MLV Series Low Voltage Pressure Sensors

Features
- 1 to 30 inH2O & 5 to 150 PSI Pressure Ranges
- 5V Operation
- High Output
- Low Power Consumption
- Excellent Position Sensitivity
- Low Warm-Up Shift
- Enhanced Front to Back Linearity
- Protective Parylene Coating Option

Applications
- Medical Breathing
- Environmental Controls
- HVAC
- Industrial Controls
- Portable/Hand-Held Equipment

General Description
The MLV Series Compensated Sensor is based on All Sensors’ CoBeam™ Technology. The device provides a high output signal at a low operating voltage while maintaining comparable output levels to traditional equivalent compensated millivolt sensors operating at higher voltages. This lower supply voltage gives rise to improved warm-up shift while the CoBeam™ Technology itself reduces package stress susceptibility resulting in improved overall long term stability. The technology also vastly improves position sensitivity compared to conventional single die devices.

These calibrated and compensated sensors give an accurate and stable output over a wide temperature range. This series is intended for use with non-corrosive, non-ionic working fluids such as air, dry gases and the like. A protective parylene coating is optionally available for moisture/harsh media protection. The output is also ratiometric to the supply voltage and designed to operate at 5.0 volts DC.

### Standard Pressure Ranges

<table>
<thead>
<tr>
<th>Device</th>
<th>Operating Range</th>
<th>Proof Pressure</th>
<th>Burst Pressure</th>
<th>Nominal Span</th>
</tr>
</thead>
<tbody>
<tr>
<td>MLV-L01D</td>
<td>±1 inH2O</td>
<td>100 inH2O</td>
<td>300 inH2O</td>
<td>7 mV</td>
</tr>
<tr>
<td>MLV-L02D</td>
<td>±2 inH2O</td>
<td>100 inH2O</td>
<td>300 inH2O</td>
<td>10 mV</td>
</tr>
<tr>
<td>MLV-L05D</td>
<td>±5 inH2O</td>
<td>200 inH2O</td>
<td>300 inH2O</td>
<td>15 mV</td>
</tr>
<tr>
<td>MLV-L10D</td>
<td>±10 inH2O</td>
<td>200 inH2O</td>
<td>300 inH2O</td>
<td>20 mV</td>
</tr>
<tr>
<td>MLV-L20D</td>
<td>±20 inH2O</td>
<td>200 inH2O</td>
<td>500 inH2O</td>
<td>20 mV</td>
</tr>
<tr>
<td>MLV-L30D</td>
<td>±30 inH2O</td>
<td>200 inH2O</td>
<td>800 inH2O</td>
<td>20 mV</td>
</tr>
<tr>
<td>MLV-005D</td>
<td>±5 PSI</td>
<td>10 PSI</td>
<td>30 PSI</td>
<td>25 mV</td>
</tr>
<tr>
<td>MLV-015D</td>
<td>±15 PSI</td>
<td>60 PSI</td>
<td>120 PSI</td>
<td>37.5 mV</td>
</tr>
<tr>
<td>MLV-015A</td>
<td>0 - 15 PSI/A</td>
<td>60 PSI</td>
<td>120 PSI</td>
<td>37.5 mV</td>
</tr>
<tr>
<td>MLV-030D</td>
<td>±30 PSI</td>
<td>90 PSI</td>
<td>150 PSI</td>
<td>37.5 mV</td>
</tr>
<tr>
<td>MLV-100D</td>
<td>±100 PSI</td>
<td>200 PSI</td>
<td>250 PSI</td>
<td>41.67 mV</td>
</tr>
<tr>
<td>MLV-150D</td>
<td>±150 PSI</td>
<td>200 PSI</td>
<td>250 PSI</td>
<td>37.5 mV</td>
</tr>
</tbody>
</table>

### Equivalent Circuit

```
+Vsupply
-Vsupply
-Vout
+Vout
```

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All Sensors

DS-0274 Rev C
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output Span</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L01D @ 1 inH2O</td>
<td>6.0</td>
<td>7.0</td>
<td>8.0</td>
<td>mV</td>
<td>4</td>
</tr>
<tr>
<td>L02D @ 2 inH2O</td>
<td>9.0</td>
<td>10.0</td>
<td>11.0</td>
<td>mV</td>
<td>4</td>
</tr>
<tr>
<td>L05D @ 5 inH2O</td>
<td>14.0</td>
<td>15.0</td>
<td>16.0</td>
<td>mV</td>
<td>4</td>
</tr>
<tr>
<td>L10D @ 10 inH2O</td>
<td>19.0</td>
<td>20.0</td>
<td>21.0</td>
<td>mV</td>
<td>4</td>
</tr>
<tr>
<td>L20D @ 20 inH2O</td>
<td>19.0</td>
<td>20.0</td>
<td>21.0</td>
<td>mV</td>
<td>4</td>
</tr>
<tr>
<td>L30D @ 30 inH2O</td>
<td>19.0</td>
<td>20.0</td>
<td>21.0</td>
<td>mV</td>
<td>4</td>
</tr>
<tr>
<td>Span Temperature Shift (0°C to 50°C)</td>
<td>-</td>
<td>-</td>
<td>±250</td>
<td>uV</td>
<td>1</td>
</tr>
<tr>
<td>Offset Voltage @ Zero Diff. Pressure</td>
<td>-</td>
<td>-</td>
<td>±500</td>
<td>uV</td>
<td>-</td>
</tr>
<tr>
<td>Offset Temperature Shift (0°C to 50°C)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L01D, L02D, L05D</td>
<td>-</td>
<td>-</td>
<td>±250</td>
<td>uV</td>
<td>1</td>
</tr>
<tr>
<td>L10D, L20D, L30D</td>
<td>-</td>
<td>-</td>
<td>±200</td>
<td>uV</td>
<td>1</td>
</tr>
<tr>
<td>Offset Warm-up Shift</td>
<td>-</td>
<td>-</td>
<td>±50.0</td>
<td>uV</td>
<td>2</td>
</tr>
<tr>
<td>Offset Position Sensitivity (1g)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L01D</td>
<td>-</td>
<td>-</td>
<td>±20.0</td>
<td>uV</td>
<td>6</td>
</tr>
<tr>
<td>L02D</td>
<td>-</td>
<td>-</td>
<td>±15.0</td>
<td>uV</td>
<td>6</td>
</tr>
<tr>
<td>L05D, L10D, L20D, L30D</td>
<td>-</td>
<td>-</td>
<td>±10.0</td>
<td>uV</td>
<td>6</td>
</tr>
<tr>
<td>Offset Long Term Drift (One Year)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L01D, L02D, L05D</td>
<td>-</td>
<td>±150</td>
<td>-</td>
<td>uV</td>
<td>-</td>
</tr>
<tr>
<td>L10D, L20D, L30D</td>
<td>-</td>
<td>±100</td>
<td>-</td>
<td>uV</td>
<td>-</td>
</tr>
<tr>
<td>Linearity, Hysteresis Error</td>
<td>-</td>
<td>0.10</td>
<td>0.30</td>
<td>%FSS</td>
<td>3</td>
</tr>
<tr>
<td>Response Time (10% to 90% Pressure Response)</td>
<td>-</td>
<td>500</td>
<td>-</td>
<td>us</td>
<td>-</td>
</tr>
<tr>
<td>Front to Back Linearity</td>
<td>-</td>
<td>0.75</td>
<td>-</td>
<td>%FSS</td>
<td>5</td>
</tr>
<tr>
<td>Input Resistance</td>
<td>-</td>
<td>12.0</td>
<td>-</td>
<td>k ohm</td>
<td>-</td>
</tr>
<tr>
<td>Output Resistance</td>
<td>-</td>
<td>3.0</td>
<td>-</td>
<td>k ohm</td>
<td>-</td>
</tr>
</tbody>
</table>

Performance Characteristics for MLV Series (inH2O)

All parameters are measured at 5.0 volt excitation and room temperature unless otherwise specified. Pressure measurements are with positive pressure applied to Port B (the only port for the single port configuration packages).
Performance Characteristics for MLV Series (PSI)

All parameters are measured at 5.0 volt excitation and room temperature unless otherwise specified. Pressure measurements are with positive pressure applied to PORT B (the only port for the single port configuration packages). Pressure is applied to PORT A for absolute devices in A-package.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Output Span</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>005D @ 5 PSI</td>
<td>24.75</td>
<td>25.0</td>
<td>25.25</td>
<td>mV</td>
<td>4</td>
</tr>
<tr>
<td>015D @ 15 PSI</td>
<td>37.13</td>
<td>37.50</td>
<td>37.88</td>
<td>mV</td>
<td>4</td>
</tr>
<tr>
<td>015A @ 15 PSIA</td>
<td>37.13</td>
<td>37.50</td>
<td>37.88</td>
<td>mV</td>
<td>4</td>
</tr>
<tr>
<td>030D @ 30 PSI</td>
<td>37.13</td>
<td>37.50</td>
<td>37.88</td>
<td>mV</td>
<td>4</td>
</tr>
<tr>
<td>100D @ 100 PSI</td>
<td>41.25</td>
<td>41.67</td>
<td>42.08</td>
<td>mV</td>
<td>4</td>
</tr>
<tr>
<td>150D @ 150 PSI</td>
<td>37.08</td>
<td>37.50</td>
<td>37.92</td>
<td>mV</td>
<td>4</td>
</tr>
<tr>
<td><strong>Span Temperature Shift (0°C to 50°C)</strong></td>
<td></td>
<td></td>
<td>±1.0</td>
<td>%FSS</td>
<td>1</td>
</tr>
<tr>
<td><strong>Offset Voltage @ Zero Diff. Pressure</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>005D @ 5 PSI</td>
<td>-</td>
<td>-</td>
<td>125</td>
<td>uV</td>
<td>-</td>
</tr>
<tr>
<td>015D @ 15 PSI</td>
<td>-</td>
<td>-</td>
<td>208</td>
<td>uV</td>
<td>-</td>
</tr>
<tr>
<td>015A @ 15 PSIA</td>
<td>-</td>
<td>-</td>
<td>125</td>
<td>uV</td>
<td>-</td>
</tr>
<tr>
<td>030D @ 30 PSI</td>
<td>-</td>
<td>-</td>
<td>125</td>
<td>uV</td>
<td>-</td>
</tr>
<tr>
<td>100D @ 100 PSI</td>
<td>-</td>
<td>-</td>
<td>125</td>
<td>uV</td>
<td>-</td>
</tr>
<tr>
<td>150D @ 150 PSI</td>
<td>-</td>
<td>-</td>
<td>125</td>
<td>uV</td>
<td>-</td>
</tr>
<tr>
<td><strong>Offset Warm-Up Shift</strong></td>
<td>±20</td>
<td></td>
<td></td>
<td>uV</td>
<td>2</td>
</tr>
<tr>
<td><strong>Offset Long Term Drift (one year)</strong></td>
<td>±100</td>
<td></td>
<td></td>
<td>uV</td>
<td>-</td>
</tr>
<tr>
<td><strong>Linearity, Hysteresis Error</strong></td>
<td>0.20</td>
<td>0.50</td>
<td></td>
<td>%FSS</td>
<td>3</td>
</tr>
<tr>
<td><strong>Response Time (10% to 90% Pressure Response)</strong></td>
<td>500</td>
<td></td>
<td></td>
<td>us</td>
<td>-</td>
</tr>
<tr>
<td><strong>Front to Back Linearity</strong></td>
<td>2.5</td>
<td></td>
<td></td>
<td>%FSS</td>
<td>5</td>
</tr>
<tr>
<td><strong>Input Resistance</strong></td>
<td>12.0</td>
<td></td>
<td></td>
<td>k ohm</td>
<td>-</td>
</tr>
<tr>
<td><strong>Output Resistance</strong></td>
<td>3.0</td>
<td></td>
<td></td>
<td>k ohm</td>
<td>-</td>
</tr>
</tbody>
</table>

Specification Notes

**Note 1:** Shift is relative to 25°C.

**Note 2:** Shift is within the first hour of excitation applied to the device.

**Note 3:** Measured at one-half full scale rated pressure using best straight line curve fit.

**Note 4:** The span is the algebraic difference between full scale output voltage and the offset voltage.

**Note 5:** Front-Back Linearity computed as: \[ \text{Lin FB} = \left( \frac{\text{Span Front}}{\text{Span Back}} \right)^{100\%} \]

**Note 6:** Parameter is characterized and not 100% tested.
How To Order

A Package
Example: MLV-L02D-A6BF-N

Pressure Range
Option | Description
--- | ---
L01D | 1 in H2O
L02D | 2 in H2O
L05D | 5 in H2O
L06D | 10 in H2O
L08D | 20 in H2O
L10D | 30 in H2O
005D | 5 PSI
015D | 15 PSI
015A | 15 PSIA
030D | 30 PSI
100D | 100 PSI
150D | 150 PSI

Port Cut Configuration
Option | Description
--- | ---
A | No Port Cut
B | Two Ports Cut 0.085" (See NOTE 1 below)
C | Two Ports Cut 0.100" (See NOTE 1 below)
D | Two Ports Cut 0.150" (See NOTE 1 below)
E | One Port (A) Cut 0.085" (See NOTE 1 below)
F | One Port (A) Cut 0.370" (See NOTE 1 below)

Port Fittings
Option | Description
--- | ---
S | No Fittings
B | Barb Fitting Port A Only
C | Barb Fitting Port B Only
D | Barb Fittings Ports A & B

Coating
Option | Description
--- | ---
N | No Coating
P | Parylene Coating

MLV Series Low Voltage Pressure Sensors

E Package
Example: MLV-L02D-E1ND-N

Pressure Range
Option | Description
--- | ---
L01D | 1 in H2O
L02D | 2 in H2O
L05D | 5 in H2O
L06D | 10 in H2O
L08D | 20 in H2O
L10D | 30 in H2O
005D | 5 PSI
015D | 15 PSI
015A | 15 PSIA
030D | 30 PSI
100D | 100 PSI
150D | 150 PSI

Port Orientation
Option | Description
--- | ---
1 | Dual Port Same Side
2 | Dual Port Opposite Side
G | Single Port (Gage)

Lid Style
Option | Description
--- | ---
N | Non-Barbed
B | Barbed

Lead Type
Option | Description
--- | ---
S | SIP
D | DIP
J | J-Lead SMT
L | Low Profile DIP

Coating
Option | Description
--- | ---
N | No Coating
P | Parylene Coating

Lead Configuration
Option | Description
--- | ---
F | Flat (Straight)
Q | Right Angle 0.075"
R | Right Angle 0.100"
J | Joggled Bend

NOTE 1) Parylene Coating: Parylene coating provides a moisture barrier and protection from some harsh media. Consult factory for applicability of Parylene for the target application and sensor type.

MLV Series Low Voltage Pressure Sensors

TABLE 1: Available E-Series Package Configurations

<table>
<thead>
<tr>
<th>Port Orientation</th>
<th>Non-Barbed Lid</th>
<th>Barbed Lid</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lead Style</td>
<td>Lead Style</td>
</tr>
<tr>
<td></td>
<td>SIP</td>
<td>DIP</td>
</tr>
<tr>
<td>Dual Port Same Side</td>
<td>E2NS</td>
<td>E1ND</td>
</tr>
<tr>
<td>Dual Port Opposite Side</td>
<td>E2NS</td>
<td>E2ND</td>
</tr>
<tr>
<td>Single Port (Gage)</td>
<td>EGN5</td>
<td>EGN6</td>
</tr>
</tbody>
</table>
Package Drawings

A6 Package (Without Options)

NOTES
1) Dimensions are in inches [mm].
2) For suggested pad layout, see drawing PAD-09

Example: MLV-L10D-A6xAF-N

A-Package: Port Cut Options

A- No Port Cut Configuration

B- Two Ports Cut 0.085" Configuration

C- Two Ports Cut 0.100" Configuration

D- Two Ports Cut 0.150" Configuration

E- Port A cut 0.080" Configuration

F- Port A Cut 0.370" Configuration

Pinout

<table>
<thead>
<tr>
<th>(Gage)</th>
<th>(Absolute)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) N/C</td>
<td>1) N/C</td>
</tr>
<tr>
<td>2) Vs</td>
<td>2) Vs</td>
</tr>
<tr>
<td>3) +Out</td>
<td>3) -Out</td>
</tr>
<tr>
<td>4) Gnd</td>
<td>4) Gnd</td>
</tr>
<tr>
<td>5) -Out</td>
<td>5) +Out</td>
</tr>
<tr>
<td>6) N/C</td>
<td>6) N/C</td>
</tr>
</tbody>
</table>

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MLV Series Low Voltage Pressure Sensors

A-Package: Port Fitting Options

Example: MLV-L10D-A6DxF-N

Port Fitting Options

NOTE: Port Cut Configuration "D" Shown As Reference.

A- No Fittings Configuration

C- Barb Fitting Port B Only Configuration

B- Barb Fitting Port A Only Configuration

D- Barb Fitting Ports A and B Configuration

A-Package: Lead Bend Options

Example: MLV-L10D-A6AAx-N

Lead Bend Options

F- Flat (Straight) Configuration

R- Right Angle 0.100" Configuration

J- Jogged Bend Configuration

Q- Right Angle 0.075" Configuration

Jogged Bend Configuration

A-Package: Port Fitting Options

A- No Fittings Configuration

C- Barb Fitting Port B Only Configuration

B- Barb Fitting Port A Only Configuration

D- Barb Fitting Ports A and B Configuration

NOTE: Port Cut Configuration "D" Shown As Reference.

Example: MLV-L10D-A6DxF-N

Lead Bend Options

F- Flat (Straight) Configuration

R- Right Angle 0.100" Configuration

J- Jogged Bend Configuration

Q- Right Angle 0.075" Configuration

MLV Series Low Voltage Pressure Sensors
E1NS Package

NOTES
1) Dimensions are in inches [mm]
2) For suggested pad layout, see drawing: PAD-01

Pinout
1) Gnd
2) +Out
3) Vs
4) -Out

E1BS Package

NOTES
1) Dimensions are in inches [mm]
2) For suggested pad layout, see drawing: PAD-01

Pinout
1) Gnd
2) +Out
3) Vs
4) -Out
E2NS Package

Pinout
1) Gnd
2) +Out
3) Vs
4) -Out

Pinout
1) Gnd
2) +Out
3) Vs
4) -Out

NOTES
1) Dimensions are in inches [mm]
2) For suggested pad layout, see drawing: PAD-01

E2BS Package

NOTES
1) Dimensions are in inches [mm]
2) For suggested pad layout, see drawing: PAD-01

MLV Series Low Voltage Pressure Sensors

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EGNS Package

NOTES
1) Dimensions are in inches [mm]
2) For suggested pad layout, see drawing: PAD-01

EGBS Package

NOTES
1) Dimensions are in inches [mm]
2) For suggested pad layout, see drawing: PAD-01

Pinout
1) Gnd
2) +Out
3) Vs
4) -Out

Absolute devices are without port hole.
E1ND Package

Pinout
1) Gnd
2) +Out
3) Vs
4) -Out
5) Do Not Connect
6) Do Not Connect
7) Do Not Connect
8) Do Not Connect

NOTES
1) Dimensions are in inches [mm]
2) For suggested pad layout, see drawing: PAD-03

E1BD Package

Pinout
1) Gnd
2) +Out
3) Vs
4) -Out
5) Do Not Connect
6) Do Not Connect
7) Do Not Connect
8) Do Not Connect

NOTES
1) Dimensions are in inches [mm]
2) For suggested pad layout, see drawing: PAD-03
### E2ND Package

**Pinout**
1) Gnd
2) +Out
3) Vs
4) -Out
5) Do Not Connect
6) Do Not Connect
7) Do Not Connect
8) Do Not Connect

**NOTES**
1) Dimensions are in inches (mm)
2) For suggested pad layout, see drawing: PAD-03

### E2BD Package

**Pinout**
1) Gnd
2) +Out
3) Vs
4) -Out
5) Do Not Connect
6) Do Not Connect
7) Do Not Connect
8) Do Not Connect

**NOTES**
1) Dimensions are in inches (mm)
2) For suggested pad layout, see drawing: PAD-03
MLV Series Low Voltage Pressure Sensors

EGND Package

NOTES
1) Dimensions are in inches [mm]
2) For suggested pad layout, see drawing: PAD-03

EGBD Package

NOTES
1) Dimensions are in inches [mm]
2) For suggested pad layout, see drawing: PAD-03

Pinout
1) Gnd
2) +Out
3) Vs
4) -Out
5) Do Not Connect
6) Do Not Connect
7) Do Not Connect
8) Do Not Connect
E1NJ Package

Pinout
1) Gnd
2) +Out
3) Vs
4) -Out
5) Do Not Connect
6) Do Not Connect
7) Do Not Connect
8) Do Not Connect

Details:

- Pinout:
  - 1) Gnd
  - 2) +Out
  - 3) Vs
  - 4) -Out
  - 5) Do Not Connect
  - 6) Do Not Connect
  - 7) Do Not Connect
  - 8) Do Not Connect

Notes:
1) Dimensions are in inches [mm]
2) For suggested pad layout, see drawing: PAD-10

E2NJ Package

Pinout
1) Gnd
2) +Out
3) Vs
4) -Out
5) Do Not Connect
6) Do Not Connect
7) Do Not Connect
8) Do Not Connect

Details:

- Pinout:
  - 1) Gnd
  - 2) +Out
  - 3) Vs
  - 4) -Out
  - 5) Do Not Connect
  - 6) Do Not Connect
  - 7) Do Not Connect
  - 8) Do Not Connect

Notes:
1) Dimensions are in inches [mm]
2) For suggested pad layout, see drawing: PAD-10
EGNJ Package

NOTES
1) Dimensions are in inches [mm]
2) For suggested pad layout, see drawing: PAD-10

EGBJ Package

NOTES
1) Dimensions are in inches [mm]
2) For suggested pad layout, see drawing: PAD-10

MLV Series Low Voltage Pressure Sensors
EGNL Package

NOTES
1) Dimensions are in inches [mm]
2) For suggested pad layout, see drawing: PAD-03

Pinout
1) Gnd
2) +Out
3) Vs
4) -Out
5) Do Not Connect
6) Do Not Connect
7) Do Not Connect
8) Do Not Connect

EGBL Package

NOTES
1) Dimensions are in inches [mm]
2) For suggested pad layout, see drawing: PAD-03

Pinout
1) Gnd
2) +Out
3) Vs
4) -Out
5) Do Not Connect
6) Do Not Connect
7) Do Not Connect
8) Do Not Connect
Suggested Pad Layout

Package Characteristics

Approximate Port Volume

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<th>Package ID</th>
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<th>Port B</th>
<th>Units</th>
<th>Notes</th>
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Package Notes
Note 1: Add 4.5 mm³ per port with barb fitting.
Note 2: Add 0.15 gram per barb fitting.

Product Labeling

All Sensors
MLV-L02D
A6AAF-N
R9J21-3

Example Device Label

* 5 PSI to 150 PSI devices may not be assembled with CoBeam™ Technology.
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