Total Stations Interface

The Total Station Interface is designed for single station use and is modeled after the laser tracker interface, as many of the measurements and operations overlap. The following guide describes its use and capabilities.

To use the Total Station interface, you must first configure your instrument settings based on the instrument QuickStart guide:

- "Leica TDRA6000 and TS30 Total Station" on page 238
- "Leica Nova (MS60, TM60, TS60) and Leica Viva (TS16)" on page 248

Connection process

1. Add an instrument model to SA (Figure 5-104) and then select **Connect>Theodolites & Total Stations> Total Stations.** The Theodolite Manager remains the generic default for all Theodolites and Total Stations.
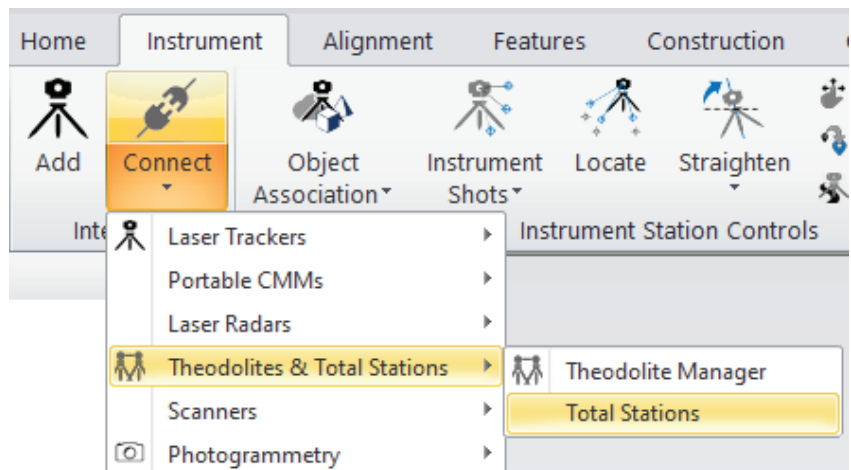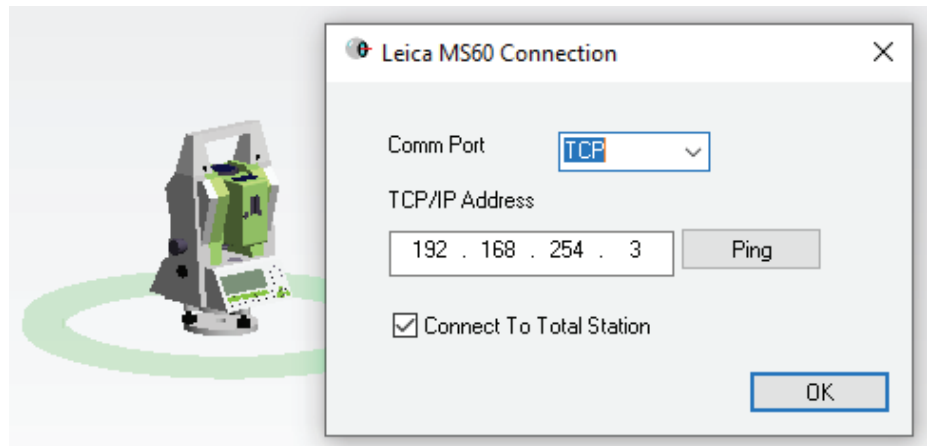

Figure 5-104. Selecting the Leica Total Station Interface

2. Enter the instruments COM Port or IP address (Figure 5-105). You will need to pre-configure the instrument's settings and connection which is details in the Quickstart Guide.

Figure 5-105. Enter the Instruments COM port or IP address

Total Station Interface

The Total Station interface should appear very familiar to SA Laser tracker users because much of the capabilities and functionality was pulled directly from it.

Target Management

Target definitions are managed through the Reflector Icon which opens the Reflectors and Targets database (Figure 5-106).
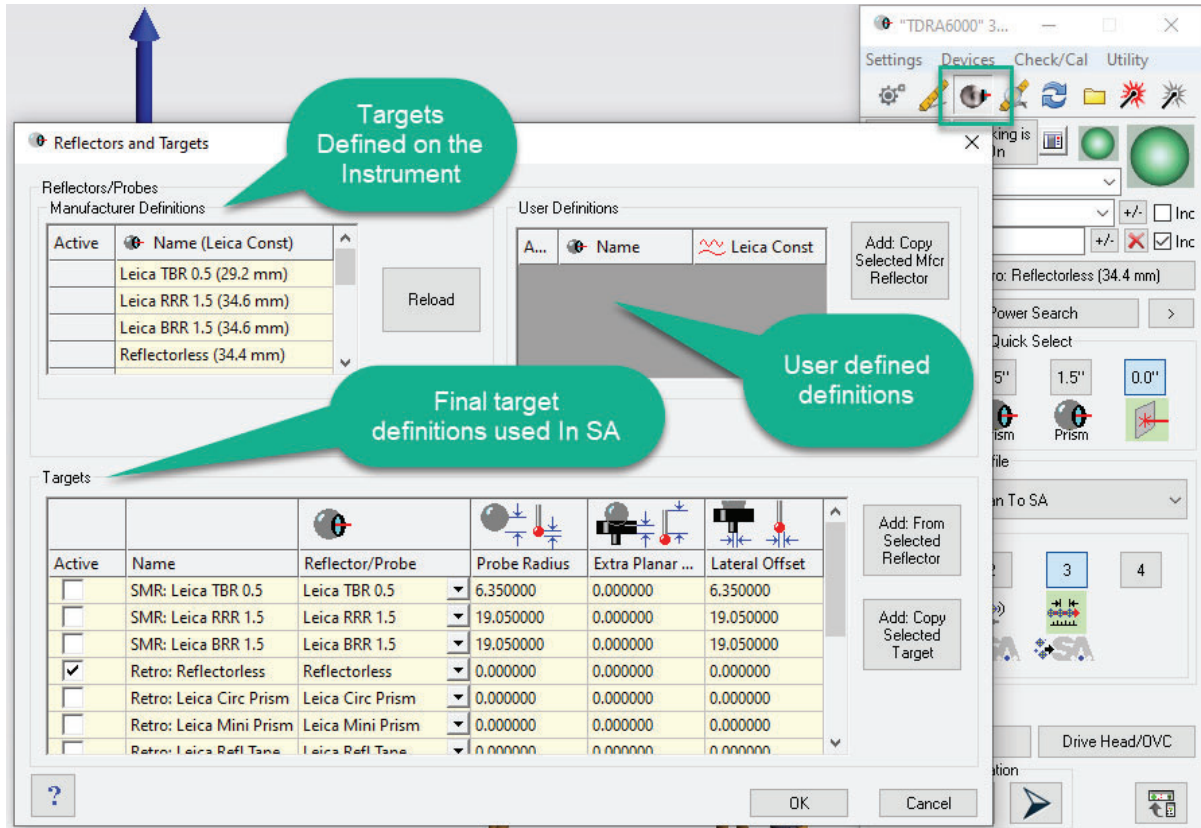

Figure 5-106. Reflectors and Target management

- **Manufacturer Definitions.** These are the target definitions defined on the scope and are the foundation for the target definitions used within SA. The Leica constant saved with the target will be reported. Use the Reload button to refresh the target list if changes have been made on the scope that are not reflected here.

- **User Definitions.** Custom target definitions can be built within the SA interface by adding a reflector definition and the reflector's constant.

- **Targets.** Targets are built from the manufacturer definition or User Definition and provide an option to edit the offsets saved with the points.

Atmospheric Corrections and Weather

The Weather Status Icon is the small traffic light next to the beam status icon. It also allows direct access to the weather settings if you double-left click on it (these can also be accessed through **Devices>Weather>Setup**) (Figure 5-107).
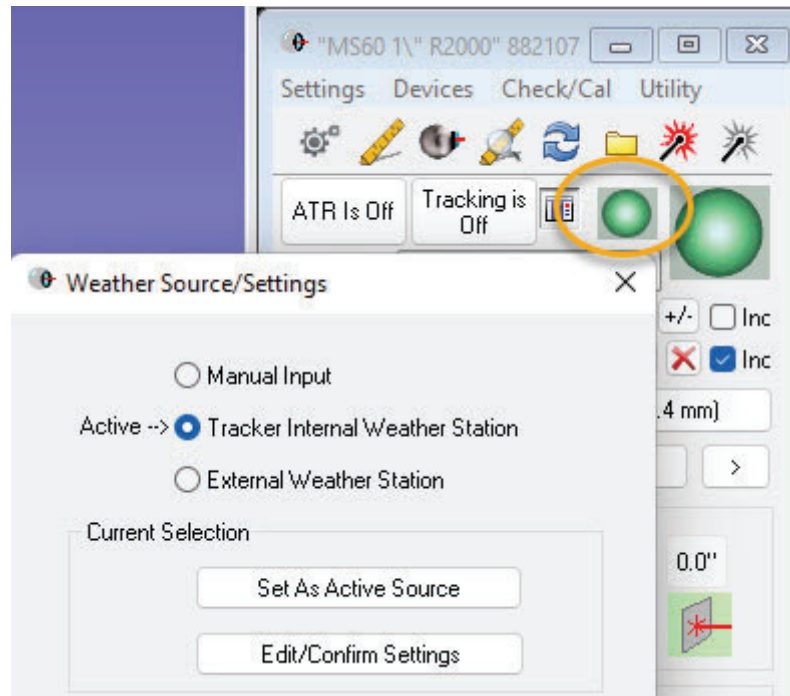

Figure 5-107. Weather or Atmospheric Correction settings

- **Manual Input.** When selected the Weather status icon will turn yellow as a reminder to check the settings on a regular basis. Editing the values manually will push the new settings to the scope for Atmospheric correction.

- **Tracker Internal Weather Station.** This will record the current settings from the instrument with each shot. It is up to the user to adjset these values on the instrument.

- **External Weather Station.** Alternatively a external weather station can be plugged into the computer and used to set the weather readings on the scope. SA will pull the readings from the weather station and push them to the instrument in this mode. This works well for example if you have an AT MeteoStation.

If there is a problem reading from the selected weather source the weather status icon will turn red.

To add a new target:

1. Select a Manufacturer Definition or User Definition to use for the target by clicking on the definition and highlighting it.

2. Press the Add: From Selected Reflector button to select a tooling offset to include with the point. More than one definition can be built at one time (you can build a 1.5" red ring reflector and a Pin nest definition at one time).

3. Press OK to build the new target definition. Measurements will use the selected reflector displayed in the measure button and can be assigned to one of the 4 quick selects by right clicking on the target definition (Figure 5-108).
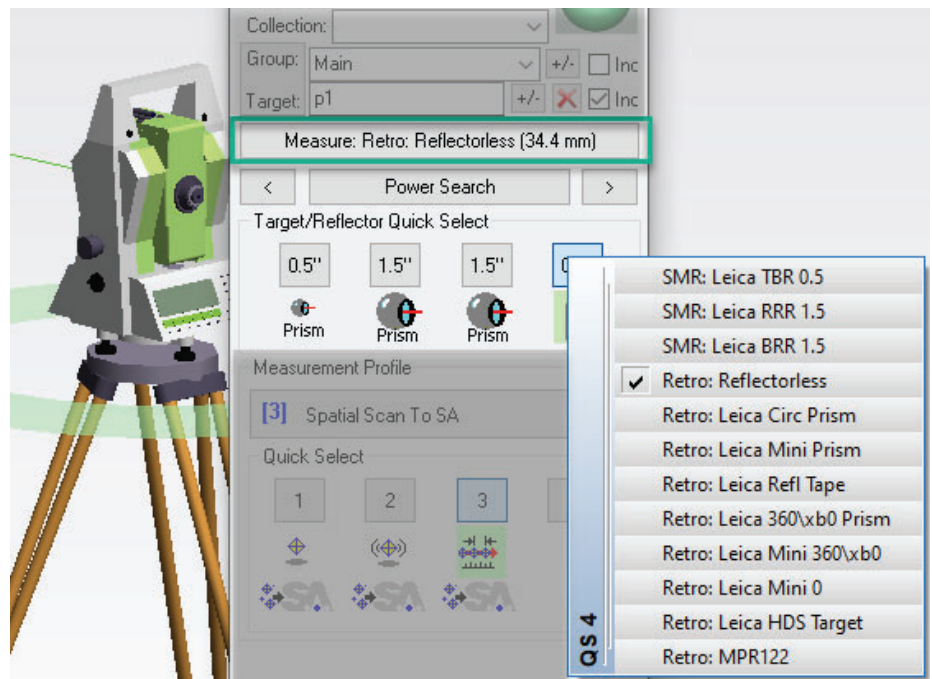

Figure 5-108. Active Target and Target Quick Select Options

ATR / Tracking and Search

ATR Control

Unlike the Theodolite Manager which had an On/Off switch for each specific target, the Total Stations Interface has a single On/Off control. When ATR is enabled it will be used to center on all reflectors.

Tracking Control

Tracking is used to send updates to SA and monitor the current beam location. Unlike the Theodolite Manager, tracking only needs to be turned off to conserve battery life.

Target Search Options

- **Power Search.** The Power Search controls are available directly under the Measurement button. The Left and Right buttons can be used to perform a full 360 scan in either direction, while the Power Search button will trigger a region scan (when enabled) and can be used with a right-click to access the Power Search configuration dialog.
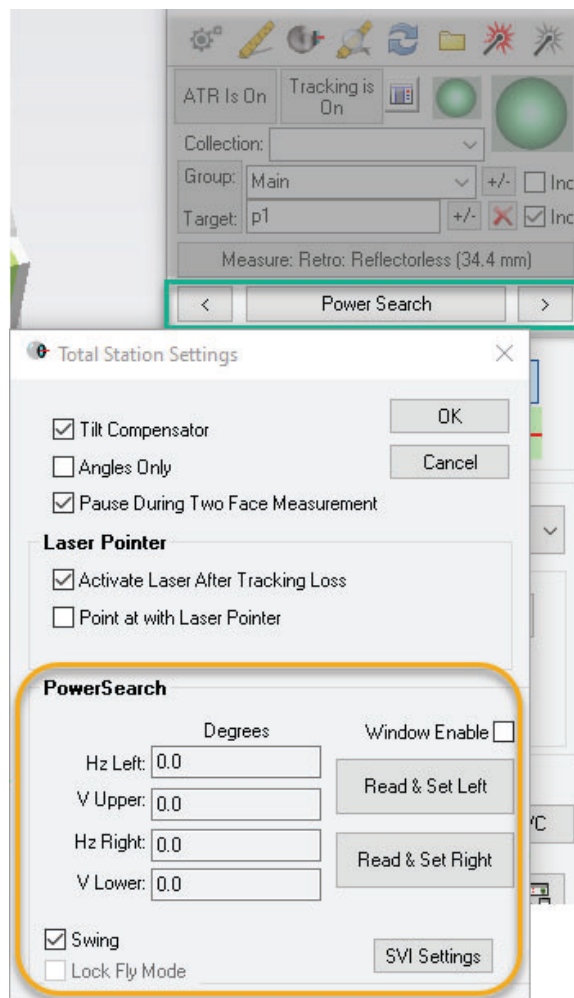
Figure 5-109. Power Search Controls and General Instrument Settings.

- **Find Target.** The find target option can be used as an alternative to Power Search and performs a spiral search for a reflector.

- **Dive Head/OVC.** This button provides access to both the manual drive controls to point the instrument in a desired direction, and access to the Overview Camera for instruments that provide that option.

Camera Operations

The Drive Head/OVC button provides access to the camera and real-time video display (Figure 5-110).

Figure 5-110. Example Video window displaying the current view through the instruments camera.
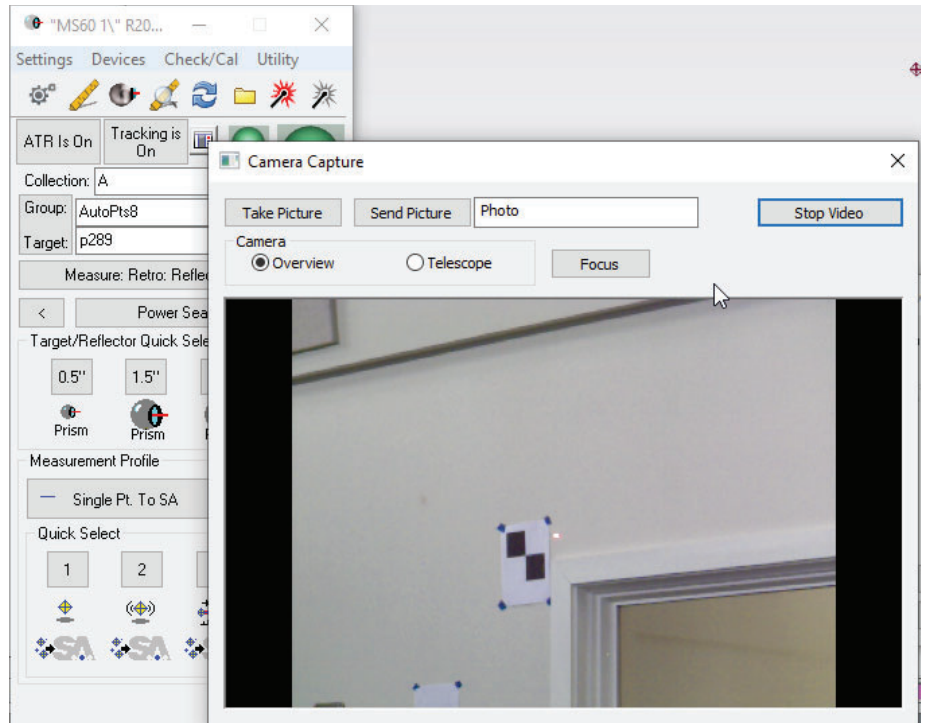
The button functions are as follows:

- **Take Picture.** This button refreshes the current image from the selected *Overview* or *Telescope* lens. The Focus button triggers the selected lens to refocus.

- **Send Picture.** This button takes the specified name from the entry field and saved the current image in the SA tree using the specified name.

- **Start/Stop Video.** This button enabled the real-time VLC embedded video display. The video will appear within the same window and clicking on the video can be used to drive the instrument to the selected point.

The current version of SA requires a special 32bit version of the VLC player to be installed. This version is available here:

http://www.kinematics.com/ftp/SA/Install/Driver%20Downloads/TotalStations_Theodolites/Leica/Leica%20Nova%20MS60%20Drivers/vlc-3.0.1-win32.exe

The VLC player will need to be run once independently of SA prior to its use within SA in order to register its path with windows.

Measurement Profiles

A measurement is defined by a measurement rate, duration and the

data that is returned to SA. This measurement definition is called a **Measurement Profile** and can be selected from the drop down list or the measurement profile Quick Select list (Figure 5-111).
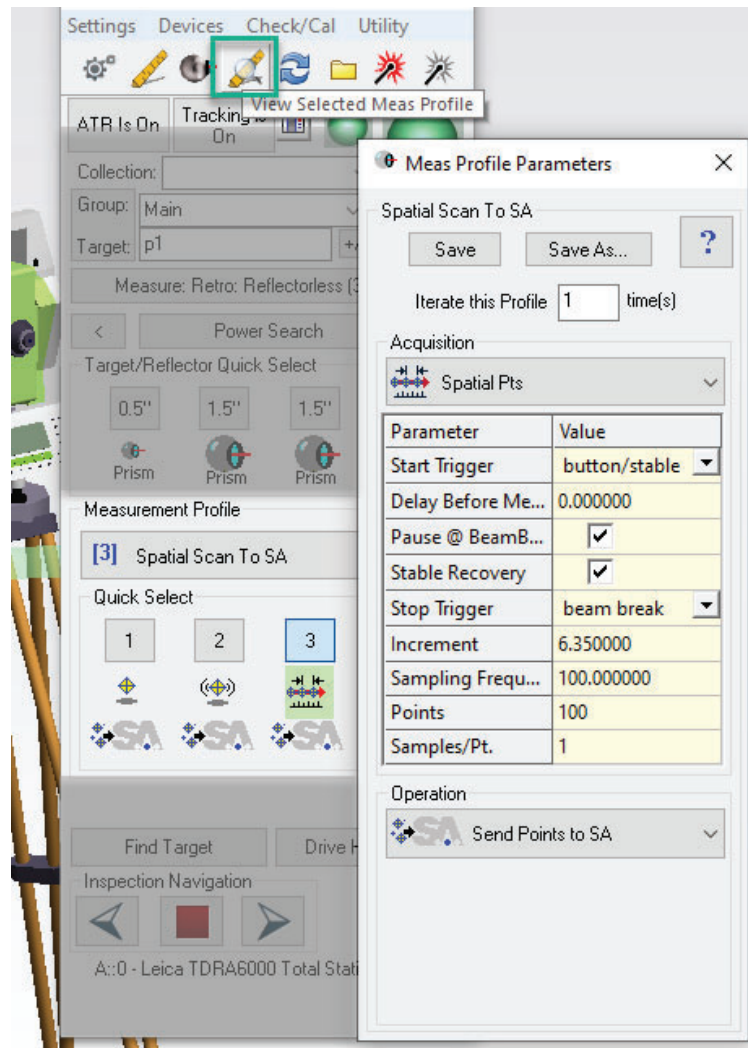

Figure 5-111. Measurement Profiles

Each measurement profile is composed of two sections:

- **Acquisition.** Defines how a measurement is taken. For example in the **Spatial Pts** profile above the "**Increment**" filed defines the spacing in the scan. Each profile has a list of fields that can be edited providing full control over the measurement process.

- **Operation.** Defines what data format to send to SA. This can include points, clouds, geometry or a combination of such.

Stationary Measurements

Total Stations Interface provide 3 levels of accuracy. The difference between these modes is the measure time:

- **Fast Point.** Performs a 1/2 second measurement

- **Standard Point.** Performs a 2 Second Measurement

- **Precise Point.** Performs a 5 second measurement, not available in all scopes.

Any measurement profile can be set to use these modes but basic controls are easily apparent when using the instrument toolbar (Figure 5-112).
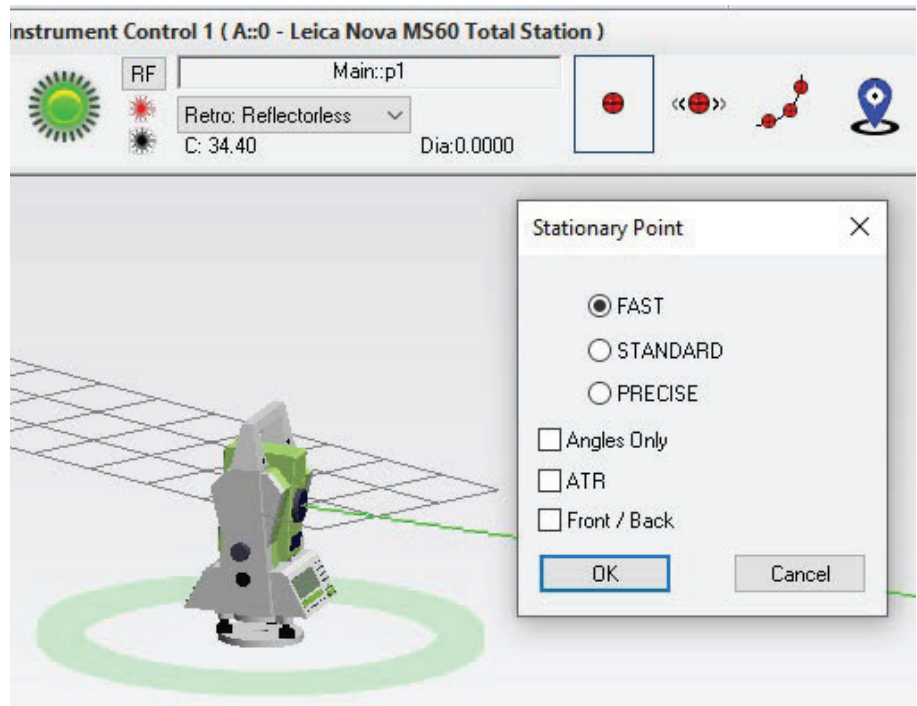
Figure 5-112. Stationary Measurement Modes

Additional controls include:

- **Angles Only.** These measurements
- **ATR.** The ability to turn ATR on or off is available for applicable targets.
- **Front/Back.** Offers the ability to automatically perform a front/back face measurement. The Instrument Settings also offer an option to enable or disable prompting for back face measurements (see Figure 5-109).

Stable Point Measurements

Stable point measurements use a scan operation. The move distance and duration threshold can be adjusted in the Settings. Stable point measurements can also be used with either Fast, Standard or Precise measurement modes.

Perimeter Scan

This profile provides the ability to perform a grid scan within a defined perimeter. Use the **Line Spacing** and **Point Spacing** to define a grid of evenly spaced lines and equally spaced points along the lines. To use the profile it must be opened and a perimeter selected from within SA or a set of points that are used to define a perimeter.

Nova Scan Profile (MS60 Only)

Scanning with the MS60 is accomplished using the **Nova Scan** Measurement profile (Figure 5-113).
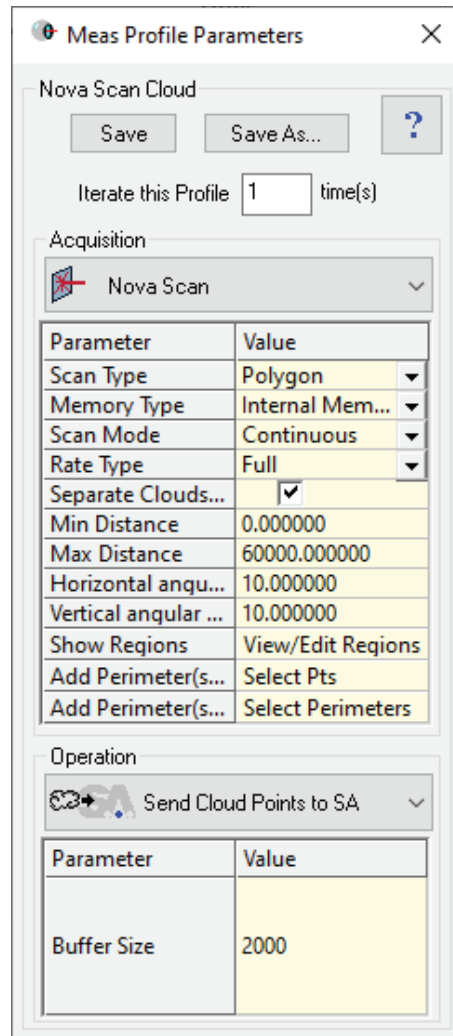
Figure 5-113. Nova Scan Measurement Profile

- **Scan Type.** Choose the scanning Method. The polygon is the most common scan, using the selected perimeter or points defining a perimeter. Rectangle is a simple version of this, using only 2 points to define a rectangular area. Dome scans are also available for newer MS60 models and can be used with 2 points to define a band (where the 2 points define the upper and lower limits of the band). A Dome scan without any points selected will perform a full 360 room scan.

- **Memory Type.** The scan data is first saved locally either on the scope or the SD card in the instrument.

- **Scan Mode.** Continuous is the typical method and performs a continuous scan. Point to Point can also be used for greater accuracy and uses a stope and go progression from point to point.

- **Rate Type.** The resolution settings for the scan can be adjusted here. The MS60+ can now accept specific rates up to 30KHz.

- **Separate Clouds Option.** When enabled this option saves scans of separate polygons as separate clouds in SA.

- **Min & Max Distance.** The Min and Max distance settings are used as filters to limit data collection beyond these values. *The Min Distance and Max Distance headers can be used as buttons to measure the current beam distance.*

- **Horizontal & Vertical Angles.** The Vertical and Horizontal angles options are also filters that limit the extents of the scan. *These headers can also be used as buttons to measure the beams current orientation.*

- **Show Regions.** Opens a dialog displaying the currently defined regions saved in the measurement profile.

- **Add Perimeters.** These options are used to select perimeters or points defining perimeters from within SA and will initiate a selection mode.

Instrument Toolbar

The Total Stations interface also supports its own instrument toolbar. This streamlined interface provides direct access to the most common functions (Figure 5-114).

Figure 5-114. Total Stations Toolbar.

Available operations include:

- **Beam Status.** As well as showing the current status of the beam you can double click on it to issue a Find Target command.

- **RF.** The RF button is short for Reverse Face and can be used for that application.

- **Laser Controls.** The Red and Black icons control the On and Off switch for the instruments laser respectively.

- **Point Name Control.** The point name control is used to define the starting name for the next measured Collection Group and Target. When scanning the group name will be used for the

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point cloud.

- **Reflector Selection.** At the bottom of the reflector selection drop-down list is an option to "*Define Target*" which will open the reflectors and targets database. The Constant and probe diameter of the selected reflector are shown.

- **Single Point.** Right-click on any of the single point measurement modes to access point measurement settings (see Figure 5-112). The same options are also available for Stable point measurements.

- **Spatial Scans.** Spatial scans can be performed by many total stations. Right-click to access the spatial increment, stable start, and Loop & Iterate trapping controls.

- **Tracking.** When tracking is On the instrument will constantly send position updates to SA for watch window applications and dynamic monitoring.

- **Power search.** Powersearch Left and Right icons. The power search region can be enabled within the settings.

- **Level Compensator Status.** The level compensator status icon can be used to turn on and off the level compensator.

- **Alarm Icon.** The alarms icon provides access to the current instrument settings for weather, level, battery, and RMS. Warning thresholds can be set for these values.

- **Settings.** Provides direct access to instrument specific settings including target measurement and powersearch options.

- **Battery Icon.** Displays the current battery status.

- **Joystick/Camera Control.** Offers access to the direct instrument drive controls and the instrument camera when available.

- **Switch Interfaces Icon.** This button provides the ability to switch to the full interface.

Additional Utilities

Additional instrument specific settings and utilities can be found in the instrument settings and under the Utilities menu. The following notes may be helpful:

SA Remote 4+
New River Kinematics, Inc.
Designed for iPad
★★★★★ 5.0 • 1 Rating
Free

SpatialAnalyzer

- **Battery Status.** The battery Status can be found by double clicking on the Beam state display or by going to **Utilities>Tkr Status.**

- **UDP Data Stream and SA Remote.** The Total Station interface offers the ability to connect and drive the instrument using the SA Remote app which can be downloaded from you're Apple App Store. Refer to the Users Manual for more information. An Android app is also available for download from the Kinematics web page.

AutoMeasure Operations

The total station interface offers the ability to use manu of the auto measure operations from within SA including:

- **Auto Measure Points.** Provides a means to measure a group of points automatically in any way needed.

- **Auto Measure a Vector Group.** Is similar to measuring points, offers full control and uses a vector group as a reference.

- **Measure Batch of Vectors.** This automated option also measures a set of vectors but does so using a Surface Vector Intersection algorithm such that it searches along a nominal vector to find the point at which this vector intersects the actual surface. The tolerances can be adjusted within the total Station Properties using the SVI Settings button.

Total Stations Interface MP Commands

Total Stations	
Basic Operations	
Start Instrument Interface	Starts the Total Station Interface. Use interface Type 0 in Argument 3 for the Leica Total Station and 1 for the Theodolite Manager
Set Instrument Measurement Mode/Profile	Offers an option to set the active Measurement Profile.
Set Instrument Group and Target	Offers a means to set the Group and Target Names for the next measurement.
Measurement Controls	
Auto Measure Points	Performs a points based automatic measurement
Auto-Measure Vectors	Performs a vector group based automatic measurement
Auto-Measure Surface Vector Intersections	Performs a surface vector intersection measurement at each point location.
Configure and Measure	Measures a point using the specified name and meas profile
Point At Target	Points at a selected point
Instrument Operational Checks	
Set Laser On	Turns on the red laser pointer
Set Laser Off	Turns off the red laser pointer
PowerSearch	PowerSearch performs an automatic and rapid search for a prism.
Set Tracking On	Enables Tracking, an already targeted prism is followed automatically.
Set Tracking Off	Disables Tracking
Set ATR On	Enables ATR (Automatic Target Aiming) for precision target centering
Set ATR Off	Disables ATR centering