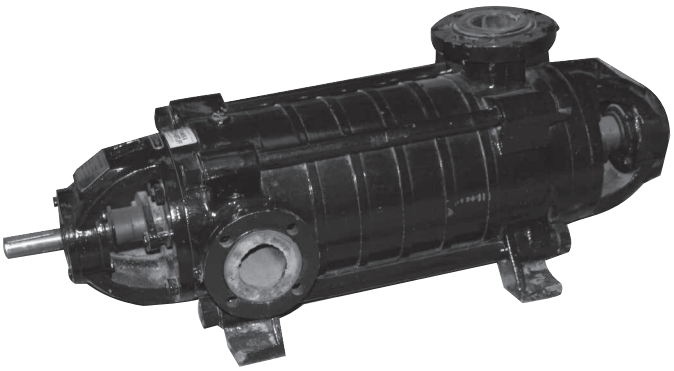
DAYLIFF

DMS
Multistage Centrifugal Pumps



Installation & Operating Manual

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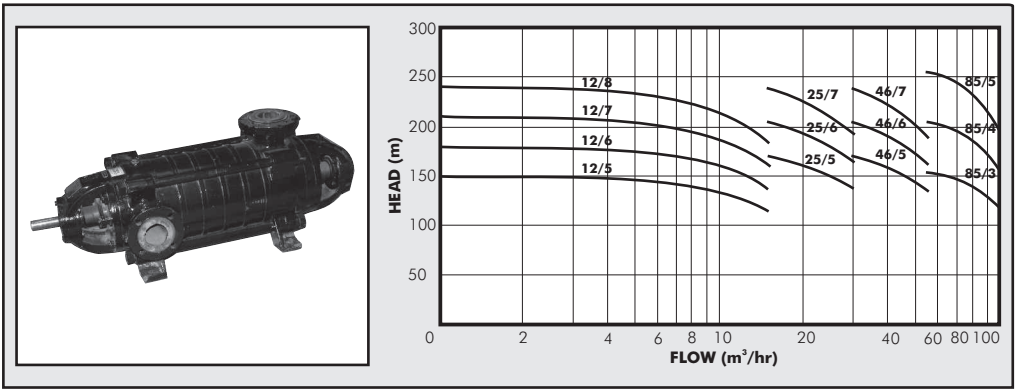
Thank you for choosing Dayliff DMS pump. The pump has been manufactured to the highest standards and if operated correctly should give many years of efficient and trouble free service. Careful reading of this instruction manual is therefore extremely important and if you have any queries please refer them to your retailer.

1. PUMP SPECIFICATIONS



The DAYLIFF DMS range of horizontal multistage centrifugal pumps are heavy duty industrial quality pumps suitable for various water supply, irrigation and industrial applications. Particular features include gland packing seals for simple and economical maintenance and external securing tie bolts for ease of disassembly. Construction is heavy duty cast iron stages and pump body, with cast iron impellers and diffusers and stainless steel shaft.

A wide range of models and specifications are available, a combination of the pump size and number of stages being selected to achieve maximum efficiency at a specific duty point. Electric motors are selected according to the required power input at the duty point and mounted together with the pump and coupling on a base frame. All pumps are also suitable for direct or belt drive by diesel engine.

Operating Conditions

Pumped liquid: Thin, clean, chemically non-aggressive liquids without abrasive particles or fibres

Max. Fluid Temperature: +110^{0}C

Max. Suction Pressure: 10 Bar

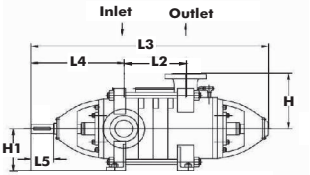
Max. Delivery Pressure: 30 Bar

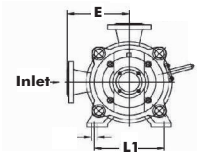
Rotation: Clockwise viewed from driving end

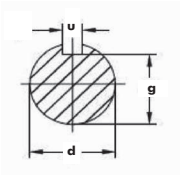
Pump Data

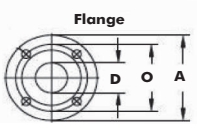
Pump Size	Pump Dimensions								Shaft			Inlet Flange				Outlet Flange			
	Inlet	Outlet	L1	L4	L5	E	H1	H	d	u	g	D	A	O	Holes	D	A	O	Holes
DMS 12	50	40	210	265	62	170	150	170	25	8	21	50	140	110	4X13.5	40	150	110	4X17.5
DMS 25	65	65	295	330	80	210	170	210	30	8	26	65	160	130	4X17.5	65	185	145	8X17.5
DMS 46	80	65	295	330	80	210	170	210	30	8	26	80	190	150	4X17.5	65	185	145	8X17.5
DMS 85	100	100	345	326	86	250	210	250	35	10	30	100	210	170	4X17.5	100	235	180	8X22

Stages	12				25				46				85			
	Power (Kw)	L2	L3	Weight (kg)	Power (Kw)	L2	L3	Weight (kg)	Power (Kw)	L2	L3	Weight (kg)	Power (Kw)	L2	L3	Weight (kg)
3	-	-	-	-	-	-	-	-	-	-	-	-	55	277	906	877
4	-	-	-	-	-	-	-	-	-	-	-	-	75	351	980	1040
5	11	210	795	292	22	360	975	452	37	360	975	560	90	425	1054	1061
6	15	210	845	316	30	425	1040	572	37	425	1040	576	-	-	-	-
7	15	210	895	333	30	490	1105	592	45	490	1105	664	-	-	-	-
8	18.5	210	945	370	-	-	-	-	-	-	-	-	-	-	-	-









2. MOUNTING

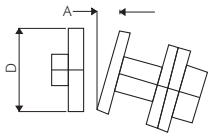
Prime Mover Selection: It is essential to ensure correct prime mover selection as the pump unit will be inefficient if over sized and will overload if undersized. The power absorbed at the duty point should be read from the pump curve and an appropriately sized prime mover selected that allows for some spare power capacity (recommended 15%) to accommodate efficiency reductions as the installation ages. Care should also be taken to de-rate engines for altitude and temperature. Full pump details are given in the detailed pump curves available on www.dayliff.com. Also full system application curves and optimal pump selection is available using DayPro selection tool accessories through the pump supplier.

Direct coupled units: Units should be direct coupled if possible. Mounting frames should be rigid to prevent flexing during operation.

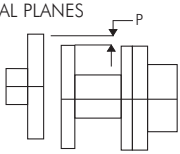
The pump and prime mover should be connected with a flexible coupling and great care must be taken to ensure axial and horizontal alignment. Pump sets must be tested to check for misalignment vibration before installation.

DIRECT COUPLED UNITS

CHECK FOR AXIAL ALIGNMENT AT 90° INTERVALS



CHECK FOR AXIAL ALIGNMENT IN HORIZONTAL AND VERTICAL PLANES



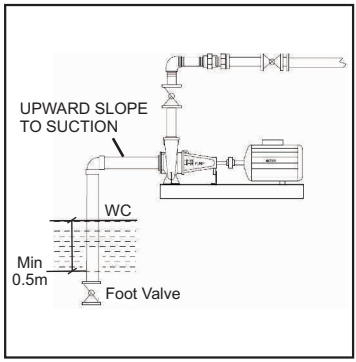
Belt Drive Units: Where the pump and prime mover (usually an engine) need to rotate at different speeds pulley drive can be used. In these cases a jack shaft mounted on plumber blocks is necessary to avoid radial loads on the pump shaft and generally a similar arrangement should be used for the engine. Pulley sizes should be selected to give the correct unit speeds and manufacturer's data should be used to select a belt arrangement to prevent overloading. Correct alignment is also important.

Provision should be made for prime mover movement for belt tensioning, which should not be over tensioned as the additional loads will cause equipment damage.

All external moving parts including coupling, pulleys, belts and shafts must be fitted with enclosing guards.

3. INSTALLATION

Location: The pump should be installed as near as possible to the water and as a general rule the suction lift should be minimised to ensure maximum pumping efficiency.



Foundation: To be sufficiently substantial to support the pump independently of piping and provide sufficient support to eliminate mounting bedplate distortion. For engine drive sets the foundation should be substantial to absorb the engine vibrations.

Pipe Supports: Piping should be supported independently near the pump. Pipe loads on the pump flanges must be avoided.

Suction Lift: In the case of negative suction installations the suction lift, which should be the sum of the vertical lift, the suction line friction losses, vapour pressure for water above 30°C and a safety margin of 2m must always be less than the given NPSH required by the pump at the rated flow. Refer to the pump curve for NPSH required.

Suction Pipe: The suction pipe must be absolutely airtight as even small leaks will impair or prevent pump operation. A pipe size larger than the pump connection is recommended and tapered eccentric connectors should be used for changes in pipe diameter. The suction line should be as short and direct as possible and sharp turns should be avoided by using long radius bends and not elbows.

When laying the pipe line maintain a uniform gradient rising towards pump for the whole distance. Avoid air pockets, humps or depressions in the pipe line (even if the pump is below supply level) which may trap air and impair performance.

Ensure the end of the suction line is sufficiently below the water surface to prevent vortexing (recommended 0.5m). The line must be free from pipe scale, welding beads or any loose particles that could damage the pump when operating.

An effective suction installation is essential for efficient pump operation. most pump operating problems are due to inappropriate suction arrangements.

Foot Valve: Unless there is a positive suction with the water surface above the pump centerline and a free water flow into the pump, a foot valve is required with an inlet area at least 11/2 times the area of the suction pipe.

A strainer should have clear area of 3 or 4 times that of the suction pipe.

Discharge Pipe: The discharge pipe should generally be at least one size larger than the pump outlet such that friction head created is not excessive. The friction head should be calculated to ensure that the pump is not overloaded. A gate valve should be fitted close to the pump for maintenance purposes and for longer pipelines where water hammer is likely a check valve is also recommended. Also important is a plugged tee at the pump outlet for pump priming at start up.

4. PUMP OPERATION

Gland Packing: A gland packing must drip during normal operation to ensure shaft lubrication. To adjust gland stud, nuts should be finger tight when the pump is first started. After start-up allow time for the packing to settle, then adjust leakage rate by tightening the nuts one flat at a time giving time to settle with each adjustment. The leakage rates should be about 20 drops per minute.

Lubrication: Ball bearings require no initial lubrication but should be greased every 2000 hours of running, annually or immediately prior to operating after a long period of idleness. Apply about two strokes from an average grease gun on the bearing housing grease nipple, though ensure not to over grease.

Pump Starting:

On Initial start up or after maintenance.

- Close discharge gate valve.
- Eliminate all air from the pump and suction pipe by priming through the priming tee.
- Air trapped in the casing and impeller can be removed by rotation of pump shaft during filling. In positive suction installations unscrewing the vent plug facilitates priming.
- Start the pump and check for correct rotation (clockwise viewed from the driving end).
- Slowly open discharge gate valve.
- Check the gland packing is dripping correctly (see above)
- Check for unusual noise or operating temperature.

Normal operation:

As for initial starting, except that the air elimination operation may not be required if the pump is adequately primed, though discharge should always be checked for normal flow.

Mains power to the motor must always be disconnected when any maintenance or adjustments are being carried out

5. TROUBLE SHOOTING

PROBLEM	POSSIBLE CAUSE	SOLUTION
No flow	**New Installation**	
	Discharge head too high	Check both the static and friction head
	Suction lift too great	Check sufficient new positive suction head available
	Old Installation	
	Suction line and pump housing not properly primed	See Pump Starting
	Impeller, suction pipe or foot valve clogged	Rectify condition
	Air leak in suction line	Rectify condition
	Packing worn allowing to leak into pump	Replace packing
Low flow	Check all the possibilities described for no flow	
	Foot valve and suction piping too small or too long	Change piping
	Wrong direction of rotation	Change motor connections
Motor overload	Undersized motor	Check pump curve for power required
	Flow too great due to total head being lower than anticipated	Reduce flow by restricting discharge gate valve or reduce the impeller diameter
	Mechanical friction due to impeller fouling the pump casing, bent shaft, pump and motor out of alignment; gland packing too tight, low voltage	Rectify condition
Noisy operation	Insufficient NPSH available causing cavitation	Change suction arrangement
	Mechanical damage	Check for bent shaft, loose impeller shaft, worn bearings, pump and motor out of alignment
Hot bearings	Most bearings are capable of withstanding a moderate temperature rise above ambient	
	If temperature is excessive	Check for over greased bearing housing, misaligned coupling, drive belts misaligned or too tight

6. TERMS OF WARRANTY

i) General Liability

- In lieu of any warranty, condition or liability implied by law, the liability of Davis & Shirtliff (hereafter called the Company) in respect of any defect or failure of equipment supplied **is limited to making good by replacement or repair** (at the Company's discretion) defects which under proper use appear therein and arise solely from faulty design, materials or workmanship within a specified period. This period commences **immediately after the equipment has been delivered to the customer** and at its termination all liability ceases. Also the warranty period will be assessed **on the basis of the date that the Company is informed of the failure**.

- This warranty applies solely to equipment supplied and **no claim for consequential damages**, however arising, will be entertained. Also the warranty specifically excludes defects caused by fair wear and tear, the effects of careless handling, lack of maintenance, faulty installation, incompetence on the part of the equipment user, Acts of God or any other cause beyond the Company's reasonable control. Also, any repair or attempt at repair carried out by any other party **invalidates all warranties**.

ii) Standard Warranty

General Terms

If equipment failure occurs in the normal course of service having been competently installed and when operating within its specified duty limits warranty will be provided as follows:-

- **Up to two years - The item will be replaced or repaired at no charge.**
- **Over two years, less than three years - The item will be replaced or repaired at a cost to the customer of 50% of the Davis & Shirtliff market price.**

The warranty on equipment supplied or installed by others is conditional upon the defective unit **being promptly returned free to a Davis & Shirtliff office** and collected thereafter when repaired. No element of site repair is included in the warranty and any site attendance costs will be payable in full at standard chargeout rates. Also proof of purchase including the purchase invoice must be provided for a warranty claim to be considered.

DAYLIFF is a brand of **Davis & Shirtliff**

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or visit

www.dayliff.com

for details of the nearest branch or stockist

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