Modular Sample Systems:
CIRCOR Tech Substrates & Industry-wide Components

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CIRCOR Instrumentation Technologies
a division of CIRCOR International, Inc.
μMS³

μ Modular Substrate Sampling System
Tubed System Flow Schematic vs. μMS³ System Flow Schematic
μMS³ Sampling System

- Modular Sampling System
  - Simple / Standard / Small / Smart (Future)
  - Standardization
    - ANSI / ISA-76.00.02 (2002)
  - Ease of Maintenance
  - Lower Internal Volumes
  - External Space Savings
μMS³ Presentation

- Product Description
- Building Block Simplicity
- Building Blocks to Sample Systems
- Product Specifications
- Conventional-to-Modular: Conversion of Existing Technology Systems
μMS³ Product Description

- The μMS³ System...
  - Designed to maximize efficiency and minimize costs
  - Developed specifically for the Process Analytical Instrumentation market
  - Incorporates a single Block and Tubeset architecture for simplicity
  - The perfect solution for most gaseous and some liquid Sample Conditioning Systems
One Building Block: creates all your system configurations.
Standard Flow Tubesets: pre-welded, minimum in number, maximum in flexibility for your sample system designs.
Simple Building Block approach: allows for initial assembly & field reassembly without Factory modifications of base.
μMS³ Simple Assembly Steps
# μMS³ Technical Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
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<tbody>
<tr>
<td>Maximum Working Pressure:</td>
<td>$250 \text{ kg/cm}^2$ (245 Bar, 24800 kPa, 3600 PSI)</td>
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<tr>
<td>Working Temperature Range:</td>
<td>-29°C to +204°C (-20°F to +400°F) for Viton (standard); -196°C to +260°C (-320°F to +500°F) for Teflon (optional); -40°C to +287°C (-40°F to +550°F) for Kalrez (optional)</td>
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<tr>
<td>Materials of Construction:</td>
<td>316L Stainless Steel (standard); Monel, Hastelloy C 276 (optional)</td>
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<tr>
<td>Leak Rate:</td>
<td>$1 \times 10^{-6}$ cc/sec He</td>
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<tr>
<td>Orifice Size:</td>
<td>0.110-inch, 2.8mm</td>
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<tr>
<td>Flow Tube Size:</td>
<td>¼-inch O.D. x 0.065-inch wall thickness (0.120-inch ID)</td>
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<tr>
<td>Weld:</td>
<td>Electron Beam welding</td>
</tr>
<tr>
<td>Connections (Process) On/Off Substrate</td>
<td>¼-inch O.D. x 0.065-inch wall tubing for compression fittings or orbital welding</td>
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<tr>
<td>Mounting Screws:</td>
<td>#8-32 9/64-inch Allen key (blocks &amp; tubesets); #10-32 5/32-inch Allen key (surface mount components)</td>
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</table>
System Integration Components

We manufacture many mechanical SP76 components (>1\times10^6 cycle diaphragm valves)

We know where to get

‘YOUR Total System’ SP76 Components

We warranty ‘Your TOTAL System’

In Alphabetical Order we will see…

…parts available for ‘Your Total SYSTEM’
Available SP76 Components

**ANALYZERS**
- Controllers
- Filters
- Flow meters
- Pumps
- Regulators
- Switches, Sensors and Gauges
- Valves
- Developments
SP76-based Analyzers (1 of 2)

- PPM Oxygen
  Teledyne Analytical Panametrics
- PPM Moisture
  Panametrics
- Refractive Index
  Proprietary
  Under Development
SP76-based Analyzers (2 of 2)

Spectrophotometer Cell
UV / NIR (fiberoptic)
Equitech Int’l., Corp.

Analyzers-on-a-Block
UV/VIS
Oxygen (Zr$_2$O$_3$-basis)
( both proprietary and under development )
Available SP76 Components

- Analyzers
- CONTROLLERS
- Filters
- Flowmeters
- Pumps
- Regulators
- Switches, Sensors and Gauges
- Valves
- Developments
SP76-based Controllers

Flow (mass basis)
(all 2-block format except*)

- Bronkhorst
- Brooks / Emerson
- Flow Matrix
  (volumetric available)
- Honeywell (sensor)
- HoribaSTEC*(1Blk)
- Porter Instrument
SP76-based Controllers

Pressure

Brooks (Emerson)

Flow Matrix

Honeywell (sensor)
Available SP76 Components

Analyzers
Controllers
FILTERS
Flowmeters
Pumps
Regulators
Switches, Sensors and Gauges
Valves
Developments
SP76-based Filters (1 of 2)

- A+ Corporation (LA, USA)
  (products under development)
  Avenger (bypass and particulate)
  Genie (cylindrical format membrane separator)
- Classic (UK)
  (products currently available)
  Primary (particulate)
  Secondary (polishing)
  Coalescing
  Liquid Discriminating (TFE membrane)
SP76-based Filters (2 of 2)

- Circor Instrumentation Technologies
  - CIRCOR Tech
    (former GO and Hoke products)
- Parker
  - former Balston products
- Swagelok
Available SP76 Components

- Analyzers
- Controllers
- Filters
- FLOWMETERS
- Pumps
- Regulators
- Switches, Sensors and Gauges
- Valves
- Developments
SP76-based Flowmeters

Rotameters
(armored & light duty)

Brooks / Emerson (both)
Bühler / Buehler (light)
(following are adaptable)
King (light)
Kobold (both)
Krohne (both)
Available SP76 Components

- Analyzers
- Controllers
- Filters
- Flowmeters

*PUMPS*
- Regulators
- Switches, Sensors and Gauges
- Valves
- Developments
SP76-based Pumps

Diaphragm
(all feasible to be manufactured; only ADI in production)

Air Dimension Inc. (ADI) (2-block head)
Gast
KNF-Neuberger

Positive Displacement (gear)
HNP Mikrosysteme GmbH
Available SP76 Components

Analyzers
Controllers
Filters
Flowmeters
Pumps
REGULATORS
Switches, Sensors and Gauges
Valves
Developments
SP76-based Regulators

CIRCOR Tech
(former GO Regulator product)

Parker

Swagelok
(former Kenmac Limited product)
Available SP76 Components

Analyzers
Controllers
Filters
Flowmeters
Pumps
Regulators
SWITCHES, SENSORS and GAUGES
Valves
Developments
SP76-based Switches, Sensors and Gauges

Switches-Flow
Chem-Tec Eqpt. Co.
Delta M
Honeywell
Malema

Switches-Moisture/Water
Bühler / Buehler

Sensors-Temperature
Honeywell

Gauges
Bourdon
Available SP76 Components

- Analyzers
- Controllers
- Filters
- Flowmeters
- Pumps
- Regulators
- Switches, Sensors and Gauges

VALVES
- Developments
SP76-based Valves (1 of 3)

CIRCOR Instrumentation Technologies
Circle Seal Controls, Inc.
Check and relief

CIRCOR Tech
manual actuated diaphragm
(on-off)
pneumatic* actuated diaphragm
(2&3-way discrete valves
3 x 2-way multi-valve bodies (5)
‘application module family’)

2-way and 3-way ball

*Positive Position Indication optional
(remote and local)
SP76-based Valves (2 of 3)

**Parker** (p-pneumatic or m-manual)

- Ball (m: 2 and 3-way)
- Check
- Diaphragm (m and p: 2-way)
- Meter (m)
- Needle (m and p)
- Relief (m)
- Toggle (m)
SP76-based Valves (3 of 3)

Swagelok  (p-pneumatic or m-manual)

Check

Diaphragm  (p and m)

Meter  (m)

Needle  (m)

Shut-off  (p and m)

Toggle  (p and m)
CIRCOR Tech

Analyzers
Controllers
Filters
Flowmeters
Pumps
Regulators
Switches, Sensors and Gauges
Valves

DEVELOPMENTS
CIRCOR Tech: 'System Solutions’
...a Process Analyzer System
“experience center “...

Submit (EML, FAX or ?) your Process Sample System
Legacy or ANSI/ISA 76 (modular) design

Request assistance with or review of your design

Request a Quotation based upon your design

Receive PERSONAL response from
CIRCOR Tech experienced industry experts
CIRCOR Tech: ‘System Solutions’
...a Process Analyzer System
“experience center “...

Bruce Keen
1972 to current
Sample Conditioning
Design Experience
FON: 918.336.4369
FAX: 918.338.2238
EML: bkeen@circortech.com

Bob Sherman (ISA Fellow)
1969 to current
Analytical System
Application Experience
FON: 815.931.9087
FAX: 815.744.7271
EML: rsherman@circortech.com
CIRCOR Tech: ‘System Solutions’
Thank you

and...

…see you at ISA EXPO 25-27OCT2005! (in Chicago!)