BIGTREETECH
Smart Filament Detection Module

Operating instruction

1.Product introduction

Smart Filament Detection Module is a filament detection module aiming at the defects of the broken materials detection module in the market. I t was launched by the 3D printing team of ShenZhen BigTree Technology CO.,LTD .

2.Module Features

1) It can detect abnormal extrusion of filament caused by nozzle plugging, filament wrapping and extruder failure.

2) It works with open source firmware marlin 2.0.x. Marlin2.0 uses powerful development tools, Visual Studio Code integrated development environment: supports online debugging, which is more helpful for product development and performance optimization. Adopts C language development, so it has low development threshold.

3) Support motherboard with broken filament detection interface.

4) Support screen 2004,12864, TFT24 (12864 mode), tft35_v3.0 (12864 mode).

5) The module is being optimized and will be compatible with touch screen in the future.

6) Support for input power 3.3v-5v.

7) Support long - range and short - range extrusion.

8) Support 1.75mm diameter filament (please install the flexible filament before installing the extruder).

9) Installation is optional.

3.Module parameters

Module size:75mmX30mmX29.55mm

Fixed hole spacing：20.35mm

Filament detection diameter：1.75mm

Detection length：7mm

Voltage：3.3V~5V

Adapter firmware：marlin 2.0.X

Support extrusion: long - range extrusion, short - range extrusion
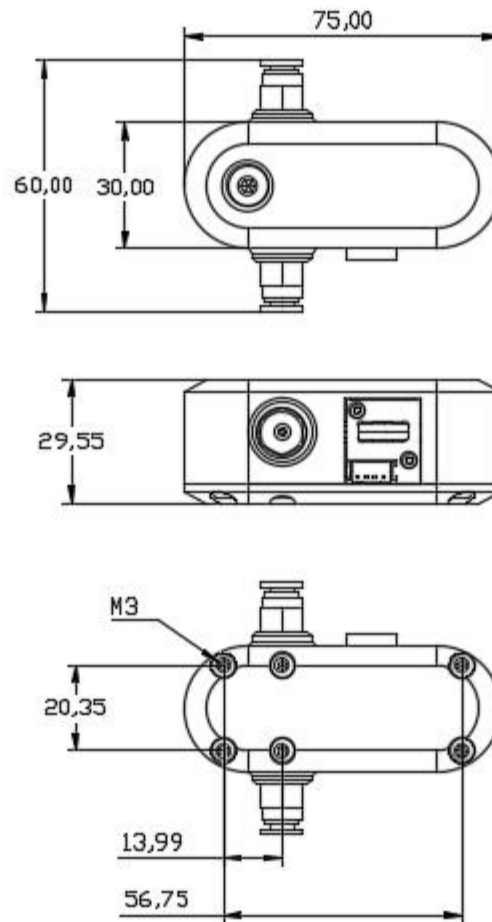

Figure 1

4.Firmware modification

1)　The firmware used in the product is marlin2.0.x. Use the screens 2004, 12864, TFT 24 (12864 mode), TFT35_V3.0 (12864 mode) can be used directly. According to our test, the motherboard that can use this sensor includes: SKR V1.3; SKR mini E3. SKR E3 DIP; MKS CEN L; MKS GEN V1.4. The module is being optimized and will be compatible with the touch screen later. The specific modification method is shown in figure 2


```
C Configuration.h ●
Marlin > C Configuration.h > ...
1084
1085    /**
1086     * Filament Runout Sensors
1087     * Mechanical or opto endstops are used to check for the presence of filament.
1088     *
1089     * RAMPS-based boards use SERVO3_PIN for the first runout sensor.
1090     * For other boards you may need to define FIL_RUNOUT_PIN, FIL_RUNOUT2_PIN, etc.
1091     * By default the firmware assumes HIGH=FILAMENT PRESENT.
1092     */
1093    #define FILAMENT_RUNOUT_SENSOR
1094    #if ENABLED(FILAMENT_RUNOUT_SENSOR)
1095      #define NUM_RUNOUT_SENSORS   1     // Number of sensors, up to one per extruder. Define a FIL_RUNOUT#_PIN for each.
1096      #define FIL_RUNOUT_INVERTING false // Set to true to invert the logic of the sensor.
1097      #define FIL_RUNOUT_PULLUP          // Use internal pullup for filament runout pins.
1098      //#define FIL_RUNOUT_PULLDOWN      // Use internal pulldown for filament runout pins.
1099
1100      // Set one or more commands to execute on filament runout.
1101      // (After 'M412 H' Marlin will ask the host to handle the process.)
1102      #define FILAMENT_RUNOUT_SCRIPT "M600"
1103
1104      // After a runout is detected, continue printing this length of filament
1105      // before executing the runout script. Useful for a sensor at the end of
1106      // a feed tube. Requires 4 bytes SRAM per sensor, plus 4 bytes overhead.
1107      #define FILAMENT_RUNOUT_DISTANCE_MM 7
1108
1109      #ifdef FILAMENT_RUNOUT_DISTANCE_MM
1110        // Enable this option to use an encoder disc that toggles the runout pin
1111        // as the filament moves. (Be sure to set FILAMENT_RUNOUT_DISTANCE_MM
1112        // large enough to avoid false positives.)
1113        #define FILAMENT_MOTION_SENSOR
1114      #endif
1115    #endif
1116
```

Figure 2

The configuration to be modified is:

Uncomment #define FILAMENT_RUNOUT_SENSOR　　Turn on the consumables detection sensor

Uncomment #define FILAMENT_RUNOUT_DISTANCE_MM 7　　Sets the accuracy of the sensor to 7mm

Uncomment #define FILAMENT_MOTION_SENSOR　　Sets the sensor to the encoder type

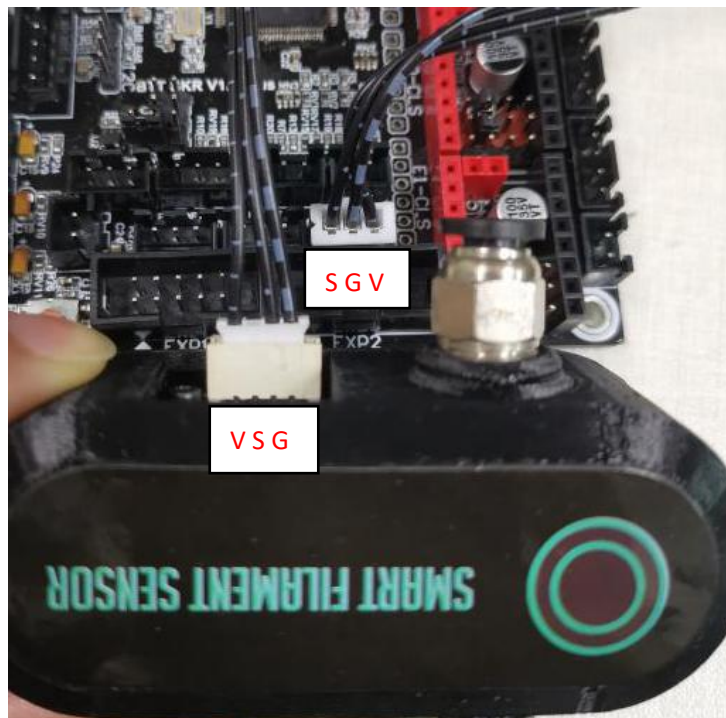## 5.Wiring method

1)Take SKR V1.3 (figure 3) as an example

Figure 3

The smart filament detection module uses a break detection interface (such as SKR V1.3 for E0DET). Any motherboard with a break detection interface can be used.
S for SIN
G for GND
V for VDD

6.Installation method

1) Remove the pneumatic joint between the teflon tube and the extruder (as shown in figure 4-6)
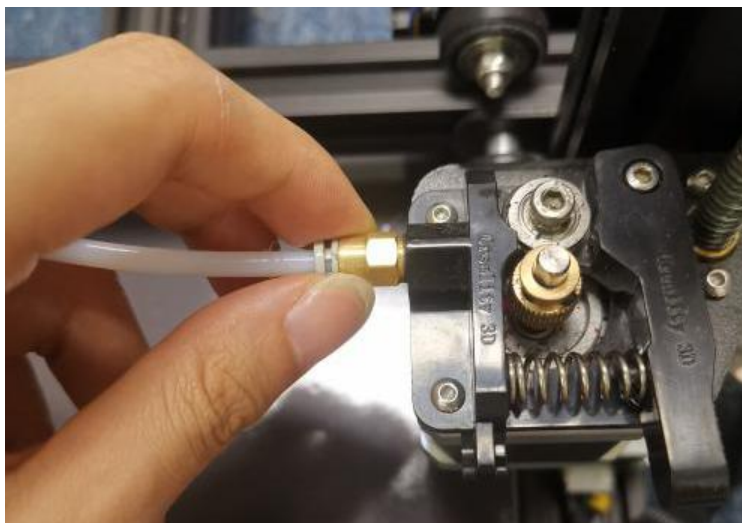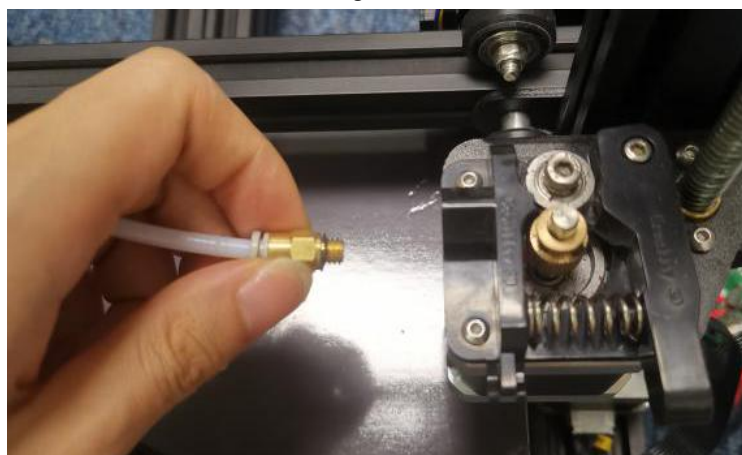

Figure 4

Figure 5

Figure 6

2)   Insert the printer's teflon tube into the pneumatic joint (like Figure 7)
Note: The teflon tube needs to be fully inserted into the module in order to ensure that it will not affect the entry of filament.

Figure 7

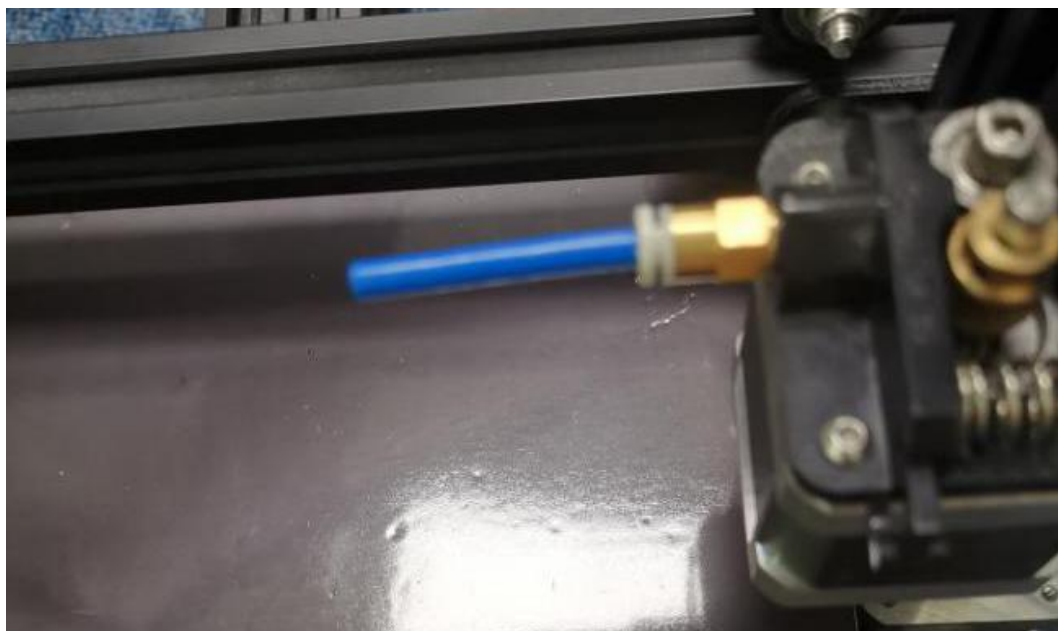3)   Screw the smart filament module connector into the extruder.(like figure 8)

Figure 8

4) Insert the smart filament module connector Teflon tube into the pneumatic joint (like Figure 9) Note: Teflon tube needs to be fully inserted into the module so that it does not affect the entry of filament.

Figure 9

5) Other fixed methods

The two screw holes shown in Figure 10 can be used for fixing, and the printed piece can be designed according to the fixed position. So this module can be applied to the proximity extruder.

Figure 10

7.Notes

1) This module is powered by 3.3v or 5V, so high voltage will cause damage to the module.

2) The current shell material is printed with PLA, so the shell will be damaged if the screws and pneumatic joints are turned frequently and wrongly many times.

3) Please consult technical support before using the motherboard with no broken filament detection module.

8.Item listing

1)   Smart Filament Sensor：

2)   Smart Filament Detection Module Cable：

3)   Smart Filament Detection Connector：

4)   Spare set screws：