Liquid Sample Conditioning Systems (LSCS)

- Guaranteed to perform to specification
- All 316 stainless steel and/or acrylic parts in flow path to minimize corrosion
- Measures pH, ORP, conductivity, temperature, free chlorine, and dissolved oxygen
- Variopol quick-disconnect fittings make replacing sensors easy

A sample conditioning system is critical to the operation of most analytical instrumentation controlling your process. Instrumentation running to specification enables your process operations staff to maximize plant efficiency, helping you to realize your full production potential.

Spartan Controls can answer the question of how to properly couple liquid analysis instrumentation to your process application. By determining your specific application requirements we will choose the Liquid Sample Conditioning System suitable for your application - or custom build to your requirements.

You may supply us a completed Rosemount Analytical Liquid Application Data Form or choose your system from the attached matrix. We will be pleased to review your matrix choice with you to ensure the LSCS will meet your requirements and to ensure the system is correctly designed.

To assure good value in your sample conditioning investment, Spartan Controls uses high-quality components backed by sound engineering practices proven over time. Our basic systems have acrylic and 316 stainless steel components, Swagelok fittings, filters, pressure regulators and tubing. These high-quality components are chosen to minimize cost by minimizing your maintenance requirements. Spartan Controls’ LSCS is leak tested prior to shipment assuring quick, trouble-free start-ups.

Spartan Controls also offers factory trained M.I. Service Technicians to do the start-up for you. Our service team can also do on-site training, provide service contracts and do demand service work.

Spartan Controls is a single source provider on analytical solutions.
Standard Specifications

- **Sample Inlet:** 1/4 inch OD tubing compression fitting
- **Sample Flow:** Minimum 134 mL/min (2.2 gal/hr) Maximum 305 mL/min (5.0 gal/hr)
- **Sample Pressure:** Minimum 35 kPa (5 psig) Maximum 448 kPa (65 psig)
- **Sample Temperature:** 0 to 50 °C (32 to 122 °F)
- **Ambient Temperature:** 0 to 50 °C (32 to 122 °F)
- **Wetted Materials:** Polypropylene, acrylic, CPVC, 316 stainless steel

Optional Specifications with:

- **Pressure Regulator:** Up to 41,370 kPa (6000 psig) at inlet
- **Sample Cooler:** Up to 315 °C (600 °F) at inlet
- **Sample Pump:** Minimum 0 kPa/psig
- **Heated Enclosure:** -18 to 38 °C (0 to 100 °F)

Typical pH Flow Path

Model: LSCS-13-20-30-F11-F20-F30-R11-R20-R30-R40-SP0-PC0-TC0-D1
Typical Residual Chlorine Flow Path

Model: LSCS-14-23-30-F12-F21-F30-R12-R22-R30-R40-SP0-PC0-TC0-D1-SB1

Typical Boiler Feed Water Flow Path

VP6 CABLE 2.5 FEET
P/N 23747-04
DO SENSOR
499ATRDOVP-54
LOW FLOW
CELL ASSEMBLY
P/N 24091-00

MODEL 1056-01-25-38-HT
DO TRANSMITTER

CALIBRATION CUP HOLDER
P/N 33810-00

INLET
BH
PV
T

1/2” TUBING

COOLING WATER OUT

REVERSE FLOW COOLER
P/N 9390021

FL-1
FL-2

TO DRAIN

PLATE MOUNTED
24” X 36”

Model: LSCS-14-20-30-F11-F20-F30-R11-R20-R30-R40-SP1-PC1-TC1-D1

BY OTHERS
LSCS Element Selection

Please ensure that ALL assumptions are complied with.

1. Select Measurement 1, 2 & 3
   Included:
   • Mounting transmitter
   • Wiring sensor cable to transmitter
   Assumptions:
   • Cable Glands ordered with Transmitter
   • 2.5 Ft VP Cable Ordered with Sensor
   • Wall mounting Bracket with 5081 & 6081
   Note: Determines which flow chamber is required and determines how the flow chamber is mounted to the plate.

2. Select Flow Chamber 1, 2 & 3
   Included:
   • Flow Chamber itself
   • Mounting
   • Assumptions;
   • Compliant with Temperature & Pressure
   Note: Rotameter flow rates suitable for measurement, see RAI PDS Installation & Calibration Equipment.

3. Select Flow Rotameter
   Included:
   • Rotameters
   • Needle Flow Valves
   Assumptions:
   • Rotameters are preferred
   • Overflow sampler NOT used with
   • DO measurement
   • Overflow sampler used after a pump for amperometric sensors
   Note: This defines the flow path.
4. Select Sample Probe
   Included:
   • Sample probe itself
   Assumptions:
   • Compliant with process temp and press
   • MNPT thread mount
   • Shipped loose
   • End user will install
   Note: Sample probes insure the integrity of the sample by avoiding taking a wall sample; they must always be used. Insert 2” beyond the inner pipe wall.

5. Select Pressure Control (Optional)
   Included:
   • Pressure Regulator and Relief Valve
   Assumptions
   • Shipped Loose
   • End user will install
   Note: This ensure that the LSCS will not be over pressurized.

6. Select Temperature Control (Optional)
   Included:
   • Cooler
   • ½” bulkheads
   • ½” tube
   • ½” needle valve
   • fittings
   Assumptions:
   • Inlet water <70 °C
   • Flow chamber & sensors suitable for outlet temp
Selection Matrix - Liquid Sample Conditioning Systems

Level 1  
Measurement 1
11 Contacting Conductivity, Mount Sensor Horizontally
12 Toroidal Conductivity, Mount Sensor Horizontally
13 pH/ORP, Mount Sensor Vertically
14 Amperometric (DO, TrDO, CI), Mount Vertically
19 Custom, Specify Measurement

Level 2  
Measurement 2
20 None
21 Contacting Conductivity, Mount Sensor Horizontally
22 Toroidal Conductivity, Mount Sensor Horizontally
23 pH/ORP, Mount Sensor Vertically
24 Amperometric (DO, TrDO, CI), Mount Vertically
29 Custom, Specify Measurement

Level 3  
Measurement 3
30 None
31 Contacting Conductivity, Mount Sensor Horizontally
32 Toroidal Conductivity, Mount Sensor Horizontally
33 pH/ORP, Mount Sensor Vertically
34 Amperometric (DO, TrDO, CI), Mount Vertically
39 Custom, Specify Measurement

Level 4  
Flow Chamber 1
F11 Cell, Low Flow, P/N 24091-00, 1” Connection, Acrylic, 50 °C, 547 kPa, 65 psig
F12 Cell, Low Flow, P/N 24091-01, Bubble Sweeping for Chlorine, Acrylic, 50 °C, 547 kPa, 65 psig
F13 Cell, Low Flow, P/N 24091-02, 3/4” for Conductivity, Acrylic, 50 °C, 547 kPa, 65 psig
F14 Cell, 316SS, 3/4” Sensor Connection, GWH-075, Contacting Conductivity
F15 Cell, 316SS, 1” Sensor Connection, GWH-100, pH & Amperometric
F16 Cell, 1 1/2” 316SS Tee, Toroidal Conductivity, 3/4” Sensor Connection
F19 Custom, Specify Requirements

Level 5  
Flow Chamber 2
F20 None
F21 Cell, Low Flow, P/N 24091-00, 1” Connection, Acrylic, 50 °C, 547 kPa, 65 psig
F22 Cell, Low Flow, P/N 24091-01, Bubble Sweeping for Chlorine, Acrylic, 50 °C, 547 kPa, 65 psig
F23 Cell, Low Flow, P/N 24091-02, 3/4” for Conductivity, Acrylic, 50 °C, 547 kPa, 65 psig
F24 Cell, 316SS, 3/4” Sensor Connection, GWH-075, Contacting Conductivity
F25 Cell, 316SS, 1” Sensor Connection, GWH-100, pH & Amperometric
F26 Cell, 1 1/2” 316SS Tee, Toroidal Conductivity, 3/4” Sensor Connection
F29 Custom, Specify Requirements

Level 6  
Flow Chamber 3
F30 None
F31 Cell, Low Flow, P/N 24091-00, 1” Connection, Acrylic, 50 °C, 547 kPa, 65 psig
F32 Cell, Low Flow, P/N 24091-01, Bubble Sweeping for Chlorine, Acrylic, 50 °C, 547 kPa, 65 psig
F33 Cell, Low Flow, P/N 24091-02, 3/4” for Conductivity, Acrylic, 50 °C, 547 kPa, 65 psig
F34 Cell, 316SS, 3/4” Sensor Connection, GWH-075, Contacting Conductivity
F35 Cell, 316SS, 1” Sensor Connection, GWH-100, pH & Amperometric
F36 Cell, 1 1/2” 316SS Tee, Toroidal Conductivity, 3/4” Sensor Connection
F39 Custom, Specify Requirements

Level 7  
Rotameters 1
R11 Rotameters: Acrylic, Sample 40-400 cc/min, Bypass 100-1500 cc/min
R12 Over Flow Sampler, 183 cc/min, Pressure < 547 kPa, Temp < 50 °C, Flow Chambers in Series After
R13 Rotameters: Glass, Sample 40-400 cc/min, Bypass 120-1200 cc/min

Level 8  
Rotameters 2
R20 None
R21 Rotameters: Acrylic, Sample 40-400 cc/min, Bypass 100-1500 cc/min
R22 None, In Series with Flow Chamber 1
R23 Rotameters: Glass, Sample 40-400 cc/min, Bypass 120-1200 cc/min
R29 Custom, Specify Requirements
## Level 9 Rotameters

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>R30</td>
<td>None</td>
</tr>
<tr>
<td>R31</td>
<td>Rotameters: Acrylic, Sample 40-400 cc/min, Bypass 100-1500 cc/min</td>
</tr>
<tr>
<td>R32</td>
<td>None, In Series with Flow Chamber 1</td>
</tr>
<tr>
<td>R33</td>
<td>Custom, Specify Requirements</td>
</tr>
<tr>
<td>R34</td>
<td>Rotameters: Glass, Sample 40-400 cc/min, Bypass 120-1200 cc/min</td>
</tr>
</tbody>
</table>

## Level 10 Rotameters

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>R40</td>
<td>None</td>
</tr>
<tr>
<td>R41</td>
<td>Optional, Used for Cooler Only, Acrylic, 0.4-5 USGPM</td>
</tr>
<tr>
<td>R42</td>
<td>Optional, Used for Cooler Only, Glass, 6 USGPM</td>
</tr>
</tbody>
</table>

## Level 11 Sample Probe

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP0</td>
<td>By End User</td>
</tr>
<tr>
<td>SP1</td>
<td>PGI PR-15, 1/2&quot; MNPT Connection, 8&quot; Insertion</td>
</tr>
<tr>
<td>SP9</td>
<td>Custom, Specify Requirements</td>
</tr>
</tbody>
</table>

## Level 12 Pressure Control

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC0</td>
<td>None, Pressure at Inlet 35 to 547 kPa (5-65 psig)</td>
</tr>
<tr>
<td>PC1</td>
<td>Pressure Regulator &amp; Relief Valve, Pressure at Inlet &gt;547 kPa (65 psig), Mounted at Sample Point</td>
</tr>
<tr>
<td>PC2</td>
<td>Pressure Regulator &amp; Relief Valve, Pressure at Inlet &gt; 547 kPa (65 psig), Mounted on Panel</td>
</tr>
<tr>
<td>PC3</td>
<td>Sample Pump, Pressure at Inlet &lt; 35 kPa (5 psig), Flow 750 ccm</td>
</tr>
<tr>
<td>PC9</td>
<td>Custom, Specify Requirements</td>
</tr>
</tbody>
</table>

## Level 13 Temperature Control

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TC0</td>
<td>None, Temperature 4 to 50 °C</td>
</tr>
<tr>
<td>TC1</td>
<td>Sample Cooler, Using Acrylic Flow Cell, Reduce Temperature to &lt;50 °C, from max 315 °C</td>
</tr>
<tr>
<td>TC2</td>
<td>Sample Cooler, Using 316SS Flow Cell, Reduce Temperature to &lt;90 °C, from Max 315 °C</td>
</tr>
<tr>
<td>TC9</td>
<td>Custom, Specify Requirements</td>
</tr>
</tbody>
</table>

## Level 14 Drawings

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>D1</td>
<td>Power Point Quotation Sketch</td>
</tr>
<tr>
<td>D2</td>
<td>AutoCAD of Quotation Drawing</td>
</tr>
<tr>
<td>D9</td>
<td>Custom, AutoCAD Drawing, 2 Revisions Allowed</td>
</tr>
</tbody>
</table>

### Options *

## Level 15 Manual Water Sample

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS0</td>
<td>None</td>
</tr>
<tr>
<td>MS1</td>
<td>One Needle Valved Manual Sample Port</td>
</tr>
<tr>
<td>MS9</td>
<td>Custom, Specify Requirements</td>
</tr>
</tbody>
</table>

## Level 16 Siphon Break

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SB0</td>
<td>None</td>
</tr>
<tr>
<td>SB1</td>
<td>One Siphon Break</td>
</tr>
<tr>
<td>SB9</td>
<td>Custom, Specify Requirements</td>
</tr>
</tbody>
</table>

## Level 17 Panel Mounting

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM0</td>
<td>Standard, 4 Holes in Corners</td>
</tr>
<tr>
<td>PM1</td>
<td>2&quot; Pipe Mount, Qty 2</td>
</tr>
<tr>
<td>PM2</td>
<td>Uni-Strut Frame</td>
</tr>
<tr>
<td>PM3</td>
<td>Uni-Strut Frame with 2&quot; Pipe Mounts</td>
</tr>
<tr>
<td>PM9</td>
<td>Custom, Specify Requirements</td>
</tr>
</tbody>
</table>

## Level 18 Enclosure

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>E0</td>
<td>None</td>
</tr>
<tr>
<td>E1</td>
<td>Stainless Steel Enclosure, 24&quot;w x 36”h x 12”d</td>
</tr>
<tr>
<td>E2</td>
<td>Stainless Steel Enclosure, 24&quot;w x 36”h x 12”d, with G.P. Heater 120 VAC 5</td>
</tr>
<tr>
<td>E9</td>
<td>Custom, Specify Requirements</td>
</tr>
</tbody>
</table>

## Level 19 Inlet Filter

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IF0</td>
<td>None</td>
</tr>
<tr>
<td>IF1</td>
<td>Inlet Strainer Filter, 140 Micron</td>
</tr>
<tr>
<td>IF2</td>
<td>Inlet Depth Filter, 10 Micron</td>
</tr>
<tr>
<td>IF9</td>
<td>Custom, Specify Requirements</td>
</tr>
</tbody>
</table>

## Level 20 High Temperature Shut Off

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>HT0</td>
<td>None</td>
</tr>
<tr>
<td>HT1</td>
<td>High Temperature Shut Off Valve</td>
</tr>
</tbody>
</table>

### Typical Model Number *

LSCS-14-23-30-F12-F21-F30-R12-R22-R30-R40-SP1-PC0-TC0-D1

---

**Notes**

* If options are not selected, leave out of LSCS model number

1 Measurement MUST be the same as in the associated transmitter

2 Toroidal sensor is mounted in a Swagelok 1 ¼” Tee

3 Do not use a rotameter after the over flow sampler

4 Pressure Control is best accomplished at the sample point rather than on the panel. RV is set to 14.96 kPa or 15 psig.

5 Electrical connections direct to device by user

6 If temperature over 315 °C, then special Sentry cooler required

7 Drawing are available for review 2 weeks ARO

8 Manual sample in conjunction with atmospheric break or with site floor drain

9 Siphon brake is 1/4” tube with gooseneck and mud dauber fitting 18” long

10 For coarse particulate safety filtration prior to a pressure regulator

11 For filtration of fine particles, not for filtration of muddy water

12 Sentry TSV, P/N 7-01137E
Typical Enclosure Dimensions

For support, contact:

**ALBERTA**
Calgary
305 - 27 Street SE
Calgary, Alberta T2A 7V2
(403) 207-0700

Edmonton
8403 - 51 Avenue
Edmonton, Alberta T6E 5L9
(780) 468-5463

Fort McMurray
#300B MacKenzie Blvd.
Fort McMurray, Alberta T9H 4C4
(780) 790-0440

Grande Prairie
11419 - 98 Avenue
Grande Prairie, Alberta T8V 5S5
(780) 539-1161

**BRITISH COLUMBIA**
Burnaby
7500 Winston Street
Burnaby, BC V5A 4X5
(604) 422-3700

Fort St John
9603-112 Street
Fort St John, BC V1J 7C7
(250) 785-0285

Prince George
#4-556 N. Nechako Rd
Prince George, BC V2K 1A1
(250) 960-9765

**SASKATCHEWAN**
Regina
475 Maxwell Crescent
Regina, Saskatchewan S4N 5X9
(306) 721-6925

Saskatoon
206B, 2750 Faithful Avenue
Saskatoon, Saskatchewan S7K 6M6
(306) 934-3484