Standard Operating Procedure

3100 use in Brewery

1. Introduction

- ***Scope***

This procedure describes how to use 3100 instrument in brewery with a measurement on-line with a beer tank in order to obtain fast, reliable and repeatable measurements. Most of the time, an unstable measurement is more due to bad fitting and bad tubings or a bad use procedure. With this procedure, a stable measurement is reached between 1.5 and 3 min.

- ***Concerned instruments and sensors***

Brand	Systems	Instruments	Sensors	Others
Orbisphere	/	3100	/	/

	Date	Initials
Redaction	29.4.2015	Eva L'Hostis
Approbation	30.4.2015	Adrien Doux
Validation	6.4.2015	Xavier Leblanc

2. Tools needed

2 flat leaf screws size 14	

3. Kits / Spare parts needed

The following table decribes all the spare parts that you should use in function of the diameter tubes (4 mm, 6 mm and ¼'') of your 3100 instrument.

	Part Number	Description	Comment	Pictures
Involved parts 4mm diameter	DG33216	Inlet filter for 3100 (4mm)	**4 mm part**	
	DG33217	Set of 10 meshes		
	DG33219	3m of 4mm inlet tubing (semi rigid tubing)	**4 mm part**	
	DG33367	3100 inlet valve, 4mm connectors (installation by local service via STU 92. Use with old 3100 model)	**4 mm part**	
Involved parts 6 mm diameter	DG33317	Inlet filter for 3100 (6mm)	**6 mm part**	
	DG33319	3m of 6mm inlet tubing (flexible tubing)	**6 mm part**	

	DG33368	3100 inlet valve, 6mm connectors (installation by local service via STU 92 Use with old 3100 model)	**6 mm part**	
Involved parts Adapters	32051A	Adapter for attaching flow cell inlet tubing to customer's sample tube. Includes one 6 mm (32813) and one 8 mm (32814) rubber sealing gasket. →max 8mm	**Metric adapter**	
	DG33322	Adapter 4mm to 6mm Swagelok	**Metric adapter**	
Involved parts ¼ inch diameter	DG33318	Inlet filter for 3100 (1/4 inch)	**¼ inch part**	
	DG33320	3m of 1/4 inch inlet tubing (flexible tubing)	**¼ inch part**	
	DG33320	3100 inlet valve, 1/4" connectors (installation by local service via STU 92 Use with old 3100 model)	**¼ inch part**	

Involved parts Adapter	DG33321	Adapter 4mm to 1/4" Swagelok	**Metric/inch adapter**	

Zwickel or Perlick tank connectors (See picture below) can be used to connect on-line the 3100 instrument to the beer tank. This part is not provided by Hach.

If you would like to use this kind of connectors, flush the rotational valve before connecting the connectors. These connectors should be mounted carefully as it can generate air ingress.

4. Description

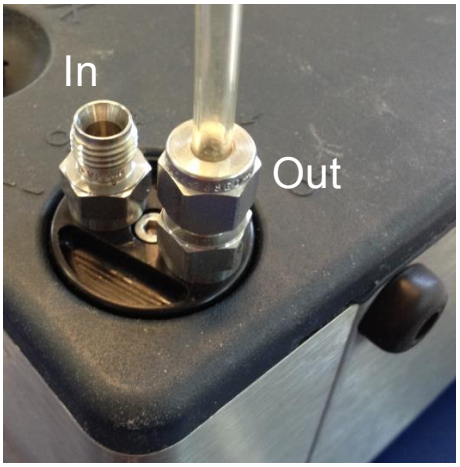
To obtain fast, reliable and repeatable measurement with beer tank, follow the recommendations below.

- ***Initial preparation of 3100***

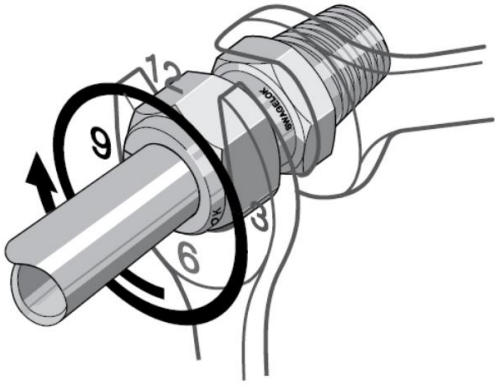
This preparation is done once at the first use of the instrument.

- **Fluidic connections on 3100 instrument**

The 3100 instrument can be provided with Swagelok connectors as shown in the picture below:



When you screw the tubing on the instrument, take care to use 2 flat leaf screws as mentioned in the following picture in order to not damage the screw threads of the plastic parts where the swagelok is screwed.



If the screw thread is damaged, the tightness of the screw thread will be not efficient and the oxygen measurement will be not reliable.

We strongly suggest the use transparent plastic tubing supplied with the instrument (See part number in the previous chapter). Their material has been specially chosen for this type of measurement because it is very weakly permeable with oxygen. The 6 mm or ¼'' diameter tubing is recommended. The 4 mm diameter tubing can be used but be careful because they can be easier to pinch and then more fragile.

- **If the sample contains particles**

It is recommended to use a filter on the inlet tube is provided as an option (See §3 "Kits / Spare parts needed") to avoid any clogging of the sample flow if the sample contains suspended particles. The mesh should be changed if colgging.

• *Procedure to perform for each measurement on a tank*

- **Fluidic connections between beer tank and 3100 instrument**

The fluidic connection between the beer tank and the 3100 instrument should be according strict rules:

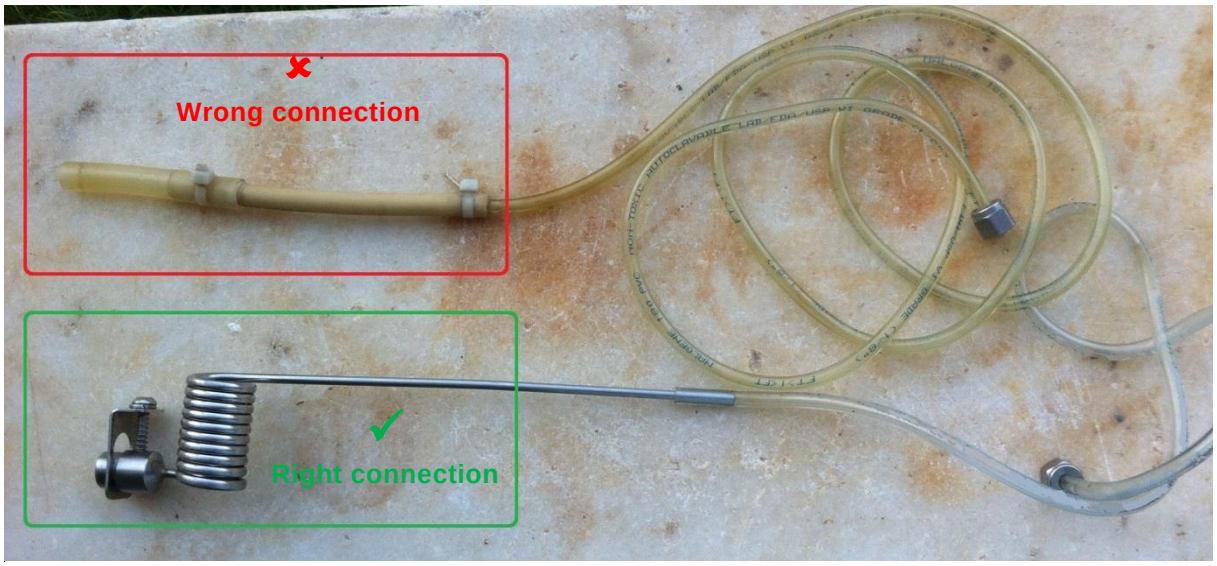
- Use the tubing's described in §3 "Kits / Spare parts needed". The material has been selectioned in order to reach the specifications. The use length for the inlet tube should be the shortest possible; < 1m if possible.
- Use fittings and adapters described in §3 "Kits / Spare parts needed" which have been selectioned to reach the specifications.
- The rotational valves used in beer tanks have not to induce an air ingress

As example of bad tubing's / fittings met on the field and which doesn't allow reaching rapid, reliable and repeatable measurements:

✘ Wrong connection

The examples shown in previous pictures are made with wrong materials and bad quality fittings.

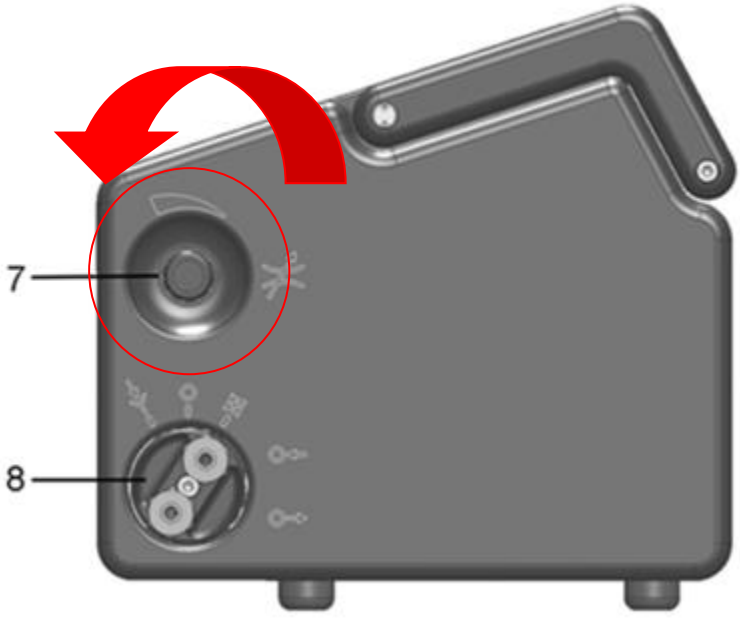
The following picture showing right fittings versus wrong fittings:



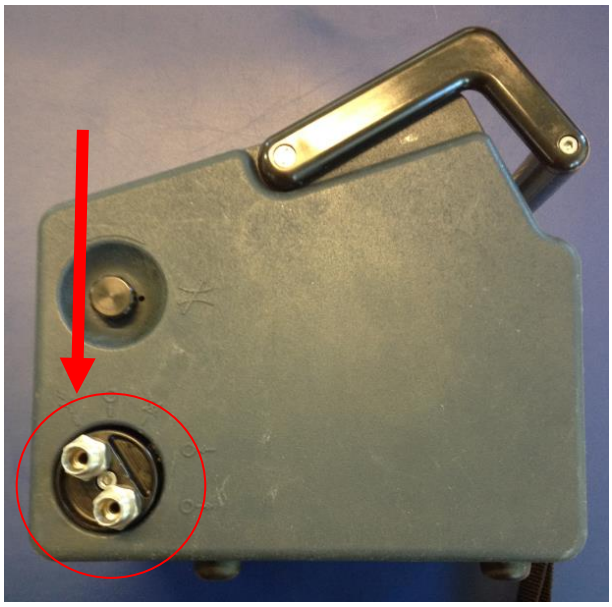
- **Flow adjustment and purge**

To measure oxygen in a beer tank, for an optimal response time, a flow rate of 400 mL/min allows reaching specifications in term of accuracy, repeatability and response time. The **PURGE** position is used to clear the sample line of any build up of air bubbles. For a thorough purge, it is recommended to keep the valve in this position for 10 seconds. During this operation, the sample flows directly from the inlet tubing to the outlet tubing. All measurements during this time are not representative of the sample as the sample does not come into contact with the sensor.

For that, open the valve called 7 in the Figure below:



Purge your external tubes. For that put the inlet valve in the position shown with an arrow during 10s.



Then put the valve in the position shown with the arrow in the Figure below to perform the measurement:

The ball in the flow rate meter should be put in the top of the glass tube to show that the flow rate is OK. The flow rate should be regular and without degasing of the beer.

From this procedure, you obtain then a stable measurement reached after 1.5-3 min.