TIGERFLOW®

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CD SERIES

VERTICAL MULTISTAGE PUMPS

Installation Operation and Maintenance Manual

TIGERFLOW®

TIGERFLOW CD SERIES
INSTALLATION OPERATION AND
MAINTENANCE MANUAL

CONTENTS

0.GENERAL SECURITY CONSIDERATIONS

About safety warnings

It is essential to read, understand and follow the warnings and safety regulations before handing the product. They have been published in order to prevent the following hazards:

- Personal accidents and health problems.
- Damage to the product and/or the system.
- Product malfunction.

The following symbols next to a paragraph indicate the possibility of danger as a result of failure to observe the prescriptions:

DANGER:

Failing to follow these instructions may cause a serious personal injury or death hazard by electrocution.

DANGER:

Failing to follow these instructions may result in serious personal injury or death hazard.

ATTENTION:

Failing to follow these instructions may result in a malfunction or damage to the equipment.

ATTENTION:

Read the instructions carefully before installing or using this product.

1.INTRODUCTION AND SECURITY

1.1. Introduction

Purpose of this manual

The purpose of this manual is to provide necessary information to:

- Install
- Handle
- Operate
- Perform maintenance operations

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Installation, Operation and Maintenance Manual

1.INTRODUCTION AND SECURITY

ATTENTION:

Read the instructions carefully before installing or using this product.

DANGER:

Any wrong use of this product may cause personal injuries and/or property damages, and may also void the warranty.

ATTENTION:

Save this manual for future reference, and keep it readily available at the location of the unit.

Inexperienced users

DANGER:

This product is intended to be operated by qualified personnel only.

Be aware of the following precautions:

- Persons with diminished capacities should not operate this product unless they are supervised or have been properly trained by qualified personnel.
- Children must be supervised to ensure that they do not play on or around the product.

1.2. Disposal of packaging and product

This product or parts of it must be disposed of in an environmentally sound manner.

1. Use public or private waste disposal services.
2. If not available, contact Tigerflow.

1.3. Warranty

For further information about the warranty, refer to the sales contract.

2.PRODUCT DESCRIPTION

2.1. Pump design

This product is a vertical multi-stage pump non self-priming that can be installed with standard electric.

This product can be provided as a complete pumping unit (pump and electric motor) or as a hydraulic unit (pump without a motor).

ATTENTION:

If you have purchased a pump without motor, make sure the motor you intend to connect to the pump meets all the technical requirements.

2.2. Applications

Intended use

The pump is suitable for:

- Civil and industrial water distribution systems
- Irrigation (for instance, for agriculture or sport facilities)
- Water treatment
- Steam boiler supply
- Washing facilities
- Cooling (for instance, air conditioning and refrigeration)
- Fire fighting applications

Unintended use

DANGER:

Inadequate use of the pump may cause hazard and damages to people and things.

Any inadequate use of the product would void the guarantee.

Some examples of inadequate use are:

- Incompatible liquids with the building materials of the pump.
- Dangerous liquids (such as toxic, explosive, inflammable or corrosive liquids)
- Drinks and edible liquids other than water (for instance, wine or milk).

DANGER:

Do not use this pump with inflammable or explosive liquids.

2.PRODUCT DESCRIPTION

ATTENTION:

Contact your distributor in the following cases:

- When the viscosity and/or density of the pumping liquid exceed that of water, such as water with glycol; a more powerful motor might be necessary.
- When the pumping liquid has been chemically treated (for instance, smoothened, densified, etc.)
- When the pump is to be installed horizontally (only for model CD32 and above), a special version fitted with specific brackets for its correct installation should be ordered.
- In any other situation other than the above described and related to the nature of the liquid.

Special Applications

ATTENTION:

Contact your distributor in the following cases:

- When the viscosity and/or density of the pumping liquid exceed that of water, such as water with glycol; a more powerful motor might be necessary.
- When the pumping liquid has been chemically treated (for instance, smoothened, densified, etc.)
- When the pump is to be installed horizontally (only for model CD32 and above), a special version fitted with specific brackets for its correct installation should be ordered.
- In any other situation other than the above described and related to the nature of the liquid.

2.3. Working Conditions:

The pump is suitable for:

- Liquid temperature: Normal temperature type 5℉~158℉ (-15℃~+70℃);
  Hot water type 5℉~248℉ (-15℃~+120℃);
- Flow rate range: 2.64~1056.72GPM (0.6~240m³/h);
- Liquid pH range: pH5~9;
- Max. ambient temperature: 104℉ (+40℃);
- Max. altitude: 3280.8 FT (1000m);
- Min. inlet pressure: Refer to NPSH curve;
- Max. working pressure: See table 1.

DANGER:

When specific gravity or viscosity of pumped liquid is bigger than water, the shaft power of pump will be increased, need to select a larger power motor, please contact us for more details.

2.4. Model Key

● Wet - end only CD3-20

CD F 10 1 A 0

Model
CD

Construction
Stainless steel, flange connection
Stainless/cast iron, flange connection

Nominal flow (m^3/hr)

Stages (1 or 2 characters)

Frame Size

A = 56C	D = 213/5TC
B = 143/5TC	E = 254/6TC
C = 182/4TC	F = 284/6TSC

SEAL
0 = Cartridge Seal, Carbon-SilCar-Viton (Standard)

● Wet - end only CD32-80

CD F 32 6 2 A 0

Model
CD

Construction
None = Stainless / cast iron construction
F = Stainless steel

Nominal flow (m^3/hr)

Stages (1 or 2 characters)

Number of reduced diameter impellers

Frame Size

A = 56C	D = 213/5TC
B = 143/5TC	E = 254/6TC
C = 182/4TC	F = 284/6TSC

SEAL
0 = Cartridge Seal, Carbon-SilCar-Viton (Standard)

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Installation, Operation and Maintenance Manual

● Wet - end / Motor combination CD3-20

CD F 10 1 A 0 D D 1 D

Model
CD

Construction
None = Stainless steel, flange connection
F = Stainless/cast iron, flange connection

Nominal flow (m^3/hr)

Stages (1 or 2 characters)

Frame Size

A = 56C	D = 213/5TC
B = 143/5TC	E = 254/6TC
C = 182/4TC	F = 284/6TSC

SEAL
0 = Cartridge Seal, Carbon-SilCar-Viton (Standard)

HP

A=1/2 HP		G=5.0 HP	N=30 HP
B=3/4 HP		H=7.5 HP	P=40 HP
C=1.0 HP		J=10 HP	Q=50 HP
D=1.5 HP		K=15 HP	R=60 HP
E=2 HP		L=20 HP	T=75 HP
F=3 HP		M=25 HP	

VOLTAGE

A=115/230V	F=575V
B=208V	G=190V/380V
C=230V	H=190-380/415V
D=230/460V	J=415V
E=208-230/460V	

POLE/FREQUENCY/PHASE
1=2/60Hz/1ϕ
2=2/60Hz/3ϕ
3=2/50Hz/1ϕ
4=2/50Hz/3ϕ

MOTOR ENCLOSURE
A=ODP
B=TEFC
C=EXPLOSION PROOF

2.4. Model Key

● Wet - end / Motor combination CD32-85

CD F 32 4 2 A 0 D D 1 B

Model
CD

Construction
None = Stainless steel, flange connection
F = Stainless/cast iron, flange connection

Nominal flow (m^3/hr)

Stages (1 or 2 characters)

Number of reduced diameter impellers

Frame Size

A = 56C	D = 213/5TC
B = 143/5TC	E = 254/6TC
C = 182/4TC	F = 284/6TSC

SEAL
0 = Cartridge Seal, Carbon-SilCar-Viton (Standard)

HP

A=1/2	HP	G=5.0 HP	N=30 HP
B=3/4	HP	H=7.5 HP	P=40 HP
C=1.0	HP	J=10 HP	Q=50 HP
D=1.5	HP	K=15 HP	R=60 HP
E=2	HP	L=20 HP	T=75 HP
F=3	HP	M=25 HP	

VOLTAGE

A=115/230V	F=575V
B=208V	G=190V/380V
C=230V	H=190-380/415V
D=230/460V	J=415V
E=208-230/460V	

POLE/FREQUENCY/PHASE
1=2/60Hz/1ϕ
2=2/60Hz/3ϕ
3=2/50Hz/1ϕ
4=2/50Hz/3ϕ

MOTOR ENCLOSURE
A=ODP
B=TEFC
C=EXPLOSION PROOF

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Installation, Operation and Maintenance Manual

2.5. Specifications Plate

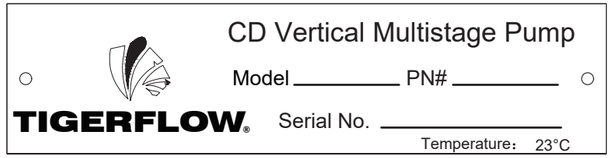

Figure 1: CD Pump Name Plate

1. Model
2. Part Number
3. Motor Power
4. Temperature
5. Serial Number

3. TECHNICAL

3.1. Room Temperature and Altitude

When the room temperature is over 104°F (40ºC) or the pump has been installed over 3281 FT (1000 m) altitude, the motor should not operate at full capacity, since there is a risk of overheating as indicated in Figure 2. Overheating may be caused by excessive room temperature or low air density with insufficient refrigeration capacity.

In those cases where both, room temperature and altitude are surpassed, correction factors must be enhanced.

In both cases, a motor with a greater nominal power would be desirable.

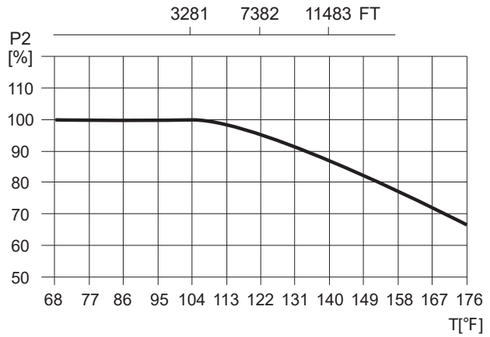

Figure 2:
Recommended motor load according to temperature and altitude

3. TECHNICAL

3.2. Minimum suction pressure

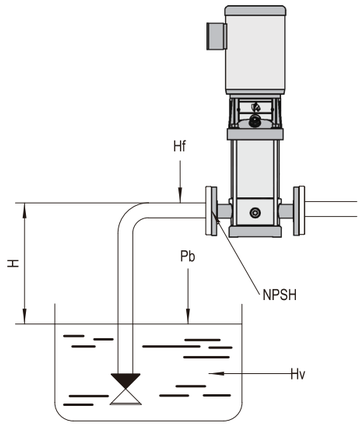

Figure 3:
Drawing of an open system with a CD pump

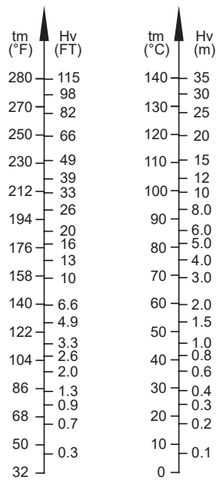

Figure 4:
Pressure according to temperature

The maximum suction “H” (Figure 3) can be worked out as follows:

$$H = P_b \cdot 2.31 - NPSH - H_f - H_v$$

Where:

P_b = Barometric pressure in psi; Pb can be set to 14.7 psi at sea level; In closed systems, pb indicates the system pressure in psi.

NPSH = Net Positive Suction Head in feet of head; To be read from the NPSH curve at the highest flow the pump will be delivering.

H_f = Friction loss in inlet pipe in feet of head at the highest flow the pump will be delivering.

H_v = Vapor pressure in feet of head.To be read from the vapor pressure scale. Hv depends on theliquid temperature tm.

If “H” value is positive, the pump can operate at a maximum suction of “H” FT (meters).

If “H” value is negative, a minimum supply pressure of “H” FT (meters) column of water must be guaranteed. The pressure while in operation depends on the value calculated for “H”.

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Installation, Operation and Maintenance Manual

3.3. Maximum Pressures

Maximum supply pressure and maximum operating pressure can be seen below. However, the actual supply pressure plus the maximum pump pressure (without flow) must always be below the values in Maximum operating pressure.
Pumps have been tested at 1.5 the maximum suction pressure.

Table1. Maximum Operating Pressure

Model	Max. Working Pressure	
	(PSI)	(bar)
CD1,3,5,10,15,20	300	25
CD32		
32-1-1~32-6-2	150 (300)	16 (30)
32-6~32-10-2	300	30
CDF32	300	30
CD42		
42-1-1~42-4-2	150 (300)	16 (30)
42-4~42-6	300	25 (30)
42-7-2~42-7	300	30
CDF42		
42-1-1~42-6	300	25 (30)
42-7-2~42-7	300	30
CD65		
65-1-1~65-3	150 (300)	16 (25)
65-4-2~65-5-2	300	25
CD85		
85-1-1~85-3-2	150 (300)	16 (25)
85-3-1~85-4-2	300	25
CDF65,85	300	25

Pumps with pressure inside brackets need to specify especially.

3. TECHNICAL

Maximum suction pressure

The following formula is valid for Figure 5.

$$P_{1max} + P_{max} \leq PN$$

P_{1max}	Maximum suction pressure
P_{max}	Maximum pump generated pressure
PN	Maximum operating pressure

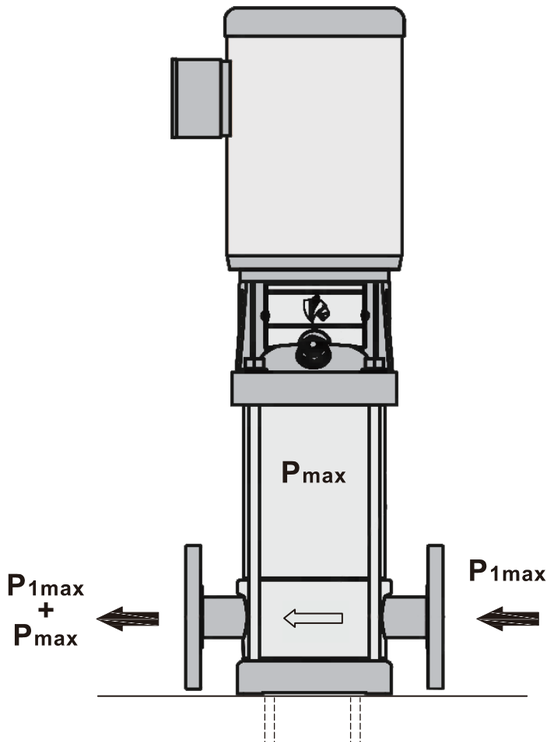

Figure 5:
Pump pressure schematics.

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3.4. Minimum flow

Due to risk of overheating, the pump must not be used below the minimum recommende flow rate.

Figure 6 shows the minimum flow rate as a percentage of the nominal flow rate depending on the liquid temperature.

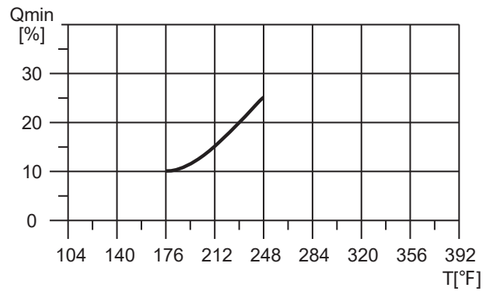


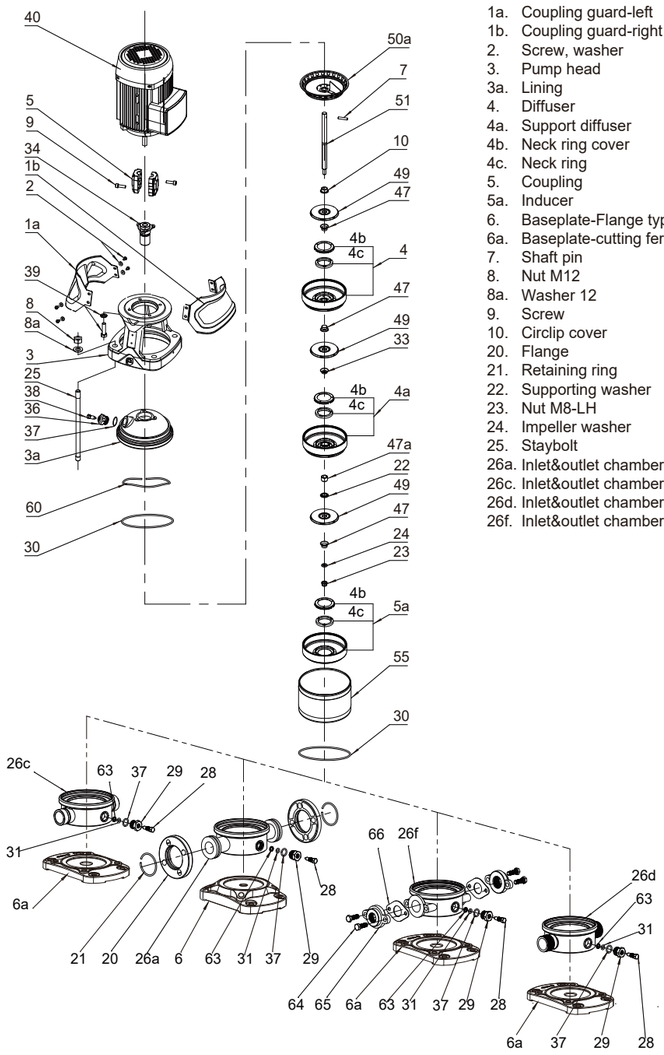
Figure 6:
Recommended motor load according to temperature and altitude

ATTENTION:
The pump must never operate while the downstream valve is closed.

4. INSTALLATION

4.1. Structure

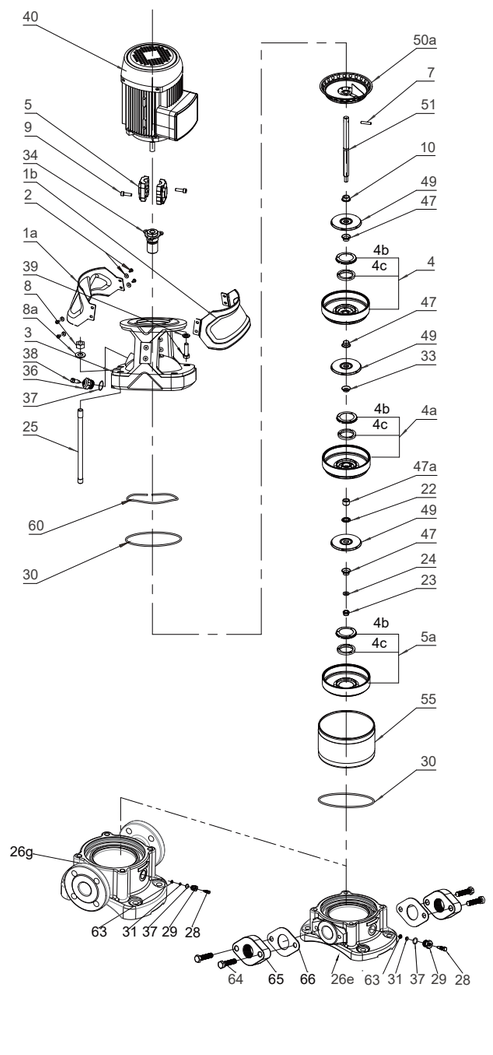
Drawing 1-A CDF3



1a. Coupling guard-left
1b. Coupling guard-right
2. Screw, washer
3. Pump head
3a. Lining
4. Diffuser
4a. Support diffuser
4b. Neck ring cover
4c. Neck ring
5. Coupling
5a. Inducer
6. Baseplate-Flange type
6a. Baseplate-cutting ferrule type
7. Shaft pin
8. Nut M12
8a. Washer 12
9. Screw
10. Circlip cover
20. Flange
21. Retaining ring
22. Supporting washer
23. Nut M8-LH
24. Impeller washer
25. Staybolt
26a. Inlet&outlet chamber-Flange type
26c. Inlet&outlet chamber-cutting ferrule type
26d. Inlet&outlet chamber-pipe thread type
26f. Inlet&outlet chamber-oval flange type
28. Drain screw M10
29. Drain plug
30. O ring 136.5×3.3
31. Y ring
33. Sleeve for support diffuser
34. Mechanical seal
36. Air vent plug
37. O ring 16×2.8
38. Air vent screw
39. Bolt, washer
40. Motor
47. Impeller sleeve 9.6×12.6
47a. Bearing
49. Impeller
50a. Top diffuser
51. Shaft
55. Cylinder
60. Corrugated spring
63. O ring retainer
64. Bolt M10×40
65. Oval flange
66. Oval flange gasket

4.1. Structure

Drawing 1-B CD3

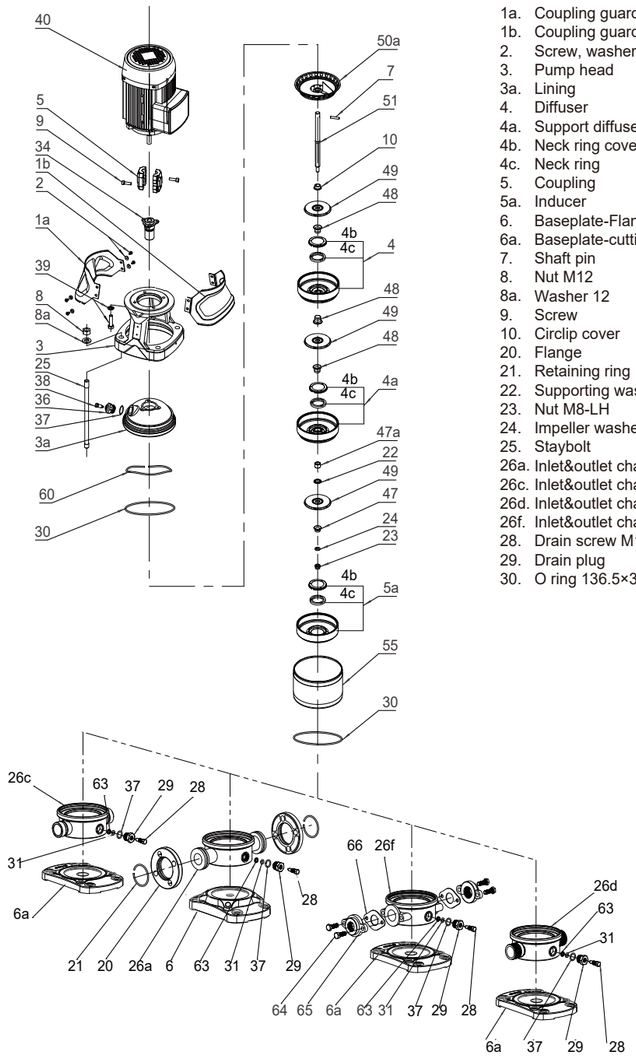


1a. Coupling guard-left
1b. Coupling guard-right
2. Screw, washer
3. Pump head
4. Diffuser
4a. Support diffuser
4b. Neck ring cover
4c. Neck ring
5. Coupling
5a. Inducer
7. Shaft pin
8. Nut M12
8a. Washer 12
9. Screw
10. Circlip cover
22. Supporting washer
23. Nut M8-LH
24. Impeller washer
25. Staybolt
26g. Inlet&outlet chamber-Flange type
26e. Inlet&outlet chamber-oval flange type
28. Drain screw M10
29. Drain plug
30. O ring 136.5×3.3
31. Y ring
33. Sleeve for support diffuser
34. Mechanical seal
36. Air vent plug
37. O ring 16×2.8
38. Air vent screw
39. Bolt, washer
40. Motor
47. Impeller sleeve 9.6×12.6
47. Bearing
49. Impeller
50a. Top diffuser
51. Shaft
55. Cylinder
60. Corrugated spring
63. O ring retainer
64. Bolt M10×40
65. Oval flange
66. Oval flange gasket

4. INSTALLATION

4.1. Structure

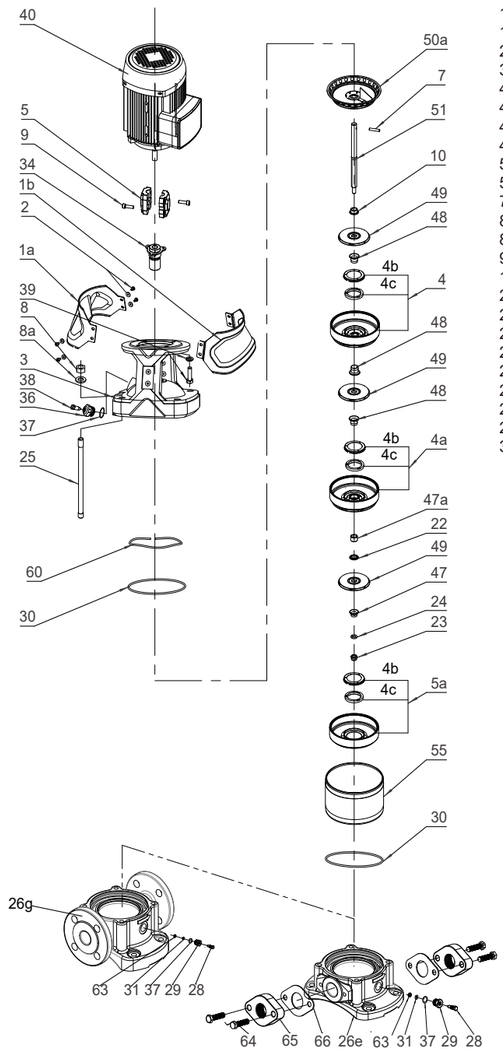
Drawing 1-C CDF5



1a. Coupling guard-left
1b. Coupling guard-right
2. Screw, washer
3. Pump head
3a. Lining
4. Diffuser
4a. Support diffuser
4b. Neck ring cover
4c. Neck ring
5. Coupling
5a. Inducer
6. Baseplate-Flange type
6a. Baseplate-cutting ferrule type
7. Shaft pin
8. Nut M12
8a. Washer 12
9. Screw
10. Circlip cover
20. Flange
21. Retaining ring
22. Supporting washer
23. Nut M8-LH
24. Impeller washer
25. Staybolt
26a. Inlet&outlet chamber-Flange type
26c. Inlet&outlet chamber-cutting ferrule type
26d. Inlet&outlet chamber-pipe thread type
26f. Inlet&outlet chamber-oval flange type
28. Drain screw M10
29. Drain plug
30. O ring 136.5×3.3
31. Y ring
34. Mechanical seal
36. Air vent plug
37. O ring 16×2.8
38. Air vent screw
39. Bolt、washer
40. Motor
47. Impeller sleeve 9.6×12.6
47a. Bearing
48. Impeller sleeve 13 ×12.6
47a. Bearing
49. Impeller
50a. Top diffuser
51. Shaft
55. Cylinder
60. Corrugated spring
63. O ring retainer
64. Bolt M10×40
65. Oval flange
66. Oval flange gasket

4.1. Structure

Drawing 1-D CD5

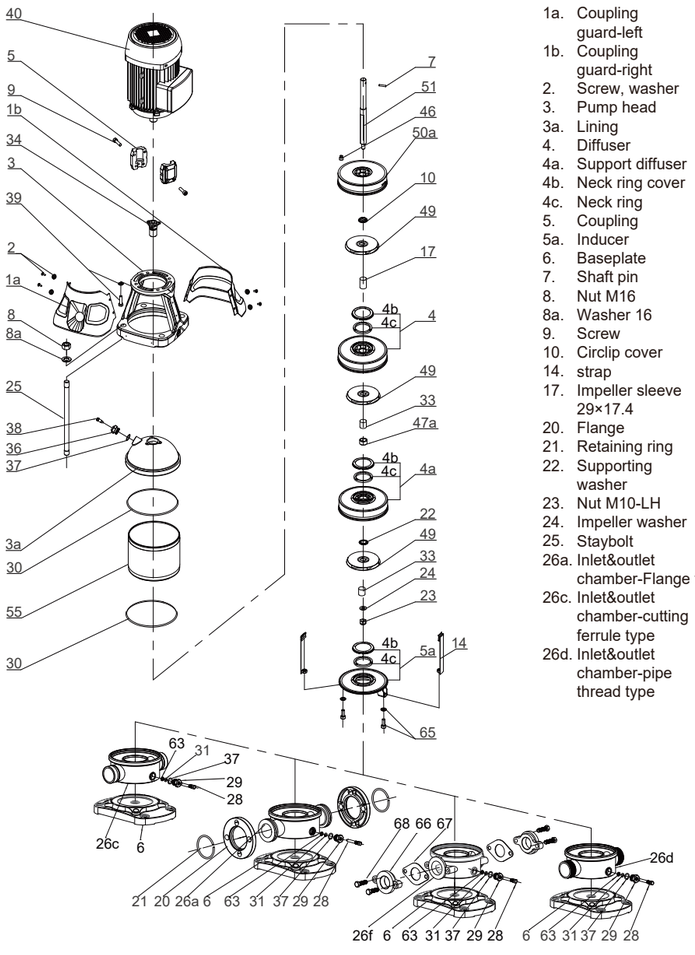


1a. Coupling guard-left
1b. Coupling guard-right
2. Screw, washer
3. Pump head
4. Diffuser
4a. Support diffuser
4b. Neck ring cover
4c. Neck ring
5. Coupling
5a. Inducer
7. Shaft pin
8. Nut M12
8a. Washer 12
9. Screw
10. Circlip cover
22. Supporting washer
23. Nut M8-LH
24. Impeller washer
25. Staybolt
26g. Inlet&outlet chamber-Flange type
26e. Inlet&outlet chamber-oval flange type
28. Drain screw M10
29. Drain plug
30. O ring 136.5×3.3
31. Y ring
34. Mechanical seal
36. Air vent plug
37. O ring 16×2.8
38. Air vent screw
39. Bolt、washer
40. Motor
47. Impeller sleeve 9.6×12.6
47a. Bearing
48. Impeller sleeve 13 ×12.6
49. Impeller
50a. Top diffuser
51. Shaft
55. Cylinder
60. Corrugated spring
63. O ring retainer
64. Bolt M10×40
65. Oval flange
66. Oval flange gasket

4. INSTALLATION

4.1. Structure

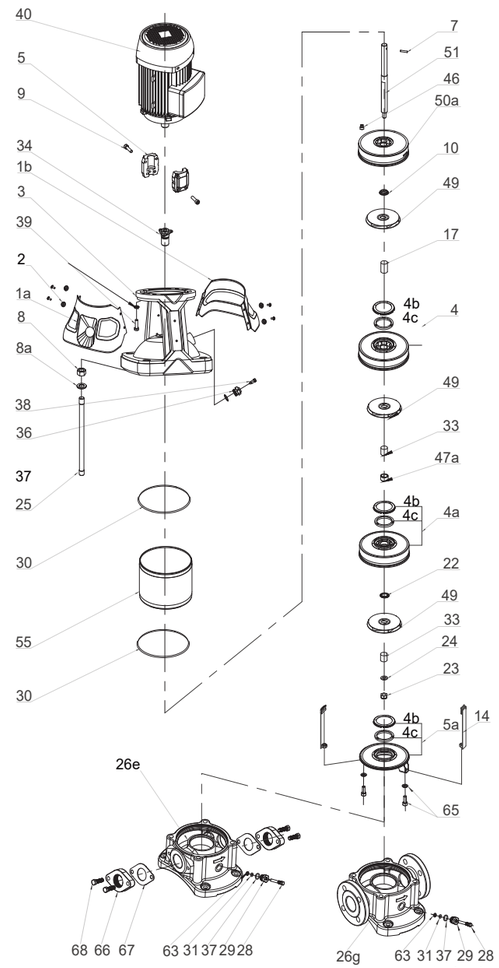
Drawing 1-E CDF10



1a. Coupling guard-left
1b. Coupling guard-right
2. Screw, washer
3. Pump head
3a. Lining
4. Diffuser
4a. Support diffuser
4b. Neck ring cover
4c. Neck ring
5. Coupling
5a. Inducer
6. Baseplate
7. Shaft pin
8. Nut M16
8a. Washer 16
9. Screw
10. Circlip cover
14. strap
17. Impeller sleeve 29×17.4
20. Flange
21. Retaining ring
22. Supporting washer
23. Nut M10-LH
24. Impeller washer
25. Staybolt
26a. Inlet&outlet chamber-Flange type
26c. Inlet&outlet chamber-cutting ferrule type
26d. Inlet&outlet chamber-pipe thread type
26f. Inlet&outlet chamber-oval flange type
28. Drain screw
29. Drain plug
30. O ring 169×3.3
31. Y ring
33. Sleeve for support diffuser
34. Mechanical seal
36. Air vent plug
37. O ring 16×2.8
38. Air vent screw
39. Bolt、washer
40. Motor
46. Adjusting rubber
47a. Bearing
49. Impeller
50a. Top diffuser
51. Shaft
55. Cylinder
63. O ring retainer
65. Screw M8×20、Washer 8
66. Oval flange
67. Oval flange gasket
68. Bolt M12 ×40

4.1. Structure

Drawing 1-F CD10

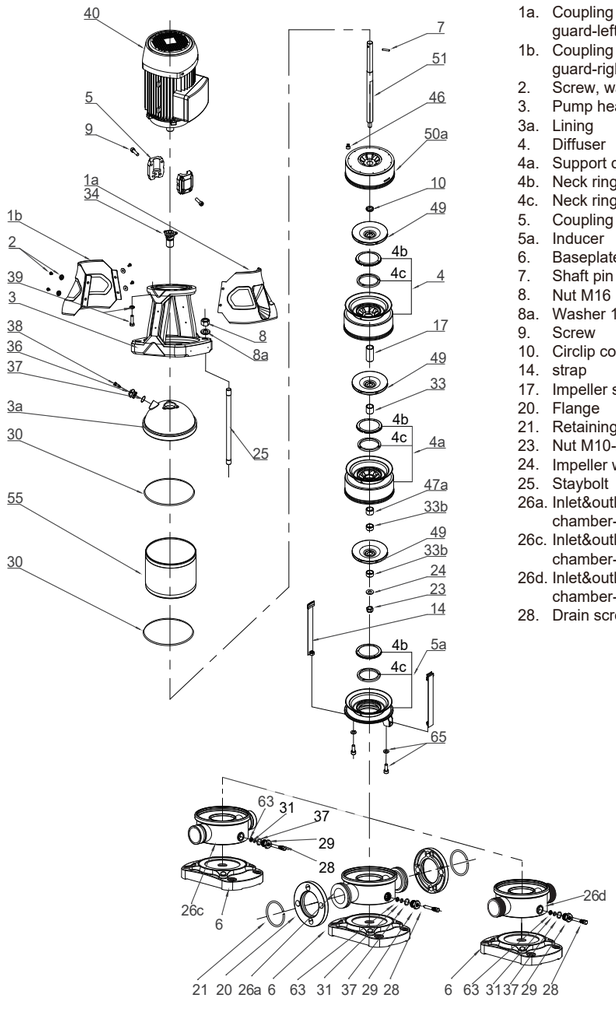


1a. Coupling guard-left
1b. Coupling guard-right
2. Screw, washer
3. Pump head
4. Diffuser
4a. Support diffuser
4b. Neck ring cover
4c. Neck ring
5. Coupling
5a. Inducer
7. Shaft pin
8. Nut M16
8a. Washer 16
9. Screw
10. Circlip cover
14. strap
17. Impeller sleeve 29×17.4
22. Supporting washer
23. Nut M10-LH
24. Impeller washer
25. Staybolt
26g. Inlet&outlet chamber-Flange type
26e. Inlet&outlet chamber-oval flange type
28. Drain screw
29. Drain plug
30. O ring 169×3.3
31. Y ring
33. Sleeve for support diffuser
34. Mechanical seal
36. Air vent plug
37. O ring16×2.8
38. Air vent screw
39. Bolt, washer
40. Motor
46. Adjusting rubber
47a. Bearing
49. Impeller
50a. Top diffuser
51. Shaft
55. Cylinder
63. O ring retainer
65. Screw M8×20, Washer 8
66. Oval flange
67. Oval flange gasket
68. Bolt M12×40

4. INSTALLATION

4.1. Structure

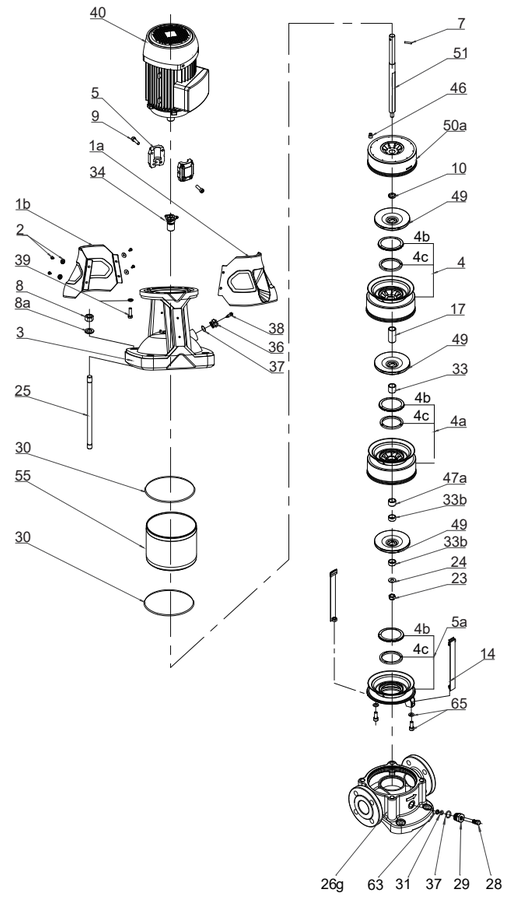
Drawing 1-G CDF15, 20



1a. Coupling guard-left
1b. Coupling guard-right
2. Screw, washer
3. Pump head
3a. Lining
4. Diffuser
4a. Support diffuser
4b. Neck ring cover
4c. Neck ring
5. Coupling
5a. Inducer
6. Baseplate
7. Shaft pin
8. Nut M16
8a. Washer 16
9. Screw
10. Circlip cover
14. strap
17. Impeller sleeve
20. Flange
21. Retaining ring
23. Nut M10-LH
24. Impeller washer
25. Staybolt
26a. Inlet&outlet chamber-Flange type
26c. Inlet&outlet chamber-cutting ferrule type
26d. Inlet&outlet chamber-pipe thread type
28. Drain screw
29. Drain plug
30. O ring 169×3.3
31. Y ring
33. Sleeve for support diffuser
33b. Long sleeve for support diffuser
34. Mechanical seal
36. Air vent plug
37. O ring 16×2.8
38. Air vent screw
39. Bolt、washer
40. Motor
46. Adjusting rubber
47a. Bearing
49. Impeller
50a. Top diffuser
51. Shaft
55. Cylinder
63. O ring retainer
65. Screw M8× 20、Washer 8

4.1. Structure

Drawing 1-H CD15, 20

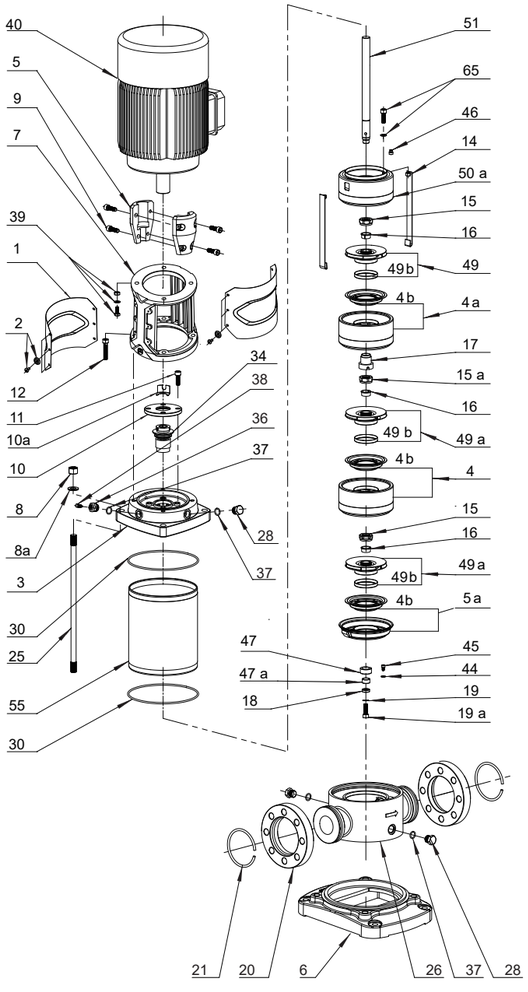


1a. Coupling guard-left
1b. Coupling guard-right
2. Screw, washer
3. Pump head
4. Diffuser
4a. Support diffuser
4b. Neck ring cover
4c. Neck ring
5. Coupling
5a. Inducer
7. Shaft pin
8. Nut M16
8a. Washer 16
9. Screw
10. Circlip cover
14. strap
17. Impeller sleeve
23. Nut M10-LH
24. Impeller washer
25. Staybolt
26g. Inlet&outlet chamber-Flange type
28. Drain screw
29. Drain plug
30. O ring 169×3.3
31. Y ring
33. Sleeve for support diffuser
33b. Long sleeve for support diffuser
34. Mechanical seal
36. Air vent plug
37. O ring 16×2.8
38. Air vent screw
39. Bolt、washer
40. Motor
46. Adjusting rubber
47a. Bearing
49. Impeller
50a. Top diffuser
51. Shaft
55. Cylinder
63. O ring retainer
65. Screw M8×20、Washer 8

4. INSTALLATION

4.1. Structure

Drawing 1-I CDF32, 42, 65, 85



1. Coupling guard
2. Screw, washer
3. Pump head
4. Diffuser (Not for 1 stage pump)
4a. Support diffuser (Not for 1 or 2 stags) pump
4b. Neck ring base assembly
5. Coupling
5a. Inducer
6. Baseplate
7. Bracket
8. Nut M16
8a. Washer 16
9. Screw
10. Seal cover
10a. Adjustment sheet
11. Screw
12. Screw
14. Strap
15. Impeller nut
15a. Impeller nut for support diffuser (Not for 1 or 2 stages pump)
16. Cone
17. Intermediate bearing (Not for 1 or 2 stages pump)
18. Cover
19. washer
19a. Screw
20. Flange
20a. Threaded flange
21. Retaining ring
25. Staybolt
26. Inlet&outlet chamber
26a. Inlet&outlet chamber thread type
28. Drainage screw
30. O ring
34. Mechanical seal
36. Air vent plug
37. O ring
38. Air vent screw
39. Bolt, washer, Nut
40. Motor
44. washer
45. Hexagon socket head screw
46. Adjusting rubber
47. Bottom bearing
47a. Bottom sleeve
49. Small impeller
49a. Impeller
49b. Ring for neck ring
50a. Top diffuser
51. Shaft
55. Cylinder
65. Screw, washer

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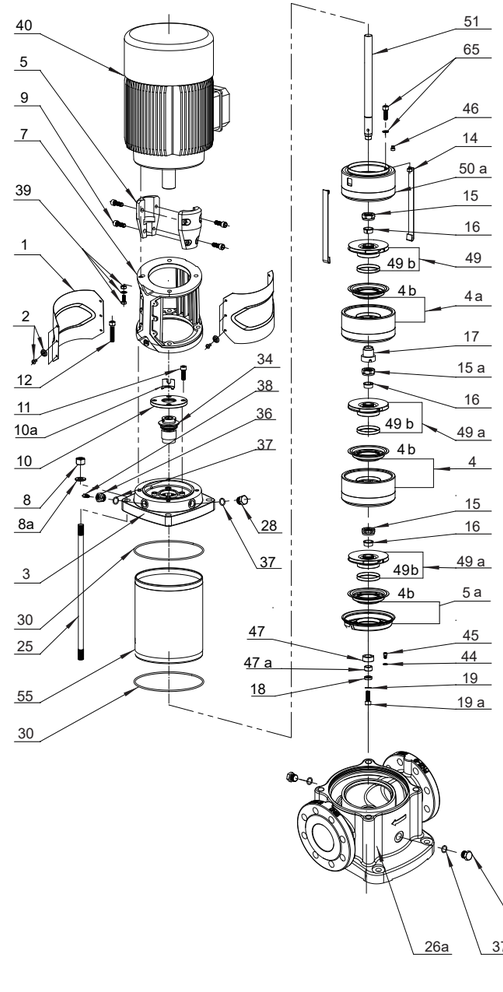
Installation, Operation and Maintenance Manual

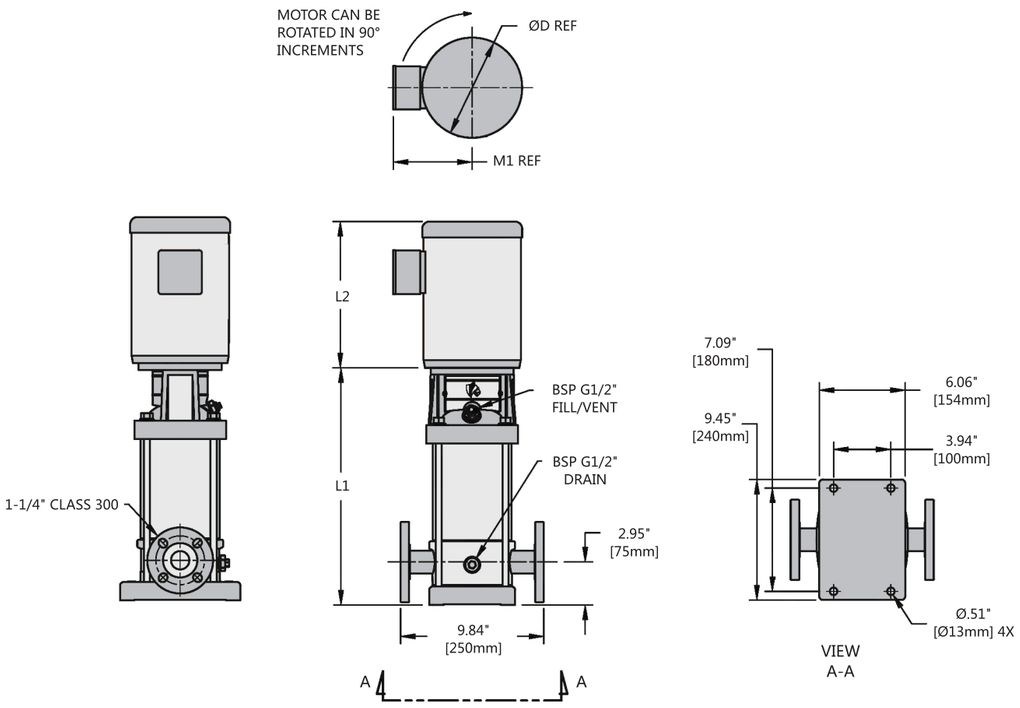
4.1. Structure

Drawing 1-J CD32, 42, 65, 85



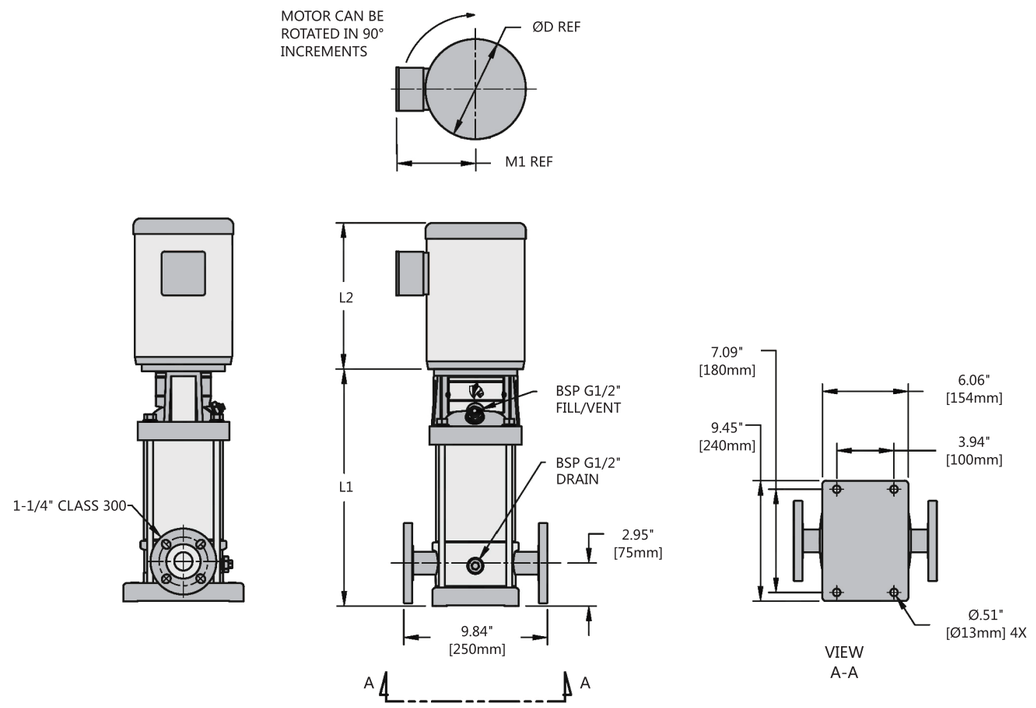
1. Coupling guard
2. Screw, washer
3. Pump head
4. Diffuser (Not for 1 stage pump)
4a. 4a、Support diffuser (Not for 1 or 2 stages pump)
4b. Neck ring base assembly
5. Coupling
5a. Inducer
7. Bracket
8. Nut M16
8a. Washer 16
9. Screw
10. Seal cover
10a. Adjustment sheet
11. Screw
12. Screw
14. Strap
15. Impeller nut
15a. Impeller nut for support diffuser (Not for 1 or 2 stages pump)
16. Cone
17. Intermediate bearing (Not for 1 or 2 stages pump)
18. Cover
19. washer
19a. Screw
25. Staybol
26a. Inlet&outlet chamber
28. Drainage screw
30. O ring
34. Mechanical seal
36. Air vent plug
37. O ring
38. Air vent screw
39. Bolt, washer, Nut
40. Motor
44. washer
45. Hexagon socket head screw
46. Adjusting rubber
47. Bottom bearing
47a. Bottom sleeve
49. Small impeller
49a. Impellerr
49b. Ring for neck ring
50a. Top diffuser
51. Shaft
55. Cylinder
65. Screw, washer

4.2. Installation Sketch & Size and Weight



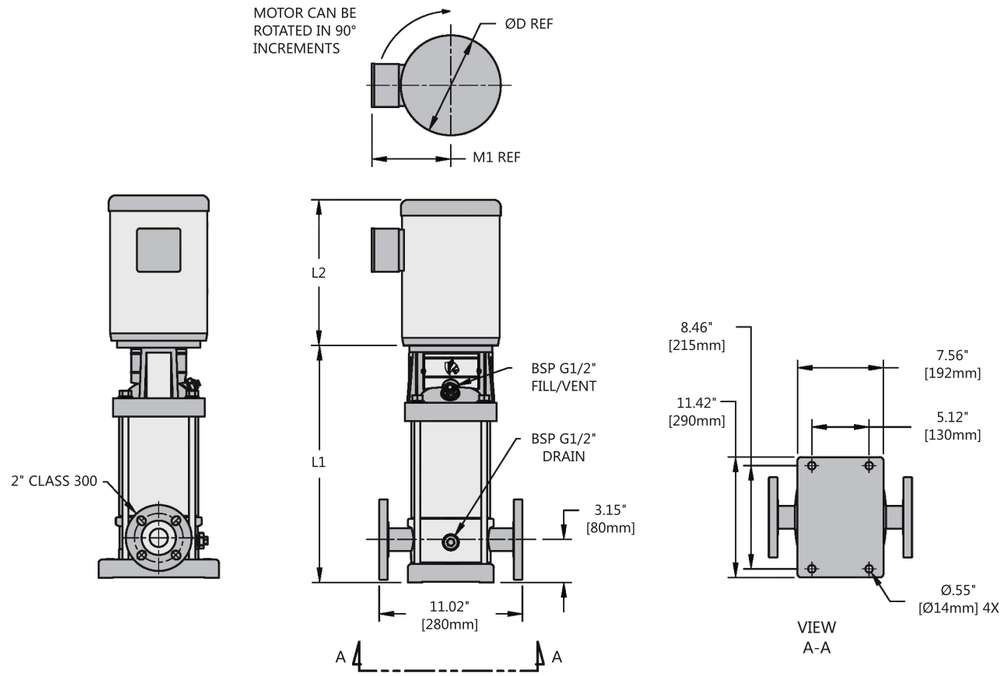
Model	HP	FRAME	DIMENSIONS (in)							WEIGHT (lbs)		
			L1	TEFC 1Φ			TEFC 3Φ			PUMP TEFC 1Φ	PUMP TEFC 3Φ	WET-END ONLY
				L2	D	M1	L2	D	M1			
CD3-3	0.75	56C	11.10	9.94	7	5.5	8.64	9	5.5	57.78	56.78	30.28
CD3-4	0.75	56C	12.28	9.94	7	5.5	8.64	9	5.5	58.82	57.82	31.32
CD3-4	1	56C	12.28	9.94	7	5.5	8.64	9	5.5	61.02	60.02	31.32
CD3-5	1	56C	13.07	9.94	7	5.5	8.64	9	5.5	61.99	60.99	32.29
CD3-7	1.5	56C	14.65	9.94	7	5.5	8.64	9	5.5	78.13	77.13	45.13
CD3-9	2	56C	16.61	9.94	7	5.5	8.64	9	5.5	72.50	71.50	37.30
CD3-10	2	56C	17.40	9.94	7	5.5	8.64	9	5.5	73.47	72.47	38.27
CD3-12	3	182TC	18.98	15.73	9.2	8.2	13.22	9.2	7	106.11	105.11	40.21
CD3-14	3	182TC	20.55	15.73	9.2	8.2	13.22	9.2	7	130.29	129.29	64.39
CD3-16	3	182TC	22.52	15.73	9.2	8.2	13.22	9.2	7	110.36	109.36	44.46
CD3-16	5	184TC	22.52				13.22	9.2	7		126.56	44.46
CD3-18	5	184TC	24.09				13.22	9.2	7		128.50	46.40

4.2. Installation Sketch & Size and Weight



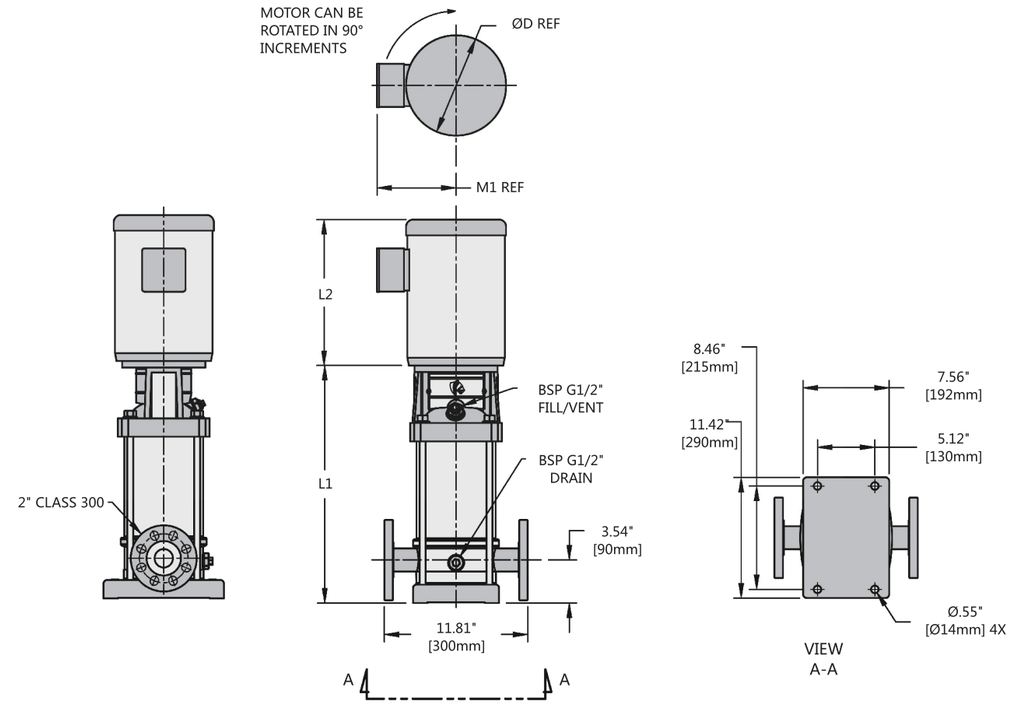
Model	HP	FRAME	DIMENSIONS (in)							WEIGHT (lbs)		
			L1	TEFC 1Φ			TEFC 3Φ			PUMP TEFC 1Φ	PUMP TEFC 3Φ	WET-END ONLY
				L2	D	M1	L2	D	M1			
CD5-3	1	56C	12.32	9.94	7	5.5	8.64	9	5.5	58.26	57.26	28.56
CD5-4	1.5	56C	13.39	9.94	7	5.5	8.64	9	5.5	64.31	63.31	31.31
CD5-6	2	56C	15.91	9.94	7	5.5	8.64	9	5.5	69.88	68.88	34.68
CD5-7	3	182TC	16.97	15.73	9.2	8.2	13.22	9.2	7	101.04	100.04	35.14
CD5-9	3	182TC	19.09	15.73	9.2	8.2	13.22	9.2	7	103.27	102.27	37.37
CD5-10	3	182TC	20.55	15.73	9.2	8.2	13.22	9.2	7	104.74	103.74	38.84
CD5-10	5	184TC	20.55				13.22	9.2	7		120.94	38.84
CD5-12	5	184TC	22.68				13.22	9.2	7		123.16	41.06
CD5-13	5	184TC	23.74				13.22	9.2	7		124.15	42.05
CD5-15	5	184TC	25.87				13.22	9.2	7		126.37	44.27
CD5-16	5	184TC	26.93				13.22	9.2	7		127.48	45.38
CD5-18	7.5	213TC	32.01				17.32	10.6	8.5		177.27	57.27
CD5-20	7.5	213TC	34.13				17.32	10.6	8.5		179.49	59.49

4.2. Installation Sketch & Size and Weight



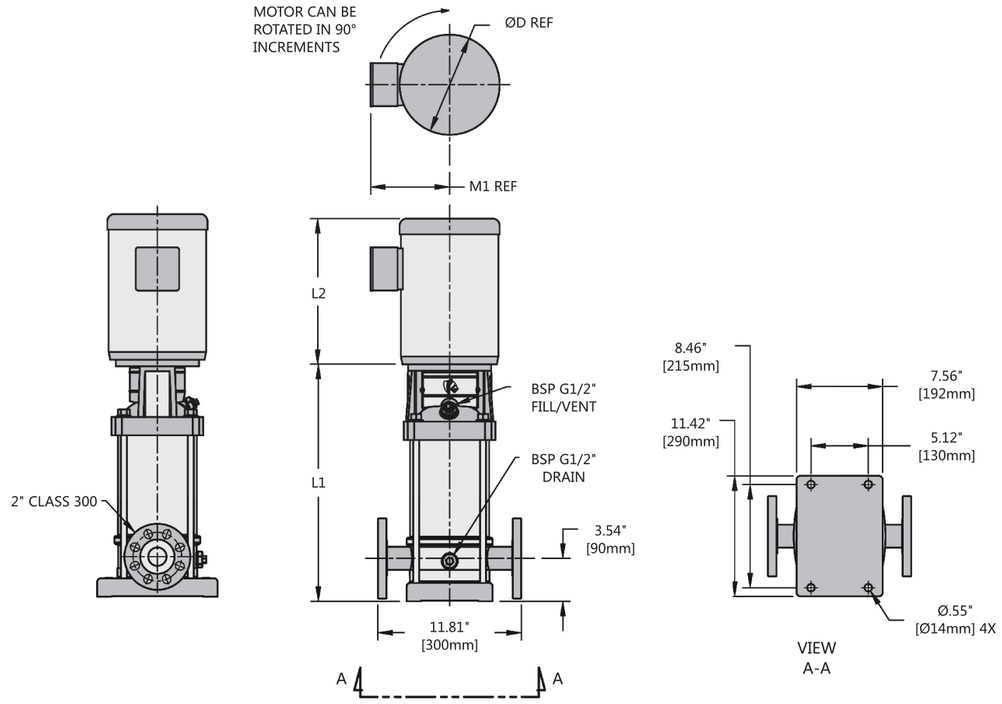
Model	HP	FRAME	DIMENSIONS (in)							WEIGHT (lbs)		
			L1	TEFC 1Φ			TEFC 3Φ			PUMP TEFC 1Φ	PUMP TEFC 3Φ	WET-END ONLY
				L2	D	M1	L2	D	M1			
CD10-2	2	56C	14.06	9.94	7	5.5	8.64	9	5.5	79.31	78.31	44.11
CD10-3	3	182TC	15.24	15.73	9.2	8.2	13.22	9.2	7	112.10	111.10	46.20
CD10-4	5	184TC	16.81				13.22	9.2	7		132.05	49.95
CD10-5	5	184TC	17.99				13.22	9.2	7		136.40	54.30
CD10-6	5	184TC	19.17				13.22	9.2	7		138.49	56.39
CD10-7	7.5	213TC	23.43				17.32	10.6	8.5		189.42	69.42
CD10-8	7.5	213TC	24.61				17.32	10.6	8.5		191.51	71.51
CD10-9	7.5	213TC	25.79				17.32	10.6	8.5		182.57	62.57
CD10-10	10	215TC	26.97				17.32	10.6	8.5		214.66	64.66
CD10-11	10	215TC	28.15				17.32	10.6	8.5		216.75	66.75
CD10-12	10	215TC	29.33				17.32	10.6	8.5		218.84	68.84
CD10-13	15	254TC	31.69				19.9	12.56	11		349.36	94.36
CD10-14	15	254TC	32.87				19.9	12.56	11		351.45	96.45
CD10-15	15	254TC	34.06				19.9	12.56	11		353.54	98.54

4.2. Installation Sketch & Size and Weight



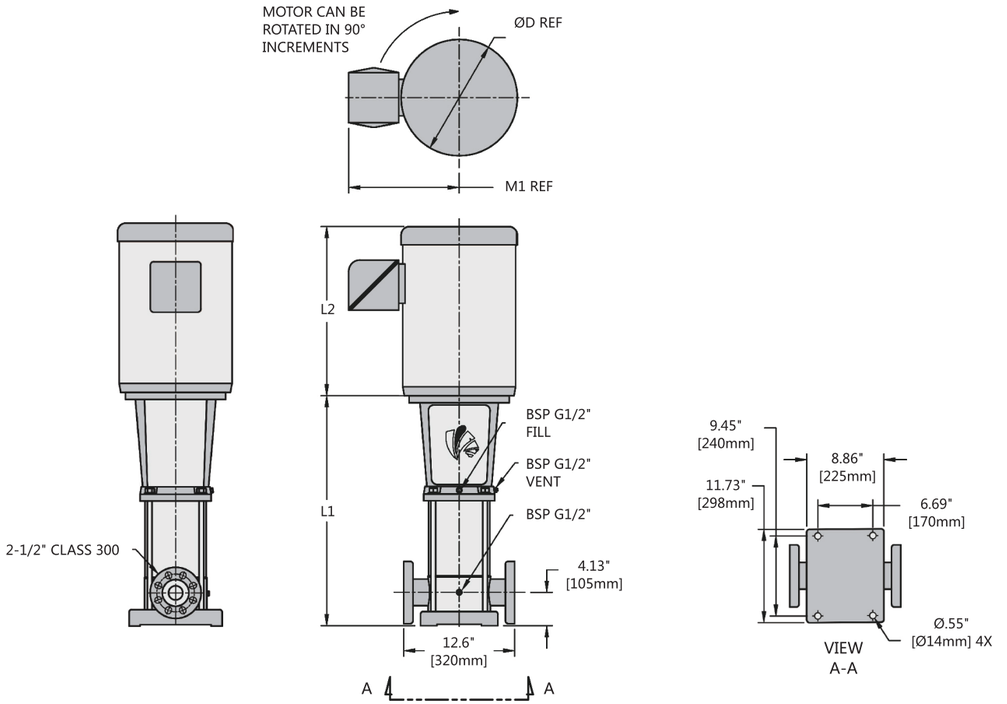
Model	HP	FRAME	DIMENSIONS (in)				WEIGHT (lbs)	
			L1	L2	D	M1	PUMP & MOTOR	WET-END ONLY
CD15-2	5	184TC	16.02	13.22	9.2	7	136.46	54.36
CD15-3	5	184TC	17.80	13.22	9.2	7	139.54	57.44
CD15-3	7.5	213TC	17.80	17.32	10.6	8.5	177.44	57.44
CD15-4	7.5	213TC	22.64	17.32	10.6	8.5	191.46	71.46
CD15-5	10	215TC	24.41	17.32	10.6	8.5	213.52	63.52
CD15-6	10	254TC	27.36	17.32	10.6	8.5	263.10	113.10
CD15-6	15	254TC	27.36	19.9	12.56	11	368.10	113.10
CD15-8	15	254TC	30.91	19.9	12.56	11	374.25	119.25
CD15-9	15	254TC	32.68	19.9	12.56	11	344.72	89.72
CD15-9	20	256TC	32.68	21.6	12.56	11	397.72	89.72
CD15-11	20	256TC	36.22	21.6	12.56	11	403.88	95.88
CD15-12	20	256TC	37.99	21.6	12.56	11	406.95	98.95
CD15-12	25	284TSC	37.99	22.95	14.6	11	513.95	98.95

4.2. Installation Sketch & Size and Weight



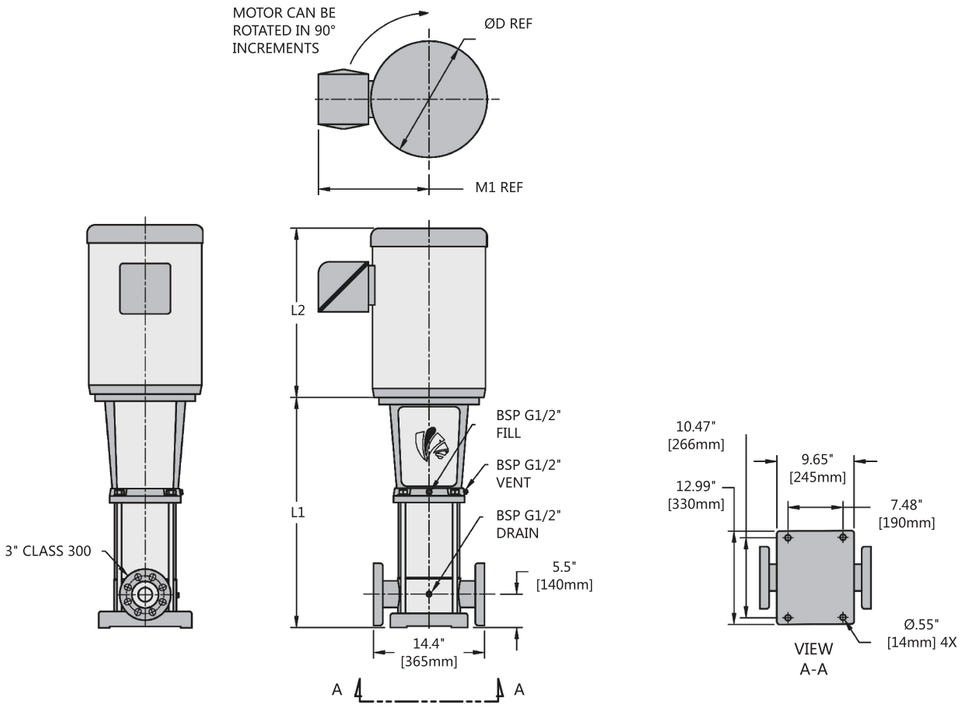
Model	HP	FRAME	DIMENSIONS (in)				WEIGHT (lbs)	
			L1	L2	D	M1	PUMP & MOTOR	WET-END ONLY
CD20-2	5	184TC	16.02	13.22	9.2	7	132.37	50.27
CD20-3	7.5	213TC	20.87	17.32	10.6	8.5	184.33	64.33
CD20-4	10	215TC	22.64	17.32	10.6	8.5	206.43	56.43
CD20-5	15	254TC	25.59	19.9	12.56	11	330.42	75.42
CD20-6	15	254TC	27.36	19.9	12.56	11	333.54	78.54
CD20-7	15	254TC	29.13	19.9	12.56	11	336.67	81.67
CD20-7	20	256TC	29.13	21.6	12.56	11	389.67	81.67
CD20-8	20	256TC	30.91	21.6	12.56	11	392.79	84.79
CD20-9	20	256TC	32.68	21.6	12.56	11	395.91	87.91
CD20-9	25	284TSC	32.68	22.95	14.6	11	502.91	87.91
CD20-10	25	284TSC	34.45	22.95	14.6	11	506.03	91.03

4.2. Installation Sketch & Size and Weight



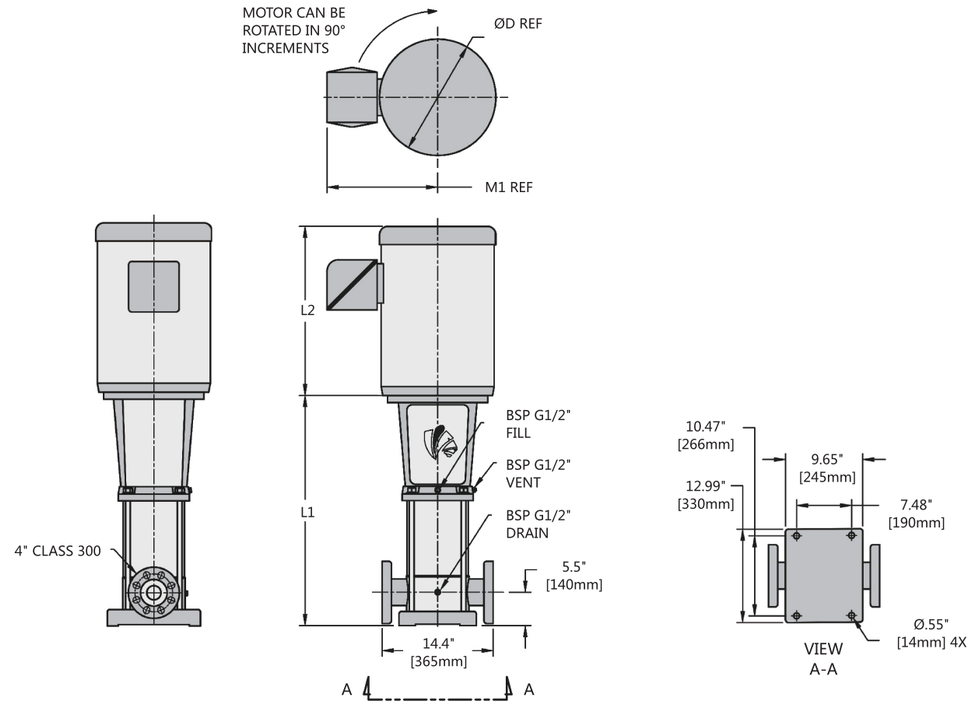
Model	HP	FRAME	DIMENSIONS (in)				WEIGHT (lbs)	
			L1	L2	D	M1	PUMP & MOTOR	WET-END ONLY
CD32-2-2	7.5	213TC	22.64	17.32	10.6	8.5	218.10	98.10
CD32-2	7.5	213TC	22.64	17.32	10.6	8.5	213.70	93.70
CD32-2	10	215TC	22.64	17.32	10.6	8.5	243.70	93.70
CD32-3-2	10	215TC	25.39	17.32	10.6	8.5	250.31	100.31
CD32-3	10	215TC	29.53	17.32	10.6	8.5	271.25	121.25
CD32-3	15	254TC	29.53	19.9	12.56	11	376.25	121.25
CD32-4-2	15	254TC	32.28	19.9	12.56	11	385.07	130.07
CD32-4	15	254TC	32.28	19.9	12.56	11	374.05	119.05
CD32-4	20	256TC	32.28	21.6	12.56	11	427.05	119.05
CD32-5-2	20	256TC	35.04	21.6	12.56	11	438.07	130.07
CD32-5	20	256TC	35.04	21.6	12.56	11	460.12	152.12

4.2. Installation Sketch & Size and Weight



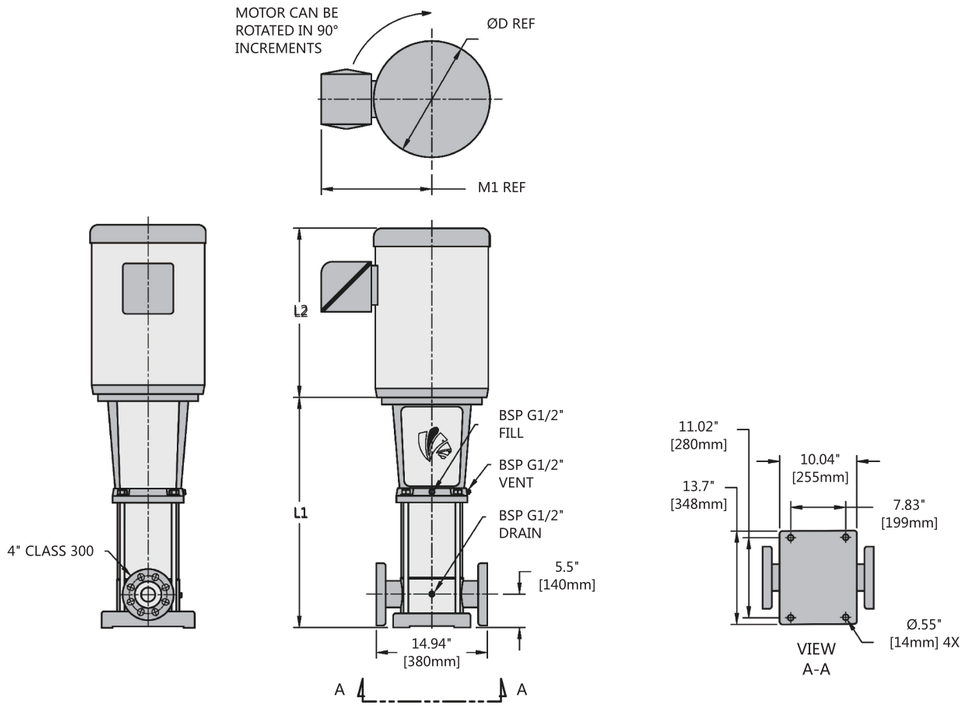
Model	HP	FRAME	DIMENSIONS (in)				WEIGHT (lbs)	
			L1	L2	D	M1	PUMP & MOTOR	WET-END ONLY
CD42-1	7.5	213TC	22.09	17.32	10.6	8.5	224.72	104.72
CD42-2-2	15	254TC	29.45	19.9	12.56	11	389.48	134.48
CD42-2	15	254TC	29.45	19.9	12.56	11	378.46	123.46
CD42-3-2	20	256TC	32.60	21.6	12.56	11	435.87	127.87
CD42-3	25	284TSC	32.60	22.9	14.6	11	542.87	127.87
CD42-4-2	25	284TSC	35.75	22.9	14.6	11	547.28	132.28
CD42-4-2	30	286TSC	35.75	24.45	14.6	11	562.28	132.28
CD42-4	30	286TSC	35.75	24.45	14.6	11	562.28	132.28
CD42-4	40	324TSC	35.75	28.25	17.1	13.5	685.28	132.28

4.2. Installation Sketch & Size and Weight



Model	HP	FRAME	DIMENSIONS (in)				WEIGHT (lbs)	
			L1	L2	D	M1	PUMP & MOTOR	WET-END ONLY
CD65-1	15	254TC	26.42	19.9	12.56	11	387.28	132.28
CD65-2-2	15	254TC	29.69	19.9	12.56	11	376.25	121.25
CD65-2	25	284TSC	29.69	22.9	14.6	11	536.25	121.25
CD65-3-2	25	284TSC	32.91	22.9	14.6	11	545.07	130.07
CD65-3	40	324TSC	32.91	28.25	17.1	13.5	683.07	130.07
CD65-4-2	40	324TSC	36.18	28.25	17.1	13.5	680.87	127.87

4.2. Installation Sketch & Size and Weight



PN	HP	FRAME	DIMENSIONS (in)				WEIGHT (lbs)	
			L1	L2	D	M1	PUMP & MOTOR	WET-END ONLY
85-1	15	254TC	22.48	19.9	12.56	11	378.46	123.46
85-2-2	20	256TC	30.43	21.6	12.56	11	460.12	152.12
85-2-2	25	284TSC	30.43	22.9	14.6	11	567.12	152.12
85-2-1	25	284TSC	30.43	22.9	14.6	11	536.25	121.25
85-2-1	30	286TSC	30.43	24.45	14.6	11	551.25	121.25
85-2	30	286TSC	30.43	24.45	14.6	11	546.84	116.84
85-2	40	324TSC	30.43	28.25	17.1	13.5	669.84	116.84
85-3-2	40	324TSC	34.06	28.25	17.1	13.5	667.64	114.64
85-3-1	40	324TSC	34.06	28.25	17.1	13.5	667.64	114.64
85-3-1	50	326TSC	34.06	28.25	17.1	13.5	689.64	114.64
85-3	50	326TSC	34.06	28.25	17.1	13.5	689.64	114.64

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Installation, Operation and Maintenance Manual

DANGER:

- Follow the safety regulations in force.
- Use adequate personal protective equipment.
- Always check local and domestic regulations and legislation in force with regards to choosing the installation site as well as electric and water connections.
- Make sure the connections are made by qualified personnel and in accordance with the regulations in force.
- Before starting to work with this unit, make sure that the control panel is isolated from the power supply and cannot be energized. The same applies to the control circuit.

4.3. Pump location

DANGER:

Do not use this pump in any environment that may contain inflammable or explosive dust or gas or that may be chemically aggressive.

Some examples of inadequate installation are:

- Dangerous sites such as corrosive or explosive atmospheres.
- Locations with very high temperature or scarce ventilation.
- Outdoor installation without rain or freeze protection.

4.4. Mechanical Installation

ATTENTION:

The pump must be fixed to a flat and solid horizontal stand by means of bolts through the holes in the pump base plate. In order to avoid damages, install the pump according to the procedures below.

4.4.1. The arrows on the pump base plate indicate the direction of the flow through it.

4.4.2. The pump must be installed in a well ventilated and freeze protected place. There must be 6 in (150 mm) minimum distance between the motor and any other object to ensure cool air supply to the motor fan.

4.4.3. All the pipes must be fitted with their own supporting elements independent from the unit.

4.4.4. In order to minimize suction load loss, the suction pipe must be as short as possible. Likewise, the suction pipe must be perfectly sealed and without any air in it.

4.4. Mechanical Installation

4.4.5. If the pump is to be used in an open circuit, the suction pipe diameter must be adequate for the installation conditions. The suction pipe diameter should not be smaller than the suction port diameter. When the suction pipe is bigger than the suction port, an adaptor must be installed.

4.4.6. Model CD 32 and above, allow horizontal or vertical installations. However, the motor must never be installed at a lower level than the base plate or in an inverted position.

4.4.7. Motors over 5 HP (4 kW) must be installed on a stand.

4.4.8. In order to minimize pump noise, we recommend the use of expansion joints on both ends of the pump. The installation/foundation must be carried out as described in 4.5. Foundation.

4.4.9. Install isolation valves on both sides of the pump to stop the system from getting empty when the pump is to be removed to be cleaned, repaired or replaced.

4.4.10. Use a non-return valve (foot valve) to protect the pump against backflow.

4.4.11. Install the pipes so that no air bubbles are formed, particularly at the suction end of the pump (Figure 7).

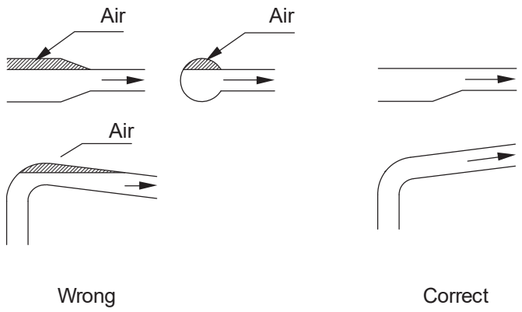

Figure 7:
Correct installation of the pipes

4.4.12. You should install a vacuum valve near the pump if the installation meets one of the following characteristics:

- The downstream pipe is inclined downwards.
- There is a risk of syphon effect.
- Protection against dirty liquid backflow is needed.

4.4.13. Before installing the pump, the suction pipe must be cleaned. When pipes carry impurities, it is needed to install a filter at 1.6~3.3 FT (0.5~1 m) from the pump inlet (particularly recommended for pumps with a flow below 44.03GPM (10 m³/h)).

4.5. Foundation

ATTENTION:

Foundation and installation must be performed according to the instructions below. Otherwise, operating failures and pump components' damage may occur.

We recommend that our pumps are installed on a concrete foundation stand that is heavy enough to provide permanent and rigid support to the whole pump. Foundation stands must be capable of absorving any vibration, normal strain or shock . Concrete foundation stand surfaces must be entirely flat and even.

Place the pump on the foundation stand and fasten it. The whole of the pump base plate must rest on the stand surface.

Recommended length and width are indicated at Figure 8. Note that the length and width of the foundation for pumps with motor size ≤ 40HP (30 kW) must be 8in (200 mm) larger than the base plate.

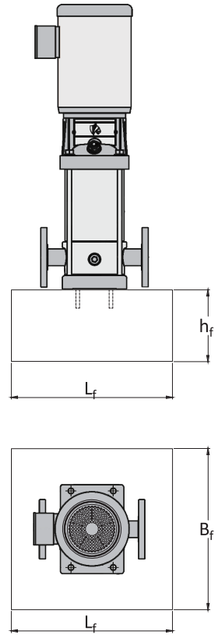

Figure 8:
Installing the pump in vertical position

4.5. Foundation

For pumps with a ≥ 50HP (37 kW) motor, the length and width of the base plate should always be 60in x 60in (1,5 x 1,5 (Lf x Bf) meters).

The weight of the foundation stand must be at least 1.5 times the total weight of the pump. To calculate the minimum foundation stand height (hf):

$$h_f = \frac{m_{pump} \times 1{,}5}{L_f \times B_f \times \delta_{determinated}}$$

Concrete density (δ) is generally estimated at 137.32 LB/FT³ (2200 kg/m³)

Facilities where silent operation is of great concern, we recommend a foundation stand up to 5 times the weight of the pump.

As shown in Figure 9 the stand must be fitted with bolts to secure the pump. Once the bolts have been installed, you may proceed to place the pump on the stand. If necessary, the pump base plate can be aligned by means of wedges to level the stand.

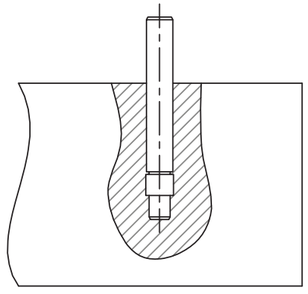

Figure 9:
Bolt in foundation stand

4.6. Vibration Damping

When dampers are to be used, they should be installed under the foundation stand. For pumps fitted with ≤ 40HP (30 kW) motors, vibration dampers can be installed as in Figure 10.

For pumps fitted with ≥ 50HP (37 kW) motors, install a damping plate to reduce vibration and noise as in Figure 11.

4.6. Vibration Damping

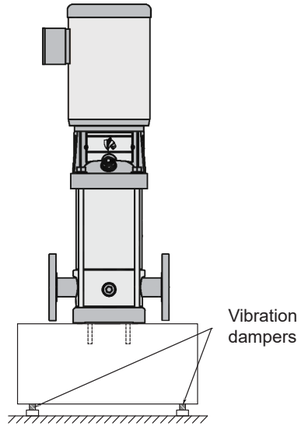

Figure 10:
Pump on vibration dampers

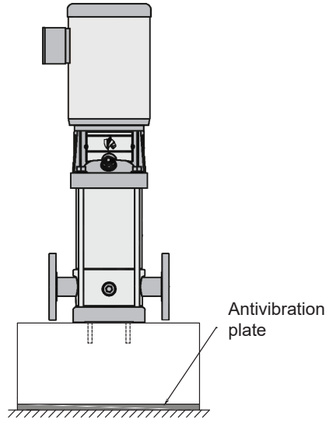

Figure 11:
Pump on a vibration damping plate

4.7. Outdoor Installation

ATTENTION:

When the pump is to be installed outdoor, we recommend that the motor is fitted under a rain cover.

4. INSTALLATION

4.8. Hot Surfaces

DANGER:

When hot liquid is to be pumped, it must be ensured that people cannot accidentally touch the equipment hot surfaces.

Figure 12 shows the parts in the pump that may get as hot as the hot liquid being pumped.

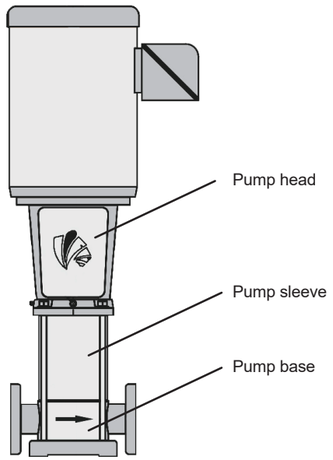

Figure 12:
Pump hot surfaces

5. START - UP

ATTENTION:

Do not start the pump until it has been filled with liquid and vented. If the pump runs dry, the pump bearings and the shaft may be damaged.

DANGER:

- Pay attention to the direction of the vent hole and make sure that the discharging water does not cause injury to persons or damage to the motor or other components. In the case of hot-water installations, pay special attention to the risk of injuries from scalding hot water.
- During operation, the outer surfaces of the pump and motor can exceed 104 ºF (40 ºC). Do not touch any part of the body without adequate protective gear. Do not place any flamable materials near the pump.

5.1. Preliminary Check

Before starting the pump, check the following points:

- The foundation bolts of the pump must be securely fastened.
- The pump must be completely filled with water.
- The voltage of the installation must match the pump's specifications.
- All the piping must be properly fastened and allow the desired flow rates.
- Valves in the suction pipe must be fully opened and the pressure pipes must be slowly opened after the pump start-up.
- Check the operation pressure if a pressure gauge has been installed.
- Check all controls for normal operation. If the pump is controlled by pressure, check the starting and stopping pressure set values. Check current maximum value to avoid motor current overload.

5.2. Start-up Procedure

Follow these instructions for a correct pump start-up:

5.2.1. Close the valve on the discharge side of the pump, and remove the priming plug from the pump head.

5.2.2. Slowly open the valve on the suction side until water flows steadily out of the priming hole.

5.2.3. Replace the priming plug and secure it firmly. Open completely the valve on the suction side.

5.2.4. Start the pump and check the direction of rotation.

5.2.5. Check if the pump rotates in the correct direction according to the arrow on the pump head. The pump should rotate counterclockwise as seen from the motor.

5.2.6. Bleed the pump through the bleed valve (vent screw) at the pump head.

5.2.7. Keep on bleeding the pump. At the same time, open the discharge valve very slightly.

5.2.8. Tighten the vent screw when the flow rate is constant. Open the discharge valve completely.

6. MAINTENANCE

ATTENTION:

If a pump has been used for toxic or harmful liquids, it should be labeled as contaminated.

DANGER:

Before starting any maintenance procedures on the pump, make sure that all power connections are off and that it cannot be energized accidentally.

DANGER:

- Maintenance and service must be exclusively carried out by trained and qualified personnel.
- Follow all safety regulations in force.
- Use suitable personal protection equipment.

Pumps fitted with 10HP (7.5 KW) or greater power motors shall preferably be repaired on site. Make sure the necessary lifting equipment is available.

Mechanical sealed surfaces are lubricated by the pumped liquid, which means that there may be a certain amount of leakage from the mechanical seals.

When the pump is started up for the first time, or when a new mechanical seal is installed, a certain run in time is required before the leakage is reduced to an acceptable level. The time required for this depends on the operating conditions, i.e. every time the operating conditions change, a new run-in period will be started.

Under normal conditions, leaking liquid should progressively reduce to zero. As a result, no leakage should be detected.

6.1. Maintenance

The pump does not require any scheduled maintenance routine. If the user wishes to schedule regular maintenance deadlines, they will depend on the type of pumped liquid and on the pump operating conditions.

Contact your nearest distributor or an authorized support service if you have any questions regarding maintenance or servicing.

6.2. Replacing the Electrical Motor

The procedure to couple the electrical motor to the pump is described below:

6.2.1. Remove the metallic coupling guards.
6.2.2. Loosen the coupling bolts. Make sure the pump shaft is firmly secured by the shaft seal and rotates without friction.
6.2.3. Put the motor into place and tighten the bolts that hold the motor into place.
6.2.4. Hold the mechanical coupling in position so that there is the same gap on all the sides (motor and hydraulic part).
6.2.5. Place the coupling guards and tighten them to the pump head.

6.3. Replacing the Mechanical Seal

CD 1-20 process:

1. Remove the metallic coupling guards.

2. Untighten the bolts that hold the mechanical coupling.

3. Untighten the bolts that hold the motor in place and remove it.

4. Untighten the six screws that hold the seal into place (three on the shaft and three on the top support). Extract the mechanic seal.

5. To install the new mechanic seal, insert it in the same position as the previous one by the upper end of the shaft.

6. Insert the three screws that hold the seal to the hydraulic pump head.

7. Make sure the pump shaft is in the correct position: The hydraulic package (impellers and shaft assembly) must be placed in the central position of its axial play.

8. Tighten the screws that hold the mechanical seal of the pump shaft while the shaft stays in the same position as described above.

NOTE: Check that the shaft turns freely without friction once the screws have been tightened in their places. Otherwise, repeat steps 7 and 8.

9. Put the motor into position and tighten the screws to secure it.

10.Hold the mechanical coupling in position so that that there is the same gap on all the sides (motor and hydraulic part).

11. Place the plastic coupling guards and secure it by means of the side screws.

6. MAINTENANCE

CD 32-85 process:

From model CD 32 and above, the pump is supplied with a fork shaped calibrated separator that facilitates the motor coupling and replacement.

1. Remove the metallic coupling guards.
2. Untighten the bolts that hold the mechanical coupling.
3. Untighten the bolts that hold the motor in place and remove it.
4. Untighten the six screws that hold the seal into place (three on the shaft and three on the top support). Extract the mechanic seal.
5. To install the new mechanic seal, insert it in the same position as the previous one.
6. Insert the three screws that hold the seal of the hydraulic pump head.
7. Tighten the screws that hold the mechanical seal of the pump shaft.
8. Lift the pump shaft and place the filler gauge below the seal collar.
9. Put the motor back into place and tighten the screws that secure the motor.
10. Position the mechanical coupling so that that there is the same gap on all the sides (motor and hydraulic part).
11. Remove the filler gauge.
12. Place the metallic coupling guards and secure it by means of the side screws.

7. TROUBLESHOOTING

DANGER:

Make sure that the power supply has been switched off and that it cannot be accidentally switched on before removing the terminal box cover and before removing/dismantling the pump.

www.tigerflow.com

Installation, Operation and Maintenance Manual

Fault	Cause	Remedy	Observations
1. Motor does not run when started.	a) Supply failure.	a) Check the power supply.	
	b) Fuses are blown.	b) Replace fuses.	
	c) Motor overloaded.	c) Check the system.	
	d) Main contacts in motor-protective circuit breaker are not making contact or the coil is faulty	d) Replace contacts or magnetic oil.	
	e) Control circuit is defective.	e) Repair the control circuit.	
	f) Motor is defective.	f) Replace the motor.	
2. Motor-protective circuit breaker trips immediately when power supply is switched on.	a) Fuses are blown.	a) Replacefuses	In case d) and e), the user should not dismantle the pump himself
	b) Contacts in motor-protective circuit breaker are faulty	b) Check the motor- protective circuit breaker.	
	c) Cable connection is loose or faulty.	c) Fasten or replace the cable connection.	
	d) Motor winding is defective	d) Replace the motor.	
	e) Pump mechanically blocked.	e) Remove the mechanical blocking of the pump.	
3. Motor-protective circuit breaker trips out occasionally.	a) Motor-protective circuit breaker setting is too low.	a) Set the motor- protective circuit breaker correctly	
	b) Defects regular power supply.	b) Check power supply.	
	c) Low voltage at peak times.	c) Add regulator.	

7. TROUBLESHOOTING

Fault	Cause	Remedy	Observations
4. Motor-protective circuit breaker has not tripped but the pump does not run.	a) Motor-protective circuit breaker does not do contact or motor winding is defective.	a) Replace the motor- protective circuit breaker.	
	b) Defective control circuit.	b) Check the control circuit.	
5. The pumped fluid does not flow regularly	a) Suction pipe too small.	a) Lengthen intake pipe.	
	b) Not enough water at the suction inlet.	b) Improve system and increase the water which reaches the pump.	
	c) Lower fluid level.	c) Try to increase fluid level.	
	d) Low pump suction compared to the water temperature. Leak in the pipe and flow.	d) Improve the system and try to increase the suction pressure.	
	e) Suction pipe partially blocked by impurities.	e) Check and remove impurities.	
6. Pump runs but discharges no water.	a) Suction pipe/pump blocked by impurities.	a) Check and clean suction pipe.	
	b) Foot or non-return valve blocked by impurities.	b) Check and clean the foot or non-return valve.	
	c) Leakage in suction pipe.	c) Check and repair suction pipe.	
	d) Air in suction or pump.	d) Refill with fluid and extract air.	
7. Pump runs in the opposite direction when switched off.	a) Leakage in the suction pipe.	a) Check and repair the suction pipe.	
	b) Foot or non-return valves are closed.	b) Check and repair food or check valves.	
	c) Foot or non-returnvalves blocked in open position or partially open.	c) Check and repair the food valve.	
	d) There is air in the suction pipe.	d) Check, repair suction pipe and bleed the air.	

Fault	Cause	Remedy	Observations
8. The pump vibrates and generates too much noise.	a) Leakage in the suction pipe.	a) Check and repair the suction pipe.	In case e), the users do not dismantle the pump by themselves.
	b) Suction pipe/pump too small or blocked by impurities.	b) Lengthen or check the inlet pipe.	
	c) There is air in the suction pipe or in the pump.	c) Refill fluid and extract air.	
	d) The ratio between impulsion head of the system and the impulsion head of the pump is very low.	d) Improve the system or choose another pump model.	
	e) Pump mechanically blocked.	e) Check and repair the pump.	

8. IMPORTANT NOTICE

- Clients will not be notified when this manual is upgraded but they will be able to download it from Hydroo's website.
- Pumps are covered by one-year guarantee under normal operating conditions. Wearable parts are not covered by the guarantee.
- Users will be responsible for any damages caused to the pump due to the dismantling of the pump by themselves within the warranty period.
- For any further information, please, contact your local distributor.

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