Liquid level transmitter

Type AKS 41

REFRIGERATION AND
AIR CONDITIONING DIVISION

Technical leaflet

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Introduction

AKS 41 liquid level transmitters are used to measure the liquid level in refrigerant vessels.

The AKS 41 transmits an active 4-20 mA signal which is proportional to the refrigerant liquid level.

The 4-20 mA signal from AKS 41 can be used in conjunction with a controller to control the refrigerant liquid level.

The Danfoss EKC 347 liquid level controller, is a dedicated controller for use with the AKS 41.

Special features

- *"Plug and Play":*
  no calibration required.
- *Service friendly:*
  electronic head and sensor tube can be separated without emptying the standpipe.
- *Damping of output signal available.*
- *Improved calibration:*
  AKS 41 range/signal output can be adapted to suit the actual application.
- AKS 41 can be supplied with a LED Bargraph indication of Liquid Level, as option

Technical data

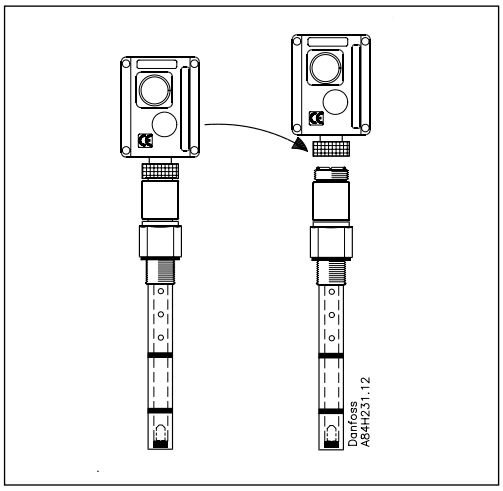
- Supply voltage and load:
  24 V a.c, –15% / +25%, 50/60 Hz
  24 V d.c, ±10%
  1.5 W
- *Signal output:*
  4-20 mA
- *Refrigerants:*
  AKS 41-3 pre calibrated to R 410A
- *Temperature range:*
  –60/+100°C (–76/+212°F)

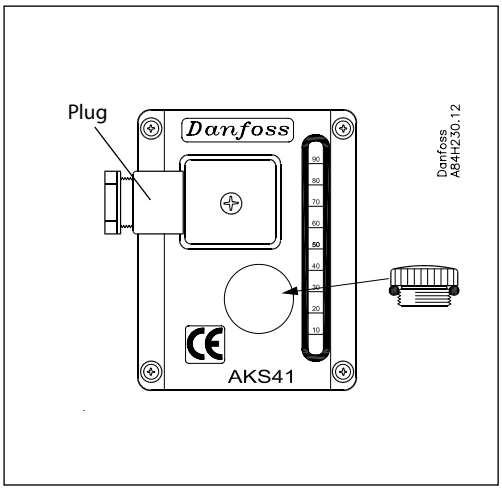
  When used in refrigerant above +60°C (140°F), a Min. Calibration must be carried out after 1 week of operation. Subsequently only a Min. Calibration once a year is needed.
- *Pressure range:*
  The AKS 41 is designed for:
  Max. working pressure: 100 bar g (1450 psig)
- *Connection:*
  Pipe thread ISO 228/1 - G 1A or 3/4 " NPT
- *Max. load resistance:*
  500 ohm
- *Ambient temperature:*
  During operation: –25 to +55°C (–13/+131°F).
  During transport: –40 to +70°C (–40/+158°F).
- *Enclosure:*
  IP65
- *Connection:*
  4-pole plug (DIN 43650)
- *Approvals:*
  EMC directive 89/336/EEC
  EMD directive 92/31/EEC
  EN 50081-1
  EN 50082-1
- *Material:*

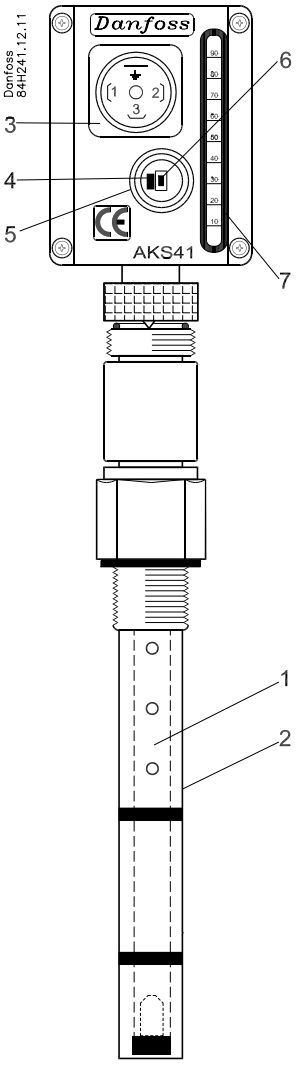
Thread:	Stainless steel. AISI 303
Reference pipe:	Stainless steel. AISI 304
Inner electrode:	PTFE
Electronic top part:	Cast Aluminium

Design

- Electronic head and sensor tube can be separated without emptying the standpipe.
- Plug can be mounted in 4 different positions.







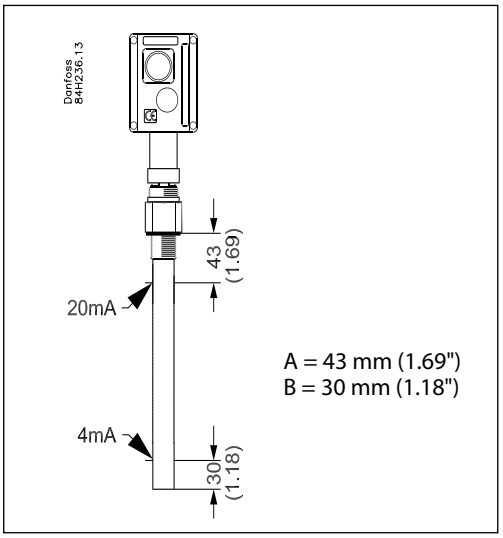
1 Inner pipe
2 Outer pipe
3 DIN connection
4 Green LED
5 Calibration cover
6 Calibration pushbutton
7 OPTION: LED Bargraph for indication of liquid level

Function and factory setting

The rod consists of two pipes - an inner pipe and an outer pipe. The liquid will flow up between the two pipes and by measuring the electrical capacitance between the pipes, the length of rod immersed in the liquid refrigerant is registered.

The signal is transmitted as a current signal from 4 to 20 mA (4 mA when the rod does not register liquid - and 20 mA when the entire rod is surrounded by liquid).

Factory setting:
The rod comes factory calibrated for R 410A, so that it will cover 4 to 20 mA throughout the rod's whole measuring range.
Any disturbances in connection with the level measurement will be damped internally.



Signal damping

Signal damping is factory-set at 15 seconds. This setting can be altered by activating the calibration switch (see page 4).
The setting range is 1 to 120 seconds.

Settings can also be made whilst the system is operating.

Procedure:

1. *Connect the supply voltage.*
2. *Push the calibration pushbutton once for each second by which you want to increase the damping.*
   Example:
   1. push to 1 sec.
   2. pushes to 2 sec.
   etc.
   120. pushes to 120 sec.
   121. pushes to 120 sec.

10 seconds after the last push, the value will be saved in the memory and the green LED will start flashing again.

After 10 seconds, a further push will start 1-second signal damping again.
(If the damping setting is set too high, restart the procedure from step 1).

Calibration of the AKS 41

AKS 41 will not need calibration if it is installed in refrigerant which is defined in AKS 41 and the ordered length corresponds to actual refrigerant measuring range.

Calibration of the AKS 41 may be relevant:-

- If the default setting does not fit and the max. /min. calibration points have to be adjusted.
- If the AKS 41 is used in a refrigerant, not already defined in AKS 41.
- If the electronic head is replaced on an existing AKS 41 sensor.

Usually the min. calibration point is chosen to be 4 mA and the max. calibration point to be 20 mA, but it is also possible to calibrate the transmitter at other calibration points.

This opportunity can be useful when cali brating on a plant with no possibility of bringing the level to the limit points.

Default factory setting is:
0% (AKS 41 free of liquid) output signal: 4 mA
100% (AKS 41 fully covered by liquid) output signal: 20 mA

The max. /min. points can be set to any value.

Adjusting the min. /max. calibration points:

Min. calibration:

1. *Bring the refrigerant liquid level to desired minimum level.*
2. *Press the calibration pushbutton and keep it activated in approx. 5 seconds, until green LED stopps flashing.*
3. *Activate, within the next 10 seconds, the calibration pushbutton once* (If calibration pushbutton is not activated within 10 seconds, it will automatically leave calibration mode and return to normal operation)

Green LED is ON in a few seconds, and then flashing.

Output is now 4 mA and AKS 41 is in normal operation

Max. calibration:

1. *Bring the refrigerant liquid level to desired maximum level.*
2. *Press the calibration pushbutton and keep it activated in approx. 5 seconds, until green LED stopps flashing.*
3. *Activate, within the next 10 seconds, the calibration pushbutton twice* (If calibration pushbutton is not activated within 10 seconds, it will automatically leave calibration mode and return to normal operation)

Green LED is ON in a few seconds, and then flashing.

Output is now 20 mA and AKS 41 is in normal operation

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Calibration of the AKS 41

(Continued)

Min. calibration when minimum refrigerant level must be different from 4 mA:

1. *Bring the refrigerant liquid level to desired minimum level.*
2. *Press the calibration pushbutton and keep it activated in approx. 5 seconds, until green LED stopps flashing.*
3. *Activate, within the next 10 seconds, the calibration pushbutton once and keep it activated.* (If calibration pushbutton is not activated within 10 seconds, it will automatically leave calibration mode and return to normal operation)
4. *Observe the output mA signal increasing fast starting at 4 mA.*
5. *Release the calibration pushbutton when the output signal is approx. 0.5 mA from the desired point.*
6. All the next activations will increase the output signal by approx. 0.05 mA
7. Approx. 10 seconds after the latest activation the LED starts flashing
8. Output now corresponds to the value measured at the latest activation.

Max. calibration when maximum refri-gerant level must be different from 20 mA:

1. *Bring the refrigerant liquid level to desired maximum level.*
2. *Press the calibration pushbutton and keep it activated in approx. 5 seconds, until green LED stopps flashing.*
3. *Activate, within the next 10 seconds, the calibration pushbutton twice and keep it activated.* (If calibration pushbutton is not activated within 10 seconds, it will automatically leave calibration mode and return to normal operation)
4. *Observe the output mA signal decreasing fast starting at 20 mA.*
5. *Release the calibration pushbutton when the output signal is approx. 0.5 mA from the desired point.*
6. All the next activations will decrease the output signal by approx. 0.05 mA
7. Approx. 10 seconds after the latest activation the LED starts flashing
8. Output now corresponds to the value measured at the latest activation.

Reset to factory setting

AKS 41 can always be reset to factory setting regardless of any revised calibration values.

1. *Press the calibration pushbutton and keep it activated in min. 20 seconds, until green LED starts flashing.*
2. *Release the calibration pushbutton.*
3. When LED starts flashing, reset to factory setting is completed.

AKS 41 is now operating according to the factory settings.

Green LED indication

Normal operation:
At normal operation the Green LED will be flashing slowly.
Generally the Green LED is ON every time calibration pushbutton is activated.

Calibration mode:
In calibration mode (Press the calibration pushbutton and keep it activated in approx. 5 seconds) the Green LED is OFF.

Ordering - AKS 41

Type	Length mm	Length in.	Measuring range mm	Measuring range in.	AKS 41 without Bargraph **Code no.**	AKS 41 with Bargraph **Code no.**
AKS 41-3	280	11.02	207	8.1	**084H4163**	

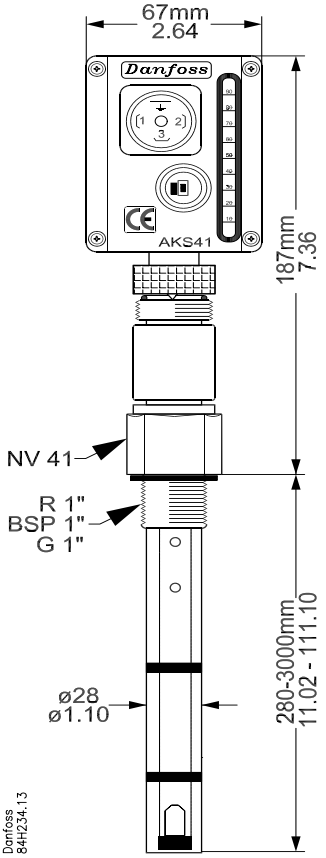
Ordering - accessories

AKS 41 only:	**Code no.**
Alu-gasket, 10 pcs.	**084H4081**
1" connection	**027F1010**

AKS 41:	Without Bargraph indication **Code no.**	With Bargraph indication **Code no.**
Electronic top part [1])	**084H4150**	**084H4151**

[1]) *Must always be calibrated when mounted on actual sensor rod*

AKS 41
Dimensions and weights



AKS 41

Type	Insertion length	Weight kg / lb
AKS 41-3	280 mm (11.02")	1.7 / 3.7