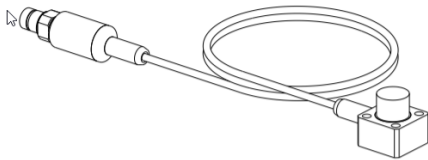


350900 HT Velocity and Acceleration Sensor

Datasheet

Cordant™

168780 Rev. L



Description

The 350900 High Temperature Velocity and Acceleration Sensor (HTVAS) provides a continuous acceleration and velocity output, allowing the customer to protect their machine with an velocity signal while simultaneously capturing the acceleration signal for machinery diagnostics. Its design is primarily for use with the Bently Nevada™ 3500/42M and 3500/44M monitors. When attaching the HTVAS to a 3500/42M or 3500/44M monitor you must use the acceleration and velocity signals from the transducer on a separate channel pair (such as channels 1 and 3) or on separate monitors.

The 350900 High Temperature Velocity and Acceleration Sensor (HTVAS) separates the high-temperature sensing element from the signal conditioning electronics, with the two permanently connected via a hardline cable. This arrangement allows you to mount the sensing head on surfaces with temperatures as high as +482°C (+900°F), while installing the signal conditioning electronics in a cooler location. Eliminating connections between the sensing head and its associated signal conditioning electronics also eliminates a significant source of potential transducer failures (connector problems). This achieves overall transducer system performance comparable to other case-mounted vibration transducers, but permits use at significantly higher temperatures.

350900 HTVAS Features

- Velocity and acceleration output
- High temperature operation up to +482°C (+900°F)
- Electronics rated to +125°C (+257°F), survivable to +155°C (+311°F)



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Most common machine malfunctions (unbalance, misalignment, etc.) occur on the rotor and originate as an increase (or at least a change) in rotor vibration. For any individual casing measurement to be effective for overall machine protection, the system must continually transmit a significant amount of rotor vibration to the machine casing, or mounting location of the transducer.

In addition, be careful to install the accelerometer transducer on the bearing housing or machine casing. Improper installation may decrease the transducer amplitude and frequency response and/or generate false signals that do not represent actual vibration. Refer to the appropriate instruction manuals and Application Notes.

Upon request, Bently Nevada provides engineering services that can identify the appropriate machine housing measurements and installation assistance if needed.

Upon request, Bently Nevada can provide engineering services to determine the suitability of housing measurements for the machine in question and/or to provide installation assistance.

Specifications

Specifications are between +20°C and +30°C (+68°F to +86°F) with machine casing vibration at 100 Hz (6000 cpm) and with a 10 kΩ load unless otherwise indicated.

Electrical

Power Requirements

Input Voltage	-18 to -30 Vdc; -18 to -28 Vdc for hazardous area approval options.
Quiescent Current	6 mA nominal, no load.
Transverse Sensitivity	Less than 5% of axial sensitivity.
Amplitude Linearity	± 1% to 4900 m/s ² (500 g) peak overall acceleration.
Mounted Resonant Frequency	Greater than 15 kHz.
Maximum Cable Length	305 meters (1000 ft).
Grounding	Case isolated.

Velocity Output

Sensitivity	3.94 mV/mm/s (100 mV/in/s) ±5%.
Frequency Response	40 Hz to 1 kHz (2400 cpm to 60 kcpm) ±5% with 305 metres (1000 ft) of cable. 25 Hz to 2 kHz (1500 cpm to 120 kcpm) ±3 dB with 305 metres (1000 ft) of cable.

System Sensitivity over Extended Temperatures	Over a sensor temperature range of -54°C to +399°C (-65°F to +750°F) and with the electronics between -54°C to +125°C (-65°F to +257°F), the output remains within ± 10% of 3.94 mV/mm/s (100 mV/in/s). Over a sensor temperature range of -54°C to +482°C (-65°F to +900°F) and with the electronics between -54°C to +125°C (-65°F to +257°F), the output remains within ± 15% of 3.94 mV/mm/s (100 mV/in/s).
Output Bias Voltage	-10.0 ± 2.0 Vdc.
Velocity Range	1270 mm/s (50 in/s).
Broadband Noise Floor (5 Hz to 2 kHz)	0.05 mm/s rms (0.002 in/s rms), max.

Acceleration Output

Sensitivity	1.02 mV/m/s ² (10 mV/g) ± 5%.
Frequency Response	25 Hz to 4 kHz (1500 cpm to 240 kcpm) ± 5% with 305 metres (1000 ft) of cable. 10 Hz to 10 kHz (600 cpm to 600 kcpm) ± 3 dB with 305 metres (1000 ft) of cable.

System Sensitivity over Extended Temperatures	Over a sensor temperature range of -54°C to $+399^{\circ}\text{C}$ (-65°F to $+750^{\circ}\text{F}$) and with the electronics between -54°C to $+125^{\circ}\text{C}$ (-65°F to $+257^{\circ}\text{F}$), the output remains within $\pm 10\%$ of 1.02 mV/m/s^2 (10 mV/g). Over a sensor temperature range of -54°C to $+482^{\circ}\text{C}$ (-65°F to $+900^{\circ}\text{F}$) and with the electronics between -54°C to $+125^{\circ}\text{C}$ (-65°F to $+257^{\circ}\text{F}$), the output remains within $\pm 15\%$ of 1.02 mV/m/s^2 (10 mV/g).
Output Bias Voltage	$-10.0 \pm 2.0\text{ Vdc}$.
Acceleration Range	4900 m/s^2 (500 g).
Broadband Noise Floor (5 Hz to 2 kHz)	147 mm/s^2 (1.5 mg) rms, max.

Environmental Limits

Operating and Storage Temperatures

Sensor	-54°C to $+482^{\circ}\text{C}$ (-65°F to $+900^{\circ}\text{F}$).
Mineral Insulated Cable	-54°C to $+482^{\circ}\text{C}$ (-65°F to $+900^{\circ}\text{F}$).
Electronics	-54°C to $+125^{\circ}\text{C}$ (-65°F to $+257^{\circ}\text{F}$).
Soak Back Temperature	The electronics will survive temperature exposure of $+155^{\circ}\text{C}$ ($+311^{\circ}\text{F}$) for four hours without failure. Electrical performance does not be met during this period.
Shock Survivability	$19,620\text{ m/s}^2$ (2000 g) peak, maximum.

Relative Humidity	100% condensing, non-submerged. Case is hermetically sealed.
Maximum Use Altitude	2000 meters (6561 ft) above sea level
Outdoor Use	Standard installation for these sensors is in a protected enclosure with wiring protected in conduit. Splash boots can be added for additional protection if needed by customer's requirements.

Physical

Sensor

Dimensions	See Graphs and Figures on page 10.
Mounting	30.2 mm (1.188 in) square mounting hole pattern, 7.2 mm (0.283 in) mounting holes (4 holes).
Mounting Surface	32 microinch rms.
Material	Nickel alloy 600.

Integral Cable

Diameter	$6.35 \pm 1.27\text{ mm}$ ($0.25 \pm 0.05\text{ in}$)
Material	300 Series Stainless Mineral Insulated Integral Cable with Stainless Steel Overbraid.
Bend Radius	Minimum bend radius of 51 mm (2.0 in).

Integral Electronics

Dimensions	See Graphs and Figures on page 10.
Mounting	Patch panel hub mount.
Material	300 series stainless steel.

Connector	MIL-DTL-83723/90 - 1006N with gold-plated 300 series stainless steel.
System Weight (without field wiring)	0.545 kg + 0.10 kg/m cable length (1.200 lb + 0.006 lb/in cable length), typical.
Mounting Angle	Any orientation

Compliance and Certifications

FCC

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

EMC

EMC Directive 2014/30/EU

RoHS

RoHS Directive 2011/65/EU

Maritime

ABS Marine Vessels

Offshore Units and Structures

Mobile Offshore Units

ATEX

60079-01

60079-07

60079-11

60079-15

ATEX Directive 2014/34/EU

Hazardous Area Approvals



For the detailed listing of country and product specific approvals, refer to the *Approvals Quick Reference Guide* (108M1756) available from Bently.com.

cNRTLus

Ex ia IIC T4/T492 °C Ga

Ex ia IIB T4/T492 °C Ga

Class I, Zone 0, AEx ia IIC T4/T492 °C Ga

Class I, Zone 0, AEx ia IIB T4/T492 °C Ga

Class I, Div. 1, Groups A, B, C and D T4/T492 °C

Class II, Div. 1, Groups E, F and G

Class III, Div. 1

Class I, Div. 1, Groups C and D T4/T492 °C

Class II, Div. 1, Groups E, F and G

Class III, Div 1

Class I, Div. 2, Groups A, B, C and D T4/T492 °C

Class I, Div. 2, Groups C and D T4/T492 °C

Ex ec IIC T4/T492 °C Gc

Class I, Zone 2, AEx ec IIC T4/T492 °C Gc

Install Per Drawing 167923



This sensor may only be powered by a power supply unit with a limited energy electric circuit in accordance with CAN/CSA C22.2 No. 61010-1-12 and ANSI/UL 61010-1, or Class 2 as defined in the Canadian Electrical Code C22.1, Section 16-200 and/or National Electrical Code (NFPA 70), article 725.121.

ATEX/IECEX



II 1 G
 Ex ia IIC or IIB Ta, T4 492°C



II 3 G
 Ex na IIC or IIB Ta, T4, T1 492°C Gc
 Ex ec IIC or IIB Ta T4, T1 492°C Gc
 Ta, T1, T4 492°C
 Ta, T4, T1 492°C

Temperature Class	Temperature Range	Equipment
T4	-40°C to +100°C	Electrical Housing
T1	-40°C to +482°C	Sensor and Cable

Entity Parameters for Zone 0/1 and Zone 2		
Group	IIC	IIB
Ui	28 V	29.2 V
Ii	153 mA	279 mA
Pi	0.84 W	1.95 W
Ci	37 nF	37 nF
Li	30 μH	30 μH

Hazardous Area Conditions of Safe Use

ATEX/IECEX

Zone 0/1:

Equipment must be connected to equipment, which meets the above listed entity parameters.

The cables type A or B (in compliance with EN 60079-25) must respect the cable parameters listed with the entity parameters.

Special Notes

- This equipment is intrinsically safe and can be used in potentially explosive atmospheres.
- The intrinsically safe apparatus shall only be connected to an associated intrinsically safe apparatus. The association shall comply with the requirements of EN 60079-25 standard.
- Operating ambient temperature range:
 - -40°C Tamb +100°C (Electronic Housing)
 - -40°C Tamb +482°C (Sensor and Cable)

Zone 2 :

The supply electrical parameters shall not exceed the values mentioned in the tables above.

Special Notes

- The equipment is safe when connected to an associated source, containing a reliable material limiting current and voltage meeting the entity parameters.
- Operating ambient temperature range:
 - -40°C to +100°C (Electronic Housing)
 - -40°C to +482°C (Sensor and Cable)
- The mating part of the connector shall provide IP54 ingress protection or better according to requirements of IEC 60079-0 and IEC 60079-7 or IEC 60079-15.
- Provisions shall be made for ensuring that the rated voltage and current are not exceeded while in service.
- This sensor may only be powered by a power supply unit with a limited energy

electric circuit in accordance with CAN/CSA C22.2 No. 61010-1-12 and ANSI/UL 61010-1, or Class 2 as defined in the Canadian Electrical Code C22.1, Section 16-200 and/or National Electrical Code (NFPA 70), article 725.121.

- Transient protection shall be provided that is set at a level not exceeding 140 % of the peak rated voltage value at the supply terminals to the equipment.

Ordering Information



For the detailed listing of country and product specific approvals, refer to the *Approvals Quick Reference Guide* (108M1756) available from Bently.com.

High Temperature Velocity and Acceleration Sensor

350900-AAA

A: Integral Cable Length Option

023	23 inches (0.58 metres)
026	26 inches (0.66 metres)
027	27 inches (0.69 metres)
044	44 inches (1.12 metres)
077	77 inches (1.96 metres)
083	83 inches (2.11 metres)
158	158 inches (4.0 metres)
237	237 inches (6.0 metres)
315	315 inches (8.0 metres)
394	394 inches (10.0 metres)

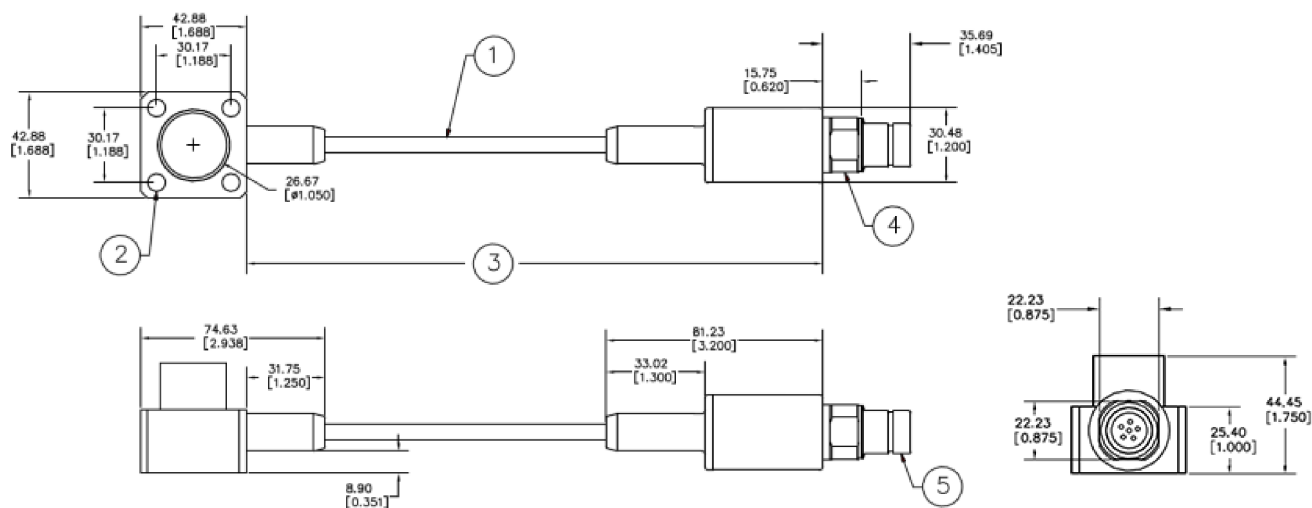
HTVAS Field Interconnect Cable

350901-AAA

A: Cable Length

010	10 ft (3.05 metres)
040	40 ft (12.2 metres)

Graphs and Figures



1. Stainless steel overbraided MI cable
2. 0.283 diameter through (typical), 4 places
3. Length
4. 1-12 UNF-2A
5. MIL-DTL-83723/90 connector

Figure 1: 350900 Transducer Dimensional Drawing

Dimensions are in millimetres [inches]

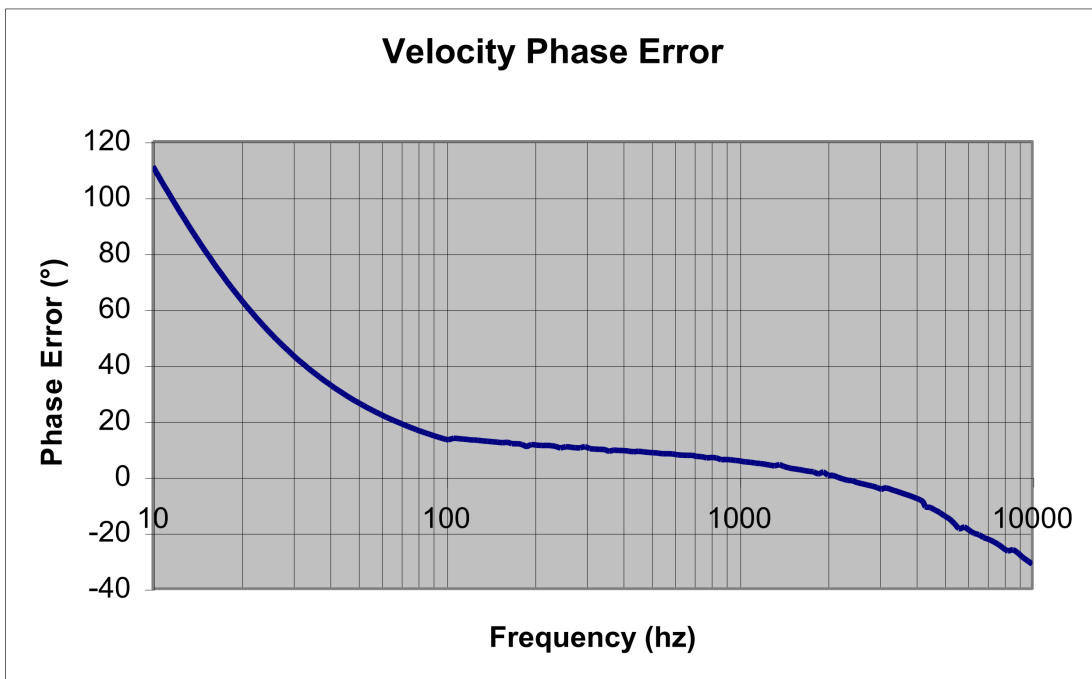
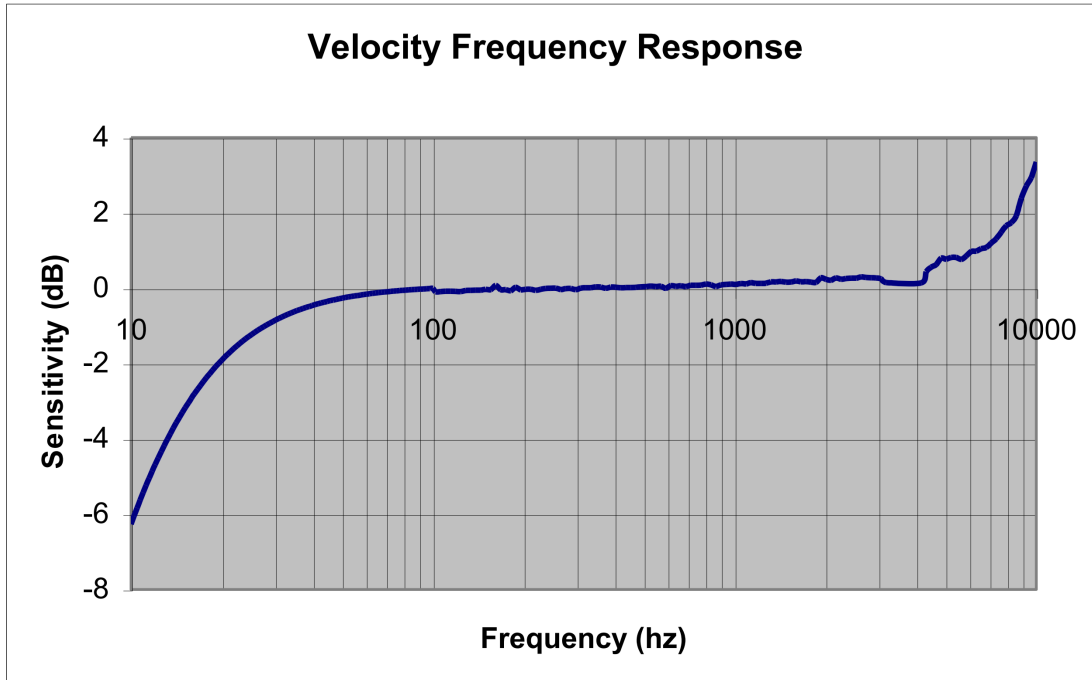


Figure 2: Typical Velocity Amplitude and Phase Response

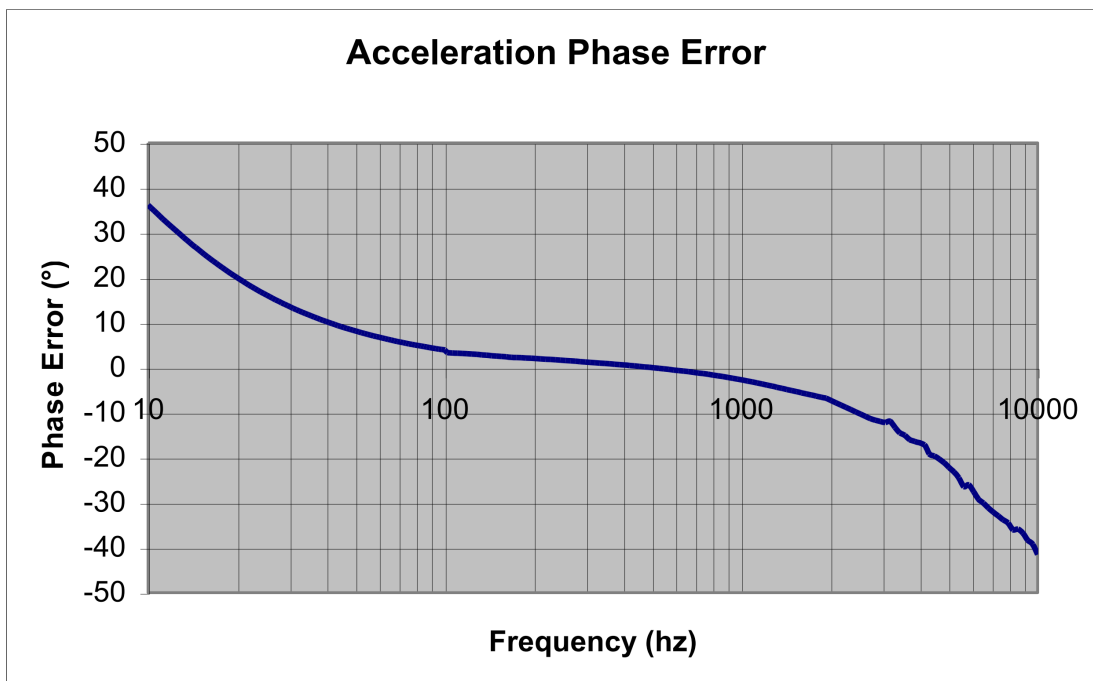
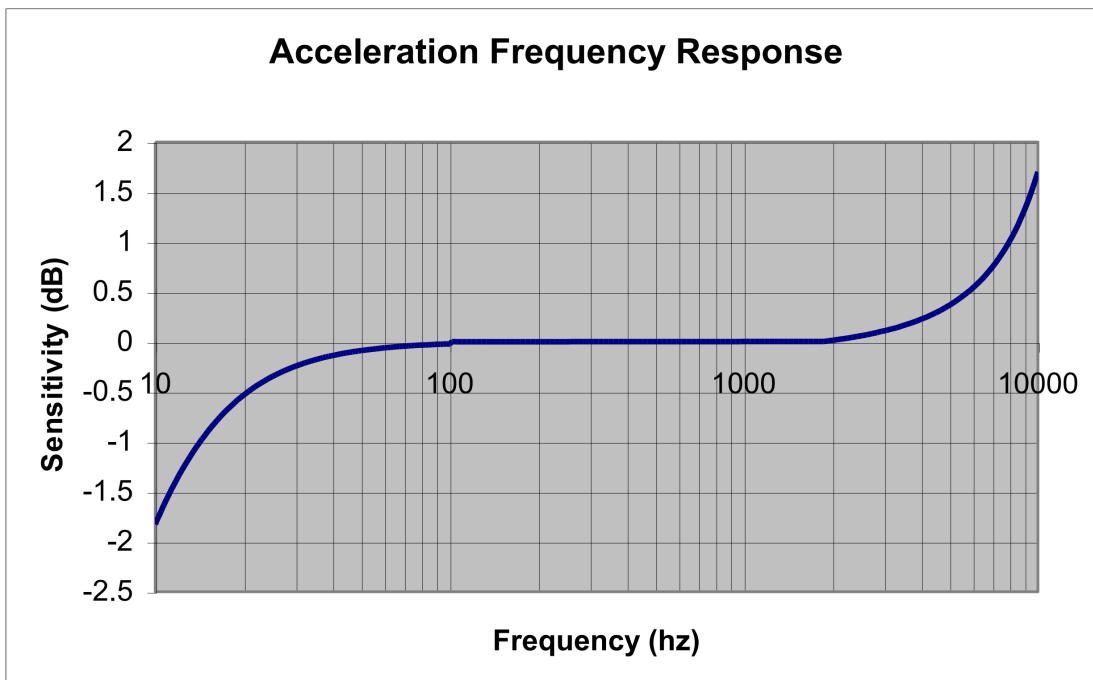


Figure 3: Typical Acceleration Amplitude and Phase Response

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Bently Nevada, a Baker Hughes Company
1631 Bently Parkway South, Minden, Nevada USA 89423
<https://bntechsupport.com>