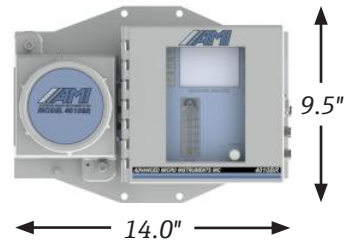


# TDLAS technology cheat sheet – H<sub>2</sub>O in natural gas

Product comparison of robustness and serviceability



	AMI 4010 BR	SpectraSensors SS500
<b>Wetted materials</b>	<ul style="list-style-type: none"> <li>Plated Aluminum, susceptible to corrosion from H<sub>2</sub>S and other contaminants</li> </ul>	<ul style="list-style-type: none"> <li>316L Stainless Steel, corrosion resistant, preferred by oil and gas market</li> </ul>
<b>Sample cell construction</b>	<ul style="list-style-type: none"> <li>Multi-pass (13 pass), more susceptible to contamination</li> <li>Uses curved mirrors; needs special alignment tools when servicing or cleaning and replacing</li> </ul>	<ul style="list-style-type: none"> <li>Single reflection, single pass cell</li> <li>Flat mirror, no special alignment when cleaning and servicing</li> </ul>
<b>Optical path</b>	<ul style="list-style-type: none"> <li>Fiber-coupled, prone to breakage, loose connector, and contamination, causing TDL reading errors</li> <li>Cell cannot be replaced in the field – must be done in lab environment with special cleaning tools</li> </ul>	<ul style="list-style-type: none"> <li>Free-space laser, contained within sealed optical head</li> <li>Laser not affected by moisture intrusion into the cell</li> </ul>
<b>Contamination issues</b>	<ul style="list-style-type: none"> <li>Multi-pass cell susceptible to liquids requiring "Liquid Eliminator"</li> <li>Two curved mirrors in horizontal cell; when contaminated, both mirrors need to be cleaned</li> </ul>	<ul style="list-style-type: none"> <li>Single removable / replaceable flat mirror</li> <li>Easy to clean without disassembling the analyzer</li> </ul>
<b>Serviceability</b>	<ul style="list-style-type: none"> <li>Components not easy to access and remove, replace</li> <li>Sample cell and mirror mounted behind display</li> <li>Cannot decouple fiber-coupled laser to replace cell</li> <li>Must send back unit to factory for repairs</li> </ul>	<ul style="list-style-type: none"> <li>Mirror and cell easy to service or replace in the field</li> <li>In case of contamination, contaminants settle onto removable mirror for easy cleaning</li> </ul>

## AMI – advanced micro instruments (competitor’s edition)

	AMI 4010 BR	SS500	SS2000(e)/SS3000(e)
LDL	5 ppm <sub>v</sub>	5 ppm <sub>v</sub>	2 ppm <sub>v</sub>
Accuracy	None stated by AMI	±10 ppm <sub>v</sub>	±2 ppm <sub>v</sub>
Repeatability	±5 ppm <sub>v</sub>	±1 ppm <sub>v</sub>	±1 ppm <sub>v</sub>
Measurement range	0.25-20 lb/mmscf	0-20 lb/mmscf	0-20 up to 250 lb/mmscf
Temperature sensitivity	Up to 1.6 lb error	Up to 0.5 lb error	Up to 0.5 lb error
Response time t90	Publishes < 2 seconds, but tested at 36 seconds	12-16 seconds	12-16 seconds
Area classification	CSA Certified Class I, Div 1	CSA certified Class I, Div 2	CSA certified Class I, Div 2
IP rating	None	NEMA 3R	NEMA 3R to 4X
Wetted materials	Nickel coated aluminum	316 Stainless	316 Stainless
Design	Embedded 13-path cell with two curved mirrors Susceptible/sensitive to damage and contamination	Simple single-pass cell, easy to clean and repair Laser sealed in optical head	Simple single-pass cell, easy to clean and repair Laser sealed in optical head
Field servicing	Difficult to service in field Not easy to access cell or sample system	Designed to be easily field serviceable	Designed to be easily field serviceable
Sample system	Embedded design, one size fits all Difficult to service No pressure regulator	Choice of sample system (available with pressure regulator, glass tube flow meters, etc.)	Choice of sample system (available with pressure regulator, glass tube flow meters, etc.)
Gas stream compatibility	Natural Gas, streams not clearly defined	Natural Gas, > 90% Methane	Natural Gas, > 90% Methane Natural Gas, > 50% Methane & ≥ 20% Ethane Natural Gas with > 50% CO <sub>2</sub>
Serial communications	RS485	RS232	RS232, RS485 and Ethernet options (e-series)
Additional measurements	None	None	CO <sub>2</sub>