

# FIELDVUE® HF300 Series HART® Filters

## Introduction

### Scope of Manual

This instruction manual includes installation and maintenance information for the FIELDVUE® HF300 Series HART® Filters. Refer to separate manuals for additional information on other FIELDVUE products used with the HART filters, such as DVC6000 Series digital valve controllers, and Type 2530H1 HART interchange multiplexers.

Control system refers to a distributed control system (DCS), programmable logic controller (PLC), or a stand-alone controller that provides a control signal to the FIELDVUE instrument.

Do not install, operate, or maintain HF300 Series HART filters without first • being fully trained and qualified in valve, actuator and accessory installation, operation and maintenance and • carefully reading and understanding the contents of the manual. If you have any questions about these instructions, contact your Emerson Process Management™ sales office before proceeding.

### Description

HF300 Series HART filters, shown in figure 1, are used with HART-based FIELDVUE instrumentation, such as DVC6000 Series digital valve controllers. These filters are used when this instrumentation is connected to a 4 to 20 mA DC control system output that was not designed for the HART (Highway Addressable Remote Transducer) communication protocol.

The HF300 Series HART filters consist of the Type HF340 HART filter that provides filtering and isolation between the control system and FIELDVUE instrument and the Type HF341 communication tap. The Type HF341 does not provide any filtering. It is simply a straight through device that provides a convenient connection for HART communication.

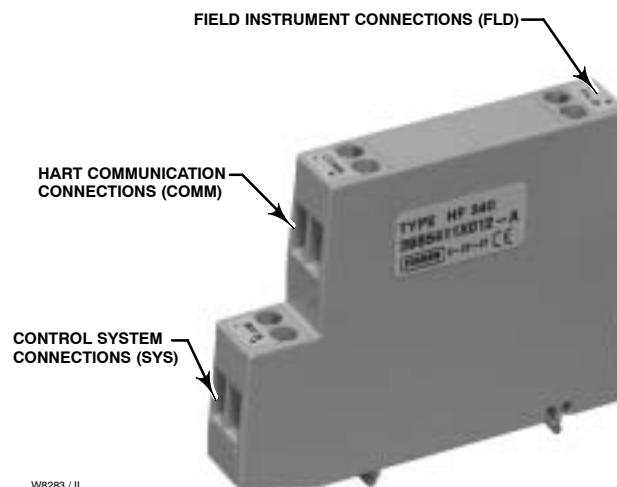


Figure 1. FIELDVUE® HF300 Series HART® Filters

The Type HF340 HART filter is a passive device that is inserted in-line with both wires of a HART 4 to 20 mA DC output loop. The purpose of the filter is to effectively isolate the control system analog output from modulated HART communication signals. The filter receives a 4 to 20 mA DC current signal from the control system, which it shunts with a capacitor and then passes through an inductor. The low AC impedance of the capacitor prevents sudden changes in the control system current output from interfering with the HART communication. The high AC impedance of the inductor permits HART communication on the instrument side of the filter. It also prevents the voltage modulation in the HART loop from being seen by, or having an affect on, the control system output. The filter introduces a maximum input-to-output voltage drop of 2 volts DC at 20 mA as long as the output load voltage is less than 14 volts DC.



Table 1. Specifications

|   |  |
|---|--|
| <b>Product Types</b><br><p><b>Type HF340:</b> Standard 35 mm DIN rail mounting with filtering components.</p> <p><b>Type HF341:</b> Standard 35 mm DIN rail mounting without filtering components (straight through with capacitor blocking on COMM terminals).</p> | <b>Ambient Relative Humidity</b><br><p>5 to 95%</p>  |
| <b>Connections</b><br><p>Three 2-pin Cage-clamp style connectors accept up to 12 AWG wire</p>   | <b>Electromagnetic Interference (EMI)</b><br><p>These units have the CE mark in accordance with the European Electromagnetic Compatibility (EMC) Directive. They meet the emissions requirements of IEC 61326-1 (Edition 1.1) for Class A equipment for use in industrial locations and Class B equipment for use in domestic locations. They also meet the immunity requirements listed in table 2 below. This table is in accordance with Annex A of IEC 61326-1 for equipment intended for use in industrial locations.</p> |
| <b>Power Requirements (Type HF340 only)</b><br><p><b>Input Current:</b> 4–20 mA DC (nominal)<br/> <b>Input Voltage:</b> At 20 milliamps DC, 2 volts above input voltage required by the field instrument (2 volt drop across filter at 20 milliamps DC)</p>         | <b>Dimensions</b><br><p>75 mm (3 inches) long by 12.5 mm (0.5 inches) wide by 60 mm (2.4 inches) deep</p>  |
| <b>Filter Output</b><br><p>Filter output is clamped at 15 volts DC. Filter load voltage requirement must not exceed 14 volts DC</p>   | <b>Approximate Weight</b><br><p>0.1 kg (4 oz)</p>  |
| <b>Ambient Operating Temperature</b><br><p>–40 to 85°C (–40 to 185°F)</p>   |  |

Table 2. EMC Immunity Performance Criteria

| Port               | Phenomenon                           | Basic Standard | Performance Criteria |
|--------------------|--------------------------------------|----------------|----------------------|
| Enclosure          | Electrostatic discharge (ESD)        | IEC 61000-4-2  | A                    |
|                    | EM field                             | IEC 61000-4-3  | A                    |
|                    | Rated power frequency magnetic field | IEC 61000-4-8  | N/A <sup>(1)</sup>   |
| I/O signal/control | Burst                                | IEC 61000-4-4  | A                    |
|                    | Surge                                | IEC 61000-4-5  | A                    |
|                    | Conducted RF                         | IEC 61000-4-6  | A                    |

1. Not applicable; only applicable to magnetically sensitive equipment.

The filter is normally installed near the field wiring terminals of the control system I/O. HART communication is only possible between the filter and the field instrument and at the filter COMM terminals, but not on the control system side of the filter. The filter is not designed or intended for use in the process environment. Neither the filter nor its outputs are approved for hazardous areas. However, a recommended intrinsic safety barrier can be connected between the FIELDVUE instrument and the filter in intrinsically safe installations. In most cases, if an IS barrier is used, the filter will not be needed.

## Specifications

Typical specifications for the HF300 Series HART filters are shown in table 1.

### Note

**Neither Emerson, Emerson Process Management, nor any of their affiliated entities assumes responsibility for the selection, use, and maintenance of any product. Responsibility for the selection, use, and maintenance of any product remains with the purchaser and end-user.**

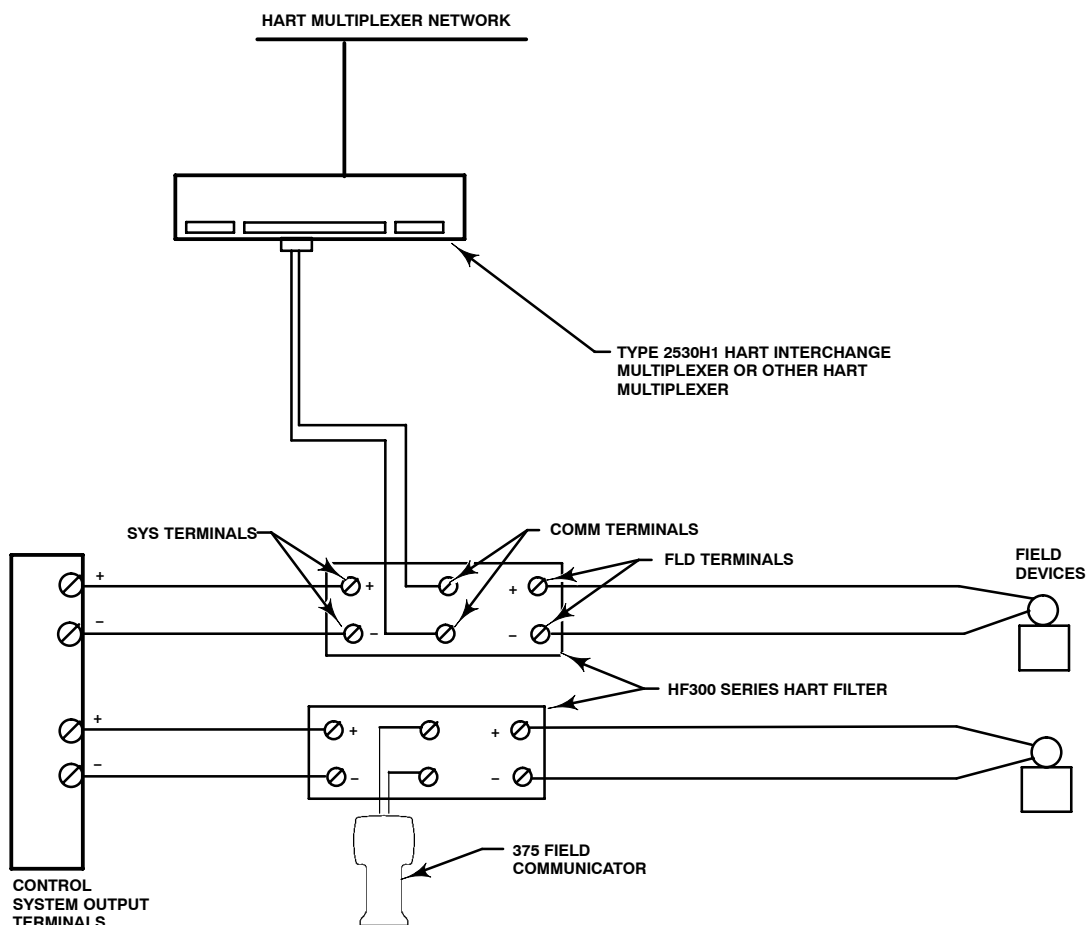


Figure 2. Typical HF300 Series HART Filter Installation

## Installation

Refer to figure 2 for typical installations. HF300 Series filters mount on a type 35 DIN rail. To install the filter, provide a temporary means of process control, then take the loop out of service. Remove the DIN interconnect blocks from the rail without disconnecting existing wiring. Install the filter on the rail. Disconnect the wires from the control system output side of the interconnect blocks and connect them to the SYS terminals on the filter, taking care to maintain correct polarity. Disconnect the wires from the field side of the interconnect blocks and connect them to the FLD terminals on the filter, taking care to maintain correct polarity.

## Shields

If using shielded wiring on both sides of the filter, the shield should connect across the filter. If the filter connects directly to the control system output and shielded loop wiring is being used, connect the shield to system ground on the instrument side of the filter.

## HART Wiring Connections

The COMM terminals on the filter provide a convenient means to tap into the loop wiring for HART communication. A HART Interchange multiplexer or the 375 Field Communicator can be connected to these terminals, or they may be left with no connections.

### Corrective Maintenance

The most likely malfunction of a loop containing an HF300 Series HART filter is reverse polarity installation of one of the wire pairs. The Type HF340 filter will work with either polarity, but misconnection could result in the wrong polarity reaching the field instrument. If the loop is not operating properly, check the polarity of the voltage at the inputs and outputs of the filter and at the inputs of the instrument.

If the instrument appears to operate properly in the loop, but communication with a non-isolated multiplexer or PC modem is not possible, it may help to reverse the wires to the COMM terminals. The Type HF340 filter inserts a high impedance in the + side of the loop only. A reversal of the connections to the SYS and FLD terminals of the filter will result in the control loop operating properly, but inoperative HART communication.

Inadequate control system compliance voltage will not support filter operation. This is an installation

problem that may appear initially to be a filter malfunction. For the filter to operate properly, the control system must have a compliance voltage that is at least 2 volts higher than the voltage required to drive the loop to maximum current. Refer to the appropriate instrument instruction manual for information on determining the control system compliance voltage.

Excessive load voltage will interfere with filter operation. A transient clamping device limits the output voltage to a nominal 15 volts. If the voltage at the output (due to the total impedances connected) is greater than 14 volts DC at maximum loop current, some of the current may be shunted by the clamping device.

The Type HF340 filter is protected against accidental over-current from sources up to 30 volts DC. If an over-current condition occurs, the filter may be inoperative for several seconds thereafter.



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