LIST OF PRODUCTS

- ✶ Digital Multimeter
- ✶ AC Clamp Adaptor
- ✶ Thermo Anemometer
- ✶ Distance Meter
- ✶ Network Cable Tester
- ✶ Earth Resistance Tester
- ✶ DC Power Supplies
- ✶ Calibrators
- ✶ Frequency Counter
- ✶ Phasing Sticks
- ✶ Waterproof Pen Testers
- ✶ EMF Detector
- ✶ Digital AC & AC/DC Clampmeter
- ✶ AC/DC Current Adaptor
- ✶ Thermo Hygrometer
- ✶ Digital Lux Meter
- ✶ Power Factor Regulator
- ✶ Digital Panel Meters
- ✶ High Voltage Detector
- ✶ Gas Analysers
- ✶ Function Generator
- ✶ Battery Tester
- ✶ Solar Power Meter
- ✶ Wood, Paper & Grain Moisture Meter
- ✶ Transistorised Electronic Analog & Digital Insulation Resistance Testers(upto 10 KV)
- ✶ Digital Sound Level Meter & Sound Level Calibrator
- ✶ Digital contact & Non-contact Type Tachometer
- ✶ Digital Non-contact (infrared) Thermometer
- ✶ Maximum Demand Controller/Digital Power Meter
- ✶ Digital Hand Held Temperature Indicators

KUSAM-MECO®

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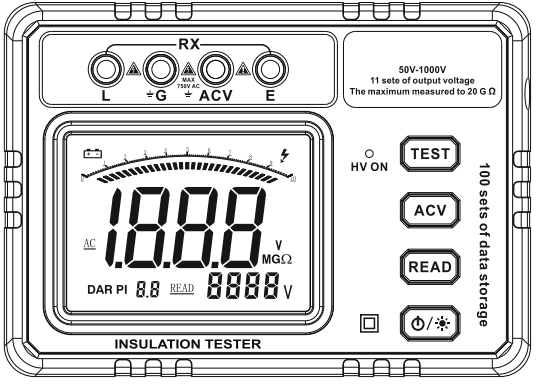
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KUSAM-MECO®

AN ISO 9001:2015 COMPANY

INSULATION TESTER
MODEL KM 371



USER'S MANUAL

Safety Rules

Safety Warning

The design, manufacture, and test are all up to the safety standard IEC61010 (safety demand of the electronic products). This manual includes the safe using of the instrument and the safety state of instrument. The warning and the safety rules that the users must comply. Please read the manual carefully before use.

Warning

- Please read carefully and understand this manual before using the instrument.
- Please comply the regulation of the manual all the time, and keep the manual for consultation.
- When using the instrument for testing, wrong operation can result in accident and instrument damage.
- The Company reserves the right to modify the instructions, if the instructions are to change without notice, please understand.
  The symbols on the instrument mean that in order to operate the instrument safely, the users are supposed to refer to the relating description in this manual.
  Danger is in order to avoid the probably serious or fatal damage in some state and operation.
  Warning is in order to avoid the danger of electric-shocking.
  Notice means avoiding the damage to the instrument and accurate measuring.

Danger

- Please don't take measurement in the flammability place, the spark maybe result in explosion.
- Please don't operate the instrument if it is wet of the instrument surface or of the user's hand.
- When testing voltage, it probably result in person injury because of the short circuit of the metal part and the testing lead.
- Please don't exceed the maximum scope of the allowable range.
- Don't open the battery cover when testing.
- When taking the insulated measurement, please don't touch the circuitry under test.Warning
- If there is abnormality from the instrument, please stop using. For example: the instrument dilapidation or metal part exposure.

- Please don't rotate the Function/Selection switch when the testing lead is inserted into the instrument and connected to the circuitry for testing.
- Please don't install any substituting parts to the instrument or carry on any unauthorized modification, instruments are sent back to the company when maintaining.
- Please don't replace the battery when the instrument is in the state of humidity.
- Please sure the connection is fastened of all the testing interfaces between the testing lead and the instrument.
- Please sure the instrument is turned off when opening the battery cover.

Notice

- Before test, please sure the voltage selector switch is on the proper location.
- After test, please set the function switch to the range "OFF". If it is unused for a long time, please take out the battery for storage
- Please don't put the instrument in the place of high temperature、humidity、dew and strong light for a long time.
- Please use the humid cloth or detergent to clean the instrument case. Don't use the friction material or solvent.
- If the instrument is wet, please make it dry before storage.

Symbol

The probability of electric-shocking

The instrument has double insulation or reinforcing insulation

Warning symbol to remind the user to pay attention.

1. Preface

1.1 Thanks for use our products, you will get the comprehensive technology support and service from our company.
1.2 This manual is used for Model KM 371 insulation resistance tester.
1.3 Before using the product, please read the manual carefully and keep it for reference.
1.4 The product is for high-voltage electric equipment tester, please follow the manual description to operate. For inappropriate operation, it will probably result in equipment damage or safety danger to the user.

2. Overview

With the rapid development of the power industry, preventive testing of electrical equipment is an important part of ensuring the safe operation and maintenance of power systems. Insulation diagnosis is an important means to detect electrical equipment insulation defects or faults. Insulation resistance tester (or high-voltage insulation meter) is a special instrument for measuring insulation resistance.
At present, electrical equipment (such as transformers, generators, etc.) is developing toward a trend of increasing capacity, increasing voltage, diversifying structures, and sealing. This requires the insulation resistance tester itself to have large capacity, strong anti-interference ability, diversified measurement indicators, accurate measurement results, simple and rapid measurement process, and easy to carry. Insulation resistance tester is in line with power industry standard, a variety of voltage level output, large capacity, strong anti-interference, high-efficiency battery use, easy to operate Safety is obviously superior to traditional mechanical insulation tester. ideal measuring instrument for measuring insulation resistance of large transformers, transformers, generators, high voltage motors, powerNcapacitors, power cables, lightning arresters, etc.

FEATURES :

- The high voltage insulation resistance tester has more functions than insulation resistance for voltage test.

- The design is up to the following safety standard:
IEC 1010, ISO 9001:2015, CE, RoHS
- Automatically release voltage function
- Be used for the insulation resistance of all kinds of electronic equipment and insulation material, such as transformer, generator, cable, switch, electric equipment and so on. Be used for the maintenance, test and check of all the series of electric equipment.
- Rated output voltage is variable
Rated output voltage with function button “TEST”
KM 371 Rated voltage can be switched among
50V,100V, 200V, 300V, 400V, 500V, 600V, 700V, 800V, 900V, 1000V by knob switch.
- High voltage indication
The LED in the instrument(HV ON) indicating the high voltage work state. And there is a danger of electric shock and the operator should pay special attention to safety.
- Low battery voltage indication“ ”.
- Battery drive, removing the operation of hand-cranked generator
- **Maximum Display :** 3½ Digit 1999 Counts Backlight Display
- The measurement range for is 1MΩ ~ 20GΩ.
- Convenient operating & carrying.
- Output short circuit current is >1.5mA
- Complete protecting circuitry, in case of over voltage & output short circuit protection.
- Can test AC Voltage 30V-750V, the frequency of AC Voltage is 40Hz-70Hz.
- Dust-proof & damp-proof, can be applied to outside operation.
- **Power Supply :** 1.5V x 6 AA Alkaline battery.
- **Dimension :** Approx. 173 x 123 x 55mm
- **Weight :** Approx. 1200g. (including battery)
- **Accessories :** Test leads, Manual, battery & carrying case.

Function Menu：

Function	
Select output voltage according to test requirement	11 sets of voltage 50V/100V/200V/300V/400V/ 500V/600V/700V/800V/900V/ 1000V
Resistance measurement range	1MΩ-20GΩ
AC voltage	30V-750V
100 sets of data storage	●
Backlight	●
Absorption ratio	●
Polarization index	●
Automatic range	●
Low voltage indication	●
Automatic discharge	●
Test voltage display	●
High voltage indication	●
Measurement time display	●
Maximum display	1999

4.Technical specifications

Test condition: test temperature/humidity 23±5℃/45～75%RH；
Output voltage: 90%~110%（Output load ≥1000MΩ）；
Short circuit current: ≥1.5mA；
Low battery voltage indication；
Insulation resistance:≥500MΩ(1000V)；
Voltage withstand:AC 2KV 50Hz 1minute;
Operation temperature and humidity:0℃~40℃ /Relative humidity 85% or less;
This manual is just applied to this instrument, our company is entitled to modify it.

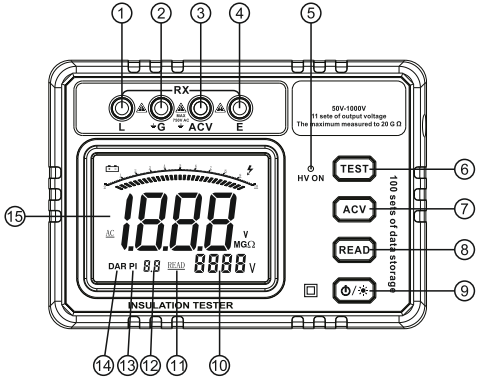
technical specifications

Output Voltage:±（10%）

50V/100V200V/300V/400V/500V/600V/700V/800V/900V/1000V

Output Voltage	Range	Accuracy	Short circuit current
50V/200V	1MΩ-500MΩ	±（8%+5）	1.5mA
300V－500V	1MΩ-10GΩ	±（8%+5）	
600V－1000V	1MΩ-20GΩ	±（10%+5）	
AC Voltage Measurement	30－750V	±（2%+5）	

5.Appearance



1.Insulation resistance measurement high voltage output L
2.Shield terminal G, the end terminal of ACV measurement
3.the positive end of AC voltage measurement 4—Earth terminal E
5.Insulation resistance measurement high voltage output indicator
6.Insulation resistance measurement high voltage selection button / high voltage start button (long press for 2 seconds to start high voltage.
7.function button of AC voltage measurement
8.Data readout selection button
9.Power switch (long press switch) / backlight button
10.Display Output Voltage
11.Data readout function indication
12.Polarization index DAR
13.Measuring the time display of the insulation resistance, the polarization index DAR, and the value of the absorption ratio PI
14.Absorption ratio PI
15.Measured value display (insulation resistance / AC voltage)

6.Safety notice

6.1 Before use, please read the manual carefully, and comply to its operating instruction accordingly.
6.2 Please don't use the accessories not being supplied by the original company in case of danger.
6.3 While measuring, the terminal E, L has DC high voltage output, non-human contact to avoid electric shock.
6.4 In order to avoid the error resulted by the insulation leakiness of the test lead, the test lead, connected to the terminal L is supposed to hang in the air as possible as it could, can't touch with the outside object.
6.5 When the insulation resistance value of the tested object is very high, and there is the serious word jump phenomenon, then please connect the shield terminal G. For example: measuring the cable core and cable shell, besides connecting the two ends of the tested object to the terminal E and L separately, you are also supposed to connect the inner insulation of the cable core or cable shell to the shield terminal G, in order to avoid the measuring error resulted by the surface leakiness. Further more, you can also use the shielding box. That is to say just put the tested object into the metal shielding box, then connect the shielding box to the instrument shielding terminal G.
6.6 When the measurement is finished, then remove the connecting line.
6.7 Don't use or have the storage in the place of sun high temperature humidity etc.
6.8 The short circuit time of the testing end should be less than 60s.
6.9 The continuous testing time should be less than 3 hours one time.

7.Work theory

The high voltage part of the instrument is applied with the Pulse Width Modulate(PWM), via the inner double voltage output cathode DC high voltage, with the characteristic of energy saving, good voltage linearity, stabilization and small ripple coefficient.
The high voltage produced by the instrument line terminal goes to the instrument earth terminal via the load resistance Rx, then transformation via V/I to display the Insulation Resistance.

8.Testing

Danger

● Before testing, please sure there is no charge existing in the tested circuitry that the high voltage instrument is connected with.

● Please put on a pair of the high voltage insulation gloves.

● If the battery cover is open, please don't carry on any measurement.

8.1 testing end connection

Insert the plug of the testing line with the testing lead into the L terminal socket of the instrument, then insert the plug of the testing line with the testing clip to the E terminal socket of the instrument and connect well separately.

8.2 testing connection

The connection of terminal E plug(black test lead with the big testing clip) is for the Earth, connect the testing clip to one side of the item ; the connection of terminal L plug(red test lead) is circuitry line, can connect the testing clip to the other side of the item ; the connection of terminal G plug is shielding line, and is connected to the surface of the tested object to avoid the surface leakiness which will influence the testing impedance. Connect the testing clip to one end of the tested object, and the small clip of the test lead to the surface of the tested object to avoid the current leakiness.

8.1.3 Rated voltage selection

Select the rated voltage according to the test requirements:

DIT-621 can choose 50V/100V/200V/300V/400V/500V/600V/700V/800V/900V/1000V

8.1.4 Testing operation

Please pay attention to safety operation:

Insulation resistance measurement

Press and hold the “⏻” button for 2 seconds to turn on. According to the measurement items, press the “TEST” button to select the appropriate high voltage (50V-1000V) to turn on the insulation resistance. The display shows the unit symbol Ω and “OL” of the resistor. The selected voltage will be displayed in the lower right corner of the display. Connect the test lead's test lead to the 2nd end of the test item. Press and hold “TEST” for 2 seconds to start the high voltage output. At this time, the red indicator of “HV ON” lights up and displays. The measurement time will be displayed at the lower left of the

screen. The measurement time will be automatically calculated by the instrument for one minute. The measurement time will be 10 minutes. The instrument will automatically calculate the “Polarization Index PI” and start the high voltage for 10 seconds. The measured insulation resistance value is read on.

If you want to measure the "absorption ratio DAR" of the insulation resistance, the measurement time must be greater than 1 minute. After 1 minute, the instrument will automatically calculate the absorption ratio. The "absorption ratio DAR" is the ratio of the insulation resistance value at 1 minute to the insulation resistance value at 30 seconds.

If you want to measure the "polarization index PI" of the insulation resistance, the measurement time must be greater than 10 minutes. By 10 minutes, the instrument will automatically calculate the absorption ratio. The "polarization index PI" is the ratio of the insulation resistance value at 10 minutes to the insulation resistance value at 1 minute.

The insulating material has a charge absorption process and a polarization process after the high voltage is applied. The power system requires that the polarization index should be measured in the insulation test of the main transformer, cable, motor, etc., and the data should be used to judge the quality, quality and aging of the insulation.

The insulating material has a charge absorption process and a polarization process after the high voltage is applied. The power system requires that the polarization index should be measured in the insulation test of the main transformer, cable, motor, etc., and the data should be used to judge the quality, quality and aging of the insulation.

After the measurement is completed, press and hold “TEST” for 2 seconds to stop the high voltage output and exit the insulation resistance measurement. The red indicator of “HV ON” is off. The measurement time exceeds 15 seconds to exit the measurement, the instrument will automatically record the measured insulation resistance value, and the instrument can record up to 100 sets of data.

8.1.5 Insulation resistance standard:

● Control line cannot be less than 1.0MΩ/V

● Wet environment should not be less than 2.5MΩ/V

● The basic circuit cannot be less than 3MΩ/V

● High voltage circuit can't be less than 1000MΩ

● Newly decorated low voltage circuit can't be less than 100MΩ

8.1.6 Insulation test for different occasions:
● 5000V voltage application: power plant and high voltage substation, including 10KV power equipment, 10KV transformer, 10KV cable.
● 2500V voltage application: wire and cable above 0.6KV, high voltage transformer above 6KV, 4100V power supply, including three-phase industrial system equipment.
● 1500V voltage application: The grounding insulation resistance of the winding is measured when the oil field submersible pump is stopped, and the 2400V power supply occasion, including the three-phase industrial system equipment.
● 1000V voltage application: 380V cable and 380V power supply, including three-phase industrial system equipment.
● 500V voltage application: Widely used in 220V power supply applications, including insulation testing of household appliances, 220V AC cables, AC contactors , etc.
● 50V voltage application: network equipment such as IT network cable.

8.2 Backlight
Press the " ☀ " button and the backlight will be on; press this button again and the backlight will go out.

8.3 Reading stored data
Press the "READ" button after power on to select the read data. The middle of the display shows "READ" in the middle of the display. Press the "READ" button to read the stored data. Press the "READ" button again to read the next set of data. The instrument can store the data. 100 sets of data.

8.4 AC voltage test
8.4.1 Press the "ACV" button after power on to select the AC voltage measurement. The display shows the unit symbol V of the voltage.
8.4.2 Insert the red pen lead into the "ACV" jack, the black test lead plug
Plug in the "G" input jack.
8.4.3 The two test leads are respectively in contact with the two ends of the voltage to be tested, and the measured AC voltage volt value is displayed on the display screen.
note:
● The measured voltage should not exceed 750V AC RMS, the frequency of AC voltage For 40Hz to 200Hz, the data error measured beyond this frequency range
Will exceed the technical specifications of this machine.
● The voltage at both ends of the measured voltage should not exceed 750V AC for the ground.Valid value, otherwise it exceeds the requirements of the local safety regulations, there is an electric shockDanger.

8.5 Power off
After the test is completed, press and hold the " ⏻ " button for 2 seconds, the LCD screen is not displayed, and the instrument power is off. For capacitive loads, the residual charge on the test article should also be drained to prevent residual charge discharge from injuring people. Then remove the test line.

9.Battery replacement

If there is the symbol " 🔋 " on the LCD, it indicates low battery, please replace the battery.
Before replacing the battery, please sure the testing connection has been disconnected and power is cut off.

9.1 Stop all the testing work, and remove the testing line from the tested object.
9.2 Remove the testing line from the instrument.
9.3 Take off the battery cover on the back of the instrument.
9.4 Put into 6 pieces batteries into KM 371, the battery is AA / 1.5V
(Please pay attention to the battery polarity)
9.5 Put on the battery cover.
9.6 Users can also connect external power supply current, external power requirement : Rated Voltage 9 V, current is more than 500 mA.

10.Storage

10.1 Set the switch to the "OFF" position.
10.2 When the instrument is not used for a long time, please take off the battery to avoid the electrolyte discharge resulting in rust.
10.3 Please keep the case clean.
10.4 instrument storage:
Storage temperature:-10℃~ +50℃
Storage relative humidity: 75%RH
The place should be dust free, no causticity gas & well-ventilated.

11. Accessory

User Manual, Test leads pair, battery installed & carrying case.

12.Several problems should be paid attention to in the use of insulation resistance tester

12.1Resistance Testers determine the integrity of coils and cables in motors, transformers, switch gear, and electrical equipment. The test method depends on the type of equipment being tested and the purpose of the test. For example, when testing electrical equipment or cables, the time-dependent capacitance leakage current and absorption leakage current are not significant. And it will quickly drop to zero, and in a short time (one minute or less) can reach a large amount of stable conduction leakage current, which provides good conditions for the spot reading/short-time impedance test. On the other hand, when the device under test is a long cable, a large motor or a generator (highly capacitive device), the time-dependent current will last for several hours, and these currents will cause the insulation resistance reading to change continuously. It is impossible to obtain a quasi-stable reading. This can be overcome if the use can be used for trend analysis between readings, such as step voltage or dielectric absorption tests. This test does not rely on a single reading, but relies on a large number of related readings. Since the time-dependent current drops very quickly when testing low capacitance devices, the results of multiple tests will be the same, so use this This method is a waste of time.

12.2Assembly test

The most important reason for testing insulation is to ensure public and personal safety by passing a high voltage DC test between the live, ground and ground conductors. You can eliminate life-threatening short circuits or grounding, usually after the initial installation of the equipment. Performing such tests can prevent wiring errors and existing defective devices in the system. High quality installation is guaranteed to prevent fire or explosion.

12.3 Maintenance Test

Another important reason for insulation testing is to protect and extend the working cycle of electrical systems and motors. The environment in which electrical systems are located all year round is affected by factors such as dust, grease, temperature, stress, and vibration. These conditions can cause deterioration of insulation, causing loss of production or even fire. Regular maintenance can provide very valuable information on system loss status. Help predict the likelihood of system failure. Solving problems in a timely manner will not only ensure trouble-free operation of the system, but also effectively extend the life of various devices. A meaningful insulation resistance measurement is obtained before measurement. The electrician should carefully check the system under test. The best measurement results will be obtained when the following conditions are met.

● The system or equipment is out of service. It is disconnected from all other circuits, switches, capacitors, brushes, lightning rods and circuit breakers to ensure that the measurement is not affected by the leakage current through the switch or over-current protection device.

● The temperature is higher than the dew point of the ambient air. If this is not met, a layer of water mist is formed on the insulating surface, and in some cases it may be absorbed by the insulating material.

● The surface layer of the conductor must not contain carbon ink and other impurities that easily form an electrical conductor in a humid environment.

● The applied voltage should not be too high. When testing low voltage systems, too high a voltage can cause overload or damage to the insulator.

● The system under test is fully discharged to the ground. The discharge time according to the ground should be greater than 5 times of the charging time.

• The effect of temperature is noteworthy. Since the insulation resistance is inversely proportional to the temperature of the insulating material (the higher the temperature, the lower the impedance), the recorded impedance reading is changed by the temperature of the insulating material. It is recommended to measure at a standard conductor temperature of 20 °C. It is customary to compare the readings with the results at 20 °C. For every 10 °C increase in temperature above 20 °C, the impedance at 20 °C will be twice the reading. At temperatures below 20 °C, for every 10 °C decrease in temperature, the impedance at 20 °C will be one-half of the reading. For example, the impedance at 1M at 40 °C is converted to an impedance at 20 °C, which is 4M. The temperature of the conductor can be measured using a non-contact infrared thermometer.

12.4 Work Safety

Ensuring safety is everyone's responsibility, but only you can grasp it. No tool can guarantee your own safety. Only equipment and safe work habits can combine to provide you with maximum protection. Here are some safety tips you should follow.

- In any case, try to ensure that the circuit is in a non-energized state during operation. Take appropriate cut-off/shutdown steps, and if these states are undefined, assume that the circuit is energized.
- For energized circuits, use protective gear, use insulated tools, wear fireproof clothing, goggles, and insulated gloves to remove watches or other accessories. Stand on an insulating mat.
- When measuring voltage on a powered circuit:
  - First connect the hook of the ground wire, then connect the live wire, first disconnect the fire wire, and then disconnect the ground wire.
  - If possible, hang the voltmeter or place it steadily. Try to avoid holding the voltmeter and reduce the impact of transient current on the human body.
  - Use the three-point test method. Especially when checking whether a circuit is non-reactive, first test a circuit that is known to be energized, then test the target circuit and test a power-on circuit again. This confirms that the voltmeter is working properly before and after the test.
  - Learn from the experience of an old electrician. Keeping one hand out of contact with other objects will reduce the chance of the closed loop circuit passing through the chest and heart.

- **When performing insulation resistance test:**
- Do not connect the insulation tester to energized conductors or energized equipment. And test according to the manufacturers recommendations.
- Open circuit fuses, switches and circuit breakers will shut down the device under test.
- Disconnect the wires of the branch circuit, the wires that have been grounded, the ground wire, and other equipment.
- Before and after the test, the wire capacitance should be discharged. Some devices may have an automatic discharge function.
- Check for any leakage current through the circuit breakers on the fuses, switches and discharge circuits. Leakage currents can cause inconsistencies and erroneous readings.
- When the insulation is poor, the equipment will generate an arc, so do not use the insulation instrument in a dangerous, flaming air environment.
- Insulate rubber gloves when connecting test leads.

MUMBAI

TEST CERTIFICATE

DIGITAL INSULATION TESTER

This Test Certificate warrantees that the product has been inspected and tested in accordance with the published specifications.

The instrument has been calibrated by using equipment which has already been calibrated to standards traceable to national standards.

MODEL NO. **KM 371**

SERIAL NO. _____

DATE: _____

ISO 9001:2015
REGISTERED

QC
KUSAM-MECO
PASS

WARRANTY

Each “KUSAM-MECO” product is warranted to be free from defects in material and workmanship under normal use & service. The warranty period is one year (12 months) and begins from the date of despatch of goods. In case any defect occurs in functioning of the instrument, under proper use, within the warranty period, the same will be rectified by us free of charges, provided the to and fro freight charges are borne by you.

This warranty extends only to the original buyer or end-user customer of a “KUSAM-MECO” authorized dealer.

This warranty does not apply for damaged Ic’s, fuses, burnt PCB's, disposable batteries, carrying case, test leads, or to any product which in “KUSAM-MECO’s” opinion, has been misused, altered, neglected, contaminated or damaged by accident or abnormal conditions of operation or handling.

“KUSAM-MECO” authorized dealer shall extend this warranty on new and unused products to end-user customers only but have no authority to extend a greater or different warranty on behalf of “KUSAM-MECO”.

“KUSAM-MECO’s” warranty obligation is limited, at option, free of charge repair, or replacement of a defective product which is returned to a “KUSAM-MECO” authorized service center within the warranty period.

THIS WARRANTY IS BUYER’S SOLE AND EXCLUSIVE REMEDY & IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. “KUSAM-MECO” SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OR LOSSES, INCLUDING LOSS OF DATA, ARISING FROM ANY CAUSE WHATSOEVER.

All transaction are subject to Mumbai Jurisdiction.