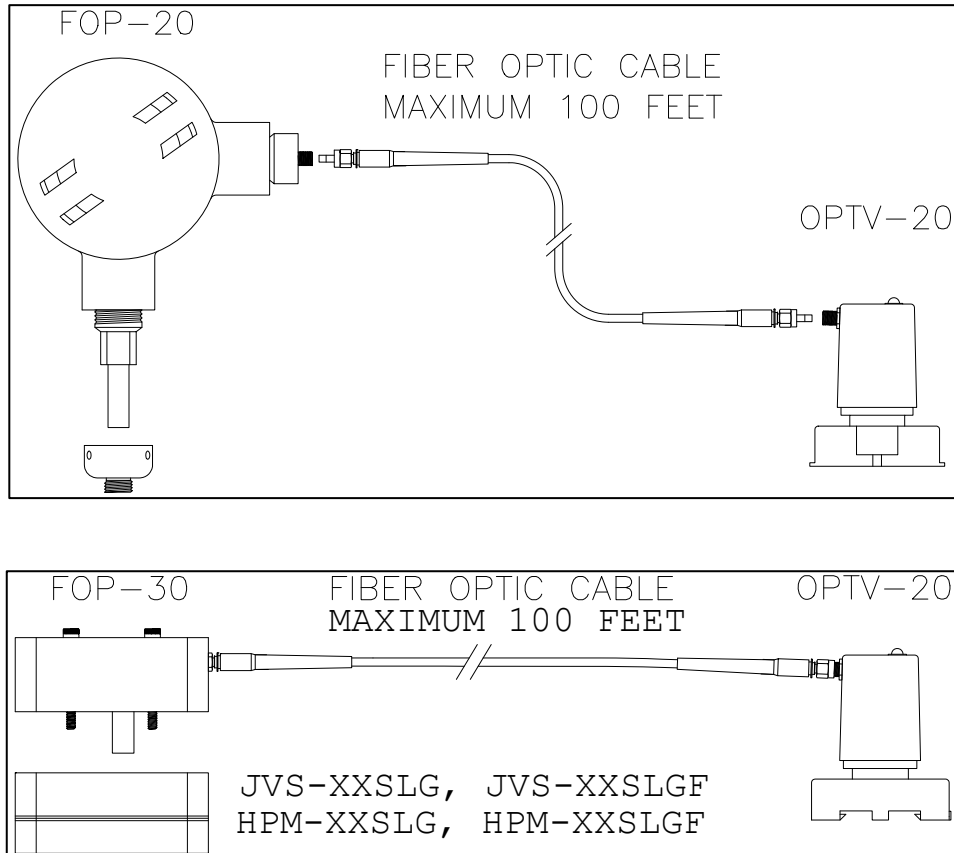


## **FOP-20 & FOP-30 Fiber Optic Pickup Systems**

The fiber optic pickup system consists of a **FOP 20** or **FOP-30** Reluctance Pickup with a Fiber Optic Transmitter, **Fiber Optic Cable** and **OPTV-20** Fiber Optic Receiver. The **FOP-20** is in an Explosion Proof Housing for use with HPM, JVM, or JVS series flow meters. The **FOP-30** is in an intrinsically safe housing for use with HPM-SLG or JVS-SLG series.



The fiber optic cable is sold in standard length of 30, 45, 60 and 100 feet.

### **FOP-20 and FOP-30 Fiber Optic Transmitters**

The **FOP-20** and **FOP-30** fiber optic pickups are designed with the following criteria:

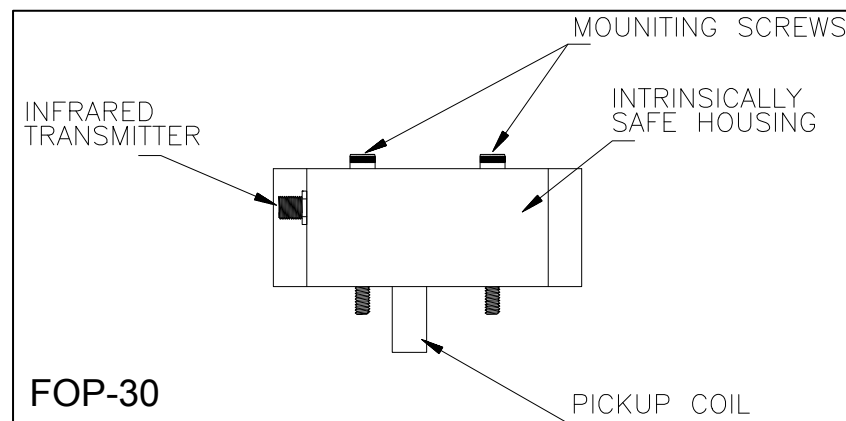
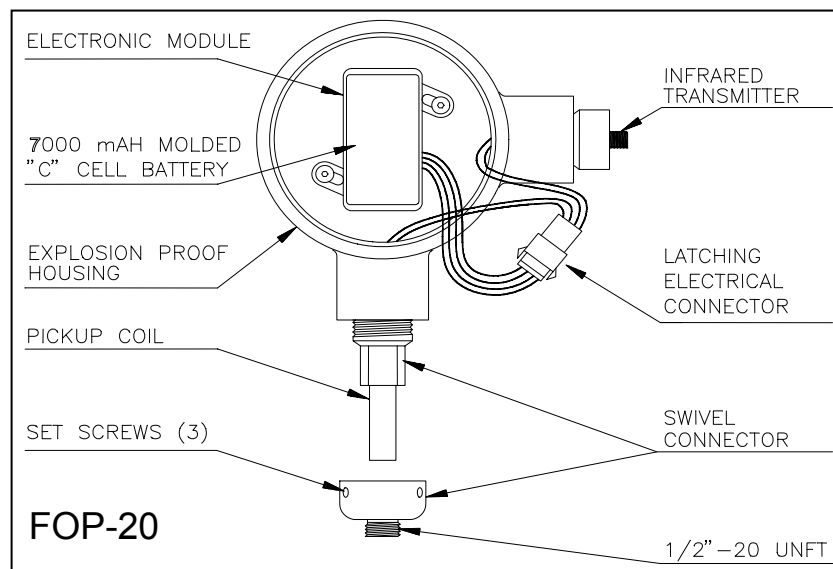
- ☒ To transmit a safe fiber optic signal. This allows the incorporation of flow meters into fully charged electrostatic paint systems (35 - 120 Kilo Volts.)
- ☒ User friendly in respect to initial hookup and maintenance.
- ☒ Swivel connector to flow meter for easy installation/removal. (FOP-20 only)
- ☒ Single, sealed, extra long life battery and electronic module.
- ☒ Simple industrial technology that is easy for maintenance personnel to understand.
- ☒ CMOS technology for long battery life.

The **FOP-20** and **FOP-30** consist of the following stages:

- ☒ Pickup coil
- ☒ Battery/electronic Module
- ☒ Infrared transmitter

The pickup coil is the sensing device. The coil is a low ohm, low inductance device embedded in a stainless steel housing. Embedded in the pickup is a small magnet which will generate pulses to a coil when the magnetic field in front of the pickup changes. The infrared wave length from the transmitter is approximately 820 nm and the pulse lasts no longer than 30  $\mu$ s. By producing this very short pulse, the life of the internal DC power source can be greatly enhanced.

The power source is a heavy duty 7000 mAH Lithium “C” cell battery. By utilizing CMOS technology in the **FOP** amplifier/transmitter, the quiescent current is below 10 $\mu$ A and increases to approximately 60 $\mu$ A when the gears are turning at 100Hz. Due to the very low drainage on the battery, a life expectancy of the battery/electronic module is between 5 and 10 years depending upon the flow rates and time of use. When the battery is installed by **AW Gear Meters**, a label with the installation date is taped to the battery. Do NOT remove this label! As preventive maintenance we recommend keeping a log with the installation dates of all **FOP’s** in use. These may be scheduled for replacement at a convenient time after 5 years of operation. This will ensure uninterrupted service during production operations.



## OPTV-20 Fiber Optic Receiver

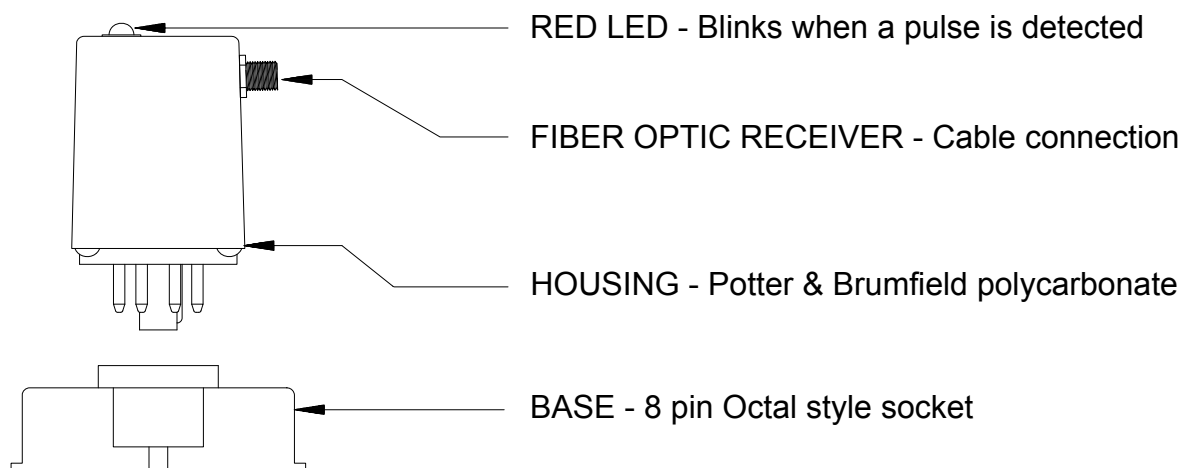
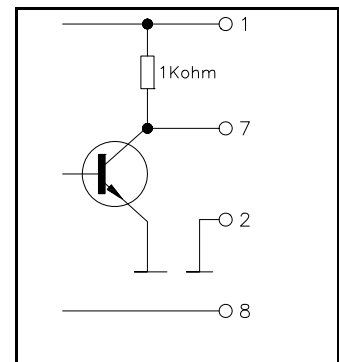
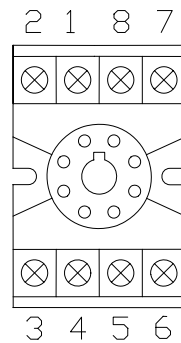
The fiber optic cable coming from the **FOP-20 or FOP-30** terminates in the **OPTV-20** receiver. This receiver consists of an infrared photo-diode, pulse shaper and an amplifier built into a Potter & Brumfield polycarbonate casing which plugs into an 8 pin Octal style socket.

On the top of the module, a red LED is mounted which will blink when a frequency signal is detected at the fiber optic receiver. It is recommended that the unit be mounted to allow operator observation of the LED. The output from the **OPTV-20** is a square wave frequency which is proportional to the flow through the flow meter on which the **FOP-20 or FOP-30** is mounted.

The maximum frequency should not be over 500 Hz. The output from the **OPTV-20** is a NPN open-collector amplifier with a 1 K $\Omega$  pull-up resistor.

### OPTV-20 Connections:

- 1 - +7 to 20 Volt DC Supply
- 2 - Ground for supply and signal
- 3 - Not used
- 4 - Not used
- 5 - Not used
- 6 - Not used
- 7 - Frequency Signal Output
- 8 - Fiber Optic Receiver Housing ground



Installation Note: To reduce the chance of noise causing the OPTV-20 to emit false signals, it is recommended that terminal 8 be connected to either panel (earth) ground or terminal 2 on the OPTV-20. Panel ground is the preferred choice of connection.

The OPTV-20 has a fixed pulse length of approximately 1 millisecond. As the frequency increases, the time elapsed between each pulse will decrease resulting in eventual saturation at approximately 1000Hz.

An alternate model OPTV-CM is available for cases where a longer pulse length is required. The OPTV-CM pulse length is approximately 6 milliseconds which saturates at approximately 150Hz.

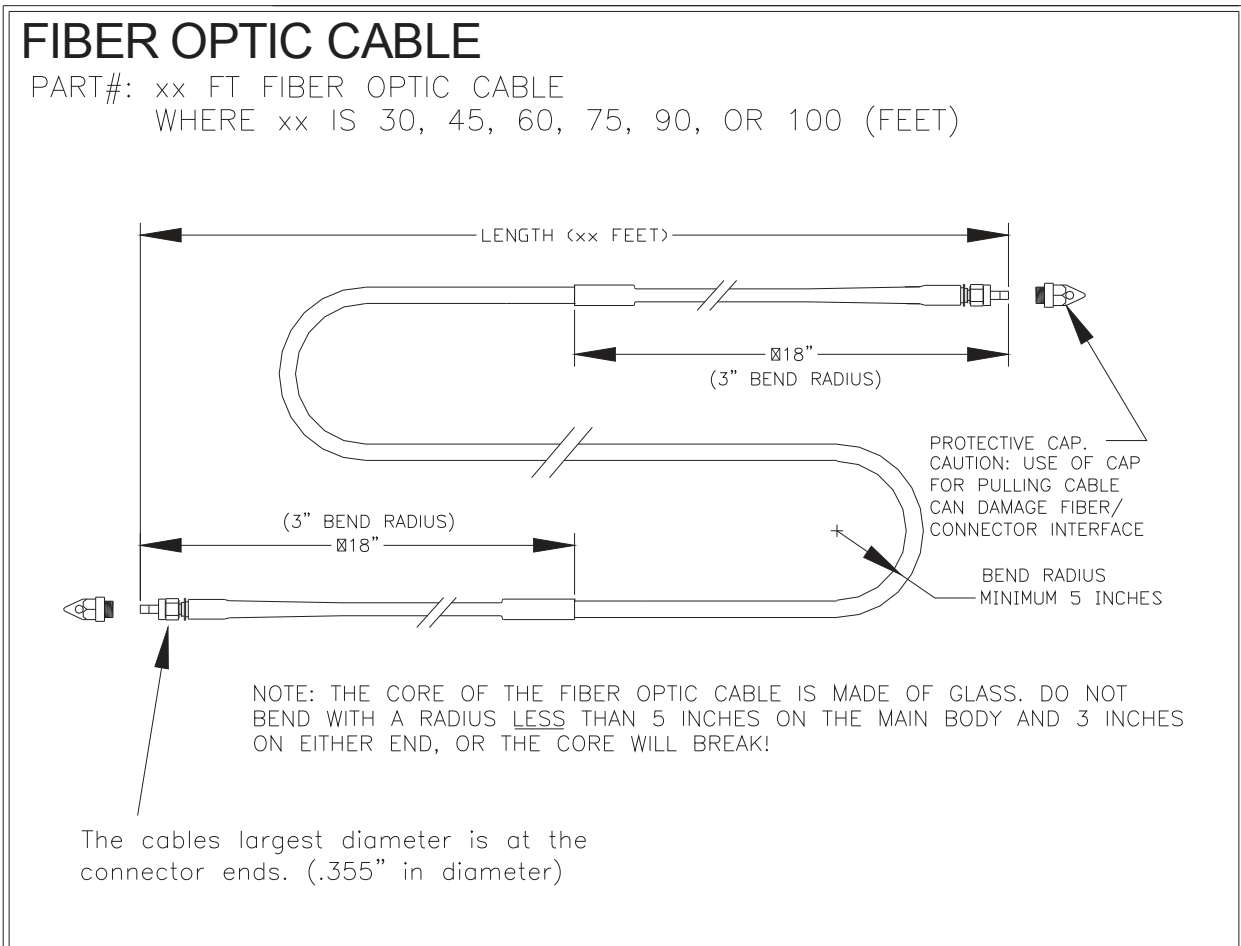
## The Fiber Optic Cable

The fiber optic cable has a dual reinforced PVC outer jacket covering a layer of Kevlar® yarn for extra strength surrounding a Hytrel® tight buffered optical fiber by Spectran®. The fiber optic cable is pre-assembled with AMP SMA905 industrial use connector by the manufacturer and is available in 30, 45, 60 and 100 foot standard lengths. For special length requirements contact AW-Lake Company. Cables can be joined for extra length or pass through a bulkhead using a Mating-Sleeve-FOC-Connector AW P.N. CO85040. The end-connectors are installed with special tools and for this reason NEVER cut the cable.

If the fiber optic cable needs to pass through walls or panels, a hole with a diameter of 3/8" is needed so the connector can pass through.

The core of the cable is made of glass, so any sharp bends **MUST** be avoided or the core could break. **The MINIMUM bend radius for each cable should never be exceeded (see drawing below).**

Always be very careful not to damage the ends of the fiber optic cable. During installation the protective cap **MUST** be kept on at all times.



## Troubleshooting

If there are any problems during operation or installation, first check all wiring and fiber optic cable connectors for loose or faulty connections.

### 1. Wiring Check:

Set up the flow indicator unit in **Totalizer mode**, so any impulses to the indicator can be registered as an increased count. Disconnect the wire to terminal 7 on the OPTV-20. Repeatedly touch the wire to terminal 1 (+15 Volt) on the socket. If the wiring and the flow indicator are OK, there should be impulses registering on the display.

### 2. OPTV-20 Check:

The OPTV-20 can be checked by inserting the fiber optic cable from another working system and see if any impulses are registered at the flow indicator.

### 3. Fiber Optic Cable Check:

If the OPTV-20 checks out OK - the fiber optic cable can be checked with an FOP and OPTV-20 known to be in working order. Connect cable between good FOP and good OPTV-20 and wave a screwdriver or other ferrous object in front of FOP pickup nose. If OPTV-20 LED blinks, cable is good.

### 4a. FOP-20 Check:

Loosen the 3 set screws on the FOP-20 swivel connector with a 1/16" Hex key wrench and remove the FOP-20 from the flow meter. With all wires and fiber optic cables connected, move a piece of ferrous metal rapidly and repeatedly very close to the tip. If all is OK, impulses should be read on the display on the indicator. The problem then could be that the FOP-20 is not all the way into the flow meter. The end of the pickup must be touching the bottom of the hole in the flow meter. Make sure the end of the pickup is seated on the bottom of the hole in the flow meter, and secure the FOP-20 with the set screws again.

### 4b. FOP-30 Check:

Remove the FOP-30 pickup sensor from the flow meter body by removing the hex bolts using a 3 mm key wrench. With all wires and fiber optic cables connected, move a piece of ferrous metal in front of the tip of the pickup sensor. If all is OK, impulses should be read on the display on the indicator. The problem then could be that the FOP-30 is not all the way into the flow meter. Make sure the body of the pickup is seated flush against the flow meter housing before securing the FOP-30 with the hex bolts. The bolts should only be lightly tightened to prevent sensor damage.

### 5. Erratic Readings in a Charged High Voltage System

If you are experiencing erratic readings when operating in a charged high voltage system it could be due to a small transient voltage carried on the surface of the fiber optic cable. By connecting terminal 8 on the OPTV-20 to terminal 2, the metal housing on the fiber optic receiver will be grounded, and the leakage will be routed to ground. If this does not help, try to connect terminal 8 to a solid chassis ground by the OPTV-20.

### 6. Grounding the Flow Meter in a Charged High Voltage System

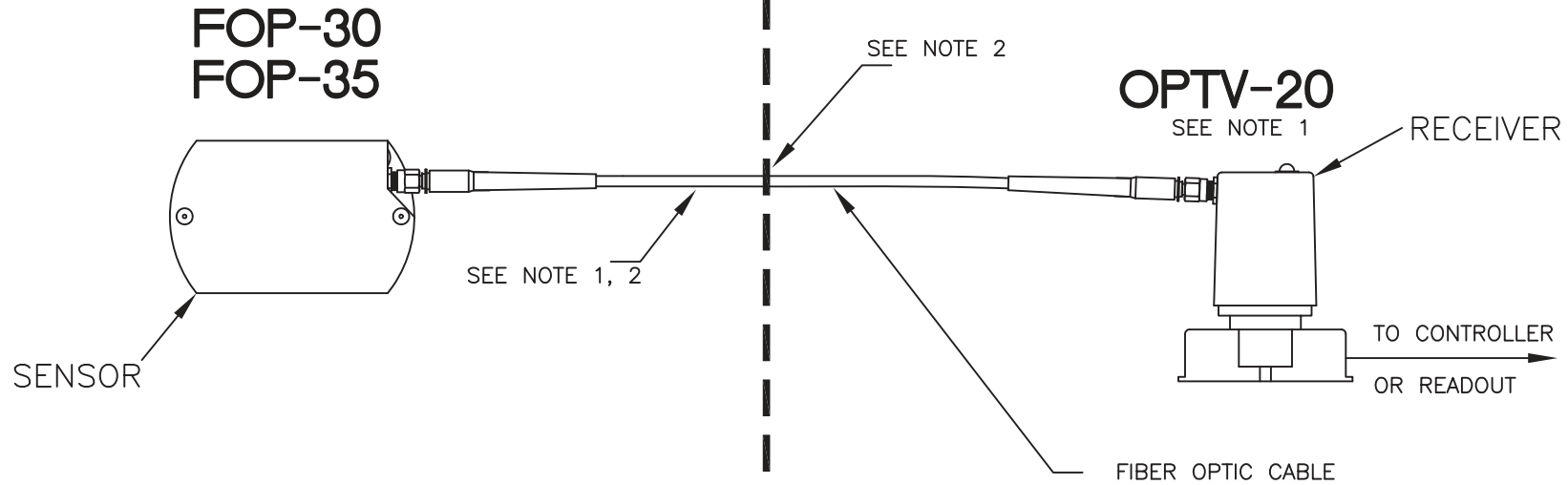
If using an electrostatic system - if possible, it is recommended to run a grounding wire to the base mount of the flow meter body.

If the problem still can not be found, please call **AW Gear Meters** for technical assistance or return authorization.

# FIBER OPTIC SYSTEM

**HAZARDOUS AREA  
CLASS I, GROUPS A, B, C, D**

**SAFE AREA**




**NOTES:**

1. SENSOR SHOULD NOT BE USED AS A FIBER OPTIC RECEIVER.
2. USE ONLY FIBER OPTIC CABLE THAT DO NOT CONTAIN ELECTRICALLY CONDUCTIVE MEMBERS FOR STRENGTH OR ELECTRICAL TRANSMISSION. USE ONLY FIBER OPTIC CABLES THAT COMPLY WITH LOCAL AND NATIONAL ELECTRICAL CODES.

**NOTES:**

1. NOT PART OF UL LISTED SYSTEM
2. BOUNDARY SEAL BETWEEN HAZARDOUS AND SAFE AREAS TO BE IN ACCORDANCE WITH ARTICLE 501-5 OF THE NATIONAL ELECTRICAL CODE OR ACCORDING TO LOCAL STANDARDS.

|      |                       |            |    |                         |             |   |  |  |  |
|------|-----------------------|------------|----|-------------------------|-------------|---|--|--|--|
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|      |                       |            |    | ENGLISH                 |             |   |  | TITLE: FIBER OPTIC SYSTEM<br>DRAWING NUMBER: FOP3301<br>DATE: 11/10/10<br>CHECKED BY: --,--  |  |
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