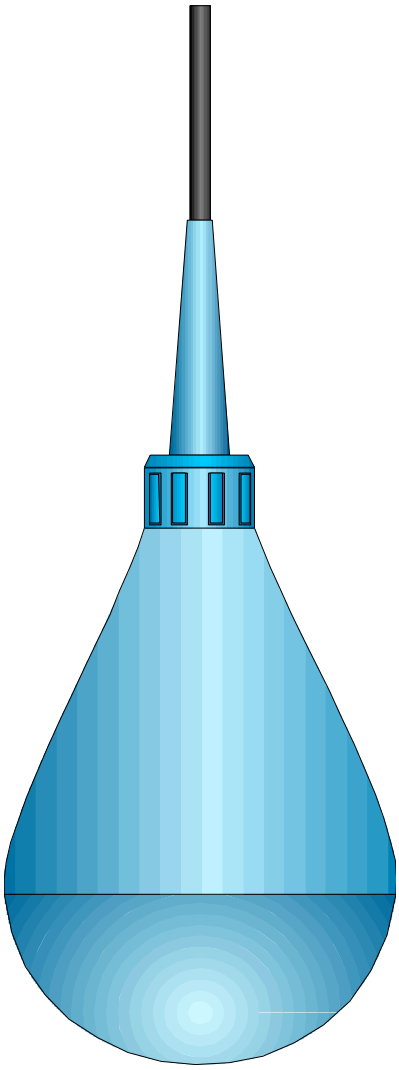
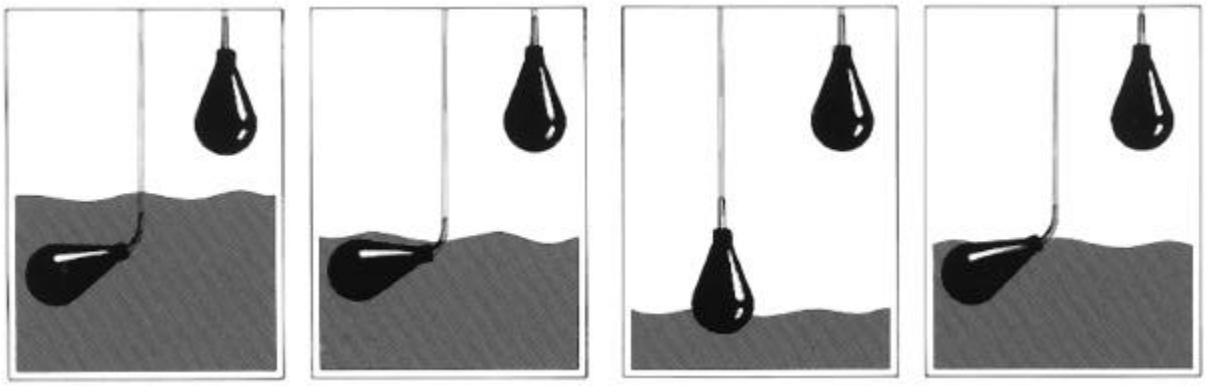
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PRODUCT DATA

LEVEL (REGULATOR) SWITCH

ENM-10





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1. GENERAL

The ENM-10 level regulator is a level switch, used in liquid level regulating systems, to indicate start, stop and alarm levels.

ENM-10 has replaced ENH-10, which due to environmental reasons, could no longer be used.

ENM-10 contains a snap action micro switch and a weight made of zinc, whereas the ”old” ENH-10 employed a mercury switch and a weight of lead.

The exterior of the ENM-10 and the ENH-10 looks the same and the materials exposed to the liquid are identical.

The function of the level switch is best described by the illustrations on the front page. As apparent, the switch does not float but takes a tilted position when covered by liquid.

This is due to the fact that the density of the level switch is greater than the liquid density. Thus, the cable is always stretched, reducing the risk for tangling when many units are installed.

The built-in changeover contact (micro switch) assumes either of its two states, depending on the position of the switch.

Cross-sectional drawings, see figures 1.1 and 1.2.

See also section 3. Materials, for further details.

Figure 1.1 Hanging position

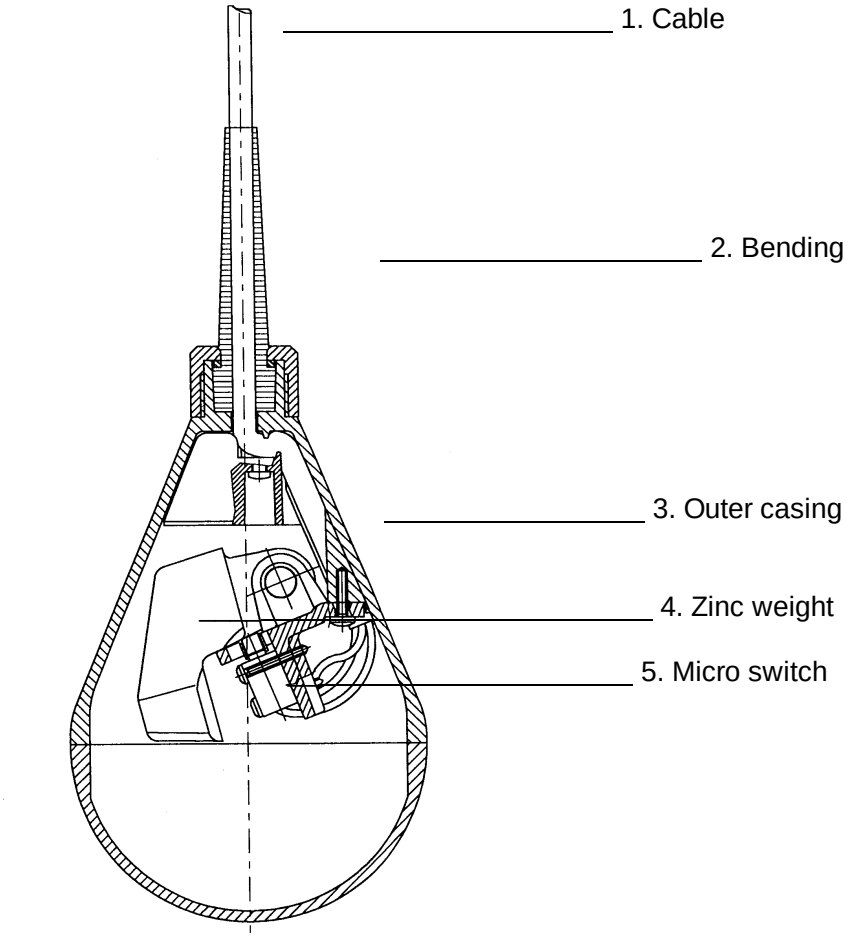
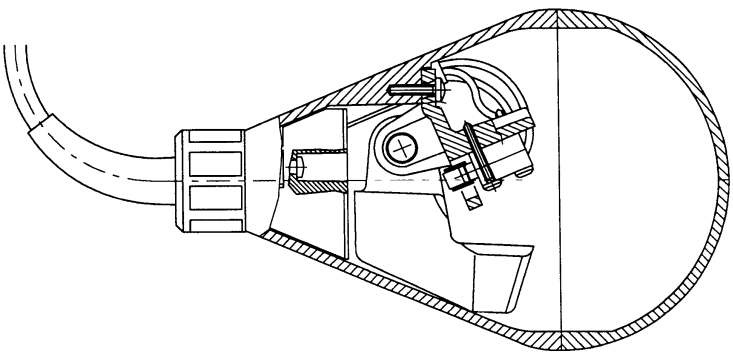


Figure 1.2 Tilted position



2. STANDARDS AND APPROVALS

CE-mark

The CE-mark stands for that the product meets general safety requirements established by applicable EU-directives for the product.
For the ENM-10, the only applicable directive is the LVD (Low Voltage Directive).
To ensure the fulfilment, ENM10 has been tested by SEMKO (Sweden) in accordance with standards, **EN61058-1** and **EN61058-2-1**. The results are published in the test report SE9420194.

All variants of the product listed in this folder comply with the requirements.

There is a European agreement on mutual recognition of test results, the CENELEC Certification Agreement (CCA). The agreement comprises EC and EFTA countries but also Hungary and the Czech Republic.

CSA - Canadian Standards Approval

The product has been tested by CSA according to the applicable requirements: CAN/CSA-C22.2 No.14-M91 Industrial control equipment
CSA Std C22.2 No.49-1981 Flexible cords and cables and fixture wires
CAN/CSA-C22.2 No.108-M89 Liquid pumps

Test report (CSA file no.): LR24026-6.

One of the requirements states that the casing must be made of self-extinguishing material. Thus, for the CSA approved versions, the casing material is mixed with a flame-resistant substance. These variants are grey.

All variants of the product with grey casing (self extinguishing) listed in this folder, fulfil the requirements according to CSA.

MSHA - Mine Safety and Health Administration (USA)

The blue PVC-cable is marked P-MSHA SC-198/1.
The cable meets the requirements of Part 18.64(f), Title 30, Code of Federal Regulations.

3. MATERIALS

Body: Polypropylene
Bending relief (protective sleeve): EPDM rubber
Cable: Special compound PVC or CPE (Chlorinated polyethylene) rubber

4. DIMENSIONS AND WEIGHTS

The diameter of all level switches is 100,5 mm.

By manufacturing the body in different lengths, the density of the level switch is varied to suit applications in a wide range of liquid densities.

The total weight is calculated as the sum of the cable and body weight.

The total weight is approx. 2 kg (4.5 lb) for a standard density regulator with 20 m cable.

PVC-cable: approx. 64 g/m
CPE (Chlorinated polyethylene) cable: approx. 74 g/m

For density g / cm3	Body length mm (in)	Weight body+bendig relief kg (lb)
0,65-0,80	194 (7+10/16)	0,785 (1,72)
0,80-0,95	177 (7)	0,775 (1,70)
0,95-1,10	162 (6+3/8)	0,765 (1,68)
1,05-1,20	142 (5+9/16)	0,755 (1,66)
1,20-1,30	133 (5+1/4)	0,755 (1,66)
1,30-1,40	130 (5+1/16)	0,755 (1,66)
1,40-1,50	126 (5)	0,755 (1,66)

5. MECHANICAL DATA

Ambient temperature range: 0 - 60 °C

Pressure durability: Equal to 20 m submergence in water

Impact resistance: Withstands a drop from 1 m against a concrete floor.

Tensile strength: Cable and strain relief conforms with the CSA standard, which means 130 N during 30 s.

Contact switch over angle:
- from vertical: 40 - 60°
- back from tilted position: 20 - 30°

6. MICRO SWITCH DATA

Interrupting Capacity, AC	250 V / 10 A resistive load 250 V / 3 A inductive load at cosφ = 0,5
Interrupting Capacity, DC	30 V / 5 A 250 V / 0,05 A

Electrical life: 200 000 operations at rated interrupting capacity.

7. CHEMICAL RESISTANCE

The list has been prepared for the complete level switch, that is for body, bending relief and cable.

0 = No effect, 1 = Minor to moderate, 2 = Severe effect, ¾ = No information available.

Acids	PVC cable		CPE (Chlorinated polyethylene) rubber cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Acetic Acid 50%	1	2	0	0
Acetic Acid 75%	2	2	0	0
Benzoic Acid	2	2	0	0
Boric Acid 5%	0	—	0	0
Butyric Acid	2	2	2	2
Chromic Acid 10%	0	2	2	2
Citric Acid	0	1	0	0
Hydrobromic Acid 5%	1	2	0	0
Hydrochloric Acid 10%	0	1	0	1
Hydrochloric Acid 37%	1	2	0	2
Hydrocyanic Acid 10%	0	0	1	2
Hydrofluoric Acid 5%	0	2	0	1
Hypochloric Acid	1	2	2	2
Maleic Acid	2	2	2	2
Nitric Acid 5%	1	1	1	1
Nitric Acid 65%	2	2	2	2
Oleic Acid	1	2	2	2
Oxalic Acid 50%	1	1	1	2
Phosphoric Acid 25%	0	0	1	2
Phosphoric Acid 85%	0	0	1	2
Sulphuric Acid 10%	1	2	1	2
Sulphuric Acid 78%	2	2	2	2
Tannic Acid	0	0	0	0
Tartaric Acid	1	1	1	1

Bases	PVC cable		CPE (Chlorinated polyethylene) rubber cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Ammonium Hydroxide	0	—	0	0
Calcium Hydroxide	0	0	0	0
Potassium Hydroxide	1	2	0	0
Sodium Hydroxide	1	2	0	0
Salts				
Aluminium Chloride	0	0	0	0
Calcium Sulphate	0	0	0	0
Calcium Chloride	0	0	0	0
Calcium Nitrate	0	0	0	0
Copper Chloride	0	0	0	0
Copper Sulphate	0	0	0	0
Ferric Chloride	0	0	0	0
Ferrous Sulphate	0	0	0	0
Magnesium Chloride	0	0	0	0
Potassium Sulphate	0	0	0	0
Potassium Nitrate	0	0	0	0
Potassium Carbonate	1	1	1	1
Potassium Bicarbonate	0	0	0	0
Sodium Sulphate	0	0	0	0
Sodium Chloride	0	0	0	0
Sodium Nitrate	0	0	0	0
Sodium Bicarbonate	0	0	0	0
Sodium Carbonate	0	0	0	0
Tin Chloride	1	1	1	1
Zinc Sulphate	0	0	0	0
Zinc Chloride	0	0	0	0

Oils	PVC cable		CPE (Chlorinated polyethylene) rubber cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Castor Oil	1	1	1	1
Cocoanut Oil	0	—	0	2
Corn Oil	2	2	2	2
Diesel Oil	2	2	2	2
Linseed Oil	2	2	2	2
Mineral Oils	2	2	2	2
Olive Oil	1	1	1	1
Silicone Oils	0	0	0	0
Solvents and miscellaneous				
Aceton	2	2	2	2
Aniline	2	2	1	2
Benzene	2	2	2	2
Butyl Alcohol	2	2	0	1
Carbon Tetrachloride	2	2	2	2
Chlorobenzene	2	2	2	2
Chloroform	2	2	2	2
Ethyl Alcohol	2	2	0	1
Ethyl Ether	2	2	2	2
Ethyl Acetate	2	2	2	2
Ethylene Dichloride	2	2	2	2
Ethylene Chloride	2	2	2	2
Formaldehyde 37%	1	2	0	0
Gasoline	2	2	2	2
Kerosene	2	2	2	2
Methyl Alcohol	2	2	0	0
Methyl Ethyl Ketone	2	2	2	2
Methylene Chloride	2	2	2	2
Nitrobenzene	2	2	2	2
Phenol	2	2	2	2
Toluene	2	2	2	2
Trichlorethylene	2	2	2	2
Turpentine	2	2	2	2

Xylene	2	2	2	2
Gases	**PVC cable**		**CPE (Chlorinated polyethylene) rubber cable**	
	20°C (68°F)	**60°C (140°F)**	**20°C (68°F)**	**60°C (140°F)**
Carbon Dioxide	0	0	0	0
Carbon Monoxide	0	0	0	0
Chlorine (wet)	2	2	2	2
Hydrogen Sulphide	0	0	1	1
Sulphur Dioxide (wet)	1	1	2	2

8. AVAILABLE VERSIONS

The ENM-10 is available in many versions.

For detailed version list, see section 2.

The range covers:

Density of surrounding liquid:	0,65 - 1,5 g / cm^3
Colour:	Blue or red or grey (flame proof)
Cables:	PVC or CPE (Chlorinated polyethylene) rubber
Approvals:	See section 2

9. SAFETY REGULATIONS

In many cases, local codes and regulations require that the level switch is connected to safety voltage supply, even though the unit itself is approved for higher voltages.

Flygt strongly recommends, that the level switch is connected to a safety voltage supply transformer (max. 50 V , in some countries 42 or even 24 V).

Special rules apply to installation in explosive atmosphere. Intrinsically safe, Ex-approved safety barriers are required for such applications.

10. CABLE DATA

The cable is available in several versions. Basically there are two types, PVC or CPE (Chlorinated polyethylene) rubber.

SUMMARY OF CABLE PROPERTIES

	PVC-cable	**CPE (Chlorinated polyethylene) rubber-cable**
Cenelec type	A05VV-F 3X0,75mm^2	A05RN-F 3X0,75mm^2
Colour	Blue or red	Black
Copper conductor size [mm^2]	0,75	0,75
Copper conductor size AWG	Approx. 19 AWG	Approx. 19 AWG
Number of conductors	3	3
Conductor insulation	PVC	EPR (ethylene propylene rubber)
Colour of conductor insulation:		
- common	Blue Red 1)	Blue
- N/C	Brown White	Brown
- N/O	Black Black	Black
Outer sheathing	Special compound PVC, type FLY-80	CPE (Chlorinated polyethylene) rubber 05 R-F
Outer nominal diameter [mm]	6,6	6,6
Maximum current [A]	10	10
Maximum voltage [V]	380	380
Resistance/ km and conductor at 20° C [Ω]	25	25
Inductance core to core/ km [mH]	0,57	NOT AVAILABLE
Inductance/ km and conductor in air [mH]	0,33	NOT AVAILABLE
Capacitance core to core/ km [nF]	150	NOT AVAILABLE
Capacitance between conductors and ground [nF]		
-In air / km	105	NOT AVAILABLE
-In water / km	123	NOT AVAILABLE

As an option, any cable may be mounted to the level switch, provided that the following conditions are fulfilled by the subsidiary, when ordering the special cable, i,e:

1) The cable is selected and obtained locally.

2) A sample is delivered for approval by the workshop before you order assembling.

3) Sufficient cable length for production is delivered to Lindås in 200 m rolls, with a centre hole in the cable drum approximately 200 mm in diameter.

   Please note that excess cable lengths will be scrapped and not stored by the assembly shop.

4) You ensure that the outer diameter of the cable within the stated tolerances which are: 6,6 (+0,2 to -0) mm

5) You accept full responsibility for the safety and function of the cable.

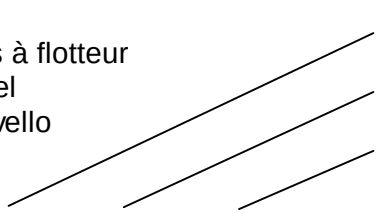
6) The ordered quantity should not be less than 50 pcs.

In most applications the PVC cable is sufficient and even better than the CPE (Chlorinated polyethylene) rubber cable, but for some chemicals the CPE cable is more suitable.

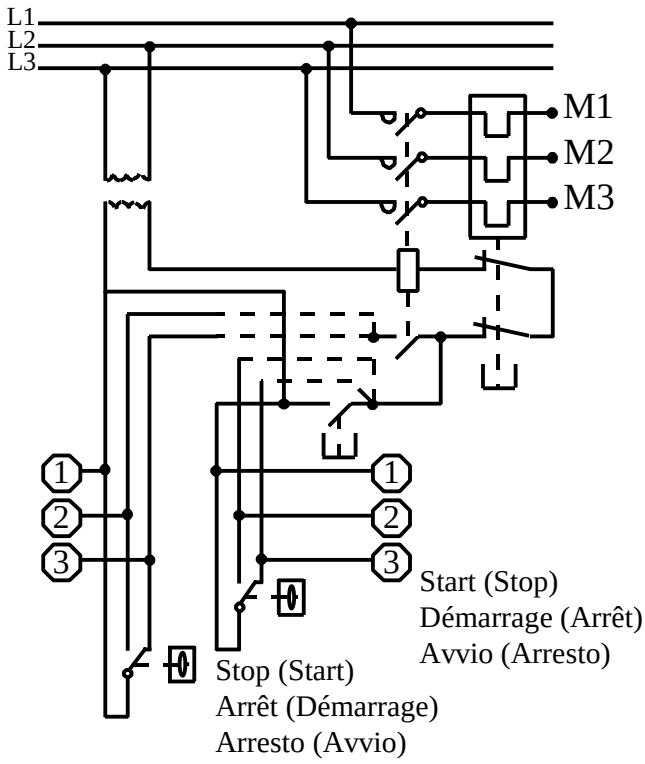
Note that the CPE cable is the same type of cable as the SubCab motor cable, which means; if the motor cable works OK in the application, the CPE level switch cable should be all right.

11. WIRING DIAGRAM

Wired table for level regulators
Anschlusstabelle für Füllstandsregler
Tableau de branchement pour interrupteurs à flotteur
Tabla de conexión para reguladores de nivel
Schema di collegamento per regolatori di livello
Kopplingstabell för nivåvippor

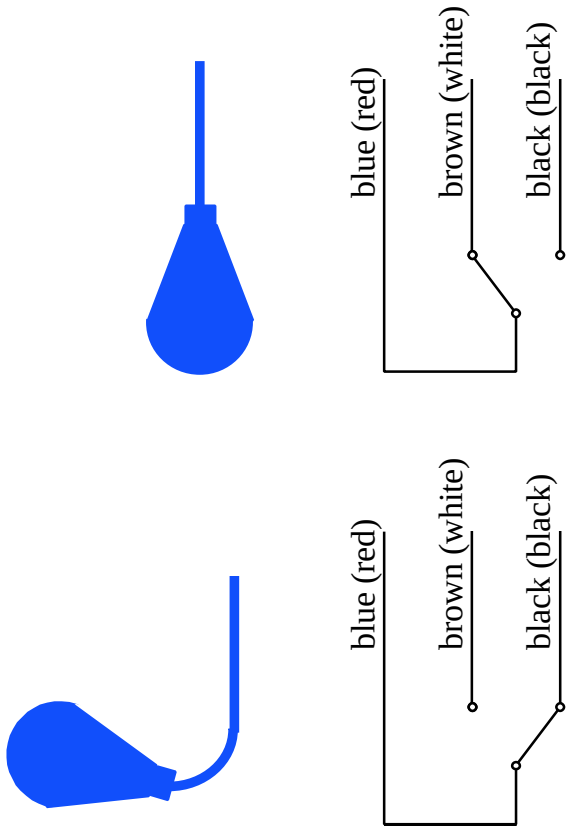


	1	2	3
Wired for emptying of pump sump Schaltung für das Entleeren eines Sammelbehälters Branchement pour vidange de puisard Conectado para vaciado de pozo Collegato per lo svuotamento del pozzo Kopplad för tömning av pumpgrop	X	X	Insulate Isolieren Isolez Aislar Isolare Isoleras
Wired for filling of tank Schaltung für Behälterfüllung branchement pour remplissage de reservoir Conectado para llenado de depósito Collegato per il riempimento del pozzo Kopplad för fyllning av tank	X	Insulate Isolieren Isolez Aislar Isolare Isoleras	X



Dashed lines show alternative wirings
Gestrichelte Linien deuten weitere Schltungsmöglichkeiten an
Les traits en pointillés correspondent à d'autres variantes de branchement
Las lineas a trazos muestran conexiones alternativas
Le linee tratteggiate indicano collegamenti alternativi
Streckdragna linjer visar alternativa kopplingar

Contact status as a function of casing position.



12. VERSION LIST OF ENM-10

Version	For density g/cm^3	Colour of level switch	Type of cable	Length of cable [m]	Approvals	For
582 88 00	0,65-0,80	blue	1	20	CE	
582 88 01	0,80-0,95	blue	1	20	CE	
582 88 02	0,95-1,10	blue	1	6	CE	
582 88 03	0,95-1,10	blue	1	13	CE	
582 88 04	0,95-1,10	blue	1	20	CE	
582 88 05	1,05-1,20	blue	1	20	CE	
582 88 06	1,20-1,30	blue	1	20	CE	
582 88 07	1,30-1,40	blue	1	20	CE	
582 88 08	1,40-1,50	blue	1	20	CE	
582 88 18	0,65-0,80	grey	1	20	CSA/CE	Canada
582 88 19	0,80-0,95	grey	1	20	CSA/CE	Canada
582 88 20	0,95-1,10	grey	1	6	CSA/CE	Canada
582 88 21	0,95-1,10	grey	1	13	CSA/CE	Canada
582 88 22	0,95-1,10	grey	1	20	CSA/CE	Canada
582 88 23	1,05-1,20	grey	1	20	CSA/CE	Canada
582 88 24	1,20-1,30	grey	1	20	CSA/CE	Canada
582 88 25	1,30-1,40	grey	1	20	CSA/CE	Canada
582 88 26	1,40-1,50	grey	1	20	CSA/CE	Canada
582 88 27	0,65-0,80	blue	2	20	CE	USA
582 88 28	0,80-0,95	blue	2	20	CE	USA
582 88 29	0,95-1,10	blue	2	6	CE	USA
582 88 30	0,95-1,10	blue	2	13	CE	USA
582 88 31	0,95-1,10	blue	2	20	CE	USA
582 88 32	1,05-1,20	blue	2	20	CE	USA

Version	For density g/cm^3	Colour of level switch	Type of cable	Length of cable [m]	Approvals	For
582 88 33	1,20-1,30	blue	2	20	CE	USA
582 88 34	1,30-1,40	blue	2	20	CE	USA
582 88 35	1,40-1,50	blue	2	20	CE	USA
582 88 52	0,95-1,10	red	3	6	CE	
582 88 53	0,95-1,10	red	3	13	CE	
582 88 54	0,95-1,10	red	3	20	CE	
582 88 55	0,95-1,10	red	3	6	CE	Canada
582 88 56	0,95-1,10	red	3	13	CE	Canada
582 88 57	0,95-1,10	red	3	20	CE	Canada
582 88 58	0,95-1,10	red	4	6	CE	USA
582 88 59	0,95-1,10	red	4	13	CE	USA
582 88 60	0,95-1,10	red	4	20	CE	USA
582 88 70	0,65-0,80	blue	5	20	CE	
582 88 71	0,80-0,95	blue	5	20	CE	
582 88 72	0,95-1,10	blue	5	6	CE	
582 88 73	0,95-1,10	blue	5	13	CE	
582 88 74	0,95-1,10	blue	5	20	CE	
582 88 75	1,05-1,20	blue	5	20	CE	
582 88 76	1,20-1,30	blue	5	20	CE	
582 88 77	1,30-1,40	blue	5	20	CE	
582 88 78	1,40-1,50	blue	5	20	CE	
582 88 80	0,95-1,10	blue	1	30	CE	
582 88 81	0,95-1,10	blue	1	50	CE	

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PRODUCT DATA

ENM-10

From (department, namn)	Date	Section	Page	Issue
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Version	**For density g/cm^3**	**Colour of level switch**	**Type of cable**	**Length of cable [m]**	**Approvals**	**For**
582 88 82	0,95-1,10	grey	1	30	CSA/CE	Canada
582 88 83	0,95-1,10	grey	1	50	CSA/CE	Canada
582 88 84	0,95-1,10	blue	2	30	CE	USA
582 88 85	0,95-1,10	blue	2	50	CE	USA
582 88 86	0,95-1,10	red	3	30	CE	
582 88 87	0,95-1,10	red	3	50	CE	
582 88 90	0,95-1,10	blue	5	30	CE	
582 88 91	0,95-1,10	blue	5	50	CE	

Type of cables:

1. Blue PVC jacket with colour coding of conductors: blue - brown - black
2. Blue PVC jacket with colour coding of conductors: red - white - black
3. Red PVC jacket with colour coding of conductors: blue - brown - black
4. Red PVC jacket with colour coding of conductors: red - white - black
5. Black CPE (Chlorinated polyethylene) jacket with colour coding of conductors: blue - brown - black