DT-P type

- AC dielectric strength tester from 1, 5, 10, 15, 20, 30, 40, 50, 60, 80, 100, 120, 130, 150, 180, 200, ... to 400 kVAC (maximum power 500 kVA)
- DC dielectric strength (option)
- Single ramp or multi ramp testing
- Voltage and current permanent monitoring
- Burning mode, duty cycle, compensation (option)
- RS232C interface (option)
- Control software (option)

THE DT SERIES -P TYPE IS AN AC HIGH VOLTAGE TESTER (ALSO CALLED AC DIELECTRIC TEST SET, AC HIPOT TEST SET, HIGH VOLTAGE TEST SET, AC DIELECTRIC STRENGTH TESTER), CONTROLLED BY A PROGRAMMABLE MODULE. OUR AC DIELECTRIC TEST SYSTEMS CAN BE PRESENTED AS A SINGLE RACK UNIT WITH OR WITHOUT CAGE, OR SEPARATED UNITS (CONTROL ON ONE SIDE, TRANSFORMER ON THE OTHER SIDE) ACCORDING TO THE MAIN INTERNATIONAL STANDARDS

TYPICALLY, THOSE TESTERS ARE USED IN TEST LABORATORIES, PRODUCTION LINES AND HIGH SPEED PRODUCTION LINES, FOR TESTING CABLES, CAPACITORS, MOTORS, ELECTRICAL MODULES, SWITCHGEAR, INSULATING MATERIALS, CONNECTORS, RELAYS, TRANSFORMERS, BUSHINGS, FUSES, ARRESTORS, BUS BARS, … IN ORDER TO COMPLY WITH IEC 60060 STANDARD

TECHNICAL CHARACTERISTICS

AC voltage (ref. S)	AC current	DC voltage (ref. R)	POWER
from 1 kV to 400 kV	from 1 mA to 200 A	from 1 kV to 400 kV	from 0.5 to 400 kVA
Each tester is coiled depending on voltage and current selection in order to keep our low cost policy See our "guide for quotation" on page 6 of this technical file			

DIELECTRIC STRENGHT TEST FUNCTION (AC voltage)

Output voltage
- adjustable from 10% to 100% of Umax

Rise speed
- adjustable in kV/s

Current threshold
- adjustable from 1% to 100% of Imax

Short-circuit current
- approx. 9 x In at maximal voltage

Test time
- adjustable from 1 and 32000 seconds (0=unlimited test time)

Reading ranges
- xxx,xx kV, xxx.x mA, x,x kV/s, xxxxx s
- resolution U, I : 1750 points

Voltage regulation
- <1% of the full scale

Accuracy
- guaranteed accuracy : 1% of the full scale
- typical accuracy : 1% of the measurement from 10% to 100% of the full scale
- we can provide optional ranges for use lower than 30% of the full scale

Breakdown indication
- by visual signal (BUZ in option)
- breakdown voltage and current are stored on the LCD display

Storage
- 20 test parameter (voltage, threshold, time…) sets can be stored or recalled

DIELECTRIC STRENGHT TEST FUNCTION (DC voltage)

In option
- see the option list below for available external diodes or ask us for filtered DC (standard ripple is 10% peak to peak of Umax @ 10mA)

PROTECTIONS & SAFETY FEATURES

Operator security

Compliant with the level 4 of the European directive for dangerous machines
- double safety loop which can be used with safety devices
- emergency stop button on the front panel
- high voltage signal with external output (for connection of lamps, buzzer, ..., see option list)
- zero-start interlock

Device under test
- fast breakdown detection (10ms)
- HV primary cut off (60 ms)

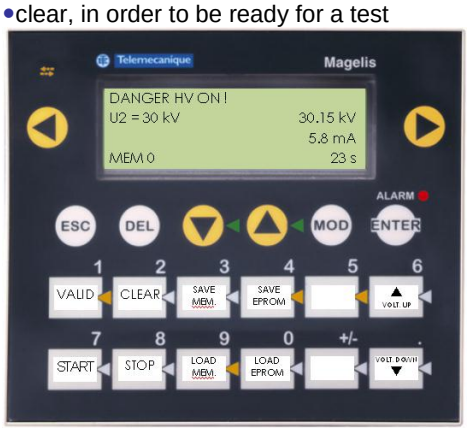
UTILIZATION

Possible settings before the test

- range selection (option)
- current threshold
- rise speeds V1 and V2
- voltage levels U1 and U2 (see possible ramps in the sequence function section)
- voltage steps deltaU between intermediate levels (see the sequence function section)
- T1 timer for U1 and intermediate levels (see the sequence function section)
- T2 timer for U2 and intermediate levels (see the sequence function section)

Possible commands during the test (with function keys)

- start /stop the test
- increase/decrease the voltage (manual mode)
- clear, in order to be ready for a test



After the test is finished or if a breakdown occurs

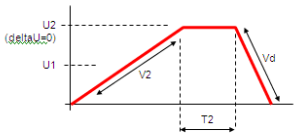
- the test results are displayed on the screen with the last recorded measurement

SEQUENCE FUNCTION

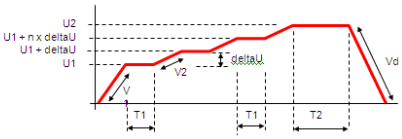
Programmable sequence

- the below sequence types are available :

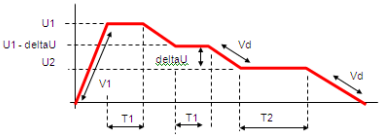
Simple cycle :



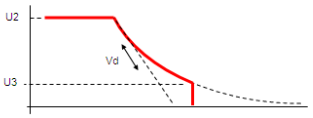
Rising by steps:



Falling by steps:



Falling speed in DC:



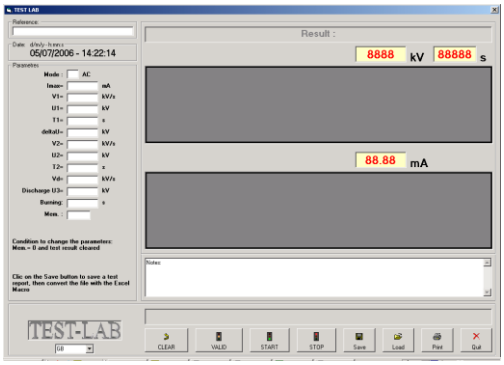
Manual sequence

- there is also the possibility to manually rise/decrease the voltage with the front panel joystick

REMOTE CONTROL SOFTWARE

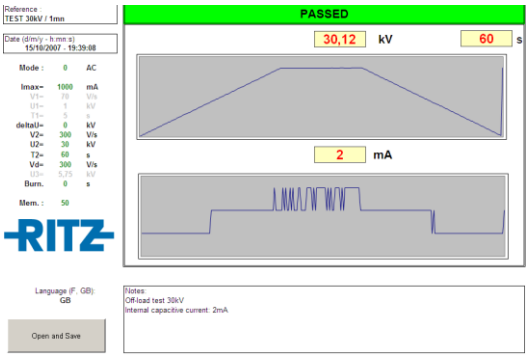
Application software

- software for DT series - works with RS232 interface
- control, visualization, graphics and records



Main DTMGPRO features :

>Traceability to Microsoft Windows™ Excel, Word, Access and SQL (option)
>Multi lingual software (english, français, german, español) + 1 customizable language



Operating temperature

- indoor, from 10°C to +35°C (lower temperatures or outdoor on request)

Operating altitude

- < 1000m

Storage temperature

- -10°C to +50°C

Over-voltage category

- CAT II

Pollution degree

- 2

Safety class

- Class I (earth connection)

GENERAL DESIGN

According to voltage and power specifications, 3 designs are available :

SINGLE RACK UNIT

Built-in HV unit (B model)
Mostly used for air insulated HV units < 30kV
- single unit with integrated transformer
- HV output through shielded cable to an external safety cage
- optional safety cage on demand (consult us with dimensions and weight of the device under test)

B model

SEPARATED UNITS

Separated Units (SU model)
Mostly used for oil insulated HV units > 50kV
- control unit connected through cables to the HV unit
- optional safety cage on demand (consult us with dimensions and weight of the device under test)

SU model

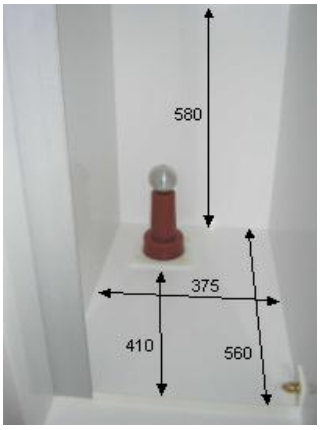
CABINET WITH CAGE

Cabinet with Cage (C model)

Compact design adapted to small devices under test <70kV and <5kVA (Specify dimensions and weight of the device under test for higher power or voltage)

- cabinet with cage (control + transformer in the same cabinet)

Typical dimensions:



C model

CONTROL UNIT DETAILS

- mains switch ❶
- PLC operator's panel ❷
- red lamp for "High Voltage ON" indication ❸
- green lamp for "Stand-by" indication ❹
- emergency stop button ❺

Wiring terminals

- IN/OUT terminals (safety loop, lamps, communication cables, ...)
- power terminals
- ground screw

Example of DT 15 kVAC, 400 mA, programmable (pult desk presentation, option)

HIGH VOLTAGE TRANSFORMER DETAILS

- high voltage output with anti corona ring (>70kV), anti corona bowl (from 30 kV to 70 kV), nut terminal (<30kV) or high voltage cable depending on power and voltage ①
- ground screw ②
- oil temperature protection ②
- 5 meters of interconnection cables (for separated units version)

HIGH VOLTAGE OUTPUT ON ANTI CORONA BOWL

HIGH VOLTAGE OUTPUT ON ANTI CORONA RING

HIGH VOLTAGE OUTPUT ON FIX TERMINAL

HIGH VOLTAGE OUTPUT ON HIGH VOLTAGE CABLE
(first picture is the output from the transformer, second one the ending)

GUIDE FOR QUOTATION

THE INFORMATION WE NEED

VOLTAGE	► AC and/or DC voltage ?
CURRENT	► I_{AC} = UCω (with ω=2ΠIf) or I_{DC} = CU/t (t=rise time)
PRESENTATION	► C model (with integrated safety cage), B model (with built-in transformer), or SU model (with separated transformer and control unit) ?
APPLICATION	►what is your device under test ?

ONCE WE HAVE THIS INFORMATION, WE CAN PROVIDE YOU A QUOTATION WHICH WILL HAVE THE TYPICAL BELOW REFERENCE

DT	-U	-I	-S or SR	-P	-C/B/SU
Type of tester	Voltage (in kV)	Current (in mA)	S:AC voltage (S:sinus) R:DC voltage (R:rectified)	P:Programmable model	C:with cage B:with built-in transformer

EXAMPLES
DT with 30kVAC, 100 mA, Programmable version presented in 1 single rack, without a safety cage
Ref. DT-30-100-S-P-B

DT with AC: 100kV 20 mA , DC: 141 kV (100x√2) 10mA (standard DC current), Programmable version presented in 2 separated racks, without a safety cage
Ref. DT-100-20-SR-P-SU

DT with 40kVAC, 40 mA, Programmable version presented in 1 single cabinet, with a safety cage
Ref. DT-40-40-S-P-C

DT with 250kVAC, 20 mA, Programmable version presented in 2 separated racks, with variable compensation, without a safety cage
Ref. DT-250-20-SVK-P

OPERATING MODES

DELIVERED AS DEFAULT, OUR HV TEST SETS ARE WITHOUT THE BELOW OPTIONS. THEY CAN BE RUN WITHOUT LIMITATION OF TIME, WITH THE MAXIMUM CURRENT AVAILABLE ON THE WHOLE RANGE.

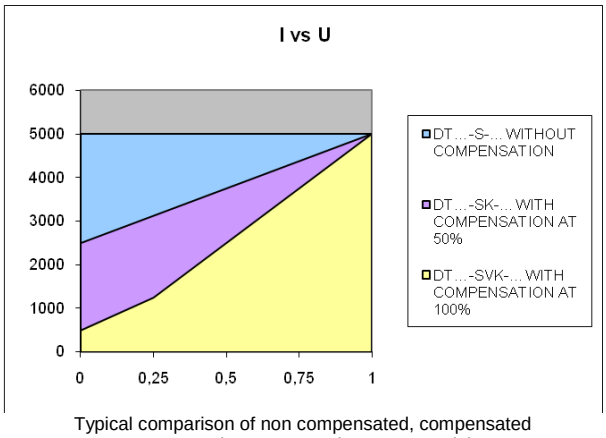
DUTY CYCLE

•definition : duty cycle is the proportion of time during which the power is generated. It is expressed in time Ton and Toff (cooling time). Our PLC program calculates automatically the maximal Ton regarding to the output current and the ratted power of the transformer. Then the cooling time Toff is calculated proportionally to the maximal current and test time of the precedent cycle.
The result of time calculations is proportional to I^2.
Example: a system designed for 25% of duty cycle: Ton/(Ton+Toff) =0.25 can deliver a constant current equal to 0.5 x Imax. 0.5^2=0.25 here the current rating is equal to the time ratio.
•advantage : Optimized weight and price of the HV transformer. This makes a cheaper solution
•disadvantages : the tester cannot be used continuously at its maximal current, like for life test for instance

COMPENSATION (K or VK option)

Available for capacitive load only
•**K** Definition : 50% of the maximal load power is compensated with an internal inductance.
•**VK** Definition : 0 to 100% of the maximal load power is compensated with internal inductance
Automatic or manual selection per steps of 6.6%

•advantages : this makes a cheaper solution, smaller in volume, lighter in weight and lower consumption
•disadvantage : the available current varies proportionally with the output voltage



Typical comparison of non compensated, compensated at 50%, and compensated at 100% models

BURNING MODE (see “br” and “brp” option)

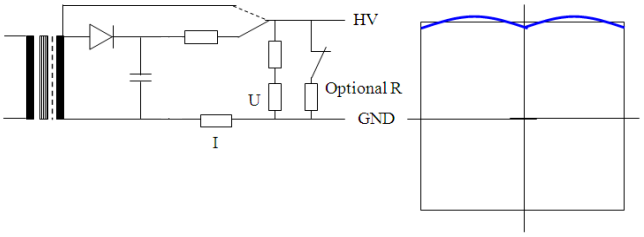
•definition : the burning mode is dedicated to burn a default in your device under test. This makes the visual or instrumented localization easier.
•the voltage regulator is by-passed through a limitation impedance so that the maximal voltage is applied at the output. The short-circuit current limited at approx. 9 x In is generated during the programmed burning time (from 0.2s up to 1s).
•with “brp” the limitation impedance is designed to allow a permanent burning with a low short-circuit current.
The operator controls manually the current output to check the good short-circuit condition at low voltage that permit to use a default localizer.

DC OPTION

•Sefelec offers 2 types of DC option

DOUBLE WAVE RECTIFIED/FILTERED DC (R OPTION)

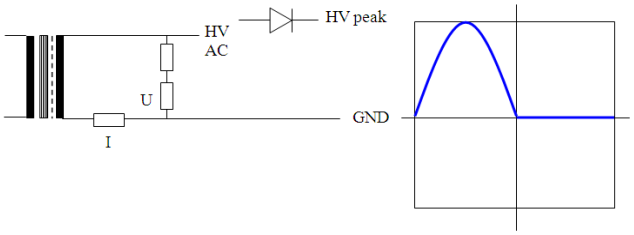
•definition : high voltage double wave rectifier, filtered. In addition, a discharge resistor (optional R)can be integrated if the device under test cannot accept a direct short-circuit with the grounding relay (this voltage discharge level
can be anyway adjusted) ; see discharge relay option (ref. DR))



•advantage : Real DC filtered at 10% peak to peak of Umax @ 10mA
fully automatic and integrated inside the transformer ;
Real DC measurement
•disadvantages : this makes a more expensive solution, and a heavier system

EXTERNAL DIODE OPTION (see D and DR OPTION)

•definition : high voltage single wave rectifier (DR types including limitation resistors) is designed to be mounted at the HV output. The ratted DC current is limited to 0.45 x the AC current of the DT and must be lower than 50mA DC, (DT < 1A AC). A discharge system MUST be associated when the rectifier is used.



•advantage : Cheaper and lighter solution.
•disadvantages : No real voltage measurement (calculated display = AC x √2); it has to be mounted manually: risk of operator error ; discharge relay system (ref. KD) is recommended but the discharge voltage can not be controlled.

OPTIONS

DR OPTIONS

DR20**
Rectifier 22kV peak 1kOhm available for voltage lower than 16kV AC

DR30**
Rectifier 30kV peak 2kOhm available for voltage lower than 21kV AC

DR45**
Rectifier 45kV peak 3kOhm available for voltage lower than 32kV AC

D70**
Rectifier 70kV peak available for voltage lower than 50kV AC

D100**
Rectifier 100kV peak available for voltage lower than 70kV AC

D142**
Rectifier 142kV peak available for voltage lower than 100kV AC

D280**
Rectifier 283kV peak available for voltage lower than 200kV AC

****HV single-wave rectifiers.**
DR types, including limitation Resistors, are designed to be mounted at the HV cable end.
D types, without limitation resistor, are designed to be mounted without HV cable.
The ratted DC current is limited to 0.45 x the AC current of the DT and must be lower than 50mA DC.
The ratted AC current must be lower than 1A AC.
CAUTION! A discharge system MUST be associated when the rectifier is used.

Br
(Only available for DT with power <10KV)
Burning: current would be 9 x In (In : nominal current) during an adjustable time from 0.2s up to 1s

Brp
Permanent burning limited lower or equal than the nominal Current

60Hz (it60Hz)
Specify this ref. if the mains your require for powering DT is in 60 Hz

2F
If the DT tester has to be used on a mains of 50 Hz or 60 Hz, we can store with this option 2 calibration ranges in voltage and current for 50 Hz and 60Hz

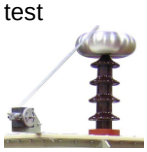
CNT
Ground continuity test : A test point must be connected to the ground to authorize the H.V. generation

BS2
Additional connector for external safety loop

2u
Additional voltage range 25%

V12, V6
Replacing standard speed 24s / 110% f.s. :
Speed 12s, regulation 2% or speed 6s, regulation 3%

KD
External grounding relay, for discharging the device under test



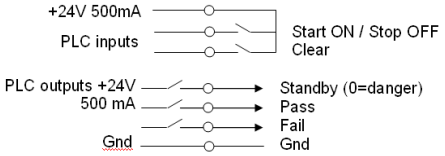
DISRES
Discharge resistor (for DC testing) to be quoted according to DUT stored energy. consult with us in order to get a quote

Pi (itoptrs232)
RS232 interface (cable and opto-bridge provided) delivered with TestLab software for Control, Visualization and Result traceability / only works uner Windows XP and available in french and english

Soft (itsoftware)
Control software for DT tester range ; visualization, curves, and records are available. Import macro for Excel.

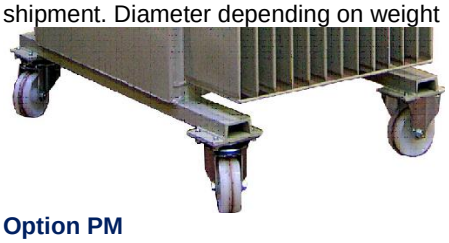
E/S ANA
Analog input/output 0-10V

E/S TOR
1 contact input: Clear/Valid/Start/Stop
2 contact outputs (+24Vdc 300mA): Standby, Pass/Fail

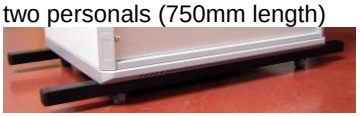


OPTIONAL ACCESSORIES

TW...
Wheels for transformer, provided with dedicated screws, but not mounted for shipment. Diameter depending on weight



Option PM
Handles for handling by two personals (750mm length)



CLV
Additional shielded cable for testing <15kVAC. Termination is made on moulded output. Connection on the moulded output can be made by 4 mm banana

CHV
Additional unshielded cable for aerial link, for testing >15kVAC. Termination is made on each side on 4mm.

CRO
30mm crocodile clamp mounted on the output cable ending

FE
Flash light fixed on the control unit. Activated at the power-up

FEM
Flash light with magnetic support and cable <10m with connector. Activated at the power-up

BUZ
Buzzer with specific sound signal for Start/Pass/Fail

BAU
Emergency stop box with connector and cable < 20m

BPO
"Operator" button in serial with the safety loop (if button is released, then test stops immediately)

OV (itoption21)
HV return wire (potential earth) black wire 6mm2. Do not use yellow/green wire to make a good identification of this cable that must be wired the shortest as possible to the ground plug of the HV source.

LM
Green/red light column (acting like the front panel red/green lights) to indicate the high voltage presence ; remote version with magnetic support and cable <10m with connector

CALIBRATION

WE HAVE A WIDE RANGE OF CAPACITIVE OR RESISTIVE HV DIVIDERS WE CAN OFFER WITH ALL OUR TESTERS. COUPLE OF THEM BELOW

DIV-45kV
45kV AC HV dividers for calibration along with accessories


DIV-15kV
15kV AC HV dividers for calibration along with accessories


DIV-600kV
600 kV DC HV dividers for calibration along with accessories


TYPICAL APPLICATIONS

TRAIN TESTING

•Typically , train manufacturers or companies making maintenance for railway industry (train, tramway, metro, ...) are testing the high voltage line of trains at 3 times the voltage of the line. In our example we test a 25kVAC high voltage line, which means the test has to be done at 75 kV AC, according to the EN50353, chapter 8.2.2 and IEC-60077-1 chapter 9.3.3.3 standards.

In this example is shown a high voltage DT tester 75 kV AC, 1 A, with variable compensation, programmable (ref. DT3-75-1000-SVK-P).
In order to proceed to the test, they remove the locomotives and then have access to the high voltage line connecting 11 cars (total length : 184 meters).
In some cases they test car per car, then the length of the high voltage line is reduced and less current is needed.
The inductive compensation is automatically adapted to the load.

TEST OF ASSEMBLIES FOR ENERGY APPLICATION

•Typically , power elements have to be tested in high voltage. Typically : switchgear, capacitors, motors, insulated materials, bushings, bus bars, transformers, bushings, fuses, arrestors, cables, switching and protection solutions for electrical distribution systems, ...

In this example is shown a high voltage DT tester 80 kV AC, 50 mA, programmable (ref. DT2-80-50-S-P)

TEST OF

•Typically , power elements have to be tested in high voltage. Typically : switchgear, bus bars, transformers, bushings, fuses, arrestors, cables, switching and protection solutions for electrical distribution systems, ...

In this example is shown a high voltage DT tester 100 kV AC, 80 mA, programmable (ref. DT2-100-80-S-P)

Specifications subject to change without notice

www.sefelec.com

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