



# SENSILEVEL

**7A.172-E**  
 Issue 3.1 - 2016

## - Series 7700 Displacer Operated Double Stage Level Controls

### Description

Displacer operated level controls are the ideal solution for liquids that are turbulent, viscous, foaming or muddy etc. Instead of using a conventional float, these instruments use displacers that can be positioned anywhere along the suspension cable.

The devices are equipped with two switch mechanisms and are available with narrow or wide switching differential.

The narrow range models, fitted with two displacers, are factory set to work with a fixed differential that is slightly variable according to the density of the liquid, while the switching levels for each stage can be easily adjusted by changing the position of the displacers along the suspension cable.

The wide range models are equipped with three displacers, which can operate in various combinations; by changing the position of the displacers along the cable, both the switching level and differential width setting for each stage can be adjusted.

The connection to the tank, in carbon steel, can be screwed 3" NPT or flanged (3" ANSI 150 RF as standard).

The displacer spring is in Inconel and is enclosed in an AISI 316 housing (with a diameter of about 73 mm) placed below the tank connection. The devices come as standard with displacers in porcelain or in AISI 316 L (see table below) and with a 3-metre AISI 316 suspension cable.

### Use

This device should be considered a component used to control level, and should not be considered a safety device.

These products are designed and constructed in accordance with the directive 2014/68/EU and are not CE marked because they are not considered to be operating under pressure.

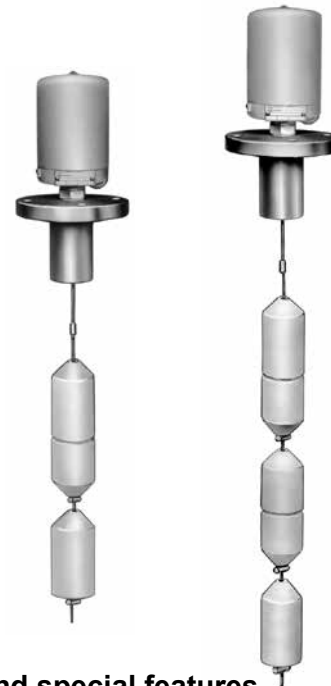
### Switch selection

To select the correct model according to the operating conditions and nature of the liquid to be controlled, please refer to the table below.

To select the switch mechanisms and switch housings, consult specification 7A.100.

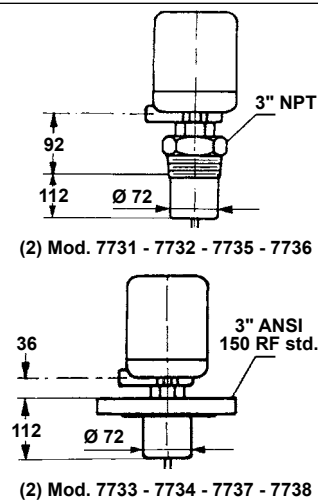
### Specifications

Maximum pressure: 70 bar								
In models with flanged connections, the maximum pressure may be limited by the flange rating								
Model	Function	Connection	Displacer	Minimum specific gravity related to the process temperature (3) (kg/dm <sup>3</sup> )				
				40°C	100°C	150°C	200°C	250°C
7731	Narrow Differential	Screwed	Porcelain (1)	0.80	0.90	1.00	1.10	--
7732			Stain. Steel	0.70	0.80	0.80	0.90	1.00
7733		Flanged	Porcelain (1)	0.80	0.90	1.00	1.10	--
7734			Stain. Steel	0.70	0.80	0.80	0.90	1.00
7735	Wide Differential	Screwed	Porcelain (1)	0.75	0.80	0.85	0.95	1.10
7736			Stain. Steel	0.70	0.75	0.80	0.85	0.95
7737		Flanged	Porcelain (1)	0.75	0.80	0.85	0.95	1.10
7738			Stain. Steel	0.70	0.75	0.80	0.85	0.9



### Options and special features

- Connection to system in AISI 316 or other special corrosion-resistant materials
- Cable and clamps in Monel, Incoloy B or Nylon
- Displacers in special materials
- Attraction sleeve with anti-corrosion coating
- Longer cable

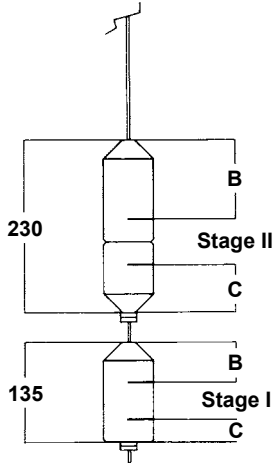


### Notes:

- (1) The porcelain displacers cannot be used at temperatures above 95°C in closed tanks containing water or condensate.
- (2) For the dimensions of the housing see specification 7A. 100.
- (3) Values applying to switches with metal contacts; for switches with mercury contacts see tables on pages 2-3.

Switching levels (mm) as a function of specific gravity and temperature

Mod. 7731 - Mod. 7733



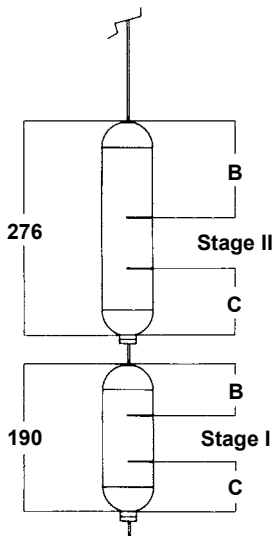
Switches with metal contacts (Micro-switches)

Specific Gravity	Stage	40°C		100°C		150°C		200°C		250°C	
		B	C	B	C	B	C	B	C	B	C
0.80	Stage II	76	82	--	--	--	--	--	--	--	--
	Stage I	44	30	--	--	--	--	--	--	--	--
0.90	Stage II	105	61	88	80	--	--	--	--	--	--
	Stage I	54	27	33	50	--	--	--	--	--	--
1.00	Stage II	129	45	113	62	103	72	--	--	--	--
	Stage I	62	24	43	45	31	58	--	--	--	--
1.10	Stage II	147	31	133	46	125	56	94	66	--	--
	Stage I	69	22	52	41	41	52	30	64	--	--

Switches with mercury contacts

Specific Gravity	Stage	40°C		100°C		150°C		200°C		250°C	
		B	C	B	C	B	C	B	C	B	C
0.80	Stage II	45	83	--	--	--	--	--	--	--	--
	Stage I	36	30	--	--	--	--	--	--	--	--
0.90	Stage II	78	62	61	81	--	--	--	--	--	--
	Stage I	47	27	35	50	--	--	--	--	--	--
1.00	Stage II	104	45	89	62	79	73	--	--	--	--
	Stage I	56	24	37	45	25	58	--	--	--	--
1.10	Stage II	125	31	111	47	103	56	70	66	--	--
	Stage I	63	22	46	41	35	52	25	64	--	--

Mod. 7732 - Mod. 7734



Switches with metal contacts (Micro-switches)

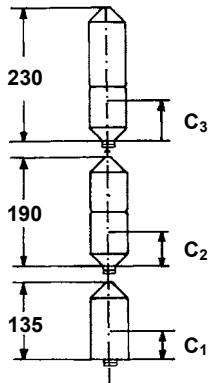
Specific Gravity	Stage	40°C		100°C		150°C		200°C		250°C	
		B	C	B	C	B	C	B	C	B	C
0.70	Stage II	53	135	--	--	--	--	--	--	--	--
	Stage I	61	56	--	--	--	--	--	--	--	--
0.80	Stage II	101	99	82	119	70	132	--	--	--	--
	Stage I	76	50	51	77	35	93	--	--	--	--
0.90	Stage II	138	70	121	88	111	100	100	112	--	--
	Stage I	87	46	65	69	51	84	38	99	--	--
1.00	Stage II	168	47	152	64	143	74	134	85	124	95
	Stage I	97	42	77	64	64	77	52	90	39	103
1.10	Stage II	192	28	178	43	170	53	161	62	152	72
	Stage I	104	39	86	59	75	71	63	83	52	95

Switches with mercury contacts

Specific Gravity	Stage	40°C		100°C		150°C		200°C		250°C	
		B	C	B	C	B	C	B	C	B	C
0.80	Stage II	68	99	50	119	--	--	--	--	--	--
	Stage I	68	50	43	77	--	--	--	--	--	--
0.90	Stage II	109	70	93	88	83	100	73	112	--	--
	Stage I	80	46	58	69	45	84	31	99	--	--
1.00	Stage II	141	47	127	64	118	74	109	85	100	95
	Stage I	90	42	70	64	58	77	46	90	33	103
1.10	Stage II	168	28	155	43	147	53	139	62	130	72
	Stage I	98	39	80	59	69	71	58	83	47	95

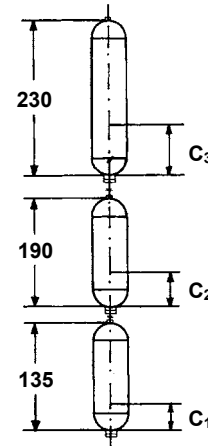
Switching levels (mm) as a function of specific gravity and temperature

Mod. 7735 - Mod. 7737



Specific Gravity	40°C			100°C			150°C			200°C			250°C		
	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>
0.75	41	95	177	--	--	--	--	--	--	--	--	--	--	--	--
0.80	38	82	149	76	116	177	--	--	--	--	--	--	--	--	--
0.85	36	71	125	71	103	151	93	123	167	--	--	--	--	--	--
0.90	34	61	103	67	91	127	88	110	143	--	--	--	--	--	--
0.95	32	53	84	64	81	107	83	98	121	103	116	135	--	--	--
1.00	30	45	66	60	71	88	79	88	102	98	105	115	--	--	--
1.05	29	37	50	58	63	71	75	79	84	93	95	97	--	--	--
1.10	28	31	36	55	55	56	72	70	68	89	86	80	106	101	93

Mod. 7736 - Mod. 7738



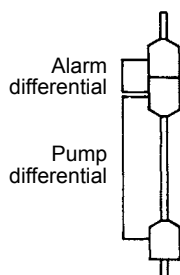
Specific Gravity	40°C			100°C			150°C			200°C			250°C		
	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>
0.70	67	140	233	--	--	--	--	--	--	--	--	--	--	--	--
0.75	64	120	196	105	156	225	--	--	--	--	--	--	--	--	--
0.80	60	103	163	99	136	190	124	157	207	--	--	--	--	--	--
0.85	57	87	134	94	119	160	117	138	176	140	158	192	--	--	--
0.90	55	74	108	89	103	133	111	122	148	133	140	163	--	--	--
0.95	52	61	85	85	89	108	106	107	123	126	125	137	147	142	152
1.00	50	50	65	82	77	87	101	94	100	121	110	114	140	127	128
1.05	48	40	46	78	66	67	97	82	80	115	98	93	134	114	106
1.10	47	31	29	75	56	49	93	71	61	111	86	74	128	101	86

Note: Models 7736/7738 can be supplied with special displacers for specific gravities other than those shown in the table.

Use: The examples given illustrate the uses for these models.

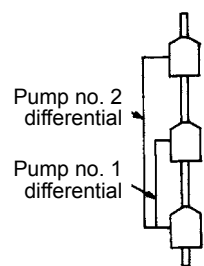
**A. Pump control plus alarm (high or low level)**

When the level rises as far as the intermediate displacer, the emptying pump is activated. When the level falls to the lower displacer the pump stops. If the level rises as far as the upper displacer the alarm is activated, and remains active until the level returns to the intermediate displacer. The sequence can be adapted for use with a filling pump, with alarm activation at the minimum level.



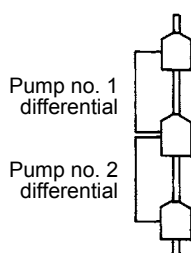
**C. Two pump control - start at different levels, stop at a common level**

When the level rises as far as the intermediate displacer, emptying pump no. 1 is activated, and stops when the level reaches the bottom displacer. If pump no. 1 is insufficient and the level reaches the upper displacer, pump no. 2 is activated. Both pumps remain on until the level falls to the bottom displacer.

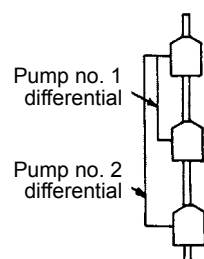


**B. Two pump control - start and stop at two different levels with one common level**

When the level falls as far as the intermediate displacer, pump no. 1 is activated, and stops when the level rises to the upper displacer. If this is insufficient and the level continues falling to the bottom displacer, then pump no. 2 is activated, which stops once again when the level reaches the intermediate displacer.

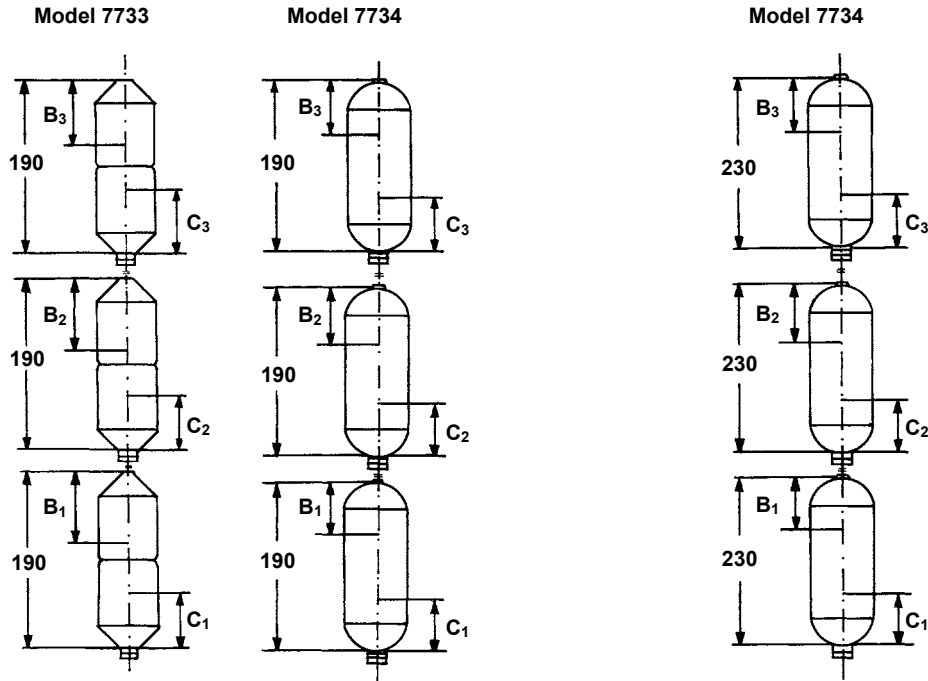


**D. The sequence of pumps can be varied for a filling problem.**



### Special three-stage Sensilevel devices

These devices feature three independent switch mechanisms, activated individually and with narrow differential. They are normally used to signal three levels or for three alarms at specific distances between switching levels. They come factory set for a given specific gravity (to be specified in order) and the admissible variation is minimal ( $\pm 4\%$  of set value). The displacers can be in AISI 316 or in porcelain, for liquids with a specific gravity greater than 0.95, and only in AISI 316 for a specific gravity between 0.75 and 0.95. For different specific gravities, please ask the department. Only type 2 or 3 switch mechanisms (with micro-switch) can be mounted on these instruments.



For specific gravity greater than 0.95 kg/dm<sup>3</sup>

For specific gravity between 0.75 and 0.95 kg/dm<sup>3</sup>

### Switching levels (mm) as a function of specific gravity and temperature

C°	B <sub>1</sub>	C <sub>1</sub>	B <sub>2</sub>	C <sub>2</sub>	B <sub>3</sub>	C <sub>3</sub>
40	82	45	78	45	72	45
80	45	80	50	77	49	70

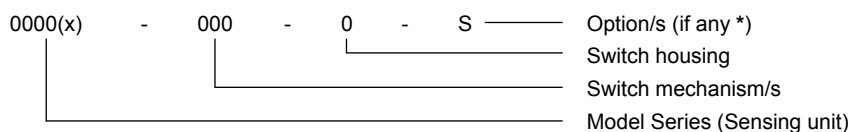
C°	B <sub>1</sub>	C <sub>1</sub>	B <sub>2</sub>	C <sub>2</sub>	B <sub>3</sub>	C <sub>3</sub>
40	104	52	100	52	93	52
80	62	93	68	86	66	80

### Model number code system

The model number for each control is determined by selecting three basic modules which describe a complete control. They are:

- Model series (Sensing unit)
- Switch mechanism/s
- Switch housings

Each module has a corresponding numeric code which, when combined together, forms the MODEL NUMBER. The model number coding arrangement is as follows:



\* When options are required, an S is added after the Switch Housing Code and the option required described.