

SeeSnake® *MAX*™ rM200



⚠ 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.

SeeSnake® *MAX*™ rM200

Record product serial number below as it appears on the nameplate.

Serial No.

--

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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 THESE INSTRUCTIONS!

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 bystanders 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.
- **Do not abuse the cord.** Never use the cord for carrying, pulling, or unplugging the power tool. Keep cord away from heat, oil, sharp edges, and moving parts. Damaged or entangled cords increase the risk of electric shock.
- **If operating equipment in a damp location is unavoidable, use a ground fault circuit interrupter**

(GFCI) protected supply. Use of a GFCI reduces the risk of electric shock.

- **Keep all electrical connections dry and off the ground.** Do not touch equipment or plugs with wet hands to reduce 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. The appropriate use of protective equipment such as a dust mask, non-skid safety shoes, a hard hat, and hearing protection will reduce personal injuries.
- **Do not overreach.** Keep proper footing and balance at all times. This enables better control of the equipment in unexpected situations.
- **Dress properly.** Do not wear loose clothing or jewelry. Keep your hair, clothing, and gloves away from moving parts. Loose clothes, jewelry, and long hair can be caught in moving parts.

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 power switch does not turn it ON and OFF.** Any equipment that cannot be controlled with the power switch is dangerous and must be repaired.

- **Disconnect the plug from the power source and/or the battery pack from the equipment before making adjustments, changing accessories, or storing.** 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 misalignment or binding of moving parts, 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 and accessories 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 dry, clean, and free from oil and grease.** This allows for better control of the equipment.

Service

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

Specific Safety Information

⚠ WARNING

This section contains important safety information that is specific to the rM200. Read these precautions carefully before using the rM200 to reduce the risk of electrical shock, fire, or other serious personal injury.

SAVE ALL WARNINGS AND INSTRUCTIONS FOR FUTURE REFERENCE!

Keep this manual with the rM200 for use by the operator.

SeeSnake Max rM200 Safety

- **An improperly grounded electrical outlet can cause electrical shock and/or severely damage equipment.** Always check work area for a properly grounded electrical outlet. Presence of a three-prong or GFCI outlet does not ensure that the outlet is properly grounded. If in doubt, have the outlet inspected by a licensed electrician.
- **Do not operate this equipment if operator or rM200 is standing in water.** Operating the rM200 while in water increases the risk of electrical shock.

- **The rM200 system camera and push cable are water-proof.** The camera control unit (CCU) and other electrical equipment and connections are not waterproof. To decrease the risk of electrical shock, do not expose the equipment to water or rain.
- **Do not use where a danger of high voltage contact is present.** The equipment is not designed to provide high voltage protection and isolation.
- **Read and understand this operator's manual, the CCU's operator's manual and the instructions for any other equipment in use before operating the SeeSnake rM200 System.** Failure to follow all instructions may result in property damage and/or serious personal injury.
- **Always use appropriate personal protective equipment when handling and using equipment in drains.** Drains may contain chemicals, bacteria, and other substances that may be toxic, infectious, cause burns or other issues. Appropriate personal protective equipment always includes safety glasses and may include drain cleaning gloves or mitts, latex or rubber gloves, face shields, goggles, protective clothing, respirators, and steel toed footwear.
- **If using drain cleaning equipment and drain inspection equipment at the same time, wear RIDGID drain cleaning gloves.** Never grasp the rotating drain cleaning cable with anything else, including other gloves or a rag which can become wrapped around the cable and cause hand injuries. Only wear latex or rubber gloves under RIDGID drain cleaner gloves. Do not use damaged drain cleaning gloves.
- **Practice good hygiene.** Use hot, soapy water to wash hands and other body parts exposed to drain contents after handling or using drain inspection equipment. To prevent contamination from toxic or infectious material, do not eat or smoke while operating or handling drain inspection equipment.

The information supplied with this product cannot cover all possible conditions and situations that may occur, and should be used in conjunction with appropriate training, sound judgment, and good work practices. These factors cannot be built into the product, but must be supplied by the operator.

The EC Declaration of Conformity (890-011-320.10) will accompany this manual as a separate booklet when required.

Description, Specifications, and Standard Equipment

Description

The SeeSnake Max rM200 is the first camera reel in the next generation of SeeSnake Pipe Inspection systems. The SeeSnake Max line has been designed to make your equipment more reliable, durable, and to enable you to deliver quality recordings to customers faster and more conveniently than ever before.



Figure 1 – SeeSnake MAX System, rM200 with cM6

The rM200 is a rugged reel and camera system that enables you to diagnose and locate problems in drain and sewer systems. The rM200 is equipped with a 200 ft [60 m] push cable that combines low optimum stiffness with a low-friction outer jacket. As a result of the push cable outer jacket, users can push the camera head further with less effort. In addition to the specialized outer jacket on the push cable, the small diameter and short body of the rM200 camera allows user to push the push cable through multiple turns and lines as small as 1.5 in [40 mm] in diameter.

The rM200 comes with a built-in sonde, integrated counter, and a removable system cable that can be connected to any SeeSnake Max or SeeSnake Original CCU.

Specifications

Table 1 SeeSnake MAX rM200 Specifications	
Weight	34.1 lb [15.5 kg]
Dimensions:	
Length	20.8 in [527 mm]
Depth	13.8 in [349 mm]
Height	24.0 in [610 mm]
Drum diameter	17.0 in [432 mm]
Camera specifications:	
Length	1.25 in [31.75 mm]
Diameter*	≥1.0 in [25 mm]*
Sonde	512 Hz
Lighting	6 high flux LEDs
Resolution:	
NTSC	648 × 488 pixels
PAL	768 × 576 pixels
Push cable:	
Length	200 ft [61 m]
Diameter	0.3 in [7.5 mm]
Bend radius	≥ 4.0 in [100 mm]
Pipe capacity	1.5 in – 6.0 in [38 mm – 150 mm]
Operating environment:	
Temperature†	–40°F – 130°F [–40°C – 55°C]
Storage temperature	–40°F – 150°F [–40°C – 65°C]
Humidity	5% – 95% RH
Waterproof depth	225 ft [69 m]
* The camera size listed reflects the specifications of the camera on the base model. Other models of the rM200 may accommodate cameras up to 1.4 in [35 mm] in diameter.	
† While the sensor will function in the extreme temperatures, some image quality changes may be noticed.	

Standard Equipment

- SeeSnake Max rM200
- Operator's manual
- Instructional DVD
- Ball guides
- Camera head guide
- Docking handle
- Directional drag brake

rM200 Components



Figure 2 – Front view



Figure 3 – Rear view

Directional Drag Brake

The rM200 also contains a built-in directional drag brake that prevents the push cable from self-deploying, but also allows the user to rewind the push cable with ease. Unlike other reels that contain brake knobs that require manual adjusting, the directional drag brake automatically applies drag when the push cable is pulled from the reel and automatically loosens drag when the push cable is returned to the reel. The directional drag brake uses a unique series of ball bearings, ratchets, and ramps to increase or decrease drag on the push cable. Depending on the direction of the drum rotation, the directional drag brake automatically elicits either higher or lower force.

When the user pulls the push cable from the rM200, the directional drag brake will automatically increase the drag on the push cable to ensure a controlled release. While pulling the push cable from the rM200, the user will hear a distinct “click” noise. The “click” acts as an audible cue to indicate the effectiveness of the drag-assisted control. While the “click” sound will diminish slightly with wear, replace the back bearing assembly when the click is inaudible or the drag becomes ineffective.

Assembly

⚠ WARNING

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

Camera Head Routing

The rM200 has been designed such that the camera head can be routed without opening up the case. Route the camera by reaching inside the case through the opening on the front and by feeding the camera head into the push cable guide. Secure the camera head in the camera clip when not in use.

NOTICE Only use the big hole to initially locate the camera head and to help guide the camera head through the push cable guide.



Figure 4 – Camera head routing

Installing System Cable

When connected correctly, the contact pins will not break under normal use. Avoid pressing sideways on the contact pins as this can cause them to break (See Figure 5).

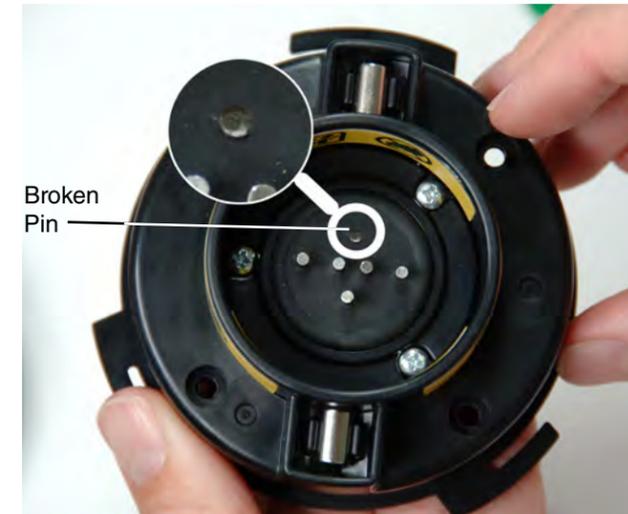


Figure 5 – Broken contact pin

If the system cable slip-ring module is not installed, insert the slip-ring module into the hub on the rear case. Twist the slip-ring module clockwise until it locks into position (See Figure 6).



Figure 6 – Slip-Ring module in locked position

NOTICE Do not touch the contact pins inside the slip-ring module or insert any tool inside the well where the pins are located. This can cause the contact pins to break. Avoid stressing or breaking the contact pins.

rM200 Pipe Guides

Pipe guides improve picture quality by bringing the camera closer to the center of the pipe and by keeping the lens free of sludge. Use ball guides whenever possible to reduce wear and tear on the camera system.

The rM200 comes with three ball guides: two ball guides and a smaller camera head pipe guide which helps the user push the camera through some type of fittings.

Installing Ball Guides

Ball guides can be easily removed or adjusted along the length of the camera to allow for better movement in pipes. For example, placing two ball guides near the front of the camera may bias the camera head upward to allow better viewing of the top of the pipe during an inspection. Ball guides can also help negotiate some passages.

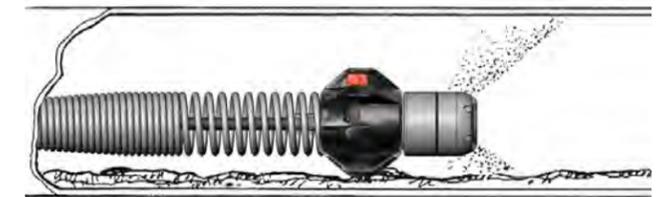


Figure 7 – Ball guide in use

The ball guides are designed to slip easily onto the camera spring and lock into place. Install the ball guides by doing the following:

1. Slide the red sliding locks away from the blue latches on both sides of the guide.
2. Press the small tabs on the blue latches so they click outward (away from each other).
3. Slide the ball guide into position over the camera head.
4. Press down on the shoulders of the blue latches so the latches are pressed in toward each other and lock into the spring.
5. Slide the two red sliding locks back over their respective blue latches so they cannot pop out while in use.



Figure 8 – Ball guides, locked (left) and unlocked (right)

For smaller pipes, tubes, or voids, the camera head pipe guide may be installed in lieu of the ball guides. Install camera head pipe guide by doing the following:

1. Unscrew the two screws holding the halves of the ball guide together.
2. Seat the halves around the camera head with their screw-holes aligned.
3. Fasten the halves together with the provided screws. Do not over-tighten.



Figure 9 – Camera head pipe guide

rM200 Handles and Docks

The rM200 handle can be set to four different positions. Each position has a different purpose that will facilitate inspections and general usability and maneuverability.

Pull Handle

The pull handle can be locked into four positions.

- Upright to maneuver the unit during transport.
- Midway for use as a kick stand.
- Against the rear case when in use; especially in small spaces.
- Against the front case for storage and transport when going up or down ladders.



Figure 10 – Pull handle locked upright



Figure 11 – Pull handle as a kick stand



Figure 12 – Pull handle in the back (left) and front (right)

Carry Handle

The provided shoulder strap can be connected directly to the frame of the rM200 as well as onto the pre-attached carry handle.



Figure 13 – Carry handle

The carry handle can be removed and replaced with the docking handle to provide increased functionality with the cM6 or another SeeSnake Max recording monitor/CCU.

Docking Handle

The docking handle was designed specifically for use with the cM6 and easily attaches at the same location as the carry handle. See the included sheet for instructions on how to attach the docking handle to the rM200.



Figure 14 – Docking handle

The rM200 also comes equipped with a docking station for future SeeSnake CCU products. The docking station, located on the back of the rM200 is outfitted with red push buttons which will allow compatible CCUs to be easily docked and released from the rM200.

Pre-Operation Inspection

WARNING



Before each use, inspect your rM200 and correct any problems to reduce the risk of serious injury from electrical shock or other causes and prevent machine damage.

1. With the SeeSnake unplugged from the CCU, inspect the system cable and plug for damage or modifications. If any damage or modification is found, do not use the SeeSnake until it has been properly repaired or replaced.
2. Clean any dirt, oil, or other contamination from the SeeSnake to aid in inspection and to prevent the unit from slipping from your grip during transport or use.

3. Inspect the SeeSnake for any broken, worn, missing, misaligned, or binding parts, or any other condition that might prevent safe, normal operation. Confirm that the unit is properly assembled. Make sure that the drum turns freely. Inspect the push cable for any cuts, breaks, kinks, or ruptures.
4. Inspect any other equipment being used per its instructions to make sure it is in good usable condition.
5. Correct any problems before use.

Work Area and Equipment Set Up

WARNING



Set up and operate the rM200 and work area in accordance with these procedures to reduce the risk of injury from electrical shock, fire, crushing injuries, and other causes, and to prevent damage to the rM200.

1. Check work area for the following:
 - Adequate lighting.
 - Flammable liquids, vapors, or dust that may ignite. If present, do not work in area until sources have been identified and corrected. The SeeSnake is not explosion proof. Electrical connections can cause sparks.
 - Clear, level, stable dry place for equipment and operator. Do not use the equipment while standing in water. If required, remove the water from the work area.
2. If possible, assess the work to be done. Determine the drain access points, sizes, and lengths, and the presence of chemicals. If chemicals are present, understand the specific safety measures required to work around those chemicals. Contact the chemical manufacturer for required information.
3. If needed, remove fixtures such as the toilet or sink, to obtain better access.
4. Determine the correct equipment for the application.
5. Ensure the equipment has been inspected as specified by the operator's manual.
6. Evaluate the work area and use barriers to keep bystanders away as needed. If working near traffic, erect cones or other barriers to alert drivers.

rM200 Placement

Position the rM200 so that the push cable can be easily managed as it is pushed through the line. The location should not be wet. Do not allow the CCU unit to get wet during use.

1. Set the rM200 approximately 3 ft [1 m] from the entry point to provide ample room to grasp and manipulate the push cable without allowing excess cable to drag on the ground.
2. Preferably, lay the rM200 on its back. This set up provides the greatest stability and prevents the rM200 from tipping during use. The wheels of the rM200 are located on the front so that the unit can be laid flat during an inspection (See Figure 15).



Figure 15 – rM200 positioned on its back

When performing inspection on a rooftop, on a hillside, or when performing an inspection that requires an overhead entry, position the rM200 on its back or on its kickstand for greater stability (See Figure 16).



Figure 16 – rM200 and its kickstand during a rooftop inspection

Connecting the rM200 to a CCU

The rM200 has been designed to work with the SeeSnake Max cM6, however it can be used with any legacy SeeSnake CCU. To use the rM200 with a SeeSnake CCU perform the following:

1. Unwrap the SeeSnake System Cable, pull back the locking sleeve, and match the System Cable plug to the matching SeeSnake System Connector on the CCU.
2. Align the guide pin to the guide socket and push the connector straight in. Ensure the guide ridge molded into the top of the cable connector points up when the plug to show that it is correctly aligned (See Item 1, Figure 17).
3. Tighten the outer locking sleeve.



Figure 17 – SeeSnake System Connector

NOTICE Only twist the outer locking sleeve! To prevent damage to pins, never bend or twist the connector or cable. Bending or twisting the connector will lead to premature failure.

Electrical Checks

When a connected CCU is powered ON, the SeeSnake camera and the counter will also power ON. The system will produce a crisp picture free of noise and lines. The system may need to warm up before it will produce the optimum picture.

Look to see that the LEDs on the camera head are producing an even amount of light. To test the slip ring, place the camera in the reel and spin the drum while watching the CCU.

Counter

All SeeSnake Max reels and many legacy SeeSnake reels come equipped with a cable-measurement system. The rM200 has an integrated distance-counter which can track the total length of push cable that has been run out of the drum. The distance counter can also measure distance from a temporary zero-point selected during the inspection (such as a pipe head or joint). The counter can also display overlays of text messages such as labels of pipe line

features. Entering an overlay through the counter burns the text onto the video. Press the menu key on the counter, to bring up the Main Menu screen.

For best results, use the keypad on the CCU to control the counter.

Counter Keypad

The integrated counter can be controlled either with its keypad or with a compatible CCU.

Table 2 Integrated Counter Keypad Legend		
Key		Meaning
	Menu / Back Key	Opens the Main Menu.
	Zero / Select Key	Selects a highlighted menu item; initializes the local zero-point counter. Press and hold this key for longer than 3 seconds to perform a hard reset.
	Sonde Key	Toggles the Sonde ON or OFF.
	LCD Brightness Key	Controls the brightness of the LEDs in the camera. Press to step up or down through various brightness levels.
	Up Arrow / Edit Key	Goes directly to the editing page for existing slides, if slide text is being displayed when pressed. Moves through menu choices or text characters.
	Left / Right Arrow Keys	Move through available slides to new slide if text is being displayed. Moves through menu choices and text characters.
	Down Arrow Key	Moves through menu choices, values and text characters in edit mode.
	Text Key	Text Overlay allows you to write a text title or description for display on any segment of the captured video.
	Date / Time Key	Date/Time provides alternatives in displaying the date, time, or both.
	Distance Key	Distance the camera has traveled in the line, or from any selected point in the line.

Getting Consistent Measurements

To get consistent measurements keep the following in mind:

- Place the camera head in the push cable guide hole before powering ON the system.
- Wait for the initialization screen on the CCU to disappear before moving the camera head.
- At the entrance to the line press and hold the Zero Key for about 3 seconds to perform a hard reset so the beginning of the line is at zero.
- Avoid moving the reel once you have started your measurements.
- When spooling the cable into the drum, maintain a uniform friction or drag on the cable to ensure it does not bunch up in the drum.
- The “local zero” function allows users to measure the distance between two points in a line. Press the Zero Key briefly will temporarily set the distance measurement to zero. When displaying a “local zero” distance measurement, the numbers will appear inside brackets. To clear the “local zero” and return to the system count, briefly press the Zero Key again.

Operating Instructions

WARNING



Always wear eye protection to protect your eyes against dirt and other foreign objects.

When inspecting drains that might contain hazardous chemicals or bacteria, wear appropriate protective equipment, such as latex gloves, goggles, face shields, and respirators to prevent burns and infections.

Do not operate this equipment if operator or machine is standing in water. Operating the machine while in water increases the risk of electrical shock. Rubber soled, non-slip shoes can help prevent slipping and electric shock, especially on wet surfaces.

Perform the following to reduce the risk of injury from electrical shock and other causes:

1. Ensure all the equipment is properly set up according to the instructions in each unit's operator's manual.
2. Turn the CCU ON. If necessary, adjust the camera head LED lighting brightness and the display image as specified by using either the keypad controller on the rM200 or by using the controller on the monitor of the CCU.

3. Pull several feet of push cable from the rM200. Ensure the camera window is clean. As an option, a slight film of detergent on the window can minimize debris sticking to the window. Place the camera unit into the line to be inspected.
4. If possible, run water through the system during the inspection to help keep the system clean, to make pushing the push cable easier, and to help orient the image at the bottom of the pipe. This can be done by placing a hose down the line or turning on a fixture (for example: flushing a toilet). Shut off water flow as needed for viewing.

NOTICE Use of the rM200 camera in porcelain appliances may scratch the surface finish of the porcelain.

5. Grip the push cable and carefully feed it into the drain to be inspected. Use rubber gripper type gloves to manipulate the push cable to improve grip and to help keep hands clean.

When pushing the push cable in to the line, keep the push cable clear of any sharp edges on the inlet that could cut, grab, or damage the push cable. Grasp and push short sections of push cable at a time and keep your hands near the inlet to better control the push cable and to prevent it from folding over, snapping, cutting or otherwise damaging the push cable jacket. Cutting the push cable jacket increases the risk of electrical shock.

When feeding the push cable into the line, watch the CCU to see what is coming. When the lights are set at less than maximum setting, it may help to occasionally turn the brightness up to see what is coming further down the line.

Be aware of obstructions (such as crushed pipe) or excessive build up in the line that could damage or prevent retrieval of the camera. Do not use the camera head to clear obstructions. The rM200 is a diagnostic tool, not a drain cleaner.

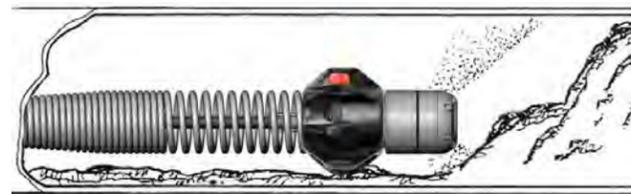


Figure 18 – Encountering an obstruction

NOTICE Do Not Use Camera Head to clear obstructions! Using the camera head to clear obstructions could damage the camera head or cause it to be caught in the obstruction, preventing removal.

A slow steady push through the system works best. At changes in direction such as P-traps, Tees, Ys, and elbows use a quick push to “pop” the camera head around the bend

by pulling the camera head back from the bend approximately 8 in [200 mm] and then quickly thrusting it through the bend. Be as gentle as possible and do not use more force than necessary. Excessive force can damage the camera head. Do not hammer or snap the camera through bends. Do not force the camera head through if there is a large amount of resistance. Be especially careful through Tees, as the push cable could fold over in the Tee and make retrieval difficult or impossible.

Watch to make sure that the drum does not hang up during use. If the drum hangs up and the push cable continues to be pulled from the rM200, the push cable will tighten around the hub of the drum, jam inside the drum, and stress the push cable.

When inspecting the line, try moving the camera head past the area to be inspected and slowly pull it back for better results. Pulling the camera head back may provide more controlled and consistent viewing. When pulling the push cable, keep clear of sharp edges and do not pull at sharp angles to the inlet to prevent damage to the push cable. If needed, jiggle the camera head in standing water to rinse any debris from the camera window.

Locating the rM200 Sonde

All SeeSnake Max pipe inspection systems, including the SeeSnake Max rM200, as well as many legacy SeeSnake pipe inspection systems have a sonde built-in to the camera. The sonde transmits a locatable 512 Hz signal, which when activated can be detected by a locator. Receivers such as the RIDGID-SeekTech SR-20, SR-60, Scout™ or NaviTrack® II set to 512 Hz can detect the sonde’s location underground.

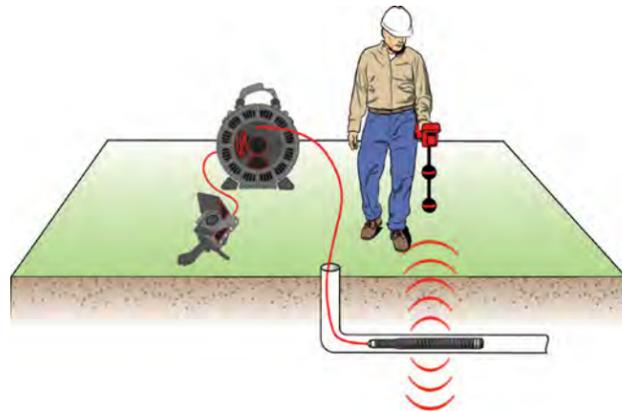


Figure 19 – Locating the rM200 sonde

Turn the Sonde ON and OFF by using the rM200 keypad or the SeeSnake CCU as described in the operator’s manual. When the Sonde is ON, the rM200 LED keypad will be lit and faint noise lines will be visible on the monitor of the CCU.

To locate the activated sonde, run the SeeSnake push cable from 5 ft to 10 ft [1.5 m to 3 m] into the pipe and use the locator to find the sonde’s position. To locate the sonde, turn the locator ON and set it to sonde mode. Scan in the direction of the sonde’s probable location until the locator detects the sonde.

For additional instructions on sonde locating, consult the operator’s manual for the locator model you are using.

Line Tracing the SeeSnake Push Cable

When used with a compatible CCU such as the cM6, the rM200 enables users to trace the path of the push cable underground using a locator. To line trace the push cable, set up the transmitter by clipping one connector to the grounding stake and clipping the other connector to the Transmitter Clip-on Terminal on the CCU. For best results, use higher frequencies.

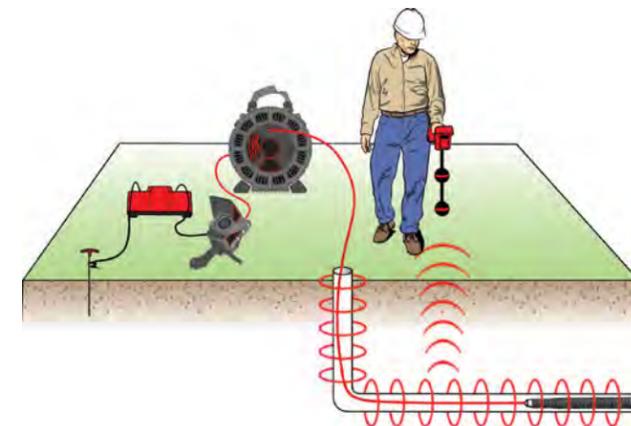


Figure 20 – Line tracing the Push Cable

For additional instructions on line tracing, consult the operator’s manual for the transmitter model or visit <http://www.ridgid.com/Tools/Utility-Locating-Training/EN/index.htm> to view the Integrated Line Trace video.

Retrieving the Camera

After completing the inspection, pull the push cable back with slow, steady force. If possible, continue running water down the line to help clean the push cable. Use a towel to wipe off the push cable as you withdraw it and feed it back into the drum.

Pay attention to the force required to withdraw the push cable. The push cable may get hung up during retrieval and may need to be manipulated as done during insertion. To avoid damaging the camera or push cable, do not force the push cable or exert excessive force during retrieval. Also, keep clear of any sharp edges and do not pull at sharp angles at the inlet.

NOTICE Always use short strokes to feed back small lengths of the push cable back into the drum. Pushing back longer lengths of push cable or forcing the push cable may cause it to loop, kink and break (See Figure 21). Lay the rM200 drum on its back for more stability when retrieving the push cable.

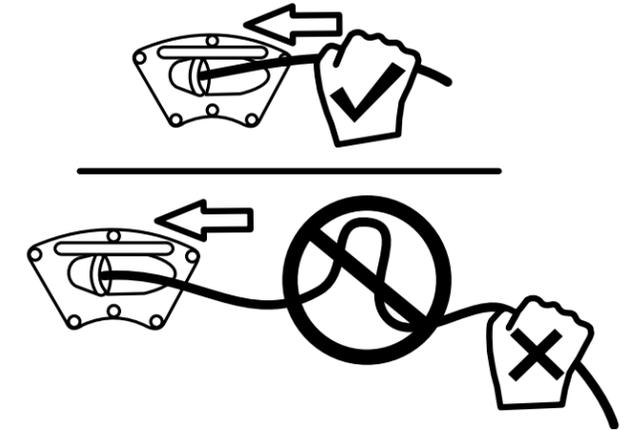


Figure 21 – Rewinding the Push Cable

Maintenance and Cleaning

WARNING

Maintain equipment in accordance with these procedures to reduce the risk of serious injury and damage to the equipment.

Disconnect the system cable from the CCU before cleaning to reduce the risk of electrical shock.

Use a soft, damp cloth to wipe the rM200 clean. If desired, use a disinfectant to clean the rM200. Never use solvents to clean any part of the system as they can crack the LED ring and affect waterproofing.

If desired, use a hose or pressure washer to clean the drum. Avoid hosing the contact board on the back of the drum.

To thoroughly clean the reel and drum, stand the reel upright and fill the bottom of the drum with lukewarm water and a mild detergent. Spin the drum to loosen the grime. Remove the water, pull out the cable and run a rag over the cable while feeding it back into the drum. Do not fill the drum with water while the unit is tipped on its back as water can enter the hub and damage the slip rings.

Camera Maintenance

Camera Head

Use a soft nylon brush, mild detergent and rags and sponges to clean the camera, spring assembly, and cables. When cleaning the camera, do not use scraping tools as they may permanently scratch the camera.

Other than keeping the LED ring and sapphire window clean, the camera head requires little maintenance. Scratches on the LED ring will have a minimal effect on the performance. To avoid damaging the watertight housing, DO NOT sand the LED ring to remove scratches.

Spring Assembly

Foreign matter will most likely accumulate in the spring assembly. Stretch the spring and stir in warm water to flush grime from the spring assembly. The splice between the push cable and the connector is located within the spring. Do not allow sharp objects or harsh chemicals to remain in the splice as they may wear on the components. Stretch the spring end-to-end as far as the internal safety cables allow to check the splice area.

Removing Camera Head

The camera head can be removed to perform troubleshooting. Read the following instructions before removing the camera head. To avoid premature failure and to avoid voiding the warranty do not bend or twist the camera head connectors. Only twist the locking sleeves.

To remove the camera head, perform the following:

1. Pay out enough cable to place the camera and spring assembly on a work bench or other convenient work area.
2. Locate the spring wrench provided with the system. Snap the spring wrench onto the spring right behind the camera head. Make sure that the notch on the wrench engages the end of the spring. Hold the wrench still and use one hand to turn the camera off the spring (See Figure 22). After removing the camera head, the camera should hang by its locking sleeve and safety cable.



Figure 22 – Turn the camera off the spring

3. Use one hand to grasp the ribbed portion of the locking sleeve and use the other hand to grasp the camera. When viewed from the rear, unscrew the ribbed portion of the sleeve counter-clockwise (See Figure 23). If necessary, use pliers to begin turning the locking sleeve. Do not exert excessive pressure. Exerting excessive pressure can crush or deform the locking sleeve.



Figure 23 – Removing the camera head

Do not twist the safety cables more than one rotation. Hold the safety cables when turning the locking sleeve to ensure the safety cables do not turn.

4. After completely unscrewing the locking sleeve from the camera housing, the connector should automatically disengage from the camera. If the connector does not disengage from the camera, grab the locking sleeve and connector in one hand. Grab the camera head with the other hand and pull the connectors straight out from the back of the camera (See Figure 24). Do not twist the connectors!



Figure 24 – Removing the connector

Re-Installing the Camera Head

To re-install the camera head, perform the following:

1. Lay the spring assembly on a convenient work area.
2. Plug the connector and locking sleeve into the camera head while making sure that the guide pins/sockets are aligned. Fully seat the connectors without twisting.
3. After fully seating the connectors, grasp the camera head with one hand and turn the ribbed portion of the locking sleeve to screw it into the back of the camera. Do not allow the safety cables to twist more than one rotation. Hold the safety cables when turning the locking sleeve to ensure the safety cable does not turn.
4. Ensure the safety cable is parallel to the camera connector and not wrapped around it. To install the camera onto the spring, rotate the camera head one turn, counter-clockwise and then thread it onto the

spring. Rotating keeps the safety cable from wrapping around the connector cord when the camera is threaded onto the spring.

Ensure the end of the spring snugly fits between the camera and the thread, but does not raise off the threads. Do not overtighten the camera head! Tighten only until the spring is snug against the camera body.

Push Cable Maintenance

Keeping the push cable clean makes it easier to spot excessive cuts or abrasions and also makes it easier to grasp and push.

When rewinding the push cable into the reel, reduce cable grime by running the cable through a rag as it enters the reel.

Visually inspect the cable for cuts and abrasions while feeding it back into the drum. Replace or repair the cable if the outer jacket is cut or abraded through.

Rewinding the Push Cable

NOTICE If the push cable is not secured inside the drum, the push cable can unwind itself if the drum is removed from the case or if the case is left open with the drum inside. Always store the camera completely inside the drum or in the camera clip. If the push cable unwinds, do not manually twist or force the push cable back into the non-rotating drum. The inevitable twisting and bending of the push cable that results from forcing it into the drum without the use of the outer case to rotate it will damage the push cable.

If the push cable has unwound from the drum, place the drum back into the case before reinserting the push cable (See Figure 25).



Figure 25 – Drum properly seated in casing

If space permits and if the entire drum has unspooled, uncoil and straighten the push cable on the ground. When the push cable is not housed in the drum, the push cable can be easily bent, kinked, and damaged. Straightening and laying the push cable out before rewinding it back into the drum can prevent further damage.

If the push cable cannot be laid out straight, use extreme care when rewinding the push cable. Ensure the push cable does not bend or get caught under or on objects. If the push cable becomes twisted or bent, stop rewinding and untwist it before continuing.

After seating the drum into the case, use both hands to guide the push cable into the drum (See Figure 26). Ensure the drum rotates in the case as the push cable rewinds.



Figure 26 – Rotating the drum to properly wind the push cable

To avoid damaging the push cable, keep one hand close to the drum when rewinding the push cable to ensure that the drum rotates freely (See Figure 27).



Figure 27 – Guiding the push cable into the drum

After rewinding the push cable back into the drum, gently thread the camera head through the push cable guide. To avoid bending and breaking the push cable when replacing the camera head, do not pull up on the actual push cable (See Figure 28).



Figure 28 – Routing the camera head

Accessories

⚠ WARNING

The following RIDGID products have been designed to function with the rM200. Other accessories suitable for use with other tools may become hazardous when used with the rM200. To reduce the risk of serious injury, only use the following accessories specifically designed and recommended for use with the rM200:

- SeeSnake MAX cM6
- rM200 Slip-Ring Cartridge (Interconnect for SeeSnake)
- RIDGID-SeekTech or NaviTrack Locators
- RIDGID-SeekTech or NaviTrack Transmitters
- RIDGID SeeSnake Camera Control Units
- rM200 Ball Guides
- rM200 Camera Head Guides

Transport and Storage

Store equipment in a locked area, out of the reach of children and people unfamiliar with its operation. Do not expose to heavy shocks or impacts during transport.

Store electrical devices in a dry place to reduce the risk of electrical shock. Store in temperatures from -40°F to 150°F [-40°C to 65°C]. Store the unit away from heat sources such as radiators, heat registers, stoves, and other products (including amplifiers) that produce heat.

Service and Repair

⚠ WARNING

Improper service or repair can make the rM200 unsafe to operate.

Service and repair of the rM200 must be performed at a RIDGID Independent Authorized Service Center.

For information on your nearest RIDGID Independent Service Center or any service or repair questions:

- Contact your local RIDGID distributor.
- Visit www.RIDGID.com or www.RIDGID.eu to find your local Ridge Tool contact point.
- Contact RIDGID Technical Services Department at rttechservices@emerson.com or, in the U.S. and Canada, call 800-519-3456.

Disposal

Parts of the rM200 contain valuable materials that can be recycled. Companies that specialize in recycling 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 2002/96/EC 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.

Troubleshooting Faulty Components

Use a working camera head to isolate a faulty components in the system. Plug the working camera head directly into the CCU system connector to test the CCU. Plug the working camera head into the hub end of the System Cable or into the push cable connector inside the drum to test each link in the series.

Attempt to isolate the fault to one of the following major components:

- Camera head
- Reel
- System cable
- CCU

Table 3 Troubleshooting		
Problem	Probable Fault Location	Solution
Camera image not seen	No power to SeeSnake CCU	Check power cord is correctly plugged in
		Check the switch on monitor/display unit
	Connections faulty	Check alignment and pins of connection between SeeSnake system unit and CCU.
		Check orientation, seating, and pin condition in the SeeSnake connection.
	Video Source incorrect.	Set video source as described in display unit operator's manual. Check CCU Video Source setting. See CCU manual.
Batteries low	Recharge or replace batteries.	
Count accuracy seems unreliable.	Settings incorrect for reel or cable being used.	Verify the settings are correct for the SeeSnake cable length, cable diameter and reel type you are using.
	Counting from a zero point other than the one intended.	Confirm you are measuring from the intended zero point.
"SOS" code blinking on LCD*	No video signal	Check source setting of monitor and reseat cable connection.

* The light on the LCD will only blink the "SOS" code on some SeeSnake CCUs.

NOTES