Certificate

No.: 968/FSP 1064.05/26

Product tested	Quartz™ Valve Position Indicator/Sensor	**Certificate holder**	Valmet Flow Control Inc. 26271 US Hwy 59 56537 Fergus Falls, MN United States of America
Type designation	QX- and QN- Models (Details see Appendix of Certificate)		
Codes and standards	IEC 61508 Parts 1-7:2010		
Intended application	The Quartz™ Valve Position Indicator/Sensor can be used in a safety instrumented system (SIS) as sensor(s) to indicate the position of a valve assembly. Quartz™ Valve Position Indicator/Sensor (QX- and QN- Models) comply with the requirements up to SIL 3 acc. to IEC 61508 depending on the variant and configuration. The configuration and number of switches (HFT = 0 or 1) depend on the target safety level (SIL) and the evaluation of the signals in the safety controller. For further information see the appendix of the certificate. The variants of the Quartz Valve Position Indicator / Sensor can be used in safety related applications up to these safety levels according to IEC 61508 and IEC 61511-1 + Corr.1:2016 + AMD1:2017.		
Specific requirements	The instructions of the associated Installation, Maintenance and Operating Instructions and Safety Manual shall be considered.		

Valid until 2031-02-27

The issue of this certificate is based upon an examination, whose results are documented in Report No. 968/FSP 1064.05/25 dated 2026-02-26.
This certificate is valid only for products which are identical with the product tested.

Köln, 2026-02-27

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Safety function: **Sensing of the position of valves or actuators. The configuration and number of switches depend on the target safety level (SIL) up to SIL 2 (HFT = 0) and SIL 3 (HFT = 1) and the evaluation of the signals in the safety controller.**

Opening and closing position of the switches may be configured such that an open contact results to an action into the safe direction of the SIF.

Model Series	λ / 1/h	λ_s / 1/h	λ_d / 1/h	SFF
QX2J, QX4J, QX5J, QX7J QN2J, QN4J, QN5J, QN7J	9.93E-09	8.27E-09	1.66E-09	83,3%
QX2L, QX4L, QX5L, QX7L QN2L, QN4L, QN5L, QN7L	1.97E-08	1.23E-08	7.38E-09	62,4%
QX2P, QX4P, QX5P, QX7P QN2P, QN4P, QN5P, QN7P	9.93E-09	8.27E-09	1.66E-09	83,3%
QX4G, QN4G	9.93E-09	8.27E-09	1.66E-09	83,3%
QX4H, QN4H	9.93E-09	8.27E-09	1.66E-09	83,3%
QX4M, QN4M	9.93E-09	8.27E-09	1.66E-09	83,3%
QX4S, QN4S	1.97E-08	1.23E-08	7.38E-09	62,4%
QX4X, QX6X, QN4X, QN6X	1.60E-07	9.34E-08	6.62E-08	58,4%
QX2A, QX4A, QX5A, QX7A, QN2A, QN4A, QN5A, QN7A	2.97E-08	1.91E-08	1.07E-08	64,4%
QX2N, QX4N, QX5N, QX6N, QX7N QN2N, QN4N, QN5N, QN6N, QN7N	2.90E-08	2.21E-08	6.91E-09	76,2%
QN35, QX35	2.89E-07	1.86E-07	1.03E-07	64,24%
QN45, QX45	3,55E-07	2,43E-07	1,11E-07	68,6%

λ Total Failure Rate ($\lambda = \lambda_s + \lambda_d$)
λ_s Safe Failure Rate
λ_d Dangerous Failure Rate
Safe Failure Fraction SFF = λ_s / λ

Safety function: **Sensing of the position of valves or actuators with a target safety level (SIL) up to SIL 1 (HFT = 0).**

Opening and closing position of the switches may be configured such that an open contact results to an action into the safe direction of the SIF.

Model Series	λ [1/h]	λs [1/h]	λd [1/h]	SFF
QX2G, QX5G, QX7G QN2G, QN5G, QN7G	3.16E-08	1.39E-08	1.77E-08	43.87%
QX2H, QX5H, QX7H, QN2H, QN5H, QN7H	3.10E-08	1.33E-08	1.77E-08	42.89%
QX2M, QX5M, QX7M, QN2M, QN5M, QN7M	1.70E-08	9.80E-09	7.20E-09	57.66%
QX2S, QX5S, QX7S QN2S, QN5S, QN7S	5.39E-08	3.62E-08	1.77E-08	67.15%

λ Total Failure Rate ($\lambda = \lambda_s + \lambda_d$)
λ_s Safe Failure Rate
λ_d Dangerous Failure Rate
Safe Failure Fraction SFF = λ_s / λ

Safety function: **Sensing of the position of valves or actuators with a target safety level (SIL) up to SIL 3 (HFT = 1) and the evaluation of the signals in the safety controller.**

Opening and closing position of the switches may be configured such that an open contact results to an action into the safe direction of the SIF.

Model Series	λ [1/h]	λs [1/h]	λd [1/h]	λdd [1/h]	λdu [1/h]	SFF
QX2G, QX5G, QX7G QN2G, QN5G, QN7G	6.31E-08	2.36E-08	3.95E-08	3.94E-08	1.05E-10	99.83%
QX2H, QX5H, QX7H, QN2H, QN5H, QN7H	6.21E-08	2.28E-08	3.93E-08	3.91E-08	1.05E-10	99.90%
QX2M, QX5M, QX7M, QN2M, QN5M, QN7M	3.40E-08	2.28E-08	1.12E-08	1.12E-08	3.23E-11	99.83%
QX2S, QX5S, QX7S QN2S, QN5S, QN7S	1.03E-07	6.31E-08	3.95E-08	3.94E-08	1.05E-10	99.91%

λ Total Failure Rate ($\lambda = \lambda_s + \lambda_d$)
λ_s Safe Failure Rate
λ_d Dangerous Failure Rate
λ_{dd} Dangerous Detected Failure Rate
λ_{du} Dangerous Undetected Failure Rate
Safe Failure Fraction SFF = λ_s / λ

Safety function: **Sensing of the position of valves or actuators and translating it into a 4-20mA value. Certified up to SIL 2, see note below.**

Diagnostic measures: For the calculation of the safety related reliability data it is assumed that the safety controller has to perform the following diagnostic measures:
In case the current <3mA or >21mA the safety controller has to perform a safety related action.

Mode Series	λ 1/h	λ_S / 1/h	λ_d / 1/h	λ_{dd} / 1/h	λ_{du} / 1/h	SFF
QN5O, QX5O	1,36E-07	2,84E-08	1,07E-07	7,03E-08	3,69E-08	72,8 %
QN7O, QX7O	1,31E-07	2,84E-08	1,03E-07	6,65E-08	3,64E-08	72,3 %

λ total failure rate
λ_d Current deviates more than 20% from the “real” value (valve Position)
λ_s Current deviates less than 20% from the “real” value (valve Position)
λ_{dd} Current is <3mA or >21mA
λ_{du} Current deviates more than 20% from the “real” value (valve Position), but is still within 3 to 21mA
Safe Failure Fraction SFF = $(\lambda - \lambda_{du}) / \lambda$

Note: The models listed in the table above are not available in a redundant configuration. Due to this fact the hardware fault tolerance is 0 (HFT=0) and considering the achieved SFF, which is smaller than 90%, the devices fulfil the requirements for the hardware integrity up to SIL 2 of IEC 61511-1, table 6 and IEC61508-2, table 2.

Safety function: **Sensing of the position of valves or actuators and translating it into a 0-10kOhm resistance value. Certified up to SIL 2, see note below.**

Diagnostic measures: For the calculation of the safety related reliability data it is assumed that the safety controller has to perform the following diagnostic measures:
In case the resistance is > 11kOhm the safety controller has to perform a safety related action.

Model Series	λ 1/h	λ_S / 1/h	λ_d / 1/h	λ_{dd} / 1/h	λ_{du} / 1/h	SFF
QNBO, QXBO	3,80E-08	3,50E-09	3,45E-08	3,04E-08	4,10E-09	89,2%
QNCO, QXCO	3,37E-08	3,07E-09	3,06E-08	2,70E-08	3,67E-09	89,1%

λ total failure rate
λ_d Resistance deviates more than 20% from the “real” value (valve Position)
λ_s Resistance deviates less than 20% from the “real” value (valve Position)
λ_{dd} Resistance is >11kOhm
λ_{du} Resistance deviates more than 20% from the “real” value (valve Position), but is still below 11kOhm

Safe Failure Fraction SFF = $(\lambda - \lambda_{du}) / \lambda$

Note: The models listed in the table above are not available in a redundant configuration. Due to this fact the hardware fault tolerance is 0 (HFT=0) and considering the achieved SFF, which is smaller than 90%, the devices fulfil the requirements for the hardware integrity up to SIL 2 of IEC 61511-1, table 6 and IEC61508-2, table 2.