

QED™ C100XT

Operation Manual



C100XT

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SAFETY

GENERAL WARNINGS

 WARNING

Information in this manual that may affect the safety of users and others is preceded by this warning symbol.

Caution - Failure to follow the correct information may result in physical injury which in some cases could be fatal. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Some QED pumping devices are designed to pump floating hydrocarbons from groundwater recovery wells. The recovered product is frequently flammable, and vapors may be explosive if exposed to heat, flame, or sparks. **When any of the pneumatic pumping systems are used care should be taken to ensure that any venting of pump drive air, potentially mixed with the explosive vapors within the pump, is located in a well-ventilated area away from sources of open flame, sparks and extreme heat. As in all situations, failure to take adequate precautions may result in catastrophic injury or death.** Protection for eyes, hands, and person should be worn when working with the pumps to avoid injury from contact with hazardous fluids. Tubing used with these systems should be routed in a manner that prevents damage due to chaffing, cutting, or crushing.

Do not apply compressed air to the system unless all safety precautions are followed.

C100XT CONTROLLER WARNINGS

The C100XT is a solar powered timer and valve that has an onboard battery pack for operation during the night and on days with marginal sunlight. The C100XT is CSA approved intrinsically safe for Class 1, Group C and D use. The general warning for venting of pump drive air needs to be followed with the C100XT as it will vent potentially explosive pump drive air during operation (venting at, or near the C100XT is not a problem). The C100XT includes an optional AC adapter to allow use inside where there is insufficient light for charging. **When the controller is used with the AC adapter, the unit is not intrinsically safe.** Use of the AC charger will require that the controller be mounted **at least** 3 feet above the ground and **at least** 25 feet horizontally from sources of combustible vapors and liquids (i.e. exhaust valve).

 WARNING **To prevent ignition of a hazardous atmosphere, only remove and replace the battery in an area known to be non-hazardous.**

If the rechargeable batteries need to be replaced, they should be replaced only with batteries supplied by QED. **If replacement batteries other than QED batteries (42207) are used in the C100XT, the “intrinsically safe” certification will be voided.**

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If the C100XT should shut down due to a low power situation (low battery voltage, low sunlight), once sufficient power is available (either by plugging the AC adapter, increase in sunlight, new battery or other power supply) the C100XT will resume cycling automatically. **The default setting for the controller is to be enabled once adequate power is supplied.** When servicing any equipment controlled by the C100XT, at a minimum, disconnect the air source from the controller to prevent unintentional cycling. If the unit does not power up after charging, a **jump start** will be required to power on the unit. Steps to jump start the unit is.

1. Remove the 8-pin connector from the bottom of the controller.
2. Remove the four thumb screws that hold on the controller front plate.
3. Find the two two-pin plugs labelled “battery” (Top center plug) and “Sol” (Top Right plug) on the back of the control panel.
4. Unplug both pins, wait a few seconds, then plug the “battery” plug back into the same “battery” port (Top middle) on the back of the panel first. Then plug the “Sol” plug back into the Sol port (Top right)
5. Check the panel to confirm the front screen is on.
6. Place control panel back into the enclosure and screw in the four thumb screws.
7. Plug 8 pin connector back into place. Click the dual arrow key to reset the Tank Full shut off display.

C100XT TERMINOLOGY

- **Refill Time:** The time the pump is venting, and fluid is entering the pump. No pressure is applied to the pump during this time.
- **Discharge Time:** The time that pressure is being applied to the pump to discharge the fluid from the pump.
- **“On” Time:** The time that the system is on the system is “awake” and cycling according to the settings of the Refill and Discharge Times.
- **“Off” Time:** The time that the system is off: the system is “sleeping” and not cycling.
- **System Enabled:** Turns the system on and enables the timing sequences to start.
- **System Disabled:** Turns the system off and disengages the timing sequences.

DEFAULT TIMES

The C100XT comes with the following default times.

NOTE: Default times are maintained even when the unit is low power disabled.

- Refill: 5 minutes
- Discharge: 30 seconds
- “On” Time: 4 hours
- “Off” Time: 1 second

NOTES

CONTROLLER SETTINGS

The C100XT has three basic controls available that affect pump operation:

Refill time setting:

The refill time setting determines how long the pump will fill. This time needs to be longer when

there is less pump submergence (fluid level above the pump). The refill time is settable from 1 second to 99 hours, 59 minutes, and 59 seconds.

Discharge time setting:

The discharge time setting determines how long the pump will discharge. This time needs to be longer when the pump is deeper, when the pump is pumping against a higher back-pressure (i.e. a pressure header or pumping uphill), and when the fluid has a high viscosity and flows slowly. The discharge time is settable from 1 second to 99 hours, 59 minutes, and 59 seconds.

Pump supply pressure setting:

The filter-regulator attached to the controller is used to raise or lower the air pressure applied to the pump during a discharge cycle. For most applications this is set at the fully clockwise position to deliver full compressor supply pressure to the pump. If the pump discharge is too high for your particular application, this pressure may be decreased to slow the flow from the pump during a discharge cycle. However, if the pressure is decreased it often becomes necessary to increase the discharge time slightly to offset the decrease in flow and to help maintain full pump discharge.

The C100XT Controller features an additional control option to set an awake ("On" Time) or sleep mode ("Off" Time). This option can be used to schedule the system operation over a one or more day period. For example, the controller can be set to cycle for one hour and "sleep" or stop cycling for 6 hours, which would then repeat. This feature is useful in cases when there is a slow recharge rate in the well.

LCD Display Contrast

While viewing any DATA key display, touching the Up or Down arrow keys will adjust display contrast. "Up" increases contrast while "Down" decreases contrast.

FUNCTION KEYS

The "TIME" button displays and allows the setting of the following times:

First push: This displays and allows the setting of the Refill time.

Second push: This displays and allows the setting of the Discharge time.

Third push: This displays and allows the setting of the System On time.

Fourth push: This displays and allows the setting of the System Off time.

If changing the Refill or Discharge times, pressing the "GO TO" key will start a new time cycle starting with the Refill time. The next time cycle automatically uses the new time. For example, if after changing the Refill time, pressing the "GO TO" key will start the new time cycle starting with the new Refill time.

If changing the System On or System Off times, pressing the "GO TO" key will start a new time cycle starting with the System Off time. The next cycle automatically uses the new time. For example, if after changing the System Off time, pressing the "GO TO" key will start the new time cycle starting

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with the new System Off time.

Note: Holding the control panel with your fingers on the back of the panel will be sensed by the TouchSense™ pads as a key press if your finger is placed directly behind the keypad array. Also note that TouchSense™ will respond to a human finger, capacitive pen, or stylus used with smartphones and tablets such as iPhones or iPads.

C100XT BATTERY

While the unit will charge itself to self-start under full sunlight charging conditions, it is recommended that the unit be charged overnight (**or least 24 hours**) before being placed into field service for the first time.

When the C100XT's battery indicator reads LOW, the C100XT goes to OFF cycle (or SLEEP) and keeps the unit in the OFF cycle until the battery gage reads OK.

Whenever the C100XT has been stored in a discharged or DEAD battery state for an extended period (more than 2 weeks), charging may be required for operation.

Battery operation time is affected by the following items:

- Initial charge, a minimum of 24 hours is recommended.
- Time of year (there is less daylight in the winter)
- Weather (cloudy days vs sunny days) the time of day (when the sun is low on the horizon it has less energy to charge the battery), and temperature (colder reduces battery capacity).
- Valve cycle frequency (as the valve cycles more, it drains more energy from the battery)

A C100XT controller used in a typical hydrocarbon skimming application, where cycle times are long (greater than 30 seconds each), will have no problem maintaining the battery charge with the built in solar panel. As cycle times become shorter (as is typical with Alpha style pumps), it may be necessary to use an external solar panel or the AC adapter to maintain the battery's charge. The following is a general guideline for cycle times and battery life:

WARNING :

To prevent ignition of a hazardous atmosphere, batteries must only be charged with 115 VAC wall socket charger in an area known to be non-hazardous. One is provided with the controller.

Cycles per Minute	Cycle Length (Sec)	Run Days*	Recommendations
6	5 refill, 5 discharge	2.6	Use AC Adapter
3	10 refill, 10 discharge	4.3	Use AC Adapter or External Solar panel
1.5	20 refill, 20 discharge	6.3	Use Built in or External Solar Panel
1	30refill, 20 discharge	7.3	Use Built in Solar Panel
Default	300 refill, 30 discharge	12	Use Built in Solar Panel

* With a completely charged battery and no charging going to the battery

TANK-FULL SHUT OFF / LEVEL CONTROL

TANK-FULL SHUT OFF

This feature is designed to be used with QED's Tank High Level Shutoff Kit, QED Model CTRTFO. The Tank Full Shutoff uses a normally closed float switch installed at a high tank position in your tank. It is designed to stop pump and controller operation when the level in the collection tank exceeds the upper limit defined by the float switch location. When high levels are detected, the C100XT controller will discontinue pump operation and Disable the controller, and will remain in a "Tank Full" and "System Disable" mode until both are reset. The "Tank Full" condition will be shown on the display of the controller as a "T" in the upper right-hand corner of the display. When this condition is detected, the tank level must be lowered enough to deactivate the switch and the controller must be reset to resume normal operation. First the "Tank Full" switch must be reset by pushing the ◀▶ key. Then the controller needs to be enabled. Pressing the "GO TO" key three times will take you to the Disable/Enable screen. Once the QED Model CTRTFO is installed, any disconnection or breaks in the switch cable will also cause a "Tank Full" and "System Disable" response.

If the QED Model CTRTFO is not being used, there is a jumper wire in place on 8-pin connector on the controller, which disables this feature.

ON/OFF LEVEL CONTROL

This feature is designed to be used with QED's On/Off Level Control Kit, Model CTRLSW. The On/Off Level Control switch uses a normally closed float switch which is designed to stop pump operation when the level of the liquid being pumped falls below the limit defined by the float switch location and resume pumping automatically when the liquid level rises again and activates the float switch. A "Level Off" condition will be shown as a "L" in the lower right-hand corner of the display.

J2, 8-Position screw terminal block.

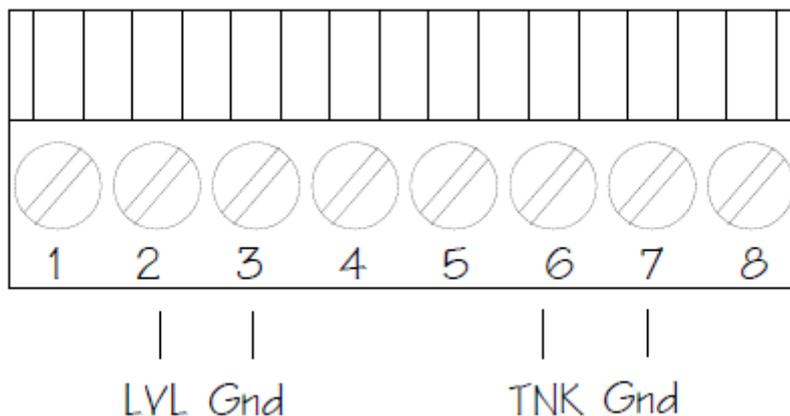


Figure 1

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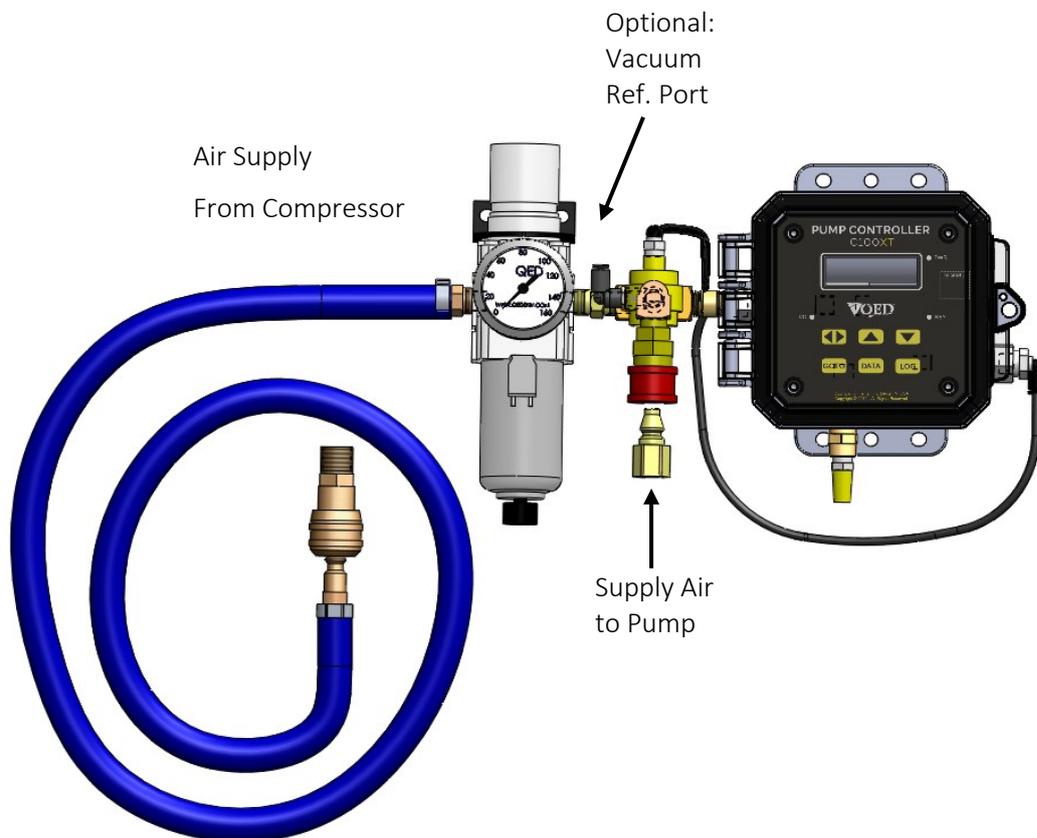
INSTALLATION – LEVEL CONTROL SWITCH

- 1) Locate well or sump to be pumped and the mounting location of the C100XT Controller. Identify the intended cable path between them and ensure that the cable will be protected and of sufficient length.
- 2) Install the Level Control Switch in the well using the 800011 Strain Relief (1/2" MPT), in the wellhead or cap. Lower the switch to the desired liquid control level in the well, then tighten the 800021 Strain Relief nut.
- 3) Route the cable from the switch to the C100XT controller, including through all conduits, connectors, and restraint devices.
- 4) Separate the two conductors for approximately 2", stripping the cable insulation back 3/8-1/2".
- 5) Connect the cable wires to the C100XT by sliding them into terminal screws 2 and 3 (See Figure 1) on the 8-pin connector, then tightening the screws.

NOTE: The jumper wire between terminals 6 and 7 should remain in place, unless the "Tank Full Shutoff Kit" is also installed. If so, follow all instructions for the Tank Full Shutoff Kit.

- 6) Verify successful installation and system function. Manually raise the float above the liquid level and observe that the C100XT responds with a "Level Off" condition.

CONTROLLER SET UP/INSTALLATION



See **Controller Settings** Section for instructions to set up all times.

C100XT VACUUM WELL INSTALLATION

When using the C100XT to control a pump in a well that is under vacuum, the pilot air exhaust needs to be referenced to the well cap/flange. Referencing is accomplished by connecting 1/4" O.D. tubing between the pilot air exhaust "presloc" fitting and the vacuum reference fitting on the well cap/flange.

C100XT WITH AC ADAPTOR

 **WARNING**: AC Adaptor must be located in a non-explosive area. See Safety Section for more information.

C100XT SOLAR CHARGED

Note: Solar panel must be raised up to a 45-degree angle on the topside of the controller.

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SPECIFICATIONS

Enclosure

Weight: 2.1 lbs (0.95 kg)

Dimensions: 4"W x 4"H x 3"D (inches)
(10 cm x 10 cm x 8 cm)

Type: Gasket Sealed NEMA

Material: Polycarbonate

Power

Standard: D-Cell Power Pack

2 V, 4 Whr D-Cell

Drain: 15 mW Avg. (15 day reserve)

External: Optional 2W Solar Panel

USB Charger w/ Cable

(2.5 mm Power Jack Input)

Charging

Solar: Shatterproof Solar Panel

0.4 Watt Panel - Standard

2 Watt Panel - Optional

Other: Using included 2.5 mm Power Jack:

4.5 - 18.0 Vdc with 1.2 W

max. power dissipation

Display

Type: 32-character LCD Display with User Contrast Control

Window: None

Temperature

Operating: -25°F to +140°F
(-30°C to 60°C)

Pneumatic Control

Type: Latching Solenoid

Manifold: 1/8-NPT Female Ports

Nickel Plated Brass

Pressure: 110 ±10 psi Max.

I/O Connections

Digital (4) Switch Input 0-30 Vdc

15kV static protection

Analog (2) Voltage Type Transducers

12-Bit ADC, 0-5 Vdc

Certifications

Non-Incendive, Intrinsically Safe for Use in Class 1, Division 1, Group C and Group D Hazardous Locations

Temperature Code: T4

QED INFORMATION

For latest information about QED Products, visit www.qedenv.com/en-us/products/

For patent information, please visit www.graco.com/patents.

The equipment in this manual is protected under Registered Trademarks. For a complete list of Registered Trademarks and Trademarks, visit www.graco.com/trademarks.

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WARRANTY INFORMATION

QED Environmental Systems, Inc. (QED) warrants to the original purchaser of its products that, subject to the limitations and conditions provided below, the products, materials and/or workmanship shall reasonably conform to descriptions of the products and shall be free of defects in materials and workmanship. Any failure of the products to conform to this warranty will be remedied by QED in the manner provided herein.

This warranty shall be limited to the duration and the conditions set forth below. All warranty durations are calculated from the original date of purchase.

1. Liquid contacting equipment (including pumps), tubing, liquid contacting supplies and flow totalization equipment are warranted for 1 year.
2. Control devices, control device mounting, and surface air supply hose are warranted for 1 year.
3. Separately sold parts and spare parts kits are warranted for ninety (90) days.
4. Repairs performed by QED are warranted for ninety (90) days from date of repair or for the full term of the original warranty, whichever is longer.

Buyer's exclusive remedy for breach of said warranty shall be as follows: if, and only if, QED is notified in writing within the applicable warranty period of the existence of any such defects in the said products, and QED upon examination of any such defects, shall find the same to be within the term of and covered by the warranty running from QED to buyer, QED will, at its option, as soon as reasonably possible, replace or repair any such product, without charge to the buyer.

In no event shall such allegedly defective products be returned to QED without its consent, and QED's obligations of repair, replacement or refund are conditioned upon the Buyer's return of the defective product to QED.

IN NO EVENT SHALL QED ENVIRONMENTAL SYSTEMS, INC. BE LIABLE FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES FOR BREACH OF SAID WARRANTY.

The foregoing warranty does not apply to major subassemblies and other equipment, accessories, and other parts manufactured by others, and such other parts, accessories, and equipment are subject only to the warranties, if any, supplied by their respective manufacturers.

QED makes no warranty concerning products or accessories manufactured by others, but QED will give reasonable assistance to Buyer in obtaining from the respective manufacturer whatever adjustment is reasonable in light of the manufacturer's own warranty.

THE FOREGOING WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED, IMPLIED OR STATUTORY (INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE), WHICH OTHER WARRANTIES ARE EXPRESSLY EXCLUDED HEREBY, and of any other obligations or liabilities on the part of QED, and QED neither assumes nor authorizes any person to assume for it any other obligation or liability in connection with said products, materials and/or workmanship.

It is understood and agreed that QED shall in no event be liable for indirect, incidental, special, or consequential damages resulting from QED supplying products hereunder, or the furnishing, performance, improper selection, or use of any product sold here under, whether due to a breach of contract, breach of warranty, the negligence of QED or otherwise.

This warranty will be void in the event of unauthorized disassembly of component assemblies.

Defects in any equipment that result from abuse, operation in any manner outside the recommended procedures, use and applications other than for intended use, or exposure to chemical or physical environment beyond the designated limits of materials and construction will also void this warranty.

Chemical attack to liquid contacting equipment and supplies shall not be covered by this warranty. A range of materials is available from QED and it is the Buyer's responsibility to select materials to fit the Buyer's application. QED will only warrant that the supplied liquid contacting materials will conform to published QED specifications and generally accepted standards for that material.

QED shall be released from all obligations under all warranties if any product covered hereby is repaired or modified by persons other than QED's service personnel unless such repair by others is made with the written consent of QED. If any product covered hereby is actually defective within the terms of this warranty, Purchaser must contact QED for determination of warranty coverage. If the return of a component is determined to be necessary, QED will authorize the return of the component, at owner's expense. If the product proves not to be defective within the terms of this warranty, then all costs and expenses in connection with the processing of the Purchaser's claim and all costs for repair, parts and labor as authorized by owner here-under shall be borne by the Purchaser.

The original Purchaser's sole responsibility in the instance of a warranty claim shall be to notify QED of the defect, malfunction, or other manner, in which the terms of this warranty are believed to be violated. You may secure performance of obligations hereunder by contacting the Customer Service Department of QED and:

- 1.** Identifying the product involved (by model or serial number or other sufficient description that will allow QED to determine which product is defective).
- 2.** Specifying where, when, and from whom the product was purchased.
- 3.** Describing the nature of the defect or malfunction covered by this warranty.

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