MODEL KSV FOR CONDUCTIVE MEDIUM

Features

- Ignores heavy conductive build up
- Single probe/Mechanically strong

General Description

The KSV series of capacitance sensors are made specifically for point level detection of conductive medium. Applications include water, chemical solutions, acid based slurries, conductive granules, and sticky liquids.

Build up is one of the most common problems for capacitance sensors. Conventional Radio Frequency sensors solve this problem by using a guard probes (the second or third element to the electrode). But this complicated probe construction tends to make probes easily broken, particularly if twisted in agitated containers. Consequently, conventional RF sensors are installed vertically and limited to a fixed length, foamed in one piece.

The KSV series have overcome this limitation by using the series resonance circuit and a single electrode. This circuit corrects for conductive build up by measuring its resistance. The single electrode can be mounted in virtually any position and is available with a number of standard mountings.

Operational Description

The electrode of the KSV is a part of the oscillation circuit. When the electrode is in the free air, the oscillation is stopped. When it is in medium, the oscillation is restored by measuring capacitance of medium and the relay is energized.

Applications

- Liquids (except for oil): Water, Caustic soda, Hydrochloric acid, nitric acid, Sulfuric acid, etc.
- Sticky conductive medium: Drainage, Dehydrated cake, Night soil, Sewage, Sludge, Slurry, etc.

Ignores Heavy Conductive Buildup

The characteristics of the KSV circuit are defined by:

① $\omega b > \omega c$: Oscillation stops (The electrode is in the air.)

② $\omega b < \omega c$: Oscillation starts (The electrode is in the medium.)

③ $\omega b = 1/(C+\Delta C) \cdot R$

ωb: Frequency when the electrode is coated or covered by the medium.

ωc: Adjusted frequency when the electrode is in the air.

C : The stray capacitance of the electrode.

ΔC: The capacitance of the medium.

R : Resistance of the medium.

When a conductive resistance builds up forms on the electrode, ωb increases as R falls (③). This means $\omega b > \omega c$ so that oscillation cannot start (①).

When actual medium level is covering the electrode, ωb decreases by taking in ΔC(③). This means $\omega b < \omega c$ so that oscillation starts and the relay energizes.

In this way, by taking resistance of conductive build up and canceling capacitance of that, the KSV prevents false relay trips.

Value of capacitance and resistance of sensitivity are shown on Table 1.

Table 1

Sensitivity	Capacitance	Resistance
H	5 to 60PF	1.5kΩ or more
L	90 to 180PF	800Ω or more

Ordering Information

KSV	For universal application												
	2	Standard											
	3	Heavy duty											
	5	Flat probe											
	6	Wire extension											
	9	High sensitivity											
		N	Plug mounting										
		F	Flange mounting										
			T	with heat radiation fin									
			P	FEP tubing (for 2F only)									
			PT	FEP tubing with heat radiation fin (for 2F only)									
			A	Foam detection									
				H	New Housing								
					0	Flat-face flange							
					1	Raised-face flange							
					4	Plug mounting							
						J	JIS flange						
						A	ANSI flange						
						D	DIN flange						
						G	G plug						
						R	R plug						
						T	NPT plug						
							S	304 stainless steel					
							S6	316 stainless steel					
								F	Insulator, PTFE for 2, 3, 9, and PE for 5, 6.				
								C	Ceramic insulator for high temp.				
									0	Viton shield			
									1	Thermiculite shield			
									2	Kalrez shield			
									3	Perfluore shield			
										▪▪▪▪	Specify the probe length		
											0	100/200V AC	
											1	110/220V AC	
											2	120/240V AC	
											3	24V DC	
												0	G1/2
												3	with NPT 3/4" socket

KSV	2	N		H	4	R	S	F	0	250	4	0	= KSV-2NH-4RSF0-250-40

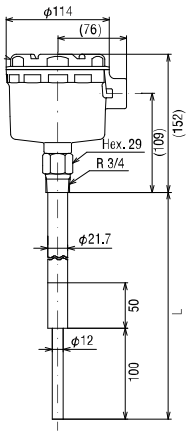
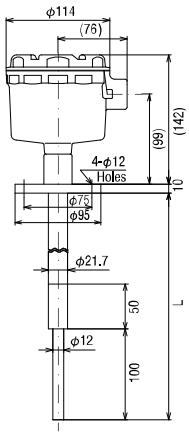
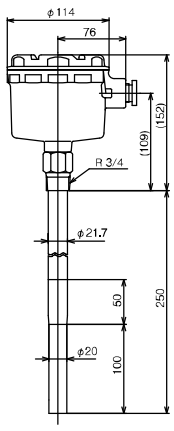
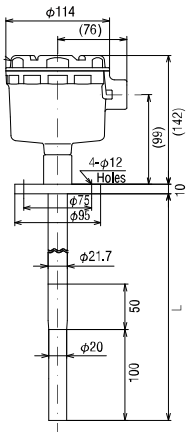
* The mounting size should be specified when you order.

* The length of electrode and insulator should be specified in mm if required.

* The medium must be informed for sensitivity setting when you order.

* The operating temp, and pressure should be informed for correct model selection.

Specifications

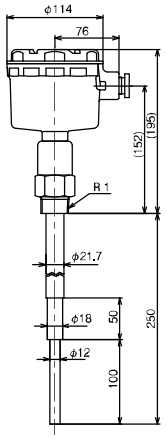
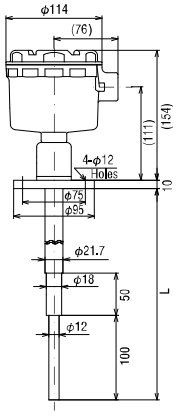
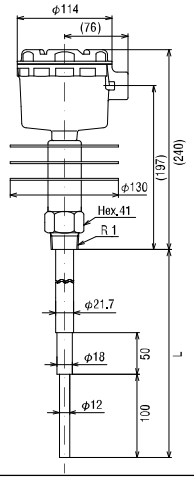
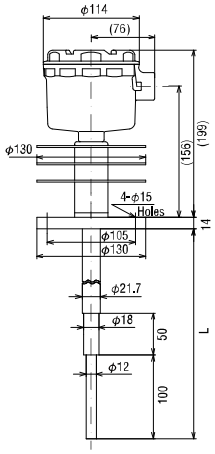
Model		1NH	1FH	2NH	2FH
Description		Standard			
Drawing					
Mounting		R3/4	JIS5K25A	R3/4	JIS5K25A
Supply Power	KRV	100 to 120V AC, 200 to 240V AC or 24V DC			
	KSV	100/200, 110/220, 120/240V AV or 24V DC			
Power Consumption	KRV	Approx. 2.5VA Max.			
	KSV	Approx. 2.2VA Max.			
Relay Output		1 SPDT, 250V 3A AC, 30V 3A DC (Resistive) C-A: Normally Open contact C-B: Normally Closed contact			
Detection Time Delay	KRV	Adjustable between 0.5 to 10 seconds			
	KSV	Not provided			
Operating Temperature	Housing	-10 to 55˚C			
	Electrode	-20 to 60˚C			
Maximum Pressure		1 MPa			
Maximum Humidity		85% RH			
Material	Housing	ADC12			
	Electrode	304SS*			
	Insulator	PTFE*			
	O-ring	FPM/FKM*			
Cable Entry		G1/2			
Protection		IP65			
Length of Electrode	Standard	250mm			
	Option	50 to 4000mm			

*Other materials are available.

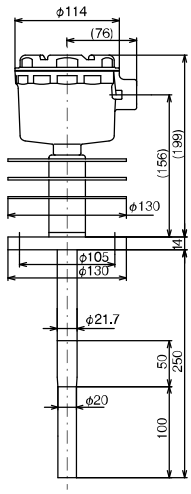
*Specification of products shall be changed by the application and operational condition.

Technical Note

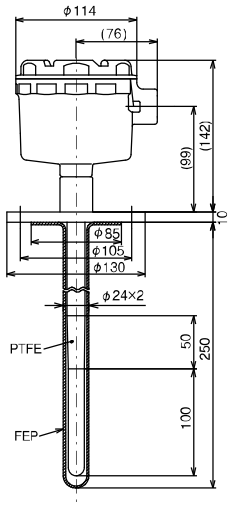
- The heat resistive type is optionally available up to 400˚C.
- Form detection and insulated tube types are optionally available.

3NH	3FH	4NH	4FH
Heavy duty		Heavy duty Heat proof	
			
R1	JIS5K25A	R1	JIS5K25A
100 to 120V AC, 200 to 240V AC or 24V DC			
100/200, 110/220, 120/240V AV or 24V DC			
Approx. 2.5VA Max.			
Approx. 2.2VA Max.			
1 SPDT, 250V 3A AC, 30V 3A DC (Resistive) C-A: Normally Open contact C-B: Normally Closed contact			
Adjustable between 0.5 to 10 seconds			
Not provided			
-10 to 55˚C		-10 to 55˚C	
-20 to 60˚C		-20 to 180˚C	
1 MPa			
85% RH			
ADC12			
304SS*			
PTFE*			
FPM/FKM*			
G1/2			
IP65			
250mm			
50 to 4000mm			

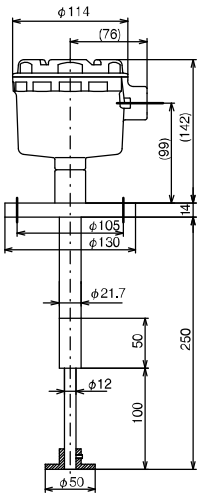
Code-T
Heat resistive



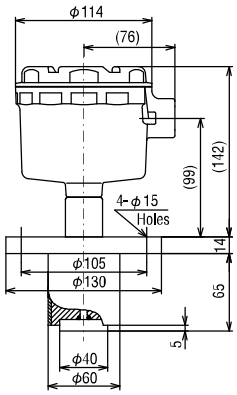
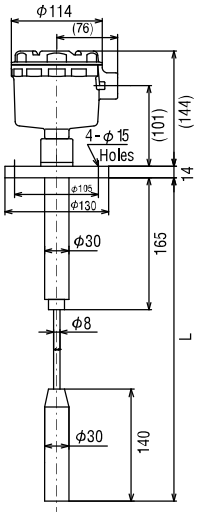
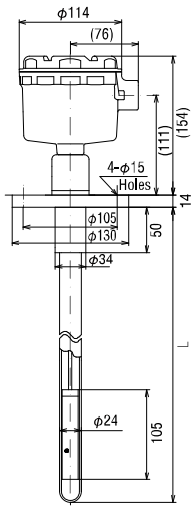
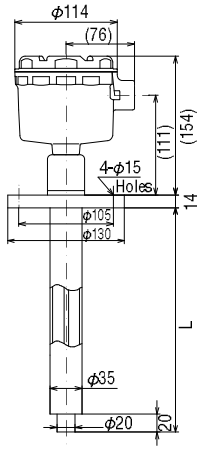
Code-P
Insulated electrode



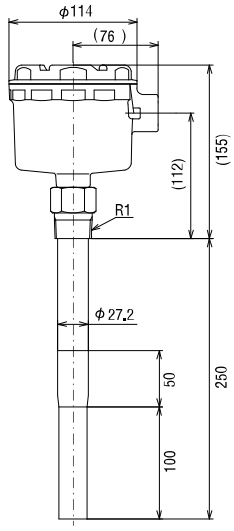
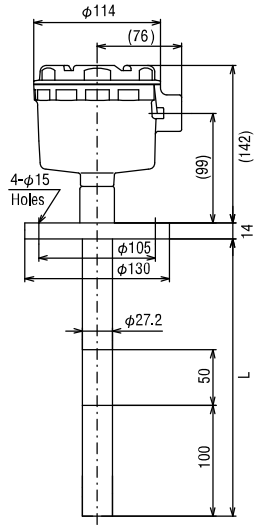
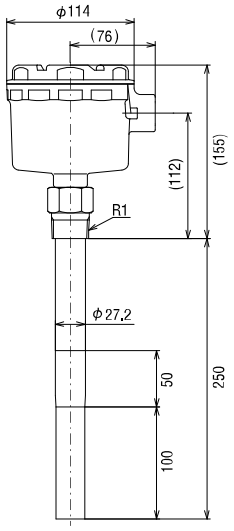
Code-A
Foam detection



Specifications

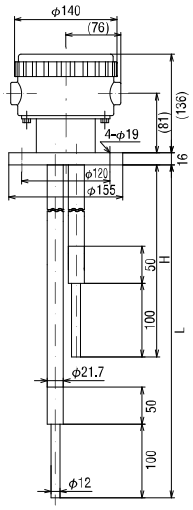
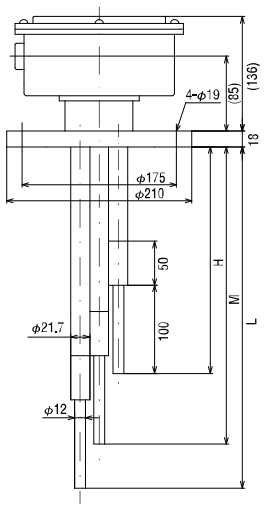
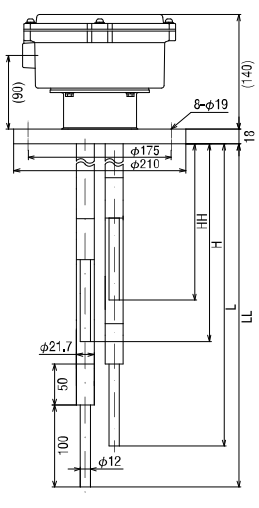
Model		5FH	6FH	7FH	8FH
Description		Flash probe	Wire extension	Pipe type	Stick proof type
Drawing					
Mounting		JIS5K50A	JIS5K50A	JIS5K50A	JIS5K50A
Supply Power	KRV	100 to 120V AC, 200 to 240V AC or 24V DC			
	KSV	100/200, 110/220, 120/240V AV or 24V DC			
Power Consumption	KRV	Approx. 2.5VA Max.			
	KSV	Approx. 2.2VA Max.			
Relay Output		1 SPDT, 250V 3A AC, 30V 3A DC (Resistive) C-A: Normally Open contact C-B: Normally Closed contact			
Detection Time Delay	KRV	Adjustable between 0.5 to 10 seconds			
	KSV	Not provided			
Operating Temperature	Housing	-10 to 55˚C			
	Electrode	-20 to 60˚C			
Maximum Pressure		1 MPa	500 kPa	100 kPa	1 MPa
Maximum Humidity		85% RH			
Material	Housing	ADC12			
	Electrode	304SS*		C3604BD	304SS*
	Insulator	PE*		FEP (Pipe)	FRP
	O-ring	FPM/FKM*			
Cable Entry		G1/2			
Protection		IP65			
Length of Electrode	Standard	65mm	1000mm	250mm	
	Option	5 to 500mm	500 to 10000mm	50 to 4000mm	

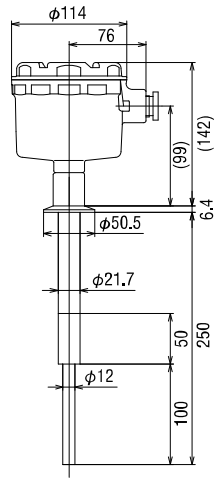
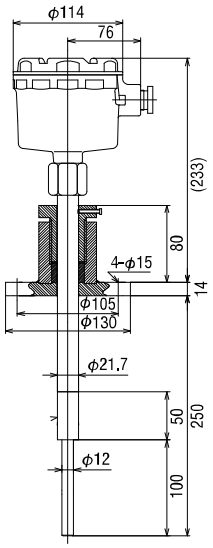
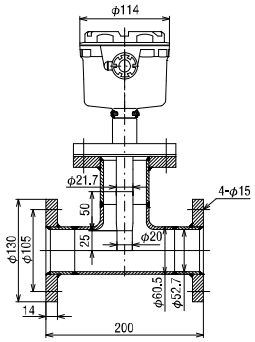
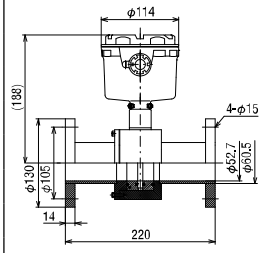
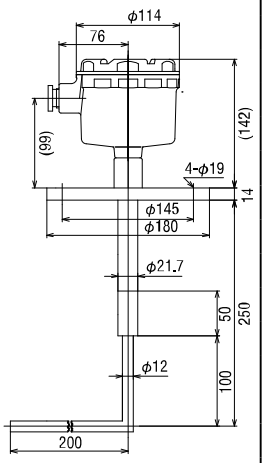
*Other materials are available.

9NH	9FH	25FH
Special type		High Sensitivity
		
R1	JIS5K50A	JIS5K50A
100 to 120V AC, 200 to 240V AC or 24V DC		
100/200, 110/220, 120/240V AV or 24V DC		
Approx. 2.5VA Max.		
Approx. 2.2VA Max.		
1 SPDT, 250V 3A AC, 30V 3A DC (Resistive) C-A: Normally Open contact C-B: Normally Closed contact		
Adjustable between 0.5 to 10 seconds		
Not provided		
–10 to 55˚C		
–20 to 60˚C		
1 MPa		
85% RH		
ADC12		
304SS*		
PTFE*		
FPM/FKM*		
G1/2		
IP65		
250mm		
50 to 4000mm		

Special type of sensor

Specifications

Description		2 points detection	3 points detection	4 points detection
Drawing				
Application		Multi points detection by one sensor		
Adaptive Model of PCB		KRV, KSV, KRS (The shape of housing is different for separation type.)		
Mounting		JIS5K50A	JIS5K80A	JIS5K100A
Material	Housing	ADC12		
	Electrode	304SS		
	Insulator	PE (Option: PTFE, Ceramic, etc.)		
Maximum Pressure		1 MPa		
Operation Temp. (Electrode)		-20 to 60˚C		
Power Supply		100V, 200V AC ±10% 50/60Hz (KRV: 100-120/200-240V AC ±10% 50/60Hz)		
Power Consumption		KRV: approx. 2.5VA, KSV: approx. 2.4VA	KRV: approx. 5.6VA, KSV: approx. 3.8VA	KRV: approx. 6.6VA, KSV: approx. 5.6VA
Relay Output		250V 3A AC, 30V 3A DC (Resistive)		
Insulation Resistance		100 Ω or more, 500V DC		
Withstand Voltage		1500V AC, 1 Minute		
Vibration Proof		10 to 55 Hz (Amplitude 1.5mm)		
Maximum Humidity		85% RH		

Sanitary Flange	Slide Flange	Pipe line A	Pipe Line B	Horizontal mounting
				
Foods & Beverage	Detection point changeable	Detect liquid inside of pipe		No space at the top of tank
KRV, KSV, KRS, KST, KRT, KRE65, KSD, KRD, KUV, KUD				
Sanitary 1.5S	JIS5K50A			JIS5K80A
ADC12				
304SS				
PE (Option: PTFE, Ceramic, etc.)				
1 MPa	–	1 MPa		
-20 to 60˚C				
100V, 200V AC ±10% 50/60Hz (KRV: 100-120/200-240V AC ±10% 50/60Hz)				
Approx. 4VA (KRV・KRE65: approx. 2.5VA, KSV・KUV: approx. 2.2VA)				
250V 3A AC, 30V 3A DC (Resistive)				
100 Ω or more, 500V DC				
1500V AC, 1 Minute				
10 to 55 Hz (Amplitude 1.5mm)				
85% RH				