

A combined system of protection and measurement
for all applications in Medium Voltage distribution



General

The NA60 protection relay, in conjunction with the new sensors combined ThySensor, can be used in all applications for the measures with traditional CTs and VTs with significant user benefits.

- Current, voltage, voltage-indicator lamp and insulator in the same component
- Low size and low weight; installation inside limited size MV switchgears is possible, thereby improving maintenance
- Galvanic insulation for current and voltage measurements
- Being a single model suitable for measuring electrical quantities of a wide range of applications, inventory management is optimized
- Absence of saturation and ferroresonance phenomena
- High measurement accuracy.

For the directional protection, a balance transformer to measure the residual current is required, while the residual voltage is derived through vector calculus on the three phase voltages.

Protective functions

27	Undervoltage
49	Thermal image for lines and transformers
50/51	Phase overcurrent
50N/51N	Residual overcurrent
59	Phase overvoltage
59N	Residual overvoltage
67	Phase directional overcurrent
67N	Ground directional overcurrent
BF	Breaker failure

Control and monitoring

74CT	CT monitoring
74VT	VT monitoring
DFR	Digital Fault Recorder
SER	Event recorder
SFR	Fault recorder
PLC	Programmable Logic Controller
CLP	Cold Load Pickup
BLOCK2	Logic selectivity

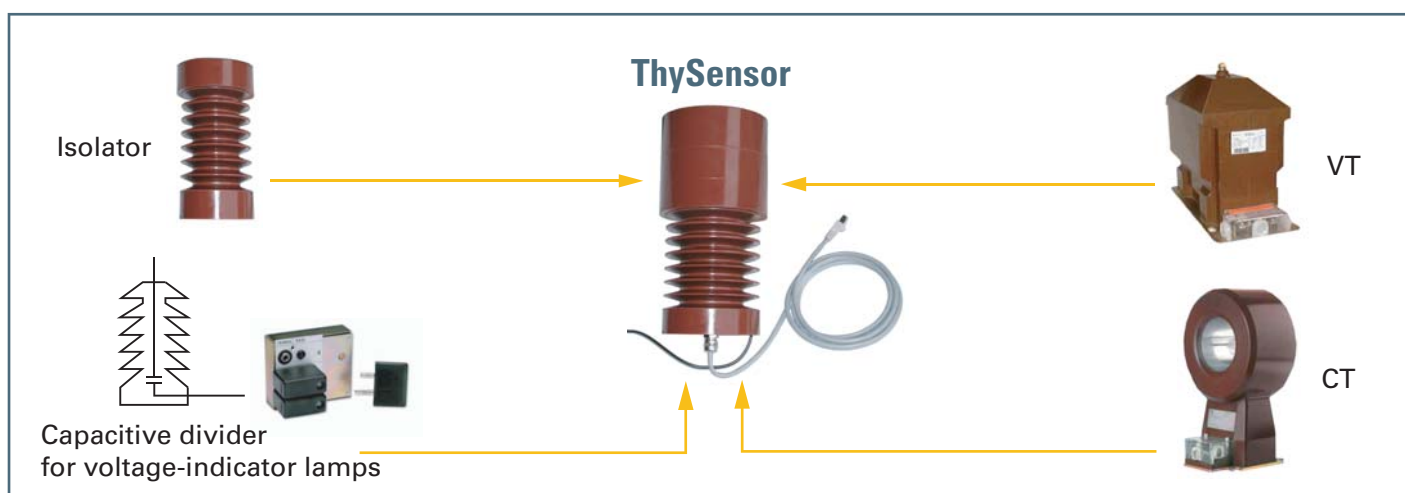
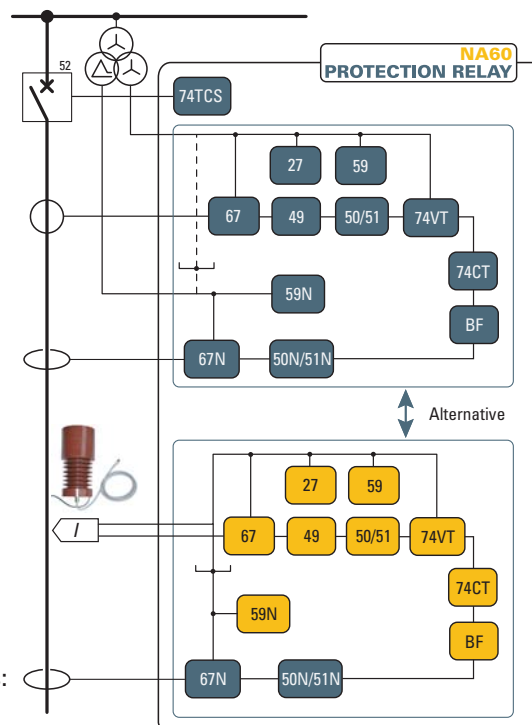
ThySensor

The sensor is an innovative combo device that includes four functions:

- Electronic current transformer
- Electronic voltage transformer
- Capacitive divider for voltage-indicator lamps
- Insulator

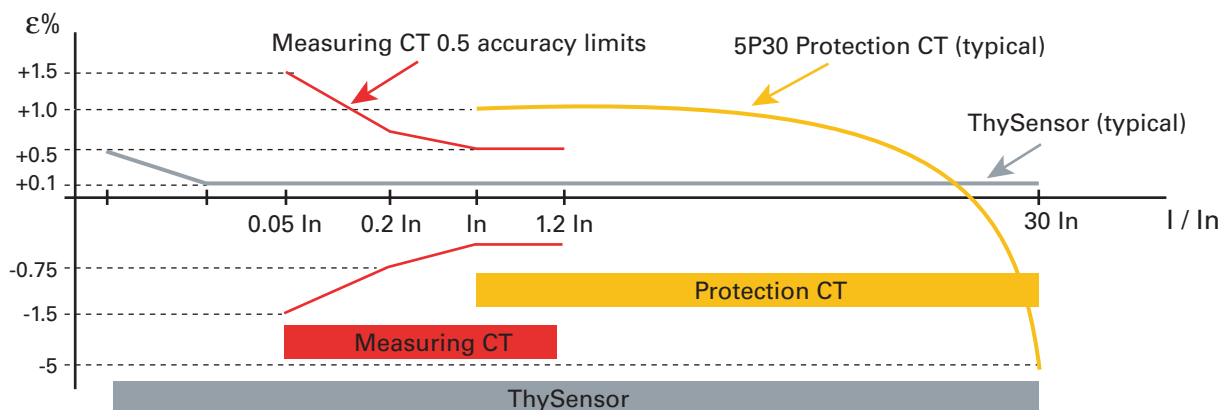
The sensor can be easily installed inside switchboards for medium voltage distribution for primary and secondary protection functions as alternative to traditional current and voltage transformers and isolators with capacitive divider.

The voltage transducer is based on an electrical field sensor, galvanically isolated from the busbars, while the current transducer is based on a special Rogowski sensor.



Technological Comparison

TECHNICAL DATA	CTs and VTs	ThySensor
Signal	1 A , 5 A secondary (CT) 100 / $\sqrt{3}$ V secondary (VT)	0.200 V a In (630 A) 1.00 V a Un (20 / $\sqrt{3}$ kV)
Accuracy	5 - 10% for protection (5P - 10P) 1% for measuring	3P, 5P Class 0,5 (typical)
Range (linearity)	0.1...50 In for protection CTs 1.3 Vn for protection VTs	Limited by the supply voltage
Output	Current (CT), voltage (VT)	Voltage
Saturation	Output signal distorted	Phenomenon absent
Ferroresonance	Damage and measuring error	Phenomenon absent
Immunity (EMC)	High	High with screening
Temperature influence	No influence	Sw compensation
Secondary VT short-circuit	Destructive	No danger
CT open secondary	Destructive and dangerous overvoltages	No danger
Power supply	No power required	± 12 V (provided by the protection relay)
Capacitive divider	Separate	Integrated (C=12 pF - ENEL DY1811, DJ1054)
Connection wires	To be sized	Integrated (standard 3 m, up to 50 m on request)
Weight	40 kg (typical for TA+TV)	3.5 kg
Cost	High	Low
Dimensions	High	225 x 110 (length x diameter)
Mounting	Binding	Simplified
Reference standards	IEC 60044-1 (CT), IEC 60044-2 (VT)	IEC 60044-7 (CT), IEC 60044-8 (VT)



Benefits



smaller

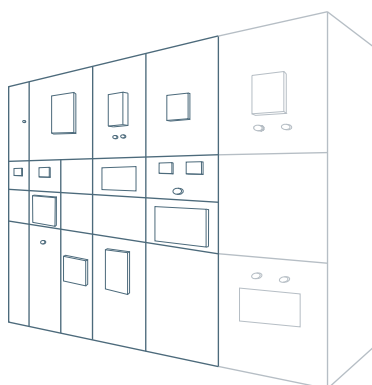


lighter



cheaper

In addition to the above described the use of protective relay NA60 in conjunction with the new ThySensor devices, can achieve significant **benefits** for the **Users** and **Manufactures** of electrical switchgears



The size of the switchgears can be reduced!

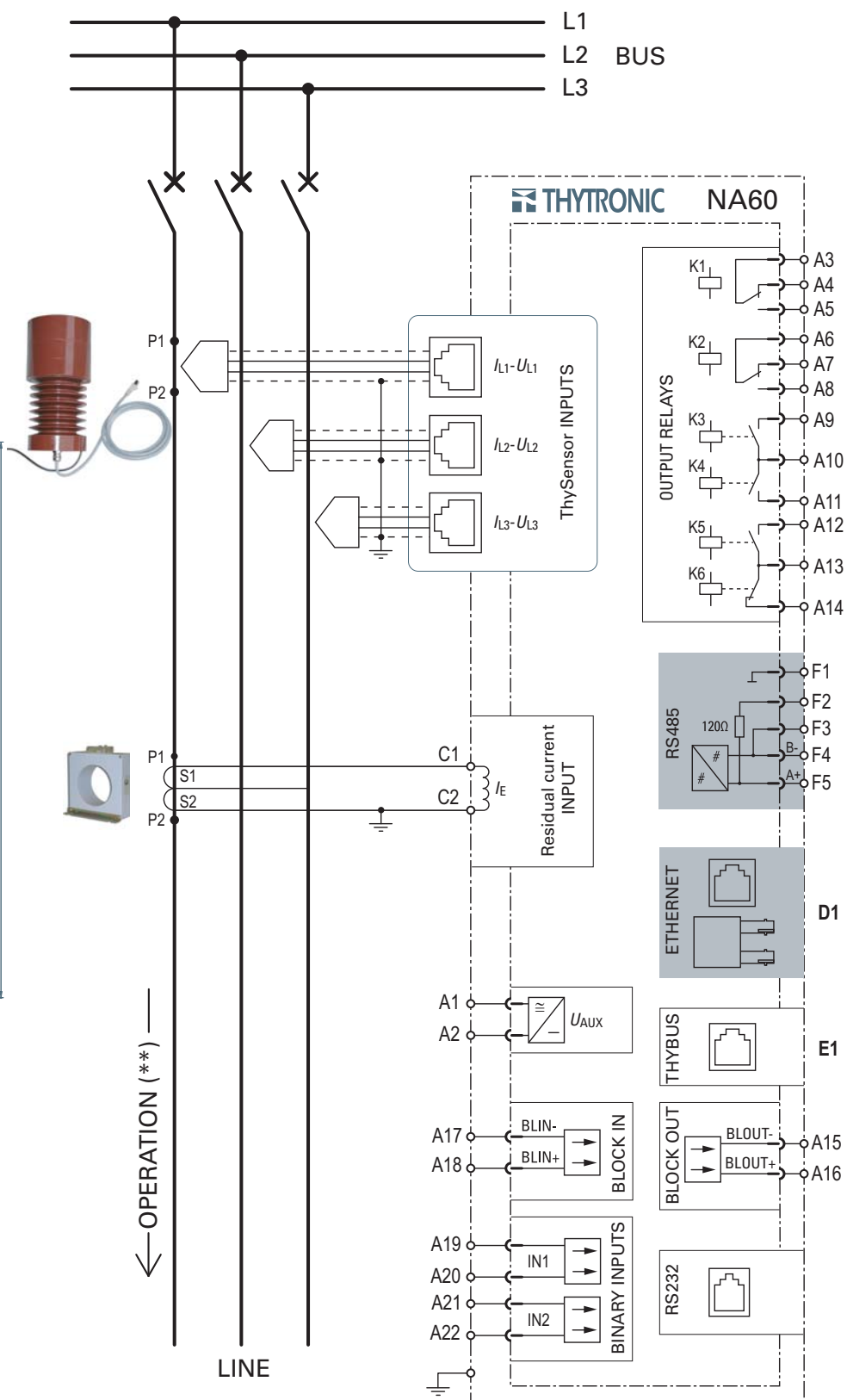
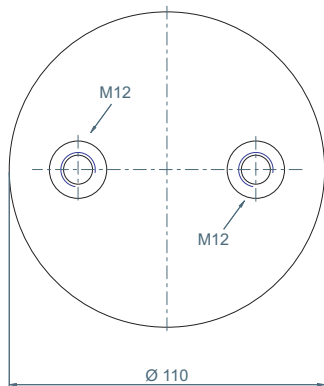
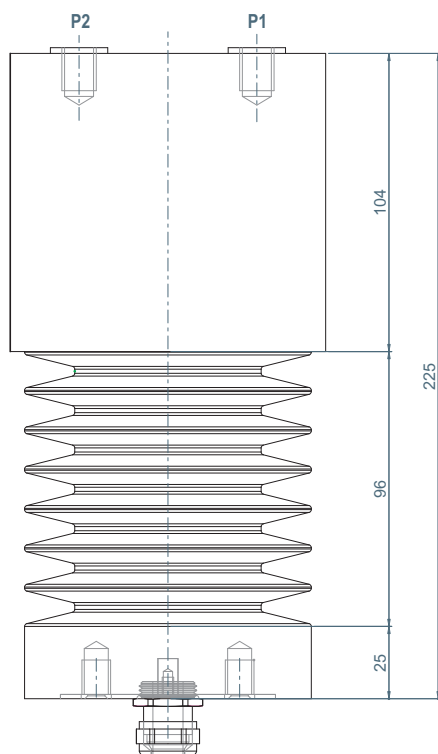
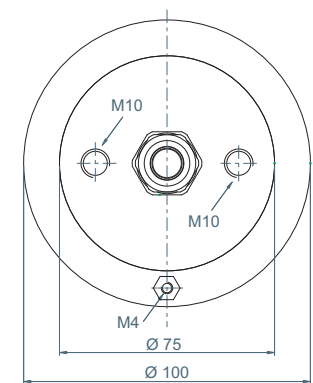
Installation inside compartments of limited size

Installation of all measuring sensors in the same compartment, even in the presence of phase and ground directional protections

Easy **Maintenance** and retrofitting

Optimized stock **management** with a single model of sensor suitable for measuring electrical quantities of a wide range of applications

Protection system, measurement and control developed and provided by an **inde-**
pendent manufacturer



(**) Operation for:

- 67 elements with characteristic angle adjusted within 0°... 90° or 270° ...359° ranges
- 67N elements for insulated neutral systems and characteristic angle setting = 90°

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