the 'Y' grooved spacer disc (groove side facing upwards) onto the platform of the JV*.
2. Place the cylinder onto the spacer disc so that three 'feet', on the underside of the cylinder base, align with the grooves on the spacer disc.
3. Slide the large O-ring down the length of the cylinder and position at the base.
4. Slide the locking ring down the length of the cylinder and over the large O-ring.
5. Align the slots of the locking ring with the pins on the platform and twist until the cylinder is locked into position.



25 mL & 50 mL Cylinder Assembly

**A 'Y' grooved spacer may not be required depending on the varying thickness of a 50 mL cylinder base.*

Section 7.2 – Noise-Reduction O-Rings

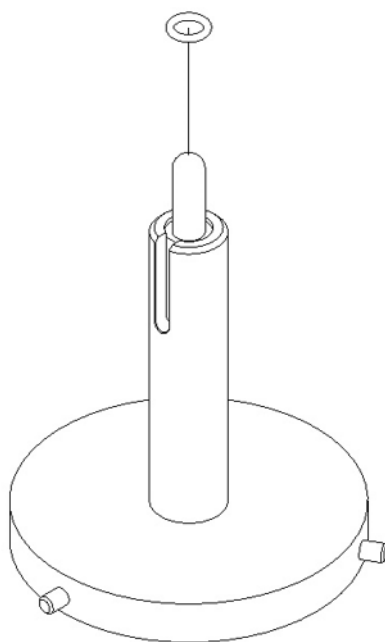
Small rubber O-rings are supplied with the JV for reducing the noise emissions produced whilst the equipment is in operation.

An O-ring can be fitted to the shaft of a platform, located at the groove of the shoulder.



This JV is not compliant with USP/Ph. Eur. test methods whilst these O-rings are fitted. However, it is recommended that method cross-validation be performed to verify acceptability for your specific product before the use of these O-rings is adopted.

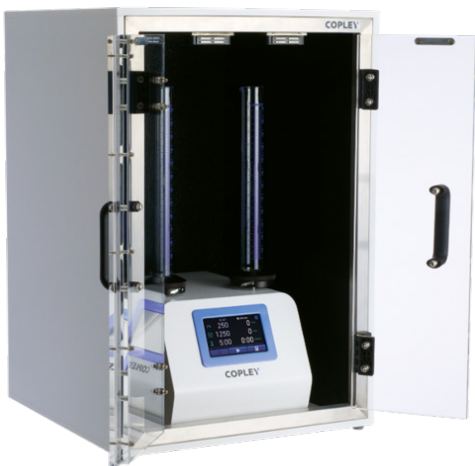
To remove the O-ring from the shaft of the platform, use a small flat-bladed screwdriver (or similar tool) and hook it out from the slot.



O-Ring Assembly

Section 7.3 – Acoustic Cabinet

A special acoustic cabinet is available on request as an optional extra which is capable of reducing the noise level of the JV below 80 dB(A).



Acoustic Cabinet

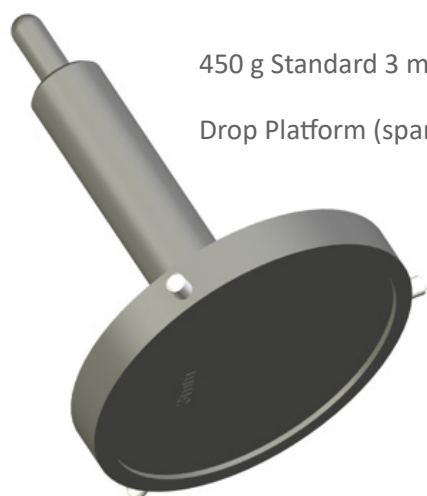
Main Unit w x d x h (mm)	480 x 500 x 710 (Height includes the 10 mm feet)
Mass (kg)	30

Section 7.4 – Stainless Steel Cup



100 mL Stainless Steel Cup (Method 3)

Section 7.5 – Platforms



450 g Standard 3 mm
Drop Platform (spare)



450 g Standard 14 mm
Drop Platform (spare)



240 g 100 mL Cylinder 3 mm
Drop Platform (optional)



240 g 100 mL Cylinder 14 mm
Drop Platform (optional)

Section 7.6 – Balance

A Kern Balance (Cat. No. 1664) for measuring and recording the mass difference is available as an optional extra. The user can connect this balance to the 'BALANCE' port on the rear panel of the JVi to automatically capture the reading on the weight screen. The Run Report will also indicate if the weight was entered manually or if it was entered using the balance.

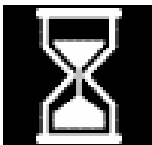
Note that on the run report, the user would need to manually write the details of the balance.



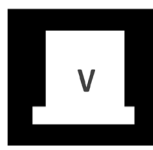
Kern Balance

For further details, please refer to the Copley website or contact your supplier.

Section 8. – Icons

Icon	Purpose	Command
	Speed / TPM	Sets the speed of taps per minute
	Tap Counter	Sets the number of taps
	Timer	Changes the test duration
	Run Test	Starts a run test
	Stop Test	This will stop the test
	Calculator	Opens the calculations page
	Settings	Opens the settings menu

Icon	Purpose	Command
	Set	Indicates the parameters that were set for test
	Actual	Indicates the current status during a test
	Print	Prints a test report
	Reset Test	Resets the JV to begin a new test
	Accept	Accepts the value entered
	Cancel	Cancels the value entered
	Delete	Deletes the last figure that was entered

Icon	Purpose	Command
	Back	Returns to the previous screen
	Weight	Select to enter a weight sample
	JV Left Platform	Shows information for the left platform
	JV Right Platform	Shows the information for the right platform
	Starting Volume	Select to enter starting volume
	Final Volume	Select to enter final volume
	Volume	Select to enter a volume sample

Icon	Purpose	Command
	Starting Weight	Select to enter starting weight
	Final Weight	Select to enter final weight
	Passcode Unlock	Indicates passcode unlocked
	Clock Settings	Opens clock settings menu
	Error!	Indicates an error warning on the display

Section 9. – Troubleshooting

Symptom	Possible Cause	Action
Printout not formatted correctly	Using a non-compatible printer	Check that a compatible printer is being used
Printout didn't finish	Initiated a printout whilst already printing	Wait for the highlighted print icon to clear then select again
Report not coming out on PC/RS-232 connection	Poor connection	Check connection and PC communication setting
Clock is wrong	Internal battery flat	Contact supplier to arrange to have the internal battery changed
Counter or timer values change	The system will always calculate to the full taps against the timer	Refer to the information notifications, Section 3.6
Touchscreen calibration shown when turned on	Internal memory has become corrupted	Contact Copley for details
No beep at the end of test	End of test beep turned off	See Settings menu: General, Section 4.2
Motor overload warning screen shown on display	Motor control electronics have overheated	Allow JV to cool down to ambient temperature then try running again. If problem persists, contact Copley
Cannot change speed Calculations are wrong	Method 1, 2 or 3 is selected in the 'Method Settings' screen	Select the correct test method, Section 4.5

Section 10. – Specification

Section 10.1 – Electrical

Model:	JV 110i	JV 210i
Mains Supply	100 V to 240 V, 50/60 Hz	
Isolation Classification	Class I - MUST BE EARTHED	
Power Consumption	Less than 75 W	
Fuse	2 x 2 A (Type T)	

Section 10.2 – Physical Properties

Model:	JV 110i	JV 210i
Main Unit (without cylinders & platforms) w x d x h (mm)	260 x 347 x 220	
Main Unit (with cylinders & platforms) w x d x h (mm)	260 x 347 x 562	
Mass (kg)	12	13
Max Noise Level @ 1 m	88.5 dB(A) 300 TPM, 14 mm drop, 250 mL Cylinder	84.6 dB(A) 60 TPM, 14 mm drop, 2 x Method III Cups
Max Sound Power Level	96.5 dB(A)	92.6 dB(A)

Section 10.3 – Environment

Model:	JV 110i	JV 210i
Operating Temperature	15 °C to 30 °C	
Relative Humidity	10 % to 85 % (non-condensing)	
Waterproof Rating	Not Waterproof	

Section 10.4 – Performance

Model:	JV 110i	JV 210i
Tap Rotation	50 TPM to 300 TPM	
Tap Range	10 to 300,000	
Resolution	1 TPM	
Accuracy	± 5 TPM	
Duration Range	0 to 99 H: 59 M: 59 S	
Duration Accuracy	± 1 S or ± 1 % (whichever is greater)	

The JV 110i and JV 210i are designed for intermittent use for performing the USP/Ph. Eur. test methods. Continuous use may cause the JV to overheat, in which case the JV will shut down as a protective measure.

If this occurs, allow the JV to cool down before restarting a test run.

The JV calculation results have a ± 1 indeterminacy of the last digit. This is due to the internal number representation within the firmware.

Section 11. – External Connection Specification

Additional devices can be connected to the JV to enable certain functions. All of the following connections are optional.



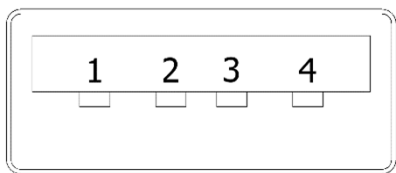
All cables that connect to the JV must be less than 3 m long.

Section 11.1 – 'PRINTER'

Compatible USB printers can be connected to the JV using the USB Type-A connector on the rear panel of the unit. Limited models of the following printer types are compatible with this device.

- Hewlett Packard (HP) Office-jet ink-jet (USB)
- Epson WorkForce (USB)

Please contact Copley Scientific to check which specific models are compatible.

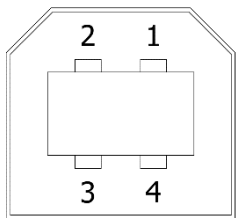


Pin	Function	Level	Description
1	VBUS	5 V	USB Power
2	D-	0 V to 5 V	USB Data-
3	D+	0 V to 5 V	USB Data+
4	GND	0 V	Signal Ground

Section 11.2 – 'PC'

This enables the JV to communicate with a host PC for the following functions via the USB Type-B connector on the rear panel:

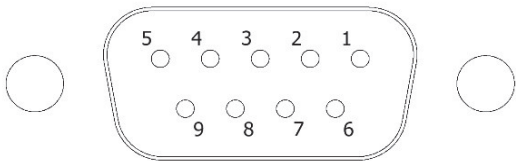
- Report data can be transmitted to a PC for data recording purposes
- The PC can be used to initiate the commands stated in Section 11.5.1



Pin	Function	Level	Description
1	VBUS	5 V	USB Power
2	D-	0 V to 5 V	USB Data-
3	D+	0 V to 5 V	USB Data+
4	GND	0 V	Signal Ground

Section 11.3 – 'RS-232'

The RS-232 enables the JV to communicate with a host PC or external system.

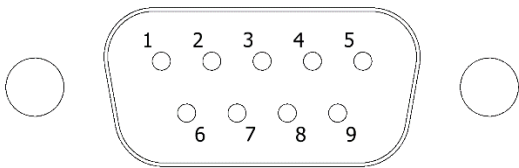


Pin	Function	Level	Description
1	N/C	N/C	Not Connected
2	RS-232 Tx	- 15 V to + 15 V	RS-232 Transmit
3	RS-232 Rx	- 15 V to + 15 V	RS-232 Receive
4	N/C	N/C	Not Connected
5	GND	0 V	Signal Ground
6	N/C	N/C	Not Connected
7	N/C	N/C	Not Connected
8	N/C	N/C	Not Connected
9	N/C	N/C	Not Connected

Section 11.4 – 'BALANCE'

A compatible Balance can be connected to the JVi using the Balance connector on the rear of the unit. The following model is compatible with this device.

- Kern



Pin	Function	Level	Description
1	N/C	N/C	Not connected
2	RS-232 Rx	- 15 V to + 15 V	RS-232 Receive
3	RS-232 Tx	- 15 V to + 15 V	RS-232 Transmit
4	N/C	N/C	Not Connected
5	GND	0 V	Signal Ground
6	N/C	N/C	Not Connected
7	N/C	N/C	Not Connected
8	N/C	N/C	Not Connected
9	N/C	N/C	Not Connected

Section 11.5 – Setting-up USB Communications with PC & RS-232

1. Connect the JV to a USB socket on the PC using a screened USB-A to USB-B cable, a USB to RS-232 adapter may be required for the RS-232.
2. Wait for the PC to install the drivers automatically. If the PC does not install the drivers automatically, please contact Copley Scientific for details on how the drivers can be installed manually.
3. On the PC, go to '*Devices and Printers*'.
4. The JV will appear as a device name '*FT232R USB UART*' or '*USB Serial Port*'.
5. Double-click on the icon.
6. Go to the '*Hardware*' tab.
7. Note the COM port number which should appear as '*COM3*' for example.



The COM port number may change when the connection is lost e.g. if the PC is turned off and on again, or if the JV is turned off and on again, or if the USB cable is unplugged and plugged in again.

8. Open a terminal emulation program, such as Hyper-terminal. Contact Copley Scientific for details of alternative emulation programs.

9. In the terminal emulation program, set up a connection using the following settings:

USB Communication Settings	
Baud rate	PC (USB): 19200 bps, RS-232: 9,600 bps
Data bits	8
Stop bits	1
Parity	None
Flow control	None
Data output format	ASCII
Transmitted text	Append CR & LF

10. When the USB communication has been set up, set the JV to output data to a PC (see "Section 4.3 – Reporting" on page 30).

11. Reports will now be sent to the PC and should appear in the terminal emulation program window.



Commands are not case sensitive.
Commands must end in CR or LF (or both).
All responses end with a CR.

Section 11.5.1 – Command set

Command	Action
C	Show the cycle count actual value
CS	Show the cycle count set value
CS n	Set the cycle count n (taps)
DATE	Show the clock date & time
D	Show the test duration actual value (seconds)
DS	Show the test duration set value (seconds)
DS n	Set the test duration start value to n (seconds)
H	Show short list of available commands
MODEL	Show this instrument model
PR	Print test report (JV 110i)
PR1	Print the left-hand platform test report (JV 210i)
PR2	Print the right-hand platform test report (JV 210i)
REMOTE ON	Lock the touch screen
REMOTE OFF	Unlock the touch screen
REMOTE	Show remote status
RPM?	Show the actual speed (integer TPM)
RPM n	Set the speed to n (integer TPM)
S	Show the actual speed (TPM)
SS	Show the set speed (TPM)
SS n	Set the speed to n (TPM)
SN	Show the machine serial number
START	Start a test
STOP	Stop/cancel test
TRESET	Test reset
TSCAL code	Touch screen calibration
V	Show firmware version



Section 12. – Test Report

Copley Scientific Tapped Density Tester Report
Test started: 15 May 2024, 10:30:47

Instrument model: JV 210i
Serial number: 12345
Platform: Right -->
Calculation type: Fixed weight

Balance Connected:
Balance Ser. Num.:

Set Speed (taps per minute): 300
Total Taps: 10

Weights (g)
Sample weight, W: 29.64

Volumes (mL)
Initial Volume, Vo: 100.0
Final Volume, Vf: 69.5

Calculations
Bulk Density (g/mL): 0.296
Tapped Density (g/mL): 0.426
Haunser Ratio: 1.439
Compress. Index (%): 30.50

Notes
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.....
.....

Performed by Signature

Position Date

Checked by Signature

Position Date



Section 13. – Conformance

Section 13.1 – Pharmacopoeia Declaration of Conformity

Copley Scientific Limited
Colwick Quays Business Park
Private Road No. 2, Colwick
Nottingham NG4 2JY
United Kingdom

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Email: sales@copleyscientific.co.uk
Web: www.copleyscientific.com
Company No.: 1390012

DECLARATION OF CONFORMITY

We, Copley Scientific Limited, at the above address declare that the instrument described below, with regards to conception, construction, and execution of bringing to market by us, conforms with the relevant pharmacopoeia requirements stated below:

Description of the Instrument:	Tapped Density Tester	
Model (Catalogue Number):	JV 110i (Cat. No. 1661)	JV 210i (Cat. No. 1662)
Serial Number:	55,700 to 80,000	
Followed Pharmacopoeia Requirements:	United States Pharmacopoeia Section <616> Tapped Bulk Density (Method 1, 2, 3) European Pharmacopoeia Section 2.9.34 Bulk Density & Tapped Density of Powders (Method 1, 2, 3)	

This declaration will become invalid if alterations are made to the instrument described above without authorisation of the manufacturer.

Signed for and on behalf of the manufacturer:

Signatory:	Jamie Clayton
Position of Signatory:	Director
Date:	15 th May 2024
Signature:	

Section 13.2 – UKCA Declaration of Conformity

COPLEY	Copley Scientific Limited	Tel:	+44 (0)115 961 6229
	Colwick Quays Business Park	Fax:	+44 (0)115 961 7637
	Private Road No. 2, Colwick	Email:	sales@copleyscientific.co.uk
	Nottingham NG4 2JY	Web:	www.copleyscientific.com
	United Kingdom	Company No.:	1390012

DECLARATION OF CONFORMITY

Document Number: Form 118-1661 UKCA DoC - JV Rev 30

We, Copley Scientific Limited, at the above address declare under our sole responsibility that the product(s) detailed below complies with the essential requirements of the following UK regulation(s) and their amendments:

- Supply of Machinery (Safety) Regulations 2008
- Electromagnetic Compatibility Regulations 2016
- RoHS Regulations 2012

Equipment Description:	Tapped Density Tester (Jolting Volumeter)	
Make/Brand:	Copley Scientific Ltd	
Model (Catalogue Number):	JV 110i (Cat. No. 1661)	JV 210i (Cat. No. 1662)
Serial Number:	55,700 to 80,000	

Compliance of the equipment has been demonstrated by assessment against the essential requirements of the UK regulations and the following UK designated standards:

- EN 61010-1:2010 + A1: 2019 Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements
- EN ISO 12100:2010 Safety of machinery - General principles for design - Risk assessment and risk reduction
- EN 61326-1:2013 Electrical equipment for measurement, control, and laboratory use - EMC requirements - Part 1: General requirements
- EN 63000:2018 Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

A technical file for this equipment is retained at the above address, by the signatory.

Signed for and on behalf of the manufacturer:	
Signatory:	Jamie Clayton
Position of Signatory:	Director
Date:	15 th May 2024
Signature:	





Section 13.3 – CE Declaration of Conformity

Copley Scientific Limited
Colwick Quays Business Park
Private Road No. 2, Colwick
Nottingham NG4 2JY
United Kingdom

EU Authorised Representative:
Authorised Representative Service
77 Camden Street Lower
Dublin, D02 XE80, Ireland

Tel: +44 (0)115 961 6229
Fax: +44 (0)115 961 7637
Email: sales@copleyscientific.co.uk
Web: www.copleyscientific.com

EU DECLARATION OF CONFORMITY

Document Number: Form 65-1661 CE DoC - JV Rev 30

We, Copley Scientific Limited, at the above address declare under our sole responsibility that the product(s) detailed below complies with the essential requirements of the following EU directive(s):

- Machinery Directive 2006/42/EC
- Electromagnetic Compatibility Directive 2014/30/EU
- RoHS Directive 2011/65/EU

Equipment Description:	Tapped Density Tester (Jolting Volumeter)	
Make/Brand:	Copley Scientific Ltd	
Model (Catalogue Number):	JV 110i (Cat. No. 1661)	JV 210i (Cat. No. 1662)
Serial Number:	55,700 to 80,000	

Compliance of the equipment has been demonstrated by assessment with reference to the following harmonised European standards:

- EN 61010-1:2010 + A1: 2019 Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements
- EN ISO 12100:2010 Safety of machinery - General principles for design - Risk assessment and risk reduction
- EN 61326-1:2013 Electrical equipment for measurement, control, and laboratory use - EMC requirements - Part 1: General requirements
- EN 63000:2018 Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

A technical file for this equipment is compiled and retained by Copley Scientific Ltd at the address above and is available through Authorised Representative Service at the address above.

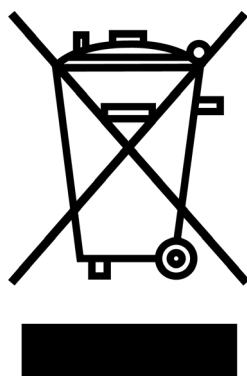
Signed for and on behalf of the manufacturer:

Signatory:	Jamie Clayton
Position of Signatory:	Director
Date:	15 th May 2024
Signature:	

Section 14. – Decommissioning, Dismantling, Disabling, & Scrapping

Electrical and Electronic Equipment (EEE) contains materials, components, and substances that may be hazardous. This can present a risk to human health and the environment when this waste is not handled correctly.

Equipment marked with the crossed-out wheeled bin symbol indicates that waste of electrical and electronic equipment should not be discarded together with unseparated municipal waste, but must be collected separately. As a consumer, you have an important role in recycling this equipment and contributing to the protection of the environment.



Copley Scientific is registered as a WEEE Producer with the UK Environment Agency and our WEE registration number is: WEEE/CKO300UX.

Copley Scientific meets its obligations to the WEEE Directive in the UK through membership of a Government Approved Producer Compliance Scheme and by providing its customers with a Recycling Program for end-of-life products.

Section 16. – Passcode



The passcode access will remain unlocked until you return to the home screen, this is indicated by the padlock symbol shown at the top of the display.

Set time and date menu:

479165



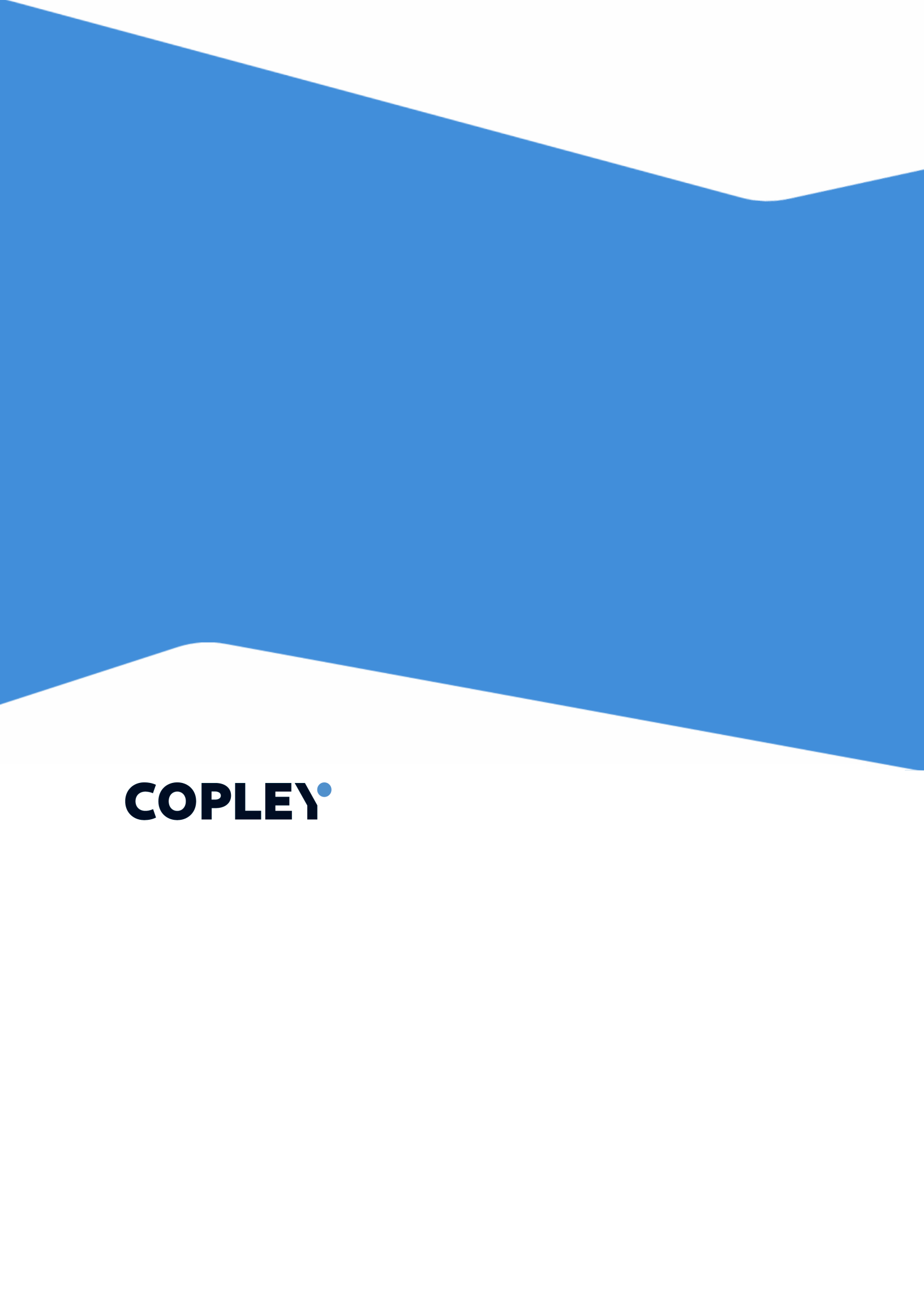
If desired, remove this page to restrict access to the 'Set date & time' menu.



NOTES



NOTES



COPLEY