QD-CT Series Multi-Channel AC Current Acquisition Module

Product Datasheet

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1. Product Overview

Product Definition

The QD-CT Series is a family of multi-channel AC current acquisition modules designed for real-time measurement of multiple AC current circuits. The modules use precision current transformers for signal isolation and sensing, with dedicated true RMS measurement chips capable of accurately measuring the true RMS value of currents with various waveforms. Each module features a standard RS-485 bus interface and supports the Modbus-RTU protocol for seamless integration with PLCs, industrial control computers, gateways, or energy management platforms.

Product Models

Model	Channels	Application Scope
QD-CT-4	4 channels	Small distribution boxes, limited circuit monitoring
QD-CT-8	8 channels	Medium distribution boxes, general industrial monitoring
QD-CT-12	12 channels	Large distribution boxes, commercial building energy monitoring
QD-CT-16	16 channels	Ultra-large distribution systems, data centers, high-density monitoring

Core Application Industries

- **Power Systems**: Substation monitoring, distribution network automation, smart grid
- **Industrial Automation**: Manufacturing lines, motor protection, equipment status monitoring
- **Commercial Buildings**: Energy management systems,energy sub-metering, HVAC monitoring
- **Telecommunications**: Base station power monitoring, tower lighting circuits
- **Data Centers**: PDU monitoring, server rack current tracking, overload prevention
- **New Energy**: PV inverter output monitoring, energy storage charge/discharge tracking
- **Water Treatment**: Pump station monitoring, multi-circuit current supervision
- **Metallurgy**: Smelting equipment monitoring, high-current circuit supervision

Key Advantages

1. **Multi-channel synchronous sampling** — Up to 16 channels independently sampled simultaneously
2. **High precision** — ±0.5%FS basic error, 0.1A resolution for accurate measurement
3. **True RMS measurement** — Dedicated RMS chip accurately measures various waveform currents

4. **Open-type CT input** — 10mm aperture, clamp-on installation without power shutdown
5. **DIN rail mounting** — Standard 35mm DIN rail installation for easy deployment
6. **RS-485 Modbus-RTU** — Industry-standard protocol for seamless PLC/SCADA integration
7. **Triple isolation** — Power, input, and output electrically isolated (1.5kV)
8. **Plug-and-play configuration** — Upper computer software for easy parameter setup

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2. Features

Key Features

- **Measurement Precision**: ±0.5%FS basic error, 0.1A resolution
- **Response Time**: 500ms fast response for real-time monitoring
- **Sampling Rate**: 50ms sampling period (20Hz), suitable for dynamic load monitoring
- **Frequency Range**: 20Hz ~ 1kHz wide frequency response
- **Power Supply**: DC 24V (20~28V), low power consumption ≤100mA
- **Installation**: Standard 35mm DIN rail mounting, compact design
- **Isolation Voltage**: 1.5kV triple isolation (power/input/output)
- **Communication**: RS-485 interface, Modbus-RTU protocol, up to 255 device addresses
- **Baud Rate**: Configurable from 1200 to 115200bps, auto-baud detection supported
- **Parity**: Configurable — None/Odd/Even
- **Working Temperature**: -10°C ~ +50°C industrial grade
- **Humidity**: 35% ~ 85% RH, non-condensing
- **Anti-interference**: Triple isolation provides excellent EMC performance
- **Software Configurable**: Full parameter configuration via Modbus registers or upper computer software
- **Zero Calibration**: Factory calibrated, maintenance-free operation
- **LED Indicators**: POW (power), RUN (running), RX/TX (communication status)

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3. Technical Specifications

3.1 Input Parameters

Parameter	Specification
Input Signal Type	AC current via open-type current transformer
Measurement Range	AC 0 ~ 50A
Transformer Ratio	1000/1
Aperture Diameter	10mm
Input Impedance	Low burden, compatible with standard 1A secondary CTs
Maximum Overload	1.2x rated current continuous; 5~10x rated current instantaneous
Wire Insertion	No direction requirement, single-pass through

Parameter	Specification
	transformer

3.2 Output Parameters

Parameter	Specification
Communication Interface	RS-485 (half-duplex)
Communication Protocol	Modbus-RTU
Default Baud Rate	9600bps (configurable 1200~115200bps)
Data Format	8 data bits, no parity, 1 stop bit (configurable)
Max Station Address	1 ~ 255
Max Communication Distance	1200m (with proper termination)
Output Data Format	Unsigned integer, scale factor 0.1A per count
Register Type	Read-only (current data), Read/Write (configuration)

3.3 Accuracy & Performance

Parameter	Specification
Basic Error	±0.5% FS
Resolution	0.1A
Sampling Period	50ms (20Hz sampling frequency)
Response Time	≤500ms
Frequency Response	20Hz ~ 1kHz
Linearity	≤±0.5% FS
Hysteresis	≤±0.2% FS
Long-term Stability	≤±0.5% FS/year
Temperature Drift	≤±0.05% FS/°C (within operating range)

3.4 Power Supply

Parameter	Specification
Supply Voltage	DC 24V (20V ~ 28V)
Max Ripple Voltage	5%
Max Power Consumption	100mA (≤2.4W)
Power Reverse Protection	Built-in reverse polarity protection
Power Terminals	Terminal 1: +24V, Terminal 2: 0V/GND

3.5 Isolation

Parameter	Specification
Isolation Method	Triple isolation (Power / Input / Output)
Isolation Voltage	1.5kV AC (1 min, 50Hz)

Parameter	Specification
Isolation Between Channels	Independent isolation per channel
Surge Protection	Built-in ESD and surge protection

3.6 Environmental Conditions

Parameter	Specification
Operating Temperature	-10°C ~ +50°C
Storage Temperature	-20°C ~ +70°C
Operating Humidity	35% ~ 85% RH, non-condensing
Altitude	≤2000m (standard); ≤5000m with derating
Vibration	IEC 60068-2-6 compliant
Shock	IEC 60068-2-27 compliant
EMC Compliance	EN 61326-1 (Industrial environment)

3.7 Mechanical Specifications

Parameter	Specification
Mounting Method	Standard 35mm DIN rail (EN 60715)
QD-CT-4 Dimensions (L×W×H)	98 × 92 × 42 mm
QD-CT-8 Dimensions (L×W×H)	148 × 92 × 42 mm
QD-CT-12 Dimensions (L×W×H)	168 × 92 × 42 mm
QD-CT-16 Dimensions (L×W×H)	198 × 92 × 42 mm
Housing Material	Flame-retardant ABS plastic (UL94-V0)
Weight (approx.)	120g ~ 280g (depending on model)
Terminal Type	Removable screw terminals

3.8 Protection & Certifications

Item	Status
IP Rating	IP20 (internal use)
CE Marking	Under evaluation
RoHS Compliance	Compliant (Directive 2011/65/EU)
EMC Directive	EN 61326-1 (Industrial)
LVD Directive	EN 61010-1 (Under evaluation)
ATEX/IECEx	Not certified (standard version); explosion-proof version available upon request
SIL Rating	Not rated
Warranty	12 months from date of shipment

Note: Certifications listed are based on standard product configurations. For specific certification requirements, please contact our sales team. Custom certification versions (CE, UL, ATEX, etc.) are available upon request.

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4. Ordering Information

4.1 Model Coding System

Segment	Code	Description
Series	QD-CT	Multi-channel AC Current Acquisition Module
Channels	4 / 8 / 12 / 16	Number of measurement channels
Standard	STD	Standard version (DC 24V, AC 0-50A)
Communication	R	RS-485 Modbus-RTU
Installation	D	DIN rail mount

Example Ordering Code: QD-CT-8-STD-R-D

4.2 Model Selection Guide

Model	Channels	Terminals	Best For
QD-CT-4	4	C1~C4	Small panels, few circuits
QD-CT-8	8	C1~C8	Medium panels, general purpose
QD-CT-12	12	C1~C12	Large panels, building energy
QD-CT-16	16	C1~C16	Data centers, high density

4.3 Configuration Notes

- All models share the same communication protocol and configuration method
- Standard transformer ratio: 1000/1 (other ratios available upon request)
- Standard range: AC 0~50A (other ranges available upon request)
- Custom transformer apertures (6.5mm, 16mm, 24mm, 36mm) available upon request
- Wide temperature version (-40°C~+85°C) available upon request

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5. Dimensions & Outline

5.1 Dimensional Summary

Model	Length (mm)	Width (mm)	Height (mm)	Mounting
QD-CT-4	98	92	42	DIN 35mm rail
QD-CT-8	148	92	42	DIN 35mm rail
QD-CT-12	168	92	42	DIN 35mm rail
QD-CT-16	198	92	42	DIN 35mm rail

5.2 Installation Clearance

- **Horizontal clearance between modules**: Minimum 5mm recommended for heat dissipation
- **Vertical clearance**: Minimum 20mm above for wiring access
- **DIN rail requirement**: Standard EN 60715 35mm top-hat rail
- **Mounting orientation**: Vertical (terminal side down) recommended

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6. Wiring Diagram

6.1 Terminal Definition

Terminal No.	Label	Function	Connection
1	24V	Power supply +	Connect to DC +24V
2	0V	Power supply -	Connect to DC 0V/GND
3	A	RS-485 +	Connect to 485+ bus line
4	B	RS-485 -	Connect to 485- bus line
5	C1	Channel 1 CT input	Transformer C1 output
6	C2	Channel 2 CT input	Transformer C2 output
…	…	…	…
5+N	Cn	Channel n CT input	Transformer Cn output (N=4/8/12/16)

6.2 LED Indicators

LED	Status	Meaning
POW	Constant ON	Power supply normal
POW	OFF	No power / Power fault
RUN	Flashing	Module running normally
RUN	OFF	Module fault / not started
RX	Flashing	Receiving data
TX	Flashing	Transmitting data

6.3 Wiring Notes

1. **Power wiring**: Terminal 1 (+24V) and Terminal 2 (0V) — use twisted pair cable, keep away from signal lines
2. **Communication wiring**: Terminal 3 (A) and Terminal 4 (B) — use shielded twisted pair, daisy-chain topology
3. **CT wiring**: Transformer secondary wires (S1/S2) connect to corresponding channel terminals — polarity does not matter
4. **Wire insertion**: Pass the conductor through the transformer aperture — no direction requirement, single pass
5. **Network termination**: When multiple modules are networked, install 120Ω termination resistors at both ends of the RS-485 bus

6. **Warning**: Always power off before making wiring connections. Do not connect/disconnect CT wires under load.

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7. Installation Guide

7.1 DIN Rail Installation Steps

1. **Prepare the DIN rail**: Ensure the 35mm standard DIN rail is securely mounted in the control cabinet
2. **Hook the module**: Align the module's top clip with the top of the DIN rail, then push down until it clicks into place
3. **Verify mounting**: Gently pull the module to confirm it is securely locked on the rail
4. **Make connections**: Connect power, communication, and CT wires according to the terminal diagram
5. **Power on**: Apply DC 24V power and verify LED indicators

7.2 Installation Recommendations

- **Orientation**: Install vertically with terminal side facing down for optimal heat dissipation
- **Heat dissipation**: Maintain minimum 5mm horizontal clearance between modules; avoid enclosing in sealed boxes without ventilation
- **EMC best practices**:
  - Separate power cables and signal cables by at least 10cm
  - Use shielded twisted pair for RS-485 communication
  - Ground the shield at one end only (master end)
  - Avoid running signal cables parallel to high-current conductors
- **Environmental**: Avoid installation near strong electromagnetic sources, high-temperature equipment, or areas with condensation risk

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8. Operation & Configuration

8.1 Parameter Configuration Methods

Method	Description	Tools Required
Modbus Register	Configure via Modbus-RTU write commands	PLC / SCADA / PC with RS-485 adapter
Upper Computer Software	GUI-based configuration tool	PC with USB-RS485 cable
Dip Switch	Not applicable (all config via software)	—

8.2 Configuration Registers

Modbus Register (Hex)	Address (Dec)	Name	Range (Default)	Description

Modbus Register (Hex)	Address (Dec)	Name	Range (Default)	Description
0x0200 (R/W)	512	Communication Address	1~255 (1)	Station address configuration
0x0201 (R/W)	513	Baud Rate	0~8 (3)	Baud rate selection (see table below)
0x0202 (R/W)	514	Parity	0~2 (0)	0=None, 1=Odd, 2=Even

8.3 Baud Rate Configuration

Register Value	Baud Rate	Note
0	1200 bps	—
1	2400 bps	—
2	4800 bps	—
3	9600 bps	Default
4	19200 bps	—
5	38400 bps	—
6	57600 bps	—
7	115200 bps	—
8	Auto-detect	Auto-baud recognition

8.4 Default Communication Settings

Parameter	Default Value
Station Address	1
Baud Rate	9600 bps
Parity	None
Data Bits	8
Stop Bits	1

8.5 Important Notes

- **Parameter changes require power cycle**: After modifying communication parameters, the device must be power-cycled (disconnect and reconnect power) or restarted via upper computer software for new settings to take effect
- **Address uniqueness**: Each device on the RS-485 bus must have a unique address (1~255)
- **Max devices per bus**: Recommended maximum 32 devices for reliable communication; theoretical max 255

9. Typical Application Circuits

9.1 Multi-Circuit Panel Energy Monitoring

A single QD-CT module monitors 4~16 branch circuits in a distribution panel. Current transformers are clamped onto each conductor, and the module aggregates all readings via RS-485 to an energy management platform for real-time monitoring and billing.

9.2 PLC Analog Input Isolation

The QD-CT module interfaces between high-current power circuits and PLC analog input cards. The triple isolation (1.5kV) protects the PLC from high-voltage transients while providing accurate current feedback for process control.

9.3 Multi-Module RS-485 Bus Networking

Multiple QD-CT modules are daisy-chained on a single RS-485 bus, each with a unique Modbus address. A master PLC or gateway reads all channel data sequentially, enabling scalable monitoring of dozens of circuits with minimal cabling.

9.4 Three-Phase Balance Monitoring

Three channels of the QD-CT module are connected to phases A, B, and C respectively. The monitoring system calculates the three-phase unbalance degree in real-time and triggers alarms when thresholds are exceeded, ensuring power quality.

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10. Troubleshooting

Symptom	Possible Cause	Solution
No power (POW LED off)	Power supply not connected or faulty	Check DC 24V supply voltage at terminals 1&2; verify polarity
RUN LED not flashing	Module fault or startup failure	Power cycle the device; if persists, contact technical support
No output signal	CT not connected or conductor not passed through	Verify CT wires are connected to correct terminals; ensure conductor passes through transformer aperture
Signal fluctuation / instability	Poor connection or electromagnetic interference	Check all terminal connections; use shielded cable; verify termination resistors
Communication failure	Wrong address/baud or bus wiring issue	Verify Modbus address

Symptom	Possible Cause	Solution
		matches master configuration; check A/B wiring; verify 120Ω termination resistors
Communication intermittent	Bus overloaded or cable too long	Reduce number of devices on bus; check cable length (≤1200m); add RS-485 repeater if needed
Overload alarm	Current exceeds measurement range	Verify CT ratio matches actual current; consider higher range CT if needed
Wrong readings	CT mismatch or calibration drift	Use only manufacturer-supplied CTs; schedule periodic calibration (recommended annually)

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11. Maintenance & Safety Notes

11.1 Safety Warnings

- **High Voltage Hazard**: Always disconnect power before installing, wiring, or servicing the module
- **Do Not Open**: There are no user-serviceable parts inside. Opening the housing will void the warranty and may expose users to dangerous voltages
- **Explosive Environment**: This product is not explosion-proof. Do not install in hazardous (classified) locations unless a certified explosion-proof version is specified
- **ESD Protection**: Handle the module with proper ESD precautions during installation

11.2 Maintenance Guidelines

- **Regular Inspection**: Visually inspect connections and indicators quarterly
- **Calibration**: Recommended calibration interval is 12 months for critical applications
- **Cleaning**: Use a dry cloth to clean the housing; do not use solvents or abrasive cleaners
- **Storage**: Store in a dry, temperature-controlled environment (-20°C~+70°C)

11.3 Disposal

- This product complies with WEEE Directive 2012/19/EU
- Do not dispose of in regular household waste
- Return to manufacturer or authorized recycling center for proper disposal

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12. Accessories & Package Contents

12.1 Standard Package Contents

Item	Quantity	Description
QD-CT Module	1 pc	Main acquisition module (model as ordered)
Current Transformers	N pcs	Open-type CTs matching channel count (ratio 1000/1)
User Manual	1 copy	Product documentation
Certificate of Conformity	1 copy	Quality assurance document

12.2 Optional Accessories

Item	Description
USB-RS485 Config Cable	For upper computer software configuration
RS-485 Repeater	For extended bus distance (>1200m)
Additional CTs	Extra transformers (various ratios/apertures available)
DIN Rail Mounting Kit	Extra mounting clips and accessories

12.3 Packaging Specifications

Parameter	Value
Packaging Type	Anti-static bag + foam-lined cardboard box
Package Dimensions	Varies by model (approx. 250×150×80mm)
Gross Weight	0.5kg ~ 1.5kg (depending on model)
Shelf Life	5 years (unopened, proper storage conditions)

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13. Contact & Company Information

Manufacturer Information

Item	Details
Company Name	[Company Name — To Be Confirmed]
Address	[Address — To Be Confirmed]
Website	[Website — To Be Confirmed]
Email	[Email — To Be Confirmed]
Sales Hotline	[Phone — To Be Confirmed]
Technical Support	[Support Email/Phone — To Be Confirmed]
After-Sales Service	[Service Details — To Be Confirmed]

Disclaimer

The specifications and information contained in this datasheet are based on the latest product information available at the time of publication. [Company Name] reserves the right to modify product designs, specifications, or materials without prior notice. For the most current version of this datasheet, please visit our official website or contact our sales department. Actual product performance may vary depending on installation conditions and operating environment.

Revision History

Version	Date	Description	Author
V1.0	2026-10-30	Initial release based on QD-CT-4/8/12/16 product manuals	—

Modbus Register Map Summary

Current Data Registers (Read-Only)

Register (Hex)	Address	Name	Data Format	Scale
0x0000	0	Channel 1 Current	Unsigned Integer	×0.1A
0x0001	1	Channel 2 Current	Unsigned Integer	×0.1A
…	…	…	…	…
0x000F	15	Channel 16 Current	Unsigned Integer	×0.1A

Configuration Registers (Read/Write)

Register (Hex)	Address	Name	Range	Default
0x0200	512	Station Address	1~255	1
0x0201	513	Baud Rate	0~8	3 (9600bps)
0x0202	514	Parity	0~2	0 (None)

Version Registers (Read-Only)

Register (Hex)	Address	Name	Description
0xF600	62976	Software Version (Low)	Lower 16 bits of version number
0xF601	62977	Software Version (High)	Upper 16 bits of version number

Modbus Function Codes

Function Code	Description	Example

Function Code	Description	Example
0x03 (Read Holding Registers)	Read current data from channels	Read 4 registers from address 0
0x06 (Write Single Register)	Write configuration parameters	Write new address/baud/parity

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End of Datasheet