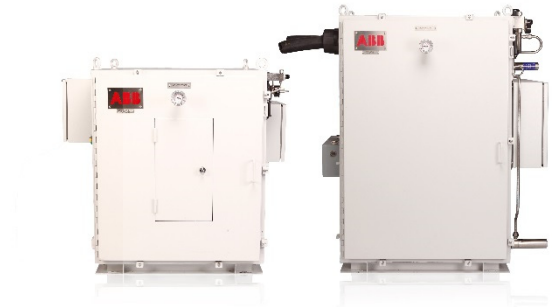


GAA630-M

Advanced emission monitoring system for marine applications

Measurement made easy

We are on your wavelength



Continuous measurement of SO₂, CO₂, NO_x, CO and O₂
with a single measuring system

Proven technology for reliable and accurate
measurements

Low maintenance due to innovative internal gas
calibration cells

MARPOL referenced extractive gas sampling approach

Conformity as per MEPC.259(68) and MEPC.177(58)

Worldwide service

Application and system design

Application

On January 1, 2015, new limit values for SO₂ and NO_x went into effect to reduce air pollution caused by ships. The International Maritime Organization (IMO) has specified these new limit values in MARPOL Annex VI. If a vessel uses an exhaust gas cleaning system – a so-called scrubber – for compliance with the limit values, this system must be continuously monitored by means of an emission measurement system.

The GAA630-M measures the gas concentration upstream or downstream of the scrubber and transfers them to the vessel's main control system. Compliance with the specified limit values can be proven and documented this way. The SO₂/CO₂ ratio can be used to control the scrubber. O₂ and CO can be measured as well for combustion optimization purposes.

Measuring principle

The GAA630-M is based on ABB's proven NDIR (non-dispersive infrared) measurement technology. The analyzer module Uras26 allows for reliable measuring and monitoring of the limit values for SO₂ and CO₂ specified by the IMO, and it can be employed for continuous monitoring of CO if required.

The O₂ concentration (combustion quality index) is measured with an electrochemical sensor (ECS).

The system can be equipped with an additional analyzer module to allow for NO_x measurements. The Limas21 UV is a rugged photometer based on NDUV (non-dispersive ultra-violet) measurement technology specifically designed for NO and NO₂ measurements.

System configuration

The system allows for simultaneous monitoring of multiple measuring points and different measured values. It can be configured for either a single stream or a dual stream sampling (see table below and gas flow diagrams on pages 4–9).

System config.	Sampling points	Streams	Measured components
C1	Downstream scrubber	Single	CO ₂ , SO ₂ , O ₂
C2	Upstream scrubber and Downstream scrubber	Dual	CO ₂ and SO ₂ , O ₂
C3	Downstream scrubber	Dual	CO ₂ , SO ₂ , O ₂
C4	Downstream scrubber	Single	CO ₂ , SO ₂ , O ₂ , NO _x
C5	Upstream scrubber and Downstream scrubber	Dual	CO ₂ and SO ₂ , O ₂ , NO _x
C6	Downstream scrubber	Single	CO ₂ , SO ₂ , O ₂ , CO

System design

The GAA630-M consists of the following parts:

- Sampling probe
- Sample gas line
- Sample conditioning system
- Analyzer system

The system is composed of two cabinets: One cabinet accommodates the sampling components and the other the analytical components.

The extraction of the gas from the exhaust line is done with heated sampling probes, which are installed in the line. The heated sampling line is the connection and supplying line between sampling probe and sampling cabinet. The probe and the sampling line are heated to avoid condensation.

To clean the filters in the sampling probe a back-flushing system via the filter chamber is integrated (with built-in solenoid valves). The filters are cleaned with pressurized air, every 6 hours cyclical or automatically when the flow is below the minimum value.

At the entrance of the analyzer cabinet there is a 3/2 way solenoid valve. The gas flow goes to the gas cooler and via filter, flow meter, pump and aqua stop filter to the gas analyzer.

Technical data

Measuring principle

NDIR for SO₂ and CO₂, electrochemical cell for O₂,
NDUV for NO_x. Extractive measurement (cold/dry)

Sample components and measuring ranges

CO₂: 0–20 % by volume

SO₂: 0–250/0–500 ppm

O₂: 0–25 % by volume

NO: 0–1000 ppm

NO₂: 0–400 ppm

NO_x: 0–1400 ppm

SO₂/CO₂ ratio: 0–250 (calculated)

Linearity deviation

≤ 1 % of span

Repeatability

≤ 0.5 % of span

Zero drift

SO₂, CO₂: ≤ 1 % of span per week

NO_x: ≤ 2 % of span per week

Sensitivity drift

≤ 1 % of measured value per week

Noise

SO₂, CO₂: ≤ 0.2 % of span at electronic T90 time = 5 sec

NO_x: ≤ 0.5 % of span at electronic T90 time = 10 sec

Analyzer response time

Less than 3 seconds (sample gas flow 60 l/h)

Warm up time

30 minutes (with thermostat), in line with MARPOL requirement

Validation / Calibration

Automatic validation with internal gas filled cells

Manual calibration with calibration gas bottle

Enclosure

Protection class: IP65

Material: Stainless steel

Weight: Sample conditioning system cabinet 260 kg, analyzer cabinet 300 kg

Dimensions w/o cabinet base (W x H x D): Sample conditioning system cabinet 800 x 1150 x 550 mm (31.50 x 45.28 x 21.65 in.), analyzer cabinet 750 x 850 x 850 mm (29.53 x 33.46 x 33.46 in.)

Electrical interfaces

Analog signals: 8 x AO, 4 x AI

Digital signals: 8 x DO, 8 x DI

Gas analyzer communication interface: Ethernet Modbus TCP/IP (standard), Modbus RTU (option), Profibus (option), data transmission (via router) or remote operation

Gas connections

Instrument Air: 1/2" OD tube fitting

Sample gas inlet and calibration port: 1/4" OD tube fitting

Power and signal connections

Power supply: max. 16 mm²/AWG 6, M32/M25 cable gland

Signal: max. 4 mm²/AWG 10, M25/M20 cable gland

Power supply

Input voltage: 115/230 VAC, 50/60 Hz

Power consumption

Sampling probe: 400 W

Electric heated sample gas line: 54 W/m

Sample conditioning system cabinet: max 800 W

Analyzer cabinet: max 400 W

Compressed air for back-purging

Quality: Dry with dew point < –20 °C (–4 °F)

Pressure: Max. 600 kPa (87 psi)

Sample gas inlet conditions

Temperature: Max. 500 °C (932 °F)

Pressure: 850 to 1100 hPa (12.3 to 16 psi)

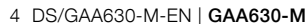
Flow: Max. 30 to 100 l/h

Ambient temperature

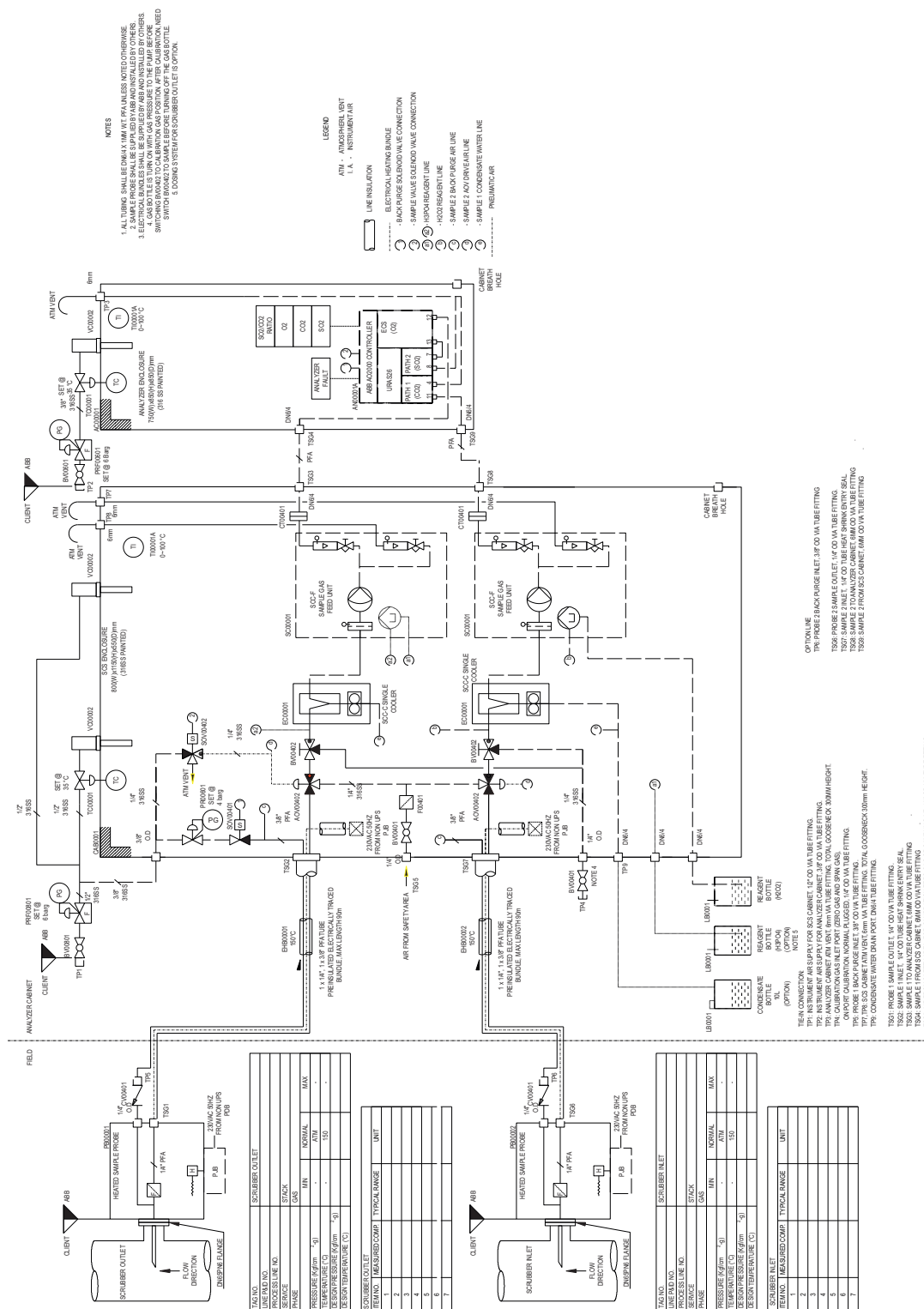
In operation: 5 to 55 °C (41 to 131 °F)

During storage and transport: –20 to 70 °C (–4 to 158 °F)

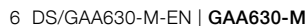
System configuration C1 gas flow diagram



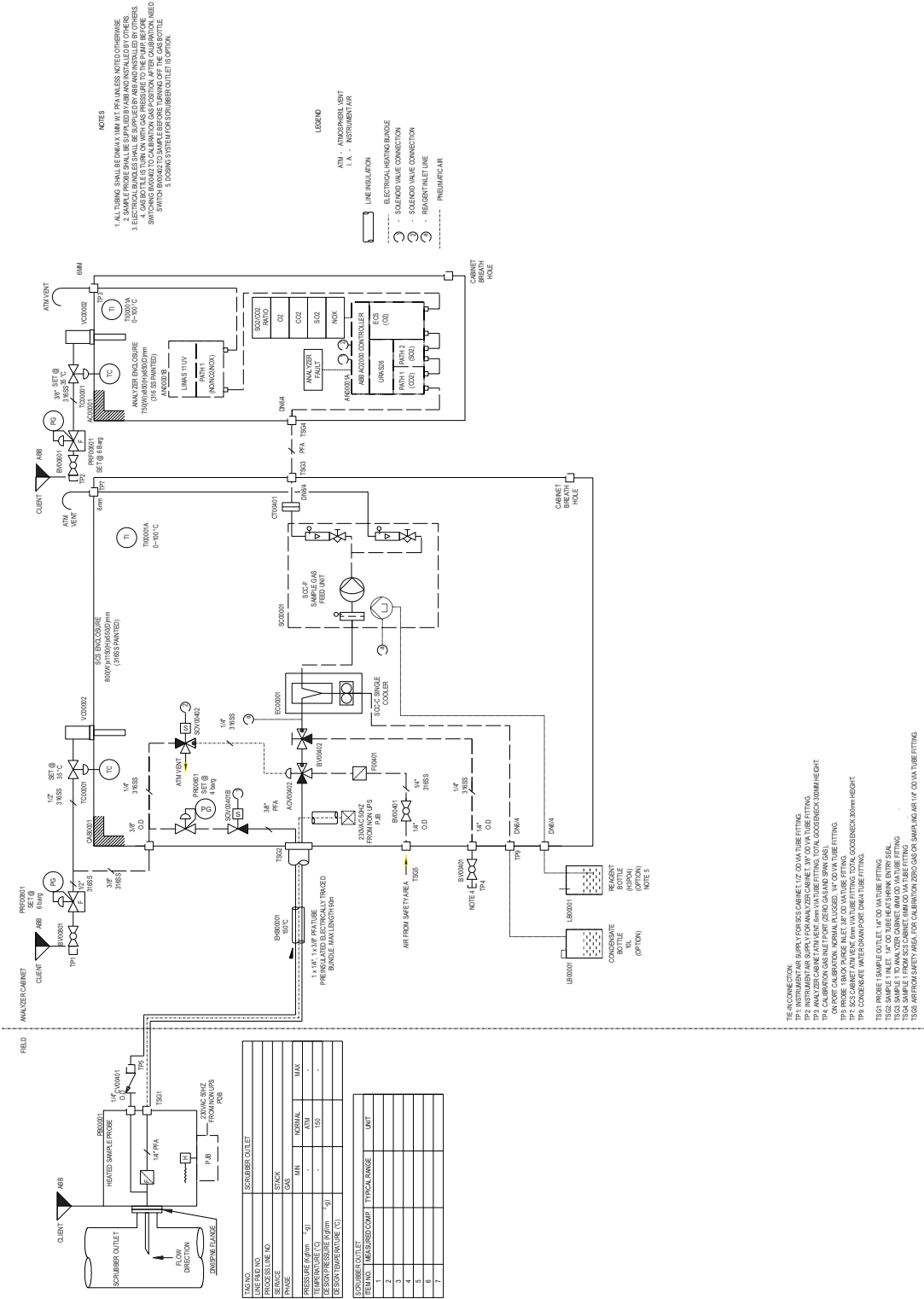
System configuration C2 gas flow diagram



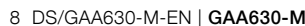
System configuration C3 gas flow diagram



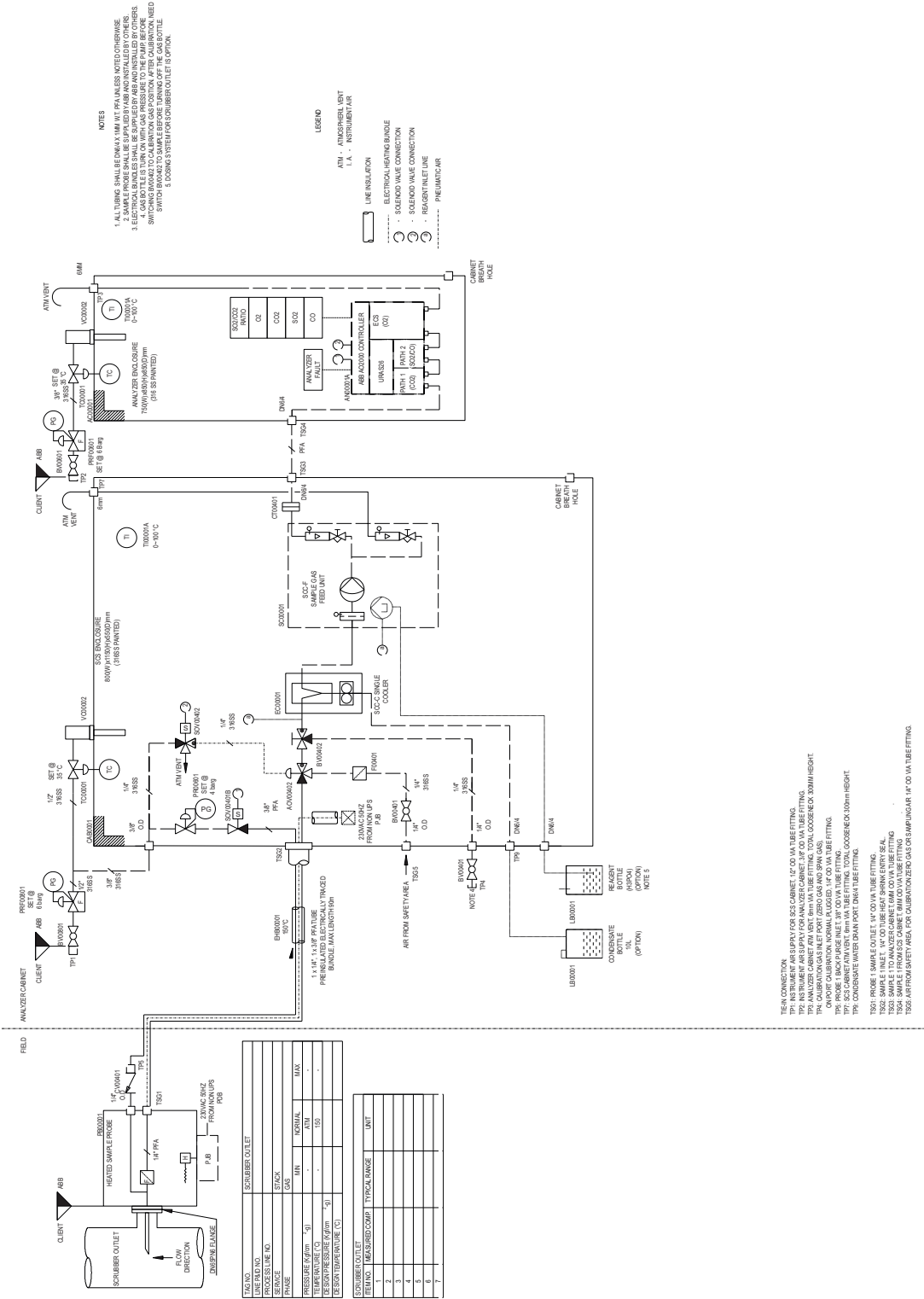
System configuration C4 gas flow diagram



System configuration C5 gas flow diagram



System configuration C6 gas flow diagram

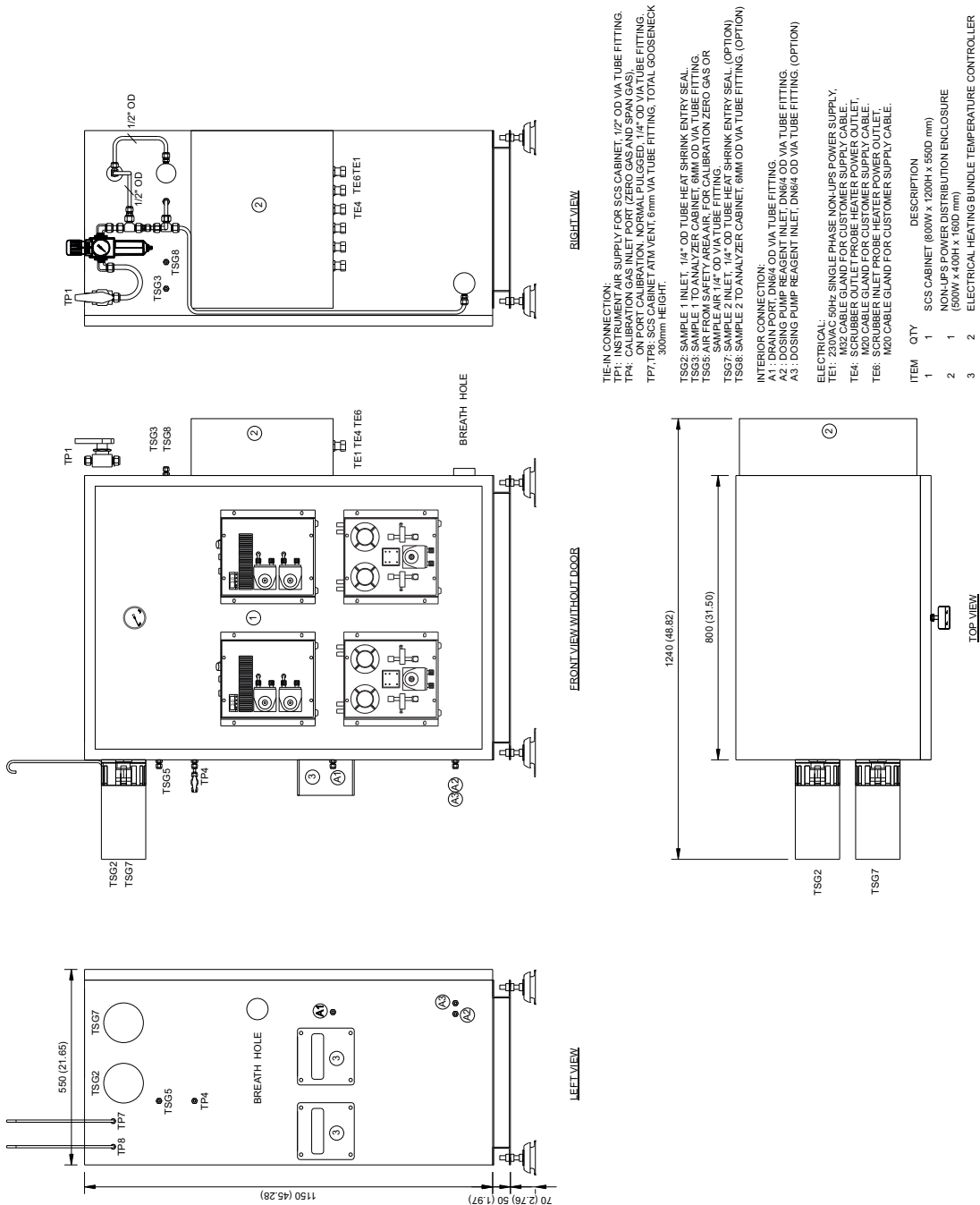


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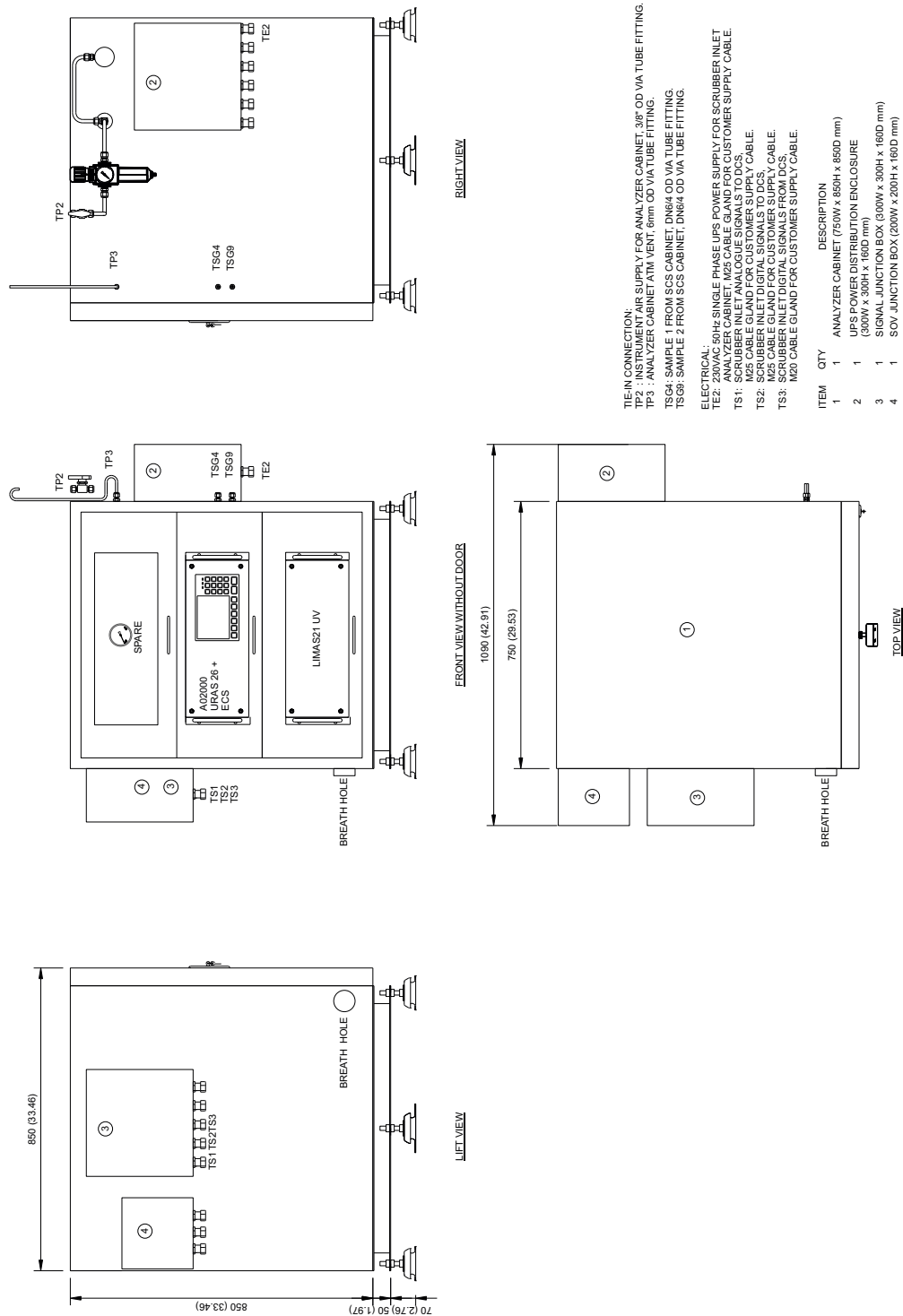
Sampling cabinet general arrangement drawing

Dimensions in mm (inch)



Analytical cabinet general arrangement drawing

Dimensions in mm (inch)



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