



# Plumbing Installation - SBE 43 DO Sensor and Pump on a CTD

This Application Note describes installation of an SBE 43 Dissolved Oxygen (DO) Sensor and pump (and associated plumbing) on an SBE 9*plus* CTD, using PN 90087 Universal Plumbing Kit. The plumbing guidelines for the SBE 9*plus* also apply to an SBE 19, 19*plus*, or 25 CTD, except as noted.

## Preparation

### Parts Included in PN 90087 Universal Plumbing Kit

PN	Description	Quantity
23337	Pump air release valve - for vertical configuration only	1
30387	Tube, 1/2" Y-fitting - for connection to pump air release valve, vertical configuration only	1
30388	Tygon tubing, 19 mm (0.75 in.) OD, 13 mm (0.5 in.) ID	4 ft
30579	Tygon tubing, 13 mm (0.5 in.) OD, 9.5 mm (0.375 in.) ID - for connections to DO sensor	0.5 ft
30389	Cable tie, 102 mm (4 in.) - to secure tubing connections	20
30458	Cable tie, 381 mm (15 in.) - to secure Y-fitting to main housing	2

### Tools Required

- Sharp knife or scalpel for cutting tubing
- Straight-edge ruler for measuring and cutting

## Installation

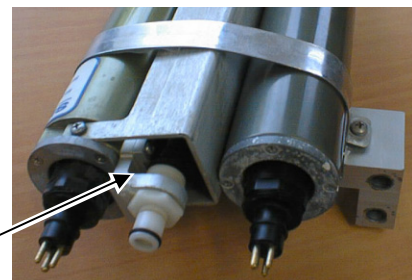
### Note for SBE 9*plus* or 25:

If your conductivity sensor does not have a conductivity tube support, install the conductivity tube support kit before installing the plumbing. (See Application Note 36 for installation details)

### Conductivity tube support kit:

- Part Number 50094 for aluminum sensors
- Part Number 50108 for titanium sensors

Conductivity tube support



Basic considerations for plumbing installation:

- Use the minimum tubing lengths necessary, but avoid tight bends in the tubing. Tight bends place stress on the tubing connections at the sensors, which can lead to failures at the connections.
- Do not create any vertical loops in the tubing. Loops trap air, preventing the pump from working properly.
- Secure each tubing connection with two cable ties.

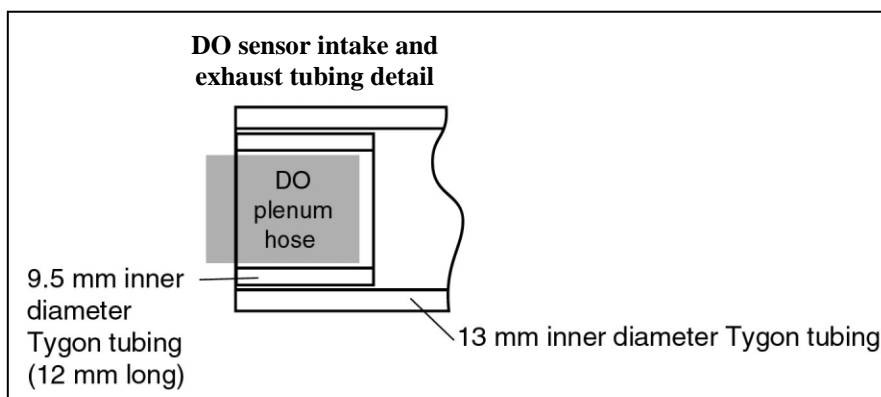
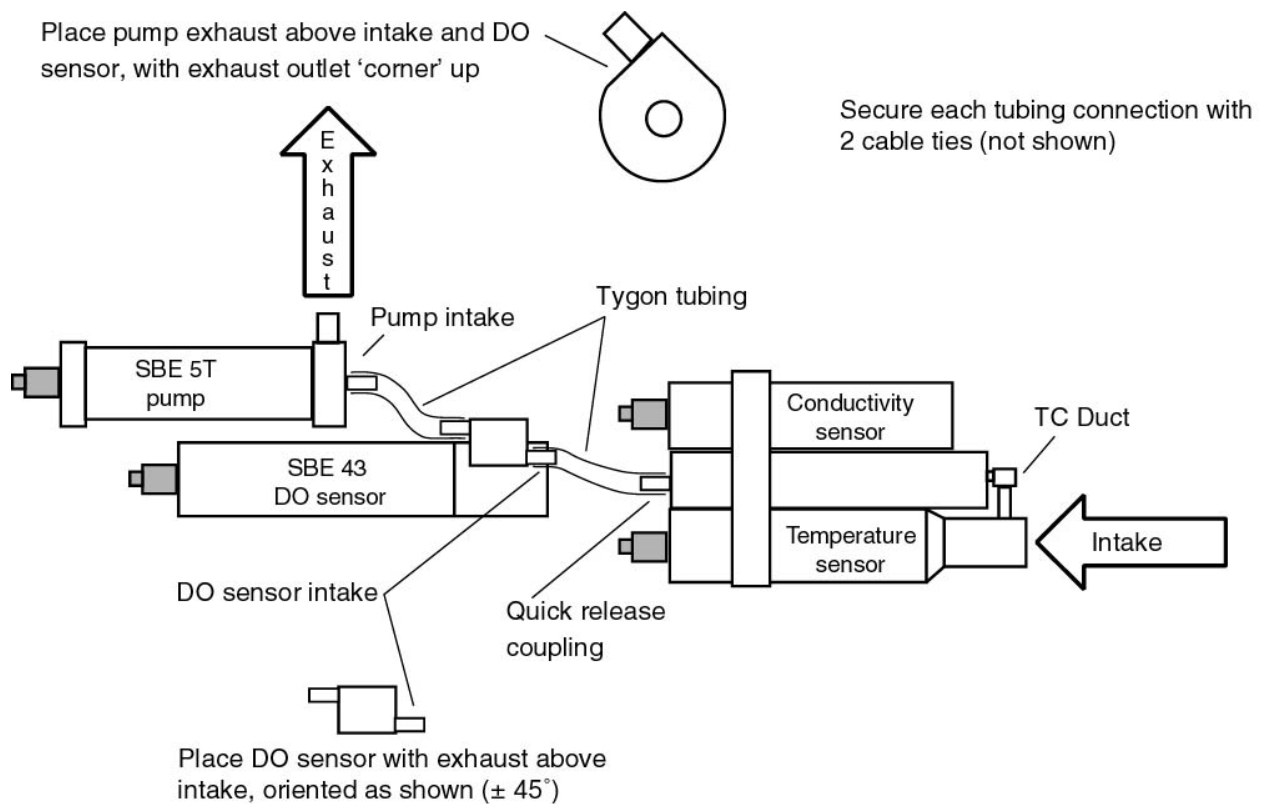
Plumbing installation details differ, depending on whether the sensors will be deployed in a horizontal or vertical configuration, as explained in the following sections.

### Horizontal Configuration Schematic and Details

The horizontal configuration is most commonly used when the CTD is integrated with an SBE 32 Carousel Water Sampler with an extension stand. When installing plumbing for the horizontal configuration:

- Configure the system as follows:
  - Place the DO sensor intake above the conductivity sensor exhaust.
  - Place the pump intake above the DO sensor exhaust.
  - Orient the pump with the exhaust outlet *corner* up.
- Failure to configure the system in this manner can trap air, preventing the pump from working properly.
- Place a 13 mm (0.5 inch) long piece of the 9.5 mm ID Tygon tubing at the DO sensor intake and exhaust. Slide the larger diameter tubing (13 mm ID) over the smaller diameter tubing to provide tight seals.

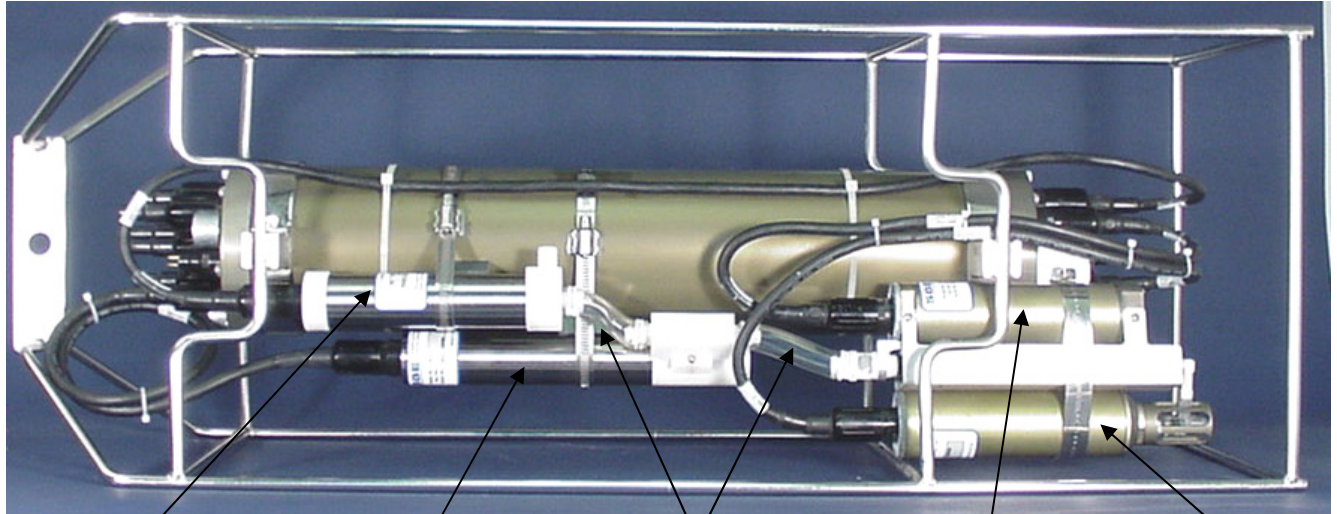
If the system does not include a DO sensor, connect the tubing from the conductivity cell directly to the pump intake.



**Horizontal Configuration Schematic and Details (continued)**

Secure each tubing connection with two cable ties (not shown).

**Overall View**



Pump  
(vertically above  
DO sensor)

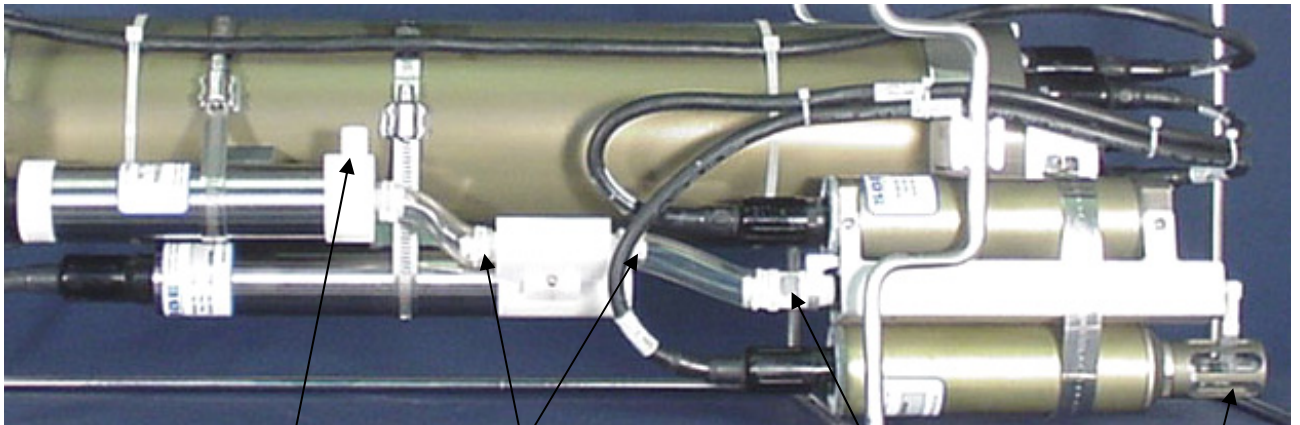
DO sensor  
(plenum intake vertically  
above conductivity sensor  
exhaust)

Tygon  
tubing

Conductivity sensor

Temperature sensor

**Details**



Pump exhaust –above DO  
sensor and TC Duct intake,  
oriented as shown below

Slide larger diameter Tygon  
tubing over smaller diameter  
Tygon tubing to provide tight  
seal at DO sensor

Quick release  
coupling on  
conductivity cell

TC Duct intake

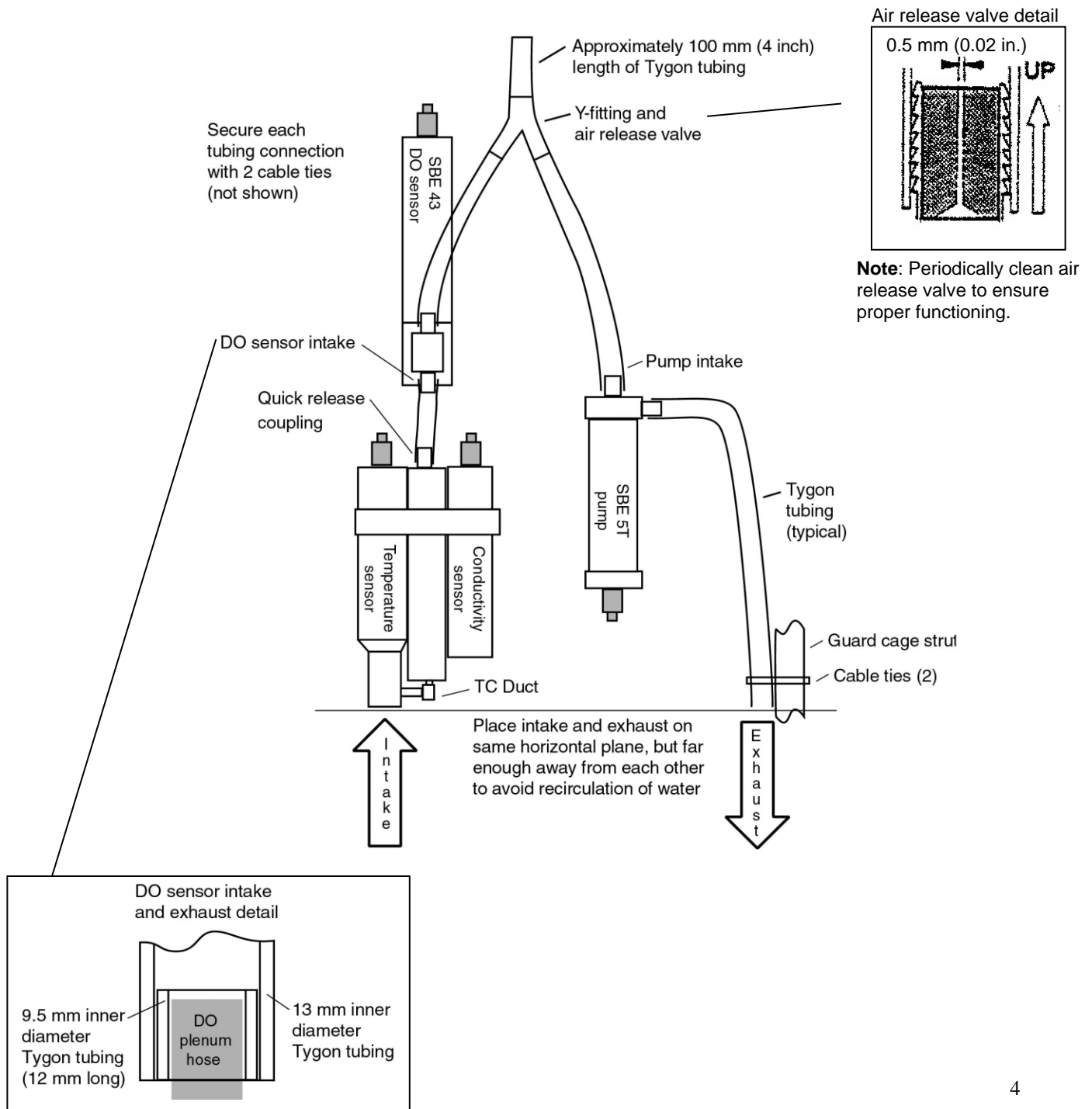
Orient with *corner*  
vertically above  
pump intake



## Vertical Configuration Schematic and Details

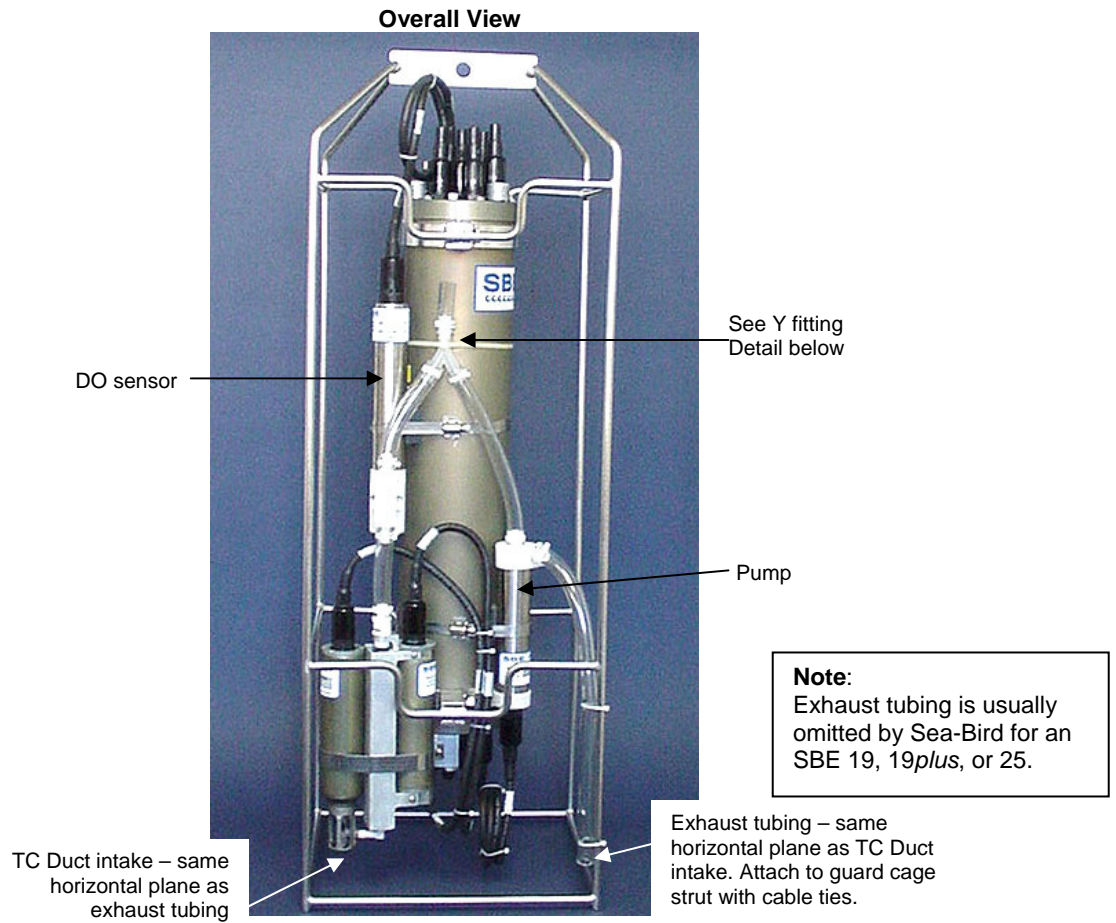
When installing plumbing for the vertical configuration:

- (For SBE 9*plus* only) Place the opening of the intake and exhaust on the same horizontal plane. Attach exhaust tubing from the pump to the cage, as shown in the schematic below. Failure to place the exhaust tubing properly can lead to acceleration of water in the plumbing, with resulting errors in conductivity data.  
**Note:** Exhaust tubing is usually omitted by Sea-Bird for an SBE 19, 19*plus*, or 25.
- Place the exhaust away from the intake, so that exhaust water is not pulled into the intake. If the exhaust is too close to the intake, it will cause errors in temperature data, because the pump transfers heat to the exhaust water.
- Place a 13 mm (0.5 inch) long piece of 9.5 mm ID Tygon tubing at the DO sensor intake and exhaust. Slide the larger diameter Tygon tubing (13 mm ID) over the smaller diameter tubing to provide tight seals.
- If the system does not include a DO sensor, connect the tubing from the conductivity cell directly to the Y-fitting.

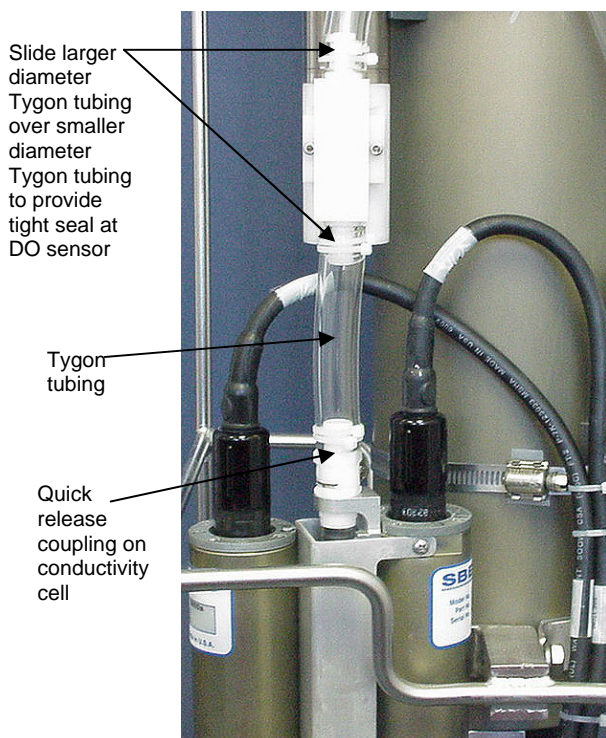


**Vertical Configuration Schematic and Details (continued)**

Secure each tubing connection with two cable ties.



**Temperature/Conductivity to DO Sensor Detail**



**Y Fitting Detail**

