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iRelay 60
Intelligent Protection Relay

Overview

The iRelay 60 is CET's elaborately designed multifunction protection relay for LV, MV and HV power systems as it features high-performance hardware design equipped with 32-bit Dual-Core CPU, 64-bit DSP and 14-bit A/D, along with professional protection algorithms and highly reliable real-time multi-tasking Operating System in the firmware design. The iRelay 60 comes with 10xDigital Input, 7xDigital Output, 1xAlarm Output, 2xRS-485 port and optional up to 4x10BASE-T/100BASE-TX Ethernet port. It supports multi-protocols, including IEC 61850, Modbus RTU/TCP, IEC 60870-5-103 and optional GOOSE. In addition, it offers User-Programmable Logic and logging capabilities such as Waveform Recording Logs and SOE Logs, as well as multiple Time Sync. methods. These features make the iRelay 60 one of the most intelligent and powerful Protection Relays in all kinds of application scenarios at LV, MV and HV systems.

Typical Applications

- Distribution Transformer Protection
- Asynchronous Motor Protection
- Capacitor Protection
- Busbar and Feeder Protection
- Backup Protection for Electrical Equipment

Basic Features

- Large LCD with user-friendly graphic interfaces
- 32-bit Dual-Core CPU, 64-bit DSP, 14-bit A/D, non-volatile memory
- User-Programmable Protection Logic
- Selectable Mimic Diagrams and 8 Setting Groups
- Waveform Recording, SOE, Motor Start Log
- IEC 61850, Modbus RTU/TCP, IEC 60870-5-103 and optional GOOSE

Inputs and Outputs

- 4xVoltage Input: VA, VB, VC and VX
- 4xCurrent Input: IA, IB, IC and IN
- 10x110/220V AC/DC Digital Input: IN1~IN10
- 7xDigital Output and 1xDiagnostics Alarm Output

Basic Programmable Logical Elements

- Digital Input Status Element (IN1~IN10)
- Digital Output Control / Status Element (OUT1~OUT7 / OUT1-S~OUT7-S)
- Instantaneous/Definite Time (DT) Intermediate Variable Element (VAR1~VAR16, VAR1-T~VAR16-T)
- User-defined Event Trigger Element (EVT1~EVT16)
- LED Indicator Element (LED1~LED8)
- Latch Element (LATCH1~LATCH8, SET1~SET8, RST1~RST8)
- Setting Group Element (GRP1~GRP8)
- Remote Control Element (RC1~RC8)
- Local Control Element (LC1~LC8)
- Circuit Breaker (CB) Status Element (52A)
- Circuit Breaker (CB) Wear Monitor Element (BCWA, BCWB, BCWC)
- Reset Element (RESET, RESET_SET)
- Fault WFR Trigger Element (FWR)
- Waveform Capture Trigger Element (WWR)
- Status Virtual Input Element (VIN1~VIN64, VIN1-NA~VIN64NA)
- Analog Virtual Input Element (VAI1~VAI32, VAI1-NA~VAI32-NA)
- GOOSE Comm. Status Alarm Element (GOALMx)
- Global Protection Status Element (TRIP)
- Global Alarm Status Element (ALARM)

Metering

- Primary Measurements
  - Ua/Ub/Uc/Ux, Uab/Ubc/Uca, Ia/Ib/Ic, Freq., Fx
  - P, Q, S, PF, Pa/Pb/Pc, Qa/Qb/Qc, Sa/Sb/Sc, Px, Qx as well as Sx
  - Voltage and Current Angle
- Secondary Measurements
  - UA/UB/UC/UX, U1, U2, U0
  - UAB/UBC/UCA, Freq., Fx
  - IA/IB/IC, IN, I1, I2, I0
  - P, Q, PA/PB/PC, QA/QB/QC, PX and QX
  - Voltage and Current Angle
  - Accumulation of Inverse-time Protection (%): IA/IB/IC/IP, IN, I2/I0, Motor Thermal Level and tE
  - df/dt-5ms and du/dt-5ms
- kWh Import/Export and kvarh Import/Export

Protection Functions

- 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)
  - Phase Discontinuity Protection (46PD)
- **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)
- **RMS Protection**
  - RMS Overvoltage Protection Stage I and II (59RMS-1, 59RMS-2)
  - RMS Overcurrent Protection Stage I and II (50RMS-1, 50RMS-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)
- **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)

Data and Event Recorders

Real-Time Waveform Capture (WFC)

- Real-time WFC @ 128 samples/cycle x 10 cycles
- Triggered by Remote Control and RMS protection actions

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SOE Log
- 512 FIFO events time-stamped to ±1ms resolution
- I/O Changes, Protection Logs, Power On/Off, Setup Changes, Time Sync., Device Operations and Self-diagnostics, etc.
- Timestamp and characteristic data recorded

Waveform Recorder (WFR)
- WFR can be triggered by Protection Start, Operation, Return or Remote Control
- Recording length up to 100 cycles, with 5 pre-fault cycles (10 cycles x 32 samples/cycle + 90 cycles x 16 samples/cycle)
- The latest 8 logs can be retrieved via front panel or through communications
- COMTRADE file format and downloadable through communications

Motor Logs
- Record the latest 5 Logs of U & I Trend after Motor Startup
  - Maximum Current during starting
  - Minimum Voltage during starting
  - Thermal accumulation level
  - Starting time
  - Curve of U, I and Thermal accumulation during starting
- Programmable recording length

Communications

RS-485 (P1, P2)
- Dual optically isolated RS-485 ports with Baud Rate from 2.4 to 38.4 kbps, supporting Modbus RTU protocol
- P1 can be configured for GPS or IRIG-B Time Sync.

Ethernet Ports
- 1 or optional 2 or 4x10BASE-T/100BASE-TX Ethernet port with RJ45 connector
- Supports IEC 61850, Modbus TCP, IEC 60870-5-103 and optional GOOSE
- Simultaneous client connections for 12xModbus TCP & 12xIEC 61850

Time Synchronization
- Battery-backed Real-time clock
- Time Sync. via RTC, Modbus, SNTP, IEC103
- Optional GPS/IRIG-B Input

System Integration
- The iRelay 60 is supported by CET's PecStar® iEMS
- The iRelay 60 can be easily integrated into other 3rd party systems via multiple comm. ports as well as multiple industrial standard protocols

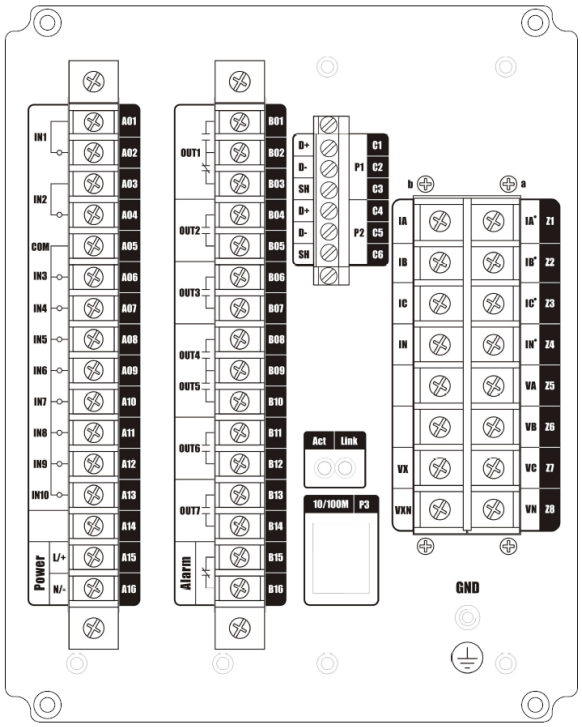
Operating Range and Accuracy

Operating Range		
UN	0-720VAC (L-L)	
UX	0-720VAC	
Ip (Phase Current)	0.05In-20In	
IN	0.04-20A	
Frequency	45.00-65.00Hz	
Protection Settings Accuracy		
Current	≤±2.5% or ±0.01In	
Voltage	≤±2.5% or 0.2V	
Frequency	≤±0.02Hz	
Directional Angle	≤±2°	
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_{set}*80)) or ±40ms, where I is the imposed exciting current, while I_{set} is the set current value	
Measurement Accuracy		
Parameters	**Accuracy**	**Resolution**
Voltage	0.50%	0.01V
Current	±0.5%	0.001A
P, Q	±0.5%	0.001kX
PF	±1.0%	0.001
Frequency	±0.02Hz	0.001Hz
kWh	Class 1	1kWh
kvarh	Class 2	1kvarh

Technical Specifications

Voltage Inputs (VA, VB, VC, VN, VX, VXN)	
Un	0-600V, 600VAC Max.
UX	0-600V
Burden	< 0.5VA/per phase
Overload	2xUn continuous, 3xUn for 10s
Frequency	50Hz/60Hz
Current Inputs (IA, IB, IC, IN)	
In (Ip Nominal)	5A (Standard), 1A (Optional)
IN	0.04A-20A ($IN_{nominal}$=1A)
Burden	< 1VA/per phase @ 5A < 0.5VA/per phase @ 1A
Overload	2xIn continuous, 10xIn for 10s, 40xIn for 1s
Power Supply (L/+, N/-)	
Standard	88 to 264V AC/DC
Burden	< 8W
Digital Inputs (IN1 to IN10, COM)	
Excitation	110V AC/DC or 220V AC/DC
Hysteresis	1ms
Digital Outputs (OUT1 to OUT7)	
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
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	138x172 mm
Unit Dimensions	178x144x155 mm
IP Rating	51

Rear Terminals



Rear Panel (Standard Model, 1x10BASE-T/100BASE-TX Ethernet Port)

Designed For Reliability **Manufactured To Last**

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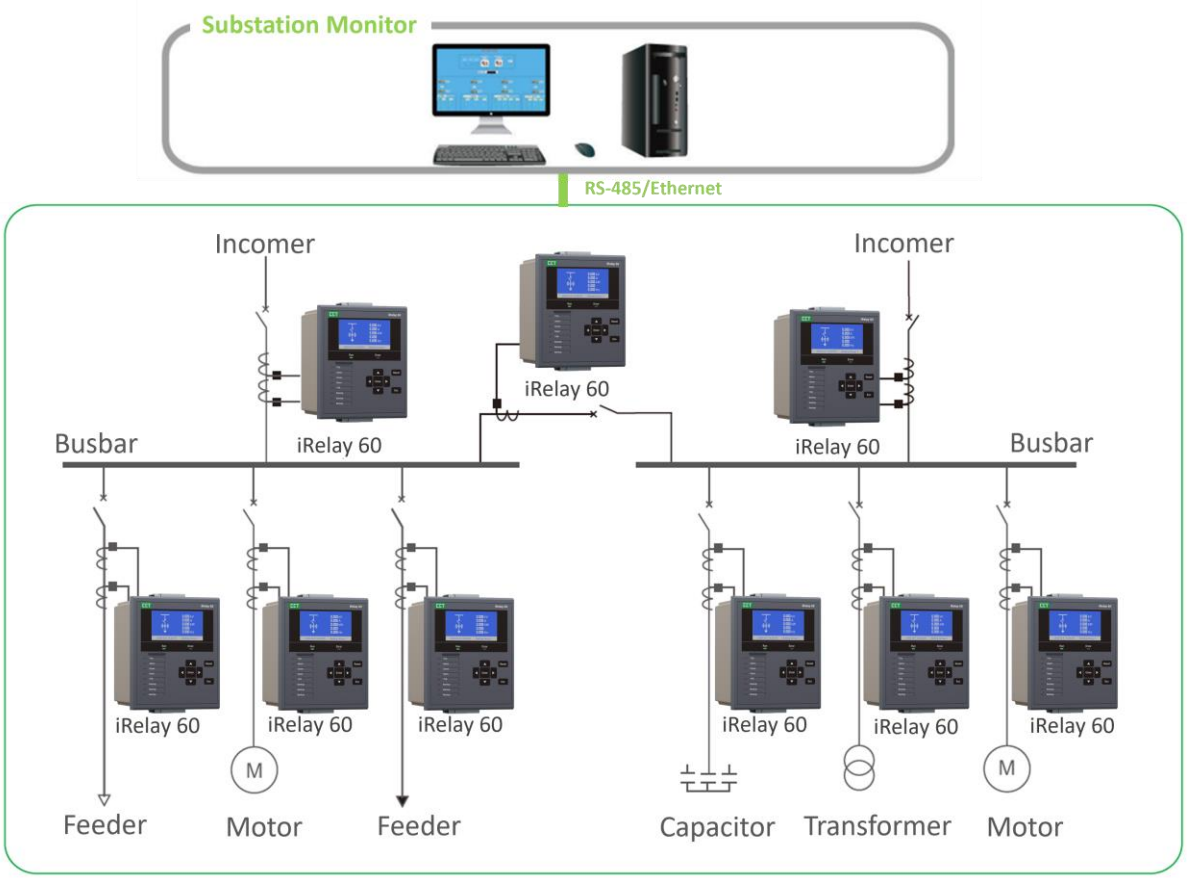
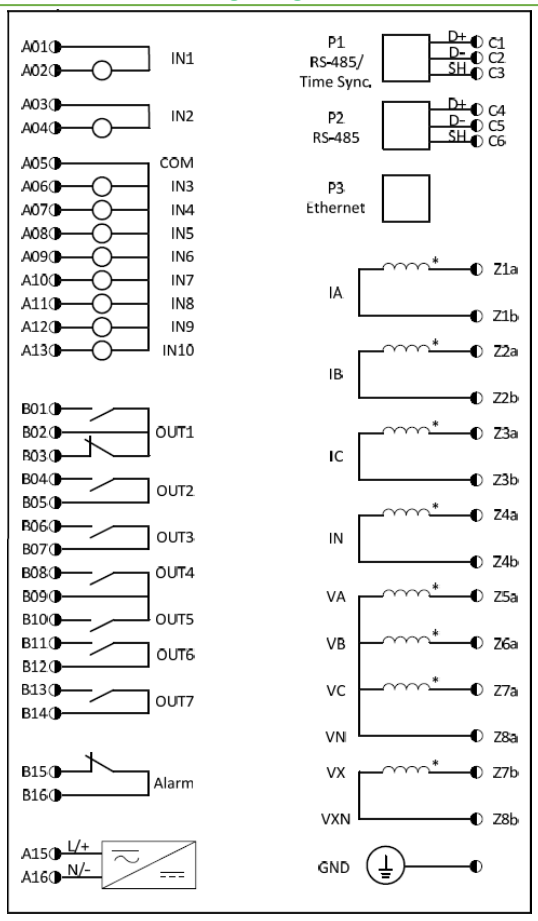
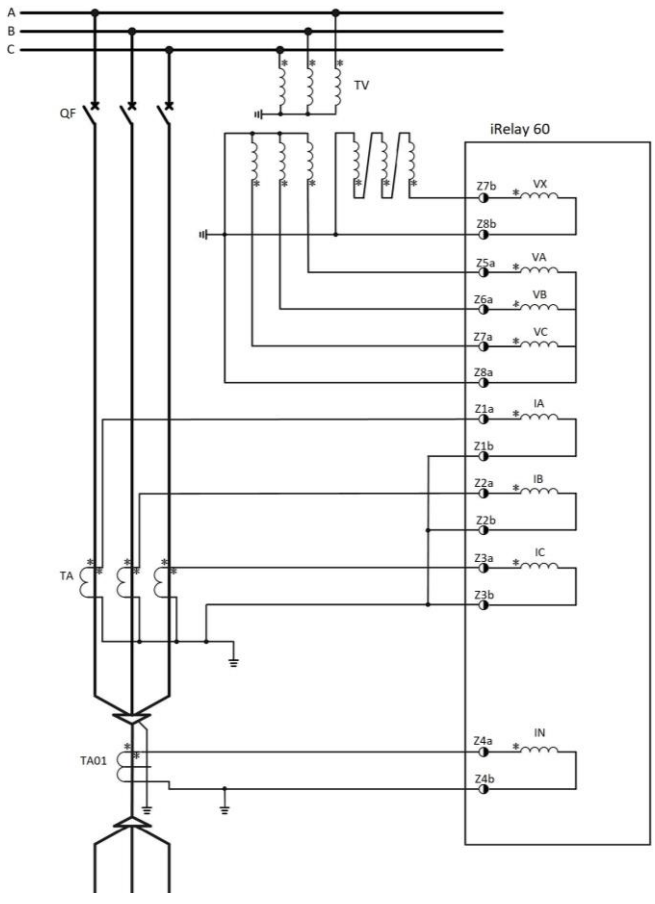
Typical Application Diagram



Schematic and Wiring Diagrams



Schematic Diagram



Wiring Diagram

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Standard of Compliance

Safety Requirements	
CE LVD 2014 / 35 / EU	EN 61010-1: 2010 + A1: 2019 EN 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: >100MΩ Impulse Voltage: 5kV, 1.2/50μs	EN 61010-1: 2010 + A1: 2019
EMC Compatibility CE EMC Directive 2014 / 30 / EU (EN 61326: 2021)	
Electrostatic Discharge	EN 61000-4-2: 2020
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 61000-4-11: 2020 + A1: 2017
Ring Wave	EN 61000-4-12: 2017
Ripple on DC Input Power Port	EN 61000-4-17: 2019
Damped Oscillatory Wave	EN 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

Ordering Information

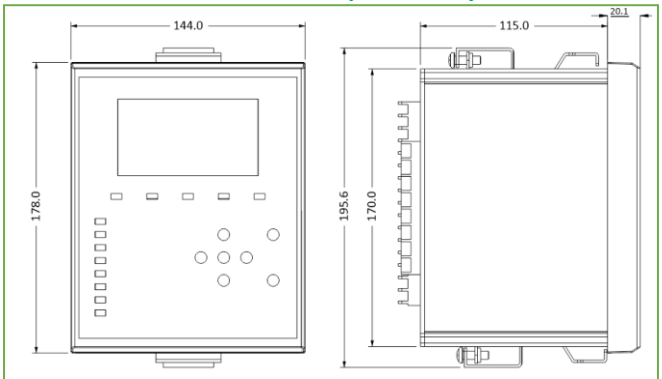
Version 20250526

Product Code	Description
iRelay 60 Intelligent Protection Relay	
Basic Function	
• Rated VLL Nominal Input: 0-600VAC • Protection Categories: Entrance, Feeder, Transformer, Motor, Capacitor, Busbar, and User-Defined Protection Logic with Programmable Recloser • Hardware Spec: 32-bit Dual-Core CPU with 64-bit DSP, 14-bit A/D, Metal Enclosure, 10xDI, 7xDO, 1xDiagnostics Alarm Output, 2xRS-485, 1x10BASE-T/100BASE-TX Ethernet Port (or optional 2 or 4x10BASE-T/100BASE-TX Ethernet Port). • Protocols: IEC 61850, Modbus TCP, IEC 60870-5-103, Modbus RTU, optional GOOSE • Features: User-Defined Protection Logic, Selectable Mimic Diagrams, 8 sets of Configuration, Waveform Recording, SOE, Motor Starting Log, KETOP Certified.	
Language	
E	English
Ip (Phase Current)	
5	5A
1	1A
IN (Neutral Current)	
1	0.04A-20A
Power Supply, DI Excitation	
2	220V DC/AC
1	110V DC/AC
System Frequency	
5	50Hz
6	60Hz
I/O	
B	7xDO
Communication Ports	
A	2xRS-485 + 1x10BASE-T/100BASE-TX Ethernet Port
C*	2xRS-485 + 2x10BASE-T/100BASE-TX Ethernet Port
D*	2xRS-485 + 4x10BASE-T/100BASE-TX Ethernet Port
Functionality	
A	User-Programmable Protection Logic
B*	User-Programmable Protection Logic + GOOSE

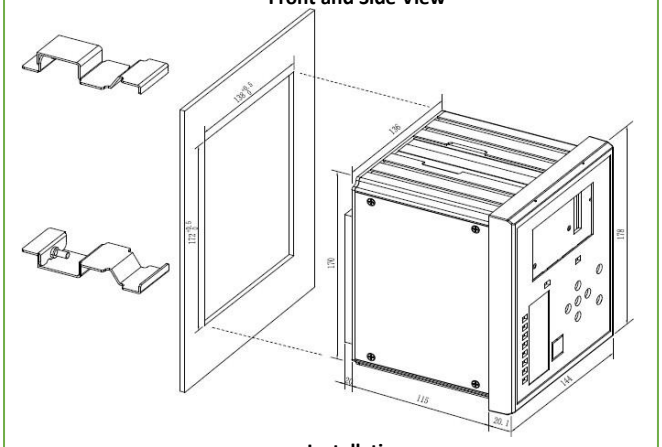
iRelay 60	-	E	5	1	2	5	B	A	A	iRelay 60-E5125BAA (Standard Model)

* Additional charges apply

Dimensions and Installation (Unit: mm)



Front and Side View



Installation

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Your Local Representative

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