



Operating Instructions
in compliance with
Pressure Equipment Directive 2014/68/EU
and
Pressure Equipment (Safety) Regulation 2016,
UK Statutory Instrument 2016 No. 1105

Molten-in Liquid Level Indicator



Please read these operating instructions carefully to ensure a safe operation and keep the same for further use.



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Safety

The molten-in liquid level indicator, hereinafter referred to as level indicator, is designed for use in refrigeration/air conditioning systems referred to as systems hereinafter. It may only be put into service if installed into the system unchanged in accordance with these instructions and as a whole is compliance with the statutory provisions.

The level indicator incorporates state-of-the-art technology and has been built according to the applicable regulations. Great value has been set upon the user's safety.

These operating instructions are integral part of the contract and shall be kept throughout the entire life of the level indicator.

Authorized personnel

Only trained and instructed personnel shall be allowed to do any work on the level indicator and system. As regards the qualification and expertise of the personnel the applicable rules and guidelines shall apply.





Residual dangers

Unavoidable residual dangers may emanate from the level indicator. Every person working on this device shall therefore carefully read these instructions.

To be observed are for example:

- the generally accepted safety regulations,
- EC directives,
- Norms (e.g. EN 378) and all national provisions.






Symbols used for safety information

	DANGER! Instructions on preventing imminent serious danger to persons. Imminent most serious injuries or death as a possible consequence. Any non-observance may lead to an immediate failure of the level indicator.
	WARNING! Instructions on preventing potential serious danger to persons. Avoidable serious to very serious injuries or death as a possible consequence. Any non-observance can cause the level indicator to fail.
	CAUTION! Instructions on preventing a minor danger to persons. Minor, reversible injuries cannot be excluded. Any non-observance may lead to a medium-term failure of the level indicator.
	ATTENTION! Instructions on preventing potential damage to equipment. Minor, reversible injuries cannot be excluded. Any non-observance may lead to a medium-term failure of the level indicator.

General safety information

These operating instructions are based on the safety requirements of EN 378-2 and EN 12178.

Instructions to prevent dangers in all cycles of service life:

	DANGER! Risk of bursting if operated beyond the technical parameters. Most serious injuries and immediate system failure possible. Observe the technical parameters.
	WARNING! Damage due to improper handling. Serious injuries and system failure possible. Never use the level indicator as transport, lifting or lashing point.
	WARNING! Any non-observance of the instructions may cause the level indicator to fail. Avoidable serious to very serious injuries or death possible. Installation, operation and maintenance by authorized personnel only.
	WARNING! Risk of service fluid to be released. Depending on the kind of service fluid serious to very serious injuries or death possible. Wear personal protective equipment (e.g. respirators, gloves).
	CAUTION! Very cold or very hot surface temperatures possible. Frostbites/burns possible. Wear personal protective equipment (e.g. respirators, gloves).

Other information

The information contained herein represents to the best of our belief our knowledge at the time when these instructions were prepared. It shall serve as code of practice to ensure a safe handling of the level indicator in transport, storage, installation, commissioning, maintenance and dismantling/disposal. A final decision as to whether the level indicator suits the purpose is to be taken by the user. This information shall not be deemed a warranty of quality.

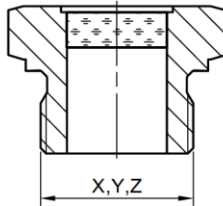
Any modification of the level indicator and operation under other than the prescribed parameters shall not be allowed and will result in the loss of the conformity declaration and all liability claims.

Description of level indicator

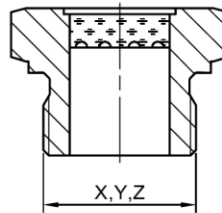
Types and connections

Einschraubstandanzeiger
Screwed level indicator

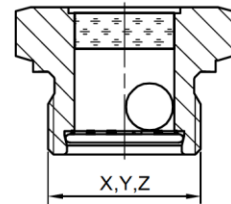
Typ D
glatte Linse
smooth lens



Typ DR
Reflexionsglas
Reflective glass



Typ DS
glatte Linse
mit Schwimmkörper
Smooth lens with indicator



Gewinde Typen / Thread type

X = Metrisches Gewinde
Metric thread

Y = NPT Gewinde
NPT thread

Z = Zölliges Gewinde
Inch thread

Rotalockstandanzeiger
Rotalock level indicator

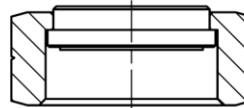
Typ RL
glatte Linse
smooth lens



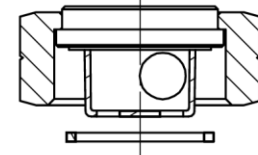
Typ RLR
Reflexionsglas
Reflective glass



Typ RLF
Standanzeiger +
Rotalockmutter
Level indicator +
Rotalock union nut



Typ RLF Set
Standanzeiger + Käfig +
Schwimmer + Dichtung +
Rotalockmutter
Level indicator + cage +
indicator + gasket +
Rotalock union nut

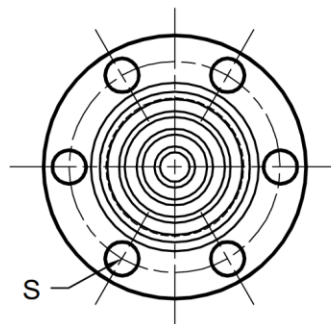


Flanschstandanzeiger
Flange-type level indicator

Typ D
glatte Linse
smooth lens



Typ DR
Reflexionsglas
Reflective glass



Anzahl der Bohrungen / Number of bores

S = 3x auf / to 360°

S = 4x auf / to 360°

S = 6x auf / to 360°

Installation dimensions can be gathered from the AWA product catalogue and technical documents respectively. The connecting options and types are explained in more detail under "Design features".



Product description

The level indicator is designed for direct visual display of liquid level in components of refrigeration or air conditioning systems. The level indicator can be installed in liquid receivers, containers, compressor housings or pipe. For better visibility of the liquid level the device can be supplied on request with reflective glass or with a float.

The level indicators consists of a sight glass molten pressure-tight into a metal casing.

The level indicator is in compliance with EN 12178, the Pressure Equipment Directive 2014/68/EU and the Pressure Equipment (Safety) Regulation 2016, UK Statutory Instrument 2016 No. 1105.

Identification

The level indicator is marked in accordance with EN 12178 by lettering as follows:

- Manufacturer's logo
- AWA part number
- Coded year of manufacture
- Maximum allowable pressure PS in bar
- "TÜV" – only for parts with existing EU design examination report

Technical parameters

Allowable pressure / temperature / service fluids:

Maximum allowable pressure PS: As indicated in the technical documents.

Allowable temperature TS: As indicated in the technical documents.

Permitted service fluids: Refrigerants acc. to EN 378-1 (2016): As indicated in the technical documents.

Leakage test:

according to DIN 8964-3 (<4.1 g/a R-134a at 10bar)

Strength test:

according to EN 12178 at 1.43-fold PS

Classification pursuant to Pressure Equipment Directive 2014/68/EU and PE(S)R 2016:

The level indicator is a pressure-retaining component.

Approval according to Pressure Equipment Directive 2014/68/EU:

Existing EU design examination report for parts marked with "TÜV".

Manufacturer's approval according to Module A1 and C1

Design Features

- The material of the level indicator components and the manufacturing method are selected in conformity with the EN 12178, the Pressure Equipment Directive 2014/68/EU, the Pressure Equipment (Safety) Regulation 2016 and the RoHS Directive 2011/65/EU thus guaranteeing the reliability for the operating range indicated.
- The glass lens of the level indicator is molten pressure-tight into the steel casing. The different coefficients of expansion of glass and metal provide for a homogenous compressive stress over the entire glass body. This is why the level indicator behaves like tough material according to the "leak before break" principle.
- Types:

Screwed level indicator – level indicator with external thread (optionally: cylindrical metric ISO-thread DIN 13, tapered pipe thread NPTF ANSI/ASME B1.20.3, cylindrical pipe thread ISO 228 and Unified screw thread ASME B1.1) screwed by means of a gasket/seal ring or by way of a pressure-tight joint into a mating part that has a suitable internal thread.

The following types of level indicators are available:

- D – smooth lens
- DS – smooth lens with float
- DR – reflective glass
- DI – smooth lens with indicator.

Rotalock level indicator – Level indicator for Rotalock connection with Rotalock union nut, seal ring and Rotalock level indicator. The threaded joint comes as Unified screw thread ASME B.1.1. Optimal results of this screw joint are achieved when no other than AWA components are used.

The following types of the level indicator are available:

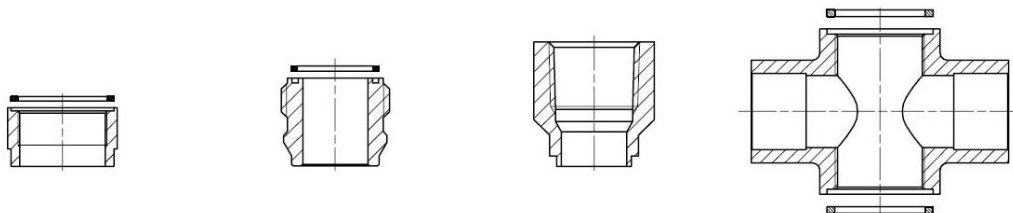
- RL – smooth lens
- RLR – reflective glass
- RLF – smooth lens with Rotalock union nut
- RLF SET – smooth lens with cage, float, gasket and Rotalock union nut.

Flange-type level indicator – Level indicator to be screwed on (3 to 6 screws), sealed by O-ring.

The following types of level indicators are available:

- D – smooth lens
- DR – reflective glass

- The level indicator comes with galvanized surface. This kind of coating ensures protection against corrosion until installation if handled and stored in dry condition.
- Suitable connecting components are available in the AWA delivery program.
 - Welding nut for ISO-thread with gasket
 - Welding nipple for Rotalock connection with gasket
 - Welding nut for NPTF thread
 - Straight-way housing for soldering / welding with one / two ISO-threads and gaskets



Transport and Storage

Transport the level indicator by closed means of transport in the original packing protected against weather influences and store it in dry areas.

Mounting

Principles

- The level indicator and/or the connecting piece shall be arranged in the system so that it can be operated properly and that it is and protected from possible hazards.



DANGER!

Damage of level indicator / connecting pieces possible.
 Serious injuries and system failure possible during operation.
 Level indicator / connecting pieces to be installed without additional loads (forces, vibrations, etc.).

- Removal space shall be so that the level indicator can be properly mounted by use of a tool and at the necessary torque.
- Only authorized personnel shall be allowed to mount the level indicator.



DANGER!

Any non-observance of these instructions may cause the level indicator to fail.
 Most serious injuries and death possible.
 Mounting by personnel trained in refrigeration systems only.

- No modifications of the level indicator and/or in-line housing are permitted. If modifications become necessary, they have to be agreed with the manufacturer prior to mounting.



WARNING!

Product features may change.
 Avoidable serious to very serious injuries or death possible.
 Any modification has to be agreed with manufacturer in advance.

Mounting preparation

- The connecting piece must have been installed and cooled in the system/component already. The sealing surfaces of the installed connecting pieces must be free of any damage.



DANGER!

Any non-observance of these instructions may cause the level indicator to fail.
 Very serious injuries or death possible.
 Install the connecting piece without level indicator.

- In the condition as supplied the level indicator may be provided with an additional transport protection. To avoid corrosion inside the level indicator or contamination, leave the transport protection in place until mounting.



ATTENTION!

Damage of internal components possible.
 Malfunction due to contamination of internal components.
 Remove the transport protection shortly before mounting.

Connecting the level indicator

- Make the connection of the level indicator in compliance with the following connection-specific principles:

Make sure that the connections are in conformity in terms of type and dimension and the sealing elements that may be necessary are used. If not, use adapters.

Make sure there is no mechanical restraint.

- Initially fasten the level indicator to the connecting piece using a suitable gasket and, if necessary, other components (cage, float ball). Pay attention to a correct position of the components and avoid damage. Then, tighten the level indicator using a positive-fit tool until the prescribed torque is reached.
- The screws of the flange type level indicator are tighten crosswise in min. 2 steps until the size-dependent torque has been reached.



WARNING!

Excessive torques or non-observance of the mounting order may cause failures delayed in time.

Serious injuries and system failure possible during operation.

Keep the mounting order, screw order and torque.

- Depending on the type, the thread type and size the following torques are applicable (Nm):

Screwed level indicator:

Thread type	Thread size	Torque	recommended gasket
M (DIN 13)	M24x1	50 +10	O-Ring
	M25x1	50 +10	O-Ring
	M26x1.5	120 +30	Aluminium
	M36x1.5	180 +20	Aluminium
	M52x2	250 +30	Aluminium

Thread type	Thread size	Torque	recommended gasket
G (ISO 228)	1/2"	50 +10	O-Ring
	3/4"	90 +10	Aluminium
	1"	150 +20	Aluminium
	1 1/2"	250 +20	Aluminium
	2"	120 +20	Fibre flat gasket

Thread type	Thread size	Torque
NPTF (ANSI/ASME B1.20.3)	1/2" – 14 NPTF	60 +10
	3/4" – 14 NPTF	90 +10
	1" – 11 1/2 NPTF	140 +10
	1 1/4" – 11 1/2 NPTF	190 +10
	1 1/2" – 11 1/2 NPTF	275 +10
	2" – 11 1/2 NPTF	340 +10

Note: Level indicator with NPTF thread to be mounted only once.
Sealants may be used for NPTF threads.

Thread type	Thread size	Torque	recommended gasket
UN	1 1/8" – 18 UNEF	50 +10	O-Ring

Rotalock level indicator:

Size	Thread	Torque	recommended gasket
RL 1 1/4"	1 1/4" –12 UNF	100 +10	AWA Rotalock PTFE gasket
RL 1 3/4"	1 3/4" –12 UN	150 +10	
RL 2 1/4"	2 1/4" –12 UN	170 +10	

Flange-type level indicator:

Thread	Torque	recommended gasket
M 6	8 +2	O-Ring
M10	45 +5	O-Ring


Commissioning

Principles


- The level indicator, except the connecting piece, has already been checked for tightness and strength by the manufacturer.
- The level indicator and the system, into which it is installed, may only be commissioned if they have been checked, with due regard to the intended mode of operation, for proper condition as to assembly, installation, set-up conditions and safe functioning.
- After mounting and initial start-up according to EN 378-2 check again for leakage and strength and an effective corrosion protection.


Steps of commissioning

- Check the system for resistance to pressure by suitable means (e.g. helium, dry nitrogen).


	<p>DANGER! Danger of bursting of level indicator. Most serious injuries possible. The test pressure must not exceed the maximum allowable pressure (PS). Strictly observe the safety information (e.g. DIN 378).</p>
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- It is absolutely necessary to apply an anticorrosive coating that suits the operating conditions because the level indicator with a temporary corrosion protection only. Make sure that the fabrication data remain legible.

	<p>CAUTION! Delayed failure due to corrosion possible. Serious injuries and failure of system during operation possible. Apply a suitable anticorrosive coat.</p>
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	<p>ATTENTION! Loss of product conformity due to illegible marking. Warranty becomes null and void. Marking/signing must be legible!</p>
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- Evacuating and filling the system with refrigerant.

	<p>DANGER! Danger of bursting if operated beyond the technical parameters. Most serious injuries possible. Observe the technical parameters of the level indicator. Make sure the system is not filled with an excessive amount of refrigerant.</p>
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- Never cool down or heat up the level indicator abruptly. The temperature gradient of the level indicator shall not exceed 30K.

**CAUTION!**

Cracks with resulting leaks in the glass lens possible.
Injuries and failure of system during operation possible.
Observe temperature differences.

Operation, Maintenance and Repair

Principles

- The level indicator is maintenance-free.
- When cleaning make sure the temperature difference between the cleaning agent and the level indicator is not too big.

**DANGER!**

Release of refrigerant possible.
Release of refrigerant may lead to most severe injuries.
For repairs the system must have an adequate temperature, free of refrigerant and sufficiently ventilated.

- As part of the regular system inspection it should be checked for corrosion/damage and operability and its proper condition restored if necessary.

**WARNING!**

Media contact possible, contact with hot/cold surfaces.
Burns, frostbites
Wear personal protective equipment as prescribed by national regulations during maintenance and inspections.

Repair

- If the level indicator needs repair, shut down the system, drain the refrigerant from the system (or system section) in an environmentally friendly manner and ventilate the system.

**DANGER!**

Refrigerant may escape.
Leaking refrigerant may cause most serious injuries.
For repairs the system must have the right temperature, free from refrigerant and sufficiently ventilated.

- For repairs use no other than original spare parts. For mounting/start-up follow these operating instructions. It is absolutely necessary to use a new gasket and do a leakage and strength test once again. AWA assumes no warranty for tightness after repairs.

**WARNING!**

Level indicator damage due to defective spare parts/mounting.
Avoidable serious injuries and system failure possible.
Use no other than original spare parts for repairs.

Dismantling and Disposal

Principles

- To dismantle the level indicator, shut off the system, remove the refrigerant from the system (or system section) in an environmentally friendly manner and sufficiently ventilate the system (or system section).

**DANGER!**

Release of refrigerant possible.

Release of refrigerant may lead to most severe injuries.

For repairs the system must have an adequate temperature, free of refrigerant and sufficiently ventilated.

**WARNING!**

Media contact possible, contact with hot/cold surfaces.

Burns, frostbites

Wear personal protective equipment as prescribed by national regulations during maintenance and inspections.

- The level indicator and its components can be recycled:

level indicator: iron scrap

cage / float ball: plastics

Dust caps: plastics (PE)

PTFE seal: plastics (PTFE)

CAS number: 9002-84-0

(observe country-specific regulations for disposal if necessary)



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