

NDT

JAMES INSTRUMENTS
Non Destructive Test Equipment



Z-WP-1000 **Windsor® Probe System** Operator's Manual

Original Instructions: Revision July 2018

Notice



The James® Instruments Windsor® Probe System has been tested in accordance with the EU regulations governing Electro-Magnetic compliance and it meets required directives.

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We: James Instruments Inc.

Of: Chicago, IL

In accordance with the following Directive(s):

2006/42/EC	The Machinery Directive
2006/95/EC	Low Voltage Directive

hereby declare that:

Equipment	Windsor® Probe System
Model Number	Z-WP-1000

is in conformity with the applicable requirements of the following documents.

<u>Ref. No.</u>	<u>Title</u>	<u>Edition/date</u>
ASTM C803-03	Standard Test Method for Penetration Resistance of Hardened Concrete.	2016
EN 61000-6-3	Electromagnetic compatibility (EMC). Generic standards. Emission standard for residential, commercial and light-industrial environments	2007
EN 61000-6-2	Electromagnetic Compatibility (EMC) Part 6-2: Generic Standards—Immunity for Industrial Environments	1999
ANSI A10-3	Powder Actuated Fastening Systems.	1995
BS 1881-207	Testing concrete. Recommendations for the assessment of concrete strength by near-to-surface tests.	1992
ACI 347	Recommended Practice for Concrete Formwork.	1978

I hereby declare that the equipment named above has been designed to comply with the relevant sections of the above referenced specifications. The unit complies with all applicable Essential Requirements of the Directives.

Signed:

A handwritten signature in black ink, appearing to read "Michael W. Hoag". The signature is written in a cursive style with a large, looping final flourish.

Name: Michael Hoag

Position: President, James Instruments Inc.

Location: Chicago, IL

On: 7/6/2018

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Introduction

The Windsor® Probe System is designed to evaluate the compressive strength of concrete. The system rapidly and accurately determines the concrete compressive strength of a structure by driving a probe into the concrete with a known amount of force; the shallower the depth of probe penetration, the stronger the concrete.

Improved and enhanced over 30 years, the system measures concrete in a simple and effective manner. It has rugged assembly for use in the construction environment and is designed to provide the end user with a simple, straightforward answer.

This system has widespread uses in testing concrete in-situ, on conventionally placed, sprayed or pre-cast concrete; on horizontal or vertical slabs; on floors or overhead; or on fresh or mature concrete. It is equally accurate at obtained results on horizontal or vertical surfaces provided that the probe is perpendicular or at right angles to the test surface.

The system is safe to use. The driver cannot be discharged unless it is fully depressed with some force against the actuating template that rests against the surface being tested.

The Windsor® Probe test has been approved by federal, state, and municipal agencies as well as several foreign countries.

Applications (Intended Use)

- Measures the compressive strength of concrete accurately and effectively
- Monitors the strength for rehabilitation as concrete ages
- Determines the developing strength of concrete
- Measure Compressive Strength of concrete above 525 psi (3.62 MPa)

Features

- New electronic measuring system enhances accuracy and efficiency
- Non-destructive and can be used with equal effectiveness on fresh and mature concrete
- Measurement to 17,000 psi (110 MPa)
- Memory for data storage and uploading to PC
- Safe and reliable
- Does not allow for accidental discharge (even when dropped) and does not have recoil
- Approved by municipalities in the United States, Asia, and Europe, this system conforms to ASTM C-803, BS 1881 Part 207, ANSI A.10-3 ACI 347-78 and other testing standards.

Instrument Contents List

Each James® Instruments Windsor® Probe System comes with the following items included in the carrying case.



Figure 1a: Windsor® Probe System Contents

Contents List

- | Item # | Definition |
|--------|---|
| 1 | Barrel Brush/Rod – Used to clean contaminants out of the barrel after firing and to position test probes to Low Power position. |
| 2 | Power Driver – Used to drive the steel probe into the surface of the concrete. |
| 3 | Withdrawal Kit – Used to withdraw the probe from the concrete surface. |
| 4 | (3) Single Probe Measuring Plates – Used to place over the probe and against the concrete to take an electronic depth reading. |
| 5 | Electronic Measuring Unit – Used to electronically measure exposed probe length, correlate this reading with an appropriate compressive strength value and store the values for later use. |
| 6 | (2) Single Probe Firing Templates – Used to place the power driver on to fire probe into concrete. |
| 7 | (2) Driver Heads – Used to screw onto the threaded end of the probe prior to firing. |
| 8 | (3) Single Probe Measuring Caps – Replaces driver head on fired probes and used to take measurements of depth penetration. |
| 9 | Checklist – Checklist of items completed by a James [®] Instruments Inc. technician prior to packaging the unit. |
| 10 | Calibration Certificate – Certificate to confirm that the instrument has been calibrated to meet or exceed published specifications. |
| 11 | (2) AA Batteries – Used to power the Electronic Measuring Unit. |
| 12 | Case – Used to carry Windsor [®] Probe equipment and accessories. |

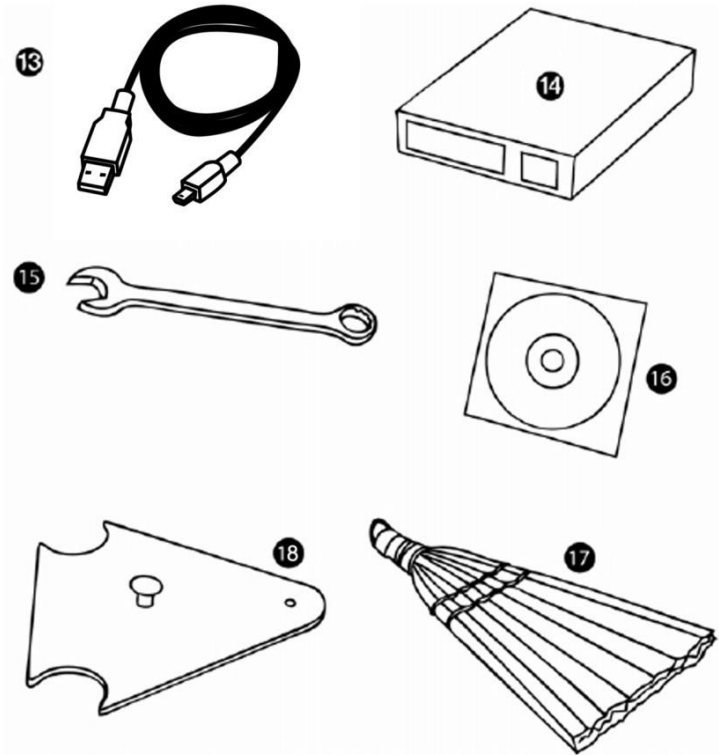


Figure 1b: Windsor® Probe System Contents

Item # Definition

- 13 USB Cord** – Serial cord used to connect the Windsor® Probe to a PC to upload data.
- 14 Mohs' Test Kit** – Used to determine the Mohs' value of any aggregate (Scale of Hardness).
- 15 Wrench** – Used with the withdrawal kit to extract the steel probe from the concrete after firing.
- 16 CD Disk** – Contains system upload program.
- 17 Whisk Broom** – Used to clean the surface after driving probes.
- 18 Three-Probe Template** – Used to place or hang over the first probe to determine the location of the placement of additional probes. This ensures that any subsequent probes are far enough apart from the initial probe; so that if a weakness is created due to the initial probe it won't affect the reading of the subsequent fired probes.

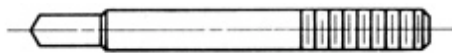
Probes

Used with a precise charge, probes are fired into a concrete surface to measure the amount of penetration. This penetration amount is then used to determine the compressive strength of the concrete. Two probe styles are available: one for lightweight, low density concrete with air filled aggregate and the other probe for more standard mix designs. Also, two standard power settings facilitate testing fresh concrete as well as mature mixes.

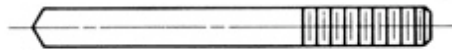
Two power settings are available: low and standard power. The low power is used where concrete strength is less than 3,000 psi (19.4 MPa). The newly designed Silver probes can be used for high performance concrete with strength up to 17,000 psi (110 MPa). The probes are made of a high strength steel alloy, heat treated and annealed to achieve a hardness of Rockwell C 48. Special machining of each probe eliminates stress concentrations.

The Gold probe has a 56% greater cross-sectional area than the Silver probe. The Gold probe is recommended for lightweight concrete - less than 125 lbs/cu. ft. (2,003 Kg/M3) in density. The Silver probe is used with concrete having a density greater than 125 lbs/cu. ft. (2,003 Kg/M3).

Probes are consumable items and can be used one time only. For additional probes, please contact NDT James® Instruments.



PRS-01 : SILVER



PRS-03 : GOLD

Figure 2: Probe Types

Mohs' Test Kit

In order to obtain accurate results with this test system, it is necessary to know the hardness of the coarse aggregate, as expressed in "Mohs." The Mohs' system is a universally accepted system for classifying minerals by hardness with numbers from 1 to 10.

On most jobs where you will be testing new concrete, the ready-mix supplier should be able to give you this information in advance because the aggregate is usually specified in the mix design. In situations where the Mohs' value is not known, it can be determined by following the procedure.

Scratch Testing

When planning to test newly placed concrete, it is best to obtain aggregate samples directly from the mix when it is delivered to the job site. If this is not possible, and when evaluating old concrete, it is necessary to locate a piece of exposed aggregate, or to expose one if none is showing. Then, use the kit with nine numbered minerals to determine the Mohs' value of any aggregate.

► To perform a Mohs' test:

1. Start with #9 and scratch the aggregate.
2. If the scratch will not rub off, scratch the aggregate with #8.
3. Continue this way until the scratch rubs off.

The number on the stone that will not scratch the aggregate is the Mohs' value of the aggregate.

Power Driver Overview

The power driver is a .32 caliber Smith and Wesson blank cartridge. Upon the firing pin striking the cartridge, the resulting temperature and pressure increase forces the probe out at a high velocity.

The following is an overview of all of the external features of the Windsor® Probe Power Driver.

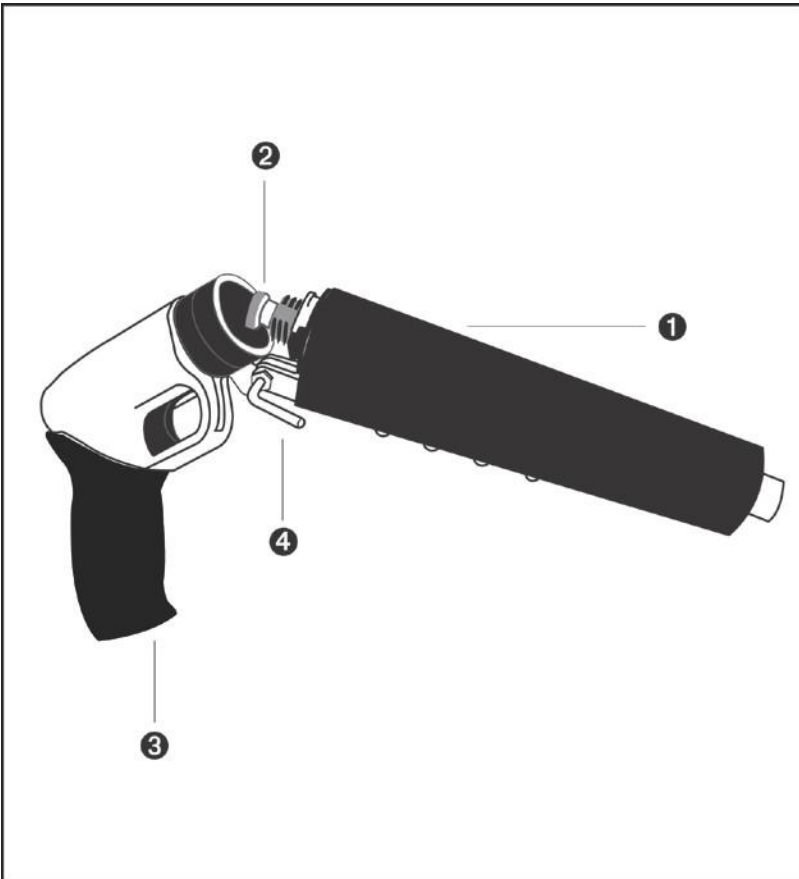


Figure 3: Windsor® Probe System Overview

Instrument Functions

Item # Definition

- 1 Barrel** – Used to hold the probe, driver head, breech plug and power load.
- 2 Breech Plug** – Used to hold the power load in the breech.
- 3 Handle** – Used to hold and driver while firing and houses the trigger to fire the probe.
- 4 Charge Extraction Tool** – Used to remove the charge from the breech.

Loading the Driver

For all concrete made with natural aggregate, load the driver with a silver probe. With lightweight concrete made with synthetic aggregate, use the gold probes. Probes and loads are provided in groups of three. Each probe package has a serial number, which allows traceability of components to manufacturer's testing of every batch. This serial number is a verification of test component accuracy.

► To open and load the driver

1. Grasp the handle with one hand and the barrel with the other. Twist the barrel clockwise to unlock the barrel.

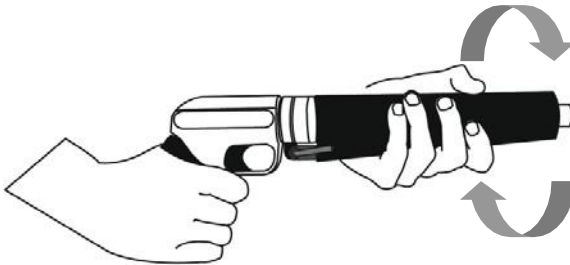


Figure 4: Unlocking the Barrel

2. Pull the barrel away from the handle and fold the barrel down.

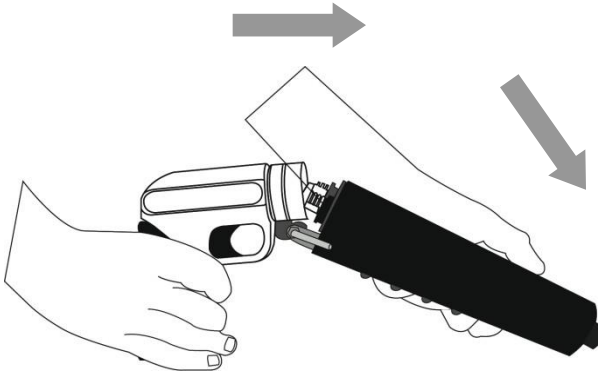


Figure 5: Removing the Barrel

3. Remove the breech plug and set it aside.

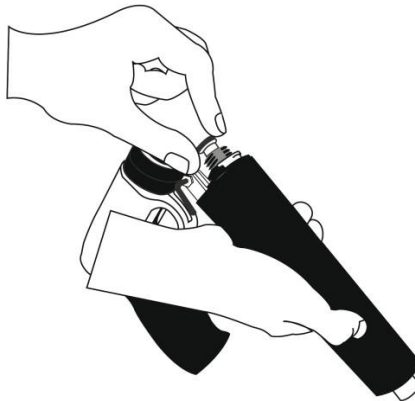


Figure 6: Removing the Breech Plug

4. Prepare the test probe by screwing the driver head onto the threaded end of the probe. Continue until it bottoms out and cannot thread on anymore.

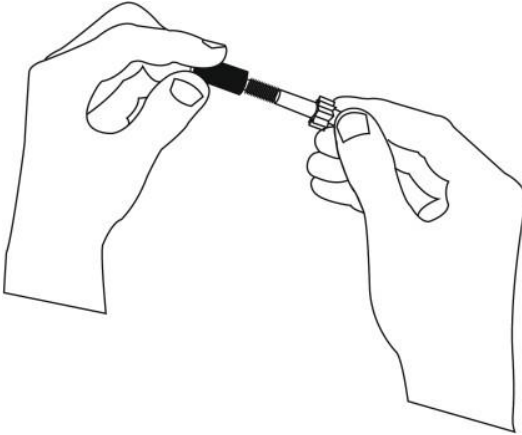


Figure 7: Prepare the Test Probe

5. Load the probe into the barrel by grasping the driver head and with a twisting motion, insert the probe into the breech-end of the driver barrel until it sits flush with the breech.

NOTE: Do not remove the rubber flange on the probe. This prevents the probe from falling out of the breech.

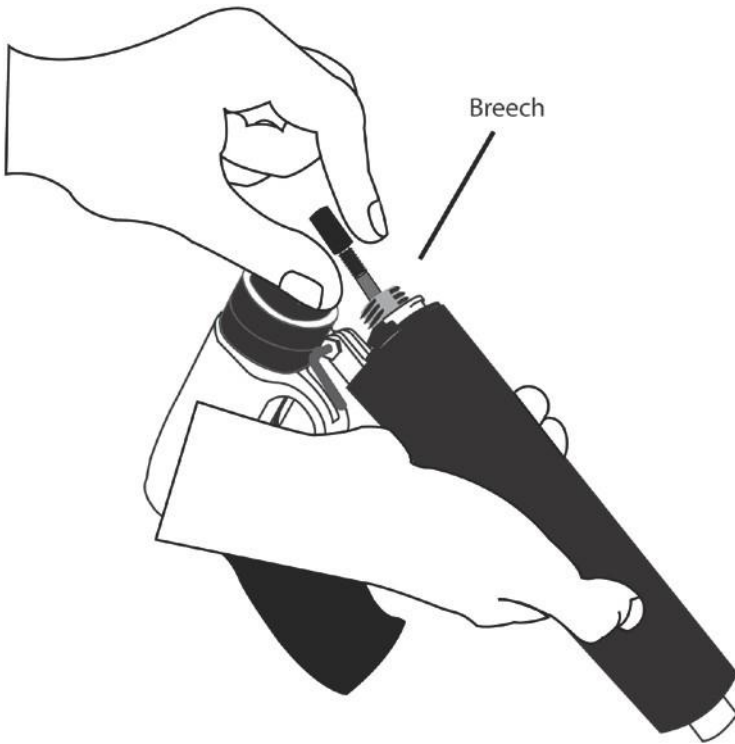


Figure 8: Loading the Probe into the Barrel

6. Reinsert the breech plug so that it sits flush with the breech surface.

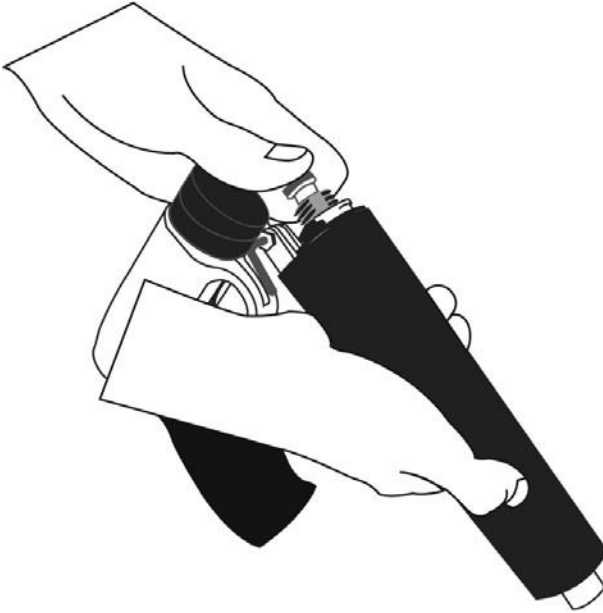


Figure 9: Reinserting the Breech Plug

7. Determine which power level is required for the test—Standard or Low Power (see p. 16).
8. Insert the .32 S&W power load into the breech plug.

9. Fold the barrel up toward the handle and pull the two together. Twist counterclockwise to close the barrel.

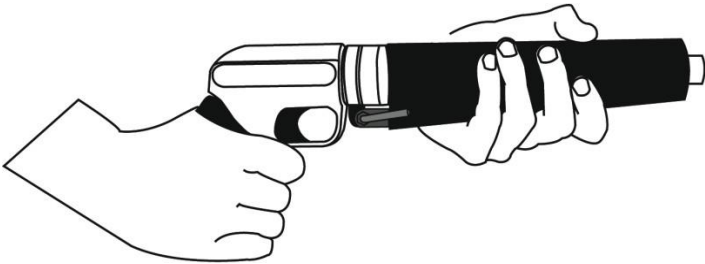


Figure 10: Closing and Locking the Barrel

At this point **do not touch the trigger**. The driver is prepared to fire. *Always* keep the driver pointed in a safe direction.

As an added safety, the driver can only be fired when pressed firmly against the single probe firing template (item 6 on p. 3). When firing, make sure everyone but the operator is clear of the danger zone. The danger zone is defined as any zone within and/or around the test area in which a person is subject to a risk to his health or safety.

Selecting Power Level

Always use low power for the first test. If the probe is not firmly embedded in the concrete, change to Standard Power. To obtain **Low Power**, push the driver head and probe 2.5 inches into the barrel (breech plug in place), using the barrel brush handle. The brush handle is specifically tapered to allow the user to push the driver head exactly 2.5 inches into the barrel ***through the breech plug***. (Add the power load into the breech plug before firing.)

For **Standard Power** the driver head and probe is pushed into the barrel, and followed by the breech plug and power load.



Figure 11: Selecting the Power Level

Always use the low power range for testing concrete less than 28 days after placement or until the concrete has cured sufficiently to cause loose probes (approximately 3800 to 4500 psi). If the probes are not firmly embedded, change to Standard Power.

Warning! If the driver ever fails to fire, hold firmly against template for 30 seconds, then remove the driver from the template, keep pointed in a safe direction, open driver and remove the power load.

Driving Probes

Individual probes, or the averages of only two probes, may not yield results that accurately reflect the true strength of the concrete. One is an indication, two a comparison, and three a statistically significant result. This is also true of cores, cylinders, or any quality control system.

Flat Surfaces

Place the single probe-locating template on concrete and drive probe. Place the three-probe template over the first probe. Position single probe-locating template in cut-away for the next two probes.

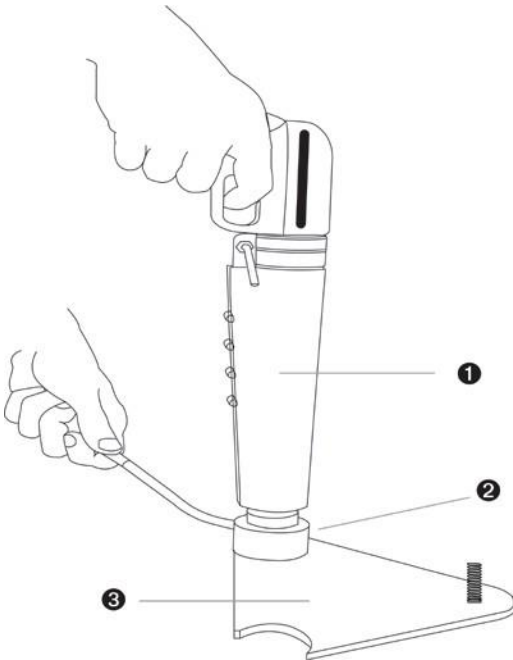


Figure 12: Preparing to Fire the Probe

Warning! It is critical that you fire with the power driver perpendicular to the surface in order to get a good reading. Firing at an angle can damage the actuating template. Also, be sure to wait at least 3 minutes between shots, to allow the driver to cool down.

Item #	Definition
1	Power Driver
2	Single Probe Locating Template
3	Three Probe Template

Vertical Surfaces

Once the first probe has been placed, the template will hang from embedded probe while the driver assembly is reloaded.

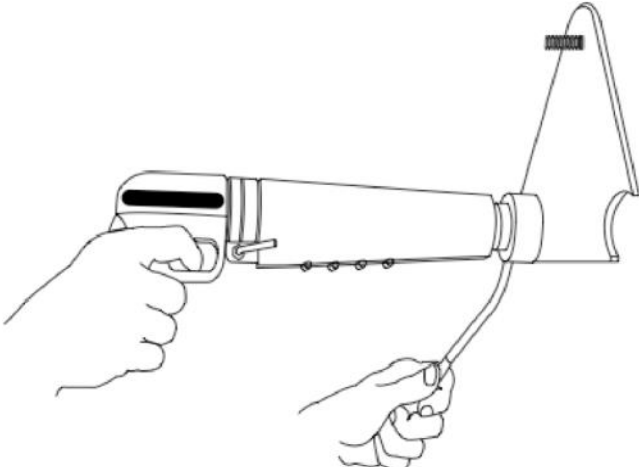


Figure 13: Preparing to Fire the Probe on Vertical Surfaces

Curved Surfaces

Use the single probe-locating template; place on concrete and drive three probes individually. Probes must be set in groups of three. No probe shall be located less than 7 inches (175 mm) from any other probe, nor less than 4 inches (100 mm) from the edge of a concrete surface. (ASTM C-803/C803M-03, Sect.8.1.1) (2010)

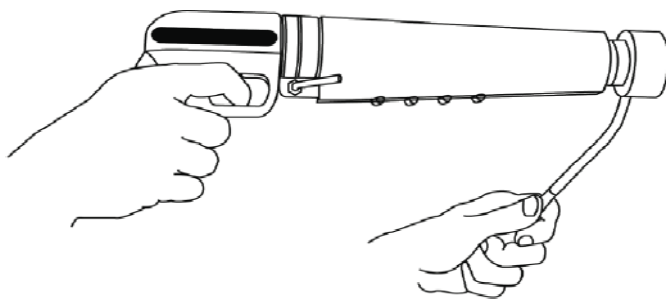


Figure 14: Firing the Probe on Curved Surfaces

Electronic Measuring Unit Overview

The following is an overview of all of the external features of the Windsor® Probe Electronic Measuring Units.

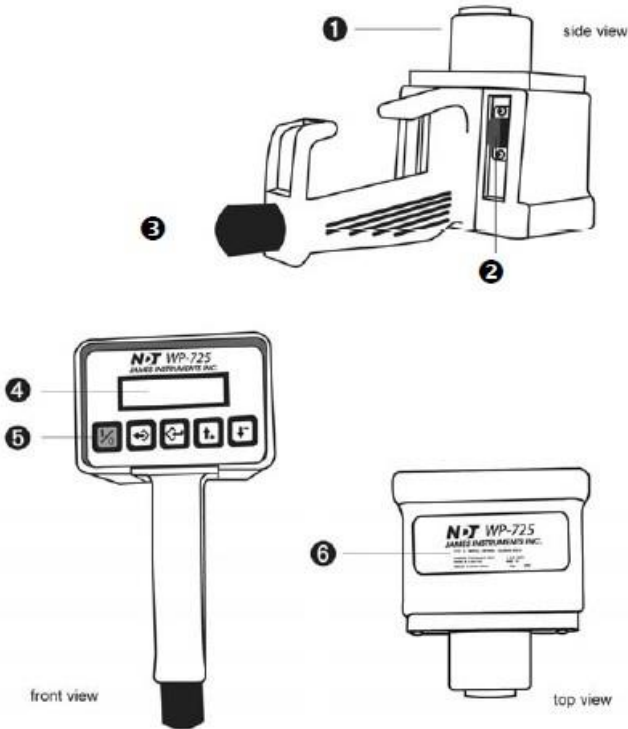


Figure 15: Windsor® Probe System Overview

Instrument Functions

Item #	Definition
--------	------------

- | | |
|---|--|
| 1 | Sensor bushing. |
| 2 | Connects to the USB port location to upload data onto your PC. |
| 3 | 2 AA battery location; unscrew open to replace. |
| 4 | Windsor® Probe display screen. |
| 5 | Windsor® Probe control panel. |
| 6 | Displays meter name, model number, and serial number. |

Determining Results

Determining results can be done manually with the optional depth gauge or automatically with the WP-725 electronic measuring unit.

► **To determine penetration depth:**

1. Remove any probe locating template and brush the surface clean with the provided whisk broom.
2. Lightly tap the probes with a hammer to make sure they are seated in their holes.
3. Remove the driver head.

4. Place a single probe measuring plate over the probe and flat against the concrete surface.



Figure 16: Leveling the Measuring Plate with the Concrete Surface

5. Thread a measuring cap on top of the probe.



Figure 17: Threading the Measure Cap

6. Push the WP-725 over the end of the cap until the bushing touches the bottom gauge plate.



Figure 18: Placing the Measuring Micrometer on the Gauge Plate

Recording Results

See p. 54 of this manual for a sample form for recording test results. It is recommended that you keep this as a master copy and photocopy it as needed. Every time the probe is used, one of these forms should be completed.

Probe Removal

Once the tests are completed and the measurements have been taken, the probes can be removed.

► To remove the probe:

1. Unscrew the measuring cap from the probe and remove the single probe measuring plate.



Figure 19: Removing the Measuring Cap

2. Place the round withdrawal barrel over the probe with the flat face down. The withdrawal barrel serves as a washer so that the hexagonal nut can rotate freely.



Figure 20: Placing the Withdrawal Barrel over the Probe

3. Screw the hexagonal nut on to the probe.

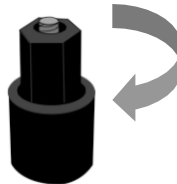


Figure 21: Screwing the Hexagonal Nut onto the Probe

Notice that the hexagonal nut has two different thread lengths inside. This is designed to accommodate different levels of probe penetration.

4. With the provided wrench, turn the wrench clockwise to pull the probe out of the concrete surface.

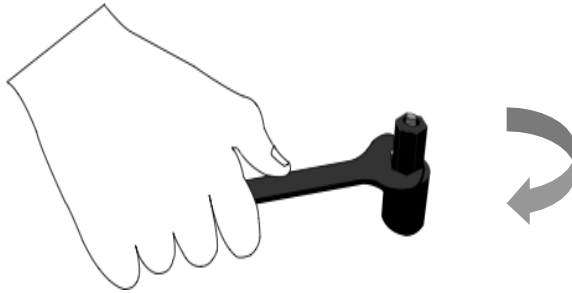


Figure 22: Pulling the Probe out of the Concrete Using a Wrench

Electronic Measuring Unit

The WP-725 is a uniquely designed instrument to simplify the collecting, interpreting, and storage of the data in the Windsor® Probe System. Its simple operator interface and menu is created to give the user maximum benefit with the least amount of interference. Functions are provided to allow the user to accurately measure exposed probe length, correlate this reading with an appropriate compressive strength value, and, finally, store these values for later inclusion in a standardized report.

Control Panel Buttons

The following describes the function of the buttons on the Windsor® Probe.

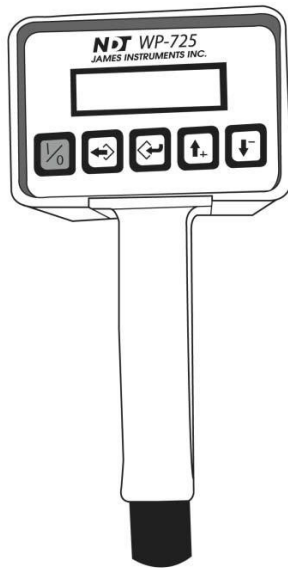


Figure 23: Leveling the Measuring Plate with the Concrete Surface

Key	Definition
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The Power button. Pressing the power button on the WP-725 should bring up the Title Screen on the display. Depressing it again should turn-off the unit.



The Esc key. Pressing this at any time returns user to the Title Screen and cancels any action.



The Enter key. Use this key to enter data into the unit.



The Up Arrow. Used to scroll through the menus and increase a displayed value.



The Down Arrow. Used to scroll through the menus and decrease a displayed value.

Title Screen

When turned on, the title screen should display the following:

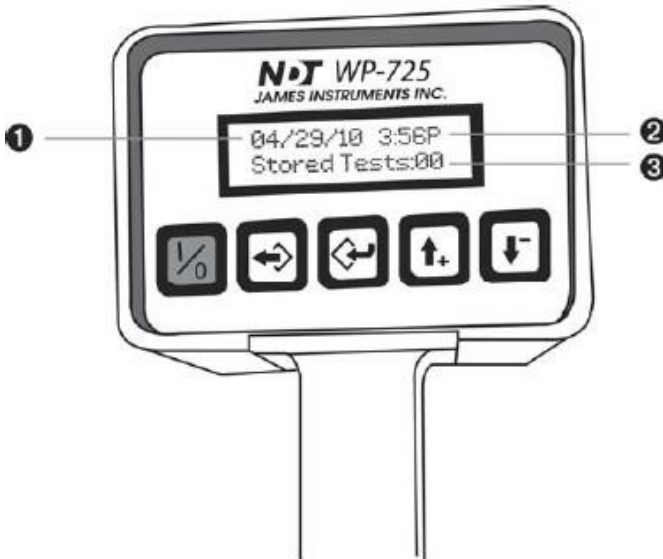


Figure 24: Windsor® Probe Electronic Measuring Unit Instrument Display

Item # Definition

- 1 Displays the current date in a day/month/year format.
- 2 Displays the current time in a 24-hour format.
- 3 Displays the number of stored tests.

Enter Setup

This function sets the parameters used by the measuring unit, allowing the user to view and modify the settings, set the clock, and calibrate the measuring device. The Setup function is displayed when you press the Down Arrow key once from the main screen.

Pressing **Enter** when Enter Setup is displayed takes the user to the Setup menu. By using the arrow keys the user can display the other options of this menu.



Figure 25: Entering the Setup Menu

Show Settings

Pressing **Enter** when Show Settings is displayed takes you to the screen below.



Figure 26: Navigating the Settings Menu

Item # Definition

- 1 **Power** – Corresponds to the driver power that was used. Low should be set for probes pushed two and one half inches down the barrel. Standard should be set if the probe was used in the standard manner. High Perf should be set if this system is used on high performance concrete.
- 2 **Agg** – This corresponds to aggregate size. The setting for this will be either Mortar- M, 1 in.- S and 2 in.- L. This should exceed the largest size aggregate in the mix design.
- 3 **Density** – This corresponds to the density of the concrete, either standard weight (Std Wght) or light weight (Lgt Wght).
- 4 **Hard** – This corresponds to the Mohs' number scale for hardness of the aggregate in the mix design. NOTE: This is not applicable to high performance and light weight concrete mix designs. If you selected Lgt Wght, you do not see a Mohs' number but a measure of the concrete density in lbs/cu. in. See "Set Settings" on p. 32.

Calibrate



Figure 27: Entering the Calibrate Menu

This selection is used only upon assembly and disassembly of the unit. It is used to specify the one inch and two and one-half (2_1/2) inch points.

(Note: This operation can be performed while in any Mohs' setting, but verification is done while in Mohs' 3 setting only.)

► To calibrate the unit:

1. Press the **Enter** button when "Calibrate" is displayed on the screen.
2. Press **Enter** again to say YES to calibrate the unit.



Figure 28: Choose “Yes” to Calibrate the WP-725

3. The unit displays **Zero Press Enter**.
4. With nothing in the measurement chamber, press **Enter**.
5. The unit should display **Max Press Enter**.
6. Push the plunger “in” 2½ inches, and press **Enter**.

This returns the user back to the main screen, and the unit is now ready for use in the measure mode.

To verify the calibration of the WP-725, the display should read:
in:1.00 and psi:0.333 (in Mohs’ 3 setting - OLD version)

in:1.00 and psi:00000 (in Mohs’ 3 setting - NEW version)

If you still experience problems performing this operation, please contact James® Instruments Inc., and ask for technical assistance.

Set Clock

Pressing **Enter** when **Set Clock** is displayed will take you to a screen where you can set the instrument clock.

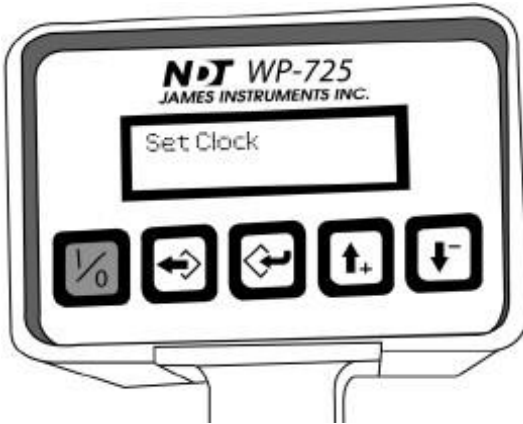


Figure 29: Enter the Set Clock Menu

Use this item to set the time and date. Use the arrow keys to adjust the value under each cursor and the **Enter** key to validate.

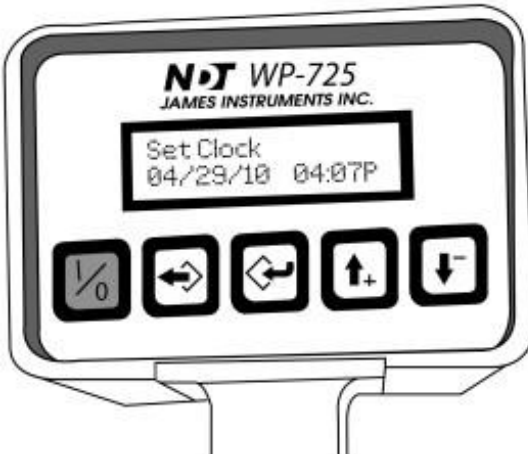


Figure 30: Select the Correct Date and Time

Set Settings



Figure 31: Enter the Set Settings menu

Pressing **Enter** with this displayed brings the user through the procedure to modify the settings used in correlating exposed probe length to compressive strength. Use the arrow keys to change selections, and use the **Enter** key to validate selections.

<u>Setting</u>	<u>Description</u>
Set Power	Use the arrow keys to select between low, standard and high performance. Press " Enter " to select.
Set Density	Use the arrow keys to select between standard weight (Std Wght) and light weight (Lgt Wght) concrete. Press " Enter " to choose. See the screen on the next page for more details.
Set Mohs	This is the hardness value of the aggregate. Perform a scratch test to determine the Mohs number, as on p. 8. The value is adjusted using the arrow keys. Press " Enter " to accept the selection.
Set Units	Use the arrow keys to select either PSI or MPa . Press " Enter " to accept the selection. (<u>Note</u> : Older versions may not have this adjustable option.)
Set Aggr Size	The aggregate size needs to be specified. Adjust the range using the arrow keys and use "Enter" to validate. The setting for this will be either: Mortar - M, 1 in.- S and 2 in.- L. (This setting should exceed the largest size aggregate in the mix design.)

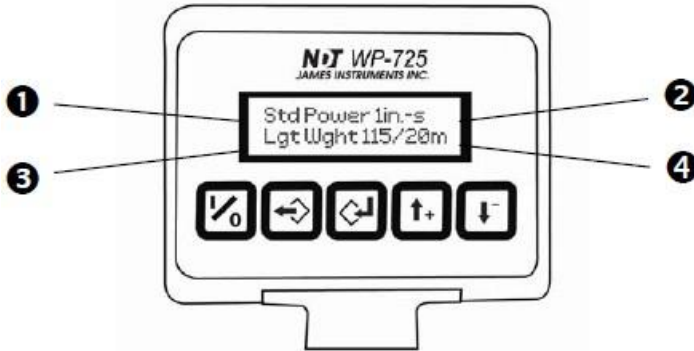


Figure 32: Navigating the Settings Menu

- 1 **Power** – This corresponds to the power setting you selected on the Set Power screen.
- 2 **Agg** – This corresponds to aggregate size. The setting for this will be either mortar-M, 1 in.- S, and 2 in.- L. (This setting should exceed the largest size aggregate in the mix design.)
- 3 **Density** – This corresponds to the density of the concrete you selected on the Set Density screen. The settings for this are Standard Weight (Std Wght) or Light Weight (Lgt Wght). The value should be readily available from the ready mix supplier.
If you select Lgt Wght, you see the Set Weight screen. Select a value. The choices are <115-l or 115/20m or >120-h. This corresponds to the density of the concrete in lbs/cu. in. and should be readily available from the ready mix supplier.
- 4 **Hard** – If you select Standard Weight, you see the Mohs' number you selected from the Set Mohs screen. This corresponds to the Mohs' number scale for hardness of the aggregate in the mix design. This is not applicable to high performance and light weight concrete mix designs.
If you selected Light Weight, as in the screen above, you see the values you selected in the Set Weight screen (described under 3, above).

Download Tests

This function downloads data out of the USB port on backside of unit next to the measuring cap bushing. It will also erase data saved in the unit.



Figure 33: Enter the Download Tests Menu

Pressing Enter when Download Test is displayed shows the message Download Tests connect PC. Attaching the supplied serial cable to the PC and running the supplied software will provide the user with the data stored in the unit on the PC.

(**Note:** To avoid losing saved test results, perform a data Upload to a PC after approximately 15 Average tests.)

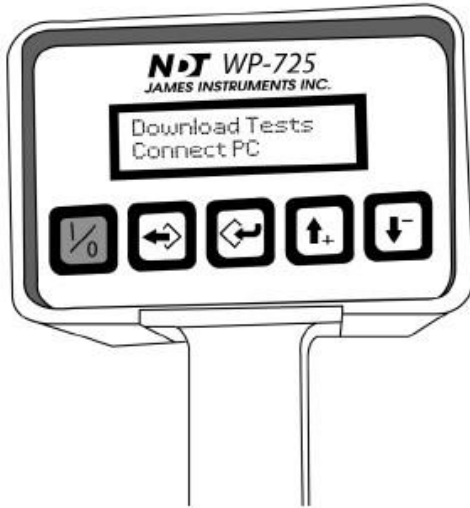


Figure 34: Connect the WP-725 to a PC Using a Serial Cable

Show Tests

This function displays the data stored in the WP-725 on the display. Press **Enter** to cycle through the tests.



Figure 35: Enter the Show Tests Menu

Run Test

This function allows the user to quickly average three measurements according to ASTM standards C-803. This will also store all data involved in the test as well as the time and date of the test. For storing single probe readings, simply store a single probe as all three readings.



Figure 36: Enter the Run Test Menu

Press Enter during each reading to save the data, and move to the next test. The average value of three tests will be calculated.

After each test, you will see a screen like the one on the next page.

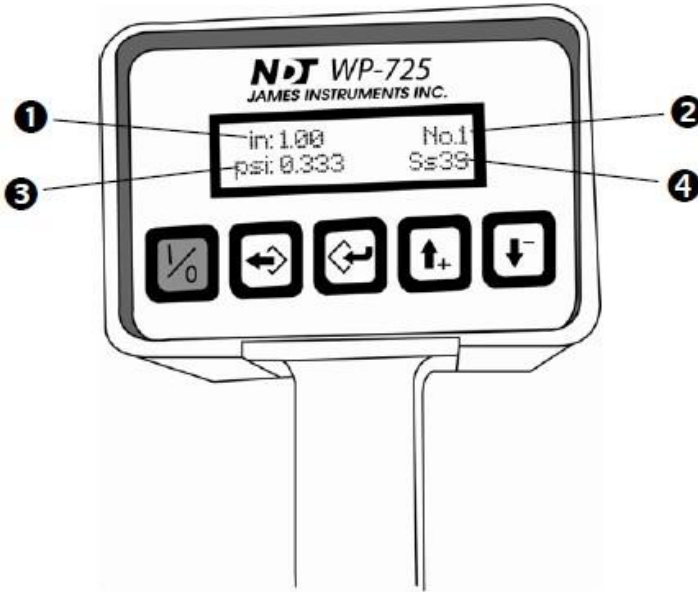


Figure 37: Navigate the Run Test Menu

Item # Definition

- 1 Displays the exposed probe length in inches.
- 2 Displays the test number. This number increments from 1 to 3 as you run/store each test result.
- 3 Displays the compressive strength in psi (or MPa).
- 4 Displays the power of the driver. Corresponds to the driver power that is used. Low (L) should be set for probes pushed two and one half inches down the barrel. Standard (S) should be set if the probe was used in the standard manner. High Perf (H) should be set if this system is used on high performance concrete.

After storing three test results, you will see another screen like the screen above. In place of the test number (position # 2), you will see “Ave” to indicate that the final result is the average of the three tests. The strength value (psi or MPa), will be the average value of the three test results.

Measure

This function is used simply for a quick reading of exposed probe length and compressive strength. Data cannot be stored from this function.



Figure 38: Enter the Measure Menu

Standard Power Table

The compressive strength of the concrete is empirically related to the penetration that varies with the hardness of the aggregate. This relationship is recognized by determining the Mohs' scale of hardness of the aggregate and applying a correction factor to the penetration.

The table represents the results of calibrating the system to the velocity of the probe at the standard power position. Standard power is used for testing concrete in existing structures cured longer than 28 days.

Always change to low power if the probe system, used at standard power, indicates less than 3,000 psi (20.68 MPa). The standard power table has no fixed relationship to the low power table. Each table has been calibrated independent to the respective probe velocity. A point of convergence will occur in the range of 3,600 psi (24.82 MPa), and vary slightly, depending on the design mix.

If the speed (velocity) of a crushing press was changed for breaking standard cylinders, a separate calibration formula for computing psi would also be required.

Always confirm the Mohs' Number of coarse aggregate with a Mineral Scratch Test or calibrate the System to standard cylinders. For standard weight concrete (>125 lbs./cu ft or 2002 kg/cu m), use Silver color PRS-01 probes (1/4 inch or 6.35 mm diameter) and read results in appropriate Mohs' column from the standard table. For lightweight concrete (<125 lbs./cu ft. or 2002 kg/cu m) use Gold color PRS-03 probes (5/16 inch or 7.94 mm diameter) and read results in No. 3, column from the standard table or apply the appropriate correction factor shown in the L.W. Table below

Lbs/cu ft, kg/cu m	Correction Factor
130 to 121, 2082 to 1938	100% of Mohs' 3 Column
120 to 115, 1922 to 1842	84% of Mohs' 3 Column
114 to less, 1826 to less	66% of Mohs' 3 Column

For mortar (no coarse aggregate concrete), use appropriate probe for concrete weight and read results in Mohs' No. 3 column.



Windsor Probe Standard Power Strength Table (No.1)

Standard Power Cylinder

Metric Standard Power Strength Table (Cylinder Correlations)						
Compressive Strength (MPa)						
Expos Probe (mm)	Mpa MOh NO. 3	Mpa MOh NO.4	Mpa MOh NO.5	Mpa MOh NO.6	Mpa MOh NO.7	
35.0	19.7	14.8	-	-	-	-
35.5	20.6	15.8	10.8	-	-	-
36.0	21.5	16.7	11.8	-	-	-
36.5	22.4	17.7	12.8	-	-	-
37.0	23.3	18.6	13.8	7.3	-	-
37.5	24.2	19.6	14.8	8.4	-	-
38.0	25.1	20.5	15.8	9.4	-	-
38.5	26.0	21.5	16.8	10.5	3.5	-
39.0	26.9	22.4	17.7	11.6	4.7	-
39.5	27.8	23.4	18.7	12.7	5.9	-
40.0	28.7	24.3	19.7	13.8	7.1	-
40.5	29.6	25.3	20.7	14.9	8.3	-
41.0	30.5	26.2	21.7	16.0	9.5	-
41.5	31.5	27.2	22.7	17.0	10.7	-
42.0	32.4	28.1	23.7	18.1	11.8	-
42.5	33.3	29.1	24.7	19.2	13.0	-
43.0	34.2	30.0	25.7	20.3	14.2	-
43.5	35.1	31.0	26.7	21.4	15.4	-
44.0	36.0	31.9	27.7	22.5	16.6	-
44.5	36.9	32.9	28.7	23.6	17.8	-
45.0	37.8	33.8	29.7	24.7	19.0	-
45.5	38.7	34.8	30.7	25.7	20.2	-
46.0	39.6	35.7	31.7	26.8	21.3	-
46.5	40.5	36.7	32.7	27.9	22.5	-
47.0	41.4	37.6	33.7	29.0	23.7	-
47.5	42.3	38.6	34.6	30.1	24.9	-
48.0	43.2	39.5	35.6	31.2	26.1	-
48.5	44.1	40.5	36.6	32.3	27.3	-
49.0	45.0	41.4	37.6	33.3	28.5	-
49.5	45.9	42.4	38.6	34.4	29.7	-
50.0	46.8	43.3	39.6	35.5	30.9	-
50.5	47.7	44.3	40.6	36.6	32.0	-
51.0	48.7	45.2	41.6	37.7	33.2	-
51.5	49.6	46.2	42.6	38.8	34.4	-
52.0	50.5	47.1	43.6	39.9	35.6	-
52.5	51.4	48.1	44.6	40.9	36.8	-
53.0	52.3	49.0	45.6	42.0	38.0	-
53.5	53.2	50.0	46.6	43.1	39.2	-
54.0	54.1	50.9	47.6	44.2	40.4	-
54.5	55.0	51.9	48.6	45.3	41.5	-
55.0	55.9	52.8	49.6	46.4	42.7	-
55.5	56.8	53.8	50.6	47.5	43.9	-
56.0	57.7	54.7	51.5	48.6	45.1	-
56.5	58.6	55.7	52.5	49.6	46.3	-
57.0	59.5	56.6	53.5	50.7	47.5	-
57.5	60.4	57.6	54.5	51.8	48.7	-
58.0	61.3	58.5	55.5	52.9	49.9	-
58.5	62.2	59.5	56.5	54.0	51.0	-
59.0	63.1	60.4	57.5	55.1	52.2	-
59.5	-	61.4	58.5	56.2	53.4	-
60.0	64.9	62.3	59.5	57.2	54.6	-
60.5	65.9	63.3	60.5	58.3	55.8	-
61.0	66.8	64.2	61.5	59.4	57.0	-
61.5	67.7	65.2	62.5	60.5	58.2	-
62.0	68.6	66.1	63.5	61.6	59.4	-
62.5	69.5	67.1	64.5	62.7	60.6	-
63.0	-	68.0	65.5	63.8	61.7	-
63.5	-	68.9	66.4	64.8	62.9	-

Imperial Standard Power Strength Table (Cylinder Correlations)						
Compressive Strength (PSI)						
Expo Prob (inch)	PSI MOh NO. 3	PSI MOh NO. 4	PSI MOh NO.5	PSI MOh NO.6	PSI MOh NO.7	
1.4	3000	-	-	-	-	-
1.425	3175	-	-	-	-	-
1.45	3325	-	-	-	-	-
1.475	3500	-	-	-	-	-
1.5	3675	3000	-	-	-	-
1.525	3825	3175	-	-	-	-
1.55	4000	3350	-	-	-	-
1.575	4175	3525	-	-	-	-
1.6	4325	3700	3050	-	-	-
1.625	4500	3875	3225	-	-	-
1.65	4675	4050	3400	-	-	-
1.675	4825	4225	3600	-	-	-
1.7	5000	4400	3775	3000	-	-
1.725	5175	4575	3950	3200	-	-
1.75	5325	4750	4150	3400	-	-
1.775	5500	4925	4325	3600	-	-
1.8	5675	5100	4500	3800	3000	-
1.825	5825	5275	4700	4000	3225	-
1.85	6000	5450	4875	4200	3425	-
1.875	6175	5625	5050	4400	3650	-
1.9	6325	5800	5250	4600	3875	-
1.925	6500	5975	5425	4800	4100	-
1.95	6675	6150	5600	5000	4300	-
1.975	6825	6325	5800	5200	4525	-
2	7000	6500	5975	5400	4750	-
2.025	7175	6675	6150	5600	4975	-
2.05	7325	6850	6350	5800	5175	-
2.075	7500	7025	6525	6000	5400	-
2.1	7675	7200	6700	6200	5625	-
2.125	7825	7375	6900	6400	5850	-
2.15	8000	7550	7075	6600	6050	-
2.175	8175	7725	7250	6800	6275	-
2.2	8325	7900	7450	7000	6500	-
2.225	8500	8075	7625	7200	6725	-
2.25	8675	8250	7800	7400	6925	-
2.275	8825	8425	7975	7600	7150	-
2.3	9000	8600	8175	7800	7375	-
2.325	9175	8775	8350	8000	7600	-
2.35	9325	8950	8525	8200	7800	-
2.375	9500	9125	8725	8400	8025	-
2.4	9675	9300	8900	8600	8250	-
2.425	9825	9475	9075	8800	8475	-
2.45	10000	9650	9275	9000	8675	-
2.475	-	9825	9450	9200	8900	-
2.5	-	10000	9625	9400	9125	-

This Table is used only for the STANDARD POWER System, operated in accordance with the manufacture Instruction Manual.

The table represents the results of calibrating the system to the velocity of the probe at the STANDARD POWER position.

STANDARD POWER is used for testing concrete in existing structures cured longer than 28 days.

ALWAYS change to LOW POWER if the Probe System, used at standard power, indicates less than 3000 psi.

This Table, No. 1, has no fixed relationship to Table No. 2. Each Table has been calibrated independent to the respective probe velocity. A point of convergence will occur in the range of 3600 psi, and vary slightly, depending on the design mix.

Always confirm the Mohs' Number of coarse aggregate with a Mineral Scratch Test or calibrate the System to standard cylinders.

For standard weight concrete (>125 lbs./cu ft.), use Silver color U-PRS-01 (1/4 inch diameter probe) and read results in appropriate Mohs' column from Table No. 1.

For lightweight concrete (<125 lbs./cu ft) use Gold color U-PRS-03 (5/16 inch diameter probe) and read results in No. 3, column from Table No. 1 or apply the appropriate correction factor shown in the L.W. Table below.

Lbs./cuft	Correction Factor
130 to 121	100% of Mohs' 3 Column
120 to 115	84% of Mohs' 3 Column
114 or less	66% of Mohs' 3 Column

For mortar (no coarse aggregate concrete), use appropriate probe for concrete weight and read results in Mohs' No. 3 column from the Table.

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Low Power Table

The compressive strength of the concrete is empirically related to the penetration that varies with the hardness of the aggregate. This relationship is recognized by determining the Mohs' scale of hardness of the aggregate and applying a correction factor to the penetration.

This table has no fixed relationship to the Standard Table. Each table has been calibrated independently to respective probe velocity. Always confirm the Mohs' number of the course aggregate with a Mineral Scratch Test or calibrate the system to standard cylinders. For standard weight concrete (<125 lbs./cu ft. or 2002 kg/cu m) use Silver color PRS-01 probes (1/4 inch or 6.35 mm diameter) and read results in appropriate Mohs' column from the Low Power table.

For lightweight concrete (120 to 130 lbs/cu ft or 1922 to 2082 kg/cu m), use Gold color PRS-03 probes (5/16 inch diameter) and read results in Mohs' Number 3 column from Table Number 2 or apply the appropriate correction factor shown in the L.W. Table below:

Lbs/cu/ft, kg/cu m	Correction Factor
130 to 121, 2082 to 1938	100% of Mohs' 3 Column
120 to 115, 1922 to 1842	84% of Mohs' 3 Column
114 to less, 1826 to less	66% of Mohs' 3 Column

For mortar (no course aggregate concrete), use appropriate probe for concrete weight and read results in Mohs' Number 3 column from the Table. The Windsor® Probe Test System apparatus complies with ASTM C803. The Precision of Probes is set forth in the Statement prepared by ASTM in accordance with C670.

The table on the following page is used only for the Low Power range of the Windsor® Probe System, i.e. the probe is positioned 2 ½ inches (or 63.5 mm) downstream in the driver barrel. The table represents the results of calibration for the system to the low velocity of the probe in the low power position.

Windsor Probe Low Power Strength Table (No.2)

Lower Power Cube

Table with columns for Metric Low Power Strength Table (Cube Correlations) and Compressive Strength (MPa). Rows list Exposed Probe (mm) and Mohs' numbers (No. 3 to No. 7) with corresponding values.

Table with columns for Imperial Low Power Strength Table (Cube Correlations) and Compressive Strength (PSI). Rows list Exposed Probe (inche) and Mohs' numbers (No. 3 to No. 7) with corresponding values.



TEST WELL BUILD WELL

This Table is used only for the LOW POWER range of the Windsor Probe System, i.e. the probe is positioned 2 1/2 inches downstream in the driver barrel.

The Table represents the results of calibration to the system to the low velocity of the probe at the LOW POWER position.

ALWAYS use the low power range for concrete less than 28 days after placement or until the concrete has cured sufficient to cause loss probes (approximately 3800 to 4500 psi). If the probes are not firmly embedded change to Standard Power.

This Table Number 2, has no fixed relationship to Table Number 1. Each Table has been calibrated independently to respective probe velocity.

Always confirm the Mohs' number of the course aggregate with a Mineral Scratch Test or calibrate the System to standard cylinders.

For standard weight concrete (>125 lbs /cu ft) use Silver color PRS-01 (1/4 inch diameter probe) and read results in appropriate Mohs' column from Table Number 2.

For lightweight concrete (120 to 130 lbs /cu ft), use Gold color PRS-03 (5/16 inch diameter probe) and read results in Mohs' Number 3 column from Table Number 2 or apply the appropriate correction factor shown in the L.W. Table below:

Table with 2 columns: Lbs/cuft and Correction Factor. Rows show ranges like 130 to 124 (100% of Mohs' 3 Column) and 120 to 115 (84% of Mohs' 3 Column).

For mortar (no coarse aggregate concrete), use appropriate probe for concrete weight and read results in Mohs' Number 3 column from the Table.

The Windsor Probe Test System apparatus complies with ASTM C803.

The Precision of Probes is set forth in the Statement prepared by ASTM in accordance with C670.

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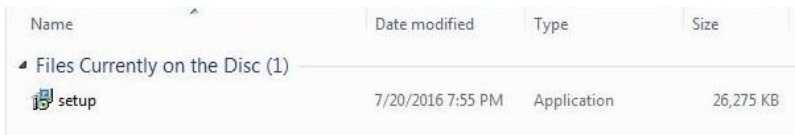


Software Installation

The PC software that has been developed for the Windsor® Probe is for data upload only. To install the software (known as Windsorlinx) on your PC follow these instructions.

► **To install the software:**

1. Insert the Windsor® Probe Software CD into the CD-ROM drive.
2. If the CD does not load the setup automatically, go to My Computer, double click on the CD under devices and double click on **setup** to start the installation.



Name	Date modified	Type	Size
Files Currently on the Disc (1)			
setup	7/20/2016 7:55 PM	Application	26,275 KB

Figure 39: Installation File Location

3. The Windsor® Probe Setup dialog appears. Click **Next** to proceed.



Figure 40: Windsor® Probe Setup Wizard

4. End User License Agreement - Select "I accept the agreement" to continue.

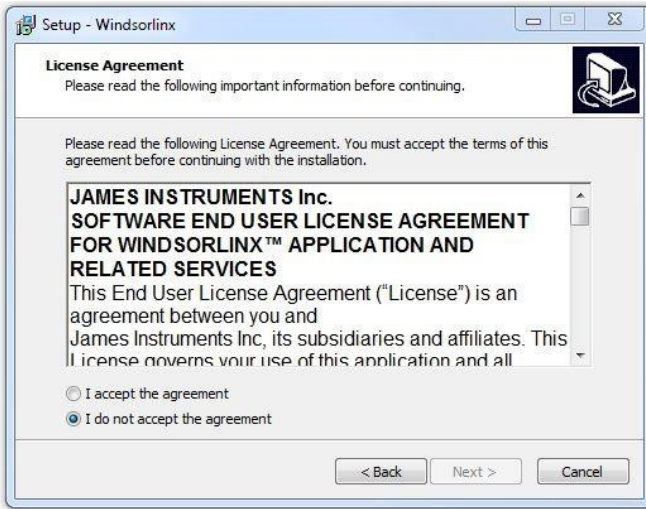


Figure 41: License Agreement

5. Select the Destination Location for Windsorlinx to be installed. Press Next to continue.



Figure 42: Windsorlinx Destination Location

6. Select the Start Menu Folder to be used for Windsorlinx. Press Next to continue.

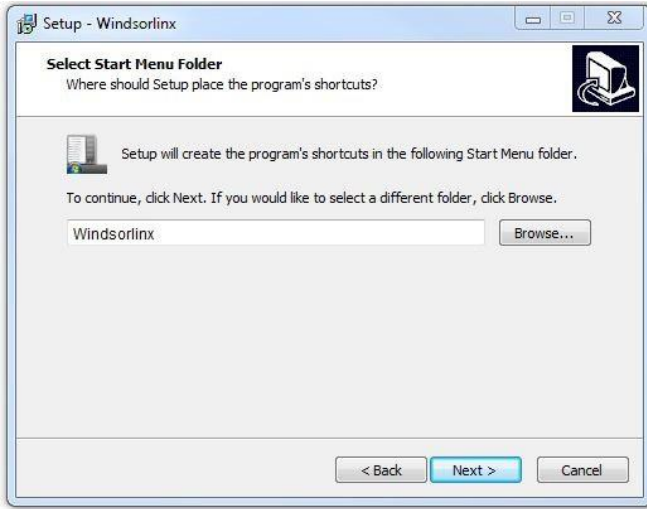


Figure 43: Start Menu Folder Location

7. Select if a desktop icon for Windsorlinx should be created. Press Next to continue.

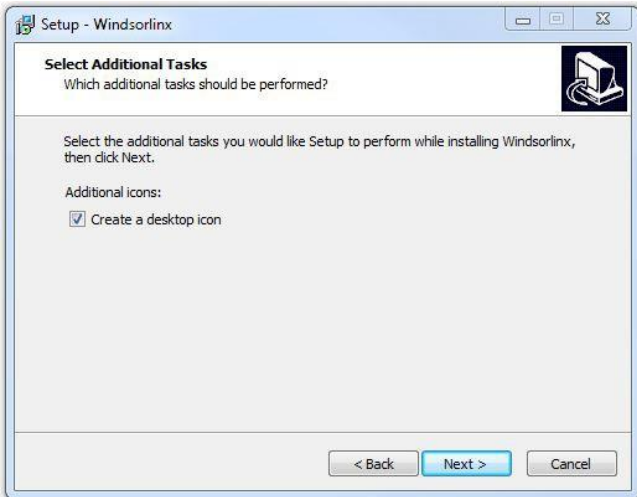


Figure 44: Create Desktop Icon Screen

- Setup is ready to install Windsorlinx on your computer. Verify the information and press Install.



Figure 45: Install Windsorlinx screen

- Completing Windsorlinx Setup Wizard. Press Finish to continue.



Figure 46: Complete Windsorlinx Setup screen

10. Extract FTDI Drivers to run the installation package. Press Extract to continue.



Figure 47: FTDI CDM Driver screen

11. Device Driver Installation Wizard – used to help install the software drivers. Press Next to continue.



Figure 48: Device Driver Installation Wizard screen

12. Device driver software license agreement. Select “I accept this agreement” and press Next to continue.

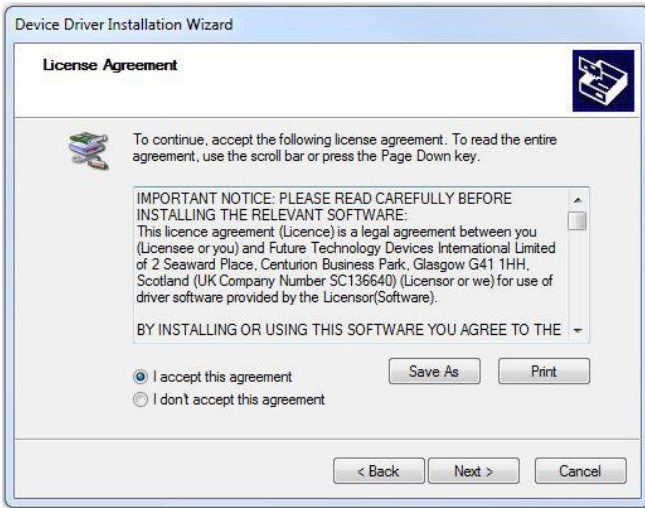


Figure 49: Device Driver License Agreement screen

13. Complete the Device Driver Installation Wizard. Press Finish to continue.



Figure 50: Completing Device Driver Wizard screen

14. After Installation the Windsorlinx Home Screen will appear. Press X on the inner screen to begin. To download test data, go to Download Test on the Unit; while in this screen.



Figure 51: Windsorlinx Home Screen

15. The Windsorlinx icon as it appears on the desktop...



Figure 52: Windsorlinx Icon

Where to Probe

Rectangular Suspended Slabs. First typical floor, place three probes in center of slab topside to establish a norm, plus a single probe at each corner. The center three may be eliminated on subsequent floors. Recommendation is one set of probes (3) for each 5,000 sq. ft. of stripping area.

Architectural Shaped Walls. Place at least one probe test in each structural element or each 3,000 sq. ft.

Column or Walls. If a three probe test is used, place one at least shoulder height, one higher and one lower with a minimum spacing of 7 inches (175 mm). Probes shall be no less than 4 inches (100 mm) from the edge of a concrete surface.

Probing Through Forms (columns or walls). When necessary, probes may be driven through wood forms or steel (up to 1/16 inch thick) with no allowance for strength loss. Add the form thickness to the measured height of probe. In this case, do not use the single probe measuring base plate or probe cap.

Hardened Surfaces. Probe normally. Surface treatments that are less than 3/16 inches thickness do not effect probing. Results will indicate the strength of the base concrete, not the surface plate. When thicker coatings exist, probe the underside of the slab if accessible.

Lightweight Concrete. Be sure to use gold color probes and read results from Mohs' Column 3, Table I, if Standard Power is used: Table II, if Low Power is used.

Footers or Pier Caps. Probe topside (bearing surface). Be sure the surface is at least broom finish or grind.

Post-tensioning Cables. Use single probes in center of element and one at each corner to ensure same or equal batching or placement. If doubt exists, probe within two feet of the bulk head.

Architectural or Tilt-up Slabs. When cast horizontally, probe at two corners and center diagonally. Top side is the compression size when "picking" vertically.

Pre-stressed Beams. Place single probes topside over web at each end or fifty foot intervals to ensure that bond to cables has been achieved prior to de-tensioning.

Fire Damaged Concrete. Set at least three sets of three probes in an unaffected area and use the combined average as a norm. Then place in sets of three, a grid pattern of 1,000 square foot areas. If results in affected areas exceed .160 inches in probe height average (3), the concrete has been affected, either by increase or decrease in strength.

Troubleshooting

Unit Will Not Power On

Occasionally, the WP-725 Electronic Measuring unit will not power ON when the Power switch is pressed. In most cases, the batteries are dead; either from usage, the unit was left ON or the batteries were not removed before storage. (**Warning:** Be sure to remove the batteries from the unit when not in use.)

Change the batteries as follows:

► To Change the Batteries:

1. Grasp the unit and locate the battery holder cap, on the end.

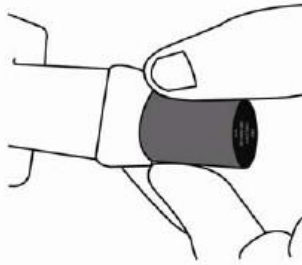


Figure 53: Locating the Battery Holder Cap

2. Loosen the knob by turning counterclockwise and pull out the battery holder.

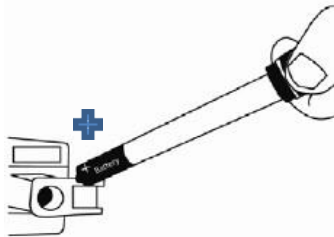


Figure 54: Pulling Out the Battery Holder

3. Replace the old batteries with two new AA size batteries. (Positive end of batteries are placed in handle first.)

Issues that may occur when using the software

1. No Port Available Screen. Be sure that the USB cable is properly connected to both the device and the PC.

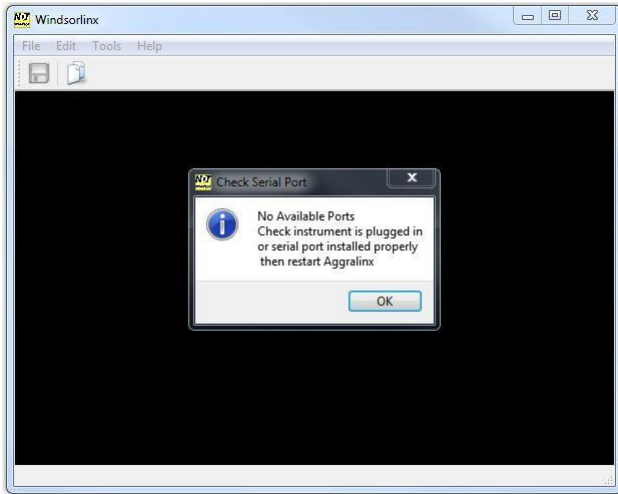


Figure 55: No Ports Available screen

2. Help screen Overview.

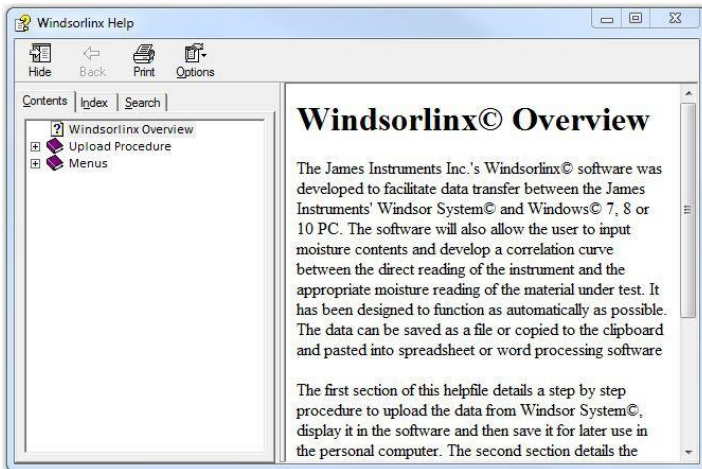


Figure 56: Help screen for Windsorlinx

Maintenance

Although built for rugged use, the WP-500 **does** require some care and precautions. Avoid excessive exposure to water. Although the unit is splash-proof, full immersion in water should be avoided. Beware of dirt and grime, both on the front panel and in the probe measuring cap bushing. Excessive dust and grime can cause damage to the face plate and care should be taken that dirt and dust inside the measuring cap bushing does not damage any mechanical components. Cleaning can be accomplished with a damp rag.

The Windsor® Power Driver is a precision instrument and requires reasonable maintenance to ensure long trouble-free service and to give the best results. The following procedure should be followed:

► **To clean the Windsor® Probe:**

1. Make sure that the driver is not loaded.
2. Open the driver and clean the bore and as much of the outside of the barrel as is accessible with an approved solvent such as WD-40.

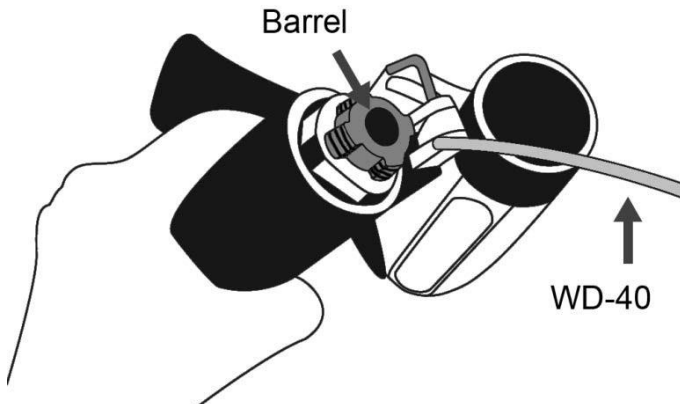


Figure 57: Lubricating the Barrel

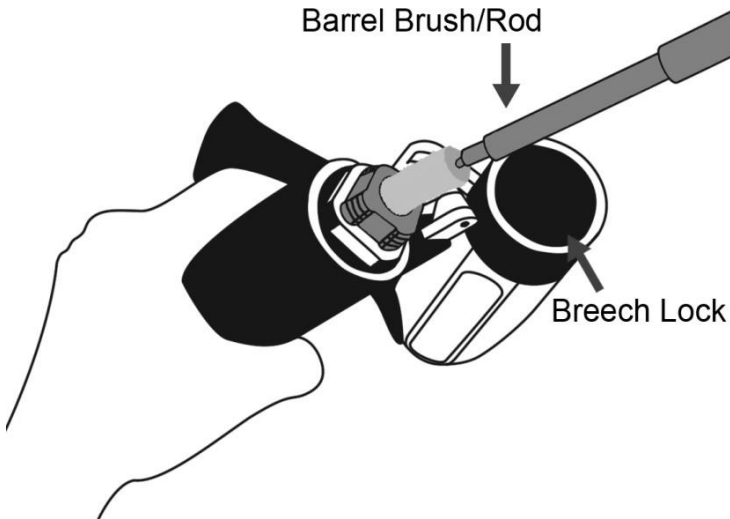


Figure 58: Use brush to clean inside of barrel

3. Pay particular attention to cleaning the bore, especially the breech plug and chamber. Be sure the breech plug is oiled before the driver is set aside.
4. Clean the mating threads of the barrel and breech lock.

The Driver unit (WP-500) includes two sealed sections; the handle assembly and the barrel assembly. These sections should never be disassembled in the field.

For cleaning, simply immerse in a pail of any cleaning solvent and then let air-dry. Wipe exterior parts with WD-40 or other similar light oil products.

In addition to the above steps, it is recommended that the Windsor® Probe System be serviced and calibrated on an annual basis.

Sample Test Form

The following two pages contain a sample form for recording test results. Copy these pages to have forms available for recording results.



Client:		Address:				Phone:	
Project Name:		Project Location:				Job Number:	
Job Phone Number:		Date:		Test Date:		Tested By:	
Class of Operation		Coefficient of variation for standard control concrete					
		Excellent		Good		Fair	
General Construction		Below 10%		10 – 15%		15 – 20%	
						Above 20%	
Test Area	Type	Aggregate	Mohs' Number	Cure Days	Probe & Power Load Certification Number	Height of Probe Gage (Average of 3 Probes)	Compressive Strength (PSI)

Table 2
Standards of Concrete Control

Class of Operation		Coefficient of variation for different control standards			
		Excellent	Good	Fair	Poor
Overall valuation	General construction	Below 10%	10 – 15%	15 – 20%	Above 20%
	Laboratory control	Below 5%	5 – 7%	7 – 10%	Above 10%
Within-test variations	Field control	Below 4%	4 – 5%	5 – 6%	Above 6%
	Laboratory control	Below 3%	3 – 4%	4 – 5%	Above 5%

NOTE: These standards represent averages for 28-day cylinders, and are computed from a large number of tests. The values you see for concrete cylinders that were not cured for 28 days may vary.

Table 3
Factors for Computing Within-Test Standard Deviation

Number of Specimens	d_2	$1/d_2$
2	1.128	0.8865
3	1.693	0.5907
4	2.059	0.4857
5	2.326	0.4299
6	2.534	0.3946
7	2.794	0.3698
8	2.847	0.3512
9	2.970	0.3367
10	3.078	0.3249

NOTE: You may use this table to report as many as 10 tests.

Using Table 3 Example Test Report

Assume Mohs' #4 aggregate.

1.8 inch 5100 PSI
1.75 inch 4750 PSI
1.825 inch 5275 PSI

The range will be the highest PSI value minus the lowest, on the above table:

5275 – 4750, or 525 PSI

The Standard Deviation equals this range value (525 PSI) times .5907. This value, .5907, is drawn from the table itself.

Therefore the Standard Deviation = 525 PSI x .5907, or 310.

The Coefficient of Variation equals the Standard Deviation (310) divided by the average PSI (5041), and then multiplied by 100 to convert the result into a percentage:

$310/5041 = .614$, rendered as 6.14%

Safety

In order to utilize this product safely, the operator must be aware of the safety precautions associated with it. This will help to prevent the operator from activating a hazard and causing an accident. It is HIGHLY recommended that every operator read this section thoroughly. James[®] Instruments claims no responsibility for misuse of this product.

Warning! This product is for professional use only!

1. The person using the tool must be trained in its use by the manufacturer, be responsible, be over 18 years old and not color blind.
2. If a misfire occurs, without withdrawing the tool wait 10 seconds then re-cock and fire again. If it still misfires, wait another 10 seconds then withdraw the tool. In accordance with the manufacturer's instructions, remove the cartridge and seek instructions from the cartridges supplier on how to return it for destruction. **CONTRACTORS MUST NOT DESTROY OR DISPOSE OF CARTRIDGES THEMSELVES.**
3. Cartridges must be stored under lock and key in a cool, dry store and only issued under controlled conditions.
4. The operator must wear suitable PPE, e.g. eye, head, and ear protection. Eye protection shall conform to EN 166:2002 and ear protection shall conform to EN 458:2004. Both eye and ear protection shall conform to directive 89/686/EEC.
5. The area must be cleared of all unnecessary personnel.
6. The tool must not be used in a situation where there is a risk of fire or explosion.
7. Always use original spare parts. Modifications to the tool are prohibited.
8. Never hold the nose of the tool against yourself or other people.
9. Read the (Material) Safety Data Sheet before handling the product. See (M)SDS page for more information on the power loads.

This product is meant to drive a metal probe into concrete at high velocity in order to determine the compressive strength of the concrete sample. However, misuse and bad practice can result in the increased likelihood of an accident. The following is a list of examples of how the operator should not use this product.

PRECAUTIONS:

-Do not fire this product without a probe. Firing without a probe will create a loud noise which can be damaging to hearing.

-Do not fire a probe into anything that is not concrete. It is possible to activate the driver against a non-concrete object. Firing into anything other than concrete can result in pinning the template and probe into the material, or the probe not penetrating the material (if too hard) and bouncing off. And thus, cause a safety issue for the user.

-Do not fire this product closer than six inches from the edge of the concrete slab. Firing too close to the edge can result in a section of concrete breaking off and causing injury.

-Do not fire into concrete that is less than six inches thick. Firing into too thin of a concrete slab can result in concrete chips being ejected out of the other side, potentially causing injury.

-Do not fire into a round column that is less than 36" in diameter.

-Minimum spacing between probe locations should be 7.0 inches.

-The firing template will deform over time. If the inner hole of this template is deformed it can cause probe breakage, scattering of concrete chips or even allow the probe to pass through the template. Therefore, it is advised a new firing template be purchased every year to replace worn templates.

-Do not load more than one probe into the product at a time. This could damage the unit.

-Do not point this product at yourself or others.

-Do not load unless you are ready to use the product, and always unload before work breaks or before storing the product at the end of the day.

- The Power Load is flammable. Do not store in a flammable atmosphere.
- Do not leave the loaded product unattended.
- Do not use the product if there are any noticeable defects. If the product is not working properly, send it back to James® Instruments for repair. The condition of the driver should be checked by the operator before every use and after each long work pause by visual examination.
- Do not fire into spalled concrete. Firing into a surface that isn't reasonably flat causes more debris to shoot out from under the template.
- Do not drill a pilot hole. This will yield invalid test results.
- Use in a well-lit area, or bring a light source if light isn't available.
- Wait at least three minutes between firing two probes. The inside of the barrel heats up every time it is fired and should be allowed to cool.
- Use in a well-ventilated area.
- Do not use this product on a ladder. Use only in an environment where you can maintain stability.
- Only use product against a stable surface. Keep one hand on the barrel and the other on the handle when firing.
- Make sure you are properly balanced and not leaning when firing the unit.
- Only use probes and cartridges provided by James® Instruments (item numbers U-PRS-01 and U-PRS-03). Using other probes or cartridges can create a serious safety issue and damage the equipment catastrophically and even injure the operator.
- Do not fire into reinforcement bars (or rebar). Fire probes into concrete only. Firing a probe into rebar has a similar effect as firing into a material that is too hard (as mentioned above). Use a rebar

locator such as the James® Instruments Rebarscope to locate rebar.

(M)SDS for Power Load:

Material Safety Data Sheet May be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Standard must be consulted for specific requirements.		U.S. Department of Labor Occupational Safety and Health Administration (Non-Mandatory Form) Form Approved OMB No. 1218-0072			
IDENTITY (As Used on Label and List) Blank Shotshells & Cartridges		Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that.			
Section I					
Manufacturer's Name Vavter Ammunition, Inc.		Emergency Telephone Number (409) 543-3682			
Address (Number, Street, City, State, and ZIP Code) PO Box 665 (Hiway 59 West)		Telephone Number for Information (409) 543-3682			
City El Campo, Texas 77437		Date Prepared JANUARY 1, 2001			
		Signature of Preparer (optional)			
Section II — Hazardous Ingredients/Identity Information					
Hazardous Components (Specific Chemical Identity; Common Name(s))		OSHA PEL	ACGIH TLV	Other Limits Recommended	% (optional)
BALL POWDER PROPELLANT (SEE ATTACHED INFO)					
PRIMER (SEE ATTACHED INFO)					
Section III — Physical/Chemical Characteristics SEE ATTACHED INFO					
Boiling Point	NA	-Specific Gravity (H ₂ O = 1)		NA	
Vapor Pressure (mm Hg.)	NA	Melting Point		NA	
Vapor Density (AIR = 1)	NA	Evaporation Rate (Butyl Acetate = 1)		NA	
Solubility in Water Powder, and wadding is water soluble					
Appearance and Odor NICKLE PLATED CENTERIFRE & RIMFIRE CARTRIDGES					
Section IV — Fire and Explosion Hazard Data					
Flash Point (Method Used)	NA	Flammable Limits	NA	LEL	UEL
Extinguishing Media Do not attempt to extinguish product if on fire					
Special Fire Fighting Procedures Remove from reach of fire					
Unusual Fire and Explosion Hazards If cannot prevent fire from reaching product, evacuate all personnel from immediate area for small quantities, premises if large quantities.					
(Reproduce locally)					

Figure 59a: (M)SDS for Power Load

Section V — Reactivity Data SEE ATTACHED INFO			
Stability	Unstable		Conditions to Avoid
	Stable	X	
Incompatibility (Materials to Avoid) Caustic Chemicals and their like			
Hazardous Decomposition or Byproducts			
Hazardous Polymerization	May Occur		Conditions to Avoid
	Will Not Occur	X	
Section VI — Health Hazard Data SEE ATTACHED INFO			
Route(s) of Entry:	Inhalation?	Skin?	Ingestion?
	NA		
Health Hazards (Acute and Chronic) NA			
Carcinogenicity: NO NTP? IARC Monographs? OSHA Regulated?			
Signs and Symptoms of Exposure NA			
Medical Conditions Generally Aggravated by Exposure NA			
Emergency and First Aid Procedures NA			
Section VII — Precautions for Safe Handling and Use SEE ATTACHED INFO			
Steps to Be Taken in Case Material Is Released or Spilled NA			
Waste Disposal Method Dispose only by qualified personnel, and at qualified locations.			
Precautions to Be Taken in Handling and Storing Handle with caution when loading, unloading, or storing. Store only in a fire hazard free location.			
Other Precautions Keep away from extremely high temperatures, and severe shocks. Protect Primers from being hit or damaged in any way.			
Section VIII — Control Measures SEE ATTACHED INFO			
Respiratory Protection (Specify Type)			
Ventilation	Local Exhaust	NA	Special NA
	Mechanical (General)	NA	Other NA
Protective Gloves	NA	Eye Protection	NA
Other Protective Clothing or Equipment Noise protectors			
Work/Hygienic Practices NA			

Figure 59b: (M)SDS for Power Load

Specifications

Windsor® Probe System Z-WP-534

Weight	26 lbs. (11.8 kg)
Case Dimensions	20" X 15"
Sound Pressure	102.9 dBA
Sound Power	114.5 dBA
Vibration Level	30.7 ±1.6 m/s ²
Batteries	AA Size (Alkaline, non-rechargeable)

Warranty Information

1. Contract

Unless otherwise stated all sales transactions are expressly subject to these terms and conditions. Modification or additions will be recognized only if accepted in writing by an authorized Officer of James[®] Instruments Inc. (hereinafter referred to as “James” or the “Company”), or an officially designated representative. PROVISIONS OF BUYER'S PURCHASE ORDER OR OTHER DOCUMENTS THAT ADD TO OR DIFFER FROM THESE TERMS AND CONDITIONS ARE EXPRESSLY REJECTED. NO WAIVER OF THESE TERMS AND CONDITIONS OR ACCEPTANCE OF OTHERS SHALL BE CONSTRUED AS FAILURE OF THE COMPANY TO RAISE OBJECTIONS.

2. Warranties

The Company only warrants the equipment manufactured or supplied by the Company as set forth herein. James[®] makes no other warranties, either expressed or implied (including without limitation, warranties[®] as to merchantability or fitness for a purpose). In no event shall James[®] be liable for any type of special, consequential, incidental, or penal damages, whether such damages arise out of or are a result of breach of contract, warranty, negligence, strict liability or otherwise. Warranty shall not apply where the equipment manufactured or supplied has been subject to accident, alteration, misuse, abuse, improper storage, packing, force majeure, improper operation, installation, or servicing. In addition, the following shall constitute the sole and exclusive remedies of Buyer for any breach by James[®] of its warranty hereunder.

a. New Products

James[®] warrants the equipment manufactured or supplied by James[®] as set forth herein. This limited warranty can only be exercised by the original purchaser of the equipment from James[®] or authorized James Agent and is not transferable to any subsequent owner or party. This limited warranty gives you specific legal rights, and you may also have other rights which vary from case to case.

i. For James[®] Equipment

James[®] warrants that James's equipment will be free from defects in materials and workmanship for a period of twenty-four (24) months on the electronic portion and six (6) months on the mechanical portion from the date of shipment of

equipment from James[®] to Buyer. Should any defects be found and reported by the Buyer during the applicable limited warranty period, the defect will be corrected upon return of the item to James[®]. James[®] will, during the applicable new equipment warranty period, provide the necessary replacement parts and labor to correct the defect.

Excluded from the new equipment warranty are all consumable and wear and tear items such as impact bodies, penetrators, connection cables, etc. These items are subject to usual wear and tear during usage. Refer to the Consumable, Wear and Tear Items section of this warranty document.

Option For Extended Limited Warranty Coverage

The original purchaser of any new equipment of James[®] which have been identified or labeled by James[®] from time to time in James's sole discretion as being eligible for extended warranty coverage shall have the option to purchase certain extensions of the applicable limited warranty provided hereunder to the electronic portion of any such items for either a twelve (12), twenty-four (24) or thirty-six (36) month period (up to a possible maximum limited warranty coverage period for the electronic portions of such new James[®] equipment of sixty (60) months) by purchasing any such twelve (12), twenty-four (24) or thirty-six (36) month limited warranty extension period either all the time of the purchase of any such item(s) or within ninety (90) days from the date of delivery of the subject item(s) of the original purchaser of such item(s). The price for each such extended limited warranty coverage period shall be as determined by the Company from time to time and all such purchases of any extended warranty coverage periods shall only be effective upon a completed purchase order and payment directly between James[®] and the original purchaser of any such item(s). The extended warranty coverage periods are only valid with respect to the original purchaser of such item(s) from the Company and such extended warranty coverage is not transferable to subsequent owners of the subject item(s) or any other parties. Upon the purchase of any extended limited warranty coverage period, the Company will issue a certificate to Buyer evidencing the details of the applicable extended warranty coverage period purchased by the Buyer.

ii. For Other Manufacturer's Products Supplied by James[®]

Products of other manufacturers supplied as such by James[®] are warranted by James[®] only to the extent of any warranty provided by the original manufacturer, if any.

iii. For Parts and Sub-Assemblies

Parts or sub-assemblies purchased by the Buyer to perform its own repair work etc. are warranted as provided hereunder by James[®] for six (6) months[®] from date of shipment of material from James to Buyer.

iv. For Consumables, Wear and Tear Items

James[®] supplies consumable items and items subject to wear and tear during normal usage of James[®] supplied products. These items are not covered under warranty. Buyer is to check for proper fit, form and function of such items upon receipt of such items. In case of a defect condition, Buyer can return the item to James[®] for evaluation within thirty (30) days[®] of the date of shipment to the Buyer. James reserves the exclusive right to issue full, partial, or no credit to the Buyer based on the condition of the returned item and circumstances related to the return. Examples of items in this category: connection cables, test blocks, impact bodies, penetrators, probes, extraction liquids, calibration liquids, pins, recording paper, test plugs, etc.

b. Calibration and Repair

i. For Calibration Services[®]

James does not warrant the calibration of any equipment. James[®] does however warrant the equipment manufactured by it, in proper working condition, to be capable of being adjusted to meet James[®] printed specifications, if any, for accuracy and performance as to the model type during the period of warranty applicable as stated above.

ii. For Repair Services

James[®] warrants repair work performed under the direct control and supervision of James[®] personnel for a period of

three (3) months from the date repairs are completed either at James[®] or at the customer site. Should the defect for which the repair work was performed reoccur within this period, James[®] will supply the necessary parts and labor (repair at James[®] facility) or parts (repair at Buyer facility) required to repair the original equipment defect for which the repair parts and labor were required. Additional repair charges that may be incurred in conjunction with any repair service warranty event will be invoiced at the James[®] customer service rates and policies in effect at the time of the event.

Excluded are all consumable and wear and tear items such as impact bodies, probes, connection cables, etc. These items are subject to usual wear and tear during usage. Refer to the Consumable Wear and Tear Item section of this warranty document.

c. Warranty Claims

i. For Warranty Claim Processing

James[®] has established James[®] organizations in the Americas, and Europe. Please visit the James[®] web site www.ndtjames.com for [®] latest address and contact information for the James organization nearest you.

3. Regulatory Laws and/or Standards

The performance of the parties hereto is subject to the applicable laws of the United States. The Company takes reasonable steps to keep its products in conformity with various nationally recognized standards and such regulations, which may affect its products. However, the Company recognizes that its products are utilized in many regulated applications and that from time to time standards and regulations are in conflict with each other. The Company makes no promise or representation that its product will conform to any federal, provincial, state or local laws, ordinances, regulations, codes or standards except as particularly specified and agreed upon for compliance in writing as a part of the contract between Buyer and the Company. The Company prices can not include the cost of any related inspections or permits or inspection fees.

4. Notices

Notice by either the Company or Buyer will be made only by facsimile or similar electronic transmission, effective on the first business day after confirmed receipt, or by letter addressed to the other party at its address as provided in this Agreement, effective three (3) business days after deposit with the U.S.

Postal Services, postage prepaid, or one (1) business day after deposit with a recognized overnight express service.

5. Interpretation

Should any term or provision contained in the contract contravene or be invalid under applicable law, the contract shall not fail by reason thereof but shall be construed in the same manner as if such term or provision had not appeared therein.

6. Assignability

Neither this contract nor any claim arising directly or indirectly out of or in connection herewith shall be assignable by Buyer or by operation of law, without the prior written consent of Company. This document shall be binding upon and inure to the benefit of each party hereto and their respective permitted successors and assigns.

7. Governing Law

This Agreement shall be governed by and construed in accordance with the internal laws of the State of Illinois, without regard to its conflict of laws provisions. Buyer and the Company expressly agree to submit to the personal jurisdiction of the federal and/or state courts sitting in Chicago, Illinois, U.S.A. and agree that such courts may be utilized if necessary to obtain injunctive or any other relief. The Hague Convention and the United Nations Convention on Contracts for the International Sale of Goods shall not apply to the construction or interpretation of these Standard Terms and Conditions or affect any of its provisions.

END.

Notes:

Repair Policy

United States | Canada | International

Ship the instrument in a box that meets UPS, Fed Ex, and standard shipping regulations. Enclose a note describing the problem(s) you are having. Include the name and phone number of the contact person in your organization.

The instrument will be evaluated within one week of receipt. The contact person will be notified with an estimate of the cost of the repair.

Upon receipt of your authorization of repair and payment terms, delivery time will be 2 weeks from that day.

If you need the repair back sooner than this, you have the option of paying an express service fee of 10 percent of the purchase price of said instrument, plus the repair cost. With this service, you can receive the instrument back within 3 working days in the USA (5 working days for Europe).

International repair shipments must contain a commercial invoice listing the instrument being returned and must contain the words:

Country of manufacture: USA

Instrument being returned to manufacturer for repair – no value for customs, value for carriage only.

Ship the complete system to:

Attn: Repair Department James Instruments, Inc. - USA 3727 North Kedzie Avenue Chicago, IL 60618-4503 USA	Attn: Repair Department James Instruments, Inc. – Europe Windmolen 22 7609 NN Almelo The Netherlands
---	--

Home page: www.ndtjames.com

E-mail: info@ndtjames.com

europe@ndtjames.eu



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Purchase Date: _____

Serial Number: _____