



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, I0, Accumulation of Inverse-time Protection (%): IA/IB/IC/IP, IN, I2/I0
- SOE Log
 - 256 FIFO events time-stamped to ± 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 (68Hz)
- 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

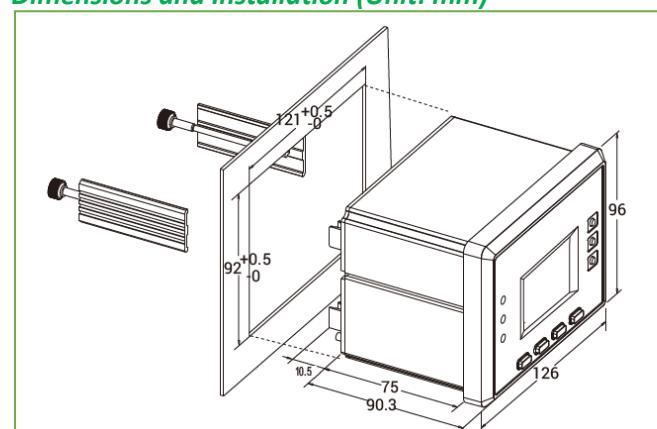
System Integration

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

Technical Specifications

Self-powered Current Inputs (I1', I1, I2', I2, I3', I3)	
CT Load Capacity	≥ 5 VA
Primary Load Current	>15 A and exceed 10% of the Nominal
Secondary Load Current	>75 mA
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)	
OUT1	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
OUT2	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



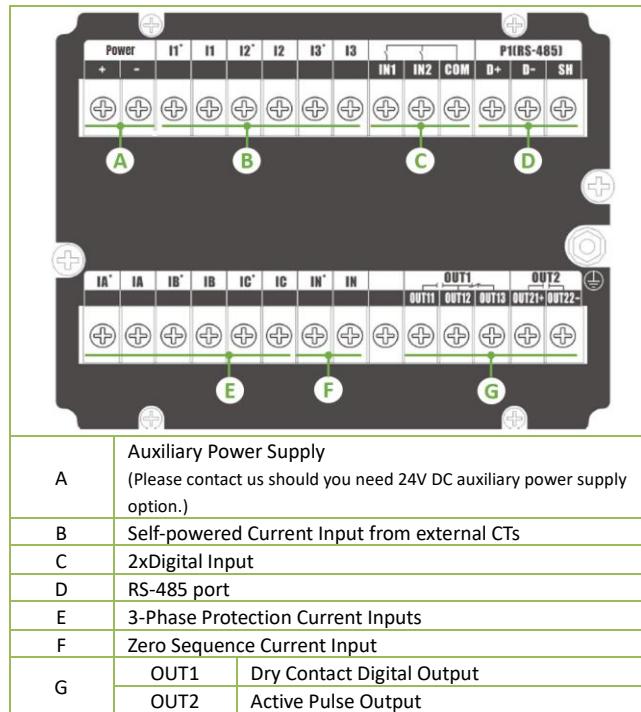
Operating Range and Accuracy

Operating Range		
Ip (Phase Current)		0.05In-20In
IN		0.04A-20A
Frequency		50Hz/60Hz
Protection Settings Accuracy		
Current		$\leq \pm 2.5\%$ or $\pm 0.01In$
Action Time Accuracy		
Inherent Action	$\leq 40ms$ (impose $1.2x$ action setting excitation for over-protection, and $0.7x$ action setting excitation for under-protection)	
Definite-time Action	$\leq \pm 40ms$ or 1% (impose $1.2x$ action setting excitation for over-protection, and $0.7x$ action setting excitation for under-protection)	
Inverse-time Action	$\leq \pm 5\%$ ($1 - I/(I_{set} \cdot 80)$) or $\pm 40ms$, where I is the imposed exciting current, while I_{set} is the set current value	
Cold Start Instantaneous Trip Action Time	$\leq \pm 100ms$ (2x action setting and supply current $> 0.2A$)	
Measurement Accuracy		
Parameters	Accuracy	Resolution
Current	$\pm 0.5\%$	0.001A
Frequency	$\pm 0.02Hz$	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: $> 100M\Omega$ Impulse Voltage: 5kV, 1.2/50 μ 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



Ordering Information

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