What are Modular Sampling Systems ?

Modular Sampling Systems (MSS) use the open ISA 76 / IEC 62339 standard.

This field-proven standard originated in continuous process industry, but has been adopted by virtually all manufacturing sectors including pilot plants and Laboratories

Image © Parker IntraFlow

What is MSS called in the Marketplace ?

The Modular Sampling System has been named and in some cases also trademarked by several organizations as:

- **ISA SP76** (International Society for Automation) – ISA standard
- **IEC 62339** (International Electrotechnical Commission) – IEC standard
- **NeSSI™** (**Ne**w **S**ampling/**S**ensor **I**nitiative) – CPAC (University of Washington)
- **µMSS™** (Micro **M**odular **S**ampling **S**ystem) – CIRCOR
- **IntraFlow™** – Parker Hannifin
- **MSS** (**M**odular **S**ampling **S**ystem) – ECI

Why was MSS Developed ?

The Modular Sampling System standard was established to:

- Improve sampling/analyzer response times (reduced volume).
- Reduce physical size of sampling systems.
- Save time and cost during engineering and fabrication.
- Reduce sampling system spares inventory.
- Improve Mean Time To Repair (MTTR).
- Simplify maintenance tools (a single Hex Key / Allen™ Wrench).
- Simplify maintenance training.

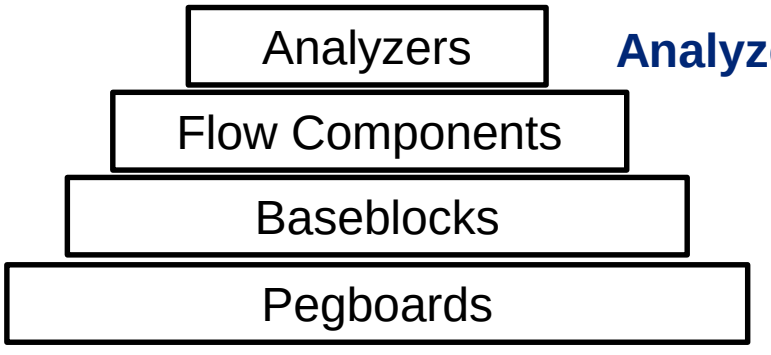
How MSS Works

Image © Parker IntraFlow

MSS standardizes:

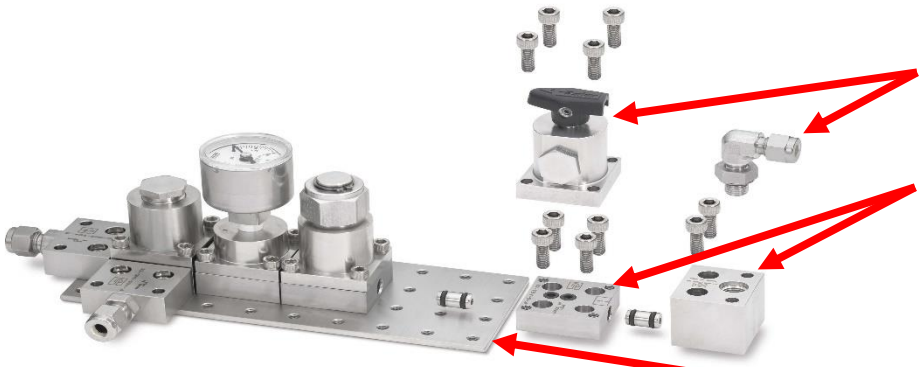
1) A “Pegboard” mechanical backplane, with standard spacing of holes and mounting screws.
2) “Lego-style” Baseblocks with pre-drilled flow paths that create a flow network above the Pegboard. “Baseblock Connectors” between Baseblocks use industry-standard o-ring seals.
3) Flow Components with standard dimensions (e.g. valves, regulators, flow controllers, etc.) that connect to the Baseblocks.
4) Standardized interfaces for connection to sensors and analyzers.

MSS Involves 3 Logical “Layers”



Analyzers that receive sample

Modular Sampling Systems



MSS Flow Components

MSS Baseblocks

MSS Pegboard

Image © Parker IntraFlow

MSS Pegboards

Each MSS System is built on a “backplane“ consisting of one or more Pegboards. These Pegboards range in size from 2”x2” to 12”x12” (actual sizing is based on the number of threaded holes). Multiple Pegboards can be connected to accommodate any size or custom shape.

Each pegboard has a standardized matrix of threaded holes to accommodate 10-32 x ½” cap screws for mounting MSS-compatible “Baseblocks”, Flow Components and Analyzers from multiple suppliers.

Pegboards are available in both heated and non-heated versions.

MSS Pegboards

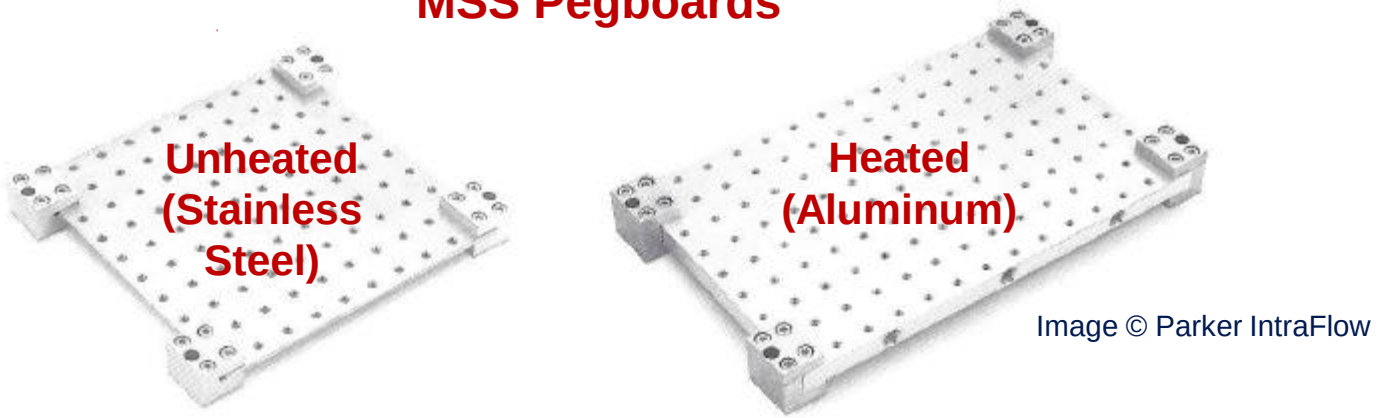


Image © Parker IntraFlow

Baseblocks

MSS Baseblocks are assembled on the “Pegboard” backplane using an ordinary 5/32” hex key (Allen™ Wrench).

Each Baseblock has standard dimensions, and mounts on the Pegboard with #10-32 UNF x 1/2” socket-head cap screws.

Each Baseblock has pre-drilled flow paths (flow pattern shown on top)

Each Baseblock can be connected to adjacent Baseblocks using “Baseblock Connectors” that use industry-standard “o-ring” seals.

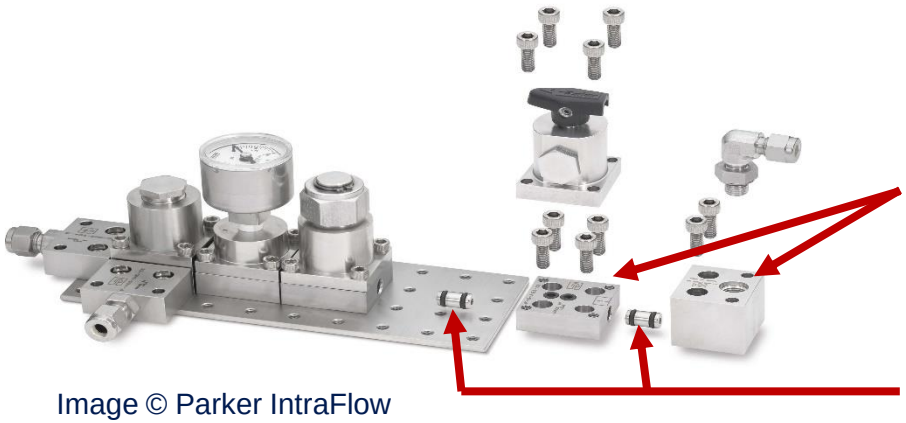


Image © Parker IntraFlow

MSS Baseblocks

MSS Baseblock Connectors

MSS Flow Components

MSS Flow Components include devices such as:

- Manual & Actuated (pneumatic) Valves
- Particulate, Coalescing & Membrane Filters
- Rotameters and Flow sensors
- Volume and Mass Flow meters and controllers
- Flow, Pressure and Temperature transmitters and switches

MSS Flow Components must fit on a Baseblock, but can be any height.

MSS Flow Components

Image © Parker IntraFlow

MSS Sensors & Analyzers

Sensors and Analyzers connect to the Modular Sampling System with a standardized Baseblock Interface.

MSS Sensors and Analyzers include chemical and physical property devices such as:

- Gas Chromatographs
- Raman probes
- NIR analyzers
- Oxygen sensors
- Moisture sensors
- pH sensors
- Conductivity sensors
- ORP sensors

Some Analyzers Require Heated Samplers

Pegboards are available in both un-heated (ASTM 304 stainless steel), and electrically or steam-heated (ASTM 6061 aluminum) versions.

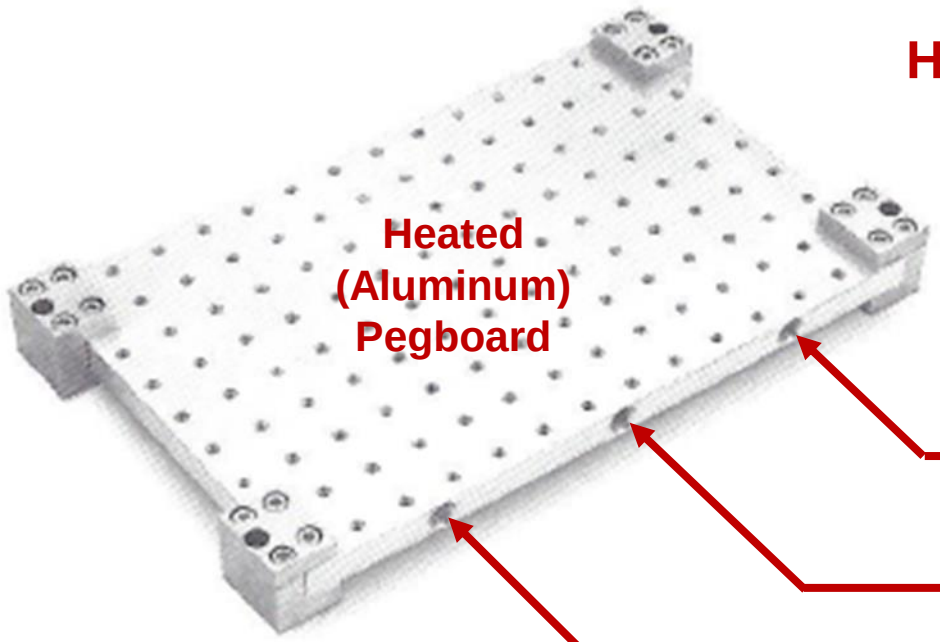


Image © Parker IntraFlow

Heated Pegboard

Ranges:
- **40 Watt**
- **50 Watt**
- **75 Watt**

Cartridge Heater

TC or RTD Temperature Feedback/Control

Cartridge Heater

Standardized ISA 76 Baseblock Interface

Sensor and Analyzer suppliers connect their products to the MSS using this Baseblock Interface standard.

ANSI/ISA 76.00.02-2002 Modular Component (Baseblock) Interfaces

MSS Baseblocks are rated for a max pressure of 500 psig, and
-57 to +204 deg C. (depending on o-ring material).

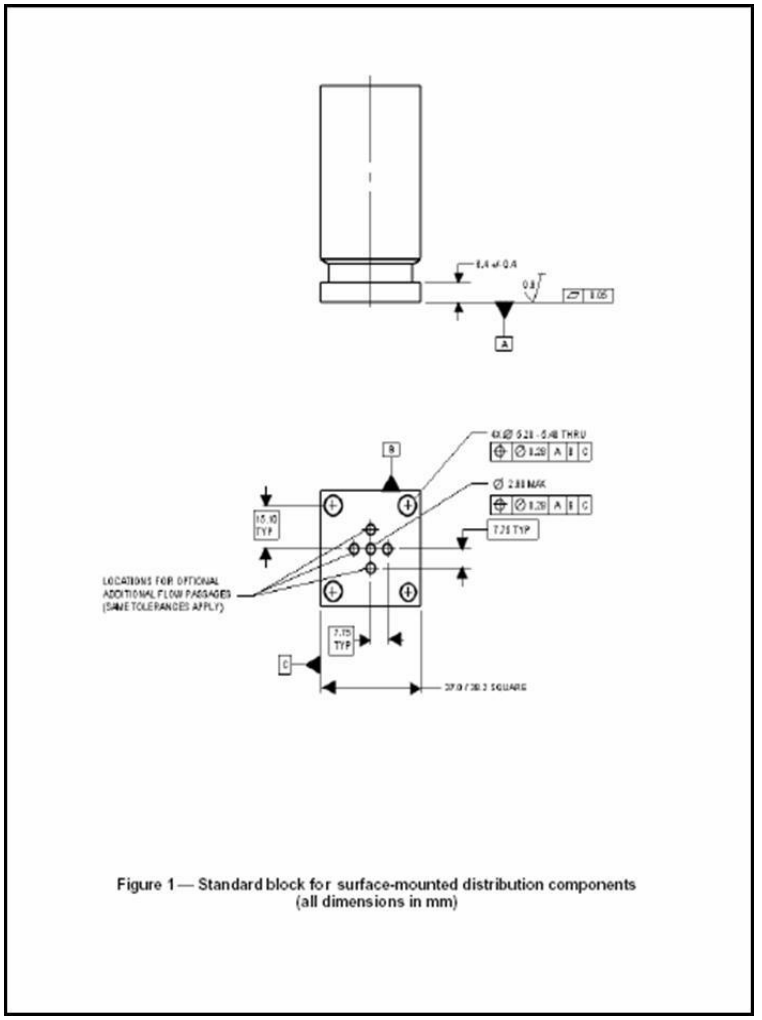


Figure 1 — Standard block for surface-mounted distribution components (all dimensions in mm)

Image © International Society of Automation

Sensor to Baseblock Interfaces

A wide range of Sensors and Analyzers are available with MSS interfaces. Custom interfaces can be ordered.

Many Sensors have been specially designed to fit in MSS module format such as the MarqMetrix fiber optic Raman BallProbe® shown at right.

Image © MarqMetrix

In some cases, MSS interfaces are provided to embed existing analytical devices such as this Teledyne Analytical PPM Oxygen sensor.

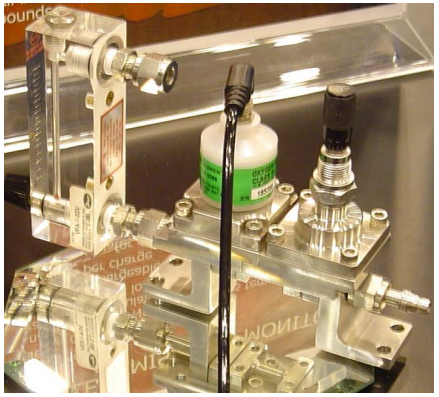


Image © CIRCOR Tech

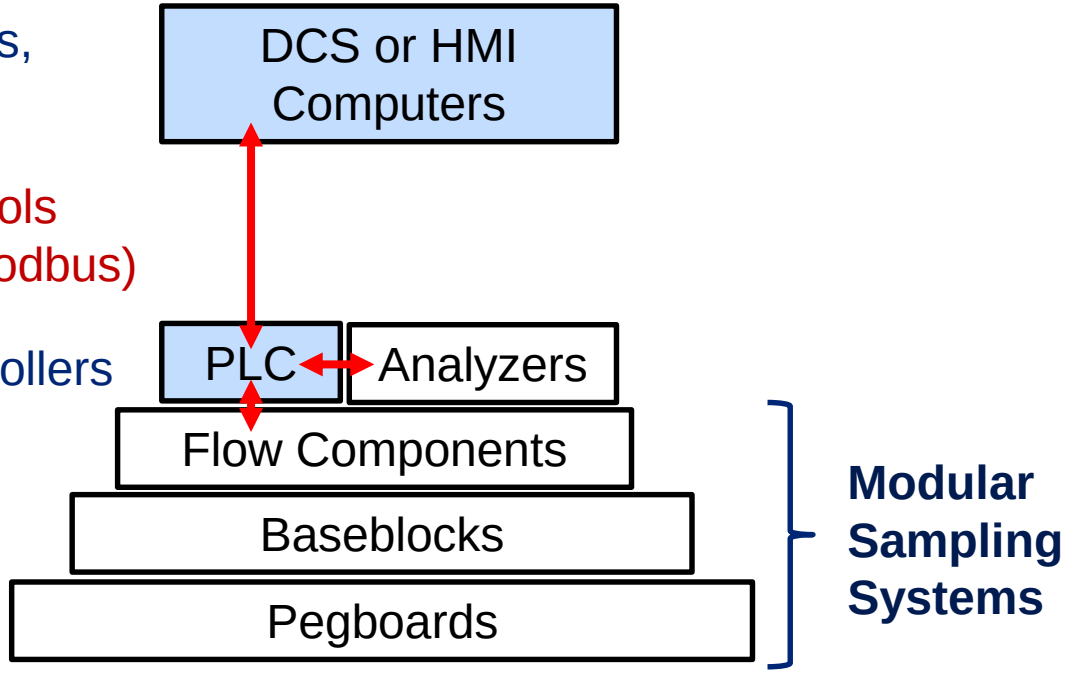
Connection of DCS and Computers

Computers and Distributed Control Systems (DCS) may be connected to PLCs controlling the Flow Components and Analyzer(s).

Distributed Control Systems,
HMI or SCADA Computers

Standard Computer Protocols
(e.g. Ethernet, Fieldbus, Modbus)

Programmable Logic Controllers



PLC Control Protocols

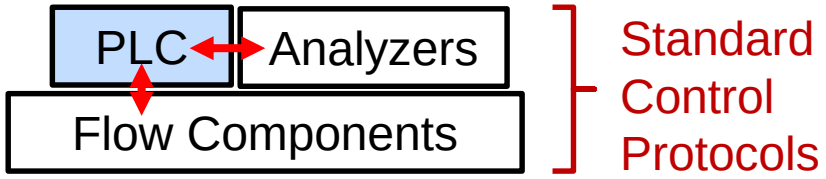
PLCs (and other shared logic control devices) may be used to:

- Manage Analyzers (including calculations, automatic calibration, and diagnostics).
- Control Flow Components (e.g. to provide selective sampling or control of heating

Standard Control Protocols are used such as:

- CAN bus
- i2C
- Modbus
- Bit bus

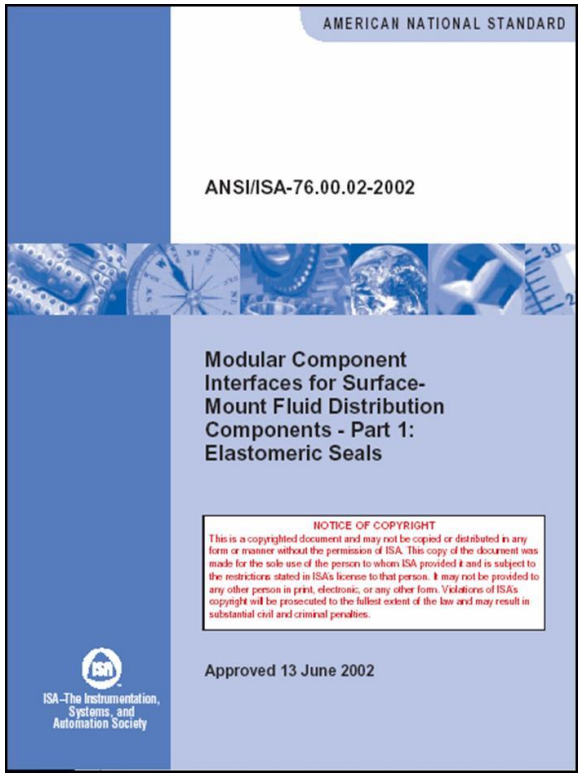
Programmable Logic Controllers



Modular Sampling System Objectives

The objectives of the MSS standard are:

1. Reduce physical size, response time and energy use of sampling systems.
2. Improve the reliability (MTBF) of analyzer and sampling systems.
3. Reduce cost and time associated with Engineering, Manufacture, Installation, and Commissioning.
4. Facilitate maintenance including MTTR (Mean Time To Repair).



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To see how these objectives have been achieved see “Why Choose Modular Sampling Systems”.