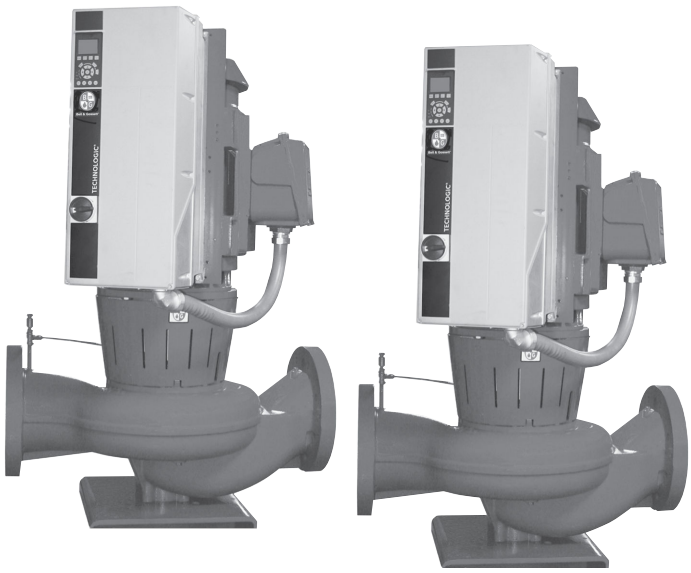
INSTRUCTION MANUAL



Duty-Standby Pumps Alternation

Bell & Gossett
a xylem brand

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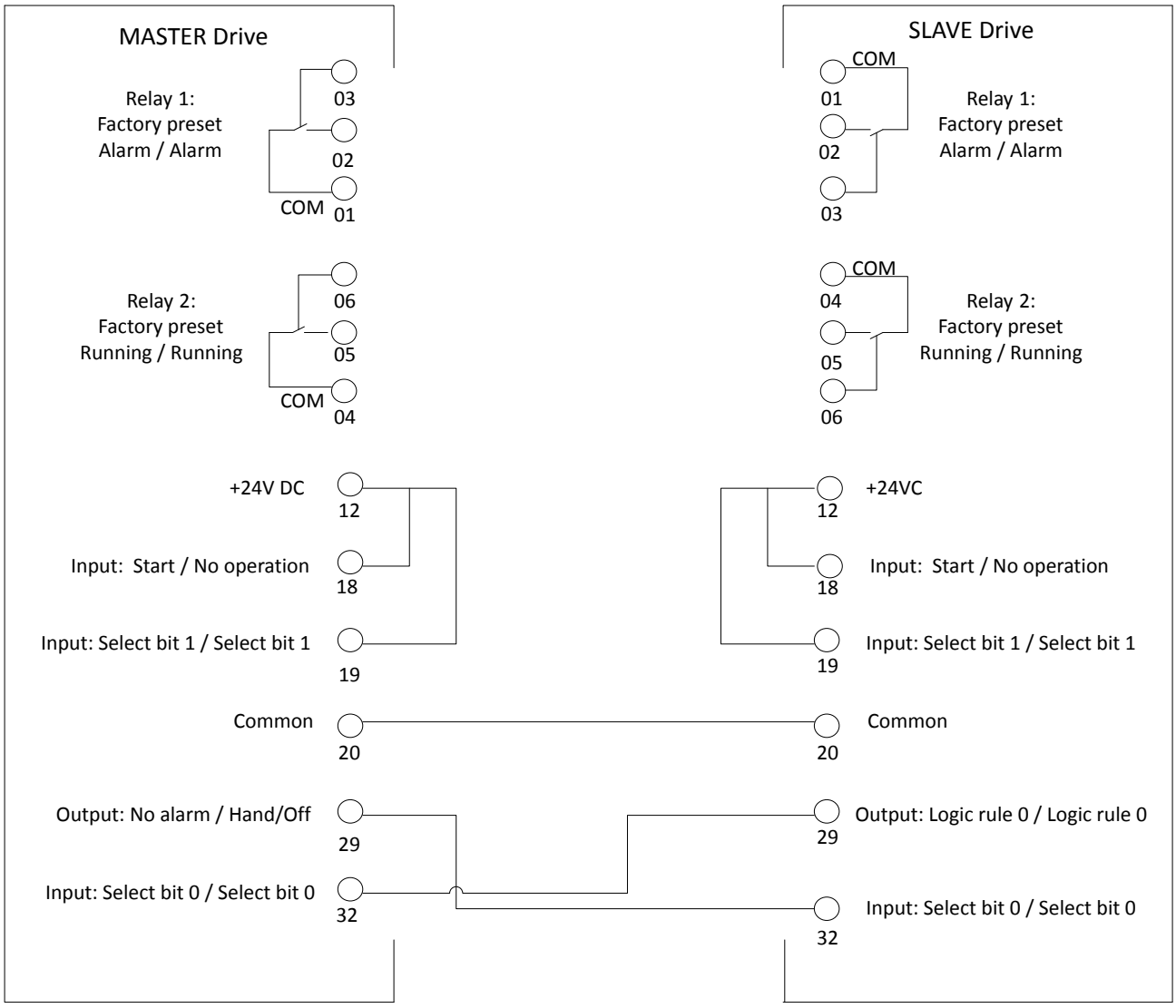
Operation

Duty-standby pumps alternation

Drives can be set up to operate two pumps running alternatively to provide a reliable pumping system. This helps to extend the life of pumps, energy conservation, and reduce maintenance costs.

1. The Master drive and Slave drive use Setup 3 and Setup 4 to operate the alternation operation.
2. To enable the alternation, set the parameter *13–00 SL Controller Mode* in the Master drive to On or vice versa.
3. The Master drive will control the alternation operation:
   a) Timed alternation: Alternation timing is determined by Timer 0 in the parameter *13–20.0 SL Controller Timer* in the Master drive. Changing this timer changes the alternation timing.
   b) Manual alternation: Pressing the [OK] and [>] keys on the Master drive at the same time resets the alternation timer and alternate the drives for running the pump.
   c) If the *Off* key of the Master drive is pressed, both drives stop the pumps.
   d) If the *Off* key of the Slave drive is pressed, the Master drive continuously runs the pump.
   e) If any drive loses power or is stopped due to an alarm condition, the lag pump automatically starts and continuously operates.
   f) If the *Hand on* key in each drive is pressed, the drives run their own pumps independently.
4. Refer to the wiring diagram for the wiring connection between the Master and Slave drives.
5. The alternation process is performed as follows:
   a) At start-up and in normal condition, the State Controller of the Master drive starts in Setup 3 and runs its pump while the Slave drive starts in Setup 4 and stops its pump due to input high received from the Master drive.
   b) When the Timer 0 expires, the Master drive changes to Setup 4 and stops its pump. At this time the input to the slave is low, the Slave drive changes to Setup 3, and runs its own pump.
   c) When the [OK] and [>] keys on the Master drive are pressed at the same time, the Timer 0 is reset and alternates the drives.
   d) When the Master or Slave drive is powered off or gets in an alarm condition, it sends a low output signal to the other drive for changing the drive's setup to Setup 3 to run its own pump.
   e) When the Master drive is in the Off mode, the Master drive stops and sends a high output signal to the Slave drive to stop the slave pump.
   f) When the slave is in the Off mode, it sends a low output signal to the Master drive for running the Master pump.

Drive connections diagram



	Master Terminal	Slave Terminal
Master Terminal	MT12 – MT18 MT12 – MT19	MT20 – ST20 MT29 – ST32
Slave Terminal	ST29 – MT32	ST12 – ST18 ST12 – ST19

NOTES:

1. Remote Start/Stop switch can be added to the drives by removing the jumper wire from pin 12 to pin 18 from both drives and connect remote start/stop to pin 12 and pin 18 to both drives with parallel connection.
2. The DI terminal 19 provides the most significant bit value (always high) and the DI terminal 32 provides the least significant bit value for selecting Setup 3 or Setup 4.

Parameter values

Table 1: MASTER Duty-Standby Parameters

Parameters number	Description	Set to Setup 3	Set to Setup 4	Comments
Operation / Display				
0–01	Language	[0] English	[0] English	English language is detected
0–03	Regional settings	[1] North America	[1] North America	Sets *1–20 Motor Power* [HP] to HP and the default value of *1–23 Motor Frequency* to 60 Hz
0–10	Active Set-up	[9] Multi Set-up	[9] Multi Set-up	Uses the setting from *0–12 This Set-up Linked to.*
0–11	Programing Set-up	[9] Active Set-up	[9] Active Set-up	The set-up in which the frequency converter is operating.
0–12	The Set-up Linked to	[0] Not linked	[3] Set-up 3	Enable conflict-free changes between Set-up 3 and Set-up 4. Note: Also set Setup 1 and Setup 2 to Set-up 3.
0–37	Display Text 1	Lead Pump	Lead Pump	This message indicates the running pump.
0–38	Display Text 2	Lag Pump	Lag Pump	This message indicates the pump that is waiting for alternation.
Digital In/Out				
5–01	Terminal 27 Mode	[0] Input	[0] Input	This digital input is not used.
5–02	Terminal 29 Mode	[1] Output	[1] Output	This digital input provides output to the Slave drive.
5–10	Terminal 18 Digital Input	[8] Start	[0] No Operation	The Master drive can only start in Set-up 3.
5–11	Terminal 19 Digital Input	[24] Set-up select bit 1	[24] Set-up select bit 1	This digital input is tied to +24 V DC as input high for the most significant bit of Set-up 3 and Set-up 4. **Notes:** Also set Setup 1 and Setup 2 to this value (Set-up select bit 1).
5–12	Terminal 27 Digital Input	[0] No Operation	[0] No Operation	This digital input is not used.
5–14	Terminal 32 Digital Input	[23] Set-up select bit 0	[23] Set-up select bit 0	This digital input provides the least significant bit value in selecting Set-up 3 or Set-up 4. **Notes:** Also set Setup 1 and Setup 2 to this value (Set-up select bit 0)

Parameters number	Description	Set to Setup 3	Set to Setup 4	Comments
5–31	Terminal 29 Digital Output	[160] No alarm	[168] Hand / Off	Output is high when there is no alarm, in Off and Hand on mode, and Timer 0 expires or [OK] and [>] keys are pressed in Setup 4. Output is low when alarm has occurred, and Timer 0 expires or [OK] and [>] keys are pressed in Setup 3.
Relays				
5–40.0	Function Relay	[9] Alarm	[9] Alarm	Default setting
5–40.1	Function Relay	[5] Running	[5] Running	Default setting
Smart Logic				
13–00	SL Control Mode	[1] On	[1] On	Enables the Smart Logic Controller
13–01	Start Event	[1] True	[1] True	Enters the fixed value of TRUE in the logic rule.
13–02	Stop Event	[0] False	[0] False	Enters the fixed value of FALSE in the logic rule.
Timers				
13–20.0	SL Controller Timer	24:00:00.000	24:00:00.000	Timing between alternations set by Timer 0.
13–20.1	SL Controller Timer	00:00:02.000	00:00:02.000	Timing for pressing [OK] and [>] keys set by Timer 1.
Logic Rules 0				
13–40.0	Logic Rule Boolean 1	[43] OK Key	[43] OK Key	Drives can be alternated by pressing [OK] and [>] keys at the same time ot the Timer 0 expires.
13–41.0	Logic Rule Operator 1	[1] AND	[1] AND	
13–42.0	Logic Rule Boolean 2	[46] Right Key	[46] Right Key	
13–43.0	Logic Rule Operator 2	[2] OR	[2] OR	
13–44.0	Logic Rule Boolean 3	[30] SL Time-out 0	[30] SL Time-out 0	
Logic Rules 1				
13–40.1	Logic Rule Boolean 1	[37] Digital Input DI32	[37] Digital Input DI32	Output is high when the output from Slave drive is low or [OK] and [>] keys are pressed or Timer 0 expires.
13–41.1	Logic Rule Operator 1	[6] NOT OR	[6] NOT OR	
13–42.1	Logic Rule Boolean 2	[26] Logic rule 0	[26] Logic rule 0	
13–43.1	Logic Rule Operator 2	[0] DISABLE	[0] DISABLE	
13–44.1	Logic Rule Boolean 3	[0] False	[0] False	

Parameters number	Description	Set to Setup 3	Set to Setup 4	Comments
Logic Rules 2				
13–40.2	Logic Rule Boolean 1	[37] Digital Input DI32	[37] Digital input DI32	Output is high when input from Slave drive is high and [OK] and [>] keys are pressed or Time 0 expires.
13–41.2	Logic Rule Operator 1	[1] AND	[1] AND	
13–42.2	Logic Rule Boolean 2	[26] Logic rule 0	[26] Logic rule 0	
13–43.2	Logic Rule Operator 2	[0] DISABLE	[0] DISABLE	
13–44.2	Logic Rule Boolean 3	[0] False	[0] False	
State 1				
13–51.0	SL Controller Event	[1] True	[1] True	Start at Setup 3
13–52.0	SL Controller Action	[4] Select set-up 3	[4] Select set-up 3	
State 2				
13–51.1	SL Controller Event	[1] True	[1] True	If [OK] and [>] keys are pressed, switch debouncing timer prevents unexpected results occurred.
13–52.1	SL Controller Action	[30] Start time 1	[30] Start timer 1	
State 3				
13–51.2	SL Controller Event	[31] SL Time-out 1	[31] SL Time-out 1	After the switch debouncing timer expires, the alternation timer 0 is reset.
13–52.2	SL Controller Action	[29] Start timer 0	[29] Start timer 0	
State 4				
13.51.3	SL Controller Event	[28] Logic rule 2	[28] Logic rule 2	If digital input from Slave is high and output from logic rule 0 is high, select Setup 4.
13.52.3	SL Controller Action	[5] Select set-up 4	[4] Select set-up 4	
State 5				
13–51.4	SL Controller Event	[1] True	[1] True	If [OK] and [>] keys are pressed, switch debouncing timer prevents unexpected results occurred.
13–52.4	SL Controller Action	[30] Start timer 1	[30] Start timer 1	
State 6				
13–51.5	SL Controller Event	[31] SL Time-out 1	[31] SL Time-out 1	After the switch debouncing timer expires, the alternation timer 0 starts.
13–52.5	SL Controller Action	[29] Start timer 0	[29] Start timer 0	
State 7				
13–51.6	SL Controller Event	[27] Logic rule 1	[27] Logic rule 1	If logic Rule 1 is high, no action.
13–52.6	SL Controller Action	[1] No Action	[1] No Action	

Table 2: SLAVE Duty-Standby Parameters

Parameters Number	Description	Set to Setup 3	Set to Setup 4	Comments
Operation / Display				

Parameters Number	Description	Set to Setup 3	Set to Setup 4	Comments
0–01	Language	[0] English	[0] English	English language is selected.
0–03	Regional Settings	[1] North America	[1] North America	Sets *1–20 Motor Power [HP]* to HP and the default value of *1–23 Motor Frequency* to 60 Hz.
0–10	Active set-up	[9] Multi Set-up	[9] Multi Set-up	Uses the setting from *0–12 This Set-up Linked to*.
0–11	Programming Set-up	[9] Active Set-up	[9] Active Set-up	
0–12	This Set-up Linked to	[0] Not linked	[3] Set-up 3	Enable conflict-free changes between Set-up 3 and Set-up 4. Note: Also set Setup 1 and Setup 2 to Set-up 3.
0–37	Display Text 1	Lead Pump	Lead Pump	This message indicates the running pump.
0–38	Display Text 2	Lag Pump	Lag Pump	This message indicates the pump is waiting for alternation.
Digital In/Out				
5–01	Terminal 27 Mode	[0] Input	[0] Input	This digital input is not used.
5–02	Terminal 29 Mode	[1] Output	[1] Output	This digital input provides output to the Slave drive.
5–10	Terminal 18 Digital Input	[8] Start	[0] No operation	The slave drive can only start in Set-up 3.
5–11	Terminal 19 Digital Input	[24] Set-up select Bit 1	[24] Set-up select Bit 1	This digital input is tied to +24 V DC as input high for the most significant bit of Set-up 3 and Set-up 4. Note: Also set Setup 1 and Setup 2 to this value (Set-up select bit 1)
5–12	Terminal 27 Digital Input	[0] No Operation	[0] No Operation	Terminal 27 is not used.
5–14	Terminal 32 Digital Input	[23] Set-up select bit 0	[23] Set-up select bit 0	NOTE: Also Setup 1 and Setup 2 to this value (Set-up select bit 0)
5–31	Terminal 29 Digital Output	[70] Logic rule 0	[70] Logic rule 0	Output is low when alarm has occurred or in Off or Han on mode
Relays				
5–40.0	Function Relay	[9] Alarm	[9] Alarms	Default setting
5–40.1	Function Relay	[5] Running	[5] Running	Default setting
Smart Logic				
13–00	SL Control Mode	[0] Off	[0] Off	Disables the Smart Logic Controller
Comparator 0				
13–10.0	Comparator Operand	[180] Local reference active	[180] Local reference active	Uses for comparing with the Off mode.
13–11.0	Comparator Operand	[5] TRUE longer than...	[5] TRUE longer than...	
Logic Rules 0				

Parameters Number	Description	Set to Setup 3	Set to Setup 4	Comments
13–40.0	Logic Rule Boolean 1	[22] Comparator 0	[22] Comparator 0	Output is high if the Slave drive is not in Off and not in alarm condition.
13–41.0	Logic Rule Operator 1	[7] NOT AND NOT	[7] NOT AND NOT	
13–42.0	Logic Rule Boolean 2	[20] Alarm (trip)	[20] Alarm (trip)	
13–43.0	Logic Rule Operator 2	[3] AND NOT	[3] AND NOT	
13–44.0	Logic Rule Boolean 3	[21] Alarm (trip lock)	[21] Alarm (trip lock)	

NOTE:

1. "Lead Pump" and "Lag Pump" messages can be displayed on the LCP by displaying "Display Text 1" in Setup 3 and displaying "Display Text 2" in Setup 4 at line 2 or line 3.

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1) The tissue in plants that brings water upward from the roots
2) A leading global water technology company

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The original instruction is in English. All non-English instructions are translations of the original instruction.

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