



*VPIF on Sealed Motor Valve*

## Specifications, Applications, Service Instructions & Parts

### VPIF Valve Position Indicator

Standard Display Monitor  
for use with  
HMMV, HMMR, HMMVC, HMMRC,  
HMXV and HMXVC

## INTRODUCTION

The Valve Position Indicator, model VPIF is a digital monitoring module added to the standard Sealed Motor Valve (SMV) product line. The VPIF monitors the valve position during normal operation and is used to recalibrate the valve after service work is performed.

The large LED display allows for viewing of the valve position (in percent) during normal operation. The VPIF contains an internal independent 4 mA and 20 mA current source, which is switch selectable for recalibration at the valve 0% 4 mA (closed) position and 100% 20 mA (full open) position.

The VPIF can be mounted on or near the valve for ease of use and visibility of the display. Often, valves are mounted high in the air or in obstructive areas where the technician cannot easily reach. The VPIF can be mounted up to 10 feet (3 meters) in any direction from the valve. VPIEC Extension Cables are available where more length is required.

## KEY FEATURES

- Versatile installation options
- Large LED display
- Corrosion resistant enclosure, NEMA 4x
- Simple SMV recalibration
- Local indication of the SMV valve position
- Uses same supply voltage as SMV
- Allows for easy removal of the VPIF from the control loop

## ADVANTAGES

In the normal operating mode the VPIF passes the 4 to 20 mA current loop signals and 24V AC to and from the SMV without signal degradation. When used for recalibration, the VPIF will output either 4 mA (fully closed) or 20 mA (fully open). A waterproof 3-position switch on the outside of the VPIF enclosure is used for recalibration of the SMV. The switch in the up position produces 20 mA; the switch in the down position produces a 4 mA signal to the valve. The calibration key must be attached to the designated location on the side of the SMV motor in order for the valve to recalibrate. After recalibration, return the switch to the middle position (automatic) and remove calibration key.

The VPIF valve position feedback can alert operators to valves controlled by an unstable control scheme. This feature is very important to the proper operation of the refrigeration system and the life of the Sealed Motor Valve. The VPIF is compact and reliable at very low temperatures. Waterproof quick disconnect connectors allow for easy removal of the SMV power head for service.

## APPLICATIONS

The VPIF may be installed on the following Sealed Motor Valves:

HMMV, HMMR, HMMVC, HMMRC, HMXV and HMXVC

## MATERIAL SPECIFICATIONS

### Electrical

Display: LED, 0.0 –100.0 %

Normal Mode: Signal pass through

Calibration Mode:

Signal Output: 4 mA or 20 mA to SMV

Power Supply: 24V AC

VPIF Power Consumption: 3.6 VA

Housing: Watertight, NEMA 4X (IP65)

Ambient Temperature: -20°F to +125°F (-30°C to +50°C)

### Mechanical

Connections: To system controller, 7 wires - marked every foot 1 thru 6 with the 7<sup>th</sup> yellow/green (Earth ground), 18 AWG wire cable with waterproof connectors, cable length of 10 feet.

## INSTALLATION

The VPIF is shipped in a box with the Sealed Motor Valve and comes factory calibrated and tested; ready to use. The VPIF can be mounted on the valve or to any flat surface. The clear cover must be removed to access the 4 plate bolts. These same 4 holes are used to mount the VPIF on a flat surface. Replace the clear cover when complete.

## WIRING INSTALLATION

Proper wiring is very important to the operation of the Sealed Motor Valve. Correct wire size for 24V AC power to the power head must be selected for the distance and number of valves. See *24V AC Power Wiring Table 1*.

The VPIF is provided with waterproof quick disconnect cables. If the VPIF is mounted on the valve, the 8' cable and the 2' cable with pigtails can be connected together for a total of 10' to the customer supplied junction box.

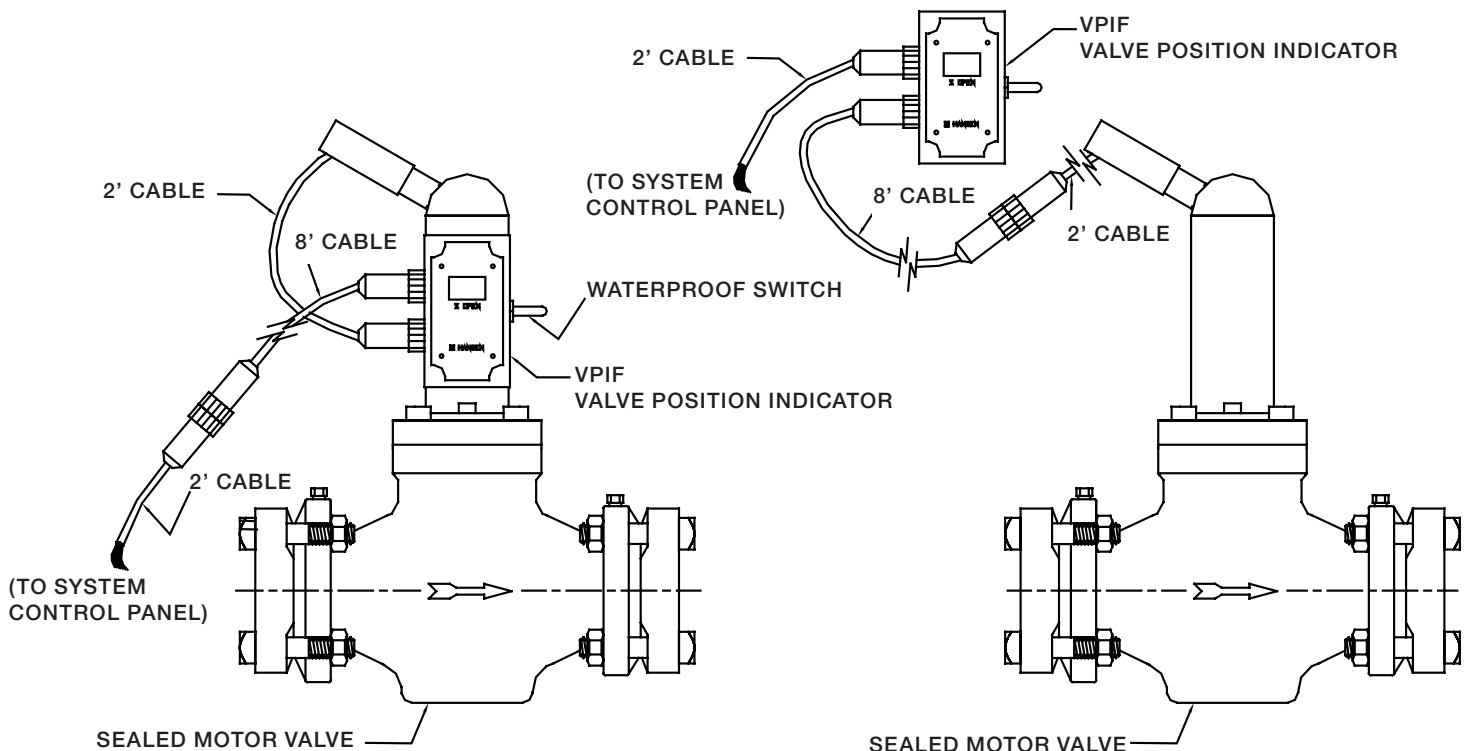
If the VPIF is mounted separately from the valve, the 8' cable is connected to the SMV power head. The VPIF can be mounted up to 10' away from the valve. For greater distances, additional 8' VPIEC Extension Cables can be connected. Refer to *Figure D*.

Table 1: 24VAC POWER WIRING

24VAC POWER WIRING (WIRES NO. 1 AND 2) (90VA PER VALVE REQUIRED)	AWG WIRE GAUGE (mm <sup>2</sup> ) NUMBER OF VALVES POWERED			
	1	2	3	4
CABLE LENGTH ft(m)				
50 (15)	18 (1,0)	16 (1,5)	14 (2,5)	12 (4,0)
100 (30)	16 (1,5)	12 (4,0)	10 (6,0)	10 (5,5)
150 (46)	12 (2,5)	10 (6,0)	8 (8,5)	8 (8,5)
200 (61)	12 (4,0)	10 (6,0)	8 (8,5)	
300 (91)	10 (6,0)	8 (8,5)		

## TYPICAL INSTALLATION

Figure A

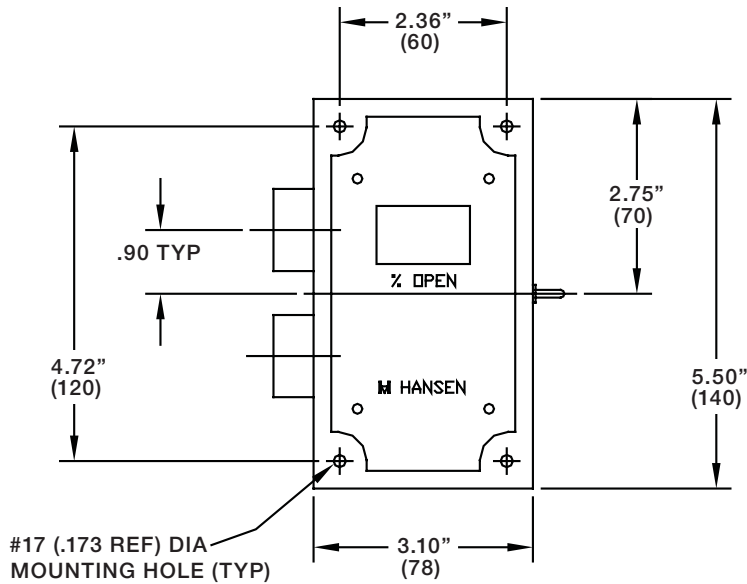


MODEL: VPIF, MOUNTED ON VALVE

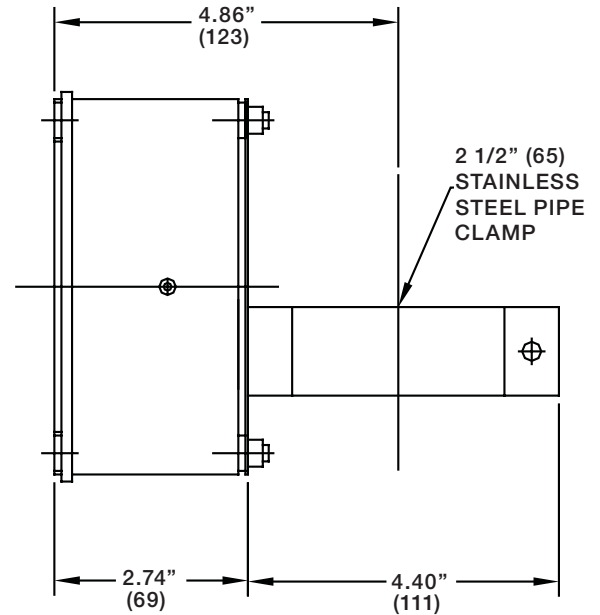
MODEL: VPIF, MOUNTED EXTERNALLY

## VPIF INSTALLATION DIMENSIONS, INCH (MM)

Figure B



**VPIF FIELD MOUNTED**



**VPIF MOTOR MOUNTED**

### RE-CALIBRATION INSTRUCTIONS FOR HMMV, HMMR, HMXV, HMMVC, HMMRC, AND HMXVC\*

Hansen Sealed Motor Valves are factory calibrated, and hold their calibration during shipment, power outages, etc. Valve disassembly or manual opening with the MOVT (Manual Operation Valve Tool) does require subsequent recalibration, therefore after removing or replacing the 4-20 mA motor of a Sealed Motor Valve, recalibrate the valve. Recalibration synchronizes the control input with the valve position; that means, for example, a 12 mA input (50%) would result in the valve moving to the half-open position.

Recalibration requires the ability to control the 4-20 mA control input to the motor between four and twenty milliamps, and requires the ability to allow the valve to stroke fully open and closed. For valves shipped after July 4, 2006, or retrofitted valves with VPIF, the 4 mA and 20 mA signal to calibrate the valve is part of the function of the VPIF. If the valve is not equipped with a VPIF, then the 4 mA and 20 mA to calibrate must come from the computer or separate signal generator. Only qualified refrigeration service personnel should perform this procedure, and proper precautions taken to prevent a hazardous or undesirable occurrence resulting from operating the valve from open and closed.

1. Secure the refrigeration system to allow the valve to open and close fully without causing undesirable system problems to occur.
2. Mount and secure the motor on the sealed motor valve. Connect electrical wiring in accordance to the valve and controller manufacturers specifications.

3. Install "Calibration Key" over 'X' on side of motor and secure with strap.
4. Increase the control input to 20 mA or slightly greater. Move VPIF switch to up position. Maintain at least 20 mA for at least two minutes. This will give the valve time to move to the wide open position and calibrate its position. Note: some computer control systems have lag times before the control input is sent to the valve. (Using "System Feedback Mode").
5. Decrease the control input to 4 mA or less. Move VPIF switch to down position. Maintain 4 mA or less for at least two minutes. This will give the valve time to move to the completely closed position and calibrate its zero point.
6. Again increase the control input to at least 20 mA. Move VPIF switch to up position. Maintain at least 20 mA for at least two minutes. This will give the valve time to move to the wide open position and set its span.
7. The valve should now be calibrated and in the wide open position.
8. Remove "Calibration Key" and store. The valve will operate satisfactorily if the "Calibration Key" remains over the "X", but the valve will recalibrate each time the control input is at 4 mA or 20 mA for more than the two minutes.
9. Return control system to automatic operation. Place VPIF switch in middle position.

## THE 3 MODES OF OPERATION

There are 3 feedback options for the feedback circuit. To change the setting, the VPIF must be opened and manually set to the proper system requirements. Improper settings can result in damage to the system controller and/or VPIF.

The VPIF is shipped from the factory with the jumper in the "Independent Feedback Mode".

- 1) **Independent Feedback Mode** – use when the local recalibration of valve position is made with the 24V DC control loop disconnected from the system PLC controller or main computer. An isolated 4-20 mA power supply in the VPIF is used to power the feedback loop at the SMV. This allows for the valve percent open position to display on the VPIF LED display only during calibration. This mode can verify feedback output is correct when the computer feedback loop is disconnected. Jumper locations 2 and 3.
- 2) **Local Feedback Mode** – use when the valve position feedback loop is not used by the system computer or PLC. A 4-20 mA power supply internal to the VPIF is used to power the feedback loop to the SMV. This allows for the valve percent open position to display on the VPIF LED display in both the automatic and recalibration operation. Jumper locations 1 and 2.
- 3) **System Feedback Mode** – use when the 24V DC feedback loop is loop powered from the system computer or PLC. The 4-20 mA feedback loop is always connected to the system controller or PLC. The VPIF internal isolated 4-20mA loop supply is not used. The valve percent open position is displayed on the VPIF LED display and also at the computer display or PLC during automatic operation and during VPIF recalibration. Jumper removed. Place on one post for future use.

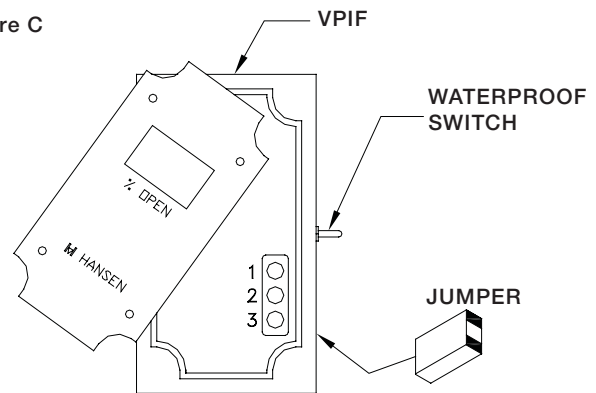
## PROCEDURE FOR CHANGING THE FEEDBACK MODE OF OPERATION

Tools required: 2mm hex key, Phillips head screwdriver and needle nose pliers.

To change the feedback mode, move the 2-position jumper to the appropriate setting. Take care not to touch the electronic components as static electricity may damage the electronic circuits.

1. Remove power and control signal lines from the VPIF by removing the external connector label "TO CONTROLLER".
2. Remove the clear cover from the VPIF.
3. Remove the black acrylic plastic plate by removing the 4 button head hex keyed screws. Use a 2 mm hex key.
4. Rotate the bottom of the plastic plate to the left. Only lift the plate enough to clear the side of the housing. Refer to Figure C.
5. Use needle nose pliers to make the required changes.
6. Assemble unit in reverse order.

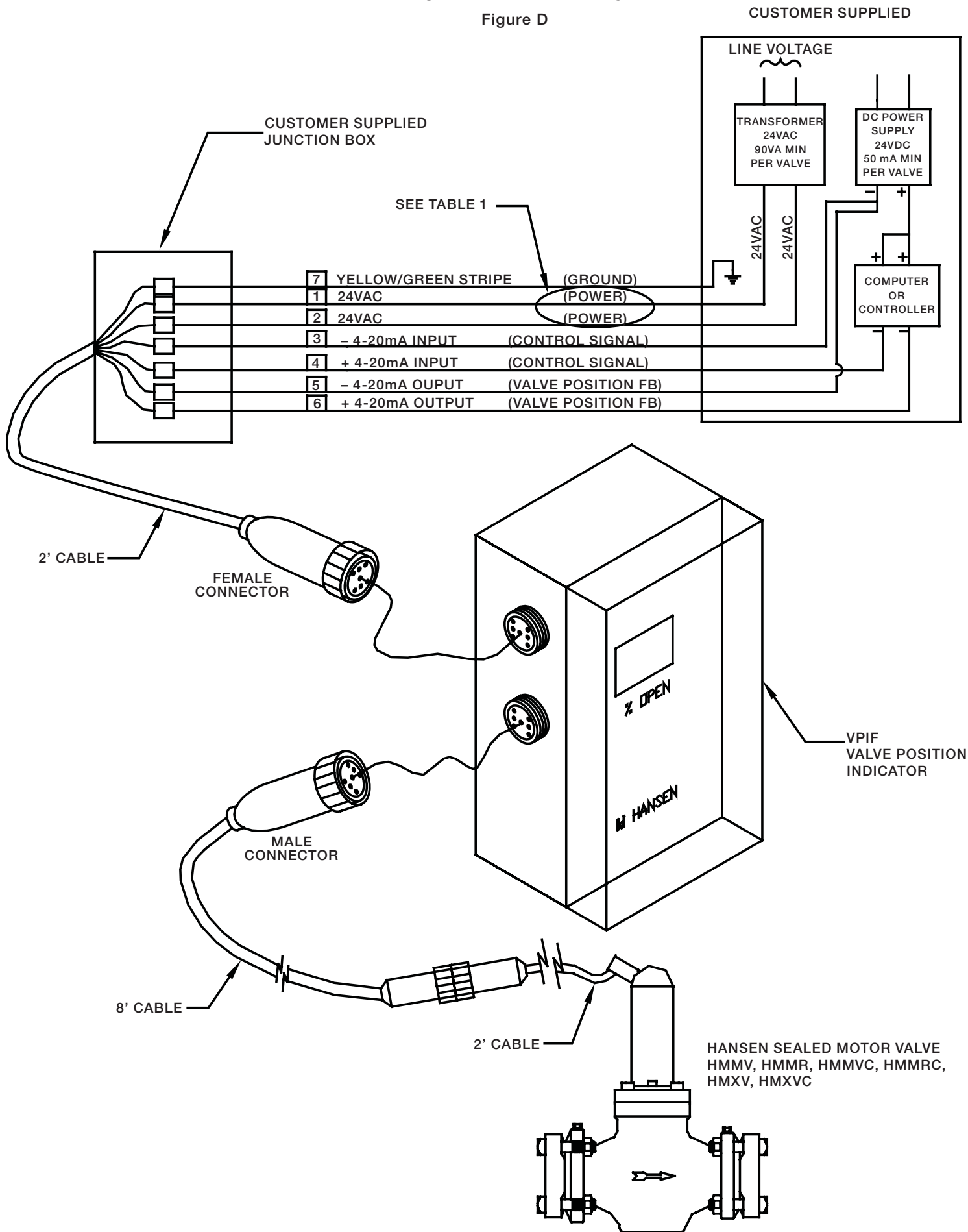
Figure C



INDEPENDENT FEEDBACK MODE: JUMPER ON PINS 2-3 (STANDARD)  
LOCAL FEEDBACK MODE: JUMPER ON PIN 1-2  
SYSTEM FEEDBACK MODE: NO JUMPER CONNECTION. PLACE JUMPER ON ONE POST FOR FUTURE USE.

# MODEL: VPIF WIRING

Figure D



## RETRO-FIT KITS FOR EXISTING SEALED MOTOR VALVE INSTALLATIONS

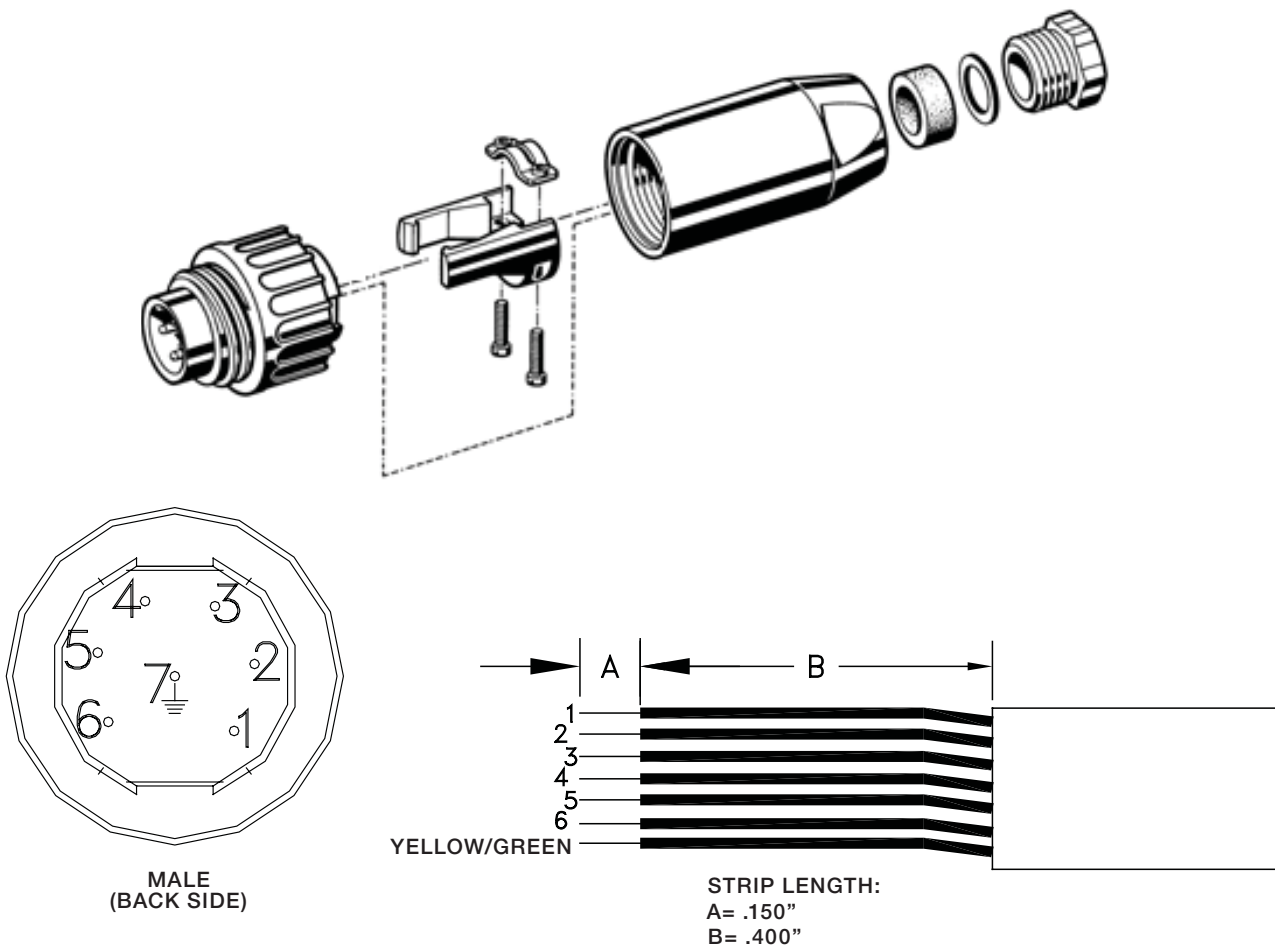
Retro-fit Kits are available to add the VPIF to existing Sealed Motor Valve installations. Kit number 75-1210 includes the VPIF, cables and junction box with wire nuts. The VPIF is simply spliced into the existing wiring. All wires are numbered each foot to aid in correct wire connections.

For those who want a quick disconnect connector on the Sealed Motor Valve power head, Kit number 75-1211 includes a field solder male cable connector. See *Figure E* for the correct terminal.

### VPIF FIELD SOLDERED CABLE CONNECTORS

(For 75-1211 VPIF Retro-fit Kit)

Figure E



- 1) EACH WIRE HAS A NUMBER IDENTIFIER (1-6). GROUND (YELLOW/GREEN) TO #7 PIN.
- 2) MATCH UP EACH WIRE TO ITS CORRESPONDING CONNECTOR POSITION AND SOLDER.

## TROUBLESHOOTING GUIDE FOR VPIF

<b><i>Problem/Complaint</i></b>	<b><i>Check/Solution</i></b>
Valve stuck	<ul style="list-style-type: none"> <li>- Wire size/gauge too small</li> <li>- Supply power not adequate</li> <li>- Cable connectors wired incorrectly</li> <li>- Check signal polarity - #3 and #4, #5 and #6 wires</li> <li>- Excessive dirt in valve</li> </ul>
No Valve Position Feedback	<ul style="list-style-type: none"> <li>- Check 24V DC power supply</li> <li>- Check signal polarity - #3 and #4, #5 and #6 wires</li> <li>- Cable connectors wired incorrectly</li> <li>- Check VPIF calibration switch in the NORMAL position</li> <li>- VPIF in the Local Feedback Mode</li> </ul>
No visual data on LED Display	<ul style="list-style-type: none"> <li>- Check 24V AC supply power is good (+/-5%)</li> <li>- Cable connectors wired correctly</li> </ul>
Valve % open span is very limited	<ul style="list-style-type: none"> <li>- Recalibrate SMV</li> </ul>
VPIF indicates % open greater than 100.0%	<ul style="list-style-type: none"> <li>- Recalibrate SMV</li> <li>- +/- 3% is within tolerance</li> </ul>
VPIF indicates % open less than 0.0%	<ul style="list-style-type: none"> <li>- Recalibrate SMV</li> <li>- +/- 3% is within tolerance</li> </ul>
VPIF LED Display value is greater than or less than what is indicated by the system controller or PLC	<ul style="list-style-type: none"> <li>- If reading between the 2 devices are within +/- 3%, this is normal</li> </ul>
System computer or PLC displays open for SMV valve position feedback	<ul style="list-style-type: none"> <li>- VPIF configured in wrong feedback mode</li> <li>- Cable connectors wired incorrectly</li> <li>- Check signal polarity - #3 and #4, #5 and #6 wires</li> </ul>
VPIF % open 10 <sup>th</sup> position is not stable	<ul style="list-style-type: none"> <li>- +/- 3% is within tolerance</li> </ul>
VPIF % open is not stable	<ul style="list-style-type: none"> <li>- Check wiring is sufficient size for the distance from 24V AC power supply and number of valves connected to the 24V AC power supply</li> <li>- Check 24V AC power source</li> <li>- System controller or PLC operation is erratic</li> <li>- RFI/EMI interference</li> </ul>

## CAUTION

The VPIF is designed for use with the SMV only. Read these instructions and related safety precautions before selecting, using, or servicing these devices.

## WARRANTY

Hansen electrical and electronic parts are guaranteed against defective materials and workmanship for 90 days F.O.B. our plant. All other components are guaranteed for one year F.O.B. our plant. No consequential damages or field labor is included.

## WARNING

As with all electronics and mechanical components, there is a limited life expectancy. An expected life of seven to ten years is typical. This should be understood as only a suggested replacement time period. Actual ambient conditions, contaminants, quality of electric current, voltage, etc., may necessitate a different replacement schedule. Regardless, the VPIF should be inspected at least annually to ensure their safe and continuous service. See also Safety Precautions in the current List Price Bulletin and the Safety Precautions Sheet supplied with the product.

## ORDERING INFORMATION

VPIF VALVE POSITION INDICATOR	
CATALOG NUMBER	DESCRIPTION
VPIF	Valve Position Indicator (VPIF) Monitor for SMV Models with 4-20mA (less cables & bracket)
VPIEC	8' Extension Cable
75-1210	VPIF Retro-fit Kit includes VPIF, 2 cables and junction box
75-1211	VPIF Retro-fit Kit includes VPIF, cable and solder quick disconnect cable connector

# HANSEN

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