

DATA INSTRUMENTS

Advanced Silicon Group



SURSENSE™ Ultra Low Pressure Sensors DCXL Series

Millivolt Output

High Accuracy Compensation

Full Scale Pressure Ranges

0 to 1 in. H₂O to 0 to 30 in. H₂O



DESCRIPTION

The SURSENSE™ line of ultra low pressure sensors is based upon a proprietary, patent applied for technology designed to reduce all output offset or common mode errors.

These sensors utilize a silicon, micromachined sensing element which features a unique stress concentration enhanced structure to provide a highly stable linear output that is proportional to applied pressure. Output offset errors due to changes in temperature, warm-up, long term stability and position sensitivity have all been significantly reduced when compared to conventional sensors.

The DCXL series sensors provide a precision calibrated ratiometric millivolt output with SURSENSE enhanced stability. Each sensor features calibrated offset, fullscale span and thermal error calibration to ensure the highest possible accuracy for flow pressure measurement. These highly stable sensors feature an industry standard ported package with improved stress isolation for printed circuit board mount applications.

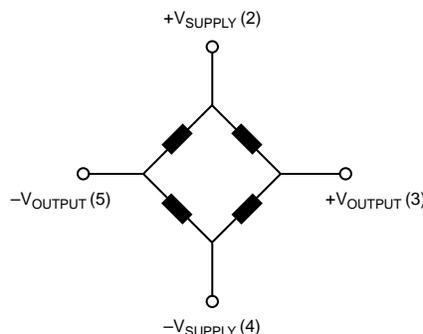
APPLICATIONS

- Medical Instrumentation
- HVAC
- Industrial Instrumentation
- Environmental Controls

FEATURES

- Available in Gage and Differential Pressure Ranges
- Temperature Compensated over 0°C to 50°C
- Position Sensitivity to $\pm 5\mu\text{V/g}$
- Warm-up drift $< \pm 50\mu\text{V}$
- Long Term Stability $< \pm 100\mu\text{V}$
- Combined Linearity and Hysteresis Error $< \pm 0.25\%$
- Custom Calibration Available

EQUIVALENT CIRCUIT



PINOUT	
1	N/C
2	+V _{SUPPLY}
3	+V _{OUTPUT}
4	-V _{SUPPLY}
5	-V _{OUTPUT}
6	N/C

DCXL01DN

Millivolt Output

High Accuracy Compensation

1 in. H₂O Full Scale Pressure

MAXIMUM RATINGS

PARAMETER	MINIMUM	MAXIMUM	UNITS
Operating Temperature Range	-25	85	°C
Storage Temperature	-40	125	°C
Proof Pressure	100		in. H ₂ O
Burst Pressure	200		in. H ₂ O
Excitation Voltage		16	V
Common Mode Pressure	50		psig
Humidity Limits	0	100	%RH

ELECTRICAL SPECIFICATIONS

PARAMETER, note 1	MINIMUM	NORMAL	MAXIMUM	UNITS
Operating Pressure Range		1.0		in. H ₂ O
Output Span, (1.0 in. H ₂ O–offset)	9.0	10.0	11.0	mV
Offset Voltage			±500	μV
Temperature Effect on Offset (0°C–50°C), note 2			±250	μV
Temperature Effect on Span (0°C–50°C), note 2			±200	μV
Offset Warm-up Shift, note 3			±100	μV
Offset Position Sensitivity (±1g)			±50	μV
Offset Long Term Drift (one year)			±200	μV
Combined Linearity and Hysteresis Error, note 4		0.05	0.25	%FS
Input Resistance		4.5		KΩ
Output Resistance		1.5		KΩ
Common Mode Voltage, % excitation		50		%

Note 1: Reference conditions (unless otherwise noted): Supply Voltage, $V_S = 12V_{DC}$, $T_A = 25^\circ C$, Common Mode Line Pressure = 0 psig. Pressure measurements are with pressure applied to Port B.

Note 2: Shift is relative to 25°C.

Note 3: Shift is within the first hour of excitation applied to the device.

Note 4: Measured at one-half full scale rated pressure using best straight line curve fit.

DCXL05DN

Millivolt Output

High Accuracy Compensation

5 in. H₂O Full Scale Pressure

MAXIMUM RATINGS

PARAMETER	MINIMUM	MAXIMUM	UNITS
Operating Temperature Range	-25	85	°C
Storage Temperature	-40	125	°C
Proof Pressure	150		in. H ₂ O
Burst Pressure	300		in. H ₂ O
Excitation Voltage		16	V
Common Mode Pressure	50		psig
Humidity Limits	0	100	%RH

ELECTRICAL SPECIFICATIONS

PARAMETER, note 1	MINIMUM	NORMAL	MAXIMUM	UNITS
Operating Pressure Range		5.0		in. H ₂ O
Output Span, (1.0 in. H ₂ O–offset)	19.0	20.0	21.0	mV
Offset Voltage			±500	μV
Temperature Effect on Offset (0°C–50°C), note 2		+45	±150	μV
Temperature Effect on Span (0°C–50°C), note 2		+125	±200	μV
Offset Warm-up Shift, note 3			±50	μV
Offset Position Sensitivity (±1g)			±10	μV
Offset Long Term Drift (one year)			±100	μV
Combined Linearity and Hysteresis Error, note 4		-0.05	±0.25	%FS
Input Resistance		10		KΩ
Output Resistance		1.5		KΩ
Common Mode Voltage, % excitation		50		%

Note 1: Reference conditions (unless otherwise noted): Supply Voltage, $V_S = 12V_{DC}$, $T_A = 25^\circ C$, Common Mode Line Pressure = 0 psig. Pressure measurements are with pressure applied to Port B.

Note 2: Shift is relative to 25°C.

Note 3: Shift is within the first hour of excitation applied to the device.

Note 4: Measured at one-half full scale rated pressure using best straight line curve fit.

DCXL10DN

Millivolt Output

High Accuracy Compensation

10 in. H₂O Full Scale Pressure

MAXIMUM RATINGS

PARAMETER	MINIMUM	MAXIMUM	UNITS
Operating Temperature Range	-25	85	°C
Storage Temperature	-40	125	°C
Proof Pressure	150		in. H ₂ O
Burst Pressure	300		in. H ₂ O
Excitation Voltage		16	V
Common Mode Pressure	50		psig
Humidity Limits	0	100	%RH

ELECTRICAL SPECIFICATIONS

PARAMETER, note 1	MINIMUM	NORMAL	MAXIMUM	UNITS
Operating Pressure Range		10.0		in. H ₂ O
Output Span, (1.0 in. H ₂ O–offset)	19.0	20.0	21.0	mV
Offset Voltage			±500	μV
Temperature Effect on Offset (0°C–70°C), note 2		+45	±150	μV
Temperature Effect on Span (0°C–70°C), note 2			±150	μV
Offset Warm-up Shift, note 3			±50	μV
Offset Position Sensitivity (±1g)			±10	μV
Offset Long Term Drift (one year)			±100	μV
Combined Linearity and Hysteresis Error, note 4		-0.05	0.25	%FS
Input Resistance		13		KΩ
Output Resistance		1.5		KΩ
Common Mode Voltage, % excitation		50		%

Note 1: Reference conditions (unless otherwise noted): Supply Voltage, $V_S = 12V_{DC}$, $T_A = 25^\circ C$, Common Mode Line Pressure = 0 psig. Pressure measurements are with pressure applied to Port B.

Note 2: Shift is relative to 25°C.

Note 3: Shift is within the first hour of excitation applied to the device.

Note 4: Measured at one-half full scale rated pressure using best straight line curve fit.

DCXL20DN

Millivolt Output

High Accuracy Compensation

20 in. H₂O Full Scale Pressure

MAXIMUM RATINGS

PARAMETER	MINIMUM	MAXIMUM	UNITS
Operating Temperature Range	-25	85	°C
Storage Temperature	-40	125	°C
Proof Pressure	300		in. H ₂ O
Burst Pressure	450		in. H ₂ O
Excitation Voltage		16	V
Common Mode Pressure	50		psig
Humidity Limits	0	100	%RH

ELECTRICAL SPECIFICATIONS

PARAMETER, note 1	MINIMUM	NORMAL	MAXIMUM	UNITS
Operating Pressure Range		20.0		in. H ₂ O
Output Span, (1.0 in. H ₂ O–offset)	19.0	20.0	21.0	mV
Offset Voltage			±500	μV
Temperature Effect on Offset (0°C–70°C), note 2			±150	μV
Temperature Effect on Span (0°C–70°C), note 2			±150	μV
Offset Warm-up Shift, note 3			±50	μV
Offset Position Sensitivity (±1g)			±5	μV
Offset Long Term Drift (one year)			±100	μV
Combined Linearity and Hysteresis Error, note 4		-0.01	0.25	%FS
Input Resistance		10		KΩ
Output Resistance		2		KΩ
Common Mode Voltage, % excitation		50		%

Note 1: Reference conditions (unless otherwise noted): Supply Voltage, $V_S = 12V_{DC}$, $T_A = 25^\circ C$, Common Mode Line Pressure = 0 psig. Pressure measurements are with pressure applied to Port B.

Note 2: Shift is relative to 25°C.

Note 3: Shift is within the first hour of excitation applied to the device.

Note 4: Measured at one-half full scale rated pressure using best straight line curve fit.

DCXL30DN

Millivolt Output

High Accuracy Compensation

30 in. H₂O Full Scale Pressure

MAXIMUM RATINGS

PARAMETER	MINIMUM	MAXIMUM	UNITS
Operating Temperature Range	-25	85	°C
Storage Temperature	-40	125	°C
Proof Pressure	450		in. H ₂ O
Burst Pressure	750		in. H ₂ O
Excitation Voltage		16	V
Common Mode Pressure	50		psig
Humidity Limits	0	100	%RH

ELECTRICAL SPECIFICATIONS

PARAMETER, note 1	MINIMUM	NORMAL	MAXIMUM	UNITS
Operating Pressure Range		30.0		in. H ₂ O
Output Span, (1.0 in H ₂ O–offset)	19.0	20.0	21.0	mV
Offset Voltage			±500	μV
Temperature Effect on Offset (0°C–70°C), note 2			±150	μV
Temperature Effect on Span (0°C–70°C), note 2			±150	μV
Offset Warm-up Shift, note 3			±50	μV
Offset Position Sensitivity (±1g)			±5	μV
Offset Long Term Drift (one year)			±100	μV
Combined Linearity and Hysteresis Error, note 4		0.1	0.25	%FS
Input Resistance		12		KΩ
Output Resistance		1.5		KΩ
Common Mode Voltage, % excitation		50		%

Note 1: Reference conditions (unless otherwise noted): Supply Voltage, $V_S = 12V_{DC}$, $T_A = 25^\circ C$, Common Mode Line Pressure = 0 psig. Pressure measurements are with pressure applied to Port B.

Note 2: Shift is relative to 25°C.

Note 3: Shift is within the first hour of excitation applied to the device.

Note 4: Measured at one-half full scale rated pressure using best straight line curve fit.

APPLICATION INFORMATION

MEDIA CAPABILITY, WETTED MATERIALS

(Apply clean dry air only)

Pressure Port B (High)	Silicon diaphragm, glass filled nylon, and alumina ceramic.
Pressure Port A (Low)	Silicon diaphragm, glass filled nylon, and alumina ceramic.

NON STANDARD OPTIONS AVAILABLE

Compensated Temperature Range	Wider Ranges: (-40°C to +125°C) with derated specifications
	Narrower Ranges: (10°C to 50°C) with improved specifications
Testing to Non Standard Conditions, changes to:	Excitation Voltage
	Common mode pressure. Standard testing has positive pressure to port B with ambient pressure to port A

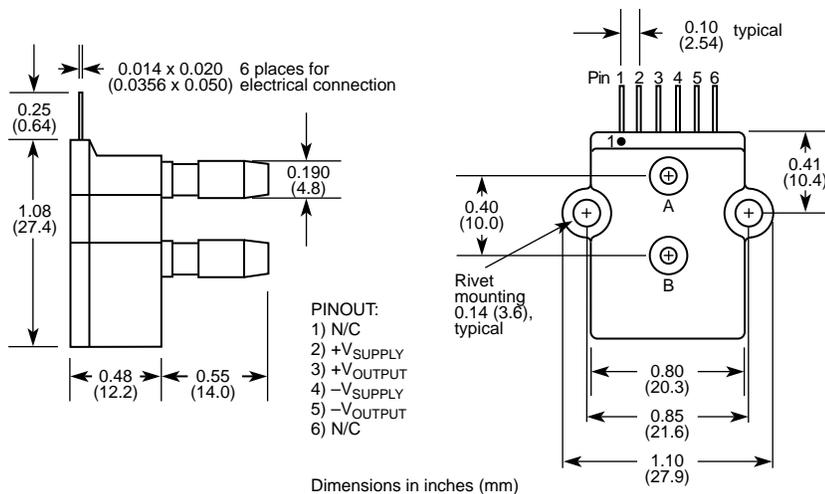
Pressure Compatibility:

Measures differential or gage pressure and vacuum. Pressure may be applied to either port A or port B. For pressure to port A the output polarity is reversed. Vacuum may be applied to either port A or port B. For vacuum to port B the output polarity is reversed.

Ratiometric Output:

The output voltage of the sensor is ratiometric, proportional, to the excitation voltage. For this model sensor all specifications will change proportionally to any changes in the excitation voltage. The excitation may vary between 3 to 16 volts. All specifications will nominally be change by a ratio of $V_{EXCITATION}/12.0$ volts. For example: if the excitation voltage is 5.0 volts then both the full scale output voltage and the offset voltage would be 5/12th the specified value.

PACKAGE DIMENSIONS



Ordering Information

MODEL NUMBER	PACKAGE TYPE
DCXL01DN	1 in. H ₂ O F. S.
DCXL05DN	5 in. H ₂ O F. S.
DCXL10DN	10 in. H ₂ O F. S.
DCXL20DN	20 in. H ₂ O F. S.
DCXL30DN	30 in. H ₂ O F. S.