

NXT Pro

WARRANTY

The manufacturer shall make standard a warranty for the thermal imager, its battery and all features installed in the thermal imager to be free of defects in material and workmanship, under normal use and service, for a period of five years. The product registration date considered for warranty must include a 30 days grace period after manufacture date, and extend three (3) months after the product manufacture date. The manufacturer must provide a warranty which covers all required battery replacements for a period of five years.

SERVICE

The manufacturer must be located in the U.S.A. and provide a full-service repair center in the U.S.A. and Germany to ensure timely and efficient processing of any service issues concerning the imager around the globe. Any repair, warranty or non-warranty, that requires an imager be shipped to a service center, may be temporarily replaced, at the discretion of the manufacturer, with a loaner imager, free of charge, to satisfy usage needs during the repair period. This loaner imager may stay with the end user until the repaired imager is returned to the possession of the end user.

The imager should be designed such that silicon boots and window covers are available for separate purchase and can be replaced by a trained technician of the fire department.

STANDARDS / QUALITY

The manufacturer must ensure quality design and manufacturing methods through third party certification to ISO 9001:2015, or its equivalent. To ensure that the product is of the highest quality, documentation must be presented upon request illustrating a battery of tests that have been conducted to verify water resistance, heat resistance, and shock/ impact resistance.

The imager must be compliant to NFPA 1801, Standard on Thermal Imagers for the Fire Service, 2021 Edition at the time of delivery. The imager must be suitable for use in at least Class I, Division 2, Groups C and D and Class II, Division 2, Groups F and G hazardous locations, and with a T6 temperature class.

PHYSICAL CONFIGURATION

The imager shall be a hand-held design with a total weight not exceeding 2.4 pounds (1.1 kg) with all standard features installed. The imager's physical dimensions shall not exceed 5.4" (137 mm) tall, 4.6" (117 mm) wide, and 8.2" (208 mm) long. The imager shall ship in cardboard packaging. A waterproof flight case is available as an option.

DURABILITY

The imager shall remain operational after being submerged under 3 feet (1m) of water for 30 minutes according to IEC 60529 (IPx7). The imager shall withstand a 6 feet (2m) drop in any orientation and sustain no operational damage. The imager shall be able to withstand an environment temperature of 300° F (150° C) for 15 minutes without operational impact or damage to the unit. The manufacturer must perform these tests in front of designated department representatives at a mutually determined time and location. Failure to perform these tests in front of designated department representatives shall constitute non-compliance with this portion of the specification.

SENSOR

The imaging array shall utilize a 640x512 pixel uncooled vanadium oxide (VOx) focal plane array. The dynamic range of the detector and associated electronics shall be nominally 1200°F (649°C).

The detector spectral response shall be 8 to 14 microns. Mid or short wave infrared products that operate below this portion of the infrared spectrum (below 8 microns) are not acceptable due to unreliable performance in smoky conditions. The frame rate of the infrared engine shall be no less than 60 Hertz.

The imager will use gain modes to cover the full object temperature range. Switching between these gain modes will be automatic and not include a forced shutter operation that may take several seconds. The mode switching will therefore be perceived as instantaneous and will not introduce risks of missing information.

DEFAULT IMAGE

The image shall be enhanced with software. Contours and edges in the image shall be highlighted in white, such that the user can easily recognize important details in the scene.

The lower temperatures shall be colorized black to white (with white for the hottest objects).

To provide a greater degree of safety, the imager shall utilize an automatic colorization mode for higher temperatures. This colorization mode shall utilize a yellow/orange/red color scheme.

Two colorization schemes shall be available, only configurable while the imager is connected to a configuration tool on a pc. For safety reasons, the user should not be able to switch between these colorization schemes while using the imager in the field.

- In the default mode, the display will show yellow colorization at temperatures of 500°F (260°C) to 799°F (426°C), orange colorization at temperatures of 800°F (427°C) to 999°F (537°C), red colorization at temperatures of 1000 °F (538°C) to 1100 °F (592°C) and dark red for hotter temperatures until the saturation occurs.
- In the alternate mode the display will show yellow colorization at temperatures of 302°F (150°C) to 571°F (299°C), orange colorization at temperatures of 572°F (300°C) to 841°F (449°C), red colorization at temperatures of 842 °F (450°C) to 1100 °F (592°C) and dark red for hotter temperatures until saturation occurs.

Such colorization shall be gradual and appear transparent to be able to discern scene details and thermal flows through the color.

While Manual Colorization Modes and other features may be present on the imager, a mechanism should exist to return to the default image automatically when a set threshold of pixels registers a dangerously high temperature.

SCREEN

The imager shall have a 3.5" (89 mm) Liquid Crystal Display (LCD) screen with 228 pixels per inch (PPI) or more. The screen shall have Planar Switching (IPS) technology with view angle of 85° in all directions, enabling multiple firefighters to see the image at the screen. The screen must be visible both in thick smoke as well as in sunny conditions to the operator while using it at arms-length. In addition, a clear polycarbonate cover must protect the display screen. This cover must be field-replaceable, watertight and of a scratch resistant material.

LENS

The imager shall have a 40° V x 50° H field of view.

The lens shall be protected with a watertight, sealed 2 mm thick germanium cover window. The germanium window cover shall be large enough to be glove cleanable. The window cover shall be curved to reduce reflections to a minimum.

SWITCHES, FEATURES, AND MODES OF OPERATION

The imager shall use only one switch to activate the unit. The switch shall employ a press-and-hold protection mechanism which prevents accidental shut-off.

During operation, a single press of the main power switch must always return the imager to the default image (for standard firefighting, also known as TI BASIC mode) regardless of current operational state or mode.

The imager must employ a secondary pair of switches for activating and adjusting advanced features and entering TI BASIC PLUS mode.

With the use of the pair of switches an intuitive on-screen menu can be operated to select the either of the following image modes:

- a manual colorization mode, which helps the user identify the hottest objects in a scene irrespective of absolute heat levels. This colorization mode must be manually adjustable by the user and colorize the hottest objects in a scene with blue, using gradients of blue to discern scene details though the color. When sufficient pixels reach the threshold where the imager would normally color them yellow, orange or red, a safety kick out mechanism will bring the user back to the default image. Thermal imagers which employ yellow, orange, or red to identify hot objects below the automatic yellow-orange-red colorization are not acceptable as they can easily be confused with the automatic colorization modes which typically use such colors to designate fire and high heat conditions.
- A digital zoom option for better scene understanding. The zoom feature will offer 2x or 4x magnification, and automatically recalibrate on the zoomed area for best performance.
- an on-screen playback functionality for playing the recorded videos and snapshots on the imager display, such that quick tactical discussions can be supported with thermal footage.

The following registration features shall be available under one single button by means of a short or long press:

- image capture functionality for taking snapshots of the scene. Stored snapshots shall download to the user's computer via a USB connection.
- a recording functionality for taking videos. Stored digital video shall download to the user's computer via a USB connection. A time and date stamp shall be included in the recorded video for documentation purposes.

Furthermore, the following features which are especially beneficial in high-stress situations shall be available as always-on, such that operation doesn't distract the user:

- A highlighter mode that always indicates the hottest point in the scene with a red square, to quickly draw attention to that point.
- A highlighter mode that always indicates the coldest point in the scene with a blue square, to quickly draw attention to that point.
- An always-on recording feature for continuous registration of thermal footage. When this mode is active, the imager shall still permit to capture images with a button press.

CONFIGURATIONS AND CUSTOMIZATION

The imager shall be available in different configurations, but at least in the following three:

- A configuration without additional manual colorization modes or features
- A configuration with all available additional manual colorization modes or features
- A configuration with all available additional manual colorization modes or features except for features that enable recording, image capture or replay.

No matter which configuration is purchased the following means of customizing the imager shall be available:

- An on-screen menu that enables setting of time and date. This enables including a regular check into a maintenance procedure that doesn't require access to a PC. To avoid accidental access to this menu, it must require two buttons to be pressed for multiple seconds.
- An online customization tool that allows the end-user to activate individual features, adjust individual features, and set a custom image for the startup screen. This level of customization requires the imager to be connected to a computer with USB cable and requires a username and password, such that non-intentional or non-authorized changes are unlikely.

A four-digit access code can be set up such that the following elements are only available to users with the code: downloading/deleting recorded footage, changing time and date, changing settings with the online customization tool.

All configuration or customization tools shall be fully online or on-imager, and not require software to be installed on a PC.

SIMPLICITY AND APPLICATIONS

The thermal imager will be used in many different situations such as fire attack, person search, overhaul, size up, smells and bells, and wildland firefighting. Training will be centered on how to use multi-purpose features to different use cases. To avoid complexity, the imager shall only have (multi-purpose) functional modes that can be employed in many situations. No specific use case modes (e.g. person search, search mode) may be available as the training for such modes is not scalable.

OUTER HOUSING

The imager shall be ergonomically designed. A slight bend in the axis between the lens and the display shall naturally discourage the user from keeping the imager directly between the eyes and the object of attention, and therefore reduce the risk of missing any information.

The outer shell or housing must be manufactured from heat resistant Ultem® thermoplastic. Due to the likelihood of rigorous use, the thermoplastic must be molded with color pigment throughout to mask small surface scratches. Outer shells or housings which are painted or otherwise lacking consistent color through their entire thickness are not acceptable. Model and brand logos shall be pad printed on the imager for the same reason.

IDENTIFICATION

The imager shall be available in no fewer than six scratch-resistant colors to allow for color-coding as needed by the department. All lower housings shall be presented in black, with the upper housing to include options for the following colors at minimum: Red, Yellow, Black, Orange, Blue, and Lime-Yellow.

The imager shall be customizable by the user with a startup image. This image may serve to identify the imager with for example a department logo, fire engine number, asset ID, or any other image as provided by the user.

STRAP SYSTEMS

To reduce bulk, the imager must not have an integral strap system; however, the imager shall accommodate an available self-retracting strap. This retractable strap shall be attachable to a D-ring at the base of the thermal imager, under the display, and must be capable of holding the unit to the firefighter's body with the full weight of the imager, with battery, hanging unsupported from the strap. All straps must be field replaceable.

POWER SUPPLY

When fully charged, the imager shall provide a minimum of 6 hours of continuous use.

The imager shall have an internal battery that can be charged wirelessly such that contacts that can corrode over time are absent. .

TRUCK AND STATION CHARGER

The manufacturer must offer a wireless charging system to mount the imager in a vehicle or fire apparatus or on the wall of a fire station. The system must be designed to be mounted securely in accordance with NFPA 1901-14.1.10.2 and DIN EN 1846-2 5.1.2.2.2 when storage of the imager in a vehicle is required. The truck mount must carry a two-year warranty.