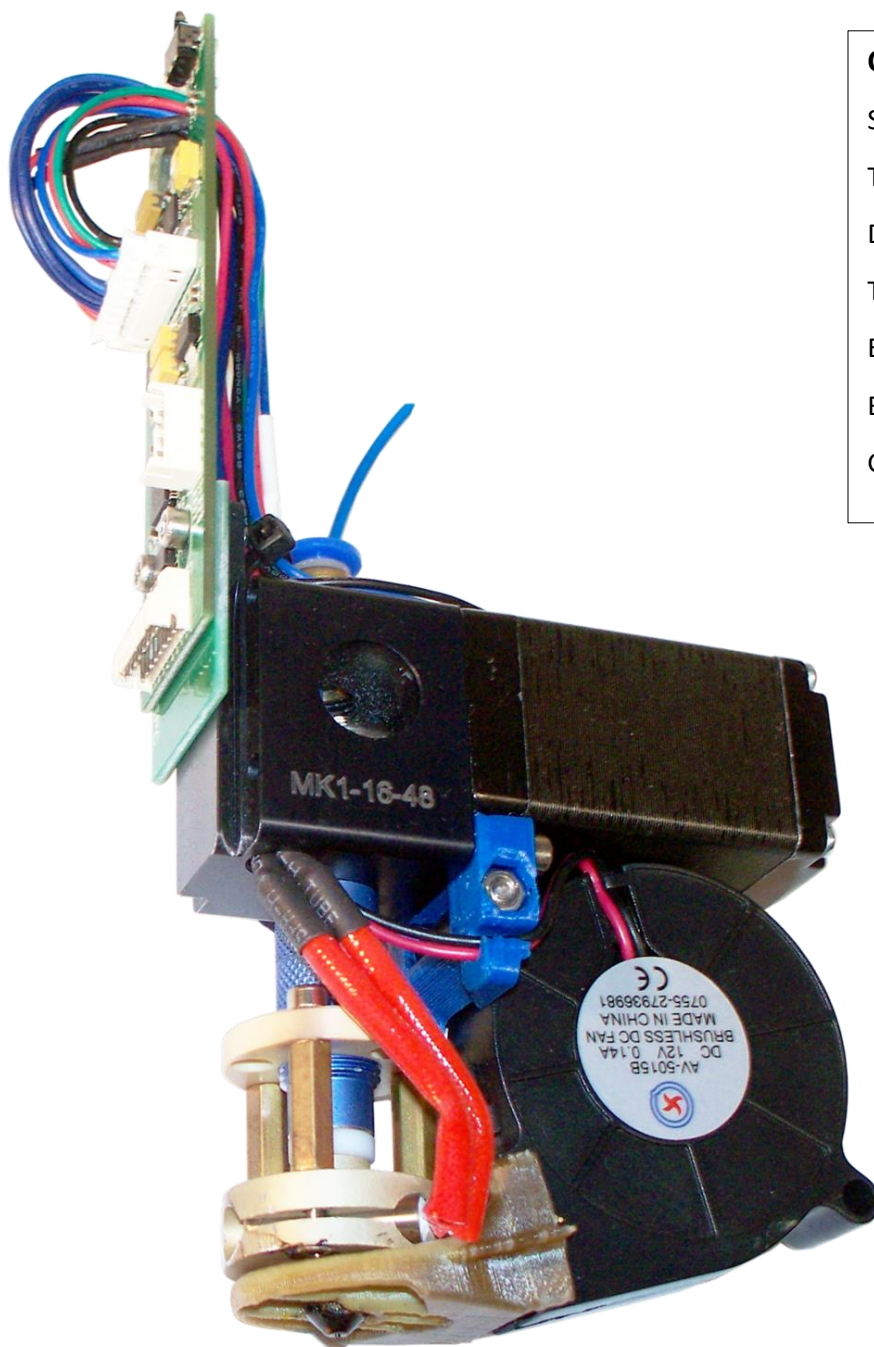




# Filament Extruder MK1-250

Compatible with:

■ HYDRA Floor Model ■ HYDRA Bench Model ■ System 30M ■ Engine ■ Engine HD



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## Click Links below to watch MK1-250 videos:

Head Overview: <https://www.youtube.com/watch?v=yaCYFmoIESk>

Loading Material: <https://www.youtube.com/watch?v=v2ifSIz0qEw>

Printing Tips: <https://www.youtube.com/watch?v=Fg9omXIYR-Q>



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## Specifications:

Operating Temperatures: ambient to 250°C recommended; 260°C maximum.

Programmable Start/Stop Dwell in milliseconds.

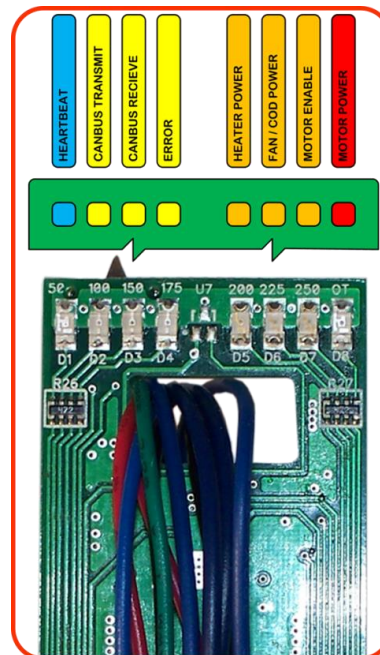
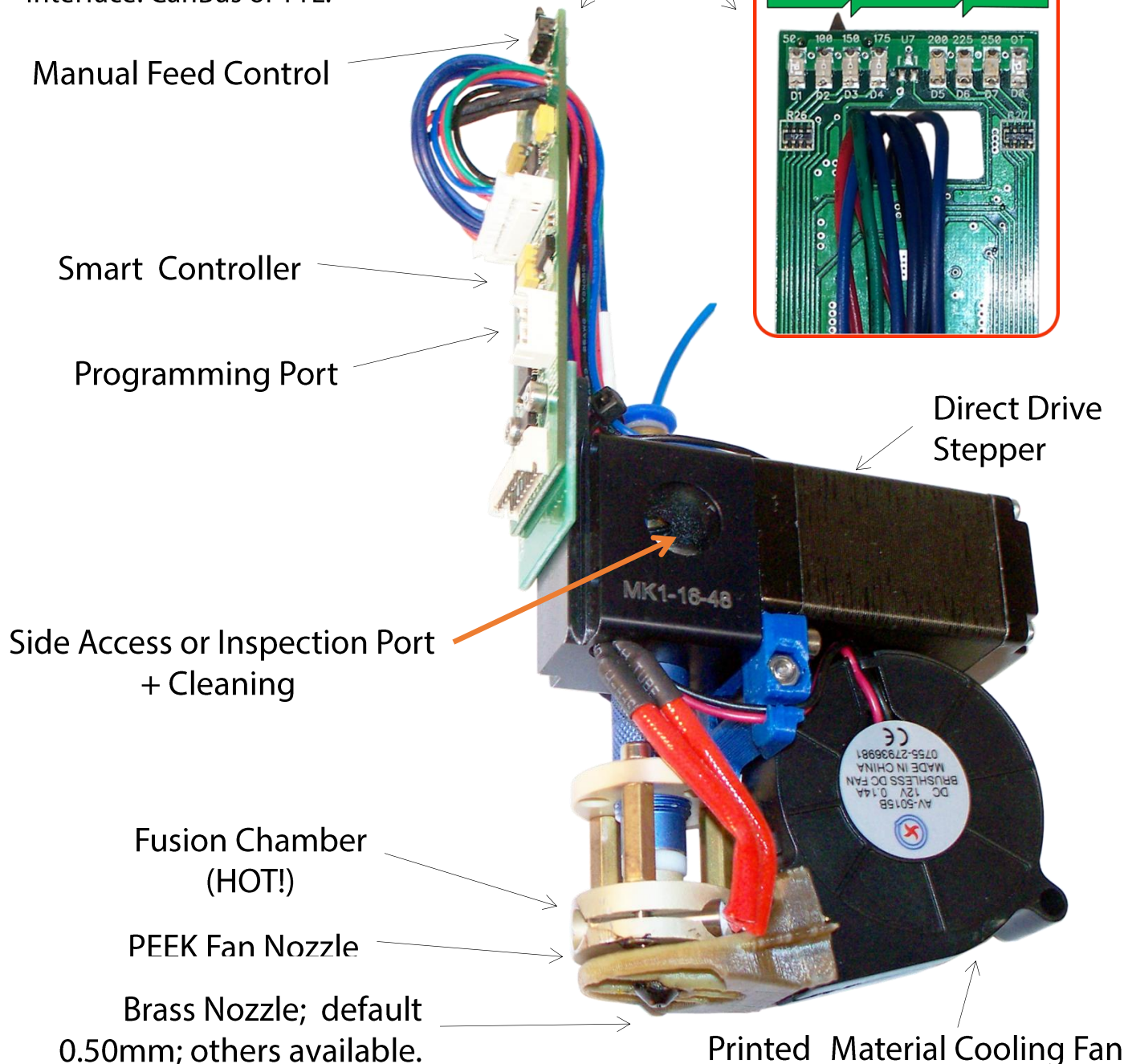
Programmable Prime/Unprime in pulses on feed motor.

Programmable Print Cooling Fan: 0 – 100%.

Weight: 600 grams, plus payload.

Power Supply: 12v, 3.5 amps max.

Interface: CanBus or TTL.





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## Theory of Operation:

The MK1-250 Print head was designed to operate with most 1.75mm diameter filaments on the open market today, including: ABS, Nylon, PET, PLA, PP, PVA, PETG, Tglase. Changing from one type to the next typically only takes a couple of minutes.

**WARNING/CAUTION:** Low temperature (under 200°C) filaments, including PLA, should be printed with the Feed Chamber Cooling Fan in place and operational. This will keep the filament cool in the feed chamber, reducing misfeeds; one is included with each printer.

**WARNING/CAUTION:** This head is NOT designed for use with FLEXIBLE or HIGH TEMPERATURE filaments; please see the MK2-250 for flexible filaments and the MK1-450 for high temperature filaments. Consult <http://hyrel3d.net/wiki/index.php/Materials> for a list of which materials are recommended for which heads.

The nozzle is made of brass, and comes with 0.50mm standard; 0.35mm, 0.75mm, and 1.0mm nozzles are available for order from Hyrel3D, as well as blanks. See page 7 for instructions on changing nozzles.

**WARNING/CAUTION:** Do NOT use nozzles from other manufacturers, as our design is different. Using other nozzles simply WILL NOT WORK. Also, leaving your head at print temperature without printing can contribute to material feed issues.

The MK1-250 has proven to be a real workhorse. When used properly, uses get thousands of hours of printing typical before ANY maintenance is needed.

The side access port allows the drive area to be inspected, and the filament drive teeth to be cleaned with a vacuum cleaner - without the need to dismount the print head in most cases. KEEP IT CLEAN and it will work great.

Hyrel's *Cleaning on the Fly* (patent pending) allows for a clean during print option, to insure the prints running greater than 1000 hours can be achieved.

The MK1 250 has an internal PTFE material delivery chute, which mates with the proprietary brass nozzle. This keeps the material cool until it enters the fusion chamber, and ensures no voids for material buildup.



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## MK1 Settings:

Used to manage control of the head.

### Live Temperature:

In Celsius.

### Heater:

On/Off and default value.

### Motor:

On/Off and manual speed feed control.

### Fan:

On/Off and default value.

Back



## Navigation:

Click to move to the next page.

### Material:

Sources in defaults. *Note: gcode will override this setting.*

### Nozzle Diameter in mm :

Crucial for flow calculations.

### Layer Z in m:

Initial value. *Note: gcode will override this setting.*

## Temp Info:

Used to manage control of the head.

### Print Temp:

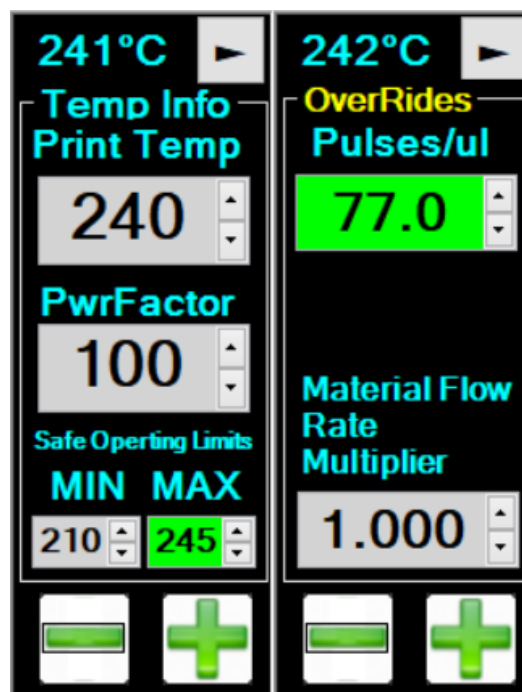
Default, in Celsius. *Note: gcode will override this setting.*

### PwrFactor:

For heater – normally 100.

### Min, Max :

Safe range for the head.



## Overrides:

To adjust flow rates live.

### Pulses:

Pulses on the motor to generate 10 nanoliters (v2.x) or 1 microliter (v3.x)

### Feed Rate % :

Live, direct modifier to **Pulses** setting. Adjust the actual flow rate as a percent of the calculated value.

For more information: <http://hyrel3d.net/wiki/index.php/MK1-250>





# Filament Extruder MK1-250

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## Prime Settings:

Used when starting the flow of filament.

### Steps:

Number of steps to start the flow of filament.

### Rate of Steps:

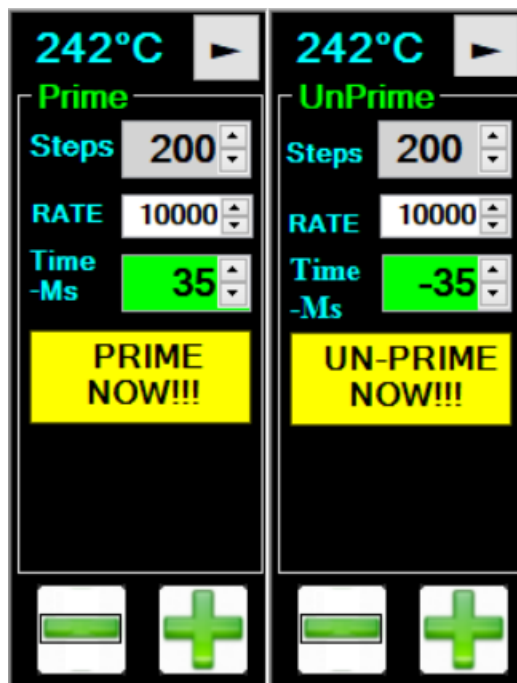
Default 10,000.

### Dwell Time:

In milliseconds after the prime starts before starting motion.

### # After Tool Change:

Iterations to perform after a tool change.



## UnPrime Settings:

Used when ending the flow of filament.

### Steps:

Number of steps to stop the flow of filament.

### Rate of Steps:

Default 10,000.

### Dwell Time:

In milliseconds after the unprime starts before starting motion.

### # Before Tool Change:

Iterations to perform before a tool change.

## Offsets:

### Clone Head:

Used for parallel printing - multiple copies concurrently.

### Offsets:

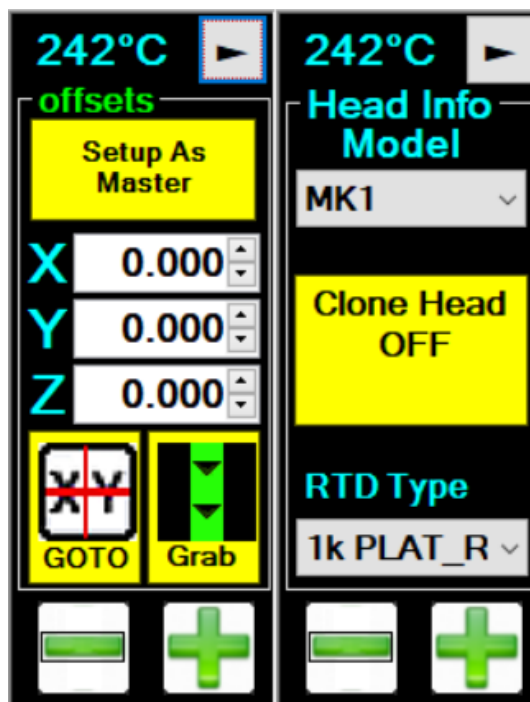
Used when multiple heads cooperate on a build.  
Ping pong and support material.

### GOTO X//Y Offset:

Used to confirm X/Y offset calibration.

### Grab:

Captures current X/Y offset for this head.



## Head Model:

### Model:

Type of head.

### RTD TYPE:

For proper temperature table.  
*Most heads since 2015 should have 1K\_PLAT selected.*

### Motor Current:

For drive motor.

### Step Mode:

For microstep resolution.



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## Soap String:

To store and read values.

## Flash:

Right-click to store current values as defaults on this head.

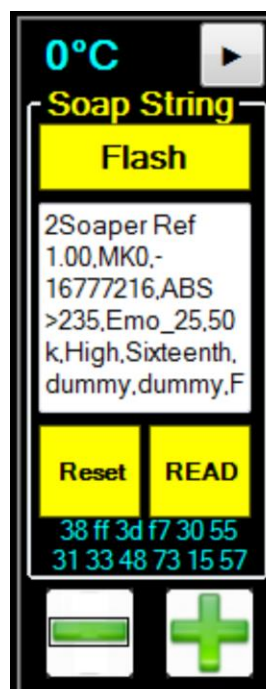
## Com Window :

For diagnostics, advanced status, and firmware version.

## Reset :

Performs soft reset; discards current values, reloads defaults from head.

## Read :



## Please note:

These values are all initial, default values.

Your gcode will overwrite some of these values, and *can, if you specify*, explicitly declare most of them.

The printer will keep the last value for each variable persistently in memory.

If a mouse click or a gcode entry subsequently provides a new value, *that new value* will be persistent until *another, newer* value is set for that parameter on that head.

For current default parameters for Hot Flow heads, see [http://hyrel3d.net/wiki/index.php/Hot\\_Flow](http://hyrel3d.net/wiki/index.php/Hot_Flow)



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## TIPS:

NEVER let your print head just sit for long periods of time while hot. The plastic can degrade and leave residue on the inside of the print nozzle.

ALWAYS preheat your print head, and run the filament manually for 5-30 seconds before printing. This will insure that the nozzle is clean and ready for action.

Printing Tips: <https://www.youtube.com/watch?v=Fg9omXIYR-Q>

## ADDITIONAL WARNINGS:

**WARNING/CAUTION:** The fusion chamber and nozzle are EXTREMELY HOT, care must be taken not to touch by hand while hot.

## MAINTENANCE:

Keep your drive teeth clean: simply vacuum from the side access port once every few days of printing.

Use care when installing the head into the yoke, due to its long format, it is possible for the connection point to be misaligned.

### How to disassemble the nozzle from the MK1 head:

Carefully:

1. Heat to the printing temperature of the material loaded.
2. Move the manual lever to the left, retracting material until it is free of the hobbed shaft, then remove by hand.
3. Turn off heat to the head and remove it from the yoke.
4. With a 1/4" driver or wrench, remove the nozzle.
5. Inspect the nozzle cavity for any stray material; if found, remove with tweezers, solvent, air pressure or other means.

### How to reassemble the nozzle on an MK1 head:

Carefully:

1. Ensure your MK1 has no filament loaded.
2. With a 1/4" driver or wrench, attach the nozzle.
3. Use normal procedure for heating and loading filament.

## DISCLAIMER:

***Use at your own risk!***

No warranty or guarantee is offered for the application of this product. The user agrees to be ENTIRELY responsible for safe operation of this product.

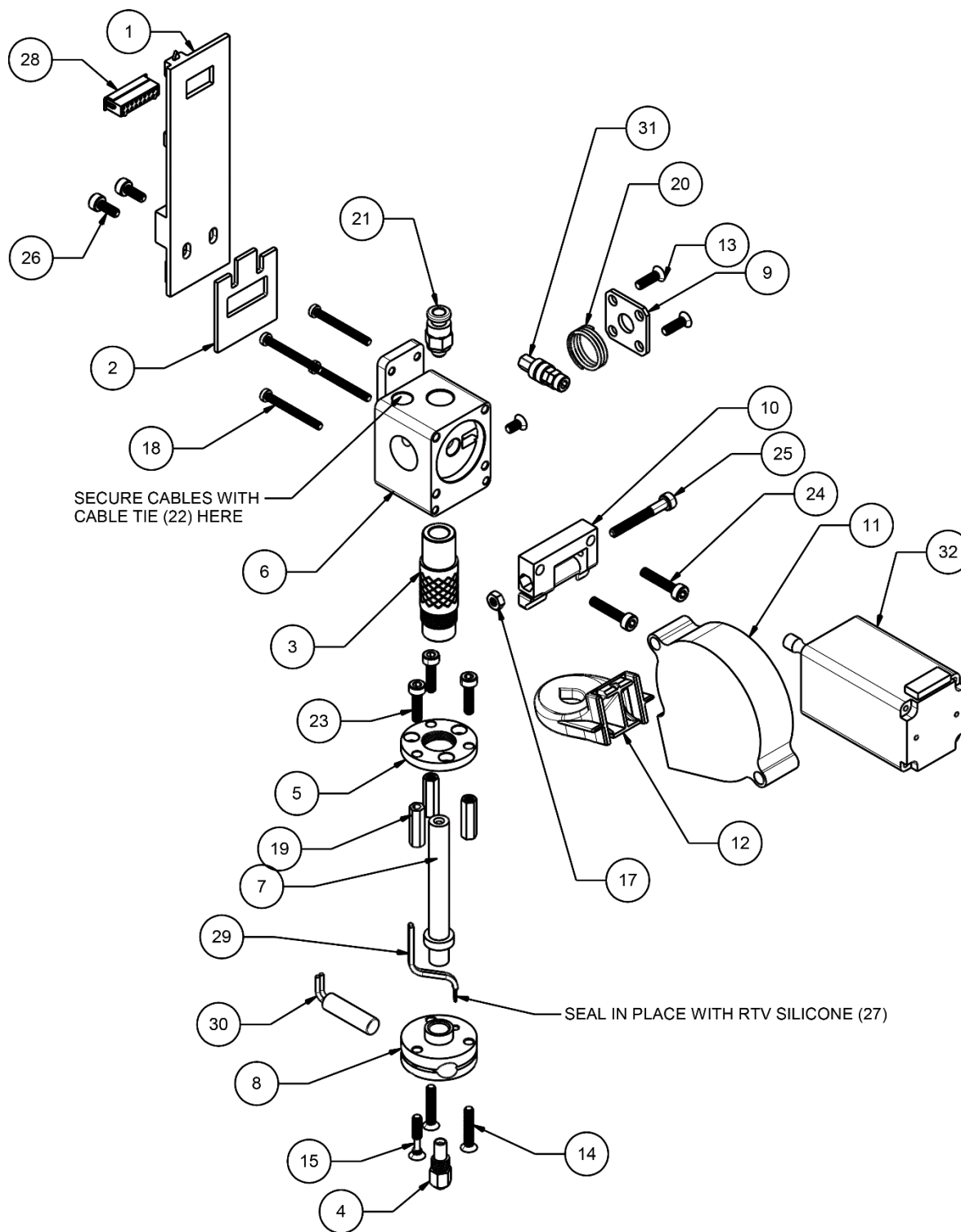


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## MK1-250 Exploded View







# Filament Extruder MK1-250

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## MK1-250 BOM

ITEM	Qty.	Part No.	Part Name
1	1	102081	102081.ExtrusionHeadCircuitBoard
2	1	102508	102508.PCBSpacerStop.H3D
3	1	102511-6	102511-6 Knurled Aluminum Material Tube
4	1	102512-1.75	102512-1.75.HotTip.1.75mmFilament
5	1	102532	102532-2B.RoundPEEK
6	1	102533-5	102533-5.MK1-400 Body
7	1	102534	102534.PTFE.New
8	1	102535	102535.RoundHeatCartridge
9	1	102536-1	102536-1.Spring.Cover.MK1.H3D.v2
10	1	103109-1	103109-1_Mk1_Quiet_Storm_Attachment v8
11	1	103109-3	103109-3.QUIETSTORMBLOWER
12	1	103109-5	103109-5_MK1_PAN NOZZLE kjg new fan dimensions.V5.5
13	2	200086-10	200086-10.Screw,M3x10mm.FlatPhil
14	2	200086-16	200086-16.M3x16FlatHead.92010A126
15	1	200086-16-U	200086-16-U.Modified M3x16 Flat Head
16	1	200086-6	200086-6.Screw,M3x6mm,FlatPhil
17	1	200088	200088.Nut,Hex,M3
18	4	200092-25	200092-25.M2.5x25.Pan.92000A112
19	3	200101-15	200101-15.STANDOFF - M3X15, HEX, FF, BRASS
20	1	200127-.75	200127-.75.Spring.Compression.75x.48x.045
21	1	200140-4	200140-4.4MM Pneumatic Connector
22	1	200225	200225.Cable Tie, 0.075" x 3"
23	3	200303-12	200303-12.Screw,M3x12mm,SocketCap
24	2	200303-16	200303-16.M3x16.SocketCap
25	1	200303-25	200303-25.M3X25.SOCKETCAP
26	2	200303-8	200303-8.Screw,M3x8mm,SocketCap
27	0.3	200509-2.8	200509-2.8 Silicone RTV, 2.8oz
28	1	300015-18	300015-18.Conn, HOUSING PHD 2mm 18POS
29	1	301112	301112.Platinum RTD
30	1	301450	301450 Heating Element, 40W
31	1	402106-3	402106-3.bearingassem_mk1
32	1	420019-1	420019-1.MOTOR.STEPPING.0.8A.28X28X52MM



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## SAMPLE PRINTS:

Some prints from the MK1-250 print head on a Hyrel 3D printer:.

T-Glase

ABS

PVA

HIPS

PLA

Taulman 618 Nylon

Smart ABS

PC-ABS Alloy

PETG

