LEVEL SWITCHES

TYPE ERH-01...04-04

CONTENTS

1. INTRODUCTION
1.1 SECURITY INSTRUCTIONS

1.1.1 Application

Level switches are designed for automatic control, signalling or controlling of fixed liquid level limit value in open or closed (pressure) vessels, within wide range of pressures and temperatures.

Other applications should be consulted with manufacturer.

Manufacturer doesn't bear responsibility for any damages which result from using level switches in method not acc. to application. Risk is on user side only.

Right using of level switches is make everything according to this technical product documentation.

1.1.2. Definitions used in description

- **Operator** – person, who use product according to application (PN-EN 61010-1, July 2004),
- **Technical inspection** - person or group of people responsible for using and conservation of product, this person has to assure of well special training for OPERATORS (PN-EN 61010-1, July 2004),

1.1.3. Alloved activities range

- **For operator** – level switches using.
- **For technical inspections** – activities like for operator, mechanical and electrical assembly and activities connected with controlling.

1.1.4 Power supply connection

Assembly and starting works should be done only by electricians with qualifications or staff instructed by them – according to actual law rules of electrotechnics.

1.1.5 Instructions and warnings

Body damage and/or serious material damages might be formed if user doesn't keep of instructions and warnings. Servicing staff have to be instructed and acquaint with whole safety instructions and warnings.
For well and safe level switch's working there has to be assured right transport, storage, assembly, starting and conservation's instruction.

Main attentions of safety in mentioned operation and maintenance manual were marked as pictograms:

	**This sign means: Pointer.** „Pointer" indicates on action or any process important for well-working of product. Material damages might be formed if user doesn't keep of instructions.
	**This sign means: Warning.** „Warning " indicates on action or any process, which might be danger for staff or makes material damages if those aren't made correctly.

1.2. SUBJECT OF TECHNICAL PRODUCT DOCUMENTATION

Technical Product Documentation subject is using, construction and assembling of level switches.

1.3 APPLICATION, MARKINGS ACC. TO SWW AND PKWiU

Level switches are designed for two-position signaling of minimum and maximum of liquid.
Marking acc. to Polish Classification of Products and Services (PKWiU): 26.51.70.0
Marking acc. to Systematic Products Specification (SWW): -0918-132

1.4 CONSTRUCTION AND WORKING RULES

The level switch is designed of the two basic assemblies separated by a diamagnetic baffle:

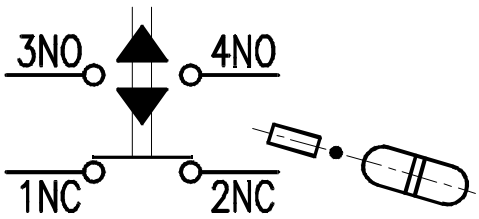
- a relay unit which is the transducing part of the device unified for all the types. The intermediate magnet, whose magnetic pole is directed with the like magnetic pole of the float magnet transmitting electric pulses as a result of the magnet lever operation on a button switching the switch contacts, is enclosed in a body. External conductors are connected to the switch terminals through cable gland.

- a float unit which is the sensing part of the level switch. Depending on application of the level switch, float unit is made different for each type and the float can be in a shape of cylinder with hemisperical bowls or shape of sphere.

The permanent magnet is mounted directly, or by means of leverage, to the float; the magnet pole is directed with the like magnetic pole of the intermediate magnet of the relay unit. The float unit magnet is protected with a housing.

The level switch is started by liquid by means of float uplift force. Liquid level changes cause swinging of the float unit, which by magnetic coupling is transmitted to an intermediate magnet, whose lever closes or opens the miniature micro-switch contacts.

Working rules of level switch is presented by electric circuit diagram. The NC - NC contacts are closed at minimum level. When the level rises, the NC - NC contacts remain closed until the maximum level is reached. At the moment when the maximum level is reached, a „blink-like" switching takes place, that is, opening of the NC - NC contacts and closing the NO - NO contacts; the NO - NO contacts are closed until the float reaches minimum level.



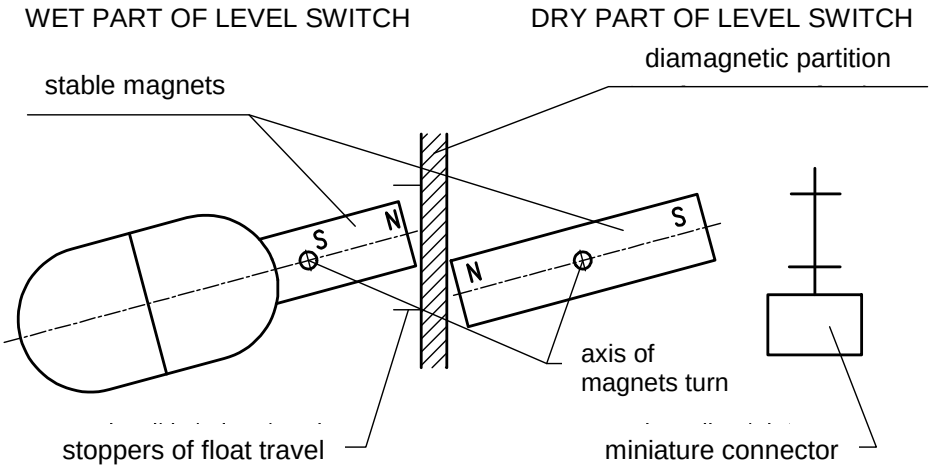
Electric circuit diagram

2. TECHNICAL DATA

Table no. 1

Item no.	Parameter	Unit type	ERH-01-04	ERH-02-04	ERH-03-04	ERH-04-04
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 liquid temperature	°C	250	200	250	250
3.	Maximum operating pressure	MPa	4	4	4	1,6
4.	Nominal switching voltage U_e: AC-15 DC-13	V	400 V 50-60 Hz 220 V =	400 V 50-60 Hz 220 V =	400 V 50-60 Hz 220 V =	400 V 50-60 Hz 220 V =
5.	Nominal continuous current I_{nc}	A	9	9	9	9
6.	Nominal switching current I_e : • in AC15 category 230V • in DC13 category 220V	A	AC1-10A 0,6	AC1-10A 0,6	AC1-10A 0,6	AC1-10A 0,6
7.	Switching durability • in AC15 category U_e=230V • in DC13 category U_e=220V	switchings	AC1-3,0x10^5 0,3x10^5	AC1-3,0x10^5 0,3x10^5	AC1-3,0x10^5 0,3x10^5	AC1-3,0x10^5 0,3x10^5
8.	Mechanical durability	cycles	5x10^6	5x10^6	5x10^6	5x10^6
9.	Ambient temperature	°C	-25…70	-25…70	-25…70	-25…70
10.	Mass	kg	1,8	2,0	2,1	3,0
11.	Minimum liquid density	g/cm^3	0,6	0,6	0,6	0,6
12.	Casing protection degree	IP	66	66	66	66

ATTENTION!
Switching hysteresis (neutral zones) presented in table no. 1 goes for liquid density 1x10^{-3} kg/m^3.
Max switching hysteresis made of changing liquid density is 1 mm on 0,1x10^{-3} kg/m^3.
Neutral zones for any density are constant. Overall and assembling dimensions are presented on enclosed dimension pictures.



3. ORDERING METHOD AND EXAMPLE OF ORDERING

Ordering of level switches type ERH-01-04 and ERH-02-04

Type: ERH-01-04
ERH-02-04 (without version “4.0...4.6”)

Switching hysteresis:
-1 switching hysteresis h = 10 mm
-2 switching hysteresis h = 20 mm
-3 switching hysteresis h = 30 mm
-4-0 Length of arm A = 125 mm, B = 125 mm
-4-1 Length of arm A = 185 mm, B = 80 mm
-4-2 Length of arm A = 250 mm, B = 125 mm
-4-3 Length of arm A = 140 mm, B = 120 mm
-4-4 Length of arm A = 100 mm, B = 120 mm
-4-5 Length of arm A = 120 mm, B = 80 mm
-4-6 Length of arm A = 150 mm, B = 80 mm

Acid-proof version

ERH-01-04 - 1 - k

Example of denotation:
ERH-01-04-1 level switch with switching hysteresis h = 10 mm

Ordering of level switches type ERH-03-04

Type ERH-03-04

Switching hysteresis:
-1 switching hysteresis min. 100 mm; max. 400 mm
-2 switching hysteresis min. 50 mm; max. 250 mm

Acid-proof version

ERH-03-04-1 - k

Example of denotation:
ERH-03-04-1 Level switch with switching hysteresis min. 100 mm; max. 400 mm

Ordering of level switches type ERH-04-04

Type ERH-04-04

Acid-proof version

ERH-04-04 - k

4. MAINTENANCE INSTRUCTION
4.1 ASSEMBLY INSTRUCTION

Whole types of level switches have to be assembled for socket ferrules with connecting flanges at dimensions are showed on picture behind.

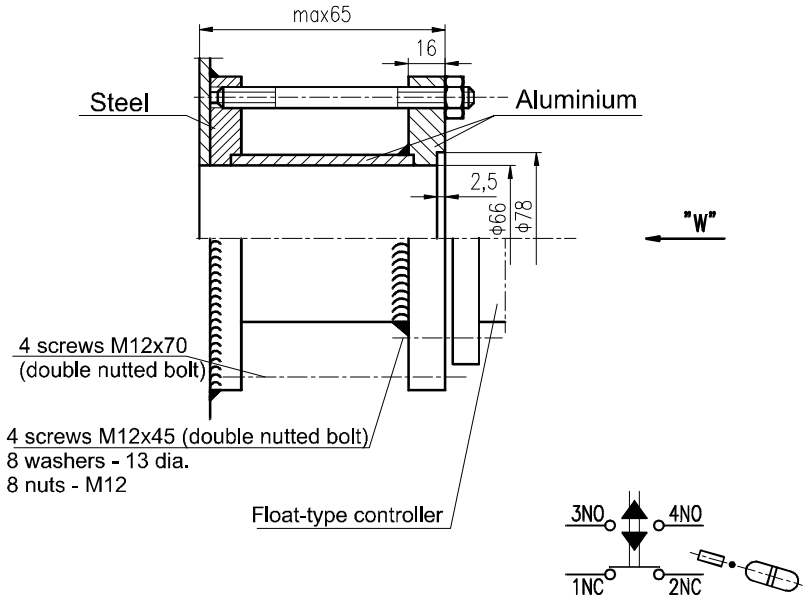
External conductor has to go by gland M20x1,5 or in armoured pipe posses threaded ends of thread M20x1,5; amroured pipe is screw in level switch thread instead of thread plug .

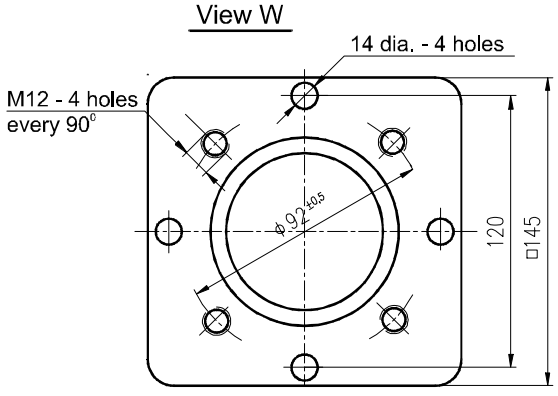
Wires have to be connected with clamps NC - NC, NO – NO depending of need. Compacted clamps NC are for minimum level. Grounding clamp is inside and outside head.

Proper assembly and usage conditions observance, according to application, provide for proper level switch operation in life expectancy period. The level switches do not require special care, except for conservation.

Operation range change in level switches type ERH-03-06 and ERH-04-06 requires shifting the limiters to a needed range, then one to stiffen the limiters by tight screwing the set screws home, or inserting of cotter pins.

Example of connecting socket ferrule

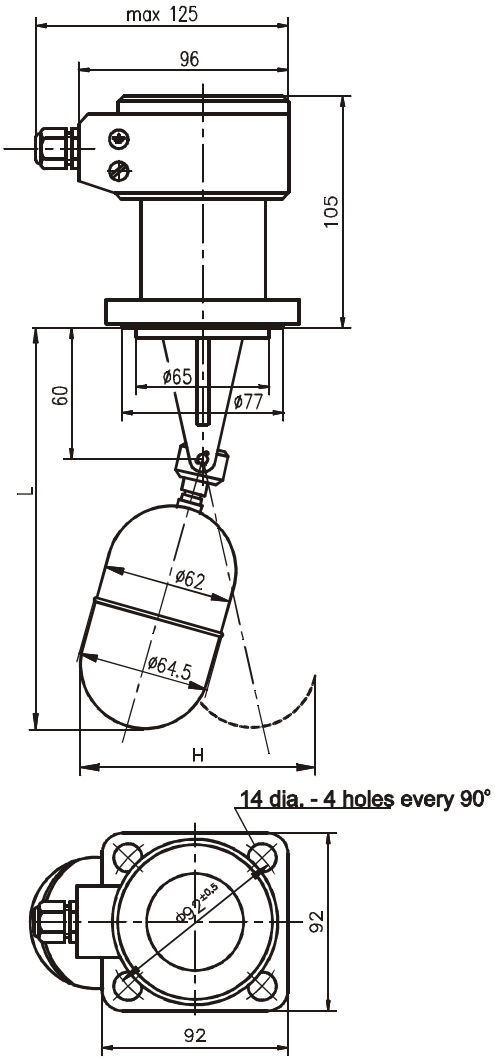




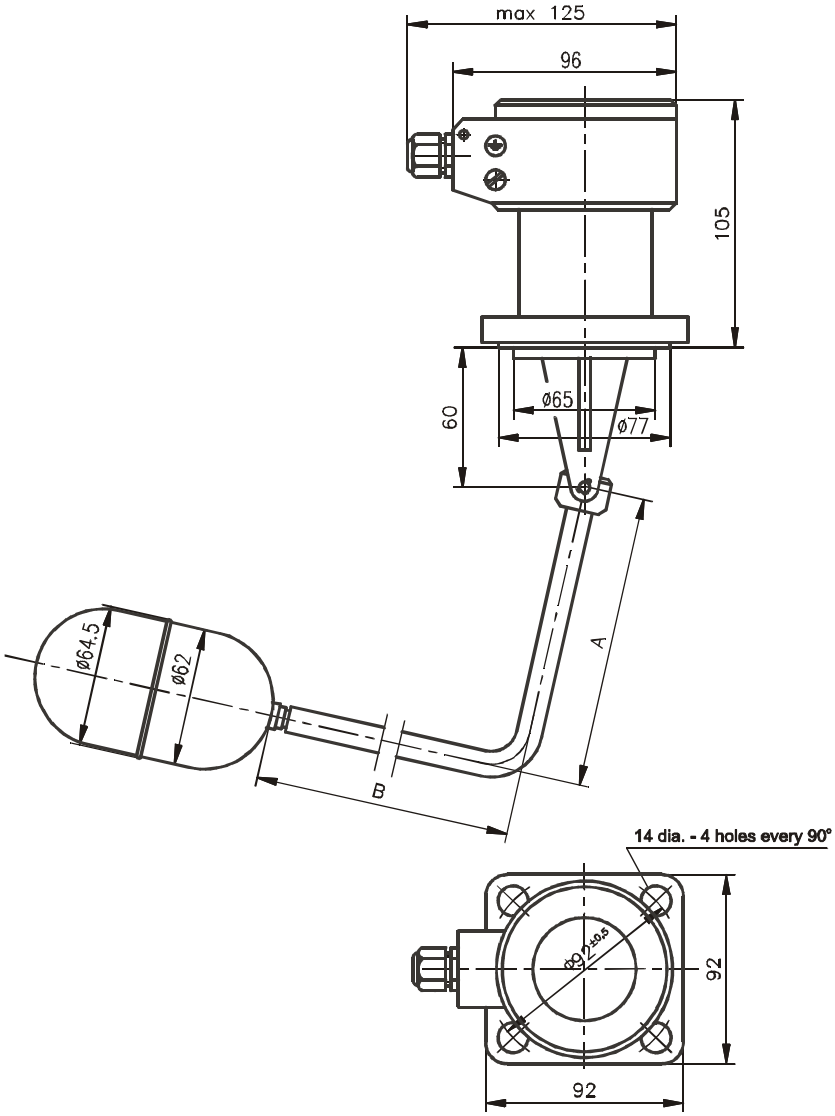
Manufacturer recommends to weld connecting flange directly to tank (without socket ferrule)

Dimension drawing of level switch type ERH-01-04

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

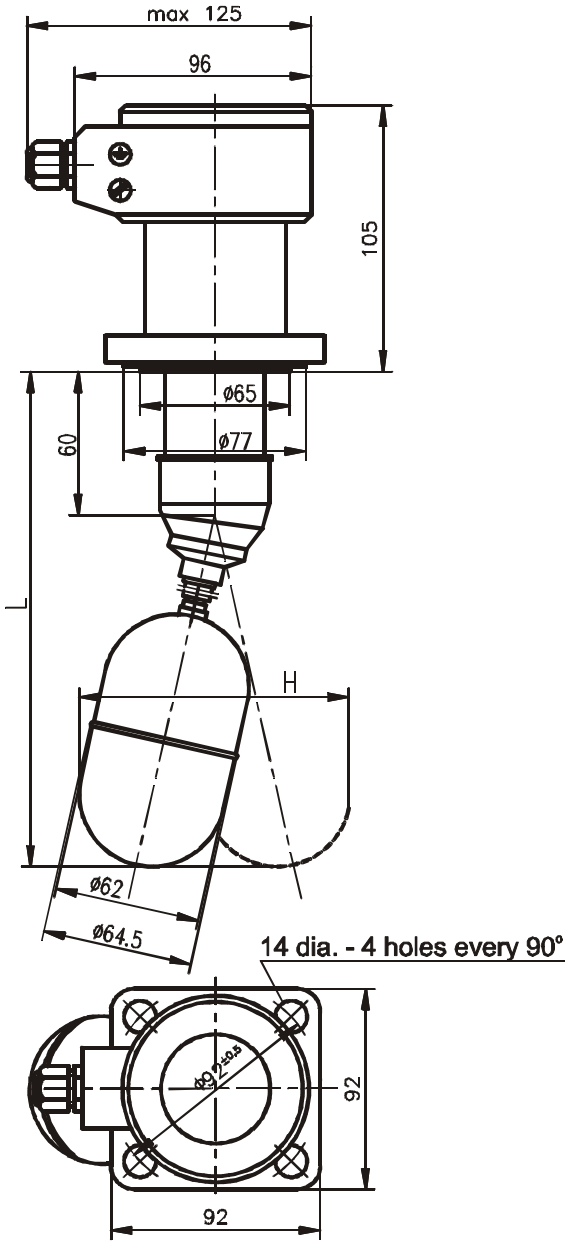


Dimension drawing of level switch type ERH-01-04 with cranked arm

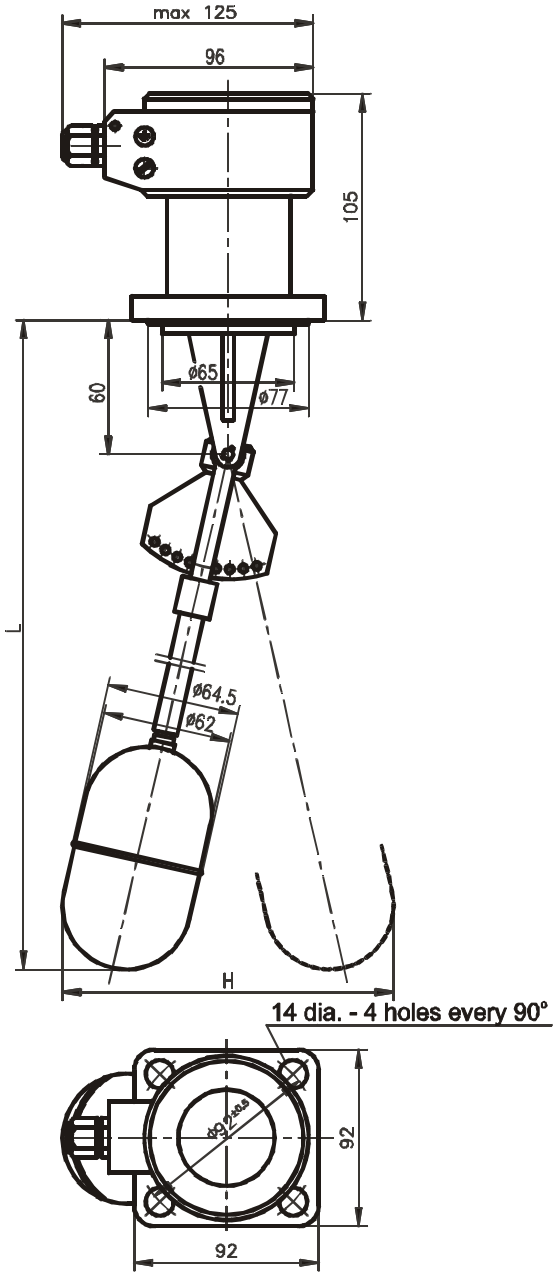


Dimension drawing of level switch type ERH-02-04

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

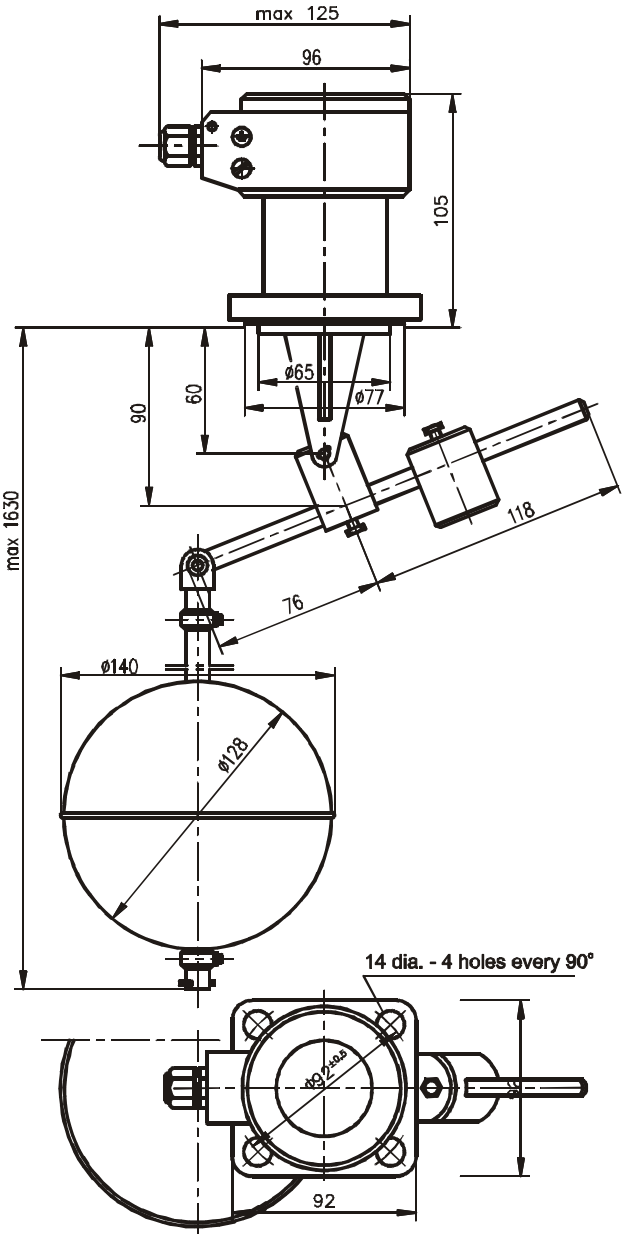


Dimension drawing of level switch type ERH-03-04



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

Dimension drawing of level switch type ERH-04-04



4.2 STARTING AND SERVICE INSTRUCTION

4.2.1 Preparing products for starting

Level switches might be assembled in closed rooms or in rooms which are protecting before effect of atmospherics conditions (like: rain, snow, and others) and free of excessive quantity of cooling fumes.

After unpacking of level switches and checking if everything outside is right, level switch has to be screw down into socket ferrule use leak stopper between socket ferrule and level switch. Manufacturer recommends to put gland down during assembly of level switch

4.2.2 Maintenance instruction

If electric circuit is made and electric lever works well, level switches will not require further maintenance.

4.3. CONSERVATION INSTRUCTION

Level switches have to be check very carefully once a year and user has pay attention on technical condition of parts, which are endangered on liquid working (float, pints, cotter pints, magnet housing, lever, etc.). Possibly impurities have to be eliminate especially out of magnet housing and gap between body and float lever.

Mentioned actions have to made more often for strong polluted liquids (e.g. periods might be determined by user or might be done during inspection of tank or fittings.

Settlings e.g. boiler scale, has to eliminated by mechanical or chemical method, but part of level switch couldn't damage.

After conservation level switch has to be assembled.

4.4. INDUSTRIAL SAFETY INSTRUCTION

Workers who make assembly of level switches on objects should have general knowledge of safety instruction and this document (IOM). Assembly can't be making if system is live.

Level switch might be zeroing or grounding – it depends on kind of object.

Marking screw helps in make mentioned actions.

5. STORAGE AND TRANSPORT TERMS

Level switches should be stored in warehouses free from any chemical fumes at temperature from 5°C to 30 °C and relative humidity of 30 to 80%.

Technical condition of level switches should be checked at least once a year.

Level switches should be stored in package protecting them against any mechanical damages. Packing of level switches is made of boxboard, acc. to the drawing no. ER3-1313.

Transport of level switches should be done in boxboards. During the transport level switches have to be disable.

6. SETS DELIVERY

The complete shipment of level switch type ERH-01…-04-06 includes:

- Operation and Maintenance Manual,
- Compatibility Declaration
- Guarantee Card

7. GUARANTY TERMS

Guaranty terms are determined in guarantee card of Manufacturer – Aplisens-Controlmatica Ostrów Wlkp., Poland – guarantee card is added to the each piece of level switch.

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