



OBV-80B

Automatic Oil Dielectric Tester

0 to 80 kV · IEC 156, ASTM D877, ASTM D1816 · built-in printer

Operating Manual

Issue 2

General Polytronic Systems Ltd · 14 Regent Street, Brent, London NW10 5LG
+44 (0) 203 093 0914 · sales@gpslimited.com · www.gpslimited.com

1 Safety

The OBV-80B generates up to 80 kV. Read this manual before using the instrument for the first time, and use it only as described here. The operator should have a good working knowledge of electrical equipment and of laboratory instruments.

Warning: the terminals and the test cell can carry high voltage. Plugging in or pulling out the mains lead or a test lead can cause a spark. Risk of electric shock.

To avoid fire and injury

- Use only the mains lead supplied, or one to the same specification.
- The instrument is earthed through the mains lead, and its earth terminal must also be connected to earth. Check that it is fastened securely before switching on, and before making any other connection.
- Do not connect or disconnect a test lead while it is connected to a live terminal.
- After switching on, do not touch the test cell lid.
- Observe the ratings and markings on the instrument, and read this manual for the ratings before making connections.
- Do not operate the instrument with any cover or panel removed.
- Use only a fuse of the type and rating specified (3 A, spares supplied).
- Do not touch exposed connections or any part that may be energised.
- If the instrument behaves abnormally, switch it off and do not use it again until it has been checked. Contact GPS.
- Do not operate the instrument in wet or damp conditions, or in an explosive atmosphere. Keep its surfaces clean and dry.
- The instrument can be used indoors or outdoors, but keep it out of rain, corrosive gas, heavy dust, high temperature and direct sun.
- Maintenance and repair must be carried out only by qualified personnel.

Symbols in this manual

Warning: death or serious injury may result if the precautions are not taken. Caution: damage to the instrument or other property may result if the precautions are not taken.

Standard practice, not stated in the source manual: switch the instrument off before opening the test cell lid to change the sample.

2 Introduction

The OBV-80B is an automatic tester for the dielectric breakdown voltage of insulating oil. A 1.5 kVA step-up transformer raises the voltage across the electrodes of the test cell at a set rate until the oil breaks down, and the instrument records the breakdown voltage. Over a series of breakdowns it calculates the average, shows it on the display and prints it.

Test programmes to IEC 156, ASTM D877 and ASTM D1816 are built in. A user method sets its own wait time, pause, stirring, maximum test voltage and number of breakdowns, and a manual mode lets the operator raise and stop the voltage from the keys.

The test value is sampled at the high-voltage end and passed straight to the analogue-to-digital converter, which avoids errors in the analogue circuit. The test cell is cast in one piece from special glass to prevent leaks, and the instrument is protected against over-current, over-voltage and short circuit.

3 Specification

Item	Specification
Output voltage	0 to 80 kV
Step-up transformer	1.5 kVA
Rate of voltage rise	0.5, 1, 2, 3 and 5 kV/s, set on the rate selector
Voltage accuracy	± (3% of reading + 2 digits)
Supply distortion	Less than 1%
Test methods	IEC 156, ASTM D877, ASTM D1816, a user method and manual mode
User method	Wait time 1 to 15 min · pause 1 to 10 min · stir 5 to 90 s · maximum test voltage 10 to 80 kV · 1 to 6 breakdowns
Electrode gap	2.5 mm standard, set with the master gauge supplied
Test cell	Special glass, cast in one piece
Display	Large LCD: date, time, temperature, humidity, operating parameters, results and menus
Printer	Built in, thermal paper roll
Protection	Over-current, over-voltage and short-circuit · earth alarm
Power supply	220 V AC ± 10% · 50/60 Hz ± 5 Hz · less than 200 W
Operating environment	0 °C to 40 °C · relative humidity up to 85%
Dimensions	409 × 393 × 388 mm
Weight	29 kg

4 The instrument

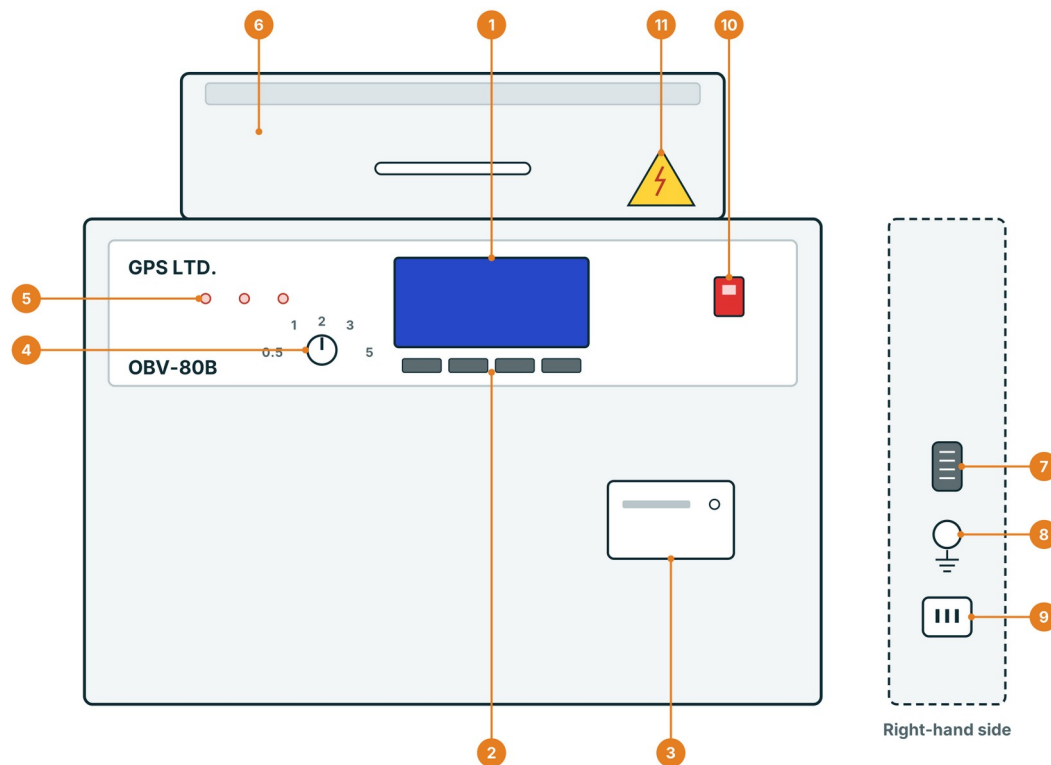


Figure 1 The OBV-80B. Items 7 to 9 are on the right-hand side

Item	Description
1 LCD	Shows the date, time, temperature and humidity, the settings, the test results and the menus (section 6)
2 Function keys	Four keys below the display. Their function is shown on the display above each key
3 Printer	Prints the result of each test (section 8)
4 Rate selector	Sets the rate of voltage rise: 0.5, 1, 2, 3 or 5 kV/s
5 Indicator lights	Light while the step they mark is under way
6 Test cell lid	Open to put the test cell in or take it out. Testing is possible only with the lid closed
7 Temperature and humidity sensor	Measures the ambient temperature (°C) and relative humidity, shown on the display
8 Earth terminal	Connect to a reliable earth before switching on
9 Power socket	For the mains lead supplied. Holds the fuse
10 Power switch	Switches the instrument on and off
11 High-voltage sign	Warns of the high voltage inside the test cell compartment

5 Getting started

1. Place the instrument on a firm, level surface, out of rain, heavy dust and direct sun.
2. Connect the earth terminal on the right-hand side to a reliable earth.
3. Prepare the test cell and the oil sample. The cell must be clean (section 9), with the electrode gap set to the standard 2.5 mm with the master gauge. Fill the cell with the sample.
4. Open the test cell lid, put the test cell in place and close the lid.
5. With the power switch off, plug the mains lead into the power socket on the right-hand side and into a 220 V AC supply.
6. Switch the power on. The start screen appears (Figure 2), showing the date, time, temperature and relative humidity.

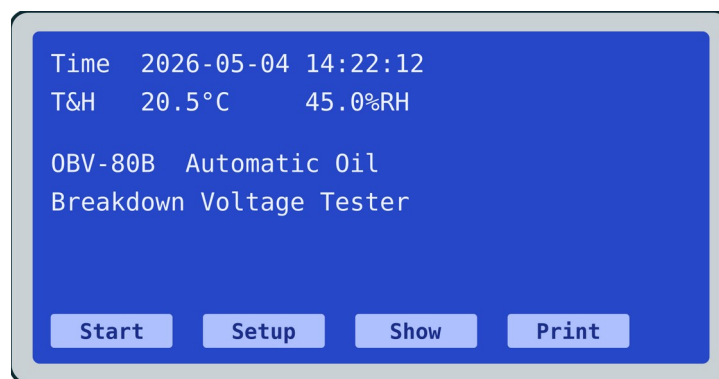


Figure 2 The start screen

Earth alarm

If the earth terminal is not connected, the instrument sounds an alarm and the display shows "please ground wire!". Switch the power off, connect the earth terminal to earth, and switch on again.

6 Keys and menus

The four function keys below the display take the function shown above each one. On the start screen they are Start, Setup, Show and Print.

Key	Function
Start	Starts a test with the method chosen
Setup	Opens the setup menu (Figure 3)
Opt	Moves the cursor to the next item
+ and -	Increase or decrease the value at the cursor
OK	Confirms the choice, or saves the settings and returns to the start screen
Back	Returns to the start screen
Print	Prints the result shown

The setup menu holds the three standard methods, the user method (Users Set) and the clock (Time Set). Press Opt to move the tick to an item and OK to open it. Manual mode is chosen from the same menu.

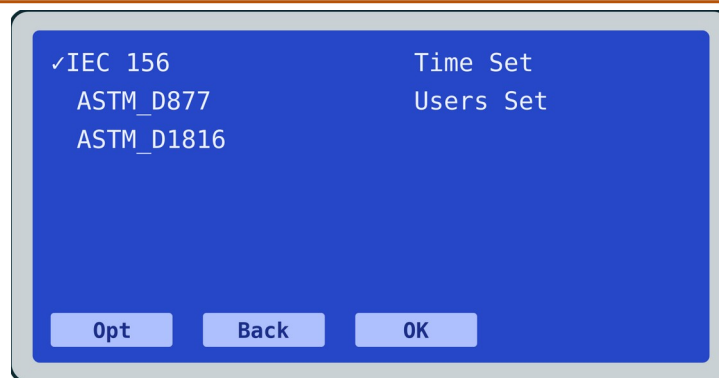


Figure 3 The setup menu

7 Running a test

Standard methods: IEC 156, ASTM D877, ASTM D1816

1. On the start screen press Setup. Press Opt to move the tick to the method, then OK (Figure 4).
2. Press Opt to move the cursor to MTV, the maximum test voltage, and set it with + and -: 10 to 80 kV in 10 kV steps, 80 kV by default.
3. Press OK to return to the start screen.
4. Set the rate selector to the rate of rise the method calls for.
5. Press Start. The instrument runs the test automatically and shows each breakdown voltage and the average (Figure 9).



Figure 4 Setting the maximum test voltage, ASTM D877 shown

IEC 156 and ASTM D1816 are set in the same way as ASTM D877.

The test cycle

In an automatic test the instrument waits for the oil to settle, then raises the voltage at the set rate until the oil breaks down. It records the breakdown voltage, removes the voltage, stirs the oil and pauses, then repeats, up to six breakdowns, and calculates the average (Figure 5).

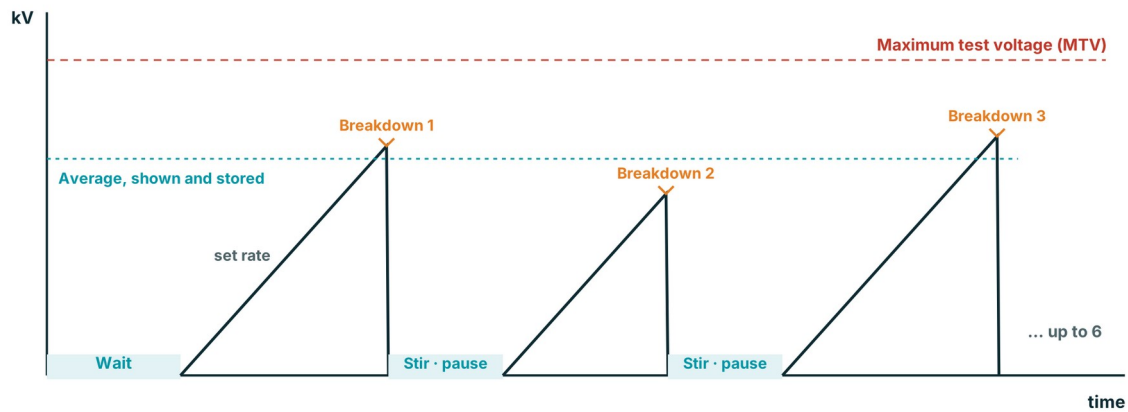


Figure 5 One automatic test: wait, then a breakdown at the set rate, stirring and a pause between breakdowns

If the voltage reaches the maximum test voltage without a breakdown, the instrument stops raising it and holds it for 50 seconds. If there is still no breakdown, the maximum test voltage is recorded as the breakdown voltage.

User method

1. On the start screen press Setup, move the tick to Users Set and press OK (Figure 6).
2. Press Opt to move the tick to each setting in turn and set it with + and –.
3. Press OK to return to the start screen, set the rate selector, and press Start.



Figure 6 The user method settings

Setting	Default	Range	Step	Meaning
Wait	15 min	1 to 15 min	1 min	Settling time before the first breakdown
Pause	5 min	1 to 10 min	1 min	Time between breakdowns
Stir	10 s	5 to 90 s	5 s	Stirring time between breakdowns
MTV	60 kV	10 to 80 kV	10 kV	Maximum test voltage
Breakdowns	6	1 to 6	1	Number of breakdowns in the test

Manual mode

1. On the start screen press Setup, move the tick to manual and press OK (Figure 7).
2. Set the rate selector. Press UP to raise the voltage. DOWN lowers it and STOP stops it.
3. When the oil breaks down, the breakdown voltage is shown (Figure 8), and the instrument removes the voltage and stirs the oil automatically.
4. There is no automatic countdown: start the next breakdown when ready. Up to six can be made; the instrument calculates the average and stores the result.
5. Press RESET to return to the start screen.

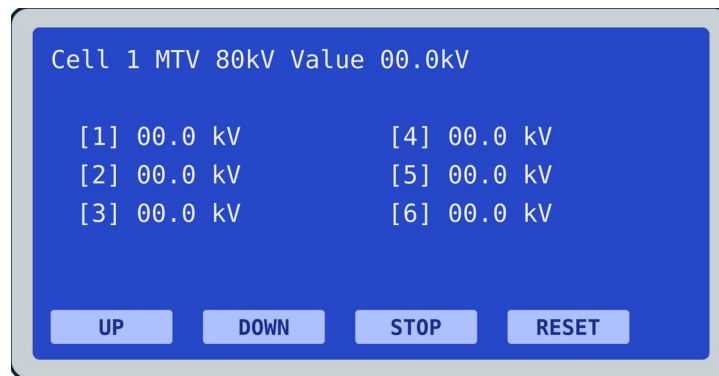


Figure 7 Manual mode, ready

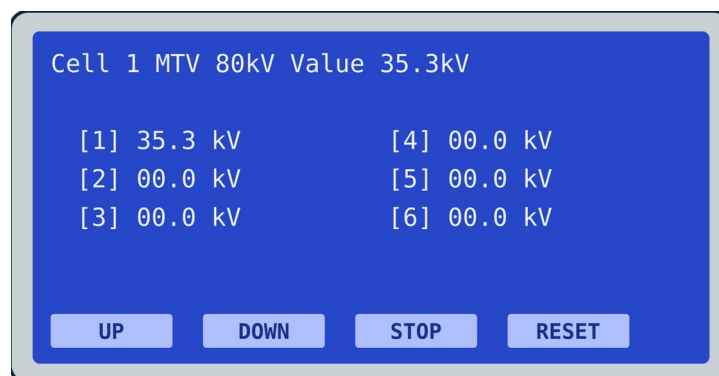


Figure 8 Manual mode after the first breakdown

8 Results, printing and stored tests

At the end of an automatic test the display shows each breakdown voltage, [1] to [6], and the average as Value (Figure 9). Press Print to print the result, or OK to return to the start screen.

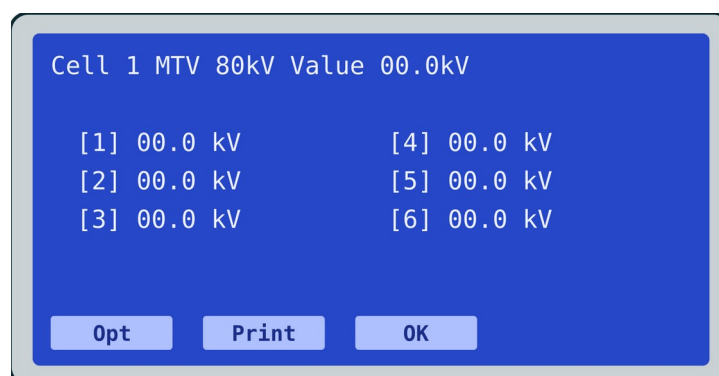


Figure 9 The result of an automatic test

Stored tests

The instrument keeps the most recent results. No. 1 is the latest, No. 2 the one before it, and so on; once the store is full, the oldest result is overwritten. Each stored result shows its breakdown voltages, the average (Value) and the date and time of the test (Figure 10).

1. From the start screen, open the stored results.
2. Press Opt to step through them, from No. 1 onwards.
3. Press Print to print the result shown, or OK to return to the start screen.

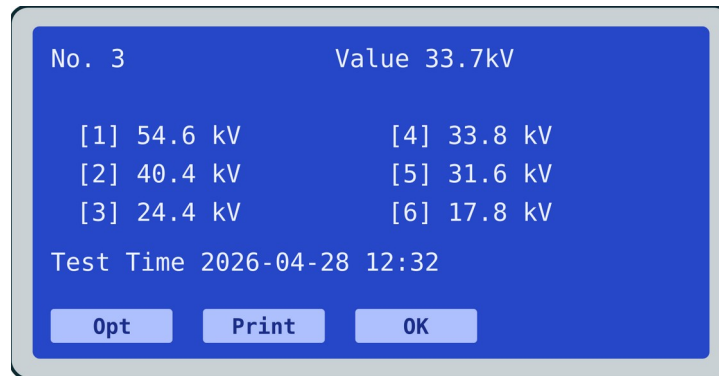


Figure 10 A stored result

Setting the date and time

Press Setup, move the tick to Time Set and press OK (Figure 11). Press Opt to move the underline to the year, month, day, hour and minute in turn, and set each with + and -. Press OK to save and return to the start screen.

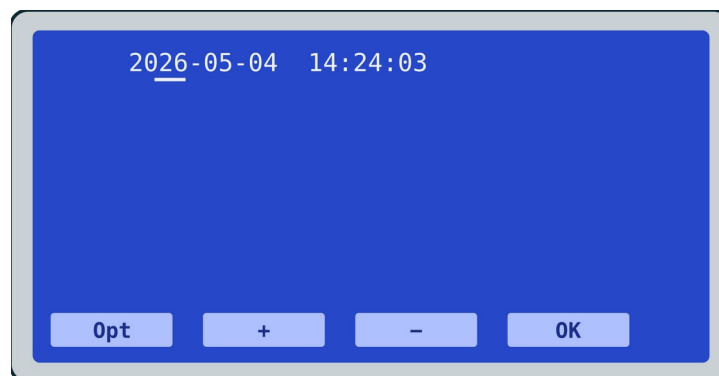


Figure 11 Setting the date and time

Care and maintenance

Test cell and electrodes

- Keep the test cells clean. When the instrument is not in use, leave some clean, qualified insulating oil in them so that they stay dry and the electrodes do not oxidise.
- Check the electrodes every month. Reset the gap to the standard value with the master gauge, and inspect the electrode faces with a magnifying glass. Clean off any dark spots with a cloth.

Cleaning the test cell

1. Wipe the electrode faces and stems with a clean cloth, several times.
2. Set the electrode gap with the master gauge.
3. Rinse the cell three or four times with absolute ethanol, then dry it with a blower.
4. Rinse the cell two or three times with insulating oil.

Cleaning the stirring paddles

1. Wipe the paddles with a cloth, repeatedly, until no particles remain. Do not touch them with your hands.
2. Holding them with the tweezers, rinse them three or four times with absolute ethanol, then dry them with a blower.
3. Still holding them with the tweezers, rinse them two or three times with insulating oil.

Changing the printer paper

1. Press the round button on the front lip of the printer to open it.
2. Put the paper roll in, with the printing side towards the print head, and pull some paper out through the slot. Keep the paper straight.
3. Close the printer lid.

Fuse

The fuse is in the power socket. Switch off and unplug the mains lead before changing it, and replace it only with a 3 A fuse of the type supplied.

Standard practice, not stated in the source manual: switching off and unplugging before changing the fuse.

Calibration

To keep the specified accuracy, the instrument should be recalibrated at regular intervals by GPS or an authorised GPS agent. We recommend a recalibration period of one year.

10 Troubleshooting

Symptom	What to check
The instrument does not work	Check that the mains lead is plugged in, and that the fuse is intact (section 9)
The voltage does not rise	Check that the test cell lid is closed
The voltage rises normally but there is no breakdown	Check the maximum test voltage (MTV) setting. The voltage stops rising at the MTV (section 7)
No result is shown after a breakdown	Check the test cell for anything other than the oil sample
The printer gives no paper	Check that there is paper in the printer (section 9)

If a fault cannot be cleared, switch off and contact GPS.

11 Supplied with the instrument

- OBV-80B instrument
- Test cell
- Mains lead
- Master gauge
- Fuses, 3 A (2)
- Stirring paddles (2)
- Tweezers
- Printer paper, one roll

- This manual, warranty card and certificate

Model	Description	Part number
OBV-80B	80 kV automatic oil dielectric tester, 1.5 kVA, built-in printer	800080

12 Warranty and service

One year from the date of purchase, subject to product registration with GPS at www.gpslimited.com/register-product. Service and technical support are available for the life of the instrument.

For service, calibration or technical support contact GPS at sales@gpslimited.com or +44 (0) 203 093 0914. Please quote the model, the part number and the serial number.