C-Flow® LAB 5x5
Instruction Manual

Table of Contents

Revised May 2019

1 Introduction

C-Flow® LAB 5x5 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. A template is also provided so that you can cut your own gaskets and membranes.

C-Flow® LAB 5x5 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 5x5.

2 Safety

C-Flow® LAB 5x5 weighs 4.5 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 5x5. This should include a COSHH assessment for the substances under test. Suitable Personal Protective Equipment should be worn and other suitable control measures taken to control the risk of exposure the 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 or inert gas) every time it is reassembled. It is the responsibility of the user to complete a risk assessment for all aspects of use.

3 Unpacking

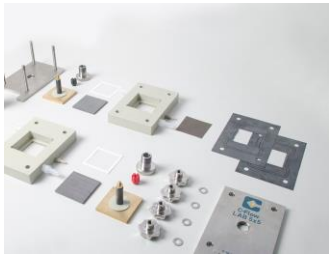
C-Flow® LAB 5x5 is shipped already assembled but not tightened. It is recommended that the cell be dismantled and reassembled before use. This will familiarise the user with its construction and to allow user to make changes to the cell set-up e.g. addition of membrane (not provided).

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

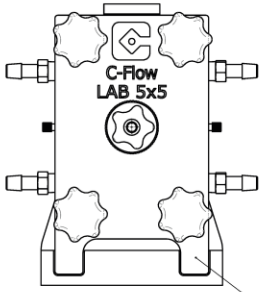
4 Specifications

Height	185 mm
Width	304 mm
Depth	65 mm, 140 mm with fittings
Weight	4.5 kg
End plates	304 stainless steel
Electrode gap	6 mm
Electrode dimensions	62 mm x 62 mm for working electrode area of 50 mm x 50 mm
Electrode material	carbon supplied as standard
Current collectors	brass
Electrolyte ports	Thread Size 1/4" NPT of 11mm depth. The as supplied fitting is a hose barb 3/8” ID 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 150 to 3000 ml/min (depending on fluid properties)
Pressure	up to 1 bar (g)

5 Cell Assembly Instructions

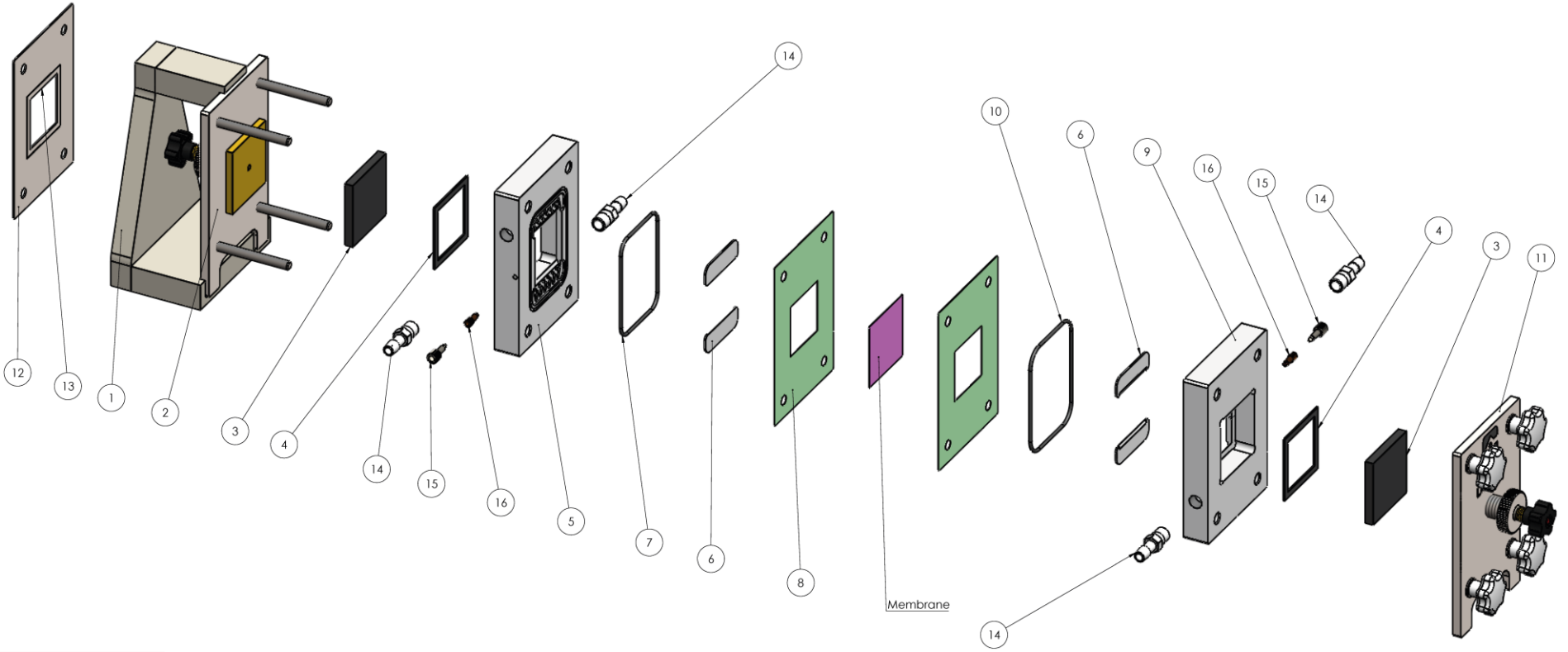
Lay out all parts	
Place Stand with triangular base on work surface and wide end towards user Place plastic Back Frame on stand, Cell-Frame O-ring recess facing down Fit Electrode Gasket into recess Place Electrode into recess, ensuring that Electrode Gasket stays in place Place brass Current Collector (with Plastic Disc and Sleeve Insulation pieces)into recess Drop Back Plate (with screwed rods) onto the frame, frame feet towards user Fit Electrode Pressure Knob, tightening to a loose fit only; knob just touching collector Fit Electrical Connection Knob Hold assembly together and turn the cell over so that the threaded rods are uppermost Clip Flow Distribution Plates into place Fit O-ring (94.92 x 2.62) into recess.	
Fit Membrane Gasket (optional), and Membrane (if used), and second Membrane Gasket (optional). The Membrane Gaskets help to locate a membrane but may be omitted if required.	
Fit O-ring (101.27 x 2.62) into Front Frame Place Front Frame, O-ring downwards, check that Reference Electrode positions on the two half Cell Frames are on opposite sides of the cell. Fit second Electrode Gasket. Fit second Electrode	
Fit second Current Collector (with plastic disc and sleeve insulation pieces) Place Front Plate assembly onto the frame Fit Electrode Pressure Knob. Loose fit only – knob just touching collector Fit second Electrical Connection Knob Loosely fit four Thumb Nuts – do not tighten fully	
Take assembly off stand and rest on feet to ensure frames are aligned Tighten the four corner Thumb Nuts, bit by bit, opposite corners together. Finally tighten the two Electrode Pressure Knobs Fit ports as required. If Reference Electrodes are not used then fit blanked off piping or small bungs to the Reference Electrode Ports. Fit piping and reference electrodes as required. Leak-test with water	

6 Parts List and Exploded View



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

Parts List			
Item	Part Number	Description	Qty
1	000854	SUPPORT FRAME ASSEMBLY	1
2	000862	5 x 5 BACK PLATE ASSEMBLY	1
3	000865	5 x 5 ELECTRODE	2
4	000866	5 x 5 ELECTRODE GASKET	2
5	000867	5 x 5 BACK FRAME	1
6	000868	5 X 5 FLOW DISTRIBUTION PLATE	4
7	000461	O-ring 94.92 x 2.62 EPDM	1
8	000869	5 x 5 MEMBRANE GASKET	2
9	000870	5 x 5 FRONT FRAME	1
10	000459	O-ring 101.27 x 2.62 EPDM	1
11	000864	5 x 5 FRONT PLATE ASSEMBLY	1
12	000849	5 x 5 TEMPLATE 02	1
13	000850	5 x 5 TEMPLATE 01	1
14	000833	Adapter 1/4" NPT Male to 3/8" ID Hose Barb	4
15	000336	Plug, Extra Long, UNF 10-32, Coned, PEEK, Natural	2
16	000338	Fitting, UNF 10-32 to 1/16" OD Tubing, Flangeless, VacuTight, Flat-Bottom, PEEK	2



RELEASED
This document is fully approved and Released for use
All copies are UNCONTROLLED - Refer to DDM to ensure you are working to the correct issue

NEW ISSUE	DATE	ECN	CHANGED BY	REMARKS
7	21-08-19	10077	SBB	Logo Update
6	22-05-19	10060	GOD	Added extra sheet for the manual
5	17-01-19	10047	HM	New Revision Required

DO NOT SCALE DRAWING

TOLERANCE ACCORDING TO BS EN 22768-1

GENERAL TOLERANCE										ANGULAR						RADII & CHAMFERS			
LOWER	0	6	30	120	400	1000	2000	4000		LOWER	0	10	50	120	400	400	LOWER	0.5	3	OVER
UPPER	6	30	120	400	1000	2000	4000			UPPER	10	50	120	400	400		UPPER	3	6	6
TOL	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2			TOL	±1°	±0°30'	±0°20'	±0°10'	±0°5'		TOL	±0.2	±0.5	±0.1

C-Tech INNOVATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS. DEBUR AND BREAK SHARP EDGES, UNLESS OTHERWISE STATED.

DRAWN BY	DATE
MAP	11-05-18

MATL: -

FINISH: -

TITLE: 5 X 5 DIVIDED CELL ASSEMBLY

DWG NO. 000871

A2

WEIGHT: 5.7060 kg | SCALE: 1:2.5 | SHEET 1 OF 1 | ISSUE 7

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 Gasket is in place. Replace if worn or torn
- Check Hose Barbs 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
- Check Flow Distributor Plates not blocked

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.

Flow Distributor inserts can be removed and channels cleaned out with small brushes if they become blocked.

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

C-Flow LAB 1x1 is a hand-assembled laboratory electrochemical cell with a 10 mm x 10 mm electrode area. It has a working volume of 1 ml of electrolyte from inlet to outlet, ideal for working with exotic or expensive solutions.	
C-Flow PLT 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. 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.	
C-Flow PRD 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.	

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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