General Specifications

Cavitation Detection Software

GS 30B10A10-01EN

■ OVERVIEW

This product is cavitation detection software that runs on STARDOM. For cavitation detection, STARDOM and EJX110A are used in combination. This product includes detection function, display function, setting function, and installs and sets operation for STARDOM and DPharp EJX.

Features of this product contributes to efficient operation and maintenance of the plant by detecting and making "cavitation" visible which is one of "production obstacles" that hinders plant operation from the information of the field device. For detection of cavitation, phenomena such as vibration of equipment and abnormal sound generated by the occurrence of cavitation is generally used. On the other hand, this product uses the pressure information of the field device, so cavitation can be detected earlier.

■ FUNCTIONAL SPECIFICATIONS

● Definition of Cavitation Strength

The detection target is the cavitation generated by the pump. Cavitation is a phenomenon in which air bubbles are appeared/disappeared from the liquid phase due to sudden depressurization and pressurization in the liquid phase. As bubbles disappear, large energy is generated. If this bubble disappears at the impeller part of the pump, large energy will damage the impeller and lead to breakdown of the pump (erosion phenomenon).

Cavitation Strength	Bubble generation state
Normal	Bubbles are not generated
Cavitation (small)	Bubbles are continuously generated
Cavitation (large)	Bubbles are continuously and intensely generated

● System Configuration

The minimum system configuration of cavitation detection system is shown.
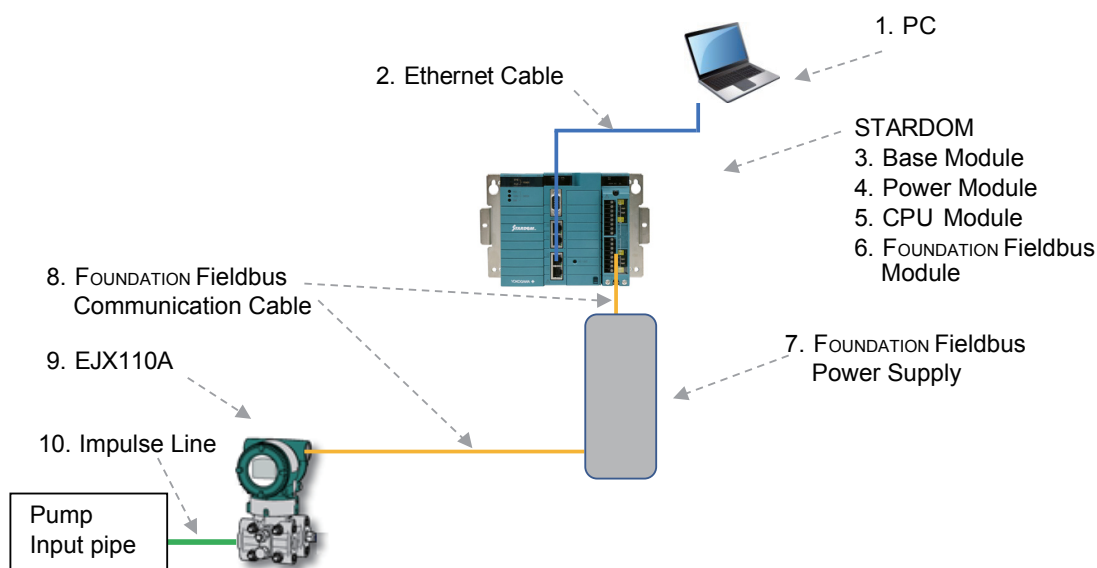
Note: It depends on the specification of STARDOM.

Figure System Configuration

#	Product	Quantity	Remark
1	PC	1	For monitoring screen and maintenance screen
2	Ethernet cable	1	
3	STARDOM base module: N2BU030	1	
4	STARDOM power supply module: NFPW441/NFPW442/NFPW444	1	
5	STARDOM CPU module: NFCP501-W**/NFCP502-W**	1	
6	STARDOM FOUNDATION Fieldbus communication module: NFLF111	1	
7	FOUNDATION Fieldbus power supply	1	It deoends on specifications of FOUNDATION Fieldbus.
8	FOUNDATION Fieldbus communication cable	2	It depends on specifications of FOUNDATION Fieldbus.
9	Differential Pressure Transmitter with Fieldbus communication type: EJX110A-F****-*1***/EE/DG1	1	Capsules and process connectors depends on process specifications. Device Revision 5 of EJX110A is necessary.
10	Impulse Line	1	

Note: STARDOM and EJX 110A need to be arranged separately.
Note: Supports up to 4 pumps per controller.
Note: When using multiple controllers, please prepare licenses for the number of controllers.

● Cavitation Detection Conditions

Cavitation detection conditions are as shown in the table below. Even when the detection conditions in the table below are satisfied, disturbance and other factors may affect detection, so it does not guarantee perfect detection.

Item	Description
Fluid	Liquid
Fluid Temperature	2 to 50 °C No sudden temperature change shall occur.
Viscosity	0.78 to 8 mPa•s The viscosity of the liquid is uniform and there is no temporal change.
Pump	Centrifugal Pump The number of revolutions of the pump must be constant. (Do not control flow rate by inverter etc.)

● Screen

This cavitation detedtion software provides a monitoring screen and a maintenance screen to be displayed on the PC browser. The Cavitation Monitoring screen is shown.

Figure Cavitation Monitoring screen

Item	Description
Pump tag	Displays the tag name of the pumps.
Field device tag	Displays the tag name of the field devices.
Current operating state	Displays the current pump operation status (Run/Stop). When the pressure change amount at the pump inlet exceeds the threshold value, it is determed to be in run. The threshold can be changed. It can be set to run / stop manually.
Pump running time	Displays the operation time of the pump after maintenance. Displays the time the "Current operating state" is in "Run" in seconds.
Accumulated pump running time	Displays the accumulated running time of the pump since this software was in operation. Displays the time the "Current operating state" is in "Run" in seconds.
Last maintenance date	Displays the date when the pump was stopped at maintenance and the "Pump running time" was reset.
Field device status	Displays the status of the field device used by this software. Good or Bad is displayed according to FOUNDATION fieldbus device status.
Result	As cavitation result, either "Normal", "Small", "Large", "Unknown", or "Non-judgment" will be displayed. Normal: No cavitation Small: Small cavitation Large: Large cavitation Unknown: If the FOUNDATION fieldbus device status is Bad Non-judgment: If cavitation level index not set
Machine learning (Future extensions)	-
Accumulated time of small cavitation	Displays the time in a small cavitation state.
Accumulated time of large cavitation	Displays the time in a large cavitation state.
Accumulated time of cavitation	Displays accumulated time of cavitation (small) and (large).
Current cavitation level index	Displays the current cavitation index.
Baseline of cavitation lebel index	Displays the baseline of cavitation level index when baseline determination operation is performed.
Threshold of small cavitation (Hysteresis 5%)	Displays the threshold of small cavitation.
Threshold of large cavitation (Hysteresis 5%)	Displays the threshold of large cavitation.
License expiration month	Displays the expiration date of the license.

The Cavitation Maintenance screen is shown. In order to prevent erroneous operation, operate all settings related information from the maintenance screen.

Figure Cavitation Maintenance screen

Item	Description
Pump tag	Enter the tag name of the pump. The tag name is a maximum of 16 characters consisting of alphanumeric characters and hyphens.
Pump running time	Reset the running time.
Setting of pump accumulated running time [h]	Set the accumulated running time.
Accumulated small cavitation reset	Rest the accumulated time of small cavitation.
Accumulated large cavitation reset	Rest the accumulated time of large cavitation.
Setting of pump operating status	Set the operating state of the pump. Automatic detection: It automatically detects the operation state (operation / stop) of the pump. When the pressure variation of the pump exceeds "threshold of pump automatic detection", the pump is detected as being in the "Run" state. Run: Set the pump state to "Run" manually. Stop: Set the pump state to "Stop" manually.
Threshold of pump automatic detection [%]	This is the threshold value of the pressure variation of the pump when the operation status of the pump is automatically detected. When it exceeds the threshold, the pump is detected as being in the "Run" state. The setting range is 0.0000 to 1000.0000 %, default is 0.4 %. It can enter up to four decimal places (example 2.0000).
Section of calculation [s]	It is the calculation section of the cavitation lebel index. The setting range is 1 to 100 seconds, default is 2 seconds. Adjust when the cavitation lebel index is small and you feel a difference between pump status and result.
Section of moving average for cavitation [s]	It is use when adjusting the section where moving average processing is performed after calculation of cavitation index. The setting range is 1 to 100 seconds, default is 10 seconds.
Current cavitation level index	Displays the current cavitation lebel index.
Setting of pump status	Set the state of the pump when determining the baseline of the cavitation lebel index.
Set of baseline with pump status for cavitation judgement	Set the current value of the cavitation label index to the baseline.
Setting of small cavitation threshold	Set this when you want to adjust the small cavitation threshold manually.
Setting of large cavitation threshold	Set this when you want to adjust the large cavitation threshold manually.
Necessary field device parameters	Set the parameter value in the field device. For the setting parameter value, refer to IM (IM 30B10A10-01EN).

■ STYLES OF SOFTWARE SUPPLY

When purchasing this product, a license sheet will be provided that describes the license code to operate and the method of obtaining the software. Follow the instructions on this license sheet to obtain the license code and software.

■ MODEL AND SUFFIX CODE

		Description
Model	PA1CAV00	Cavitation Detection Software
Suffix Codes	-L	License
	1	Always 1
	0	Japanese
	1	English

The cavitation detection software license is valid for one year. Purchase it every year for continued use.

■ DOCUMENT

- Differential Pressure Transmitter (EJX110A), GS 01C25B01-01EN
- Model EJX Series FOUNDATION Fieldbus Communication, GS 01C25T02-01EN
- STARDOM Overview, GS 34P02A01-02E
- STARDOM Outline, TI 34P02A11-01E
- Cavitation Detection System Installation Guide, TI 30B10A10-01EN

■ TRADEMARK

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