The latest digital technology for protection, control and metering for feeders and machines

Maximum flexibility and versatility.

Fully adaptable to bay and system requirements.

Programmability allows free definition of operational logic.

Configurable communications and programming tools.

Contributing to improved Safety, Quality of Service and Profitability of Electrical Systems
The IRV series is based on the latest digital technology and has been designed to provide maximum flexibility and versatility.

They incorporate all the functions required for protection, control and metering of feeder or machine applications.

The 8IRV models are complemented by a series of easy to use communications and programming tools that provide a user-friendly environment in which to configure applications.

### Protection Functions

**50** Instantaneous phase overcurrent (2 units).

**50Q** Instantaneous negative sequence overcurrent (2 units).

**50N** Instantaneous neutral overcurrent (2 units).

**50Ns** Instantaneous sensitive neutral overcurrent, with independent analog input (Ns).

**51** Time delay phase overcurrent (inverse/definite) (3 units).

**51Q** Time delay negative sequence overcurrent (inverse/definite) (3 units).

**51N** Time delay neutral overcurrent (inverse/definite) (3 units).

**51Ns** Time delay sensitive neutral overcurrent (inverse/definite) with independent analog inputs (Ns).

**51V** Overcurrent with voltage restraint (3 units).

**67** Directional phase overcurrent.

**67N** Directional neutral overcurrent.

**67Ns** Directional sensitive neutral overcurrent.

**67Nu** Directional ungrounded neutral overcurrent.

**37** Time delay phase undercurrent.

**27** Undervoltage (3 units) (selectable input L-L or L-N).

**59** Overvoltage (3 units) (selectable input L-L or L-N).

**59N** Neutral overvoltage calculated from the phase voltages (2 units).

**59N** Neutral overvoltage with dedicated voltage channel.

**47** Negative sequence overvoltage.

**81M** Overfrequency (4 units).

**81m** Underfrequency (4 units).

**81D** Rate of change (4 units).

**79** Recloser.

**25** Synchrocheck with voltage, phase and frequency elements.

**32P/Q** Directional power (active/reactive).

**49** Thermal image.

**50BF** Breaker failure.

**46** Phase balance (I2/I1).

**87N** Restricted earth fault.

**78** Phase angle measuring (out-of-step).

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**Description**

**Model 8IRV** protection and control IEDs are based on the latest digital technology and are designed to provide maximum flexibility and versatility.

Flexible Programming Logic

Basic relationships between the configurable modules of 8IRV IEDs.
Flexible analog metering can replace traditional panel meters.

**Protection**

8IRV units include a set of protection functions that cover all requirements of the applications indicated. Each function can be enabled or disabled during configuration or by commands transmitted via the communications ports, operator interface (HMI) or digital inputs.

**Control**

8IRV models are designed to cover all control functions required for machines, feeders, or other applications, with all of the characteristics associated with intelligent RTUs:

- Captured and calculated metering data via analog inputs and transducers.
- Data capture from digital inputs and internal signal states.
- Local and remote control of substation equipment via auxiliary output contacts.
- Input/output logic, interlocks, control hierarchy and programmable control functions.
- Demand metering.
- Communications ports for connections to the substation HMI or directly to the Control Center and/or SCADA.

**Measurement**

8IRV models display the following information:

- Captured analog values: voltages and currents, line and phase values.
- Harmonic content of current and voltage on phase A, up to the 8th harmonic.
- Positive, negative and zero sequence components of both voltage and current.
- Calculated power values: active, reactive, and apparent power.
- Power factor (cosø).
- Frequency.
- Thermal image.
- Energy meters: active input and output, and capacitive and inductive reactance.

The sampling frequency of the metering units is 32 samples per cycle (1920 Hz in 60 Hz systems and 1600 Hz in 50 Hz systems). All samples are used for metering and oscillography storage.

Metering values are used as inputs for the protection functions. Additionally, any reading, whether measured or calculated, can be selected as an input to user-programmed functions (communications, display, logic, etc.).

**Measurements**

- Voltages and currents (line and phase values)
- Voltage and current harmonics on phase A
- Voltage and current positive, negative and zero sequence components
- Active, reactive and apparent power
- Power factor (cosø)
- Frequency
- Thermal image
- Active input and output energy, and capacitive and inductive reactance
Functions

- Cold load pickup
  The purpose of this function is to avoid trips when reconnecting heavy loads. This is achieved by temporarily selecting a different settings group.

- Fault locator
  A fault locator is included, to determine the distance to the fault in miles, kilometers, or percentage of total length.

- Load frequency shedding logic
  A control function with 4 load shedding units operating at 8 frequencies defined as 4 trip frequencies and 4 reset frequencies.

- Event recording and programmable event logs
  A 200 record capacity event log is stored in non-volatile memory. A user can select event triggering signals. The events are recorded with a 1ms resolution. Additionally, up to 12 selectable analog quantities can be included in the log.

- Fault reporting
  Capacity for storing up to 15 fault reports with relevant data, such as picked-up units, tripped units, pre-fault metering, fault metering, current interrupted, etc.

- Oscillography record
  The oscillography record allows from 1 to 64 oscillographs to be saved in a cyclical memory. Sampling frequency is 32 samples per cycle, with a total recording time of 15 seconds. The records are guaranteed to be saved for 27 days in the event of a sustained loss of auxiliary power.

  Values that can be recorded include analog signal metering, digital inputs and internal signals generated by the protection functions, the recloser and the logic control units.

  IEDs are supplied complete with a display and analysis program that allows the waveform records to be converted to COMTRADE format.

- Metering logs
  Up to 4 analog quantities can be selected from among all available metering values. Any value, measured or calculated, can be used except for the energy meter quantities. Up to twelve minimum and maximum values will be stored for each selected quantity in the metering logs for each time slot. Time slot resolution can be adjusted to the needs of the application by configuring day and interval masks. Up to 168 records can be stored.

Characteristic Curves

IEC standar

0 Fixed time
1 Inverse curve
2 Very inverse curve
3 Extremely inverse curve
4 Long-term inverse curve
5 Short-term inverse curve
6 Inverse curve + time limit
7 Very inverse curve + time limit
8 Extremely inverse curve + time limit
9 User-defined curve

ANSI standar

0 Fixed time
1 Moderately inverse curve
2 Inverse curve
3 Very inverse curve
4 Extremely inverse curve
5 Long-term inverse curve
6 Short-term inverse curve
7 Inverse curve + time limit
8 Very inverse curve + time limit
9 Extremely inverse curve + time limit
10 User-defined curve
GPS synchronization maximizes the effectiveness of the study of event reports obtained from various relays distributed throughout the system.

Integrated simulator

8IRV models include a special test and simulation mode that allows operations to be simulated using waveforms loaded in via the front-panel communications port.

Time synchronization

The IEDs include an internal clock with a resolution of 1 ms. This can be synchronized via GPS (IRIG-B protocol) or by communications through the remote communications port (PROCOME 3.0 or DNP 3.0 protocols).

Programmable logic

The inputs to the logic functions can be any of the signals or readings generated by following functions:

- Protection units
- Digital inputs
- Communications
- Command functions
- Analog inputs

The user can define a logical operation using primitive logic functions (AND, OR, XOR, NOT, etc.), flip-flops, timers, comparators, etc.

The programming function allows definition of the trip logic, control logic, interlocks, functional modules and control hierarchy required for complete protection and operation of a bay.

The fault locator increases the efficiency of maintenance personnel.
Application

8IRV units are designed to work best as part of an integrated protection and control system, although their performance and use offers significant advantages when they are used as stand alone components of conventional protection systems.

Due to their flexible communications structure, 8IRV units provide great versatility when applied to distributed integrated protection and control systems. Systems of this type have the following fundamental characteristics:

- Physical distribution of the analog and digital data acquisition and local control IEDs.
- Differences between protection equipment and control equipment disappears: the IEDs used combine both functions to a greater or lesser extent.
- Distribution of functions in different levels allows functions to be executed in the level where all of the required data is located, optimizing the system.
- The hierarchy of the command functions is flexible and configurable: control center, substations, local bay control, etc.
- Protection units are located at the lowest level of the hierarchy and maintain their functional integrity even in the absence of the higher levels and of the other units at the same level.
- A minimum use of conventional cabling is required as the connections between the data capture modules and the substations use a communications system. At the substation level, the data received is combined and presented to the local operator or to a remote operator (control room) in a suitable format, as required for each purpose: supervision, control, analysis, etc.

There are two remote communications ports to each IED: one for protection and one for control functions. Interfacing each subsystem (protection and control) with independent networks is possible. Independent network architectures can use the different communications protocols supported by the 8IRV.

One or two networks, depending on the protocol and the application:
- Fiber Optic (glass / plastic) / RS232 / RS485
- Asynchronous serial links, 38,400 Bps (database refresh period: 0.5s)
- Star Topology / Switches
- Double ring
Human-Machine Interface

The operator interface (HMI) allows a high degree of configurability. The HMI includes an alphanumeric display (4 lines of 20 characters) with a keypad that can be used to interact with the IED.

Alphanumeric Keypad and Display

This interface can be used for the following operations:

- Viewing and modifying settings
- Viewing all captured and calculated metering values
- Control operations
- Changing setting groups
- Data queries

Selection and command buttons for configured elements

There are eight push-buttons on the front of the unit to control the elements of the system that have been configured for this purpose (breakers, disconnecting switches, recloser, programmed control units, local/remote control, etc.) or to reset operation signals.

These push-buttons allow local control of substation apparatus or IED functions, and six of them are fully programmable. Each of these push-buttons has an associated LED indicator to display the state of the element associated with the button.

The push-button group has a general interlock that can be configured from the HMI or via the communications ports providing the security required for proper operation.

The push-button control system provides the operator with simple, fast controls for the bay.
Communications

All 8IRV IEDs include two communications ports on the rear panel for remote access, plus a front panel port for local access.

8IRV standard models are provided with three communications protocols simultaneously: PROCOME, MODBUS and DNP 3.0.

PROCOME protocol complies with the IEC-870-5 series of standards and is used for both protection and control data. DNP 3.0 and MODBUS protocols are used exclusively to communicate control data.

All three communications ports can be used simultaneously, with independently selectable baud rates up to 38,400 Bps.

Some models can optionally include a 100 FX port (Ethernet over fiber optic) and an RJ45 port, as physical support for the IEC 61850 / UCA 2.0 protocol. This protocol allows interchange of data of all types, both with the higher hierarchical levels and with other IEDs. Moreover, it is based on accepted open standards (Ethernet) and supports self-description.

Easily integrated into industrial environments via RS485 and MODBUS protocol.
Construction

**8IRV** units are designed for mounting in 19" racks, and are two, three or four units high (depending on the number of digital inputs/outputs). They are finished in graphite gray. The electronic cards, or modules, are mounted horizontally, and can be extracted by removing the front panel. External connections use plug-in terminal blocks on the rear panel of the enclosure, with ring lug connectors.

Vertical mount versions of the IED are available (model **3IRV**).

The enclosure is provided with a ground terminal. It is essential that this terminal is properly connected to the substation ground, to enable correct operation of the filters that protect the IED from external electromagnetic disturbances.

- **Analog inputs**: the units include ten analog inputs divided in two non-self shorting ring lug terminal blocks (block A and B). Connectors accept lugs for wires up to AWG 10 (6mm²).

- **Digital inputs and outputs**: two-unit high models have one AC digital input and seven DC digital inputs. These connections are located in terminal block D. There are also two double pole trip and close contacts, one “in service” contact, and six auxiliary outputs, located in terminal block C and part of block D. Connectors accept lugs for wires up to AWG 13 (1 or 2.5 mm²).

Additional digital inputs and outputs are available in the three-unit high models, which include one digital input/output expansion card with six auxiliary outputs, 17 digital inputs and two transducer inputs.

**Available digital inputs and outputs:**

**2 U high models:**
- 8 digital inputs
- 6 digital outputs

**3 U high models:**
- 25 digital inputs
- 12 digital outputs

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Placement and design of the terminal blocks and ports allow easy, reliable connection of the IED.
Retrieval of information:
Captured and calculated metering.
Status of the digital inputs.
Status of the auxiliary and control outputs: trip and close.
Status of the protection modules.
Status of the signals used by the internally programmed logic functions.
Status of the self-test functions.

Retrieval, display and storage of the logs generated by the equipment:
Sequence of events.
Fault reports.
Oscillography.
Metering logs.

Programming Tools

`Zivcom` software provides a user-friendly interface to carry out all of the operations required for parameter setting and access to the data recorded by the equipment.

The program can be installed and used on a PC using any of the following operating systems: Windows 95, Windows 98, Windows 2000, Windows NT, Windows ME or Windows XP.

`Zivcom` software package allows easy definition of logical control functions.

The program enables the following tasks to be carried out via a connection from any RS232 port on a PC where the program is running to any of the RS232 ports on the 8IRV equipment:

- Upload or download settings.
- Edit settings.
- Store settings for future editing.
- Read states of the equipment.
- Synchronization with a PC.
- Retrieve, view and store records generated by the equipment.
- Load configuration files that define the configurable parameters of the equipment.
- Retrieve configuration files from the 8IRV.
- Update IED firmware.

Off-line programming is available for the following tasks:

- Edit settings files.
- Programming digital inputs, auxiliary outputs and targets.
- Edit logic functions via graphical user interface.
- Define signals to be recorded in the event log and the metering quantities to be stored with these records.
- Define the signals to be stored in the oscillographs.
- Define the display names of the configurations.
- Define the signals to be transmitted over the communications protocols.
- Convert retrieved oscillographs to COMTRADE format.

`Zivcom` software includes an oscillography display and analysis tool that can use waveforms captured by an 8IRV or by other equipment capturing files in COMTRADE format.
**Settings Ranges**

### Protection Units

#### Directional Undercurrent

- **Phase / Neutral Directional Unit**
  - Characteristic angle: 0° - 90°
  - Polarizing voltage sensitivity: 0.05 - 10.00V
  - Coordination time: 0.00 - 30ms

- **Isolated Neutral Directional Unit**
  - Low current (LC): 5 - 500mA
  - High current as a multiple of LC:
    - Low voltage: 0.5 - 30V
    - High voltage: 0.5 - 70V
  - Time delay: 0.05 - 10.0s
  - TOC inhibit timer: 0.05 - 100.0s

#### Undercurrent

- **Phase Time Undercurrent**
  - Magnitude Selection
    - 0: Direct sequence
    - 1: Phase current
  - Pickup: 0.02 - 2 In
  - Fixed time: 0.05 - 300.00s

#### Voltage Protection

- **Phase Over/Under Voltage Unit**
  - Voltage Selection
    - 0: Phase - Phase
    - 1: Phase - Ground
  - Pickup: 10.00 - 300.00V
  - Time delay: 0.00 - 300.00s
  - Trip logic: OR / AND

- **Neutral Overvoltage Unit**
  - Pickup: 2.00 - 150.00V
  - Time delay: 0.00 - 300.00s

- **Negative Sequence Overvoltage Unit**
  - Pickup: 2.00 - 100.00V
  - Time delay: 0.00 - 300.00s

#### Frequency Protection

- **Load shedding logic**: YES / NO
- **Undervoltage inhibit**: 20 - 150V
- **Over / Under Frequency**
  - Pickup: 40.00 - 70.00Hz
  - Time delay: 0.00 - 300.00s
  - Reset time: 0.00 - 300.00s

- **Rate of Change Unit**
  - Frequency pickup: 40.00 - 70.00Hz
  - Rate of change pickup: (-0.5) - (-10.00) Hz/s
  - Time delay: 0.00 - 300.00s
  - Reset time: 0.00 - 300.00s

- **Phase Angle Measuring (out-of-step)**
  - Pickup: 1 - 25°
  - Temporary block: 0.05 - 30.00s
  - Trip duration: 0.1 - 300 s

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(*) See available curves on page 4.

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**Time Overcurrent**

**Design Parameters**

- **Reset level**: >95%
- **Accuracy of pickup current**: <3% or 1% In
- **Transitory overreach**: <5%
- **Accuracy of operating time**: <4%

*(for multiples of pickup current >2)*

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Note: Time characteristics may be reduced due to saturation of the channel if very high values are configured. Consult ZIV in case of special requirements.
Settings Ranges

### Auxiliary Units

#### Breaker Failure Unit
- **Phase / Neutral pickup**: 0.02 - 1.00 In
- **Time delay**: 0.00 - 2.00 s

#### Restricted Earth Faults Unit
- **Pickup**: 0.04 - 2.00 In
- **Ground fault restraint**: 0 - 100%
- **Time delay**: 0.00 - 300.00 s

#### Residual Current Unit
- **Pickup**: 0.02-10.00 In
- **Time delay**: 0.05-300.00 s

#### Phase Balance Unit
- **Pickup**: 0.05 - 0.4 I2/I1
- **Time delay**: 0.05 - 300.00 s
- **Minimum positive sequence**: 0.02 - 1.00 In

#### Synchrocheck Unit
- **Synchronization**: 0 - External / 1 - Internal
- **Phase comparison**: 0 - Va / 3 - Vab (side B) / 1 - Vb / 4 - Vbc / 2 - Vc / 5 - Vca

- Closing on voltage conditions
  - **YES/NO for**
    - Hot Bus / Hot Line
    - Hot Bus / Dead Line
    - Dead Bus / Hot Line
    - Dead Bus / Dead Line

- **Maximum voltage difference for closing**: 2 - 30%
- **Maximum phase difference for closing**: 2 - 80°
- **Maximum frequency difference for closing**: 0.01 - 2.00 Hz
- **Time**: 0.05 - 300.00 s

#### Thermal Image Unit
- **Heating constant**: 0.5 - 300 min
- **Cooling constant**: 0.5 - 300 min
- **Maximum sustained current**: 1.50 - 10.00 A
- **Alarm activation threshold**: 50 - 100%
- **Reset threshold**: 50 - 100%
- **Memorize thermal image on power failure**: YES / NO

#### Directional Power Unit
- **Angle**: 0.00 - 359.95°
- **Pickup**: -16000 to 16000 VA
- **Time delay**: 0.00 - 300.00 s

#### Cold Load Pickup Unit
- **Breaker open time before switching to settings group 4**: 0-1800 s
- **Breaker closed time before switching to active settings group**: 0-1800 s

### Recloser

#### Recloser in Service
- **YES / NO**

#### Recloser Time*
- **For phase/phase faults**: 0.05 - 300 s
- **For ground faults**: 0.05 - 300 s

#### Cycle Control Times
- **Delay time for reference voltage**: 0.5 - 300 s
- **Delay time for reference voltage presence**: 0 - 20 s
- **Disable delay time**: 0.05 - 300 s
- **Safety delay for phase/phase faults**: 0.05 - 300 s
- **Safety delay for ground faults**: 0.05 - 300 s
- **Safety delay after manual closing**: 0.05 - 300 s
- **Pickup time**: 0.05 - 0.35 s
- **Manual closing time**: 0.05 - 300 s

#### Sequence Control
- **Programmable number of shots**: 1 - 4
- **Supervision of manual closing on reference voltage**: YES / NO
- **Supervision of reclosing on reference voltage**: YES / NO
- **Supervision of manual closing on synchronization**: YES / NO
- **Supervision of reclosing on synchronization**: YES / NO
- **Wait for synchronization**: YES / NO
- **External lockout**: Level Pulse

- **Trip enable (YES/NO)** for states:
  - Trip inactive
  - Trip safety delay, cycles 1, 2, 3 and 4
  - Trip safety delay, external manual closing
  - Trip safety delay closing via recloser

- **Recloser enable (YES/NO)** for states:
  - Reclosing for tripping with recloser inactive
  - Reclosing after safety delay, cycles 1, 2 and 3

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*Note: the time characteristic may be reduced due to channel saturation if a high value is set in the configuration. Consult ZIV for particular requirements.*

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Event, fault and oscillography utilities help to produce post-fault reports faster.
Setting Ranges

Logic

- Trip seal-in enabled: YES/NO
- Opening failure timer: 0.02 - 2s
- Closure failure timer: 0.02 - 2s
- Lockout enable: YES/NO
- Fault report recording: YES/NO
- Manual closing with recloser supervision: YES/NO

Oscillography

- Type of trigger: 0 - Pickup
- 1 - Trip 1
- Analog channel masks (max. 10 channels):
  - 1-Phase A current
  - 2-Phase B current
  - 3-Phase C current
  - 4-Neutral current
  - 5-Sensitive neutral current
  - 6-Ungrounded neutral current
  - 7-Phase A voltage
  - 8-Phase B voltage
  - 9-Phase C voltage
  - 10-Ground voltage
  - 11-Sync. voltage
- Digital channels: Any digital input or configurable digital signal can be selected
- Pre-trigger: 0-25 cycles
- Record length: 5-725 cycles
- Trigger function: YES/NO
- Continuous mode: YES/NO

Breaker Supervision

- Excessive trip count: 1 to 40
- Sum of I2 alarm: 0.99,999,99kA²
- Actual I2 (adjust and report): 0.99,999,99kA²
- Supervision of close coil circuit: YES/NO
- Supervision of trip coil circuit: YES/NO

Metering Log

- Calculation window for averaging samples: 1 to 15min
- Weekday mask: Monday to Sunday
- Log recording interval: 00:00-23:59
- Starting time of daily log: 00:00-23:59 (hh:mm)
- End time of daily log: 00:00-23:59 (hh:mm)

Note: the time characteristic may be reduced due to channel saturation if a high value is set in the configuration. Consult ZIV for particular requirements.

Dimensions

- Enclosure Type T and Z: Dimensions in mm.
- Mounting holes: 8 mm.

Technical Assistance

High-quality local technical service is available to customers worldwide, either from our own personnel (in Spain, Brazil and the USA) or from our extensive network of local collaborators in other countries.

Several round-the-clock help services are available (24 hours/day, 365 days/year) for immediate attention.
**Technical Characteristics**

### Power Supply Voltage
- **Ranges**: 24 Vdc/Vac (± 20%), 48–250 Vdc/Vac (± 20%)
- **Burden**: < 20 W

### Voltage Inputs
- **Rated voltage (Vn)**: 50 - 230 Vca
- **Thermal withstand capacity**: 300 Vac (continuous)
- **Burdens**: Vn = 110 V < 0.5 VA

### Current Inputs
- **Rated current**: 1 A / 5 A (selectable) (Phases/Neutral)
- **Thermal withstand capacity**: 20 A (continuous), 250 A (for 3 s), 500 A (for 1 s)
- **Dynamic limit**: 1250 A
- **Burdens**: (In = 1 A) < 0.05 VA, (In = 5 A) < 0.2 VA

### Transducer Inputs
- **Input impedance**: <1kOhm

### Frequency
- **Operating range**: 16-61 Hz

### DC Digital Inputs
- **Rated Voltage**: 24 Vdc, 48 Vdc, 125 Vdc, 250 Vdc
- **Activation (V)**: 12 Vdc, 30 Vdc, 70 Vdc, 120 Vdc
- **Reset (V)**: 9 Vdc, 25 Vdc, 65 Vdc, 115 Vdc
- **V Max continuous**: 48 Vdc, 90 Vdc, 300 Vdc, 500 Vdc
- **Burden at rated V (W)**: 0.050W, 0.5W, 0.8W, 1W

### AC Digital Inputs
- **Rated Voltage**: 110/125 Vac
- **Activation (V)**: 85 Vac
- **Reset (V)**: 51 Vac
- **V Max continuous**: 250 Vac
- **Burden at rated V (W)**: 0.35 W

### Trip and Close Outputs and Auxiliary Outputs
- **Make and carry (resistive)**: 60A for 1 s
- **Continuous (resistive)**: 16A
- **Close**: 5000 W
- **Break capacity (resistive)**: 240W (48Vdc), 2500 VA, 110W (80-250Vdc)
- **Break capacity (L/R=0.04 s)**: 120W at 125Vdc
- **Minimum contact closing duration**: 100 ms
- **Break delay**: <150 ms

### Measurement Accuracy
- **Measured currents (phases and neutral)**: In = 5A / In = 1A ±0.3mA / ±0.1%
- **Voltage measurements**: VA, VB, VC, VS ±0.1% / ±50mW
- **Calculated currents (phases and neutral)**: In = 5A / In = 1A ±0.8mA / ±0.3%
- **Calculated voltages**: VAB, VBC, VCA ±0.2% / ±75mW
- **Active/reactive power**: (In = 5A and phase current >1A) ±0.3% 0º or 180º or ±90º
- **Phase-angle measurements**: ±0.4º
- **Power factor**: ±0.01
- **Frequency**: ±0.005Hz

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**Warranty**

All new products sold to customers are warranted against defects in design, materials, and workmanship for a period of ten (10) years from the time of delivery. Contact for complete details.

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**Quality**

* is an ISO 9001 Certified Company.

* is firmly committed to a Plan for Continuous Improvement within the framework of a policy of Total Quality that covers all stages from feasibility studies through commissioning of the complete system.
Model Selection

Select the most suitable model for your application using the following table:

<table>
<thead>
<tr>
<th>Functions</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>3x50/51 + 50N/51N + 50Ns/51Ns + 50Q/51Q + 51V + 3x67 + 67N + 67Ns + 37 + 3x27 + 3x59 + 1x59N + 47 + 81M/m + 81D + 79 + 25 + 32 + 32Q + 49 + 50BF + 46 + 87N(REF) + 78</td>
<td>A(1)</td>
</tr>
<tr>
<td>3x50/51 + 50N/51N + 50Ns/51Ns + 50Q/51Q + 51V + 3x67 + 67N + 67Ns + 37 + 3x27 + 3x59 + 64 + 47 + 81M/m + 81D + 79 + 25 + 32 + 32Q + 49 + 50BF + 46 + 78</td>
<td>B</td>
</tr>
<tr>
<td>3x50/51 + 67Na + 50Q/51Q + 51V + 37 + 3x27 + 3x59 + 1x59N/64 + 47 + 81M/m + 81D + 79 + 25 + 32 + 32Q + 49 + 50BF + 46 + 78</td>
<td>C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Options</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard model</td>
<td>1</td>
</tr>
<tr>
<td>Ports 100FX - Ethernet Fiber-optic and RJ45 (IEC 61850 / UCA 2.0)(3)</td>
<td>2</td>
</tr>
<tr>
<td>Ports 100FX - 2 x RJ45 (IEC 61850 / UCA 2.0)</td>
<td>3</td>
</tr>
<tr>
<td>Local wireless communications (Bluetooth)</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Auxiliary Voltage</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 Vdc / Vac (±20%)</td>
<td>1</td>
</tr>
<tr>
<td>48 - 250 Vdc / Vac (±20%)</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Voltage of the Digital Status Contact Inputs</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 Vdc</td>
<td>0</td>
</tr>
<tr>
<td>48 Vdc</td>
<td>1</td>
</tr>
<tr>
<td>125 Vdc</td>
<td>2</td>
</tr>
<tr>
<td>250 Vdc</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ports</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>COM1 (LOC) + COM2 (REM - P1) + COM3 (REM - P2)</td>
<td>1</td>
</tr>
<tr>
<td>RS232+USB RS232/FOP RS232/RS485/FOC</td>
<td>2</td>
</tr>
<tr>
<td>RS232+USB RS232/FOP RS232/RS485/FOP</td>
<td>3</td>
</tr>
<tr>
<td>RS232+USB RS232/FOC RS232/RS485/FOC</td>
<td>4</td>
</tr>
<tr>
<td>RS232+USB RS232 RS232+RS485</td>
<td>5</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Number of Inputs and Outputs</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 inputs + 6 outputs + Trip / close contacts</td>
<td>0</td>
</tr>
<tr>
<td>25 inputs + 12 outputs + 2 transducer inputs + Trip / close contacts</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spare</th>
<th>Code</th>
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</thead>
<tbody>
<tr>
<td>As default</td>
<td>00</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Type of case</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>2U x 1 19” rack</td>
<td>T</td>
</tr>
<tr>
<td>3U x 1 19” rack</td>
<td>Z</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Protocols</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>COM1 (LOC) + COM2 (REM) + COM3 (REM)</td>
<td>A</td>
</tr>
<tr>
<td>PROCOME PROCOME/DNP 3.0/MODBUS®</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Enclosure</th>
<th>Code</th>
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</thead>
<tbody>
<tr>
<td>Stainless steel + printed circuit board not tropicized</td>
<td>--</td>
</tr>
<tr>
<td>Stainless steel + tropicized printed circuit board</td>
<td>L</td>
</tr>
</tbody>
</table>

For vertical format, specify model: 3IRV-

(1) Includes current trigger capacity for function 67N.
(2) Ports as per option 5.
(3) Selectable (independently for COM2 and COM3).
External Connections

8IRV-A (2U High)

External Connections

- Power Supply
- Bus V
- Voltage Inputs
- Current Inputs
- Sensitive In
- Programmable Digital Inputs
- COMMON
- COMMON
- COMMON
- IN5-IN6
- 52 Coil
- Supervision
- (+) Optional

Note: The 3U-high model has an additional expansion board with 12 digital inputs, 6 auxiliary outputs and 2 transducer inputs (mA).

Remote Comm.

- CAN BUS
- IRIG-B 123
- BUS CAN

Communications

- Remote Comm.
- RS232
- RS485
- Full Modem
- F.O.
- CAN BUS
- REMOTE COMM.

- Local Comm.
- (+) BLUETOOTH
- RS232
- USB

Connections

- TRIP1
- TRIP2
- CLOSE1
- CLOSE1
- C11
- C12
- C13
- C14
- C15
- C16

- OUT1
- OUT2
- OUT3
- OUT4
- OUT5
- OUT6

IREX Alarm

Programmable Digital Outputs

U.S.A. and Canada:
2340 Des Plaines River Road
Chicago, Illinois, 60018
Tel.: +1 (847) 299-6580
Fax: +1 (847) 299-6581

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Niterói, Rio de Janeiro
Tel.: +55 21 27 29 0170
Fax: +55 21 26 20 2398

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