# ATTACHMENT 3.0-3.17: TECHNICAL DATA (AND COST) FOR LEAK DETECTION PUMPS

CALCULATION SUMMARY

# TECHINAL DATA (AND COST) FOR LEAK DETECTION PUMPS

This calculation summary provides a brief overview of the technical data for the leak detection and removal system pumps utilized in the Federal Waste Facility (FWF). Due to differences in the codes/regulations, waste sources/types, and design criteria, no leak pump is required in the Compact Waste Facility (CWF). Please refer to Drawing Sheet C2.11 contained in Appendix 3.0-2. Also, refer to flow rate and capacity computation for the leak detection and removal pump contained in the Miscellaneous Water Calculation Attachment in this Appendix (3.0-3).

This document (calculation summary) and the calculation detail are from internal URS calculation WCS-004-CKA-006 and also refer to WCS-004-CKA-002 for the leak detection and removal system pumps.

## OBJECTIVE:

Provide technical data including cost, pump curves, pump dimensions, pump clearance inside of side slope pipe, instrumentation, and controls.

## SOLUTIONS/CONCLUSIONS/RESULTS:

Technical data concerning the leak detection and removal pumps is provided including cost, pump curves, pump dimensions, pump clearance inside of side slope pipe (refer to Technical Data (and Cost) for Leachate Collection and Removal Pumps Attachment), instrumentation, and controls. The Operator (Applicant) will ultimately decide which manufacturer pump to utilize.

## CALCULATION BASIS:

Criteria, Given Data/Inputs, and Assumptions refer to applicable portions of those same subheadings contained in the Miscellaneous Water Calculation Attachment in this Appendix (3.0-3). The reader is referred to that attachment for the calculation basis pertaining to the leak detection and removal pump.

## References:

Grundfos, "Grundfos Product Guide, Redi-Flo3 and CU 300, Environmental Pumps," L-RF-TL-014, Olathe, KS, 2003, (accessed 3 May 2004)., http://www.grundfos.com/web/homeus.nsf, refer to entire document. (15Redi-Flo3-170 Pump.)

Form NQAP-3.3
June 2003

# CALCULATION COVER SHEET

| | |
|---|---|
| Project No.: 39400004.00300 | Calc. No.: WCS-004-CKA-006 |
| Client: | |
| Associated Report Title: (if applicable) | |
| Calc. Title (Problem Statement): | Technical data and cost for leak collection and detection pumps in the Federal facility. |
| Information Given: | Electronic specifications are located at G:\WCS\Calculation packs\Pumps. Email communications are included in this package.<br><br>Andrew Lindemann of Geotech Environmental Equipment, Inc., did not provide a functional pH range for the pump, however he did indicate that it was for remediation pumping, leachate recovery, pollution recovery, and dewatering. |
| Assumptions: | See Calc No. WCS-004-CKA-002. |
| References: | http://www.grundfos.com/web/homeus.nsf & http://www.geotechenv.com |

REVIEW ASSIGNMENT

| Assigned Checker: NA | No Check Required x (PM Approved) |
|---|---|
| Type of Calculation: | Scope of Review: (P – Partial, C – Complete) |
| ☐ Hand Calculation<br>☐ Spread Sheet Calculation<br>☐ Computer Program Calculation<br>☒ Other For Information Only (Reference) | ☐ Math Check – P or C<br>☐ Method of Analysis – P or C<br>☐ Input Information – P or C<br>☐ Assumptions – P or C<br>☐ Compare w/Previous Calculations – P or C<br>☐ Other |

REVISION BLOCK

| Rev. | Originator | Date | Checker | Date | PM | Date | Comments (optional) |
|---|---|---|---|---|---|---|---|
| 0 | CKA | 5/06/04 | N/A | | | | For Reference Only |
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| | | | | | | | |

URS **Christopher Anderson**
05/05/04 12:38 PM

To: sales@geotechenv.com
cc:
Subject: Redi-Flo3 Questions

Mr. Popiel or other Sales Rep.,

From the Grundfos website, I found your name as a sales contact for their pumps. URS Corporation is concluding design on a radioactive waste disposal (RWD) site in west Texas that includes leak detection and collection. From the Grundfos website, I down-loaded a product guide on environmental pumps that contains some data but need more specific details about the 15Redi-Flo3-170. These questions include:

Is application of this type of pump for leak collection at a RWD site within its design function?
What pH range can the pump handle?
Is there a recommendation on operational life?
What is the initial cost of the pump and accessories?

Thanks for your help,

Christopher K. Anderson, PE
URS Corporation
756 East Winchester Street, Suite 400
Salt Lake City, UT 84107
Phone: 801.904.4000
Fax: 801.904.4100
Direct: 801.904.4026
christopher_anderson@urscorp.com
www.urscorp.com

"Andrew Lindemann" <AndrewL@geotechenv.com>

05/06/04 11:32 AM

To: <Christopher_Anderson@URSCorp.com>
cc:
Subject: Grundfos Pump Inquiry

Christopher,

We have installed many of these kinds of pumps in other radioactive sites, with-out failure due to radiation. (Example: Westinghouse Savannah River) Each site is unique and could cause unexpected results. Unfortunately I cannot answer this question.

As for the pH Range of this pump, there are no specifications besides compatibilities with the materials of the pump.

The pump applications specifications are for Remediation pumping, Leachate recovery, Pollution recovery, and dewatering..

I have attached an owner's manual to this email...

Please call me, or email me if you have further questions..

*Andrew Lindemann*

National Sales Manager

**Geotech Environmental Equipment, Inc.**

ph 800-833-7958 fax 303-322-7242

www.geotechenv.com

"Andrew Lindemann" <AndrewL@geotechenv.com>

To: <Christopher_Anderson@urscorp.com>
cc:
Subject: RE: Grundfos Pump Inquiry

05/06/04 04:16 PM

The list price for this pump is $1258.00
You'll also need Motor Lead.
Some other Options are:
**CU-300** (Recommended for trouble shooting errors and communicating with the pump using the R-100)
**R-100** Remote (Great for changing setting /preprogramming of the Pump)
**Potentiometer** (control the speed of the pump with out the R-100)
**G-100** (used for remote communication of 1 or more pumps)
**Geotech Transducer** (for level control)

For a more accurate price, you can contact us with more information about the site and what you're interested in accomplishing, and then we would be able to assist in the correct design and ultimately discount a package system.

Let me know how I can assist you further.

Andrew Lindemann
National Sales Manager
Geotech Environmental Equipment, Inc.
ph 800-833-7958 fax 303-322-7242
www.geotechenv.com

-----Original Message-----
From: Christopher_Anderson@URSCorp.com
[mailto:Christopher_Anderson@URSCorp.com]
Sent: Thursday, May 06, 2004 3:57 PM
To: Andrew Lindemann
Subject: Re: Grundfos Pump Inquiry

Andrew,

Thank you for the information. I did not receive the attachment (owners manual for the Redi-Flo3), could you please resend it.
Also, what is the approximate cost of the 15Redi-Flo3-170 or similar?

Thanks,

Christopher K. Anderson, PE
URS Corporation
756 East Winchester Street, Suite 400
Salt Lake City, UT 84107
Phone: 801.904.4000
Fax: 801.904.4100
Direct: 801.904.4026
christopher_anderson@urscorp.com
www.urscorp.com

RF3.pd

URS **Christopher Anderson**
05/06/04 04:42 PM

To: "Andrew Lindemann" <AndrewL@geotechenv.com>
cc:
Subject: RE: Grundfos Pump Inquiry

Thanks the attachment and cost.

Christopher K. Anderson. PE
URS Corporation
756 East Winchester Street, Suite 400
Salt Lake City, UT 84107
Phone: 801.904.4000
Fax: 801.904.4100
Direct: 801.904.4026
christopher_anderson@urscorp.com
www.urscorp.com

# LIMITED WARRANTY

Products manufactured by GRUNDFOS are warranted to the original user only to be free of defects in material and workmanship for a period of 18 months from date of installation, but not more than 24 months from date of manufacture. GRUNDFOS' liability under this warranty shall be limited to repairing or replacing at GRUNDFOS' option, without charge, F.O.B. GRUNDFOS factory or authorized service station, any product of GRUNDFOS manufacture. GRUNDFOS will not be liable for any costs of removal, installation, transportation, or any other charges which may arise in connection with a warranty claim. Products which are sold but not manufactured by GRUNDFOS are subject to the warranty provided by the manufacturer of said products and not by GRUNDFOS' warranty. GRUNDFOS will not be liable for damage or wear to products caused by abnormal operating conditions, accident, abuse, misuse, unauthorized alteration or repair, or if the product was not installed in accordance with GRUNDFOS printed installation and operating instructions.

To obtain service under this warranty, the defective product must be returned to the distributor or dealer of GRUNDFOS products from which it was purchased together with proof of purchase and installation date, failure date, and supporting installation data. Unless otherwise provided, the distributor or dealer will contact GRUNDFOS or an authorized service station for instructions. Any defective product to be returned to GRUNDFOS or a service station must be sent freight prepaid; documentation supporting the warranty claim and/or a Return Material Authorization must be included if so instructed

**MANUFACTURER WILL NOT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES, LOSSES, OR EXPENSES ARISING FROM INSTALLATION, USE, OR ANY OTHER CAUSES. THERE ARE NO EXPRESS OR IMPLIED WARRANTIES, INCLUDING MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, WHICH EXTEND BEYOND THOSE WARRANTIES DESCRIBED OR REFERRED TO ABOVE. EXCEPT AS EXPRESSLY HEREIN PROVIDED THE GOODS ARE SOLD "AS IS", THE ENTIRE RISK AS TO QUALITY AND FITNESS FOR A PARTICULAR PURPOSE, AND PERFORMANCE OF THE GOODS IS WITH THE BUYER, AND SHOULD THE GOODS PROVE DEFECTIVE FOLLOWING THEIR PURCHASE, THE BUYER AND NOT THE MANUFACTURER, DISTRIBUTOR, OR RETAILER ASSUMES THE ENTIRE RISK OF ALL NECESSARY SERVICING OR REPAIR.**

Some jurisdictions do not allow the exclusion or limitation of implied warranties of merchantability and fitness for a particular purpose, of incidental or consequential damages and some jurisdictions do not allow limitations on how long implied warranties may last or require you to pay certain expenses as set forth above. Therefore, the above limitations or exclusions may not apply to you. This warranty gives you specific legal rights and you may also have other rights which vary from jurisdiction to jurisdiction.

The telephone number of our service and repair facilities central directory, from which you can obtain the locations of our service and repair facilities is, 1-800-333-1366.



GRUNDFOS
*Leaders in Pump Technology*
**Grundfos Pumps Corporation** • 3131 N. Business Park Ave., Fresno, CA 93727
**Customer Service Centers:** Allentown, PA • Fresno, CA
**Phone:** (800) 333-1366 • **Fax:** (800) 333-1363
**Canada:** Oakville, Ontario • **Mexico:** Apodaca, N.L.
***Visit our website at www.us.grundfos.com***

L-RF-IO-008 Rev 2/00
PRINTED IN USA

# Redi-Flo3

## SQE-NE
## Environmental Pumps

# Installation and Operating Instructions

- **Efficient Permanent Magnet Motor**
- **High Starting Torque**
- **Soft Start**
  (2 seconds to reach maximum rpm, and maximum pressure)
- **Built-in "Smart" Motor Protection with automatic restart**
- **Communication Through the Redi-Flo3 Status Box**
- **Integrated Protection Against Adverse Conditions**
- **Environmental Materials of Construction**

***Please leave these instructions with the pump for future reference***

GRUNDFOS
*Leaders in Pump Technology*

# SAFETY WARNING

## Electrical Work

**WARNING:**To reduce the risk of electric shock during operation of this pump requires the provision of acceptable grounding. If the means of connection to the supply connected box is other than grounded metal conduit, ground the pump back to the service by connecting a copper conductor (at least the size of the circuit supplying the pump) to the grounding screw provided within the wiring compartment.

# Pre-Installation Checklist

## 1. Well Preparation

If the pump is to be installed in a new well then the well should be fully developed and bailed or blown free of cuttings and sand. The construction of the GRUNDFOS Redi-Flo3 submersibles makes it resistant to abrasion: however, no pump made of any material can forever withstand the destructive wear that occurs when constantly pumping sandy water.

## 2. Make Sure You Have the Right Pump

Determine the maximum depth of the well, and the drawdown level at the pump's maximum capacity. Pump selection and setting depth should be made based on this data.

## 3. Pumped Fluid Requirements

Submersible well pumps are designed for pumping turbid free, cool water; free of air or gases. Possible decreased pump performance and life expectancy can occur when operating in conditions outside of this chemistry. Water temperature ideally should not exceed 104°F. Extended pump life and optimal performance can best be obtained through proper well development and in the case of higher fluid temperatures use a cooling shroud.

A check should be made to ensure that the installation depth of the pump will always be at least three feet below the maximum drawdown level of the well (Fig.1). The bottom of the motor should never be installed lower than the bottom of the screen.

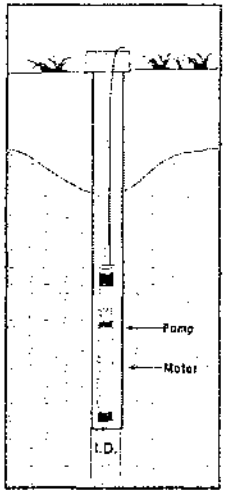



Fig 1

## 4. Motor Cooling Requirements

To ensure proper motor cooling refer to the table below for minimum flow requirements:

| Flow velocity past the motor | Maximum liquid temperature |
|---|---|
| 0.0 f/s (free convection) | 86° F(30°C) |
| Min. 0.5 f/s | 104°F (40°C) |



# Pre-Installation Checklist

If the pump is to be installed horizontally, e.g. in a tank, and there is a risk that the pump might be covered by mud, it must be installed in a flow sleeve.

**Liquid temperatures/cooling**

Figure 2 shows an operating Redi-Flo3 pump installed in a well.

Figure 2 illustrates the following:

- Well diameter.
- Pump diameter.
- Temperature of pumped liquid.
- Flow past the motor to the pump strainer.

Note: The well diameter must be at least 3". If there is a risk that the motor will be covered with sediment or the pumped fluid is at an elevated temperature then it is recommended the pump be placed in a Flow Sleeve. The motor should always be installed above the well screen.

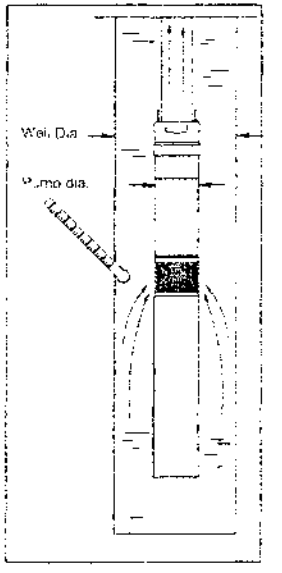



Fig. 2

## 5. Applications

**Typical applications:**

Environmental applications such as:

- Remediation pumping.
- Leachate recovery.
- Pollution recovery.
- Dewatering

## 6. Motor Preparation

GRUNDFOS MSE3-NE submersible motors have water-lubricated slide bearings. No additional lubrication is required.

The submersible motors are factory-filled with a special GRUNDFOS motor liquid (type SML 2), which will protect the motor fluid down to -4°F(20°C) and to prevent the growth of bacteria. The level of motor fluid is important for the operating life of the bearings and consequently the life of the motor.

**Refilling of motor liquid**

It is recommended to check and if needed, refill the motor with GRUNDFOS motor fluid SML 2.

# Pre-Installation Checklist

**To refill the motor, proceed as follows:**

1. Remove the cable guard and separate the pump end from the motor.

2. Place the motor in vertical position with an inclination of approx. 10°.

3. Remove the filling plug using a screwdriver or a similar tool.

4. Inject motor liquid into the motor with a filling syringe or similar tool,see fig. 3.

5. To allow possible air to escape, move the motor from side to side. And turn the shaft.

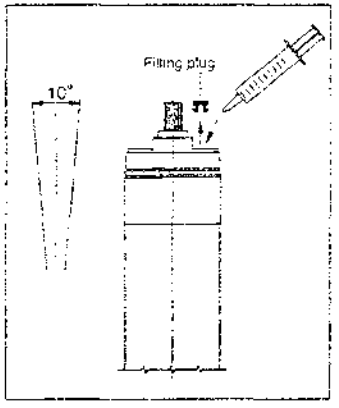


Fig. 3

6. Replace the filling plug and make sure it is tight.

7. Assemble pump end and motor.

8. Install the cable guard.

**The pump is now ready for installation.**

## 7. Installation Postions

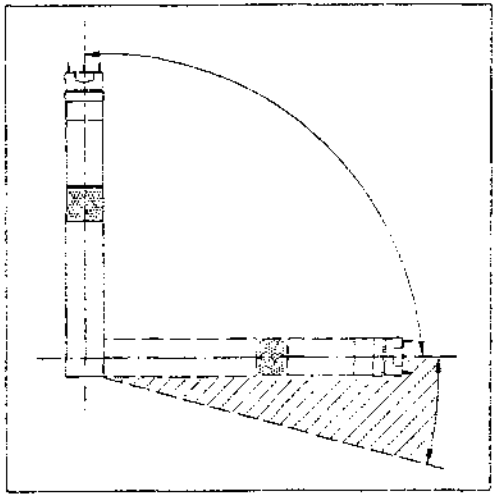


Fig. 4

**Positional requirements**
The pump is suitable for vertical as well as horizontal installation, however, the pump shaft must never fall below the horizontal plane, see fig. 4.



# Installation Procedures

## 8. Electrical connection

**General**
The electrical connection should be carried out by an authorized electrician in accordance with local regulations.

**Before starting work on the pump, make sure the electricity supply has been switched off and that it cannot be accidentally switched on. The pump must be grounded. The pump must be connected to an external mains switch.**

The supply voltage, rated maximum current and power factor (PF) appear on the motor nameplate. The required voltage for GRUNDFOS submersible MSE3-NE motors, measured at the motor terminals, is +6%/–10% of the nominal voltage during continuous operation (including variation in the supply voltage and losses in cables).

If the pump is connected to an installation where a Ground Fault circuit breaker (GFI) is used as additional protection, this circuit breaker must trip out when ground fault currents with DC content (pulsating DC) occur.

**Supply voltage:**1 x 100-115V or 1 x 200-240 V +6%/–10%, 50/60 Hz.

The current consumption can only accurately be measured by means of a true RMS instrument. If other instruments are used, the value measured will differ from the actual value.
The Redi-Flo3 pumps can be connected to a Redi-Flo3 status box.

**Note: The pump must never be connected to a capacitor or to another type of control box other than a Redi-Flo3 status box. The pump must never be connected to an external frequency converter.**

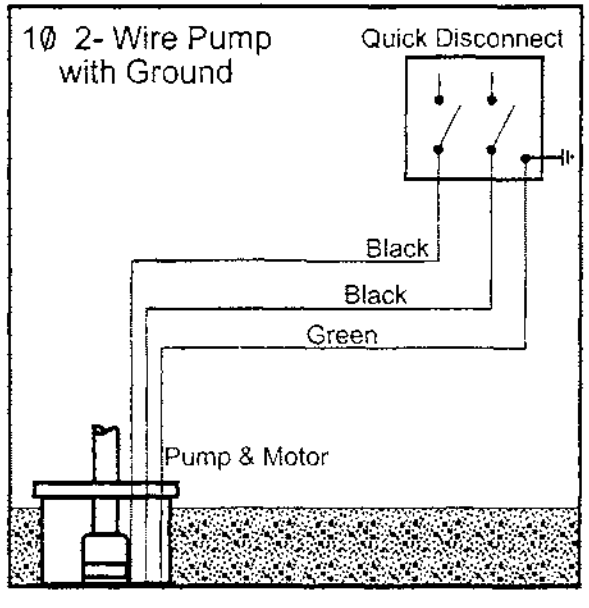
**Motor protection**
The motor has built-in automatic thermal overload protection and requires no additional motor protection.

**Connection of motor**
The motor can be connected directly to the main circuit breaker.

## 9. Making the Wiring Connections

**WARNING!**
**To reduce the risk of electric shock during operation of this pump requires the provision of acceptable grounding. If the means of connection to the supply connected box is other than grounded metal conduit, ground the pump back to the service by connecting a copper conductor, at least the size of the circuit supplying the pump.**

**Single-Phase 2-wire**
**Wiring Diagram**
**for GRUNDFOS Motors**




**A capacitor or control box should NEVER be connected to a Redi-Flo3 submersible pump.**

Fig. 5





## 10. Cable Sizing

**SINGLE-PHASE 60 HZ Maximum Cable Length Motor Service to Entrance**

| Motor Rating | | Copper Wire Size | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| VOLTS | HP | 14 | 12 | 10 | 8 | 6 | 4 | 2 | 0 | 00 |
| 115 | 1/3 | 130 | 210 | 340 | 540 | 840 | 1300 | 1960 | 2910 | |
| | 1/2 | 100 | 160 | 250 | 390 | 620 | 960 | 1460 | 2160 | |
| 230 | 1/3 | 550 | 880 | 1390 | 2190 | 3400 | 5250 | 7960 | | |
| | 1/2 | 400 | 650 | 1020 | 1610 | 2510 | 3880 | 5880 | | |
| | 3/4 | 300 | 480 | 760 | 1200 | 1870 | 2890 | 4370 | 6470 | |
| | 1 | 250 | 400 | 630 | 990 | 1540 | 2380 | 3610 | 5360 | 6520 |
| | 1 1/2 | 190 | 310 | 480 | 770 | 1200 | 1870 | 2850 | 4260 | 5240 |

## 11. Motor Cable

Redi-Flo3 pumps are specifically designed to be used with Grundfos SQE-NE Tefzel motor leads. Standard SQE-NE Tefzel motor leads are available between 25 and 300 foot lengths in 5 foot increments. Custom lengths longer than 300 feet are available in 10 foot increments up to 600 feet from the factory.

**General**
Note: Do not lower or lift the pump by means of the motor cable.

The loose data plate supplied with the pump should be placed close to the installation site.

## 12. Installing the cable plug to the motor

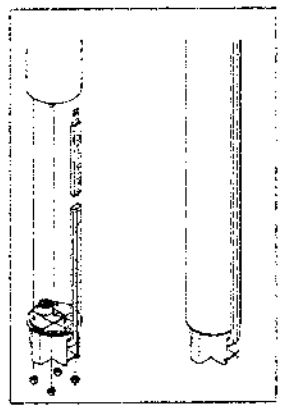


Fig. 6

**To install the cable plug, proceed as follows:**

1. Check that the cable is of the correct type, cross-section and length.
2. Check that the mains on the location has correct connection to ground.
3. Check that the motor socket is clean and dry.
4. Press the cable plug into the motor socket. The plug will only fit one way, see fig. 6.
5. Install and tighten the four nuts, see fig. 6. When the plug has been installed, there must not be a clearance between the motor and the cable plug.

## 13. Installing the cable guard

To fit the cable guard, proceed as follows:

1. Make sure that the motor lead lies flat in the cable guard.
2. The two flaps of the cable guard must engage with the upper edge of the pump sleeve, see fig. 7.

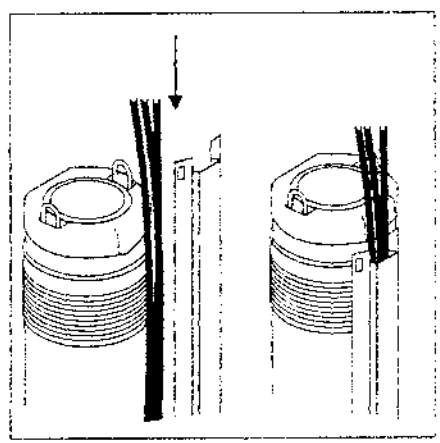


Fig. 7

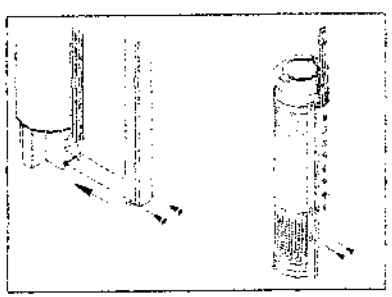


Fig. 8

3. Fasten the cable guard to the cable plug with the four screws supplied, see fig. 8.





## 14. Piping

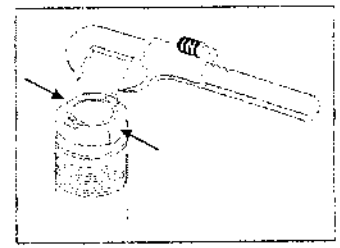


Fig. 9

- The pump should only be gripped by the two flats at the top of the pump, as shown in fig. 9.
- The pump can be installed vertically or horizontally. During operation, the pump must always be completely submerged in water.
- When plastic pipe is used, a stainless steel safety wire is recommended for lowering and lifting the pump. Fasten the wire to the eyelet on the pump, as shown in fig. 10.
- The threaded joints must be well cut and fit together tightly to ensure that they do not work loose.

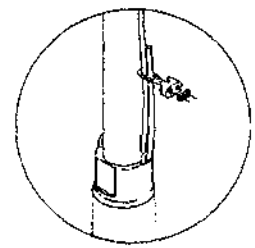


Fig. 10

## 15. Installing the Pump

**Installation Depth**

The dynamic water level should always be above the pump see fig. 11.

A = Dynamic water level
B = Static Water Level
C = Minimum 3" well diameter
D = Drawdown
E = Installation depth below static water level. Maximum 500 feet

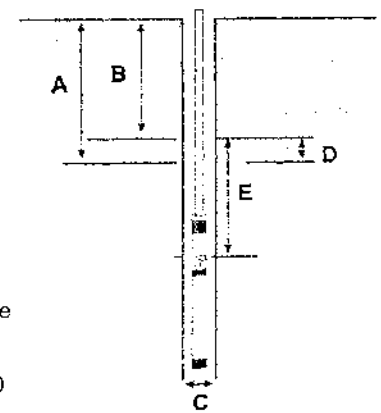



Fig. 11

**Procedures**

To install the pump, follow these steps:

1. Install the enclosed data plate sticker at the well head.
2. Check the well for proper clearance — the well must be at least 3" in diameter. It is a good idea to check the well for clearance using a plumb ring (2.95 ø x 10 in.).
3. Attach the first section of riser pipe to the pump.

## 16. Installing the Pump(cont.)

4. Lower the pump into the well. Make sure the motor cable is not damaged when the pump is lifted or lowered into the well — especially in 3" wells. ***NOTE*: Do not lower or lift the pump using the motor cable.**
5. When the pump has been installed to the required depth, the installation should be finished by means of a well seal. Note that the dynamic water level should always be above the pump.
6. Loosen the safety wire so that it becomes unloaded and lock it to the well seal using a cable clamp.
7. Attach the supplemental information label at the electrical installation site.
8. Complete the electrical connections. **Remember that a capacitor or a control box should NEVER be connected to a Redi-Flo3 submersible pump.**

**Installation depths**

Maximum installation depth: below the static water level: 500 feet.
Minimum installation depths: 1.75' below the dynamic water level:

**Vertical installation:**

During start-up and operation, the pump must always be completely submerged in water.

**Horizontal installation:**

The pump must be installed at least 1.75 ft. below the dynamic water level. If there is a risk that the pump might be covered by mud, the pump must always be placed in a flow sleeve.

## 17. Generator Operation

- It is OK to operate the Redi-Flo3 with a generator.

The generator must be sized 10% above the pumps P1 (Input Power) values.
Use the table to select the correct size generator for the motor HP.

| Motor HP | Min. Generator Size (Watts) |
|---|---|
| 1/3 - 1/2 A | 1000 |
| 1/2 - 3/4 B | 1700 |
| 1- 1½ C | 2000 |





## 18. Starting the Pump for the First Time

When the pump has been connected correctly, the pump should be started with the discharge valve closed approximately one-third. Due to the soft start feature, the pump takes approximately 2 seconds to develop full pressure.

**Motor Cooling and Other Considerations**

- Make sure the well is capable of yielding a minimum quantity of water corresponding to the pump capacity.
- Do not start the pump until it is completely submerged in the liquid.
- As the valve is being opened, the drawdown should be checked to ensure that the pump always remains submerged.
- To ensure the necessary cooling of the motor, the pump should never be set so low that it gives no water. If the flow rate suddenly falls, the reason might be that the pump is pumping more water than the well can yield.

**Water Impurities**

- If there are impurities in the water, the valve should be opened gradually as the water becomes clearer. The pump should not be stopped until the water is clean, otherwise the pump parts and the check valve may become clogged.
- When the water is clean the valve should be fully opened.

**Minimum flow rate**

- To ensure the necessary cooling of the motor, the pump flow rate should never be set to a value lower than .2 gpm. If the flow rate suddenly falls, the reason might be that the pump is pumping more water than the well can yield.

Note: **The pump's dry-running protection is effective only within the recommended duty range of the pump.**

Note: **Do not let the pump run against a closed discharge valve for more than 5 minutes. When the discharge valve is closed, there is no cooling flow and there is a risk of overheating in motor and pump.**

# Operating the Pump

**Built-in protection**
The motor incorporates an electronic unit which protects the motor in various damaging situations.

In case of overload, the built-in overload protection will stop the pump for 5 minutes. After 5 minutes, the pump will attempt to restart.
If the pump is started and the well has not recovered, the pump will stop after 30 seconds.

If the pump has been stopped as a result of dry running, it will start automatically after 5 minutes or the reset time set by the R100.

**Resetting the pump:**
Switch off the electricity supply for 1 minute.
*The motor is protected against the following conditions:*
- dry running,
- voltage surges (up to 5000 V),
- overvoltage,
- undervoltage,
- overload
- overtemperature.

**MSE 3NE Motors:**
Note: To set Dry-Run limit in the MSE-NE pumps, you need to connect the pump to a Redi-Flo3 status box. Refer to Redi-Flo3 status box I&O for proper connections.

To set Dry-Run protection, follow these steps:
1. Start the pump against closed discharge.
2. Rapidly read the power consumption value (W) in the R100 display 2.5.
3. Multiply this value by 0.9.
4. Within the R100, go to display 4.6 and enter the new value (minimum power limit).
5. Go to display 4.7 and change the setting to "Active".

For further information on dry-running, refer to RediFlo3 Status Box I&O.

**Maintenance and service:**
The pumps are normally maintenance-free. Deposits and wear may occur. For that purpose, service kits and service tools are available from GRUNDFOS. The GRUNDFOS Service Manual is available on request. The pumps can be serviced at a GRUNDFOS service center.



# Assembly/Disassembly

## 19. Assembly of Pump and Motor

To assemble pump end and motor, proceed as follows:

1. Place the motor horizontally in a vice and tighten it, see fig. 12.
2. Grease the motor shaft end with a vegetable based grease.
3. Screw the pump end on the motor. A spanner may be used on the clamping faces of the pump part, see fig.12.
4. Install cable guard as described on page 7.

When pump end and motor have been assembled correctly, there must not be a clearance between pump end and motor.

To disassemble reverse procedure.

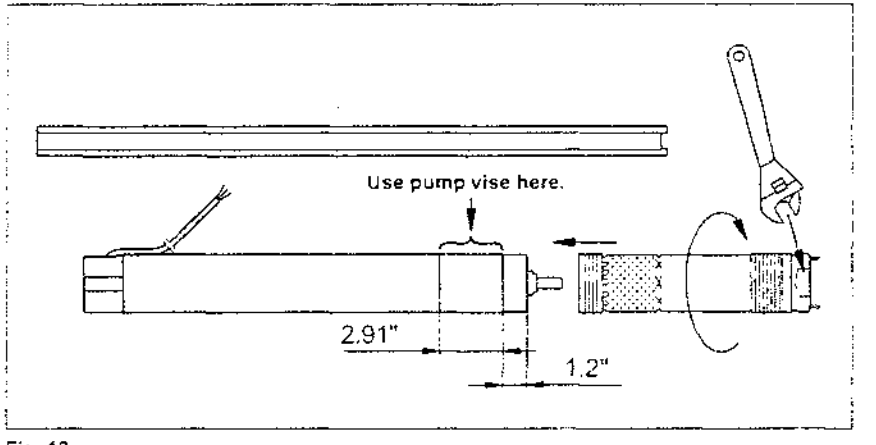


Fig. 12

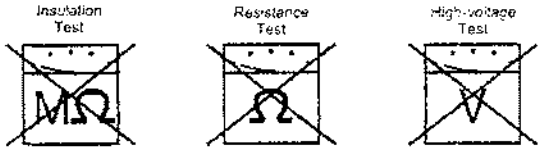
Troubleshooting

| Fault | Cause | Remedy |
|---|---|---|
| 1. The pump does not run | a. The fuses are blown | Replace the blown fuses. If the new fuses blow too, check the electrical installation and the drop cable. |
| | b. The GFI circuit breaker has tripped. | Reset the circuit breaker. |
| | c. No electricity supply. | Contact the Electricity provider. |
| | d. The motor protection has cut off the electricity supply due to overload. | Check for motor/pump blockage. |
| | e. The drop cable is defective. | Repair/replace the pump/cable. |
| | f. Overvoltage has occurred. | Check the electricity supply |
| 2. The pump runs but gives no water. | a. The discharge is closed. | Open the valve |
| | b. No water or too low water level in well. | See item 3a. |
| | c. Check valve is stuck in it's closed position. | Pull the pump and clean or replace the valve. |
| | d. The suction strainer is closed. | Pull the pump and clean the strainer. |
| | e. The pump is defective. | Repair/replace the pump. |
| 3. The pump runs at reduced capacity. | a. The drawdown is larger than anticipated. | Increase the installation depth of the pump, throttle the pump or replace it with a smaller capacity model. |
| | b. The valve s in the discharge pipe are partly closed/blocked. | Check and clean/replace the valves as necessary. |
| | c. The discharge pipe is partly chocked by impurities (Iron bacteria). | Clean/replace the discharge pipe. |
| | d. The non- return valve of the pump is blocked. | Pull the pump and check/replace the valve. |
| | e. The pump and the riser pipe are partly choked | Pull out the pump. Check and clean or replace the pump, if |
| | by impurities (Iron bacteria). | necessary. Clean the pipes. |
| | f. The pump is defective. | Repair/replace the pump. |
| | g. Hole in discharge pipe. | Check and repair the piping. |
| | h. The riser pipe is defective. | Replace. |
| | i. Undervoltage has occurred. | Check the electricity supply. |
| 4. Frequent starts and stops. | a. The differential of the pressure switch between the start and stop pressures is too small. | Increase the differential. However, the stop pressure must not exceed the operating pressure of the pressure tank, and the start pressure should be high enough to ensure sufficient water supply. |
| | b. The water level electrodes or level switches in the reservior have not been installed correctly | Adjust the intervals of the electrodes/level switches to ensure suitable time between the cutting-in and cutting-out of the pump. See installation and operating instructions for the automatic devices used. If the intervals between start/stop cannot be changed via the automatics, the pump capacity may be reduced by throttling the discharge valve. |
| | c. Checkvalve is leaking or stuck half-open. | Pull the pump and clean/replace the non-return valve. |
| | d. The supply voltage is unstable. | Check the electrical supply. |
| | e. The motor temperature is too high. | Check the water temperature. |

# Troubleshooting

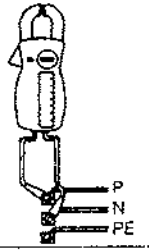
**Instruments not allowed:**

Note: The use of the following instruments is not allowed during fault finding:




Note: When measuring, use RMS-instruments.

**Checking the motor and cable:**

| | | |
|---|---|---|
| 1. Supply voltage   | Measure the voltage L1 (RMS) between phase and L2. Connect the voltmeter to the terminals at the connections. | The voltage should, when the motor is loaded, be within the range specified on Page 4, large variations in supply voltage indicate poor electricity supply, and the pump should be stoppec until the problem has been corrected. |
| 2. Current consumption  | Measure the current (RMS) while the pump is operating at a constant discharge head(if possible, at capacity where the motor is heavily loaded). For maximum current, see motor nameplate. | If the current exceeds the full load current, there are the following possible faults: Poor connection in the leads, possibly in the cable joint. Too low supply voltage, see item 1 on Page 13. |

## Environment

During handling, operation, storage and transport, all environment regulations dealing with the handling of hazardous materials must be observed.

**When the pump is taken out of operation, it must be ensured that no hazardous material is left in the pump and in the riser pipe, which can be injurous to persons and the environment.**

## Disposal

Disposal of this product or parts of it must be carried out according to the following guidelines:

1. Use the local public or private waste collection service.
2. If such waste collection service does not exist or cannot handle the materials used in the product, please deliver the product or any hazardous materials from it to your nearest GRUNDFOS company or service center.



# Technical Data

| | |
|---|---|
| **Supply Voltage:** | 1x200-240V +6%/-10%, 50/60 Hz, PE |
| **Operation via Generator:** | As a minimum, the generator output must be equal to the motor P1[KW] +10% |
| **Starting Current:** | The motor starting current is equal to the highest value stated on the motor nameplate |
| **Starting:** | Soft starting |
| **Run-up Time:** | Maximum : 2 seconds |
| **Motor Protection:** | The motor is protected against: Dry running, overvoltage, undervoltage, overload, overtemperature |
| **Power Factor:** | PF= 1 |
| **Service Factor:** | 0.33-0.50A[HP]-1.75 at 230V<br>0.50-0.75A[HP]-1.4 at 230V<br>1.0 -1.5C[HP] -1.15 at 230V |
| **Motor Cable:**<br>Length | 3 Wire, 12 AWG TEFZEL<br>Available in 5 ft. increments from 25ft.- 300ft. |
| **Motor Liquid:**<br>**pH Values:** | Type SML 2<br>Redi-Flo3: 5 to 9 |
| **Liquid Temperature:** | The temperature of the pumped liquid must not exceed 104°F. |
| **Note: if liquids with a viscosity higher than that of water are to be pumped, please contact GRUNDFOS** | |
| **Discharge Port:** | 5SQE-NE- 1"NPT<br>10-15SQE-NE- 1 1/4" NPT<br>22-30SQE-NE- 1 1/2" NPT |
| **STORAGE CONDITIONS** | |
| *Minimum Ambient Temperature:* | -4°F |
| Maximum Ambient Temperature: | +140°F |
| **Freeze Protection:** | If the pump has to be stored after use, it must be stored on a frost-free location or it must be ensured that the motor liquid is frost-proof. (The motor must be stored without being filled with motor liquid ) |
| **OPERATING CONDITIONS** | |
| **Minimum Ambient Fluid Temperature:** | 34°F |
| **Maximum Ambient Fluid Temperature:** | +104°F |
| **APPROXIMATE DIMENSIONS AND WEIGHT** | |
| **Motor Dimensions (MSE3-NE):** | |
| 0.33-0.50A[hp] | 20.9" length x 2.68" diameter |
| 0.50-0.75B[hp] | 20.9" length x 2.68" diameter |
| 1.0-1.5C[hp] | 22.3" length x 2.68" diameter |
| **Motor Weights (MSE3-NE):** | |
| 0.33-0.50A[hp] | 6.0 Lbs |
| 0.50-0.75B[hp] | 7.1 Lbs |
| 1.0-1.5C[hp] | 8.2 Lbs |
| **Pump End Dimensions:** | |
| **Pump Diameter:** | 2.68" |
| **Pump Diameter, incl. cable guard:** | 2.91" |
| **Pump End Dimensions(min. and max.):** | |
| 5SQE-NE | 8.1" to 13.6" |
| 10SQE-NE | 8.1" to 14.5" |
| 15SQE-NE | 8.1" to 14.5" |
| 22SQE-NE | 8.1" to 14.5" |
| 30SQE-NE | 8.1" to 11.3" |
| **Pump End Weights(min. and max.):** | |
| All Redi-Flo3 Models | 2.2 lbs to 3.5 lbs |
| **Well Diameter (minimum):** | 3" |
| **Installation Depth (Maximum):** | 500 feet, below static water level. |

| PUMP TYPE | HP | VOLTAGE | MAX. AMPS |
|---|---|---|---|
| 5SQE03A-90-NE | 1/3 A | 230V/115V | 3.9/7.8 |
| 5SQE03A-120-NE | 1/3 A | 230V/115V | 3.9/7.8 |
| 5SQE05A-170-NE | 1/2 A | 230V/115V | 4.9/9.8 |
| 5SQE05B-210-NE | 1/2 B | 230V | 4.9 |
| 5SQE05B-250-NE | 1/2 B | 230V | 4.9 |
| 5SQE07B-290-NE | 3/4 B | 230V | 7.6 |
| 5SQE10C-340-NE | 1 C | 230V | 7.6 |
| 5SQE10C-380-NE | 1 C | 230V | 7.6 |
| 5SQE10C-420-NE | 1 C | 230V | 7.6 |
| 10SQE03A-100-NE | 1/3 A | 230V/115V | 3.9/7.8 |
| 10SQE05A-140-NE | 1/2 A | 230V/115V | 4.9/9.8 |
| 10SQE05B-180-NE | 1/2 B | 230V | 4.9 |
| 10SQE07B-220-NE | 3/4 B | 230V | 7.6 |
| 10SQE10C-260-NE | 1 C | 230V | 7.6 |
| 10SQE10C-300-NE | 1 C | 230V | 7.6 |
| 10SQE15C-340-NE | 1 1/2 C | 230V | 11.1 |
| 15SQE03A-70-NE | 1/3 A | 230V/115V | 3.9/7.8 |
| 15SQE05A-110-NE | 1/2 A | 230V/115V | 4.9/9.8 |
| 15SQE05B-130-NE | 1/2 B | 230V | 4.9 |
| 15SQE07B-170-NE | 3/4 B | 230V | 7.6 |
| 15SQE10C-200-NE | 1 C | 230V | 7.6 |
| 15SQE10C-230-NE | 1 C | 230V | 7.6 |
| 15SQE15C-270-NE | 1 1/2 C | 230V | 11.1 |
| 22SQE03A-40-NE | 1/3 A | 230V/115V | 3.9/7.8 |
| 22SQE05A-80-NE | 1/2 A | 230V/115V | 4.9/9.8 |
| 22SQE05B-110-NE | 1/2 B | 230V | 4.9 |
| 22SQE07B-140-NE | 3/4 B | 230V | 7.6 |
| 22SQE10C-180-NE | 1 C | 230V | 7.6 |
| 22SQE15C-210-NE | 1 1/2 C | 230V | 11.1 |
| 30SQE05A-40-NE | 1/2 A | 230V/115V | 4.9/9.8 |
| 30SQE05B-80-NE | 1/2 B | 230V | 7.6 |
| 30SQE10C-120-NE | 1 C | 230V | 7.6 |
| 30SQE15C-160-NE | 1 1/2 C | 230V | 11.1 |

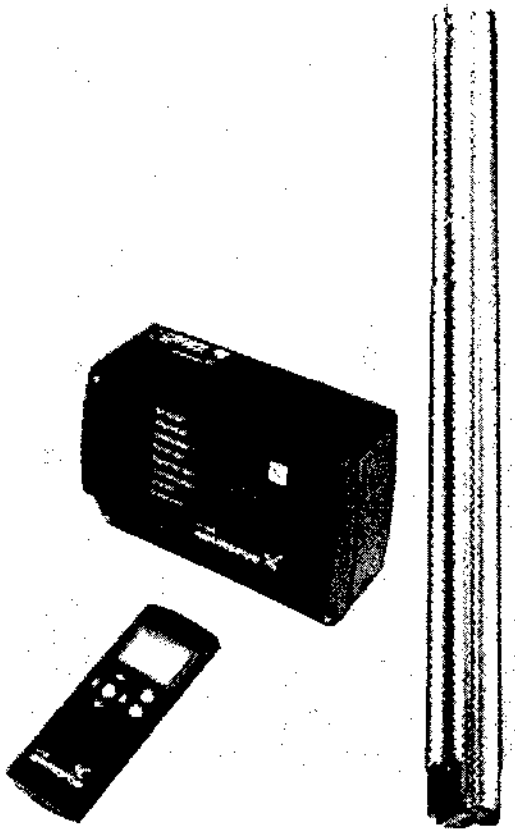




| ACCESSORIES | |
|---|---|
| PRODUCT | PART NUMBER |
| CU 300 | 96422776 |
| Flow Sleeve | 96037505 |
| Grease | 96037562 |
| Grundfos SPP1 Potentiometer | 625468 |
| RediFlo3 Motor Leads - available in 5ft. increments | See price list |
| 25ft | 96037428 |
| 50ft | 96037429 |
| 75ft | 96037430 |
| 100ft | 96037431 |
| 125ft | 96037432 |
| 150ft | 96037433 |
| 175ft | 96037434 |
| 200ft | 96037435 |
| 225ft | 96037436 |
| 250ft | 96037437 |
| 300ft | 96037438 |
| R100 Infrared Remote | 625333 |
| HP Infrared Printer 822408 | 620480 |

# Redi-Flo3™ and CU 300

## Environmental Pumps
## 60Hz



# Table of Contents

# Features and Benefits

### Redi-Flo3 Submersible Pumps

Redi-Flo3 pumps are suitable for both continuous and intermittent operation for a variety of environmental applications including:

- Remediation
- Pollution Recovery
- Leachate Recovery
- Dewatering
- Tank Applications

### Redi-Flo3 pumps offer the following features:

- Dry-Run Protection
- High Efficiency Pump End and Motor
- High Starting Torque
- Protection Against Up-Thrust
- Soft-Start
- Over- and Under-Voltage Protection
- Overload Protection
- Over-temperature Protection
- Variable Speed
- Electronic Control and Communication

Redi-Flo3 pumps incorporate a totally new motor design. With the use of permanent-magnet technology within the motor, Redi-Flo3 pumps deliver unmatched performance. The combination of permanent-magnet motors and Grundfos' own micro frequency converter, we are now able to communicate with the pump in ways never before possible. Just a few of the features that come out of this combination are constant level control, soft-start and integrated dry-run protection. These are just a few of the many features that Redi-Flo3 pumps can offer.

Redi-Flo3 pumps use the Grundfos "Smart Motor". This permanent-magnet motor is single phase input and with a 2-wire design makes installation easy. The combination of integrated microelectronics in the pump with the optional CU300 status box and R100 at the surface allows communication with the pump through standard electrical motor power leads. No additional wires are required. This feature allows the direct use of multiple sensors, digital input and relays without adding extra control electronics and costs.

The surface CU300 status box allows communication with the "Smart Motor" through the R100 infrared remote control unit or via the CU300 PC Software Tool. This gives you the ability to monitor and setup or change your pumping system to meet the specific needs of your application.

The Redi-Flo3 can operate without the status control box much like a traditional submersible electric pump. Some communication and program functions will not be available in this configuration, but the internal motor protection features are still active.

### Pump and Motor Range

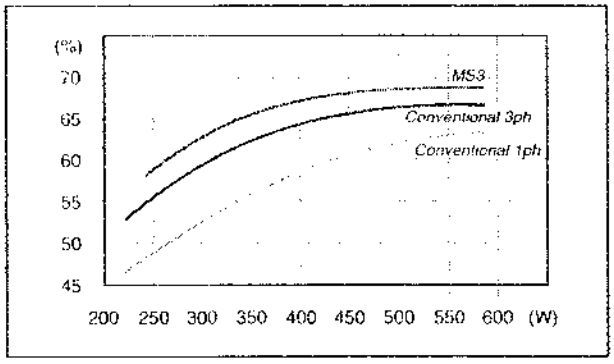
| Product | Description |
|---|---|
| Redi-Flo3<br>Pump End | 5,10,15,22,30, GPM |
| MSE3NE<br>Motor | Single Phase<br>1/3 - 1.5 Hp |

### Dry-Run Protection

The Redi-Flo3 incorporates integrated Dry-Run protection. When the fluid level falls below the inlet of the pump, the pump automatically shuts off. After a programmable period of time, the pump automatically starts up again.

### High Motor Efficiency

Redi-Flo3 motors are based on a permanent magnet rotor, which produce high efficiency within a wide load range. The high and flat efficiency curve of the Permanent-Magnet (PM) motor allows for coverage of a wide power range with the same motor as compared to conventional submersible AC motors. For Redi-Flo3 pumps, this means only three motors to cover the horsepower range from 1/3 to 1.5Hp.

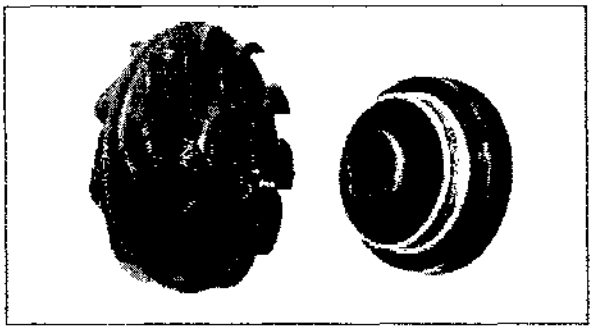



### High Pump Efficiency

The pump end components are made from Polyvinylidene Fluoride (PVDF). The pumps are designed to deliver at peak efficiency levels. Because of high pump efficiencies, overall power consumption will be reduced.

### Wear Resistance

Redi-Flo3 pump design uses "floating" impellers. Each impeller has its own tungsten carbide/ceramic bearing. This design and the environmental quality of materials make this pump an excellent choice for environmental application projects.



### Protection Against Up-Thrust

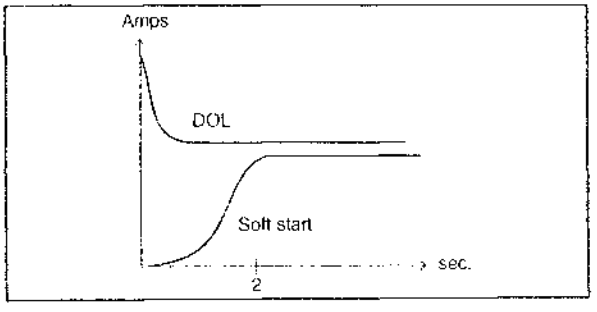
During start-up many pumps start in an up-thrust condition. To prevent damage caused by up-thrust, a top bearing has been placed in the motor to protect both the pump and the motor against up-thrust.

### Soft-Start

Redi-Flo3 have a soft-start feature possible because of the integrated electronics. Soft-start reduces the starting current and gives the pump a smooth and steady acceleration.

### High Starting Torque

Because of the permanent-magnet motor, the Redi-Flo3 pumps have excellent starting capabilities. The high locked rotor torque produced by the PM motor provides a starting torque that is 1.5 times greater than conventional submersible pump motors. Even if the voltage is low, the PM motor will still maintain a high starting torque.




### Overvoltage and Undervoltage Protection

Overvoltage and undervoltage may occur at any time, especially if you have an unstable voltage supply. The integrated protection in the Redi-Flo3 motor protects itself when voltage falls outside of permissible voltage range. The 230V pump motor will cut out if voltage falls below 150V or above 280V. The motor will automatically start when the voltage is within the permissible range. It is not necessary to have additional voltage protection.

### Overload Protection

When the pump load rises above the maximum amp level, the motor will automatically compensate and reduce the speed to maintain its maximum amp level. If the speed drops to 65% of the nominal speed, the motor will shut off.

### Overtemperature Protection

Permanent-magnet motors emit very little heat because of their high efficiency. Redi-Flo3 motors are designed with an internal circulation system to effectively cool all the internal components.

As extra protection, the electronic unit also has a built-in temperature sensor. When the temperature rises too high, the motor will automatically shut-off; when the temperature drops the motor will automatically restart.

### Variable Speed

The Redi-Flo3 "Smart" motor enables continuous variable speed control within 65%-100% (7000-10,700 rpm). The pump can be set to operate at any duty point in the range between 65% and 100% of the pumps performance curve. The pump can be adapted to any specific requirement. The variable speed control requires the status box and R100 or potentiometer.

### Installation

Redi-Flo3 pumps can be installed vertically or horizontally (Note: the pump must not fall below the horizontal level in relation to the motor). For horizontal installations, a flow sleeve is recommended to ensure sufficient flow past the motor to provide proper cooling and prevent the unit from being buried in sand or silt.

### Service

The modular design of the Redi-Flo pump-end and motor makes it easy to repair and service. The motor lead is also replaceable.

## Remediation/Pollution Recovery/Dewatering

Connection of a sensor such as a pressure transducer enables the pump via the status control box to pump constant level by varying the speed of the pump automatically between 7,000 and 10,700 rpms to maintain desired fluid level. Alternately, a maximum and minimum fluid level can be programmed to control the pump at a set speed.

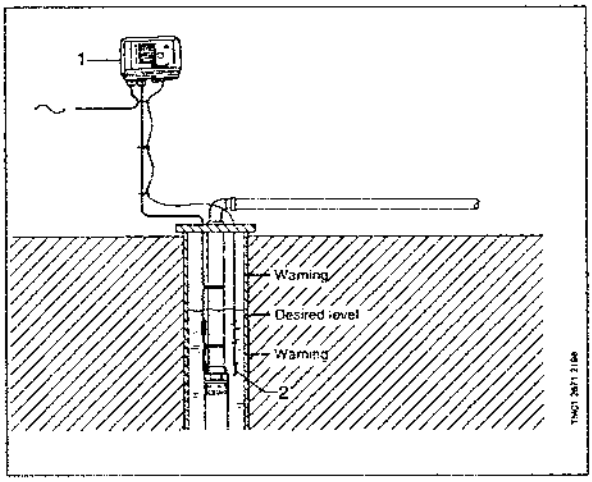
## Maintaining a Constant Water Table

### Introduction

By monitoring the water table and by adjusting pump performance, the water table can be maintained at a constant level.

EXAMPLES OF APPLICATION:
For example maintaining a constant water table is useful in the following situations:

- When the groundwater should be kept out of a building site.
- When the salt water should be kept from penetrating a borehole with potable water.



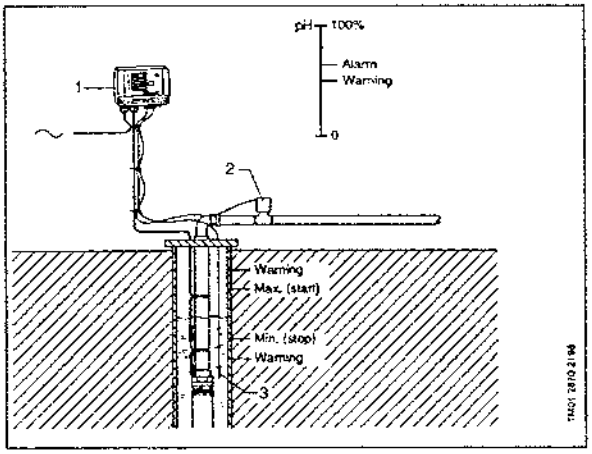

**Description**

| Pos. | Description |
|---|---|
| 1 | CU300 |
| 2 | Level sensor |

## Remedial Pumping with Water Quality Monitoring

### Introduction

By means of sensor signals it is possible to carry out remedial pumping where the water contains contamination e.g. chemicals, oils, etc.

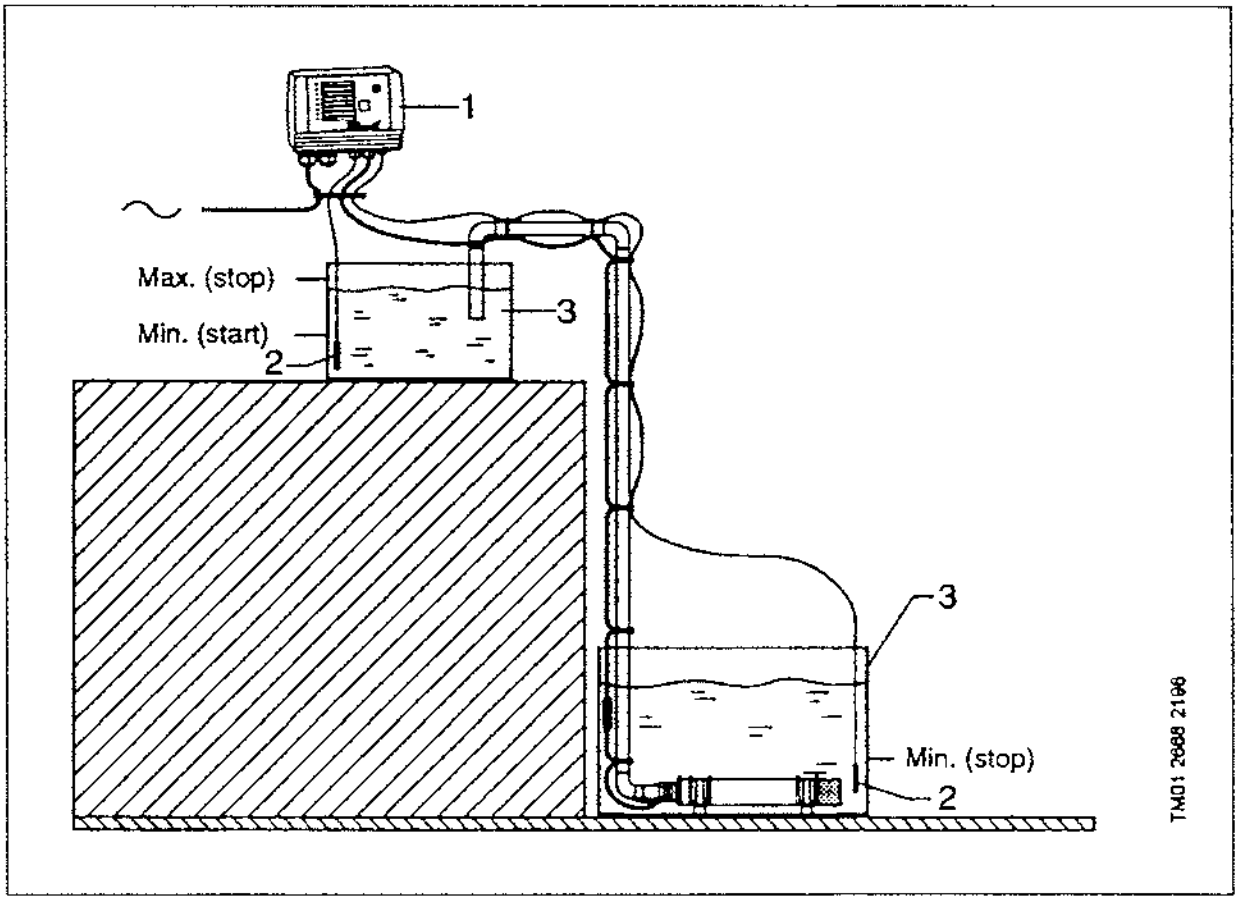



**Description**

| Pos. | Description |
|---|---|
| 1 | CU300 |
| 2 | pH sensor<br>Detects the water quality |
| 3 | Level sensor |

## Pumping from One Tank to Another

Where there is a need to move water from one tank to another, the Redi-Flo3 is ideal.




**Description**

| Pos. | Description |
|---|---|
| 1 | CU300 |
| 2 | Level sensor |
| 3 | Water tank |

NOTE: When the Redi-Flo3 pump is installed horizontally, it is recommended that a flow sleeve be fitted. The motor must be fully submerged in the water.

**Sensor 1 (tank at top)**

| Level | Description |
|---|---|
| Max. (stop) | When the water has reached this level, the pump stops. Green indicator light in on/off-button flashes. |
| Min. (start) | When the water has dropped to this level, the pump starts. Green indicator light in on/off-button is constantly lit. |

**Sensor 2 (bottom tank)**

| Level | Description |
|---|---|
| Min. (stop) | When water has dropped to this level, tank is empty, stop pump. |

# Status Control Box Communication

### Redi-Flo3 CU300 Status Box

The CU300 status box is a control and communication unit especially developed for the Redi-Flo3 submersible pumps.

The CU300 status box provides:

- Easy adjustment to a specific well
- Full control of Redi-Flo3 pumps
- Two-way communication with the Redi-Flo3 pumps
- Indicator lights on the front to indicate alarms
- The ability to start and stop the pump with the push of a button.

The CU300 communicates with the pump using the power leads. It is not necessary to run any extra cables between the pump and the CU300 status box.

The following alarms can be indicated by the CU300:

- No Contact
- Overvoltage
- Undervoltage
- Dry-run
- Speed Reduction
- Overtemperature
- Overload
- Sensor Alarm

The CU300 incorporates:

- External signal input for three sensors
- relay output for external alarm control
- Control according to the signals received, e.g. flow, pressure, water level and conductivity

The CU300 can communicate with the R100 infrared remote control or R100 PC software tool.

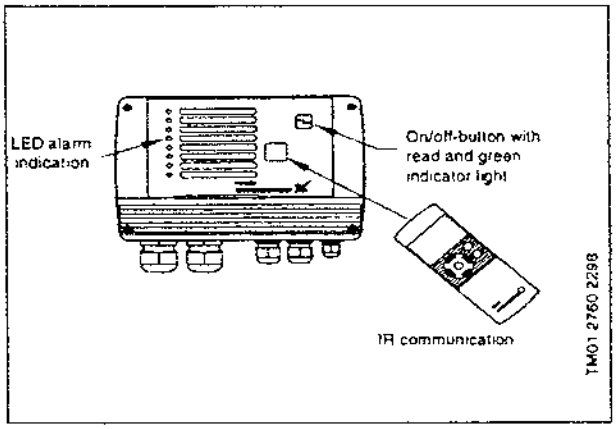
### R100 Remote Control or PC Software Tool

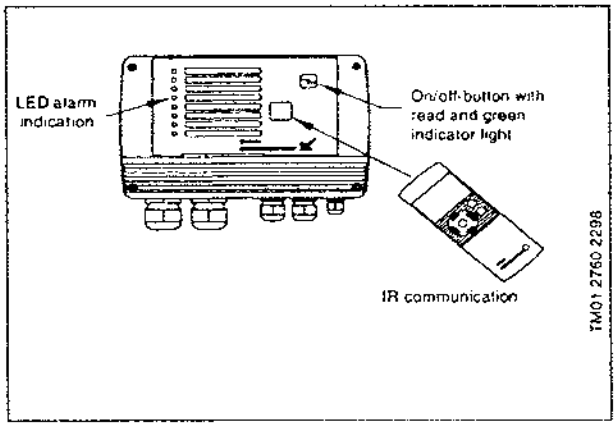
The R100 allows you to monitor the installation by reading current operating parameters, such as:

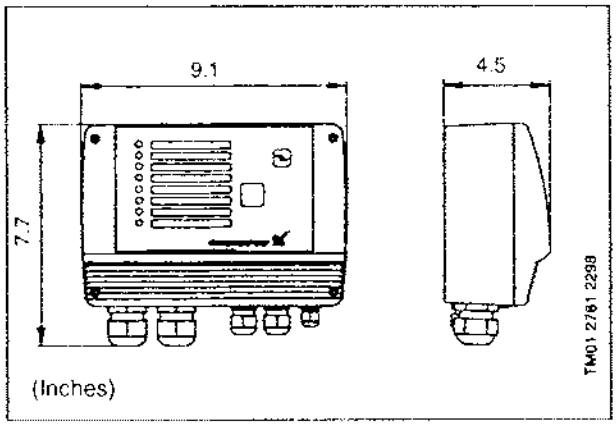
- Power Consumption
- Energy Consumption
- Number of Operating Hours

It allows you to change factory settings. A number of settings can be made, such as:

- Speed (Performance)
- Constant Pressure Control Mode
- De-watering Function
- Automatic Restart Time



The CU300 Redi-Flo3 control panel communicates with the Redi-Flo3 motors via the pump power cable to turn the pumps on and off, set motor speed and monitor pump status. The technique used for performing this communication impresses a high frequency data signal on the pump power cable that is picked off by internal pump electronics and then decoded into command instructions. This is the reason for assigning unique numbers to each CU300 in a multiple unit installation. The unique number serves as a communication address between each CU panel/motor pair.

In situations where multiple CU300 pump power cables are run parallel in wiring trays or conduit and less than 10-12 inches apart, the possibility for undesired communication between units exists. When this occurs, intermittent or continuous NO CONTACT is typically seen. Other unexpected errors may also be seen.

There are two approaches available to eliminating the possibility of this occurring:

1. Physical separation of cables – maintain a minimum distance of 10-12 inches between pump power cables, and never place more than one cable in a conduit.

2. Use shielded cable – The use of shielded cable prevents cross communication between parallel cables and allows sharing of conduit and cable trays. Tie the cable shield to earth only at the CU control panel.

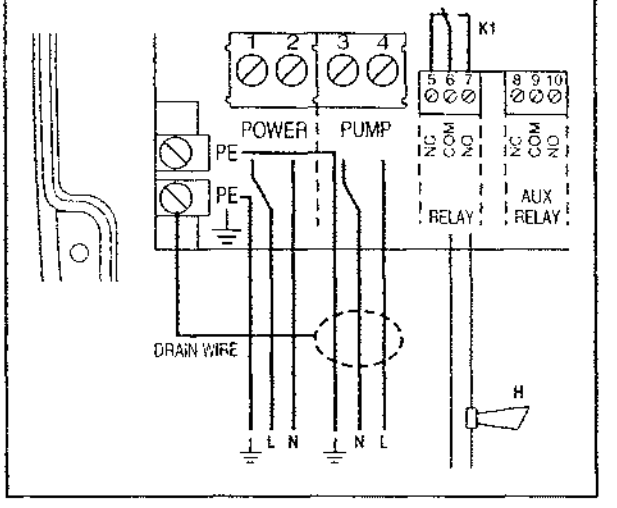
Suitable cables:

| Manf. | Part # | Gage |
|---|---|---|
| Anixter | 2A-1403S | 14 |
| Anixter | 2A-1203S | 12 |
| Anixter | 2A-1003S | 10 |

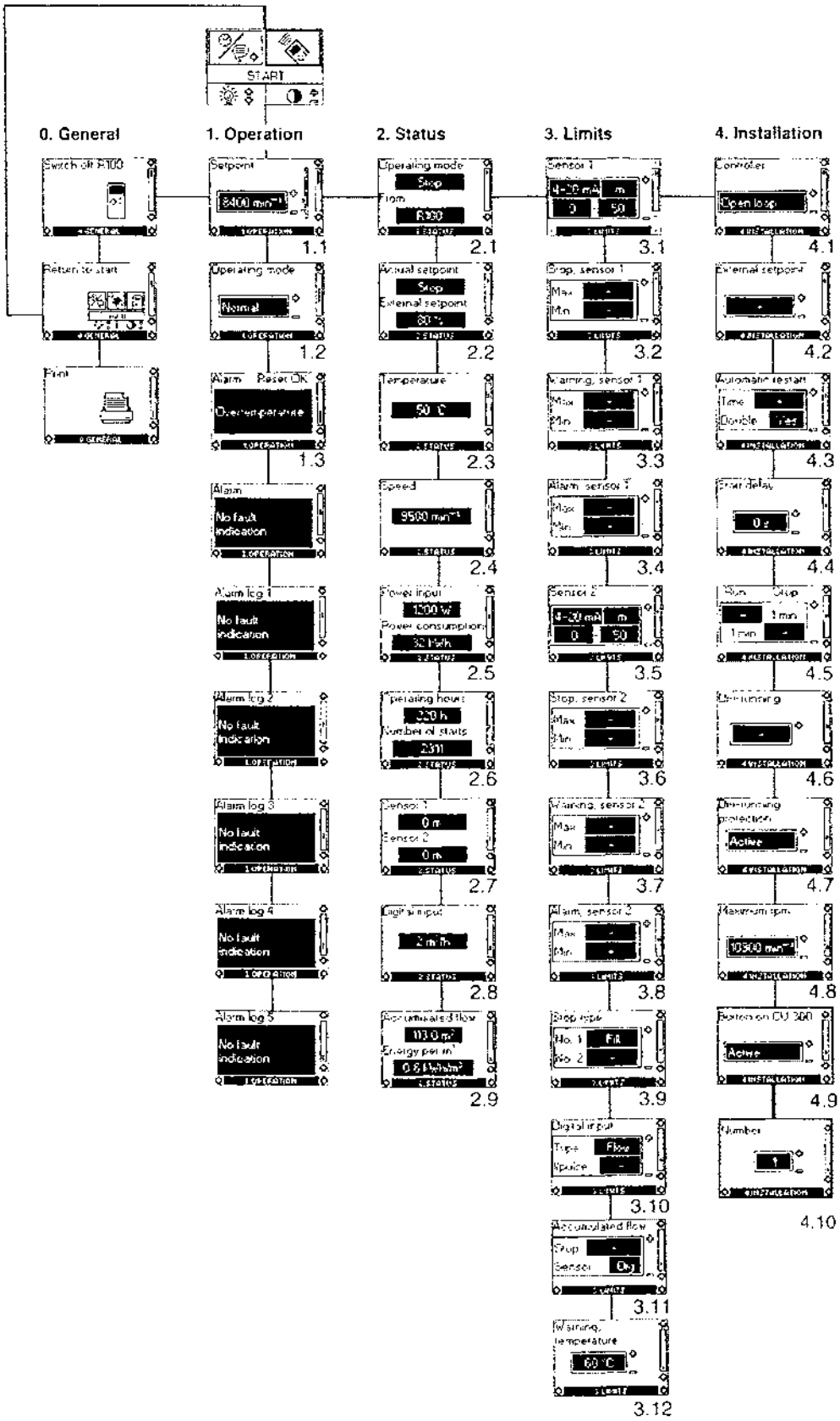
Anixter (1-800-321-1486)

In addition, Grundfos recommends applying power to only one CU panel/motor at a time while programming the CU number with the R100. This will prevent the possibility of two pumps receiving the same number assignment command.

**SHIELDED CABLE WIRING DIAGRAM**



# R100 Menu Structure



**R100 Menu Structure for the CU300**
*(ref. CU300 I&O)*

**0. General**

**1. Operation**
1.1 Set-point setting
1.2 Selection of operating mode
1.3 Alarm indication

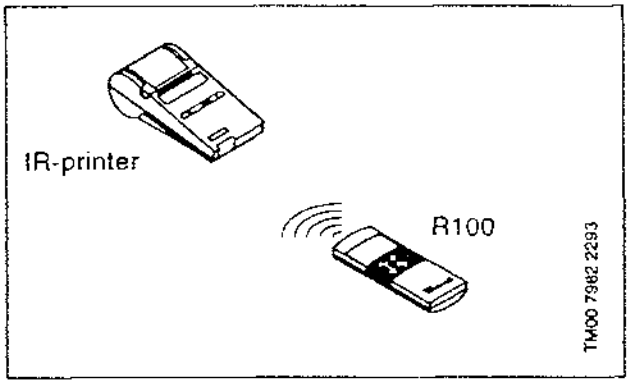
**2. Status**
The indication of:
2.1 Actual operating mode
2.2 Actual and external set point
2.3 Actual motor temperature
2.4 Actual motor speed
2.5 Actual power input and accumulated motor power consumption.
2.6 Accumulated number of operating hours and accumulated number if starts.
2.7 Actual values of sensors 1 and 2 respectively
2.8 Actual values of the digital input
2.9 Accumulated flow, and the power used to pump 1 gal.

R100 allows you to make a number of settings:

**3. Limits**
The setting of:
3.1 Sensor 1
3.2 Min. and max. stop limit of sensor 1
3.3 Min. and max. warning limit of sensor 1
3.4 Min. and max. alarm limit of sensor 1
3.5 Sensor 2
3.6 Min. and max. stop limit of sensor 2
3.7 Min. and max. warning limit of sensor 2
3.8 Min. and max. alarm limit of sensor 2
3.9 Filling or emptying
3.10 Setting of the function of the digital sensor connected to the digital input
3.11 The setting of the water quantity stop limit and the setting of the sensor to detect water quantity
3.12 The setting of the temperature warning limits of the motor electronics

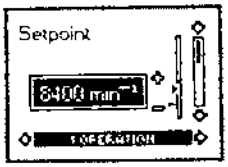
**4. Installation**
4.1 Selection of controller
4.2 Setting of external set-point
4.3 Setting of automatic restart time
4.4 Allocation of individual start delays
4.5 Setting of the stop and run times for the de-watering function
4.6 Setting of the value of the Dry-Run shutdown
4.7 Activating or deactivating the Dry-Run protection
4.8 Setting of the maximum motor speed
4.9 Activating or deactivating the on/off-button on the CU 300
4.10 Allocation of number where more than one CU300 is installed

**Status report**
All settings and measured values can be transferred to a portable printer via wireless infrared communication and be printed in a status report.



### Examples of R100 displays

#### Menu OPERATION



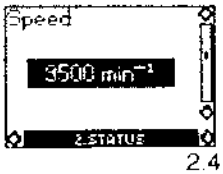

1.1

**Set-point Setting**
From the factory, the pump is set to maximum speed, 10,700 rpm. R100 allows you to reduce the pump speed by changing the setpoint. The speed can be set from 7,000–10,700 rpm, at 100 rpm intervals.

The unit of the set-point is automatically changed according to the unit of the sensor connection to sensor input no. 1 if closed loop.

EXAMPLE: Sensor input no. 1 is connected to a pressure sensor using the unit feet (ft.) and the range 0 – 200 (dependent on the actual sensor characteristics). Therefore, the set-point of display 1.1 can be set to between 0 – 200 ft.

#### Menu STATUS




2.4

The displays appearing in this menu are status displays only. You cannot change settings in this menu.

**Example**
In display 2.4, the actual speed of the pump is shown.

#### Accumulated Number of Operating Hours and Number of Starts

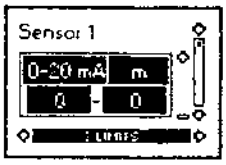

2.6

The value of operating hours and the number of starts are values accumulated from the time of installation and they cannot be reset.

Both values are stored in the motor electronics, and are kept even if the CU300 is replaced.

The number of operating hours is registered every two minutes of continuous operation.

#### Menu LIMITS




3.1

**The Setting of Sensor 1**

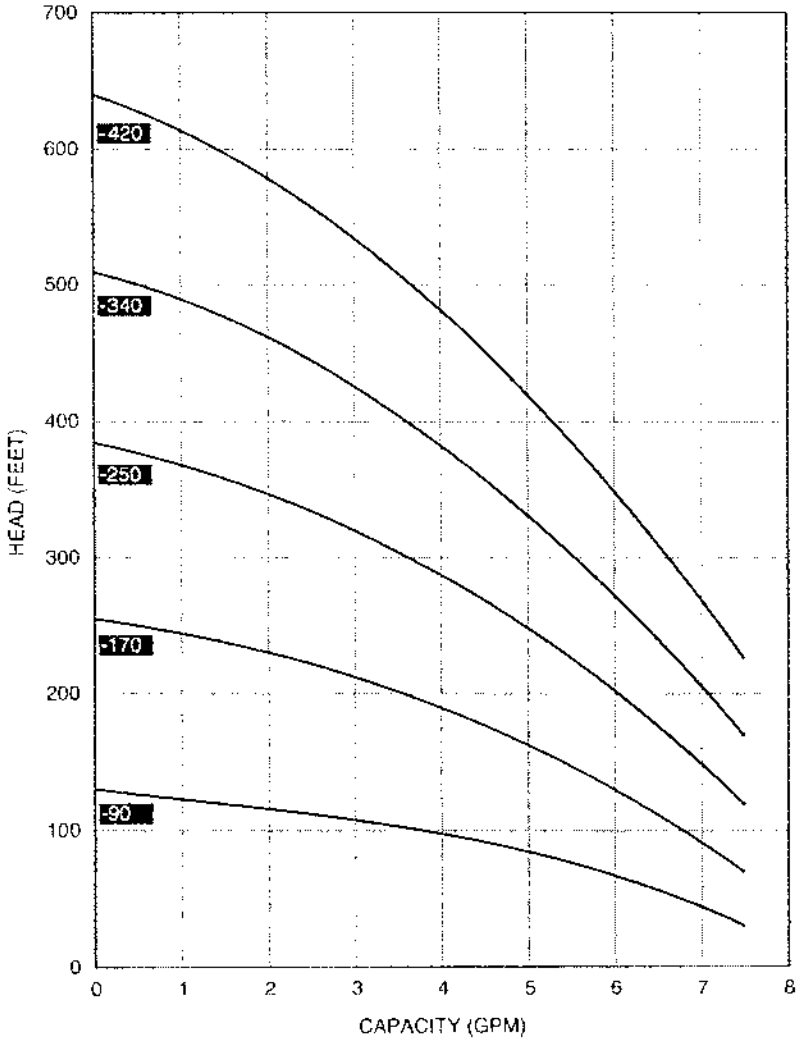
Depending on the type of sensor, the following settings can be made:

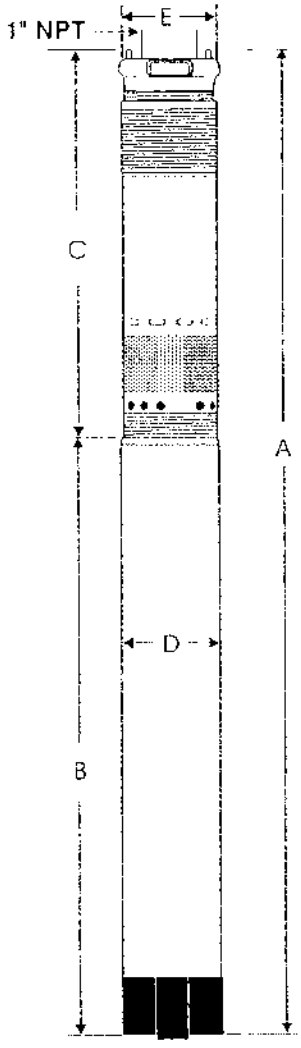
Sensor outputs:
(not active), 0-10V, 2-10V, 0-20mA, 4-20mA.

Setting range unit: M3/h, m, %, gpm, ft.

| Model # | HP | Size | Disch. Size | Dimensions in Inches | | | | | Approx. Ship Wt. |
|---|---|---|---|---|---|---|---|---|---|
| | | | | A | B | C | D | E | (pounds) |
| 5Redi-Flo3-90 | 1/3A | 3" | 1" NPT | 30.4 | 19.8 | 10.6 | 2.6 | 2.9 | 12 |
| 5Redi-Flo3-170 | 1/2A | 3" | 1" NPT | 31.5 | 19.8 | 11.6 | 2.6 | 2.9 | 12 |
| 5Redi-Flo3-250 | 1/2B | 3" | 1" NPT | 33.6 | 19.8 | 13.7 | 2.6 | 2.9 | 13 |
| 5Redi-Flo3-340 | 1C | 3" | 1" NPT | 38.2 | 21.3 | 16.9 | 2.6 | 2.9 | 16 |
| 5Redi-Flo3-420 | 1C | 3" | 1" NPT | 39.3 | 21.3 | 18.0 | 2.6 | 2.9 | 16 |

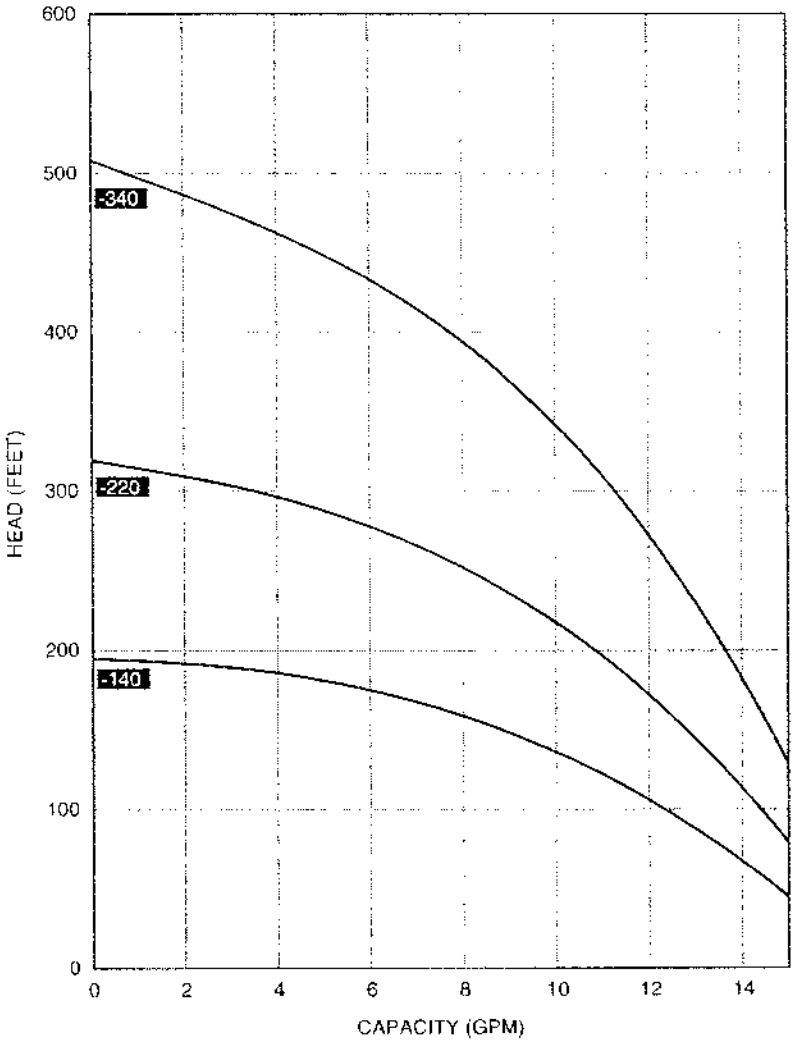
Note: Weights include pump ends with motors

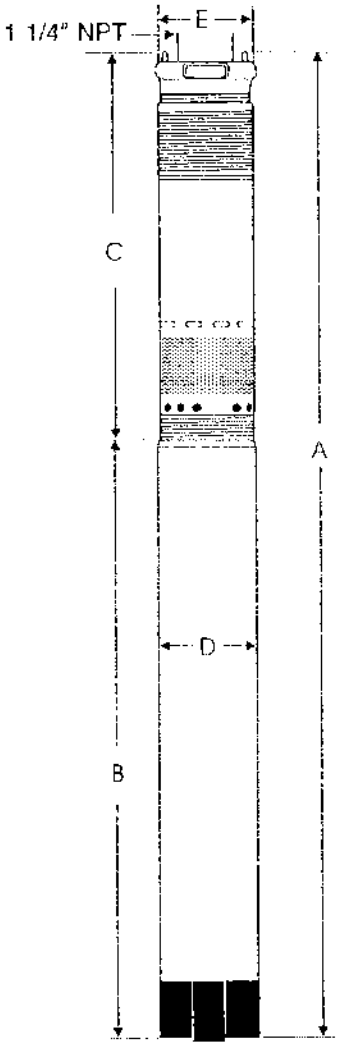


| Model # | HP | Size | Disch. Size | Dimensions in Inches | | | | | Approx. Ship Wt. |
|---|---|---|---|---|---|---|---|---|---|
| | | | | A | B | C | D | E | (pounds) |
| 10Redi-Flo3-140 | 1/2A | 3" | 1 1/4" NPT | 30.4 | 19.8 | 10.6 | 2.6 | 2.9 | 12 |
| 10Redi-Flo3-220 | 3/4B | 3" | 1 1/4" NPT | 33.6 | 19.8 | 13.7 | 2.6 | 2.9 | 13 |
| 10Redi-Flo3-340 | 1 1/2C | 3" | 1 1/4" NPT | 38.2 | 21.3 | 16.9 | 2.6 | 2.9 | 16 |

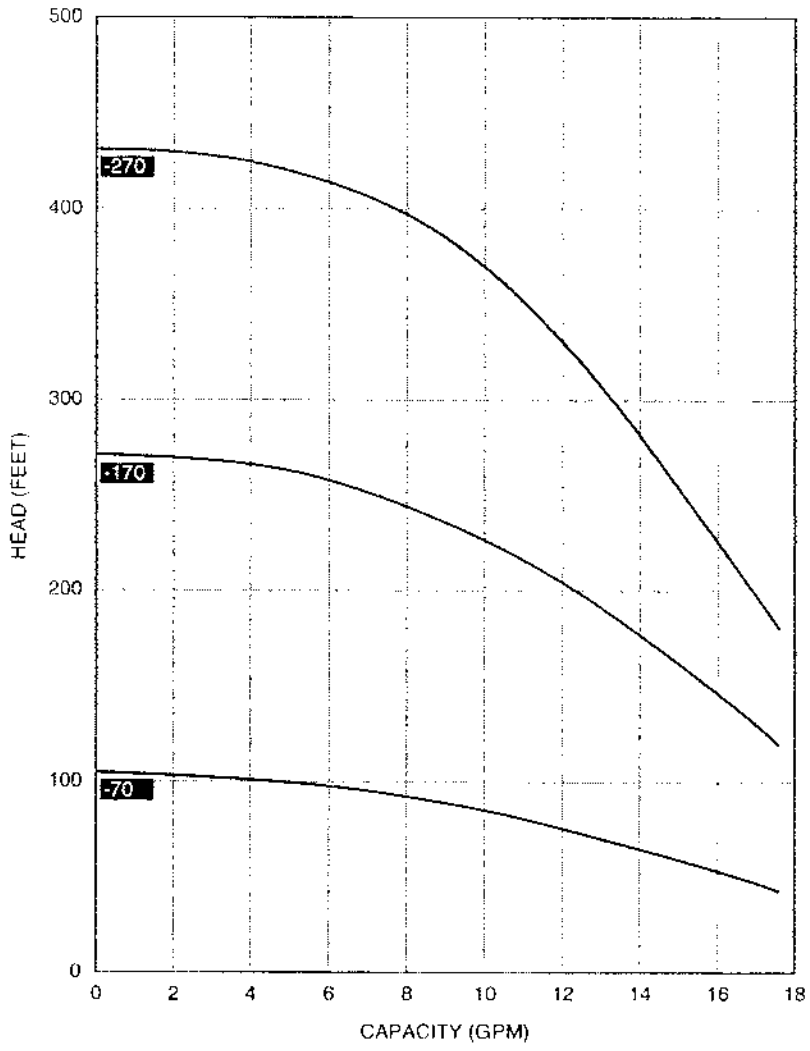
Note: Weights include pump ends with motors

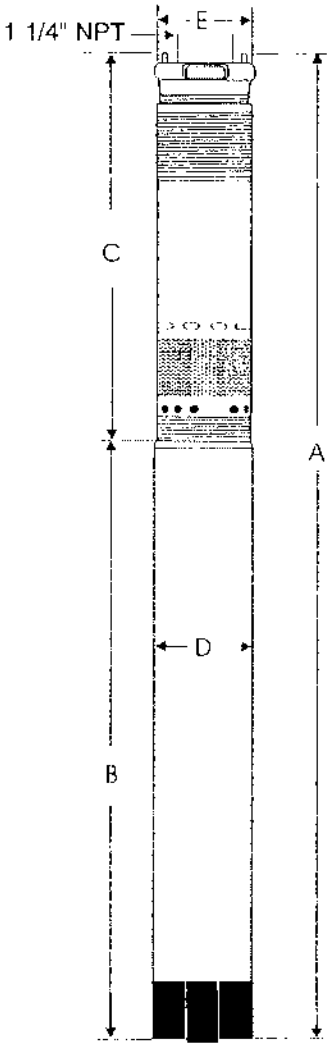


| Model # | HP | Size | Disch. Size | Dimensions in Inches | | | | | Approx. Ship Wt. |
|---|---|---|---|---|---|---|---|---|---|
| | | | | A | B | C | D | E | (pounds) |
| 15Redi-Flo3-70 | 1/3A | 3" | 1 1/4" NPT | 30.4 | 19.8 | 10.6 | 2.6 | 2.9 | 12 |
| 15Redi-Flo3-170 | 3/4B | 3" | 1 1/4" NPT | 33.6 | 19.8 | 13.7 | 2.6 | 2.9 | 13 |
| 15Redi-Flo3-270 | 1 1/2C | 3" | 1 1/4" NPT | 38.2 | 21.3 | 16.9 | 2.6 | 2.9 | 16 |

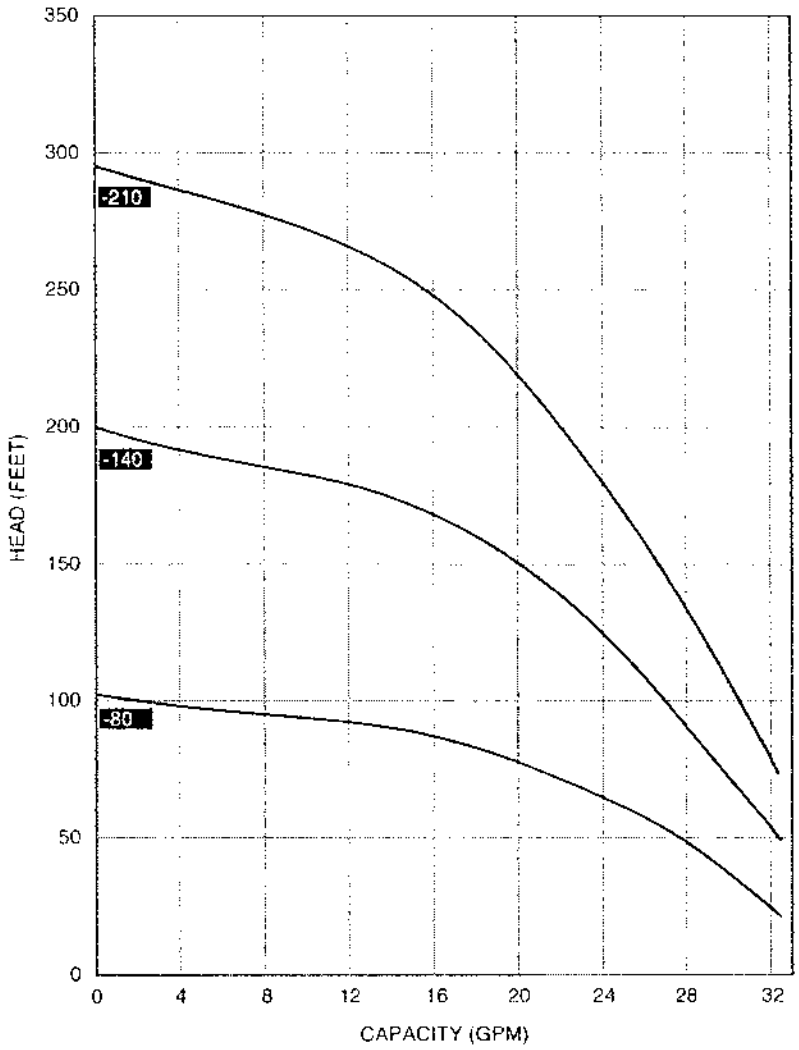
Note: Weights include pump ends with motors

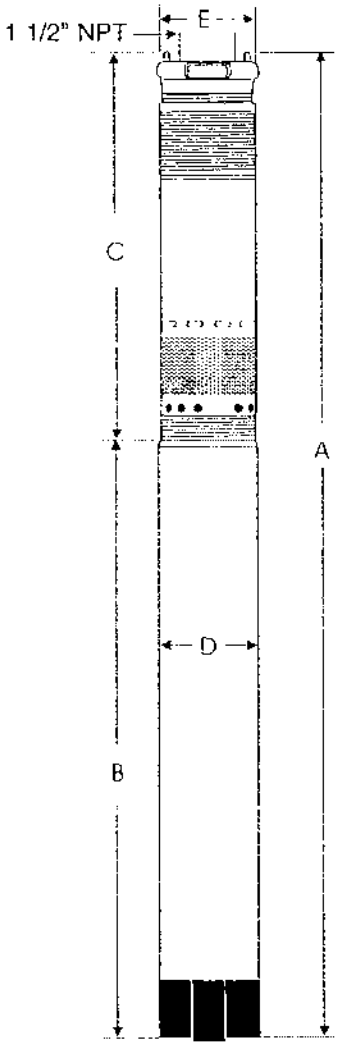


| Model # | HP | Size | Disch. Size | Dimensions in Inches | | | | | Approx. Ship Wt. |
|---|---|---|---|---|---|---|---|---|---|
| | | | | A | B | C | D | E | (pounds) |
| 22Redi-Flo3-80 | 1/2A | 3" | 1 1/2" NPT | 30.4 | 19.8 | 10.6 | 2.6 | 2.9 | 12 |
| 22Redi-Flo3-140 | 3/4B | 3" | 1 1/2" NPT | 33.6 | 19.8 | 13.7 | 2.6 | 2.9 | 13 |
| 22Redi-Flo3-210 | 1 1/2C | 3" | 1 1/2" NPT | 38.2 | 21.3 | 16.9 | 2.6 | 2.9 | 16 |

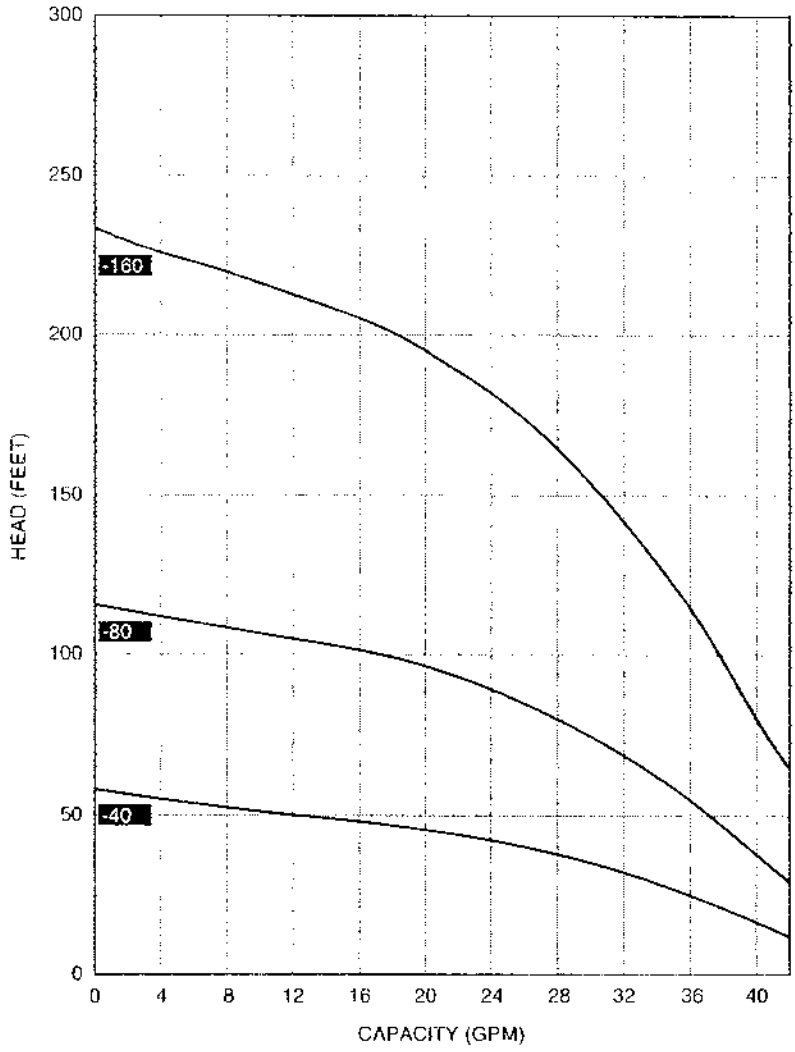
Note: Weights include pump ends with motors

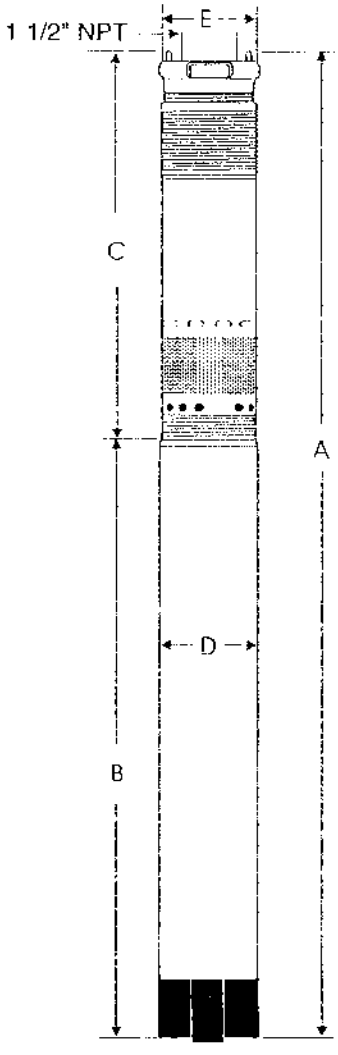


| Model # | HP | Size | Disch. Size | Dimensions in Inches | | | | | Approx. Ship Wt. |
|---|---|---|---|---|---|---|---|---|---|
| | | | | A | B | C | D | E | (pounds) |
| 30Redi-Flo3-40 | 1/2A | 3" | 1 1/2" NPT | 30.4 | 19.8 | 10.6 | 2.6 | 2.9 | 12 |
| 30Redi-Flo3-80 | 1/2B | 3" | 1 1/2" NPT | 29.0 | 19.8 | 10.6 | 2.6 | 2.9 | 13 |
| 30Redi-Flo3-160 | 1 1/2C | 3" | 1 1/2" NPT | 35.0 | 21.3 | 13.7 | 2.6 | 2.9 | 16 |

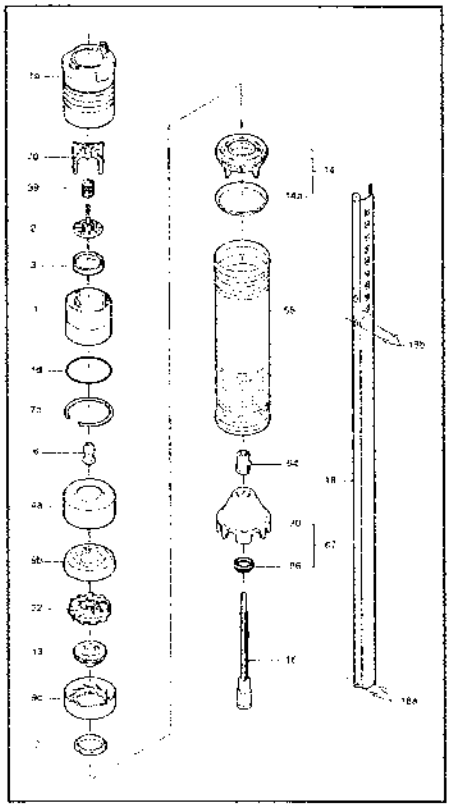
Note: Weights include pump ends with motors



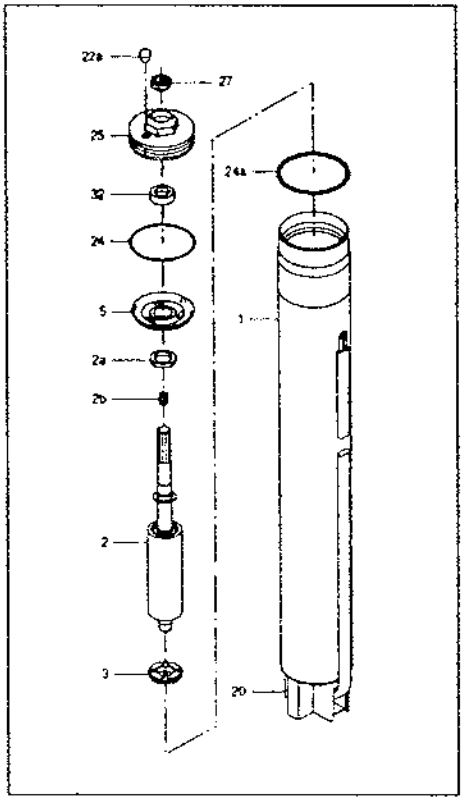
## MATERIAL SPECIFICATION – REDI-FLO3 PUMP END

| Pos. | Component | Material | DIN W. Nr. | AISI |
|---|---|---|---|---|
| 1 | Valve Casing | PVDF | | |
| 1a | Discharge Chamber | Stainless Steel | 1.4401 | 316 |
| 1d | O-Ring | FPM Rubber | | |
| 2 | Valve Cone | PVDF | | |
| 3 | Valve Seat | FPM Rubber | | |
| 9b | Top Chamber | PVDF | | |
| 4a | Empty Chamber | PVDF | | |
| 6 | Top Bearing | FPM Rubber | | |
| 7 | Neck Ring | PVDF | | |
| 7a | Lock Ring | Stainless Steel | 1.4401 | 316 |
| 32 | Guide Vanes | PVDF | | |
| 9c | Bottom Chamber | PVDF | | |
| 13 | Impeller w/ tungsten carbide bearing | PVDF | | |
| 14 | Suction Interconnector | PVDF | | |
| 14a | Ring | Stainless Steel | 1.4401 | 316 |
| 16 | Shaft w/ coupling | Stainless Steel<br>Sintered Steel | 1.4401 | 316 |
| 18 | Cable Guard | Stainless Steel | 1.4401 | 316 |
| 18a-b | Cable Guard Screws | Stainless Steel | 1.4401 | 316 |
| 30 | Pressure Equalization Cone | PVDF | | |
| 39 | Valve Spring | Stainless Steel | 1.4406 | 316LN |
| 55 | Pump Sleeve | Stainless Steel | 1.4401 | 316 |
| 70 | Valve Guide | PVDF | | |
| 64 | Priming Screw | PVDF | | |
| 86 | Lip Seal Ring | FPM Rubber | | |



## MATERIAL SPECIFICATION – REDI-FLO3 PUMP MOTOR

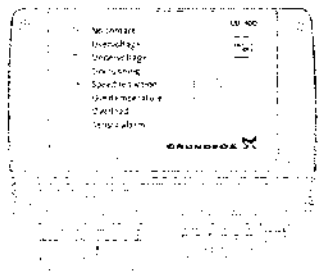
| Pos. | Component | Material | DIN W. Nr. | AISI |
|---|---|---|---|---|
| 1 | Stator | Stainless Steel | 1.4401 | 316 |
| 2 | Rotor | Stainless Steel | 1.4401 | 316 |
| 2a | Stop Ring | PP | | |
| 2b | Filter | Polyester | | |
| 3 | Thrust Bearing | Carbon | | |
| 5 | Radial Bearing | Ceramic/ tungsten carbide | | |
| 20 | Motor Cable w/ plug | Tefzel | | |
| | | PVDF | | |
| 22a | Filling Plug | FPM Rubber | | |
| 24 | O-Ring | FPM Rubber | | |
| 24a | O-Ring | FPM Rubber | | |
| 25 | Top Cover | PPS | | |
| 27 | Filter | Polyester | | |
| 32 | Shaft Seal | FPM Rubber | | |
| | Motor Liquid | SML-2 | | |



| ELECTRIC | |
|---|---|
| **Supply Voltage:** | 1x200-240V +6%/-10%, 50/60 Hz, PE<br>1x100-115V |
| **Operation via Generator:** | As a minimum, the generator output must be equal to the motor P1[KW] +10% |
| **Starting Current:** | The motor starting current is equal to the highest value stated on the motor nameplate |
| **Starting:** | Soft-start |
| **Run-up Time:** | Maximum: 2 seconds |
| **Motor Protection:** | The motor is protected against:<br>Dry running, overvoltage, undervoltage, overload, overtemperature |
| **Power Factor:** | PF=1 |
| **Service Factor:** | 0.33-0.50A[Hp]-1.75 at 115V/230V<br>0.50-0.75B[Hp]-1.4 at 230V<br>1.0-1.5C[Hp]-1.15 at 230V |
| **Motor Cable:** | 3 Wire, Tefzel Cable Kit |
| **Motor Liquid:** | Type SML 2 |
| **pH Values:** | 2-13 |
| **Liquid Temperature:** | The temperature of the pumped liquid should not exceed 104°F. |
| **Note: If liquids with a viscosity higher than that of water are to be pumped, please contact GRUNDFOS** | |
| **Minimum Ambient Temperature:** | -4° F |
| **Maximum Ambient Temperature:** | +140° F |
| **Frost Protection:** | If the pump is to be stored after use, it must be stored in a frost-free location or it must be ensured that the motor liquid is frost-proof. Otherwise motor must be stored without being filled with motor liquid. |
| **OPERATING CONDITIONS** | |
| **Minimum Ambient Fluid Temperature:** | -4° F |
| **Maximum Ambient Fluid Temperature:** | +104° F |
| **APPROXIMATE DIMENSIONS AND WEIGHT** | |
| **Motor Dimensions (MSE - NE 3):** | |
| 0.33-0.50A[Hp] | 20.9" length x 2.68" diameter |
| 0.50-0.75B[Hp] | 20.9" length x 2.68" diameter |
| 1.0-1.5C[Hp] | 22.3" length x 2.68" diameter |
| Pump Diameter, incl. cable guard: | 2.91" |
| **Motor Weights (MSE - NE 3):** | |
| 0.33-0.50A[Hp] | 6.0 lbs |
| 0.50-0.75B[Hp] | 7.1 lbs |
| 1.0-1.5C[Hp] | 8.2 lb |
| **Pump End Dimensions:** | |
| Pump Diameter: | 2.68" |
| Pump Diameter, incl. cable guard: | 2.91" |
| **Pump End Dimensions (min. and max.):** | |
| 5 Redi-Flo3 | 10.6" to 18.0" |
| 10 Redi-Flo3 | 10.6" to 16.9" |
| 15 Redi-Flo3 | 10.6" to 16.9" |
| 22 Redi-Flo3 | 10.6" to 16.9" |
| 30 Redi-Flo3 | 10.6" to 13.7" |
| **Pump End Weights (min. and max.):** | |
| All | 2.2 lbs to 3.5 lbs |
| **Well Diameter (minimum):** | 3" |
| **Installation Depth (maximum):** | 500 feet, below static water level |

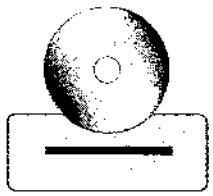
## CU300 Status Box

| Description | Product no. |
|---|---|
| CU300 Status Box | 96422776 |



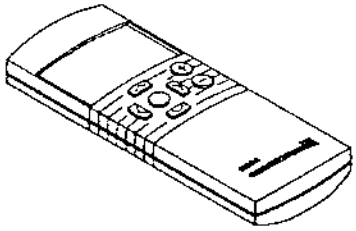
## CU 300 PC Tool Software

| Description | Product no. |
|---|---|
| CU 300 PC Tool Software | 96432875 |



## R100 Remote Control

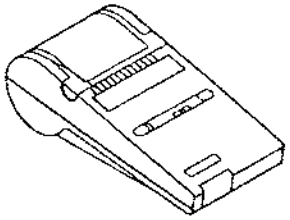
| Description | Product no. |
|---|---|
| The R100 is used for wireless infrared communication with the CU300 | 625333 |



TM00 8367 2796

## Printer

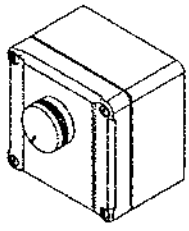
| Description | Product no. |
|---|---|
| Printer for R100, infrared communication Type: Hewlett Packard, HP 82240B | 620480 |
| Paper Roll | 620481 |

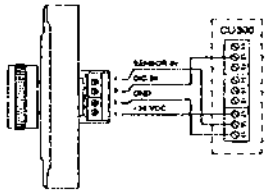


TM00 8368 2796

## Potentiometer

| Description | Version | Product no. |
|---|---|---|
| External potentiometer with cabinet for wall mounting. Screened cables, 4-wire cable, max. length of cable: 100m | Grundfos potentiometer, SPP1 Enclosure class: IP 55 | 655468 |

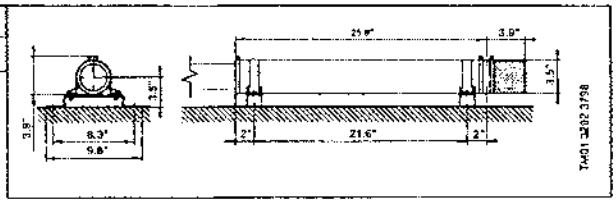




TM00 2604 4793 - TM01 3231 3798

## Redi-Flo3 - Flow Sleeve

| Description | Product no. |
|---|---|
| Flow Sleeve Complete | 96037505 |



# Notes

L-BF-TI-014 | Rev. 5:03
PRINTED IN U.S.A.

Subject to alterations.

**U.S.A.**
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