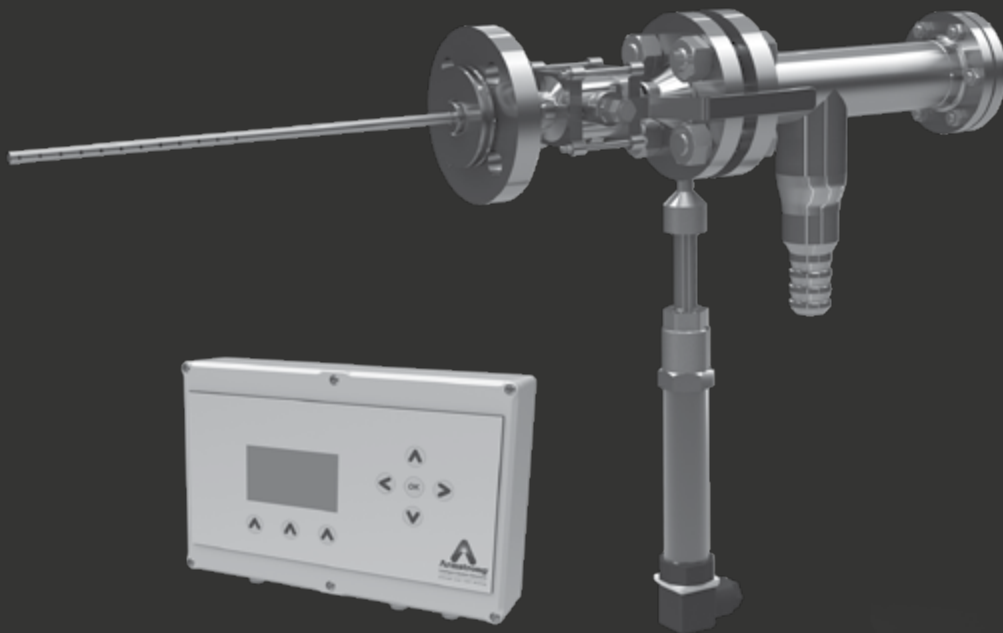




STEAM QUALITY MONITORING





Armstrong® Steam Quality Monitor – Steam QM-1

Wet steam is a costly problem across many industries causing damages and product quality issues:

- Batch rejection, wet packs and wet loads in sterilizers.
- Food grade quality of steam not achievable.
- Carbon dioxide with water creates carbonic acid that damages pipes.
- Slug of water causes water hammering which is destructive.
- Flow meters are inaccurate.
- Water abrades like sand and will erode pipes, elbows, valves...
- Lower latent heat available reduces heat transfer.
- Blade erosion on saturated steam turbines.
- Thermal stress as condensate cools down.



In fact, steam quality typically refers to the amount of water in the steam which is also known as “dryness fraction”. Saturated steam is a biphasic mixture of steam and water where the water is in the form of un-vaporized micro-droplets.

The dryness fraction (X) quantifies the ratio of the mass of steam to the mass of the biphasic mixture:

$$X = \frac{\text{Mass of Steam}}{\text{Mass of Steam} + \text{Mass of Water}}$$

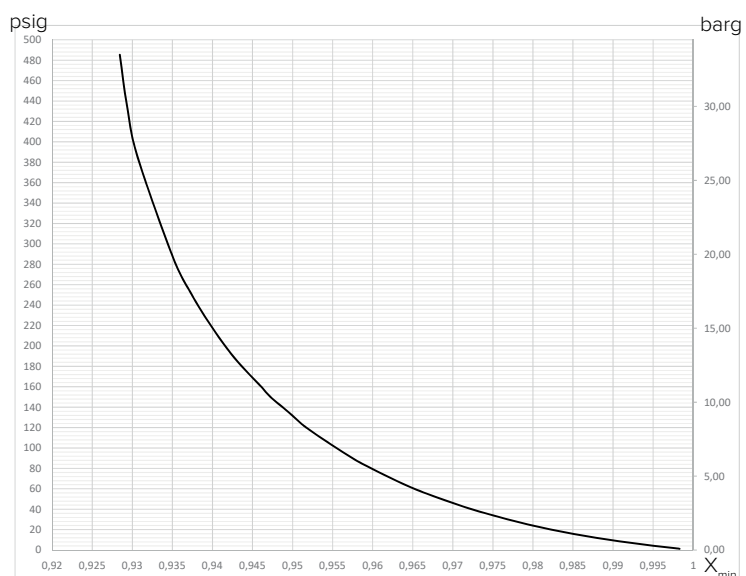
Part of the difficulty in monitoring the steam dryness fraction is that steam systems are dynamic. The steam is moving through the components and conditions change, second by second. Within this complex system, there are many things that contribute to water in the steam.

Monitoring the dryness fraction of steam has long been a manual process – time consuming, inconsistent, unreliable, and presents inherent safety and accuracy risks.

The Steam QM-1 is an automatic steam quality monitor that safely and reliably determines and communicates the dryness fraction of plant and culinary steam; allowing you to continuously and efficiently monitor your steam system.

The Steam QM-1 makes it easy, safe and precise to monitor steam quality when the highest quality steam is needed.

Minimum Dryness Fraction Measurable



Steam QM-1 Specifications

Steam Operating Pressure Range	43 - 465 psig (3 - 32 barg)
Voltage	12 VAC or 15 - 24 VDC

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit armstronginternational.com for up-to-date information.

Steam Quality Monitor – Steam QM-1

Manual Versus Automatic

Until now steam dryness fraction measurement has been a time-intensive, unreliable and potentially unsafe process. Steam QM-1 is not only more reliable and safer than manual testing, the unit is also portable, so it can be easily transported to multiple points on your steam line.

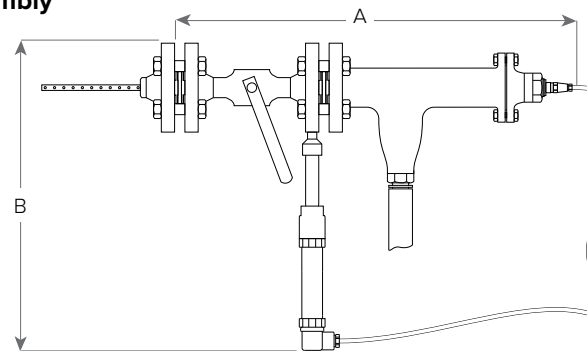
When you compare Steam QM-1 to manual testing methods the choice is clear:

Manual Method	Automatic Method	
Description		
<ul style="list-style-type: none"> A sample of the steam is condensed during a limited time frame. Temperature and mass measurements allow calculation of the steam dryness. 	<ul style="list-style-type: none"> Reducing steam pressure to atmosphere allows measurement of steam dryness. 	
Disadvantages		
<ul style="list-style-type: none"> Time Consuming: Typically manual steam quality measurement requires two people, and can take up to one hour per measurement point. This does not include additional time required to complete necessary reports. Trending: Unable to trend steam dryness over a period of time. Unsafe: There are inherent safety risks involved in sampling live steam and condensate in a water receiver. Unreliable: Measurement results depend on the skill of the technician conducting the test. 	Advantages	
<ul style="list-style-type: none"> Quick and Easy: Steam QM-1 is simple to install. Trending: Continuous measurements provide trending data over time. Safe: Once QM-1 is installed it is much safer than manual measurement methods. Reliable: Steam QM-1 is both reliable and accurate. 		

Steam QM-1 Dimensions & Weight

	in	mm
A – Assembly Width	20	500
B – Assembly Height	15	375
C – Cabinet Width	10	250
D – Cabinet Height	6.5	160
E – Cabinet Depth	2.5	60
Assembly Weight	20 lb	9 kg
Cabinet Weight	2 lb	0,9 kg

Assembly



Steam QM-1 Package Includes:

Insulation Cover • All Necessary Accessories

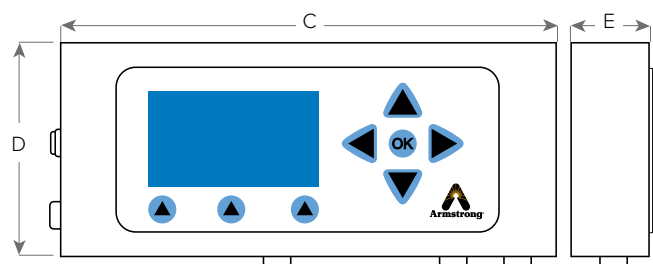
Optional Feature:

Data Logger

More Information:



Cabinet





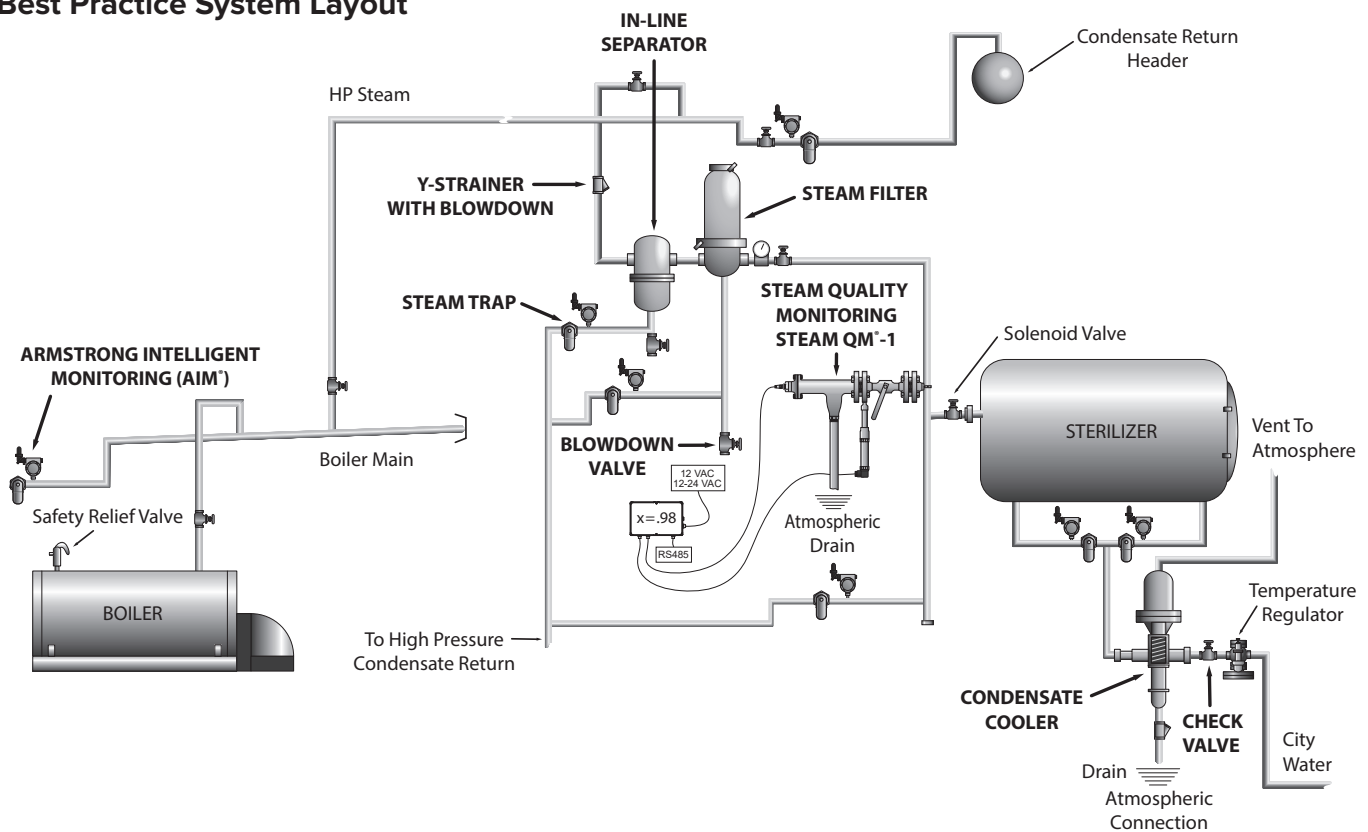
Armstrong® Steam QM[®]-1 – Steam Quality Monitor

Steam quality, or more specifically, steam dryness, is a critical factor to ensure proper sterilization of medical equipment. Most sterilizer manufacturers specify a minimum steam dryness fraction of 97% for steam entering an autoclave. With more than 3% condensate in the steam line the chances of a wet pack occurring increase. A wet pack is defined as any visible moisture identified on the pack after sterilization and drying. When a group of wet packs are identified in a cycle then it is referred to as a wet load.

According to the Association for the Advancement of Medical Instrumentation, medical instruments showing signs of moisture - or wet packs - should not be used in medical or surgical environments. Wet packs can act as a pathway for microorganisms, which can lead to hospital acquired infections.

The Steam QM[®]-1 from Armstrong International allows you to identify when steam quality drops below an acceptable dryness fraction; immediately alerting you to a potential contamination risk. When the Steam QM[®]-1 is applied according to the best practice piping layout illustrated below, you can feel confident the utility side of your sterilization process is operating as efficiently and effectively as possible.

Best Practice System Layout



Steam QM[®]-1 Features

- Steam dryness monitoring
- Simple installation
- Reliable/repeatable accuracy
- Safe alternative to the traditional manual method of measuring steam quality
- RS485 connection for data logging using regulation compliant device; results may be remotely monitored via Modbus
- All stainless steel construction

Why measure steam dryness?

- Reduce wet packs in sterilization process by ensuring that dry steam is entering the sterilization autoclave
- Avoid water hammer
- Help ensure upstream steam system equipment effectiveness
- Monitor boiler carry over
- Avoid erosion in valves, regulators, etc.
- Control the desuperheater (dryness fraction used instead of pressure and temperature)

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Armstrong® Steam Quality Monitor – Steam QM®-3

The sterilization process, the quality of the sterile product and the serviceability and longevity of the sterilizer and its associated equipment are greatly influenced by the quality of steam supplied to a sterilizer. Sterilization is a process whose efficacy cannot be verified retrospectively by inspection or testing of the product before use. For this reason, sterilization processes must be validated, the performance of the process routinely monitored, and the equipment maintained.



EN 285

This European standard specifies requirements and the relevant tests for large steam sterilizers, primarily used for the sterilization of medical devices and their accessories but has been adopted by most pharmaceutical industries.

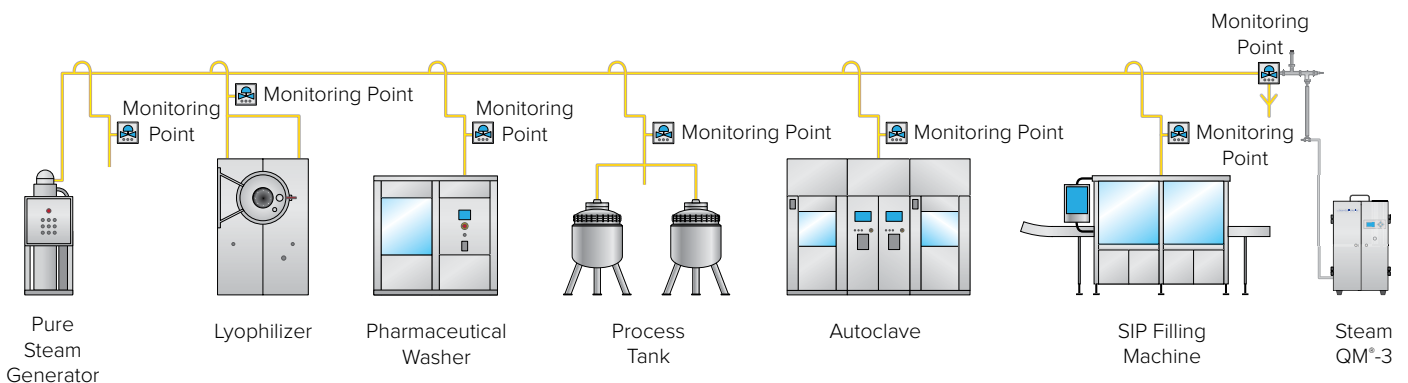
- The sterilizer shall be designed to operate with saturated steam containing up to 3.5 ml non-condensable gases collected from 100 ml condensate.
- The sterilizer shall be designed to operate with saturated steam with a dryness value not less than 0.95, where the dryness value denotes the mass of the gas fraction in the mass of saturated steam.
- When the supplied steam is expanded to atmospheric pressure the superheat shall not exceed 25K.

The patented Steam Quality Monitor QM®-3 is an alternative procedure to the one described in EN285 that has been shown to give equivalent results to the method specified in this European Standard in order to demonstrate that the level of non-condensable gases contained in the steam will not prevent the attainment of sterilization conditions in any part of the sterilizer load and to avoid excess moisture carried in suspension that can cause damp loads, while too little cannot prevent the steam from becoming superheated during expansion into the sterilizer chamber.

Sensing Range	
Dryness Fraction	85 - 100%
Amount of Superheat Present	0 - 50° C 0 - 90° F
NCG Content	0 - 15%

Product Features

- Simple “Plug and Play” installation,
- Simultaneous steam dryness, superheat and non-condensables (NCGs) monitoring,
- Safe alternative to the traditional manual method of sampling steam,
- RS485 connection for data logging using regulation compliant device; results may be remotely monitored via MODBUS.



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Steam Quality Monitor – Steam QM®-3

Manual Versus Automatic

Until now steam quality measurement has been a time-intensive, unreliable and potentially unsafe process. Steam QM®-3 is not only more reliable and safer than manual testing, the unit is also portable, so it can be easily transported to multiple points on your steam line.

When you compare Steam QM®-3 to manual testing methods the choice is clear:

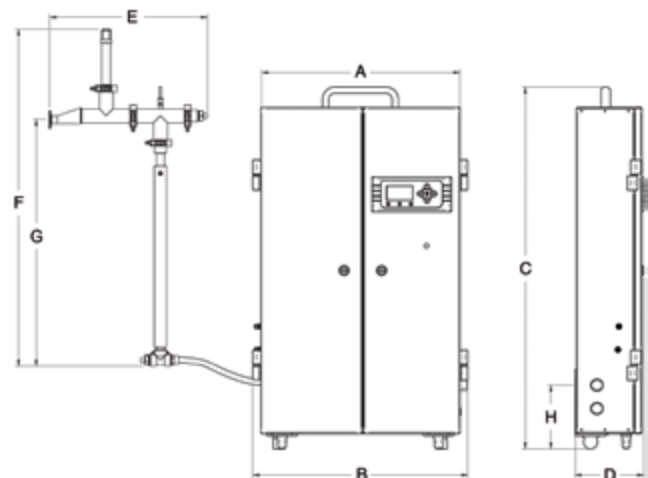
Manual Method	Automatic Method	
Description		
<ul style="list-style-type: none"> A sample of clean steam is condensed, and the enthalpy allows measurement of steam dryness, and NCG content. Temperature measurement before condensation identifies an excess of superheat temperature. 	<ul style="list-style-type: none"> Reducing steam pressure to atmosphere allows measurement of steam dryness. Steam temperature and pressure measurements detect superheat. Volume of non-condensable gases are compared to condensate. 	
Disadvantages		
<ul style="list-style-type: none"> Time Consuming: Typically manual steam quality measurement requires two people, and can take up to three hours per measurement point. This does not include additional time required to complete necessary reports. Trending: It is impossible to monitor a trend over a period of time. Unsafe: There are inherent safety risks involved in sampling live steam and condensate in a water receiver. Unreliable: Measurement results depend on the skill of the technician conducting the test. 	Advantages	
	<ul style="list-style-type: none"> Quick and Easy: Steam QM®-3 is simple to install. Trending: Continuous measurements provide trending data over time. Safe: Because Steam QM®-3 is installed while the steam valve is closed, it is much safer than manual measurement methods. Reliable: Steam QM®-3 is both reliable and accurate within +/- 1% of steam dryness. 	

Installation Qualification/Operational Qualification

Installation Qualification/Operational Qualification (IQ/OQ) procedures available to comply with government and international standards that recommend documented verification that your equipment is installed and functioning according to the manufacturer's specifications.

Specifications	
Steam Operating Pressure Range	0.5-4 barg 7-60 psig
Voltage	110/230 VAC
Cooling Water	15 l/h @ 10 °C (4 gph @ 50 °F)

Dimensions & Weight		
	in	mm
A – Cabinet Width	22	550
B – Width	24	600
C – Cabinet Height	40	1000
D – Depth	7.5	190
E – Width	17	430
F – Height	37	945
G - Height from inlet tee to bottom	26	660
H - Height from cabinet steam inlet to bottom	7.5	190
Cabinet Weight	42 lb	19 kg
Total Weight	55 lb	25 kg



Steam QM®-3 Package Includes:

Insulation Covers • Wall Mount • All Necessary Accessories

More Information:



Optional Feature:

Data Logger

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