Product brochure

CQ900
Capacitor Controller

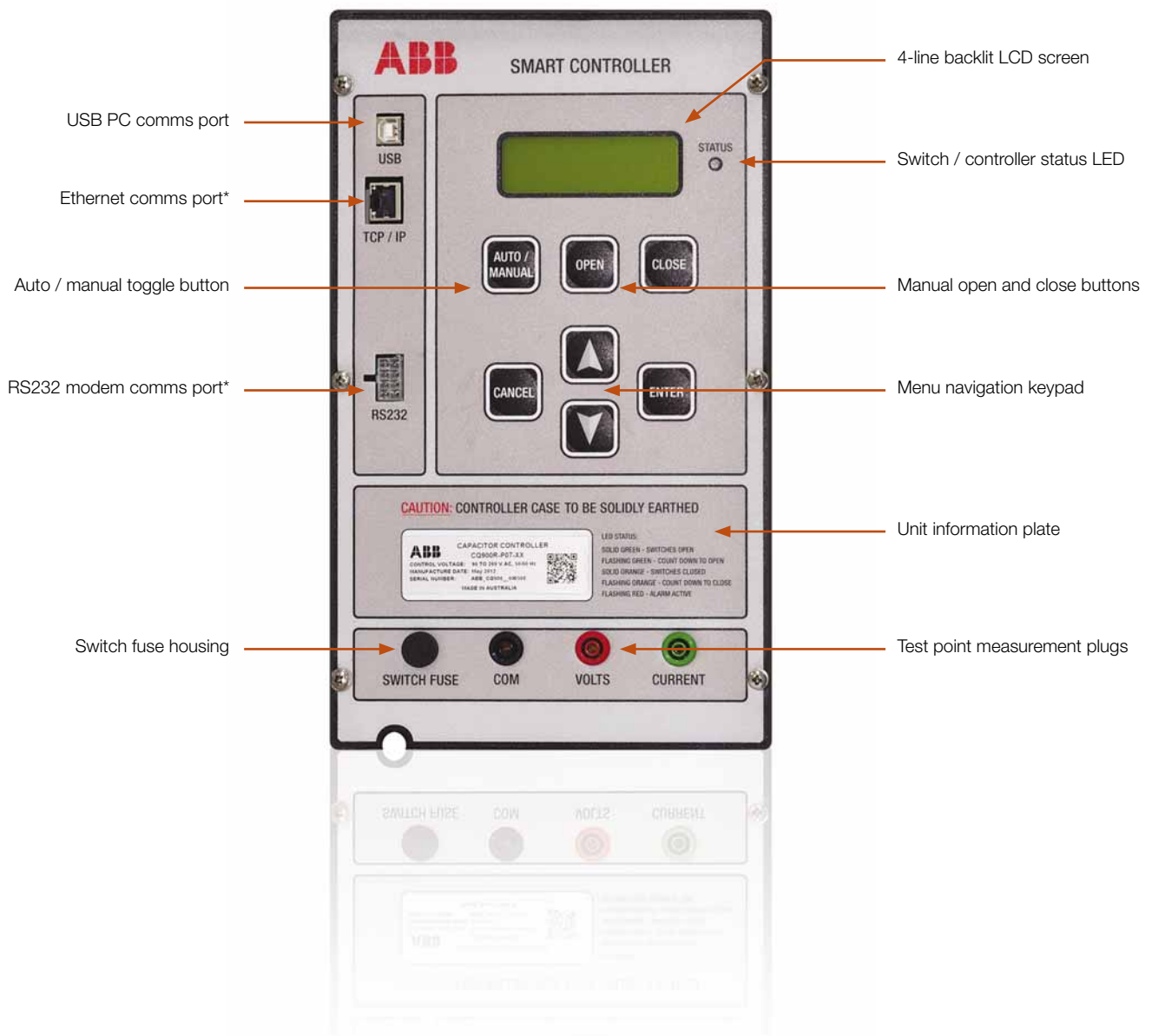Power and productivity
for a better world™

ABB

Introduction

The ABB CQ900 range of Capacitor Controllers are the next generation in smart controllers designed to provide a low cost, reliable method of switching pole-mounted capacitors. The CQ900 range comes in two basic configurations – the CQ900R and the CQ900L.

The CQ900L is a stand-alone controller which switches capacitor banks automatically based on network conditions. The CQ900R has the same standard features as the CQ900L but with the addition of communication modules for remote control.

It is designed for easy setup, configuration and monitoring through either the large front panel LCD screen and keypad, or by using the supplied PC software.

The CQ900 controllers include a range of control modes including remote, automatic and manual control, and are designed to offer customers true value through smarter management of their electrical systems and reliable integration with Smart Grid systems.

USB PC comms port

Ethernet comms port*

Auto / manual toggle button

RS232 modem comms port*

Switch fuse housing

4-line backlit LCD screen

Switch / controller status LED

Manual open and close buttons

Menu navigation keypad

Unit information plate

Test point measurement plugs

ABB I CQ900 Capacitor Controller 3

Benefits and features

Benefits	Features
Reliability	– Fast onboard micro-processor for accurate sampling, measurement and decision making. Flash upgradeable software allows new features to be deployed in the field – Advanced automatic switching – External temperature sensor – Real time battery backed clock (approximately 10 year life in unpowered state) – ISO-9001 manufacturing environment
Flexibility	– Universal power supply (90 VAC to 264 VAC) – Frequency auto detection (47 Hz to 63 Hz real-time frequency measurement) – Flexible mounting options – Wide range of switch types supported (eg. motor driven, solenoid driven or electrically held switch types) – Optional available features: - ABB CapLink short range wi-fi communications - Neutral current measurement via sensor input - Capacitor bank switch status feedback monitoring
Durability	– Wide environmental operating conditions (-40°C to +70°C) – IP65 (NEMA 4R) rated enclosure – Electrical protection via 450 V varistors and transient voltage suppressors to provide fast spike and ESD protection (1500 V 8/20µs impulse protection)
Easy to use	– Includes a logical, structured menu system and user-friendly navigation interface including 4-line LCD screen – Fully user programmable via unit faceplate or PC software for maximum flexibility in operation – MS Windows™ compatible software package supplied for external configuration and data retrieval process – USB2.0 PC interface
Data Integrity	– Real-time monitoring of network parameters – Flash stored programmed settings – Data logging capture 10,000 events at set time periods into non-volatile memory

Features

Modes of operation

The CQ900L has the ability to be used either as a manually controlled device or an automatically controlled device, which switches the capacitors on/off based on a wide range of standard control modes.

The CQ900R has all the same standard features as the CQ900L but also has the addition of communication modules for remote control and monitoring.

The following automatic control modes are available as standard on all CQ900 controllers:
– Schedule (time)
– Voltage
– Temperature
– Var*
– Current*
  requires a current sensor to be installed

Allowing great flexibility, any combination of three of the above control modes can be used in conjunction, with the hierarchy of control being selected by the user. The threshold values and time-outs for each control parameter are fully programmable by the user, either through the unit faceplate or the supplied PC Utility Software.

Where schedule switching is required, the CQ900 supports both a single schedule as well as different schedules for summer and winter. Separate schedules for weekdays (work days) and weekends (non-work days) are supported along with the ability to select which days are work and non-work days. Holidays and daylight saving time are also supported.

Data logging

The CQ900 has internal storage for 10,000+ data log entries. The data log is useful for troubleshooting and load profiling. A data log entry is made upon all controller events such as switch open or close, threshold values being exceeded or alarms triggered. Data log entries can also be programmed to be recorded at predetermined time intervals from 30 seconds to every hour.

The data log is stored in non-volatile flash memory, with the oldest log entries being overwritten cyclically when storage is full.

Log data is downloaded as a .CSV file (com sep val) allowing easy transportation and manipulation of information in programs such as MS Excel.

PC utility software

Both the CQ900L and CQ900R utilise a standard USB connection for communicating directly with a PC or laptop, while also supporting communication via ABB CapLink. The software provides an intuitive, user friendly interface which allows rapid programming and deployment of CQ900 controller units. Configuration files can be created and saved for future unit download further reducing the time taken to deploy multiple units.

The software is designed so that no file extraction is required for it to run, allowing the software to be stored and operated on a portable device. This allows greater flexibility for operating in the field.

Real time status and measured values are updated every second and are displayed on the monitor tab.
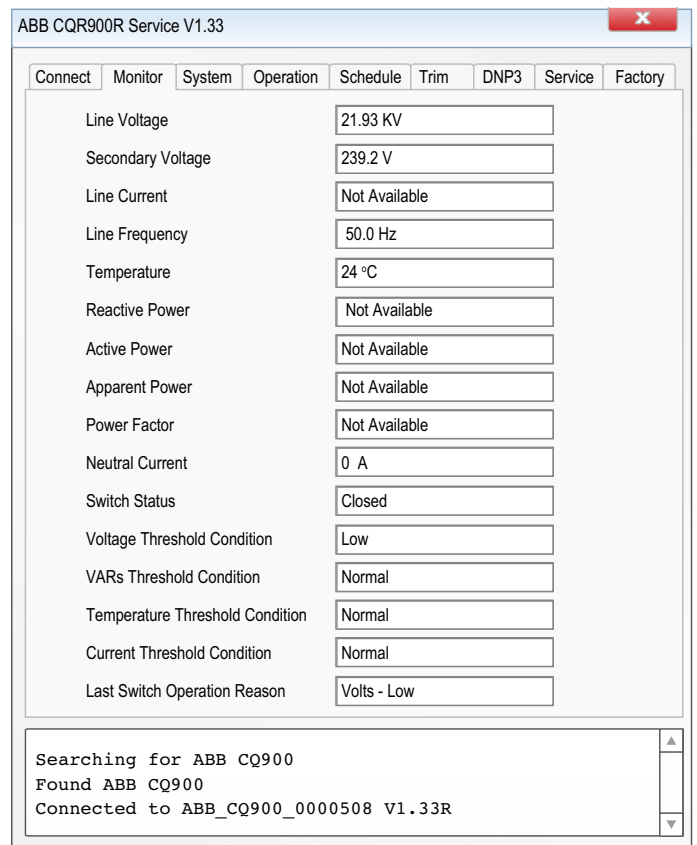Please see figure 1.

ABB CQR900R Service V1.33	
Connect Monitor System Operation Schedule Trim DNP3 Service Factory	
Line Voltage	21.93 KV
Secondary Voltage	239.2 V
Line Current	Not Available
Line Frequency	50.0 Hz
Temperature	24 ºC
Reactive Power	Not Available
Active Power	Not Available
Apparent Power	Not Available
Power Factor	Not Available
Neutral Current	0 A
Switch Status	Closed
Voltage Threshold Condition	Low
VARs Threshold Condition	Normal
Temperature Threshold Condition	Normal
Current Threshold Condition	Normal
Last Switch Operation Reason	Volts - Low

Searching for ABB CQ900
Found ABB CQ900
Connected to ABB_CQ900_0000508 V1.33R

Figure 1: Example of monitor tab on CQ900 utility software

ABB I CQ900 Capacitor Controller 5

Communication

With the increasing requirement for smart grids and the need for flexible switching options, the CQ900R controller comes fully equipped for modern communication.

DNP3.0

For remote control and monitoring, the CQ900R utilises the DNP3.0 protocol. For full flexibility this includes polled and unsolicited responses, support up to class 3 polling, and DNP3.0 time synchronisation. Using analog output points the auto switch mode programmable parameters can also be remotely configured.

For transmitting remote data, the CQ900 supports both RS232 and Ethernet (TCP or UDP) communication ports. This allows a wide range of modem / radio devices to be used, while also allowing the CQ900R to retrofit with existing communications infrastructure.

In case there is a problem with the communication system (ie master station is down, communication tower failure), the CQ900R has a configurable time-out period which returns the unit to local automatic mode until the communication link has been restored.

The controller also allows remote monitoring and recording while the unit is in local automatic control mode.

ABB CapLink™

Given that the majority of capacitor controllers are mounted in an elevated position in the field, a physical connection between the controller and a laptop can be an undesirable proposition.
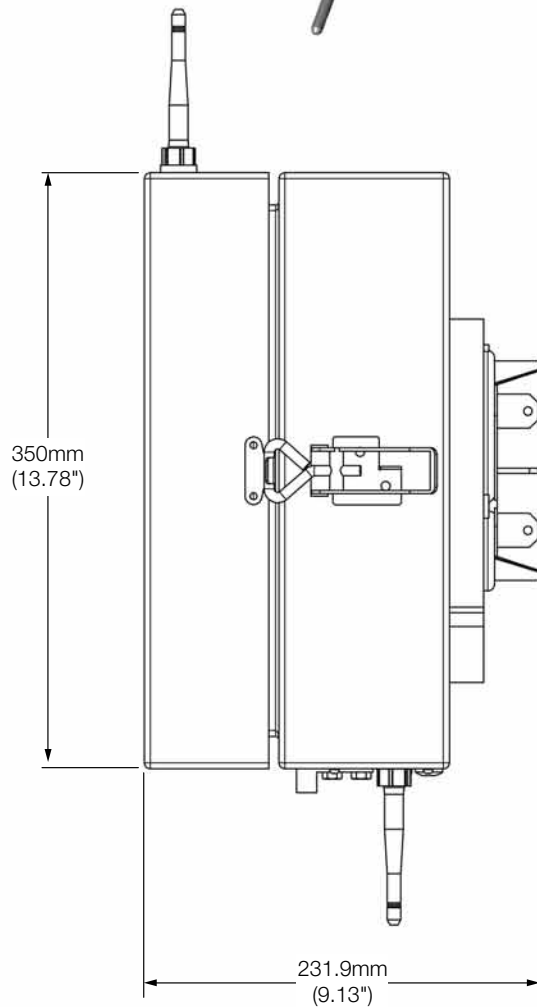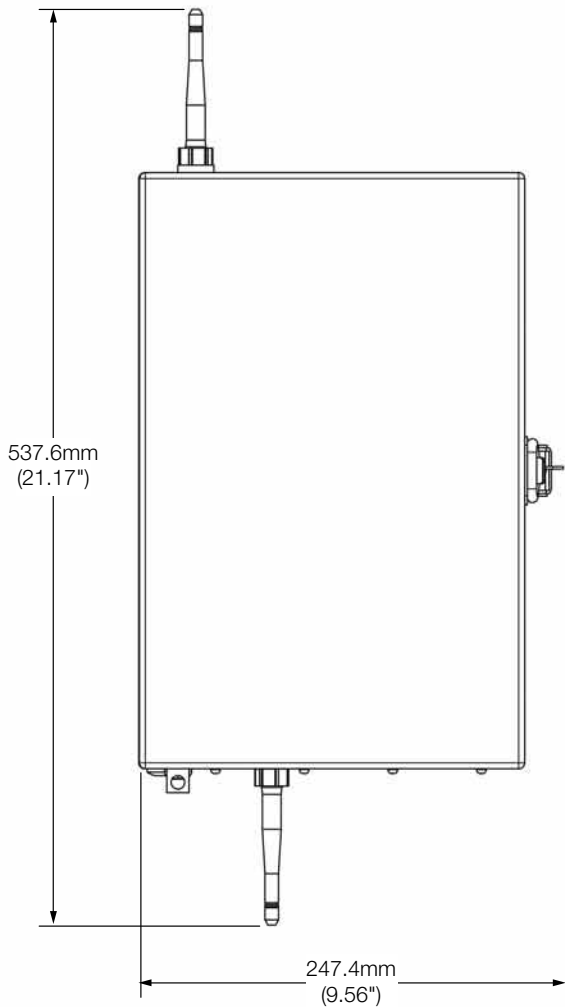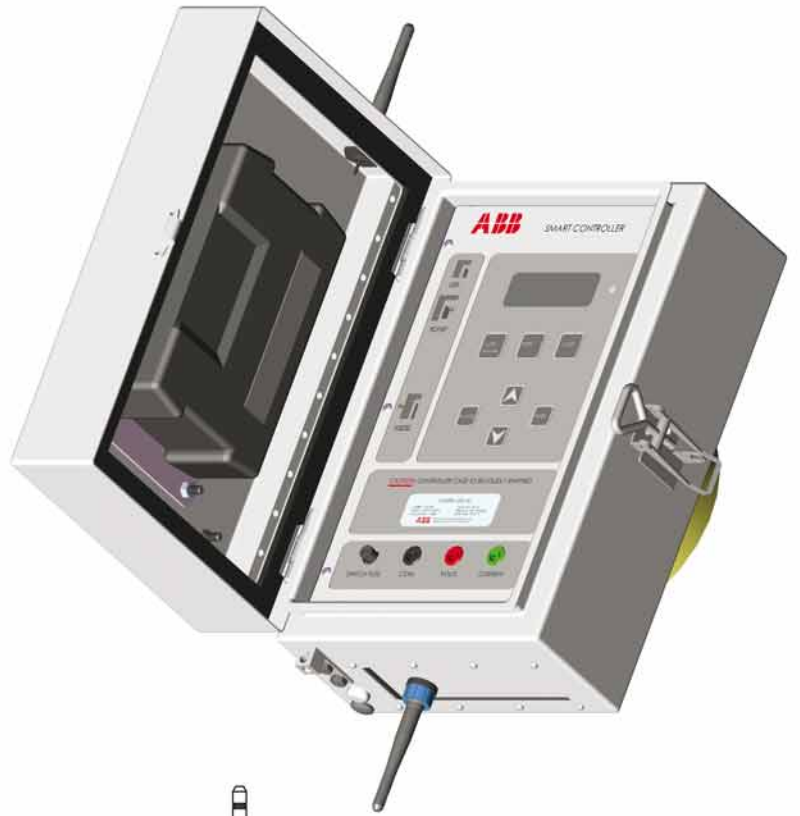
Optional on both the CQ900L and CQ900R, ABB CapLink™ allows the user the full connection functionality of the standard USB connection over a secure short range wireless link (up to 50m / 150ft). This allows field technicians to communicate with the CQ900 from the ground or service vehicle, resulting in much safer operation of the controller regardless of the weather conditions.

Dimensions CQ900L

226mm
(8.9")

123mm
(4.0")

350mm
(13.78")

253.3mm
(10.0")

198.1mm
(7.8")
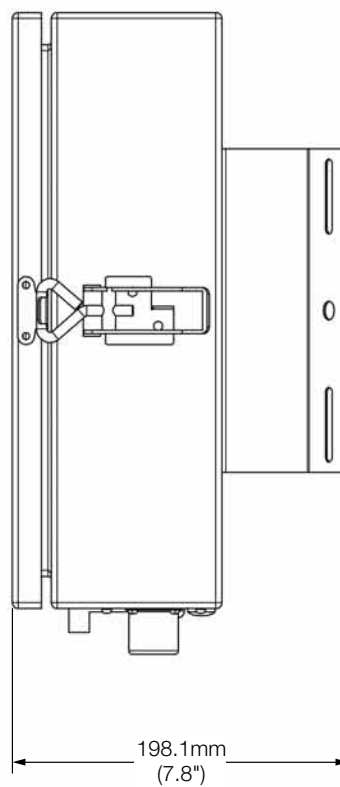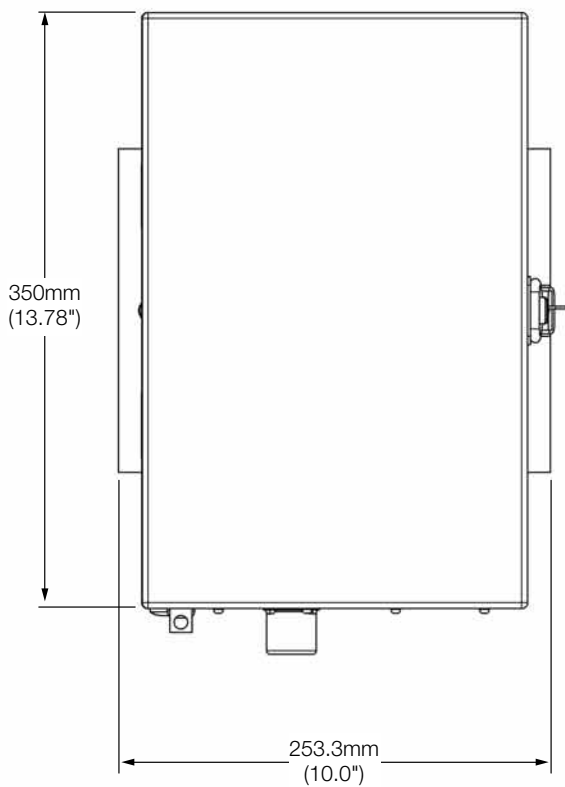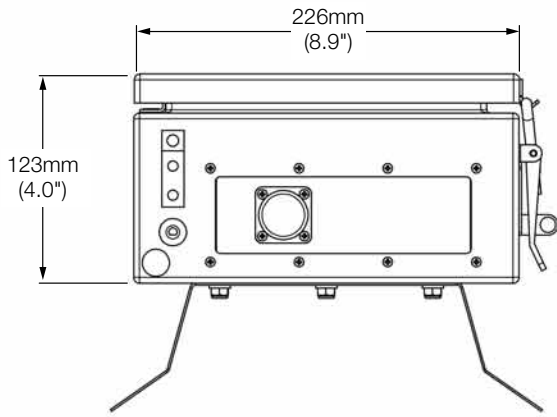
CQ900L shown with standard pole mount bracket. Please see page 9 for meter base socket mount.

Dimensions CQ900R

226mm
(8.9")

178.9mm
(7.04")

537.6mm
(21.17")

247.4mm
(9.56")

350mm
(13.78")

231.9mm
(9.13")

ABB SMART CONTROLLER
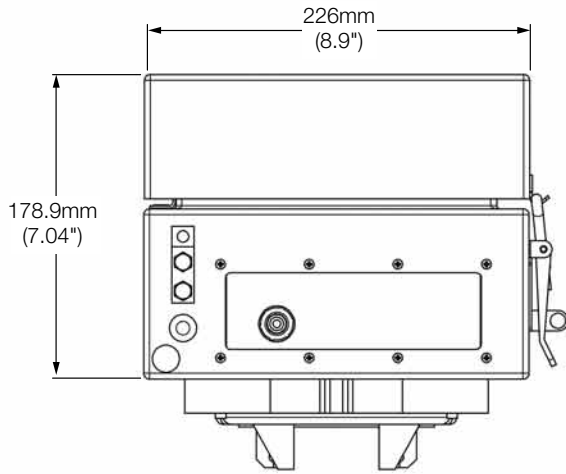
CQ900R shown with meter socket base. Please see page 8 for standard pole mount bracket.

ABB I CQ900 Capacitor Controller 9

Selection table

Controller selection tabel	CQ900	R	—	P	07	—	C	N
Control type:								
R – Remote control enabled								
L – Local control only								
Mounting configuration:								
P – Standard pole mount bracket								
A – Meter base socket mount configuration "A"								
B – Meter base socket mount configuration "B"								
C – Meter base socket mount configuration "C"								
D – Meter base socket mount configuration "D"								
Plug configuration:								
00 – No cable plug fitted (meter base mount only)								
02 – 2-pin neutral current plug (meter base mount only)								
07 – Standard 7-pin plug (pole mount bracket)								
09 – Standard 7-pin plug (pole mount bracket) and 2-pin neutral current plug (pole mount bracket)								
ABB CapLink:								
C – Fitted (includes removable antenna)								
X – Not fitted								
Neutral current sensing option:								
N – Neutral current sensing option enabled								
X – Neutral current sensing not fitted								
*If neutral current sensing option selected, plug type 02 or 09 must be selected.								
Optional extras:								
CQ900-CLD – ABB CapLink PC USB dongle								

Meter base socket signal outputs

The CQ900 can accommodate a range of meter base wiring configurations. Correct meter base jaw options must be specified at the time of ordering. Please contact ABB for non-standard plug configurations.

6 JAW OPTION A

6 JAW OPTION C

6 JAW OPTION B

6 JAW OPTION D
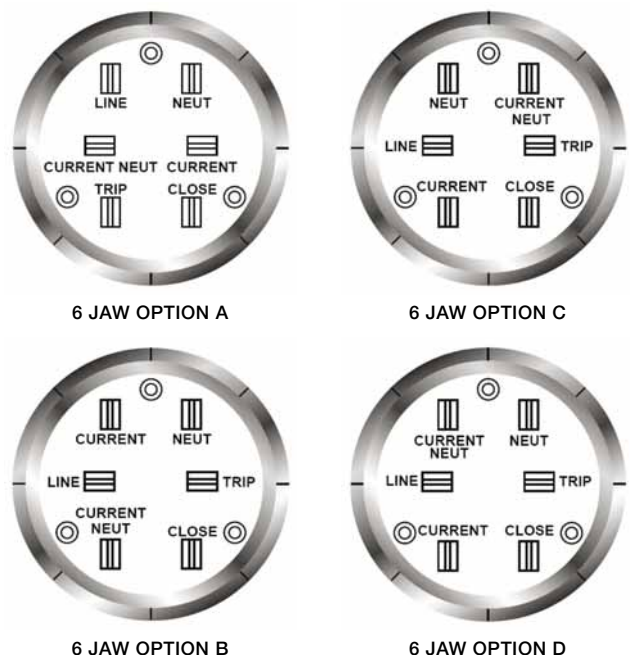
Technical data

Control system

– Micro-processor-based system for balanced three-phase networks

– Field upgradeable firmware capability through USB interface allows future upgrades and features to be deployed in field

Supply voltage

90 VAC to 264 VAC universal power supply

Consumption

10 VA max (no modem), 30 VA max (with modem*)

Connection type for measuring circuit and power supply

– Phase-phase or phase-neutral. User selectable VT ratios

– External current sensor converting 0–600 A to 0–10 VAC (optional for power based measurements)

Frequency range

47 Hz to 63 Hz - Real time frequency measurement monitors actual system frequency and calculates kvar, PF, KVA, kW etc, based on actual system conditions

Electrical isolation/protection

– 450 V varistor protection

– Transient voltage suppressors providing fast spike and ESD protection (1500 V 8/20 us impulse protection)

– Electrically protected auxiliary digital inputs

Fuse protection

– Unit protection: 2 A Fast blow (M205) internal

– Switch protection: 10 A SLOW-BLO® (M205)

Operating environment

Operating temperature:

-40°C to +70°C (ambient)

(-40°F to +158°F)

Unit display operating temperature:

-20°C to +70°C

(-4°F to +158°F)

Humidity range: 5% to 95% (non-condensing)

Measurement sensor performance

Voltage:	± 375.8 V peak (264 Vrms) range
	0.2 VAC resolution
	± 1% accuracy
Current:	0 to 600A range
	0.5A resolution
	± 1% accuracy + sensor accuracy
Phase angle:	-179° to +180° range
	1° resolution
	± 0.1% accuracy
Temperature:	-40°C to +70°C
	(-40°F to +158°F) range
	1°C (1°F) resolution
	± 1% non-linearity

Output contacts

Switch contacts:	2 x 20 A volt free contacts
	1 open, 1 close
Continuous current (max):	20 A
Inrush current (max):	100 A
Contact closure period:	User selectable, 100 ms to 10 s as well as constant closed for electrically held switch operation

#Requires a current sensor to be installed

*Only available on CQ900R model

Settings

Control modes:

– Remote (control or monitor only)

– Automatic (local)

– Manual (local)

Automatic control modes:

– Schedule (Time)

– Voltage

– Schedule with temperature override

– Temperature

– VAR#

– Current#

Switch on schedule:

– Single or seasonal

– Work day and non-work day schedules with full customisation

Switch on temperature range:	-40°C to +50°C
	(-40°F to +122°F)
Switch on voltage range:	105 V to 130 V
	or 210 V to 260 V
Switch on VAR range:	-10 Mvar to +10 Mvar
Open/Close time delay:	5 s to 10 min
	Separate open
	and close times
Maximum operations:	1 to 30 daily operations
Logging periods:	30 s to 60 min

Enclosure

Lockable, IP65 (NEMA 4R), powder coated, stainless steel enclosure

Mounting

Pole mounting brackets provided as standard.

Optional wall and meter socket mounts are also available.

Memory/Calendar

Time clock:	Battery backed RTC
Calendar:	– 20 years preset
	– 30 user settable annual holidays
	– Daylight savings operation and auto season adjust
	– Fully user selectable weekdays and weekends

Non-volatile flash data logging memory:

10,000+ record logs

Non-volatile storage of log and operating parameters in data FLASH

Backup battery: 3.6 V lithium cell — 10 year life (unpowered state)

Communications

– Unit configuration and data log transfer via USB

– Optional "ABB Smart Link" radio allows local interrogation without touching unit. (Up to 50 m range)

– RS232 and Ethernet interfaces allow monitoring over remote networks using a wide range of modem devices. DNP3.0 communication protocol enabled*

Quality

– Printed circuit board in accordance to IPC-D-2221

– Unit in accordance applicable electrical standards

– CE mark (C-tick), RoHS component compliant

– Manufactured in an ISO 9001 and ISO 14001 environment