

# Instruction Manual Z.21R Pullstart #32170

Please read and understand these instructions completely before you install your engine.

## TECHNICAL DATA:

Engine Size	.21 (3.48ccm)
Exhaust	Rear
Bore	16.4mm
Stroke	16.4mm
Liner	ABC
Number of ports	3+1 (3x transfer-, 1x exhaust-port)
Crankshaft	SG-Shaft
Crankcase	LRP VTEC.21 Heavy Duty, black anodised
Piston	Fully CNC-machined, high-silium alloy
Connecting Rod	Fork shaped aluminium using double bushings
Glowplug	Standard style, LRP Standard R5 (No. 35050) included
Carburetor	Competition slide carburetor, 7.0mm venture, aluminium
Power Output*	2.12 PS
Useable RPM range*	2.000 – 30.000
Weight	410g

\*Figures may vary depending on used fuel, muffler and tuning.

## WARNING NOTES:

- Never leave your RC model unattended when the engine is running. If a fault should occur the result could be a fire in the model which could destroy anything else in the vicinity.
- Nitro engines produce gases which are very dangerous for your health; one of them is carbon monoxide which can lead to death! Always use your engine outdoors or in well ventilated areas.
- Running nitro engines and it's surroundings get very hot, you can seriously burn yourself when you touch it with your fingers.
- Never try to stop a running engine with your fingers. Please interrupt/pinch the fuel line, or close the top of the carburetor.
- Not suitable for children under 14 years, this engine is not a toy.

## FUEL:

Use fresh 2-stroke model car fuel only, never use regular gasoline or airplane fuel! We recommend using our line of LRP high-quality fuels. For the LRP Z.21R Pullstart engine we recommend fuel with 25% nitro. A higher nitro content decreases your engine's lifetime. Do never exceed 30%.

## AIRFILTER:

A good airfilter is very important for the life of your engine. Never run without an airfilter, as quick and permanent damage will result! Don't forget to impregnate the airfilter with a suitable oil before usage. Carefully clean the airfilter at least after every fifth tank. Replace the airfilter every 3litres (~1 gallon) of usage.

## GLOW-PLUG:

Use only standard style glow-plugs for this engine, we recommend using our line of LRP high-quality glow-plugs (available as R3 to R6). Check them frequently and never run with worn-out or old glow-plugs since they could damage your engine. They turn dull when your engine was too lean and should be replaced, they should stay bright like chrome. **Whenever you have trouble with the engine stalling for no reason, replace the glow-plug first!**

## EXHAUST SYSTEM:

Never run without a pipe since this will cause excessive overheating and may damage your engine. A proper pipe lets 2-stroke engines run properly and fast. We recommend using our line of LRP high-quality pipes and headers.

## PULL STARTER:

Always pull the handle straight and don't let the cord rub on anything. Do not fully extend the cord as this may abuse and damage the pull starter (using about 2/3 of the complete length of the cord is enough to start your engine). Don't let fuel get in contact with the pull starter as this may weaken it. The Pull Starter is designed to start the engine running in a counterclockwise rotation. **Forcing the flywheel clockwise will cause sever damage to the pull starter.**

## **CARBURETOR:**

The factory settings of the engine are as following and are a good starting point for you. Turn in the needles completely (Caution: do not overtighten them!) and loosen them the required number of turns again:

- **Mid range:** 3,5 turns
- **Main:** 3 turns

**Idle screw (No.1):** Adjusts the air flow when carburetor is fully closed. Turn CW for higher idle-speed and CCW for lower idle-speed. Should be open 0.5-1.0mm.

**Mid range needle (No.2):** Adjusts the mid/low-speed flow rate of the fuel. Turn CW for leaner and CCW for richer setting.

**Main speed needle (No.3):** Adjusts the main flow rate of the fuel (when the throttle is opened significantly). Turn CW for leaner and CCW for richer setting.



## **RUN-IN:**

This is a very important step in ensuring that you get the highest performance and lifetime of your engine, take your time for proper run-in. We do not recommend using run-in benches, use your car for run-in and use the same fuel as you will be using for the life of the engine. If your engine doesn't start easily you may try loosen the glow-plug by  $\frac{1}{2}$ -turn to decompress the engine and try again, don't forget to tighten the glow-plug again once it started!

### **Procedure:**

- Start the engine and set the main-needle very rich, i.e. excessive smoke coming from the muffler.
- Let the engine idle for 2mins first to warm it up.
- Now start driving your car, it will be slow and sluggish, but this is an important step.
- Do not allow the engine to rev-up too high, run the engine at half speed on the straightaway.
- The engine should not be too cold and not too hot during run-in,  $70\text{-}90^\circ\text{C}$  ( $160\text{-}195^\circ\text{F}$ ) is perfect.
- Let the engine cool down for 15mins after each tank during the run-in period.
- We recommend doing so for 4 tanks of fuel before you start tuning your engine.

## **TUNING:**

It never hurts to have the mixture too rich, but NEVER let the mixture get too lean. Always tune from rich to lean. If in doubt, richen it up first! Never try to tune a cold engine, run 5 full laps to get the engine up to running temperature before doing any adjustments!

### **Basic tuning procedure is as follows:**

1. Set the engine's idle speed up slightly higher than normal.
2. Start tuning your engine with the settings too rich.
3. Always tune main-speed needle (top-end) first.
4. Tune mid-range needle next.
5. Reset idle speed screw.

### **Procedure:**

1. Set the idle speed so your engine doesn't stall (slightly higher than normal).
2. Go to the track with the main-needle set too rich, there should be heavy smoke coming from the muffler now.
3. Tune the engine by leaning the main-needle  $1/8$  turn at a time.
  - Your goal will be that the engine will just reach maximum RPM on the straightaway.
  - Open the main-needle again by an  $1/8$  turn when you have reached that point, this should be the perfect setting for the main-needle (temperature of  $95\text{-}110^\circ\text{C}$  /  $200\text{-}230^\circ\text{F}$ ).
  - If the main-needle is set too lean, the engine will overheat and will not accelerate smoothly. If this happens, immediately stop the engine and richen the main-needle (counterclockwise)  $1/4$  turn before a new attempt.
4. Adjust the mid-range needle now. Run 3 full laps, stop the car near you and let it idle for 5secs. "Push off"...
  - It should have slightly richened up, but still accelerate quickly. If it died before the 5secs, check the following:
    - If it seemed to load up and slowly stop, the mid-range needle is too rich.
    - If the idle-speed increased before it stopped, the mid-range needle is too lean.
5. You may have to re-adjust the idle-speed now. If it idles too high, the clutch may not release completely and you will lose "snap" off the corners. If it idles too low, it may stall at the start, or at the end of the straightaway when you release the throttle.

### **Ways to measure the engines temperature:**

- Temperature gauge method (recommended): Pull in quickly and immediately take a temperature reading. Place the gauge directly over the engine pointed at the glow plug.
- Spit method: Pull in quickly and immediately put some spit on the engine's head. The saliva should just slowly boil off (2-3secs). It should not dance around as if it were on a hot griddle, nor should it lay there and steam.

## **AFTER RUN:**

Use after-run oil to keep everything lubricated after you have finished your day. After-run oil helps for an easy start the next time and protects your internals against rust. Use only "after-run oil" specially formulated for R/C engines. Do not use silicone shock oil or similar as they will seriously harm your engine.

### ***Procedure:***

First let the tank run completely empty at idle until it runs out of fuel (try re-starting it several times), next put a few drops down the open carburetor and a few drops down the glow plug hole. Pull the pullstarters chord 5-times and you are done.

## **MAINTENANCE:**

Treat your engine with care and check it frequently. This engine will rev up to 30'000 RPM and any fault at such high RPM can cause serious damage. All moving parts inside the engine are subject to wear, you must know if a piston/liner/conrod has worn out and if they need to be replaced. If you replace one part, please check if everything else is still in good shape at the same time. If you only change one part and other parts are in bad shape, there's the possibility that there will be a new failure soon!

### ***Some important matters:***

- Clean the outside of the engine properly before you open it. Any dust or dirt which gets into the engine could make considerable damage.
- Check the conrod frequently. If you want to replace the conrod, be sure the big end of your crankshaft is still round and at a good size. If not, also replace the crankshaft.
- When you start putting your engine back together, make sure that each part is totally clean before installation and please use some oil (after-run is suited well) to lubricate everything.
- Be careful that each part has its correct direction, especially piston/liner/conrod. Both the lower part of the piston and the lubrication hole in the conrod should be facing to the front (direction to the carburetor).
- Before you install the combustion chamber, please doublecheck that you installed all head shims.
- Use a hex wrench to install the screws. When you start to feel resistance, stop turning the screw. Repeat this for each screw, use the star-technique to tighten all the screws completely. Do not overtighten them!

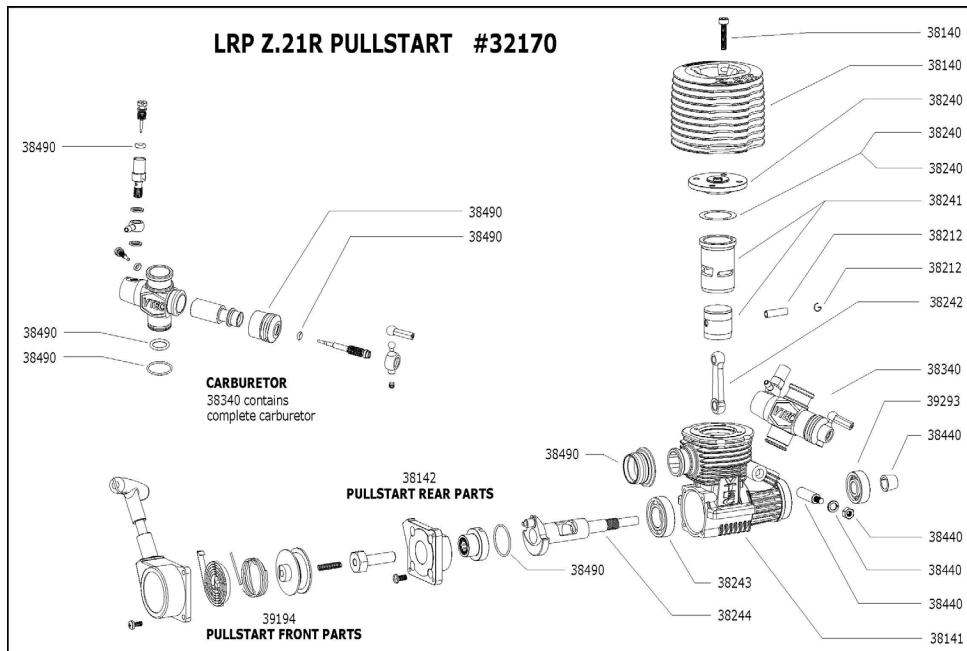
## **TROUBLE SHOOTING GUIDE:**

PROBLEM	REASON	SOLUTION
Engine does not start	Glow plug defective	→ replace glow plug
	Glow plug does not work properly	→ check the condition of the glow plug → check the glow plug igniter
	Engine is set too rich (too much fuel, hits back)	→ check carburetor settings, repeat tuning procedure → unscrew the glow plug completely and use startbox for 5sec
	Engine is too lean (too little fuel, does not start)	→ check carburetor setting, repeat tuning procedure
	Engine doesn't suck in the fuel	→ check the fuel line for possible damage → check the carburetor setting
Engine stops after a short time after glow plug igniter has been disconnected	Glow plug defective	→ replace glow plug
	Bad fuel	→ replace fuel by fresh and correct type of fuel
	Bad carburetor setting	→ check the carburetor setting, repeat tuning procedure
	Dirt in fuel line or carburetor	→ clean fuel line, clean & check carburetor
	Fuel line damaged	→ replace fuel line
	Loose glow plug or cooling head	→ tighten glow plug and/or cooling head
	Air filter old or dirty	→ clean or replace air filter
Performance decreases after reaching operating temperature or engine stalls from time to time	Engine is set too lean	→ check the carburetor setting, repeat tuning procedure
	Glow plug defective or wrong type	→ replace the glow plug by a correct type
	Engine runs too hot	→ run-in process is not completed
	Shims under comb. chamber wrong	→ check number of shims
Engine's still keeps running at high RPM for a moment when you release the throttle	Bad carburetor setting	→ open mid-range needle ¼ turn at a time and re-adjust idle-speed → set idle speed lower
	Glow plug, wrong type (too hot)	→ use glow plug with higher number (e.g. go from 6 to 7)
	Shims under comb. chamber wrong	→ check number of shims

Please always check [www.lrp-electronic.de](http://www.lrp-electronic.de) for guidance if you are experiencing problems!

## DRAWINGS & SPARE PARTS:

Please check spare parts availability at [www.lrp-electronic.de](http://www.lrp-electronic.de)



## REPAIR PROCEDURES / LIMITED WARRANTY

All products from LRP electronic (hereinafter called "LRP") are manufactured according to the highest quality standards. LRP guarantees this product to be free from defects in materials or workmanship for 90 days from the original date of purchase verified by sales receipt. This limited warranty doesn't cover defects, which are a result of normal wear, misuse or improper maintenance. This applies on:

- Engine disassembly by customer
- Any modification of the engine done by the customer
- Rust inside the engine
- Dust or dirt inside the engine
- Damaged engine due to glow plug failure
- Overheating
- Scratches inside the engine caused by dirt or dust
- Water in fuel
- Wrong break-in procedure
- Damaged piston due to piston stop devices
- Damaged cylinder exhaust port due to piston stop devices
- Breakages at high rpm without engine load
- Did not read Instruction manual

In case of problems first check all other components and the trouble shooting guide, to eliminate all other possibilities or improper handling. Please only return the sole engine without the clutch, motor stands, etc.. You can send defective products to your national LRP-distributor. Hobby shops are not authorized to replace products thought to be defective.

The original sales receipt including date of purchase needs to be included. Otherwise, no limited warranty can be granted. For quick repair- and return service, add your address and detailed description of the malfunction. Products sent in for repair that operate perfect will be charged with a service fee. Therefore first check with the trouble shooting guide.

Our limited warranty liabilities shall be limited to repairing the unit to our original specifications. In no case shall our liability exceed the original cost of this unit. Because we don't have control over the installation or use of this product, we can't accept any liability for any damages resulting from using this product. By installing or operating this product, the user accepts all resulting liability.

The specifications like weight, size and others should be seen as guide values. Due to ongoing technical improvements, which are done in the interest of the product, LRP does not take any responsibility for the accuracy of these specs.

### WHAT SHALL I DO?

- Package your product carefully.
- Send parcel to your national LRP distributor.
- Distributor repairs or exchanges the product.
- Shipment back to you usually by COD (cash on delivery), but this is subject to your national LRP distributor's general policy.