

## TECHNICAL SPECIFICATION

### DN47 Glass Oscillatory Baffled Reactor / Crystalliser (OBRC)



## OVERVIEW

This Oscillatory Baffled Reactor / Crystalliser (OBRC) has been manufactured for the intended use of carrying out chemical reactions and crystallisations at larger scales. It will allow the investigation of the fundamental kinetics and the critical process parameters such as reactant ratios, cooling rates, temperatures, addition rates etc. and what effects the baffled mixing can bring.

The unit can be supplied with a single or twin vessel configuration, both configurations fit on the same reactor framework. Twin vessel configurations are supplied such that they can be used as two individual batch vessels or connected to work as a chain of stirred tanks, this vastly increases the flexibility of the unit and allows much easier integration into continuous processing streams.

### Operating Parameters:

Temperature Range:	-20°C ~ +120°C
Oscillator Frequency:	0.1 Hz ~ 6.0 Hz in 0.1 Hz increments
Oscillator Amplitude / Stroke:	5 mm ~ 70 mm in 1 mm increments
Pressure:	Ambient

Although the above conditions are individually possible, no guarantees can be given for any particular combination. For instance, the total speed of the oscillator is limited by the motor and controller so a frequency of 6 Hz can be achieved at smaller amplitudes but not necessarily at the largest oscillation.

### Materials of Construction:

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

Vessel:	Borosilicate 3.3 Glass
Collars:	316L Stainless Steel
Drain Valve:	316L Stainless Steel / FEP
Baffle String:	316L / PEEK
Seals:	PTFE / FEP

### Weight and Dimensions:

Weight approx.:	360kg
Dimensions:	1000 x 650 x 2400 mm (width x depth x height)

The above dimensions are of the footprint of the unit without castors. A further space of 100mm should be allowed all around the reactor to allow for connections of services etc

### Reaction Vessel:

The standard scope of supply includes one, fully jacketed, DN47 reaction vessel:

1.6m working length / 2.77-litre vessel with a 2.6-litre working volume.

Each vessel is made up of several straight glass sections (3 as standard) with intermediate coupling collars of 316L steel. The vessel is water jacketed and the same water flows through a heating path within the collars and end caps to ensure that the complete vessel is maintained at one temperature throughout.

The vessel is complete with a fully sealed cap, baffled agitator, jacket heating connections, bottom outlet valve, and process inlet / PAT connection points. The bottom outlet valve is specially adapted to allow for its complete removal and the fitting of a sparger for gas/liquid reactions.

The OBRC vessel and baffle design provides high intensity, low shear mixing with a large jacket area to process volume allowing for precise control over process temperatures. The unit can be supplied with a single vessel or twin vessel configuration. The twin configuration allows much more flexibility and offers the end user the chance to integrate the reactor into many continuous and semi-continuous processes.

The twin vessel configuration is mounted on the same frame as the single vessel systems and therefore occupies the same footprint. It is always possible to upgrade a single vessel to a twin vessel unit at a later date.

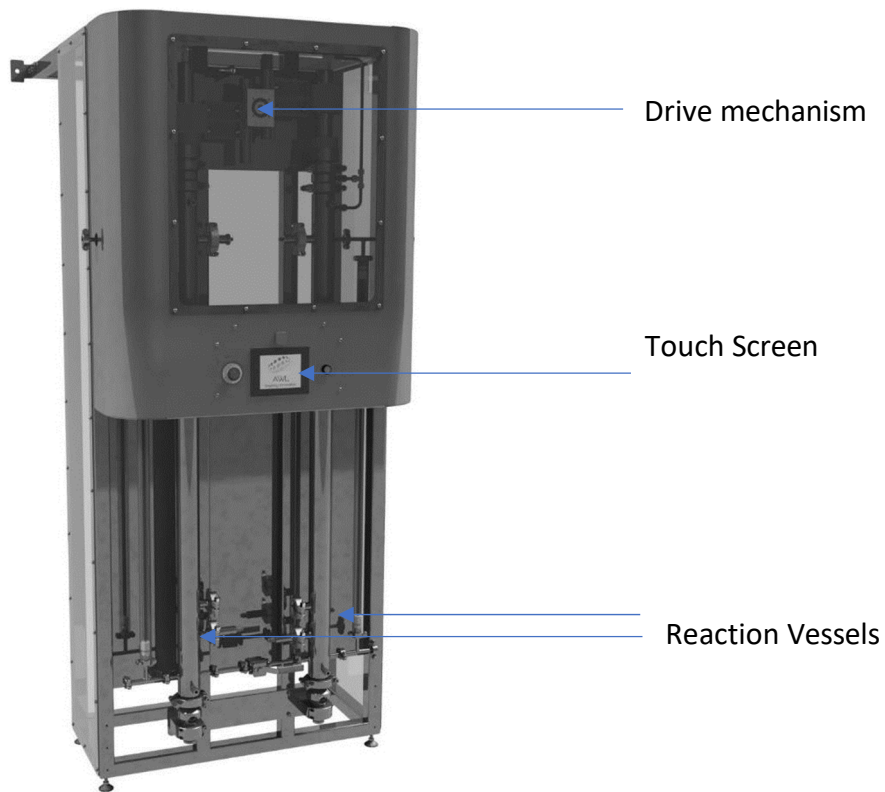
### Drive Mechanism:

A linear gearbox drives a high-powered permanent magnetic coupling which drives the baffle indirectly through a fully sealed cap using magnetic forces. This enables the vessel to be manufactured with no moving seals thereby vastly prolonging the service intervals. The gearbox is driven by a high-precision servo motor and the coupling/baffle string is balanced with a counterweight to increase the overall electrical efficiency of the unit. The counterweight can be removed and replaced with a second vessel at the time of order or at any time post-purchase.

### Support Structure:

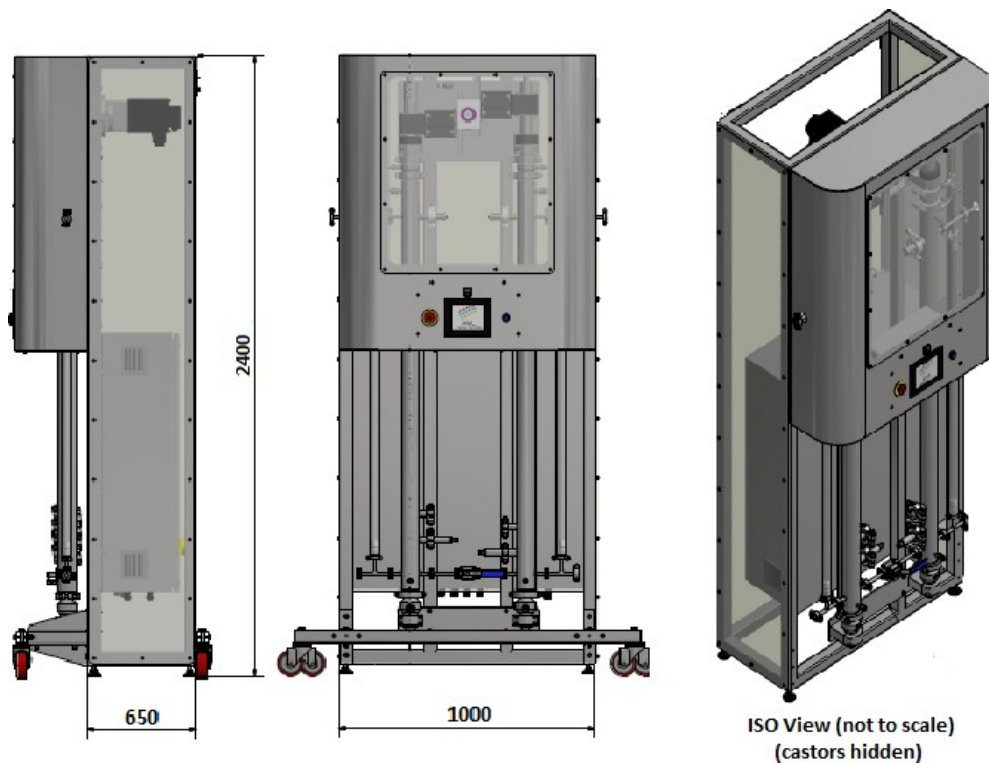
The reaction vessel is supported by a stainless-steel support structure. The rear upper framework houses the servo motor, gearbox, and other moving parts whilst the lower rear section of the support structure houses the control panel.

Representative Example:



*Figure 1: DN47 OBRC Complete System*

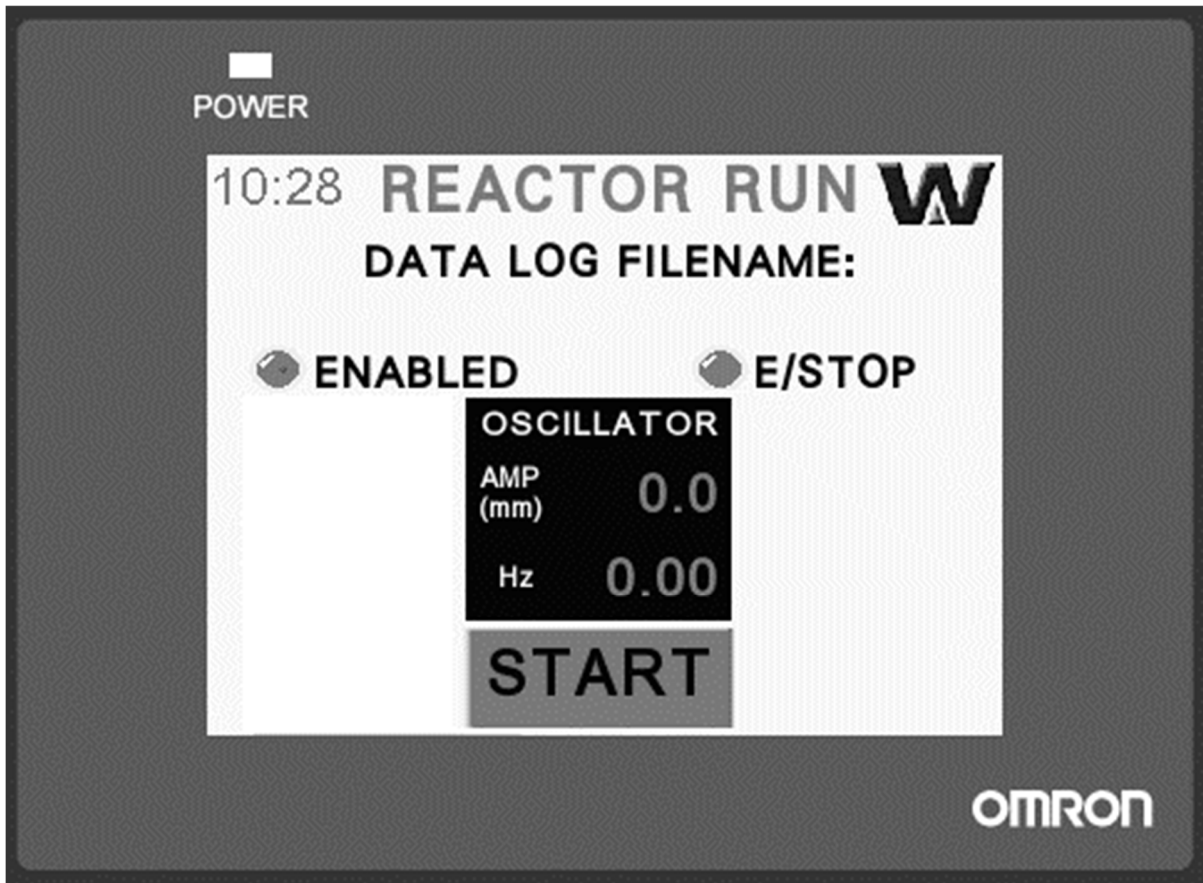
General Arrangement:



*Figure 2: General Arrangement (For Illustration Only)*

## Operator Panel:

Mounted on the front guard are the touch screen HMI, reset and emergency stop buttons. The HMI is used to start and stop the oscillator as well as adjust the frequency and amplitude of oscillation. The panel also indicates the state of the safety circuit which is controlled by the oscillator drive controller and the inbuilt pressure transmitter safety controller.



## Control System:

The control system cabinet houses the PLC, drive controller, safety circuits, fuses, power isolator and other electronics. The cabinet is mounted on the rear side of the OBRC framework.

Electrical Specifications:

Supply: 3 Phase, Neutral and Bonded Earth, 400 Volts, 50 Hz

The supply must be fed to the machine in a conduit that is grounded to the enclosure. The machine's operating current is up to 16 Amp.

Temperature: The system is designed to be operated at an ambient temperature of between 0 – 50°C. (140F). Storage should be within an ambient temperature range of 0 to 65°C and a relative humidity range of 5 to 95% non-condensing.

## Standards and Directives:

AWL's COBC range is manufactured as standard to meet the following European directives and harmonised standards:

2014/35/EU

Low Voltage Directive

2014/68/EU

Pressure Equipment Directive

2004/108/EC

Electromagnetic Compatibility Directive

EN 13849-1: 2015

Safety of Machinery – Safety-related parts of control systems

EN ISO 12011: 2010

General principles for design. Risk assessment and Risk Reduction

EN 61000-6-4 : 2007

Generic Immunity Standard – Industrial Environment

EN 61000-6-6: 2003

Generic Emission Standard – Industrial Environment

## Options:

The following options are outside the standard scope of supply but can be provided on request.

Increased operating temperature (up to 200°C) Twin reaction vessels.

Reactor mounted and HMI controlled low pressure pumps Larger HMI touch screen.

Additional and bespoke connection / PAT points Sparge insert for gas / liquid reactions.

DCS control ATEX

Compliance

Temperature-controlled lines in & out Separate control and/or operating panel

Alternative electrical specification to suit final destination Alternative materials of construction / wetted parts.

## 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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