From:	Joel Balmat
To:	Pelton, Jason M (DEC)
Cc:	Travis, Matthew E (DEC); Sullivan, Jim (HEALTH); Edward Hannon - Northrop Grumman Systems Corp. (edward.hannon@ngc.com); Fred Weber; Chris Engler (christopher.engler@arcadis.com); Lewis Davies
Subject:	Modifications to the OU3 Groundwater Containment System, Operable Unit 3, Former Grumman Settling Ponds, Bethpage, NY
Date:	Tuesday, May 17, 2022 1:52:17 PM
Attachments:	image001.png OU3 Groundwater Containment System Modifications Memo 2022 05 17.pdf

Jason,

This document is being submitted on behalf of Northrop Grumman Systems Corporation by HSW. The objectives of the OU3 groundwater containment system (GWCS) modifications are to convert Monitoring Wells BCPMW-4-1 and BCPMW-4-2 to temporary groundwater recovery wells to extract VOC-impacted groundwater, convey the extracted water to the GWCS, and modify the GWCS to accommodate the additional flow from the new extraction wells.

Please let us know if you have any questions regarding this submittal. Thank you.

Joel Balmat, MS
Principal Consultant
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May 17, 2022

Jason Pelton, PG
Section Chief, Remedial Bureau D, Section B
Division of Environmental Remediation
New York State Department of Environmental Conservation
625 Broadway, 12th Floor
Albany NY 12233-7013

Re: Proposed Modifications to the Bethpage Park Groundwater Containment System, Operable Unit 3 (OU3), Former Grumman Settling Ponds, Bethpage, NY

Dear Mr. Pelton:

This document is being submitted on behalf of Northrop Grumman Systems Corporation (Northrop Grumman) by HSW Consulting LLC (HSW). HSW prepared the proposed modifications to the OU3 Bethpage Park Groundwater Containment System (GWCS) with Northrop Grumman's Engineer of Record for the existing GWCS, Arcadis of New York, Inc. (Arcadis). Arcadis has reviewed the proposed modifications and concurs that implementing the modifications will achieve the intended design objectives (refer to **Attachment A**). A Site Plan is presented as **Figure 1**.

Objectives and Design Elements

The objectives of the GWCS modifications are to convert Monitoring Wells BCPMW-4-1 and BCPMW-4-2 (hereafter MW-4-1 and MW-4-2) to temporary groundwater recovery wells to extract volatile organic compound (VOC)-impacted groundwater, convey the extracted water to the GWCS, and modify the GWCS to accommodate the additional flow from the new extraction wells. These objectives will be accomplished by completing the following tasks:

- Perform engineering design activities sufficient for modification of the GWCS construction and safe operation.
- Solicit construction bids from qualified construction contractors and electricians.
- Submit the proposed modifications to The New York State Department of Environmental Conservation (NYSDEC) for review.
- Perform system modification field activities.
- Perform system startup and testing.
- Prepare a Construction Completion Report, including As-Built Drawings.

Background

Following notification to NYSDEC by Northrop Grumman in early April 2022 regarding the detection of elevated VOCs in GWCS monitoring well MW-4-2, Northrop Grumman tasked HSW to prepare a conceptual design for submittal to the Department for converting MW-4-2 to a groundwater extraction well and treating the extracted groundwater. Since the initial notification to NYSDEC relating to MW-4-2, elevated VOCs were detected in collocated monitoring well MW-4-1; therefore, that well will also be converted to an extraction well.

A conceptual design was prepared and submitted to NYSDEC on April 11, 2022. Conceptual design review and project scoping meetings were conducted on May 10, 2022. The first meeting was with Northrop Grumman's Engineer of Record for the existing GWCS, Arcadis. The second meeting was held between NYDEC, Northrop Grumman, and HSW. The parties agreed on the proposed conceptual design for implementation. Following those meetings, HSW solicited bids from construction and electrical contractors. The procurement process is now complete.

Description of GWCS Modifications

Northrop Grumman intends to modify the GWCS to allow for groundwater extraction, conveyance, and treatment at the existing groundwater treatment plant. Monitoring wells MW-4-1 and MW-4-2 will be converted to recovery wells, and extraction and treatment of groundwater from existing recovery wells (RWs) RW-1, -2, -3, and -4 will continue as it has in the past. The existing GWCS treatment system will be modified to add two 2,000-pound liquid-phase granular activated carbon (LGAC) units and associated piping for effluent polishing as an additional factor of safety prior to final effluent discharge. The GWCS vapor treatment system will not require modification and will continue to operate in its current configuration.

The technical details of the proposed modifications are provided in figures and attachments including:

- A modified Process Flow Diagram (PFD) is presented as **Figure 2** and a Trenching and Piping Layout and Trench and Piping Details are presented as **Figures 3** and **4**, respectively.
- Engineering calculations are provided in **Attachment B**, including:
  - The expected influent contaminants of concern (COCs) to the treatment system include the flow rate and COC concentrations from the addition of MW-4-1 and MW-4-2;
  - Modeled removal efficiencies for the existing air stripper;
  - Hydraulic head loss calculations for pump sizing and selection;
  - COC mass removal rates to evaluate performance of the existing air stripper vapor; and treatment system;
  - Cut sheets for new key system components.
- The engineering calculations and data analyses verified that the modified groundwater treatment system will continue to meet the established groundwater and air discharge criteria.

- A detailed field construction Scope of Work for the GWCS modifications is provided in **Attachment C** and is summarized below. Field construction activities are scheduled to begin the week of May 16, 2022 including:
  - Pre-construction activities including mobilization, layout of trench lines, performing field utility locates (GPR and EM), and installing erosion controls;
  - Trenching from RW-1 to MW-4-1 and MW-4-2 and installing underground conveyance piping and electrical conduit. Native soil will be used for trench backfill.
  - Installing access vaults at MW-4-1, MW-4-2, and at the RW-1 conveyance line tie-in;
  - Installing electric submersible pumps in MW-4-1 and MW-4-2, and modifying wellhead piping to include a totalizing flow meter, manual ball valve, check valve, sample port, and pressure indicator;
  - Completing RW-1 conveyance line tie-in, which includes a manual ball valve and check valve to prevent backflow from MW-4-1 or MW-4-2 into RW-1;
  - Pressure testing all newly installed groundwater conveyance piping;
  - Installing electrical rack, disconnects, and all wiring terminations to MW-4-1 and MW-4-2;
  - Setting and plumbing two 2,000-pound LGAC vessels at the existing treatment building. LGAC adsorption will be a final polishing step for the effluent from the air stripper;
  - Decontaminate construction equipment and IDW management; and
  - Perform site restoration activities and cleanup prior to demobilization.
- HSW will provide daily construction oversight, health and safety monitoring, and documentation including:
  - Daily health and safety tailgate meetings;
  - Continuous dust monitoring upwind and downwind during intrusive activities (e.g., earth work, trenching, and well vault installation);
  - VOC monitoring in the breathing zone of open excavations using a calibrated, hand-held photoionization detector (PID);
  - Preparing daily written and photographic documentation of work progress; and
  - Maintaining a set of field drawings to red-line all field modifications to the GWCS.

System Startup, Testing, and Operations, Maintenance, and Monitoring

The following startup, testing, and operations, maintenance, and monitoring (OM&M) activities will be conducted following completion of the GWCS modifications:

- The newly installed submersible pumps and equipment will be tested and checked for proper operation including:
  - Bump testing pump motors to ensure correct pump rotation;
  - Verifying totalizing flow meters are functioning properly;

- Visually checking for leaks in exposed piping; and
- Training OM&M staff on operations of the newly installed GWCS components.

- Following the initial testing, the full GWCS will be placed in normal operation with MW-4-1 and 4-2 pumping. The system will be allowed to run for approximately 1 - 2 hours, and groundwater and vapor samples will be collected as detailed in **Table 1**.
- During the initial startup test, water levels will be collected to monitor drawdown and flow rates from MW-4-1 and MW-4-2. At the end of the initial startup test, pumping of MW-4-1 and MW-4-2 will be discontinued until treatment system sample results confirm that all required performance and discharge criteria are met. The existing GWCS recovery wells will continue to operate normally.
- After startup testing and sampling confirm that performance and discharge criteria were achieved, the submersible pumps in MW-4-1 and MW-4-2 will be placed in full-time operation. Groundwater and vapor testing will resume as detailed in **Table 1**.
- OM&M of the modified GWCS will continue to be managed by Northrop Grumman staff.
- Update the current As-Built Drawings documenting the completed modifications to the GWCS.

Please let us know if you have any questions or require any further information.

Sincerely,
HSW Consulting, LLC.

Lewis J Davies, PE
Senior Consultant

Attachments

TABLE

Table 1 - Air, Groundwater, and Vapor Monitoring Plan

Sample Location	Sampling Frequency[1/]	Purpose	Screening/Sample Parameter(s) (Analytical Method)
Construction Air Monitoring			
Upwind of Construction Area	Continuously during intrusive activities	Dust monitoring	Particulate concentration using hand-held monitor (DustTrak™)
Downwind of Construction Area			
Within the Work Zone	Continuously during intrusive activities	VOC monitoring	Hand-Held PID
Groundwater and Liquid Treatment Process Sampling			
BCPMW-4-1	First week x 3, weekly for the first month, monthly for the months 2 and 3, return to existing frequency per the OM&M Plan[2/] thereafter	Monitor VOC levels in MW-4-1 and MW-4-2 and mass recovery rate	VOCs (USEPA Method 8260D)
BCPMW-4-2			
Combined Influent to AST			
Effluent after final LGAC		Monitor LGAC breakthrough	
Air Stripper Vapor Treatment System			
Vapor Treatment System Influent	Initial startup test, weekly for the first month, monthly for months 2 and 3, return to existing frequency per the OM&M Plan thereafter	Monitor VGAC for breakthrough and discharge requirements	VOCs (USEPA Method TO-15) and Hand-Held PID
Vapor Treatment System VGAC Interim Point			
Vapor Treatment System VGAC Effluent			

[1/] Or until data supports an alternate frequency
[2/] OM&M Manual, Bethpage Park Groundwater Containment System, Arcadis, 2016
AST - Air Stripping Tower
LGAC - liquid-phase granular activated carbon
USEPA - United States Environmental Protection Agency

FIGURES

LEGEND

- Existing Well Location
- Equipment Storage/Laydown Area
- Site Delivery Entrance/Exit Route
- Not Accessible for Entry
- Equipment Decontamination Area
- LGAC Vessels Staging Location

Notes:
Entrance/Exit only from Aerospace Blvd
Equipment Storage/Laydown will be behind locked gate

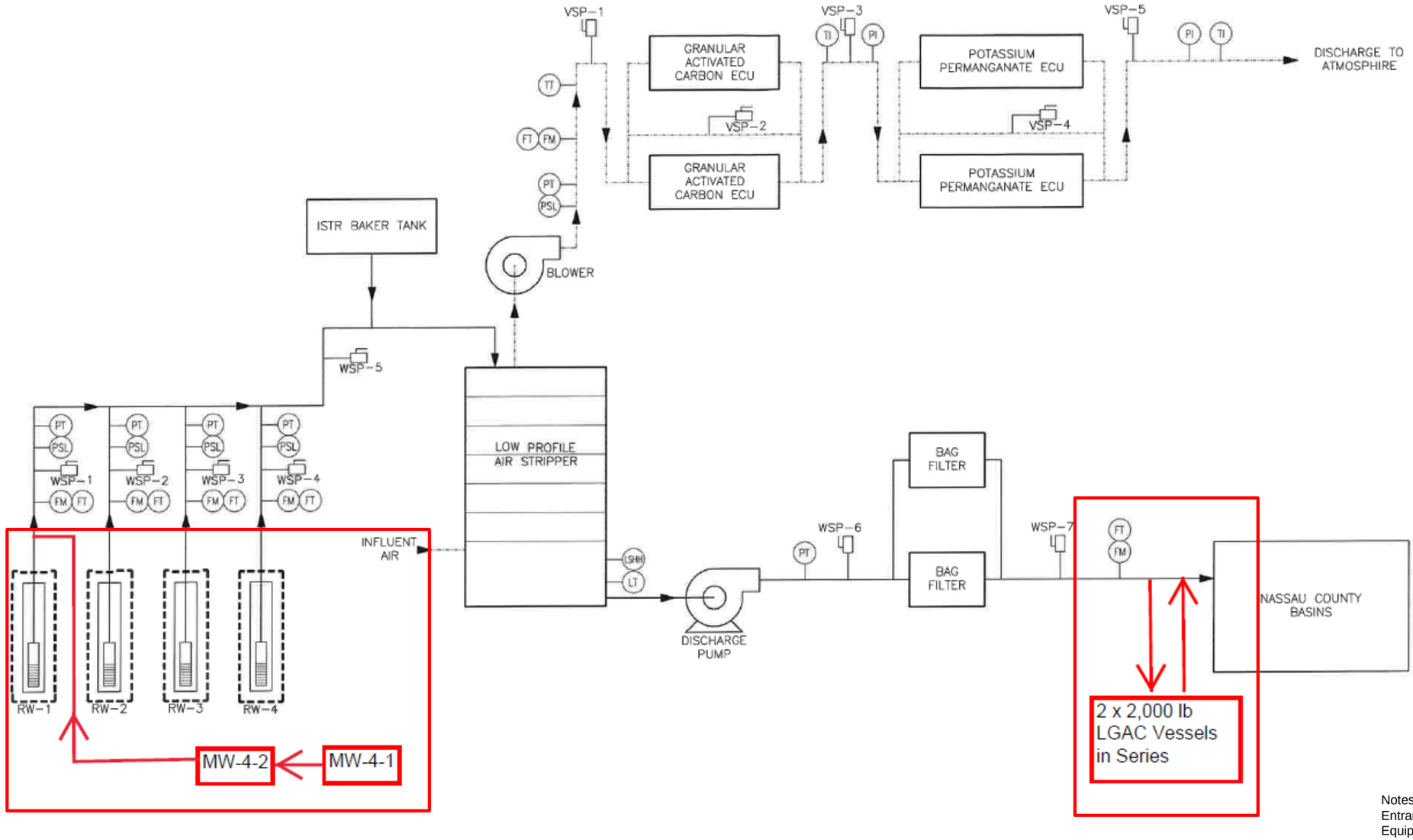
SCALE: AS SHOWN	DATE: 05-13-22
PROJECT NO: 7AS301122 T021	DRAWN BY: ACE
N.T.S	CHECKED BY: LJD

605 E. ROBINSON ST. SUITE 308
ORLANDO, FLORIDA 32801
PH: (407) 872-6893
FAX: (407) 872-7440
WWW.VERDANTAS.COM

SITE PLAN

NORTHROP GRUMAN CORPORATION
OPERABLE UNIT 3 - GWTS MODIFICATIONS
BETHPAGE, NY

FIGURE NO. 1



LEGEND

- PROCESS WATER
- PROCESS AIR
- FM — INSTRUMENT
- SAMPLE PORT
- FLOW DIRECTION
- FM FLOW METER
- FT FLOW RATE TRANSMITTER
- PSL PRESSURE VACUUM LOW
- PT PRESSURE TRANSMITTER
- PI PRESSURE INDICATOR
- LSHH LEVEL SWITCH HIGH HIGH
- LT LEVEL TRANSMITTER
- TT TEMPERATURE TRANSMITTER
- TI TEMPERATURE INDICATOR
- WSP WATER SAMPLE PORT
- VSP VAPOR SAMPLE PORT
- ECU EMISSION CONTROL UNIT

Notes:
Entrance/Exit only from Aerospace Blvd
Equipment Storage/Laydown will be behind locked gate

SCALE: AS SHOWN	DATE: 05-13-22
PROJECT NO: 7AS301122 T021	DRAWN BY: ACE
N.T.S	CHECKED BY: LJD

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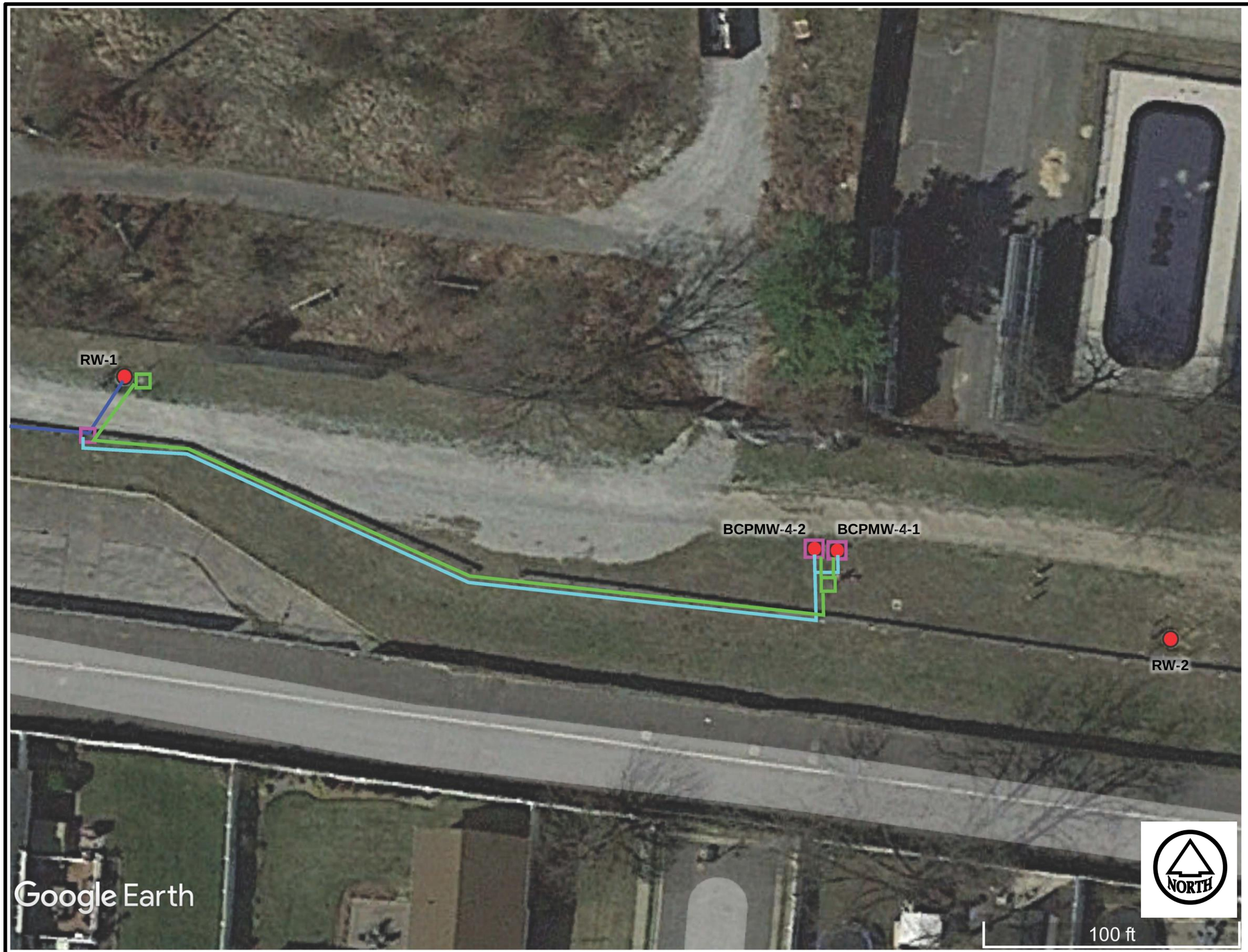
GROUNDWATER TREATMENT SYSTEM PROCESS FLOW DIAGRAM

NORTHROP GRUMAN CORPORATION
OPERABLE UNIT 3 - GWTS MODIFICATIONS
BETHPAGE, NY

FIGURE NO. 2



LEGEND

- Existing Well Location
- New Concrete Vault
- Electrical Rack
- New Water Conveyance Line
- Existing Water Conveyance Line
- New Electrical Conduit

SCALE: AS SHOWN	DATE: 05-13-22
PROJECT NO: 7AS301122 T021	DRAWN BY: ACE
N.T.S	CHECKED BY: LJD

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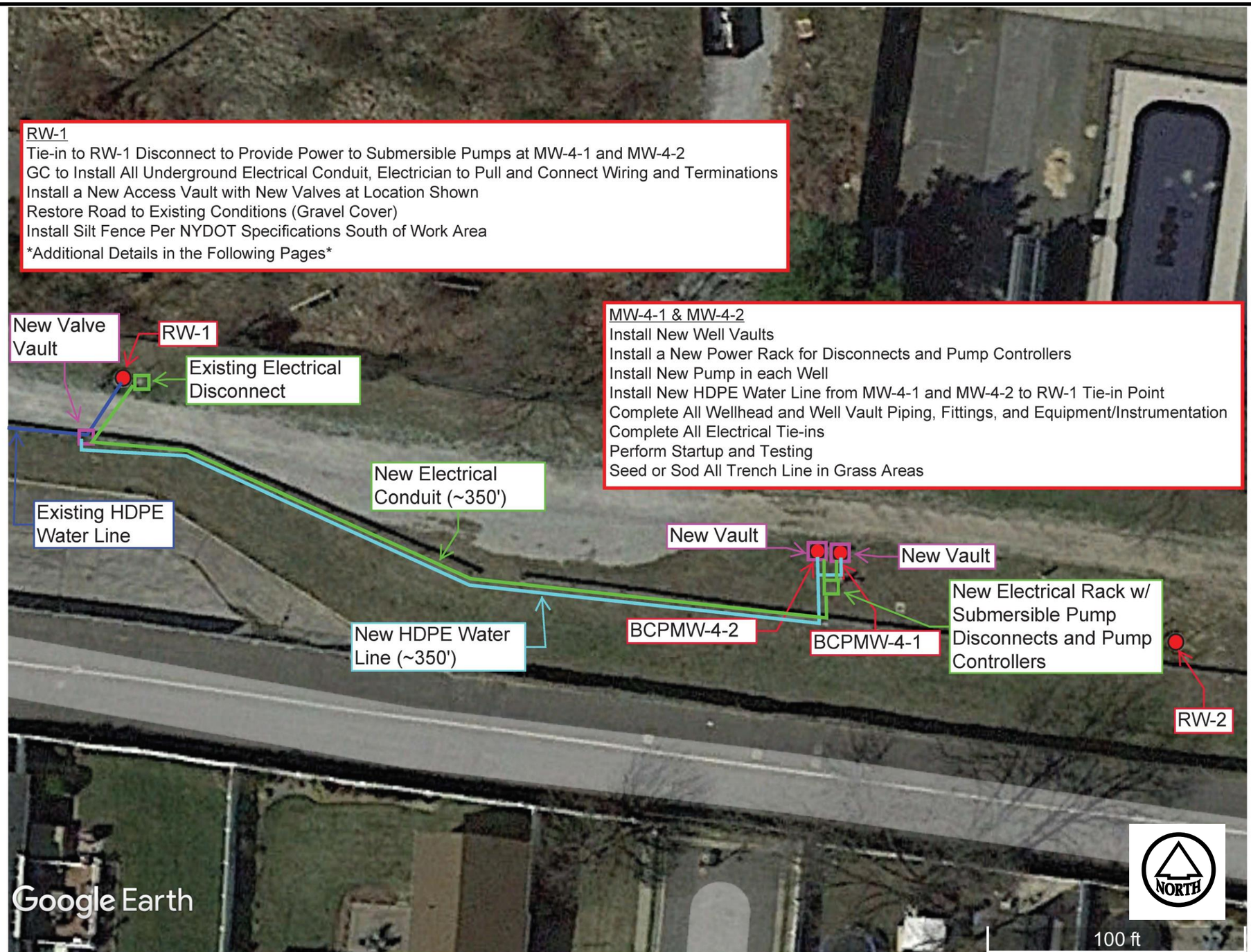
TRENCHING AND PIPING LAYOUT

NORTHROP GRUMAN CORPORATION
OPERABLE UNIT 3 - GWTS MODIFICATIONS
BETHPAGE, NY

FIGURE NO. 3



SCALE: AS SHOWN	DATE: 05-13-22	HSW	605 E. ROBINSON ST. SUITE 308 ORLANDO, FLORIDA 32801 PH: (407) 872-6893 FAX: (407) 872-7440 WWW.VERDANTAS.COM	**TRENCHING AND PIPING DETAILS** NORTHROP GRUMAN CORPORATION OPERABLE UNIT 3 - GWTS MODIFICATIONS BETHPAGE, NY	FIGURE NO. 4
PROJECT NO: 7AS301122 T021	DRAWN BY: ACE				
N.T.S	CHECKED BY: LJD				

ATTACHMENT A

May 16, 2022, Letter from Arcadis on the Proposed OU3 GWCS Modifications

Jason Pelton, PG
Project Manager
Remedial Section B, Remedial Bureau D
Division of Environmental Remediation
New York State Department of Environmental Conservation
625 Broadway, 12th Floor
Albany, New York 12233-7013

Arcadis of New York, Inc.
Two Huntington
Quadrangle
Suite 1S10
Melville
New York 11747
Phone: 631 249 7600
Fax: 631 249 7610
www.arcadis.com

Date: May 16, 2022

Our Ref: 30062838
Subject: Proposed Modifications to Monitoring Wells 4-1 and 4-2

Dear Jason,

As the Engineer of Record for the Northrop Grumman Operable Unit 3 Groundwater Treatment System located in Bethpage, NY, I have reviewed the proposed modifications associated with the conversion of Monitoring Wells 4-1 and 4-2 to temporary remedial wells as outlined in this document and, based on that review, have concluded that these modifications will not result in adverse operation of the system nor will the modifications result in an exceedence of regulatory standards, guidelines, or criteria that govern the operation of this system including both water and vapor treatment and emissions.

Sincerely,

Christopher Engler, PE New York PE-069748
Vice President

Email: Christopher.Engler@arcadis.com
Direct Line: 315.409.6579

ATTACHMENT B

OU3 GWCS Design Calculations and Cut Sheets

COC Mass Calculations and Air Stripper Influent Concentrations

Individual Wells COC's ug/l																											
Well ID	**Well Flow Rate (gpm)**	**Percentage of Total Flow**	**1,1-Dichloroethane**	**grams/day**	**1,1-Dichloroethene**	**grams/day**	**Benzene**	**grams/day**	**cis-1,2-Dichloroethene**	**grams/day**	**Toluene**	**grams/day**	**trans-1,2-Dichloroethene**	**grams/day**	**Trichloroethene**	**grams/day**	**Vinyl Chloride**	**grams/day**	**Xylene-O**	**grams/day**	**Xylenes - M,P**	**grams/day**	**Acetone**	**grams/day**	**Ethylbenzene**	**grams/day**	**Total VOCs (grams/day)**
RW-1	30	0.127659574	0.5	0.081756	0.5	0.081756	0.5	0.081756	0.5	0.081756	0.5	0.081756	0.5	0.081756	0.5	0.081756	0.5	0.081756	0.5	0.081756	0.5	0.081756	0.5	0.081756	0.5	0.081756	
RW-2	75	0.319148936	0.5	0.20439	0.5	0.20439	0.7	0.286146	187	76.44186	9.4	3.842532	0.5	0.20439	34.2	13.980276	12.1	4.946238	5.5	2.24829	0.5	0.20439	5	2.0439	0.5	0.20439	
RW-3	75	0.319148936	0.5	0.20439	0.5	0.20439	0.5	0.20439	28.25	11.548035	0.5	0.20439	0.5	0.20439	22.2	9.074916	0.5	0.20439	0.5	0.20439	0.5	0.20439	5	2.0439	0.5	0.20439	
RW-4	30	0.127659574	0.5	0.081756	0.5	0.081756	0.5	0.081756	0.5	0.081756	0.5	0.081756	0.5	0.081756	0.5	0.081756	0.5	0.081756	0.5	0.081756	0.5	0.081756	0.5	0.081756	0.5	0.081756	
MW-4-1	10	0.042553191	15.9	0.8666136	73.4	4.0005936	31.2	1.7005248	8570	467.09928	9810	534.68424	52.4	2.8560096	226	12.317904	263	14.334552	1090	59.40936	2480	135.16992	104	5.668416	728	39.678912	
MW-4-2	15	0.063829787	8.5	0.694926	23.8	1.9457928	56.3	4.6028628	3660	299.22696	27500	2248.29	8.1	0.6622236	26.1	2.1338316	250	20.439	983	80.366148	2060	168.41736	76.9	6.2870364	749	61.235244	
Totals	235	1																									
RW-1 through RW-4 only				0.572292		0.572292		0.654048		88.153407		4.210434		0.572292		23.218704		5.31414		2.616192		0.572292		4.251312		0.572292	**131.279697**
RW-1 through RW-4 plus MW-4-1 and MW-4-2				2.7061236		6.5186784		6.9574356		854.479647		2787.184674		4.0905252		37.6704396		40.087692		142.3917		304.159572		16.2067644		101.486448	**4303.9397**

Well ID	Combined Influent COC's Weighted Average ug/l											
RW-1	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064
RW-2	0.160	0.160	0.223	59.681	3.000	0.160	10.915	3.862	1.755	0.160	1.596	0.160
RW-3	0.160	0.160	0.160	9.016	0.160	0.160	7.085	0.160	0.160	0.160	1.596	0.160
RW-4	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064
MW-4-1	0.677	3.123	1.328	364.681	417.447	2.230	9.617	11.191	46.383	105.532	4.426	30.979
MW-4-2	0.543	1.519	3.594	233.617	1755.319	0.517	1.666	15.957	62.745	131.489	4.909	47.809
Totals **1.0 SF**	1.67	5.09	5.43	667.12	2176.05	3.19	29.41	31.30	111.17	237.47	12.65	79.23
1.25 SF	2.08	6.36	6.79	833.90	2720.07	3.99	36.76	39.12	138.96	296.84	15.82	99.04
1.5 SF	2.50	7.63	8.15	1000.68	3264.08	4.79	44.12	46.95	166.76	356.20	18.98	118.85

ShallowTray® low profile air strippers

System Performance Estimate

Client and Proposal Information:

Series chosen:	31200	31200
Water Flow Rate:	235.0 GPM US	53.4 m3/hr
Air Flow Rate:	1800 CFM	3058 m3/hr
Water Temp:	50 °F	10.0 °C
Air Temp:	60 °F	15.6 °C
A/W Ratio:	57 :1	57 :1
Safety Factor:	0%	0%
Water Discharge Temp.	50.2 °F	10.1 °C

INDUCED DRAF

Contaminant	Untreated Influent / Effluent Target	Model 31211 Effluent Lbs/hr ppmv %removal	Model 31221 Effluent Lbs/hr ppmv %removal	Model 31231 Effluent Lbs/hr ppmv %removal	Model 31241 Effluent Lbs/hr ppmv %removal	SELECTED MODEL Model 31251 Effluent Lbs/hr ppmv %removal	Model 31261 Effluent Lbs/hr ppmv %removal
1,1- Dichloroethane	1.67 ppb	<1 ppb	<1 ppb	<1 ppb	<1 ppb	<1 ppb	<1 ppb
Solubility 5,500 ppm	5 ppb	0.00 0.01	0.00 0.01	0.00 0.01	0.00 0.01	0.00 0.01	0.00 0.01
Mwt 98.96 75-34-3		74.22%	93.36%	98.29%	99.56%	99.89%	99.97%
1,1-Dichloroethylene	5.09 ppb	<1 ppb	<1 ppb	<1 ppb	<1 ppb	<1 ppb	<1 ppb
Solubility 500 ppm	5 ppb	0.00 0.02	0.00 0.02	0.00 0.02	0.00 0.02	0.00 0.02	0.00 0.02
Mwt 96.94 75-35-4		90.86%	99.16%	99.92%	99.99%	100.00%	100.00%
Benzene	5.43 ppb	1 ppb	<1 ppb	<1 ppb	<1 ppb	<1 ppb	<1 ppb
Solubility 1,780 ppm	1 ppb	0.00 0.02	0.00 0.03	0.00 0.03	0.00 0.03	0.00 0.03	0.00 0.03
Mwt 78.12 71-43-2		77.02%	94.72%	98.79%	99.72%	99.94%	99.99%
cis-1,2-DCE	667.12 ppb	215 ppb	69 ppb	22 ppb	7 ppb	2 ppb	<1 ppb
Solubility 3,500 ppm	5 ppb	0.05 1.93	0.07 2.55	0.08 2.75	0.08 2.82	0.08 2.84	0.08 2.85
Mwt 96.94 156-59-2		67.79%	89.63%	96.66%	98.92%	99.65%	99.89%
Toluene	2176.05 ppb	542 ppb	135 ppb	34 ppb	8 ppb	2 ppb	<1 ppb
Solubility 515 ppm	5 ppb	0.19 7.34	0.24 9.17	0.25 9.62	0.26 9.74	0.26 9.77	0.26 9.77
Mwt 92.13 108-88-3		75.09%	93.80%	98.46%	99.62%	99.90%	99.98%
trans-1,2-Dichloroethylene	3.19 ppb	<1 ppb	<1 ppb	<1 ppb	<1 ppb	<1 ppb	<1 ppb
Solubility 600 ppm	5 ppb	0.00 0.01	0.00 0.01	0.00 0.01	0.00 0.01	0.00 0.01	0.00 0.01
Mwt 96.94 156-60-5		81.05%	96.41%	99.32%	99.87%	99.98%	100.00%
Trichloroethylene	29.41 ppb	6 ppb	1 ppb	<1 ppb	<1 ppb	<1 ppb	<1 ppb
Solubility 1100 ppm	5 ppb	0.00 0.07	0.00 0.09	0.00 0.09	0.00 0.09	0.00 0.09	0.00 0.09
Mwt 131.5 79-01-6		78.95%	95.57%	99.07%	99.80%	99.96%	99.99%
Vinyl Chloride	31.3 ppb	3 ppb	<1 ppb	<1 ppb	<1 ppb	<1 ppb	<1 ppb
Solubility 2,700 ppm	2 ppb	0.00 0.19	0.00 0.21	0.00 0.21	0.00 0.21	0.00 0.21	0.00 0.21
Mwt 62.5 75-01-4		91.41%	99.26%	99.94%	99.99%	100.00%	100.00%
o-Xylene	111.17 ppb	25 ppb	6 ppb	1 ppb	<1 ppb	<1 ppb	<1 ppb
Solubility 152 ppm	5 ppb	0.01 0.34	0.01 0.41	0.01 0.43	0.01 0.43	0.01 0.43	0.01 0.43
Mwt 106.17 95-47-6		77.48%	94.93%	98.86%	99.74%	99.94%	99.99%
m-Xylene	237.47 ppb	47 ppb	9 ppb	2 ppb	<1 ppb	<1 ppb	<1 ppb
Solubility 158 ppm	5 ppb	0.02 0.74	0.03 0.89	0.03 0.92	0.03 0.92	0.03 0.93	0.03 0.93
Mwt 106.17 108-38-3		80.08%	96.03%	99.21%	99.84%	99.97%	99.99%
Acetone	12.65 ppb	12 ppb	12 ppb	11 ppb	11 ppb	11 ppb	10 ppb
Solubility 50,000 ppm	ppb	0.00 0.00	0.00 0.01	0.00 0.01	0.00 0.01	0.00 0.01	0.00 0.02
Mwt 58.08 67-64-1		3.47%	6.81%	10.05%	13.16%	16.18%	19.08%
Due to its miscibility with water, acetone removal is difficult to predict. Call your representative for more information							
Ethyl Benzene	79.23 ppb	17 ppb	4 ppb	<1 ppb	<1 ppb	<1 ppb	<1 ppb
Solubility 152 ppm	5 ppb	0.01 0.24	0.01 0.29	0.01 0.31	0.01 0.31	0.01 0.31	0.01 0.31
Mwt 106.16 100-41-4		78.52%	95.39%	99.01%	99.79%	99.95%	99.99%
Total ppb	3360 ppb	870 ppb	237 ppb	72 ppb	27 ppb	15 ppb	12 ppb
Total VOC Lbs/hr - ppmv		0.29 10.92	0.37 13.69	0.39 14.41	0.39 14.60	0.39 14.66	0.39 14.67
Total		74.10%	92.95%	97.87%	99.18%	99.55%	99.66%

Report Generated: 5/14/2022

Modeler VIMP June 2019

ShallowTray® low profile air strippers

System Performance Estimate

Client and Proposal Information:

Series chosen:	31200	31200
Water Flow Rate:	235.0 GPM US	53.4 m3/hr
Air Flow Rate:	1800 CFM	3058 m3/hr
Water Temp:	50 °F	10.0 °C
Air Temp:	60 °F	15.6 °C
A/W Ratio:	57 :1	57 :1
Safety Factor:	0%	0%
Water Discharge Temp.	50.2 °F	10.1 °C

INDUCED DRAF

Contaminant	Untreated Influent / Effluent Target	Model 31211 Effluent Lbs/hr ppmv %removal	Model 31221 Effluent Lbs/hr ppmv %removal	Model 31231 Effluent Lbs/hr ppmv %removal	Model 31241 Effluent Lbs/hr ppmv %removal	SELECTED MODEL Model 31251 Effluent Lbs/hr ppmv %removal	Model 31261 Effluent Lbs/hr ppmv %removal
1,1- Dichloroethane	2.08 ppb	<1 ppb	<1 ppb	<1 ppb	<1 ppb	<1 ppb	<1 ppb
Solubility 5,500 ppm	5 ppb	0.00 0.01	0.00 0.01	0.00 0.01	0.00 0.01	0.00 0.01	0.00 0.01
Mwt 98.96 75-34-3		74.22%	93.36%	98.29%	99.56%	99.89%	99.97%
1,1-Dichloroethylene	6.36 ppb	<1 ppb	<1 ppb	<1 ppb	<1 ppb	<1 ppb	<1 ppb
Solubility 500 ppm	5 ppb	0.00 0.02	0.00 0.03	0.00 0.03	0.00 0.03	0.00 0.03	0.00 0.03
Mwt 96.94 75-35-4		90.86%	99.16%	99.92%	99.99%	100.00%	100.00%
Benzene	6.79 ppb	2 ppb	<1 ppb	<1 ppb	<1 ppb	<1 ppb	<1 ppb
Solubility 1,780 ppm	1 ppb	0.00 0.03	0.00 0.03	0.00 0.04	0.00 0.04	0.00 0.04	0.00 0.04
Mwt 78.12 71-43-2		77.02%	94.72%	98.79%	99.72%	99.94%	99.99%
cis-1,2-DCE	833.9 ppb	269 ppb	87 ppb	28 ppb	9 ppb	3 ppb	<1 ppb
Solubility 3,500 ppm	5 ppb	0.07 2.41	0.09 3.19	0.10 3.44	0.10 3.52	0.10 3.55	0.10 3.56
Mwt 96.94 156-59-2		67.79%	89.63%	96.66%	98.92%	99.65%	99.89%
Toluene	2720.27 ppb	678 ppb	169 ppb	42 ppb	10 ppb	3 ppb	<1 ppb
Solubility 515 ppm	5 ppb	0.24 9.18	0.30 11.46	0.32 12.03	0.32 12.17	0.32 12.21	0.32 12.22
Mwt 92.13 108-88-3		75.09%	93.80%	98.46%	99.62%	99.90%	99.98%
trans-1,2-Dichloroethylene	3.99 ppb	<1 ppb	<1 ppb	<1 ppb	<1 ppb	<1 ppb	<1 ppb
Solubility 600 ppm	5 ppb	0.00 0.01	0.00 0.02	0.00 0.02	0.00 0.02	0.00 0.02	0.00 0.02
Mwt 96.94 156-60-5		81.05%	96.41%	99.32%	99.87%	99.98%	100.00%
Trichloroethylene	36.76 ppb	8 ppb	2 ppb	<1 ppb	<1 ppb	<1 ppb	<1 ppb
Solubility 1100 ppm	5 ppb	0.00 0.09	0.00 0.11	0.00 0.11	0.00 0.12	0.00 0.12	0.00 0.12
Mwt 131.5 79-01-6		78.95%	95.57%	99.07%	99.80%	99.96%	99.99%
Vinyl Chloride	39.12 ppb	3 ppb	<1 ppb	<1 ppb	<1 ppb	<1 ppb	<1 ppb
Solubility 2,700 ppm	2 ppb	0.00 0.24	0.00 0.26	0.00 0.26	0.00 0.26	0.00 0.26	0.00 0.26
Mwt 62.5 75-01-4		91.41%	99.26%	99.94%	99.99%	100.00%	100.00%
o-Xylene	138.96 ppb	31 ppb	7 ppb	2 ppb	<1 ppb	<1 ppb	<1 ppb
Solubility 152 ppm	5 ppb	0.01 0.42	0.02 0.51	0.02 0.54	0.02 0.54	0.02 0.54	0.02 0.54
Mwt 106.17 95-47-6		77.48%	94.93%	98.86%	99.74%	99.94%	99.99%
m-Xylene	296.84 ppb	59 ppb	12 ppb	2 ppb	<1 ppb	<1 ppb	<1 ppb
Solubility 158 ppm	5 ppb	0.03 0.93	0.03 1.11	0.03 1.15	0.03 1.16	0.03 1.16	0.04 1.16
Mwt 106.17 108-38-3		80.08%	96.03%	99.21%	99.84%	99.97%	99.99%
Acetone	15.82 ppb	15 ppb	15 ppb	14 ppb	14 ppb	13 ppb	13 ppb
Solubility 50,000 ppm	ppb	0.00 0.00	0.00 0.01	0.00 0.01	0.00 0.01	0.00 0.02	0.00 0.02
Mwt 58.08 67-64-1		3.47%	6.81%	10.05%	13.16%	16.18%	19.08%
Due to its miscibility with water, acetone removal is difficult to predict. Call your representative for more information							
Ethyl Benzene	99.04 ppb	21 ppb	5 ppb	<1 ppb	<1 ppb	<1 ppb	<1 ppb
Solubility 152 ppm	5 ppb	0.01 0.30	0.01 0.37	0.01 0.38	0.01 0.39	0.01 0.39	0.01 0.39
Mwt 106.16 100-41-4		78.52%	95.39%	99.01%	99.79%	99.95%	99.99%
Total ppb	4200 ppb	1088 ppb	296 ppb	90 ppb	34 ppb	19 ppb	14 ppb
Total VOC Lbs/hr - ppmv		0.37 13.65	0.46 17.11	0.48 18.01	0.49 18.26	0.49 18.32	0.49 18.34
Total		74.10%	92.95%	97.87%	99.18%	99.55%	99.66%

Report Generated: 5/14/2022

Modeler VIMP June 2019

ShallowTray® low profile air strippers

System Performance Estimate

Client and Proposal Information:

Series chosen:	31200	31200
Water Flow Rate:	235.0 GPM US	53.4 m3/hr
Air Flow Rate:	1800 CFM	3058 m3/hr
Water Temp:	50 °F	10.0 °C
Air Temp:	60 °F	15.6 °C
A/W Ratio:	57 :1	57 :1
Safety Factor:	0%	0%
Water Discharge Temp.	50.2 °F	10.1 °C

INDUCED DRAF

Contaminant	Untreated Influent / Effluent Target	Model 31211 Effluent Lbs/hr ppmv %removal	Model 31221 Effluent Lbs/hr ppmv %removal	Model 31231 Effluent Lbs/hr ppmv %removal	Model 31241 Effluent Lbs/hr ppmv %removal	SELECTED MODEL Model 31251 Effluent Lbs/hr ppmv %removal	Model 31261 Effluent Lbs/hr ppmv %removal
1,1- Dichloroethane	2.5 ppb	<1 ppb	<1 ppb	<1 ppb	<1 ppb	<1 ppb	<1 ppb
Solubility 5,500 ppm	5 ppb	0.00 0.01	0.00 0.01	0.00 0.01	0.00 0.01	0.00 0.01	0.00 0.01
Mwt 98.96 75-34-3		74.22%	93.36%	98.29%	99.56%	99.89%	99.97%
1,1-Dichloroethylene	7.63 ppb	<1 ppb	<1 ppb	<1 ppb	<1 ppb	<1 ppb	<1 ppb
Solubility 500 ppm	5 ppb	0.00 0.03	0.00 0.03	0.00 0.03	0.00 0.03	0.00 0.03	0.00 0.03
Mwt 96.94 75-35-4		90.86%	99.16%	99.92%	99.99%	100.00%	100.00%
Benzene	8.15 ppb	2 ppb	<1 ppb	<1 ppb	<1 ppb	<1 ppb	<1 ppb
Solubility 1,780 ppm	1 ppb	0.00 0.03	0.00 0.04	0.00 0.04	0.00 0.04	0.00 0.04	0.00 0.04
Mwt 78.12 71-43-2		77.02%	94.72%	98.79%	99.72%	99.94%	99.99%
cis-1,2-DCE	1000.68 ppb	322 ppb	104 ppb	33 ppb	11 ppb	3 ppb	1 ppb
Solubility 3,500 ppm	5 ppb	0.08 2.90	0.11 3.83	0.11 4.13	0.12 4.23	0.12 4.26	0.12 4.27
Mwt 96.94 156-59-2		67.79%	89.63%	96.66%	98.92%	99.65%	99.89%
Toluene	3264.08 ppb	813 ppb	202 ppb	50 ppb	13 ppb	3 ppb	<1 ppb
Solubility 515 ppm	5 ppb	0.29 11.01	0.36 13.75	0.38 14.44	0.38 14.61	0.38 14.65	0.38 14.66
Mwt 92.13 108-88-3		75.09%	93.80%	98.46%	99.62%	99.90%	99.98%
trans-1,2-Dichloroethylene	4.79 ppb	<1 ppb	<1 ppb	<1 ppb	<1 ppb	<1 ppb	<1 ppb
Solubility 600 ppm	5 ppb	0.00 0.02	0.00 0.02	0.00 0.02	0.00 0.02	0.00 0.02	0.00 0.02
Mwt 96.94 156-60-5		81.05%	96.41%	99.32%	99.87%	99.98%	100.00%
Trichloroethylene	44.12 ppb	9 ppb	2 ppb	<1 ppb	<1 ppb	<1 ppb	<1 ppb
Solubility 1100 ppm	5 ppb	0.00 0.11	0.00 0.13	0.01 0.14	0.01 0.14	0.01 0.14	0.01 0.14
Mwt 131.5 79-01-6		78.95%	95.57%	99.07%	99.80%	99.96%	99.99%
Vinyl Chloride	46.95 ppb	4 ppb	<1 ppb	<1 ppb	<1 ppb	<1 ppb	<1 ppb
Solubility 2,700 ppm	2 ppb	0.01 0.28	0.01 0.31	0.01 0.31	0.01 0.31	0.01 0.31	0.01 0.31
Mwt 62.5 75-01-4		91.41%	99.26%	99.94%	99.99%	100.00%	100.00%
o-Xylene	166.76 ppb	38 ppb	8 ppb	2 ppb	<1 ppb	<1 ppb	<1 ppb
Solubility 152 ppm	5 ppb	0.02 0.50	0.02 0.62	0.02 0.64	0.02 0.65	0.02 0.65	0.02 0.65
Mwt 106.17 95-47-6		77.48%	94.93%	98.86%	99.74%	99.94%	99.99%
m-Xylene	356.2 ppb	71 ppb	14 ppb	3 ppb	<1 ppb	<1 ppb	<1 ppb
Solubility 158 ppm	5 ppb	0.03 1.11	0.04 1.33	0.04 1.38	0.04 1.39	0.04 1.39	0.04 1.39
Mwt 106.17 108-38-3		80.08%	96.03%	99.21%	99.84%	99.97%	99.99%
Acetone	18.98 ppb	18 ppb	18 ppb	17 ppb	16 ppb	16 ppb	15 ppb
Solubility 50,000 ppm	ppb	0.00 0.00	0.00 0.01	0.00 0.01	0.00 0.02	0.00 0.02	0.00 0.03
Mwt 58.08 67-64-1		3.47%	6.81%	10.05%	13.16%	16.18%	19.08%
Due to its miscibility with water, acetone removal is difficult to predict. Call your representative for more information							
Ethyl Benzene	118.85 ppb	26 ppb	5 ppb	1 ppb	<1 ppb	<1 ppb	<1 ppb
Solubility 152 ppm	5 ppb	0.01 0.36	0.01 0.44	0.01 0.46	0.01 0.46	0.01 0.46	0.01 0.46
Mwt 106.16 100-41-4		78.52%	95.39%	99.01%	99.79%	99.95%	99.99%
Total ppb	5040 ppb	1305 ppb	355 ppb	107 ppb	41 ppb	23 ppb	17 ppb
Total VOC Lbs/hr - ppmv		0.44 16.37	0.55 20.53	0.58 21.61	0.59 21.91	0.59 21.99	0.59 22.01
Total		74.10%	92.95%	97.87%	99.18%	99.55%	99.66%

Report Generated: 5/14/2022

Modeler VIMP June 2019

BCPMW-4-1 HEAD LOSS CALCULATION (continued)

	Project:	**Northrop Grumman (Bethpage, NY)**	
	Subject:	**BCPMW-4-1 Retrofit**	
	By:	**ACE**	**DATE: 5/5/2022**
	Checked:	**ZH, LJD**	**SHEET: 3 OF 3**

Minimum Total Head Losses

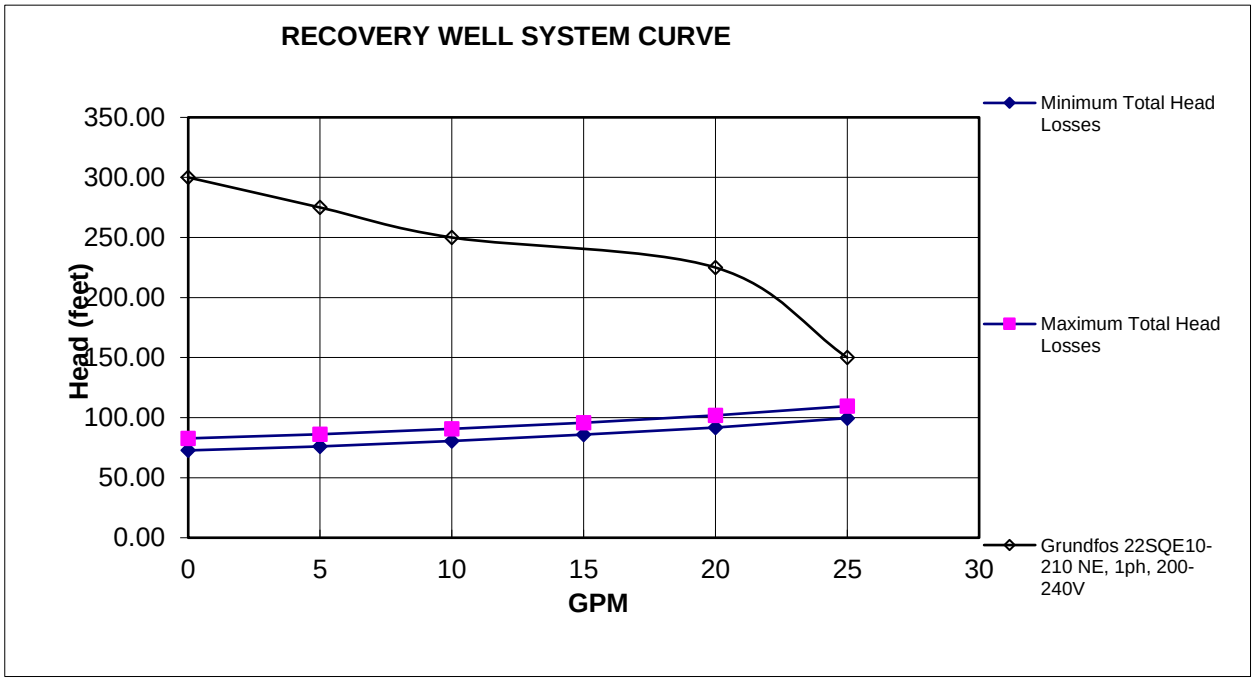
Flow at Well (gpm)	Friction & Minor Losses	Static Head	System Losses	Nozzle Losses	TDH (feet)
0	9.7	63.0	0.0	0.0	72.73
5.0	13.0	63.0	0.0	0.0	76.05
10.0	17.7	63.0	0.0	0.0	80.67
15.0	22.8	63.0	0.0	0.0	85.80
20.0	28.8	63.0	0.0	0.0	91.76
25.0	36.6	63.0	0.0	0.0	99.60

Maximum Total Head Losses

Flow at Well (gpm)	Friction & Minor Losses	Static Head	System Losses	Nozzle Losses	TDH (feet)
0	9.7	73.0	0.0	0.0	82.73
5.0	13.0	73.0	0.0	0.0	86.05
10.0	17.7	73.0	0.0	0.0	90.67
15.0	22.8	73.0	0.0	0.0	95.80
20.0	28.8	73.0	0.0	0.0	101.76
25.0	36.6	73.0	0.0	0.0	109.60

Pump Model Number Grundfos 22SQE10-210 NE, 1ph, 200-240V

Flow Rate (gpm)	0.0	5.0	10.0	20.0	25.0	0.0	0.0
Head (feet H2O)	300	275	250	225	150	0	0



BCPMW-4-2 HEAD LOSS CALCULATION (continued)

	Project:	**Northrop Grumman (Bethpage, NY)**	
	Subject:	**BCPMW-4-2 Retrofit**	
	By:	**ACE**	**DATE: 5/5/2022**
	Checked:	**ZH, LJD**	**SHEET: 3 OF 3**

Minimum Total Head Losses

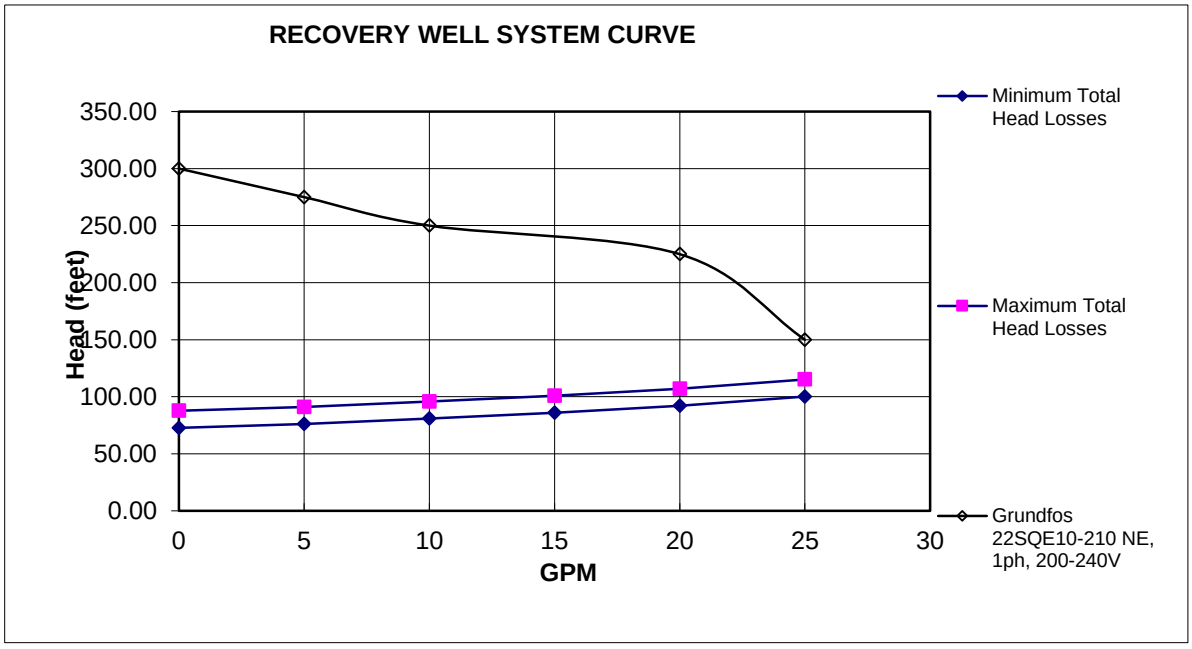
Flow at Well (gpm)	Friction & Minor Losses	Static Head	System Losses	Nozzle Losses	TDH (feet)
0	9.7	63.0	0.0	0.0	72.73
5.0	13.1	63.0	0.0	0.0	76.08
10.0	17.8	63.0	0.0	0.0	80.78
15.0	23.0	63.0	0.0	0.0	86.02
20.0	29.1	63.0	0.0	0.0	92.14
25.0	37.2	63.0	0.0	0.0	100.17

Maximum Total Head Losses

Flow at Well (gpm)	Friction & Minor Losses	Static Head	System Losses	Nozzle Losses	TDH (feet)
0	9.7	78.0	0.0	0.0	87.73
5.0	13.1	78.0	0.0	0.0	91.08
10.0	17.8	78.0	0.0	0.0	95.78
15.0	23.0	78.0	0.0	0.0	101.02
20.0	29.1	78.0	0.0	0.0	107.14
25.0	37.2	78.0	0.0	0.0	115.17

Pump Model Number Grundfos 22SQE10-210 NE, 1ph, 200-240V

Flow Rate (gpm)	0.0	5.0	10.0	20.0	25.0	0.0	0.0
Head (feet H2O)	300	275	250	225	150	0	0



GRUNDFOS

Company name:
Created by:
Phone:

Date: 4/13/2022

Count	Description
1	**22SQE10-210 NE**

Product photo could vary from the actual product

Product No.: 97778433

3" multi-stage, submersible pump designed for domestic water supply, liquid transfer in tanks, irrigation and environmental applications. The pump has "floating" impellers, each with its own tungsten carbide/ceramic bearing.

The pump features soft starting and protection against dry-running, upthrust, overvoltage, undervoltage, overload and overtemperature.

The motor is a one-phase motor of the permanent magnet rotor type ensuring optimum efficiency within a wide load range.
The motor is fitted with a replaceable cable plug.

Liquid:

Pumped liquid:	Water
Liquid temperature range:	0 .. 35 °C
Selected liquid temperature:	20 °C
Density:	998.2 kg/m³
Kinematic viscosity:	1 mm²/s

Technical:

Pump speed on which pump data is based:	10700 rpm
Actual calculated flow:	20 US gpm
Rated flow:	22 US gpm
Resulting head of the pump:	200 ft
Rated head:	196.9 ft
Approvals:	CULUS
Curve tolerance:	ISO9906:2012 3B

Materials:

Pump:	Stainless steel EN 1.4401 AISI 316
Impeller:	Composite SOLEF 8808/0902 PVDF-CF10
Motor:	Stainless steel DIN W.-Nr. 1.4401 AISI 316

Installation:

Maximum operating pressure:	15 bar
Pump outlet:	1 1/2"NPT
Minimum borehole diameter:	76 mm

Electrical data:

Motor type:	MSE3-NE
Power input - P1:	2.32 kW
Rated power - P2:	1.55 kW
Power input P3:	2.3 kW
Main frequency:	50 Hz

GRUNDFOS

Company name:
Created by:
Phone:

Date: 4/13/2022

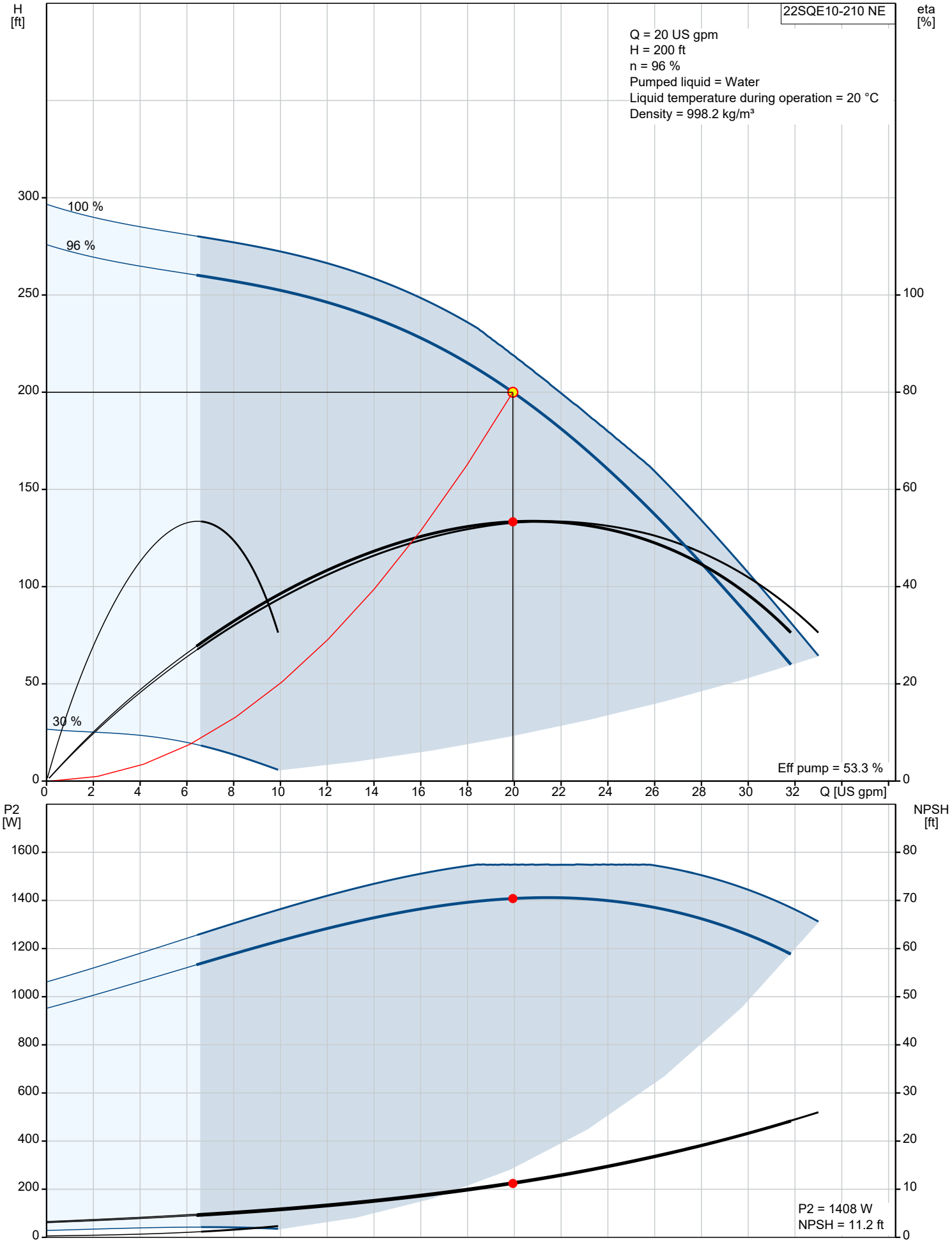
Count	Description	
	Rated voltage:	1 x 200-240 V
	Rated current:	11 A
	Power factor:	1.00
	Rated speed:	10700 rpm
	Start. method:	direct-on-line
	Enclosure class (IEC 34-5):	IP68
	Insulation class (IEC 85):	F
	Motor Number:	97778397
	Others:	
	Net weight:	6 kg
	Gross weight:	6.7 kg

GRUNDFOS

Company name:
Created by:
Phone:

Date: 4/13/2022

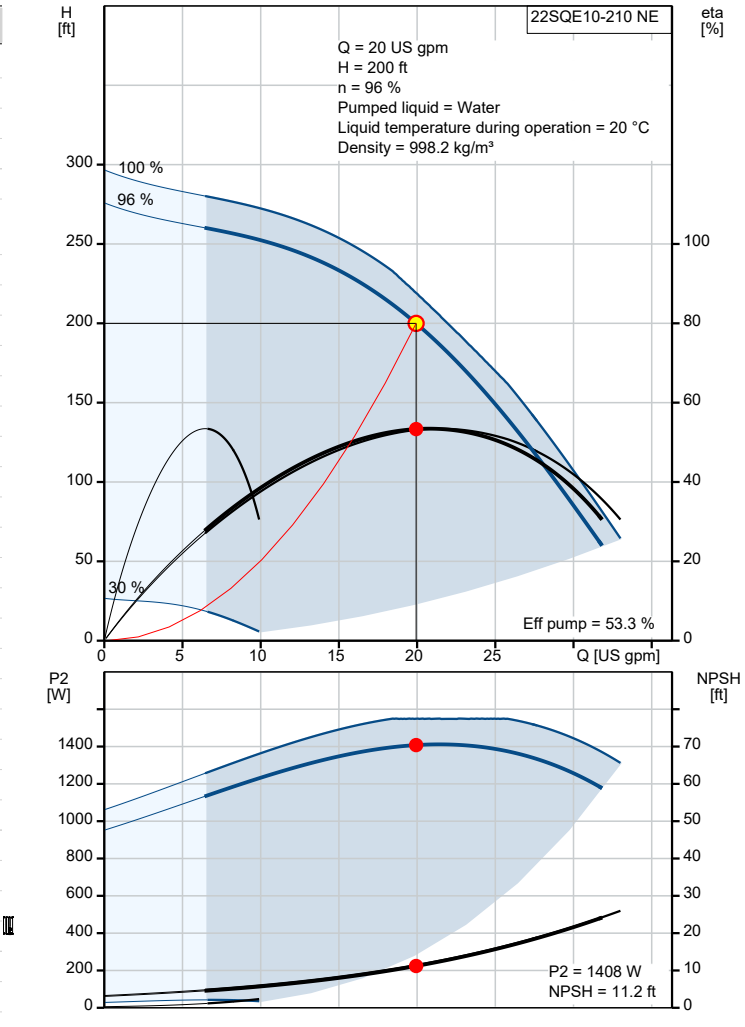
97778433 22SQE10-210 NE 50 Hz

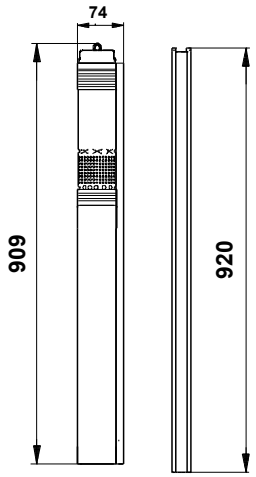


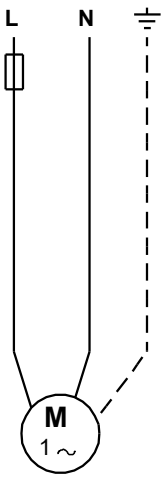
Company name:
Created by:
Phone:

Date: 4/13/2022

Description	Value
General information:	
Product name:	22SQE10-210 NE
Product No.:	97778433
EAN:	5710624313770
Technical:	
Pump speed on which pump data is based:	10700 rpm
Actual calculated flow:	20 US gpm
Rated flow:	22 US gpm
Resulting head of the pump:	200 ft
Rated head:	196.9 ft
Stages:	6
Approvals:	CULUS
Curve tolerance:	ISO9906:2012 3B
Pump Number:	96397454
Model:	B
Valve:	pump with built-in non-return valve
Materials:	
Pump:	Stainless steel
Pump:	EN 1.4401
Pump:	AISI 316
Impeller:	Composite
Impeller:	SOLEF 8808/0902 PVDF-CF10
Motor:	Stainless steel
Motor:	DIN W.-Nr. 1.4401
Motor:	AISI 316
Installation:	
Maximum operating pressure:	15 bar
Pump outlet:	1 1/2"NPT
Minimum borehole diameter:	76 mm
Liquid:	
Pumped liquid:	Water
Liquid temperature range:	0 .. 35 °C
Selected liquid temperature:	20 °C
Density:	998.2 kg/m³
Kinematic viscosity:	1 mm²/s
Electrical data:	
Motor type:	MSE3-NE
Power input - P1:	2.32 kW
Rated power - P2:	1.55 kW
Power input P3:	2.3 kW
Main frequency:	50 Hz
Rated voltage:	1 x 200-240 V
Rated current:	11 A
Power factor:	1.00
Rated speed:	10700 rpm
Start. method:	direct-on-line
Enclosure class (IEC 34-5):	IP68
Insulation class (IEC 85):	F
Built-in motor protection:	Y
Thermal protec:	internal
Motor Number:	97778397
Controls:	
CU 300/CU 301:	communication with CU 300/CU 301 possible
Others:	
Net weight:	6 kg
Gross weight:	6.7 kg
Sales region:	N-amreg





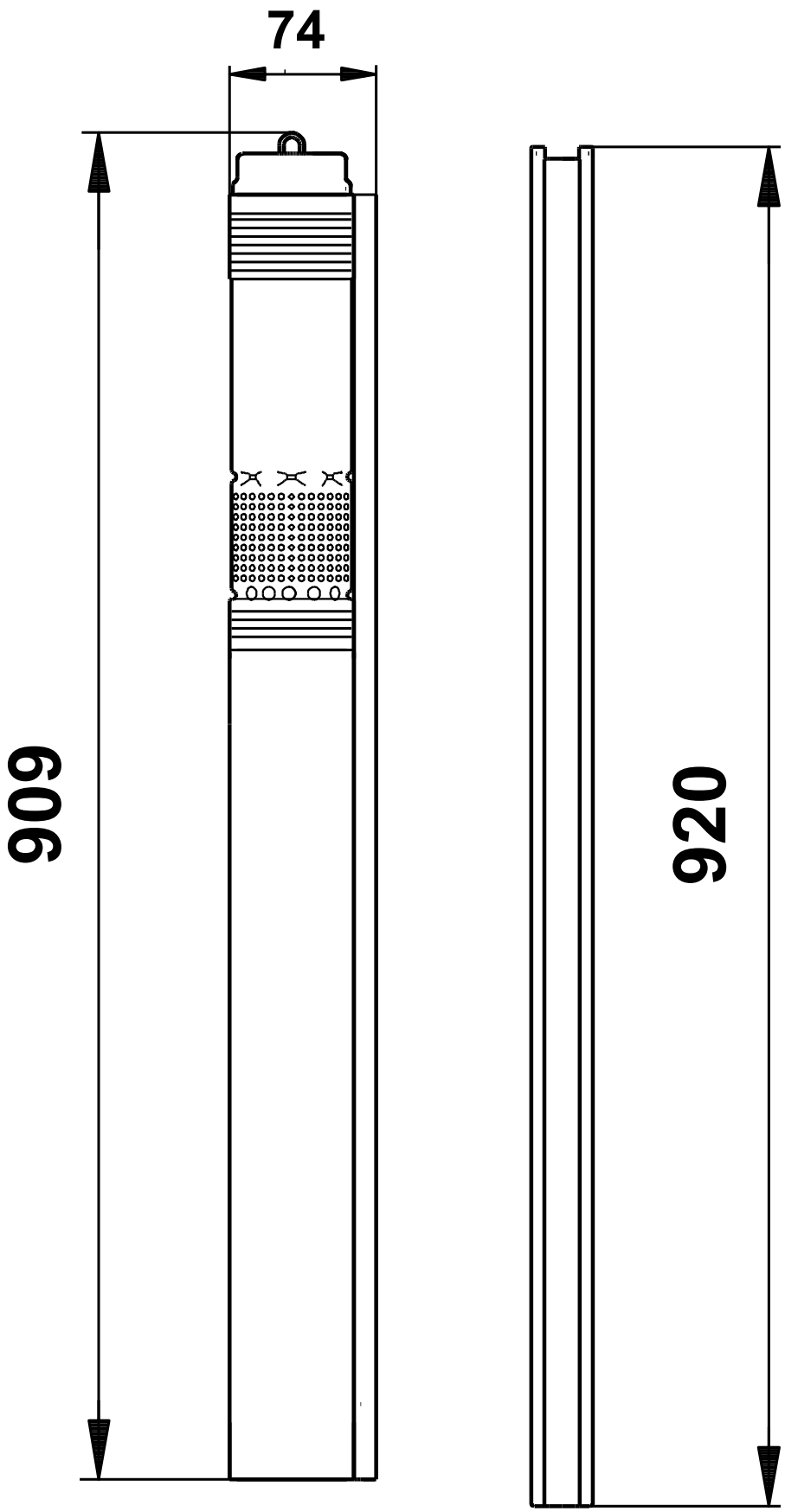


GRUNDFOS

Company name:
Created by:
Phone:

Date: 4/13/2022

97778433 22SQE10-210 NE 50 Hz

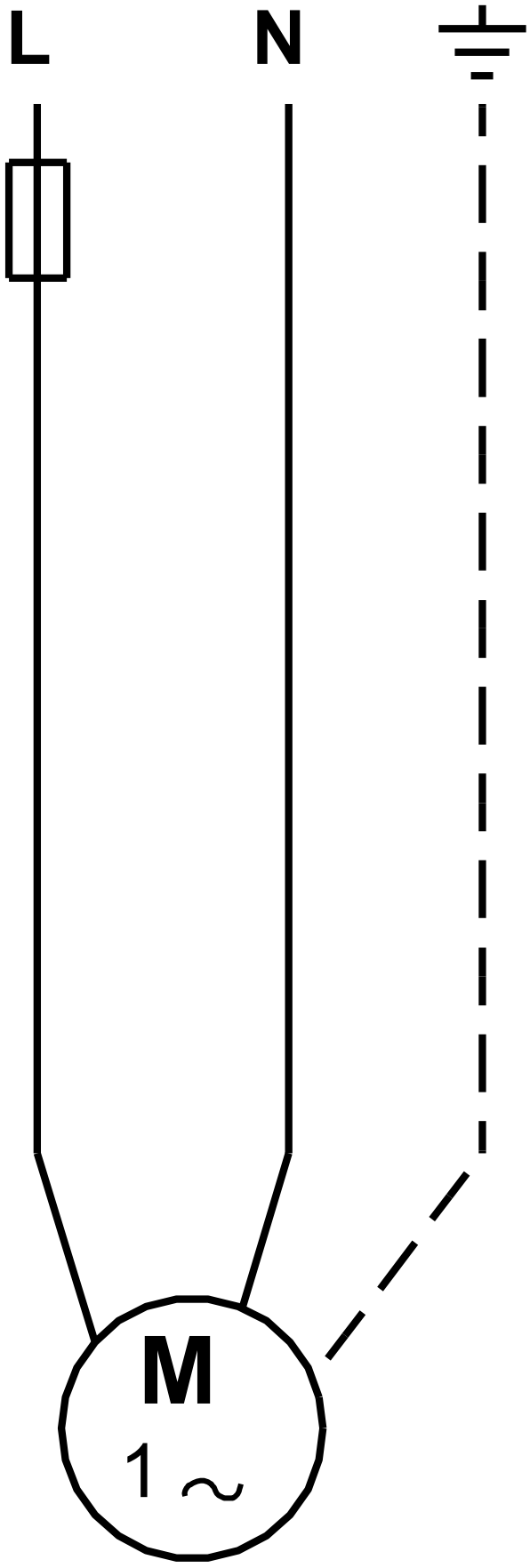


Note! All units are in [mm] unless otherwise stated.
Disclaimer: This simplified dimensional drawing does not show all details.

Company name:
Created by:
Phone:

Date: 4/13/2022

97778433 22SQE10-210 NE 50 Hz



All units are [mm] unless otherwise presented.

Company name:
Created by:
Phone:

Date: 4/13/2022

97778433 22SQE10-210 NE 50 Hz

Input

General

Select pump family	SQE-NE, Model C
Application	Groundwater supply

Edit load profile

Load profile	Full load

Operational conditions

Increase of energy price	6 %
Calculation period	10 years

Life cycle cost

How detailed do you want your life cycle cost analysis?	Simple LCC analysis
	Pump A

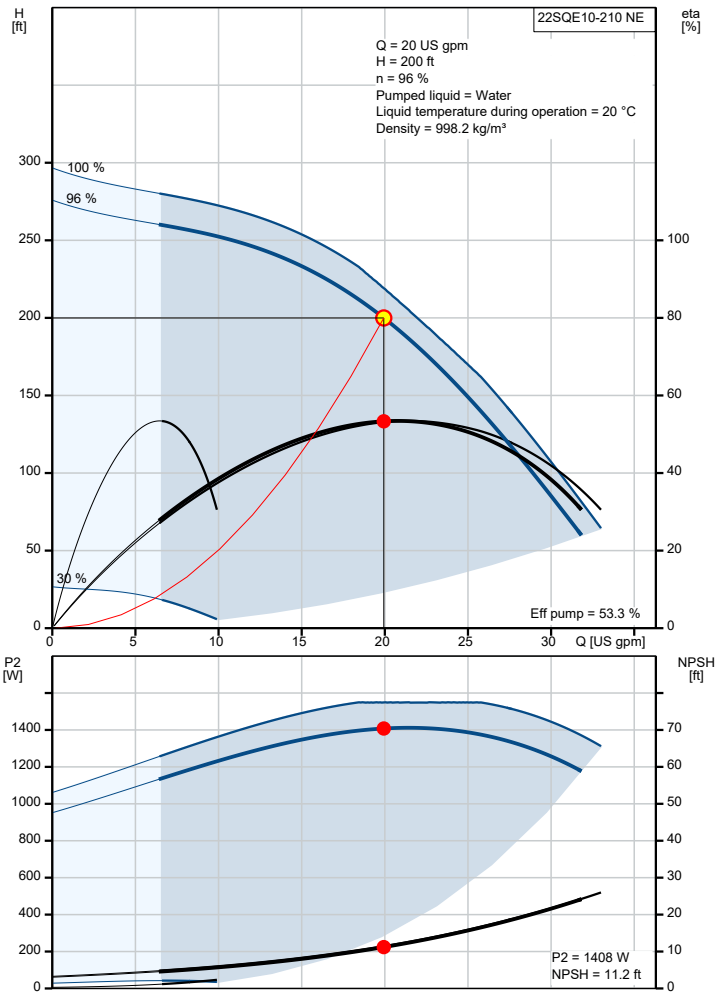
Load profile

	1
Flow (%)	100
Flow (US GPM)	20
Head (%)	100
Head (ft)	199.9
P1 (kW)	1.975
Eff total (%)	38.0
Time (h/a)	1000
Consumption (kWh/Year)	1975
Quantity	1

Sizing result

Type	22SQE10-210 NE
Quantity	1
Motor	1.55 kW

Flow	20	US gpm
Head	199.9	ft
Power P1	1.975	kW
Power P2	1.408	kW
Eff pump	53.3	%
Eff pump+mtr	38.9	% =Eta pump * Eta motor
Consumption	1975	kWh/Year
Price	On request	
Life cycle cost	7401	EUR /10Years



Company name:
Created by:
Phone:

Date: 4/13/2022

Installation and Input

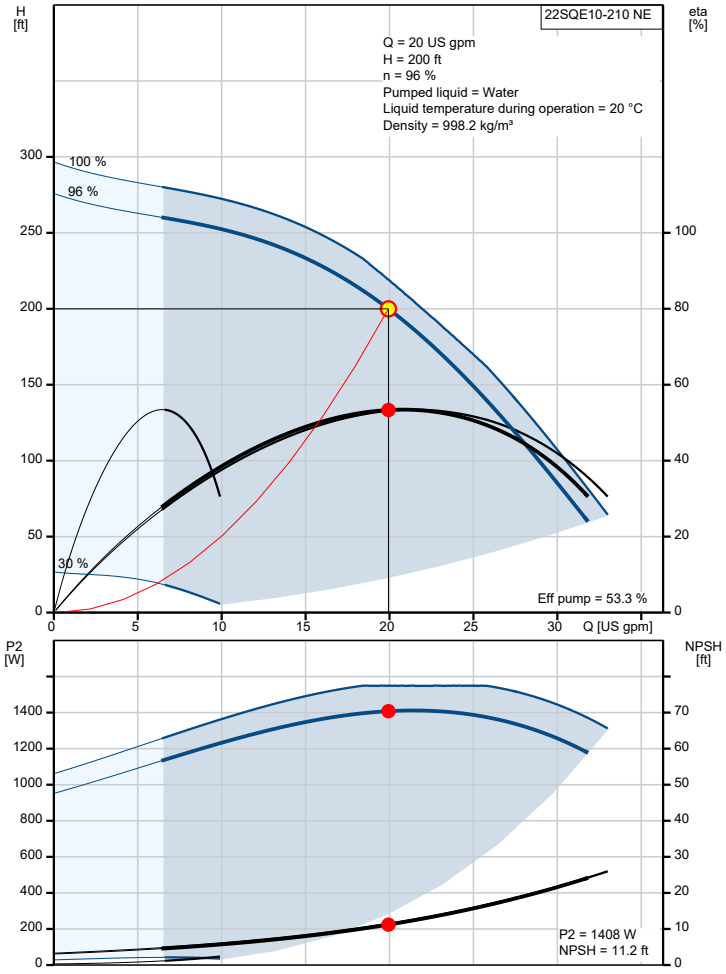
Sizing results

Product number:	97778433
Type:	22SQE10-210 NE
Quantity:	1
Motor:	1.55 kW
Flow:	20 US gpm
Head:	199.9 ft
Power P1:	1.975 kW
Eff pump:	53.3 %
Eff pump+mtr:	38.9 % =Eta pump * Eta motor
Consumption:	1975 kWh/Year
Price:	On request

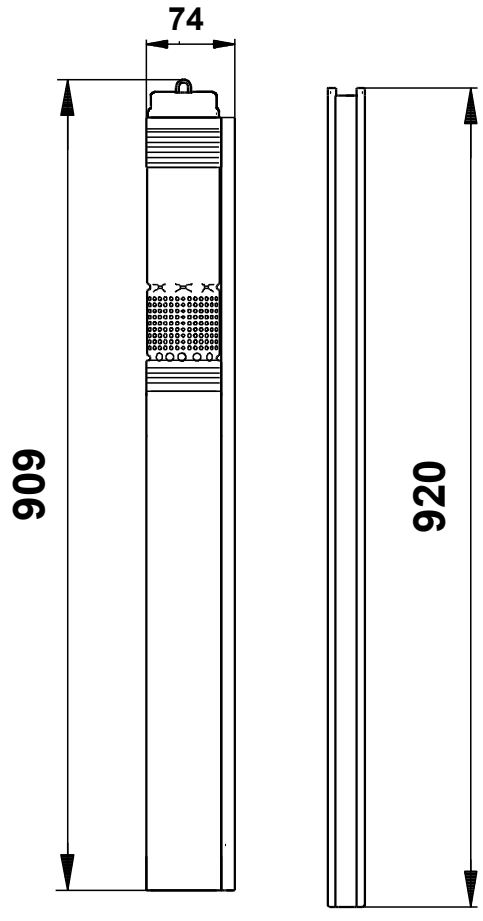
Load profile

	1
Flow (%)	100
Flow (US GPM)	20
Head (%)	100
Head (ft)	199.9
P1 (kW)	1.975
Eff total (%)	38.0
Time (h/a)	1000
Consumption (kWh/Year)	1975
Quantity	1

Pump curve

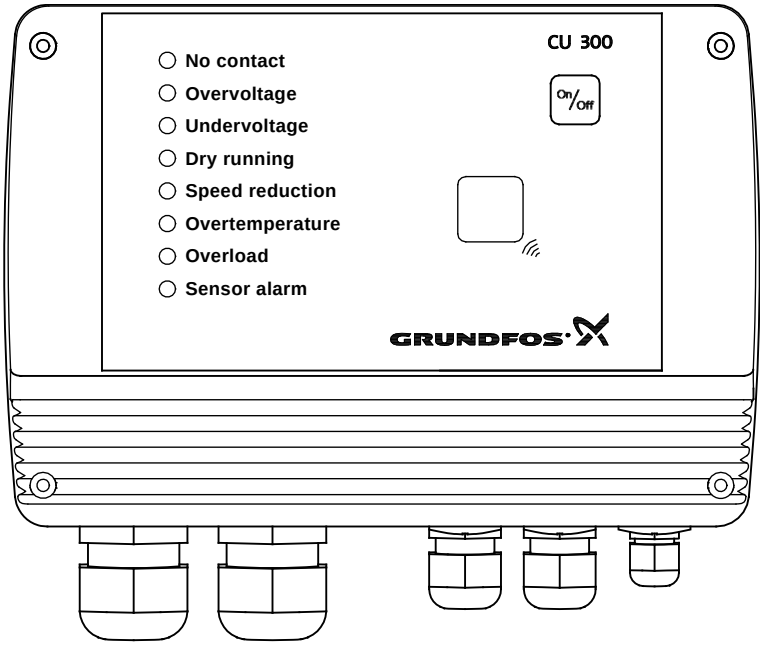


Dimensional drawing



CU 300

Installation and operating instructions



Other languages

www.grundfos.com/CU300-manual

be
think
innovate

GRUNDFOS

English (GB) Installation and operating instructions

Original installation and operating instructions.

CONTENTS

Warning

Prior to installation, read these installation and operating instructions. Installation and operation must comply with local regulations and accepted codes of good practice.

Warning

This product can be used by children of eight years and up and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they are under supervision or have been instructed in the safe use of the product and understand the hazards involved.

Children must not play with the product. Cleaning and maintenance of the product must not be made by children without supervision.

1. Symbols used in this document

Warning

If these safety instructions are not observed, it may result in personal injury.

Note

Notes or instructions that make the job easier and ensure safe operation.

2. General

The control unit CU 300 is developed for the SQE submersible pumps.

CU 300 covers the voltage range 1 x 100-240 V - 10 %/+ 6 %, 50/60 Hz, PE.

CU 300 has the following functions:

- control of the pump on the basis of sensor signals
- setting of operating parameters
- monitoring of operation and alarm indication, if any.

CU 300 indicates the following alarms:

- no contact
- overvoltage
- undervoltage
- dry running
- speed reduction
- overtemperature
- overload
- sensor alarm.

The individual alarms are described in details in section *13. Alarm functions*.

CU 300 receives alarm signals from the motor for the following parameters:

- dry running
- incipient pump or motor defect
- too high temperature in motor electronics
- supply failure.

As standard, CU 300 incorporates an alarm signal relay.

2.1 Expansion possibilities

CU 300 enables the use of the following devices:

- **Grundfos GO:**
  Wireless infra-red remote control that enables change of factory settings and monitoring of the installation by calling up actual operating data, e.g. speed, operating hours and power consumption.
- **External sensors:**
  Reception of data from external sensors and control according to the data received, e.g. flow rate, pressure, water level and conductivity.
- **External potentiometer SPP 1:**
  Manual speed control.

2.2 On/Off button

By means of the On/Off button on CU 300, you can do the following:

- Start or stop the pump.
- Reset alarms.

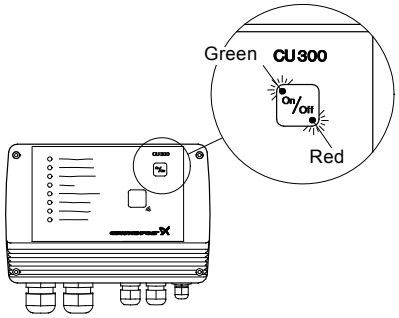


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Fig. 1

The green and red indicator lights in the On/Off button indicate pump operating condition as follows:

Indication	Description
Green indicator light permanently on	Pump is operating
Green indicator light flashing	Pump has been stopped by one of the following: • a sensor • an external on/off switch • a stop command from the Grundfos GO
Red indicator light permanently on	Pump has been stopped by means of the On/Off button*
Red indicator light flashing	CU 300 is communicating with the Grundfos GO

* If you use the On/Off button to stop the pump, you must also use this button for restarting the pump.
If you press the On/Off button for minimum 5 seconds, you start the pump, irrespective of any active fault or alarm indications. When you release the On/Off button, the pump will stop.

3. Mechanical installation

Warning

Before starting any work on CU 300, make sure that the power supply has been switched off and that it cannot be accidentally switched on.

3.1 Location

You can place CU 300 both indoors and outdoors. The control unit must not be exposed to direct sunlight.

3.2 Mounting CU 300

CU 300 is designed for wall mounting.

The box has six mounting holes (∅4). See fig. 2. The dimensions are in mm.

CU 300 must be mounted as follows:

- Horizontally to allow condensed water, if any, to escape. See fig. 2.
- On a plane surface to avoid deformation of the box.

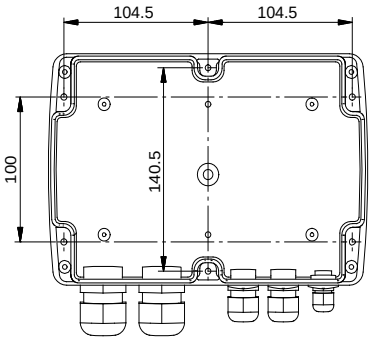

Fig. 2

CU 300 is supplied with a set of gaskets for the Pg screwed connections.

The gaskets are to be used for the connection of cables or wires to ensure tight connections, IP55, and cable relief.

4. CU 300 as an alarm unit

4.1 Description

When CU 300 is connected to an SQE pump, one of the eight red indicator lights on CU 300 will indicate any alarm.

The indications are based on signals from the motor and from sensors, if installed. The individual alarms are described in details in section *13. Alarm functions*.

You can connect an external alarm-signal transmitter and an external on/off switch. See section *4.2 Electrical installation* concerning connection, etc.

Figure 3 shows an example of an installation with CU 300 as an alarm unit.

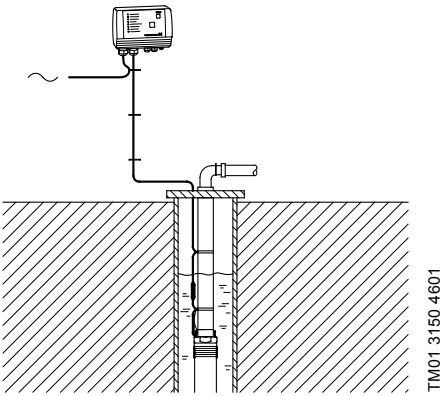

Fig. 3

CU 300 functions as an alarm unit for the pump. Furthermore, you can communicate with the pump via the remote control Grundfos GO, see also section *14. CU 300 with Grundfos GO*.

4.2 Electrical installation

Warning

Never make any connections in the CU 300 unit unless the power supply has been switched off. CU 300 must be connected in accordance with the rules and standards in force for the application in question.

The supply voltage and frequency are marked on the nameplate. Make sure that CU 300 is suitable for the power supply on which it will be used.

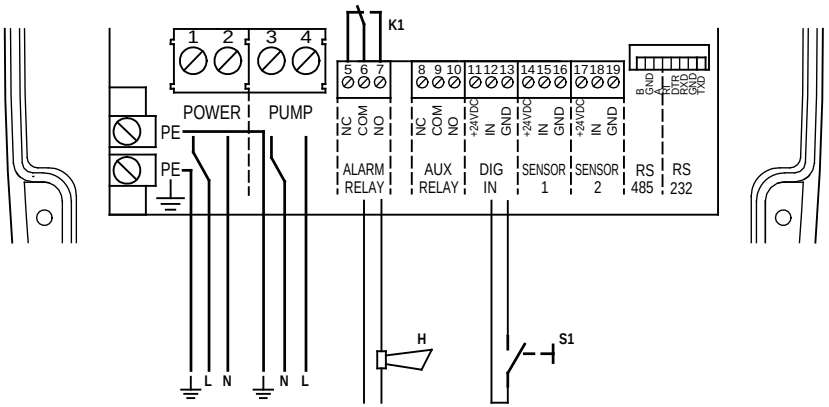

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Fig. 4

Pos.	Description
S1	On/off switch for start or stop of pump
H	Alarm signal transmitter (optional)
K1	Internal alarm signal relay Relay data: 250 VAC, 1 A, AC1

4.2.1 Mains supply

POWER, terminals 1, 2 and PE

Connect terminals 1 and 2 to the phase and neutral leads of the mains supply. You can connect each terminal to any of the two leads.

Connect the PE terminal to the green/yellow earth lead. You must connect each PE terminal to an earth lead of its own.

The maximum cross-section of the leads to be connected is 6 mm^2.

Backup fuse: Maximum 16 A.

Note

You must not connect the leads of the mains supply to terminals 3 and 4.

4.2.2 Pump supply

PUMP, terminals 3, 4 and PE

Connect terminals 3 and 4 to the phase and neutral leads of the pump. You can connect each terminal to any of the two leads.

Connect the PE terminal to the green/yellow earth lead. You must connect each PE terminal to an earth lead of its own.

The maximum cross-section of the leads to be connected is 6 mm^2.

4.2.3 Alarm signal relay

ALARM RELAY, terminals 5, 6 and 7

Connect terminals 5, 6 and 7 to the internal alarm signal relay as follows:

- Terminal 5 NC (normally closed).
- Terminal 6 COM (common).
- Terminal 7 NO (normally open).

The relay is activated when the alarm and warning limits are exceeded.

You can select manual or automatic restarting in the Grundfos GO display "Automatic restarting".

Manual restarting is carried out by means of the On/Off button on CU 300.

4.2.4 Digital input

DIG IN, terminals 11, 12 and 13

In fig. 4, the digital input is used to start and stop the pump.

You can select the function of the digital input by means of the Grundfos GO in the display "Digital input".

4.3 Description of dry-running protection

When the pump sucks air, the pump power input decreases.

If the pump power input falls below the dry-running power limit set in the Grundfos GO display "Dry-running stop", the pump will stop and CU 300 will indicate the dry-running alarm.

4.3.1 Function

The dry-running protection applies only if the motor speed lies within the maximum speed range (i.e. maximum speed less than 1000 min^{-1}). See fig. 5.

Normally, maximum speed is 10,700 min^{-1}. However, you can reduce the maximum speed in the Grundfos GO display "Maximum speed". The dry-running power limit set in the display "Dry-running stop" must match the speed.

Changing the setpoint:

If you use the Grundfos GO display "Setpoint" or "External setpoint" to change the setpoint, the pump can be forced to run at a reduced speed in relation to the maximum speed. The dry-running protection will not protect the pump if the reduced speed lies outside the maximum speed range (i.e. maximum speed less 1000 min^{-1}). See fig. 5.

Constant-pressure control

In constant-pressure control mode, the dry-running protection is active, as the motor will operate at maximum speed in connection with dry running.

Pump power input curve

The curve shows the pump power input in relation to the pump speed.

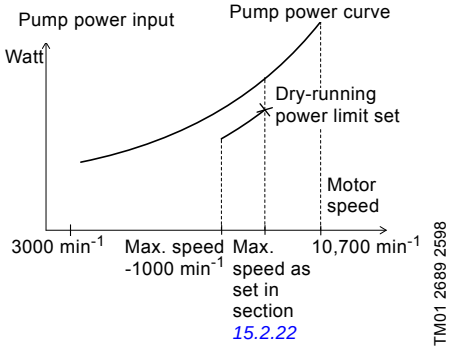


Fig. 5

4.4 Settings

For a detailed description of the Grundfos GO displays, see section *14. CU 300 with Grundfos GO*.

4.4.1 Required Grundfos GO settings

If the maximum speed of the pump has been reduced by more than 1000 min^{-1}, the dry-running stop value must be changed. In order to change the dry-running protection function, you must make the following Grundfos GO settings.

1. Set "Dry-running protection" to "Active".

Note

In certain installations, it may be necessary to disable the dry-running protection. The disabling applies to the dry-running power limit set in the display *15.2.21 Dry-running stop*. See fig. 5.

Set the dry-running power limit in the display *15.2.21 Dry-running stop* by following the procedure below:

- Start the pump against a closed discharge pipe.
- Read the input power (P1) in the display *15.1.9 Power consumption*.
- Calculate the dry-running power limit: P1 x 0.9 [W].
- Set this value in the display *15.2.21 Dry-running stop*.

4.5 Description of the dewatering function

When the pump sucks air, the pump power input decreases.

If the pump power input falls below the dry-running power limit set in the display *15.2.21 Dry-running stop*, the pump will stop.

During dewatering, the green indicator light in the On/Off button on CU 300 is flashing to indicate that the pump has stopped.

4.5.1 Applications

You can use the dewatering function in applications where the pump often runs dry, e.g.:

- In boreholes with a low yield.
- In boreholes and building sites where the water table should be lowered.

4.5.2 Function

The dewatering function works as follows:

1. The pump is operating.
2. The pump sucks air due to a drop in the water level.
3. The load decreases, and consequently the pump power input does as well.
4. The pump stops when the power input falls to the dry-running power limit set in the Grundfos GO display *15.2.21 Dry-running stop*.

Note

The length of the stop time depends on the setting you have made in the Grundfos GO display "Dewatering max off time". See section *15.2.19 Dewatering, maximum "On" and "Off" time*.

4.5.3 Required Grundfos GO settings

In order to activate the dewatering function, you must make the following Grundfos GO settings:

1. Set "Dry-running protection" to "Active".
2. Set the dry-running power limit, i.e. dry-running stop. See "Setting of dry-running power limit (dry-running stop)" below.
3. Set the relation between run and stop times.
   Indication of operation:
   The dry-running alarm indication on CU 300 is automatically disabled, when you make the setting in the display *15.2.19 Dewatering, maximum "On" and "Off" time*.
   To disable the dewatering function and return to dry-running protection, simply disable the "Dewatering" function in the display *15.2.18 Dewatering*.

Setting of dry-running power limit (dry-running stop):

1. Start the pump against a closed discharge pipe.
2. Read the input power (P1) in the display *15.1.9 Power consumption*.
3. Calculate the dry-running power limit: P1 x 0.9 [W].
4. Set this value in the display *15.2.21 Dry-running stop*.

4.5.4 On/off times

The dewatering function means that there is a dependence between the period of time during which the pump is running, the on time, and the period of time during which the pump is stopped, the off time.

Figure 6 shows an example of on and off times set in the display *15.2.19 Dewatering, maximum "On" and "Off" time*.

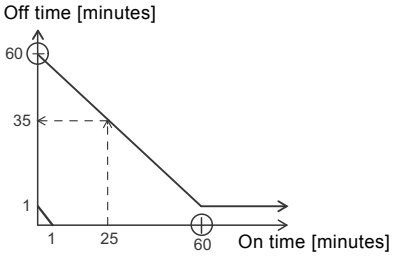


Fig. 6

Explanation:

The on and off times are set to 60 minutes each. The pump has been running for 25 minutes when dry running occurs. The pump will be stopped for 35 minutes. If the pump has been running for e.g. 120 minutes, the stop time will be 1 minute.

5. CU 300 with constant-pressure control - 0 to 6 bar

5.1 Description

Using constant-pressure control enables automatic adjustment of the pump performance according to consumption. The system maintains a constant pressure within the maximum pump performance in spite of a varying water consumption.

Figure 7 shows an example of an installation with constant-pressure control within the range from 0 to 6 bar.

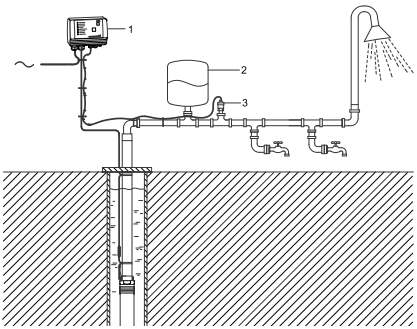


Fig. 7

Pos.	Description
1	CU 300
2	Diaphragm tank Absorbs pressure variations.
3	Pressure sensor The required pressure is set using the Grundfos GO.

5.2 Function

The pressure is registered by means of the pressure sensor, which transmits a signal to CU 300. CU 300 adjusts the pump performance accordingly by changing the pump speed.

Mains borne signalling

The communication between CU 300 and the pump is effected via the power supply cable.

This communication principle is called mains borne signalling or power line communication. Using this principle means that no additional cables to the pump are required.

The communication of data is effected by means of a high-frequency signal transmitted to the power supply cable and led into the electronics unit by means of signal coils incorporated in the motor and CU 300 respectively.

When does the pump start?

The pump starts as a consequence of:

- high flow
- low pressure
- a combination of both.

To ensure that the pump is started when water is consumed, a flow detection is required. The flow is detected via pressure changes in the system. When water is consumed, the pressure will drop accordingly depending on the size of the diaphragm tank and the water flow:

- At a low flow, the pressure will drop slowly.
- At a high flow, the pressure will drop quickly.

See fig. 8.

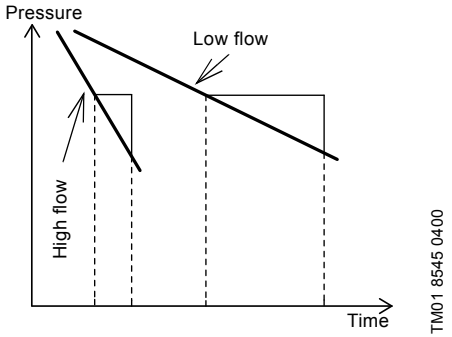


Fig. 8

Note When the pressure is dropping 0.1 bar/s or faster, the pump will start immediately.

If you use a diaphragm tank of 8 litres, the pump will start at a flow rate of approx. 0.18 m^3/h.

Note If a you use a larger tank, the flow must be higher before the pump starts.

Consumption up to 0.18 m^3/h

The pump will start when the pressure has dropped to 0.5 bar below the pressure setting.

The pump will run until the pressure is 0.5 bar above the pressure set.

Flow detection

During pump operation, i.e. when water is consumed, CU 300 will adjust the pump speed to maintain a constant pressure. In order to stop the pump when no water is consumed, CU 300 performs flow detection every 10 seconds.

The pump speed is reduced until a small pressure drop is registered. This pressure drop indicates that water is consumed and the pump speed is resumed. See fig. 9.

If the pump speed can be reduced without any pressure drop being registered, this indicates that no water is consumed. The diaphragm tank will be filled with water and the pump will be stopped.

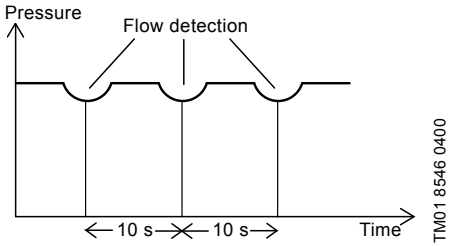


Fig. 9

System limits

Even though CU 300 is controlling the pressure within ± 0.2 bar, bigger pressure variations may occur in the system.

If the consumption is suddenly changed, e.g. if a tap is opened, the water must start flowing before the pressure can be made constant again. Such dynamic variations depend on the pipework, but, typically, they will lie between 0.5 and 1 bar.

If the desired consumption is higher than the quantity the pump is able to deliver at the desired pressure, the pressure follows the pump curve as illustrated in fig. 10.

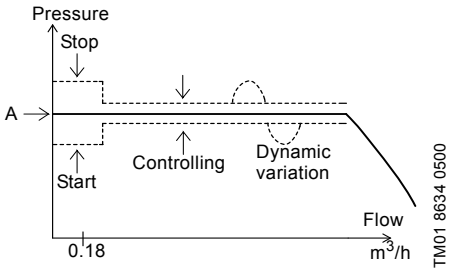


Fig. 10

A = Required pressure

5.3 Positioning the pressure sensor

Pressure loss often causes inconvenience to the user. CU 300 keeps the pressure constant in the place where the pressure sensor is positioned. See fig. 11.

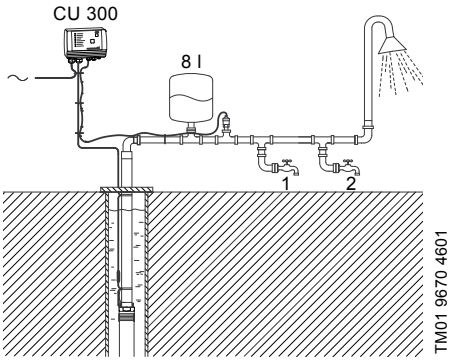


Fig. 11

In fig.11, tap 1 is placed close to the pressure sensor. Therefore, the pressure will be kept nearly constant at tap 1, as the friction loss is small. At the shower and tap 2, the friction loss is bigger. This, of course, depends on the piping. However, old and furred-up piping may cause inconvenience due to friction loss.

Therefore, we recommend that you position the pressure sensor as close to the places of consumption as possible.

5.4 System sizing

Warning

The installation must be designed for the maximum pump pressure.

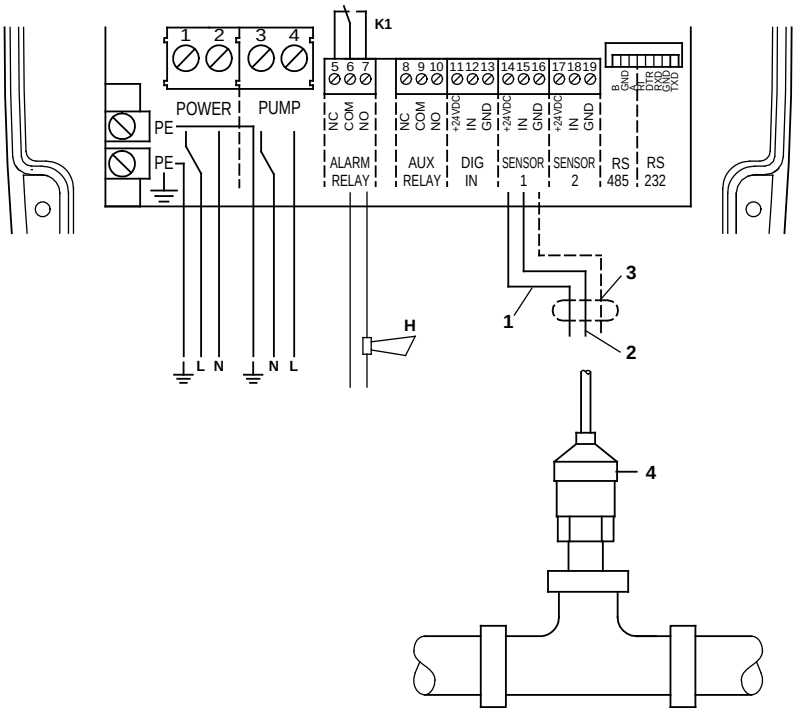
In normal installations with CU 300 and an SQE pump set to constant-pressure control, the required tank size is 8 litres. You can use bigger tanks without causing any problems.

5.5 Electrical installation

Warning

Never make any connections in the CU 300 unit unless the power supply has been switched off. CU 300 must be connected in accordance with the rules and standards in force for the application in question.

The supply voltage and frequency are marked on the nameplate. Make sure that CU 300 is suitable for the power supply on which it will be used.



TM01 9650 2400

Fig. 12

Pos.	Description
1	Pressure sensor, brown lead, terminal 14
2	Pressure sensor, black lead, terminal 15
3	Pressure sensor, screen, terminal GND
4	Pressure sensor Must be connected to analog input 1.
H	Alarm signal transmitter (optional).
K1	Internal alarm signal relay Relay data: 250 VAC, 1 A, AC1

5.5.1 Mains supply

POWER, terminals 1, 2 and PE

Connect terminals 1 and 2 to the phase and neutral leads of the mains supply. You can connect each terminal to any of the two leads.

Connect the PE terminal to the green/yellow earth lead. You must connect each PE terminal to an earth lead of its own.

Maximum cross-section of the leads to be connected is 6 mm^2.

Backup fuse: Maximum 16 A.

Note You must not connect the leads of the mains supply to terminals 3 and 4.

5.5.2 Pump supply

PUMP, terminals 3, 4 and PE

Connect terminals 3 and 4 to the phase and neutral leads of the pump. You can connect each terminal to any of the two leads.

Connect the PE terminal to the green/yellow earth lead. You must connect each PE terminal to an earth lead of its own.

Maximum cross-section of the leads to be connected is 6 mm^2.

5.5.3 Alarm signal relay

ALARM RELAY, terminals 5, 6 and 7

Connect terminals 5, 6 and 7 to the internal alarm signal relay as follows:

- Terminal 5 NC (normally closed).
- Terminal 6 COM (common).
- Terminal 7 NO (normally open).

The relay operates when the alarm and warning limits are exceeded.

You can select manual or automatic restarting in the Grundfos GO display "Automatic restarting".

Manual restarting is carried out by means of the On/Off button on CU 300.

5.5.4 Required Grundfos GO settings

You must make the following Grundfos GO settings:

1. In display "Control mode" select "Closed loop".
2. Set the sensor in the "Analog input 1" or "Analog input 2" display.
   Example:
   – sensor output signal (4-20 mA)
   – setting range unit (m)
   – setting range - head
   min.: 0.0
   max.: 40
3. Set the stop type in the "Stop type, sensor 1" display.
   – "Fill".
4. Set the digital input.
   – "Not active"
5. Set the setpoint
   Example: Desired head 35 m.
   Rule: The maximum setting of the setpoint corresponds to the maximum value set in display *15.2.4 Analog inputs* less 5 m.
   In this case, 40 less 5 = 35 m.

5.6 Startup

Prior to startup, the precharge pressure of the diaphragm tank must be set to 70 % of the setpoint set in the Grundfos GO display "Setpoint".

6. CU 300 with constant-pressure control - 0 to 10 bar

6.1 Description

Using constant-pressure control enables automatic adjustment of the pump performance according to consumption. The system maintains a constant pressure within the maximum pump performance in spite of a varying water consumption.

Figure 13 shows an example of an installation with constant-pressure control within the range from 0 to 10 bar.

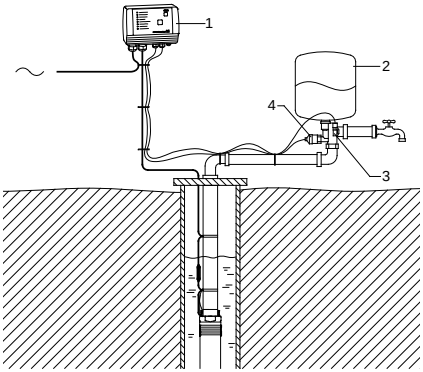


Fig. 13

Pos.	Description
1	CU 300
2	Diaphragm tank Absorbs pressure variations.
3	Flow switch The pump starts at once when water is consumed at the taps.
4	Pressure sensor The required pressure is set using the Grundfos GO.

6.2 Function

The pressure is registered by means of the pressure sensor and transmitted to CU 300. CU 300 adjusts the pump performance accordingly. To ensure that the pump is started when water is consumed, include a flow switch in the system.

The required pressure (setpoint) is set in the Grundfos GO display "Setpoint".

- **Consumption up to 0.18 m^3/h.**
  The flow switch contact is open.
  The pump starts when the pressure is equal to the setpoint less 0.5 bar. The pump will fill the tank and stop when the pressure is equal to the setpoint plus 0.5 bar. Consequently, the pump runs on/off operation.
- **Consumption above 0.18 m^3/h.**
  The flow switch contact is closed.
  The pump starts when the flow switch contact closes and the speed control ensures that the pressure is kept constant. If the flow is below 0.18 m^3/h and the flow switch contact is opened, the tank is filled to a pressure equal to the setpoint plus 0.5 bar. When this pressure is reached, the pump stops. Stopping is a combination of the flow switch contact opening and the pressure being equal to the setpoint plus 0.5 bar.

If the flow is larger than the quantity the pump is able to deliver at the desired pressure, the pressure follows the pump curve as illustrated in fig. 14.

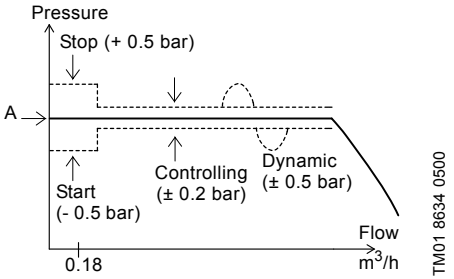


Fig. 14

A = Required pressure

6.3 Positioning the pressure sensor

Pressure loss often causes inconvenience to the user. CU 300 keeps the pressure constant in the place where the pressure sensor is positioned. See fig. 15.

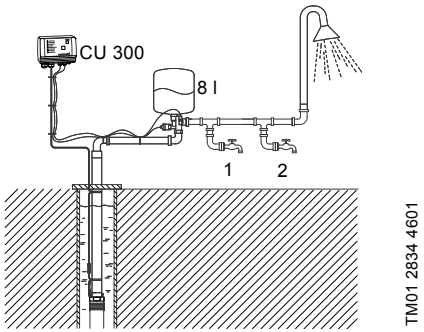


Fig. 15

In fig. 15, tap 1 is placed close to the pressure sensor. Therefore, the pressure will be kept nearly constant at tap 1, as the friction loss is small. At the shower and tap 2, the friction loss is bigger. This, of course, depends on the piping. However, old and furred-up piping may cause inconvenience due to friction loss.

Therefore, we recommend that you position the pressure sensor as close to the places of consumption as possible.

6.4 System sizing

Warning

The installation must be designed for the maximum pump pressure.

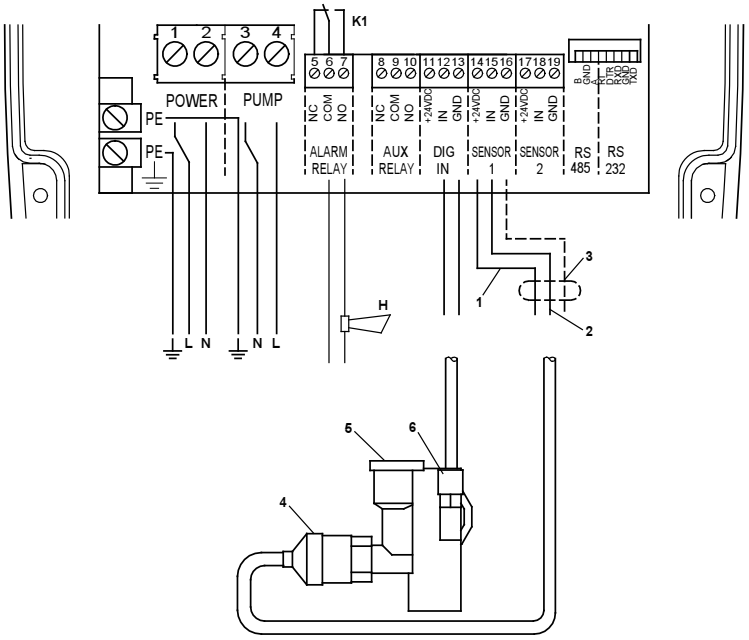
In normal installations with CU 300 and an SQE pump set to constant-pressure control, the required tank size is 8 litres. You can use bigger tanks without causing any problems.

6.5 Electrical installation

Warning

Never make any connections in the CU 300 unit unless the power supply has been switched off. CU 300 must be connected in accordance with the rules and standards in force for the application in question.

The supply voltage and frequency are marked on the nameplate. Make sure that CU 300 is suitable for the power supply on which it will be used.



TM01 3089 3398

Fig. 16

Pos.	Description
1	Pressure sensor, brown lead, terminal 14
2	Pressure sensor, black lead, terminal 15
3	Pressure sensor, screen, terminal GND
4	Pressure sensor Must be connected to analog input 1.
5	Diaphragm tank connection
6	Flow switch Must be connected to the digital input, terminals 12 and 13. Cannot be connected wrongly.
H	Alarm signal transmitter (optional)
K1	Internal alarm signal relay Relay data: 250 VAC, 1 A, AC1

6.5.1 Mains supply

POWER, terminals 1, 2 and PE

Connect terminals 1 and 2 to the phase and neutral leads of the mains supply. You can connect each terminal to any of the two leads.

Connect the PE terminal to the green/yellow earth lead. You must connect each PE terminal to an earth lead of its own.

Maximum cross-section of the leads to be connected is 6 mm^2.

Backup fuse: Maximum 16 A.

Note You must not connect the leads of the mains supply to terminals 3 and 4.

6.5.2 Pump supply

PUMP, terminals 3, 4 and PE

Connect terminals 3 and 4 to the phase and neutral leads of the pump. You can connect each terminal to any of the two leads.

Connect the PE terminal to the green/yellow earth lead. You must connect each PE terminal to an earth lead of its own.

Maximum cross-section of the leads to be connected is 6 mm^2.

6.5.3 Alarm signal relay

ALARM RELAY, terminals 5, 6 and 7

Connect terminals 5, 6 and 7 to the internal alarm signal relay as follows:

- Terminal 5 NC (normally closed).
- Terminal 6 COM (common).
- Terminal 7 NO (normally open).

The relay operates when the alarm and warning limits are exceeded.

You can select manual or automatic restarting in the Grundfos GO display "Automatic restarting".

Manual restarting is carried out by means of the On/Off button on CU 300.

6.5.4 Required Grundfos GO settings

You must make the following Grundfos GO settings:

1. In display *15.2.2 Control mode*" select "Closed loop".
2. Set the sensor in the "Analog input 1" or "Analog input 2" display.
   Example:
   – sensor output signal (4-20 mA)
   – setting range unit (m)
   – setting range - head
   min.: 0.0
   max.: 40.
3. Set the stop type in the "Stop type, sensor 1" display.
   – "Fill".
4. Set the digital input.
   – "Not active"
5. Set the setpoint
   Example: Desired head 35 m.
   Rule: The maximum setting of the setpoint corresponds to the maximum value set in display "Analog input 1" less 5 m.
   In this case, 40 less 5 = 35 m.

6.6 Startup

Prior to startup, the precharge pressure of the diaphragm tank must be set to 70 % of the setpoint set in the Grundfos GO display "Setpoint".

7. CU 300 with constant-pressure control - two-pump operation

7.1 Description

Using constant-pressure control in connection with two-pump operation enables automatic adjustment of the pump performance according to the consumption in systems where a high flow is required. The system maintains a constant pressure within the maximum pump performance in spite of a varying water consumption.

Note During two-pump operation, the two pumps **must** have the same nominal flow, e.g. two SQE 2.

Figure 17 shows an example of a two-pump installation with constant-pressure control.

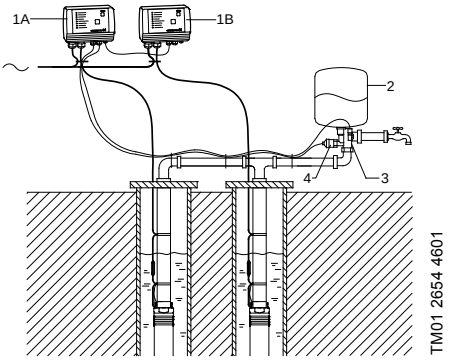


Fig. 17

Pos.	Description
1A, 1B	1A = CU 300 (master) 1B = CU 300 (slave)
2	Diaphragm tank, minimum 24 litres Absorbs pressure variations.
3	Flow switch The pump starts at once when water is consumed at the taps.
4	Pressure sensor The required pressure is set using the Grundfos GO.

7.2 Function

The pressure is registered by means of the pressure sensor and transmitted to CU 300 (master). CU 300 adjusts the pump speed to ensure that the pressure is kept constant. To ensure that the pump connected to CU 300 (master) is started when water is consumed, a flow switch must be included in the system.

Set CU 300 (master) to the desired pressure (setpoint) in the Grundfos GO display "Setpoint".

- **Consumption up to 0.18 m^3/h.**
  The flow switch contact is open.
  The pump connected to CU 300 (master) starts when the pressure is equal to the setpoint less 0.5 bar. The pump will fill the tank and stop when the pressure is equal to the setpoint plus 0.5 bar. Consequently, the pump runs on/off operation.
- **Consumption above 0.18 m^3/h.**
  The flow switch contact is closed.
  The pump connected to CU 300 (master) starts when the flow switch contact closes and the speed control ensures that the pressure is kept constant.
  If the flow is lower than 0.18 m^3/h and the flow switch contact is opened, the tank is filled to a pressure equal to the setpoint plus 0.5 bar. When this pressure is reached, the pump stops.
  Stopping is a combination of the flow switch contact opening and the pressure being equal to the setpoint plus 0.5 bar.
  If the consumption exceeds the quantity the pump connected to CU 300 (master) is able to deliver, the pressure in the diaphragm tank will fall.

The pump connected to CU 300 (slave) will be started in the two following situations:

1. If the pressure in the diaphragm tank falls to 1 bar below the setpoint.
2. If the pump connected to CU 300 (master) has been operating at maximum performance for more than 5 seconds and the water requirement has increased.

The pump connected to CU 300 (slave) will be stopped in the three following situations:

1. If the system pressure is 1 bar higher than the setpoint.
2. If the pump connected to CU 300 (master) has been operating at minimum performance for more than 5 seconds and the water requirement has fallen.
3. If the flow switch indicates "No flow" and the system pressure is 0.5 bar higher than the setpoint.

If the flow is larger than the quantity the pumps are able to deliver at the desired pressure, the pressure follows the pump curve. See fig. 18.

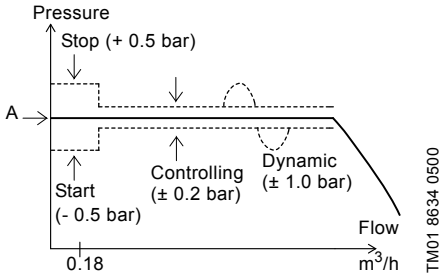


Fig. 18

A = Required pressure

7.3 Positioning the pressure sensor

See section *6.3 Positioning the pressure sensor*.

7.4 System sizing

Warning

The installation must be designed for the maximum pump pressure.

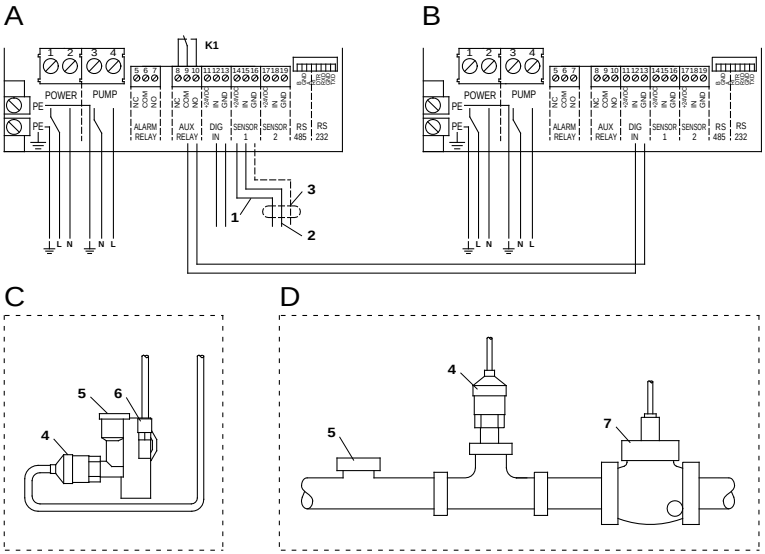
In two-pump installations set for constant-pressure control, the required tank size is 24 litres. You can use bigger tanks without any problems.

7.5 Electrical installation

Warning

Never make any connections in the CU 300 unit unless the power supply has been switched off. CU 300 must be connected in accordance with the rules and standards in force for the application in question.

The supply voltage and frequency are marked on the nameplate. Make sure that CU 300 is suitable for the power supply on which it will be used.



TM01 9671 2500

Fig. 19

Pos.	Description
A	CU 300 (master)
B	CU 300 (slave)
C	Installation for Q < 5 m^3/h
D	Installation for Q > 5 m^3/h
1	Pressure sensor, brown lead, terminal 14
2	Pressure sensor, black lead, terminal 15
3	Pressure sensor, screen, terminal GND
4	Pressure sensor Must be connected to analog input 1.
5	Diaphragm tank connection
6	Flow switch (Q < 5 m^3/h) Must be connected to the digital input, terminals 12 and 13. Cannot be connected wrongly.
7	Flow switch (Q > 5 m^3/h) Must be connected to the digital input, terminals 12 and 13. Cannot be connected wrongly.
K1	Internal alarm signal relay Relay data: 250 VAC, 1 A, AC1

7.5.1 Auxiliary relay

Connect CU 300 (master) to CU 300 (slave) as follows:

Connections	
CU 300 (master)	**CU 300 (slave)**
Terminal 9 (COM)	Terminal 12 (IN)
Terminal 10 (NO)	Terminal 13 (GND)

See fig. 19.

7.5.2 Mains supply

POWER, terminals 1, 2 and PE

Connect terminals 1 and 2 to the phase and neutral leads of the mains supply. See fig. 19.

You can connect each terminal to any of the two leads.

Connect the PE terminal to the green/yellow earth lead. You must connect each PE terminal to an earth lead of its own.

Maximum cross-section of the leads to be connected is 6 mm^2.

Backup fuse: Maximum 16 A.

Note

You must not connect the leads of the mains supply to terminals 3 and 4.

7.5.3 Pump supply

PUMP, terminals 3, 4 and PE

Connect terminals 3 and 4 to the phase and neutral leads of the pump. See fig. 19.

You can connect each terminal to any of the two leads.

Connect the PE terminal to the green/yellow earth lead. You must connect each PE terminal to an earth lead of its own.

Maximum cross-section of the leads to be connected is 6 mm^2.

7.5.4 Alarm signal relay

ALARM RELAY, terminals 5, 6 and 7

Connect terminals 5, 6 and 7 to the internal alarm signal relay as follows:

- Terminal 5 NC (normally closed).
- Terminal 6 COM (common).
- Terminal 7 NO (normally open).

The relay operates when the alarm and warning limits are exceeded.

You can select manual or automatic restarting in the Grundfos GO display "Automatic restarting".

Manual restarting is carried out by means of the On/Off button on CU 300.

7.5.5 Flow switch and pressure sensor

Connect the flow switch and the pressure sensor to the control unit (A = master) as illustrated in fig. 19.

Flow switch:

Pump type	Product number
SQE 1	96037332
SQE 2, SQE 3, SQE 5, SQE 7	96037559

7.5.6 Required Grundfos GO settings

You must make the following Grundfos GO settings on CU 300 (master):

1. In display "Control mode" select "Closed loop".
2. Set the sensor in the "Analog input 1" or "Analog input 2" display.
   Example:
   – sensor output signal (4-20 mA)
   – setting range unit (m)
   – setting range - head
   min.: 0.0
   max.: 40.
3. Set the stop type in the "Stop type, sensor 1" display.
   – "Fill".
4. Set the digital input in "Digital input 1" display:
   – "Start".
5. Set the setpoint
   Example: Desired head 35 m.
   Rule: The maximum setting of the setpoint corresponds to the maximum value set in display *15.2.4 Analog inputs* less 5 m.
   In this case, 40 less 5 = 35 m.

You must make the following Grundfos GO setting on CU 300 (slave):

6. Set the digital input in "Digital input 1" display:
   – "Start"

7.6 Startup

Prior to startup, you must set the precharge pressure of the diaphragm tank to 70 % of the setpoint set in the Grundfos GO display "Setpoint".

8. CU 300 with sensors

8.1 General

CU 300 can be used in systems with one to three sensors connected.

Figure 20 shows an example of an installation incorporating sensors.

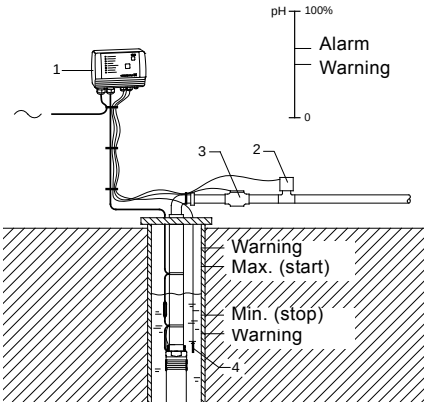


Fig. 20

Pos.	Description
1	CU 300
2	pH sensor Detects the water quality.
3	Pulse flow meter Detects the water quantity.
4	Level sensor

You can set the alarm, warning and stop limits individually for all sensors connected. The limit settings do not influence each other, and each setting offers its own functioning.

Figure 21 shows a schematic presentation of the setting of maximum and minimum limits for alarm, warning and stop respectively.

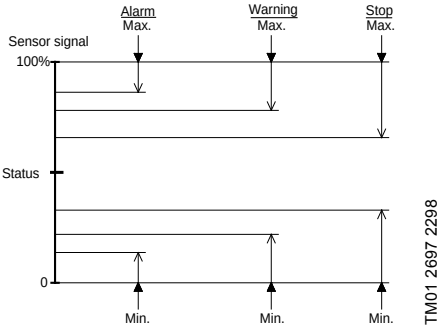


Fig. 21

You must only set the limits applying to the selected sensor.

These settings are made in the displays *15.2.4 Analog inputs* and *15.2.5 Limits, sensor 1 and 2* to *15.2.5 Limits, sensor 1 and 2*.

8.2 Sensor functioning

8.2.1 Alarm limits

When an alarm limit is exceeded, the following takes place:

1. The pump is stopped.
2. The alarm signal relay operates.
3. The "Sensor alarm" indicator light on CU 300 is on.
4. The alarm appears in the Grundfos GO display "Alarms and warnings".

If the pump has stopped already or if the alarm signal relay has operated, this condition is maintained.

8.2.2 Warning limits

When a warning limit is exceeded, the following takes place:

1. The alarm signal relay operates.
2. Pump operation is continued. No "Sensor alarm" indication.
3. The warning appears in the Grundfos GO display "Alarms and warnings".

8.2.3 Start and stop limits

Start and stop limits must be used in connection with the emptying and filling of e.g. water tanks.

The start and stop function depends on the application, i.e. emptying or filling.

- Emptying means that the pump must start at a given maximum water level and stop at a given minimum water level. See fig. 22.

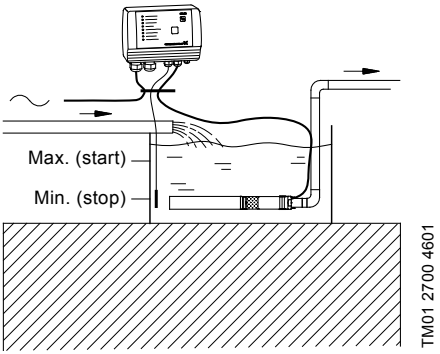


Fig. 22

- Filling means that the pump must start at a given minimum water level and stop at a given maximum water level. See fig. 23.

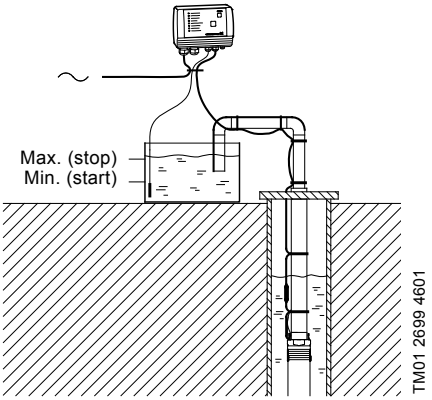


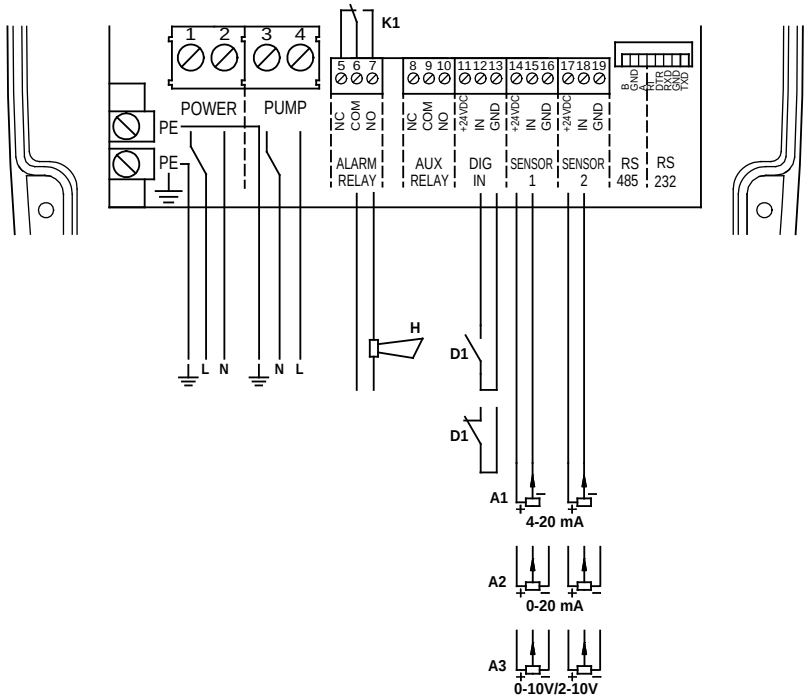
Fig. 23

8.3 Electrical installation

Warning

Never make any connections in the CU 300 unit unless the power supply has been switched off. CU 300 must be connected in accordance with the rules and standards in force for the application in question.

The supply voltage and frequency are marked on the nameplate. Make sure that CU 300 is suitable for the power supply on which it will be used.



TM01 3088 2500

Fig. 24

Pos.	Description
A1	Analog sensor, output signal 4-20 mA
A2	Analog sensor, output signal 0-20 mA
A3	Analog sensor, output signal 0-10/2-10 V
D1	Digital sensor, NO (normally open)
D1	Digital sensor, NC (normally closed)
H	Alarm signal transmitter (optional)
K1	Internal alarm signal relay Relay data: 250 VAC, 1 A, AC1

8.3.1 Mains supply

POWER, terminals 1, 2 and PE

Connect terminals 1 and 2 to the phase and neutral leads of the mains supply. You can connect each terminal to any of the two leads.

Connect the PE terminal to the green/yellow earth lead. You must connect each PE terminal to an earth lead of its own.

Maximum cross-section of the leads to be connected is 6 mm^2.

Backup fuse: Maximum 16 A.

Note You must not connect the leads of the mains supply to terminals 3 and 4.

8.3.2 Pump supply

PUMP, terminals 3, 4 and PE

Connect terminals 3 and 4 to the phase and neutral leads of the pump. You can connect each terminal to any of the two leads.

Connect the PE terminal to the green/yellow earth lead. You must connect each PE terminal to an earth lead of its own.

Maximum cross-section of the leads to be connected is 6 mm^2.

8.3.3 Alarm signal relay

ALARM RELAY, terminals 5, 6 and 7

Connect terminals 5, 6 and 7 to the internal alarm signal relay as follows:

- Terminal 5 NC (normally closed).
- Terminal 6 COM (common).
- Terminal 7 NO (normally open).

The relay operates when the alarm and warning limits are exceeded.

You can select manual or automatic restarting in the Grundfos GO display "Automatic restarting".

Manual restarting is carried out by means of the On/Off button on CU 300.

8.3.4 Sensors

SENSOR 1 and SENSOR 2, terminals 14, 15, 16, 17, 18 and 19:

Terminals 14, 15 and 16 (SENSOR 1) and terminals 17, 18 and 19 (SENSOR 2) are used for external sensors, e.g. a pressure gauge, a flow meter or another type of sensor.

You set the limits for the signal from an external sensor in the Grundfos GO in the "Analog input 1" and "Analog input 2" displays.

You can use the signal to do the following:

- To start and stop the motor.
- To operate the alarm signal relay, without stopping the motor.

The sensors must give signals within the ranges 0-20 or 4-20 mA, 0-10 or 2-10 VDC. Changeover between current and voltage signals is carried out by means of the Grundfos GO.

The total load of terminals 11, 14 and 17 (+24 VDC) must not exceed 100 mA.

8.3.5 Required Grundfos GO settings

You must make the following Grundfos GO settings:

1. Set "Analog input 1".
   - sensor output signal (4-20 mA)
   - setting range unit (m)
   - setting range - head min.: 0.0 max.: 50.
2. Set "Analog input 2" to "Not active".
3. Set the minimum stop value for sensor 1 in display "Min. stop value, sensor 1".
4. Set the maximum stop value for sensor 1 in display "Max. stop value, sensor 1".
5. Set the "Warning limits" and "Alarm limits" for sensor 1 in display "Limits, sensor 1".
6. Set the desired stop type in display "Stop type, sensor 1:
   Example:
   - "Fill".

9. CU 300 connected to potentiometer

9.1 Description

Using an external potentiometer enables:

- Manual control of the motor speed, and thereby of pump performance.

Manual starting/stopping of the pump.

Note To stop the pump, turn the potentiometer (SPP 1) to "STOP".

Figure 25 shows an example of an installation with a potentiometer.

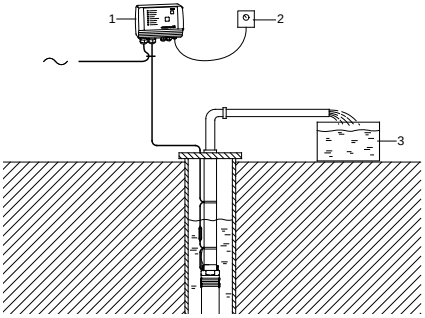


Fig. 25

Pos.	Description
1	CU 300
2	External Grundfos potentiometer, SPP 1 The required flow is obtained by changing the motor speed manually using the external potentiometer.
3	Water tank

9.2 Electrical installation

Warning

Never make any connections in the CU 300 unit unless the power supply has been switched off. CU 300 must be connected in accordance with the rules and standards in force for the application in question.

The supply voltage and frequency are marked on the nameplate. Make sure that CU 300 is suitable for the power supply on which it will be used.

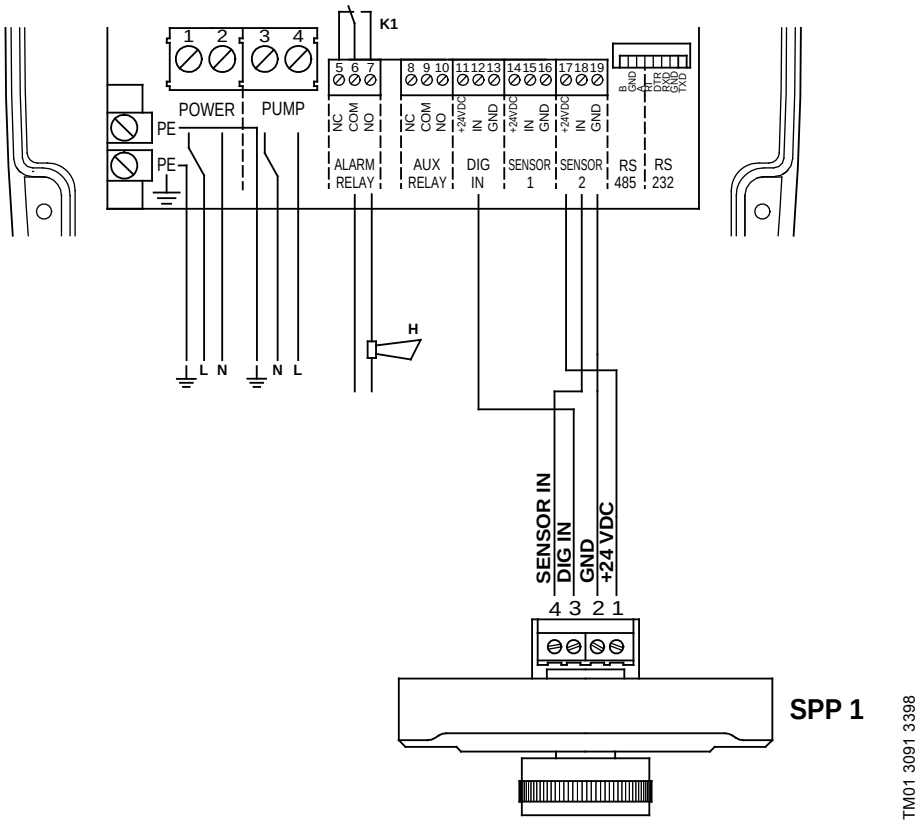


Fig. 26

Pos.	Description
K1	Internal alarm signal relay Relay data: 250 VAC, 1 A, AC1
H	Alarm signal transmitter (optional)
SPP 1	External Grundfos potentiometer, SPP 1

9.2.1 Mains supply

POWER, terminals 1, 2 and PE

Connect terminals 1 and 2 to the phase and neutral leads of the mains supply. You can connect each terminal to any of the two leads.

Connect the PE terminal to the green/yellow earth lead. You must connect each PE terminal to an earth lead of its own.

Maximum cross-section of the leads to be connected is 6 mm^2.

Backup fuse: Maximum 16 A.

Note

You must not connect the leads of the mains supply to terminals 3 and 4.

9.2.2 Pump supply

PUMP, terminals 3, 4 and PE

Connect terminals 3 and 4 to the phase and neutral leads of the pump. You can connect each terminal to any of the two leads.

Connect the PE terminal to the green/yellow earth lead. You must connect each PE terminal to an earth lead of its own.

Maximum cross-section of the leads to be connected is 6 mm^2.

9.2.3 Alarm signal relay

ALARM RELAY, terminals 5, 6 and 7

Connect terminals 5, 6 and 7 to the internal alarm signal relay as follows:

- Terminal 5 NC (normally closed).
- Terminal 6 COM (common).
- Terminal 7 NO (normally open).

The relay operates when the alarm and warning limits are exceeded.

You can select manual or automatic restarting in the Grundfos GO display "Automatic restarting".

Manual restarting is carried out by means of the On/Off button on CU 300.

9.2.4 Potentiometer SPP 1

Connections between the SPP 1 and CU 300:

SPP 1	CU 300
1	17 (SENSOR 2 +24 VDC)
2	19 (SENSOR 2 GND)
3	12 (DIG IN)
4	18 (SENSOR 2 IN)

9.2.5 Required Grundfos GO settings

You must make the following Grundfos GO settings:

1. In display "Control mode" select "Open loop".
2. Set the external setpoint to "SPP 1", enabling speed control using the SPP 1. "Analog input 2" is set to "SPP 1".
3. Set "Digital input 1" to "Start"

10. CU 300 connected to water meter

10.1 Description

Using a water meter (pulse flow meter) enables:

- Monitoring of the flow.
- Stop of pump after a given quantity of water has been pumped.
- Indication of accumulated flow and the energy consumption required to pump 1 m^3.

Figure 27 shows an example of an irrigation system incorporating a water meter.

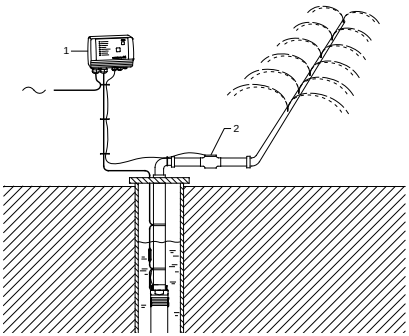


Fig. 27

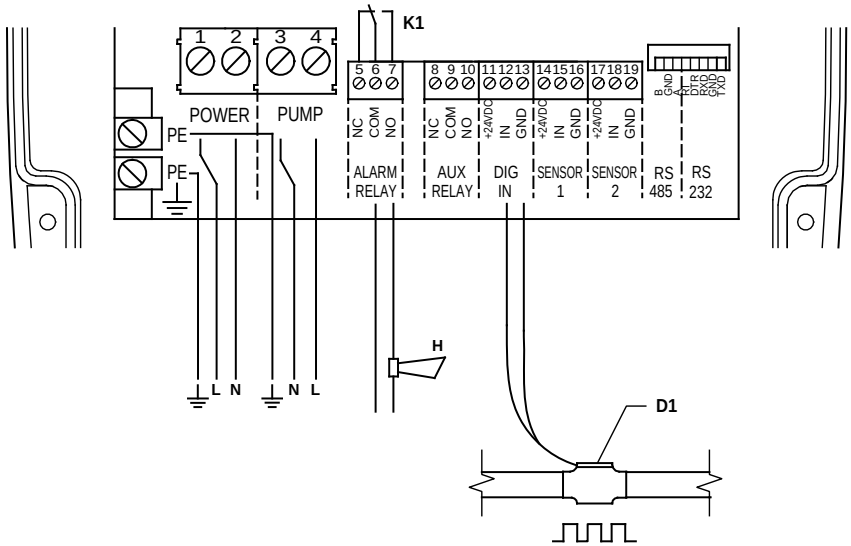
Pos.	Description
1	CU 300
2	Water meter (pulse flow meter)

10.2 Electrical installation

Warning

Never make any connections in the CU 300 unit unless the power supply has been switched off. CU 300 must be connected in accordance with the rules and standards in force for the application in question.

The supply voltage and frequency are marked on the nameplate. Make sure that CU 300 is suitable for the power supply on which it will be used.



TM01 6223 1899

Fig. 28

Pos.	Description
D1	Water meter (pulse flow meter)
H	Alarm signal transmitter (optional)
K1	Internal alarm signal relay Relay data: 250 VAC, 1 A, AC1

10.2.1 Mains supply

POWER, terminals 1, 2 and PE

Connect terminals 1 and 2 to the phase and neutral leads of the mains supply. You can connect each terminal to any of the two leads.

Connect the PE terminal to the green/yellow earth lead. You must connect each PE terminal to an earth lead of its own.

Maximum cross-section of the leads to be connected is 6 mm^2.

Backup fuse: Maximum 16 A.

Note

You must not connect the leads of the mains supply to terminals 3 and 4.

10.2.2 Pump supply

PUMP, terminals 3, 4 and PE

Connect terminals 3 and 4 to the phase and neutral leads of the pump. You can connect each terminal to any of the two leads.

Connect the PE terminal to the green/yellow earth lead. You must connect each PE terminal to an earth lead of its own.

Maximum cross-section of the leads to be connected is 6 mm^2.

10.2.3 Alarm signal relay

ALARM RELAY, terminals 5, 6 and 7

Connect terminals 5, 6 and 7 to the internal alarm signal relay as follows:

- Terminal 5 NC (normally closed).
- Terminal 6 COM (common).
- Terminal 7 NO (normally open).

The relay operates when the alarm and warning limits are exceeded.

You can select manual or automatic restarting in the Grundfos GO display "Automatic restarting".

Manual restarting is carried out by means of the On/Off button on CU 300.

10.2.4 Water meter (pulse flow meter)

DIG IN, terminals 12 and 13

Connect terminals 12 and 13 to the water meter:

- Terminal 12 IN (signal input).
- Terminal 13 GND (earth).

10.2.5 Required Grundfos GO settings

You must make the following Grundfos GO settings:

1. Set "Digital input 1".
   – Function: "Pulse-flow meas."
2. Set "Flow per pulse":
   Example**:** "10 l/pulse".

When you have set a value in this display, the actual flow will appear in status display "Digital input".

You must only set a value in the display "Stop limit, accum. flow" if stop of pump after a given quantity of water has been pumped is required.

Example:

- Stop limit, accum. flow: "7.5 m^3".
- Sensor, accum. flow stop: "Digital input".

When you have set a value in this display, the "Accumulated flow" and "Energy per m^3" will appear in the status displays "Accumulated flow" and "Specific energy".

11. Constant water level

11.1 Description

The water level can be kept constant by connecting an analog level sensor.

Figure 29 shows an example of an installation designed for maintaining a constant water level in the borehole.

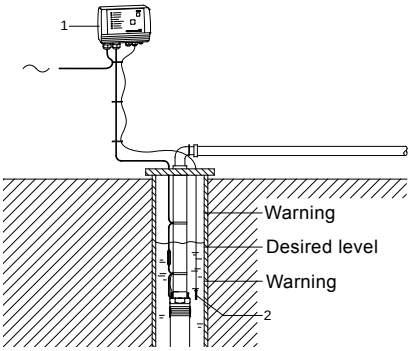


Fig. 29

Pos.	Description
1	CU 300
2	Level sensor

11.2 Function

CU 300 controls the pump speed and consequently adjusts the pump performance to the borehole yield.

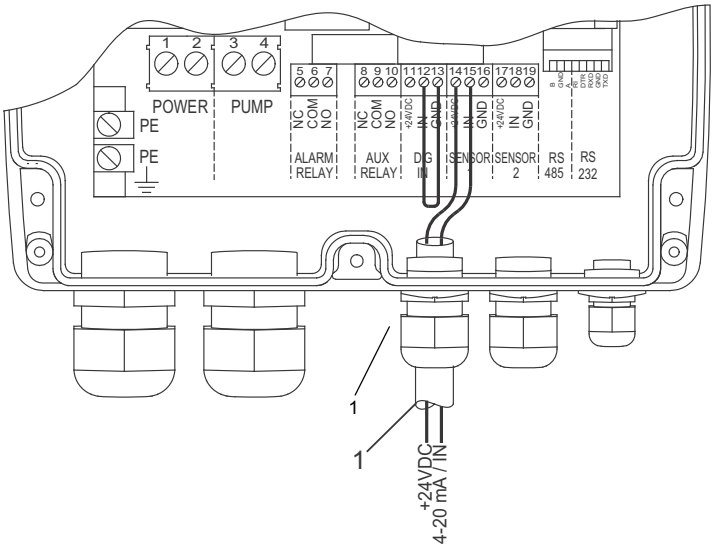
1. When the water level is much higher than the desired level (setpoint), the pump is running at maximum performance.
2. When the level is coming closer to the desired level, the pump performance will be reduced.
3. When the desired level is reached, the pump speed will be so low that the pump performance is zero. After further 60 seconds, the pump will stop.

11.3 Electrical installation

Warning

Never make any connections in the CU 300 unit unless the power supply has been switched off. CU 300 must be connected in accordance with the rules and standards in force for the application in question.

The supply voltage and frequency are marked on the nameplate. Make sure that CU 300 is suitable for the power supply on which it will be used.



TM01 6213 2400

Fig. 30

Pos.	Description
1	Connection of level sensor: • Terminal 14, 24 VDC supply • Terminal 15, signal input

11.3.1 Mains supply

POWER, terminals 1, 2 and PE

Connect terminals 1 and 2 to the phase and neutral leads of the mains supply. You can connect each terminal to any of the two leads.

Connect the PE terminal to the green/yellow earth lead. You must connect each PE terminal to an earth lead of its own.

Maximum cross-section of the leads to be connected is 6 mm^2.

Backup fuse: Maximum 16 A.

Note

You must not connect the leads of the mains supply to terminals 3 and 4.

11.3.2 Pump supply

PUMP, terminals 3, 4 and PE

Connect terminals 3 and 4 to the phase and neutral leads of the pump. You can connect each terminal to any of the two leads.

Connect the PE terminal to the green/yellow earth lead. You must connect each PE terminal to an earth lead of its own.

Maximum cross-section of the leads to be connected is 6 mm^2.

11.3.3 Alarm signal relay

ALARM RELAY, terminals 5, 6 and 7

Connect terminals 5, 6 and 7 to the internal alarm signal relay as follows:

- Terminal 5 NC (normally closed).
- Terminal 6 COM (common).
- Terminal 7 NO (normally open).

The relay operates when the alarm and warning limits are exceeded. See section *15.2.5 Limits, sensor 1 and 2*.

11.3.4 Digital input

Connect terminals 12 and 13 with a short piece of wire to create a short circuit between them.

11.3.5 Level sensor

Connect terminals 14 and 15 to the level sensor:

- Terminal 14, 24 VDC (voltage supply).
- Terminal 15, IN (signal input).

11.3.6 Required Grundfos GO settings

You must make the following Grundfos GO settings:

1. In display "Control mode" select "Closed loop".
2. Set "Analog input 1".
   Example:
   – sensor output signal (4-20 mA),
   – setting range unit (m)
   – setting range - head
   Min.: 0.0
   Max.: 60.
   Set the stop type.
   – Sensor 1: "Empty".
3. Set the "Setpoint" e.g. desired water level (m).
   Example: 55 m.
   – Rule: The maximum setting of the setpoint corresponds to the maximum value set in display "Analog input 1" less 5 m.
   In this case, 60 less 5 = 55 m.
   The water level can be kept within a tolerance of ± 1 % of the setting range.
4. Set "Digital input 1".
   – "Start".

12. CU 300 connected to RS-485

12.1 Description

Using the RS-485 input enables:

- communication via Grundfos fieldbus GENIbus
- connection to the Grundfos Remote Management (CIU 270) gateway for communication over long distances.

12.2 CU 300 connected to a PC directly

Figure 31 shows an example of an installation which is connected to a PC directly via the PC Tool link and GENIbus.

The installation shown in the example enables configuration, fault finding and servicing of the installation by means of a PC with a PC Tool CU 300 software. See fig. 31.

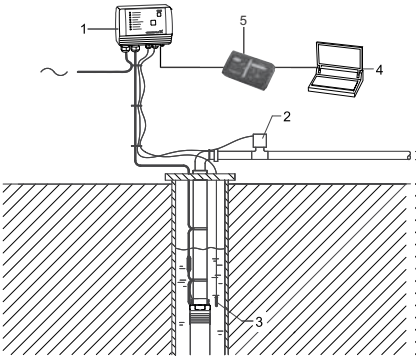


Fig. 31

Pos.	Description
1	CU 300
2	E.g. a pH sensor for monitoring of water quality
3	Level sensor
4	PC
5	PC Tool Link

CU 300 connected to GENIbus network:

Figure 32 shows an example of an installation connected to a GENIbus network with two CU 300 installations via the RS-485 input. The GENIbus network is connected to Grundfos Remote Management (CIU 270) through a PC with internet access.

The installation shown in the example enables configuration, fault finding, servicing, data logging of the connected installations over long distances. See fig. 32.

You can connect and communicate with up to 32 GENIbus units on one network.

The units can be:

- CU 300 units only
- CU 300 units in combination with other Grundfos products with GENIbus connection.

Contact Grundfos for further details.

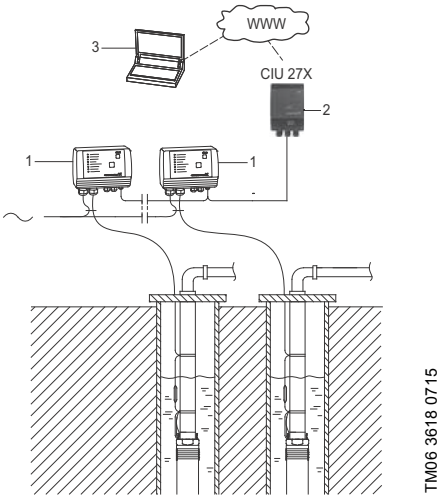


Fig. 32

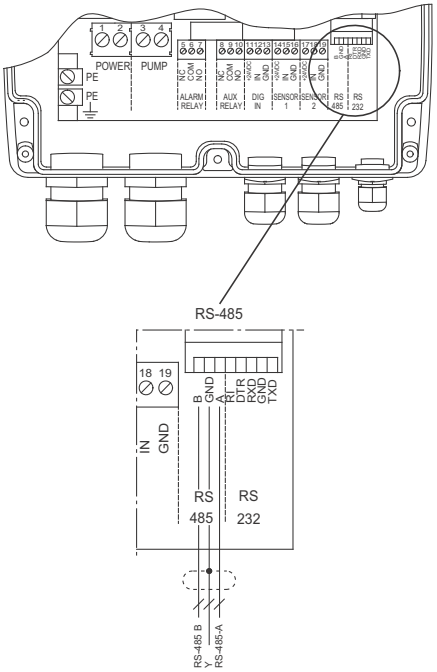
Pos.	Description
1	CU 300
2	CIU 270
3	PC

12.3 Electrical installation

Warning

Never make any connections in the CU 300 unit unless the power supply has been switched off. CU 300 must be connected in accordance with the rules and standards in force for the application in question.

The supply voltage and frequency are marked on the nameplate. Make sure that CU 300 is suitable for the power supply on which it will be used.



TM06 3600 0615

Fig. 33

Pos.	Description
RS-485	Connection of RS-485, GENIbus

12.3.1 Mains supply

POWER, terminals 1, 2 and PE

Connect terminals 1 and 2 to the phase and neutral leads of the mains supply. You can connect each terminal to any of the two leads.

Connect the PE terminal to the green/yellow earth lead. You must connect each PE terminal to an earth lead of its own.

Maximum cross-section of the leads to be connected is 6 mm^2.

Backup fuse: Maximum 16 A.

Note You must not connect the leads of the mains supply to terminals 3 and 4.

12.3.2 Pump supply

PUMP, terminals 3, 4 and PE

Connect terminals 3 and 4 to the phase and neutral leads of the pump. You can connect each terminal to any of the two leads.

Connect the PE terminal to the green/yellow earth lead. You must connect each PE terminal to an earth lead of its own.

Maximum cross-section of the leads to be connected is 6 mm^2.

12.3.3 Alarm signal relay

ALARM RELAY, terminals 5, 6 and 7

Connect terminals 5, 6 and 7 to the internal alarm signal relay as follows:

- Terminal 5 NC (normally closed).
- Terminal 6 COM (common).
- Terminal 7 NO (normally open).

The relay operates when the alarm and warning limits are exceeded.

You can select manual or automatic restarting in the Grundfos GO display "Automatic restarting".

Manual restarting is carried out by means of the On/Off button on CU 300.

12.3.4 RS-485 input

The RS-485 input, terminals A, Y (GND) and B, is for external bus communication.

The communication is effected according to the Grundfos bus protocol, GENIbus, and is two-way communication.

CU 300 can communicate with a PC with the PC Tool CU 300 installed.

You need a PC Tool link adapter to communicate with a PC. Connect the adaptor to CU 300, terminals A, Y (GND) and B, for direct communication with a PC on a GENIbus network.

The PC Tool CU 300 enables configuration, monitoring and fault finding of the actual installation.

The RS-485 input is a low-voltage circuit. Therefore, you must separate all connections to terminals A, Y (GND) and B from network circuits by means of double or reinforced insulation.

A screened, twisted-pair cable is required. The maximum cable length is 1200 m.

13. Alarm functions

13.1 No contact

The connection and/or communication between CU 300 and the motor is not established.

"No contact" is permanently on. See fig. 34.

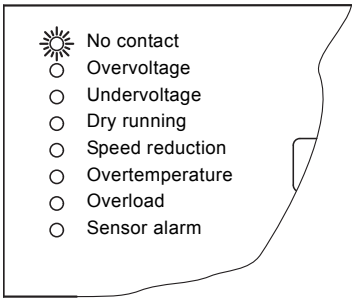


Fig. 34

Possible cause	Remedy
Motor is not an MSE 3 motor.	Install an MSE 3 motor.
Motor is not connected.	Check connections.
Cable breakage.	Check cable.
Poor or no connection.	Check connections.
The cable length exceeds 200 m.	Reduce cable length.
CU 300 is defective.	Replace CU 300.
The motor is defective.	Replace motor.

Important:

The alarm indication "No contact" will also appear if the pump and CU 300 do not have the same number (allocated by the Grundfos GO). The problem may occur e.g. in connection with replacing a motor or a CU 300.

Solution:

The pump and CU 300 must be allocated the same number via the Grundfos GO display "Number".

The alarm "No contact" makes the On/Off button on CU 300 inactive, and actual operating parameters cannot be called up. However, installation parameters can be called up.

"No contact" does not cause a pump stop.

13.2 Overvoltage

The supply voltage to the motor exceeds the maximum value allowed.

For more information about factory settings, see section *16. Technical data*.

The motor is stopped and "Overvoltage" is permanently on. See fig. 35.

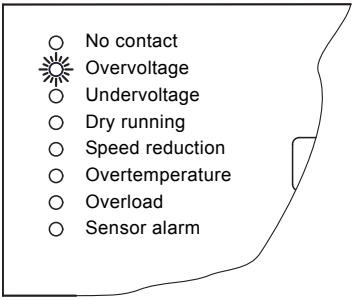


Fig. 35

Possible cause	Remedy
Unstable power supply.	Contact the power supply authorities.
Too high supply voltage.	Contact the power supply authorities. Check installation.
Supply voltage outside voltage range of motor.	Check installation.

Restarting

When the supply voltage lies within the voltage range of the motor, the motor will restart automatically.

13.3 Undervoltage

The supply voltage to the motor is lower than the minimum value allowed.

For more information about the factory setting, see section *16. Technical data*.

The motor is stopped and "Undervoltage" is permanently on. See fig. 36.

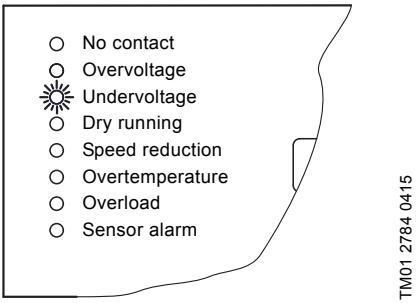


Fig. 36

Possible cause	Remedy
Unstable power supply.	Contact the power supply authorities.
Supply voltage outside voltage range of motor.	Check installation.
Voltage drop in mains is too big.	Increase wire cross-section.

Restarting

When the supply voltage lies within the voltage range of the motor, the motor will restart automatically.

13.4 Dry running

The purpose of the dry-running protection is to protect the pump in case of insufficient water flow.

The dry-running protection makes the conventional dry-running protection unnecessary.

No additional cables to the motor are required.

The dry-running alarm is activated when the load has been below the dry-running power limit for an accumulated time of 5 seconds.

The motor is stopped and "Dry running" is permanently on. See fig. 37.

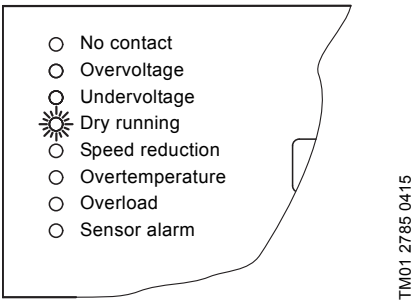


Fig. 37

Possible cause	Remedy
The pump performance is too high compared to the borehole yield.	Replace pump with a smaller one.
	Reduce pump performance using the Grundfos GO display "Maximum speed".
Borehole filter is blocked.	Borehole service is required.

Restarting

After 5 minutes (factory setting), or the period set by means of the Grundfos GO display "Automatic restarting", the motor will restart automatically.

13.5 Speed reduction

At a moderate undervoltage or overload of the motor, the speed is reduced, but the motor is not stopped. The speed reduction indicator light is on, and at the same time the undervoltage or overload light is on.

"Speed reduction" and "Undervoltage" or "Overload" are permanently on.

In fig. 38, the "Speed reduction" alarm was caused by undervoltage.

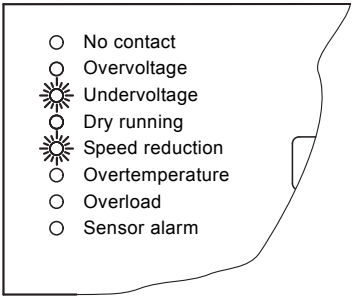


Fig. 38

Possible cause	Remedy
Pump is worn, causing overload.	Pump must be serviced.
Wrong combination of pump and motor, causing overload.	Replace pump or motor.
Unstable power supply, causing undervoltage.	Contact the power supply authorities.
Too big voltage drop over the cable, causing undervoltage.	Size cable to avoid too big voltage drop.

Speed resuming

When the supply voltage lies within the voltage range of the motor again and the cause of the overload has disappeared, the motor resumes normal speed.

13.6 Overtemperature

The motor temperature is monitored continuously during operation.

The motor is factory-set to a maximum value. See section *16. Technical data*.

The motor temperature has exceeded the maximum temperature limit. If the temperature is too high, there is a risk that the motor electronics will be damaged.

The motor is stopped and "Overtemperature" is permanently on. See fig. 39.

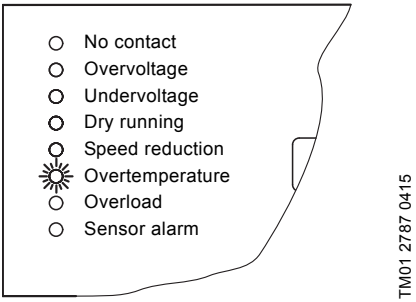


Fig. 39

A too high operating temperature may indicate that the installation needs service.

Possible cause	Remedy
Insufficient cooling or flow velocity along motor.	Take out pump and install flow sleeve.
Insufficient cooling due to incrustation of the motor.	Clean motor. Install flow sleeve.

Restarting

When the motor electronics has cooled sufficiently, the motor will restart automatically. See section *16. Technical data*.

13.7 Overload

The motor is overloaded, i.e. the current consumption of the motor exceeds the limit value.

For more information about the factory setting, see section *16. Technical data*.

The motor is stopped and "Overload" is permanently on. See fig. 40.

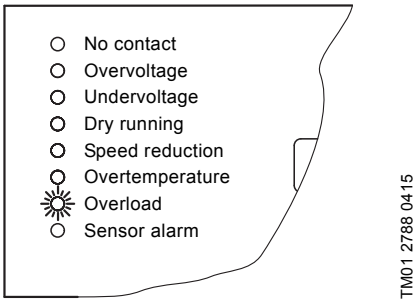


Fig. 40

Possible cause	Remedy
Pump is defective.	Pump must be serviced.
Sand or gravel in pump.	Pump must be serviced.
Wrong combination of pump and motor.	Replace pump or motor.

Restarting:

After 5 minutes (factory setting), or the period set by means of the Grundfos GO display "Automatic restarting", the motor will restart automatically.

13.8 Sensor alarm

The sensor alarm is activated in two incidents:

- If a connected sensor has detected that an alarm limit has been exceeded.
- If the sensor signal has fallen outside the measuring range set.

The motor is stopped and the "Sensor alarm" is permanently on. See fig. 41.

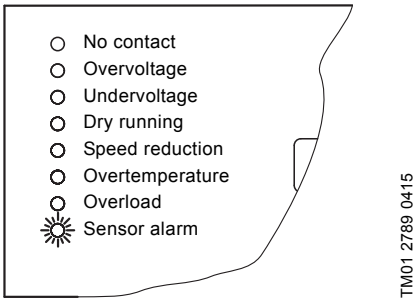


Fig. 41

Restarting

After 5 minutes (factory setting), or the period set by means of the Grundfos GO display "Automatic restarting", the motor will restart automatically.

14. CU 300 with Grundfos GO

The remote control Grundfos GO is used for wireless infra-red communication with CU 300. During communication, there must be visual contact between CU 300 and the Grundfos GO. See fig. 42.

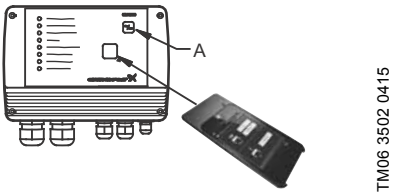


Fig. 42 CU 300 communicating with Grundfos GO

The Grundfos GO offers possibilities of setting and status displays for CU 300.

When the communication between the Grundfos GO and CU 300 has been established, the red indicator light (A) in the On/Off button will flash.

For general use of the Grundfos GO, see the operating instructions for this unit.

The menu structure for the Grundfos GO and CU 300 is divided into three main menus, each containing a number of displays.

- Status
- Settings
- Alarms and warnings

See *14.1 Menu overview* on page 38.

14.1 Menu overview

Status	Section	Page
External setpoint	*15.1.1 External setpoint*	40
Controlled from	*15.1.2 Controlled from*	40
Value, sensor 1	*15.1.3 Value, sensor 1 and 2*	40
Value, sensor 2		
Motor temperature	*15.1.4 Motor temperature*	40
Motor speed	*15.1.5 Motor speed*	40
Digital input	*15.1.6 Digital input*	40
Specific energy	*15.1.7 Specific energy*	40
Accumulated flow	*15.1.8 Accumulated flow*	40
Power consumption	*15.1.9 Power consumption*	40
Energy consumption	*15.1.10 Energy consumption*	40
Operating hours	*15.1.11 Operating hours*	40
Number of starts	*15.1.12 Number of starts*	40

Settings	Section	Page
Operating mode	*15.2.1 Operating mode*	40
Control mode	*15.2.2 Control mode*	40
Setpoint	*15.2.3 Setpoint*	41
Analog input 1	*15.2.4 Analog inputs*	41
Analog input 2		
Limits, sensor 1	*15.2.5 Limits, sensor 1 and 2*	41
Min. stop value, sensor 1	*15.2.6 Min. stop value, sensor 1 and 2*	41
Max. stop value, sensor 1	*15.2.7 Max. stop value, sensor 1 and 2*	41
Limits, sensor 2	*15.2.5 Limits, sensor 1 and 2*	41
Min. stop value, sensor 2	*15.2.6 Min. stop value, sensor 1 and 2*	41
Max. stop value, sensor 2	*15.2.7 Max. stop value, sensor 1 and 2*	41
External setpoint	*15.2.8 External setpoint*	41
Warning temperature	*15.2.9 Warning, temperature*	42
Digital input 1	*15.2.10 Digital input*	42
Flow per pulse	*15.2.11 Flow per pulse*	42
Stop limit, accum. flow	*15.2.12 Stop limit, accumulated flow*	42
Sensor, accum. flow stop	*15.2.13 Sensor, accumulated flow stop*	42
Stop type, sensor 1	*15.2.14 Stop type, sensor 1 and 2*	42
Stop type, sensor 2		
Automatic restarting	*15.2.15 Automatic restarting*	42
Double restarting time	*15.2.16 Double restarting time*	42
Start delay	*15.2.17 Start delay*	43
Dewatering	*15.2.18 Dewatering*	43
Dewatering max. on time	*15.2.19 Dewatering, maximum "On" and "Off" time*	43
Dewatering max. off time		

Continues on page 39.

Continued from page 38.

15. Description of functions

15.1 Status

The "Status" menu for CU 300 offers the possibility of reading operating parameters.

15.1.1 External setpoint

You can read the value of the external setpoint in this display.

15.1.2 Controlled from

This display shows the control source:

- CU 300
- external.

15.1.3 Value, sensor 1 and 2

You can read the values measured by sensor 1 and 2 in these displays.

15.1.4 Motor temperature

The actual temperature of the motor electronics stated in "° C" or "° F".

Tolerance: ± 5 %.

Relation to other displays:

To select "° F", choose this in display *15.2.28 Unit configuration*.

15.1.5 Motor speed

The actual speed stated in min^{-1} (rpm).

Tolerance: ± 1 %.

15.1.6 Digital input

You can read the value measured by the digital input in this display. For instance, the actual flow is shown if the digital input has been connected to a pulse flowmeter and is setup to monitor the flow.

15.1.7 Specific energy

You can read the specific energy in this display.

15.1.8 Accumulated flow

You can read the pumped water quantity in this display.

15.1.9 Power consumption

You can read the actual power consumption in this display.

15.1.10 Energy consumption

You can read the total energy consumption in this display.

15.1.11 Operating hours

The value of operating hours is accumulated from the pump's birth and it cannot be reset.

The value is stored in the motor electronics, and it is kept even if CU 300 is replaced.

The value is updated in the software every 2 minutes of continuous operation. The displayed value is updated every two hours.

15.1.12 Number of starts

The value of number of starts is accumulated from the pump's birth and it cannot be reset.

The value is stored in the motor electronics, and it is kept even if CU 300 is replaced.

15.2 Settings

The "Settings" menu for CU 300 offers the possibility of setting operating parameters.

15.2.1 Operating mode

Select one of the following operating modes:

- *Max.*
  Pump operation is set to maximum speed, irrespective of setpoint. The maximum speed is set in display *15.2.22 Maximum speed* (default: 10,700 min^{-1}).
- *Normal.*
  Normal operating mode, i.e. pump operation is based on the setpoint set in display *15.2.3 Setpoint*.
  Examples: Speed set in display *15.2.3 Setpoint* or sensor control.
- *Min.*
  Pump operation is set to minimum speed, 3000 min^{-1}, irrespective of setpoint.
- *Stop.*
  The pump is stopped.

Factory setting

"Stop".

15.2.2 Control mode

The following settings are available:

- *Open loop.*
  The speed is set to normal operation based on the setpoint set in display *15.2.3 Setpoint* (e.g. 10,700 min^{-1}) or controlled by means of a signal connected to analog input 2.
  See section *9. CU 300 connected to potentiometer*.
- *Closed loop.*
  Controlling according to sensor 1 (type and unit).
  Example: Constant-pressure control.
  See section *6. CU 300 with constant-pressure control - 0 to 10 bar*.

Relation to other displays:

The unit (min^{-1}) of display *15.2.3 Setpoint* is changed according to the unit of the sensor installed.

Factory setting

"Open loop"

15.2.3 Setpoint

Setting range: *3000-10,700 min^{-1}* (100 min^{-1} intervals).

Dry-running protection

If you use "Setpoint" to reduce the speed, the dry-running protection will apply only in the "maximum speed" range, i.e. maximum speed less than 1000 min^{-1}. See section *4.3.1 Function*.

Relation to other displays

The setting in display *15.2.3 Setpoint* is overridden by the "Max." and "Min." settings in display *15.2.1 Operating mode*.

If you select "Closed loop" in display *15.2.2 Control mode*, the setpoint is set within the setting range of the installed sensor.
Example: If the analog input 1 is connected to a pressure sensor using the unit metre (m) and the measuring range (0-60), you can set the setpoint between 0 and 55 m in display *15.2.3 Setpoint*.

Factory setting

"10,700 min^{-1}"

15.2.4 Analog inputs

Make the following settings according to sensor type:

- Sensor output signal: **"-"** (not active), *0-20 mA, 4-20 mA, 0-10 V, 2-10 V.*
- Setting range unit: m^3/h, m, %, GPM, ft.

Setting range:

- Minimum value: 0-249 (0, 1, 2, ...249).
- Maximum value: 1-250 (1, 2, ...250).

Factory setting

Sensor output signal: "Not active"

Setting range unit: "m".

15.2.5 Limits, sensor 1 and 2

In these displays, you can set the warning and alarm limits for sensor 1 and 2.

15.2.6 Min. stop value, sensor 1 and 2

In these displays, you can set the minimum value at which the pump must stop for sensor 1 and 2.

15.2.7 Max. stop value, sensor 1 and 2

In these displays, you can set the maximum value at which the pump must stop for sensor 1 and 2.

15.2.8 External setpoint

Set the pump performance control by means of an external signal.

To be used in the following two situations:

- For installations including a potentiometer.
- In large SCADA systems.
  In SCADA systems, this function makes it possible to control pump performance via remote controlling (e.g. via a PC).

The following settings are available:

- SPP 1.
  Grundfos potentiometer.
  See section *2.1 Expansion possibilities*.
- 4-20 mA.
- 0-20 mA.
- 2-10 V.
- 0-10 V.
- "Not active"
  No external setpoint setting made.

Description

By connecting a current or voltage signal to analog input 2, you can control the motor speed between the setpoint set in display *15.2.3 Setpoint* and the lowest speed of 3000 min^{-1}.

If the setpoint is set to 10,700 min^{-1} in display*15.2.3 Setpoint*, the motor speed can be changed between 3000 and 10,700 min^{-1}.

The actual setpoint is calculated by CU 300 and shown in display *15.2.3 Setpoint*.

If an SPP 1 potentiometer is connected, the internal voltage supply of CU 300 is used to generate the signal.

See section *9. CU 300 connected to potentiometer*.

Relation to other displays

If you have set display *15.2.2 Control mode* to "Closed loop" instead of "Open loop" (factory setting), the controlling is based on signals from analog input 1. Therefore, the unit in display *15.2.3 Setpoint* is changed from min^{-1} to the unit of sensor 1 (m^3/h, m, %, GPM, ft).

Factory setting

"Not active".

15.2.9 Warning, temperature

Set the temperature warning limit of the motor.

Setting range: "-" (not active), 2, 4, 6, ...85 °C.

Note

The maximum temperature depends on the motor type.

Set the temperature warning limit between normal operating temperature and maximum temperature.

Relation to other displays

You find the actual operating temperature in display *15.1.4 Motor temperature*.

If the temperature warning limit is exceeded, the alarm signal relay operates.

Advantage

Instead of a sudden stop without a warning, you get the following:

- Information that the motor temperature is rising.
- The possibility of planning service of the installation.

Usage

You can use this function e.g. if the pumped liquid contains a relatively high level of ochre.

Factory setting

"Not active".

15.2.10 Digital input

Select one of the following functions:

- The digital sensor connected to the digital input (flow measuring).
- The external on/off switch for the pump.

The following functions are available:

- *Not active*.
- *Stop*.
  The pump is stopped when a switch connected to terminals 12 and 13 is closed. No l/pulse to be set.
  See section *15.2.10 Digital input*.
- *Start*.
  The pump is started when a switch connected to terminals 12 and 13 is closed. No l/pulse to be set.
  See section *15.2.10 Digital input*.
- *Flow*.
  If you have selected "Flow", the l/pulse value must also be set.
  Setting range: **"-"** (not active), 0.1, 0.2, 0.3,....20, 21, 22, ...100 l/pulse.

Relation to other displays:

The selection of "Flow" in this display makes display *15.2.10 Digital input* available, i.e. status of digital input.

Factory setting

"Not active".

15.2.11 Flow per pulse

In this display the pumped volume per pulse is set.

Setting range: 0.0, 0.1, 0.2, 0.3, ...20, 21, 22, ...100 l/pulse.

For more information, see section *15.2.10 Digital input*.

Factory setting

"0.0 l/pulse"

15.2.12 Stop limit, accumulated flow

In this display, you can set a limit at a specific amount of pumped water where the pump must stop.

Factory setting

"Disabled".

15.2.13 Sensor, accumulated flow stop

In this display, you can select the sensor for monitoring the accumulated flow.

Factory setting

"Disabled".

15.2.14 Stop type, sensor 1 and 2

In these displays, you can set the stop type for sensor 1 and 2. For further information, see *8.2.3 Start and stop limits*.

Factory setting

"Disabled".

15.2.15 Automatic restarting

Set the automatic restart time from stop to restart attempt.

The following settings are available:

- "Enabled"
- "Disabled"
- 0 to 254 minutes.

Factory setting

"5 minutes".

15.2.16 Double restarting time

The following settings are available:

- enabled
- disabled.

When you have selected "Enabled", the restart time set will be doubled automatically for every 10 motor stops caused by an alarm. The time is doubled up to a stop time of 4 hours. After 10 hours of operation without an alarm, the restart time is automatically set to:

- The time set in the "Time" field.
- 5 minutes (factory setting) if no setting was made in the "Time" field.

Relation to other displays:

If you have selected "Double", the dewatering function is disabled.

15.2.17 Start delay

Set a start delay.

This function is used in installations where several pumps are connected to the same pipeline and where it is required that the pumps do not start up at the same time.

The SQE pumps have a built-in soft starter, which takes the starting current into account.

Setting range: *0-60 s*.

Factory setting

"0 s"

15.2.18 Dewatering

For more information about the dewatering function, see *4.5 Description of the dewatering function*.

The following settings are available:

- enabled
- disabled.

Relation to other displays

You can set the pump on and off times in the displays *15.2.19 Dewatering, maximum "On" and "Off" time*.

Factory setting

"Disabled".

15.2.19 Dewatering, maximum "On" and "Off" time

In these displays, you set the maximum "On" and "Off" time for the pump for the dewatering function.

For more information, see section *4.5 Description of the dewatering function*.

Operating indication

The dry-running alarm indication on CU 300 is automatically disabled, when this display setting is made.

When you select the setting "Disabled", the dewatering function is disabled, and the dry-running alarm indication can be activated again.

Relation to other displays:

If you select "Double" in display *15.2.15 Automatic restarting*, the dewatering function is disabled.

Factory setting

"Disabled"

15.2.20 Dry-running protection

The following settings are available:

- enabled
- disabled.

The setting in this display applies to both the dewatering function and the dry-running protection.

In certain installations, it may be necessary to disable the dry-running protection.

For further information, see section *4.3 Description of dry-running protection*.

Factory setting

"Enabled".

15.2.21 Dry-running stop

The dry-running stop value (dry-running power limit) is factory-set.

The value depends on the actual motor.

The factory setting depends on the power rating of the motor. See section *16. Technical data*.

When the dry-running protection or the dewatering function is to be enabled, the minimum value of the pump power input must be set in this display.

For further information, see section *4.5 Description of the dewatering function*.

Setting range: *0-2500 W*.

Relation to other displays

15.2.20 Dry-running protection must be set to "Enabled".

If you have enabled "Double" in display *15.2.16 Double restarting time*, the dewatering function is disabled.

You can read the actual pump power input in display *15.1.9 Power consumption*.

Factory setting

Motor size	Dry-running stop
0.7 kW	300 W
0.7 kW (SQ/SQE 2-55)	550 W
1.15 kW	680 W
1.55 kW	800 W
1.85 kW	900 W

15.2.22 Maximum speed

Set the maximum speed.

Setting range: 3000 - 10,700 min^{-1}.

Factory setting

10,700 min^{-1}.

15.2.23 Buttons on product

In this display, you can disable the On/Off button on the control unit for protective reasons.

You can set the On/Off button to:

- "Active"
- "Not active".

Factory setting

"Active".

15.2.24 Number

Allocate a number to CU 300 and the pump connected. CU 300 and the pump must have the same number.

Note

When allocating a number, the power supply to other CU 300 units, if any, must be switched off.

Setting range: "Not active", 1, 2, ...199.

Once a number setting has been made, the factory setting (not active) is no longer available.

In connection with bus communication, you must allocate a number to CU 300 and the pump.

If CU 300 and the pump do not have the same number, the alarm "No contact" will be indicated.

Factory setting

"Not active".

15.2.25 Store settings

You can store the actual settings for later use in this display.

15.2.26 Recall settings

You can recall the last stored settings that the pump will then use in this display.

15.2.27 Undo

You can undo previously made settings in this display.

15.2.28 Unit configuration

You can select between SI and US units in this display. The setting can be made generally for all parameters or customised for each individual parameter.

15.3 Alarms and warnings

15.3.1 Alarm and warning logs

These displays show the types of warnings and alarms that may have appeared.

Possible warnings and alarms are described in the following table:

Indication	Description
No fault indication	No alarms are registered by CU 300.
No contact to pump	No communication between CU 300 and the pump.
Overvoltage	The supply voltage exceeds the limit value.
Undervoltage	The supply voltage is below the limit value.
Dry running	The dry-running protection of the pump has been activated.
Overtemperature	The motor temperature exceeds the limit value.
Overload	The current consumption of the motor exceeds the limit value.
Alarm, sensor 1	The sensor 1 signal has fallen outside the measuring range set. Note: The sensor number refers to the terminal connection input number.
Alarm, sensor 2	The sensor 2 signal has fallen outside the measuring range set. Note: The sensor number refers to the terminal connection input number.
Sensor 1 defective	The sensor signal of a 4-20 mA or 2-10 V sensor is below 2 mA or 1 V respectively.
Sensor 2 defective	The sensor signal of a 4-20 mA or 2-10 V sensor is below 2 mA or 1 V respectively.
Warning, sensor 1	The sensor 1 warning limit has been exceeded.
Warning, sensor 2	The sensor 2 warning limit has been exceeded.
Warning, temperature	The temperature warning limit has been exceeded.

Relation to other displays:

The setting in display *15.2.3 Setpoint* is overridden by the "Max." and "Min." settings in display *15.2.1 Operating mode*.

If you select "Closed loop" in display *15.2.2 Control mode*, the setpoint is set within the setting range of the installed sensor.
Example: If the analog input 1 is connected to a pressure sensor using the unit metre (m) and the measuring range (0-60), you can set the setpoint between 0 and 55 m in display *15.2.3 Setpoint*.

16. Technical data

Supply voltage

1 x 100-240 V - 10 %/+ 6 %, 50/60 Hz, PE.

Power consumption

5 W.

Backup fuse

Maximum 16 A.

Current consumption

Maximum 130 mA.

Mains borne signalling

Frequency shift keying (FSK).
(132.45 kHz, ± 0.6 kHz).

Enclosure class

IP55.

Maximum difference between CU 300 and pump

200 metres.

Ambient temperature

- During operation: -30 to 50 °C
  (must not be exposed to direct sunlight).
- During storage: -30 to 60 °C.

Weight

2.0 kg.

Relative air humidity

Maximum 95 %.

Materials

The CU 300 box is made of black PPO.

EMC (Electromagnetic compatibility)

See *Declaration of conformity* on page 48.

Dimensional sketch

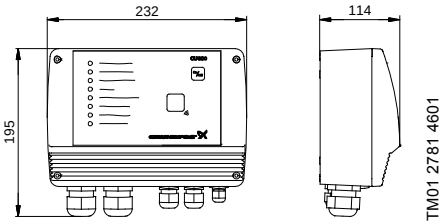


Fig. 43

Inputs/output

Alarm relay	Potential-free changeover contact. Maximum contact load: 250 VAC. Maximum current: 1 A. Minimum contact load: 5 VDC, 10 mA. Specifications: 250 VAC, 8 A, AC1.
Auxiliary relay	Potential-free changeover contact. Maximum contact load: Safety extra-low voltage to be used only. Maximum current: 1 A. Minimum contact load: 5 VDC, 10 mA. Specifications: 250 VAC, 8 A, AC1.
Digital input	External potential-free contact. Logic "0": U_{in} > 3.2 V. Logic "1": U_{in} < 0.9 V.
Sensor 1	Voltage signal: 0-10 VDC/2-10 VDC, R_i = 11 kΩ. Tolerance: at maximum voltage signal. Screened cable is recommended. Maximum cable length: 500 m. Current signal: DC 0-20 mA/4-20 mA, R_i = 500 Ω. Tolerance: ± 3 % at maximum current signal. Screened cable is recommended. Maximum cable length: 500 m.
Sensor 2	Potentiometer SPP 1: 0-24 VDC, 10 kΩ (via internal voltage supply). Screened cable is recommended. Maximum cable length: 100 m. Voltage signal: 0-10 VDC/2-10 VDC, R_i = 11 kΩ. Tolerance: ± 3 % at maximum voltage signal. Screened cable is recommended. Maximum cable length: 500 m. Current signal: DC 0-20 mA/4-20 mA, R_i = 500 Ω. Tolerance: ± 3 % at maximum current signal. Screened cable is recommended. Maximum cable length: 500 m.
RS-485	Grundfos fieldbus, GENIbus. 0.25 - 1 mm^2 screened 2-core cable. Maximum cable length: 1200 m.

Factory settings

Alarm	200-240 V motors				100-115 V motors
	0.7 kW	**1.15 kW**	**1.55 kW**	**1.85 kW**	**0.7 kW**
Overvoltage[1)]	320 VAC	320 VAC	320 VAC	320 VAC	185 VAC
Undervoltage	Speed reduction: 190 V	Speed reduction: 190 V	Speed reduction: 210 V	Speed reduction: 210 V	Speed reduction: 90 V
	Stop limit: 150 V	Stop limit: 150 V	Stop limit: 150 V	Stop limit: 150 V	Stop limit: 75 V
Dry-running stop	300 W 550 W[2)]	680 W	800 W	900 W	300 W
Dry-running protection	"Active" (Grundfos GO setting). See section *15.2.20 Dry-running protection*)				
Speed reduction	In connection with undervoltage or overload				
Electronics temperature	Stop limit: 65 °C	Stop limit: 75 °C	Stop limit: 85 °C	Stop limit: 85 °C	Stop limit: 85 °C
	Restart: 55 °C	Restart: 65 °C	Restart: 75 °C	Restart: 75 °C	Restart: 75 °C
Overload	5.2 A	8.4 A	11 A	12.3 A	12.1 A
Sensor alarm	"No sensor used" (Grundfos GO setting). See section *15.2.4 Analog inputs*)				

1) 200-240 V motors: Operation is guaranteed up to 280 VAC.
100-115 V motors: Operation is guaranteed up to 150 VAC.
In order to avoid unnecessary stops, the overvoltage stop limit is as stated.

2) Applies only to SQ/SQE 2-55.

Accuracy of Grundfos GO readings

Display	Accuracy
External setpoint	± 5 %
Motor temperature	± 5 %
Motor speed	± 1 %
Power input	± 5 %
Power consumption	± 5 %
Energy consumption	± 5 %

Sensors

The sensor signal accuracy depends on the sensor type. See the sensor specifications in question.

17. Disposal

This product or parts of it must be disposed of in an environmentally sound way:

1. Use the public or private waste collection service.
2. If this is not possible, contact the nearest Grundfos company or service workshop.

Subject to alterations.

Declaration of conformity

GB: EC/EU declaration of conformity

We, Grundfos, declare under our sole responsibility that the product CU 300, to which the declaration below relates, is in conformity with the Council Directives listed below on the approximation of the laws of the EC/EU member states.

Note: There are two sets of Council Directives and standards listed below. One set applies until and including 19th April 2016. The other set applies from 20th April 2016 and onwards.

These Directives and standards apply until and including 19th April 2016:

– Low Voltage Directive (2006/95/EC).
  Standards used:
  EN 60335-1:2012
– EMC Directive (2004/108/EC).
  Standards used:
  EN 55014-1:2006 + A1:2009 + A2:2011
  EN 55014-2:1997 + A1:2001 + A2:2008

These Directives and standards apply from 20th April 2016 and onwards:

— Low Voltage Directive (2014/35/EU).
  Standards used:
  EN 60335-1:2012
— EMC Directive (2014/30/EU).
  Standards used:
  EN 55014-1:2006 + A1:2009 + A2:2011
  EN 55014-2:1997 + A1:2001 + A2:2008

This EC/EU declaration of conformity is only valid when published as part of the Grundfos installation and operating instructions (publication number 96427972 0915).

Bjerringbro, 15th June 2015

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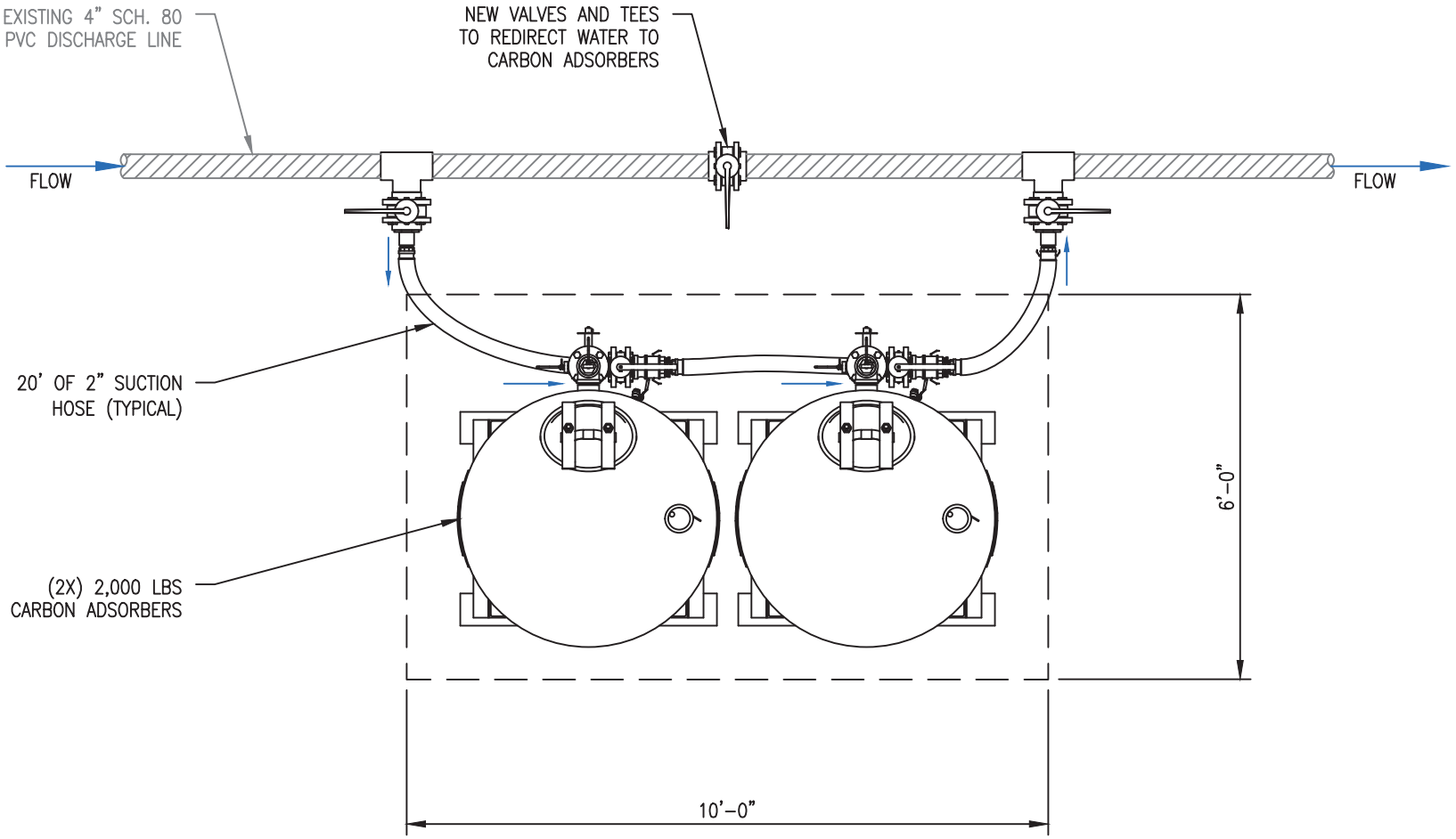
TEMPORARY TREATMENT SYSTEM - OPTION 3

OVERALL PLAN VIEW



NOTES:

1. DESIGN FLOW RATE: 25 GPM
2. SYSTEM FOOTPRINT APPROXIMATELY 6'x10'
3. NOT ALL VALVES, CONNECTIONS, ETC. SHOWN FOR CLARITY

REV.	DATE	BY	REMARKS
A	04/28/22	RS	PRELIMINARY DESIGN FOR REVIEW

CUSTOMER: VERDANTAS

SITE: LONG ISLAND, NY

TITLE: EQUIPMENT LAYOUT OPTION 3 TEMPORARY TREATMENT SYSTEM

SCALE: NTS

DRAWN BY: RS DATE: 04/28/22

APPROVED BY: JMB DATE: 04/28/22

DWG SIZE: A | SHEET: 1 OF 1 | DRAWING NO.: Q010109-M-401 | A

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ATTACHMENT C

OU3 GWCS Detailed Construction Scope of Work

Appendix C

Detailed Scope of Work: MW-4-1 and MW-4-2 Retrofit 5/12/2022

1. Modifications at RW-1, MW-4-1, and MW-4-2:
    a. Mobilize to Site, see **Figure 1**.
    b. Run 350 feet of 2-inch HDPE (water conveyance) SDR11 or SDR17 and 1.5-inch Schd. 80 PVC electrical conduit from MW-4-1 and MW-4-2 to RW-1 as shown in **Figures 3** and **4.** Piping will be installed in a 1-foot wide by 4 feet deep trench. Geophysical and electromagnetic utility locates must be performed prior to this activity. Perform utility locate callout service 811.
    c. Build new Kindorf electrical rack with stainless steel parts.
    d. Install two new, rack mounted, NEMA 4x rated enclosures for two new 30A non-fused electrical disconnect switch panels for MW-4-1 and MW-4-2.
    e. Install two new, rack mounted, NEMA 4x rated enclosure for two new Grundfos C300 pump controllers for MW-4-1 and MW-4-2. See **Figure 4**.
    f. Remove existing well casings for MW-4-1 and MW-4-2 and replace with 3’ x 5’ x 4’ concrete access vaults at each well.
    g. Install a submersible well pump, support cable, and 1.5” HDPE SDR-17 discharge piping in MW-4-1 and MW-4-2. Pumps provided by Verdantas.
    h. Install a totalizer, sample port, check valve, manual ball valve, pressure indicator, and true unions for O&M access in the MW-4-1 and MW-4-2 well head piping accessible by the concrete vaults. All well head valves, fittings, and unions are Schd. 80 PVC. Totalizing flow meters to be provided by Verdantas.
    i. Expose the 3” HDPE groundwater conveyance piping at RW-1 and install 3’ x 5’ x 4’ concrete vault. Tie-in the MW-4-1 and MW-4-2 water conveyance piping into the existing RW-1 water conveyance piping. Install a new 3” ball valve and check valve on the RW-1 side of the tie-in location, accessible by the concrete vault to control flow from either or both wells and to ensure that groundwater from MW-4-1 and MW-4-2 cannot flow to RW-1. All valves, fittings, and unions are Schd. 80 PVC.
    j. Electrical wiring for MW-4-1 and MW-4-2 will be tied into the existing 480 volt, 3-phase service panel at RW-1 from the service side of the disconnect and run to the new power rack. Power to recovery well pump will be 480 volt, 3-phase on the service side, 230 volt, 1-phase to the recovery well pump.
    k. For MW-4-1 and 4-2, provide and install new pull box to facilitate pump wire management. Pull 2 pair, 4# 8's from new Switch to existing RW-1 disconnect. Tap line side of switch using approved connectors or by changing line side lugs to accept secondary conductors. Make connection to new switch and pull box with PVC conduit installed by others.
2. Modifications at the existing OU3 Groundwater Treatment System:
    a. Modify the existing 4” PVC discharge line in the treatment building to install an LGAC treatment loop (see **Figure 2**) as follows:

i. Cut the existing above-ground 4” SCHD 80 PVC discharge line, before it exits the treatment building, and install two 4” Tees that will exit the building.
ii. Between the two Tees, install a 4” manual ball-valve for bypass.
iii. Install new, above-ground, 4” SCHD 80 PVC that routes out of the building to the two new LGAC vessels, then from the LGAC vessels back inside to reconnect to the discharge line.
iv. It is anticipated the treatment trailer will be located to the west of the existing treatment plant,

3. Startup and Testing:
    a. All new water conveyance piping will be hydraulically or pneumatically tested to 1.5 times the maximum operating pressure prior to being placed in service.
    b. MW-4-1 effluent, MW-4-2 effluent, and system samples will be collected immediately on Day 1 of operation for rush turnaround analysis for VOCs. Following sample collection, MW-4-1 and MW-4-2 will be turned off pending confirmation of the treatment system VOC removal efficiency.
    c. Collect air stripper vapor treatment system discharge sample while MW-4-1 and 4-2 are in operation for performance verification.
    d. Based on sampling results, MW-4-1 and 4-2 will be placed into regular service.