



Aplicaciones y Tecnología, S.A.



Compatible  
ZIVersys

# WDI

Protection Against Reverse Power Flow  
Protection, Metering and Communications

## Description

WDI are protective relays against reverse power flow and are designed with the latest digital technology.

The equipment incorporates a metering unit to isolate the generator from the electric circuit, when there is a driving power failure.

WDI relays are equipped with a local communications port and optionally they can have a remote communications port.

The WDI equipment guarantees an easy installation process. They can be used separately or integrated in systems with other type of devices such as CPI, TPI, FGI, SCI, MXI, etc.

## Application

If a generator is connected to the electrical power system and its driving power stops while the excitation is applied, the generator becomes a synchronous motor.

The main purpose of the protection against reverse power flow is to isolate the generator from the electrical power system when the above mentioned conditions take place.

This protection is really a turbine protection, since in case of reverse power flow, the turbine is affected by abnormal stresses leading to the following troubles:

-Steam turbines:

Damage and overheating in blades.

-Hydraulic turbines:

Cavitation

-Diesel groups:

Risk of explosion

Steam and gas turbines, are the most sensitive to the motorization phenomenon. Among hydraulic turbines, the Kaplan type are the most sensitive, the Francis type could be affected sometimes, while the Pelton turbines are not affected at all.

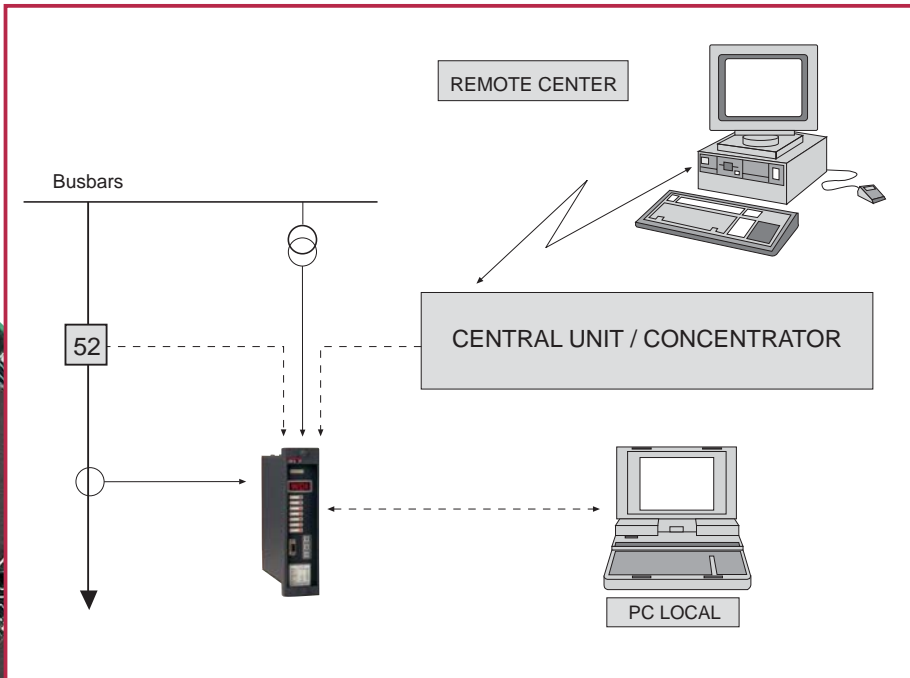
To protect a machine against this phenomenon, protection against reverse power flow (32) is applied. This protection operates when the electric system delivers active power to the generator. Protections should be set to a value below of the combined mechanic and electric power losses, usually between 1% and 2% of the rated power. Two types of tripping modes are present:

**Quick mode:**

Depending on the turbine's distributor or injector status

**Slow mode:**

With time delay (usually 2 seconds) to allow power fluctuation and avoid unwanted trips



## Functions

They incorporate, as standard, the following ones:

- 8 Led Targets, (7 configurable)
- 2 programmable digital inputs,
- 2 tripping outputs (1 switched contact and 1 programmable a/b)
- 3 auxiliary outputs (2 configurable)
- Local and remote communications interface (Optional)
- Sequence of Event Recording
- Self-diagnostics and monitoring
- Time synchronization

## Man-machine interface

Man - machine interface can be performed in two different ways

• **LOCALLY**, through:

**1. Protection function access using (F2) key** . With the cover installed, access is allowed through one of the function keys. By pressing F2 key, the following information is sequentially displayed:

- Target Indication - Last Trip
- Current metering (primary side)
- Target Reset
- Led Reset

**2. Protection function access using entire keypad.** Removing the cover, user has access to the entire 16 key keyboard arranged in a 4x4 matrix and to the four function keys below the display. Access to the different menu functions is accomplished by using the

Configuration	General Adjustments	Information
Inputs and outputs		Measurements
Communications	Protection	

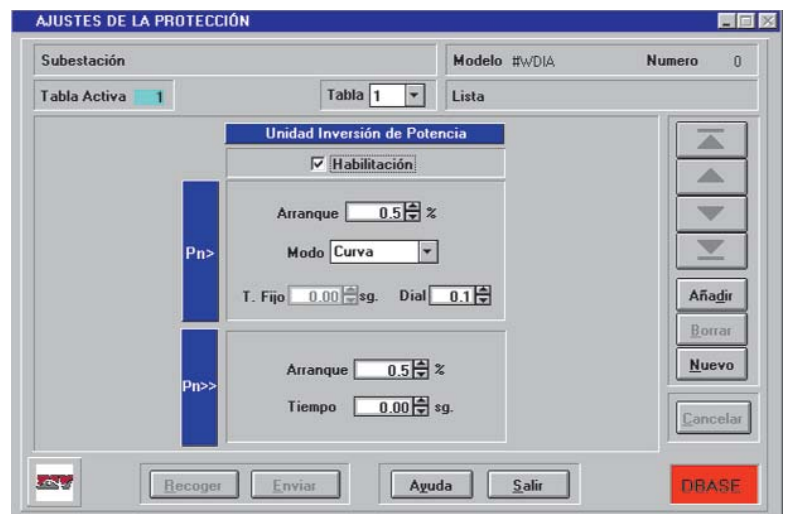
selection arrows (↓, ↑) or directly pressing the number of the desired option displayed on the screen.

The liquid crystal alphanumeric display has 4 rows with 20 characters each. It provides information about terminal unit alarms, settings, metering, status, etc .

**3. Via PC.** Connected to RS-232 front port. Maximum capabilities can be achieved by using the Zivercom communications program.

• **REMOTELY:**

Communication through the rear port RS 232 or Optical Fiber (glass or plastic).





Screen from the  communications program for PC





## Communications

The communications program  enables the dialogue with **WDI** 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, metering data, etc..

The program is protected against unauthorized users. , runs under **Windows™**, it is user friendly and easy to handle

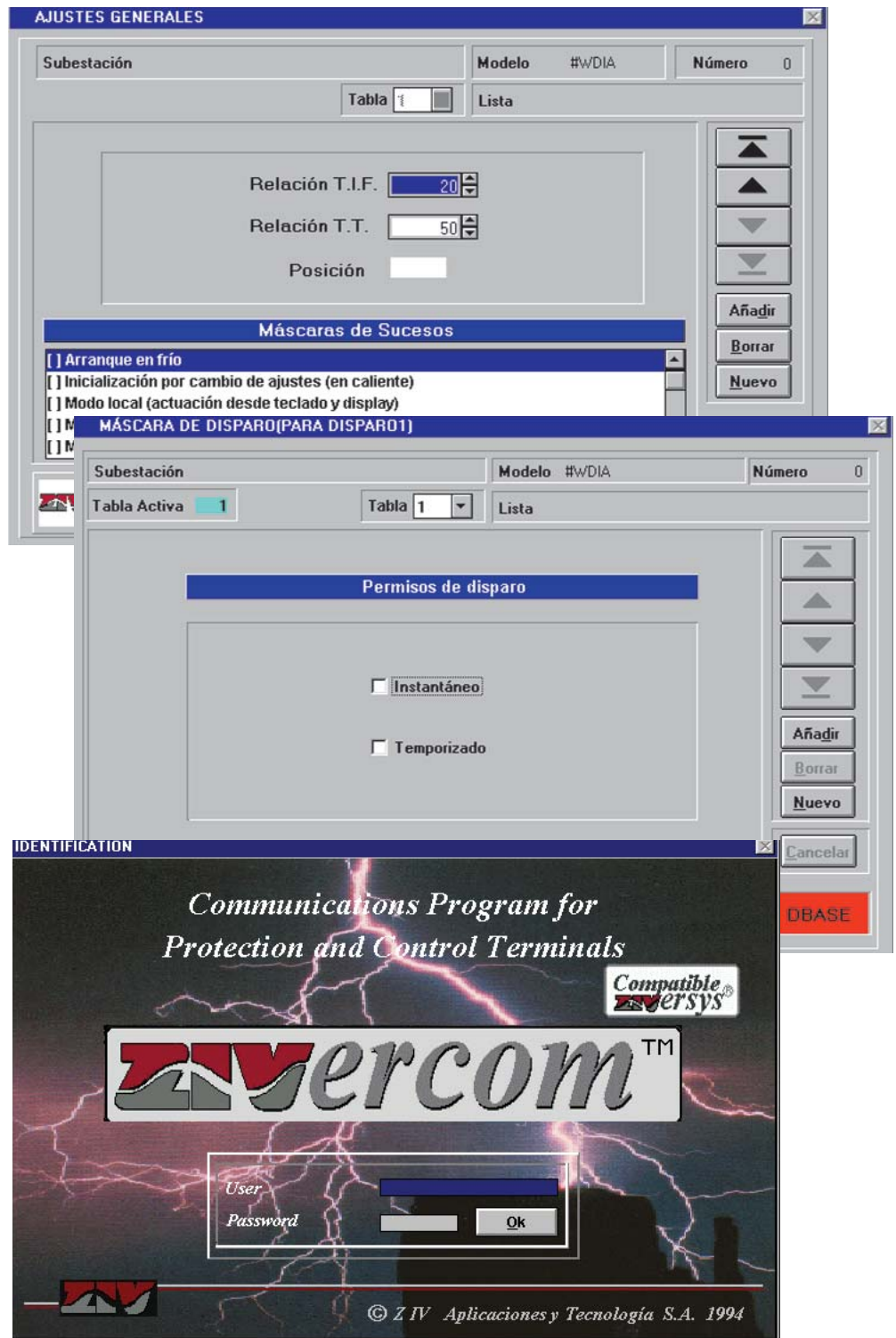
Every menu contains several dialog windows which in each case, ask user to either introduce data or select certain predetermined values.


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**.

## Modularity

The **WDI** protective relays are mounted in standard 1/7 19"rack metallic housing, all are 6 RU high and painted in graphite color. They are designed for panel installation. Additionally, **WDI** 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 19"-rack. All equipment is protected with a transparent sealable cover.

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



Examples of screens from the 

\* **WINDOWS™** is a registered trademark of **Microsoft Corporation** in the United States of America and other countries

## Protection settings range

### General Settings

CT Ratio	1-3.000
VT Ratio	1-4.000

### Protection

First power threshold Pr>>	0.5-30%Pr
Time Delay	0-60 seconds
Second power threshold >	0.5-30%Pr
Time Dial	0.1-1
Definite Time	0-60 seconds

Pr: Rated Power



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



## Technical characteristics

### Auxiliary voltage ( $U_{aux}$ )\*

24-48 V<sub>dc</sub> ( $\pm 20\%$ )

110-125 V<sub>dc</sub> ( $\pm 20\%$ )

220-250 V<sub>ac</sub> ( $\pm 20\%$ )

230 V<sub>ac</sub> ( $\pm 20\%$ )

Power consumption: 7 W

\* Selectable according to models

### Current inputs

Rated current ( $I_n$ ) 1 or 5 A

### Thermal withstand capability

4 In Continuously

50 In During 3 s

100 In During 1 s

Dynamic limit 240 In

### Burdens

$I_n = 1A$  <0.1 VA

$I_n = 5A$  <0.2 VA

### Voltage inputs

Rated values ( $U_n$ ) 110 V, 50 Hz

Rated values ( $U_n$ ) 120 V, 60 Hz

Thermal capability (continuous) 2x $U_n$  (phases)

Thermal capability (for 10 s) 3.6 x  $U_n$  (zero sequence)

### Digital inputs

#### Input voltage range

24-250  $\pm 20\%$  V<sub>dc</sub>\*

110  $\pm 20\%$  V<sub>cc/ac</sub>

230 V<sub>ca</sub>  $\pm 20\%$  V<sub>ac</sub>

Consumption < 10 mA

\* Range according to model

### Tripping outputs

Switching capability 2500 W

Breaking capability 250 W/1250 VA\*

Switching voltage 250 V<sub>cc</sub>

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\*

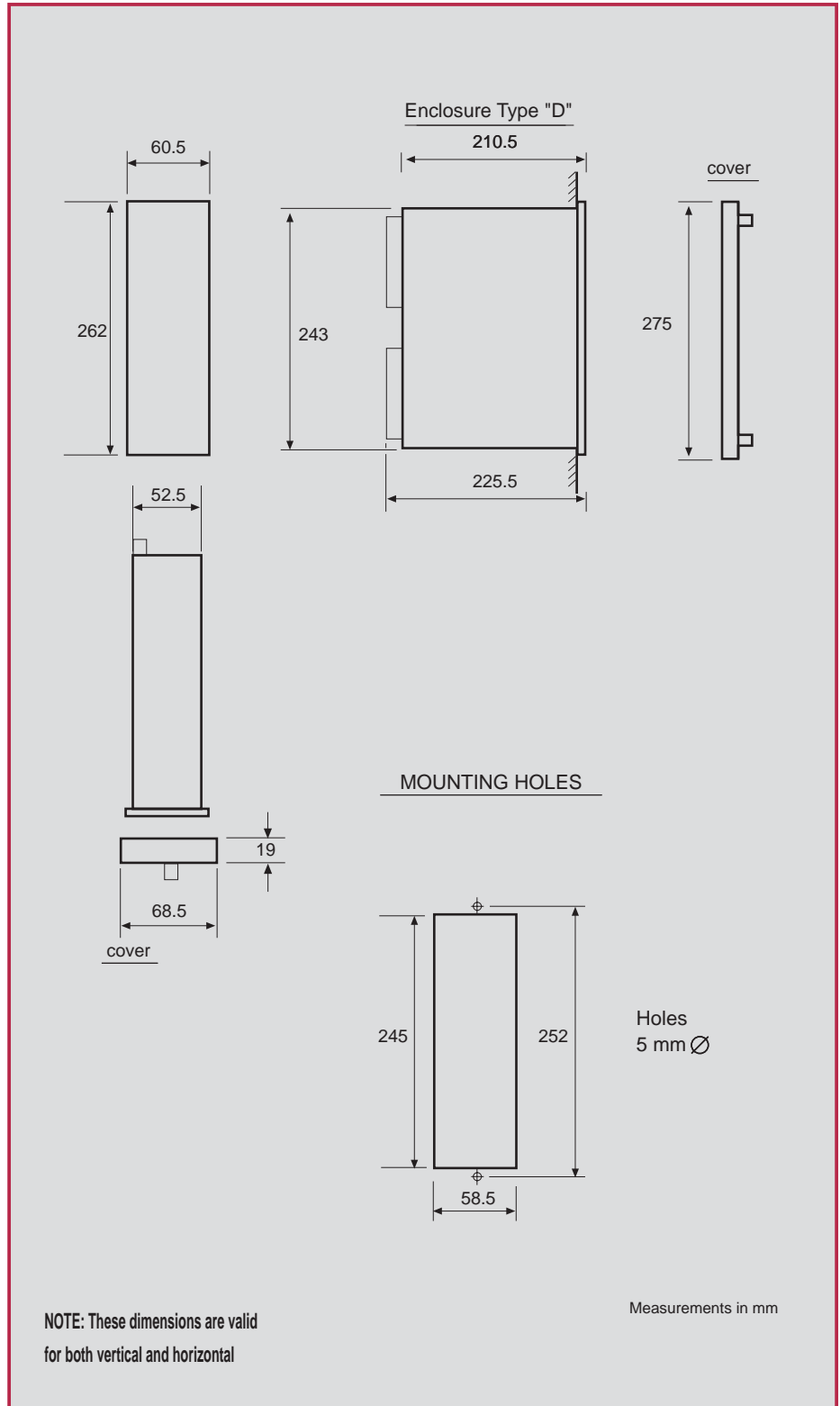
Switching voltage 250 V<sub>cc</sub>

I continuous 3 A

I short duration 8 A during 4 s

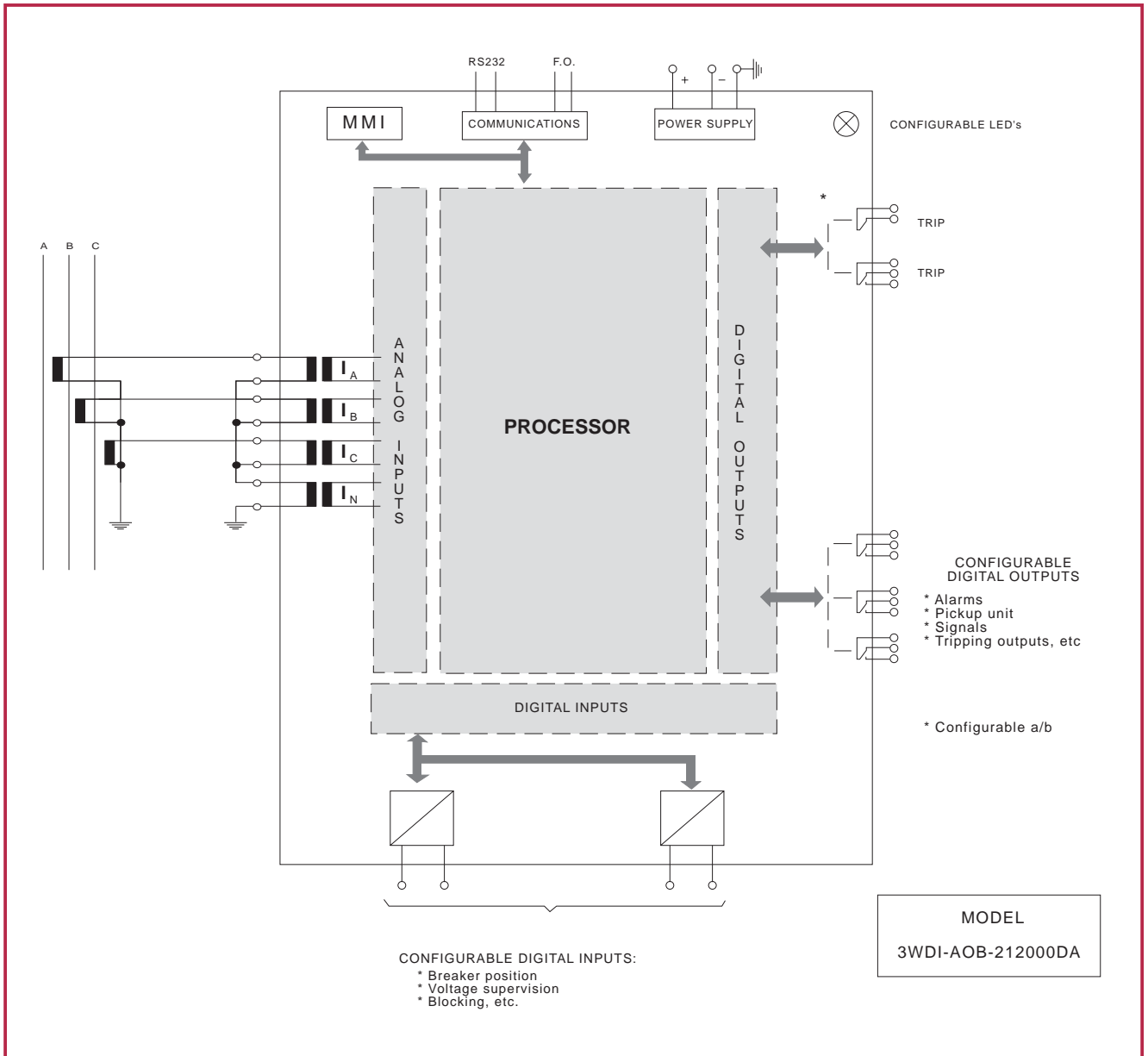
\* With a resistive load

## Dimensions





## Connections diagram



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