Labcell Limited
Automotive Test Instrumentation

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ISO 9001
REGISTERED FIRM

CAN BUS Measurement Modules

CSM measurement technology and data loggers

CAN Interface

Kvaser, Vector, ETAS, dSpace IXXAT etc

Software: DiagRA, INCA, CANape, Vision, CalDesk, MLab and Diadem

ECU

UniCAN 2 Professional (GPS, Modem)

Power Control MiniModule

HV Thermo-Scan MiniModule

Type K

Type J

Type T

Thermo-Scan MiniModule

AD-Scan MiniModule

CNT-Scan MiniModule

PT-Scan MiniModule

OUT-Scan MiniModule
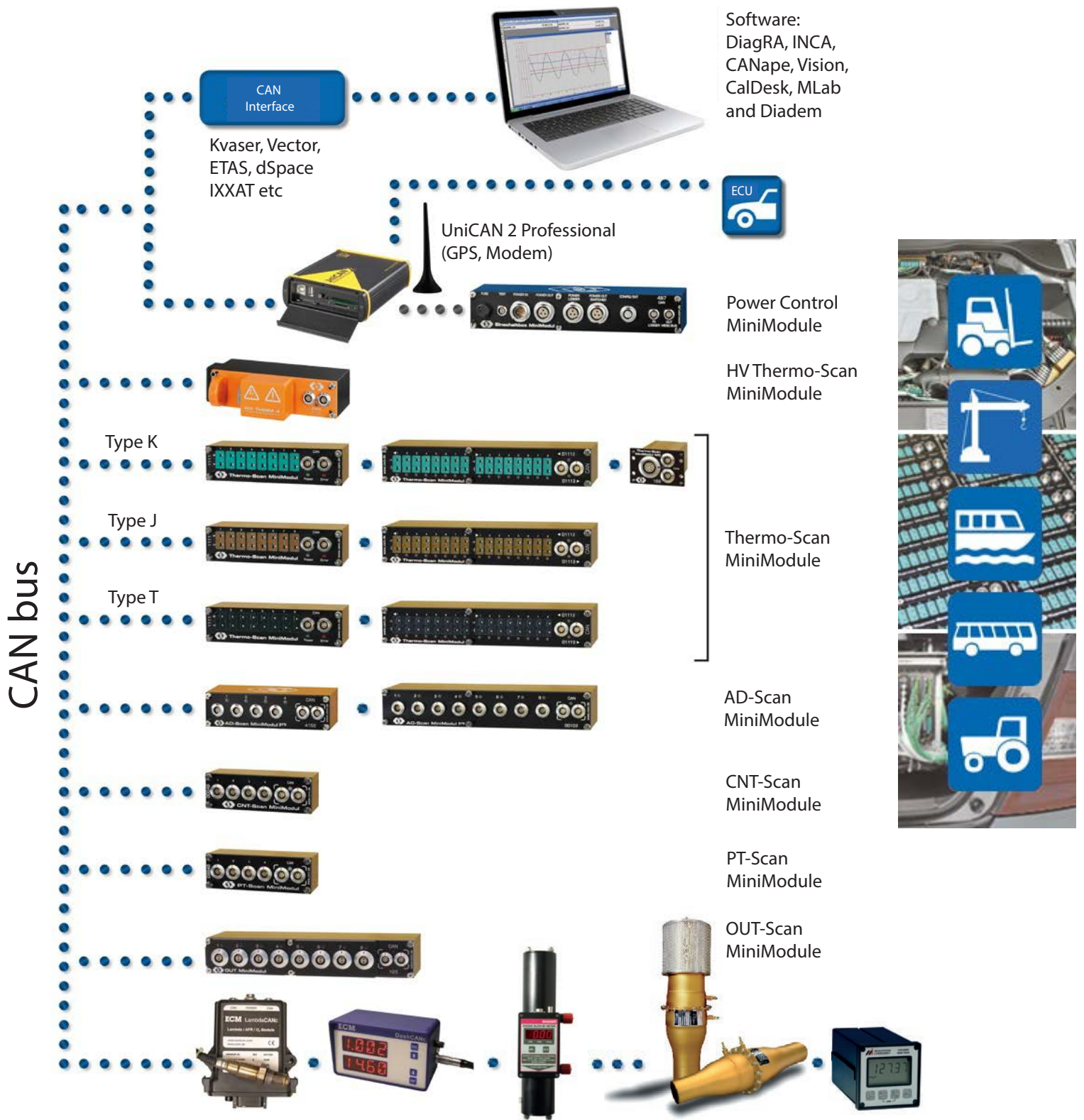
CAN bus

Since the introduction of the CAN-bus based MiniModule range in the year 2003, the measurement modules from CSM have evolved to a global standard and thus decisively shape the world of mobile measurement and test-bench measurement technology.

The CSM MiniModules are available in 3 casing sizes and in two different casing options, compact casing or slide-casing. The slide-casing is CSM's response to strong customer demand for tool-free stackability.

The configuration of the CSM MiniModule family is executed over the cost free CSM ConfigTool or a CANopen master. Users of ETAS INCA benefit from the CSM INCA AddOn.

Blow-by Meter & Laminar Flow Elements

For Engine Testing, Lubricant Testing and Fleet Maintenance in Dynamometer Cells and Vehicles

The M400MR measures the flow of gases from an engine's crank-case. This flow, called blow-by, is caused by piston ring, valve guide and turbocharger leakage. Blow-by data is used to determine engine condition and lubrication oil effectivness.

Blow-by is quantified either by:

The flowrate at a given engine load or speed

or:

The time it takes for a certain volume of gas to flow over a given engine cycle.

The M400MR has both flow rate and totaliser modes and can therefore support both types of measurement. The Blow-by Meter operates on a vortex shedding principle which provides a fast response and an insensitivity to temperature, pressure and velocity. Thare are no moving parts in the meter and the vortex shedding principle ensures perfect zero stabilty.

M400MR Features:

- Wide flow measurement range
- Suitable for spark ignition and diesel engines
- 0-5V linearised, programmable output or CAN
- Easy-to-read display
- Flow rate and totaliser modes
- User-defined engineering units
- Low flow restriction
- Built in oil separators and dampers
- Integral ports for temperature and pressure probes

Flow Ranges:

Flow ranges are set by user adjustable by-pass ports:

4 to 150 LPM (0.15 to 5.4 CFM)
11 to 300 LPM (0.41 to 10.8 CFM)
15 to 400 LPM (0.56 to 14.4 CFM)

Total flow: 1,000 Litres (total), 100.0 ft3 (total)

Precise Flow Instruments for the Measurement of Air Flow Including Engine Air Intake Applications
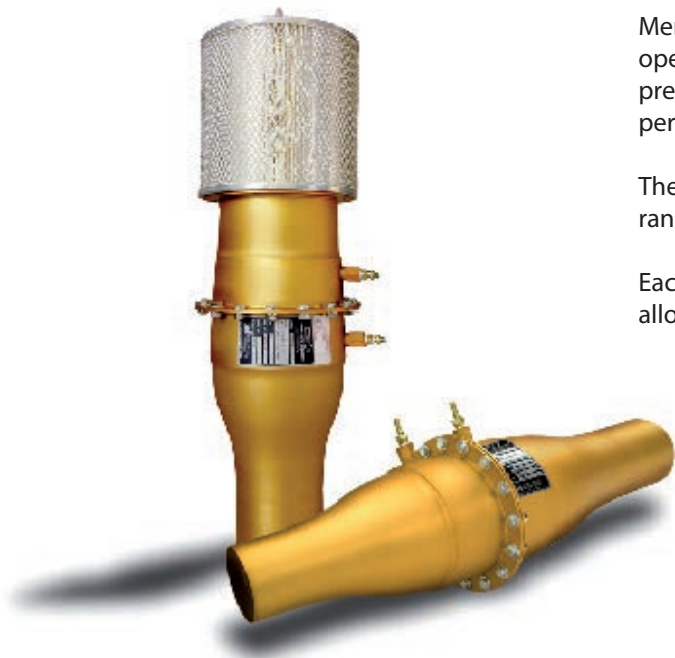
Meriam Laminar Flow Elements measure volume flow rate of gas by operating on capillary flow principles. The LFE generates a differential pressure which is near-linear to flow rate passed resulting in excellent performance in terms of accuracy, repeatability and turndown.

They are available in a number of line sizes to suit a choice of flow ranges and applications.

Each LFE is calibrated independently and supplied with co-efficients to allow flow rate to be determined by measuring differential pressure.

The 50MC2 model of LFE is an ideal choice for determining engine air intake. It is available in 4 different line sizes and measures up to 64,000 LPM. The upstream filter allows the meter to be used in dynamometer conditions and connected, via flexible hosing, to the intake of an engine.

A suitably scaled transmitter can be fitted to output flow vs DP vs V out (typically 0-5 VDC). In addition, a CAN output option is also available.

LFE Features:

- Measures clean, dry air/gases
- Wide flow turndown (20:1)
- Flow ranges from 5 cc/min to 64,000 LPM
- Line sizes : 1/4" to 8" Diameter
- Accuracy: +/- 0.72 % of Reading
- Filtered meters available
- Choice of line connections (Hose, flanged or threaded)

Applications Include:

- Engine Air Intake Measurement
- Emissions Analysis
- Flow Benches
- Calibration Standards/Reference
- Component Leak Detection

Specifications for Engine Air Intake:

Model: 50MC2	-2F	-4F	-6F	-8F
Line Size:	2"	4"	6"	8"
Max Flow (scfm)	100	400	1000	2250
Max Flow (LPM)	2800	11000	28000	64000

Overall Accuracy: +/- 1.0% of Reading
Input: 24 VDC
Output: 0-5V DC or CAN options

ECM Engine Exhaust Gas Analysers
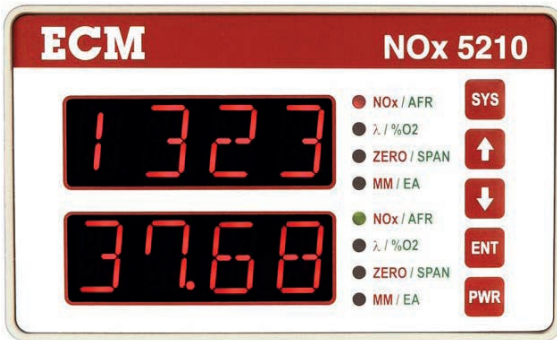
ECM's NOx 5210 is a versatile and highly integratable NOx, Lambda and O2 analyser for the development of engines, combustion systems and after treatment systems. NOx, Lambda and O2 are measured using a ceramic sensor that is mounted in the exhaust of the engine.
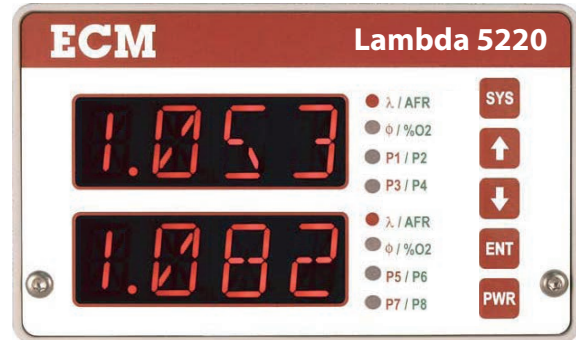
ECM's Lambda 5220 is a powerful, "next generation" wideband Lambda and O2 analyser. The Lambda 5220 is suited for both dynamometer and in-vehicle work. Lambda is the most important parameter influencing the emissions, fuel economy and drivability of combustion engines and it is imperative that it be measured accurately.
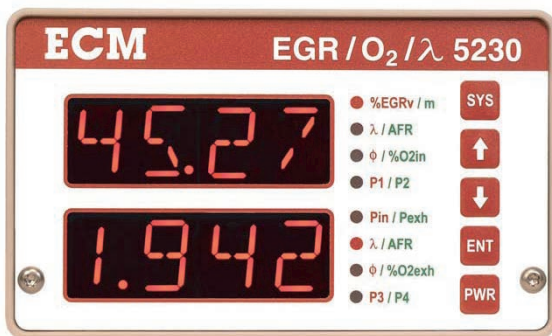
Exhaust gas recirculation (EGR) is a powerful control used to suppress NOx emissions in engines. As important as EGR is to the operation of engines, in the past there has been no simple and compact way to measure it. Now there is with ECM's EGR 5230 Analyzer.
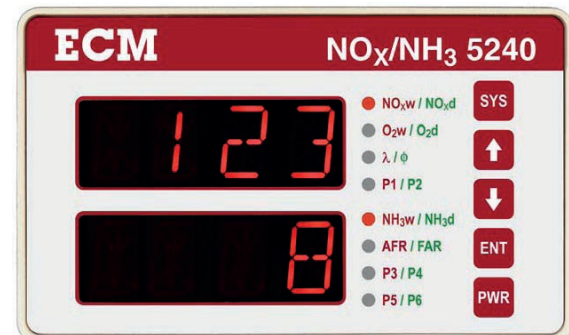
ECM's NOx/NH3 5240 Analyser is a remarkable instrument that combines the measurement of NOx, NH3, O2 and Lambda into a single, compact package. The NOx/NH3 5240 makes these difficult measurements with ease and is an indispensible tool for the development of modern engine systems.

ECM NOx 5210

Ranges: NOx 0 to 5000 ppm, λ 0.4 to 25, A/F 6 to 364, Φ 0.04 to 2.5, O2 0 to 25%
Response Time: NOx Less than 1 s. Less than 150 ms (λ, AFR, Φ, O2)
Fuel Type: Programmable H:C, O:C, N:C ratios and H2
Analogue Outputs: 6 channels, 0 to 5V linearized & programmable for NOx, λ, A/F, Φ, O2 etc.
CAN Programmable communication protocol

ECM Lambda 5220

Ranges: λ 0.4 to 25, A/F 6 to 364, Φ 0.04 to 2.5, O2 0 to 25%, Pressure: 0 to 517 kPa
Response Time: Less than 150 ms
Fuel Type: Programmable H:C, O:C, and N:C ratios and H2
Analogue Outputs: 6 channels, 0 to 5V linearized & programmable for λ, A/F, Φ, O2, pressure etc
CAN Programmable communication protocol

ECM EGR 5230

Ranges: EGR 0 to 100%, λ 0.4 to 25, AFR 6 to 364, Φ 0.04 to 2.5, O2 0 to 25%
Response Times: Less than 1 second (%EGR). Less than 150 ms (λ, AFR, Φ, %O2 , Pressure)
Fuel Type: Programmable H:C, O:C and N:C ratios and H2
Analogue Outputs: 6 channels, 0 to 5V linearized & programmable for EGR, λ, AFR, Φ, O , pressure etc
CAN Programmable communication protocol

ECM NOX/NH3 5240

Ranges NOx 0 to 5000 ppm, NH3 0 to 1000 ppm O2 0 to 25%, λ 0.4 to 25, AFR 6 to 364, Φ 0.04 to 2.5
Response Times Less than 1 s (NOx, NH3). Less than 150 ms (O2, λ, AFR, Φ)
Fuels Supported: Programmable H:C, O:C, N:C ratios and H2
Analogue Outputs: 6 channels, 0 to 5V linearized & programmable for NOx, NH3, O2, λ, AFR, Φ etc.
CAN Programmable communication protocol

The ECM NOxCAN is a versatile and highly integratable NOx, Lambda and O2 measurement module for the development of all engines, combustion and after treatment systems.

The NOxCAN uses a ceramic NOx sensor that is mounted in the exhaust of the engine and communicates measured NOx, Lambda, O2 and all sensor parameters via its CAN port. Suitable for spark ignition and diesel engines.

ECM's LambdaCAN module is a powerful wideband Lambda, AFR and O2 measurement module with a CAN interface. Pressure compensation is also available.

In addition to providing outstanding measurement range and accuracy, LambdaCAN addresses the two principle sources of error with wideband sensor use: ageing and pressure sensitivity.

The performance of all air-breathing engines is highly dependent on intake air conditions. These can be measured by baroCAN thus eliminating weather variables of a particular day which are likely to influence and bias emissions and fuel economy.

ECM's baroCAN module is a compact and rugged measurement system that provides all the important air conditions: humidity, %O2, dew point, water vapour pressure, temperature and absolute pressure. Sensors can be easily mounted in a variety of locations and the measured parameters transmitted via CAN.

ECM's dashCAN is a small, two-channel remote display for LambdaCAN and NOxCAN networks.

Simply attach dashCAN to the CAN bus and any two parameters from the network can be displayed. Perfect for dashboard use, dashCAN uses tall, 15-segment LED digits for easy viewing at all cabin temperatures and lighting conditions.

ECM's dashCAN+ is an enhanced display and features 6 x analogue outputs. Using the menu, any parameter on the network can be converted into a 0-5V DC signal.

Suitable for Dynamometer and In-Vehicle Applications

Rack Mounting option for up to four ECM analysers

ECM (Engine Control and Monitoring) develops, manufactures and supplies test instrumentation and control systems for vehicle powertrains, engines and combustion systems. ECM products are used to increase energy conversion efficiency and reduce pollutant emissions.
ECM is the world's largest producer of ceramic sensor-based engine and combustion system test instrumentation.
ECM's innovations include: the ceramic sensor-based NOx analyser, the ceramic sensor-based EGR (Exhaust Gas Recirculation) analyser, dynamic pressure compensation for ceramic sensors, "smart" ceramic sensors and fast-response temperature measurement.
ECM's tools are used by major vehicle manufacturers, engine manufacturers, combustion system manufacturers, research institutions and government agencies throughout the world
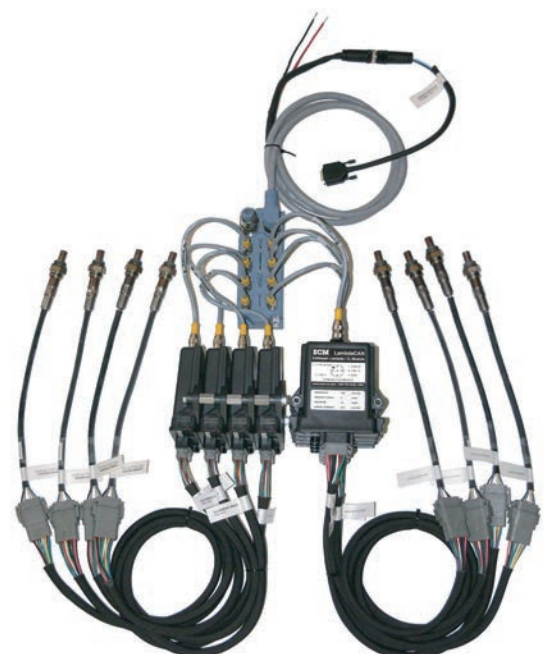
Example ECM Eight-Channel "LambdaCAN" System

KRAL Flowmeter & Tetratec CFO Kit

KRAL Liquid Flowmeters

Laboratory precision even in harsh industrial applications.
KRAL flowmeters provide both sturdy design and high precision.
For over 20 years, KRAL products have satisfied a wide range of customer requirements.
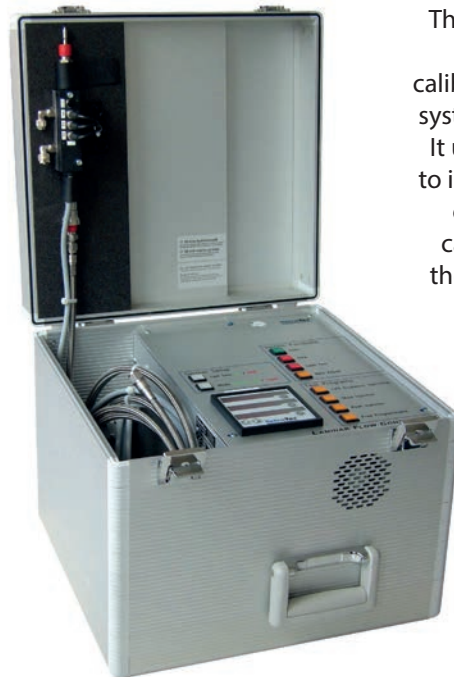
- Wide range of applications
- Special designs and fabrications accommodated
- High accuracy
- Robust and precise
- No flow conditioning required
- Easy installation and operation
- Follows any rapid fluctuations or pulsations
- Bi-directional flow measurement
- Multiple port connections available

KRAL Flowmeters can measure accurately without straight runs of piping, over flow measuring ranges of 0.1 to 7500 LPM; this includes applications with rapid flow fluctuations and liquid pulsations. The various series cover high system pressures up to 420 bar and a range of -40°C to +250°C.

Tetratec CFO gas dosing kit

The Tetratec CFO-Sx00 is commonly used for calibration of CVS dilution system or SHED chamber. It uses electronic control to inject a known dose of gas (either propane or carbon monoxide) into the CVS system to check the calibration of the measurement instrumentation.

- CVS calibration with wide flow turndown capability
- SHED test option
- Compliant with EPA standards
- Electronic pressure control
- Fully portable and self contained housing
- Certification supplied

Specifications:
Power: 110-260 VAC, 50/60Hz, 24VDC max. 100W
Outputs: Ethernet, RS-232 & RS-485
Display: S320 features 3 x 6 digits text LED (Red)
Housing: Aluminium case (373 x 358 x 300mm), Approx 11 kg weight
Process connection: AN4a, 316 SS Steel gas inputs; Flexible SS mantled PTFE tube connections also available
Media compatibility: Propane, Carbon Monoxide and any clean, dry, non-corrosive gas (which is SS compatible)

The CFO-Sx00 is available with one or two critical orifices (according to the CVS air flow volume under test) and flow rate is set and controlled via an electronic regulator.

Pressure Measurement

M2110P Smart Pressure Gauge

The M2110P is a microprocessor based programmable pressure sensing device. The device can be programmed through the front keypad or via the RS232C port.

- Measures gauge, vacuum & absolute pressure
- Accuracy of 0.05% of full scale
- Ranges for 20 psi to 2000 psi
- 4 1/2 Digit Display
- RS232C, 4-20mA and relay outputs

M1500 Pressure Transmitter

The M1500 Pressure transmitters are ideal for pressure measurement needs from 10" H20 to 3000 psi full scale. Output options include RS232, RS485, USB, mA or V DC.

- Lab data aquisition
- Test and monitoring applications
- Barometric pressure reference
- Production skids
- Pneumatic/hydraulic go, no go testing
- Pressure leak testing
- Process control applications
- Laminar Flow Systems

MGF16BN Digital Pressure Gauge

The MGF16BN successfully addresses the modern demands of process pressure measurement.

- 0.25% gauge accuracy
- 316L stainless steel wetted parts
- NEMA 4X
- Capture minimum and maximum readings
- Push button zero
- 15 selectable engineering units
- Selectable shut off times

Z200/Z300 Analogue Pressure Gauges

Cost effective and reliable analogue gauges for use when only a local indication is required.

- Simple and compact design
- High operating pressures up to 6000 Psig
- Over pressure safe from either side to maximum working pressure
- Indicating mechanism isolated from pressure chamber
- Wide application in air, gas and liquid media.
- Ranges up to 150 Psid

M2 Smart Manometer

Meriam's M2 Series Smart Manometers bring high precision and value to handheld, digital manometer users. Pressure ranges from 10" H2O F.S. to 3000 PSIG F.S. are available. M2 pressure sensors are available to measure gauge, differential, absolute or vacuum pressure.

- Leak Test, this function allows user to view Min Max Pressure values and calculates leak rate
- Auto Record documents up to 240 readings
- Damping Rates, user selectable time constant from 0.1 to 25 seconds.
- Field Re-cal. The M2 can be recalibrated in the field for zero, span and linearity.
- Auto Shut-Off with user selectable limits
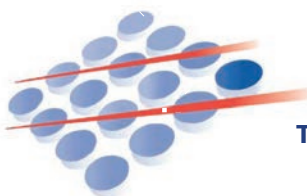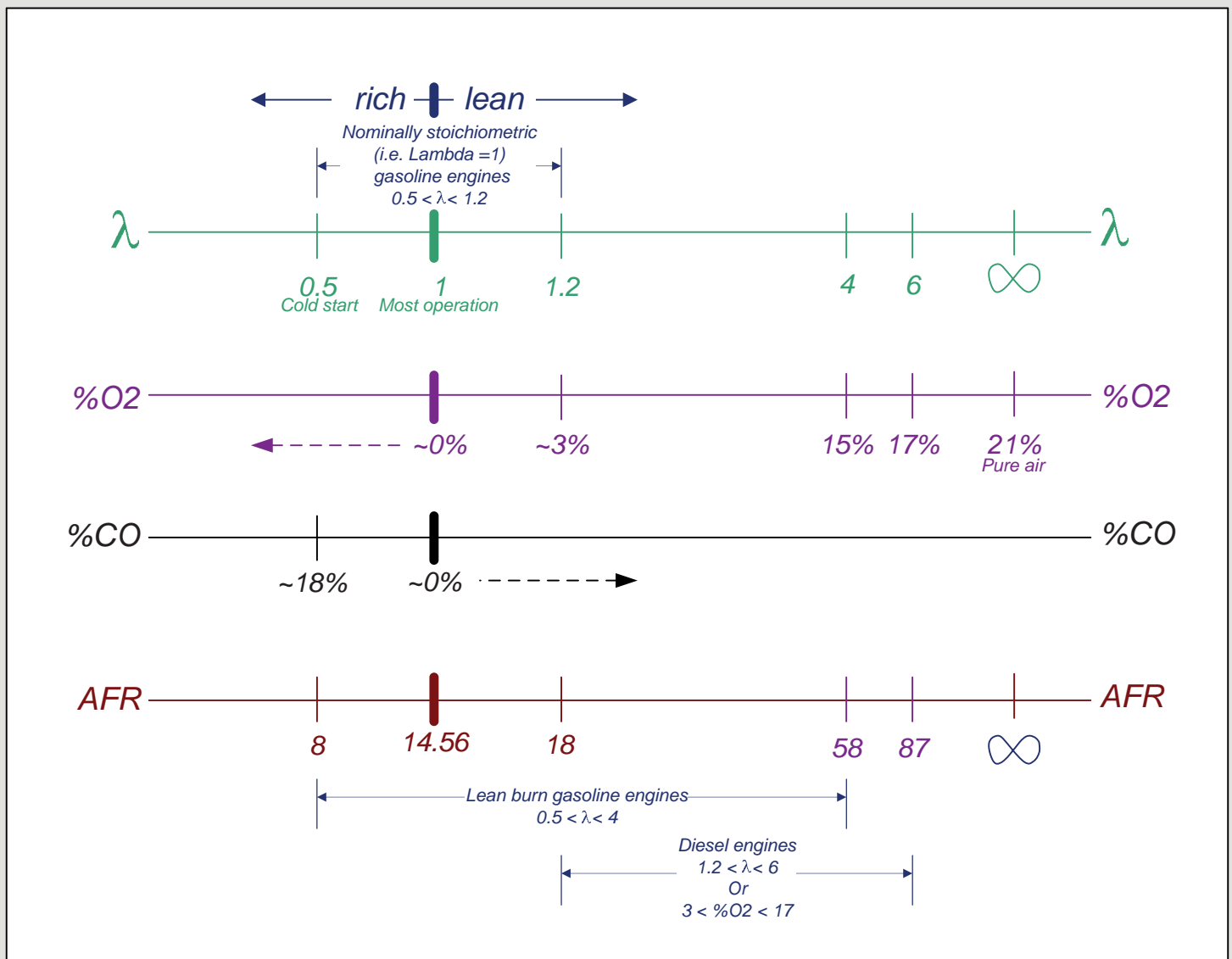- Accuracy 0.05% F.S. or optional 0.025%

Technical Note - Engine Stoichiometry

The fueling of an engine (i.e. stoichiometry) can be described six different ways; Lambda (λ), AFR (air-fuel ratio), FAR (fuel-air ratio), Equivalence ratio (Φ), %O2 and %CO.

There is a relationship between these six different quantities. The relationship is shown here for Lambda, AFR, %O2 and %CO.

Equivalence ratio is not shown since it is just the inverse of Lambda (1/λ). Similarly, FAR is not shown since it is simply the inverse of AFR (1/AFR). Note that some relationships are non-linear. For example, a %O2 of 20.946% (pure air) means infinite Lambda. For this reason, it is better to report diesel stoichiometry in %O2 instead of Lambda.

All piston engines sold today fit into one of three categories; Nominally stoichiometric gasoline, lean-burn gasoline and diesel. The Lambda, etc. range of operation of these three engines is shown below.