XIAC CF1220 Memory Flap Unit Installation/Validation (v1.0 – January 2016)

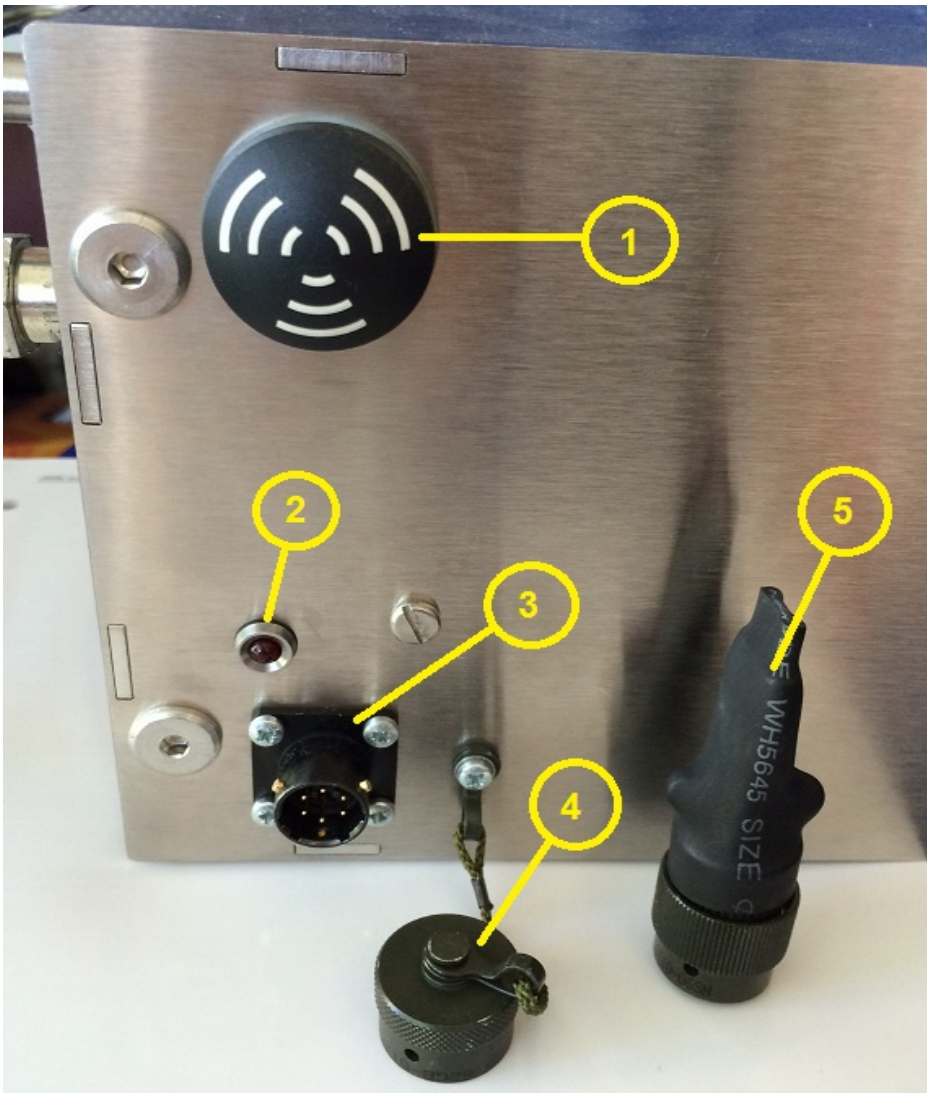
Installation

The basic mechanical layout as well as the electrical and pneumatic connections are identical to the OEM CF1220 MFU. Installation is therefore equal to the procedures as described in the OEM manual.

Non OEM indicators & connector

On the back of the unit we find a few items that were not present on the OEM unit.

1. Audible signal indicator / Beeper
2. Optical signal indicator / LED
3. Connector for Bluetooth dongle
4. Dust cap (replace when connector not in use)
5. Bluetooth dongle (required for iPhone app)



Function of the indicators

When at least one of the measured cylinder timings is out of the set minimum and maximum range, an audible signal will sound and an optical signal will indicate the channel in error. The optical signal will also flash when the air pressure is low (no audible signal will sound).

Audible signal: Will output a specified number of beeps when a channel is in error. The number of beeps can be changed through the iPhone app. The signal is approximately 80dB, this is not very loud and will not cause any discomfort to the ears even when the front doors (that usually cover the MFU) are open.

Optical signal: The LED will flash in a binary (morse code style) fashion to indicate the faulty channel. A short flash (dit) is indicated by a dot (“.”) and a long flash (dah) by a dash (“-”). The duration of the dits and dahs are chosen so that they are easily recognisable for most people. They keep repeating (separated by a long pause) until the channel is no longer in error.

- No Error: Repeated short flash followed by long pause
- Air pressure error : `- - - -` **(1111)**
- Error on channel 1: `. . . -` **(0001)**
- Error on channel 2: `. . - .` **(0010)**
- Error on channel 3: `. . - -` **(0011)**
- Error on channel 4: `. - . .` **(0100)**
- Error on channel 5: `. - . -` **(0101)**
- Error on channel 6: `. - - .` **(0110)**
- Error on channel 7: `. - - -` **(0111)**
- Error on channel 8: `- . . .` **(1000)**
- Error on channel 9: `- . . -` **(1001)**
- Error on channel 10: `- . - .` **(1010)**
- Error on channel 11: `- . - -` **(1011)**
- Error on channel 12: `- - . .` **(1100)**

Operation of the unit

Electronic method

The position of the cylinder piston is measured through 24 Hall-Effect-Sensors (2 for each channel). The analogue output of the HES is affected by the magnet attached to the piston inside the cylinder, a software protocol implements this signal and determines the position of the cylinder. As the XIAC cylinders are specifically designed for this purpose and the position of the magnet inside the cylinder is critical, this system will only work with the supplied cylinders.

Power supply

The CF1220 **does not** supply power to the Memory-Flap-Unit, to combat this problem, energy is taken from the nozzle up/down output and memory flap outputs and stored into buffer capacitors. This means that the XIAC electronics will loose power input when the nozzle is up and the memory flaps are at home position. During a normal production run, there is a short period where the nozzle is up and the memory flaps are pulled open. This happens just before the nozzle comes down again on the newly indexed bottle. This short moment of power-loss is bridged by the buffer capacitors and won't cause any issue.

The only moment that it **may cause a problem** is in the output test. Dependent on the CF1220 software, when entering the output test, the nozzle is forced up and the memory flaps pulled open. Now the MFU is out of power and will no longer work. To enable the unit in the output test, just turn on the output for the nozzle (Output 14).

Stopping the machine

To stop the machine in case of an error, the air pressure signal is briefly interrupted. This interruption is done at a very specific moment so that the affected bottles are right underneath the machine. One (full) bottle has just been indexed and the new bottle (containing the pre-counted quantity) is right under the nozzle. It will stop production on all CF1220 machines and will stop the conveyor on most CF1220 machines. The reject arm opens and after pressing the reset button (on the touch screen), the two affected bottles are rejected.

The error-stop signal is multiplexed with the low-air pressure signal in such a fashion that the original low-air pressure message will still work as in the OEM unit.

Validation

The new unit affects the functioning of air pressure error signal to the CF1220 control unit, it is therefore necessary to confirm proper functioning of this signal.

For this procedure, we assume the new unit has already been installed into the machine as described in the OEM manual and the machine is ready to be switched on with all parts in place.

Validate low-air pressure

1. Switch on machine
2. Wait until touch screen has booted, then press reset
    1. Nozzle is down
    2. LED flashes on the MFU indicating “no error”
3. Disconnect the air supply to the CF1220 (at the back of the machine)
    1. Touch screen indicates “No Air pressure”
4. Reconnect the air supply
5. Press reset button on the touch screen
    1. “No Air pressure” error should disappear

Validate stop-machine on timing error

1. Switch on machine
2. Wait until touch screen has booted, then press reset
    1. Nozzle is down
    2. LED flashes on the MFU indicating “no error”
3. Install the Bluetooth dongle as described in the “CF1220 MFU app manual” and login to the app as Administrator (Admin).
4. Start the machine and run some bottles with product
5. Change a setting to bring the timing out of range (Set FWD RESP to 30ms)
    1. After a new bottle has indexed, the machine will stop with 1 bottle underneath the nozzle and one (full) bottle has just left the index station.
    2. The reject arm will open
    3. The beeper will sound
    4. the optical indicator will flash in a morse code fashion
6. Change the FWD RSP time back to default (18ms)
7. Press RESET on the touch screen
    1. Conveyor will start
    2. 2 bottles will be rejected
8. Start the machine
    1. LED will indicate “no error” after a new bottle has been indexed

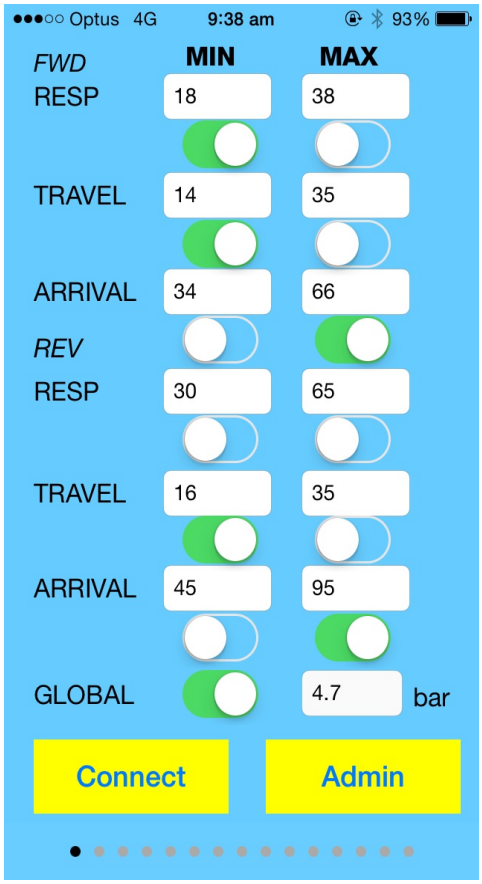
Timing requirement

As can be seen in below screenshot, not all errors are enabled. The errors for the timings that will not influence the accuracy of the count are not enabled. This is done so that the cylinders can be used without problem for the longest possible time.

Important timings explained:
FWD RESP (forward response time). If a cylinder responds too quick, the memory flap may bump into a previous product and change its direction. Worst case would be that it would catch the product onto the memory flap rather than letting it pass. Very unlikely to happen, but enabled never-the-less.
TRAVEL (forward travel time). If the travel time is too short, the cylinder moves too fast and could bounce when the buffer is hit.
ARRIVAL (forward arrival time). If the memory flap does not reach the end within the required time, it could miss catching a product and an overcount/undercount situation may occur.

REV RESP (reverse response time). This time does not influence the accuracy of the count and therefore error checking is disabled by default.
TRAVEL (reverse travel time). If the travel time is too short, the cylinder moves too fast and could bounce when the buffer is hit.
ARRIVAL (reverse arrival time). If the memory flap does not return home within the required time, it could be commanded forward while not all products on the flap have passed through to the bottle resulting in miscounted bottles.

Note that the air pressure indicated (4.7 Bar) has a tolerance of about 10%



Example video

Please take your time to watch the example video explaining the use of the iPhone app.

Link to YouTube video: https://youtu.be/gyCoIMxWoD4

Or use the below QR code. The QR-code can be read using the QRReader app for your device.

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