MICROBREWTECH REV-500 USER MANUAL

CONTENTS

SAFETY

Only operators who have been trained to use this equipment may use this machine. There are some minor risks which must be identified and understood. This is an automated machine which will not stop unless it is instructed to.

Eye and hearing protection is mandatory while using the REV. Some beer bottles can have manufacturing defects which can cause them to shatter during the crowning process. While this is an extremely rare occurrence it is good practice to wear eye protection at all times. During cleaning, high temperatures and chemicals are used which also require proper eye protection. Any machine that uses a pneumatic air supply requires the use of safety glasses.

High forces exist, up to 176kg per crowner, and 46kg for the fill heads (At standard 80psi supply pressure). Pinch points exist and are unavoidable in a machine of this type. The control panel or emergency stop should be used to stop the machine if there is a jam or issue; under no circumstances should hands be used in the machines operating area while the machine is in operation.

Avoid loose clothing, or any jewlery etc which could get caught in the conveyor belt. Operators must be aware of pinch points of the conveyor belt.

The emergency stop button of the REV does NOT completely stop and disable the machine. Once pressed the starwheel is disabled and all pneumatic cylinders return to their “home” position. It is not practicable to fully disable all of the pneumatic cylinders, as the pressurised product line is clamped using a pneumatic cylinder, and beer would rush out everywhere if all pressure was released. Operators should be aware of how to disconnect the pneumatic air suppy at the pneumatic inlet.

High voltages exist within the control cabinet. 240V power is converted in the cabinet to 24V which the machines components run on. All electric components except for the power suppy and conveyor belt motor and the conveyor relay are 24V DC.

A qualified electrician is required to maintain the 240V system. Never open the cabinet while the machine is turned on.

Correct training and observation of safety guidelines will ensure the machine is safe to work with.

SPECIFICATIONS AND REQUIREMENTS

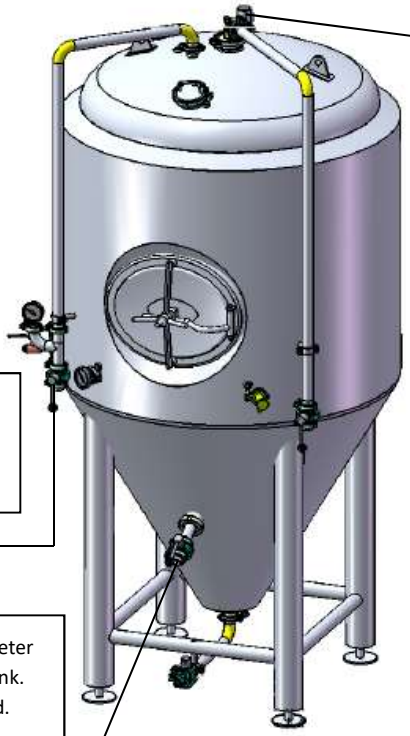
- 2 X high flow CO2 regulators and cylinders.
- Bright beer tank must have a high flow pressure relief valve fitted, and be capable of holding up to 22 psi for highly carbonated beer, less for cold beer with less carbonation, cold properly carbonated beer can be filled easily at 17 psi.
- A high quality 15A single phase air compressor (requires a special plug installed, but 3 phase isn't necessary). The compressor can be installed outside, or away from the work area to significantly reduce noise.
- High quality air supply is required to increase the longevity of the pneumatic components, in very humid conditions an air dryer may be necessary. It is the customer's responsibility to provide the machine with a high quality pneumatic air supply.
- Power supply to the machine is single phase standard 240V power supply.
- A 1.5" Tri Clamp connection is provided for the beer product line to connect, beer line is provided by the brewery. (Shortest line is best, approx 25mm ID is recommended.)
- The beer must be supplied to the machine in good condition for best results, at 0 Deg C or below, and 2 to 3 Volumes dissolved CO2.
- Crowns are subject to approval, the machine requires soft crowns.
- No solid particulates are allowed in the product being filled. For example coffee grounds will block the exit valves and cause the proportional valve to be blocked and cause machine malfunction.

CONNECTION DIAGRAM AND EQUIPMENT LISTS

PRODUCT CONNECTION DIAGRAM

Following is the connection diagram required to run the bottling machine. All connections must be ready before commissioning.

1. CO_2 cylinder and high flow regulator.



2. Suitable pressure relief valve for bright / uni tank pressure rating.

3. Blanking plate / or connection for CO_2 to bright /uni tank.

Beer in bright tank. Carbonated between 2-3 volumes @ 0 Deg Celsius.

NOTE: WARM OR OVERCARBONATED BEER WILL NOT FILL CORRECTLY.

4. 20 – 25mm diameter hose from bright tank. Preferably insulated.

The shorter the better.

5. Air compressor. 320 lpm minimum @ 100psi

6. 1.5” Tri Clamp connection from product hose to the machine.

7. Air hose with compatible ¼” BSP thread for the regulator inlet.

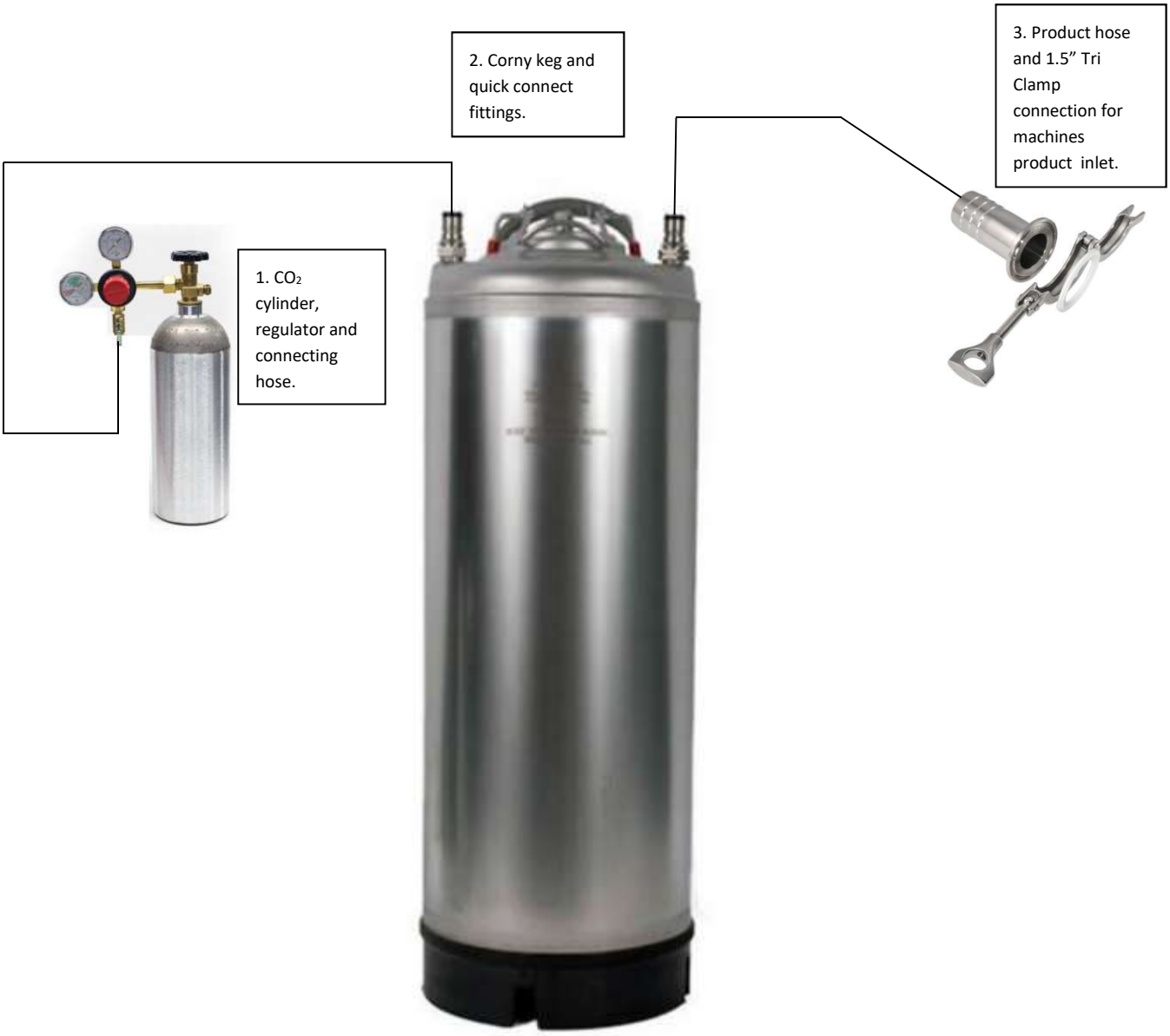
8. 3/8” hygenic tubing from CO_2 cylinder to machine’s push fitting CO_2 inlet. (John Guest).

9. CO_2 cylinder and regulator for machine supply.

CLEANING CONNECTION DIAGRAM

The connections for cleaning are essentially the same as for filling except normally a small tank is used in order to conveniently add the cleaning chemicals. A large tank isn't necessary for cleaning, cornelius kegs are a useful way to do this, or a normal keg may be used if cleaning agents can be easily added.

A CO_2 inlet to the keg and a connection from the Corny keg to the 1.5" product inlet to the machine are required.



SETUP

It is most important to have the machine aligned correctly, and to turn the machine on in the correct sequence to avoid any interference or crashes occurring. If in doubt contact the manufacturer.

INITIAL PHYSICAL SETUP OF THE MACHINE.

The physical setup of the machine is the most critical part in making the machine run at its best.

It is critical to ensure this is performed correctly. The process takes some time, but once achieved the machine should run with no issues. Training will be provided with the delivery of this new machine.

Please follow the steps as given as the sequence of the steps has been determined to be the best way to achieve excellent results. Do not skip steps, and allow an adequate amount of time.

STARWHEEL ALIGNMENT

1. This process assumes that the fill heads are true.
2. Remove all bottles from the machine and ensure that the fill heads and crowners are in the fully up position to avoid any interference.
3. If bottle size has been changed then remove the outer guides six M8 socket head cap screws (13mm spanner is required), and replace with the outer guide made for the new bottle.
4. If you are simply checking alignment is already OK then the four M10 socket head cap screws are left tight. If the starwheel is being replaced, or realignment is required, for example for a new bottle size, then leave the four M10 socket cap screws loose.
5. Disconnect the pneumatic supply, so the fill head cylinder can be moved by hand. **Ensure the fill head and crowners are in the UP position out of the way**.

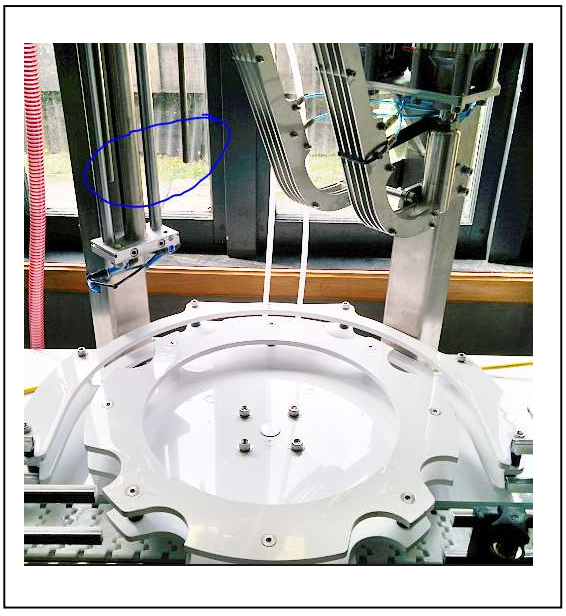


Figure 1 Empty Starwheel, Fill Heads and Crowners UP.

6. Turn the bottling machine on and introduce 2 bottles by hand while it is initialising the starwheel. Initialising is nice and slow for doing this.

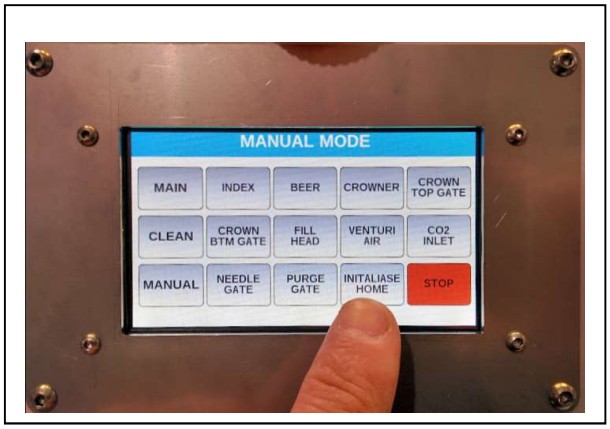
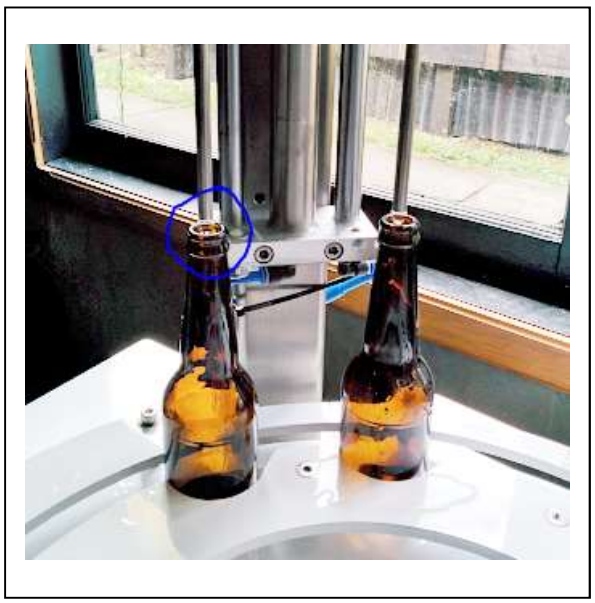


Figure 2 Starwheel Initialisation / Homing Button.

7. Once the starwheel has "homed" ensure the two bottles have indexed correctly, located against the outside guide and the trailing edge of the starwheel. Then move the fill head down to approx 10mm (3/8") above the bottle tops to check alignment. You may also manually move the fill head all the way down to double check the fill tubes are true. Special care is required. **NEVER LEAVE THE FILL HEADS ALL THE WAY DOWN, THIS MEANS THE STARWHEEL WON'T BE ACCIDENTALLY INDEXED WHILE IT IS DOWN.** (This may cause the fill tubes to be bent.)



8. If checking alignment and alignment is fine then move the fill heads up out of the way, connect the pneumatic air supply and continue. If alignment is required, loosen the bolts and go back to step 4.

9. With the fill heads 10mm above the bottle tops, align the bottles by adjusting in a clockwise direction, (the same direction as the machine indexes). If you overshoot, then move anticlockwise further than the fill head tubes, and repeat manually moving in a clockwise direction for correct alignment. This ensures that the bottles are naturally in the same position they will be in during automatic operation.

10. Once alignment is achieved nip the socket head capscrews in a star pattern, being careful not to knock the wheel out of alignment. Gradually tighten all bolts, and re-initialise. This is to check that the starwheel has been aligned correctly, and also hasn't moved during tightening of the socket capscrews. Don't over tighten the bolts, during normal operation there are low forces on the starwheel mounting bolts.

CIP CLEANING AND SANITISING

CLEANING

Cleaning out the lines is a very important part of the filling process, in order to keep the machine operating correctly, and to provide quality product to your customers.

It is important to clean the lines out immediately after a filling run, so that beer does not accumulate in the lines and valves. Normally this can be done with hot water at 65 to 70 Degrees, followed by a mild sanitiser CIP for storage between runs. A Cornelius style keg is suggested as being the easiest method to do this.

An extremely dirty machine may require several CIP cleaning cycles to be performed with a mild caustic solution at approximately 65 degrees.

CLEANING PROCEEDURE

1. Cleaning should be performed at low pressure; 10 to 14 psi is plenty. This ensures that if any leaks occur in any tubing, they will occur during filling of beer, not with any cleaning chemical. A Cornelius keg is ideal to fill with hot water, caustic solution or sanitiser.

2. If the line is long between the cleaning tank and the machine, the filling operation can be used to bring the fluid through, and to clear the lines of any beer which may still be present, this is also a good way to quickly bring the hot water through the line to the machine. When filling at very low pressure, the fill speed needs to be increased to approximately 90 (%).

Figure 3 Typical settings for bringing cleaning fluid through the lines.

3. Once the cleaning fluid is through to the machine it can be stopped (Between fills so that no pressure is in the bottle), and the CIP program run. The cleaning screen has two options, “Clear Lines” and CIP, or “Clean In Place”.

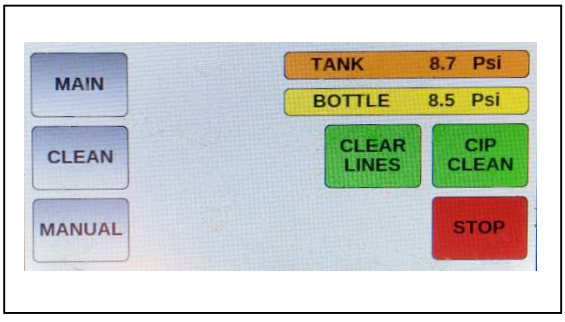


Figure 4 Clean screen

The CIP program fills the bottles to overflowing, so that the fluid completely fills the entry and exit lines. It also allows the operator to manually remove the pressure sensor lines to allow the fluid to flow through them and turn the valve to allow fluid to flow back through the CO_2 line. There are designated parts of the program for letting the fluid flow through the pressure sensor and CO_2 lines. The CIP program also cycles the valves open and closed to mechanically remove any buildup.

CLEANING THE FILL HEAD SEALS AND FILL TUBES

The fill head's silicone bottle seals and fill tubes are exposed when the machine is not in use. They will require cleaning before a filling run. Cleaning with a cloth will remove any fly dirt or similar which may have been deposited while the machine is not in use. Note below (From the maintenance section).

- Avoid getting any harsh cleaning chemicals on the fill head pneumatic cylinder, especially when cleaning the underside of the fill head seals and the fill head tubes.

FILLING PROCEEDURES

CHECKLIST:

- Machine is correctly set for the bottle size and running smoothly.
- Beer is carbonated and chilled to 0 degrees Centigrade (32 Fahrenheit) or less, (prevents excessive foaming).
- Beer is not over-carbonated, this will prevent successful filling, see carbonation tables in the appendix.
- CO2 tanks are full, regulators are ready at Approx. 20 to 24 psi at the bright tank and 3-4 psi higher for the machines supply.
- Machine is cleaned and Sanitised (per instruction in "Routine Cleaning and Sanitising" section).
- All hoses are cleaned and sanitised.
- Crowns are ready for use, sanitised and dried if necessary.
- Bottles are ready for filling, sanitiser ready for rinsing bottles before placing in the machine.

TYPICAL FILLING SETTINGS

This machine is designed to cater for beer or other carbonated liquids which vary in carbonation level / temperature / type of beer, and filling pressure. In order to achieve this the user must adjust the settings on the touch screen for the filling session taking place.

Filling beer is a complicated process that involves juggling many factors including:

Beer type, carbonation level, product temperature, bottle temperature, product pressure, and finally once being filled into the bottle the machine settings described below.

As an example: If we have a highly carbonated beer there are some things to do to help filling:

- We will want to fill at a slightly higher pressure in the bright tank. This means filling will occur at a higher pressure, helping to avoid breakout during filling. Breakout is when carbon dioxide comes out of solution during filling.
- We will also want to be filling cold, 0 Deg C, as carbon dioxide stays in solution at low temperatures. (Ever tried to pour a warm beer?).
- Because of the higher pressure in the bright tank the fill speed on the machine will need to be reduced, higher pressure in the bright tank automatically causes faster filling even with the same filling speed set on the machine.
- Filling may need to be slower than normal to reduce agitation of the beer during filling.
- Fob release pressure may be slightly lower than normal to reduce fobbing agitation when the fill heads are retracted.

An example for a “normal” beer typical filling settings could be:

EXPLANATION OF EACH BUTTON:

Following is an explanation of each of the buttons on the main screen, their typical values and faults that may occur if they are incorrect.

FILLING SPEED

This setting determines the speed at which the bottles will fill. The possible range is from approximately 20% to 80%.

- Faults can be caused if the speed is too slow, the bottle will not fill fast enough, or may not depressurise fast enough, which will cause a controller error.
- If the speed is too fast, the beer will be agitated causing excessive foaming, and random low fills.
- Remember that the speed that the bottle fills is a combination of the bright tank pressure AND this speed setting.

FILL HEIGHT SENSITIVITY

Sensitivity allows the controller to correctly sense when the bottle is full. Typical settings will be around 0.8 to 1.8 psi. Note that this setting can be determined by looking at the difference in pressure between the tank and the bottle while filling.

For example during the filling phase if the tank pressure is 19.8psi and the bottle pressure is 18.9psi as shown, then the suggested fill sensitivity is 19.8-18.9 = 0.9 plus 0.3 psi = 1.2psi as shown above. Using the difference between the pressures plus about 0.3 should give good consistent fill heights.

- Faults that can be caused: If the sensitivity is too low then the bottles will underfill.
- If the beer exits the bottle and a significant amount exits the needle valve line then the sensitivity is too high, this will also cause depressurisation failures
- If underfills are coming through say every five fills or so then the sensitivity is very slightly too low, try increasing by 0.1psi or so.

FOBTIMER

The Fob timer setting is simply the number of seconds that the crowners are delayed before capping the bottles. Typical settings are from 0 to 2 seconds. This allows the operator to delay the crowners if the bottles are not quite capping on the foam.

This feature is great because the filling parameters do not have to be changed to adjust capping on the foam. Changing fill parameters will always take some time to settle in, before it can be seen if the changes have had the desired effect.

Having the fob timer close to zero is desirable because it means you are filling quickly. If you have the Fobtimer up at 2 or even 4 seconds then the beer may be undercarbonated, or you could probably fill a bit faster.

DEPRESSURISATION SPEED

This is the speed that the bottle is depressurised after filling finishes. This value should be left at 90% open. It is intended that this setting will be removed from the screen in the future.

RELEASE PRESSURE

After filling the remaining headspace in the bottle is depressurised before the fill head is retracted. If the fill head were retracted at filling pressure there would be beer everywhere but in the bottle, which is not what we want. The higher the release pressure the more agitated the beer will be causing more fobbing / foaming of the beer when the fill head is released.

- Faults – If the release pressure is too high then the beer will foam excessively.
- If the release pressure is too low then the carbonation coming out of solution in the beer will cause too much foaming and a “Fob depressurisation took too long” failure will occur.
- Note that if the release pressure is set at zero then the bottle will never get to zero psi, as carbon dioxide coming out of the beer will keep the pressure in the bottle very slightly above atmospheric pressure.

FAULTS

Faults during are diagnosed by the microcontroller, and an error message is displayed so the operator can determine the fault easily.

FAULTS DURING FILLING OPERATION – (DISPLAYED ON MICROCONTROLLER)

INDEXING FAULT

Fault messages:

- "STOPPED BOTTLE INDEXER FAILURE"
- "STOPPED BOTTLE INDEXER JAMMED"

If there is a jam; (for example if the operator forgets to turn the conveyor and the bottles are jammed at the exit of the starwheel), the starwheel motor will be forced out of position while it is indexing. This will not harm the main motor. It is designed to “release” under this circumstance; however the starwheel may need to be re aligned. The microcontroller will also recognise that it is out of position and throw a fault if the jam occurs during automatic operation. The best way to deal with a jam is to press the emergency stop button to disable the motors and return the pneumatic cylinders to their “home” positions. In the event of a jam all alignments should be checked.

COUNTERPRESSURE FAILURE

Fault message:

- "STOPPED COUNTERPRESSURE FAILURE"

A counterpressure failure occurs when the bottle is unable to be pressurised high enough to meet the pressure of the beer in the inlet line. Typically this occurs when the CO_2 cylinder connected through the machine is not turned on, set too low or has run out of gas.

Other possible situations:

- Only one bottle (or no bottles) are in position under the fill head. The machine will not be able to pressurise the single bottle.
- The pneumatic air supply pressure is too low, and a seal is not able to be made on the top of the bottle.

DEPRESSURISATION FAILURE

Fault message:

- "STOPPED FOB DEPRESSURISATION FAILURE"

1. A Depressurisation failure can occur when the fill height sensitivity is set too low, which causes too much product to be in the exit lines, subsequently stopping the bottle from being able to depressurise correctly.
2. If the depressurisation pressure is set too low and the bottle cannot get to that pressure. If the release pressure is set to zero psi then the CO2 being released from solution will not allow the bottles pressure to get to zero psi.

3. If the product is overcarbonated for its temperature then the beer will foam so much it will block the exit lines and prevent correct depressurisation.

DEPRESSURISATION FAILURE

Fault message:

- "STOPPED SOFT START FAILURE"
- The beer bottle is pressurised slightly above the pressure of the bright tank, then allowed to depressurise at the nominated fill speed until exactly the same pressure as the bright tank before filling starts. This fault occurs when the bottle takes too long to depressurise to the same as the bright tank. There are three situations that can cause this fault.

1. The inlet CO2 pressure is too high, causing the bottle to be over pressurised and therefore unable to depressurise fast enough. – Try reducing the inlet CO2 pressure.
2. If the fill speed is too low then the bottle cannot depressurise fast enough, and the fault will occur. NB that below 5% fill speed the outlet valve is fully closed, and filling will be impossible. A fill speed below 25% would be unusual.
3. If the exit valves are blocked, or not operating correctly then this fault will occur. There has been a case where a machines proportional valve was blocked with coffee grounds, stopping it from opening correctly. No solids should be put through the machine. Contact Microbrewtech if you suspect the exit valves have malfunctioned.

MAINTENANCE

This is a robust machine that should provide many thousands of trouble free fills. The machine should be relatively maintenance free.

- The most important thing is the machines alignment/ setup being correct to avoid any physical crashes.
- Maintaining the air supply to the machine is very important for keeping the pneumatic components in good condition. The air compressor for the machine should be drained every day, to prevent excessive water droplets in the air supply. A filter regulator and water trap are supplied with the machine to remove 99% of water droplets from the air. If the machine is to be operated in an extremely humid environment then an air dryer may be necessary. Please consult with the manufacturer or directly with SMC the pneumatic component manufacturer.
- Regularly check the machine for loose components, nuts / bolts etc, however keep in mind that not all bolts are highly torqued, too much tightening may impair the machines performance, especially where plastic components are involved, as it is easy to overtighten and deform them. Consult the manufacturer if unsure.
- Avoid getting any harsh cleaning chemicals on the fill head pneumatic cylinder, especially when cleaning the underside of the fill head seals and the fill head tubes.
- Maintenance advice is available from the manufacturer, and specific procedures can be supplied on request.