Control Panel Auto Sequence

Below are the proposed sequence of operations to be incorporated into the PLC software.

Operation 1

Chamber A on-line, system running within recommended DP.

Active LED's	De-active LED's (LED off)
Chamber 'A' On-Line (solid green)	Chamber 'A' Standby
Differential Pressure OK 'A' (solid green)	Differential Pressure High 'A'
Chamber 'B' Standby (solid amber)	Chamber 'B' On-Line
'External' Power source (solid green)	Differential Pressure OK 'B'
	Differential Pressure High 'B'
	Equalisation Valve / Prime
	Changeover Active
	System Fault
	'Solar' Power source
	Basket Cleaning Required 'A'
	Basket Cleaning Required 'B'

15 second dwell time

Operation 2

Chamber A – Maintenance required, as DP has reached value for safe working allowable.

Active LED's	De-active LED's (LED off)
Chamber 'A' On-Line (solid green)	Differential Pressure OK 'A'
Differential Pressure High 'A' (solid red)	Chamber 'A' Standby
Chamber 'B' Standby (solid amber)	Chamber 'B' On-Line
'External' Power source (solid green)	Differential Pressure OK 'B'
	Differential Pressure High 'B'
	Equalisation Valve / Prime
	Changeover Active
	System Fault
	'Solar' Power source
	Basket Cleaning Required 'A'
	Basket Cleaning Required 'B'

15 second dwell time

Operation 3

Prime offline chamber

Active LED's	De-active LED's (LED off)
Differential Pressure High 'A' (solid red)	All other LED's
Equalisation / Prime (amber – flashing)	
Chamber 'A' On-Line (solid green)	
'External' Power source (solid green)	
Chamber 'B' Standby (solid amber)	

10 second dwell time

Changeover in progress

Active LED's	De-active LED's (LED off)
Changeover Active (amber – flashing)	All other LED's
Chamber 'A' On-Line (green - flashing)	
Chamber 'B' Standby (amber - flashing)	
'External' Power source (solid green)	

25 second dwell time whilst gate valve rotates to chamber A in 20 seconds (additional 5 second +tolerance to allow gate valves to reach final resting position).

Operation 4

Chamber B – On-line, system running within recommended DP. Maintenance required on Chamber A.

Active LED's	De-active LED's (LED off)
Chamber 'B' On-Line (solid green)	Chamber 'B' Standby
Differential Pressure OK 'B' (solid green)	Differential Pressure High 'B'
'External' Power source (solid green)	Chamber 'A' On-Line
Basket Cleaning Required 'A' (solid amber)	Differential Pressure OK 'A'
	Differential Pressure High 'A'
	Equalisation Valve / Prime
	Changeover Active
	System Fault
	'Solar' Power source
	Chamber 'A' Standby
	Basket Cleaning Required 'B'

5 second dwell time

Operation 5

Chamber B – On-line, system running within recommended DP. Maintenance complete on Chamber A.

Active LED's	De-active LED's (LED off)
Chamber 'B' On-Line (solid green)	Chamber 'B' Standby
Differential Pressure OK 'B' (solid green)	Differential Pressure High 'B'
'External' Power source (solid green)	Chamber 'A' On-Line
Chamber 'A' Standby (solid amber)	Differential Pressure OK 'A'
	Differential Pressure High 'A'
	Equalisation Valve / Prime
	Changeover Active
	System Fault
	'Solar' Power source
	Basket Cleaning Required 'A'
	Basket Cleaning Required 'B'

10 minute dwell time prior to cycle repeat.

Cycle repeat. As above but now reversed, i.e. Chamber 'B' Maintenance required, followed by changeover to chamber A, and so forth – repeating cycle.

REMOTE (APP) & AUTO modes to operate on the sequence as above.

Manual mode to run on a separate sequence (see below):

Manual Mode

In manual mode the intention is to demonstrate a changeover in minimal time.

During an Auto/Remote (App) cycle if the user is to turn the keyed selector to 'manual', the following sequence to commence.

1. Current cycle to complete, gate valves to complete changeover if rotating.
2. Manual mode switch on control panel to be in vertical position as default (i.e. between A & B).
3. User selects desired 'on-line' chamber with switch on control panel, dependant on where the auto sequence finishes. On-line chamber will be indicated with the appropriate LED.
4. Once selected the following logic is followed:

Operation 1

Assuming Chamber A is on-line and chamber B has been selected manually.

Prime offline chamber

Active LED's	De-active LED's (LED off)
Differential Pressure OK 'A' (solid green)	All other LED's
Equalisation / Prime (amber – flashing)	
Chamber 'A' On-Line (solid green)	
'External' Power source (solid green)	
Chamber 'B' Standby (solid amber)	

5 second dwell time

Changeover in progress

Active LED's	De-active LED's (LED off)
Changeover Active (amber – flashing)	All other LED's
Chamber 'A' On-Line (green - flashing)	
Chamber 'B' Standby (amber - flashing)	
'External' Power source (solid green)	

25 second dwell time whilst gate valve rotates to chamber A in 20 seconds (additional 5 second +tolerance to allow gate valves to reach final resting position).

Operation 2

Chamber B – On-line, system running within recommended DP. Maintenance required on Chamber A.

Active LED's	De-active LED's (LED off)
Chamber 'B' On-Line (solid green)	Chamber 'B' Standby
Differential Pressure OK 'B' (solid green)	Differential Pressure High 'B'
'External' Power source (solid green)	Chamber 'A' On-Line
Basket Cleaning Required 'A' (solid amber)	Differential Pressure OK 'A'
	Differential Pressure High 'A'
	Equalisation Valve / Prime
	Changeover Active
	System Fault
	'Solar' Power source
	Chamber 'A' Standby
	Basket Cleaning Required 'B'

5 second dwell time

Operation 3

Chamber B – On-line, system running within recommended DP. Maintenance complete on Chamber A.

Active LED's	De-active LED's (LED off)
Chamber 'B' On-Line (solid green)	Chamber 'B' Standby
Differential Pressure OK 'B' (solid green)	Differential Pressure High 'B'
'External' Power source (solid green)	Chamber 'A' On-Line
Chamber 'A' Standby (solid amber)	Differential Pressure OK 'A'
	Differential Pressure High 'A'
	Equalisation Valve / Prime
	Changeover Active
	System Fault
	'Solar' Power source
	Basket Cleaning Required 'A'
	Basket Cleaning Required 'B'

Above sequence replicated for chamber 'B'.

Safety and other features

'System fault' to light up flashing red in case of operation error/failure. Manual reset required post inspection and maintenance.

Emergency stop with key release.

Keyed on/off switch for panel.

Keyed mode selector.

Selector switch for A/B in manual mode. 3 position changeover cam switch required.

Reset button for 'basket cleaning required' LED's, this doesn't need to be wired up for the exhibition piece as the sequence will control the LED's. Momentary push button switch type.

Selection in App required for switching to 'solar power' – solar power LED lights up, for demonstration purposes.

Adjustable dwell times in App. For adjustment at exhibition when required.

***For live installations*:**

The manual reset button of the Maintenance required lights prior to chamber standby lights becoming active will need to be wired in. This can also be done via the App/remotely. Data feed required to control room for maintenance requirement.

Chamber changeover prevention required, e.g. flashing light/alarm signal, so that changeover cannot take place to an offline chamber until basket cleaning/maintenance has taken place and light reset.