

Data Sheet

# Pressure transmitter Type **AKS 32** and **AKS 33**



AKS 32 and AKS 33 are pressure transmitters that measure a pressure and convert the measured value to a standard signal:

- 1 – 5 V DC or 0 – 10 V DC for AKS 32
- 4 – 20 mA for AKS 33

A robust design makes the AKS very suitable for application within a number of fields e.g.

- Air conditioning systems
- Refrigeration plant
- Process control
- Laboratories

## Features

Highly developed sensor technology means high pressure regulation accuracy, a very important factor in the precise and energy-economic capacity regulation of refrigeration plants.

- Fully digitally compensated, developed specially for refrigeration plants.
  - LP: -30 – 40 °C ( $\leq$  16 bar)
  - HP: 0 – 80 °C ( $>$  16 bar)
- Compatibility with all refrigerants incl. ammonia means less stock and greater application flexibility
- Built-in voltage stabiliser, i.e. the AKS pressure transmitters can be powered from an unregulated voltage supply of any output within given limits
- Effective protection against moisture means that the sensor can be mounted in very harsh environments, e.g. in the suction line encapsulated in an ice block
- Robust construction gives protection against mechanical influences such as shock, vibration and pressure surge. AKS sensors can be mounted direct on to the plant application
- No adjustment necessary. With the highly developed sensor technology and sealed gauge principle, the accuracy of the factory setting is maintained independent of variations in ambient temperature and atmospheric pressure. This is very important when ensuring evaporating pressure control in air conditioning and refrigeration applications
- EMC protection according to EU EMC-directive (CE-marked)
- UL approved
- Polarity protected inputs
- For use in zone ATEX 2 explosive atmospheres

## Product specification

### Technical data

**Table 1: Performance**

<b>Accuracy (incl. non-linearity, hysteresis and repeatability)</b>	± 0.3% FS (typ.) / ± 0.8% FS (max.)
<b>Non-linearity BFUL (conformity)</b>	< ± 0.2% FS
<b>Hysteresis and repeatability</b>	≤ ± 0.1% FS
<b>Thermal zero point shift</b>	≤ ± 0.1% FS / 10K (typ.)
	≤ ± 0.2% FS / 10K (max.)
<b>Thermal sensitivity (span) shift</b>	≤ ± 0.1% FS / 10K (typ.)
	≤ ± 0.2% FS / 10K (max.)
<b>Response time</b>	< 4 ms
<b>Max. working pressure</b>	See ordering table
<b>Burst pressure</b>	min. 300 bar
<b>Power-up time</b>	< 50 ms

**Table 2: Electrical specifications AKS 33, 4 – 20 mA output signal**

Rated output signal	4 – 20 mA
Supply voltage [U <sub>B</sub> ], polarity protected	9 – 32 V DC
Supply voltage dependency	< 0.1% FS / 10 V
Output limitation	22.4 mA
Max.Load, [R <sub>L</sub> ]	$R_L \leq \frac{U_B - 9V}{0.02A} [\Omega]$

**Table 3: Electrical specifications for AKS 32, 0 – 10 V DC output signal**

Rated output signal (short-circuit protected)	0 – 10 V DC
Supply voltage [U <sub>B</sub> ], polarity protected	15 – 32 V DC
Supply current consumption	< 8 mA
Supply voltage dependency	< 0.05% FS / 10 V
Sink / source	< 1 mA
Load resistance, R <sub>L</sub>	R <sub>L</sub> ≥ 15 kΩ

**Table 4: Electrical specifications for AKS 32, 1 – 5 V DC output signal**

Rated output signal (short-circuit protected)	1 – 5 V DC
Supply voltage [U <sub>B</sub> ], polarity protected	9 – 32 V DC
Supply current consumption	< 5 mA
Supply voltage dependency	< 0.05% FS / 10 V
Sink / source	< 1 mA
Load resistance, R <sub>L</sub>	R <sub>L</sub> ≥ 10 kΩ

**Table 5: Environmental conditions**

Operating temperature range	Normal	-40 – 85 °C		
	ATEX Zone 2	-10 – 85 °C		
Media temperature range [°C]		-40 – 85 °C		
Compensated temperature range		LP: -30 – 40 °C / HP: 0 – 80 °C		
Transport/storage temperature range		-50 – 85 °C		
EMC – Emission		EN 61000-6-3		
EMC – Immunity	Electrostatic discharge	Air	8 kV	EN 61000-6-2
		Contact	4 kV	EN 61000-6-2
	RF	field	10 V/m, 26 MHz – 1 GHz	EN 61000-6-2
		conducted	3 V <sub>rms</sub> , 150 kHz – 30 MHz	EN 61000-6-2
	Transient	burst	4 kV (CM)	EN 61000-6-2
		surge	1 kV (CM,DM)	EN 61000-6-2
Insulation resistance		> 100 MΩ at 500 V DC		
Vibration stability	Sinusoidal	20 g, 25 Hz – 2 kHz	IEC 60068-2-6	
	Random	7.5 grms, 5 Hz – 1 kHz	IEC 60068-2-34, IEC 60068-2-36	

## Pressure transmitter, Type AKS 32 and AKS 33

Shock resistance	Shock	500 g / 1 ms	IEC 60068-2-27
	Free fall	1 m	IEC 60068-2-32
Enclosure (depending on electrical connection)	Plug version		IP65 - IEC 60529
	Cable version		IP67 - IEC 60529

**Table 6: Explosive atmospheres**

Zone 2 applications	<b>II 3G</b> <b>Ex ce IIA T3 Gc</b> <b>-10°C&lt;Ta&lt;+85°C</b>	EN60079-0; EN60079-7
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The products for ATEX Zone 2 are applicable in refrigeration applications employing any flammable refrigerants classified as IIA – please, refer to AKS installation guide.

In ATEX Zone 2 applications at low temperatures cable and plug must be protected against impact.

**Table 7: Explosive atmospheres**

AKS other products can be used in end user applications employing the following flammable refrigerants: A3: R290, R600, R600a, R1270, A2L: R32, R444B, R452A/B, R454A/B/C, R455A, R1234zyef	IEC/EN 60335-2-89 (commercial refrigerating appliances) IEC/EN 60335-2-40 (electrical heat pumps, air-conditioners)
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For other products not ATEX Zone 2 assessed, an ignition risk assessment has been conducted with reference to IEC/EN 60335-2-89 (commercial refrigerating appliances) and IEC/EN 60335-2-40 (electrical heat pumps, air-conditioners).

For countries where safety standards are not an indispensable part of the safety system, Danfoss recommends the installer to seek a third-party approval of the system containing flammable refrigerant. Note: Please, follow specific selection criteria stated in the data sheet for these particular refrigerants.

**Table 8: Mechanical characteristics**

Electrical connection	EN 175301-803 plug / 2 m cable
Wetted parts, material	EN10088-1-1.4404 (AISI 316L)
Housing material	EN10088-1-1.4404 (AISI 316L)
Refrigerants	DR3, DR55, DR7, HDR110, L40, R1234yf, R1234ze, R1270, R1290, R134a, R22, R227, R23, R290, R32, R404A, R407A, R407B, R407C, R407F, R410A, R413A, R417A, R422A, R422D, R427A, R438A, R444B, R447A, R448A, R449A, R449B, R450A, R452A/B, R454A/B/C R455A, R502, R507, R513A, R600, R600a, 717 (NH3), R744 (CO2), R1270

## Electrical connections

**Table 9: Electrical connections**

Type code	A1	A3
Ambient temperature	-40 – 85 °C	-30 – 80 °C
Electrical connection 4 – 20 m output	Pin 1: + supply Pin 2: ÷ supply Pin 3: not used  Earth : Connected to AKS enclosure	Brown wire: + supply Black wire: ÷ supply Red wire: not used Orange wire: not used Screen: not connected to AKS enclosure
Electrical connection 0 – 5 –, 0 – 10 V output	Pin 1: + supply Pin 2: ÷ supply/common Pin 3: + output  Earth : Connected to AKS enclosure	Brown wire: + output Black wire: ÷ supply/common Red wire: + supply Orange wire: not used Screen: not connected to AKS enclosure

## Dimension and weight

Table 10: Dimension and weight

Version with EN 175301-803 Pg 9plug	Cable version

Table 11: Dimension and weight

Pressure Connection	1/4 - 18 NPT	G 3/8 A ISO 228/1	1/4 in. flare
L [mm]	16	18	16.5

## Ordering

**Table 12: AKS 32, version 1 – 5 V**

Operating range		Max. working pressure PB	Compensated temperature range	Code no.		
				EN 175301-803, plug Pg 9		
[bar]		[bar]	[°C]	1/4 NPT <sup>(1)</sup>	G 3/8 A <sup>(2)</sup>	1/4 in. flare <sup>(3)</sup>
LP	-1 – 6	33	-30 – 40	060G2000	060G2004	060G2068
	-1 – 12	33	-30 – 40	060G2001	060G2005	060G2069
HP	-1 – 20	40	0 – 80	060G2002	060G2006	060G2070
	-1 – 34	55	0 – 80	060G2003		060G2071
	-1 – 50	100	0 – 80	–	060G2007	060G2155

**Table 13: AKS 32, version 0 – 10 V**

Operating range		Max. working pressure PB	Compensated temperature range	Code no.		
				EN 175301-803, plug Pg 9		
[bar]		[bar]	[°C]	1/4 NPT <sup>(1)</sup>	G 3/8 A <sup>(2)</sup>	1/4 in. flare <sup>(3)</sup>
LP	-1 – 5	33	-30 – 40	–	060G2038	–
	-1 – 9	33	-30 – 40	060G2013	060G2036	060G2082
HP	-1 – 24	40	0 – 80	060G2014	060G2037	060G2083
	-1 – 39	60	0 – 80	060G2080	060G2079	060G2084

**Table 14: AKS 33, version 4 – 20 mA**

Operating range		Max. working pressure PB	Compensated temperature range	Code no.					
				EN 175301-803, plug Pg 9			Cable		
[bar]		[bar]	[°C]	1/4 NPT <sup>(1)</sup>	G 3/8 A <sup>(2)</sup>	1/4 in. flare <sup>(3)</sup>	1/4 NPT <sup>(1)</sup>	G 3/8 A <sup>(2)</sup>	1/4 in. flare <sup>(3)</sup>
LP	-1 – 5	33	-30 – 40	060G2112	060G2108	060G2047	–	–	–
	-1 – 6	33	-30 – 40	060G2100	060G2104	060G2048	–	060G2120	–
	-1 – 9	33	-30 – 40	060G2113	060G2111	060G2044	–	–	060G2062
	-1 – 12	33	-30 – 40	060G2101	060G2105	060G2049	060G2117	–	–
	0 – 16	40	-30 – 40	060G2114	060G2109	–	–	–	–
HP	-1 – 34	55	0 – 80	060G2103	060G2107	060G2051	060G2119	–	060G2065
	-1 – 20	40	0 – 80	060G2102	060G2106	060G2050	060G2118	–	–
	0 – 25	40	0 – 80	060G2115	060G2110	060G2045	–	060G2127	060G2067

<sup>(1)</sup> 1/4 - 18 NPT

<sup>(2)</sup> Thread ISO 228/1 - G 3/8 A (BSP)

<sup>(3)</sup> 7/16 - 20 UNF

Is also available in US-version (1 – 6 V) and with 1/8-27 NPT connection. Please contact Danfoss

## Certificates, declarations and approvals

The list contains all certificates, declarations, and approvals for this product type. Individual code number may have some or all of these approvals, and certain local approvals may not appear on the list.

Some approvals may change over time. You can check the most current status at [danfoss.com](http://danfoss.com) or contact your local Danfoss representative if you have any questions.

### Approvals

Table 15: Approvals

UL recognized for sale in the USA and Canada	Electrical safety	File no. E310 24, E494625
	Hazardous location	File no. E227388
CE marked according to the EMC directive		2015/30/EU
Ex evaluated for Zone 2 for sale in Europe		ATEX II 3G Ex-nA IIA T3 Gc
For sale in Russia, Belarus and Kazakhstan		EAC (EurAsian conformity)

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