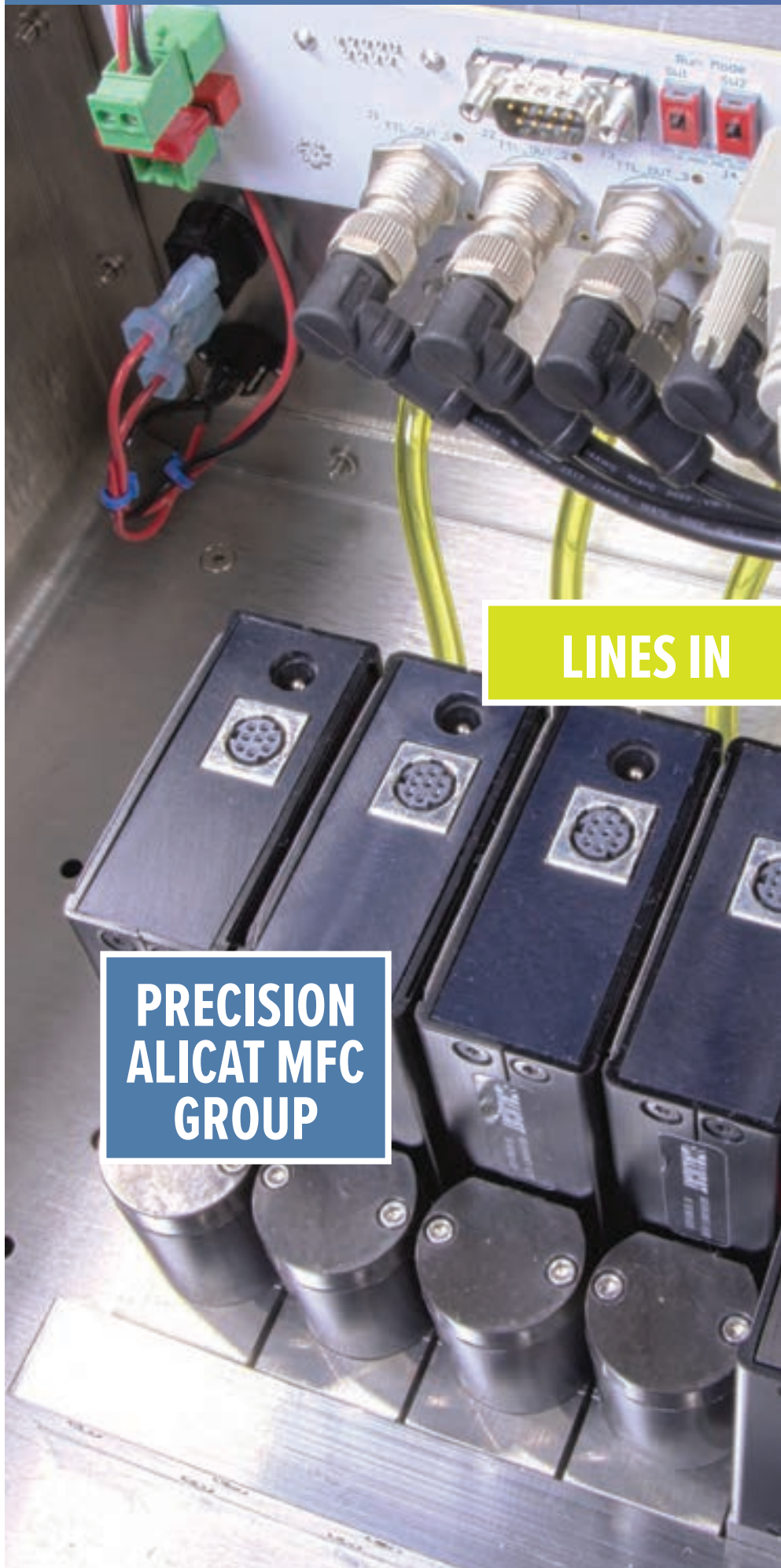


Create precision, on-demand,
gas mixtures **in seconds.**



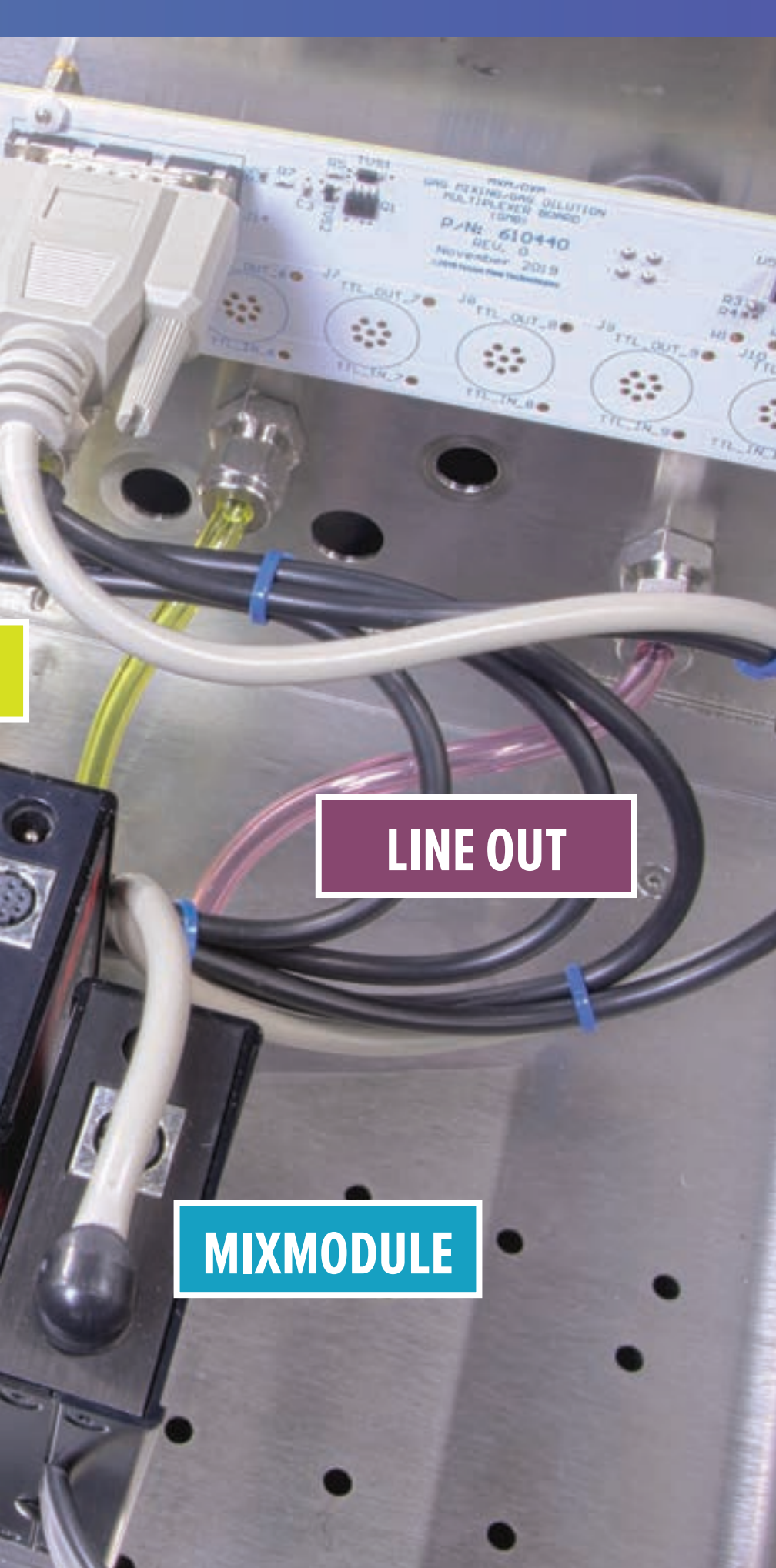
How does the Fusion Flow MXM precisely and reliably blend gases together?

- The MXM system employs up to 10 Alicat Scientific high speed, precision, differential pressure based mass flow controllers (MFC) to manage the flow rates of all constituent gases.
- A master 'MixModule' pressure sensing unit measures the outlet pressure of the resultant mixture, and continually sends flow commands to the subordinate MFCs.
- The user can run the mixer in one of three automated operational modes, which prioritize either the outlet pressure or the overall flow rate of the blended gases.
- A fully customized internal plumbing network and multiplexing circuit board only require the user to connect the regulated feed gas sources, an outlet plumbing line, and electrical power cable before delivering freshly mixed gas.
- Various hard coded and adjustable self-checking routines constantly monitor the MXM's performance, with the end goal to provide the desired gas blend under all operating conditions.
- A dedicated 6 button color TFT control panel, and optional touchscreen PC let the user interact with the extensive control and automation settings which the MXM platform provides.
- Each Alicat Scientific mass flow controller can be used with up to 130 different on-board gases, which are selectable on the MXM machine. This allows the MXM to be used in other scenarios outside its original 'as-sold' configuration.



LINES IN

PRECISION
ALICAT MFC
GROUP



LINE OUT

MIXMODULE

Who can best take advantage of the MXM's capabilities?

- Laboratory managers who currently purchase expensive pre-mixed gas cylinders.
- Companies rapidly developing new sensor technologies, or calibrating existing ones.
- R&D facilities needing to replicate innumerable natural and man-made gas mixtures.
- Students, universities, hospitals requiring pressurized, modified atmospheres for glove boxes, cellular growth, or chemical process research.
- Welding facilities looking to have on-demand, precision mixed shielding gas for all stations.
- Burner/furnace manufacturers researching or using alternative combustion fuels.
- Plasma based gas chromatography developers wanting a turn-key solution for their mixed gas needs.
- Food suppliers packaging their products with exacting modified atmospheres.
- Material engineers creating new compounds and processes with extreme consistency.
- Laser equipment suppliers interested in reducing exotic gas waste.
- Bulk gas suppliers dreaming of an alternative way to blend traceable mixtures without cumbersome techniques.
- Gas analyzer users or manufacturers calibrating or characterizing their delicate equipment.

Build Options

The MXM can be configured in 4 general arrangements depending on the needs of the user, and the form-factor constraints of the MXM chassis. The MXM system as a whole can control up to 10 MFC's of any size that Alicat Scientific offers. However, due to the extensive footprint variation of these flow controllers, there are some physical limitations for the fully enclosed MXM model.

MXM:

A standard MXM system employs a fully housed, table top instrument, with a 6 button TFT control panel. The MXM chassis can accommodate up to 6 of any low-flow (as low as 100 SCCM) and medium-flow MFCs (up to 100SLPM), irrespective of gas type. Laboratory grade stainless steel plumbing and manifolds are used throughout by default, although poly tubing options with standard fittings exist for additional customization flexibility.



MXM-SA:

For gas mixing requirements that can't be covered by the internal 6 units of the MXM table top mixer, the MXM-SA stand-alone option always exists to meet the needs of the customer. In those cases, any combination of up to 10 MFCs (of any size 100 SCCM to 5000 SLPM), are physically mounted and plumbed by the end-user to suit the application and working environment. The 6 button color TFT control panel UI is retained on the system's brain unit, called the MixModule. The MXM-SA stand-alone configuration provides a way to connect the various controllers to the MixModule via an external multiplexing board (GMB). In this manner, just about any gas mixing challenge can be met using the wide range of Alicat Scientific mass flow controllers available.



MXM-PC:

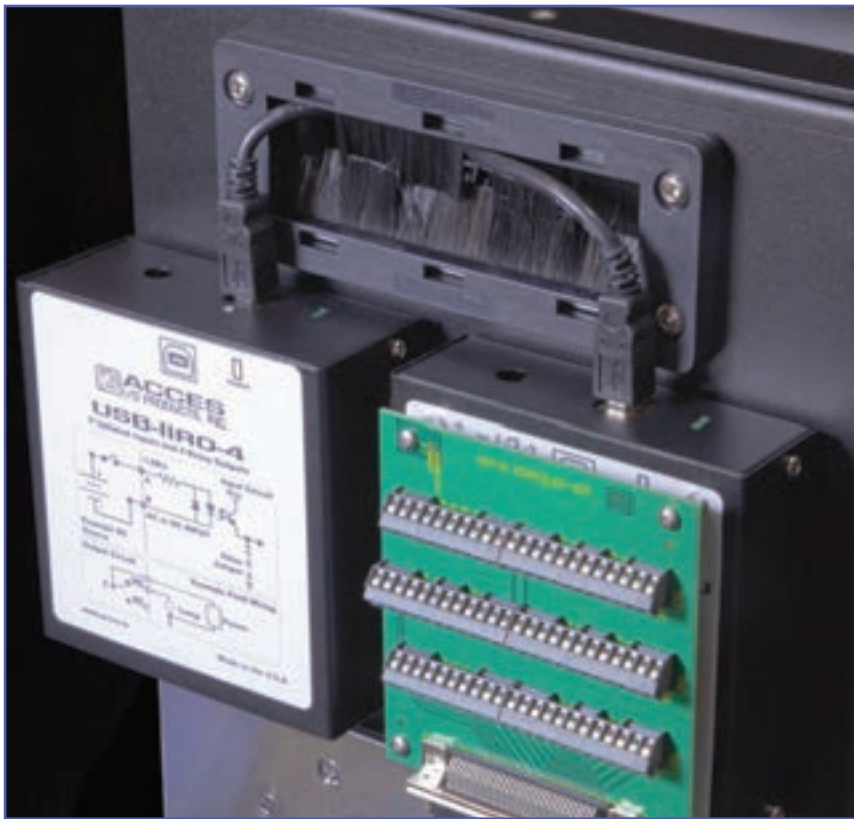
The MXM-PC is the same as the MXM system, but with the addition of a set-top, Windows PC touch panel as an optional interface. The PC panel also provides connectivity for the optional digital and analog I/O boxes, often negating the need for a 3rd party PLC; useful for when more advanced hardware integration is desired.

The Fusion Flow MXM Software comes pre-installed on the touch screen PC, and provides extensive control and automation features to augment the standard MXM. The set-top PC Panel/stand can also be removed and used remotely from the MXM chassis, with the appropriate extension cables.

MXM-SA-PC:

Lastly, a PC touch panel can be added to the standalone system, creating the MXM-SA-PC configuration. This option provides all of the same hardware and automation benefits found on the MXM-PC, but takes advantage of the highly variable stand-alone components. The computer ships with the same Fusion Flow MXM Software and open-air table-top stand as found on the MXM-PC model. Alternatively, the software can be purchased outright (without the PC touch panel and stand), to be installed on the end-user's Windows based PC.





Accessories

- Analog I/O box for use with the Fusion Flow MXM Software (mountable on the rear of the PC panel)
- Digital I/O box for use with the Fusion Flow MXM Software (mountable on the rear of the PC panel)
- Static mixing tubes
- Small ballast tanks and sample cylinders
- PC panel w/ open-air table top holder with Fusion Flow MXM Software pre-installed
- The Fusion Flow MXM Software





3 Operational Modes:

Constant Flow

The user simply selects the desired overall flow rate of the mixed gas. The flow rate must be within the mathematical minimum/maximum limits of the particular MFC devices relative to the gas mix ratio configured. This mode is ideal for processes that demand a specific amount of mixed gas be continuously delivered to meet a chemical/molecular need. The MXM will deliver the requested overall flow rate with no regard to outlet pressure. If the mixer cannot achieve the desired mixed gas flow rate (due to restrictions, downstream plumbing issues, insufficient feed pressure, etc.), the self-checking MixModule will halt the mixing operation once the mix tolerance limits have been exceeded, or implausible MFC flow data is received, relative to the commands sent.

Tank Fill

The user selects a minimum and maximum outlet pressure along with a desired flow rate, so that a large receiving vessel is kept within a reasonable usage pressure, and is always 'topped off' with properly mixed gas. The tank fill mode is best employed when feeding a network of use stations that have varied demands. The MXM will attempt to fill the buffer tank at the requested overall flow rate, stopping all flow once the upper outlet pressure limit has been reached. As gas is consumed, the pressure in the tank will be reduced until the lower pressure limit triggers the MXM to resume the filling operation. This cycle repeats indefinitely until stopped by the user, or the self-check system.

Pressure Control

The user selects a specific outlet pressure (along with an upper pressure limit), to which the MXM maintains, all while holding the mixture to the desired gas mix ratio. Active pressure control mode is critical for processes that demand a constant gas pressure regardless of downstream process variability. Up to the physical/gas ratio limits of the particular system, the MXM firmware will use as much total mixed flow as required to initially build pressure in the customer's process, and then dynamically and precisely maintain the desired pressure setpoint by proportionally varying each MFC's flow output; without the need for separate pressure control hardware. All flow will stop if the downstream upper pressure limit is exceeded, but resume automatically if pressures/flows return to attainable levels. Like the other running modes, the mixing operation will cease if any self-checking values go out of bounds.



Fusion Flow MXM Software

The default 6-button TFT color interface panel included on every MXM system is a simple way to setup and control your gas mixing system. However, there will be times when additional automation and features are required to accomplish the task.

Fusion Flow Technology's proprietary, Windows based MXM software package allows the user to more easily integrate the mixing operation with existing hardware, log data for traceability purposes, and more easily control and monitor the blending process.

Using a Windows based PC (or optional PC Touch Panel) with the MXM software provides the following additional features to the already robust MXM base unit's capabilities:

- Unlimited preset gas mixtures
- Scheduling of gas mix presets
- Full eventing system with rules, conditionals, and triggers
- Hardware integration with PLC-like capabilities using the optional analog and digital I/O boxes, coupled with aforementioned eventing system
- Visual representation of the current live mix using a dynamic color pie chart, and bar graph for overall flow rate
- Quick access to change gas mixes, parameters and settings via data entry boxes and pop-up menus
- Interpolation of gas mix presets
- Remote database logging deployable via three common database types
- Additional features will be released over time as software downloads, providing a quick way for system upgrades and enhanced usability.

FusionFlow



Thomas Mcgrath

(01) 4523432 | 087 0525055

thomas.mcgrath@carlstuart.com

www.labunlimited.com/fusion-flow-technology

Contact me Today!

Lab Unlimited
CARL STUART GROUP