DANBRIDGE
DENMARK

research
production
education

12 KV NON-DESTRUCTIVE INSULATION TESTER TYPE JP12

INDICATES IONISATION VOLTAGE
SEPARATE VOLTAGE AND CURRENT METERS
MEASURES ON EARTHED OBJECTS
DESIGNED FOR CONTINUOUS OPERATION
INHERENTLY SAFE TO USE

This equipment offers considerable advantages for the testing of electrical insulation in components, materials etc. It provides an indication of the safe working voltage and in addition in many cases information may be obtained regarding the properties of the insulation. The instrument provides an audible indication of the onset of ionisation in the test object. Ionisation usually starts at a voltage well below the breakdown voltage, and the working voltage must always be below the ionisation voltage for safe operation.
The test object is not damaged during tests so that grading of components etc. may be performed in addition to the normal rejection tests.
The instrument is very useful both in the laboratory for design tests and quality inspection and in the workshops for production testing etc. It is inherently safe in operation when correctly used and is very simple to operate.

GENERAL DESCRIPTION

The insulation tester type JP12 comprises a high frequency generator supplying the test voltage. This may be varied continuously by a potentiometer up to a maximum of 12 kV dc. The output voltage is indicated on a meter with 2 ranges in order to allow accurate measurement at lower voltages.
The test voltage is fed through a screened coaxial cable to an insulated test prod. A safety switch is incorporated in the handle of the test prod. On closing this switch the high tension is switched on through a relay thus providing a maximum of safety for the operator.
A socket is provided on the instrument so that if required the relay may be operated remotely e.g. when employing a safety cage. The "low" terminal of the test voltage is earthed directly so that earthed objects may be easily tested and in addition hum disturbances are largely eliminated.
If ionisation occurs in the test object low voltage pulses are developed at the high tension terminal. These pulses are fed into a 3-stage amplifier driving a crystal-type loud-speaker. Thus even very minute discharges provide an audible noise in the loud-speaker.
The amplifier gain may be adjusted by a potentiometer to suit the local noise level.
Any leakage current in the test object may be checked by a microammeter on the front panel. Resistance may be calculated from the voltmeter and microammeter readings if required.
The instrument is of robust construction and designed for continuous use. – The instrument is inherently safe to operate, as the output current is limited to a safe value by the high generator impedance, the safety switch also reducing the risk of accidental contact with points at high tension.

SPECIFICATION

OUTPUT VOLTAGE

2 ranges 0–6 kV and 0–12 kV dc. Monitored on voltmeter. Source impedance about 10 Megohms. Max. current less than 1 mA.

CURRENT INDICATION

Leakage current indicated on built-in microammeter, 100 μA full scale. A silicon rectifier shunted across the meter provides an effective overload protection.

TEST LEADS

High tension supplied to test object by coaxial cable and test prod with built-in pressbutton switch for test voltage. Low tension lead connected to earth. Socket provided for external switch for test voltage.

INDICATION OF IONISATION

A 3-stage amplifier feeds a loud-speaker providing an audible indication of ionisation. Amplifier gain continuously adjustable by a potentiometer. An output socket provides for external indication, using phones or an oscilloscope.

VALVES

3–EF86 (American type 6267), 2–EL36 (American type 6CM5), 1–DY87 (American type 1S2A).

MAINS SUPPLY

100 to 130 volts and 200 to 260 volts, 50 to 60 c/s.

POWER CONSUMPTION

40 to 70 watts depending on output voltage.

MOUNTING

Cabinet in blue plasticcoated aluminium with front panel in light-grey enamel.

DIMENSIONS

340 wide × 240 high × 265 deep mm. (13½ × 9½ × 10½ inch).

WEIGHT

11 kilos (24 lbs).

WE RESERVE THE RIGHT TO DEVIATE FROM THIS SPECIFICATION

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A/S DANBRIDGE

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TELEPHONE: ASTA *1575
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INSTRUCTION MANUAL

12 kV Non-Destructive Insulation Tester

Type JP12

A/S DANBRIDGE
47 Brigadevej . Copenhagen S . Denmark

Instructions for use

1. Supply voltage

Check that the switch at the back of the instrument is correctly set and that the correct fuse is fitted.

2. Earthing

The instrument must - if at all possible - be earthed in order to suppress random noise and hum voltages in the test circuit. Connect the earth lead to the earth terminal on the front panel.

3. Connection of test sample

Connect one terminal of the sample to the earth terminal. The test prod applies the H.T. test voltage to the other terminal.

4. Apply mains voltage

by employing the power switch. The green pilot lamp indicates mains voltage switched on. After about one minute, the valves have heated up, and the instrument is ready for use.

5. Testing procedure

The settings of "Amplifier Gain" and "H.T. Control" should be in minima positions. Set switch "6kV - 12kV" in "6kV" position. Take the H.T.-test prod on the flexible cable and keep it in touch with the other terminal or test point of the item.

The conical test prod is terminated in a straight shank section for fixing a crocodile clip.

The "Amplifier Gain" control is turned up to a suitable position. Press the handle spring contact, this switches on the H.T. as indicated by the red lamp lighting up.

Increase the H.T. gradually by turning the H.T. control up and check the voltage and leakage currents on the meters.

The noise emitted from the loudspeaker as the applied voltage rises constitutes a "noise picture" which may be employed for evaluating the characteristics and performance of the insulation.

Ionisation Phenomena do not show a well defined threshold value, but, will commence accordingly to material constants, surface nature, measuring conditions e.g. temperature, air humidity etc. But, within a series of tests and by noticing measuring conditions one may obtain a good comparable and reproducable indication of the material tested. Therefore, a good experience and routine tests with this instrument, in each particular case, will make an outstanding help in the judgement of insulation materials.

The ionisation current flow produces a characteristic noise signal in the loudspeaker, usually beginning with a hissing noise. On increasing the H.T. the hiss will become more intense and distinct and, when going on more sharp clicks are heard. If the test voltage is made great enough the break-down limit of the material is reached. This causes the H.T. meter pointer deflection to decrease as the leakage current rises. Simultaneously a number of cracks in rapid successions are heard on the loudspeaker until at complete break-dowm the crack pulses finally crease.

For many production control tests the break-down test is usually of no interest, but the determination of ionisation "limit" solves many material problems. The break-dowm test, however, is of more interest in the laboratory during the design stages when the break-down limit must be known.

The switch "6kV - 12kV" controls the H.T. range and when switching from the lower to the higher range the H.T. control must be turned anticlockwise in order to avoid a sudden voltage rise on the test sample.

If remote operation of the H.T. relay is required e.g. when employing a safety cage the spring contact function in the handle may be replaced by applying an external switch to the coaxial connector "EXT.H.T.Switch". The external switch is connected between pin 2 and shield on the plug connector. The ext. switch may e.g. be a foot operated type. The relay operating voltage is only 6.3 V a-c.

NOTE When reducing the H.T. setting from a high value to a much lower value with the H.T. switch off, wait for at least 10 seconds before operating the H.T. switch. If the delay is too short a momentary surge voltage develops which may destroy the test object.

6. Internal Resistance

The internal resistance of the H.T. source is about 10 Megohms and provides a safe current limitation in testing procedure as well as reducing the personal risk to a minimum.

WARNING! When testing large capacitors (over ab. 1000 pF) take care of the charging voltage and short circuit the capacitor through a resistor after testing.

7. Testing insulation resistance

The insulation resistance of many materials tends to vary according to the test voltage and often too to the polarisation of the voltage applied. The insulation resistance value may be calculated from the test voltage and leakage current reading.

8. Use of phone

A headphone or c-r oscilloscope may be employed as indicator e.g. in noisy locations. The external indicator is connected between pin 2 and shield on the 4-pin plug connector. When phones are used, the instrument should always be carefully grounded and the operator must keep away from any high tension points.

Circuit Description

The circuit comprises the H.T. circuit, a 3-stage amplifier and the power supply.

H.T. unit. This consists of a 20kc-oscillator employing an output pentode tube as oscillator. A secondary winding on the tuning coil supplies a high alternating voltage. This is rectified by a vacuum diode.

The rectified d-c after filtering is fed to the test-prod. A chain of resistors totalling 60 MΩ connects the H.T. to the 100 µA monitorvoltmeter. On the 12 kV range the meter is shunted to 200 µA fullscale.

Leakage current is monitored by a 100 µA meter in the negative H.T. lead. A silicon diode is shunted across the meter to avoid damage to the meter due to short-circuits in the test-object.

The noise voltage due to ionisation in the test object is coupled to the amplifier through a 500 pF capacitor connected to the H.T. test lead. The complete H.T. unit is built into a dust-tight box to ensure reliable operation for long periods.

Amplifier. The amplifier input is shunted by a voltage-sensitive resistor which limits the input to the amplifier to a safe value in case of short-circuits in the test object.

A low-pass filter in the input circuit and a tuned rejector circuit in the cathode lead of the first amplifier stage are employed to avoid amplifier overloading due to oscillator voltage break-through.

The amplifier comprises 3 stages with a gain control between the first and second stage. The output feeds a crystaltype loudspeaker to give an audible indication of noise.

Power Supply The power transformer may be switched to either 110 or 220 volts by connecting the primary windings either in parallel or in series.

3 separate secondary windings of 140 volts each supply bridge-connected silicon rectifiers with capacitor outputs. Two of the outputs are connected in series and provide a positive supply of about 350 to 400 volts according to load. The third rectifier output provides a 150 volt negative bias.

The high tension valtage is adjusted by varying the supply voltages for the oscillator tube. These are controlled by a series regulator tube fed from the positive 400 volt supply.

The output voltage from the series regulator is controlled by varying the bias on the control grid by means of a potentiometer ("H.T. control"). The low end of this potentiometer is connected to the auxillary negative supply to enable reducing the test voltage right down to zero.

Anode voltage for the amplifier is supplied at about 200 volts by one of the rectifier outputs.

Maintance and Service

All critical components in the H.T. unit are hermetically encapsulated so that the instrument is suitable for operation even in humid environments. However, in case of prolonged exposure to high humidity during storage or transport it is adviseable to operate the instrument for one or two days continously with high tension switched off in order to eliminate any absorbed moisture.

Before dismantling the instrument, disconnect the mains supply.

Loosen the 4 screws holding the front panel. Turn instrument upside down, remove the 4 screws holding the bottom cover and remove this.
Remove the top cover by pulling the lower side panels outwards until the cover front-edge is clear of the front panel upper fixing screws. Then lift cover away.
Fasten front panel screws lightly to ensure that the control knobs are free of the front panel.

To reassemble the instrument, put on the top and bottom covers and fasten the bottom cover screws lightly. Then adjust the front panel frame so that it is flush with the top cover on all sides and tighten the top screws in the front panel.

With the instrument upside down, center the bottom cover and tighten the bottom front panel screws while pressing the front edge of the bottom cover down. Finally tighten the bottom cover screws.

Access to the H.T. unit is gained by removing the lid of the screening box.

In order to remove the complete H.T. unit, pull off the connector socket and remove the four fixing screws.

If the H.T. oscillator coil or the complete unit has been replaced, re-adjustment of the rejector circuit in the amplifier input may be necessary.

In order to check this adjustment connect a c-r oscilloscope to the phone output, set the gain control to maximum and the H.T. output to about 6kV. Adjust the preset trimmer (500 - 2000 pF) in the rejector circuit until minimum 2o kc output is obtained, as indicated on the c-r screen.

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LIST OF COMPONENTS

The components are grouped according to the respective sub-units as listed below.

1. Power supply printed circuit board.
2. H.T. generator unit.
3. Amplifier printed circuit board.
4. Front panel components.
5. Rear panel components.
6. Test prod and miscellaneous.

1. POWER SUPPLY BOARD

Complete assembly excluding V3, Part No. 89050

Capacitors

Circuit Ref.	Value	Rating V	Tol. %	Manufacturer	Type	Part No.
C8	0.2µF	600	20%	Philips	metal.plastic	40460
C9	50µF	350	-10 +50	Philips	Electrolyt.	40904
C10	50µF	350	-10 +50	Philips	Electrolyt.	40904
C11	50µF	350	-10 +50	Philips	Electrolyt.	40904
C12	50µF	350	-10 +50	Philips	Electrolyt.	40904

Resistors

Circuit Ref.	Value	Rating	Tol. %	Manufacturer	Type	Part No.
R8	*33KΩ	1W	5	Beyschlag	Carbon	45333
R11	1MΩ	1W	5	Beyschlag	Carbon	45510
R12	1KΩ	1/3W	5	Beyschlag	Carbon	43210
R13	1KΩ	1/3W	5	Beyschlag	Carbon	43210
R14	33KΩ	10W	5	Philips	WW	46260
R15	15KΩ	1W	5	Beyschlag	Carbon	45315
R16	1KΩ	1/3W	5	Beyschlag	Carbon	43210
R17	100KΩ	1/3W	5	Beyschlag	Carbon	43410
R18	4.7KΩ	1/3W	5	Beyschlag	Carbon	43247

* R8 is adjusted on test.

Miscellaneous

		Part No.
Rec. 3	Bridge rectifier Philips Type BY123	26251
Rec. 4	Bridge rectifier Philips Type BY123	26251
Rec. 5	Bridge rectifier Philips Type BY123	26251
Rel.	Relay 6,3V AC Keyswitch Type MK2	53630
Tube socket Octal for P.C. Jungbecker 845		25413
V3	Pentode output tube EL36, Philips, Mullard	54100

2. H.T. GENERATOR UNIT

Complete assembly excluding V2 Part No. 81800

Capacitors

Circuit Ref.	Value	Rating	Tol. %	Manufacturer	Type	Part No.
C1	500pF	20kV	-20 +60	L.C.C.	Ceramic	39500
C2	500pF	20kV	-20 +60	L.C.C.	Ceramic	39500
C3	500pF	20kV	-20 +60	L.C.C.	Ceramic	39500
x C4	2.5µF	64V	-10 +50	Philips	Electrolyt	40810
x C5	2.5µF	64V	-10 +50	Philips	Electrolyt	40810
x C6	4.7nF	500V	-20 +50	Philips	Ceramic	40150
x C7	0.1µF	400V	20	Philips	metal.plastic	40730
x C14	0.1µF	400V	20	Philips	metal.plastic	40730

Resistors

Circuit Ref.	Value	Rating	Tol. %	Manufacturer	Type	Part No.
R1	1MΩ	1W	5	Beyschlag	Carbon	45510
R2	1MΩ	1W	5	Beyschlag	Carbon	45510
R3	60MΩ		5	Danbridge	Special	
Alternatively						
R3	2 x 30MΩ	1W	5	Welwyn	Metal.	46261
x R4	100kΩ	1/3W	5	Beyschlag	Carbon	43410
x R5	47kΩ	1/3W	5	Beyschlag	Carbon	43347
x R6	10kΩ	1/3W	5	Beyschlag	Carbon	43310
x R7	1MΩ	1/3W	5	Beyschlag	Carbon	43510

Miscellaneous

Circuit Ref.		Part No
x L1	Filter choke 1omH Manufacturer Prahn	428oo
x Rec.1	Germanium diode OA81 Philips, Mullard	26loo
T1	Fil. Transformer J. Schou	61oo4
T2	H.T. Transformer Danbridge (H.T. Coil	92550
	(Grid Coil	92551
	(U-core set	361lo
V1	H.T. Rectifier tube DY87, Telefunken	543oo
V2	Output pentode EL36, Philips, Mullard	541oo
Printed circuit board incorporating components above marked x		89052

3. AMPLIFIER BOARD

Complete assembly excluding V4, V5 and V6, Part No. 89051

Capacitors

Circuit Ref.	Value	Rating V	Tol. %	Manufacturer	Type	Part No.
C15	25µF	3oo	-1o +5o	Philips	Electrolyt	4o9o3
C16	25µF	3oo	-1o +5o	Philips	Electrolyt	4o9o3
C17	25µF	3oo	-1o +5o	Philips	Electrolyt	4o9o3
C18	22opF	5oo	1o	Philips	Ceramic	4o1oo
C19	22opF	5oo	1o	Philips	Ceramic	4o1oo
C2o	1onF	5oo	-2o +5o	Philips	Ceramic	4o16o
C21	22opF	5oo	1o	Philips	Ceramic	4o1oo
C22	o,1µF	4oo	2o	Philips	Metall.plastic	4o73o
C23	1onF	5oo	-2o +5o	Philips	Ceramic	4o16o
C24	o,1µF	4oo	2o	Philips	Metall.plastic	4o73o
C25	1onF	5oo	-2o +5o	Philips	Ceramic	4o16o
C26	o,1µF	4oo	2o	Philips	Metall.plastic	4o73o
C27	2oo-1ooopF			Bulgin	Mica Pre-set	41o5o

Resistors

Circuit Ref.	Value	Rating	Tol. %	Manufacturer	Type	Part No.
R23	1okΩ	1/3W	5	Beyschlag	Carbon	4331o
R24	1okΩ	1/3W	5	Beyschlag	Carbon	4331o
R25	2.2kΩ	1/3W	5	Beyschlag	Carbon	43222
R26	1ookΩ	1/3W	5	Beyschlag	Carbon	4341o
R27	1MΩ	1/3W	5	Beyschlag	Carbon	4351o
R28	22okΩ	1/3W	5	Beyschlag	Carbon	43422
R29	1ookΩ	1/3W	5	Beyschlag	Carbon	4341o
R3o	1MΩ	1/3W	5	Beyschlag	Carbon	4351o
R31	1ookΩ	1/3W	5	Beyschlag	Carbon	4341o
R32	1okΩ	1/3W	5	Beyschlag	Carbon	4331o
R33	33kΩ	1/3W	5	Beyschlag	Carbon	43333
R34	2.2kΩ	1/3W	5	Beyschlag	Carbon	43222
R35	2.2kΩ	1/3W	5	Beyschlag	Carbon	43222
R36	1MΩ	1/3W	5	Beyschlag	Carbon	4351o
R37	2.2kΩ	1/3W	5	Beyschlag	Carbon	43222
R39	1MΩ	1/3W	5	Beyschlag	Carbon	4351o

Miscellaneous	Part No.
L2 Tuning coil, Danbridge	9253o
V4, V5, V6 Pentode tube EF86, Philips, Mullard	542oo
VDR2 Voltage dependent resistor type E299DD/P3o Philips, Mullard	46ooo
3-Noval tube sockets, manufacturer Jungbecker	2543

4. FRONT PANEL COMPONENTS

Circuit Ref.	Part No.
M1 Moving coil meter 95μA "kV" Manufacturer Jensen Electric	42655
M2 Moving coil meter looμA "μA" Manufacturer Jensen Electric	42656
Printed circuit board on M1 complete	89o53
Components mounted on above board	
R19 Resistor, carbon adjusted on test	
R2o Resistor, carbon lookΩ 1/3W 5% Beyschlag	4341o
R21 Resistor, carbon lookΩ 1/3W 5% Beyschlag	4341o

Printed circuit board on M2 complete		Part No. 89o54
Components mounted on above board		
R22 Resistor carbon 1kΩ 1/3W 5% Beyschlag		Part No. 4321o
Rec.2. Silicon diode OA2o2, Philips, Mullard		Part No. 2615o
PL1	Pilot lampholder red Bulgin	Part No. 412o2
	Pilot lamp Philips 6.3V/o.3A	Part No. 3357o
PL2	Pilot lampholder green Bulgin	Part No. 412o3
	Pilot lamp Philips 6.3V/o.3A	Part No. 3357o
Sw.1	DPST Switch "6/12kV" Torotex	Part No. 2oo8o
Sw.4	DPST Switch "Power" Torotex	Part No. 2oo8o
R38	Potentiometer "Gain", Carbon, 1MΩ, log. Ruwido	Part No. 5159o
R1o	Potentiometer "H.T. Control" WW lookΩ 4W Colvern	Part No. 5158o
R9	Resistor, Carbon 82kΩ, 1W, 5%, Beyschlag	Part No. 45382
	(Mounted on SW1)	
C13	Capacitor, oil, 5nF/2kV Jensen	Part No. 4o42o
VDR1	Voltage dependent resistor E298 ZZ/o6	Part No. 46oo1
	(C13 & VDR1 mounted on SW.4)	
	Phone socket, 3 pole socket	Part No. 25o15
	Ext. H.T. switch socket, 4 pole socket	Part No. 25o17
	Loudspeaker crystal type	Part No. 3466o1
	Knob for Gain & H.T. Control	Part No. 381o3

5. REAR PANEL COMPONENTS

Circuit Ref.		
T3	Power Transformer, Manufacture J.S.	Part No. 61oo3
SW.3	Voltage switch, Manufacture Schurter	Part No. 5780o
Fuse Holder, manufacture TS		Part No. 55900
Fuse 5 x 2omm, slow	(115V : 1A	Part No. 55914
	(23oV : o.5A	Part No. 55912
Power Socket		Part No. 25ooo

6. TEST PROD AND MISCELLANEOUS

Test prod complete with cable	Part No. 9316o
Mains lead with chassis plug	Part No. 8716o
Plug connector for phone	Part No. 25o16
Plug connector for Ext. H.T. switch	Part No. 25o18

Test Prod. H.T.
R1 1M/1 W
R2
C2 500p 20kV
C3
C1 500p 20kV
V1 DY 87
Top
T1 6,3/1,4V
T2
H.T. GENERATOR Assembly 81800
R3 60M
C14 0,1µ
R4 100k
OA81 Rec 1
C4 2,5µ
C5 2,5µ
R5 47k
- 1,5V
Print 89052
L1 10mH
C6 4,7n
R7 1M
R6 10k
FX1 Top EL36 V2
+ 200V
+ 115V
C7 0,1µ
R8 33k adj 1W
+360V
POWER SUPPLY Print 89050
FX2 Top V3 EL36
R13 1k
R11 1M 1W
R12 1k
R9 82k 1W
SW.1 6/12kV
R10 100k 4W "H.T. CONTROL"
R14 33k 8W
R15 15k 1W
C8 0,2µ 600V
C9 50µ/350V
R16 1k
R17 0,1M
Rel.
-150V
R19 adj.
M1 95µA "kV"
Print 89053
R20 100k
SW.1 6/12kV
R21 100k
OA202 Rec 2
Print 89054
M2 100 µA "µA"
R22 1k
PL1 6,3V/0,15A Red
+ 175 V
AMPLIFIER Print 89051
R23 10k
R24 10k
R25 2,2k
R26 100k
R27 1M
C15 25µ/300V
R28 220k
R30 1M
C16 25µ/300V
R29 100k
C17 25µ/300V
+ 120V
+ 65 V
+ 80V
V4 EF86
V5 EF86
V6 EF86
C19 220p
R31 100k
C18 220p
R32 10k
C20 10n
R33 33k
C21 220p
+ 1,3 V
+ 1,3 V
+ 2,0V
R34 2,2k
C22 0,1µ
C23 10n
R35 2,2k
C25 10n
R36 1M
R37 2,2k
C24 0,1µ
C26 0,1µ
R39 1M
VDR 2 E299 DD/P340
L2 20mH
C27 200 - 1000p
R38 1M "GAIN"
Phone Socket
Shield
2
Loudspeaker
2
SW. 2
Ext. H.T. Socket
Test prod. Contact
Shield
DC voltages mea
230V power sup

H.T. GENERATOR
Assembly 81800

POWER SUPPLY
Print 89050

V1 DY 87 Top
T1 6,3/1,4V
T2
C3
C14 0,1µ
R4 100k
OA81 Rec 1
C4 2,5µ
C5 2,5µ
R5 47k
- 1,5V
Print 89052
L1 10mH
C6 4,7n
R7 1M
R6 10k
FX1 Top EL36 V2
C7 0,1µ
+ 200V
+ 115V
R8 adj 33k 1W
+360V
FX2 Top V3 EL36
R13 1k
R11 1M 1W
R12 1k
R9 82k 1W
SW.1 6/12kV
R10 100k 4W "H.T.CONTROL"
R14 33k 8W
R15 15k 1W
C8 0,2µ 600V
C9 50µ/350V
C10 50µ/350V
C11 50µ/350V
C12 50µ/350V
Rec 3 BY 123
Rec 4 BY 123
Rec 5 BY 123
140V
140V
140V
R16 1k
R17 0,1M
Rel.
R18 4,7k
-150V
6,3V
PL1 6,3V/0,15A Red
PL2 Green 6,3V/0,15A
6,3V
+175V

T3
115V
SW.3
115V
230V
115V
SW.3
FUSE 115V/1A SLOW 230V/0,5A
VDR1 E 298 ZZ/06
C13 5n/2kV~
SW.4 POWER
115/230V~

OA202 Rec 2
Print 89054
M2 100 µA
„µA"
R22 1k
R20 100k
R21 100k

R23 10k
R24 10k
R25 2,2k
R27 1M
R28 220k
R29 100k
R30 1M
C15 25µ/300V
C16 25µ/300V
C17 25µ/300V
+65V
+80V
V5 EF86
V6 EF86
C18 220p
C19 220p
C20 10n
R32 10k
+1,3V
+2,0V
R35 2,2k
R36 1M
R37 2,2k
C23 10n
C24 0,1µ
C25 10n
C26 0,1µ
R39 1M
R38 1M „GAIN"

2
Ext. H.T. Socket
Shield
SW.2
Test prod. Contact

Phone Socket
Shield
2
Loudspeaker

DC voltages measured to ground terminal with 230V power supply and H.T set to 12kV.

83600
NON DESTRUCTIVE INSULATION TESTER

Tegn: B.Lehnē 16-1-67
Konst: V. Jensen 16-1-67

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