



DML

Submersible Sewage Pumps with Single Channel Impeller



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Features and Applications



Model **DML**

■ Features

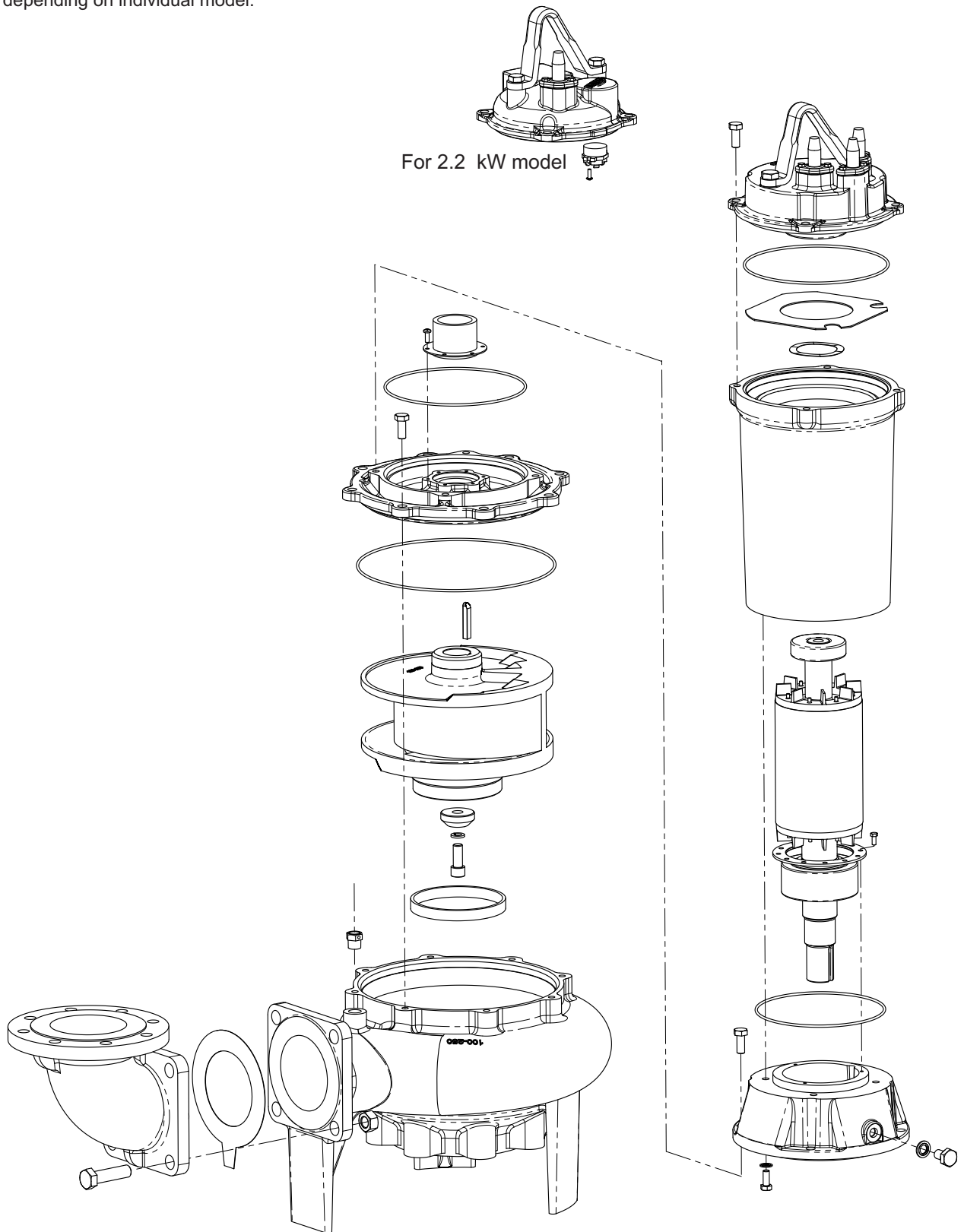
- Non-clog single channel impeller.
Non-clog single channel impeller has 76mm spherical passage to prevent clogging..
- Robust construction
Rugged cast iron construction, all fasteners of stainless steel and a 4 pole motor.
- Double mechanical seal in oil chamber
An oil lubricated double mechanical seal with lower faces of hard silicon carbide provides strong and reliable shaft sealing
- Long life.
Short overhung shaft, large bearings and high grade mechanical seal gives longer life.
- High efficiency, energy saving.
Well hydraulically designed single channel impeller gives high efficiency and saves energy.

■ Applications

- Sewage.
- Waste water.
- Storm water drainage

Typical Exploded View

Note: Actual construction may vary depending on individual model.

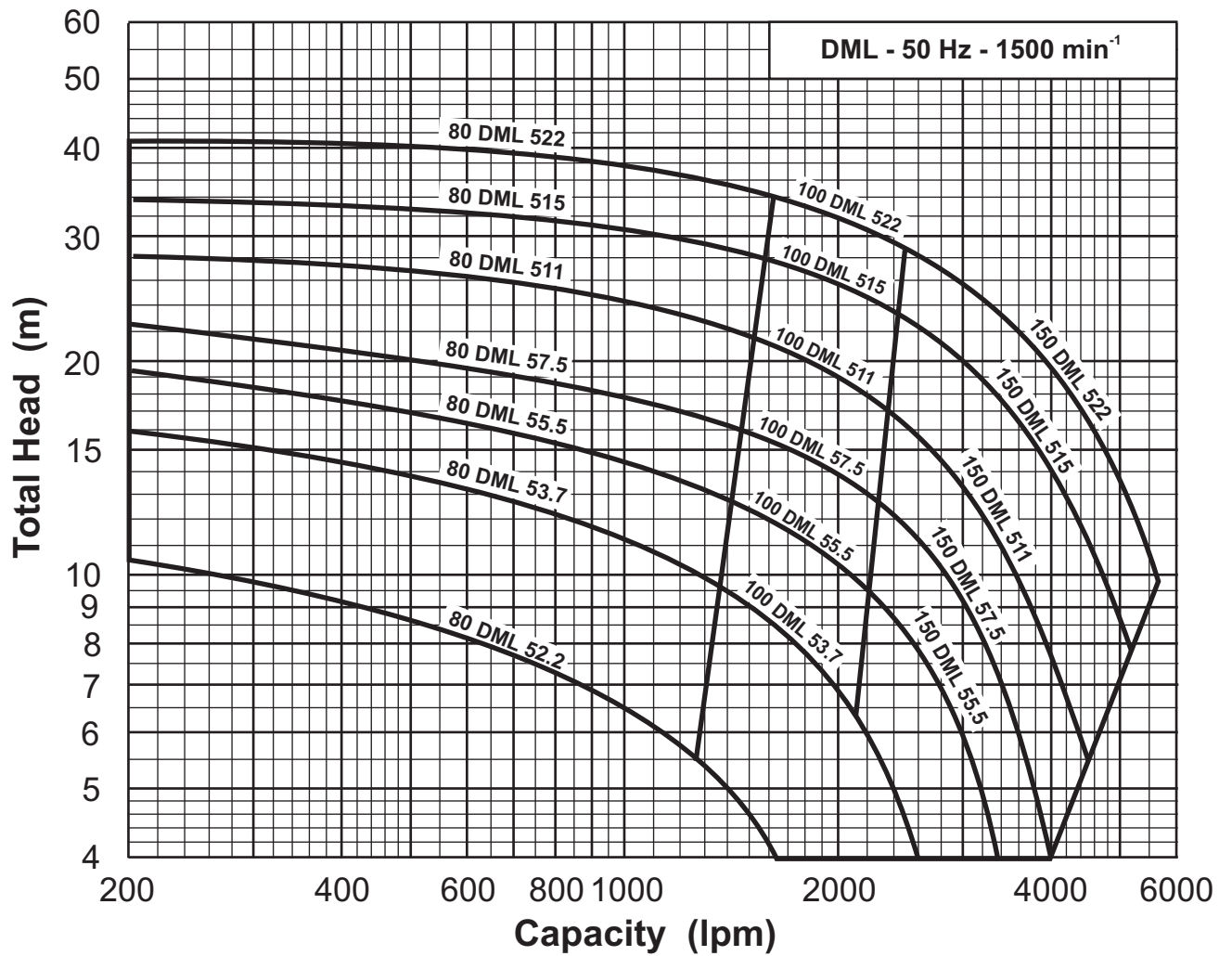


Specifications

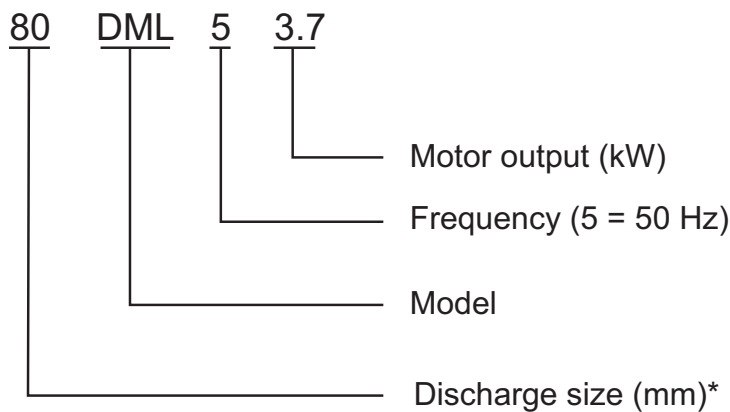
		Standard	Optional
Scope	Discharge	80 - 150 mm	
	Motor Power	2.2 - 22 kW (3ph.)	
	Performance	Capacity: 200 - 5400 lpm Head: 4 - 40m.	
Liquid	Type	Sewage	
	Max. Temp.	40°C	
	Max. Solids	Refer to table below	
Submergence	Maximum	8 m.	
	Minimum	Refer to low water level (L.W.L) in dimensions.	
Construction	Impeller	Non-clog single channel.	
	Mechanical Seal	Oil lubricated double mechanical seal, single spring.	
Materials	Casing	Cast Iron	
	Impeller	Cast Iron	
	Suction Cover	Cast Iron	
	Shaft	403 Stainless Steel	
	Motor Frame	Cast Iron	
	Fasteners	304 Stainless Steel	
	Mechanical Seal	Upper Faces: Carbon / Ceramic Lower Faces: Silicon Carbide / Silicon Carbide Lubricating Oil: Turbine oil VG32 (SAE 10W/20W)	
Motor	Type	Air filled dry submersible, IP58, Class F insulation.	
	Poles/Speed	4 pole / 1450 rpm	
	Applicable Voltages	380/400/415 Volt, 3 phase, 50 Hz	
	Starting	DOL (2.2 kW) Star-Delta (3.7 to 22 kW)	
	Protection	In built overload protection (2.2 kW) Miniature thermal protector (3.7 to 22 kW)	
	Bearings	Pre lubricated sealed ball bearings.	
Cable	Length	10 m.	
Accessories	Flange	Discharge elbow with screwed companion flange.	
			Quick Discharge Connector (QDC)

Solids Handling			
Model	- discharge	80 Ø	100 Ø
	- motor kW	All	All
Max. diameter of solids		76 mm	

Performance Chart



Model code

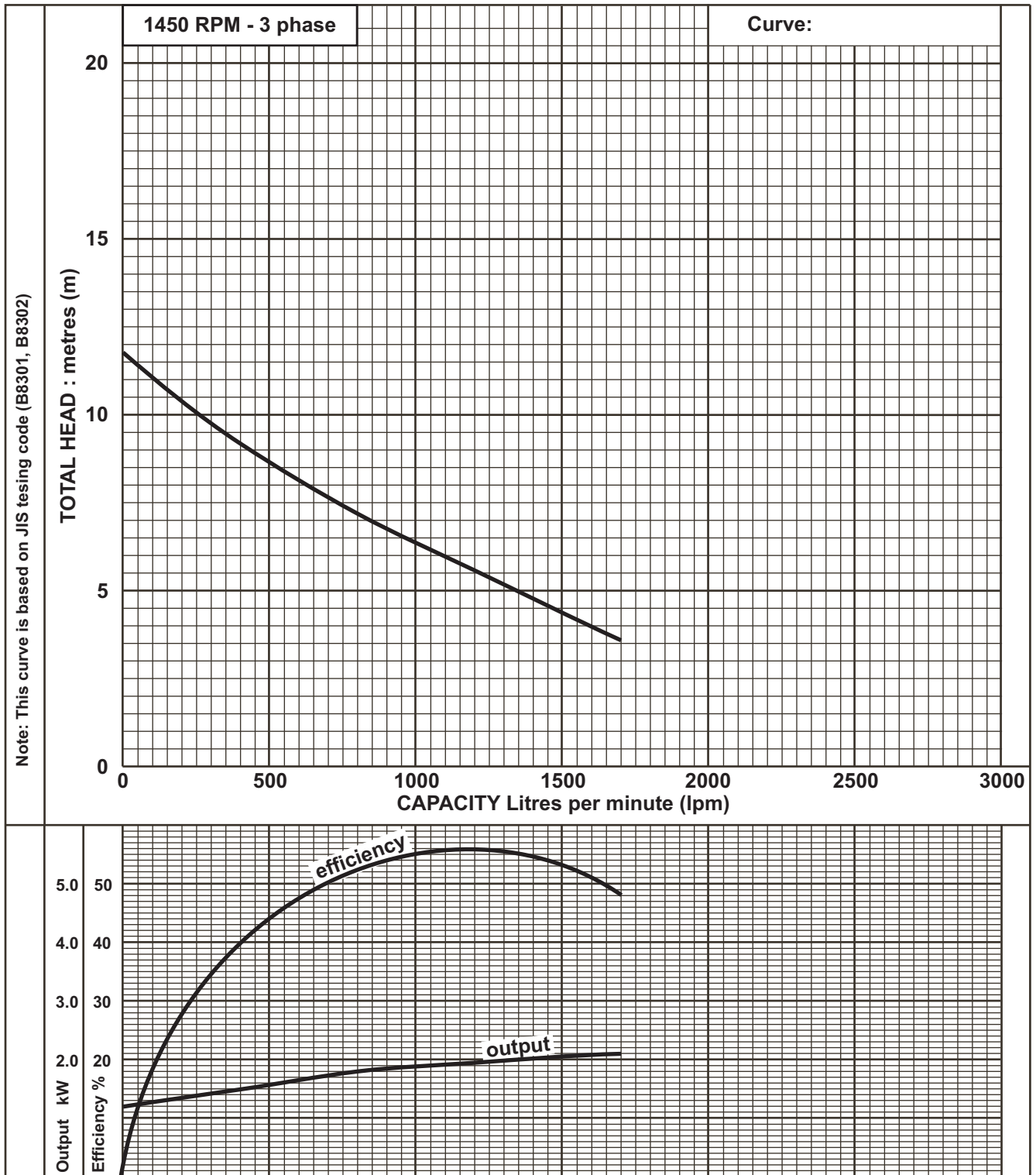


* Discharge size is determined by the elbow supplied with the pump. Therefore, pump nameplate shows "80/100/150" or "80/100" for common model.

This enables the most appropriate discharge size to be selected for the duty and installation.

Performance Curve

80 DML52.2



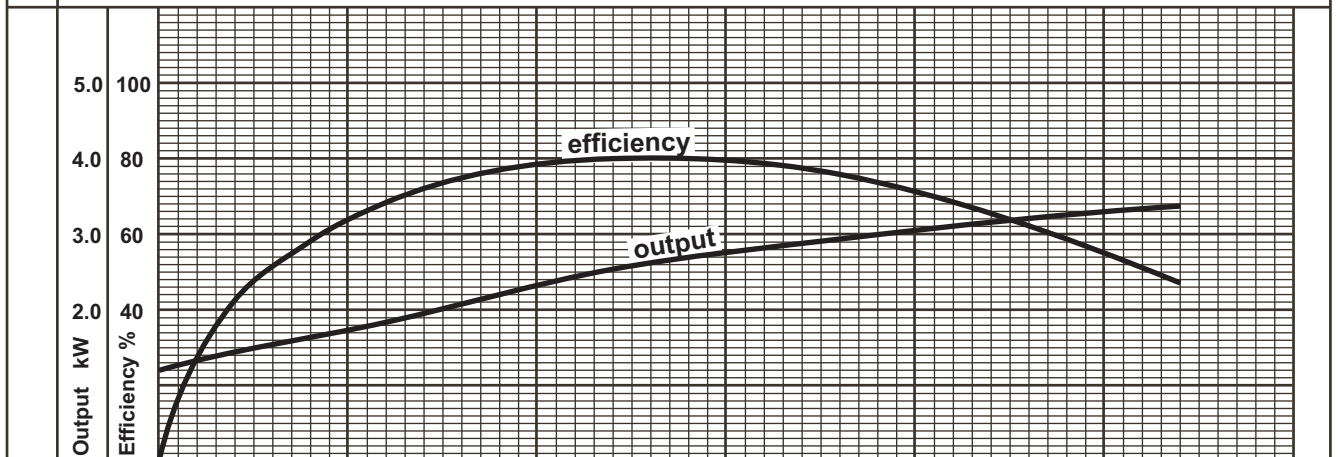
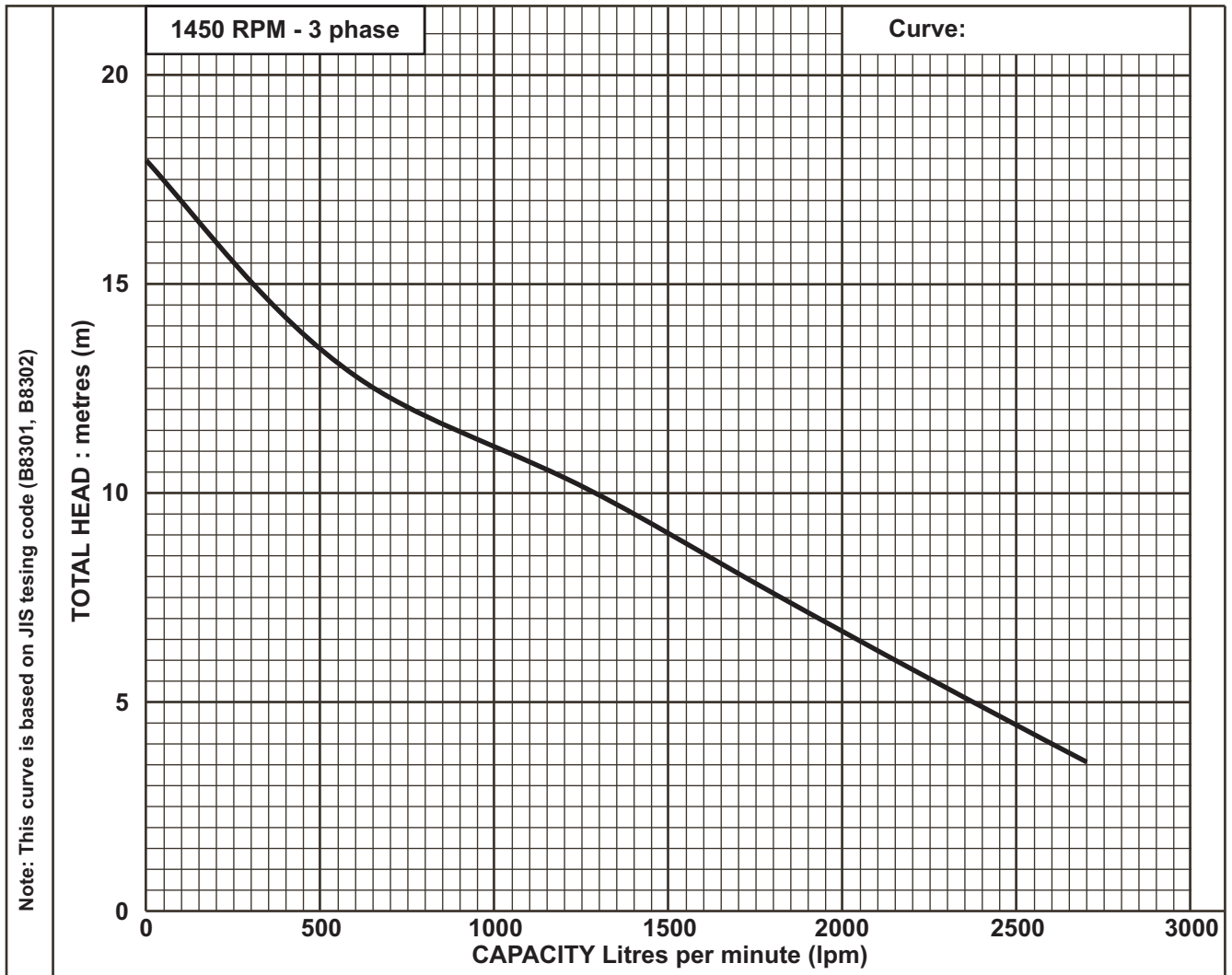
Test No.	Pump			
	Capacity lpm	Total Head m	Effic. %	Output kW
1	0	11.8	0	1.20
2	400	9.2	40.0	1.50
3	800	7.2	52.0	1.81
4	1200	5.6	56.0	1.96
5	1700	3.6	48.0	2.10

Note: Nominal discharge of casing is 80 Ø mm		
Discharge Ø mm	Pump Model	Elbow supplied with Pump
80	80 DML 52.2	80 x 80

Model:	80 DML 52.2	Frequency:	50 Hz
Discharge Ø:	80mm	Output:	2.2kW
Pump Rating	Capacity - lpm :	0	0
	Total Head - m	0	0
Motor Rating	400 Volt	5.2 Amps	1450rpm
	Maker: Ebara	Type: Dry Type	

Performance Curve

(80)(100) DML53.7



Test No.	Pump			
	Capacity lpm	Total Head m	Effic. %	Output kW
1	0	18.0	0	1.20
2	600	12.8	68.0	1.84
3	1200	10.4	80.0	2.55
4	1800	7.6	76.0	2.94
5	2700	3.6	47.0	3.38

Discharge size is determined by the elbow supplied with the pump. Pump nameplate shows "80/100".

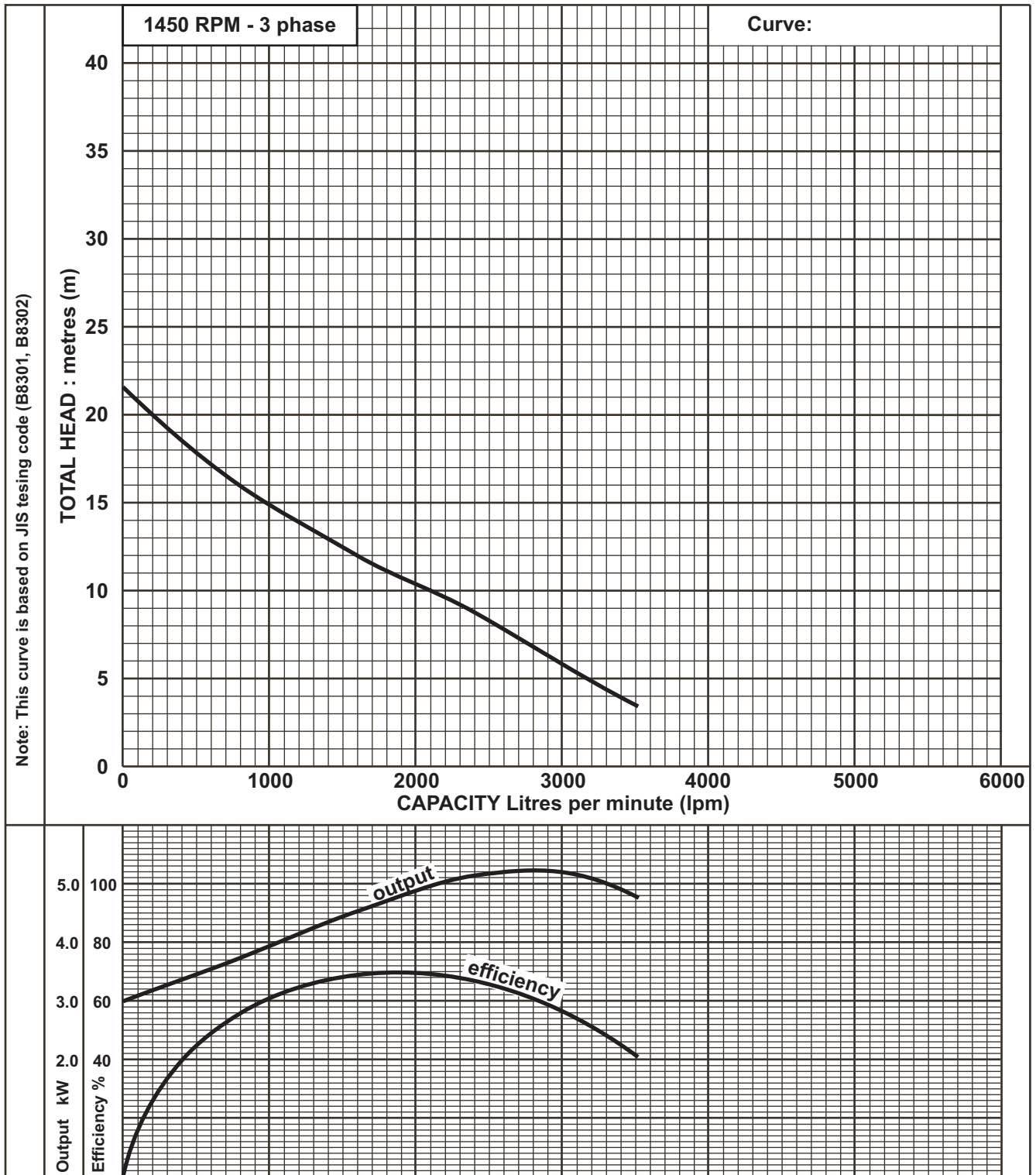
Note: Nominal discharge of casing is 80 Ø mm

Discharge Ø mm	Pump Model	Elbow supplied with Pump
80	80 DML 53.7	80 x 80
100	100 DML 53.7	80 x 100

Model:	80,100, DML 53.7	Frequency:	50 Hz
Discharge Ø:	80,100 mm	Output:	3.7 kW
Pump Rating	Capacity - lpm :		
	Total Head - m		
Motor Rating	415 Volt	8.4 Amps	1450rpm
	Maker: Ebara	Type: Dry Type	

Performance Curve

(80)(100)(150) DML55.5



Test No.	Pump			
	Capacity lpm	Total Head m	Effic. %	Output kW
1	0	21.6	0	3.0
2	800	16.0	56.0	3.73
3	1600	12.0	69.0	4.54
4	2400	8.8	67.0	5.15
5	3520	3.4	41.0	4.76

Discharge size is determined by the elbow supplied with the pump. Pump nameplate shows "80/100/150".

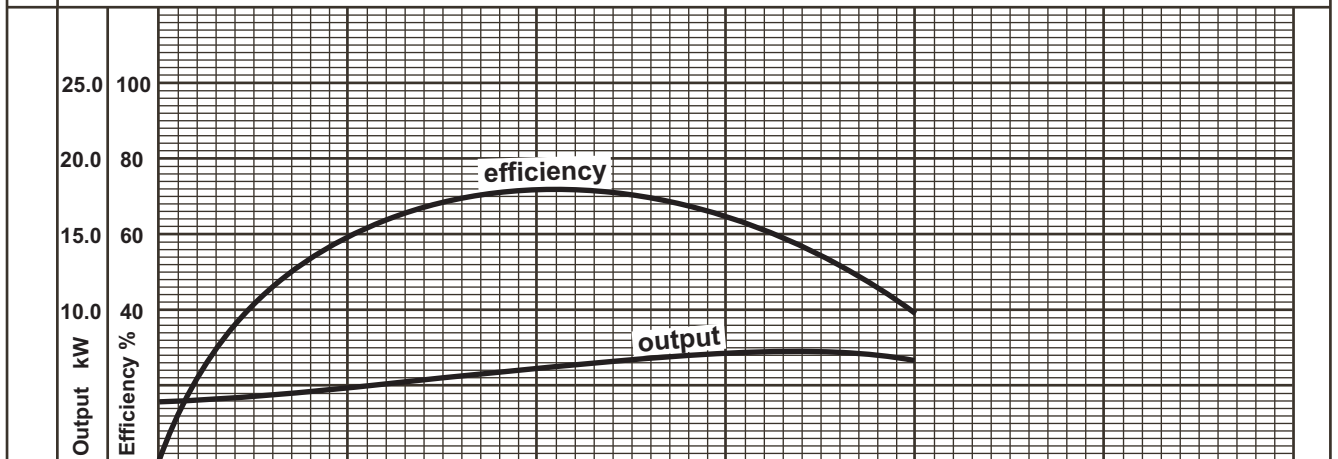
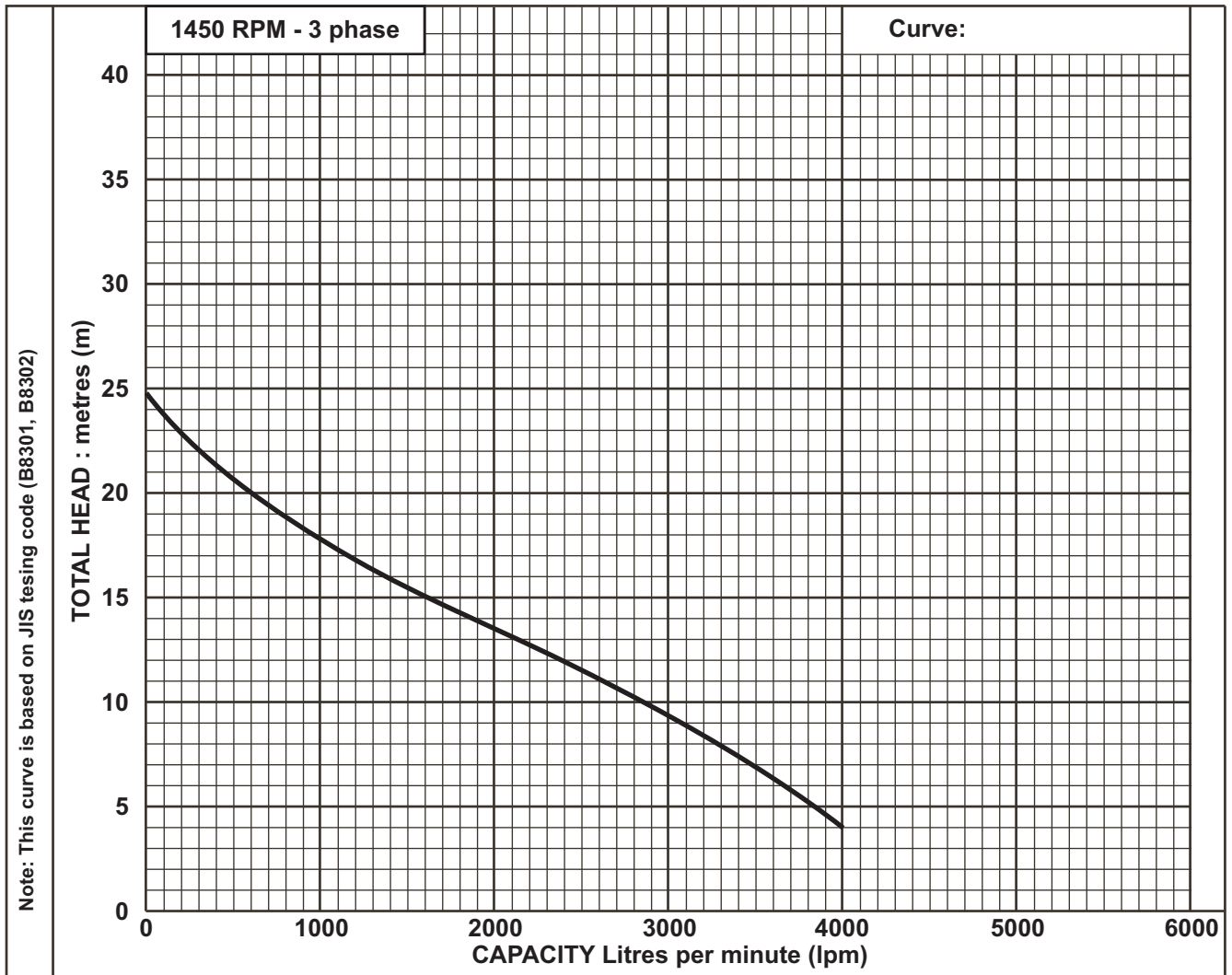
Note: Nominal discharge of casing is 100 Ø mm

Discharge Ø mm	Pump Model	Elbow supplied with Pump
80	80 DML 55.5	100 x 80
100	100 DML 55.5	100 x 100
150	150 DML 55.5	100 x 150

Model: 80,100,150 DML 55.5		Frequency: 50 Hz	
Discharge Ø: 80,100,150 mm		Output: 5.5 kW	
Pump Rating	Capacity - lpm :		
	Total Head - m		
Motor Rating	415 Volt	12.7 Amps	1450rpm
	Maker: Ebara	Type: Dry Type	

Performance Curve

(80)(100)(150) DML57.5



Test No.	Pump			
	Capacity lpm	Total Head m	Effic. %	Output kW
1	0	24.8	0	4.0
2	1200	16.8	64.0	5.15
3	2400	12.0	71.0	6.63
4	3600	6.4	52.0	7.24
5	4000	4.0	39.0	6.70

Discharge size is determined by the elbow supplied with the pump. Pump nameplate shows "80/100/150".

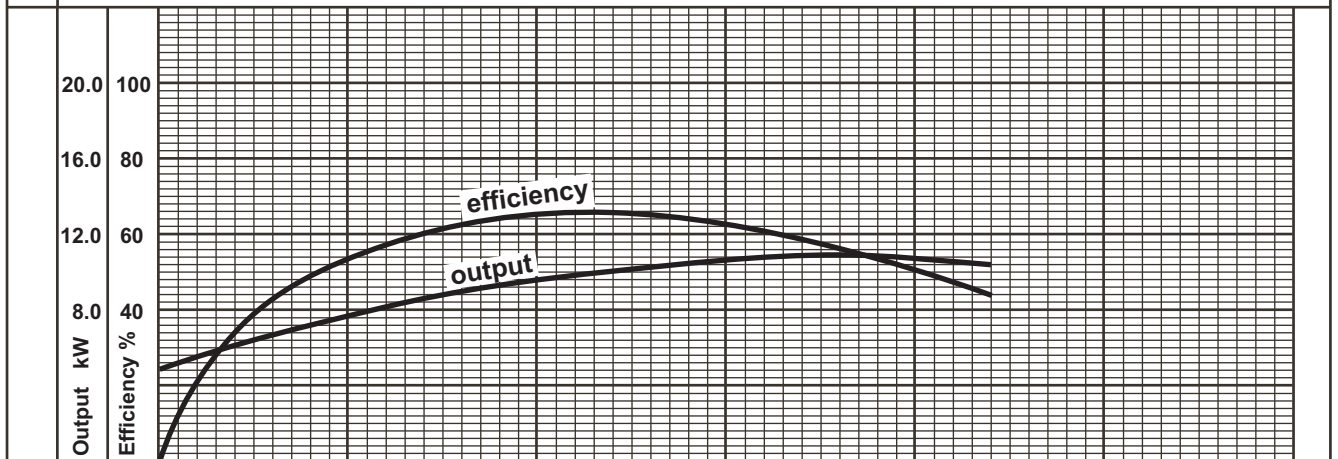
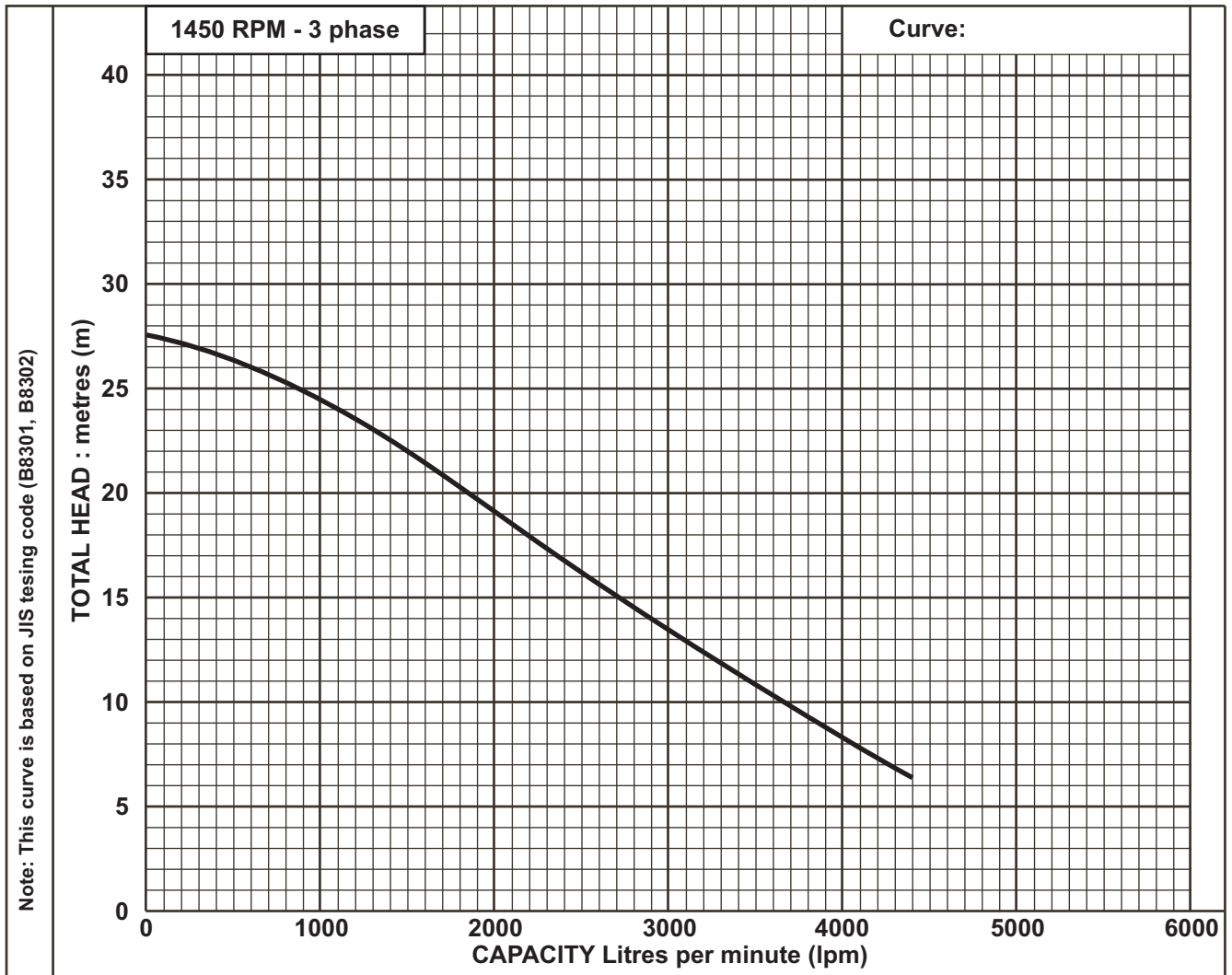
Note: Nominal discharge of casing is 100 Ø mm

Discharge Ø mm	Pump Model	Elbow supplied with Pump
80	80 DML 57.5	100 x 80
100	100 DML 57.5	100 x 100
150	150 DML 57.5	100 x 150

Model: 80,100,150 DML 57.5		Frequency: 50 Hz	
Discharge Ø: 80,100,150 mm		Output: 7.5 kW	
Pump Rating	Capacity - lpm :		
	Total Head - m		
Motor Rating	415 Volt	16.9 Amps	1450rpm
	Maker: Ebara	Type: Dry Type	

Performance Curve

(80)(100)(150) DML511



Test No.	Pump			
	Capacity lpm	Total Head m	Effic. %	Output kW
1	0	27.6	0	4.80
2	1200	23.6	57.0	8.12
3	2400	16.8	66.0	9.98
4	3600	10.4	56.0	10.92
5	4400	6.4	44.0	10.45

Discharge size is determined by the elbow supplied with the pump. Pump nameplate shows "80/100/150".

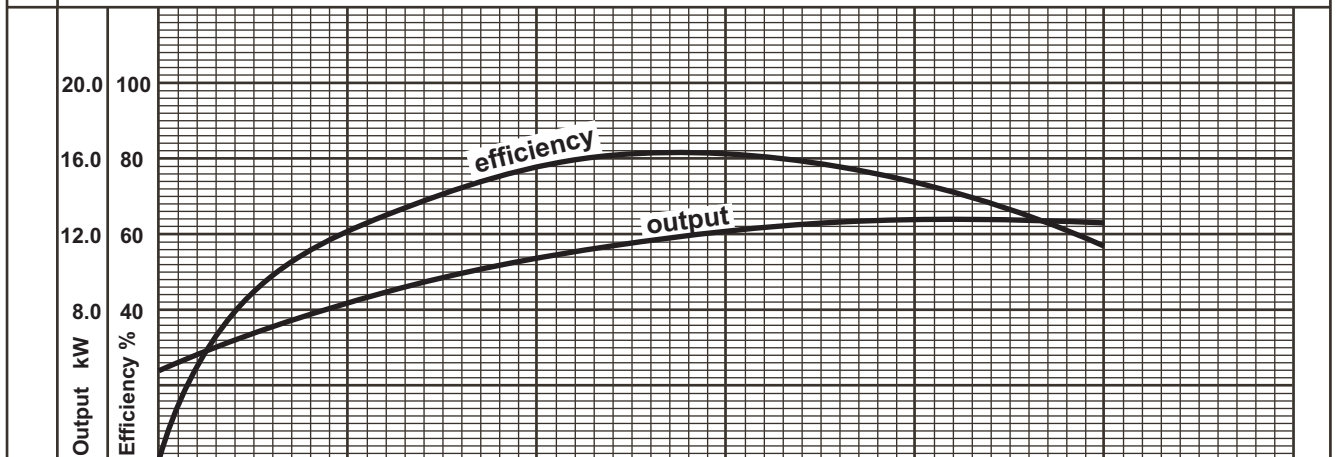
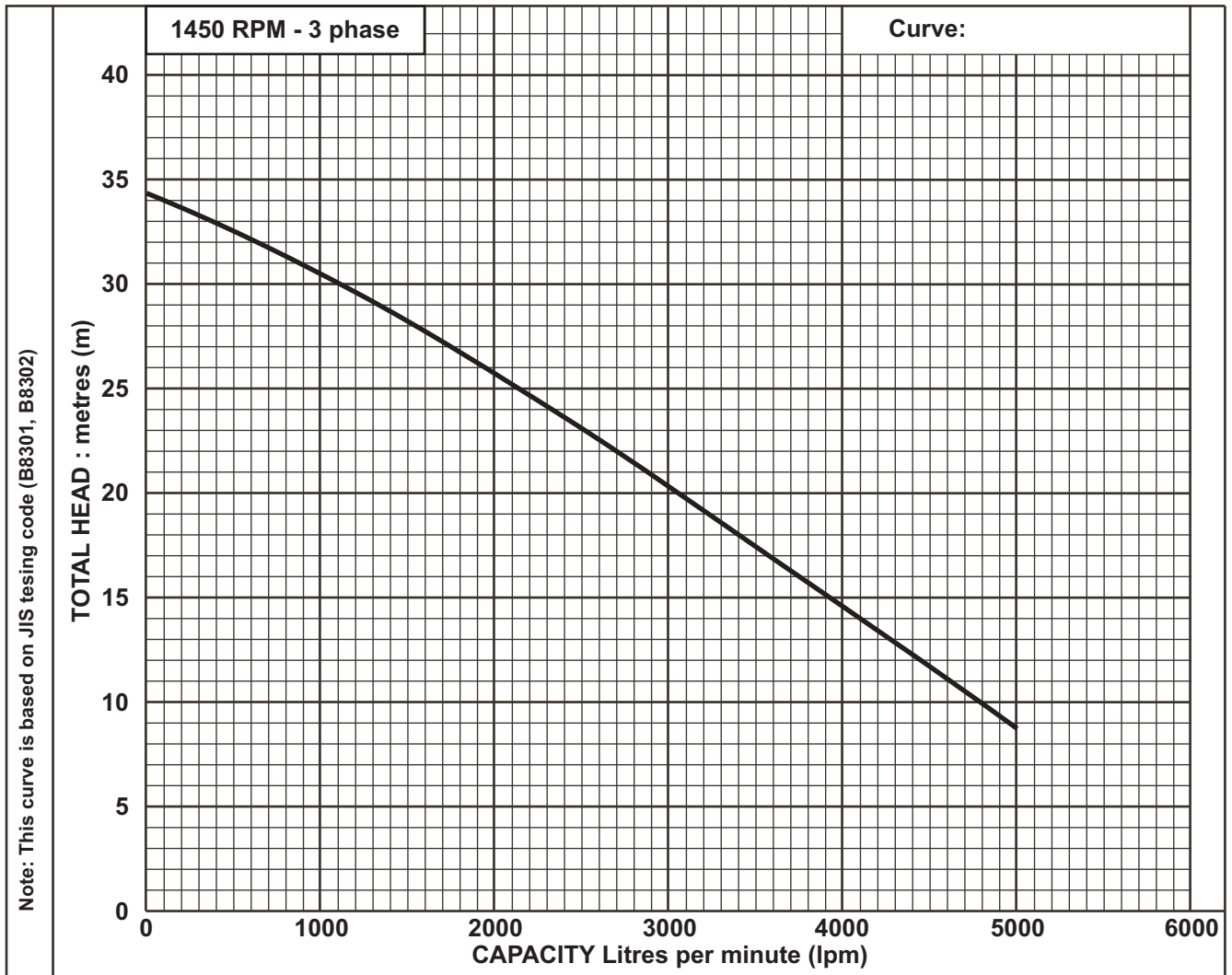
Note: Nominal discharge of casing is 100 Ø mm

Discharge Ø mm	Pump Model	Elbow supplied with Pump
80	80 DML 511	100 x 80
100	100 DML 511	100 x 100
150	150 DML 511	100 x 150

Model: 80,100,150 DML 511		Frequency: 50 Hz	
Discharge Ø: 80,100,150 mm		Output: 11 kW	
Pump Rating	Capacity - lpm :		
	Total Head - m		
Motor Rating	415 Volt	23.0 Amps	1450rpm
	Maker: Ebara	Type: Dry Type	

Performance Curve

(80)(100)(150) DML515



Test No.	Pump			
	Capacity lpm	Total Head m	Effic. %	Output kW
1	0	34.4	0	4.80
2	1200	29.6	65.0	8.93
3	2400	23.6	81.0	11.42
4	3600	16.8	78.0	12.66
5	5000	8.8	57.0	12.61

Discharge size is determined by the elbow supplied with the pump. Pump nameplate shows "80/100/150".

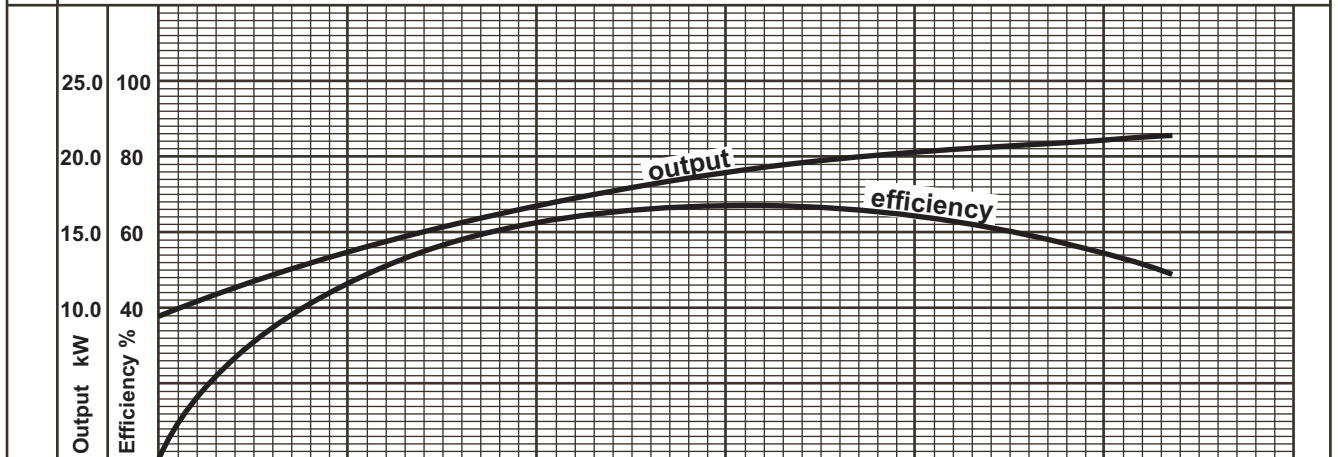
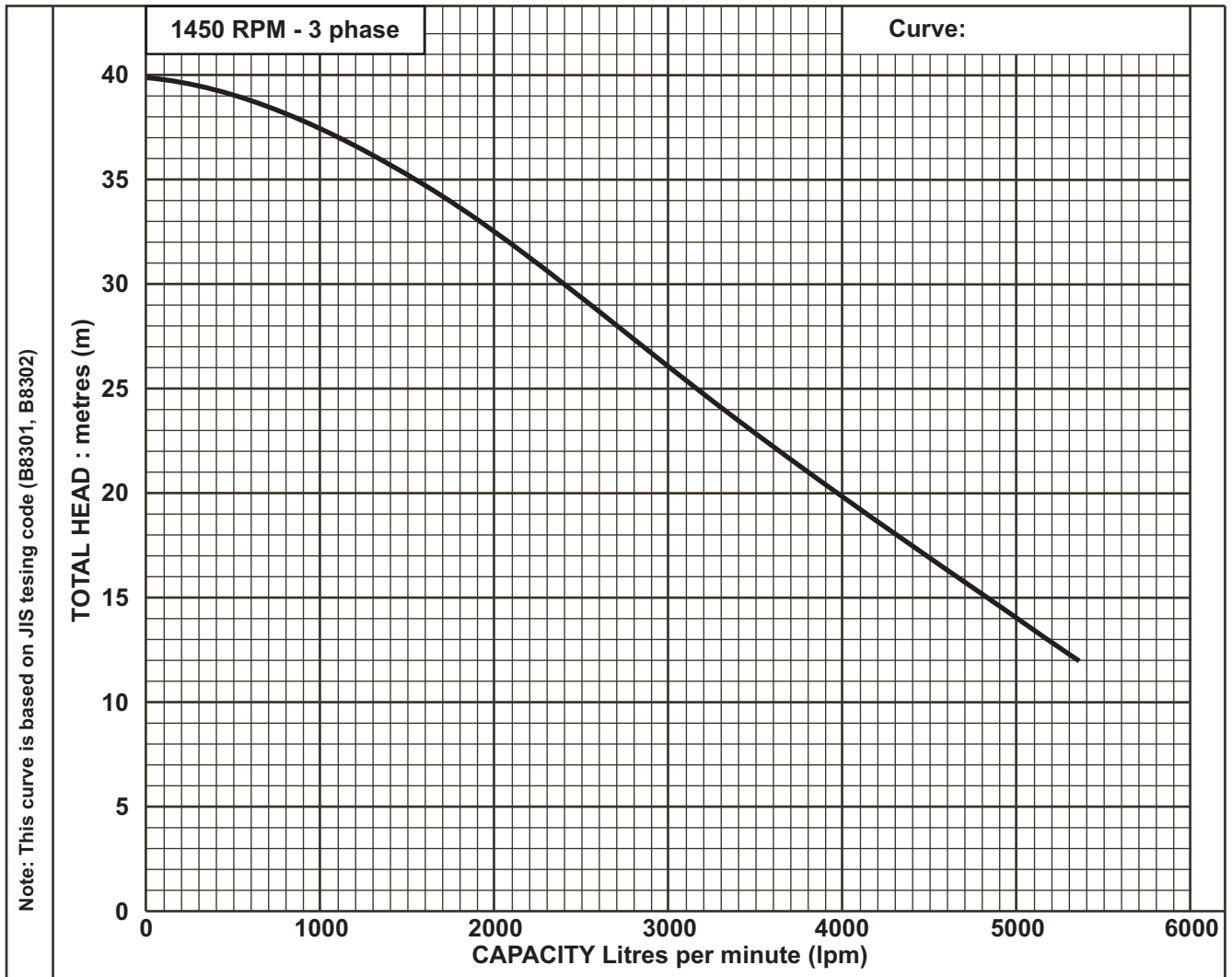
Note: Nominal discharge of casing is 100 Ø mm

Discharge Ø mm	Pump Model	Elbow supplied with Pump
80	80 DML 515	100 x 80
100	100 DML 515	100 x 100
150	150 DML 515	100 x 150

Model: 80,100,150 DML 515		Frequency: 50 Hz	
Discharge Ø: 80,100,150 mm		Output: 15 kW	
Pump Rating	Capacity - lpm :		
	Total Head - m		
Motor Rating	415 Volt	30.0 Amps	1450rpm
	Maker: Ebara	Type: Dry Type	

Performance Curve

(80)(100)(150) DML522



Test No.	Pump			
	Capacity lpm	Total Head m	Effic. %	Output kW
1	0	40.0	0	9.50
2	1600	34.8	58.0	15.68
3	3200	24.8	67.0	19.35
4	4800	15.2	57.0	20.91
5	5360	12.0	49.0	21.44

Discharge size is determined by the elbow supplied with the pump. Pump nameplate shows "80/100/150".

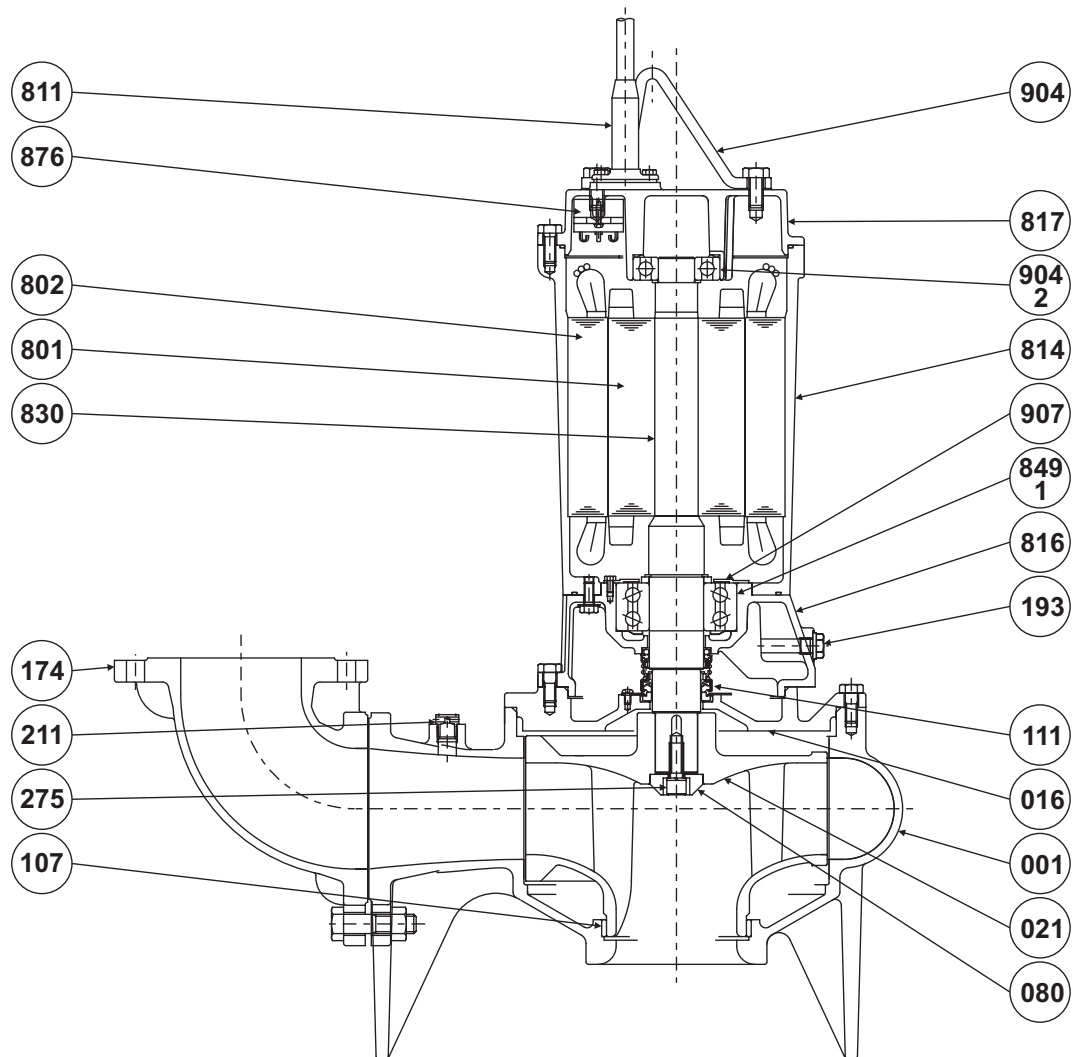
Note: Nominal discharge of casing is 100 Ø mm

Discharge Ø mm	Pump Model	Elbow supplied with Pump
80	80 DML 522	100 x 80
100	100 DML 522	100 x 100
150	150 DML 522	100 x 150

Model: 80,100,150 DML 522		Frequency: 50 Hz	
Discharge Ø: 80,100,150 mm		Output: 22 kW	
Pump Rating	Capacity - lpm :		
	Total Head - m		
Motor Rating	415 Volt	42.0 Amps	1450rpm
	Maker: Ebara	Type: Dry Type	

Sectional View

DML 2.2 kW



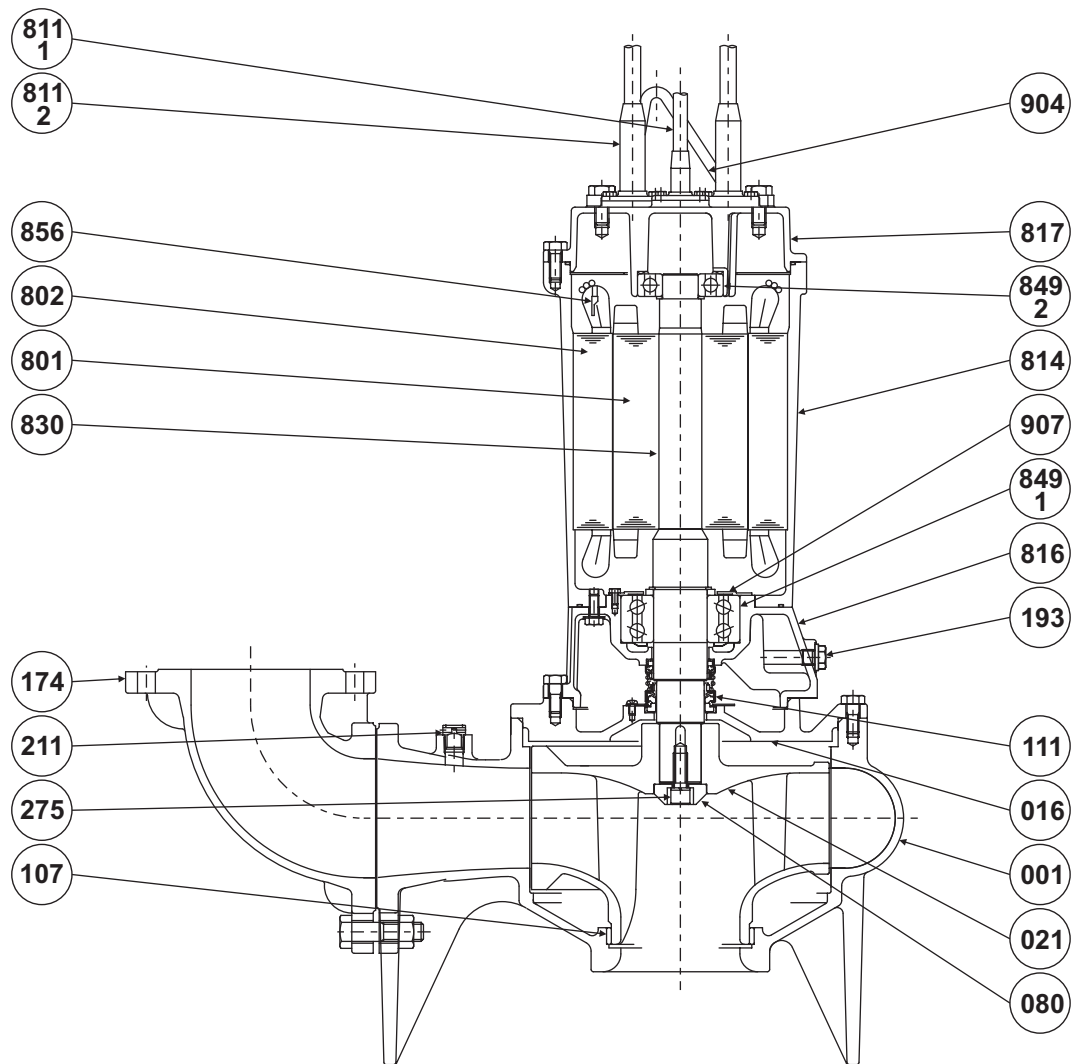
Item Number	Description	Material	Quantity per unit
001	Casing	FC200 Cast iron	1
016	Mechanical Seal Cover	FC200 Cast iron	1
021	Impeller	FC200 Cast iron	1
080	Bushing	SS Steel	1
107	Wear Ring	BC Bronze	1
111	Mechanical Seal		1
174	Discharge Elbow	FC200 Cast Iron	1
193	Oil Plug	NBR/SUS NBR & Stainless Steel	1
211	Air Vent Valve	C3604 Brass	1
275	Impeller Bolt	SUS304 Stainless Steel	1
801	Rotor		1

Item Number	Description	Material	Quantity per unit
802	Stator		
811	Cable		1
814	Motor Frame	FC200 Cast iron	1
816	Lower Bracket	FC200 Cast iron	1
817	Upper Bracket	FC200 Cast iron	1
830	Shaft #	SUS403 Stainless Steel	1
849-1	Ball Bearing		1
849-2	Ball Bearing		1
876	Auto Cut		1
904	Lifting Hanger	SS Steel	1
907	Bearing Cover	SPCC Steel	1

refers to pump side of shaft material

Sectional View

DML 3.7 ~11 kW



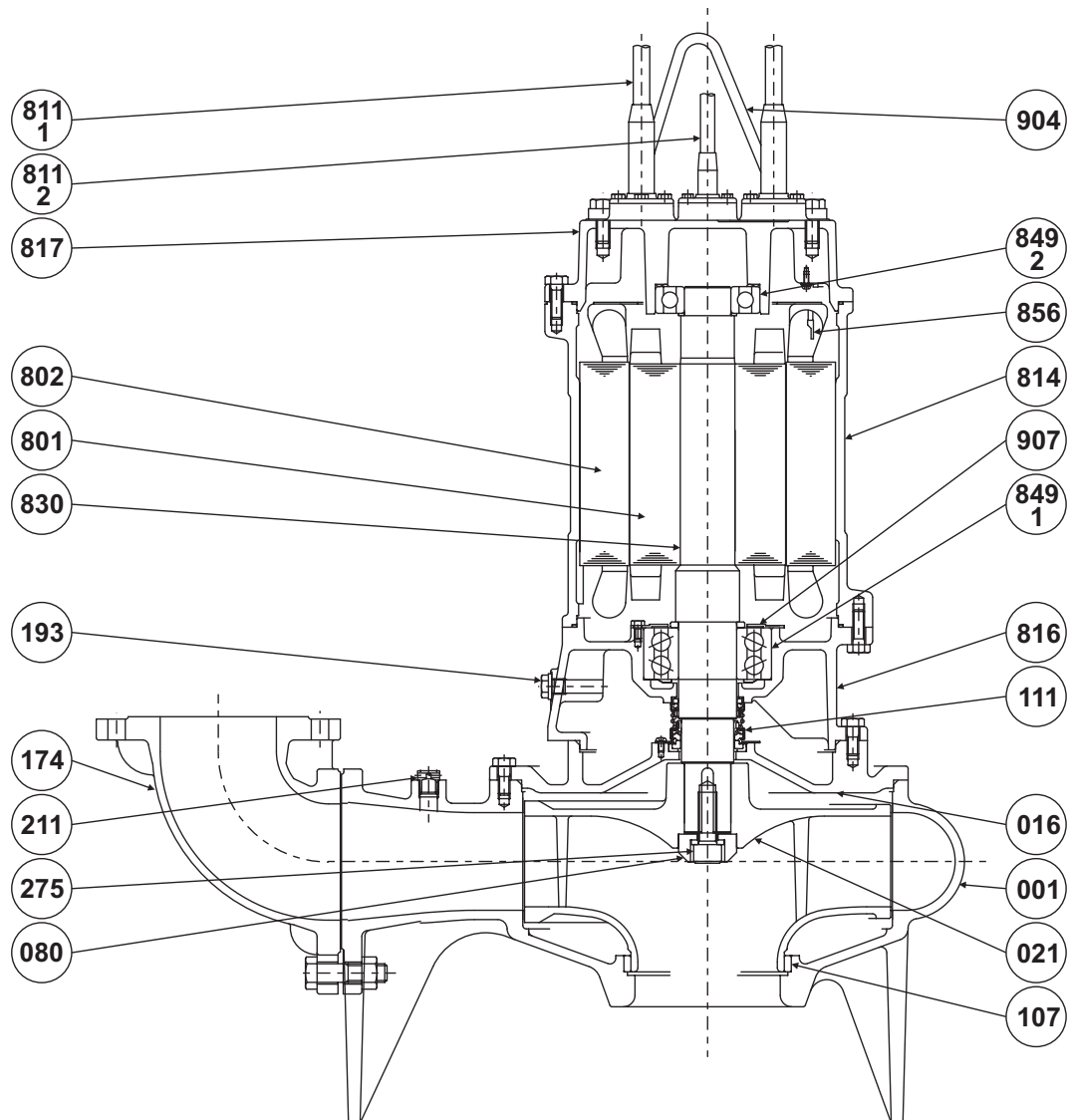
Item Number	Description	Material	Quantity per unit
001	Casing	FC200 Cast iron	1
016	Mechanical Seal Cover	FC200 Cast iron	1
021	Impeller	FC200 Cast iron	1
080	Bushing	SS Steel	1
107	Wear Ring	BC Bronze	1
111	Mechanical Seal		1
174	Discharge Elbow	FC200 Cast Iron	1
193	Oil Plug	NBR/SUS NBR & Stainless Steel	1
211	Air Vent Valve	C3604 Brass	1
275	Impeller Bolt	SUS304 Stainless Steel	1
801	Rotor		1
802	Stator		1

Item Number	Description	Material	Quantity per unit
811-1	Cable (Power)		2
811-2	Cable (Signal)		1
814	Motor Frame	FC200 Cast iron	1
816	Lower Bracket	FC200 Cast iron	1
817	Upper Bracket	FC200 Cast iron	1
830	Shaft #	SUS403 Stainless Steel	1
849-1	Ball Bearing		1
849-2	Ball Bearing		1
856	Thermal Protector		3
904	Lifting Hanger	SS Steel	1
907	Bearing Cover	SPCC Steel	1

refers to pump side of shaft material

Sectional View

DML 11 ~22 kW



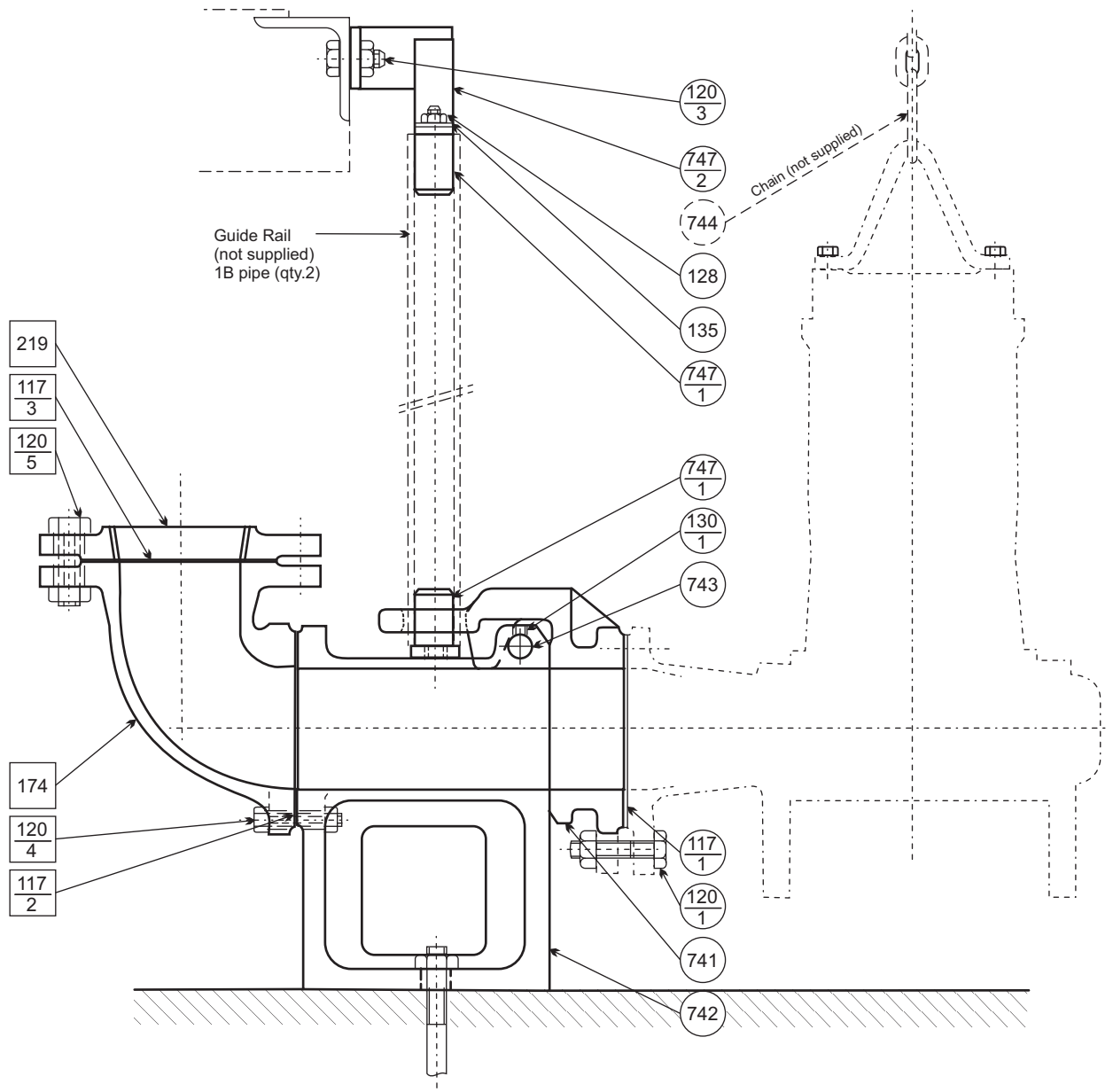
Item Number	Description	Material	Quantity per unit
001	Casing	FC200 Cast iron	1
016	Mechanical Seal Cover	FC200 Cast iron	1
021	Impeller	FC200 Cast iron	1
080	Bushing	SS Steel	1
107	Wear Ring	BC Bronze	1
111	Mechanical Seal		1
174	Discharge Elbow	FC200 Cast Iron	1
193	Oil Plug	NBR/SUS NBR & Stainless Steel	1
211	Air Vent Valve	C3604 Brass	1
275	Impeller Bolt	SUS304 Stainless Steel	1
801	Rotor		1
802	Stator		1

Item Number	Description	Material	Quantity per unit
811-1	Cable (Power)		2
811-2	Cable (Signal)		1
814	Motor Frame	FC200 Cast iron	1
816	Lower Bracket	FC200 Cast iron	1
817	Upper Bracket	FC200 Cast iron	1
830	Shaft #	SUS403 Stainless Steel	1
849-1	Ball Bearing		1
849-2	Ball Bearing		1
856	Thermal Protector		3
904	Lifting Hanger	SS Steel	1
907	Bearing Cover	SPCC Steel	1

refers to pump side of shaft material

Sectional View Model LM 80 Quick Discharge Connector

Applicable to 80mm 2.2 & 3.7 kW DML models



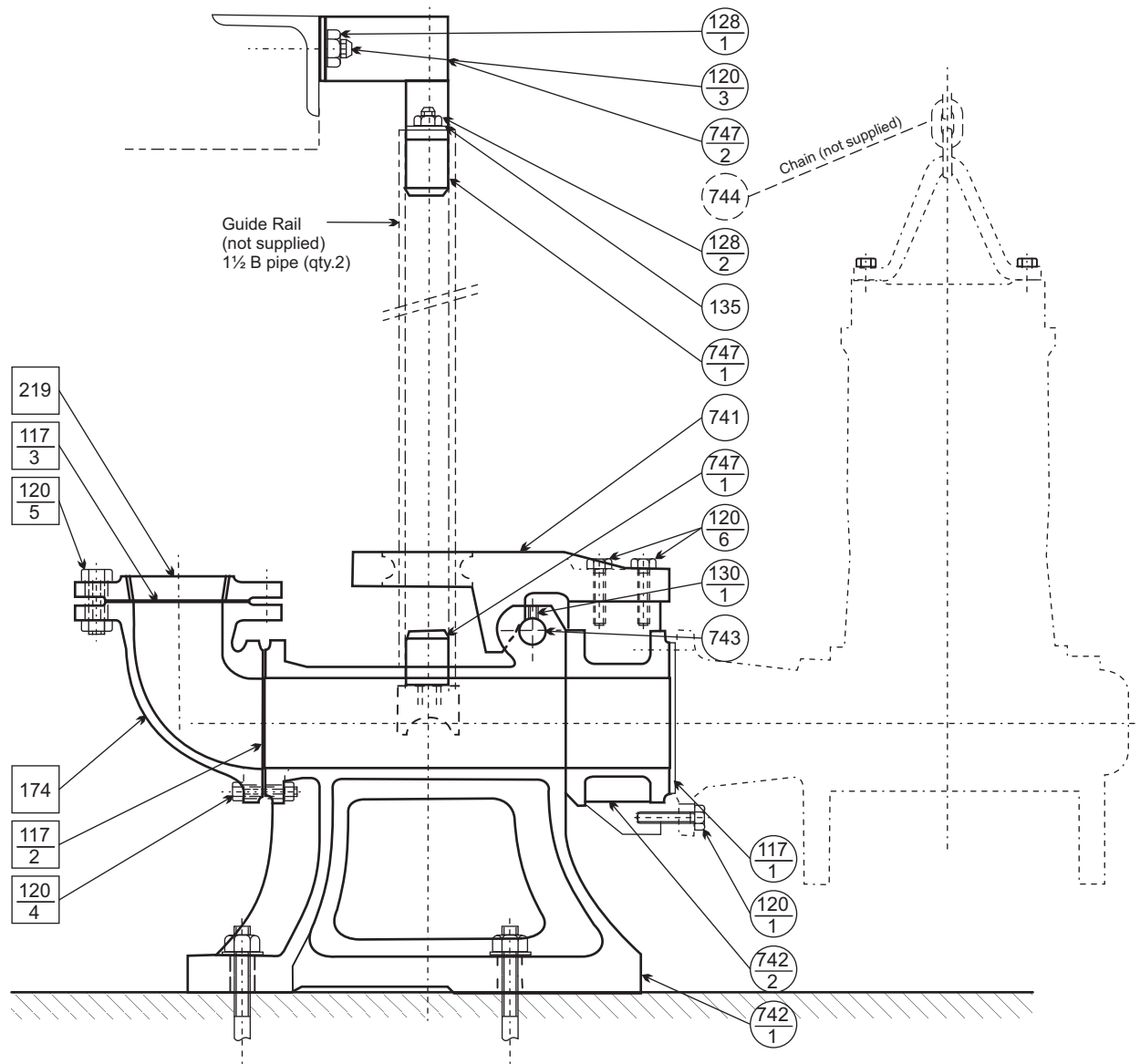
Item Number	Description	Material	Quantity per unit
117-1	Gasket	NBR Rubber	1
117-2	Gasket	NBR Rubber	1
117-3	Gasket	NBR Rubber	1
120-1	Bolt & Nut	SUS Stainless Steel	4
120-3	Bolt & Nut	SUS Stainless Steel	2
120-4	Bolt & Nut	SUS Stainless Steel	4
120-5	Bolt & Nut	SUS Stainless Steel	4or8
128	Nut	SUS Stainless Steel	2
130-1	Set Screw	SUS Stainless Steel	1

Item Number	Description	Material	Quantity per unit
135	Washer	SUS Stainless Steel	2
174	Discharge Bend	FC200 Cast iron	1
219	Companion Flange	FC200 Cast iron	1
741	Sliding Guide	FC200 Cast iron	1
742	QDC Body	FC200 Cast iron	1
743	Suspension Bar	SUS Stainless Steel	1
744	Chain	(Not supplied)	1
747-1	Guide Pin	S17C Steel	4
747-2	Guide Support	SS Steel	1

Note: Those parts with item number indicated in a are supplied with the pump.

Sectional View Model LL 100 Quick Discharge Connector

Applicable to all 5.5 to 22 kW DML models

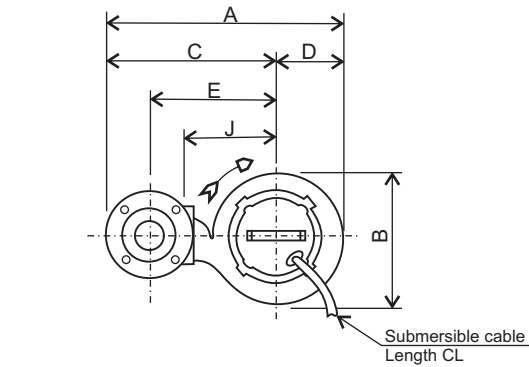


Item Number	Description	Material	Quantity per unit
117-1	Gasket	NBR Rubber	1
117-2	Gasket	NBR Rubber	1
117-3	Gasket	NBR Rubber	1
120-1	Bolt	SUS Stainless Steel	4
120-3	Bolt	SUS Stainless Steel	2
120-4	Bolt & Nut	SUS Stainless Steel	4
120-5	Bolt & Nut	SUS Stainless Steel	4or8
120-6	Bolt	SUS Stainless Steel	4
128-1	Nut	SUS Stainless Steel	2
128-2	Nut	SUS Stainless Steel	2
130-1	Set Screw	SUS Stainless Steel	1

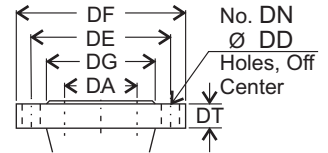
Item Number	Description	Material	Quantity per unit
135	Washer	SUS Stainless Steel	2
174	Discharge Bend	FC200 Cast iron	1
219	Companion Flange	FC200 Cast iron	1
741	Sliding Guide	FCD400 Cast Iron	1
742-1	QDC Body	FC200 Cast iron	1
742-2	QDC Flange	FC200 Cast iron	1
743	Suspension Bar	SUS Stainless Steel	1
744	Chain	(Not supplied)	1
747-1	Guide Pin	SS400 Steel	4
747-2	Guide Support	SS Steel	1

Note: Those parts with item number indicated in a are supplied with the pump.

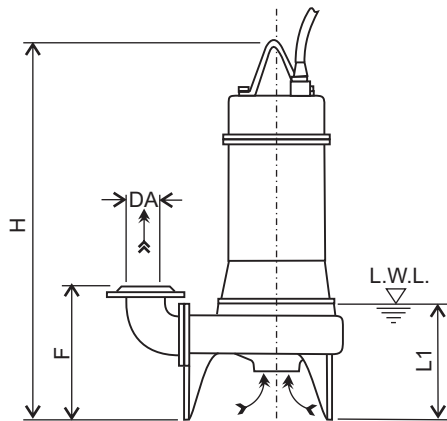
Dimensions



Discharge Flange Dimensions
(JIS 10kgf/cm²)



DA	DE	DF	DG	DT	DN	DD
80	150	185	126	18	4	15
100	175	210	151	20	8	15
150	240	280	212	22	8	19

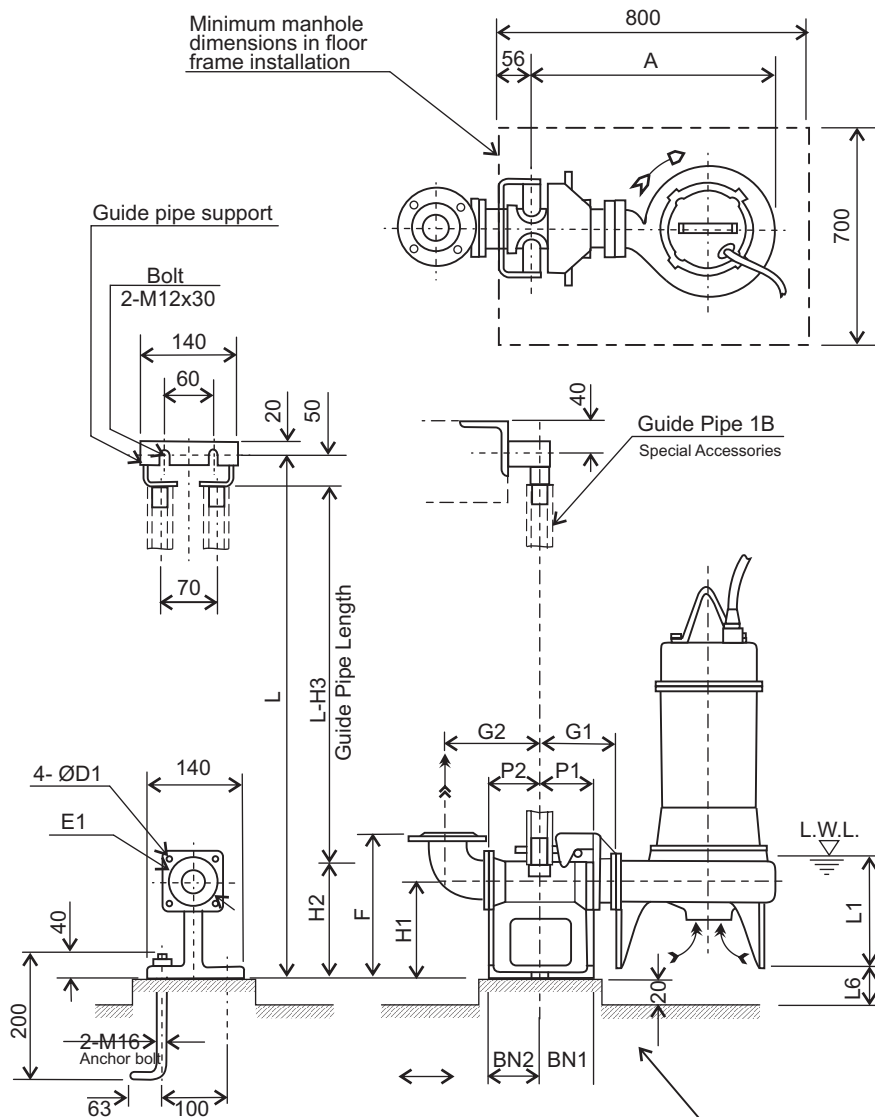


Note:

- 1/. L.W.L (Low Water Level)
Is limited to 10 minutes operation at low water level.
- 2/. Is limited to 30 minutes operation with water level below top of motor.

Size DA	Model	Output KW	A	B	C	D	E	F	H	J	L1	CL	Weight
80	80 DML 52.2	2.2	534	320	378	157	285	298	668	210	279	10 m	80 kg
	80 DML 53.7	3.7	534	320	378	157	285	298	727	210	279	10 m	87 kg
	80 DML 55.5	5.5	640	381	453	188	360	334	824	255	310	10 m	118 kg
	80 DML 57.5	7.5	640	381	453	188	360	334	824	255	310	10 m	123 kg
	80 DML 511	11	734	455	513	221	420	350	938	315	329	10 m	157 kg
	80 DML 515	15	734	455	513	221	420	350	938	315	329	10 m	163 kg
	80 DML 522	22	777	497	533	245	440	363	1021	335	332	10 m	223 kg
100	100 DML 53.7	3.7	577	320	420	157	315	313	727	210	279	10 m	89 kg
	100 DML 55.5	5.5	653	381	465	188	360	334	824	255	310	10 m	121 kg
	100 DML 57.5	7.5	653	381	465	188	360	334	824	255	310	10 m	125 kg
	100 DML 511	11	746	455	525	221	420	350	938	315	329	10 m	160 kg
	100 DML 515	15	746	455	525	221	420	350	938	315	329	10 m	166 kg
	100 DML 522	22	790	497	533	245	440	363	1021	335	332	10 m	226 kg
150	150 DML 55.5	5.5	713	381	525	188	385	369	824	255	310	10 m	127 kg
	150 DML 57.5	7.5	713	381	525	188	385	369	824	255	310	10 m	132 kg
	150 DML 511	11	806	455	585	221	445	385	938	315	329	10 m	166 kg
	150 DML 515	15	806	455	585	221	445	385	938	315	329	10 m	172 kg
	150 DML 522	22	850	497	605	245	465	398	1021	335	332	10 m	232 kg

Units: mm unless otherwise specified



Note:

1/ For detailed dimensions of the pumps, refer to separate dimension data sheets.

2/ The discharge bend and companion flange supplied with the pump are used with the QDC.

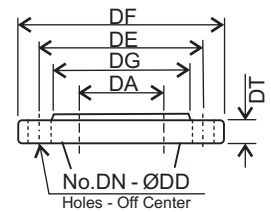
3/ The weight in dimension tables refers only to the weight of the QDC.

4/ Standard accessories supplied with QDC include:-

- Connector body with foundation bolts.
- Guide pipe support
- Sliding Glide
- Adaptor Flange

Guide Pipe is not supplied.

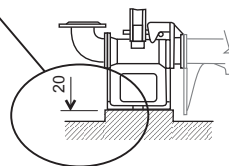
Discharge Flange
(JIS 10kgf/cm²)



DA	DE	DF	DG	DT	DN	DD
80	150	185	126	18	8	15

NOTE

For 80 DML with LM80, body has to be raised 20 mm from floor

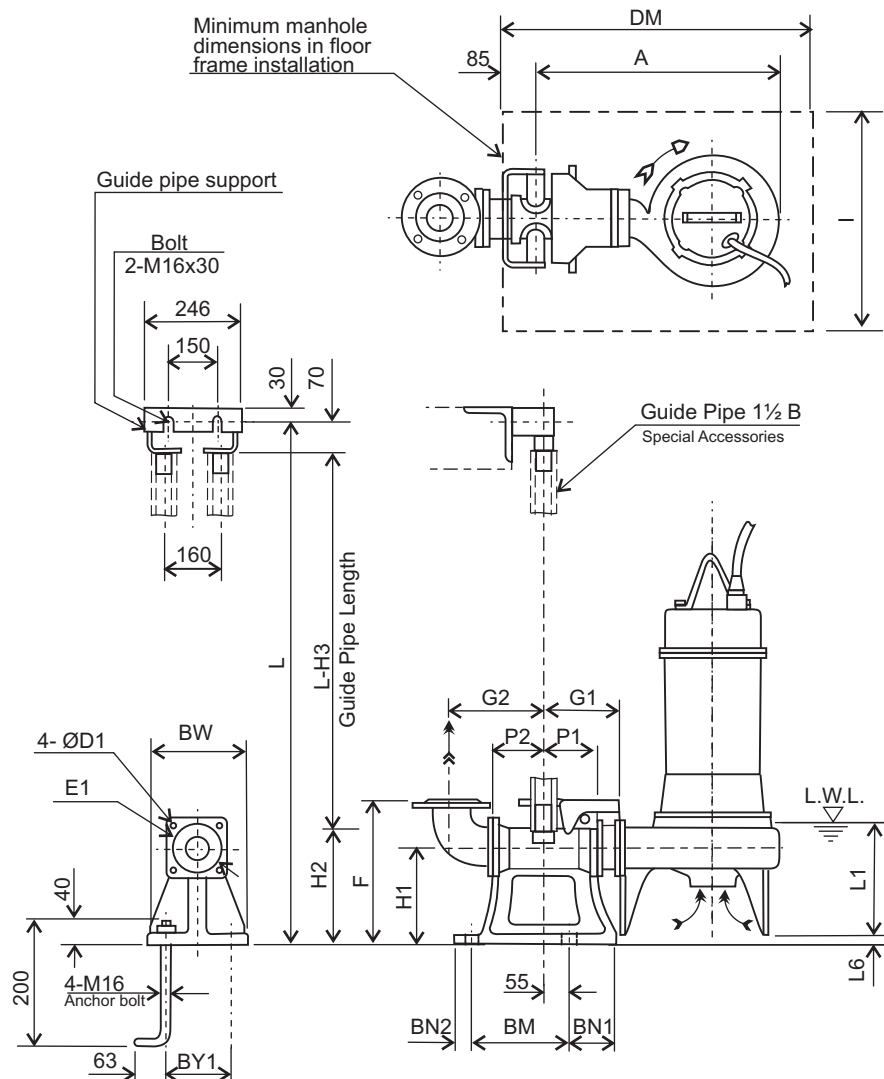


Pump Model	A	P1	P2	G1	G2	F	H1	H2	H3	L1	L6	BN1	BN2	D1	E1	QDC Model	Weight (Of QDC only)
80 DML 52.2	492	75	90	125	165	285	175	230	280	279	7	75	90	15	155	LM80	17 kg
80 DML 53.7	492	75	90	125	165	285	175	230	280	279	7	75	90	15	155	LM80	17 kg

Units: mm unless otherwise specified

Dimensions with QDC

Pump **DML** QDC **LL**



Note:

1/ For detailed dimensions of the pumps, refer to separate dimension data sheets.

2/ The discharge bend and companion flange supplied with the pump are used with the QDC.

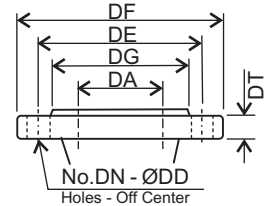
3/ The weight in dimension tables refers only to the weight of the QDC.

4/ Standard accessories supplied with QDC include:-

- Connector body with foundation bolts.
- Guide pipe support
- Sliding Glide
- Adaptor Flange

Guide Pipe is not supplied.

Discharge Flange
(JIS 10kgf/cm²)



DA	DE	DF	DG	DT	DN	DD
80	150	185	126	18	8	15
100	175	210	151	20	8	15
150	240	280	212	22	8	19

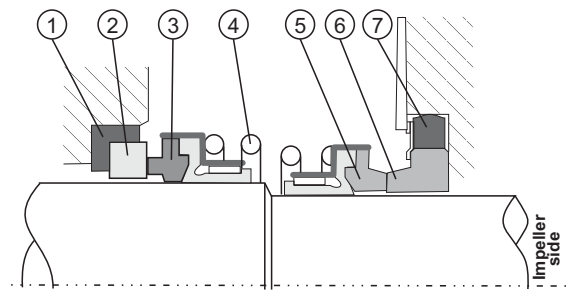
Pump Model	A	P1	P2	G1	G2	F	H1	H2	H3	L1	L6	BN1	BN2	BM	BY1	BW	DM	I	D1	E1	QDC Model	Weight (Of QDC only)
80 DML 55.5	628	105	105	185	210	365	240	265	335	310	31	100	40	220	180	230	800	700	19	175	LL100	46 kg
80 DML 57.5	628	105	105	185	210	365	240	265	335	310	31	100	40	220	180	230	800	700	19	175	LL100	46 kg
80 DML 511	721	105	105	185	210	365	240	265	335	329	15	100	40	220	180	230	1000	700	19	175	LL100	46 kg
80 DML 515	721	105	105	185	210	365	240	265	335	329	15	100	40	220	180	230	1000	700	19	175	LL100	46 kg
80 DML 522	765	105	105	185	210	365	240	255	335	332	12	100	40	220	180	230	1000	700	19	175	LL100	46 kg
100 DML 53.7	552	105	120	185	225	365	240	255	325	279	52	100	40	220	180	230	800	700	15	155	LL80	44 kg
100 DML 55.5	628	105	105	185	210	365	240	265	335	310	31	100	40	220	180	230	800	700	19	175	LL100	46 kg
100 DML 57.5	628	105	105	185	210	365	240	265	335	310	31	100	40	220	180	230	800	700	19	175	LL100	46 kg
100 DML 511	721	105	105	185	210	365	240	265	335	329	15	100	40	220	180	230	1000	700	19	175	LL100	46 kg
100 DML 515	721	105	105	185	210	365	240	265	335	329	15	100	40	220	180	230	1000	700	19	175	LL100	46 kg
100 DML 522	765	105	105	185	210	365	240	265	335	332	12	100	40	220	180	230	1000	700	19	175	LL100	46 kg
150 DML 55.5	628	105	105	185	235	400	240	265	335	310	31	100	40	220	180	230	800	700	19	175	LL100	46 kg
150 DML 57.5	628	105	105	185	235	400	240	265	335	310	31	100	40	220	180	230	800	700	19	175	LL100	46 kg
150 DML 511	721	105	105	185	235	400	240	265	335	329	15	100	40	220	180	230	1000	700	19	175	LL100	46 kg
150 DML 515	721	105	105	185	235	400	240	265	335	329	15	100	40	220	180	230	1000	700	19	175	LL100	46 kg
150 DML 522	765	105	105	185	235	400	240	265	335	332	12	100	40	220	180	230	1000	700	19	175	LL100	46 kg

Units: mm unless otherwise specified

Technical Data Mechanical Seals, Lubricating Oil, Bearings

Applicable Models	Output kW	Mechanical Seal Type	Lubricating Oil		Bearings	
			Capacity - CC	Type	Bottom	Top
DML	2.2	EAN-30	1100	Turbine Oil SAE 10W or SAE 20W (Turbine Oil#32)	5307ZZ	6205ZZ
	3.7				5307ZZ	6205ZZ
	5.5	EAN-40	1600		5309ZZ	6306ZZ
	7.5				5309ZZ	6306ZZ
	11	EAN-45	2900		5310ZZ	6308ZZ
	15				5310ZZ	6308ZZ
	22				3000	5312ZZ
5312ZZ				6309ZZ		

No.	Part Name	Material	No. per Set	Type
1	Packing	N.B.Rubber	1	EAN-30 EAN-40 EAN-45
2	Floating Ring	Ceramic	1	
3	Seal Ring	Carbon Graphite	1	
4	Spring	304 SS	1	
5	Seal Ring	Silicon Carbide	1	
6	Floating Ring	Silicon Carbide	1	
7	Packing	N.B.Rubber	1	



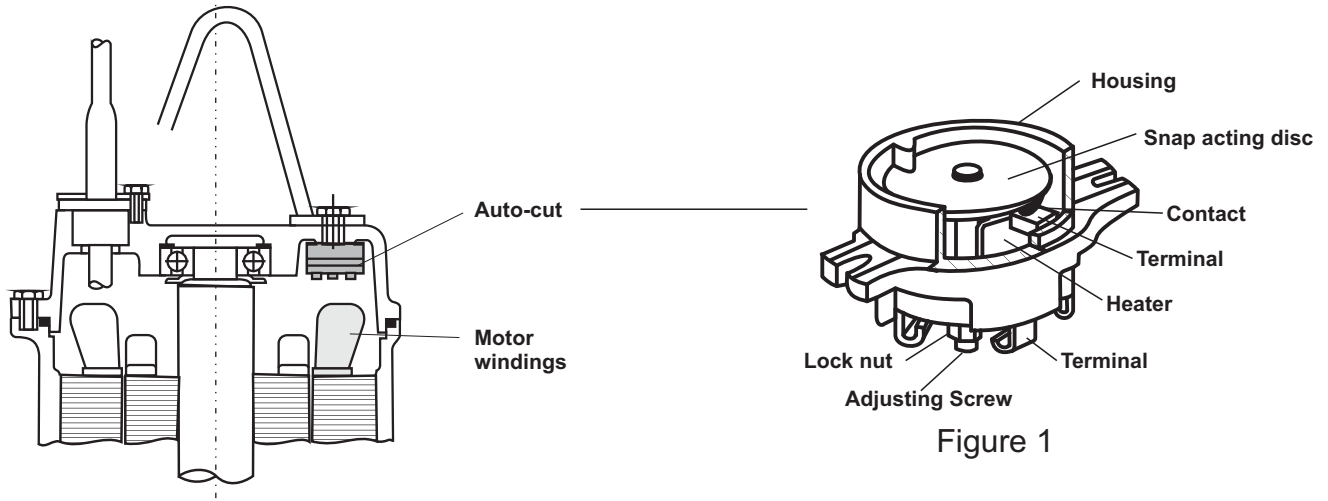
Technical Data

Auto Cut

Applicable to 2.2 kW DML only

The three pole model that is used for three phase models is illustrated below.

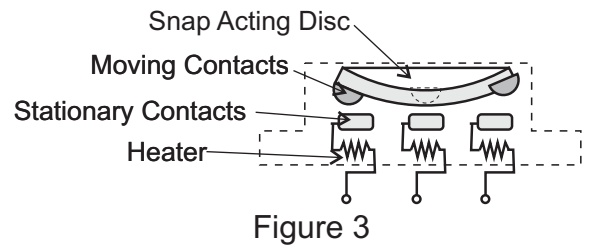
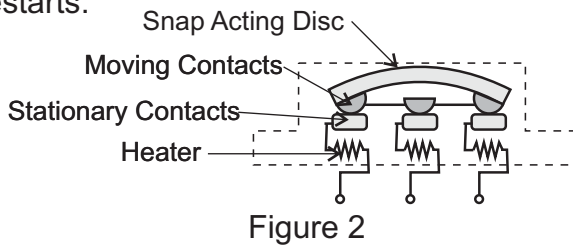
The Auto-Cut consists of: 3 sets of contacts, 1 snap-acting disk, 3 heaters, 3 terminals and 1 calibration bolt and nut, all enclosed in a bakelite housing.



The Auto-Cut is installed directly over the motor winding of the motor where it not only senses over heating of the winding but also excess amperage draw by each winding.

Figure 2 shows the Auto-Cut in its normal operating condition (contacts closed). When actuating temperature is reached, the snap acting disc opens to interrupt the circuit as shown in figure 3 and stops the motor.

When the motor temperature cools down to the safe operating temperature, the snap acting disc resets automatically to the original position as shown in figure 2, and the motor restarts.



To suit models DML		
Phase	Power kW	Auto-Cut
3Ø	2.2	KA-313-GCXL102

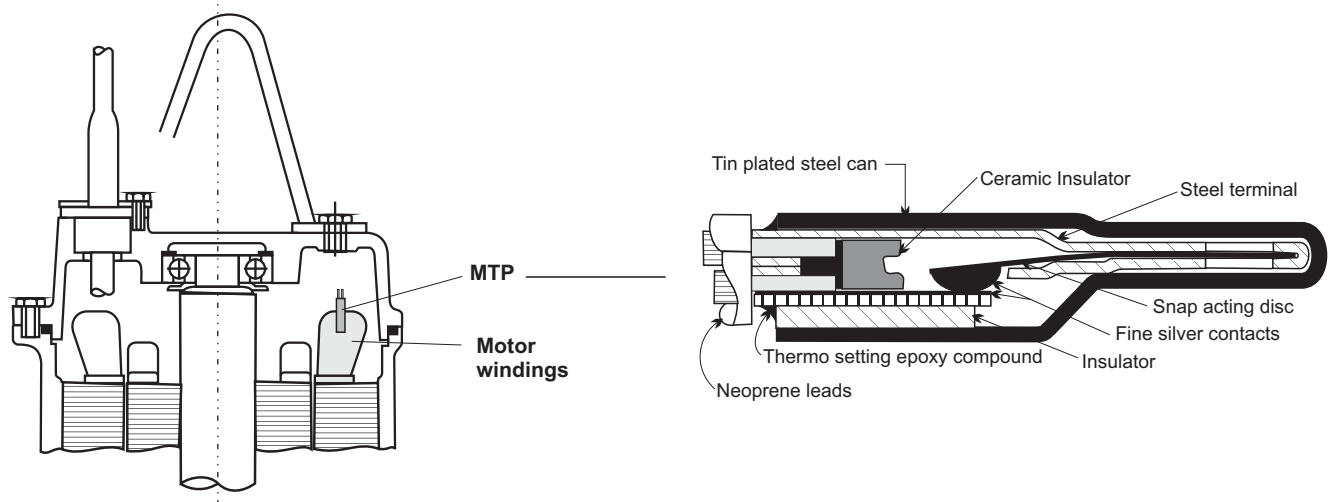
Technical Data

Miniature Thermal Protector

Applicable to 3.7 to 22 kW DML

A Miniature Thermal Protector (MTP) is embedded in each winding of the motor as illustrated below, and provides automatic cut off with manual reset..

When the temperature of the windings increases and reaches the MTP acting point, an external motor protection circuit (not supplied) is activated.



Specifications

for 380/400/415 Volt, 50Hz, 3 phase motors

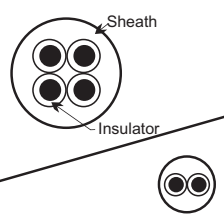

	to suit models DML 3.7 to 22 kW
Model	Klixon 9700K-46-215
Type of contact	b (Normally - Closed, Acting-Open)
Acting temperature	150 ± 5°C
Re-setting temperature	Approx 100°C
Contact Rating	DC 24V - 18A
	AC 230V - 13A

Technical Data

Cable Specifications

Applicable Models		Motor kW	Starting method	Length of cable	Material	Number & size of conductor(s)		
						Power Cable(s)		Protector Cable
DML	Three Phase	2.2	DOL	10m	H07RN-F	1 of	4 x 1.5 mm ²	2 x 1 mm²
		3.7	Y-Δ	10m	H07RN-F	2 of	4 x 1.5 mm ²	2 x 1 mm ²
		5.5	Y-Δ	10m	H07RN-F	2 of	4 x 1.5 mm ²	2 x 1 mm ²
		7.5	Y-Δ	10m	H07RN-F	2 of	4 x 1.5 mm ²	2 x 1 mm ²
		11	Y-Δ	10m	H07RN-F	2 of	4 x 4 mm ²	2 x 1 mm ²
		15	Y-Δ	10m	H07RN-F	2 of	4 x 4 mm ²	2 x 1 mm ²
		22	Y-Δ	10m	H07RN-F	2 of	4 x 6 mm ²	2 x 1 mm ²

DML models 3.7 kW and above are designed for connection to a star delta starter, having two of 4 core power cables. They also have miniature thermal protectors embedded in the windings of the motor, using a 2 core cable for connection to an external motor protection circuit (not supplied).

Item	Cross sectional area of conductors	No. of conductors	Cable Type	Sheath Material	Insulation Material	Sheath Thickness mm	Insulation Thickness mm	Overall Diameter mm	
Three Phase Power Cables	1.5 mm ²	4	H07RN-F	PCR	EPR	1.7	0.8	11.2	
	4 mm ²					2.0	1.0	15.4	
	6 mm ²					2.3	1.0	18.1	
Protector Cable	1 mm ²	2	H07RN-F	PCR	EPR	1.3	0.8	8.7	

PCR = Polychloroprene Rubber EPR = Ethylene Propylene Rubber

Note: Cable specifications were changed in 2009 to be meet CE market requirements. See pages 500 & 501 for more details.

Motor Data **2.2 to 22 kW, Three Phase, 4 Pole Motors**

Hz	Poles	Phase	Output (kW)	Voltage	Applicable Models
50	4	3	2.2 to 22	415 V	DML

Name-Plate Rating	Model	VZDL	VZDL	VZDL	VZDL	VZDL	VZDL	VZDL
	Output - kW	2.2	3.7	5.5	7.5	11	15	22
	Phase	3	3	3	3	3	3	3
	Poles	4	4	4	4	4	4	4
	Volts	415	415	415	415	415	415	415
	Amps	5.2	8.4	12.7	16.9	23.0	30.0	42.0
	Speed - rpm	1420	1420	1440	1450	1450	1450	1460
	Insulation Class	F	F	F	F	F	F	F
No Load Test	Amps	2.81	4.45	7.64	9.70	11.85	15.08	18.82
	Watts	580	840	1330	1550	1730	1950	2100
Resistance at 20° C	Ohms	6.953	3.592	1.842	1.248	0.863	0.549	0.289
75% Load	Current - Amps	4.32	6.95	10.83	14.34	18.96	24.67	34.04
	Efficiency - %	67.13	69.56	71.38	72.81	78.80	81.98	83.88
	Power Factor - %	79.22	79.82	74.23	74.96	76.81	77.39	80.41
	Speed - rpm	1442	1447	1460	1467	1467	1469	1474
100% Load	Current - Amps	5.20	8.40	12.70	16.90	23.00	30.00	42.00
	Efficiency - %	68.98	71.61	74.06	75.61	80.40	83.29	85.34
	Power Factor - %	85.08	85.44	81.03	81.47	82.59	83.46	85.16
	Speed - rpm	1421	1428	1445	1446	1454	1457	1466
Locked Rotor Torque - %		221	244	272	278	184	211	185
Start Current - amps ^(DOL)		26.7	50.0	87.8	121.7	141.9	220.9	332.7
Number starts per hour		20	20	20	20	20	20	20
Design Standard		JEC37	JEC37	JEC37	JEC37	JEC37	JEC37	JEC37
Voltage Tolerance		± 10%	± 10%	± 10%	± 10%	± 10%	± 10%	± 10%
Frequency Tolerance		± 5%	± 5%	± 5%	± 5%	± 5%	± 5%	± 5%
Gd ² - kgm ²		0.02	0.03	0.059	0.076	0.12	0.16	0.34
Mft's Symbols		EB	EB	EB	EB	EB	EB	EB

Change to Cable Specifications

Note: Cable specifications were changed in 2009 to be meet CE market requirements. Materials and colour of cables where changed as below.

Cables with the same gland shape are interchangeable, providing conductor size is suitable for motor power.

Note that superceded cable conductors were often of larger size as they were designed for use with lower voltage (200Volt) motors.

"New" CE Marked cables (from August 2009)									
Applicable Models		Motor kW	Starting method	Length of cable	Material	Power Cable Details			Protector Cable
						Qty	Size	Gland Shape	Size & Gland
DML	Three Phase	2.2	DOL	10m	H07RN-F	1	4 x 1.5 mm ²		N/A
		3.7	Y-Δ			2	4 x 1.5 mm ²		
		5.5							
		7.5							
		11							
		15							
		22							
	4 x 4 mm ²								
		4 x 6 mm ²							

DML models 3.7 kW and above are designed for connection to a star delta starter, having two of 4 core power cables. They also have miniature thermal protectors embedded in the windings of the motor, using a 2 core cable for connection to an external motor protection circuit (not supplied).

Power Cable Colours (& tag)	Cable 1 - BLACK 1 (U1), BLACK 2 (V1) & BLACK 3 (W1) with GREEN/YELLOW Earth (PE) Cable 2 - BLACK 1 (V2), BLACK 2 (W2) & BLACK 3 (U2) with GREEN/YELLOW Earth (PE)
Protector Cable Colours	BLUE & BROWN

The cable number is printed along each black cable.



Superceded cables (pre August 2009)									
Applicable Models		Motor kW	Starting method	Length of cable	Material	Power Cable Details		Protector Cable	
						Size	Gland Shape	Size & Gland	
DML	Three Phase	2.2	DOL	10m	HVTC	4 x 2 mm ²		N/A	
		3.7	Y-Δ	10m	HVTC	4 x 2 mm ² & 3 x 2 mm ²			2 x 1.25 mm ²
		5.5							
		7.5				4 x 3.5 mm ² & 3 x 3.5 mm ²			
		11				4 x 5.5 mm ² & 3 x 5.5 mm ²			
		15				4 x 14 mm ² & 3 x 14 mm ²			
		22	4 x 14 mm ² & 3 x 14 mm ²						

DML models 3.7 kW and above designed for connection to a star delta starter, had 1 of 4 core power cable and 1 of 3 core power cable (and the 2 core protector cable).

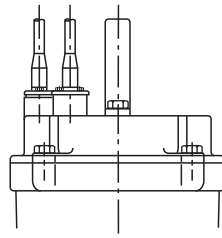
Power Cable Colours	4 core cable - RED, WHITE & BLACK with GREEN Earth 3 core cable - RED, WHITE & BLACK
Protector Cable Colours	BLACK & WHITE

Change to Cable Specifications

The diagrams below illustrate the changes to the various size model DML pumps and can be used to assist in identifying whether they are current or superceded versions, which is necessary to ensure the correct replacement cables are supplied.

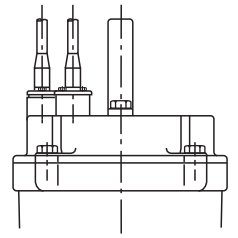
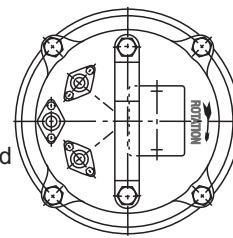
Superceded

Current

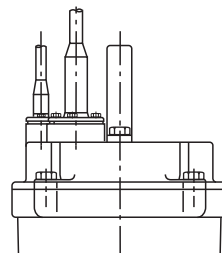
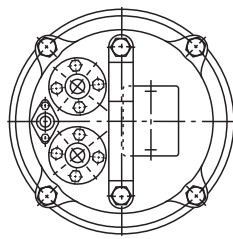


1x4 + 1x3 core
2 mm²
Diamond gland

2x4 core
1.5 mm²
Diamond gland

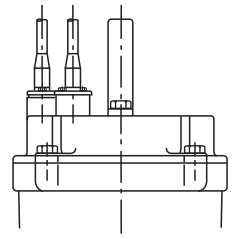
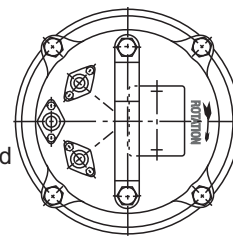


3.7 kW

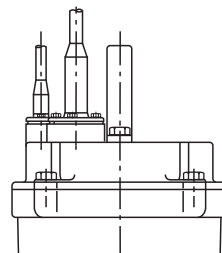
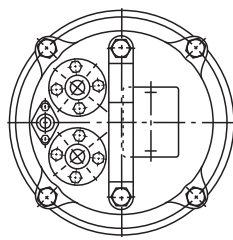


1x4 + 1x3 core
3.5 mm²
Round gland
(~Ø55)

2x4 core
1.5 mm²
Diamond gland

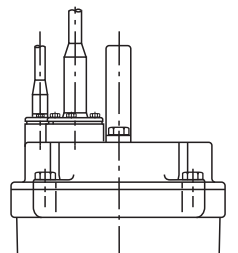
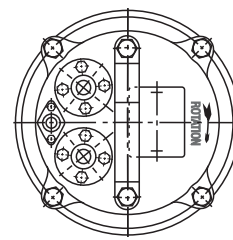


5.5 & 7.5 kW

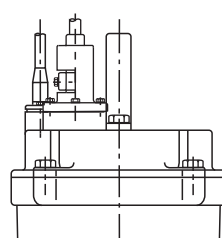
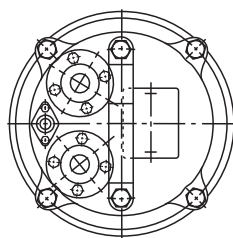


1x4 + 1x3 core
3.5 mm² (11 kW)
5.5 mm² (15 kW)
Round gland
(~Ø55)

2x4 core
4 mm²
Round gland
(~Ø55)

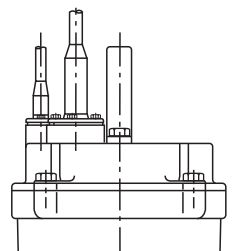
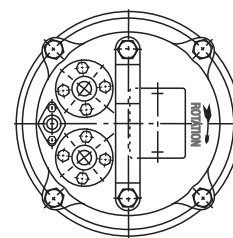


11 & 15 kW



1x4 + 1x3 core
14 mm²
Round cast iron gland
with clamp
(~Ø100)

2x4 core
6 mm²
Round gland
(~Ø55)



22 kW

All specifications subject to change without notice

DML models 3.7 kW and above are designed for connection to a start-delta starter, having two of 4 core power cables. They also have Miniature Thermal Protectors (MTP's) embedded in the winding of the motor, which provides automatic cut off with manual reset. When the temperature of the windings increases and reaches the MTP acting point, an external motor protection circuit (not supplied) is activated.

To be connected to external protection equipment supplied and installed by user.

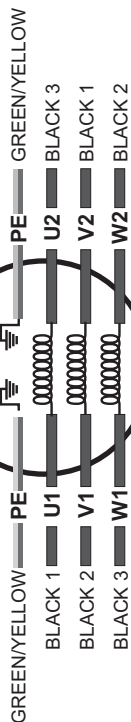
Appropriate thermal overload relays must be installed in the control panel, since the thermal protector is not capable of detecting sudden temperature rises caused by single phasing or locked rotor.



BLUE
BROWN

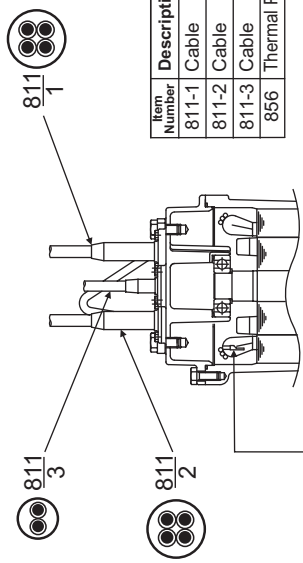
4 core power cable

4 core power cable



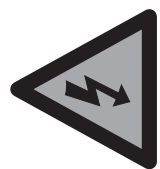
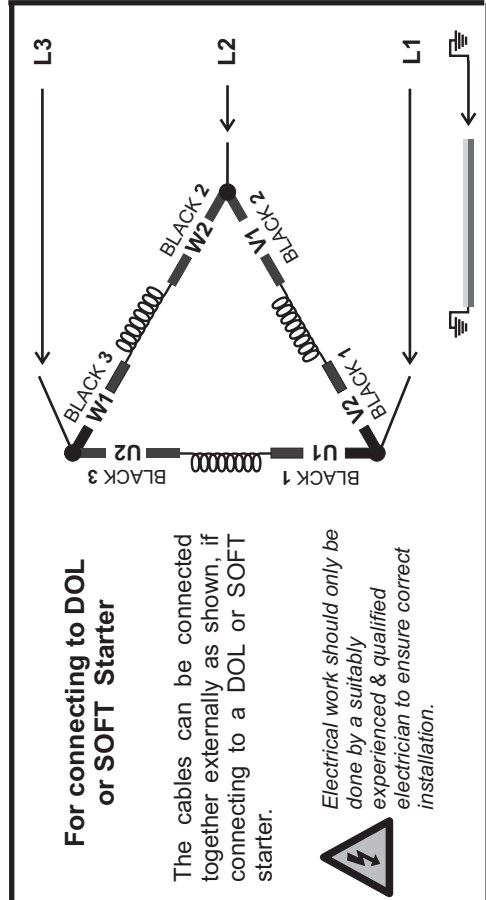
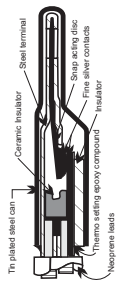
Cable tags on the end of each cable

The cable number is printed along each black cable.



Item Number	Description	Material	Quantity per unit
811-1	Cable	4 core power cable	1
811-2	Cable	4 core power cable	1
811-3	Cable	2 core protector cable	1
856	Thermal Protector	Klixon 9700K-46-215	2

to suit models DML 3.7 to 22 kW	
Model	Klixon 9700K-46-215
Type of contact	b (Normally - Closed, Acting-Open)
Acting temperature	150 ± 5°C
Re-setting temperature	Approx 100°C
DC Rating	DC 24V - 18A
Contact Rating	AC 230V - 13A



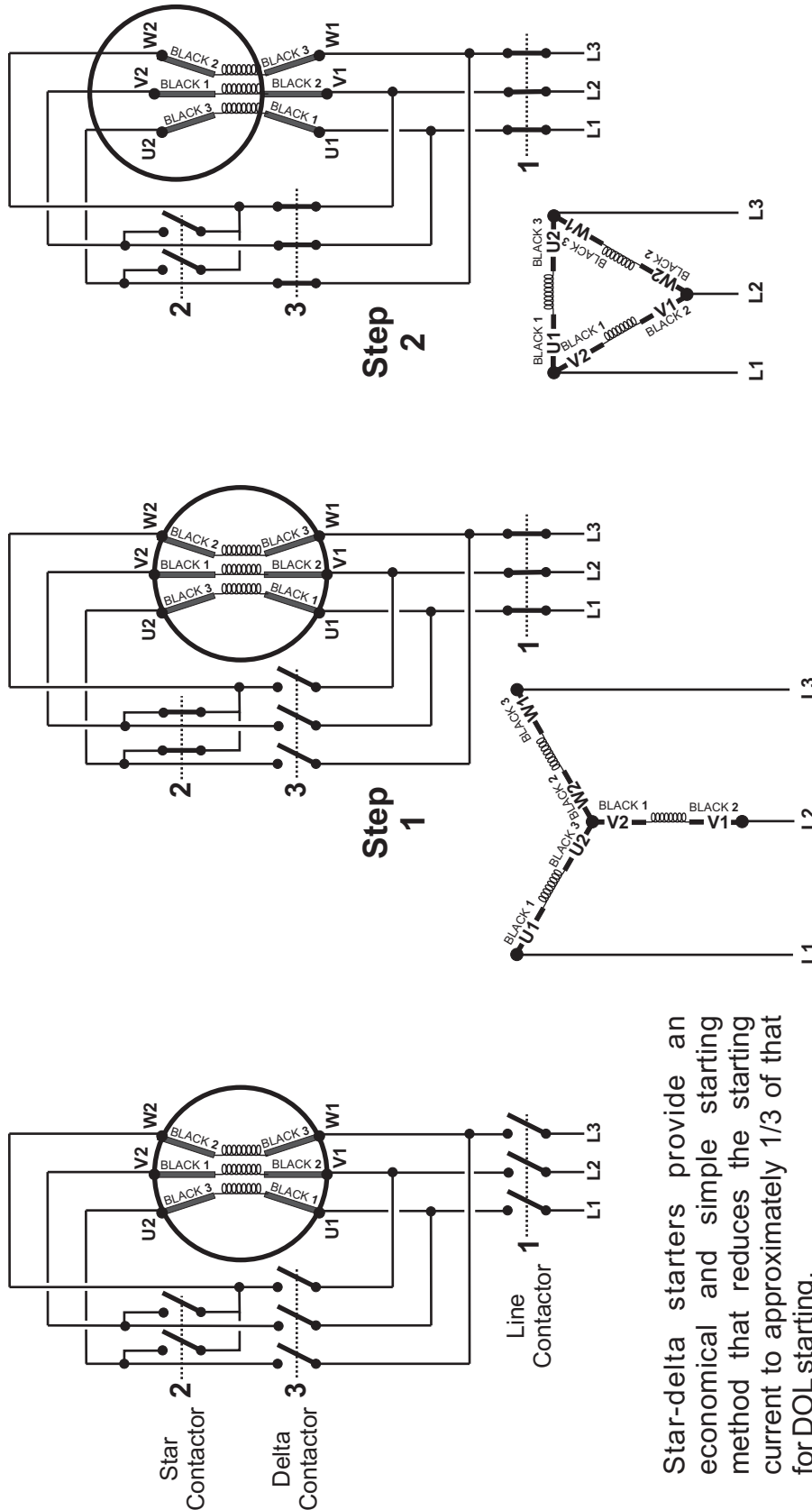
All electrical work must be performed correctly by a qualified electrician and all national and local electrical codes must be observed.

Note: Refer to instruction manual supplied with pump

All specifications subject to change without notice

Applicable to
3.7 to 22 kW DML models

Example of Star-Delta Starting



Star-delta starters provide an economical and simple starting method that reduces the starting current to approximately 1/3 of that for DOL starting.



All electrical work must be performed correctly by a qualified electrician and all national and local electrical codes must be observed.

Note: Refer to instruction manual supplied with pump