

BFBP21 Tech Sheet

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Customer: Bullfrog Spas
Part Number: 56342-01-X1 825 Incoloy
Custom Box Overlay
Box Overlay Part Number 46091

UL System Model: BP21-BFBP21-AS
Software Version ID: M100_225 V13.0
Software Version: 13.0
File Name: BP2100_13.0_BFBP21_3.hex
Configuration Signature: B078E8D3

Eng. Project Number: 3911

Base PCBA: 56341-01-X2
Bare Board: 24082_D or E

Control Panels:
Bullfrog TP600 50285
Software Version 2.3 and later
TP600 CE 50015 version 2.3 or later
Bullfrog TP900 50284
Software Version BF 2.12 and later

Auxiliary Panels
See Page 19



Manufactured under one or more of these patents. U.S. Patents: 5332944, 5361215, 5550753, 5559720, 5,883,459, 6253227, 6282370, 6590188, 6976052, 6965815, 7030343, 7,417,834 b2, Canadian Patent: 2342614, Australian patent: 2373248 other patents both foreign and domestic applied for and pending. © Copyright 2009 Balboa Water Group.

System Revision History

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Part #	EPN	Date	Originator	Changes Made
56342	3876	11-28-12	BWG	Initial Release BFBP21 based on BFG15 - GL1500
56342-01	3876	02-01-13	BWG	Change TP600 to use Menu button and custom menu, v. 13 firmware

Basic Functions Setup 1

Power Requirements:

Single Service [3 wires (line, neutral, ground)]

230VAC, 50Hz, 1p, 16A/32A, (Circuit Breaker rating = 20A/40A max.) - 16A Service for Setups 3 & 4 ONLY

Dual Service [5 wires (line 1, neutral 1, line 2, neutral 2, ground)]

230VAC, 50Hz, 1p, 2x 16A, (Circuit Breaker rating = 20A max each service.)

3-Service [5 wires (line 1, line 2, line 3, neutral, ground)]

400VAC, 50Hz, 3Np, 16A, (Circuit Breaker rating = 20A max each phase line.)

IMPORTANT - Service must include a neutral wire, with a line to neutral voltage of 230VAC.

System Outputs:

Pump 1	230VAC	2-Speed	10.3A max in Seups 3 & 4 only. 8A max in Setups 1 & 2 only. 10.3A max in Setup 1 & 2 with 3-service power input ONLY 30-minute timer for High Speed, 60-Minute timer for Low Speed
Pump 2	230VAC	2-Speed	8A max 30-minute timer (Setups 1 & 2 only) for both speeds 10.3A max in Setup 1 & 2 with 3-service power input ONLY
Circ Pump	230VAC	1-Speed	2A max Programmable Filtration Cycles + Polling This is the heater pump except in Setups 2 and 4, where Pump 1 is the heater pump. The heater pump must deliver 20 GPM through heater.
Ozone	230VAC		.5A max
Spa Light	10VAC	On/Off	1A max 60-minute timer.
Cabinet LED	10VAC	Hot	Power use limit is part of 1A spa light.
A/V (Stereo)	230VAC	Hot	5A max Always on
Heater	3.0kW @ 240VAC max		

Hardware Setup

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Wiring Diagram

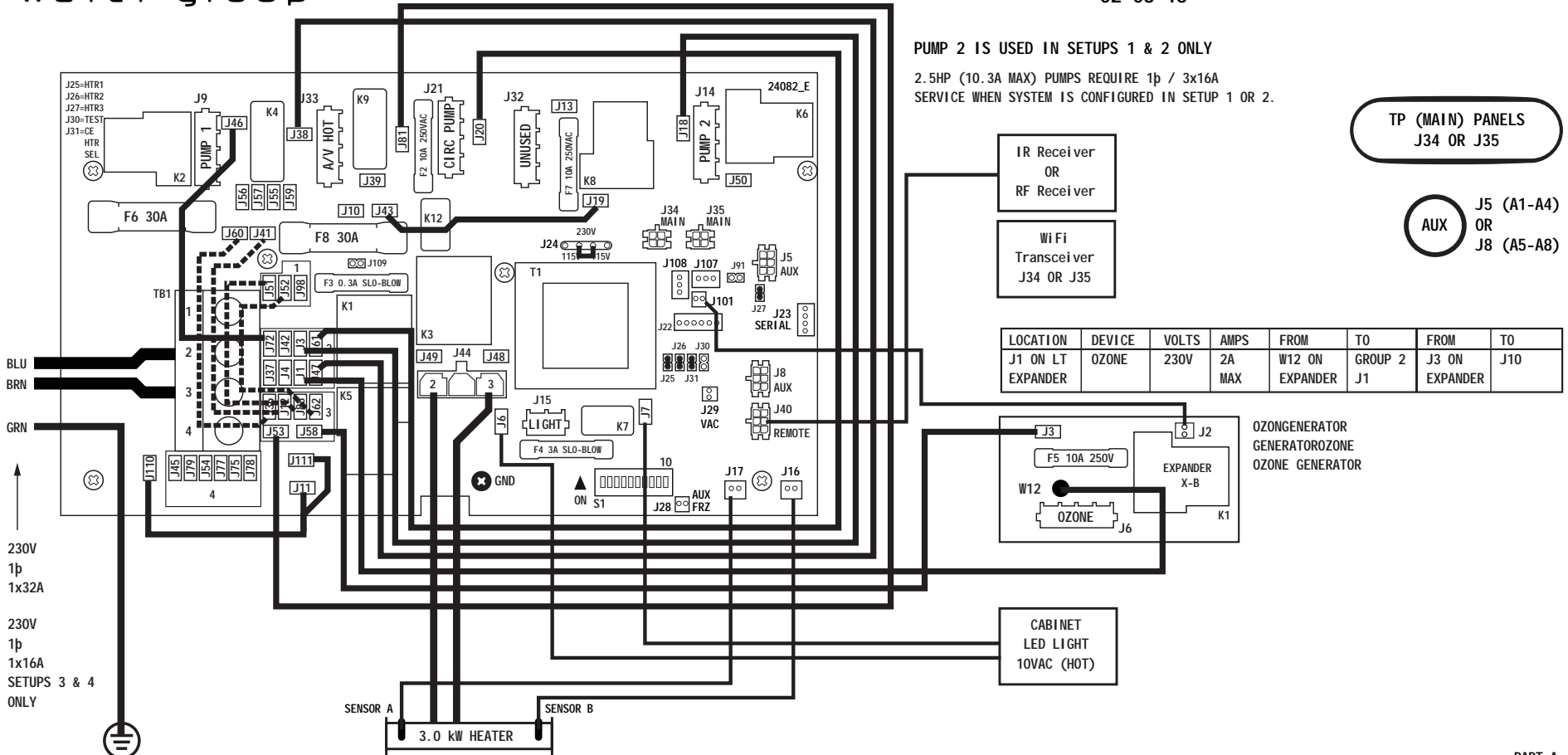


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02-08-13

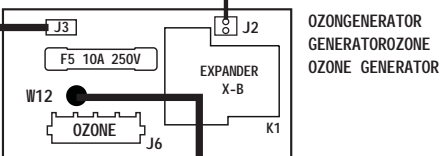
PUMP 2 IS USED IN SETUPS 1 & 2 ONLY
2.5HP (10.3A MAX) PUMPS REQUIRE 1p / 3x16A
SERVICE WHEN SYSTEM IS CONFIGURED IN SETUP 1 OR 2.

TP (MAIN) PANELS
J34 OR J35

J5 (A1-A4)
OR
J8 (A5-A8)



LOCATION	DEVICE	VOLTS	AMPS	FROM	TO	FROM	TO
J1 ON LT EXPANDER	OZONE	230V	2A MAX	W12 ON EXPANDER	GROUP 2 J1	J3 ON EXPANDER	J10



CABINET LED LIGHT
10VAC (HOT)

230V
1p
1x32A

230V
1p
1x16A
SETUPS 3 & 4
ONLY

PART A

Manufactured under one or more of these patents. U.S. Patents: 5332944, 5361215, 5550753, 5559720, 5,883,459, 6253227, 6282370, 6590188, 6976052, 6965815, 7030343, 7,417,834 b2, Canadian Patent: 2342614, Australian patent: 2373248 other patents both foreign and domestic applied for and pending. © Copyright 2009 Balboa Water Group.



Hardware Setup

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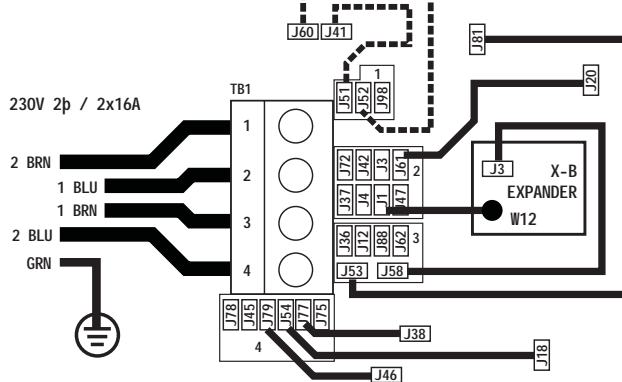
Settings

SINGLE SERVICE 230V 1p / 1x32A, TWO-SERVICE 230V 1p / 2x16A, THREE-SERVICE 230V 1p / 3x16A

LOCATION	DEVICE
J9	NETZSTROMVERSORGUNG 2-GESCHW. -PUMPE 1 ALIMENTATION POMPE 1 A 2 VITESSES 2-SPEED PUMP 1
J14	NETZSTROMVERSORGUNG 2-GESCHW. -PUMPE 2 ALIMENTATION POMPE 2 A 2 VITESSES 2-SPEED PUMP 2
	PUMP 2 LINE 1 CONNECTION J19 to J43
J15	10V BELEUCHTUNG ECLAIRAGE BAIN HYDRO SPA LIGHT
J21	KREISLAUF PUMPE POMPE DE CIRCULATION CIRC PUMP
	CIRC AND OZONE LINE 1 CONNECTION J81 to J59
J32	N/A
J33	TV / AV
J40	IR RECIEVER
J5, J8	AUX PANEL(S) - AX10, AX20, AX30, AX40

SETUP #	CIRC PUMP	PUMP 1	PUMP 2	TEMP SCALE
1*	PROGRAMMABLE FILTRATION + POLLING	2-SPEED	2-SPEED	°C
2*		2-SPEED	2-SPEED	°C
3	PROGRAMMABLE FILTRATION + POLLING	2-SPEED		°C
4		2-SPEED		°C

PUMP 1 LOW TIMEOUT IS 60 MINUTES.

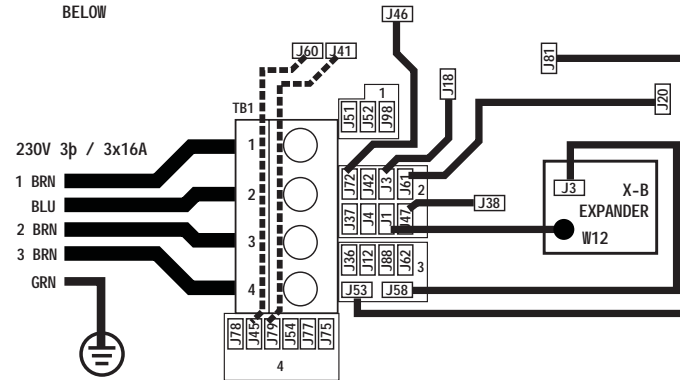


FOR SUPPLY CONNECTIONS, USE CONDUCTORS SIZED ON THE BASIS OF 60°C AMPACITY BUT RATED MINIMUM OF 90°C.

USE COPPER CONDUCTORS ONLY. EMPLOYER UNIQUEMENT DES CONDUCTEURS DE CUIVRE.

TORQUE RANGE FOR MAIN TERMINAL BLOCK (TB1): 27-30 IN. LBS. (31.1-34.5 kg cm)

SYSTEM WILL BE IN SETUP #2 UNLESS MARKED DIFFERENTLY BELOW



SYSTEM WILL BE SHIPPED IN SETUP #2 UNLESS MARKED OTHERWISE

SWITCHBANK S1 OFF

SWITCHBANK S1 ON

TEST MODE OFF	SWITCH	TEST MODE ON
DON'T ADD 1 HS PUMP W/HTR	◀ A1	ADD 1 HS PUMP WITH HEAT
DON'T ADD 2 HS PUMPS W/HTR	◀ A2	ADD 2 HS PUMPS WITH HEAT
DON'T ADD 4 HS PUMPS W/HTR	◀ A3	ADD 4 HS PUMPS WITH HEAT
SPECIAL AMPERAGE RULE A	◀ A4	SPECIAL AMPERAGE RULE B
STORE SETTINGS**	◀ A5	MEMORY RESET**
NOT ASSIGNED	◀ A6	NOT ASSIGNED
NOT ASSIGNED	◀ A7	NOT ASSIGNED
NOT ASSIGNED	◀ A8	NOT ASSIGNED
NOT ASSIGNED	◀ A9	NOT ASSIGNED
NOT ASSIGNED	◀ A10	NOT ASSIGNED

**SWITCH # 6 SHOULD BE SET TO OFF UPON FINAL INSTALLATION.

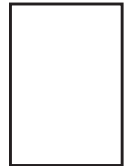
230V 1p 1X16A

OFF ON

- ◀ A2
- ◀ A3
- ◀ A4

* 2.5HP (10.3A MAX) PUMPS REQUIRE 1p / 3x16A SERVICE WHEN SYSTEM IS CONFIGURED IN SETUP 1 OR 2.

INSTEAD OF SETUP #2, THIS SYSTEM IS CONFIGURED IN SETUP #:



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PART B

Setup Reference Table

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Setup #	Circ Pump	Pump 1	Pump 2	Temp Scale
1	Programmable Filtration + Polling	2-Speed	2-Speed	°C
2	None	2-Speed	2-Speed	°C
3	Programmable Filtration + Polling	2-Speed		°C
4	None	2-Speed		°C

System is shipped in Setup 2

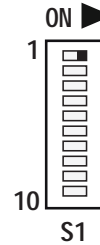
Pump 1 Low timeout is 60 minutes.

Changing Software Setups

Test Menu Access (S1, Switch 1 ON) *Service Technician ONLY.*

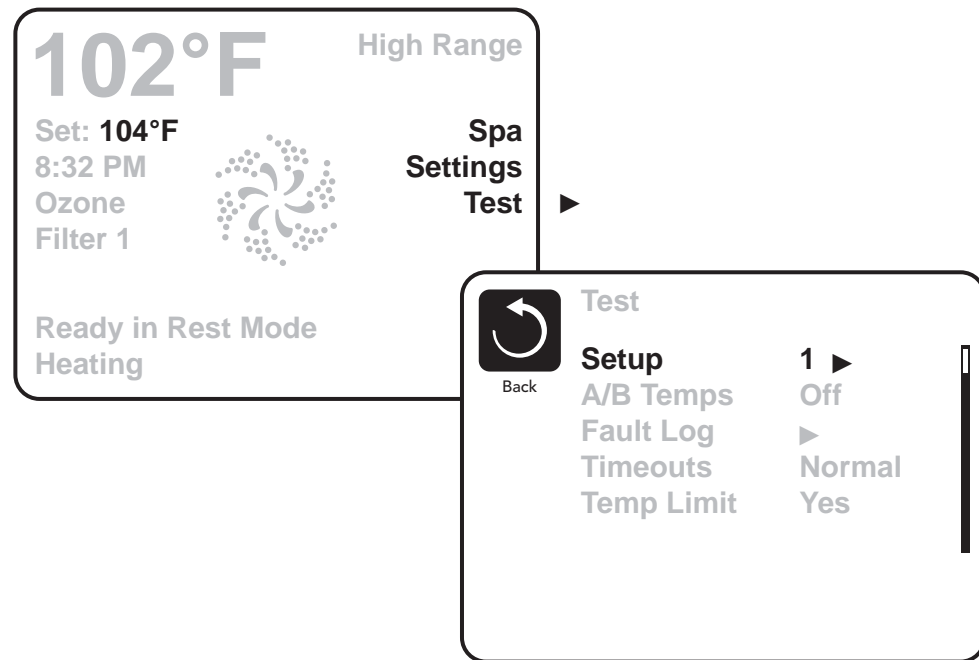
DANGER! HIGH VOLTAGE WILL BE ACCESSIBLE! SERVICE TECHNICIAN ONLY!

While the system is running, move DIP Switch 1 (on S1 on the Main circuit board) to ON. The system will enter Test Mode. Moving DIP Switch 1 to OFF will exit Test Mode.



Software Setups

Under the TEST Menu, the Setup screen will allow changing the Setup from 1 to any number established by the Manufacturer. Changing the Setup may require wiring changes as well.



Equipment Expansion

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Expansion Features

Control Connection

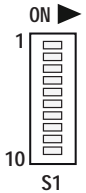
	Default	Fuse
Relay 1 (J101)	Ozone	10A
Relay 7/8 (J107)	Undefined	None
Relay 9/10 (J108)	Undefined	None

DIP Switch Functions

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Fixed-function DIP Switches

- A1 Test Mode (normally Off).
- A2 In "ON" position, add one high-speed pump (or blower) with Heater.
- A3 In "ON" position, add two high-speed pumps (or 1 HS Pump and Blower) with Heater.
- A4 In "ON" position, add four high-speed pumps (or 3 HS Pumps and Blower) with Heater.
- A5 In "ON" position, enables Special Amperage Rule B. See Special Features section under Configuration Options for functionality with your system.
In "OFF" position, enables Special Amperage Rule A.
- A6 Persistent memory reset (Used when the spa is powering up to restore factory settings as determined by software configuration).







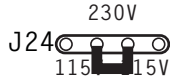
A2, A3, and A4 work in combination to determine the number of high-speed devices and blowers that can run before the heat is disabled. i.e. A2 and A3 in the ON position and A4 in the OFF position will allow the heater to operate with up to 3 high-speed pumps (or two HS Pumps and Blower) running at the same time. Heat is disabled when the fourth high-speed pump or blower is turned on.

Note: A2/A3/A4 all off = No heat with any high-speed pump or blower.

Undesignated switches are not assigned a function.

Jumper Definitions

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J109	GFCI Test/Trip enabled when jumper is on both pins of J109. Note: This feature must be enabled in software as well.	J109 
J91	Real Time Clock Enable/Disable Note: This Jumper should NOT be shorted when the Control Panel can display time of day.	J91 
J30	Do Not Use	
J31	Non Applicable	
J29	Do Not Use	J29 
J25, J26, J27	Heater Type Settings. Note: Factory Configured do not change.	
J24	Jumper on center two pins (230V) when heater is running at 240V. Two Jumpers installed; one on left 2 pins and one on right 2 pins (115V) when heater is running at 120V.	

Warning!

Setting DIP switches or jumpers incorrectly may cause abnormal system behavior and/or damage to system components. Refer to Switchbank illustration on Wiring Configuration page for correct settings for this system. Contact Balboa if you require additional configuration pages added to this tech sheet.

Manufactured under one or more of these patents. U.S. Patents: 5332944, 5361215, 5550753, 5559720, 5,883,459, 6253227, 6282370, 6590188, 6976052, 6965815, 7030343, 7,417,834 b2, Canadian Patent: 2342614, Australian patent: 2373248 other patents both foreign and domestic applied for and pending. © Copyright 2009 Balboa Water Group.



BFBP21 Configuration Options

General Features

Feature	Default
Pump 1 in Filter Cycle (Circ Only)	No
Pump 1 Low Timer	<i>60 Minutes</i>
General Pump Timer	30 Minutes
Blower Timer	15 Minutes
Mister Timer	15 Minutes
Light Timer	60 Minutes
Circ (when enabled)	Programmable + Polling
Cleanup Cycle	<i>30 Minutes</i>
Cleanup as Preference setting	<i>Yes</i>
Ozone	With Heater Pump*
Ozone Suppression	<i>60 Minutes</i>
Pump Purge	<i>300 Seconds</i>
Blower Purge	30 Seconds
Mister Purge	5 Seconds

* The heater Pump can be either a Circ Pump or Pump 1 Low.

Blue Indicates New Custom Configuration Default (Setup 1)

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BFBP21 Configuration Options

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Temperature Features

Feature	Default
Temperature Display	°C

All temperatures must be specified in °F. The system converts °F to °C dynamically. If Celsius is required for default settings, choose a desired °C value that (after rounding) corresponds to a Fahrenheit value.

°C	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
°F	39	41	43	45	46	48	50	52	54	55	57	59	61	63	64	66	68	70	72
°C	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	
°F	73	75	77	79	81	82	84	86	88	90	91	93	95	97	99	100	102	104	

Hi-Range Min. Set Temp	80°F
Hi-Range Max. Set Temp	104°F
Hi-Range Default Temp*	100°F
Lo-Range Min. Set Temp	50°F
Lo-Range Max. Set Temp	99°F
Lo-Range Default Temp*	70°F
Freeze Threshold	44°F
Temp Lock Type	Temp + Settings

*May be changed by end-user (if enabled)

Blue Indicates New Custom Configuration Default (Setup 1)

Manufactured under one or more of these patents. U.S. Patents: 5332944, 5361215, 5550753, 5559720, 5,883,459, 6253227, 6282370, 6590188, 6976052, 6965815, 7030343, 7,417,834 b2, Canadian Patent: 2342614, Australian patent: 2373248 other patents both foreign and domestic applied for and pending. © Copyright 2009 Balboa Water Group.

BFBP21 Configuration Options

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Time Features

Feature	Default
Time Format*	24 Hour
Filter 1 Start Hour*	<i>18:00 (6:00 PM)</i>
Filter 1 Duration*	2 Hours in Setups 2 & 4 <i>3 Hours in Setups 1 & 3</i>
Filter Cycle 2 Default*	<i>ON</i>
Filter 2 Start Hour*	08:00 (8:00 AM)
Filter 2 Duration*	<i>1 Hour</i>
Light Cycle	Disabled
Light Cycle Default*	OFF
Light Cycle Start Hour*	21:00 (9:00 PM)
Light Cycle Duration*	15 Minutes

**May be changed by end-user (if enabled)*

Blue Indicates New Custom Configuration Default (Setup 1)

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BFBP21 Configuration Options

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Reminder Features

Feature	Default
Reminders Shown*	No
Check pH	<i>OFF</i>
Check Sanitizer	<i>OFF</i>
Clean Filter	30 Days
Test GFCI	<i>65 Days</i>
Drain Water	<i>100 Days</i>
Change Cartridge	OFF
Clean Cover	<i>OFF</i>
Treat Wood	<i>OFF</i>
Change Filter	365 Days

**May be changed by end-user (if enabled)*

Blue Indicates New Custom Configuration Default (Setup 1)

Manufactured under one or more of these patents. U.S. Patents: 5332944, 5361215, 5550753, 5559720, 5,883,459, 6253227, 6282370, 6590188, 6976052, 6965815, 7030343, 7,417,834 b2, Canadian Patent: 2342614, Australian patent: 2373248 other patents both foreign and domestic applied for and pending. © Copyright 2009 Balboa Water Group.

BFBP21 Configuration Options

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Special Features

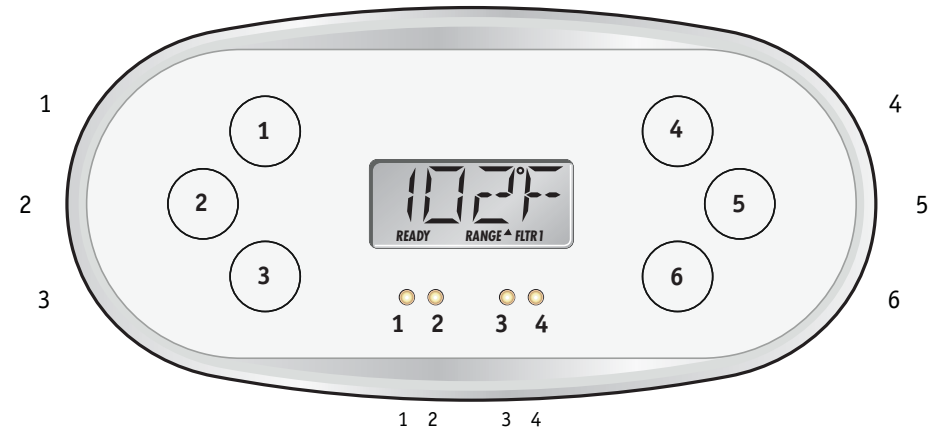
Feature	Default
Special Amperage Rule A	No Limitation
Special Amperage Rule B	No Limitation
Drain Mode	Disabled
Demo Mode	Disabled
Automatic GFCI Test	Disabled
Ozone Slaved to Heater Pump	NO
Dual Voltage Heater	Always Input Voltage
Safety Suction	Disabled
Menu Style	<i>Bullfrog (Hold)</i>

TP600 Panel Configuration

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Button Layout Table

Button #	Pump 2 Setups 1 & 2	No Pump 2 Setups 3 & 4
1	Jets 1	Jets 1
2	Jets 2	Unused
3	Light 1	Light 1
4	Up	Up
5	Menu	Menu
6	Down	Down
LED 1	Jets 1	Jets 1
LED 2	Jets 2	Unused
LED 3	Light 1	Light 1
LED 4	Heat On	Heat On



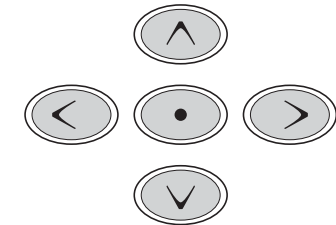
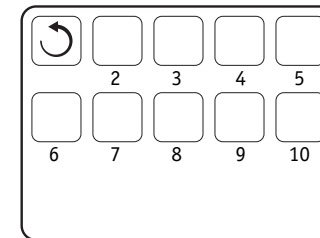
TP900 Panel Configuration

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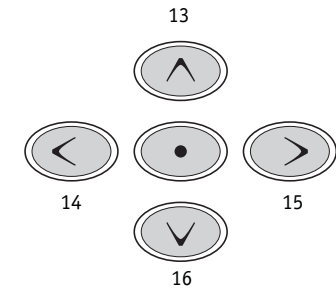
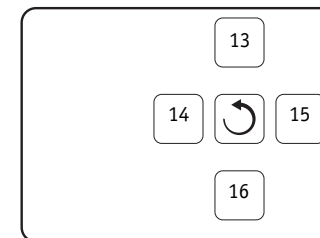
Button Layout Table

Button #	Pump 2 & Circ Pump Setup 1	Pump 2 & No Circ Pump Setup 2	No Pump 2 & Circ Pump Setup 3	No Pump 2 & No Circ Pump Setup 4
1	N/A	N/A	N/A	N/A
2	Jets 1	Jets 1	Jets 1	Jets 1
3	Jets 2	Jets 2	Light 1	Light 1
4	Light 1	Light 1	Invert	Invert
5	Invert	Invert	(Circ Icon)	Undefined
6	(Circ Icon)	Undefined	Undefined	Undefined
7	Undefined	Undefined	Undefined	Undefined
8	Undefined	Undefined	Undefined	Undefined
9	Undefined	Undefined	Undefined	Undefined
10	Undefined	Undefined	Undefined	Undefined
11	N/A	N/A	N/A	N/A
12	N/A	N/A	N/A	N/A
13	Light 1	Light 1	Light 1	Light 1
14	Jets 1	Jets 1	Jets 1	Jets 1
15	Jets 2	Jets 2	Undefined	Undefined
16	Invert	Invert	Invert	Invert

Spa Screen (Not used in custom Bullfrog panel)



Spa Equipment Screen*



A Circ Icon will appear when a Circ Pump is configured.

* Using the custom Bullfrog panel, the "Spa Equipment" screen is accessed from the Main Screen via the "Spa" menu choice.

BFBP21 Configuration Options

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Auxilliary Panel Features on Bank 1*

Feature	Default
Aux Button A1	Jets 1
Aux Button A2	Jets 2
Aux Button A3	Jets 3
Aux Button A4	Light

Auxilliary Panel Features on Bank 2*

Feature	Default
Aux Button A5	Jets 1
Aux Button A6	Jets 2
Aux Button A7	Jets 3
Aux Button A8	Light

*Bank 1 consists of J5 on the Main Circuit Board.
Bank 2 consists of J8 on the Main Circuit Board.
Aux Connection Splitter PN25257 may be required.

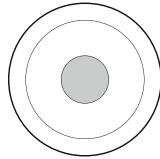
BFBP21 Configuration Options

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Auxilliary Panel Features

AX10 Panels on Bank 1*

A1, AX10A1	No O/L	52803	
A2, AX10A2	No O/L	52804	
A3, AX10A3	No O/L	55805	▶
A4, AX10A4	No O/L	52806	



Call Customer Service for additional information about Auxiliary Panels.

Auxiliary Panel Part Number _____

Overlay Part Number _____

AX10 Panels on Bank 2*

A5, AX10A1	No O/L	52803
A6, AX10A2	No O/L	52804
A7, AX10A3	No O/L	52805
A8, AX10A4	No O/L	52806

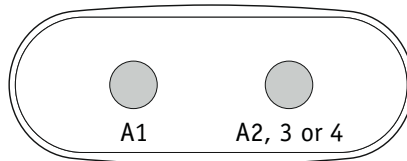
*Bank 1 consists of J5 on the Main Circuit Board.

Bank 2 consists of J8 on the Main Circuit Board.

Aux Connection Splitter PN25257 may be required.

AX20

AX20 A1A2	No O/L	52800
AX20 A1A3	No O/L	52801
AX20 A1A4	No O/L	52802

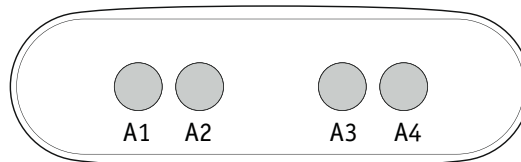


AX20 Auxiliary Panel plugged into Bank 1 will operate A1 + A2, A3 or A4.

AX20 Auxiliary Panel plugged into Bank 2 will operate A5 + A6, A7 or A8.

AX40

AX40	No O/L	52799
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AX40 Auxiliary Panel plugged into Bank 1 will operate A1 + A2, A3 and A4.

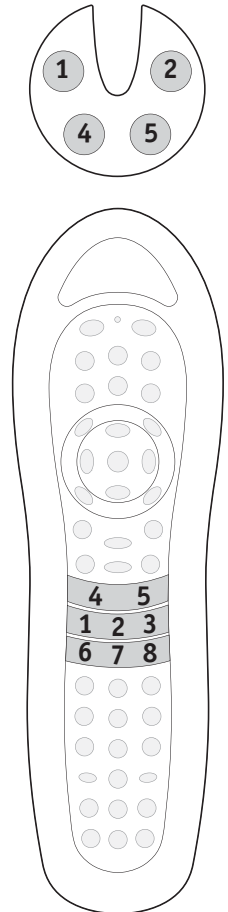
AX40 Auxiliary Panel plugged into Bank 2 will operate A5 + A6, A7 and A8.

BFBP21 Configuration Options

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Remote Panel Features

Feature	Default
Remote Button A1	Jets 1
Remote Button A2	Jets 2
Remote Button A3	Jets 3
Remote Button A4	Undefined
Remote Button A5	Light
Remote Button A6	Undefined
Remote Button A7	Undefined
Remote Button A8	Undefined



Remote Panel Part Number _____
 Overlay Part Number _____