

## Self and Dual Powered Overcurrent Relay



### Overview

The iRelay 50-P is CET's elaborately designed overcurrent protection relay for LV, MV and HV power systems featuring compact construction, integrating a 32-bit low-power embedded processor, a 16-bit A/D converter, and a large-capacity high-speed non-volatile memory chip with unlimited read-write cycles. It comes with 2xDigital Input, 2xDigital Output, and 1xRS-485 port that supports Modbus RTU protocol. In addition, it can operate in both self-power supply mode from external CTs and auxiliary power supply mode. This makes the iRelay 50-P an essential component of an intelligent, comprehensive protection solution, especially suitable for specific application scenarios where external auxiliary power is unavailable yet microcomputer-based protection is required.

### Typical Applications

- Ring Main Units
- Gas-Insulated Switchgear
- Photovoltaic Pad-Mounted Transformer
- Distribution Substation Retrofit Project

### Basic Features

- A large LCD with user-friendly graphic interfaces
- 32-bit Dual-Core CPU, 16-bit A/D converter, non-volatile memory
- Self-powered from CTs with low power consumption
- Supports a 48VDC auxiliary power supply mode

### Inputs and Outputs

- 4xProtection Current Input: IA, IB, IC and IN
- 3xSelf-powered Current Input: I1, I2 and I3
- 2x48VDC Digital Input: IN1, IN2
- 2xDigital Output:
  - OUT1: Dry Contact Output
  - OUT2: Active Pulse Output @ 48VDC as NO auxiliary contact

### Metering and Records

- Primary measurements: Ia, Ib and Ic
- Secondary measurements: IA/IB/IC, IN, I1, I2, I3, Accumulation of Inverse-time Protection (%): IA/IB/IC/IP, IN, I2/I3
- SOE Log
  - 256 FIFO events time-stamped to  $\pm 1$ ms resolution
  - I/O Changes, Protection Logs, Power On/Off, Setup Changes, Time Sync., Device Operations and Self-diagnostics, etc.
  - Timestamp and characteristic data are recorded

### Protection Functions

- Comprehensive protection functions with reliable performance and fast response
- Cold Start Tripping time < 100ms
- Inrush Current Blocking (68H2)
- Overcurrent Block Protection (50/68)
- Instantaneous Overcurrent Protection (50P-1)
- Instantaneous Overcurrent Protection with Definite Time (50P-2)
- Overcurrent Protection Stage I, II and III (50P-3/-4/-5)
- Overload Protection (50P-6)
- Inverse Time Overcurrent Protection (51P)
- External Zero Sequence Overcurrent Protection (50N standard zero-sequence measurement CT)
- External Zero Sequence Inverse Time Overcurrent Protection (51N standard zero-sequence measurement CT)
- Self-generated Zero Sequence Overcurrent Protection (50N three-phase current calculation (Self-generated))
- Self-generated Zero Sequence Inverse Time Overcurrent Protection (51N three-phase current calculation (Self-generated))
- Negative Sequence Overcurrent Protection (46)
- Negative Sequence Inverse Time Overcurrent Protection (51Neg)
- Digital Input Protection IN1, IN2 (DI Relay)

### Communications

#### RS-485 (P1)

- Dual optically isolated RS-485 ports with Baud Rate from 2.4 to 38.4 kbps
- Modbus RTU protocol

### Time Synchronization

- Battery-backed Real-time clock
- Time Sync. via RTC and Modbus

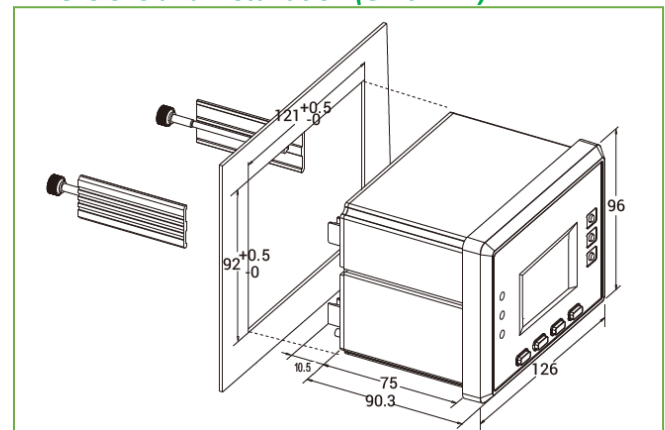
### System Integration

- The iRelay 50-P is supported by CET's PecStar® iEMS
- The iRelay 50-P can be easily integrated into other 3<sup>rd</sup> party systems via Modbus RTU protocol

### Technical Specifications

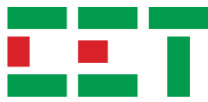
Self-powered Current Inputs (I1*, I1, I2*, I2, I3*, I3)	
CT Load Capacity	≥5VA
Primary Load Current	>15A and exceed 10% of the $I_{nominal}$
Secondary Load Current	>75mA
Protection Current Inputs (IA*, IA, IB*, IB, IC*, IC, IN*, IN)	
In (Ip Nominal)	5A
IN	0.04A-20A
Burden	<1VA/per phase
Overload	2xIn continuous, 10xIn for 10s, 40xIn for 1s
Frequency	50Hz/60Hz
Power Supply (+, -)	
Auxiliary Power Supply	48VDC, $\pm 20\%$
Burden	<2W
Digital Inputs (IN1, IN2, COM)	
Type	Dry contact, 48VDC internally wetted
Hysteresis	1ms
Digital Outputs (OUT1, OUT2)	
<b>OUT1</b>	Dry Contact
Turn-on Capacity	5A for continuous, 30A for 0.2s
Active Time	<10ms
Return Time	<5ms
Breaking Capacity	
DC	Resistive @50W, Inductive @35W (L/R = 0.04s)
AC	1250VA, 5A maximum
<b>OUT2</b>	Active Pulse Output
Tripping Energy	>3Ws
Output Voltage	48VDC (>16Ω or >64Ω Tripping Coil Resistance, respectively)
Environmental Conditions	
Operating Temperature	-25°C to 70°C
Storage Temperature	-40°C to 85°C
Humidity	5% to 95% non-condensing
Atmospheric Pressure	70 kPa to 110 kPa
Altitude	<3000m
Mechanical Characteristics	
Panel Cutout	121x92 mm
Unit Dimensions	126x96x100.8 mm
Front Panel IP Rating	IP40

### Dimensions and Installation (Unit: mm)



**Designed For Reliability**

**Manufactured To Last**



### Operating Range and Accuracy

Operating Range		
Ip (Phase Current)	0.05In-20In	
IN	0.04A-20A	
Frequency	50Hz/60Hz	
Protection Settings Accuracy		
Current	≤±2.5% or ±0.01In	
Action Time Accuracy		
Inherent Action	≤40ms (impose 1.2x action setting excitation for over-protection, and 0.7x action setting excitation for under-protection)	
Definite-time Action	≤±40ms or 1% (impose 1.2x action setting excitation for over-protection, and 0.7x action setting excitation for under-protection)	
Inverse-time Action	≤±5% (1 - I/(I <sub>set</sub> *80)) or ±40ms, where I is the imposed exciting current, while I <sub>set</sub> is the set current value	
Cold Start Instantaneous Trip Action Time	≤±100ms (2x action setting and supply current > 0.2A)	
Measurement Accuracy		
Parameters	Accuracy	Resolution
Current	±0.5%	0.001A
Frequency	±0.02Hz	0.001Hz

### Standard of Compliance

Safety Requirements	
CE LVD 2014 / 35 / EU	EN 61010-1: 2010 + A1: 2019 EN IEC 61010-2-030: 2021 + A1: 2021
Electrical Safety in Low Voltage Distribution Systems up to 1000Vac and 1500 Vdc	IEC 61557-12: 2021 (PMD)
Insulation AC Voltage: 2kV @ 1 minute Insulation Resistance: $> 100\text{M}\Omega$ Impulse Voltage: 5kV, 1.2/50 $\mu\text{s}$	EN 61010-1: 2010 + A1: 2019
EMC Compatibility	
CE EMC Directive 2014 / 30 / EU (EN 61326: 2021)	
Electrostatic Discharge	EN 61000-4-2: 2009
Radiated Fields	EN IEC 61000-4-3: 2020
Fast Transients	EN 61000-4-4: 2012
Surges	EN 61000-4-5: 2014 + A1: 2017
Conducted Disturbances	EN 61000-4-6: 2023
Magnetic Fields	EN 61000-4-8: 2010
Impulse Magnetic Fields	EN 61000-4-9: 2016
Voltage Dips and Interruptions	EN IEC 61000-4-11: 2020
Ring Wave	EN 61000-4-12: 2017
Ripple on DC Input Power Port	EN 61000-4-17: 1999 + A2: 2009
Damped Oscillatory Wave	EN IEC 61000-4-18: 2019
Mechanical Tests	
Vibration Test	IEC 60255-21-1
Shock and Bump Test	IEC 60255-21-2
Seismic Test	IEC 60255-21-3

### Rear Terminals

A	Auxiliary Power Supply (Please contact us should you need 24V DC auxiliary power supply option.)	
B	Self-powered Current Input from external CTs	
C	2xDigital Input	
D	RS-485 port	
E	3-Phase Protection Current Inputs	
F	Zero Sequence Current Input	
G	OUT1	Dry Contact Digital Output
	OUT2	Active Pulse Output

### Ordering Information

Version 20251223	
Product Code	Description
iRelay Self and Dual Powered 50-P Overcurrent Relay	
Language	
E	English
Ip (Phase Current)	
5	5A
IN (Zero Sequence Current)	
1	0.04A-20A
Power Supply, (Trip Pulse Output)	
2	48VDC
System Frequency	
5	50Hz
6	60Hz
DI Excitation	
N	Dry Contact
Communication Ports	
A	1xRS-485
Tripping Capability	
Z	Enhanced Tripping
iRelay 50-P - E 5 1 2 5 N A Z iRelay 50-P-E5125NAZ (Standard Model)	

#### Notes:

- The iRelay 50-P draws power from CTs. Please refer to "Guidelines for Selecting the iRelay 50-P Overcurrent Relay" to verify whether the on-site CT meets the device's power supply requirements.
- The iRelay 50-P trips the circuit breaker via a tripping pulse, which imposes specific requirements on the trip coil of the circuit breaker. Please refer to the "Guidelines for Selecting the iRelay 50-P Overcurrent Relay" to verify whether the iRelay 50-P meets the tripping requirements of the circuit breaker.
- We also offer the 24V DC auxiliary power supply, please contact us should you need any further assistance.

### Your Local Representative

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