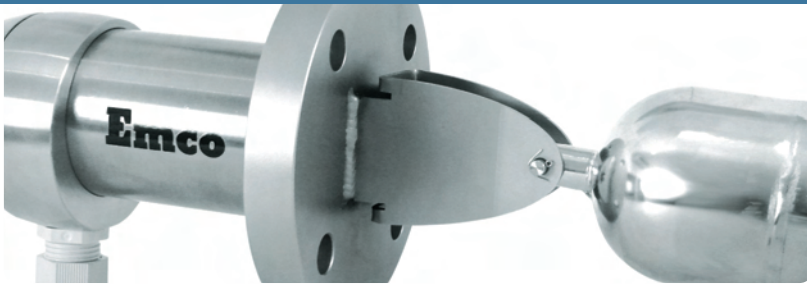


Emco Controls

CONSTRUCTION AND DESIGN OF INSTRUMENTS FOR FLOW, LEVEL AND TEMPERATURE



EMCO Liquid Level Switch



# WELCOME TO EMCO CONTROLS

## WELCOME TO EMCO CONTROLS

EMCO Controls is a Danish instrumentation company.

The factory is placed in Hørsholm near Copenhagen, not far from Hamlet's Elsinore.

From the premises in Hørsholm, domestic and export sales as well as manufacturing are conducted. We employ skilled people with many years of experience in manufacturing of mechanical instruments.

EMCO Controls originates back to 1966 and has right from the beginning been recognized as a manufacturer of process control equipment including switches and indicators for level measurement.

## ENGINEERING

Design and engineering of our instruments are based on recognized international standards. Our work is supported by the latest version of Autodesk Inventor with 3 D solid modelling and computer programmes developed by our engineers.

Our instruments are manufactured according to the EU Pressure Equipment Directive (PED) 97/23 EC and CE marked when required by the process conditions.

We continually strive to provide high **quality sensors with design innovation** to meet our customers' requirements.

## MANUFACTURING

Our CNC machines for turning and milling are equipped with EDGE CAM.

## QUALITY ASSURANCE

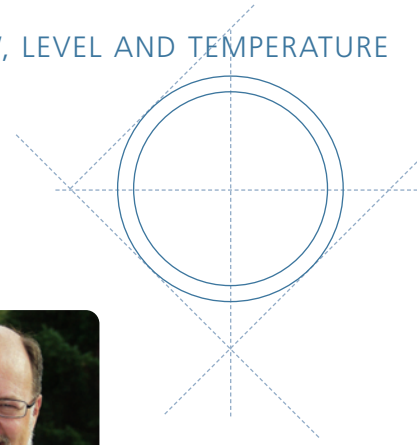
A quality system according to ISO 9001-2000 has been implemented in order to manufacture according to a quality defined by international standards, by our customers and ourselves.

## CUSTOMER SEGMENT

**Shipbuilding.** • Power plants, incineration units, combustion units.

**General food industry.** • Water treatment plants. • Pharmaceutical industry.

**Chemical industry.** • General liquid handling industry.



## QUALITY SENSORS WITH DESIGN INNOVATION



### HISTORY

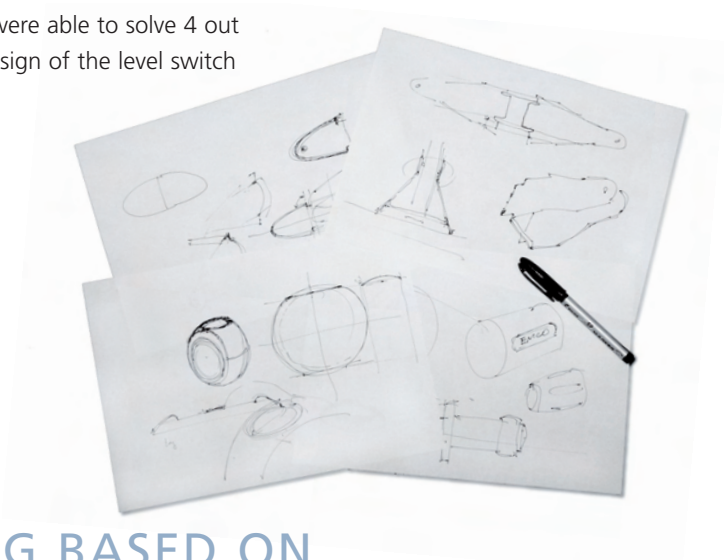
EMCO liquid level switches have been manufactured since 1973 serving customers reliably in many different industries including the shipbuilding industry.

The present liquid level switch is developed by our engineers backed up by more than 30 years of know-how gained by close corporation with our valid customers.

The initial stage of the new development was to set up the requirements to the design of the level switch. 5 major requirements were identified:

1. Easy electrical and mechanical mounting
2. Good corrosion resistance of the switch housing
3. Modern design
4. Low manufacturing costs
5. High degree of flexibility

The engineers within the company were able to solve 4 out of the 5 major requirements. The design of the level switch was done by an industrial designer.



## ENGINEERING BASED ON INTERNATIONAL STANDARDS



## LEVEL SWITCH

### APPLICATION

The EMCO level switch is designed to control the liquid level in vessels containing corrosive or non-corrosive liquids.

### ALARM DUTY

The standard level switch with float code 01 is used for signalling high or low alarm points.

The signal may be used for plant shut down or emergency override control.

Level switch with float code 05 is intended for side mounting with alarm point with difficult accessibility.

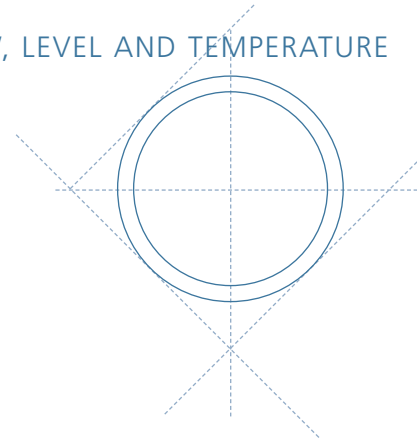


Level switch with float code 04 is for vertical mounting on top of the vessel. Level switches with long levers f. d. code 50 are used for alarm duty with unstable liquid surface or with insulated vessels requiring long levers undisturbed movement.

Liquid level interface, minimum difference in density 0,2

### PUMP/VALVE CONTROL

Two level switches with float code 01 are used for pump control where one switch starts the pump by activating a holding relay and the other switch brakes the holding relay when the desired liquid level has been reached.



## FUNCTION

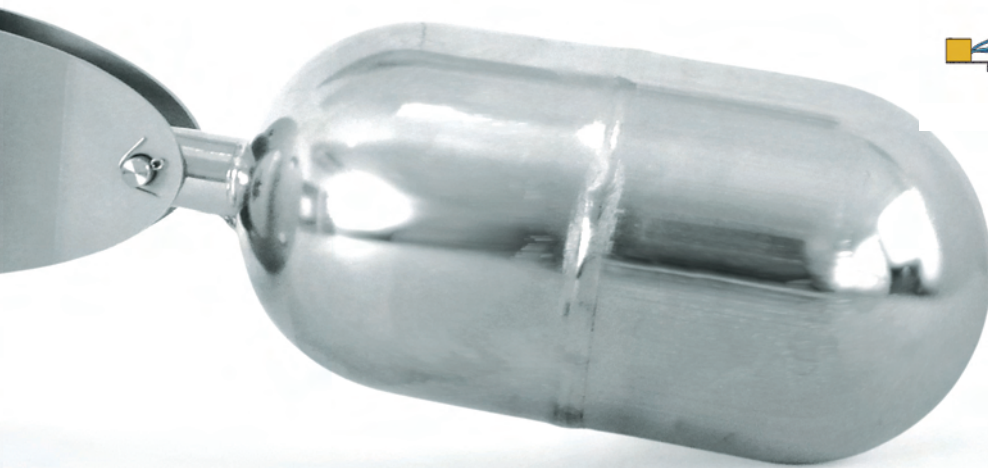
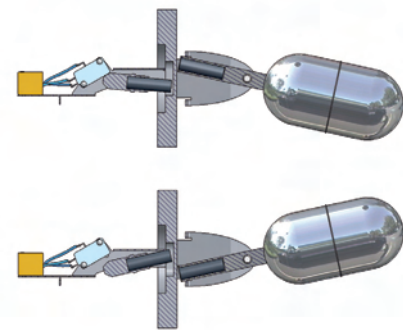
The EMCO float switch can be mounted horizontally or vertically, but horizontal mounting is the most common.

The float lever carries a permanent magnet which is opposed by a similar magnet mounted in the switch housing. The magnets having the same pole directed toward each other are separated by a non magnetic diaphragm. The glandless construction offers excellent sealing.

## CONSTRUCTION

The EMCO Float switch consists of 3 main parts :

1. Housing with switch, electrical or pneumatic
2. Mounting flange
3. Float



The modular construction of the EMCO float level switch offers excellent flexibility to suit customers' requirements.

## FEATURES

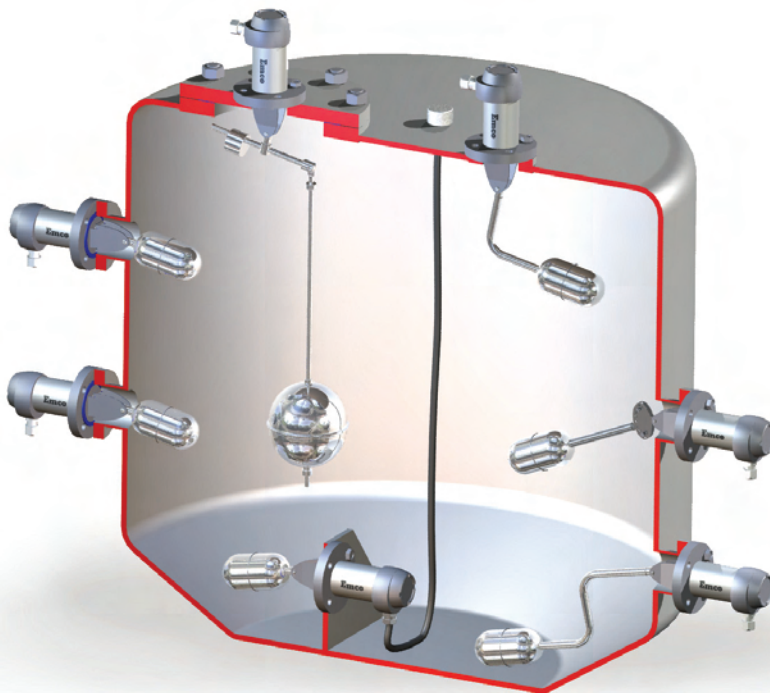
- Easy to install • Very high flexibility • Fast delivery
- Type approved by Det Norske Veritas, Lloyds Register of Shipping and Bureau Veritas
- Applicable for high temperatures



# TECHNICAL SPECIFICATIONS

## TECHNICAL SPECIFICATIONS

Switch housing:	Stainless steel, option aluminium
Wetted parts:	Stainless steel AISI 316, as option PP and PTFE
Specific gravity:	Standard min 0,7 option. 0,5
Max. working pressure:	EMCO flange 40 bar Standard flange 100 bar Standard flanges to DIN or ANSI/ASME norm
Max. working temperature:	Depending on switch type
Enclosure:	IP 65, IP 68 with 3x1,5 mm <sup>2</sup> ships cable
Electrical gland connection :	M20 x 1,5 mm
Option:	Hirschmann, Schaltbau or other make of connector



# HOUSING

Stainless steel housing is standard

CODE	MATERIAL	SWITCH TYPE	PROTECTION	CABLE LENGTH*
1	aluminium	electrical	IP 65	
2	stainless steel	electrical	IP 65	
3	aluminium	electrical	IP 68 submersible	3 meters*
4	stainless steel	electrical	IP 68 submersible	3 meters*
5	aluminium	pneumatic		
6	stainless steel	pneumatic		

\*other lengths on request

# SWITCHES

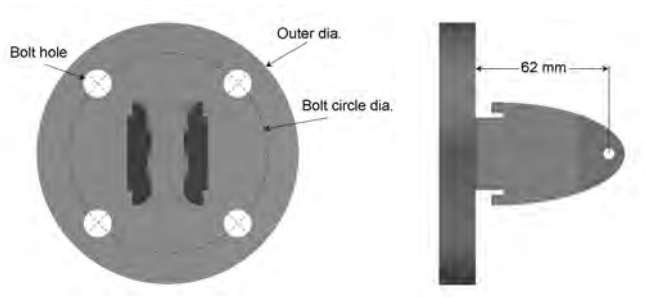
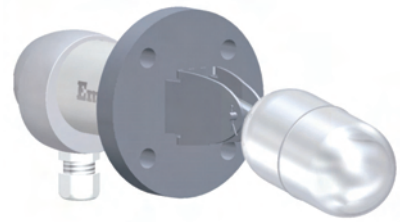
	CODE	DIAGRAM	SWITCH RATING	TEMPERATURE
Electrical SPDT Silver contacts	10		250 V ac 2A 24 V dc 0,7A (1,3 A)	liquid : 225°C ambient : 80°C
Electrical SPDT, Gold contacts	11		30 V dc 300 mA	liquid: 225°C ambient: 80°C
Electrical SPDT, Silver contacts	12		2A 250 V ac 0,7A 24 V dc (1,3A)	liquid: 225°C ambient: 80°C
Inductive NAMUR EEX ia II C T6	13		Level under control point output 3mA Level above output 1mA Power supply: 8V dc	liquid: 150°C ambient: 80°C
Pneumatic pressure 3-8 bar.	16		Level below switch point output logic 1 Kv: 0,8 (pressure output)	liquid: 120°C ambient: 60°C
Pneumatic pressure 3-8 bar.	17		Level below switch point logic 0 max. Kv: 0,8 (no pressure output)	liquid: 120°C ambient: 60°C

# MOUNTING FLANGE

## EMCO FLANGES

EMCO flanges are delivered in 2 versions :

1. The heavy duty flange (standard) with flange diameter of 122 mm. with 4 Ø 13 mm bolt holes on a BCD of 92 mm.
2. The light duty flange with flange diameter of 102 mm. with 4 Ø 7 mm. bolt holes on a BCD of 92 mm.



The different types of counter flanges are shown on page 11

A flat gasket for general use is available. The gasket is to be mounted between the level switch and the counter flange. For corrosive liquids special gaskets are available including PTFE and Viton.

Mounting kit containing the gasket and 4 bolts is to be specified separately.

## STANDARD FLANGES

Flange standards:	DIN and ANSI/ASME others on request
Flange sizes:	DN 65, DN 80, DN 100, 3", 4", others on request
Flange facing:	Flat facing DIN 2526, tongue and groove DIN 2512, Flat face FF, raised face RF or ring type joint RTJ to ANSI B 16.5
Pressure rating:	PN 16, PN 40, PN 100, 150 lbs, 300lbs, 600 lbs
Flange material:	stainless steel AISI 316

For reduced cost loose flanges in carbon steel are available as an option.

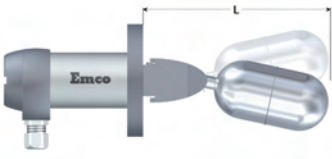
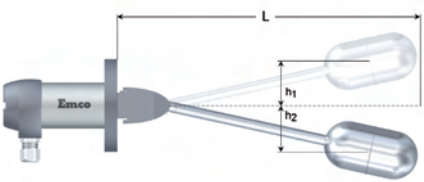


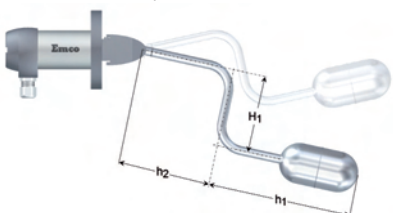
## BELLOWS SEALS

EMCO and standard flanges are available with bellows seals for applications where there is a risk that particles in the liquid or viscous liquids will obstruct the free movement of the float. The bellows is made of Neoprene which reduces the operating temperature to 80° C.





# FLOATS

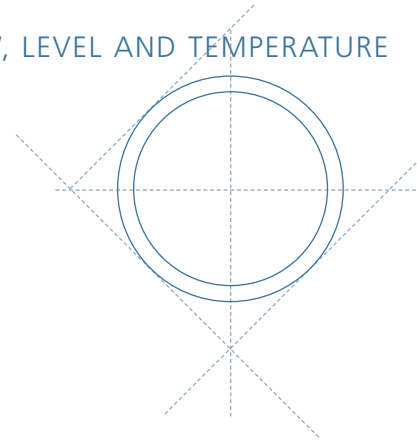
	CODE	L MM	HYSTERESIS MM	h <sub>1</sub> MM	h <sub>2</sub> MM
Side mounted, Standard lever 	01	210	12-15		
Side mounted, Long lever 	25 30 35 40 50 60 70 80 90 100	250 300 350 400 500 600 700 800 900 1000	25 38 52 65 98 113 146 168 193 223	8 16 19 31 54 56 58 64 81 111	17 22 33 34 44 57 88 104 112 112
Topmounted, Variable hysteresis 	03	3000 max.	variable		
Topmounted, Cranked lever 	04		min. 15	210	min. 100 max. 550
Side mounted, Cranked lever 	05	H1 min. 100 max. 550	min. 40	210	min. 100

Float for liquid interface detection: code 35LID.

Floats in PP and PTFE are limited in number of available types, ask for separate data sheet.

# FLOATS

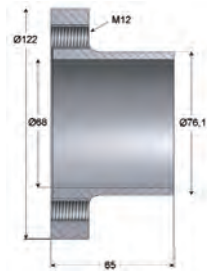
	CODE	L MM	HYSTERESIS MM	h <sub>1</sub> MM	h <sub>2</sub> MM	H <sub>1</sub> MM	H <sub>2</sub> MM	STOP POS		
Side mounted, Variable hysteresis  	02	370	57	- 94	- 151	- 49	- 200	1-4		
			108	- 43		- 6		1-5		
			160	+ 9		+ 40		1-6		
			212	+ 61		+ 100		1-7		
			262	+ 111		+ 158		1-8		
			295	+ 144		+ 193		1-9		
			25	- 94	- 119	- 49	- 162	2-4		
			76	- 43		- 6		2-5		
			128	+ 9		+ 40		2-6		
			180	+ 61		+ 100		2-7		
			230	+ 111		+ 158		2-8		
			263	+ 144		+ 193		2-9		
			28	- 43	- 71	- 6	- 114	3-5		
			80	+ 9		+ 40		3-6		
			132	+ 61		+ 100		3-7		
			182	+ 111		+ 158		3-8		
			215	+ 144		+ 193		3-9		
			27	+ 9	- 18	+ 40	- 54	4-6		
			79	+ 61		+ 100		4-7		
			129	+ 111		+ 158		4-8		
			162	+ 144		+ 193		4-9		
			27	+ 61	+ 34	+ 100	- 3	5-7		
			77	+ 111		+ 158		5-8		
			110	+ 144		+ 193		5-9		
			25	+ 111	+ 86	+ 158	+ 41	6-8		
			58	+ 144		+ 193		6-9		
			0261	610	634	+ 318	- 315	+ 372	- 370	1-9
			0950	950	1117	+ 560	- 557	+ 614	- 610	1-9



# ACCESSORIES

## COUNTER FLANGES

With weld neck



### CODE

380  
460

### MATERIAL

Carbon steel  
AISI 316 stainless steel

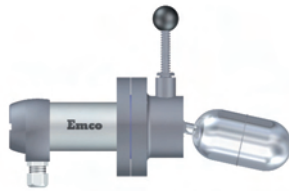
For weld in



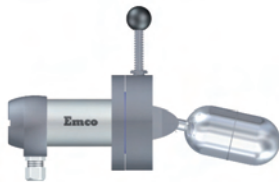
490  
510

Carbon steel  
AISI 316 stainless steel

Tester



Type L0 and M0



Type LL0 and LM0

L0  
M0

Carbon steel  
AISI 316 stainless steel

LL0  
LM0

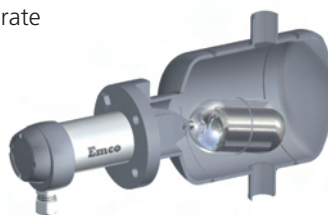
Carbon steel  
AISI 316 stainless steel

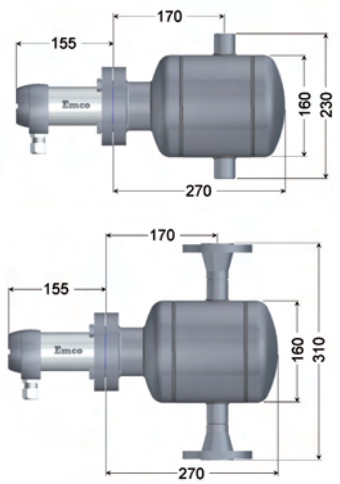
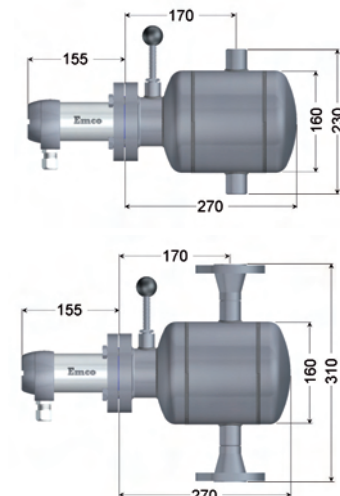
# FLOATS CHAMBERS

## FLOAT CHAMBERS







A huge variety of models are available on request including different level switch mounting flanges and process connections. Please ask for separate drawing for models not shown below.

Type H0/J0 – cut away shown with low level



	CODE	MATERIAL
<p>With code 380/460 mounting flange</p> 	<p>H0</p> <p>IDO</p> <p>IAO</p> <p>J0</p> <p>KD0</p> <p>KA0</p>	<p>Carbon steel with 1" butt weld ends</p> <p>Carbon steel with DN 25 PN 40 flanges (DIN)</p> <p>Carbon steel with 1" 300 lbs RF flanges (ANSI)</p> <p>AISI 316 with 1" butt weld ends</p> <p>AISI 316 with DN 25 PN 40 flanges (DIN)</p> <p>AISI 316 with 1" 300 lbs RF flanges (ANSI)</p>
<p>With code L0/M0 tester</p> 	<p>H0/L0</p> <p>IDO/L0</p> <p>IA0/L0</p> <p>J0/M0</p> <p>KD0/M0</p> <p>KA0/M0</p>	<p>Carbon steel with 1" butt weld ends</p> <p>Carbon steel with DN 25 PN 40 flanges (DIN)</p> <p>Carbon steel with 1" 300 lbs RF flanges (ANSI)</p> <p>AISI 316 with 1" butt weld ends</p> <p>AISI 316 with DN 25 PN 40 flanges (DIN)</p> <p>AISI 316 with 1" 300 lbs RF flanges (ANSI)</p>

## FLOAT CHAMBERS WITH STANDARD FLANGE SWITCH CONNECTION

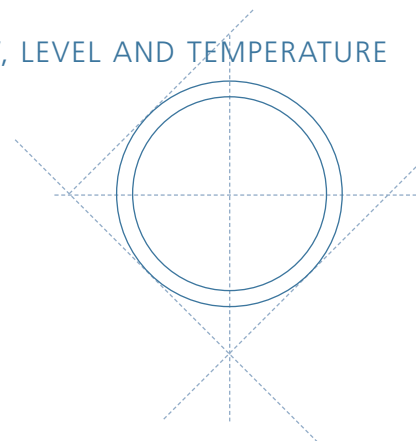
	<p>EMCO float chamber code VER-H with vertical butt weld end process connections</p> <p>Switch connection: DN 80 or 3"</p> <p>Process connection: 33,7 or 60,3 1" or 2"</p> <p>Pressure rating: up to PN 100 or 600 lbs</p>
	<p>EMCO float chamber code VER-I with vertical flanged process connections</p> <p>Switch connection: DN 80 or 3"</p> <p>Process connection: DN 25 or DN 50 1" or 2"</p> <p>Pressure rating: up to PN 100 or 600 lbs</p>
	<p>EMCO float chamber code HERR-I with horizontal flanged process connections pointing to the right</p> <p>Switch connection: DN 80 or 3"</p> <p>Process connection: DN 25 or DN 50 1" or 2"</p> <p>Pressure rating: up to PN 100 or 600 lbs</p>
	<p>EMCO float chamber code HERR-I with horizontal flanged process connections pointing to the left</p> <p>Switch connection: DN 80 or 3"</p> <p>Process connection: DN 25 or DN 50 1" or 2"</p> <p>Pressure rating: up to PN 100 or 600 lbs</p>
	<p>EMCO float chamber code HERR-I with horizontal flanged process connections pointing backwards</p> <p>Switch connection: DN 80 or 3"</p> <p>Process connection: DN 25 or DN 50 1" or 2"</p> <p>Pressure rating: up to PN 100 or 600 lbs</p>
	<p>EMCO float chamber code HORD-I with horizontal flanged process and drain connections and vertical drain connections</p> <p>Switch connection: DN 80 or 3"</p> <p>Process connection: DN 25 or DN 50 1" or 2"</p> <p>Pressure rating: up to PN 100 or 600 lbs</p>

# HOW TO ORDER

	CODE HEAVY DUTY	CODE LIGHT DUTY
<b>CONTACT HOUSE</b>		
Aluminium IP65	1	
Stainless steel IP65 (standard)	standard 2	
Aluminium IP68*	3	
Stainless steel IP68*	4	
Pneumatic	9	
*IP68 with 3 meter cable		
<b>SWITCH TYPE</b>		
Micro switch, silver	10	
Micro switch, gold	11	
DPDT, silver	12	
Namur, inductive	13	
Pneumatic logic 1	16	
Pneumatic logic 0	17	
<b>MOUNTING</b>		
Standard flange (DIN as ANSI)	BN	
Standard flange with bellows (DIN as ANSI)	EN	
EMCO flange	FN	AN
EMCO flange with bellows	GN	DN
<b>FLOATS</b>		
Standard lever	01	
Long lever	25-100	
Variable	02	
Variable	0261	
Variable	0295	
Topmounted variable	03	
Topmounted	04	
Cranked lever	05	
<b>ACCESSORIES</b> For code FN/GN mounting flanges and AN/DN mounting flanges		
	FN/GN	AN/DN
Counter flange weld neck carbon steel	380	38
Counter flange weld neck stainless steel AISI 316	460	46
Counter flange carbon steel	490	49
Counter flange stainless steel AISI 316	510	51
Tester carbon steel	LO	L
Tester stainless steel AISI 316	MO	M
Tester carbon steel	LL0	LL
Tester stainless steel AISI 316	LM0	LM
Float chamber carbon steel with 1" butt weld ends	/with tester	H0 H0/L0 H H/L
Float chamber carbon steel with DN 25 PN 40 flanges (DIN)	/with tester	ID0 ID0/L0 ID ID/L
Float chamber carbon steel with 1" 300 lbs RF flanges (ANSI)	/with tester	IA0 IA0/L0 IA IA/L
Float chamber AISI 316 with 1" butt weld ends	/with tester	JO JO/M0 J J/M
Float chamber AISI 316 with DN 25 PN 40 flanges (DIN)	/with tester	JD0 JD0/M0 JD JD/M
Float chamber AISI 316 with 1" 300 lbs RF flanges (ANSI)	/with tester	JA0 JA0/M0 JA JA/M
<b>MOUNTING KITS</b>		
General purpose gasket and 4 pcs M 12 x 30 bolts (standard)	FN1	
Viton gasket and 4 pcs M 12 x 30 bolts	FN2	
PTFE gasket and 4 pcs M 12 x 30 bolts	FN3	
General purpose gasket and 4 pcs M 6 x 30 bolts (standard)		AN1
Viton gasket and 4 pcs M 6 x 30 bolts		AN2
PTFE gasket and 4 pcs M 6 x 30 bolts		AN3

**EXAMPLE:** EMCO Float Switch type 210FN01-380-FN1 is a float switch with a SPDT switch silver plated contact, EMCO flange mounting, standard lever, counter flange with weld neck in carbon steel and general purpose gasket.

## OTHER EMCO PRODUCTS



### LEVEL

EMCO magnetic level indicators

EMCO magnetic level indicators series LI indicate the liquid level of vessels. The liquid level detection is safe, reliable and maintenance free. Reed switches can be added for control purposes and remote indication is available as well.

EMCO glass level gauges

EMCO level gauges are designed for direct visual observation of liquid level in tanks. 2 main types are available : The Reflex type where the inner surface of the glass has reflecting prisms and the Transparent type where the observer is able to detect the liquid level, the colour, and the clarity of the liquid.

### FLOW

DP flow is one of the most studied and best understood flow technologies due to its simplicity and importance. This bare bone technology is world wide accepted and supported by millions of successful installations. Instrument companies are continuing to bring out new and improved transmitters, including multi variable transmitters, supporting and extending the utility of DP flow.

DP flow meters

The main type of flow meters for gas and liquid is the FLEMCO type and for steam it is the STEEMCO type. They are mounted between flanges from DN 50 to DN 400. All types have a 4-20 mA analogue output signal, but also they have the possibility of serial communication with HART.

Above DP flow meters are for volumetric flow. Models for mass flow for gas and saturated and superheated steam are available.

DP flow elements

The traditional way is separating the DP element from the electronics. This method is still chosen for many flow applications.

One can choose between a large variety of DP elements to suit a specific application. The choice goes from the well proven and simple orifice plate or orifice plate with carrier rings up to ISA 1932 nozzle, venturi nozzle or classical venturi tube for more demanding applications to averaging pitot tubes for easy installations and large pipes.

Restriction orifice plates and critical flow devices are also considered to be part of the group of DP elements.



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