Reference Guide

Revision May 17th 2010

Commtest Instruments Ltd.
Level 2, 22 Moorhouse Avenue
Christchurch
New Zealand
E-mail help@commtest.com

Printed in New Zealand.

Disclaimer

Information in this document is subject to change without notice. Names and data used in examples are fictitious unless otherwise noted. This document is distributed as is, without warranty of any kind, either expressed or implied, respecting the contents of this document, including but not limited to implied warranties for the document's quality, performance, merchantability, or fitness for any particular purpose. Neither Commtest Instruments Ltd nor its employees, dealers, agents or distributors shall be liable to the user of this document or any other person or entity with respect to any liability, loss, or damage caused or alleged to be caused directly or indirectly by this document.

Trademark Notice

Ranger™, Ranger Station™, Ranger Booster™, AscentView™, AscentWatcher™, AscentOPC™, vbSeries™, Commtest™, vbXManager™, vbRemote™ and PROFLASH™ are trademarks of Commtest Instruments Ltd.
Ascent®, Commtest® and vbOnline® are registered trademarks of Commtest Instruments Ltd. Other trademarks and registered trademarks are the property of their respective owners.

Contents

Section 3: Software Installation and Setup 40

Section 1: Introduction

Please keep this Instrument Reference Guide for future reference and read it before operating your Ranger equipment.

Although this book makes use of common vibration analysis concepts, it is not intended as a comprehensive guide or training manual. Please ensure you have the relevant knowledge and experience to carry out the procedures described. It is essential to follow all appropriate safety precautions when working near rotating machinery.

All instructions for installing the hardware components of your Ranger system are contained within this manual. Installation of the Ranger hardware can be carried out prior to setting up your Ascent database.

The 'Software Installation and Setup' section of this manual assumes that you already have a good knowledge of the Ascent software and know how to create machine structures and measurement setups. Machine structures and measurement setups must be created in Ascent before any measurements can be taken. If you have not yet done so, please read sections 1 and 2 of your *Software Reference Guide* before you read the Software Installation and Setup section of this manual.

Product and support feedback
If you any have questions not answered by this reference guide, or would like to make a suggestion, please contact us at www.commtest.com.

FCC Compliance

The devices detailed in this document (Ranger Sensor, Ranger Booster and Ranger Station) comply with part 15 of the FCC Rules. Operation is subject to the following conditions: (1) These devices may not cause harmful interference, and (2) these devices must accept any interference received, including interference that may cause undesired operation.

NOTE: THE MANUFACTURER IS NOT RESPONSIBLE FOR ANY RADIO OR TV INTERFERENCE CAUSED BY UNAUTHORIZED MODIFICATIONS TO THIS EQUIPMENT. SUCH MODIFICATIONS COULD VOID THE USER'S AUTHORITY TO OPERATE THE EQUIPMENT.

TO MAINTAIN COMPLIANCE WITH FCC'S RF EXPOSURE GUIDELINES: THIS DEVICE AND ITS ANTENNAS MUST OPERATE WITH A SEPARATION DISTANCE OF AT LEAST 20CM FROM ALL PERSONS.

CHANGES OR MODIFICATIONS NOT EXPRESSLY APPROVED BY THE PARTY RESPONSIBLE FOR COMPLIANCE COULD VOID THE USER'S AUTHORITY TO OPERATE THE EQUIPMENT.

Overview of the Ranger System

The Ranger online system uses permanently installed wireless sensors to automatically collect vibration and temperature data (and rotational speed via the Ranger Station device's tachometer input) according to user-defined schedules specified in the Ascent software. During data collection by wireless Ranger sensor or Ranger Station, measurement data is streamed via a TCP/IP wireless (or hybrid wired/wireless) Ethernet network to a PC containing the Ascent database. Users of the Ascent software are able to access this database, generate reports and view collected data as spectra, waveforms and machine trends. Machine alarm status is automatically checked by the software when new measurements are received.

The steps to set up the Ranger online system and collect data can be summarized as follows:

1. First design your system. Diagram the factory layout identifying the machines to be monitored, the cabling topology to the Ranger Station(s) if used wired rather than wirelessly, and the proposed location of each Ranger sensor device.

   Networking issues, such as the proximity of existing Ethernet cables to potential Ranger Station mounting sites should be discussed with your network administrator before installing any Ranger devices. Your network administrator will be required to assign IP addresses to each Ranger Station device and assist you in setting up communications to the database server PC. You must also determine the number of Ranger Boosters that may be required based on the physical plant layout.

2. Next, begin implementing your system. Attach sensors to machines then install Boosters and wall-mounted Ranger Station devices.

3. Install the Ascent software and use it to create a software database of your machines that mirrors their physical layout and defines the types of measurements that will be carried out on them.

4. Configure the Ascent software to communicate with each Ranger Station and Ranger sensor device, then specify within the software which measurements will be taken at each location.

5. Create recording intervals with the Ascent software to instruct each Ranger device when to take measurements.

6. Run the OnlineManager program to begin collecting data.

7. View the data at your convenience using the Ascent software. Multiple users will be able to access this data on their own PCs (for more information see the Ascent *Software Reference Guide* section 'Using a Network').

Standard Features

Ranger Sensor

- Biaxial frequency and time domain vibration measurements (1 Hz to 10 kHz, +/- 3 dB, 6 kHz X Axis)
- Integrated temperature sensor (0 °C to 50 °C, 32 °F to 122 °F)
- 24-bit A/D converter providing high-precision measurements
- Wireless (ZigBee, 2.4 GHz) network connectivity (line of sight to Ranger Station)
- Wake on High Vibration (WoHV) auto wake and measurement feature (2 to 20 mm/s RMS)
- 1700 mAh custom Lithium Ion battery pack with two year life*
- Firmware upgradable using Commtest PROFLASH

Ranger Station

- Tachometer input (including Keyphasor®) for speed measurements
- User-configurable relay output
- Wi-Fi wireless and RJ45 wired network connectivity
- DSP for fast, accurate calculations
- Firmware upgradable using Commtest PROFLASH

Ranger Booster

- IP65 sealed enclosure w/power supply gland
- ZigBee wireless signal amplifier (500 m range)
- Firmware upgradable using Commtest PROFLASH

* Estimate based on typical use: Wake on High Vibe running continuously, one set of 6 recording on each axis each day (Velocity 1kHz, 800 line, 4 averages, 50% overlap). Ambient temperature between 0 °C (32 °F) and 50 °C (122 °F).

Standard Kit Items

Ranger Sensor

- Ranger wireless sensor
- 3.6 V, 1700 mAh Li-Ion (non-rechargeable) battery packs (x2)*
- Antenna protectors (x2)*
- Mounting studs: 0°, 22.5°, 45°, 67.5°
- Mounting shim
- Mounting epoxy

* Spare included in kit

Ranger Station

- Ranger Station device
- Ranger Station antennas (x2)
- Power adapter 12 V (3 A) output (Phoenix connector termination)
- Screwdriver
- 5 wire flash harness
- Flash harness sensor adapter

Ranger Booster

- Ranger Booster device
- Power adapter 12 V (3 A) output (stripped wire termination)

Accessories

- Ascent Software Reference Guide
- Ranger System Reference Guide
- Warranty Card
- Calibration Certificate

Note: Thoroughly inspect your instrument kit's contents upon receipt. If any kit items are missing, please contact Commtest customer support or your sales agent for assistance.

System Requirements

Minimum PC system requirements

- Microsoft® Windows® XP® SP2, Server 2003®, Server 2008®, Vista® (32 or 64-bit) or 7® (32 or 64-bit) operating system
- 1 GHz 32-bit (x86) or 64-bit (x64) processor or faster
- 1 GB of system RAM
- 1 GB of available hard disk space
- A CD-ROM compatible optical drive
- Windows-compatible mouse, touchpad or other pointing device
- Microsoft .NET Framework Version 3.5 SP1 or higher
- An unused Parallel or USB port for Dongle communications (not required if using Ascent CLK software license keys)
- An Ethernet adapter or WiFi network card

Requirements for each Ranger Station device

- 35 mm DIN rail mount for each Ranger Station device (the housing must be protected against the environment)
- 12 V to 24 V DC nominal power supply (200 mA maximum per Ranger Station device)
- Ethernet access (wireless or wired) for data transfer

Requirements for each Ranger sensor device

- Machine (mounting) screw. 1/4-28 Unified Fine (UNF) thread (1/4-20 UNC, M6x1 metric). Maximum height 0.236" (6.0 mm).

Please contact your local reseller for suppliers of recommended Ranger accessories.

System Components

The Ranger system consists of three component types:

The Ranger sensor. The Ranger sensor is mounted on the machinery being measured, and contains a biaxial accelerometer sensor, a temperature sensor, a wireless (ZigBee) transceiver and a long-life Lithium Ion battery pack. Measurements are taken by the sensor at specified intervals (specified in the Ascent software and controlled by the OnlineManager software) and transmitted wirelessly to the sensor's parent Ranger Station. The sensor's 'Wake on High Vibration' (WoHV) feature also allows the sensor to detect unusually high vibration levels, wake from sleep automatically, and immediately alert the software.

The Ranger Station. The Ranger Station wirelessly receives measurement data from its child Ranger sensor(s) to stream back to the OnlineManager software. Ranger Stations are also equipped with a tachometer input for speed measurements, and a switching relay output for activating lights, alarms etc. if specified measurement criteria are exceeded. The Ranger station communicates with a PC hosting the Ascent or OnlineManager software via a wireless (Wi-Fi) or wired (RJ-45) Ethernet connection.

The Ranger Booster. A wireless signal boosting device and data packet forwarder, optionally available to extend the range between Ranger sensor and Ranger Station by up to 600 meters.

A large Ranger system may consist of several Ranger Stations, Ranger Boosters and Ranger sensors, depending on the complexity of the installation and the plant environment. A small Ranger system may consist of only a single Ranger Station and Ranger sensor within line of site.

Components

RANGER SENSOR

BATTERY COVER (TOP)

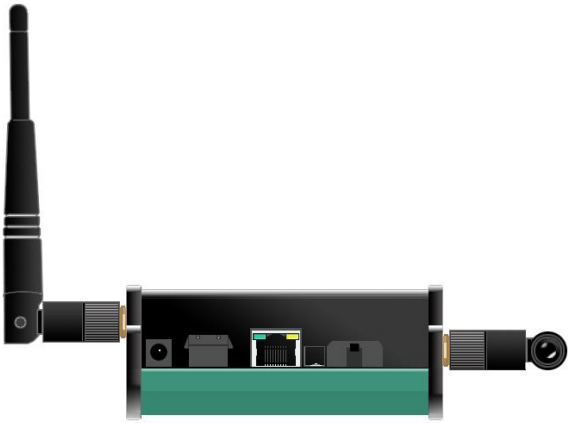
SENSOR BASE (BOTTOM)

BATTERY CELL (SIDE)

BATTERY CELL (TOP)

Ranger sensor

Ranger Station (front)



Ranger Station (top)

Ranger Booster (front view)

Ranger Booster (side view)

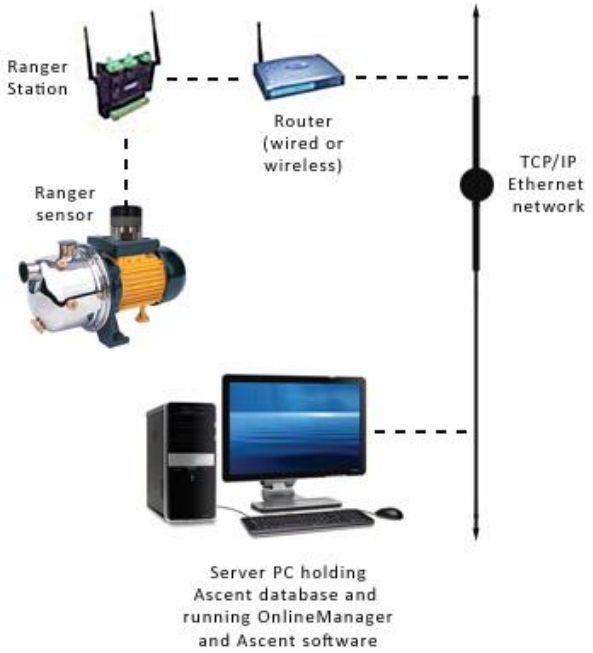
Ranger System Configuration

The Ranger online system uses a TCP/IP network (either wired or wireless via a Wi-Fi router) to connect each Ranger Station device to a desktop PC or server. RJ-45 sockets on each Ranger device can be used to link the devices to the network. The Ranger Station and Ranger sensor devices are programmed via a PC running Ascent software.

Note: The Ranger Station is a network device that requires its own unique IP address. In normal networking environments a network administrator will carry out this task. You need to arrange to IP address allocation *before* installation - see your network administrator to arrange this.

Example 1 below illustrates the most basic type of system in which a single PC is used to control all Ranger Station and Ranger sensor devices and to display the recorded data. The PC runs the OnlineManager and Ascent software, and also holds the machine database. This system is sufficient when using a fast PC and when only one person needs to view the data. Note that the example below does not use a Ranger Booster; instead the Ranger Station and Ranger sensor communicate directly with one another.

This sort of connection is usable if the distance between the Ranger Station and Ranger sensor is relatively short and within line of sight. If the sensor is to be positioned beyond line of sight of a Ranger Station, a Ranger Booster will be required within 20 meters of the Ranger sensor. The Ranger Booster extends the connection range by approximately 500 meters. If required, several 'daisy-chained' Boosters can be used to greatly extend the system's wireless range.



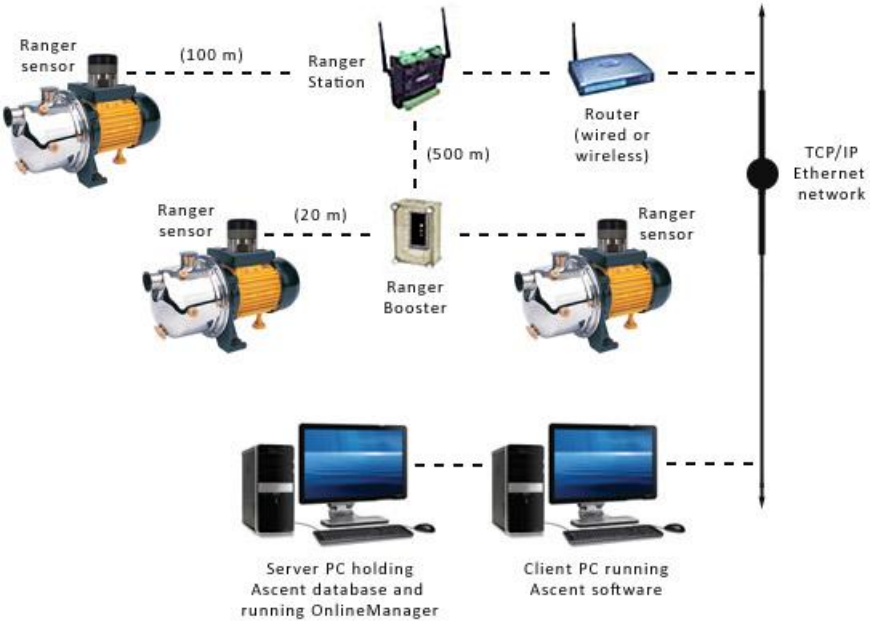
Example 1: Standalone controller and database viewer

Bear in mind that while the OnlineManager program is busy requesting and collecting measurements the Ascent software's response times may slow, making database access and viewing more time consuming.

Example 2 demonstrates a system in which a separate client PC is used to manage the Ranger Station and Ranger sensor devices and for viewing the collected data. The server PC holds the Ascent database and runs the OnlineManager program.

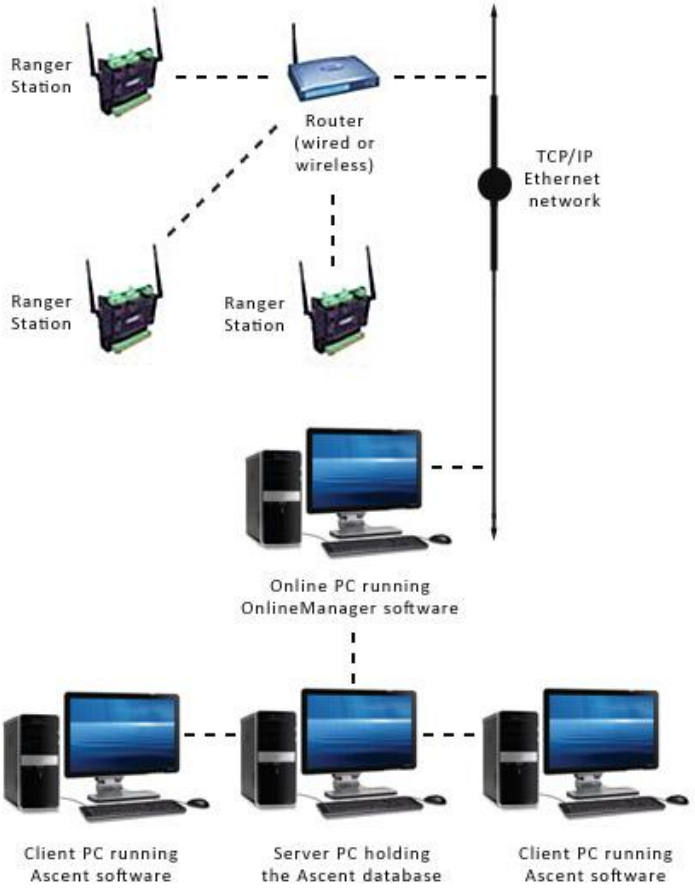
With this system, database access time is generally faster than in example 1 because the server PC controls all measuring processes, adding new recordings to the database as they are collected. Multiple client PCs can be connected to the server allowing many users to view and work with the database.

This example also uses two additional Ranger sensors rather than the single sensor used in example 1. Both of these sensors are connected via a Ranger Booster. The Ranger Booster extends the wireless connection range of the additional sensors by approximately 500 meters.



Example 2: Controller PC with separate database viewer PC

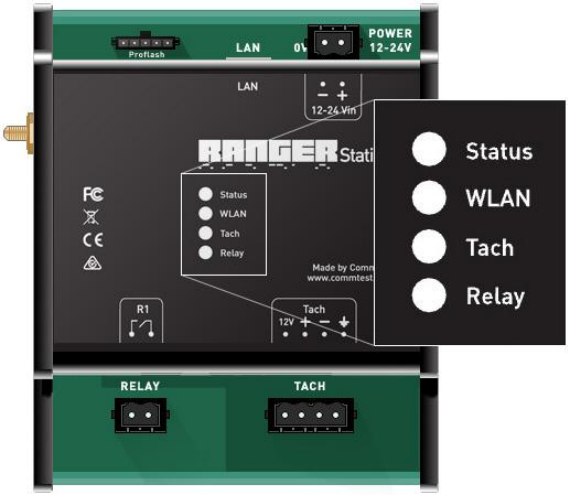
The configuration shown in example 3 is the most speed-efficient solution for situations in which many Ranger Station and Ranger sensor devices have been installed (note however that Ranger Stations cannot communicate with one another, only with Ranger sensors and PCs), and many people require access to the database. A single PC running only the OnlineManager program controls all measurement processes. This online PC then passes the recorded data to a server PC which holds the Ascent database. Each user wishing to view the data can access this database from their own PC.



Example 3: Control shared by two PCs with multiple client PCs for database viewing

Ranger Station LED Status Indicators

The Ranger Station device uses a number of status LEDs to indicate the current state its switch relay, network communications link, tachometer (if used) and the Ranger device itself.



Ranger Station LEDs

The Relay LED activates when the Ranger Station's output relay has been activated. The relay is single-pole, normally open, with a 5 A, 3 V DC, 250 V AC current rating. It is typically intended for activating warning lights or sirens.

The output relay is controlled by messages from the PC; configured using the Ascent software; and can be activated automatically when user-specified alarm states are triggered.

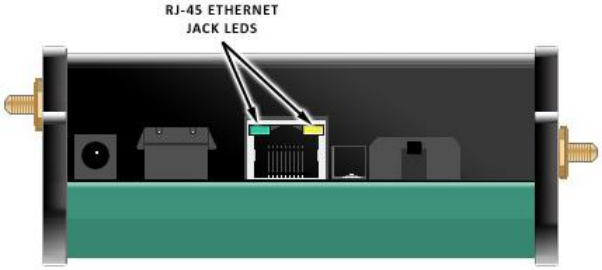
The Status LED flashes green to indicate that the device is working normally; a steady red if there is a device error or during a proflash update; or a steady orange during startup.

The WLAN LED has two operating modes:

1. Intermittent flashing indicates that the device is connected to a WiFi network and is sending and receiving network traffic normally.
2. Regular bursts of rapid flashing indicate that the device is searching for a wireless network to connect to. This indicates a problem. The device may be out of range of the WiFi network, or there may be a problem with the WiFi configuration either in the device or on the network.

The Tach LED activates when a tachometer reading is being taken by the device.

Two colored LEDs built into the front of the Ethernet cable RJ-45 connector socket indicate what type of communications link has been automatically selected.



Ethernet Jack LEDs

Left LED	Right LED	Meaning
OFF	OFF	No Link
OFF	Solid Amber	100BASE-T Half Duplex Link
OFF	Solid Green	100BASE-T Full Duplex Link
Solid Amber	OFF	10BASE-T Half Duplex Link
Solid Green	OFF	10BASE-T Full Duplex Link

Note: The left or right LEDs blink when a communications link is active.

Sensor Battery Pack

The Ranger sensor is powered by a user-replaceable, non-rechargeable custom Lithium Ion 1/6D, ER32L100 battery pack with a normal charged voltage range of 3.0 V to 3.6 V. The battery is designed to function within an operating temperature range of -55 °C to 125 °C (-67 °F to 257 °F). However, below -10 °C (-14 °F) and above 60 °C (140 °F) the battery performance (current output and usable life) will be significantly reduced.

Ranger Sensor Battery Pack

The Ranger battery pack's lifespan is estimated at approximately two years. This estimate is based on an average of six measurements on each axis every 24 hours (Velocity, 1 kHz, 800 lines, 4 averages, 50% overlap) and an ambient operating temperature of between 0 °C and 50 °C (32 °F and 122 °F).

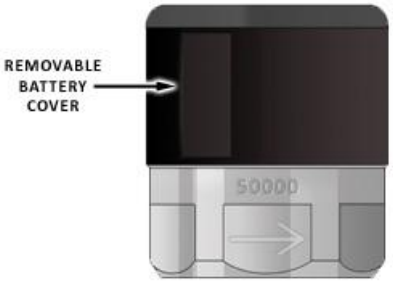
Replacement batteries (part number BATTXXX) are available from authorized Commtest Instruments distributors.

Battery Specifications	
Nominal capacity @ 1 mA to 2 V	1.7 Ah
Rated voltage	3.6 V
Diameter	32.9 mm (1.295")
Height	10.2 mm (0.401")
Weight	21 grams

Replacing the Battery Pack

To replace a depleted Ranger sensor battery pack:

- Dismount the Ranger sensor from its screw mounting (if permanently mounted, move to the next step).



Ranger sensor

- Grip the base of the sensor firmly with one hand and the plastic cover with the other.
- Twist the battery cover in an anti-clockwise direction. Remove the plastic housing and set aside.

Battery cover (top view)

- Carefully detach the antenna cover and set aside. The antenna cover is attached to the battery pack via a small velcro patch.
- Detach the battery ribbon connector using a small Philips screwdriver or a fingernail. Take care not to damage the antenna. Set the discharged battery aside.

Battery pack (side view)

- Connect the new battery to the sensor's battery ribbon connector. A green LED will illuminate on the epoxy-coated Ranger circuit board and flash if power is successfully supplied.
- Gently fold the antenna over the new battery and re-attach the antenna cover.
- Screw the battery cover back onto the sensor (clockwise) and re-mount the sensor.

Warning:
Damaged batteries should not be re-inserted into the instrument. Dispose of damaged batteries responsibly and in accordance with local regulations. Do not disassemble the battery or dispose of in fire.

Section 2: Hardware Installation

If not using DHCP automatic IP allocation, we highly recommend that your network administrator assigns IP addresses to each Ranger Station device before they are mounted in the factory. The network administrator will need to install the Ascent software on a single computer - see Installing the Software (page 40), then follow the instructions in Connecting via a Network (page 47).

The following steps describe the recommended installation sequence for a Ranger system. Specific details for each step are given in the topics that follow. Please read all topics in this section before beginning the physical installation of any Ranger system devices.

1. Install the Ranger Station device(s) in mounted protective housings.
2. Connect Ranger Station tachometers; connect relay outputs and Ethernet cable (if used), then check for ground loops.
3. Mount all Ranger sensors.
4. Mount all Ranger Booster devices.
5. Connect power to the Ranger Station and Ranger Booster devices.
6. When hardware installation is complete, continue with software installation (Section 3: Software Installation and Setup on page 40).

Ranger Station/Booster DC Power Supply

Power supply requirements for the Ranger Station and Ranger Booster devices are 9 V to 36 V DC (nominally 12 V to 24 V DC), 250 mA maximum per device.

Many factories have a 24 V instrumentation supply available. This is ideal for powering the Ranger Station and Ranger Booster devices. If DC 12 V to 24 V supply is not available then a mains-powered DC power supply will be required. The simplest solution is to use the 12 V 3 A plug packs supplied with the Ranger devices; however, this plug pack is not recommended if ambient temperatures are outside the instruments' recommended operational range of 0 °C to 50 °C (32 to 122 °F). As an alternative there are many suppliers of DIN rail mount mains-powered DC supplies.

Note: The Ranger Station and Ranger Booster power inputs are fully isolated. The DC supply cannot cause ground loops.

Installing a Ranger Station Device

Choosing an Installation Location

General considerations

- Choose a mounting position that allows for easy routing of tachometer sensor, power and Ethernet cables (if used).
- Consult your network administrator to determine the proximity of existing Ethernet connection sockets to potential Ranger Station mounting sites. The Ethernet socket is used for communication between a Ranger Station device and a server PC.
- For maintainability and accessibility, locate the Ranger Station device a safe distance from high voltage and power generation equipment. Ensure the Proflash socket remains unobstructed for easy access (in order to program/Proflash device firmware).
- Locate the Ranger Station device at least 0.5 m (1.6 ft) from high voltage (>= 440 V), high current (>= 100 A) or high frequency equipment for improved noise immunity.

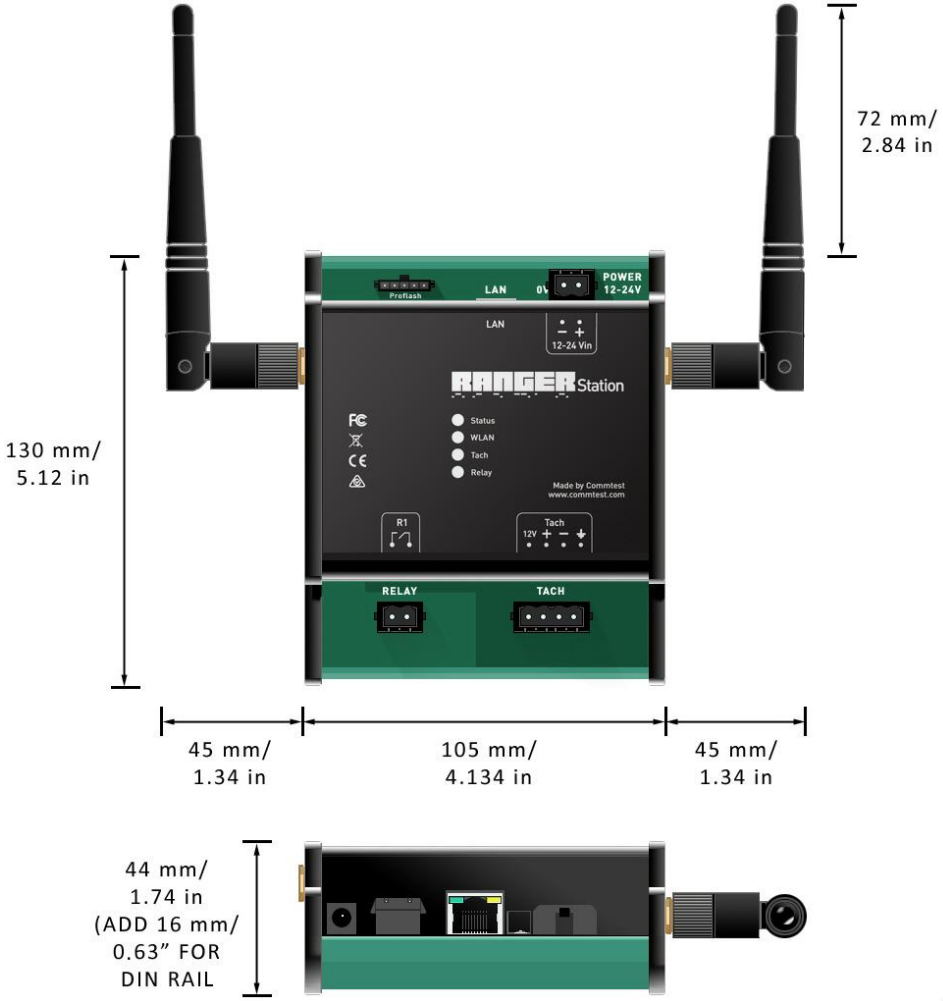
Environmental requirements

- Ensure the ambient temperature is between - 10 °C and + 60 °C (14 to 140 °F).
- Ensure the ambient humidity is below 95% relative humidity, with no condensation.
- Ambient temperatures must not fluctuate such that condensation might form on or inside the Ranger Station devices.

Ranger Station Housing Enclosure

In the presence of corrosive or salty air, or excessive dust (especially conductive), the Ranger Station device should be installed in an IP65 or NEMA 4 enclosure with glands on all cable entries. A suitable enclosure can be ordered from your Commtest distributor, or you can design your own enclosure based on the following dimensional diagram.

Note: the Ranger Booster case is IP65 rated and equipped with a power supply gland. It does not require an additional external enclosure.



Mounting

1. Mount the Ranger Station device on a wall or other stationary surface using a 35 mm DIN rail. The device can be mounted in any orientation: typically horizontally or vertically.

2. Connect cables as described in the topics that follow.

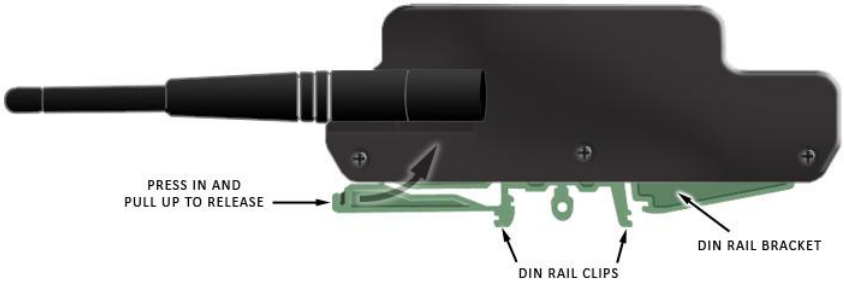
Note: There are **no** hardware jumper settings or any other physical adjustments required on the Ranger Station device.

Removing a Ranger Station Device from a DIN Rail

The mounting brackets attached to the underside of the Ranger Station case are press-fitted onto a DIN rail.

DIN Rail Bracket

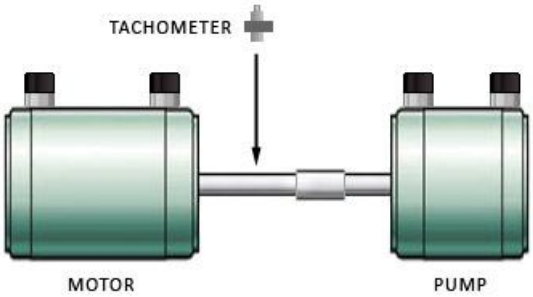
Should the need arise to remove the device from the rail, press the slotted ends of the bracket firmly to retract the clips, then pull away to detach the bracket. The brackets are permanently attached to the Ranger Station's base, and cannot be removed without damaging the instrument and/or the brackets.



Removing From DIN Rail

Install Speed Sensors (Tachometers)

For a typical 'basic' machine comprising a motor, a coupling and a driven device, e.g. a pump, a single speed sensor should be installed. All Ranger sensors attached to the machine can obtain the RPM from this one speed sensor.



Basic machine with speed sensor

The Ascent software also provides for situations where a machine includes a gearbox or other fixed ratio drive such as a belt or chain. The two (or more) shafts in the machine will be turning at different speeds but these speeds are relative to one another. As with the basic machine setup, only one speed sensor is required. See Configuring Tachometers/Speed Sensors (page 91) for more information.

Supported speed sensors
The input circuit is very flexible and accepts pulse-train type signals from a wide variety of speed sensors. A few examples are listed below.

Hall effect sensors (recommended for use with the Ranger Station)
These are ideal, providing non-contact sensing of any ferrous target e.g. gear teeth, flange bolts and shaft keyways.

Optical tachs (LED or laser)
These are compatible but not recommended due to the need to keep optical elements clean.

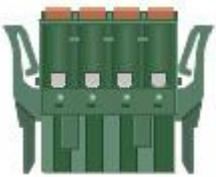
Keyphasor®
A separately powered displacement probe that detects a shaft keyway. Its output may need to be conditioned to match the 1.5 V threshold and 12 V max level of the tach inputs. This is described in Connecting Tachometer Inputs (page 27).

Connecting Tachometer Inputs

The tachometer input is clearly labeled on the Ranger Station device and accepts 4 wires, labeled above the connector (from left to right).

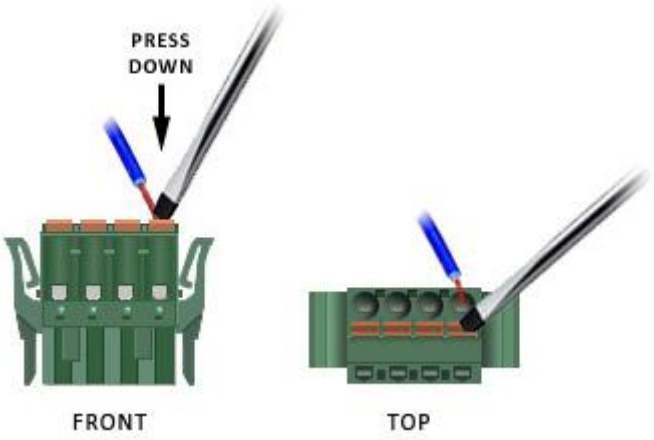
12 V	Power supply to the tachometer sensor. Limited to 50 mA by an auto-resetting fuse
tach+	Positive tachometer signal to the Ranger Station device
tach-	Return path for the tachometer signal
⏚	Ground and return path for the + 12 V supply

Connecting to the spring cage plugs
The Ranger Station device uses modern un-pluggable, self-latching, spring cage connectors.



Tachometer Spring Cage

- To insert a wire, depress the orange tab on the plug using a small blade screwdriver and insert the conductor.



- Release the orange tab; a spring blade makes electrical contact and grips the bare wire securely.

Note: To remove the wire depress the orange tab and extract.

Speed sensors should be connected according to the following tables.

Device connector	Hall effect	TTL	Switch
12 V	supply		
tach+	link to + 12 V	TTL output	link to + 12 V
tach-	output	common	switch +
⏚	common		switch -

Device connector	Keyphasor® (raw signal)	Optical tachometer
12 V		supply
tach+	common	link to + 12 V
tach-	output	output
⏚		common

Notes:
In the tables 'link to **+ 12 V**' means add a short wire loop between this contact and the **12 V** contact (both on the tach connector).

The **tach+** and **tach-** inputs are optically isolated from the Ranger Station circuitry so connections to them cannot cause ground loops.

Keyphasor® Sensors

If your Keyphasor® driver box provides a positive TTL output signal, connect up as for TTL sensors in the previous table. Use the raw analog output from the driver box.

The Keyphasor proximity sensor gap should be adjusted so the driver box output is - 8 V +/- 2 V (i.e. - 6 V to -10 V) when the sensor is over the shaft. This is the normal mid-range position for these sensors. When the sensor is over the keyway its output will be - 14 V to - 22 V, depending on its make and model.

Note: Keyphasor mode must be enabled in the Ascent software.

Single Tachometer - Multiple Ranger Station Devices

Very large, variable-speed machines can use a single tachometer to drive several Ranger Station devices.

- Connect your sensor to a 'master' Ranger Station device (as described in the previous topic).
- Connect the tach+/- pins in parallel with this 'master' device i.e. link all the **tach+** pins with one wire and all the **tach-** pins with another.

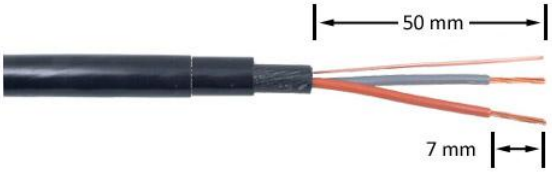
Depending on your choice of tach sensor there will be a limit to the maximum number which can be connected in this way. As a guide, installations of five devices have been successfully linked in the field using this method.

Connecting Relay Outputs

The Ranger Station relay output accepts 2 wires. The relay is single-pole, normally open and makes a contact closure when activated. It is intended for activating warning lights, sirens or similar and can switch both AC and DC voltages (250 V AC or 30 V DC, 5 A).

Recommended wire termination

- Separate the signal wires and drain wire over a 50 mm (2 inch) length.



Recommended cable termination

- Fold back the cut end of the foil shield. Insulate it with heat-shrink tubing.

- Strip 7 mm (1/4 inch) of the signal wires. If there is any risk of corrosion on the exposed conductors they should be tinned with solder.

Connecting to the spring cage plugs

The Ranger Station device uses modern un-pluggable, self-latching, spring cage connectors.

Relay Spring Cage

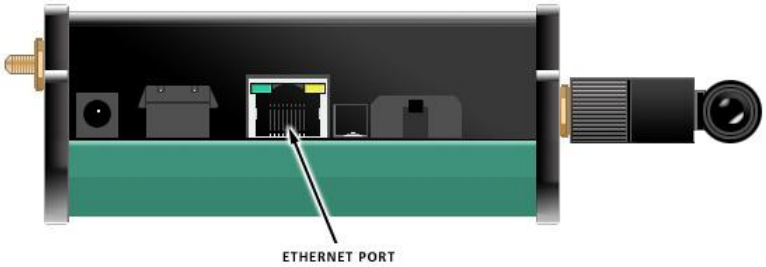
- To insert a wire, depress the orange tab on the plug using a small blade screwdriver and insert the conductor (prepared as above).

- Release the orange tab; a spring blade makes electrical contact and grips the bare wire securely.
- To remove a wire, depress the orange tab and extract the wire.

Wired Network Connection

If you choose not to connect to the Ranger Station wirelessly, plug a standard Cat5 or Cat6 twisted-pair Ethernet cable into the Ethernet socket, labeled 'LAN', on the Ranger Station device.

Note: The software steps required to connect to the Ranger Station wirelessly are described in Section 3 (see Configure Wireless (Wi-Fi) Connection (page 51)).



The Ranger Station device will auto-sense the connection speed 10/100 Mbps and whether the connection is half or full duplex (see LED Status Indicators on page 15 for details).

Any TCP/IP-based network can be used to connect back to the server PC. The link can be as simple as a single crossover patch cable, or as complex as a combination of routers, bridges, hubs, and fiber-optic links. These are standard commercial items that are economically priced and readily available. An IT consultant will be able to advise the best solution for your requirements. You will need to bear in mind the temperature rating and housing requirements of commercial grade items.

Earthing/Grounding

The Ranger Station device must be connected to factory ground at no more than **one** point. This will prevent ground loops, which can cause significant currents to flow (for example if different areas in the factory have slightly different potentials). These ground loop currents could induce 'mains hum' noise into analog signals or even cause wires to overheat.

The Ranger Station device contains a complete ground plane, which is accessible via the 0 V contact of the tachometer input. All other connectors are optically, inductively or resistively isolated from the ground plane; e.g. the tach + and tach - inputs, the DC power supply, the Proflash port and the Ethernet connection.

After installing and completing all previously described wiring to the Ranger Station device, we recommend you check for ground loops as follows:

- Measure the resistance between a Ranger Station ⏚ ground contact and factory ground. If the resistance is less than 100 Ω then the cause should be investigated.

The device can now be grounded by connecting a single wire from the tachometer ground contact to a factory ground.

Mounting Ranger Sensors

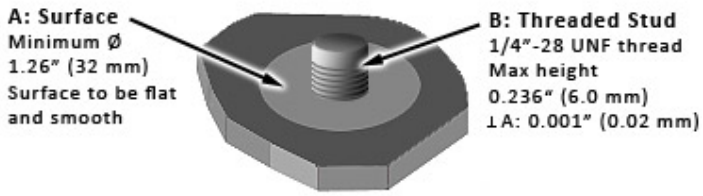
Your choice of sensor mounting will affect the accuracy and therefore the repeatability of vibration and temperature measurements.

For optimal measurement results, Ranger and velocity sensors should be mounted using a threaded stud or adhesive mounting pad and stud. Permanent mounting of Ranger sensors is described in the next topic.

Tachometers should be mounted according to the manufacturer's instructions.

Permanent Mounting

To mount using the stud method, prepare a mounting location on the machine. The following diagram is provided as an indication of a typical mount.



Stud Mounting

Screw the Ranger sensor onto the threaded stud. Use of thread locking compound is recommended. The Ranger sensor should be torqued to between 2.8 and 6.7 nM (2 and 5 lb/ft) using a precision torque wrench. Do **not** over tighten the Ranger sensor as this will damage the device.

Speed Sensor Cable Types, Grounding and Routing

Use shielded twisted pair cable. We recommend cable with a foil shield and drain wire for ease of shield termination.

Copper conductors of size 24 AWG (0.22 mm^2) are adequate for most installations. The conductors must be tinned copper wire to reduce corrosion problems.

The cable's temperature rating and resistance to corrosive environments must be appropriate for the conditions.

All tachometers should have isolated housings with cable shields **not** connected at the tach end (as per standard sensor wiring). This is to ensure that the Ranger Station device is only grounded at **one** location. (See Earthing/Grounding on page 32 for more information).

Never run signal cables parallel to AC power cables. Either run the signals in separate cable trays or maintain a separation of >= 0.5 m (1.5 ft). Keep clear of fluorescent light fittings for similar reasons.

If signal cables must cross power cables, make sure they do so at right angles (90°).

Cable signals must be protected from wear or abrasion points, which could damage the insulation material causing a short circuit.

Long Cable Runs

A cable resistance target of below 10 Ω is appropriate for most speed sensors. This is to ensure signal accuracy and to minimize susceptibility to noise. This guideline results in the following limits to cable runs.

Conductor size (AWG)	Area (mm^2)	Resistance ohm/m @ 35 °C	Max cable run (m)	(ft)
28	0.1	0.22	45	(150)
24	0.22	0.09	110	(350)
20	0.5	0.04	250	(800)
16	1.4	0.014	700	(2300)
12	3.3	0.006	1700	(5600)

The speed sensor signal is a series of pulses so its transmission on the cable is also dependent upon the cable capacitance and the maximum pulse rate. Maximum pulse rate = maximum expected RPM x number of pulses per revolution. Guidelines for a typical 100 pF/m (30 pF/ft) cable are:

Max pulse rate	Max cable run
1000 CPM	22 km (13.5 miles)
10 000 CPM	2200 m (7000 ft)
100 000 CPM	210 m (700 ft)
300 000 CPM	70 m (230 ft)

Installing a Ranger Booster Device

A Ranger Booster transceiver should be installed when a Ranger sensor and its parent Ranger Station device are not located within line of sight, or in highly energized RF environments.

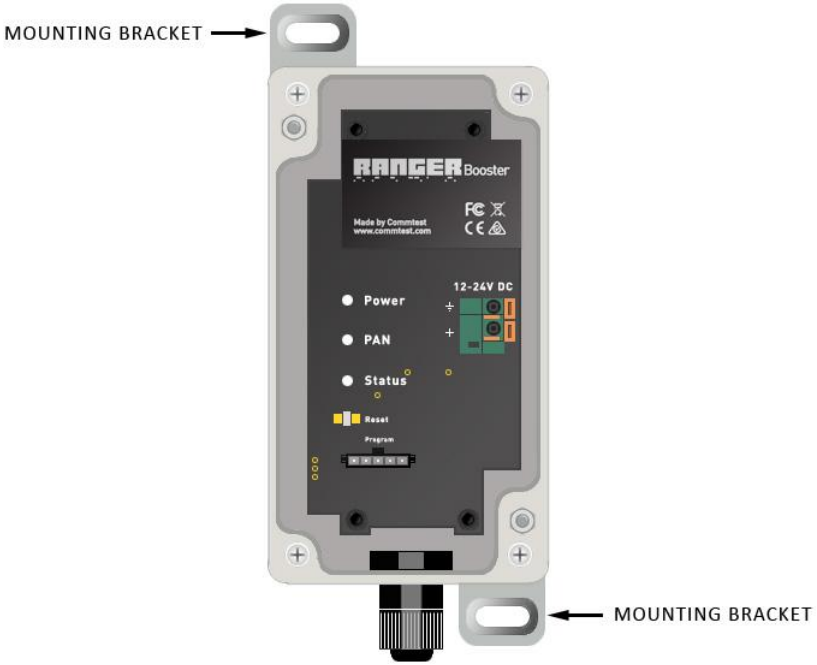
The Ranger Booster transceiver is housed within an integrated IP65-certified enclosure needing minimal post-installation maintenance. It does not require a separate enclosure or a physical network connection, and can be mounted in any orientation. There are **no** hardware jumper settings or any other physical adjustments required on the Ranger Booster device.

Connecting to the Power Supply

The Ranger Booster device is mounted using two standard permanently-connected brackets. Once mounted:

- Remove the Ranger Booster device's transparent plastic cover by unscrewing the four Phillips-head screws holding it in place (one located in each corner). Set the cover and screws aside.
- Unscrew the power supply gland at the base of the Booster device and detach the end-cap.
- Feed the 12 V (3 A) power supply cable through the end-cap, then through the power supply gland.
- Connect the power adapter's bare-wire positive and negative terminations to the spring-clip power terminal.
- Re-attach and tighten the power supply gland's screw end-cap, leaving enough excess cable within the Booster enclosure to ensure no tension is placed on the power supply terminal.
- Re-attach the Ranger Booster device's cover and screw the four Phillips-head screws back into place.

While the Ranger Booster is powered, the red **Power** LED will illuminate. The amber **Status** LED will illuminate and flash when data is being transmitted across the wireless network. The green PAN (Personal Area Network) LED will illuminate when the device has established a connection with a Ranger Station.



Ranger Booster Mounting Brackets

Choosing an Installation Location

General considerations

- Choose a mounting position that allows for easy routing of power cables.
- For maintainability and accessibility, locate the Ranger Booster device a safe distance from high voltage and power generation equipment. Ensure the Proflash socket remains unobstructed for easy access (in order to program/Proflash device firmware).
- Locate the Ranger Booster device at least 0.5 m (1.6 ft) from high voltage (>= 440 V), high current (>= 100 A) or high frequency equipment for improved noise immunity.

Environmental requirements

- Ensure the ambient temperature is between - 10 °C and + 60 °C (14 to 140 °F).
- Ensure the ambient humidity is below 95% relative humidity, with no condensation.
- Ambient temperatures must not fluctuate such that condensation might form on or inside the Ranger Booster device.

Add a Ranger Booster to an Existing Network

If additional Ranger sensors are added to an existing Ranger network, expanding its physical layout, you may need to install additional Ranger Boosters to ensure communications are maintained between Ranger components. Once a new Ranger Booster, or any other Ranger device, has been installed you must reset the network allowing all new components to be detected.

- Open the Online Device Setup Wizard by selecting **Edit>Online Device Setup** or by pressing **CTRL-ALT-S** on your keyboard.

- Select a Ranger Station device within the network that has been altered and click the **Edit** button. The VB Device properties panel will open.

- Click the **Configuration** tab.

- Press the **Send** button beside 'Network Route Discovery'. A message will display stating that the network is being reset. Once completed, the new Ranger Booster device will be integrated into the Ranger network.

Section 3: Software Installation and Setup

The Ranger Station and Ranger sensor devices are programmed via a PC running Ascent software. All communication setup, data recording intervals, alarms and measurement information is configured in the software. Recordings that are scheduled to be run at regular intervals will be triggered by the OnlineManager program, which is a separate software application.

Installing the Software

Note: You must have administrator permissions on your PC in order to install the Ascent software. Contact your network administrator for assistance if required.

The Ascent CD-ROM contains the **Ascent**, **OnlineManager**, **AscentWatcher** and **AscentOPC** programs. You may choose to install all or just some of these programs on your computer.

Note: Port 10001 must be open in your firewall or router to allow Ethernet communications between the software and the Ranger Station device. Contact your network administrator if you require assistance with this task or refer to your router and/or firewall software instructions. Note that Windows XP and Vista include integrated firewalls. If you are using either of these operating systems you may need to enable access through these integrated firewalls in addition to the router or firewall.

- Close all programs on your PC.
- Insert the Ascent CD-ROM into the CD-ROM drive.
  - Wait for the Ascent installation page to automatically start in your web browser. Follow the installation instructions listed.

OR

- Run the **Ascent_v[Version].exe** installer file located in the CD-ROM's root directory.

Note: The Ascent software suite requires the Microsoft® .NET Framework 3.5 SP1 or higher to be installed on your computer. The .NET Framework file is included on your installation CD-ROM. If it is not pre-installed on your system, a software prompt will alert you during the Ascent software installation.

- Select the software language you wish to use from the Languages dropdown list then click **OK**. The installer's introduction screen will open.

Note: If you are upgrading from a previous version of Ascent you will be prompted to uninstall the older software. Click **OK** to uninstall the software automatically.

- Click **Next**. The License Agreement screen will be displayed.
- Scroll to the bottom of the license agreement then tick the two check boxes located at the bottom of the panel. Doing so indicates that you have read and agree to the license terms specified.
- Click **Next**.
- To install every program in the Ascent suite select all programs listed then click **Next**. If you wish to select specific programs to install choose only those applications that are required then click **Next**.
- Select an installation location by clicking the **Browse** button and navigating to a target directory on your computer. The default installation location is recommended.
- Click **Install**. The software will be installed in the selected location.

- Click **Next** then **Finish**. This completes the installation.

Uninstalling the Software

- Navigate to **Start>All Programs>Commtest>Ascent>Uninstall Ascent** in Windows XP.

OR

- From the Windows Start menu navigate to the Control Panel and select **Add or Remove Programs**. For Windows XP this is **Start>Control Panel**.
- Locate and select the Ascent program. To un-install click **Remove**.

Creating Machines and Measurement Setups

Machine structures and measurement setups must be created in the Ascent software before any measurements can be taken. If you have not yet done so, please read sections 1 and 2 of your *Ascent Software Reference Guide* to learn how to set up your machine database.

Once your machine database has been created you are ready to begin configuring your online system as described in the rest of this section.

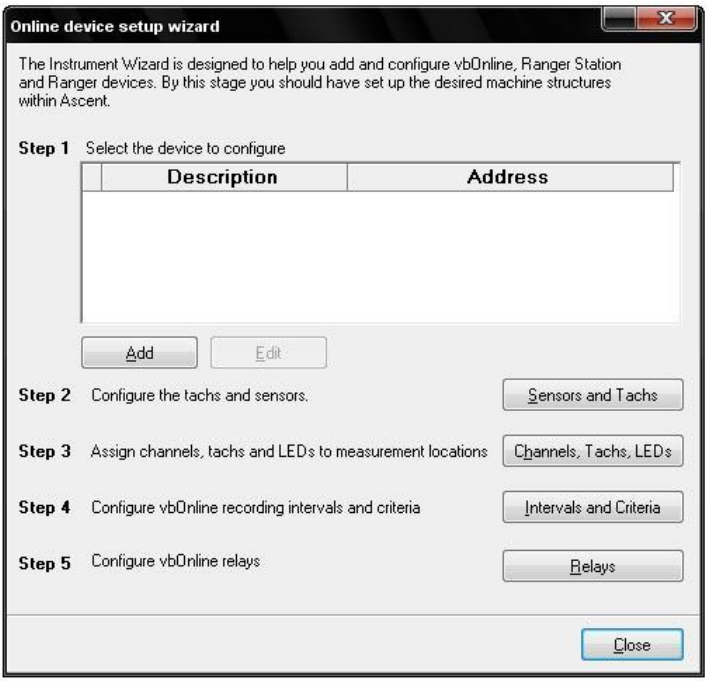
Using the Online Device Setup Wizard

Use the Online Device Setup Wizard to configure each of your Ranger Station and Ranger sensor devices. The Wizard will guide you through the setup process with a series of numbered steps. Some of these steps are optional (such as configuring relays) and may be omitted during the initial configuration then returned to at a later time if desired.

You can run the Wizard again at any time after the initial setup if you need to edit a setup item or enable an optional feature.

Note: We recommend that you turn on Auto Save, which will automatically save your configuration settings as you make them. (Auto Save is turned on by default but you should check this now by going to the main menu and ensuring that **Options>Auto Save** is ticked). If you do not enable Auto Save we recommend that you manually save your configuration settings with the toolbar **Save** button every few minutes while setting up your Ranger system. The Ascent program will prompt you to save *all* your changes upon closing. (Turning on Auto Save will disable Ascent's Undo\Revert function; i.e. the software cannot go back a step if you make a mistake - you will need to manually correct any errors made.)

- To run the Wizard, first start the Ascent program and open a folder containing machines you wish to monitor.
- From the main menu select **Edit>Online Device Setup** (at the bottom of the drop-down menu).



Note: The Wizard can also be opened using the shortcut key combination **CTRL+ALT+S**.

Step 1: Set up Communications with the Ranger Station

The first step in the setup process is to establish a link between the software and each Ranger Station device, allowing the two-way exchange of data. Initial configuration should be performed using a crossover cable, or alternatively from within a micro network. That is, a single standalone computer, router/switch, and a Ranger Station isolated from any other network devices. The steps below assume a crossover cable is being used to connect to the Ranger Station. However, if a router or switch is being used, simply jump ahead to Establish Ascent Communications with the Ranger Station (page 46).

Before you begin the setup process you need to create a list that shows which Ranger Station device will be used to monitor and control each group of Ranger sensors. The list should also contain the IP address of each Ranger Station device so that the devices can be correctly configured.

Note: The following instructions assume that you have already created your machine database containing all measurement setups (machines, locations, points, measurement schedule entries etc.) for your Ranger network. See the *Ascent Software Reference Guide* for information on the steps required to complete this task.

Make a Direct Connection via Crossover Cable

Any PC or laptop equipped with an RJ-45 Ethernet port can be connected directly to Ranger Station device via an Ethernet crossover cable.

Note: crossover cables are difficult to differentiate from standard straight-through Ethernet cables by eye alone as both use the same RJ45 (8P8C) connector plug. The two cable types differ only in their wiring configuration. Some manufacturers use color-coded boots (typically red or purple) to identify their crossover cables, but there is no recognized international standard. Crossover cables are available everywhere standard straight-through Ethernet cables are sold.

Windows Vista

- Select **Start>Control Panel>Network and Sharing Center>Manage network connections**. From the resulting window, right click the appropriate connection (typically 'Local Area Connection') and select **Properties**.
- In the 'Local Area Connection Properties' window select **Internet Protocol Version 4 (TCP/IPv4)** then click the **Properties** button.
- Select **Use the following IP address** and set the IP address and subnet mask. Enter an IP address of **192.168.1.1** and a subnet mask of **255.255.255.0**. Specifying a default gateway is not required.
- Click **OK**.
- Connect one end of the Ethernet crossover cable to the labeled ('LAN') connector on the Ranger Station device. Plug the other end into the computer's Ethernet port. Ascent should now be able to communicate with your Ranger Station instrument.

Windows XP

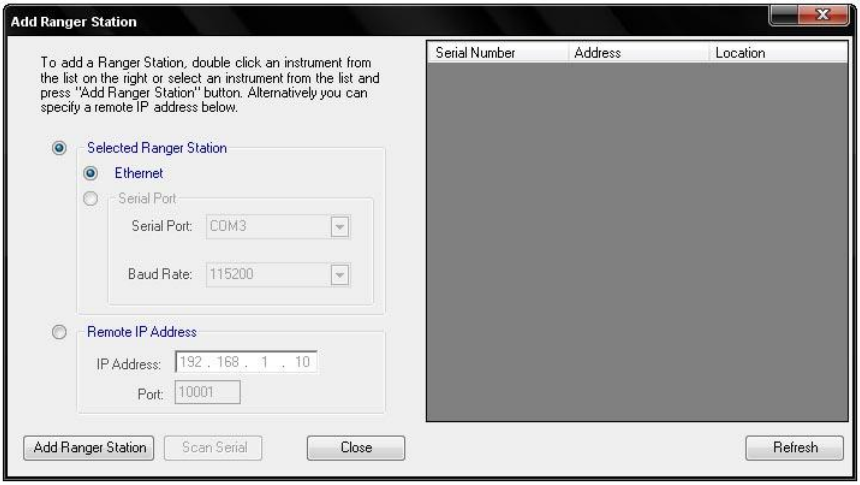
- Select **Start>Control Panel>Network Connections**. Right-click the appropriate connection (Local Area Connection) and select **Properties**.

- In the 'Local Area Connection Properties' window ('This connection uses the following items' list) select **Internet Protocol (TCP/IP)** then click the **Properties** button.
- Select **Use the following IP address** and set the IP address and subnet mask. Enter an IP address of **192.168.1.1** and a subnet mask of **255.255.255.0**. Specifying a default gateway is not required.
- Click **OK**.
- Connect one end of the Ethernet crossover cable to the labeled ('LAN') connector on the Ranger Station device. Plug the other end into the computer's Ethernet port. Ascent should now be able to communicate with your Ranger Station instrument.

Establish Ascent Communications with the Ranger Station

Note: The following instructions assume that you have already established a connection with the Ranger Station as described in the previous topic.

- Start the Ascent software.
- Open the Online Device Setup Wizard by selecting **Edit>Online Device Setup** or by pressing **CTRL-ALT-S** on your keyboard.
- Click **Add>Ranger Station**. The 'Add Ranger Station' window will open. The Ranger Station, if detected, will listed in the window.



- Click the device with your mouse then press the **Add Ranger Station** button. The device is now connected and has been added to the Ascent software's internal instrument database.

Note: If the Ranger Station is not listed, and you know the IP address of the device you wish to connect, enter the IP number field into the IP Address field. If a different port number is being used to communicate with the device, enter it into the Port text field (10001 is the default port number and should not normally need to be changed).

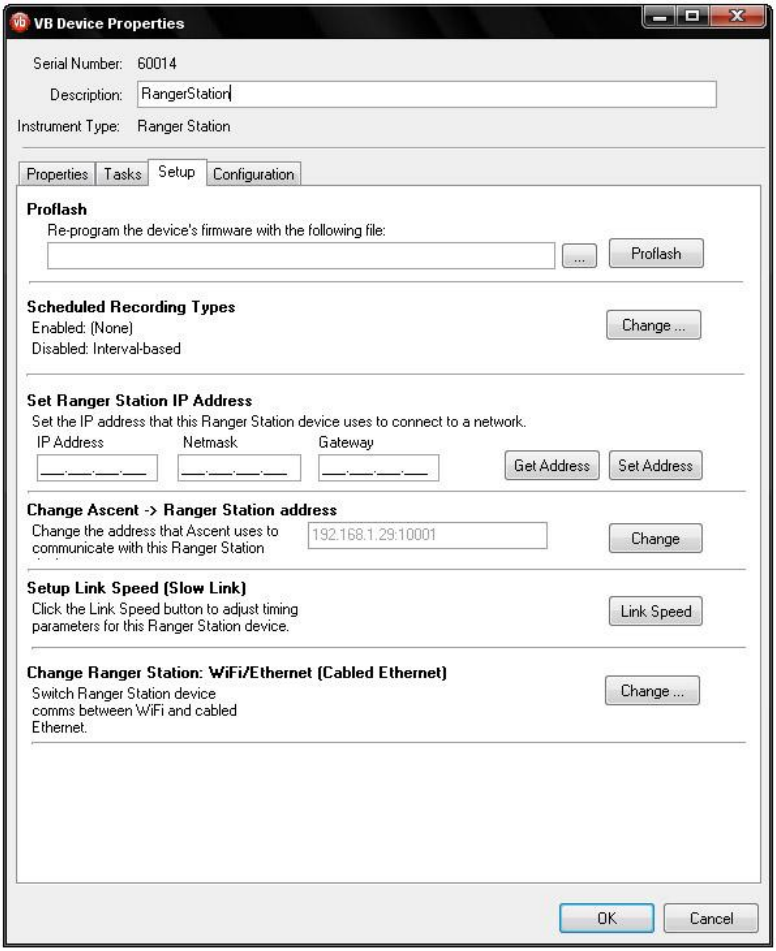
- Press **Close** to exit the Online Device Setup Wizard.

Set the Ranger Station's Network IP Address

The task of assigning IP addresses to each Ranger Station device must be carried out by a network administrator.

Note: The following steps assume you have already established Ascent communication with the Ranger Station as described in the previous topic.

- Open the Online Device Setup Wizard by selecting **Edit>Online Device Setup** or by pressing **CTRL-ALT-S** on your keyboard.
- Select the Ranger Station device, identifiable by its serial number, and press the **Edit** button. The VB Device Properties window will open
- Click the **Setup** tab.

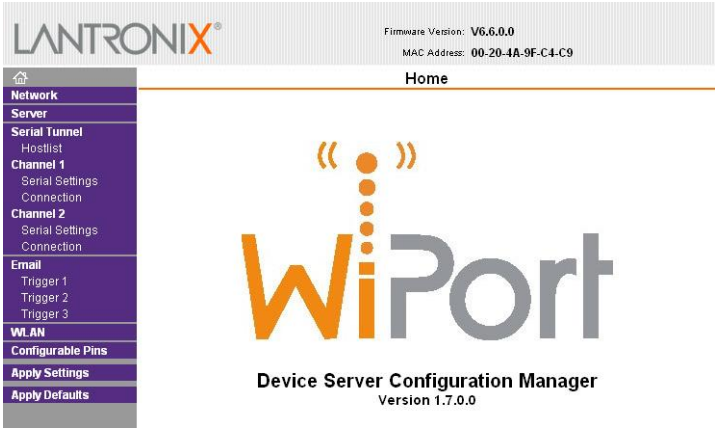


- In the 'Set Ranger Station Address' field enter the IP address, netmask and gateway (the gateway is optional) supplied by your network administrator for this Ranger Station device.
- Click **Set Address**. The Device Details summary window will display. The new IP address is now set
- Click **OK** to close the VB Device Properties window then **Close** to exit the Online Device Setup Wizard. The Ranger Station is now ready for installation in the destination network.

Set the Ranger Station IP via a Web Browser

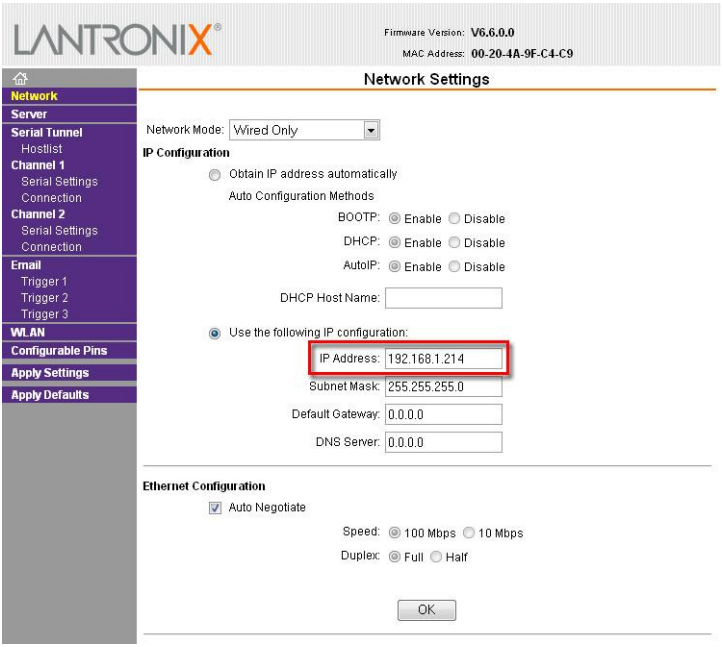
Although the primary means of setting a Ranger Station's IP address is via the Ascent software, the instrument's IP address can also be edited using a standard web browser.

- Open an Internet browser and navigate to the Ranger Station's current IP address (the factory-default IP address is **http://192.168.1.266** and the current IP address should be listed under the **Setup** tab of the VB device Properties panel). The Ranger Station's WiPort web interface will open.
- If you are asked for a username and password, leave both fields empty and press **OK**.



Ranger Station Web Interface

- Press the **Network** button at the top of the left-hand menu. The 'Network Settings' screen will open.
- Type a new IP address into the 'IP Address:' field.



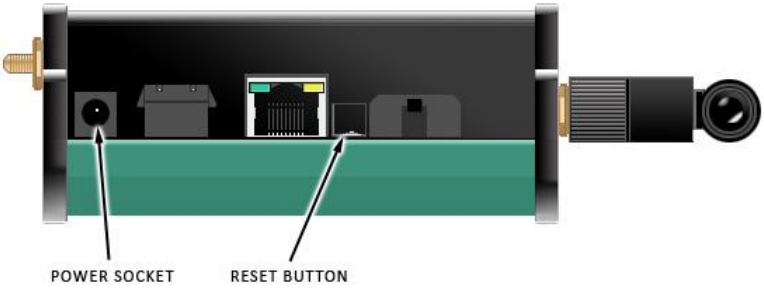
IP Address Field

- Press **OK**. A confirmation message will be displayed at the bottom of the screen (beside the 'OK' button).
- Press **Apply Settings** near the bottom of the left-hand menu. An update progress bar will be displayed while the Ranger Station's IP address is updated. This process may take up to 90 seconds.

Reset IP Address to Factory Default

If for any reason you are unable to communicate with the Ranger Station, it can be physically reset to its factory network configuration.

- Disconnect the AC power socket from the device.



- Press and hold the reset button located on the power supply end of the Ranger Station.
- Reconnect the AC power plug to the instrument's power socket while holding the Reset button. The Ranger Station's Status LED will turn red for approximately 15 seconds while the device's network configuration is reset to its factory state. Once the Ranger Station has completed the reset sequence, the Status LED will turn green and begin flashing.

The Ranger Station's network connection status is now **Wired Ethernet**, using a static IP address of **192.168.1.226**. See the previous topic's instructions for changing the instrument IP address, if required.

Configure Wireless (Wi-Fi) Connection

Before configuring and activating a WiFi connection with the Ranger Station you will require the following:

- An appropriate IP address, Netmask and Gateway for your network.
- The SSID name of your wireless network.
- The channel used by your wireless network.

- A cabled Ethernet connection (for setup only)

Configuring the Ranger Station for WiFi

- Connect your PC to the Ranger Station using a Crossover Ethernet cable (see Make a Direct Connection via Crossover Cable (page 44)), or through a standard wired router or switch.
- Start the Ascent software and select **Edit>Online Device Setup**. The Online Device Setup Wizard interface will open.
- Select your Ranger Station (identifiable by its serial number) and press **Edit**. The 'VB Device Properties' window will open.

Note: If your Ranger Station is not displayed in the Online Device Setup Wizard, open **Add>Ranger Station**. Select the device in the new window and press the **Add Ranger Station** button.

- Select the Setup tab.
- Click the **Change** button beside 'Change Ranger Station: WiFi/Ethernet'.
- Leave the checkbox set beside **Cabled Ethernet**. **DO NOT** change this to WiFi. Click **Configure WiFi...**.
- You will be asked for a username and password. Leave both username and password fields blank and click **OK**. The Lantronix WiPort Device Server Configuration panel will open in your default web browser.

Ranger Station Web Interface

- Click **Network** from the left-hand menu bar.
- Set **Network Mode** to 'Wireless Only'.

Note: If you wish to change the Ranger Station's IP address, or change the NetMask or Gateway details used on the final network, do so now.

- Click **OK**. A confirmation message will be displayed at the bottom of the screen (beside the **OK** button).
- Click **WLAN** on the menu bar.

- Change the Network Name (SSID) field to match your Wireless Router's SSID.

- Select the **Ad Hoc** Network type and choose the channel (1-11) used by your wireless network from the **Channel** dropdown list.
- Click **OK**. A confirmation message will be displayed at the bottom of the screen.
- Click **Network** from the menu bar and set **Network Mode** back to 'Wired Only'.
- Click **OK**. A confirmation message will be displayed at the bottom of the screen.
- Click **Apply Settings** on the menu bar. The Ranger Station will restart and a confirmation message will be displayed when the process has completed.

- Close the Lantronix WiPort Device Server Configuration Manager. Return to the Ascent software

Activating Ranger Station Wi-Fi

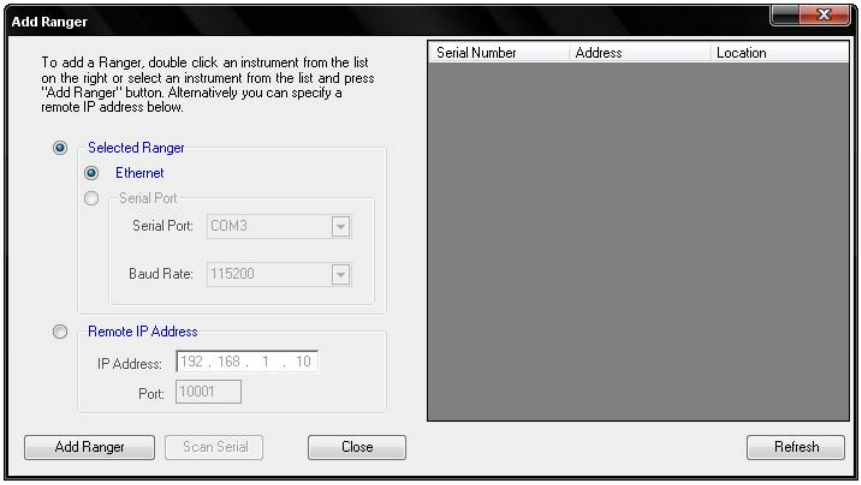
- Re-open the 'VB Device Properties' window in Ascent if it has been closed (**Edit>Online Device Setup**. Select the Ranger Station device and click **Edit**).
- Select the **Setup** tab.
- Click the **Change** button beside 'Change Ranger Station: WiFi/Ethernet'.
- Select the **WiFi** radio button and click **OK**. Wait for the Ranger Station to reboot. A confirmation message will appear after the process has completed. This may be up to 90 seconds.
- Click **OK**.
- Close the Ascent software.
- Remove the Ethernet network cable connecting the computer or router to the Ranger Station device.
- Start the Ascent software on your WiFi equipped computer and select **Edit>Online Device Setup**.
- Click **Add>Ranger Station** and select your Ranger Station from the list.
- Click the **Add Ranger Station** button. You are now connected via Wi-Fi.

Step 2: Set Up Communications with the Ranger Sensor

The first step in the setup process was to establish a link between the software and the Ranger Station device. Now you must establish a link between the software and the Ranger sensor(s).

Note: you cannot establish a connection with a Ranger sensor without first communicating with a Ranger Station (as described in Step 1: Set Up Communications with the Ranger Station (page 44)). Ranger sensors cannot communicate directly with wireless routers or network cards. Ensure the Ranger sensor is powered up and within range before proceeding with the steps below.

- Open the Online Device Setup Wizard by selecting **Edit>Online Device Setup** or by pressing **CTRL-ALT-S** on your keyboard.
- Click **Add** then **Ranger**. The Add Ranger window will open. The Ranger sensor, if detected, will be displayed in the right-hand panel of the window.



- Click the device with your mouse then press the **Add Ranger** button. The Ranger sensor is now connected.

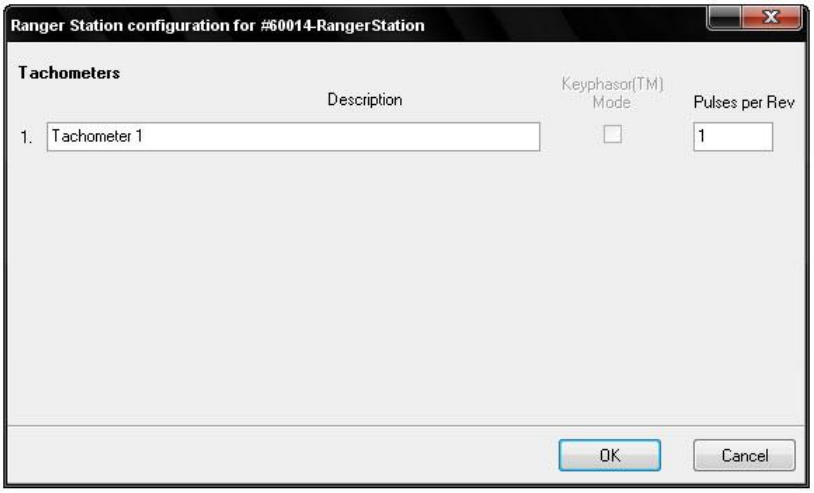
If the Ranger sensor does not appear in the right-hand panel of the window, confirm that a communications link has been established with the Ranger Station, that it is powered up, and that a battery is connected to the Ranger sensor. Re-position the Ranger sensor closer to the Ranger Station to confirm that the Ranger device is working normally. If, after checking these, you are still unable to connect to the sensor at your desired sensor location you may require a Ranger Booster between the Ranger Station and the Ranger sensor to amplify the wireless signal between the two devices. If the sensor was previously displayed, but no longer appears, replace the Ranger sensor battery.

Step 3: Assign Ranger Stations to Tach Measurement Locations

The third step in the setup process is to specify which Ranger Station devices, if any, are to be used for taking tachometer measurements. If tachometer measurements are not required, continue on to step 4.

- Open the Online Device Setup Wizard by selecting **Edit>Online Device Setup** or by pressing **CTRL-ALT-S** on your keyboard.
- Select the Ranger Station device, identifiable by its serial number and click the **Tachs** button. The Tachometer Configuration panel will open.

- Type a description into the 'Description' text field, then the number of tachometer pulses per revolution into the 'Pulses per Rev' box. Click **OK**.



Tachometer Setup Screen

- From the Online Device Setup Wizard press the **Channels, Tachs, LEDs** button. The Device Channel Configuration panel will open.
- Select the Ranger Station from the **vb Device** dropdown list.
- Select the tachometer description ('Tachometer 1' in the example above) from the **Tach** dropdown list.
- Select 'LED Set 1' from the **LED Set** dropdown list

Tachometer Assignment

- Click **OK**. Repeat the procedure above for all tachometer measurements. When you have finished click **OK** to close the Device Channel Configuration window.

The Device Channel Configuration window lists all the sub-elements beneath the selected item. Because we selected a machine the window lists all the points and locations on this single machine. If you select the top-level folder every machine's points and locations will be listed.

The Ranger Station, Ranger sensor devices and tachometers you have previously defined will appear in the drop-down lists when you click the arrows to make a selection.

- The grid width can be re-sized by placing the cursor between two columns till it changes to a left-right arrow. Hold down the left-mouse button and drag it in either direction to perform the resizing.

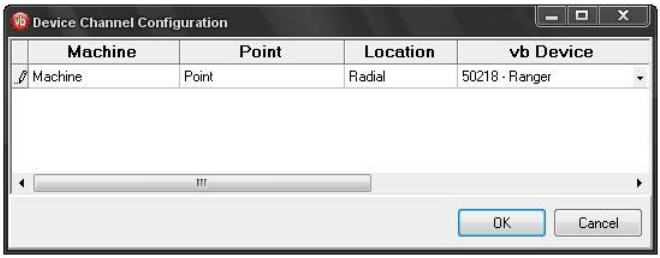
- Use the drop-down boxes in each column to select the Ranger Station or Ranger sensor device, channel and tachometer (if required) that will be used to take measurements at each location. To quickly assign a single Ranger Station device to multiple locations see the next topic, Copying Items to Multiple Locations.

Step 4: Assign Ranger Sensors to Measurement Locations

The fourth step in the setup process is to specify which Ranger sensor device is to be used for taking temperature or vibration measurements at each location.

- In the navigator, click any machine to select it.
- Open the Online Device Setup Wizard by selecting **Edit>Online Device Setup** or by pressing **CTRL-ALT-S** on your keyboard.

- Select the Ranger sensor device, identifiable by its serial number, and press the **Channels, Tachs, LEDs** button. The 'Device Channel Configuration' panel will open.



- Use the drop-down boxes in each column to select the Ranger sensor device and axis (not required for temperature measurements) that will be used to take measurements at each location. To quickly assign a single Ranger Station device to multiple locations see the next topic, Copying Items to Multiple Locations.

- To choose another machine to work with, select it in the navigator (the window will update to show this machine's points/locations etc) then repeat the previous steps.

- When you have finished click **OK** to close the Device Channel Configuration window.

Note: You may encounter situations where there are several shafts running at different speeds due to gearbox ratios, pulley ratios or roller diameters. Solutions to these special cases are discussed in Configuring Tachometers/Speed Sensors (page 91).

To clear a Ranger Station or Ranger sensor device from a location

- Click the drop-down box arrow and select a different device or the black highlight bar to leave this location empty.

Copying Items to Multiple Locations

You can quickly assign a Ranger Station or Ranger sensor device (or other item) to multiple locations using 'copy and paste'.

- To do this, use the drop-down arrows to assign a device to one location - the cell will be highlighted blue.

- Press **CTRL+C** on your keyboard to copy this device to memory.
- Move the cursor to the next row down and hover it over the dividing line between the row cells until it changes direction to face towards the right (it will only do this if you are directly over the cell dividing line).

- With the cursor facing to the right, drag the mouse down the column to select every row that you want this Ranger Station or Ranger sensor device to be copied to. The cells will turn black to indicate that they are selected.

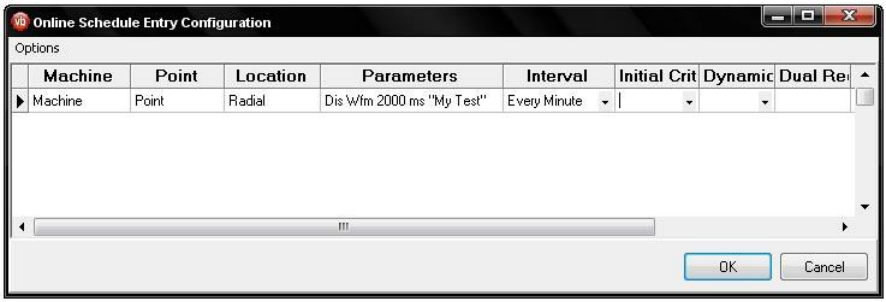
- Press **CTRL+V** to paste the device into every one of the selected locations.

This 'copy and paste' method can be used in any situation where the same item can be assigned to multiple places e.g. the 'Tachometer' or 'LED Set' columns in this same window.

Step 5: Configure Recording Intervals

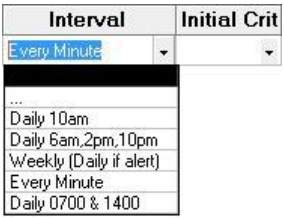
The fifth step in the setup process is to create *Recording Intervals* that specify how often measurements will be taken at each location. When you run the OnlineManager program it reads the recording intervals you have created then takes measurements accordingly. All measurements that you want to be automatically collected must have a recording interval assigned to them.

- Open the Online Device Setup Wizard by selecting **Edit>Online Device Setup** or by pressing **CTRL-ALT-S** on your keyboard. Select a Ranger Station or Ranger sensor from the Wizard.
- Click the **Intervals and Criteria** button. The 'Online Schedule Entry Configuration' panel will open.
- If the window is empty select a machine, point, location or schedule entry in the navigator.



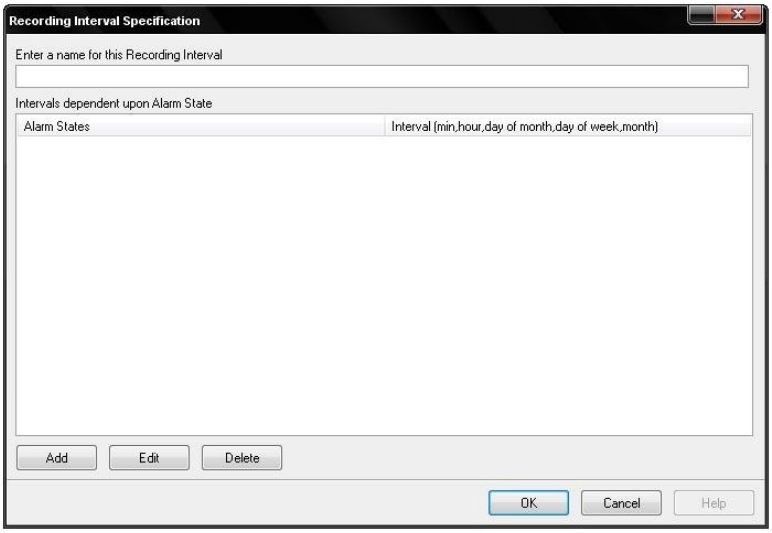
The Online Schedule Entry Configuration window lists all the points, axes and schedule entries at this machine. The window also contains fields that allow you to create recording intervals and assign any criteria you have created.

The 'Interval' drop-down box contains a list of all recording intervals you define.



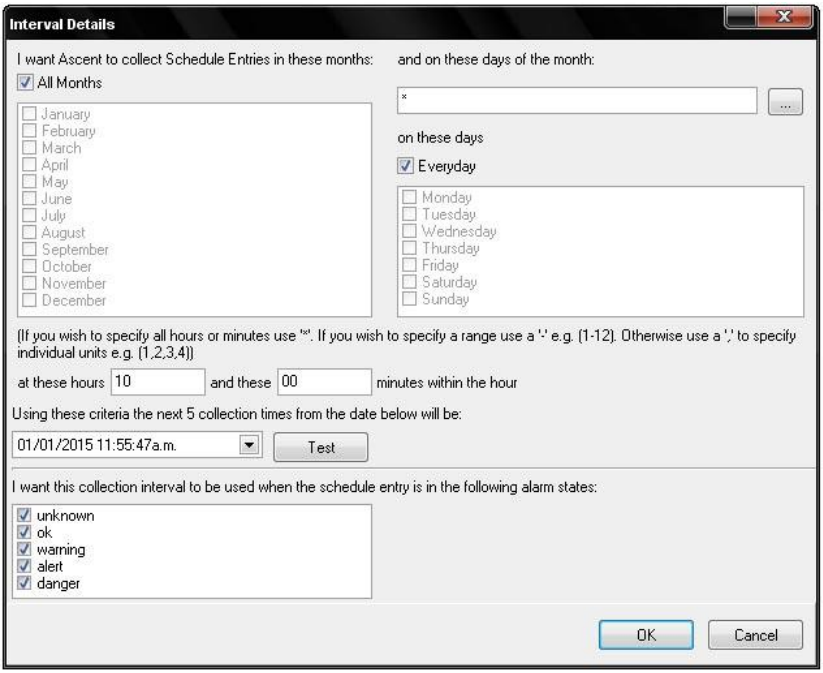
Selecting the three dots opens the Recording Intervals Editor window that allows you to add, edit and delete recording intervals.

- Click the 'Interval' drop-down box and select the three dots.
- Click **Add** to add a new recording interval. The 'Recording Interval Specification' panel will open.



- Enter a description for this recording interval. The description should be an informative label using keywords that describe the purpose of this particular recording interval e.g. 'Weekly depending on alarm state' or 'Monthly any state'.

- Click **Add** to set up the recording interval details.

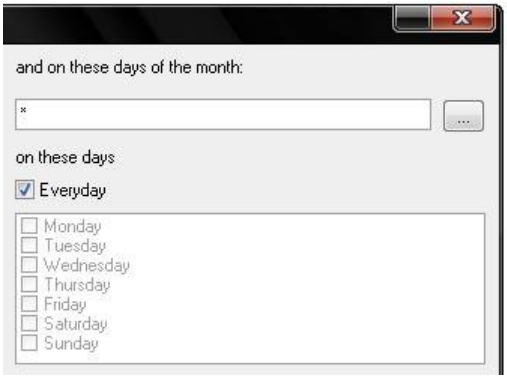


The Interval Details window allows you to specify how often a recording will be taken. You may wish to create multiple entries, each with a different data recording interval depending on the current alarm state. For example, you could create a recording interval with three entries: the first collects data weekly regardless of the alarm state; the second collects data daily if the location being measured triggers a warning alarm; the third collects data hourly if a danger alarm is triggered.

Fill out the fields as follows:

- All Months is selected by default. If you wish to select specific months untick 'All Months' then tick the boxes as necessary.

The next two fields are used in conjunction with one another to select specific days and dates for data collection. Choose one of the following three options.



- If you want to specify particular days of the month e.g. the 3rd and 10th day of each month, click ... and use the Day Selector to *deselect* the days you do not require (every day will be selected by default, indicated by the green ticks). Click **OK** to close the window. Leave the 'on these days' field below at its default value of 'Everyday'.

- To select one or more specific days of the week for data collection, leave the top field (days of the month) at its default value of * (all months). Below this, untick the box for 'Everyday' then use the tickboxes to select the required days.

- To select both a date and day e.g. the 3rd day of the month only if it is a Monday, click  and use the Day Selector to *deselect* the days you do not require (every day will be selected by default, indicated by the green ticks). Below this, untick the box for 'Everyday' then use the tickboxes to choose the required days.

Now specify the times that you would like data collection to be carried out using the 'hours' and 'minutes' fields. You can specify exact hours and minutes e.g. take a measurement at 10:15 a.m. or you can specify a time range within which to take measurements e.g. take a measurement every minute between 10 and 15 minutes past the hour at 3 p.m., 4 p.m. and 5 p.m.

Hours are specified using the 24 hour clock e.g. for 10 a.m. enter 10, for 10 p.m. enter 22. Choose one of the following three options.

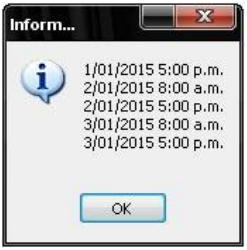
- If you want measurements to be taken every hour enter an asterisk '*' in the 'hours' field.

- To take measurements at particular hours of the day enter the hour numbers separated by commas e.g. to take measurements at 1 p.m., 3 p.m. and 5 p.m. enter 13, 15, 17 in the 'hours' field (remember to use the 24 hour clock).

- To take measurements over a range of hours enter the range separated by a dash e.g. to take a measurement every hour between 1 p.m. and 5 p.m. enter 13-17 (remember to use the 24 hour clock).

Minutes work in the same way as hours using the asterisk, comma and dash to specify exact times or ranges.

- You can check whether you have set the time correctly by clicking the **Test** button. This lists when the next five measurements will be taken, according to your settings.



The final step in defining a recording interval is to assign alarm states.

- Tick the alarm states that you want this recording interval to apply to. To take recordings regardless of the alarm state of the measurement location, tick every box. If you have no alarms at a location select unknown.

- Click **OK** to finish defining the recording interval details then click **OK** again to close the Recording Interval Specifications window.

The recording intervals you define will appear in the 'Recording Interval' drop-down list and can be assigned to any schedule entries.

To add additional entries to the recording interval e.g. to define different recording intervals for when the location triggers an alarm, repeat the process from the beginning of this topic.

- When you have finished defining recording intervals click **Close**.

At the top left of this window, the Options menu contains options for working with dual channel recordings, recording intervals and criteria. Some of these options are also accessible using the right-click shortcut menu.

Use as Criteria
Criteria define a single condition that must be met in order for a recording to be taken e.g. 'Is the machine running between 1600 to 1800 RPM?' Yes = take a recording, No = don't take a recording.

Creating and assigning criteria is an optional step that can be performed now or after configuring a Ranger sensor. To create criteria you must first create special numeric data schedule entries to base the criteria on. Instructions for creating numeric data schedule entries and assigning criteria are given later in this manual (see Criteria and Conditional Monitoring on page 76 for more information).

- Click **Close** and continue at Step 6: Configure Online Relays (page 69).

Hours and minutes example:
You want the Ranger sensor to take measurements at 1 p.m., 3 p.m. and 5 p.m. Three measurements will be taken each hour with the first measurement starting at 10 minutes past and successive measurements being taken at 11 and 12 minutes past.

Measurements will be taken at 1:10, 1:11, 1:12, 3:10, 3:11, 3:12, 5:10, 5:11 and 5:12.

- In the 'hours' field enter 13, 15, 17 (1 p.m., 3 p.m. and 5 p.m.).
- In the 'minutes' field enter 10-12 (three measurements, one each minute).
- Click **Test** to confirm that the time has been set correctly.

Step 6: Configure Online Relays

Step 6 is optional - it allows you to enable/disable a relay and specify when it will be switched. Ranger Station relays can be configured to activate warning lights, audible alarms or shut down a machine.

You can also specify how long an alarm state must persist before a relay is activated. Applying a time delay period to a relay will prevent it triggering if a machine comes out of its alarm state within the specified time. This will help ensure that your monitoring system does not trigger a machine shutdown or alarm alert because of a single abnormal measurement. It will also prevent the Ranger Station relay from being triggered by any natural frequencies which may be excited during machine run-up.

If you do **not** wish to enable relays at this time click **Close** to finish using the Online Device Setup Wizard. Continue reading from the next topic.

Each relay is associated with the machine's current alarm state.

- To configure the Ranger Station relay, open the Online Device Setup Wizard by selecting **Edit>Online Device Setup** or by pressing **CTRL-ALT-S** on your keyboard. Select a Ranger Station from the Wizard.
- Click the **Relays** button. The Relay Configuration panel will open

Relay Configuration

- Type a name into the 'Relay' field if desired, such as a description of the relay function e.g. 'Shutdown' or 'Printer#1 warning'.

- Select **Active** from the **Mode** dropdown list (The **Manual (Open)** and **Manual (Closed)** options specify that a relay will remain open or closed regardless of a machine's alarm state.)
- Select an LED Set and alarm state that will be used to switch each relay.
- Select a time delay period in seconds or minutes from the **Delay** dropdown list. If a machine enters an alarm state and subsequently exits the alarm state within this time the relay will not activate.
- When you have finished click **OK** to close the Relay Configuration window.

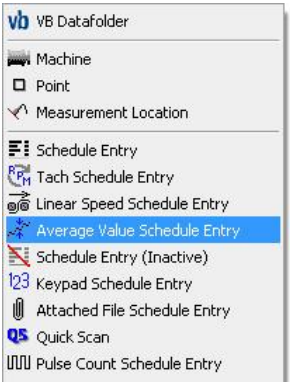
Relays that trigger a machine shutdown will need to be reset once the machine is restarted. This procedure is described in Resetting Relays Following a Machine Shutdown (page 107).

Taking a Ranger Sensor Temperature Measurement

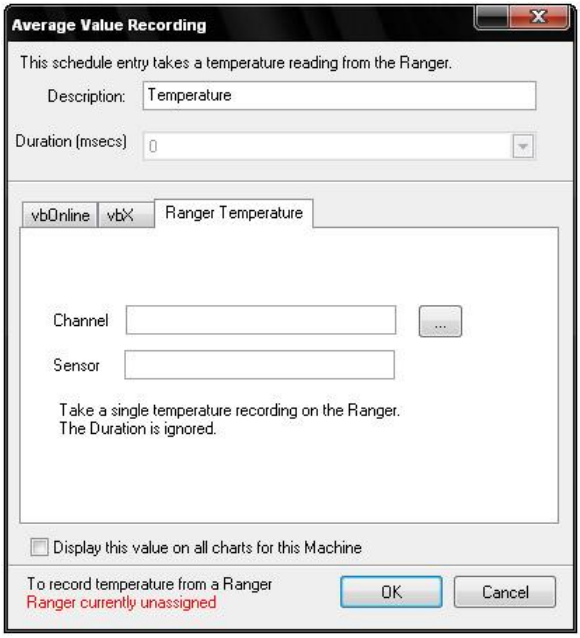
The Ranger sensor device can be used to collect temperature measurements as part of your condition monitoring program. The recorded temperature values can be trended in the same way as vibration recordings using Ascent's Trend view (see the Ascent *Software Reference Guide*, 'Trending Data' section, for more information). In addition, Warning, Alert and Danger alarms can be created that will trigger when the returned value is above or below a user-specified range. Setting alarms for numeric data schedule entries is described in Creating/Editing Alarms for Numeric Data (page 75).

Temperature measurements are recorded by creating a special *Numeric Data Schedule Entry* called an *Average Value Schedule Entry*. An Average Value schedule entry measures the averaged value of any input signal -- in this case temperature -- over a user-specified duration.

- Right-click a point or location and select **New>Average Value Schedule Entry**. The Average Value Recording panel will open.



- Click the **Ranger Temperature** tab.



- Enter a meaningful description for this schedule entry into the 'Description' text field.

- Click the 'More' () button beside 'Channel' to open the 'Device Channel Configuration' window.

- From the 'Device Channel Configuration' window select the Ranger sensor that will be used to take the measurement from the **vb Device** dropdown list. Note that your instrument will not be displayed if it has not been added to the Ascent software database, as described in Step 2: Set Up Communications with the Ranger Sensor (page 55).

- Click **OK**. The 'Device Channel Configuration' window will close and the 'Channel' and 'Sensor' fields on the 'Average Value Recording' panel will be populated automatically.

- Click **OK** to close the window. The new schedule entry will appear in the Ascent software's top-left navigator list.

Note: To manually test the schedule entry, select it in the navigator list and press **CTRL-ALT-R**. A temperature recording will be attempted immediately.

- Click the new Average Value schedule entry in the navigator, then open the Online Device Setup Wizard (**Edit>Online Device Setup** or **CTRL-ALT-S** on your keyboard).

- Press the **Intervals and Criteria** button on the Wizard and select a recording interval (the frequency that measurements will be taken) from the **Interval** dropdown box. See the previous topic, Configure Recording Intervals on page 62, for more details on configuring measurement intervals.

- Click **OK**, then **Close** to exit the Wizard. The temperature measurement will be taken using the assigned Ranger sensor via the OnlineManager software (details on page 102) when OnlineManager is next run.

The value returned by this numeric data schedule entry can also be used to determine whether a criterion has been met and therefore whether a vibration recording is taken or not (see Criteria and Conditional Monitoring on page 76 for details).

Only one instance of this schedule entry will normally be created at an individual point as the temperature being measured will usually be common to everything at that point.

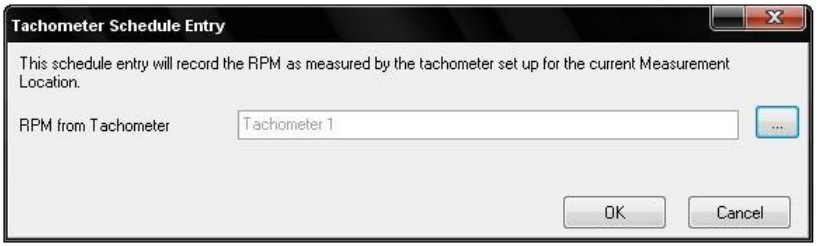
Note: See the *Ascent Software Reference Guide*, 'Associating Process Variables with Vibration Recordings' section for more information on the 'Display this value on all charts for this Machine' checkbox. This checkbox allows Ascent to display Ranger temperature measurements, among other process variables, on vibration charts. Ascent will automatically associate the Ranger temperature measurement recorded closest to a vibration measurement when it is charted. This feature may, depending on measurement intervals, provide data indicative of a machine's state at the time of a vibration measurement.

Creating Numeric Data Schedule Entries

Creating a tach schedule entry

Tach Schedule Entries measure the running speed of the machine by taking a reading from a tachometer.

- Right-click a point and select **New>Tach Schedule Entry**. The tachometer assigned to this point is displayed in the window. Click the **Browse** () button to assign a Ranger Station and Tach to the schedule entry if the 'RPM from Tachometer' field is blank.

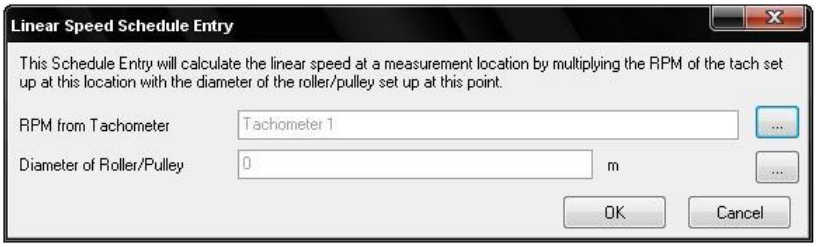


- Click **OK** to create the schedule entry and close the window.

Creating a linear speed schedule entry

Linear Speed Schedule Entries calculate the linear speed of the machine using the RPM supplied by a tachometer and the diameter of the roller/pulley at the specified point.

- Right-click a point and select **New>Linear Speed Schedule Entry**. The tachometer assigned to this point is displayed in the top field. Click the **Browse** (...) button to assign a Ranger Station and Tach to the schedule entry if the 'RPM from Tachometer' field is blank.

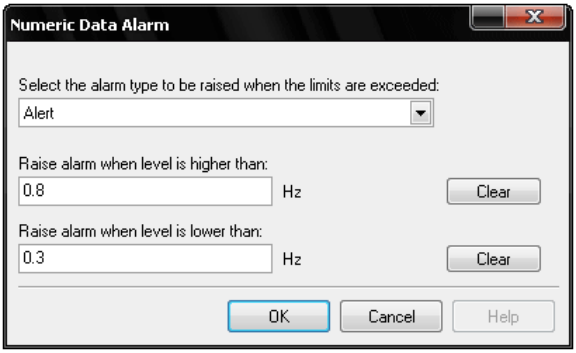


- Click the second ... button and enter the diameter of the roller/pulley at this point in the Point Editor. The tachometer multiplier value will normally be 1, indicating that the roller is turning at the same speed as the shaft measured by the tachometer.

- Click **OK** twice to close both windows.

Creating/Editing Alarms for Numeric Data

- Right-click a numeric data schedule entry and select **New>Numeric Data Alarm**.



- Select the type of alarm that will be raised using the dropdown box.
- Enter the upper and lower threshold values for this alarm. Alternatively you can just specify one and leave the other blank.

  The values you enter will be measured in the default units for your sensor type e.g. for a tach schedule entry the units will be in RPM. For an average value schedule entry, such as temperature, the units will be whatever default you have specified under **Options>Unit Preferences**.
- Click **OK** when you are finished.

Editing numeric data alarms

- In the navigator list, right-click the alarm and select **Edit**. You may need to select the schedule entry in the navigator first in order to display its alarms in the navigator list.

Criteria and Conditional Monitoring

Note: Creating criteria is optional. Once your monitoring program is operational you can add criteria at a later stage to fine-tune the data collection cycle to more closely monitor particular conditions of interest.

You may sometimes want to collect recordings only when a machine is running in a particular operating mode, for example when it is running at a particular linear speed. You can control when recordings are collected using *Criteria*.

Criteria define a condition that must be met before a recording is taken. An example of a condition is 'the machine must be running'. If this condition is met the Ranger sensor device will take a recording; if the machine is switched off no recording is taken.

To determine whether a condition is met or not you will need to set up a numeric data schedule entry to measure a particular output such as linear speed, temperature or machine running speed. These numeric data schedule entries return a single value which is then matched against whatever criterion (condition) you specify.

Criteria are set up as a three stage process:

1. First create a numeric data schedule entry to measure a particular output such as machine running speed (see Creating Numeric Data Schedule Entries on page 73 for instructions).

2. Second, create a criterion that specifies a condition, such as a small range of running speeds that an RPM must fall between. The numeric data schedule entry will be used to determine whether this condition is met.

3. Third, assign this criterion to as many schedule entries as you wish. When the numeric data measurement is taken its value will be compared with your criterion to see if the condition has been met. If the condition has been met then a regular recording (vibration, current, temperature etc) will now be taken.

Validity Period and Retry Interval

To create criteria you first need to create a numeric data schedule entry and specify a range of values that a measurement must fall between. Then you can optionally specify how long a criteria measurement is valid for after it has been taken and also instruct the Ranger sensor to take a criterion measurement again (after a set amount of time) if the criterion is not met on the first attempt.

Specifying *Validity Periods* allows you to reduce unnecessary recordings because you won't have to take a criterion measurement over and over again to determine if a machine is still in the same operating mode. The validity period of a criteria measurement specifies a time period that the measurement is valid for. For example, a schedule entry has a criterion assigned to it with a validity period of 5 minutes. When the criteria measurement is taken its value is recorded and held for 5 minutes. Within this time period another schedule entry that uses the same criterion is due to be taken. The OnlineManager program first checks to see if the validity period on the original criterion has expired: if it has, the criteria measurement will be re-taken for the next schedule entry; if it has not expired then the OnlineManager program will re-use the original criteria measurement to determine if the next schedule entry will be recorded.

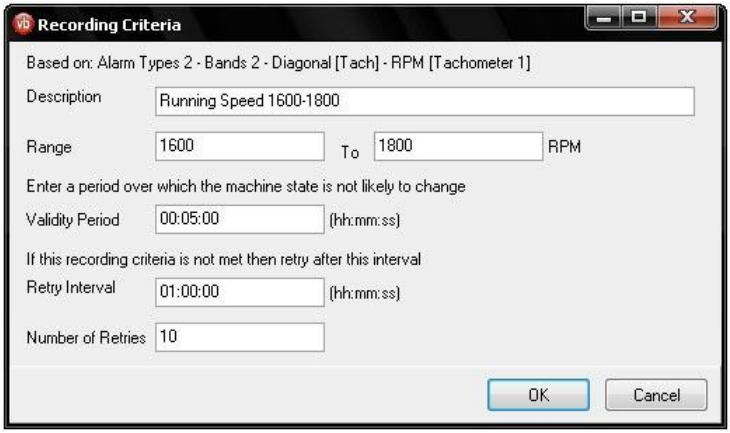
You should set the validity period according to how often the machine changes state/speed. For example, paper machines tend to run at the same speed for many hours, so the validity period can be set to several minutes with minimal risk that the value is out of date.

The other optional settings you can specify for a criteria measurement are the *Retry Interval* and *Number of Retries***.** The retry interval and number of retries will be of most use for machines whose operating mode changes often or for machines that run intermittently. When the OnlineManager program tries to take a schedule entry that has a criterion assigned to it, the criteria measurement is taken first to see if the value falls within the required range. If the value does not fall within the required range the measurement is taken again after a timeout equal to the retry interval. The retry process repeats for the number of retries you have specified *OR* until the criteria is within range.

For example, a criterion is created with a retry interval of 1 hour and number of retries set to 3. The first time the criterion is evaluated its value is outside the specified range (so the schedule entry it is assigned to is not recorded). One hour later the first retry is taken - this also fails. After another hour the criterion is re-taken again (and fails). The third and final retry is taken an hour later - its value determines if the associated schedule entry is recorded or not. If any of the retries had succeeded in meeting the criteria range then the schedule entry would have been recorded and any further retries would have been cancelled.

Creating Criteria

- To create criteria, first create some numeric data schedule entries at your chosen machine locations.
- In the Online Device Setup Wizard click the **Intervals and Criteria** button (beside step 4). If the Wizard is closed open it by selecting **Edit>Online Device Setup** from the main menu.
- In the Online Schedule Entry Configuration window, locate the numeric data schedule entry that will be used to create this criterion then click this row to highlight this entry.
- From the menu select **Options>Use as Criteria**. This opens the Recording Criteria window



- Give this criterion a meaningful description that describes its purpose, such as the machine/point it applies to, what it is measuring and the range of values it encompasses. This will make it easier to identify later if you create a large list of criteria.
- Enter a range of values that a measurement must fall between to meet this criterion. You may specify negative numbers and non-integer values such as 1.8.
- If required, enter a validity period for this criterion. This can be specified in hours, minutes or seconds.
- If required, enter a retry interval and the number of retries to carry out.
- Click **OK** to close this window.

Discarding criteria measurements
Because criteria measurements are only used to determine if a recording should be taken, these measurements are automatically discarded after use rather than being stored. This is done to reduce the potential size of your database. However, you can choose to keep criteria measurements if you wish to do so (see Discarding Recordings Automatically on page 115 for more information).

Assigning Criteria

Once criteria have been created they can be used at any location on a machine. For example, you might have a tachometer attached to a machine to take running speed measurements. You can create a single tach schedule entry with one criterion (running speed must be between values x and y) then assign this criterion to every location on your machine so that the Ranger device will only take recordings if the machine is switched on.

- To assign criteria, select a machine in the navigator that you want to apply this criteria to. (If you have closed the Wizard, from the main menu select **Edit>Online Device Setup** then click a Ranger Station or Ranger sensor device to select it and click the **Intervals and Criteria** button (beside step 4).

- In the Online Schedule Entry Configuration window, select a location to apply the criteria to then use the 'Criteria' drop-down boxes to assign criteria to one or more parameter sets (you can use the 'copy and paste' method here to paste the same criterion to multiple parameter sets). If you have not created any criteria the drop-down boxes will be empty.

- When you've finished assigning criteria click **OK** then click **Close** to close both this window and the Wizard.

Criteria measurements taken with one Ranger sensor can even be used to control recordings on other Ranger sensors. For example this may be appropriate on a paper machine that measures linear speed at just one location but uses ten or more Ranger sensors to monitor all points of interest. The criteria's validity period should be reasonably long in such a situation (≥ 5 minutes) otherwise the Ranger device which measures speed will spend all its time performing this task in response to criteria requests from the other Ranger devices.

Variable Speed Machines

When a machine has multiple operating modes, for example variable operating speeds, this can present problems when trying to trend data, compare data or set alarm levels. Vibration amplitudes fluctuate depending on the operating mode of the machine, perhaps giving the appearance of a fault where none exists. Alarms that cover peaks such as running speed will no longer be valid if the running speed changes significantly.

You cannot compare data taken on a machine running at 1800 RPM with measurements taken on the same machine running at 3600 RPM. Also, how will you know when the machine is operating in one mode or another?

The solution is to instruct the Ranger device to take measurements only if the machine is in one or more specific operating modes, and to keep the recordings from each mode separate.

Example:
A user wants to monitor a machine that usually operates in one of two modes - near 1800 RPM or near 3600 RPM. The user sets up two schedule entries at the same measurement location, each with its own parameter set and alarms. One schedule entry will be recorded only if the RPM falls within the criteria range 1700-1900 RPM while the other will be recorded if the RPM falls within the criteria range 3400-3800 RPM. (Note that these two criteria are created from a single tach schedule entry.)

When the OnlineManager program tries to take the first recording it sees that this schedule entry can only be taken when a specific criterion is met. To determine whether the criterion is met the program instructs the Ranger Station to take a tachometer reading. The OnlineManager program finds that the criterion is met (the machine is running at 1786 RPM) so the first schedule entry is now recorded.

The program then moves to the second schedule entry and sees that this also has a criterion assigned to it. The program re-checks the RPM criteria, which fails as the RPM does not fall within the specified range (the machine is still running at 1786 RPM). The second schedule entry is ignored.

The 1800 RPM and 3600 RPM recordings will be kept separate in the navigator, each stored under its own schedule entry.

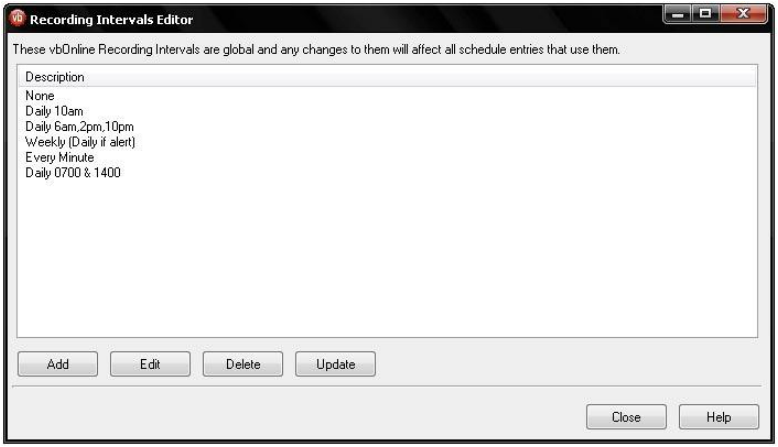
Editing Recording Intervals and Criteria

Recording intervals and criteria are not location-specific so they can be assigned to any machine; therefore, any changes in a recording interval or criterion will affect all machines that use it. If you want to change only one instance of a recording interval or criterion you will need to create a new one and re-assign this to your chosen location(s).

Whenever you need to change any part of a Ranger station or Ranger sensor setup, open the Wizard and click the appropriate numbered step button.

- To re-open the Wizard select **Edit>Online Device Setup** or press **CTRL-ALT-S** on your keyboard

- Click the **Intervals and Criteria** button (beside step 4) then select any machine in the navigator if the window is empty.
- From the Options menu in this window select **Options>Edit Recording Intervals** (or **Edit Recording Criteria**). The Recording Intervals Editor is displayed below (both Editors are similar).



- In the Editor, select the item you wish to change then click **Edit** (if you are editing a recording interval another window will open - select a recording interval and click **Edit** again).
- Make your changes then click **OK** to close the window.

If you are editing a recording interval click **OK** twice to close both windows. Now click **Update**. This will update the 'next measurement due' date for any recordings that use this interval.

- Click **Close**, **Save** then **Close** to close the Wizard.

Dynamic Criteria

Dynamic criteria are used to take measurements from machinery that operates intermittently or which does not maintain a steady state for long. For example, a moving crane that only runs for 15 seconds at a time. The use of dynamic criteria ensures that recordings are only taken during a period of stable operating conditions.

Measurement triggering can be either running speed based or derived from an average value (process variable) measurement e.g. the flow rate obtained from a DCS output signal. You can configure triggering so that either one or both of the speed and average value have to be within specified ranges.

Example:

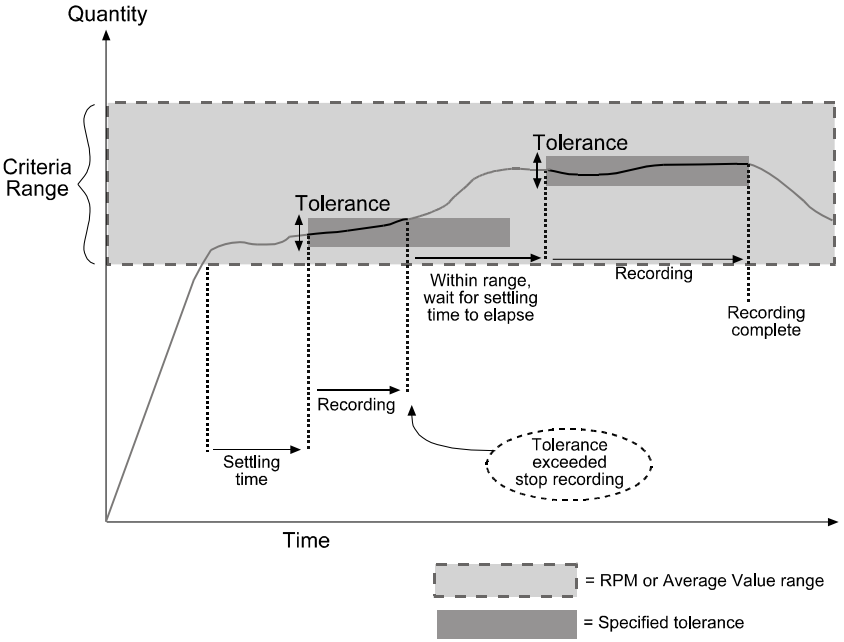
1. The onboard criteria is set up to trigger a recording when a machine's running speed falls within the 1000 to 1200 RPM range and its flow rate falls within the 80 to 100 liters per second range.

2. After recording has begun the Ranger Station device continually checks the speed and flow rate to see if they are staying steady, relative to a user-specified 5% tolerance value for the RPM and 5 L/s tolerance for the flow rate.

3. In this example the running speed stays relatively steady but the flow rate varies by more than the specified tolerance - the measurement is aborted.

4. The Ranger Station device re-checks the machine's speed and flow rate and finds that they are still within the desired ranges. The Ranger recording is triggered again. The tolerances are re-positioned within the ranges to take into account this new recording's initial RPM/flow rate.

5. This triggering/checking/aborting process continues until the recording is successfully taken or until a user-specified time limit is reached.



Triggering the recording process

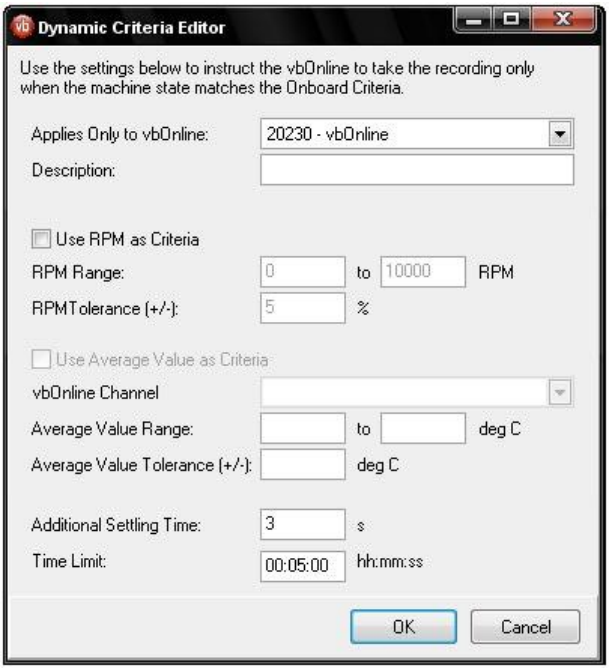
Notes

Onboard criteria can be applied to frequency and time recordings. The triggering criteria can be derived from a tachometer or any DC average value reading onboard the Ranger Station (or both of these).

- To set up onboard recording criteria open the Online Device Setup Wizard and click the button for step 4.

  Dynamic criteria are listed beside your regular criteria and you can apply both to the same schedule entry as they are not mutually exclusive.

- Select **Options>Edit Dynamic Criteria** then click **Add**. Recordings will be triggered when a machine's state matches your settings.



- Select which Ranger device these criteria will be associated with. Dynamic recording criteria are specific to a single Ranger device so they can't be used to trigger recordings on another Ranger device.

- Enter a descriptive name for these criteria and choose whether to use the machine's running speed or some other process variable as the triggering mechanism. You can use both if you prefer.

  - To use the RPM criteria tick the RPM box - the associated fields will become editable. Specify an upper and lower limit for the RPM. When the running speed is within this range, recording will begin as soon as the settling time has elapsed.

- Enter a percentage value for the RPM Tolerance. The tolerance specifies a permissible amount of variation from the measurement's starting RPM. The default is 5% on either side of the initial RPM value. If the RPM varies by more than 5% of its starting value the recording will be aborted and re-started when the RPM next enters the RPM range.

- To use the Average value as your criteria tick the corresponding box.
  - Choose which sensor and axis will be used to trigger the recording.
  - Set the range and tolerance as before, but note that this tolerance is an *absolute* value rather than a percentage.
- Now specify an additional settling time and a time limit for taking the recording. The additional settling time is used to allow a machine's speed or other process variable to settle into a steady state before the actual recording begins. The time limit simply states how long you want the Ranger to continue attempting to take a recording if it is not successful on the first attempt.
- Click **OK** to then **Close** to return to the Online Schedule Entry Configuration window.
- To apply dynamic criteria, select them from the drop-down box. Dynamic recording criteria are specific to a single Ranger device, therefore the 'Dynamic Criteria' drop-down boxes will only display criteria that can be applied to your selected schedule entry.

When Should I Use Dynamic Criteria Rather Than Initial Criteria?

Dynamic criteria are ideal for machines that vary in speed often. Use dynamic criteria when you need to ensure that recordings are taken during a period of stable operating conditions.

Note: With dynamic criteria no other recordings can be taken until the current recording has either finished or timed out. This is because the Ranger device is busy checking if the criteria are within range. You should *not* use dynamic criteria if it is essential to monitor all channels frequently.

Initial criteria are ideal for machines that run at the same speed for long periods. Use initial criteria when frequency of monitoring is important.

Editing Dynamic Criteria

- To re-open the Wizard, select **Edit>Online Device Setup**.
- Click the **Intervals and Criteria** button (beside step 4) then select one of the following editing options:

1. To view the criteria for a specific Ranger device, locate a machine that has been assigned to that device then click the 'Dynamic Criteria' drop-down box and select the three dots.
2. To view the complete list of dynamic recording criteria for every Ranger device, from the menu select **Options>Edit Dynamic Recording Criteria**.

- In the Editor, select the criterion you wish to change then click **Edit**.
- Make your changes then click **Close** to close the window.
- Click **OK** then **Close** to close the Wizard.

Wake on High Vibration (WoHV)

The 'Wake on High Vibration' (WoHV) feature instructs Ranger sensors to 'wake' from their normal sleep states (in the interval between regularly scheduled measurements) if and when vibration states exceeding specified user-selectable levels are detected. Triggering of the WoHV feature will prompt a sensor to send a continuous stream of measurement data back to its parent Ranger Station and on to the Ascent database via the OnlineManager software.

WoHV parameters are configured via the Ascent software's Dynamic Criteria feature. WoHV dynamic criteria entries can only be assigned to vibration measurements, not to tachometer or temperature readings.

At least one schedule entry in the navigator **must** be configured to take measurements at regular intervals when using the WoHV feature (see Editing Recording Intervals and Criteria (page 81)). This may be the schedule entry assigned to the WoHV feature, or a separate waveform measurement. When the WoHV feature is triggered, subsequent recordings allow the OnlineManager software to determine whether vibration levels have fallen below the trigger threshold. If this occurs, the WoHV feature will be reset and 're-arm' allowing polling for excessive vibration levels to re-start. If no further measurements are taken, as would occur if the WoHV feature were to be configured but no associated interval specified, the WoHV mode could not be reset and would remain 'set' (active).

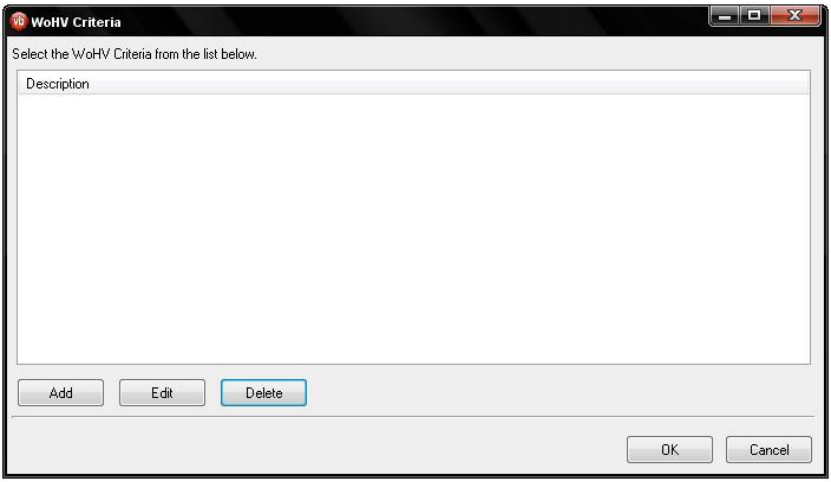
Create a WoHV Criterion

- Select a previously generated waveform schedule entry from the navigator list, or generate a new waveform schedule entry. This is the schedule entry that the WoHV criteria will be applied to.

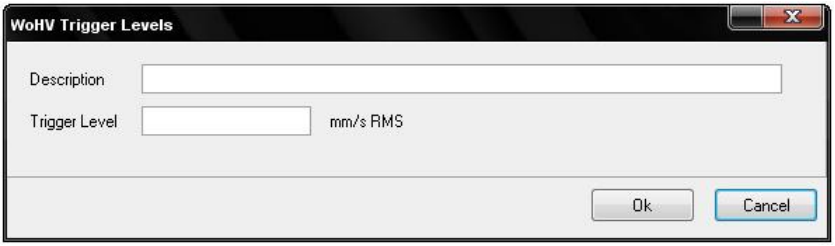
- Open the Online Device Setup Wizard by selecting **Edit>Online Device Setup** or by pressing **CTRL-ALT-S** on your keyboard.

- Select the Ranger sensor device you wish to assign the WoHV criteria to and click the **Intervals and Criteria** button. The Online Schedule Entry Configuration panel will open.

- Open the **Dynamic Criteria** dropdown list and click the three dotted lines ('**...**') to open the WoHV Criteria panel.



- Click the **Add** button. The WoHV Trigger Levels window will open.



- Type a description for the WoHV criteria into the **Description** text field. You may wish to use the name of the equipment being monitored.

- Type a vibration level into the **Trigger Level** text field. Any vibrations above this level will trigger the WoHV criteria.

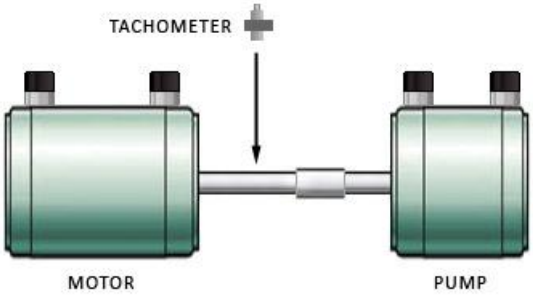
- Click **OK** twice to close the WoHV Trigger Levels and the WoHV Criteria panels. The new WoHV criteria will be assigned to the measurement and displayed in the Dynamic Criteria column. The new WoHV Dynamic Criteria entry will be activated when the OnlineManager is next used.

Edit a WoHV Criterion

- Open the Online Device Setup Wizard by selecting **Edit>Online Device Setup** or by pressing **CTRL-ALT-S** on your keyboard.
- Select the Ranger sensor device you wish to assign the WoHV criteria to and click the **Intervals and Criteria** button. The Online Schedule Entry Configuration panel will open.
- Open the **Dynamic Criteria** dropdown list and click the three dotted lines ('**...**') to open the WoHV Criteria panel.
- Select the existing WoHV criterion from the list of those available and click the **Edit** button. The WoHV Trigger Levels window will open.
- Edit the name or trigger level of the WoHV entry, then click **OK**. Click **OK** again to close the WoHV Criteria panel.

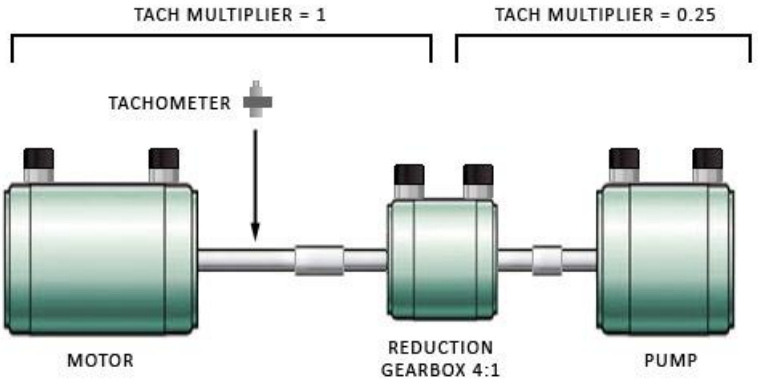
Configuring Tachometers/Speed Sensors

For a typical, basic machine comprising a motor, a coupling and a driven device such as a pump, a single speed sensor will typically be installed. The many vibration sensors on the machine can all obtain the RPM from this one speed sensor.



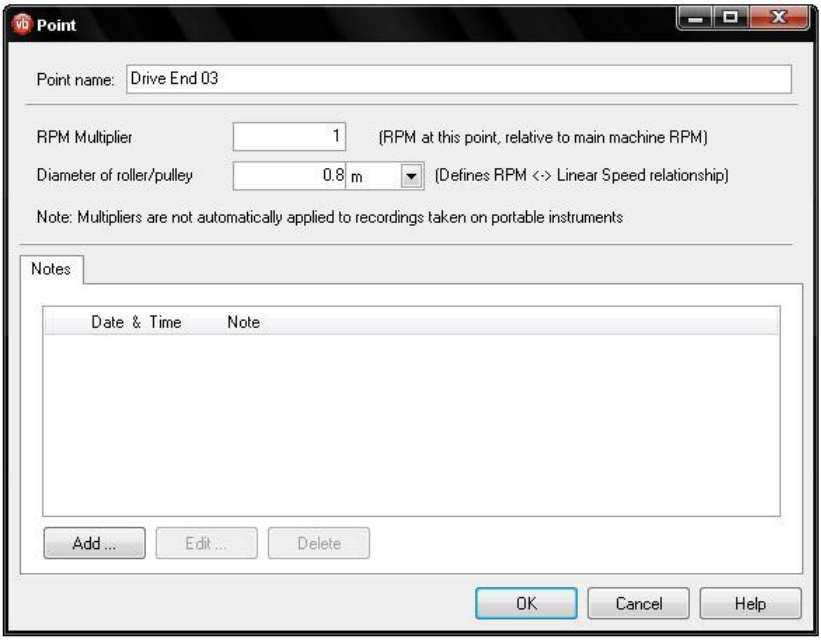
Basic machine with speed sensor

The Ascent program also caters for situations where the machine includes a gearbox or other fixed ratio drive such as a belt or chain. The two (or more) shafts in the machine will be turning at different speeds, but these speeds are all related to each other. As with the basic machine configuration, only one speed sensor is required; however, you must tell the software how fast each shaft is turning compared to the shaft where the speed sensor is located. This ratio is called the 'Tach multiplier' and is assigned to specific **points** on the machine. The tachometer reading is then multiplied by the point's tach multiplier value to determine the true running speed for individual shafts (the default tach multiplier value is 1).



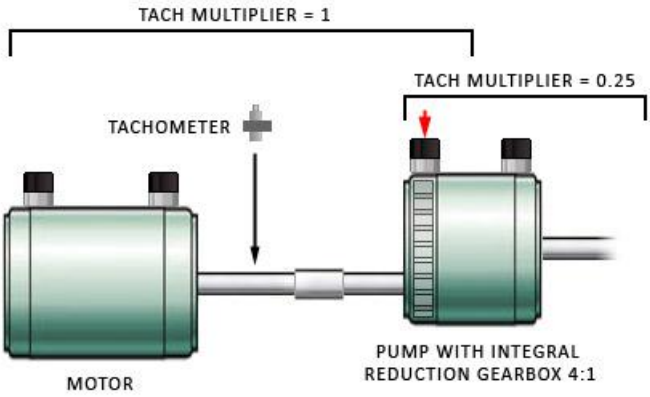
Fixed-ratio-drive machine

- To add a tach multiplier value to an existing point, right-click the point in the navigator and select **Edit**.



- Enter a tachometer multiplier value. The RPM generated by the tachometer will be multiplied by this value to calculate the true running speed of this shaft.
- Click **OK** when you are done.

The Ascent program also provides for the situation where a single *vibration* sensor is used to monitor two shafts turning at different speeds. A common example is on a gearbox as shown in the next diagram. The arrow indicates the best available location for measuring *both* the input shaft and the low speed shaft from the gearbox.



Single vibration sensor monitoring two shafts

To set up measurements for this situation it will be necessary to define *two points* (and two measurement locations with appropriate schedule entries and alarms) that represent the same physical location on the machine e.g.

Sludge Pump - Pump DE Input - Vertical
Sludge Pump - Pump DE LSS - Vertical

The schedule entries at both locations should be configured to use the same Ranger device and speed sensor. The only difference between the two locations is that the Pump DE LSS (low speed shaft) point should have its tach multiplier set to 0.25 instead of the default 1.

Linear Speed Machines

The rollers in a linear speed machine, such as a paper machine, will turn at different speeds due to their different diameters, but these speeds are all relative to the linear speed of the paper. To allow the software to calculate the correct RPM for each roll you must enter the tach multiplier at each point as the ratio of:

<roller diameter at tach sensor> / <roller diameter at point>

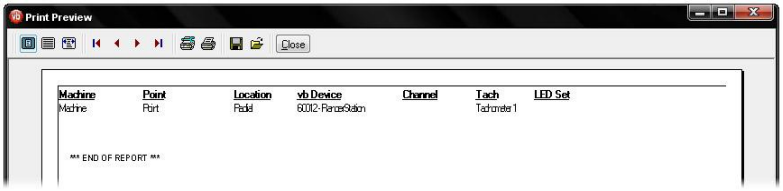
Example:
The tachometer is installed on a 1 m roll. A point with a 0.25 m roll will require a tach multiplier = 1 / 0.25 = 4.

Paper machines will usually have more than 32 points that require monitoring so you are likely to use several Ranger Station devices. Generally only one tachometer is needed for an entire machine, so you can either install a tachometer on a roll near each Ranger Station device or you can use a single tachometer to drive several devices. Wiring for this latter setup is described in Connecting Tachometer Inputs (page 27).

Creating a Structure Report

As you set up your Ranger system you can create structure reports that detail the system's physical connections (which tachometers and Ranger sensors are assigned to each location), and its measurement scheduling system (what recording intervals and criteria have been assigned). These reports can be produced as hard copy references that can then be used to set up other machines in identical fashion. If a machine is disassembled and sent away for maintenance these reports can be used to quickly put everything back the way it was.

Each of the numbered step buttons on the Online Device Setup Wizard will open a specific configuration window. These configuration windows are used to generate the reports. The following image shows a preview of an online channel configuration report.



- To create a report detailing the setup of a single machine, select that machine in the navigator then select **Edit>Online Device Setup**. (To select all machines in a folder select the folder icon at the top of the navigator)

- Click a numbered step button to display a part of your system structure e.g. click **Channels, Tachs, LEDs** to display which channels, tachometers and LEDs are connected to a particular machine.

- Right-click anywhere in the displayed window and select **Preview**, **Print** or **Export**.

Preview displays the report on-screen without printing it. After previewing, click the printer icon at the top of this window to print the report.

Print sends the displayed report directly to the printer.

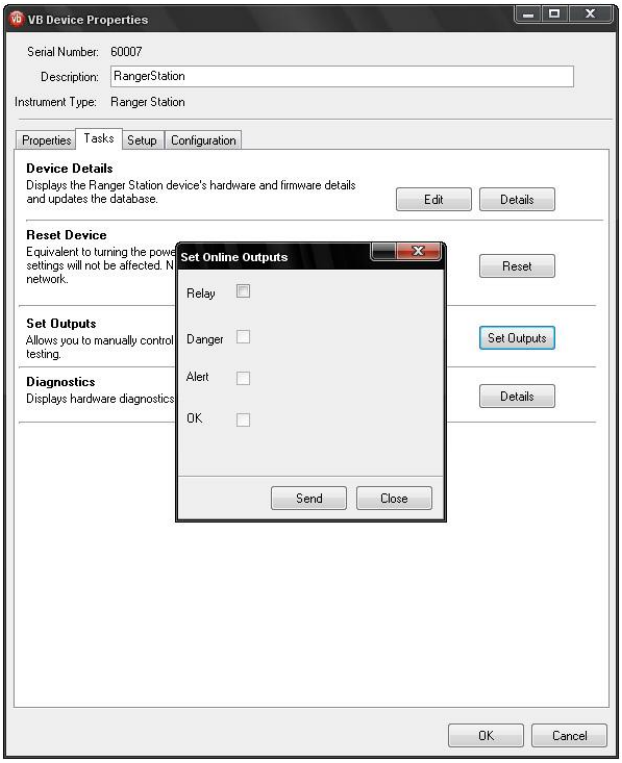
Export creates a CSV file that can be e-mailed off site and opened on another PC using a spreadsheet program such as Excel.

Section 4: Testing Your System

Testing the Relay

You can test the Ranger Station's relay LED (and whatever is connected to the relays) by manually activating it as follows:

- Open the Online Device Setup Wizard by selecting **Edit>Online Device Setup** from the Ascent software's main menu, or by pressing **CTRL-ALT-S** on your keyboard.
- Select a Ranger Station device to test and click **Edit**.
- Click the **Tasks** tab then click **Set Outputs**.



- Tick the **Relay** checkbox then click **Send**. A message will display telling you that the output has been successfully set (check the relay now - see note at end of topic).

- Untick the **Relay** checkbox when finished and click **Send**, then **Close**, **OK** then **Close** to close the Wizard.

Note: This test requires a visual inspection of the instrument LED. You must determine the most efficient means of checking each device. To save time you may wish to activate relays from the Ascent software's host computer while a second person checks each Ranger Station device in the field, reporting the results via cell phone or radio. Alternatively, one person could walk around the plant with a laptop (containing the Ascent software) and an Ethernet Crossover cable. This person could connect the laptop to each Ranger Station device in turn (see Make a Direct Connection via Crossover Cable (page 44)) to activate the relay then view the results.

Taking Recordings Manually

Once Ascent/Ranger communications have been set up and the Ascent software knows which schedule entries are to be recorded on which Ranger sensors and Ranger Station devices, you can test the system.

Right-click a schedule entry in the navigator and select **Online Devices>Record Now!.** Alternatively, select a schedule entry and press **CTRL-ALT-R** on your keyboard.

The Ranger sensor or Ranger Station will take the measurement (this may take a short time as the sensor settles, various communication transactions take place etc). Any recording interval or criteria associated with this schedule entry will be bypassed. The recording will automatically appear in the lower navigator window when the measurement is complete.

Problems?
If you have not assigned a Ranger device to a schedule entry you will not be able to take a recording. The Online Channel Configuration window will open automatically to allow you to assign these now.

If you attempt to take a recording when the Ranger device is actively measuring you will get an error message stating that the device is not currently ready. This is likely to occur if the OnlineManager program is running or if another user is also trying to take a recording manually. You may need to stop the OnlineManager program (see Stopping the OnlineManager on page 106).

Testing Ranger Sensor Connections

You can perform a quick, functional check of each Ranger sensor by using the technique described in Taking Recordings Manually (page 97). However, we recommend that you perform a more thorough, one-off, post-installation test to ensure that each sensor is working as expected and is connected correctly. This test requires two people and a convenient form of communication, such as radios.

One person gently taps each sensor in turn while the other takes recordings manually on each sensor, looking for signal spikes caused by the tapping. The person taking the recordings then reports the result back via the radio and the test repeats with the next sensor.

The tapping will appear as periodic spikes in a time waveform recording. The time waveform schedule entry used for the test can be copied and pasted into each measurement location in the Ascent software then deleted once testing is complete.

- Create a list of machines and their measurement locations to aid coordination between the two people. A machine list can be quickly created in the Online Device Setup Wizard using the Export function (see Creating a Structure Report on page 94).

- Create a time waveform schedule using the Ascent software. The number of samples and duration must be sufficient to capture the transient tapping signal e.g. 1024 samples, 2000 ms duration.

- Copy and paste this schedule entry to each machine location. A single schedule entry can be pasted to every location simultaneously - see sub-heading Copying to multiple locations, at the end of this topic.

- Now send one person to the factory floor to perform the tapping. Test each sensor in turn by right-clicking a schedule entry and selecting **Online Devices>Record Now!**. This procedure must be carefully synchronized to ensure you capture the signal spikes.

- Continue until it has been verified that every sensor responds appropriately to the applied signal.

Problems?
If a sensor does not respond correctly check the following:

- Is the sensor communicating with the Ranger Station device? (Out of range? Battery low? Sensor not properly mounted?)
- Is the sensor assigned correctly in the Ascent software?

Copying to multiple locations

- Right-click the schedule entry and select **Copy Branch to Clipboard**.

- Right-click the top-level folder to select every machine in the folder then select **Paste**. (To selectively choose individual machines, select each machine in turn rather than the whole folder.)

- The Ascent program will offer to paste the item to *all* the appropriate places that exist below the item you have selected. Click **Yes** to confirm.

Adjusting the Connection Speed Settings

Note: You will only need to adjust the Ascent/Ranger Station connection speed settings if you have difficulty communicating with your Ranger Station device. Before altering the connection speed settings, you should first check that:

- the device is powered on
- the green 'Status' LED is flashing
- the Ethernet cable is plugged securely into the Ranger Station (if using a wired connection)

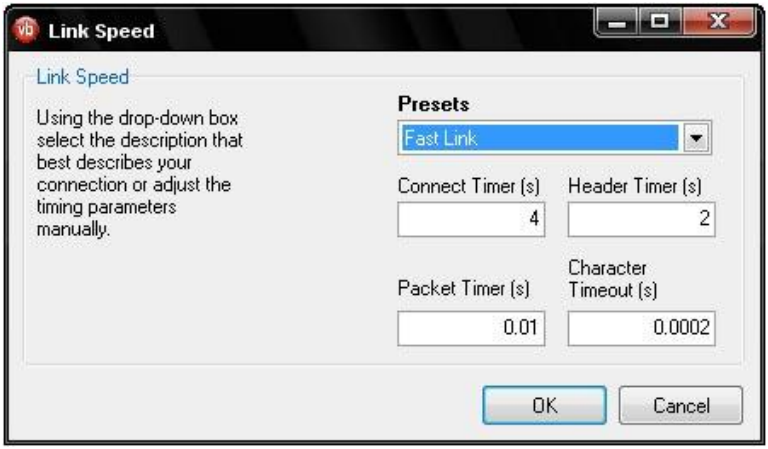
- the Ascent/Ranger link works with other Ranger devices
- the correct Ranger Station IP address is being used (and no other network devices have been assigned the same IP address)
- the correct Ranger Station or Ranger sensor is assigned to any schedule entries you are trying to record

The connection speed of your online system will depend on the type of physical setup being used (LAN or wireless connection). The connection speed selected in the Ascent software must match the *actual* connection speed of your system in order for the Ranger components and Ascent software to communicate.

If you are experiencing difficulties connecting to a Ranger device you can adjust the default settings, which are set to the most common connection type (slow connection speed for wireless, fast connection for wired).

Note: Changing the connection speed settings within the software will **not** alter the physical connection speed of your system - connection speed settings are only used to *describe* the speed of your existing connection.

- From the main menu select **Edit>Online Device Setup**.
- Select the Ranger device whose speed settings you wish to alter and click **Edit**.
- Click the **Setup** tab then click **Link Speed**.



- From the 'Presets' drop-down box, select the description that best describes your system's connection speed. Use the following table as a guide:

Type of Connection	Suggested Connection Speed
LAN/wired	Fast Link or Medium Link
Wireless	Slow Link
Other	Custom Configuration

Select 'Custom Configuration' only if you cannot establish a connection using any of the defaults. You will need to manually adjust the other connection timing parameters in this window. This task should be carried out with the supervision of the network administrator.

Section 5: Taking Recordings - OnlineManager

The OnlineManager program is responsible for reading the recording intervals you set up and instructing the Ranger device(s) to take the recordings.

You can also take measurements manually (without a recording interval) at any time. See Taking Recordings Manually (page 97) for more information.

Managing Many Ranger Devices

When you have more than one Ranger device the OnlineManager program communicates with each device in turn, instructing it to take recordings. As each device receives its instructions it will begin the recording process immediately. This means that multiple devices can collect data at the same time.

The process of retrieving and saving recordings to the database takes a few seconds to carry out, thus if you have many Ranger devices this could potentially slow down the rate at which recordings are taken. To speed up the data collection process you can run several instances of the OnlineManager program with each one managing its own Ascent database and Ranger devices.

There are some important points to bear in mind with this approach:

1. You cannot run several instances of the OnlineManager program on the same computer. Each instance must be installed on a separate PC.
2. The OnlineManager programs must each work with their own database (they cannot share the same Ascent database).
3. You can have more than one Ascent database on a PC.

Example configuration:
You have 3 large paper machines with 300 or more points on each machine.

- Assign as many Ranger devices to the 3 machines as needed.
- Create 3 databases, one for each machine.
- Install 3 OnlineManager programs on separate computers to manage each group of Ranger devices (Ranger Station parents and Ranger sensor children). Each OnlineManager program will read and write data to one of the 3 Ascent databases.

You can even split parts of a machine across several databases if the number of recordings to be taken is expected to slow the collection time considerably e.g. create separate databases for the machine's drive end and non-drive end. This setup will require you to open each database in turn (if they are all stored on one PC) to view the separate sections of the same machine.

Using Auto Save

We recommend that you use Auto Save when the OnlineManager and Ascent programs are running at the same time. Auto Save automatically saves changes as they are made, thereby preventing deadlocks caused by more than one person or process trying to update an Ascent database at the same time.

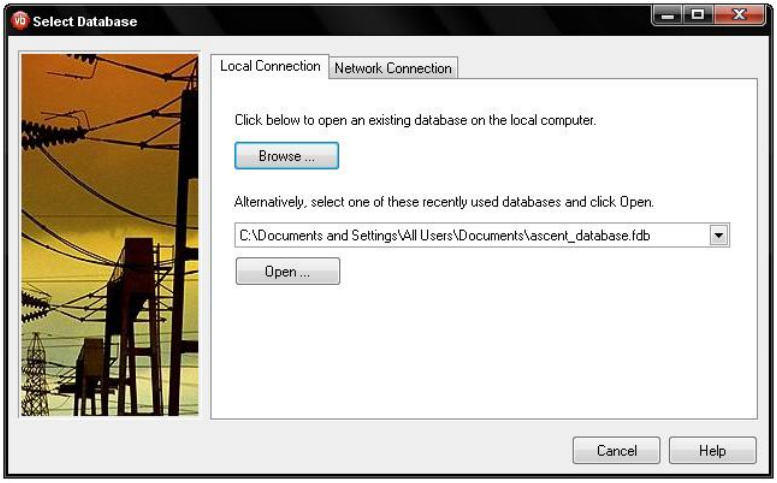
- Auto Save is turned on by default. To toggle this feature on/off, from the Ascent software's main menu select **Options>Auto Save**.

Note: Turning on Auto Save will disable the Ascent program's Undo\Revert function i.e. if you mistakenly delete an item you will need to manually re-create it. For this reason we recommend turning *off* Auto Save it you are deleting large numbers of items.

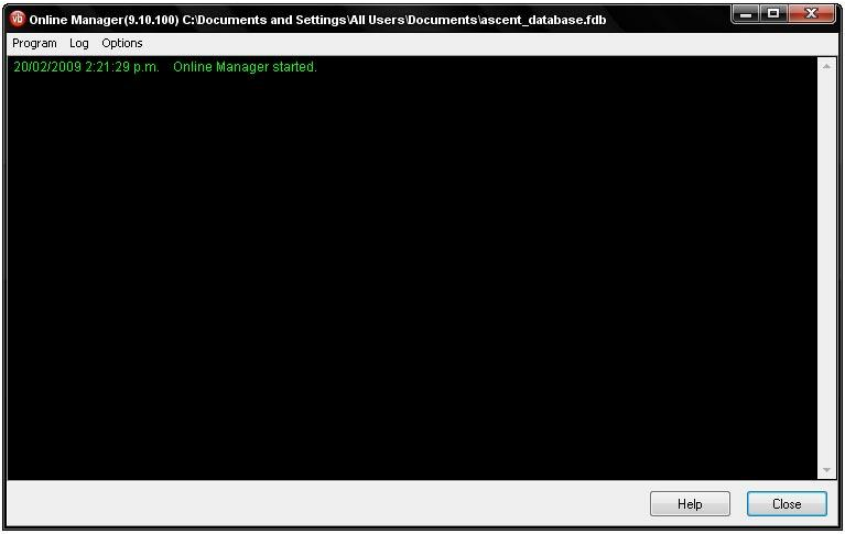
Using the OnlineManager Software

- To run the OnlineManager program use the Windows Start menu (**Start>All Programs>Commtest>Ascent>OnlineManager**).

- The first time you run the program the Select Database window will appear. Select the database to monitor from the drop-down menu then click **Open**. (You will be automatically connected to this database when you run the program from now on.)



- After a few seconds the OnlineManager window will appear. To begin taking automated measurements select **Program>Start** from the menu.



The program writes the transactions to the screen as they occur. Verbose mode lists each step in the measurement process and is displayed by default. If verbose mode is switched off the display will list only the start and finish of each recording.

- To de-activate verbose mode, from the menu choose **Options>Verbose Mode**. To re-activate verbose mode repeat the process.

Measurements are added to the database as they are recorded. Any users who are currently using the Ascent software will see a **Refresh** button appear on their toolbar. When this button is pressed, that user's view of the database will be updated and the new recordings will appear in the navigator.

Starting Recording Automatically

You can configure the OnlineManager program to begin automatically taking recordings at program startup.

- Select **Options>Configure**.
- Tick the **Run on start up** box.

Stopping the OnlineManager

Note: If the OnlineManager program is running on a remote PC you will need to ask the person in charge of that computer to carry out this procedure for you.

- To temporarily halt recording, from the menu select **Program>Stop now!**. This halts measurement collection without closing the OnlineManager program.
- To re-start automated recordings select **Program>Start**.
- To close the program completely click **Close**. No more recordings will be taken until the OnlineManager program is re-opened and **Program>Start** is selected.

The option **Stop now!** instructs the OnlineManager program to stop taking recordings immediately. The current recording(s) will be aborted and no alarms will be checked. If you select **Stop now!** when the program is actively communicating with a Ranger device you may need to reset that device.

Selecting a Different Database

The OnlineManager program can take recordings from one database at a time.

- To select a different database, from the menu select **Options>Change Database** then choose another database from the drop-down box and click **Open**.

The last database you viewed will be selected by default the next time you run the program.

Resetting Relays Following a Machine Shutdown

Before resetting a relay you will need to diagnose and fix the problem that caused it to trigger. Once the problem has been fixed follow the procedure below to re-start your machine.

- In the Ascent program right-click the affected machine and select **Online Devices>Manual Relay Configuration**.

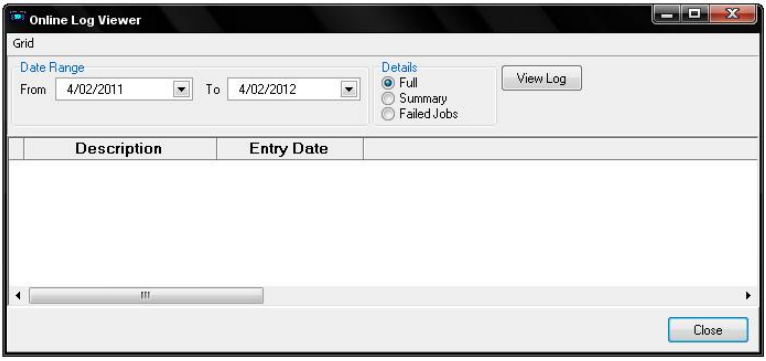
- Change the Mode to **Manual (Open)** or **Manual (Closed)** as required to manually bypass the relay and click **Apply**. If the machine was shut down as a result of the triggered relay you can now re-start the machine.
- Once you have established that the problem has been eliminated you can change the Mode setting to **Active**. Right-click the affected machine and select **Online Device>Manual Relay Configuration**
- Select the **Active** Mode to re-enable the relay.
- Click **Apply** then **Close** to finish.

Logging the Measuring Process

The online log lists all the actions taken by the OnlineManager program, providing a history of transactions that occurred while the system was unattended.

You can use the online log to view all transactions, show a basic summary of the recording jobs or display just those jobs that failed. All this can be done over a specified data range.

- If the OnlineManager program is not yet running, start this application now (see previous topic for instructions) then select a database to view.
- From the menu select **Log>View**.



- In the 'Details' section of the form, select which transactions you would like to see (Full, Summary or Failed Jobs).
- Click **View Log** to perform the search and list the results.
- When you have finished viewing the log results click **Close**.

Choosing a date range

- Type your chosen date range directly into the 'From' and 'To' boxes or use the calendar as described below.
- Click the 'From' drop-down box to open the date selection calendar.

- Use the ◂ and ▸ buttons to change the month/year.
- Click one of the numbered days to select it.
- Repeat the date selection process for the 'To' drop-down.

Tip: To return the 'From' and 'To' fields to today's date, click Today: at the bottom of the calendar.

Printing the Log

- From the menu select **Log>View** and select which transactions you would like to see (Full, Summary etc) and the date range.
- Click **View Log** to perform the search and list the results.
- From the menu select **Grid** or right-click within the window and select **Preview, Print** or **Export**.

Preview displays the log on-screen without printing it. After previewing, click the printer icon at the top of this window to print the report.

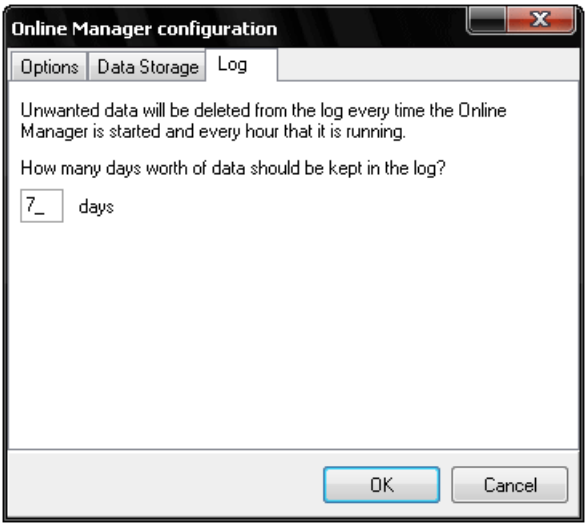
Print sends the displayed log directly to the printer.

Export creates a CSV file that can be e-mailed off site and opened on another PC using a spreadsheet program such as Excel.

Deleting Data from the Log

Log data is deleted from the log table at OnlineManager start up and after each hour that it is running. By default the OnlineManager program will store 7 days of data.

- To change the number of days of data to keep in the log select **Options>Configure** then click the 'Log' tab.
- Enter the new number of days then click **OK**.



- To delete all data from the log table, from the OnlineManagers program's main menu select **Log>Delete Entries** then click **Yes**.

This does not remove the recordings from your Ascent database. To remove recordings from an Ascent database see Data Thinning (page 112).

You can also discard specific measurement types automatically, e.g. measurements that don't trigger any alarms, rather than storing them in the database. This will significantly reduce your data storage needs. See Discarding Recordings Automatically (page 115) for more information.

Viewing Your Data

Once data has been collected, it can be displayed and manipulated using the Ascent software. Please read the *Software Reference Guide* for details of how to use charts and reports etc.

Section 6: Managing Your Data Storage Effectively

Once you have set up a program for collecting and storing machine information, you will potentially store many hundreds or even thousands of recordings in your Ascent database. If a database is allowed to become very large it will eventually slow down Ascent's data retrieval and display times.

While it is important to collect enough historical data to be able to trend a machine's condition over time, it is not necessary to keep every recording ever taken on each machine.

To reduce the size of your Ascent database you will need to reduce the number of recordings stored within it. There are several approaches you can take to do this:

1. Use the OnlineManager program's Data Thinning function to selectively delete recordings either manually or automatically on a regular basis (see Data Thinning on page 112).

2. Automatically discard specific types of recording, e.g. criteria recordings, so that they are never stored (see Discarding Recordings Automatically on page 115).

3. Periodically thin your database by manually deleting old recordings.

4. Use a combination of options 1 and 2 and 3 to automatically discard some recordings then delete others manually every few months.

5. Backup your database regularly (every few months or so) and store these old recordings separately on your hard drive or on CD-ROM then delete all recordings from the 'active' copy of your database.

You can also use Ascent's database optimization tools to compact the database and reclaim lost space, which will help to speed up the program if it is getting noticeably slower. See the Ascent *Software Reference Guide*, Database Optimization, for more information on backing up your database and using the database optimization tools.

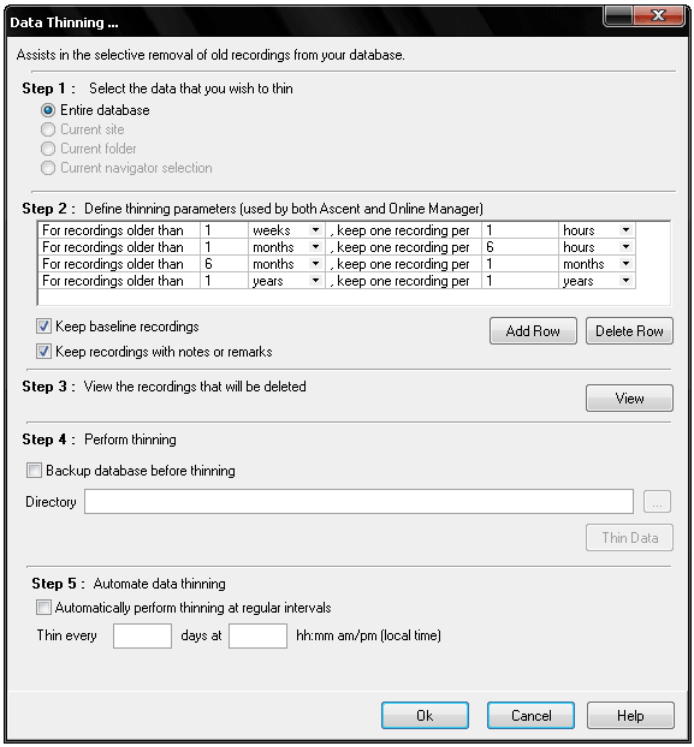
Data Thinning

Data thinning allows you to 'thin out' your recordings by removing unneeded historical data. This can significantly reduce the size of your database thereby improving the speed of data retrieval and display. A thinned out database will also take up less storage on your hard drive.

You can use the data thinning feature to keep different numbers of recordings for different time periods e.g. to keep most new recordings but only keep a few recordings from 6 months ago and even fewer recordings from 1 year ago. To help avoid accidental deletions you are required to view the recordings before deleting them. You also have the option of creating a backup file that can be used to restore the deleted data.

Data thinning can be carried out using either the Ascent or OnlineManager programs. If you use the Ascent software to perform data thinning you can selectively remove recordings from folders and individual machines (unlike the OnlineManager program where thinning is carried out on the entire database). However, the OnlineManager program has an additional *automated* data thinning option that is not available with the Ascent software. You can use this to run your data thinning process automatically on a regular basis. (For instructions on performing data thinning using the Ascent software, see the Ascent *Software Reference Guide*, Data Thinning).

- To perform data thinning with the OnlineManager program, from the menu select **Options>Configure** then click the **Data Thinning** button.



- **Step1:** 'Entire database' is the only option available for removing recordings when using the OnlineManager program to perform data thinning.

  Step 2: Choose how many recordings you want to keep over a specified period. Use the drop-down boxes and type numbers into the blank fields to complete this sentence: "For recordings older than X days/months..., keep one recording per X minutes/hours...".

  Example: "For recordings older than 2 days, keep one recording per 6 hours".

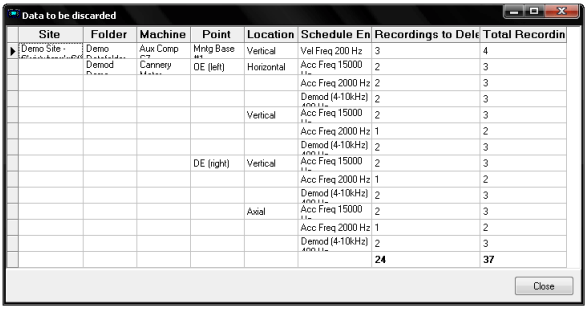
  You can specify additional periods by clicking **Add Row**. Any additional rows must have a time defined *further* in the past than the preceding rows.

Example:
"For recordings older than 2 days, keep one recording per 6 hours"
"For recordings older than 2 weeks..."
"For recordings older than 2 months..."

Note: Add Row and **Delete Row** will always add or delete the bottom row.

- To keep all baseline recordings or those that have notes or remarks associated with them, tick the box(es).

- **Step 3:** Click **View** to see the specific schedule entries and number of recordings that will be deleted, and the total number of recordings that exist for that schedule entry. (The **Thin Data** button will not become active until you view the records.)



- Click **Close** to close this window then make any changes to your thinning criteria if necessary.

- **Step 4:** If you wish to backup your database before removing recordings, tick the box and specify where the backup should be stored by either entering the file path or using the  button to navigate to a backup folder. When you are ready click **Thin Data**.

- **Step 5:** This step is optional. Choose how regularly you want your data to be thinned and at what time of the day/night you want the process carried out. The OnlineManager program will apply your data thinning parameters every time the specified number of days has passed. If the thinning process does not successfully complete the OnlineManager program will retry every hour.

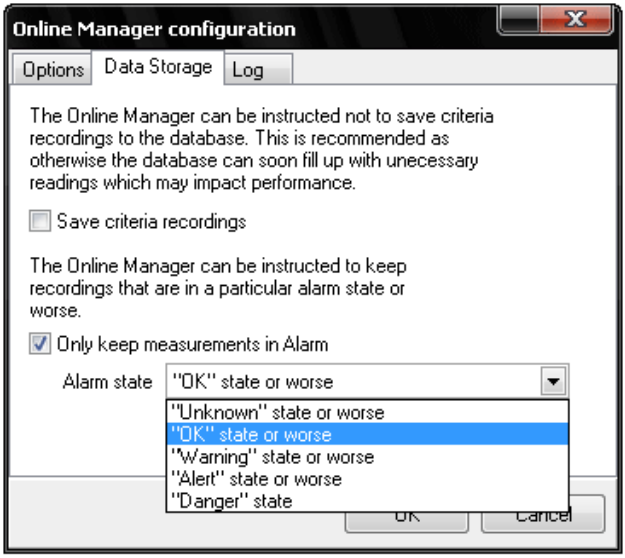
Notes:
If you make a mistake you can use **File>Database>Restore** to restore the data using the backup file you made in the last step.

If a recording that has a corresponding dual channel recording is marked to be kept then both recordings will be kept. This does not guarantee that orbit plots will be preserved. Orbit plots may only contain an x axis or a y axis after thinning.

Discarding Recordings Automatically

You can use the OnlineManager program to automatically discard criteria recordings and/or any recordings that do not trigger an alarm.

- From the menu select **Options>Configure** then click the 'Data Storage' tab.



By default, criteria recordings are automatically discarded to prevent your Ascent database from filling up with unnecessary recordings. We recommend that you keep this default setting.

- Tick 'Only keep measurements in Alarm' then use the drop-down box to select the alarm states whose recordings will be saved.

Each alarm state includes itself and any worse alarm states e.g. if you choose 'OK' any recordings that trigger an alarm of 'OK', 'Warning', 'Alert' or 'Danger' will be saved - all others will be discarded.

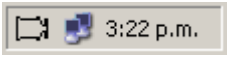
Bear in mind that if you wish to establish baselines and collect trendable data you will need to save at least some recordings that are in an 'OK' state.

Section 7: Automated Alarm Notification - AscentWatcher

The AscentWatcher program is used to monitor Ascent databases and provides automated notification of any changes in machine alarm state. You can choose to be notified via e-mail, SMS message, on-screen pop-up messages and/or a flashing icon in the system tray.

Pop-up notification message

An icon will be placed in the computer's system tray to indicate a database is being monitored. This will change color when a machine's alarm status changes and optionally flash.



System tray icons indicating machine alarm status

Once you receive notification of a machine's changed state you must 'acknowledge' the alarm to clear the message. Then you can use the Ascent software to display and analyze the recordings that have triggered the alarm(s).

Note: The AscentWatcher program monitors entire databases rather than individual folders or machines.

Creating AscentWatcher Files

To monitor a database you need to create an .AscentWatcher file. This file contains information that tells the AscentWatcher program which database to monitor and when and how you want to be notified of a machine's changed alarm state (e-mail, pop-up messages and/or a flashing icon in the system tray). These files can be configured to run automatically each time you start your PC (if you do this you will never need to manually start the program after the initial setup).

When new data is received by the Ascent software and the AscentWatcher program is running, you will be notified of any changes in machine status. (Alarms are checked automatically by the Ascent software when new recordings are received so the AscentWatcher program will notify you immediately.)

Note: You do not need to run the Ascent program to set up your .AscentWatcher files.

1. To start the AscentWatcher program use the Windows Start menu (**Start>All Programs>Commtest>Ascent>AscentWatcher**).

2. On the toolbar click **Config**. This opens the Configure window which you will use to tell the program which database to monitor and how you wish to receive alarm notifications.

3. Enter a descriptive name for this configuration e.g. the name of the database you will be watching. This description will be displayed in notification messages, the main AscentWatcher window titlebar and the Windows tooltip when you hover the mouse over the system tray icon. If you are monitoring several databases a well-named description will help identify the database currently being monitored.

4. Tick the box if you would like the program to run automatically when you turn on your computer.

Select a database to monitor. Click the 'Database' tab then either enter the absolute path to the database file or click  to navigate to your database. (If the database is stored on your own computer this will be located by default in C:\Program Files\Commtest Instruments\Ascent\<name of database>.GDB, or for Windows XP and Server 2003 in C:\Documents and Settings\All Users\Documents). For Windows Vista the database will be stored by default in: C:\Users\Public\Documents.

1. If you normally login to this Ascent database with a username and password enter these here. (If you do not use an Ascent login this means that the defaults are still enabled - click **Default** to automatically fill in these fields.) To test whether you can connect to your chosen database click **Test** (if you cannot connect see sub-heading 'Problems' at the end of this topic).

   If you have not previously been granted access to this database the system administrator will need to set up user accounts for each database you wish to monitor. Please contact the system administrator and refer them to the Ascent *Software Reference Guide*, Creating and Managing User Accounts.

2. Click the 'Machine States' tab and use the drop-down box to choose an alarm state. The AscentWatcher program will send you notification whenever a machine enters this state.

3. Select the type of notification required by ticking/unticking the boxes. If you wish to receive e-mail notification of alarm state changes please read the next topic.

Problems?
When you click **Test** or **OK** to finish filling out the Configure window an error message will appear if you do not have access permissions to the selected database.

The system administrator will need to set up user accounts in the Ascent software for each database you wish to monitor. Please contact your system administrator and refer them to the Ascent *Software Reference Guide*, Creating and Managing User Accounts.

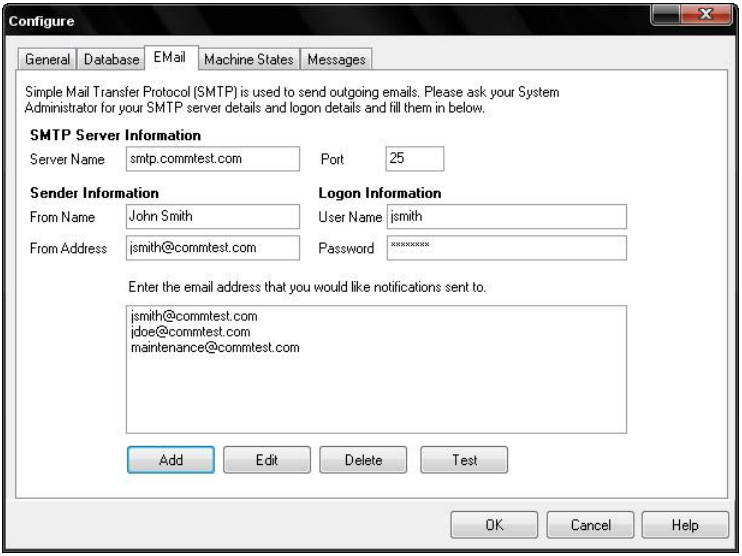
- If you get a different error message read it carefully to try and determine the source of the problem, for example if the Ascent software cannot connect to your chosen database you may have typed in the path incorrectly.

Setting Up E-mail Notification

E-mails can be sent to one or more people by entering their e-mail account details into the AscentWatcher file.

1. If the Configure window is not yet open click **Config** to open this now then click the **Email** tab.

2. Enter the name of your SMTP server and its port number (ask your system administrator for this information if you do not know this). If you use Outlook Express for your e-mail you can find this information out for yourself - see sub-heading 'Outlook Express users' at the end of these instructions.



3. In the 'Sender Information' fields enter the name that you'd like the message receiver to see e.g. From 'John Smith'. (If the message is received by you this name will be replaced with the whatever name you have set up in your e-mail program.)

4. Enter your e-mail address in the 'From Address' field. This is the address that will appear in the 'Reply To' field when the message is received. (You can specify any e-mail address here e.g. one that you use off-site or at home. You do not have to use the 'work' e-mail address on your company's SMTP server.)

5. In the 'Logon Information' fields enter the user name and password required to access the SMTP server.

6. Click **Add** and enter an e-mail address you want notifications to be sent to.

7. Select the e-mail address with the mouse and click **Test**. The AscentWatcher program will now send an e-mail to this address to confirm that this notification method is working.

8. Repeat steps 1-4 to send e-mail notifications to additional addresses.

Note: If you have an existing distribution list that you use to send messages to many people within your company you can use this single address here instead of specifying multiple individual addresses.

Outlook Express users

- For Outlook Express users the required information can be found by opening Outlook Express and selecting **Tools>E-mail Accounts**.
- Under the 'E-mail' section select 'View or change existing e-mail accounts' then click **Next**.
- Select the appropriate e-mail account (if there is only one you do not need to select anything) then click **Change**.
- Under 'Server Information' write down the name of the *Outgoing* mail server - this is the SMTP server name that must be entered in the AscentWatcher 'Email' window.
- Under 'Logon Information' you will find your user name and password (if you don't know the password ask your system administrator for this information).
- Click **More Settings** and click the 'Advanced' tab. The port number will be listed under *Outgoing* server (depending on the version of Outlook you are running). If the port number is not listed try entering '25' (the default). If this does not work when you send a test e-mail, ask your system administrator for the correct port number.
- Close all windows to return to the AscentWatcher 'Email' window then enter the details you wrote down. Follow the previous instructions from step 3.

Setting Up SMS Notification

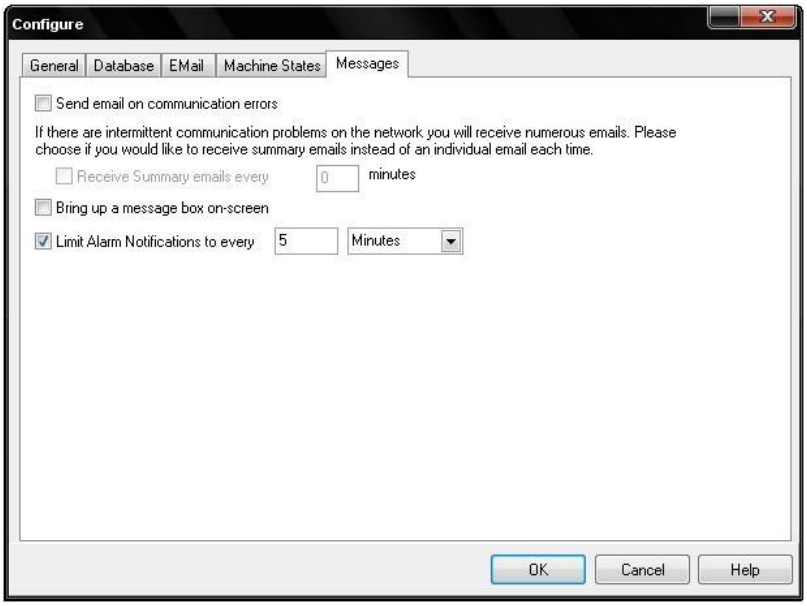
SMS (Short Message Service) allows you to receive alarm notifications as text messages on your mobile phone. An SMS gateway provider will be able to supply you with an e-mail address that can be used to redirect alarm notifications to your mobile. Your local telecommunications service provider will most likely be able to help you with such a service.

- To set up SMS notification, follow the instructions in the previous topic for setting up e-mail notifications. Use the e-mail address supplied by the SMS gateway provider when entering the e-mail address.

Communications Error Notifications

The AscentWatcher program can notify you if communication is lost between the OnlineManager program and a Ranger device. You can choose to receive individual error notifications or a summary of communications problems over the last 'x' minutes. (The e-mail summary option is provided for networks with high latency or low bandwidth issues as these could generate numerous communication errors and therefore, many e-mails.)

- Click the **Messages** tab.



- Choose a notification method (e-mail or pop-up message on your PC).
- If you wish to receive summary e-mails select the **Limit Alarm notifications to every** option and enter a minutes value for how often you would like these to be sent.
- Click **OK** to finish.

If you select the e-mail option, messages will be sent to the e-mail addresses, distribution lists and SMS gateway service addresses you specified on the 'Email' tab (see Setting up E-mail Notification on page 120).

Saving AscentWatcher Files

- Click **OK** and save this configuration with a descriptive file name. We recommend saving the .AscentWatcher file to the default location.

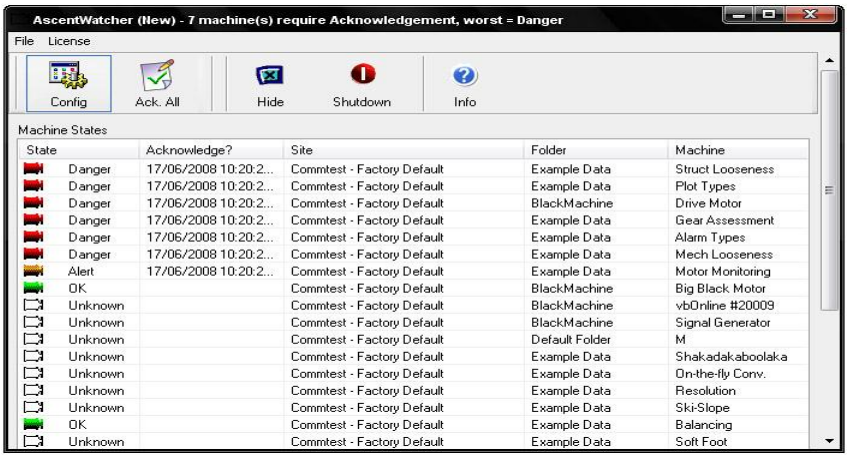
Problems?
If an error message appears, see the Problems section at the end of the previous topic.

The program will pause for a short time then you will receive your first notification (e-mail, pop-up message and/or a flashing icon).

Note: Pop-up messages appear at the bottom-right of your screen by default. If you drag the message elsewhere it will appear there from then on until you close and re-start the program.

- To clear a pop-up message click **Details**. Alternatively, if you chose the flashing icon option, click the icon in the system tray. Either action will open the main window where you can see the details of your machines and 'Acknowledge' any alarms.

- The main window lists the contents of your chosen database by site, folder and machine. If any machines are flashing you will need to acknowledge them now by clicking **Ack. All**. Once an alarm has been acknowledged you should then open your Ascent database and analyze the latest recordings of any machines that are in alarm.



Monitoring more than one database

A single .AscentWatcher file can only monitor one database. If you have several databases you wish to monitor you must create a separate .AscentWatcher file for each one.

- Click **Config** and repeat the previous steps to select another database and set up your preferred notification method.
- Select **File>Save As** and enter a new name so that you don't overwrite the previous .AscentWatcher file.

Editing AscentWatcher Files

When you run the AscentWatcher program it automatically loads the .AscentWatcher file for the previously watched database. If the .AscentWatcher you wish to edit is already open please skip step 1.

1. Click **File>Load** then locate and open the .AscentWatcher file you wish to edit.
2. Cick **Config** and edit the details as required.
3. Click **OK** then from the menu select **File>Save** to save your changes.

Running AscentWatcher

You can run the program automatically at PC startup by ticking the 'run at startup' option when you create each .AscentWatcher file. Multiple databases can be monitored simultaneously by creating an .AscentWatcher file for each database and ticking this option for each one.

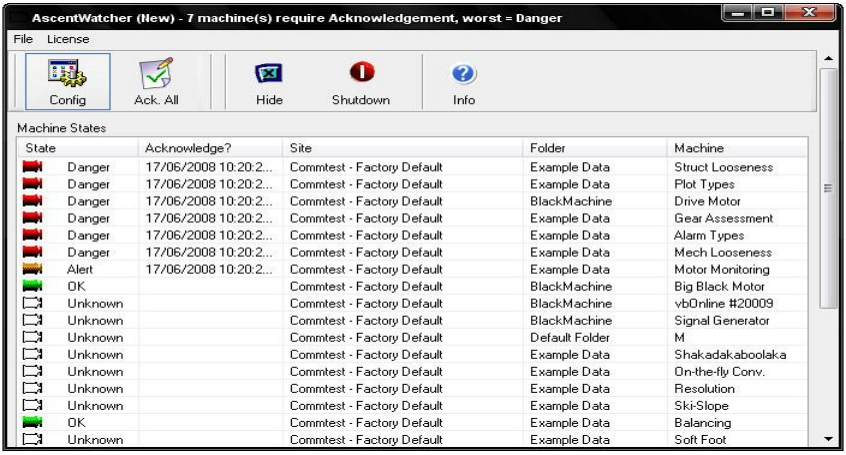
Manually monitoring a database using AscentWatcher
You can start the program manually at any time by selecting it from the Windows Start menu. The last database you monitored will be loaded automatically when the program is run.

- To select a different database to monitor select **File>Load** and choose another .AscentWatcher file.
- To monitor more than one database using this method, start another instance of the program (from the Start menu) and load a different .AscentWatcher file. Repeat for additional databases.

Using AscentWatcher

Pop-up messages identify a database by its description and will display the worst alarm state.

When you click the pop-up message **Details** button or click the flashing taskbar icon the main window opens. This window shows you all the machines in the currently monitored database. If a machine has no alarms assigned to it, its state will be listed as 'Unknown'.



The window title bar contains a description of the database currently being monitored. This is the description you entered when you created the .AscentWatcher file for this database.

When a machine is in alarm you need to 'Acknowledge' that machine by clicking **Ack. All** or using the right-click shortcut menu to select and acknowledge individual machines. Acknowledging an alarm will turn off the flashing icon but does not carry out any other action.

You can also mark one or more machines as 'unacknowledged' by right-clicking them and selecting **Mark as Unacknowledged** from the shortcut menu. You may find this function useful if there are many machines newly in alarm and you want to check them one at a time in the Ascent software. An unacknowledged machine will continue to flash until acknowledgement is received - this can serve as a useful reminder of which machines you have checked/not yet checked.

Changing the sort order
You can use different sort orders to group machines in the manner that is most practical for you. For example, you can sort machines by folder to list each machine within an individual folder by its alarm state. This makes it easier for you to decide which folders to investigate first.

- To re-order the machines click the labels at the top of each column e.g. click 'State' to order machines by their highest or lowest alarm state, click 'Machine' to sort machines alphabetically by name etc.

Machines are always sorted first by column then by alarm. For example, clicking 'Folder' will sort the machines within each folder and rank them by their alarm state. Clicking 'Folder' again will toggle the alarm state from highest to lowest.

Toolbar Buttons and File Menu

Most options are available directly from the main toolbar and can also be found under the **File** menu (along with some additional options).

Config
Open the configuration window so you can create/edit an .AscentWatcher file.

Ack. All
Acknowledge all machines in this database that require acknowledgement.

Hide
Hide the AscentWatcher main window but leave it running in the background. The icon remains in the system tray and can be clicked to make the main window re-appear.

Shutdown
Close the AscentWatcher program completely.

Info
Display AscentWatcher version information.

File>Load
Load an .AscentWatcher file to monitor a specific database.

File>Save
Save the current configuration to an .AscentWatcher file (i.e. save the machine list you see in the main window).

File>Save As
Create a new .AscentWatcher file to monitor a different database.

Troubleshooting Startup Files

When you tick the box to run an .AscentWatcher file automatically at startup, the program creates a link which it uses to locate this file when Windows starts. This link can be broken by accidentally moving or deleting the .AscentWatcher file.

This may produce the following problems:

- 'File not found' errors when starting Windows.
- The wrong .AscentWatcher file opening when Windows starts.

To fix the error you will need to remove the links to some or all .AscentWatcher files.

- Open an .AscentWatcher file in the main window and click **Config** then untick the option to start the program automatically. Click **OK**.
- Right-click the Windows **Start** button.
- Select **Explore** (do **not** select 'Explore All Users').
- A Windows explorer window will open. Navigate to **Programs>Startup**. Your .AscentWatcher file startup links will be listed here (recognizable by their machine icons).
- Delete any links that are not working correctly.

- Once this is done you can re-create the links by editing the files. Open an .AscentWatcher file in the main window and click **Config** then re-select the start automatically option. Repeat for all databases that you want to be automatically monitored when Windows starts.

Section 8: Making Data Available - AscentOPC

The AscentOPC system makes information from an Ascent database available to OPC clients. AscentOPC can be integrated into your factory's existing Distributed Control System using OLE for Process Control (OPC). It allows machine data to be made available to anyone across your factory's Windows network. You can check the alarm status of machines, points and measurement locations for the following schedule entry types:

- Tach
- Linear speed

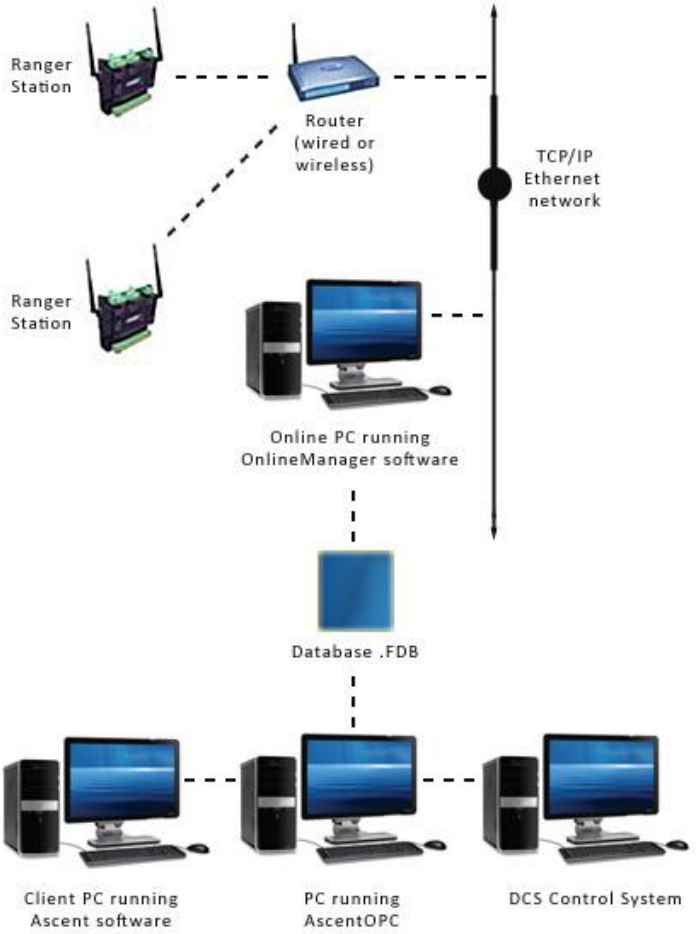
Recordings and alarms are updated 'live' so that you always have the most recent information to hand.

How the AscentOPC System Works

The system is made up of the AscentOPC server program and one or more OPC clients (one for each user). The AscentOPC server 'publishes' any new recordings as soon as they are added to an Ascent database and updates all OPC clients that are connected. You can connect to the AscentOPC server via an OPC client and view the published data on your own computer.

Setup
The system administrator only needs to install the AscentOPC server program on a single computer. The administrator can then run the Ascent software and select one or more folders of machines to publish (publishing makes them available for viewing).

Each client user will need to install an OPC client on his/her computer then use this to connect to the AscentOPC server across the network. Once you are connected to the server you can use your OPC client to select the machines you wish to monitor.



An example AscentOPC configuration

Notes:

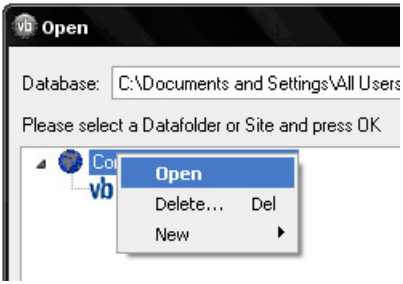
- Client users do not need to have the Ascent software installed on their PC as they will be accessing the data through the AscentOPC server.
- The Ascent database and AscentOPC server program can be installed on one PC or separate PCs (if your Ascent licence includes network support).

- The Ascent program does not need to be running in order for clients to view information. Once the AscentOPC server has been set up and pointed at a database, the server can access any new recordings and their associated alarms.
- When the database is updated by the Ascent program e.g. new recordings are collected, AscentOPC will update any clients that are connected. The Ascent database can be updated by a Ranger device or by a user of Ascent manually transferring data from a portable vb instrument.
- The server will only publish one database at a time. OPC clients can only see the database that is currently being published.

Publishing a Folder

Each site within a database may contain many machine folders and it is these folders that are published by the AscentOPC system (rather than individual machines). Publishing a folder makes every machine within that folder available to the AscentOPC server, which in turn displays this information to OPC clients.

- To publish a folder, start the Ascent program and open an entire site by right-clicking the site icon and selecting **Open**. When the navigator opens it will group and display every folder within that site.



- Right-click a folder and select **Publish using OPC**. Repeat this process for each folder you want published then click the toolbar **Save** button when you have finished.

- You can now close the Ascent software. You do not need to run the Ascent software at the same time as the AscentOPC program as the server can access any new data directly through the database file.

Note: Publishing makes every machine within the folder visible to OPC clients. If you do not want a machine to be published move it into another, non-publishing folder.

Setting up AscentOPC

- From the Windows Start menu select **All Programs>Commtest>Ascent>AscentOPC**.

- Choose **File>Open Database**. If your database is already displayed in the Select Database window click **Open**.

  Alternatively you can choose any recently opened database from the drop-down box or use the **Browse** button to find a database held on your PC. (If your Ascent licence allows networking you can click the 'Network Connection' tab to open a database held elsewhere on the network - see the Ascent *Software Reference Guide* Connecting to a Network Database for instructions). Click **Open** when you have selected a database.

AscentOPC Server application

With the AscentOPC server program running any user can now run their OPC client to connect to the server and view machine data.

Running AscentOPC

- To minimize the server window without closing the program, click the **x** at the top right of the window.

- To maximize the server window double-click the  icon in the system tray.
- To close the server program select **File>Shutdown**. Alternatively right-click the system tray icon and select **Shutdown** from the shortcut menu.

Running AscentOPC server automatically on startup
The AscentOPC server can be instructed to run automatically whenever the computer is switched on and a user is logged in.

- Select **Options>Run on startup**. When this option is selected the application will run minimized in the system tray.

Selecting Another Database

Database selection is carried out via the AscentOPC server - OPC clients can only view the database that is currently being published.

- To view a different database, on the AscentOPC server menu select **File>Open Database** then choose another database from the drop-down box.
  - If your database is not listed here use the **Browse** button to navigate to it or click the 'Network Connection' tab to open a database held elsewhere on the network.
  - When you are returned to the Select Database window click **Open**.

If you are publishing this database for the first time you will need to run the Ascent program and select the folders you wish to publish. See Publishing a Folder (page 134).

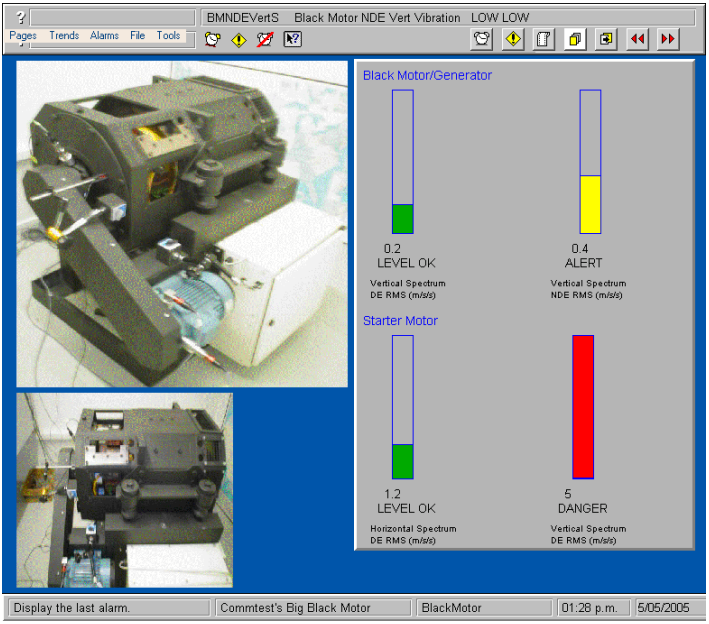
Updating the AscentOPC Server

When the server is running it takes an initial 'snapshot' of the current machine structures and displays all new data as it arrives. If new data is added to a folder while the server is running e.g. a new location is added, the OPC client will **not** show any structural changes until the server program is re-started. If data is removed from the database e.g. a location is deleted, the server will continue publishing the last values before the data was removed. However, the changed data will be labeled as being of 'bad' quality.

- To update the server right-click the  icon in the system tray, select **Shutdown** then re-start the program.

Viewing the Data - OPC Clients

Once the AscentOPC server is running, anyone with an OPC client on their PC can connect to the server to view machine data. There are many OPC clients available that can be used to connect to the AscentOPC server e.g. CitectSCADA. Your Distributed Control System administrator will be able to advise you on the most practical OPC client for your needs.

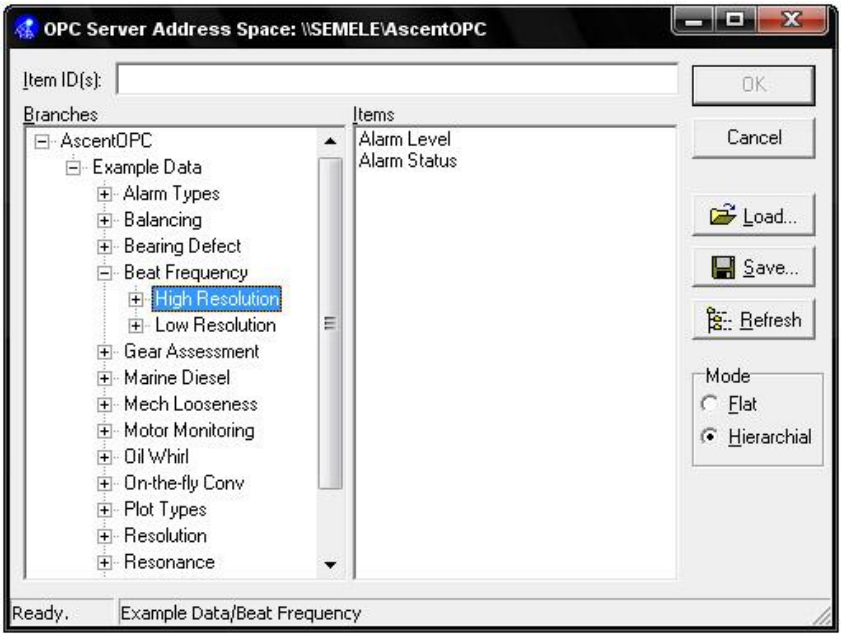


Graphical interface created with CitectSCADA showing live alarm levels

Viewing Data in List or Navigator Tree Style

OPC clients can browse the AscentOPC data using a navigator tree-style display rather than a listing of all items.

The 'Hierarchical Browsing' option allows clients to see a view of the data similar to the Ascent navigator tree structure i.e. clients can click on parts of the tree structure to open out the machines, points and measurement locations.



Example OPC client viewing data using hierarchical browsing

- To display data using a navigator tree-style, in the AscentOPC program select **Options>Hierarchical Browsing**. Deselect this option to display items in list-style.

Notes:
Because the display of data is controlled from the server program **all** connected clients will see their data according to the option selected here (tree or list style).

Browsing options can only be changed when no clients are connected (if clients are connected the software will display a helpful information prompt advising you of this restriction).

Section 9: Maintenance and Support

Proflashing Ranger Devices with New Firmware

New firmware will be made available from time to time, which can be downloaded to your PC from the Commtest website. To upgrade to a newer version of firmware you PROFLASH the device with the new firmware file (.hex extension). This is carried out within the Ascent software.

- From the main menu select **Edit>Online Device Setup**.
- Select a Ranger Station or Ranger sensor device from the Manager VB window then click **Edit**.
- Click the 'Setup' tab to display the PROFLASH option.
- Type in the pathname to the downloaded .hex file or use the  button to navigate to the correct location.
- Click **Proflash** then follow the on-screen instructions.

Note: PROFLASHING the device takes approximately one minute. Do not interrupt the process as this will damage the Ranger device. The program will prompt you when the PROFLASH is complete.

Change Ranger Sensor RF Channel

If you wish to set up multiple Ranger networks within a site, each network of Ranger Stations and Ranger sensors should be configured to communicate using a separate RF (Radio Frequency) channel. Doing so will prevent interference and the possibility of system slowdowns due to bandwidth constriction or collisions.

The 2.4 GHz ZigBee standard allows for 16 channels, each requiring 5 MHz of bandwidth to transmit up to 250 kilobits per second of data. Available channels for the Ranger sensor encompass 14 of these channels (11-24).

Note: the Ranger system's default RF channel is 18.

To change the RF channel used by a Ranger Station and its associated Ranger sensors:

- From the main menu select **Edit>Online Device Setup**.
- Select a Ranger Station or Ranger sensor device from the Manager VB window then click **Edit**.
- Click the 'Tasks' tab to display the 'DEVICE DETAILS' option.
- Click the **Edit** button. The 'Ranger Device Details' window will open.

RF Selection Window

- Enter a channel number into the text field and click **Apply**. Available channels are 11 to 24.

RF channels should not be confused with WiFi channels. To change the WiFi channel used to communicate with the Ranger Station, see the Configure Wireless (Wi-Fi) Connection (page 51) section.

Contacting Technical Support

If you have any problems please contact Commtest support staff directly for assistance. Our e-mail address is help@commtest.com.

We also provide a searchable knowledge base of frequently asked questions (FAQ) on our website.

- The knowledge base can be found at www.commtest.com. Click the **Support** link then **Frequently Asked Questions** to access the knowledge base.

Appendix: Specifications

Ranger Station

Specifications	Ranger Station	Remarks
Tachometer Input		
Range	0.5 Hz to 5000 Hz (30 to 300 000) RPM	Divided by number of pulses per revolution
Recommended sensor	Hall effect	Also optical, laser and Keyphasor® tach sensors
Power supply to sensor	12 V	Current limited by a 50 mA PTC
Input type	Optically isolated, accepts TTL	
TTL inputs pulses	2.5 V (2 mA) min, 12 V (20 mA) max, off-state < 0.8 V	
Relay Output		
Type	SPST, normally open	
Voltage and current rating	250 V AC or 30 V DC, 5 A	
Controlled by	Server	User configurable, based on alarms
Status Indicators		
System status	1 x LED	Power and DSP status
WLAN status	1 x LED	Indicates Wi-Fi comms
Tach status	1 x LED	Indicates tach recording
Relay status	1 x LED	Indicates relay is energized
Comms and Power		
Network comms	ZigBee 2.4 GHz, Ethernet v2.0, IEEE 802.3, TCP/IP, 10/100baseT	Auto senses 10/100 Mbps and half/full duplex
Network connection, link speed	RJ-45 socket, ≥ 256 kbps (optimum), 2400 bps (min)	Via any commercially available link
Diagnostic comms	Custom serial @ 230 kbaud	Auto-baud at power up 57.6 kbaud to 230 kbaud
Power supply	250 mA @ 9 V to 36 V DC	
Mechanical		
Mounting	Standard 35 mm DIN rail	For installation in enclosed control cabinet
Size	105 mm x 130 mm x 45 mm	(60 mm including DIN rail)
Optional sealed housing	IP 65 / NEMA 4	
Environmental		
Temp range	-10 °C to 60 °C (14 to 140) °F	
Humidity	95% RH non-condensing	
EMC	EN61326	Emissions and immunity
Analysis Software		
Name	Ascent Level 3	

Revised 16 February 2009. While every effort has been made to provide the most accurate information we advise that information in this document may contain technical inaccuracies or typographical errors. Commtest Instruments Ltd may at any time and without notice make improvements and/or changes in the products described in this information.

This device complies with part 15 of the FCC Rules. Operation is subject to the following conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

NOTE: THE MANUFACTURER IS NOT RESPONSIBLE FOR ANY RADIO OR TV INTERFERENCE CAUSED BY UNAUTHORIZED MODIFICATIONS TO THIS EQUIPMENT. SUCH MODIFICATIONS COULD VOID THE USER'S AUTHORITY TO OPERATE THE EQUIPMENT.

TO MAINTAIN COMPLIANCE WITH FCC'S RF EXPOSURE GUIDELINES: THIS DEVICE AND ITS ANTENNAS MUST OPERATE WITH A SEPARATION DISTANCE OF AT LEAST 20CM FROM ALL PERSONS.

CHANGES OR MODIFICATIONS NOT EXPRESSLY APPROVED BY THE PARTY RESPONSIBLE FOR COMPLIANCE COULD VOID THE USER'S AUTHORITY TO OPERATE THE EQUIPMENT.

Ranger Sensor

Specifications	Ranger Sensor	Remarks
Performance		
Sensitivity	100 mV/g	
Frequency response (+/- 3 dB)	1 Hz to 10 kHz	6 kHz X Axis
Frequency response (+/- 10%)	3 Hz to 4 kHz	
Dynamic range	+/- 50 g peak	
Axes	Biaxial	
Wake on High Vibe (WoHV)	2 to 20 mm/s RMS	In 10 to 1000 Hz band
Electrical		
Settling time	< 1 s	
Power supply	Li-Ion 1/6D cell	Non-rechargeable primary cell
Voltage	3.6 V	
Capacity	1.7 Ah	
Battery life	2 years	At typical usage*
Electrical noise - broadband	300 ug RMS	
Electrical noise - spectral 10 Hz	30 ug	
Electrical noise - spectral 100 Hz	3 ug	
Electrical noise - spectral 1 kHz	2 ug	
Comms and Power		
Network comms	ZigBee, 2.4 GHz	Via Ranger Station
Wireless range	100 m	Line of sight
Network connection, link speed	Wireless link, ≥ 256 kbps (optimum), 2400 bps (min)	
Mechanical		
Case material	316L stainless steel	Industrial plastic for battery compartment
Mounting	1/4"-28 UNF thread	Or epoxy mount
Size	43 mm x 48 mm	Diameter x height
Weight	160 g	
Environmental		
Temp range	-10 °C to 80 °C (14 to 176) °F	
Maximum shock	500 g peak	
Compliance testing	CE, IEC6100, CISPR 22:2006 for Class B, ETSI EN 300 440	
Sealing - sensors/electronics	Epoxy potted	
Sealing - battery compartment	IP 65	

Revised 16 February 2009. While every effort has been made to provide the most accurate information we advise that information in this document may contain technical inaccuracies or typographical errors. Commtest Instruments Ltd may at any time and without notice make improvements and/or changes in the products described.
* Typical usage is defined as: Wake on High Vibe running continuously, one set of 6 recording on each axis each day (Velocity 1kHz, 800 line, 4 averages, 50% overlap). Temperature between 0 °C and 50 °C.

This device complies with part 15 of the FCC Rules. Operation is subject to the following conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

NOTE: THE MANUFACTURER IS NOT RESPONSIBLE FOR ANY RADIO OR TV INTERFERENCE CAUSED BY UNAUTHORIZED MODIFICATIONS TO THIS EQUIPMENT. SUCH MODIFICATIONS COULD VOID THE USER'S AUTHORITY TO OPERATE THE EQUIPMENT.

TO MAINTAIN COMPLIANCE WITH FCC'S RF EXPOSURE GUIDELINES: THIS DEVICE AND ITS ANTENNAS MUST OPERATE WITH A SEPARATION DISTANCE OF AT LEAST 20CM FROM ALL PERSONS.

CHANGES OR MODIFICATIONS NOT EXPRESSLY APPROVED BY THE PARTY RESPONSIBLE FOR COMPLIANCE COULD VOID THE USER'S AUTHORITY TO OPERATE THE EQUIPMENT.

Index

A

C

D

E

N

O

P

R

S

W