LightRay® LRM

Installation Manual

LIGHTRAY™

BUILT IN THE USA

OPERATOR'S USER GUIDE CONTENTS

- Safety
- System Overview
- Packer Set Up
- Process Table
- Operation
- Repair/Replacement Parts
- Preventative Maintenance

Safety

LightRay® LRM

SAFETY

This is the safety alert symbol

Your safety and the safety of others are very important.

We have provided important safety messages in this guide and on your LightRay equipment, however it is up to you as an individual to apply common sense and always read and obey all safety messages.

This symbol alerts you to potential hazards that can kill or hurt you and others. All safety messages will follow the safety alert symbol and either the word **“DANGER”** or **“WARNING”.**

These words mean: 

SAFETY

You can be SERIOUSLY injured if you don't follow the instructions.

All safety messages will tell you what the potential hazard is, it will tell you how to reduce the chance of injury and explain to you what can happen if the instructions are not followed.

WARNING: To reduce the risk of fire, electric shock, or injury to persons when using LightRay systems, follow basic precautions including the following:

- Read all instructions before using the device
- **DO NOT** look at the LED UV lights for prolonged periods of time when energized
- **DO NOT** store the system, launchers, or any auxiliary equipment where it will be exposed to weather.
- **DO NOT** tamper with control box or enclosure.
- **DO NOT** repair or replace any parts of the device or attempt any servicing unless specifically recommended in this guide or in published user-repair instructions.
- Ensure that your personal safety protection equipment functions and is in good working order; wear gloves when handling the resin materials or equipment.

EQUIPMENT SAFETY

The power supply for the LRM system that is used with the LRM Packer is configured for operation with a standard 110 Volt by 15A fused outlet. During normal operation, the LED's will draw up to 20ADC but always refer to the process chart for your system.

Please confirm that the power source to which you are connecting can supply the necessary amperage safely and without tripping the circuit. Disconnect other current drawing devices from the electrical circuit if required.

Never bypass the GFI interlock on the inlet to the power supply. Test the interlock before every installation to confirm it is working.

EQUIPMENT SAFETY

- Check **ALL** electrical and air connections prior to starting your work.
- Include a variety of tools to ensure that proper procedures are carried out safely.
- Ensure that your work area is clear of perils and safe from falls or tripping over equipment, cables or hoses.
- Check air pressure gauges and valves to ensure they are calibrated correctly against known pressure readings of devices or tools. If in doubt, reduce the air regulator valve to zero before connecting to any live air pressure source.

- When using an external electrical power source, select a **GFI** or fused circuit protection outlet and ensure that the voltage is correct before turning on the power to your equipment.
- Always check your equipment prior to starting the planned work process.
- Verify LED lights from the system light up before installing and follow the Preventative Maintenance Guide to ensure equipment is in proper working order
- Air Compressor will need to produce a minimum of 10 CFM , 50PSI
- Not recommended for use with the LR3 Packer sizes 3”x5, 4”x5, and 6”x5ft packers
- Large diameter repairs (8” and above) are ONLY allowed to be completed in straight pipe sections. System is not designed to line in bends when using the Large diameter packers.

System Overview

LightRay® LRM

SYSTEM OVERVIEW

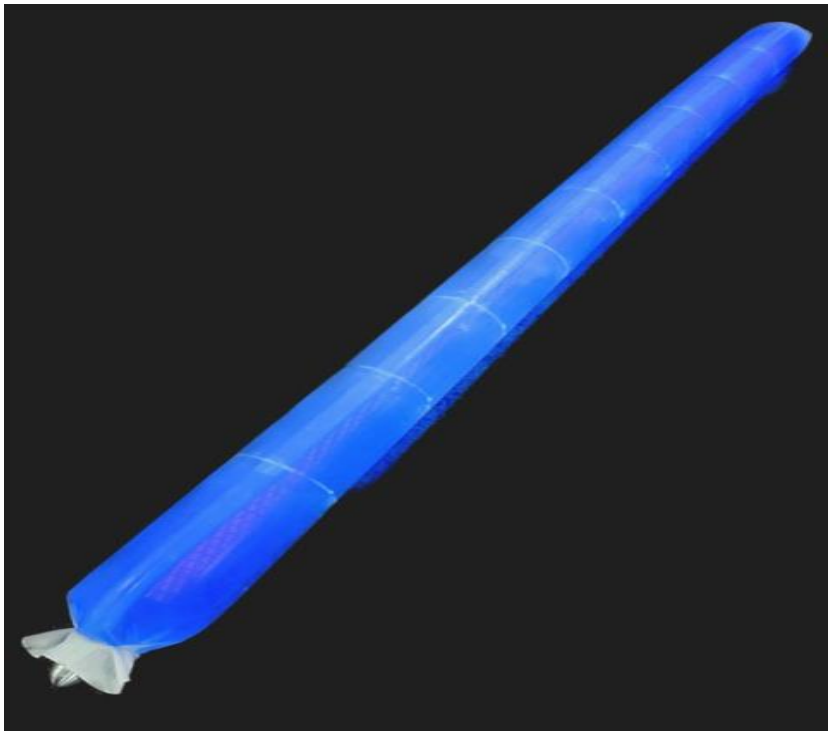
8 major components

1. Reel: Storage for the 400’ cable, Slip Ring Adapter, and Power Supply
2. Five Line Cart or Robot (varies by user): Positioner attachment for aligning launcher
3. Control Box: Activates the LED light train. Manual timer for curing cycles of 4” and 6” diameter liners
4. Light Train: LED lights utilized to cure the liner. Includes 50’ extension cable, LT-LP Separator
5. Launcher: Aligns the lateral liner with the pipe for inversion and cures the main connection (System includes launchers for 8”, 10”, and 12” main line pipe)
6. Camera Reel: Used in aiding alignment and getting lateral length measurement
7. Air Delivery System: Provides air to the system critical for inversion
8. Consumables: LRS Liner Bladder Kit (Dry kits or Pre Wet-Out Kits)
9. Air Compressor: 70 CFM Minimum

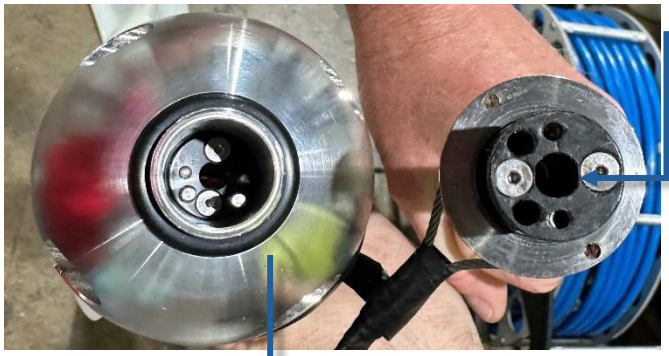
PACKER

The packer is made up of several pieces. The end connectors, the bladder, the LED light and the leading spring or hook.

If the bladder is dirty, light will not travel through it and the LED lights will not be able to cast the light activated resin.



PACKER



Packer Adapter/Smart End:

Packers' electrical connection

Reel End Adapter:

This electrically connects the reel to the packer

Electrical contacts are rated for a finite number of cycles. These particular contacts are rated for 500 plug/unplug cycles – but can far exceed this number if handled with care.

Regularly inspect these contacts for signs of burn marks or oxidation as they may need to be replaced.

Intermittent lights are a sign that the contacts may be starting to wear

PACKER

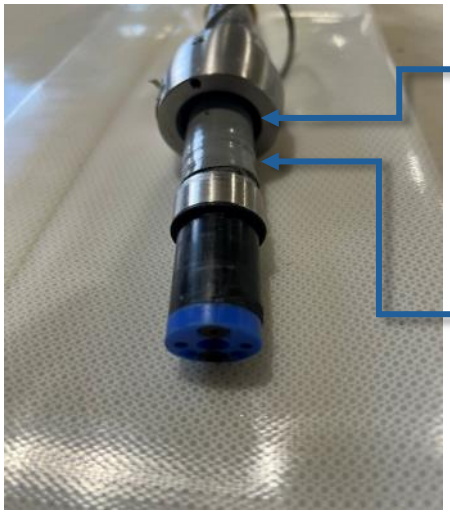
Packer Pulling Anchor:

The pulling anchor piece allows the packer to be attached to a pull rope.

End Connector:

The end piece connects the air/power/push hose to the packer; this piece allows for the adapter to be connected to the packer.

PACKER



There are three O-rings from the LRM ADAPTER to the packer, keep these clean, lubricated, and free of debris. Periodically check the O rings and change if necessary. The part numbers for reordering these O Rings are:

Packer Oring – 9452K389

Reel Cone O Ring – 9452K83

Grey Hose O Ring – 9452K187

CONTROL BOX

Pressure Vacuum Switch:

The switch allows the operator to choose to vacuum the packer or pressurize the packer.

**Vacuum only works with both switches to vacuum

Air Pressure Regulator:

This adjusts the pressure/vacuum delivered from the control box.

Rugged design case

Reel Power/ Power Out Connector:

The attachment for the power cable from the control box to the reel.

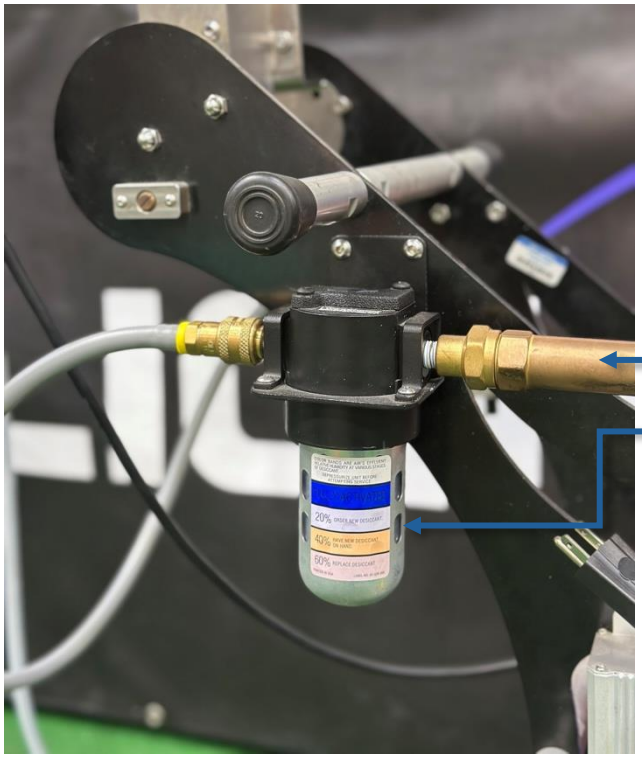
AMP Meter:

Displays how many amps are being pulled while LED lights are on.

Also includes: Process table for all liner configurations and timer for tracking the curing process

DESICCANT ASSEMBLY

The Desiccant assembly has been added to the LRM system to remove more moisture from the air as well as removing small particles from the air, so your system does not get clogged. Your filter may need to be replaced if air/vacuum times increase.



Air Filter location for desiccant

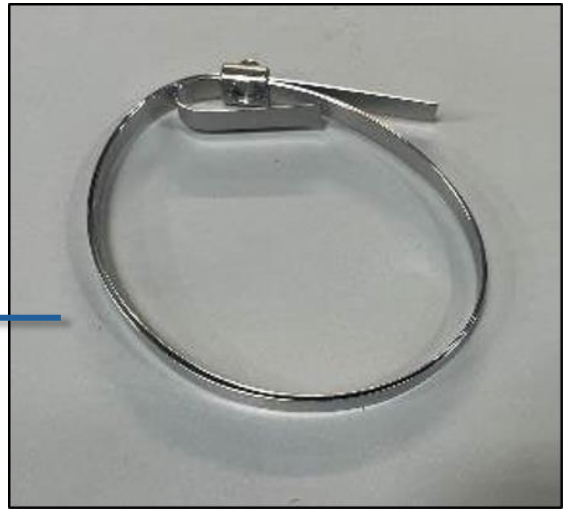
You can visually inspect the beads through the side vents.

The beads will need to be visually inspected before each use, if the beads appear to be pink in color, they need to be changed. This can affect warranty consideration if not maintained properly.

SPARE PARTS KIT

Spare parts kit for changing the small diameter packer bladder.

11200007
LR3 Spare Parts Kit



11200001-14

SM PACKER PACKAGE *11200008-(1-9)*

PL206500
Green Stretch Wrap

11200008-(1-9)-101
Spare Packer Bladders

11200011-(2,5,7)
UV PIP LINER 3”,4”,6”

11200008-100
Packer Spare Parts Kit

11200008-(1-9)-100
Packer only Part#

Packer Set Up

LightRay® LRM

PACKER SET UP

1. Connect your pex hose reel end to your packer. (Only Hand Tight)
2. Prior to each use make sure you clean your packer.(Inflate to 5 PSI for easier cleaning)
3. Vacuum the packer down while working the light train to one side of the silicone bladder.
4. Next, cut a piece of the provided clear plastic tubing to cover the entire packer.
5. Apply soapy water to the inside of the clear plastic to assist in sliding it over the packer.





PACKER SET UP

6. Secure the clear plastic to the packer using a zip tie on both ends
7. Using white electrical tape, tape over the zip ties to the outside of the packer on both sides.
8. Cut a small slit in the clear plastic on both ends next to the electrical tape.
9. Wrap the entire length of the packer using the green plastic wrap
10. To prevent the green wrap from sliding during install, apply electrical tape on the ends of the green wrap, Wrap around twice on each end of the packer






Preform the light test to make sure you are reading proper amperage before loading the liner onto the packer

LOADING THE PACKER

1. Make a mark on the packer where the lights end on each side of the packer using a permanent marker
2. Cut appropriate size piece of liner for the patch repair. **(Always wear gloves when handling the wet- out liner.)**
3. If needed use the rope on the inside of the liner to assist pulling it onto the packer.(Remove the rope on the inside of the liner if not being used)
4. Make sure to lubricate the packer before pulling the liner onto the packer




LOADING THE PACKER

5. Make sure to stop the liner at your mark on the front end of the packer so the liner is lined up with the lights
6. Make a slit in the outer yellow film on the liner and remove.
7. Make sure your light train is pushed to one side of the liner so you can fold the remainder over on itself.
8. Starting at the front end, wrap the liner tightly using the green plastic wrap over the entire liner length. (Green wrap overlaps should be less than one inch)

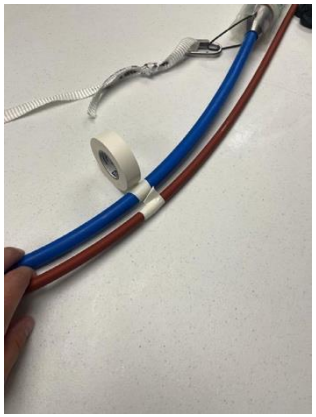




If the intended location for the repair is subject to water infiltration, the recommended action is to remove the plastic yellow film and slide over black plastic before wrapping

LOADING THE PACKER

9. Using light pressure run the perforator tool over the green wrap the entire length of the liner on the packer, this will allow the scored green wrap to stretch easily.
10. Transfer the previously recorded measurement from your camera cable to the pex hose assembly with the camera head aligned to the end of the liner.
11. Using the black plastic provided, wrap the entire liner length and secure using painter's tape.
12. If needed the protected packer can be disconnected from the reel and moved to the patch repair location before re attaching it to the pex hose.


PACKER INSTALLATION

Make sure the insertion point of the pipe is blocked from UV light before removing any of the black UV resistant plastic.

Place the packer into the desired position within the pipe by either pushing or pulling it into place stopping at the tape mark that was transferred onto the pex on the reel. The operator should confirm this position by inserting the video inspection camera to either follow the packer to the correct position or after the placement of the packer. Push or pull the camera to observe the correct positioning and ensure the packer is positioned correctly and ready for inflation.

IMPORTANT: Once the packer with the material is in place. Test the lights by switching the UV Test light switch to the Lights position for NO MORE than 2 or 3 seconds. If you cannot see the lights, you can check the Volt Amp Meter for any kind of a reading. This indicates that the LED light are working and can be observed by the camera if possible.

You are now going to follow your Yellow Green Process chart for the installation.

Process Table

LightRay® LRM

Small Diameter Process Table
(3/4/6”)

Follow these steps when you are prepped and, in the pipe, ready to inflate the packer

1. Turn the pressure regulator dial all the way down(Counterclockwise)
2. Turn the Power/Vacuum switch to the off position then turn the pressure/vacuum switch to pressure
3. Slowly turn the pressure regulator dial clockwise to slowly add pressure to 5PSI
4. Once at 5PSI, set the timer for 3 minutes and wait. Once the time is up, start increasing the pressure regulator dial to 10 PSI and set timer for another 3 minutes
5. Once 10PSI is held for 3 minutes, perform the pull test.(Pulling on the mule tape/Non stretch rope that’s attached to the cable on the rear of the packer
6. Follow the process table to desired PSI in increments of 5PSI to the final pressure desired depending on the liner diameter.

- If packer does not move continue to next step
- If the packer moves its likely due to a possible loss of pressure in your packer
- Confirm your packer is the correct size for the pipe and there is no pressure loss, you can camera this to make sure the packer is inflating properly
- If your packer moves, vacuum it down and pull it out of the pipe and conduct the positive pressure test
- If there is no obvious pressure loss, please contact a WRT Representative for further assistance

Small Diameter Process Table
(3/4/6”)

7. Once the desired pressure is met, we are ready to turn on vacuum and relax the liner. To perform this action, we turn the Pressure/Vacuum switch to vacuum and the power/vacuum switch to vacuum. Then increase the Pressure Regulator dial clockwise all the way and set the timer for 3 minutes
8. After 3 minutes, turn the pressure regulator all the way down (Counterclockwise) then turn the power/vacuum switch to off and the pressure/vacuum switch to pressure. Then increase the pressure regulator dial to the desired pressure depending on the liner diameter, then set the timer for 5 minutes.
9. You are now ready to turn on the lights. Turn the power/vacuum switch to the UV lights and then set the time accordingly.
10. When the time is finished turn the power/vac switch to vacuum and the pressure/vac switch to vacuum. Then turn the pressure regulator dial clockwise all the way.
11. Set the timer for 4 minutes, once the 4 minutes is complete, we are ready to remove the packer by pulling on the mule tape/ Non stretch rope. Once the packer is removed, we are ready to inspect with a camera. Make sure the packer is vacuumed down off the liner before removing.

*If your packer is stuck, you can try to add hot water/soap(Lubricant) mixture to the pipe and try to remove.**

Note- If using a 20ft Packer allow additional time for the vacuum, you should add 2 more minutes to the time.

Operation

LightRay® LRM

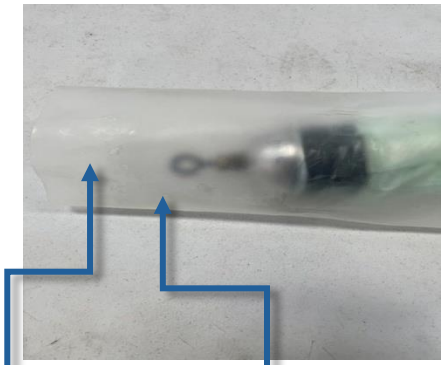
LOADING THE PACKER
(Large Diameter Packer Process)

- **NOTE:** Since the resin is a UV light activated process, there is no reason to rush any of this operation. Take your time. Be safe and proceed sensibly.

LOADING THE PACKER

1. The Packer is constructed of a PRIMARY reinforced silicone bladder and a SECONDARY restraining Polyurethane (PU) sleeve which forces the liner to expand from the center section – outward to the ends. Excluding extreme abrasion with a sharp object, the PRIMARY bladder will last many cycles. The SECONDARY sleeve, however, will have a limited number of cycles (1-2 cycles) before it needs to be replaced.
2. When replacing the SECONDARY sleeve, simply slide it over one end of the Packer while under vacuum and then slide it over the silicone bladder until it reaches the opposite end. There should be 4-6" inches of excess material hanging over each side of the packer into the length of the sleeve to allow for expansion. Align the sleeve so that there is an equal amount of excess sleeve material hanging over both ends of the Packer.
3. Secure the SECONDARY PU sleeve with 2-3 wraps of duct tape to the ends of the packer on both sides.

Primary Silicone Bladder



Overhang

Restraining PU Sleeve

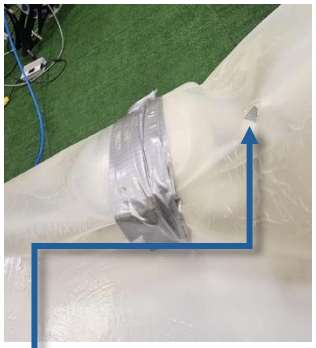
LOADING THE PACKER

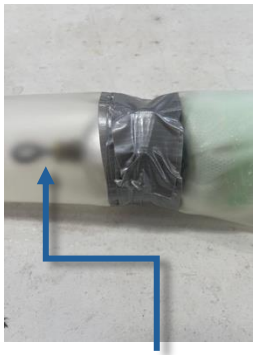
4. Tighten a hose clamp over the duct taped area and wrap another 2-3 wraps of duct tape over the hose clamps.
5. Cut small relief holes on both ends of PU sleeve so air can escape. DO NOT FORGET THIS STEP!
6. Make sure to secure a pull rope through the holes located on the back of the packer. DO NOT secure a pull rope to the wire on the PEX connector end.
7. Cut some of the excess PU sleeve on the front end.
8. Turn on the lights and mark both ends of the lights.

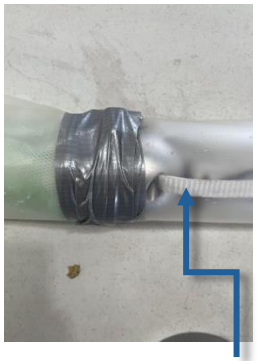
Since moving air is required to cool the LED lights inside of the packer, a small vent orifice is located in the end fitting, OPPOSITE the power connection. Make sure that the vent end is left slightly open so air can flow out.

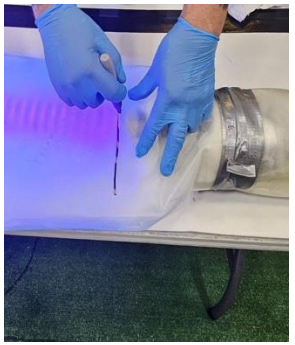
Vent End

Feed End









CUT A SMALL RELIEF HOLE FOR AIR TO ESCAPE

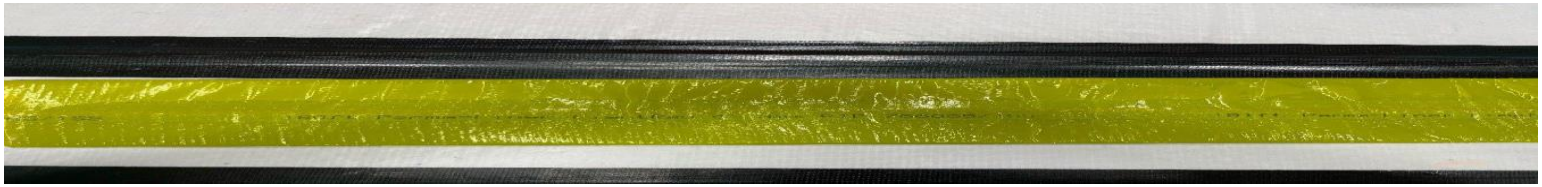
SO AIR CAN FLOW OUT. MAKE SURE THE SLEEVE, ONCE BANDED OVER THE VENT END, HAS CLEARANCE

SECURE A PULL ROPE TO THE BACK OF THE PACKER

Emergency Technical Support: 888-915-2477

LOADING THE PACKER

9. Place the liner material package onto a plastic sheet on a flat surface. Using latex gloves, carefully remove the material from its storage container. Measure the length and then cut it cleanly with scissors.

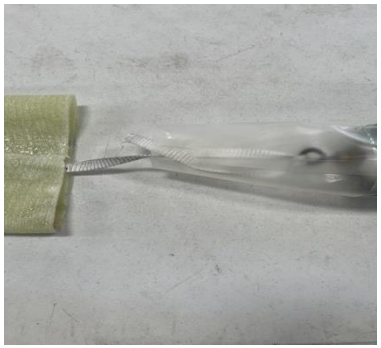


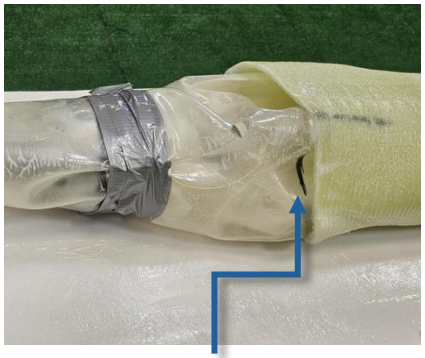
10. Replace the remainder of the material back into the storage container. Seal the remaining liner using tape, to make sure the end is not exposed to light and then note on the package the date and the length being used. Deduct the quantity from the total roll length and mark the balance left for use with date and length.
11. Remove the yellow/black film or cut the yellow/black film protective covering in half lengthwise from the material. Place the material back onto the flat surface.

IF THERE IS SEVERE WATER FLOW, CONSIDER SHUTTING DOWN THE FLOW BEFORE ATTEMPTING TO INSTALL THE LINER.

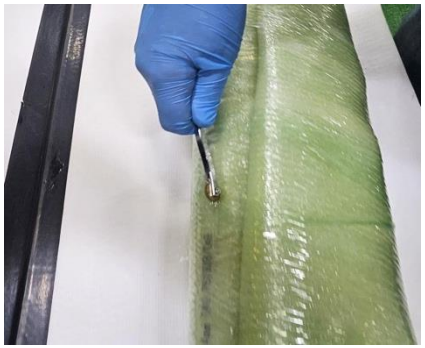
LOADING THE PACKER

12. Using a push rod, string a rope inside of the liner material and attach the rope to the front of the packer. Restrain the material from the opposite side and slowly begin pulling the packer through the material. Stop pulling once the liner is lined up with your marker lines referencing the lights.
13. Once the liner is lined up with your reference marks, fold and wrap the liner to the packer tightly once down. The overlaps of the green wrap should be half the length of the wrap. (Approximately 2-3 inches)
14. Take the perforator tool and roll it over the green wrap where the liner is folded. Make sure to lubricate the outside of the liner with liner lube.
15. Using a pull rope already strung in the pipe pull and position the packer, into the pipe repair zone.
16. Once the Packer is in position, inflate the packer to the proper pressure while following the process chart on the inside of the control box..
17. Once the pressure has been reached cure the liner. 15 Remove the packer and inspect.

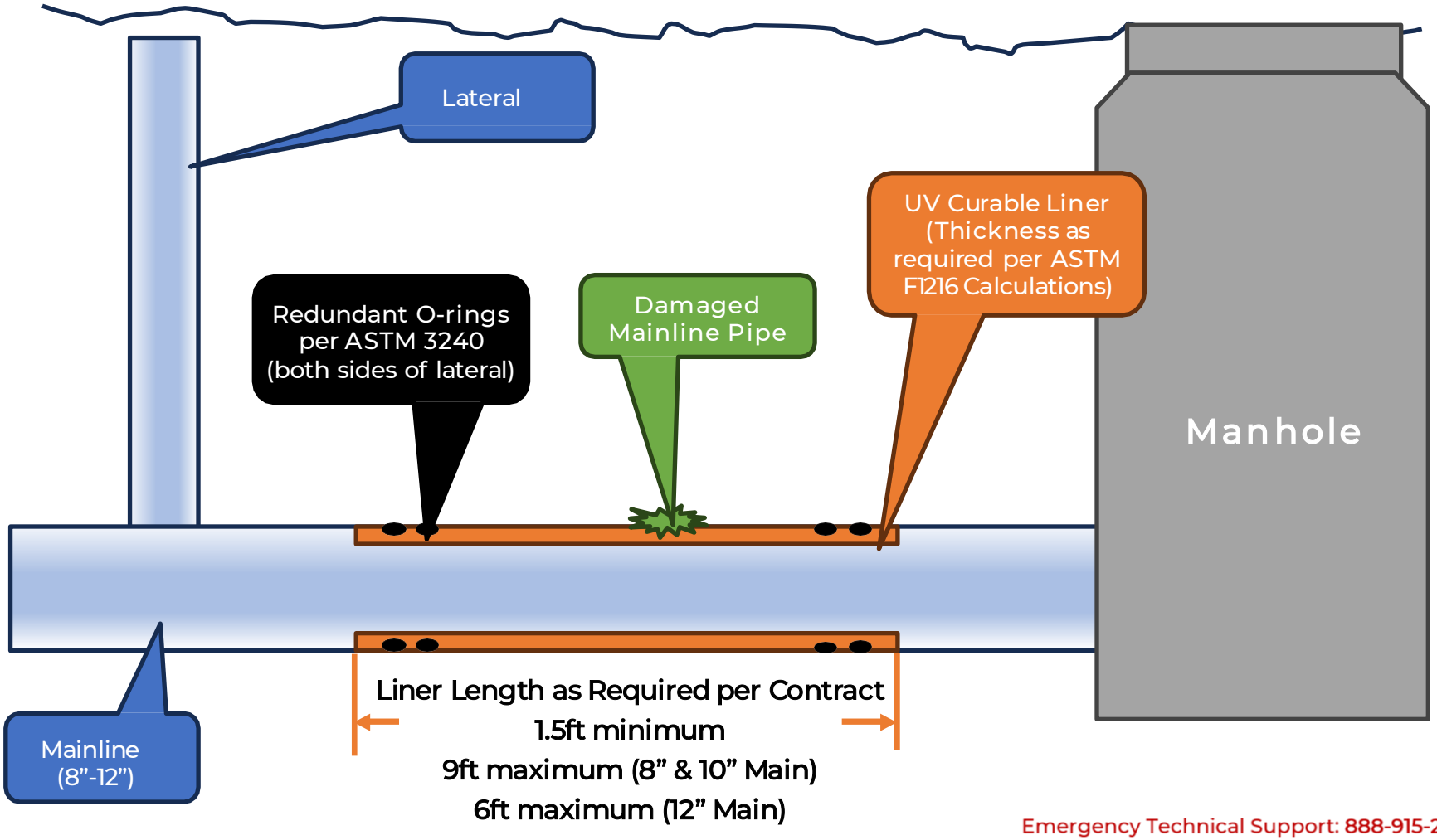




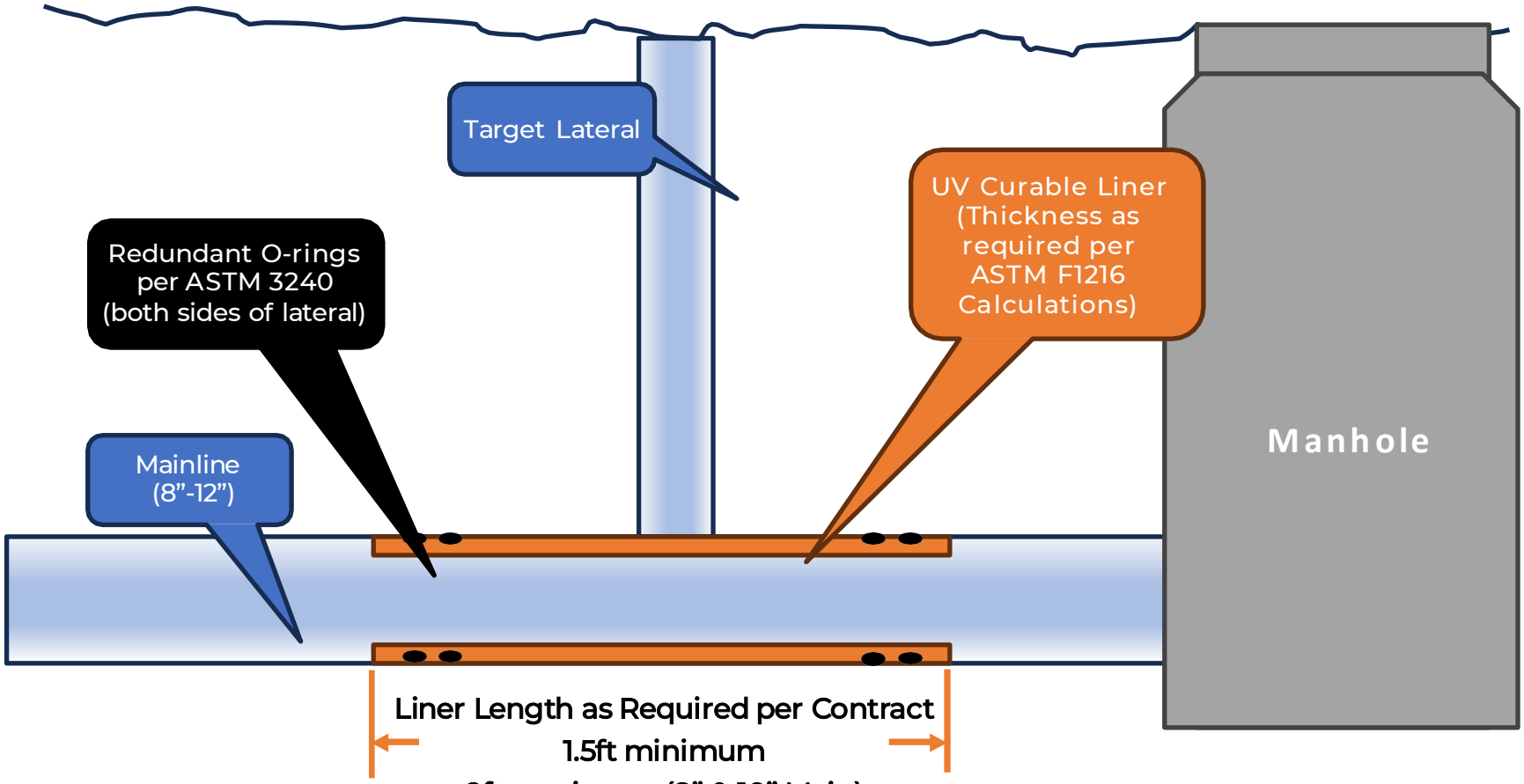
Marker Line Referencing Lights



PATCH REPAIR



PATCH REPAIR



LOADING THE PACKER

(Small Diameter Packer Process: 6” and Under)

The Packer

The packer is made up of several pieces. The end connectors, the bladder, the LED light and the leading spring.

If the bladder is dirty, light will not travel through it and the LED lights will not be able to cast the light activated resin.

Repair/Replacement Parts

LightRay® LRM

REPAIR/REPLACEMENT PARTS

**If your packer has the orange heat shrink like the above photo, you need to order the Original Length Bladder Replacement. If your packer does not have the orange heat shrink, then you need to order the Updated Bladder Length Part Numbers. Please contact your sales rep for any questions.

UPDATED BLADDER LENGTH REPLACEMENT PART NUMBERS	ORIGINAL BLADDER LENGTH REPLACEMENT PART NUMBERS
4”x10’ (11200008-3-101)	4”x10’ (O-11200008-3-101)
4”x20’ (11200008-4-101)	4”x20’ (O-11200008-4-101)
6”x10’ (11200008-5-101)	6”x10’ (O-11200008-5-101)
6x20’ (11200008-6-101)	6”x20’ (O-11200008-6-101)

REPAIR/REPLACEMENT PARTS

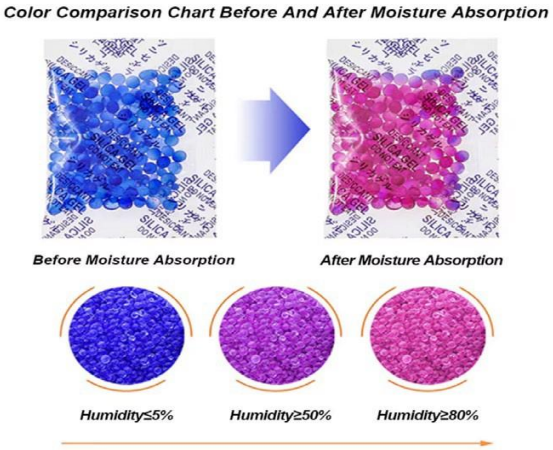
Desiccant -20240001

116432-2011 Desiccant Bead Refill

**If purchasing beads online, be mindful they are not prefiltered and can contain dust and other particles that can clog your filters faster.

4414K72 Filter Element Replacement 2pk

116432-2010 Grey Desiccant Hose



Replace the beads when needed to help keep moisture from entering your system.

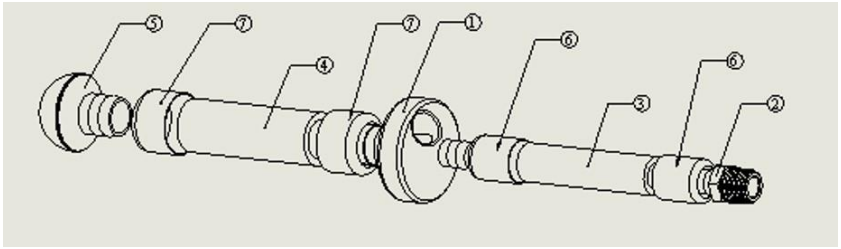
If you purchased your LR3 prior to 2025 and would like to add this desiccant to your machine, order Part # 20240001-UPGRADE to add it to your system

Emergency Technical Support: 888-915-2477

Preventative Maintenance

LightRay® LRM

PACKER PUSHER



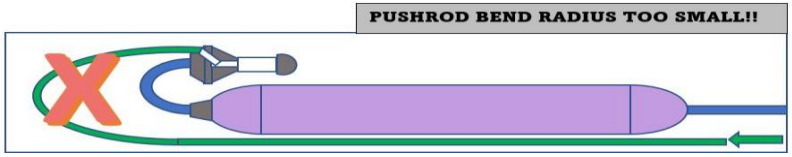
Packer Pusher
11200008-1-01

Please take care if you intend on using a packer pusher

INAPPROPRIATE PUSHROD SELECTION COULD LEAD TO PACKER JAMMING IN PIPE

The pushrod used with your packer pusher MUST have a bend radius that is greater than the diameter of the pipe being rehabilitated.

If the pushrod's bend radius is smaller than the pipe diameter, the packer pusher can turn on itself, leading to an inadvertent jam when attempting to retrieve the packer.



LIGHT RAY LRM- PULL IN PLACE- INSTALLATION SHEET

Install Date:_____ PLI Certified Technicians:_____

Project Address: _____

Temperature:_____ Weather Conditions:_____

Pipe Material Type:_____ Pipe Diameter:_____ Water Infiltration? Yes No

90° Connections: _____ 45° Connections: _____ Total Bends:_____

Can navigate bends but not intended to cure around bends. Contact PLI Service for questions.

Length of Pipe-To-Be-Lined =_____Ft _____In

PIP Access Points: _____

Packer Size_____

Liner Size_____ Liner Serial Number: _____

Packer Holding (Curing) Pressure: _____

Amperage Reading at Start of Cure_____

Start Cure Time:_____End Cure Time:_____

Install Notes:

NOTES

NOTES

NOTES

NOTES