TECHNICAL SPECIFICATION

OSCILLATORY BAFFLED REACTOR / CRYSTALLISER (OBRC)

DN25 & DN40

CLUSTER CRYSTALLISER REACTORS

AWL inspiring innovation

Dec Group

OVERVIEW

The Cluster crystalliser Reactor (CCR) has been designed to allow the user to evaluate the potential benefits of oscillatory baffled mixing with chemical reactions and crystallisations in a cascade of two (Twin CCR) or four (Quad CCR) vessels. It will allow the investigation of the fundamental kinetics and critical process parameters such as flow rates, reactant ratios, cooling rates, temperatures, addition rates etc. and what benefits the baffled mixing can bring. The unit is PLC controlled to allow automatic vacuum transfer between vessels giving the end user precise control over residence times.
The framework and vessel mountings are standardized to allow either DN25 or DN40 or a mix of sized vessels to be used.

The unit can be configured for many different continuous or semi-continuous processes in a series of vessels, e.g. reaction, work-up, solvent exchange, crystallisation alternatively it can be run in a semi-batch configuration e.g. one vessel is being filled and warmed whilst a second vessel is carrying out a cooling crystallisation before the two vessels swap roles. This setup allows the unit to run as a crystalliser within a continuous process whilst avoiding many of the problems associated with fully continuous crystallisations.

Vacuum transfer between the vessels is controlled via a touch screen HMI and transfer intervals and volumes are user-programmable. This allows the user to have precise control over flow rates and residence times. All transfer lines are fully jacketed to avoid unwanted side reactions or crystallisations within the lines.

All the necessary valves, pipework etc. are built into the CCR allowing for simple, user-friendly operation.

Operating Parameters:

	DN25 Vessels	DN40 Vessels
Temperature Range:	-20 °C ~ +120 °C	-20 °C ~ +120 °C
Oscillator Frequency:	0.1Hz ~ 6.0 Hz in 0.1 Hz increments	0.1 Hz ~ 6.0 Hz in 0.1 Hz increments
Oscillator Stroke:	5 mm ~ 60 mm in 1 mm increments	5 mm ~ 60 mm in 1 mm increments
Operating Pressure:	Ambient	Ambient
Working Volume:	110 ml	280 ml

Although the above conditions are individually possible, no guarantees can be given for any combination. The overall speed of the oscillation is limited by the linear motor and whilst, for example, 10mm at 6Hz is possible, 40mm at 6Hz may not be.

Materials of Construction:

The wetted parts of the OBR are manufactured, as standard, from the following materials:

Glass Vessel:	Borosilicate 3.3
Interface Collar(s)	316L
Bottom Outlet Valve:	PEEK / FFKM / FEP
Splash Cap:	PTFE
Baffle String:	316L/PEEK

Alternative materials, where suitable, are available on request.

Weights and Dimensions:

Twin Reactor: 200kg, 600mm x 500mm x 900mm (width x depth x height) Quad Reactor: 300kg, 1000mm x 500mm x 900mm (width x depth x height) Controls: 20kg, 300mm x 625mm x 410mm (width x depth x height)

Note: As we are continually improving both the performance and reliability of our products all product data and specifications may be subject to change without notice.

SYSTEM:

Reaction Vessel:

The Reaction Vessels comprise straight glass sections with 316L end caps and intermediate process insertion collars. The design is such that the smooth bore and minimal dead volume connection and sampling points allow the operator to work with heterogenous solids with a minimal hang-up.
The intermediate process insertion collar can be used for sampling or PAT and can be supplied with a range of fittings to suit the operator's requirements.
The reactor can be supplied with either 25mm or 40mm diameter vessels to suit the end user requirements.
The vessel, end caps and intermediate collars are fully jacketed to achieve optimum temperature control throughout the reactor.

Figure 1: Cross-section view through a reaction vessel

Inter-Vessel Transfer:

The flow of reactants etc. between vessels is controlled by discrete vacuum and gravity transfer. Fluid is pulled from a reaction vessel into an intermediate transfer vessel via vacuum thereby minimizing the potential for damage to crystals. It is then transferred into the next vessel by gravity. The user can choose transfer volumes between vessels along with transfer intervals allowing precise control over residence times and flow rates. All transfer lines are temperature controlled to avoid unwanted side reactions or crystallisations.

All the required valving, vessels and other control parts are provided as standard within the unit to allow for simple, trouble-free operation. The end-user merely needs to connect the system to their vacuum and compressed air services and the CCR is ready to go.

General Arrangement:

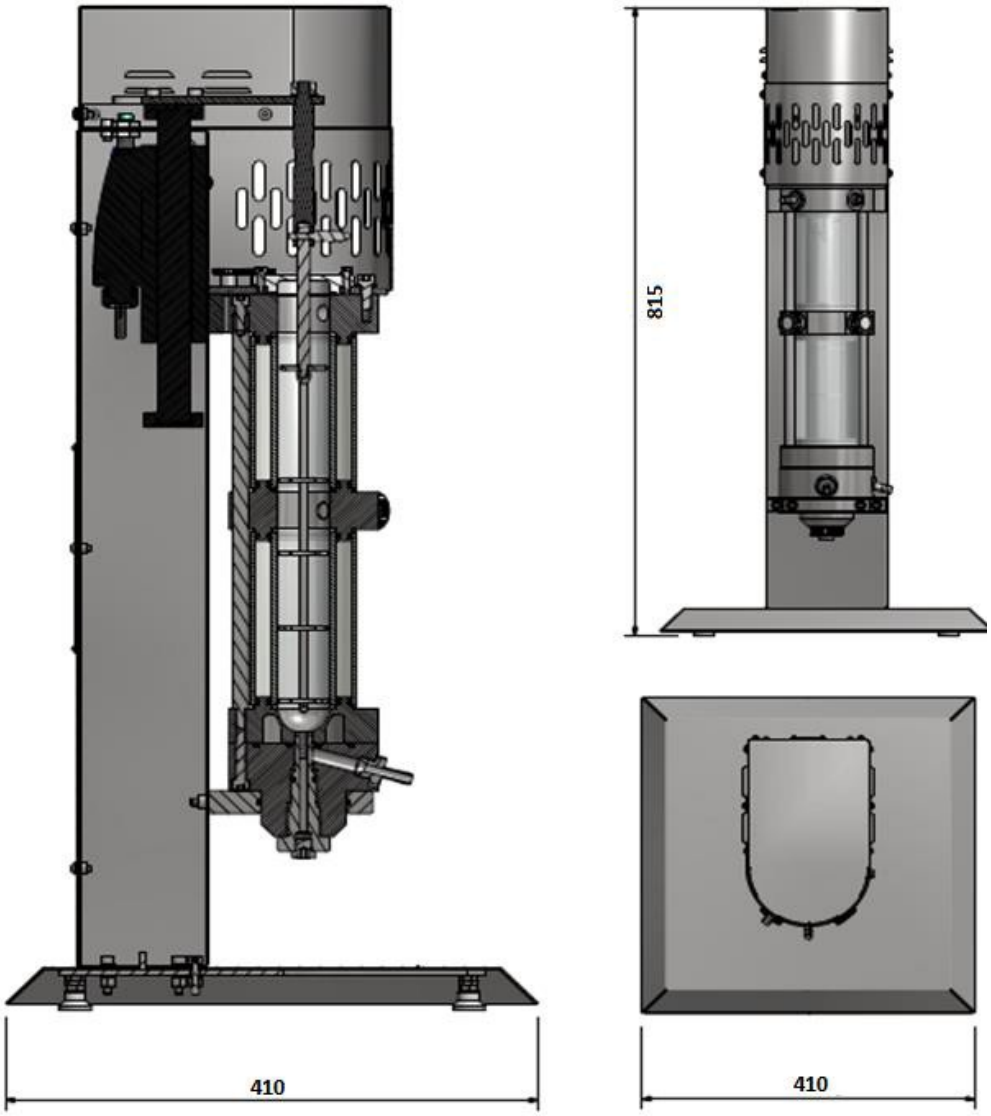

Figure 2: Figure 2: Representative example of a single stage of the CCR

Support Structure:

The CCR is mounted on a stainless steel support structure.

The vessels and transfer vessels can easily be removed from the support structure for cleaning purposes.

Drive System:

The drive system consists of a linear motor and controller, pre-programmed to allow the amplitude and frequency of the baffled agitator to be adjusted via the touch screen which is mounted on the local operating panel along with emergency stop and reset buttons.
The linear motor and all moving parts are built into the frame and fully enclosed behind metal guarding.

Control System:

The control system cabinet houses the PLC, drive controller, safety circuits (Emergency Stop) fuses and power isolator and an on-board touch screen to allow the control system to operate as a standalone unit without the need for an external laptop or PC. The main control panel can be positioned remotely from the unit, not requiring any fume cupboard space.

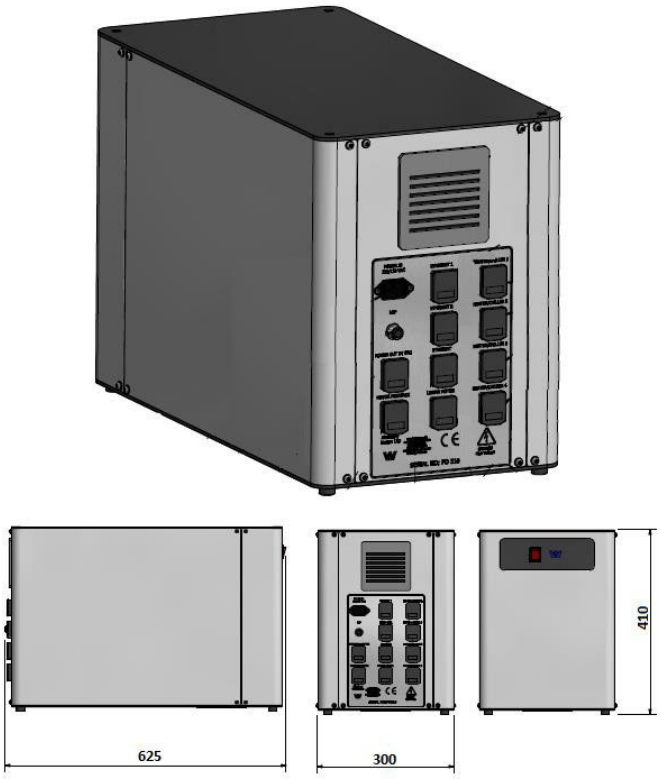

Figure 3: Control Panel

Local Operating Panel:

The local operating panel is connected via trailing leads which allows the operator to control the unit from outside the fume cupboard.

Electrical Specifications:

Supply: 1 phase, N and Bonded Earth, 230 Volts, 50Hz (alternative configurations are available on request).

The machine operating current is up to 10 Amps.

The supply to the control panel must be via an earthed mains connector. Temperature:
The control system should be operated at an ambient temperature of between
0 and 50°C. (140°F). Storage should be within an ambient temperature range of 0 to 65 °C and a relative humidity range of 5 to 95% non-condensing.

Documentation:

Each unit is supplied with one hard and one electronic copy of the documentation package which includes the following items:

- Operations and Maintenance Manual
- CE Declaration of Conformity
- General Arrangements and Parts Lists
- Electrical Schematic Drawings
- Proposal and Technical Specifications
- Safety Documentation

Standards and Directives:

AWL's laboratory range of OBR's built as standard to meet the following.
directives:

EN 60204 – 1:2018
Safety of Machinery - Electrical Equipment of machines.

EN 61000-6-4:2018
Electromagnetic compatibility. Generic emissions standard for industrial environments

EN 61000-6-2:2016
Electromagnetic compatibility. Generic immunity standards for industrial environments

Options:

At or before the time of order the customer can choose from a range of options and extras including:

- Increased operating temperatures.
- Integrated feed pump(s)
- Additional feed collars, process insertion points
- Bespoke feed collar to suit end user PAT.
- DCS control
- Temperature-controlled transfers in/out
- Alternative materials for construction

WHO WE ARE

Alconbury Weston Ltd (AWL) are at the forefront of the design, manufacture & supply of Continuous Processing Technologies & Systems.

We truly live and breathe inspiring innovation. In the past 8 years, we have taken the much-talked-about and highly anticipated continuous processing theories and turned them into a reality for use in the Chemical, Food and Pharmaceutical Industries today.

“The advance in technology is based on making it fit in so that you don't even really notice it”.
Bill Gates

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