

## Product Data Sheet

SD 4101-2E05

September 2011

Damcos® VPI

# VPI - Valve position indicator



## General Description

Basically the valve position indicator is a precision gear motor with a display indicating the flow of a certain oil volume through the unit. The gear wheels rotate according to flow and flow direction of the fluid. A built-in mini gear box with a gear ratio chosen to suit the actuator displacement in question transfers the gear motor movement to the indicator shaft. There is no mechanical connection between the gear motor and the indicator shaft.

The rotary movement of the hydraulic gear wheels is transferred to the indicator shaft by a magnetic clutch. This eliminates possible external leakages. An indicator arrow moves within a scale angle which is adjustable between 75° and 200°. A small indicator disc (flow indication) mounted firmly on the indicator shaft serves as leakage indicator.

## Versions

The VPI indicator is available in 5 versions:

VPI-V: Visual indication

VPI-E: Visual + electrical open/closed indication (switches)

VPI-C: Visual + electrical analog (potentiometer) indication

VPI-CE: Double electrical function C+E

VPI-EE: Double electrical function E+E

Special versions may be mounted in Ex area and are equipped with cable.

## Material

Housing:	ALMgSi 1.0 Anodized or Ms58, CuZn39Pb3
Screws:	A4-70 and 12.9 or A4-80
Seals:	NBR ~ Acrylonitrile Butadiene
Sight glass:	PMMA
Weight:	Approx. 1.2 kg ~ 2.7 lb
Top part/indicator:	PPS, POM

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Process Management

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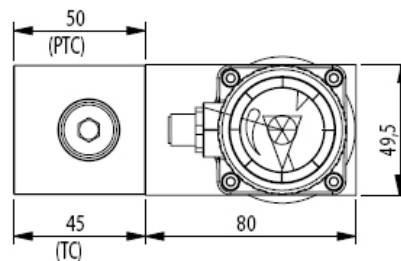
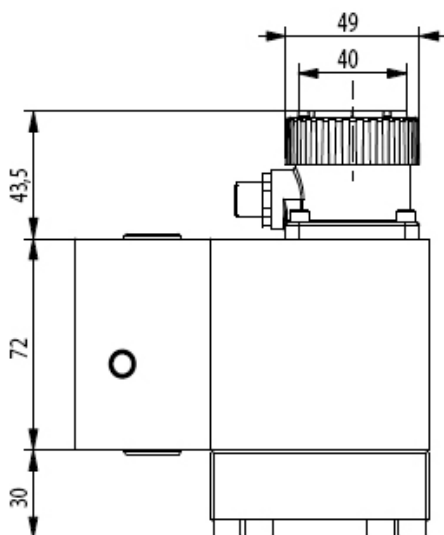
## Technical specifications

Max. working pressure:	135 bar ~ 1958 lbf/in <sup>2</sup>
Test pressure:	225 bar ~ 2973 lbf/in <sup>2</sup>
Burst pressure:	> 525 bar ~ 7615 lbf/in <sup>2</sup>
Temperature range:	-20°C to 80°C ~ -4°F to 176°F
Viscosity range:	15-200cSt
Filtration requirement:	25 µm nominal
Hydraulic medium:	Acid-free hydraulic oil
Max. flow:	100 cm <sup>3</sup> /sec ~ 6 l/min
Min. flow:	3 cm <sup>3</sup> /sec ~ 0.2 l/min
Connection face:	DIN 24 340 Cetop-3 / VPI connection
Insulation class:	IP 68, 3 bar 24 hours

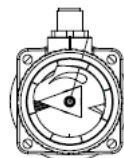
## Operating Restrictions

Flushing of control lines must never take place through the VPI.

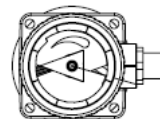
## Main Dimensions



Bottom mounting  
CFG1



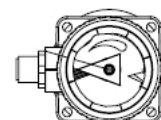
Left mounting  
CFG2



Top mounting  
CFG3



Right mounting  
CFG4



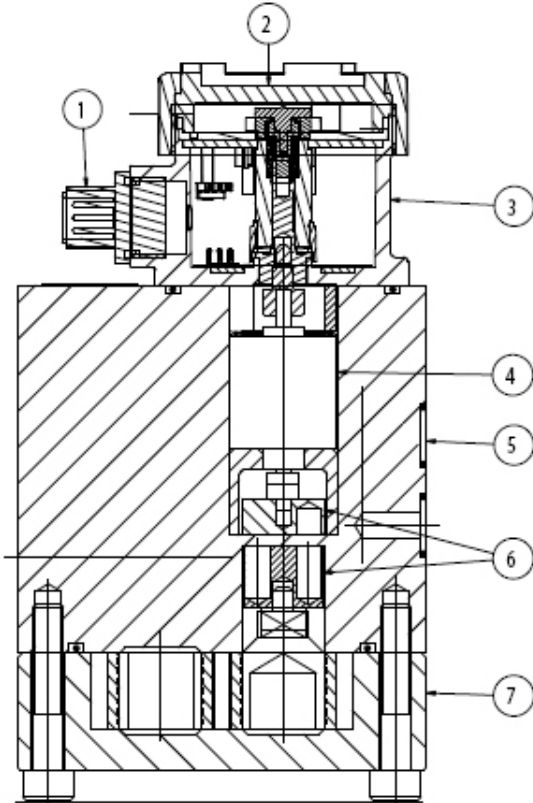
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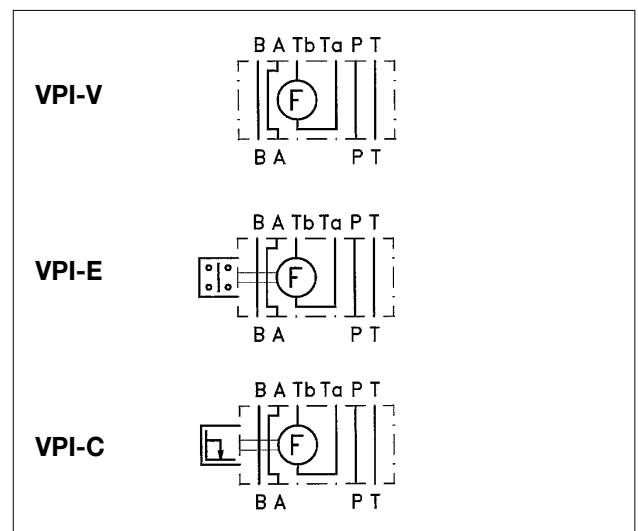
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## Main Layout and Hydraulic Symbol



1. Connection plug
2. Visual indication
3. Top part containing electrical parts
4. Gear box
5. Housing with CETOP 3 mounting surface
6. Magnetic clutch
7. Bottom part with gear motor



## Choice of Gear Box

Measuring range				Gear
cm <sup>3</sup>		in <sup>3</sup>		
From	Up to	From	Up to	Ratio 1:
15	25	0.9	1.5	0015
25	40	1.5	2.4	0025
40	70	2.4	4.3	0040
70	100	4.3	6.1	0060
100	170	6.1	10.4	0100
170	260	10.4	15.9	0150
260	430	15.9	26.2	0250
430	700	26.2	42.7	0405
700	1250	42.7	76.3	0720
1250	2200	76.3	134.2	1280
2200	3500	134.2	213.2	2000
3500	5600	213.5	341.6	3125
5600	11000	341.6	671.0	6103

Measuring range for VPI-PTC:

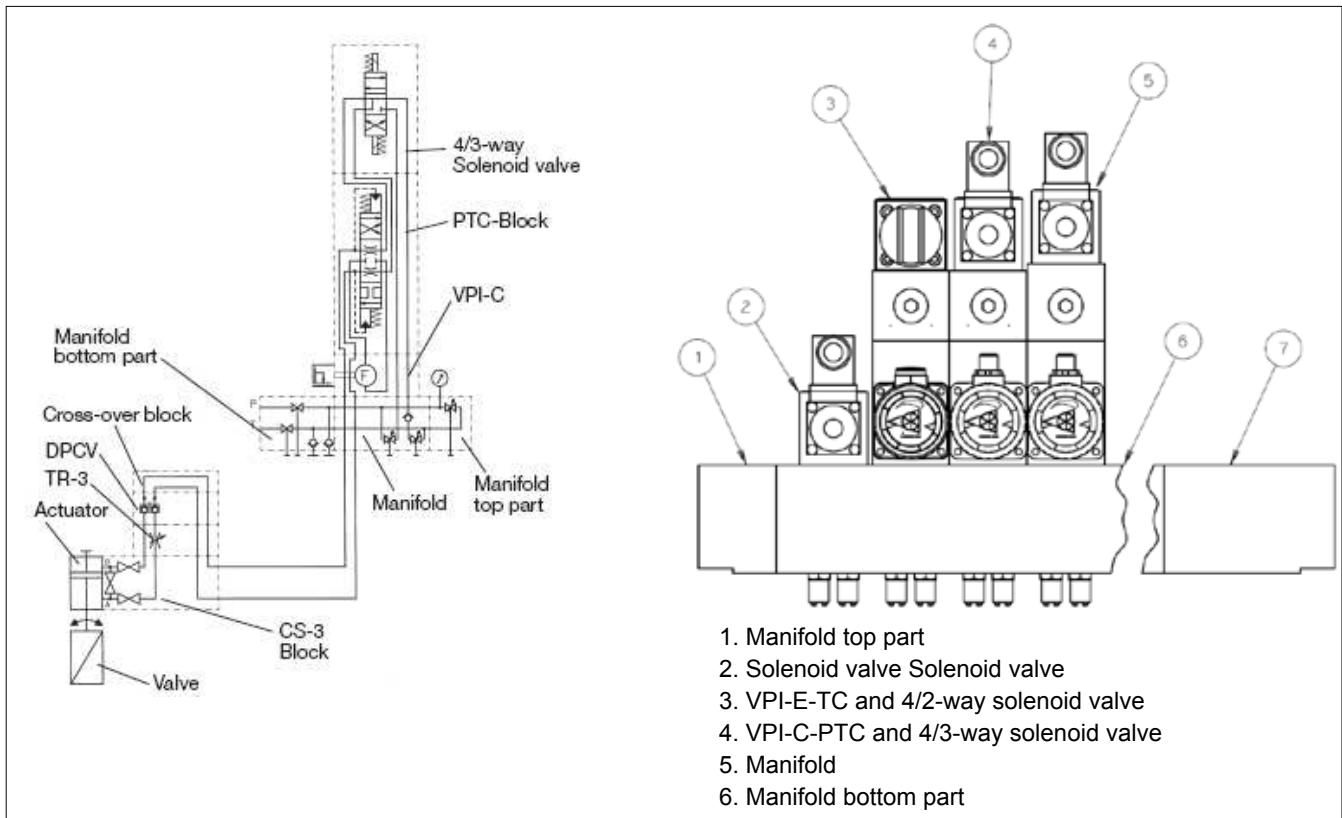
– Actuator displacement

Measuring range for VPI-TC:

– Actuator displacement + compression of oil  
(1-1.5% of pipe volume)

Pipe size	Pipe volume each 10 metres		Compression volume each 10 metres	
	cm <sup>3</sup>	in <sup>3</sup>	cm <sup>3</sup>	in <sup>3</sup>
Ø6	282.7	17.6	4.24	0.26
Ø7	384.8	23.5	5.77	0.35
Ø8	506.6	30.9	7.54	0.46
Ø9	636.0	38.8	9.54	0.58
Ø10	785.0	47.9	11.78	0.72

## Typical Application and VPI combinations on manifold



### VPI-V

This indicator is only used for visual indication of the valve position. It is normally used with TC-block and

4/2 way manual pilot valve. VPI-V can be used with PTC-block and 4/3 way valve.

### VPI-E

This indicator is used for visual and electric (ON/OFF) indication of the end positions of the valve (open/closed). The VPI-E is normally used with TC-block, but VPI-E can also be used with PTC-block.

VPI-E is available with »normally open« switches, but can as a variant be supplied with »normally closed« switches.

### VPI-C

4/3 way manual pilot valve. VPI-C can be used with PTC-block and 4/3 way valve, when the intermediate positions of the valve is required.

VPI-C can also be used with TC-block and 4/2 way valve.

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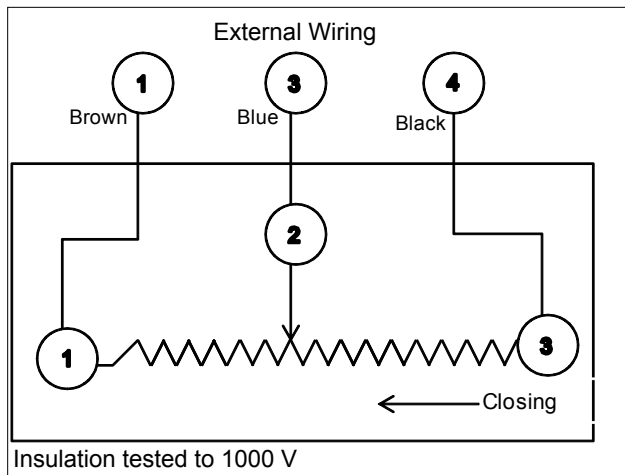
## VPI-C

### Signal processing:

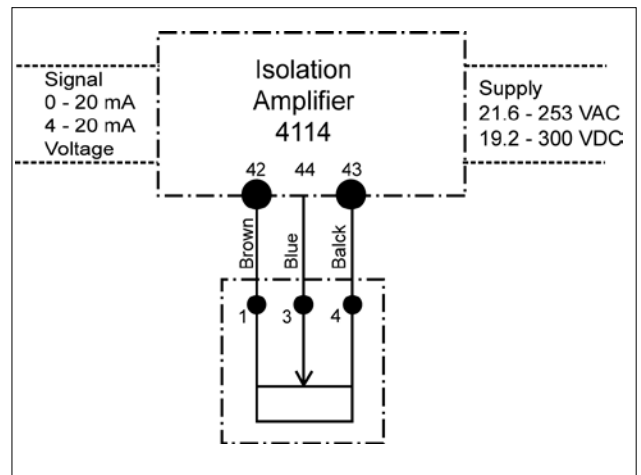
For transforming the potentiometer signal into a standard 4 - 20 mA signal we recommend the PR. Note that the VPI-C should always be used as a voltage-divider, with negligible current in the wiper.

Isolation Amplifier 4114.  
Input configured to POTM.

### Terminal Layout:



### Hook-up:



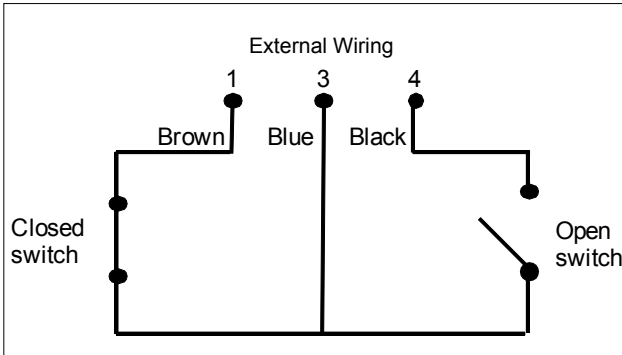
### User data:

Max. continuous load:	0.2 W (VA)
Max. peak load:	1 W (VA)
The normal approx. output range:	15% in closed position and between 42% and 85% in open position.
The open position signal	is dependent on the choice of gear box size.
Standard Resistance Values:	2 K $\Omega$
Total Resistance Tolerance:	+/- 20%
Independent Linearity Tolerance:	+ 5%
Resolution:	Essentially infinite
Output smoothness:	< 0.1%
Insulation Resistance:	> 1.000M $\Omega$ at 500V.D.C
Dielectric Strength:	1 min. at 500V.D.C.
Resistance Temp. Coefficient:	+ 400 ppm/ $^{\circ}$ C
Environmental Performances	
Operating Temp. Range:	-25 $^{\circ}$ C to +85 $^{\circ}$ C
Vibration:	10Hz to 2,000Hz 15G. Total resist. value var. < +2%

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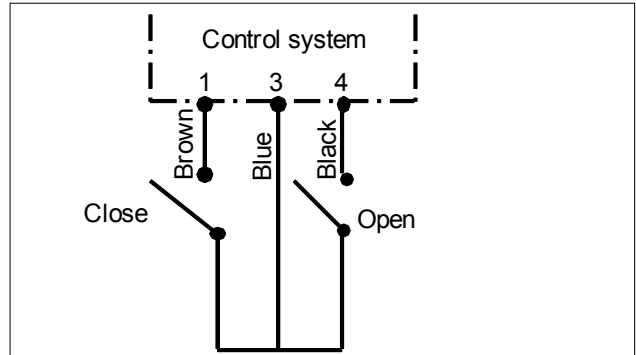
## VPI-E

### Terminal Layout:



Switches shown in closed valve position. Max. cont. load 2.5 W. Insulation tested to 1000 V.

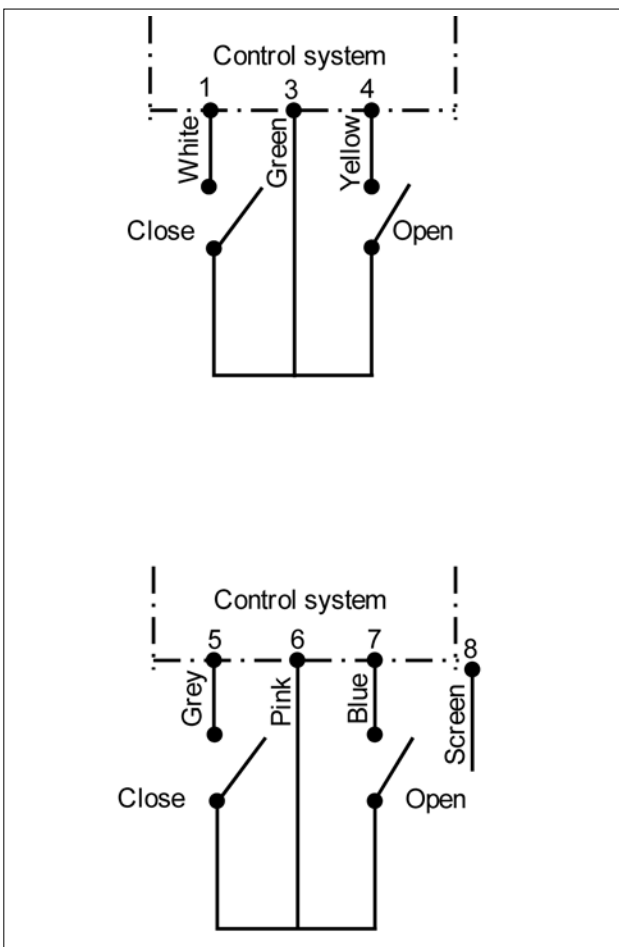
### Hook-up:



Computer, I.S. control or direct connected lamps or relays.

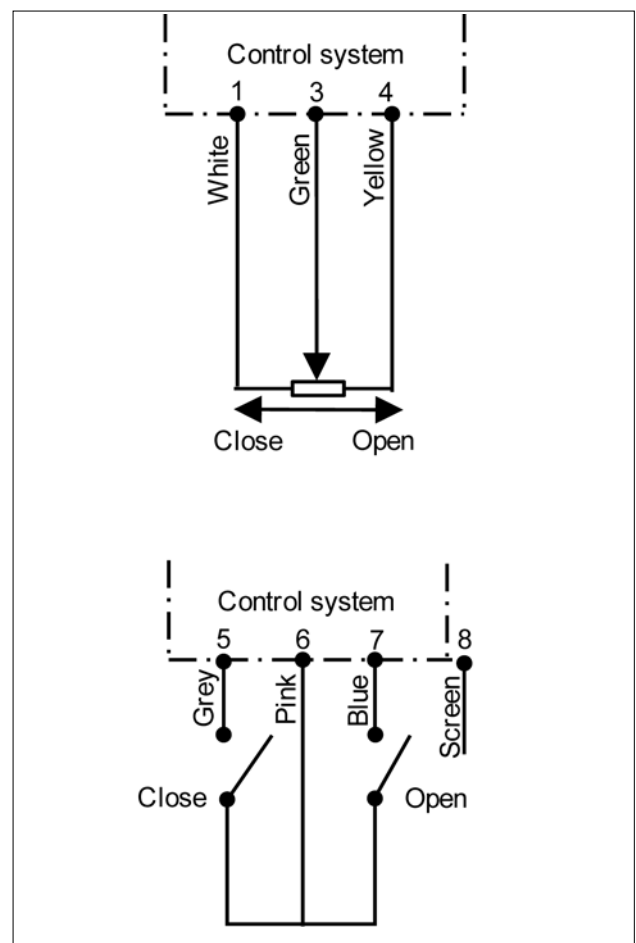
## DVPI-EE

### Hook-up:



## DVPI-CE

### Hook-up:



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## Application

The VPI is designed to indicate the position of hydraulically actuated valves and the indicator arrow in the display will move from fully open to fully closed or vice versa when a volume equal to the actuator displacement passes through the unit.

Observe the min. and max. flows when dimensioning a hydraulic system including VPI indicators. Also observe the various factors influencing the accuracy and reliability of this in-direct position indication method.

Manufacturer's data of microswitches:

Contact material:	Gold alloy X-point
Operating force:	1,5 N
Electrical rating:	100mA / 60 VAC
Life expectancy:	10 <sup>6</sup>
Max. temp:	85°C.

## Connection Plug data

Standard cables are with hotmelt mounted plugs. Plugs delivered with VPI for spareparts accept  $\varnothing 4$  to  $\varnothing 8$  mm cable up to 1.5 mm<sup>2</sup>

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