

DESCRIPTIVE BULLETIN

RGM7000

Data logging power and energy meter



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Introduction

Revenue metering

- Certified ANSI C12.20 0.2 accuracy class and IEC 62053-22 0.2s energy measurement accuracy
- High precision frequency measurements — 0.007 Hz
- Transformer line loss and CT/PT compensation
- Data logging, including three historical logs with 64+ parameters each
- Designed for high reliability and ease of use

Power quality metering

- Programmable alarm limits
- THD monitoring and harmonics recording
- Waveform recording of up to 512 samples/cycle, 170 events

Communication and I/O

- Two optional, separately addressable Ethernet ports with email on alarm, data push, web servers, IP whitelisting
- Standard IrDA and RS485 ports
- Modbus ASCII/RTU/TCP, DNP3 and IEC 61850 protocols

Applications

- Utility metering
- Commercial metering
- Substation metering
- Industrial metering
- Power generation
- Campus metering
- Submetering*
- Analog meter replacement
- Power quality studies
- Disturbance recording
- Load studies
- Voltage recording

* New York State approved for residential submetering.



Primary revenue metering

Certified 0.2% energy accuracy

The RGM7000 meter is certified to ANSI c12.20 0.2 accuracy class and IEC 62053-22 0.2s measurement accuracy. It provides highly stable, precise and reliable measurements that maintain accuracy over time. The meter has a standard energy test pulse for accuracy verification.

Table 1: Accuracy chart

Measured parameters	Accuracy %	Display range
Voltage L-N	0.1%	0–9999 V or kV
Voltage L-L	0.2%	0–9999 V or kV scalable
Current	0.2%	0–9999 A or kA
± Watts	0.2%	0–9999 W, kW, MW
± Wh	0.2%	5–8 digits programmable
± VARs	0.2%	0–9999 VARs, kVARs, MVARs
± VARh	0.2%	5–8 digits programmable
VA	0.2%	0–9999 VA, kVA, MVA
VAh	0.2%	5–8 digits programmable
PF	0.2%	± 0.5–1.0
Frequency	± 0.007 Hz	45–65 Hz
THD	± 2.0%	1–99.99%
% Load bar	± 1 segment	0.005–6 A

Note: Applies to 3-element WYE and 2-element Delta connections.

CT/PT compensation

To meet stringent accuracy requirements, users need to compensate for inaccuracies of instrument transformers in their system. The RGM7000 meter has built-in features that provide CT/PT compensation through amplitude and phase angle adjustment.

Transformer/line loss compensation

The RGM7000 meter's transformer and line loss compensation (TLC) supports correct energy measurements when the meter is placed on the secondary side of the transformer. Compensate energy readings for TLC to perform accurate customer usage billing.

Extensive data logging capability

The RGM7000 meter has up to 4 MB of data logging memory, used for historical trends, limit alarms, I/O changes and sequence of events. The unit's real-time clock timestamps all data in the instrument when log events are created.

01 Historical trending

Historical logs

- Three assignable historical logs
- 64+ parameters per log
- Independently programmed trending profiles



01

I/O change log

- Provides a timestamped log of any relay output
- Provides a timestamped log of input status changes
- 2048 events available

System events log

To protect critical billing information, the meter records and logs the following actions with a timestamp:

- Demand resets
- Password requests
- System startup
- Energy resets
- Log resets
- Log reads
- Programmable settings changes
- Critical data repairs

Limit/alarm log

- Provides magnitude and duration of an event
- Includes timestamp and alarm value
- 2048 events available
- Email on alarm capability with INP100S Ethernet card

Alarm limits and control capability

- Up to eight limits
- Set limits on any measured parameter
- Voltage unbalance
- Current unbalance
- Based on % of full-scale settings
- Trigger relay outputs or emails for control

High performance power quality analysis

02 Waveform scope

03 Advanced harmonic analysis

Simultaneous voltage and current waveform recorder

The meter records up to 512 samples per cycle for a voltage sag or swell or a current fault event. It provides the pre- and post-event recording capability shown in the table below. Waveform records are programmable to the desired sampling rate.

The meter's advanced DSP design allows power quality triggers to be based on a one-cycle updated RMS. Up to 170 events can be stored until the memory is full. The meter stores waveform data in a first-in/first-out circular buffer to ensure data is always recording.

Table 2: Event recording capability

	Samples per cycle	Pre-event cycles	Post-event cycles	Max. waveforms per event	Number of stored events
V5	32	16	48	128	85
	64	8	24	64	85
	128	4	12	32	170
	256	2	6	16	170
V6	512	1	3	8	170

Note: Sampling rate based on 60 Hz systems.
For 50 Hz systems, multiply by 1.2.

Waveform scope

The unit uniquely offers a waveform scope that lets you view the real-time waveform for voltage and current. The waveform scope lets you use the meter as a basic oscilloscope throughout a power system.



02

Independent CBEMA or SEMI F47 log plotting

The meter stores an independent CBEMA or SEMI F47 log for magnitude and duration of voltage events. This lets you quickly view total surges, total sags and duration without retrieving waveform data. Timestamps are stored with millisecond accuracy.

Harmonic recording to the 40th order

The RGM7000 meter provides advanced harmonic analysis to the 40th order for each voltage and current channel in real time. Using the stored waveforms, harmonic analysis is available to the 255th order.



03



Standard communication capability

The RGM7000 meter provides two independent communication ports with advanced features.

Rear-mounted serial port with KYZ pulse

- RS485 — This port allows RS485 communication using Modbus or DNP3 protocols. Baud rates are from 1200 to 57600.
- KYZ pulse — In addition to the RS485 port, the meter also includes pulse outputs mapped to absolute energy.

Front-mounted IrDA communication

The RGM7000 meter has an optical IrDA port, allowing you to program it with an IrDA-enabled laptop computer.

Field communication capability

The RGM7000 meter's flexible communication architecture integrates directly into most existing software systems. In addition to its standard communication, the meter offers extensive communication and I/O expandability through its two universal option card slots. The meter accepts and auto-detects new I/O cards even after installation. Up to two cards of any type can be used per meter.



INP100S: 100BaseT Ethernet capability

- NTP time server for high accuracy network time synchronization
- Simultaneous DNP3 over Ethernet and Modbus TCP/IP communication



20mAOS: Four-channel 4–20 mA outputs

- Assignable to any parameter
- 0.1% of full scale
- 850 Ω at 24 V DC
- Loop powered using up to 24 V DC



INP300S: IEC 61850 protocol Ethernet card

- Multiple logical nodes
- Configurable .CID file



PO1S: Four pulse outputs/four status inputs

- Programmable to any energy parameter and pulse value
- Form A: Normally open contacts
- Also used for end of interval pulse



1mAOS: Four-channel bi-directional 0–1 mA outputs

- Assignable to any parameter
- 0.1% of full scale
- Max. load impedance 10 k Ω



RO1S: Two relay outputs/two status inputs

- 250 V AC/30 V DC — 0.25 A relays, Form C
- Trigger on user-set alarms
- Set delays and reset delays

—
04 Field-expandable
I/O slots



FOVPS or FOSTS: Fiber optic card

- ABB's exclusive fiber optic daisy chain switchable built-in logic mimics an RS485 half-duplex bus. This lets you daisy chain meters for lower installation costs; full duplex is also assignable. This feature requires the software to ignore echoes.
- ST-terminated option (-FOSTS)
- Versatile link-terminated option (-FOVPS)
- Modbus and DNP3 protocols available



Meter auto-
detects I/O
card type

Simple field
upgrade

—
04

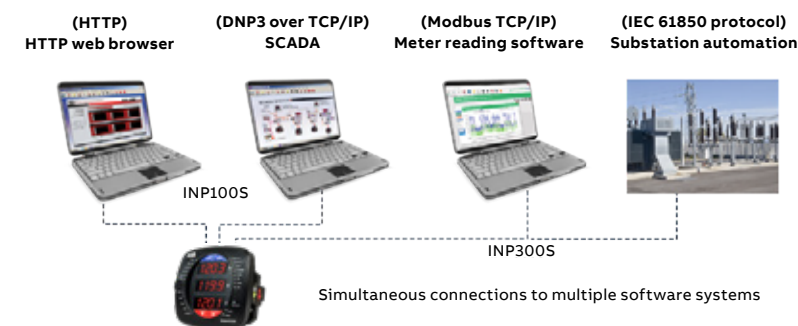
Field-expandable I/O slots

100BaseT Ethernet (INP100S or INP300S)

—
05 Simultaneous
data connections

—
06 Embedded web server
with smartphone support

Simultaneous data connections



—
05

INP100S — Web server, Modbus, DNP3 and email

- Web server with configurable HMI
- Smartphone compatible
- 12 Modbus TCP/IP connections
- 5 DNP3 over TCP/IP connections
- Data push of meter readings to cloud servers
- Send email on alarm or periodic email notification of meter status and readings

INP300S — Web server, Modbus, DNP3 and IEC 61850

- IEC 61850 protocol
- 5 Modbus connections
- 5 MMS clients
- Web server for status and configuration
- Dual Ethernet port capable
- Simultaneous Modbus, DNP3 over Ethernet and IEC 61850

Both INP100S and INP300S offer enhanced security through the exclusive client feature, which provides secure communication for a whitelisted IP/MAC address, to protect from unauthorized programming.

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06

Designed for high reliability and ease of use

- Ruggedly designed to withstand harsh electrical environments
- Industrial-grade components
- Designed to the highest surge withstand and transient standards
- Detailed circuit board testing and automation to ensure 100% reliability
- Bright-red, three 0.56" line LED display for easy meter reading in any environment
- Short-circuit safe current inputs with dual input methods ensure that CT connections will not open in a fault condition



Typical substation solutions

—
07 Substation voltage
and frequency recording

—
08 Interval load profiling

—
09 Low cost
substation telemetry

Substation voltage and frequency recording

Traditionally, voltage recording meters were relegated to high cost metering or monitoring solutions. The RGM700 meter can be placed throughout an electrical distribution network. The meter provides one of the industry's lowest cost methods of collecting voltage information within a utility power distribution grid.

- Perform voltage reliability analysis to ensure proper voltage to customers
- Compare voltage reliability throughout transmission or distribution networks
- Monitor the output of substation transformers or line regulators
- Initiate conservation voltage reduction, reducing system demand
- Monitor highly accurate frequency to regulate frequency stability
- Replace costly frequency transducers

Interval load profiling

The RGM7000 meter allows you to log substation data over time for electrical usage, demand, voltage, current, power factor (PF) and many other parameters. This enables a complete analysis of the power system over time.

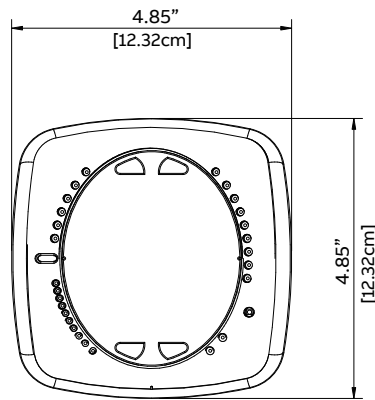
- Provide revenue-accurate load profiling
- Determine substation usage
- Analyze feeder capacity and utilization
- Provide time-based load profile for planning and estimation
- Data trend PF distribution and imbalances for system efficiency analysis

Low cost substation telemetry

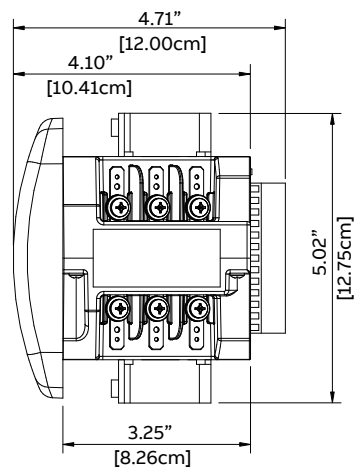
The RGM7000 meter's advanced output capability brings back data using many different communication media, such as RS485, Ethernet and analog outputs. This ensures that one meter can be used for almost every substation application, no matter what communication infrastructure is needed.

- Perfect for new or retrofit applications
- Multiple communication paths
- One meter provides outputs for every application
- Multiple systems and/or users can access data simultaneously

Dimensional drawings

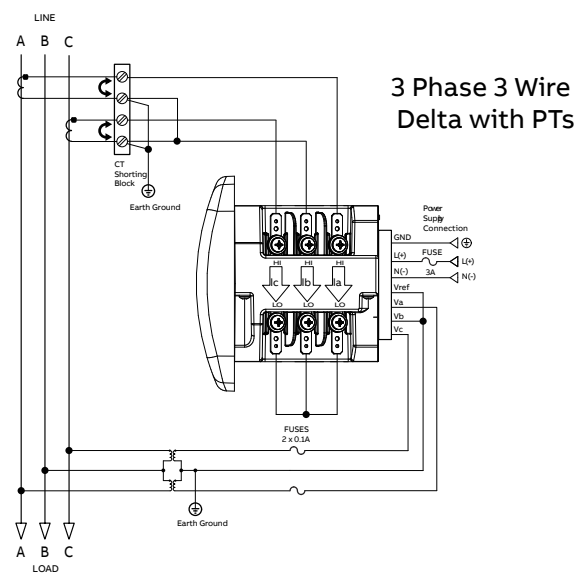
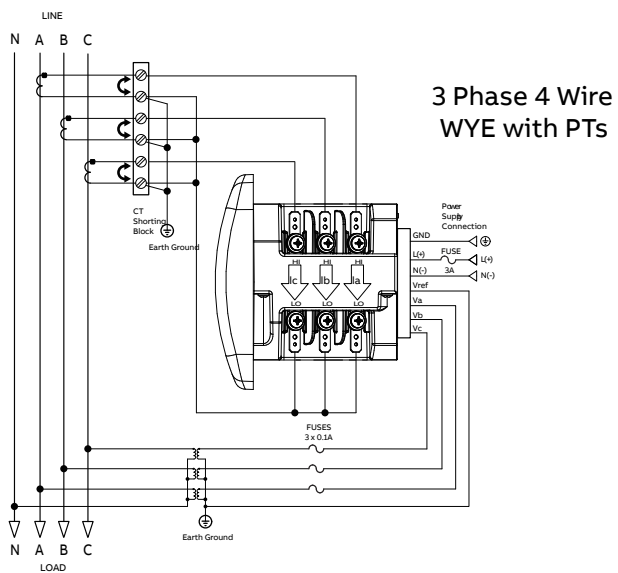
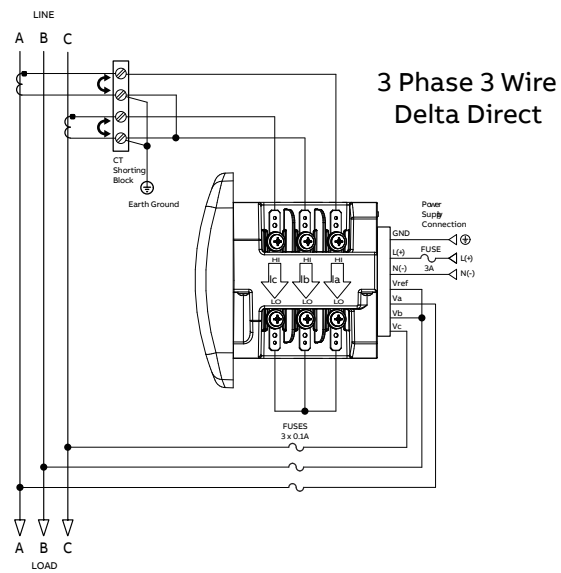
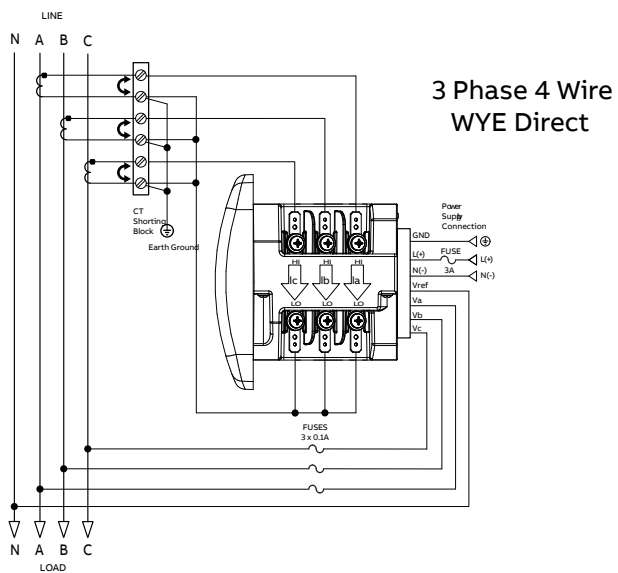


**RGM7000 meter
front dimensions**



**RGM7000 meter
side dimensions**

Wiring diagrams



Specifications

Voltage inputs:

- Absolute range: (20–576) volts line to neutral, (0–721) volts line to line
- Universal voltage input
- Input withstand capability — meets IEEE C37.90.1 (surge withstand capability)
- Programmable voltage range to any PT ratio
- Supports: 3-element wye, 2.5-element WYE, 2-element delta, 4-wire delta systems
- Input impedance: 1 M Ω /phase
- Burden: 0.36 VA/phase at 600 V; 0.014 VA at 120 volts
- Input wire gauge: #12–26 AWG/(0.129–3.31) mm²

Current inputs:

- Class 10: (0.005 to 10) A, 5 A nominal CT secondary
- Class 2: (0.001 to 2) A, 1 A nominal CT secondary
- Fault current withstand (at 23 °C): 100 A for 10 seconds, 300 A for 3 seconds, 500 A for 1 second
- Continuous current withstand: 20 A for screw-terminated or pass-through connections
- Programmable current to any CT ration
- Burden 0.005 VA per phase max. at 11 A
- Pickup current: 0.1% of nominal (Class 10: 5 mA; Class 2: 1 mA)
- Pass-through wire diameter: 0.177"/4.5 mm

Isolation:

- All inputs and outputs are galvanically isolated to 2500 volts

Environmental rating:

- Storage: (-20 to +70) °C
- Operating: (-20 to +70) °C
- Humidity: to 95% RH non-condensing
- Faceplate rating: NEMA 12
- Protection: IP30 — meter front/back, optional DIN rail mounting, optional plug-in I/O modules

Sensing method:

- True RMS
- Sampling at over 400 samples/cycle on all channels of measured readings simultaneously
- Harmonics resolution to 40th order
- Waveform up to 510 samples/cycle

Update rate:

- Watts, VARs and VA — every 6 cycles
- All other parameters — every 60 cycles

Power supply:

- Option D2: (90–265) V AC @ 50/60 Hz or (100–370) V DC/10 VA max.
- Option D: (18–60) V DC (24 to 48 V DC systems)/7 W max.

Standard communication format:

- 2 Com ports (back and faceplate)
 - RS485 port through backplate
 - IrDA through faceplate
- Com port baud rate: (1200–57600)
- Com port address: 1–247
- 8-bit, parity setting: odd, even, none
- Modbus RTU, ASCII or DNP3 protocols

KYZ pulse:

- Type form C
- On resistance: 35 ohms max
- Peak voltage: 350 V DC
- Continuous load current: 120 mA
- Peak load current: 350 mA (10 ms)
- Off-state leakage current @ 350 V DC: 1 μ A

Dimensions and shipping:

- Weight: 2 lbs
- Basic unit: (H4.85 x W4.85 x L4.25) in.
- Mounts in either 96 mm square DIN or ANSI C39.1 4" round cutouts
- Shipping container dimensions: 6" cube

Meter accuracy:

- See page 5
- **Note:** For 2.5-element programmed units, degrade accuracy by an additional 0.5% of reading
- **Note:** For 1A (Class 2) nominal, degrade accuracy to 0.5% of reading for watts and energy; all other values 2 times rated accuracy

Compliance:

- ANSI C12.20-2015, 0.2 Accuracy Class and C12.1 (MET Labs Certified)*
- ANSI C62.41 (Burst)*
- FCC, Part 15, Subpart B, Class A (Radiated and Conducted Emissions)*
- IEC 62053-22 Accuracy, 0.2S (KEMA Laboratories Certified) *
- IEC 62053-23 Edition 1, Class 2
- EN 61000-6-2 – Immunity for Industrial Environments: 2005
- EN 61000-6-4 – Emission Standards for Industrial Environments: 2007
- CE (EN 61326-1*, EN 61000-6-2, EN 61000-6-4)
 - EN 61000-3-2, Class A (Harmonic Current)*
 - EN 61000-3-3 (Voltage Fluctuation and Flicker)*
 - IEC 61000-4-2, Ed.1.2, Class A (Electrostatic Discharge)*

- IEC 61000-4-3, Class A (Radiated EM Immunity)*
- IEC 61000-4-4, Second Ed., Class A (EFT)*
- IEC 61000-4-5, Ed. 1.1, Class A (Surge Immunity)*
- IEC 61000-4-6 (Conducted Immunity)*
- IEC 61000-4-8, Class A (Magnetic Immunity)*
- IEC 61000-4-11, Class A (Voltage Variations Immunity)*
- IEC/CISPR11, Ed.4.1 (Radiated Emissions)*
- CISPR22, Class A, Fifth Ed.*
- IEC 61850 (KEMA Laboratories Certified)*
- IEEE C37.90.1 (Surge Withstand Capability)
- Certified to UL/IEC 61010-1 and CSA C22.2 No. 61010-1, UL File: E250818*
- REACH/RoHS 3 Directive 2011/65/EU
- New York State approved for residential metering

*Third-party lab certified

Table 3: Ordering Information (all fields must be filled in to create a valid part number)

RGM7000		*	*	*	*	*	*	Description
Base unit	RGM7000							Standard unit with display, all current/voltage/power/frequency/energy counters measurement, % load bar, RS485 and IrDA communication ports and one front test pulse output
Frequency		5						50 Hz AC frequency system
		6						60 Hz AC frequency system
Current inputs			5A					5 Amps
			1A					1 Amp
Software				A				Multimeter function only
				B				Data logging memory, 2 MB of memory
				C				Power quality harmonics, 2 MB of memory
				D				Limits and control, 2 MB of memory
				E				64 Samples/cycle waveform recording, 3 MB of memory
				F				512 Samples/cycle waveform recording, 4 MB of memory
Power supply					HI			90–265 V AC/100–370 V DC
					LDC			18–60 V DC
I/O modules*					X	X		None
					E1	E1		I00BaseT Ethernet
					E2	E2		I00BaseT Ethernet with IEC 61850 protocol
					C1	C1		Four channel bi-directional 0–1 mA outputs
					C20	C20		Four channel 4–20 mA outputs
					RS1	RS1		Two relay status outputs/two status inputs
					PS1	PS1		Four pulse outputs/four status inputs
					F1	F1		Fiber optic interface with ST terminations
					F2	F2		Fiber optic interface with versatile terminations



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