FuelTech FT INJECTOR Pro Line Racing Owner's Manual

Contents

FuelTech FT INJECTOR Pro-Line Racing

Presentation

- Thank you for purchasing FT Injectors. In this manual you will find all the information you will need to ensure proper operation, configuration and maintenance of your injectors.
- The FT Injector is available in three versions, 320 lb/h, 520 lb/h and 720 lb/h.
- Each FT Injector is made with the best possible materials, including corrosion resistant internals allowing them to be used with any fuel from gasoline to Nitromethane,
- Nitropropane and even fuels that contain MTBE and ETBE. Silver plated terminals ensure the best electrical connection possible along with an EV1 style connector for
- positive locking and vibration resistance.
- The FT Injector is compatible with any ECU available on the market and requires a 8A/2A Peak and Hold injector driver.

Warranty terms

- The use of this equipment should be in complete compliance with the terms described in this manual. The manufacturer denies responsibility for failure to do so or other product misuse.
- This product must be installed and tuned by specialized auto shops or professionals with experience on engine tuning.
- Before starting any electrical installation, disconnect the battery.
- This product is not certified for aeronautic purposes or any flying vehicles, as it has not been designed for such applications.
- In some countries where an annual inspection of vehicles is enforced, no modification in the OEM ECU is permitted. Be informed about local laws and regulations prior to the product installation.

Important warning for proper installation of this product:
Always remove and insulate unused wires. NEVER roll up excess wiring as this may create an antenna that captures electromagnetic interference that may generate product malfunction.

Limited Warranty
This product warranty is limited to 90 days from the purchase date, only covering manufacturing defects and requiring purchase invoice presentation.
Any disassembly of the unit or removal or replacement of any internal component of the unit will void the product warranty and render the unit ineligible for service. Damages caused by disassembly or misuse of the unit are not covered by the warranty. Warranty void unless repair is done xclusively by FuelTech technical support.
Manual Version 1.4 – August/2021

Characteristics

Compatible with any kind of fuel, including:

- Gasoline
- Ethanol
- Methanol
- Nitromethane
- Nitropropane
- MTBE/ETBE

Electrical specifications

- Low impedance
- Coil resistance: 1.5 Ohms
- Voltage compatibility: up to 24V
- Ingress protection Rating: IP67 / NEMA6

Dimensions mm (in)

1. Overall height – 86,3 mm (3.4”)
2. Overall width – 29 mm (1.14”)
3. Top O-ring diameter – 13,7 mm (0.54)
4. Tip – 13 mm (0.51”)
5. Bottom O-ring diameter – 13,7 mm (0.54”)
    - AN and ORB sizes
    - N-4 or AN-6 for fuel supply side
    - AN-3 or ORB6 for manifold side
6. Overall height – 102 mm (4.02”)
7. Tip 45º – 27 mm (1.06”)

Packaging Contents

- Instructions manual
- FuelTech sticker

Installation

Electrical

- Pin 1: 12V to 24V switched power (never wire constant power, will damage the injector)
- Pin 2: ECU injector output or peak and hold driver output
- The injector will still work even if the connections are swapped, however, we strongly recommend following the standard pinout in order to make any kind of troubleshooting easier.

Testing your injectors before first startup

- Go to your outputs screen under sensors and calibration
- Setup each injector output
- The output are set you can power the ECU up and click on the lightning bolt button near each injector output. The injectors will click when the test button is pressed. Test each injector to ensure proper functionality, and to make sure they're on the correct cylinder and rail according to your selection.

If your injectors are not working use the diagnostic guide below

- Check for power at the injector connector with a volt meter or LED test light
- Check the injector output from your ECU with a noid light set or LED test light
- Make sure your peak and hold driver modules are plugged in if using an FT ECU
- Check for power and ground on your peak and hold module
- Check to make sure all relays related to injectors are energized
- Check all fuses related to injector power

Fuel injector installation

O- ring style injectors

- a. Lube the upper and lower o ring with petroleum jelly or ATF
- b. Press the bottom of the injector into your intake manifold injector bung
- c. Align all injectors and press the fuel rail onto the top of the injector ensuring all of the o rings are intact and seated properly

ORB style install

- a. Lube the lower O-ring on the ORB fitting with petroleum jelly or ATF
- b. Carefully thread your ORB fitting in to the threaded boss on your intake manifold
- c. Lubricate the upper o-ring with petroleum jelly or ATF
- d. Make sure all injectors are aligned properly and press the fuel rail onto the top of the injector

AN feed style install

- a. Carefully thread your AN line to the top of the injector
- b. Snug the AN line with a wrench to prevent damage to the fitting
- c. Lubricate lower o-ring with petroleum jelly or ATF
- d. Carefully press your injectors into the bungs on your intake manifold

Double AN style install

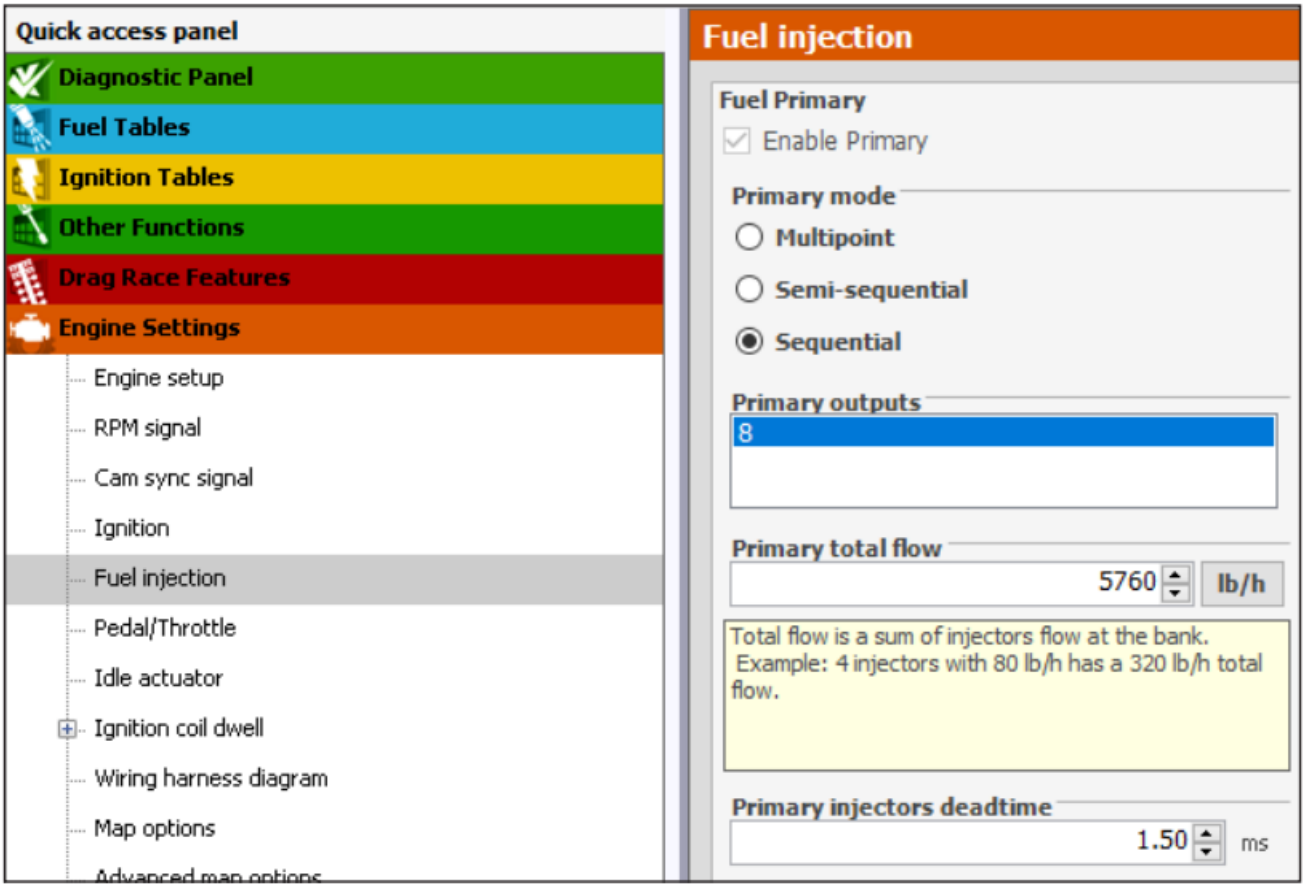
- a. Carefully thread your AN line onto the top fitting of your injector
- b. Tighten the upper fitting with a wrench to prevent damage to the fitting
- c. Carefully thread your AN line to the outlet of the injector
- d. Tighten the lower outlet an line with a wrench to prevent damage to the fitting

IMPORTANT
Once installed, pressurize the system to inspect for leaks before starting In some cases, it will be necessary to increase the diameter of the injector fitting holes in the intake manifold.

Configuration

Navigate to engine settings on the quick access panel.

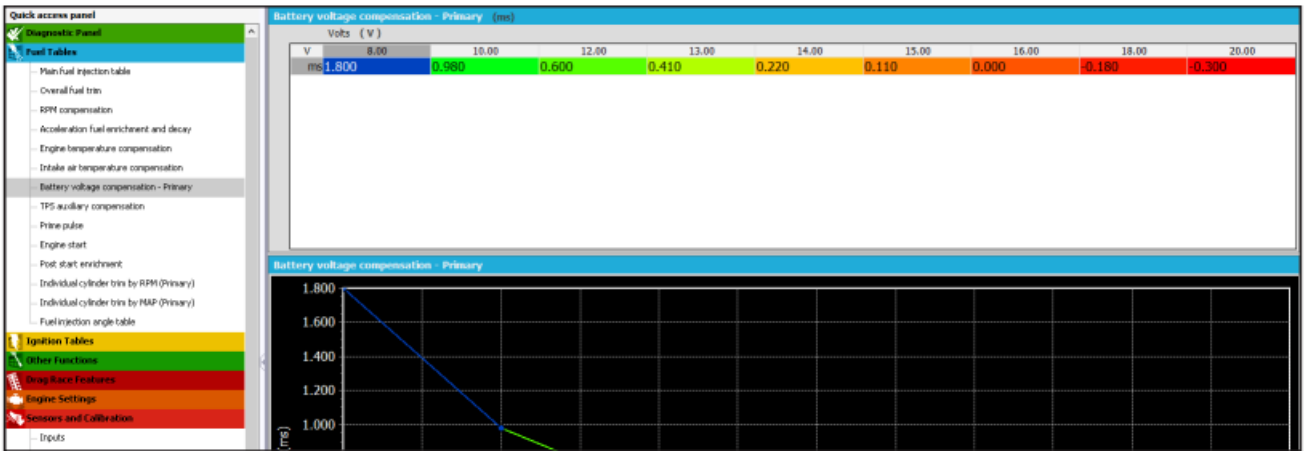
- a. Click Fuel injection
- b. Enter your total flow by adding your injectors together Example: 720lb/h x 8 cylinders = 5760
- c. Enter your primary injector dead time



Battery voltage compensation

Next step is on battery voltage compensation in fuel tables.

8 Volts	10 Volts	12 Volts	13 Volts	14 Volts	15 Volts	16 Volts	18 Volts	20 Volts
1.800	0.980	0.600	0.410	0.220	0.110	0.000	-0.180	-0.300



Base fuel pressure (differential)

The recommended base fuel is 90PSI, this allows a better fuel atomization in the combustion chamber.

Execute the following steps to regulate it:

- a. Disconnect the fuel regulator vacuum hose

- b. Rev the engine up to 3000RPM steady
- c. Regulate the base fuel pressure at 90PSI or desired pressure, making sure to have a stable number

IMPORTANT
It's not recommended use more than 140PSI of differential fuel pressure, this will damage the injectors

Dead Time table

Battery voltage (V)	Fuel pressure PSI – (BAR) – 320 lb/h											
	30 (2.1)	40 (2.8)	43.5 (3)	50 (3.4)	60 (4.1)	70 (4.8)	80 (5.5)	90 (6.2)	100 (6.9)	110 (7.6)	120 (8.3)	130 (9)
8	2.08	2.22	2.24	2.28	2.42	2.52	2.72	2.84	2.96	3.08	3.24	3.38
10	1.7	1.78	1.8	1.84	1.9	1.98	2.06	2.16	2.18	2.24	2.36	2.52
12	1.38	1.42	1.46	1.5	1.56	1.6	1.64	1.72	1.82	1.88	1.96	2.08
14	1.18	1.22	1.24	1.28	1.34	1.4	1.44	1.48	1.56	1.64	1.7	1.78
16	1.04	1.08	1.1	1.12	1.18	1.22	1.26	1.32	1.34	1.38	1.46	1.52
18	0.92	0.94	0.96	0.98	1.02	1.06	1.1	1.14	1.22	1.24	1.28	1.34
20	0.84	0.84	0.86	0.9	0.92	0.94	0.98	1.04	1.1	1.12	1.16	1.22
Injection time (ms)												

Battery voltage (V)	Fuel pressure PSI – (BAR) – 520 lb/h											
	30 (2.1)	40 (2.8)	43.5 (3)	50 (3.4)	60 (4.1)	70 (4.8)	80 (5.5)	90 (6.2)	100 (6.9)	110 (7.6)	120 (8.3)	130 (9)
8	2,34	2,42	2,52	2,6	2,7	2,84	2,94	3,06	3,2	3,4	3,54	3,7
10	1,82	1,92	1,96	2,02	2,12	2,16	2,3	2,42	2,52	2,6	2,72	2,84
12	1,52	1,54	1,62	1,68	1,78	1,8	1,84	1,94	2	2,1	2,16	2,24
14	1,3	1,34	1,36	1,44	1,48	1,52	1,56	1,64	1,72	1,76	1,84	1,92
16	1,14	1,2	1,22	1,22	1,28	1,28	1,36	1,38	1,48	1,52	1,62	1,68
18	1	1,06	1,08	1,08	1,12	1,16	1,2	1,24	1,3	1,32	1,42	1,48
20	0,86	0,92	0,94	0,96	1	1,04	1,08	1,1	1,16	1,22	1,26	1,3
Injection time (ms)												

Battery voltage (V)	Fuel pressure PSI – (BAR) – 720 lb/h											
	30 (2.1)	40 (2.8)	43.5 (3)	50 (3.4)	60 (4.1)	70 (4.8)	80 (5.5)	90 (6.2)	100 (6.9)	110 (7.6)	120 (8.3)	130 (9)
8	2.34	2.36	2.44	2.58	2.68	2.72	3.02	3.3	3.56	3.84	3.86	4.14
10	1.88	1.88	1.94	2.04	2.1	2.18	2.34	2.48	2.6	2.8	2.96	3.12
12	1.54	1.54	1.62	1.66	1.7	1.78	1.94	2.1	2.14	2.22	2.38	2.44
14	1.32	1.34	1.36	1.42	1.48	1.48	1.62	1.72	1.02	1.86	1.98	2.08
16	1.14	1.16	1.18	1.2	1.26	1.3	1.46	1.5	1.54	1.62	1.7	1.76
18	1	1.02	1.04	1.1	1.12	1.18	1.28	1.32	1.34	144	1.5	1.54
20	0.9	0.92	0.94	0.96	1	1.06	1.12	1.2	1.22	1.26	1.32	1.38
Injection time (ms)												

Horsepower vs Injector size

320 lb/h Injectors

43.5 PSI Fuel pressure differential			
Power:	4 injectors	6 injectors	8 injectors
Ethanol	1232 HP	1849 HP	2466 HP
Gasoline	1923 HP	2885 HP	3846 HP
Methanol	641 HP	961 HP	1282 HP

520 lb/h Injectors

90 PSI Fuel pressure differential			
Power:	4 injectors	6 injectors	8 injectors
Ethanol	2804 HP	4206 HP	5608 HP
Gasoline	4360 HP	6539 HP	8719 HP
Metanol	1436 HP	2154 HP	2872 HP

520 lb/h Injectors

90 PSI Fuel pressure differential			
Power:	4 injectors	6 injectors	8 injectors
Ethanol	3882 HP	5824 HP	7765 HP
Gasoline	6036 HP	9054 HP	12072 HP
Methanol	1988 HP	2982 HP	3976 HP

FT Injector 320 lb/h flow table

Minimum pulse width 1.3 ms

4300 RPM – Flow x Injection time (ms)																	
Ideal flow	0.000	19.19	23.62	33.95	38.38	57.56	76.75	95.94	115.13	134.32	153.50	172.69	191.88	230.26	268.63	301.10	314.40	320.00
Effective pulse width	0.000	1.625	2.000	2.875	3.250	4.875	6.500	8.125	9.750	11.375	13.000	14.625	16.250	19.500	22.750	25.500	26.375	32.000
Actual pulse width	0.000	2.603	2.906	3.611	4.268	5.884	7.500	9.116	10.732	12.348	13.964	15.580	17.196	20.428	23.660	26.084	26.666	32.000
Pulse addition	0.000	0.978	0.906	0.736	1.018	1.009	1.000	0.991	0.982	0.973	0.964	0.955	0.946	0.928	0.910	0.584	0.291	0.000
Flow without correction	0.000	4.85	10.35	23.17	26.29	45.58	64.88	84.18	103.47	122.77	142.06	161.36	180.65	219.24	257.83	290.76	306.27	319.14
Flow with correction	0.000	19.19	23.62	33.95	38.38	57.56	76.75	95.94	115.13	134.32	153.50	172.69	191.88	230.26	268.63	301.10	314.40	319.14

FT Injector 520 lb/h flow table

4300 RPM – Flow x Injection time (ms)																		
Ideal flow	0.00	19.19	23.99	33.58	38.38	57.56	76.75	95.94	115.13	134.32	153.51	172.69	191.88	230.26	268.63	383.76	460.52	520.00
Effective pulse width	0.000	1.000	1.250	1.750	2.000	3.000	4.000	5.000	6.000	7.000	8.000	9.000	10.0000	12.0000	14.0000	20.0000	24.0000	32.0000
Actual pulse width	0.000	1.970	2.150	2.509	2.689	3.663	4.641	5.619	6.596	7.574	8.552	9.530	10.508	12.464	14.420	20.288	24.199	32.0000
Pulse addition	0.000	0.970	0.900	0.759	0.689	0.663	0.641	0.619	0.596	0.574	0.552	0.530	0.508	0.464	0.420	0.288	0.199	0.000
Flow without correction	0.000	0.000	0.000	13.32	19.99	44.56	64.18	83.81	103.43	123.05	142.67	162.29	181.91	221.15	260.39	378.12	456.60	521.90
Flow with correction	0.000	19.19	23.99	33.58	38.38	57.56	76.75	95.94	115.13	134.32	153.51	172.69	191.88	230.26	268.63	383.76	460.52	521.90

FT Injector 520 lb/h

4300 RPM – Flow x Injection time (ms)																		
Ideal flow	0.00	26.57	33.21	46.49	53.14	79.70	106.27	132.84	159.41	185.98	212.54	239.11	265.68	318.82	371.95	531.36	637.63	720.00
Effective pulse width	0.000	1.000	1.250	1.750	2.000	3.000	4.000	5.000	6.000	7.000	8.000	9.000	10.0000	12.0000	14.0000	20.0000	24.0000	32.0000
Actual pulse width	0.000	2.118	2.280	2.602	2.764	3.874	4.862	5.850	6.838	7.826	8.814	9.802	10.790	12.766	14.742	20.670	24.622	32.0000
Pulse addition	0.000	1.118	1.030	0.852	0.764	0.874	0.862	0.850	0.838	0.826	0.814	0.802	0.790	0.766	0.742	0.670	0.622	0.000
Flow without correction	0.000	0.000	0.000	11.42	21.71	56.21	83.10	109.99	136.88	163.77	190.66	217.55	244.44	298.22	352.00	513.34	620.90	718.33
Flow with correction	0.000	26.57	33.21	46.49	53.14	79.70	106.27	132.84	159.41	185.98	212.54	239.11	265.68	318.82	371.95	531.36	637.63	718.33

Max flow vs Pressure

FT Injector 320 lb/h (cc/min)

PSI	BAR	Flow		PSI	BAR	Flow		PSI	BAR	Flow
30	2.1	182 (1911)		60	4.1	262 (2751)		95	6.5	328 (3444)
35	2.4	203 (2131)		65	4.5	268 (2814)		100	6.9	341 (3580)
40	2.8	208 (2184)		70	4.8	279 (2929)		105	7.2	344 (3612)
43.5	3	212 (2206)		75	5.1	288 (3024)		110	7.6	353 (3706)
45	3.1	224 (2352)		80	5.5	293 (3076)		115	7.9	358 (3759)
50	3.4	231 (2425)		85	5.8	301(3160)		120	8.3	369 (3874)
55	3.8	248 (2604)		90	6.2	319 (3349)		130	9	382 (4011)

FT Injector 520 lb/h (cc/min)

PSI	BAR	Flow		PSI	BAR	Flow		PSI	BAR	Flow
30	2.1	301(2860)		60	4.1	428 (4066)		95	6.5	534 (5073)
35	2.4	325 (3087)		65	4.5	451(4284)		100	6.9	544 (5168)
40	2.8	349 (3315)		70	4.8	466 (4427)		105	7.2	561(5330)
43.5	3	364 (3458)		75	5.1	472 (4484)		110	7.6	573 (5443)
45	3.1	373 (3543)		80	5.5	494 (4693)		115	7.9	580 (5510)
50	3.4	394 (3743)		85	5.8	508 (4826)		120	8.3	601 (5709)
55	3.8	412 (3914)		90	6.2	523 (4968)		130	9	614 (5833)

FT Injector 720 lb/h (cc/min)

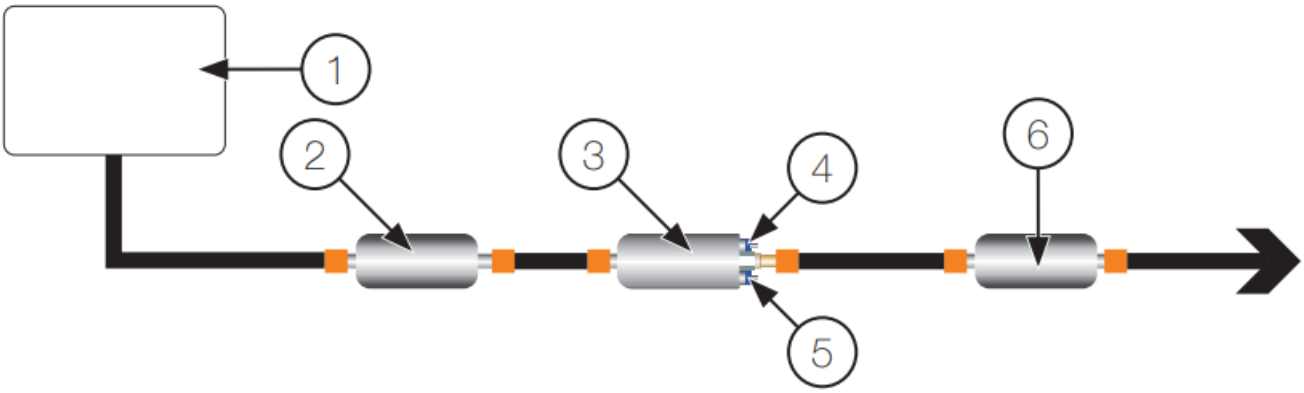
PSI	BAR	Flow		PSI	BAR	Flow		PSI	BAR	Flow
30	2.1	422 (4009)		60	4.1	607 (5766)		95	6.5	747 (7096)
35	2.4	459 (4360)		65	4.5	634 (6023)		100	6.9	763 (7248)
40	2.8	498 (4712)		70	4.8	654 (6213)		105	7.2	782 (7429)
43.5	3	519 (4930)		75	5.1	666 (6327)		110	7.6	799 (7590)
45	3.1	530 (5035)		80	5.5	691 (6564)		115	7.9	808 (7676)
50	3.4	557 (5291)		85	5.8	711 (6754)		120	8.3	836 (7942)
55	3.8	582 (5529)		90	6.2	728 (6919)		130	9	860 (8170)

Injector care and maintenance

Fuel filter requirements

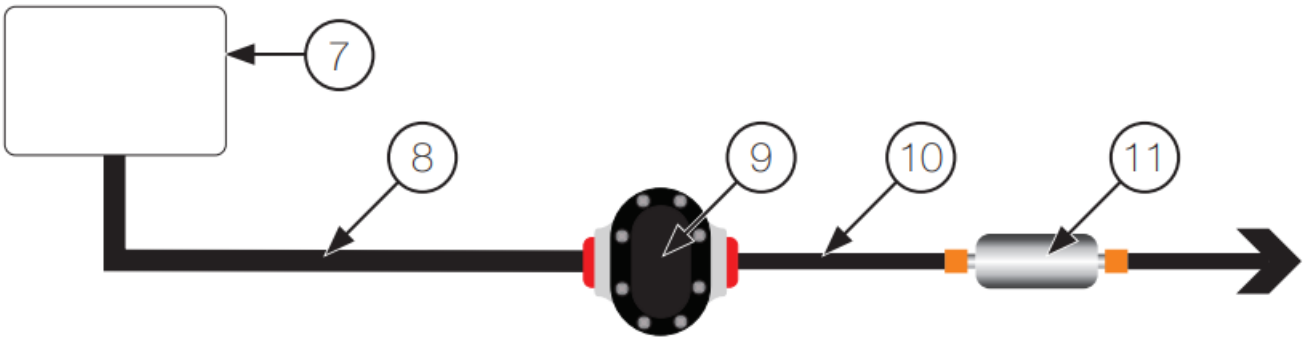
FuelTech recommends a 100-micron pre-pump fuel filter (straninig). Then install a 10-micron filter as close to the feed of the injectors as possible.

1. Fuel tank
2. Fuel filter 100-micron
3. Fuel pump
4. Fuel pump: 12V from relay (activated by ECU output)
5. Fuel pump: ground
6. Fuel filter 10-micron



1. **Fuel filter system with mechanical fuel pump**
2. When using mechanical fuel pump there's no need to use the 100 microns filter, just the 10 microns.

7. Fuel tank
8. Fuel hose with minimum 11/4″ thickness
9. Mechanical fuel pump
10. Fuel hose with minimum 12AN
11. 10 microns fuel filter



Off season maintenance

If you will have the car sitting for more than 3 weeks without running and you use methanol or oxygenated fuel follow the instructions below:

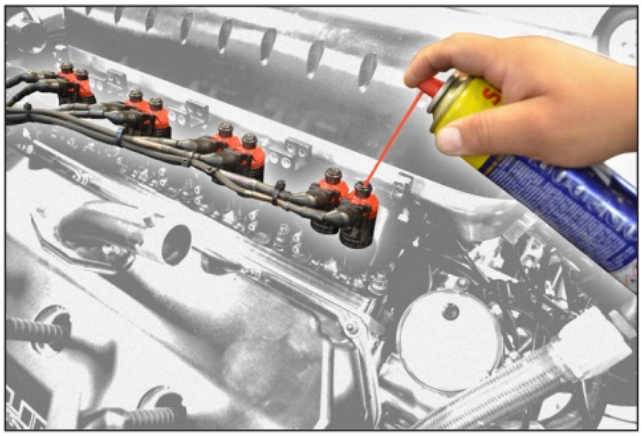
- a. Drain or seal your fuel system
- b. Remove the injectors from the car
- c. Spray the inlet and outlet with penetrating oil and cap both ends with the supplied rubber caps
- d. Store your injectors in a plastic closable bag
- If you do not use an oxygenated fuel simply seal your fuel system off by capping the breather and keep the fuel cell or tank filled to the top.

Do not attempt to disassemble the product or to remove or replace any of its components. Any attempt to do so could damage the product and will void the product warranty. FuelTech will not service or replace any injector that has been opened or where attempts to open are visible. Failure to heed any of the warnings or precautions described in this manual may cause engine damage and will void this product warranty.

Off season maintenance without removing injectors

In the absence of an injector cleaning and lubrication machine, simple and safe maintenance can be performed.

- a. Remove the fuel rail
- b. Spay penetrating oil on the injectors
- c. Turn on ignition and go to “Output Test” in FTManager software, pulse the injector sprayed with penetrating oil. Repeat this procedure for all injectors
- d. Put penetrating oil one more time in the injectors
- e. Assemble the fuel rail
- This procedure is necessary of the vehicle sitting for more than 3 weeks without running.



Oxygenated fuels usually include

- MTBE / ETBE
- Nitropropane / Nitromethane
- Methanol
- Ethanol

455 Wilbanks Dr. Ball Ground, GA, 30107, USA
Phone: +1 678-493-3835
Toll Free: +1 855-595-3835
E-mail: info@FuelTech.net
www.FuelTech.net

Documents / Resources

	**FuelTech FT INJECTOR Pro Line Racing** [pdf] Owner's Manual FT INJECTOR Pro Line Racing, FT INJECTOR, Pro Line Racing, Pro Line, Racing

References

- **Injeções Eletrônicas Programáveis FuelTech**
- **FuelTech USA**