Stonel™ Hawkeye™ valve position sensor
V 2.0

Safety Manual

11/2022

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1. General information

The Stonel™ Hawkeye™ series valve position sensor is used to indicate the position of a valve assembly. This device is typically used as a safety component that provides a signal output of valve position. The end user can use this information in different ways depending on the SIF or sensory input that is being instrumented.

Hawkeye™ series valve position sensor can be used in a multitude of sensor input configurations and any sub classification depending on the model and SIF being implemented for the desired Safety Function and SIL level.

The valve position can be indicated using one of the defined outputs (conventional switching or NAMUR output according to EN 60947-5-6). The Hawkeye sensors provide input feedback of the valve to the safety system. End user must follow all guidance identified in the Installation, Maintenance and Operating Instructions (later referred as IMO) with this safety manual to verify the products proper installation and operation of the product product.

2. Structure of valve position indicator

2.1. System components and description of use

See the IMO for the detailed technical description of the device and the system architecture.

2.2. Permitted device types

The information in this manual pertaining to functional safety applies to all device variants mentioned in the device type coding below. It is up to the end-user to verify that the correct model is selected for the intended function and the SIF.

2.3. Supplementary device documentation

Related QX/QN Installation, Maintenance and Operating Instructions listing

IMO	Applicable models	Type	Description
105005	Hawkeye HK30, HK31	Limit switch	2 wire solid state SST Sensor
105005	Hawkeye HK40	Limit switch	Namur sensor for intrinsically safe applications
105348	Hawkeye HX35	Limit switch	2 wire solid state SST Sensor
105348	Hawkeye HX45	Limit switch	Namur sensor for intrinsically safe applications

Table 1

These are available from our Stonel product center or for download from https://www.neles.com/stonel/downloadables/

3. Description of safety requirements

3.1. Safety function

Limit switch models: The function of the device is to provide contact inputs to the safety system that relates the position of the measured actuator / valve. Sensors can be used in conjunction to verify valve position. In order to acheive the desired SIL safety level, redundant contacts/switches may be needed.

3.2. Restrictions for use in safety-related applications

Please ensure that the valve position sensor is used correctly for the application in question and that the ambient conditions are taken into account. The instructions for installation conditions, as detailed in the IMO, shall be observed. The specifications in the IMO shall not be exceeded.

3.3. Functional safety indicators

The table below shows the specific values for functional safety.

Model Series	Type	λ / 1/h	λ_s / 1/h	λ_d / 1/h	λ_{du} / 1/h	SFF
HK30 / HK31	A	1.37E-07	8.19E-08	5.48E-08	5.48E-08	60%
HK40	A	1.01E-07	6.73E-08	3.39E-08	3.39E-08	66%
HX35	A	1.12E-07	6.99E-08	4.20E-08	4.20E-08	62%
HX45	A	1.77E-07	1.22E-07	5.56E-08	5.56E-08	69%

Table 2

λ = Total Failure Rate (λ = λs + λd)
λs = Safe Failure Rate
λd = Dangerous Failure Rate
λdu = Dangerous Undetected Failure Rate
SFF = Safe Failure Fraction (%)

Limit switch models: The failure rates assume that idle current principle has been applied. The switch must be chosen such that an open switch must result in an action which performs the safety function. In normal operation (no safety demand) the switch is closed and a current, sourced by the controller, flows through the switch (idle current). If the current flow is interrupted, due to switch or line break etc., the safety function will be performed.

The achievable SFF of the Hawkeye sensor assembly depends on the configuration and number of the switches and the evaluation of the signals from the Hawkeye in the connected safety controller.

4. Installation

4.4.1. Hardware fault tolerance

The hardware fault tolerance of the standalone installation is HFT=0. If hardware fault tolerance of >= 1 is required, then a redundant configuration of the limit switch installation shall be used.

4.4.2. Installation and commissioning

The installation and commissioning/calibration of the device must be done by qualified technician, according to the IMO. It is important that the mechanical connection to the valve/actuator is installed correctly and securely by a qualified technician. Every parameter related to the device type in question and mentioned in the IMO needs to be checked and compared against the device settings. If any deviations exist the safety of the installation cannot be guaranteed.

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4.4.3. Orientation

Orientation of the device is described in the IMO.

4.5. Operation

See IMO for the operation of the device.
Limit switch models: The sensors are triggered by targets attached to the stem of the valve. They are positioned in such a manner that ensures that the switch points are repeatable and consistent over the full temperature range, even in high vibration environments.

4.6. Maintenance

See the IMO for maintenance instructions.

During maintenance work on the device, alternative safety function methods shall be taken to ensure process safety. This device should be considered in all SIF proof tests.

5. Repair

Any repair to the device shall be carried out under guidance by the manufacturer. Device failures must be reported to the manufacturer. The user shall provide a detailed report to the manufacturer describing the failure and any possible effects.

6. HX/HK Certificate

Certificate

No.: 968/FSP 2194.00/21

Product tested	Hawkeye™ Valve Position Monitors	**Certificate holder**	Neles USA Inc. dba StoneL 26271 US Highway 59 Fergus Falls, MN 56537 USA
Type designation	HX / HK (Details see Revision List)		
Codes and standards	IEC 61508 Parts 1-7:2010		
Intended application	The Hawkeye™ valve position monitors can be used in a safety instrumented system (SIS) as sensor(s) to indicate the position of a valve assembly. The sensors fulfill the requirements of SIL 2, SC 3 according to IEC 61508 and can be used in applications as such. The product was also reviewed in reference to the requirements of IEC 61511-1:2016 + Corr.1:2016 + AMD1:2017 applicable during a type examination and can be used in application as such.		
Specific requirements	The instructions of the associated Installation, Maintenance and Operating Instructions and Safety Manual shall be considered.		

Valid until 2026-02-11

The issue of this certificate is based upon an examination, whose results are documented in Report No. 968/FSP 2194.00/21 dated 2021-02-08.
This certificate is valid only for products which are identical with the product tested.

TÜV Rheinland Industrie Service GmbH
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Certification Body Safety & Security for Automation & Grid

Köln, 2021-02-11

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