

3500/77M Recip Cylinder Pressure Monitor

Product Datasheet

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 operations and maintenance personnel.

Depending on configuration, each channel typically conditions its input signal to provide various parameters called measured variables. Users can configure Alert setpoints for each active measured variable and Danger setpoints for any two of the active measured variables.

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

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

Three measured variables 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

range†

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

†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)

Measured Variables

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 Ω

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 Ω

**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
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

Compliance and Certifications

EMC

Standards:

EN 61000-6-2 Immunity for Industrial Environments
EN 61000-6-4 Emissions for Industrial Environments

European Community Directives:

EMC Directive 2014/30/EUC

Electrical Safety

Standards:

EN 61010-1

European Community Directives:

LV Directive 2014/35/EU

Hazardous Area Approvals

Note: For the detailed listing of country and product specific approvals, refer to the Approvals Quick Reference Guide, document 108M1756, at www.GEmeasurement.com

CSA/NRTL/C

Approval Option (01)

For I/O module ordering options with internal barriers:

Ex nC [ia] IIC T4 Gc
Class I, Division 1,
Groups A, B, C and D

Class I, Zone 2/0
AEx nC [ia] IIC T4 Gc
Class I, Division 1
Groups A, B, C and D

T4 @ -20 °C ≤ Ta +65 °C
(-4 °F to +149 °F)
per drawing 138547

For I/O module ordering options without internal barriers:

Ex nC [L] IIC T4 Gc
Class I, Division 2,
Groups A, B, C and D

Class I, Zone 2
AEx nC IIC T4 Gc
Class I, Division 2
Groups A, B, C and D

T4 @ -20 °C ≤ Ta +65 °C
(-4 °F to +149 °F)
per drawing 149243

ATEX/IECEX:

Approval Option (02)

For I/O module ordering options with internal barriers:

 II 3 (1) G
Ex nA nC ic [ia Ga] IIC T4 Gc

T4 @ -20 °C ≤ Ta +65 °C
(-4 °F to +149 °F)

For I/O module ordering options without internal barriers:

 II 3 G
Ex nA nC ic IIC T4 Gc

T4 @ -20 °C ≤ Ta +65 °C
(-4 °F to +149 °F)

Note: Refer to document 141495 3500 Internal Barriers Datasheet for additional information when using I/O modules with internal barriers.

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

Monitor Module

1 full-height front slot

I/O Modules

1 full-height rear slot

Ordering Information

Note: For the detailed listing of country and product specific approvals, refer to the Approvals Quick Reference Guide, document 108M1756, at www.GEmeasurement.com

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
- 02** ATEX/IECEx/CSA

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 -AXXXX-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

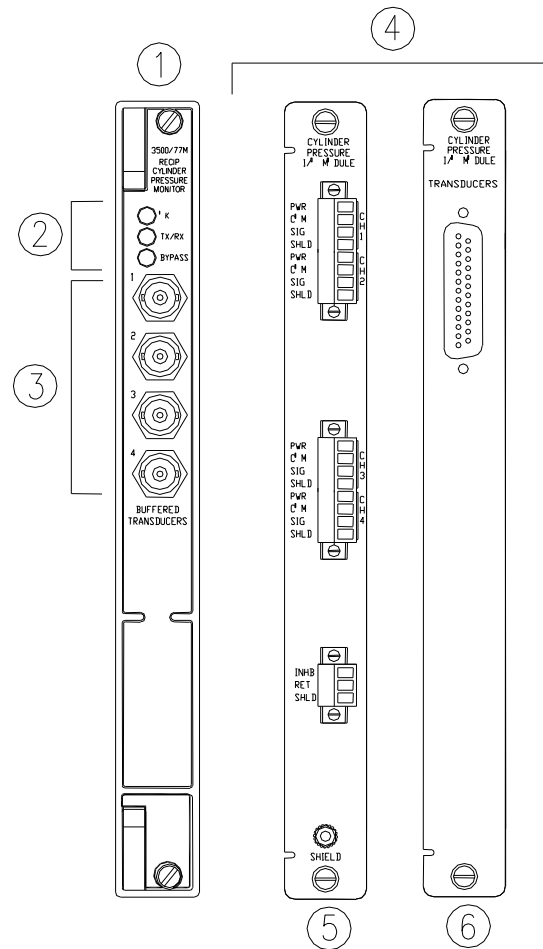
SPARES

146282-01

Part Number 147485-01
Rev. L

176449-07	3500/77M Monitor Manual.		Internal I/O Module connector header, Euro Style, 3 pin. Used on I/O modules 143729-01.
143729-01	3500/77M Cylinder Pressure Monitor.	146973-01	Recip Multi-Event Wheel Kit.
143737-01	Cylinder Pressure I/O Module with Internal Terminations for Bently Approved Third Party Pressure Transducers.	145732-01	Recip Multi-Event Wheel.
		146622-01	Recip Multi-Event Wheel Stud.
00580434	Cylinder Pressure I/O Module with External Terminations for Bently Approved Third Party Pressure Transducers.	165855-XX	Recip Cylinder Pressure Transducer. (See 165855 data sheet)
00580441	Internal I/O Module connector header, Euro Style, 8 pin. Used on I/O modules 143729-01.	283615	MTL 7796+ External Barrier (See Field Wiring Dwg 147729) (022000812 MTL 796(+) External Barrier is discontinued)

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

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