

# 3500/77M Recip Cylinder Pressure Monitor

Bently Nevada™ Asset Condition Monitoring

## Description

The 3500/77M Recip Cylinder Pressure Monitor is a 4-channel monitor that accepts input from Bently Nevada approved pressure transducers, conditions the signal to make various pressure measurements for reciprocating compressors, and compares the conditioned signals with user-programmable alarms.

The primary purpose of the 3500/77M monitor is to provide:

- Machinery protection by continuously comparing monitored parameters against configured alarm setpoints to drive alarms.
- Essential machine information for both operations and maintenance personnel.

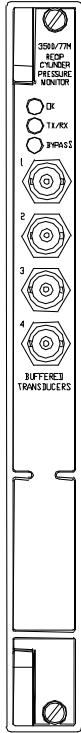
Depending on configuration, each channel typically conditions its input signal to provide various parameters called "proportional values," also referred to as PPL's. Users can configure Alert setpoints for each active proportional value (PPL) and Danger setpoints for any two of the active proportional values.

Each channel of the 3500/77M will provide eight PPL values that relate to cylinder pressure operation. The five PPL values that relate to a single chamber are as follows:

- Discharge Pressure
- Suction Pressure
- Maximum Pressure
- Minimum Pressure
- Compression Ratio

Three PPL values combine one or more channel values with configured mechanical parameters to compute their value:

- Peak Rod Compression
- Peak Rod Tension
- Degree of Rod Reversal



---

## Specifications

### Inputs

#### Signal:

Accepts 1 to 4 channels of Bently Nevada approved positive voltage 3rd-party pressure transducers (psia)

---

### Scale Factor

95,000  $\mu\text{V}/\text{psi}$  for 100 psia range\*

38,000  $\mu\text{V}/\text{psi}$  for 250 psia range\*

19,000  $\mu\text{V}/\text{psi}$  for 500 psia range\*

9,500  $\mu\text{V}/\text{psi}$  for 1000 psia range\*

3,800  $\mu\text{V}/\text{psi}$  for 2500 psia range\*

1,900  $\mu\text{V}/\text{psi}$  for 5000 psia range\*

950  $\mu\text{V}/\text{psi}$  for 10000 psia range\*

\*All pressure transducers will be supplied with scale factor specifications that include pressure/voltage values at two points. The above data assumes +0.5 Vdc at 0 psia and +10.0 Vdc at the full-range psia value.

---

### Signal Conditioning

#### Frequency Response

0 to 5.5 kHz on all configured pressure channels

#### Pressure Accuracy

Within  $\pm 0.5\%$  of pressure transducer full-range (9.5 volts: From +0.5 to +10.0 volts) @ +25°C (77° F)

Within  $\pm 1.0\%$  of pressure transducer full-range (9.5 volts: From +0.5 to +10.0 volts) over -30 °C to +65 °C (-22 °F to 150 °F)

---

### Proportional Values

#### Cylinder Pressure

Discharge Pressure, Suction Pressure, Maximum Pressure, Minimum Pressure, Compression Ratio, Peak Rod Compression, Peak Rod Tension, Degree of Rod Reversal

### Input Impedance

#### Internal/ External Termination Cylinder Pressure I/O:

50 k $\Omega$

### Power Consumption

7.8 watts with transducer supplies at full load.

---

### Outputs

#### Front Panel LEDs

##### OK LED

Indicates when the 3500/77M is operating properly.

##### TX/RX LED

Indicates when the 3500/77M is communicating with other modules in the 3500 rack.

##### Bypass LED

Indicates when the 3500/77M is in Bypass Mode.

### Buffered Transducer Outputs

The front of each monitor has one coaxial connector for each channel. Each connector is short-circuit protected.

**Note:** The Buffered Transducer Outputs on monitors using the Cylinder Pressure I/O module will be inverted and offset by - 2.265 Vdc.

---

### Output Impedance

550  $\Omega$

### Transducer Power Supply

+23.0  $\pm$  0.8 Vdc with 24.5 ma current limiting on each channel.

---

### Environmental Limits

#### Operating Temperature

#### When used with Internal/External

Specifications and Ordering Information  
Part Number 147485-01  
Rev. G (11/08)

**Termination  
Cylinder Pressure  
I/O Module:**

-30 °C to +65 °C (-22 °F to +150 °F)

**Storage  
Temperature**

-40 °C to +85 °C (-40 °F to +185 °F)

**Humidity**

95%, non-condensing

---

**CE Mark Directives**

**EMC Directives**

**EN50081-2**

*Radiated  
Emissions*

EN 55011, Class A

*Conducted  
Emissions*

EN 55011, Class A

**EN50082-2**

*Electrostatic  
Discharge*

EN 61000-4-2, Criteria B

*Radiated  
Susceptibility*

ENV 50140, Criteria A

*Conducted  
Susceptibility*

ENV 50141, Criteria A

*Electrical Fast  
Transient*

EN 61000-4-4, Criteria B

*Surge  
Capability*

EN 61000-4-5, Criteria B

*Magnetic Field*

EN 61000-4-8, Criteria A

*Power Supply  
Dip*

EN 61000-4-11, Criteria B

*Radio  
Telephone*

ENV 50204, Criteria B

**Low Voltage  
Directives**

**EN 61010-1**

Safety Requirements

---

**Hazardous Area Approvals**

**CSA/NRTL/C**

**Approval Option  
(01)**

Class I, Div 2

Groups A, B, C, D

T4 @ Ta = -20 °C to +65 °C

(-4 °F to +150 °F)

*Certification  
Number*

CSA 150268-1002151 (LR 26744)

---

**Physical**

**Monitor Module**

**Dimensions  
(Height x Width  
x Depth)**

241.3 mm x 24.4 mm x 241.8 mm  
(9.50 in x 0.96 in x 9.52 in)

**Weight**

0.91 kg (2.0 lb.)

**I/O Modules**

**Dimensions  
(Height x Width  
x Depth)**

241.3 mm x 24.4 mm x 99.1 mm  
(9.50 in x 0.96 in x 3.90 in)

**Weight**

0.20 kg (0.44 lb.)

**Rack Space  
Requirements**

---

Specifications and Ordering Information  
Part Number 147485-01  
Rev. G (11/08)

## Monitor Module

1 full-height front slot

## I/O Modules

1 full-height rear slot

---

## Ordering Information

### Ordering Considerations

#### General

The 3500/77M Module requires the following (or later) firmware and software revisions:

- 3500/77M Module Firmware Revision L
- 3500/01 Software – Version 3.00
- 3500/02 Software – Version 2.30
- 3500/03 Software – Version 1.30

External Termination Blocks cannot be used with Internal Termination I/O Modules.

When ordering I/O Modules with External Terminations, the External Termination Blocks and Cables must be ordered separately.

---

### List of Options and Part Numbers

#### Cylinder Pressure Monitor

##### 3500/77M-AXX-BXX

A: I/O Module Type

- 03** Cylinder Pressure I/O with Internal Terminations.
- 04** Cylinder Pressure I/O with External Terminations

B: Agency Approval Option

- 00** None
- 01** CSA/NRTL/C

#### External Termination Blocks

##### 125808-10

Cylinder Pressure External Termination Block (Euro Style connectors).

##### 128015-10

Cylinder Pressure External Termination Block (Terminal Strip connectors).

---

#### 3500 Transducer Signal to External Termination Block Cable

##### 129525 -AXXX-BXX

A: Cable Length

- 0005** 5 feet (1.5 metres)
- 0007** 7 feet (2.1 metres)
- 0010** 10 feet (3 metres)
- 0025** 25 feet (7.5 metres)
- 0050** 50 feet (15 metres)
- 0100** 100 feet (30.5 metres)

B: Assembly Instructions

- 01** Not Assembled
- 02** Assembled

---

### SPARES

#### 146282-01

3500/77M Monitor Manual.

#### 176449-07

3500/77M Cylinder Pressure Monitor.

#### 143729-01

Cylinder Pressure I/O Module with Internal Terminations for Bently Approved Third Party Pressure Transducers.

#### 143737-01

Cylinder Pressure I/O Module with External Terminations for Bently Approved Third Party Pressure Transducers.

#### 00580434

Internal I/O Module connector header, Euro Style, 8 pin. Used on I/O modules 143729-01.

#### 00580441

Internal I/O Module connector header, Euro Style, 3 pin. Used on I/O modules 143729-01.

#### 146973-01

Recip Multi-Event Wheel Kit.

#### 145732-01

Recip Multi-Event Wheel.

#### 146622-01

Recip Multi-Event Wheel Stud.

**165855-XX**

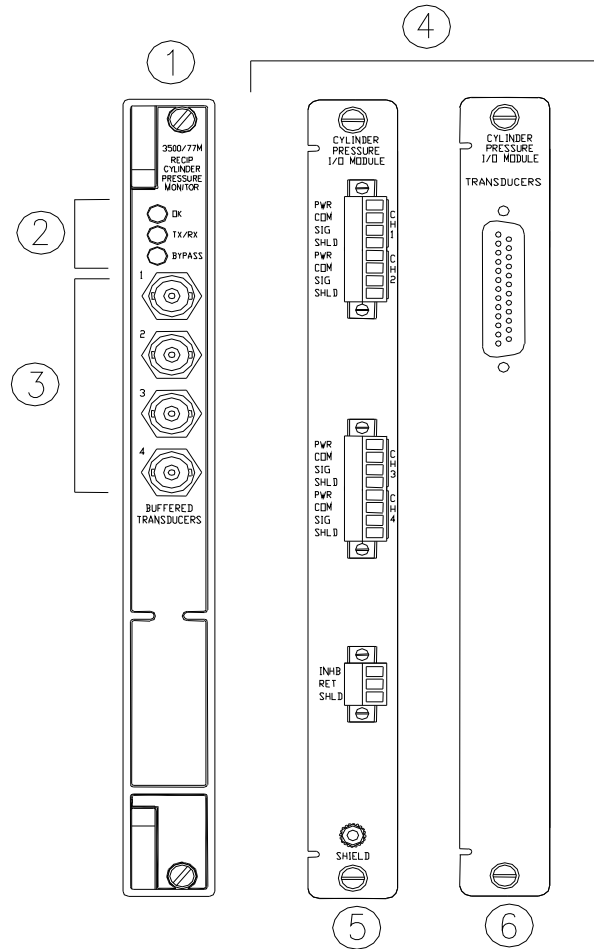
Recip Cylinder Pressure  
Transducer.

(See 165855 data sheet)

**02200812**

MTL 796(+) External Barrier (See Field  
Wiring Dwg 147729)

# Graphs and Figures



- 1) Main 3500/77M Cylinder Pressure Monitor Module (front view).
- 2) Status LEDs.
- 3) Buffered transducer outputs. These provide an unfiltered output for each of the four transducers. All are short circuit protected.
- 4) I/O module rear views.
- 5) Cylinder Pressure I/O Module, Internal Termination.
- 6) Cylinder Pressure I/O Module, External Termination.

**Figure 1: Front and Rear View**

Copyright 2001. Bently Nevada LLC.  
1631 Bently Parkway South, Minden, Nevada USA 89423  
Phone: 775.782.3611 Fax: 775.215.2873  
[www.ge-energy.com/bently](http://www.ge-energy.com/bently)  
All rights reserved.

Bently Nevada is a trademark of General Electric Company.