

Level Switch

Manual



Level Switch KS
Level Switch RS
Level Switch LS

AQ M-Tech AB

Manual version 3.6

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1. Manufacturer information

AQ M-Tech AB operates a policy of on-going development and reserves the right to make changes and improvements to any of the products described in this manual without prior notice.

Under no circumstances shall AQ M-Tech be held responsible for any loss or indirect damage howsoever caused. The contents of this document are provided as it is. AQ M-Tech AB reserves the right to revise this document or withdraw it at any time without prior notice.

CE Declaration of Conformity

Manufacturer: AQ M-Tech AB Sweden declares, that the product: The Level Switch marked with CE-label conforms with the standards: EN 61000-6-2:2005, EN 61000-6-4:2007, EN55011 (Group 1, Class B). The Level Switch is RoHS compliant, directive 2011/65/EU. The Level Switch marked with  conforms to WEEE directive 2012/19/EU.

Limited Warranty

AQ M-Tech AB warrants to the original end user that the Level Switch is free from any defects in materials or workmanship for a period of one year from the date of purchase. During the warranty period, should the Level Switch have indications of failure due to faulty workmanship or materials, AQ M-Tech AB will replace it with no charge. This warranty shall not apply if the Level Switch is modified, misused or subjected to abnormal working conditions.

Replacement as provided under this warranty is the only remedy of the purchaser. The purchaser pays freight to AQ M-Tech AB. AQ M-Tech AB shall in no event be held liable for indirect or consequential damages of any kind or character to the purchaser.

Warning

The Level Switch is intended to be connected to the Ultrasound Controller, manufactured by AQ M-Tech AB. AQ M-Tech AB takes no responsibility for any possible damage that could happen if the Level Switch is connected to any other equipment or if it is repaired or modified by anyone other than AQ M-Tech AB.

Certificate of Quality and Function

AQ M-Tech AB guarantees that the Level Switch has passed function and quality tests.

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2. Introduction

When the Level Switch is attached to the outside of a container or pipe it can sense liquid level inside. The Level Switch senses through the wall without any need for a hole in the container. The Level Switch is made to be used together with the Ultrasound Controller D72 or DP72. Level Switch LS is also available ATEX certified, see Level Switch EX manual. Level Switch KS is a new Level Switch with improved specifications that can be used instead of Level Switch LS.

3. Mode

The sensor Mode setting of the Ultrasound Controller D72 or DP72 determines in which way the Level Switch measures the level.

In Level Switch mode the Level Switch measures a single level from the side.

In Level Sensor mode the Level Switch measures a continuous level from the bottom.

In Gel Sensor mode the Level Switch measures a single gel-level from the side.

4. Level Switch Mode

In Level Switch Mode each Level Switch measures a single level. It measures the presence or no presence of liquid behind the container wall (or pipe wall).

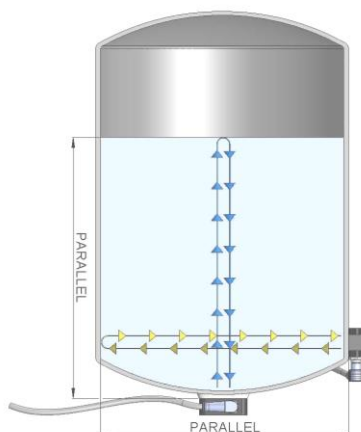
All types of Level Switches can be used in Level Switch Mode but use different measuring techniques. There are two measuring techniques Echo and WR (see Ultrasound Controller D72 and DP72 manual).

Level Switch KS and Level Switch LS should be used with the Echo technique and Level Switch RS must be used only with the WR technique.

The Level Switch is attached on the wall of the container or pipe. For a cylindrical wall, a Level Switch with a diameter close to the diameter of the container should be chosen. The ultrasound must pass easy into the container or pipe; therefore there must be a tight ultrasound-connection without any air-gap between the Level Switch and the wall.

5. Level Sensor Mode

In Level Sensor mode the Level Switch measures the continuous liquid level. The Level Switch is attached under the container and measures through the bottom.



Level Switch KS or Level Switch LS should be used (Level Switch RS can not be used).

A Level Switch that fits the shape of the bottom should be chosen. The Level Switch measures the echo that bounces at the liquid surface. It is important the echo goes straight back to the Level Switch. If the Level Switch and the bottom are not horizontal then the echo may bounce in another direction.

If the bottom is not horizontal, silicone can be used to glue the Level Switch at an angle. In this case the Level Switch should be

connected to D72 and be active measuring while being glued so that it can be adjusted for maximum echo.

Sound must be able to pass through the bottom. Most plastics let sound through well except polypropylene and fiber reinforced plastics. For stainless steel, a bottom thickness of 5,8mm is the maximum recommended. Stainless steel 5,8mm 2,9mm and 1,45mm works well at 2MHz which is the optimal frequency for the Level Switch. For other thicknesses other frequencies will be chosen by D72 / DP72.

Sound velocity varies with liquids and temperatures. A Level Switch placed low on the container wall can be used to measure and compensate for sound velocity changes.

More information: Ultrasound Controller D72 / DP72 manual.

6. Gel Sensor Mode

In Gel Sensor Mode, each Level Switch measures a single gel-level. It measures the presence or no presence of gel or air behind the column wall.

Level Switch KS can be used in Gel Sensor Mode. The ultrasound must pass easily into the container or pipe; therefore, there must be a tight ultrasound-connection without any air-gap between the Level Switch and the wall.

7. Installing the Level Switch

Installing the Ultrasound Controller D72 / DP72 and connecting the cables is described in the Ultrasound Controller Manual.

Between the Level Switch and the container there must be a tight ultrasound-connection. For Level Switch MK, this is achieved with a soft silicone surface. For the other Level Switches, it is achieved by using glue or compound.

Level Switch MK

For attaching the Level Switch MK no glue or compound is needed. The Level Switch MK has a flexible surface which achieves a good ultrasound-connection when it is pressed against the container. The pressure needs to be around 15N (minimum 5N and maximum 50N), depending also on the shape of the container. The pressure makes the flexible surface adapt to the container. It is important the Level Switch MK is held in place with a fixture. The fixture should provide the means for applying the pressure on the Level Switch so it will be pressed against the container. Since the Level Switch MK has a rounded surface, the fixture needs also to hold the Level Switch MK straight in place. A possible fixture is a plastic block adapted to the shape of the container, with a 25,1mm hole for the Level Switch. More information about how the Level Switch MK can be used for measuring is available in Ultrasound Controller manual.

Level Switch KS / KSF / RS / RSF / CF / LS / LSF

Gluing the Level Switch is the best attachment technique. Transparent silicone glue is heat-resistant and is a good glue at all temperatures. A Level Switch glued with silicone is easy to remove. The silicone glue can be Loctite 5366 or a similar transparent (1-component moisture curing) silicone. It can take a few days to cure but the Level Switch can be used while the silicone is curing. Put some silicone on the container-facing side of the Level Switch and press it on to the container.

The silicone should completely cover the gap between the Level Switch and the container. During the first hours, the Level Switch must be held securely in place with something like a tape or so.

Transparent 1-component MS-polymer can also be used if temperature is not above 80°C. It is flexible like silicone and takes some days to cure.

Hard glues should be avoided since they can come loose by temperature variations.

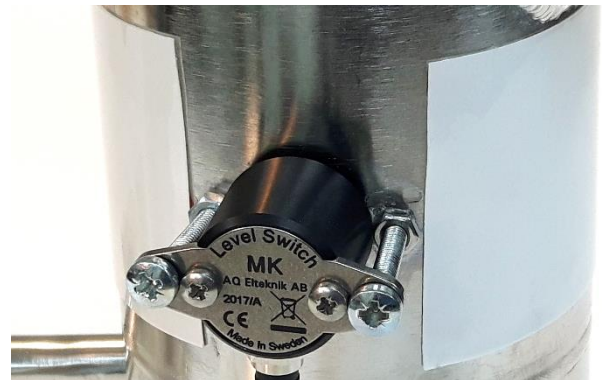
If the Level Switch is not glued, Sonotech SONO 600 can be used, or Electrolube Heat Transfer Compound. It does not cure so the Level Switch must be held in place by other means. If the Level Switch is removed, the old compound should be wiped off and new used next time. These compounds are not recommended at temperatures above 60°C.

More information about how the Level Switch can be used for measuring is available in Ultrasound Controller manual.

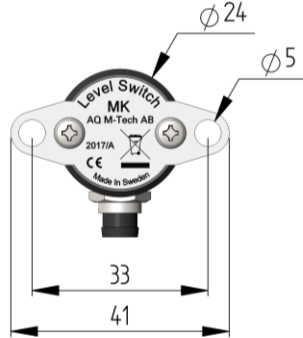
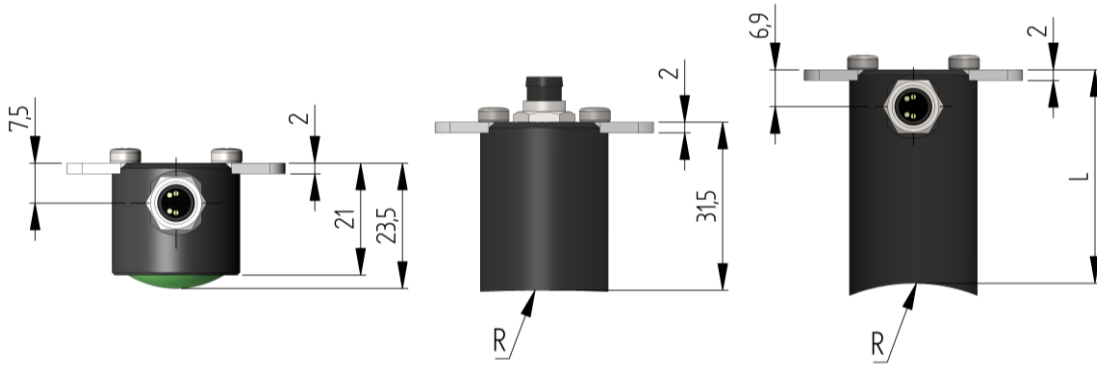
Level Switch RS can only be used with the measuring technique WR, which is sensitive for small movements so gluing the Level Switch RS is recommended.

8. Stainless Steel and Glass Containers

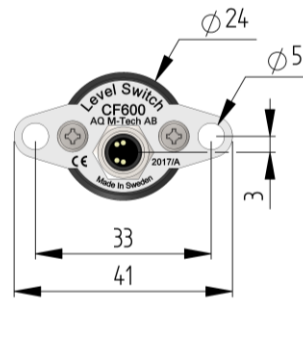
When the Level Switch is mounted on a stainless steel or glass container and the echo-technique is used, it is advisable to also attach a sound absorbing tape on the container. The tape will suppress unwanted sound travelling along the container and thereby improve the measurements (the *Edata* will be lower with air, making threshold *Ethd* also lower, which is good). The 3M tape 8671 is suitable for this purpose. It withstands high temperature 135°C. The tape is transparent and can be removed without leaving any trace. The picture shows the tape with the protective paper still attached. It should be placed centered over the Level Switch and go around the container, starting and ending near the Level Switch. The important area to cover is about 100mm on each side, close to the Level Switch. On a big container, if the tape is too short, it can be cut in two pieces and placed on each side of the Level Switch. The tape is 50,8mm wide and one tape should be used for each Level Switch. Attaching tape above or below the Level Switch does not help. The tape is supplied with the Level Switch in 500mm length and can also be ordered separately from AQ M-Tech, order number 101310. The material is polyurethane and acetone should not be used for cleaning the tape.



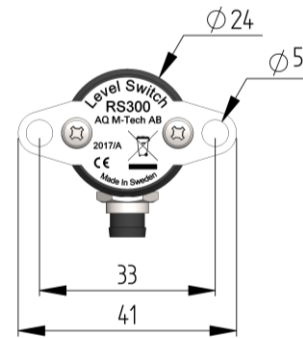
9. Technical Data



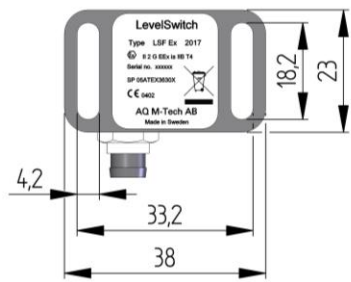
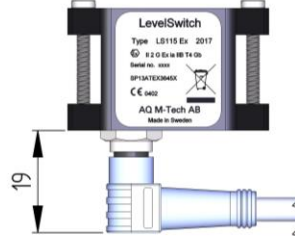
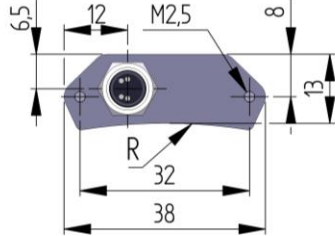
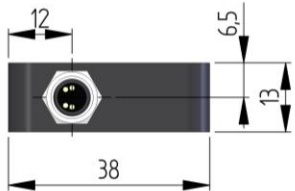
Level Switch MK



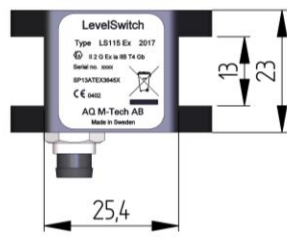
**Level Switch CF
Level Switch CFF**



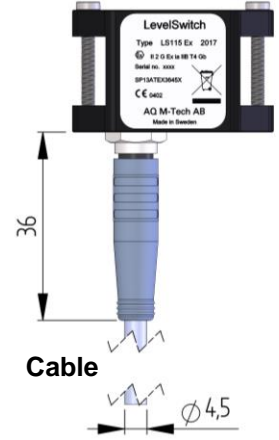
**Level Switch KS
Level Switch KSF
Level Switch RS
Level Switch RSF**



Level Switch LSF



Level Switch LS



Cable

Level Switch	Dimensions (mm)	comment
Level Switch MK	R = spherical silicone	Has flexible silicone surface
Level Switch KS	L = 15 R = fit container diameter	
Level Switch KSF	L = 20 R = flat surface	Can fit a depression 8mm deep
Level Switch RS	L = 40 R = fit container diameter	
Level Switch RSF	L = 40 R = flat surface	
Level Switch CF	R = fit container diameter	Connector is on top
Level Switch LSF	R = flat surface	Old version not for new design
Level Switch LS	R = fit container diameter	Old version not for new design

Level Switch	Level Switch RS / RSF Level Switch KS / KSF Level Switch CF	Level Switch MK	Level Switch LS
Material in contact with the container	PEI	Silicone	POM-H
Container / pipe temperature	-20°C to 140°C	-20°C to 140°C	-15°C to 60°C
Ambient temperature	-20°C to 60°C	-20°C to 60°C	-15°C to 60°C

Level Switch RS	Fit container / pipe diameter (mm)
RS27	¾" DN20 26 – 28
RS30	29 – 31
RS34	1" DN25 32 – 35
RS38	36 – 40
RS42	1¼" DN32 40 – 43
RS46	1½" DN40 44 – 49
RS53	50 – 57
RS65	2" DN50 58 – 69
RS75	2½" DN65 70 – 79
RS85	3" DN80 80 – 98
RS115	4" DN100 98 – 135
RS165	6" DN150 135 – 200
RS250	200 – 350
RS600	350 – 1000
RSF	1000 – Flat

Level Switch KS	Fit container diameter (mm)
KS27	26 – 28
KS30	29 – 31
KS34	32 – 35
KS38	36 – 40
KS42	40 – 43
KS46	44 – 49
KS53	50 – 57
KS65	58 – 69
KS75	70 – 79
KS85	80 – 98
KS115	98 – 135
KS165	135 – 200
KS250	201 – 350
KS600	351 – 1000
KSF	1000 – Flat

Level Switch LS	Fit container diameter (mm)
LS46	44 – 47
LS49	48 – 50
LS53	51 – 58
LS65	59 – 69
LS75	70 – 79
LS85	80 – 91
LS100	92 – 106
LS115	107 – 124
LS135	125 – 147
LS165	148 – 180
LS200	180 – 240
LS300	240 – 400
LS600	400 – 1000
LSF	1000 – Flat

Cable	data	Order number
Cable type	4 x 0,14mm ² + screen, PVC, diameter 4,1mm	
Cable Length	7m connector 0° grey	G-Cable-7m
	7m connector 90° grey	WG-Cable-7m
	20m connector 0° grey	G-Cable-20m
	20m connector 90° grey	WG-Cable-20m
	40m connector 90° grey	WG-Cable-40m

Do not twist the Level Switch cable connector, as it may destroy internal connections.

