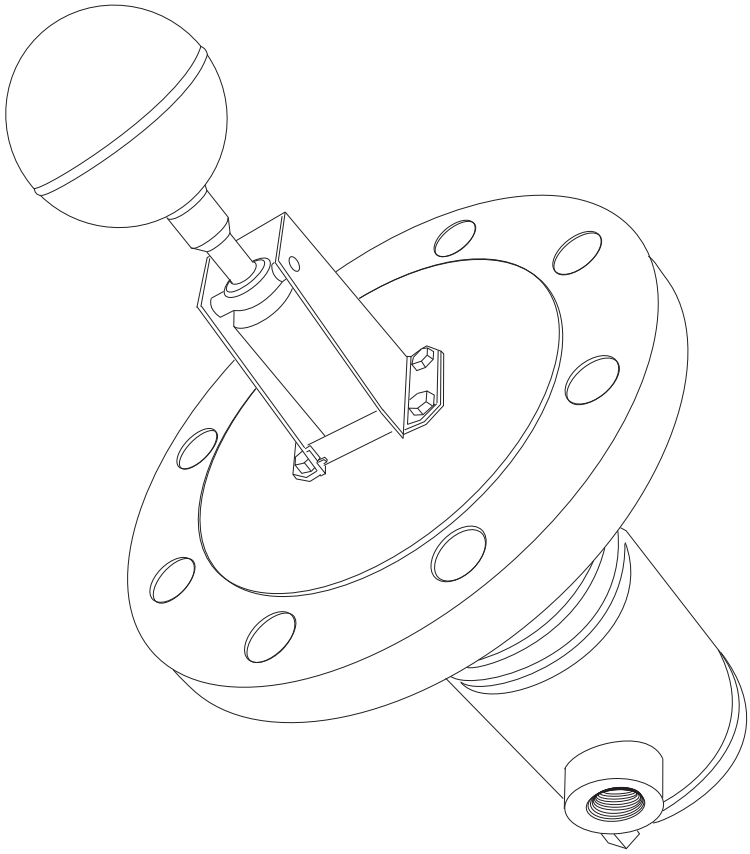
Level Pressure Flow Temperature Liquid Analysis Registration Systems Components Services Solutions

Operation Instructions

Float Level Switch CS5603/CS5613

High Temperature and High Pressure



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Endress+Hauser

People for Process Automation

Table of Contents

1 Safety Instructions

1.1 Designated Use

Float Level Switch CS5603/CS5613 is a float type compact level explosion-proof switch. Being manufactured from steel makes it compatible with most liquids. Float Level Switch CS5603/CS5613 is especially suited for use in high temperature (max. 350°C), high pressure (max. 4.9MPa) applications and simplifies the liquid level control process.

1.2 Installation, Commissioning, and Operation

- Mounting, electrical installation, start-up, and maintenance of the instrument may only be performed by trained personnel authorized by the operator of the facility.
- Personnel must read and understand these installation instructions before performing the procedures.
- The instrument may only be operated by personnel who are authorized and trained by the operator of the facility. All instructions in this manual must be observed.
- The installer must make sure that the measuring system is correctly wired according to the wiring diagrams. The measuring system must be grounded.
- Observe all law and regulations applicable and valid for your country and pertaining to the opening and repairing of electrical devices.

1.3 Product Requirement

Power Source
Check the voltage of the power supply before connecting it to the product. It should be the exact voltage required for proper operation of the product.

Connection to Other Devices
It is possible to connect to other devices explained in this instruction. Refer to each operation instruction when connecting to devices.

Ground
Do not remove earth terminal or earth wire when the power is on.

Power Cable
Use a power cable specified by our company. The product should be protectively grounded before it is connected to a measurement object or an external control circuit.

1.4 Operational Safety

Hazardous Area

- Use the explosion proof type for measurement in areas where explosion hazards are present.
- Devices installed in areas having explosion hazards must not be opened when the power is on.
- Strict compliance with installation instructions and – ratings, as directed in this supplementary documentation, is mandatory.
- Device maintenance and repair is restricted to meet explosion proof regulations.
- Tighten the cable gland firmly.
- Devices employed in areas having explosion hazards should be installed and wired in keeping with explosion proof regulations.
- Ensure that all personnel are properly qualified.
- Observe the certification requirements as well as national and local regulations.

Caution!

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

1.5 Notes on Safety Conventions and Symbols

To highlight safety-relevant or alternative operating procedures in this manual, the following conventions have been used, each indicated by a corresponding symbol on the left.

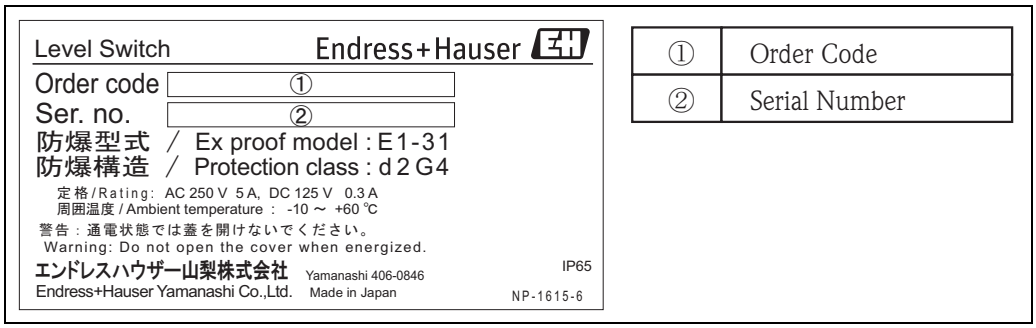
Safety Conventions	
	**Warning!** A warning highlights actions or procedures which, if not performed correctly, will lead to personal injury, a safety hazard or destruction of the instrument
	**Caution!** Caution highlights actions or procedures which, if not performed correctly, may lead to personal injury or incorrect functioning of the instrument
	**Note!** A note highlights actions or procedures which, if not performed correctly, may indirectly affect operation or may lead to an instrument response which is not planned
Explosion protection	
	**Device certified for Use in Explosion Hazardous Area** If the device has this symbol embossed on its name plate it can be installed in an explosion hazardous area
	**Explosion Hazardous Areas** Symbol used in drawings to indicate explosion hazardous areas. Devices located in and wiring entering areas with the designation “explosion hazardous areas” must conform with the stated type of protection.
	**Safe Area (non-explosion hazardous area)** Symbol used in drawings to indicate, if necessary, non-explosion hazardous areas. Devices located in safe areas still require a certificate if their outputs run into explosion hazardous areas
Explosion protection	
	**Direct Voltage** A terminal to which or from which a direct current or voltage may be applied or supplied
	**Alternating Voltage** A terminal to which or from which an alternating (sine-wave) current or voltage may be applied or supplied
	**Grounded Terminal** A grounded terminal, which as far as the operator is concerned, is already grounded by means of an earth grounding system
	**Protective Grounding (earth) Terminal** A terminal which must be connected to earth ground prior to making any other connection to the equipment
	**Equipotential Connection (earth bonding)** A connection made to the plant grounding system which may be of type e.g. neutral star or equipotential line according to national or company practice

2 Identification

2.1 Device Designation

2.1.1 Nameplate

The following technical data are given on the instrument nameplate:



①	Order Code
②	Serial Number

Figure 1: CS5000-series Nameplate

2.2 Order Information

2.2.1 CS5603

010	**Function:**								
	0	Standard function							
	1	Non standard function							
020		**Process Connection:**							
	1	10K 80A RF, flange JIS B2220							
	2	20K 80A RF, flange JIS B2220							
	3	10K 100A RF, flange JIS B2220							
	4	20K 100A RF, flange JIS B2220							
	5	3" 150lbs RF, flange ANSI 16.5							
	6	3" 300lbs RF, flange ANSI 16.5							
	7	4" 150lbs RF, flange ANSI 16.5							
	8	4" 300lbs RF, flange ANSI 16.5							
	9	Special version, TSP-no.to be spec.							
030				**Material Process Connection; Float:**					
			4	SUS304; SUS316, Spherical					
			5	SUS304; SUS316, Cylindrical					
			6	SUS316; SUS316, Spherical					
			7	SUS316; SUS316, Cylindrical					
			9	Special version, TSP-no.to be spec.					
040					**Approval:**				
				2	Flame proof d2G4 E[*1], IP65				
				3	Flame proof d2G4 EB[*2] , IP65				
				9	Special version, TSP-no.to be spec.				
050						**External Chamber:**			
					0	Not used			
					9	Special version, TSP-no.to be spec.			
060							**Cable Entry:**		
						0	PF(G) 1/2		
						1	PF(G) 3/4 cable gland, TF16-11		
						2	PF(G) 3/4 cable gland, TF16-12		
						3	PF(G) 3/4 cable gland, TF16-9		
						9	Special version, TSP-no.to be spec.		
070								**Colour:**	
							0	Sliver	
							9	Special version, TSP-no.to be spec.	
CS5603-									Order code

[*1] TIIS d2G4 (E)
[*2] TIIS d2G4 + cable gland (EB)

Standard

Old	New
PT male thread	R
PT female thread	Rc
PS	Rp
PF	PF(G)

2.2.2 CS5613

10	**Function:**								
	0	Standard function							
	1	Non standard function							
20		**Switch Head Connection:**							
		3	10K 100A RF, flange JIS B2220						
		4	20K 100A RF, flange JIS B2220						
		7	4" 150lbs RF, flange ANSI 16.5						
		8	4" 300lbs RF, flange ANSI 16.5						
		9	Special version, TSP-no.to be spec.						
30			**material Switch Head Connection; Float:**						
			4	SUS304;SUS316, spherical					
			5	SUS304;SUS316,cylindrical					
			6	SUS316;SUS316, spherical					
			7	SUS316;SUS316,cylindrical					
			9	Special version, TSP-no.to be spec.					
40				**Protection class:**					
				2	Flame proof d2G4 E, IP65				
				3	Flame proof d2G4 EB, IP65				
				9	Special version, TSP-no. to be spec.				
50					**External Chamber:**				
					A	STPG370, 10K 25A RF, SS400,flangeJIS B2220			
					B	STPG370, 20K 25A RF, S25C,flangeJIS B2220			
					C	STPG370, 1" 150lbs RF, SS400,flangeANSI B 16.5			
					D	STPG370, 1" 300lbs RF, S25C,flangeANSI B 16.5			
					E	SUS304, 10K 25A RF,SUS304,flange JIS B2220			
					F	SUS304, 20K 25A RF,SUS304,flange JIS B2220			
					G	SUS304, 1" 150lbs RF, SUS304,flangeANSI B 16.5			
					H	SUS304, 1" 300lbs RF, SUS304,flangeANSI B 16.5			
					J	SUS316, 10K 25A RF,SUS316,flangeJIS B2220			
					K	SUS316, 20K 25A RF,SUS316,flangeJIS B2220			
					L	SUS316, 1" 150lbs RF, SUS316,flangeANSI B 16.5			
					M	SUS316, 1" 300lbs RF, SUS316,flangeANSI B 16.5			
					9	Special version, TSP-no. to be spec.			
60						**Cable entry:**			
						0	PF(G) 1/2		
						1	PF(G) 3/4 cable gland, TF16-11		
						2	PF(G) 3/4 cable gland, TF16-12		
						3	PF(G) 3/4 cable gland, TF16-9		
						9	Special version, TSP-no. to be spec.		
70							**Colour:**		
							0	Silver	
							9	Special version, TSP-no. to be spec.	
CS5613-									Order code

*1 TIIS d2G4 (E)
*2 TIIS d2G4 + cable gland (EB)

Standard

Old	New
PT male thread	R
PT female thread	Rc
PS	Rp
PF	PF(G)

2.3 Scope of Delivery

Caution!

It is extremely important to follow the instructions concerning the unpacking, transportation and storage of measuring instruments provided in the chapter "3.1 Incoming Acceptance, Transportation, Storage".

The scope of delivery consists of:

- Assembled instrument

Accompanying documentation:

- Operating Instructions (this manual)

3 Installation

3.1 Incoming Acceptance, Transport, Storage

3.1.1 Incoming Acceptance

Check the packing and contents for any signs of damage.
Check the shipment, and make sure that nothing is missing and that the items match your order.

3.1.2 Transportation

Follow the safety instructions and conditions of transportation for instruments in excess of 18kg (40 lbs.).

3.1.3 Storage

Pack the measuring instrument so that it is protected against impacts during storage and transportation.
The original packing material provides the optimum protection for this.
The allowed storage temperature is -10 to +60 °C (14° F to 140° F).

3.2 Installation Conditions

3.2.1 Dimensions

CS5603

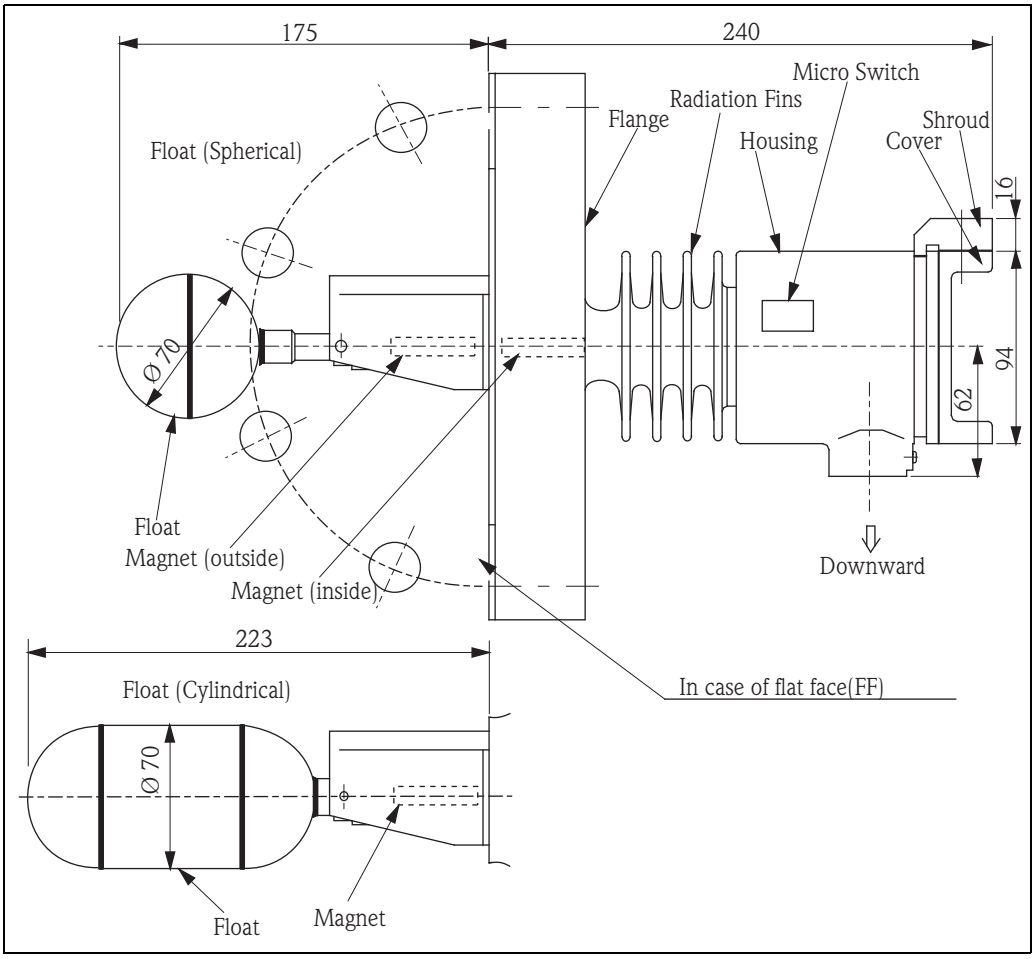


Figure 2: CS5603 Dimensions

3.3 Confirmation of CS prior to Installation

The conduit connection must always be set downward.

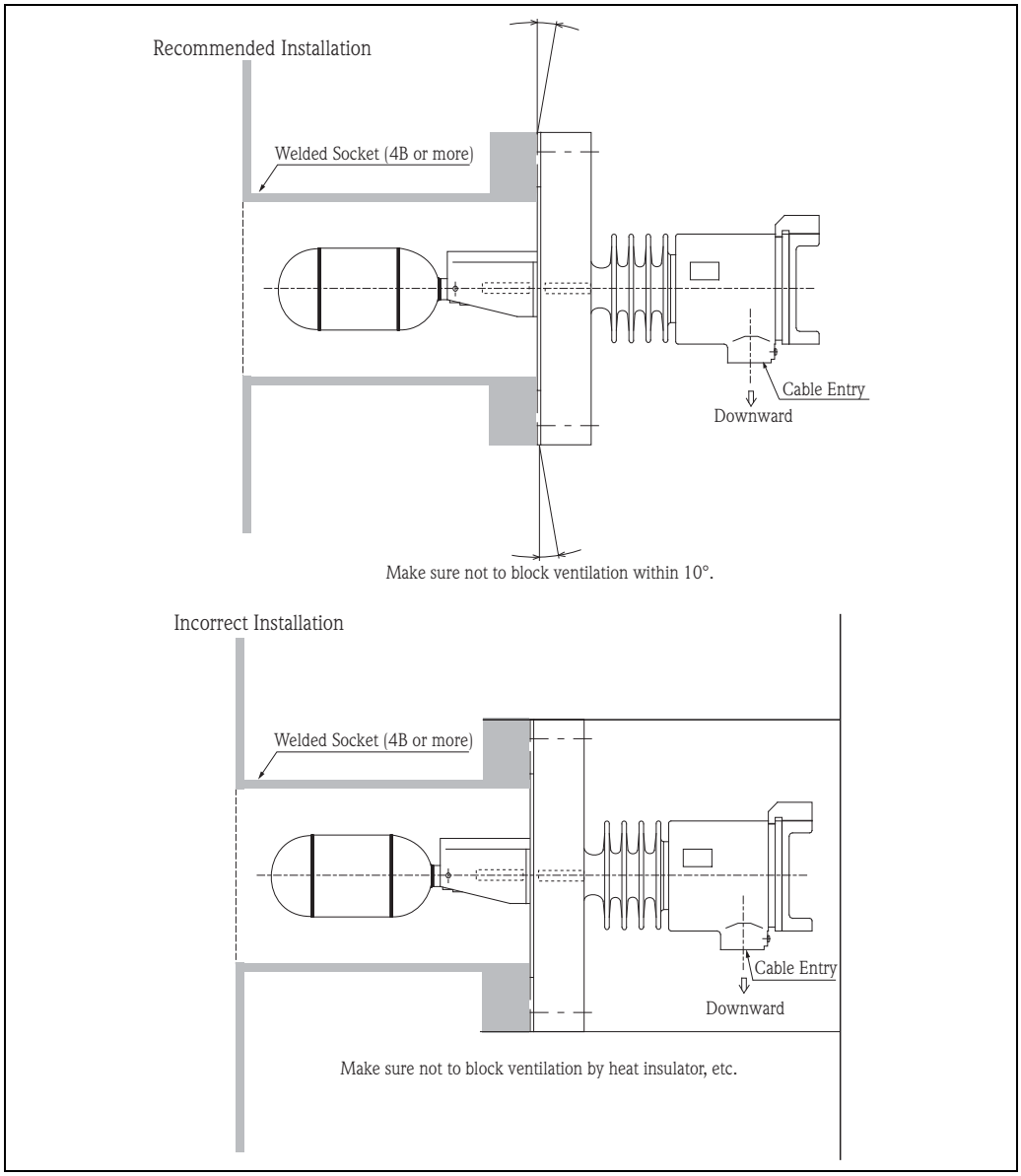


Figure 3: Reed Switch

Confirmation Procedure

1. Remove the cover and connect a circuit tester to the terminal board.
2. When float is lowered, confirm that the terminal between No.2 to 3 has conductivity.
3. When float is hoisted, confirm that the terminal between No.1 to 2 has conductivity.
4. Replace the cover.

This completes the confirmation procedure.

Caution!
Since CS-series is designed so that its housing is cooled by radiator fins, do not install CS in a way that obstructs the effectiveness of the radiator fins.

3.4 Installation

CS should be mounted horizontally in the tank side wall. Since CS is installed by using 80A or larger flange, use 3B or larger nozzle. For CS with external type chamber, the flange is a 25A connection (refer to Figure 6).

3.4.1 Allowable Angle for Installation

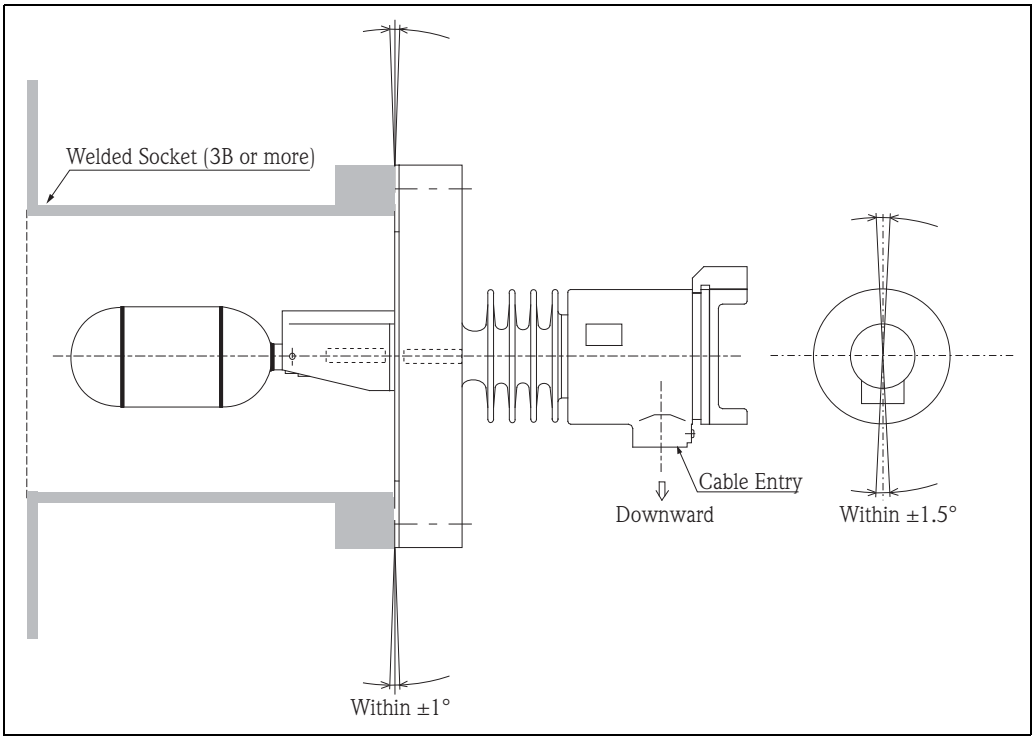


Figure 4: Allowable Angle

3.4.2 Nozzle Limitation in 80A Flange

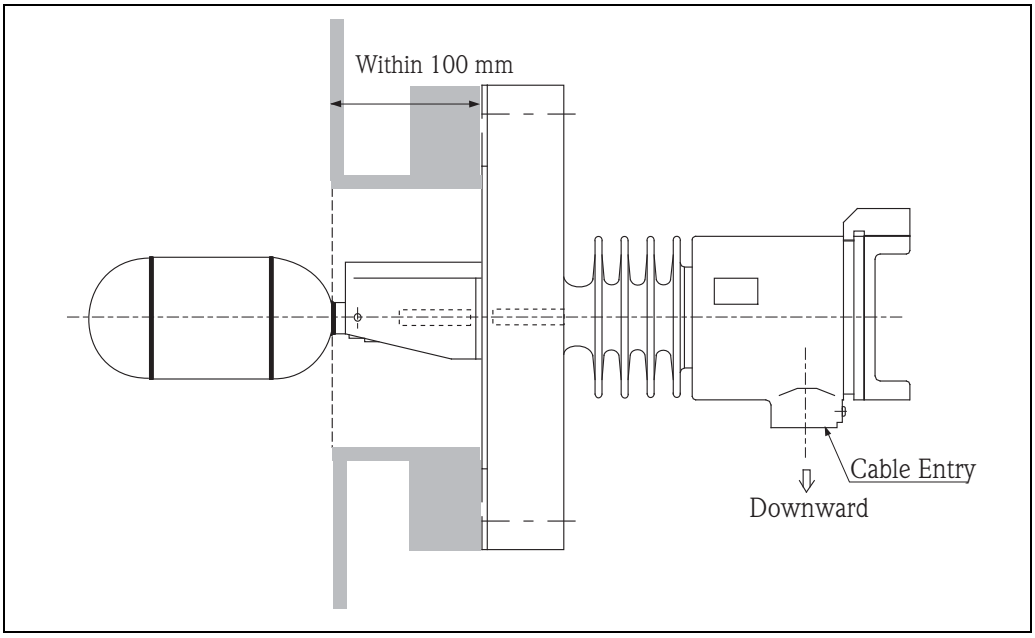


Figure 5: Nozzle Limitation

3.4.3 External Chamber Type Installation

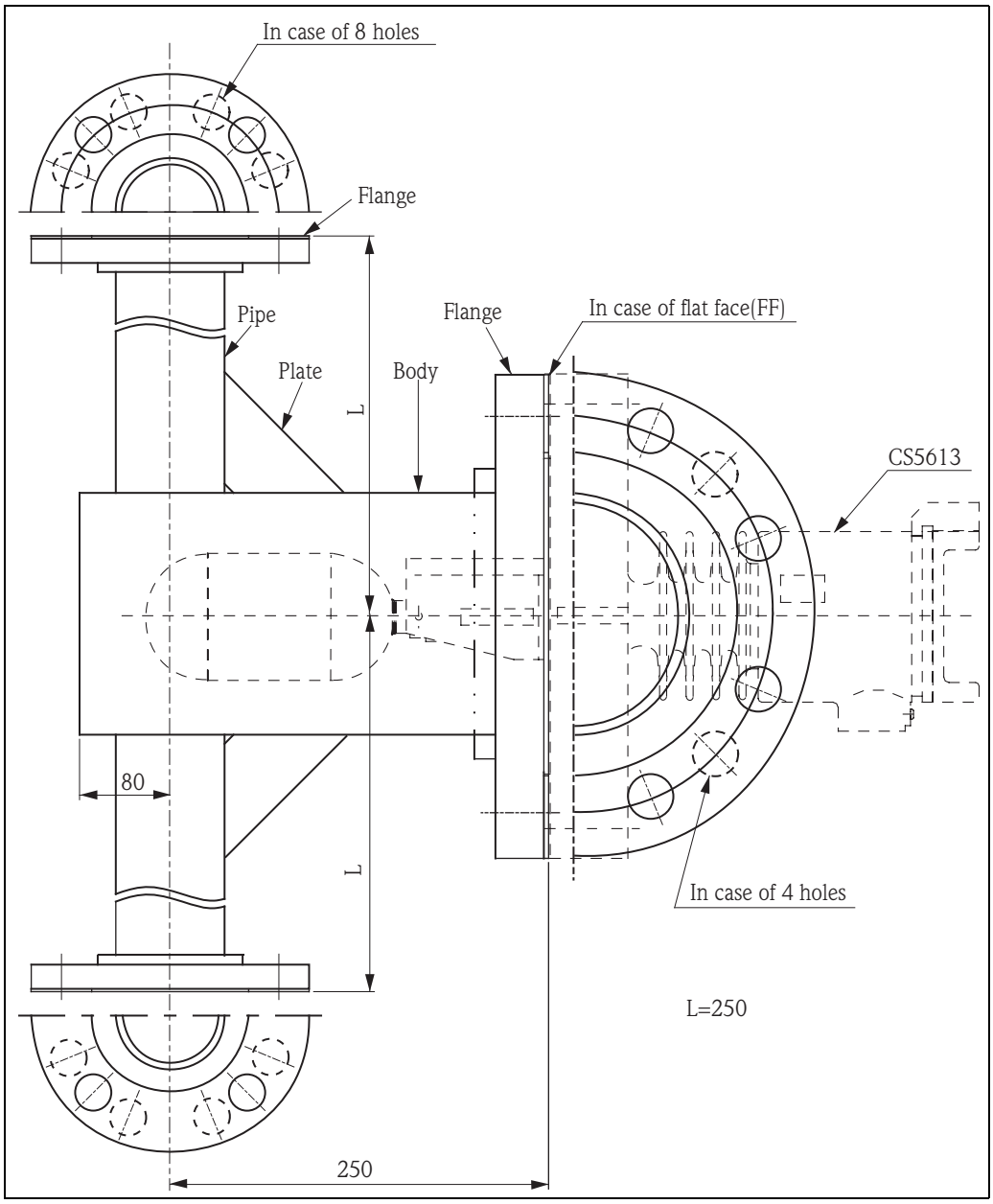


Figure 6: CS5613 Installation

4 Wiring

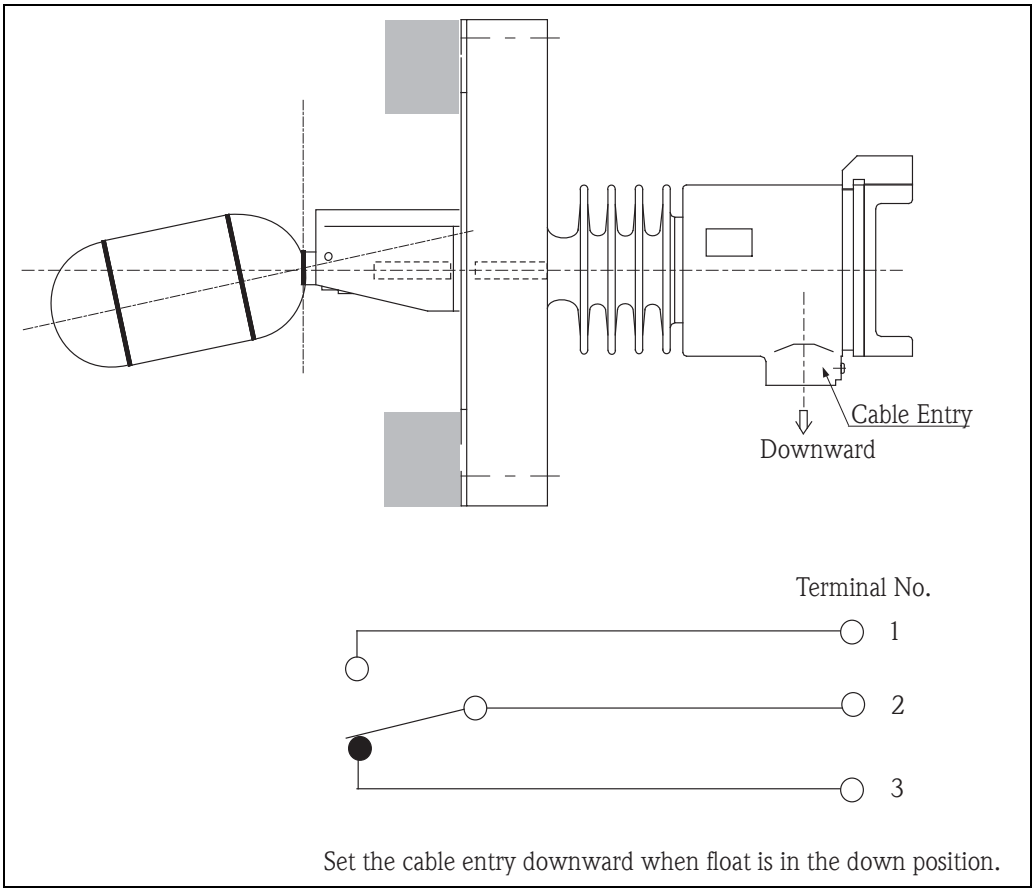


Figure 7: Wiring

5 Operation

Liquid level variations in a tank are detected by the float. Microswitch is activated by repulsive force produced between magnets on the float and magnets arranged inside the housing. Operating signals are emitted as contact ON/OFF signals Wiring is completed as shown in the diagrams below. External output wiring is made so that it forms NO or NC circuit depending on signal utilization.

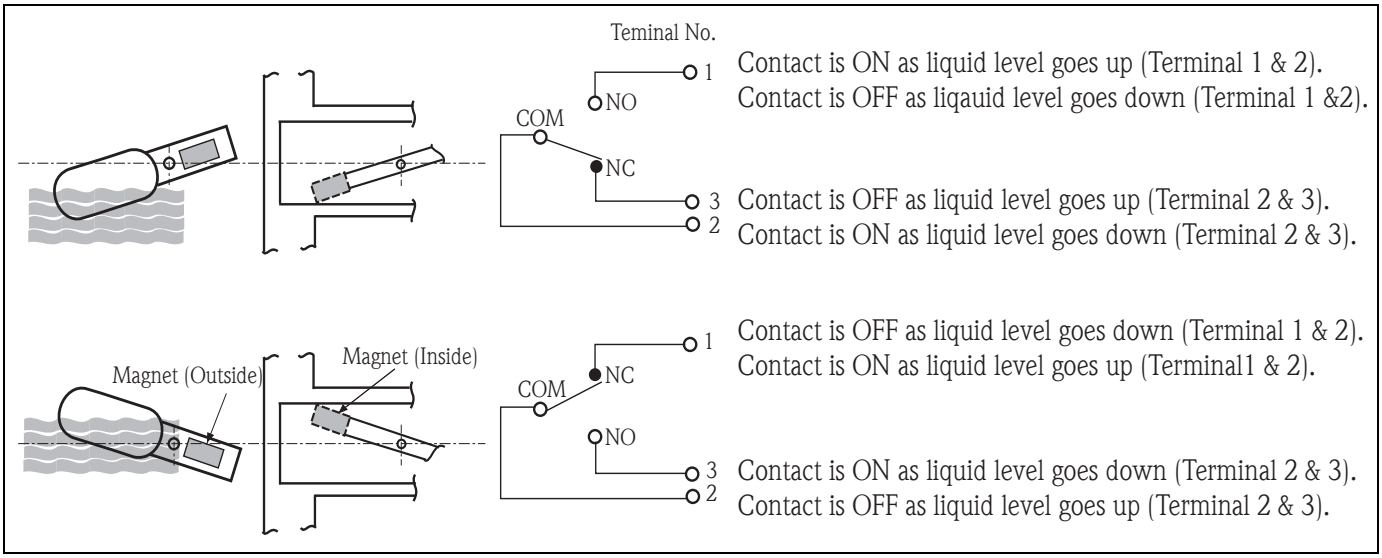


Figure 8: Microswitch Operation

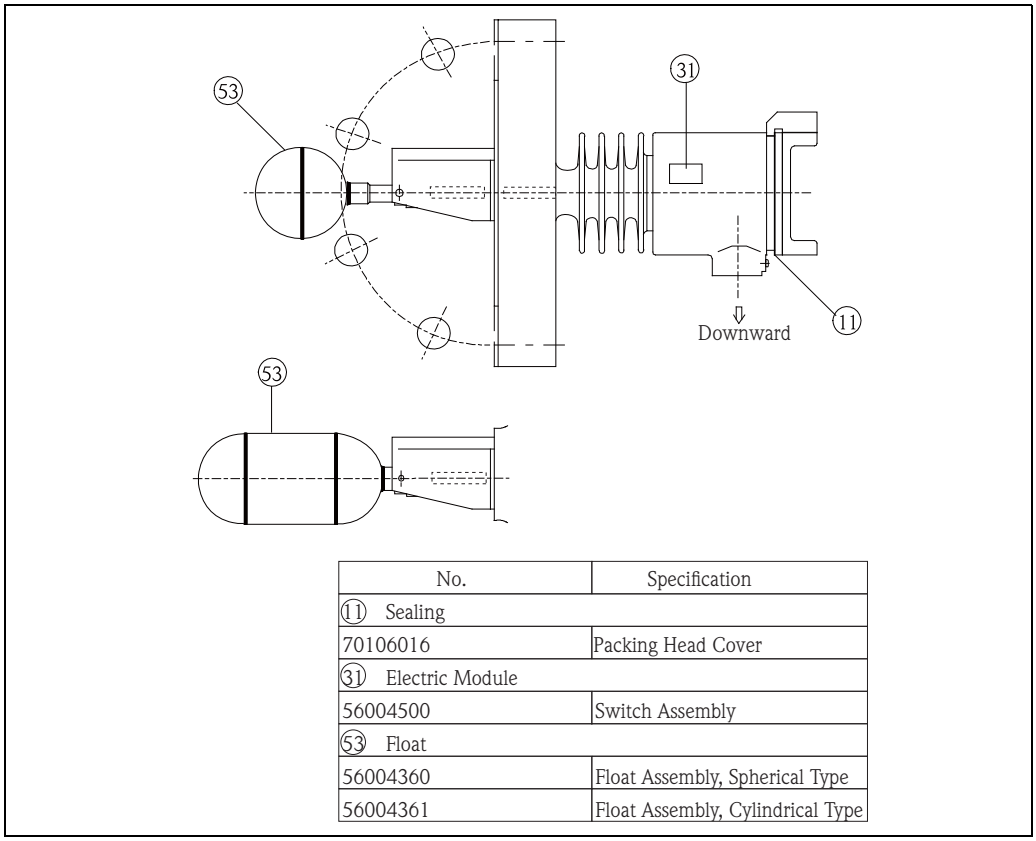
6 Maintenance

The level switch requires no particular attention or maintenance. When it is used for measuring viscous liquids, however, the float should be cleaned and an inspection performed at the same time.

7 Troubleshooting

7.1 Spare Parts

Spare parts are contained in kits. Spare parts for CS-series which can be ordered from Endress+Hauser are shown with their order numbers in the diagram below. Contact Endress+Hauser service representatives for further assistance.



No.	Specification
(11) Sealing	
70106016	Packing Head Cover
(31) Electric Module	
56004500	Switch Assembly
(53) Float	
56004360	Float Assembly, Spherical Type
56004361	Float Assembly, Cylindrical Type

Figure 9: Spare Parts

7.2 Troubleshooting

Error Symptom	Possible Cause	Corrective measure
Signal does not change.	Microswitch is defective.	Replace microswitch.
	Float has sunk.	Replace float.
	Float has seized.	Disassemble the float and remove the iron powder or other foreign substance.
	Float does not move due to iron powder accumulation around the magnet.	Disassemble the float and remove the iron powder or other foreign substance.
	Short-circuit or severed internal wire	Short-circuit or severed internal wire requires complete overhaul.

7.3 Return

1. The following procedure must be performed before returning CS float level switch to Endress+Hauser e.g. for repair or calibration.
   - Remove all residue. Pay special attention to the gasket grooves and crevices where fluid may be present. This is especially important if the fluid is corrosive, poisonous, carcinogenic, radioactive, or otherwise hazardous.
   - Always enclose a duly completed "Declaration of Hazardous Material and De-contamination" form (a copy of the “Declaration of Hazardous Material and De-contamination” is included at the end of this operating manual). Only then can Endress+Hauser transport, examine, and repair a returned device.
   - Enclose special handling instructions if necessary, for example a safety data sheet as per EN 91/155/EEC.
2. Additionally specify:
   - An exact description of the application
   - The chemical and physical characteristics of the instrument
   - A short description of the error that occurred (specify the error code where possible)
   - Operating time of the device

Note!
A copy of the “Declaration of Contamination” is included at the top of this operating manual.

Caution!
- Hazardous materials may be attached to damaged parts of CS or its plastic material. Unless hazardous materials are completely removed from CS, no repair request is accepted.
- Incomplete cleaning of the instrument may result in waste disposal or cause harm to personnel (burns, etc.). Any costs arising from this will be charged to the operator of the instrument.

7.4 Disposal

In case of disposal, separate the various components according to their materials.

7.5 Contact Addresses of Endress+Hauser

The addresses of Endress+Hauser are given on the back cover of this operating manual. If you have any questions, do not hesitate to contact Endress+Hauser representative.

8 Technical Data

Ambient Temperature	-10 to +60°C (operation not possible in freezing temperature)
Measured Liquid Temperature	-20 to +350°C (operation not possible in freezing temperature)
Float Shape (Spherical Type)	
Level Accuracy	±5mm (ρ = 1g/cm^3)
Hysteresis	10mm (ρ = 1g/cm^3)
Measured Liquid Specific Density	≤ 0.65g/cm3
Maximum Allowable Working Pressure	4.90 MPa (at 200°C max.)
Containment Temperature	-20 to 350°C (at 4.41MPa max.)
Float Shape (Cylindrical Type)	
Level Accuracy	±8mm (ρ = 1g/cm^3)
Hysteresis	16mm (ρ = 1g/cm^3)
Measured Liquid Specific Density	≤ 0.45g/cm3
Maximum Allowable Working Pressure	2.35 MPa (at 100°C max.)
Containment Temperature	-20 to 350°C (at 1.96MPa max.)
Measured Liquid Specific Density	0.45 to 2.0g/cm^3
Approval	Flame Proof TIIS, d2G4
Protection Class	IP65
Installation	10K 80A RF, flange JIS B2220 10K 100A RF, flange JIS B2220 20K 80A RF, flange JIS B2220 20K 100A RF, flange JIS B2220 3" 150lbs RF, flange ANSI B16.5 4" 150lbs RF, flange ANSI B16.5 3" 300lbs RF, flange ANSI B16.5 4" 300lbs RF, flange ANSI B16.5
Material	Float (Cylindrical, Spherical): SUS316 Flange: SUS304, SUS316 Housing: SCS13, AC4CT6 Cover: AC4A
Contact Capacity	AC250V, 5A (Resistance Load) DC125V, 0.3A (Resistance Load)
Contact Arrangement	SPDT (Microswitch)
Cable Entry	PF(G)1/2
Weight	Approx. 7.5kg (CS5603: 10K 80A RF, flange JIS B2220)
Paint Color	Silver

Endress+Hauser

People for Process Automation

Declaration of Hazardous Material and De-Contamination
Erklärung zur Kontamination und Reinigung

RA No. ☐☐☐☐☐☐☐☐

Please reference the Return Authorization Number (RA#), obtained from Endress+Hauser, on all paperwork and mark the RA# clearly on the outside of the box. If this procedure is not followed, it may result in the refusal of the package at our facility.
Bitte geben Sie die von E+H mitgeteilte Rücklieferungsnummer (RA#) auf allen Lieferpapieren an und vermerken Sie diese auch außen auf der Verpackung. Nichtbeachtung dieser Anweisung führt zur Ablehnung ihrer Lieferung.

Because of legal regulations and for the safety of our employees and operating equipment, we need the "Declaration of Hazardous Material and De-Contamination", with your signature, before your order can be handled. Please make absolutely sure to attach it to the outside of the packaging.
Aufgrund der gesetzlichen Vorschriften und zum Schutz unserer Mitarbeiter und Betriebseinrichtungen, benötigen wir die unterschriebene "Erklärung zur Kontamination und Reinigung", bevor Ihr Auftrag bearbeitet werden kann. Bringen Sie diese unbedingt außen an der Verpackung an.

Type of instrument / sensor
Geräte-/Sensortyp _____

Serial number
Seriennummer _____

☐ **Used as SIL device in a Safety Instrumented System** / Einsatz als SIL Gerät in Schutzeinrichtungen

Process data/Prozessdaten
Temperature / Temperatur_____ [°F] _____ [°C]
Pressure / Druck _____ [psi] _____ [Pa]
Conductivity / Leitfähigkeit _____ [µS/cm]
Viscosity /Viskosität _____ [cp] _____ [mm²/s]

Medium and warnings
Warnhinweise zum Medium

	Medium /concentration Medium /Konzentration	Identification CAS No.	flammable entzündlich	toxic giftig	corrosive ätzend	harmful/ irritant gesundheits-schädlich/ reizend	other * sonstiges*	harmless unbedenklich
Process medium Medium im Prozess								
Medium for process cleaning Medium zur Prozessreinigung								
Returned part cleaned with Medium zur Endreinigung								

* explosive; oxidising; dangerous for the environment; biological risk; radioactive
* explosive;brandfördernd;umweltgefährlich; biogefährlich; radioaktiv

Please tick should one of the above be applicable, include safety data sheet and, if necessary, special handling instructions.
Zutreffendes ankreuzen; trifft einer der Warnhinweise zu, Sicherheitsdatenblatt und ggf. spezielle Handhabungsvorschriften beilegen.

Description of failure / Fehlerbeschreibung _____

_____

_____

Company data / Angaben zum Absender

Company /Firma _____
_____
Address / Adresse
_____
_____

Phone number of contact person / Telefon-Nr. Ansprechpartner:
_____
Fax / E-Mail _____
Your order No. / Ihre Auftragsnr. _____

"We hereby certify that this declaration is filled out truthfully and completely to the best of our knowledge.We further certify that the returned parts have been carefully cleaned. To the best of our knowledge they are free of any residues in dangerous quantities."
"Wir bestätigen, die vorliegende Erklärung nach unserem besten Wissen wahrheitsgetreu und vollständig ausgefüllt zu haben. Wir bestätigen weiter, dass die zurückgesandten Teile sorgfältig gereinigt wurden und nach unserem besten Wissen frei von Rückständen in gefahrbringender Menge sind."

_____ (place, date / Ort, Datum)

_____ Name, dept./Abt. (please print /bitte Druckschrift)

_____ Signature / Unterschrift

Endress+Hauser Japan Co., Ltd.
Product Center Yamanashi
862-1 Mitsukunugi Sakaigawa-cho
Fuefuki-shi Yamanashi,
406-0846 Japan

Phone: ++81 55 266 4964
Fax: ++81 55 266 4969

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