

Argon Consumption

Why Argon is needed within OES?

Argon is essential for producing a spark excitation and preventing oxidation on the sample surface, which helps ensure accurate and precise analysis. Moreover, argon creates an environment in the spark stand (or probe for mobile OES) that allows high transmission of UV wavelengths for elements like carbon, phosphorus, sulfur, and others. Wavelengths below around 200 nm would be absorbed in a normal air atmosphere, which is why argon is commonly used in OES instruments.

Not all types of argon can be used for optical emission spark spectrometers. The required argon must have a high purity level, at least 4.8 (Ar 4.8 > 99.998% Ar). If nitrogen analysis is necessary, argon quality of 5.0 or higher is mandatory.



Gas Type	Argon (Vol.%)	H ₂ (Vol.%)	Oxygen (vpm)	Nitrogen (vpm)	Water vapor (vpm)	Carbon compounds (vpm)	Suitable for Nitrogen and Gas Analysis
Argon for spectroscopy (Ar 4.8)	99.998	-, -	3	10	5	≤0.5	✗
Ar 5.0	99.999	-, -	2	5	3	≤0.2	✓
Ar 6.0	99.9999	-, -	≤0.5	≤0.5-1*	≤0.5	≤0.2	✓

Argon Consumption

FMS/FME

FOUNDRY-MASTER Smart/FOUNDRY-MASTER Expert			
Measurement Iron Base			
Flow Rates:			
Constant Flow [CF]	12	nl/h	
Flush [FL]	79	nl/h	
Analytical Flush [AF]	70	nl/h	
Measuring time	nl/measure		
Flush	2,5 s	FL+CF	0,1
Prepburn	5,5 s	AF+CF	0,1
Measuring time	4,5 s	AF+CF	0,1
Total Consumption per Analysis	0,3		

Flush procedure optic			
FMS/FME			
			nl
UV Flush	35 min	UV F	23

Standby			
			nl
Constant flow	1 h	CF	12

nl = Standard Liters (under Standard Condition, Pressure and Temperature)

H = hour

Min = minutes



Argon Consumption

OE Series (OE750/OE720)

OE Series OE750/OE720			
Measurement Iron Base			
Flow Rates:			
Constant Flow [CF]	12	nl/h	
Purge [PU]	290	nl/h	
Analytical Flush [AF]	75	nl/h	
Measuring time			nl/measure
Flush	1,5s	Af+CF	0,04
Preburn	5,5s	AF+CF	0,13
Measuring time	4,5s	AF+CF	0,11
Purge	0,5s	AF+CF+PU	0,05
Total Consumption per Analysis			0,3

Flush procedure/Pump Cycle optic - first installation		nl
OE750	12h	60
OE720	24h	600

Standby		nl
Constant flow	1 h	CF

nl = Standard Liters (under Standard Condition, Pressure and Temperature)

H = hour

Min = minutes



Argon Consumption

PMI-MASTER Pro/PMI-Master Smart

PMI-MASTER Pro/PMI-Master Smart Fe matrix + UVTouch			
Measurement Iron Base			
Flow Rates:			
Constant Flow [CF]	22 nl/h		
UVT Constant [UVT C]	5 nl/h		
Argon High [HI]	100 nl/h		
Analytical Flush [AF]	130 nl/h		
Measuring time	nl/measure		
Flush	2 s	HI+CF+AF	0,1
Preburn	5,5 s	HI+CF+AF	0,4
Measuring time	3 s	AF+CF	0,1
Total Consumption per Analysis	0,7		

Flush procedure optic - first installation			nl
UV Flush	0,5 h		60

Standby			nl
Constant flow first 30 Min. break	0,5 h	CF+UVT C	25
Constant flow longer break	1 h	UVT C	5

nl = Standard Liters (under Standard Condition, Pressure and Temperature)

H = hour

Min = minutes



Argon Consumption

Examples

Calculating the total consumption of argon is challenging because it depends on how the instrument is used. Typically, a constant high flow of argon is not required, but the instrument should be able to perform a spark immediately at any time.

Scenario for a FOUNDRY-MASTER Smart

Conditions

- 300 Spark in 8h in three batches
- Consumption in spark time = $0,3\text{l}/\text{measurement} * 300 = 90 \text{ l}$
- 24 h Uptime with CF = $24\text{h} * 12\text{l}/\text{h} = 288 \text{ l}$

Total Argon Consumption = 378 l/day

Scenario for a PMI-Master Smart with UV-Touch

- 300 burns (no nitrogen required) in 8 h
- Flush time to enable transmission for UV Touch probe 30min = 60 l
- Consumption in spark time = $0.7 \text{ nl/ measurement} * 300 = 183 \text{ l}$
- 8 h uptime with CF = $8\text{h} * 5\text{nl}/\text{h} = 40 \text{ l}$
- 2 h constant flow Sparkstand (short break) = $2\text{h} * 25 \text{ l}/\text{h} = 50 \text{ l}$

Total Argon Consumption = 333 l/day

[APPLICATION NOTE]

OES Instruments

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Argon Consumption

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