CET

KYN28A-12

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iRelay 60-E

24/09/06 16:45:24

Ia	0.000 A
P	0.000 kW
PF	0.000
IN	00 00 00 00 0

Run   Comm.

1. Trip
2. Alarm
3. Closed
4. Open
5. Charge
6.
7.
8.

Reset

Enter

Esc

CET

# iRelay 60-E

Intelligent Protection Relay

Overview

iRelay 60-E is an advanced intelligent protection relay that integrates protection, control, measurement, supervision and automation functions into a single device. Housed in a compact 144x178x140.1mm casing, it features a backlit, intuitive LCD display for easy navigation, along with additional I/O options. Combining maximum reliability with exceptional functionality and flexibility, the iRelay 60-E is ideal for various applications in MV or HV Energy Distribution, including Feeders, Busbar, Transformers, Capacitor Bank and Motors.

Typical Applications

- Distribution Transformer Protection
- Capacitor Protection
- Busbar and Feeder Protection
- Motor Protection
- General-Purpose Backup Protection for other Power System Circuits or Devices

Functional Diagram

iRelay 60-E Intelligent Protection Relay
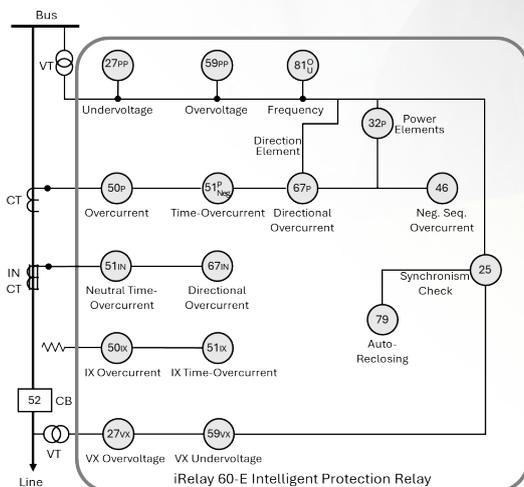
Basic Features

- Large, backlit LCD for data viewing, relay control, diagnostics and configuration
- LEDs for trip/alarm and breaker status indication and fault type
- 3xVoltage Input: VA, VB, VC
- 3xCurrent Input: IA, IB and IC
- 1xNeutral Current Input (IN) for standard ground fault protection
- 1xAuxiliary Voltage Input (VX) for directional zero-sequence voltage input offering phase-to-ground insulation monitoring (59VL) or single phase voltage (phase-to-phase voltage) for synchronism check (25)
- 1xAuxiliary Current Input for sensitive Neutral Current Input (for example, Transformer/Capacitor Bank secondary side)
- 9xDigital Input externally excited @110/220VAC/DC or 48/24-VDC
- 5xMechanical Relay Output (1xForm C, 4xForm A)
- 1xOptically isolated RS-485 port with Baud Rate from 2.4 to 38.4 kbps, supporting Modbus RTU protocol

Metering and Monitoring

- Primary metering for Ua, Ub, Uc, Uab, Ubc, Uca, Aux. Voltage Ux, Ia, Ib, Ic, In, Aux. Current Ix, Frequency, Aux. Frequency, Per-phase and Total P, Q, S and PF
- Secondary metering for UA, UB, UC, UAB, UBC, UCA, Aux. Voltage UX, IA, IB, IC, IN, Aux. Current IX, Voltage Sequences U1/U2/U0, Current Sequences I1/I2/I0, UAB, Frequency, Aux. Frequency, P, Q, S, PF Total, Per-phase P and Q, Thermal Capacities in inverse-time protection
- Energy metering for kWh, kvarh Import/Export
- Voltage/Current Transformer circuit supervision
- Trip/Start or Open/Close circuit supervision requiring two Digital Inputs for each circuit breaker pole

Data and Event Recorders

Waveform Recorder (WFR)

- 8 latest waveform logs of Current, DI/DO Status trigged by Protection Start/Operation/Return or manual trigger
- 8 cycles for pre-fault (2 cyclces x 32 samples/cycle) and post-fault (6 cycles x 16 samples/cycle)
- Stored in non-volatile memory and retrievable through communications

SOE Log

- 256 FIFO time-stamped with characteristic value
- I/O Changes, Protection Logs, Power On/Off, Setup Changes, Time Sync., Device Operations and Self-diagnostics, etc.

Communication

- Optically isolated RS-485 port with Baud Rate from 2.4 to 38.4 kbps, supporting Modbus RTU protocol

Time Synchronization

- Battery-backed RTC @6ppm (error <0.5s/day)

System Integration

- The iRelay 60-E is supported by CET's PecStar® iEMS
- The iRelay 60-E can be easily integrated into other 3rd party systems because of its support for Modbus RTU protocol

Protection Features

- Comprehensive protection functions with reliable performance and fast response

Current Protection

- Inrush Blocking Protection (50/68)
- Switch On To Fault Protection (SOTF)
- Phase Current Acceleration SOTF Protection (SOTF AR)
- DI SOTF Protection (SOTF DI)
- Phase Overcurrent Protection (67P-1)
- Definite Time Overcurrent Protection (67P-2)
- Definite Time Overcurrent Protection Stage I, II and III (67P-3, 67P-4, 67P-5)
- Overload Protection (50P-6)
- Inverse Time Overcurrent Protection (51P)
- IN SOTF Protection (SOTF IN)
- IN Acceleration SOTF Protection (SOTF IN AR)
- IN Overcurrent Protection Stage I, II, III and IV (67IN-1, 67IN-2, 67IN-3, 67IN-4)
- IN Inverse Time Overcurrent Protection (51IN)
- I0 SOTF Protection (SOTF I0)
- I0 Acceleration SOTF Protection (SOTF I0 AR)
- I0 Overcurrent Protection Stage I, II and III (67I0-1, 67I0-2, 67I0-3)
- I0 Inverse Time Overcurrent Protection (51I0)
- Negative Sequence Overcurrent Protection Stage I and II (46-1, 46-2)
- IX Overcurrent Protection (50IX)
- IX Inverse Time Overcurrent Protection (51IX)

Voltage Protection

- Overvoltage Protection Stage I and II (59PP-1, 59PP-2)
- Undervoltage Protection Stage I and II (27PP-1, 27PP-2)
- Undervoltage Splitting Protection (27Sp)
- VX Overvoltage Protection Stage I and II (59VX-1, 59VX-2)
- VX Undervoltage Protection Stage I and II (27VX-1, 27VX-2)

Frequency and Power Protection

- Overfrequency Protection Stage I and II (81O-1, 81O-2)
- Underfrequency Protection Stage I and II (81U-1, 81U-2)
- Directional Power Protection Stage I and II (32P-1, 32P-2)

Motor Protection

- Motor Status Monitoring (MSTOP, MSTART, MRUN)
- Motor Start-up Protection (48)
- Thermal Overload Protection (49)
- tE Protection (tE)
- Locked Rotor Protection (50LR)
- Loss of Load Protection (37I)
- Motor Restarting Function (27/62)
- Starting Times Protection (66T)

Typical Application Diagram
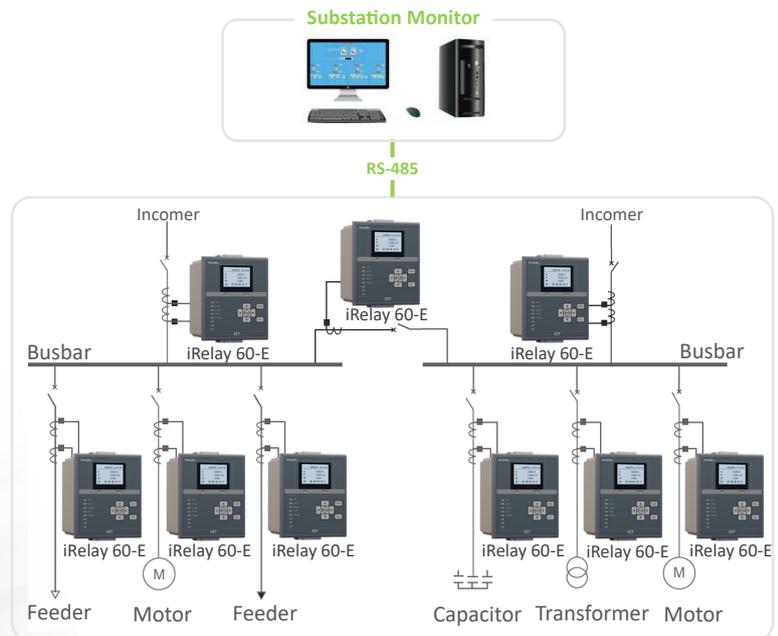
DI Protection and others

- Digital Input Protection (IN3-T~IN10-T)
- Synchronism Check (25)
- Auto Reclosing (79)
- Insulation Monitoring (NV)
- Restart Inhibition (66INTVAL)
- Loss of Potential (LOP)
- CT Monitoring (CTS)
- Trip Circuit Supervision (74TC)

Basic Protection Elements

- Low-voltage Element
- Zero-sequence Voltage Element
- Phase Current-direction Element
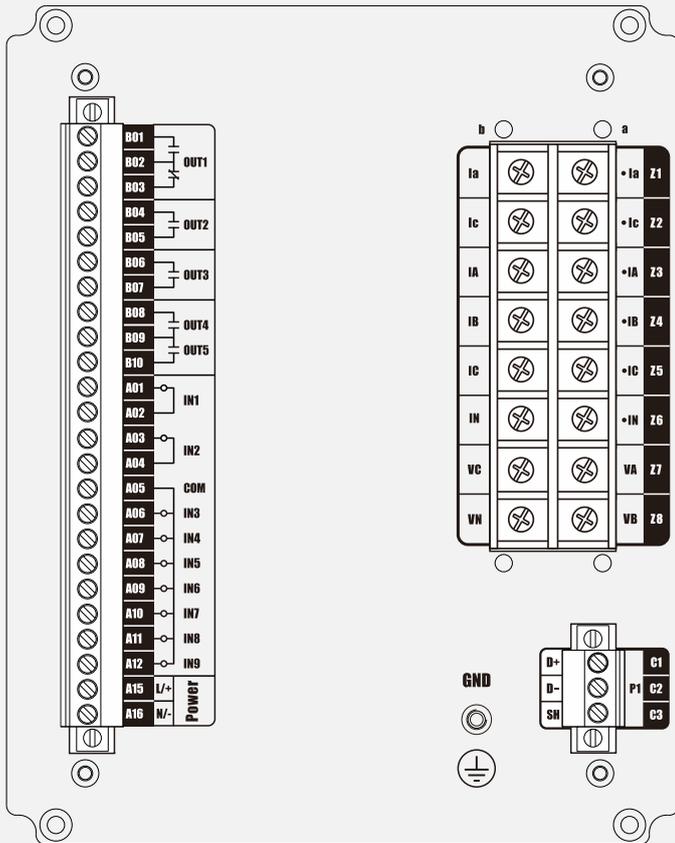- Neutral Current-direction Element

Metering Accuracy

Parameters	Accuracy	Resolution
Voltage	0.50%	0.01V
Current	±0.5%	0.001A
Frequency	±0.01Hz	0.001Hz
P, Q	±0.5%	0.001kX
PF	±1.0%	0.001
kWh	Class 1	1kWh
kvarh	Class 2	1kvarh

Protection Accuracy

Current Protection		
Pickup currents tolerance		2.5% of setting value or 0.01In
Trip time tolerance	Instantaneous trip	40ms
	Definite time trip	40ms or 1% of setting value
	Inverse definite minimum	40ms or 5% of reference (calculated)
	time trip	value + 2.5% current tolerance
Angle faults (directional faults)		±3°
Voltage Protection		
Pickup voltage tolerance		2.5% of setting value or 0.2V
Trip time tolerance		40ms or 1% of setting value
Frequency Protection		
Pickup frequency tolerance		0.01Hz
Trip time tolerance		40ms or 1% of setting value

Connection Diagram

Terminals Diagrams

Index	Label	Description
B01-B10	OUT1-OUT5	Relay Outputs
A01-A12	IN1, IN2, COM, IN3-IN9	Digital Inputs
A15-A16	L/+, N/-	Power Supply
Z1a-Z5a	•IA, •IB, •IC, •IN, •IX	Current Inputs
Z1b-Z5b	IA, IB, IC, IN, IX	
Z6a-Z8a	VA, VB, VC	Voltage Inputs
Z6b-Z8b	VN, VX, VXN	
C1-C3	D+, D-, SH	RS-485 Port
	GND	Chassis Ground Input
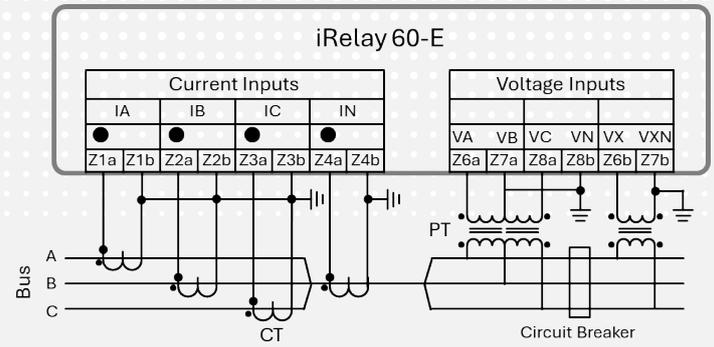
Technical Specifications

Voltage Inputs (VA, VB, VC, VN, VX, VXN)	
Nominal (UN)	100VAC (L-L)
Range	0.01-1.5UN (L-L)
Burden	< 0.5VA per phase
Overload	1.4xUN continuous, 2xUN for 10s
Frequency	50Hz/60Hz
Current Inputs (•IA, IA, •IB, IB, •IC, IC, •IX, IX)	
Nominal (In)	5A or 1A
Metering Range	0.02-1.2In
Protection Pickup Range	0.04-20In
Burden	< 1VA per phase (5A Input) < 0.5VA per phase (1A Input)
Overload	2xIN continuous, 10xIN for 10s, 50xIN for 1s
Neutral Current Inputs (•IN, IN)	
Nominal	5A/1A Compatible
Power Supply (L/+, N/-)	
Standard	88-264VAC/DC, 50/60Hz
Optional	48V DC or 24V DC
Burden	< 5W
Digital Inputs (IN1 to IN9, COM)	
Voltage	110VAC/DC, 220VAC/DC, 48VDC, 24VDC
Hysteresis	1ms minmum

Digital Outputs (OUT1 to OUT5)		
Quantity	OUT1	Form C
	OUT2-OUT5	Form A
Rated Voltage		250VAC/24VDC
Continuous Contact Carry		8A
Max. Switching Power		2000VA/192W
Min. Switching Load		100mA @ 5VDC
Operating Time		<10ms
Release Time		<5ms

Standards of Compliance

Safety Requirements	
CE LVD 2014/35/EU	EN 61010-1: 2010 +A1: 2019 EN IEC 61010-2-030: 2021 +A11: 2021
Electrical Safety in Low Voltage Distribution Systems up to 1000Vac and 1500 Vdc	IEC 61557-12: 2021 (PMD)

Products Safety Requirements and Tests
  AC Voltage
  Insulation Resistance
  Impulse Voltage
	EN 61010-1: 2010 +A1: 2019
	
	2kV @ 1 minute
	>100MΩ
	5kV, 1.2/50µs

Electromagnetic Compatibility EMC 2014/30/EU (EN IEC 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: 2019
Damped Oscillatory Wave	EN IEC 61000-4-18: 2019

Mechanical Tests	
Vibration Test	IEC 60255-21-1
Shock Test	IEC 60255-21-2
Seismic Test	IEC 60255-21-3

Dimensions and Installation
(Unit: mm)
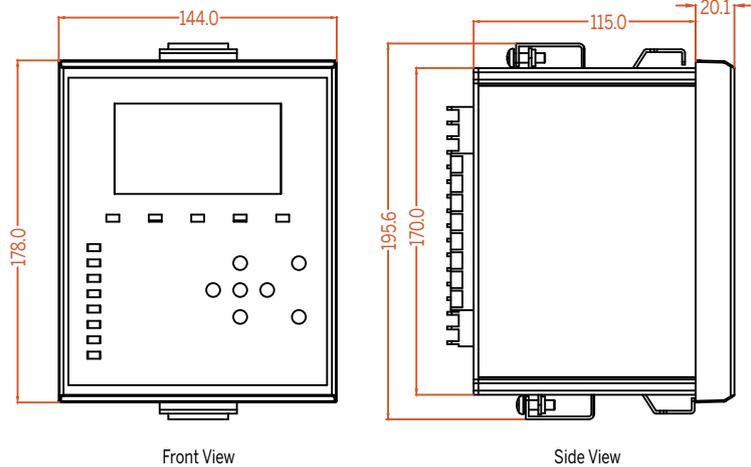
Front View

Side View

Bottom View

Installation
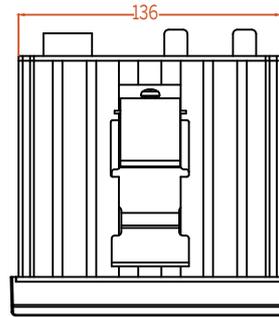
Ordering Information

Product Code									Description
iRelay 60-E Intelligent Protection Relay									
Basic Function									▪ Rated VLL Nominal Input: 100VAC, 150VAC Max. ▪ Protection Categories: Feeder, Transformer, Motor, Capacitor, Busbar ▪ Hardware Spec: 32-bit CPU with 12-bit A/D, Metal Enclosure, 9xDI, 5xDO, 1xRS-485 ▪ Protocols: Modbus RTU ▪ Features: Waveform Recording, SOE, Motor Starting Log
Language	E								English
Ip (Phase Current)		5							5A
		1							1A
IN (Neutral Current)			1						5A/1A Compatible
IX (Auxiliary Current)				5					5A
				1					1A
Power Supply, DI Excitation					4*				48V DC
					3*				24V DC
					2				220V DC/AC
					1				110V DC/AC
System Frequency						5			50Hz
						6			60Hz
I/O							B		9xDI + 5xDO
Communication Ports								A	1xRS-485
iRelay 60-E	- E	5	1	5	2	5	B	A	iRelay 60-E-E51525BA(Standard Model)

* Additional charges apply
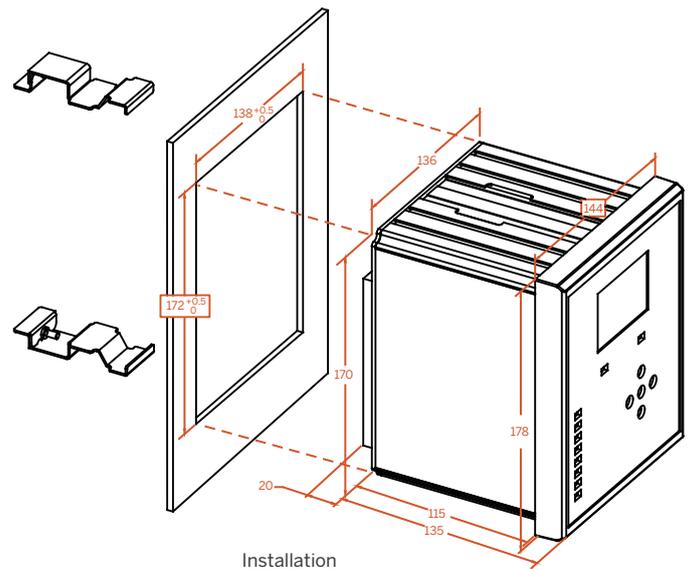
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