

# OTS PB and OTS AF Range

## Fully automatic insulating oil dielectric breakdown testing



- Fully compliant with international and national standards
- Full Range to suit all user needs
- Easy adjust – locking electrode gap
- Fast precision breakdown detection
- Ultra-fast HV switch off time
- Suitable for mineral, ester and silicon oils

### DESCRIPTION

Megger's range of automatic oil test sets performs accurate breakdown voltage tests on mineral, ester and silicon insulating liquids. Common across the range precision, shatter proof test vessels are easy to clean and provide repeatable results, whether they are used in the field or laboratory featuring lock in precision electrode gap setting adjustment wheels. The transparent, shielded lid and large test chamber allows easy access to the test vessel, enabling users to see what is happening within the test chamber.

All of the current test standards world wide are preloaded in the instrument for convenient automatic operation, however should a new test standard or an existing standard be amended there are 3 custom tests that can be configured to the new requirements. This enables testing to continue to cover the short period while Megger updates the test procedure files. New updated files are then downloaded by the user and installed into the test instrument via a USB memory stick / flash drive.

Test results are identified either by a serial number or asset ID and are time and date stamped. The Megger asset and data management software, PowerDB Lite, is bundled at no extra cost providing an excellent tool for downloading and printing results.

An optional internal printer provides a hard copy of results. Ink based printout ensures durability at all temperatures. USB flash drive for easy transfer of test results, external USB printer and on the AF model a barcode scanner.

User safety is paramount and Megger have designed independent and dual redundant high voltage cut-off circuitry to ensure safety. During a test the operator can terminate by pressing any button on the keyboard which will remove high voltage immediately and abort the test. The transparent lid provides ample visibility within the chamber yet is protected and electrically shielded by a screen with multiple links to instrument ground.

### OTS PB models

These 60 kV and 80 kV oil test sets are small and the lightest on the market with weight ranging from 16 kg to 23.5 kg depending on model configuration. They come complete with optional carry bag and transport case. The carry bag has pouches for electrode accessory pack, leads, quick user guide, paper roll etc. these units can be supplied mains powered only, or mains powered and battery operated for additional flexibility in portable applications. The optional batteries are NiMH, or if selecting an 80 kV model a lead acid battery can be specified. In addition, an internal 12 V DC charger and vehicle adaptor cable is standard when any battery option is fitted.

### OTS AF models

These 60 kV, 80 kV and 100 kV models have much a larger test chamber for even easier access and cleaning, particularly useful in a lab environment. They are fitted with a 12 key alpha-numeric keypad to facilitate entry of test ID, file names, notes etc. Alpha characters are entered by repetitive pressing on a key, the same way as text is entered in modern cellular telephones. The AF models also have the ability to use a USB barcode reader to scan oil sample barcode labels, ideal for better integration with a LIM system.

## APPLICATION

Monitoring and maintenance of oil quality is essential in ensuring the reliable operation of oil filled electrical equipment. Codes of practice have been established in many countries that include several different types of test on insulating oils.

One of the fundamental tests of oil quality is the breakdown voltage test, which is a measure of the oil's ability to withstand electric stress. A low breakdown voltage can indicate the presence of contaminants such as water or conducting particles.

Care should be taken to ensure the process of sampling oil and subsequent testing does not in any way contaminate it with foreign objects. Cleaning vessels between oil tests should be a rinse with the next sample, never clean with fibrous materials. To ensure an accurate reading set gap carefully and lock adjusting wheels.

## FEATURES AND BENEFITS

### COMMON ACROSS PB AND AF

- Lock in precision oil vessel - lockable gap setting
- Flat electrode gap gauges that will not damage electrodes
- Oil temperature is measured continuously so it can be determined whether the oil test sample is within the range allowed by the test standards before the test is commenced
- QVGA colour display with backlight (easy to read in sunlight or dark conditions)
- Large, easy clean test chamber with oil drain
- High visibility test chamber
- Safe operation with dual redundant micro switch
- Intuitive user interface
- Fully automatic operation with preloaded international test standards
- User configurable test sequences to cover transition period of new / updated test standards (standards maintained via USB updates from Megger)
- All instruments supplied with one 400 ml test vessel in the box as standard, unless the super user kit is specified (see below)
- Built onto rigid box section chassis the prevent flexing on impact that otherwise would damage transformer
- Unique built in chamber drain pipe for easy removal of oil accidentally spilt in test chamber, this can easily be connected to a lab waist system
- Test standards favorites list speeds up selection by only displaying the standards regularly used by the user

### OTS PB ADDITIONAL FEATURES AND BENEFITS

- Small and lightweight, lightest on the market starting at 16 kg
- Battery options for portable use

### OTS AF ADDITIONAL FEATURES AND BENEFITS

- Barcode scanning capability for oil sample ID
- Extralarge test chamber for ease of use in high productivity application
- 12 key alpha-numeric keypad to facilitate entry of test ID, file names, notes etc.

### COMMON PB AND AF OPTIONAL ITEMS

- Superuser Kit. This cost effective solution supplies everything you need to carry out effective oil testing.  
Includes:  
A 150 ml test vessel for low volume testing.  
A standard 400 ml test vessel.  
A stirrer lid with standard impellor.

Additional impellers focused on ASTM and IEC standards and even a useful guide booklet to provide essential advice on how to get the best from you new OTS , ALL FREE.  
All of this is supplied in a FREE durable Megger case to easily and safely transport your test essentials.



- Internal printer
- Voltage check unit (VCM100D/VCM80D)
- Motorised lid impeller
- 150 ml test vessel

### OTS60PB OPTIONAL ITEMS






- Factory fitted NiMH battery with 12 V charger and vehicle lead
- Carry bag
- Transport case

### OTS80PB OPTIONAL ITEMS

- Factory fitted lead-acid or NiMH battery with 12 V charger and vehicle lead
- Carry bag
- Transport case

### OTS60AF, OTS80AF and OTS100AF OPTIONAL ITEMS

- Barcode scanner (USB)

* Optional item ** IEC 60156 recommends a separate test vessel is used for each type of fluid to be tested *** Important future proof feature						
		OTS60PB	OTS80PB	OTS60AF	OTS80AF	OTS100AF
<b>Configured to order options</b>						
<b>Printer (built in) or not</b>		■			■	
<b>Internal battery fitted or not</b>		■				
<b>Mains / Line supply lead (plug)</b>		■			■	
<b>Electrode set supplied (IEC ASTM or Universal)</b>		■			■	
<b>Soft Padded carry case</b>		■				
<b>OTS Range Differentiating Features</b>						
<b>Max test voltage</b>	60 kV	■		■		
	8 kV		■		■	
	100 kV					■
<b>Power supply</b>	Lead acid battery option		■			
	NiHM battery option	■				
	Vehicle 12 V skt lead option	■				
	Mains only operation	■			■	
<b>Data management</b>	Internal test result memory	■			■	
	Download results to USB stick	■			■	
	USB stored data download	■			■	
	USB upload of assets to be tested	■			■	
	Barcode scanning capability				■	
	Keypad for easy asset ID and memo entry				■	
<b>Ruggedness</b>	Tough display and chamber lid	■			■	
	Low cost shatter proof test vessel	■			■	
	Large corner protecting rubber feet	■			■	
	Rugged non-flex construction	■			■	
<b>Transport</b>	Transport case	■*				
	Protective carry case	■*				
	Light weight (<23 kg) one man carry	■				
<b>Operating costs</b>	Low cost test vessel (Vessel of each oil **)	■			■	
	Annual full calibration	■			■	
<b>Test standards</b>	Fast favourite list selection	■			■	
	Fully automatic test sequence	■			■	
	Test standards update via USB device ***	■			■	
	Custom tests	■			■	
<b>Cleanliness</b>	Easy pour / clean vessel design	■			■	
	Large test chamber (easy access)				■	
	Test chamber spilt oil drain	■			■	
<b>Accuracy</b>	Continuous oil temperature measurement	■			■	
	Lockable thumbwheel adjustable electrode gap	■			■	
	Voltage output verification unit available	■			■	

## SPECIFICATIONS

### Test voltage

OTS60PB	0 to 60 kV rms maximum (30 kV - 0 - 30 kV)
OTS80PB	0 to 80 kV rms maximum (40 kV - 0 - 40 kV)
OTS60AF	0 to 60 kV rms maximum (30 kV - 0 - 30 kV)
OTS80AF	0 to 80 kV rms maximum (40 kV - 0 - 40 kV)
OTS100AF	0 to 100 kV rms maximum (50 kV - 0 - 50 kV)

**Voltage resolution and accuracy** 0.1 kV  $\pm 1\%$   $\pm 2$  digits

### Programmed test sequences

ASTM D 1816-04	BS EN 60156-96	SABS EN60156
ASTM D 877A-02	CEI EN 60156-95	VDE0370 part 5
ASTM D 877B-02	IRAM 2341	AS1767.2.1
IEC 60156-95	UNE EN 60156	PA SEV EN60156
	NF EN 60156	JIS C 2101-99 (M)
		JIS C 2101-99 (S)
		plus 3 custom test sequences

**Vessels** 400 ml (standard)  
150 ml (superuser pack / option)  
Carefully designed test vessels manufactured from most chemical resistant clear polymer on the market provides tried and tested reliable test results. Featuring precision electrode alignment and adjustment wheels that lock electrodes in position, the option of a 150ml vessel for low volume oil samples is also available

**Temperature measuring range** 10 °C to 65 °C  
(ASTM D877 requires oils to be within 20 °C and 30 °C)  
(IEC 60156 required oil to be within 15 °C and 25 °C)

**Temperature sensor resolution** 1 °C

**Power supply** Line voltage 85 to 265 VAC  
Line frequency 50/60 Hz

**Battery type** Lead acid 2 x 12 V 4 Ah, (OTS80PB ONLY)  
Or NiMH 24 V 2 Ah (OTS60PB or OTS80PB ONLY)

**Interface** USB 2.0 compatible  
2 x USB type-A (Flash drive, printer, other)  
1 x USB type-B (Factory use only, PC or Printer)

**Internal printer** (Option)  
Matrix impact printer  
Paper 57.5 mm wide

**External printer** Any printer with USB interface and PCL3 driver

**Protection** Dual safety micro switches on chamber cover

**Display** 320 x 240 QVGA colour display with backlight

**Operating temperature range and humidity** 0 °C to +50 °C  
80% RH at 40 °C

**Storage temperature range and humidity** -30 °C to +65 °C  
95% RH at 40 °C

**Maximum altitude** 2000 m

**Safety** Designed in accordance with IEC61010

**EMC** Light industrial IEC 61326-1 Class B, CISPR 22, CISPR 16-1 and CISPR 16-2

### Dimensions

OTS60PB	520 mm x 340 mm x 250 mm
OTS80PB	520 mm x 380 mm x 250 mm
OTS60AF	580 mm x 420 mm x 290 mm
OTS80AF	580 mm x 420 mm x 290 mm
OTS100AF	580 mm x 420 mm x 290 mm

### Weight

OTS60PB	16 kg (printer, no battery), 16.8 kg (printer, NiMH battery)
OTS80PB	20 kg (printer, no battery), 20.8 kg (printer, NiMH battery), 23.2 kg (printer, lead acid batteries)
OTS60AF	30 kg with printer option fitted
OTS80AF	30 kg with printer option fitted
OTS100AF	30 kg with printer option fitted

Test vessels 1.1 kg (400 ml and 150 ml)

**Language** English, French, German, Spanish, Chinese, Czech, Dutch, Finnish, Italian, Norwegian, Polish, Portuguese, Russian and Swedish

**Programmed test sequence overview**












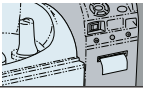



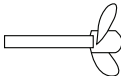


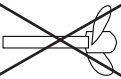


Standards complied with and programmed	Oil types tested		Electrode gap options (mm)				Electrode shape options			Oil stirring options			Voltage rise rate options			Breakdown test sequence		
	Mineral Ester HMWH	Silicon	1.0	2.0	2.5	2.54							0.5 kV/s	2 kV/s	3 kV/s	Number of tests	Initial stand time	Time between tests
IEC 60156-95	■	■		■			■			■	■	■		■		6	5 mins	2 mins
BS EN 60156-96	■	■		■			■			■	■	■		■		6	5 mins	2 mins
CEI EN 60156-95	■	■		■			■			■	■	■		■		6	5 mins	2 mins
IRAM 2341	■	■		■			■			■	■	■		■		6	5 mins	2 mins
UNI EN 60156	■	■		■			■			■	■	■		■		6	5 mins	2 mins
NF EN 60156	■	■		■			■			■	■	■		■		6	5 mins	2 mins
SABS EN 60156	■	■		■			■			■	■	■		■		6	5 mins	2 mins
VDE 0370 part 5	■	■		■			■			■	■	■		■		6	5 mins	2 mins
AS1767.2.1	■	■		■			■			■	■	■		■		6	5 mins	2 mins
PA SEV EN 60156	■	■		■			■			■	■	■		■		6	5 mins	2 mins
JIS C 2101-99 (M)	■			■			■								■	5 x 2	2 mins	1 min
JIS C 2101-99 (S)		■		■			■								■	1 x 5	2 mins (x5)	N/A
ASTM D 1816-04	■	■		■				■								5	3 mins	1 min 15s
ASTM D 877A-02	■	■							■							5	2 mins	1 min
ASTM D 877B-02	■	■								■						1 x 5	2 mins (x5)	N/A
Custom tests (x3) (Programmable)	■	■	1.0 to 7.0													5, 6 or 10	10s to 600s	10s to 600s



**ORDERING CONFIGURATION**

Example of an ordering configuration:-

OTS80PB-UK-1-A-P-5-C = This order is for an OTS80PB with UK power lead, Sealed LEAD ACID battery, ASTM electrode set, internal printer, super user kit and carry case.

Model:	<b>OTS</b>	<b>PB-</b>	-	-	-	-	-	-	-	Weight
Select a model	60 kV	60PB	↑	↑	↑	↑	↑	↑	↑	29.5 kg
	80 kV	80PB								29.5 kg
Select Power Cord		EU Lead	EU	↑	↑	↑	↑	↑	↑	
		UK Lead	UK							
		US Lead	US							
		AU Lead	AU							
		NO Plug	BL							
Battery options		Sealed LEAD ACID (OTS80PB ONLY)	1	↑	↑	↑	↑	↑	↑	3.3 kg
		NiMH (OTS60PB and OTS80PB ONLY)	2							0.8 kg
		No Battery	X							
Electrod options			ASTM set	A	↑	↑	↑	↑	↑	
			IEC set	E						
			Full set	U						
Printer			Internal printer	P	↑	↑	↑	↑	↑	0.54 kg
			No printer	X						0.08 kg
Stirrer options				Stirrer lid fitted	4	↑	↑	↑	↑	0.3 kg
				Stirrer lid not fitted	X					0.3 kg
Carry case			Carry case (PB Models only)	C	↑	↑	↑	↑	↑	1.3 kg
			No carry case	X						

## ORDERING INFORMATION

Description	Order Code	Description	Order Code
OTS60PB	Configured*		
OTS80PB	Configured*		
OTS60AF	Configured*		
OTS80AF	Configured*		
OTS100AF	Configured*		
<b>Included accessories (On all configurations)</b>			
Vessel 400 ml assembly			
12 V vehicle charger lead (OTS PB battery configurations only)			
Magnetic bead stirrers (2 off)			
Magnetic bead retriever			
User manual CD			
PowerDB Lite software			
Electrode gauge set 1, 2, 2.5, 2.54 mm	1002-144		
<b>Configured accessories (to order additional or spare)</b>			
<b>OTS IEC60156 Electrode set contents - supplied in accessory case</b>			
12.7 mm spherical electrodes (2)			
36 mm mushroom electrodes (2)			
Magnetic stirrer bar (2)			
Magnetic stirrer bar retriever (1)			
Gap gauge set	1001-477		
<b>OTS ASTM D877/D1816 Electrode set contents – supplied in accessory case</b>			
25.4 mm standard (sharp edges) cylindrical electrodes (2)			
25.4 mm non-standard (round edges) cylindrical electrodes (2)			
36 mm mushroom electrodes (2)			
Magnetic stirrer bar (2)			
Magnetic stirrer bar retriever (1)			
Gap gauge set	1001-478		
<b>Full electrode set (covers IEC and ASTM standards)</b>			
12.7 mm spherical electrodes (2)			
36 mm mushroom electrodes (2)			
25.4 mm standard (sharp edges) cylindrical electrodes (2)			
25.4 mm non-standard (round edges) cylindrical electrodes (2)			
Magnetic stirrer bar (2)			
Magnetic stirrer bar retriever (1)			
Gap gauge set	1001-479		
Vessel lid mounted impeller (ASTM D1816) for use with 400 ml vessel	1001-102		
Carry bag (padded) OTS80PB	1001-476		
Carry bag (padded) OTS60PB	1001-480		
<b>Optional accessories</b>			
Vessel 400 ml assembly (no electrodes supplied)	1001-473		
Vessel 150 ml assembly (no electrodes supplied)	1001-474		
VCM100D digital voltage checker	1001-105		
VCM80D digital voltage checker	1001-801		
Printer paper, 1 roll (MOV applies) (4 rolls supplied if printer configured)	25995-001		
Barcode reader, USB	1001-047		
Transport case (with wheels)	1001-475		
ASTM alternative propeller shaft assy	1007-153		
IEC alternative propeller shaft assy	1007-154		
Electrodes - Spherical (pair)	6220-484		
Electrodes - Mushroom (pair)	6220-580		
Electrodes - Cylindrical (pair)	6220-483		
Electrodes - Non-standard cylindrical with 0,5 mm edge radius (pair)	6220-538		
Electrode gauge set 1, 2, 2.5, 2.54 mm	1002-144		
<b>OTS Super-user kit:</b>			
400 ml vessel kit			
150 ml vessel kit			
Additional IEC impellor			
Additional ASTM impellor			
Standard impellor			
Vessel lid mounted impeller (ASTM D1816) for use with 400 ml vessel			
'Megger Guide to breakdown testing' booklet			
Oil testing application note			
Carry case	1007-467		
* See ordering configuration on previous page			

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 Johannesburg SOUTH AFRICA, Chonburi THAILAND

**CERTIFICATION ISO**  
 Registered to ISO 9001:2000 Cert. no. Q 09290

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