



PARTS-, SPARE PARTS, & MATERIAL LIST

COMPONENT TYPE & VERSION

SHEET OF

CONTROL COMPONENTS
TMT 16/75 MR

ISSUE

x

Notes: All items with stated ID nos. can be purchased as spare parts.
When ordering spare parts -state ID no.

DATE

BY

CHECK

↓

DRAWINGS REFERRED TO:

95,04,03

A.S.C

DRAWING NO.

REF

DESCRIPTION

a

CONTROL COMPONENTS TMT 16/75 MR

b

c

d

ITEM

Nos. of
Capital
letters

REF

ID NO

PARTS DESCRIPTION

QTY

MATERIAL

1	045-3201	ASSEMBLY SET SINGLE (75MM)	4	AL
2	035B3801	MANIFOLD BLOCK 8DEL. (75MM)	2	AL
3	032D3952	END BLCOK (RIGHT)	2	
4	032D6571	END BLCOK (LEFT)	2	
5	051-9221	PHS PIPE BLOCK	2	BS
6	380-0605	PRESSURE GAUGE	1	
7	331-0004	NEEDLE VALVE	1	
8	232-0722	THREDED BUSHING	60	
9	037-4321	NON-RETURN VALVE	15	
10	037-9414	BOTTOM PART FOR HPR	15	
11	045-0261	TOP PART FOR HPRO2 (MOUNT. 2)	7	
12	045-0281	TOP PART FOR HPRO2 (MOUNT. 4)	8	
13	053-2521	THROTTLE BLOCK	15	
14	344-1802	4/2WAY SOLENOID VALVE (DETENT)	15	
15		STEEL PIPE ϕ 12 x 2.0t		
16		STEEL PIPE ϕ 10 x 1.5t		
17	032-1502	BLANK PLATE	1	



HPR 01, 02, 03

IP 44

Hydraulic Position Indicators

A1

Versions:

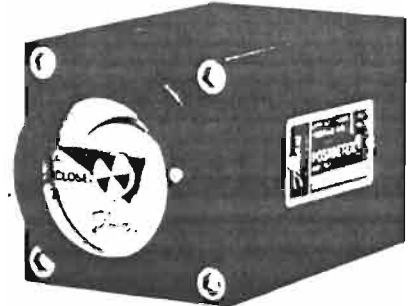
The HPR is available in 3 versions

- HPR 01: Visual indication
- HPR 02: Visual + electrical open/closed indication (switches)
- HPR 03: Visual + electrical analog (potentiometer) indication

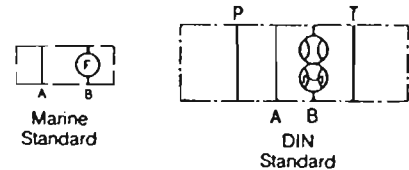
Note: On request the HPR can be delivered in sea-water resistance brass MS 58.

Hydraulic Data:

Max. working pressure:	115 bar ~ 1667 lbf/in ²
Test pressure:	180 bar ~ 2609 lbf/in ²
Burst pressure:	495 bar ~ 7175 lbf/in ²
Temperature range:	+20°C to 80°C ~ +4°F to 176°F
Viscosity range:	15-200cSt
Filtration requirement:	30 µm nominal
Hydraulic media:	Acid-free hydraulic oil
Max. flow:	100 cm ³ /sec ~ 6.1 in ³ /sec, (6 l/min)
Min. flow:	5 cm ³ /sec ~ 0.3 in ³ /sec, (0.3 l/min)
Connection face:	DIN 24340 Cetop 3

HPR 01


Hydraulic Symbol:



Materials: (excl. cable gland)

Housing, topcover and bottom member:	ALMgSi 0.5, anodized
Screws, sign plates and rivets:	AISI 304
Connection housing (HPR 02/03):	ALMgSi 0.5, anodized
Seals and friction elements:	NBR ~ Acrylonitrile Butadiene
Sight glass:	PMMA

General Description:

Basically the hydraulic position indicator is a precision oil gear motor with a display indicating the passing of a certain oil volume through the unit.

The gear wheels rotate according to flow and flow direction of the passing fluid. A built-in mini-gearbox with a gear ratio chosen to suit the displacement in question transforms gear motor movement to the indicator shaft. An indicator arrow is mounted on the indicator shaft by means of a friction clutch in order to obtain automatic end stop correction.

The arrow moves within a scale angle that is adjustable between 75° and 185° (volume indication).

A small indicator disc (flow indication) mounted firmly on the indicator shaft serves as leakage indicator.

Application:

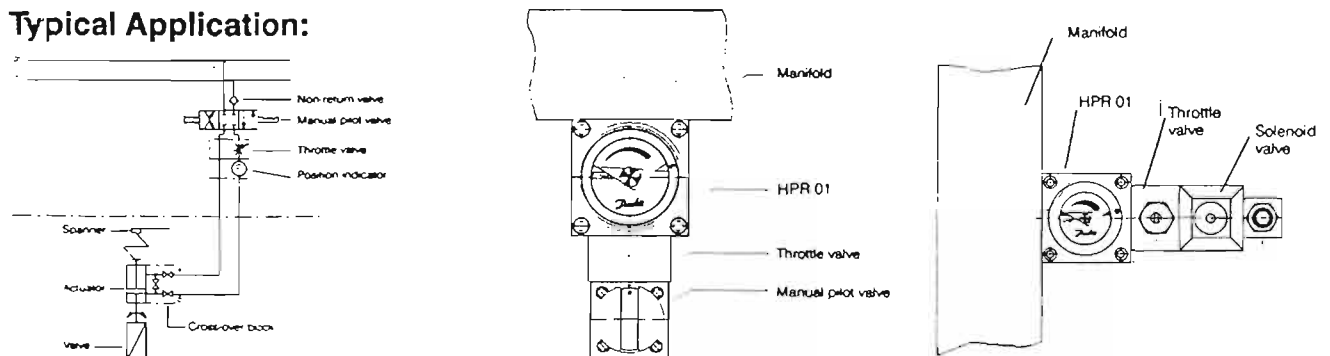
The HPR is designed to indicate the position of hydraulically actuated valves and ideally its indicator arrow should move from fully open to fully closed or vice versa when a volume equal to the actuator displacement passes through the unit.

Observe the min. and max. flows when dimensioning a hydraulic system including an HPR.

Also observe the various factors influencing the accuracy and reliability of this indirect position indication method. The compression of the hydraulic medium during operation of the actuator is the most important of these factors that are described in technical sheet no. 4000 - 3E01.

Throttle valve must be incorporated in the hydraulic control system and should be mounted next to the HPR.

Typical Application:



Operating Restrictions: Flushing of control lines must never take place through the HPR.

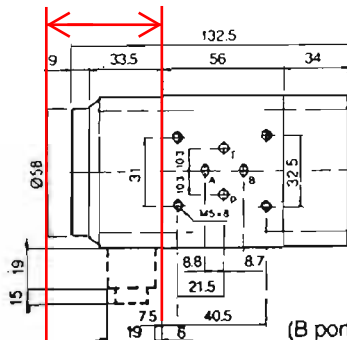
HPR 01, 02, 03

IP 44

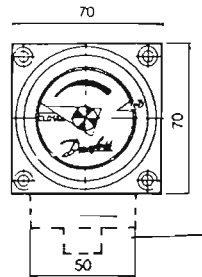
Hydraulic Position Indicators

A1

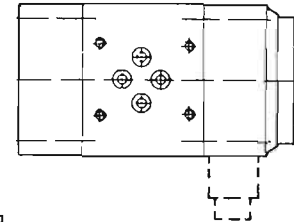
Main Dimensions:



(B port = measuring port)



Note: The top (indicator) part of the HPR can be mounted in any one of 4 possible positions in relation to the main body.



For HPR 02 & 03:
Connection housing
Cable gland

Total dry weight: HPR 01 = 1.6 kg
HPR 02 = 1.8 kg
HPR 03 = 2.0 kg

HPR 02	<h3>Terminal Layout</h3>	<h3>Hook up</h3> <p>Computer or I.S. Control</p>	<h3>Manufacturers data for microswitches</h3> <p>Contact material silver (inlay) Operation force (g max) 140 g Electrical rating 5A 250 VAC Life expectancy min. 100,000 Electrical rating 5A 30 VDC Life expectancy min. 200,000</p>
	<p>User data Max. continuous load: 5A 30 VDC Max. peak load: 5A 30 VDC</p>	<p>Direct connected to lamps or relays</p>	

HPR 03	<h3>Terminal Layout</h3>	<h3>Signal processing</h3> <p>For transforming the resistance signal into a standard 4 - 20 mA signal we recommend the DSH Isolation Amplifier 2204.</p>	<h3>Manufacturers data for potentiometers.</h3> <table border="1"> <tr><th colspan="2">Electrical Characteristics</th></tr> <tr><td>Resistance Range</td><td>2 K Ω</td></tr> <tr><td>Resistance Tolerance</td><td>± 10%</td></tr> <tr><td>Linearity (Independent)</td><td>± 1.0%</td></tr> <tr><td>Resolution</td><td>Essentially infinite</td></tr> <tr><td>Effective Electrical Angle</td><td>340° ± 3°</td></tr> <tr><td>End Voltage</td><td>0.5% max.</td></tr> <tr><td>Output Smoothness</td><td>0.1%</td></tr> <tr><td>Power Rating</td><td>70°C 1.0 W 125°C 0 W</td></tr> <tr><td>Dielectric Strength</td><td>Sea Level 50 V - min.</td></tr> <tr><td>Insulation Resistance</td><td>500 V 1000 Meg. Ω min.</td></tr> <tr><th colspan="2">Environmental Characteristics</th></tr> <tr><td>Vibration</td><td>15 G</td></tr> <tr><td>Wiper Bounce</td><td>0.1 millisecc. max.</td></tr> <tr><td>Shock</td><td>50 G</td></tr> <tr><th colspan="2">Mechanical and Physical Characteristics</th></tr> <tr><td>Backlash</td><td>0.1° max.</td></tr> <tr><td>Rotational Life, shaft revolutions</td><td>20,000,000</td></tr> <tr><td>Torque, Starting and Running</td><td>0.25 oz.-in. max.</td></tr> <tr><td>Ball Bearings</td><td>Front and rear</td></tr> </table>	Electrical Characteristics		Resistance Range	2 K Ω	Resistance Tolerance	± 10%	Linearity (Independent)	± 1.0%	Resolution	Essentially infinite	Effective Electrical Angle	340° ± 3°	End Voltage	0.5% max.	Output Smoothness	0.1%	Power Rating	70°C 1.0 W 125°C 0 W	Dielectric Strength	Sea Level 50 V - min.	Insulation Resistance	500 V 1000 Meg. Ω min.	Environmental Characteristics		Vibration	15 G	Wiper Bounce	0.1 millisecc. max.	Shock	50 G	Mechanical and Physical Characteristics		Backlash	0.1° max.	Rotational Life, shaft revolutions	20,000,000	Torque, Starting and Running	0.25 oz.-in. max.	Ball Bearings	Front and rear
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<p>User data Max. continuous load: 1.0 W (VA) Max. peak load: 5 W (VA) The normal approximate output range is 100 Ω - 1000 Ω for a 0-90° rotation of the indicator arrow.</p>	<h3>Hook up</h3> <p>For Amplifier Control</p> <p>For Processing Control</p>																																										

Cable Gland Data:

Cable outer diam.	: 7 - 10 mm
Insulation class	: IP 65
Thread	: PG 9
Material	: Nickel plated brass
Seal material	: NBR