



**GLASS EXPANSION**  
Quality By Design

Installation Guide

# D-Torch

For Thermo® 6000/7000 DUO

**Disclaimer:** Glass Expansion supplies products to customers with the assumption that only qualified individuals who are properly trained in the appropriate procedures will use our products. It is our customer's entire responsibility to safely store, handle and use the products ordered from Glass Expansion. We assume the installer/operator to be experienced, competent, safety conscious professionals. Glass Expansion assumes no liability for any damage or injuries - physical, emotional or mental, arising out of persons incorrectly or inappropriately using or handling our products. We also assume no liability for any damage to an instrument or product from incorrect installation, handling or use of the product by the user.

## Before you Start

Thank you for purchasing the D-Torch.

As supplied, the D-Torch is fully assembled. Table 1, lists the D-Torch parts that can be ordered separately.

Item no.	Part Number	Description	Qty
1	31-808-2895	D-Torch Thermo 6000 injector adaptor	1
2	31-808-2897	D-Torch Thermo 6000 injector ferrule	1
3	Refer Note	D-Torch Thermo 6000 injector	Refer note
4	31-808-3083	D-Torch Thermo 6000 plug	1
5	31-808-2932	D-Torch Thermo 6000 body	1
6	31-808-2840	D-Torch Thermo 6000 quartz outer tube	1
7	31-808-2707	Retainer	1
8	70-803-0915	Injector ferrule tool	1
9	SAFEGLOVE-MED	Safety gloves	1

**Note:** The injector (item 3) is not supplied with standard D-Torch assembly (shown for reference only.) A range of injectors suitable for the D-Torch can be purchased from Glass Expansion.



# Scope

**The following pages of this document will explain:**

1. General safety
2. Removal of D-Torch outer tube
3. Attach D-Torch outer tube
4. Access D-Torch injector
5. Replacement of injector ferrule

Appendix A: Ceramic outer tube (option for standard D-Torch)

\* The D-Torch is covered by US Patent 8,232,500 B2

# Instructions

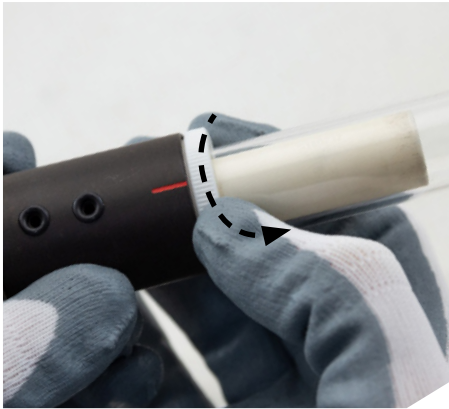
## 1. General Safety

- Always wear safety gloves (item 9) and safety glasses when handling ICP torches.
- It is recommended you read and understand this procedure before starting.
- The person performing this work must be competent in making basic ICP connections.
- The ICP torch is made from high grade engineered materials – Handle with extreme care.
- Do not allow the Torch to be placed on hard surfaces or allow it to come into contact with hard objects.

## 2. Removal of the D-Torch outer Tube

The D-Torch's outer tube is accurately located in the D-Torch body with a retainer cap. The outer tube can be removed at any time by completing the following steps:

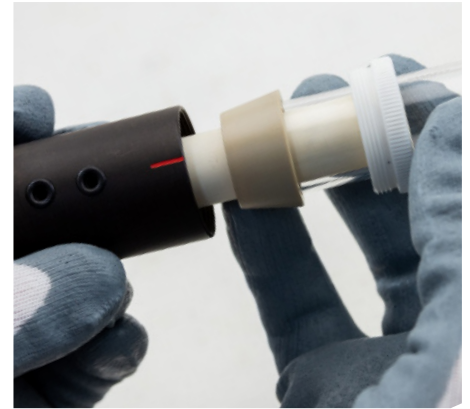
- 2.1 If fitted, remove the D-Torch assembly from your ICP (not shown).
- 2.2 Unscrew retainer ½ turn.
- 2.3 Grip outer tube (lower end, near D-Torch body) then gently wriggle the tube from side to side (figure 2.3). You will hear a “click” as the outer tube releases.
- 2.4 Fully unscrew the retainer then carefully withdraw the outer tube from the D-Torch body.



Step 2.2



Step 2.3



Step 2.4

**Note:** D-Torch outer tube is permanently fitted with a taper ferrule - Do not attempt to remove ferrule from outer tube.

Alumina inner tube is permanently fixed to D-Torch body - Do not attempt to remove alumina inner tube from D-Torch body

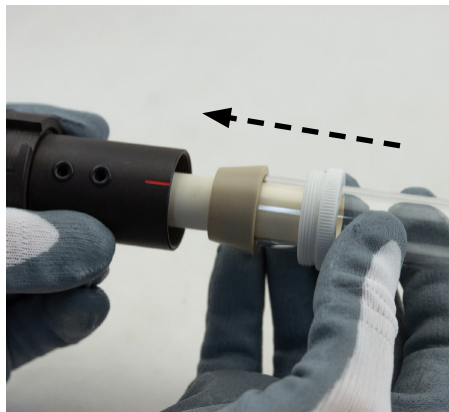
### 3. Attach D-Torch outer tube

To attach the outer tube, complete the following steps:

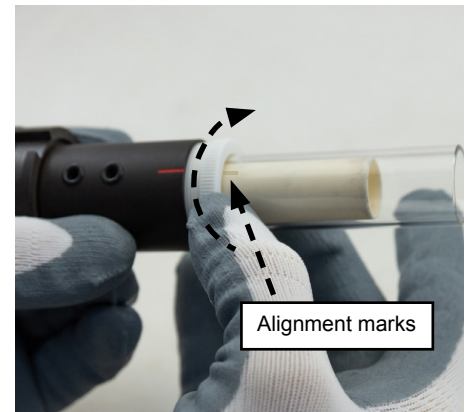
- 3.1 **Check**, that both locating surfaces (outer tube and torch body) are clean and free from damage.
- 3.2 Carefully slide the outer tube over the inner tube – the outer tube will self locate into the torch body.
- 3.3 Tighten the retainer to fix the outer tube in place (moderate pressure by hand is adequate).  
**Check**, that the tube and torch body alignment marks are aligned.
- 3.4 If required, return torch assembly to ICP and connect as normal (not shown).



Step 3.1



Step 3.2



Step 3.3

### 4. Access the D-Torch injector

To remove the injector:

- 4.1 Unscrew the injector adaptor from rear of D-Torch then carefully remove the adaptor (with injector) from D-Torch.



Step 4.1a



Step 4.1b

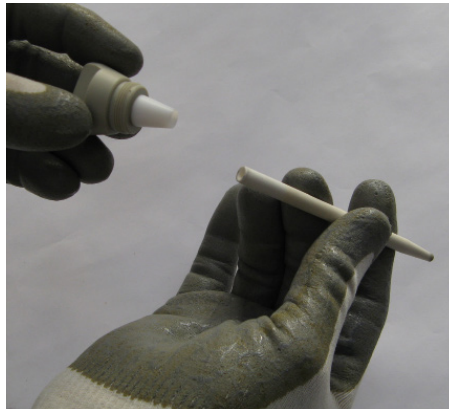


Step 4.1c

4.2 Pull the injector out from the injector adaptor. **Note:** Check condition of the ferrule. Replace ferrule if damaged or deteriorated. (Refer section 5.)  
**Plug:** Do not remove this Plug from the D-Torch body - This Plug must be left in place for all Radial applications.



Step 4.2a



Step 4.2b



Plug - Refer to note

To reinstall the injector with the D-Torch:

Repeat steps 4.1 and 4.2 in reverse order.

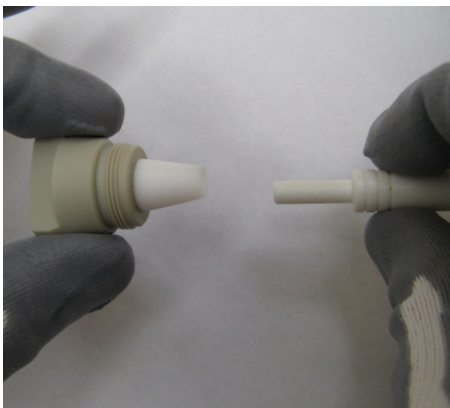
**Note:** Push injector all the way into the injector ferrule. (End of injector must butt-up against inside of adaptor).

## 5. Replacement of the injector ferrule

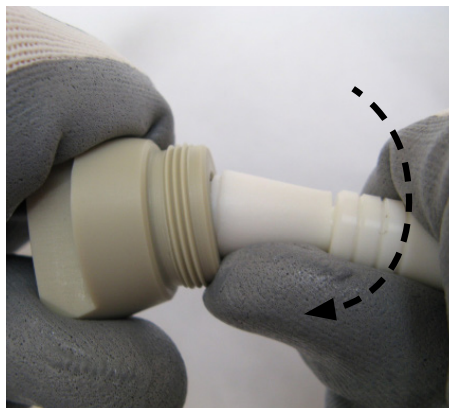
To replace the injector ferrule, complete the following steps:

5.1 Insert the injector ferrule tool (item 8) into injector ferrule then pivot tool sideways to unseat the ferrule from the injector adaptor - Discard ferrule.

**Note:** You may need to apply a moderately high amount of force to unseat the injector ferrule from the adaptor.



Step 5.1a



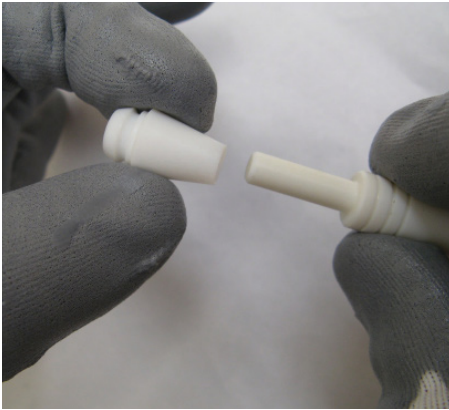
Step 5.1b



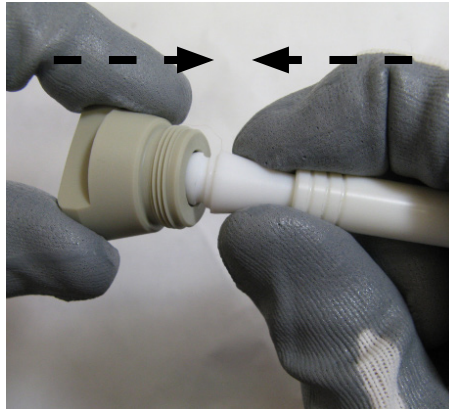
Step 5.1c

5.2 Place a new injector ferrule (from D-Torch injector consumable kit, item 2) onto the stem of injector ferrule tool. Position the ferrule into the adaptor and push together until you feel the ferrule seat with adaptor o-ring.

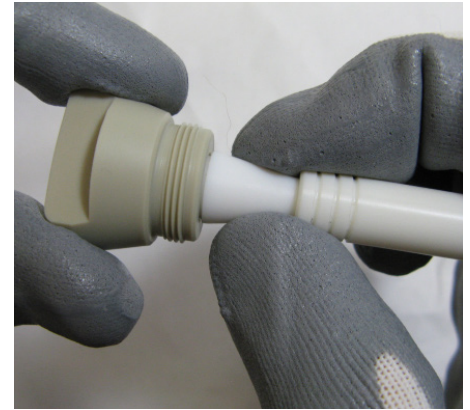
**Hint:** It can help if you swivel (pivot, like step 5.1) the injector ferrule tool whilst pushing-in the injector ferrule.



Step 5.2a



Step 5.2b



Step 5.2c

**Note:** If you have questions regarding the D-Torch or this document, please contact your supplier.

## Appendix A - Ceramic outer tube (option for standard D-Torch)

If desired, it is possible to operate D-Torch with a durable ceramic outer tube - You can purchase either:

A complete D-Torch with additional ceramic outer tube and accessory items, part number 30-808-2862, or just the ceramic outer tube and accessory items, supplied in a kit, part number 31-808-3079 as listed in the table below.

Item no.	Part Number	Description	Qty
1	31-808-3834	D-Torch Thermo 6000 Duo Ceramic outer tube	1
2	31-808-2933	Optic fibre	1
3	31-808-3117	Optic fibre 450 assembly	Refer note
4	31-808-3211	Bulkhead connector	1
5	31-808-2971	Blanking plug Thermo 6000 Duo Torch box	1
6	2497	Screwdriver 3mm straight blade	1

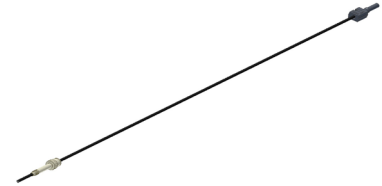
item 1



item 2



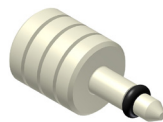
item 3



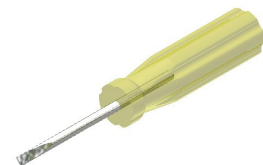
item 4



item 5



item 6



When using the D-Torch with the ceramic outer tube, the following issues must be considered:

### **Align torch function (Thermo 6000 Software)**

The 'Align Torch' function in the Thermo 6000 software may not operate correctly with the ceramic outer tube in place. Therefore, it is recommended that you align the D-Torch with the quartz outer tube in place before changing to the ceramic outer tube.

### **Plasma ignition detection**

Inside the torch box, there is a sensor that detects light and signals when the plasma is active. The opaque nature of the ceramic outer tube prevents sufficient light reaching the torch box sensor. To overcome this problem, an optic fibre is supplied to convey light from the D-Torch to the ICP sensor. Fitting the optic fibre assembly to the Thermo 6000 ICP is a minor change.

Two different optic fibre assemblies are supplied with this kit, one for each Thermo 6000 ICP variant:

#### **Thermo 6000 models up to the year 2010**

The shorter 'optic fibre assembly' (kit item 2) and 'blanking plug' (kit item 4) is used.

#### **Thermo 6000 models from the year 2011 onwards**

The longer 'optic fibre 450 assembly' (kit item 3) is used.

The following page details the necessary steps to fit both optic fibre types.

## Thermo 6000 models up to the year 2010

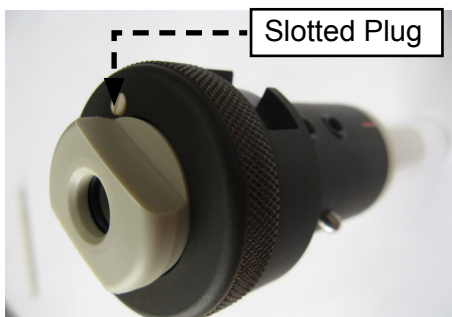
To fit the optic fibre assembly (conveys light from the D-Torch to the ICP) perform the following:

A.1 If fitted, remove existing Torch from ICP (not shown).

A.2 Remove slotted plug from rear of D-Torch using screwdriver provided (Item 5).

A.3 Mount D-Torch in torch box as usual.

A.4 Insert optic fibre assembly (item 2) into rear of D-Torch and tighten lightly by hand.



Step A.2



Step A.3



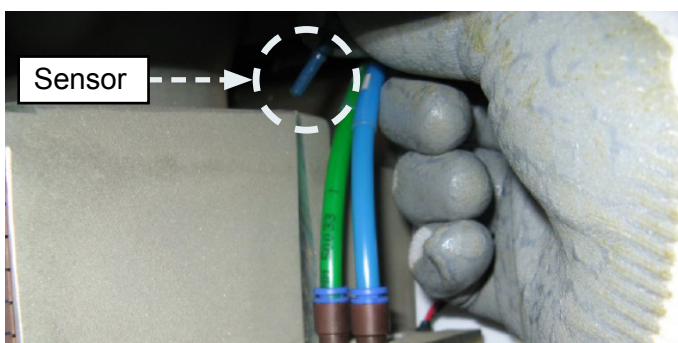
Step A.4

A.5 Slide light sensor out from top of ICP torch box.

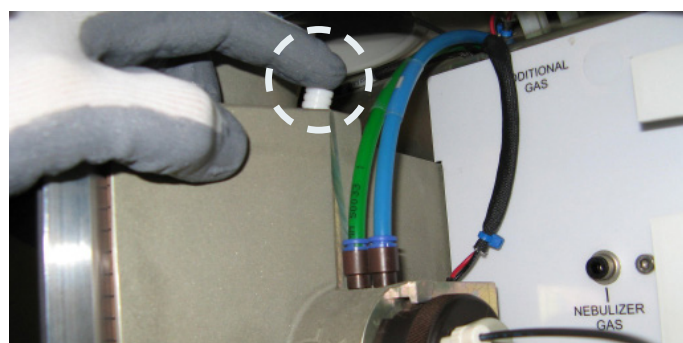
A.6 Plug sensor hole in ICP torch box using blanking plug (Item 3) supplied.

A.7 Insert ICP sensor into rear of optic fibre assembly.

A.8 Connect spray chamber as usual.



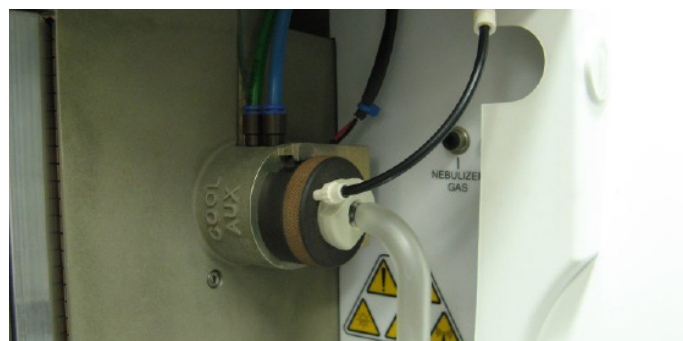
Step A.5



Step A.6



Step A.7



Step A.8

**Note:** If you replace D-Torch with a conventional ICP torch, you must return light sensor to ICP torch box (steps A.7 to A.4 in reverse order)

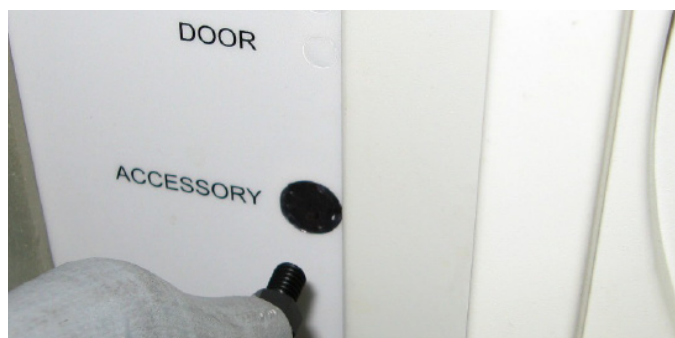
### Thermo 6000 from the year 2011 onwards

To fit the optic fibre assembly (conveys light from the D-Torch to the ICP) perform the following:

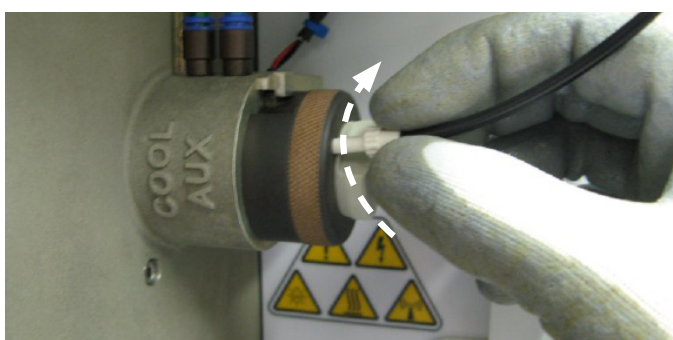
- B.1 If fitted, remove the existing Torch from ICP (not shown).
- B.2 Remove slotted plug from rear of D-Torch using the screwdriver provided (Kit item 5) – Shown figure A.2, above.
- B.3 Mount D-Torch in torch box as usual.
- B.4 Fasten (screw clockwise) threaded end of bulkhead connector (item 4) to ICP 'ACCESSORY' port.
- B.5 Insert the threaded-end of optic fibre assembly (item 3) into rear of D-Torch and tighten lightly by hand.
- B.6 Insert the other end of the optic fibre assembly into the recently installed (Step B4) ICP bulkhead connector.
- B.7 Connect spray chamber as usual. (Not shown)



Step B.3



Step B.4



Step B.5



Step B.6

**Note:** If you replace D-Torch with a conventional ICP torch, you must remove the optic fibre from the ICP socket (step B.5)

## Consumables list for 30-808-2862:

Part Number	Description
31-808-2707	Retaining Ring for D-Torch
31-808-2840	Quartz Outer Tube for D-Torch
31-808-2895	Injector Adaptor for D-Torch
31-808-2897	Injector Ferrule for D-Torch
70-803-0915	Injector Ferrule Tool 6.5mm
31-808-2932	Base and Inner Tube for D-Torch
31-808-2933	Optic Fibre for D-Torch 170mm
31-808-3117	Optic Fibre for D-Torch 450mm
31-808-3834	Ceramic Outer Tube for D-Torch
70-803-1921	O-ring kit for Thermo 6000, 7000, PRO D-Torch
31-808-4381	FKM O-Rings (PKT 10)
50-100-1636	O-ring Removal Tool

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