Reliability Creativity Service	Product Specifications	FZ01-340E1	1/7
	For Sodium Hypochlorite / Sodium Hydroxide Solutions Compact Electromagnetic Flow Sensor	Model	VNS□□RF VNS□□RE

1. Specifications

Measure-ment mode	Model		VNS05R□	VNS10R□	VNS20R□
Pulsation flow measurement mode	Nominal diameter		5mm	10mm	20mm
	Accuracy guaranteed flow-rate range		0.01 to 1 L/min	0.1 to 10 L/min	0.6 to 60 L/min
	Applicable pump		Electromagnetic (solenoid) diaphragm constant volume pump only		
	Accuracy (at fluid temperature 25°C)	Frequency pulse	±5.0%RD: 20 to 100% of the maximum accuracy guaranteed flow rate ±1.0%F.S.: 5 to 20% of the maximum accuracy guaranteed flow rate		
Constant flow measurement mode	Accuracy guaranteed flow-rate range		0.05 to 1 L/min	0.5 to 10 L/min	3.0 to 60 L/min
	Low flow cutoff (standard)		0.025 L/min	0.25 L/min	1.5 L/min
	Accuracy (at fluid temperature 25°C)	Frequency pulse	±2.5%RD: 20 to 100% of the maximum accuracy guaranteed flow-rate ±0.5%F.S.: 5 to 20% of the maximum accuracy guaranteed flow-rate		
		Unit pulse	±2.0%RD: 20 to 100% of the maximum accuracy guaranteed flow-rate ±0.4%F.S.: 5 to 20% of the maximum accuracy guaranteed flow-rate		
Specifications common to the both modes	Repeat accuracy		±2.0%F.S.: 3σ under the following conditions (Output deviation per sec, response 2 sec, frequency pulse)		
	Temperature characteristics		±2.0%RD: 20 to 100% of the maximum accuracy guaranteed flow-rate ±0.4%F.S.: 5 to 20% of the maximum accuracy guaranteed flow-rate		
	Conductivity characteristics		±1.5%RD: 20 to 100% of the maximum accuracy guaranteed flow-rate ±0.3%F.S.: 5 to 20% of the maximum accuracy guaranteed flow-rate		
	Fluid to be measured		VNS□□RF: Sodium hypochlorite solution"concentration 1 to 12%" VNS□□RE: Sodium hydroxide solution"concentration 10 to 25%”		
	Fluid conductivity range		14mS/cm or higher		
	Fluid temperature range		0 to +40°C (No freezing)		
	Working ambient temperature/humidity range		-20 to +60°C 35 to 85%RH (No dew condensation)		
	Storage ambient temperature range		-20 to +70°C		
	Maximum working pressure		1MPa		
	Pressure drop (the maximum accuracy guaranteed flow-rate)		20kPa or less		
	Output specifications	Pulse output (Output 1 and 2must be specified.)	NPN open collector pulse Maximum load : Output 1: 28VDC 20mA Output 2: 30VDC 20mA ON-time residue voltage: 1V		
		ASSP serial communication (Since this is the calculation/communication method used when ASI-200 is connected, it is not necessary to specify Output 1 and 2.)	ON-time resistance: 200Ω or less, OFF-time resistance: 100kΩ or more Cable length: 10m or less (AWG28)		

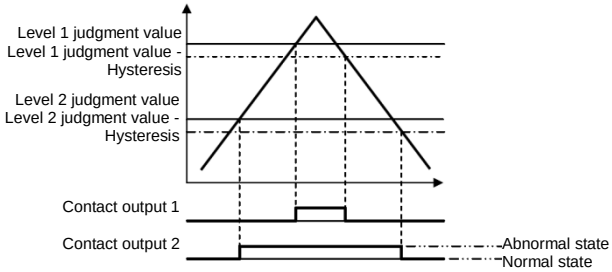
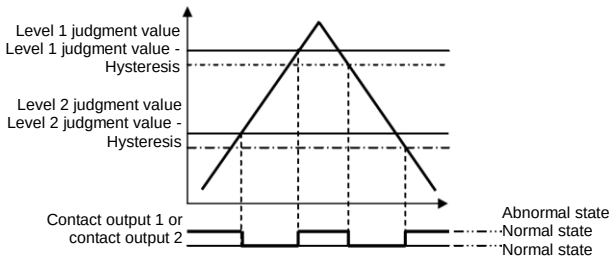
Model				VNS05R□	VNS10R□	VNS20R□
Output 1 *2	High-density pulse *1	Duty ratio : 50%		Standard 200.0Hz (Adjustable at factory from 20 to 400Hz in 0.1Hz steps) Note: When ASI-100 or ASI-200 is connected, 200.0Hz is recommended for Output 1.		
	Unit pulse			0.001L/P (standard)	0.01L/P (standard)	0.1L/P (standard)
	Alarm *3			Select from Normal Open (standard) and Normal Close. Alarm can be set at factory for each of "Excitation Error/Memory Error/ Low power supply voltage /No water/Excessive Fluid Noise/ Reverse Flow/Excessive Flow."		
	Switch *4			Select from Normal Open (standard) and Normal Close. Level judgment value: Adjustable at factory from 0 to 100% of the maximum accuracy guaranteed flow rate in 1% steps		
Output 2 *2	Unit pulse			Same as Output 1		
	Alarm *3			Same as Output 1 Note: When ASI-100 or ASI-200 is connected, Alarm is recommended for Output 2.		
	Switch *4			Same as Output 1		
Response-ability				63% response Dumping time: 2 seconds (standard) Adjustable at factory from 0.1 to 600 seconds in 0.1second steps.		
Cable	Basic specifications			Cable length: 500mm, 4-core AWG26, outer diameter Φ4.2, shielded		
	Terminal processing			Coating is peeled off and core wires are twisted.		
	Wiring	ASI-200		Red: Power supply+ Blue: GND White: Sending line Yellow: Receiving line		
		ASI-100 or General receiver		Red: Power supply+ Blue: GND White: Output 1 Yellow: Output 2		
LED display				Single LED On the flowsensor, bicolor LED(green/red) Green: Indicates the flow rate by three blinking speeds Red: Indicates the error status by the number of blinks		
Standard installation position				The position that the LED surface is parallel or perpendicular (from bottom to top) to the ground. (No air shall be in the fluid)		
Flow direction				Arrow direction indicated on the product		
Pipe connection				Socket-shape union joint 16A		Socket-shape union joint 20A
Protection grade				Indoor specification (equivalent to IP64)		
Power supply				24V DC±10% It is recommended to supply power from an isolated power supply and connect a separate power supply to each VNS. In the pulsation flow measurement mode, the power supply FG terminal is recommended to be grounded (Class D or higher).		
Current consumption				60mA DC or less		
Weight				Approximately 200g	Approximately 200g	Approximately 300g

Model			VNS05R☐		VNS10R☐		VNS20R☐	
Main materials (Circled parts are wetted.) *5		Top and bottom Covers	PPS					
	○	Main body casing	PEEK					
	○	Socket-shape union joint	PVC					
	Detailed model		VNS05RF	VNS05RE	VNS10RF	VNS10RE	VNS20RF	VNS20RE
	○	Electrode	Titanium (2 types)	Hastelloy C22 (or equivalent)	Titanium (2 types)	Hastelloy C22 (or equivalent)	Titanium (2 types)	Hastelloy C22 (or equivalent)
	○	Grounding ring	Titanium (2 types)	Hastelloy C22 (or equivalent)	Titanium (2 types)	Hastelloy C22 (or equivalent)	Titanium (2 types)	Hastelloy C22 (or equivalent)
	○	O-ring	FKM	EPDM	FKM	EPDM	FKM	EPDM
Others			CE Marking product , UKCA Marking product , RoHS directive compliant					

2. Selection Sheet

* Check☑ of each item to select or enter a value as necessary.

Model	☐ VNS05RF ☐ VNS05RE	☐ VNS10RF ☐ VNS10RE	☐ VNS20RF ☐ VNS20RE
Measurement mode	☐Pulsation flow measurement mode: The applicable pump is electromagnetic (solenoid) diaphragm constant volume pump only. Use it with the stroke length 100% * the pulsation flow measurement mode setting is “Output 1: Frequency pulse and Output 2: Alarm. ☐Constant flow measurement mode: Other than electromagnetic (solenoid) diaphragm constant volume pump * The flow rate of the in-fluid valve less pump is too low to measure by VNS. In addition, some pulsation pumps are not applicable for measurement by VNS. Check the manufacturer and model of the pump and consult us.		
Flow direction	☐Forward flow ☐Forward/reverse flow (Reverse flow: Accuracy not guaranteed): Contact us for details.		
Low flow cutoff (In case flow-rate is lower than the specified flow-rate, it is calculated as 0.)	☐ Yes (standard): 2.5%F.S. ☐No For “Yes”: VNS05R: 0.025 L/min, VNS10R: 0.25 L/min, VNS20R: 1.5 L/min		
Dumping (Enter the number of seconds.)	sec Choose from 0.1 to 600 seconds (standard: 2 seconds) ★ Enter a value in 0.1second steps.		
Output specifications	☐Pulse output ☐ASSP serial communication (Calculation/communication method used when ASI-200 is connected) * When ASSP serial communication is selected, it is not necessary to specify Output 1 and 2.		

Output 1 *2	Output format	☐Normal Open (N.O.: Standard) ☐Normal Close (N.C.)	
	Output type Choose one of the options. * Standard is frequency pulse.	☐ Frequency pulse*1 * In case of use with ASI-100orASI-200, 200.0Hz of frequency pulse is recommended.	Hz 20.0 to 400.0Hz(Standard: 200.0Hz) ★The frequency is selectable by 0.1Hz steps.
		☐Unit pulse	・VNS05R: ☐0.001L/P(Standard) ☐0.01L/P ☐0.1L/P ・VNS10R: ☐0.01L/P(Standard) ☐0.1L/P ☐1L/P ・VNS20R: ☐0.1L/P(Standard) ☐1L/P ☐10L/P
		☐Alarm*3	For each alert judgment item, the state is normal if nothing is detected and abnormal if any item is detected. Choose items to trigger alerts in 2-1. Alarm Judgment Items below. * In case Alarm is selected for Output 1, choose other than Alarm for Output 2.
		☐ Switch level judgment *4	 This is to judge as normal condition when flow-rate is not more than the set Level1 Judgment Value and as abnormal condition when flow-rate is above the set Level 1 Judgment Value. →Enter the level judgment values in 2-2.Level Judgment Values.
		☐Switch window judgment*4	 This is to detect whether flow-rate is within the set upper limit and the set lower limit or falls outside of the range, and to judge as normal condition when flow-rate is not more than the set upper limit and not less than the set and as abnormal condition when flow-rate or falls outside of the range. Setting of the upper limit value and the lower limit value can be with either of Level 1 Judgment Value and Level 2Judgment Value. →Enter the level judgment values in 2-2.Level Judgment Values.

Output 2 *2	Output format	☐Normal Open (N.O.: Standard) ☐Normal Close (N.C.)	
	Output type Choose one of the options. * Standard is Alert.	☐Alarm*3 *In case of use with ASI-100 or ASI-200, Alarm is recommended.	Same as Output 1
		☐Unit pulse	Same as Output 1
		☐Switch Level Judgment Values*4	Same as Output 1
		☐Switch window judgment*4	Same as Output 1

2-1. Alert Judgment Items *6

Excitation Error detection	“Output” only for both LED operation and switch output	
Memory Error detection	“Output” only for both LED operation and switch output	
Low power voltage detection	“Output” only for both LED operation and switch output	
No-water detection	LED operation	☐Active (Standard) ☐Inactive
	Switch output	☐Active (Standard) ☐Inactive
Excessive fluid noise detection	LED operation	☐Active (Standard) ☐Inactive
	Switch output	☐Active (Standard) ☐Inactive
Reverse Flow detection	LED operation	☐Active (Standard) ☐Inactive
	Switch output	☐Active (Standard) ☐Inactive
Excessive Flow Rate detection	LED operation	☐Active (Standard) ☐Inactive
	Switch output	☐Active (Standard) ☐Inactive

2-2. Level Judgment Value *7

Level 1 judgment value	%	0 to 100% (Standard: 50%) ★ This is selectable by 1% steps.
Level 2 judgment value	%	0 to 100% (Standard: 30%) ★ This is selectable by 1%steps.
Hysteresis	%	0 to 9% (Standard: 3%) ★ This is selectable by 1% steps.

*1: Indicates the frequency at the maximum accuracy guaranteed flow-rate.
*2: Output 1 and 2 values and selected items are fixed at factory and cannot be changed after installation.
*3: Alarm can be selected for either Output 1 or Output 2 only.
*4: Window judgment is calculated and output by using the set values for Output 1 and 2.
*5: Material symbols

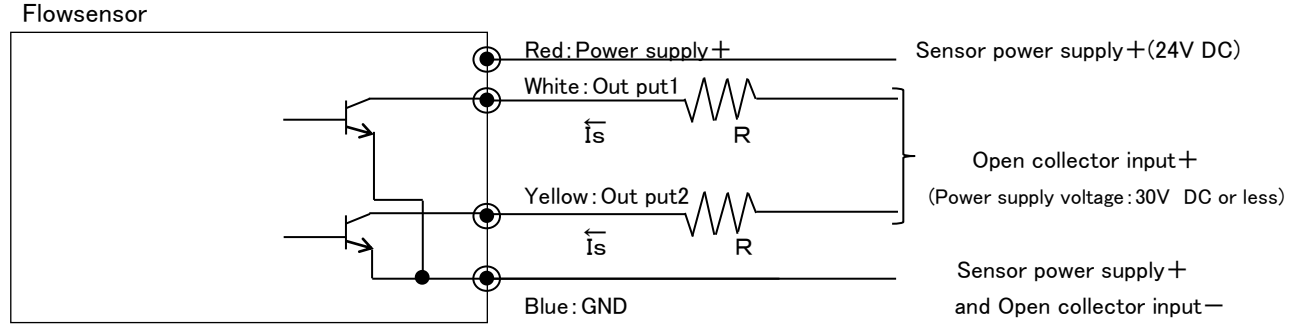
PPS	Polyphenylene Sulfide
PEEK	Poly Ether Ether ketone
PVC	Polyvinyl chloride
Ti	Titanium
FKM	Fluoro Rubber
EPDM	Ethylene Propylene Rubber

*6: Description of Alert items

Excitation Error detection ……	When current does not flow through the excitation coil correctly
Memory Error detection……	When a memory data error has occurred
Power Supply Low Battery detection…	When the power supply voltage has gone lower
Dry detection ……	When the flow sensor is not full of fluid to be measured
Excessive Fluid Noise detection……	When correct flow measurement is not possible because abnormal current is flowing through the fluid to be measured, air is in the fluid, etc.
Reverse Flow detection……	When the fluid is flowing in the direction opposite to the arrow on the flow sensor
Excessive Flow detection ……	When the flow rate exceeds 125% of the upper limit of the accuracy guaranteed flow rate

*7: The maximum flow-rate of the accuracy guaranteed flow-rate range is 100%.

3.Wiring technique



Please set the sink current for open collector output of output 1and output 2 to 20mA or less.
(Recommended resistor is 10kΩ～20kΩ.)

$$\text{Is(Output sink current:mA)} = \frac{\text{V(Power supply voltage:Volt)}}{\text{R(Pull-up resistor:k}\Omega\text{)}} \leqq 20\text{mA}$$

4. Precautions for handling

Before handling the product, be sure to read the handling manual carefully. And, use the product correctly.

4-1. Working environment, fluid to be measured

(1)Ensure that the wetted parts' materials have corrosion resistance against fluid to be measured.
(2)The product cannot be used for non-conducting fluid such as purified water, oil, etc.
(3)Flowing of electric current in the fluid to be measured may leads to incorrect operation.
(4) Keep the product away from a strong magnetic field or a source of electric noise.
(5)The product is not explosion-proof specification. Do not use the product in an explosive atmosphere such as flammable gas, etc.
(6)Avoid installation at a place exposed to direct sunlight and/or rain (Indoor specification).

4-2. Precautions for piping

(1)In case of parallel installation of plural pieces of the product, to decrease wavering of flow detection by electromagnetic interference, distance each of them 20cm or more.
(2)No air shall be in the fluid to be measured. The measurement accuracy is to be affected.
Do not install the product at a place where air accumulation can easily occur (e.g. upstream side of a falling pipe. Also, before start measurement, remove air sufficiently.
(3)For the installation position of the flowsensor, to avoid influence of air bubbles, dust, dirt, etc., the orientation that makes the flow direction be from bottom to top is recommended.
(4)Devices such as a flow-rate adjusting valve, etc., which disturb flow shall be installed in the downstream of the flowsensor.
(5)Avoid installing the product where it is exposed to excessive pressure, such as water hummer, etc.
(6)In case foreign substances, oil, etc., exist in the piping, install the flowsensor after cleaning inside of the pipe.
(7)Make sure to align the flow direction of the fluid with the flow direction indicated by the arrow on the main body.
(8)Provide straight pipe portion of 5D or more at the upstream and 3D or more at the downstream of the flowsensor.
(9)Around the place of installation, provide enough space for maintenance.

4-3.Wiring

(1)For a power supply and a remote counter, it is recommended to electrically isolate them from others.