

MEGOHMETER



DESCRIPTION:

PPCS has availability of several equipment for check and testing on power and optical cables. Such equipment are used both after installation and during laying operations. Applying this control instruments, PCS guarantee the cable proper functioning and the accurate job execution.

Megger is a not ageing test of the cable; such equipment verify the cable insulation. The PCS megohmmeters are portable units, fitted into a rugged construction site casing with cover, operating on battery and on AC current

The test with Megger has to be done before start up, lay down, after each pull-in and from switch box to switch box.

TECHNICAL DATA

Models:

N. 4 C.A.6547 "CHAUVIN ARNOUX"

Insulation measurements:

- ✓ 500V – 2TΩ
- ✓ 1000V – 4TΩ
- ✓ 2500V – 10TΩ
- ✓ 5000V – 10TΩ

OTDR - Optical time-domain reflectometer

Basic Equipment Datasheet



DESCRIPTION:

PCS has availability of several equipment for check and testing on power and optical cables. Such equipment are used both after installation and during laying operations. Applying this control instruments, PCS grants the proper cable functioning and the accurate job execution.

An optical time-domain reflectometer (OTDR) is an optoelectronic instrument used to characterize an optical fiber and to provide the suitable information concerning fibre length and dispersion values that shall be respected. An OTDR is the optical equivalent of an electronic time domain reflectometer.

Test procedure for non-destructive testing of optical fiber cable has to be made prior to start-up / laydown, after each pull-in and for system testing after connections – junction box to junction box.

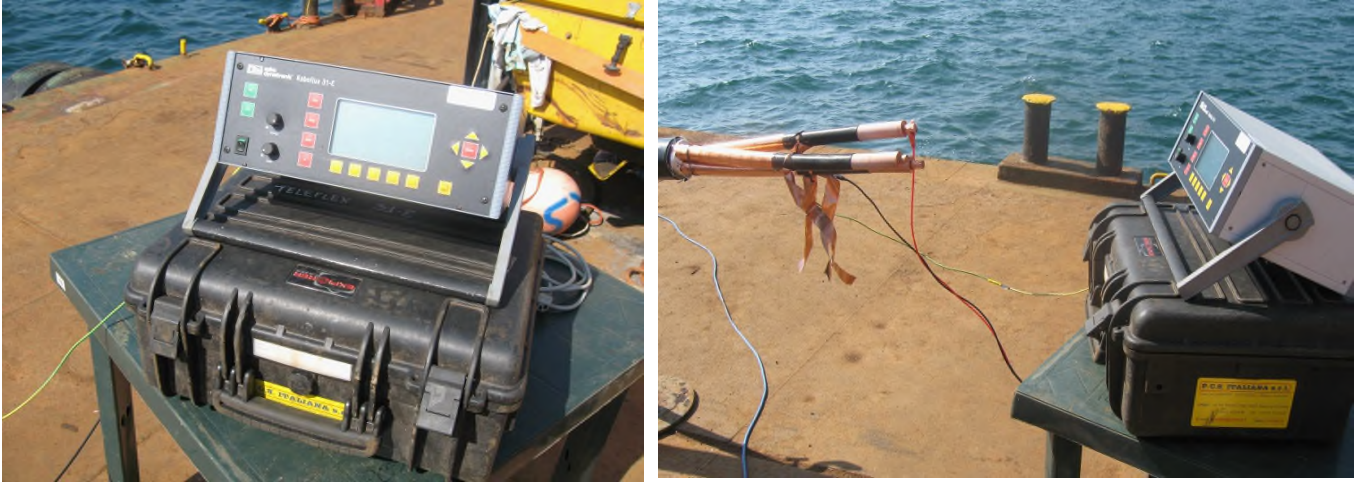
TECHNICAL DATA

Models:

n.2 type OF-500 "FLUKE" - 60km

n.1 type OFM-100 "FLUKE" - 100km

TDR - TELEFLEX



DESCRIPTION:

PCS has availability of several equipment for check and testing on power and optical cables. Such equipment are used both after installation and during laying operations.

Applying this control instruments, PCS guarantee the cable proper functioning and the accurate job execution.

Teleflex is a not ageing test of the cable; such equipment verify the length and integrity of the power cable.

The test with Teleflex has to be done before the start up, every shift change (during laying) in absence of rain, at laying completion, after each pull-in and from switch box to switch box.

TECHNICAL DATA

Models:

N. 1	Interflex 130 "Intereng"	55 Km
N. 1	T01/4 "Seba KTM"	20 Km
N. 1	T30-E "Seba KTM"	100 Km

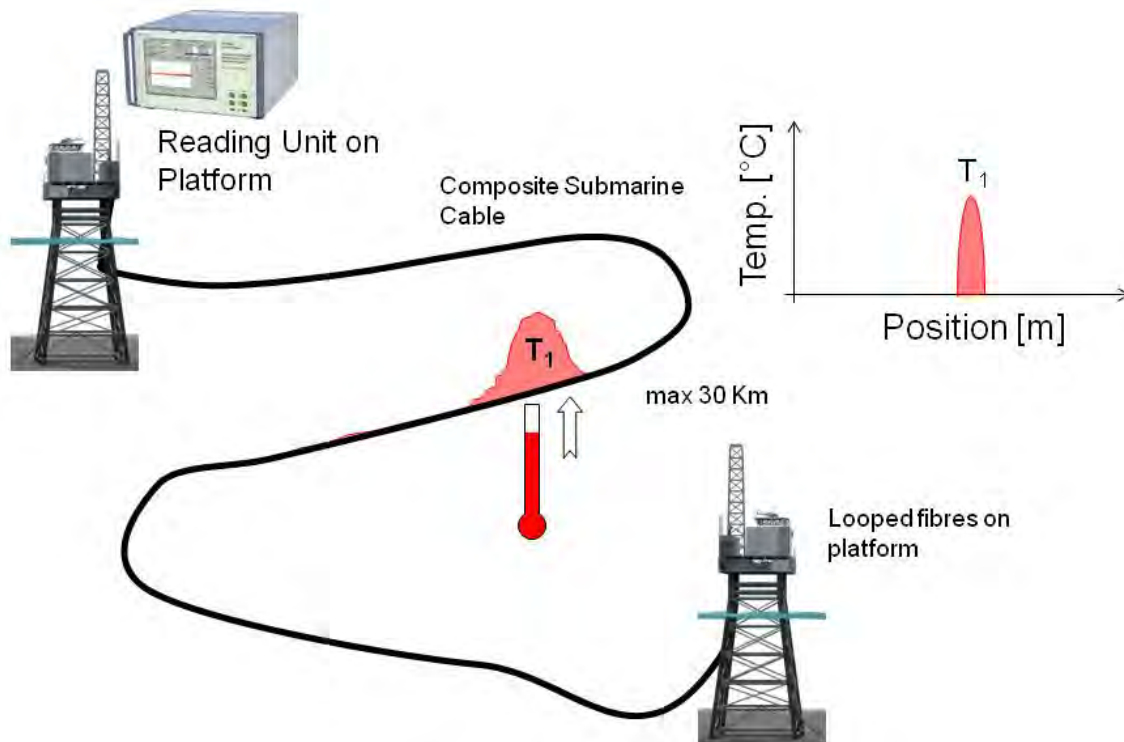
Δ -TEST

Δ -TEST instrument is owned by PCS and it is used for check of stress and temperature variation into cables working on the optical fibre elements.



The instrument works by monitoring into the fibre (at defined intervals to be properly set prior to the start of monitoring) the temperature value inside the cable. This value is recorded by an algorithm that calculates the frequency inside the cable which then revert this data into a temperature value.

As the cable has specified working temperatures to be kept according to the load applied to the cable itself, the temperature monitoring can give a good idea about cable working conditions at the time of the monitoring.



The value recorded by the instrument can be affected by the strain inside the fibre in the event of a mechanical stress applied on the fibre itself (as in this case due to the anchor dragging on the cable).

For this reason into the provided readings has been considered a 15% of strain effect which has been used to cool the temperature readings directly revealed on the cable.

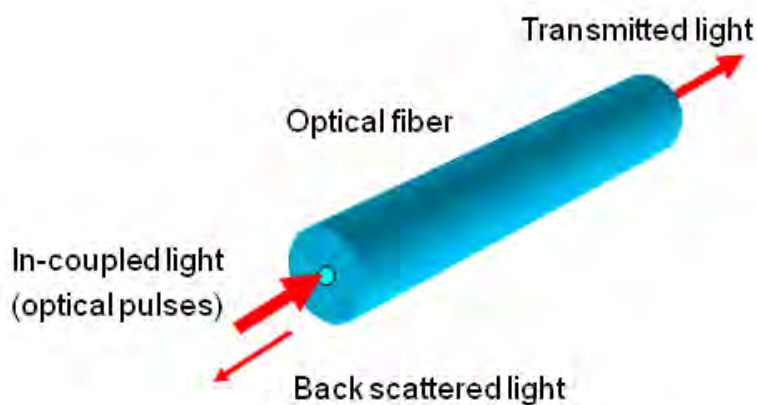
The incidence of the strain effect can be turned in the event that variation in power load can be directly monitored in order to verify directly the temperature variation according to the load chagement.

Cable temperature is one of the basic information to understand how the system is working and PCS on-line temperature & stress monitoring system provides an enhanced safety of the distribution network and an immediate localization of any anomaly in cable.

This system is applicable to any existing and new cable/umbilical with inner optical single mode fibre and monitoring can be carried out in complete safety avoiding production shut down.

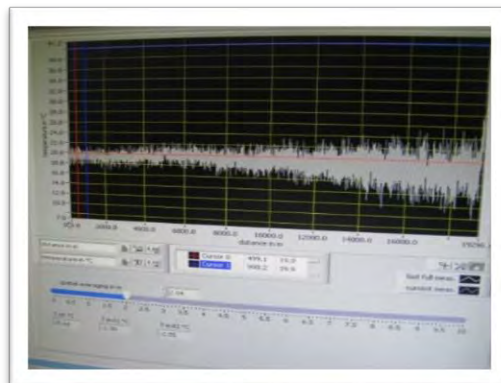
The system works on the principle of reflectometry technique to evaluate the backscattered frequency signal sent into an optic fibre loop.

Such frequency values are transformed into temperature and stress results that are evaluated by PCS technicians and software to provide the stress value in fibre and define the ΔT (Delta Temperature) variation that can confirm or assess the cable conditions.



The process of monitoring a composite cable takes advantage of the fact that the optical fibre is in close contact with the cores thus the temperature monitoring is much easier as external factors have less impact on readings.

According to the engineering cable data provided by Customers and the actual value related to the cable in service, the operating temperature can be assumed, following the definitions provided in IEC 287 standard.



Δ-TEMP

PCS, thanks to its extensive capabilities and know-how on installation of submarine cables, has implemented an innovative instrument and software solution to evaluate cable temperature on composite submarine cables by means of the optical fibre element running into the cable formation: Δ-TEMP instrument.



MONITORING SYSTEM AND DAMAGE LOCATION

The process of monitoring a composite cable takes advantage of the fact that the optical fibre is in close contact with the cores thus the temperature monitoring is much easier as external factors less impact on the readings. According to the engineering cable data provided by Customers and the actual value related to the cable in service, it can be assumed the cable temperature, following the definitions provided in IEC 287 standard.

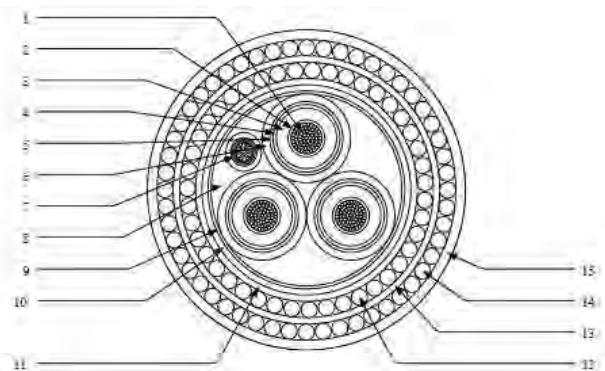
Considering the heat developed by each of the three cores wrapped with optical element and enclosed within binder or inner sheath, the cable temperature is slightly higher than the working conductor temperature.

It has to be considered that conductors insulation does not work as thermal insulation but as electric insulation and it has a normal working temperature of 90° C that has to be maintained not to damage the dielectric capabilities of the material and consequently the cable.

15 kV 133% I.L., 70 sq mm three-core EPR composite cable
 Water-blocked compacted circular Cu
 Cu tape screen separate PE jacket with fillers, anti-teredo
 PP String bedding, galvanized steel double wire armor, PP string serving

Description

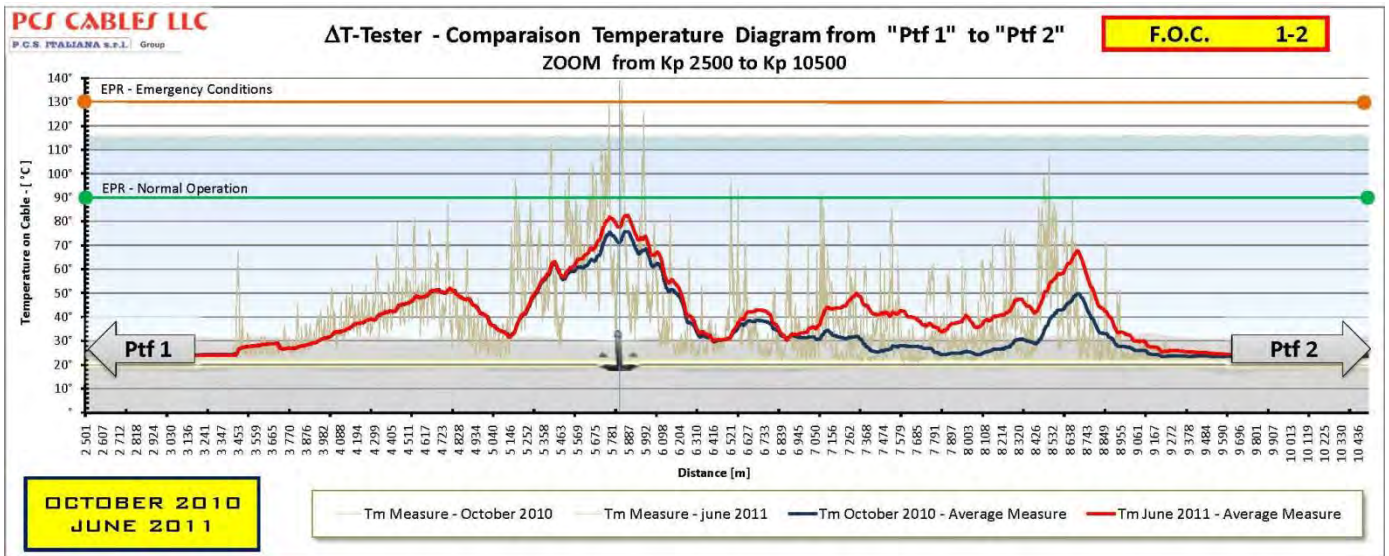
- | | |
|------------------|--------------------|
| 1 Conductor | 2 Conductor screen |
| 3 Insulation | 4 Core screen |
| 5 Tape screen | 6 Core jacket |
| 7 Optical unit | 8 Fillers |
| 9 Binder tape | 10 Anti-teredo |
| 11 Armor bedding | 12 Armor |
| 13 Separator | 14 Armor |
| 15 Serving | |



According to a previous monitoring, a “t” temperature will be identified in reason of the cable characteristics, available data of power load and any external factor that may impact on the frequency readings (i.e. ambient temperature, water temperature, etc.). This “t” reading will be kept as reference .

By additional scheduled readings, the reference “t” value can be adjusted according to variations in power load that modify the cable conductor temperature or to variation of the ambient values that may partially affect the cable temperature variation.

Matching the different results deducted from the external affecting factors (such as power load and ambient temperature), the readings results will be tuned to the “t” reference in order to verify the ΔT that clears if any modification in actual cable temperature has incurred.

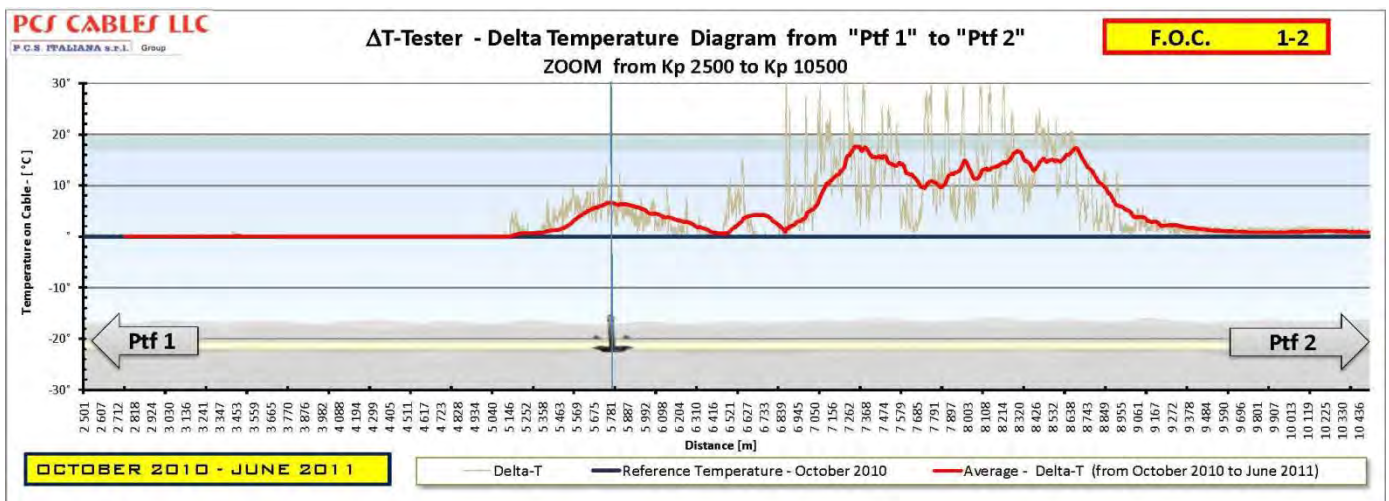


The ΔT increase warns about the insulation that is less capable to dissipate conductor heat due to intrinsic causes like a reduced thickness due to extreme ageing or external causes like an anchor damage.

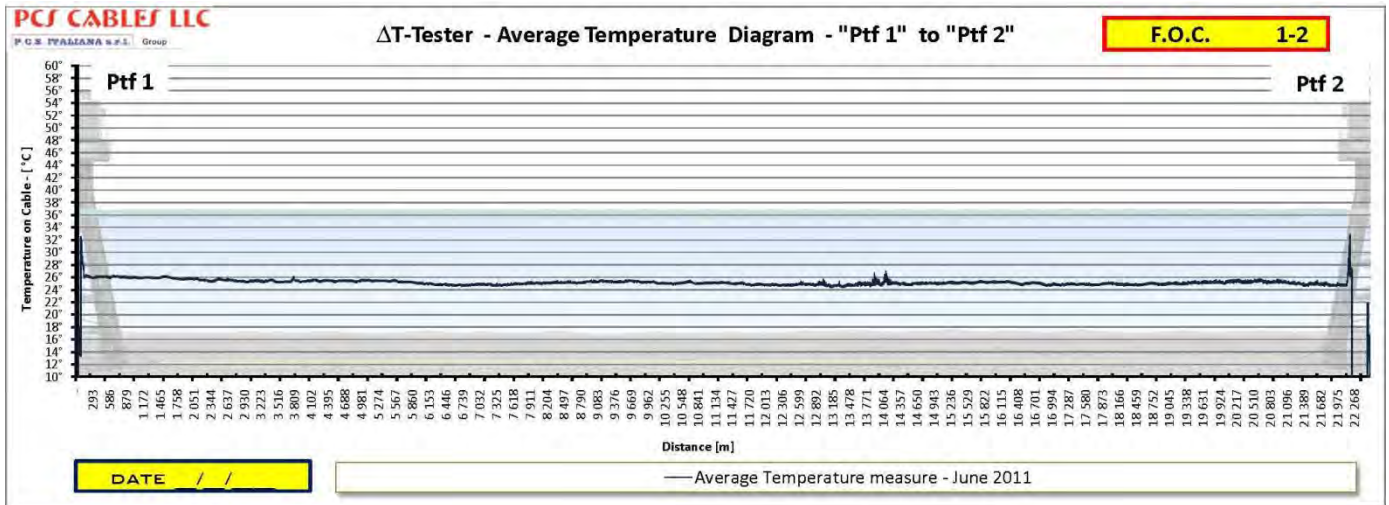
In consideration of normal cable design and IEC 228 standard, the maximum conductor temperature for continuous load is 90°C.

In the event that a composite cable is working at its full load, the cable temperature would be around 90° as ambient water temperature will mitigate the “oven” heating factor keeping the cable temperature very close to the conductor temperature.

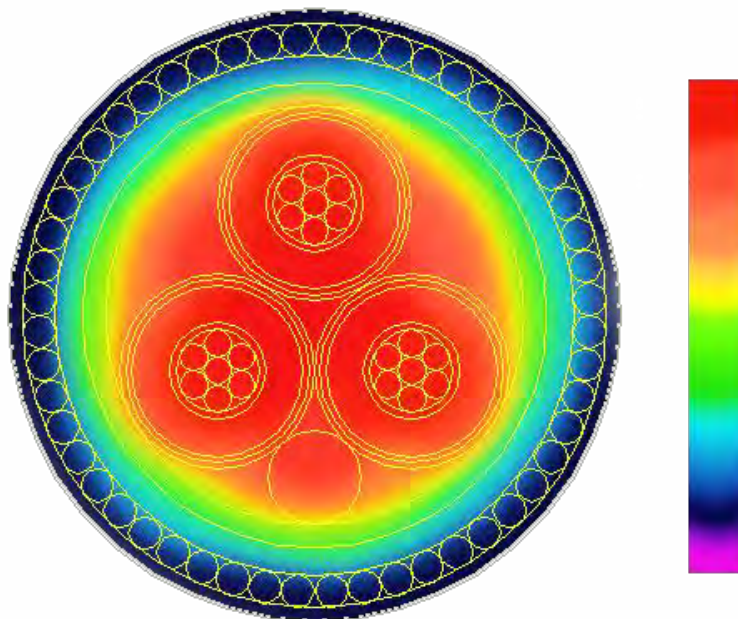
Following the load information and relevant temperature of the conductor, the results of the frequency/temperature monitoring can identify if any unpredictable increase of temperature are present in the cable and by means of several readings, evaluate the amplitude of the ΔT variation.



The system detects and monitor the temperature in the working cable and if no external factors are affecting the cable, the reading values will confirm the working temperature within the range of the international standards. This information can be useful to understand if there is availability for a power increase in cable and anyway to be kept as reference value to verify the system situation in further readings campaign.



EXAMPLE OF TEMPERATURE INSIDE CABLE



Considering the heat developed by each of the three cores wrapped with optical element and enclosed within binder or inner sheath, cable temperature is slightly higher than working conductor temperature.

It has to be considered that conductors insulation work as electric insulation not as thermal and it has 90° C normal working temperature shall be maintained to prevent dielectric degradation of the insulation material and consequent cable fault.

HVA28

Ultra-compact and universal VLF High Voltage Test Set

The b2 electronic GmbH high voltage testing **HVA28** offers outstanding features in terms of size, weight, ruggedness, safety and ease of use. Testing of medium voltage cables, rotating machines and transformers was never that easy.

Short Facts

- VLF and DC Output
- Sheath Test
- Sheath Fault Location
- Vacuum Bottle Test



14kg

10 μ F

IP67

DDD[®]



USB
Bluetooth



Colour
Display
4.3"

Features

- Output voltage 28kV_{peak}, 20kV_{rms}
- Pure sinusoidal output voltage (load-independent)
- Output current 20mA max.
- Highest test capacity of 10 μ F
- Ultra light and compact weight (14kg)
- Total protection – unbreakable, watertight, dustproof, chemical resistant and corrosion proof case
- Protection class IP67 (with closed lid)
- Unlimited and continuous duty cycle
- Large Colour display (4,3")
- Cable testing according: CENELEC HD 620/621, IEEE 400.2-2004, IEEE 400-2001, etc.
- Programmable test sequences
- USB and Bluetooth connections
- Upgradable with partial discharge diagnostic system (optional)
- Upgradable with tan delta diagnostics
- Integrated 12kV transient protection (50Hz)
- Dual Discharge Device (DDD[®]), both integrated and automatic discharge devices
- Easy exchangeable HV cable
- Intuitive menu operation
- Sheath Test
- Sheath Fault Locating (in combination with Earth Fault Locator)
- Vacuum Bottle Test

HVA28

Type	HVA28	
Article number	SH0219	
Input Voltage	100 – 240 V 50/60 Hz /400 (VA)	
Output Voltage	Sinusoidal	0 – 28 kV peak, 20 kV rms
	DC	± 0 – 28 kV
	Squarewave	0 - 28 kV
	Accuracy	± 1%
	Resolution	0.1 kV
Output Current	0 – 20 mA (Resolution 1 µA) Accuracy: ±1%	
Resistance Range	0.1 MΩ...5 GΩ	
Output Frequency	0.01 ... 0.1 Hz in steps of 0.01 Hz (default 0.1 Hz) - auto frequency	
Output Load	0.5 µF @ 0.1 Hz @ 20kV rms 5.0 µF @ 0.01 Hz @ 20 kV rms 10.0 µF maximum Capacitance! ¹	
Sheath Test	Max Test Voltage	10 kV
	Trip Current	0.1 mA – 5.0 mA
Sheath Fault Location ²	Max Test Voltage	10 kV
	Pulse/Period	1:3 / 4 s, 1:5 / 4 s, 1:5 / 6 s, 1:9 / 6 s
Output Modes	AC (VLF) Symmetrical and load independent across full range, DC (plus or negative polarity), Burn-/Fault Condition or Fault Trip Mode, Jacket / Sheath Testing	
Safety	50Hz 12kV Feedback Protection / Dual Discharge Device (internal)	
Memory	50 Test Records Stored	
Metering	Voltage and Current (True rms and / or peak), , Capacitance, Resistance, Time, Flashover Voltage	
Duty	Continuous! No thermal limitation for operating time.	
HV Cable	4 m with Alligator clamps	
Software	"HVA Control Center"	
Computer interfaces	Bluetooth	standard
	USB	standard
Environmental conditions	Storage: -25°C to +70°C Operating: -5°C to +45°C Humidity: 5-85% non condensing	
Dimensions L x W x H	Peli Case 1430, 430 x 240 x 340 mm	
Weight	14 kg	
Upgrades (Optional)	Partial Discharge System / Tangens Diagnostic System	

¹ At lower frequency and voltage

² in combination with locating device (not in scope of supply)

Options

- Tan Delta Diagnostics System
- Partial Discharge Diagnostics System PD30

Scope of delivery

- HVA28 Testing Device
- HV cable 4m
- Power and earthing cable
- Accessory bag
- USB stick
- Operating manual

HVA94

Compact and universal VLF High Voltage Test Set

Large output load capability up to 10 μF^1

The **HVA94 cable tester** by **b2hv** is a portable 0.1 Hz VLF cable test system for the **testing of medium and high voltage cables**.

With its weight of **128 kg** the hipot tester provides an excellent power-to-weight-ratio.

The powerful output is capable of driving **capacitive loads** of up to **10 μF** .

At maximum output voltage cables with a **length** of up to **33 km** can be tested.

- Sinusoidal: **0 – 94 kV** peak, 0 – 66 kV rms
- DC: $\pm 0 - 90$ kV
- Squarewave: 90 kV

The HVA94 cable tester offers various **operating modes**.

Cable testing, cable sheath / jacket testing, sheath fault location, cable fault conditioning (burning), vacuum bottle test.



The following features make the high voltage HVA94 cable tester the **outstanding cable test system** of its class:

- Predefined standard-compliant cable test sequences
- Symmetrical sine wave high voltage
- RMS measurement of output voltage and current
- Measurement of capacitive and resistive load
- Automatic and load dependent frequency selection (0.01 Hz – 0.1 Hz)
- Display of current test time
- Integrated real-time scope function
- Self-explanatory, multilingual software
- Automatic measurement reporting
- Report storage via RS232 (USB optional)
- PC software (HVA Control Center) for data analysis and storage
- Flashover detection and ultra fast switch off
- Flashover voltage measurement
- Time optimized burning mode
- No regular maintenance required

The fully comprehensive **safety features** of the highvoltage cable tester guarantees protection for operator and test instrument.

- > Short circuit protected output
- > 12 kV feedback protection
- > Signal lamps for active / inactive high voltage
- > Status display of safety functions
- > Integrated discharge circuit (DDD®) for device under test
- > Main switch with key-lock
- > Emergency-off button on front panel

A SINGLE insulation tester for NUMEROUS applications:

- > Cables: XLPE , PE, EPR, PILC, etc.
- > Capacitors
- > Switchgear
- > Transformers
- > Rotating machines (IEEE 433)
- > Isolators
- > Bushinas

Type	HVA94	
Article number	SH0211	
Input Voltage	210 – 240 V 50/60 Hz (3.0 kVA)	
Output Voltage	Sinusoidal	0 – 94 kV peak, 66 kV rms
	DC	± 0 – 90 kV
	Squarewave	90 kV
	Accuracy	± 1 %
	Resolution	0.1 kV
Output Current	0 – 65 mA (Resolution 1 µA) Accuracy: ± 1 %	
Resistance Range	0.1 MΩ...5 GΩ	
Output Frequency	0.01 ... 0.1 Hz in steps of 0.01 Hz (default 0.1 Hz) – auto frequency selection	
Output Load	0.75 µF @ 0.1 Hz @ 66 kV rms (Approx 2,500 m of cable) ² 1.0 µF @ 0.1 Hz @ 64 kV rms (Approx 3,300 m of cable) ² 1.2 µF @ 0.01 Hz @ 57 kV rms (Approx 4,000 m of cable) ² 10 µF @ 0.01 Hz @ 23 kV rms (Approx 33,000 m of cable) ² 10 µF maximum Capacitance! ¹	
Output Modes	AC (VLF) Symmetrical and load independent across full range, DC (plus or negative polarity), Burn-/ Fault Condition or Fault Trip Mode, Jacket / Sheath Testing	
Safety	50 Hz 12 kV Feedback Protection / Discharge unit	
Memory	50 Test Records Stored	
Metering	Voltage an Current (True rms and / or peak), Capacitance, Resistance, Time, Flashover Voltage	

Duty	Continuous! No thermal limitation for operating time.	
HV Cable	7.5 m with Alligator clamps on end (other options available on request)	
Software	„HVA Control Center“	
Computer interfaces	RS232	▪
	USB	Optional
Environmental conditions	Storage: -25°C to + 70°C, Operating: -5°C to + 45°C	
Dimensions L x W x H	650 x 445 x 610 mm (Excl. Carry Handle), also as 19" version available	
Weight	128 kg	
Upgrades (Optional)	Tan Delta TD60, Partial Discharge System PD90	
¹ At lower frequency and voltage ² Based on a typical cable: 300 pF/m		

