Encina NTNCWS Application Review

Barrick, Anna <abarrick@pa.gov>

Thu 7/6/2023 1:55 PM

To:mmarr@encina.com <mmarr@encina.com>;rhenry@meiser-earl.com <rhenry@meiser-earl.com>

Cc:Gair, Edie <egair@pa.gov>;Eldred, Andrew <aeldred@pa.gov>

Good Afternoon,

Edie Gair has completed her preliminary review of the Encina NTNCWS Application and does not have any additional hydrogeologic-related deficiencies, at this time.

I have completed my preliminary review and have the following engineering-related comments/questions: (I was unable to find a contact person for Hyundai Engineering Co. Ltd, so please forward to the appropriate PE.)

1. Please provide additional information for the proposed greensand filter package system, including detailed specifications for the vessels and media. In particular, submit manufacturer, model no., diameter, height, and proof of NSF 61 certification for the two vessels. Also, submit manufacturer, effective size, uniformity coefficient, depth, and NSF 61 certification for greensand, anthracite cap, and gravel underbedding.

2. In the application, it was stated that "water from filter backwashing is routed to OWS sump and then collected backwash water is periodically disposed of by vacuum truck". Please provide OWS sump and drain pit details (tank sizes) and where the wastewater will be disposed of via a vacuum truck.

3. NSF 61 documentation was submitted for Balmoral Tanks Ltd. Is this the manufacturer of the chlorine contact tank? What is the material of the proposed chlorine contact tank? If interior tank coatings are proposed, please submit manufacturer, coating name, and NSF 61 certification.

4. There appears to be a typographical error in Section 2.1 Design Basis of the Process Equipment Data Sheet for Greensand Filter Package. The chlorine contact tank working volume is listed as 640 gallons. Elsewhere in the application, the volume is specified to be 875 gallons (minimum water volume of 870 gallons).

5. Provide manufacturer, model no., and NSF 61 certification for the proposed duplicate sodium hypochlorite chemical feed pumps (0.3 pounds per hour). Confirm that the skid will be equipped with a chemical containment basin. What are the size (diameter, height) and volume of the Poly Processing chemical storage tank?

6. Please submit manufacturer, model no., and NSF certification for the flow meter.

7. Provide manufacturer, model no., HP, and NSF 61 certification for the proposed duplicate high service pumps (85 gpm), shown on the Piping and Instrumentation Diagram (704-P-005A and B).

Please submit your response within 20 business days of the date of this email. Upon receipt of an acceptable response, a construction permit will be issued.

If you have any questions, feel free to call me.

Thanks, Anna

Anna E. Barrick, P.E. | Environmental Engineer
Department of Environmental Protection | Safe Drinking Water
North Central Regional Office
208 West Third Street Suite 101 | Williamsport PA 17701
Phone: 570.327.3731 | Fax: 570.327.3565
www.dep.pa.gov

Barrick, Anna

From: Richard C. Henry, P.G.
Sent: Tuesday, September 12, 2023 2:06 PM
To: Lena M. Fox
Subject: FW: Encina NTNCWS Response
Attachments: NCWS Application Response Attachments.zip; Encina Technical Deficiency Letter response NTNCWS 082302023 - final - MM.pdf

This is the email (below) of the original submission. Upload message along with the two attached files.

From: Michael Marr <mmarr@encina.com>
Sent: Wednesday, August 30, 2023 4:48 PM
To: Barrick, Anna <abarrick@pa.gov>
Cc: egair@pa.gov; Eldred, Andrew <aeldred@pa.gov>; Richard C. Henry, P.G. <rhenry@meiser-earl.com>; Sheida Sahandy <ssahandy@encina.com>
Subject: Encina NTNCWS Response

Hi Anna:

Please see attached Encina's response to the Department's earlier notice, including relevant attachments in the zip file.

Thank you again for providing us with additional time to make this submittal.

Please let me know if you have any questions or concerns. Thank you.

Michael Marr
ENCINA
Director of Government Relations & Compliance
Mobile (412) 953-4684

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From: Michael Marr
Sent: Wednesday, August 30, 2023 4:44 PM
To: Michael Marr
Subject: FW: TDL response- Sewage Planning

Michael Marr

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Director of Government Relations & Compliance
Mobile (412) 953-4684

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ENCINA

August 30, 2023

Anna E. Barrick, P.E.
Environmental Engineer
Department of Environmental Protection
Safe Drinking Water
North Central Regional Office
208 West Third Street Suite 101
Williamsport PA 17701

Via email to: abarrick@pa.gov

RE: Encina NTNCWS Application Review

Dear Ms. Barrick,

Please find below, along with supporting documentation attached to this email, our responses to your comments received on July 6, 2023, regarding the Encina NTNCWS Application Review. If you wish to see these responses also reflected in the language we submitted online, please let us know.

The vendors as well as the vendor information provided in this communication are those being considered at this time, but final vendor choices will be made at a later phase in the project. Even though the final vendors may differ than those identified here, they will still be ones who will meet all applicable codes, standards, and certifications.

Item #1:
PADEP Comment: Please provide additional information for the proposed greensand filter package system, including detailed specifications for the vessels and media. In particular, submit manufacturer, model no., diameter, height, and proof of NSF 61 certification for the two vessels. Also, submit manufacturer, effective size, uniformity coefficient, depth, and NSF 61 certification for greensand, anthracite cap, and gravel underbedding.

Encina Response:
A. Filter Vessels
The dimensions of each filter vessel supplied by PENTAIR are 24 inches in diameter and 64.3 inches in height. Please refer to Attachment 1-1 for PENTAIR vendor cut sheet, which includes proof of NSF 61 certification and the applicable filter vessel model 30X60 COMP 6"TF indicated in the red box.

B. Filter Media

The GreensandPlus performance media supplied by Inversand Company has the WQA Gold Seal Certification for compliance with NSF 61. Effective size is 0.30 to 0.35 mm, uniformity coefficient is less than 1.60, and minimum bed depth is 15 inches. Please refer to Attachment 1-2a for Inversand Company's specification of the GreensandPlus media, which includes the WQA Gold Seal Certification. Physical properties mentioned above can be found on page 2.

The Anthrafilt performance media supplied by Carbon Sales, Inc. has an effective size range of 0.6 mm to 1.2 mm, a uniformity coefficient of 1.4, and a minimum cap depth of 6 inches. Please refer to Attachment 1-2b for proof of NSF 61 certification of Antrafilt and Attachment 1-2c for the SDS.

The gravel underbedding supplied by APAC – Central Inc has an effective size range of 0.125 inches to 2.5 inches, a uniformity coefficient range of 1.2 to 1.7, and a maximum bed depth of 8 inches. Please refer to Attachment 1-2d for proof of NSF 61 certification and Attachment 1-2e for the SDS for the gravel.

Item #2:

PADEP Comment: In the application, it was stated that "water from filter backwashing is routed to OWS sump and then collected backwash water is periodically disposed of by vacuum truck". Please provide OWS sump and drain pit details (tank sizes) and where the wastewater will be disposed of via a vacuum truck.

Encina Response:

Please refer to Attachment 2 for the OWS drain pit drawing details. The collected wastewater via vacuum truck will be disposed offsite with a contracted professional third party and done in accordance with all applicable rules and regulations; the company and disposal location details will be determined in the EPC phase of the project.

Item #3:

PADEP Comment: NSF 61 documentation was submitted for Balmoral Tanks Ltd. Is this the manufacturer of the chlorine contact tank? What is the material of the proposed chlorine contact tank? If interior tank coatings are proposed, please submit manufacturer, coating name, and NSF 61 certification.

Encina Response:

Balmoral Tanks Ltd is a vendor under consideration for the potable water tank (project equipment tag number 704-T-004). Superior Tank Co, as listed on the Module 5 application, is another vendor under consideration. Please refer to Attachment 3-1 for Superior Tank Co's proof of NSF 61 certification, for consistency with the application.

Highland Tank & Mf Co is the manufacturer under consideration for the chlorine contact tank. The chlorine contact tank is specified to be SS316L, with all tank internal surfaces lined to be of NSF/ANSI 61 certified material, such as epoxy, which is consistent with the design Highland

Tank offers. Please refer to Attachment 3-2 for the vendor cut sheet, which includes proof of NSF 61 certification for the tank lining.

Item #4:
PADEP Comment: There appears to be a typographical error in Section 2.1 Design Basis of the Process Equipment Data Sheet for Greensand Filter Package. The chlorine contact tank working volume is listed as 640 gallons. Elsewhere in the application, the volume is specified to be 875 gallons (minimum water volume of 870 gallons).

Encina Response:
The P&ID and Process Datasheet have been updated for consistency, with the chlorine contact tank minimum working volume confirmed for 870 gallons. Please refer to Attachment 4-1 for the P&ID and Attachment 4-2 for the Process Datasheet.

Item #5:
PADEP Comment: Provide manufacturer, model no., and NSF 61 certification for the proposed duplicate sodium hypochlorite chemical feed pumps (0.3 pounds per hour). Confirm that the skid will be equipped with a chemical containment basin. What is the size (diameter, height) and volume of the Poly Processing chemical storage tank?

Encina Response:
Please refer to Attachment 5 for Prominent Fluid Controls' proof of NSF 61 certification, with the Sigma/2 model number indicated in the red box for the sodium hypochlorite chemical feed pumps. The dimensions of the chemical storage tank are 3.3 ft in diameter, 4.3 ft in height, and 264 gallons in volume. The NaOCl dosing skid will be enclosed in a curbed area with a valve that is connected to the OWS (oily water sewer) for drain management. The valve position is normally closed. Any collected chemicals in the curbed area will be drained to the OWS by opening the valve. The curbed area is designed for containment of chemicals from smaller maintenance activities up to larger spills from this skid; for example, leak or rupture of the NaOCl supply tank. In the case of larger containment events, the collected chemicals will be disposed of by vacuum truck. As previously mentioned, disposal will be offsite with a contracted professional third party and done in accordance with all applicable rules and regulations; the company and disposal location details will be determined in the EPC phase of the project.

Item #6:
PADEP Comment: Please submit manufacturer, model no., and NSF certification for the flow meter.

Encina Response:
The flowmeter type has been updated from orifice to magnetic. Please refer to Attachment 4-1 for the updated P&ID reflecting this change.

Please refer to Attachment 6-1 for Emerson's proof of NSF 61 certification, with the Rosemount

8705 model number indicated in the red box for the flow meter.

Please refer to Attachment 6-2 for Neptune Technology's proof of NSF 61 certification, with the T-10 model number indicated in the red box for the flow gauge.

Item #7:
PADEP Comment: Provide manufacturer, model no., HP, and NSF 61 certification for the proposed duplicate high service pumps (85 gpm), shown on the Piping and Instrumentation Diagram (704-P-005A and B).

Encina Response:
Please refer to Attachment 7-1 for GRUNDFOS's proof of NSF 61 certification, and Attachment 7-2 for the pump catalogue. The model number is Hydro MPC-E 2 CRNE 20-3 with 7.5 HP.

If you have any questions regarding the information we have shared in this response or wish to set up a time to discuss any of it, please let us know. Thank you for your time and consideration.

Sincerely,

Michael Marr

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Director of Government Relations & Compliance
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Mobile (412) 953-4684

Electronic CC:
Edie Gair (egair@pa.gov)
Andrew Eldred (aeldred@pa.gov)
Richard Henry (rhenry@meiser-earl.com)
Sheida Sahandy (SSahandy@Encina.com)

COMPOSITE PRESSURE VESSELS

MADE IN THE USA OF FOREIGN & DOMESTIC PARTS

DESIGNED FOR COMMERCIAL SOFTENING AND FILTRATION APPLICATIONS

Tested and Certified by the Water Quality Association

against NSF Std. 61 for Material Safety Section 8 and NSF std. 372 for Low Lead Compliance.

*Tested under domestic cold: 23 ± 2 °C (73 ± 4 °F).

Pentair Structural§ Composite Pressure Vessels offer reinforced fiberglass construction for outstanding performance and durability. Available in capacities up to 1,600 gallons, composite vessels are available with a variety of different configurations. ASME code available.

FEATURES • BENEFITS

- For commercial and industrial water treatment and storage
- 100% composite fiberglass construction
- Outstanding performance and durability in harsh chemical environments
- Absolutely will not – and cannot – rust
- Capacities up to 1,600 gallons
- Factory-backed five-year warranty
- Commercial softening and filtration

MATERIAL OF CONSTRUCTION

- Polyethylene inner shell

INSTALLATION TIPS

- Bolt base to floor
- Calculate height for valve and base combined

OPERATING PARAMETERS

- Maximum operating pressure – 150 psi
- Maximum operating temperature – 120°F (threaded); 150°F (flanged)
- ASME Section X Code Vessels Available

PENTAIR DESIGN PARAMETERS

- Safety factor – 4:1
- Minimum burst at 600 psi
- Tested to 250,000 cycles without leakage

COLOR OPTIONS

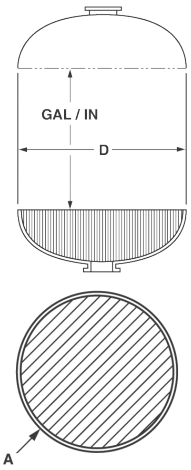
- AL – Almond
- BL – Blue
- BK – Black
- GR – Gray
- NA – Natural

SPECIFICATIONS

VESSEL	DESCRIPTION	HEIGHT W/BASE INCHES / MM	HEIGHT W/O BASE INCHES / MM	CAPACITY GALLONS / LITERS	CUBIC FEET	BASE	SHIP WEIGHT LBS.
18" DIA.	18X65 COMP 4"T	67 / 1702	65.7 / 1669	64 / 242	8.56	SMC	67
	18X65 COMP 4"T 4"B	73.13 / 1858	65.6 / 1666	64 / 242	8.56	SMC EXT	74
	18X65 COMP 6"TF 6"BF	84.12 / 2137	70.5 / 1791	62 / 235	8.29	TRIPOD	92
21" DIA.	21X62 COMP 4"T	67 / 1702	63.4 / 1610	84 / 318	11.23	SMC	95
	21X62 COMP 4"T 4"B	72.8 / 1849	63.5 / 1613	84 / 318	11.23	SMC EXT	102
24" DIA.	24X50 COMP 4"T	55.6 / 1412	51.5 / 1308	84 / 318	11.23	SMC	90
	24X50 COMP 4"T 4"B	63 / 1600	52.9 / 1344	84 / 318	11.23	SMC EXT	97
	24X65 COMP 4"T	65.2 / 1656	61.1 / 1552	100 / 379	13.37	SMC	109
	24X65 COMP 4"T 4"B	70.1 / 1781	60 / 1524	100 / 379	13.37	SMC EXT	115
	24X65 COMP 6"TF	65 / 1651	61.2 / 1554	100 / 379	13.37	SMC	114
	24X65 COMP 6"TF 6"BF	79 / 2007	65 / 1651	100 / 379	13.37	TRIPOD	124
	24X72 COMP 4"T	74.19 / 1884	70.12 / 1781	118 / 447	15.77	SMC	109
	24X72 COMP 4"T 4"B	80.4 / 2042	70.3 / 1786	119 / 450	15.91	SMC EXT	124
	24X72 COMP 6"TF	77 / 1956	73.4 / 1864	119 / 450	15.91	SMC	137
	24X72 COMP 6"TF 6"BF	88.5 / 2248	74.5 / 1892	119 / 450	15.91	TRIPOD	147
	30X60 COMP 6"TF	71.6 / 1819	64.3 / 1633	151 / 572	20.19	SMC EXT	195
30" DIA.	30X60 COMP 6"TF 6"BF	82.5 / 2096	68.5 / 1740	151 / 572	20.19	TRIPOD	205
	30X72 COMP 4"T	78.9 / 2004	69.8 / 1773	187 / 708	25.00	SMC EXT	198
	30X72 COMP 4"T 4"B	77.2 / 1961	69.8 / 1773	187 / 708	25.00	SMC EXT	205
	30X72 COMP 6"TF	79.73 / 2025	70 / 1778	187 / 708	25.00	SMC EXT	195
	30X72 COMP 6"TF 6"BF	88.24 / 2241	74.67 / 1897	187 / 708	25.00	TRIPOD	211
36" DIA.	36X36 COMP 6"TF 6"BF	55.3 / 1405	41 / 1041	118 / 447	15.77	TRIPOD	148
	36X57 COMP 6"TF	68 / 1727	59.3 / 1506	205 / 776	27.40	SMC EXT	195
	36X57 COMP 6"TF 6"BF	77.3 / 1963	63 / 1600	205 / 776	27.40	TRIPOD	225
	36X72 COMP 4"T	80.4 / 2042	71.8 / 1824	264 / 999	35.29	SMC EXT	264
	36X72 COMP 4"T 4"B	80.4 / 2042	70.5 / 1791	264 / 999	35.29	SMC EXT	285
	36X72 COMP 6"TF	82.29 / 2090	73.54 / 1868	264 / 999	35.29	SMC EXT	295
	36X72 COMP 6"TF 6"BF	90.1 / 2289	76.2 / 1935	264 / 999	35.29	TRIPOD	305
	36X72 COMP 6"TF 6"BF 4"TBSF	89.6 / 2276	75.3 / 1913	264 / 999	35.29	TRIPOD	315
42" DIA.	42X72 COMP 6"TF	72.5 / 1842	71.1 / 1806	345 / 1306	46.12	SMC SHORT	370
	42X72 COMP 6"TF 6"BF	90.1 / 2289	73 / 1854	345 / 1306	46.12	TRIPOD	400
	42X72 COMP 6"TF 6"BF 4"TBSF	94.6 / 2403	77.5 / 1969	345 / 1306	46.12	TRIPOD	415
48" DIA	48X72 COMP 6"TF	81.5 / 2070	75.2 / 1910	463 /1753	61.89	SMC SHORT	494
	48X72 COMP 6"TF 6"BF	91.91 / 2335	76 / 1930	463 /1753	61.89	TRIPOD	500
	48X72 COMP 6"TF 6"BF 4"TBSF	96.75 / 2457	80.75 / 2051	463 /1753	61.89	TRIPOD	504
63" DIA.	63X67 COMP 6"TF 6"BF	81.5 / 2070	67.1 / 1704	600 / 2271	80.21	TRIPOD	680
	63X86 COMP 6"TF 6"BF	98.88 / 2512	84.5 / 2146	865 / 3274	120.31	TRIPOD	950
	63X86 COMP 16"TMWY 6"BF	99 / 2515	84.5 / 2146	865 / 3274	120.31	TRIPOD	950
	63X86 COMP 16"TMWY 6"BF 4"TBSF	99 / 2515	85 / 2159	865 / 3274	120.31	TRIPOD	960
	63X116 16"TMWY 6" BF 4" TBSF	130 / 3302	116 / 2946	1250 / 4732	167.10	TRIPOD	1190
	63X144 16"TMWY 6" BF 4" TBSF	158 / 4013	144 / 3658	1600 / 6057	213.89	TRIPOD	1398

*Measurements are subject to change without notice and are for reference only.
NOTE: Flexible connections must be installed between hard piping and tank openings. Failure to install flex connection properly with the vessel will void the warranty.
NOTE: Different base options can be selected on different tank diameters. The bases selected above illustrate most common base selection.

DOME VOLUME (GALLONS) AND STRAIGHT WALL GALLON PER INCH

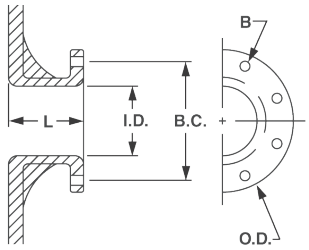


NOMINAL DIAMETER			
D (INCHES)	GALLONS* (ONE DOME)	GALLON/ INCH (APPROX.)	A (SQ. FEET)
12	1.0	0.5	0.7
13	1.4	0.5	0.9
14	1.7	0.6	1.1
16	2.7	0.8	1.3
18	3.7	1.0	1.8
21	6.2	1.4	2.4
24	9.3	1.9	3.0
30	18	2.9	4.6
36	33	4.2	6.7
42	52	5.7	9.0
48	74	7.5	12.0
63	168	13.0	20.0

*Cubic Ft. = 0.1337 x Gallons

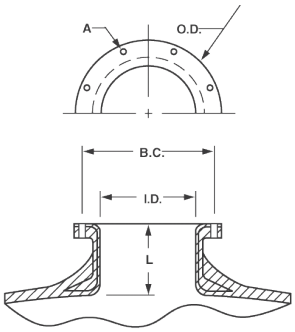
SIDE FLANGE

DIMENSIONS							
SIZE	L	I.D.	B.C.	O.D.	A BOLT DIA.	NUMBER OF HOLES	WEIGHT (LBS.)
4" ANSI	4.1"	4.0"	7.5"	9.0"	0.63"	8	6.4

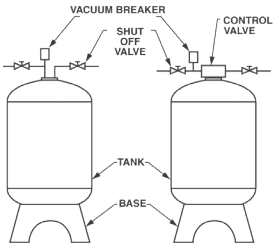


TOP AND BOTTOM OPENING FLANGES/MANWAY

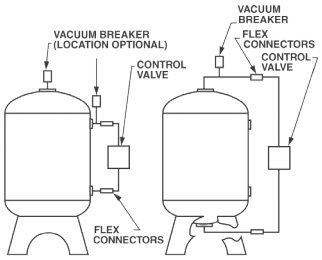
DIMENSIONS							
SIZE	L	I.D.	B.C.	O.D.	A BOLT DIA	NUMBER OF HOLES	WEIGHT (LBS.)
6" SNA	3.6"	5.9"	8.5"	9.4"	0.31"	12	5.8
10" ANSI	3.7"	10.0"	14.3"	16.0"	0.88"	12	17.8
16" Manway SNA	4.3"	16.0"	20.4"	21.3"	0.50"	24	34.0



VACUUM BREAKER INSTALLATION



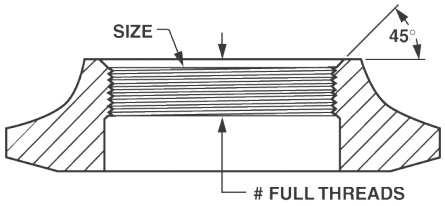
FLEX CONNECTORS INSTALLATION



NOTE: Flexible connectors must be installed between hard piping and tank openings. These pressure vessels are treated for an internal negative pressure of 5y HG (17 Pa) vacuum below atmospheric. If negative pressure could ever exceed 5y Hg (17 Pa), an adequate vacuum breaker must also be properly installed. Failure to install flex connection properly, or improper installation of a vacuum breaker when required, may void the warranty.

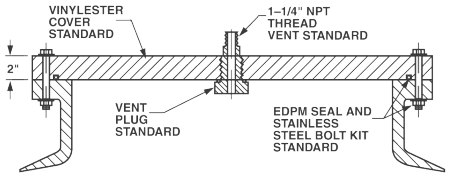
TOP AND BOTTOM OPENING THREADS

SPECIFICATIONS			
SIZE	COMPOSITE/ POLY GLASS	NUMBER OF FULL THREADS	COMPOSITE
2.5" - 8" NPSM	6	3 min	6
4" - 8" UN	7	3 min	7
4.5" - 8" Buttress	7	3 min	7



MANWAY COVER

SPECIFICATIONS		
MATERIAL	PRESSURE RATING	TAPPING
CPVC	100 psi	As requested
VE	150 psi	As shown only



ADDER DIMENSIONS

*Measurements are subject to change without notice and are for reference only.

DIMENSIONS		
FLECK VALVE	TANK DIA. (INCHES/MM)	ADDER HT. (X) (INCHES/MM)
2750	18/475	6.5/165
2850	21/533	6.5/165
2900	24, 30/610, 762	12/305
3150	42/1067	10/254
3900	48-63/1219-1600	15/381

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P: 262.238.4400 | Customer Service: 800.279.9404 | tech-support@pentair.com | pentair.com

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40846 Rev H JA22

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Phone 856-881-2345 Fax 856-881-6859
Email: info@inversand.com • www.inversand.com

GREENSANDplus™

Performance Media for Water Filtration

Removes iron, manganese, hydrogen sulfide, arsenic and radium.

GreensandPlus™ is a black filter media used for removing soluble iron, manganese, hydrogen sulfide, arsenic and radium from groundwater supplies.

The manganese dioxide coated surface of GreensandPlus acts as a catalyst in the oxidation reduction reaction of iron and manganese.

The silica sand core of GreensandPlus allows it to withstand waters that are low in silica, TDS and hardness without breakdown.

GreensandPlus is effective at higher operating temperatures and higher differential pressures than standard manganese greensand. Tolerance to higher differential pressure can provide for longer run times between backwashes and a greater margin of safety.

Systems may be designed using either vertical or horizontal pressure filters, as well as gravity filters.

GreensandPlus is a proven technology for iron, manganese, hydrogen sulfide, arsenic and radium removal. Unlike other media, there is no need for extensive preconditioning of filter media or lengthy startup periods during which required water quality may not be met.

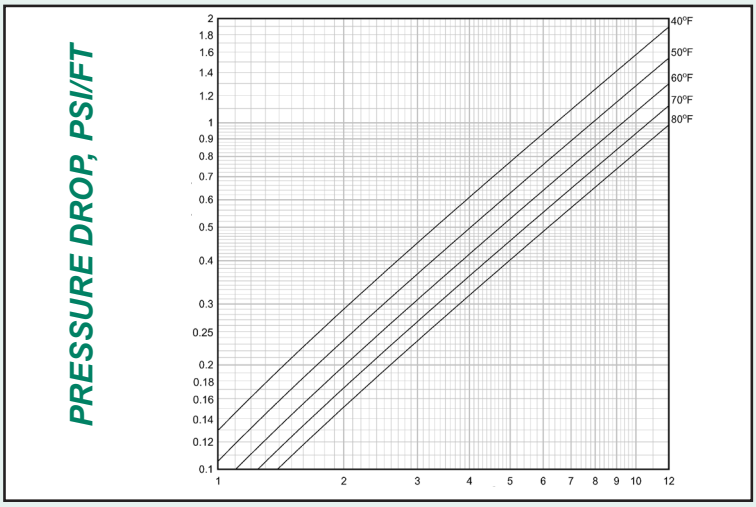
GreensandPlus is an exact replacement for manganese greensand. It can be used in CO or IR applications and requires no changes in backwash rate or times or chemical feeds.

GreensandPlus has the WQA Gold Seal Certification for compliance with NSF/ANSI 61.

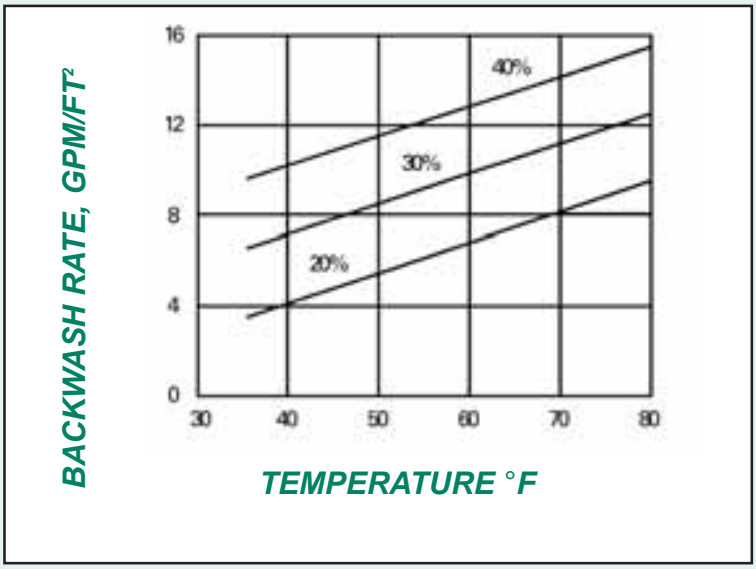
REACH Registration 01-2119452801-43-0020 for import to the EU.

Packaging is available in 1/2 cubic foot bags or 1 metric ton (2,205 lbs) bulk sacks.

GREENSANDPLUS PRESSURE DROP (CLEAN BED)



BED EXPANSION DURING BACKWASHING



PHYSICAL CHARACTERISTICS

Physical Form
Black, nodular granules shipped in a dry form

Apparent Density
88 pounds per cubic foot net (1410.26 kg/m3)

Shipping Weight
90 pounds per cubic foot gross (1442.31 kg/m3)

Specific Gravity
Approximately 2.4

Porosity
Approximately 0.45

Screen Grading (dry)
18 X 60 mesh

Effective Size
0.30 to 0.35 mm

Uniformity Coefficient
Less than 1.60

pH Range
6.2-8.5 (see General Notes)

MaximumT emperature
No limit

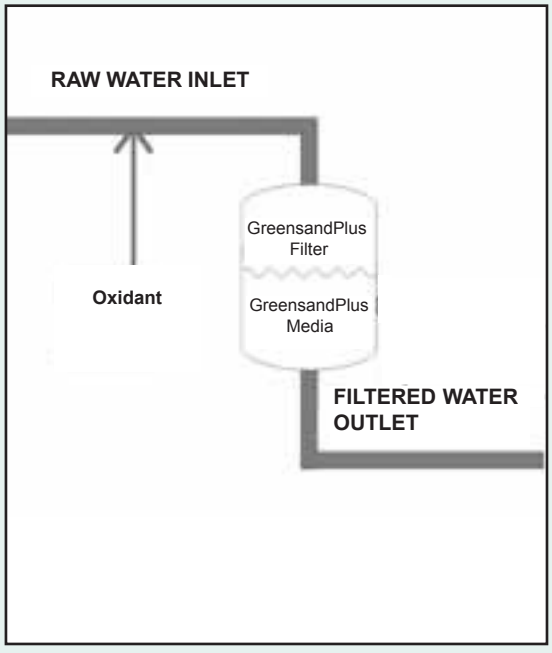
Backwash Rate
Minimum 12 gpm/sq. ft. at 55°F (29.4 m/hr @ 12.78°C) (see expansion chart)

Service Flow Rate
2 -12 gpm/sq. ft (4.9m/hr - 29.4 m/hr)

Minimum Bed Depth
15 inches (381 mm) of each media for dual media beds or 30 inches minimum (762 mm) of GreensandPlus alone.

METHOD OF OPERATION CO

GreensandPlus: Catalytic Oxidation (CO)



Catalytic Oxidation (CO) operation is recommended in applications where iron removal is the main objective in well waters with or without the presence of manganese. This method involves the feeding of a predetermined amount of chlorine (Cl_2) or other strong oxidant directly to the raw water before the GreensandPlus Filter.

Chlorine should be fed at least 10-20 seconds upstream of the filter, or as far upstream of the filter as possible to insure adequate contact time. A free chlorine residual carried through the filter will maintain GreensandPlus in a continuously regenerated condition.

For operation using chlorine, the demand can be estimated as follows:

mg/L Cl_2 = (1 x mg/L Fe) + (3 x mg/L Mn) + (6x mg/L H_2S) + (8 x mg/L NH_3)

SUGGESTED OPERATING CONDITIONS

Bed Type

Dual media: anthracite 15-18 in. (381 mm - 457 mm) and GreensandPlus 15-24 in. (381 mm - 610 mm)

Capacity

700-1200 grains of oxidized iron and manganese/sq.ft. of bed area based on oxidant demand and operation to iron break through or dp limitations.

Backwash

Sufficient rate using treated water to produce 40% bed expansion until waste water is clear, or for 10 minutes, whichever occurs first.

Air/Water Scour

Optional using 0.8-2.0 cfm/sq. ft. (15 m/hr - 7 m/hr) with a simultaneous treated water backwash at 4.0-4.5 gpm/sq. ft. (9.8 m/hr - 11.03 m/hr).

Raw Water Rinse

At normal service flow rate for 3 minutes or until effluent is acceptable.

Flow Rate

Recommended flow rates with CO operation are 2-12 gpm/sq. ft. (4.9 m/hr - 29.4 m/hr). High concentrations of iron and manganese usually require lower flow rates for equivalent run lengths. Higher flow rates can be considered with very low concentrations of iron and manganese. For optimizing design parameters, pilot plant testing is recommended.The run length between backwashes can be estimated as follows:

What is the run length for a water containing 1.7 mg/L iron and 0.3 mg/L manganese at a 4 gpm/sq. ft. service rate:

Contaminant loading

= (1 x mg/L Fe) + (2 x mg/L Mn)
= (1 x 1.7) + (2 x 0.3)
= (2.3 mg/L or 2.3/17.1 = 0.13 grains/gal. (gpg)

At 1,200 grains / sq. ft. loading ÷ 0.13 gpg = 9,230 gal./sq. ft.

At 4 gpm / sq. ft. service rate 9,230/4 = 2,307 min.

The backwash frequency is approximately every 32-38 hours of actual operation.

The Intermittent regeneration (IR) operation is available for certain applications. Contact your Inversand representative for additional information.

GENERAL NOTES

pH

Raw waters having natural pH of 6.2 or above can be filtered through GreensandPlus without pH correction. Raw waters with a pH lower than 6.2 should be pH-corrected to 6.5-6.8 before filtration. Additional alkali should be added following the filters if a pH higher than 6.5-6.8 is desired in the treated water. This prevents the possible adverse reaction and formation of a colloidal precipitate that sometimes occurs with iron and alkali at a pH above 6.8.

Initial Conditioning of GreensandPlus

GreensandPlus media must be backwashed prior to adding the anthracite cap. The GreensandPlus backwash rate must be a minimum of 12 gpm/sq. ft. @ 55°F.

After backwashing is complete, the GreensandPlus must be conditioned. Mix 0.5 gal. (1.9 L) of 6% household bleach or 0.2 gal (0.75 L) of 12% sodium hypochlorite for

Initial Conditioning of GreensandPlus

every 1 cu. ft. (28.3 L cu. m) of GreensandPlus into 6.5 gallons (25 L) of water.

Drain the filter enough to add the diluted chlorine mix. Apply the diluted chlorine to the filter being sure to allow the solution to contact the GreensandPlus media. Let soak for a minimum of 4 hours, then rinse to waste until the “free” chlorine residual is less than 0.2 mg/L. The GreensandPlus is now ready for service.

Radium and Arsenic Removal Using GreensandPlus

The GreensandPlus CO process has been found to be successful in removing radium and arsenic from well water. This occurs via adsorption onto the manganese and/or iron precipitates that are formed. For radium removal, soluble manganese must be present in or added to the raw water for removal to occur. Arsenic removal requires iron to be present in or added to the raw water to accomplish removal. Pilot plant testing is recommended in either case.

REFERENCES

USA

American Water Company, CA
San Jacinto, CA
City of Tallahassee, FL
Adedge Technologies, Inc., Buford, GA
City of Mason City, IL
City of Goshen, IN
City of Hutchinson, KS
City of Burlington, MA
Dedham Water Co., MA
Raynham Center, MA
Northbrook Farms, MD
Sykesville, MD
Tonka Equipment Company, Plymouth, MN
City of New Bern, NC
Onslow County, NC
Hungerford & Terry, Inc., Clayton, NJ
Fort Dix, NJ
Jackson Twsp. MUA, NJ

USA

Churchill County, NV
Suffolk County Water Authority, NY
City of Urbana, OH
Roberts Filter Group, Darby, PA

International

Watergroup, Saskatoon, SK Canada
BI Pure Water, Surrey, BC Canada
Sydney, Nova Scotia, Canada
PT Beta Pramesta, Jakarta, Indonesia
PT Besflo Prima, Jakarta, Indonesia
Eurotrol, Milanese, Italy
Gargon Industrial, Mexico City, Mexico
River Sands Pty. Ltd., Queensland, Australia
Filtration Tech, Auckland, New Zealand
Alamo Water Poland, Izabeln, Poland
Aquatrol Company, Moscow, Russia
Impulse Group, St. Petersburg, Russia
Brenntag Nordic, Taby, Sweden
EcoFilter Technology, Liechtenstein



The manufacturing of GreensandPlus is an ongoing, 24/7 process to ensure the highest quality water treatment media.

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The Public Health and Safety Organization

NSF Product and Service Listings

These NSF Official Listings are current as of **Thursday, July 13, 2023** at 12:15 a.m. Eastern Time. Please contact NSF to confirm the status of any Listing, report errors, or make suggestions.

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NSF/ANSI/CAN 61
Drinking Water System Components - Health Effects

NOTE: Unless otherwise indicated for Materials, Certification is only for the Water Contact Material shown in the Listing. Click here for a list of Abbreviations used in these Listings. Click here for the definitions of Water Contact Temperatures denoted in these Listings. Products certified to NSF/ANSI/CAN 61 comply with the health effects criteria in NSF/ANSI/CAN 600.

Carbon Sales, Inc.

375 Johnson Street
Wilkes-Barre, PA 18702
United States
570-823-7664

Facility : Wilkes-Barre, PA

Process Media

Trade Designation	Size	Water Contact Temp	Water Contact Material
Anthracite[1]			
Filter Antracite	.3mm - 50mm	CLD 23	ANTH

Anthrafilt	.3mm - 50mm	CLD 23	ANTH

[1] The carbon source is anthracite coal.

NOTE: Certified for water treatment plant applications.
This product has not been evaluated for point of use applications.

Number of matching Manufacturers is 1

Number of matching Products is 2

Processing time was 0 seconds

SAFETY DATA SHEET

Issuing Date 25-Jul-2018 **Revision Date** 25-Jul-2018 **Revision Number** 1

This document complies with the US OSHA Hazard Communication Standard (29 CFR 1910.1200), Canada WHMIS 2015 which includes the amended Hazardous Products Act (HPA) and the Hazardous Products Regulation (HPR), and Mexico's NMX-R-019-SC-2011.

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND THE COMPANY/UNDERTAKING

GHS product identifier

Product Name **Anthrafilt™ Anthracite Filter Media**

Other means of identification

Product Code(s) **49977**

Synonyms Anthracite Filter Media

Recommended use of the chemical and restrictions on use

Recommended Use Water filtration

Uses advised against No information available

Supplier's details

Supplier Address
Carbon Sales, Inc.
375 Johnson Street
Wilkes Barre, PA 18702
570-823-7664

Emergency telephone number

Emergency Telephone Number 570-823-7664

2. HAZARDS IDENTIFICATION

Classification

This product is not considered hazardous according to the criteria set within the US OSHA Hazard Communication Standard (29 CFR 1910.1200), Canada WHMIS 2015 which includes the amended Hazardous Products Act (HPA) and the Hazardous Products Regulation (HPR), and Mexico's NMX-R-019-SC-2011.

Not classified

Label Elements

Signal Word
None

Physical and Health Hazards Not Otherwise Classified
Not applicable.

Precautionary Statements

Other information

3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms Anthracite Filter Media

Chemical Name	CAS-No	Weight %	Hazardous Material Information Review Act registry number (HMIRA registry #)	Date HMIRA filed and date exemption granted (if applicable)
Coal, anthracite	8029-10-5	100	-	-

4. FIRST AID MEASURES

Description of necessary first-aid measures

Eye Contact Not an expected route of exposure. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

Skin Contact Not an expected route of exposure. IF ON SKIN: Wash with plenty of soap and water.

Inhalation Not an expected route of exposure.

Ingestion Not an expected route of exposure. If swallowed: Drink plenty of water.

Most important symptoms/effects, acute and delayed

Most Important Symptoms/Effects No information available

Indication of immediate medical attention and special treatment needed, if necessary

Notes to Physician Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable Extinguishing Media No information available

Specific Hazards Arising from the Chemical No information available.

Explosion Data

Sensitivity to Mechanical Impact None.

Sensitivity to Static Discharge None.

Protective Equipment and Precautions for Firefighters As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Personal Precautions Ensure adequate ventilation.

Environmental Precautions

Environmental Precautions See Section 12 for additional Ecological Information.

Methods and materials for containment and cleaning up

Methods for Containment Prevent further leakage or spillage if safe to do so.

Methods for Cleaning Up Pick up and transfer to properly labeled containers.

7. HANDLING AND STORAGE

Precautions for safe handling

Handling Handle in accordance with good industrial hygiene and safety practice.

Conditions for safe storage, including any incompatibilities

Storage Keep containers tightly closed in a dry, cool and well-ventilated place.

Incompatible Products None known based on information supplied.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Control parameters

Exposure Guidelines

Chemical Name	ACGIH TLV	OSHA PEL	NIOSH IDLH
Coal, anthracite 8029-10-5	TWA: 0.4 mg/m³ dust, respirable particulate matter	-	-

Appropriate engineering controls

Engineering Measures Showers
Eyewash stations
Ventilation systems

Individual protection measures, such as personal protective equipment

Eye/Face Protection No special protective equipment required.
Skin and Body Protection No special protective equipment required.
Respiratory Protection No protective equipment is needed under normal use conditions. If exposure limits are exceeded or irritation is experienced, NIOSH/MSHA approved respiratory protection should be worn.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Physical State Solid (compressed).
Appearance Black.
Odor None.
Odor Threshold No information available.

Property	Values	Remarks/ - Method
pH	No data available	None known
Melting Point/Range	No data available	None known
Boiling Point/Boiling Range	No data available	None known
Flash Point	> 900 °C	None known
Evaporation rate	No data available	None known
Flammability (solid, gas)	No data available	None known
Flammability Limits in Air		
upper flammability limit	No data available	
lower flammability limit	No data available	
Vapor Pressure	No data available	None known
Vapor Density	No data available	None known
Relative Density	No data available	None known

Specific Gravity	No data available	None known
Water Solubility	No data available	None known
Solubility in other solvents	No data available	None known
Partition coefficient: n-octanol/water	No data available	None known
Autoignition Temperature	No data available	None known
Decomposition Temperature	No data available	None known
Viscosity	No data available	None known

Flammable Properties Not flammable
Explosive Properties No data available
Oxidizing Properties No data available

Other information

VOC Content (%) No data available

10. STABILITY AND REACTIVITY

Reactivity No data available.

Chemical stability Stable under recommended storage conditions.

Possibility of hazardous reactions None under normal processing.

Hazardous Polymerization Hazardous polymerization does not occur.

Conditions to avoid None known based on information supplied.

Incompatible materials None known based on information supplied.

Hazardous decomposition products None known based on information supplied.

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Product Information

Inhalation No known effect based on information supplied.
Eye Contact No known effect based on information supplied
Skin Contact No known effect based on information supplied
Ingestion No known effect based on information supplied

Numerical measures of toxicity - Product

The following values are calculated based on chapter 3.1 of the GHS document: Not applicable

Symptoms related to the physical, chemical and toxicological characteristics

Symptoms No information available.

Delayed and immediate effects and also chronic effects from short and long term exposure

Respiratory or Skin Sensitization Based on available data, the classification criteria are not met
Germ Cell Mutagenicity Based on available data, the classification criteria are not met.
Carcinogenicity Contains no ingredients above reportable quantities listed as a carcinogen.

Reproductive Toxicity Based on available data, the classification criteria are not met.
STOT - single exposure Based on available data, the classification criteria are not met
STOT - repeated exposure Based on available data, the classification criteria are not met

Aspiration Hazard None of the ingredients are known to be an aspiration hazard.

12. ECOLOGICAL INFORMATION

Ecotoxicity
Contains no substances known to be hazardous to the environment or not degradable in waste water treatment plants

Persistence and Degradability No information available

Bioaccumulation No information available

Mobility No information available

Other Adverse Effects No information available.

13. DISPOSAL CONSIDERATIONS

Waste Disposal Methods Dispose of in accordance with federal, state, and local regulations.

Contaminated Packaging Dispose of in accordance with local regulations.

14. TRANSPORT INFORMATION

DOT Not regulated

TDG Not regulated

MEX Not regulated

15. REGULATORY INFORMATION

International Regulations

Ozone depleting substances	Not applicable
Persistent Organic Pollutants	Not applicable
Hazardous Waste	Not applicable
The Rotterdam Convention (Prior Informed Consent)	Not applicable
International Convention for the Prevention of Pollution from Ships (MARPOL)	Not applicable

International Inventories

TSCA	Contact supplier for inventory compliance status
DSL/NDSL	Contact supplier for inventory compliance status

Legend
TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List

U.S. Federal Regulations

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

SARA 311/312 Hazard Categories
Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate

classifications. Under the amended regulations at 40 CFR 370, EPCRA 311/312 Tier II reporting for the 2017 calendar year will need to be consistent with updated hazard classifications.

Clean Water Act
This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42).

CERCLA
This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material.

U.S. State Regulations

California Proposition 65
This product does not contain any Proposition 65 chemicals.

U.S. State Right-to-Know Regulations

This product does not contain any substances regulated by state right-to-know regulations.

U.S. EPA Label Information
EPA Pesticide Registration Number Not applicable

16. OTHER INFORMATION

NFPA	**Health Hazard** 0	**Flammability** 0	**Instability** 0	**Physical and Chemical Hazards** -
HMIS	**Health Hazard** 0	**Flammability** 0	**Physical Hazard** 0	**Personal Protection** X

Prepared By Product Stewardship
23 British American Blvd.
Latham, NY 12110
1-800-572-6501
Issuing Date 25-Jul-2018
Revision Date 25-Jul-2018
Revision Note Initial Release.

General Disclaimer
The information provided on this SDS is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of Safety Data Sheet

The Public Health and Safety Organization

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NSF/ANSI/CAN 61
Drinking Water System Components - Health Effects

NOTE: Unless otherwise indicated for Materials, Certification is only for the Water Contact Material shown in the Listing. Click here for a list of Abbreviations used in these Listings. Click here for the definitions of Water Contact Temperatures denoted in these Listings. Products certified to NSF/ANSI/CAN 61 comply with the health effects criteria in NSF/ANSI/CAN 600.

APAC - Central DBA Arkhola
Sand and Gravel
755 East Millsap Road
Fayetteville, AR 72703
United States
479-785-4271

Facility : Van Buren, AR

Process Media

Trade Designation	Size	Water Contact Temp	Water Contact Material
Gravel			

Filter Gravel	[1]	CLD 23	SLDOX

[1] All sizes and gradations.

Sand

Filter Sand	[1]	CLD 23	SLDOX

[1] All sizes and gradations.

NOTE: Certified for water treatment plant applications.
This product has not been evaluated for point of use applications.

Number of matching Manufacturers is 1

Number of matching Products is 2

Processing time was 0 seconds

SAFETY DATA SHEET

1. Identification

Product identifier **Sand and Gravel**

Other means of identification

Synonyms To be completed by company based on specific products being marketed.

Recommended use Sand and Gravel aggregate may be used in the manufacture of bricks, mortar, cement, concrete, plasters, paving materials, and other construction materials. Sand and Gravel aggregate may be distributed in bags, totes, and bulk shipments.

Recommended restrictions None known.

Manufacturer/Importer/Supplier/Distributor information

Company Oldcastle Materials
Name APAC-Central Inc.
Address P.O. Box 9208, Fayetteville, AR 72703
Telephone 479-587-3300
Website www.apaccentralinc.com
Emergency Contact CHEMTREC
Emergency phone number 1-800-424-9300

2. Hazard(s) identification

Physical hazards Not classified.

Health Hazards

Carcinogenicity	Category 1A
Specific Target Organ Toxicity, Repeated Exposure	Category 2

OSHA defined hazards Not classified.

Label elements

Signal word Danger

Hazard statement May cause cancer. May cause damage to organs (lung) through prolonged or repeated exposure.

Precautionary statement

Prevention Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves/protective clothing/eye protection/face protection.

Response If exposed or concerned: Get medical advice/attention.

Storage Restrict or control access to stockpile areas. Engulfment hazard: To prevent burial or suffocation, do not enter a confined space, such as a silo, bulk truck or other storage container or vessel that stores or contains aggregates without an effective procedure for assuring safety.

Disposal Dispose of contents/container in accordance with local/regional/national/international regulations.

Hazard(s) not otherwise classified (HNOC) None known.

Supplemental information

Respirable Crystalline Silica (RCS) may cause cancer. Sand and Gravel is a naturally occurring mineral complex that contains varying quantities of quartz (crystalline silica). In its natural bulk state, sand and gravel is not a known health hazard. Sand and Gravel may be subjected to various natural or mechanical forces that produce small particles (dust) which may contain respirable crystalline silica (particles less than 10 micrometers in aerodynamic diameter). Repeated inhalation of respirable crystalline silica (quartz) may cause lung cancer according to IARC and NTP; ACGIH states that it is a suspected cause of cancer. Other forms of RCS (e.g., tridymite and cristobalite) may also be present or formed under certain industrial processes.

3. Composition/information on ingredients

Mixtures

Chemical name	CAS number	%
Sand and Gravel	None	> 99
Crystalline Silica(Quartz)	14808-60-7	> 1

4. First-aid measures

Inhalation	Sand and Gravel dust: Move to fresh air. Call a physician if symptoms develop or persist.
Skin contact	Sand and Gravel dust: Wash off with soap and water. Get medical attention if irritation develops and persists.
Eye contact	Sand and Gravel dust: Immediately flush with plenty of water for at least 15 minutes. Hold eyelids apart. Occasionally lift the eyelid(s) to ensure thorough rinsing. Beyond flushing, do not attempt to remove material from the eye(s). Get medical attention if irritation develops or persists.
Ingestion	Sand and Gravel dust: Rinse mouth and drink plenty of water. Never give anything by mouth to an unconscious person. Get medical attention.
Most important symptoms/effects, acute and delayed	Inhaling dust may cause discomfort in the chest, shortness of breath, and coughing. Prolonged inhalation may cause chronic health effects. This product contains crystalline silica. Prolonged or repeated inhalation of respirable crystalline silica liberated from this product can cause silicosis, and may cause cancer.
Indication of immediate medical attention and special treatment needed	Provide general supportive measures and treat symptomatically. Keep victim under observation. Symptoms may be delayed.
General information	Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Pre-existing medical conditions that may be aggravated by exposure include disorders of the eye, skin and lung (including asthma and other breathing disorders). If addicted to tobacco, smoking will impair the ability of the lungs to clear themselves of dust.

5. Fire-fighting measures

Suitable extinguishing media	Sand and Gravel is not flammable. Use fire-extinguishing media appropriate for surrounding materials.
Unsuitable extinguishing media	None known.
Specific hazards arising from the chemical	No unusual fire or explosion hazards noted. Not a combustible dust.
Special protective equipment and precautions for firefighters	Use protective equipment appropriate for surrounding materials.
Fire fighting equipment/instructions	No specific precautions.
Specific methods	Contact with powerful oxidizing agents may cause fire and/or explosions (see section 10 of SDS).
General fire hazards	No unusual fire or explosion hazards noted.

6. Accidental release measures

Personal precautions, and emergency procedures	Wear appropriate protective equipment and clothing during clean-up of materials that contain or may liberate sand and gravel dust.
Methods and materials for containment and cleaning up	Spilled material, where dust is generated, may overexpose cleanup personnel to respirable crystalline silica-containing dust. Do not dry sweep or use compressed air for clean-up. Wetting of spilled material and/or use of respiratory protective equipment may be necessary.
Environmental precautions	Avoid discharge of fine particulate matter into drains or water courses.

7. Handling and storage

Precautions for safe handling	Do not handle until all safety precautions have been read and understood. Keep formation of airborne dusts to a minimum. Provide appropriate exhaust ventilation at places where dust is formed. Do not breathe dust. Avoid prolonged exposure. Provide adequate ventilation. Wear appropriate personal protective equipment. Observe good industrial hygiene practices.
Conditions for safe storage,	Avoid dust formation or accumulation.

8. Exposure controls/personal protection

Occupational exposure limits 1 – Value equivalent to OSHA formulas (29 CFR 1910.1000, 29 CFR 1917, 29 CFR 1918).

2 – Value also applies to MSHA Metal / Non-Metal (1973 TLVs at 30 CFR 56/57.5001).
3 – OSHA enforces 0.250 mg/m^3 in construction and shipyards (CPL-03-00-007).
4 – Value also applies to OSHA construction (29 CFR 1926.55, Appendix A) and shipyards (29 CFR 1915.1000, Table Z).
5 – MSHA limit = 10 mg/m^3.

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value	Form
Particulates not otherwise classified (CAS SEQ250)	PEL	5 mg/m3 15mg/m3	Respirable fraction. Total dust.

US. OSHA Table Z-3 (29 CFR 1910.1000)

Components	Type	Value	Form
Crystalline Silica (Quartz) (CAS 14808-60-7)	TWA	0.3 mg/m3 0.1 mg/m3 2.4 mppcf	Total dust. 1,2 Respirable. 1,2,3 Respirable. 1,3,4
Particulates not otherwise classified (CAS SEQ250)	TWA	5 mg/m3 15 mg/m3 50 mppcf 15 mppcf	Respirable fraction. 1 Total dust. 1,4,5 Total dust. 1,4 Respirable fraction. 1
Tridymite and Cristobalite (other forms of crystalline silica) (CAS Mixture)	TWA	0.15 mg/m3 0.05 mg/m3 1.2 mppcf	Total dust. 1 Respirable. 1,2 Respirable. 1

US. ACGIH Threshold Limit Values®

Components	Type	Value	Form
Crystalline Silica (CAS 14808-60-7)	TWA	0.025 mg/m3	Respirable fraction.
Tridymite and Cristobalite (other forms of crystalline silica) (CAS Mixture)	TWA	0.025 mg/m3 10 mg/m3	Respirable fraction.

US. NIOSH: Pocket Guide to Chemical Hazards

Components	Type	Value	Form
Crystalline Silica (CAS 14808-60-7)	TWA	0.05 mg/m3	Respirable dust.

Biological limit values No biological exposure limits noted for the ingredient(s).

Exposure guidelines OSHA PELs, MSHA PELs, and ACGIH TLVs are 8-hr TWA values. NIOSH RELs are for TWA exposures up to 10-hr/day and 40-hr/wk. Occupational exposure to nuisance dust (total and respirable) and respirable crystalline silica should be monitored and controlled. Terms including “Particulates Not Otherwise Classified,” “Particulates Not Otherwise Regulated,” “Particulates Not Otherwise Specified,” and “inert or Nuisance Dust” are often used interchangeably; however, the user should review each agency’s terminology for differences in meanings.

Appropriate engineering controls Good general ventilation (typically 10 air changes per hour indoors) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

Individual protection measures, such as personal protective equipment

Eye/face protection Wear safety glasses with side shields (or goggles).

Skin protection

Hand protection Use personal protective equipment as required.

Other Use personal protective equipment as required.

Respiratory protection When handling or performing work with sand and gravel that produces dust or respirable crystalline silica in excess of applicable exposure limits, wear a NIOSH-approved respirator that is properly fitted and is in good condition. Respirators must be used in accordance with all applicable workplace regulations.

Thermal hazards Not anticipated. Wear appropriate thermal protective clothing, when necessary.

General hygiene considerations	Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and chemical properties

Appearance	
Physical state	Solid.
Form	Solid, particles.
Color	To be completed by company.
Odor	Not applicable.
Odor threshold	Not applicable.
pH	To be completed by company.
Melting point/freezing point	Not applicable.
Initial boiling point and boiling range	Not applicable.
Flash point	Non-combustible
Evaporation rate	Not applicable.
Flammability (solid, gas)	Not applicable.
Upper/lower flammability or explosive limits	
Flammability limit – lower (%)	Not applicable.
Flammability limit – upper (%)	Not applicable.
Vapor pressure	Not applicable.
Vapor density	Not applicable.
Relative density	To be completed by company.
Solubility(ies)	
Solubility (water)	Insoluble
Partition coefficient (n-octanol/water)	Not applicable.
Auto-ignition temperature	Not applicable.
Decomposition temperature	Not applicable.
Viscosity	Not applicable.
Other information	
Explosive properties	Not applicable.
Flammability	Not applicable.

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
Chemical stability	Material is stable under normal conditions.
Possibility of hazardous reactions	No dangerous reaction known under conditions of normal use.

11. Toxicological information

Information on likely routes of exposure

Inhalation	Repeated inhalation of respirable crystalline silica (quartz) may cause silicosis, a fibrosis (scarring) of the lungs. Silicosis is irreversible and may be fatal. Silicosis increases the risk of contracting pulmonary tuberculosis. Some studies suggest that repeated inhalation of respirable crystalline silica may cause other adverse health effects including lung and kidney cancer.
Skin contact	Sand and Gravel dust: May cause irritation through mechanical abrasion.
Eye contact	Sand and Gravel dust: May cause irritation through mechanical abrasion.
Ingestion	Not likely, due to the form of the product. However, accidental ingestion of the content may cause discomfort.
Symptoms related to the physical, chemical and toxicological characteristics	Sand and Gravel dust: Discomfort in the chest. Shortness of breath. Coughing.

Information on toxicological effects

Acute toxicity	Not expected to be acutely toxic.
Skin corrosion/irritation	This product is not expected to be a skin hazard.
Serious eye damage/eye irritation	Direct contact with eyes may cause temporary irritation.
Respiratory or skin sensitization	
Respiratory sensitization	No respiratory sensitizing effects known.
Skin sensitization	Not known to be a dermal irritant or sensitizer.
Germ cell mutagenicity	No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.
Carcinogenicity	Respirable crystalline silica has been classified by IARC and NTP as a known human carcinogen, and classified by ACGIH as a suspected human carcinogen.

IARC Monographs. Overall Evaluation of Carcinogenicity

Crystalline Silica(Quartz) (CAS 14808-60-7)	1 Carcinogenic to humans.
Respirable Tridymite and Cristobalite (other forms of Crystalline) (CAS Mixture)	1 Carcinogenic to humans.

NTP Report on Carcinogens

Crystalline Silica(Quartz) (CAS 14808-60-7)	Known To Be Human Carcinogen.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

Reproductive toxicity	Not expected to be a reproductive hazard.
Specific target organ toxicity - single exposure	Not classified.
Specific target organ toxicity – repeated exposure	Respirable crystalline silica: May cause damage to organs (lung) through prolonged or repeated exposure.
Aspiration hazard	Due to the physical form of the product it is not an aspiration hazard.
Chronic effects	Prolonged inhalation of respirable crystalline silica may be harmful. May cause damage to organs (lungs) through prolonged or repeated exposure. There are reports in the literature suggesting that excessive crystalline silica exposure may be associated with autoimmune disorders and other adverse health effects involving the kidney. In particular, the incidence of scleroderma (thickening of the skin caused by swelling and thickening of fibrous tissue) appears to be higher in silicotic individuals. To date, the evidence does not conclusively determine a causal relationship between silica exposure and these adverse health effects.

12. Ecological information

Ecotoxicity	Not expected to be harmful to aquatic organisms. Discharging sand and gravel dust and fines into waters may increase total suspended particulate (TSP) levels that can be harmful to certain aquatic organisms.
Persistence and degradability	Not applicable.
Bioaccumulative potential	Not applicable.
Mobility in soil	Not applicable.
Other adverse effects	No other adverse environmental effects (e.g., ozone depletion, photochemical ozone creation potential, global warming potential) are expected from this component.

13. Disposal considerations

Disposal instructions	Do not allow fine particulate matter to drain into sewers/water supplies. Do not contaminate ponds, waterways or ditches with fine particulates. Dispose of contents in accordance with local/regional/national/international regulations.
Hazardous waste code	Not regulated.
Waste from residues / unused products	Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).
Contaminated packaging	Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty packaging materials should be recycled or disposed of in accordance with applicable regulations and practices.

14. Transport information

DOT

Not regulated as dangerous goods.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

Not applicable.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

15. Regulatory information

US federal regulations This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

CERCLA Hazardous Substance List (40 CFR 302.4)

Not listed.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories Immediate Hazard - No
Delayed Hazard - Yes
Fire Hazard - No
Pressure Hazard - No
Reactivity Hazard - No

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical Yes

SARA 313 (TRI reporting)

Not regulated.

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA) Not regulated.

US state regulations

US. Massachusetts RTK - Substance List

Crystalline Silica(Quartz) (CAS 14808-60-7)
Respirable Tridymite and Cristobalite (other forms of crystalline silica) (CAS Mixture)

US. New Jersey Worker and Community Right-to-Know Act

Crystalline Silica(Quartz) (CAS 14808-60-7)

Respirable Tridymite and Cristobalite (other forms of crystalline silica) (CAS Mixture)

US. Pennsylvania Worker and Community Right-to-Know Law

Crystalline Silica(Quartz) (CAS 14808-60-7)
Respirable Tridymite and Cristobalite (other forms of crystalline silica) (CAS Mixture)

US. Rhode Island RTK

Not regulated.

US. California Proposition 65

WARNING: This product contains a chemical known to the State of California to cause cancer.

US - California Proposition 65 - Carcinogens & Reproductive Toxicity (CRT): Listed substance

Crystalline Silica(Quartz) (CAS 14808-60-7)

International Inventories

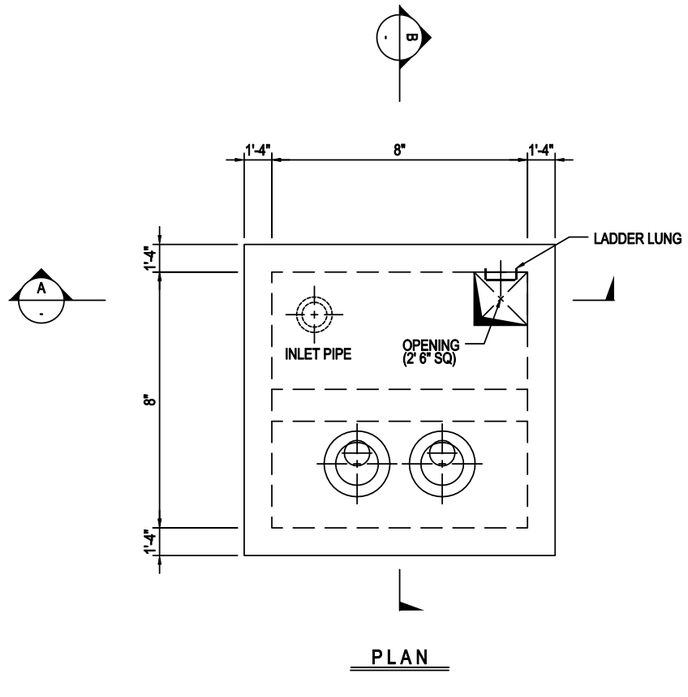
Country(s) or region	Inventory name	On inventory (yes/no)*
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates this product complies with the inventory requirements administered by the governing country(s).
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

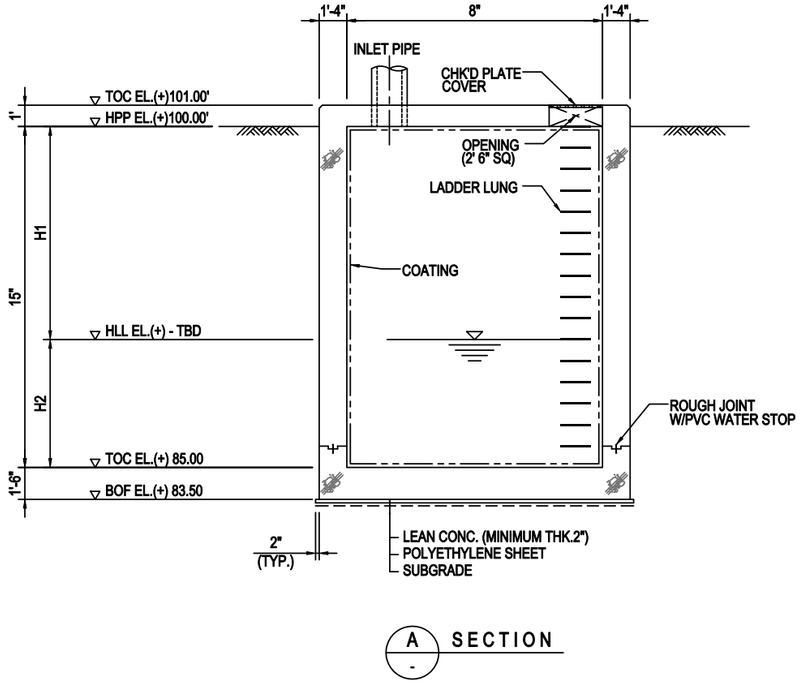
16. Other information, including date of preparation or last revision

Issue date 06-04-2015

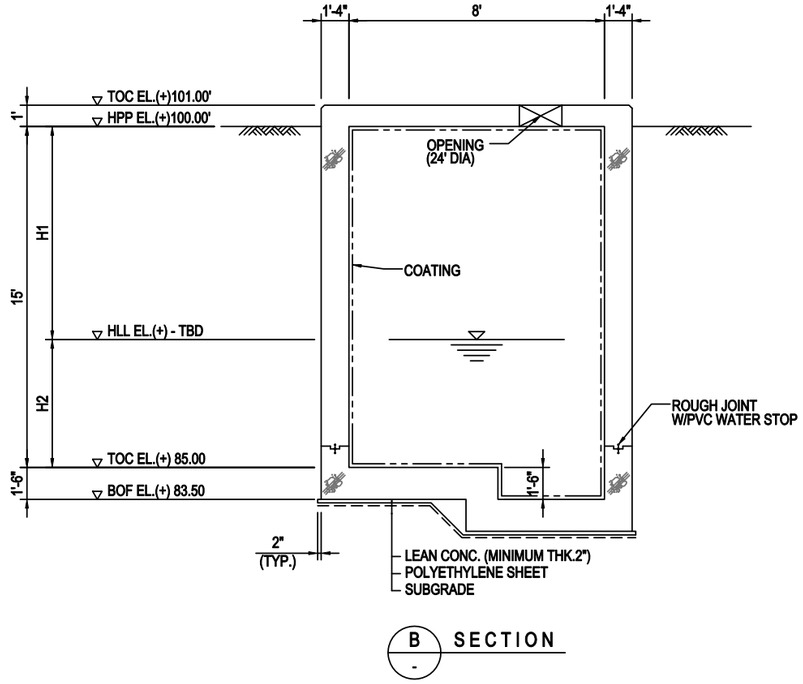
Version # **1**



PLAN



A - SECTION



B - SECTION

OWS DRAIN PIT

The Public Health and Safety Organization

NSF Product and Service Listings

These NSF Official Listings are current as of **Tuesday, August 22, 2023** at 12:15 a.m. Eastern Time. Please contact NSF to confirm the status of any Listing, report errors, or make suggestions.

Alert: NSF is concerned about fraudulent downloading and manipulation of website text. Always confirm this information by clicking on the below link for the most accurate information:
http://info.nsf.org/Certified/PwsComponents/Listings.asp?Company=C0349754&Standard=061&

NSF/ANSI/CAN 61
Drinking Water System Components - Health Effects

NOTE: Unless otherwise indicated for Materials, Certification is only for the Water Contact Material shown in the Listing. Click here for a list of Abbreviations used in these Listings. Click here for the definitions of Water Contact Temperatures denoted in these Listings. Products certified to NSF/ANSI/CAN 61 comply with the health effects criteria in NSF/ANSI/CAN 600.

Superior Tank Co., Inc.
9500 Lucas Ranch Road
Rancho Cucamonga, CA 91730
United States
909-912-0580
Visit this company's website
(http://www.superiortank.com)

Facility : Rancho Cucamonga, CA

Protective (Barrier) Materials

Trade Designation	Water Contact Size Restriction	Water Contact Temp	Water Contact Material
Tanks[1] [G]			
Factory Powder Coated Bolted Steel Storage Tanks and Components	14,309-5,884,000 gal	D. HOT	MLTPL

[1] Listed Storage Tanks/Reservoirs include NSF certified and Tested Factory Powder Coated accessories, polyurethane sealer, Polylac bolt coverings, Noryl nut coverings, EPDM strip and chime lap gaskets Interiors and floors are composed of epoxy coated carbon steel interior with epoxy coated floor with NSF Certified coating. All NSF Certified coatings must be Listed for tanks at least 14,309 gallons, and application must occur according to Certified specifications.

[G] Product is Certified to NSF/ANSI 372 and conforms with the lead content requirements for “lead free” plumbing as defined by California, Vermont, Maryland, and Louisiana state laws and the U.S. Safe Drinking Water Act.

Number of matching Manufacturers is 1

Number of matching Products is 1

Processing time was 0 seconds

Highland Tank | count on our products. trust in our people.

asme pressure vessels

chlorine contact tanks

HT-1121

PRODUCT DETAILS

Chlorine Contact Tanks (CCT) are typically used with chlorine injection equipment in a well water system to help comply with strict drinking water standards. This process vessel is designed to achieve sufficient contact time between the injected chlorine and the water that needs disinfection.

Chlorination is the most common disinfection method for public and private drinking water systems. This disinfection process is necessary to kill disease-causing bacteria in the water. In order to be sure the added chlorine is killing the bacteria, the water must have sufficient contact time with the injected chlorine for proper disinfection.

CCT have an inlet on one end and an outlet on the opposite end. The water flows through a series of internal mixing baffles and perforated high efficiency mixing baffles to lengthen the contact time water has with the injected chlorine before it leaves the vessel.

Highland Tank manufactures two models of CCT. Sizing for CCT is related to the flow rate and tank efficiency. Highland Tank's CCT are lined with maintenance-free, non-contaminating epoxy or polyurethane lining, approved by NSF as suitable for the storage of potable water.

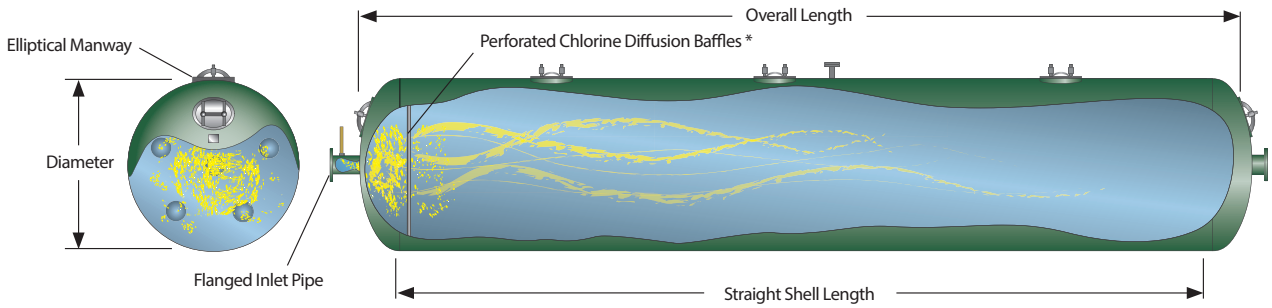
Premium ASME Pressure Vessels

from the Industry Leader

chlorine contact tank sizing guide

HT-1121

Superior Performance CCT



*Perforated Diffusion Baffles as Required

Volume Gallons	Straight Shell Dimensions Diameter	Length	Approximate Overall Length
*1,500	4'-0"	15'-6"	17'-9"
*2,000	4'-0"	21'-0"	23'-3"
*2,000	4'-6"	16'-0"	18'-6"
3,000	4'-0"	32'-0"	34'-3"
3,000	4'-6"	24'-6"	27'-0"
3,000	5'-0"	20'-0"	22'-9"
4,000	5'-0"	28'-0"	30'-9"
4,000	6'-0"	18'-0"	21'-3"
5,000	6'-0"	24'-0"	27'-3"
5,000	7'-0"	16'-0"	19'-9"
6,000	6'-0"	28'-0"	31'-3"
6,000	7'-0"	20'-0"	23'-9"
7,000	7'-0"	24'-0"	27'-9"

Volume Gallons	Straight Shell Dimensions Diameter	Length	Approximate Overall Length
7,500	7'-0"	25'-0"	28'-9"
7,500	8'-0"	18'-6"	22'-9"
8,000	7'-0"	27'-0"	30'-9"
8,000	8'-0"	20'-0"	24'-3"
9,000	7'-0"	30'-0"	33'-9"
9,000	8'-0"	22'-2"	26'-5"
10,000	8'-0"	25'-0"	29'-3"
12,000	8'-0"	31'-0"	35'-3"
15,000	8'-0"	40'-0"	44'-3"
20,000	10'-0"	32'-0"	37'-3"
25,000	10'-6"	38'-0"	43'-6"
30,000	10'-6"	44'-0"	49'-6"

*Only available as Standard model CCT.

Notes:

1. Tanks are built in accordance with the latest edition of the ASME Unfired Pressure Vessel Code. All ASME vessels are welded, tested and inspected per ASME Code requirements and the stamped name plate.
2. Thicknesses are calculated per ASME Section VIII, Division I – UG 27.
3. Fitting details/locations are typical.
4. 11"X 15" elliptical manway is typical for an inspection opening. All lined vessels require a 12"X 16" minimum elliptical manway.
5. Tanks with different/larger volumes, dimensions and pressures are available upon request.
6. ASME stamped vessels are required in most states. Where applicable, non-code hydropneumatic tanks are available upon request.

Highland Tank

Stoystown, PA
One Highland Road
Stoystown, PA 15563-0338
814.893.5701

Manheim, PA
4535 Elizabethtown Road
Manheim, PA 17545-9410
717.664.0600

Watervliet, NY
958 19th Street
Watervliet, NY 12189-1752
518.273.0801

Greensboro, NC
2700 Patterson Street
Greensboro, NC 27407-2317
336.218.0801

Friedens, PA
1510 Stoystown Road
Friedens, PA 15541-7402
814.443.6800

Clarkston, MI
4701 White Lake Road
Clarkston, MI 48346-2554
248.625.8700

Mancelona, MI
9517 Lake Street
Mancelona, MI 49659-7968
231.587.8412

PROUDLY MADE IN AMERICA

© Highland Tank - HT-1121 - 01/2019

704-X-010
GREEN SAND FILTER PACKAGE

DESIGN CAPACITY, gpm	30

704-M-002
POTABLE WATER STATIC MIXER

DESIGN CAPACITY, gpm	30
DESIGN PRESSURE, psig	130
DESIGN TEMPERATURE, °F	170 / -13
INSULATION	ET

704-T-004
POTABLE WATER TANK

SIZE, ft-in (I.D. x TL-TL)	15' x 15'
NOMINAL CAPACITY, ft3	2650 (19820 gal)
DESIGN PRESSURE, psig	FULL OF WATER / -0.07
DESIGN TEMPERATURE, °F	170 / -13
INSULATION	HC

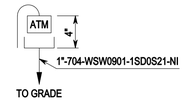
704-EH-001
POTABLE WATER HEATER

DESIGN PRESSURE, psig	50
DESIGN TEMPERATURE, °F	170 / -13
DESIGN DUTY, MMBtu/hr	0.3

NOTES
30. SAMPLE POINT TO BE LOCATED AT LEAST 6 INCHES ABOVE GROUND LEVEL.
31. LT, TG, LG, ELECTRIC HEATER, EDUCTOR, INLET/OUTLET PIPING AND TANK ITSELF SHALL BE PROVIDED CERTIFIED ANSI/NSF 61.
32. OVERFLOW OUTLET TO BE LOCATED 12 – 24 INCHES ABOVE GROUND SURFACE.
33. AIR GAP TO BE PROVIDED BETWEEN END OF PIPE AND TOP OF WATER LEVEL IN DRAIN PIT.
34. LLL: PUMP LOW LEVEL ALARM
LLLL: PUMP TRIP

GENERAL NOTES
A. SEE DRAWING NO. PTCMF-2704-PR-1501 FOR GENERAL NOTES.

NOTES
1. ALL LINE SIZES TO BE CONFIRMED DURING DETAIL ENGINEERING STAGE.
2. EDUCTOR FOR ADEQUATE MIXING TO BE PROVIDED BY TANK MANUFATURER.
3. CONNECTION FOR TANK FILLING TO BE PROVIDED.
4. TRAY SUPPORT TO BE PROVIDED.



5. FOR DISINFECTION. CHEMICAL DOSING PUMPS START ON MV>2.0 AND STOP ON MV<0.5. PUMP
6. LOCAL INDICATOR AND WARNING ALARM FOR LOW LEVEL (HORN AND BEACON HEACON) SHALL BE PROVIDED.
7. SPLASH PROTECTION FOR OVERFLOW PIPE LINE TO BE PROVIDED AND OVERFLOW PIPE OUTLET SHALL BE POSITIONED TO ENSURE THAT ANY DISCHARGE FROM THE OVERFLOW PIPE IS VISIBLE.
8. CONNECTION TO BE PROVIDED TO SAMPLE POTABLE WATER DIRECTLY FROM THE TANK.
9. TRUCK CONNECTION SIZE AND TYPE TO BE CONFIRMED WITH TRUCK SUPPLIER.
10. FILTER BACKWASH WATER TO BE ROUTED TO OWS SUMP BY GRAVITY.
11. LOCAL LEVEL INDICATION TO BE READABLE AT GRADE.
12. FOR SAMPLING STATION DETAILS, REFER TO P&ID, PTCMF-2901-PR-0509.
13. FOR MOTOR DETAILS REFER TO P&ID, PTCMF-2901-PR-0511.
14. CHEMICAL DOSING PUMP STROKE TO BE ADJUSTED MANNUALLY ACCORDING TO RESIDUAL CHLORNIE CONCENTRATION AS MEASURED BY AI-001.
15. EMERGENCY POWER SUPPLY TO BE PROVIDED.
16. EDUCTOR TO BE SUBMERGED LOW LIQUID LEVEL.
17. DELETED.
18. CHLORINE CONTACT TANK TO BE PROVIDED BY 704-X-010 PACKAGE VENDOR. MINIMUM WORKING VOLUME OF THE TANK IS 870 GALLONS, WHICH IS PROVIDED CONTACT TIME OF AT LEAST CHLORINE 20 MINUTES.
19. LOCAL INDICATOR AND FIELD INSTRUMENT TO BE PROVIDED FOR MANUAL OPERATION DURING PHASE 1.
20. VISIBLE AT GRADE.
21. DELETED.
22. SAMPLE CONNECTION IS ENTRY POINT MONITORING LOCATION.
23. CHLORNIE CONTACT TANK WITH FIVE (5) INTERNAL BAFFLE TO BE PROVIDED TO HAVE CHLORINE CONTACT TIME.
24. DELETED
25. HYDROPNEUMATIC TANK IS PROVIDED TO LOWER THE ENERGY CONSUMPTION OF THE BOOSTER DURING LOW-FLOW SITUATIONS BY ALLOWING THE WATER TO BE DRAWN FROM THE TANK INSTEAD OF TURNING ON A PUMP TO MEET THE LOW DEMAND.
26. INTERNAL BAFFLE (DEFLECTOR) AT OUTLET TO BE PROVIDED.
27. PACKAGE SECUENCE TO BE CONTROLLED THROUGH LOCAL CONTROL PANEL. SEQUENCE START/ STOP SHALL BE INITIATED BY LCP AND DCS.
28. PUMPS START/ STOP TO BE CONTROLLED THROUGH LOCAL CONTROL PANEL TO MAINTAIN ON-DEMAND PRESSSURED POTABLE WATER. POTABLE WATER SUPPLY PRESSURE TO BE ADJUSTED THROUGH LCP.
29. HYDROPNEUMATIC TANK AND LCP TO BE PROVIDED BY PUMP VENDOR.

HOLDS
1. DELETED.
2. FILTER DETAILS AND CONTROL TO BE DETERMINED LATER ACCORDING TO VENDOR INFORMATION.
3. SIZE TO BE CONFIRMED ACCORDING TO VENDOR INFORMATION.
4. FLOW INSTRUMENT SELECTION TO BE CONFIRMED LATER.
5. NUMBER OF BOOSTER PUMPS TO BE CONFIRMED BY VENDOR.

DOCUMENT STATUS:

CATEGORY	ISSUE PURPOSE	OWNER'S RESPONSE CODE
1	IFR	☐ R1 – APPROVED ☐ R2 – APPROVED WITH COMMENTS ☐ R3 – REVIEWED WITH COMMENTS
	IFD	–
2	IFI	–

REV.	DATE	DESCRIPTION	PRPD.	CHKD.	APPRD.
0	20 JAN 2023	ISSUED FOR DESIGN	J.S.KWON	J.S.KWON	S.T.SHIM
A	11 NOV 2022	ISSUED FOR REVIEW	J.S.KWON	J.S.KWON	S.T.SHIM

OWNER :

CONTRACTOR : HYUNDAI ENGINEERING CO. LTD.

PROJECT NAME :
ENCINA POINT TOWNSHIP CIRCULAR MANUFACTURING FACILITY

TITLE : PIPING AND INSTRUMENTATION DIAGRAM
POTABLE WATER TANK

DWG. NO. : PTCMF-2704-PR-1509		SHT. NO. :	01 OF 01
SCALE : NONE	UNIT NO. : 704	REV. :	0

704-P-005A/B
POTABLE WATER PUMPS

RATED FLOW RATE, gpm	85
RATED DIFF. PRESSURE, psi	69.4
RATED DRIVER POWER, Hp	-
INSULATION	ET

Document Title: **PROCESS EQUIPMENT DATA SHEET FOR GREEN SAND FILTER PACKAGE (704-X-010)**

Document No.: **PTCMF-2704-PR-1360**

Client: **Encina Development Group, LLC**

Project Name: **Encina Point Township Circular Manufacturing Facility**

DOCUMENT STATUS:

CATEGORY	ISSUE PURPOSE	OWNER'S RESPONSE CODE
1	IFR	☐ R1- APPROVED ☐ R2 - APPROVED WITH COMMENTS ☐ R3 - REVIEWED WITH COMMENTS
	IFD	-
2	IFI	-

0	24 Feb. 23	ISSUED FOR DESIGN	J.S.KWON	J.S.KWON	S.T.SHIM
REV.	DATE	DESCRIPTION	PREPARED	CHECKED	APPROVED

REVISION LOG

REV. NO.	REV. DATE	REVISED PAGE	REVISION DESCRIPTION
0	24 Feb. 23	-	ISSUED FOR DESIGN

Table of Contents

1. GENERAL

1.1. Scope of the document

This Duty Specification covers the minimum requirements for the process design and supply of the Multimedia Filters Package to be installed inside the Raw Water Treatment Unit 704 of the Encina Point Township Circular Manufacturing Facility Phase 2.

Design shall be made to reach the following objectives:

- Ensure produced quantity and treated water quality
- Minimize the energy consumption and the operating cost
- Ensure the reliability of the overall treatment line, for the required plant lifetime
- Ensure a safe and easy operation and maintenance

1.2. Definitions/Acronym

AMB	Ambient
DCS	Distributed Control System
LCP	Local Control Panel
Mfr	Manufacturer

2. PROCESS DESCRIPTION

Green Sand Filter Package (704-X-010) is designed to produce an average net amount of 30 gpm of potable water. Preliminarily 2 x 100 % filters (one filter spare) are required with a nominal filtration rate (to be confirmed by Mfr during detailed engineering).

The potable well water is pumped through Green Sand Filter Package where remove iron and manganese to Chlorine Contact Tank (by Mfr.). Chlorine Contact Tank is designed to have more than 5 baffle to increase their efficiency for chlorination contact. Chlorine mixed potable water is collected to Potable Water Tank (704-T-004).

Green Sand filters are washed on a counter current basis by the potable water. Water from filter back washing is routed OWS sump and then collected backwash water is periodically disposed by vacuum truck.

Green Sand filters are automatically backwashed, one at time, based on high differential pressure across filters or based on totalized water volume.

The backwashing operation will be done by backwash water pump, provided by Mfr. (Requirement of backwash pumps to be confirmed during detailed engineering by Mfr. Information.)

Chlorine is dosed at upstream of the filter as possible to insure adequate contact time. A free chlorine residual carried through the filter will maintain Green Sand Filters in a continuously regenerated condition. (Regeneration method to be confirmed during detailed engineering by Mfr. Information.)

2.1. Design Basis

Green Sand Filter Package shall be designed considering the following design basis:

- N° of Filters — 2 (2 x 100%) (1)
- Filters Type — Green Sand-media filters
- Filters Back-Washing Water Quality — Potable Water (2)
- Filters Design Capacity (total average gross inlet) — 30 gpm (1,5)
- Filters Back-Wash Water flow — ≤ Two times Design Capacity each filter
- Iron Conc. at Inlet — 0.8mg/l
- Manganese Conc. at Inlet — 0.3mg/l
- Product water quality — < 0.3 mg/L of Iron; < 0.05mg/L of Manganese
- Operating Temperature at Inlet — AMB (4)
- Maximum Allowable Pressure Drop — 28 psi
- Working Time — 24 h between two consecutive back-washing operation (3)
- Maximum Backwash water — 5% of design capacity (3)
- Filling Media — Green Sand
- N° of Chlorine Contact Tank — 1 (1 x 100%)
- Chlorine Contact Tank Type — Rectangular
- Chlorine Contact Tank working volume — min. 870 gallons

(1) Number of filters and design capacity of each filter to be confirmed by Manufacturer. When one filter will be in backwash, the others will be able to run at 100% of capacity, to produce the required filtered water flowrate.
(2) Effluent water from package will be used as backwash water.
(3) MFR to confirm.
(4) Minimum Operating Feed Temperature is 33.8°F.
(5) Net Filtered Water capacity. Vendor to add additional water to cover backwash water losses.

2.2. Battery Limit Condition

The following table shows the battery limit connections and conditions between the Package and the external supply piping system. Process conditions are to be considered preliminary by Manufacturer.

	Size	Number of Connection	Operating pressure	Operating temperature	Design Pressure	Design Temperature
Feed Water Inlet	2”	1	65 psig (1)	AMB	130 psig	32/170°F
Potable Water Outlet	2”	1	50 psig (1)	AMB	130 psig (1)	32/170°F

Backwash Water Inlet	1" (1)	1	35 psig (1)	AMB	150 psig (1)	32/170°F
Backwash Water Outlet	1" (1)	1	7 psig (1)	AMB	150 psig (1)	32/170°F

(1) Preliminary. To be confirmed by Vendor.

Connections are not limited to the above indicated. MFR to indicate additional connection for utilities and chemicals.

3. PACKAGE INSTRUMENTATION AND CONTROL

Package operation sequence and interlocks shall be controlled by Local Control Panel (LCP). Status indication, Annunciator, Monitoring systems shall interface with DCS. To improve the operating flexibility Vendor shall provide panel which located at field for open/close and start/stop operation.

Each filter will be equipped with on/off valves to isolate and allow automatic backwash operation. Backwash will be activated based on totalized flow overridden by high pressure drop. Backwash water will be under flow control.

Flow measurement shall be provided at inlet of each filter; signal will be used to cut inlet flow to the Package to limit maximum flow to each filter.

Package Vendor to provide Logic & Sequence block diagram to implement the automatic back wash sequence in DCS.

4. UTILITY AND SITE CONDITIONS

The package will be installed outside.

4.1. Site Data

For Site Data conditions refer to Basic Engineering Design Data, PTCMF-2901-PR-0001.

4.2. Utilities Characteristics

For Utilities Characteristics refer to Basic Engineering Design Data, PTCMF-2901-PR-0001.

4.3. Area Classification

Preliminary Hazardous area classification: Safe Area.

5. SCOPE OF WORKS

5.1. Scope of Supply

The Green Sand Filter Package (704-X-010) shall include, but not necessarily be limited to, the components described here below:

- Filters vessels, (n° 2), complete with green sand packing (1)

- Filters internal distributors
- Backwash Pumps (1 operating +1 spare) for filters backwash (2)
- Chlorine Contact Tank, (n° 1), with 5 baffles (Refer to attachment 1, Chlorine Contact Tank Data Sheet.)
- Isolation valves for each filter, to isolate and allow backwash operation
- Instrumentation: all instruments necessary for the good and safe operation of the package are part of the Mfr scope of design and supply
- One local free standing panel for field manual operation

(1) Number of filters shall be confirmed and optimized by Vendor considering minimum, normal and design case indicated in Section 3.1

(2) Possibility to additional use Plant Air for filter backwash to be evaluated by Vendor.

The Package shall be as much as possible pre-assembled on skids, and shall be supplied with all equipment, piping, valves and associated wiring, tubing, terminal flanges.

Vendor is responsible for checking and advising about any component, even if not indicated herein which is considered necessary for the proper package operation.

Design shall be made to minimise the energy consumption and the operating cost.

The package shall include all equipment required for safe and reliable operation, including, but not limited to, instrumentation, controls and interlocks, piping and safety devices, as far as feasible preassembled.

The Manufacturer (Mfr) will submit with the proposal the detailed documentation that clearly defines the whole scope of supply.

5.2. Engineering Data (Deliverable List)

Vendor shall provide, but not necessarily be limited to, all relevant:

- Technical Specification or Datasheet of Equipment
- Deviation/Clarification List
- Experience list/Project Reference List
- Sub-Vendor List
- ITP (Inspection and Test Plan)
- Equipment List
- Instrument List
- Valve List, if required
- Utility Consumption List
- Electrical Load List
- Spare Part List for Erection & Construction
- Spare Part List for Commissioning & 2 year Operation
- Special Tool List

- Process Calculation Sheet
- Chemical Calculation Sheet
- PFD with Material Balance
- P&ID
- Plot Plan
- Control Logic and Schematic of Overall Package
- Scope of Supply and Service Table
- Others, if required

5.3. Material of construction

Material of construction shall be in accordance to Vendor experience. Vendor shall propose the material to be reviewed and approved.

Minimum Design Metal Temperature of piping and equipment is -13°F.

5.4. Process Guarantees

The following performance guarantees shall be provided as minimum by Mfr.

- Achieve 100% of the design flow capacity: net filtered water: 30 gpm
- Removal of Iron and Manganese: < 0.3 mg/L of Iron, < 0.05mg/L of Mn
- Max pressure drop through Package: 14 psi

5.5. Manufacturer Information

Manufacturer shall inform on:

- Utilities Consumption;
- Plot area required;

6. REFERENCE DOCUMENTS

PTCMF-2901-PR-0001	Basic Engineering Design Data
PTCMF-2901-PR-0002	Process Design Criteria
PTCMF-2901-PR-0006	Drainage and Sewer Philosophy
PTCMF-2704-PR-0001	Design Basis for Raw Water Treatment
PTCMF-2704-PR-1101	UFD for Pretreatment System
PTCMF-2704-PR-1102	UFD for Filtered Water System
PTCMF-2704-PR-1103	UFD for Desalinated Water System
PTCMF-2704-PR-1104	UFD for Demineralized Water System
PTCMF-2704-PR-1105	UFD for Thickener Package & Backwash Sump

PTCMF-2704-PR-1106 UFD for Chemical Dosing System

The Public Health and Safety Organization

NSF Product and Service Listings

These NSF Official Listings are current as of **Thursday, July 13, 2023** at 12:15 a.m. Eastern Time. Please contact NSF to confirm the status of any Listing, report errors, or make suggestions.

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NSF/ANSI/CAN 61
Drinking Water System Components - Health Effects

NOTE: Unless otherwise indicated for Materials, Certification is only for the Water Contact Material shown in the Listing. Click here for a list of Abbreviations used in these Listings. Click here for the definitions of Water Contact Temperatures denoted in these Listings. Products certified to NSF/ANSI/CAN 61 comply with the health effects criteria in NSF/ANSI/CAN 600.

Prominent Fluid Controls

136 Industry Drive
Pittsburgh, PA 15275
United States
412-787-2484
Visit this company's website
(http://www.prominent.us)

Facility : Pittsburgh, PA

Mechanical Devices

Trade Designation	Size	Water Contact Temp	Water Contact Material
Chemical Metering Pumps			
Beta (BT4B####PVT$)[1]	1/4"x3/16"-1/2"x3/8"	CLD 23	MLTPL

Beta (BT4BXXXXNPE$)[2]	1/4" - 1/2"	CLD 23	MLTPL
Beta (BT5B####PVT$)[1]	1/4"x3/16"-1/2"x3/8"	CLD 23	MLTPL
Beta (BT5BXXXXNPE$)[2]	1/4" - 1/2"	CLD 23	MLTPL
Concept Plus (CNPAXXXXNPE$)[2]	1/4" - 3/8"	CLD 23	MLTPL
Concept Plus (CNPB####PVT2)[1]	1/4"x3/16-3/8"x1/4"	CLD 23	MLTPL
Concept Plus (CNPBXXXXNPE$)[2]	1/4" - 3/8"	CLD 23	MLTPL
Concept Plus (CNPa####PVT$)[1]	1/4"x3/16"-3/8"x1/4"	CLD 23	MLTPL
DFXA0365[4]	1/2" x 3/8"	CLD 23	MLTPL
DFXA0518[4]	1/2" - 3/8"	CLD 23	MLTPL
DFXA0530[4]	1/2" - 3/8"	CLD 23	MLTPL
DFXA0565[4]	1/2" - 3/8"	CLD 23	MLTPL
DFXA0730[4]	1/2" - 3/8"	CLD 23	MLTPL
Delta (DLTA####PVT2)[1]	1/8"x3/16"-1/2"x1/2"	CLD 23	MLTPL
Delta (DLTAXXXXNPE$)[2]	1/2"	CLD 23	MLTPL
Gamma/L (GALA####PVT$)[1]	1/4"x3/16"-1/2"x3/8"	CLD 23	MLTPL
Gamma/L (GALAXXXXNPE$)[2]	1/4" - 1/2"	CLD 23	MLTPL
Gamma/X (GMXA####PVT2)[1]	1/4"x3/16"-1/2"x3/8"	CLD 23	MLTPL
Gamma/X (GMXA####PVT7)[1]	1/4"x3/16"-1/2"x3/8"	CLD 23	MLTPL
Gamma/X (GMXAXXXXNPE$)[2]	1/2"	CLD 23	MLTPL
Gamma/XL (GXLA####PVT$)[1]	[3]	CLD 23	MLTPL
Gamma/XL (GXLAXXXXNPE$)	[3]	CLD 23	MLTPL
Sigma/1 (S1BaH#####PVT@07)[1]	1/2" - 3/4"	CLD 23	MLTPL
Sigma/1 (S1CbH#####PVT@07)[1]	1/2" - 3/4"	CLD 23	MLTPL
Sigma/2 (S2BaH#####PVT@07)[1]	1/2" - 1"	CLD 23	MLTPL
Sigma/2 (S2CbH#####PVT@07)[1]	1/2" - 1"	CLD 23	MLTPL
Sigma/3 (S3BaH######PVT@07)[1]	1" - 1 1/2"	CLD 23	MLTPL
Sigma/3 (S3CbH######PVT@07)[1]	1" - 1 1/2"	CLD 23	MLTPL

[1] #### - Pump version
Beta - 0220, 0232, 0413, 0420, 0708, 0713, 1000, 1008, 1601, 1602, 1604, 2001, 2002, 2504
Concept Plus - 0215, 0308, 0704, 1000, 1002, 1601, 0309
Delta - 0280, 0450, 0730, 1020, 1608, 1612, 2508
Gamma/L - 0220, 0232, 0413, 0420, 0708, 0713, 1000, 1005, 1008, 1601, 1602, 1605
Gamma/X - 1602, 1604, 0708, 1009, 0414, 0715, 0220, 0424
Gamma/XL - 0280, 0450, 0730, 1020, 1608, 1612
Sigma/1 - 04084, 04120, 07042, 07065, 10022, 10044, 10050, 12017, 12035

Sigma/2 - 04350, 07120, 07220, 16050, 16090, 16130
Sigma/3 - 040830, 070410, 070580, 120145, 120190, 120270

$ - Liquid End Version
0 - No bleed valve, no valve springs
2 - With bleed valve, no valve springs

7 - Self bleeding, with groove

@ - Diaphragm

0 - Standard Diaphragm, PTFE Version (Non-Sigma)

1 - Double Diaphragm with diaphragm rupture indicator (Non-Sigma)

A - Safety Diaphragm with stop function (Sigma only)

S - Safety Diaphragm with visual indicator (Sigma only)

& - Positive Displacement Element

0 - Standard Diaphragm, PTFE Version

1 - With membrane rupture signaling

Any codes not specifically indicated in the trade name or listing notes represent features that do not affect the parts of the pump in contact with the media. Any value(s) are acceptable for these codes.
Certification does NOT include any accessories (foot valve, injection valve and/or tubing). Certification does NOT include the plate valve option for the Sigma/3.

These pumps are approved for use with the following media at the maximum concentrations listed below. These products are evaluated by diluting the exposed water treatment chemical to its maximum use level (MUL), as defined in NSF/ANSI/CAN 60.
ACH Aluminum chlorohydrate (40%)
Aluminum sulfate (50%)
Ammonium hydroxide (29%)
Chlorine dioxide (2.0%)
Ferric chloride (45%)
Fluorosilicic acid (25%)
Hydrochloric acid (33%)
Liquid ammonium Sulfate (40%)
Phosphoric acid (85%)
Polyaluminum chloride (45%)
Potassium permanganate (3%)
Sodium bisulfite (44%)
Sodium chlorite (25%)
Sodium fluoride (4.0%)
Sodium hydroxide (50%)
Sodium hypochlorite (15%)
Sodium permanganate (20%)
Sulfuric acid (98%)
Zinc orthophosphate (100%)

[2] XXXX - Pump version

Beta - 0220, 0232, 0413, 0420, 0708, 0713, 1000, 1008, 1601, 1602, 1604, 2001, 2002, 2504

Concept Plus - 0308, 0215, 0704, 1000, 1002, 1601, 0309

Delta - 1020, 1608, 1612, 2508, 0730

Gamma/L - 232, 420, 713, 1000, 1005, 1008, 1601, 1602, 1605
, 0708, 0413,
0220
Gamma/X - 2504, 1604, 0708, 1009, 0414, 0715, 0220, 0424, 0245, 2002, 1602
Gamma/XL - 0730, 1020, 1608, 1612, 2508

$ - Liquid end version
0 - No bleed valve, no valve springs
2 - With bleed valve, no valve springs

Any codes not specifically indicated in the trade name or listing notes represent features that do not affect the parts of the pump in contact with the media. Any value(s) are acceptable for these codes.

Certification does NOT include any accessories (foot valve, injection valve and/or tubing).
These pumps are Certified for use with the following media at the maximum concentrations listed below. These products are evaluated by diluting the exposed water treatment chemical to its maximum use level (MUL), as defined in NSF/ANSI/CAN 60.
Ammonium hydroxide (29%)
Liquid Ammonium sulfate (40%)
Phosphoric acid (50%)
Polyaluminum chloride (45%)
Potassium permanganate (3%)
Sodium fluoride (4.0%)
Sodium hypochlorite (15%)
Sodium Permanganate (20%)

[3] 3/8" x 1/4" - 1/2" x 3/8", 5/8", 1/2"

[4] Certified for use with the following media at the maximum concentrations listed below. These products are evaluated by diluting the exposed water treatment chemical to its maximum use level (MUL), as defined in NSF/ANSI Standard 60.

TPV hose material:
Aluminum Chloride (50%)
Aluminum Sulfate (50%)
Ammonia, aqueous (35%)
Ammonium Hydroxide (29%)
Ammonium Sulfate (45%)
Calcium carbonate (25%)
Calcium Chloride (30%)
Calcium Hydroxide (10%)
Calcium Hypochlorite (15%)
Copper Sulfate (13%)

Dipotassium Orthophosphate (50%)
Disodium Orthophosphate (50%)
Ferric Chloride (43%)
Ferric Sulfate (5%)
Ferrous Chloride (40%)
Ferrous Sulfate (5%)
Fluorosilicic acid (25%)
Hydrochloric Acid (20%)
Magnesium Sulfate (25%)
Polyaluminum Chloride (45%)
Polyaluminum Chlorosulfate (50%)
Polyaluminum Hydroxychlorosulfate (75%)
Polyaluminum Silicate Sulfate (66%)
Polyaluminum Sulfate (50%)
Potassium Carbonate (47%)
Potassium Chloride (34%)
Potassium hydroxide (10%)
Potassium Permanganate (6%)
Potassium Tripolyphosphate (100%)
Sodium Acid Pyrophosphate (12%)
Sodium Aluminate (50%)
Sodium Ascorbate (60%)
Sodium Bicarbonate (100%)
Sodium Bisulfite (50%)
Sodium Carbonate (7%)
Sodium Chlorate (45%)
Sodium Chloride (20%)
Sodium Chlorite (7.5%)
Sodium Fluoride (3%)
Sodium Hydroxide (40%)
Sodium Hypochlorite (12.2%)
Sodium Metabisulfite (10%)
Sodium Percarbonate (7%)
Sodium Permanganate (6%)
Sodium Polyphosphates (35%)
Sodium Silicate (10%)
Sodium Sulfite (10%)
Sodium Trimetaphosphate (20%)
Sodium Tripolyphosphate (15%)
Tetrasodium Pyrophosphate (7%)
Tricalcium Phosphate (70%)
Zinc Chloride (80%)
Zinc Orthophosphate (100%)
Zinc Sulfate (36%)

PUR hose material:
Aluminum Chloride (50%)
Aluminum Sulfate (50%)
Ammonia, aqueous (35%)
Ammonium Hydroxide (10%)
Ammonium Sulfate (30%)
Calcium carbonate (25%)
Calcium Chloride (30%)
Calcium Hydroxide (10%)
Calcium Hypochlorite (15%)
Copper Sulfate (13%)
Dipotassium Orthophosphate (50%)
Disodium Orthophosphate (50%)
Ferric Chloride (43%)
Ferric Sulfate (5%)
Ferrous Chloride (40%)
Ferrous Sulfate (5%)
Fluorosilicic acid (25%)
Magnesium Sulfate (25%)
Poly (Diallyldimethylammonium Chloride)(pDADMAC) (50%)
Poly Aluminum Chloride (100%)
Polyacrylamide (2.5%)
Polyaluminum Chloride (45%)
Polyaluminum Chlorosulfate (50%)
Polyaluminum Hydroxychlorosulfate (75%)
Polyaluminum Silicate Sulfate (66%)
Polyaluminum Sulfate (50%)
Potassium Carbonate (47%)
Potassium Chloride (34%)
Potassium hydroxide (10%)
Potassium Permanganate (6%)
Potassium Tripolyphosphate (100%)
Sodium Acid Pyrophosphate (12%)
Sodium Aluminate (50%)
Sodium Ascorbate (60%)
Sodium Bicarbonate (100%)
Sodium Bisulfite (50%)
Sodium Carbonate (7%)
Sodium Chlorate (45%)
Sodium Chloride (20%)
Sodium Chlorite (7.5%)
Sodium Fluoride (3%)
Sodium Metabisulfite (10%)
Sodium Percarbonate (7%)
Sodium Permanganate (6%)

Sodium Polyphosphates (35%)
Sodium Silicate (10%)
Sodium Sulfite (10%)
Sodium Trimetaphosphate (20%)
Sodium Tripolyphosphate (15%)
Tetrasodium Pyrophosphate (7%)
Tricalcium Phosphate (70%)
Zinc Chloride (80%)
Zinc Orthophosphate (100%)
Zinc Sulfate (36%)

SEBS hose material:
Acetic Acid (99%)
Aluminum Chloride
Aluminum Sulfate (50%)
Ammonium Sulfate (30%)
Calcium Chloride (30%)
Citric Acid
Ferric Chloride (43%)
Ferrous Sulfate (5%)
Fluoric Acid
Hydrochloric Acid (38%)
Hydrofluoric Acid (40-48%)
Hydrogen Peroxide (90%)
Magnesium Chloride (35%)
Nitric Acid (60%)
Phosphoric Acid (75%)
Sodium Bicarbonate (7%)
Sodium Hypochlorite (12%)
Sulfuric Acid (30%)

Number of matching Manufacturers is 1

Number of matching Products is 28

Processing time was 0 seconds

The Public Health and Safety Organization

NSF Product and Service Listings

These NSF Official Listings are current as of **Tuesday, July 11, 2023** at 12:15 a.m. Eastern Time. Please contact NSF to confirm the status of any Listing, report errors, or make suggestions.

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NSF/ANSI/CAN 61
Drinking Water System Components - Health Effects

NOTE: Unless otherwise indicated for Materials, Certification is only for the Water Contact Material shown in the Listing. Click here for a list of Abbreviations used in these Listings. Click here for the definitions of Water Contact Temperatures denoted in these Listings. Products certified to NSF/ANSI/CAN 61 comply with the health effects criteria in NSF/ANSI/CAN 600.

Emerson - Rosemount, Micro Motion Inc.
12001 Technology Drive
Eden Prairie, MN 55344-3695
United States
952-828-3125

Facility : Nanjing, China

Mechanical Devices

Trade Designation	Size	Water Contact Temp	Water Contact Material
Water Meters[1] [G]			
Rosemount Model 8705[A][B][C][D][E][F][G][H][I][J][K][L][M][2]	.5" - 36"	C. HOT	MLTPL
Rosemount Model 8705[A][B][C][D][E][F][G][H][I][J][K][L][M][2]	.5" - 36"	CLD 23	MLTPL
Rosemount Model 8711[A][B][C][D][E][F][G][H][I][J][K][L][3]	.5" - 8"	C. HOT	MLTPL
Rosemount Model 8711[A][B][C][D][E][F][G][H][I][J][K][L][3]	.5" - 8"	CLD 23	MLTPL
Rosemount Model 8750W[A][B][C][D][E][F][G][H][I][J][K][L][M][4]	.5" - 40"	C. HOT	MLTPL
Rosemount Model 8750W[A][B][C][D][E][F][G][H][I][J][K][L][M][4]	.5" - 40"	CLD 23	MLTPL

[1] All NSF-61 approved products must have the "DW" option code.
[2] 8705[A][B][C][D][E][F][G][H][I][J][K][L][M]
A - Liner Material: T
B - Electrode Material: S or H
C - Electrode Type: A, B, E or F
D - Line Size: 005, 010, 015, 020, 025, 030, 040, 050, 060, 080, 100, 120, 140, 160, 180, 200, 240, 300, or 360. (Where 360 = 36 inches)
E - Flange Type = any one alpha or digital character
F - Flange Rating = any one alpha or digital character
G - Coil Housing Configuration = Any two-digit alpha or numeric characters
H - Safety Approval = Any zero to two-digit alpha or numeric characters
I - Submersion Protection = Any zero to three-digit alpha or numeric characters
J - Grounding Rings: G1, G2, G5 or G6
K - Any 0 to 50-digit alpha or numeric characters
L - Drinking Water Certification: DW
M - Any 0 to 50-digit alpha or numeric characters

8705[A][B][C][D][E][F][G][H][I][J][K][L][M]
A - Liner Material: T
B - Electrode Material: S or H
C - Electrode Type: A, B, E or F
D - Line Size: 005, 010, 015, 020, 025, 030, 040, 050, 060, 080, 100, 120, 140, 160, 180, 200, 240, 300, or 360. (Where 360 = 36 inches)
E - Flange Type = any one alpha or digital character
F - Flange Rating = any one alpha or digital character
G - Coil Housing Configuration = Any two-digit alpha or numeric characters
H - Safety Approval = Any zero to two-digit alpha or numeric characters
I - Submersion Protection = Any zero to three-digit alpha or numeric characters
J - Grounding Rings: G1, G2, G5 or G6
K - Any 0 to 50-digit alpha or numeric characters
L - Drinking Water Certification: DW
M - Any 0 to 50-digit alpha or numeric characters

[3] 8711[A][B][C][D][E][F][G][H][I][J][K][L]
A - Liner Material: S
B - Electrode Material: S or H
C - Electrode Type: A, B, E or F
D - Line Size: 005, 010, 015, 020, 025, 030, 040, 050, 060, or 080. (Where 080 = 8 inches)
E - Transmitter Mount: any one alpha or digital character
F - Mating Flange = any one alpha or digital character
G - Safety Approval = Any zero to two-digit alpha or numeric characters
H - Submersion Protection = Any zero to three-digit alpha or numeric characters
I - Grounding Rings: G1, G2, G5 or G6
J - Any 0 to 50-digit alpha or numeric characters
K - Drinking Water Certification: DW
L - Any 0 to 50-digit alpha or numeric characters

[4] 8750W[A][B][C][D][E][F][G][H][I][J][K][L][M]
A - Sensor Design Revision: any one alpha or digital character
B - Transmitter Class: any one alpha or digital character
C - Transmitter Power: any one alpha or digital character
D - Conduit Entries: any one alpha or digital character
E - Sensor style: any one alpha or digital character
F - Liner Material: T
G - Electrode Material: S or H
H - Electrode Type: A, B, E or F
I - Line Size: 005, 010, 015, 020, 025, 030, 040, 050, 060, 080, 100, 120, 140, 160, 180, 200,
240, 300, 360, or 400. (Where 400 = 40 inches)
J - Any 0 to 50-digit alpha or numeric characters
K - Grounding Rings: G1, G2, G5 or G6
L - Drinking Water Certification: DW
M - Any 0 to 50-digit alpha or numeric characters

[G] Product is Certified to NSF/ANSI 372 and conforms with the lead content requirements for “lead free” plumbing as defined by California, Vermont, Maryland, and Louisiana state laws and the U.S. Safe Drinking Water Act.

Facility : Chihuahua, Mexico

Mechanical Devices

Trade Designation	Size	Water Contact Temp	Water Contact Material
Water Meters[1] [G]			
Rosemount Model 8705[A][B][C][D][E][F][G][H][I][J][K][L][M][2] [3]	.5" - 36"	CLD 23	MLTPL
Rosemount Model 8705[A][B][C][D][E][F][G][H][I][J][K][L][M][4]	.5" - 36"	C. HOT	MLTPL
Rosemount Model 8711[A][B][C][D][E][F][G][H][I][J][K][L][6]	.5" - 8"	C. HOT	MLTPL
Rosemount Model 8711[A][B][C][D][E][F][G][H][I][J][K][L][3] [5]	.5" - 8"	CLD 23	MLTPL
Rosemount Model 8750W[A][B][C][D][E][F][G][H][I][J][K][L][M][N][O][8]	.5" - 48"	C. HOT	MLTPL
Rosemount Model 8750W[A][B][C][D][E][F][G][H][I][J][K][L][M][N][O][3] [7]	.5" - 48"	CLD 23	MLTPL

[1] All NSF-61 approved products must have the "DW" option code.
[2] 8705 [A][B][C][D][E][F][G][H][I][J][K][L][M]
A - Liner Material - T (Line sizes - 0.5 inch to 36 inch) or P (Line sizes - 4 inch to 36 inch)
B - Electrode Material - S or H
C - Electrode Type - A, B, E or F
D - Line Size - 005**, 010**, 015**, 020**, 025**, 030**, 040, 050, 060, 080, 100, 120, 140, 160, 180, 200, 240, 300, or 360. (Where 360 = 36 inches) (** Line size authorized for only Liner Material - T)
E - Flange Type - any one alpha or digital character
F - Flange Rating - any one alpha or digital character
G - Coil Housing Configuration - any two-digit alpha or numeric characters
H - Safety Approval - any zero to two-digit alpha or numeric characters
I - Submersion Protection - any zero to three-digit alpha or numeric characters
J - Grounding Rings - G1, G2, G5, G6 or no characters
K - Additional Options - any 0 to 50-digit alpha or numeric characters
L - Drinking Water Certification - DW
M - Additional Options - any 0 to 50-digit alpha or numeric characters
[3] Certification includes electrodes and optional grounding rings made from 316 Stainless Steel or Nickel alloy. Certification does not include grounding rings from any other material or lining protectors.

[4] 8705[A][B][C][D][E][F][G][H][I][J][K][L][M]
A - Liner Material - T
B - Electrode Material - S or H
C - Electrode Type - A, B, E or F
D - Line Size - 005, 010, 015, 020, 025, 030, 040, 050, 060, 080, 100, 120, 140, 160, 180, 200, 240, 300, or 360. (Where 360 = 36 inches)
E - Flange Type - any one alpha or digital character
F - Flange Rating - any one alpha or digital character
G - Coil Housing Configuration - any two-digit alpha or numeric characters
H - Safety Approval - any zero to two-digit alpha or numeric characters
I - Submersion Protection - any zero to three-digit alpha or numeric characters
J - Grounding Rings - G1, G2, G5, G6 or no characters
K - Additional Options - any 0 to 50-digit alpha or numeric characters
L - Drinking Water Certification - DW
M - Additional Options - any 0 to 50-digit alpha or numeric characters

[5] 8711 [A][B][C][D][E][F][G][H][I][J][K][L]
A - Liner Material - S
B - Electrode Material - S or H
C - Electrode Type - A, B, E or F
D - Line Size - 005, 010, 015, 020, 025, 030, 040, 050, 060, or 080. (Where 080 = 8 inches)
E - Transmitter Mount - any one alpha or digital character
F - Mating Flange - any one alpha or digital character
G - Safety Approval - any zero to two-digit alpha or numeric characters
H - Submersion Protection - any zero to three-digit alpha or numeric characters
I - Grounding Rings - G1, G2, G5, G6 or no characters
J - Any 0 to 50-digit alpha or numeric characters
K - Drinking Water Certification - DW
L - Any 0 to 50-digit alpha or numeric characters

[6] 8711[A][B][C][D][E][F][G][H][I][J][K][L]
A - Liner Material - S
B - Electrode Material - S or H
C - Electrode Type - A, B, E or F
D - Line Size - 005, 010, 015, 020, 025, 030, 040, 050, 060, or 080. (Where 080 = 8 inches)
E - Transmitter Mount - any one alpha or digital character
F - Mating Flange - any one alpha or digital character
G - Safety Approval - any zero to two-digit alpha or numeric characters
H - Submersion Protection - any zero to three-digit alpha or numeric characters
I - Grounding Rings - G1, G2, G5, G6 or no characters
J - Any 0 to 50-digit alpha or numeric characters
K - Drinking Water Certification - DW
L - Any 0 to 50 - digit alpha or numeric characters

[7] 8750W [A][B][C][D][E][F][G][H][I][J][K][L][M][N][O]
A - Sensor Design Revision - any one alpha or digital character
B - Transmitter Class - any one alpha or digital character
C - Transmitter Mount - any one alpha or digital character
D - Transmitter Power - any one alpha or digital character
E - Transmitter Outputs - any one alpha or digital character
F - Conduit Entries - any one alpha or digital character
G - Sensor style - any one alpha or digital character
H - Liner Material - T (Line sizes - 0.5 inch to 48 inch) or P (Line sizes - 4 inch to 48 inch)
I - Electrode Material - S or H
J - Electrode Type - A, B, E or F
K - Line Size - 005**, 010**, 015**, 020**, 025**, 030**, 040, 050, 060, 080, 100, 120, 140, 160, 180, 200, 240, 300, 360, 400,420, or 480. (Where 480 = 48 inches)
(** Line size authorized for only Liner Material - T)
L - Flange Type, Flange Rating, Flange Material, Safety Approvals, and Other options - any three to 50-digit alpha or numeric characters
M - Grounding Rings - G1, G2, G5, G6 or no characters
N - Drinking Water Certification - DW
O - Additional Options - any 0 to 50-digit alpha or numeric characters

[8] 8750W[A][B][C][D][E][F][G][H][I][J][K][L][M][N][O]
A - Sensor Design Revision - any one alpha or digital character
B - Transmitter Class - any one alpha or digital character
C - Transmitter Mount - any one alpha or digital character
D - Transmitter Power - any one alpha or digital character
E - Transmitter Outputs - any one alpha or digital character
F - Conduit Entries - any one alpha or digital character
G - Sensor style - any one alpha or digital character
H - Liner Material - T
I - Electrode Material - S or H
J - Electrode Type - A, B, E or F
K - Line Size - 005, 010, 015, 020, 025, 030, 040, 050, 060, 080, 100, 120, 140, 160, 180, 200,240, 300, 360, 400,420, or 480. (Where 480 = 48 inches)
L - Flange Type, Flange Rating, Flange Material, Safety Approvals, and Other options -

Any three to 50-digit alpha or numeric characters

M - Grounding Rings - G1, G2, G5, G6 or no characters

N - Drinking Water Certification - DW

O - Additional Options - Any 0 to 50-digit alpha or numeric characters

[G] Product is Certified to NSF/ANSI 372 and conforms with the lead content requirements for "lead free" plumbing as defined by California, Vermont, Maryland, and Louisiana state laws and the U.S. Safe Drinking Water Act.

Number of matching Manufacturers is 1

Number of matching Products is 12

Processing time was 0 seconds

Safety approval offering

The Rosemount 8700 Series Magnetic Flowmeters offer many different hazardous locations certifications. The table below provides an overview of the available hazardous area approval options. Equivalent hazardous locations certifications for sensor and transmitter must match in integrally mounted magnetic flowmeter systems. Remote mounted magnetic flowmeter systems do not require matched hazardous location certifications. For complete information about the hazardous area approval codes listed, see Safety approval certifications starting on page 53.

Table 24. Factory Mutual (FM) approvals offering

Transmitter	8732			8712[1]			8712H[1]
Sensor	**8705**	**8707**	**8711**	**8705**	**8707**	**8711**	**8707**
		Safety approval code					
Ordinary Locations							
Transmitter	NH	NH	NH	NH	NH	NH	NH
Sensor	NH	NH	NH	NH	NH	NH	NH
Suitable for Class I, Division 1							
Explosion-Proof							
Trans: Groups C, D T6	E5[2]	-	E5	-	-	-	-
Sensor: Groups C, D T6	E5[2]	-	E5	-	-	-	-
Explosion-Proof with Intrinsically Safe Output							
Trans: Groups C, D T6	E5[2][3]	-	E5[3]	-	-	-	-
Sensor: Groups C, D T6	E5[2]	-	E5	-	-	-	-
Suitable for Class I, Division 2							
Non-Flammable Fluids							
Trans: Groups A,B,C,D T4	N0	N0	N0	N0	N0	N0	N0
Sensor: Groups A,B,C,D T5	N0	N0[4]	N0	N0	N0[4]	N0	N0[4]
Flammable Fluids							
Trans: Groups A,B,C,D T4	N5	N5	N5	N5	N5	N5	N5
Sensor: Groups A,B,C,D T5	N5	N5[4]	N5	N5	N5[4]	N5	N5[4]
Non-Flammable Fluids with Intrinsically Safe Output							
Trans: Groups A,B,C,D T4	N0[3]	N0[3]	N0[3]	-	-	-	-
Sensor: Groups A,B,C,D T5	N0	N0[4]	N0	-	-	-	-
Other certifications		**Product certification code[5]**					
Canadian Registration Number (CRN)	CR	CR	Standard	CR	CR	Standard	CR
European Pressure Equipment Directive (PED)	PD	-	PD	PD	-	PD	-
NSF 61 Drinking Water	DW	-	DW	DW	-	DW	-

(1) Remote Transmitter Only.

(2) Available in line sizes 1/2-in. to 8-in. (15 mm to 200 mm) only.

(3) For I.S. Output, code F or P must be ordered.

(4) 8707 Sensor has Temp Code - T3C.

(5) Product Certification Codes are added to the Sensor model number only.

The Public Health and Safety Organization

NSF Product and Service Listings

These NSF Official Listings are current as of **Monday, July 10, 2023** at 12:15 a.m. Eastern Time. Please contact NSF to confirm the status of any Listing, report errors, or make suggestions.

Alert: NSF is concerned about fraudulent downloading and manipulation of website text. Always confirm this information by clicking on the below link for the most accurate information: http://info.nsf.org/Certified/PwsComponents/Listings.asp?Company=40940&Standard=061&

NSF/ANSI/CAN 61
Drinking Water System Components - Health Effects

NOTE: Unless otherwise indicated for Materials, Certification is only for the Water Contact Material shown in the Listing. Click here for a list of Abbreviations used in these Listings. Click here for the definitions of Water Contact Temperatures denoted in these Listings. Products certified to NSF/ANSI/CAN 61 comply with the health effects criteria in NSF/ANSI/CAN 600.

Neptune Technology Group, Inc.
1600 Alabama Highway 229
Tallassee, AL 36078
United States
334-283-7321

Facility : Tallassee, AL

Mechanical Devices

Trade Designation	Size	Water Contact Temp	Water Contact Material
Water Meters[1] [G]			
Neptune Aquity Meter	5/8" - 2"	CLD 23	MLTPL
Neptune HP Turbine Meters	1.5" - 2"	CLD 23	MLTPL
Neptune MACH 10[2]	5/8" - 12"	CLD 23	MLTPL
Neptune HP Tru/Flo Compound Meters	2"	CLD 23	MLTPL
Neptune HP Turbine Meters	3" - 10"	CLD 23	MLTPL
Neptune Strainers	1.5" - 10"	CLD 23	MLTPL
Neptune T-10 Meters	5/8" - 2"	CLD 23	MLTPL
Neptune Tru/Flo Compound Meters	3" - 6"	CLD 23	MLTPL
Neptune® Engineered Polymer T-10	5/8"	CLD 23	MLTPL
Neptune® HP Protectus III Meter Assembly	4" - 10"	CLD 23	MLTPL
Neptune® HP Protectus III S Meter Assembly	4" - 10"	CLD 23	MLTPL
Neptune® HP Fire Service Turbine Meter	3" - 10"	CLD 23	MLTPL
Neptune® HP Fire Service Turbine S Meter	3" - 10"	CLD 23	MLTPL
Neptune® High Performance Fire Service Turbine Meter	3" - 10"	CLD 23	MLTPL
Neptune® High Performance Fire Service Turbine S Meter	3" - 10"	CLD 23	MLTPL

[1] Only products bearing the NSF Mark on the product, product packaging, and/or documentation shipped with the product are Certified.
[2] The trade name may be followed by an alpha character (A-I), which denotes the following connection size x length and type:
- 1-1/2 x 13 flange
- 1-1/2 x 10 flange
- 1-1/2 x 12-5/8 screw
- 1-1/2 x 12-5/8 thread
- 2 x 17 flange
- 2 x 10 flange
- 2 x 15-1/4 flange
- 2 x 15-1/4 screw
- 2 x 15-1/4 thread
- 3 x 12 flange
- 3 x 17 flange
- 4 x 14 flange
- 4 x 20 flange
- 6 x 18 flange
- 6 x 24 flange
- 8 x 20 flange
- 10 x 26 flange

- 12 x 19 flange

[G] Product is Certified to NSF/ANSI 372 and conforms with the lead content requirements for "lead free" plumbing as defined by California, Vermont, Maryland, and Louisiana state laws and the U.S. Safe Drinking Water Act.

Number of matching Manufacturers is 1

Number of matching Products is 15

Processing time was 0 seconds

A PRODUCT SHEET OF NEPTUNE TECHNOLOGY GROUP

T-10® METER

SIZES: 1 ½" and 2"

Construction

Every Neptune® T-10® water meter meets or exceeds the latest AWWA C700 Standard. Its nutating disc, positive displacement principle has been time-proven for accuracy and dependability since 1892, ensuring maximum utility revenue.

The T-10 water meter consists of three major assemblies: a register, a lead free, high-copper alloy maincase, and a nutating disc measuring chamber.

The T-10 meter is available with a variety of register types. For reading convenience, the register can be mounted in one of four positions on the meter.

The corrosion-resistant maincase will withstand most service conditions: internal water pressure, rough handling, and in-line piping stress.

The innovative floating chamber design of the nutating disc measuring element protects the chamber from frost damage while the unique chamber seal extends the low-flow accuracy by sealing the chamber outlet port to the maincase outlet port. The nutating disc measuring element utilizes corrosion-resistant materials throughout and a thrust roller to minimize wear.

Warranty

Neptune provides a limited warranty for performance, materials and workmanship. See warranty statement for details.

KEY FEATURES

Register

- Magnetic-driven, low-torque registration ensures accuracy
- Impact-resistant register
- High-resolution, low-flow leak detection
- Bayonet-style register mount allows in-line serviceability
- Tamperproof seal pin deters theft
- Date of manufacture, size, and model stamped on dial face

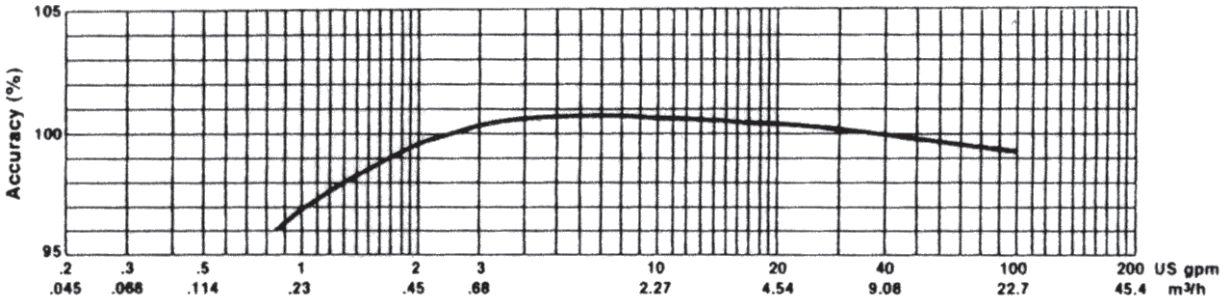
Lead Free Maincase

- Made from lead free, high-copper alloy
- NSF/ANSI 61 Certified
- NSF/ANSI 372 Certified
- Lifetime guarantee
- Resists internal pressure stresses and external damage
- Handles in-line piping variations and stresses
- Provides residual value vs. plastic
- Electrical grounding continuity

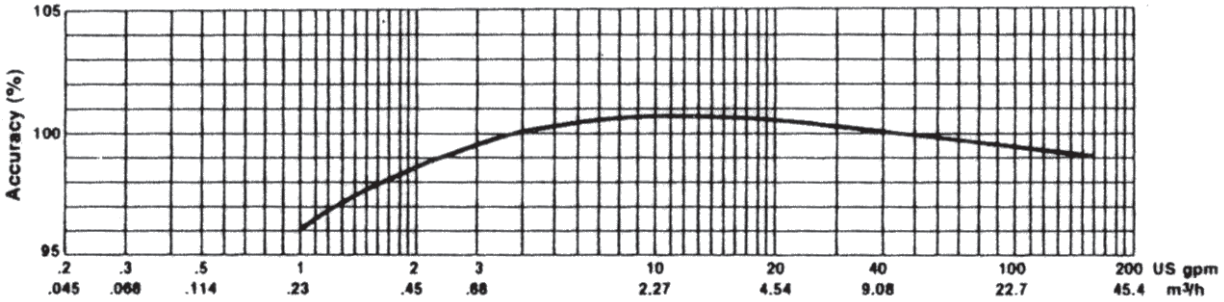
Nutating Disc Measuring Chamber

- Positive displacement
- Widest effective flow range for maximum revenue
- Proprietary polymer materials maximize long-term accuracy
- Floating chamber design is unaffected by meter position or in-line piping stresses

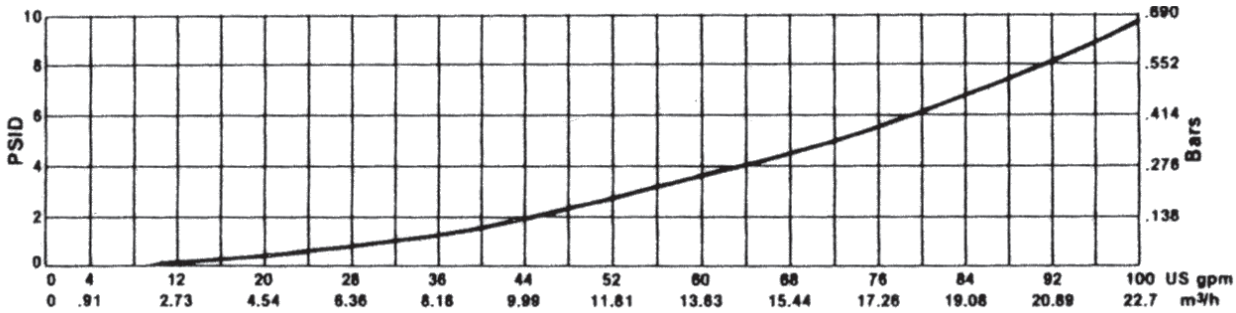
1 ½" Accuracy



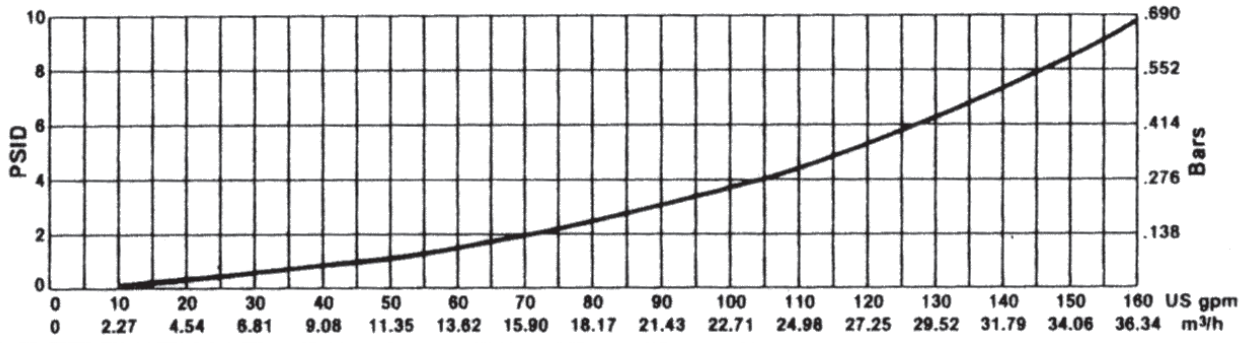
2" Accuracy



1 ½" Pressure Loss



2" Pressure Loss



These charts show typical meter performance. Individual results may vary.

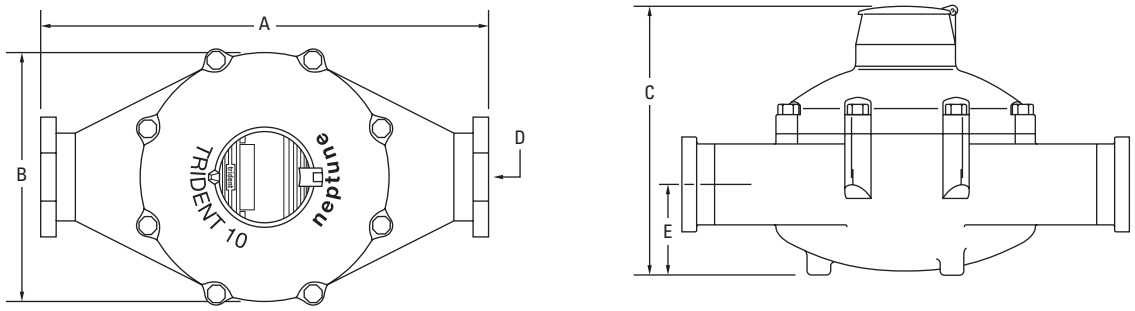
Operating Characteristics

Meter Size	Normal Operating Range @100% Accuracy (±1.5%)	AWWA Standard	Low Flow @ 95% Accuracy
1 ½"	2 to 100 US gpm 0.46 to 22.73 m³/h	5 to 100 US gpm 1.1 to 22.7 m³/h	¾ US gpm 0.17 m³/h
2"	2 ½ to 160 US gpm 0.57 to 36.36 m³/h	8 to 160 US gpm 1.8 to 36.3 m³/h	1 US gpm 0.23 m³/h

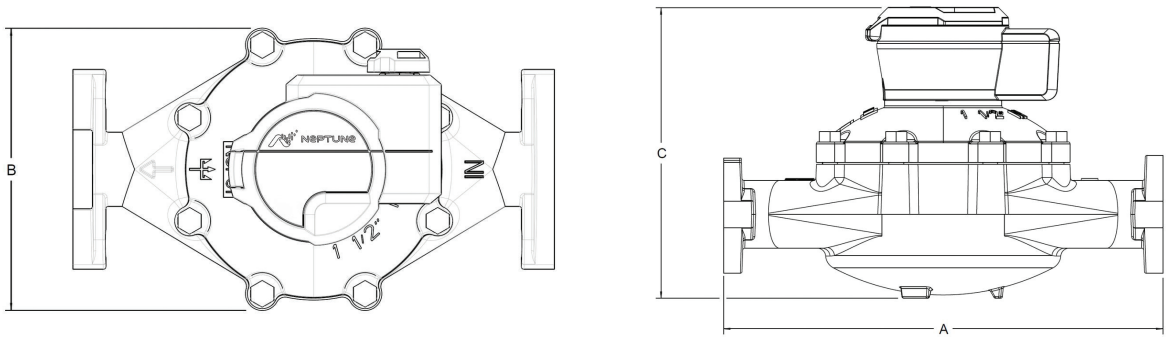
Dimensions

Meter Size	A in/mm	B in/mm	C-Std. in/mm	C-ARB in/mm	C- E-CODER®) R900*i*™ or ProCoder™) R900*i*™	D- Threads per inch	D- Thread Type	E in/mm	Weight lbs/kg
1 ½" Screw End	12 5/8 321	8 1/16 205	8 1/8 206	8 13/16 220.3	8 3/8 213	11 1/2	1 1/2 NPT	2 9/16 65	31 14.1
1 ½" Flanged End	13 330	8 1/16 205	8 1/8 206	8 13/16 220.3	8 3/8 213	—	—	2 9/16 65	35 15.9
2" Screw End	15 1/4 387	9 7/16 240	9 5/16 237	9 15/16 248.4	9 1/2 241	11 1/2	2" NPT	3 1/8 79	40 18.1
2" Flanged End	17 432	9 7/16 240	9 5/16 237	9 15/16 248.4	9 1/2 241	—	—	3 1/8 79	44 20.0

T-10 With Standard Register



T-10 With E-CODER®)R900*i*™ or ProCoder™)R900*i*™ Pit Register



Guaranteed Systems Compatibility

All T-10 meters are guaranteed adaptable to our ProRead™, ProCoder™, E-CODER®, E-CODER®)R900*i*™, E-CODER®)R450*i*™, ProCoder™)R900*i*™, TRICON®/S, TRICON/E®3, and Neptune Utility Systems™ without removing the meter from service.

Specifications

Certification

- NSF/ANSI 61, NSF/ANSI 372

Application

- Cold water measurement of flow in one direction

Maximum Operating Water Pressure

- 150 psi (1,034 kPa)

Maximum Operating Water Temperature

- 80°F

Measuring Chamber

- Nutating disc technology design made from proprietary synthetic polymer

Registration

ProRead Registration (per sweep hand revolution)		**1 ½"**	**2"**
100	US Gallons	✓	✓
100	Imperial Gallons	✓	✓
10	Cubic Feet	✓	✓
1	Cubic Metre		✓
.01	Cubic Metre	✓	
Register Capacity ProRead, ProCoder, and E-CODER		**1 ½"**	**2"**
100,000,000	US Gallons	✓	✓
100,000,000	Imperial Gallons	✓	✓
10,000,000	Cubic Feet	✓	✓
100,000	Cubic Metres	✓*	
1,000,000	Cubic Metres	✓**	✓
E-CODER High Resolution (8-digit reading)		**1 ½"**	**2"**
1	US Gallons	✓	✓
1	Imperial Gallons	✓	✓
0.1	Cubic Feet	✓	✓
0.01	Cubic Metres		✓
0.001	Cubic Metres	✓	
ProCoder High Resolution (8-digit reading)		**1 ½"**	**2"**
1	US Gallons	✓	✓
1	Imperial Gallons	✓	✓
0.1	Cubic Feet	✓	✓
0.01	Cubic Metres	✓	✓

**ProRead and E-CODER only **ProCoder only*

Options

Sizes

- 1 ½" flanged or threaded end
- 2" flanged or threaded end

Units of Measure

- U.S. gallons, imperial gallons, cubic feet, cubic metres

Register Types

- Direct reading: Bronze box and cover
- Remote reading: ProRead Absolute Encoder, ProCoder, E-CODER, E-CODER)R900*i*, E-CODER)R450*i*, ProCoder)R900*i*, TRICON/S, TRICON/E3
- Reclaim

Measuring Chamber

- Synthetic polymer

Companion Flanges

- Lead free, high-copper alloy

Environmental Conditions

- Operating temperature: +33°F to +149°F (0°C to +65°C)
- Storage temperature:
- +33°F to +158°F (0°C to +70°C)

Test Ports

- 1" (optional)

NEPTUNE TECHNOLOGY GROUP

#winyourday
neptunetg.com

Neptune Technology Group
1600 Alabama Highway 229
Tallassee, AL 36078
800-633-8754 f 334-283-7293

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Drinking Water Safety

Grundfos, PACO and Peerless products.

See Grundfos Products | See PACO Products | See Peerless Products

Product	Low Lead Certification	Drinking Water Certification	Comments
UP 10	NSF372	NSF61	NSF61 & NSF372 versions available UL File MH26400
Comfort System	NSF372	NSF61	NSF61 & NSF372 versions available UL File MH26400
ALPHA, ALPHA1, ALPHA2 (SF,SU, CIL2, RES)	NSF372	NSF61	NSF61 & NSF372 versions available UL File MH26400
UP/UPS15 (B5, B7, BU, BU7P, BUC5, BUC7, SF, SU, SU7P)	NSF372	NSF61	NSF61 & NSF372 versions available UL File MH26400
UP/UPS26 (BF, SF, SU)	NSF372	NSF61	NSF61 & NSF372 versions available UL File MH26400
UP/UPS43 (BF)	IAPMO Low Lead		IAPMO File 6591
UP/UPS 26-150 43-100 50-60 (SF)	NSF372	NSF61	NSF61 & NSF372 versions available UL File MH26400
UP/UPS Accessories (Flange sets)	IAPMO Low Lead		IAPMO File 6591 PN: 519651 PN: 519652 PN: 96409355 PN: 96409356 PN: 539615 PN: 569611 PN: 592540 PN: 592541 PN: 9680614 PN: 9680614 PN: 592540 PN: 591358

			PN: 592563 PN: 96806141 PN: 96806143 PN: 592507 PN: 98159666 PN: 97799824 PN: 98159665 UL File MH26400
UP/UPS Accessories (Flange sets)	IAPMO Low Lead		PN: 529911 PN: 529912 PN: 529913 PN: 91584913 PN: 91584914 PN: 91584915 PN: 96409357 PN: 525396 PN: 525398 PN: 525407 PN: 529912WW PN: 592541 PN: 599207 PN: 599208 PN: 599209 PN: 599210 PN: 599211 PN: 599227 PN: 599228 PN: 599229 PN: 599230 PN: 599231 PN: 96806143 PN: 519850 PN: 519851 PN: 519852 PN: 519755 PN: 519756 PN: 519757 PN: 525279 PN: 595079 PN: 596620 PN: 596621 PN: 98153735 UL File MH26400
UP/UPS Accessories (Flange sets)	IAPMO Low Lead	NSF61	PN: 91130354 PN: 91130355
UP Accessories (ISO valves)	NSF372		IAPMO File 5653 PN: 91140896 PN: 91140897 PN: 91140898 PN: 91140899 PN: 91140900 PN: 96806129

			PN: 96806130 PN: 96806131 PN: 96806132 PN: 96806133 PN: 96806134 PN: 96806135 PN: 96806136 PN: 96806137 PN: 96806138 PN: 592542 PN: 91130272 PN: 91130273 PN: 91130274 PN: 91130275 PN: 91130276
UPS Versaflo Bronze	IAPMO Low Lead		IAPMO File 6591
UP 43-110 FN	NSF372		UL File MH26400
MAGNA-1 (FN)	NSF372		UL File MH26400
MAGNA-3 (FN)	NSF372		UL File MH26400
Small CR(E)/CRI(E)/CRN(E) (1s, 1, 3, 5)	NSF372	NSF61	NSF61 & NSF372 versions available UL File MH26400
Medium CR(E)/CRI(E)/CRN(E) (10, 15, 20)	NSF372	NSF61	NSF61 & NSF372 versions available UL File MH26400
Large CR(E)/CRN(E) (32, 45, 64)	NSF372	NSF61	NSF61 & NSF372 versions available UL File MH26400
XXL CR(E)/CRN(E)) (95, 125, 155, 185, 215, 255)	NSF372	NSF61	NSF61 & NSF372 versions available UL File MH26400
Hydro MPC E,F,S 2-6CR(E) 3-90	NSF372	NSF61	NSF61 & NSF372 versions available UL File MH26400
Hydro Multi-E 2-3CRE 3-20	NSF372	NSF61	NSF61 & NSF372 versions available UL File MH26400
Hydro Multi-B 2-3CME 3-25	NSF372	NSF61	NSF61 & NSF372 versions available UL File MH26400
CRE Plus CRE 3-90	NSF372	NSF61	NSF61 & NSF372 versions available UL File MH26400
CM/CME	NSF372	NSF61	NSF61 & NSF372 versions available UL File MH26400
CMBE	NSF372	NSF61	NSF61 & NSF372 versions available

			UL File MH26400
MQ	NSF372	NSF61	NSF61 & NSF372 versions available CSA File 115146 (DAB name)
4-inch Submersible (5S – 77S)	NSF372	NSF61	Pump End Only NSF61 & NSF372 versions available UL File MH26400
MS 402 & Lead Assy.	NSF372		versions available UL File MH26400
MS 4000 & Lead Assy.	NSF372		NSF372 versions available UL File MH26400
MS 6000 & Lead Assy.	NSF372		NSF372 or ANSI/NSF/CAN 61 versions available UL File MH26400
MMS6 MMS 8000, 10000, 12000 & Lead Assy.	NSF372		NSF372 versions available UL File MH26400
SQ/SQE	NSF372		NSF372 versions available UL File MH26400
SCALA1 SCALA2	NSF372	NSF61	NSF61 & NSF372 versions available UL File MH26400
DDA, DDC, DDE		NSF61	NSF61 versions available UL File MH26400
Smart Digital XL Dosing DDA, DDE		NSF61	NSF61 versions available UL File MH26400
DME Dosing		NSF61	NSF61 versions available UL File MH26400
Oxiperm Pro 162		NSF61	NSF61 versions available UL File MH26400
PACO LC	NSF372	NSF61	NSF61 & NSF372 versions available NSF International
PACO LCV	NSF372	NSF61	NSF61 & NSF372 versions available NSF International

PACO LF	NSF372	NSF61	NSF61 & NSF372 versions available NSF International
PACO VL	NSF372	NSF61	NSF61 & NSF372 versions available NSF International
PACO KP	NSF372	NSF61	NSF61 & NSF372 versions available NSF International
PACO KPV	NSF372	NSF61	NSF61 & NSF372 versions available NSF International
Peerless Vertical Packed with Barrel	NSF372	NSF61	UL File MH59961 Grundfos Peerless NSF61 / NSF372
Peerless Vertical Mechanical Sealed with Barrel	NSF372	NSF61	UL File MH59961 Grundfos Peerless NSF61 / NSF372
Peerless Vertical Packed	NSF372	NSF61	UL File MH59961 Grundfos Peerless NSF61 / NSF372
Peerless Vertical Mechanical Sealed	NSF372	NSF61	UL File MH59961 Grundfos Peerless NSF61 / NSF372
Peerless Inline Packed	NSF372	NSF61	UL File MH59961 Grundfos Peerless NSF61 / NSF372
Peerless Inline Mechanical Sealed	NSF372	NSF61	UL File MH59961 Grundfos Peerless NSF61 / NSF372
Peerless Horizontal Split Case Packed	NSF372	NSF61	UL File MH59961 Grundfos Peerless NSF61 / NSF372
Peerless Horizontal Split Case Mechanical Sealed	NSF372	NSF61	UL File MH59961 Grundfos Peerless NSF61 / NSF372
Peerless End Suction F/C Packed	NSF372	NSF61	UL File MH59961 Grundfos Peerless NSF61 / NSF372
Peerless End Suction F/C Mechanical Sealed	NSF372	NSF61	UL File MH59961 Grundfos Peerless NSF61 / NSF372

Grundfos Pumps Corporation,
902 Koomey Road,
Brookshire,
TX 77423

Hydro MPC

Hydro MPC CR, CRE systems with 2 to 6 pumps and Hydro MPC CME systems with 2 and 3 pumps

60 Hz North America

CLASSIFIED
C UL US
WATER QUALITY
Drinking Water System Component
NSF / ANSI 61
NSF / ANSI 372

be
think
innovate

GRUNDFOS

Table of contents

1. Product introduction

Applications

Grundfos Hydro MPC pump systems are designed for a wide range of applications, including:

- domestic water pressure boosting systems
- high-rise building pressure boosting
- municipal water supply and transfer applications
- municipal water transfer and boosting
- hydronic water circulation (HVAC)
- redundant pumping applications.

As standard, the Hydro MPC pump systems consist of two to six identical Grundfos CR or CRE pumps connected in parallel and mounted on a common base frame with a control cabinet and all necessary fittings.

The pumps in this system can be removed without interfering with the pipes on either side of the manifolds.

Hydro MPC comes in three control variants. For further information, see the product ranges on page 7 and *Control variants* on page 15.

Hydro MPC-E

Pump systems with two to six identical electronically speed-controlled pumps.

Hydro MPC-E(CRE) is fitted with CRE, pumps with integrated frequency converter.

Hydro MPC-E (CUE) is fitted with CR pumps connected to Grundfos CUE frequency converters; one per pump mounted in the control panel.

Hydro MPC-F

Pump systems with two to six identical CR pumps connected to one Grundfos CUE frequency converter. The speed-controlled operation alternates between the pumps of the pump system.

Hydro MPC-S

Pump systems with two to six identical fixed speed CR pumps.

Pump Energy Index

Pump Energy Index (PEI) was established by the U.S. Department of Energy (DOE) and adopted by Canada as the standard metric used to evaluate pump efficiency. The value is the ratio of the pump efficiency rating (PER) divided by the calculated minimally complaint PER (PER_{STD}) for the pump type. This provides a representation of a pump's actual performance compared to the minimal standard performance required by regulation. The lower the PEI value, the more efficient a pump is at the tested operating points.

PER is determined by defined testing parameters required by the DOE. This includes testing a particular pump model at its best efficiency point (BEP).

For PEI values there are two different versions:

- PEI_{CL} (constant load): Applies to a bare-shaft pump, and a pump sold with a motor
- PEI_{VL} (variable load): Applies to pumps sold with a motor and controller (such as VFD, VSD)

The DOE has set the maximum PEI value as 1.00. Any pump, pump and motor, or pump, motor and controller that exceeds a PEI value of 1.00 can no longer be manufactured after January 26, 2020.

PEI is a generalized efficiency value. PEI cannot be used to determine the efficiency of a pump in a specific application.

Even though packaged systems with advanced control logic can deliver greater savings, the skid packaged system will not have a PEI value, the individual pumps in the system will have a PEI value.

Product type	hp (kW)	Voltage	PEI_{VL}	Impeller diameter [in (mm)]
CRE 10	1 (0.75)	1x200-240	0.42	3.66 (92.9)
		3x440-480	0.41	
	1.5-2 (1.1-1.5)	1x200-240	0.41	
		3x200-240	0.43	
		3x440-480	0.41	
	3-15 (2.2-11)	3x200-240	0.41	
		3x440-480	0.40	
CRE 15	1.5-2 (1.1-1.5)	1x200-240	0.45	4.13 (104.8)
		3x200-240	0.44	
		3x440-480	0.46	
	3-15 (2.2-11)	3x200-240	0.42	
		3x440-480	0.40	
CRE 20	1.5-2 (1.1-1.5)	1x200-240	0.51	
		3x200-240	0.50	
		3x440-480	0.48	
	3-15 (2.2-11)	3x200-240	0.42	
		3x440-480	0.41	
CRE 32	3-15 (2.2-11)	3x200-240	0.41	4.66 (118.4)
		3x440-480	0.40	
	20 (15) and up	3x440-480	0.44	
CRE 45	3-15 (2.2-11)	3x200-240	0.41	5.34 (136)
		3x440-480	0.40	
	20 (15) and up	3x440-480	0.46	
CRE 64	3-15 (2.2-11)	3x440-480	0.43	5.59 (142)
	20 (15) and up	3x440-480	0.46	
CRE 95	3-15 (2.2-11)	3x440-480	0.42	6.07 (154)
	20 (15) and up	3x440-480	0.45	
CRE 125	20 (15) and up	3x440-480	0.59	6.38 (162)
CRE 155	20 (15) and up	3x440-480	0.58	6.64 (169)

Product type	Poles	PEI_{CL} pump with motor	PEI_{VL} pump with motor plus controller*	Impeller diameter [in (mm)]
CR, CRN, CRI 10	2	0.87	0.48	3.66 (92.9)
CR, CRN, CRI 15	2	0.91	0.48	4.13 (104.8)
CR, CRN, CRI 20	2	0.91	0.47	
CR, CRN, 32	2	0.87	0.45	4.66 (118.4)
	4	0.91	0.50	
CR, CRN, 45	2	0.89	0.46	5.34 (136)
	4	0.91	0.47	
CR, CRN, 64	2	0.93	0.46	5.59 (142)
	4	0.94	0.48	
CR, CRN, 95	2	0.93	0.45	6.07 (154)
	4	0.94	0.47	
CR, CRN, 125	2	0.93	0.59	6.38 (162)
	4	0.94	0.47	
CR, CRN, 155	2	0.93	0.59	6.64 (169)
	4	0.95	0.47	

*Grundfos CUE continuous controls

Benefits

Advanced pump system control

Gr1014555

Fig. 1 CU 352

The pumps of the Hydro MPC pump system are controlled individually by the CU 352 multipump control unit which contains application-optimized software and pump-curve data. CU 352 knows the exact hydraulic and electrical data of the pumps to be controlled. Furthermore, a log function enables monitoring of the system performance over a period of time.

User-friendliness

Hydro MPC features a built-in startup wizard in a wide range of languages that guides the installer through a series of steps until the system is correctly installed. The large user-friendly display makes viewing information and making program changes easy to see and accomplish.

Reliability

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Fig. 2 Grundfos CRE and CME pumps

Hydro MPC systems are built on the renowned Grundfos CR pump range and the industrial quality CM pump range. Every vital piece of Hydro MPC is made by Grundfos. You are thus guaranteed long-lasting technology that requires a minimum of maintenance and provides a maximum of efficiency.

Low-energy consumption

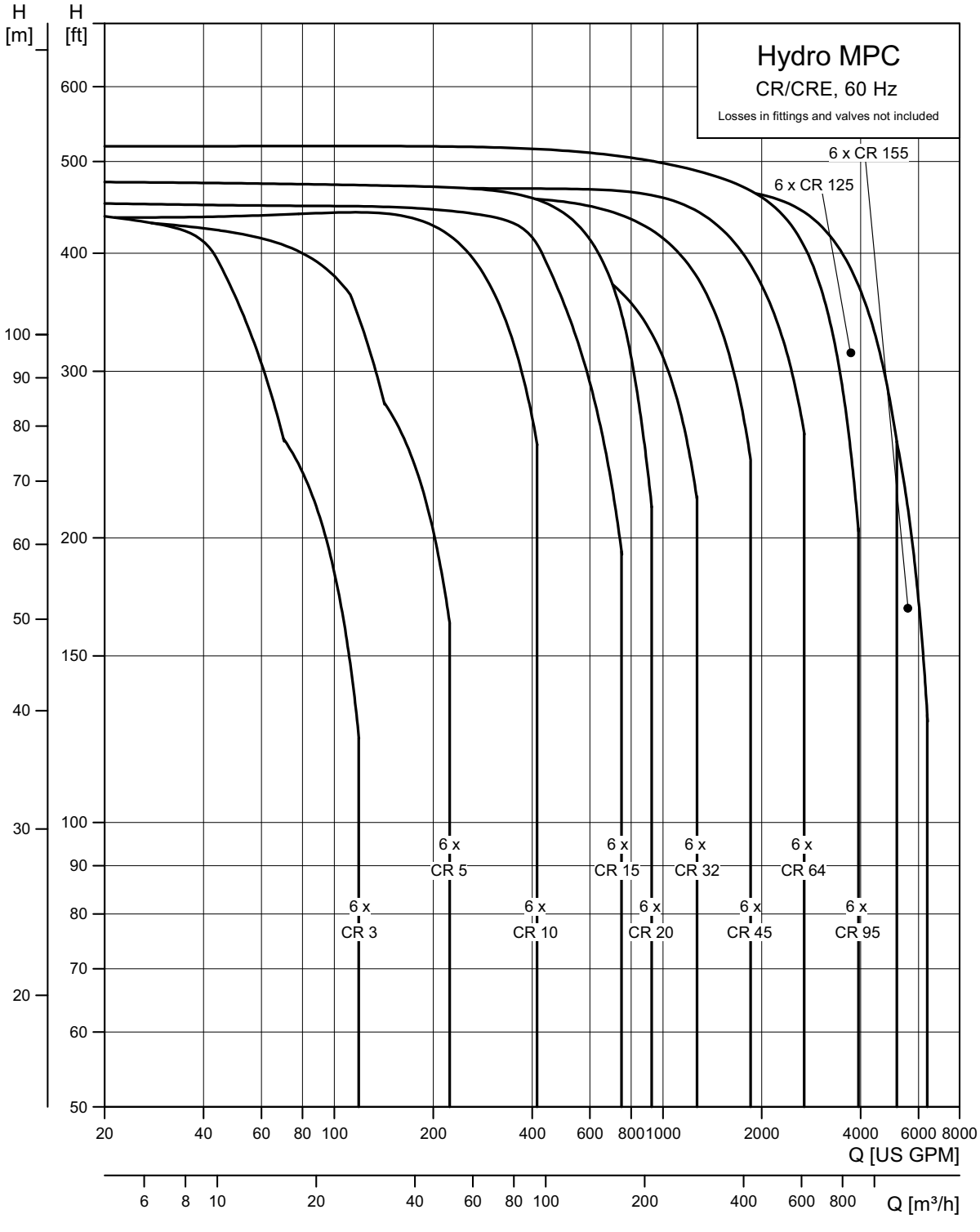
The Hydro MPC-E systems with the newest MLE motors from 0.50 to 15 Hp (0.37 to 11 kW) have a combined total VFD/motor efficiency higher than NEMA Premium Efficiency motor alone.

TM06 7469 3416

Fig. 3 Range of MLE motors 3x460-480 V, 20-30 Hp are induction style motors and have IE4 efficiency rating. MLE motor with a total efficiency exceeding the EuP IE5 up to 15 Hp (11 kW) and IE4 from 20 Hp (15 kW) to 30 Hp (22 kW) levels according to IEC 60034-30-1.

2. Product data

Hydro MPC Performance range, CR, CRE



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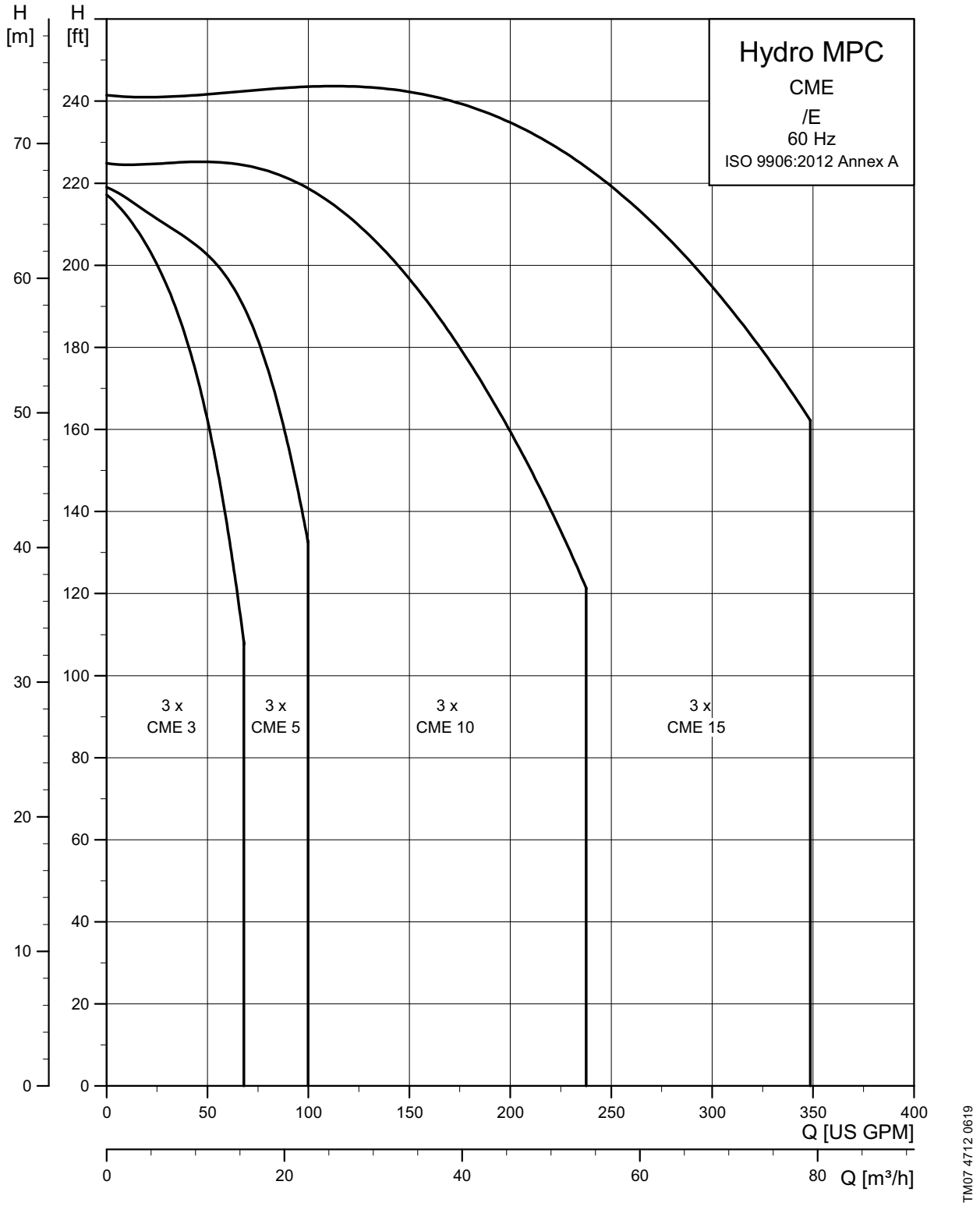
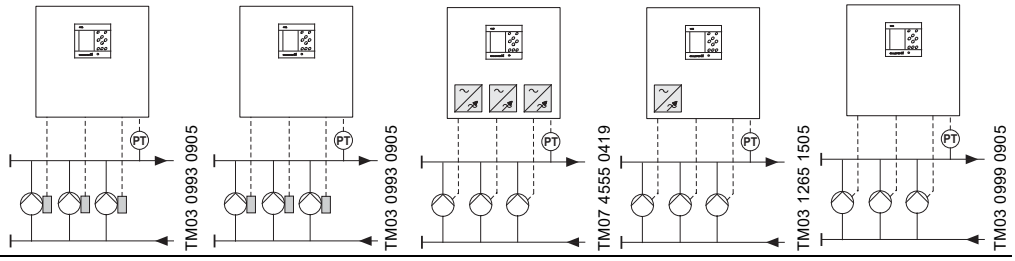
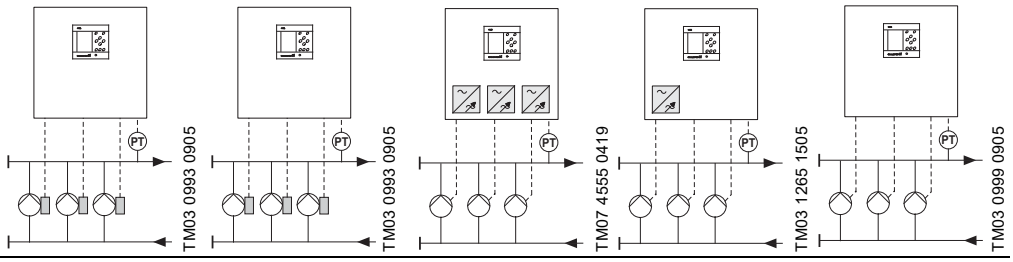
Hydro MPC Performance range, CME



Product range, 60 Hz



Control variant	Hydro MPC-E (CRE)	Hydro MPC-E (CME)	Hydro MPC-E CR (CUE)	Hydro MPC-F	Hydro MPC-S
Frequency	**60 Hz**	**60 Hz**	**60 Hz**	**60 Hz**	**60 Hz**
Hydraulic data					
Maximum head [ft. (m)]	479 (146)	231 (70)	479 (146)	479 (146)	479 (146)
Flow rate [gpm (m^3/h)]	0-4755 (0-1080)	0 to 330 (0 to 75)	0-4755 (0-1080)	0-4755 (0-1080)	0-4755 (0-1080)
Liquid temperature [°F (°C)]	32-140, 180 (0-60, 82)[1]	32 to 140, 180 (0 to +60, 82)[1]	32-140, 180 (0-60, 82)[1]	32-140, 180 (0-60, 82)[1]	32-140, 180 (0-60, 82)[1]
Maximum operating pressure [psi (bar)]	232 (16)[2]	145 (10)	232 (16)[2]	232 (16)[2]	232 (16)[2]
Motor data					
Number of pumps	2-6	2-3	2-6	2-6	2-6
Motor power [Hp (kW)]	0.50-100 (0.37-75)[3]	1.5-7.5 (1.11-5.50)	0.50-100 (0.37-75)[3]	0.75-75 (0.55-55)	0.50-75 (0.37-55)
Shaft seal					
HQQE (SiC/SiC/EPDM)	•		•	•	•
AQQE (SIC/SIC/EPDM)		•			
Materials					
CRE, CRIE 3 to CRE, CRIE 20: stainless steel EN/DIN 1.4301 / AISI 304	•		•	•	•
CR, CRE 32 to CR, CRE 155: cast iron and stainless steel EN/DIN 1.4301 / AISI 304	•		•	•	•
CM, CME 3 to CM, CME 15: A-version CI/304 SS		•			
Manifold: stainless steel[6]	•	•	•	•	•
Pipe connection					
NPT connection	2-3"	1.5-2.5"	2-3"	2-3"	2-3"
ANSI flange connection	4-16"	3-4"	4-16"	4-16"	4-16"



Control variant	Hydro MPC-E (CRE)	Hydro MPC-E (CME)	Hydro MPC-E CR (CUE)	Hydro MPC-F	Hydro MPC-S
Frequency	**60 Hz**	**60 Hz**	**60 Hz**	**60 Hz**	**60 Hz**
Functions					
Constant-pressure control	●	●	●	●	●[4]
Automatic cascade control	●	●	●	●	●
Pump changeover	●	●	●	●	●
Stop function	●	●	●	●	-
Proportional-pressure control	●	●	●	●	-
Multisensor, HVAC	●[7]	●[7]	●[7]	●[7]	●[7]
Bus communication, external	❍	❍	❍	❍	❍
Integrated frequency converter in pump	●	●	●	●	-
External frequency converter in cabinet	●	●	●	●	-
Ethernet connection	●	●	●	●	●
Alternative setpoints	●	●	●	●	●
Redundant primary sensor, option	●	●	●	●	●
Secondary sensor	●[8]	●[8]	●[8]	●[8]	●[8]
Standby pump	●	●	●	●	●
Emergency run	●	●	●	●	●
Specific energy calculation	●[5]	●[5]	●[5]	-	-
Log function	●	●	●	●	●
Monitoring of non-return valve	●[9]	●[9]	●[9]	-	-
Reduced operation	●	●	●	●	●
Service contact information	●	●	●	●	●
Help texts	●	●	●	●	●

● Available as standard.
❍ Available on request.

1 Higher temperature is available on request.
CR, CRE 3 / CR, CRE5 / CME 3 / CME 5 max. liquid temperature is 140 °F (60 °C), 180 °F (82 °C) in standard max. liquid temperatures for all other pump sizes.

2 Pump systems with a maximum operating pressure higher than 232 psi (16 bar) are available on request.

3 The Hydro MPC-E (CRE) pump systems from 0.50 to 30 Hp (0.37 to 22 kW) are fitted with speed-controlled CRE pumps with integrated frequency converters. The Hydro MPC-E (CUE) pump systems from 40 to 100 Hp (30 to 75 kW) are fitted with CR pumps connected to Grundfos CUE frequency converters. MPC-E (CUE) systems are available in Hp range of MPC-E(CRE), if requested.

4 The pressure will be between H_{set} and H_{stop}. For further information, see page 15.

5 Requires that a flowmeter has been installed and connected.

6 In some regions, galvanized manifolds are available as an option. For further information, contact Grundfos.

7 Requires additional sensors.

8 Requires an additional secondary sensor.

9 Systems with MLE motors, 0.50 to 30 Hp (0.37 to 22 kW).

Type key

Hydro MPC

See *12. Optional equipment* for pump system on page 87.

Code	Example	Hydro MPC	-E	6	CRE 95-3	UL	C	A-	A-	ABCD
	Type range									
	System type									
E	All pumps, E-motor or CUE									
F	Fixed-speed pumps, one CUE									
S	Fixed-speed pumps									
X	Customized-system pumps									
	Number of main pumps									
	Pump type									
	Voltage code									
U1	3 x 380-415 V, N, PE, 50/60 Hz									
U2	3 x 380-415 V, PE, 50/60 Hz									
U3	3 x 380-415 V, N, PE, 50 Hz									
U4	3 x 380-415 V, PE, 50 Hz									
U5	3 x 380-415 V, N, PE, 60 Hz									
U6	3 x 380-415 V, PE, 60 Hz									
U7	1 x 200-240 V, PE, 50/60 Hz									
U8	1 x 200-240 V, N, PE, 50/60 Hz									
U9	3 x 220-240 V, PE, 60 Hz									
UA	3 x 440-480 V, PE, 60 Hz									
UB	1 x 220-240 V, N, PE, 50/60 Hz									
UC	1 x 220-240 V, N, PE, 50 Hz									
UD	3 x 440-480 V, N, PE, 60 Hz									
UJ	1 x 208-230 V, PE, 60 Hz									
UK	3 x 208-230 V, PE, 60 Hz									
UL	3 x 460-480 V, PE, 60 Hz									
UX	CSU variant (special voltage rating)									
	Design									
A	Systems with the control cabinet mounted on the same base frame as the pumps									
C	Systems with the control cabinet mounted on its own base for floor mounting*									
D	Systems with the control cabinet mounted on its own base frame*									
W	Systems with the control cabinet prepared for wall mounting*									
	Starting method									
A	E									
B	DOL									
C	SD									
	Material combination									
A	Stainless-steel manifold, base frame and standard valves									
B	Stainless-steel manifold, base frames and valves									
X	Customized material combination									
	Options									
A	Standard hydraulics									
B	Pilot pump									
D	Non-return valve									
E	Elbow manifold									
H	Dry-running protection									
J	Redundant sensor									
K	One free position									
L	Two free positions									
M	Three free positions									
P	Low NPSH pumps									
S	Customized variant									
U	Undersized motor									
V	Standard controls with options									
W	Customized controls									
X	More than four options									

Operating conditions

Operating pressure

Hydro MPC CR/CRE as standard, the maximum operating pressure is 232 psi (16 bar).

Hydro MPC CME as standard, the maximum operating pressure is 145 psi (10 bar).

Hydro MPC CR/CRE pump systems with a higher maximum operating pressure are available on request.

Temperature

Liquid temperature for systems with CR, CRE 3, CR,CRE 5, CME 3, and CME 5 pump models:

- 32-140 °F (0-60 °C).

Liquid temperature for all other pump models:

- 32-180 °F (0-82 °C).

Ambient temperature: 32-104 °F (0-40 °C).

Note: Higher liquid temperature capability is available on request.

Relative humidity

Maximum 95 %.

3. Construction

CR pump

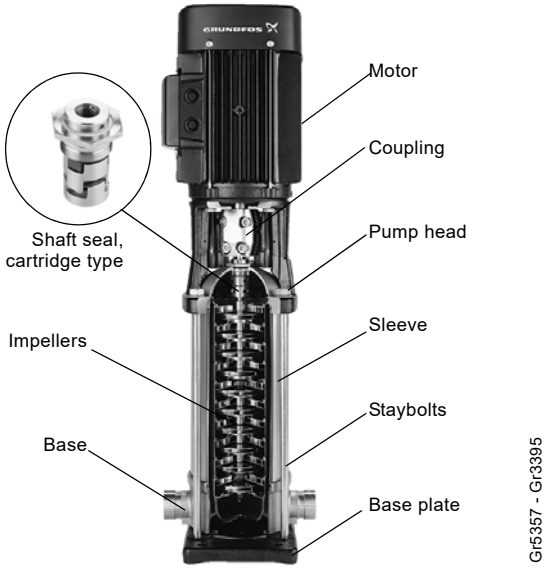


Fig. 4 CR pump

CR pumps are non-self-priming, vertical multistage centrifugal pumps.

Each pump consists of a base and a pump head. The chamber stack and outer sleeve are secured between the pump head and the base by means of staybolts. The base has inlet and outlet ports at the same level (in line) and of the same port size.

CRE pumps are based on CR pumps. The difference between the CR and CRE pump ranges is the motor. CRE pumps are fitted with a motor with integrated frequency converter.

CR and CRE pumps have pump head and base of cast iron.

All hydraulic parts are made of stainless steel.

For further information, see the following data booklets by using the QR code or link:

Title	QR code	Publication number
CR, CRI, CRN 60 Hz		98446676
http://net.grundfos.com/qr/i/98446676		
CR, CRI, CRN 60 Hz		99301180
http://net.grundfos.com/qr/i/99301180		
CR, CRI, CRN, CRT, CRE, CRIE, CRNE, CRTE custom-built pumps		96486346
http://net.grundfos.com/qr/i/96486346		
CRE, CRIE, CRNE 50/60 Hz		98423696
http://net.grundfos.com/qr/i/98423696		
Grundfos E-pumps 50/60 Hz		96570076
http://net.grundfos.com/qr/i/96570076		

The data booklets are available in Grundfos Product Center on www.grundfos.com. See page 94.

For information about the pump position in the pump system, see fig. 9 on page 14.

CME pump

Cast-iron version

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Fig. 5 Grundfos CME pumps

The Grundfos CME pumps are non-self-priming, horizontal, multistage, end-suction centrifugal pumps. The pumps are of the close-coupled type.

CME pumps have an integrated frequency converter. CME pumps have mechanical shaft seals.

The compactness of the Hydro MPC CME is achievable due to the unique combination of size and performance offered by the Grundfos CM,CME pumps. Certain dimensions of the CM, CME pumps are 30 % smaller than those of corresponding pumps with identical performance.

For further details on the pumps, see the following data booklets:

Title	Publication number
CM, CME	98435269
Grundfos E-pumps	L-ML-PG-001

Shaft seal

CR, CRE pumps have a maintenance-free mechanical cartridge type HQQE shaft seal. Seal faces are silicon carbide/silicon carbide. Rubber parts are of EPDM.

Note: Other shaft-seal variants are available on request.

Gr83395

Fig. 6 Cartridge shaft seal

The shaft seal can be replaced without dismantling the pump. The shaft seal of pumps with motorsabove 10 Hp can be replaced without removing the motor.

For further information, see the data booklet on shaft seals, publication number 96519875. The data booklet is available in Grundfos Product Center on www.grundfos.com. See page 94.

MLE Motors

CRE CME pumps

CRE and CME pumps are fitted with a totally enclosed, fan-cooled, 2-pole motor with integrated frequency converter.

Principal dimensions are in accordance with EN standards.

Electrical tolerances to EN 60034.

	Motor with integrated frequency converter		
	P2: ≤ 1.5 Hp (1.1 kW)	**P2: 1-15 Hp (0.75-11 kW)**	**P2: 20-30 Hp (15-22 kW)**
Mounting designation	V18	Up to 5 Hp (4 kW): V18 From 7 Hp (5.5 kW): V1	
Insulation class	F		
Efficiency class	Up to 15 Hp (11 kW): exceeding IE5 See section *Low-energy consumption* on page 4. From (20-30 Hp (15-22 kW): IE4		
Enclosure class	IP54		
Power supply Tolerance: ± 10 %	1 x 200-240 V, 50/60 Hz	3 x 380-500 V, 50/60 Hz	3 x 380-480 V, 50/60 Hz

Motors with integrated frequency converter require no external motor protection. The motor incorporates thermal protection against slow overloading and seizure, class TP 211 according to IEC 34-11.

Manifold

A stainless steel inlet manifold (AISI 316Ti/EN DIN 1.4571) is fitted on the inlet side of the pumps.

A stainless steel outlet manifold (AISI 316Ti/EN DIN 1.4571) is fitted on the outlet side of the pumps.

An isolating valve and a non-return valve are fitted between the outlet manifold and the individual pumps. The non-return valve can be fitted on the inlet side on request.

For information about the position of the inlet and outlet manifolds, see fig. 9 on page 14.

Control cabinet

The control cabinet is fitted with all the necessary components. If necessary, the Hydro MPC pump systems are fitted with a fan to remove surplus heat generated by the frequency converter.

Control cabinet variants

The control cabinets are divided into four different designs:

- **Design A:** systems with the control cabinet mounted on the same base frame as the pumps.
- **Design C:** systems with the control cabinet mounted on its own base for floor mounting. The control cabinet can be placed up to 6.5 ft. (2 m) from the pumps.
- **Design D:** systems with the control cabinet mounted on its own base frame. The control cabinet can be placed up to 6.5 ft. (2 m) from the pumps.

For further information, see fig. 9 on page 14 and technical data on page 82.

CU 352

The CU 352 multipump control unit of Hydro MPC is located in the door of the control cabinet.

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Fig. 7 CU 352

CU 352 features a color display, ten buttons, and two indicator lights. The control panel enables manual setting and change of parameters such as setpoint, start/stop of system or individual pumps.

CU 352 has application-optimized software for adapting the system to the application in question.

IO 351

IO 351 is a module for exchange of digital and analog signals between CU 352, and the remaining electrical system via GENIbus. IO 351 is available in the A and B variants.

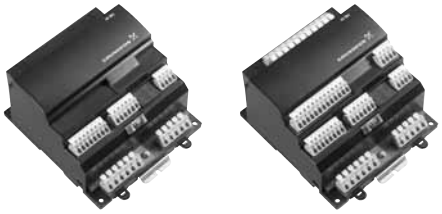

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Fig. 8 IO 351A and IO 351B

IO 351A

IO 351A is used for one to three mains-operated Grundfos pumps.

IO 351B

IO 351B is used for one to six mains-operated Grundfos pumps, and/or pumps controlled by external Grundfos CUE frequency converters. The module can also be used as an input-output module for communication with monitoring equipment or other external equipment.

Base frame

The pumps in a Hydro MPC system are mounted on a common base frame. The base frame is made of stainless steel AISI 304, except for systems with CR, CRE 95, CR, CRE 125 and CR, CRE 155 pumps which are mounted on a base frame made of powder-coated black (RAL 9005) C-channels.

System components for MPC CRE

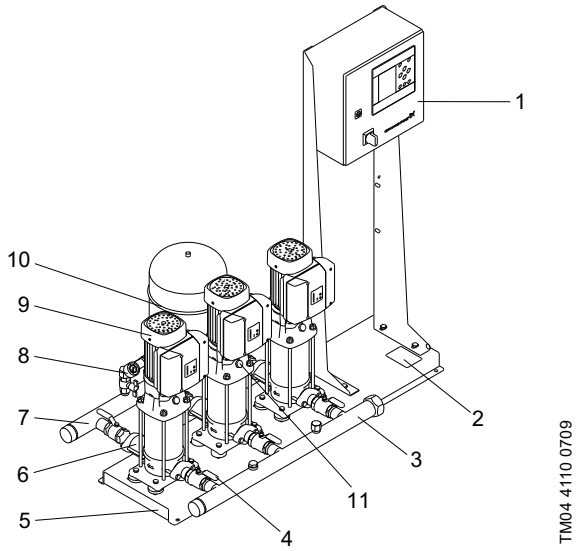


Fig. 9 MPC CRE system components

Pos.	Description	Quantity
1	Control cabinet	1
2	Nameplate	1
3	Inlet manifold	1
4	Isolating valve	2 per pump
5	Base frame	1
6	Non-return valve	1 per pump
7	Outlet manifold	1
8	Pressure transmitter or gauge	1
9	Pump	2-6
10	Diaphragm tank (optional)	1

System components for MPC CME

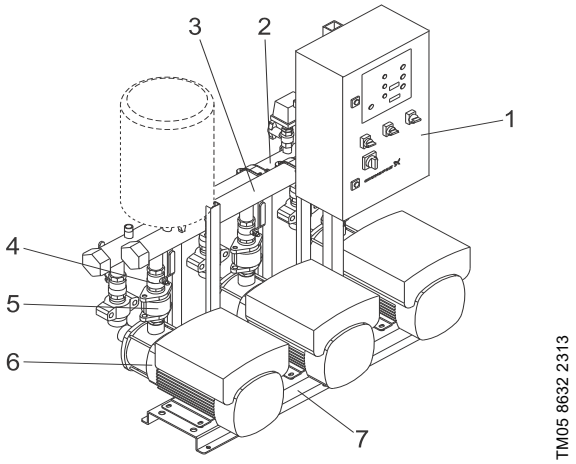


Fig. 10 Front view of the Hydro MPC CME pump system

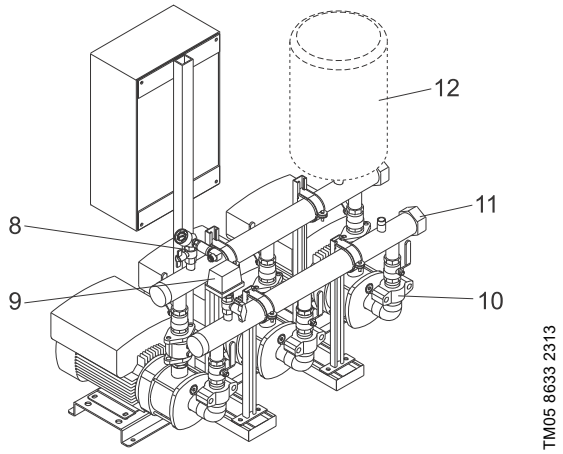
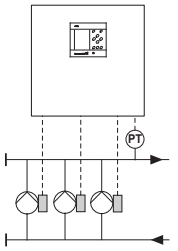
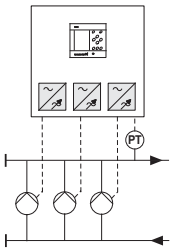
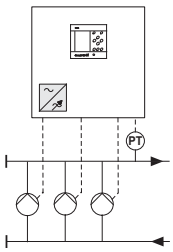
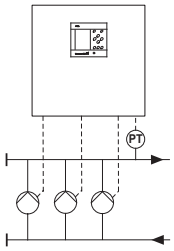
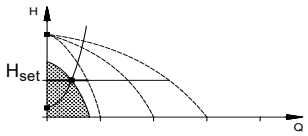
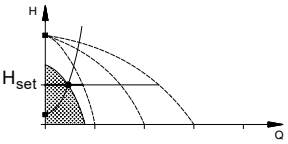
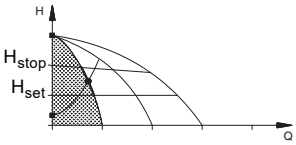
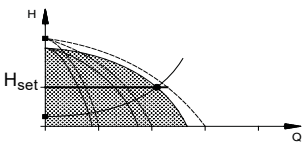
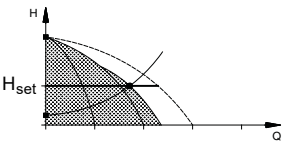
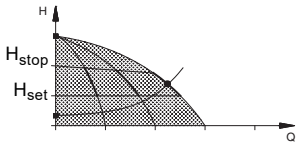


Fig. 11 Rear view of the Hydro MPC CME pump system

Pos.	Description	Quantity
1	Control cabinet	1
2	Inlet manifold (316 SS)	1
3	Outlet manifold (316 SS)	1
4	Isolating valve (nickel plated brass)	2 per pump
5	Non-return valve (Polyacetal (POM))	1 per pump
6	Pump (CME A-version CI/304 SS)	2-3
7	Base frame (304 SS)	1
8	Pressure transmitter and pressure gauge	1
9	Inlet pressure switch and pressure gauge	1
10	Oval flange connection (CME 3 - CME 10)	2 per pump
	Intermediate adapter connection (CME 15)	1 per pump
11	Screw cap or blanking flange	2
12	Optional diaphragm tank, available as an accessory	

4. Functions

Control variants

Pump systems with speed-controlled pumps		Pump systems with pumps connected to one CUE frequency converter	Pump systems with mains-operated pumps
Hydro MPC-E (CRE or CME)	**Hydro MPC-E (CUE)**	**Hydro MPC-F**	**Hydro MPC-S**
Hydro MPC pump system with three CRE, CME pumps.  TM03 0993 0905  TM074555 0419		Hydro MPC pump system with three CR pumps. One of the pumps is connected to a Grundfos CUE frequency converter in the control cabinet. The speed-controlled operation alternates between the pumps of Hydro MPC.  TM03 1265 1505	Hydro MPC pump system with three mains-operated CR, CRI pumps.  TM03 0999 0905
One CRE, CME pump in operation.  TM00 7995 2296		One CR pump connected to a Grundfos CUE frequency converter in operation.  TM00 7995 2296	One mains-operated CR, CRI pump in operation.  TM03 2045 3505
Three CRE, CME pumps in operation.  TM00 7996 2296		One CR pump connected to a Grundfos CUE frequency converter and two mains-operated CR pumps in operation.  TM00 7998 2296	Three mains-operated CR, CRI pumps in operation.  TM03 2046 3505
• Hydro MPC-E maintains a constant pressure through continuously variable adjustment of the speed of the CRE, CME pumps connected. • The performance is adjusted to the demand through cutting in/out the required number of CRE, CME pumps and through parallel control of the pumps in operation. • Pump changeover is automatic and depends on load, operating hours and fault. • All pumps in operation run at the same speed.		• Hydro MPC-F maintains a constant pressure through continuously variable adjustment of the speed of the CR pump connected to a Grundfos CUE frequency converter. The speed-controlled operation alternates between the pumps. • One CR pump connected to the Grundfos CUE frequency converter always starts first. If the pump cannot maintain the pressure, one or two mains-operated CR pumps are cut in. • Pump changeover is automatic and depends on load, operating hours and fault.	• Hydro MPC-S maintains pressure between H_{set} and H_{stop} throughfixed speed pumps cutting in/out the required number of pumps. • The operating range of the pumps lies between the lines H_{set} and H_{stop} (cut-out pressure). The cut-out pressure cannot be set, but is calculated automatically. • Pump changeover is automatic and depends on load, operating hours and fault.

CU 352 control panel

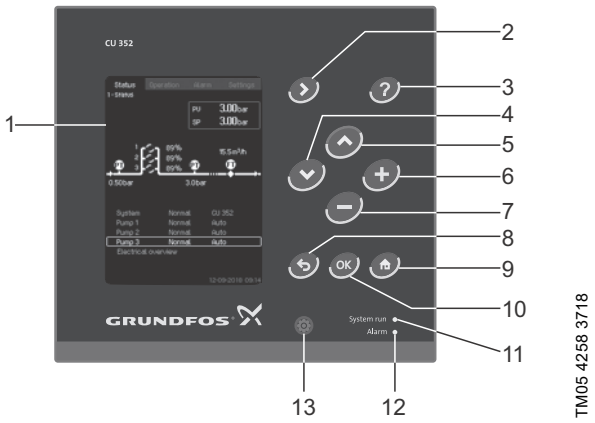


Fig. 12 CU 352 control panel

Key

Pos.	Description
1	Display
2	Arrow to the right
3	Help
4	Down
5	Up
6	Plus
7	Minus
8	Esc.
9	Home
10	OK
11	Indicator light, operation (green)
12	Indicator light, fault (red)
13	Display brightness

"Status" menu

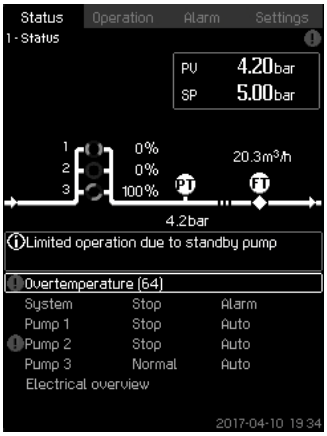


Fig. 13 "Status" menu

Description

- Reading of process value (PV) of control parameter and selected setpoint (SP).
- Graphical illustration of system (upper display half).
- Indication if any incidents occur during operation (middle of display).
- Reading of performance of system and individual pumps (lower display half).
- Button (?) for further information.
- Active buttons are on.

"Operation" menu

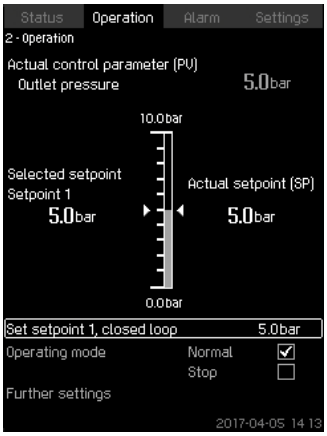


Fig. 14 "Operation" menu

Description

- Setting of basic parameters, for instance, setpoint or start/stop of system, or individual pumps.
- Reading of selected setpoint and current setpoint.
- Button (?) for further information.
- Active buttons are on.

"Alarm" menu

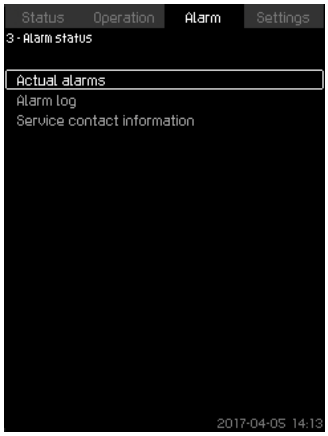


Fig. 15 "Alarm" menu

Description

- Overview of current warnings and alarms in clear text with detailed information:
  - The cause of the fault.
  - The remedy for the fault.
  - Where the fault occurred: system, pump no. 1…
  - When the fault occurred (time and date).
  - When the fault disappeared (time and date).
  - Whom to contact for service.
- Alarm log with up to 24 warnings and alarms.
- Button (?) for further information.
- Active buttons are on.

"Settings" menu

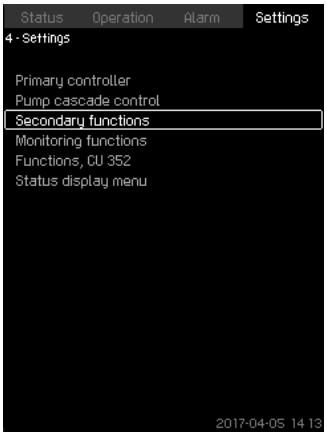


Fig. 16 "Settings" menu

Description

- Various settings:
  - External setpoint influence
  - Redundant primary sensor
  - Standby pumps
  - Stop function
  - Proportional pressure
  - Display language
  - Ethernet, etc.
- Button (?) for further information.
- Active buttons are on.

Overview of functions

	Hydro MPC		
	-E	-F	-S
Functions via the CU 352 control panel			
Constant-pressure control	●	●	● [1]
Proportional pressure	●	●	-
Automatic cascade control	●	●	●
Alternative setpoints	●	●	●
Multisensor[5]	●	●	●
Redundant primary sensor[4]	●	●	●
Minimum changeover time	●	●	●
Secondary sensor[5]	●	●	●
Number of starts per hour	●	●	●
Standby pumps	●	●	●
Forced pump changeover	●	●	●
Pump test run	●	●	●
Dry-running protection[4]	●	●	●
Stop function	●	●	- [2]
Password	●	●	●
Clock program	●	●	●
Pilot pump[4]	●	●	
Soft pressure buildup	●	●	●
Emergency run	●	●	●
Pump curve data	●	●	●
Flow estimation	●	●	●
Limit 1 and 2 exceeded	●	●	●
Pumps outside duty range	●	●	●
Log function	●	●	●
Monitoring of non-return valve[5]	●	-	-
Specific energy calculation	● [3]	-	-
Setpoint ramp	●	●	●
Reduced operation	●	●	●
Communication			
Ethernet connection	●	●	●
Other bus protocols: PROFIBUS, LonWorks, Modbus, GRM, GSM, BACnet MS/TP, Industrial Ethernet via CIM modules. For further information, see *12. Optional equipment*, page 87.	❍	❍	❍
External GENIbus connection	❍	❍	❍

● Standard.
❍ On request.
- Not available.

1 The pressure will be almost constant between H_{set} and H_{stop}. For further information, see page 15.

2 Hydro MPC-S has on/off control of all pumps. For further information, see page 22.

3 Requires that a flowmeter has been installed and connected.

4 Hardware not supplied as standard, but the functionality is available in the controller.

5 Systems with MLE motors, 0.50 - 30 Hp (0.37 - 22 kW).

Description of selected functions

Constant-pressure control of E-systems

Constant-pressure control ensures that the system delivers a constant pressure despite a change in consumption.

When taps are opened, water is drawn from the diaphragm tank, if installed. The pressure drops to a set cut-in pressure, and the first speed-controlled pump starts. The speed of the pump in operation is continuously increased to meet the demand. As the consumption rises, more pumps are cut in until the performance of the pumps in operation corresponds to the demand. During operation, CU 352 controls the speed of each pump individually according to known pump curve data downloaded into CU 352.

Furthermore, CU 352 regularly estimates whether pumps are to be cut in or out to ensure the best efficiency.

When the water consumption falls, pumps are cut out one by one to maintain the set outlet pressure.

Display language

Fig. 17 Display language

Via CU 352, you can select the language for the display.

Options

- English
- Danish
- German
- French
- Italian
- Spanish
- Portuguese
- Greek
- Dutch
- Swedish
- Finnish
- Polish
- Russian
- Korean
- Chinese
- Japanese
- Czech
- [N/A]
- Hungarian
- [N/A]
- Croatian
- Latvian
- Lithuanian
- Romanian
- Slovakian
- Slovenian
- Serbian Latin
- Indonesian
- Malay
- Estonian

Pump curve data

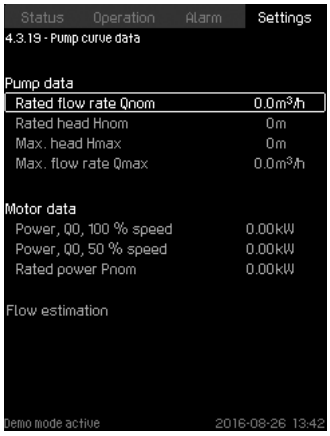


Fig. 18 Pump curve data

Pump curve data is loaded into the CU352 controller on the Hydro MPC pump system at the factory. The controller uses pump curve data along with inlet and outlet pressure information to determine where each pump is operating at. This optimizes performance and minimize energy consumption. The Hydro MPC CU352 controller knows exactly when to stage on and off pumps in operation based on hydraulic efficiency, and provides protection from running pumps outside their duty range.

Redundant primary sensor

A redundant sensor can be installed as backup for the primary sensor in order to increase reliability and prevent operation stop. The redundant primary sensor is at the same reference point as the primary sensor, i.e. in the outlet manifold of the pump system.

Note: The redundant primary sensor is available as a factory-fitted option.

Automatic cascade control

Cascade control ensures that the performance of Hydro MPC is automatically adapted to consumption by switching pumps on or off. This makes the system run as energy-efficiently as possible with a constant pressure and a limited number of pumps.

Alternative setpoints

This function makes it possible to set up to six setpoints as alternatives to the primary setpoint. The setpoints can be set for closed loop and open loop. The performance of the system can thus be adapted to other consumption patterns.

Example

A Hydro MPC pump system is used for irrigation of a hilly golf course.

Constant-pressure irrigation of golf course sections of different sizes and at different altitudes may require more than one setpoint.

For golf course sections at a higher altitude, a higher outlet pressure is required.

Log values

Fig. 19 Log values

The log function enables monitoring selected parameters. The data can be presented in the display or exported as a CSV file via the built-in Ethernet connection.

Specific energy calculation

For MPC-E systems with a flowmeter , CU 352 can calculate and show the specific energy used. It is shown as two values, the actual value and the average value.

Number of starts per hour

This function limits the number of pump starts and stops per hour. It reduces noise emission and improves the comfort of systems with mains-operated pumps.

Each time a pump starts or stops, CU 352 calculates when the next pump is allowed to start or stop not to exceed the permissible number of starts per hour.

This function always allows pumps to be started to meet the requirement, but pump stops are delayed, if necessary, not to exceed the permissible number of starts or stops per hour.

Standby pumps

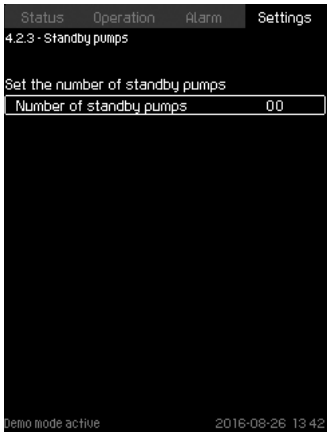


Fig. 20 Standby pumps

It is possible to let one or more pumps function as standby pumps. A pump system with, for instance, four pumps, one having the status of a standby pump, will run like a pump system with three pumps, as the maximum number of pumps in operation is the total number of pumps minus the number of standby pumps.

If a pump stops due to a fault, the standby pump is cut in. This function ensures that the system can maintain the rated performance even if one of the pumps stops due to a fault.

The status of a standby pump alternates between all pumps of the same type.

Forced pump changeover

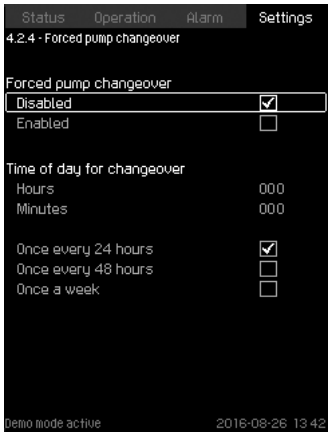


Fig. 21 Forced pump changeover

This function ensures that the pumps run for the same number of operating hours over time.

In certain applications, the required flow remains constant for long periods and does not require all pumps to run. In such situations, pump changeover does not take place naturally, and forced pump changeover may be required. Once every 24 hours, the controller checks if any pump in operation has been running continuously for the last 24 hours.

If this is the case, the pump with the largest number of operating hours stops and is replaced by the pump with the lowest number of operating hours.

Pump test run

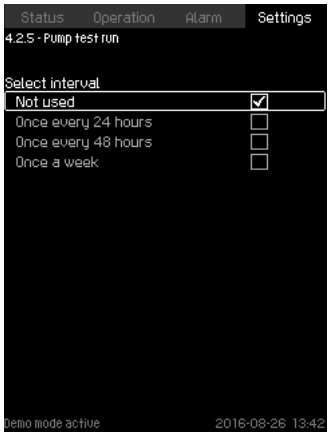


Fig. 22 Pump test run

This function is primarily used in connection with pumps that do not run every day.

Benefits:

- Pumps do not seize up during a long standstill due to deposits from the pumped liquid.
- The pumped liquid does not decay in the pump.
- Trapped air is removed from the pump.
- The pump starts automatically and runs for a short time.

Dry-running protection

This function is one of the most important protection functions, as dry running may damage bearings and shaft seals.

The inlet pressure of the system or the level in a tank on the inlet side is monitored. If the inlet pressure or the water level is too low, all pumps stop.

Level switches, pressure switches or analog sensors signalling water shortage at a set level can be used. Furthermore, you can set the system to be reset and restarted manually or automatically after a situation with water shortage.

Stop function

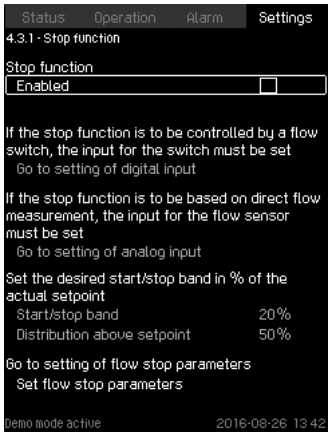


Fig. 23 Stop function

The stop function makes it possible to stop the last pump in operation if there is no or a very small consumption.

Purpose:

- to save energy
- to prevent heating of shaft-seal faces due to increased mechanical friction as a result of reduced cooling by the pumped liquid
- to prevent heating of the pumped liquid.

This function is only used in the Hydro MPC pump system with variable-speed pumps.

Note: Hydro MPC-S has on/off control of all pumps.

When the stop function is enabled, the operation of the system is continuously monitored to detect a low flow rate. If CU 352 detects no or a low flow rate (Q less than Q_{min}), it changes from normal constant-pressure operation to on/off control of the last pump in operation.

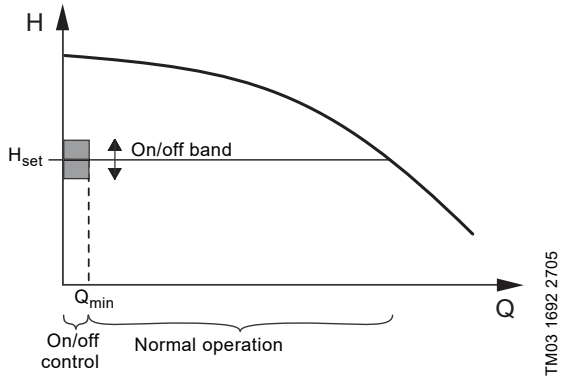


Fig. 24 On/off band

As long as the flow rate is lower than Q_{min}, the pump runs in on/off operation. If the flow rate is increased to above Q_{min}, the system returns to normal operation.

Via CU 352, you can set Hydro MPC to operate as energy-efficiently as possible or with the highest level of comfort.

Stop parameters

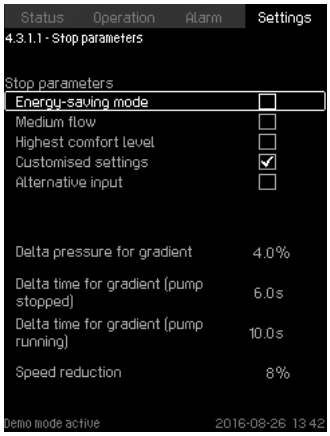


Fig. 25 Stop parameters

Five stop parameters can be selected:

- Energy-saving mode (factory setting)
  If you want the highest energy-saving mode possible.
- Medium flow
  If you want a compromise between the highest energy-saving mode and the highest comfort level.
- Highest comfort level
  If you want the highest comfort level without too many pump starts or stops.
- Customised settings
  If you want to make your own settings.
- Alternative input
  If you select this function, you can define the stop flow on the basis of the system setpoint, total tank volume or pre-charge pressure.

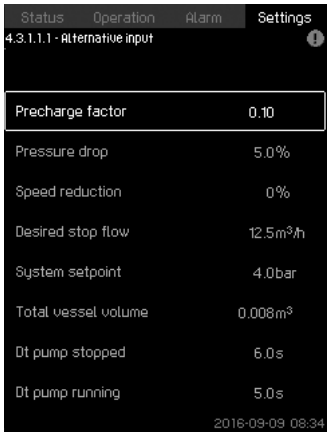


Fig. 26 Alternative input

Setpoint ramp

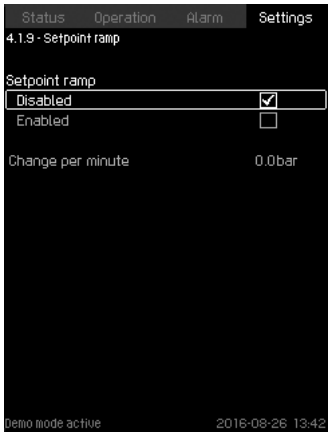


Fig. 27 Setpoint ramp

If this function is enabled, any setpoint change made via the controller, via clock program, when changing between alternative setpoints, or via a SCADA system, will be made gradually over time. In this way, smooth setpoint changes can be made, thus causing no discomfort to the consumer.

Pilot pump

The pilot pump takes over the operation from the main pumps in periods when the consumption is so small that the stop function of the main pumps is activated.

Purpose:

- to reduce the necessary size of the diaphragm tank
- to reduce the number of operating hours of the main pumps.

Password

Fig. 28 Password

Passwords make it possible to limit the access to the "Operation" and "Settings" menus in the controller. If access is limited, it is not possible to view or set any parameter in the menus.

Clock program

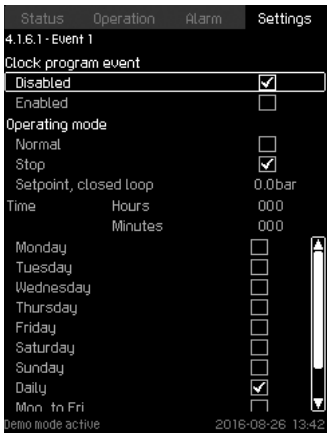


Fig. 29 Clock program

This function makes it possible to set up to ten events with specification of day and time for their activation or deactivation.

An example of application is sprinkling of golf courses at fixed times for the individual greens.

Proportional pressure

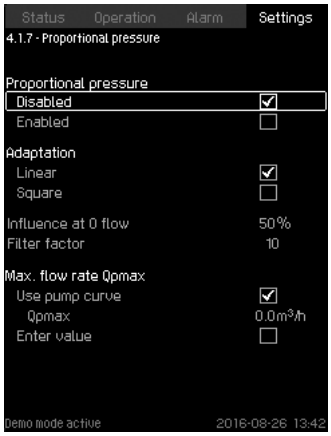


Fig. 30 Proportional pressure

This function can be used in applications to compensate for friction head needed at high flow and not needed at low flows.Purpose:

- to deliver the required water at all times
- to compensate for friction loss
- to keep energy consumption at a minimum
- to ensure the highest comfort level at tapping points, etc.
- to minimize water loss from leaks
- to reduce wear and tear on pipes.

In situations with high flow rates, the pressure loss in the pipe system is relatively high. To deliver a system pressure of 72.5 psi (5 bar) in such a situation, the outlet pressure of the system must be set to 87 psi (6 bar) if the pressure loss in the pipe system is 14.5 psi (1 bar).

In a low-flow situation, the pressure loss in the pipe system may only be 2.9 psi (0.2 bar). Here, the system pressure would be 84.1 psi (5.8 bar) if the setpoint was fixed to 87 psi (6 bar). That is 11.6 psi (0.8 bar) too high compared with the peak situation above.

To compensate for this excessive system pressure, the proportional-pressure function of CU 352 automatically adapts the setpoint to the actual flow rate. The adaptation can be linear or square. Such automatic adaptation offers you large energy savings and optimum comfort at the tapping point!

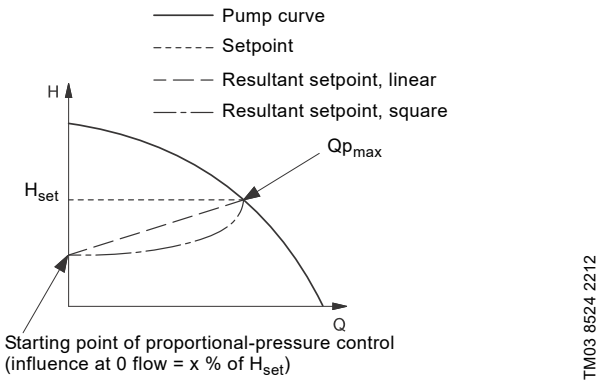


Fig. 31 Proportional-pressure control

Note: Qp_{max} is the expected maximum flow rate. It can either be set to the maximum flow the system can deliver at a determined setpoint, or a value can be entered manually based on a known or assessed maximum flow rate.

Example

Influence at 0 flow (Q0) = pressure loss in supply pipe x 100 / setpoint.

Influence at 0 flow (Q0) = 14.5 psi (1 bar) x 100 / 87 psi (6 bar) = 16.67 %.

Setpoint at Q_{min} with proportional-pressure control:

87 psi (6 bar) - (87 psi (6 bar) x 0.1667) = 72.5 psi (5 bar).

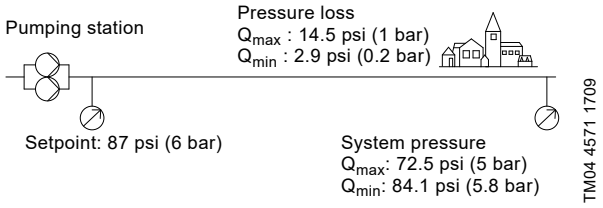


Fig. 32 Without proportional-pressure control

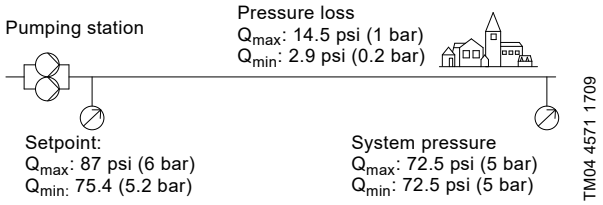


Fig. 33 With proportional-pressure control

Soft pressure build-up

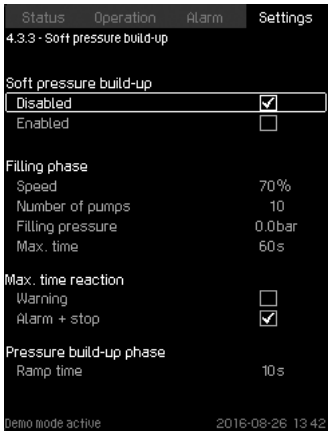


Fig. 34 Soft pressure build-up.

This function ensures a gradual pressure build-up with, for instance, empty pipes.

It has two phases:

1. The pipe is slowly filled with water.
2. When the system's pressure sensor detects that the pipe has been filled with water, the pressure is increased until it reaches the setpoint. See fig. 35.

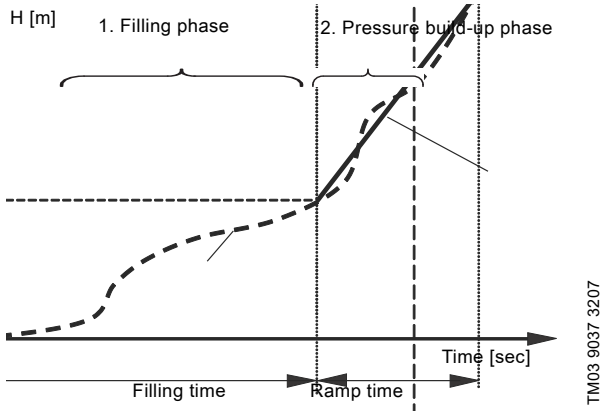


Fig. 35 Filling and pressure build-up phases

The function can be used to prevent water hammer in high-rise buildings with unstable power supply or in irrigation systems.

Emergency run

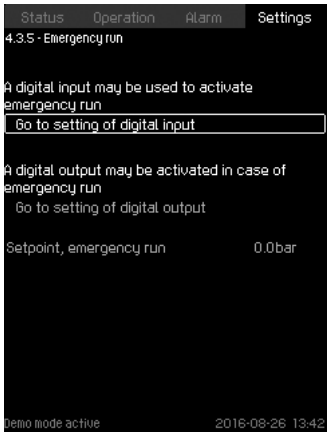


Fig. 36 Emergency run

This function is especially suited for important systems where the operation must not be interrupted. The function keeps all pumps running regardless of warnings or alarms. The pumps run according to a setpoint set specifically for this function.

Reduced operation

This function makes it possible to reduce the operation of the system via a digital input. The function is used in applications where the mains power is sometimes switched to generator power. To avoid using more power than the generator can deliver, the system can be derated via a digital input.

Status display menu

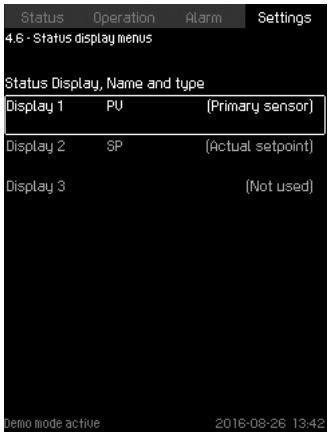


Fig. 37 Status display menu

The main status menu can show up to three status values.

In this menu, you can define each status value and a name for the value. Examples:

PV: process value

SP: setpoint

Q: flow rate.

Setting range

1. Name of each display value.
2. Selection of displays 1 to 3.

Setting the display value

1. Go to the Settings menu.
2. Select "Status display menu".
3. Mark the display and press [ok].
4. Enter a name for the display value.
5. Define the function of the display.

Status display menus

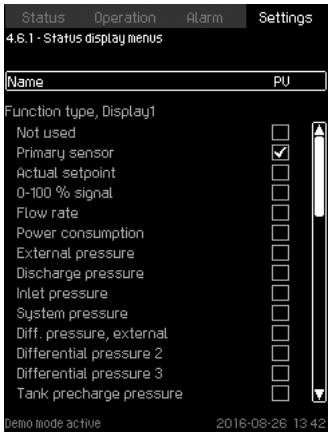


Fig. 38 Status display menus

Factory settings

Display 1: PV, primary sensor.

Display 2: SP, actual setpoint.

Non-return valve

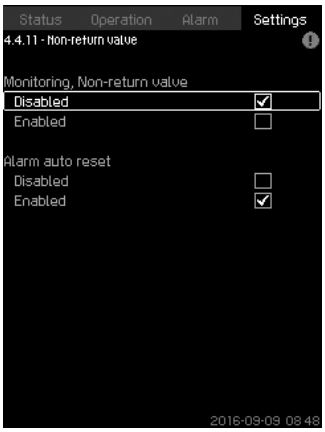


Fig. 39 Non-return valve

This function enables CU 352 to detect if a non-return valve is leaking or in need of replacement.

A small leakage results in a warning after five seconds.

If a non-return valve is in need of replacement, an alarm is given after 10 seconds, and the pump stops. In this case, the pump is not able to overcome the backflow through the pump with the faulty non-return valve.

Note: The function is only valid for MPC-E systems with MLE motors, model G, F, H, I and J.

Multisensor settings

This function is designed to control up to six zones in an HVAC system within a defined differential-pressure band. The function influences the actual setpoint if one of the multisensors is below or above its limits.

Furthermore, the system can optimize the actual setpoint if the energy-saving mode is activated by reducing the actual setpoint until the minimum limit of one of the multisensors is reached.

Multisensor settings

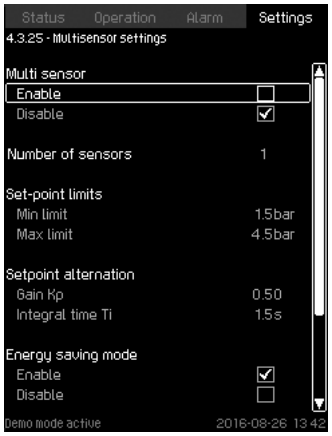


Fig. 40 Multisensor settings

Volume counter

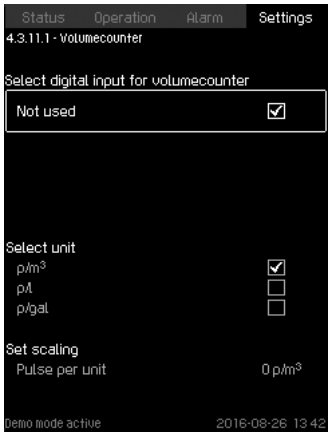


Fig. 41 Volume counter

You can set CU 352 to accumulate a pumped volume from a digital water meter.

Note: This menu only appears if an IO 351B module is connected to CU 352.

5. Installation

Mechanical installation

Location

Install the pump system in a well-ventilated room to ensure sufficient cooling of control cabinet and pumps.

Note: The pump system is not designed for outdoor installation and must not be exposed to direct sunlight.

Place the pump system with a 3 ft (1 m) clearance on front and two sides for inspection and service.

Pipes

Arrows on the pump base show the direction of flow of water through the pump.

The pipes connected to the pump system must be of adequate size.

Connect the pipes to the manifolds of the pump system. Either end can be used. Apply sealing compound to the unused end of the manifold and fit the screw cap. For manifolds with flanges, fit a blanking flange with gasket.

To optimize operation and minimize noise and vibration, it may be necessary to consider vibration dampening of the pump system.

Noise and vibration are generated by the rotations in motor and pump and by the flow in pipes and fittings. The effect on the environment is subjective and depends on correct installation and the state of the remaining system.

If pump systems are installed in blocks of flats or the first consumer on the line is close to the pump system, we recommend that you fit expansion joints on the inlet and outlet pipes to prevent vibration from being transmitted through the pipes.

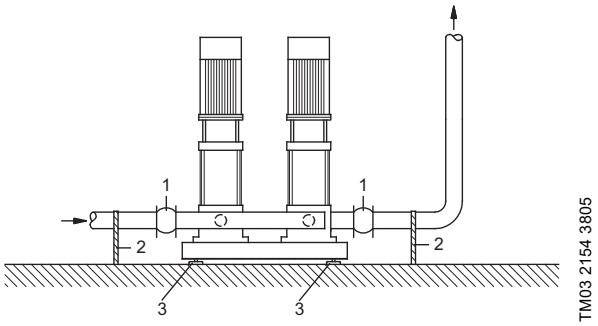


Fig. 42 Schematic view of hydraulic installation

Pos.	Description
1	Expansion joint
2	Pipe support (and good location for system isolation valve)
3	Vibration damper

Note: Expansion joints, pipe supports and machine shoes shown in fig. 42 are not included in a standard pump system.

Tighten all nuts before startup.

Fasten the pipes to parts of the building to ensure that they cannot move or be twisted.

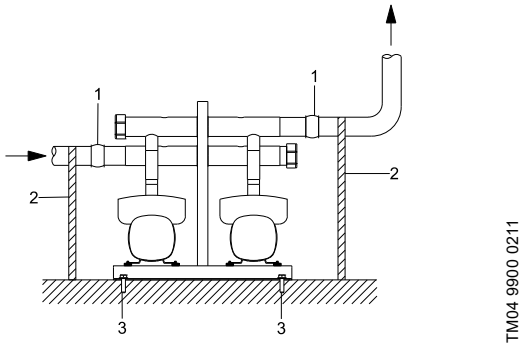


Fig. 43 Example showing the position of expansion joints, pipe supports and mounting bolts

Pos.	Description
1	Expansion joint (recommended accessory) (Good location for system isolating valves.)
2	Pipe support
3	Mounting bolt

Note: Expansion joints, pipe supports and mounting bolts shown in fig. 42 above are not included in a standard booster system.

Fasten the pipes to parts of the building to ensure that they cannot move or be twisted.

Foundation

Position the pump system on an even and solid surface, such as a concrete floor or foundation. If the pump system is not fitted with vibration dampers, bolt it to the floor or foundation.

Note: As a rule of thumb, the weight of a concrete foundation must be 1.5 times the weight of the pump system.

Dampening

To prevent the transmission of vibrations to buildings, it may be necessary to isolate the pump system foundation from building parts by means of vibration dampers.

Which is the right damper varies from installation to installation, and a wrong damper may increase the vibration level. Vibration dampers must, therefore, be sized by the supplier.

If you install the pump system on a base frame with vibration dampers, always fit expansion joints on the manifolds. This is important to prevent the pump system from "hanging" in the pipes.

Expansion joints

Expansion joints provide these advantages:

- absorption of thermal expansion and contraction of pipes caused by variations in liquid temperature
- reduction of mechanical influences in connection with pressure surges in the pipes
- isolation of structure-borne noise in the pipes (only rubber bellows expansion joints).

Note: Do not fit expansion joints to compensate for inaccuracies in the pipes, such as center displacement of flanges.

Fit expansion joints at a distance of a minimum of 1 to 1.5 times the nominal flange diameter from the manifold on the inlet as well as on the outlet side. This prevents the development of turbulence in the expansion joints, resulting in better inlet conditions and a minimum pressure loss on the outlet side. At high water velocities of more than 5 m/s, we recommend that you fit larger expansion joints corresponding to the pipes.

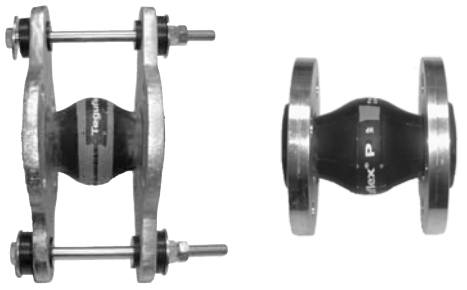


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Fig. 44 Examples of rubber bellows expansion joints with and without limiting rods

Expansion joints with limiting rods can be used to minimize the forces caused by the expansion joints. We recommend that you always use expansion joints with limiting rods for flanges larger than 4 inches.

Anchor the pipes so that they do not stress the expansion joints, manifolds and the pump. Follow the supplier's instructions and pass them on to advisers or pipe installers.

Electrical installation

The electrical installation must be carried out by authorized staff in accordance with local regulations and the relevant wiring diagram.

- The electrical installation of the pump system must be carried out in accordance with enclosure class IP54.
- Check that the power supply and frequency correspond to the values stated on the nameplate. Contact Grundfos if you have special voltage requirements.
- Make sure that the conductor cross-section meets the specifications in the wiring diagram.

6. Sizing

Take these parameters into account when sizing a pump system:

- The performance of the pump system must meet the highest possible demand both in terms of flow rate and pressure.
- The pump system must not be oversized. This is important in relation to installation and operating costs.

You can size the Grundfos Hydro MPC pump systems via Grundfos Product Center or this data booklet.

Sizing in Grundfos Product Center (recommended)

We recommend that you size your Hydro MPC pump system in Grundfos Product Center, which is a selection program offered by Grundfos. For further information, see page 94.

Fig. 45 Sizing in Grundfos Product Center

Sizing via this data booklet

There are seven steps:

1. maximum flow requirement
2. required outlet pressure
3. system layout
4. consumption profile and load profile
5. inlet pressure
6. selection of pump system
7. accessories.

1. Maximum flow requirement

The total consumption and the required maximum flow rate depend on the application in question. The maximum flow requirement can be calculated by means of the table below which is based on statistical data.

Consumer	Unit	Q_{year}	Consumption period d	Q_{day}	fd	$Q(m)_{day}$	ft (m)	Maximum flow rate
		[gal/year (m^3/year)]	[days/year]	[gal-day (m^3/day)]		[m^3/day]		[gpm (m^3/h)]
Residence building	Residence (2.5 persons)	48344 (183)	365	132 (0.5)	1.3	172 (0.65)	1.7 (0.51)	0.20 (0.046)
Office building	Employee	6604 (25)	250	26 (0.1)	1.2	32 (0.12)	3.6 (1.09)	0.08 (0.018)
Shopping centre	Employee	6604 (25)	300	21 (0.08)	1.2	26 (0.1)	4.3 (1.31)	0.08 (0.018)
Supermarket	Employee	21134 (80)	300	71 (0.27)	1.5	11 (0.4)	3.0 (0.91)	0.22 (0.05)
Hotel	Bed	47551 (180)	365	132 (0.5)	1.5	198 (0.75)	4.0 (1.21)	0.55 (0.125)
Hospital	Bed	79252 (300)	365	21 (0.8)	1.2	264 (1.0)	3.0 (0.91)	0.53 (0.12)
School	Pupil	2113 (8)	200	11 (0.04)	1.3	17 (0.065)	2.5 (0.76)	0.03 (0.007)

fd: Maximum consumption factor, day
ft: Maximum consumption factor, hour

Example: Hotel with 540 beds

Number of beds:	n
Total annual consumption:	Q_{year} x n
Consumption period:	d
Average consumption per day:	(Q_{year} x n) / d
Yearly maximum consumption:	$Q(m)_{day}$ = fd x Q_{day}
Maximum flow requirement per hour:	Q_{max} = maximum flow rate/hour x number of beds.

Calculation

n	=	540 beds.
Q_{year} x n	=	47551 x 540 = 25,677,540 gal/year (180 x 540 = 97,200 m^3/year).
d	=	365 days/year.
(Q_{year} x n)/d	=	25,677,541/365 = 70,349 gal/day (97,200/365 = 266.3 m^3/day).
$Q(m)_{day}$	=	fd x Q_{day} = 1.5 x 266.3 = 399.4 m^3/day.
Q_{max}	=	Maximum flow rate/hour x number of beds = 0.55 x 540 = 297 gph (0.125 x 540 = 67.5 m^3/h).

2. Required outlet pressure

The required outlet pressure of Hydro MPC can be calculated with the following equation:

$p_{set} = p_{tap(min)} + p_f + (h_{max}/10.2)$
$p_{boost} = p_{set} - p_{in(min)}$

Key

p_{set} = Required outlet pressure in bar
$p_{tap(min)}$ = Required minimum pressure at the highest tapping point in bar
p_f = Total pipe friction loss in meters
h_{max} = Height from pump outlet port to highest tapping point in meters
$p_{in(min)}$ = Minimum inlet pressure in bar
p_{boost} = Required boost in bar.

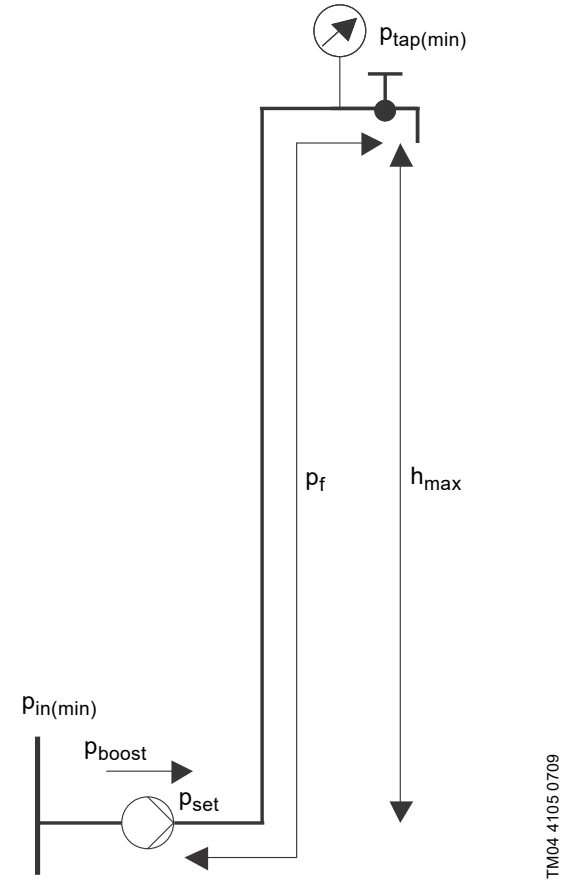

Fig. 46 Calculation of required outlet pressure

Calculation

$p_{tap(min)}$ = 29 psi (2 bar)
p_f = 17.4 psi (1.2 bar)
h_{max} = 136.1 ft. (41.5 m)
$p_{in(min)}$ = 29 psi (2 bar)
p_{set} = 2 + 1.2 + (41.5/10.2) = 105.8 psi (7.3 bar)
p_{boost} = 7.3 - 2 = 76.8 psi (5.3 bar).

3. System layout

What is the system layout?

a) Direct boosting
Example: Hydro MPC connected to water mains designed to distribute water from one place to another.

b) Break tank
Example: Hydro MPC connected to a break tank installed before the pump system.

c) Pressure boosting in zones
Example: High-rise building or hilly landscape where the water supply system is divided into zones.

d) Roof tank
Example: Hydro MPC distributes water to a roof tank on top of a high-rise building.

4. Consumption profile and load profile

The consumption pattern of the installation can be illustrated as a 24-hour consumption profile and a load profile.

24-hour consumption profile

The 24-hour consumption profile is the relation between the time of the day and the flow rate.

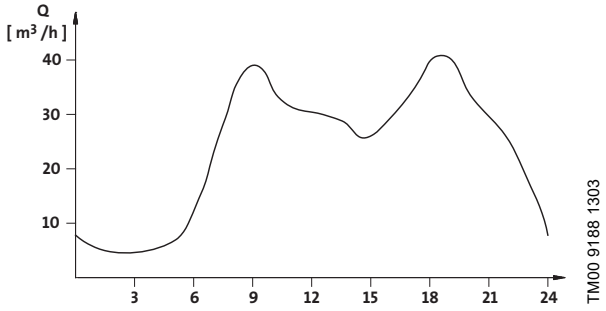

Fig. 47 Example of 24-hour consumption profile

Note: If the consumption is variable, and optimum comfort is required, use pumps with continuously variable speed.

Load profile

When the 24-hour consumption profile has been determined, the load profile can be made.

The load profile gives an overview of how many per cent per day the pump system operates at a specific flow rate.

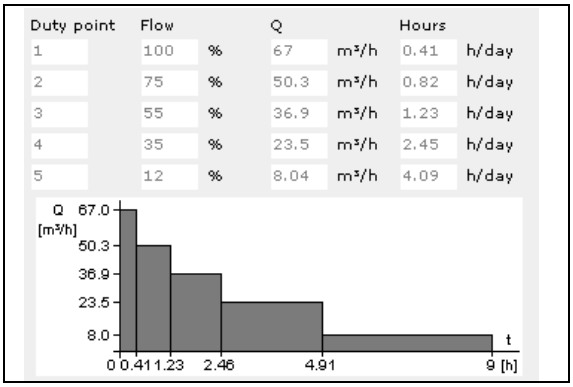

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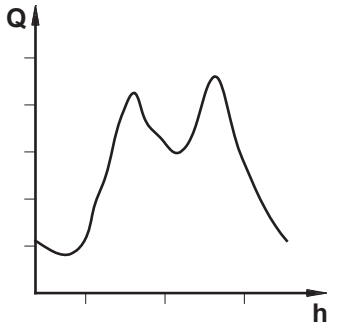
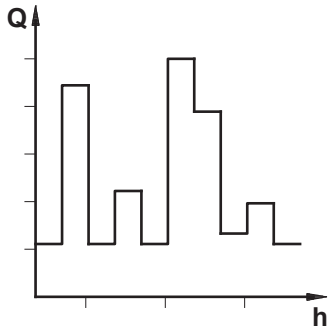
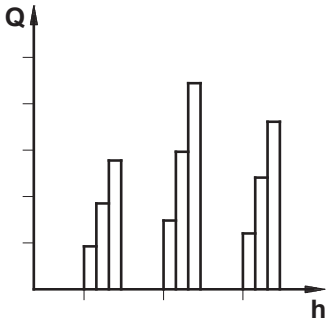
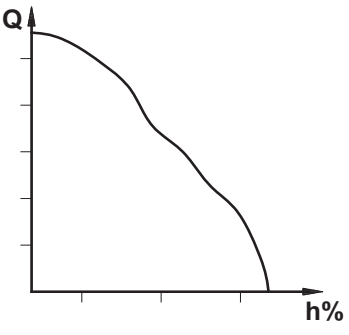
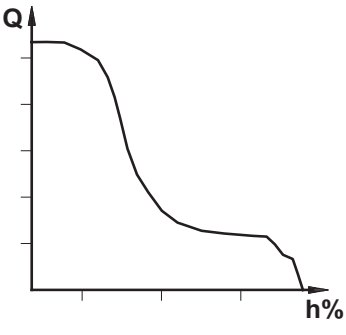
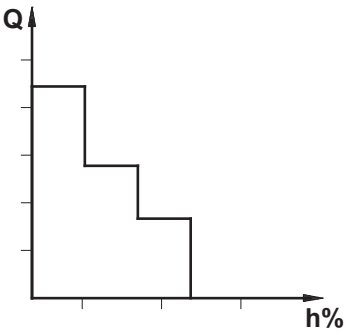
Fig. 48 Load profile

Examples of typical 24-hour consumption profiles and their load profiles:

	Water supply	Industry	Irrigation
24-hour profile	 TM00 9197 1705	 TM00 9200 1705	 TM00 9198 1705
	Flow rate: Highly variable **Pressure:** Constant	**Flow rate:** Highly variable with sudden changes **Pressure:** Constant	**Flow rate:** Constant and known **Pressure:** Constant
Duty-time profile	 TM00 9201 1705	 TM00 9199 1705	 TM00 9202 1705
	Consumption is highly variable. Continuously variable speed control of the pumps is recommended. **Recommended types:** -E and -F	Consumption is highly variable with sudden changes. Continuously variable speed control of the pumps is recommended. **Recommended types:** -E and -F	Variations in consumption are regular, yet known. Simple control is recommended. **Recommended types:** -S

5. Inlet pressure

If there is a positive inlet pressure, take the inlet pressure into consideration to ensure safe operation.

If there is a positive inlet pressure, this has to be added to the outlet pressure supplied by the pump system in order to evaluate the resulting maximum outlet pressure.

Example

A Hydro MPC-E pump system with 3 CRE 20-7 pumps has been selected.

Maximum operating pressure: 232 psi (16 bar).

Maximum inlet pressure: 145 psi (10 bar).

Outlet pressure against a closed valve: 145 psi (10 bar).

The selected system is allowed to start at an inlet pressure of a maximum of 84.1 psi (5.8 bar), as the maximum operating pressure is limited to 232 psi (16 bar). If the maximum inlet pressure exceeds 84.1 psi (5.8 bar), select a system rated PN 25.

6. Selection of Hydro MPC pump system

Select the pump system on the basis of these factors: maximum flow requirement, required outlet pressure, load profile, number of pumps required and possible standby pumps.

7. Accessories

When you have selected the optimum Hydro MPC pump system, consider whether you require any of the accessories mentioned below.

Dry-running protection

Every pump system must be protected against dry running.

The inlet conditions determine the type of dry-running protection:

- If the system draws water from a tank or a well, select a level switch or an electrode relay for dry-running protection.
- If the system has an inlet pressure, select a pressure transmitter or a pressure switch for dry-running protection.

Pilot pump

If a pilot pump is selected, size it according to the size of the main pumps in the system. As a rule of thumb, the pilot pump must not be smaller than one-fifth of the flow of a main pump at the desired setpoint.

Selection of diaphragm tank

The need for a diaphragm tank should be estimated on the basis of the following guidelines:

- All Hydro MPC pump sets in buildings must be equipped with a diaphragm tank due to the stop function.
- Normally, Hydro MPC pump sets in water supply applications require no diaphragm tank as long as piping layouts partly hold the necessary capacity, partly have the elasticity to give sufficient capacity. **Note:** A tank may be necessary to avoid the risk of water hammering a diaphragm.
- The need for a diaphragm tank for Hydro MPC pump sets in industrial applications should be estimated from situation to situation on the basis of the individual factors on site.

Pump type	Recommended diaphragm tank size [gal (L)]			
	-E	-E(CUE)	-F	-S
CR, CRE 3	4.4 (17)	4.4 (17)	4.4 (17)	20 (76)
CR, CRE 5	4.4 (17)	4.4 (17)	4.4 (17)	34 (129)
CR, CRE 10	10.3 (39)	10.3 (39)	10.3 (39)	62 (235)
CR, CRE 15	34 (129)	34 (129)	34 (129)	211 (799)
CR, CRE 20	34 (129)	34 (129)	34 (129)	211 (799)
CR, CRE 32	44 (167)	44 (167)	44 (167)	317 (1200)
CR, CRE 45	86 (326)	86 (326)	86 (326)	528 (1999)
CR, CRE 64	132 (500)	132 (500)	132 (500)	1056 (3997)
CR, CRE 95	132 (500)	132 (500)	132 (500)	1056 (3997)
CR, CRE 125	211 (799)	211 (799)	211 (799)	(2) x 1056 (3997)
CR, CRE 155	211 (799)	211 (799)	211 (799)	(2) x 1056 (3997)

Recommended diaphragm tank size	
Pump type	**Tank size [gal (L)]**
CME 3	4.4 (17)
CME 5	4.4 (17)
CME 10	10.3 (39)
CME 15	34 (129)

The size of the recommended diaphragm tank in gallons can be calculated from the following equations:

Hydro MPC-E, -E(CUE), and -F

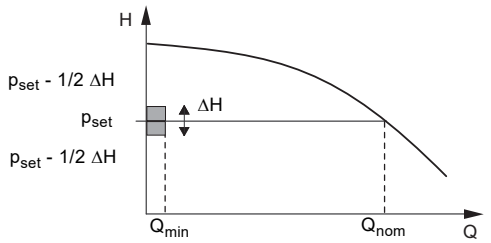
$$V_0 = \frac{k_Q \cdot Q \cdot (p_{set} + 14.5)^2 \cdot \left(\frac{3600}{N} - 10\right)}{60 \cdot (k_f \cdot (p_{set} + 14.5) \cdot k_H \cdot p_{set}}$$

Hydro MPC-S

$$V_0 = \frac{15 \cdot Q \cdot (p_{set} + 14.5) \cdot k_H \cdot p_{set} + p_{set} + 14.5)}{N \cdot (k_f \cdot p_{set} + 14.5) \cdot k_H \cdot p_{set}}$$

Symbol	Description
V_0	Tank volume [gallons]
k_Q	The ratio between nominal flow rate of one pump Q_{nom} and the flow rate Q_{min} at which the pump is to change to on/off operation. $k_Q = Q_{min}/Q_{nom}$, (0.10 for CR Pumps, 10 %)
Q	Mean flow rate, Q_{nom} [gpm]
p_{set}	Setpoint [psi]
k_H	The ratio between the on/off band ΔH and the setpoint p_{set}, $k_H = \Delta H/p_{set}$
k_f	The ratio between tank pre-charge pressure p_0 and the setpoint p_{set}. $k_f = p_0/pset$. 0.9 for Hydro MPC-S 0.7 for Hydro MPC-E, -E(CUE), and -F
N	Maximum number of starts/stops per hour

Hydro MPC-E, -E (CUE), and -F



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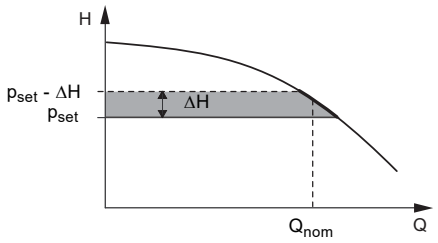
Hydro MPC-S



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The tank values are based on the following data:

Symbol	Hydro MPC	
	-E, -E(CUE), and -F	-S
Q	Q_{nom} of one pump	Q_{nom} of one pump
k_Q	10 %	-
p_{set}	58 psi (4 bar)	58 psi (4 bar)
k_H	20 %	25 %
k_f	0.7	0.9

Example of Hydro MPC-E and -S with CR, CRE 10

Symbol	Hydro MPC-E	Hydro MPC-S
Q [gpm (liter)]	44 (166)	44 (166)
k_Q	10 %	-
k_H	20 %	25 %
p_{set} [psi (bar)]	58 (4 bar)	58 (4 bar)
N [h^{-1}]	200	100
Result		
V_0 [gallons (liter)]	4.83 (18)	43.0 (163)
Selected tank [gallon (liter)]	4.4 or 10.3 (16.65 or 38.61)	44 or 62 gallon (167 or 235)
ΔH [psi (bar)]	11.6 (0.80 bar)	14.5 (1.0 bar)
p_0 [psi (bar)]	40.6 (2.80 bar)	52.2 (3.60 bar)

7. Curve conditions

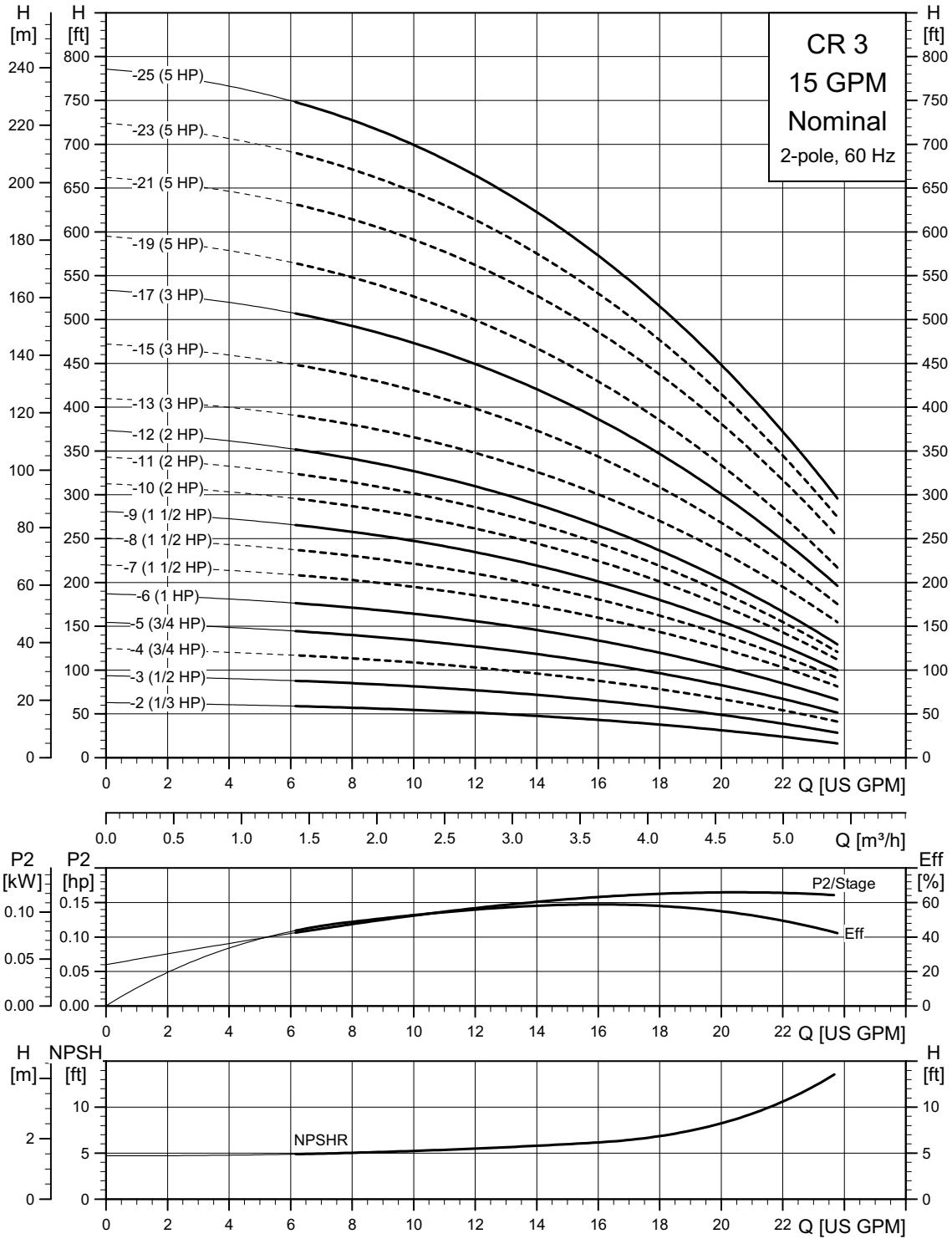
How to read the curve charts

The guidelines below apply to the curves on the following pages:

- Measurements have been made with airless water at a temperature of 68 °F (20 °C).
- The curves apply to a kinematic viscosity of υ is equal to 1 mm^2/s (1 cSt).
- The QH curves apply to fixed speeds of 2900 min^{-1} at 50 Hz and 3480 min^{-1} at 60 Hz.
  Note: In most cases, the actual speed deviates from the above-mentioned speeds. For realistic curves, please refer to Grundfos Product Center where the pump curves include the characteristics of the selected motor and therefore show curves at actual speeds.
  In Grundfos Product Center, you can also adjust the curves depending on the density and viscosity.
- The conversion between head H [m] and pressure p [kPa] applies to a water density of ρ equal to 1000 kg/m^3.

8. Curve charts, Hydro MPC-E, 60 Hz

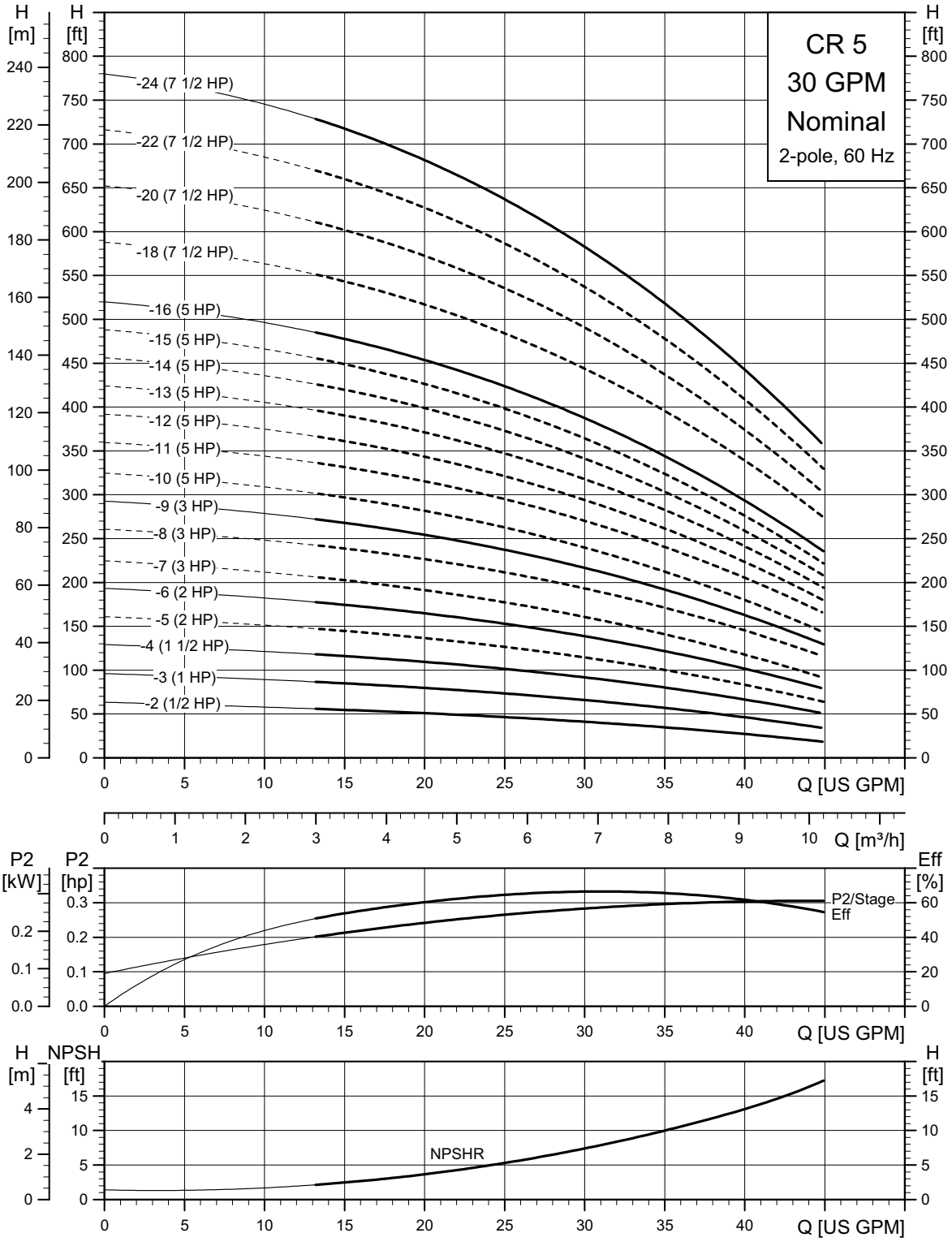
Hydro MPC-E with CR, CRE 3



TM07 4788 0619

Note: Irrespective of the input frequency, the 100 % speed of pumps is approximately 3480 min^{-1}.

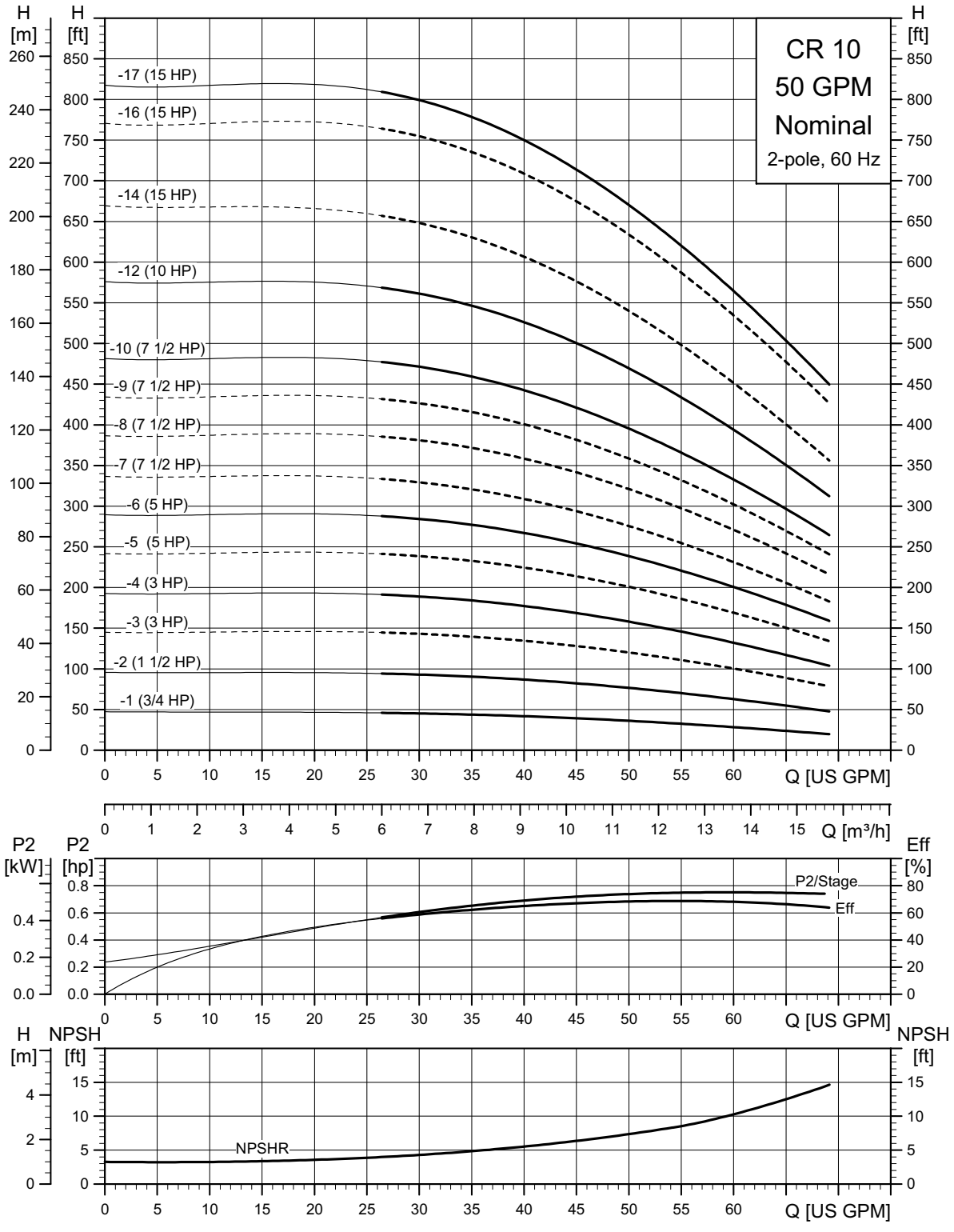
Hydro MPC-E with CR, CRE 5



TM07 4789 0619

Note: Irrespective of the input frequency, the 100 % speed of pumps is approximately 3480 min^{-1}.

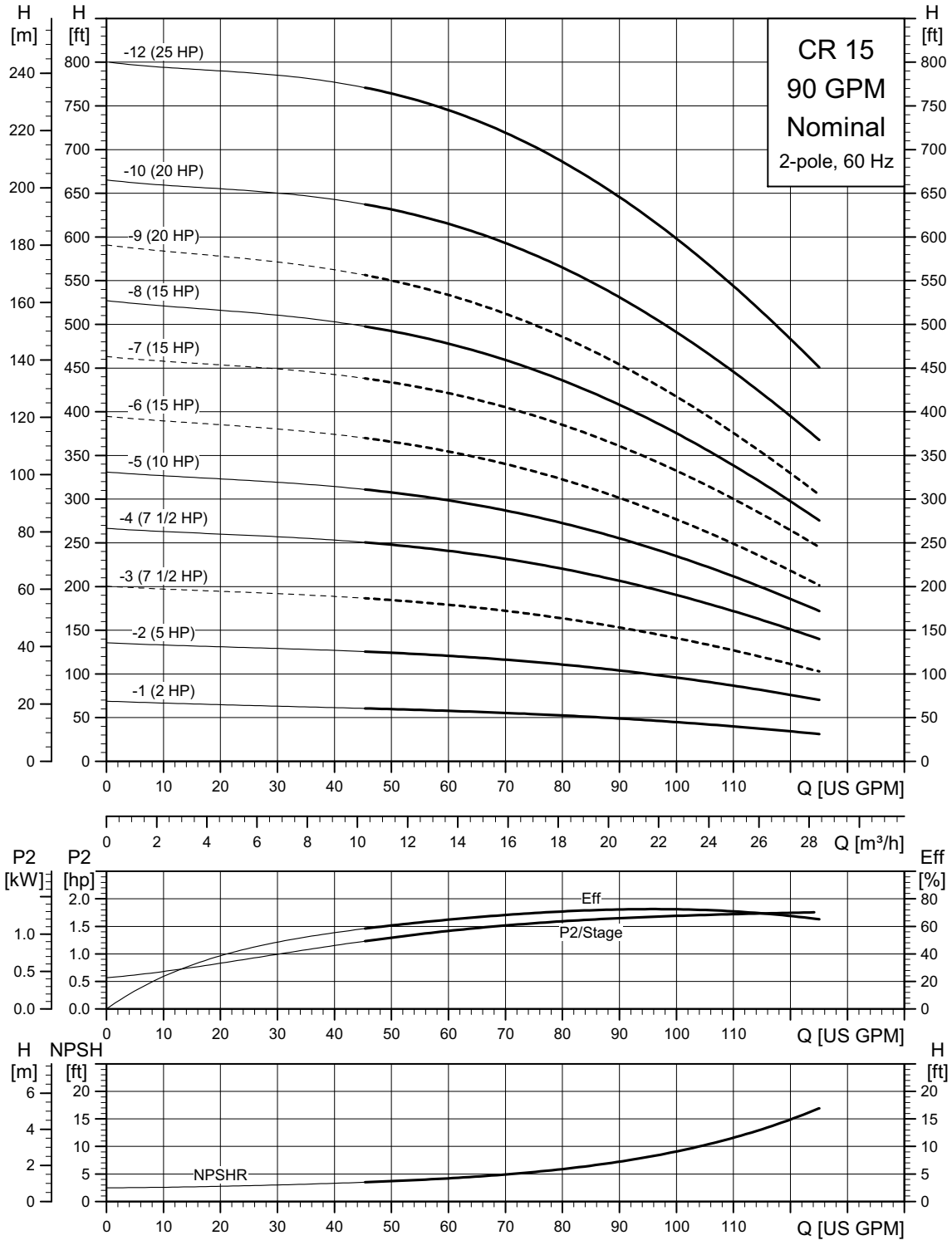
Hydro MPC-E with CR, CRE 10



TM07 4790 0619

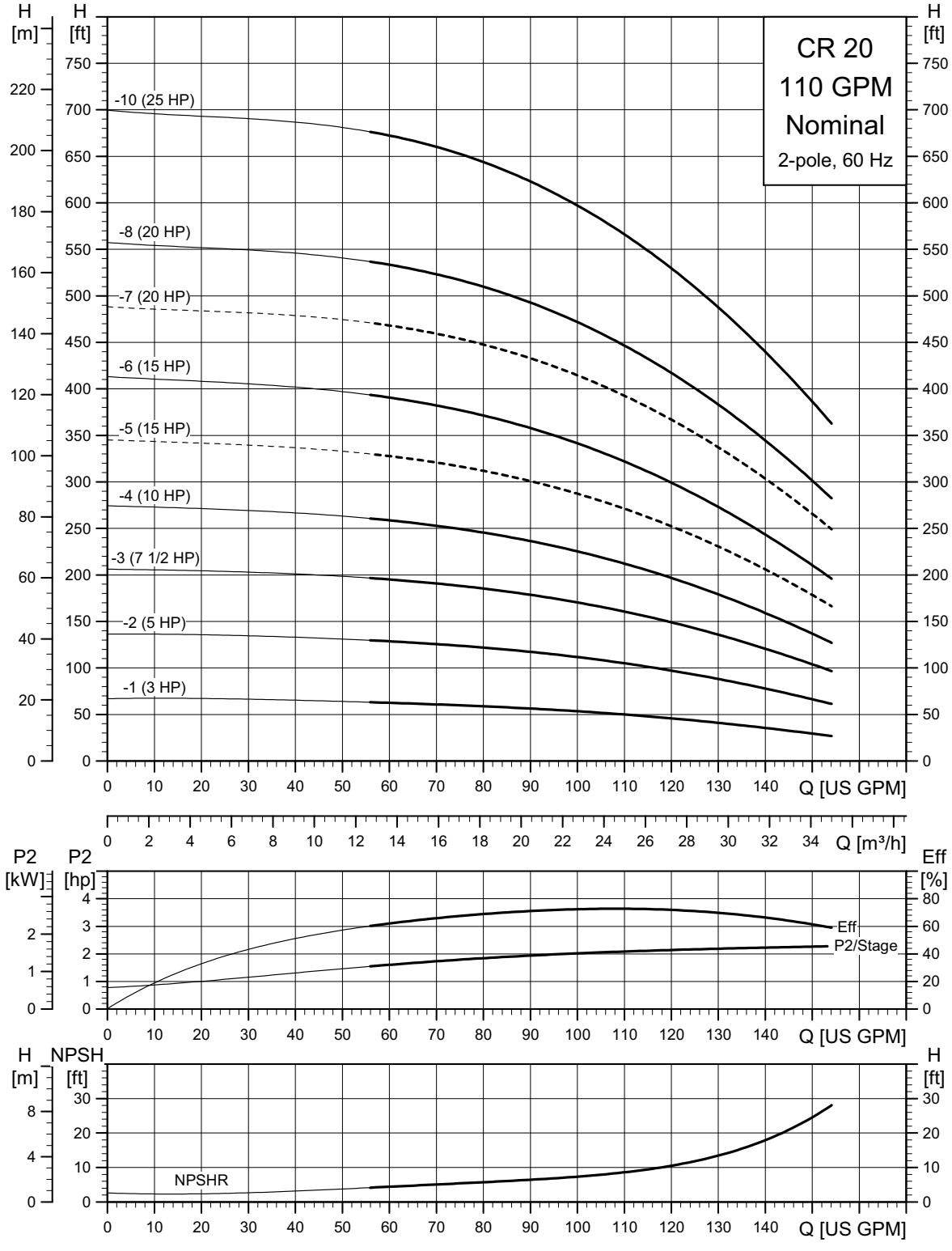
Note: Irrespective of the input frequency, the 100 % speed of pumps is approximately 3480 min^{-1}.

Hydro MPC-E with CR, CRE 15



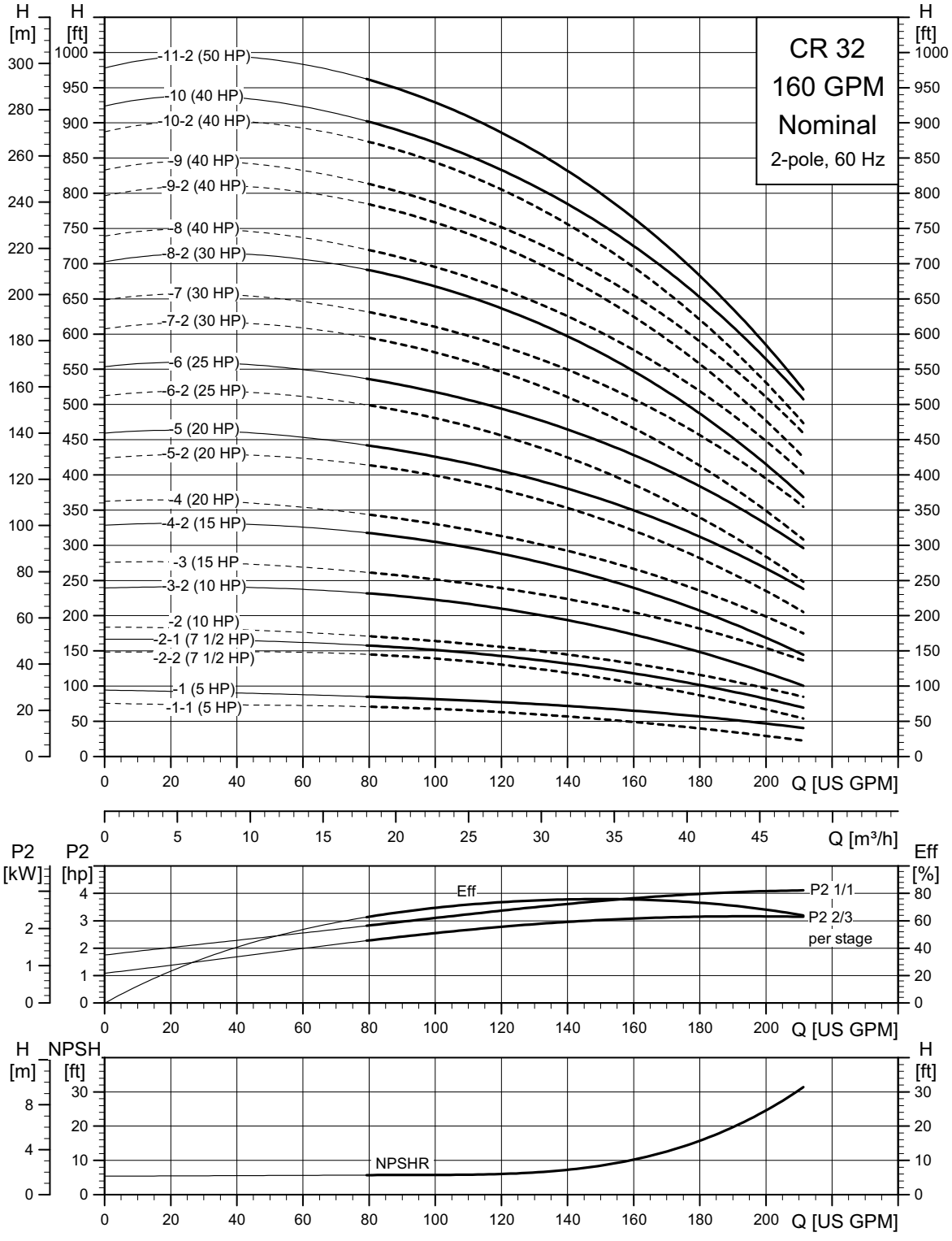
Note: Irrespective of the input frequency, the 100 % speed of pumps is approximately 3480 min^{-1}.

Hydro MPC-E with CR, CRE 20



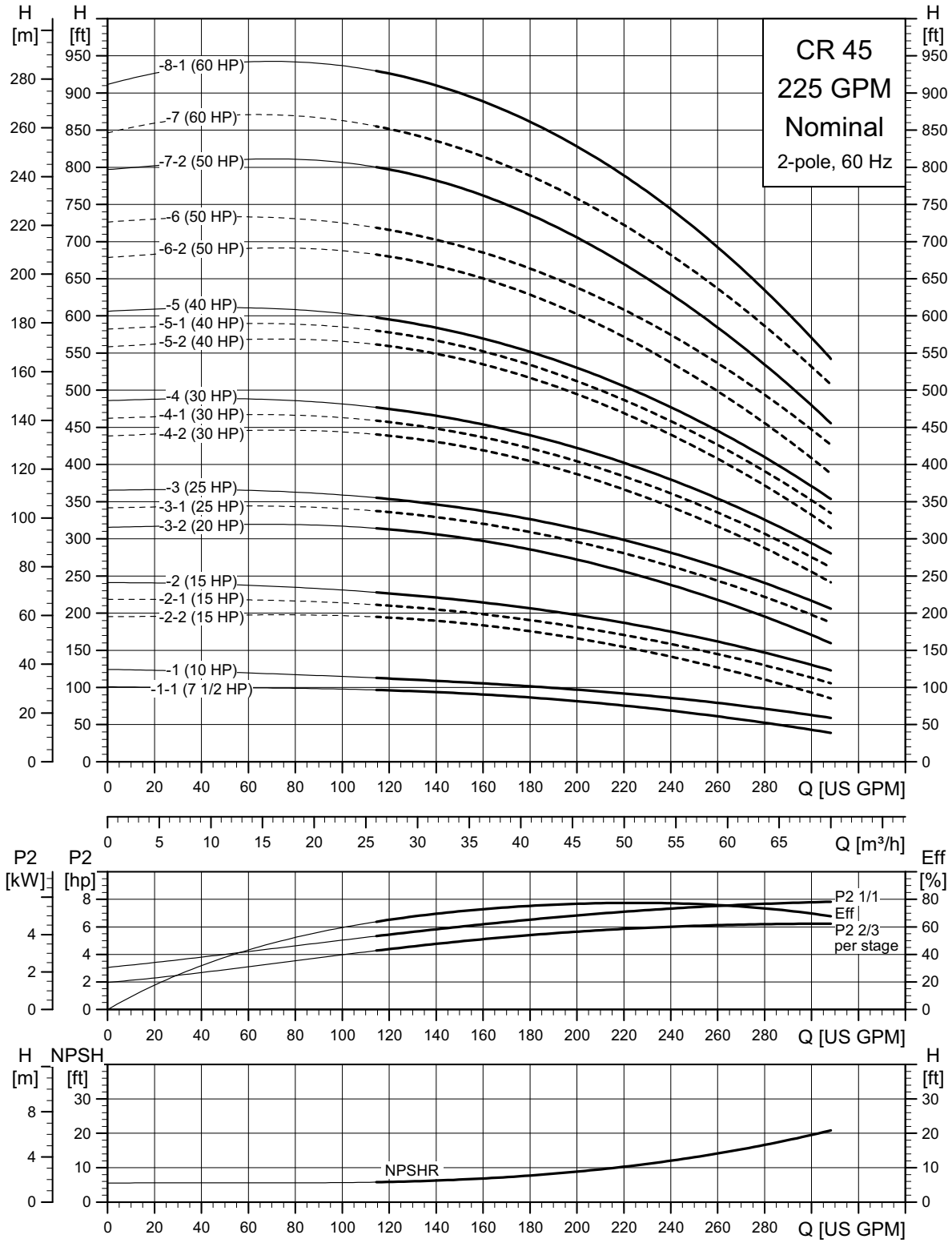
Note: Irrespective of the input frequency, the 100 % speed of pumps is approximately 3480 min^{-1}.

Hydro MPC-E with CR, CRE 32



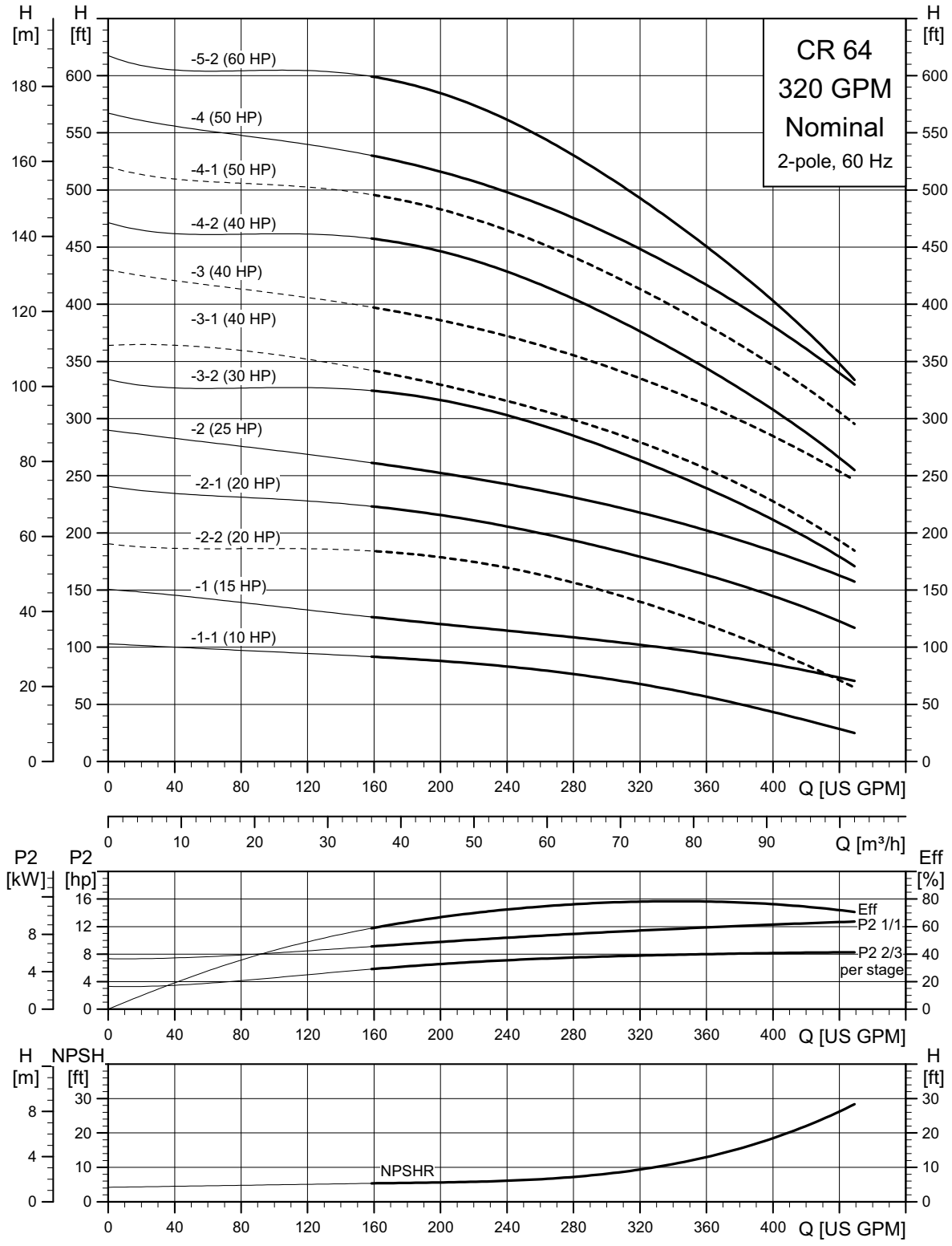
Note: Irrespective of the input frequency, the 100 % speed of pumps is approximately 3480 min^{-1}.

Hydro MPC-E with CR, CRE 45



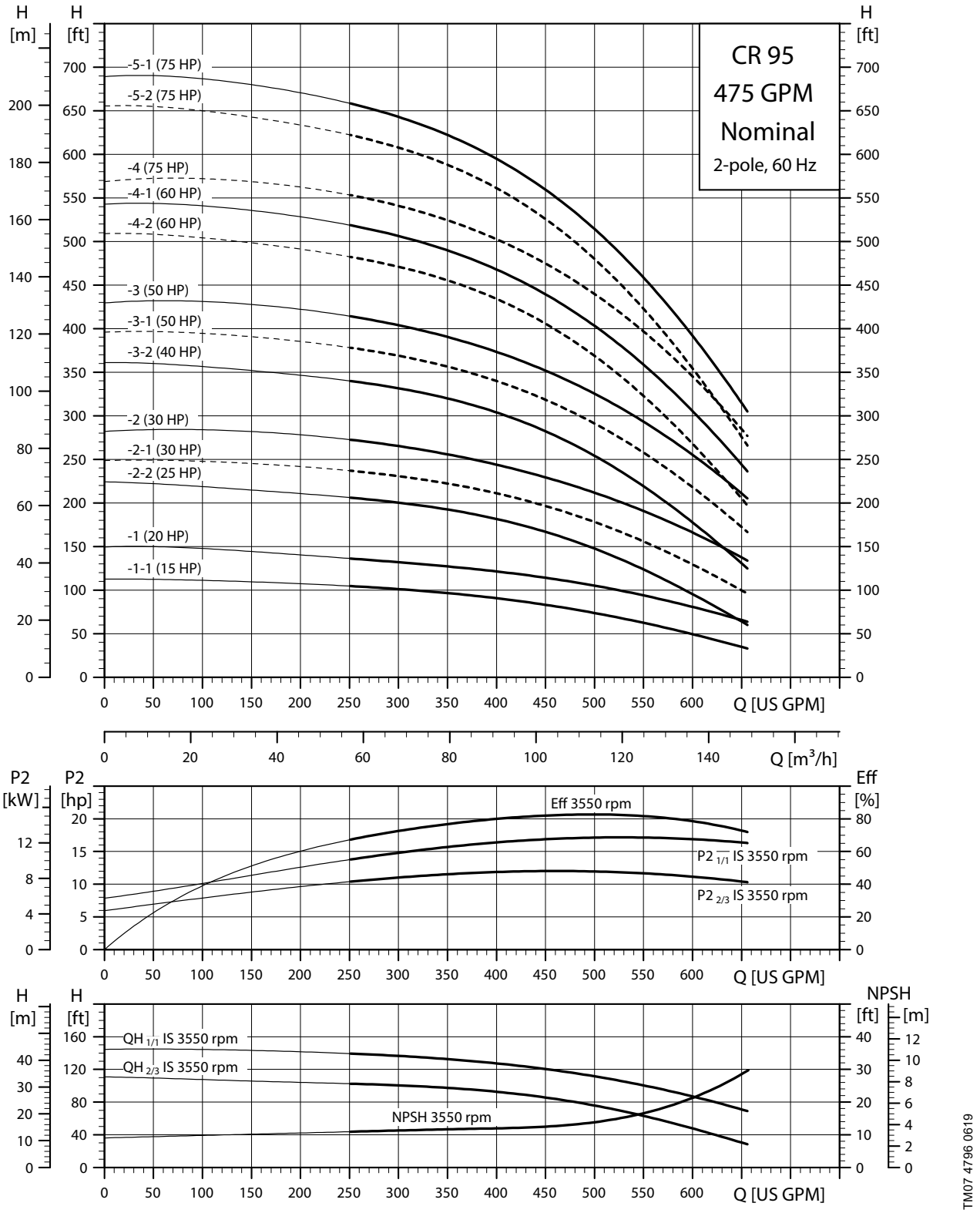
Note: Irrespective of the input frequency, the 100 % speed of pumps is approximately 3480 min^{-1}.

Hydro MPC-E with CR, CRE 64



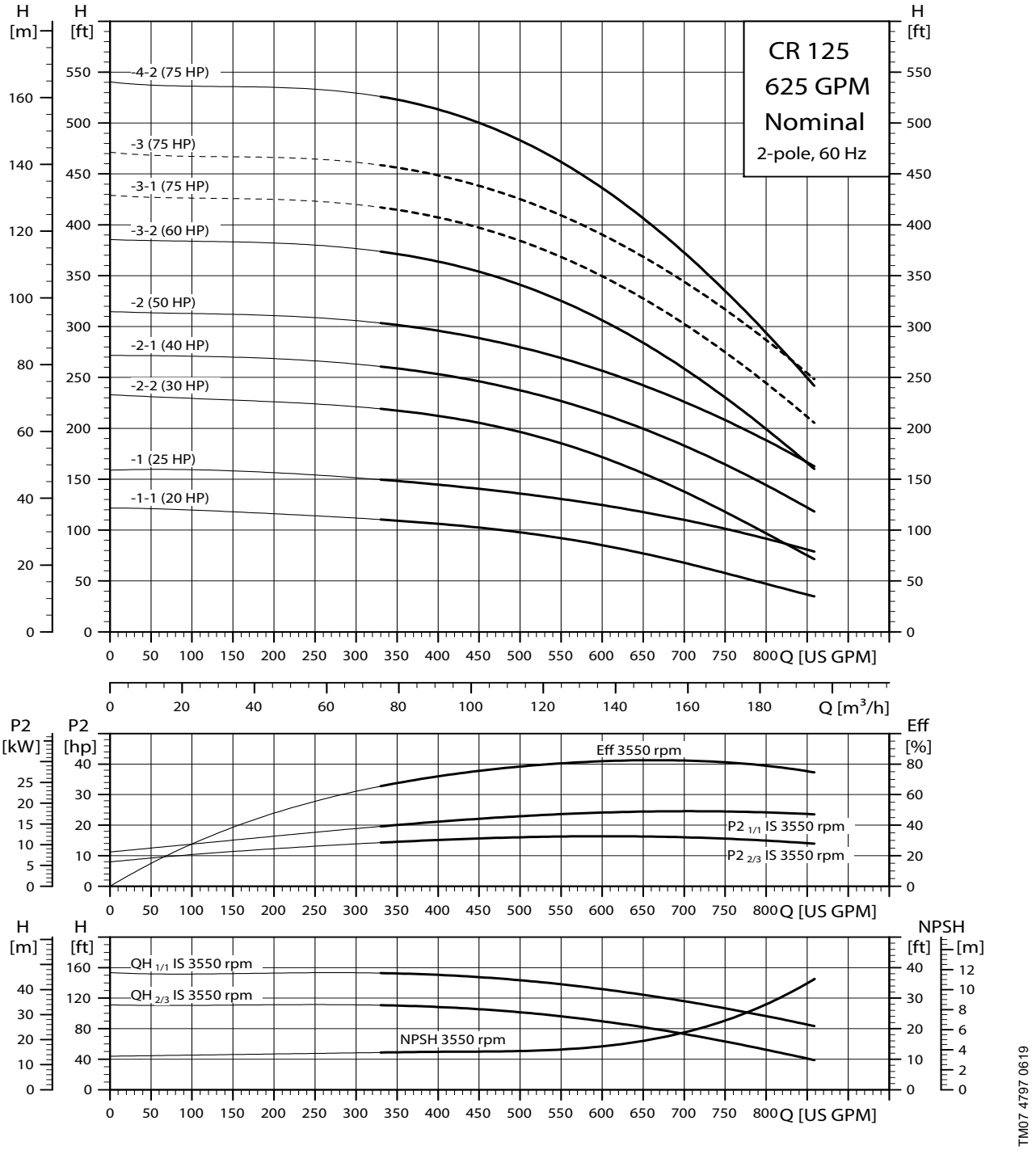
Note: Irrespective of the input frequency, the 100 % speed of pumps is approximately 3480 min^{-1}.

Hydro MPC-E with CR, CRE 95



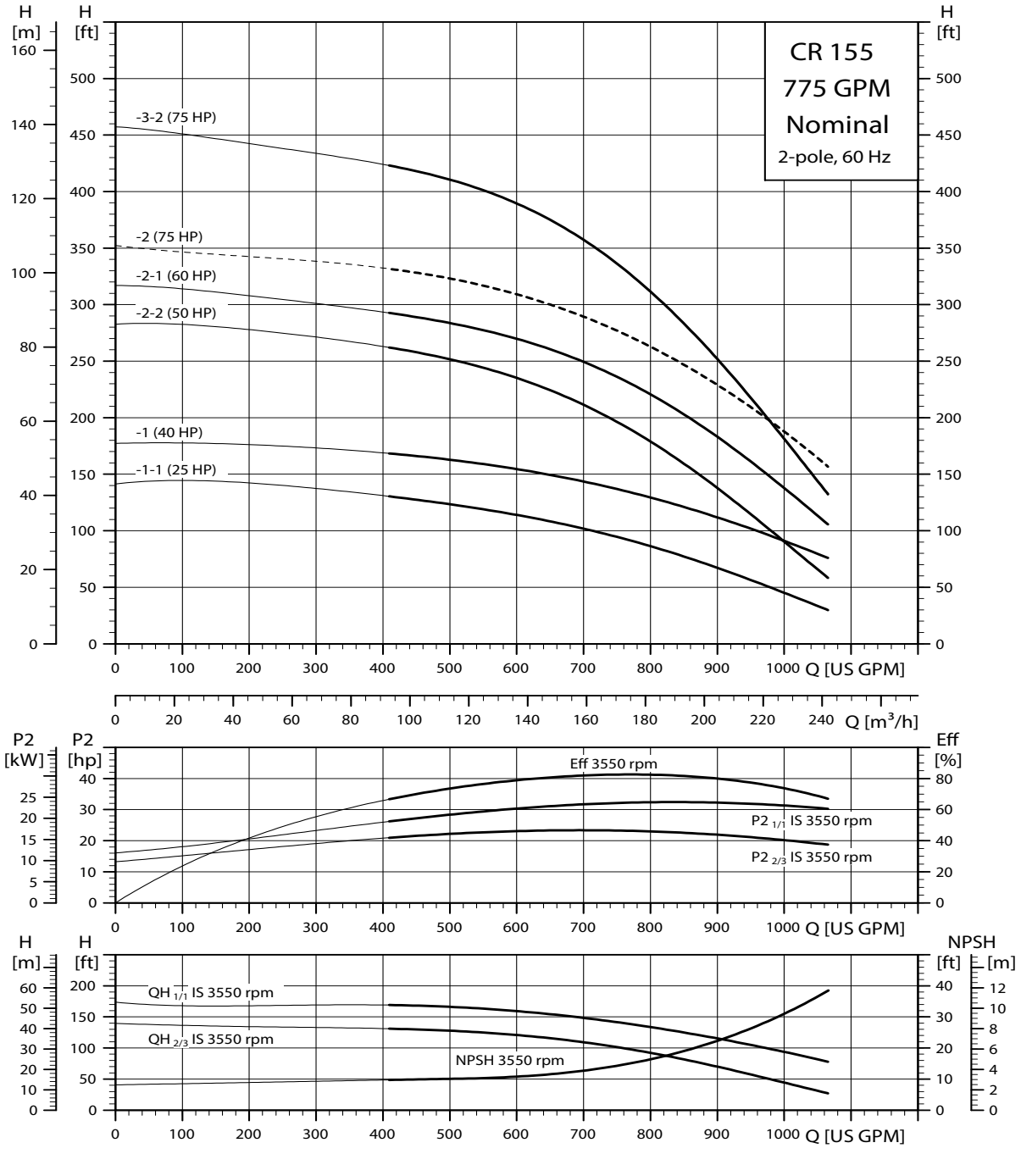
Note: Irrespective of the input frequency, the 100 % speed of pumps is approximately 3480 min^{-1}.

Hydro MPC-E with CR, CRE 125



Note: Irrespective of the input frequency, the 100 % speed of pumps is approximately 3480 min^{-1}.

Hydro MPC-E with CR, CRE 155

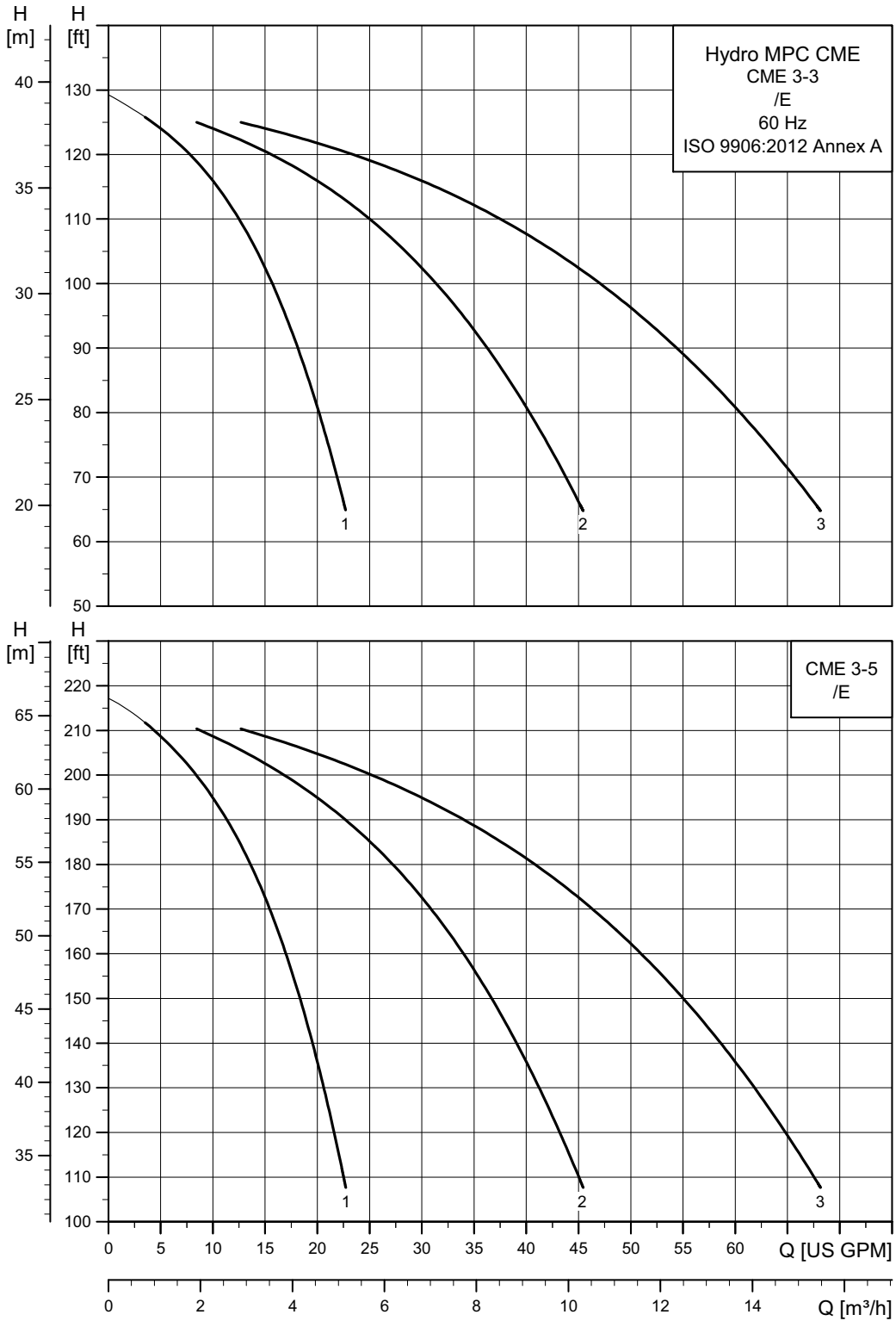


TM07 4798 0619

Note: Irrespective of the input frequency, the 100 % speed of pumps is approximately 3480 min^{-1}.

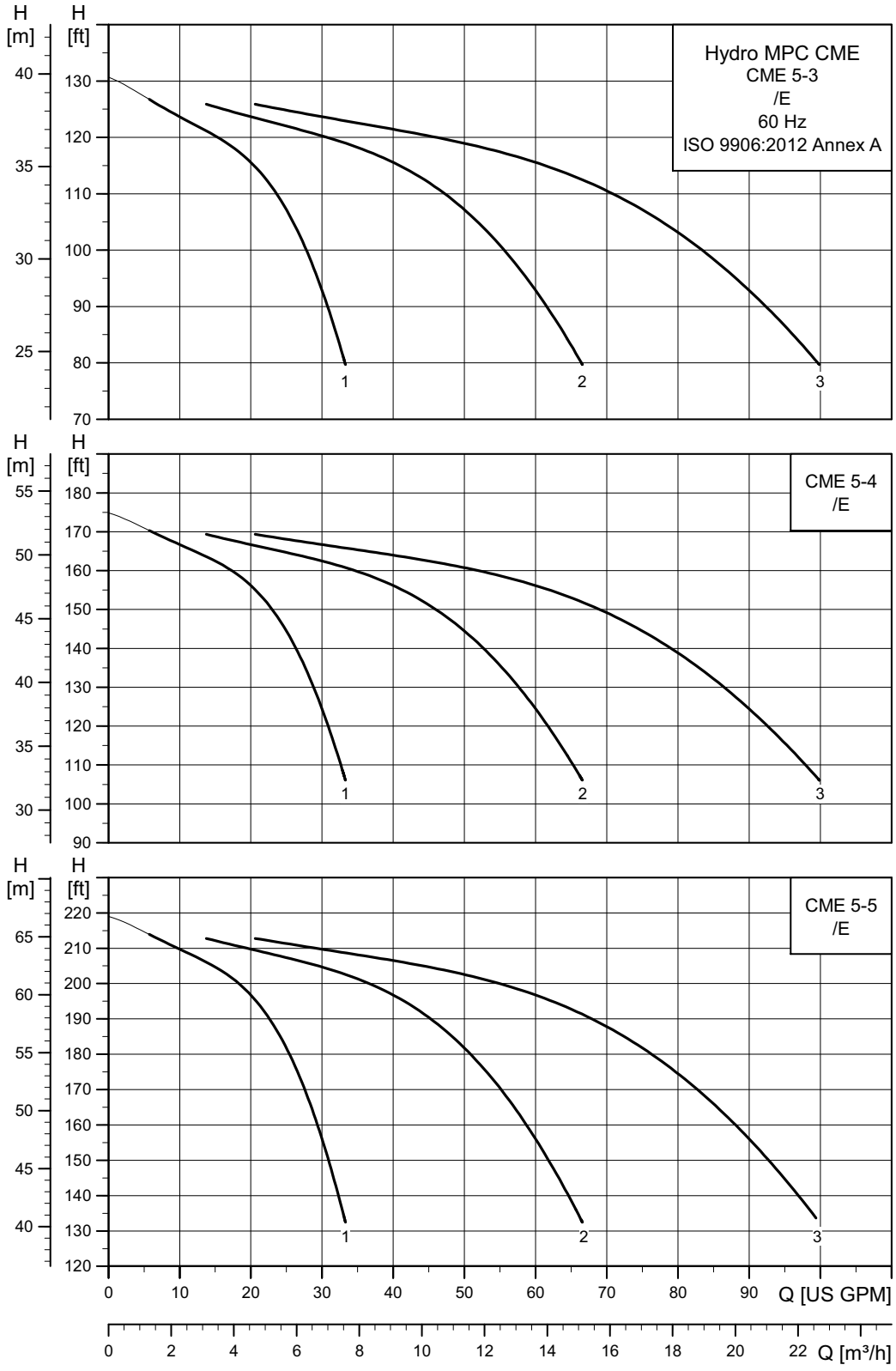
9. Curve charts, Hydro MPC CME, 60 Hz

Hydro MPC with CME 3



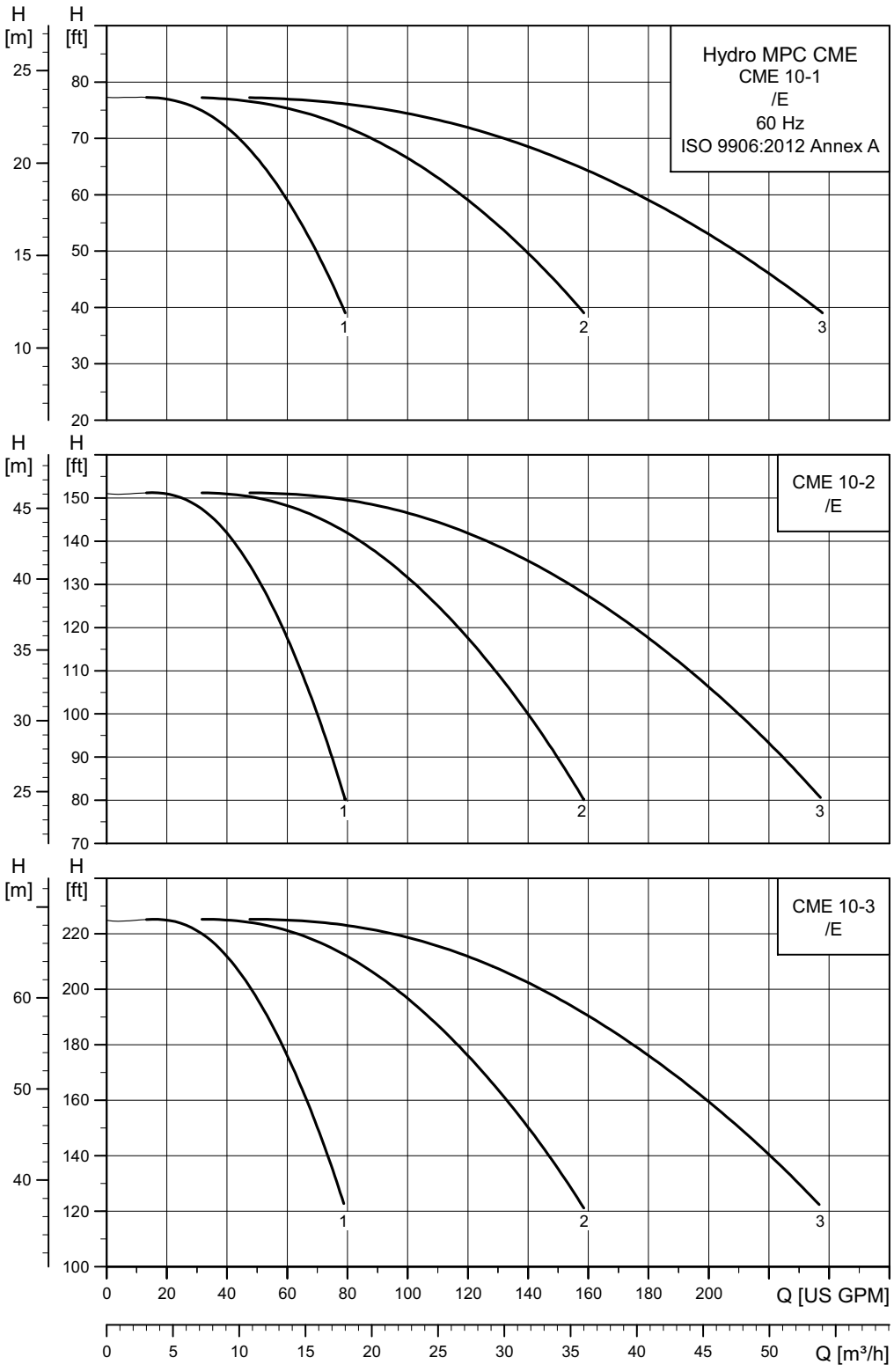
TM07 4908 0619

Hydro MPC with CME 5



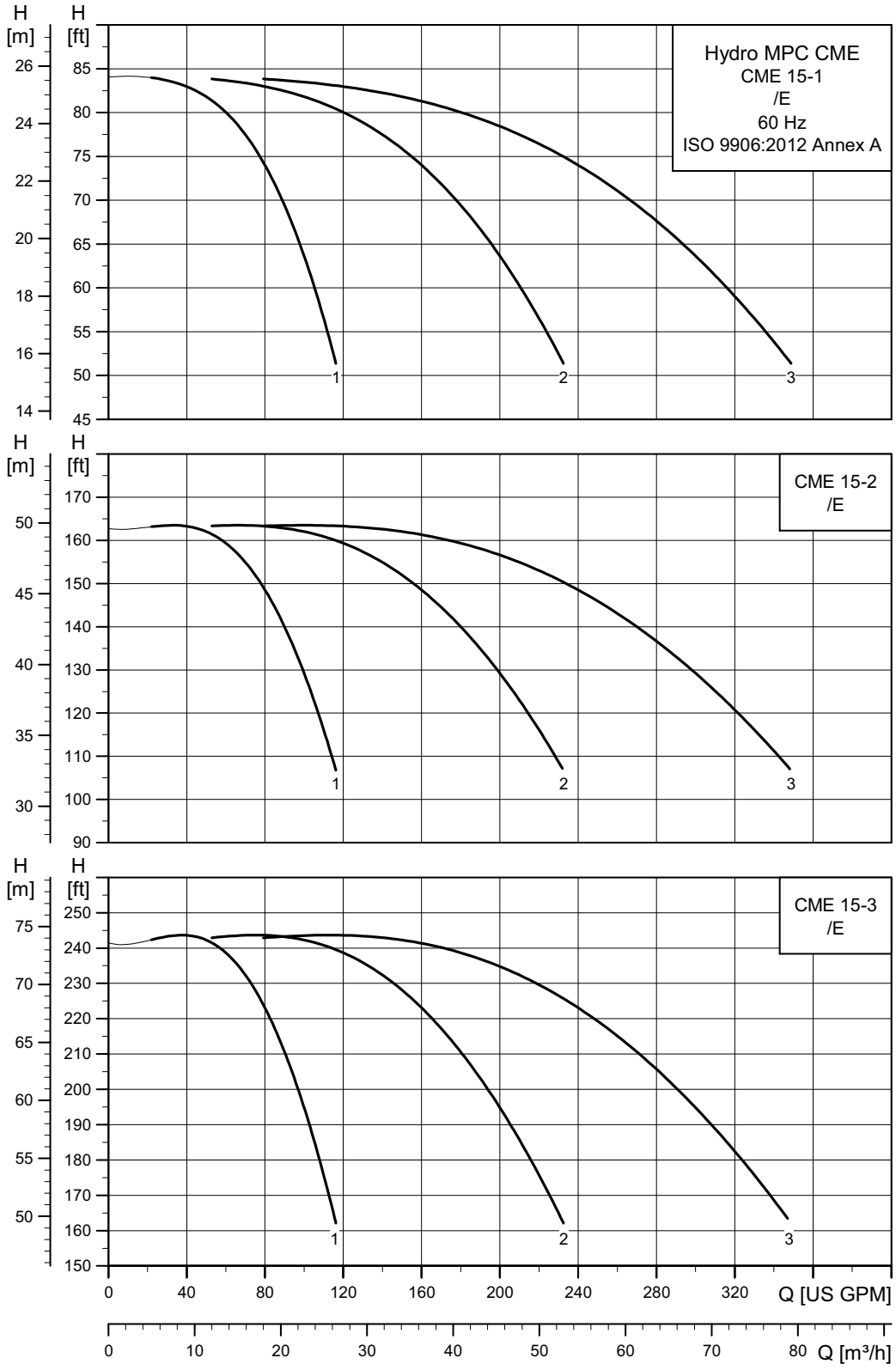
TM07 4909 0619

Hydro MPC with CME 10



TM07 4910 0619

Hydro MPC with CME 15



TM07 4911 0619

10. Technical data, Hydro MPC-E, 60 Hz

Hydro MPC-E with CRE 3 or CRE 5

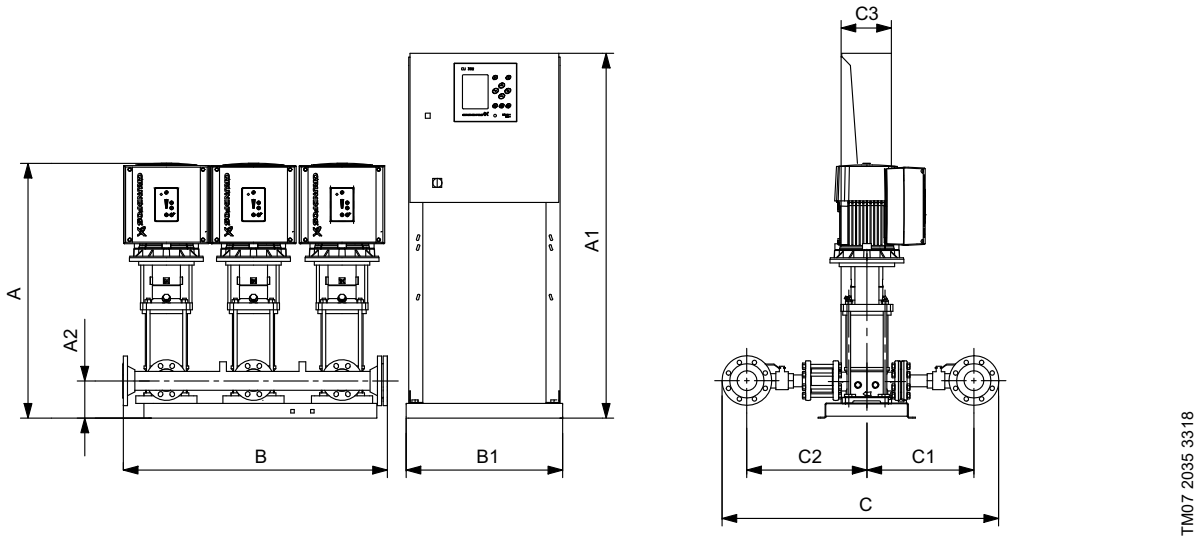


Fig. 49 Dimensional sketch of a Hydro MPC pump system with a control cabinet mounted on a separate base frame (design D). The pump system is shown as an example. The pumps supplied may differ from the sketch.

Hydro MPC-E with CR 3 or CR 5

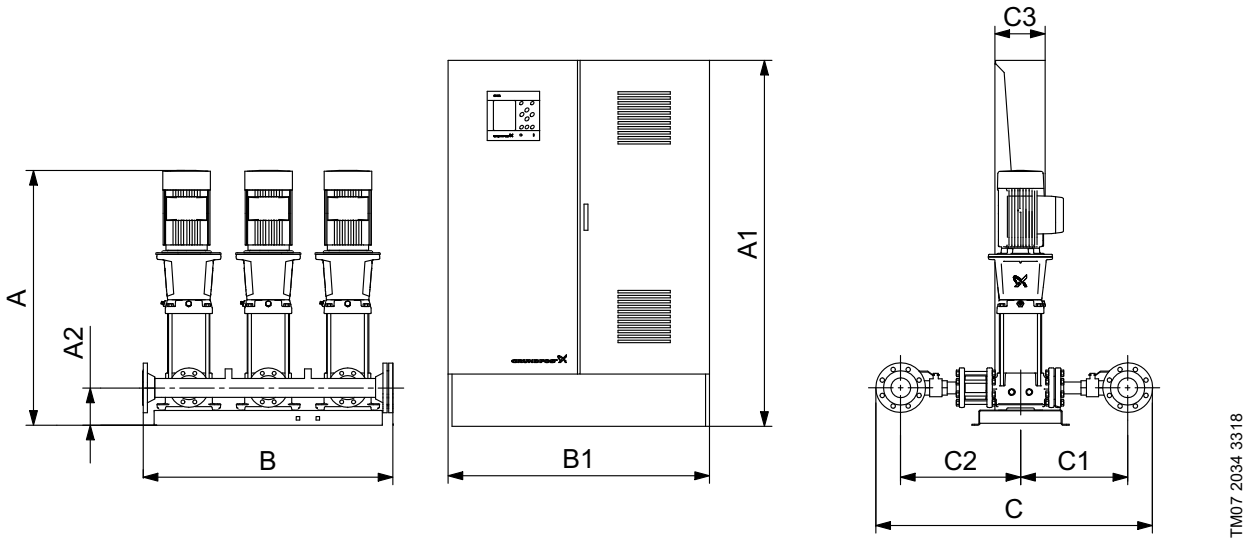


Fig. 50 Dimensional sketch of a Hydro MPC pump system with a control cabinet mounted on a separate base frame (design C). The pump system is shown as an example. The pumps supplied may differ from the sketch.

Electrical data and dimensions

Hydro MPC-E with CRE 3

Number of pumps	Pump type	Motor [Hp (kW)]	Connection size	A [in (mm)]	A2 [in (mm)]	B [in (mm)]	C [in (mm)]	C1 [in (mm)]	C2 [in (mm)]	Design
2	CRE 3-6	1 (0.75)	2" NPT	28.8 (732)	4.7 (732)	24.4 (620)	24.7 (627)	10 (254)	12.3 (312)	D
	CRE 3-9	1.5 (1.1)		28 (711)	4.7 (732)	24.4 (620)	24.7 (627)	10 (254)	12.3 (312)	D
	CRE 3-12	2 (1.5)		33.1 (841)	4.7 (732)	24.4 (620)	24.7 (627)	10 (254)	12.3 (312)	D
	CRE 3-15	3 (2.2)		35.1 (892)	5.7 (145)	24.4 (620)	28.3 (719)	11.8 (300)	14.1 (358)	D
3	CRE 3-6	1 (0.75)	2" NPT	28.8 (732)	4.7 (732)	37 (940)	24.7 (627)	10 (254)	12.3 (312)	D
	CRE 3-9	1.5 (1.1)		28 (711)	4.7 (732)	37 (940)	24.7 (627)	10 (254)	12.3 (312)	D
	CRE 3-12	2 (1.5)		33.1 (841)	4.7 (732)	37 (940)	24.7 (627)	10 (254)	12.3 (312)	D
	CRE 3-15	3 (2.2)		35.1 (892)	5.7 (145)	37 (940)	28.3 (719)	14.8 (376)	14.1 (358)	D
4	CRE 3-6	1 (0.75)	2 1/2" NPT	28.8 (732)	4.7 (732)	49.7 (1262)	27.5 (699)	11.1 (282)	13.4 (340)	D
	CRE 3-9	1.5 (1.1)		28 (711)	4.7 (732)	49.7 (1262)	27.5 (699)	11.1 (282)	13.4 (340)	D
	CRE 3-12	2 (1.5)		33.1 (841)	4.7 (732)	49.7 (1262)	27.5 (699)	11.1 (282)	13.4 (340)	D
	CRE 3-15	3 (2.2)		35.1 (892)	5.7 (145)	49.7 (1262)	31.1 (790)	12.87 (327)	15.2 (386)	D
5	CRE 3-6	1 (0.75)	2 1/2" NPT	28.8 (732)	4.7 (732)	62.3 (1582)	27.5 (699)	11.1 (282)	13.4 (340)	D
	CRE 3-9	1.5 (1.1)		28 (711)	4.7 (732)	62.3 (1582)	27.5 (699)	11.1 (282)	13.4 (340)	D
	CRE 3-12	2 (1.5)		33.1 (841)	4.7 (732)	62.3 (1582)	27.5 (699)	11.1 (282)	13.4 (340)	D
	CRE 3-15	3 (2.2)		35.1 (892)	5.7 (145)	62.3 (1582)	31.1 (790)	12.87 (327)	15.2 (386)	D
6	CRE 3-6	1 (0.75)	2 1/2" NPT	28.8 (732)	4.7 (732)	74.9 (1902)	27.5 (699)	11.1 (282)	13.4 (340)	D
	CRE 3-9	1.5 (1.1)		28 (711)	4.7 (732)	74.9 (1902)	27.5 (699)	11.1 (282)	13.4 (340)	D
	CRE 3-12	2 (1.5)		33.1 (841)	4.7 (732)	74.9 (1902)	27.5 (699)	11.1 (282)	13.4 (340)	D
	CRE 3-15	3 (2.2)		35.1 (892)	5.7 (145)	74.9 (1902)	31.1 (790)	12.87 (327)	15.2 (386)	D

Hydro MPC-E with CR 3

2	CR 3-6	1 (0.75)	2" NPT	26.4 (671)	4.7 (732)	24.4 (620)	24.7 (627)	10 (254)	12.3 (312)	C
	CR 3-9	1.5 (1.1)		27.9 (709)	4.7 (732)	24.4 (620)	24.7 (627)	10 (254)	12.3 (312)	C
	CR 3-12	2 (1.5)		31.4 (798)	4.7 (732)	24.4 (620)	24.7 (627)	10 (254)	12.3 (312)	C
	CR 3-15	3 (2.2)		37.6 (955)	5.7 (145)	24.4 (620)	28.3 (719)	11.8 (300)	14.1 (358)	C
3	CR 3-6	1 (0.75)	2" NPT	26.4 (671)	4.7 (732)	37 (940)	24.7 (627)	10 (254)	12.3 (312)	C
	CR 3-9	1.5 (1.1)		27.9 (709)	4.7 (732)	37 (940)	24.7 (627)	10 (254)	12.3 (312)	C
	CR 3-12	2 (1.5)		31.6 (803)	4.7 (732)	37 (940)	24.7 (627)	10 (254)	12.3 (312)	C
	CR 3-15	3 (2.2)		37.6 (955)	5.7 (145)	37 (940)	28.3 (719)	14.8 (376)	14.1 (358)	C
4	CR 3-6	1 (0.75)	2 1/2" NPT	26.4 (671)	4.7 (732)	49.7 (1262)	27.5 (699)	11.1 (282)	13.4 (340)	C
	CR 3-9	1.5 (1.1)		27.9 (709)	4.7 (732)	49.7 (1262)	27.5 (699)	11.1 (282)	13.4 (340)	C
	CR 3-12	2 (1.5)		31.6 (803)	4.7 (732)	49.7 (1262)	27.5 (699)	11.1 (282)	13.4 (340)	C
	CR 3-15	3 (2.2)		37.6 (955)	5.7 (145)	49.7 (1262)	31.1 (790)	11.1 (282)	15.2 (386)	C

Number of pumps	Pump type	Motor [Hp (kW)]	Connection size	A [in (mm)]	A2 [in (mm)]	B [in (mm)]	C [in (mm)]	C1 [in (mm)]	C2 [in (mm)]	Design
5	CR 3-6	1 (0.75)	2 1/2" NPT	26.4 (671)	4.7 (732)	62.3 (1582)	27.5 (699)	11.1 (282)	13.4 (340)	C
	CR 3-9	1.5 (1.1)		27.9 (709)	4.7 (732)	62.3 (1582)	27.5 (699)	11.1 (282)	13.4 (340)	C
	CR 3-12	2 (1.5)		31.6 (803)	4.7 (732)	62.3 (1582)	27.5 (699)	11.1 (282)	13.4 (340)	C
	CR 3-15	3 (2.2)		37.6 (955)	5.7 (145)	62.3 (1582)	31.1 (790)	11.1 (282)	15.2 (386)	C
6	CR 3-6	1 (0.75)	2 1/2" NPT	26.4 (671)	4.7 (732)	74.9 (1902)	27.5 (699)	11.1 (282)	13.4 (340)	C
	CR 3-9	1.5 (1.1)		27.9 (709)	4.7 (732)	74.9 (1902)	27.5 (699)	11.1 (282)	13.4 (340)	C
	CR 3-12	2 (1.5)		31.6 (803)	4.7 (732)	74.9 (1902)	27.5 (699)	11.1 (282)	13.4 (340)	C
	CR 3-15	3 (2.2)		37.6 (955)	5.7 (145)	74.9 (1902)	31.1 (790)	11.1 (282)	15.2 (386)	C

Design D: Hydro MPC pump system with a control cabinet mounted on a separate base frame.
Design C: Hydro MPC pump system with a floor-mounted control cabinet.
Dimensions may vary by ± 0.39 in. (10 mm).

Hydro MPC-E with CRE 5

Number of pumps	Pump type	Motor [Hp (kW)]	Connection size	A [in (mm)]	A2 [in (mm)]	B [in (mm)]	C [in (mm)]	C1 [in (mm)]	C2 [in (mm)]	Design
2	CRE 5-4	1.50 (1.1)	2" NPT	25.9 (658)	4.7 (119)	24.4 (620)	24.7 (627)	10 (254)	12.3 (312)	D
	CRE 5-6	2.0 (1.5)		30.9 (785)	4.7 (119)	24.4 (620)	24.7 (627)	10 (254)	12.3 (312)	D
	CRE 5-9	3.0 (2.2)		33.1 (841)	4.7 (119)	24.4 (620)	24.7 (627)	10 (254)	12.3 (312)	D
	CRE 5-13	5.0 (4.0)		42.9 (1090)	5.7 (145)	24.4 (620)	28.3 (719)	11.8 (300)	14.1 (358)	D
	CRE 5-16	5.0 (4.0)		45.1 (1146)	5.7 (145)	24.4 (620)	28.3 (719)	11.8 (300)	14.1 (358)	D
3	CRE 5-4	1.50 (1.1)	2 1/2" NPT	25.9 (658)	4.7 (119)	37.12 (943)	27.5 (699)	11.1 (282)	13.4 (340)	D
	CRE 5-6	2.0 (1.5)		30.9 (785)	4.7 (119)	37.12 (943)	27.5 (699)	11.1 (282)	13.4 (340)	D
	CRE 5-9	3.0 (2.2)		33.1 (841)	4.7 (119)	37.12 (943)	27.5 (699)	11.1 (282)	13.4 (340)	D
	CRE 5-13	5.0 (4.0)		42.9 (1090)	5.7 (145)	37.12 (943)	31.1 (790)	12.9 (328)	15.2 (386)	D
	CRE 5-16	5.0 (4.0)		45.1 (1146)	5.7 (145)	37.12 (943)	31.1 (790)	12.9 (328)	15.2 (386)	D
4	CRE 5-4	1.50 (1.1)	3" NPT	25.9 (658)	4.7 (119)	49.9 (1267)	28 (711)	11.1 (282)	13.4 (340)	D
	CRE 5-6	2.0 (1.5)		30.9 (785)	4.7 (119)	49.9 (1267)	28 (711)	11.1 (282)	13.4 (340)	D
	CRE 5-9	3.0 (2.2)		33.1 (841)	4.7 (119)	49.9 (1267)	28 (711)	11.1 (282)	13.4 (340)	D
	CRE 5-13	5.0 (4.0)		42.9 (1090)	5.7 (145)	49.9 (1267)	31.6 (803)	12.9 (328)	15.2 (386)	D
	CRE 5-16	5.0 (4.0)		45.1 (1146)	5.7 (145)	49.9 (1267)	31.6 (803)	12.9 (328)	15.2 (386)	D
5	CRE 5-4	1.50 (1.1)	3" NPT	25.9 (658)	4.7 (119)	62.5 (1588)	28 (711)	11.1 (282)	13.4 (340)	D
	CRE 5-6	2.0 (1.5)		30.9 (785)	4.7 (119)	62.5 (1588)	28 (711)	11.1 (282)	13.4 (340)	D
	CRE 5-9	3.0 (2.2)		33.1 (841)	4.7 (119)	62.5 (1588)	28 (711)	11.1 (282)	13.4 (340)	D
	CRE 5-13	5.0 (4.0)		42.9 (1090)	5.7 (145)	62.5 (1588)	31.6 (803)	12.9 (328)	15.2 (386)	D
	CRE 5-16	5.0 (4.0)		45.1 (1146)	5.7 (145)	62.5 (1588)	31.6 (803)	12.9 (328)	15.2 (386)	D
6	CRE 5-4	1.50 (1.1)	4" ANSI	25.9 (658)	4.7 (119)	75 (1905)	33.6 (853)	11.1 (282)	13.5 (343)	D
	CRE 5-6	2.0 (1.5)		30.9 (785)	4.7 (119)	75 (1905)	33.6 (853)	11.1 (282)	13.5 (343)	D
	CRE 5-9	3.0 (2.2)		33.1 (841)	4.7 (119)	75 (1905)	33.6 (853)	11.1 (282)	13.5 (343)	D
	CRE 5-13	5.0 (4.0)		42.9 (1090)	5.7 (145)	75 (1905)	37.2 (945)	12.9 (328)	15.3 (389)	D
	CRE 5-16	5.0 (4.0)		45.1 (1146)	5.7 (145)	75 (1905)	37.2 (945)	12.9 (328)	15.3 (389)	D

Hydro MPC-E with CR 5

Number of pumps	Pump type	Motor [Hp (kW)]	Connection size	A [in (mm)]	A2 [in (mm)]	B [in (mm)]	C [in (mm)]	C1 [in (mm)]	C2 [in (mm)]	Design
2	CR 5-4	1.50 (1.1)	2" NPT	25.7 (653)	4.7 (119)	24.4 (620)	24.7 (627)	10 (254)	12.3 (312)	C
	CR 5-6	2.0 (1.5)		29.5 (749)	4.7 (119)	24.4 (620)	24.7 (627)	10 (254)	12.3 (312)	C
	CR 5-9	3.0 (2.2)		35.5 (902)	4.7 (119)	24.4 (620)	24.7 (627)	10 (254)	12.3 (312)	C
	CR 5-13	5.0 (4.0)		42.8 (1087)	5.7 (145)	24.4 (620)	28.3 (719)	11.8 (300)	14.1 (358)	C
	CR 5-16	5.0 (4.0)		44.9 (1140)	5.7 (145)	24.4 (620)	28.3 (719)	11.8 (300)	14.1 (358)	C
3	CR 5-4	1.50 (1.1)	2 1/2" NPT	25.7 (653)	4.7 (119)	37.12 (943)	27.5 (699)	11.1 (282)	13.4 (340)	C
	CR 5-6	2.0 (1.5)		29.5 (749)	4.7 (119)	37.12 (943)	27.5 (699)	11.1 (282)	13.4 (340)	C
	CR 5-9	3.0 (2.2)		35.5 (902)	4.7 (119)	37.12 (943)	27.5 (699)	11.1 (282)	13.4 (340)	C
	CR 5-13	5.0 (4.0)		42.8 (1087)	5.7 (145)	37.12 (943)	31.1 (790)	12.9 (328)	15.2 (386)	C
	CR 5-16	5.0 (4.0)		44.9 (1140)	5.7 (145)	37.12 (943)	31.1 (790)	12.9 (328)	15.2 (386)	C
4	CR 5-4	1.50 (1.1)	3" NPT	25.7 (653)	4.7 (119)	49.9 (1267)	28 (711)	11.1 (282)	13.4 (340)	C
	CR 5-6	2.0 (1.5)		29.5 (749)	4.7 (119)	49.9 (1267)	28 (711)	11.1 (282)	13.4 (340)	C
	CR 5-9	3.0 (2.2)		35.5 (902)	4.7 (119)	49.9 (1267)	28 (711)	11.1 (282)	13.4 (340)	C
	CR 5-13	5.0 (4.0)		42.8 (1087)	5.7 (145)	49.9 (1267)	31.6 (803)	12.9 (328)	15.2 (386)	C
	CR 5-16	5.0 (4.0)		44.9 (1140)	5.7 (145)	49.9 (1267)	31.6 (803)	12.9 (328)	15.2 (386)	C
5	CR 5-4	1.50 (1.1)	3" NPT	25.7 (653)	4.7 (119)	62.5 (1588)	28 (711)	11.1 (282)	13.4 (340)	C
	CR 5-6	2.0 (1.5)		29.5 (749)	4.7 (119)	62.5 (1588)	28 (711)	11.1 (282)	13.4 (340)	C
	CR 5-9	3.0 (2.2)		35.5 (902)	4.7 (119)	62.5 (1588)	28 (711)	11.1 (282)	13.4 (340)	C
	CR 5-13	5.0 (4.0)		42.8 (1087)	5.7 (145)	62.5 (1588)	31.6 (803)	12.9 (328)	15.2 (386)	C
	CR 5-16	5.0 (4.0)		44.9 (1140)	5.7 (145)	62.5 (1588)	31.6 (803)	12.9 (328)	15.2 (386)	C
6	CR 5-4	1.50 (1.1)	4" ANSI	25.7 (653)	4.7 (119)	75 (1905)	33.6 (853)	11.1 (282)	13.5 (343)	C
	CR 5-6	2.0 (1.5)		29.5 (749)	4.7 (119)	75 (1905)	33.6 (853)	11.1 (282)	13.5 (343)	C
	CR 5-9	3.0 (2.2)		35.5 (902)	4.7 (119)	75 (1905)	33.6 (853)	11.1 (282)	13.5 (343)	C
	CR 5-13	5.0 (4.0)		42.8 (1087)	5.7 (145)	75 (1905)	37.2 (945)	12.9 (328)	15.3 (389)	C
	CR 5-16	5.0 (4.0)		44.9 (1140)	5.7 (145)	75 (1905)	37.2 (945)	12.9 (328)	15.3 (389)	C

Design D: Hydro MPC pump system with a control cabinet mounted on a separate base frame.
Design C: Hydro MPC pump system with a floor-mounted control cabinet.
Dimensions may vary by ± 0.39 in. (10 mm).

Hydro MPC-E with CRE 10

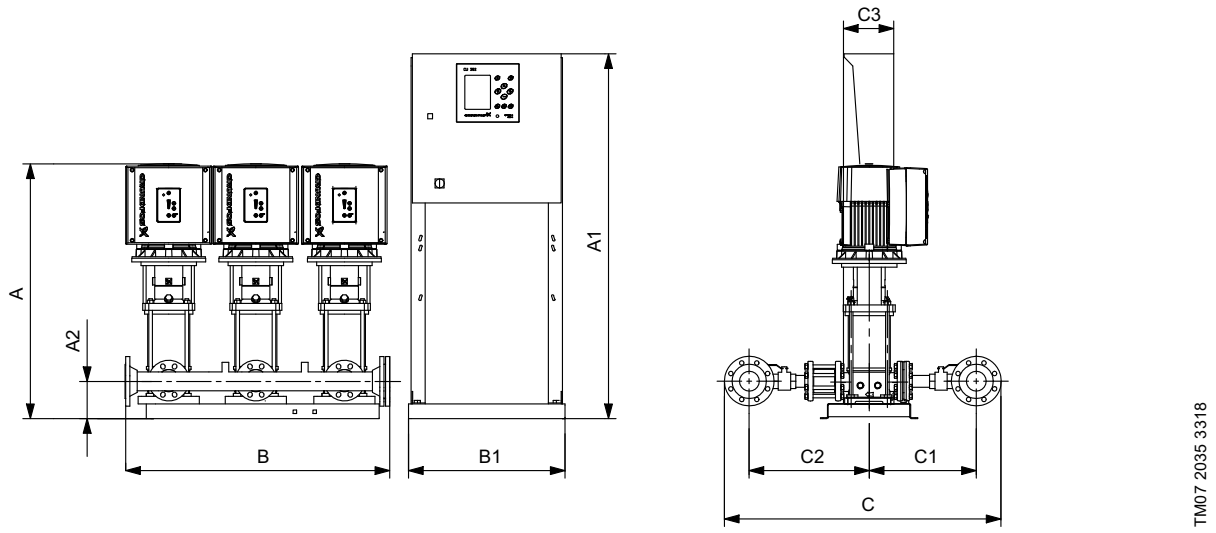


Fig. 51 Dimensional sketch of a Hydro MPC pump system with a control cabinet mounted on a separate base frame (design D). The pump system is shown as an example. The pumps supplied may differ from the sketch.

Hydro MPC-E with CR 10

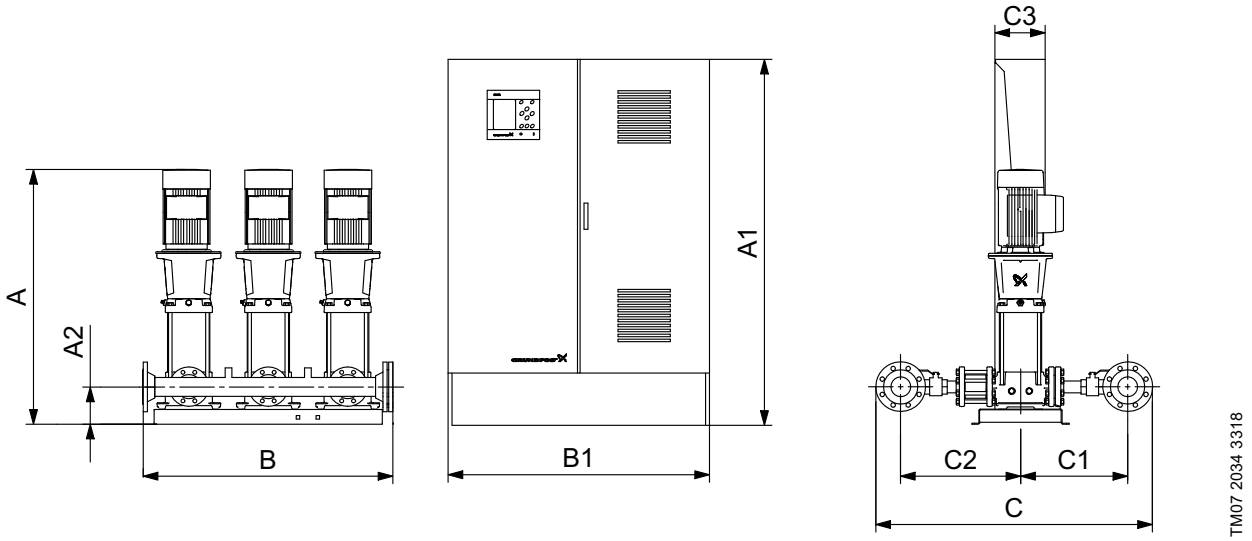


Fig. 52 Dimensional sketch of a Hydro MPC pump system with a control cabinet mounted on a separate base frame (design C). The pump system is shown as an example. The pumps supplied may differ from the sketch.

Electrical data and dimensions

Hydro MPC-E with CRE 10

Number of pumps	Pump type	Motor [Hp (kW)]	Connection size	A [in (mm)]	A2 [in (mm)]	B [in (mm)]	C [in (mm)]	C1 [in (mm)]	C2 [in (mm)]	Design
2	CRE 10-2	1.50 (1.1)	2 1/2" NPT	28.1 (714)	6.3 (160)	26.9 (683)	37.6 (955)	15.9 (404)	18.7 (475)	D
	CRE 10-3	3.0 (2.2)		28.8 (732)	6.3 (160)	26.9 (683)	37.6 (955)	15.9 (404)	18.7 (475)	D
	CRE 10-4	3.0 (2.2)		31.9 (810)	6.3 (160)	26.9 (683)	37.6 (955)	15.9 (404)	18.7 (475)	D
	CRE 10-5	5.0 (4.0)		37.8 (960)	6.3 (160)	26.9 (683)	37.6 (955)	15.9 (404)	18.7 (475)	D
	CRE 10-6	5.0 (4.0)		38.9 (988)	6.3 (160)	26.9 (683)	37.6 (955)	15.9 (404)	18.7 (475)	D
	CRE 10-8	7.5 (5.5)		41.6 (1057)	6.3 (160)	40.3 (1024)	37.6 (955)	15.9 (404)	18.7 (475)	D
	CRE 10-10	7.5 (5.5)		44 (1118)	6.3 (160)	40.3 (1024)	37.6 (955)	15.9 (404)	18.7 (475)	D
3	CRE 10-2	1.50 (1.1)	3" NPT	28.1 (714)	6.3 (160)	39.7 (1008)	38.2 (970)	16 (406)	18.7 (475)	D
	CRE 10-3	3.0 (2.2)		28.8 (732)	6.3 (160)	39.7 (1008)	38.2 (970)	16 (406)	18.7 (475)	D
	CRE 10-4	3.0 (2.2)		31.9 (810)	6.3 (160)	39.7 (1008)	38.2 (970)	16 (406)	18.7 (475)	D
	CRE 10-5	5.0 (4.0)		37.8 (960)	6.3 (160)	39.7 (1008)	38.2 (970)	16 (406)	18.7 (475)	D
	CRE 10-6	5.0 (4.0)		38.9 (988)	6.3 (160)	39.7 (1008)	38.2 (970)	16 (406)	18.7 (475)	D
	CRE 10-8	7.5 (5.5)		41.6 (1057)	6.3 (160)	60.1 (1527)	38.2 (970)	16 (406)	18.7 (475)	D
	CRE 10-10	7.5 (5.5)		44 (1118)	6.3 (160)	60.1 (1527)	38.2 (970)	16 (406)	18.7 (475)	D
4	CRE 10-2	1.50 (1.1)	4" ANSI	28.1 (714)	6.3 (160)	52.2 (1326)	43.7 (1110)	16 (406)	18.7 (475)	D
	CRE 10-3	3.0 (2.2)		28.8 (732)	6.3 (160)	52.2 (1326)	43.7 (1110)	16 (406)	18.7 (475)	D
	CRE 10-4	3.0 (2.2)		31.9 (810)	6.3 (160)	52.2 (1326)	43.7 (1110)	16 (406)	18.7 (475)	D
	CRE 10-5	5.0 (4.0)		37.8 (960)	6.3 (160)	52.2 (1326)	43.7 (1110)	16 (406)	18.7 (475)	D
	CRE 10-6	5.0 (4.0)		38.9 (988)	6.3 (160)	52.2 (1326)	43.7 (1110)	16 (406)	18.7 (475)	D
	CRE 10-8	7.5 (5.5)		41.6 (1057)	6.3 (160)	79.8 (2027)	43.7 (1110)	16 (406)	18.7 (475)	D
	CRE 10-10	7.5 (5.5)		44 (1118)	6.3 (160)	79.8 (2027)	43.7 (1110)	16 (406)	18.7 (475)	D
5	CRE 10-2	1.50 (1.1)	4" ANSI	28.1 (714)	6.3 (160)	64.8 (1646)	43.7 (1110)	16 (406)	18.7 (475)	D
	CRE 10-3	3.0 (2.2)		28.8 (732)	6.3 (160)	64.8 (1646)	43.7 (1110)	16 (406)	18.7 (475)	D
	CRE 10-4	3.0 (2.2)		31.9 (810)	6.3 (160)	64.8 (1646)	43.7 (1110)	16 (406)	18.7 (475)	D
	CRE 10-5	5.0 (4.0)		37.8 (960)	6.3 (160)	64.8 (1646)	43.7 (1110)	16 (406)	18.7 (475)	D
	CRE 10-6	5.0 (4.0)		38.9 (988)	6.3 (160)	64.8 (1646)	43.7 (1110)	16 (406)	18.7 (475)	D
	CRE 10-8	7.5 (5.5)		41.6 (1057)	6.3 (160)	99.5 (2527)	43.7 (1110)	16 (406)	18.7 (475)	D
	CRE 10-10	7.5 (5.5)		44 (1118)	6.3 (160)	99.5 (2527)	43.7 (1110)	16 (406)	18.7 (475)	D
6	CRE 10-2	1.50 (1.1)	6" ANSI	28.1 (714)	6.3 (160)	77.4 (1966)	47.9 (1217)	17.1 (434)	19.8 (503)	D
	CRE 10-3	3.0 (2.2)		28.8 (732)	6.3 (160)	77.4 (1966)	47.9 (1217)	17.1 (434)	19.8 (503)	D
	CRE 10-4	3.0 (2.2)		31.9 (810)	6.3 (160)	77.4 (1966)	47.9 (1217)	17.1 (434)	19.8 (503)	D
	CRE 10-5	5.0 (4.0)		37.8 (960)	6.3 (160)	77.4 (1966)	47.9 (1217)	17.1 (434)	19.8 (503)	D
	CRE 10-6	5.0 (4.0)		38.9 (988)	6.3 (160)	77.4 (1966)	47.9 (1217)	17.1 (434)	19.8 (503)	D
	CRE 10-8	7.5 (5.5)		41.6 (1057)	6.3 (160)	119.2 (3028)	47.9 (1217)	17.1 (434)	19.8 (503)	D
	CRE 10-10	7.5 (5.5)		44 (1118)	6.3 (160)	119.2 (3028)	47.9 (1217)	17.1 (434)	19.8 (503)	D

Hydro MPC-E with CR 10

Number of pumps	Pump type	Motor [Hp (kW)]	Connection size	A [in (mm)]	A2 [in (mm)]	B [in (mm)]	C [in (mm)]	C1 [in (mm)]	C2 [in (mm)]	Design
2	CR 10-2	1.50 (1.1)	2 1/2" NPT	27.9 (709)	6.3 (160)	26.9 (683)	37.6 (955)	15.9 (404)	18.7 (475)	C
	CR 10-3	3.0 (2.2)		33.2 (843)	6.3 (160)	26.9 (683)	37.6 (955)	15.9 (404)	18.7 (475)	C
	CR 10-4	3.0 (2.2)		34.4 (874)	6.3 (160)	26.9 (683)	37.6 (955)	15.9 (404)	18.7 (475)	C
	CR 10-5	5.0 (4.0)		37.6 (955)	6.3 (160)	26.9 (683)	37.6 (955)	15.9 (404)	18.7 (475)	C
	CR 10-6	5.0 (4.0)		38.8 (986)	6.3 (160)	26.9 (683)	37.6 (955)	15.9 (404)	18.7 (475)	C
	CR 10-8	7.5 (5.5)		41.7 (1059)	6.3 (160)	26.9 (683)	37.6 (955)	15.9 (404)	18.7 (475)	C
	CR 10-10	7.5 (5.5)		44.1 (1120)	6.3 (160)	26.9 (683)	37.6 (955)	15.9 (404)	18.7 (475)	C
3	CR 10-2	1.50 (1.1)	3" NPT	27.9 (709)	6.3 (160)	39.7 (1008)	38.2 (970)	16 (406)	18.7 (475)	C
	CR 10-3	3.0 (2.2)		33.2 (843)	6.3 (160)	39.7 (1008)	38.2 (970)	16 (406)	18.7 (475)	C
	CR 10-4	3.0 (2.2)		34.4 (874)	6.3 (160)	39.7 (1008)	38.2 (970)	16 (406)	18.7 (475)	C
	CR 10-5	5.0 (4.0)		37.6 (955)	6.3 (160)	39.7 (1008)	38.2 (970)	16 (406)	18.7 (475)	C
	CR 10-6	5.0 (4.0)		38.8 (986)	6.3 (160)	39.7 (1008)	38.2 (970)	16 (406)	18.7 (475)	C
	CR 10-8	7.5 (5.5)		41.7 (1059)	6.3 (160)	39.7 (1008)	38.2 (970)	16 (406)	18.7 (475)	C
	CR 10-10	7.5 (5.5)		44.1 (1120)	6.3 (160)	39.7 (1008)	38.2 (970)	16 (406)	18.7 (475)	C
4	CR 10-2	1.50 (1.1)	4" ANSI	27.9 (709)	6.3 (160)	52.2 (1326)	43.7 (1110)	16 (406)	18.7 (475)	C
	CR 10-3	3.0 (2.2)		33.2 (843)	6.3 (160)	52.2 (1326)	43.7 (1110)	16 (406)	18.7 (475)	C
	CR 10-4	3.0 (2.2)		34.4 (874)	6.3 (160)	52.2 (1326)	43.7 (1110)	16 (406)	18.7 (475)	C
	CR 10-5	5.0 (4.0)		37.6 (955)	6.3 (160)	52.2 (1326)	43.7 (1110)	16 (406)	18.7 (475)	C
	CR 10-6	5.0 (4.0)		38.8 (986)	6.3 (160)	52.2 (1326)	43.7 (1110)	16 (406)	18.7 (475)	C
	CR 10-8	7.5 (5.5)		41.7 (1059)	6.3 (160)	52.2 (1326)	43.7 (1110)	16 (406)	18.7 (475)	C
	CR 10-10	7.5 (5.5)		44.1 (1120)	6.3 (160)	52.2 (1326)	43.7 (1110)	16 (406)	18.7 (475)	C
5	CR 10-2	1.50 (1.1)	4" ANSI	27.9 (709)	6.3 (160)	64.8 (1646)	43.7 (1110)	16 (406)	18.7 (475)	C
	CR 10-3	3.0 (2.2)		33.2 (843)	6.3 (160)	64.8 (1646)	43.7 (1110)	16 (406)	18.7 (475)	C
	CR 10-4	3.0 (2.2)		34.4 (874)	6.3 (160)	64.8 (1646)	43.7 (1110)	16 (406)	18.7 (475)	C
	CR 10-5	5.0 (4.0)		37.6 (955)	6.3 (160)	64.8 (1646)	43.7 (1110)	16 (406)	18.7 (475)	C
	CR 10-6	5.0 (4.0)		38.8 (986)	6.3 (160)	64.8 (1646)	43.7 (1110)	16 (406)	18.7 (475)	C
	CR 10-8	7.5 (5.5)		41.7 (1059)	6.3 (160)	64.8 (1646)	43.7 (1110)	16 (406)	18.7 (475)	C
	CR 10-10	7.5 (5.5)		44.1 (1120)	6.3 (160)	64.8 (1646)	43.7 (1110)	16 (406)	18.7 (475)	C
6	CR 10-2	1.50 (1.1)	6" ANSI	27.9 (709)	6.3 (160)	77.4 (1966)	47.9 (1217)	17.1 (434)	19.8 (503)	C
	CR 10-3	3.0 (2.2)		33.2 (843)	6.3 (160)	77.4 (1966)	47.9 (1217)	17.1 (434)	19.8 (503)	C
	CR 10-4	3.0 (2.2)		34.4 (874)	6.3 (160)	77.4 (1966)	47.9 (1217)	17.1 (434)	19.8 (503)	C
	CR 10-5	5.0 (4.0)		37.6 (955)	6.3 (160)	77.4 (1966)	47.9 (1217)	17.1 (434)	19.8 (503)	C
	CR 10-6	5.0 (4.0)		38.8 (986)	6.3 (160)	77.4 (1966)	47.9 (1217)	17.1 (434)	19.8 (503)	C
	CR 10-8	7.5 (5.5)		41.7 (1059)	6.3 (160)	77.4 (1966)	47.9 (1217)	17.1 (434)	19.8 (503)	C
	CR 10-10	7.5 (5.5)		44.1 (1120)	6.3 (160)	77.4 (1966)	47.9 (1217)	17.1 (434)	19.8 (503)	C

Design D: Hydro MPC pump system with a control cabinet mounted on a separate base frame.
Design C: Hydro MPC pump system with a floor-mounted control cabinet.
Dimensions may vary by ± 0.39 in. (10 mm).

Hydro MPC-E with CRE 15

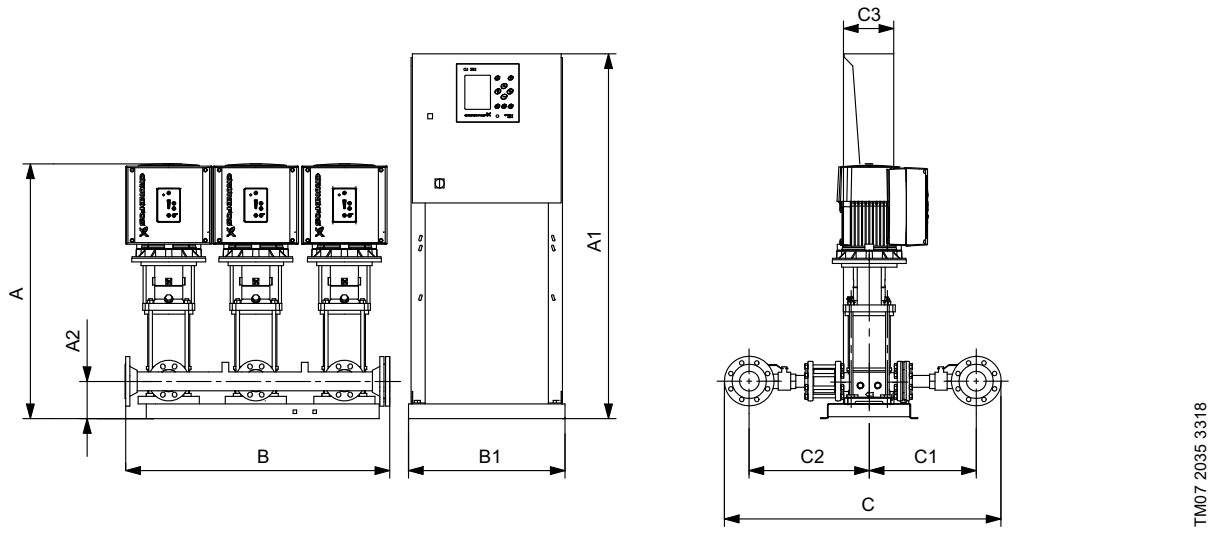


Fig. 53 Dimensional sketch of a Hydro MPC pump system with a control cabinet mounted on a separate base frame (design D). The pump system is shown as an example. The pumps supplied may differ from the sketch.

Hydro MPC-E with CR 15

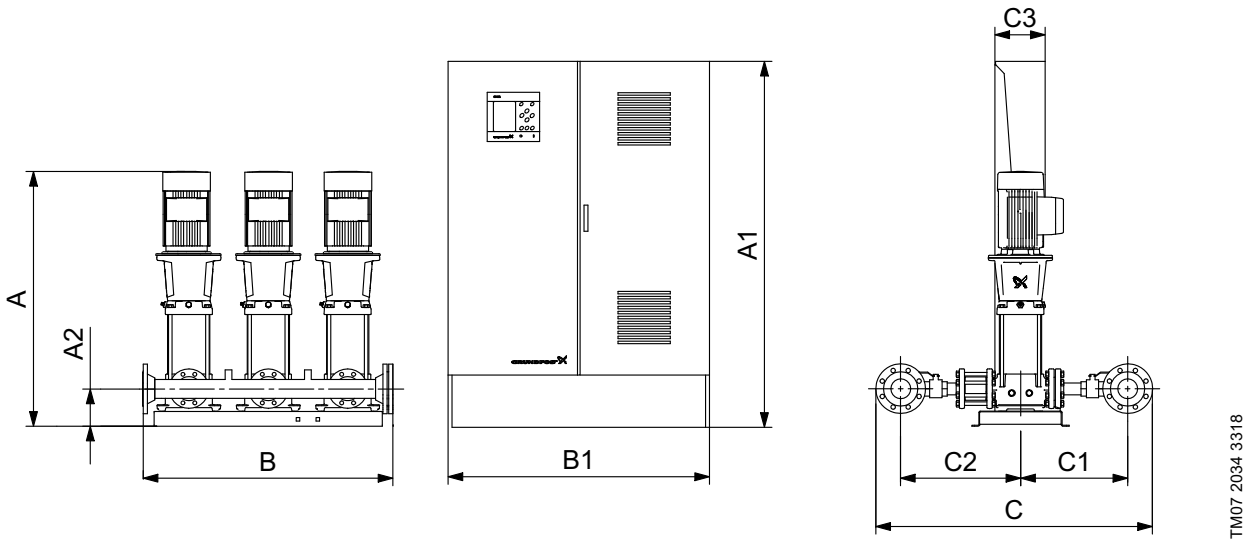


Fig. 54 Dimensional sketch of a Hydro MPC pump system with a control cabinet mounted on a separate base frame (design C). The pump system is shown as an example. The pumps supplied may differ from the sketch.

Electrical data and dimensions

Hydro MPC-E with CRE 15

Number of pumps	Pump type	Motor [Hp (kW)]	Connection size	A [in (mm)]	A2 [in (mm)]	B [in (mm)]	C [in (mm)]	C1 [in (mm)]	C2 [in (mm)]	Design
2	CRE 15-2	5.0 (4.0)	4" ANSI	35.4 (899)	6.3 (160)	29.4 (747)	44.2 (1123)	16.2 (411)	19 (483)	D
	CRE 15-3	7.5 (5.5)		37.5 (953)	6.3 (160)	40.4 (1026)	44.2 (1123)	16.2 (411)	19 (483)	D
	CRE 15-4	7.5 (5.5)		40.5 (1029)	6.3 (160)	40.4 (1026)	44.2 (1123)	16.2 (411)	19 (483)	D
	CRE 15-5	10.0 (7.5)		50.5 (1283)	6.3 (160)	40.4 (1026)	44.2 (1123)	16.2 (411)	19 (483)	D
	CRE 15-7	15.0 (11.0)		73.6 (1869)	6.3 (160)	40.4 (1026)	44.2 (1123)	16.2 (411)	19 (483)	D
3	CRE 15-2	5.0 (4.0)	4" ANSI	35.4 (899)	6.3 (160)	42 (1067)	44.2 (1123)	16.2 (411)	19 (483)	D
	CRE 15-3	7.5 (5.5)		37.5 (953)	6.3 (160)	60.1 (1527)	44.2 (1123)	16.2 (411)	19 (483)	D
	CRE 15-4	7.5 (5.5)		40.5 (1029)	6.3 (160)	60.1 (1527)	44.2 (1123)	16.2 (411)	19 (483)	D
	CRE 15-5	10.0 (7.5)		50.5 (1283)	6.3 (160)	60.1 (1527)	44.2 (1123)	16.2 (411)	19 (483)	D
	CRE 15-7	15.0 (11.0)		73.6 (1869)	6.3 (160)	60.1 (1527)	44.2 (1123)	16.2 (411)	19 (483)	D
4	CRE 15-2	5.0 (4.0)	6" ANSI	35.4 (899)	6.3 (160)	54.6 (1387)	46.3 (1176)	16.3 (414)	19 (483)	D
	CRE 15-3	7.5 (5.5)		37.5 (953)	6.3 (160)	79.8 (2027)	46.3 (1176)	16.3 (414)	19 (483)	D
	CRE 15-4	7.5 (5.5)		40.5 (1029)	6.3 (160)	79.8 (2027)	46.3 (1176)	16.3 (414)	19 (483)	D
	CRE 15-5	10.0 (7.5)		50.5 (1283)	6.3 (160)	79.8 (2027)	46.3 (1176)	16.3 (414)	19 (483)	D
	CRE 15-7	15.0 (11.0)		73.6 (1869)	6.3 (160)	79.8 (2027)	46.3 (1176)	16.3 (414)	19 (483)	D
5	CRE 15-2	5.0 (4.0)	6" ANSI	35.4 (899)	6.3 (160)	67.2 (1707)	46.3 (1176)	16.3 (414)	19 (483)	D
	CRE 15-3	7.5 (5.5)		37.5 (953)	6.3 (160)	99.6 (2530)	46.3 (1176)	16.3 (414)	19 (483)	D
	CRE 15-4	7.5 (5.5)		40.5 (1029)	6.3 (160)	99.6 (2530)	46.3 (1176)	16.3 (414)	19 (483)	D
	CRE 15-5	10.0 (7.5)		50.5 (1283)	6.3 (160)	99.6 (2530)	46.3 (1176)	16.3 (414)	19 (483)	D
	CRE 15-7	15.0 (11.0)		73.6 (1869)	6.3 (160)	99.6 (2530)	46.3 (1176)	16.3 (414)	19 (483)	D
6	CRE 15-2	5.0 (4.0)	6" ANSI	35.4 (899)	6.3 (160)	79.8 (2027)	46.3 (1176)	16.3 (414)	19 (483)	D
	CRE 15-3	7.5 (5.5)		37.5 (953)	6.3 (160)	119.2 (3028)	46.3 (1176)	16.3 (414)	19 (483)	D
	CRE 15-4	7.5 (5.5)		40.5 (1029)	6.3 (160)	119.2 (3028)	46.3 (1176)	16.3 (414)	19 (483)	D
	CRE 15-5	10.0 (7.5)		50.5 (1283)	6.3 (160)	119.2 (3028)	46.3 (1176)	16.3 (414)	19 (483)	D
	CRE 15-7	15.0 (11.0)		73.6 (1869)	6.3 (160)	119.2 (3028)	46.3 (1176)	16.3 (414)	19 (483)	D

Hydro MPC-E with CR 15

Number of pumps	Pump type	Motor [Hp (kW)]	Connection size	A [in (mm)]	A2 [in (mm)]	B [in (mm)]	C [in (mm)]	C1 [in (mm)]	C2 [in (mm)]	Design
2	CR 15-2	5.0 (4.0)	4" ANSI	35.3 (897)	6.3 (160)	29.4 (747)	44.2 (1123)	16.2 (411)	19 (483)	C
	CR 15-3	7.5 (5.5)		37.6 (955)	6.3 (160)	29.4 (747)	44.2 (1123)	16.2 (411)	19 (483)	C
	CR 15-4	7.5 (5.5)		39.3 (998)	6.3 (160)	29.4 (747)	44.2 (1123)	16.2 (411)	19 (483)	C
	CR 15-5	10.0 (7.5)		40.5 (1029)	6.3 (160)	40.37 (1025)	44.2 (1123)	16.2 (411)	19 (483)	C
	CR 15-7	15.0 (11.0)		48 (1219)	6.3 (160)	40.37 (1025)	44.2 (1123)	16.2 (411)	19 (483)	C
3	CR 15-2	5.0 (4.0)	4" ANSI	35.3 (897)	6.3 (160)	42 (1067)	44.2 (1123)	16.2 (411)	19 (483)	C
	CR 15-3	7.5 (5.5)		37.6 (955)	6.3 (160)	42 (1067)	44.2 (1123)	16.2 (411)	19 (483)	C
	CR 15-4	7.5 (5.5)		39.3 (998)	6.3 (160)	42 (1067)	44.2 (1123)	16.2 (411)	19 (483)	C
	CR 15-5	10.0 (7.5)		40.5 (1029)	6.3 (160)	60.1 (1527)	44.2 (1123)	16.2 (411)	19 (483)	C
	CR 15-7	15.0 (11.0)		48 (1219)	6.3 (160)	60.1 (1527)	44.2 (1123)	16.2 (411)	19 (483)	C
4	CR 15-2	5.0 (4.0)	6" ANSI	35.3 (897)	6.3 (160)	54.6 (1387)	46.3 (1176)	16.3 (414)	19 (483)	C
	CR 15-3	7.5 (5.5)		37.6 (955)	6.3 (160)	54.6 (1387)	46.3 (1176)	16.3 (414)	19 (483)	C
	CR 15-4	7.5 (5.5)		39.3 (998)	6.3 (160)	54.6 (1387)	46.3 (1176)	16.3 (414)	19 (483)	C
	CR 15-5	10.0 (7.5)		40.5 (1029)	6.3 (160)	79.8 (2027)	46.3 (1176)	16.3 (414)	19 (483)	C
	CR 15-7	15.0 (11.0)		48 (1219)	6.3 (160)	79.8 (2027)	46.3 (1176)	16.3 (414)	19 (483)	C
5	CR 15-2	5.0 (4.0)	6" ANSI	35.3 (897)	6.3 (160)	67.2 (1707)	46.3 (1176)	16.3 (414)	19 (483)	C
	CR 15-3	7.5 (5.5)		37.6 (955)	6.3 (160)	67.2 (1707)	46.3 (1176)	16.3 (414)	19 (483)	C
	CR 15-4	7.5 (5.5)		39.3 (998)	6.3 (160)	67.2 (1707)	46.3 (1176)	16.3 (414)	19 (483)	C
	CR 15-5	10.0 (7.5)		40.5 (1029)	6.3 (160)	99.6 (2530)	46.3 (1176)	16.3 (414)	19 (483)	C
	CR 15-7	15.0 (11.0)		48 (1219)	6.3 (160)	99.6 (2530)	46.3 (1176)	16.3 (414)	19 (483)	C
6	CR 15-2	5.0 (4.0)	6" ANSI	35.3 (897)	6.3 (160)	79.8 (2027)	46.3 (1176)	16.3 (414)	19 (483)	C
	CR 15-3	7.5 (5.5)		37.6 (955)	6.3 (160)	79.8 (2027)	46.3 (1176)	16.3 (414)	19 (483)	C
	CR 15-4	7.5 (5.5)		39.3 (998)	6.3 (160)	79.8 (2027)	46.3 (1176)	16.3 (414)	19 (483)	C
	CR 15-5	10.0 (7.5)		40.5 (1029)	6.3 (160)	119.2 (3028)	46.3 (1176)	16.3 (414)	19 (483)	C
	CR 15-7	15.0 (11.0)		48 (1219)	6.3 (160)	119.2 (3028)	46.3 (1176)	16.3 (414)	19 (483)	C

Design D: Hydro MPC pump system with a control cabinet mounted on a separate base frame.
Design C: Hydro MPC pump system with a floor-mounted control cabinet.
Dimensions may vary by ± 0.39 in. (10 mm).

Hydro MPC-E with CRE 20

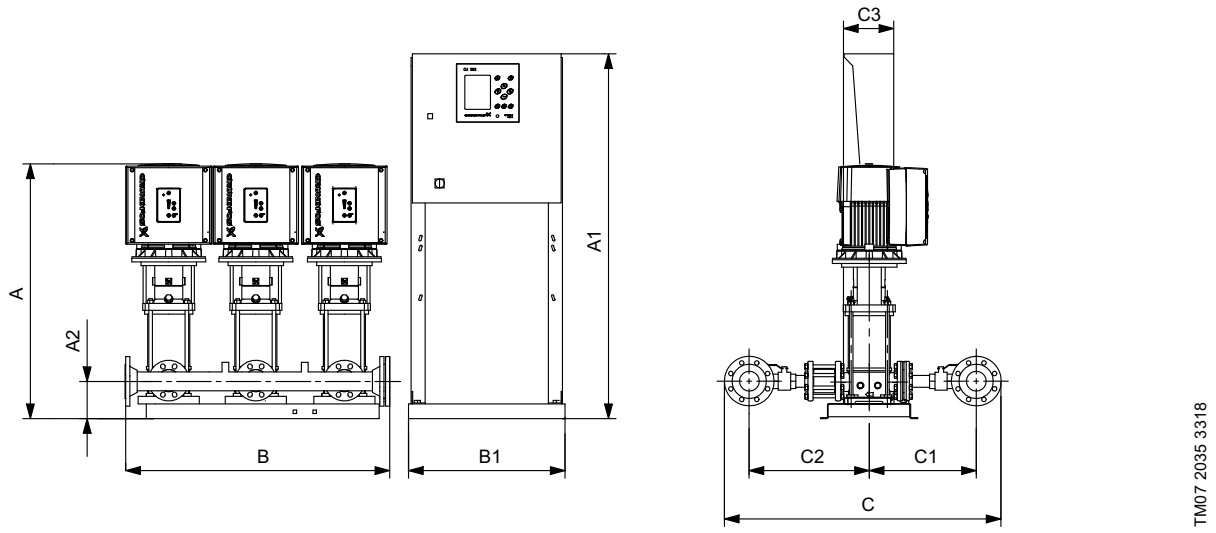


Fig. 55 Dimensional sketch of a Hydro MPC pump system with a control cabinet mounted on a separate base frame (design D). The pump system is shown as an example. The pumps supplied may differ from the sketch.

Hydro MPC-E with CR 20

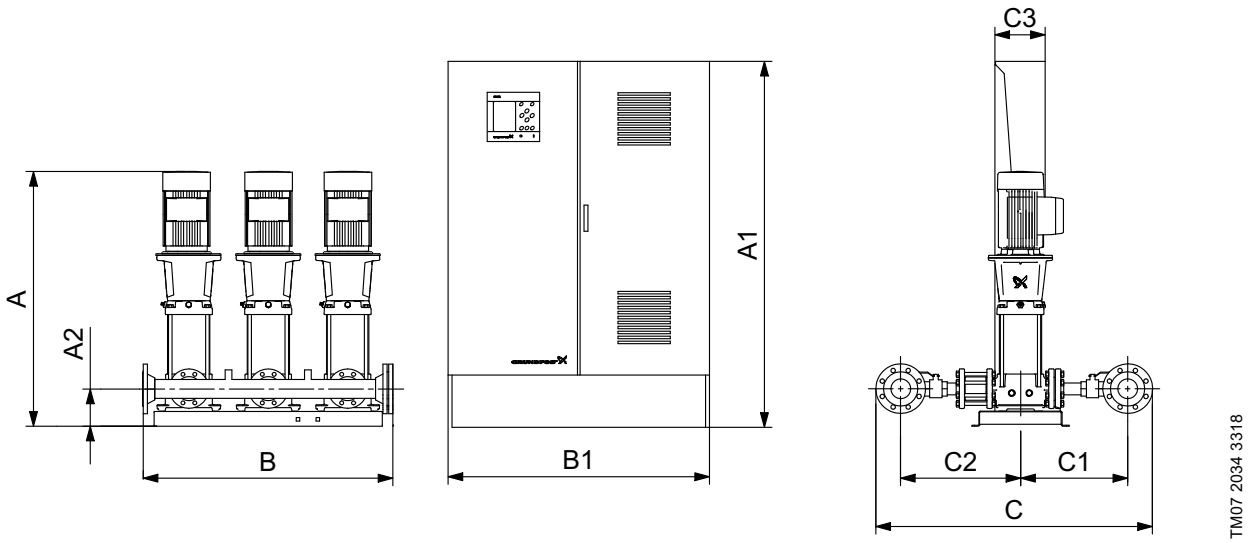


Fig. 56 Dimensional sketch of a Hydro MPC pump system with a control cabinet mounted on a separate base frame (design C). The pump system is shown as an example. The pumps supplied may differ from the sketch.

Electrical data and dimensions

Hydro MPC-E with CRE 20

Number of pumps	Pump type	Motor [Hp (kW)]	Connection size	A [in (mm)]	A2 [in (mm)]	B [in (mm)]	C [in (mm)]	C1 [in (mm)]	C2 [in (mm)]	Design
2	CRE 20-1	3.0 (2.2)	4" ANSI	30.7 (780)	6.3 (160)	29.4 (747)	44.2 (1123)	16.2 (411)	19 (483)	D
	CRE 20-2	5.0 (4.0)		35.4 (899)	6.3 (160)	29.4 (747)	44.2 (1123)	16.2 (411)	19 (483)	D
	CRE 20-3	7.5 (5.5)		37.5 (953)	6.3 (160)	40.4 (1026)	44.2 (1123)	16.2 (411)	19 (483)	D
	CRE 20-4	10.0 (7.5)		38.7 (983)	6.3 (160)	40.4 (1026)	44.2 (1123)	16.2 (411)	19 (483)	D
	CRE 20-5	15.0 (11.0)		46.9 (1191)	6.3 (160)	40.4 (1026)	44.2 (1123)	16.2 (411)	19 (483)	D
	CRE 20-6	15.0 (4.0)		48.7 (1237)	6.3 (160)	40.4 (1026)	44.2 (1123)	16.2 (411)	19 (483)	D
3	CRE 20-1	3.0 (2.2)	4" ANSI	30.7 (780)	6.3 (160)	42 (1067)	44.2 (1123)	16.2 (411)	19 (483)	D
	CRE 20-2	5.0 (4.0)		35.4 (899)	6.3 (160)	42 (1067)	44.2 (1123)	16.2 (411)	19 (483)	D
	CRE 20-3	7.5 (5.5)		37.5 (953)	6.3 (160)	60.1 (1527)	44.2 (1123)	16.2 (411)	19 (483)	D
	CRE 20-4	10.0 (7.5)		38.7 (983)	6.3 (160)	60.1 (1527)	44.2 (1123)	16.2 (411)	19 (483)	D
	CRE 20-5	15.0 (11.0)		46.9 (1191)	6.3 (160)	60.1 (1527)	44.2 (1123)	16.2 (411)	19 (483)	D
	CRE 20-6	15.0 (4.0)		48.7 (1237)	6.3 (160)	60.1 (1527)	44.2 (1123)	16.2 (411)	19 (483)	D
4	CRE 20-1	3.0 (2.2)	6" ANSI	30.7 (780)	6.3 (160)	54.6 (1387)	46.3 (1176)	16.3 (414)	19 (483)	D
	CRE 20-2	5.0 (4.0)		35.4 (899)	6.3 (160)	54.6 (1387)	46.3 (1176)	16.3 (414)	19 (483)	D
	CRE 20-3	7.5 (5.5)		37.5 (953)	6.3 (160)	79.8 (2027)	46.3 (1176)	16.3 (414)	19 (483)	D
	CRE 20-4	10.0 (7.5)		38.7 (983)	6.3 (160)	79.8 (2027)	46.3 (1176)	16.3 (414)	19 (483)	D
	CRE 20-5	15.0 (11.0)		46.9 (1191)	6.3 (160)	79.8 (2027)	46.3 (1176)	16.3 (414)	19 (483)	D
	CRE 20-6	15.0 (4.0)		48.7 (1237)	6.3 (160)	79.8 (2027)	46.3 (1176)	16.3 (414)	19 (483)	D
6	CRE 20-1	3.0 (2.2)	6" ANSI	30.7 (780)	6.3 (160)	79.8 (2027)	46.3 (1176)	16.3 (414)	19 (483)	D
	CRE 20-2	5.0 (4.0)		35.4 (899)	6.3 (160)	79.8 (2027)	46.3 (1176)	16.3 (414)	19 (483)	D
	CRE 20-3	7.5 (5.5)		37.5 (953)	6.3 (160)	119.2 (3028)	46.3 (1176)	16.3 (414)	19 (483)	D
	CRE 20-4	10.0 (7.5)		38.7 (983)	6.3 (160)	119.2 (3028)	46.3 (1176)	16.3 (414)	19 (483)	D
	CRE 20-5	15.0 (11.0)		46.9 (1191)	6.3 (160)	119.2 (3028)	46.3 (1176)	16.3 (414)	19 (483)	D
	CRE 20-6	15.0 (4.0)		48.7 (1237)	6.3 (160)	119.2 (3028)	46.3 (1176)	16.3 (414)	19 (483)	D

Hydro MPC-E with CR 20

Number of pumps	Pump type	Motor [Hp (kW)]	Connection size	A [in (mm)]	A2 [in (mm)]	B [in (mm)]	C [in (mm)]	C1 [in (mm)]	C2 [in (mm)]	Design
2	CR 20-1	3.0 (2.2)	4" ANSI	33.2 (843)	6.3 (160)	29.4 (747)	44.2 (1123)	16.2 (411)	19 (483)	C
	CR 20-2	5.0 (4.0)		35.3 (897)	6.3 (160)	29.4 (747)	44.2 (1123)	16.2 (411)	19 (483)	C
	CR 20-3	7.5 (5.5)		37.6 (955)	6.3 (160)	29.4 (747)	44.2 (1123)	16.2 (411)	19 (483)	C
	CR 20-4	10.0 (7.5)		39 (991)	6.3 (160)	40.4 (1026)	44.2 (1123)	16.2 (411)	19 (483)	C
	CR 20-5	15.0 (11.0)		44.5 (1130)	6.3 (160)	40.4 (1026)	44.2 (1123)	16.2 (411)	19 (483)	C
	CR 20-6	15.0 (4.0)		46.2 (1173)	6.3 (160)	40.4 (1026)	44.2 (1123)	16.2 (411)	19 (483)	C
3	CR 20-1	3.0 (2.2)	4" ANSI	33.2 (843)	6.3 (160)	42 (1067)	44.2 (1123)	16.2 (411)	19 (483)	C
	CR 20-2	5.0 (4.0)		35.3 (897)	6.3 (160)	42 (1067)	44.2 (1123)	16.2 (411)	19 (483)	C
	CR 20-3	7.5 (5.5)		37.6 (955)	6.3 (160)	42 (1067)	44.2 (1123)	16.2 (411)	19 (483)	C
	CR 20-4	10.0 (7.5)		39 (991)	6.3 (160)	60.1 (1527)	44.2 (1123)	16.2 (411)	19 (483)	C
	CR 20-5	15.0 (11.0)		44.5 (1130)	6.3 (160)	60.1 (1527)	44.2 (1123)	16.2 (411)	19 (483)	C
	CR 20-6	15.0 (4.0)		46.2 (1173)	6.3 (160)	60.1 (1527)	44.2 (1123)	16.2 (411)	19 (483)	C
4	CR 20-1	3.0 (2.2)	6" ANSI	33.2 (843)	6.3 (160)	54.6 (1387)	46.3 (1176)	16.3 (414)	19 (483)	C
	CR 20-2	5.0 (4.0)		35.3 (897)	6.3 (160)	54.6 (1387)	46.3 (1176)	16.3 (414)	19 (483)	C
	CR 20-3	7.5 (5.5)		37.6 (955)	6.3 (160)	54.6 (1387)	46.3 (1176)	16.3 (414)	19 (483)	C
	CR 20-4	10.0 (7.5)		39 (991)	6.3 (160)	79.8 (2027)	46.3 (1176)	16.3 (414)	19 (483)	C
	CR 20-5	15.0 (11.0)		44.5 (1130)	6.3 (160)	79.8 (2027)	46.3 (1176)	16.3 (414)	19 (483)	C
	CR 20-6	15.0 (4.0)		46.2 (1173)	6.3 (160)	79.8 (2027)	46.3 (1176)	16.3 (414)	19 (483)	C
5	CR 20-1	3.0 (2.2)	6" ANSI	33.2 (843)	6.3 (160)	67.2 (1707)	46.3 (1176)	16.3 (414)	19 (483)	C
	CR 20-2	5.0 (4.0)		35.3 (897)	6.3 (160)	67.2 (1707)	46.3 (1176)	16.3 (414)	19 (483)	C
	CR 20-3	7.5 (5.5)		37.6 (955)	6.3 (160)	67.2 (1707)	46.3 (1176)	16.3 (414)	19 (483)	C
	CR 20-4	10.0 (7.5)		39 (991)	6.3 (160)	99.6 (2530)	46.3 (1176)	16.3 (414)	19 (483)	C
	CR 20-5	15.0 (11.0)		44.5 (1130)	6.3 (160)	99.6 (2530)	46.3 (1176)	16.3 (414)	19 (483)	C
	CR 20-6	15.0 (4.0)		46.2 (1173)	6.3 (160)	99.6 (2530)	46.3 (1176)	16.3 (414)	19 (483)	C
6	CR 20-1	3.0 (2.2)	6" ANSI	33.2 (843)	6.3 (160)	79.8 (2027)	46.3 (1176)	16.3 (414)	19 (483)	C
	CR 20-2	5.0 (4.0)		35.3 (897)	6.3 (160)	79.8 (2027)	46.3 (1176)	16.3 (414)	19 (483)	C
	CR 20-3	7.5 (5.5)		37.6 (955)	6.3 (160)	79.8 (2027)	46.3 (1176)	16.3 (414)	19 (483)	C
	CR 20-4	10.0 (7.5)		39 (991)	6.3 (160)	119.2 (3028)	46.3 (1176)	16.3 (414)	19 (483)	C
	CR 20-5	15.0 (11.0)		44.5 (1130)	6.3 (160)	119.2 (3028)	46.3 (1176)	16.3 (414)	19 (483)	C
	CR 20-6	15.0 (4.0)		46.2 (1173)	6.3 (160)	119.2 (3028)	46.3 (1176)	16.3 (414)	19 (483)	C

Design D: Hydro MPC pump system with a control cabinet mounted on a separate base frame.
Design C: Hydro MPC pump system with a floor-mounted control cabinet.
Dimensions may vary by ± 0.39 in. (10 mm).

Hydro MPC-E with CRE 32

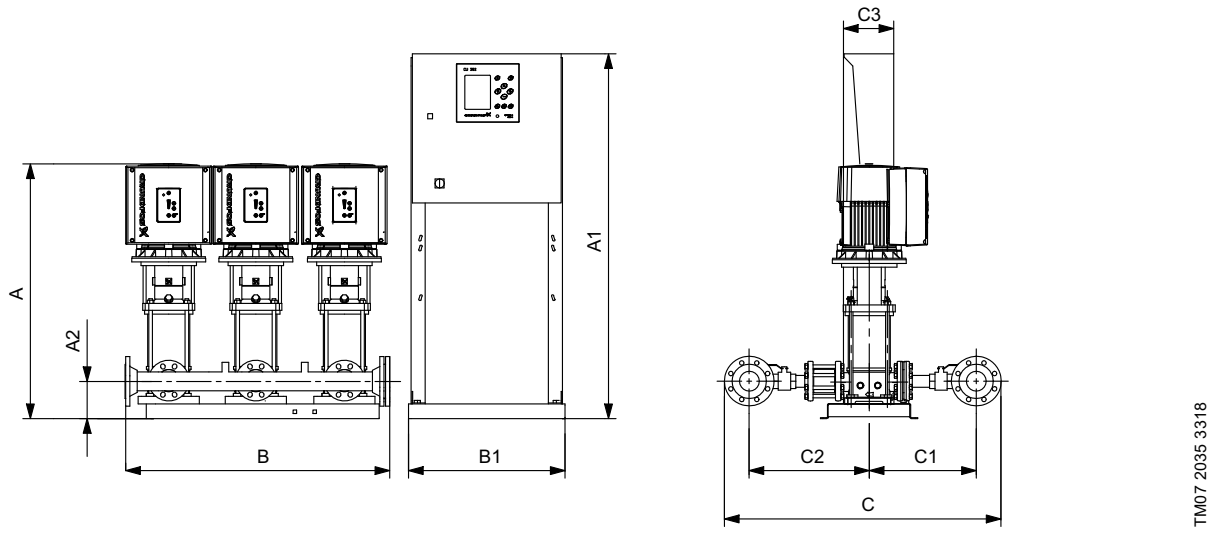


Fig. 57 Dimensional sketch of a Hydro MPC pump system with a control cabinet mounted on a separate base frame (design D). The pump system is shown as an example. The pumps supplied may differ from the sketch.

Hydro MPC-E with CR 32

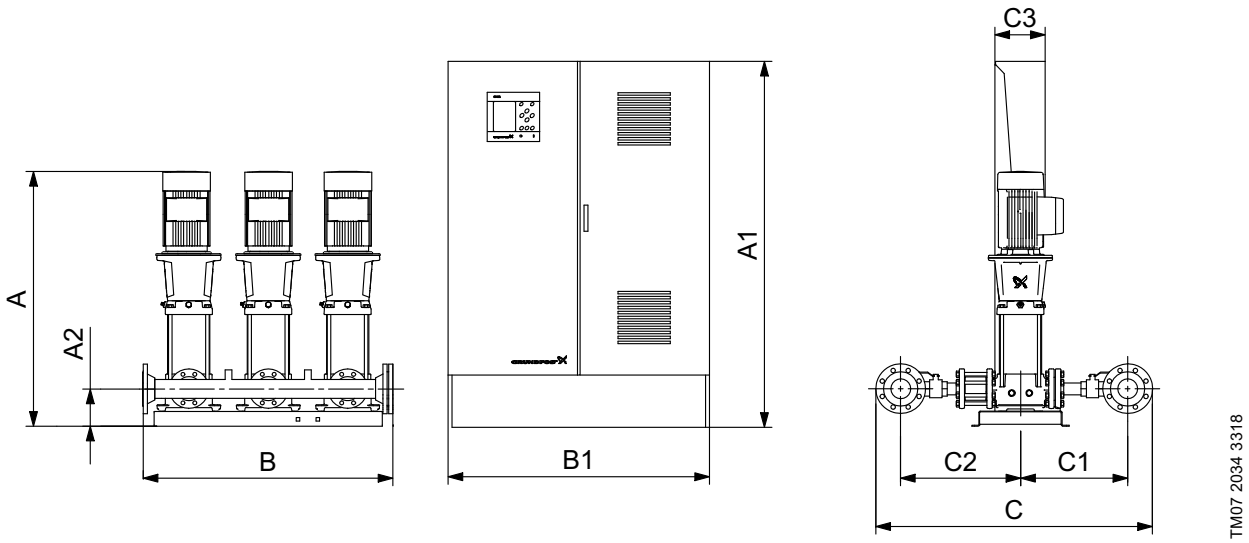


Fig. 58 Dimensional sketch of a Hydro MPC pump system with a control cabinet mounted on a separate base frame (design C). The pump system is shown as an example. The pumps supplied may differ from the sketch.

Electrical data and dimensions

Hydro MPC-E with CRE 32

Number of pumps	Pump type	Motor [Hp (kW)]	Connection size	A [in (mm)]	A2 [in (mm)]	B [in (mm)]	C [in (mm)]	C1 [in (mm)]	C2 [in (mm)]	Design
2	CRE 32-1	5.0 (4.0)	4" ANSI	38.1 (968)	6.9 (175)	40.4 (1026)	47.8 (1214)	14.6 (371)	24.2 (615)	D
	CRE 32-2-1	7.5 (5.5)		40.8 (1036)	6.9 (175)	40.4 (1026)	47.8 (1214)	14.6 (371)	24.2 (615)	D
	CRE 32-3-2	10.0 (7.5)		43.1 (1095)	6.9 (175)	40.4 (1026)	47.8 (1214)	14.6 (371)	24.2 (615)	D
	CRE 32-4-2	15.0 (11.0)		54 (1372)	6.9 (175)	40.4 (1026)	47.8 (1214)	14.6 (371)	24.2 (615)	D
	CRE 32-5	20.0 (15.0)		56.8 (1443)	6.9 (175)	40.4 (1026)	47.8 (1214)	14.6 (371)	24.2 (615)	D
	CRE 32-6-2	25.0 (18.5)		58.7 (1491)	6.9 (175)	40.4 (1026)	47.8 (1214)	14.6 (371)	24.2 (615)	D
3	CRE 32-1	5.0 (4.0)	6" ANSI	38.1 (968)	6.9 (175)	60.1 (1527)	49.8 (1265)	14.6 (371)	24.2 (615)	D
	CRE 32-2-1	7.5 (5.5)		40.8 (1036)	6.9 (175)	60.1 (1527)	49.8 (1265)	14.6 (371)	24.2 (615)	D
	CRE 32-3-2	10.0 (7.5)		43.1 (1095)	6.9 (175)	60.1 (1527)	49.8 (1265)	14.6 (371)	24.2 (615)	D
	CRE 32-4-2	15.0 (11.0)		54 (1372)	6.9 (175)	60.1 (1527)	49.8 (1265)	14.6 (371)	24.2 (615)	D
	CRE 32-5	20.0 (15.0)		56.8 (1443)	6.9 (175)	60.1 (1527)	49.8 (1265)	14.6 (371)	24.2 (615)	D
	CRE 32-6-2	25.0 (18.5)		58.7 (1491)	6.9 (175)	60.1 (1527)	49.8 (1265)	14.6 (371)	24.2 (615)	D
4	CRE 32-1	5.0 (4.0)	6" ANSI	38.1 (968)	6.9 (175)	79.8 (2027)	49.8 (1265)	14.6 (371)	24.2 (615)	D
	CRE 32-2-1	7.5 (5.5)		40.8 (1036)	6.9 (175)	79.8 (2027)	49.8 (1265)	14.6 (371)	24.2 (615)	D
	CRE 32-3-2	10.0 (7.5)		43.1 (1095)	6.9 (175)	79.8 (2027)	49.8 (1265)	14.6 (371)	24.2 (615)	D
	CRE 32-4-2	15.0 (11.0)		54 (1372)	6.9 (175)	79.8 (2027)	49.8 (1265)	14.6 (371)	24.2 (615)	D
	CRE 32-5	20.0 (15.0)		56.8 (1443)	6.9 (175)	79.8 (2027)	49.8 (1265)	14.6 (371)	24.2 (615)	D
	CRE 32-6-2	25.0 (18.5)		58.7 (1491)	6.9 (175)	79.8 (2027)	49.8 (1265)	14.6 (371)	24.2 (615)	D
5	CRE 32-1	5.0 (4.0)	8" ANSI	39.7 (1008)	6.9 (175)	99.7 (2532)	49.8 (1265)	14.6 (371)	24.2 (615)	D
	CRE 32-2-1	7.5 (5.5)		42.4 (1077)	6.9 (175)	99.7 (2532)	49.8 (1265)	14.6 (371)	24.2 (615)	D
	CRE 32-3-2	10.0 (7.5)		44.7 (1135)	6.9 (175)	99.7 (2532)	49.8 (1265)	14.6 (371)	24.2 (615)	D
	CRE 32-4-2	15.0 (11.0)		55.6 (1412)	6.9 (175)	99.7 (2532)	49.8 (1265)	14.6 (371)	24.2 (615)	D
	CRE 32-5	20.0 (15.0)		58.4 (1483)	6.9 (175)	99.7 (2532)	49.8 (1265)	14.6 (371)	24.2 (615)	D
	CRE 32-6-2	25.0 (18.5)		60.3 (1532)	6.9 (175)	99.7 (2532)	49.8 (1265)	14.6 (371)	24.2 (615)	D
6	CRE 32-1	5.0 (4.0)	8" ANSI	39.7 (1008)	6.9 (175)	119.4 (3033)	49.8 (1265)	14.6 (371)	24.2 (615)	D
	CRE 32-2-1	7.5 (5.5)		42.4 (1077)	6.9 (175)	119.4 (3033)	49.8 (1265)	14.6 (371)	24.2 (615)	D
	CRE 32-3-2	10.0 (7.5)		44.7 (1135)	6.9 (175)	119.4 (3033)	49.8 (1265)	14.6 (371)	24.2 (615)	D
	CRE 32-4-2	15.0 (11.0)		55.6 (1412)	6.9 (175)	119.4 (3033)	49.8 (1265)	14.6 (371)	24.2 (615)	D
	CRE 32-5	20.0 (15.0)		58.4 (1483)	6.9 (175)	119.4 (3033)	49.8 (1265)	14.6 (371)	24.2 (615)	D
	CRE 32-6-2	25.0 (18.5)		60.3 (1532)	6.9 (175)	119.4 (3033)	49.8 (1265)	14.6 (371)	24.2 (615)	D

Hydro MPC-E with CR 32

Number of pumps	Pump type	Motor [Hp (kW)]	Connection size	A [in (mm)]	A2 [in (mm)]	B [in (mm)]	C [in (mm)]	C1 [in (mm)]	C2 [in (mm)]	Design
2	CR 32-1	5.0 (4.0)	4" ANSI	37.9 (963)	6.9 (175)	40.4 (1026)	47.8 (1214)	14.6 (371)	24.2 (615)	C
	CR 32-2-1	7.5 (5.5)		40.9 (1039)	6.9 (175)	40.4 (1026)	47.8 (1214)	14.6 (371)	24.2 (615)	C
	CR 32-3-2	10.0 (7.5)		43.1 (1095)	6.9 (175)	40.4 (1026)	47.8 (1214)	14.6 (371)	24.2 (615)	C
	CR 32-4-2	15.0 (11.0)		51.5 (1308)	6.9 (175)	40.4 (1026)	47.8 (1214)	14.6 (371)	24.2 (615)	C
	CR 32-5	20.0 (15.0)		53.2 (1351)	6.9 (175)	40.4 (1026)	47.8 (1214)	14.6 (371)	24.2 (615)	C
	CR 32-6-2	25.0 (18.5)		57.1 (1450)	6.9 (175)	40.4 (1026)	47.8 (1214)	14.6 (371)	24.2 (615)	C
3	CR 32-1	5.0 (4.0)	6" ANSI	37.9 (963)	6.9 (175)	60.1 (1527)	49.8 (1265)	14.6 (371)	24.2 (615)	C
	CR 32-2-1	7.5 (5.5)		40.9 (1039)	6.9 (175)	60.1 (1527)	49.8 (1265)	14.6 (371)	24.2 (615)	C
	CR 32-3-2	10.0 (7.5)		43.1 (1095)	6.9 (175)	42 (1067)	49.8 (1265)	14.6 (371)	24.2 (615)	C
	CR 32-4-2	15.0 (11.0)		51.5 (1308)	6.9 (175)	60.1 (1527)	49.8 (1265)	14.6 (371)	24.2 (615)	C
	CR 32-5	20.0 (15.0)		53.2 (1351)	6.9 (175)	60.1 (1527)	49.8 (1265)	14.6 (371)	24.2 (615)	C
	CR 32-6-2	25.0 (18.5)		57.1 (1450)	6.9 (175)	60.1 (1527)	49.8 (1265)	14.6 (371)	24.2 (615)	C
4	CR 32-1	5.0 (4.0)	6" ANSI	37.9 (963)	6.9 (175)	79.8 (2027)	49.8 (1265)	14.6 (371)	24.2 (615)	C
	CR 32-2-1	7.5 (5.5)		40.9 (1039)	6.9 (175)	79.8 (2027)	49.8 (1265)	14.6 (371)	24.2 (615)	C
	CR 32-3-2	10.0 (7.5)		43.1 (1095)	6.9 (175)	79.8 (2027)	49.8 (1265)	14.6 (371)	24.2 (615)	C
	CR 32-4-2	15.0 (11.0)		51.5 (1308)	6.9 (175)	79.8 (2027)	49.8 (1265)	14.6 (371)	24.2 (615)	C
	CR 32-5	20.0 (15.0)		53.2 (1351)	6.9 (175)	79.8 (2027)	49.8 (1265)	14.6 (371)	24.2 (615)	C
	CR 32-6-2	25.0 (18.5)		57.1 (1450)	6.9 (175)	79.8 (2027)	49.8 (1265)	14.6 (371)	24.2 (615)	C
5	CR 32-1	5.0 (4.0)	8" ANSI	37.9 (963)	6.9 (175)	99.7 (2532)	49.8 (1265)	14.6 (371)	24.2 (615)	C
	CR 32-2-1	7.5 (5.5)		40.9 (1039)	6.9 (175)	99.7 (2532)	49.8 (1265)	14.6 (371)	24.2 (615)	C
	CR 32-3-2	10.0 (7.5)		43.1 (1095)	6.9 (175)	99.7 (2532)	49.8 (1265)	14.6 (371)	24.2 (615)	C
	CR 32-4-2	15.0 (11.0)		51.5 (1308)	6.9 (175)	99.7 (2532)	49.8 (1265)	14.6 (371)	24.2 (615)	C
	CR 32-5	20.0 (15.0)		53.2 (1351)	6.9 (175)	99.7 (2532)	49.8 (1265)	14.6 (371)	24.2 (615)	C
	CR 32-6-2	25.0 (18.5)		57.1 (1450)	6.9 (175)	99.7 (2532)	49.8 (1265)	14.6 (371)	24.2 (615)	C
6	CR 32-1	5.0 (4.0)	6" ANSI	37.9 (963)	6.9 (175)	119.4 (3033)	49.8 (1265)	14.6 (371)	24.2 (615)	C
	CR 32-2-1	7.5 (5.5)		40.9 (1039)	6.9 (175)	119.4 (3033)	49.8 (1265)	14.6 (371)	24.2 (615)	C
	CR 32-3-2	10.0 (7.5)		43.1 (1095)	6.9 (175)	119.4 (3033)	49.8 (1265)	14.6 (371)	24.2 (615)	C
	CR 32-4-2	15.0 (11.0)		51.5 (1308)	6.9 (175)	119.4 (3033)	49.8 (1265)	14.6 (371)	24.2 (615)	C
	CR 32-5	20.0 (15.0)		53.2 (1351)	6.9 (175)	119.4 (3033)	49.8 (1265)	14.6 (371)	24.2 (615)	C
	CR 32-6-2	25.0 (18.5)		57.1 (1450)	6.9 (175)	119.4 (3033)	49.8 (1265)	14.6 (371)	24.2 (615)	C

Design D: Hydro MPC pump system with a control cabinet mounted on a separate base frame.
Design C: Hydro MPC pump system with a floor-mounted control cabinet.
Dimensions may vary by ± 0.39 in. (10 mm).

Hydro MPC-E with CRE 45

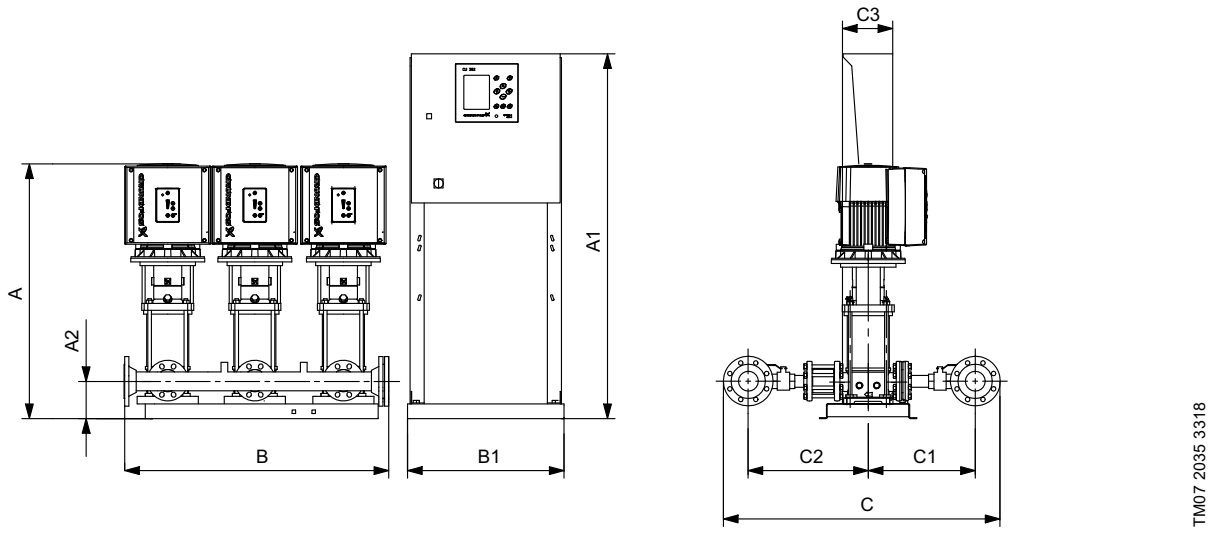


Fig. 59 Dimensional sketch of a Hydro MPC pump system with a control cabinet mounted on a separate base frame (design D). The pump system is shown as an example. The pumps supplied may differ from the sketch.

Hydro MPC-E with CR 45

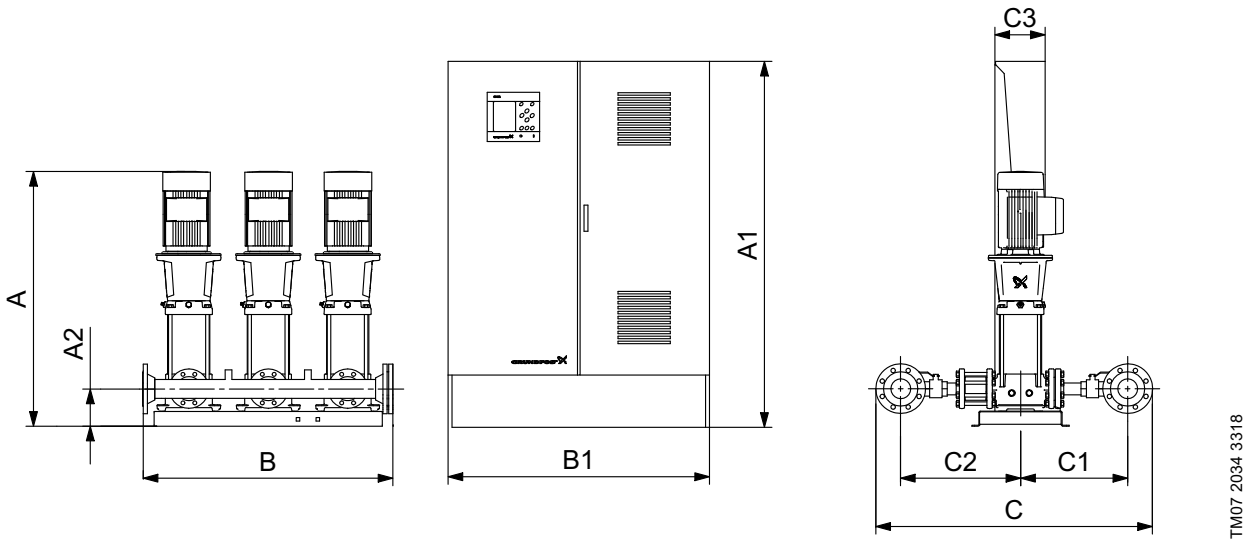


Fig. 60 Dimensional sketch of a Hydro MPC pump system with a control cabinet mounted on a separate base frame (design C). The pump system is shown as an example. The pumps supplied may differ from the sketch.

Electrical data and dimensions

Hydro MPC-E with CRE 45

Number of pumps	Pump type	Motor [Hp (kW)]	Connection size	A [in (mm)]	A2 [in (mm)]	B [in (mm)]	C [in (mm)]	C1 [in (mm)]	C2 [in (mm)]	Design
2	CRE 45-1-1	7.5 (5.5)	6" ANSI	40.2 (1021)	8.3 (211)	40.4 (1026)	51.6 (1311)	15.2 (386)	25.4 (645)	D
	CRE 45-1	10.0 (7.5)		40.2 (1021)	8.3 (211)	40.4 (1026)	51.6 (1311)	15.5 (394)	25.1 (638)	D
	CRE 45-2	15.0 (11.0)		51 (1295)	8.3 (211)	40.4 (1026)	51.6 (1311)	15.5 (394)	25.1 (638)	D
	CRE 45-3-2	20.0 (15.0)		54.1 (1374)	8.3 (211)	40.4 (1026)	51.6 (1311)	15.5 (394)	25.1 (638)	D
	CRE 45-3	25.0 (18.5)		54.2 (1377)	8.3 (211)	40.4 (1026)	51.6 (1311)	15.5 (394)	25.1 (638)	D
	CRE 45-4	30.0 (22.0)		57.4 (1458)	8.3 (211)	40.4 (1026)	51.6 (1311)	15.5 (394)	25.1 (638)	D
3	CRE 45-1-1	7.5 (5.5)	6" ANSI	40.2 (1021)	8.3 (211)	60.1 (1527)	51.6 (1311)	15.2 (386)	25.4 (645)	D
	CRE 45-1	10.0 (7.5)		40.2 (1021)	8.3 (211)	60.1 (1527)	51.6 (1311)	15.5 (394)	25.1 (638)	D
	CRE 45-2	15.0 (11.0)		51 (1295)	8.3 (211)	60.1 (1527)	51.6 (1311)	15.5 (394)	25.1 (638)	D
	CRE 45-3-2	20.0 (15.0)		54.1 (1374)	8.3 (211)	60.1 (1527)	51.6 (1311)	15.5 (394)	25.1 (638)	D
	CRE 45-3	25.0 (18.5)		54.2 (1377)	8.3 (211)	60.1 (1527)	51.6 (1311)	15.5 (394)	25.1 (638)	D
	CRE 45-4	30.0 (22.0)		57.4 (1458)	8.3 (211)	60.1 (1527)	51.6 (1311)	15.5 (394)	25.1 (638)	D
4	CRE 45-1-1	7.5 (5.5)	8" ANSI	41.8 (1062)	9.8 (249)	79.9 (2029)	55.6 (1412)	16.3 (414)	25.9 (658)	D
	CRE 45-1	10.0 (7.5)		41.8 (1062)	9.8 (249)	79.9 (2029)	55.6 (1412)	16.3 (414)	25.9 (658)	D
	CRE 45-2	15.0 (11.0)		52.6 (1336)	9.8 (249)	79.9 (2029)	55.6 (1412)	16.3 (414)	25.9 (658)	D
	CRE 45-3-2	20.0 (15.0)		55.6 (1412)	9.8 (249)	79.9 (2029)	55.6 (1412)	16.3 (414)	25.9 (658)	D
	CRE 45-3	25.0 (18.5)		55.7 (1415)	9.8 (249)	79.9 (2029)	55.6 (1412)	16.3 (414)	25.9 (658)	D
	CRE 45-4	30.0 (22.0)		58.9 (1496)	9.8 (249)	79.9 (2029)	55.6 (1412)	16.3 (414)	25.9 (658)	D
5	CRE 45-1-1	7.5 (5.5)	8" ANSI	41.8 (1062)	9.8 (249)	99.7 (2532)	55.6 (1412)	16.3 (414)	25.9 (658)	D
	CRE 45-1	10.0 (7.5)		41.8 (1062)	9.8 (249)	99.7 (2532)	55.6 (1412)	16.3 (414)	25.9 (658)	D
	CRE 45-2	15.0 (11.0)		52.6 (1336)	9.8 (249)	99.7 (2532)	55.6 (1412)	16.3 (414)	25.9 (658)	D
	CRE 45-3-2	20.0 (15.0)		55.6 (1412)	9.8 (249)	99.7 (2532)	55.6 (1412)	16.3 (414)	25.9 (658)	D
	CRE 45-3	25.0 (18.5)		55.7 (1415)	9.8 (249)	99.7 (2532)	55.6 (1412)	16.3 (414)	25.9 (658)	D
	CRE 45-4	30.0 (22.0)		58.9 (1496)	9.8 (249)	99.7 (2532)	55.6 (1412)	16.3 (414)	25.9 (658)	D
6	CRE 45-1-1	7.5 (5.5)	10" ANSI	44.2 (1123)	12.2 (310)	119.4 (3033)	60.4 (1534)	17.4 (442)	27.1 (688)	D
	CRE 45-1	10.0 (7.5)		44.2 (1123)	12.2 (310)	119.4 (3033)	60.4 (1534)	17.4 (442)	27.1 (688)	D
	CRE 45-2	15.0 (11.0)		55.0 (1397)	12.2 (310)	119.4 (3033)	60.4 (1534)	17.4 (442)	27.1 (688)	D
	CRE 45-3-2	20.0 (15.0)		58.0 (1473)	12.2 (310)	119.4 (3033)	60.4 (1534)	17.4 (442)	27.1 (688)	D
	CRE 45-3	25.0 (18.5)		58.1 (1476)	12.2 (310)	119.4 (3033)	60.4 (1534)	17.4 (442)	27.1 (688)	D
	CRE 45-4	30.0 (22.0)		61.3 (1557)	12.2 (310)	119.4 (3033)	60.4 (1534)	17.4 (442)	27.1 (688)	D

Hydro MPC-E with CR 45

Number of pumps	Pump type	Motor [Hp (kW)]	Connection size	A [in (mm)]	A2 [in (mm)]	B [in (mm)]	C [in (mm)]	C1 [in (mm)]	C2 [in (mm)]	Design
2	CR 45-1-1	7.5 (5.5)	6" ANSI	40.3 (1024)	8.3 (211)	40.4 (1026)	51,6 (1311)	15.2 (386)	25.4 (645)	C
	CR 45-1	10.0 (7.5)		40.3 (1024)	8.3 (211)	40.4 (1026)	51,6 (1311)	15.5 (394)	25.1 (638)	C
	CR 45-2	15.0 (11.0)		48.5 (1232)	8.3 (211)	40.4 (1026)	51,6 (1311)	15.5 (394)	25.1 (638)	C
	CR 45-3-2	20.0 (15.0)		53.9 (1369)	8.3 (211)	40.4 (1026)	51,6 (1311)	15.5 (394)	25.1 (638)	C
	CR 45-3	25.0 (18.5)		55 (1397)	8.3 (211)	40.4 (1026)	51,6 (1311)	15.5 (394)	25.1 (638)	C
	CR 45-4	30.0 (22.0)		61.5 (1562)	8.3 (211)	40.4 (1026)	51,6 (1311)	15.5 (394)	25.1 (638)	C
3	CR 45-1-1	7.5 (5.5)	6" ANSI	40.3 (1024)	8.3 (211)	60.1 (1527)	51,6 (1311)	15.2 (386)	25.4 (645)	C
	CR 45-1	10.0 (7.5)		40.3 (1024)	8.3 (211)	60.1 (1527)	51,6 (1311)	15.5 (394)	25.1 (638)	C
	CR 45-2	15.0 (11.0)		48.5 (1232)	8.3 (211)	60.1 (1527)	51,6 (1311)	15.5 (394)	25.1 (638)	C
	CR 45-3-2	20.0 (15.0)		53.9 (1369)	8.3 (211)	60.1 (1527)	51,6 (1311)	15.5 (394)	25.1 (638)	C
	CR 45-3	25.0 (18.5)		55 (1397)	8.3 (211)	60.1 (1527)	51,6 (1311)	15.5 (394)	25.1 (638)	C
	CR 45-4	30.0 (22.0)		61.5 (1562)	8.3 (211)	60.1 (1527)	51,6 (1311)	15.5 (394)	25.1 (638)	C
4	CR 45-1-1	7.5 (5.5)	8" ANSI	41.8 (1062)	9.8 (249)	79.9 (2029)	55.6 (1412)	16.3 (414)	25.9 (658)	C
	CR 45-1	10.0 (7.5)		41.8 (1062)	9.8 (249)	79.9 (2029)	55.6 (1412)	16.3 (414)	25.9 (658)	C
	CR 45-2	15.0 (11.0)		50 (1270)	9.8 (249)	79.9 (2029)	55.6 (1412)	16.3 (414)	25.9 (658)	C
	CR 45-3-2	20.0 (15.0)		55.4 (1407)	9.8 (249)	79.9 (2029)	55.6 (1412)	16.3 (414)	25.9 (658)	C
	CR 45-3	25.0 (18.5)		56.5 (1435)	9.8 (249)	79.9 (2029)	55.6 (1412)	16.3 (414)	25.9 (658)	C
	CR 45-4	30.0 (22.0)		63 (1600)	9.8 (249)	79.9 (2029)	55.6 (1412)	16.3 (414)	25.9 (658)	C
5	CR 45-1-1	7.5 (5.5)	8" ANSI	41.8 (1062)	9.8 (249)	99.7 (2532)	55.6 (1412)	16.3 (414)	25.9 (658)	C
	CR 45-1	10.0 (7.5)		41.8 (1062)	9.8 (249)	99.7 (2532)	55.6 (1412)	16.3 (414)	25.9 (658)	C
	CR 45-2	15.0 (11.0)		50 (1270)	9.8 (249)	99.7 (2532)	55.6 (1412)	16.3 (414)	25.9 (658)	C
	CR 45-3-2	20.0 (15.0)		55.4 (1407)	9.8 (249)	99.7 (2532)	55.6 (1412)	16.3 (414)	25.9 (658)	C
	CR 45-3	25.0 (18.5)		56.5 (1435)	9.8 (249)	99.7 (2532)	55.6 (1412)	16.3 (414)	25.9 (658)	C
	CR 45-4	30.0 (22.0)		63 (1600)	9.8 (249)	99.7 (2532)	55.6 (1412)	16.3 (414)	25.9 (658)	C
6	CR 45-1-1	7.5 (5.5)	10" ANSI	44.2 (1123)	12.2 (310)	119.4 (3033)	60.4 (1534)	17.4 (442)	27.1 (688)	C
	CR 45-1	10.0 (7.5)		44.2 (1123)	12.2 (310)	119.4 (3033)	60.4 (1534)	17.4 (442)	27.1 (688)	C
	CR 45-2	15.0 (11.0)		52.5 (1334)	12.2 (310)	119.4 (3033)	60.4 (1534)	17.4 (442)	27.1 (688)	C
	CR 45-3-2	20.0 (15.0)		57.8 (1468)	12.2 (310)	119.4 (3033)	60.4 (1534)	17.4 (442)	27.1 (688)	C
	CR 45-3	25.0 (18.5)		59 (1499)	12.2 (310)	119.4 (3033)	60.4 (1534)	17.4 (442)	27.1 (688)	C
	CR 45-4	30.0 (22.0)		65.5 (1664)	12.2 (310)	119.4 (3033)	60.4 (1534)	17.4 (442)	27.1 (688)	C

Design D: Hydro MPC pump system with a control cabinet mounted on a separate base frame.
Design C: Hydro MPC pump system with a floor-mounted control cabinet.
Dimensions may vary by ± 0.39 in. (10 mm).

Hydro MPC-E with CRE 64

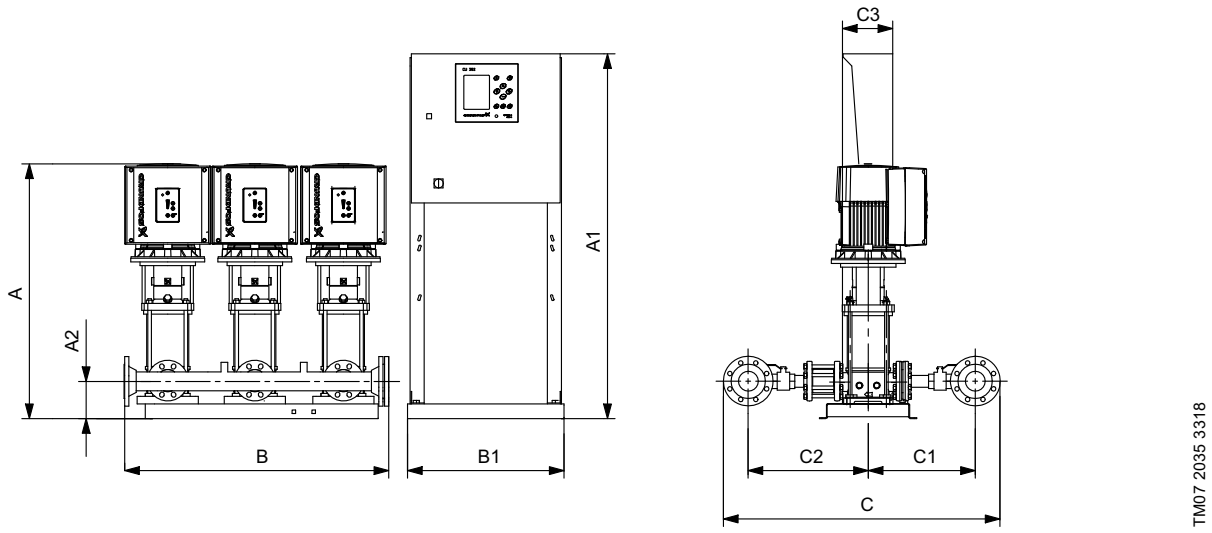


Fig. 61 Dimensional sketch of a Hydro MPC pump system with a control cabinet mounted on a separate base frame (design D). The pump system is shown as an example. The pumps supplied may differ from the sketch.

Hydro MPC-E with CR 64

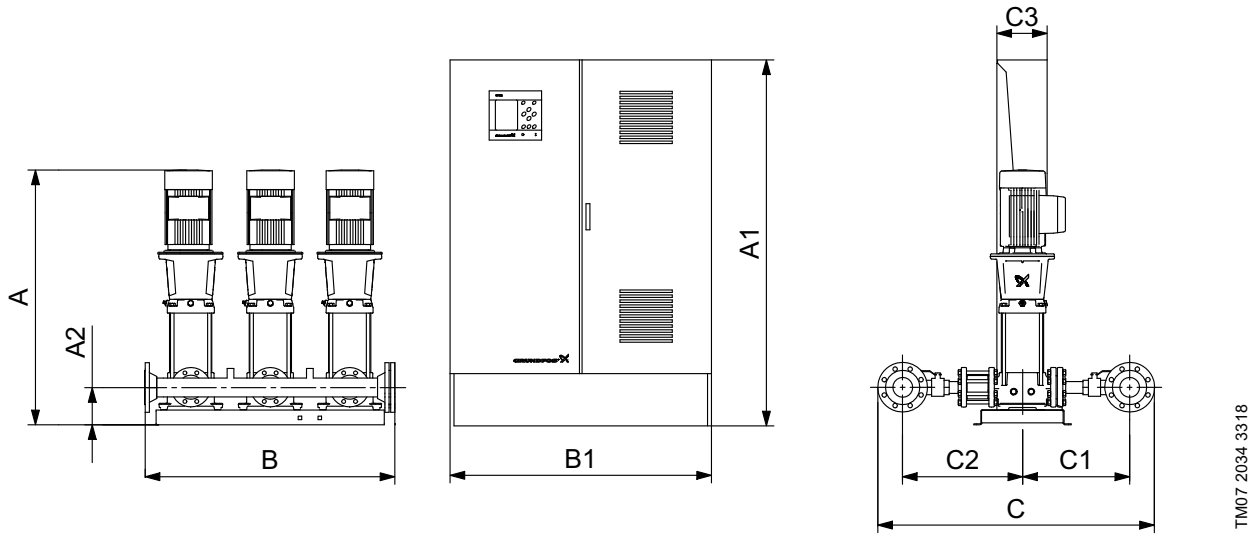


Fig. 62 Dimensional sketch of a Hydro MPC pump system with a control cabinet mounted on a separate base frame (design C). The pump system is shown as an example. The pumps supplied may differ from the sketch.

Electrical data and dimensions

Hydro MPC-E with CRE 64

Number of pumps	Pump type	Motor [Hp (kW)]	Connection size	A [in (mm)]	A2 [in (mm)]	B [in (mm)]	C [in (mm)]	C1 [in (mm)]	C2 [in (mm)]	Design
2	CRE 64-1-1	10.0 (7.5)	6" ANSI	39.8 (1011)	8.3 (211)	40.4 (1026)	54.3 (1379)	16.5 (419)	26.7 (678)	D
	CRE 64-1	15.0 (11.0)		47.9 (1217)	8.3 (211)	40.4 (1026)	54.3 (1379)	16.5 (419)	26.7 (678)	D
	CRE 64-2-1	20.0 (15.0)		51.2 (1300)	8.3 (211)	40.4 (1026)	54.3 (1379)	16.5 (419)	26.7 (678)	D
	CRE 64-2	25.0 (18.5)		51.2 (1300)	8.3 (211)	40.4 (1026)	54.3 (1379)	16.5 (419)	26.7 (678)	D
	CRE 64-3-2	30.0 (22.0)		58.3 (1481)	8.3 (211)	40.4 (1026)	54.3 (1379)	16.5 (419)	26.7 (678)	D
3	CRE 64-1-1	10.0 (7.5)	8" ANSI	39.8 (1011)	8.3 (211)	60.2 (1529)	56.3 (1430)	16.4 (417)	26.5 (673)	D
	CRE 64-1	15.0 (11.0)		47.9 (1217)	8.3 (211)	60.2 (1529)	56.3 (1430)	16.4 (417)	26.5 (673)	D
	CRE 64-2-1	20.0 (15.0)		51.2 (1300)	8.3 (211)	60.2 (1529)	56.3 (1430)	16.4 (417)	26.5 (673)	D
	CRE 64-2	25.0 (18.5)		51.2 (1300)	8.3 (211)	60.2 (1529)	56.3 (1430)	16.4 (417)	26.5 (673)	D
	CRE 64-3-2	30.0 (22.0)		58.3 (1481)	8.3 (211)	60.2 (1529)	56.3 (1430)	16.4 (417)	26.5 (673)	D
4	CRE 64-1-1	10.0 (7.5)	8" ANSI	39.8 (1011)	8.3 (211)	79.9 (2029)	56.3 (1430)	16.4 (417)	26.5 (673)	D
	CRE 64-1	15.0 (11.0)		47.9 (1217)	8.3 (211)	79.9 (2029)	56.3 (1430)	16.4 (417)	26.5 (673)	D
	CRE 64-2-1	20.0 (15.0)		51.2 (1300)	8.3 (211)	79.9 (2029)	56.3 (1430)	16.4 (417)	26.5 (673)	D
	CRE 64-2	25.0 (18.5)		51.2 (1300)	8.3 (211)	79.9 (2029)	56.3 (1430)	16.4 (417)	26.5 (673)	D
	CRE 64-3-2	30.0 (22.0)		58.3 (1481)	8.3 (211)	79.9 (2029)	56.3 (1430)	16.4 (417)	26.5 (673)	D
5	CRE 64-1-1	10.0 (7.5)	10" ANSI	43.7 (1110)	12.2 (310)	99.7 (2532)	64.3 (1633)	19.1 (485)	29.2 (742)	D
	CRE 64-1	15.0 (11.0)		51.9 (1318)	12.2 (310)	99.7 (2532)	64.3 (1633)	19.1 (485)	29.2 (742)	D
	CRE 64-2-1	20.0 (15.0)		55.1 (1400)	12.2 (310)	99.7 (2532)	64.3 (1633)	19.1 (485)	29.2 (742)	D
	CRE 64-2	25.0 (18.5)		55.2 (1402)	12.2 (310)	99.7 (2532)	64.3 (1633)	19.1 (485)	29.2 (742)	D
	CRE 64-3-2	30.0 (22.0)		62.2 (1580)	12.2 (310)	99.7 (2532)	64.3 (1633)	19.1 (485)	29.2 (742)	D
6	CRE 64-1-1	10.0 (7.5)	12" ANSI	43.7 (1110)	12.2 (310)	119.5 (3035)	68.8 (1748)	19.8 (503)	49.8 (1265)	D
	CRE 64-1	15.0 (11.0)		51.9 (1318)	12.2 (310)	119.5 (3035)	68.8 (1748)	19.8 (503)	49.8 (1265)	D
	CRE 64-2-1	20.0 (15.0)		55.1 (1400)	12.2 (310)	119.5 (3035)	68.8 (1748)	19.8 (503)	49.8 (1265)	D
	CRE 64-2	25.0 (18.5)		55.2 (1402)	12.2 (310)	119.5 (3035)	68.8 (1748)	19.8 (503)	49.8 (1265)	D
	CRE 64-3-2	30.0 (22.0)		62.2 (1580)	12.2 (310)	119.5 (3035)	68.8 (1748)	19.8 (503)	49.8 (1265)	D

Hydro MPC-E with CR 64

Number of pumps	Pump type	Motor [Hp (kW)]	Connection size	A [in (mm)]	A2 [in (mm)]	B [in (mm)]	C [in (mm)]	C1 [in (mm)]	C2 [in (mm)]	Design
2	CR 64-1-1	10.0 (7.5)	6" ANSI	39.8 (1011)	8.3 (211)	40.4 (1026)	54.3 (1379)	16.5 (419)	26.7 (678)	C
	CR 64-1	15.0 (11.0)		45.5 (1156)	8.3 (211)	40.4 (1026)	54.3 (1379)	16.5 (419)	26.7 (678)	C
	CR 64-2-1	20.0 (15.0)		50.9 (1293)	8.3 (211)	40.4 (1026)	54.3 (1379)	16.5 (419)	26.7 (678)	C
	CR 64-2	25.0 (18.5)		52.1 (1323)	8.3 (211)	40.4 (1026)	54.3 (1379)	16.5 (419)	26.7 (678)	C
	CR 64-3-2	30.0 (22.0)		56.3 (1430)	8.3 (211)	40.4 (1026)	54.3 (1379)	16.5 (419)	26.7 (678)	C
	CR 64-3	40.0 (30)		58.1 (1476)	8.3 (211)	40.4 (1026)	54.3 (1379)	16.5 (419)	26.7 (678)	C
3	CR 64-1-1	10.0 (7.5)	8" ANSI	41.4 (1052)	9.8 (249)	60.2 (1529)	56.3 (1430)	16.4 (417)	26.5 (673)	C
	CR 64-1	15.0 (11.0)		47.1 (1196)	9.8 (249)	60.2 (1529)	56.3 (1430)	16.4 (417)	26.5 (673)	C
	CR 64-2-1	20.0 (15.0)		52.5 (1334)	9.8 (249)	60.2 (1529)	56.3 (1430)	16.4 (417)	26.5 (673)	C
	CR 64-2	25.0 (18.5)		53.6 (1361)	9.8 (249)	60.2 (1529)	56.3 (1430)	16.4 (417)	26.5 (673)	C
	CR 64-3-2	30.0 (22.0)		57.9 (1471)	9.8 (249)	60.2 (1529)	56.3 (1430)	16.4 (417)	26.5 (673)	C
	CR 64-3	40.0 (30)		59.3 (1506)	9.8 (249)	60.2 (1529)	56.3 (1430)	16.4 (417)	26.5 (673)	C
4	CR 64-1-1	10.0 (7.5)	8" ANSI	41.4 (1052)	9.8 (249)	79.9 (2029)	56.3 (1430)	16.4 (417)	26.5 (673)	C
	CR 64-1	15.0 (11.0)		47.1 (1196)	9.8 (249)	79.9 (2029)	56.3 (1430)	16.4 (417)	26.5 (673)	C
	CR 64-2-1	20.0 (15.0)		52.5 (1334)	9.8 (249)	79.9 (2029)	56.3 (1430)	16.4 (417)	26.5 (673)	C
	CR 64-2	25.0 (18.5)		53.6 (1361)	9.8 (249)	79.9 (2029)	56.3 (1430)	16.4 (417)	26.5 (673)	C
	CR 64-3-2	30.0 (22.0)		57.9 (1471)	9.8 (249)	79.9 (2029)	56.3 (1430)	16.4 (417)	26.5 (673)	C
	CR 64-3	40.0 (30)		59.3 (1506)	9.8 (249)	79.9 (2029)	56.3 (1430)	16.4 (417)	26.5 (673)	C
5	CR 64-1-1	10.0 (7.5)	10" ANSI	43.7 (1110)	12.2 (310)	99.7 (2532)	64.3 (1633)	19.1 (485)	29.2 (742)	C
	CR 64-1	15.0 (11.0)		49.4 (1255)	12.2 (310)	99.7 (2532)	64.3 (1633)	19.1 (485)	29.2 (742)	C
	CR 64-2-1	20.0 (15.0)		54.9 (1394)	12.2 (310)	99.7 (2532)	64.3 (1633)	19.1 (485)	29.2 (742)	C
	CR 64-2	25.0 (18.5)		56 (1422)	12.2 (310)	99.7 (2532)	64.3 (1633)	19.1 (485)	29.2 (742)	C
	CR 64-3-2	30.0 (22.0)		60.2 (1529)	12.2 (310)	99.7 (2532)	64.3 (1633)	19.1 (485)	29.2 (742)	C
	CR 64-3	40.0 (30)		62 (1575)	12.2 (310)	99.7 (2532)	64.3 (1633)	19.1 (485)	29.2 (742)	C
6	CR 64-1-1	10.0 (7.5)	12" ANSI	43.7 (1110)	12.2 (310)	99.7 (2532)	64.3 (1633)	19.1 (485)	29.2 (742)	C
	CR 64-1	15.0 (11.0)		49.4 (1255)	12.2 (310)	99.7 (2532)	64.3 (1633)	19.1 (485)	29.2 (742)	C
	CR 64-2-1	20.0 (15.0)		54.9 (1394)	12.2 (310)	99.7 (2532)	64.3 (1633)	19.1 (485)	29.2 (742)	C
	CR 64-2	25.0 (18.5)		56 (1422)	12.2 (310)	99.7 (2532)	64.3 (1633)	19.1 (485)	29.2 (742)	C
	CR 64-3-2	30.0 (22.0)		60.2 (1529)	12.2 (310)	99.7 (2532)	64.3 (1633)	19.1 (485)	29.2 (742)	C
	CR 64-3	40.0 (30)		62 (1575)	12.2 (310)	99.7 (2532)	64.3 (1633)	19.1 (485)	29.2 (742)	C

Design D: Hydro MPC pump system with a control cabinet mounted on a separate base frame.
Design C: Hydro MPC pump system with a floor-mounted control cabinet.
Dimensions may vary by ± 0.39 in. (10 mm).

Hydro MPC-E with CRE 95

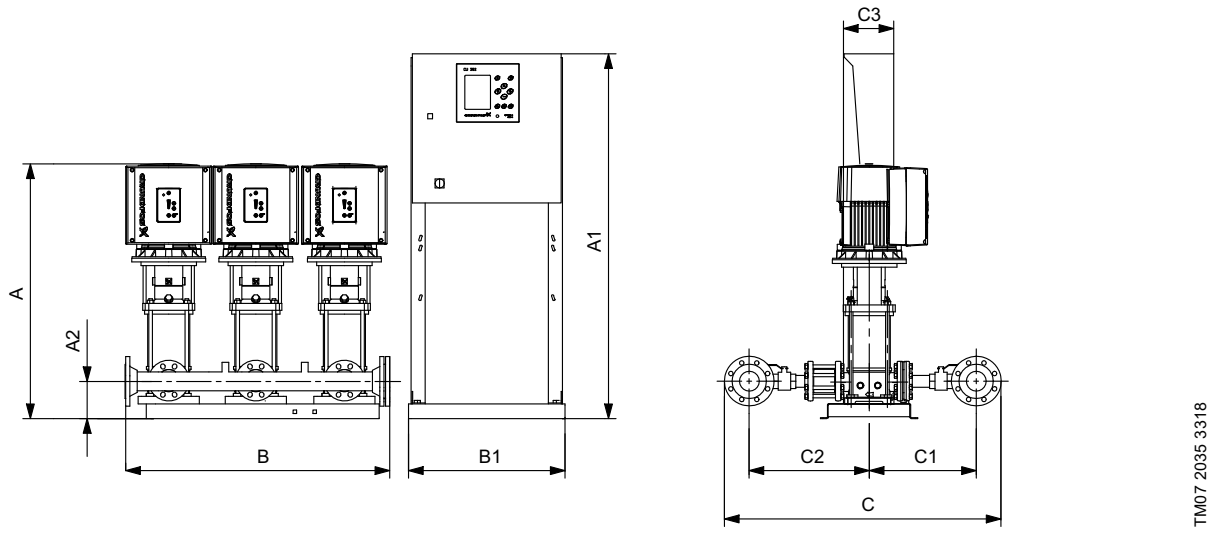


Fig. 63 Dimensional sketch of a Hydro MPC pump system with a control cabinet mounted on a separate base frame (design D). The pump system is shown as an example. The pumps supplied may differ from the sketch.

Hydro MPC-E with CR 95

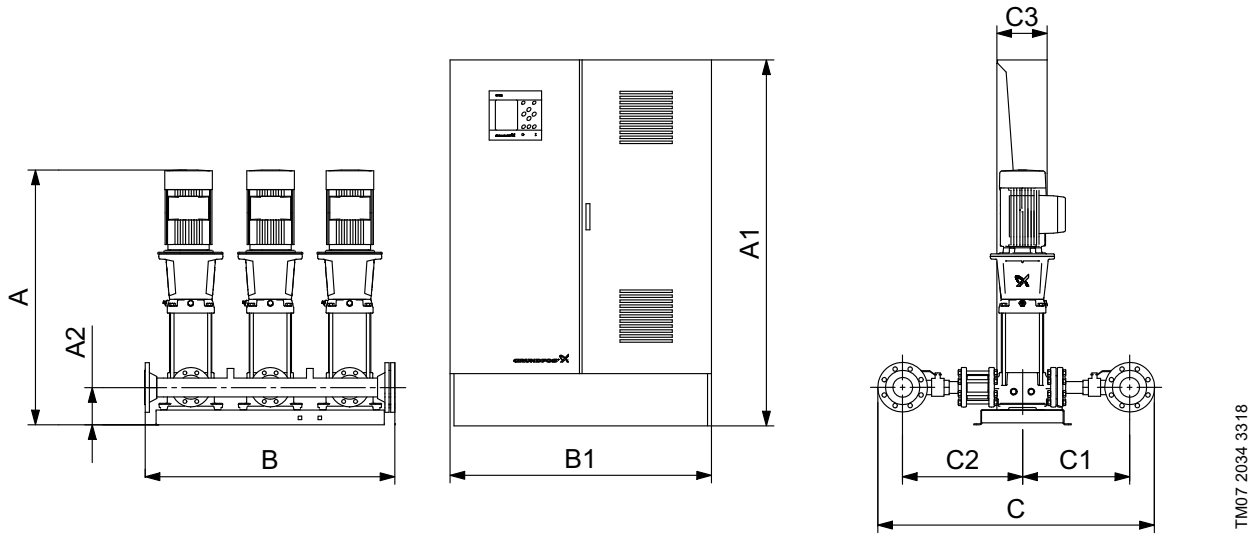


Fig. 64 Dimensional sketch of a Hydro MPC pump system with a control cabinet mounted on a separate base frame (design C). The pump system is shown as an example. The pumps supplied may differ from the sketch.

Electrical data and dimensions

Hydro MPC-E with CRE 95

Number of pumps	Pump type	Motor [Hp (kW)]	Connection size	A [in (mm)]	A2 [in (mm)]	B [in (mm)]	C [in (mm)]	C1 [in (mm)]	C2 [in (mm)]	Design
2	CRE 95-1-1	15.0 (11.0)	8" ANSI	52.6 (1336)	11.9 (302)	40.6 (1031)	84.2 (2139)	29.4 (747)	41.3 (1049)	D
	CRE 95-1	20.0 (15.0)		52.6 (1336)	11.9 (302)	40.6 (1031)	84.2 (2139)	29.4 (747)	41.3 (1049)	D
	CRE 95-2-2	25.0 (18.5)		56.7 (1440)	11.9 (302)	40.6 (1031)	84.2 (2139)	29.4 (747)	41.3 (1049)	D
	CRE 95-2-1	30.0 (22.0)		60.5 (1537)	11.9 (302)	40.6 (1031)	84.2 (2139)	29.4 (747)	41.3 (1049)	D
	CRE 95-2	30.0 (22.0)		60.5 (1537)	11.9 (302)	40.6 (1031)	84.2 (2139)	29.4 (747)	41.3 (1049)	D
3	CRE 95-1-1	15.0 (11.0)	8" ANSI	52.6 (1336)	11.9 (302)	60.2 (1529)	84.2 (2139)	29.4 (747)	41.3 (1049)	D
	CRE 95-1	20.0 (15.0)		52.6 (1336)	11.9 (302)	60.2 (1529)	84.2 (2139)	29.4 (747)	41.3 (1049)	D
	CRE 95-2-2	25.0 (18.5)		56.7 (1440)	11.9 (302)	60.2 (1529)	84.2 (2139)	29.4 (747)	41.3 (1049)	D
	CRE 95-2-1	30.0 (22.0)		60.5 (1537)	11.9 (302)	60.2 (1529)	84.2 (2139)	29.4 (747)	41.3 (1049)	D
	CRE 95-2	30.0 (22.0)		60.5 (1537)	11.9 (302)	60.2 (1529)	84.2 (2139)	29.4 (747)	41.3 (1049)	D
4	CRE 95-1-1	15.0 (11.0)	10" ANSI	52.6 (1336)	11.9 (302)	80 (2032)	86.7 (2202)	29.4 (747)	41.3 (1049)	D
	CRE 95-1	20.0 (15.0)		52.6 (1336)	11.9 (302)	80 (2032)	86.7 (2202)	29.4 (747)	41.3 (1049)	D
	CRE 95-2-2	25.0 (18.5)		56.7 (1440)	11.9 (302)	80 (2032)	86.7 (2202)	29.4 (747)	41.3 (1049)	D
	CRE 95-2-1	30.0 (22.0)		60.5 (1537)	11.9 (302)	80 (2032)	86.7 (2202)	29.4 (747)	41.3 (1049)	D
	CRE 95-2	30.0 (22.0)		60.5 (1537)	11.9 (302)	80 (2032)	86.7 (2202)	29.4 (747)	41.3 (1049)	D
5	CRE 95-1-1	15.0 (11.0)	12" ANSI	52.6 (1336)	11.9 (302)	99.6 (2530)	86.7 (2202)	29.4 (747)	41.3 (1049)	D
	CRE 95-1	20.0 (15.0)		52.6 (1336)	11.9 (302)	99.6 (2530)	86.7 (2202)	29.4 (747)	41.3 (1049)	D
	CRE 95-2-2	25.0 (18.5)		56.7 (1440)	11.9 (302)	99.6 (2530)	86.7 (2202)	29.4 (747)	41.3 (1049)	D
	CRE 95-2-1	30.0 (22.0)		60.5 (1537)	11.9 (302)	99.6 (2530)	86.7 (2202)	29.4 (747)	41.3 (1049)	D
	CRE 95-2	30.0 (22.0)		60.5 (1537)	11.9 (302)	99.6 (2530)	86.7 (2202)	29.4 (747)	41.3 (1049)	D
6	CRE 95-1-1	15.0 (11.0)	14" ANSI	52.6 (1336)	11.9 (302)	119.6 (3038)	95.2 (2418)	31.1 (790)	43.1 (1095)	D
	CRE 95-1	20.0 (15.0)		52.6 (1336)	11.9 (302)	119.6 (3038)	95.2 (2418)	31.1 (790)	43.1 (1095)	D
	CRE 95-2-2	25.0 (18.5)		56.7 (1440)	11.9 (302)	119.6 (3038)	95.2 (2418)	31.1 (790)	43.1 (1095)	D
	CRE 95-2-1	30.0 (22.0)		60.5 (1537)	11.9 (302)	119.6 (3038)	95.2 (2418)	31.1 (790)	43.1 (1095)	D
	CRE 95-2	30.0 (22.0)		60.5 (1537)	11.9 (302)	119.6 (3038)	95.2 (2418)	31.1 (790)	43.1 (1095)	D

Hydro MPC-E with CR 95

Number of pumps	Pump type	Motor [Hp (kW)]	Connection size	A [in (mm)]	A2 [in (mm)]	B [in (mm)]	C [in (mm)]	C1 [in (mm)]	C2 [in (mm)]	Design
2	CR 95-1-1	15.0 (11.0)	8" ANSI	52.6 (1336)	11.9 (302)	40.6 (1031)	84.2 (2139)	29.4 (747)	41.3 (1049)	C
	CR 95-1	20.0 (15.0)		52.6 (1336)	11.9 (302)	40.6 (1031)	84.2 (2139)	29.4 (747)	41.3 (1049)	C
	CR 95-2-2	25.0 (18.5)		59.4 (1509)	11.9 (302)	40.6 (1031)	84.2 (2139)	29.4 (747)	41.3 (1049)	C
	CR 95-2-1	30.0 (22.0)		59.4 (1509)	11.9 (302)	40.6 (1031)	84.2 (2139)	29.4 (747)	41.3 (1049)	C
	CR 95-2	30.0 (22.0)		59.4 (1509)	11.9 (302)	40.6 (1031)	84.2 (2139)	29.4 (747)	41.3 (1049)	C
	CR 95-3-2	40.0 (30.0)		66 (1676)	11.9 (302)	40.6 (1031)	84.2 (2139)	29.4 (747)	41.3 (1049)	C
	CR 95-3	50.0 (37)		69.2 (1758)	11.9 (302)	40.6 (1031)	84.2 (2139)	29.4 (747)	41.3 (1049)	C
3	CR 95-1-1	15.0 (11.0)	8" ANSI	52.6 (1336)	11.9 (302)	60.2 (1529)	84.2 (2139)	29.4 (747)	41.3 (1049)	C
	CR 95-1	20.0 (15.0)		52.6 (1336)	11.9 (302)	60.2 (1529)	84.2 (2139)	29.4 (747)	41.3 (1049)	C
	CR 95-2-2	25.0 (18.5)		59.4 (1509)	11.9 (302)	60.2 (1529)	84.2 (2139)	29.4 (747)	41.3 (1049)	C
	CR 95-2-1	30.0 (22.0)		59.4 (1509)	11.9 (302)	60.2 (1529)	84.2 (2139)	29.4 (747)	41.3 (1049)	C
	CR 95-2	30.0 (22.0)		59.4 (1509)	11.9 (302)	60.2 (1529)	84.2 (2139)	29.4 (747)	41.3 (1049)	C
	CR 95-3-2	40.0 (30.0)		66 (1676)	11.9 (302)	60.2 (1529)	84.2 (2139)	29.4 (747)	41.3 (1049)	C
	CR 95-3	50.0 (37)		69.2 (1758)	11.9 (302)	60.2 (1529)	84.2 (2139)	29.4 (747)	41.3 (1049)	C
4	CR 95-1-1	15.0 (11.0)	10" ANSI	52.6 (1336)	11.9 (302)	80 (2032)	86,7 (2202)	29.4 (747)	41.3 (1049)	C
	CR 95-1	20.0 (15.0)		52.6 (1336)	11.9 (302)	80 (2032)	86,7 (2202)	29.4 (747)	41.3 (1049)	C
	CR 95-2-2	25.0 (18.5)		59.4 (1509)	11.9 (302)	80 (2032)	86,7 (2202)	29.4 (747)	41.3 (1049)	C
	CR 95-2-1	30.0 (22.0)		59.4 (1509)	11.9 (302)	80 (2032)	86,7 (2202)	29.4 (747)	41.3 (1049)	C
	CR 95-2	30.0 (22.0)		59.4 (1509)	11.9 (302)	80 (2032)	86,7 (2202)	29.4 (747)	41.3 (1049)	C
	CR 95-3-2	40.0 (30.0)		66 (1676)	11.9 (302)	80 (2032)	86,7 (2202)	29.4 (747)	41.3 (1049)	C
	CR 95-3	50.0 (37)		69.2 (1758)	11.9 (302)	80 (2032)	86,7 (2202)	29.4 (747)	41.3 (1049)	C
5	CR 95-1-1	15.0 (11.0)	12" ANSI	52.6 (1336)	11.9 (302)	99.6 (2530)	86,7 (2202)	29.4 (747)	41.3 (1049)	C
	CR 95-1	20.0 (15.0)		52.6 (1336)	11.9 (302)	99.6 (2530)	86,7 (2202)	29.4 (747)	41.3 (1049)	C
	CR 95-2-2	25.0 (18.5)		59.4 (1509)	11.9 (302)	99.6 (2530)	86,7 (2202)	29.4 (747)	41.3 (1049)	C
	CR 95-2-1	30.0 (22.0)		59.4 (1509)	11.9 (302)	99.6 (2530)	86,7 (2202)	29.4 (747)	41.3 (1049)	C
	CR 95-2	30.0 (22.0)		59.4 (1509)	11.9 (302)	99.6 (2530)	86,7 (2202)	29.4 (747)	41.3 (1049)	C
	CR 95-3-2	40.0 (30.0)		66 (1676)	11.9 (302)	99.6 (2530)	86,7 (2202)	29.4 (747)	41.3 (1049)	C
	CR 95-3	50.0 (37)		69.2 (1758)	11.9 (302)	99.6 (2530)	86,7 (2202)	29.4 (747)	41.3 (1049)	C
6	CR 95-1-1	15.0 (11.0)	14" ANSI	52.6 (1336)	11.9 (302)	119.6 (3038)	95.2 (2418)	31.1 (790)	41.3 (1049)	D
	CR 95-1	20.0 (15.0)		52.6 (1336)	11.9 (302)	119.6 (3038)	95.2 (2418)	31.1 (790)	41.3 (1049)	D
	CR 95-2-2	25.0 (18.5)		59.4 (1509)	11.9 (302)	119.6 (3038)	95.2 (2418)	31.1 (790)	41.3 (1049)	D
	CR 95-2-1	30.0 (22.0)		59.4 (1509)	11.9 (302)	119.6 (3038)	95.2 (2418)	31.1 (790)	41.3 (1049)	D
	CR 95-2	30.0 (22.0)		59.4 (1509)	11.9 (302)	119.6 (3038)	95.2 (2418)	31.1 (790)	41.3 (1049)	D
	CR 95-3-2	40.0 (30.0)		66 (1676)	11.9 (302)	119.6 (3038)	95.2 (2418)	31.1 (790)	41.3 (1049)	D
	CR 95-3	50.0 (37)		69.2 (1758)	11.9 (302)	119.6 (3038)	95.2 (2418)	31.1 (790)	41.3 (1049)	D

Design D: Hydro MPC pump system with a control cabinet mounted on a separate base frame.
Design C: Hydro MPC pump system with a floor-mounted control cabinet.
Dimensions may vary by ± 0.39 in. (10 mm).

Hydro MPC-E with CRE 125

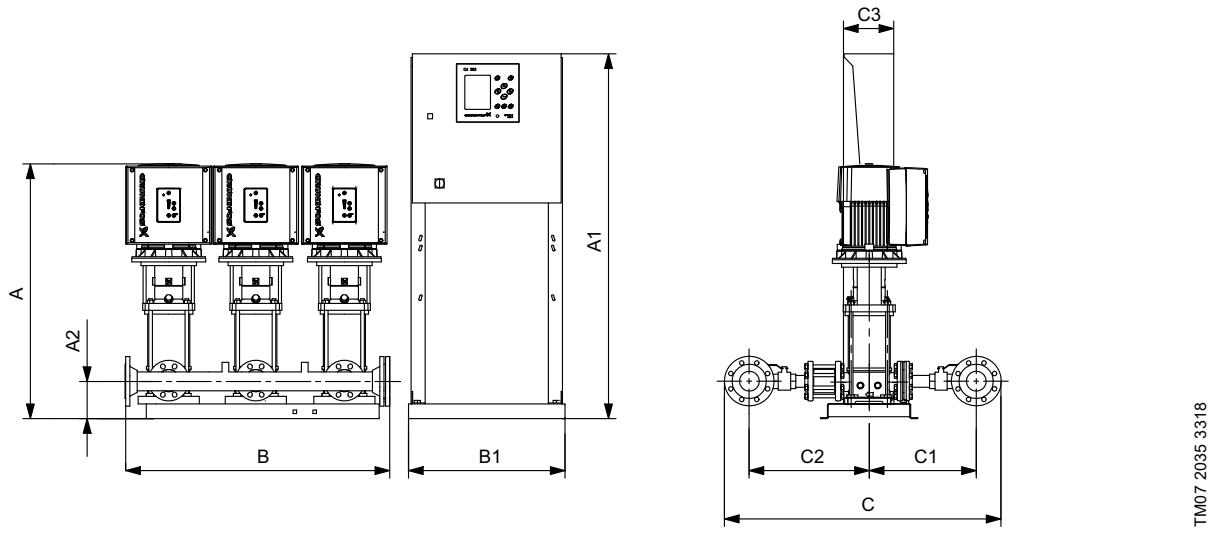


Fig. 65 Dimensional sketch of a Hydro MPC pump system with a control cabinet mounted on a separate base frame (design D). The pump system is shown as an example. The pumps supplied may differ from the sketch.

Hydro MPC-E with CR 125

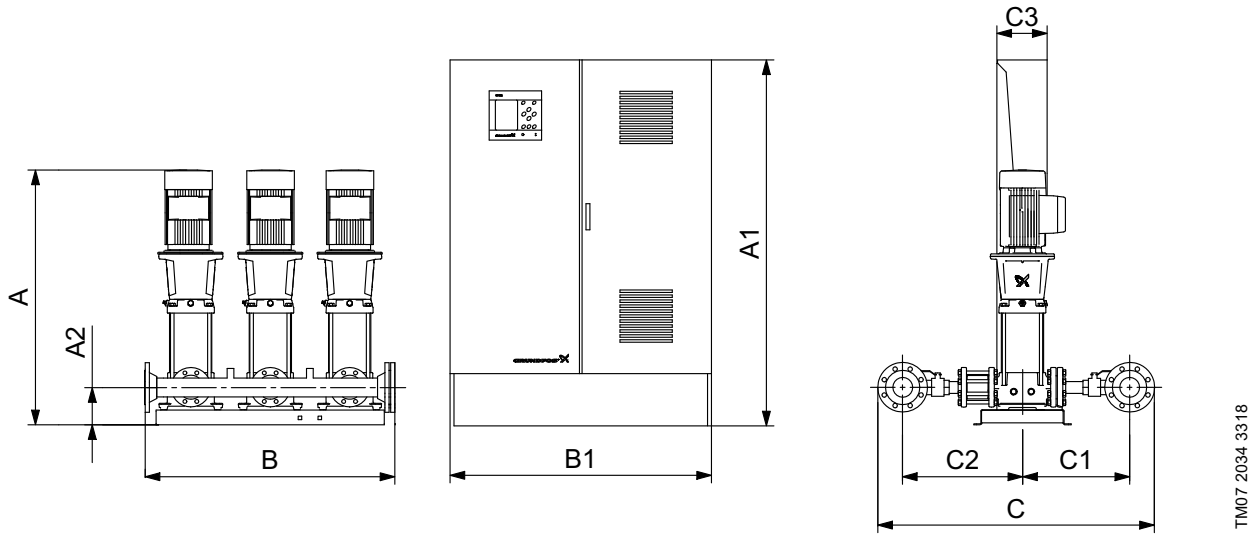


Fig. 66 Dimensional sketch of a Hydro MPC pump system with a control cabinet mounted on a separate base frame (design C). The pump system is shown as an example. The pumps supplied may differ from the sketch.

Electrical data and dimensions

Hydro MPC-E with CRE 125

Number of pumps	Pump type	Motor [Hp (kW)]	Connection size	A [in (mm)]	A2 [in (mm)]	B [in (mm)]	C [in (mm)]	C1 [in (mm)]	C2 [in (mm)]	Design
2	CRE 125-1-1	15.0 (11.0)	8" ANSI	59.4 (1509)	16.9 (429)	52.4 (1331)	87.2 (2215)	29.9 (759)	43.8 (1113)	D
	CRE 125-1	25.0 (18.5)		59.5 (1511)	16.9 (429)	52.4 (1331)	87.2 (2215)	29.9 (759)	43.8 (1113)	D
	CRE 125-2-2	30.0 (22.0)		68.1 (1730)	16.9 (429)	52.4 (1331)	87.2 (2215)	29.9 (759)	43.8 (1113)	D
3	CRE 125-1-1	15.0 (11.0)	10" ANSI	59.4 (1509)	16.9 (429)	78 (1981)	96.4 (2449)	33.2 (843)	47.2 (1199)	D
	CRE 125-1	25.0 (18.5)		59.5 (1511)	16.9 (429)	78 (1981)	96.4 (2449)	33.2 (843)	47.2 (1199)	D
	CRE 125-2-2	30.0 (22.0)		68.1 (1730)	16.9 (429)	78 (1981)	96.4 (2449)	33.2 (843)	47.2 (1199)	D
4	CRE 125-1-1	15.0 (11.0)	12" ANSI	59.4 (1509)	16.9 (429)	103.7 (2634)	99.4 (2526)	33.2 (843)	47.2 (1199)	D
	CRE 125-1	25.0 (18.5)		59.5 (1511)	16.9 (429)	103.7 (2634)	99.4 (2526)	33.2 (843)	47.2 (1199)	D
	CRE 125-2-2	30.0 (22.0)		68.1 (1730)	16.9 (429)	103.7 (2634)	99.4 (2526)	33.2 (843)	47.2 (1199)	D
5	CRE 125-1-1	15.0 (11.0)	14" ANSI	59.4 (1509)	16.9 (429)	129.5 (3289)	101.4 (2576)	33.2 (843)	47.2 (1199)	D
	CRE 125-1	25.0 (18.5)		59.5 (1511)	16.9 (429)	129.5 (3289)	101.4 (2576)	33.2 (843)	47.2 (1199)	D
	CRE 125-2-2	30.0 (22.0)		68.1 (1730)	16.9 (429)	129.5 (3289)	101.4 (2576)	33.2 (843)	47.2 (1199)	D
6	CRE 125-1-1	15.0 (11.0)	14" ANSI	59.4 (1509)	16.9 (429)	155 (3937)	101.4 (2576)	33.2 (843)	41.3 (1049)	D
	CRE 125-1	25.0 (18.5)		59.5 (1511)	16.9 (429)	155 (3937)	101.4 (2576)	33.2 (843)	41.3 (1049)	D
	CRE 125-2-2	30.0 (22.0)		68.1 (1730)	16.9 (429)	155 (3937)	101.4 (2576)	33.2 (843)	47.2 (1199)	D

Hydro MPC-E with CR 125

Number of pumps	Pump type	Motor [Hp (kW)]	Connection size	A [in (mm)]	A2 [in (mm)]	B [in (mm)]	C [in (mm)]	C1 [in (mm)]	C2 [in (mm)]	Design
2	CR 125-1-1	15.0 (11.0)	8" ANSI	59.4 (1509)	16.9 (429)	52.4 (1331)	87.2 (2215)	29.9 (759)	43.8 (1113)	C
	CR 125-1	25.0 (18.5)		60.5 (1537)	16.9 (429)	52.4 (1331)	87.2 (2215)	29.9 (759)	43.8 (1113)	C
	CR 125-2-2	30.0 (22.0)		67.1 (1704)	16.9 (429)	52.4 (1331)	87.2 (2215)	29.9 (759)	43.8 (1113)	C
	CR 125-2-1	40.0 (30.0)		69.6 (1768)	16.9 (429)	52.4 (1331)	87.2 (2215)	29.9 (759)	43.8 (1113)	C
	CR 125-2	50.0 (37.0)		72.8 (1849)	16.9 (429)	52.4 (1331)	87.2 (2215)	29.9 (759)	43.8 (1113)	C
	CR 125-3-2	60.0 (44.0)		78.2 (1986)	16.9 (429)	52.4 (1331)	87.2 (2215)	29.9 (759)	43.8 (1113)	C
3	CR 125-1-1	15.0 (11.0)	10" ANSI	59.4 (1509)	16.9 (429)	78 (1981)	96.4 (2449)	33.2 (843)	47.2 (1199)	C
	CR 125-1	25.0 (18.5)		60.5 (1537)	16.9 (429)	78 (1981)	96.4 (2449)	33.2 (843)	47.2 (1199)	C
	CR 125-2-2	30.0 (22.0)		67.1 (1704)	16.9 (429)	78 (1981)	96.4 (2449)	33.2 (843)	47.2 (1199)	C
	CR 125-2-1	40.0 (30.0)		69.6 (1768)	16.9 (429)	78 (1981)	96.4 (2449)	33.2 (843)	47.2 (1199)	C
	CR 125-2	50.0 (37.0)		72.8 (1849)	16.9 (429)	78 (1981)	96.4 (2449)	33.2 (843)	47.2 (1199)	C
	CR 125-3-2	60.0 (44.0)		78.2 (1986)	16.9 (429)	78 (1981)	96.4 (2449)	33.2 (843)	47.2 (1199)	C
4	CR 125-1-1	15.0 (11.0)	12" ANSI	59.4 (1509)	16.9 (429)	103.7 (2634)	99.4 (2525)	33.2 (843)	47.2 (1199)	C
	CR 125-1	25.0 (18.5)		60.5 (1537)	16.9 (429)	103.7 (2634)	99.4 (2525)	33.2 (843)	47.2 (1199)	C
	CR 125-2-2	30.0 (22.0)		67.1 (1704)	16.9 (429)	103.7 (2634)	99.4 (2525)	33.2 (843)	47.2 (1199)	C
	CR 125-2-1	40.0 (30.0)		69.6 (1768)	16.9 (429)	103.7 (2634)	99.4 (2525)	33.2 (843)	47.2 (1199)	C
	CR 125-2	50.0 (37.0)		72.8 (1849)	16.9 (429)	103.7 (2634)	99.4 (2525)	33.2 (843)	47.2 (1199)	C
	CR 125-3-2	60.0 (44.0)		78.2 (1986)	16.9 (429)	103.7 (2634)	99.4 (2525)	33.2 (843)	47.2 (1199)	C
5	CR 125-1-1	15.0 (11.0)	14" ANSI	59.4 (1509)	16.9 (429)	129.5 (3289)	101.4 (2576)	33.2 (843)	47.2 (1199)	C
	CR 125-1	25.0 (18.5)		60.5 (1537)	16.9 (429)	129.5 (3289)	101.4 (2576)	33.2 (843)	47.2 (1199)	C
	CR 125-2-2	30.0 (22.0)		67.1 (1704)	16.9 (429)	129.5 (3289)	101.4 (2576)	33.2 (843)	47.2 (1199)	C
	CR 125-2-1	40.0 (30.0)		69.6 (1768)	16.9 (429)	129.5 (3289)	101.4 (2576)	33.2 (843)	47.2 (1199)	C
	CR 125-2	50.0 (37.0)		72.8 (1849)	16.9 (429)	129.5 (3289)	101.4 (2576)	33.2 (843)	47.2 (1199)	C
	CR 125-3-2	60.0 (44.0)		78.2 (1986)	16.9 (429)	129.5 (3289)	101.4 (2576)	33.2 (843)	47.2 (1199)	C
6	CR 125-1-1	15.0 (11.0)	14" ANSI	59.4 (1509)	16.9 (429)	155 (3937)	101.4 (2576)	33.2 (843)	47.2 (1199)	C
	CR 125-1	25.0 (18.5)		60.5 (1537)	16.9 (429)	155 (3937)	101.4 (2576)	33.2 (843)	47.2 (1199)	C
	CR 125-2-2	30.0 (22.0)		67.1 (1704)	16.9 (429)	155 (3937)	101.4 (2576)	33.2 (843)	47.2 (1199)	C
	CR 125-2-1	40.0 (30.0)		69.6 (1768)	16.9 (429)	155 (3937)	101.4 (2576)	33.2 (843)	47.2 (1199)	C
	CR 125-2	50.0 (37.0)		72.8 (1849)	16.9 (429)	155 (3937)	101.4 (2576)	33.2 (843)	47.2 (1199)	C
	CR 125-3-2	60.0 (44.0)		78.2 (1986)	16.9 (429)	155 (3937)	101.4 (2576)	33.2 (843)	47.2 (1199)	C

Design D: Hydro MPC pump system with a control cabinet mounted on a separate base frame.
Design C: Hydro MPC pump system with a floor-mounted control cabinet.
Dimensions may vary by ± 0.39 in. (10 mm).

Hydro MPC-E with CR 155

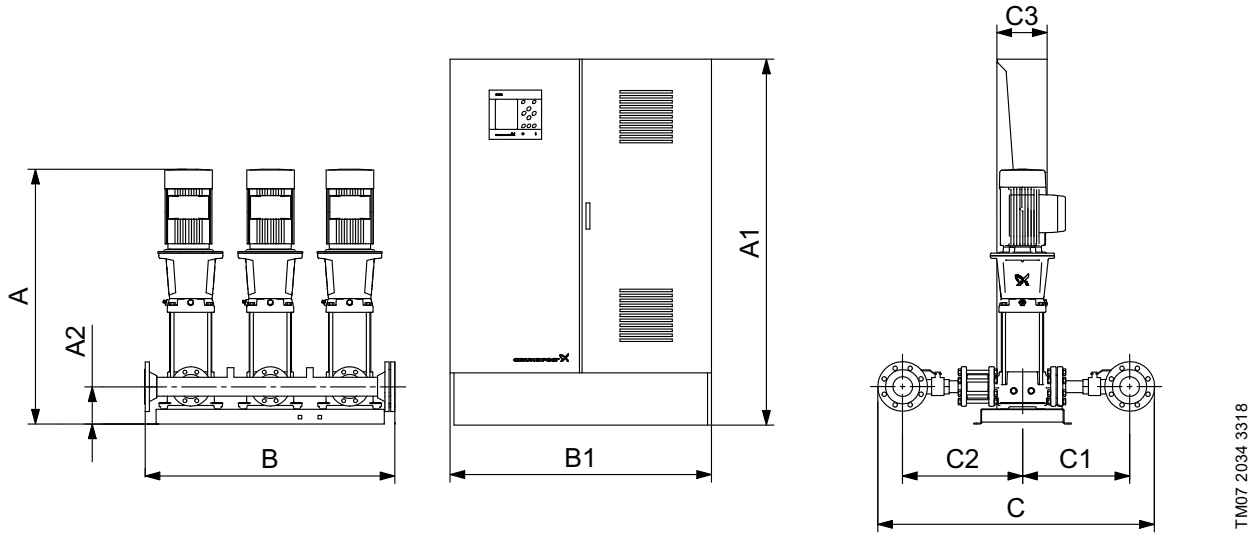


Fig. 67 Dimensional sketch of a Hydro MPC pump system with a control cabinet mounted on a separate base frame (design C). The pump system is shown as an example. The pumps supplied may differ from the sketch.

Electrical data and dimensions

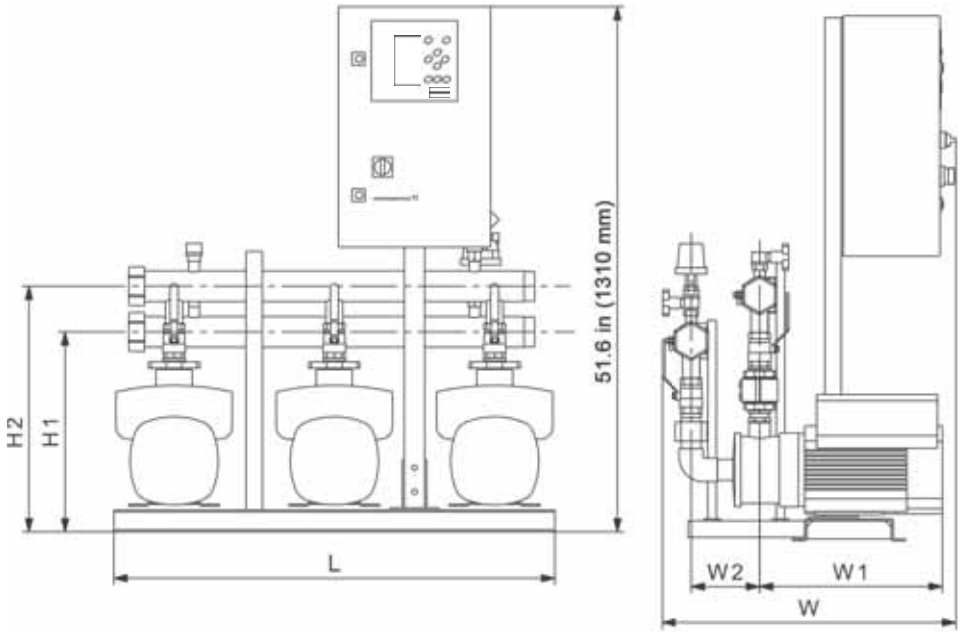
Hydro MPC-E with CR 155

Number of pumps	Pump type	Motor [Hp (kW)]	Connection size	A [in (mm)]	A2 [in (mm)]	B [in (mm)]	C [in (mm)]	C1 [in (mm)]	C2 [in (mm)]	Design
2	CR 155-1-1	25.0 (18.5)	10" ANSI	60.5 (1537)	16.9 (429)	52.4 (1331)	105.9 (2690)	36.7 (932)	53.2 (1351)	C
	CR 155-1	40.0 (30.0)		64.8 (1646)	16.9 (429)	52.4 (1331)	105.9 (2690)	36.7 (932)	53.2 (1351)	C
	CR 155-2-2	50.0 (37.0)		69.6 (1768)	16.9 (429)	52.4 (1331)	105.9 (2690)	36.7 (932)	53.2 (1351)	C
	CR 155-2-1	60.0 (44.0)		69.1 (1755)	16.9 (429)	52.4 (1331)	105.9 (2690)	36.7 (932)	53.2 (1351)	C
3	CR 155-1-1	25.0 (18.5)	12" ANSI	60.5 (1537)	16.9 (429)	78.1 (1984)	105.9 (2690)	36.7 (932)	53.2 (1351)	C
	CR 155-1	40.0 (30.0)		64.8 (1646)	16.9 (429)	78.1 (1984)	105.9 (2690)	36.7 (932)	53.2 (1351)	C
	CR 155-2-2	50.0 (37.0)		69.6 (1768)	16.9 (429)	78.1 (1984)	105.9 (2690)	36.7 (932)	53.2 (1351)	C
	CR 155-2-1	60.0 (44.0)		69.1 (1755)	16.9 (429)	78.1 (1984)	105.9 (2690)	36.7 (932)	53.2 (1351)	C
4	CR 155-1-1	25.0 (18.5)	14" ANSI	60.5 (1537)	16.9 (429)	103.9 (2639)	110.9 (2817)	36.7 (932)	53.2 (1351)	C
	CR 155-1	40.0 (30.0)		64.8 (1646)	16.9 (429)	103.9 (2639)	110.9 (2817)	36.7 (932)	53.2 (1351)	C
	CR 155-2-2	50.0 (37.0)		69.6 (1768)	16.9 (429)	103.9 (2639)	110.9 (2817)	36.7 (932)	53.2 (1351)	C
	CR 155-2-1	60.0 (44.0)		69.1 (1755)	16.9 (429)	103.9 (2639)	110.9 (2817)	36.7 (932)	53.2 (1351)	C
5	CR 155-1-1	25.0 (18.5)	16" ANSI	60.5 (1537)	16.9 (429)	129.5 (3289)	113.4 (2880)	36.7 (932)	53.2 (1351)	C
	CR 155-1	40.0 (30.0)		64.8 (1646)	16.9 (429)	129.5 (3289)	113.4 (2880)	36.7 (932)	53.2 (1351)	C
	CR 155-2-2	50.0 (37.0)		69.6 (1768)	16.9 (429)	129.5 (3289)	113.4 (2880)	36.7 (932)	53.2 (1351)	C
	CR 155-2-1	60.0 (44.0)		69.1 (1755)	16.9 (429)	129.5 (3289)	113.4 (2880)	36.7 (932)	53.2 (1351)	C
6	CR 155-1-1	25.0 (18.5)	16" ANSI	60.5 (1537)	16.9 (429)	129.5 (3289)	113.4 (2880)	36.7 (932)	53.2 (1351)	C
	CR 155-1	40.0 (30.0)		64.8 (1646)	16.9 (429)	129.5 (3289)	113.4 (2880)	36.7 (932)	53.2 (1351)	C
	CR 155-2-2	50.0 (37.0)		69.6 (1768)	16.9 (429)	129.5 (3289)	113.4 (2880)	36.7 (932)	53.2 (1351)	C
	CR 155-2-1	60.0 (44.0)		69.1 (1755)	16.9 (429)	129.5 (3289)	113.4 (2880)	36.7 (932)	53.2 (1351)	C

Design D: Hydro MPC pump system with a control cabinet mounted on a separate base frame.
Design C: Hydro MPC pump system with a floor-mounted control cabinet.
Dimensions may vary by ± 0.39 in. (10 mm).

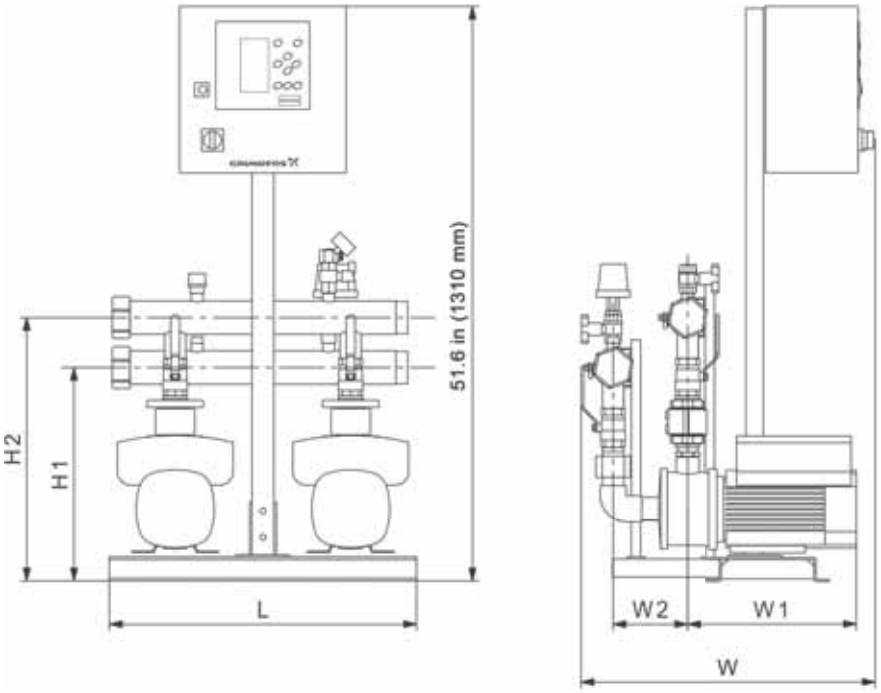
11. Technical data, Hydro MPC CME, 60 Hz

Dimensional sketches for CME



TM07 4709 2219

Fig. 68 Hydro MPC CME pump system with three CME pumps



TM07 4702 2219

Fig. 69 Hydro MPC CME pump system with two CME pumps

Hydro MPC CME with CME 3

No. of pumps	Pump type	Motor [hp (kW)]	Voltage code	FLA [Amps] U1 / U2 / U3	Connection size [in]	L [in (mm)]	W [in (mm)]	W1 [in (mm)]	W2 [in (mm)]	H1 [in (mm)]	H2 [in (mm)]	Tank [gal (L)]	Wt. [lbs (kg)]
2	CME 3-3	1.5 (1.1)	U1	20.2	2" NPT	27.6 (701)	23.9 (607)	18.4 (467)	5.9 (150)	18.1 (460)	23.9 (607)	4.4 (17)	175 (79)
	CME 3-5	1.5 (1.1)	U1	20.2		27.6 (701)	26.2 (665)	19.9 (505)	7.3 (185)	18.1 (460)	23,9 (607)	4.4 (17)	178 (81)
3	CME 3-3	1.5 (1.1)	U1	29.3	2" NPT	43.3 (1099)	22.9 (582)	18.4 (467)	5.9 (150)	18.1 (460)	23,9 (607)	4.4 (17)	242 (110)
	CME 3-5	1.5 (1.1)	U1	29.3		43.3 (1099)	24.4 (620)	19.9 (505)	7.3 (185)	18.1 (460)	23,9 (607)	4.4 (17)	244 (111)

Hydro MPC CME with CME 5

No. of pumps	Pump type	Motor [hp (kW)]	Voltage code	FLA [Amps] U1 / U2 / U3	Connection size [in]	L [in (mm)]	W [in (mm)]	W1 [in (mm)]	W2 [in (mm)]	H1 [in (mm)]	H2 [in (mm)]	Tank [gal (L)]	Wt. [lbs (kg)]
2	CME 5-3	1.5 (1.1)	U1	20,2	2" NPT	27.6 (701)	25.9 (658)	20.4 (518)	7.5 (191)	19.3 (490)	24.2 (615)	4.4 (17)	175 (79)
	CME 5-4	2 (1.4)	U1, U2, U3	20.2 / 17.8 / 9.6		26.6 (676)	25.5 (648)	20.4 (518)	7,5 (191)	19.3 (490)	25.7 (653)	4.4 (17)	200 (91)
	CME 5-5	2 (1.4)	U2, U3	17.8 / 9,6		27.6 (701)	26.4 (671)	20.9 (518)	8,4 (213)	19.3 (490)	25.7 (653)	4.4 (17)	202 (92)
3	CME 5-3	1.5 (1.1)	U1	29.3	2" NPT	43.3 (1099)	24.9 (632)	20.4 (518)	7,5 (191)	19.3 (490)	24.2 (615)	4.4 (17)	242 (110)
	CME 5-4	2 (1.4)	U1, U2, U3	29.3 / 25.7 / 13.4		43.3 (1099)	24.6 (625)	20.4 (518)	7,5 (191)	19.3 (490)	25.7 (653)	4.4 (17)	279 (127)
	CME 5-5	2 (1.4)	U2, U3	25.7 / 13.4		43.3 (1099)	25.4 (645)	20.9 (518)	8,4 (213)	19.3 (490)	25.7 (653)	4.4 (17)	282 (128)

Hydro MPC CME with CME 10

No. of pumps	Pump type	Motor [hp (kW)]	Voltage code	FLA [Amps] U1 / U2 / U3	Connection size [in]	L [in (mm)]	W [in (mm)]	W1 [in (mm)]	W2 [in (mm)]	H1 [in (mm)]	H2 [in (mm)]	Tank [gal (L)]	Wt. [lbs (kg)]
2	CME 10-1	1.5 (1.1)	U1	20.2	2.5" NPT	27.6 (701)	25.0 (635)	20,9 (518)	7.4 (188)	21.5 (546)	27,5 (699)	10.3 (39)	238 (108)
	CME 10-2	3 (2.2)	U2, U3	17.8 / 9.6		27.6 (701)	26,8 (681)	25,2 (640)	7.4 (188)	21.5 (546)	27.5 (699)	10.3 (39)	264 (120)
	CME 10-3	5 (3.7)	U2, U3	42.0 / 20.2		27.6 (701)	29,3 (744)	28,8 (732)	8.6 (218)	22.0 (559)	27.9 (709)	10.3 (39)	405 (184)
3	CME 10-1	1.5 (1.1)	U1	29.3	2.5" NPT	43.3 (1099)	25.4 (645)	20,9 (518)	7.4 (188)	21.5 (546)	27.5 (699)	10.3 (39)	334 (152)
	CME 10-2	3 (2.2)	U2, U3	25.7 / 13.4		43.3 (1099)	26,3 (668)	25,2 (640)	7.4 (188)	21.5 (546)	27.5 (699)	10.3 (39)	373 (169)
	CME 10-3	5 (3.7)	U2, U3	62.0 / 29.3		43.3 (1099)	28,8 (732)	28,8 (732)	8.6 (218)	22.0 (559)	27.9 (709)	10.3 (39)	585 (265)

Hydro MPC CME with CME 15

No. of pumps	Pump type	Motor [hp (kW)]	Voltage code	FLA [Amps] U1 / U2 / U3	Connection size [in]	L [in (mm)]	W [in (mm)]	W1 [in (mm)]	W2 [in (mm)]	H1 [in (mm)]	H2 [in (mm)]	Tank [gal (L)]	Wt. [lbs (kg)]
2	CME 15-1	3 (2.2)	U2, U3	17.8 / 9.6	3" ANSI 150#	27.6 (701)	30.4 (772)	27.7 (704)	9.6 (244)	23.6 (599)	28.5 (723)	34.0 (129)	300 (136)
	CME 15-2	5 (3.7)	U2, U3	42.0 / 20.2		27.6 (701)	31.0 (787)	30.1 (765)	9.6 (244)	23.6 (599)	28.5 (723)	34.0 (129)	441 (200)
	CME 15-3	7.5 (5.5)	U2, U3	42.0 / 20.2		27.6 (701)	32.1 (815)	31.3 (795)	9.6 (244)	23.6 (599)	28.5 (723)	34.0 (129)	460 (209)
3	CME 15-1	3 (2.2)	U2, U3	25.7 / 13.4	4" ANSI 150#	43.3 (1099)	29.4 (747)	27.7 (704)	9.6 (244)	22.7 (577)	27.0 (685)	34.0 (129)	443 (200)
	CME 15-2	5 (3.7)	U2, U3	62.0 / 29.3		43.3 (1099)	30.7 (780)	30.1 (765)	9.6 (244)	23.2 (589)	27.5 (698)	34.0 (129)	654 (297)
	CME 15-3	7.5 (5.5)	U2, U3	62.0 / 29.3		43.3 (1099)	31.9 (810)	31.3 (795)	10.8 (274)	23.2 (589)	27.5 (698)	34.0 (129)	683 (310)

E system with two or three CME pumps.
Voltage code U1: 1 x 208-230 V - 10 %/+ 10 %, N, PE.
Voltage code U2: 3 x 208-230 V - 5 %/+ 5 %, N, PE.
Voltage code U3: 3 x 460-480 V - 10 %/+ 10 %, N, PE.
Dimensions may vary by ± 1 in.

Maximum system amps (full load amperage)

Number of pumps	Motor [Hp (kW)]	MPC-E (CRE/CME)			MPC-E (CUE), -F, -S			
		1 x 230 V	3 x 208-230 V	3 x 460-480 V	1 x 230 V	3 x 208-230 V	3 x 460-480 V	3 x 575-600V
2	1 (0.75)	11.4		5.3		11.2	6.2	5.4
	1.5 (1.1)	15.4	10.2	6.1	27	15.2	7.4	6.8
	2 (1.5)	20.2	12.8	7.3	32	17	8.8	7.4
	3 (2.2)		17.8	9.6	43	23.2	11.6	9.8
	5 (4)		28.4	14.4	66	35.4	18.4	14.2
	7.5 (5.5)		42	20.2	94	50.4	24	20
	10 (7.5)			26.8	120	63.6	31	24
	15 (11)			37.8		94.4	44	38
	20 (15)			54		120.8	56	46
	25 (18.5)			63		151.6	70	56
	30 (22)			75			82	70
	40 (30)						106	84
	50 (37)						132	106
	60 (44)						162	126
3	1 (0.75)	16.1		6.95		15.8	8.3	7.1
	1.5 (1.1)	22.1	14.3	8.15	39.5	21.8	10.1	9.2
	2 (1.5)	29.3	18.2	9.95	47	24.5	12.2	10.1
	3 (2.2)		25.7	13.4	63.5	33.8	16.4	13.7
	5 (4)		41.6	20.6	98	52.1	26.6	20.3
	7.5 (5.5)		62	29.3	140	74.6	35	29
	10 (7.5)			39.2	179	94.4	45.5	35
	15 (11)			55.7		140.6	65	56
	20 (15)			80		180.2	83	68
	25 (18.5)			93.5		226.4	104	83
	30 (22)			111.5			122	104
	40 (30)						158	125
	50 (37)						197	158
	60 (44)						242	188
4	1 (0.75)	20.8		8.6		20.4	10.4	8.8
	1.5 (1.1)	28.8	18.4	10.2	52	28.4	12.8	11.6
	2 (1.5)	38.4	23.6	12.6	62	32	15.6	12.8
	3 (2.2)		33.6	17.2	84	44.4	21.2	17.6
	5 (4)		54.8	26.8	130	68.8	34.8	26.4
	7.5 (5.5)		82	38.4	186	98.8	46	38
	10 (7.5)			51.6	238	125.2	60	46
	15 (11)			73.6		186.8	86	74
	20 (15)			106		239.6	110	90

Number of pumps	Motor [Hp (kW)]	MPC-E (CRE/CME)			MPC-E (CUE), -F, -S			
		1 x 230 V	3 x 208-230 V	3 x 460-480 V	1 x 230 V	3 x 208-230 V	3 x 460-480 V	3 x 575-600V
4	25 (18.5)			124		301.2	138	110
	30 (22)			148			162	138
	40 (30)						210	166
	50 (37)						262	210
	60 (44)						322	250
5	1 (0.75)	25.5		10.25		25	12.5	10.5
	1.5 (1.1)	35.5	22.5	12.25	64.5	35	15.5	14
	2 (1.5)	47.5	29	15.25	77	39.5	19	15.5
	3 (2.2)		41.5	21	104.5	55	26	21.5
	5 (4)		68	33	162	85.5	43	32.5
	7.5 (5.5)		102	47.5	232	123	57	47
	10 (7.5)			64	297	156	74.5	57
	15 (11)			91.5		233	107	92
	20 (15)			132		299	137	112
	25 (18.5)			154.5		376	172	137
	30 (22)			184.5			202	172
	40 (30)						262	207
	50 (37)						327	262
	60 (44)						402	312
6	1 (0.75)	30.2		11.9		29.6	14.6	12.2
	1.5 (1.1)	42.2	26.6	14.3	77	41.6	18.2	16.4
	2 (1.5)	56.6	34.4	17.9	92	47	22.4	18.2
	3 (2.2)		49.4	24.8	125	65.6	30.8	25.4
	5 (4)		81.2	39.2	194	102.2	51.2	38.6
	7.5 (5.5)		122	56.6	278	147.2	68	56
	10 (7.5)			76.4	356	186.8	89	68
	15 (11)			109.4		279.2	128	110
	20 (15)			158		358.4	164	134
	25 (18.5)			185		450.8	206	164
	30 (22)			221			242	206
	40 (30)						314	248
	50 (37)						392	314
	60 (44)						482	374

Notes: Maximum system amperage reflects panels with no options and may change due to panel options requested.

12. Optional equipment

Pump system

All optional equipment must be specified when ordering the pump system, as it must be fitted from factory prior to delivery.

See options in the Hydro MPC type key on page 10.

Option		Description	Location	Options (type key for Hydro MPC)
Pilot pump		During periods when consumption is low, the pilot pump takes over the operation from the main pumps when the main pumps stop function is activated.	System	B
NRV on inlet side		As standard, the non-return valves are fitted on the outlet side of the pumps of the pump system. In installations with suction lift, we recommend that you install non-return valves on the inlet side of the pumps to prevent dry running.	Inlet side	D
Elbow manifold	-	Manifolds with elbows in one end can reduce dead ends. On request.	Inlet/outlet side	E
Dry-running protection		The pump system must be protected against dry running. The inlet conditions determine the type of dry-running protection. • If the system draws water from a tank or a well, select a level switch or an electrode relay for dry-running protection. • If the system has an inlet pressure, select a pressure transmitter or a pressure switch for dry-running protection. For further description, see table below.	On inlet manifold	H
Redundant primary sensor		In order to increase the reliability, a redundant primary sensor can be connected as backup sensor for the primary sensor. **Note**: The redundant primary sensor must be of the same type as the primary sensor.	-	J
One free pump position	-	Systems with one free pump position are available from a 3-pump up to a 6-pump system. The pump systems, including the cabinet, are prepared for the future pump.	-	K
Two free pump positions		Systems with two free pump positions are available on 4-pump up to 6-pump systems. The pump systems, including the cabinet, are prepared for the future pumps.	-	L
Three free pump positions		Systems with three free pump positions are available on 5 and 6 pump systems only. The pump systems, including the cabinet, are prepared for the future pumps.	-	M

Option		Description	Location	Options (type key for Hydro MPC)
Low pre-pressure (low NPSH)	-	The pump systems are available with CR low-NPSH pumps designed to eliminate the risk of cavitation and ensure a stable and reliable operation. The CR low-NPSH has a special inlet design that reduces the NPSH value required by the pump and prevents erosion and destruction of pump, pipes and valves. The improved inlet design may expose the low-NPSH pump to more stress than conventional pumps without affecting the stability of operation. The CR low-NPSH pump reduces excess pressure itself and does not require any additional tank to provide supplementary pressure. **Note**: Systems are available on request with CR low-NPSH from CR/CRI 3 to CR/CRI 20 and CRN, CRNE from CRN, CRNE 3 to CRN, CRNE 64.	-	Q
Customized variant	-	Customized systems can be produced on request. For further information, contact your local Grundfos sales office.	-	S
Undersized motor		We recommend a Hydro pump system with undersized motors if operating conditions deviate from those stated in the Hydro MPC Data Booklet and Grundfos Product Center. We especially recommend undersized motors if the duty point is constant,and the flow rate is significantly lower than the maximum recommended flow rate.	-	U
Standard controls with options		See standard Control MPC options on page 11.	-	V
Customized controls		See Control MPC options on page 11.	-	W

Dry-running protection, option H

Description	Range [psi (bar)]
Dry-running protection by means of electrode relay, without electrodes and electrode cable *	-
Inlet pressure sensor**	0-87 (0-6)
	0-145 (0-10)
	0-232 (0-16)

* Only one type of dry-running protection can be selected, as it must be connected to the same digital input as CU 352. This also applies to level switches. For further information about CU 352, see page 15.

** The inlet pressure sensor is normally connected to the analog input AI2 of CU 352. If this input is used for another function, such as "External setpoint", connect the sensor to analog input AI3. If, however, this input is also occupied, increase the number of analog inputs by installing an IO 351B module, see page 90. For further information about IO 351B, see page 15.

Redundant primary sensor, option J

Description	Range [psi (bar)]
Redundant primary sensor*	0-145 (0-10)
	232 (0-16)

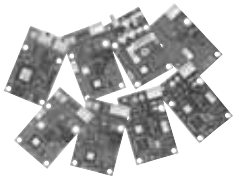
* The redundant primary sensor is normally connected to the analog input AI3 of CU 352. If this input is used for another function, such as "External setpoint", connect the redundant sensor to analog input AI2. If, however, this input is also occupied, increase the number of analog inputs by installing an IO 351B module, see page 90.

Control MPC

All optional equipment for Control MPC must be specified when ordering the pump system, as it must be fitted from factory prior to delivery. Standard Hydro MPC systems are produced with Control cabinet standard version A.

See options in the Control MPC type key on page 11.

Operating-panel options					Included in pre-defined Control MPC standard			
Option		**Description**	**Location**	**Options (type key for Control MPC)**	**A**	**B**	**E**	**F**
Redundant primary sensor	-	The redundant primary sensor is visible on the wiring diagram. **Note**: The redundant primary sensor is not included.	In the control cabinet	O1	•	•	•	•
Show repair switches in wiring diagram	-	The repair switches are visible on the wiring diagram. **Note**: Repair switches are not included.	In the control cabinet	O2	•	•	•	•
Emergency-operation switch	-	The emergency-operation switch enables emergency operation if a fault occurs in the CU 352. **Note**: The motor protection and the dry-running protection are not activated during emergency operation. **Note**: One switch for each pump.	In the control cabinet	O3	-	•	•	•
IO 351B interface		This option features a factory-fitted and non-programmed IO 351B interface enabling exchange of additional digital in-/outputs, seven additional outputs, two additional analog inputs and three analog outputs. **Note**: The CU 352 supports up to two IO 351B interfaces.	In the control cabinet	O4	-	-	-	-
Potential-free contacts	-	Potential-free contacts are used to indicate that the pumps in the system are running or that an alarm is present.	In the control cabinet	O5	-	-	-	-

Operating-panel options					Included in pre-defined Control MPC standard			
Option		**Description**	**Location**	**Options (type key for Control MPC)**	**A**	**B**	**E**	**F**
CIM - Communication interface modules		The CIM modules enable communication of operating data, such as measured values and setpoints, between Hydro MPC and a building-management system. Note: CIM modules must be fitted by authorized staff. The CIM module enables transfer of data such as: • operating mode • setpoint • control mode • warnings and alarms • power/energy consumption. We offer the following CIM modules:		O6	↓	↓	↓	↓
• CIM 050		GENIbus module	In the control cabinet	O6a	-	-	-	-
• CIM 110		LonWorks module		O6b	-	-	-	-
• CIM 150		PROFIBUS DP Module		O6c	-	-	-	-
• CIM 200		Modbus RTU Module		O6d	-	-	-	-
• CIM 260		3G/4G GRM Grundfos Remote Management		O6e	-	-	-	-
• CIM 280		3G/4G GRM Grundfos Remote Management		O6f	-	-	-	-
• CIM 300		BACnet MS/TP Module		O6g	-	-	-	-
• CIM 500		Ethernet module		O6h	-	-	-	-
Dry-running protection - electrode relay	-	Electrode Relay mounted in panel. **Note**: Order electrodes separately.	In the control cabinet	O7	-	-	•	-
Dry-running protection - vibration-limit switch	-	The vibration-limit switch is visible on the wiring diagram. **Note**: Vibration-limit switch not included.	In the control cabinet	O8	-	-	-	•
Dry-running protection - inlet pressure sensor	-	The inlet-pressure sensor is visible on the wiring diagram. **Note**: inlet-pressure switch not included.	In the control cabinet	O9	•	•	-	-
Dry-running protection - digital input	-	Digital input is visible on the wiring diagram.	In the control cabinet	O10	•	•	-	-
Fault light, pump		The fault light is on if a fault occurs in the pump. **Note**: One fault light for each pump.	In door of control cabinet	O11	-	-	-	-
Operating light, pump		The operating light when the relevant pump is in operation. **Note**: One operating light for each pump.	In door of control cabinet	O12	-	-	-	-
Fault light, system		The fault light is on if a fault occurs in the system. **Note**: Phase failure causes no fault indication.	In door of control cabinet	O13	-	-	-	-
Operating light, system		The operating light is on when the system is in operation.	In door of control cabinet	O14	-	-	-	-
Ammeter	-	An ammeter indicates the current of one phase per pump. **Note**: One ammeter for each pump.	In door of control cabinet	O15	-	-	-	-

Operating-panel options					Included in pre-defined Control MPC standard			
Option		**Description**	**Location**	**Options (type key for Control MPC)**	**A**	**B**	**E**	**F**
Voltmeter	-	A voltmeter indicates the mains voltages between mains phases and between the neutral conductor, N, and the mains phases. **Note**: One voltmeter for each pump.	In door of control cabinet	O16	-	-	-	-
Pilot pump control	-	With this option, the Control MPC is prepared for connection, meaning that it includes fuses and motor starter. The pilot pump is visible on the wiring diagram.	In the control cabinet	O17	-	-	-	-
Main switch with door interlock	-	The cabinet door can only be opened if the main switch is in off position.	In the control cabinet	O18	-	-	-	-
Main switch for neutral conductor	-	The main switch for switching off the neutral conductor is only used in connection with single-phase motors. Select this option according to the local rules for the installation site. As standard, the main switch does not switch off the neutral conductor.	In the control cabinet	O19	-	-	-	-
Phase-failure monitoring	-	Protect the pump system against phase failure. **Note**: A potential-free switch is available for external monitoring	In the control cabinet	O20	-	-	-	-
Panel light and socket	-	The panel light is on when the door of the control cabinet is open. Panel lights for 50 Hz are in accordance with EN 60529/10.91. **Note**: The panel light and socket are to be connected to a separate power supply.	In the control cabinet	O21	-	-	-	-
Transient-voltage protection	-	The transient-voltage protection protects the pump system against high-energy transients.	In the control cabinet	O22	-	-	-	-
Lightning protection	-	The pump system can be protected against strokes of lightning. The lightning protection is in accordance with IEC 61024-1:1992-10, class B & C. Note: Additional earthing facilities must be arranged by the customer at the installation site.	In the control cabinet	O23	-	-	-	-
Backup battery		The battery is connected to the CU352 as a backup in case the power supply is interrupted.	In the control cabinet	O24	-	-	-	-
Ethernet	-	The ethernet connection makes it possible to get unlimited access to the setting and monitoring of the Hydro MPC from a remote PC.	In the control cabinet	O25	-	-	-	-
Beacon	-	The beacon is on in case of a system alarm. **Note**: Phase failure causes no alarm indication.	On top of the control cabinet, external	O26	-	-	-	-
Audible alarm	-	The audible alarm sounds in case of a system alarm.	In the control cabinet	O27	-	-	-	-
Motor filter (LC)	-	The motor filter is mounted in panel for CUE -/ EC systems. Control MPC uses Sinus filters as standard. Other types are on request.	In the control cabinet	O28	-	-	-	-

All options can be added to the predefined package choice
- • Included in the predefined package
- \- Not included in the predefined package

13. Accessories

All accessories can be fitted to the Hydro MPC pump system after delivery.

Option		Description
Dry-running protection	-	The pump system must be protected against dry running. Dry-running protection by means of level switches is used in installations where the pump system draws water from a tank or well. For further description, see table below.
		Grundfos GO Remote is used for wireless infrared or radio communication with the pumps. Various Grundfos GO Remote variants are available. The variants MI 204 complete kit, MI 204 and MI 301 are described in the following. For further description, see table below.
• **MI 301**		**MI 301** • The MI 301 is a module with built-in infrared and radio communication. Use the MI 301 in conjunction with an Android- or iOS-based Smartphone with a Bluetooth connection. The MI 301 has a rechargeable Li-ion battery and must be charged separately.

Dry-running protection

Description	Product number
Level switch including 16 ft (5 m) of cable*	96020142

* The input for the level switch is not included. See page 90.
Only one type of dry-running protection can be selected, as it must be connected to the same digital input as CU 352. This also applies to level switches.

Diaphragm tank

Pump type	Recommended diaphragm tank size [gallons]			
	-E	-E(CUE)	-F	-S
CR, CRE 3	4.4	4.4	4.4	20
CR, CRE 5	4.4	4.4	4.4	34
CR, CRE 10	10.3	10.3	10.3	62
CR, CRE 15	34	34	34	211
CR, CRE 20	34	34	34	211
CR, CRE 32	44	44	44	317
CR, CRE 45	86	86	86	528
CR, CRE 64	132	132	132	1056
CR, CRE 95	132	132	132	1056
CR, CRE 125	211	211	211	(2) x 1056
CR, CRE 155	211	211	211	(2) x 1056

Recommended diaphragm tank size	
Pump type	**Tank size [gal (L)]**
CME 3	4.4 (17)
CME 5	4.4 (17)
CME 10	10.3 (39)
CME 15	34 (129)

Grundfos GO Remote

Product numbers for MI 204 (complete kit), MI 204 and MI 301

Grundfos GO Remote variant	Product number
Grundfos MI 204 (complete kit)	98612711
Grundfos MI 204	98424092
Grundfos MI 301	98046408

Additional documentation

The documents and publication numbers below refer to printed documentation of Hydro MPC, Group versions.

Document	Publication number
Installation and operating instructions	
Hydro MPC	96605907
Quick guide	
Hydro MPC	99107595
Catalogue	
Hydro pump systems - custom-built solutions 50/60 Hz	96881732

In addition to printed documentation, Grundfos offers product documentation in Grundfos Product Center at www.grundfos.com. See page 91.

14. Grundfos Product Center

Online search and sizing tool to help you make the right choice.

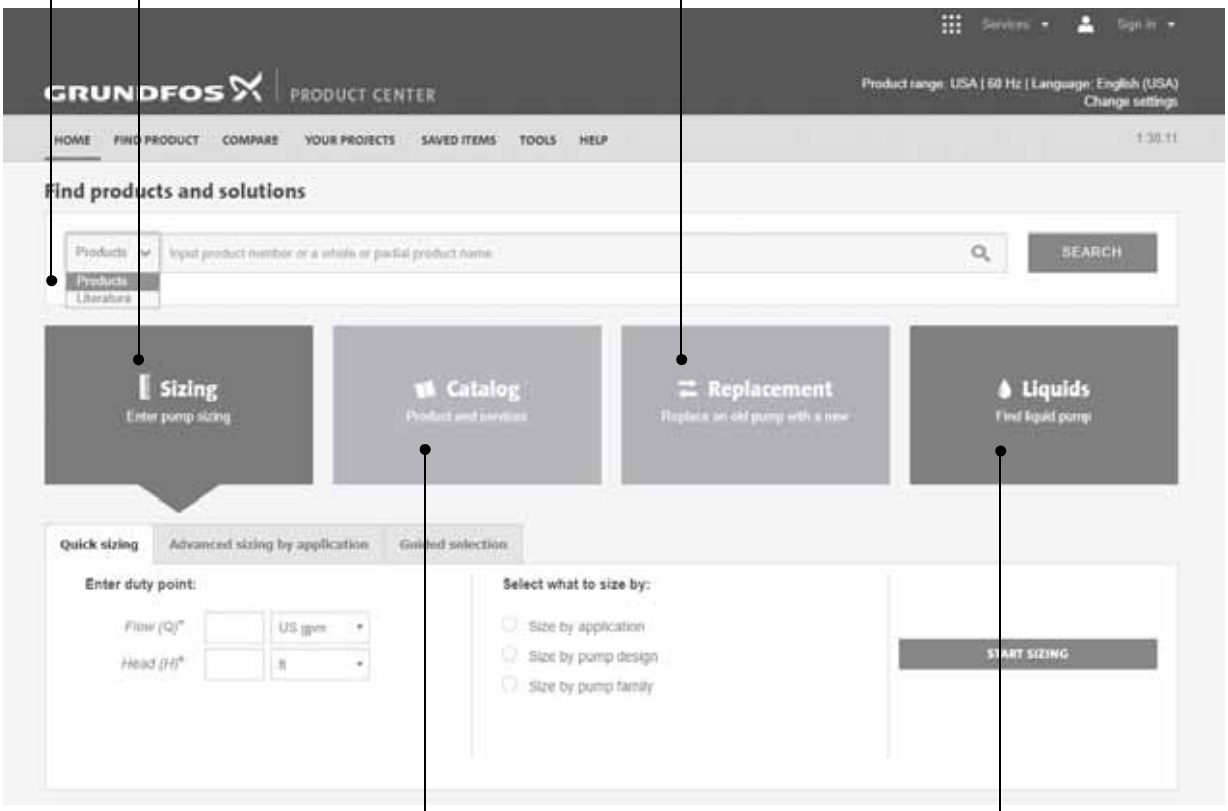
http://product-selection.grundfos.com

This drop-down menu enables you to set the search function to "Products" or "Literature".

"SIZING" enables you to size a pump based on entered data and selection choices.

"REPLACEMENT" enables you to find a replacement product. Search results will include information on the following:

- the lowest purchase price
- the lowest energy consumption
- the lowest total life cycle cost.



"CATALOGUE" gives you access to the Grundfos product catalogue.

"LIQUIDS" enables you to find pumps designed for aggressive, flammable or other special liquids.

All the information you need in one place

Performance curves, technical specifications, pictures, dimensional drawings, motor curves, wiring diagrams, spare parts, service kits, 3D drawings, documents, system parts. The Product Center displays any recent and saved items - including complete projects - right on the main page.

Downloads

On the product pages, you can download installation and operating instructions, data booklets, service instructions, etc. in PDF format.

Grundfos GO

Mobile solution for professionals on the GO!

Grundfos GO is the mobile tool box for professional users on the go. It is the most comprehensive platform for mobile pump control and pump selection including sizing, replacement and documentation. It offers intuitive, handheld assistance and access to Grundfos online tools, and it saves valuable time for reporting and data collection.

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