

PROJECT: Kirk in the Hills Western Mechanical	UNIT TAG: P3 & P4	QUANTITY: _____
REPRESENTATIVE: _____	TYPE OF SERVICE: _____	DATE: _____
ENGINEER: _____	SUBMITTED BY: _____	DATE: _____
CONTRACTOR: _____	APPROVED BY: _____	DATE: _____
	ORDER NO.: _____	DATE: _____

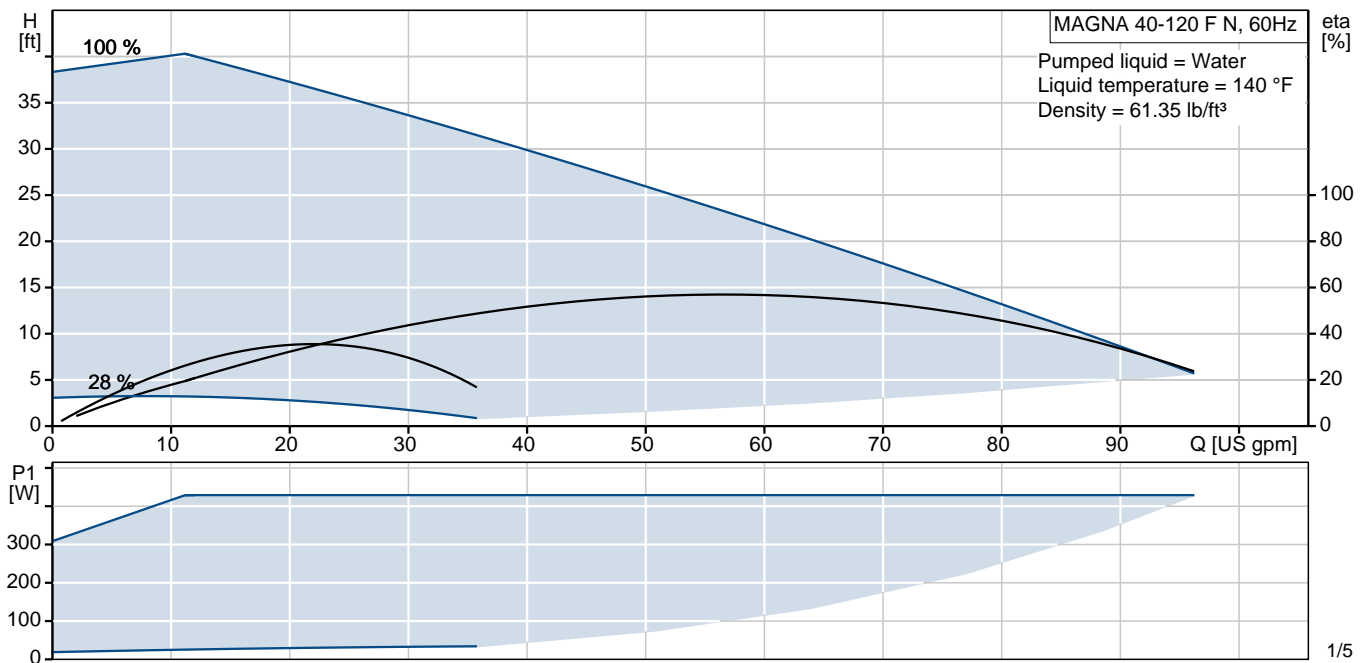
MAGNA 40-120 F N

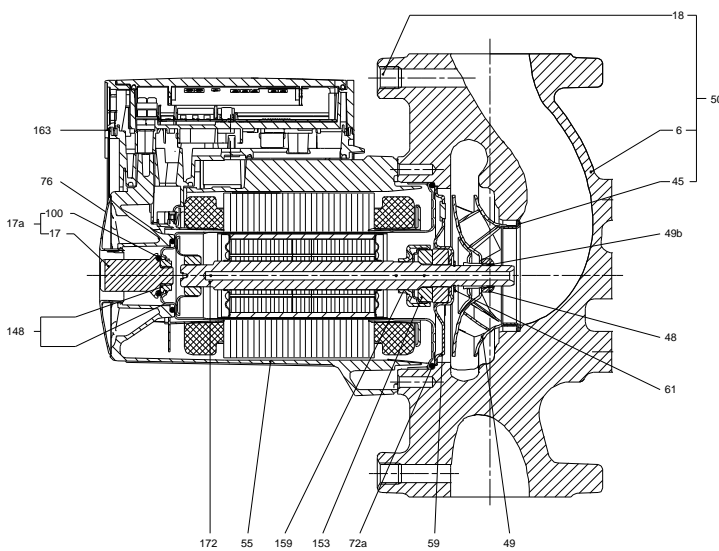
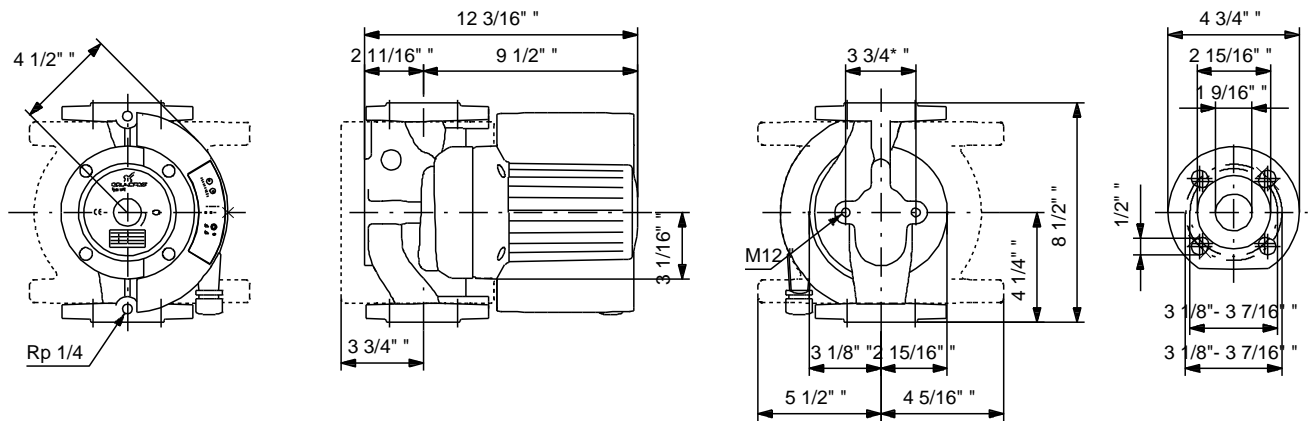
Circulator pumps, electronically controlled



Product photo could vary from the actual product

Conditions of Service	Pump Data	Motor Data
Flow: 55	Maximum operating pressure: 174 psi	P1 max: 25 .. 450 W
Head: 22	Liquid temperature range: 59 .. 203 °F	Rated voltage: 230 V
Efficiency: _____	Maximum ambient temperature: 104 °F	Main frequency: 60 Hz
Liquid: Water	Approvals: CE, CCSAUS	Enclosure class: X4D
Temperature: 140 °F	Flange standard: GF 15/40	Insulation class: H
NPSH required: _____	Pipe connection: 1.5"	
Viscosity: 0.0388 ft ² /h	Product number: 96734633	
Specific Gravity: 0.985		

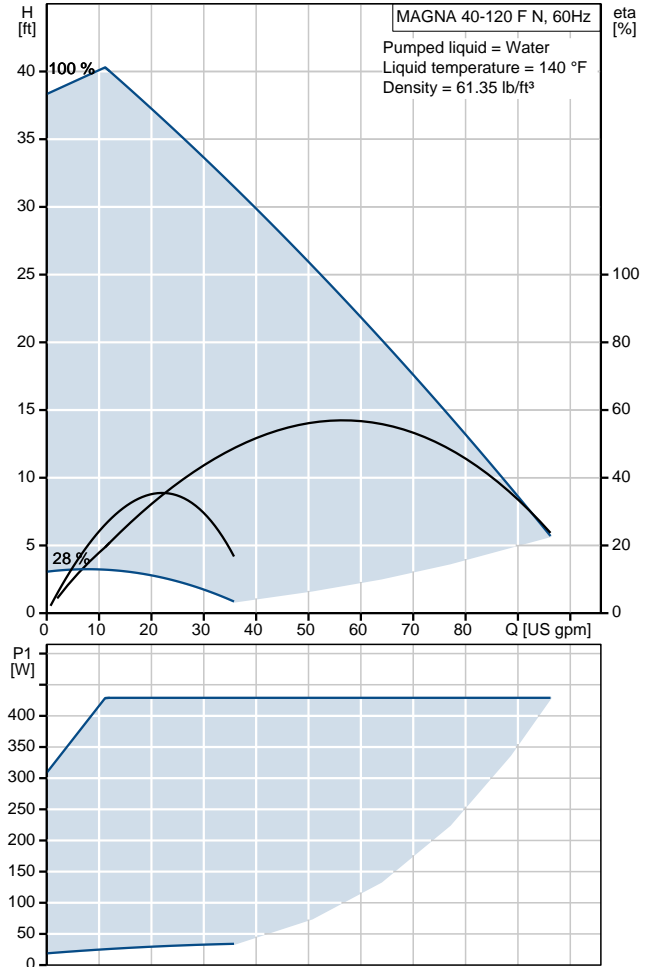




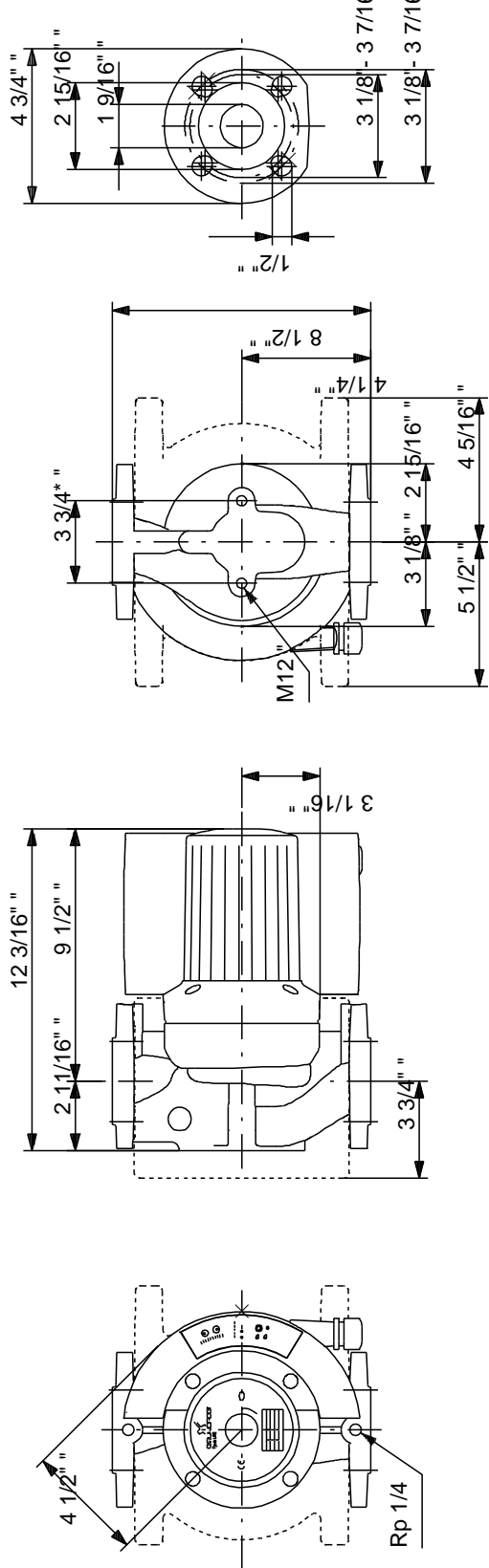
Materials:

- Pump housing: Stainless steel
DIN W.-Nr. 1.4308
AISI CF8
ASTM 1.4308
- Impeller: Stainless steel
DIN W.-Nr. 1.4301
AISI 304

Description	Value
Product name:	MAGNA 40-120 F N
Product Number:	96734633
EAN number:	5700838118223
Technical:	
Head max:	39.4 ft
TF class:	110
Approvals on nameplate:	CE, CCSAUS
Model:	F
Materials:	
Pump housing:	Stainless steel DIN W.-Nr. 1.4308 AISI CF8 ASTM 1.4308
Impeller:	Stainless steel DIN W.-Nr. 1.4301 AISI 304
Installation:	
Range of ambient temperature:	32 .. 104 °F
Maximum operating pressure:	174 psi
Flange standard:	GF 15/40
Pipe connection:	1.5"
Pressure stage:	175 PSI
Port-to-port length:	8 1/2 mm
Liquid:	
Pumped liquid:	Water
Liquid temperature range:	59 .. 203 °F
Liquid temp:	140 °F
Density:	61.35 lb/ft ³
Kinematic viscosity:	0.0388 ft ² /h
Electrical data:	
Power input - P1:	25 .. 450 W
Maximum current consumption:	0.17 .. 2 A
Main frequency:	60 Hz
Rated voltage:	1 x 230 V
Enclosure class (IEC 34-5):	X4D
Insulation class (IEC 85):	H
Controls:	
Pos term box:	15
Others:	
Net weight:	75 lb
Gross weight:	83.8 lb
Shipping volume:	0.34 ft ³
Energy label:	A

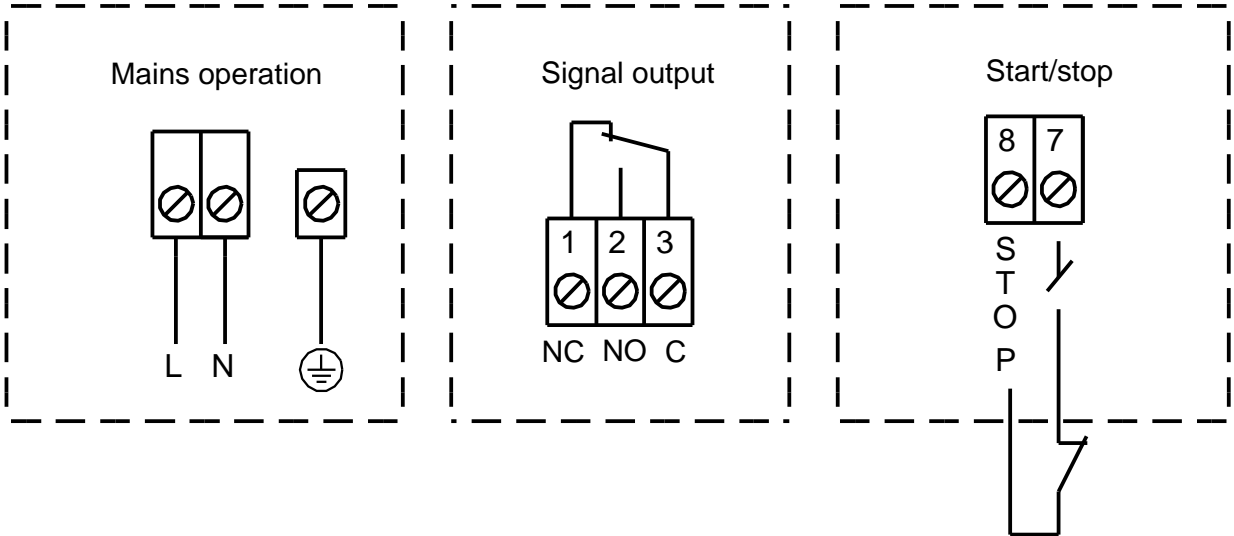
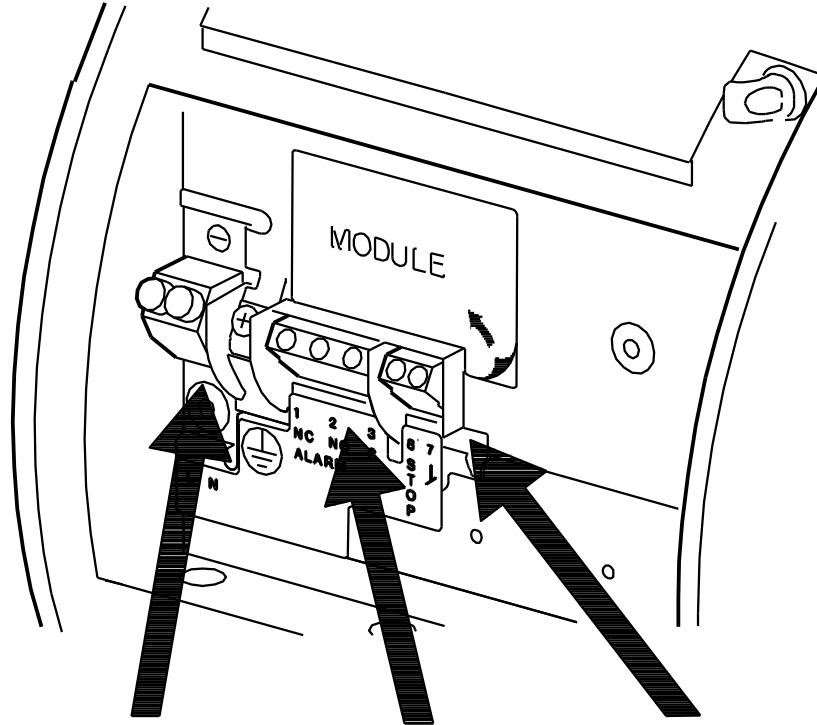


96734633 MAGNA 40-120 F N 60 Hz



Note! All units are in [mm] unless others are stated.
 Disclaimer: This simplified dimensional drawing does not show all details.

96734633 MAGNA 40-120 F N 60 Hz

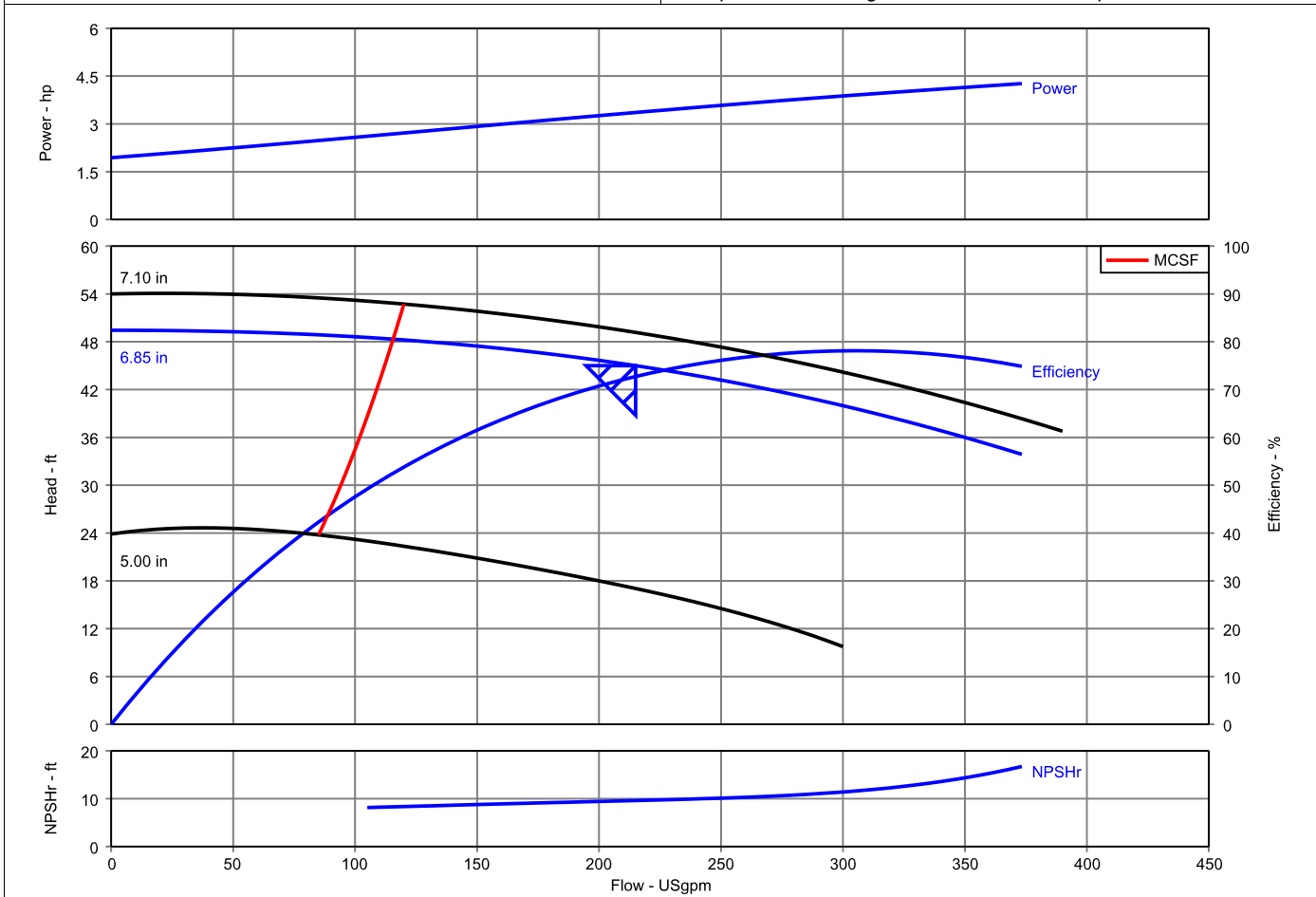


All units are [mm] unless otherwise presented.

Pump Performance Datasheet

Project name / location	Kirk in the Hills	Tag Number	: 001	P1 & P2
Consulting engineer	Western Mechanical	Service	:	
Customer		PACO Model	: 40707 VL	
Customer ref. / PO		Quantity	: 1	
Quote number	: ALAN DEAL 12/12/12	Quoted By (Sales Office)	: HS Buy Van Associates Inc.	
Date last saved	: 12/12/2012 8:17 AM	Quoted By (Sales Engineer)	: Randy Walker	

Operating Conditions		Liquid	
Flow, rated	: 215.0 USgpm	Liquid type	: Water
Differential head / pressure, rated (requested)	: 45.00 ft	Additional liquid description	:
Differential head / pressure, rated (actual)	: 45.06 ft	Solids diameter, max	: 0.00 in
Suction pressure, rated / max	: 0.00 / 0.00 psi.g	Solids concentration, by volume	: 0.00 %
NPSH available, rated	: Ample	Temperature, max	: 68.00 deg F
Frequency	: 60 Hz	Fluid density, rated / max	: 1.000 / 1.000 SG
		Viscosity, rated	: 1.00 cP
		Vapor pressure, rated	: 0.34 psi.a
Performance		Material	
Speed, rated	: 1,775 rpm	Material selected	: Cast iron
Impeller diameter, rated	: 6.85 in	Pressure Data	
Impeller diameter, maximum	: 7.10 in	Maximum working pressure	: 21.40 psi.g
Impeller diameter, minimum	: 5.00 in	Maximum allowable working pressure	: 175.0 psi.g
Efficiency	: 72.73 %	Maximum allowable suction pressure	: 175.0 psi.g
NPSH required / margin required	: 9.61 / 0.00 ft	Hydrostatic test pressure	: 263.0 psi.g
nq (imp. eye flow) / S (imp. eye flow)	: 36 / 93 Metric units	Driver & Power Data	
MCSF	: 115.8 USGpm	Motor sizing specification	: Based on duty point (rated power)
Head, maximum, rated diameter	: 49.44 ft	Margin over specification	: 0.00 %
Head rise to shutoff	: 9.87 %	Service factor	: 1.00
Flow, best eff. point (BEP)	: 305.4 USgpm	Power, hydraulic	: 2.44 hp
Flow ratio (rated / BEP)	: 70.41 %	Based on duty point (rated power)	: 3.36 hp
Diameter ratio (rated / max)	: 96.48 %	Non-overloading (max power)	: 4.26 hp
Head ratio (rated dia / max dia)	: 91.52 %	Nameplate motor rating	: 5.00 hp / 3.73 kW
Cq/Ch/Ce [ANSI/HI 9.6.7-2010]	: 1.00 / 1.00 / 1.00		
Selection status	: Acceptable		



Construction Datasheet

Project name / location	Kirk in the Hills	Tag Number	: 001	P1 & P2
Consulting engineer	Western Mechanical	Service	: -	
Customer		PACO Model	: 40707 VL	
Customer ref. / PO	:	Quantity	: 1	
Quote number	: ALAN DEAL 12/12/12	Quoted By (Sales Office)	: HS Buy Van Associates Inc.	
Date last saved	: 12/12/2012 8:16 AM	Quoted By (Sales Engineer)	: Randy Walker	

Construction				Motor Information	
Nozzle	Size (in.)	Nozzle Configuration	Pos'n	Manufacturer	: Baldor
Suction	4	125# ANSI	Side	Frame Size	: 184JM
Discharge	4	125# ANSI	Side	Power	: 5.00 hp

Orientation / Configuration	: Vertical	RPM	: 1,800 rpm
Rotation	: Clockwise	Enclosure	: ODP
Wear Ring Configuration	: Single - Case	Operating Power Supply	: 230/460/3/60
Discharge Elbow Size	: -	Efficiency	: Premium
Subplate	: -	Service factor	: 1.15
Sump Depth (feet)	: -	Motor Application	: Suitable for Variable Speed Drive
Bearing Frame	: -	Motor Options/Accessories	: -
Bearing Frame Foot	: -	Cord Length (feet)	: -

Materials	
Case	: Cast Iron, ASTM A48 - Class 30
Motor Bracket	: Cast Iron, ASTM-A48, CL 30
Impeller	: Silicon Bronze, ASTM B584 C87600 B21
Impeller Cap Screw and Washer	: Stainless Steel, AISI-303
Impeller Key	: Steel, Cold Drawn C1018
Case wear ring	: Tin Bronze, ASTM B584-90500 (B18)

Baseplate, Coupling and Guard	
Baseplate	: Not Applicable
Drip Pan	: -
Coupling	: -
Guard	: OSHA Approved

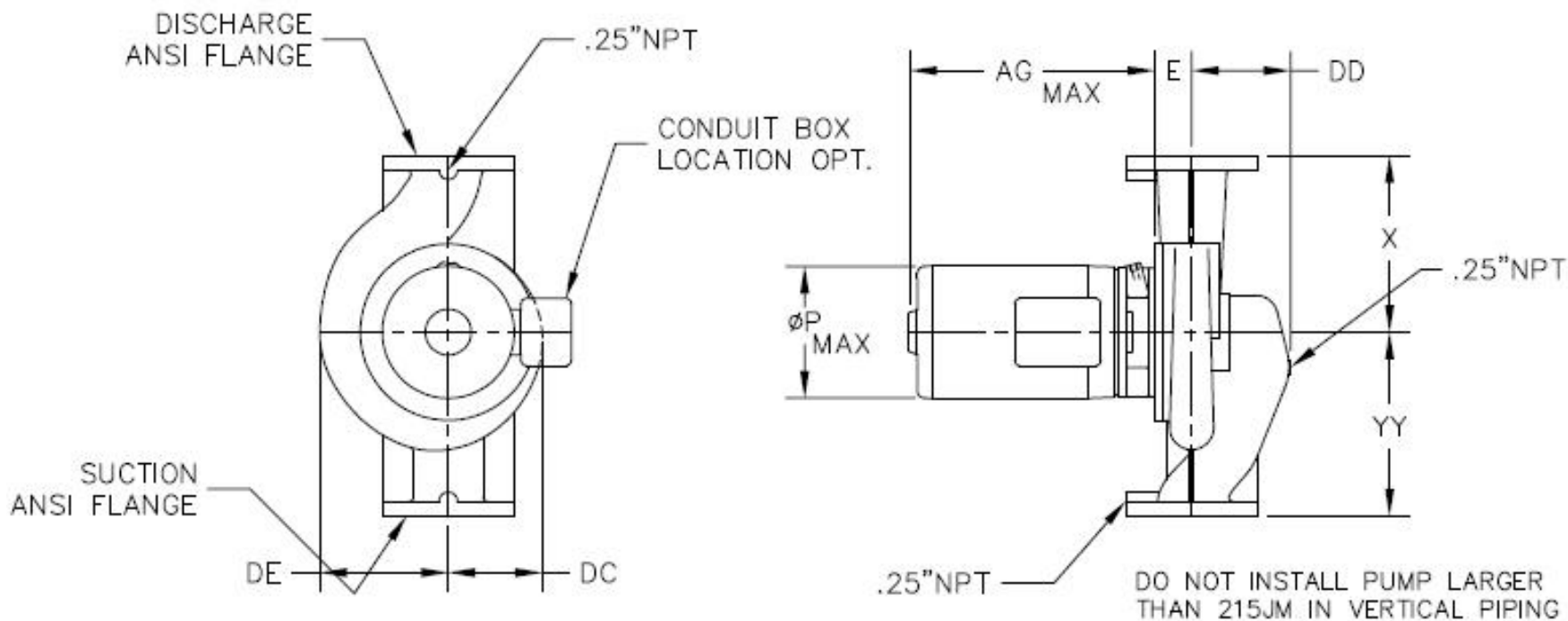
Seal & Packing Construction	
Sealing Method	: Single Seal, Type 21S
Seal Material	: Buna Carbon Ceramic SS-Spring and Hardware
Packing Gland	: -
Lantern Ring	: -
Recirculation Lines	: Nylon Tubing with Brass Fittings

Weights (Approx.)	
Pump	: 159.0 lb
Baseplate	: -
Driver	: 79.00 lb
Estimated Shipping gross weight	: 238.0 lb

Impeller wear ring	: -
Pump Shaft	: Steel, AISI-1040
Sleeve	: Bronze, III932, C89835
Line Shaft	: -
Column	: -
Discharge Pipe	: -
Discharge Elbow	: -
Suction Elbow	: -
Subplate	: -
Hardware	: Steel, Grade 5
O Rings	: Buna N
Pump Coatings	: Standard Manufacturers Paint

General Arrangement

Project name / location	: Kirk in the Hills	Tag Number	: 001	P1 & P2
Consulting engineer	: Western Mechanical	Service	:	
Customer	:	PACO Model	: 40707 VL	
Customer ref. / PO	:	Quantity of pumps	: 1	
Quote number	: ALAN DEAL 12/12/12	Quoted By (Sales Office)	: HS Buy Van Associates Inc.	
Date last saved	: 12/12/2012 8:16 AM	Quoted By (Sales Engineer)	: Randy Walker	



NOT FOR CONSTRUCTION, Unless certified and referenced on order

Units	Frame	S x D (in.)	AG (Max)	DC	DD	DE	E	P (Max)	X	YY	Weight ea
inches	184JM	4 X 4	20.00	5.12	6.69	7.38	2.00	10.00	10.00	10.00	238.0

Conditions of Service			Motor Data			
Flow: 215.0 USgpm	Fluid: Water	HP: 5	Encl: ODP	Phase: 3	Efficiency: Premium	
TDH: 45.00 ft	Temp.: 68.00 deg F	RPM: 1,775 rpm	Hz: 60	Voltage: 230/460	S.F.: 1.15	

Project name / location	: -	Tag Number	: 001
Consulting engineer	Kirk in the Hills	Service	: -
Customer	Western Mechanical	PACO Model	: SD4040-125
Customer ref. / PO	:	Quantity	: 1
Quote number	: PEG-ALAN/121412	Quoted By (Sales Office)	: HS Buy Van Associates Inc.
Date last saved	: 12/14/2012 1:38 PM	Quoted By (Sales Engineer)	: Randy Walker

Suction Diffuser for P1 & P2

Construction

Nozzle	Size (in.)	Nozzle Configuration	Pos'n
Inlet	4	-	Top
Outlet	4	-	Side

Difuser Body	: Cast Iron, ASTM-A126, CL B
Hardware	: Steel, ASTM A-283C
Internal Magnet	: -
Strainer	: SS 304, ASTM-A240, 3.5MM Holes
Mesh Grid (Startup strainer)	: SS 304, ASTM-A240, (#20 Mesh)
Strainer Cover	: Cast Iron, ASTM-A126, CL B
O Rings	: EPDM
Coating	: Standard Manufacturers Paint
Construction Code/Part Number	: 96877830

Weights (Approx.)

Estimated Shipping gross weight	: 75.00 lb
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Grundfos Suction Diffusers



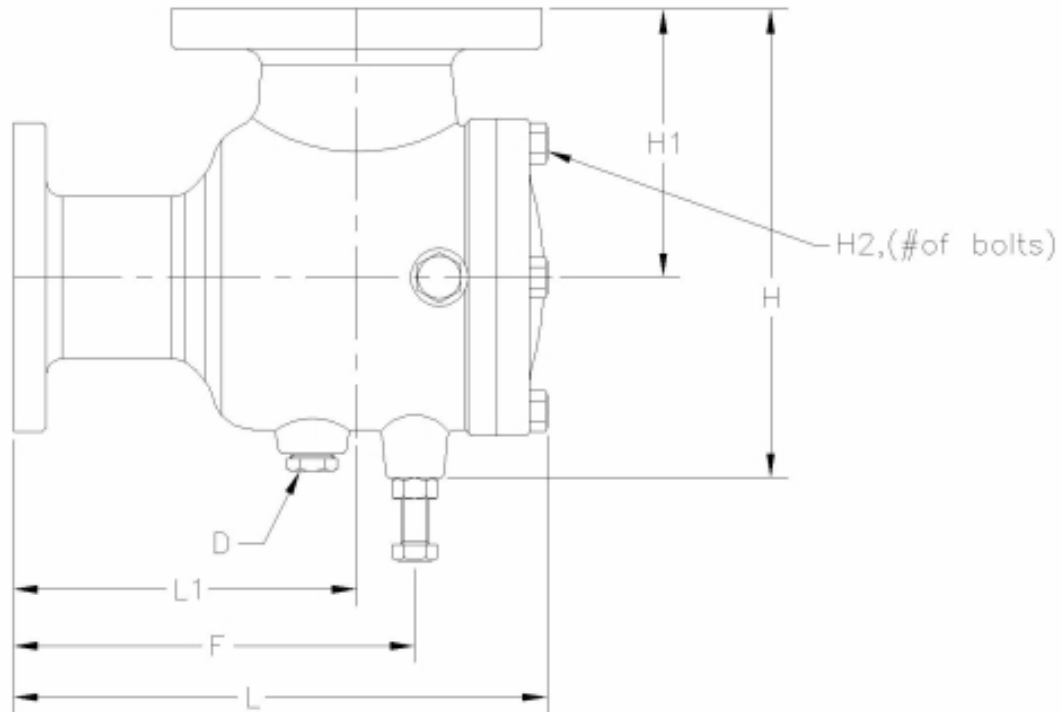
Description

Grundfos Series SD, Suction diffuser provides and ensures a uniform flow pattern to the suction side of the pump ensuring a stable NPSH. Suction diffuser makes it possible to install the pump in a very narrow spacing as no long bends are necessary.

The suction diffuser incorporates a cylindrical strainer preventing impurities from entering the pump. Additional feature includes an adjustable support for mounting.

General Arrangement

Project name / location	Kirk in the Hills	Tag Number	: 001	Suction Diffuser for P1 & P2
Consulting engineer	Western Mechanical	Service	:	
Customer	:	PACO Model	: SD4040-125	
Customer ref. / PO	:	Quantity of pumps	: 1	
Quote number	: PEG-ALAN/121412	Quoted By (Sales Office)	: HS Buy Van Associates Inc.	
Date last saved	: 12/14/2012 1:38 PM	Quoted By (Sales Engineer)	: Randy Walker	



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Units	Inlet Flg-125# ANSI	Outlet Flg-125# ANSI	Strainer Open Area Sq. In.	L	L1	H1	H	H2	F	D-Purge	Weight-Lbs
inches	4	4	78	12.9	8.3	6.5	11.4	6	9.8	0.75	75.00

Conditions of Service				Motor Data			
Flow: -	Fluid: -	HP: -	Encl: -	Phase: -	Efficiency: -		
TDH: -	Temp.: -	RPM: -	Hz: -	Voltage: -	S.F.: -		

Project name / location	Kirk in the Hills	Tag Number	: 002	Combination Valve for P1 & P2
Consulting engineer	Western Mechanical	Service	: -	
Customer	:	PACO Model	: CV40-125	
Customer ref. / PO	:	Quantity	: 1	
Quote number	: PEG-ALAN/121412	Quoted By (Sales Office)	: HS Buy Van Associates Inc.	
Date last saved	: 12/14/2012 1:39 PM	Quoted By (Sales Engineer)	: Randy Walker	

Construction

Nozzle	Size (in.)	Nozzle Configuration	Pos'n
Inlet	4	125# ANSI flange	Side
Outlet	4	125# ANSI flange	Side

Valve Body	: ASTM A395
Seat Guide	: -
Disc	: Bronze ASTM B124 C37700
Spring	: Stainless Steel, ASTM A240-304
Packing Gland	: Bronze ASTM B124 C37700
Stem Packing	: -
Yoke	: Steel ASTM A283-C
Indicator	: -
Hand wheel	: Ductile iron A395
Construction Code/Part Number	: 96877845

Weights (Approx.)

Estimated Shipping gross weight	: 102.0 lb
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Grundfos Combination Valves



Description

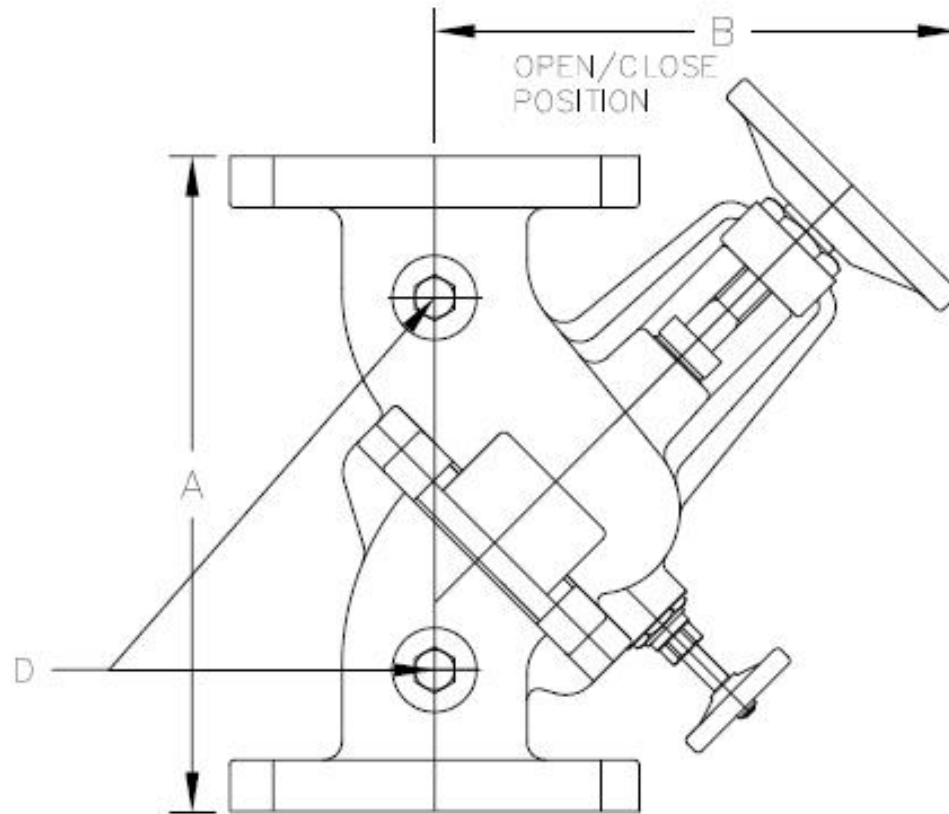
Grundfos Series CV, Combination valve combines three valves in one: shut-off valve, balancing valve, and check valve. The combination valve makes it possible to reduce the overall system pressure drop since fewer individual components are needed when installing a pump.

The combination valve provides the feature of changing the flange orientation to allow 90° pipe connection. Additional feature includes a built-in bypass valve allowing for drainage of water upstream of the check valve.

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General Arrangement

Project name / location	: Kirk in the Hills	Tag Number	: 002
Consulting engineer	: Western Mechanical	Service	: Combination Valve for P1 & P2
Customer	:	PACO Model	: CV40-125
Customer ref. / PO	:	Quantity of pumps	: 1
Quote number	: PEG-ALAN/121412	Quoted By (Sales Office)	: HS Buy Van Associates Inc.
Date last saved	: 12/14/2012 1:39 PM	Quoted By (Sales Engineer)	: Randy Walker



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Units	Inlet Fig-125# ANSI	Outlet Fig-125# ANSI	A	B	D-Purge	Weight-Lbs
inches	4	4	13.24	10.83	0.5	102.0

Conditions of Service			Motor Data		
Flow: -	Fluid: -	HP: -	Encl: -	Phase: -	Efficiency: -
TDH: -	Temp.: -	RPM: -	Hz: -	Voltage: -	S.F.: -

How to select a CUE

The size of the CUE is determined quickly and precisely based on the max. motor current. See fig. 48.

The power size, which is the typical shaft power P₂, is only an approximate value and cannot be used to select the nominal size of the CUE.

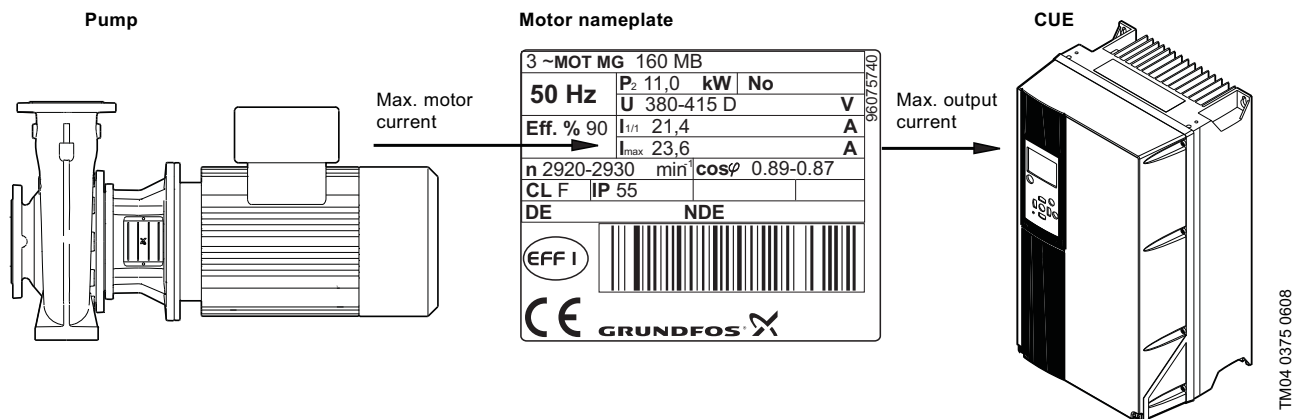


Fig. 48 Selection of CUE based on max. motor current

The main steps

When you have selected the pump, follow these steps to select a CUE:

1. Select the voltage range of the CUE. It should fit the motor voltage and the mains supply at the installation site.
2. Find the max. motor current* on the motor nameplate or in the data sheet of the selected motor. Select the first CUE that is able to deliver the max. motor current. See selection tables starting on page 41.
3. Select the enclosure class. Choose IP21 or IP54/55. See selection tables starting on page 41.
4. Check if an output filter is required. Select the output filter according to the table on page 34.
5. Select the accessories required for the application. It could be sensors or additional input modules.

Selecting the different accessories may require additional steps.

*** Important note: If motor has service factor, use service factor amperes for max. motor current.**

The actual motor current should always be less than or equal to the output current of the CUE.

If not, the CUE will reduce the maximum speed when the maximum limit is reached during operation.

Example 1

These data are given:

- voltage range is 3 x 460 V
- max. motor current is 23.6 A.
- enclosure class of the CUE must be IP21.

Select the CUE according to the selection tables in section Mains supply 3 x 440 - 500V on 43.

Data of the CUE selected:

Max. output current:	27A
Product number (IP21):	91136772

Special conditions

Derating must be taken into account when using the CUE in these situations:

- low air pressure (heights)
- low speeds
- installations with long motor cables
- cables with a large cross-section
- high ambient temperature.

The required action is described in the next sections.

Low air pressure

At low air pressure, the cooling capability of air is reduced.

At altitudes above 3,280 ft (1,000 m), the max. output current should be derated in accordance with the diagram in fig. 49.

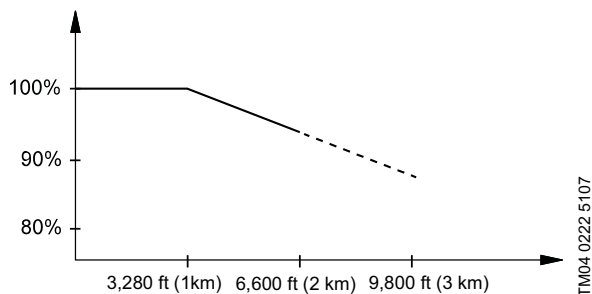


Fig. 49 Derating of output current at low air pressure

At altitudes above 6,600 ft (2,000 m), PELV cannot be met. PELV = Protective Extra Low Voltage.

An alternative is to lower the ambient temperature at high altitudes and thereby ensure 100% output current at high altitudes.

Example 2

At an altitude of 6,600 ft (2,000 m), the output current 27 A of the selected CUE in example 1 must be derated to 92% according to fig. 49. This is equal to 25 A.

High ambient temperature

If the output current is reduced to 80 % of the nominal output current of the CUE in questions, the ambient may be 5 °C higher.

The other possibility is to use a unit one size bigger. For higher temperature increases, bigger units are required. The efficiency of the CUE will, however, be reduced at higher temperatures.

If the CUE gets too hot, it will reduce the switching frequency.

Note that the nominal temperature rating depends on the enclosure type.

The maximum ambient temperature of the different enclosures can be found in section *Technical data* on p. 45.

CUE selection

Grundfos CUE

Mains supply 3 x 200-240 V

Rated Input Voltage	CUE output amps	enclosure rating	CUE only part number	CUE constant pressure* part number	Enclosure	Max conductor (AWG)	Efficiency	output filter	
								dU/dt	Sine wave
3 x 200-240V	4.6	IP21	91136747	91136790	A2	10	0.95		96754973
	4.6	IP55	91136861	91136915	A5	10	0.95		96754973
	6.6	IP21	91136748	91136791	A2	10	0.96		96754973
	6.6	IP55	91136862	91136916	A5	10	0.96		96754973
	7.5	IP21	91136749	91136792	A2	10	0.96		96754973
	7.5	IP55	91136863	91136917	A5	10	0.96		96754973
	10.6	IP21	91136750	91136793	A2	10	0.96		96754976
	10.6	IP55	91136864	91136918	A5	10	0.96		96754976
	12.5	IP21	91136751	91136794	A3	10	0.96		96754976
	12.5	IP55	91136865	91136919	A5	10	0.96		96754976
	16.7	IP21	91136752	91136795	A3	10	0.96		96754976
	16.7	IP55	91136866	91136920	A5	10	0.96		96754976
	24.2	IP21	91136753	91136796	B3	8	0.96		96754977
	24.2	IP55	91136867	91136921	B1	8	0.96		96754977
	30.8	IP21	91136754	91136797	B3	8	0.96		96754978
	30.8	IP55	91136868	91136922	B1	8	0.96		96754978
	46.2	IP21	91136755	91136798	B3	8	0.96		96755019
	46.2	IP55	91136869	91136923	B1	8	0.96		96755019
	59.4	IP21	91136756	91136799	B4	2	0.96		96755021
	59.4	IP55	91136870	91136924	B2	2	0.96		96755021
	74.8	IP21	91136757	91136800	B4	1/0	0.96		96755032
	74.8	IP55	91136871	91136925	C1	1/0	0.96		96755032
	88	IP21	91136758	91136801	C3	1/0	0.97		96755033
	88	IP55	91136872	91136926	C1	1/0	0.97		96755033
	115	IP21	91136759	91136802	C3	1/0	0.97		96755033
	115	IP55	91136873	91136927	C1	1/0	0.97		96755033
	143	IP21	91136760	91136803	C4	4/0	0.97		96755034
	143	IP55	91136874	91136928	C2	4/0	0.97		96755034
	170	IP21	91136761	91136804	C4	250 MCM	0.97		96755034
	170	IP55	91136875	91136929	C2	250 MCM	0.97		96755034

* includes CUE and 0-120 psi 4-20mA sensor

Main dimensions and weight

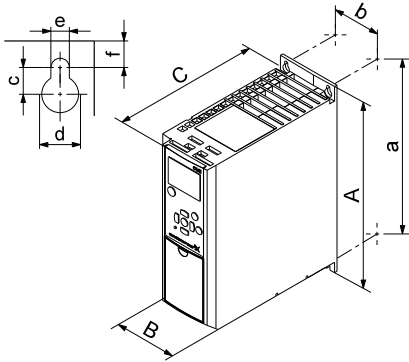


Fig. 50 Enclosures A2 and A3

TM03 9000 2807

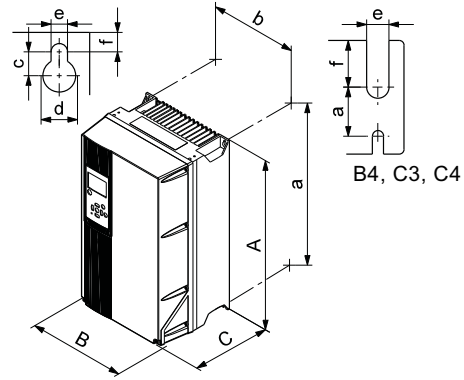


Fig. 51 Enclosures A5, B1, B2, B3, B4, C1, C2, C3 and C4

TM03 9002 2807

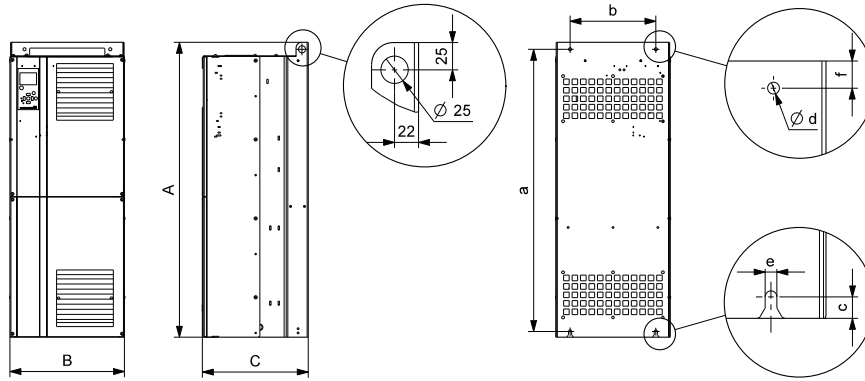


Fig. 52 Enclosures D1 and D2

TM03 9922 4607

Enclosure	Height [in (mm)] ¹⁾		Width [in (mm)] ¹⁾		Depth [in (mm)] ¹⁾		Screw holes [in (mm)]				Weight [lb (kg)]
	A	a	B	b	C	C ²⁾	c	Ød	Øe	f	
A2	10.55 (268)	10.12 (257)	3.54 (90)	2.76 (70)	8.08 (205)	8.62 (219)	.315 (8.0)	.433 (11)	.217 (5.5)	.354 (9.0)	10.8 (4.9)
with IP21/NEMA1 kit	14.76 (375)	13.78 (350)	3.54 (90)	2.76 (70)	8.08 (205)	8.62 (219)	.315 (8.0)	.433 (11)	.217 (5.5)	.354 (9.0)	11.7 (5.3)
A3	10.55 (268)	10.12 (257)	5.12 (130)	4.34 (110)	8.08 (205)	8.62 (219)	.315 (8.0)	.433 (11)	.217 (5.5)	.354 (9.0)	14.6 (6.6)
with IP21/NEMA1 kit	14.76 (375)	13.78 (350)	5.12 (130)	4.34 (110)	8.08 (205)	8.62 (219)	.315 (8.0)	.433 (11)	.217 (5.5)	.354 (9.0)	15.4 (7.0)
A5	16.54 (420)	15.83 (402)	9.53 (242)	8.47 (215)	7.87 (200)	7.87 (200)	.323 (8.2)	.472 (12)	.256 (6.5)	.354 (9.0)	30.9 (14)
B1	18.90 (480)	17.87 (454)	9.53 (242)	8.27 (210)	10.24 (260)	10.24 (260)	.472 (12.0)	.748 (19)	.354 (9.0)	.354 (9.0)	26.5 (23)
B2	25.59 (650)	24.57 (624)	9.53 (242)	8.27 (210)	10.24 (260)	10.24 (260)	.472 (12.0)	.748 (19)	.354 (9.0)	.354 (9.0)	59.5 (27)
B3	15.71 (399)	14.96 (380)	6.50 (165)	5.52 (140)	9.76 (248)	10.32 (262)	.315 (8.0)	.472 (12)	.268 (6.8)	.311 (7.9)	26.5 (12)
with IP21/NEMA1 kit	18.71 (472)	—	6.50 (165)	—	9.80 (249)	10.32 (262)	.315 (8.0)	.472 (12)	.268 (6.8)	.311 (7.9)	—
B4	20.47 (520)	19.49 (495)	9.09 in (231)	7.87 (200)	9.53 (242)	9.53 (242)	—	—	.335 (8.5)	.591 (15.0)	51.8 (23.5)
with IP21/NEMA1 kit	26.38 (670)	—	10.04 (255)	—	9.69 (246)	9.69 (246)	—	—	.335 (8.5)	.591 (15.0)	—
C1	26.77 (680)	25.52 (648)	12.13 in (308)	10.71 (272)	12.21 (310)	12.21 (310)	.472 (12.0)	.748 (19)	.354 (9.0)	.386 (9.8)	99.2 (45)

Enclosure	Height [in (mm)] ¹⁾		Width [in (mm)] ¹⁾		Depth [in (mm)] ¹⁾		Screw holes [in (mm)]				Weight [lb (kg)]
	A	a	B	b	C	C ²⁾	c	∅d	∅e	f	
C2	30.31 (770)	29.09 (739)	14.57 (370)	13.15 (334)	13.19 (335)	13.19 (335)	.472 (12.0)	.748 (19)	.354 (9.0)	.386 (9.8)	143.3 (65)
C3	21.65 (550)	20.51 (521)	12.13 (308)	10.63 (270)	13.11 (333)	13.11 (333)	–	–	.335 (8.5)	.669 (17.0)	77.2 (35)
with IP21/NEMA1 kit	21.65 (755)	–	12.95 (329)	–	13.27 (337)	13.27 (337)	–	–	.335 (8.5)	.669 (17.0)	–
C4	25.98 (660)	24.84 (631)	14.57 (370)	12.99 (330)	13.11 (333)	13.11 (333)	–	–	.335 (8.5)	.669 (17.0)	110.2 (50)
with IP21/NEMA1 kit	37.40 (950)	–	15.39 (391)	–	13.27 (337)	13.27 (337)	–	–	.335 (8.5)	.669 (17.0)	–
D1	47.60 (1209)	45.43 (1154)	16.54 (420)	11.97 (304)	14.96 (380)	–	.787 (20)	.433 (11)	.433 (11)	.984 (25)	229.3 (104)
D2	62.56 (1589)	60.43 (1535)	16.54 (420)	11.97 (304)	14.96 (380)	–	.787 (20)	.433 (11)	.433 (11)	.984 (25)	332.9 (151)

¹⁾ The dimensions are maximum height, width and depth.

²⁾ Depth with MCB 114 option

Shipping dimensions of D1 and D2:

Height x width x length = 650 x 570 x 1730 mm.

Surroundings

Relative humidity	5-95 % RH
Minimum ambient temperature at full operation	32° F (0 °C)
Minimum ambient temperature at reduced operation	14° F (-10 °C)
Temperature during storage and transportation	-13° F to 149° F (-25 to 65 °C)
Storage duration	Max. 6 months
Maximum altitude above sea level with full performance	3,280 ft (1 km)
Maximum altitude above sea level with performance reduction	6,600 ft (2 km)
CUE, up to 160 amps	
Ambient temperature	Max. 122 °F (50 °C)
Average ambient temperature over 24 hours	Max. 113° F (45 °C)
CUE, 190 amps and above	
Ambient temperature	Max. 113° F (45 °C)
Average ambient temperature over 24 hours	Max. 104° F (40 °C)

Note: The CUE comes in a packaging which is not suitable for outdoor storage.

Sound pressure level

Maximum sound pressure level measured at a distance of 1 m from the unit:

Enclosure	Sound pressure level [dBA]
A2	60
A3	60
A5	63
B1	67
B2	70
B3	63 ¹⁾
B4	63
C1	62
C2	65
C3	67
C4	-
D1	76
D2	74

¹⁾ The sound pressure level for B3 in the 3 x 525-600 V range is 70 dBA.

The sound pressure level of a motor controlled by a frequency converter may be higher than that of a corresponding motor which is not controlled by a frequency converter.

Terminal tightening torques

Enclosure	Tightening torque [Nm]			
	Mains	Motor	Ground	Relay
A2	1.8	1.8	3	0.6
A3	1.8	1.8	3	0.6
A5	1.8	1.8	3	0.6
B1	1.8	1.8	3	0.6
B2	4.5	4.5	3	0.6
B3	1.8	1.8	3	0.6
B4	4.5	4.5	3	0.6
C1	10	10	3	0.6
C2	14 ¹⁾ /24 ²⁾	14 ¹⁾ /24 ²⁾	3	0.6
C3	10	10	3	0.6
C4	14 ¹⁾ /24 ²⁾	14 ¹⁾ /24 ²⁾	3	0.6
D1	19	19	19	0.6
D2	19	19	19	0.6

¹⁾ Conductor cross-section ≤ 95 mm².

²⁾ Conductor cross-section ≥ 95 mm².

Cables

Cable length

Maximum length, screened motor cable	500 ft (150 m)
Maximum length, unscreened motor cable	1000 ft (300 m)
Maximum length, signal cable	1000 ft (300 m)

Cable cross-section to signal terminals

Maximum cable cross-section to signal terminals, rigid conductor	16 AWG (1.5 mm ²)
Maximum cable cross-section to signal terminals, flexible conductor	18 AWG (1.0 mm ²)
Minimum cable cross-section to signal terminals	22 AWG (0.5 mm ²)

Note: For cable cross-section to mains and motor, see next section Fuses on page 48.

Fuses

Non-UL fuses and conductor cross-section to mains and motor

Typical shaft power P2	Maximum fuse size	Fuse type	Maximum conductor cross-section
[kW]	[A]		[AWG] (mm ²)
1 x 200-240 V			
1.1	20	–	12 (4)
1.5	30	–	8 (10)
2.2	40	–	8 (10)
3	40	–	8 (10)
3.7	60	–	8 (10)
5.5	80	–	8 (10)
7.5	100	–	2 (35)
3 x 200-240 V			
0.75	10	gG	12 (4)
1.1	20	gG	12 (4)
1.5	20	gG	12 (4)
2.2	20	gG	12 (4)
3	32	gG	12 (4)
3.7	32	gG	12 (4)
5.5	63	gG	8 (10)
7.5	63	gG	8 (10)
11	63	gG	8 (10)
15	80	gG	2 (35)
18.5	125	gG	1 (50)
22	125	gG	1 (50)
30	160	gG	1 (50)
37	200	aR	3/0 (95)
45	250	aR	4/0 (120)
3 x 380-500 V			
0.55	10	gG	12 (4)
0.75	10	gG	12 (4)
1.1	10	gG	12 (4)
1.5	10	gG	12 (4)
2.2	20	gG	12 (4)
3	20	gG	12 (4)
4	20	gG	12 (4)
5.5	32	gG	12 (4)
7.5	32	gG	12 (4)
11	63	gG	8 (10)
15	63	gG	8 (10)
18.5	63	gG	8 (10)
22	63	gG	2 (35)
30	80	gG	2 (35)
37	100	gG	1 (50)
45	125	gG	1 (50)
55	160	gG	1 (50)
75	250	aR	3/0 (95)
90	250	aR	4/0 (120)
110	300	gG	2 x 70
132	350	gG	2 x 70
160	400	gG	2 x 185
200	500	gG	2 x 185
250	600	gR	2 x 185
3 x 525-600 V			

Typical shaft power P2	Maximum fuse size	Fuse type	Maximum conductor cross-section
[kW]	[A]		[AWG] (mm ²)
0.75	10	gG	12 (4)
1.1	10	gG	12 (4)
1.5	10	gG	12 (4)
2.2	20	gG	12 (4)
3	20	gG	12 (4)
4	20	gG	12 (4)
5.5	32	gG	12 (4)
7.5	32	gG	12 (4)
3 x 525-690 V			
11	–	–	–
15	–	–	–
18.5	–	–	–
22	–	–	–
30	–	–	–
37	–	–	–
45	–	–	–
55	–	–	–
75	–	–	–
90	–	–	–
110	225	–	2 x 70
132	250	–	2 x 70
160	350	–	2 x 185
200	400	–	2 x 185
250	500	–	2 x 185

UL fuses and conductor cross-section to mains and motor

CUE Output Amps [Amp (kW)]	Fuse type							Maximum conductor cross-section [AWG]
	Bussmann RK1	Bussmann J	Bussmann T	SIBA RK1	Littel Fuse RK1	Ferraz-Shawmut CC	Ferraz-Shawmut RK1	
1 x 200-240 V								
6.6 (1.1)	KTN-R20	-	-	-	-	-	-	10
7.5 (1.5)	KTN-R30	-	-	-	-	-	-	7
10.6 (2.2)	KTN-R40	-	-	-	-	-	-	7
12.5 (3)	KTN-R40	-	-	-	-	-	-	7
16.7 (3.7)	KTN-R60	-	-	-	-	-	-	7
24.2 (5.5)	-	-	-	-	-	-	-	7
30.8 (7.5)	-	-	-	-	-	-	-	2
3 x 200-240 V								
4.6 (0.75)	KTN-R10	JKS-10	JJN-10	5017906-010	KTN-R10	ATM-R10	A2K-10R	10
6.6 (1.1)	KTN-R20	JKS-20	JJN-20	5017906-020	KTN-R20	ATM-R20	A2K-20R	10
7.5 (1.5)	KTN-R20	JKS-20	JJN-20	5017906-020	KTN-R20	ATM-R20	A2K-20R	10
10.6 (2.2)	KTN-R20	JKS-20	JJN-20	5017906-020	KTN-R20	ATM-R20	A2K-20R	10
12.5 (3)	KTN-R30	JKS-30	JJN-30	5012406-032	KTN-R30	ATM-R30	A2K-30R	10
16.7 (3.7)	KTN-R30	JKS-30	JJN-30	5012406-032	KTN-R30	ATM-R30	A2K-30R	10
24.2 (5.5)	KTN-R50	JKS-50	JJN-50	5012406-050	KLN-R50	-	A2K-50R	7
30.8 (7.5)	KTN-R50	JKS-60	JJN-60	5012406-050	KLN-R60	-	A2K-50R	7
46.2 (11)	KTN-R60	JKS-60	JJN-60	5014006-063	KLN-R60	A2K-60R	A2K-60R	7
59.4 (15)	KTN-R80	JKS-80	JJN-80	5014006-080	KLN-R80	A2K-80R	A2K-80R	2
74.8 (18.5)	KTN-R125	JKS-150	JJN-125	2028220-125	KLN-R125	A2K-125R	A2K-125R	1/0
88 (22)	KTN-R125	JKS-150	JJN-125	2028220-125	KLN-R125	A2K-125R	A2K-125R	1/0
115 (30)	FWX-150	-	-	2028220-150	L25S-150	A25X-150	A25X-150	1/0
143 (37)	FWX-200	-	-	2028220-200	L25S-200	A25X-200	A25X-200	4/0
170 (45)	FWX-250	-	-	2028220-250	L25S-250	A25X-250	A25X-250	250 MCM
3 x 380-500 V								
1.6 (0.55)	KTS-R10	JKS-10	JJS-10	5017906-010	KTN-R10	ATM-R10	A2K-10R	10
2.1 (0.75)	KTS-R10	JKS-10	JJS-10	5017906-010	KTN-R10	ATM-R10	A2K-10R	10
2.7 (1.1)	KTS-R10	JKS-10	JJS-10	5017906-010	KTN-R10	ATM-R10	A2K-10R	10
3.4 (1.5)	KTS-R10	JKS-10	JJS-10	5017906-010	KTN-R10	ATM-R10	A2K-10R	10
4.3 (2.2)	KTS-R20	JKS-20	JJS-20	5017906-020	KTN-R20	ATM-R20	A2K-20R	10
6.3 (3)	KTS-R20	JKS-20	JJS-20	5017906-020	KTN-R20	ATM-R20	A2K-20R	10
8.2 (4)	KTS-R20	JKS-20	JJS-20	5017906-020	KTN-R20	ATM-R20	A2K-20R	10
11 (5.5)	KTS-R30	JKS-30	JJS-30	5012406-032	KTN-R30	ATM-R30	A2K-30R	10
14.5 (7.5)	KTS-R30	JKS-30	JJS-30	5012406-032	KTN-R30	ATM-R30	A2K-30R	10
21 (11)	KTS-R40	JKS-40	JJS-40	5014006-040	KLS-R40	-	A6K-40R	7
27 (15)	KTS-R40	JKS-40	JJS-40	5014006-040	KLS-R40	-	A6K-40R	7
34 (18.5)	KTS-R50	JKS-50	JJS-50	5014006-050	KLS-R50	-	A6K-50R	7
40 (22)	KTS-R60	JKS-60	JJS-60	5014006-063	KLS-R60	-	A6K-60R	2
52 (30)	KTS-R80	JKS-80	JJS-80	2028220-100	KLS-R80	-	A6K-80R	2
65 (37)	KTS-R100	JKS-100	JJS-100	2028220-125	KLS-R100	-	A6K-100R	1/0
80 (45)	KTS-R125	JKS-150	JJS-150	2028220-125	KLS-R125	-	A6K-125R	1/0
105 (55)	KTS-R150	JKS-150	JJS-150	2028220-160	KLS-R150	-	A6K-150R	1/0
130 (75)	FWH-220	-	-	2028220-200	L50S-225	-	A50-P225	4/0
160 (90)	FWH-250	-	-	2028220-250	L50S-250	-	A50-P250	250 MCM
3 x 525-600 V								
1.7 (0.75)	KTS-R10	JKS-10	JJS-10	5017906-010	KTN-R10	ATM-R10	A2K-10R	10
2.4 (1.1)	KTS-R10	JKS-10	JJS-10	5017906-010	KTN-R10	ATM-R10	A2K-10R	10
2.7 (1.5)	KTS-R10	JKS-10	JJS-10	5017906-010	KTN-R10	ATM-R10	A2K-10R	10
3.9 (2.2)	KTS-R20	JKS-20	JJS-20	5017906-020	KTN-R20	ATM-R20	A2K-20R	10
4.9 (3)	KTS-R20	JKS-20	JJS-20	5017906-020	KTN-R20	ATM-R20	A2K-20R	10
6.1 (4)	KTS-R20	JKS-20	JJS-20	5017906-020	KTN-R20	ATM-R20	A2K-20R	10
9 (5.5)	KTS-R30	JKS-30	JJS-30	5012406-032	KTN-R30	ATM-R30	A2K-30R	10

Inputs and outputs

Mains supply (L1, L2, L3)

Supply voltage	200-240 V ± 10 %
Supply voltage	380-500 V ± 10 %
Supply voltage	525-600 V ± 10 %
Supply voltage	525-690 V ± 10 %
Supply frequency	50/60 Hz
Maximum temporary imbalance between phases	3 % of rated value
Leakage current to earth	>3.5 mA
Number of cut-ins, enclosure A	max. 2 times/min.
Number of cut-ins, enclosures B and C	max. 1 time/min.
Number of cut-ins, enclosures D	max. 1 time/2 min.

Note: Do not use the supply voltage for switching the CUE on and off.

Motor output (U, V, W)

Output voltage	0-100% ¹⁾
Output frequency	0-100 Hz ²⁾
Switching on output	not recommended

¹⁾ Output voltage in% of supply voltage.

²⁾ Depending on the pump family selected.

RS-485 GENibus connection

Terminal number	68 (A), 69 (B), 61 GND (Y)
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The RS-485 circuit is functionally separated from other central circuits and galvanically separated from the supply voltage (PELV).

Digital inputs

Terminal number	18, 19, 32, 33
Voltage level	0-24 VDC
Voltage level, open contact	> 19 VDC
Voltage level, closed contact	< 14 VDC
Maximum voltage on input	28 VDC
Input resistance, R _i	Approx. 4 kΩ

All digital inputs are galvanically separated from the supply voltage (PELV) and other high-voltage terminals.

Signal relays

Relay 01 , terminal number	1 (C), 2 (NO), 3 (NC)
Relay 02 , terminal number	4 (C), 5 (NO), 6 (NC)
Maximum terminal load (AC-1) ¹⁾	240 VAC, 2 A
Maximum terminal load (AC-15) ¹⁾	240 VAC, 0.2 A
Maximum terminal load (DC-1) ¹⁾	50 VDC, 1 A
Minimum terminal load	24 V DC 10 mA 24 V AC 20 mA

¹⁾ IEC 60947, parts 4 and 5.

C Common
NO Normally open
NC Normally closed

The relay contacts are galvanically separated from other circuits by reinforced insulation (PELV).

Analog inputs

Analog input 1 , terminal number	53
Voltage signal	A53 = "U" ¹⁾
Voltage range	0-10 V
Input resistance, R _i	Approx. 10 kΩ
Maximum voltage	± 20 V
Analog input 2 , terminal number	54
Current signal	A54 = "I" ¹⁾
Current range	0-20, 4-20 mA
Input resistance, R _i	Approx. 200 Ω
Maximum current	30 mA
Maximum fault, terminals 53, 54	0.5 % of full scale

The factory setting is voltage signal "U".

All analog inputs are galvanically separated from the supply voltage (PELV) and other high-voltage terminals.

Analog output

Analog output 1 , terminal number	42
Current range	0-20 mA
Maximum load to frame	500 Ω
Maximum fault	0.8 % of full scale

The analog output is galvanically separated from the supply voltage (PELV) and other high-voltage terminals.

MCB 114 sensor input module

Analog input 3 , terminal number	2
Current range	0/4-20 mA
Input resistance	< 200 Ω
Analog inputs 4 , terminal number	4, 5
Analog inputs 5 , terminal number	7, 8
Signal type, 2- or 3-wire	Pt100/Pt1000

Note: When using Pt100 with 3-wire cable, the resistance must not exceed 30 Ω.