A2 Clogging Sensor

PAN, May 18th, 2023

1. Introduction

This sensor detects clogging or missing filaments. If the printing works fine, the filament rotates the encoder and the photo interrupter receives pulses every 1 to 10 sec, depending on the printing speed, and the built-in LED will flash.

This sensor can be mounted near the filament spool or at the entry of the extruder

The clogging processing monitor (see Report A3 Clogging Monitor Appliance) is a small circuit with an Arduino Nano and Velleman Display

If the filament transport becomes interrupted the alarms are:

- Buzzer on during 1 Minute, Printer enters into the „Pause Mode“ for nozzle cleaning.

- If the alarm is not stopped, the 3D printer shuts down after 30 Minutes

2. Application and list of the components

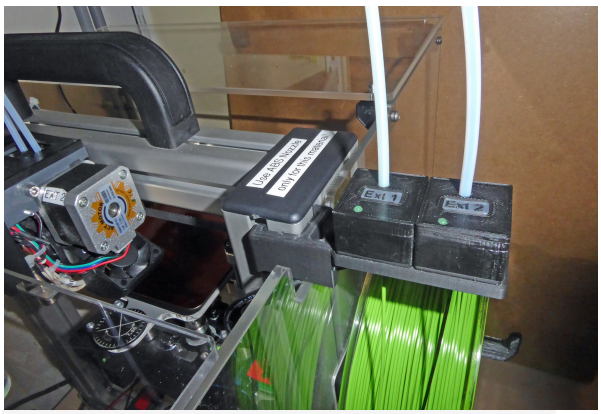

Fig. 1:. Two Clogging Sensors mounted at FELIC TEC 4 printer with dual extruders

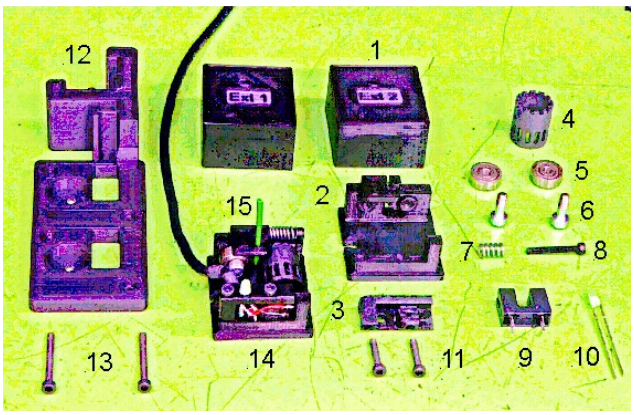

Fig. 2: Overview components
for details see report A5 STL files

Components of the clogging sensor module
PAN, March14th, 2021

Part Nr	Name	Dimensions	Comments and printing instructions
1	Cover	29x30x17.5	PLA, Panel „Ext 1“ as a separted plate, fixed by Acetone
2	Base	31x29x16.5	PLA, no suspension, but WITH auxiliar suspension plates
3	Solder Plate	20.7x9.7x6.25	PLA, printed vertical, no suspension
4	Encoder	D12x15	PLA, printed vertical WITH draft shields
5	Ball Bearing	D10/3x4	Standard China Quality
6	Hex Bold	M3x12	With shaft D3, check mounting into ball bearing
7	Spring	D4x7, d0.65	5 turns, spring characterics: 17 N/mm
8	Hex Bold	M2x18	
9	Opto Barrier	12.3x10.8x6.4	Type ISTS100 or similar
10	Green LED	D3	
11	Hex Bold	M2x14	
12	Filament Guide	101x34x19.5	Filament holder for Sensor Ext 1 and Ext 2
13	Hex Bold	M2x22	Mounting Sensor with Cover to Filament Guide
14	Sensor mounted	29x30x18.5	Type USB cable, but it is NOT an USB device!
15	Filament	D 1.75	

Table 1: Clogging Sensor Components
Revised May 2023: Part 4: Encoder Material changed from PLA to aluminum

3. Sensor Module Design

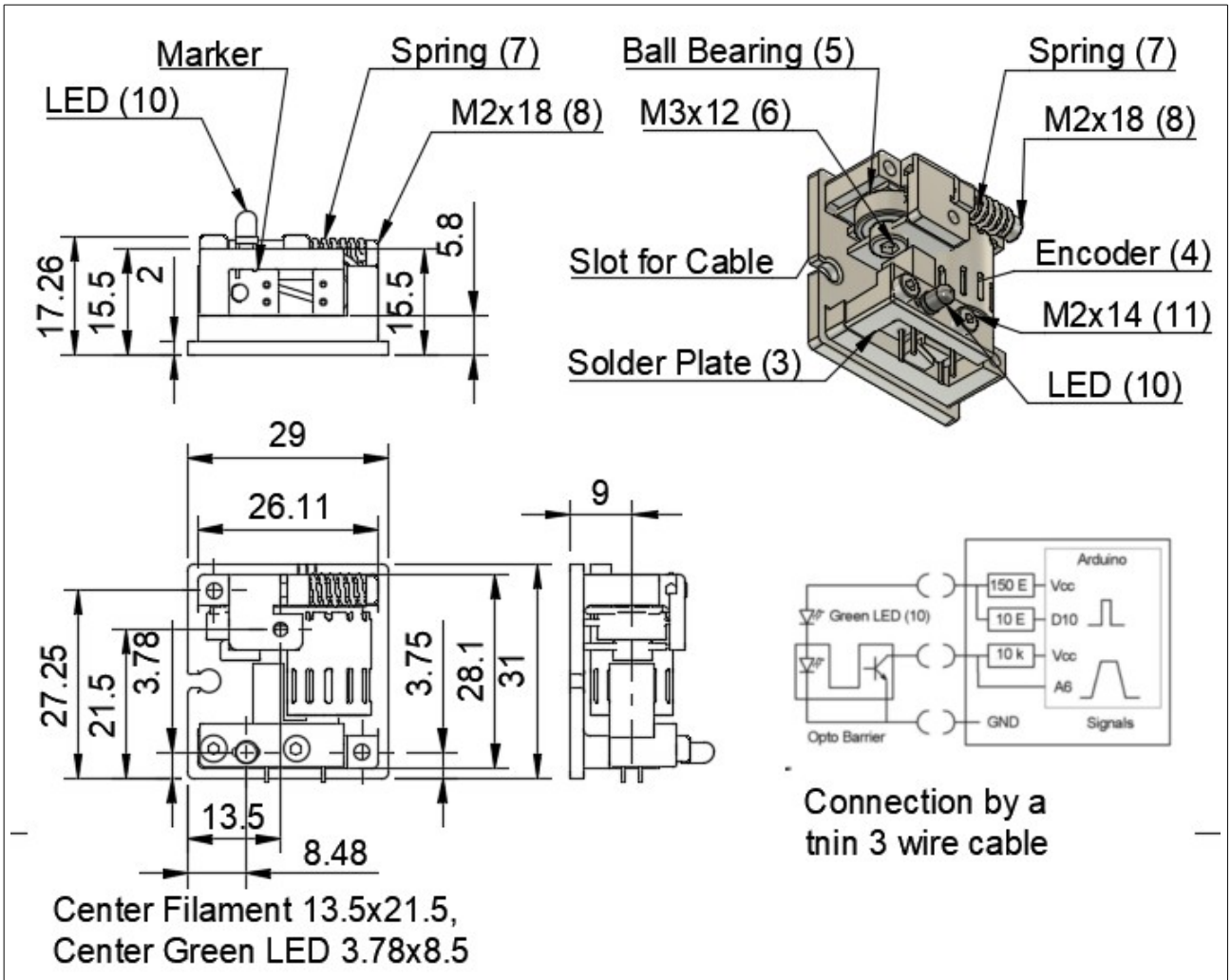

Fig. 3: Overview Clogging Sensor with Connections to CM Appliance
Note: the LED 10 is in Series with the opto barrier LED

The filament is pressed between Encoder Drum (4) and Ball Bearing (5).

The pressure is adjusted by the M2x18 Screw (8) and the Spring (7), about 2 N

The 3D-printed Encoder Drum (4) crushed after many hours in operation and is now conventionally manufacturing in aluminum!

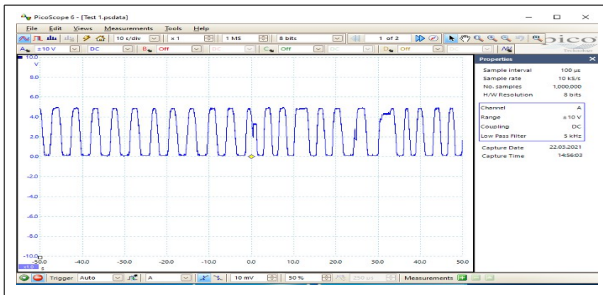

Fig.4: Sensor Signal during printing
(here without serial green LED!)

Oscilloscope Settings:
10 sec/Div, +/-10 V

- Every 5 to 10s a 0.2 V to 4.8 V transition
- The irregular signals are correct, depend on the momentary printing process