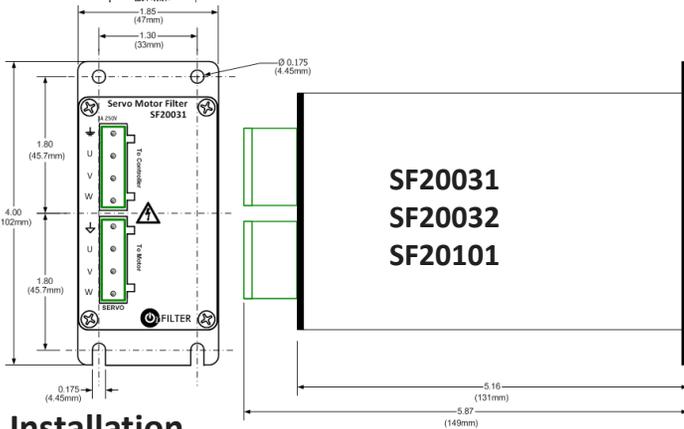


SF20201

Mounting Dimensions



SF20031
SF20032
SF20101

Installation

Filter shall be installed in dry stationary location with reasonable ventilation and the ambient temperature between 5° and 40°C. Filter is designed to be mounted vertically on the wall. Locate filter as close as it is practical to the servo controller, not to the motor.

RECOGNIZED COMPONENT



Included:
SF20xxx Filter 1 ea.



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Patent Pending. All specifications are subject to change without notice. Made in U.S.A.

Servo and Variable-Frequency Motors EMI Filters SF Series



User's Guide



Thank you for buying OnFILTER' servo EMI filter. It will help to improve reliability of servo motor's bearings, reduce electromagnetic interference and EMI-caused electrical overstress to sensitive components. Please read this User's Guide carefully - improper use of servo EMI filters can damage motors and servo controllers and cause injury or death.

WARNING

Failure to follow these warnings may cause equipment damage, personal injury or death



- Do not exceed maximum rating - it may cause overheating
- Allow sufficient space around this device for ventilation to avoid overheating



- No serviceable parts inside - do not open.
- High voltage is present inside

Basics

Servo, variable frequency and similar motors (for simplicity referred to further in this document as "servo motors") are driven by pulsed signals. Sharp edges of these pulses can cause the following problems:

- damage to ball bearings in the motor due to capacitive coupling between stator and rotor of the motor
- ringing and overvoltage in wires going to the motor
- electromagnetic interference (EMI) inside the equipment
- electrical overstress (EOS) to sensitive electronic components

The SF series of servo EMI filters substantially increase rise and fall times of drive pulses. The spectrum of the signal of drive pulses loses significant portion of energy at the high end. This serves a number of purposes.

- The lower the frequency spectrum, the higher impedance is presented by the capacitive coupling between stator and rotor of the motor. This reduces high-frequency currents through the motor's bearing improving their longevity
- Lesser high-frequency component of the spectrum results in less ringing with high amplitude of the drive signal which reduces stress on the motor and wiring
- High frequency current on ground in the tool is reduced significantly which leads to less EOS (electrical overstress) exposure to sensitive components.

In addition to EMI problems with drive signals, servo controllers (often called "servo amplifiers" or "servo packs") also generate noise back to the power line which causes strong interference in the tool. Often, separate power line EMI filters are needed to alleviate this problem. One of SF series filter - SF20032 - combines servo motor filter with AC power line filter in one unit. This saves space inside of your tool and simplifies connections.

Filter Care

Normally, filter requires no maintenance and no calibration. It is recommended, though, to periodically inspect filter for overheating and to clean its surface with dry cloth.

During its normal operation filter may have elevated temperature which would feel "warm" to the touch, but not what is considered "hot." If the filter does feel "hot" to the touch (more than 70°C or 158°F), turn your equipment off, disconnect filter from the circuit and discontinue using it. For warranty or other repair contact factory or its authorized distributors. Full text of warranty can be found in the Library section at www.onfilter.com

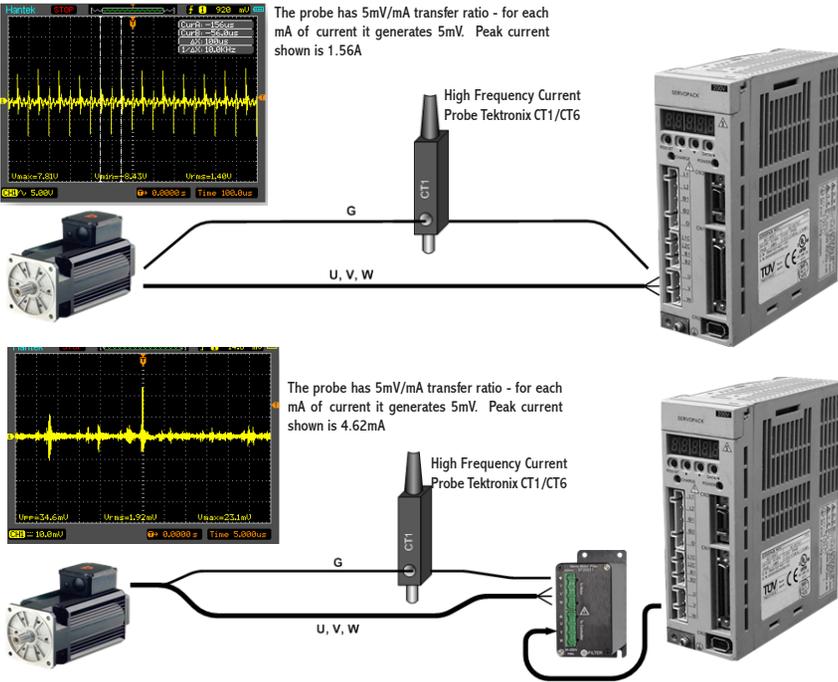
Specification

	SF20031	SF20032	SF20101	SF20201
DRIVE CIRCUIT				
Drive Voltage, max.	250V	250V	250V	250V
Drive Current, max.*	3A	3A	10A	20A
Rise/Fall Times, typ.	1.5µS	1.5µS	1.2µS	1.2µS
AC CIRCUIT				
AC Voltage, max.	N/A	250VAC	N/A	N/A
AC Current, max.	N/A	10A	N/A	N/A
Noise Reduction, typ.	N/A	>20dB	N/A	N/A
Nominal DC Resistance	<0.2Ω	<0.2Ω	<0.2Ω	<0.2Ω
Ambient Temperature		+5° .. 40°C		
Climatic Category		+05/040/00		

* at duty cycle (motor exerting max. torque) of 20%

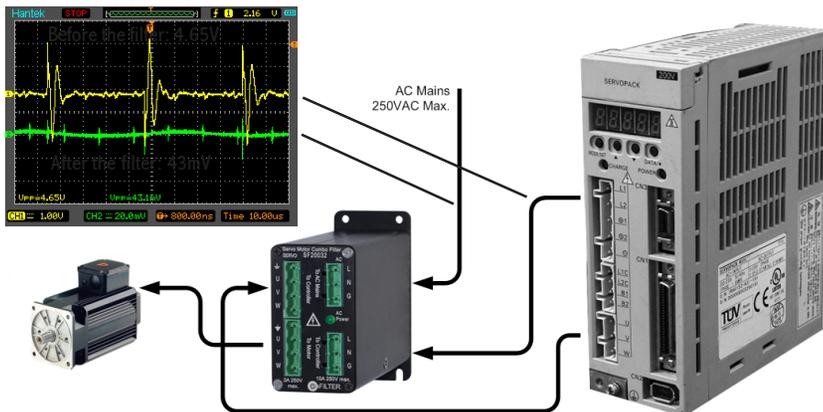
Ground Current Reduction

OnFILTER' SF series filters use proprietary technology to significantly reduce ground current in drive circuit. This further reduces noise in the tool and decreases current in motor's bearings. The figures below show measurements of ground current without and with SF series filter.



AC Power Noise Reduction

Pulse drive circuit in servo controller generate transient signals into incoming AC power line. SF20032 filter has built-in AC single phase filter with differential and common noise suppression that blocks the noise generated by servo controller from reaching AC power line.



Filter Models

This User's Guide covers four models: three for the motor only and one combo filter providing filtering for both motor and AC power supply.

Model	Motor	AC Power
SF20031	250V 3A	N/A
SF20032	250V 3A	250VAC 10A Single Phase
SF20101	250V 10A	N/A
SF20201	250V 20A	N/A



Terminal plug-ins are supplied with the filter. The plug-ins for 3A and 10A filters are manufactured by Wurth (<http://katalog.we-online.de/>)

Application	Number of Contacts	Wurth Part Number
Servo Controller to Motor	4	691 344 410 004
Servo Controller to AC	3	691 344 410 003

The plugs for a 20A filter are manufactured by FCI (www.fciconnect.com). The part number is 20020516-M041B01LF.

Should you need a replacement or additional plug-ins, contact OnFILTER or your local Wurth or FCI distributor.

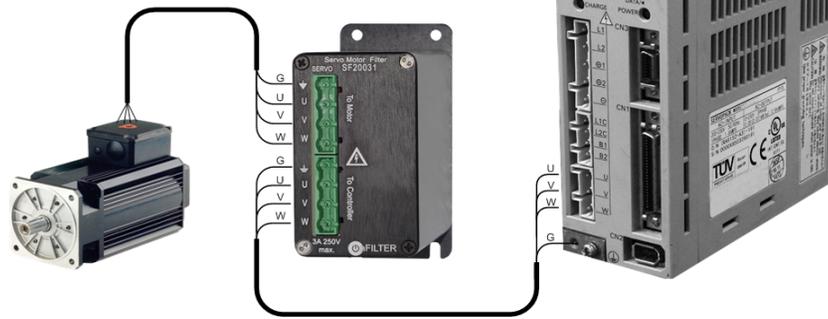
Filter Connections and Placement

Models SF20031, SF20101 and SF20201

These models provide filtering of drive signals from servo controller to the motor. Connect U, V, W and Ground terminal of servo controller to the terminal of filter labeled "To Controller." Connect motor cables to "To Motor" terminals of the filter instead of the controller. Grounding of motor should be done only via the filter to maintain performance.

Use only recommended wire gage - refer to User's Guide for your servo controller. Carefully check for proper polarity of connections - wrong connection can damage motor and controller.

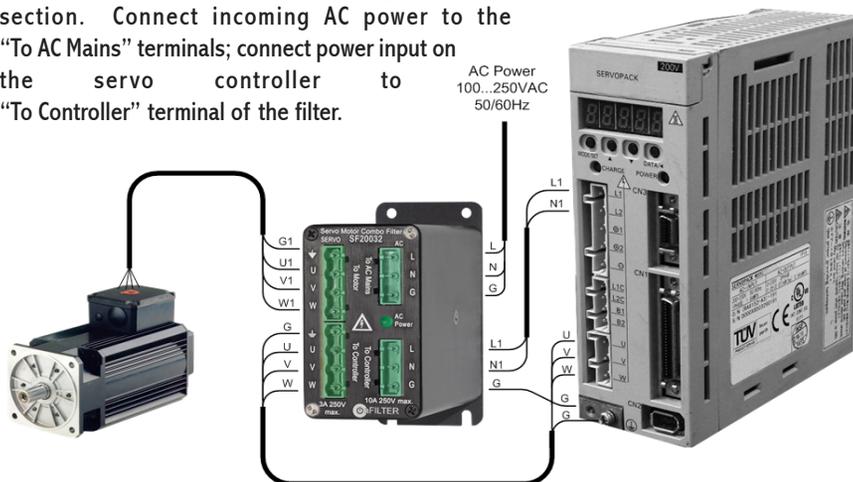
It is preferable to use shielded cable since this reduces radiated emission from the cables.



Model SF20032

This model provides filtering of AC power in addition to filtering drive signal to the motor. This way noise from the servo/variable frequency drive is blocked from polluting your tool on both ends - drive and AC power.

Connect motor circuit the same way as in previous section. Connect incoming AC power to the "To AC Mains" terminals; connect power input on the servo controller to "To Controller" terminal of the filter.



Placement of Filter

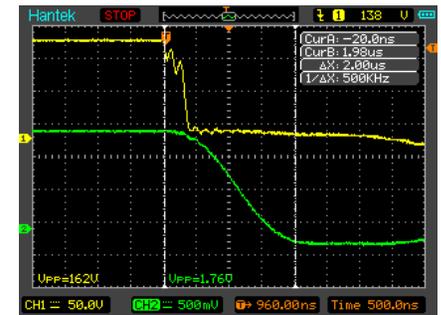
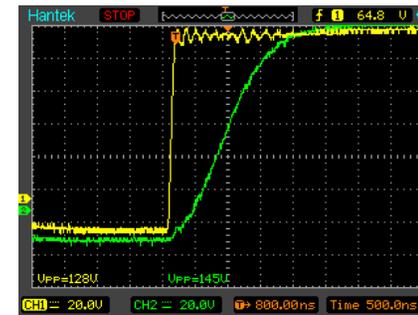
Place filter as close as practical to the controller, not to the motor. This avoids long runs of wires with high energy of high frequency spectrum which generates not only undesirable ringing, but also noise pollution of the entire tool via parasitic inductive and capacitive coupling.



Filter Performance

Rise and Fall Edges of Drive Pulses

The screenshots below show typical modifications of edges of the drive pulses by SF series filters. Depending on the specifics of the servo controller and the motor the wave shape may vary slightly.



Dealing with Artifacts

Drive pulses may have variety of artifacts which the filters can "smooth" as shown below.

