CSI Controls®

RK Series™

Serious Products for Serious Contractors!

INDUSTRIAL CONTROL EQUIPMENT
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Float Systems Manual

Table of Contents

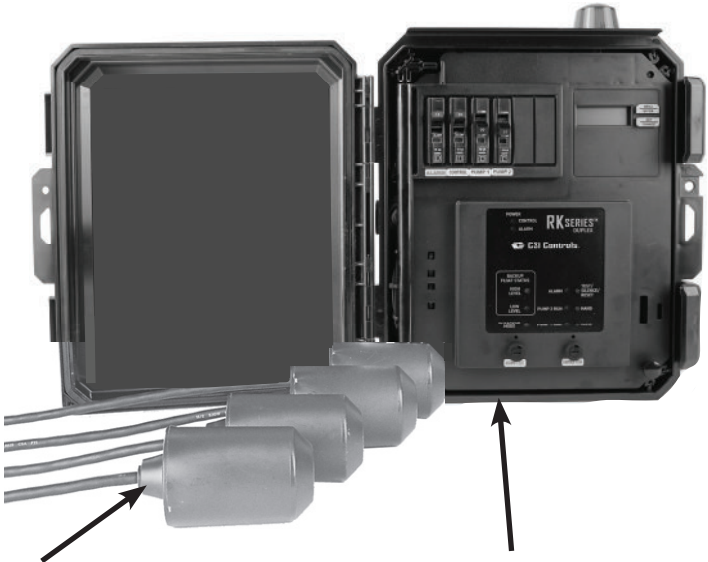
About the RK Series Float Systems

The RK Series float system is an innovative approach to today's level control requirements and offers many of the most requested items as standard features such as lockable latches, a flashing red alarm light, an electronic horn, and the innovative "Touch-To-Silence" pad all in a NEMA 4X enclosure. Through the use of a standard subdoor and raised backpanel, the RK Series is able to house common control panel features such as circuit breakers, start components, contactors, and a terminal strip. The RK Series also offers an exclusive control circuit board with float indication lights conveniently located on the subdoor that allow the user to see the status of each float.

Available in : Simplex or Duplex

Single Phase to Three Phase

Standard Float Systems Include:



Floats
-3 for simplex
-4 for duplex

The Control Panel

⚠WARNING	ELECTRICAL SHOCK HAZARD Disconnect power before installing or servicing this product. A qualified service person must install and service this product according to applicable electrical and plumbing codes.	⚠WARNING	EXPLOSION OR FIRE HAZARD Do not use this product with flammable liquids. Do not install in hazardous locations as defined by National Electrical Code, ANSI/NFPA 70.

Failure to follow these precautions could result in serious injury or death. Replace product immediately if switch cable becomes damaged or severed. Keep these instructions with warranty after installation. This product must be installed in accordance with National Electric Code, ANSI/NFPA 70 so as to prevent moisture from entering or accumulating within boxes conduit bodies, fittings, float housing, or cable.

Warning: In critical applications where a failure could cause property damage, a separate backup high water alarm should be used.

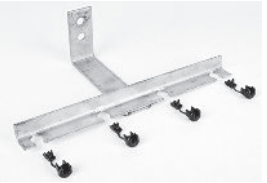
Step 1: Installing the Floats

Basic Float Installation

The installer can tie wrap the floats to the pump discharge pipe at the appropriate levels using a heavy duty tie wrap or a clamp designed for that purpose.

Installation Using the Float Mounting Bracket

Mount the bracket to the side of the tank and then install the floats and weights into the cord snubbers.



Installation Using the 2" PVC Mounting Bracket

Install the PVC mounting bracket to the side of the tank and suspend a length of 2" PVC pipe from the bracket. This allows the installer to mount the floats the same as they would to the discharge pipe.

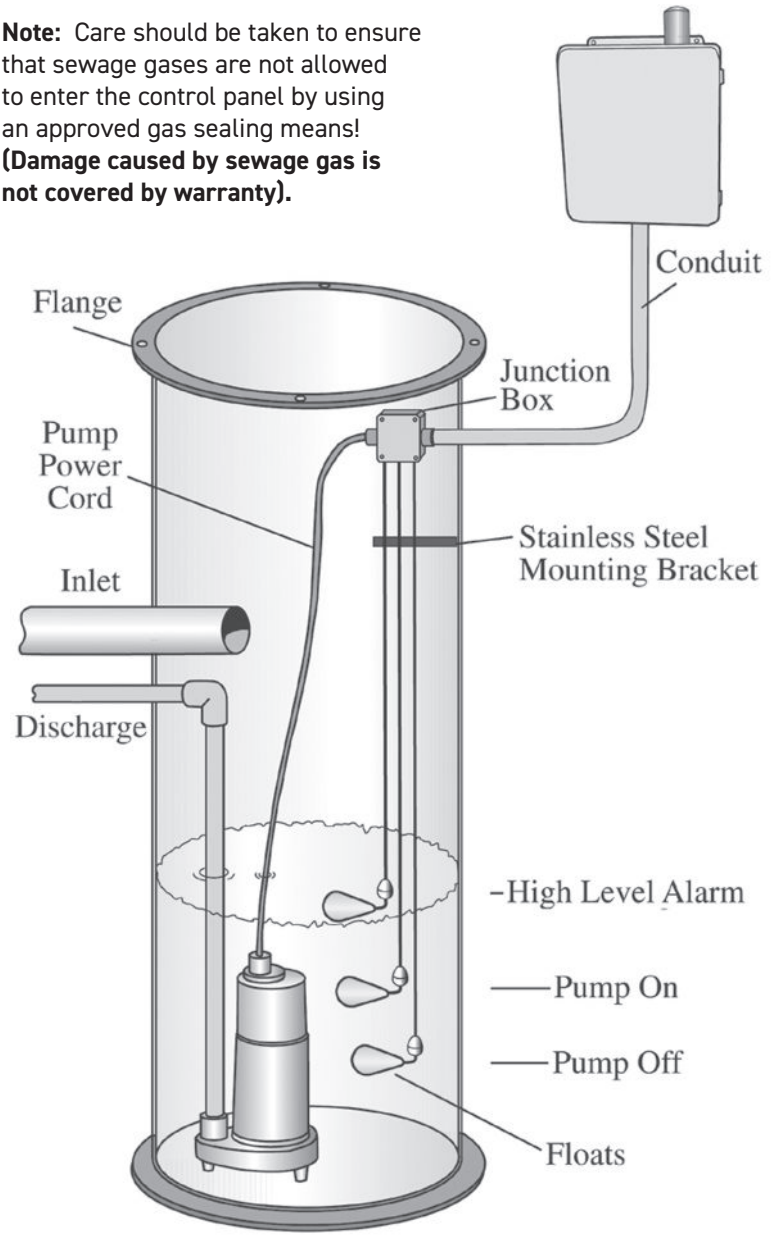
Warning: 1. Do not install a float switch in direct line of incoming liquid
2. Make sure you leave at least 3.5 inches of tether length between the actual float and the clamping device to allow the float to tip properly.

Step 2: Installing the Controller

1. Determine a mounting location for the panel.
2. Determine the location of the conduit(s) coming into the panel.
3. Drill holes in the panel for conduit entry.
4. Mount the panel using the provided mounting feet.
5. Bring the float wires and power wires into the panel through the conduit.
6. Wire the panel according to the schematic included in the panel.
7. Check installation by turning power on and manually tipping the floats or running up the water level to test for proper installation.
8. Test the unit periodically to ensure proper operation.

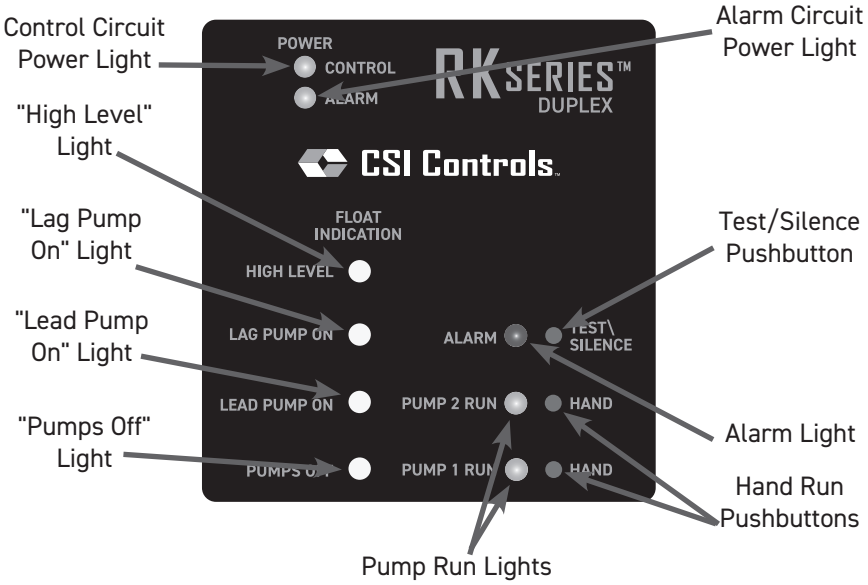
Typical Float System Installation Diagram

Note: Care should be taken to ensure that sewage gases are not allowed to enter the control panel by using an approved gas sealing means! **(Damage caused by sewage gas is not covered by warranty).**



Understanding the Float System

Subdoor Control Center



Float Indication Status Lights

Float indication lights show the status of the floats in the basin. If a float is tipped closed, the corresponding LED will be lit. If the floats tip out of sequence it will cause the float indication lights to show an error. If a higher float comes on before the next lowest float, the LED of the lower float will flash indicating a problem. For example, if the "Lead Pump On" float hangs up and the water level comes down to the "Pumps Off" float level, the "Pumps Off" float will tip down. The "Pumps Off" LED will then flash while the "Lead Pump On" LED remains on. However, the error indication will be automatically cleared next time the floats sequence in the proper order. Another example would occur when the "Pumps Off" float fails to close when it tips up. When the "Lead Pump On" float tips up, the "Pumps Off" LED will then flash while the "Lead Pump On" LED remains on. Even though the error indication is the same there could be two causes for the error. The first cause being a hung up float, and the second cause being a float failure. These lights help to assist in troubleshooting float errors and station problems.

If you need any additional help please call the factory for technical assistance: **1-800-746-6287**

Float System Features

Hand Run Buttons

RK panels include push-to-run (HAND) pushbuttons for the motor starters output and a push-to-test (TEST) pushbutton for the alarm output accessible on the subdoor. The push-to-run (HAND) pushbuttons toggle their respective outputs off and on each time pushed under normal operation. However, to protect the pumps should the sump go below the "Pump(s) Off" float, the HAND pushbuttons revert to momentary contact and must be held down to maintain its respective output on. This is a safety feature that keeps the pumps from running dry.

Blown Fuse Indicators

These lights are located above the fuses on the subdoor. If a fuse is blown, the indicator above the blown fuse will light up and the power light on the subdoor control center for that circuit will be off. However, if the power light is off and the blown fuse light is not lit then that circuit is not getting any power.

Audible Alarm Circuitry

RK panels come standard with an audible piezo alarm (95 db +/-) and the exclusive side mounted “Touch-To-Silence” pad (patents pending). With this feature the user is able to silence the audible by simply touching the decal on the side of the enclosure.

Alternation and Lag Delay (Duplex Controllers Only)

On the duplex controller the float indications are labeled "Lead Pump" and "Lag Pump" because there is a built in alternator in the controller. The alternator cycles which pump is the lead pump after each pump run cycle. The non-adjustable delay causes the lag pump to wait ten seconds before turning on after the lead pump has turned on. This is useful during a power outage when the liquid level may reach the lag pump setting. The lead pump will turn on when power is restored and the lag pump will turn on ten seconds later.

Special Options

Redundant Off Float

The redundant off float option reassures that the pump(s) will not run dry. If your panel has this option the terminal strip will include numbers 7 & 8. To use the redundant off option, connect a normally open float switch to these terminals, otherwise install a jumper across terminals 7 & 8 if you do not wish to use this feature. When the float is in the open position the pumps will not be able to run except by using the hand run push buttons in momentary contact mode.

Note: "Hand Run Buttons" (page 8) describes momentary contact mode.

Auxiliary Alarm Contact

If your panel has the Auxiliary Alarm Contact option then the terminal strip will include the numbers 17 & 18. This option offers a dry contact that closes during a high level alarm condition then opens when the alarm goes away or when the panel is silenced.

RK "E Series"

The RK "E Series" offers basic features including 3-float operation (simplex only), "Touch-To-Silence" pad, an audible alarm, and flashing alarm light in a NEMA 4X enclosure. It is an economical solution for your pump control needs.

Understanding the
"E Series" Float System - Page 10

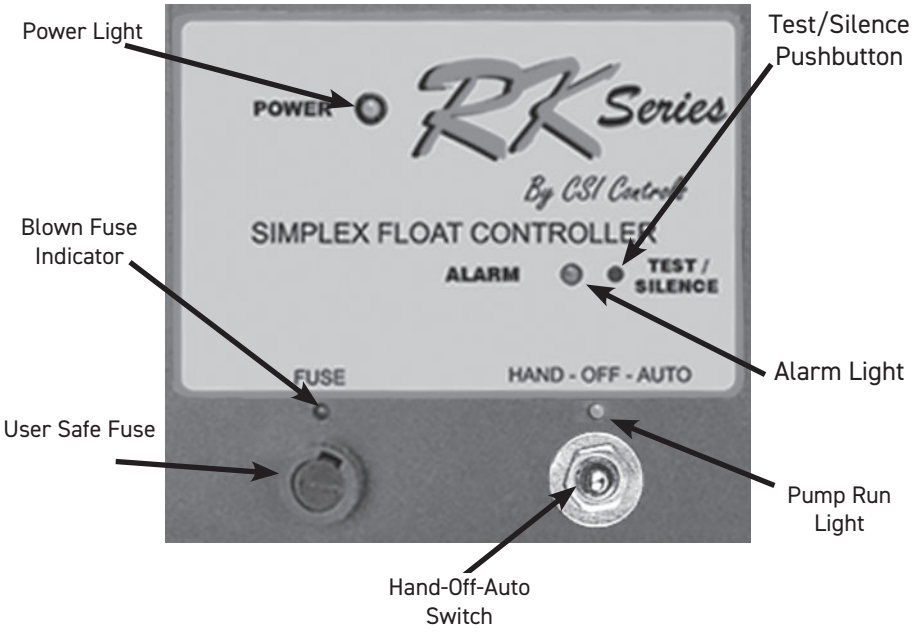
DDCs and DIBS

Every RK Series panel has a removable faceplate on the subdoor to add either a Digital Display Center (DDC) or a Digital Interface Board (DIB). Upgrading to one of these display options allows the user to access more features.

DDC Operation Manual - Page 11

DIB Operation Manual - Page 15

Subdoor Control Center



Hand-Off-Auto Switch

The Hand-Off-Auto switch is located on the front of the subdoor for control of the pump state. In the "Auto" position, the level control circuit will control the pump. In the "Hand" position, the pump will be turned on, and in the "Off" position the pump will be disabled from running.

Note 1: When there is a fuse blown condition on a RK "E Series" controller the "blown fuse indicator" will light and the "power light" will continue to be dimly lit.

Note 2: Since the "E Series" is an economical version of the float system, it does not support certain features. Features not available in the "E Series" panels are Alternation (simplex control only), Hand Run Buttons, Float Status Lights, Redundant Off Float Option, and the Auxiliary Alarm Contact option.

If you need any additional help please call the factory for technical assistance: **1-800-746-6287**

Digital Display Center (DDC)

Make sure power is OFF before installing DDC!

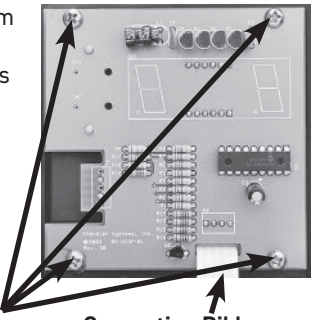
Installation

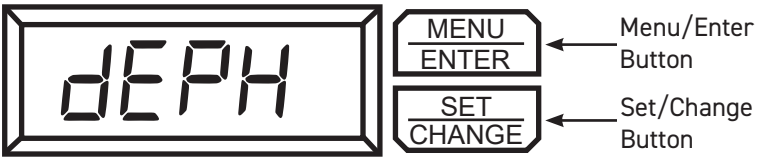
To install the DDC, remove the faceplate from above the control center on the subdoor and insert the DDC module from the back of the subdoor. Next, screw in the four corner screws. **With the power off**, attach the ribbon from the DDC module to the control board. After everything is installed, turn the power on. It may take up to 10 seconds for the circuit board to complete the program update. Once the circuit board has completed the program update, normal operation will begin.

Note: RKE boards cannot update through the DDC.

Removable Face Plate

Back of DDC Module





Display Menu

Press Menu/Enter Button to change between menu fields

Et. # - (Elapsed Time, # is Pump number (1 or 2)):
Reads out the total elapsed run time of the corresponding pump.
Press Set/Change button to alternate between hours and minutes & seconds

CC.# - (Cycle Counter, # is Pump number (1 or 2)):
Reads out the number of cycles the corresponding pump has run. (Max Value: 9999)

F1tr - (Field 1 Timer, Time Dose DDCs only):
Reads out the remaining time in the current time cycle. If the pump(s) are running then it indicates the time remaining until the pump(s) shut off. If the pump(s) are off then it indicates time remaining until the pump(s) are enabled to run again.

User Settings Menu

Press and hold Menu/Enter Button for 3 seconds while in the Display Menu to enter into this menu. Press the Menu/Enter Button to change between menu fields.

LCOP - (Level Control Options Menu):

Press Set/Change button to enter into this submenu.

tDOP - (Time Dosing Options Menu, Time Dose DDCs only):

Press Set/Change button to enter into this submenu.

Level Control Options Menu

LSS - (Lead Selection Setting, Duplex Panels Only):
Display will alternate showing "LSS" and the current value.

Press Set/Change button to change this field.

Possible Settings:
0 = Alternate Between Pumps
1 = Pump #1 Always is Lead Pump
2 = Pump #2 Always is Lead Pump

r CC - (Reset Cycle Counter(s))
Display will alternate showing "r CC" and the value "0."
Press Set/Change button to change this field.

Possible Settings:
0 = Do Not Reset Cycle Counter(s)
1 = Reset Cycle Counter(s) to 0

Time Dosing Options Menu

F1t1 - (Field 1 Time 1 (Pump Enable Time Setting))
Display will alternate showing "F1t1" and the current value. Time shown is in [Minutes : Seconds] (Maximum time setting is 99:59)

Press Set/Change button to change this field.

F1t2 - (Field 1 Time 2 (Pump Disable Time Setting))
Display will alternate showing "F1t2" and the current value. Time shown is in [Hours : Minutes] (Maximum time setting is 99:59)

Press Set/Change button to change this field.

ALOr - (Alarm / Override Function):
Display will alternate showing "ALOr" and the current value.

Press Set/Change button to change this field.

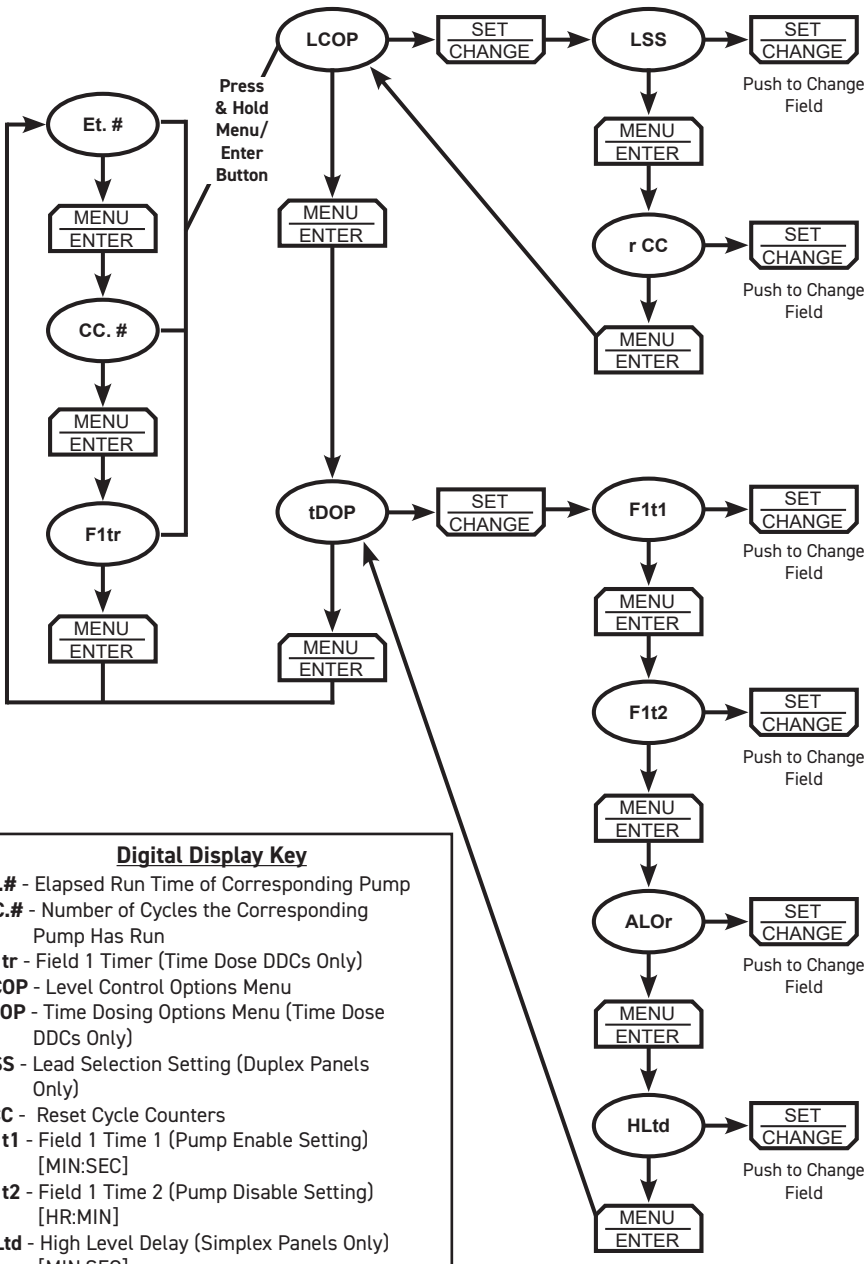
Possible Settings, Simplex:
(What the High Level input will do)
0 = Override the Pump Disable Timer and Alarm with selected Time Delay (see HLtd setting). A warning will sound and flash the alarm light to indicate the panel is in Override mode. This can be silenced. It will be cleared after the Disable Timer times out.
1 = Only Override the Pump Disable Timer without any alarms.
2 = Only Sound High Level Alarm without any delays.

Possible Settings, Duplex:
(What the Lag (override) input will do)
0 = Override Pump Disable Timer. A warning will sound and flash the alarm light to indicate the panel is in Override mode. This can be silenced. It will be cleared after the Disable timer times out.
1 = Override the Pump Disable Timer. No warning will sound.
2 = Override function is disabled. Lag float input is ignored.

HLtd - (High Level Time Delay, Simplex Panels Only):
Display will alternate showing "HLtd" and the current value. The High Level Alarm will delay according to the set time. If the fluid level is above the High Level input for this length of time without interruption, the alarm will begin to sound. Time shown is in [Minutes : Seconds] (Maximum time setting is 99:59)

Press Set/Change button to change this field.

DDC Flow Chart



Digital Display Key

Et.# - Elapsed Run Time of Corresponding Pump
CC.# - Number of Cycles the Corresponding Pump Has Run
F1tr - Field 1 Timer (Time Dose DDCs Only)
LCOP - Level Control Options Menu
tDOP - Time Dosing Options Menu (Time Dose DDCs Only)
LSS - Lead Selection Setting (Duplex Panels Only)
rCC - Reset Cycle Counters
F1t1 - Field 1 Time 1 (Pump Enable Setting) [MIN:SEC]
F1t2 - Field 1 Time 2 (Pump Disable Setting) [HR:MIN]
HLtd - High Level Delay (Simplex Panels Only) [MIN:SEC]

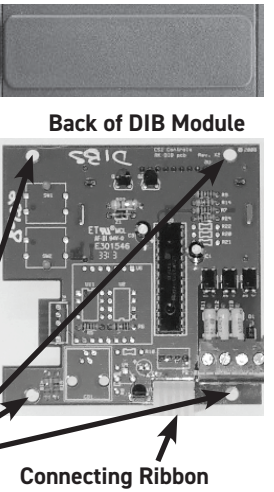
Digital Interface Board (DIB)

Make sure power is OFF before installing DIB!

Installation

To install the DIB, remove the faceplate from above the control center on the subdoor and insert the DIB module from the back of the subdoor (be sure to remove the protective film on the display before installing). Next, screw in the four corner screws. **With the power off**, attach the ribbon from the DIB module to the control board. After everything is installed, turn the power on. It may take up to 10 seconds for the circuit board to complete the program update. Once the circuit board has completed the program update, normal operation will begin. Once a DIB has been installed, the panel will not work if the DIB is removed.

Note: RKE boards are not compatible with the DIB.



Menu Navigation

To advance to the next menu, press the "Menu/Enter" button. To go to the settings menu from the display menu, push and hold "Menu/Enter" until you see the "Level Cntrl Menu" appear on the LCD screen. When in the Settings Menu press "Menu/Enter" to cycle through the fields, to select a submenu, press the "Set/Change" button.

Editing Fields

To edit the setting currently being displayed on the screen, press the "Set/Change" button. The value that is now being edited will begin to flash. To change this value, press the "Set/Change" button. To move to the next edit digit, or to finish editing the setting, press the "Menu/Enter" button.

Example

To Change Pump Alternation Features: (Duplex Systems Only)
From the Display Menu press and hold the "Menu/Enter" button until "Level Cntrl Menu" appears on the LCD screen. Next press the "Set/Change" button to enter into the Level Control submenu. The first field is "Lead Pump Set". Press the "Set/Change" button again to change this field. The field being edited will flash. Press the "Set/Change" button to change the field and press the "Menu/Enter" button to accept the setting.

Display Menu

Press Menu/Enter Button to change between menu fields.

Elapsed Time # - (# is Pump number (1 or 2)):
Reads out the total elapsed run time of the corresponding pump. (Max Value 999999:59:59) Time shown is in the format of [Hours:Minutes:Seconds]

Cycle Count # - (# is Pump number (1 or 2)):
Reads out the number of cycles the corresponding pump has run. (Max Value: 999999)

Override Count - (Time Dose DIBs only):
Reads out the number of times the panel has gone into override mode. (Max Value: 999999)

High Level Count :
Reads out the number of times the liquid level has reached high level. (Max Value: 999999)

Field #1 Timer - (Time Dose DIBs only):
Reads out the remaining time in the current time cycle. If the pump(s) are running then it indicates the time remaining until the pump(s) shut off. If the pump(s) are off then it indicates time remaining until the pump(s) may run again.

Active Alarm :
Reads out what alarm condition the panel is currently experiencing. If there are no alarms, it will read "None."

User Settings Menu

Press and hold Menu/Enter for 3 seconds while in the Display Menu to enter into this menu. Press the Menu/Enter button to change between the following menu fields.

Level Cntrl Menu - (Level Control Options Menu):
Press Set/Change button to enter into this submenu.

Time Dosing Menu - (Time Dosing Options Menu, Time Dose DIBs only):
Press Set/Change button to enter into this submenu.

Telemetry Menu - (Modem DIBs only):
Press Set/Change button to enter into this submenu.

Alarm History :
Press Set/Change button to enter into this submenu.

Level Cntrl Menu - (Level Control Options Menu):

Lead Pump Set (Duplex Panels Only):
Press Set/Change button to change this field.
Possible Settings:

Alternate	= Alternates which pump turns on at LEAD PUMP input every time a pump runs.
Pump 1 is Lead	= Pump #1 ALWAYS turns on at the LEAD PUMP input and Pump #2 ALWAYS turns on at the LAG PUMP input.
Pump 2 is Lead	= Pump #2 ALWAYS turns on at the LEAD PUMP input and Pump #1 ALWAYS turns on at the LAG PUMP input.

Reset Cyc Cnt # - This is the cycle count that can be viewed in the Display Menu (Reset Cycle Counter to zero, # is pump number (1 or 2)
Possible Settings:

Do Not Reset	= Cycle Counter will not reset
Reset Counter	= Cycle Counter will reset to 0

Reset ETM # - This is the Elapsed time that can be viewed in the Display Menu (Reset Elapsed Time to zero, # is pump number (1 or 2)
Press Set/Change button to change this field.
Possible Settings:

Do Not Reset	= Elapsed Time will not reset
Reset Counter	= Elapsed Time will reset to 0

Time Dosing Options Menu (Time Dose Versions Only)

Pump 1 Time On - (Pump Enable Time Setting) This is the amount of time the pump will be enabled to run once the level reaches the PUMP ON (simplex) or LEAD PUMP ON (duplex) input. **Note:** If the level reaches the PUMP OFF input before time expires, the pump will shut off and the Pump Disable time will begin.

Time shown is in [Minutes:Seconds] (Maximum time setting is 99:59)
Press Set/Change button to change this field.

Pump 1 Time Off - (Pump Disable Time Setting) This is the amount of time the pump must wait after it completes a run cycle before it may run again. **Note:** If the level reaches the override (lag) input, the pump will begin to run regardless of Pump Disable Time.

Time shown is in [Hours:Minutes] (Maximum time setting is 99:59)
To disable Time Dosing, set this field to 00:00.
Press Set/Change button to change this field.

Pump 1 Ovrrid On - (Pump Enable Time Setting for Override) This is the amount of time the pump will be enabled to run once the level reaches the override input at which time the system enters Override Time Dosing mode.

Time shown is in [Minutes:Seconds] (Maximum time setting is 99:59)
Press Set/Change button to change this field.

Pump 1 Ovrrid Off - (Pump Disable Time Setting for Override) This is the amount of time the pump must wait after it completes an Override run cycle before it may run again. **Note:** The pump will continue to cycle in override time dosing mode until the level is below the PUMP ON input when the Override Pump Disable Time expires.

Time shown is in [Hours:Minutes] (Maximum time setting is 99:59)
Press Set/Change button to change this field.

Pump 2 Time On - (Pump Enable Time Setting)
See "Pump 1 Time On" Description
Time shown is in [Minutes:Seconds] (Maximum time setting is 99:59)
Press Set/Change button to change this field.

Pump 2 Time Off - (Pump Disable Time Setting)
See "Pump 1 Time Off" Description
Time shown is in [Hours:Minutes] (Maximum time setting is 99:59)
To disable Time Dosing, set this field to 00:00.
Press Set/Change button to change this field.

Time Dosing Options Menu (Continued)

Pump 2 Ovrrid On - (Pump Enable Time Setting for Override)
See "Pump 1 Ovrrid On" Description
Time shown is in [Minutes:Seconds] (Maximum time setting is 99:59)
Press Set/Change button to change this field.

Pump 2 Ovrrid Off - (Pump Disable Time Setting for Override)
See "Pump 1 Ovrrid Off" Description
Time shown is in [Hours:Minutes] (Maximum time setting is 99:59)
Press Set/Change button to change this field.

Alarm/Override - This setting controls 3 functions of Time Dosing:
Override: When the basin level reaches the Override float (High Level float on simplex, Lag float on duplex), the panel will override the Off Timer, and run the pump(s) using the override On and Off times.
Override Warning: When an override occurs, the panel will sound an Override Warning Alarm, to signal that an override event is occurring.
High Level Alarm: When the basin level reaches the High Level float, the panel will sound a High Level Alarm, to signal that the liquid level is much higher than expected.
Press Set/Change button to change this field.

Setting	Override	Override Warning	High Level Alarm
Override w/ Alarms	ON	ON	ON
Override-No Warning	ON	OFF	ON
Overide-No Alarms	ON	OFF	OFF
Alarm-No Override	OFF	OFF	ON

High Level Delay - (High Level Time Delay, Simplex Panels Only):
The High Level Alarm will delay according to the set time. If the fluid level is above the High Level float for this length of time without interruption the alarm will begin to sound.
Time shown is in [Minutes:Seconds] (Maximum time setting is 99:59)
Press Set/Change button to change this field.

Number of Fields - (Duplex Panels Only):
The Time Dosing operation can be set up for "One Field" or "Two Fields."
- When set to "Two Fields" each pump will be able to run as soon as its corresponding Off Timer is complete. During override the two pumps may run at the same time.
- When set to "One Field" each pump will only be able to run when the Off Timer for **both** pumps is complete. The two pumps will never run at the same time.

Alarm History Menu

This menu displays the last three alarms that have occurred, beginning with the most recent alarm.

Auxiliary Inputs

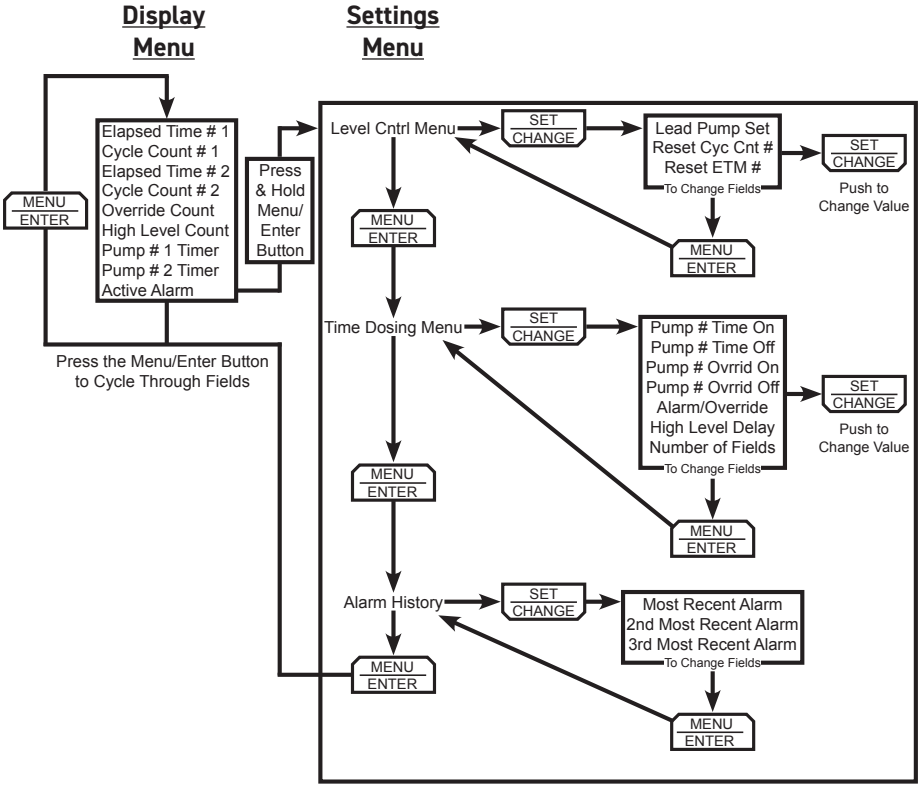
There are three Auxiliary Inputs on the DIB, each with its own alarm. Each has a 120Vac input, and all three share a common Neutral.
(Input Rating: 120 Vac, 10mA each)

Flash Codes

Each different alarm is annunciated on the LCD screen. The audible and alarm light also flash at different rates for each alarm. The flash rates are explained below:

2 Flashes per second -	High Level Alarm
2 Flashes every other second -	Auxiliary Inputs
1 Flash every other second -	Float Failure
1 Flash every 4 seconds -	Override Warning Alarm Power Failure Control Power Failure

Subdoor Control Center



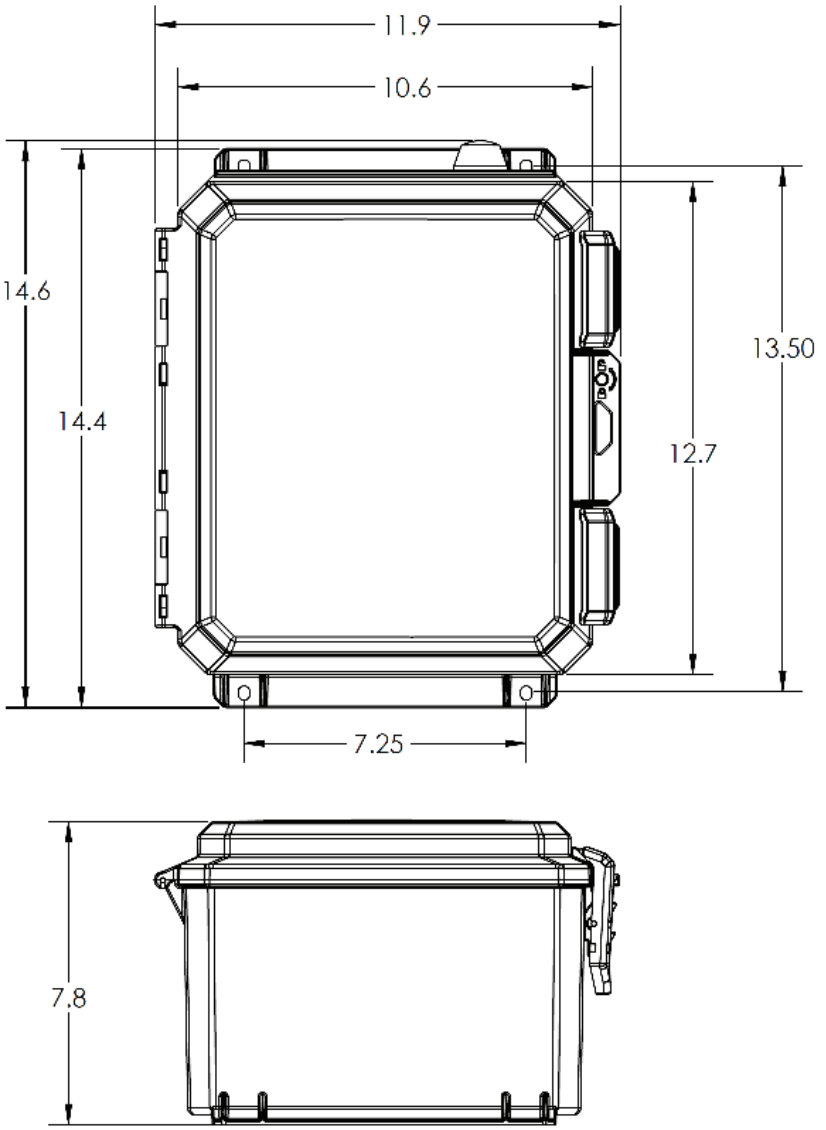
Float System Troubleshooting

IF	THEN
-The panel power lights are not on.	-Make sure the Control / Alarm breaker(s) are turned on. -Make sure you have the correct incoming voltage. -Make sure all necessary jumper wires are in the proper terminal. -Make sure both fuses are not blown. If both fuses are blown, the Fuse Trip Indicator Lights will not operate.
-Alarm Fuse or Control Fuse light is on.	-A fuse has blown. Replace the fuse with a similiar amperage 5 x 20mm fuse. If the new fuse also blows, check the incoming field wiring. **Note:** Extra fuses are located on the back of the subdoor.
-The Float Indicator Lights are flashing.	-Make sure all the floats are connected to the proper terminals. -Turn the control panel off. Wait 10 seconds then turn the control panel back on. If a float had been skipped in the order of operation this should clear the error. -If the floats are connected through a junction box, make sure there is no water in the junction box. -A float may be malfunctioning.

Float System Troubleshooting

IF	THEN
-The pump(s) will not run in automatic.	-Push the "Hand" button to see if the pump(s) will run in manual operation. If the pump does not run in manual operation contact a local certified professional. -Check to see if any float indicator lights are flashing. (See-The Float Indicator Lights pg 7) -If the panel has the Redundant Off option make sure there is a float switch or jumper wire connected to terminals 7 & 8.
-The High Level Alarm is activated.	-If possible, open the tank and verify that the liquid level is a the high level setpoint. -Ensure all the circuit breakers are turned on and that they are not tripped. -Push and hold the "Hand" button to run the pump(s) manually. If the high level alarm continues after manually running the pump, contact a local certified professional.

Enclosure Dimensions



Field Wiring Connections

Terminal Strip With All Available Options

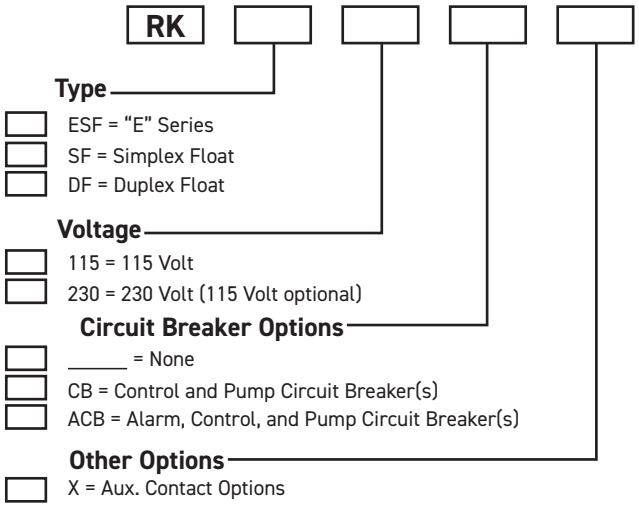
L1	L2	N	1	2	3	4	N	5	6	7	8	9	10	11	12	13	14	15	16	17	18

Sample RKDF230ACB Terminal Strip

L1, L2 & N	115/230 VAC Pump Power
1	115 VAC Alarm Power
2	115 VAC Control Power
3 & 4	Pump 1 Mtr.
N	For 115 Volt Pump Connection
5 & 6	Pump 2 Mtr.
7 & 8	Redundant Off
9 & 10	Off
11 & 12	Lead On
13 & 14	Lag On
15 & 16	Alarm
17 & 18	Aux. Alarm Contact

Note: Terminal strips differ between RK models and options. Your panel may be missing some of these terminal strip numbers. However, this example shows all possible field wiring connections.

Determining Your RK Model Number



Float System Specifications

Available in Simplex & Duplex	Duplex Includes Alternator & Lag Pump Delay
Enclosure Dimensions	12.7" x 10.6" x 7.8"
Overall Dimensions	14.6" x 11.9" x 7.8"
Enclosure	Nema 4X with Molded Mounting Feet
Alarm Piezo	95 db with "Touch to Silence" Circuitry
Float Status Lights	Displayed on Subdoor
Flashing Red Alarm Beacon	Provides 360° Visual Display
Weight	10.8 lbs
Contactor(s)	25 Amp, Heavy Duty, Definite Purpose
Includes:	20' Mechanical Floats (3 for Simplex, 4 for Duplex)
Aux. Alarm Contact Rating	5 Amp 120 VAC
Controller Temp. Range	-40°F (-40°C) – +185°F (+85°C)
Humidity	95% Non-Condensing
Terminal Torque Ratings	Large – 35 inch lbs, Small – 12 inch lbs

Non-Conductive Injection Molded Subdoor
Blown Fuse Status Lights
cULus 508 Listed
Maximum 2 HP - (12 FLA) or 3 HP (17 FLA) with HD Option
3 Year Limited Warranty

CSI Controls®

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