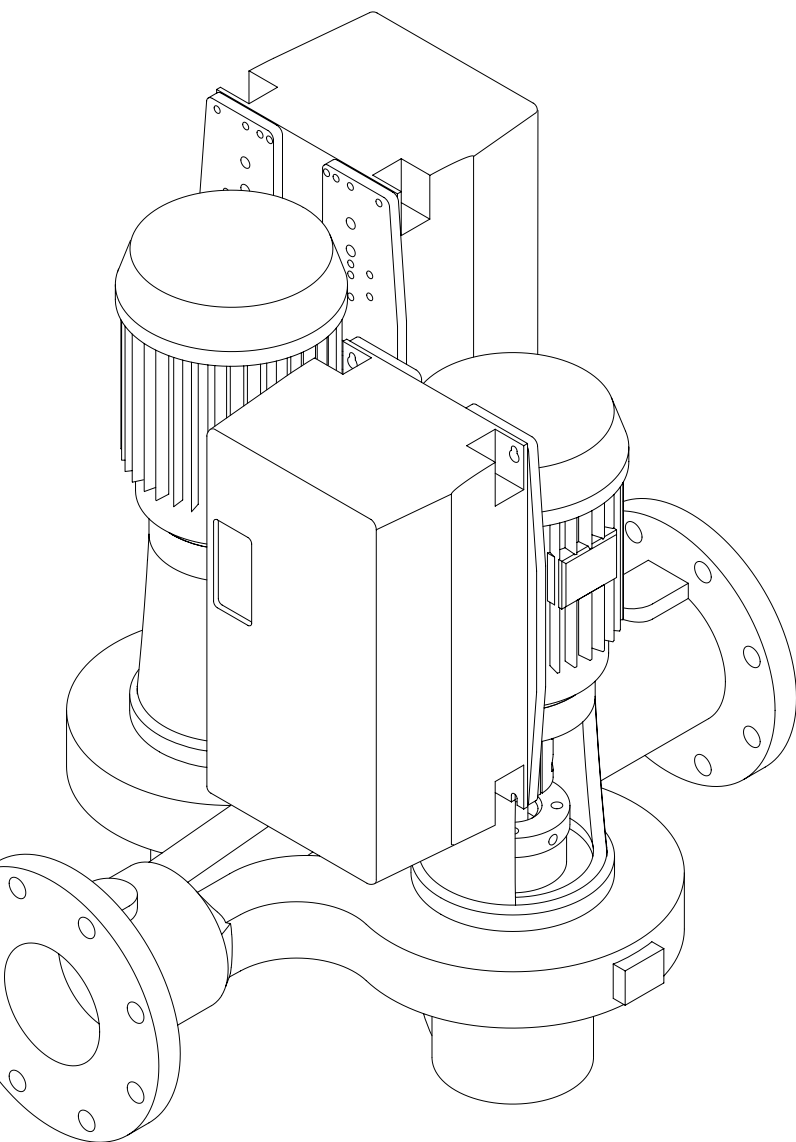


# Design Envelope duty/standby pumps alterna- tion setup instructions

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## Installation and operating instructions

File No: 94.83  
Date: MAY 19, 2015  
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## To alternate Armstrong Design Envelope pumping units based on elapsed time and to activate the standby unit should the duty pump fail.

### GENERAL DATA

Two identical IVS 102 controllers are used; one integrated on each pump. Although one is designated as the "Master" IVS 102 controller and the other as the "Back-Up", both take part equally in the alternation.

The designation "Master" IVS 102 controller simply indicates that this is the IVS 102 controller that is controlling the alternation process.

The system provides complete redundancy. If one IVS 102 controller goes into an alarm condition, the other will automatically take over operation. Alternation attempts will cease until both IVS 102 controllers are ready to operate.

For simplicity, this system requires only one set of "dry" external run/stop contacts. +24 V DC control voltage from both IVS 102 controllers is provided to the master IVS 102 controller's relay 1. If the master IVS 102 controller's control circuitry is working, its power supply will be used. If the master IVS 102 controller cannot provide control voltage, the back-up IVS 102 controller will automatically take over.

On the attached drawing (KFO042), the external interlock is disabled. To enable this, edit the value of parameter 5-12, terminal 27 digital input, as required and wire the interlock.

No speed control is shown. This circuit works equally well for any speed control method desired: open loop, closed loop, or sensorless.

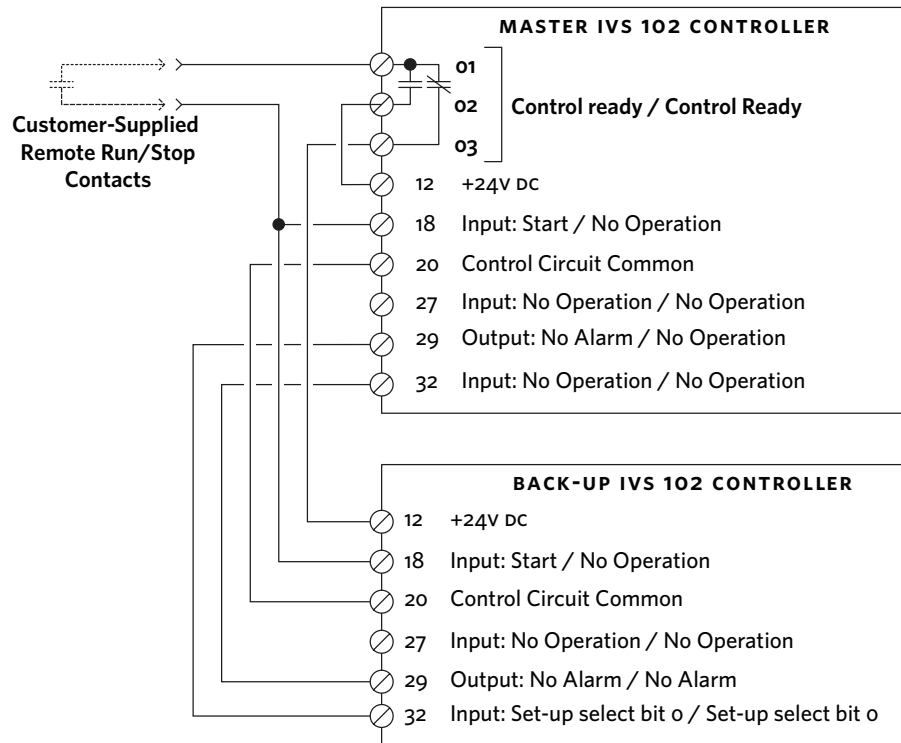
No external monitoring is shown. All of this can be accomplished normally, with the exception that relay 1 on the master IVS 102 controller is used by this circuit.

Pump alternation is controlled by the active setup of each IVS 102 controller. This is directly controlled by the master IVS 102 controller.

- Under normal conditions, the state controller of the master IVS 102 controller's smart logic controller will run its program and change the active setup of the master IVS 102 controller based on the time delay set in timer 0 by parameter 13-20.0.
- When the master IVS 102 controller is operating normally in setup 1, its digital output 29 will be high. This will put the back-up IVS 102 controller into setup 2.
- When the master IVS 102 controller is operating normally in setup 2, its digital output 29 will be low. This will put the back-up IVS 102 controller into setup 1.
- If the master IVS 102 controller is in an alarm condition or if it loses power, its digital output 29 will be low. This will put the back-up IVS 102 controller into setup 1, allowing it to take over operation.
- If the back-up IVS 102 controller is in an alarm condition or if it loses power, its digital output 20 will be low. This will cause the master IVS 102 controller to exit the program that is running in its state controller. This will put the master IVS 102 controller into setup 1, allowing it to take over operation.


While IVS 102 controller alternation is generally controlled by the timer 0, as set in parameter 13-20.0, during system start-up and other situations, there may be a desire to force the alternation.

- Logic rule 1 provides the ability to address such a situation. This allows the user to over-ride the timer by pressing the [OK] and [>] keys on the keypad (local control panel) at the same time.
- Timer 1 provides an "anti-bounce" action for this key press combination. Once this pair of keys is pressed, the IVS 102 controller won't recognize that combination again until the 2 second timer has expired.



**Notes**

1. Setup 1 is used for the Active ivs 102
2. Setup 2 is used for the Standby ivs 102
3. The "/" in the terminal descriptions above indicates how the terminal is programmed in Setup1 and Setup2. The functions are indicated like this Setup 1/ Setup 2.
4. See the attached documentation for parameter values and descriptions.

DRAWING NUMBER: KF0042		<b>ARMSTRONG</b> 
DRAWN BY: KF		
TITLE: <b>IVS 102 Controls Two-Pump Alternation Based on Elapsed Time</b>		
DATE: March 21, 2009	REV.: DR: JMarch 21, 2009	SHEET 1 OF 1 SHEET
SCALE: NONE		

**MASTER IVS 102 CONTROLLER PARAMETERS**

PARAMETER NUMBER	PARAMETER NAME	PARAMETER VALUE		COMMENTS
		SETUP 1	SETUP 2	
0-01	Language	[22] English US	[22] English US	Messages on the display use US English
0-03	Regional settings	[1] North America	[1] North America	Sets various parameters to North American default values.
0-10	Active setup	[9] Multi setup	[9] Multi setup	Allows the active setup on the IVS 102 controller to be changed on command.
0-11	Programming setup	[1] Setup 1	[2] Setup 2	This parameter controls which setup the keypad is currently programming. Make sure to change this back to 'Active setup' when programming is completed.
0-12	This set-up linked to	[0] Not linked	[1] Setup 1	Allows the IVS 102 controller to switch between setups while running.
5-02	Terminal 29 mode	[1] Output	[1] Output	Setup terminal to provide an output to the other IVS 102 controller.
5-10	Terminal 18 digital input	[8] Start	[0] No operation	Allows the IVS 102 controller to run in setup 1, but not in setup 2.
5-12	Terminal 27 digital input	[0] No operation	[0] No operation	If no external interlock is needed, this eliminates the need to wire a jumper between terminals 12 and 27.
5-14	Terminal 32 digital input	[0] No operation	[0] No operation	Although this is programmed for 'No operation', this digital input is used by the master IVS 102 controller to determine if the back-up IVS 102 controller can run.
5-31	Terminal 29 digital input	[160] No alarm	[0] No operation	When this digital output is high, the back-up IVS 102 controller will be in setup 1. If the master IVS 102 controller is in an alarm condition or in setup 2, the back-up IVS 102 controller will be in setup 1.
5-40	Relay 1	[1] Control ready	[1] Control ready	When the master IVS 102 controller's control is operational, its +24v DC power supply is used to provide the run command to both IVS 102 controllers.

**STATE CONTROLLER START AND STOP EVENTS**

13-00	sl controller mode	[1] ON	[1] ON	Allows the state controller to operate.
13-01	Start event	[37] Digital input D132	[37] Digital input D132	When the back-up IVS 102 controller can run (as indicated by D132 being high), the state controller will run.
13-02	Stop event	[26] Logic rule 0	[26] Logic rule 0	When the back-up IVS 102 controller can't run (as indicated by D132 being low), the state controller will stop and exit.
13-20.0	sl controller timer 0	023:59:58.000	023:59:58.000	The timer sets the time between automatic alternations.
13-20.1	sl controller timer 1	000:00:02.000	000:00:02.000	This is an 'anti-bounce' timer to keep pressing the [OK] and [>] arrows from causing multiple actions.

**LOGIC RULE 0**

13-40.0	Logic rule boolean 1	[37] Digital input D132	[37] Digital input D132	This output is high when the back-up IVS 102 controller is not able to operate.
13-41.0	Logic rule operator 1	[5] NOT AND	[5] NOT AND	
13-42.0	Logic rule boolean 2	[1] TRUE	[1] TRUE	

**LOGIC RULE 1**

13-40.1	Logic rule boolean 1	[43] OK key	[43] OK key	This is used to alternate IVS 102 controllers. This can either happen after timer 0 expires or by pressing the [OK] and the [>] at the same time.
13-41.1	Logic rule operator 1	[1] AND	[1] AND	
13-42.1	Logic rule boolean 2	[46] Right key	[46] Right key	
13-43.1	Logic rule operator 2	[2] OR	[2] OR	
13-44.1	Logic rule boolean 3	[30] sl time-out 0	[30] sl time-out 0	

## MASTER IVS 102 CONTROLLER PARAMETERS

PARAMETER NUMBER	PARAMETER NAME	PARAMETER VALUE		COMMENTS
		SETUP 1	SETUP 2	
<b>STATE 1</b>				
13-51.0	SL controller event	[1] TRUE	[1] TRUE	This anti-bounce timer keeps the pressed keys from quickly repeating.
13-52.0	SL controller action	[30] Start timer 1	[30] Start timer 1	
<b>STATE 2</b>				
13-51.1	SL controller event	[31] SL time-out 1	[31] SL time-out 1	After the 'anti-bounce' timer expires, the main alternation timer starts. The example here shows a 24-hour alternation time.
13-52.1	SL controller action	[29] Start timer 0	[29] Start timer 0	
<b>STATE 3</b>				
13-51.2	SL controller event	[27] Logic rule 1	[27] Logic rule 1	If timer 0 expires or the [OK] and [>] keys are pressed, the master IVS 102 controller will switch to setup 2.
13-52.2	SL controller action	[3] Select setup 2	[3] Select setup 2	
<b>STATE 4</b>				
13-51.3	SL controller event	[1] TRUE	[1] TRUE	This anti-bounce timer keeps the pressed keys from quickly repeating.
13-52.3	SL controller action	[30] Start timer 1	[30] Start timer 1	
<b>STATE 5</b>				
13-51.4	SL controller event	[31] SL time-out 1	[31] SL time-out 1	After the 'anti-bounce' timer expires, the main alternation timer starts. The example here shows a 24-hour alternation time.
13-52.4	SL controller action	[29] Start timer 0	[29] Start timer 0	
<b>STATE 6</b>				
13-51.5	SL controller event	[27] Logic rule 1	[27] Logic rule 1	If timer 0 expires or the [OK] and [>] keys are pressed, the master IVS 102 controller will switch to setup 1.
13-52.5	SL controller action	[2] Select setup 1	[2] Select setup 1	

## BACK-UP IVS 102 CONTROLLER PARAMETERS

PARAMETER NUMBER	PARAMETER NAME	PARAMETER VALUE		COMMENTS
		SETUP 1	SETUP 2	
0-01	Language	[22] English US		Messages on the display use US English.
0-03	Regional settings	[1] North America		Sets various parameters to North American default values.
0-10	Active setup	[9] Multi setup		Allows the active setup on the IVS 102 controller to be changed on command.
0-11	Programming setup	[9] Active setup		If the keypad is used to edit the IVS 102 controller's parameters, the parameters edited will be those in the setup that is presently active.
0-12	This set-up linked to	[0] Not linked	[1] Setup 1	Allows the IVS 102 controller to switch between setups while running.
5-02	Terminal 29 mode	[1] Output	[1] Output	Sets up terminal to provide an output to the other IVS 102 controller.
5-10	Terminal 18 digital input	[8] Start	[0] No operation	Allows the IVS 102 controller to run in setup 1, but not in setup 2.
5-12	Terminal 27 digital input	[0] No operation	[0] No operation	If no external interlock is needed, this eliminates the need to wire a jumper between terminals 12 and 27.
5-14	Terminal 32 digital input	[23] Setup select bit 0	[23] Setup select bit 0	Used by the master IVS 102 controller to control the active setup of the back-up IVS 102 controller.
5-31	Terminal 29 digital output	[160] No alarm	[160] No alarm	When this output is high, the back-up IVS 102 controller can run, so the state controller of the master IVS 102 controller will run to control the alternation of the IVS 102 controllers.

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