

General Specifications

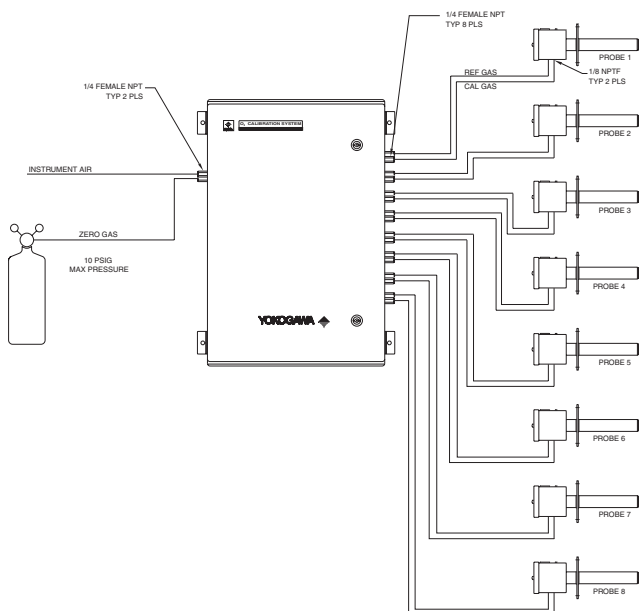
MC1, AC1, AC4, AC8
Calibration Units

O₂

Yokogawa's zirconia oxygen detector systems offer a variety of calibration units for quick, easy control of calibration and reference gases giving the user simple, accurate calibration and operation. Users with single-point measuring systems, such as the model ZR402 converter, may choose either manual or automatic calibration units, models MC1 or AC1, respectively. For users with multi-point measuring systems, such as the model AV550 converter, the user has a choice of either a 4- or 8-channel auto calibration unit, models AC4 or AC8, respectively.

FEATURES

- Dry instrument air as span calibration gas and reference air
- Single point of control for reference air and calibration gases
- Easy wiring of converter to solenoids
- Easy tubing from multiple detectors to a single calibration system
- Easy setting of flow rates to all detectors



GENERAL SPECIFICATIONS

Calibration Gas & Reference Air: A two-point calibration using zero and span gas is recommended. Yokogawa's Oxygen probes use instrument air as both span calibration gas and reference air. The reference air is maintained at 0.8 LPM while the span gas, which is used during calibration, is maintained at 0.6 LPM. The calibration units allow for easy setting of these flowrates with simple plumbing to the calibration unit and the probe(s). It is crucial to the zirconia cell that the flowrates are maintained at a constant rate, since the Nernst equation assumes the partial pressure of O₂ on the reference side is stable.

Piped reference air is always recommended and all calibration units offered by Yokogawa come standard with reference air flow control and independent flowmeter(s).

For zero gas a mixture of 0.5 to 8% oxygen balanced in nitrogen is recommended. Pure nitrogen is not allowed as a calibration gas. Please note that if instrument air is used as span gas, the maximum zero gas mixture is 8% oxygen balanced in nitrogen. If instrument air is not dry, a separate in-line filter is required to prevent moisture from entering the calibration line.

NOTE: When instrument air has a nitrogen backup for air failure, it cannot be used for reference gas. Natural convection or bottled air (20.6% oxygen balanced in nitrogen) must be used.

Maximum Distance Between Probe and Cal Unit: Although there is not a distance limitation between the calibration unit and probe, the user is advised to make the distance as short as possible to minimize calibration time and gas pressures.

I. CALIBRATION SYSTEMS

1.0 Model MC1, Manual Calibration Panel

The MC1 is the manual calibration unit for a single oxygen probe. It provides regulation of the reference air and cal gas while allowing the operator to select zero or span gas for calibration. Separate flowmeters are used to set cal gas flowrates and reference air.

Flowrates: Cal gas - 0.6 LPM; Reference air - 0.8 LPM

Note: Exceeding recommended flowrates will damage the detector cell.

Maximum pressure: 35 psig

Cal plate: Stainless steel

Connection: 1/4" FNPT

Cal tubing: 1/4" copper (standard); 1/4" SS (optional)

Weight: Approximately 4.4 lb (2 kg)

SINGLE CHANNEL O ₂ MANUAL CALIBRATION	
MC1	MODEL NUMBER
CODE A	TUBING/FITTINGS
-C	1/4" copper tubing and brass fittings
-S	1/4" stainless steel tubing and fittings
CODE B	REFERENCE AIR FLOWMETER
-R*U	Reference air flowmeter

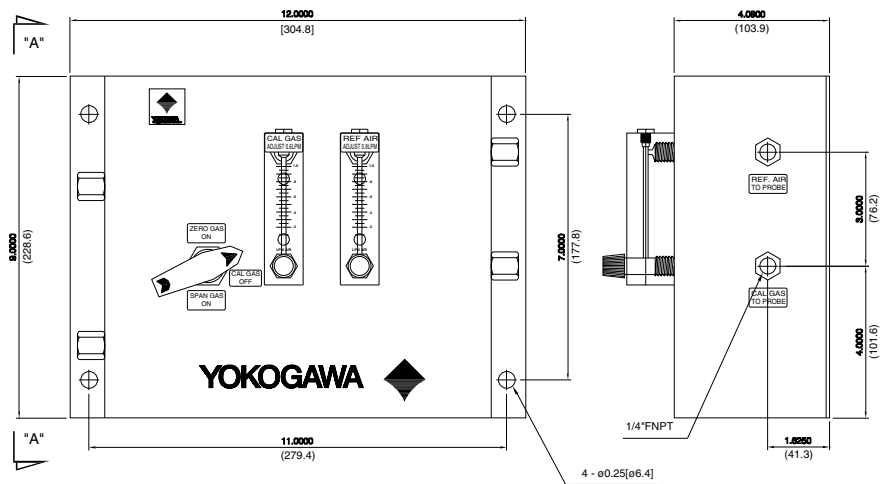


Figure 1.0
MC1 Manual Calibration Plate

1.2 Automatic Calibration

Using either the ZR402 or AV550 converter, the automatic calibration unit allows the user the luxury of setting flowrates and timing sequences only when gas sources are changed or replaced. There are three types of automatic calibration units with 1-, 4- and 8- channel capacities for automatic execution of calibration using solenoid(s). Each allows for independent adjustment of flowrates for all reference air and calibration gases with standard manual overrides for each channel.

1.2a Model AC1 Single point automatic calibration

The AC1 includes individual span, zero and block solenoids with manual overrides for easy setup of flowrates. It also contains a 1 amp fuse with a LED indicator to indicate a power surge. The user has a choice of copper or stainless steel tubing in addition to NEMA 4 or NEMA 4X enclosures. The AC1 provides excellent control of reference air and cal gas flowrates while maintaining a constant regulation of gases.

Operating pressure: 20 psi

Maximum pressure: 35 psi

Flowmeter range: 0.15 to 1 LPM (separate flowmeter for cal gas and reference air)

Flowrate: Cal Gas - 0.6 LPM; Reference Air - 0.8 LPM

Cal tubing: 1/4" copper (standard); 1/4" SS (optional)

Gas connection: 1/4" FNPT

Voltage: 110 VAC, 50/60 Hz (standard)

SINGLE CHANNEL O ₂ AUTO CALIBRATION	
AC1	MODEL NUMBER
CODE A	ENCLOSURE
-4	NEMA 4, metal enclosure
-5	NEMA 4X, fiberglass enclosure
CODE B	TUBING/FITTINGS
-C	1/4" copper tubing and brass fittings
-S	1/4" stainless steel tubing and fittings
CODE C	POWER SUPPLY
-A	For use with ZA8C
-D	For use with ZR402 (requires 110VAC)
CODE D	REFERENCE AIR CONNECTION
-R*U	Reference air connection

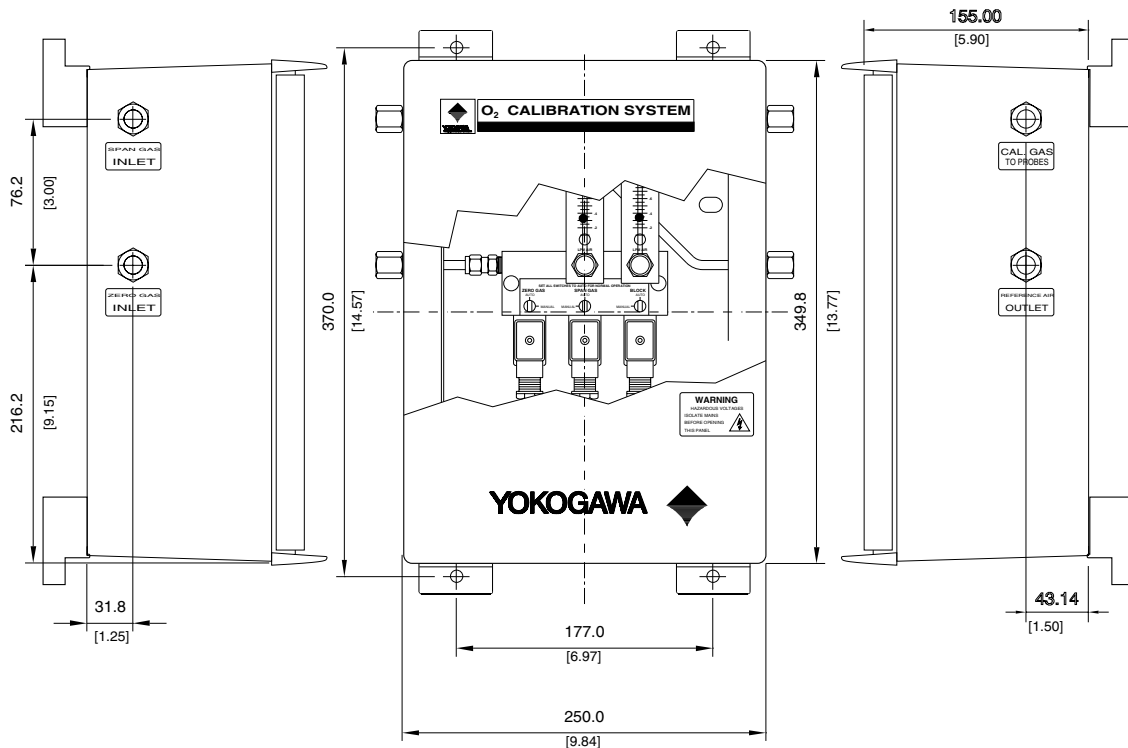


Figure 1.1A
AC1-5 Single Point Automatic Calibration (NEMA 4X)

II. ACCESSORIES

2.0 Dual Stage Regulator, M1132ZX

This regulator controls the gas pressure of the zero gas cylinder before it reaches the calibration unit. The dual stage regulator is highly recommended for services which require a near constant delivery pressure as the calibration source pressure decays (see M1133AR). Air diffusion and absorption, desorption and off-gassing are minimized because of its stainless steel construction.

NOTE: This regulator is used on a “zero gas” cylinder with a CGA 580 connection. The cylinder connection must be CGA580 (used for <5% oxygen balanced in nitrogen.)

Maximum Inlet Pressure: 3000 psig
Operating Temperature Range: -40 to 200 °F
Bonnet Vents: 1/8" NPTF
Inlet/Outlet Connection: CGA 580 with 1/4" NPTM
Purge Ports: 1/4" NPT female
Weight: 4.7 lbs.
Material of Construction: Body - 316L stainless steel; Diaphragm - 316L stainless steel; Seat/Seal -tefzel/teflon, Kel-F; Gauges - 316 stainless steel; Bonnet - brass, nickel-plated.
Delivery Pressure Range: 2 to 75 psig
Flow Capacity Air: 300 scfh
Gauges: Delivery, 0-100 psig; cylinder pressure, 0-3000 psig, 2" diameter

2.1 Portable Calibration Kit, M1233SR

The M1233SR portable calibration kit includes zero and span gas cylinders (106 liter) in a convenient carrying case. Also included are two cylinder regulators preset at 0.6 LPM flow rate and a calibration hose.

M1233SC Span Gas 103 liter 20.8% O₂
M1233SM Zero Gas 103 liter 1.0% O₂
M1233SS Regulator 0.6 LPM

2.2 Zero Gas Pressure Switch, M1133AR

The pressure switch is used to alert the Operator via a contact input that the zero gas cylinder needs replacing, before the cylinder is empty. Recommended connection is to the high pressure side of the zero gas regulator.

Adjustable Set Point Ranges: 30 to 575 psi (2.07 to 39.5 Bar) On Fall; 50 to 600 psi (3.45 to 4.5 Bar) On Rise

Dead Band: 8 to 60 psi (0.55 to 4.14 Bar)

Over Range: 2500 psi (172.4 Bar)

Proof Pressure: 3000 psi (207 Bar)

Storage temperature: -40° to 180 °F
(-40° to 82 °C)

Ambient temperature: 0° to 160 °F
(-17.8° to 71 °C)

Set Point repeatability: 1% of span

Switch output: One SPDT (either NC or NO)

Electrical rating: Rated to 5 amps resistive and 15 amps inductive (75% PF), at 125 and 250 VAC, 1/4" HP

Enclosure: Aluminum with irradiate finish rated for 100 hours salt spray (Nema 4).

Electrical connection: One SPDT output; 1/2" NPTF, 5-foot cable.

Pressure connection: 1/8" NPTM

Mounting: NPTM pressure connection.

Weight: 12 oz. (340 g)

Approvals: UL508 listed: E42272; CSA C22.2 No. 14-1987: LR9690

2.3 Flexible Cal Line, M1233SX

Length: 18"

Fittings: 1/8" MNPT x 1/4" FNPT

Temperature Rating: -65 to 450 °F

NOTE: The end-user is responsible for the following: all calibration gas and reference air cylinders; interconnecting tubing and regulator(s) with appropriate fittings to attach to calibration units; interconnecting cable for auto-calibration units between the calibration box and converter (table 2.0). In addition a dual stage regulator is recommended for the zero gas cylinder. Yokogawa is not a manufacturer or distributor of gas products. Check with your authorized technical representative for a local supplier of calibration gases.

