



Precise control and monitoring
of system power quality

Power factor controllers RVC and RVT

Enhancing power quality

In utility, industrial and infrastructure applications

Hitachi Energy is a global technology leader that is advancing a sustainable energy future for all. We serve customers in the utility, industry and infrastructure sectors with innovative solutions and services across the value chain. Together with customers and partners, we pioneer technologies and enable the digital transformation required to accelerate the energy transition towards a carbon-neutral future. We are advancing the world's energy system to become more sustainable, flexible and secure whilst balancing social, environmental and economic value. Hitachi Energy has a proven track record and unparalleled installed base in more than 140 countries. Headquartered in Switzerland, we employ around 38,000 people in 90 countries and generate business volumes of approximately \$10 billion USD.

Hitachi Energy is a leader in high-voltage technology, offering a wide range of high-voltage products up to 1,200-kilovolt (kV) helping enhance the safety, reliability and efficiency of power networks while minimizing environmental impact. Our technology leadership continues to facilitate innovations in areas such as ultra-high-voltage power transmission, enabling smart grids and enhancing eco-efficiency.

Power quality is a major concern for transmission and distribution utilities, industries, transport and infrastructure sectors. Poor power quality affects grid reliability, productivity, leads to higher operating costs and penalties for non-compliance with grid codes. Hitachi Energy is a technology leader with a wide range of products, systems and services that improve power quality including capacitors and filters, power electronics-based compensators and software solutions, across the power value chain for low, medium and high-voltage applications, helping to shape a stronger, smarter and greener grid.

Power factor controllers (PFC) from Hitachi Energy can be integrated with any capacitor bank and can help control and monitor its operation.

Hitachi Energy's RVC controller became over the years the reference for our customers due to its simplicity, unique design, ease of use while commissioning. It offers to our customers' versatile functions, reliability and robustness.

Hitachi Energy's RVT controller offers extra added features to measure and visualize graphically power quality data, control and correct unbalanced network in any installation.

Their advance control system makes Hitachi Energy PFC the best in class controllers for both industrial and commercial applications such as buildings, mining, steel industry, chemical, pulp and paper, cement, plastics, printing or food and beverage industry and many others.

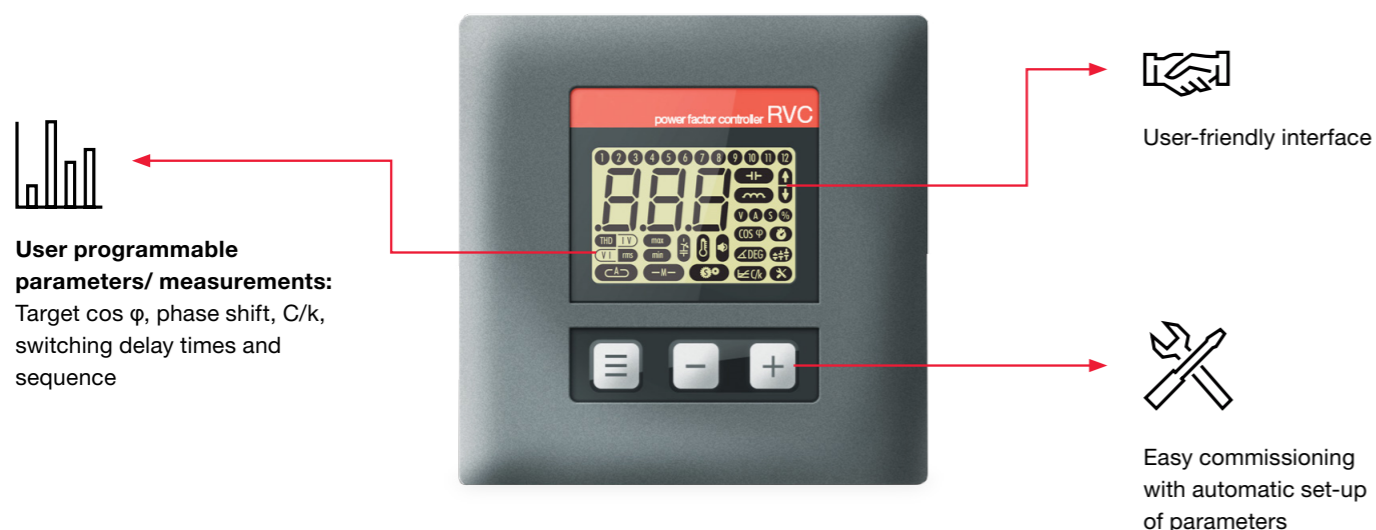
Hitachi Energy's power factor controllers are the best choice for panel builders interested in providing the optimal solution for their customers.



Power factor controllers

Features and benefits

RVC controller



RVT controller



	RVC	RVT
Main functions	Offers monitoring, measurement, control and display of key parameters such as voltage, current, power factor, THDV, steps switching, alarm settings.	Offers measurement, monitoring and display of key parameters such as voltage, current, power factor, THDV and THDI, harmonic spectrum, waveform, steps switching, alarm settings, complete three-phase measurements of power and energy.
Easy commissioning	<p>The "Auto-Set" feature eases the bank commissioning process. The set-up of parameters such as C/ k (sensitivity), active outputs, switching and phase shift is automatic.</p> <p>The text-free, intuitive interface allows for both an easy commissioning and for setting of programmable thresholds.</p>	<p>The "Auto-Set" feature eases the bank commissioning process. The set-up of parameters such as C/ k (sens-itivity), active outputs, switching and phase shift is automatic.</p> <p>The color touchscreen enables a quick display of customer waveform and harmonic spectrum.</p>
User-friendly interface	Fully graphical user interface with icons and 3 main buttons on the front of the controller.	The graphical user interface of the RVT is available with a color touchscreen (320 x 240 pixels). The screen menu is designed to be intuitive and flexible, providing better user experience and available in several languages including English, French, German, Spanish and simplified Chinese.
Communication	No communication available.	<p>RVT has versatile communication interfaces. By default a USB port is available and it can be used with an add-on RS485 adapter to communicate via Modbus RTU.</p> <p>RVT 12-3P provides an RJ45 Ethernet port with Modbus TCP/ IP communication protocol.</p> <p>The optional PQ-Link software enables a remote communication via computer to ease the commissioning.</p>
Availability for LV, MV and HV banks	Not available for MV/ HV capacitor banks.	By connecting a voltage measurement transformer (VT/ PT) to the RVT voltage measurements inputs, and setting the proper scaling factor, the RVT is able to control a MV or HV capacitor bank just like a LV capacitor bank. The maximum measurement voltage at the RVT voltage measurement terminals is 690 Vac.
Wide voltage supply range	Supply voltage from 100 V to 440 Vac	Supply voltage from 100 V to 460 Vac
Current transformers	Both 5A and 1A CT's may be connected to the RVC and RVT controllers	
Multiple digital inputs	Not available	Two digital inputs can be used: one to switch from a day to a night power factor setting and vice versa, and one that is an input for an external alarm signal.
Efficient switching strategy	<p>The switching strategy combines integral, direct, linear or circular switching to address various needs:</p> <ul style="list-style-type: none"> Control the $\cos \phi$ in presence of rapidly varying loads Reduce the number of switching Avoid unnecessary intermediary switching Increase the lifetime of the capacitors and contactors 	<p>The switching strategy combines integral or normal, direct or progressive, linear or circular switching to address various needs:</p> <ul style="list-style-type: none"> Control the $\cos \phi$ in presence of rapidly varying loads Reduce the number of switching Avoid unnecessary intermediary switching Increase the lifetime of the capacitors and contactors

RVT

Accessories

RS485 Modbus adapter

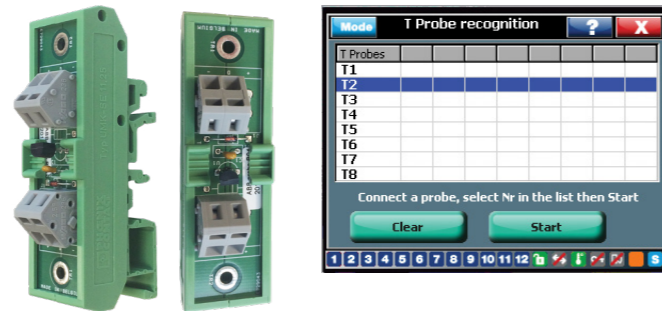
The Modbus adapter is an optional accessory which enables communication via Modbus RTU with a monitoring system. It enables to monitor and display all RVT parameters (including harmonic spectra and tables).



01 RS Modbus adapter

External probes for temperature measurement

Up to eight temperature probes may be connected to RVT through a daisy chain network (to know more on how to connect temperature probes, please refer to the Installation and Operating Instructions manual). In the event of exceeding the temperature threshold, RVT closes the fan relay. Information on the measured temperature can be recorded with the event logging function.



02 Temperature probe selection screen and external probes

IP54

RVT front plate offers an IP43 protection degree in its standard version. A gasket accessory enhances the standard RVT protection degree to IP54.



03 IP54 gasket accessory



RVC and RVT

Technical specifications

Parameters	RVC	RVT
Operating voltage	100 Vac to 440 Vac	From 100 up to 460 Vac/ Vdc
Voltage measurement	100 Vac to 440 Vac	Up to 690 Vac or higher with voltage transformer
Consumption	15 VA max	15 VA max
Voltage tolerance	±10% on indicated operating voltages	±10% on indicated operating voltages
Measurement category (according to IEC 61010-1)	CAT III	CAT III
Accuracy	1% full scale	1% full scale
Frequency range	50 or 60 Hz +/- 5% (automatic adjustment to network frequency)	From 45 to 65 Hz (automatic adjustments to network frequency)
Current input	5 A or 1 A (RMS) (class 1 C.T.)	5 A or 1 A (RMS) (class 1 C.T.)
Current input impedance	<0.1 Ohm	<0.1 Ohm
Number of outputs	RVC-3: 3 outputs RVC-6: 6 outputs RVC-8: 8 outputs RVC-10: 10 outputs RVC-12: 12 outputs	RVT6: 6 outputs RVT12: 12 outputs RVT12-3P: 12 outputs (three-phase measurement feature)
Output contact rating	Max. continuous current: 1.5 A Max. peak current: 5 A Max. voltage: 440 Vac	Max. continuous current: 1.5 A (ac) – 0.3 A (110 Vdc) Max. peak current: 5 A Max. voltage: 440 Vac
Alarm contact rating (voltage free contact)	NO contact Max. continuous current: 5 A Rated/ max. breaking voltage: 250 Vac/ 440 Vac	NO contact Max. continuous current: 5 A Rated/ max. breaking voltage: 250 Vac/ 440 Vac
Fan contact rating (voltage free contact)	-	NO contact Max. continuous current: 1.5 A (ac) Rated/ max. breaking voltage: 250 Vac/ 440 Vac
Digital inputs (isolated optocoupler)	-	Input 1 (rated 15-24 Vac/ Vdc): day/ night cos φ selection Input 2(rated 15-24 Vac/ Vdc): External input alarm/ protection/ disconnection
Power factor setting	From 0.7 inductive to 0.7 capacitive	From 0.7 inductive to 0.7 capacitive
Starting current setting (C/ k)	0.01 to 5 A	0.01 to 5 A
Switching time between steps	Programmable from 1 s to 999 s	Programmable from 1 s to 18 h
Switching sequences	1:1:1:1:1:.....:1 - 1:2:2:2:2:.....:2 1:2:4:4:4:.....:4 - 1:1:2:4:8:.....:8 1:2:3:3:3:.....:3 - 1:2:3:6:6:.....:6 and other customer programmable sequences	1:1:1:1:1:.....:1 - 1:2:2:2:2:.....:2 1:2:4:4:4:.....:4 - 1:1:2:4:8:.....:8 1:2:3:3:3:.....:3 - 1:2:3:6:6:.....:6 and other customer programmable sequences
Mode of switching	The modes of switching for all the programmable switching sequences are integral, direct, linear or circular	The modes of switching for all the programmable switching sequences are normal or integral, progressive or direct, linear or circular
Power outage release	Quick automatic disconnection in less than 20 ms (50 Hz) in case of power outage or voltage drop	Quick automatic disconnection in less than 20 ms (50 Hz) in case of power outage or voltage drop
Modbus baud rate	-	300 - 600 - 1200 - 2400 - 4800 - 9600 - 19200 - 38400 – 57600 bps
USB device connection	-	Available

Parameters	RVC	RVT
Temperature probe input connection	-	Only 2 contacts using 1-wire protocol No external power supply mode Connection to more nodes in a daisy chain network 8 temperature probes connection 8 meters maximum between RVT to temperature probe or between probes
Step configuration	Automatic, fixed, disabled	Automatic, fixed, disabled
Display	LCD display	QVGA 320 x 240 pixels color touchscreen
Adjustable display backlighting	-	Available
Operating temperature	-10°C to 70°C	-20° C to 70° C
Storage temperature	-30°C to 85°C	-30° C to 85° C
Mounting position	Vertical panel mounting	Vertical panel mounting
Dimensions	144 x 144 x 43 mm (h x w x d) Cut-out: 138 x 138 mm (h x w)	Front plate: 146 x 146 mm (h x w) Rear side: 205 x 135 mm Overall: 146 x 211 x 67 mm (h x w x d) Cut-out dimensions: 138 x 138 mm (h x w)
Weight	400 g (unpacked)	650 g (unpacked)
Connector	Spring cage clamp terminal block	Spring cage clamp terminal block
Front plate protection	IP43	IP43 (IP54 on request)
Relative humidity	Maximum 95%, non-condensing	Maximum 95 %, non-condensing
Standards	CE marked	CE and UL marked

NOTES: All parameters and modes are saved in a non-volatile memory. Power factor correction operation is insensitive to the presence of harmonics. Both controllers are working with passive and regenerative loads (four-quadrant operation).

Product line-up

Features	RVC	RVT6 / RVT12	RVT12 - 3P
Article numbers	RVC-3: 2GCA294983A0050 RVC-6: 2GCA294984A0050 RVC-8: 2GCA294985A0050 RVC-10: 2GCA294986A0050 RVC-12: 2GCA294987A0050	RVT6: 2GCA291720A0050 RVT12: 2GCA291721A0050	2GCA291722A0050
1/ 3-phase measurements	1 voltage measurement input 1 current measurement input	1 voltage measurement input 1 current measurement input	3 voltage measurement inputs 3 current measurement inputs
Real time clock	NO	NO	YES
Energy measurements	NO	NO	YES
Ethernet connection	NO	NO	YES
USB host connection	NO	NO	YES
USB device connection	NO	YES	YES
Digital inputs	NO	YES	YES
Alarm/ fan relays	Alarm relay	YES	YES
Output relays	3 – 6 – 8 – 10 – 12	6 or 12	12
Lock switch	NO	YES	YES
RS485 Modbus connection	NO	YES	YES
External temperature probes	NO	YES	YES

Hitachi Energy's commitment

Quality assurance

At Hitachi Energy, we are committed to providing the best products and services. Our products comply with or exceed the latest international standards. In addition to type tests in independent laboratories, our certified design and manufacturing processes guarantee the highest quality. We are certified according to the latest relevant ISO quality standards.

Sustainability

For Hitachi Energy, sustainability is about balancing economic success, environmental stewardship and social progress to benefit all our stakeholders. Sustainability considerations cover how we design and manufacture products, what we offer customers, how we engage suppliers, how we assess risks and opportunities, and how we behave in communities where we operate and towards one another, while striving to ensure the health, security and safety of our employees, contractors and others affected by our activities. We are certified according to the latest relevant ISO quality standards.



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RVC quick start



RVT quick start

