RT-3, RT-5x, RT-7x and RT-9x
Thermal Imagers

⚠ WARNING!

Read this Operator's Manual carefully before using this tool. Failure to understand and follow the contents of this manual may result in electrical shock, fire and/or serious personal injury.

Thermal Imagers	
Record Serial Number below and retain product serial number which is located on nameplate.	
Serial No.	

Safety Symbols

In this operator's manual and on the product, safety symbols and signal words are used to communicate important safety information. This section is provided to improve understanding of these signal words and symbols.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE NOTICE indicates information that relates to the protection of property.

This symbol means read the operator's manual carefully before using the equipment. The operator's manual contains important information on the safe and proper operation of the equipment.

This symbol means always wear safety glasses with side shields or goggles when handling or using this equipment to reduce the risk of eye injury.

This symbol indicates the risk of electrical shock.

General Safety Rules

⚠ WARNING

Read all safety warnings and instructions. Failure to follow the warnings and instructions may result in electric shock, fire and/or serious injury.

SAVE ALL WARNINGS AND INSTRUCTIONS FOR FUTURE REFERENCE!

Work Area Safety

- **Keep your work area clean and well lit.** Cluttered or dark areas invite accidents.
- **Do not operate equipment in explosive atmospheres, such as in the presence of flammable liquids, gases or dust.** Equipment can create sparks which may ignite the dust or fumes.
- **Keep children and by-standers away while operating equipment.** Distractions can cause you to lose control.

Electrical Safety

- **Avoid body contact with earthed or grounded surfaces such as pipes, radiators, ranges and refrigerators.** There is an increased risk of electrical shock if your body is earthed or grounded.
- **Do not expose equipment to rain or wet conditions.** Water entering equipment will increase the risk of electrical shock.

Personal Safety

- **Stay alert, watch what you are doing and use common sense when operating equipment. Do not use equipment while you are tired or under the influence of drugs, alcohol or medication.** A moment of inattention while operating equipment may result in serious personal injury.
- **Use personal protective equipment. Always wear eye protection.** Protective equipment such as dust mask, non-skid safety shoes, hard hat or hearing protection used for appropriate conditions will reduce personal injuries.
- **Do not overreach. Keep proper footing and balance at all times.** This enables better control of the power tool in unexpected situations.

Equipment Use and Care

- **Do not force equipment. Use the correct equipment for your application.** The correct equipment will do the job better and safer at the rate for which it is designed.
- **Do not use equipment if the switch does not turn it ON and OFF.** Any tool that cannot

be controlled with the switch is dangerous and must be repaired.

- **Remove the battery pack from the equipment before making any adjustments, changing accessories, or storing.** Such preventive safety measures reduce the risk of injury.
- **Store idle equipment out of the reach of children and do not allow persons unfamiliar with the equipment or these instructions to operate the equipment.** Equipment can be dangerous in the hands of untrained users.
- **Maintain equipment.** Check for missing parts, breakage of parts and any other condition that may affect the equipment's operation. If damaged, have the equipment repaired before use. Many accidents are caused by poorly maintained equipment.
- **Use the equipment in accordance with these instructions, taking into account the working conditions and the work to be performed.** Use of the equipment for operations different from those intended could result in a hazardous situation.
- **Use only accessories that are recommended by the manufacturer for your equipment.** Accessories that may be suitable for one piece of equipment may become hazardous when used with other equipment.
- **Keep handles and grasping surfaces dry, clean and free from oil and grease.** Slippery handles and grasping surfaces do not allow for safe handling and control of the tool in unexpected situations.

Service

- **Have your equipment serviced by a qualified repair person using only identical replacement parts.** This will ensure that the safety of the tool is maintained.

Specific Safety Information

⚠ WARNING

This section contains important safety information that is specific to this inspection tool.

Read these precautions carefully before using the RIDGID® Thermal Imagers to reduce the risk of electrical shock or serious personal injury.

SAVE ALL WARNINGS AND INSTRUCTIONS FOR FUTURE REFERENCE!

Keep this manual with the tool for use by the operator.

Thermal Imager Safety

- **Do not use the thermal imagers as a control device.** Only use as a measuring device. This will reduce the risk of damage or injury in case of low battery, malfunction or false measurement**.**
- **Take appropriate precautions when working near electrical, moving or hot parts.** Close contact may cause electrical shock, entanglement, burns and other serious injury. Protective equipment may be required.
- **Do not use this device for personal inspection or medical use in any way.** This is not a medical device. This could cause personal injury.
- **Do not operate the equipment if operator or device is standing in water. Do not expose the equipment to water or rain.** This increases the risk of electrical shock.
- **Do not open or disassemble the thermal Imager or battery.** There are no user serviceable parts. Have repairs performed only at authorized locations. Opening or disassembling the thermal imager or batteries may cause electrical shock or personal injury.
- **Do not use thermal imager or battery if either has been dropped, modified or damaged in any way.** Modified or damaged thermal imager or battery increases the risk of electrical shock.
- **Do not probe thermal imager or battery terminals with conductive objects.** Shorting of terminals may cause sparks, burns or electrical shock.

Battery Safety

- **Follow all charging instructions and do not charge or store the battery pack outside the temperature range specified in the instructions.** Charging or storing improperly or at temperatures outside the specified range may damage the battery and increase the risk of battery leakage, electrical shock or fire.

- **Use appropriate Thermal Imager and Battery combinations.** *See batteries listed in the Optional Equipment* section for use with the thermal imager. Using equipment and batteries that are not rated for use together can cause the battery to burst, fire or personal injury.
- **Avoid contact with battery fluids.** Fluids may cause burns or skin irritation. Thoroughly rinse with water in case of accidental contact with fluid. Consult doctor if fluid comes into contact with eyes.
- **When battery pack is not in use, keep it away from other metal objects, like paper clips, coins, keys, nails, screws or other small metal objects that can make a connection from one terminal to another.** Shorting the battery terminals together may cause burns or a fire.
- **Do not burn battery or expose to high temperatures.** High temperatures can cause the battery to explode.
- **Properly dispose of batteries.** Do not burn. When disposing, place tape over battery terminals to prevent shorting. Batteries are Li-Ion and should be recycled. Follow all applicable local regulations for disposal of batteries. *Refer to Disposal* section.

RIDGID Contact Information

If you have any question concerning this RIDGID® product:

– Contact your local RIDGID distributor.
– Visit RIDGID.com to find your local RIDGID contact point.
– Contact Ridge Tool Technical Service Department at rtctechservices@emerson.com, or in the U.S. and Canada call (800) 519-3456.

Description

The RIDGID® Models RT-3, RT-5x, RT-7x and RT-9x Thermal Imagers are handheld equipment which detect infrared radiation and provide images for contactless determination of surface temperature distribution.

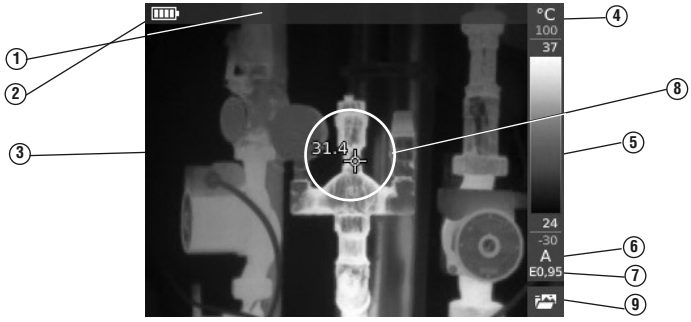
Thermal images reveal different temperatures as different colors.

Controls

No.	Control/Parts	Icons	Description
1	Display	—	Displays infrared and real images, menu and functions.
2	USB Port Cover	—	Contains micro USB interface for power supply and connection to the computer.
3	Power/Escape Key	Esc	Power Key - Switch camera ON and OFF./Escape Key - Cancels action.
4	OK Key/Joystick	OK	OK Key - Open menu, select function, confirm setting./Joystick - Navigate within the menu, highlight function, select color palette.
5	Quick Select Button		Opens the function assigned to the quick select button.
6	Infrared Camera Lens	—	Takes infrared images.
7	Digital Camera Lens	—	Takes real images (RT-5x, RT-7x and RT-9x only).
8	Trigger	—	Saves the displayed image.
9	Battery Compartment	—	Holds the rechargeable battery.
10	Serial Number	—	Serial Number.

Figure 1 – Thermal Imager

Screen



No.	Screen Element	Description
1	Status Bar	In the status bar, information may be displayed depending on the setting.
2	Battery Capacity/ Charge Status	• : Battery operation, capacity 75-100% • : Battery operation, capacity 50-75% • : Battery operation, capacity 25-50% • : Battery operation, capacity 10-25% • : Battery operation, capacity 0-10% • : Mains operation, battery is charging.
3	Image Display	Infrared image or real image display.
4	°C or °F	Temperature units.
5	Scale	• Grey characters: measuring range. • White characters: temperature margin of the image displayed, showing the minimum/maximum reading (with automatic scale adjustment) or the selected minimum/maximum display value (with manual scale adjustment).
6	A, M or S	A - automatic scale adjustment. M - manual scale adjustment. S - ScaleAssist is enabled.
7	E ...	Emissivity setting.
8	Cursor	Point that temperature on screen is being measured. Round center indicates IFOV warner OFF, Square center indicates IFOV warner ON.
9	Quick Select Button Function	Displays the chosen Quick select function.

Figure 2 – Thermal Imager Screen

Icon	Menu Item	Function
	Image Gallery	Opens an overview of saved images.
	Scale (This function is only available if the Image type is set to infrared)	Set scale limits.
	Emissivity (This function is only available if the Image type is set to infrared)	Set emissivity (E) and reflected temperature (RTC).
	Palette	Toggles the palette selection.
	Adjustment (This function is only available available if the Image type is set to infrared)	Manual calibration. The camera automatically calibrates approximately every 60 seconds. If desired, manual calibration can be carried out at any time.
	Image Type	Alternately switches the image display between infrared and real image.
	Zoom (RT-9x only)	Enlarges the image section (2x, 3x, 4x).

Figure 3 – Quick Select Button Icons

Other Icons (Appear in Status Bar)

Icon	Function
Wi-Fi icons	
	App is connected.
	No connection to the App.

Specifications

Parameter	RT-3	RT-5x	RT-7x	RT-9x
Measuring Range	-4 to 536°F (-20 to 280°C)	-22 to 1202°F (-30 to 650°C)	-22 to 1202°F (-30 to 650°C)	-22 to 1202°F (-30 to 650°C)
Accuracy	± 2 °C / ± 2% (Whichever is greater) -22 to -8°F (-30 to -21°C) Measuring Range ± 5.4°F (± 3°C)			
Measurement Functions	• Single point • Cold spot • Hot spot • Differential temperature • Scale Assist • IFOV warner	• Single point • Cold spot • Hot spot • Differential temperature • Scale Assist • IFOV warner • E-Assist	• Single point • Cold spot • Hot spot • Differential temperature • Scale Assist	• IFOV warner • E-Assist • Ambient Temperature, Ambient Humidity and Electrical information can be entered manually for future reference
Display Options	• Infrared image	• Infrared image • Real image		
Infrared Resolution	160 x 120 pixels, 3.4 mrads	160 x 120 pixels, 3.4 mrads	240 x 180 pixels, 2.6 mrads	320 x 240 pixels, 2.3 mrads
Super Resolution Optional Feature	320 x 240 pixels, 2.1 mrad	320 x 240 pixels, 2.1 mrad	480 x 360 pixels, 1.6 mrad	640 x 480 pixels, 1.3 mrads
Thermal Sensitivity (NETD)	<120 mK	<100 mK	<90 mK	<60 mK
Field of View (FOV) /Min. Focusing Distance	31° x 23° / <0.5 m	31° x 23° / <0.5 m	35° x 26° / <0.5 m	42° x 30° / <0.5 m
Spectral Range	7.5 - 14 µm			
Focus	Fixed Focus			
Digital zoom	—	—	—	2x, 3x, 4x
Visual Image Size/ Min. Focusing Distance	—	3.1 MP / 0.5 m	3.1 MP / 0.5 m	3.1 MP / 0.5 m
Display	8.9 cm (3.5") TFT			
Color Palettes	4 options: • Iron • Rainbow HC • Cold-hot • Grey			10 options: • Iron • Inverted grey • Rainbow HC • High temp • Cold-hot • Humidity • Grey • Rainbow • Blue/red • Sepia
File format	• jpg • bmt • Option of exporting in, .bmt, .jpg, .png, .csv and .xls			
Internal Mass Storage	2.8 GB			
Interface	• USB 2.0 micro B	• Wi-Fi • USB 2.0 micro B		
Battery Type	Li-Ion Rechargeable Battery 2500 mAh / 3.7 V			
Operating Time	4.0 h @ 20 °C			
Operating Temp.	5 to 122 °F (-15 to 50 °C)			
Storage Temp.	-22 to 140 °F (-30 to 60 °C)			
Humidity	20 - 80 %RH, Not Condensing			
Protection Class	IP 54			
Weight (w/Battery)	1.12 lbs. (0.51 kg)			
Dimensions	8.6" x 3.78" x 3.74" (219 x 96 x 95 mm)			

Standard Equipment

The RT-3, RT-5x, RT-7x and RT-9x Thermal Imagers comes with the following items:

- Carry Case
- Li-Ion Battery
- Lanyard
- AC Adapter
- USB Cable
- Operator's Manual
- E-Assist Emissivity Decals (not with RT-3)

NOTICE This equipment is used to make temperature measurements. Incorrect set up and use or improper application may result in incorrect or inaccurate measurements. Selection of appropriate measurement methods for the conditions is the responsibility of the user.

Installing the Lanyard

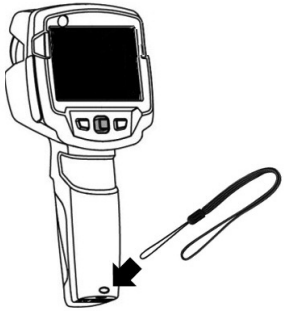


Figure 4 – Installing the lanyard

Powering the Unit

⚠ WARNING

To reduce the risk of serious injury during use, follow these procedures for proper assembly.

Power is supplied via replaceable rechargeable battery or the provided USB cable and AC adapter (battery must be inserted).

The thermal imager is equipped with a buffer battery to maintain system data during power interruption (such as when the rechargeable battery is removed changed).

Changing/Installing Battery

1. Switch unit OFF and remove any connections.
2. Slide the battery compartment cover down to remove *(Figure 5A)*.
3. Push the battery to release and remove *(Figure 5B)*.
4. Insert the new battery and slide upwards until it clicks into place *(Figure 5C)*.
5. Close the battery compartment *(Figure 5D).*

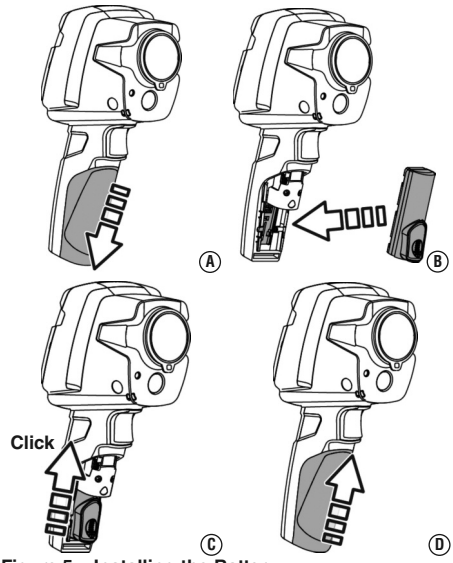


Figure 5 – Installing the Battery

Charging Battery

A new battery should be charged for 3 hours minimum before first use. If the battery has been completely drained, the charging time is approx. 5 hours.

1. Open the USB port cover.
2. Connect the USB cable to the thermal imager USB Interface *(Figure 6).*
3. If using the AC Adapter, insert the USB cable into the AC adapter.
4. With dry hands, either
   - Insert the AC adapter into an appropriate electrical outlet.
   - Insert the USB cable into a powered USB Port.

   The battery will begin charging automatically.

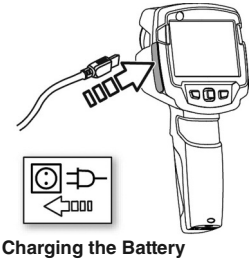


Figure 6 – Charging the Battery

Pre-Operation Inspection

⚠ WARNING

Daily before use, inspect your Thermal Imager and correct any problems to reduce the risk of serious injury from electric shock and other causes, and prevent equipment damage.

1. Make sure the unit is OFF.
2. Remove the battery and inspect for signs of damage. Replace if necessary. Do not use if the battery is damaged.
3. Clean the equipment. See Maintenance Instructions. This aids inspection and helps prevent the tool from slipping from your grip.
4. Inspect the locator for the following:
   - Proper assembly, maintenance and completeness.
   - Any broken, worn or missing parts.
   - Inspect the camera lens for condensation. To avoid damaging the unit, do not use the camera if condensation forms inside the lens. Let the water evaporate before using.
   - Presence and readability of the product and battery labels *(Figure 1)*.
   - Any other condition which may prevent safe and normal operation.

   If any problems are found, do not use the thermal imager until the problems have been repaired.
5. Inspect and maintain any other equipment being used per its instructions to make sure it is functioning properly.

Set-Up And Operation Instructions

⚠ WARNING

Do not use the thermal imager as control device. Only use as a measuring device. This will reduce the risk of damage or injury in case of low battery, malfunction or false measurement.

Follow set up and operating instructions to reduce the risk of injury or incorrect measurements and to prevent tool damage.

1. Confirm have appropriate work area (*See General Safety Rules)*. Operate in clear, level, stable, dry location.Do not use the thermal imager while standing in water.
2. Determine the correct equipment for the application, *see Description* and *Specifications* sections.
3. Make sure all equipment has been inspected and set up as directed in their instructions.

Initial Start-Up

Turning ON And OFF

1. Turning ON: Remove the protective cap from the unit lens. Press the Power Escape Key (⏻). The thermal imager turns ON and the start screen appears on the display. The thermal imager starts a warm up period that lasts 10 minutes. During the warm up and equalization period, the accuracy tolerance of the thermal imager is greater than specification.

   During the warm up period and approximately every 60 seconds during use, the thermal imager automatically re-calibrates to guarantee measuring accuracy. This is indicated by an audible "click" and the screen image briefly freezing.

   When the thermal imager is on, an image is displayed on the screen. When turning unit on for the first time, go to the “Configuration Settings” to set language, time/date and temperature units, if needed
2. Turning OFF: Press and hold down the Power/Escape Key (⏻) until the progress bar on screen is complete. The display goes OFF and the camera is switched OFF.

Menu

Press OK key to open the menu. Move the Joystick up/down to highlight a function (red border) *(Figure 6)*. Press OK key to select the function. Move the joystick to right to open the submenu (marked with >). Press OK key to select the function.

To return to the main menu, move the joystick to

the left or move the joystick to the menu bar and press OK key.

Figure 7 – Menu Functions

Quick Select Button

The user can assign certain functions to the quick select button, to call up at the touch of a button. *See Figure 3* for available functions.

1. Move the joystick to the right. The Configure key selection menu appears. The activated function is marked with a dot (●).

Figure 8 – Assigning Quick Select Function

2. Move the joystick up/down until the red box appears around the required menu item. Press OK key. The quick select button is assigned to the selected menu item. The icon for the selected function is displayed bottom right.
3. Press the Quick Select Button ( ). The function assigned to the quick select button is carried out.

Measurements

NOTICE High thermal radiation (e.g. due to sun, fire, furnaces) may damage the Detector. To prevent damage to the thermal imager, do not point directly at the sun or other intense light sources. Do not point at objects with temperatures outside the measuring range of the tool, see specifications.

NOTICE The accuracy of the thermal imager temperature measurements depends on the specific settings of the tool. Emissivity and Reflected Temperature settings can significantly affect accuracy. If using the Automatic Scaling function, the color assigned to a temperature is continuously changing, and color should not be used to compare temperatures. Use a fixed scale if color will be used to compare temperature.

These conditions can significantly affect the accuracy of measurements with thermal imagers:

- Emissivity and reflected temperature settings.
- When performing building thermography (investigating heat moving through the building shell), a greater difference between inside and outside temperature (ideal: ≥ 15°C/≥ 27°F) improves accuracy.
- Weather conditions that can create large changes in temperature (Such as intense sunlight heating a surface, winds or rain that can significantly cool a surface).
- The thermal imager requires a warm up and equalization period of up to 10 minutes after being turned on to maximize accuracy.
- Distance to surface. The surface must be recognizable and clear, and larger than the IFOV warner cursor.

It is the operator's duty to evaluate these conditions to assess the effect of the condition and quality of the measurements.

Saving An Image

1. Focus on the area for which image is to be taken.
2. Press Trigger. The image is automatically saved.

   Regardless of the image type set, an infrared image is saved with an attached real image (except RT-3).

Figure 9 – Saving an Image

3. If a higher resolution is required, in the menu under Configuration, select SuperResolution.

Setting Measuring Functions

1. Open the Measurement submenu. The submenu with the measurement functions opens.

   Pixel Mark:

   Single point measurement: the temperature measuring point in the center of the image is marked with white crosshairs and the value is displayed.

   Min/Max On Area (RT-9x Only):

   Min/max on area: the minimum, maximum and mean values for a selected area are displayed.

   Cold spot, Hot spot: the lowest or highest temperature measuring point within the range selection is marked with blue or red crosshairs and the value is displayed.

   Measuring Range: choose between two temperature ranges. (RT-3 single temperature range only).

   Differential Temperature: identifies the difference between two temperatures.

   External Measurement Values: select Humidity, Current, Voltage, Solar, Power, None.

   IFOV: When on, the IFOV warner shows a square center on the cursor that indicates the smallest surface that can be used for measuring temperature.

   Zoom: enlarges the image section (2x, 3x, 4x), for RT-9x only.

2. Move the joystick up/down to select the required function and then press OK.

Image Gallery

Saved images can be displayed, analyzed or deleted. The Image Gallery is not available when Wi-Fi is enabled.

File Names

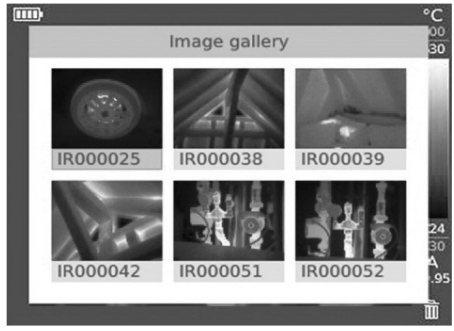


Figure 10 – Image Gallery

Designation	Explanation
IR	Infrared image with attached real image
000000	Consecutive number
SR	Images captured with SuperResolution

File names can be changed by connecting the thermal imager to computer and saving the file to a new location on the computer.

Displaying A Saved Image

Saved images can be viewed and analyzed in the image gallery.

When SuperResolution is enabled, 2 images are saved in the image gallery (an IR image, and a real image). The high-resolution SuperResolution image is saved in the background. In the status bar, the number of SuperResolution images to be saved is displayed. A maximum five (5) SuperResolution images can be processed simultaneously.

1. Select the Image gallery function. All saved images are displayed in the form of an infrared preview.
2. Move joystick to select an image.
3. Press OK to open the selected image. The image is displayed.

Analyzing An Image

If an image is saved with SuperResolution, the image gallery contains an (IR) image and a high-resolution real image (SR). The images show the

same image section. They can be displayed and analyzed in the image gallery.

The measurement functions Single point measurement, Hot spot, Cold spot, Min/Max on Area and Differential temperature can be used to analyze saved images.

Deleting An Image

1. Select the Image gallery function. All saved images are displayed in the form of an infrared preview.
2. Move joystick to select an image.
3. Press quick select button ( ).
4. Delete image? Message appears on screen.

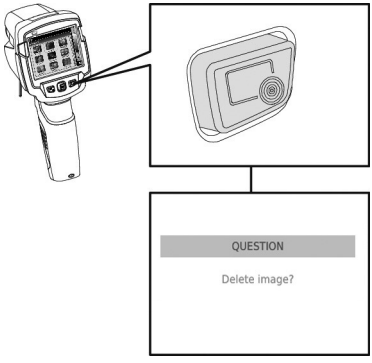


Figure 11 – Deleting an Image

5. Press OK to delete the image.

Setting The Scale

The active scaling mode is displayed bottom right: A - automatic scaling, M - manual scaling and S - ScaleAssist.

Automatic scaling continuously adjusts the scale to the readings presented, and the color assigned to a temperature value changes.

Manual scaling defines fixed limit values, and the color assigned to a temperature value is fixed (important for visual image comparisons).

ScaleAssist, is a standardized scale set based on the inside and outside temperature.

Scaling influences the way the infrared image is shown on the display but does not affect the recorded measuring values.

Setting Automatic Scaling

1. Select the Scale function and press OK.
2. Move the joystick up or down until Auto is selected and then press OK. Automatic scaling is activated. A is displayed bottom right.

Setting Manual Scaling

The lower limit value, the temperature range (upper and lower limit value simultaneously) and the upper limit value can be set.

1. Select the Scale function and press OK.
2. Move the joystick up/down until Manual is selected.
3. Move the joystick to the right, select Min. Temp. (lower limit value). Move the joystick up/down to set the value.
4. Move the joystick to the right, select Max. Temp. (upper limit value). Move the joystick up/down to set the value.
5. Press OK. Manual scaling is activated. M is displayed bottom right.

Setting ScaleAssist

The ScaleAssist function calculates a display-neutral scale depending on the inside and outside temperature. This is useful in identifying leak paths in buildings. Ideally there should be a difference of at least ≥ 10°C/≥ 18°F (ideal: ≥ 15°C/≥ 27°F).

1. Select the Scale function. Press OK.
2. In the mode menu, move the joystick up/down until ScaleAssist is selected.
3. Move the joystick to the right, select Indoor temperature. Move the joystick up/down to set the value.
4. Move the joystick to the right, select Outdoor temperature. Move the joystick up/down to set the value.
5. Move the joystick to the left, back to the mode menu.
6. Press Ok to activate ScaleAssist. S is displayed bottom right.

Setting Emissivity And Reflected Temperature Coefficient (RTC)

Emissivity

Emissivity is a term use to describe energy emitting characteristics of materials and has a value ranging from 0 to 1. Emissivity values approaching zero are typical for things with a high reflectivity, like a mirror. Low reflectivity materials (such as items painted flat black) have emissivity values approaching 1. Emissivity is material-specific and must be adjusted for correct measurement results. Improper emissivity values can cause significant temperature errors.

Non-metals (paper, ceramic, gypsum, wood, paints and coatings), plastics and food typically have high emissivity, which means that the surface temperature can be easily measured using infrared.

Because of their low or non-uniform emissivity, bright metals and metal oxides only have limited suitability for infrared measurement. Highly inaccurate measurements should be expected. A remedy for this is coatings that increase emissivity, e.g. paint or emission adhesive, which must be applied to the object to be measured.

Alternately, the RT-5x, RT-7x and RT-9x thermal imagers are equipped with ε-Assist, a feature that will determine the emissivity using the ε-marker affixed to the target surface.

The following tables gives the standard preprogrammed materials and emissivity and typical emissivity of common materials for use as a guideline in setting emissivity.

Standard Preprogrammed Materials

Material (material temperature)	Emissivity
Aluminum, bright rolled (170°C)	0.04
Cotton (20°C)	0.77
Concrete (25°C)	0.93
Ice, smooth (0°C)	0.97
Iron, emery-ground (20°C)	0.24
Iron with casting skin (100°C)	0.80
Iron with rolling skin (20°C)	0.77
Gypsum (20°C)	0.90
Glass (90°C)	0.94
Rubber, hard (23°C)	0.94
Rubber, soft grey (23°C)	0.89
Wood (70°C)	0.94
Cork (20°C)	0.70

Other Common Materials

Material (material temperature)	Emissivity
Radiator, black anodized (50°C)	0.98
Copper, slightly tarnished (20°C)	0.04
Copper, oxidized (130°C)	0.76
Plastics: PE, PP, PVC (20°C)	0.94
Brass, oxidized (200°C)	0.61
Paper (20°C)	0.97
Porcelain (20°C)	0.92
Flat Black paint (80°C)	0.97
Steel, heat-treated surface (200°C)	0.52
Steel, oxidized (200°C)	0.79
Clay, burnt (70°C)	0.91
Transformer paint (70°C)	0.94
Brick, mortar, plaster (20°C)	0.93

Selecting/Setting The Emissivity

1. Select the Emissivity function.
2. Move the joystick up/down to select the desired material (with permanently set emissivity) and then press OK.
3. Move the joystick up/down until User defined is selected. Move the joystick to the right until desired emissivity value is selected. Manually set value and press OK.

Reflected Temperature Coefficient (RTC) Information:

The Reflected Temperature Coefficient (RTC) is calculated based on the Reflected Temperature. In most cases, the reflected temperature is identical to the ambient air temperature. Only when objects with strong emissions at much lower temperatures (such as cloudless skies during outdoor readings) or much higher temperatures (such as ovens or machines) are in proximity to the object being measured should the radiation temperature of these sources be determined and used. The reflected temperature has little effect on objects with high emissivity.

Reflected temperature can be determined by:

1. Use a 12" x 12" (300 mm x 300 mm) minimum sheet of aluminum foil. Crumple up the aluminum foil.
2. Uncrumple the aluminum foil. Attach the foil to cardboard the same size.
3. Place the foil directly in front of the surface that you want to measure the temperature of, foil side out.
4. Set the thermal imager emissivity to 1.0.
5. Use the thermal imager to measure the temperature of the middle of the foil. Use

this as the Reflected Temperature entered into the thermal imager.

6. Remove the foil from in front of the surface to be measured. Enter an appropriate emissivity for the surface to the be measured and take temperature measurement.

Setting The RTC

1. Select the Emissivity function.
2. Move the joystick to the right until RTC is selected. Manually set desired value and press OK.

Setting ε-Assist

ε-markers and the ε-Assist function of the Thermal Imager can be used to automatically set the emissivity and RTC. RTC can always be set. Emissivity can only be automatically set if the surface temperature is more than 2°C different than the reflected temperature. ε-markers can be used on surfaces that have a consistent temperature of less than 176°F (80°C) and a minimum size of at least 4.75" x 4" (12 cm x 10 cm). Do not reuse ε-markers.

1. Affix ε-marker to the center of the surface and allow ε-marker and object temperature to equalize for at least 30 seconds.
2. Select the Emissivity function.
3. Move the joystick to the right until ε-Assist is selected and press OK. The screen will change to the real image. A white box will appear on the real image. Place the box around the ε-marker *(see Figure 12)*. Thermal imager should be 20" to 28" (0.5 to 0.7 m) away from the ε-marker, and at a 10-30 degree angle.

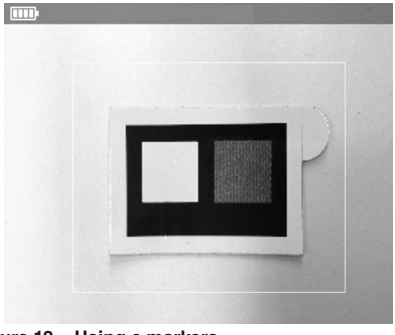


Figure 12 – Using ε-markers

4. The thermal imager will automatically read the ε-marker and populate the emissivity and the reflected temperature. If emissivity cannot be read, you will be prompted to manually enter an emissivity.
5. Press OK key to accept the displayed values.

Selecting Color Palette

A variety of color palettes are supplied to meet personal preferences. Palettes with greater color variation may be beneficial when there are larger temperature differences to better visualize the temperatures.

This function is only available if the Image type is set to infrared image.

1. Select the Palette function.
2. Move the joystick up/down to select the required color palette and then press OK.

Setting Image Type

The display can be switched between infrared image and real image (digital camera). Model RT-3 do not have real image function, it has only infrared image type.

1. Select the Image type function.
2. Move the joystick up or down and choose between infrared image or real image view.
3. Press OK key to confirm the selection.

Activating/Disabling The Zoom (RT-9x only)

1. Move the joystick to the right and open the soft key menu (quick select button).
2. Move the joystick down and select Zoom. Then press OK.
3. Press quick select button ( ) to set the Zoom.

Activating The Differential Temperature

Differential temperature enables the temperatures between two measuring points to be calculated and shown in the status bar.

1. Open Menu.
2. Move the joystick down and select Measurement. Then press OK or move the joystick to the right.
3. Move the joystick down and select Differential temperature. Then press OK. The Differential Temperature menu will appear. The menu will

not be seen when measurements are being made but pressing any key will bring the menu back up.

4. Move the joystick down/up and select which differential temperature is to be calculated (Point-Point, Point-Value, Point-RTC). Then press OK.
5. **Point-Point Selection:**
   a. Move the joystick to the right, select measuring point 1 and press OK. Move the measuring point to the live image using the joystick and press OK.
   b. Move the joystick to the right, select measuring point 2 and press OK. Move the measuring point to the live image using the joystick and press OK.
6. **Point-Value Selection:**
   a. Move the joystick to the right and select measuring point 1 and press OK. Move the measuring point in the image using the joystick and press OK.
   b. Move the joystick to the right and set the value manually.
7. **Point-RTC Selection:**
   a. Move the joystick to the right and select measuring point 1 and press OK. Move the measuring point in the image using the joystick and press OK.
   b. Move the joystick to the right and set the value manually.
8. End measurement: Move the joystick to the right, press End.

Activating/Disabling The Min/Max On Area Function

1. Open Menu.
2. Move the joystick down and select Measurement. Then press OK or move the joystick to the right.
3. Move the joystick down and select Min/Max on Area. Then press OK or move the joystick to the right.
4. Select Min/Max on Area and press OK to activate or disable the function.
   a. Select Hot spot/Cold spot and press OK to activate or disable the function.
   b. Select Hide all and press OK to disable all functions for the measuring range.

Configuration

Country Settings

The user interface language can be set.

1. Select the Country settings function.
2. Move the joystick up/down to select the desired language and then press OK.

Set Time/Date

The time and date format are set automatically based on the selected user interface language.

1. Select the Set time/date function.
2. Move the joystick to the right/left to select the desired setting option.
3. Move the joystick up/down to set the value.
4. After setting all values, press OK.

Power-Save Options

The illumination intensity of the display can be set. A lower intensity increases the battery life. The time until automatic switch-off can be set.

1. Select the Power-save options function.
2. Move the joystick up/down to select the desired intensity level and then press OK.

SuperResolution

SuperResolution is a technology to improve image quality. Each time a SuperResolution image is recorded, a sequence of images is saved and used to calculate an image with four times more resolution. The geometric resolution (IFOV) is improved by a factor of 1.6. SuperResolution images take longer to process, which will be indicated in the status bar. Up to five SuperResolution images can be processed at one time.

To use the function, the camera should be handheld and the objects to be imaged should not move.

1. Open the SuperResolution function.
2. Press OK to activate or disable the function.

Full Screen Mode

1. Select the Full screen mode function.
2. When Full Screen Mode is activated, the scale and icon for the quick select button are hidden. When a key is pressed, these elements are displayed briefly.

Save JPEG

Infrared images are saved in BMT (image with all temperature data) format. BMT format images can only be accessed with special software *(see Connectivity Section)*. The image can also be saved in JPEG format (without temperature data) at the same time. The image content corresponds to the infrared image shown on the display, including scale display and image marks for the selected measuring functions. The JPEG file is saved under the same file name as the associated BMT file and can be opened without special software.

1. Open the Save JPEG function and press OK.
2. Move the joystick up/down until ON/OFF is selected and press OK.
3. Add a date/time stamp to a JPEG file, if required. Turn function ON/OFF for this.

Connectivity

Wi-Fi Connection - Using The App

The RIDGID® Models RT-5x, RT-7x and RT-9x Thermal Imagers includes Wi-Fi technology allowing wireless data transfer to properly equipped smartphones or tablets ("device") running iOS or Android operating systems.

Compatibility: Requires iOS 8.3 or later/Android 4.3 or later.

1. Download the appropriate RIDGID® app to your smartphone or tablet by going to http://www.RIDGID.com/Thermal.
2. Open Menu.
3. Move the joystick down and select Configuration. Then press OK or move the joystick to the right.
4. Move the joystick down and select Connectivity. Then press OK or move the joystick to the right.
5. Move the joystick down and select Wi-Fi. Then press OK. Tool Wi-Fi is now on, and a Wi-Fi equipped device can find and pair with the tool.
6. In the Wi-Fi settings of your device, select desired RIDGID tool. Refer to your device instructions for specific information on how to connect via Wi-Fi. Once connected, the App is connected symbol appears on screen.
7. After the initial pairing, most devices will automatically connect to the Tools when the Wi-Fi is active and in range. Thermal imager should be less than 33 ft. (10 m) from the device to be detected. Any obstacle between the tool and device can reduce the operational range.
8. Follow the app instructions for proper use.

iOS is registered trademark of Apple Inc.

Android and the Android logo are trademarks of Google Inc.

USB Connection

The thermal imager can be connected to a computer or similar device using the USB cable *(Figure 13)*. It will be recognized as a storage device and files can be accessed like any other files. Go to http://www.RIDGID.com/Thermal to download software (IR-Soft) for use with the BMT files from the thermal imagers. See *Save JPEG Function* to save images as .jpeg files.

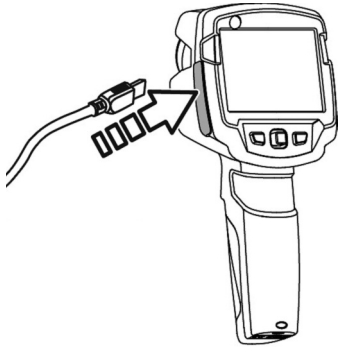


Figure 13 – Connecting USB Cable to Imager

Updating Thermal Imager Firmware

From time to time the thermal imager firmware (software) may need to be updated. Updated thermal imager firmware, if available, will be found at http://www.RIDGID.com/Thermal. Go to "Information" in the menus to see current firmware version. Download the updated firmware and using the USB connection, save it to the thermal imager memory. Disconnect the USB cable and restart the thermal imager.

Ambient/Electrical Conditions

Values for ambient temperature and humidity and electrical conditions can be entered manually and will be recorded in the file for future reference (such as for reports). Manually entering the am-

bient conditions does not change the thermal imager output.

1. Go to Menu, Configuration, Ambient conditions.
2. Move the joystick as necessary to set the values.
3. Press OK.

Information

The following instrument information is displayed:

- Device data (e.g. serial number, device name, firmware version)
- Options
- Measurement functions
- Wi-Fi
- Radio certifications
- Legal information

Reset Options

Reset Counters

NOTICE After a reset, the naming (consecutive numbering) of the images starts from the beginning. The already saved images with the same name will be overwritten. Back up all saved images before resetting the counter to prevent possible overwriting.

1. Open Menu and press ok.
2. Move the joystick up/down until configuration is selected.
3. Move the joystick to the right, select Reset counter.
4. Reset image counter? is displayed on the screen.
5. Press OK to apply factory settings.
6. Press Esc to cancel the process.

Factory Settings

The instrument settings can be reset to the factory settings. Time/date, country settings and counter are not reset.

1. Open Menu and press ok.
2. Move the joystick up/down until configuration is selected.
3. Move the joystick to the right, select Reset options.
4. Move the joystick up/down to select the Factory settings function.
5. Apply factory settings? is displayed on the screen.
6. Press OK to apply factory settings.
7. Press Esc to cancel the process.

Formatting

The image memory can be formatted to remove all images from the imager. When formatting, all data saved in the memory is lost. Back up all saved images before formatting to prevent loss of data. Formatting does not reset the counter.

1. Open Menu and press ok.
2. Move the joystick up/down until configuration is selected.
3. Move the joystick to the right, select Reset options.
4. Move the joystick up/down to select the Format function.
5. Format memory? is displayed on the screen.
6. Press OK to format the memory.
7. Press Esc to cancel the process.

Storage

Remove battery from tool. Store the Thermal Imagers in case. Avoid storing in extreme heat or cold.

⚠ WARNING Store tool in a dry, secured area that is out of reach of children and people unfamiliar with the RIDGID Thermal Imagers. The thermal imagers are dangerous in the hands of untrained users.

Maintenance

⚠ WARNING

Remove battery from tool before cleaning.

Cleaning

Do not immerse the thermal imagers in water. Close the battery cover and USB port cover. Wipe off dirt with a damp soft cloth. Avoid rubbing too hard. Do not use aggressive cleaning agents or solutions.

Gently clean the display screen with a clean dry cloth. Avoid rubbing too hard.

If the infrared camera lens is dirty, clean it with an alcohol lens wipe. Treat the instrument as you would a telescope or camera.

Reset Options

Refer to the *Other Settings* section.

Calibration

The Thermal Imagers are factory calibrated and only require recalibration if repaired.

Troubleshooting

SYMPTOM	POSSIBLE REASON	SOLUTION
'Error! Memory full!' is displayed.	Insufficient memory available.	Transfer images to the PC or delete.
Error! Permissible instrument temperature exceeded!' is displayed.	Ambient temperature too high.	Switch off the camera, allow the instrument to cool down and observe the permissible ambient temperature.
'~' is displayed before a value.	Value is outside the measuring range.	Extended display range with no guarantee of accuracy.
'---' or '+++' is displayed instead of a value.	Value is outside the measuring range and the extended display range.	Use the unit as per Measuring Range, *see Specifications.*
'xxx' is displayed instead of a value.	Value cannot be calculated.	Check parameter settings for plausibility.
Automatic zeroing (audible click and brief image freeze) is carried out very frequently.	Camera is still in its warm-up period (10 minutes).	Wait until the warm-up period has passed.

Service And Repair

⚠ WARNING

Improper service or repair can make the machine unsafe to operate.

Service and repair on the thermal imagers must be performed by a RIDGID Independent Service Center. Use only RIDGID service parts.

For information on your nearest RIDGID Independent Service Center or any service or repair questions, see *Contact Information Section* in this manual.

Optional Equipment

⚠ WARNING

To reduce the risk of injury, only use accessories specifically designed and recommended for use with the RIDGID Thermal Imagers, such as those listed.

Catalog No.	Description
59658	Li-Ion rechargeable battery 2500 mAh/3.7 V
59663	Battery Charger
59668	Pack of 10 E-Markers (For E-Assist)

For a complete listing of RIDGID equipment available for this tool, see the Ridge Tool Catalog online at RIDGID.com or see Contact Information.

Disposal

Parts of this tool contain valuable materials and can be recycled. There are companies that specialize in recycling that may be found locally. Dispose of the components in compliance with all applicable regulations. Contact your local waste management authority for more information.

For EC Countries: Do not dispose of electrical equipment with household waste!

According to the European Guideline 2012/19/EU for Waste Electrical and Electronic Equipment and its implementation into national legislation, electrical equipment that is no longer usable must be collected separately and disposed of in an environmentally correct manner.

Battery Disposal

For USA and Canada: The RBRC™ (Rechargeable Battery Recycling Corporation) Seal on the battery packs means that RIDGID has already paid

the cost of recycling the lithium-ion battery packs once they have reached the end of their useful life.

RBRC™, RIDGID®, and other battery suppliers have developed programs in the USA and Canada to collect and recycle rechargeable batteries. Normal and rechargeable batteries contain materials that should not be directly disposed of in nature, and contain valuable materials that can be recycled. Help to protect the environment and conserve natural resources by returning your used batteries to your local retailer or an authorized RIDGID service center for recycling. Your local recycling center can also provide you with additional drop off locations.

RBRC™ is a registered trademark of the Rechargeable Battery Recycling Corporation.

For EC countries: Defective or used battery packs/batteries must be recycled according to the guideline 2006/66/EC.

Approval And Certification

Product	Ridge Tool Company (RIDGID) RT-3 RT-5x RT-7x RT-9x
Mat.-No.	57533 57528 57523 57518
Date	17.05.2017

The use of the wireless module is subject to the regulations and stipulations of the respective country of use, and the module may only be used in countries for which a country certification has been granted. The user and every owner has the obligation to adhere to these regulations and prerequisites for use, and acknowledges that the re-sale, export, import etc. in particular in countries without wireless permits, is his responsibility.

Country	Comments
Canada	Contains IC: 5969A-TIW101 IC: 22560-2017RTFAM IC Warnings
USA	Contains FCC ID: TFB-TIW1-01 FCC ID: 2AECA-2017RTFAM FCC Warnings

IC Warnings

Wi-Fi / Bluetooth® Information	Feature	Values
	Wi-Fi range	typical 15 m
	radio type	TiWi-BLE
	radio class	WLAN 2.4 GHz IEEE 802.11 b/g
	radio module company	LSR W66 N220 Commerce Court Cedarburg, WI 53012-2636 USA
	RF Band	WLAN: 2412 – 2480MHz
	power output [E.I.R.P]	WLAN: 20dBm

RSS-Gen & RSS-247 statement:

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

(1) this device may not cause interference, and

(2) this device must accept any interference, including interference that may cause undesired operation of the device.

Caution: Radio Frequency Radiation Exposure.

This equipment complies with IC radiation exposure limits set forth for an uncontrolled environment and meets the IC radio frequency (RF) Exposure Guidelines. This equipment should be installed and operated keeping the radiator at least 12 cm or more away from person's body in normal use position.

Co-Location:

This transmitter must not be co-located or operated in conjunction with any other antenna or transmitter.

FCC Warnings:

Information from the FCC (Federal Communications Commission)

For your own safety

Shielded cables should be used for a composite interface. This is to ensure continued protection against radio frequency interference.

FCC warning statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Caution

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. Shielded interface cable must be used in order to comply with the emission limits.

Warning

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

Caution: Radio Frequency Radiation Exposure

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment and meets the FCC radio frequency (RF) Exposure Guidelines. This equipment should be installed and operated keeping the radiator at least 12 cm or more away from person´s body in normal use position.

Co-Location:

This transmitter must not be co-located or operated in conjunction with any other antenna or transmitter.