

LightRay® LR2

Installation Manual

Rev D



OPERATOR'S USER GUIDE CONTENTS

- Safety
- System Overview
- Silicone Bladder Replacement Procedure
- Silicone Bladder Prep*
- Installation Procedures*
- Upgrades
- Process Charts



* Covered with Hands-On training from WRT/LMK Training Personnel

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Safety

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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:



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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 device or packers where it will be exposed to weather.
- **DO NOT** open or tamper with the Power box enclosure.
- **DO NOT** repair or replace any parts of the device or attempt any servicing unless specifically recommended in this guide.
- Ensure that your personal safety protection equipment functions and is in good working order; wear gloves when handling the resin materials or equipment.

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EQUIPMENT SAFETY



The power pack for the 2" UV system is configured for operation with a standard 110 Volt outlet. During normal operation, the LED's will draw nearly **3-5Amps for 5ft 8-11Amps for 10ft 14-17Amps for 20ft**



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 switch. Test the interlock before every installation to confirm it is working. The GFI itself is your “power on” for the lights.



Never inflate your packer more than 5 PSI outside of an uncontained pipe. Doing so could cause severe damage to the equipment and personal injury.

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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.
 - **Store your LR3 equipment in a temperature-controlled environment, recommended operating temperature is 20F to 120F outside.**
 - **Storage temperatures of 50F to 90F degrees is recommended to prevent condensation from forming on electrical connections over time.**

General Operational Concept

(Pull in Place Only)



The 2" UV system is designed to be installed using the Pull in Place (PIP) method of installation so you will need to string a pull rope into the pipe

Following standard CIPP practices, **thoroughly clean and prepare the damaged pipe prior to installation.**



With UV systems, the resin begins to cure when exposed to UV radiation. You must always protect your liner from inadvertent activation while being prepared/installed in the host pipe.



Caution: Liner exposed to sunlight during installation may also inadvertently begin to cure. Be sure liner is installed in shaded/protected areas. Protect from UV exposure until ready to cure!

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System Overview

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SYSTEM REQUIREMENTS

Electrical Power:

- Requires 110V @ 15A □ 1650W.
- Recommend a dedicated electrical circuit.

Air Source:

- Recommend a pancake style air compressor Minimum Compressor 75PSI/
Maximum 150PSI & Minimum 2CFM

Pull in Place (PIP) Light Train:

- With the smaller the diameter the pull force increases.

Lubrication:

- DO NOT SHORTCUT THIS – utilize plenty of lubricant on the packer when pulling into place.
- Recommend Soap and water, Slic lubricant

UV Protection:

- Wear appropriate UV protective eyewear during prolonged exposures.

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SYSTEM OVERVIEW

8 major components

1. Reel: Storage for the Light Train Packer and hose assembly
2. Control Box: Activates the LED light train. Manual timer for curing cycles of 2" and 3" diameter liners
3. Power Cables and Air Delivery Hoses: Connects all power and air sources to together.
4. Vacuum/Air Valve: Controls air flow for packer vacuum and pressure cycles.
5. Input Air Regulator/Gauge: Controls input air pressure and allows the installer an additional gauge to ensure that input air pressure is correct.

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MAJOR COMPONENTS

REEL

Storage for the Light Train Packer and hose assembly, the reel also acts as a retrieval mechanism for the Light Train – rated to over 200 lbs. of pull.



CONTROL BOX

Powers the LED Packer Lights. **GFI- this acts as your power on and off button**, this delivers power from control box to LED's and provides the Amp Meter.

Recommended Reading is 3-5 Amps for 5ft 8-11 for 10ft 14-17 Amps for 20ft



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MAJOR COMPONENTS

POWER CABLES AND AIR DELIVERY HOSES:

Connects all power and air sources to together.



VACUUM/AIR VALVE:

Controls air flow for packer vacuum and pressure cycles. Shown in the Normally Open (Vacuum) Position



INPUT AIR REGULATOR/GAUGE:

Controls air flow for packer vacuum and pressure cycles. Shown in the Normally Open (Vacuum) Position



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COMPLETE SYSTEM CONFIGURED FOR INSTALL



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Silicone Bladder Replacement Procedure

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SILICONE BLADDER REPLACEMENT PROCEDURE

Long before the first liner is measured, ordered, and before one even contemplates installing a patch with the 2" UV System, you must be completely comfortable with the process of changing the silicone bladder material. This is not an easy process, but with the proper instruction included with this manual you can preform this task without defect.

Replacement Bladder for 2" Only

Part #	Description	Quantity Per Kit
LR3-PACKER-5FT-BB	Spare 5 ft blue bladder	2 (Plus 4 of the 1ft Prolapse Sleeves)
LR3-PACKER-5FT-WB	Spare 5 ft white bladder	3 (6 Total white Bladder sections)
LR3-PACKER-10FT-BB	Spare 10ft blue bladder	2 (Plus 4 of the 1ft Prolapse Sleeves)
LR3-PACKER-10FT-WB	Spare 10ft white bladder	3 (6 total white Bladder sections)
LR3-PACKER-20FT-BB	Spare 20ft blue bladder	2 (Plus 4 of the 1 Ft Prolapse Sleeves)
LR3-PACKER-20FT-WB	Spare 20ft white bladder	3 (6 Total white bladder sections)

2"x100 FT UV PIP Liner Kit (11200011-17)

When replacing the bladders the cut lengths are the same for both 2" and 3"

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SILICONE BLADDER REPLACEMENT PROCEDURE

Replacement Bladder for 3" Only

Part #	Description	Quantity Per Kit
LR3-PACKER-5FT-3BB	Spare 5 ft blue bladder	2 (Plus 4 of the 1ft Prolapse Sleeves)
LR3-PACKER-5FT-3WB	Spare 5 ft white bladder	3 (6 Total white Bladder sections)
LR3-PACKER-10FT-3BB	Spare 10ft blue bladder	2 (Plus 4 of the 1ft Prolapse Sleeves)
LR3-PACKER-10FT-3WB	Spare 10ft white bladder	3 (6 total white Bladder sections)
LR3-PACKER-20FT-3BB	Spare 20ft blue bladder	2 (Plus 4 of the 1 Ft Prolapse Sleeves)
LR3-PACKER-20FT-3WB	Spare 20ft white bladder	3 (6 Total white bladder sections)

If replacing the 5ft blue bladder, it needs to be 6'2"

If replacing the 5ft white bladder, it needs to be 3'1"

If replacing the 10ft blue bladder, it needs to be 11'

If replacing the 10ft white bladder, it needs to be 5'4"

If replacing the 20ft blue bladder, it needs to be 21'2"

If replacing the 20ft white bladder, it needs to be 10'7"

When replacing the bladders the cut lengths are the same for both 2" and 3"

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BANDING THE SILICONE

The 2" UV System utilizes wire and a wire clamp tool to band the bladder to light train assembly. The entire kit needed to change the bladder was included in your crate with the initial shipment. The detailed instructions for preforming the wire wrap on the bladder are included in the banding tool packaging.

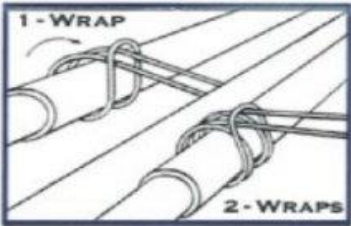
Please follow the instructions labeled **"Instructions For A Double Wrap Clamp"** to ensure that the bladder is secured properly. **Always exercise extreme caution with uncontained inflated bladders.**



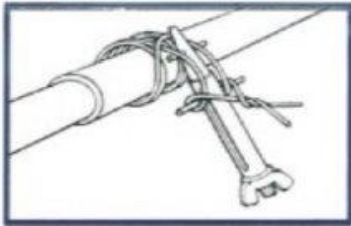
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ALWAYS USE THE DOUBLE WRAP CLAMP INSTRUCTIONS

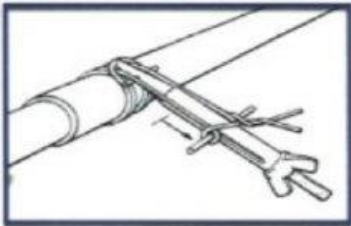
INSTRUCTIONS FOR A DOUBLE WRAP CLAMP



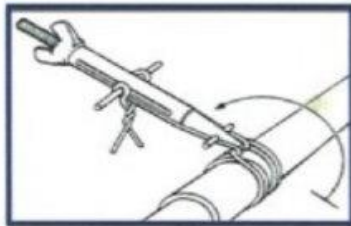
Step 1: Cut the wire to length (4 times around the item you are clamping plus 12 inches of wire.) Fold wire in half, tape (or wire nut) ends together and wrap around item where you want the clamp. Tuck the ends through the loop



Step 2: Wrap around (inside the first wrap), tuck through the loop again and remove the tape (or wire nut). Place tool as shown, with the wire over the front pin. Twist ends together tightly.



Step 3: Place notch at end of tool against the wire loop and turn wingnut clockwise to tighten.



Step 4: Rotate tool over to lock the clamp. Loosen wingnut and remove the ClampTite tool. Clip off wire ends about 1/4" from clamp and push them down against the hose.

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Silicone Bladder Prep

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PREPPING THE SILICONE BLADDERS

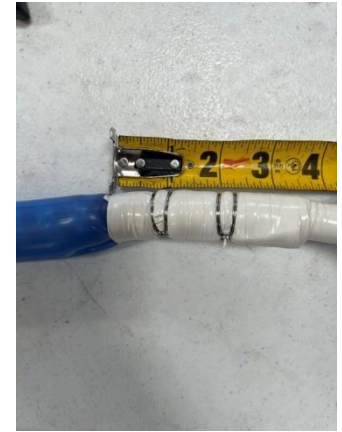
- 1) Starting next to the black and red wire, wrap silicone tape approximately 4" wide on both ends of the cable.
- 2) Lubricate the light train with soapy water or SLIC.
- 3) Pull prolapse sleeve over light train to the reel side of the cable for later.
- 4) Lubricate the inside of the blue bladder and slide it over the light train positioning approximately 3" over the black and red wire on both ends.
- 5) Fold the ends and using electrical tape wrap three times around the blue bladder.
- 6) Secure one of the wire bands 1" from the red/black wire and a second 1" apart from the first.



Reel Side



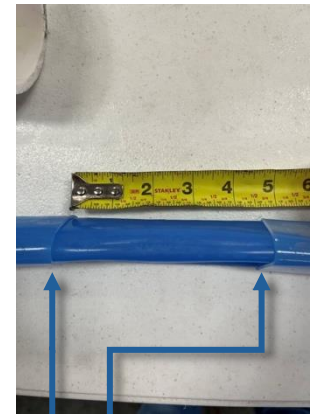
Black/Red Wire



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PREPPING THE SILICONE BLADDERS

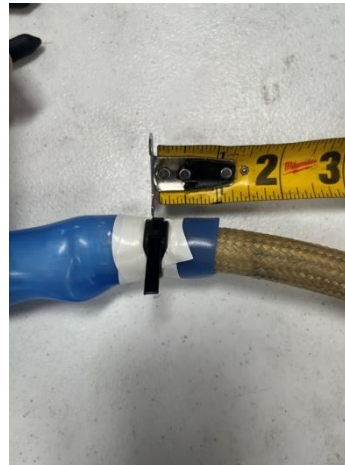
- 7) Cover the wire banding with electrical tape and ensure that the wire ends are not poking through the tape.
- 8) Fold the white bladder in half and cut so you have two equal lengths.(If already cut from the factory move on to the next step)
- 9) Lubricate the inside of one of the white bladders and slide over the blue to the reel side positioning, so it is 2" past the blue bladder.
- 10) Lubricate inside the second white bladder and slide over the blue bladder positioning it so there is a gap approximately 4" wide between them.
- 11) Wrap the ends in electrical tape and secure a low-profile cable tie approximately 1" from the end of the white bladder. Repeat on the other end of the packer.



4" Gap Between Bladders **Emergency Technical Support: 888-915-2477**

PREPPING THE SILICONE BLADDERS

- 12) Cover the cable tie using electrical tape and continue taping onto the cable making a tapered edge on both sides.
- 13) Lubricate the inside of the blue prolapse sleeves and slide over the ends and position so they are 2" past the white bladder underneath.
- 14) Wrap electrical tape 1" from the end and secure using low-profile cable tie.
- 15) Tape over the cable tie and onto the cable making a smooth tapered end. Repeat on the other prolapse sleeve.



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Installation Procedures

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INSTALLATION PROCEDURES

The following procedures and guidelines are written with the assumption that the pipe or pipes to be repaired have been properly cleaned and the operation confirmed by a recent video inspection. In addition, all entryways or access positions have been made clear for safe entry with both manpower and equipment necessary to carry out the planned work.

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OPERATION: SITE-READINESS

The 2" UV packers have been designed for flexible use and only intended to be pulled into place using a tagline or tether. The operator will need a video inspection camera to assist and monitor the process within the pipes under repaired.

1) The camera should be inserted into the pipe and pushed or pulled to the beginning of the section to be repaired. Then, a mark should be applied to the push rod or cable of the camera. Next, the camera should be moved to the furthest position of the repair and marked again. This is required so that later, the positioning of the packer and the UV resin material will cover the repair with an adequate overlap of undamaged pipe on either side of the repair. These marks or measurements can then be transferred to the packer cable, so the identical positioning of the packer corresponds to the repair section planned.

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OPERATION: PRE-CHECK

2) The standard recommendations for an pipeline repair is one and a half times (1.5) the diameter of the pipe being repaired in both directions. The pipe being repaired would have 6" of additional material in both directions where possible. If the total length of bad pipe is 2' in length, then the material would be a minimum of 3' in length.

3) Select an area out of direct sunlight or erect a UV protective canopy that removes the possibility of any sunlight or UV contamination. Lay down a plastic sheet on a flat surface and place the packer on the sheet. Check to ensure the packer device is clean and free of any defects.

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OPERATION: PRE-CHECK/TESTING

4) Connect an adequate air supply of up to at least 75PSI (Minimum 2CFM) and **ensure the air regulator is set to 0 PSI before opening the air supply valve**. Add your air supply to the water separator, then air into the Venturi/Air valve.

5) **Make sure the Venturi Valve is turned inline to the Vacuum position**, then connect your air line from the back pressure gauge to the reel.



Vacuum Position



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OPERATION: PRE-CHECK/TESTING

6) Connect your electrical connections and turn on the UV-Led lights by using the GFI(Manual Reset) Inspect the unit and lights for 10 seconds and if all is working properly you are ready for your repair.

7) Your system should now be completely set up



Turn On- Red Button
Turn Off- Black Button/Unplug



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BACK PRESSURE TEST

*****THIS PROCEDURE SHOULD ONLY BE PERFORMED
IN A CONTAINED PIPE***

IN PROCESS MONITORING: (testing for fine leaks only visible at pressure)

1. Open the valve and continue through the staged inflation cycle identified on the process table.
2. At the last stage (BEFORE THE LIGHTS ARE TURNED ON), close the valve by turning it counter-clockwise and inspect the pressure reading on the gage. It should match the set pressure of your regulator. Monitor for 1 minute.
 - a) If the pressure remains stable (drops less than 10 PSI in one minute) – open the valve, wait the recommended amount of time to refill bladder, and proceed to turning on the UV lights and curing
 - b) If the pressure drops quickly (more than 10PSI in one minute), the packer has a leak and it is recommended that it be pulled out from the application and be repaired before curing.



Valve
opened
to allow
air in



Valve
closed to
test back
pressure

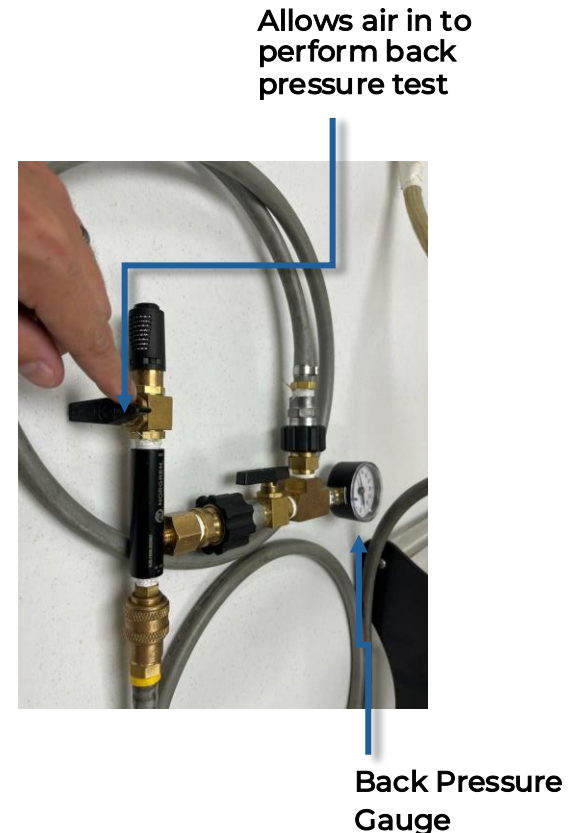
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 - a) If the pressure remains stable (drops less than 10 PSI in one minute) – open the valve, wait the recommended amount of time to refill bladder, and proceed to turning on the UV lights and curing
 - b) If the pressure drops quickly (more than 10PSI in one minute), the packer has a leak and it is recommended that it be pulled out from the application and be repaired before curing.



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DETAILED PATCH INSTALLATION PROCESS

PREPARATION

- 1) Wrap the entire length of the packer with the green wrap once, while under vacuum. The overlaps need to be approximately $\frac{1}{2}$ the length of the green wrap. Use electrical tape to tape the ends of the wrap onto the packer.
- 2) Turn on the lights and make a black mark on the reel side of the packer to know how far to pull your liner on and into place and turn off the lights.
- 3) Cut the necessary length of appropriate pre-wet liner.
- 4) Using the perforator tool roll over the liner on both sides for the entire length of the liner for resin migration.
- 5) Pull the patch onto the packer in the correct location on the packer.



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DETAILED PATCH INSTALLATION PROCESS

- 6) Work the light train to one side of the liner, fold the liner, then wrap tightly once down with 1" overlaps of the green wrap.
- 7) Using the perforator tool gently roll over the wrapped liner(DO NOT ROLL ON THE EXPOSED SILICONE BLADDER/LINER ONLY)
- 8) Use your electrical tape to tape the ends of the liner to the packer, tightly, two to three times around.
- 9) Carefully, snip the electrical tape half the width of the tape.



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DETAILED PATCH INSTALLATION PROCESS

- 10) Using the black plastic provided, slide over the liner and secure using painter's tape.
- 11) Before pulling the packer into the pipe, unplug all air and electrical connections going into the reel. Then lubricate the packer and pull it into place.
- 12) Once into place, reconnect all air and electrical connections going into the reel making sure the regulator is set to zero.
- 13) Turn the vacuum/air valve to the open-air position and start the inflation.
- 14) Start slowly turning the regulator dial clockwise until you reach 10PSI, then follow the proper size process chart.
- 15) Once the repair is completed turn off the lights, turn on the vacuum before attempting to remove the packer from the pipe. If you're struggling with packer removal after repair, please call WRT 1-888-915-2477 for assistance.



Unplug prior to pulling into pipe

Open Air Position

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Upgrades

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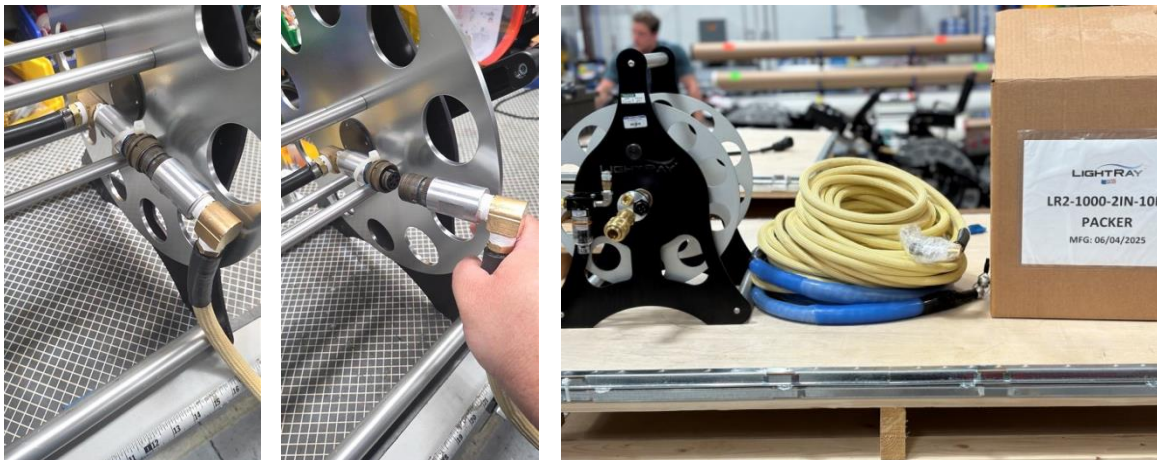


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2" REEL/PACKER UPGRADE

Introducing the new 10-foot packers for the 2" system!! This new upgrade allows the versatility of using multiple packers with one reel to give you more options for all your 2 and 3" repairs. We now offer a detachable packers for the 2" system that are available in 5', 10', and 20' versions. Call your Waterline Renewal Technologies Representative today for more information.



**** Prior models can be retro fitted with this upgrade if preferred. Please speak with your sales representative for more details LR2-UPGRADE****

Product Part Number

2"x5' LR2-1000-2IN-5FT

2"x10' LR2-1000-2IN-10FT

2"x20' LR2-1000-2IN-20FT

3"x5' LR2-1000-3IN-5FT

3"x10' LR2-1000-3IN-10FT

3"x20' LR2-1000-3IN-20FT

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Process Tables

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IN GROUND

2" Install Process Table Chart (2" x 2mm liner)

Step	Pressure	Duration 5ft Packer @3cfm*	Duration 10ft Packer @3cfm*	Duration 20ft Packer @3cfm*
Inflate	10PSI	1 Minute	1 Minute	1 Minute
Inflate	20PSI	1 Minute	1 Minute	1 Minute
Inflate	30PSI	1 Minute	2 Minutes	2 Minutes
Inflate	40PSI	1 Minute	2 Minutes	2 Minutes
Pull Test	Pull Test	Pull Test	Pull Test	Pull Test
Inflate	60PSI	1 Minute	2 Minutes	2 Minutes
Close Valve and Measure SEE PAGE 24	60PSI	Activate Back Pressure Gauge Monitor for 1 minute	Activate Back Pressure Gauge Monitor for 1 minute	Activate Back Pressure Gauge Monitor for 1 minute
Open Valve	60PSI	1 Minute	1 Minute	1 Minute
Turn Lights On	60PSI	Cure for 5 Minutes	Cure for 5 Minutes	Cure for 5 Minutes

ABOVE GROUND TEST

Step	Pressure	Time
Inflate	5PSI	1 Minute
Lights On		10 Seconds

Monitor the amperage draw which identifies if the lights are powered.

Amperage Draw:

- 5ft packer: 3 - 5 Amps
- 10ft packer: 8 - 11 Amps
- 20ft packer: 14 - 17 Amps

**Time to fill the packer strongly depends on the flow rate capabilities of the compressor used. If the flow rate is expected to be lower than what is specified above, please contact Waterline Renewal Technologies.*

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IN GROUND

3" Install Process Table Chart (3" x 3mm liner)

Step	Pressure	Duration 5ft Packer @3cfm*	Duration 10ft Packer @3cfm*	Duration 20ft Packer @3cfm*
Inflate	10PSI	2 Minutes	2 Minutes	2 Minutes
Inflate	20PSI	2 Minutes	2 Minutes	2 Minutes
Inflate	30PSI	2 Minutes	2 Minutes	3 Minutes
Inflate	40PSI	3 Minutes	3 Minutes	3 Minutes
Pull Test	Pull Test	Pull Test	Pull Test	Pull Test
Inflate	40PSI	2 Minutes	2 Minutes	3 Minutes
Close Valve and Measure SEE PAGE 24	40PSI	Activate Back Pressure Gauge Monitor for 1 minute	Activate Back Pressure Gauge Monitor for 1 minute	Activate Back Pressure Gauge Monitor for 1 minute
Open Valve	40PSI	1 Minute	1 Minute	1 Minute
Turn Lights On	40PSI	Cure for 15 Minutes	Cure for 15 Minutes	Cure for 15 Minutes

ABOVE GROUND TEST

Step	Pressure	Time
Inflate	3PSI	1 Minute
Lights On		10 Seconds

Monitor the amperage draw which identifies if the lights are powered.

Amperage Draw:

- 5ft packer: 3 - 5 Amps
- 10ft packer: 8 - 11 Amps
- 20ft packer: 14 - 17 Amps

**Time to fill the packer strongly depends on the flow rate capabilities of the compressor used. If the flow rate is expected to be lower than what is specified above, please contact Waterline Renewal Technologies.*

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2" UV System - 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: _____

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:

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CUSTOMER PORTAL ACCESS



Prior to replacing the Packer Bladder, please review our tutorial video by scanning or going to:

www.waterlinerenewal.com/customers

Passcode: wrt

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REVISION HISTORY

Document Revision Author	Revised Section / Paragraph	Reason for Revision	Rev	Released
Chris Ras / Engineering	Process Table	Process Table Pressure Update	E	QT9 05//25
Matt Fadness / Service	Reel/Packer Update	Reel / Packer Separation / Intro of the 10ft option	F	QT9 07/25

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