



**TELEDYNE  
MONITOR LABS**  
A Teledyne Technologies Company

# ML<sup>®</sup> 675 Continuous Emissions Monitoring System

## THEORY OF OPERATION

The ML<sup>®</sup> 675 or ML<sup>®</sup>675 Open Architecture (OA) is a pre-engineered Continuous Emissions Monitoring System (CEMS) designed for use in EPA 40 CFR Part 60 and Part 75 compliance applications and for process control. This dilution based system can be configured to accurately measure SO<sub>2</sub>, NO<sub>x</sub>, CO, CO<sub>2</sub>, and /or O<sub>2</sub> on a wet basis.

Both configurations of the ML<sup>®</sup> 675 CEMS consist of a heated probe, sample umbilical, single bay cabinet, analyzers, control equipment, and a dilution air cleanup package. The Open Architecture version has the dilution air cleanup package mounted on a wall instead of the cabinet.

Using dilution extractive principles, pressurized dilution-air is used as the motive force to provide suction that mixes a small amount of stack gas into the same dilution air stream. This creates a diluted sample which returns under positive pressure to the analyzers for analysis. A precision mass flow meter is used to determine an accurate, real time dilution ratio. Since no moisture is actually removed from the original sample, measurements are made on a wet basis.

A programmable logic controller (PLC) performs all automatic sequencing of the sample cycle, daily calibration cycle, and backpurge cycle. During calibration mode, zero and span gases are injected into the probe head to comply with EPA calibration requirements. Backpurge air is delivered to the probe on a periodic basis to clean the probe, providing months of continued operation without maintenance.

In addition, the PLC has the ability to log fuel flows and provide the required analog outputs in units of diluent corrected ppm concentrations (ppmc), Lbs/MBTU, and Lbs/Hr. Standard relay outputs that signal system status and fault information are also generated from the PLC. A RegPerfect<sup>®</sup> Data Acquisition System (DAS) may be attached to the PLC via Ethernet to provide long term data collection, compliance report generation, remote control and diagnostic information.

The ML<sup>®</sup> 675 is a self-contained system requiring single point attachment for power, instrument air, and calibration gases. All utility distributions are routed through the ML<sup>®</sup> 675 internally. No duplication of utilities is required on the stack.

## ML<sup>®</sup> 675 FEATURES

- EPA certifiable for all 40 CFR 60 and 40 CFR 75 applications.
- Well suited to generate reliable and accurate process control information. Typical applications include gas turbines, industrial sources, and power boilers.
- State of the art TML sensor-e<sup>®</sup> analyzers are utilized for pollutant monitoring allowing a single source for system and analyzer support.
- Automatic, local and remote initiation of any system sequence is available. This includes the ability to zero and span a single analyzers through the entire sampling train or directly at the analyzer to diagnose sampling system anomalies.
- Minimal maintenance is required. Weekly manual calibrations, quarterly probe checks, and quarterly filter changes are typically all the system requires to achieve uptimes of 95% or greater.
- Self-diagnosing alarm package. The ML<sup>®</sup> 675 will alarm the user for sample train heater failures, dilution air delivery problems, and analyzer faults. This system is smart enough to protect itself during fatal fault condition ensuring no moisture can contaminate any analyzer.



# SPECIFICATIONS

## CABINET VERSION:

Dual bay, 19" Rack Mount, NEMA 12 with fan ventilation  
 Other NEMA ratings are available.  
 Dimensions 80"H x 50"W x 40"D (203.2cm H x 127cm W x 101.6cm D)  
 Approx. 400 lbs (181.44kg)  
 Front door with window, rear door, removable side panels  
 Lifting lugs and/or castors can be provided

## OPEN ARCHITECTURE VERSION:

Open rack with optional desk.  
 Dimensions 80"H x 63"W x 30"D (w/out desk 23" W)  
 (203.2cm H x 160cm W x 76.2cm D)  
 Approx. 300 lbs (136.08kg)  
 Dilution Air Cleanup Package 60"H x 21"W x 13"D  
 (152.4cm H x 53.3cm W x 33cm D)  
 Approx. 60lbs (27.215kg)

## PROBE:

Standard 316L Stainless Steel, optional C276 Hastelloy probe straw  
 Laser drilled critical orifice for accurate dilution  
 EPA approved lengths  
 2 micron ceramic filter  
 Heated head maintained at approximately 350°F (176.7°C)  
 Components housed in a NEMA 4X enclosure

## DILUTION SAMPLE LINE:

3/8" Teflon for diluted sample return  
 Tubes for calibration and backpurge standard  
 Frost free protection when required  
 Fire retardant jacket

## SYSTEM CONTROLLER:

GE or Allen Bradley PLC provides data buffering, digital inputs, digital outputs, analog inputs, analog outputs, and Ethernet communications.  
 Optional HMI provided for manual system control.

## AIR CLEANUP PACKAGE:

Provides dilution air at -100°F dew point  
 Free of CO<sub>2</sub>, NO<sub>x</sub>, and SO<sub>2</sub>  
 Optional CO scrubber  
 Supports up to two dilution systems with additional hardware  
 Low instrument air alarm  
 Ballast tank provided for mixing and pressure stabilization  
 Precision mass flow meter for real time dilution ratio

## GAS ANALYZERS:

Model number TML-30, 30U, 30M, for CO  
 Model number TML-41, 41M, 41H, for NO<sub>x</sub>  
 Model number TML-50, 50H, for SO<sub>2</sub>  
 Model number TML-20, for CO<sub>2</sub>  
 An optional Zirconia Oxide O<sub>2</sub> sensor can be added to the probe.

## SYSTEM RANGES:

CO 0-100 to 0-10000 ppm  
 NO<sub>x</sub> 0-50 to 0-5000 ppm  
 SO<sub>2</sub> 0-50 to 0-5000 ppm  
 O<sub>2</sub> 0-25%  
 CO<sub>2</sub> 0-20%

## RELATIVE ACCURACY:

±20% of Reference Methods for 40 CFR 60  
 ±7.5% (better than ±10.0%) of Reference Methods for 40 CFR 75

## RESPONSE TIME:

Approximately 90 seconds to 95% full scale from system inlet

## CALIBRATION DRIFT:

Zero and Span  
 ±0.5% absolute for O<sub>2</sub>/CO<sub>2</sub>%  
 ±2.5% of full scale for NO<sub>x</sub> and SO<sub>2</sub>  
 ±5.0% of full scale for CO

## REPEATABILITY: ±1% of full scale

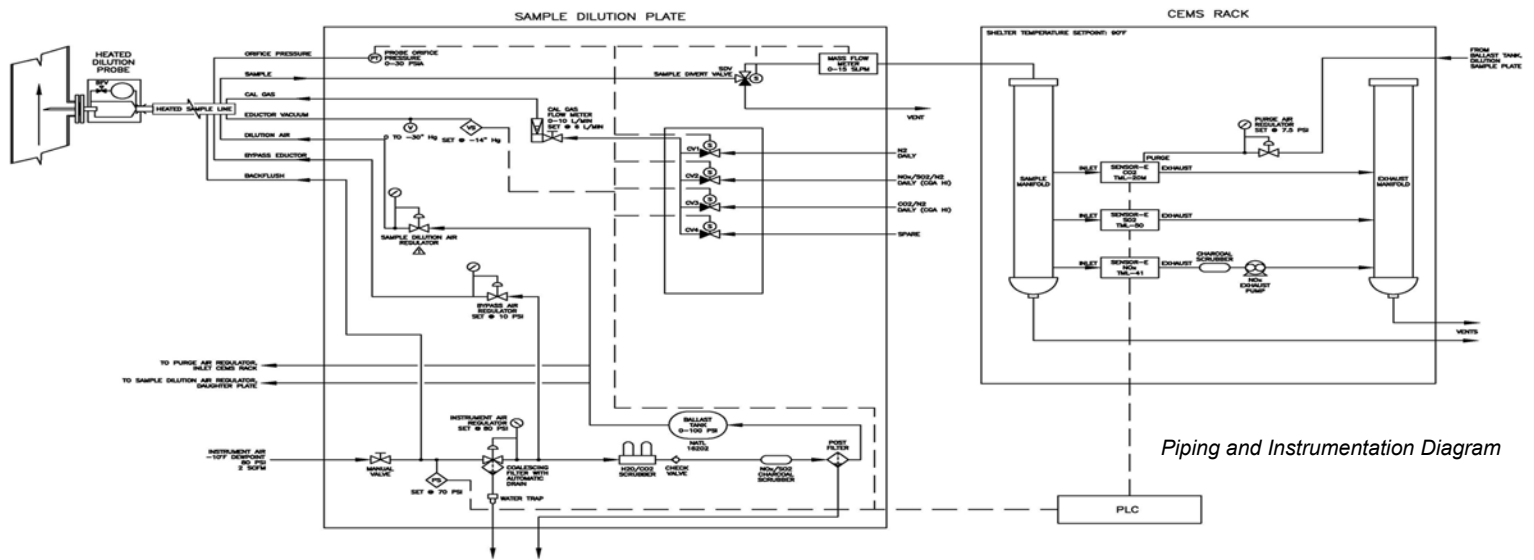
**PROCESS:** 80-1800°F (27-982°C), up to 35% moisture  
**AMBIENT:** 65-80°F (18-27°C), 35% RH, no direct sunlight

## SYSTEM UTILITIES:

40°F (-40°C) dew point instrument air, 80 psig minimum, 2 SCFM per probe  
 240VAC, single phase, 60 hertz, 50 amp power

## OPTIONS:

- LightHawk® 560 Opacity Monitor integration
- Ultraflow 150 Ultrasonic Stack Flow integration
- RegPerfect® Data Acquisition System
- Training
- Installation supervision and Startup
- EPA certification
- Maintenance Contracts



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