DOC. No. ETP-0002 REV. 1

COMPLETE IN 45 SHEETS

TITLE Technical Document

CUSTOMER

FINAL USER

PROJECT

JOB NO.

MODEL DSC4 50Hz Version

| TO | SET |
|---|---|

ISSUED BY Submersible Pump Development Dept.

| REV. | PAGE | DATE | APPROVED | BY |
|---|---|---|---|---|
| 4 | | | | |
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| 1 | P1-3,P2-4,7,P3-1,3,7,10 | Mar.26.2010 | H.Sakacho | S.Yamada |

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EBARA

EBARA CORPORATION

PM35U

## CONTENTS

**1. PUMP RATED CAPACITY AND TOTAL HEAD**

Pumping requirements in the system are stated as **Rated Capacity** and **Rated Total Head**.

Rated capacity is the flow rate determined by the total design capacity of pumping station and the number of operating pumps.

$$\textbf{Rated Capacity} = \frac{\text{Total design capacity of pumping station}}{\text{Number of operating pumps}}$$

**Rated Total Head =** System head at the rated capacity.

The pump is operated at the cross point of the pump Q-H Curve (capacity-head) and the **System Head Curve** as shown in Fig.1-1. The head at the cross point is defined as the rated total head of pump.

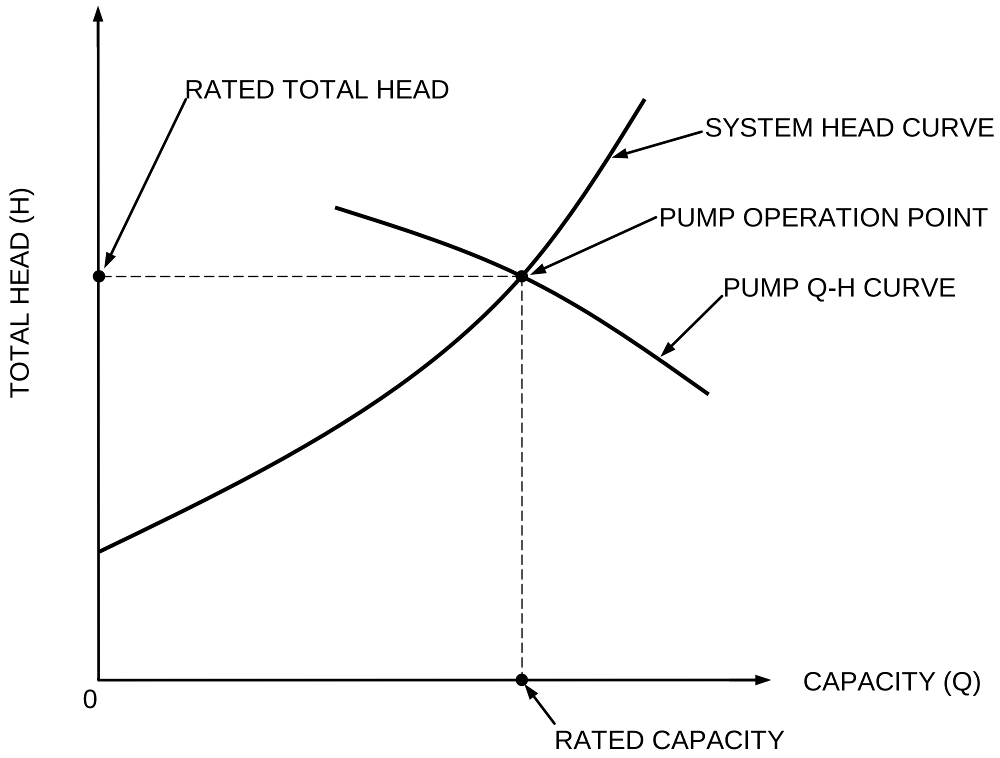



**Fig 1-1 PUMP OPERATION POINT**

## 2. SYSTEM HEAD

System head of the system is the sum of the **Static Head** and the **Dynamic Head**, and its curve is a quadratic curve of the capacity as shown in Fig.1-2.

**System Head =** Static head (Ha)＋Dynamic head (Hd)

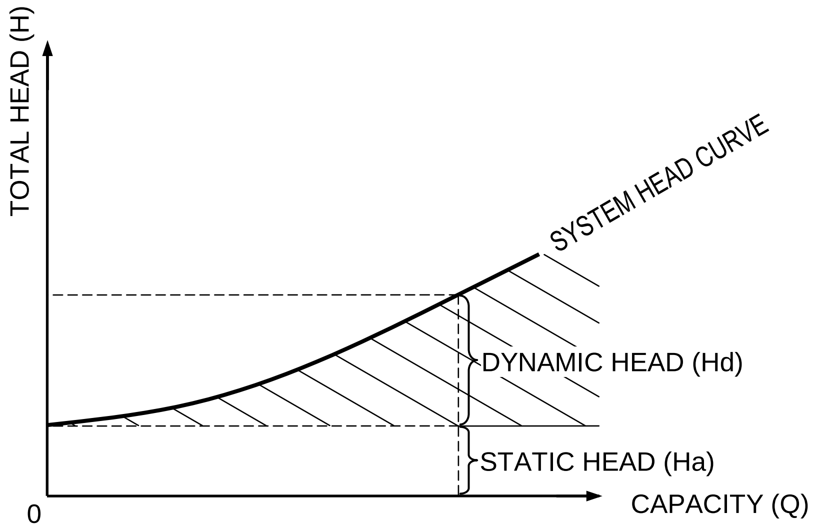



**Fig.1-2 SYSTEM HEAD CURVE**

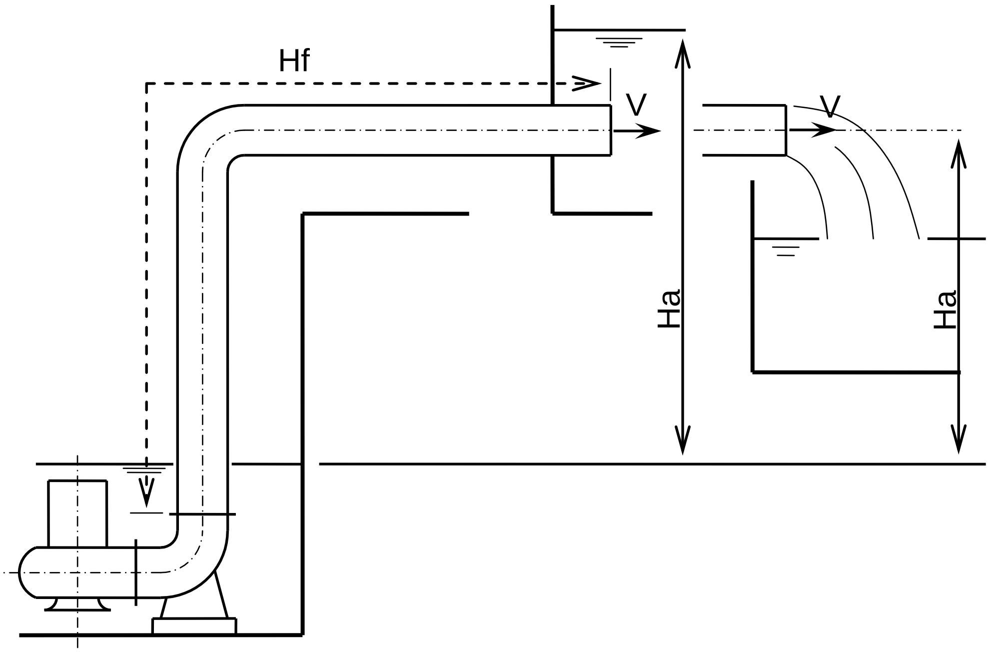



**Fig.1-3 SYSTEM HEAD** △1

**Dynamic Head(Hd)**

Dynamic head for each case of static head in Fig.1-3 is as follows:

$$Hd = Hf + \frac{V^2}{2g}$$

Where, Hf : Hydraulic loss from the discharge of QDC to the system discharge end

$\frac{V^2}{2g}$ : Velocity head at the system discharge end

### 3. PUMP OPERATION RANGE

As stated in para.1 the pump is operated at the cross point of its Q-H curve and the system head curve. Therefore , so long as the system head curve is not changed, the pump is operated at a design point. In an actual pumping system, however, the static head varies depending on the suction and/or discharge water level. As a result, the system head curve shifts as shown in Flg.1-4.

With this shift in the system head curve, the cross point with pump Q-H varies, and this variation is termed as the **Pump Operation Range**.

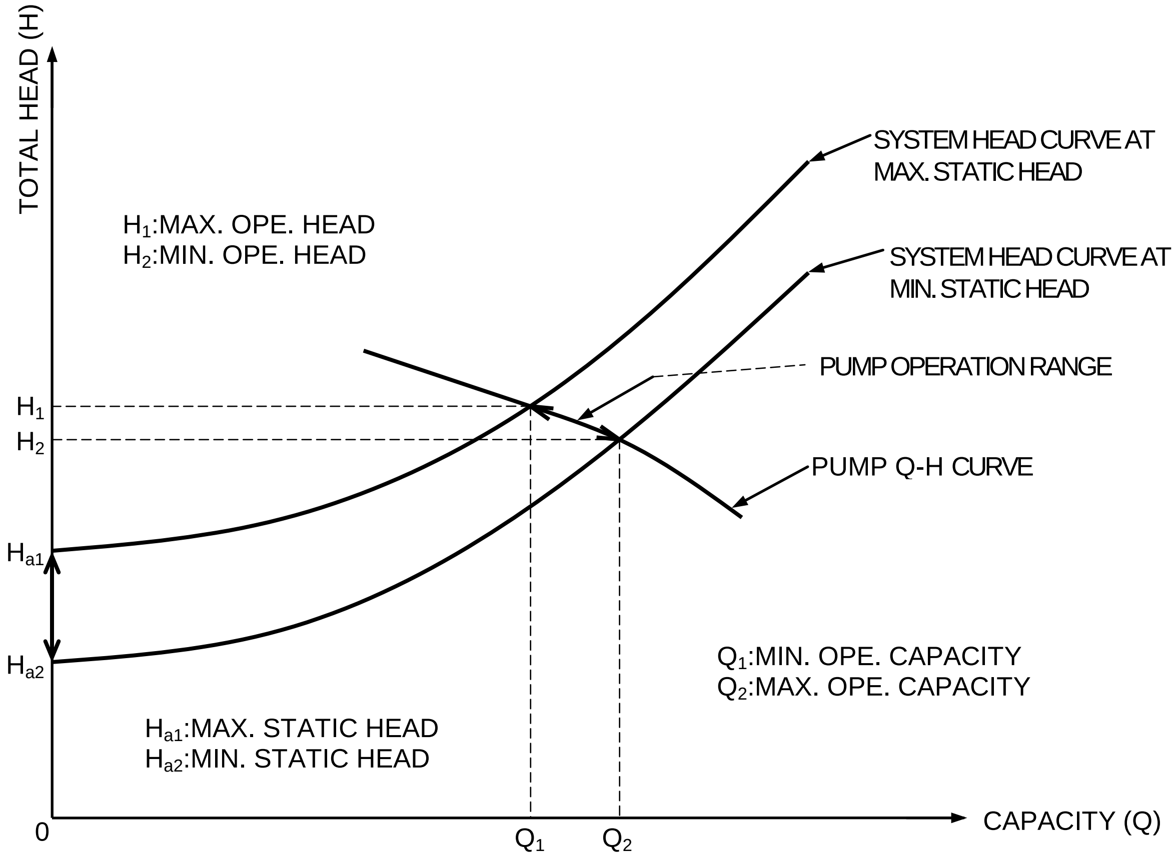



**Fig.1-4 PUMP OPERATION RANGE**

## 4. NPSH

Adequate suction pressure at the impeller is necessary for the pump to perform as designed. This suction pressure (absolute) converted into water head is called **NPSH req.** and is shown on the pump performance curve as one of the pump characteristic.

On the other hand, actual suction pressure (absolute) converted into water head is called **NPSH av.** and is defined as shown in Fig.1-5

NPSH req. shall not exceed NPSH av. in the continuous operation range.

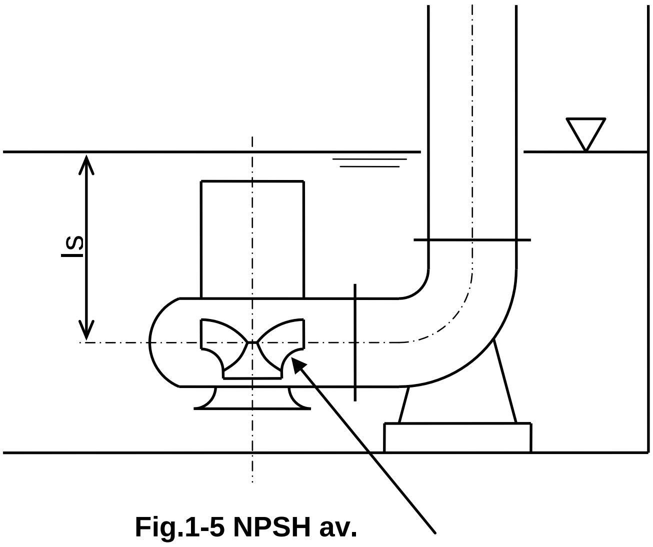



**Fig.1-5 NPSH av.**

NPSH available (m)
NPSH av. = Is + Pa – Pv
Where,

Is: Submergence of impeller (m)
Pa: Atmospheric pressure (m)
under 1 atm, Pa = 10.3m
Pv: Vapor pressure (m)
water at 20℃, Pv = 0.24 (m)

**5. AIR-ENTRAINING VORTEX**

Lack of enough submergence causes the generation of harmful air-entraining vortices as shown in Fig.1-6. The submergence at which generation of vortices can be avoided is termed as the **Minimum Submergence (S).**

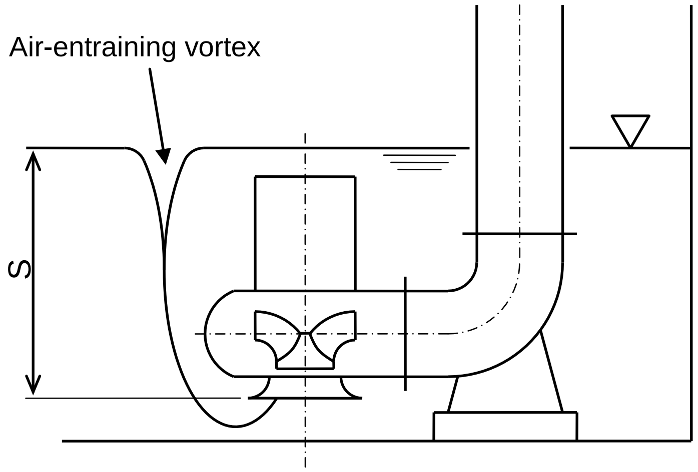



**Fig.1-6 AIR-ENTRAINING VORTEX**

**6. SUBSURFACE VORTEX**

In cases where the clearance between pump and bottom of the pit is not adequate, harmful subsurface vortices generates as shown in Fig.1-7

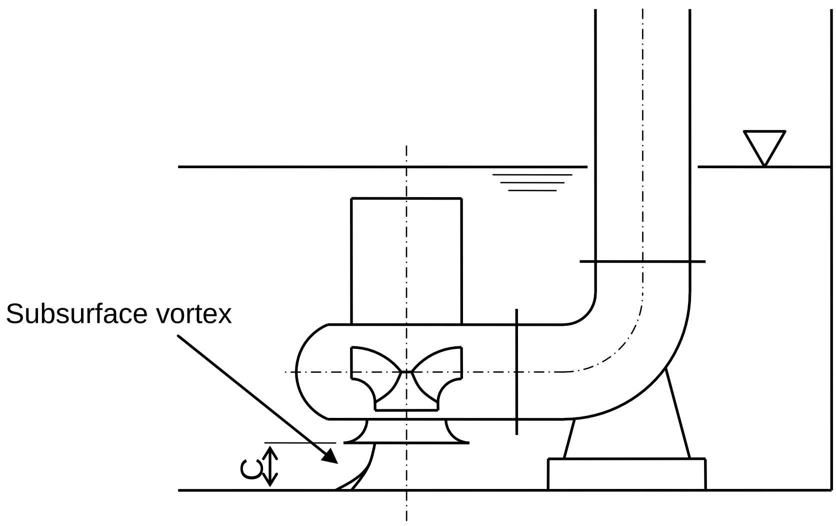
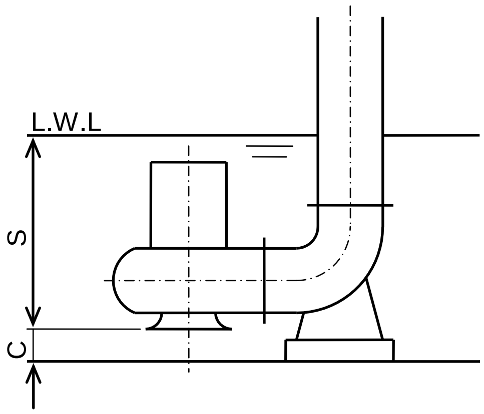



**Fig.1-7 SUBSURFACE VORTEX**

## 7. SUBMERGENCE AND CLEARANCE



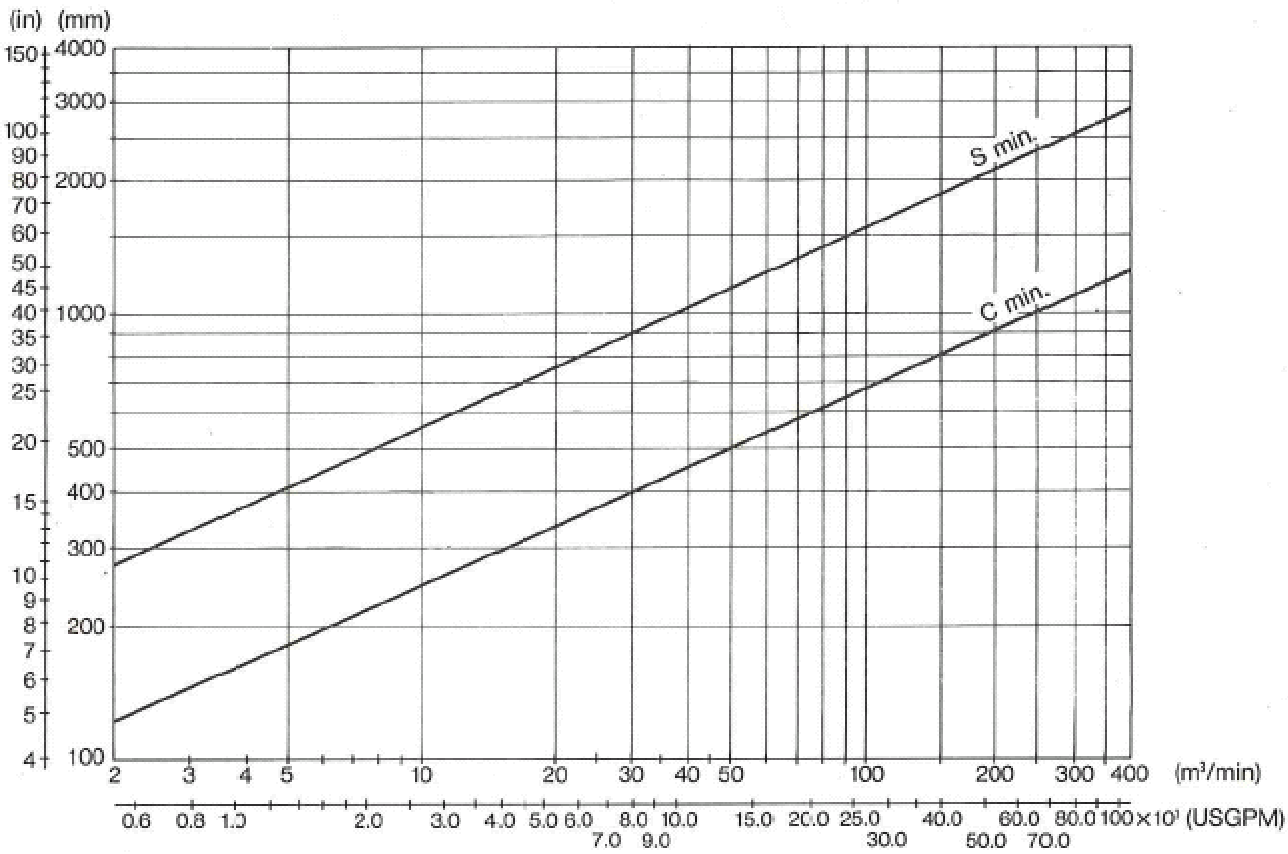




**Fig. 1-8 SUBMERGENCE AND CLEARANCE**

## 1. PUMP DESCRIPTION

Discharge Bore Size (mm)

PUMP MODEL 150DSC4

MODEL CODE AO – 45050

HYDRO MODEL

IMP. TYPE
(Open: O
Close: C)

Motor Output (50hp)
Frequency (5: 50Hz)
Pole

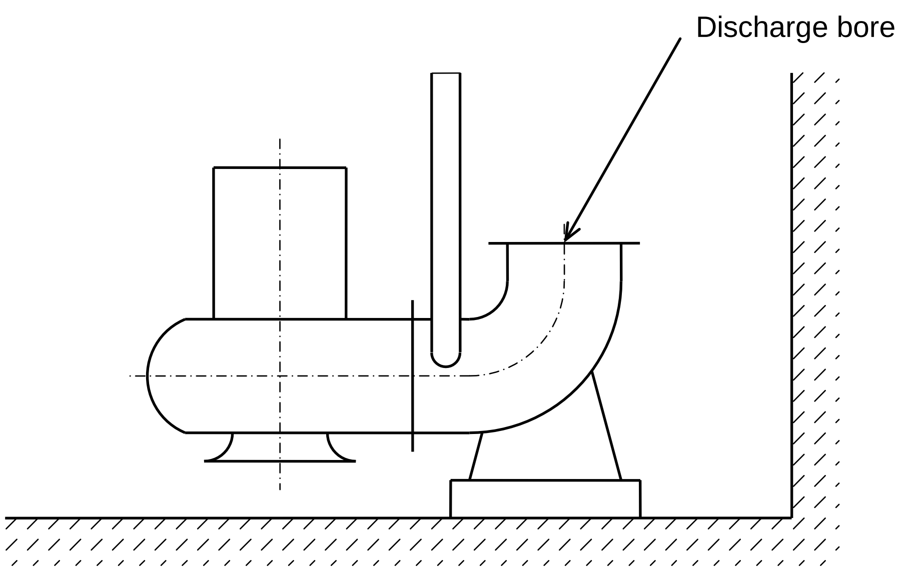



**Fig. 2-1 Pump Description**

## 2. TYPICAL INSTALLATION

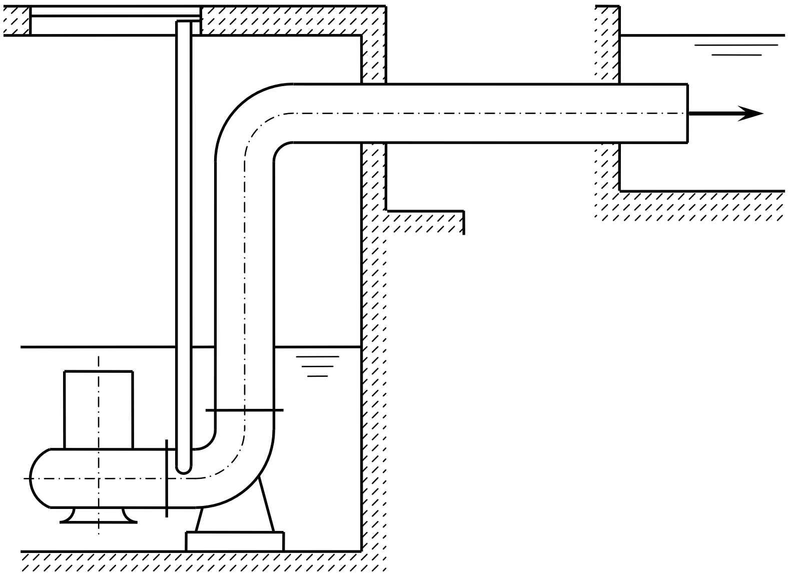


**Fig.2-2 Typical Installation**

## 3. STANDARD SPECIFICATIONS

| STANDARD SPECIFICATION | | | OPTION |
|---|---|---|---|
| Design | Capacity | 2 to 20 $m^3$ /min | |
| | Total head | 5 to 50m | |
| | Liquid temp. | 0 to 40 ℃ | |
| | Max. submergence | 35m | |
| Construction | Impeller | Open / Close | |
| | Shaft seal | Cartridge type duplex mechanical seals in tandem arrangement | |
| | | Upper: Carbon/Ceramic | |
| | | Lower: Silicon Carbide/Silicon Carbide | |
| | Bearing | Grease lubricated ball bearing | |
| | Driver | Air filled watertight electric motor with cooling jacket | |
| | | Starting method: D.O.L. / Star Delta | |
| | Mounting method | Quick discharge connector (QDC) with guide pipes for wet pit installation | |
| Accessories | | 10m watertight rubber insulated flexible cable | Temp.detector for Thrust brg. |
| | | Built-in winding temp. detectors for each phase | |
| | | Built-in float type leakage detector | |
| Codes & Standards | | JIS, JEC (see Note) | |

Note:

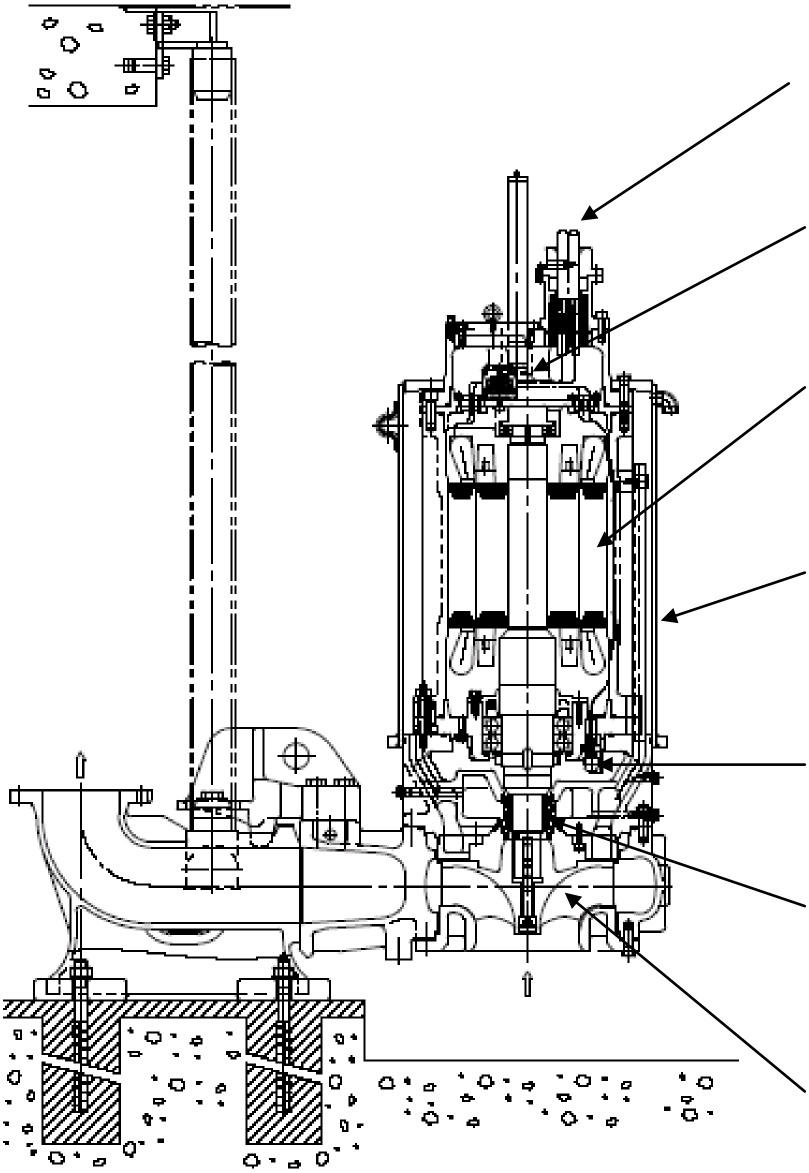
JIS: Japanese Industrial Standard
JEC: Japanese Electrotechnical Committee

## 4. IMPELLER DESIGN ⚠1

<table>
<tr><th>Pump Model</th><th>Model Code</th><th>Type of Impeller</th><th>Nos. of Blades</th><th>Passable solid dia. (inch)</th></tr>
<tr><td rowspan="4">150DSC4</td><td>AO-45050</td><td>Open</td><td rowspan="4">2</td><td rowspan="9">3</td></tr>
<tr><td>BC-45075</td><td rowspan="3">Close</td></tr>
<tr><td>BC-45060</td></tr>
<tr><td>CC-45100</td></tr>
<tr><td rowspan="3">250DSC4</td><td>EO-65075</td><td rowspan="6">Open</td><td rowspan="5">3</td></tr>
<tr><td>EO-65060</td></tr>
<tr><td>EO-65050</td></tr>
<tr><td rowspan="2">300DSC4</td><td>FO-65050</td></tr>
<tr><td>GO-65050</td></tr>
<tr><td rowspan="3">150DSC4</td><td>HO-45050</td><td rowspan="3">2</td><td>2</td></tr>
<tr><td>BBC-45145</td><td rowspan="2">Close</td><td rowspan="5">3</td></tr>
<tr><td>BBC-45120</td></tr>
<tr><td rowspan="3">300DSC4</td><td>EEO-65145</td><td rowspan="3">Open</td><td rowspan="3">3</td></tr>
<tr><td>EEO-65120</td></tr>
<tr><td>EEO-65100</td></tr>
</table>

## 5. TYPICAL CONSTRUCTION

Open Impeller Model



Watertight cable entry system assures safe operation without water leakage into terminal casing.

Terminal board provides easy connecting of cable.

High efficiency, compact designed motor with thermal detector for each phase of winding.

Self cooling system with cooling Jacket assures safe operation of motor in the air.

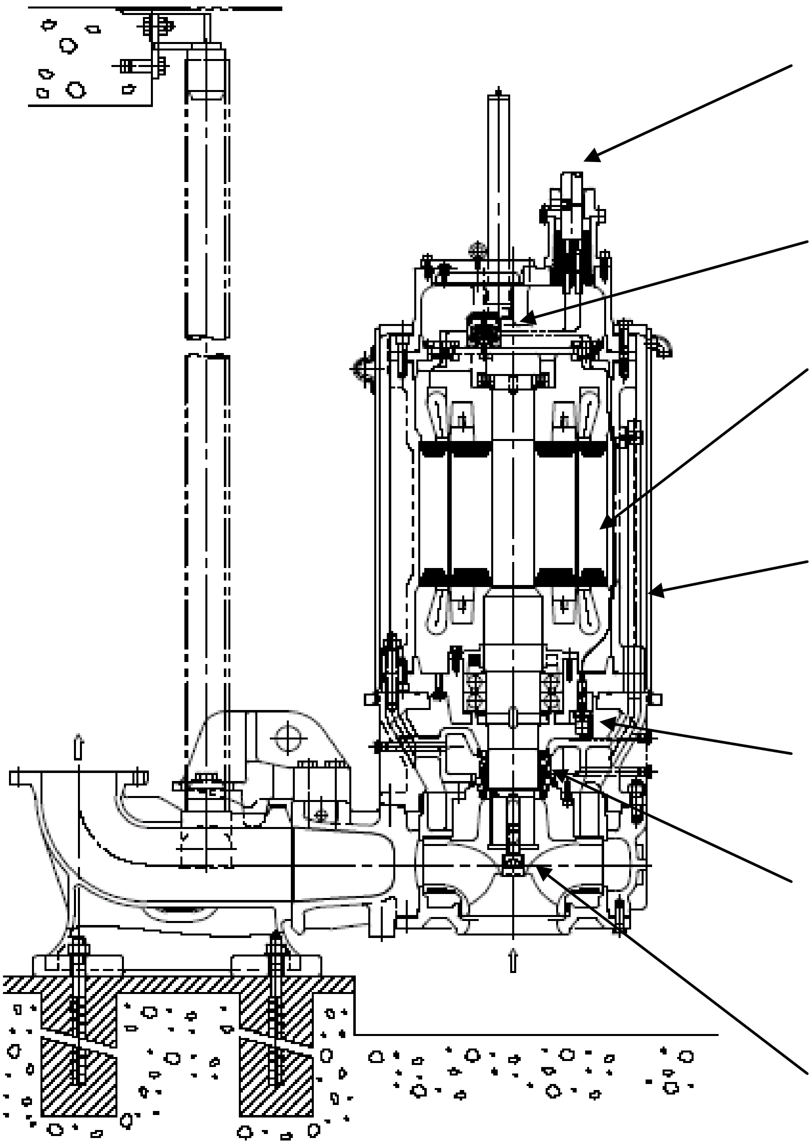
Float type leakage detector warns mechanical seal failure.

Cartridge type, duplex mechanical seals in tandem arrangement provides easy maintenance and high reliability.

High efficiency, open impeller accepts large solid dia.

**Fig.2-3 Typical Construction (Open Impeller)**

Close Impeller Model



Watertight cable entry system assures safe operation without water leakage into terminal casing.

Terminal board provides easy connecting of cable.

High efficiency, compact designed motor with thermal detector for each phase of winding.

Self cooling system with cooling Jacket assures safe operation of motor in the air.

Float type leakage detector warns mechanical seal failure.

Cartridge type, duplex mechanical seals in tandem arrangement provides easy maintenance and high reliability.

High efficiency, closed impeller accepts large solid dia.

**Fig.2-4 Typical Construction (Close Impeller)**

## 6 . MATERIALS

| PARTS | MATERIAL |
|---|---|
| Pump casing<br>QDC | Cast iron<br>JIS FC250<br>equiv. to ASTM A48 CL35 |
| Impeller | Cast iron<br>JIS FC250<br>equiv. to ASTM A48 CL35 |
| Shaft | Stainless Steel<br>JIS SUS420J2 △1<br>equiv. to AISI 420 |
| Casing ring | Stainless Steel<br>JIS SUS420<br>equiv. to AISI 420 |
| Motor Frame | Cast iron<br>JIS FC250<br>equiv. to ASTM A48 CL35 |
| Cooling jacket | Rolled steel<br>JIS SS400<br>equiv. to ASTM A283 Gr.D |
| Mechanical Seal | Upper: Carbon/Ceramic<br>Lower: Silicon Carbide/Silicon Carbide |

## 7. LUBRICATION

| | | LOWER BEARING | UPPER BEARING | SHAFT SEAL |
|---|---|---|---|---|
| Lubricant | | GREASE | | Turbo Oil (See Note) |
| Standard | | NLGI grade 3 | | ISO VG32 |
| MAKER | EXXON | UNIREX N3 | - | TERESSO 32 |
| | MOBIL | MOBILITH AW3 | POLYREX EM | DTE OIL, OIL LIGHT |
| | SHELL | - | ALVANIA HVQ | SHELL TURBO OIL 32 |
| | KYODO YUSHI | - | MULTEMP SRL | - |
| | NIHON GREASE | - | NIGUACE NSL | - |

Note : Other lubricants may be used where the oil is not allowed to use.

## 8. SHOP PAINTING

| Coating spec. No. | I | II |
|---|---|---|
| Preparation | SSPC – SP - 10 | SSPC – SP - 3 |
| Materials & coating nos. | Zinc rich primer x 1<br>Coal tar epoxy paint x 2 | Zinc rich primer x 1 |
| Color | Black | Green |
| Total dry film thickness ($\mu$m) | 140 | 10 |

Spec. No.I : Surfaces contacting pumping liquid

Spec. No.II : Internal surface of motor

Note : Non ferrous material and stainless steel are not painted.

## 9. SHOP TESTS

### 9-1 TESTS PERFORMED

The following tests are performed on each pump in the shop.

1. Insulating resistance test for motor and cables before/after performance test.
2. Non-witness full-scale performance test with test facilities conforming to JIS B8301, 8302. (Witness full-scale performance test is carried out as option.)

### 9-2 ACCEPTANCE CRITERIA

Pump input power should not exceed rated power of motor at the rated capacity. Total head should be equal to or more than rated total head at the rated capacity.

### 9-3 TEST RECORDS

Test records may be supplied with each pump at the time of shipment upon request.

## 1. PUMP TOTAL HEAD

How to determine total head at a given rated capacity is shown for the simple pumping system in Fig. 1-3

Since the pump total head is equal to the system head at rated capacity, the pump total head may be obtained from the following equation :

**Pump total head (Ht)** = Static head ＋ Dynamic head = Ha ＋ Hd

Where, Ha : Static head

Hd : Dynamic head (see P.1-3)

## 2. PUMP SELECTION

In this paragraph, a sample selection of the DSC4 pump is demonstrated by using a simple wet pit case.

**Conditions** **Rated capacity**: 15m$^3$/min

**Ha**: 13 m

**Hd**: 3 m

**Step 1: Selection of pump model**

Assuming a sum of Ha and Hd as pump total head, select pump from **DSC4 FAMILY CURVES**. In this case, the assumed total head is 16m, and EO-65075 is selected from family curves.

**Step 2: Check Items on the Selected Pump**

Check the selected pump for the following items.

**- Pump continuous operation range**

Confirm that the pump continuous operation range based on the system head variation is within the continuous operable range of the performance curve.

**- NPSH**

NPSH req. shall not exceed NPSH av. in the continuous pump operation range.

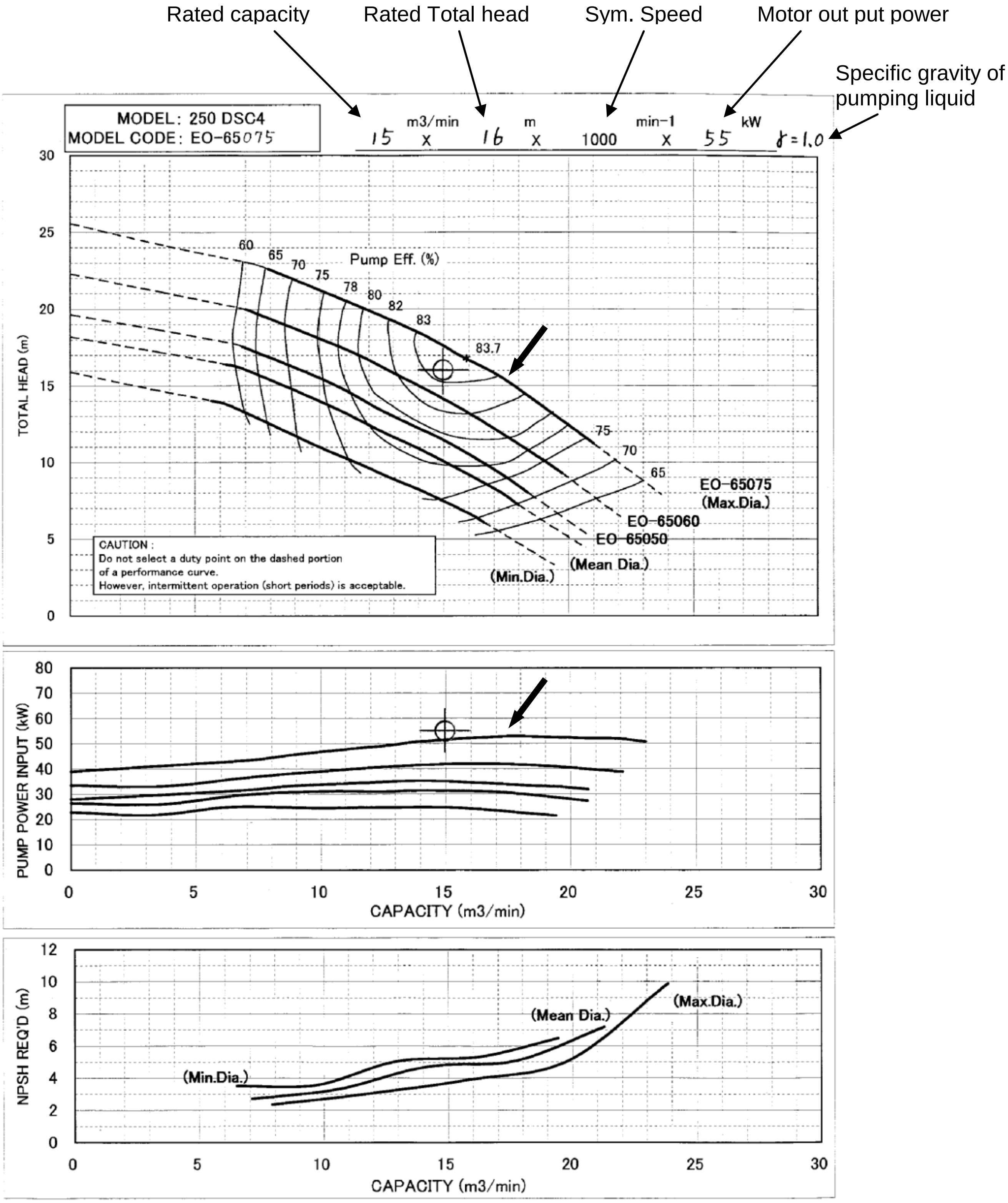
- **Motor rating**

Pump power input shall not exceed motor rating in the pump operation range.

**- Starting method and cable size**

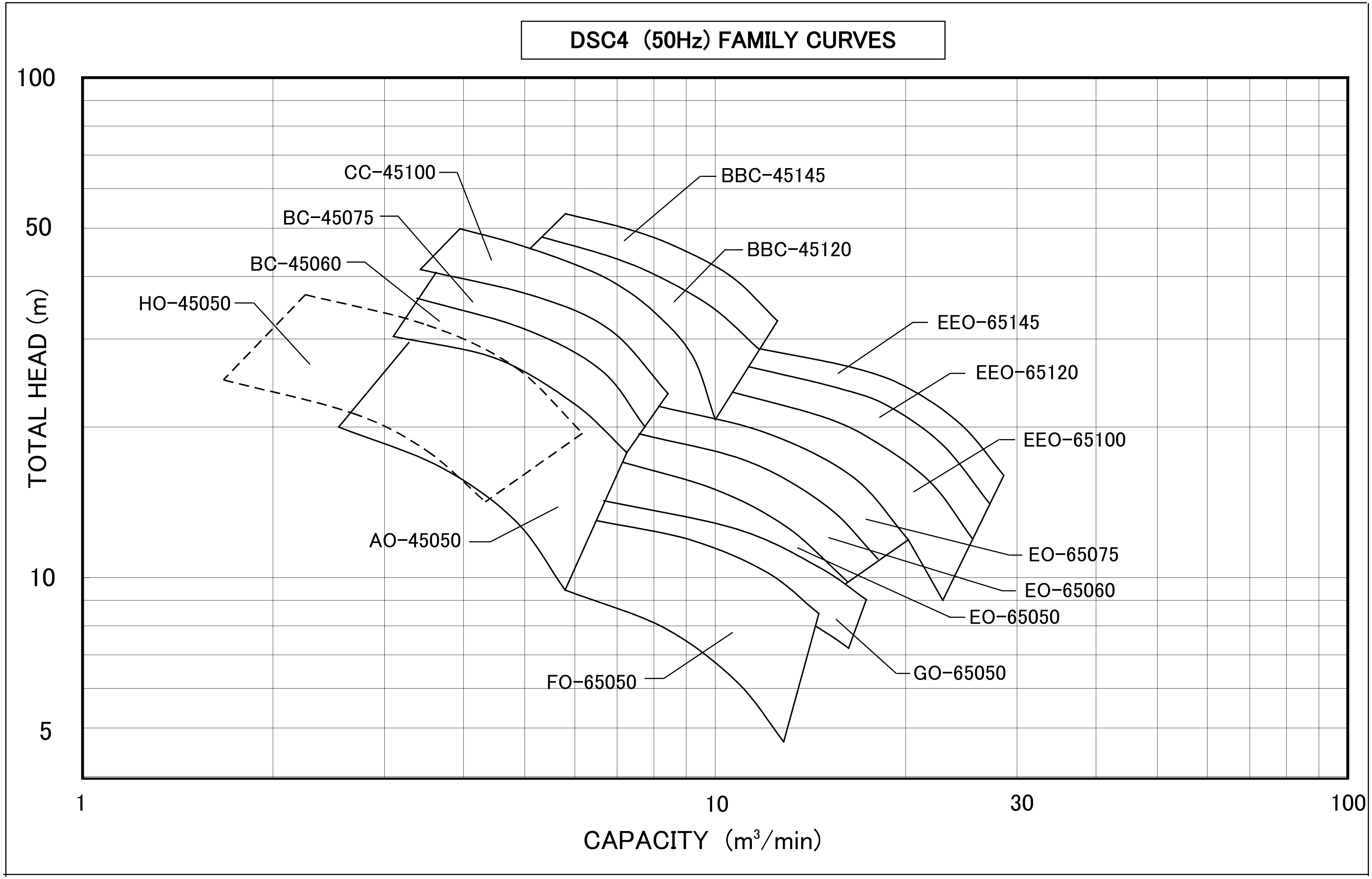
Check starting method and cable size.

## 3. HOW TO USE PERFORMANCE CURVES

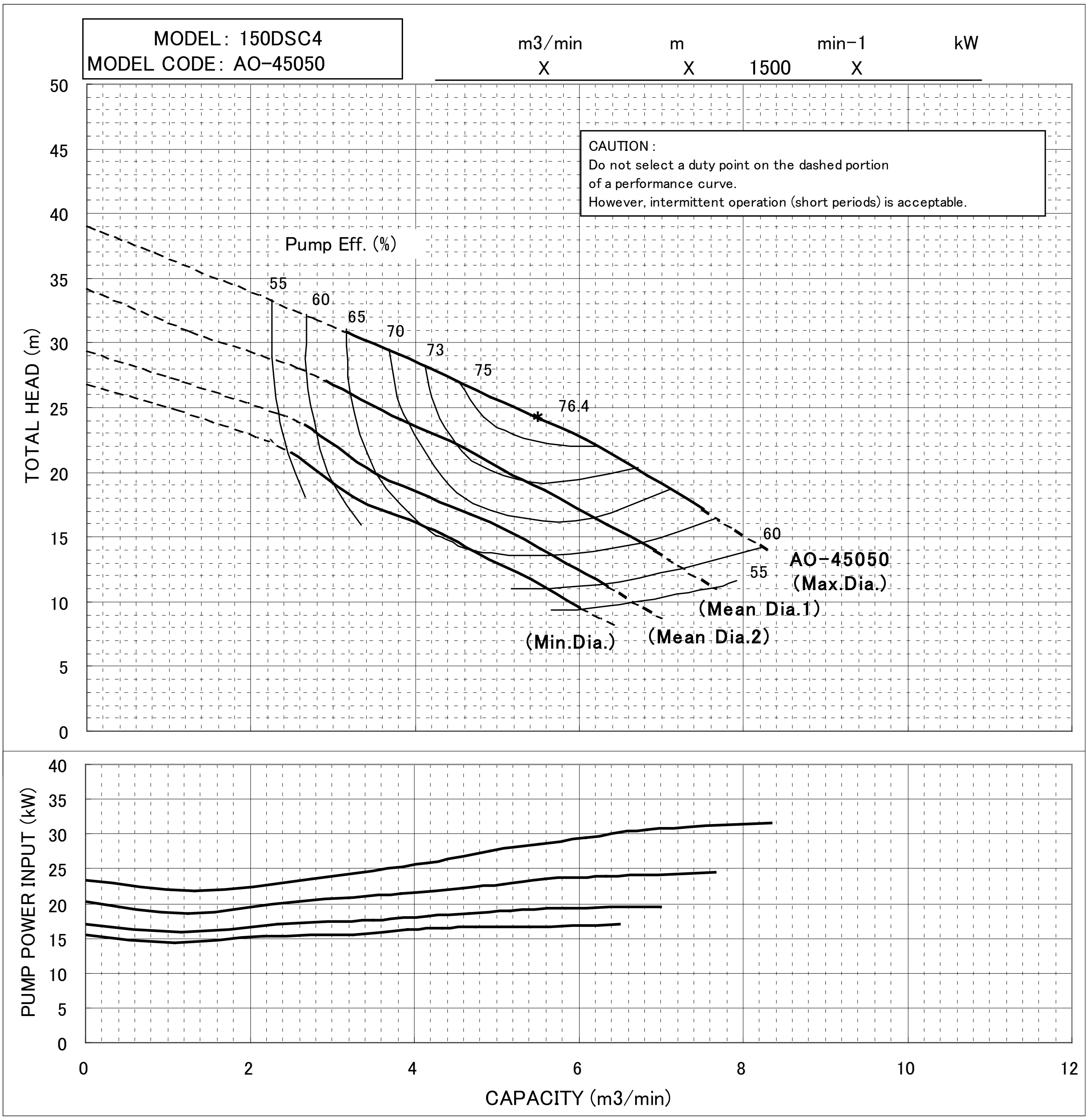


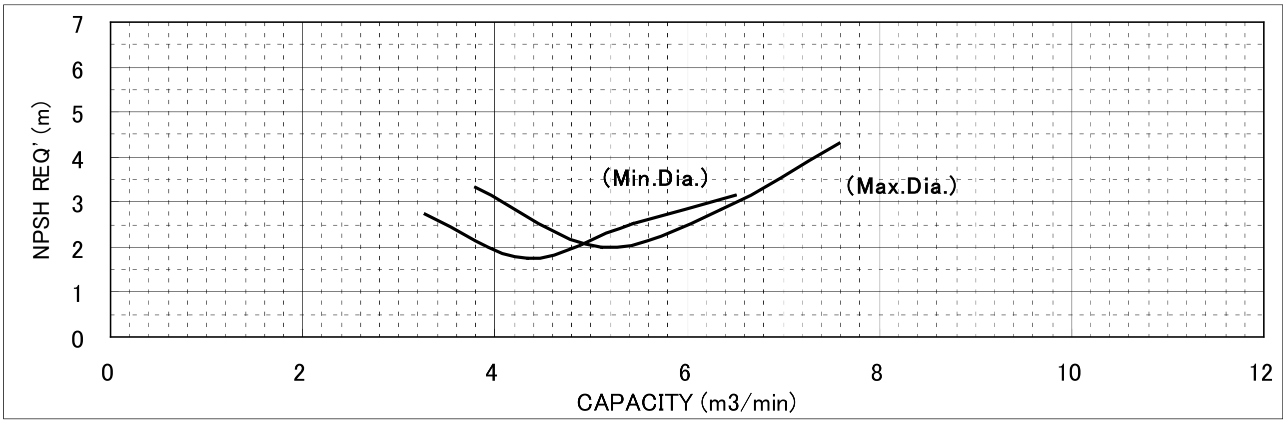

**Pump continuous operable range**

Do not select continuous operation points on the dashed portion of the curve.


DSC4 (50Hz) FAMILY CURVES
TOTAL HEAD (m)
CAPACITY (m³/min)
100
50
10
5
1
10
30
100
CC-45100
BC-45075
BC-45060
HO-45050
AO-45050
BBC-45145
BBC-45120
EEO-65145
EEO-65120
EEO-65100
EO-65075
EO-65060
EO-65050
GO-65050
FO-65050

## PERFORMANCE CURVES　HYDRO MODEL: A



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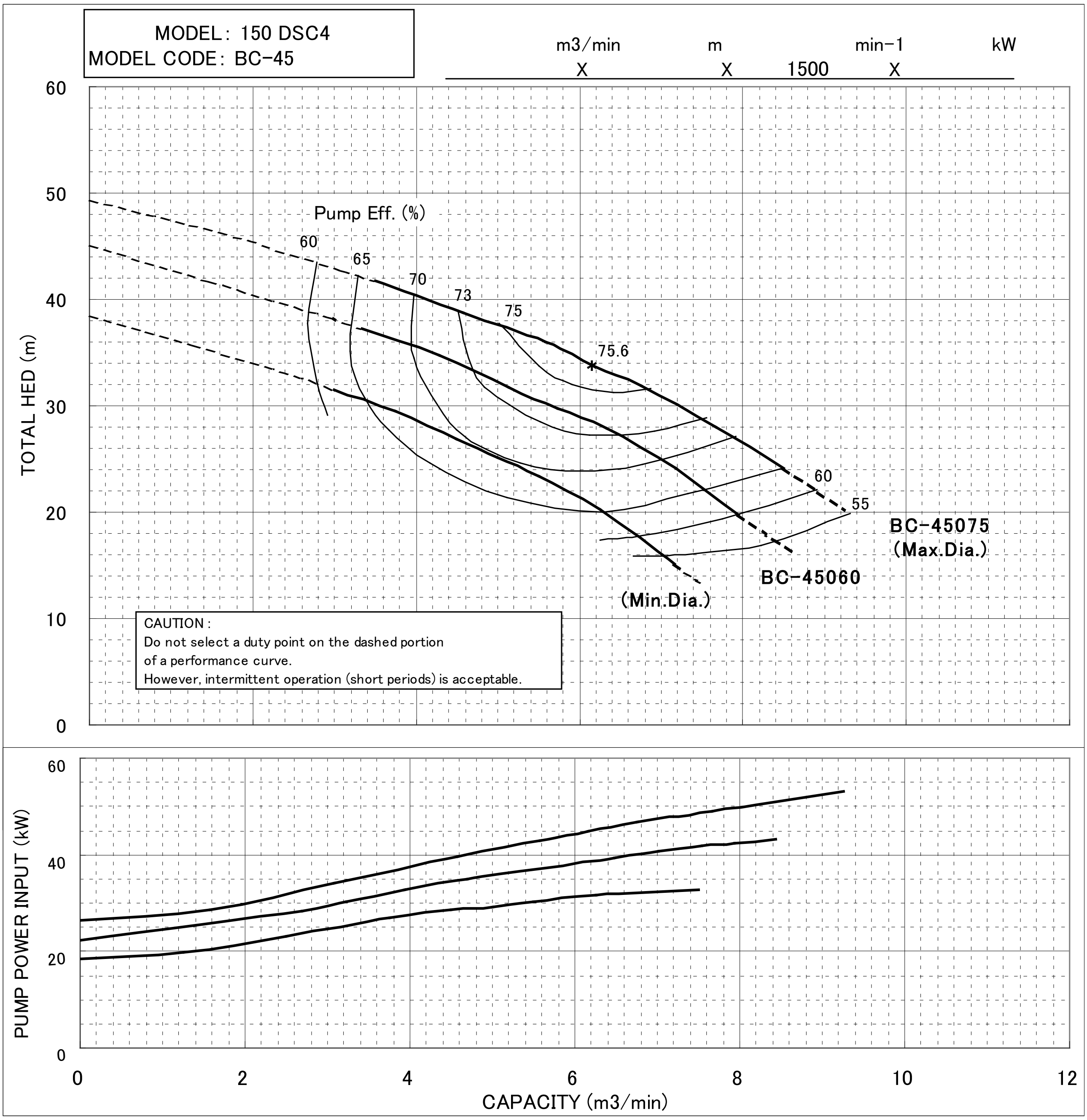
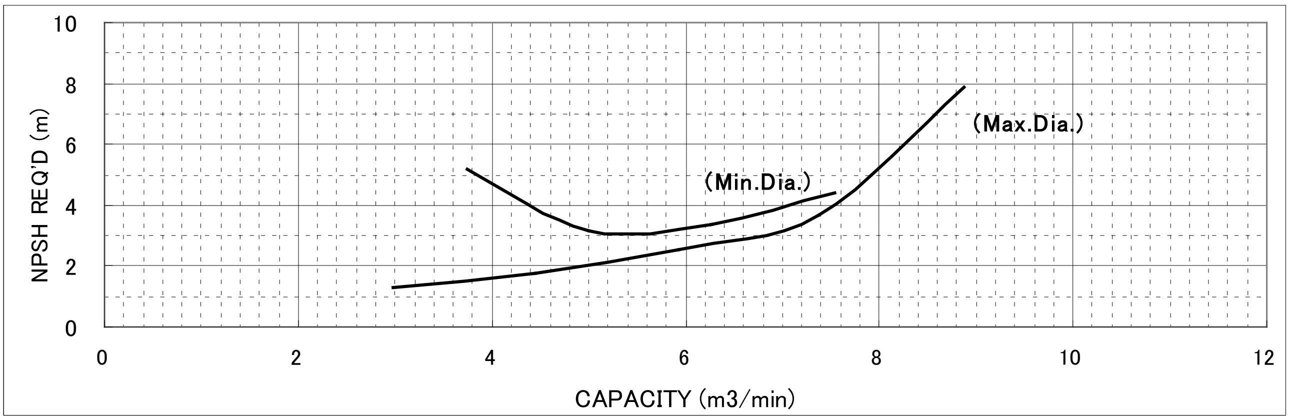
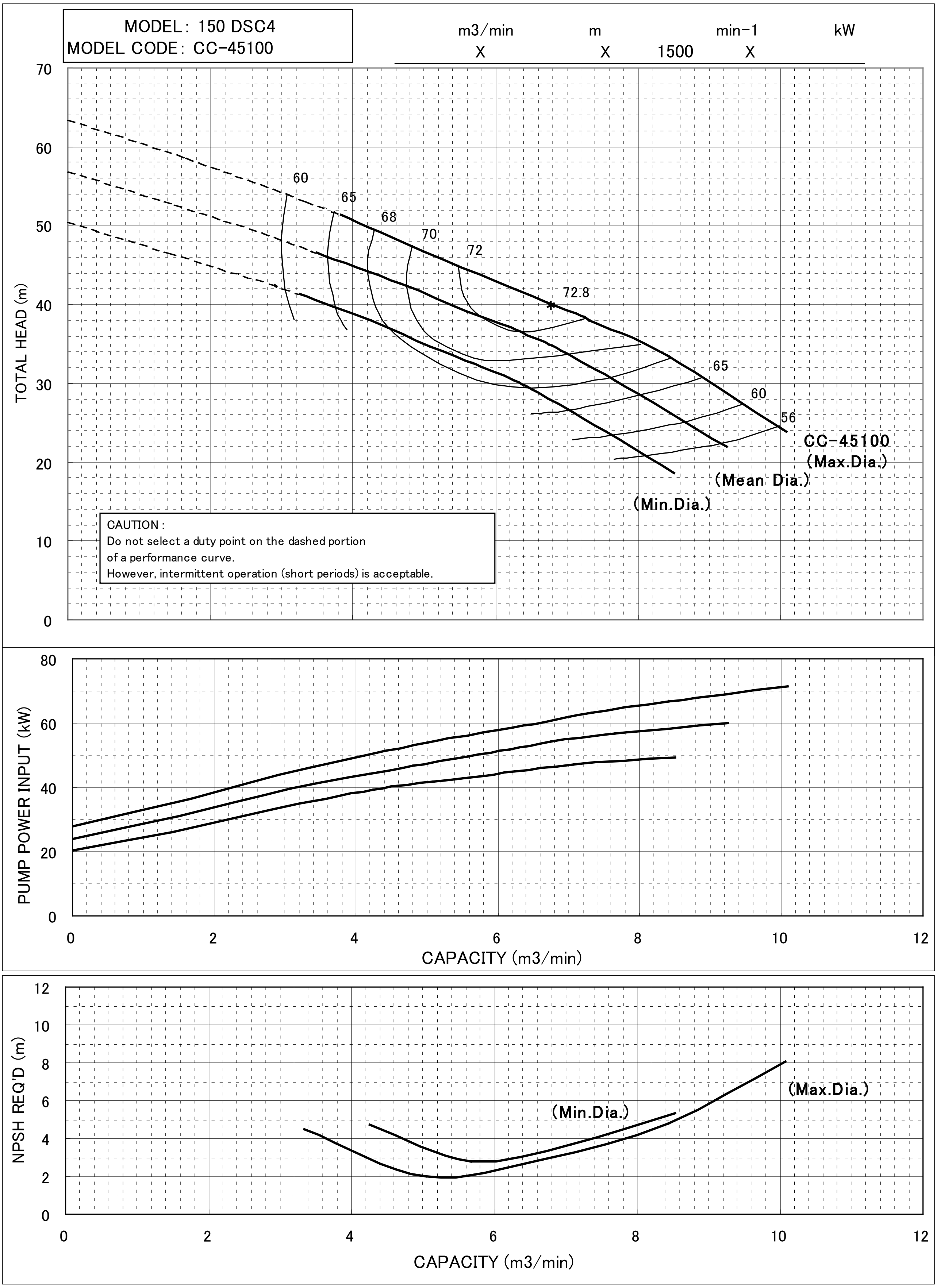
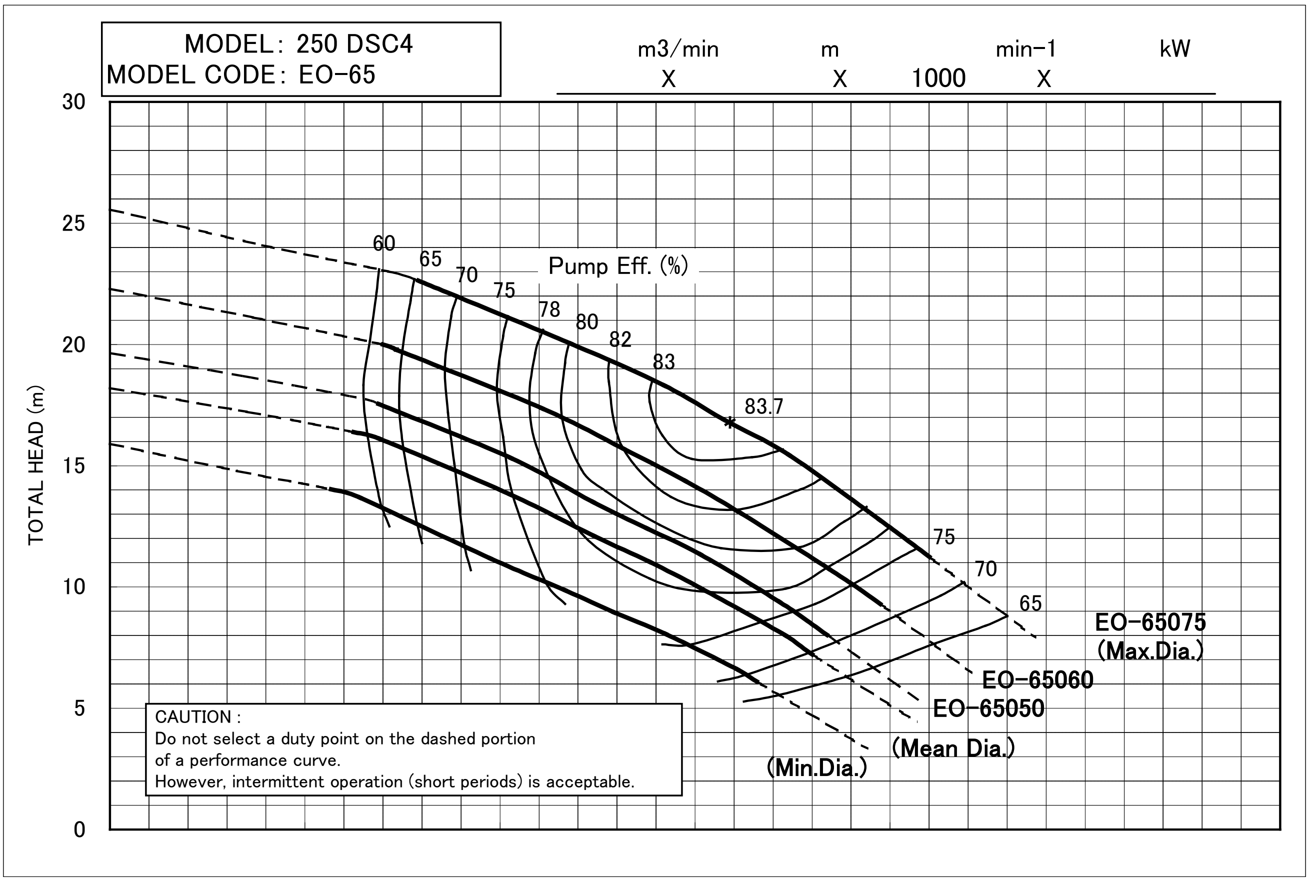


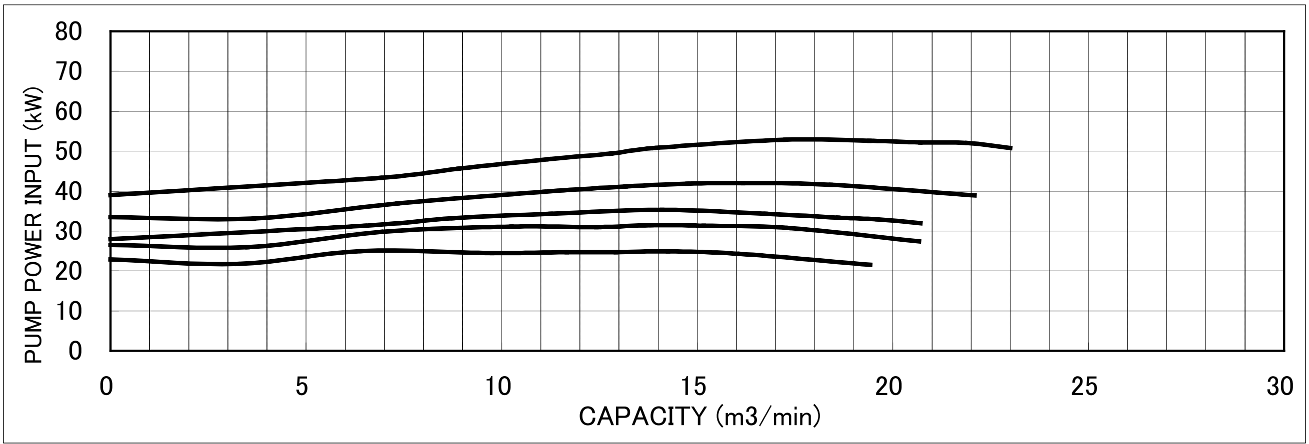



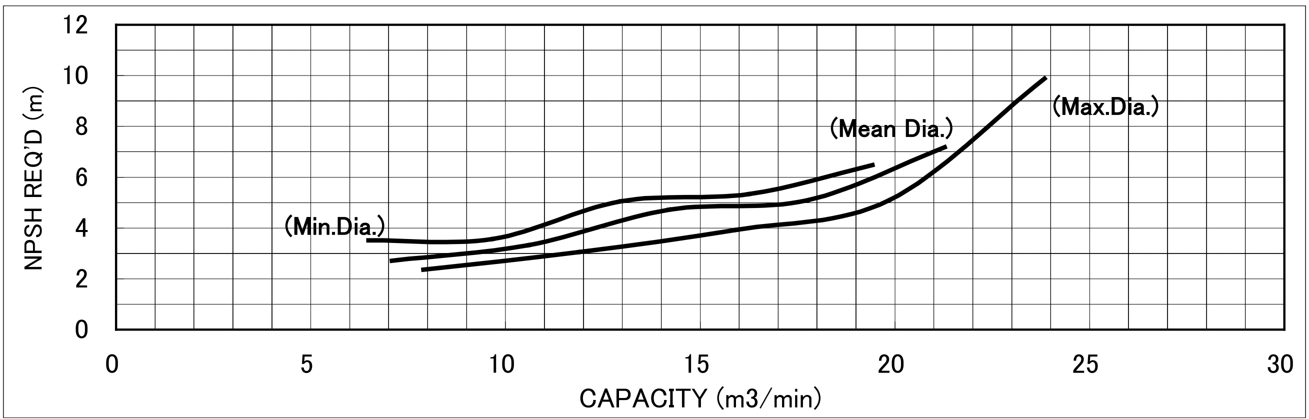
# PERFORMANCE CURVES HYDRO MODEL: C



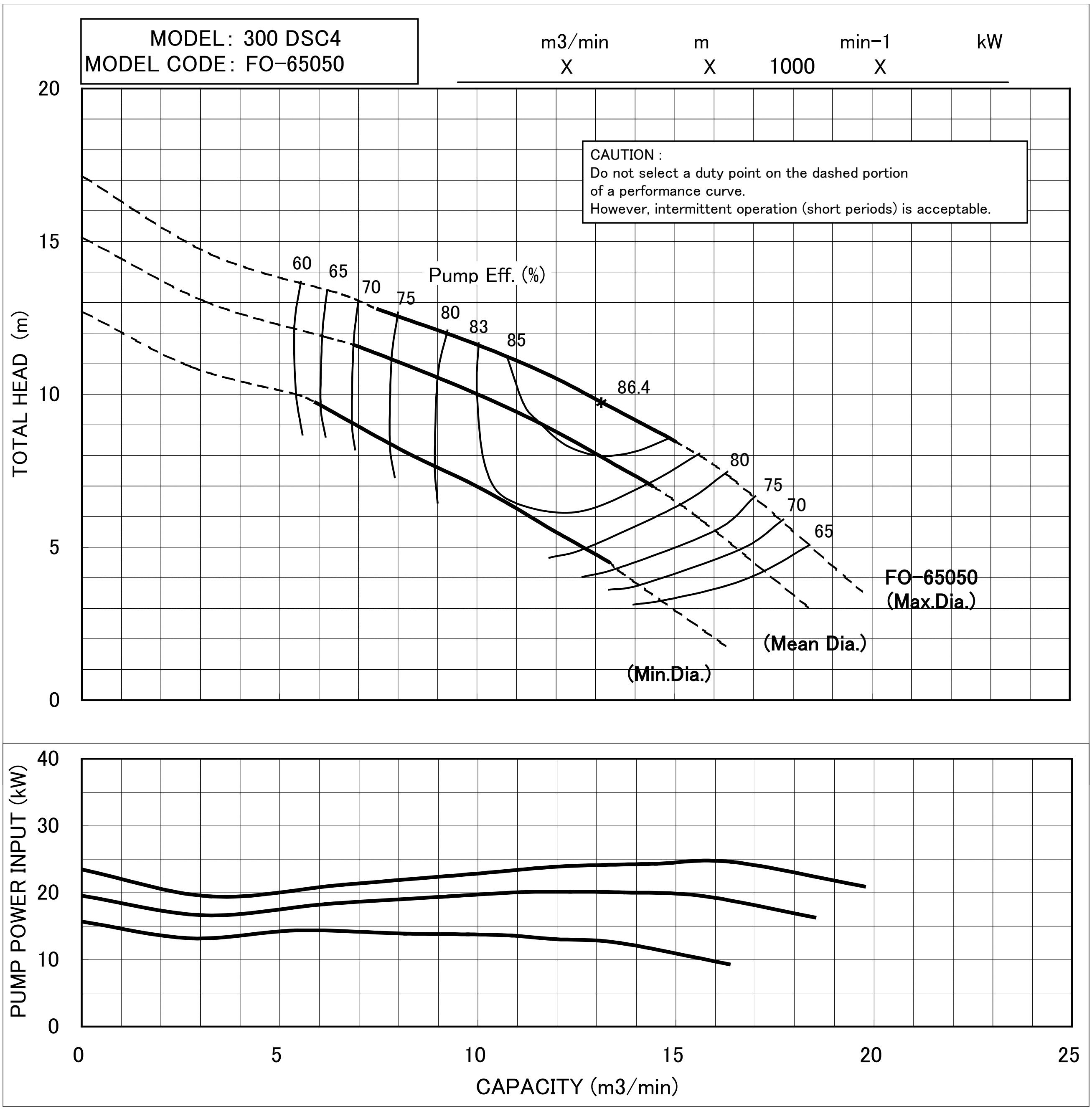
PERFORMANCE CURVES HYDRO MODEL: E

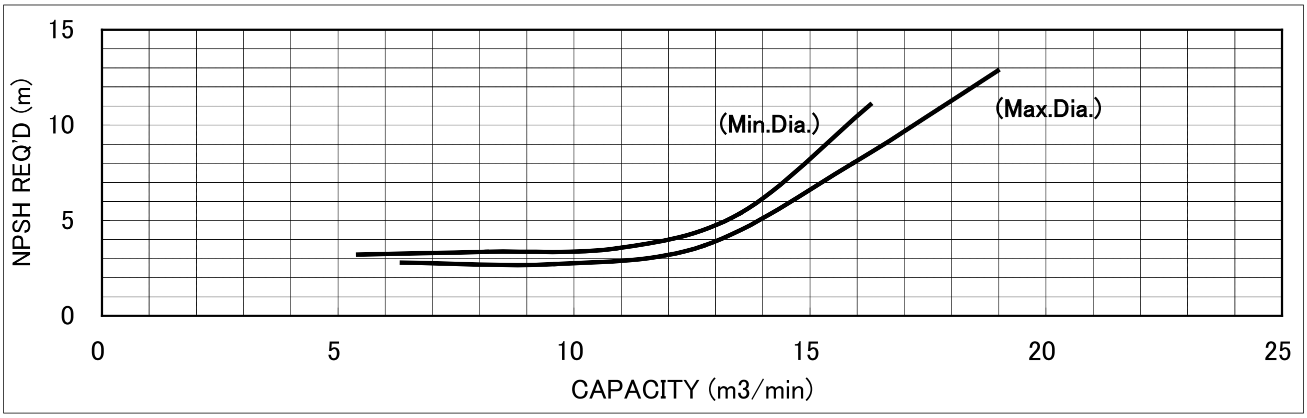


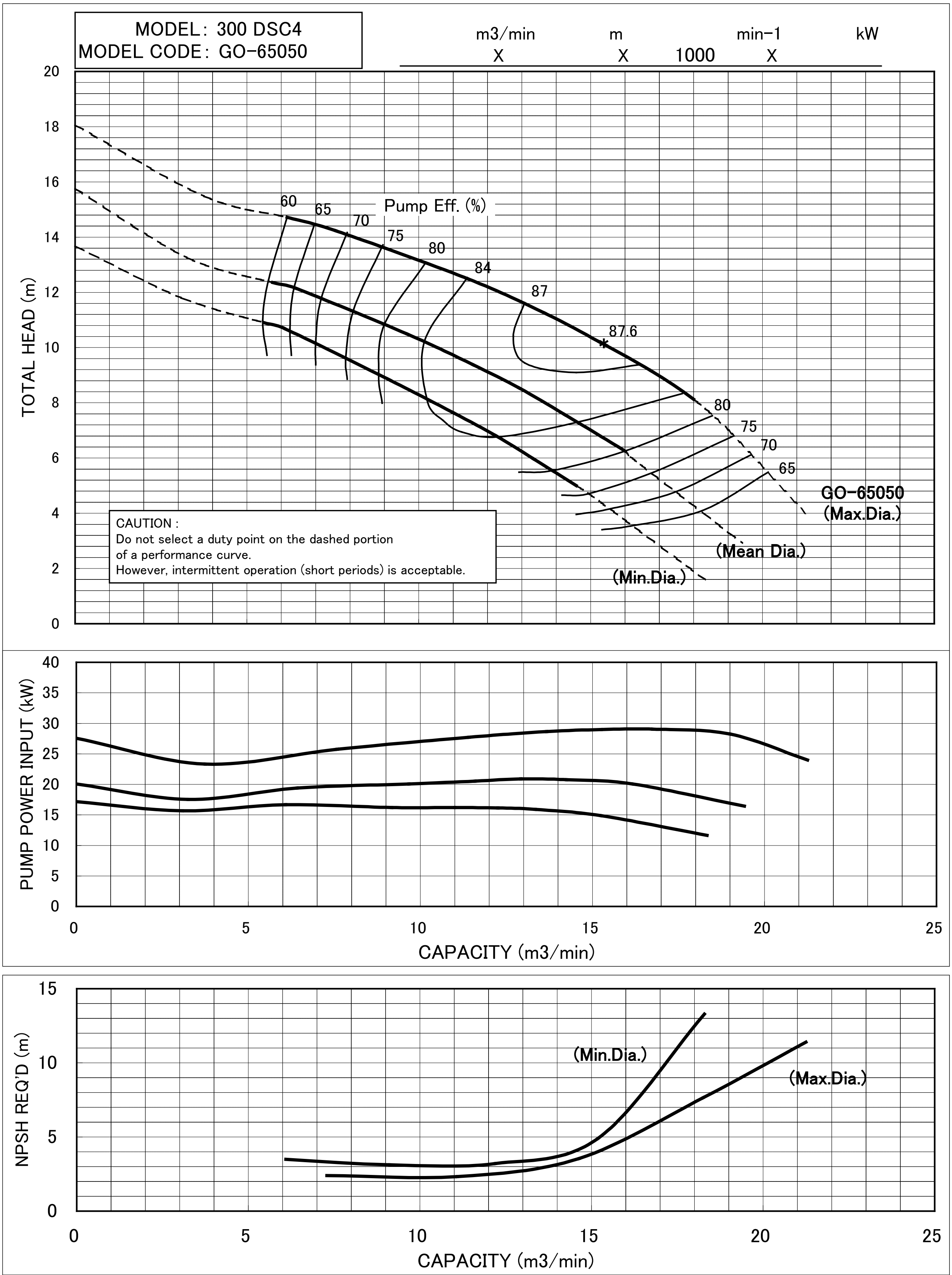



PERFORMANCE CURVES HYDRO MODEL: F



PERFORMANCE CURVES HYDRO MODEL: G



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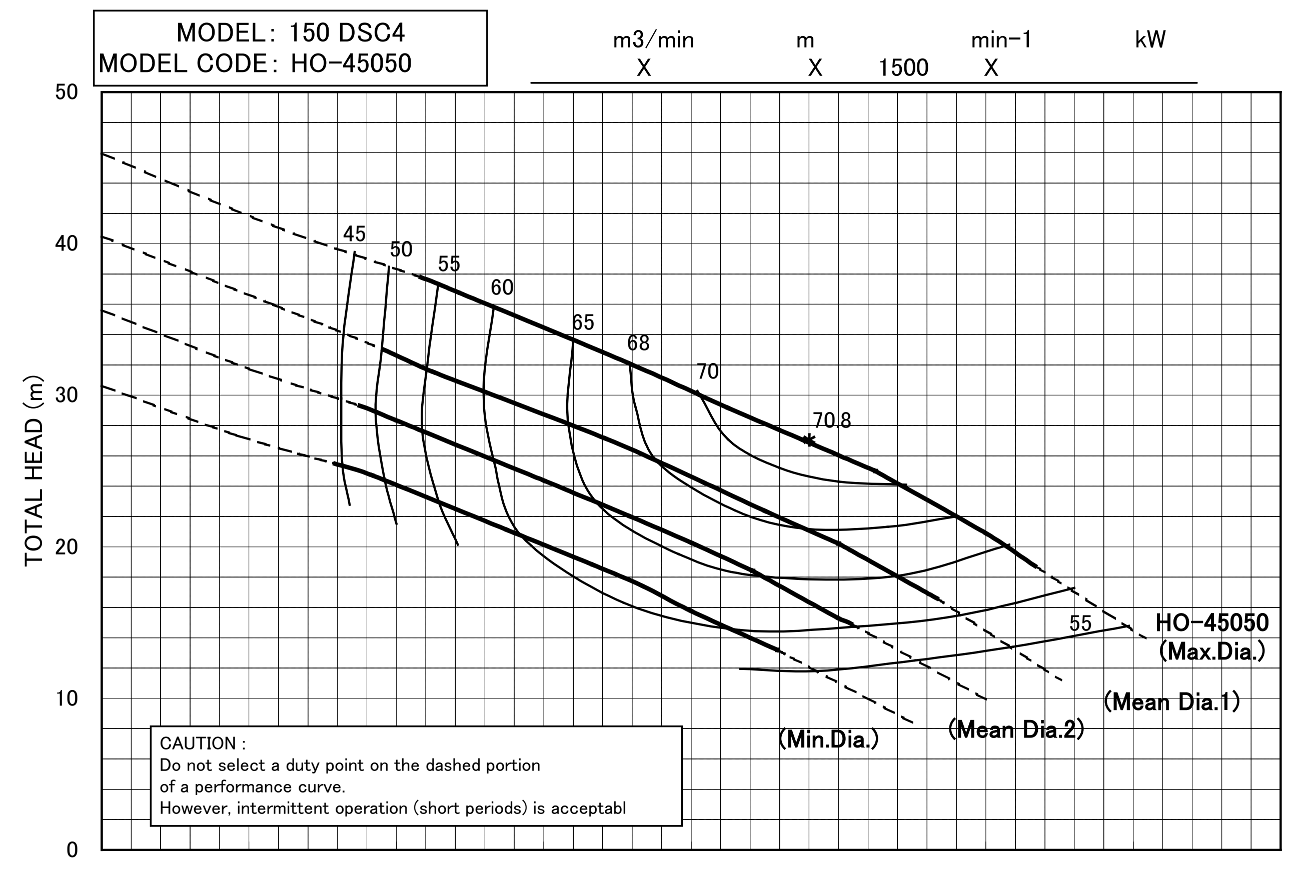
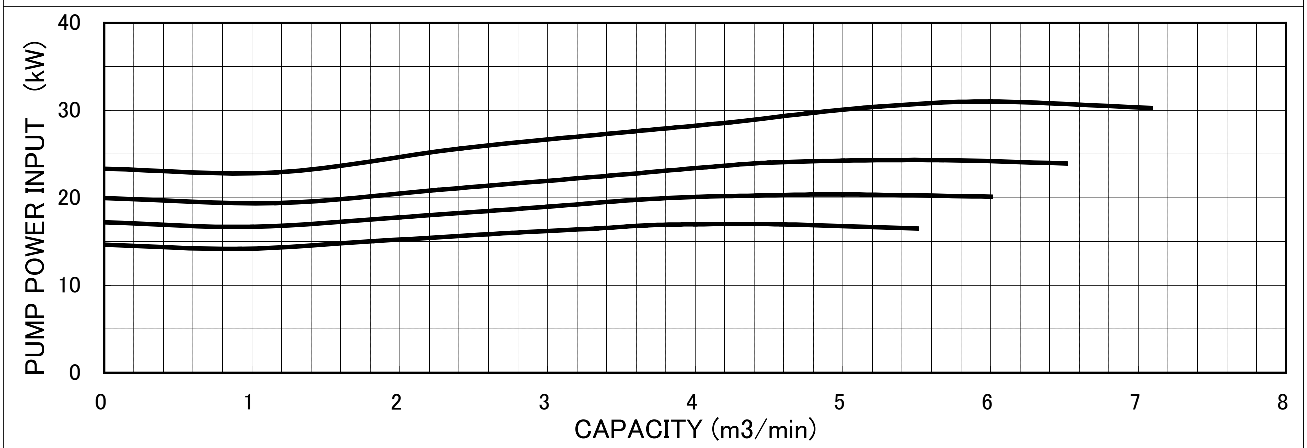
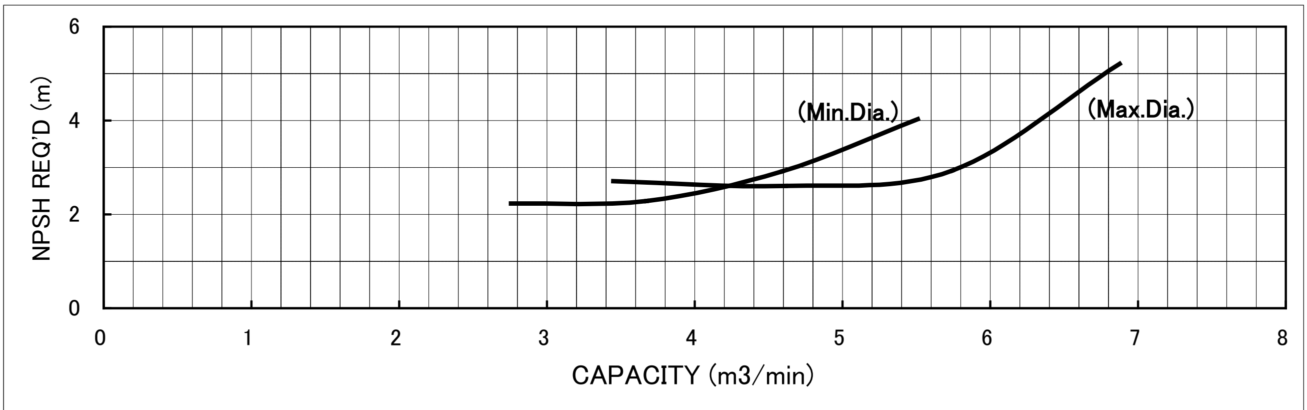
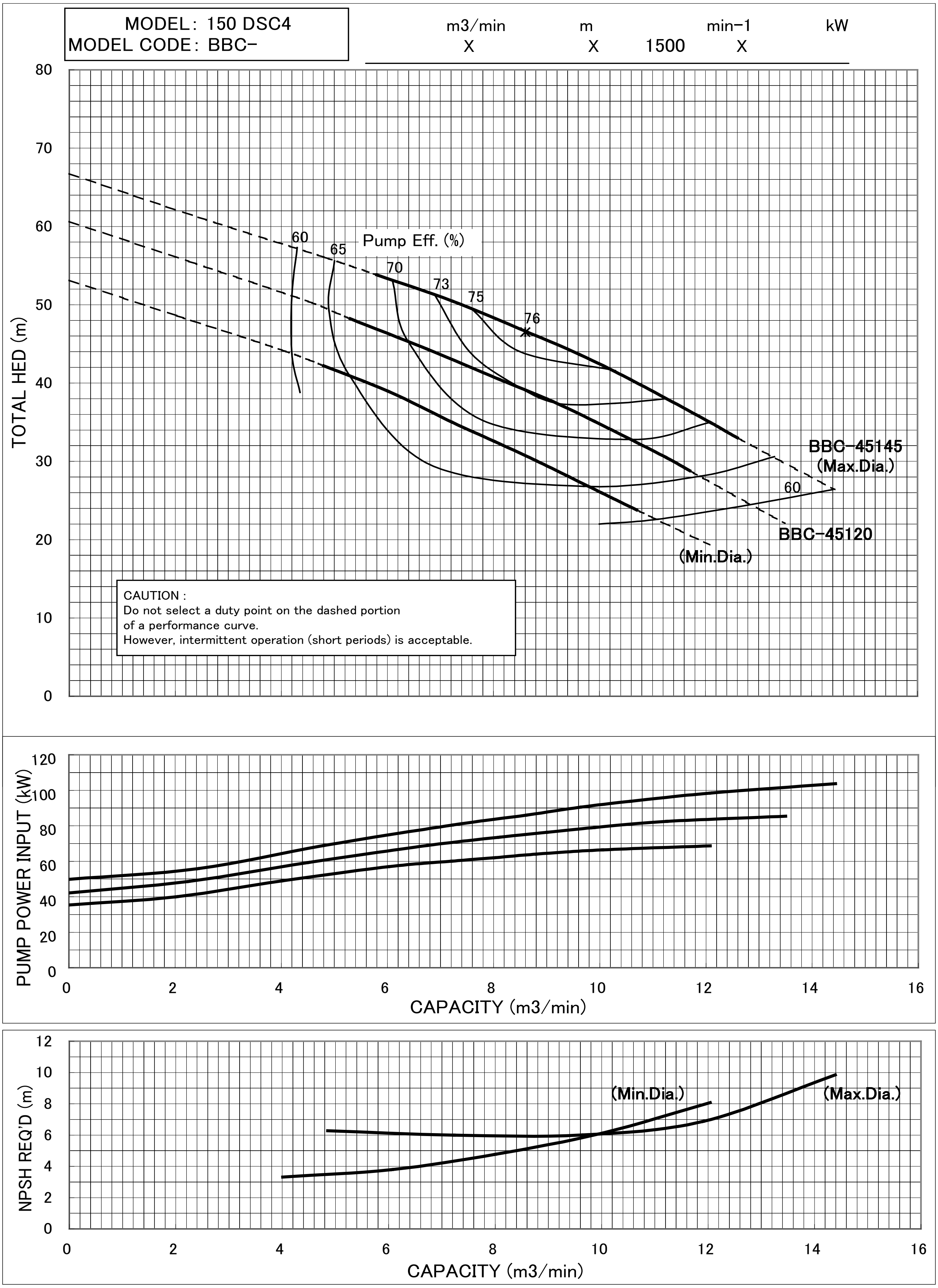


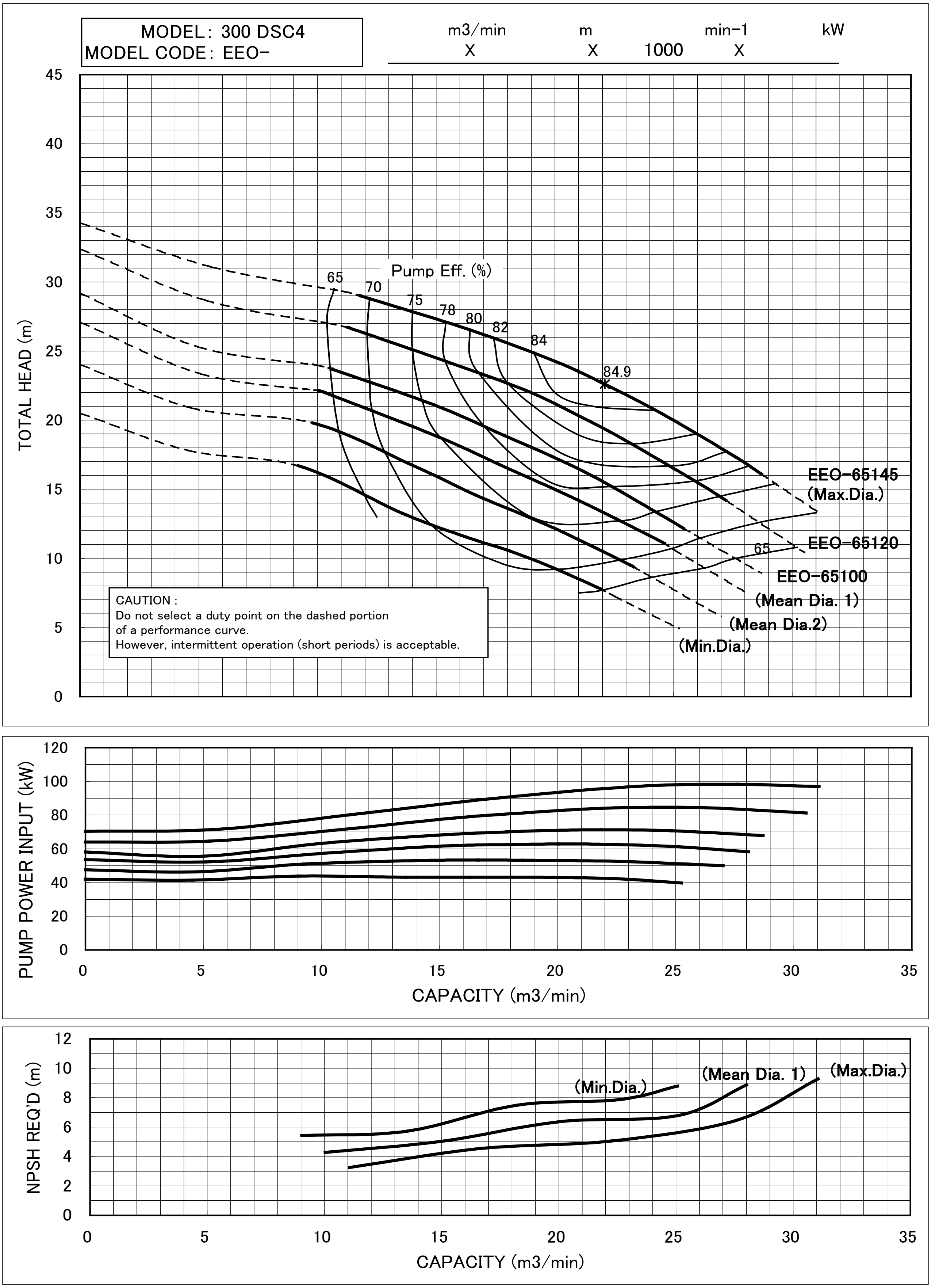



PERFORMANCE CURVES HYDRO MODEL: BB



PERFORMANCE CURVES HYDRO MODEL: EE

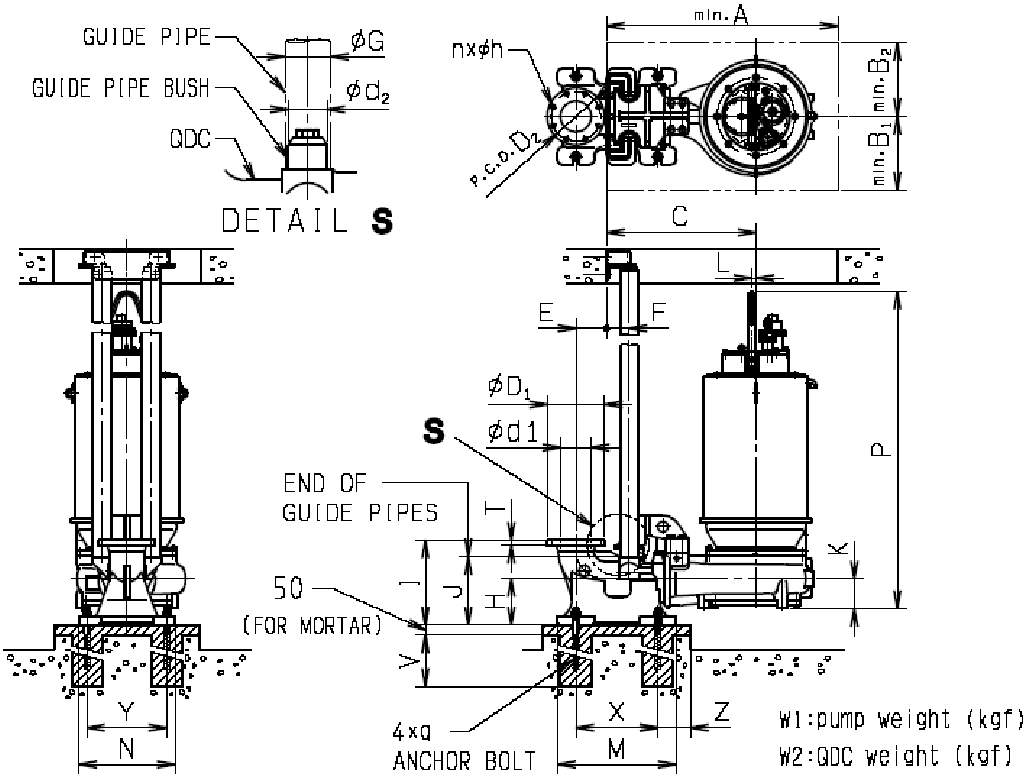


**1. DSC4 MECHANICAL DATA**

Notes:

1. The weight of pump includes the weight of 10m of cables, and does not include the weight of the guide pipes and the water in pump.
2. All dimensions are approximate.
3. All dimensions may be changed without notice.

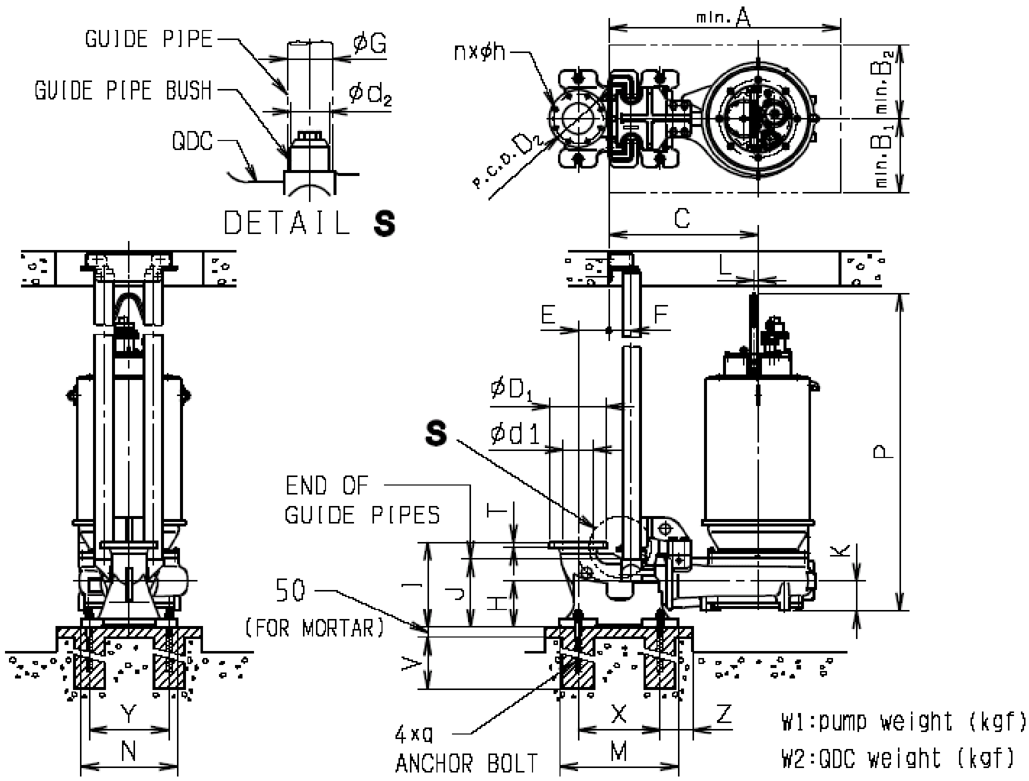
Hydro Model: A




Unit: mm

| Model Code | HP (kW) | d1 | A | B1 | B2 | C | E | F | G | H | I | J |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AO-45050 | 50 (37) | 150 | 1130 | 360 | 360 | 730 | 150 | 110 | 89.1 | 225 | 415 | 333 |
| | | K | L | M | N | P | V | X | Y | Z | q | d2 |
| | | 145 | 20 | 580 | 470 | 1451 | 450 | 400 | 390 | 160 | M24 | 75 |
| | | W1 | W2 | | Discharge Flange of QDC | | | D1 | D2 | T | n | h |
| | | 810 | 110 | | | | | 279.4 | 241.3 | 25.4 | 8 | 23 |

Hydro Model: B

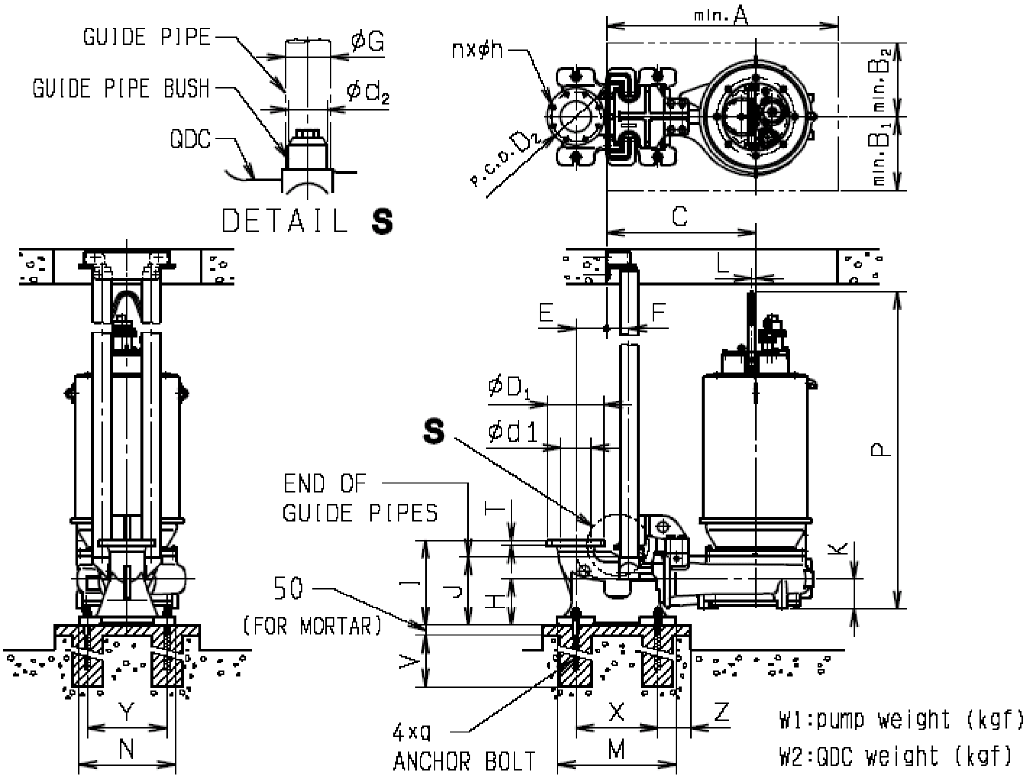



Unit: mm

| Model Code | HP (kW) | d1 | A | B1 | B2 | C | E | F | G | H | I | J |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BC-45075 | 75 (55) | 150 | 1130 | 360 | 360 | 730 | 150 | 110 | 89.1 | 225 | 415 | 333 |
| | | K | L | M | N | P | V | X | Y | Z | q | d2 |
| | | 145 | 20 | 580 | 470 | 1571 | 450 | 400 | 390 | 160 | M24 | 75 |
| | | W1 | W2 | | Discharge Flange of QDC | | | D1 | D2 | T | n | h |
| | | 920 | 110 | | | | | 279.4 | 241.3 | 25.4 | 8 | 23 |

| Model Code | HP (kW) | d1 | A | B1 | B2 | C | E | F | G | H | I | J |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BC-45060 | 60 (45) | 150 | 1130 | 360 | 360 | 730 | 150 | 110 | 89.1 | 225 | 415 | 333 |
| | | K | L | M | N | P | V | X | Y | Z | q | d2 |
| | | 145 | 20 | 580 | 470 | 1531 | 450 | 400 | 390 | 160 | M24 | 75 |
| | | W1 | W2 | | Discharge Flange of QDC | | | D1 | D2 | T | n | h |
| | | 880 | 110 | | | | | 279.4 | 241.3 | 25.4 | 8 | 23 |

Hydro Model: C



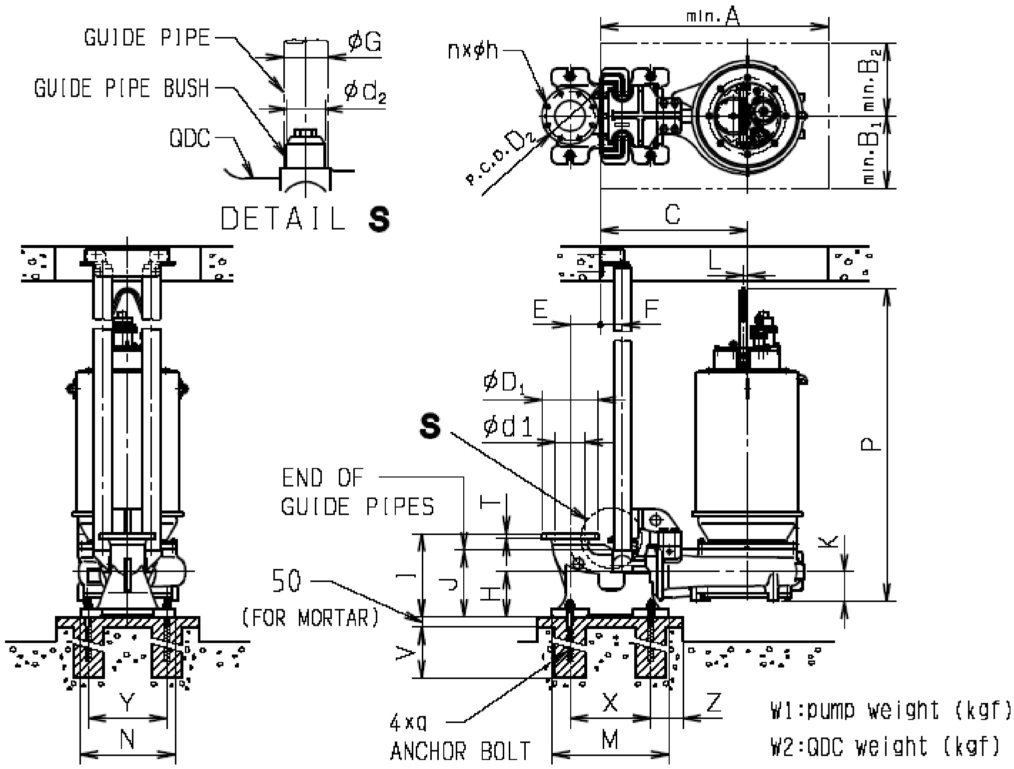

Unit: mm

| Model Code | HP (kW) | d1 | A | B1 | B2 | C | E | F | G | H | I | J |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CC-45100 | 100 (75) | 150 | 1220 | 400 | 380 | 780 | 150 | 110 | 89.1 | 225 | 415 | 333 |

| Model Code | HP (kW) | K | L | M | N | P | V | X | Y | Z | q | d2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CC-45100 | 100 (75) | 145 | 20 | 580 | 470 | 1642 | 450 | 400 | 390 | 160 | M24 | 75 |

| Model Code | HP (kW) | W1 | W2 | Discharge Flange of QDC | D1 | D2 | T | n | h |
|---|---|---|---|---|---|---|---|---|---|
| CC-45100 | 100 (75) | 1040 | 110 | | 279.4 | 241.3 | 25.4 | 8 | 23 |

Hydro Model: E



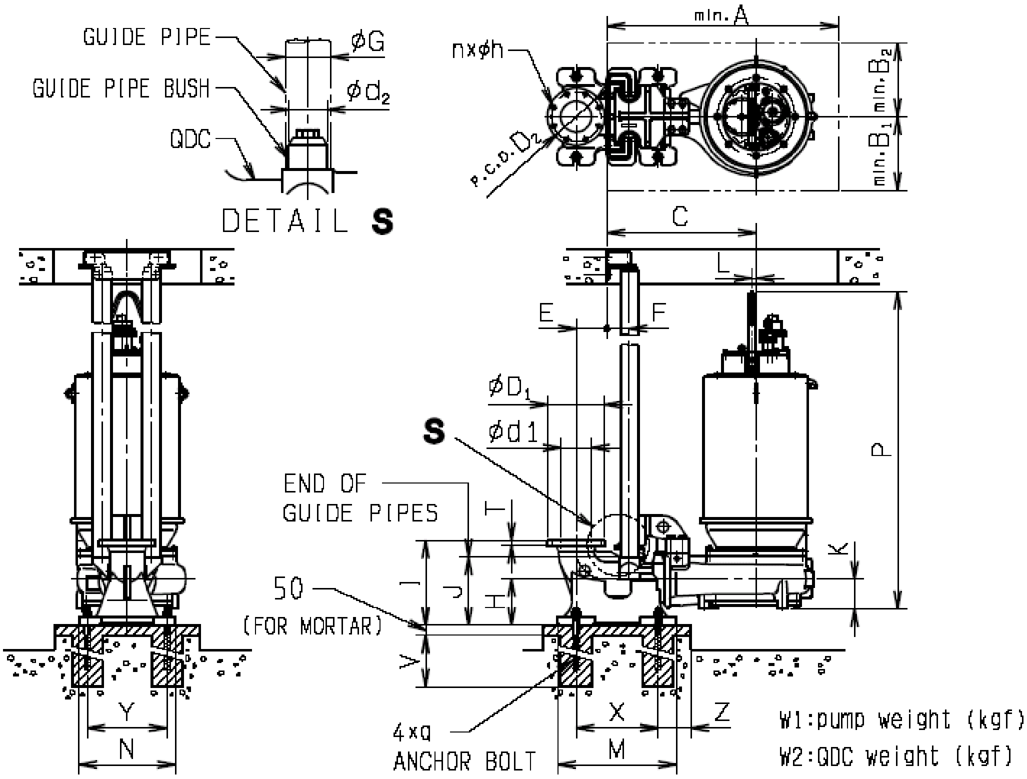

Unit: mm

| Model Code | HP (kW) | d1 | A | B1 | B2 | C | E | F | G | H | I | J |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EO-65075 | 75 (55) | 250 | 1410 | 490 | 390 | 905 | 215 | 110 | 89.1 | 290 | 580 | 448 |
| | | K | L | M | N | P | V | X | Y | Z | q | d2 |
| | | 210 | 30 | 630 | 550 | 1802 | 450 | 450 | 470 | 160 | M24 | 75 |
| | | W1 | W2 | | Discharge Flange of QDC | | | D1 | D2 | T | n | h |
| | | 1410 | 170 | | | | | 406.4 | 362 | 30.3 | 12 | 26 |

| Model Code | HP (kW) | d1 | A | B1 | B2 | C | E | F | G | H | I | J |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EO-65060 | 60 (45) | 250 | 1410 | 490 | 390 | 905 | 215 | 110 | 89.1 | 290 | 580 | 448 |
| | | K | L | M | N | P | V | X | Y | Z | q | d2 |
| | | 210 | 20 | 630 | 550 | 1666 | 450 | 450 | 470 | 160 | M24 | 75 |
| | | W1 | W2 | | Discharge Flange of QDC | | | D1 | D2 | T | n | h |
| | | 1170 | 170 | | | | | 406.4 | 362 | 30.3 | 12 | 26 |

| Model Code | HP (kW) | d1 | A | B1 | B2 | C | E | F | G | H | I | J |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EO-65050 | 50 (37) | 250 | 1410 | 490 | 390 | 905 | 215 | 110 | 89.1 | 290 | 580 | 448 |
| | | K | L | M | N | P | V | X | Y | Z | q | d2 |
| | | 210 | 20 | 630 | 550 | 1626 | 450 | 450 | 470 | 160 | M24 | 75 |
| | | W1 | W2 | | Discharge Flange of QDC | | | D1 | D2 | T | n | h |
| | | 1030 | 170 | | | | | 406.4 | 362 | 30.3 | 12 | 26 |

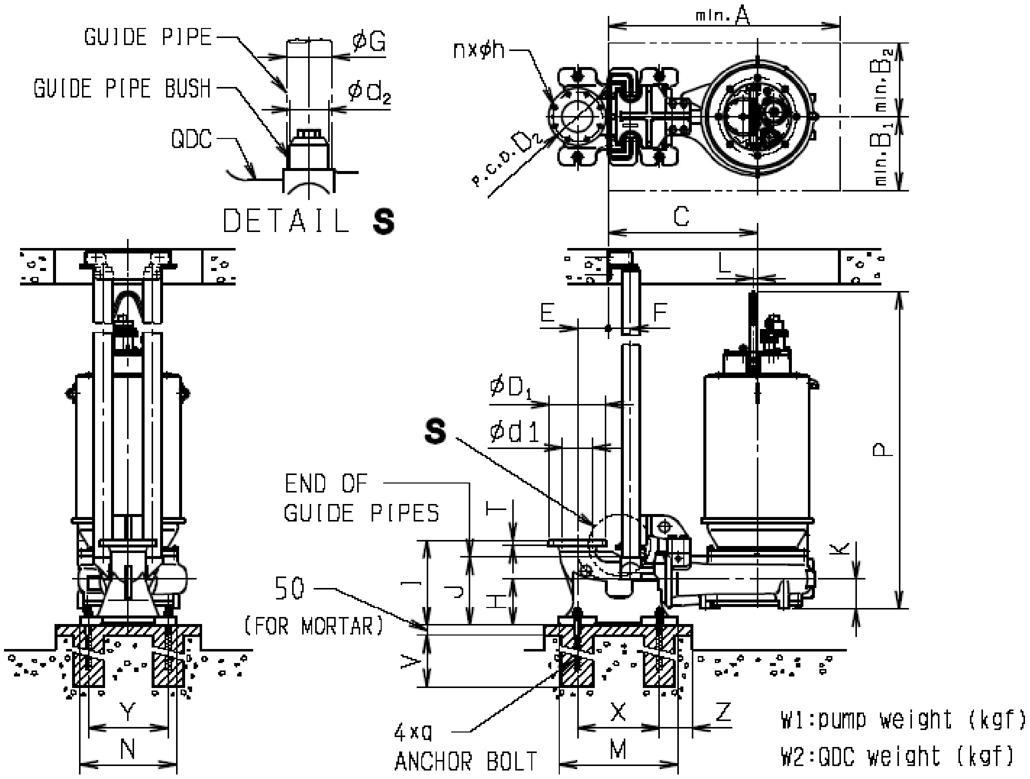
Hydro Model: F




Unit: mm

| Model Code | HP (kW) | d1 | A | B1 | B2 | C | E | F | G | H | I | J |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FO-65050 | 50 (37) | 300 | 1350 | 450 | 350 | 875 | 260 | 110 | 89.1 | 330 | 660 | 503 |
| | | K | L | M | N | P | V | X | Y | Z | q | d2 |
| | | 250 | 20 | 680 | 570 | 1646 | 450 | 500 | 490 | 160 | M24 | 75 |
| | | W1 | W2 | | Discharge Flange of QDC | | | D1 | D2 | T | n | h |
| | | 1020 | 230 | | | | | 482.6 | 431.8 | 31.8 | 12 | 26 |

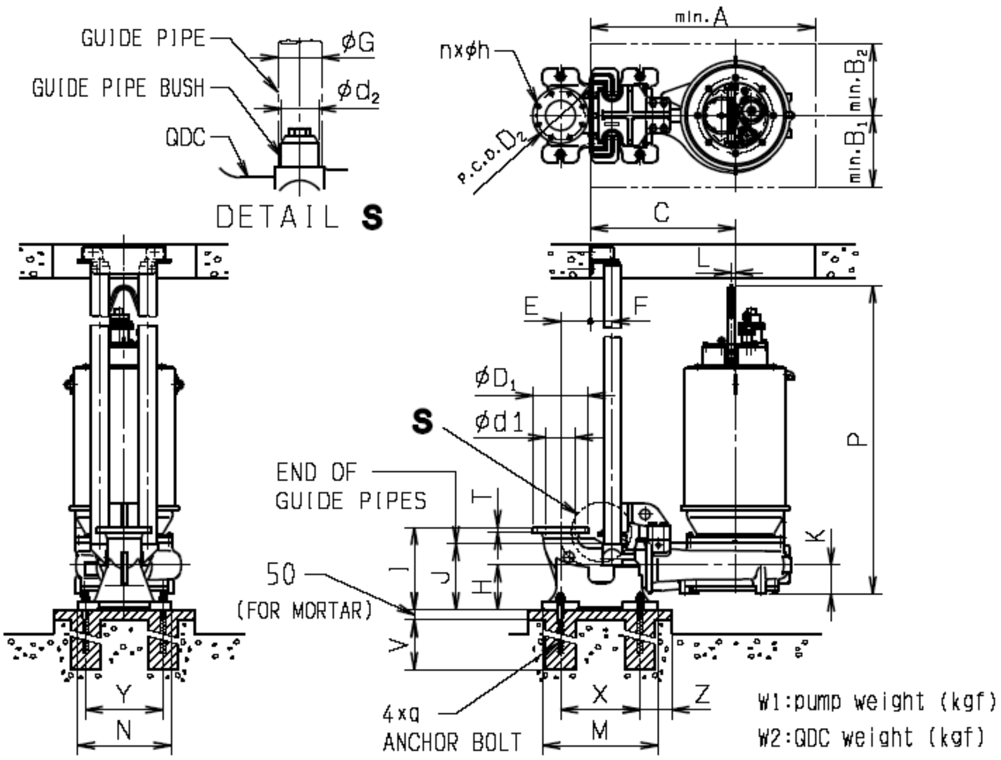
Hydro Model: G




Unit: mm

| Model Code | HP (kW) | d1 | A | B1 | B2 | C | E | F | G | H | I | J |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GO-65050 | 50 (37) | 300 | 1390 | 470 | 380 | 890 | 260 | 110 | 89.1 | 330 | 660 | 503 |
| | | K | L | M | N | P | V | X | Y | Z | q | d2 |
| | | 250 | 20 | 680 | 570 | 1646 | 450 | 500 | 490 | 160 | M24 | 75 |
| | | W1 | W2 | | Discharge Flange of QDC | | | D1 | D2 | T | n | h |
| | | 1020 | 230 | | | | | 482.6 | 431.8 | 31.8 | 12 | 26 |

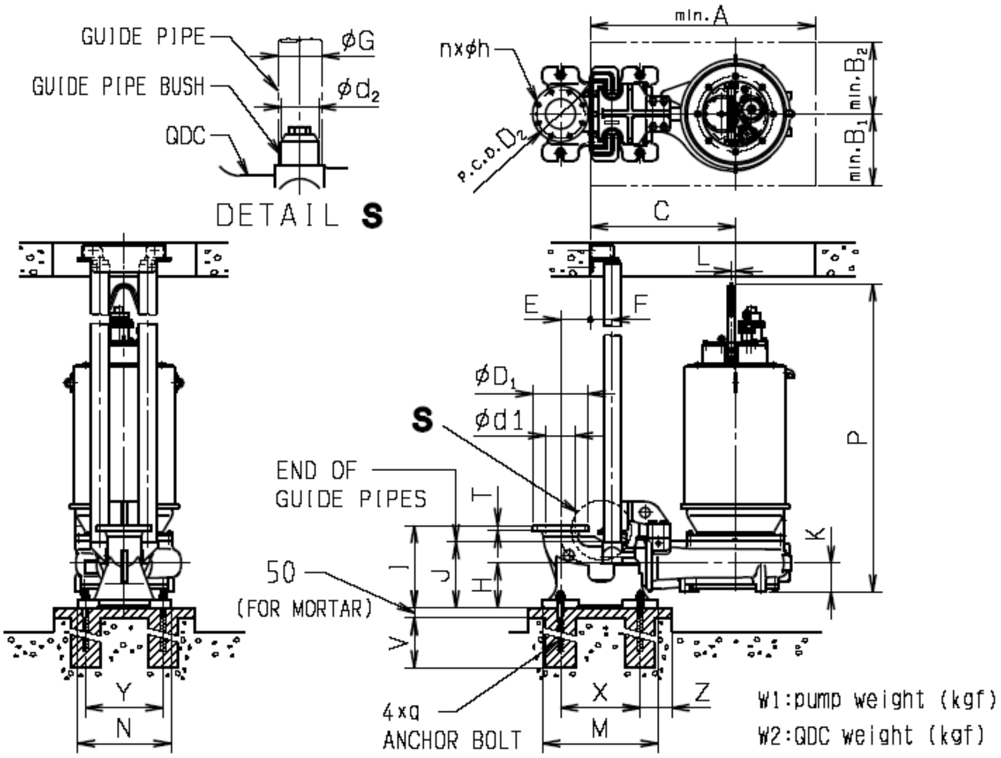
Hydro Model: H




Unit: mm

| Model Code | HP (kW) | d1 | A | B1 | B2 | C | E | F | G | H | I | J |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HO-45050 | 50 (37) | 150 | 1130 | 360 | 360 | 730 | 150 | 110 | 89.1 | 225 | 415 | 333 |
| | | K | L | M | N | P | V | X | Y | Z | q | d2 |
| | | 145 | 20 | 580 | 470 | 1471 | 450 | 400 | 390 | 160 | M24 | 75 |
| | | W1 | W2 | | Discharge Flange of QDC | | | D1 | D2 | T | n | h |
| | | 850 | 110 | | | | | 279.4 | 241.3 | 25.4 | 8 | 23 |

Hydro Model: BB

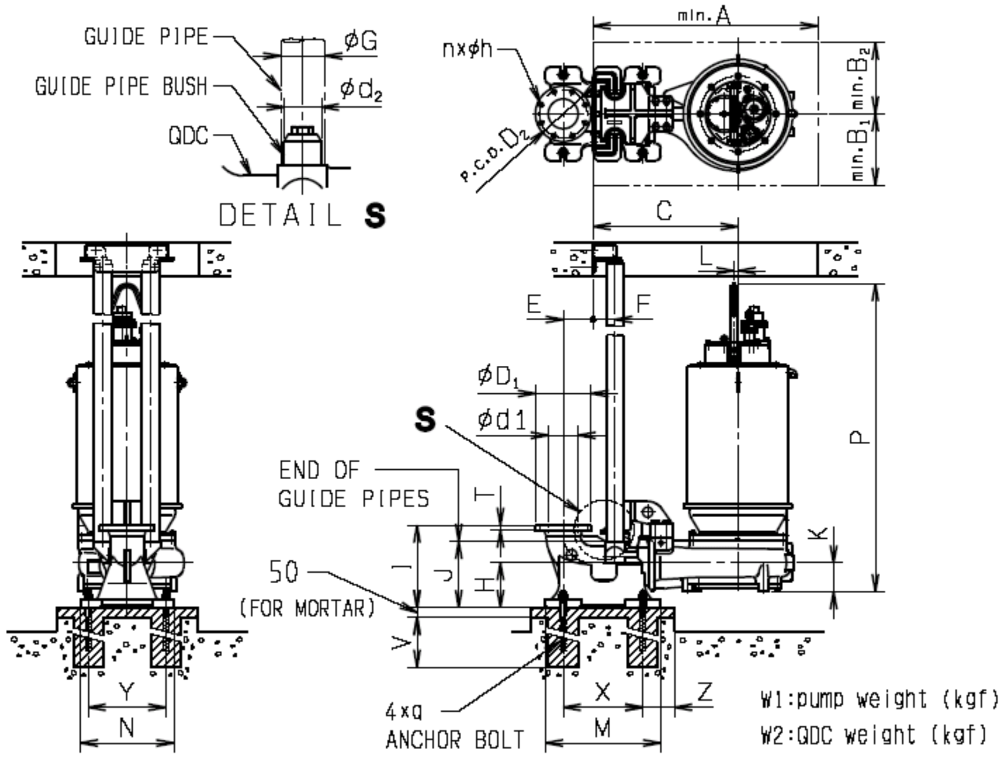



Unit: mm

| Model Code | HP (kW) | d1 | A | B1 | B2 | C | E | F | G | H | I | J |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BBC-45145 | 145 (110) | 150 | 1200 | 380 | 380 | 800 | 150 | 110 | 89.1 | 225 | 415 | 333 |
| | | K | L | M | N | P | V | X | Y | Z | q | d2 |
| | | 160 | 30 | 580 | 470 | 1817 | 450 | 400 | 390 | 160 | M24 | 75 |
| | | W1 | W2 | | Discharge Flange of QDC | | | D1 | D2 | T | n | h |
| | | 1330 | 110 | | | | | 279.4 | 241.3 | 25.4 | 8 | 23 |

| Model Code | HP (kW) | d1 | A | B1 | B2 | C | E | F | G | H | I | J |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BBC-45120 | 120 (90) | 150 | 1200 | 380 | 380 | 800 | 150 | 110 | 89.1 | 225 | 415 | 333 |
| | | K | L | M | N | P | V | X | Y | Z | q | d2 |
| | | 160 | 30 | 580 | 470 | 1727 | 450 | 400 | 390 | 160 | M24 | 75 |
| | | W1 | W2 | | Discharge Flange of QDC | | | D1 | D2 | T | n | h |
| | | 1270 | 110 | | | | | 279.4 | 241.3 | 25.4 | 8 | 23 |

Hydro Model: EE




Unit: mm

| Model Code | HP (kW) | d1 | A | B1 | B2 | C | E | F | G | H | I | J |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EEO-65145 | 145 (110) | 300 | 1510 | 540 | 430 | 960 | 260 | 110 | 89.1 | 330 | 660 | 503 |
| | | K | L | M | N | P | V | X | Y | Z | q | d2 |
| | | 250 | 30 | 680 | 570 | 2042 | 450 | 500 | 490 | 160 | M24 | 75 |
| | | W1 | W2 | | Discharge Flange of QDC | | | D1 | D2 | T | n | h |
| | | 1730 | 230 | | | | | 482.6 | 431.8 | 31.8 | 12 | 26 |

| Model Code | HP (kW) | d1 | A | B1 | B2 | C | E | F | G | H | I | J |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EEO-65120 | 120 (90) | 300 | 1510 | 540 | 430 | 960 | 260 | 110 | 89.1 | 330 | 660 | 503 |
| | | K | L | M | N | P | V | X | Y | Z | q | d2 |
| | | 250 | 30 | 680 | 570 | 1962 | 450 | 500 | 490 | 160 | M24 | 75 |
| | | W1 | W2 | | Discharge Flange of QDC | | | D1 | D2 | T | n | h |
| | | 1650 | 230 | | | | | 482.6 | 431.8 | 31.8 | 12 | 26 |

| Model Code | HP (kW) | d1 | A | B1 | B2 | C | E | F | G | H | I | J |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EEO-65100 | 100 (75) | 300 | 1510 | 540 | 430 | 960 | 260 | 110 | 89.1 | 330 | 660 | 503 |
| | | K | L | M | N | P | V | X | Y | Z | q | d2 |
| | | 250 | 30 | 680 | 570 | 1912 | 450 | 500 | 490 | 160 | M24 | 75 |
| | | W1 | W2 | | Discharge Flange of QDC | | | D1 | D2 | T | n | h |
| | | 1590 | 230 | | | | | 482.6 | 431.8 | 31.8 | 12 | 26 |

## 1. MOTOR SPECIFICATIONS

| | |
|---|---|
| Type | Air-filled watertight three phase induction motor |
| Frequency and Voltage | 50Hz, 380V, 415V |
| Insulation class | H |
| Max. allowable starting | 10 per hour |
| Protection | Thermal detector for each phase |
| | Float type leakage detector |
| | Thermal detector for thrust bearing (option) |

## 2. STARTING METHOD

Direct on line (DOL) starting and star delta starting are applied to Ebara submersible motor pump, type DSC4.

## 3. CABLE

Watertight rubber-insulated flexible cable is provided.

Cables provided for the motor consist of the followings :

Protection : 1-4 (8) core x #14 (if thermal detector for thrust bearing is required)

Power supply : depends on voltage, starting method and bhp.

Standard length of cables : 10m

**1. MECHANICAL SEAL**

Ebara DSC pump employs the **cartridge type, duplex mechanical seals in tandem arrangement**.

Cartridge type mechanical seal provides

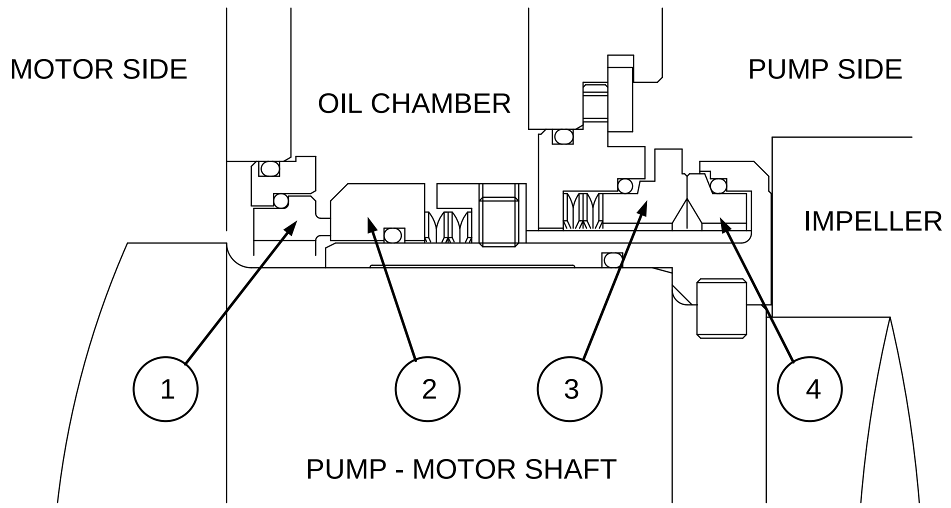
------Easy maintenance because it is handled as one unit

------High reliability due to assembly and adjustment separated from the bowl unit

Duplex mechanical seals in tandem arrangement provides

------High reliability because of dual seals construction

------Long life operation with oil lubrication

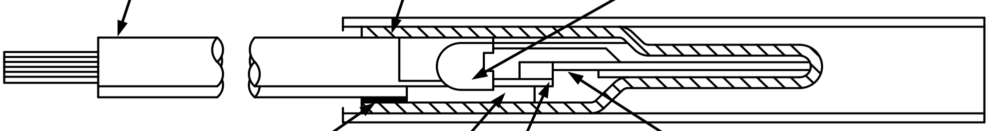



| | | |
|---|---|---|
| 4 | SEAL RING (LOWER) | SILICON CARBIDE |
| 3 | FLOATING SHEET (LOWER) | SILICON CARBIDE |
| 2 | SEAL RING (UPPER) | CERAMIC+STAINLESS STEEL |
| 1 | FLOATING SHEET (UPPER) | CARBON |
| NO. | DESCRIPTION | MATERIAL |

**Fig. 6-1 MECHANICAL SEAL**

## 2. THERMAL DETECTOR FOR MOTOR WINDING

A “9700K” made by Sensata Technologies Baoying Co., Ltd. is fitted to prevent the motor operating in an over-heated condition.




**SWITCH RATING**

CONTACT RATING : AC115V 18A / AC230C 13A

CONTACT TYPE : B – CONTACT (NORMALLY CLOSED)

OPEN TEMP. : 140±5℃

**Fig.6-2 THERMAL DETECTOR FOR MOTOR WINDING**

**CHARACTERISTICS**

The circuit is normally closed.

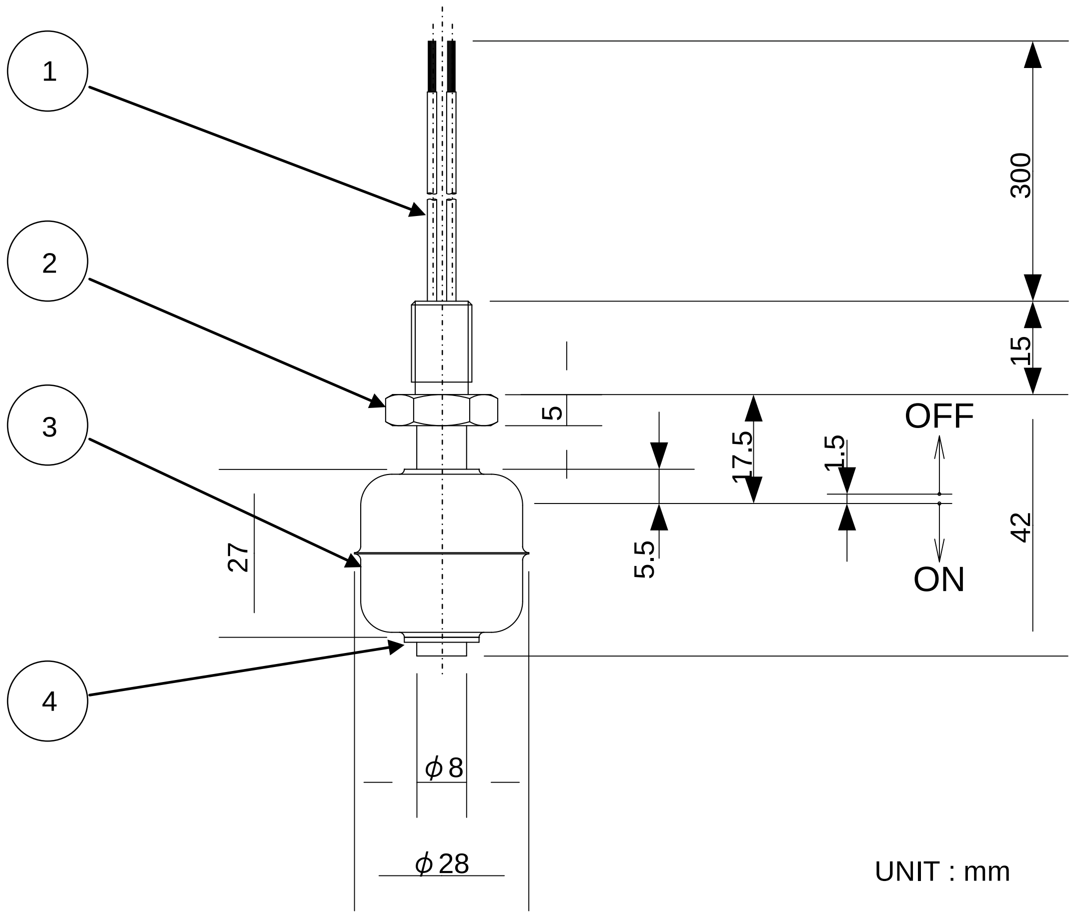
The disc is operated both by the current passing through it and by heat received from the windings.

When the temperature of the disc reaches a predetermined point corresponding to the maximum allowable temperature of winding, the disc snaps open to interrupt the circuit.

When the winding temperature returns to the safe operation range, the circuit is restored automatically.

### 3. LEAKAGE DETECTOR

A built-in float type leakage detector is fitted to sense leaking of pumping water and/or seal oil into the motor as a result of failure of the mechanical seal.




**SWITCH RATING**

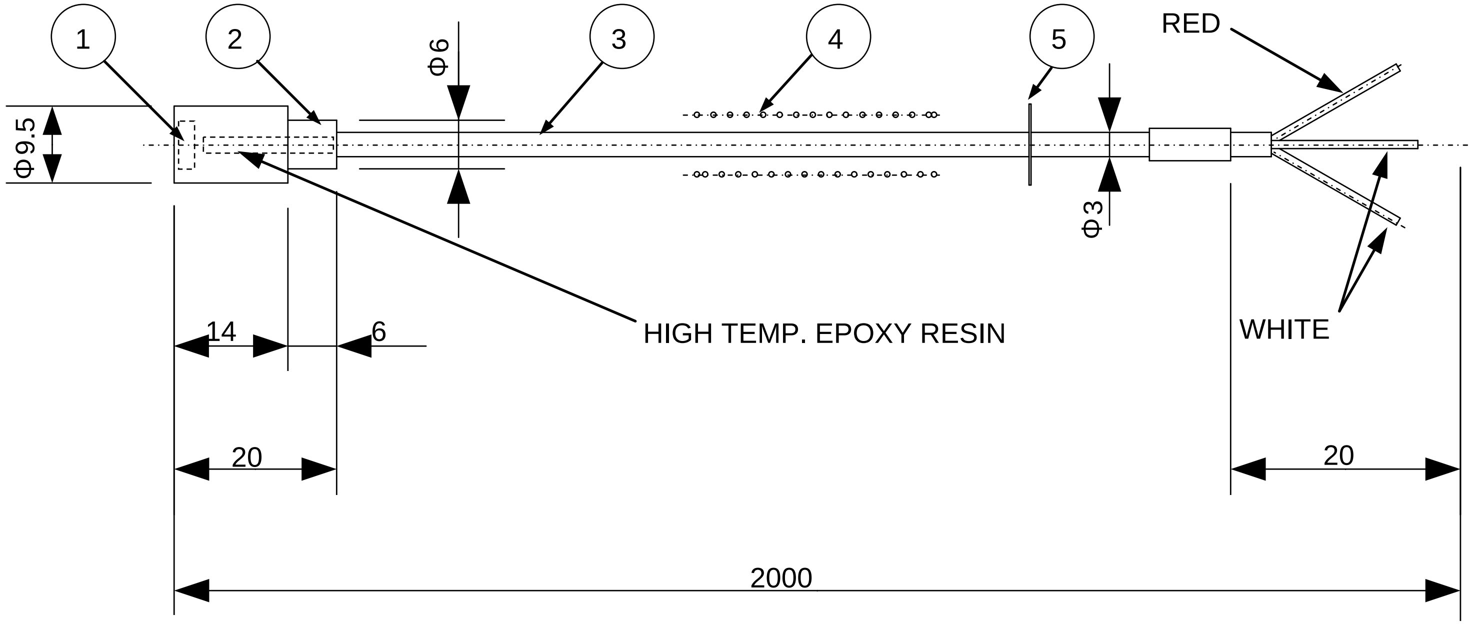
CONTACT RATING : Breaking capacity : AC50VA/DC50W
Max. breaking current : AC0.5A/DC0.5A
Max. operating voltage : AC300V/DC300V

CONTACT TYPE : B-CONTACT (NORMALLY CLOSED)

| | | | |
|---|---|---|---|
| 4 | STOPPER | 316 Stainless Steel | 1 |
| 3 | FLOAT | 316 Stainless Steel | 1 |
| 2 | HOUSING | 316 Stainless Steel | 1 |
| 1 | LEAD WIRE | Heatproof Polyvinyl Chloride Wire (0.3mm) | 2 |
| NO. | PART NAME | MATERIAL | Q'ty/1set |

**Fig. 6-3 LEAKAGE DETECTOR**

## 4. THERMAL DETECTOR FOR THRUST BEARING (OPTION)

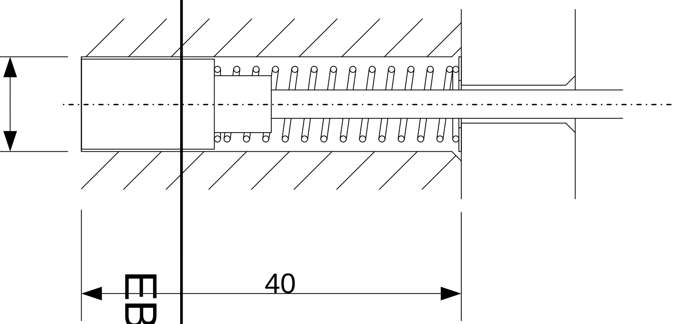



UNIT : mm

TEMPERATURE RANGE : -50～150℃

LIMIT OF ERROR : JIS C1604 CLASS B

SET TEMPERATURE : 85℃




**ASSEMBLY OF BEARING TEMP. DETECTOR**

| NO. | PARTS | MATERIAL | Q'ty | REMARKS |
|---|---|---|---|---|
| 5 | SELF LOCK RETAINIG RING | SPRING STEEL | 1 | |
| 4 | SPRING | STAINLESS STEEL | 1 | |
| 3 | LEAD WIRE | | 1 | 7/φ0.16 TEFLON-TEFLON |
| 2 | CAP | STAINLESS STEEL | 1 | |
| 1 | RESISTANCE BULB | | 1 | Pt100Ω at 0℃ 3W 5mA |

**Fig. 6-4 THERMAL DETECTOR FOR THRUST BEARING**