

# **C-Flow<sup>®</sup> LAB 1x1**

## **Instruction Manual**



**C-Flow**  
Electrochemical Range

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## 1 Introduction

C-Flow® LAB 1x1 has been designed for general purpose laboratory electrochemical work. This includes research and development, electrochemical reaction study, and the development of electrodes, electrolytes and membranes.

A stand is provided to make assembly quick and easy. The use of the stand is shown in the on-line video demonstration. The unit is designed for ease of use and no tools are required for assembly.

The cell comes equipped with a set of electrodes but it is designed so that you can fit your own electrodes very easily. Templates are provided so that you can cut your own gaskets and membranes.

C-Flow® LAB 1x1 has been designed based on our long experience of electrochemical R&D. We are constantly improving our products and we welcome any feedback or suggestions you have about C-Flow® LAB 1x1.



## **2 Safety**

C-Flow® LAB 1x1 weighs 1.25 kg when assembled and precautions should be taken to avoid injuries to feet if the unit is accidentally dropped. Safety shoes should be worn when unpacking, assembling, disassembling or moving the cell.

The user should carry out a risk assessment before using the C-Flow® LAB 1x1. This should include a COSHH assessment for the substances under test. Suitable Personal Protective Equipment should be worn and other suitable measures taken to control the risk of exposure to substances hazardous to health.

Due to risk of chemical release at pressure, it is recommended that the user measure the pressure at the entrance to the cell and restrict the liquid flow rate so that the pressure does not exceed 1 bar (gauge). The user should check the pressure rating of any tubing or fittings used with the cell (not provided). It is recommended that the cell be checked for leaks with a non-hazardous substance (e.g. water) every time it is reassembled. It is the responsibility of the user to complete a risk assessment for all aspects of use.

## **3 Unpacking**


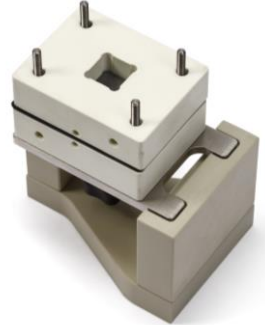


C-Flow® LAB 1x1 is shipped already assembled but not tightened. It is recommended that the cell be dismantled and reassembled before use. This will familiarise the user with its construction and to allow user to make changes to the cell set-up e.g. addition of membrane (not provided).

Take care when unpacking the cell to avoid dropping it and causing damage or injury.

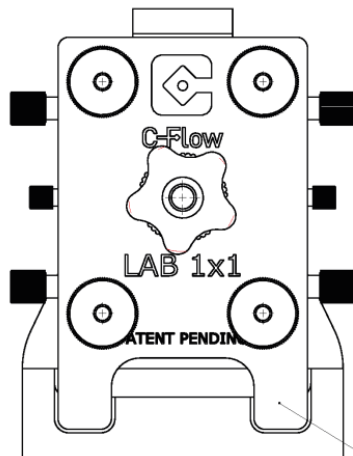
## 4 Specifications

|                            |  |
|----------------------------|--|
| Height                     | 110 mm   |
| Width                      | 100 mm with fittings   |
| Depth                      | 150 mm with fittings   |
| Weight                     | 1.25 kg  |
| End plates                 | 304 stainless steel  |
| Electrode gap              | 10 mm  |
| Electrode dimensions       | 20 mm x 20 mm for working electrode area of 10 mm x 10 mm                          |
| Electrode material         | carbon supplied as standard  |
| Current collectors         | brass  |
| Electrolyte ports          | Thread size: UNF 1/4"-28 of 11mm depth. The supplied fitting is for 1/8" OD tubing |
| Reference electrode blanks | PEEK   |
| Cell Frames                | CPVC   |
| Gasket material            | EPDM   |
| Membrane material          | not supplied   |
| Electrode gasket material  | expanded EPDM  |
| O-rings                    | EPDM   |
| Stand                      | polypropylene  |
| Gasket templates           | stainless steel  |
| Maximum applied voltage    | 10 V   |
| Operating temperature      | up to 80°C   |
| Throughput                 | Typically 30 to 600 ml/min (depending on fluid properties)                         |
| Pressure                   | up to 1 bar (g)  |

## 5 Assembly Instructions

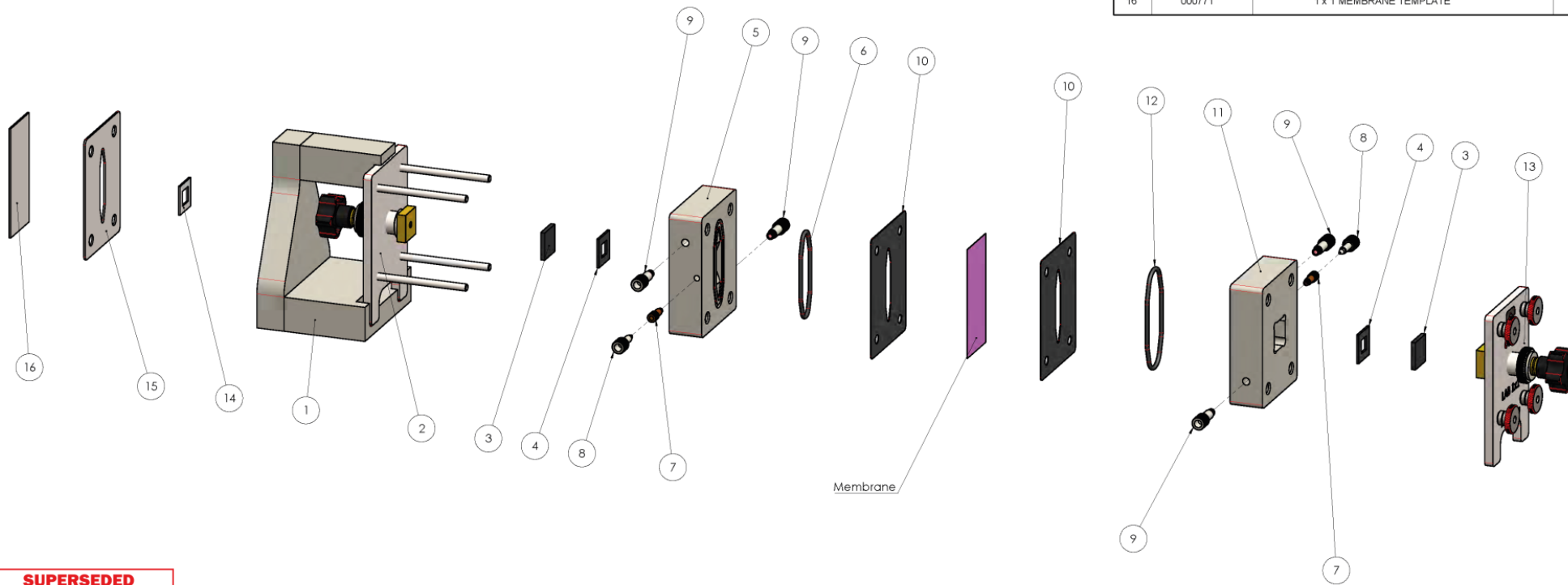
|  |   |
|--|---|
| <p>Place Stand with triangular base on a work surface with wide end towards user.</p> <p>Place Back Frame (plastic block, not the metal Back Plate) O-Ring groove side down onto inner notch on Stand.</p> <p>Carefully fit Electrode Gasket into recess of Back Frame and then fit Electrode, ensuring that the Electrode Gasket stays in place. Current Collector, Insulating Disc, Insulating Sleeve.</p> <p>Place Back Plate over the Back Frame, feet towards user, threaded rods passing through the Back Frame. Screw Electrode Pressure Knob into Back Plate, knurled ring to rear of Back Plate, until it just touches the Electrode Assembly.</p> <p>Pick up the whole sub-assembly, turn it over, place it on the Stand. Fit O-Ring (note that the O-Ring grooves on the two Frames are of different sizes, with O-Rings to match, so take care to match the two O-Rings to the grooves).</p> |    |
| <p>Optional - Fit Membrane Gasket, Membrane and second Membrane Gasket. The purpose of the Membrane Gaskets is to locate a Membrane, if used.</p> <p>Fit O-Ring into face of Front Frame and fit the Front Frame over the threaded rods.</p> <p>Fit the Electrode Gasket into recess and fit the Electrode ensuring that the Electrode Gasket stays in place</p>   |   |
| <p>Place brass Current Collector onto Electrode. Fit Insulating Disc and Insulating Sleeve onto the Current Collector.</p> <p>Place Front Plate over the threaded rods.</p> <p>Fit Electrode Pressure Knob. Loose fit only – knob just touching collector</p> <p>Fit Insulating Disc, then Washers, then Terminal Knob.</p> <p>Fit four Thumb Nuts loosely – do not tighten fully</p>  |  |
| <p>Take the unit off the stand and rest it on its feet to ensure that frames are aligned</p> <p>Tighten the four corner Thumb Nuts, bit by bit, opposite corners together.</p> <p>Finally tighten the two Electrode Pressure Knobs</p> <p>Fit Electrode Ports and Reference Electrode Ports as required. Use Teflon tape for a good seal. If reference electrodes are not used then fit Reference Electrode Port Plugs.</p> <p>The cell is now complete.</p>   |  |

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Stamp here current issue number during assembly  
- 4mm tall minimum

| Parts List |             |  |     |
|------------|-------------|--|-----|
| Item       | Part Number | Description  | Qty |
| 1          | 000767      | 1x1 SUPPORT FRAME ASSEMBLY   | 1   |
| 2          | 000804      | 1 x 1 BACK PLATE ASSEMBLY  | 1   |
| 3          | 000806      | 1 x 1 ELECTRODE  | 2   |
| 4          | 000805      | 1 x 1 ELECTRODE GASKET   | 2   |
| 5          | 000808      | 1 x 1 FRAME - INNER  | 1   |
| 6          | 000398      | O Ring ID 40.95 Dia 2.62 Viton   | 1   |
| 7          | 000338      | Fitting, UNF 10-32 to 1/16" OD Tubing, Flangeless, VacuTight, Flat-Bottom, PEEK  | 2   |
| 8          | 000336      | Plug, Extra Long, UNF 10-32, Coned, PEEK, Natural                                | 2   |
| 9          | 000337      | Fitting, UNF 1/4"-28 to 1/8" OD Tubing, Flangeless, VacuTight, Flat-Bottom, PEEK | 4   |
| 10         | 000807      | 1 x 1 MEMBRANE GASKET  | 2   |
| 11         | 000792      | 1 x 1 FRAME - OUTER  | 1   |
| 12         | 000396      | O Ring ID 50.47 Dia 2.62 Viton   | 1   |
| 13         | 000800      | 1 x 1 FRONT PLATE ASSEMBLY   | 1   |
| 14         | 000776      | 1 x 1 ELECTRODE GASKET TEMPL.  | 1   |
| 15         | 000774      | 1 x 1 MAIN GASKET TEMPLATE   | 1   |
| 16         | 000771      | 1 x 1 MEMBRANE TEMPLATE  | 1   |



Membrane

**SUPERSEDED**  
This document is out of date. Refer to DDM for a copy of the latest issue

| NEW ISSUE | DATE     | ECN   | CHANGED BY | REMARKS                                   |
|-----------|----------|-------|------------|---|
| 3         | 30-05-18 | 10004 |            | Reversing material changes                |
| 2         | 23-05-18 | 10001 |            | Parts removed/changed, materials modified |
| -         | -        | -     | -          | -   |

DO NOT SCALE DRAWING

| TOLERANCE ACCORDING TO BS EN 22768-1 |        |        |         |         |       |       |       |                   |       |        |       |
|--------------------------------------|--------|--------|---------|---------|-------|-------|-------|-------------------|-------|--------|-------|
| GENERAL TOLERANCE                    |        |        |         | ANGULAR |       |       |       | RADIUS & CHAMFERS |       |        |       |
| COVERS                               | 1      | 2      | 3       | COVERS  | 1     | 2     | 3     | COVERS            | 1     | 2      | 3     |
| UPPER                                | ± 0.30 | ± 0.20 | ± 0.15  | UPPER   | ± 10' | ± 20' | ± 30' | UPPER             | ± 0.4 | ± 0.3  | ± 0.2 |
| TOL                                  | ± 0.15 | ± 0.10 | ± 0.075 | TOL     | ± 11' | ± 22' | ± 33' | TOL               | ± 0.2 | ± 0.15 | ± 0.1 |



|   |                |                                    |                         |
|---|----------------|------------------------------------|-------------------------|
| UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETRES. DEBUR AND BREAK SHARP EDGES, UNLESS OTHERWISE STATED. |                | TITLE: 1 X 1 DIVIDED CELL ASSEMBLY |                         |
| DRAWN BY: map   | DATE: 09-05-18 | DWG NO.:                           | 000809                  |
| MAT'L:  |                | WEIGHT: 1.6259 kg                  | SCALE: 1:2 SHEET 1 OF 2 |
| FINISH:   |                |                                    | EDITION: 3              |



## **7 Troubleshooting**

### **Leaks**

Check for leaks with water. If there are leaks then disassemble, check all components and reassemble. Take care to ensure that Electrode Gaskets and O-Rings are in place and that the frames are square when tightening the thumb nuts.

- Check O-Rings in place
- Check Membrane Gaskets in place
- Check no foreign bodies or dirt on gaskets of faces of Cell Frames
- Check Electrode Gaskets are in place. Replace if worn or torn
- Check Electrolyte Ports are tight with Teflon Tape
- Check Reference Electrode Port is tight and blanked off if not in use

### **Poor Flow Rate**

- Check piping not kinked

### **Poor Electrical Contact**

- Check Current Collector face is clean and bright. Use solvent and or gentle abrasive
- Check rear-side of electrode is clean. Use solvent and gentle abrasive if not
- Check Electrical Connectors are tightened

## **8 Cleaning**

After use the cell should be thoroughly flushed with water and disassembled and dried.

All components can be cleaned with detergent or ethanol or isopropyl alcohol.

Periodically check the Electrodes for degradation. Clean them and replace if necessary.

The brass current collectors should be cleaned periodically to ensure good electrical contact with the electrodes. Keep the brass bright with fine abrasive and detergent.

## **9 Templates**

A template is provided for users to cut both Electrode Gaskets and Membranes.



## 10 Other C-Flow Products

|  |   |
|--|---|
| <p><b>C-Flow LAB 5x5</b> is a hand-assembled laboratory electrochemical cell with a 50 mm x 50 mm electrode area. It is an ideal general purpose electrochemical cell for research and development purposes.</p>   |  A stainless steel laboratory electrochemical cell with a 50 mm x 50 mm electrode area. It features a central red knob and four side knobs. The text "C-Flow LAB 5x5" is visible on the top panel. |
| <p><b>C-Flow PLT</b> is a modular pilot plant that offers very high flow rates and flexibility of operation. It is perfect for electrochemical process development in industry or academia.</p> <p>A wide variety of electrochemical processes can be carried out on C-Flow PLT, including the treatment of dilute systems (e.g. waste water), chemical synthesis, viscous liquids or particulate containing liquids, and systems requiring high volumetric flows.</p> |  A modular pilot plant consisting of a blue metal frame with multiple levels. It contains various pipes, valves, and components for electrochemical process development.                          |
| <p><b>C-Flow PRD</b> is our production scale electrochemical system. Its individual cells give flexibility of operation and of scale-up. It can be customised to suit a wide range of electro-chemical applications, from treatment of waste waters to synthesis of electrolytes and fine chemicals.</p>   |  A production scale electrochemical system featuring a large metal frame with multiple vertical cells and a large orange control cabinet.  |

## **11 Disclaimer**

Care has been taken in the preparation of this manual to give instructions of relevance to normal use of the product. All advice, analysis, calculations, information, forecasts and recommendations are supplied for the assistance of the user and are not to be relied on as a substitution for the exercise of judgement by the user. C-Tech Innovation Ltd does not accept liability for any direct or consequential loss arising from use of this manual or its contents and gives no warranty or representation (express or implied) as to the fitness for the purpose of any process, material, product or system referred to in the manual.

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