



Insulation Monitoring Device Solution

1. Overview for Company(Sensor system)

- ❖ Isolation Monitoring Device For AC/DC System
- ❖ Monitoring Devices & DC Switch for Photovoltaic
- ❖ Presence Indicator for MV voltage
- ❖ Hall Effect Sensor



*“Satisfying our customers through a
reliable and safe product”*



1. Overview for Company(Sensor system)

WHAT DO WE DO?

Electrical and electronic equipment
For measurement, protection and
control of electrical installations

1 Design and Prototypes

2 Development

3 Test and Certifications

4 Manufacturing

5 Commercialization

6 Support and Verification

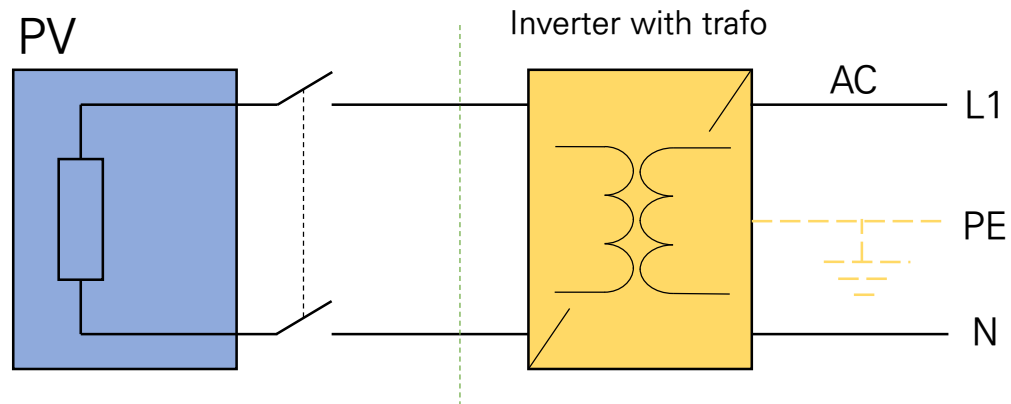
7 Repairs

IMD = Insulation Monitoring Device

It's a device that measures
the Insulation resistance in isolated electrical installation
of earth(IT systems)

IT systems

They are electrical installations in which
all active conductors are separated from ground



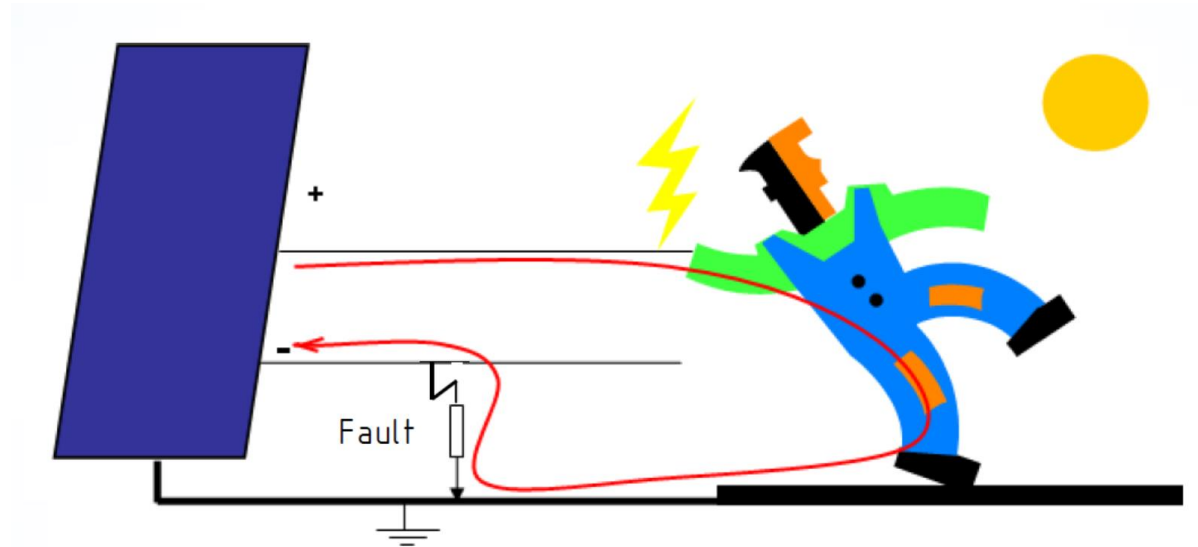


IT systems features

- A first insulation fault can only flow a very small error current. the affected phase is referenced to ground.
- The IMD detects a deterioration inadmissible isolation and warns of it.
- The insulation fault must be repaired as quickly as possible, before a second failure of isolation in another active conductor, which yes it would cause the network to fail.

2. IMD

IT systems features



- Resistance for human body(80kg) is calculated as 2,500 Ohms($2.5K\Omega$). However, if the skin is wet, this resistance drops to 850 to 1000 Ohms

IT systems features

Current Through the human body $I = V/R$

- 1–3mA Perception threshold
- 3–10mA tingling sensation, may cause reflex movements.
- 10mA Tetanization : muscle contractions and paralysis of the muscles of the hands and arms, preventing the release of objects.
- 25mA Respiratory arrest : if the current flows through the head it can affect the respiratory nervous center
- 25–30mA Choking : if the current flows through the thorax it can cause tetanization of the diaphragm, preventing the contraction of muscles of the lungs.
- 60–75mA Ventricular fibrillation : if the current flows through the heart, the heart rate is out of control.

ISOLATION FAULTS, CAUSES?

Electrical Causes :

- ✓ Transient overvoltage's
- ✓ Frequency variations
- ✓ Lightning effects
- ✓ Overcurrents

Mechanical Causes :

- ✓ Downloads, shocks
- ✓ Bending
- ✓ Penetration of foreign bodies

Environmental:

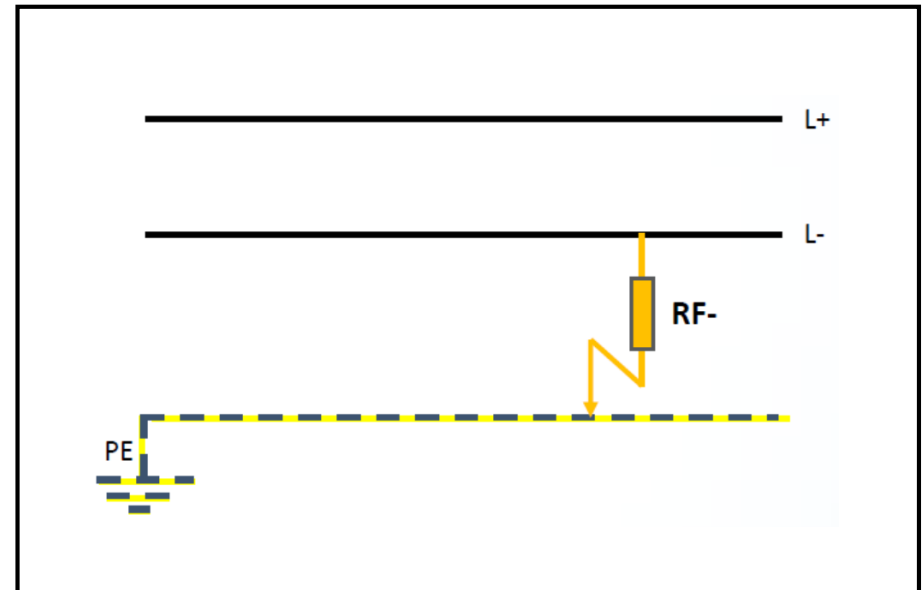
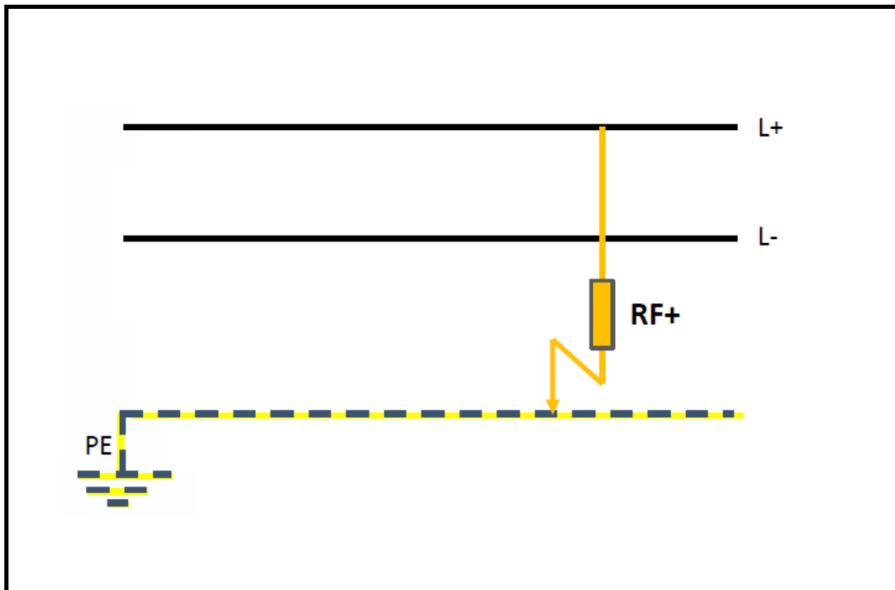
- ✓ Temperature
- ✓ Humidity
- ✓ Chemical influences
- ✓ Dirting, dust accumulations, oils
- ✓ Aging of cables

Other causes:

- ✓ Animals(eg animal bites)
- ✓ Plants
- ✓ Defective installation

TYPES OF INSULATION FAILURE

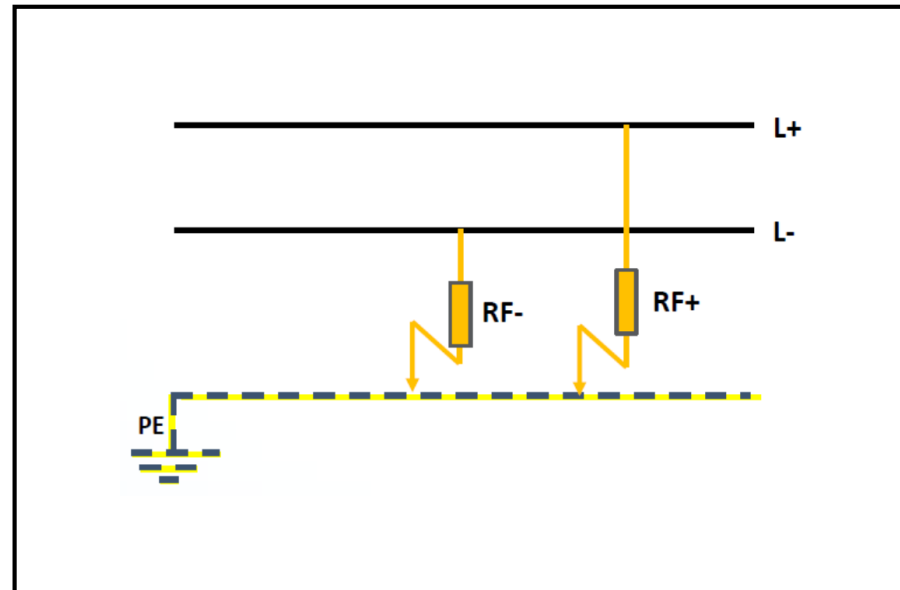
Asymmetrical fault : a degradation in a conductor



TYPES OF INSULATION FAILURE

Symmetrical fault : a degradation similar in both conductors

$$\text{Fault Resistance} = R_{F+} // R_{F-}$$



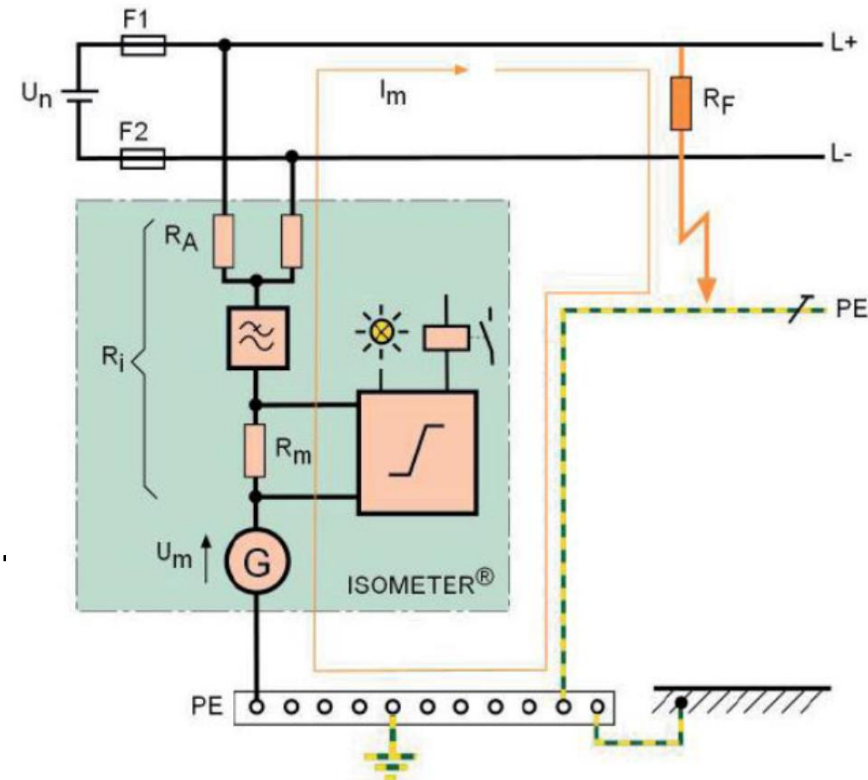
MEASURING TECHNIQUES(IMD)

Two main group :

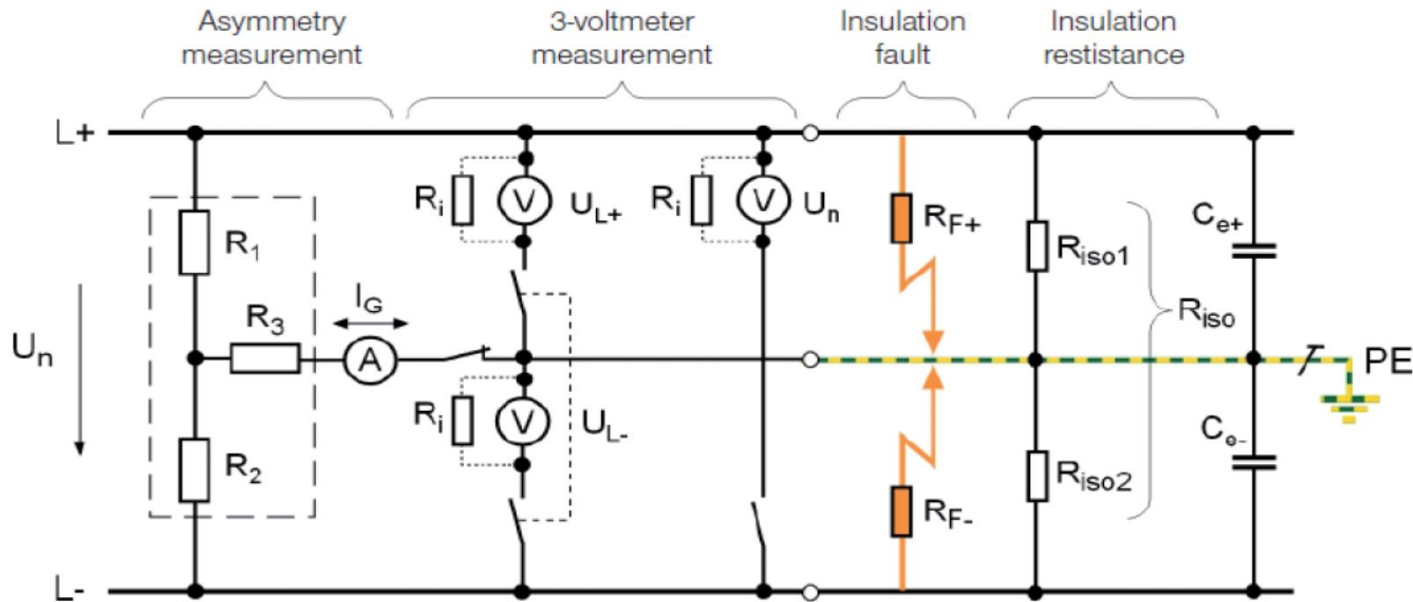
- ✓ **Active** measuring techniques (A signal is introduced for ground)
- ✓ **Passive** measuring techniques (other method of measure)

ACTIVE MEASURING TECHNIQUES

- ✓ Superimpose a voltage on the system to be monitored.
- ✓ On the first fault, the measuring circuit closes and a small measuring current I_m flow
- ✓ I_m is proportional to R_F fault.
- ✓ Normally the voltage superimpose is pulsed.
- ✓ U_n is eliminate by filters.
- ✓ The fault can be measured even if $U_n = 0$.
- ✓ Measure asymmetrical and symmetrical fault.



PASSIVE MEASURING TECHNIQUES



✓ It is based on the principle of the Wheatstone Bridge.

- Imbalance Method : can only measure asymmetric faults
- Three Voltmeter Method : Can measure Symmetric and asymmetric faults
- Both methods depend on system voltage.

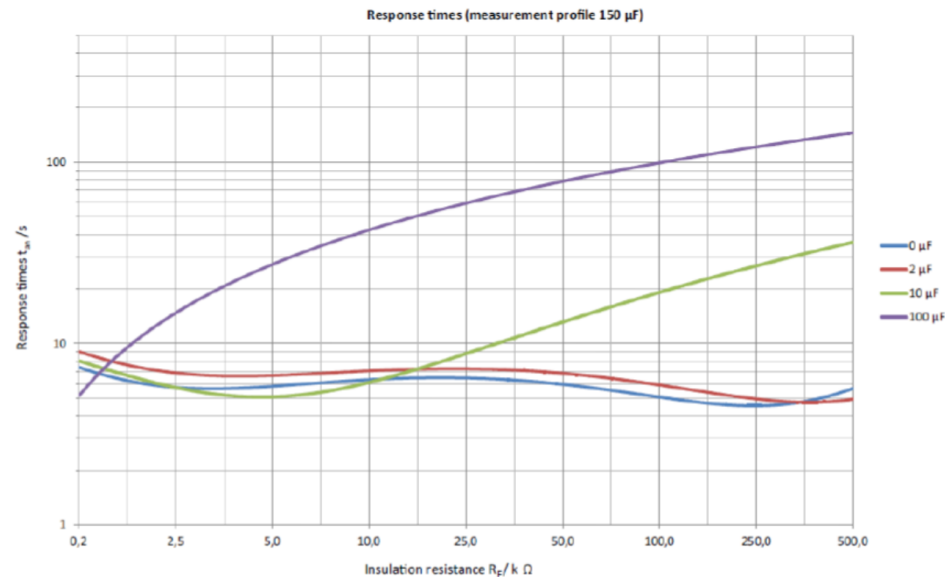
IMD standard

- ✓ The standard is IEC 61557-8 :
 - Electrical Safety in low voltage distribution up to 1,000 VAC and 1,500VDC
 - Part-8 : Insulation Monitoring Devices for IT Systems
 - This standard defines types of IMD according to the application :

IMD-DC, IMD-AC and IMD-AC+DC

Leakage Capacity In IT Systems

- ✓ When there is leakage capacity in the IT system, intrinsic due to the construction of the installation itself, the IMD's increase the detection times of ground faults.
- ✓ For example in very large photovoltaic plants.

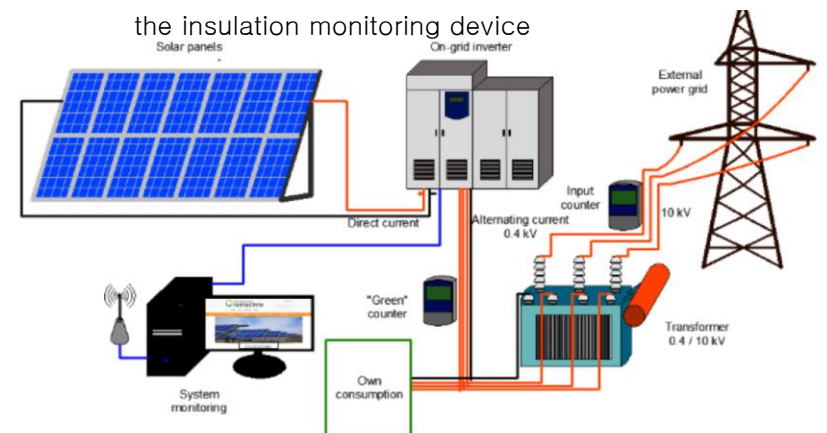
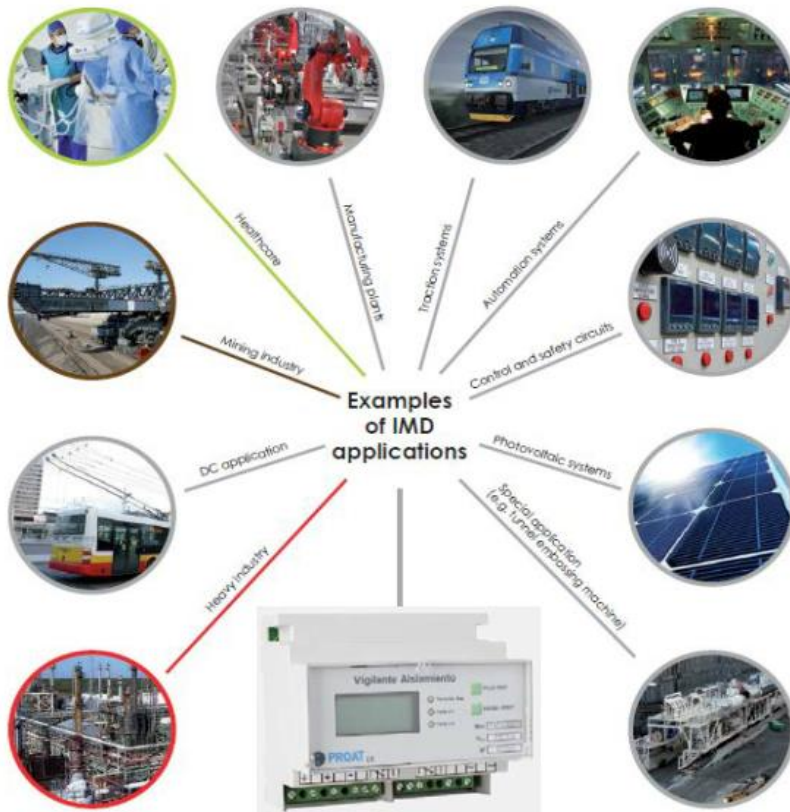


IMD(Isolation Monitoring Device) Application Field

IMD(Isolation Monitoring Device) utilizations is at every IT power supply syste

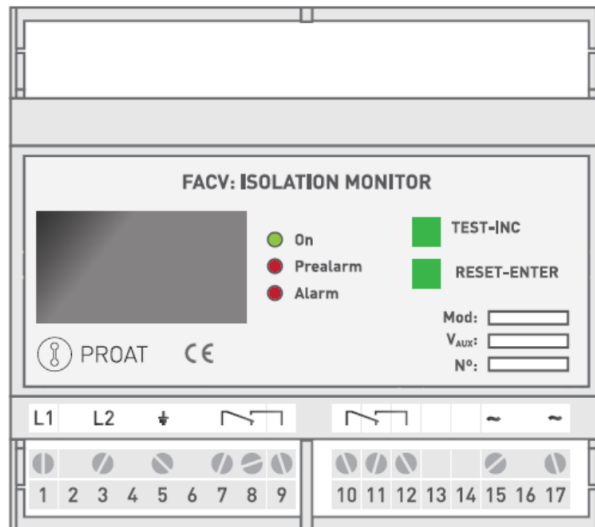
The main advantages of IT power supply system equipped with insulation monitoring devices :

- Operation continuity – in case of first fault(connection between IT power supply system and ground–earth fault) the network is still operational
- Higher safety of operation
 - Immediate overview of network status continuous monitoring of the insulationlevel to earth
 - Early detection of faulty devices by immediate signalization by the insulation monitoring device



3. IMD PRODUCT

FACV – ISOLATION MONITOR AC



REFERENCE SELECTOR TABLE

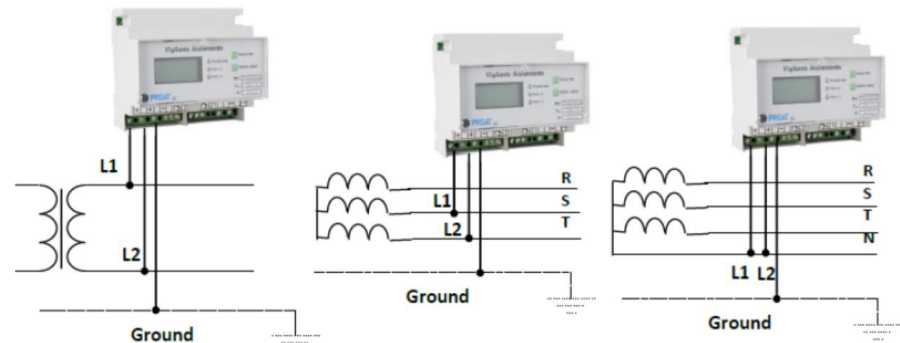
Reference	Monitored Voltage
FACV-230	0 ... 230 VAC
FACV-440	0 ... 440 VAC
FACV-750	0 ... 750 VAC

✓ APPLICATIONS

- AC current ungrounded installations : 230, 440y 750VAC
- Systems with power conversion components, such as rectifiers and inverters.
- AC fault detection on inverter systems.

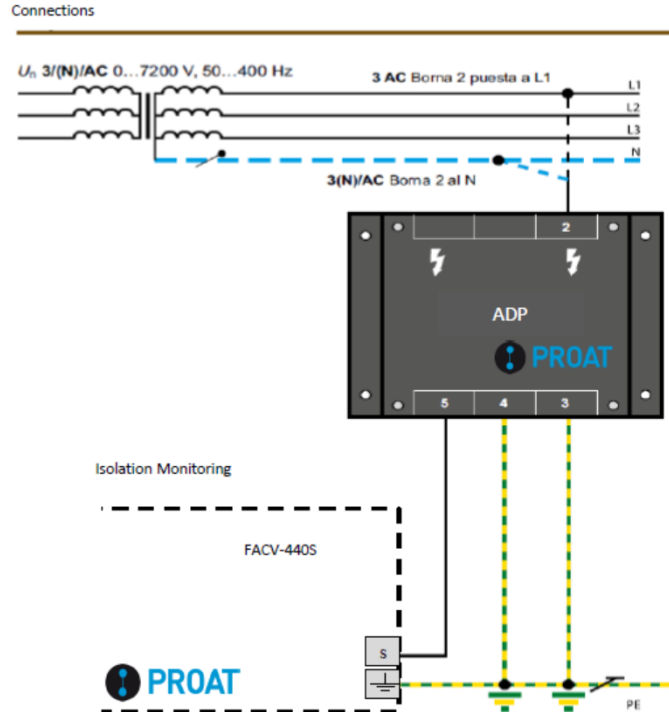
✓ The actuation level is user adjustable between 5K and 150K Ω .

✓ The auxiliary voltage is reference selectable : 120~370VDC y 85 ~264VAC



3. IMD PRODUCT

FACV+ADP – ISOLATION MONITOR AC



- ✓ Using the ADP coupler, the signal of FACV, can be extended up to 7,200VAC
- ✓ The ADP filters the high AC voltage and only pass the signal that the IMD sends by earth, in case of ground fault.
- ✓ The IMD FACV detects the fault, if there is any one.

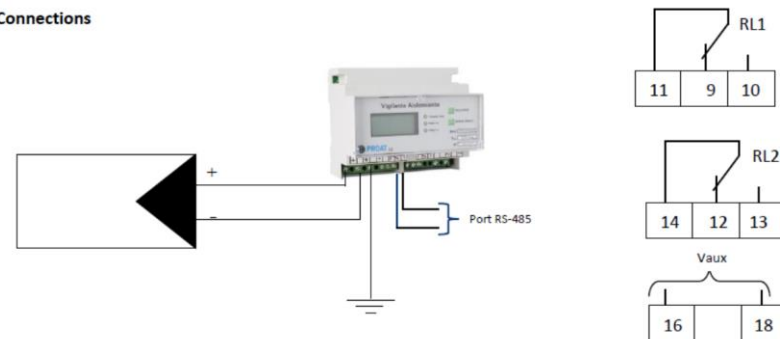
3. IMD PRODUCT

FACB – ISOLATION MONITOR DC



- ✓ Models until 1000VDC
- ✓ Leakage capacity until 200uF
- ✓ Symmetrical and Asymmetrical faults.
- ✓ Output analog 0–10V.
- ✓ Preatarm and Alarm levels
- ✓ Measurement range : 10K ~ 1M Ω , FACB-M/ 10 ~10M Ω
- ✓ Display show real level. Insulation.
- ✓ Batteries and Solar Applications

Connections

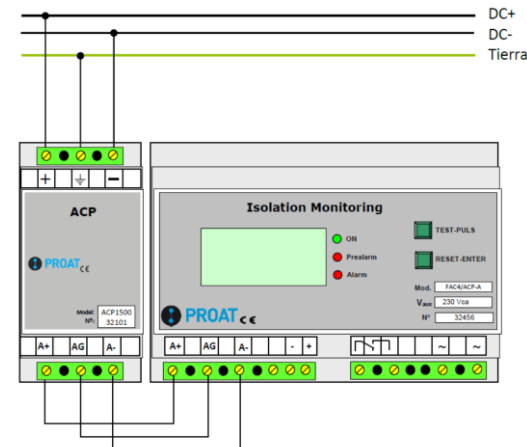


3. IMD PRODUCT

FAC4+ACP – ISOLATION MONITOR DC

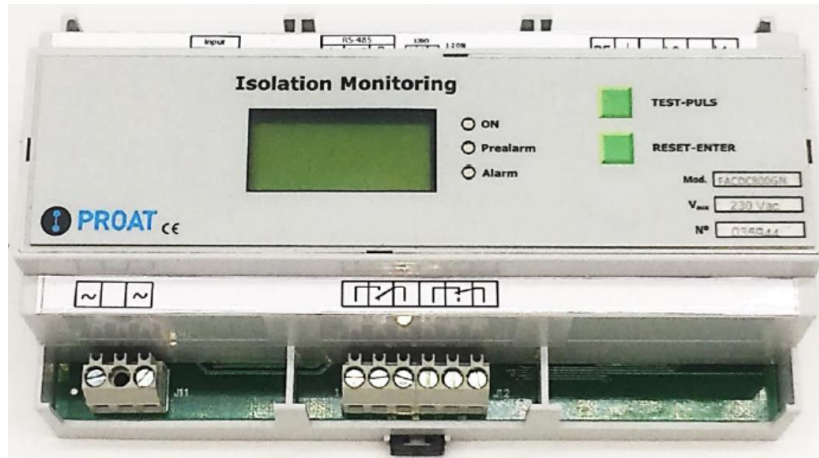


- ✓ Models until 1500VDC
- ✓ Leakage capacity until 200uF
- ✓ Symmetrical and Asymmetrical faults.
- ✓ Output analog 0–10V.
- ✓ Prealarm and Alarm levels
- ✓ Measurement range : 10K ~ 1M Ω
- ✓ Display show real level. Insulation.
- ✓ Batteries and Solar Applications



3. IMD PRODUCT

FACDC-800GN(800Vac/1500Vdc) – ISOLATION MONITOR AC+DC



- ✓ Display with real insulation level.
- ✓ Symmetrical and Asymmetrical faults.
- ✓ Prealarm and Alarm levels.
- ✓ Measurement range : 0-999K Ω
- ✓ Leakage capacity calculation
- ✓ External input, which allows to stop the device, in case of installations in which other elements of isolation surveillance exist.
- ✓ Output RS-485 port with ModBus-RTU communications protocol.
- ✓ Admits leakage capacity in the installation, up to 1000uF.
- ✓ Active Method the adapts to the variation of the leakage capacity of the installation



감사합니다.