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LEVEL SWITCHES
TYPE ERH-01...04-07

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1. INTRODUCTION

1.1 SAFETY INDICATIONS

1.1.1 Range of applications

Level switches is designed for automatic adjustment, signalling or controlling of preset threshold value of fluid level in open or closed (pressurized) tanks, in wide range of pressures and temperatures.

Other applications must be consulted with the producer.

Producer is not responsible for any damages, resulting from controller use, inconsistent with above applications. The risk is born by the user only.

The element of proper use of that device is also following this technical documentation recommendations.

1.1.2. Definitions used in the description

- **Operator** – person using the device according to its purpose (PN-EN 61010-1, July 2004),
- **Technical inspection** – person or group of persons, responsible for device use and maintenance, and assuring appropriate trainings for OPERATORS (PN-EN 61010-1, July 2004),

1.1.3. Allowed operations range:

- **For operator** – level switch operation.
- **Technical inspection** – as for operator, also mechanical and electrical installation and adjustment activities.

1.1.4 Power supply connecting.



Installation works and level switch start-up should be performed only by qualified electricians or personnel trained under their supervision, according to valid regulations and electrotechnical recommendations.

1.1.5 Indications and warnings.

In case of not following recommendations and warnings serious injuries and/or property damages may occur. Operator must be properly trained by technical inspection and familiarized with all safety recommendations and warnings.

For reliable and safe level switch operation it is required to assure proper transport, storage, installation, start-up and maintenance.

In this technical documentation the important safety information are marked with the following symbols:

	<p style="text-align: center;">This symbol means: Indication.</p> <p>“Indication” shows action or process, especially important for proper device operation. In case of not following such recommendation property damages may occur.</p>
	<p style="text-align: center;">This symbol means : Warning.</p> <p>“Warning” shows action or process, which in case of improper execution may be dangerous for personnel or cause serious property damages.</p>

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1.2 SUBJECT OF TECHNICAL PRODUCT DOCUMENTATION

The subject of this technical product documentation is application, design and installation of level switches.

1.3 APPLICATION, LEGAL DESIGNATIONS

Level switches are designed for double-position signalling of fluid minimum and maximum.
Designation according to Polish Classification of Products and Services (PKWiU): 26.51.70.0
Designation according to Systematic List of Products (SWW): -0918-132.

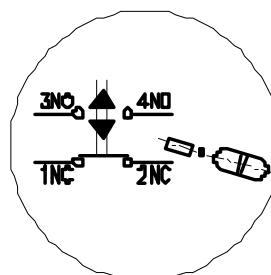
1.4 DESIGN AND OPERATION PRINCIPLE

Level switches consists of two main groups, separated with diamagnetic partition:

- relay group**, being the converting device part, unified for all types.
In the body there is intermediate magnet, directed with equal pole to the float magnet, and the miniature connector, supplying electric impulses, resulting from magnet lever arm action, to the connector contacts switching button. To the connector terminals external cables are connected, guided though the cable gland.
- float group**, being the level switch sensor group. Depending on level switch application, the float group is different for each type, and float may look like cylinder with semicircular bowls or ball.

Constant magnet is connected directly or through the lever system to the float, which is directed with the equal pole to the intermediate magnet of relay group. Float group magnet is protected by housing.

Level switch is activated by the fluid, through the float buoyant force. Fluid level changes cause float group tilting, which through the magnetic coupling are transferred to the intermediate magnet, which lever arm closes or opens miniature connector contact. The level switch operation principle is shown by the following electric diagram. For the minimum level terminals NC-NC are shortened. When level rises, terminals NC-NC remain shortened until reaching the maximum level. Then the snap switching takes place, i.e. opening of terminals NC-NC and shorting of terminals NO-NO, which remain shorted until reaching minimum level by the float.



Electric diagram

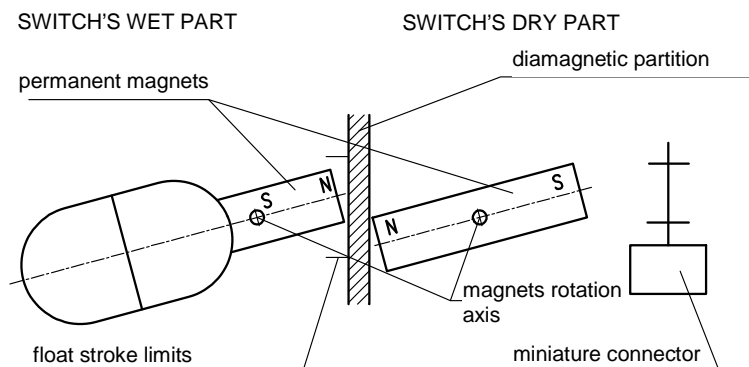
2. TECHNICAL DATA

Table no. 1. Technical data

No.	Parameter	Unit type	ERH-01-07	ERH-02-07	ERH-03-07	ERH-04-07
1.	Switching hysteresis	mm	10 20 ±15% 30	10 20 ±15% 30	min 50±15% max 250±2% min 100±15% max 400±2%	min 32±15% max 1350±2%
2.	Maximum fluid temperature	°C	70	70	70	70
3.	Maximum operation pressure	MPa	0.2	0.2	0.2	0.2
4.	Rated contact voltage U _e AC and DC	V	24	24	24	24
5.	Rated continuous current I _{nc}	A	10	10	10	10
6.	Rated contact current I _e in category AC15	A	2.5	2.5	2.5	2.5
	24 V	A	2.5	2.5	2.5	2.5
	in category DC13 24 V	A	2.5	2.5	2.5	2.5
7.	Contact life in category AC15 U _e =24V; I _e =2.5A in category DC13 U _e =24V; I _e =2.5A	connections connections	10 ⁷ 5x10 ⁶	10 ⁷ 5x10 ⁶	10 ⁷ 5x10 ⁶	10 ⁷ 5x10 ⁶
8.	Mechanical durability	cycles	10 ⁷	10 ⁷	10 ⁷	10 ⁷
9.	Ambient temperature	°C	-25...70	-25...70	-25...70	-25...70
10.	Weight					
	- submersible version	kg	1,8	2,0	2,1	3,0
	- submersible acid-proof version	kg	2,6	2,8	2,9	3,8
	- 1 m cable	kg	0,2	0,2	0,2	0,2
11.	Minimum liquid density	g/cm ³	0.6	0.6	0.6	0.6
12.	Housing protection rating	IP	68	68	68	68

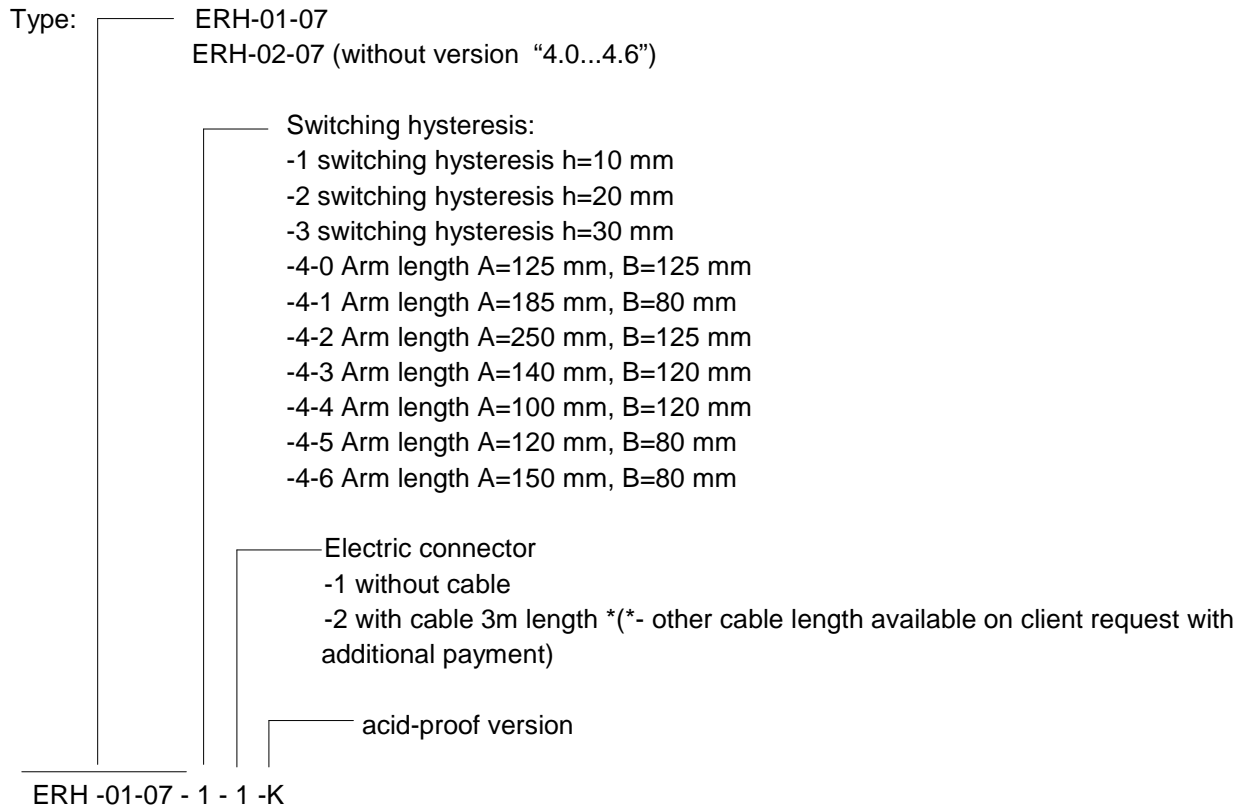
ATTENTION!

Switching hysteresis (insensibility zones) in table 1 relate to fluid density $1 \times 10^{-3} \text{ kg/m}^3$. Maximum et switching hysteresis caused by fluid density change is approximately 1 mm for $0.1 \times 10^{-3} \text{ kg/m}^3$. Insensibility zones are constant for the given fluid. Overall and installation dimensions are shown on attached dimensional drawings.



3. ORDERING METHOD

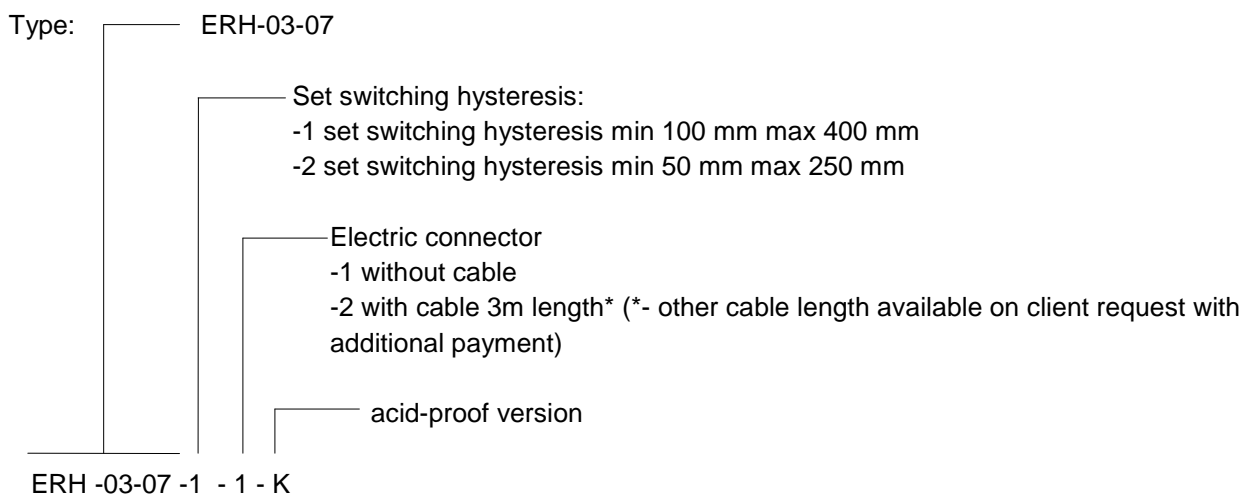
Ordering method for level switches ERH-01-07 and ERH-02-07



Example of ordering:

ERH -01-07 – 1-1 Level switches with switching hysteresis h=10 mm, without cable

Ordering method for level switches ERH-03-07

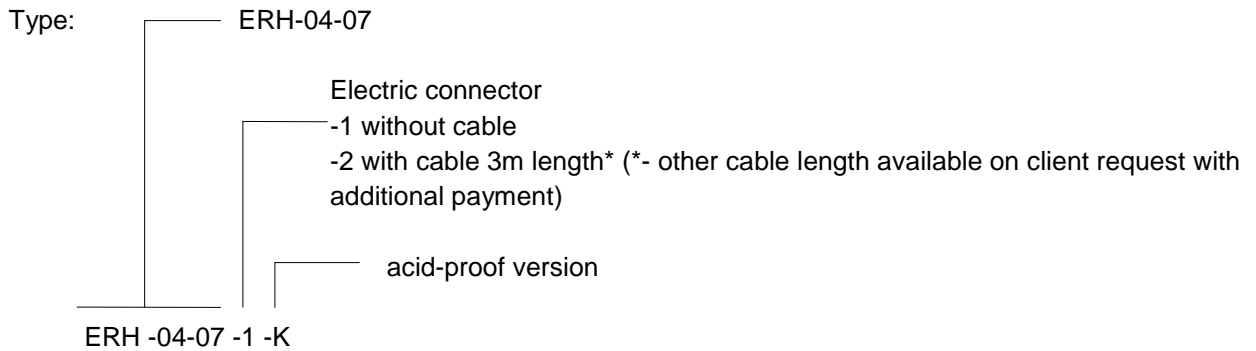


Example of ordering:

ERH -03-07-1- 1 level switches with set switching hysteresis min 100 mm max 400 mm, without cable

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Ordering method for level switches ERH-04-07



Przykład oznaczenia

ERH -04 -07- 1 level switch with set switching hysteresis min 32 mm max 1350 mm, without cable

4. OPERATION INSTRUCTION

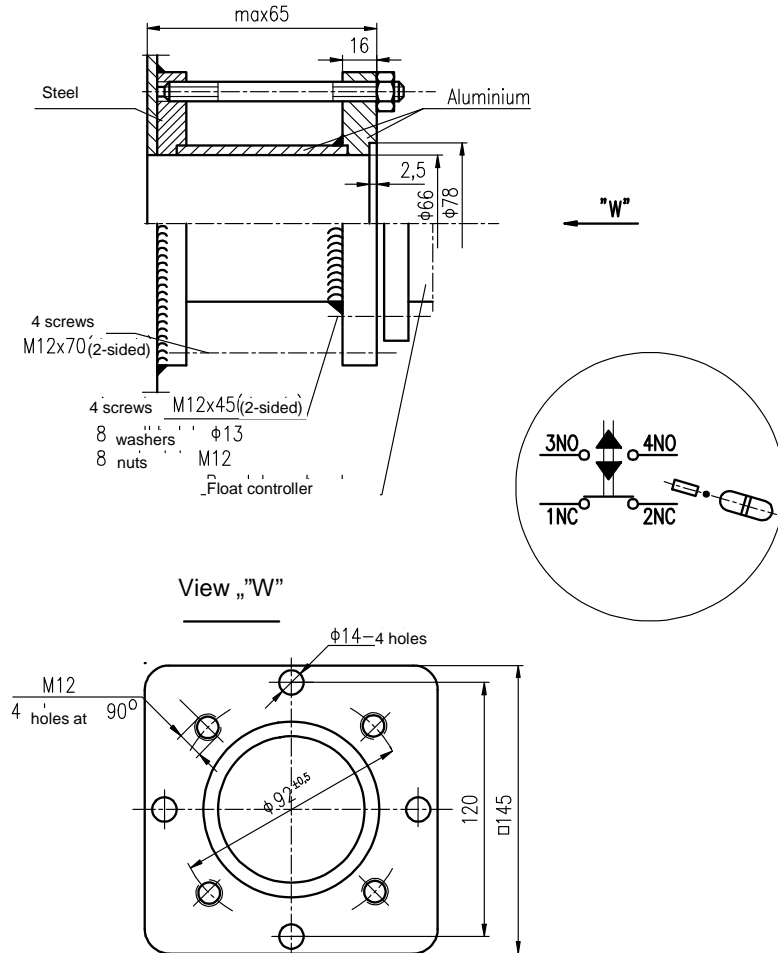
4.1 INSTALLATION INSTRUCTION

All level switches types should be connected to connecting pipes with connection flanges with dimensions shown on the drawing below.

In version - 1 of electric connection (i.e. without sealed cable). External electric cable with external dimension from $\Phi 9$ to max $\Phi 13$ should be introduced to galvanized pipe with internal diameter min. $\Phi 14$. Pipe should be screwed to the terminal with taper thread R 3/4". Check the connection tightness after screwing. No leaks are allowed. The other pipe end should be placed in the gland of branch socket. Cables in the head should be connected to terminals NC – NC, NO – NO, depending on requirements.

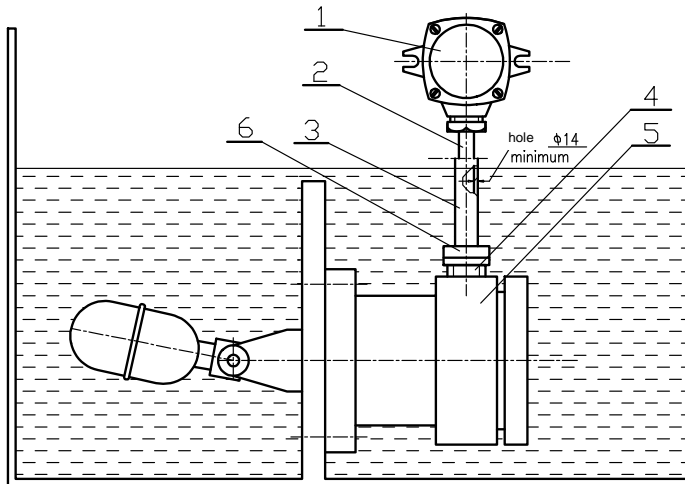
After cables connecting, screw the head cover, paying attention for sealing ring position, protecting the tightness after immersing. In case of level switches with electric connection – 2 the connecting cable is sealed by the producer, and does not require guiding in the pipe. Cable has GL certificate for direct guiding in sea water. Cable ends are designed according to electric diagram in the technical product documentation.

Connecting pipe example

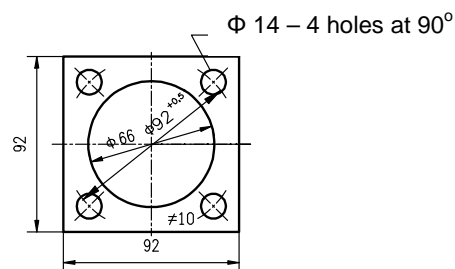


It is recommended to weld the connection flange directly to the tank (without connection pipe).

Required controller installation method with electric connection in ver. -1



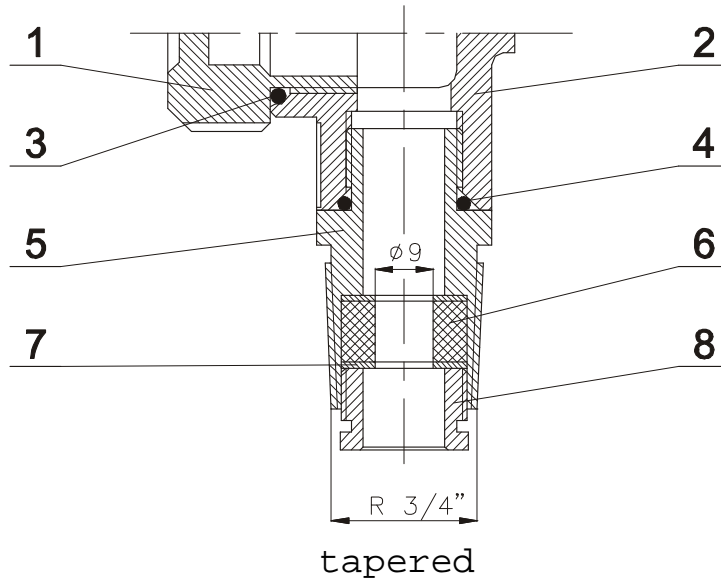
- 1 – Branch socket is not supplied by manufacturer
- 2 - Cable YKOXS 5x1 with external diameter max $\phi 13$ is not supplied
- 3 – Pipe with connection (nut R 3/4" with taper thread), galvanized (Fe/Zn-25 CD acc. to BN-84/3702-02). Like the cable, it is not supplied.
- 4 – Gland element
- 5 – level switch
- 6 – End with taper thread R 3/4"



Caution:

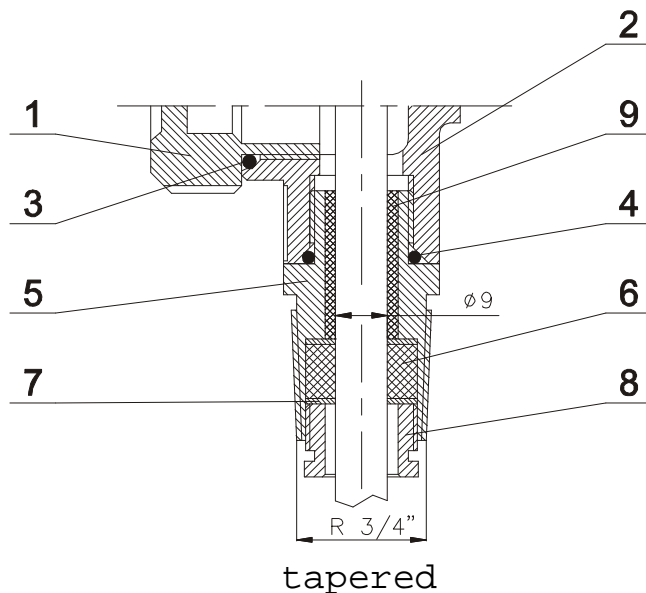
Other types of cables may be used, but only up to external diameter max $\phi 13$.

Pipe and cable sealing method with electric connection in ver. -1



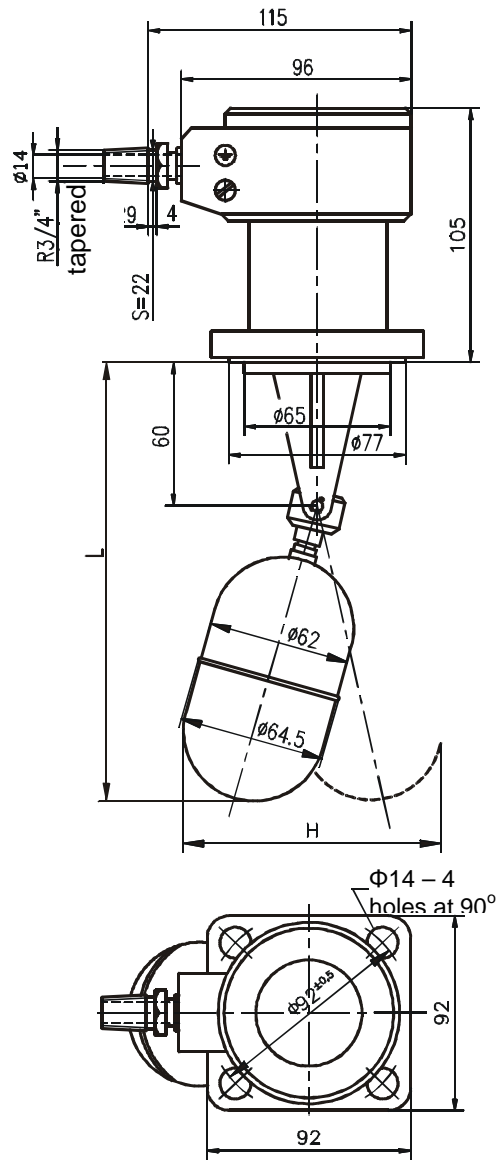
1. Cover
2. Head
3. Sealing ring $\phi 70 \times 3$
4. Sealing ring $\phi 17.3 \times 2.4$
5. End
6. Seal
7. Washer
8. Gland element

Pipe and cable sealing method with electric connection in ver. -2



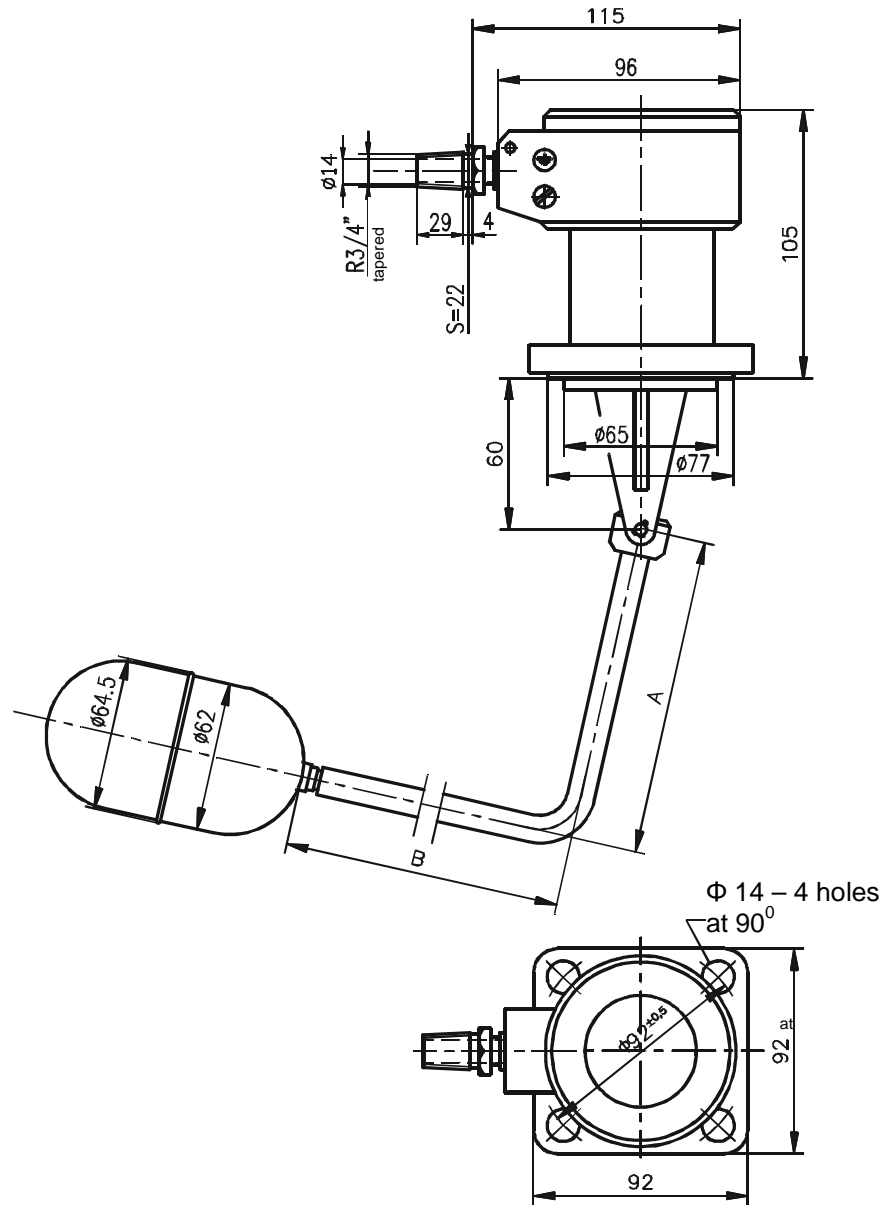
1. Cover
2. Head
3. Sealing ring $\phi 70 \times 3$
4. Sealing ring $\phi 17.3 \times 2.4$
5. End
6. Seal
7. Washer
8. Gland element
9. Glue EPIDIAN 5
10. Cable YKOXS 5x1

Dimension drawing of level switch ERH-01-07

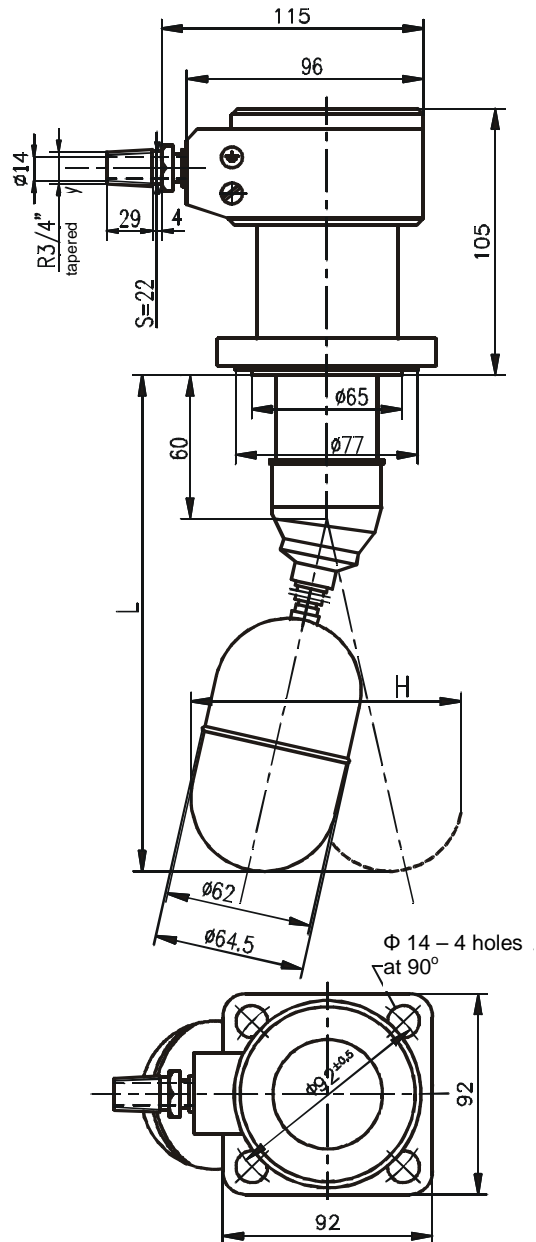


Ver.	H [mm]	L [mm]
-1	120	190
-2	140	230
-3	150	255

Dimension drawing of level switch ERH-01-07-4

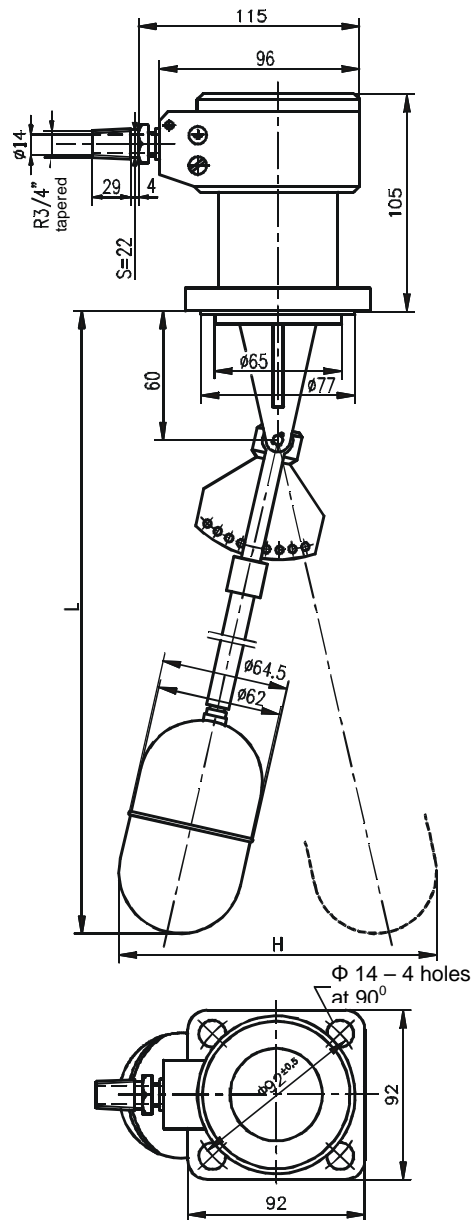


Dimension drawing of level switch ERH-02-07



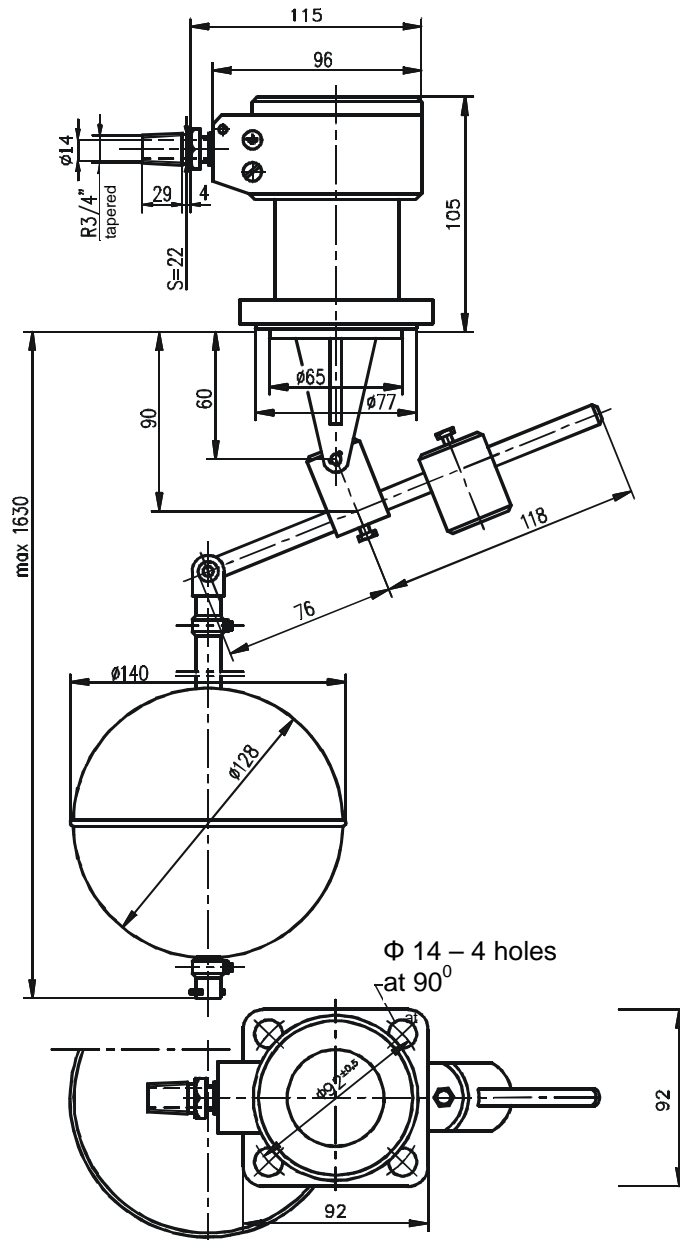
Ver.	H [mm]	L [mm]
-1	120	190
-2	140	230
-3	150	255

Dimension drawing of level switch ERH-03-07



Ver.	H [mm]	L [mm]
-1	680	510
-2	450	380

Dimension drawing of level switch ERH-04-07



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4.2 START-UP AND OPERATION INSTRUCTION

4.2.1 Preparing for start-up

Level switches may be installed in closed rooms or at least protected from weather conditions: rain, snow, etc., and free from excessive chemical exhalations. After level switch unpacking and inspecting it should be screwed to the connection pipe, placing the seal between pipe and level switch; it is recommended to install the level switch with the gland down.

4.2.2 Operation manual

After connecting the electric circuit and checking its correct operation, the level switches do not require any further operation.

4.3. MAINTENANCE INSTRUCTION



Level switch should be at least once a year subjected to detailed inspection, paying attention for technical condition of parts, subjected to fluid influence (float, bolts, cotter pins, magnet housing, lever, etc.), removing possible impurities especially from the magnet housing and from the gap between body and float lever.

For highly contaminated fluids the above activities should be performed more frequently, in periods defined by the user, during the inspections of the whole tank and equipment. Forming deposits, e.g. boiler scale, should be removed mechanically or chemically, paying attention not to damage the level switches parts.

After performed maintenance install the level switch.

4.4 SAFETY INSTRUCTION



Personnel installing level switches in objects should have general knowledge of safety requirements and this documentation. Do not perform level switch installation, when system is live.

Depending on object type and existing protection system the level switch should be zeroed or earthed.

For this purpose properly marked rod is provided.

5. STORAGE AND TRANSPORT CONDITIONS

Level switches received from the producer should be stored in rooms free from chemical exhalations and assuring environment temperature from 5 to 30°C and relative humidity from 30 to 80%. The level switch technical condition should be checked at least once a year.

Level switches should be stored in the package, assuring protection from mechanical damages. Level switches are packed in the carton box, drawing no. ER3-1313.

Level switches should be transported in the packages. Pay attention for immobilizing the level switches during transport.

6. DELIVERY RANGE

Level switch type ERH-01..-04-07 should be accompanied with:

- Technical products documentation,
- Declaration of Conformity
- Warranty card.

6.1. Spare parts

On Customer's special demand producer may supply the following spare parts against payment, according to the ordered level switch type.

Table no. 2

No.	Spare part name	Level switch type			
		ERH-01-07	ERH-02-07	ERH-03-07	ERH-04-07
1.	Micro-switch type 83140	1 pc.	1 pc.	1 pc.	1 pc.
2.	Float, drawing no. ER2-1024	1 pc.	1 pc.	1 pc.	-
3.	Float, drawing no. ER2-0565	-	-	-	1 pc.
4.	Joint covering, drawing no. ER1-1120	-	1 pc.	-	-

7. WARRANTY CONDITIONS

Warranty conditions are defined by the warranty card, effective in the Controlmatica ZAP-PNEFAL company, attached to each level switch.

ATTENTION: The right of introducing design changes in the product, without deteriorating of its operation parameters, is reserved.