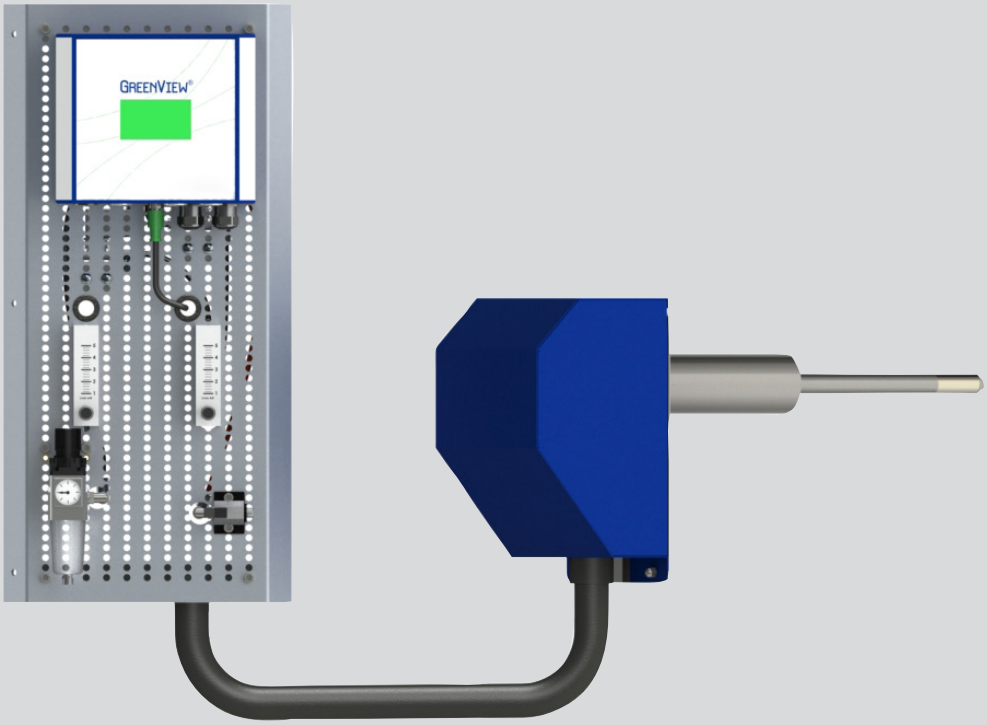
G3620A/P

Stack Gas Oxygen Analysing Manual



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Green Instruments

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1 Introduction

1.1 About this Manual

The G3620a/p Stack Gas Oxygen Analyzing System, hereafter named a SGOA System, consists of an oxygen analyzer, a sampling board, and a probe.

This manual contains data and instructions for the installation, operation, and maintenance of the sampling 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 (part no. 01245) – IP67 box
- The G36p Oxygen Analyzer manual (part no. 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 & figures have been made in general terms and do not take into consideration specific installations. The figures used in the manual are only for general illustration purposes. The manual is designed for the standard G3620a/p SGOA System.

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. 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.

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

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.

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 G36p Oxygen Analyzer or on the right side of the G36a 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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Web: www.greeninstruments.com

1.3 About the System

The G3620a/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:

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

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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
Sampling Board	
Ambient Temperature	0°C-55°C
Sampling Board Dimension	600 × 290 × 130 mm (H × W × D)
Weight – Incl. G_{36a} O_2 Analyzer	Approx. 6.0 kg without packaging
Weight – Incl. G_{36p} O_2 Analyzer	Approx. 4.0 kg without packaging
Ejector Probe	
Sensor Technology	Heated zirconia type sensor
Measurement Range	0.0-21.0% (selectable range)
Sample Temperature	0°C-500°C
Probe Insert Length	243-337 mm for duct diameters 260…2800 mm
Socket	OD: 60 mm L: 200 mm
Connection - Ejector Air (Red)	6/4 mm tubing
Connection - Calibration Gas (Blue)	6/4 mm tubing
Ejector Air Flow	Approx. 2 l/min at 1 bar
Calibration Air Flow	Approx. 3 l/min or 1 l more than ejector air flow
Ejector Probe Dimension – Short	285 x 180 x 475 mm (H x W x D)
Ejector 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	
For detail information refer to 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 Installation

Read this chapter in its entirety before installing the system.

3.1 Control at Delivery

When you receive the G3620a/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.

3.2 Where to Install the System

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

- The sampling 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 can be installed up to 6 m from the analyzing board.
- As standard scope of supply, the sampling board can be installed up to 3 m from the ejector probe.
- It is recommended to place the ejector probe as illustrated in Figure 3-1 below. If you find it difficult estimating where to install the ejector probe, please contact Green Instruments A/S for more instructions.

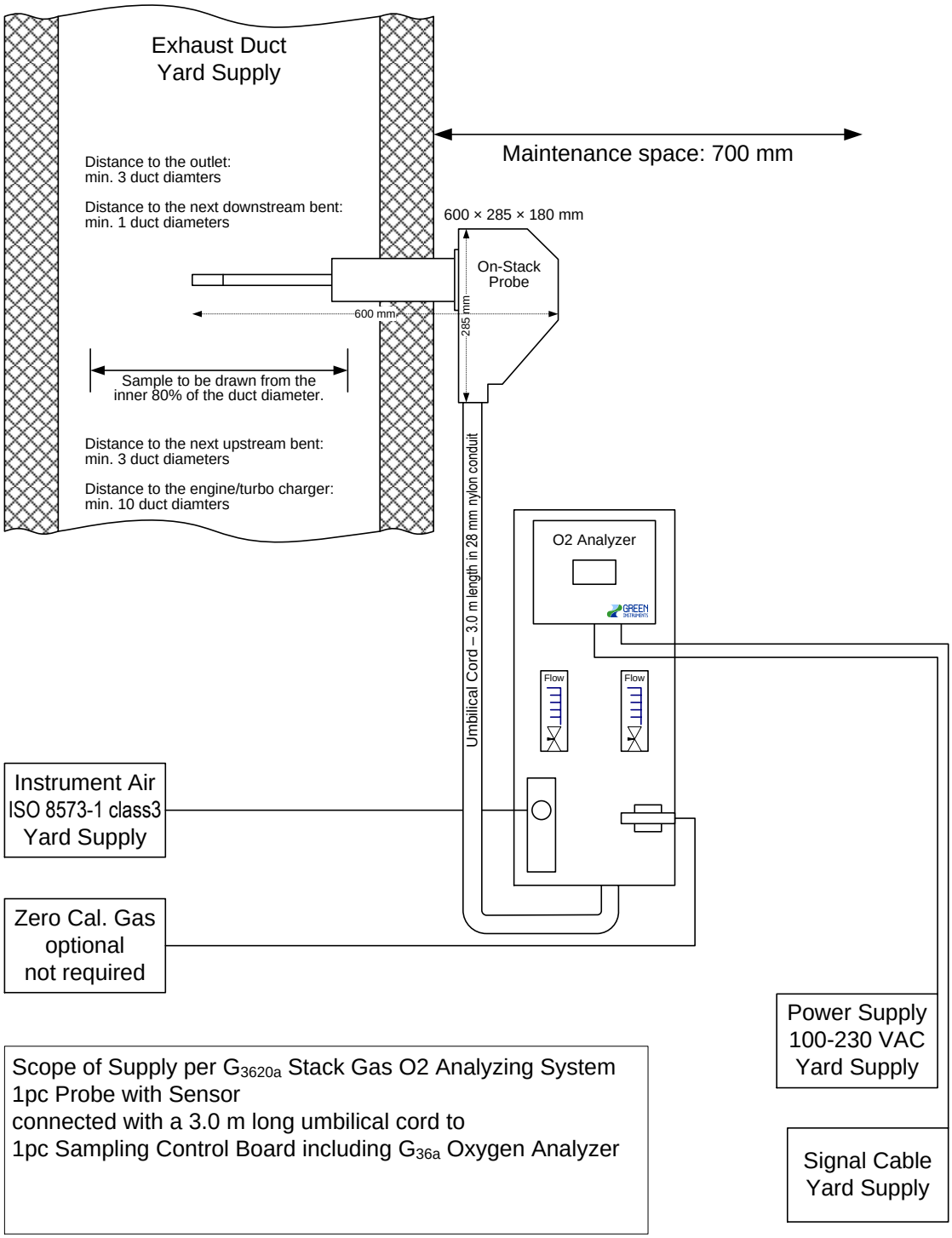


Figure 3-1: Installation Layout of the G3620a with G36a Stand-alone Analyzer

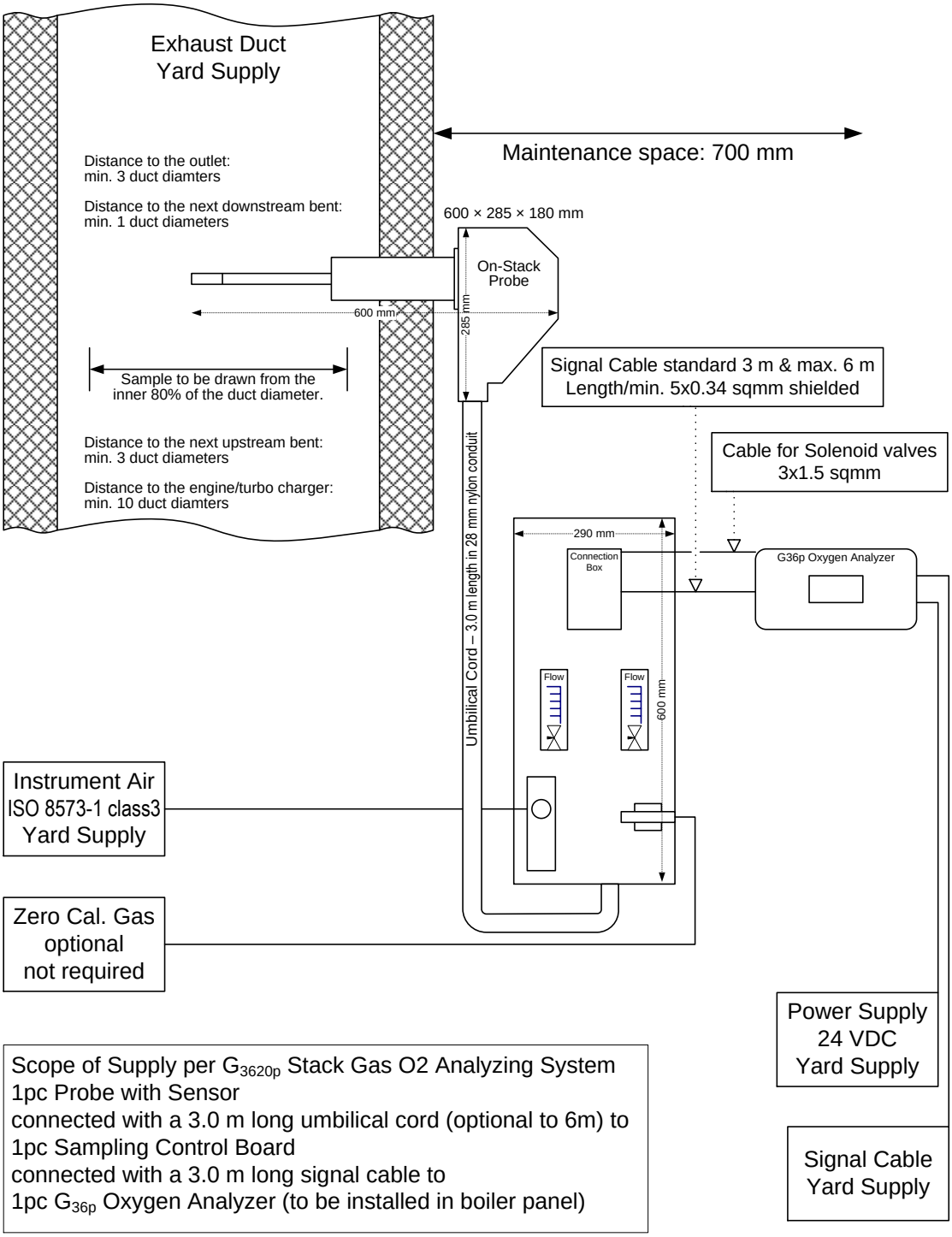


Figure 3-2: Installation Layout of the G3620p with G36p Panel Mounted Analyzer

3.3 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 G3620a/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.

3.4 Ejector Probe

The sample gas flow is drawn through the sample filter element into the sensor area via a narrow passage securing quick response time. The probe has a small air operated ejector, which drives the sample gas past the sensor and back into the stack. The sample gas velocity and responding time is controlled by the flow of the ejector air.

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 ejector probe.

When welding the mounting socket to the stack, make sure that the back plate of the probe is mounted with the sampling hose connection facing down and the probe protection house mounted in a vertical position of the stack. Please see Figure 3-1 and 3-2 for the installation of the ejector probe.

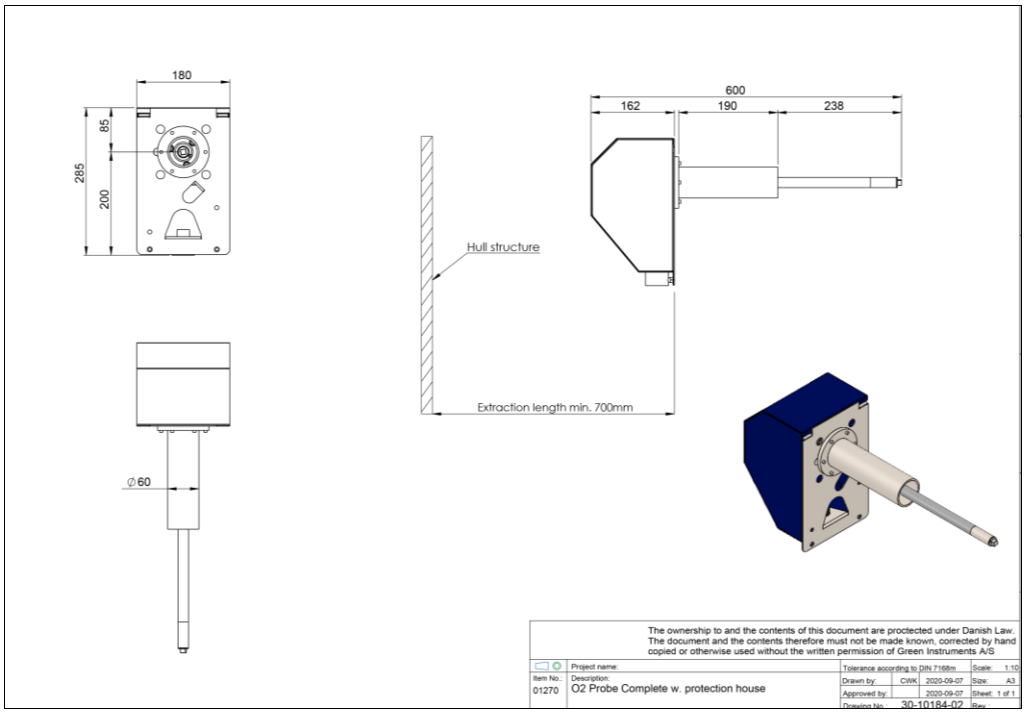


Figure 3-3: O_2 Ejector Probe Standard

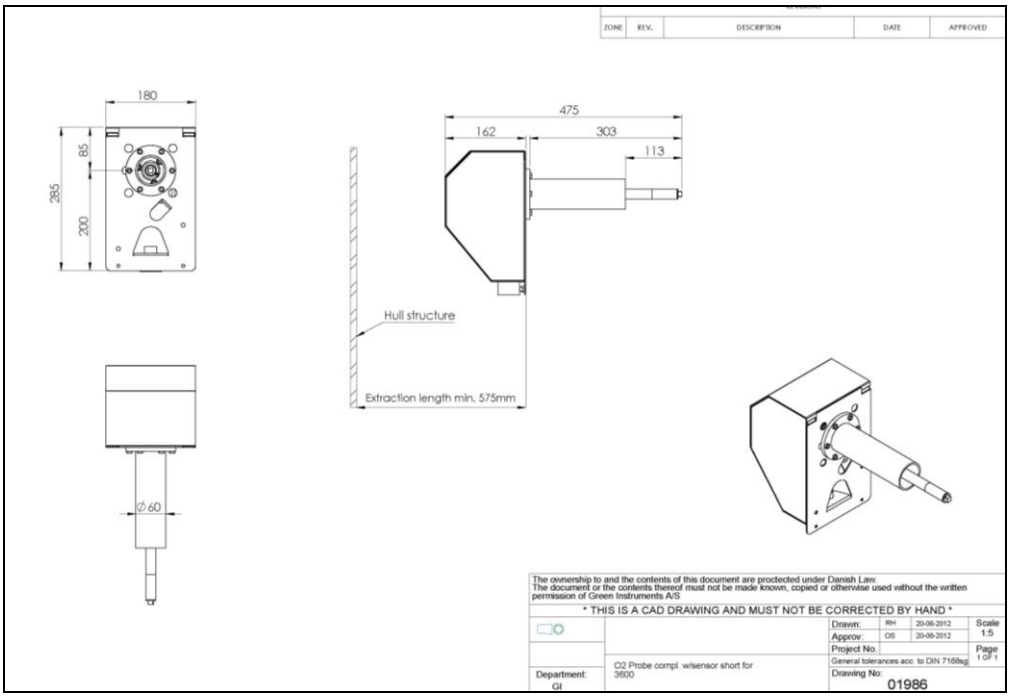


Figure 3-4: O_2 Ejector Probe Short

3.5 Analyzing Board

The analyzing board is designed for mounting with the G36a Oxygen Analyzer or the G36p Oxygen Analyzer for panel mounting. For the G3620p, the analyzing board is connected to the panel mounted analyzer by a standard 3 m long signal cable. This signal cable can be delivered up to 6m as optional.

The analyzing 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 analyzing board and the ejector probe are installed in appropriate locations, the instrument air and power can be connected as described below.

3.5.1 Air Supply Connection

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

3.5.2 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.

3.5.3 Analyzer and Electrical Connection

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

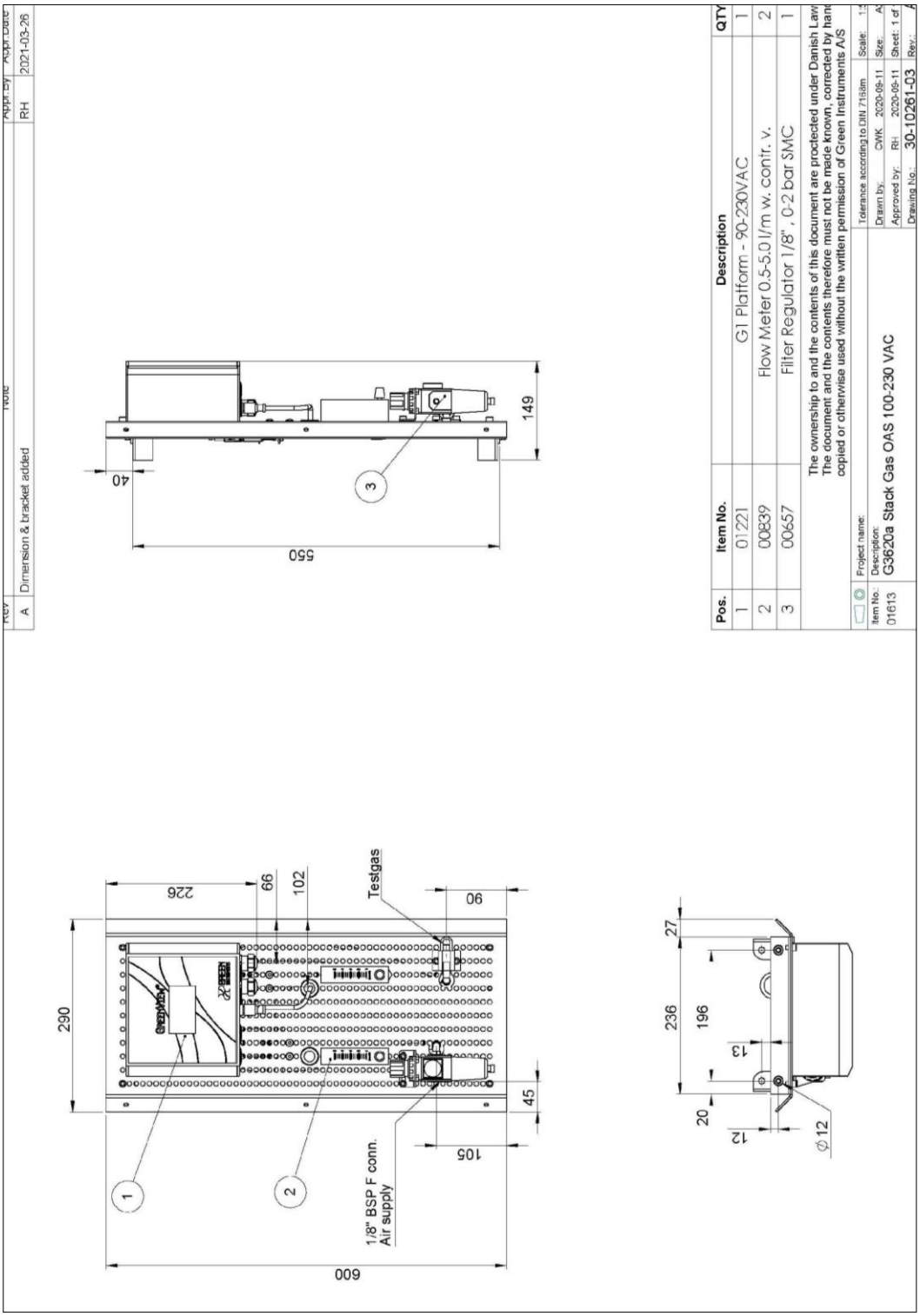


Figure 3-5: Analyzing Board with G36a Oxygen Analyzer Mounted on Board

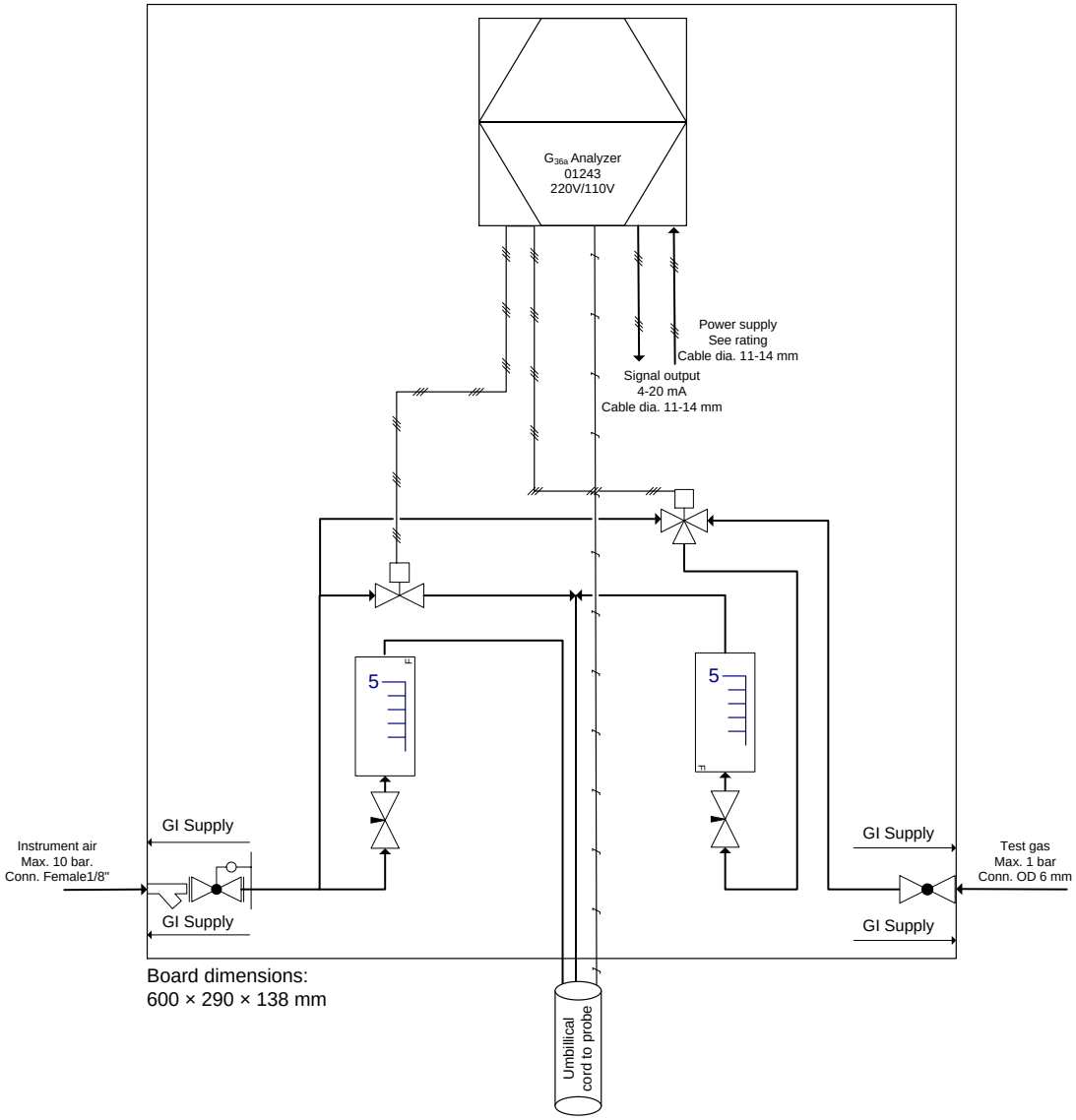


Figure 3-6: Piping and Connection Diagram of the G3620a

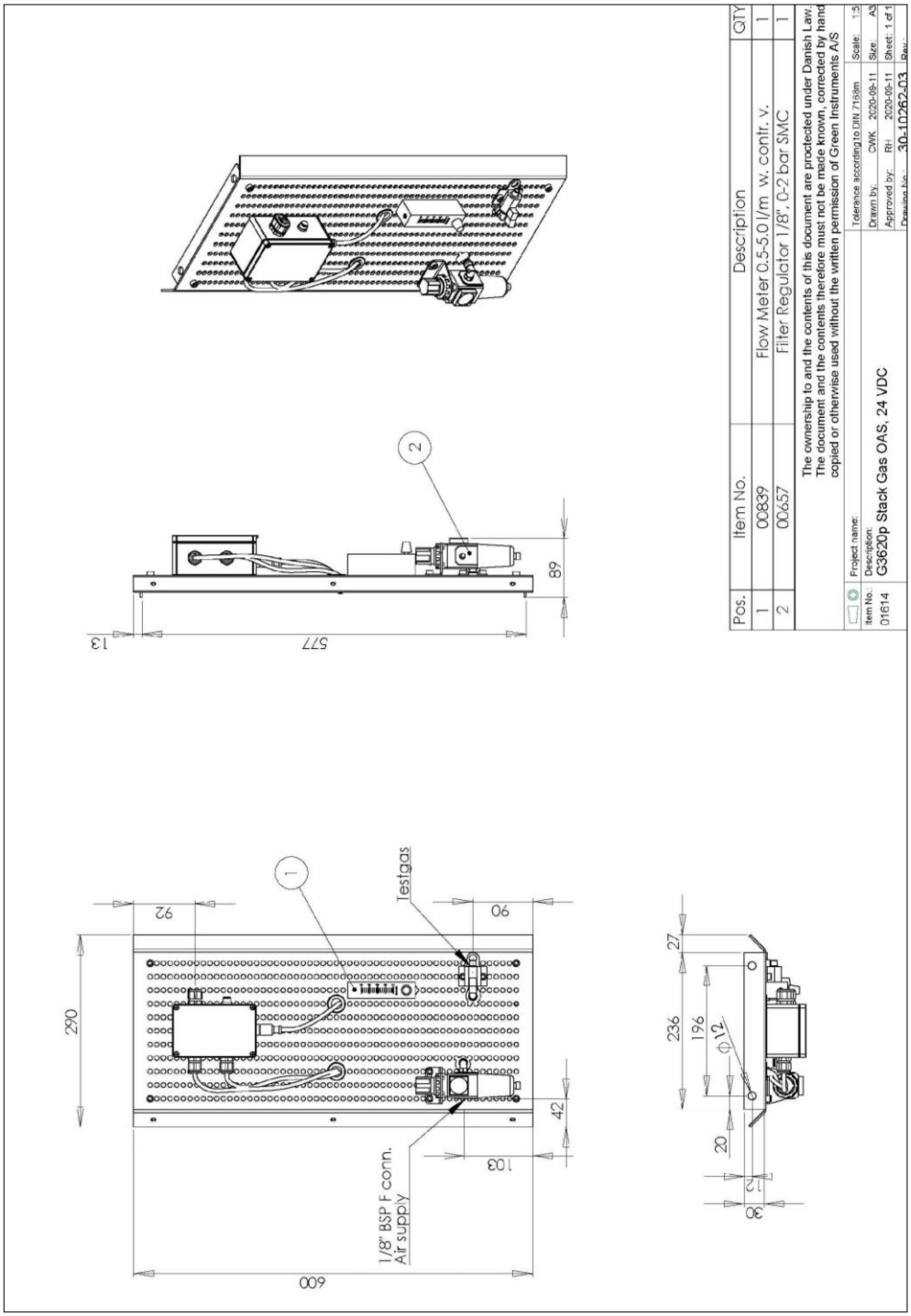


Figure 3-7: Analyzing Board with Connector Box for G_{36p} Oxygen Analyzer

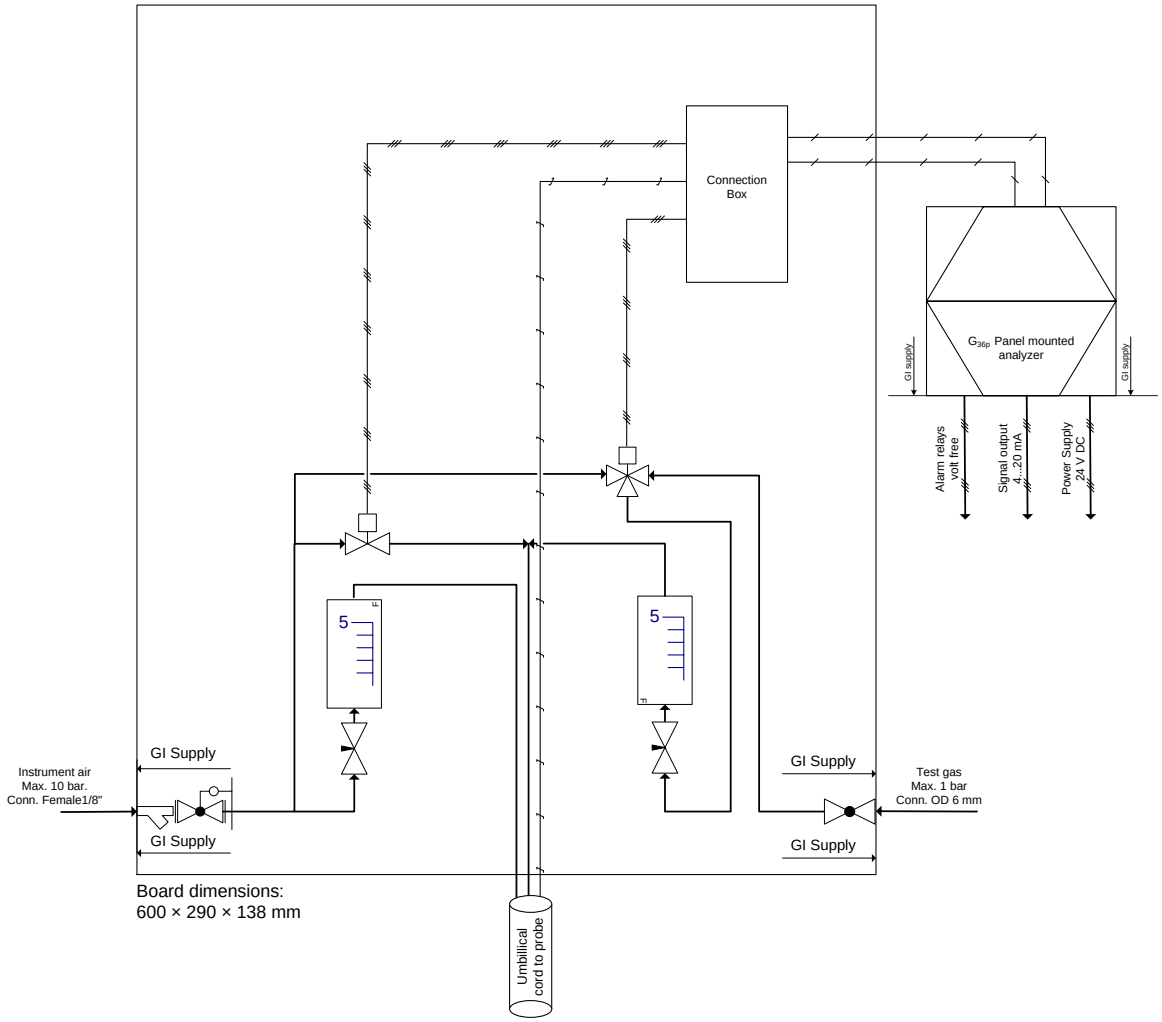


Figure 3-8: Piping and Connection Diagram of the G3620p

4 Commissioning

4.1 Installation and Setup Pre-checks

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

- Check and confirm 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. Refer to the analyzer manual for the default settings.
- Check that the output range is configured according to the description 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.**

4.2 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 the ejector air flow at the sampling flow meter to approx. 2 l/min for common conditions. If more suction is needed the ejector air flow can be adjusted.
- Adjust the calibration air flow to approx. 3 l/m or 1 l more than the ejector air flow.
- Artificial calibration and back-flushing of the filter can now be performed following the instructions the analyzer manual.

5 Routine Maintenance

WARNING

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

Turnoff 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.

5.1 Calibration

The system must be calibrated regularly and always after each startup 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 refer to the analyzer manual for more information about calibrations.

5.2 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^{o}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 removed carefully using neutral detergent and clean dry rag.

5.3 Ejector Probe

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

keep the filter clean. However, slow responds to O_2 changes in the flue gases indicates that the probe filter or the probe venturi air nozzle is contaminated. In case of heavy filter contamination, manual cleaning of the filter and the probe venturi air nozzle will be required.

When cleaning or changing the probe filter, the probe must be removed from the stack. The filter element is removed by unscrewing the filter bolt. Before removing the probe from the stack, please make sure that there is no over-pressure inside the stack.

To clean the ejector probe, start by removing the ejector probe from the stack:

- Turn off the analyzer and disconnect the air supply.
- Unscrew the nuts and remove the blue cover plate of the ejector probe.
- Use a spanner to loosen the sensor. Unplug the sensor and the two sampling tubes. Remember that the sensor can be extremely hot!
- Unbolt the 6 bolts at the bottom of the probe head bottom and pull out the ejector probe.

Cleaning the probe filter element:

- To clean the probe filter element manually, remove the filter element by unscrewing the filter bolt.
- Clean or change the filter.

Cleaning the ejector probe venturi air nozzle:

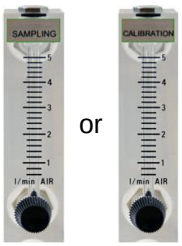
- Unbolt the red bolt on the probe head top and pull the ejector probe venturi air nozzle out.
- Clean the ejector probe venturi air nozzle with pressurized instrument air. The gas canals in the ejector probe head top can also be cleaned with pressurized instrument air.

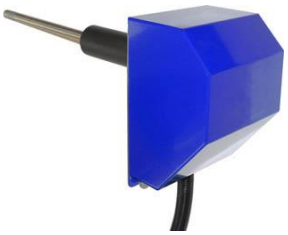
5.4 Sensor

To replace the sensor, remove the blue cover plate of the probe. Then remove the sensor from the probe head following the below steps:

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

6 Spare Parts

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	
00472	Flange Gasket OD 100 for Stack Probe	
00573	Probe filter element - 25 micron	
00839	Flow meter 0.5-5.0 l/m w. control valve	 or
00854	Umbilical cord completes 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	
01267	Filter bolt	
01268	Inner Gasket OD 64 for Stack Probe	
01270	Long type probe completes with protect housing	
01986	Short type probe completes with protect housing	
01381	G36p Oxygen Analyzer manual	
02190	G36p Oxygen Analyzer 24 VAC (including 01388)	

Part No.	Part Description	The specific appearance of the spare parts is subject change without notice; the function however will not change
01388	Gasket for panel mounted analyzer	
01398	Valve for test gas	
01471	SD card with Green Instruments' software & standard settings files - please inform the serial number of the analyzer when ordering a new SD card.	
01627	Air jet	
01760	This manual	

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