

TANK MANAGER FOR TWO TANKS



MEHEEN

CRAFTED IN THE USA

OPERATING MANUAL

10/31/11
C-More T6C
L color touch panel

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WARNING:

- 1. VENTING OF TANKS CONTAINING INERT GAS SUCH AS CO₂ CAN DISPLACE OXYGEN IN CONFINED SPACES. ALWAYS PLUMB TANK VENTS OUTSIDE AND AWAY FROM CONFINED AREAS.**
- 2. THE TANK MANAGER IS A MICRO-PROCESSOR CONTROLLED DEVICE WHICH CONTROLS TEMPERATURES AND PRESSURES IN A TANK. EVEN THOUGH THE TANK MANAGER IS PROGRAMMED NOT TO EXCEED 14.9 PSI, VALVE AND INSTRUMENT FAILURES CAN OCCUR CAUSING DANGEROUS PRESSURE BUILD UP WITHIN THE TANK.**

ANY TANK THIS TANK MANAGER IS TO BE INSTALLED ON MUST HAVE ITS OWN INDEPENDENT PRESSURE RELIEF SYSTEM WHICH WILL ACTIVATE WITHIN THE SAFE OPERATING PRESSURE OF THAT TANK. EQUIPMENT DAMAGE OR SERIOUS INJURY TO PERSONNEL CAN RESULT FROM THE FAILURE TO FOLLOW ALL APPLICABLE CODES AND STANDARDS. WE DO NOT GUARANTEE THE PRODUCTS DESCRIBED IN THIS PUBLICATION ARE SUITABLE FOR YOUR PARTICULAR APPLICATION, NOR DO WE ASSUME ANY RESPONSIBILITY FOR YOUR SYSTEMS DESIGN, INSTALLATION, OR OPERATION.

General

The Tank Manager is a sophisticated micro-processor, which controls tank temperature, automatic carbonating, carbonation levels and dispensing pressures for two tanks. The micro-processor receives a signal from a Resistive Temperature Device (RTD) located in the tank to precisely display and control process temperature and provide an accurate output control signal used for the tanks cooling system. Inputs from the operator interface, pressure transmitters and process temperatures are used to calculate correct carbonation levels and pressures. The micro-processor then controls a series of valves to inject CO₂ through a carbonating stone, and add or relieve pressure from the head space of the tank as needed.

The Tank Manager, when used for carbonating, purges the beer with CO₂ through the carbonating stone and step controls the entire carbonating process to achieve the desired volumes of CO₂ set from the operator interface. When the correct volumes of dissolved CO₂ are achieved, the Tank Manager performs a counter pressure scrub of the beer to ensure that residual dissolved air in the product is displaced. Once the carbonation process is complete the Tank Manager automatically switches into a maintenance mode where correct tank pressure is maintained based on temperature and the volumes of CO₂ set point.

The Tank Manager also controls tank pressures for proper dispensing to kegs or bottles. When used for dispensing, the Tank Manager automatically adds dispensing gas pressure to the head space of the tank above the programmed volumes of CO₂. The amount of dispensing pressure is also operator adjustable.

NOTE: The ability of the Tank Manager to carbonate is dependant upon temperature, tank geometry and the carbonating stone used. The cooling system for the tank must be able to cool the contents below 36°F and 32°F is preferred. Warm carbonating temperatures or inefficient carbonating stones can result in lower than indicated carbonation levels. It may take extra time for tanks larger than 50 barrels to become completely carbonated. If an electrical power failure occurs during the operation of the Tank Manager all valves to the tank will be shut while the power is off. When electrical power is restored the Tank Manager will reenergize but will leave all the valves to the tank shut. When the Reset button is pushed, then the tank will be vented.

Installation

The Tank Manager is designed to be used on two individual tanks and should not be moved to other tanks and must be installed correctly to operate properly. It is highly recommended that wiring from the Tank Manager to the cooling system be run using approved watertight conduit. **DO NOT install the Tank Manager if the cooling system cannot cool the contents below 36°F as the unit will not function at product temperatures above 36°F. DO NOT over fill the tank when using the Tank Manager, as a certain amount of head space is required for it to function properly.**

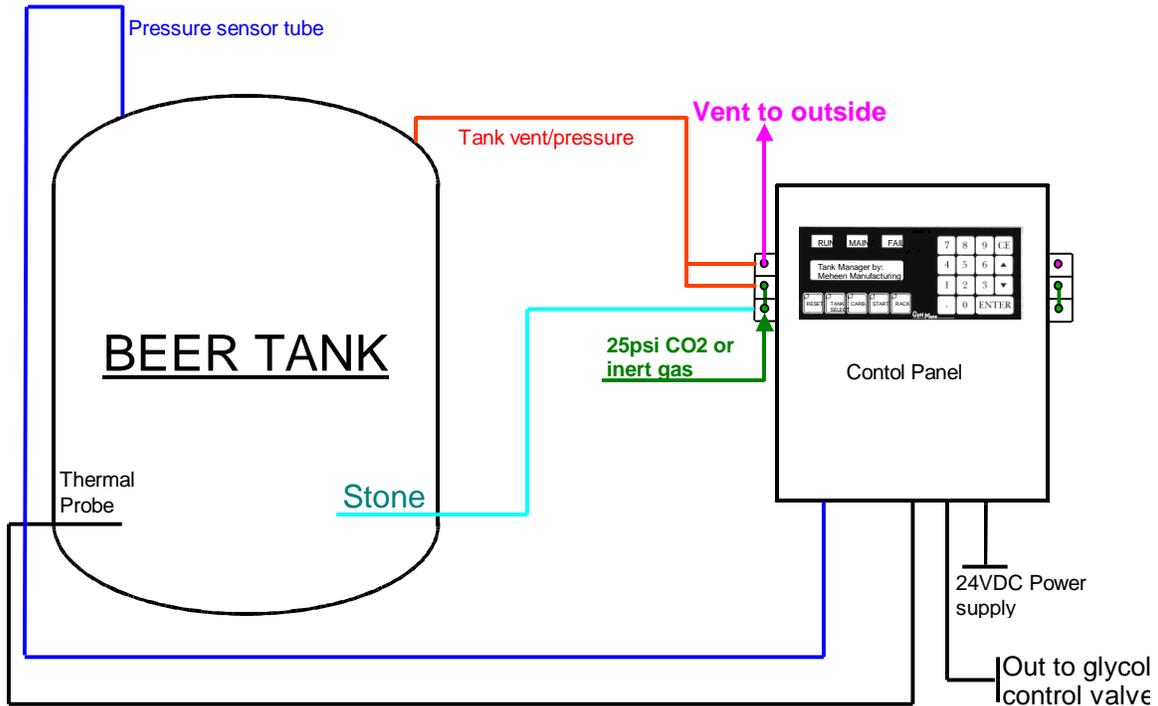
WARNING:

To minimize the risk of potential safety problems, you should follow all applicable local and national codes that regulate the installation and operation of your equipment. These codes vary from area to area and usually change with time. It is your responsibility to determine which codes should be followed, and to verify that the equipment, installation and operation are in compliance with the latest revision of these codes.

At a minimum, you should follow all applicable sections of the National Fire Code, National Electric Code, and the codes of the National Electrical Manufacturers Association (NEMA). There may be local regulatory or government offices that can also help determine which codes and standards are necessary for safe installation and operation.

- The Tank Manager is wired from the factory with a normally open output for the tank cooling control. If this does not fit your application, please contact Meheen Manufacturing.
- The electronic temperature controller uses an RTD to measure tank temperature. This RTD is of the 3-wire, 100 ohm, platinum type. It must be installed using a shielded wire. For wire runs less than 50 feet, 20 gauge wire is acceptable. For wire runs over 50 feet, use 18 gauge wire with a shield. ***The shield of the sensor wire must be grounded at the control panel end of the run and not at the tank end. One end only!***
- Mount the Tank Manager control firmly to the wall near the tanks to be controlled.

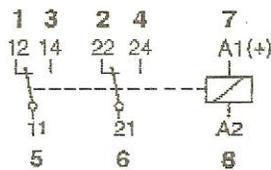
- Refer to the illustration below for the locations of tubing and wiring connections. Wiring connections are shown in black and tubing connections are colored. Also the connections on the sides of the Tank Manager are clearly labeled. Illustration below shows connections for one tank and is typical for both tanks.



Tubing should be a minimum of 1/4 inch ID for tubing runs 20 feet long or shorter. If the tubing length is longer than 20 feet, the tubing size should be increased, particularly for the tubing connecting to the head space of the tank. Recommended CO₂ pressure to the Tank Manager should be set to 25-30psi.

- The wiring for the temperature probe and the output for the cooling control valve will be routed through the connector (CGB) at the bottom of the box. This connector can be removed to allow for connection of 1/2" water tight conduit. This is the preferred connection method.

- Temp. control relay (CR1) for tank1 and CR2 for tank2 are the cooling control valve relays. These relays are DPDT, rated for 13 amps at 120VAC and 10 amps at 30 VDC. To install a 120VAC Normally Closed cooling valve, CR1 & CR2 are both wired from the factory for 120VAC N.C. cooling valves. Attach the “hot” wire of the valve to terminal #14 on CR1 or CR2 depending on which tank is being connected see wiring schematic in this manual. Attach the hot wire of the power source to terminal#11. If the temperature is above set point on the control panel, output #3 for tank1 and #7 for tank2 of the output module will light as will the light on CR1 or CR2 and the cooling control valves will energize.



- To install a 24VDC control valve or some other voltage other than 120VAC, will require a customer supplied power supply. For a normally closed control valve, route the “hot” side of the power supply into the control box via the conduit connector in the bottom of the box. Attach the power supply wire to terminal #21 on CR1 or CR2 and connect the “hot” wire to the valve to terminal #24 on CR1 or CR2. Action of the valve should be the same as described above.
- The temperature probe consists of an RTD cut to the inside dimensions of the thermal well installed in the tank. Install the RTD and spring assembly by screwing the entire assembly into the end of the thermal well. Inside the black plastic weather head is a temperature transmitter. The RTD is attached to terminals #1, 2 & 3 of the transmitter. Please refer to schematic for the following; the customer must install field wiring from terminals 1, 2 & 3 of both temperature transmitters to the control box. Again these wires should be routed through the conduit connection on the bottom of the control box. The RTDs are three wire type with the two common colored (often red) wires connecting to terminals 1&2 of the transmitter. The third colored (often white) from the RTD attaches to terminal 3 of the transmitter.

Stone Test Procedure

For the Tank Manager to function properly, it is critical that the carbonation stone works correctly, tank is properly filled leaving 15-20% head space and the cooling system is up to the task. In this section the concern is the carbonation stone and how it performs. It is recommended to do the following and record your measurements before using the Tank Manager the first time. Connect the carbonation stone with its holder to a CO₂ bottle with good quality regulator and gauge. Place the stone in a bucket of water with the stone submerged and in its orientation the same as it will be installed in the tank. Slowly increase the pressure until a curtain of fine bubbles forms and record the pressure: _____psi. Next slowly decrease the pressure until the bubbles stop and record that pressure: _____psi. If you see any leakage of gas from around the holder, correct the leak and repeat this test. These pressures can be used to help with diagnosing carbonation issues, so please have them available when calling for advice.

Next with the stone still in the bucket of water, turn the CO₂ pressure to 30psi and observe the bubbles. If the bubbles are excessively large or the curtain of tiny bubbles is lost, too much CO₂ is passing through the stone. To correct this a small adjustable needle valve can be installed in the CO₂ line prior to the stone. Adjust the needle valve down until you observe a correct curtain of tiny bubble from the stone.

Operational Summary

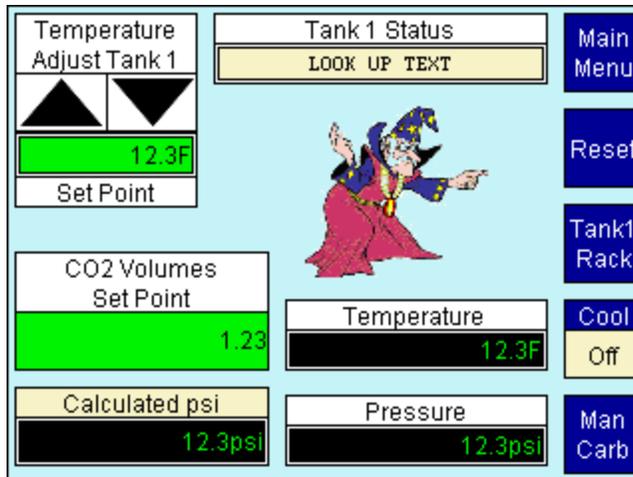
The Tank Manager is an electronic temperature controller and a micro-processor controlled carbonating and dispensing machine. The temperature controller operates at all times when the Tank Manager is turned on, regardless of the carbonation mode, but can be turned off with the push of a button for Tank cleaning. The micro-processor uses a temperature signal and a pressure signal for calculating proper carbonation levels. Temperature and carbonation levels between 1.60-3.00 volumes are adjusted using an operator interface located on the front of the control panel.

The operator interface consists of a small touch screen with the power up screen and main menu as shown below. Under each tank heading, Tank 1, Tank 2 is a text display that tells what each tank is doing at all times. These text displays also are used to indicate any sort of probe or pressure sensor failure. Below the text

display is the current set point temperature of each tank, followed by the actual temperature of each tank. Below that the Volumes of CO₂ set point when entered and calculated pressure at the current temperature. The bottom line displays the current pressure in each tank. The first time the Tank Manager is plugged in and each time it is Reset, the text display is (Sys. Reset). The first time the Tank Manager is plugged in both Tank 1 and Tank 2 automatically set to 32°F.

Tank 1 Status	Tank 2 Status	Tank 1 Setup	
LOOK UP TEXT	LOOK UP TEXT		
Temperature S.P.	Temperature S.P.	Tank 2 Setup	
12.3F	12.3F		
Temperature	Temperature		
12.3F	12.3F		
Volumes S.P.	Volumes S.P.		
1.23	1.23		
Calculated psi	Calculated psi		
12.3psi	12.3psi		
Pressure	Pressure		
12.3psi	12.3psi		
Tank 1 Status	Tank 2 Status		Tank 1 Setup
LOOK UP TEXT	LOOK UP TEXT		
Temperature S.P.	Temperature S.P.	Tank 2 Setup	
12.3F	12.3F		
Temperature	Temperature		
12.3F	12.3F		
Tank 1 Manual Carbonation Set Point	Tank 2 Manual Carbonation Set Point		
12.3psi	12.3psi		
Pressure	Pressure		
12.3psi	12.3psi		

At the right of the screen Tank 1 Setup and Tank 2 Setup buttons can be accessed or the corresponding F1 & F2 keys for inputs for each tank. To make adjustments or to start a carbonation cycle for Tank 1 for example, you would press Tank 1 Setup or F1 and the screen changes as shown on the next page. This screen is a combination of touch and the use of the function keys at the bottom of the unit. NOTE: When manual carbonation is entered, the Volumes SP and Calculated psi will be replaced as shown to the right above.



To adjust the temperature set point, use the up/down arrows in the upper left corner of the screen. The set point will increase or decrease each time the button is pushed by 0.5F and the new set point is displayed just below the arrow buttons. The box labeled LOOK UP TEXT will always display what mode the tank is in and warn of a temp probe failure should one occur. F1 is always used to return to the main menu screen. RST is the reset for the tank program and is actuated by touch or by pressing F2.

The Tank 1/Rack is not on the screen until the auto carbonation process is complete and has gone into maintenance mode. The message “Maint Mode” is displayed in the text box. When Racking from the Maint Mode the pressure set point is automatically set to just above the equilibrium pressure of the carbonated beverage by 1psi.

Rack mode can also be operated if the system is reset by going to the “Man. Carb” mode touch button or F5. From the “Man. Carb” screen press the “Tank 1 Rack” button. When accessed this way the racking pressure is automatically loaded as the actual measure pressure in the tank and you can adjust this pressure using the arrow keys.

Cool/F4 is touch or F4 key actuated. This button turns off cooling to the tank for such activities as cleaning and maintenance. NOTE: The cooling can only be turned off if the system is reset and the carbonating system has not been activated. Also any time the carbonation program is started the cooling system to the tank will automatically be turned on and you will not be allowed to turn it off.

Man Carb/F5: When the F5 button is pushed with the system in the reset condition it will take you to the manual carbonation screen described later in this manual.

Volumes: This is a touch button which brings up a numeric display. You can enter any volumes of carbonation between 1.60-3.00 from the display. Once you have chosen the carbonation level, press the ENT button active on the screen and the carbonation program automatically starts. *NOTE: Should the tank temperature happen to be above 41°F when the volumes are entered the Tank Manager will display the message “TEMP +41°F” and the program will not start. When the tank cools below 41°F, the Tank Manager will automatically start the purge process. At the end of the purge process if the temperature is above 36°F or the calculated equilibrium pressure is above 14.8psi the “Carb hold 36°F+” will display and the carbonation process will not start. Once the temperature is below 36°F and the calculated pressure for the volumes of CO₂ you have chosen is below 14.8psi the carbonation process will begin automatically. Recommended carbonation temperature is 32F.*

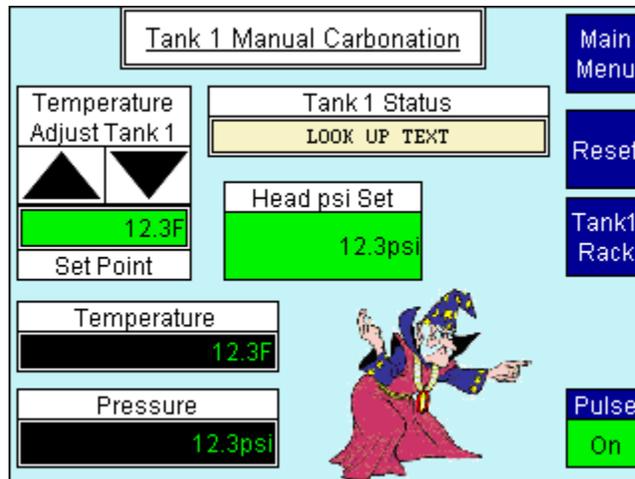
Auto Carbonation

The Tank Manager begins its carbonation cycle by scrubbing CO₂ through the beer for approximately 15 minutes (this is referred to as the purge process above). This is done by opening the vent in the head space of the tank while CO₂ is pulsed through the carbonating stone located near the bottom of the beer tank. In this manner unwanted dissolved air is removed from the beer. NOTE: If the pressure in the beer tank is above 2psi when carbonation starts, the CO₂ scrubbing purge is bypassed and the carbonating process begins. After the initial CO₂ purge of the beer is complete, carbonating is performed if the temperature is below 36°F and the calculated pressure is below 14.8psi. If the temperature is above 36°F or the calculated pressure is more than 14.8psi carbonation will not start and the message “Carb hold 36F+” will be displayed. Once the temp is below 36F and the calculated pressure is below 14.8psi, the carbonation process starts automatically. The Tank Manager performs a step carbonation process based on temperature, pressure and the rate at which the beer is able to absorb CO₂. Approximately every 10 minutes the actual tank pressure is measured and a new pressure calculated for each step during carbonation. As the beer carbonates, the amount of CO₂ which is absorbed for each increment of time changes and the micro-processor compensates for this change by adjusting the CO₂ pressure at the next time increment. This process is continued until the desired volumes of CO₂ gas are dissolved in the beer. When the correct volumes of CO₂ have been established, the beer is again scrubbed with CO₂ injected through the stone. This time exact counter pressure needed for equilibrium conditions and the volumes of CO₂ is maintained during the scrubbing process. This final scrub ensures that the

beer is completely carbonated to the desired level and any residual dissolved air is displaced. When carbonation is complete, the “Maint. Mode” message is display. The Tank Manager automatically maintains correct counter pressure for the set volumes of CO₂ based on the tank temperature until racking or the Tank Manager is reset.

Manual Carbonation

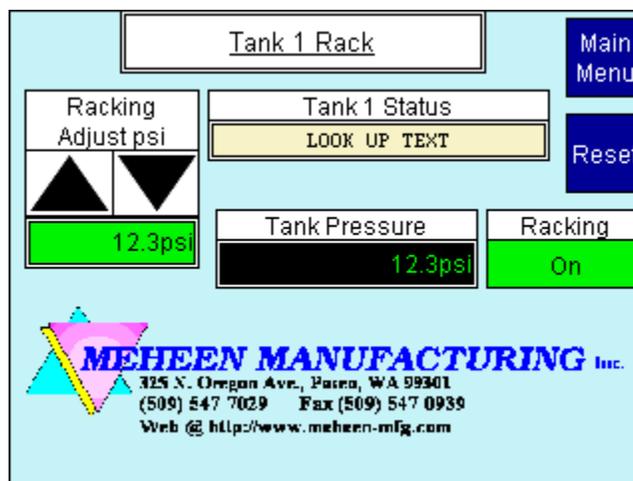
Man/F5: Manual carbonation function is accessed from the Tank 1 or Tank 2 primary screens described above. The manual carbonation process allows you to set the desired head space pressure in the tank from 0-14.9psi. The Tank Manager will put CO₂ through the carbonating stone with the vent and head space valves shut until the desired set point is reached at which point the CO₂ to the stone is shut off. Should the pressure drop below the set point the Tank Manager will turn the stone on again to maintain your programmed pressure.



To set the head pressure (Head psi SP) touch Head psi SP button and it will expand into a numeric key pad. Press the numbers to the pressure you desire and press ENT to start the system. The “Pulse” touch button will allow you to operate the carbonating stone continuously or pulsing as indicated on the button. You can reset manual carbonation by pressing the Reset key on this screen or any screen assigned to the tank you are working with. The text box will display “Tank 1 Man Carb” on all screens with text for Tank 1 to let you know what the machine is doing.

Racking

The Rack screen is accessed by using the “Tank 1 Rack” or F3 button on the screen shown previously. NOTE: Racking can only be performed after carbonation is complete and the machine is in the “Maint. Mode” in the text display when auto carbonation has been performed. When “Man Carb” has been entered, the Racking mode can be accessed any time.



Racking beer from the beer tank to kegs or a bottling machine such as the Merlin is used to adjust the head space pressure for packaging operations. The Rack screen displays the tank head pressure set point and is adjusted using the arrow keys above the display. The text display tells you what mode the Tank Manager is currently in. When this screen is first brought up the text message is “Maint. Mode” or “Man Carb” and the “Rack” touch button will be off. When you touch the “Rack” button changing it to On, the “Rack psi” set point will be changed to the calculated equilibrium pressure +1psi initially if from the “Maint. Mode” or the current tank pressure if from the “Man Mode”. Any time while the Rack mode is on, you may adjust the head space pressure by using the up/down arrow keys on the screen. NOTE: you can return to the Main screen any time by pressing the Main Menu or F1 and to return to the rack screen, use the Tank 1 or Tank 2 button, then the appropriate button to return to this screen. Pressing the “Rack” button to turn it off will return the Tank Manager to the Maint. Mode or Man Carb depending on how it was accessed. This feature allows you to rack partial tanks and return the system to the maintenance mode for storage at set point equilibrium conditions. You may switch from maintenance to racking and back as many times as necessary provided the Rest button is not pushed. The racking

function only operates after the Tank Manager is in the maintenance mode or from the Man Mode. DO NOT press Rest on the Tank 1 or Tank 2 screens until all beer has been racked and you are ready to vent the pressure from the tank and reset the program. In the racking mode, the Tank Manager maintains the counter pressure in the head space of the beer tank above equilibrium pressure or at an adjusted level during dispensing. If at any time the pressure in the tank exceeds 14.9psi the tank vent will open and release the pressure until it is below 14.9psi.

Once racking is complete and the tank is empty, press the Reset button on the screen to vent the pressure from the tank and reset the program in the Tank Manager. Allow adequate time for the tank to completely vent and be certain all pressure has been released before opening the tank.

C.I.P. Tank Cleaning

If your tank is equipped with Clean In Place (CIP), you will want to turn the cooling system off while performing hot cleaning. To turn off the cooling system go to the TK1 or TK2 screen, press the RST key if system is not reset and touch or press the “Cool F4” button. The key message will turn to “Off” and the cooling system will remain off until you turn it back On or start the automatic carbonation system.

Failures

Failures which are diagnosed by the computer of the Tank Manager are displayed on the user interface. These failures are displayed with text as “CH 1-4 FAIL” to indemnify which signal has a problem. These failures are identified by the computer should any temperature or pressure reading occur outside of expected ranges or if the probe should fail.

CH 1 = TK1 pressure sensor
CH 2 = TK1 temperature probe
CH 3 = TK1 pressure sensor
CH 4 = TK1 temperature probe