

Technical Bulletin

#125

SpectraSensors SS2000 Tunable Diode Laser System

A Cost Effective Measurement in Natural Gas



Far more attention is being paid to the quality of natural gas these days and if suppliers and pipeline companies are to avoid costly shut-ins accurate and relevant gas analysis is critical for both plant diagnostics and custody transfer points. A new technique for measurement of water vapor and carbon dioxide in natural gas is rapidly becoming popular among gas producers and pipeline companies alike. The SS2000 from SpectraSensors is laser based system offering many benefits including a speed of response to a step change in either direction (wet to dry or dry to wet) of less than 6 seconds (98% of change).

The SS2000 can help avoid a shut-in or allows a quicker return to full flow than any other technique. The improvements in terms of accuracy and speed of response make for a strong argument in terms of safety issues alone, but there is also a direct cost benefit to the natural gas industry in terms of money saved. The ability to monitor dehydrator performance in virtually real time means that diagnostics of plant failures becomes easier and recovery from a high H₂O or CO₂ event is considerably quicker. With other system taking up to 3.5 hours longer to recover from a short term moisture event than the SS2000 it is likely that a shut-in due to a transient plant problem can be avoided altogether. With minimum shut-ins of 4 hours and the average shut-in time being between 1 to 3 days it is clear that it can be expensive.

Production in MMBTU/Day		Savings Excluding Manpower Rates for Producers					
		\$2.00	\$2.20	\$2.40	\$2.60	\$2.80	\$3.00
1,000	1 Hour	\$83	\$93	\$100	\$108	\$117	\$125
	4 Hours	\$333	\$367	\$400	\$433	\$467	\$500
	8 Hours	\$667	\$733	\$800	\$867	\$933	\$1,000
	12 Hours	\$1,000	\$1,100	\$1,200	\$1,300	\$1,400	\$1,500
	24 Hours	\$2,000	\$2,200	\$2,400	\$2,600	\$2,800	\$3,000
5,000	1 Hour	\$417	\$458	\$500	\$542	\$583	\$625
	4 Hours	\$1,667	\$1,833	\$2,000	\$2,167	\$2,333	\$2,500
	8 Hours	\$3,333	\$3,667	\$4,000	\$4,333	\$4,667	\$5,000
	12 Hours	\$5,000	\$5,500	\$6,000	\$6,500	\$7,000	\$7,500
	24 Hours	\$10,000	\$11,000	\$12,000	\$13,000	\$14,000	\$15,000
10,000	1 Hour	\$833	\$917	\$1,000	\$1,083	\$1,167	\$1,250
	4 Hours	\$3,333	\$3,667	\$4,000	\$4,333	\$4,667	\$5,000
	8 Hours	\$6,667	\$7,333	\$8,000	\$8,667	\$9,333	\$10,000
	12 Hours	\$10,000	\$11,000	\$12,000	\$13,000	\$14,000	\$15,000
	24 Hours	\$20,000	\$22,000	\$24,000	\$26,000	\$28,000	\$30,000
25,000	1 Hour	\$2,083	\$2,292	\$2,500	\$2,708	\$2,917	\$3,125
	4 Hours	\$8,333	\$9,167	\$10,000	\$10,833	\$11,667	\$12,500
	8 Hours	\$16,667	\$18,333	\$20,000	\$21,667	\$23,333	\$25,000
	12 Hours	\$25,000	\$27,500	\$30,000	\$32,500	\$35,000	\$37,500
	24 Hours	\$50,000	\$55,000	\$60,000	\$65,000	\$70,000	\$75,000
50,000	1 Hour	\$4,167	\$4,583	\$5,000	\$5,417	\$5,833	\$6,250
	4 Hours	\$16,667	\$18,333	\$20,000	\$21,667	\$23,333	\$25,000
	8 Hours	\$33,333	\$36,667	\$40,000	\$43,333	\$46,667	\$50,000
	12 Hours	\$50,000	\$55,000	\$60,000	\$65,000	\$70,000	\$75,000
	24 Hours	\$100,000	\$110,000	\$120,000	\$130,000	\$140,000	\$150,000

In addition maintenance costs can be saved from the lower operational cost of a non-contact method.

Gas Shipments are a perishable item. Gas that is not shipped today is normally lost revenue that is unable to be made up by increased production at a later date. The tables on page 1 helps calculate the effect of a shut-in from the perspective of a gas producer while the table on page 2 is from the perspective of a pipeline company. This table shows up to 100,000 MMBTU/Day but many of the larger pipelines are in the region of 300,000 or even 600,000 MMBTU/Day.

Shut-ins are not the complete story when calculating the cost benefits of the SS2000. All other techniques require frequent re-calibration, cleaning or re-coating and, as the SS2000 is a non-contact system it is far more resistant to contamination commonly found in natural gas systems (see Technical bulletin #124).

An example is given of typical costs involved in maintaining a surface sensor technique like Phosphorus Pentoxide, Aluminum Oxide or Quartz Crystal:

Cost of on-site manpower to remove and replace sensor	about \$150
Cost of transport to Manufacturer	about \$ 30
Cost Recalibration/cleaning	about \$300
Cost of return transport	about \$ 30
Total	<u>about \$510</u>

It is common for system to be recalibrated every 2 to 3 months but lets say 3 times a year making the total Maintenance cost for the year about \$1,530

If this figure is added to the cost of just one shut-in lasting say 8 hours on an average pipeline of 25,000 MMBTU/Day at \$2.60 (\$21,667) then the cost benefit is \$1,560 + \$21,667 = \$23,347.

Lease/Purchase

To conserve capital equipment budgets the SS2000 is also available on lease/purchase programs that can also include sample conditioning systems, installation and on-site training courses (if required) making on a low monthly lease over two or three years with a low value purchase at the end of the lease making the it very cost effective.

Flow in MMBTU/Day		Cost of Shut-ins Excluding Manpower Rates for Pipeline Transportation (I.T & F.T)			
		\$0.15	\$0.30	\$0.45	\$0.60
5,000	1 Hour	\$31	\$63	\$94	\$125
	4 Hours	\$125	\$250	\$375	\$500
	8 Hours	\$250	\$500	\$750	\$1,000
	12 Hours	\$375	\$750	\$1,125	\$1,500
	24 Hours	\$750	\$1,500	\$2,250	\$3,000
10,000	1 Hour	\$63	\$125	\$188	\$250
	4 Hours	\$250	\$500	\$750	\$1,000
	8 Hours	\$500	\$1,000	\$1,500	\$2,000
	12 Hours	\$750	\$1,500	\$2,250	\$3,000
	24 Hours	\$1,500	\$3,000	\$4,500	\$6,000
25,000	1 Hour	\$156	\$313	\$469	\$625
	4 Hours	\$625	\$1,250	\$1,875	\$2,500
	8 Hours	\$1,250	\$2,500	\$3,750	\$5,000
	12 Hours	\$1,875	\$3,750	\$5,625	\$7,500
	24 Hours	\$3,750	\$7,500	\$11,250	\$15,000
50,000	1 Hour	\$313	\$625	\$938	\$1,250
	4 Hours	\$1,250	\$2,500	\$3,750	\$5,000
	8 Hours	\$2,500	\$5,000	\$7,500	\$10,000
	12 Hours	\$3,750	\$7,500	\$11,250	\$15,000
	24 Hours	\$7,500	\$15,000	\$22,500	\$30,000
100,000	1 Hour	\$625	\$1,250	\$1,875	\$2,500
	4 Hours	\$2,500	\$5,000	\$7,500	\$10,000
	8 Hours	\$5,000	\$10,000	\$15,000	\$20,000
	12 Hours	\$7,500	\$15,000	\$22,500	\$30,000
	24 Hours	\$15,000	\$30,000	\$45,000	\$60,000



IMA Group, Inc.
2400 Lincoln Avenue
Altadena
CA 91001
Phone: 626 296 6242
Fax: 626 296 6281