

Understanding factory validation gas

Verify TDLAS performance

Benefits at a glance

- Validation of TDLAS performance
- Determination of proper validation gas backgrounds
- Support and service for on-going support of the analyzer



Figure 1 - The validation or reference gas bulkhead port is found near the sample inlet port on most analyzers.

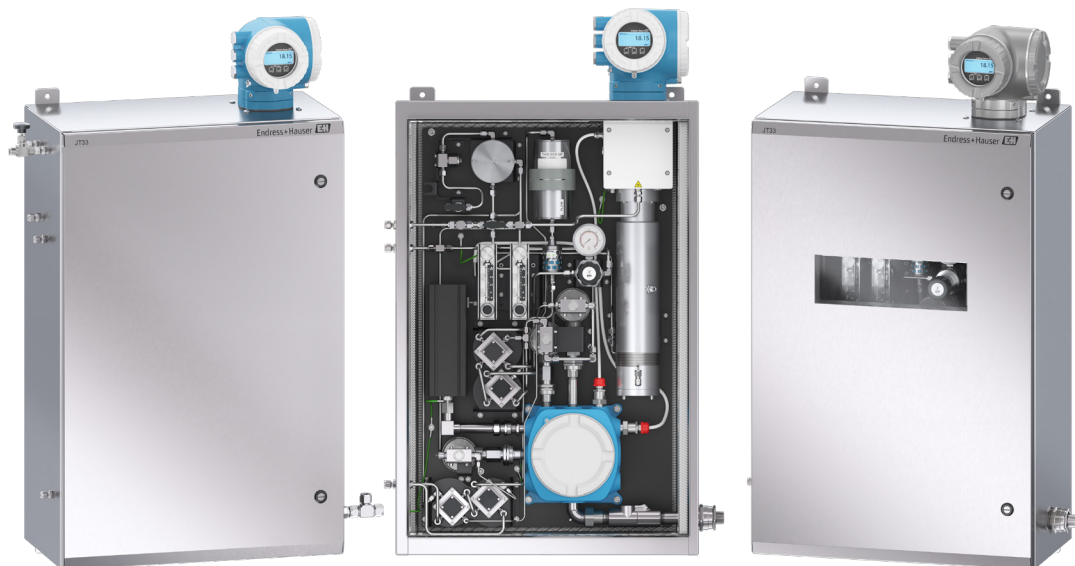
Regular validation of a TDLAS analyzer provides a simple method to determine proper operation and verification of measurement quality. In general, the validation gas should mimic the gas that was used during production of the analyzer. The validation gas type

is listed on each analyzer calibration sheet supplied at time of order, and it can vary depending on the analyzer build. The guidelines in this document help the customer to understand which validation gas background will be used.

JT33 H₂S analyzer validation

Standard JT33 TDLAS H₂S analyzers default to 100% methane validation gas for natural gas applications while all other applications use 100% nitrogen validation gas. As an optional feature, JT33 analyzers allow for user-specified validation gas backgrounds as an optional order code matrix.

Background composition options for JT33	Standard validation gas background	Alternate validation gas background
Table 1 - Natural gas, 90% or more methane	CH ₄	100% CH ₄
Table 2 - Natural gas, 50% or more methane, 0 to 20% ethane, 0 to 20% CO ₂ , 0 to 20% N ₂	CH ₄	100% N ₂ 100% CO ₂
Table 3 - Natural gas, up to 50% methane, 20% ethane, and 50 to 100% CO ₂	CH ₄	
Table 22 - NGL ethane > 95%	N ₂	
Table 23 - NGL ethane/propane mix, 65 to 90% ethane, and 0 to 30% propane	N ₂	
Table 31 - NGL Y-grade stream with 35 to 55% ethane, 30 to 45% propane, up to 20% butanes, and up to 6% pentane	N ₂	
Table 32 - NGL propane > 90%, 0 to 8% butanes	N ₂	
Table 33 - NGL butane with i-butane 20 to 40% and n-butane 55 to 90%	N ₂	
Table 42 - NGL propane/propylene mix up to 100% of either gas	N ₂	
Table 61 - Hydrogen recycle, gas streams with 70 to 90% hydrogen, 8 to 20% methane, 3 to 10% ethane	N ₂	
Table 62- Fuel/flare gas, 25 to 65% hydrogen, 15 to 55% methane, 5 to 15% ethane, 1 to 15% propane, 1 to 15% ethylene	N ₂	



J22 moisture analyzer validation

All standard J22 TDLAS moisture analyzers include validation in 100% methane (CH₄) as Stream 2 and 100% nitrogen (N₂) as Stream 3. Stream 1 is reserved for the process gas measurement as Table 1/2/3 natural gas. Validation gas backgrounds are subject to change when the J22 is ordered as a technically special product (TSP). The validation gas background should be specified during the TSP process or identified on the purchase order to the factory.


Calibration Certificate Gas Measurement		Endress+Hauser 						
E+H OPTICAL ANALYSIS								
11027 Arrow Route Rancho Cucamonga, CA 91730								
Customer Information:								
Order Number:	16333							
ANALYZER INFORMATION & SPECIFICATIONS:								
ANALYZER MODEL:	J22	ANALYTE:	H2O					
ANALYZER SOFTWARE VERSION:	v1.04.01	MEASUREMENT RANGE:	0 - 500 ppmv					
ANALYZER SERIAL NUMBER:	TC003128000	TEMPERATURE RANGE:	-20°C to 60°C					
CELL / OPTICAL HEAD SERIAL NUMBER:	T900F028000	PRESSURE RANGE:	700 - 1,700 mbar					
TAG NUMBER:	N/A	VALIDATION GAS MEDIUM:	- Methane - Nitrogen					
		REPEATABILITY:	The greater of ± 1 ppmv or ± 1% of reading					
Calibration Gas Composition*								
Matrix/Gas	Methane	Ethane	Propane	Butane	Pentane+	Nitrogen	CO2	Hydrogen
Stream 1	75.00%	10.00%	5.00%				10.00%	
Stream 2	100.00%							
Stream 3						100.00%		

Figure 2: The background composition for each gas used during calibration is listed on the calibration certificate included with the J22 analyzer.

SS2100 product family - H₂S analyzer validation

The SS2100 TDLAS analyzer product line validation gas background will vary depending upon the specified process background table (Feature 50) and the validation method (Feature 110). Please refer to the tables below.

Product	Background composition	Validation	Validation gas background
SS2100i Scope-A single analyte H ₂ S	All tables	N - Validation via external stream selector	N ₂ ¹
SS2100 SS2100i Scope-B single analyte H ₂ S ²	Table 1 - Natural gas	N - Validation via external stream selector	CH ₄
	Table 2 - Rich natural gas	1 - 1-point solenoid actuated validation	CH ₄
	Table 3 - Natural gas with high CO ₂	2 - External validation + air actuated valves	N ₂
	Table 21 - LNG	3 - 1-point validation + air actuated valves	N ₂
	Table 22 - NGL ethane	All validation options	N ₂
	Table 23 - NGL ethane/propane mix		
	Table 31 - NGL Y-grade		
	Table 32 - NGL propane		
	Table 33 - NGL butane		
	Table 42 - NGL propane/propylene mix		
	Table 61 - Hydrogen recycle		
Table 62 - Fuel/flare			
Table 90 - Caustic tower feed			
Special version, TSP-no. to be spec.			

Notes:

¹ If product is ordered as Scope-A (analyzer only), then the validation gas background defaults to N₂ but may be specified as N₂ or CH₄ on purchase order.

² If a multi-pack analyzer is ordered, then the validation gas background is based on the primary analyte. For example, an H₂S/H₂O analyzer with external validation (option N) would use CH₄ for validation gas background for both H₂S and H₂O. If the multi-pack analyzer has TSP options, then N₂ validation gas is used.

SS2100 product family - CO₂ analyzer validation

CO₂ measurements are generally validated in nitrogen backgrounds unless ordered as part of a multi-pack analyzer.

When CO₂ is part of a multi-pack analyzer, the validation gas background of the primary analyte will also be used for CO₂ validation.

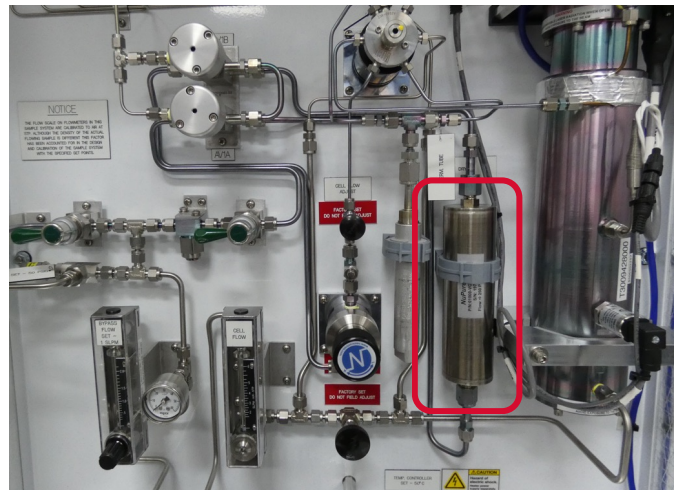
SS500 - H₂O analyzer validation

The SS500 moisture analyzer was designed for natural gas applications. All SS500 moisture analyzers use 100% CH₄ for validation gas background.

SS2100 product family - H₂O analyzer validation

Trace moisture analyzers use a permeation tube for validation. Permeation tubes rely upon process gas flow past a permeable membrane built into tubes to create a validation gas mixture. Due to this design, factory validation gas is not relevant.

Higher concentration moisture measurements in natural gas (Table 1/2/3) have transitioned over to the J22 product line. For moisture measurements found in gas processing applications, nitrogen is used for factory validation. Please refer to the table listed below for reference.



Product	Measurement range	Background composition	Validation method	Validation gas background
SS2100 SS2100i Scope-B H ₂ O ¹	0-5 ppmv 0-20 ppmv	Table 1 - Natural gas	Permeation Tube	Not applicable
		Table 2 - Rich natural gas		
		Table 3 - Natural gas with high CO ₂		
		Table 21 - LNG		
		Table 41 - Ethylene		
Scope-A or Scope-B analyzer	0-50 ppmv 0-100 ppmv 0-200 ppmv 0-300 ppmv 0-500 ppmv 0-1000 ppmv	Table 1 - Natural gas	Product replaced with J22	
		Table 2 - Rich natural gas		
		Table 3 - Natural gas with high CO ₂	N - Validation via external stream selector	N ₂
		Table 22 - NGL ethane		
		Table 23 - NGL ethane/propane mix		
		Table 31 - NGL Y-grade		
		Table 32 - NGL propane		
		Table 33 - NGL butane		
Special version, TSP-no. to be spec.				

Note:

¹ If a multi-pack analyzer is ordered, then the validation gas background is based on the primary analyte. For example, an H₂S/H₂O analyzer with external validation (option N) would use CH₄ for the validation gas background for both H₂S and H₂O. If the multi-pack analyzer has TSP options, then N₂ validation gas is used.