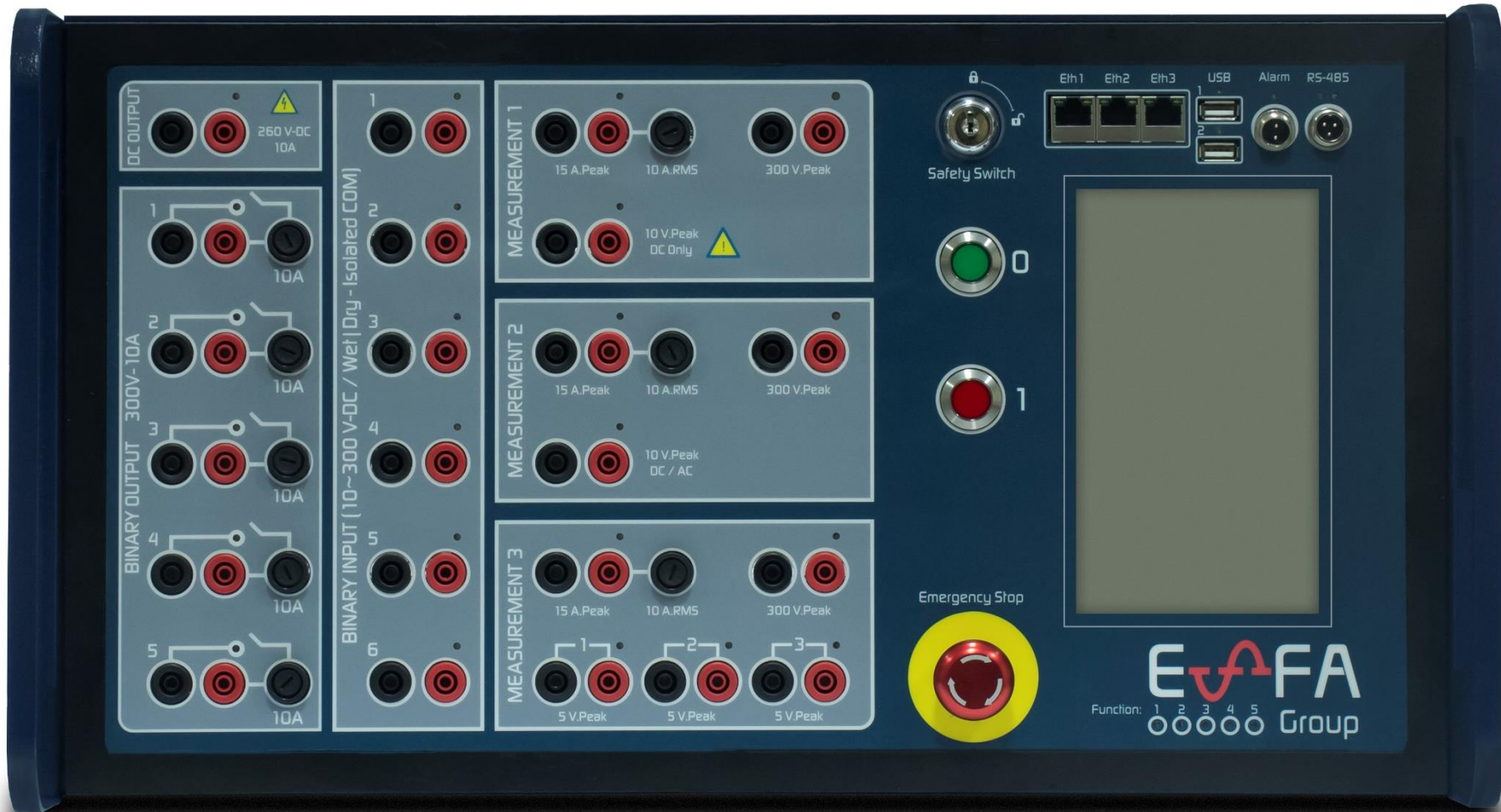


KAVOSH T22

All-in-One Testing Solution



ESFAGroup.com

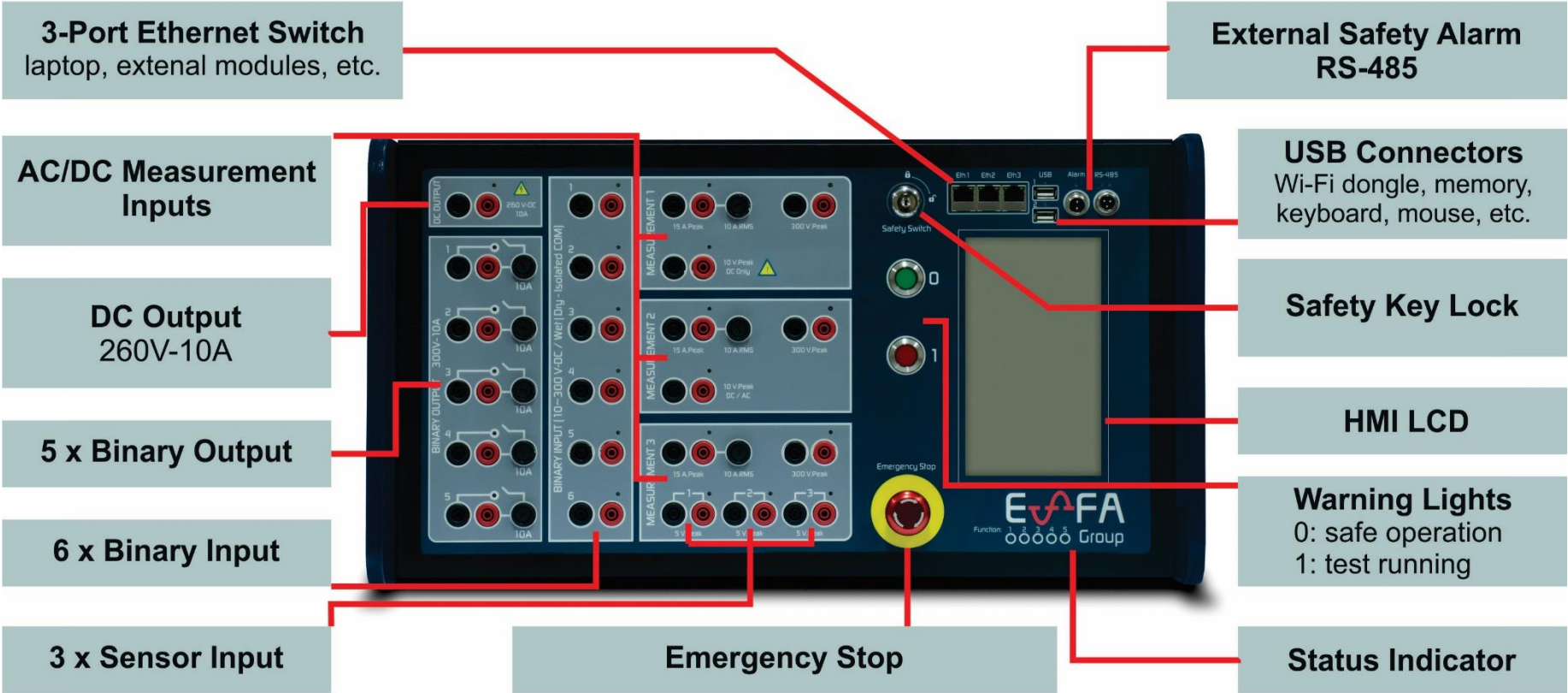
All-in-one Diagnostic Test Device for Electrical Equipment, KAVOSH T22

KAVOSH T22 is a controllable single-phase current and voltage source with the rated output power of 5 kVA. This is designed and produced by ESFA Group and it is suitable for performing various kinds of commissioning, periodic, and diagnostic tests. KAVOSH T22 can be employed in high voltage substations, distribution substations, power plants, research centers, universities, and industrial plants such as petrochemicals and refineries. The output voltages can be controlled in the range of 0~2200 V-AC and 0~260 V-DC, respectively. In addition, its output current can be controlled in the range of 0~1000 A-AC and 0~400 A-DC, respectively. Moreover, the frequency of AC voltage and current is controllable between 20 and 120 Hz. Furthermore, KAVOSH can be synchronized with an external current or voltage to generate current or voltage with the same frequency and adjustable phase difference and amplitude (within 1000 A and 2200 V). Applications of such feature consist of amplifying electrical signals, performing three-phase tests using three separate KAVOSH, distance or directional relay tests by primary injection, and etc.

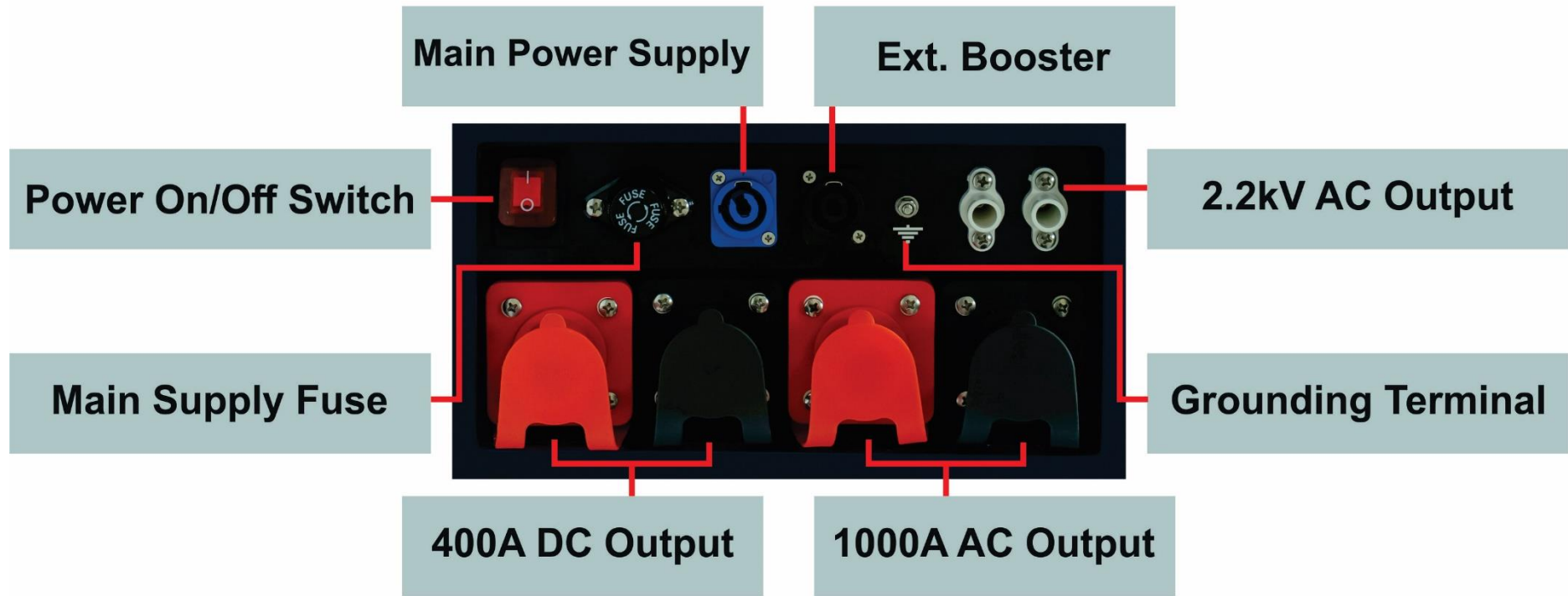
KAVOSH is equipped with a built-in server to which a device with only an internet browser can be connected. To do so, wireless communication (Wi-Fi) or directly connection of KAVOSH to a laptop, PC, tablet, or mobile by CAT 6 network cable can be utilized. Furthermore, a touchable LCD mounted on KAVOSH can be used to perform all the tests without using an external computer. The software easily provides all the required reports and makes a database. Moreover, all the test results can optionally be sent to a server (ESFAnalysis software) by which they will be analyzed based on standards guidelines, comparing to similar cases and historical test results, and a professional consultant team experiment. KAVOSH has some software and hardware optional modules including easy three-phase transformer test, positive- and zero-sequence line impedance measurement, dissipation factor ($\text{tg}\delta$) measurement, and motor current signature analysis.

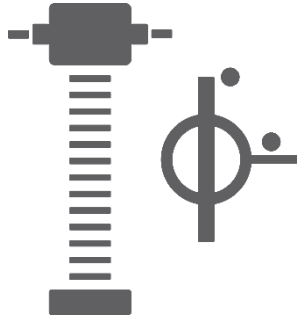
Evolution is coming ...

I/O Details



I/O Details





Current Transformer



Ratio and Polarity (by injecting current up to 1000A)

Ratio and Polarity (by applying voltage up to 2.2kV)

Secondary Burden

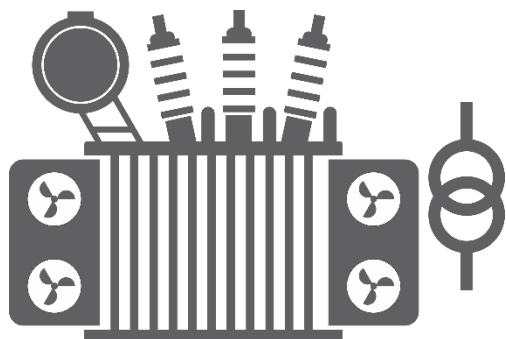
DC Winding Resistance

Excitation Curve & Hysteresis Curve

Core Demagnetizing

Power Frequency Withstand Voltage (up to 2.2 kV) for Secondary Side

Test and Analysis of TPY and TPZ Type CT (Magnetizing characteristic, error and remanence factor)



Power Transformer



Turn Ratio

No-load Current and Loss

Flux Division

Hysteresis Curve

Core Demagnetizing

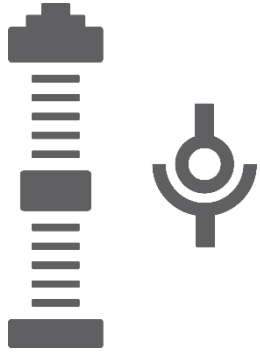
DC Winding Resistance

Short Circuit Resistance and Reactance

Dynamic Resistance of On Load Tap Changer

Vector Group

Switch Box for Automatic and Quick Performing Three-phase Transformer Tests (by TEM1)



Voltage Transformer (CVT, PT)



Ratio and Polarity (up to 2.2kV)

Secondary Burden

Primary and Secondary DC winding Resistance

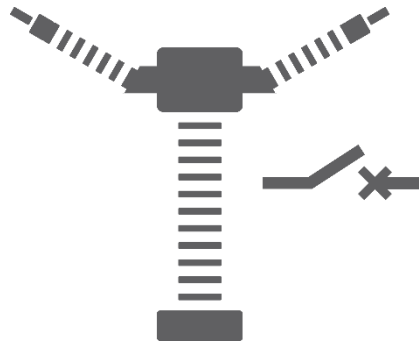
VT Excitation Curve

No-load Current and Loss

Power Frequency Withstand Voltage (up to 2.2kV)

Short Circuit Impedance (especially for CVT)

CVT Capacitor Measurement



Circuit Breaker and Disconnecting Switch



Static Contact Resistance (by injecting DC current up to 400 A)

Time Test (for various duty cycles such as CO, OC, COC, OCO)

Pole Discordance Analysis

Trip/Close Coil Minimum Pickup Voltage (up to 260 V, 10 A)

DC Motor Current and Spring Charge Time Monitor (by using optional DC clamp-on ammeter)

Power Frequency Withstand Voltage (up to 2.2kV)

Double Ground Method
(for time test of a circuit breaker in an in-service high voltage substation)

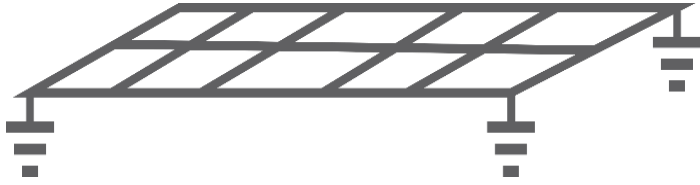


Overhead Line and Cable



Positive and Zero Sequence Impedance measurement
(by CM1 module: 1000V- 4A / 50V - 80A)

Positive and Zero Sequence Impedance Calculation
(by ESFAAnalysis software based on typical tower outlines and ASTM standard conductors)



Ground Grid

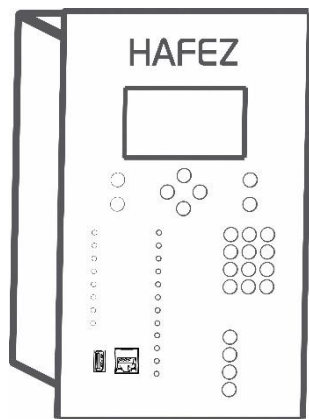


Ground Resistance and Reactance

Ground Connection Integrity Check

Soil Resistivity (by injecting DC current up to 400A)

Safety Voltages including Step, Touch, Transfer, Metal-to-Metal Voltages
(especially by using CM1 module)



Entire Protection System (instrument transformers, relays, and trip circuit By injecting single-phase current and voltage)



Overcurrent and Earth Fault Relay

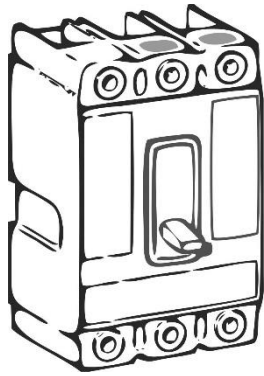
Directional Earth Fault

Directional Over Current (self-polarized relay)

High-Impedance Differential Relay
(including REF, busbar, motor, and generator)

Low-Impedance Differential Relay
(including REF, busbar, motor, and generator)

Distance Relay (self-polarized relay)



Low Voltage Breakers (MCB, MCCB, and ACB) and Fuse



I-t Characteristic (Clearing Time) for Low-Voltage, Medium-Voltage, and Power Fuses
(by injecting up to 1000 A)

I-t Characteristic for Low-Voltage Circuit Breakers (MCB, MCCB, and ACB)

Current Outputs

Output	Amplitude	t_{\max}	V_{\max}	Power	Duty cycle $T_{\text{on}}/T_{\text{off}}$
1000 A AC (rms)	10 -1000 A	30 s	5 V	5000 VA	5 s / 60 s
	10 – 400 A	10 min	5 V	2000 VA	5 s / 30 s
	10-200 A	>2 h	5 V	1000 VA	Cont. ON
400 A DC	10 -100 A	>2 h	5 V	500 VA	Cont. ON
	10 - 200 A	10 min	5 V	1000 VA	Cont. ON
	10 – 400 A	2 min	5 V	2000 VA	5 s / 20 s
10 A AC (rms)	0 -10 A	10 min	260 V	2600 VA	5 s / 20 s
	0 – 3 A	>2 h	260 V	780 VA	Cont. N
10 A DC	0 -10 A	10 min	260 V	2600 VA	5 s / 20 s
	0 – 3 A	>2 h	260 V	780 VA	Cont. N

Voltage Outputs

Output	Amplitude	t_{\max}	I_{\max}	Power
2200 V AC (rms)	0-260 V	>2 h	3 A	780 VA
	0-260 V	10 min	10 A	2600 VA
	0-2200 V	1 min	2 A	4400 VA
	0-2200 V	>2 h	0.5 A	1100 VA
260 V DC	0-260 V	>2 h	3 A	780 VA
	0-260 V	10 min	10 A	2600 VA

Analog Inputs

Analog Input	Impedance (Ohm)	Range (peak)	Amplitude Error (%)	Phase Error (Degree)
10 A AC/DC	<0.1 Ω	50 mA – 15 A	<0.25%	<0.2
10 V AC/DC	>10 M Ω	1 mV – 10 V	<0.25 %	<0.2
300 V AC/DC	>1 M Ω	0.1 V – 300 V	<0.25 %	<0.2

Internal Measurement of Outputs

Output	Range	Amplitude Error (%)	Phase Error (Degree)
2200 V AC	5-2200 V AC (rms)	<0.25	<0.2
1000 A AC	5-1000 A (rms)	<0.25	<0.2
400 A DC	5-400 A	<0.25	<0.2
260 V DC	5-260 V DC	<0.25	<0.2

Binary Inputs

Quantity	Max Input Current	Response time	Max Input Voltage	Toggling condition
6	10 mA	1 ms	300 V (peak)	wet or dry contact

Binary Outputs

Quantity	Max Current	Max Voltage	Make time	Break time
5	10 A	250 V AC	7 ms	7 ms

Power Supply

Single phase nominal voltage	Nominal frequency	Max current	Min fuse size	Power Consumption
190 – 250 V AC	50 / 60 Hz	25 A AC	32 A	< 5000 VA

Mechanical Data

A. Modules

Module Name	Application	Weight	Dimensions
KAVOSH T22	Main module	38 kg	520 * 284 * 370 mm
KAVOSH TEM1	Transformer switch box	5 kg	446 * 247 * 116 mm
KAVOSH CM1	Line impedance measurement	28 kg	450 * 280 * 230 mm

B. Accessories

Module Name	Weight	No. of Tools Bag	Tool Bag Dimensions
KAVOSH T22	35 kg	2	500 * 330 * 300 mm
KAVOSH TEM1	20 kg	1	500 * 330 * 300 mm
KAVOSH CM1	15 kg	1	500 * 330 * 300 mm



About **ESFA** Group:

ESFA Group is manufacturer of various protection relays, test and troubleshooting equipment, smart grid hardware/software, and provider of services and software systems for such subjects. Our goal is to create a revolutionary change in power industry. This is possible by changing the attitudes of the industrial experts, which in turn requires increasing the level of technical knowledge and striving for change and progress. Moreover, our persistent plan is to introduce new approaches in designing equipment and implementing them based on the state-of-the-art in order to change the design method and the operation of the power grid with more scientific and economical approaches.

Evolution is coming up ...

Contact with us

ESFAGroup.com