ML® 660 Continuous Emissions Monitoring System

THEORY OF OPERATION

The ML®660 or ML®660 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 system can be configured to accurately measure SO_2, NO_x, NH_3, CO, CO_2, and /or O_2 on a dry basis.

Both configurations of the ML®660 CEMS consists of a heated probe, heated sample umbilical, and single bay cabinet. Each system includes analyzers, control equipment, and a sample conditioning package. Using conventional extractive principles, a vacuum pump draws unconditioned, temperature controlled (above dew point) stack gas through the filtered probe, heated sample line, and into the sample conditioner where moisture and fine particulate are removed. The now dry, cool stack gas is delivered to a sample manifold for distribution to each analyzer.

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 heated probe filter, 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® 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®660 is a self-contained system requiring single point attachment for power, instrument air, and calibration gases. All utility distributions are routed through the ML®660 internally. No duplication of utilities is required on the stack.

ML ® 660 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® 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®660 will alarm the user for sample train heater failures, sample conditioning failures, probe and sample line pluggage, and analyzer faults. This system is smart enough to protect itself during fatal fault conditions thereby eliminating the posibilty of moisture contamination.

CABINET VERSION:
Single bay, 19" Rack Mount, Standard NEMA 12 with fan ventilation or HVAC.
Other NEMA ratings are available.
Dimensions 81"H x 25"W x 39"D Approx. 400lbs
Front door with window, rear door, removable side panels
Lifting lugs and/or castors can be provided

OPEN ARCHITECTURE VERSION:
Open rack w/desk.
Dimensions 80"H x 63"W w/desk (24"W w/o) x 30"D Approx. 300lbs
Sample Conditioning Plate.
28"H x 24"W x 9"D Approx. 60lbs

PROBE:
Standard 316L Stainless Steel or Hastelloy probe straw
EPA approved lengths
5-50 micron filter
Heated head maintained above 250°F (121°C)
Insulating jacket provided

HEATED SAMPLE LINE:
3/8" Teflon or 316 Stainless Steel sample tube
Recommended maximum length 250 feet
Line temperature controlled above 250°F (121°C)
Low temperature alarm provided to PLC
Insulated fire retardant jacket

PROBE SUPPORT BUNDLE:
¼" Teflon calibration line
½" polyethylene backpurge line
16 AWG triad for probe heater power
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.

SAMPLE CONDITIONER:
Thermo-electric cooler
Teflon diaphragm pump
Peristaltic moisture drain pump
2 micron Teflon sample filter
Water slip alarm, sample dew point alarm
Probe and sample line vacuum alarm

GAS ANALYZERS:
Model number TML-30, 30U, 30M, for CO
Model number TML-41, 41M, 41H, for NOX
Model number TML-50, 50H, for SO$_2$
Model number TML-42, for NH$_3$
Model number TML-20, for CO$_2$
A Paramagnetic O$_2$ or NDIR CO$_2$ cell can be added to any TML model above except the TML-30U.

RANGES:
CO	0-.1 to 0-5000ppm
NOx	0-.05 to 0-5000ppm
SO2	0-.05 to 0-5000ppm
O2	0-5/10/25%
CO2	0-2000 to 0-3000, 0-10/15/20%
NH3	0-20ppm

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:
Less than 90 seconds to 95% full scale from system inlet
CALIBRATION DRIFT:
Zero and Span
±0.5% absolute for O$_2$/CO$_2$%
±2.5% of full scale for CO, NO$_X$, CO$_2$ NH$_3$, and SO$_2$ ppm

REPEATABLILITY: ±1% of full scale
PROCESS: 80-1800°F (27-982°C), up to 50% 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, 5 SCFM
Single point attachment of 240Vac, single phase, 60 hertz, 50 amp power

WEIGHT: Approximately 400 pounds

OPTIONS:
- Regulatory Consultation
- LightHawk® 560 Opacity Monitor integration
- Ultraflow 150 Ultrasonic Stack Flow integration
- Automatic Linearity's
- RegPerfect® Data Acquisition System
- Training
- Installation supervision
- Startup
- EPA certification
- Maintenance Contracts

ML®660 Piping and Instrumentation Diagram
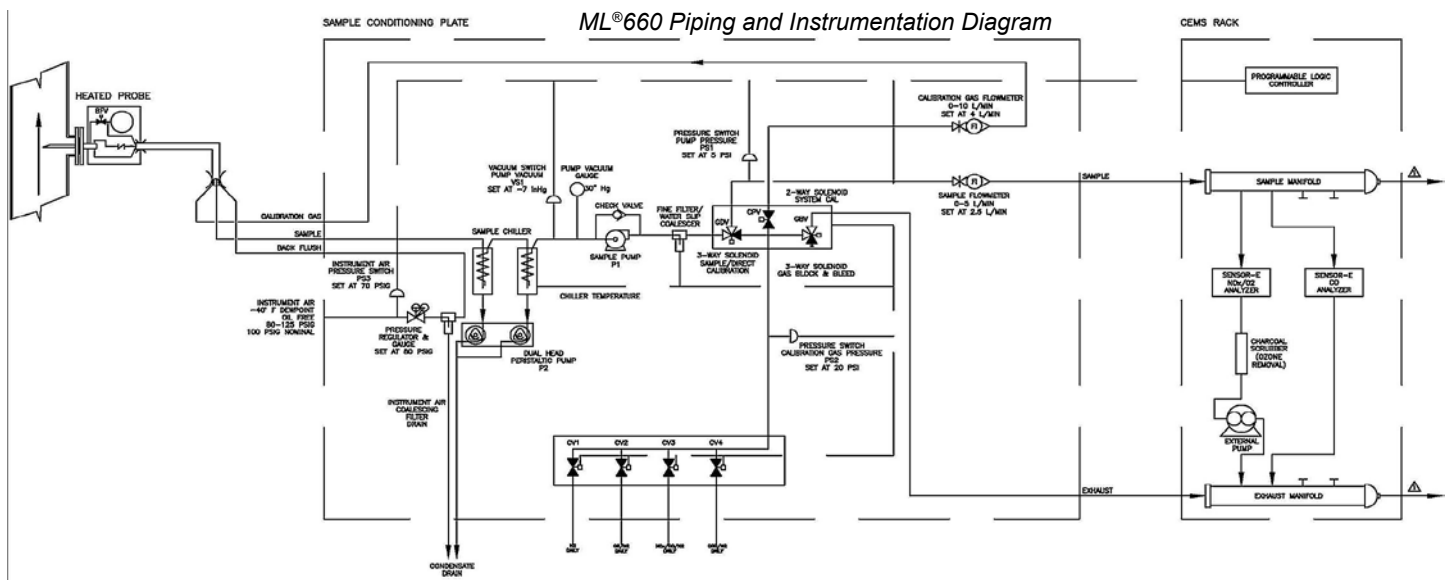
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