Aplicaciones y Tecnología, S.A.

Compatible ersys

TPI

Over/under Voltage Protection

Protection, Metering and Communications

Ref. FTPI703A

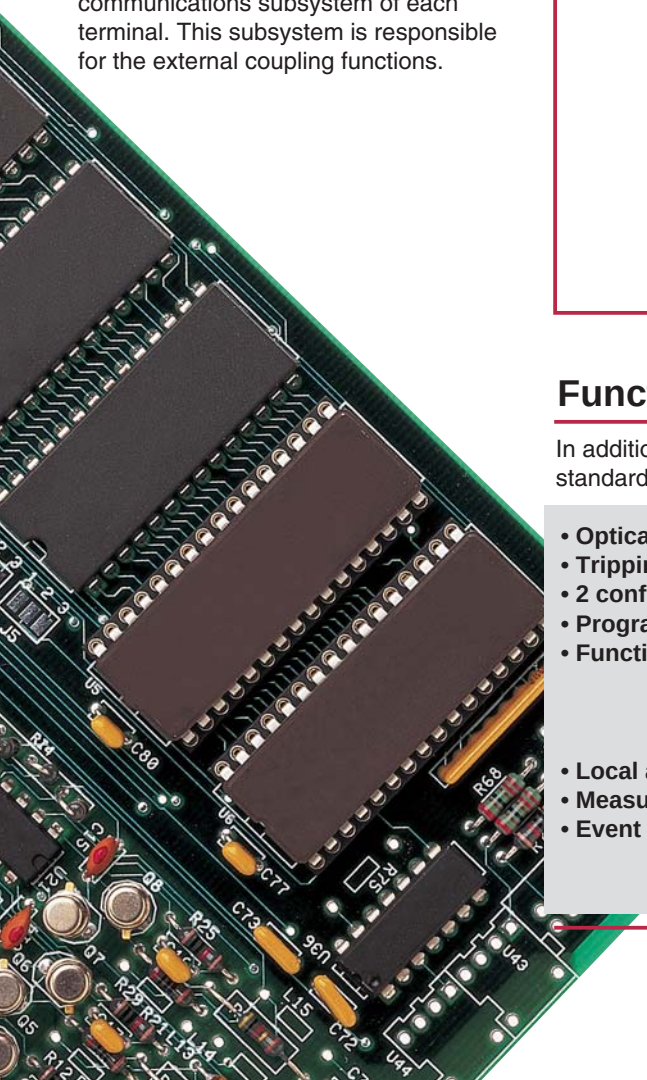
Description

TPI relay family, using digital tecnology of the last generation, incorporates over and under voltage protection functions as well as metering and communications. The following versions are available:

- **Single-phase over/under voltage (127/159) (selectable)**
- **Three-phase over/under voltage (3x27/3x59) (selectable)**
- **Single-phase residual voltage protection (1x59N)***

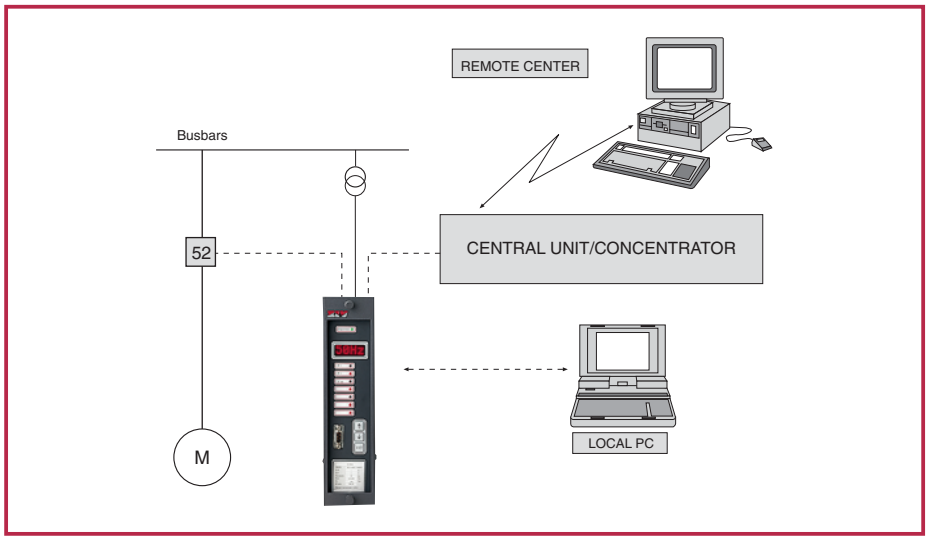
* 3rd harmonic filter included

Each relay can be used either individually or integrated in a system with other types of protections **(CPI, FGI, FGI** or others**)**. Local and remote communications are available in each case.
When the relays are part of an integrated protection and control system, the connection to the remote center is made through the communications subsystem of each terminal. This subsystem is responsible for the external coupling functions.



Application

Voltage is one of the main electrical quantities for defining a Power System. The power equipment installed in a system, has been designed to operate at a given voltage level, however, small over voltages in the network have little effect on it.
Generators, transformers, capacitor banks, etc. are electrical machines very sensitive to over voltages. On the other hand, there are other components such as motors, regulators, etc. which should not operate under the rated voltage level.
Overvoltage and undervoltage protections are usually inverse or definite time type, with tripping times between 0.2 and 20 s. Instantaneous trip is required in those cases where the magnitude of the overvoltages is considerable.
TPI protective relays, are applicable in those installations requiring a reliable detection of voltage fluctuations.



Functions

In addition to the protection functions above described, they incorporate, as standard, the following ones:

- **Optical alarm indication: 7 LED´s (6 configurable)**
- **Tripping outputs (1 switched contact plus another configurable one a/b)**
- **2 configurable digital inputs**
- **Programmable logic of auxiliary outputs (3 switched contacts)**
- **Functions selection:**
  - **2 overvoltage levels**
  - **2 undervoltage levels**
  - **1 over and 1 undervoltage levels**
- **Local and remote* communications interface**
- **Measuring of voltage**
- **Event recording and Fault Reporting**

*** Optional**

Man-machine interface

Man-machine communication can be done in two different modes:

• **LOCALLY,** through:

1. Push button. When the equipment has its cover on, access to it can be made through one push button. Pressing it, the information is displayed in a circular motion, showing the following features:

- Last trip data
- Measurements (referred to the primary side)
- Last trip information and LED's reset

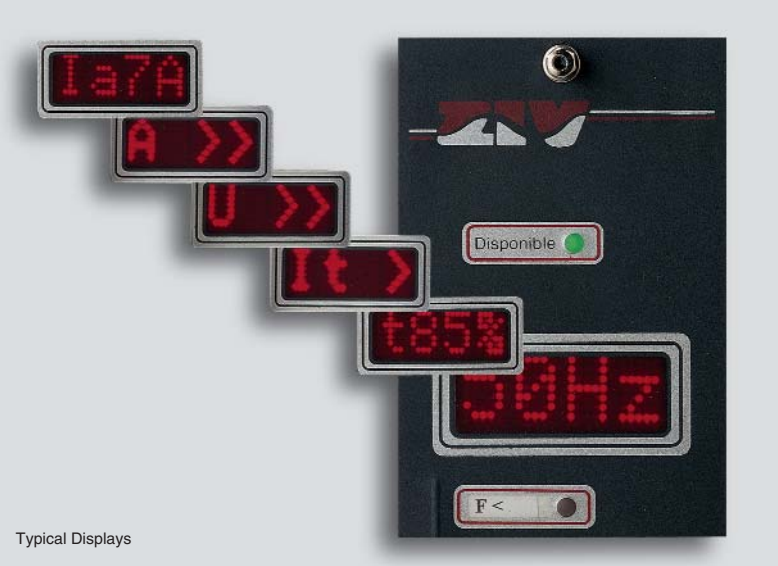
2. Key board. Removing the cover, user has access to the entire keyboard, 3 keys (🡻, 🡹 and **Enter**). Through the 🡻, 🡹 keys, access is allowed to the corresponding submenus, for example:

Configuration	Settings	Information
Communications	General	Measurements
Inputs and outputs Configuration	Protection	Last trip data

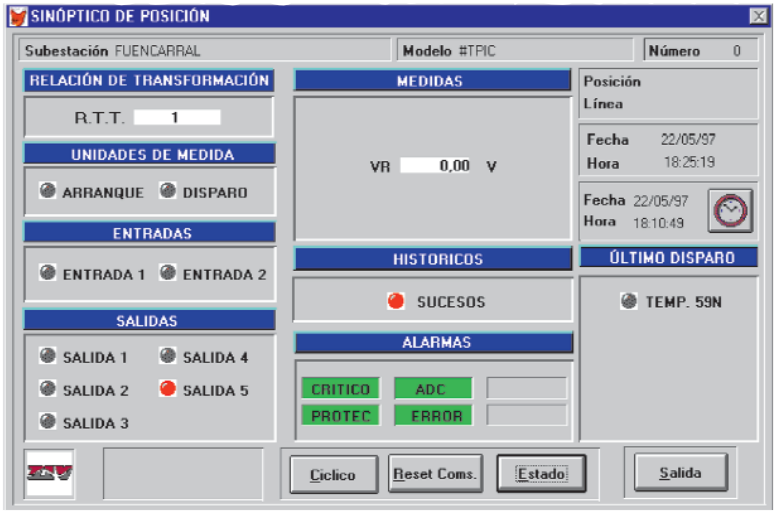
3. Display. LCD type with one row of 4 characters.

4. PC. Connected to a serial communications port, placed in the front of the equipment.

• **REMOTELY (optional)**, through a serial communications port in the rear of the equipment. RS232 or Optical Fiber (glass or plastic) are the two available options.



Typical Displays



Screen from the ZIVercom communications program for PC

Communications

The communications program ZIVercom enables the dialogue with **TPI** relays, and other equipment, either **locally** (via front port) or **remotely** (via serial port). This program covers every user need regarding programming, setting, operations, event recording, reporting, measuring data, etc..
The program is protected against unauthorized users by means of **passwords**.
ZIVercom, which runs in **Windows**™, is user friendly and requires buttons or keys to open the various submenus.

Each submenu contains one or several dialog windows which, in each case, ask user to either introduce data or select certain predetermined values.

The communication through the local port implies necessarily an automatic switch to **local mode**. Thus, remote access is inhibited. Configuration of the remote serial port and the programmable I/O, can only be carried out in **local mode**.

Examples of screens from the ZIVercom

Rear view of the relay.

Modularity

The **TPI** protective relays are mounted in standard 1/7 19"rack metallic housing, (horizontal construction is also available) all are 6 RU high and painted in graphite color. They are designed for panel installation. Additionally, **TPI** equipment can be part of a system with other type of protections **(CPI, MXI** and/or **FGI)**.
In this case, housings would be 1/2 or 1 full 19”-rack. All equipment is protected with a transparent sealable cover.

Terminal blocks are placed in the rear of the equipment and admit wires of a cross section up to 4 mm^2 (11 AWG) for voltage circuits and 2.5 mm^2 (13 AWG) for the rest of the circuits.

Protection setting ranges

General setting ranges	
Transformer ratio VT	1 -4000
Over voltage Function	YES/NO
Under voltage Function	YES/NO
Over and Under voltage	YES/NO

Single-phase over/under voltage unit (1 ×27) (1 ×59)	
Pick-up unit. U< / U>	0 - (0.1 –1.5) U_n
Instantaneous U>>	0 - (1 –2.5) U_n
Definite time t< / t>	(0 –100) s
Unit curve U<	V/t
Unit curve U>	V/t

Single-phse over / under voltage unit (3 ×27) / (3 ×59)	
Pick-up unit. U< / U>	(0.1 –1.5) U_n
Instantaneous U>>	(1 –2.5) U_n
Definite time t< / t>	(0 –100) s
Unit curve U<	V/t
Unit curve U<	V/t

Residual voltage unit (1 ×59N)	
Pick-up unit U>	(0.2 –0.5) U_n
Definite time t>	(0 –100) s.

Sistem incorporating protective relays and 3IRD terminal in a 19" rack.

Technical characteristics

Auxiliary voltage (U_{aux})*
24-48 V_{dc} (± 20 %)
110-125 V_{dc} (± 20 %)
220-250 V_{dc} (± 20 %)
230 V_{ac} (± 20 %)
Power drain: 7 W

* Selectable according to models

Voltage inputs	
Rated values (U_n)	110 V, 50 Hz
Rated values (U_n)	120 V, 60 Hz
Thermal capability (continuous)	2xU_n (Phases)
Thermal capability (for 10 s)	3.6xU_n (zero sequence)

Digital inputs	
Input voltage range	
24 -250 ±20%	V_{dc}*
110 ±20%	$V_{dc/ac}$
230	V_{ac}
Current Drain	< 10 mA

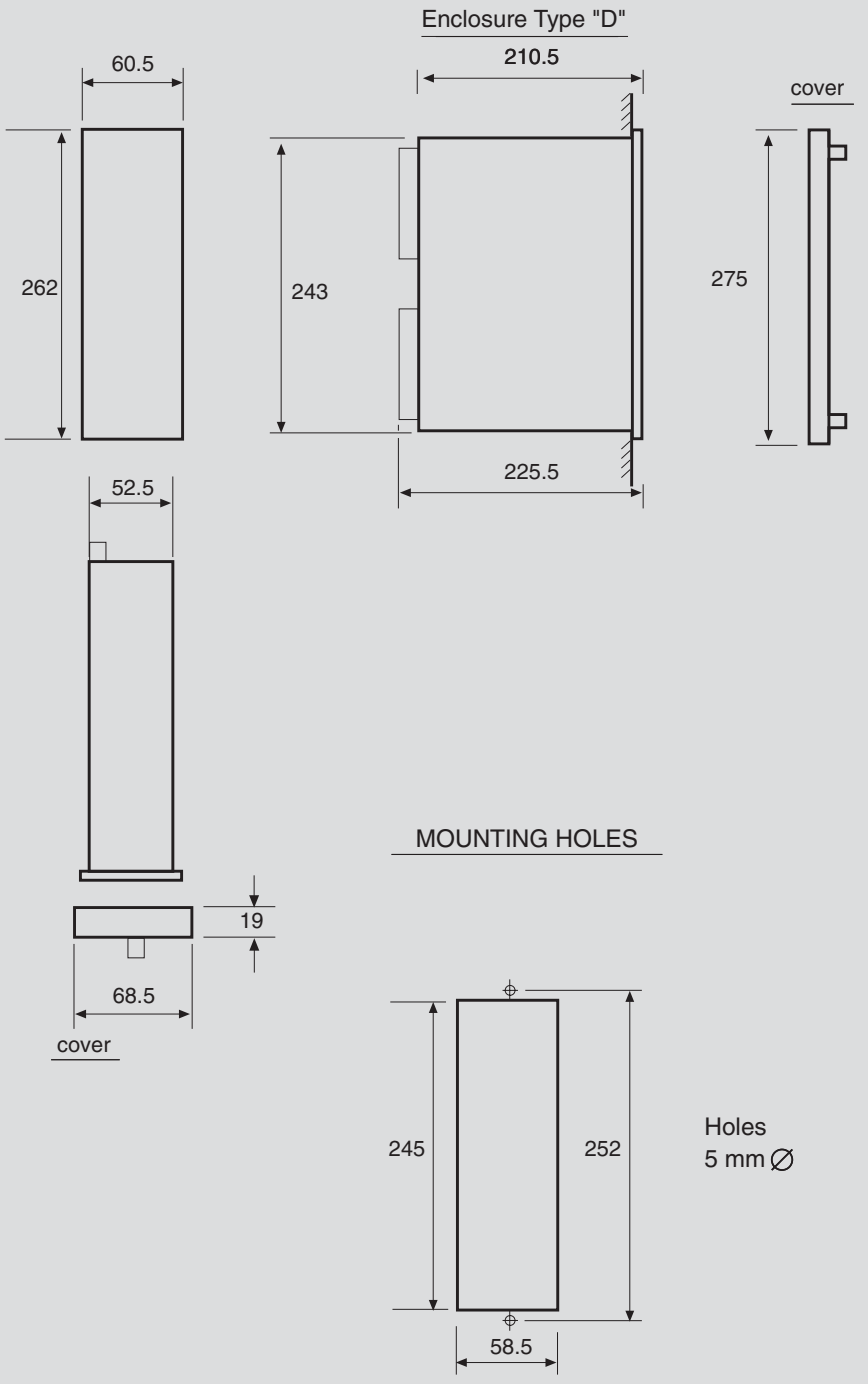
* Range according to model

Tripping outputs	
Switching capability	2500 W
Breaking capability	250 W/1250 VA*
Switching voltage	250 Vcc
I continuous	5 A
I short duration	10 A during 0.5 s

Auxiliary outputs	
Switching capability	2000 W
Breaking capability	200 W/1000 VA*
Switching voltage	250 Vcc
I continuous	3 A
I short duration	8 A during 4 s

* With a resistive load

Dimensions



NOTE: These dimensions are valid for both vertical and horizontal construction

Measurements in mm

Model selection

SELECTION	
Vertical	3
Horizontal	8

FUNCTIONS	
Single-phase (1×27) / (1×59) *	A
Three-phase (3×27) / (3×59) *	B
Single-Phase residual voltage (1×59N)	C
(3×27/59)*+(1×27/59)*	D
(3×27/59)*+1×59n*	E

*Selectable in the relay

AUXILIARY VOLTAGE

POWER SUPPLY	DIGITAL INPUTS	
24 -48 V^*_{dc}	24 -48 V_{dc}	1
110 -125 V^*_{dc}	24 -125 V_{dc}	2
220 -250 V^*_{dc}	48 -250V_{dc}	3
230 V_{ac}	230 V_{ac}	4

*±20%

RATED VOLTAGE	
110 and 110-3 V_{ac} / 50 Hz	1
120 and 120-3 V_{ac} / 60 Hz	3

COMMUNICATIONS	
Local RS232	1
Local RS232 / Remote F.O. plastic	2
Local RS232 / Remote F.O. glass (SMA)	3
Local RS232 / Remote F.O. glass (ST)	4

TYPE OF ENCLOSURE	
6 U ×1/7 19"-Rack	D
As part of a system in a full 19"Rack	V

Revision

EXEMPLO: Model 3TPI-B0B-2120000DA

30 ϕ Under / Over voltage
120 Vcc/50 Hz
Communication by O.F. (plastic)

Standards and type tests

This equipment satisfies and exceeds the requirements of IEC-255 in its maximum class for all the values indicated below:

Insulation test (IEC-255-5)	
Between circuits and earth	2 kV, 50 Hz 1 min
Between independent circuits	2 kV, 50 Hz 1 min

* Selectable according to models

Impulse test
(CEI 255-5)
5 kV , 1.2/50 µs, 0.5 J

1 MHz disturbances	
(IEC 255-22-4 Class III)	
Common mode	2.5 kV
Differential mode	1 kV

Fast transients
(IEC 255-22-1 Class IV)
4 kV ± 10%

Electrostatic discharges
(IEC-255-22-2 Class III)
8 kV ± 10%

Temperature (IEC-255-6)	
Operating range	-10°C to +55°C
Storage range	-25°C to +70°C
Humidity	95% (non-condensing)

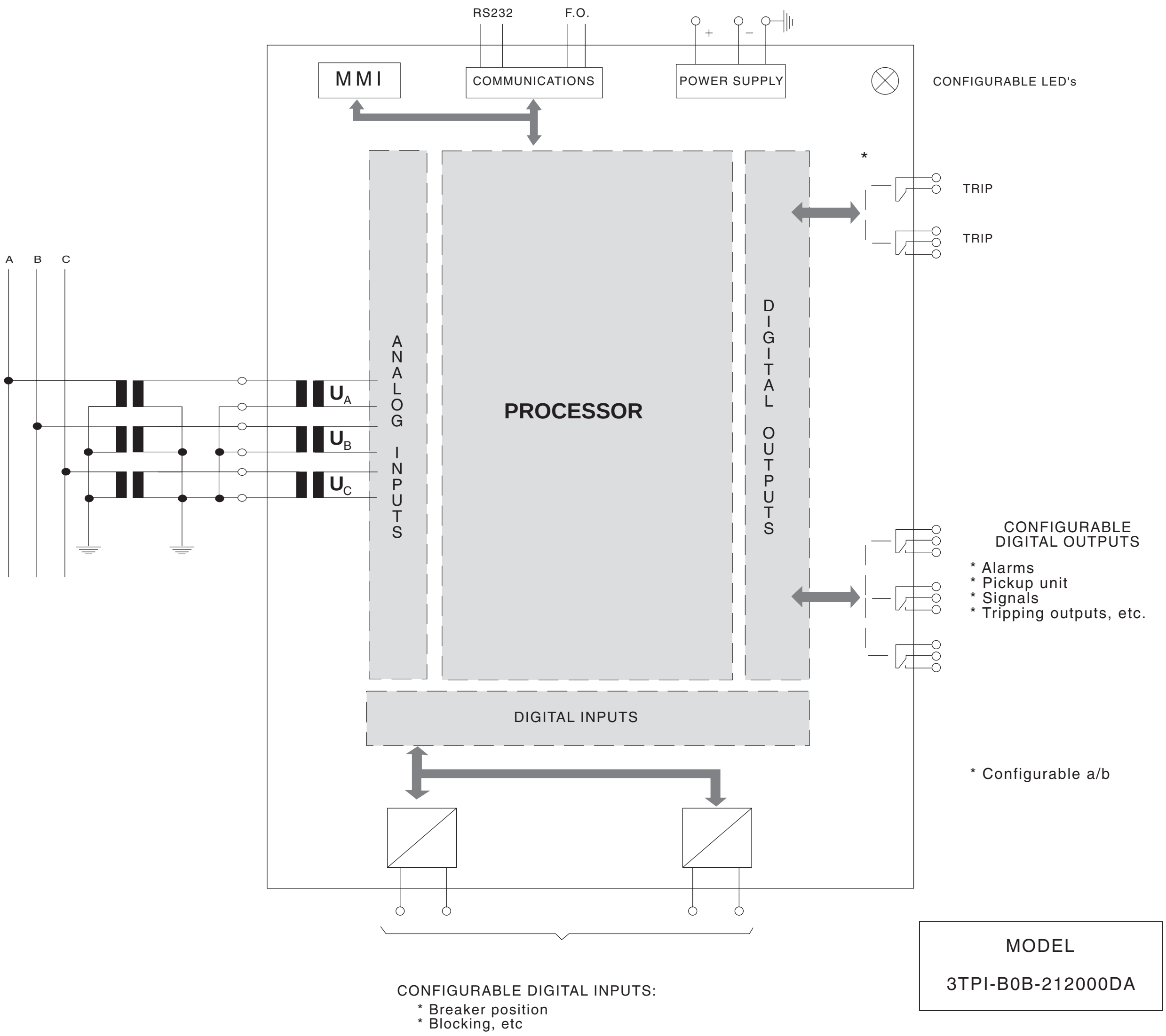
Alternating component (ripple)
(IEC 255-11)
Ripple should always be less than 20%

Radio frequency emissivity
IEC-41B (5) 80

Degree of protection provided by the enclosure
IP 51 for the metallic enclosure. IEC-529

Susceptibility to radiated electromagnetic fields
IEC-255-22-3 Class III
10 V/m

Connections diagram



MODEL

3TPI-B0B-212000DA

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OTZARRETA (Zarautz) - Mod. ZIV0101500 - Dep. Leg.: S.S. 1.238/94