



Aplicaciones y Tecnología, S.A.



Compatible[®]
ZIVersys



IRD

Feeder Terminal

Protection, Control, Metering and Communications



Description

IRD terminals consist of a family of integrated systems for feeders. They are digital equipment, based on a powerful microprocessor, incorporating overcurrent protection (directional and non-directional), recloser, control, metering and communications. The following versions are available:

- **Three-phase and ground overcurrent**
- **Three-phase and ground overcurrent, plus one sensitive ground unit,**
- **Three-phase and ground directional* overcurrent**
- **Three-phase non-directional and ground directional overcurrent (isolated ground networks)**

* With voltage memory

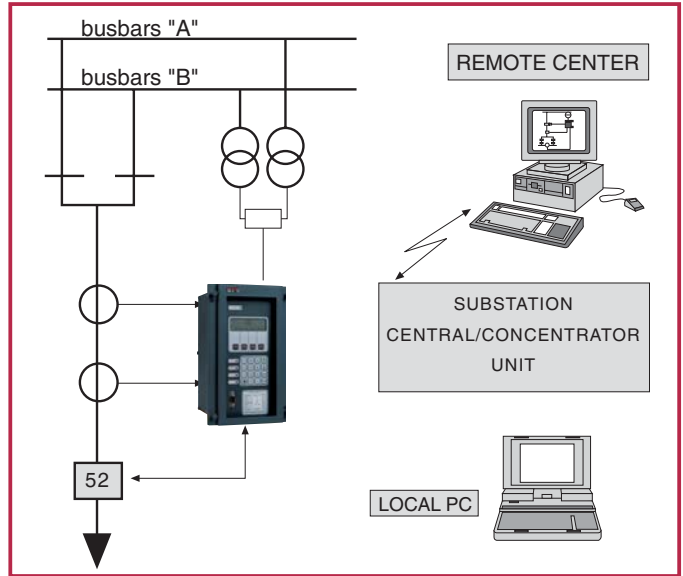
Each terminal can be used either individually or integrated in larger systems together with other type of IED's (Intelligent Electronic Devices). In both cases, local and remote communications are available.

When the **IRD** unit is part of an integrated protection and control system for substations, the linkage to the main S/S unit is made through its communication sub system. This performs the linking functions with the external world. On each case it emulates the corresponding protocol.

Applications

IRD terminals are applicable in medium voltage lines, power transformers, generators, and feeders in general, where overcurrent (directional or non-directional) protection (for phase to phase or for phase to ground faults) is required. Additionally, they can be used in medium voltage networks with isolated neutral, where high sensitive directional zero sequence protection for faults to ground is also required.

Finally, **IRD** offers important advantages, such as breaker operations, service restoration and meter data acquisition, in substations.



Functions

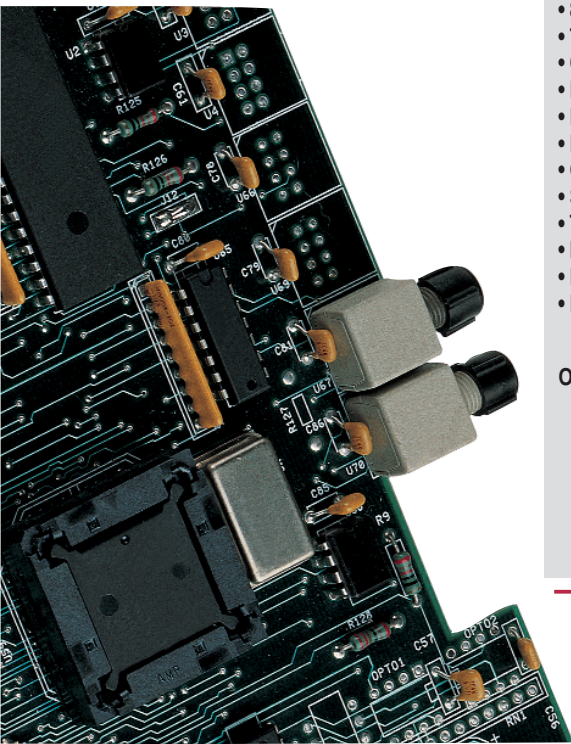
In addition to the above mentioned protection functions, all IRD equipment offers the following features:

- 5 selectable characteristic curves, 3 inverse, 1 definite time and 1 user programmable
- 3 setting groups (1 active and 2 alternative)
- Three-pole recloser with up to 4 programmable reclosing attempts (phase to phase or phase to ground)
- Optical alarm indicators: 5 LED's (4 configurable)
- Trip and close outputs (2 configurable contacts per function)
- 8 configurable digital inputs
- 7 auxiliary outputs from protection functions via programmable logic
- Close and trip circuits monitoring
- Breaker monitoring: I open, limit the number of trips on a time period, open and close time
- Local and remote communications interface
- Breaker failure unit
- Open phase unit
- Sensitive zero sequence unit
- Time synchronization
- Metering of: I U, angles, P (according to models), demand and data recording (history)
- Event recording
- Fault reporting

Optional features include:

- Oscillography
- Additional digital I/O modules and optical indicators
- Fault locators

- Over/under voltage functions (IVD models)
- Additional local and remote control and interlocking functions (7IRD model)



Man-machine interface

Man-machine interface can be performed in two different ways:

• **LOCALLY**, through:

1. Function keys. With the cover installed, access is allowed through one of the function keys. Pressing it, the information is displayed in a circular motion, showing the following features:

- **Last trip data**
- **Recloser status**
- **Number of recloses**
- **Metering waxes (primary side)**
- **Possibility of blocking/unblocking the recloser**
- **Reset last trip data**
- **Reset recloser counter**

2. Keyboard. Removing the cover, user has access to the entire keyboard (16 keys in one 4x4 matrix) plus 4 other function keys. When these keys are activated, their corresponding function is shown at the bottom of the display. Through a password, access is allowed to the corresponding sub-menus, for example:

3. Display. LCD type with 4 rows of 20 characters per row.

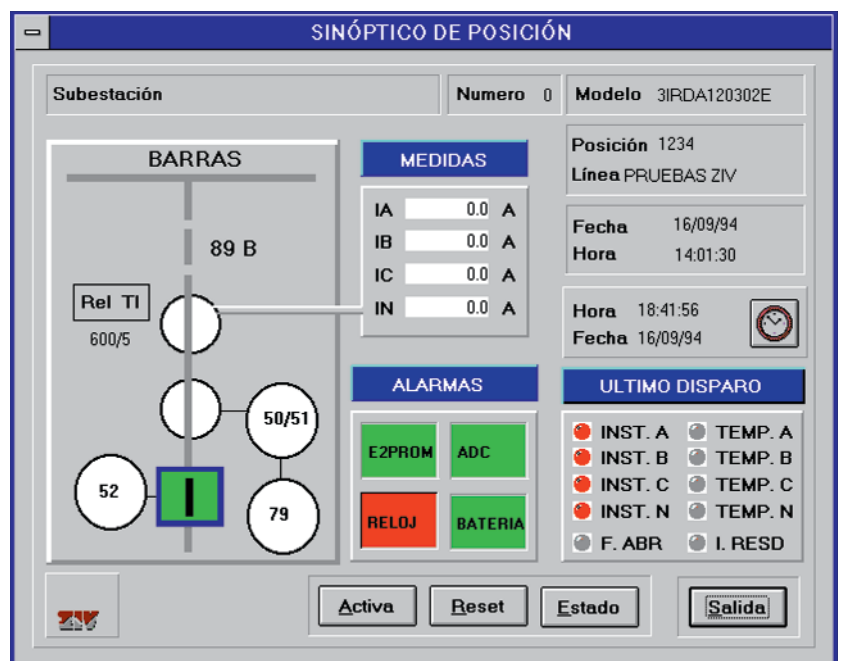
4. PC. Connected to a serial RS232 communications port, placed in the front of the equipment.

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

Example of menu:

Operations	Configuration	Settings	Activate table
Circuit breaker (Open/Close)	Passwords	General	Table 1
Automatism	Permissions for operations	Protection	Table 2
Conn/disconn/reset	Language selection	Automatism	Table 3
	Date/Time setting	Logic	
	Communications	Breaker supervision	
		Events	

The information menu is access-free and, when selected, it shows the following heading: **Settings, Configuration, Operations, Logging, Status. Metering**



Screen from the communications program for PC



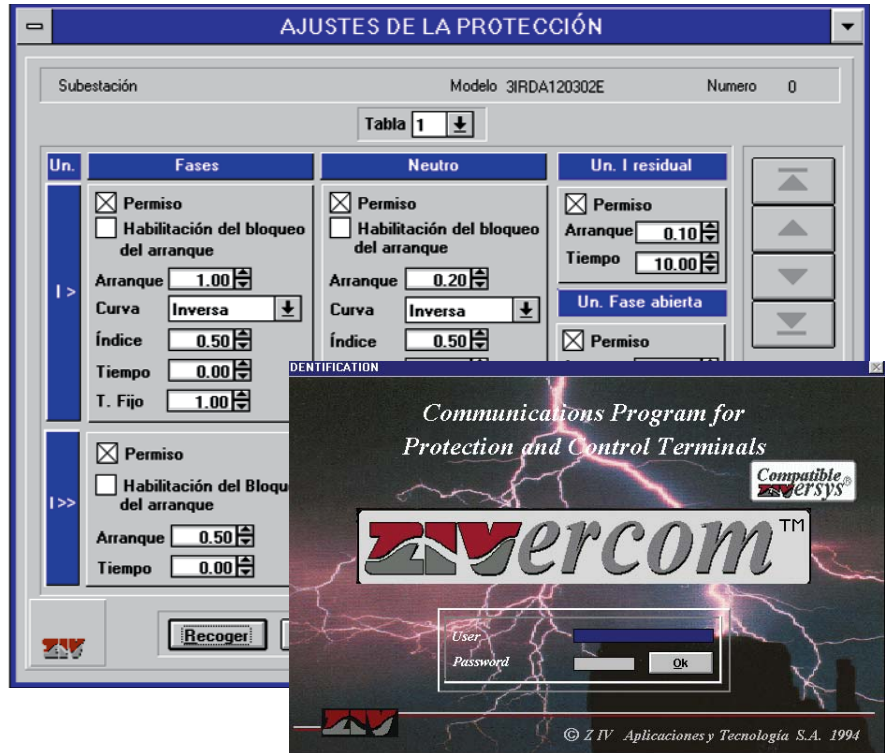
Communications

The communications program **vercom** enables the dialog with IRD terminals, and other IED's, either **locally** (via front port) or **remotely** (via serial port). This program covers every user need regarding programming, settings, operations, event recording, reporting, metering data, etc..

The program is protected against unauthorized users by means of **passwords**. **vercom**, which runs in **WINDOWS**, is user friendly and requires buttons or keys to open the various sub-menus.

Each sub-menu 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. The configuration of the remote serial port can only be carried out in **local mode**.



Examples of screens from the **vercom**

Modularity

Systems incorporating IRD terminals are mounted in cases of 1/4, 1/2 or 1 19" rack and 6U high or in 19" cases of 2U high (8IRD). All painted in graphite color and designed for panel or cabinet installation, with a transparent and sealable cover.

Terminal blocks are vertically placed in the rear and admit wires with a cross section up to 11 AWG (4 mm²) for voltage and current circuits, or 13 AWG (2.5 mm²) for the rest of the circuits.



System made of protective relays and a 3IRD terminal mounted in one 19" rack

Reclosure setting ranges

Programmable reclosures	1-4
Supervision of manual closing by U_n and/or inhibition	YES/NO
Supervision of reclosures by U_n and/or inhibition	YES/NO
Reclosure time for faults between phases or faults to ground	(0.05-300) s
Reset time for faults between phases or faults to ground	(0.05-300) s
Lockout time after a manual close	(0.05-300) s
Waiting time for U_n and/or inhibition	(0.05-300) s
Waiting time*	(0.05-300) s
Reclosure initiation time	(0.05-0.35) s
Time for a manual closing	(0.05-300) s
Enable/disable units for a first trip and during lockout and reset time	YES/NO
Enable/disable units for an initial reclosure in first trips and during lockout and reset time	YES/NO

*For a closing command when the inhibition reclosing signal is activated

Protection setting ranges

General settings			
Rated current	1 or 5 A*	Rated frequency	50 or 60 Hz
Transformer ratio (VT)	1-3.000	Transformer ratio (CT)	1-4.000

* Adjustable by user in each unit terminal

Overcurrent protection (non-directional) (50/51 + 50N/51N)			
	Phases	Standard ground	optional ground*
Time unit $I>$	(0.2-2.4) I_n	(0.04-0.48) I_n	(0.1-1.2) I_n
Instantaneous unit $I>>$	(0.1-30) I_n	(0.1-12) I_n	(0.1-30) I_n

* Optional range on request

Overcurrent protection (directional) (67 + 67N)			
	Phases	Standard ground	optional ground*
Time unit $I>$	(0.2-2.4) I_n	(0.04-0.48) I_n	(0.1-1.2) I_n
Instantaneous unit $I>>$	(0.1-30) I_n	(0.1-12) I_n	(0.1-30) I_n
Polarizing voltage	110 V, 50 Hz	110 V, 50 Hz	110 V, 50 Hz
Polarizing voltage	120 V, 60 Hz	120 V, 60 Hz	120 V, 60 Hz

The characteristic angle (which corresponds to the maximum torque) can be adjusted between 15° and 85° (phase units) and 85° and 150° (ground units), both leading the polarizing voltage. The directional characteristic is ± 90° around the maximum torque line.

* Optional range on request

Overcurrent protection for sensitive ground (50 Ns / 51 Ns)	
Time unit	(0.01-0.24) I_n
Instantaneous unit $I>>$	(0.05-3) I_n

Sensitive zero sequence current unit	
Pick-up	(0.02-0.48) I_n
Time	(0.05-300) s

Directional zero sequence overcurrent protection (isolated ground) (67 N _A)	
Low Current (I_b)	(0.005 – 0.5) A
High Current (I_a)	(1 – 3) I_b
Low Voltage (U_b)	(0.5 – 6 V)
High Voltage (U_a)	(6 – 60) V
First trip time	(0.05 – 10) s
Switch to Instantaneous	(0.05 – 100) s

Breaker failure unit	
Pick-up	(0.02-2.4) A
Time	(0.05-0.70) s

Open phase unit	
Pick-up	(0.05-0.4) I_2/I_1
Time	(0.05-300) s

Characteristic angle: I lagging U in 90°

I_t Characteristics	
Type of curve (Phase/ground)	Inverse, Very Inv., Extremely Inv., Definitive time and one user- configurable
Time dial	0.05-1
Time (definite time)	(0.05-100) s
Time (instantaneous)	(0.00-100) s

Technical Characteristics Dimensions

Auxiliary voltage (U_{aux})*

24-48 V_{dc} (± 20 %)

110-125 V_{dc} (± 20 %)

220-250 V_{dc}

230 V_{ac} (± 20 %)

Power consumption: 7 W (± 20 %)

* Selectable according to models

Current inputs

Rated current (I_n) 1 or 5 A

Thermal withstand capability

4 I_n Continuously

50 I_n During 3 s

100 I_n During 1 s

Dynamic limit 240 I_n

Burdens

$I_n = 1$ A < 0,1 VA

$I_n = 5$ A < 0,2 VA

Voltage inputs

Rated values (U_n) 110 V at 50 Hz

Rated values (U_n) 120 V at 60 Hz

Thermal capability (continuous) 2x U_n (phases)

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

Digital inputs

Input voltage range

24-250 ±20% V_{dc}*

110 ±20% V_{dc/ac}

Consumption < 10 mA

* Range according to model

Tripping outputs

Switching capability 2500 W

Breaking capability 250 W/1250 VA*

Switching voltage 250 V_{dc}

I continuous 5 A

I short duration 10 A during 0.5 s

Auxiliary outputs

Switching capability 2000 W

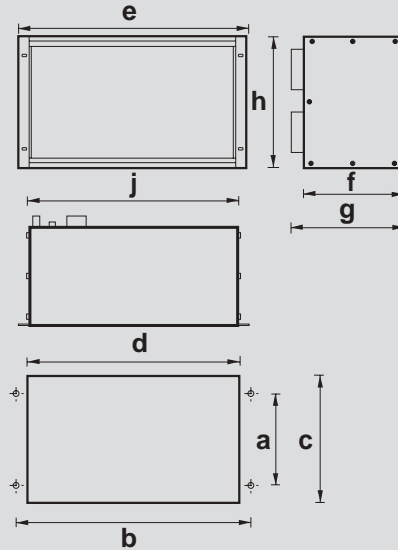
Breaking capability 200 W/1000 VA*

Switching voltage 250 V_{dc}

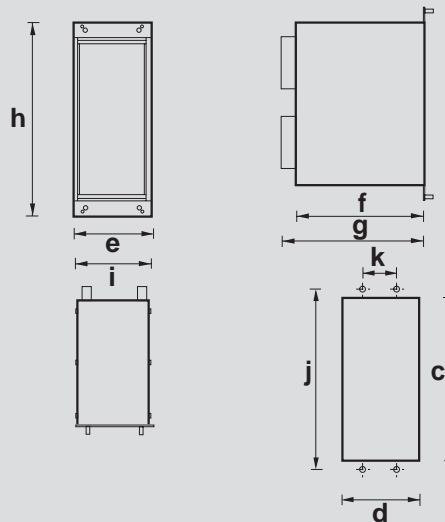
I continuous 3 A

I short duration 8 A during 4 s

* With a resistive load



Enclosures type "A", "B", "C", "F" y "K"

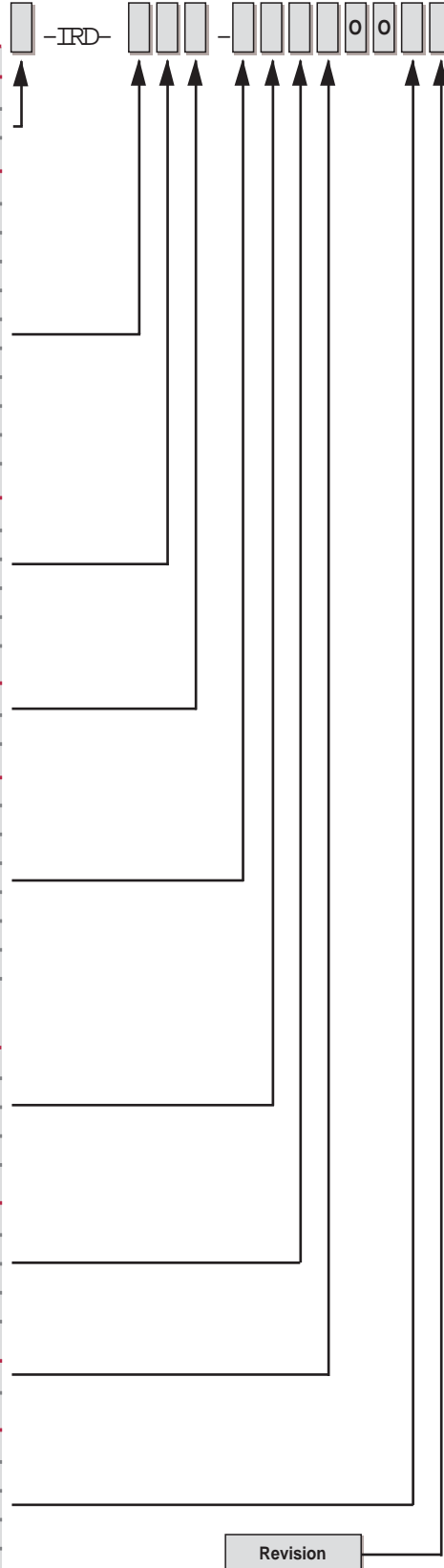


Enclosure type "S"

ENCLOSURE TYPE	DIMENSIONS (mm)								
	a	b	c	d	e	f	g	h	i
A (6Ux1 rack)	190.5	449	269	465	483	208.5	234	266	445
B (6Ux1/2 rack)	190.5	234.5	269	251	278	208.5	234	275	230.5
C (6Ux1/4 rack)	190.5	128	269	144	170	210.5	234	275	124
F (2Ux1 rack)	76	449	90	465	483	246	256	88	445
S (especial)	N/A	N/A	270	125	138	208	263	325	123

Model selection

CONSTRUCTION			
Rack modules. 6U High			3
19" Rack. 2U High			8
FUNCTIONS			
3x50/51+50N/51N+79			A
3x67+67N+79			B
3x50/51+50N/51N+50Ns/51Ns+79			C
3x50/51+67NA+79			D
3x50/51+50N/51N+95+95R			E
3x50/51+67N(Opt)			F
3x50/51+2x50N/51N+79			G
3x50/51			I
3x50/51+2x50N/51N			L
3x50/51+50N/51N			M
OPTIONS			
Special model			0
Basic model			1
Oscillography (O)			2
Fault Locator (FL)			3
Option (O+FL)			4
RATED CURRENT			
5 A			N
1 A			E
AUXILIARY VOLTAGE			
POWER SUPPLY	STANDARD DIGITAL INPUTS	SUPERVISION DIGITAL INPUTS*	
24-48 V _{dc}	24-48 V _{dc} (I)	24-48 V _{dc} (IV)	1
110-125 V _{dc}	24-125 V _{dc} (II)	125 V _{dc} (V)	2
220-250 V _{dc}	48-250V _{dc} (III)	250 V _{dc} (VI)	3
230 V _{ac}	(I), (II) or (III)	(IV), (V) or (VI)	**
* ±20% ** To be defined based on selected option			
RATED VOLTAGE			
- / 50 Hz			0
110 and 110-3 V _{ac} / 50 Hz			1
- / 60 Hz			2
120 and 120-3 V _{ac} / 60 Hz			3
COMMUNICATIONS			
RS232 + RS232			1
RS232 + P.O.F. (1 mm)			2
RS232 + G.O.F. (SMA connector)			3
RS232 + G.O.F. (ST connector)			4
I/O MODULE			
Standard			0
TYPE OF ENCLOSURE			
6 U x 1/4 19" Rack			C
6 U x 1/2 19" Rack			B
6 U x 1 19" Rack			A
6 U x 1/4 with top/bottom fixings			S
2 U x 1 19" Rack			F



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 a 50 Hz 1 min
Between independent circuits	2 kV a 50 Hz 1 min

Impulse test (IEC 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 a +55°C
Storage range	-25°C a +70°C
Humidity	95% (non-condensing)

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

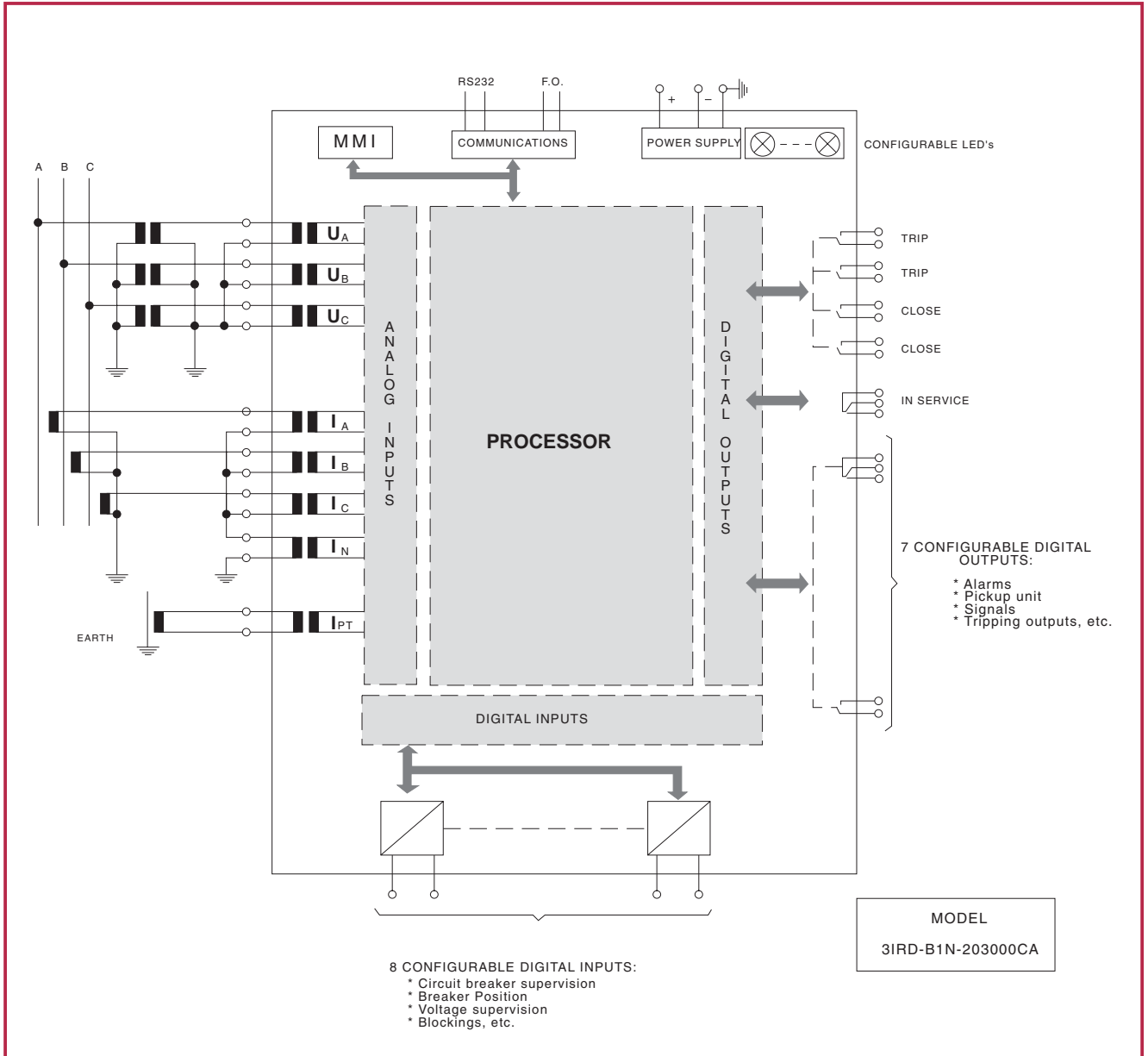
Radio frequency emissivity IEC-41B (5) 80	

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

Susceptibility to radiated electromagnetic fields IEC-5-22-3 Class III	
10 V/m	



Connections diagram



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