HTCJ-V 300kV/15kJ Automatic Impulse Voltage Generator Solution(Customize)

I. Equipment Technical Parameters and Accessory Functions, Layout System Diagram and Equipment Design Drawing

1. General

1.1 This parameter is applicable to conduct the impulse withstand voltage test (Full wave & Chop wave) for 35kV or smaller voltage level high voltage equipment including transformer, CT/PT, switch gear, circuit breaker etc. It is the technical description of functional design, structure, performance, installation and test of the equipment

1.2 This equipment meets the current international standards, national standards and relevant industry standards.

2. Reference Standard

GB311.1-1997: <<Insulation coordination of high voltage transmission and transformation equipment>>

GB/T16927.1-1997:<< General test requirements of high voltage test technology>>

GB/T16927.2-1997: <<Measurement system of high voltage test technology>>

GB/T16896.1-1997: << High voltage impulse test digital recorder>>

ZB F24 001-90: <<Implementation rules of impulse voltage measurement>>

GB191 :<<Packing and shipping marks>>

GB4208 <<Enclosure protection class>>

GB813-89 <<Oscilloscope and peak meter for impact test>>

3. Working Condition

The test system of impulse voltage generator is mainly applicable to impulse full wave withstand voltage test of 35kV and smaller voltage level high voltage equipment.

3.1 The altitude shall not exceed 1500m

3.2 Ambient temperature: - 15 ~ + 50 ℃

3.3 Air relative humidity: ≤ 90%

3.4 Installation and use location: indoor use, movable

3.5 There must be a reliable grounding point and grounding

resistance<0.5Ω !

4. Impulse Voltage Generator（Model：HTCJ-300/15）

4.1 Impulse Voltage Generator Main Parameters

4.1.1 Nominal lightning impulse voltage：300kV

4.1.2 Nominal Capacitance (Energy)：15kJ

4.1.3 Stage Capacitance：1.0μF,100kV Dry type full insulation package

4.1.4 Stage Voltage：100kV

4.1.5Pole number /Stage capacity：3 / 5kJ

4.1.6 Output waveform：

1.2μs±30%/50μs Standard lightning impulse voltage full wave

2~6μs Standard lightning impulse voltage chop wave

4.1.7 Synchronization range：>20%

4.1.8 Working Time：

When the working voltage is less than 80% of rated working voltage, it can work continuously

When the working voltage is higher than 80% of rated working voltage, it can work intermittently

4.1.9 The error voltage difference of amplitude regulation is less than 1%, and the minimum output power is not more than 10% of the nominal voltage of the equipment..

4.1.10 Synchronization error rate：<1%

4.2 Technical description of impulse voltage generator

4.2.1 Impulse voltage generator Structure

4.2.1.1 adopt Switzerland company HAEFELY's SGS series main circuit design, so as to realize the overall super small size.

4.2.1.2 It is triggered by the ball gap without error, with little wear and fast and accurate positioning

4.2.1.3 the fixed mechanism of wave adjusting resistor with spring crimping and convenient plug-in is adopted to ensure the reliability of contact and make the output waveform smooth without burr.

4.2.1.4 the trigger range of synchronous ball gap can be more than 20%, which ensures the reliability of trigger, and the automatic control is convenient and reliable.

4.2.1.5 the triggering of synchronous ball gap has no polarity effect, and it does not need bilateral triggering.

4.2.2 Main capacitor

4.2.2.1 the main capacitor adopts high-density solid capacitor, The DC working voltage of each capacitor is ± 100kV, and the inherent inductance of the capacitor is less than 0.2 μ H. Light weight and small volume, which is the first in China.

4.2.2.2 the concave convex deformation of capacitor is less than 1 mm under normal working condition and working environment.

4.2.2.3 the capacitor is packaged with solid insulation medium and shell dry insulation, without oil leakage and deformation.

4.2.3 Wave modulator

4.2.3.1 the resistance of wave head and wave tail has enough heat capacity to ensure long-term continuous operation of generator.

4.2.3.2 the charging resistor has enough thermal capacity to ensure the generator to operate continuously for a long time.

4.2.3.3 the resistance of wave head and wave tail adopts plate structure, which is made of Kang copper wire without induction. The external part is made of insulating resin vacuum casting. The joint is of spring compression type, which is easy to install.

4.2.3.4 the connector of wave head and wave tail resistance is made of 3mm stainless steel wire cutting.

4.2.3.5 there are three groups of wave head resistance and three groups of wave tail resistance for lightning impulse, and one group of charging resistance and protection resistance.

4.2.3.6 The resistance is spring crimp type, easy to install, and each stage can insert 3 wave heads and 3 wave tails

4.2.4 control and protection system

4.2.4.1 IGCS-6000 automatic control system is used to provide various controls for the main part of impulse voltage generator, which can fully meet the various control functions of impulse test. IGCS-6000 control system adopts imported devices, and two core optical cable is used for connection with equipment body.

IGCS-6000 automatic control system takes programmable controller as the core device, so the volume of the controller is very small, and the controller can realize manual control and automatic control. The special software package can be used for computer control, so as to realize intelligent operation. The special software package can be used with peak voltmeter and oscilloscope for measurement and waveform analysis to realize the integration of computer measurement and control of impulse voltage test system.

4.2.4.2 the control system has the following control functions:

a. Using PLC technology, two core optical fibers are used to transmit control commands and feedback

equipment status, so electromagnetic interference is avoided and the safety of control system and computer is improved.

b. The control function has manual, full-automatic and program control functions. The functions of each level are relatively independent to ensure the reliability of the system.

c. The thyristor voltage regulation mode is adopted, and the charging voltage feedback measurement system is provided.

d. The distance between ignition ball gap and cutoff ball gap can be adjusted manually and automatically, and displayed on the LCD panel.

e. It has a truncated trigger pulse with adjustable time delay and a feedback system with generator ignition trigger.

f. With the constant current charging mode controlled by function, the stability of the charging voltage can reach 1%.

g. The LCD panel can indicate the charging voltage and charging process of the impulse generator with an accuracy of 1%.

h. The charging voltage and charging time can be directly input by the LCD panel.

I. With abnormal charging protection function, it can automatically or manually send trigger ignition pulse

j. Indication of working state of impact generator, such as self discharge, non triggering, normal triggering, etc.

k. Grounding and grounding release control of equipment body and charging part.

l. Charging process with automatic or manual control of charging voltage

m. can ring the alarm bell automatically or manually

n. With over-current and over-voltage automatic protection

o. Isolation filter shielding design

4.2.5 Safety grounding system

4.2.5.1 The first stage capacitor of the generator is grounded through a grounding resistance by using an electromagnet automatic grounding mechanism.

4.2.5.2 Grounding operation and charging control have interlock protection to ensure safe and normal operation.

4.3 Main configuration of equipment

4.3.1 Rectifier charging power supply (integrated with voltage impulse generator body)

Model: HTGR-100 / 30

Rated voltage: Un = ± 100kV DC (positive or negative)

Rated current: In = 30mA (under rated voltage)

Voltage control thyristor module voltage regulation, voltage regulation range 0 ~ 100% Un

Polarity conversion: changing the direction of high voltage silicon stack

Input voltage: 220 V single phase voltage

Power frequency: 50 / 60 Hz

Power consumption: 3kVA

4.3.2 Weakly damped capacitive voltage divider

Model: HTCR-300 / 800

Rated voltage: 300kV

Rated capacitance: 800pF

Number of capacitance: 1

Square wave response: partial response time less than 100ns, overshoot less than 10%

Partial pressure ratio: according to the situation

Uncertainty of partial pressure ratio: less than 1%

4.3.3 Cut off device

model: JD-250kV

Rated voltage: 250kV

Ball gap type: 250mm diameter hemispherical clearance

Trigger mode: Three electrode discharge trigger

(high performance pulse amplifier is used to output 15kV, 100ns trigger pulse)

Time delay mode: Electronic time delay circuit with 2 ~ 6us time delay adjustable provides cut-off trigger pulse

4.3.4 Measuring equipment

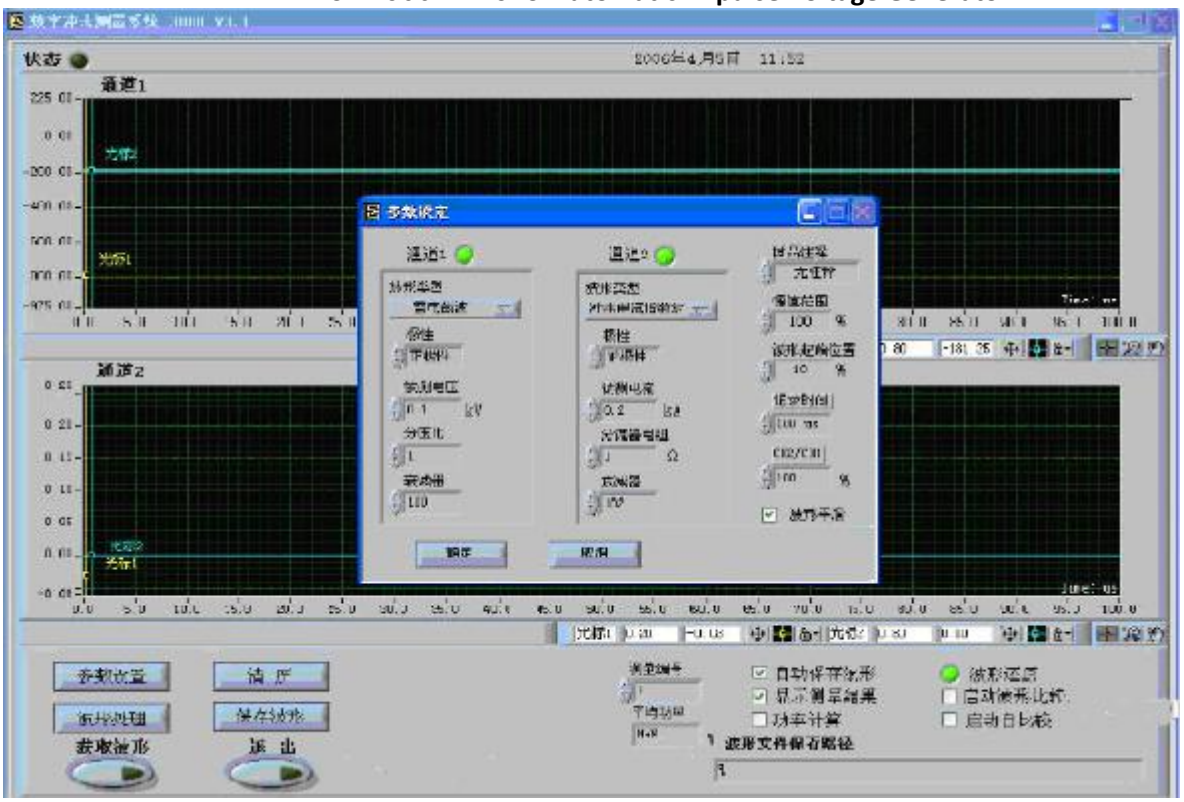
Model: IGCS-6000 Digital Impulse Voltage Measurement System

Waveform measurement: Optical fiber communication high precision digital acquisition card

The highest sampling rate:1.0gs/s, the bandwidth is more than 100MHz, the resolution: 12bit,
Record length: 10K bytes, 2 channels
Maximum recording length (k/channel): 10
Maximum input range (V): 200
Channel input impedance (mΩ /15pF): 1
Waveform analysis: Industrial control computer (WIN 7 operating system)

Special software package for lighting impulse measurement:
a. Calculation and display of impulse waveform parameters
b. Waveform comparison function
c. Amplification, reduction and translation of waveform
d. Storage and call of waveform
e. Waveform mapping and report preparation

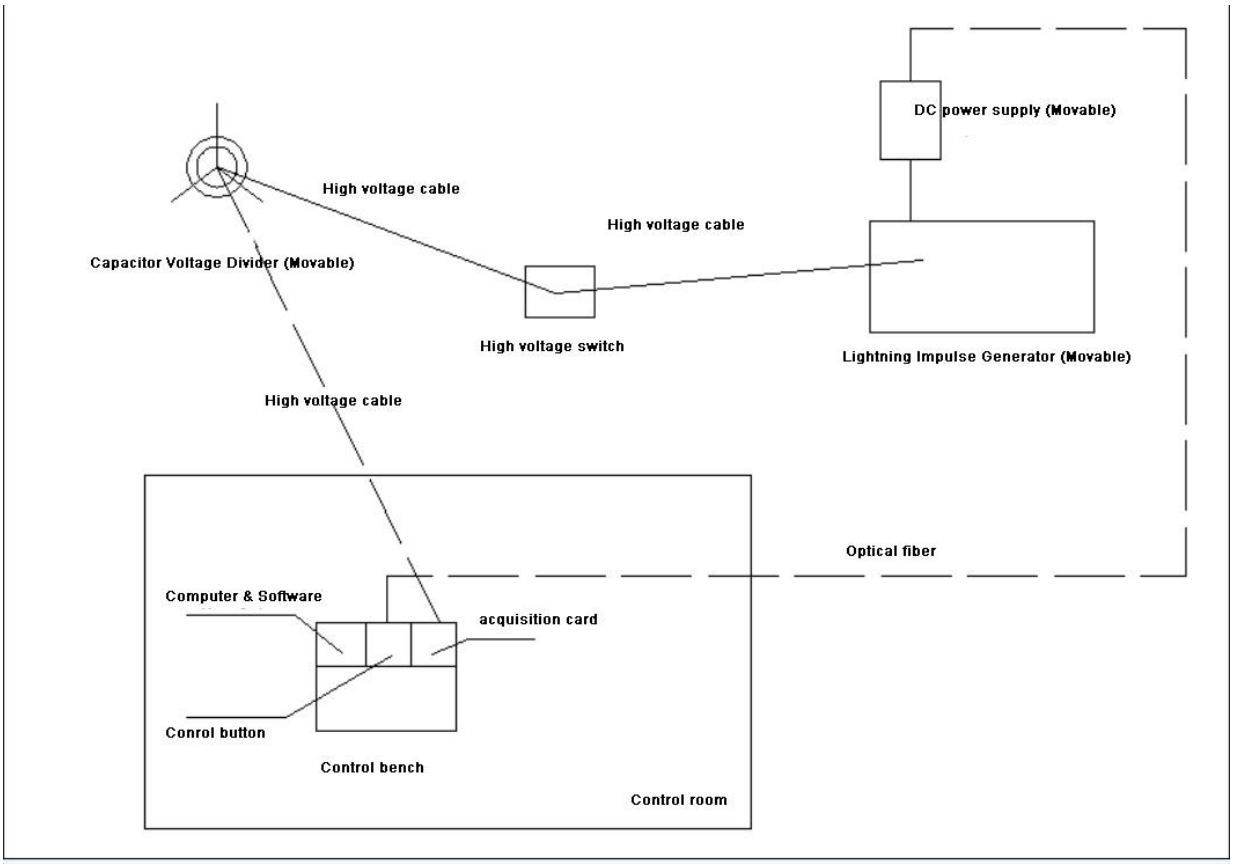
Automatic Impulse Voltage Generator's waveform measurement and recording analysis software operation screen：

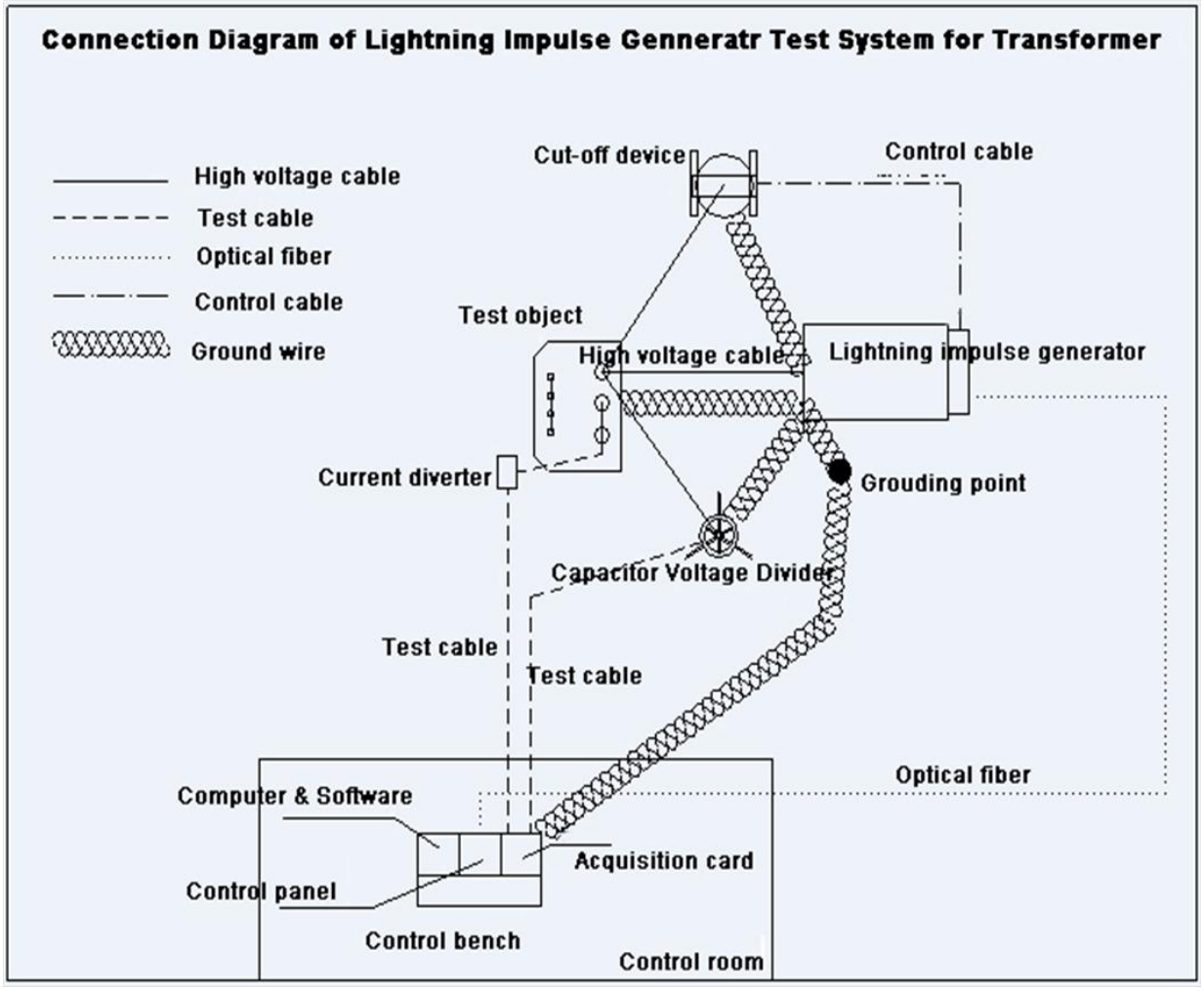

状态
通道1
通道2
参数设定
通道1
通道2
确定
取消
获取波形
退 出


50000
50000

Automatic Impulse Voltage Generator's control and operation screen

Layout of Switch Cabinet and Transformer lightning impulse test





Main Equipment Effect Drawing

II Description of Technical Scheme Features

1. The main level voltage of SGS generator adopted in the scheme is 100kV, which is in line with the current development trend at home and abroad. The main structure is designed by the world famous company HAEFELY, which is the most compact generator in China.

2. The control and measurement system adopted in the scheme is a leading product in domestic technology at present. The core device is programmable controller. Almost all control functions are realized by software programming. Therefore, the system has simple structure, few peripheral circuit boards and high reliability.

3. The measurement and control structure of the scheme is designed as a whole, with LCD industrial computer, which can realize full-automatic control measurement and analysis. The measurement and

control system is operated by liquid crystal touch screen and has a variety of status prompt pictures, realizing the intelligent operation of man-machine dialogue. The system cancels the multi-core control cable and adopts the optical fiber communication line without opening the cable trench, which makes the layout of the control room more simple and convenient.

4. The optical fiber measurement and control transmission system adopted in the scheme effectively solves the harm of the ground potential rise encountered in the high voltage test to the measurement and control system, eliminates the electromagnetic interference caused by the control lead, and greatly improves the reliability of the system, especially in the case of discharge breakdown.

5. The operation interface of igcs-6000 control and measurement system adopted in the scheme fully considers the habitual characteristics of high-voltage test, which is simple and easy for test personnel to operate. The system has designed a special program operation screen, which is convenient for the full wave and cut-off test of the transformer, greatly simplifies the operation of the test personnel, and can effectively prevent human errors.

III.Equipment and Accessories Configuration List

No.	Item name & model	Unit	QTY	Price(USD)
1	HTCJ-300kV/15kJ Lighting Impulse Voltage Generator	set	1	11430
2	HTGR±100kV/30mA DC Charging Power Supply (Integrated with Impulse Voltage Generator)	set	1	4285
3	HTCR-300kV/800pF Weakly Damped Capacitor Voltage Divider	set	1	6142
4	250kV Cut-off Device	set	1	8858
5	Current diverter	set	1	885
6	Current diverter resistance core: **0.2Ω/2kA**	pc	1	42
7	Current diverter resistance core: **0.5Ω/0.8kA**	pc	1	30
8	12bits optical fiber communication high precision digital acquisition card	set	1	285
9	IGCS-6000 Automatic Lighting Impulse Shock Control System	set	1	9285
10	Wave Modulation Resistance: wave head resistance, wave tail resistance	set	3	115
11	Short aluminum bar	pc	6	85
12	Discharge rod	pc	1	58
13	30m long Optical fiber	pc	2	715
14	Extra laptop for calibration separately	set	1	645
Total				42860