SACK INDUSTRIES

# FC3S Surge Kit Instructions

## About the kit:

This surge tank kit is for those who are looking for a competition motorsports fuel system that is a drop in for the FC3S chassis using a stock tank.

## Pre-Requesites:

Empty fuel tank or near empty.

The fuel tank must be in good condition (not rusty). If not, you have bigger issues to worry about.

2x Walbro pumps for the surge tank, 1x Walbro pump for the lift pump.

Re-Use OEM fuel pump gasket.

## Recommendations:

Clean your tank! Drop your tank, get some Clorox PH Down and fill ‘er up. 4 cups of ph down + fill your gas tank up with water = no more rust in 24 hours! Make sure to neutralize with 4 cups of baking soda and let it air dry.

Extra Optional - You can then use 1 gallon POR-15 metal etcher and then rinse extensively till its clear. Let it air dry for 24 hours or use a heat gun to dry for 2-4 hours. (After drying will have a dusty white powder on the surface, this is normal)  And then use 2 quarts POR 15 Sealer.

## DISCLAIMER:

We are not responsible for any installation errors. Please use proper safety equipment when performing the following steps to fit this surge kit.

## What’s inside:

The main things that make the kit go brrr.

- 1x FC3S Surge Tank Bulkhead
- 1x Y Barb
- 1x Surge Tank Hanger Flange
- 1x Surge Tank
- 1x Fuel Pump Hanger Rod
- 2x Fuel Pump Hanger Clamp: Front and Rear
- 1x Walbro Sock Extender
- 1x Lift Pump Tank
- 1x Lift Pump Bracket
- 2x Trap Doors (Optional)

- 4x 1/8 in rivets (Included  w/ Trap Doors)
- 1x 3.5mm spacer
- 1x Fuel Level Sending Unit
- 3x Stainless Compact Fuel Filters for Walbro Pumps

Mechanical & Electrical Related Hardware:

- M3x6 SS SHCS: 3
- M3 Internal Tooth Washer: 2
- M3 x 16 SS SHCS: 1
- M3x25 SS SHCS: 1
- M3x 40 SS SHCS: 2
- M4x30 SS Stud: 9
- M4 SS Hex Nuts: 36
- M4 SS External Tooth Lock Washers: 40
- M4 x 20 SS SHCS: 2
- M4 x 10 SS SHCS: 25
- 3/16 insulation: 4 FT
- 4ft 14awg Red PTFE Wire
- 4ft 14awg Black PTFE Wire
- Nylon Shoulder Washers: 9
- PTFE Washers: 9
- 7mm x 4mm  O Ring: 9
- Quick Connects: 3 pair
- Ring Terminals for 12 AWG: 20

Plumbing Related Hardware:

- 6an ORB 3/8 Barb Fitting: 1
- 1/4npt 90 degree 3/8 barb fitting: 1
- 8an ORB to 8AN flare: 1
- 6an ORB to 6AN flare: 1
- 140mm corrugated hose: 2
- 160mm corrugated hose: 1
- 450mm corrugated hose: 1
- Fuel Injection Hose Clamp: 7
- 13mm x 10mm O ring: 3
- 19mm x 15mm O Ring: 1

Misc

- Metal Shears

## Tools Needed for Install:

Rivet Tool (If you have the optional trap doors)

Wire Crimper

Allen Keys for M3 and M4 SHCS

Pliers

Metal Shears (Included in Kit)

AN Wrenches

7mm Wrench and Socket

Marker

Dremel or File

Pliers

5.5mm Drill Bit

Drill

# Surge Tank Assembly

**Step 1:** ***(This step assumes that you have an empty tank and it's in good condition, please refer to the requirements and recommendations at the top if not.)***

I. Install a Nylon shoulder washer into one of the 9 holes on the bulkhead from the top.

A. 

II. Insert a M4x30 stud into the hole and put a nut on the shoulder washer side loosely

A. 

III. Insert an O-ring onto that same stud from the bottom.

A. 

IV. Stack a washer on top of that o-ring

A. 

V. Put a nut on and confirm the stud is sticking out equally on both sides.

A. 

VI. Use a 7mm wrench and a 7mm ratchet to snug it up.

A. ***SNUG. It's allowed to rotate, but not have up and down play!

VII. Repeat for the rest of the holes. 9 total.

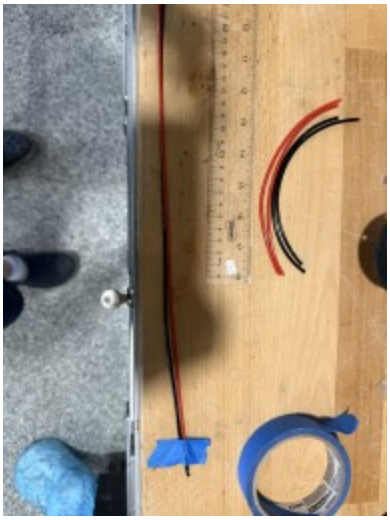
## Step 2: Bulkhead Terminals , Ring Terminals & Wiring Prep

Create your lift pump harness & prep your surge pump wires.

I. Use the red & black 14AWG Tefzel wire, cut about 22 inches for each.

A. *It needs to be long so that you can connect the lift pump with the surge tank out.*

*B.* If you are running a brushless lift pump, cut out 1 additional wire of the same length. Preferably different color. Must be 22awg. (Not Included)

C. 

II. If running 525 surge pumps or pumps without a connector directly on the pump, cut 4 wires about 6 inches. (2 Red & 2 Black)

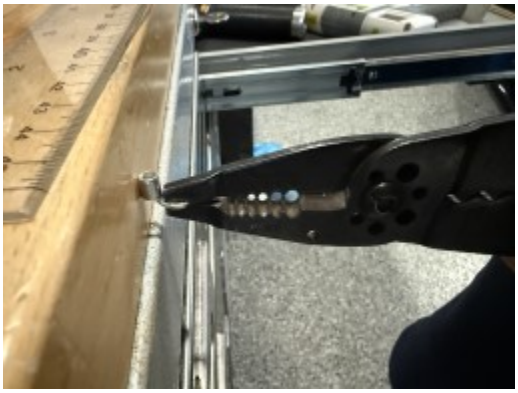
III. If running any other pump with a connector directly on it, like the 450 and 255 then cut 4 wires about 10 inches.

IV. If you are running brushless surge pumps, cut out 2 additional wires of the same length. Preferably different color. Must be 22awg. (Not Included)

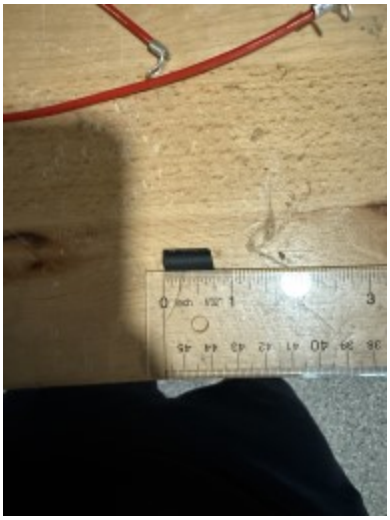
V. Bend all your ring terminals 90 degrees.

A. Use a hard surface and hold the ring side using pliers.

*B. You want the barrel for the wire on the outside of the 90 degree bend, not the inside or else you won't be able to bolt it onto the studs.*

C. 

VI. Precut 12 pieces of 3/16 heat-shrink ¾ inch long. (18 if you're only using 3 brushless pumps)

A. 

VII. Strip one end of each wire.

VIII. Put 90 degree ring terminals on the ends, crimp them and slide the ¾ inch heat shrink you cut over the barrel of the ring terminals and heat them to seal.

*A. Optional: Use some solder to lock the terminals in so they will never come off.*

*B.* 

C. 

*IX.* Cut about 20 inches of 3/16 heat-shrink. Slide it over the longest black and red wires (*and signal if brushless*) but only heat up a quarter of it on the ring terminal side. You will do the rest towards the end.

A. *DO NOT TWIST YOUR WIRES TOGETHER IN A BRAID. This will make it harder to take out the surge kit for servicing.*

*X.* Install the pump connector or quick connect on the other end of the lift pump harness.

A. Pump connectors for pumps that have a removable connector

B. Quick connects for pumps without connectors like the Walbro 525.

## Step 3: Finalize Ring Terminal & lock in position.

I. One by one, install all of the ring terminals onto the studs you installed in step 1. Follow the markings on the bulkhead.

A. It's ring terminal first, followed by external tooth lock washer, followed by a nut.

II. Use a 7mm wrench on the bottom nut and a 7mm socket on the top to lock the ring terminal in place.

A. 

III. Use a 7mm socket and snug the nut on the top of the bulkhead. The ring terminal should be able to rotate with resistance. It should not rotate freely.

IV. Repeat for the rest of the wires. You may need to rotate some wires to tighten some ring terminals.

V. Arrange the ring terminals like below when you're done.

A. 

## Step 4: Return Fitting

Install the 6an ORB ⅜ barb fitting on. (Be prepared to have to rotate it a little as the Y Barb in the next step may interfere with it.)

## Step 5: Feed Y Barb

I. If you are running 2 surge pumps(3 pumps total) in the tank, drill out the blocked passageway in the y barb with a 5.5mm drill bit. Do not drill out if you only running 1 Surge pump (2 total)

II. With the bulkhead flange on a table with the top of the bulkhead flange facing down, install the 19mm x 15mm O Ring onto the o-ring groove.

A. 

III. Install the Y barb onto the bulkhead flange with 2pc M4x10, 2pc M4x20 and 4pc lock washers.

A. Torque these down 15ft/lbs. Not a lot or else you will strip the aluminum threads and be FUBAR'ed. Ignore the square rod.

B. 

## Step 6: Hose Plumbing for Feed & Return

I. Take the 8 clamps and remove the bolt on them
   A. Install M4x10 SHCS on these.

II. With the two ports(6AN and 8AN) on the bulkhead facing you, install the 140mm hose on the left barb, the 160mm hose on the right barb, and the 160mm hose on the barb installed in step 4.

A. 

III. Put the 3 clamps over and **ensure they are over the barbs** and use an allen wrench to tighten them.
   A. Make sure they are out of the way. You can confirm this by putting the tank flange over the bulkhead and see if you can access the SHCS with an allen wrench. (The tank hanger flange is the piece with the cutouts and 3 mounting points.)

B. 

   C. The rest of the clamps will be used later.

## Step 7: Tank Hanger Flange Install

I. Slip over the OEM gasket on the bulkhead.
II. Install the tank flange with 3 pcs of m4x10 SHCS.
    A. Torque these down 15ft/lbs. Not a lot or else you will strip the aluminum threads and be FUBAR'ed.

## Step 8: Fuel Pump Hanger Prep

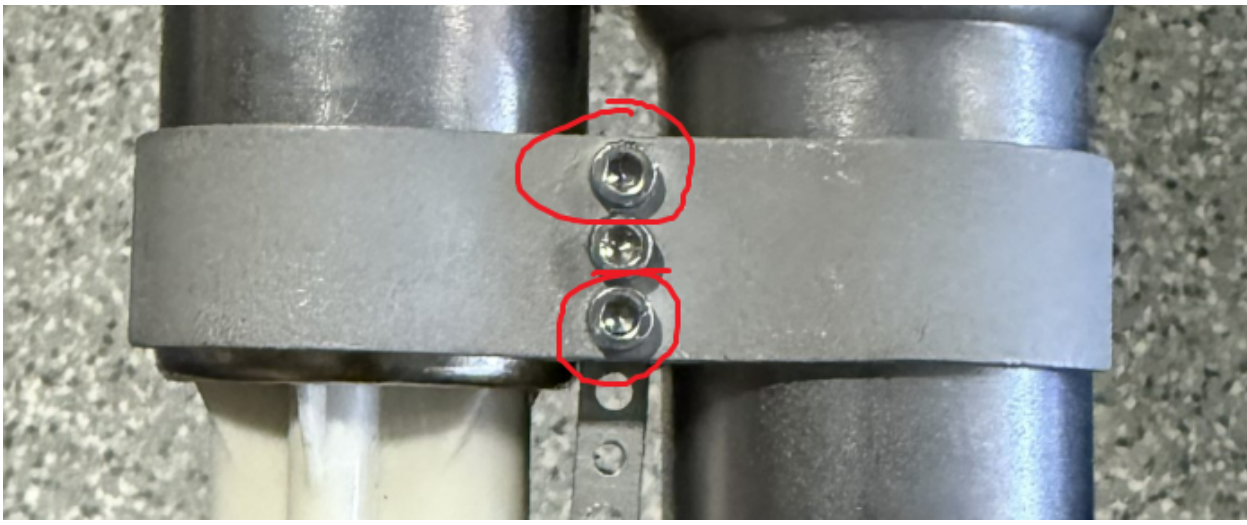
I. Take the Front and Rear Fuel Pump Clamps and the hanger rod.
II. Position it like the below image and put a m3x40 bolt through the upper and lower hole.
    A. The front piece has three holes, the rear piece has two.
III. Then take the 3.5mm plastic spacer (black and small with 3 ribs), and place it between the front clamp and the rod and hold it down so that the spacer is sandwiched in.
    A. 
IV. Put a m3x25 SHCS into the middle hole. You can remove the spacer once the middle is threaded through completely and the spacer is snug enough to slide out.

## Step 9: Fuel Pump Hanger & Pump Assembly

I. Position the assembled hanger with the 3x M3 SHCS facing you.
II. Insert a fuel pump into the right hole first. Then insert the other pump into the left hole if you have it. The assembled pump pic below is for reference.
    A. If you have only one pump(or both pumps can sit side by side without interference, keep the bottom of the clamp around the midline of the pumps.
    B. If you have two pumps (both 525), the top of the clamp needs to be about the mid line of the left pump. The other pump needs to be snugged up to the other.
        1. This is because 525's need to sit staggered due to the fat bottom.

C. 

III. Snug down clamp by tightening the upper and lower SHCS. Do not tighten the middle one!
   A. The pumps should be able to rotate, but not slide up and down!

B. 

IV. If you have 525 pumps, install the three o rings on the pickup hole on the pump you inserted first.

V. Take the sock extended and push it onto the o-ring.
   A. You need three to make up the height so you can press the extender into an o-ring. The sock isn't pressurized so the o-ring is just there to seal.

B. 

C. 

VI. Take a M3x6 SHCS and lock in the sock extender.
    A. Just snug! Don't overtighten it, it's just pressing against plastic.

## Step 10: Fuel Pump Sock Install & Verification

I. With the pump assembly put together, position the assembly so that the 3 SHCS on the clamp are facing you and the bottom of the pumps are facing up.

II. Install the pump pump socks
    A. You'll be taking them out later, just doing this step for fitment and clocking.

III. Clock the pumps with the socks so that they look like the picture below.

A. 

IV. Slide the tank over the pumps to verify if it can slide over and slide back out without taking out the socks.
    A. If the socks fall out, that means you gotta reclock the pumps a bit.
V. Take the pump socks off and put them somewhere safe for later.

## Step 11: Assemble Fuel Pump Assembly & Bulkhead Assembly

I. On a table, Position the pump assembly so that the 3 SHCS on the clamp are facing down and the bottom of the pumps facing you.
II. Position the bulkhead assembly on the same table so that the longer hose is on the left.
    A. Position this above the pump assembly
III. Slip over 2x clamps from step 6 on each end of the hose, except the return hose.
IV. Push the corrugated hose onto the pump. 140mm hose goes to the closest barb on the pump, 160mm goes to the farther barb on the other pump.
V. Make sure the clamps are over the barbs and tighten clamps snugly, may have to adjust later so not too tight.
VI. With your left hand holding the bulkhead assembly and right hand holding the pump assembly, rotate the pump assembly clockwise (right) and push the rod into the square slot on the Y-Barb. Insert a M3x16 SHCS in to the opening at the top.
    A. You may need to push the return hose out of the way.

B. 

C. 

D. 

VII. Once you have it inserted, cut the return hose where it reaches the top of the fuel pump clamp. There isn't enough room for this hose to go all the way to the bottom.

A. 

## Step 12: Fuel Pump Sock Install & Verification Pt 2.

I. Now that you have the thing basically assembled, you have to test to see if the tank will slip over the whole thing now.

II. Insert the socks back on and slip the tank over to do the same verification. If the socks fall out, then you need to rotate the pumps a little till the tank can fit over.
    A. Sometimes the pump assembly with the hoses can make things look not straight and bent. This is okay, there's some wiggle room in the design to help facilitate install. As long as you can slip the tank over and slip the tank out without the socks falling out, that's perfect!

III. Once you verified the socks didn't fall out, take the tank off and tighten the two clamps on the fuel pump barbs.

## Step 13: Surge Pump Wiring

I. Depending on what kind of pumps you have, you can just wire to a connector and call it a day.
    A. But for pumps like the 525, you have to wire them to a quick connect. There isn't any room for bigger connectors.

II. Leave yourself about 2 inches of overlap of wire for each wire coming from the pump and each wire coming from the bulkhead.
    A. I.E. The positive wire going to Pump1 bulkhead overlaps 2 inches. Positive wire going Pump 1 overlaps 2 inches. Total of 4 additional inches.
    B. This will give you wiggle room to move stuff around and push wires where they need to sit for everything to clear.

## Step 14: ¼ NPT Barb

I. Install provided ¼ npt 90 degree 3/8 barb. It has been shortened by me and deburred.
II. Make sure it is facing this direction pictured below.
A. 

### Step 15: Bulkhead Wiring

I. Cut however much you think you may need for the wires to reach an area in your trunk. For mine I used about 1 ft for all the wires.
II. Put the ring terminals on all the wires
III. Put 3/16 heat shrink on all the wires.
IV. Secure wire with ring terminals installed on them on the bulkhead with the m4 nuts
    A. Use a wrench on the bottom nut to keep the whole stud from rotating, and a socket on the top nut to lock it in.
V. Make sure everything has enough clearance.
VI. Install the connector of your choice.

### Step 14: Surge Tank Assembly Complete

Slide the tank over, reconfirm the socks don't fall out and bolt it in with 4 pcs M4x10 at 15ft/lbs or whatever you can get with an allen key.

# Lift Pump Assembly

I. Bend the tabs on the lift pump bracket so that the pump fits in.
II. The tab with the hole needs to be bent up.
III. Use the provided clamp to clamp down the pump loosely so that the pump can slide up and down.
IV. Install the fuel strainer onto the pump.
V. Position pump inside lift bump basket and make sure it’s seated as far down as it can.

    A. Depending on the pump, the pump will not reach the bottom of the lift pump basket. This is okay as the tank is tilted slightly forward and that position where the lift pump is, is the lowest part of the tank.

VI. Use the provided m3x10 SHCS and tighten down the bracket.

VII. Push the lift pump down snugly into the lift pump basket and tighten the clamp.

VIII. Take the m3x10 SHCS out and take the bracket with the pump out

IX. Put the m3x10 SHCS into the bracket and put the M3 Internal Tooth Washers at the ends of them.
    A. Need these washers so that the SHCS don't get lost when servicing or installing.

X. Take the lift pump and put the provided 500mm corrugated hose and secure it with the provided Fuel Injection Hose Clamp.

XI. Put the entire assembly aside for now. You are done with the lift pump stuff. Leave the bracket w/ pump and the lift pump basket separated. **They cannot fit through the opening of the gas tank together.**

XII. Optional: If you have trap doors, rivet the trap doors onto the lift pump basket using the provided rivets. Keep in mind each side is different. The doors swing towards the inside of the tank.

# Step Prior to Install - Prepping the gas tank and floor area.

I. Use the provided metal shears to cut the stock basket like the image below.
    A. Please do not use any brushless tools or anything that can generate a spark to cut the basket. The basket is thin.
    B. If you really cannot cut the basket, you may need to drop the tank and get a better position to cut the basket. Dropping the tank is a 30 min job if the tank is near empty.

C. 

II. After the basket is cut, position the surge tank assembly slowly inside the tank with the 90 degree barb facing the front of the vehicle. Make sure to feed the wire in slowly. You will need to unfeed the wire in this manner shortly, so keep this in mind.

III. You will find an area where you can rotate the bulkhead where the top of the tank clears the opening in the gas tank.

IV. You will then notice that the bulkhead cannot go any further because of the sheet metal of the floor.

V. Use a marker and trace out the outline of the bulkhead where it's interfering. The outline can be about 3mm more than the bulkhead to give you some wiggle room. (See blue outline, sorry for the bad resolution pic.)

A. 

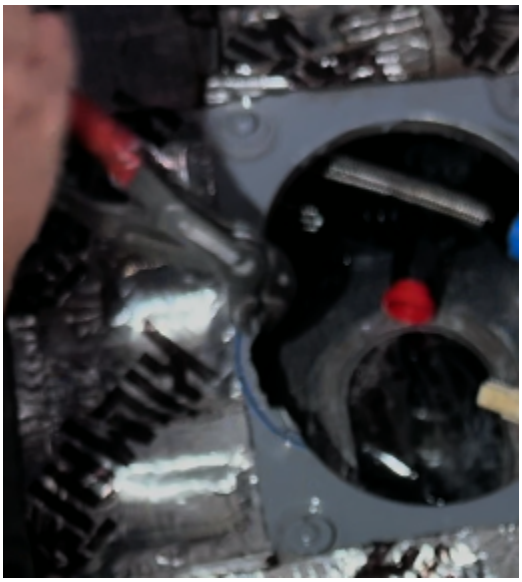
VI. Take out the surge tank and keep note of the lift pump wires, they need to be fed out carefully.

VII. Tape up the opening of the fuel tank so debris doesn't get in.

VIII. Use the provided shears to cut slits into the arc you traced. The slits need to be about 3-5mm thick.

A. 

IX. Use pliers to bend all the slits and down until it breaks off.

A. 

X. Use a file or dremel to clean up the edge so it looks good and it’s not sharp.

XI. Confirm the surge tank can go in and rotate to sit at the bottom.

# Install Assembled Kit -

### Step 1: Lift Pump

I. Take the **lift pump basket** and position it in the back of the OEM basket. It will be press fit between the wall of the gas tank and the oem basket. Keep note of the hole orientation for the threads, **the threads need to be on the OEM basket side.**

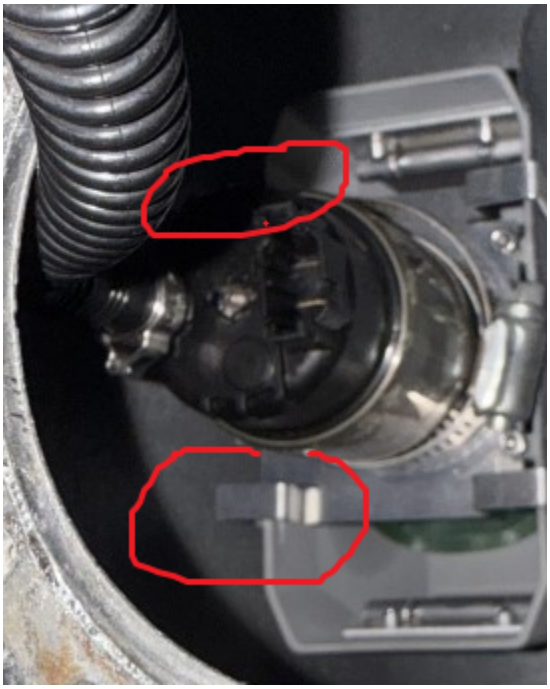
**A.**

II. Take your fuel pump installed on the bracket and fit it through the hole of the gas tank, you will need to play with some angles to get it through.

A.

III. Make sure the rear clips go outside the lift pump basket. There are two little slots on it that will register it.

A.



IV. Tighten the m3x6 SHCS.

A. 

## Step 2: Surge Tank

I. Position the surge tank on the floor of the trunk. Slip over hose clamp over corrugated hose. Connect the hose to the ¼ npt 90 degree barb. Tighten clamp. Make sure the ears of the clamp **aren't** sticking down like the photo.

A. 

II. Connect lift pump connector

III. Put the assembled surge tank in with the barb facing the front of the vehicle. Rotate when it clears the top of the tank. Secure with the provided m4x10 bolts.
IV. Put the o-ring that came with the fuel level sending unit on
V. Install fuel level sending unit by rotating it clock-wise. It only needs to be hand tight initially, and then use a wrench to go 90 degrees. It just needs to be snug.
    A. It's a tight fit so rotate the fuel sending unit slowly, it might catch on some of the wires on the terminal.

# Installation is done: You can now proceed to plumb your fuel system.


Can use the stock panel to pass through wires. I just don't have one. I need to print one out haha.
Feed
P2