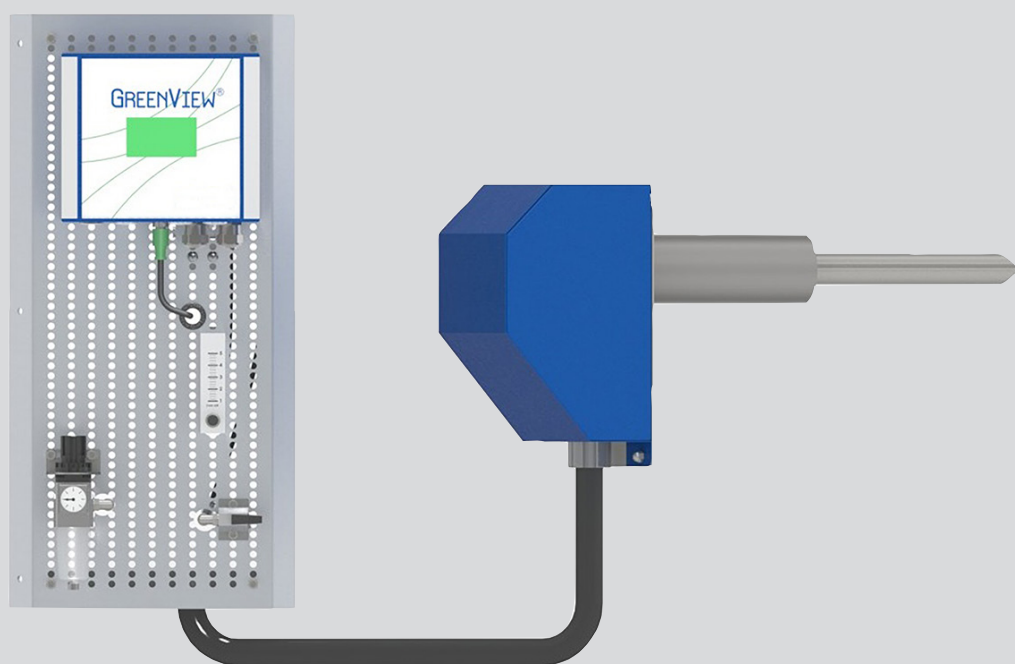


G3621A/P

Stack Gas Oxygen Analysing System With Diffusion Probe



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1 Introduction

1.1 About this Manual

The G3621a/p Stack Gas Oxygen Analyzing System, hereafter named an SGOA System, consists of an oxygen analyzer, an analyzing board, and a diffusion probe.

This manual contains data and instructions for the installation, operation, and maintenance of the analyzing board and the SGOA System as a whole. The instructions for installation, operation, and maintenance of the analyzers are provided in separate manuals:

- The G36a Oxygen Analyzer manual (p#01245) – IP67 box
- The G36p Oxygen Analyzer manual (p#01381) – panel mounted

Therefore, for the installation, operation, and maintenance of an entire SGOA System, this manual and the concerned oxygen analyzer manual must be read carefully in their entirety.

The instructions have been made in general terms and do not take into consideration the existing equipment and its installation. As such, the manual is designed for the standard G3621a/p SGOA System with Diffusion Probe.

This manual does not describe all possible situations but only the most common and known situations and cannot replace the necessary instruction and education of the personnel.

Attention

Before operation read all instructions and warnings within this manual and associated documentation. Improper use may cause personal injury and/or damage of equipment and may void the warranty.

Green Instruments A/S disclaims any responsibility for damage and/or injury caused by improper installation, use or maintenance of the equipment.

Should situations not described in this manual occur which cannot be solved in accordance with normal known practice and good workmanship, the operator should contact Green Instruments A/S for instructions.

This manual does not claim to cover all details or variations in the equipment or to provide for every possible contingency that may arise during installation, operation, or maintenance.

Green Instruments A/S reserves the right to minor alterations and improvements owing to developments without being obliged to enter the corresponding changes in this manual.

Green Instruments A/S reserves the copyright of the manual. Without prior written permission of Green Instruments A/S, the manual may not be copied and given to unauthorized people.

1.2 Inquiries and Feedback

All claims and inquiries for spares shall be addressed to Green Instruments A/S or our distributors.

In all correspondence or when ordering spare parts, please carefully state the equipment type and serial number, which you can find on the label on the back of the G_{36p} Oxygen Analyzer or on the right side of the G_{36a} Oxygen Analyzer.

Green Instruments A/S appreciates all feedback and suggestions for improvement of this manual. If you have any questions or find any errors in the manual, you are welcome to contact us at the following address:

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1.3 About the System

The G3621a/p SGOA System is designed to measure the content of oxygen in stack gas. The compact design provides a wide range of configuration possibilities, outstanding performance, reliable and in situ real-time monitoring.

The system consists of the following main elements:

- Diffusion probe complete with filter, gas tube, sensor, and housing.
- Umbilical cord including cables and tubing.
- Analyzing board, air supply filter regulator, test gas inlet, and a flow meter.
- Analyzer (G36a or G36p panel mounted).

Download the product certificates at <https://greeninstruments.com/>.

2 Specifications

Gas Connection

Test Gas Inlet	Max. 1 bar – quick coupling for 6 mm OD hose
Air Supply Inlet	Max. 10 bar – 1/8” BSP connection
Air Supply Quality	Instrument air according to ISO 8573-1 Class 3.3.3

Analyzing Board

Ambient Temperature	0°C...55°C
G3621a Analyzing Board Dimension	600 × 290 × 138 mm (H × W × D)
Weight – Incl. G36a O2 Analyzer	Approx. 6.0 kg without packaging
G3621p Analyzing Board Dimension	600 × 290 × 95 mm (H × W × D)
Weight – Incl. G36p O2 Analyzer	Approx. 4.0 kg without packaging

Diffusion Probe

Sensor Technology	Heated zirconia type sensor
Measurement Range	0.0...21.0%
Sample Temperature	0°C...500°C
Probe Insert Length	208-338 mm for duct diameters 235-2800 mm
Welding Socket size OD:	70.0 mm L: 200 mm; or Thread size: 1/2” BSP
Air Supply Connection	6/4 mm tubing
Calibration Air Flow	Approx. 0.5...1.0 l/m
Diffusion Probe Dimension – Short	285 x 180 x 475 mm (H x W x D)
Diffusion Probe Dimension – Long	285 x 180 x 600 mm (H x W x D)
Weight Including House	Approx. 6.0 kg without packaging

Umbilical cord

Cord Length	3.0 m
Tubing	In 28 mm nylon conduit

Analyzer

See Details in Chapter 2 in The Analyzer Manual.

Optional Equipment

Remote digital display with alarm relays, digital flow switch, and visualization, recording, and data logging.

Specifications are subject to change without notice.

3 Safety Aspects



Hot Sensor/Probe!

The sensor and the probe are hot and can cause severe burning of personnel if not handled with care.

Installation and Operation!

The installation and operation of the G3621a/p SGOA System and associated equipment must be carried out by skilled personnel.

Green Instruments A/S does not take any responsibility for the operation of the system and associated equipment whatsoever. The successful and safe operation of this equipment is dependent on proper handling, installation, operation, and maintenance.

Recycling!

Do not dispose any part of the equipment with regular refuse. Disposal should be in accordance with the requirements of the current statutory regulations.

4 Control at Delivery

When you receive the G3621a/p SGOA System, please inspect and confirm that the received scope of supply is in accordance with the packing list and not damaged.

Any discrepancy should be reported to the supplier immediately. If any of the received parts are damaged, the shipping company should be informed, and new parts should be made available before completing the installation.

5 Installation

Read this chapter in its entirety before installing the system.

5.1 Where to Install the System

Satisfactory operation, faultless functions, and minimal maintenance of the analyzing board, are achieved by paying attention to the following points:

- The analyzing board and the analyzer shall be installed in a clean area away from dust, oil mist, and moisture. The elements of the system should be installed at viewing level so that it is easily accessible in connection to operation and service.
- The probe shall be installed in a suitable location that represents the gas to be tested and where there is a laminar flow.
- The panel mounted analyzer G36p can be installed up to 6 m from the analyzing board.
- As standard scope of supply, the analyzing board can be installed up to 3 m from the diffusion probe.
- It is recommended to place the diffusion probe as illustrated in Figure 5-1 and Figure 5-2 below. If you find it difficult estimating where to install the diffusion probe, please contact Green Instruments A/S for more instructions.

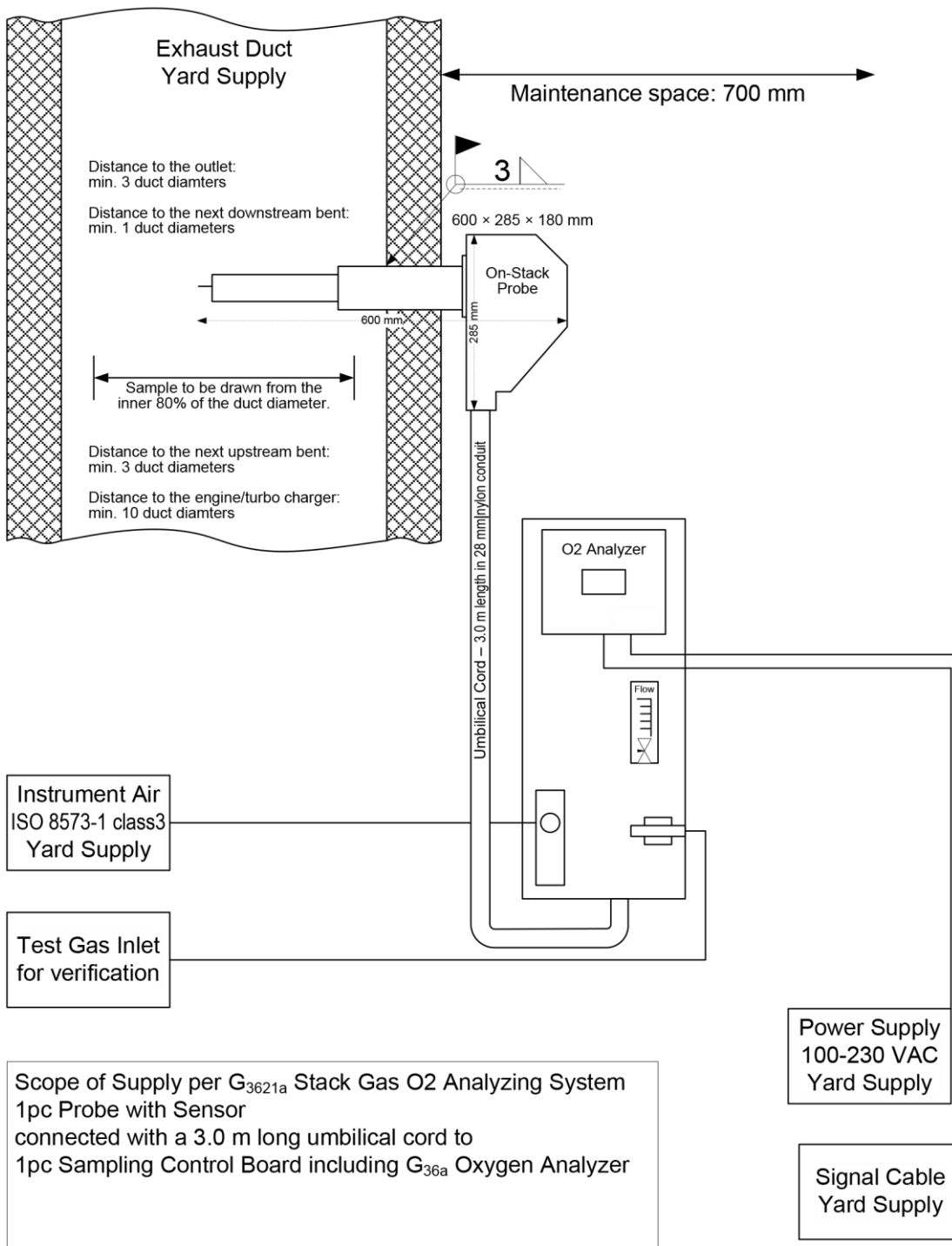


Figure 5-1: Installation Layout of the G3621a with Welding Type Probe

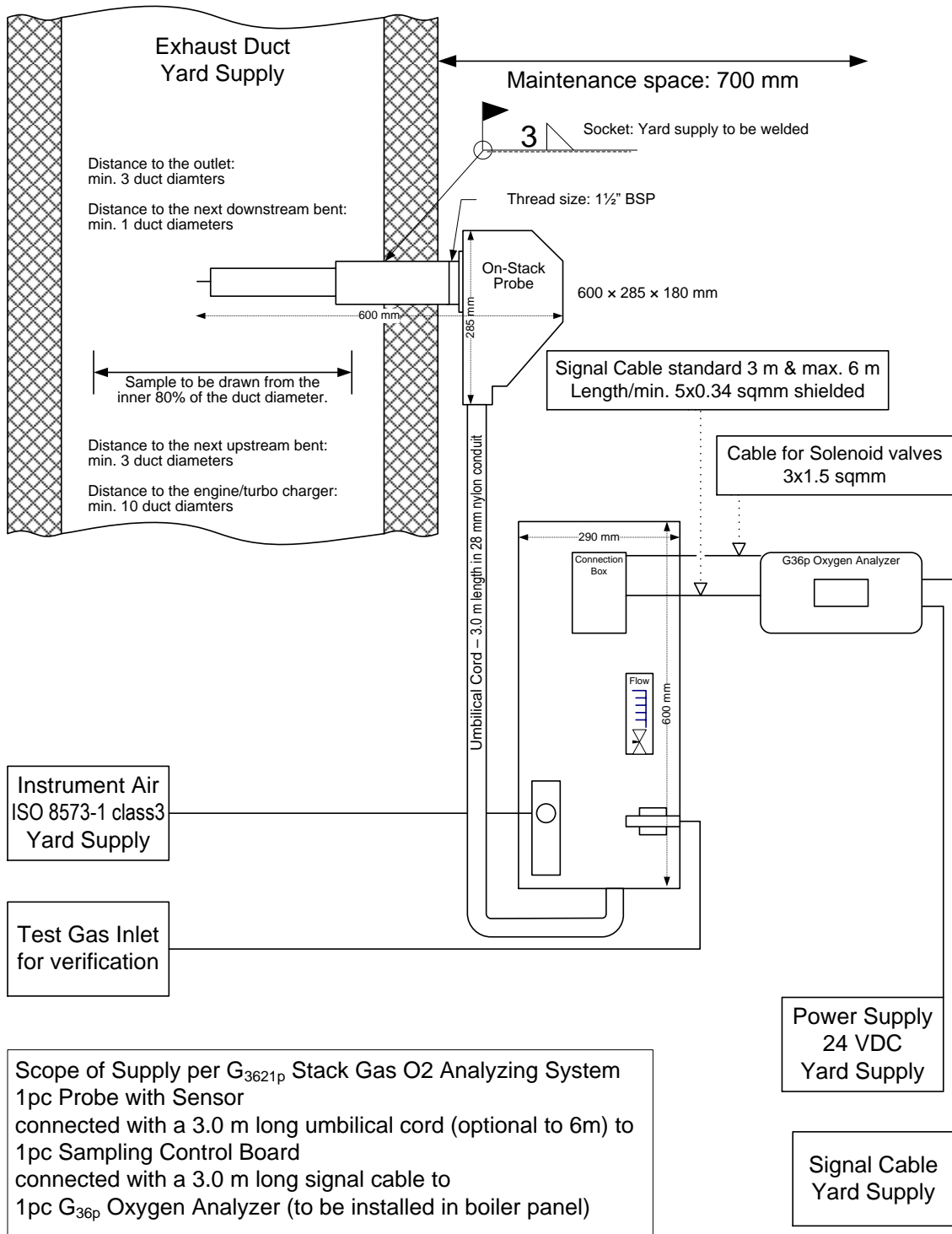


Figure 5-2: Installation Layout of the G3621p with Thread Type Probe

5.2 Diffusion Probe

The sample gas flow is diffused through the sample filter element into the sensor area. The gas, which passes the probe, must represent the gas to be tested and extracted from a location with laminar flow. Holes and leaks in the gas ducting system before and after the probe may influence the accuracy of the measurement.

The probe shall be placed so that it is protected against mechanical damage. The flue gas temperature cannot exceed the given temperature limit of the diffusion probe.

The diffusion probe is delivered with one of the following mounting types:

Probe with welding socket (see Figure 5-3 and Figure 5-4)

Probe with thread (see Figure 5-5 and Figure 5-6)

When mounting the probe on the stack, make sure that the back plate of the probe is mounted with the hose connection facing down and the probe protection house mounted in a vertical position of the stack. Please see Figure 5-1 and Figure 5-2 for the installation of the probes.

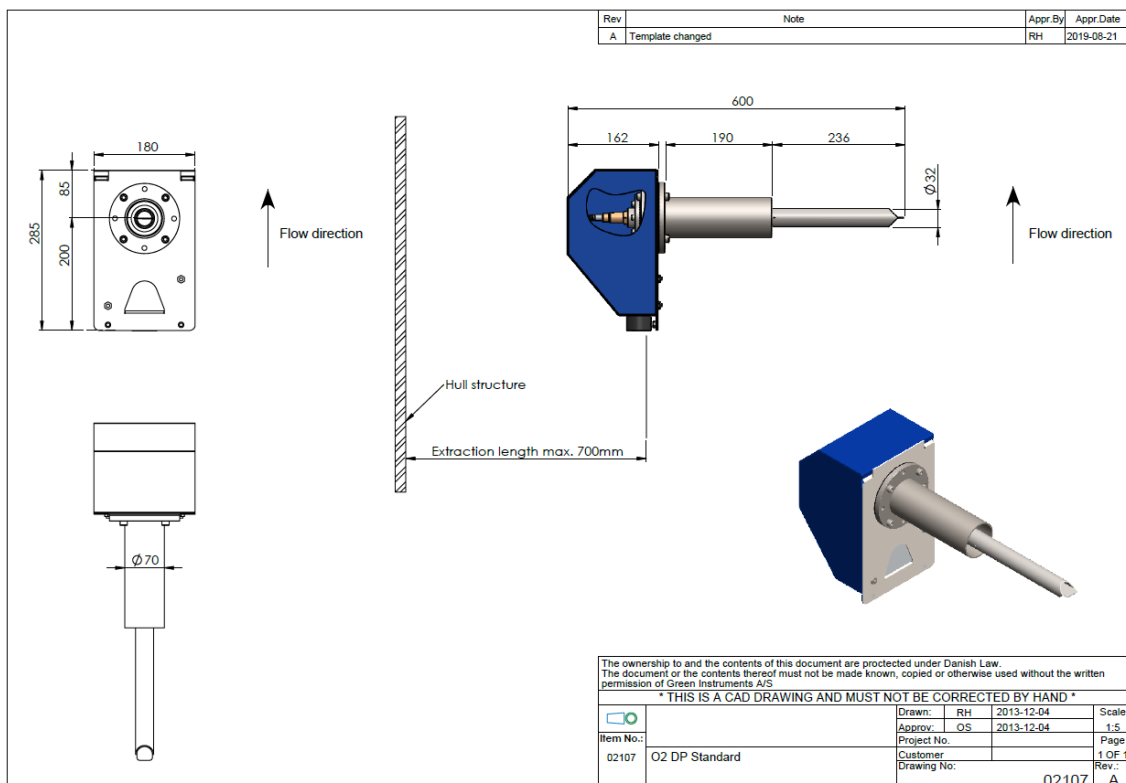


Figure 5-3: Diffusion Probe Standard – Welding Type

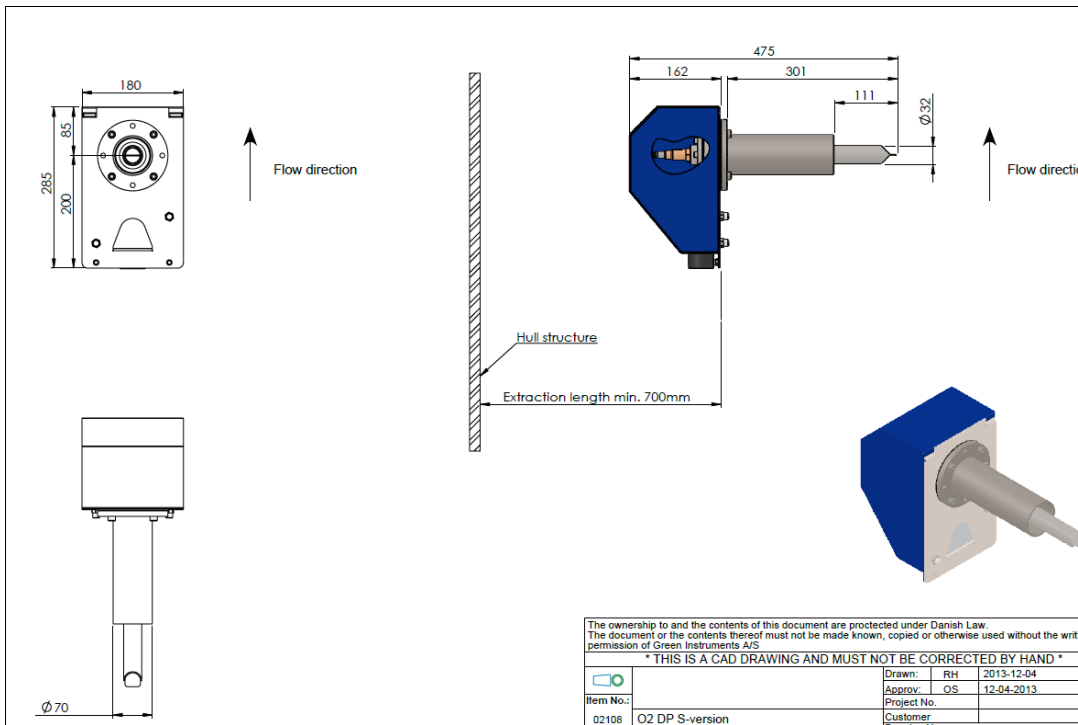


Figure 5-4: Diffusion Probe Short – Welding Type

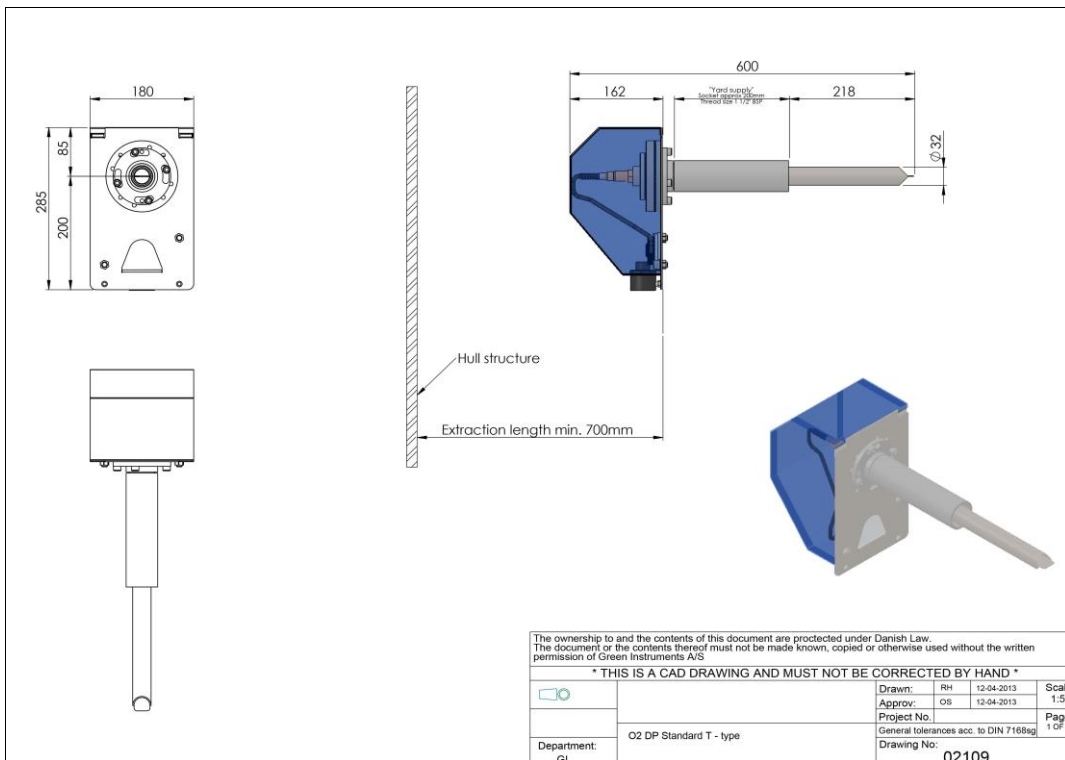


Figure 5-5: Diffusion Probe Standard – Thread Type

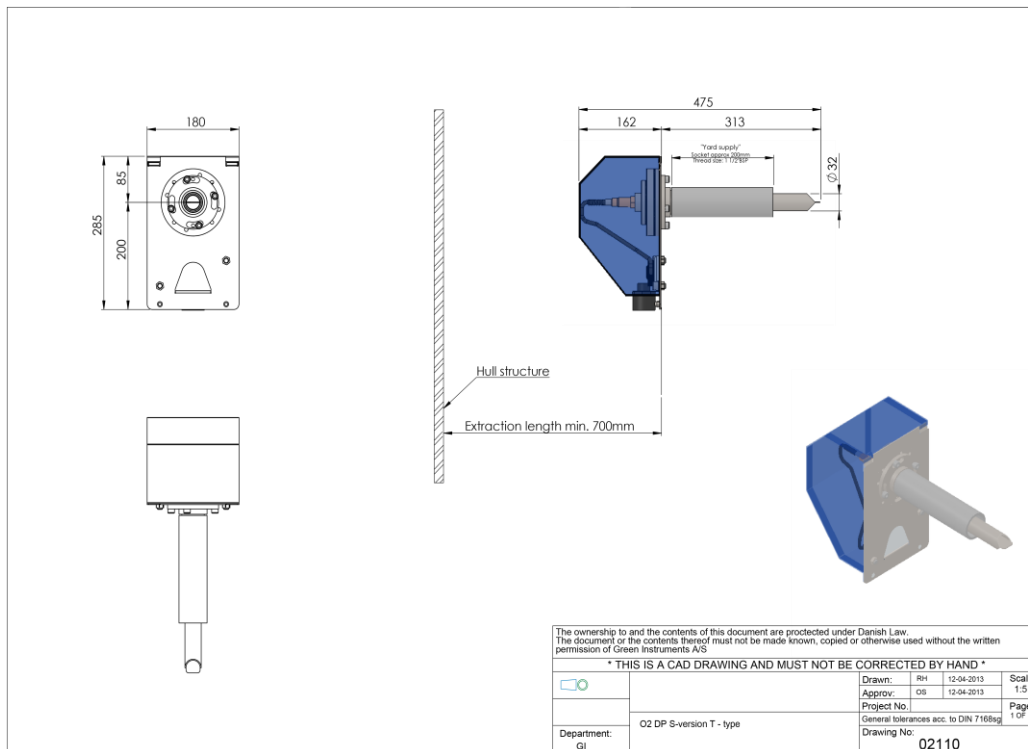


Figure 5-6: Diffusion Probe Short – Thread Type

5.3 Analyzing Board

5.3.1 Mounting Board

The analyzing board is designed for mounting with the G36a Oxygen Analyzer (see Figure 5-7 and Figure 5-8) or the G36p Oxygen Analyzer for panel mounting (see Figure 5-9 and). For the G3621p, the analyzing board is connected to the G36p panel mounted analyzer by a standard 3 m long signal cable. This signal cable can be delivered up to 6 m as optional.

The board has two angle iron mounting brackets. The brackets are made of ordinary mild steel and can be welded or bolted directly to a chosen location structure as required.

The two mounting brackets are mounted horizontally and parallel with a distance of 577 mm. When the board and the diffusion probe are installed in appropriate locations, the instrument air and power can be connected as described below.

5.3.2 Air Supply Connection

For back-flushing and calibration, instrument air is connected directly to the air supply filter reduction station. The reduction station consists of a filter and a drain. The air sup-

ply connection to the reduction station is a 1/8” BSP female connection. The maximum pressure for the air supply inlet is 10 bar.

5.3.3 Test Gas Connection

For system verification, test gas is connected to the inlet valve. The connection is a quick coupling for OD 6/4 mm hose. The maximum pressure for the test gas inlet is 1 bar.

5.3.4 Analyzer and Electrical Connection

For the SGOA system installation, the instructions for the electrical connections are described in the oxygen analyzer manual chapter 3.

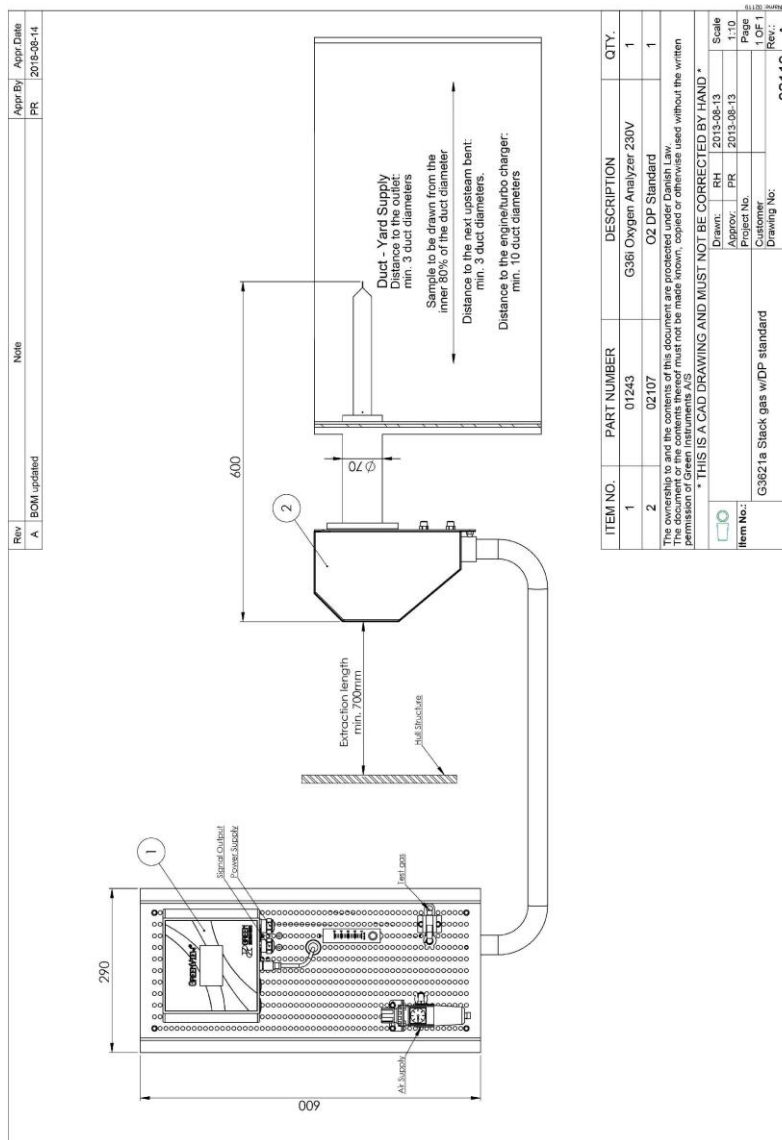


Figure 5-7: Analyzing Board with G36a Oxygen Analyzer Mounted on Board

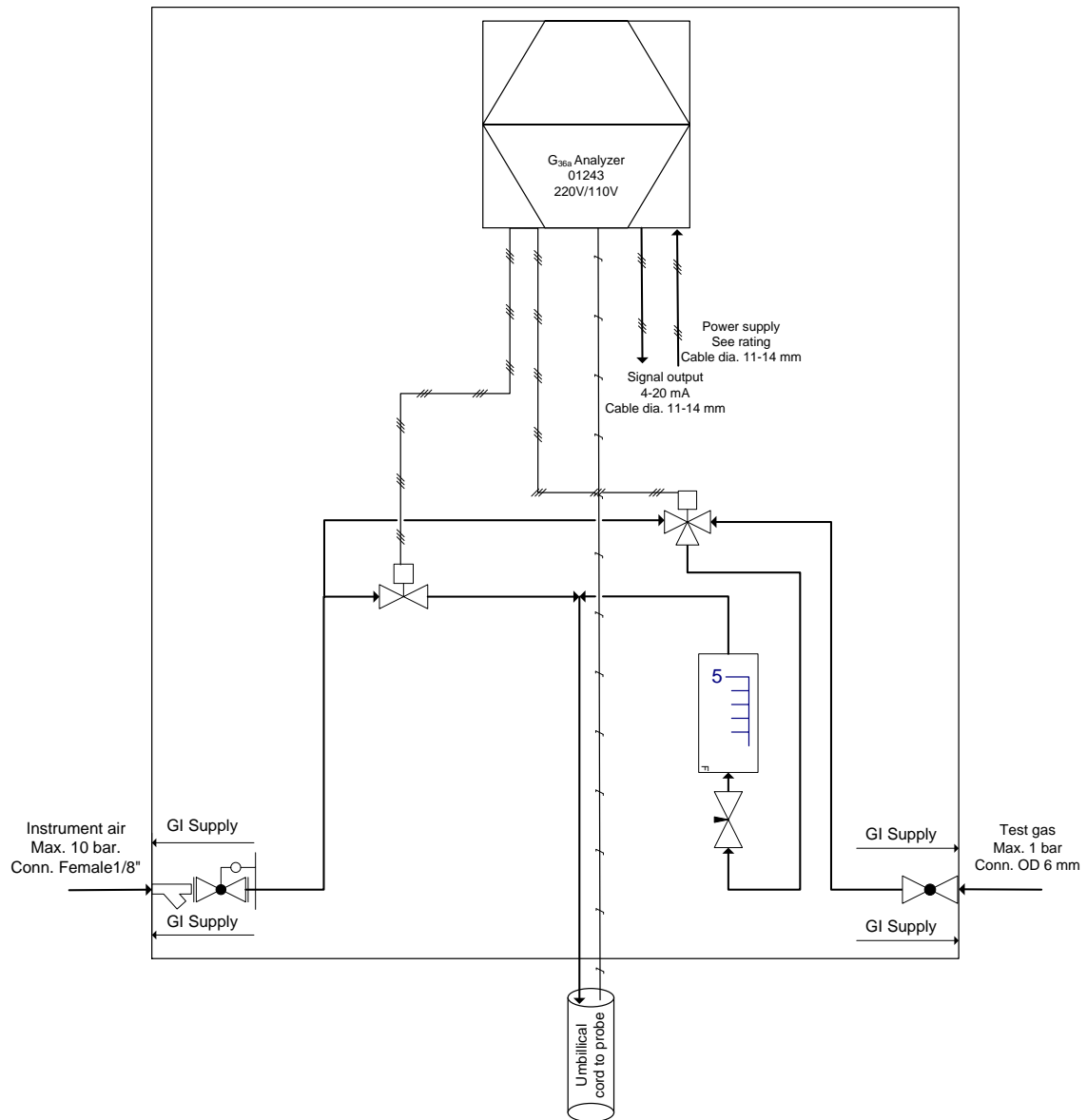


Figure 5-8: Piping and Connection Diagram of the G3621a

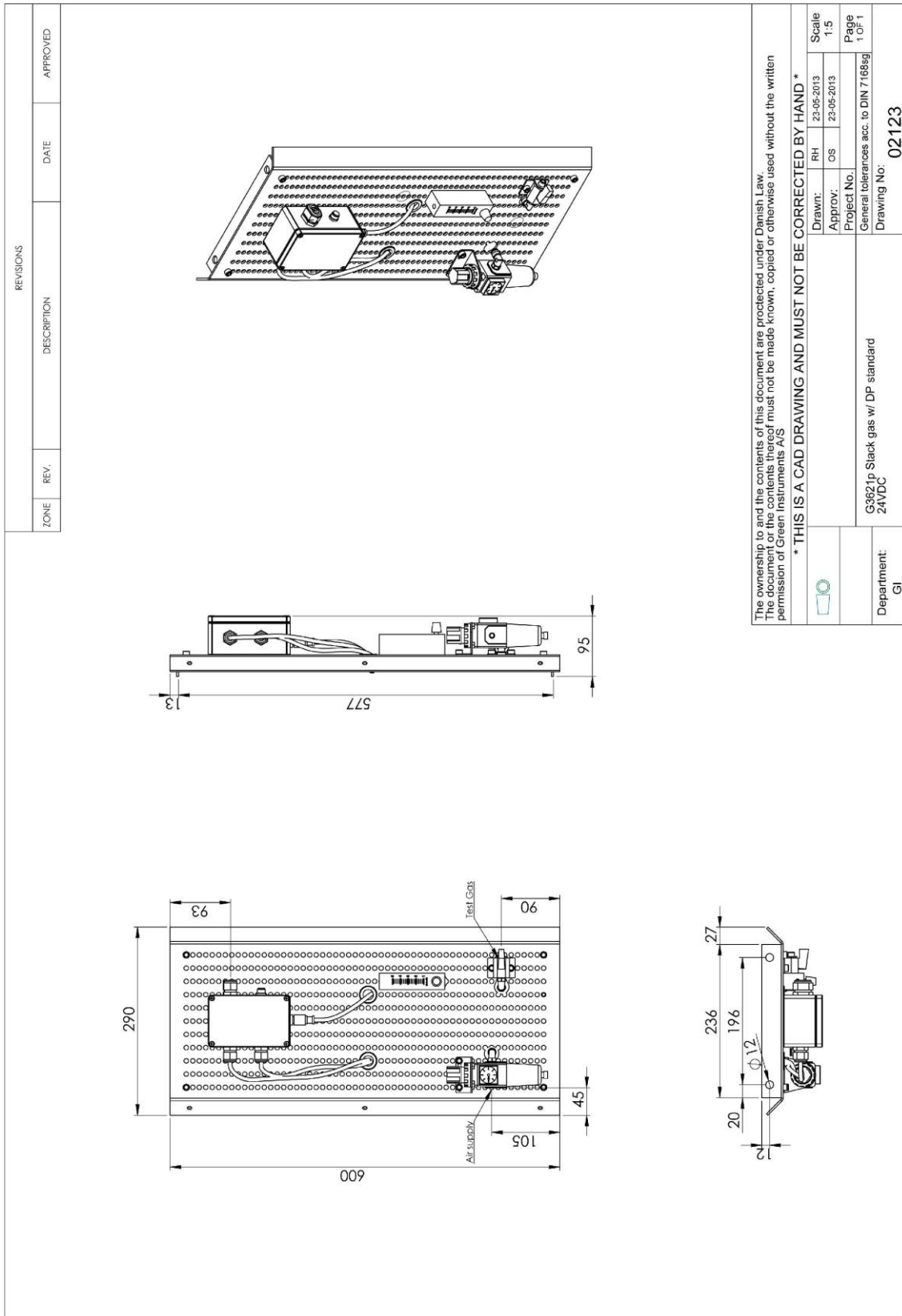


Figure 5-9: Analyzing Board with Connector Box for G36p Oxygen Analyzer

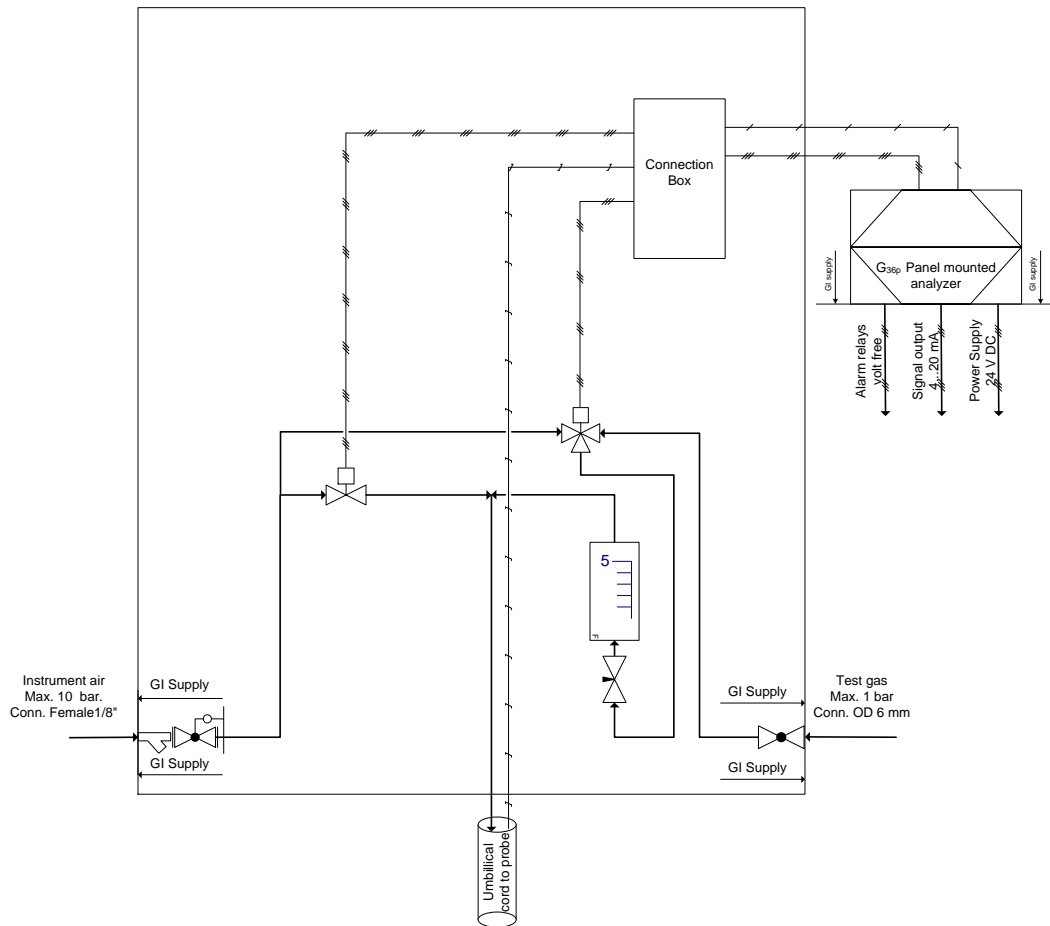


Figure 5-10: Piping and Connection Diagram of the G3621p

6 Commissioning

6.1 Installation and Setup Pre-checks

After completing the installation and before starting the system for the first time, please check the following:

Control that all electrical connections are carried out according to the manual.

Check that the air supply is connected to the air supply filter regulator without leaking and in accordance with good installation practice.

Check that the probe is installed in a suitable location representing the gas to be tested, without leaking and in accordance with good installation practice.

Check that the alarms are set to the intended levels. See section 5.2 in the analyzer manual for the default settings.

Check that the output range is configured according to the description in section 5.4 in the analyzer manual.

Re-check all connections to make sure there is no air leaking. **A leaking connection will result in loss of air and may result in poor calibration.**

6.2 Start of System

Switch the power supply on. During the heating of the sensor, the display will indicate increasing oxygen content. After 1-2 minutes the oxygen content will start to stabilize. After approximately 10 minutes, when the sensor has reached its operation temperature, the oxygen readings are considered stable.

Adjust the air supply pressure at the air supply filter regulator to approx. 1 bar.

Adjust flow meter to approx. 1 l/minute.

The auto-calibration and back-flushing of the filter are now performed automatically. For more information, see the instructions in the analyzer manual.

7 Routine Maintenance

Warning



The sensor/probe is hot and can cause severe burning of personnel if not handle with care.

Turn-off the analyzer before working with the probe and sensor.

Before removing the probe from the stack, make sure that there is no over-pressure or hot exhaust gas inside the stack.

7.1 Calibration

The system must be calibrated regularly and always after each start-up of the oxygen analyzer. If in continuously operation, experience has shown that one calibration per week is sufficient. With the default configuration, the analyzer is automatically calibrated every 6 hours using the artificial calibration. Please see the analyzer manual for more information about calibrations.

7.2 Air Flow System

Routine inspection and maintenance of the air flow system and connections is required to make sure no gas is leaking. It is important that air flow and pressure are stable. Failure to periodically inspect and maintain the above requirements may lead to imprecise analyzer readings and malfunctioning of the system.

The maximum allowed pressure for the air supply filter regulator is 10 bar and the temperature is 60 °C. Prevent ultraviolet rays and the adhesion of organic solvents to the reduction unit. Depressurize the air supply filter regulator station before cleaning and servicing.

The flow meter and control valve does not require any special maintenance. Dirt and oil on the surface can be carefully removed using neutral detergent and a clean dry rag.

7.3 Diffusion Probe

The probe filter is normally cleaned by automatic backflushing. The period between backflushing's is determined by the setup and should be set and changed according to the actual flue gas condition and how dirty the filter gets. Regular backflushing will normally

keep the filter clean. However, slow responds to O₂ changes in the flue gases indicates that the probe filter is contaminated. In case of heavy filter contamination, manual cleaning of the filter will be required.

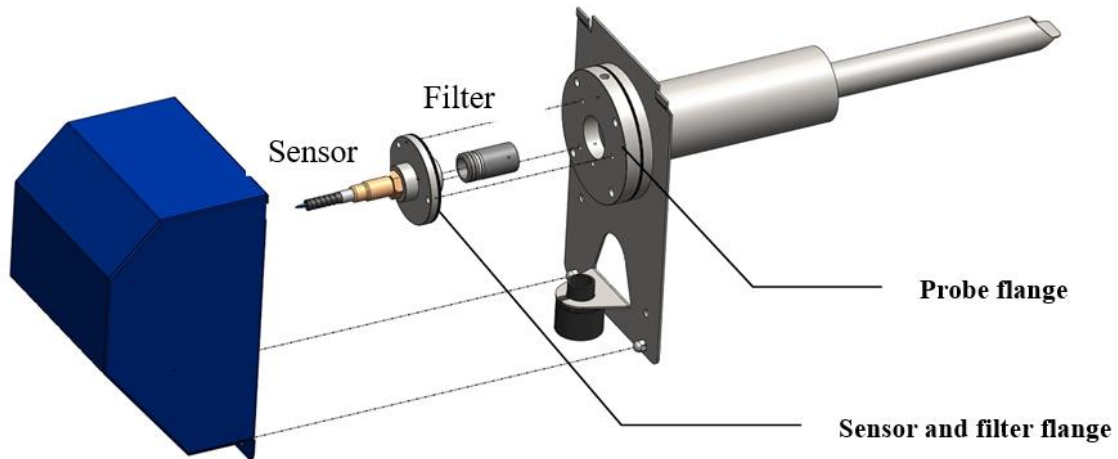


Figure 7-1: Maintenance of the Diffusion Probe

To clean the probe filter, please go through the following steps:

- Turn off the analyzer and disconnect the air supply.
- Unscrew the nuts and remove the blue cover plate of the probe.
- Unbolt the 3 bolts at the sensor and filter flange.
- Remove the sensor and filter flange and unscrew the threaded filter.
- Clean or change the filter.
- Re-screw the filter to the sensor and filter flange and remount the flange to the probe.
- Close the blue cover plate of the probe.

7.4 Sensor







To replace the sensor, please follow the below steps:

- Turn off the analyzer and remove the blue cover plate of the probe.
- Unplug the sensor connection.
- Loose the sensor from the probe head by using a spanner and pull out the sensor.
- Screw a new sensor into the probe and set the sensor plug to the sensor connector.
- Then close the cover plate.

8 Spare Parts

Spare parts are not included in the standard delivery. Spare parts can be ordered when necessary. When ordering spare parts, please mention the serial number of the analyzer, which you can find on the label on the right side of the blue analyzer box.

Part No.	Part Description	The specific appearance of the spare parts is subject change without notice; the function however will not change
00657	Air supply filter regulator 1/8", 0-2 bar	
00839	Flow meter 0.5-5.0 l/m w. control valve	
00854	Umbilical cord completed with sensor cable and air hoses - 3 m	
00910	Calibration Valve	
01061	Back-Flush Valve	
01034	Solenoid 24 VAC	

Part No.	Part Description	The specific appearance of the spare parts is subject change without notice; the function however will not change
01243	G36a Oxygen Analyzer 100-230 VAC	
01245	G36 Oxygen Analyzer manual	
01251	Fuse 2 AT (pkg of 10)	
01258	SEN9 Oxygen sensor screw-in type – with male connector	
01381	G36p Oxygen Analyzer manual	
02190	G36p Oxygen Analyzer 24 VAC (including 01388)	
01388	Gasket for panel mounted analyzer	
01398	Valve for test gas	

Spare Parts

Part No.	Part Description	The specific appearance of the spare parts is subject change without notice; the function however will not change
01471	SD card with Green Instruments' software & standard settings files - please inform the serial number of the analyzer when ordering a new SD card.	
02107	Long type welding socket probe	
02108	Short type welding probe complete	
02109	Long type probe with thread	
02110	Short type probe with thread	
01905	Probe filter	
01913	Gasket f. DP1 Block	
01914	Gasket f. DP1 Flange O125 w. air hole	
02155	This manual	

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