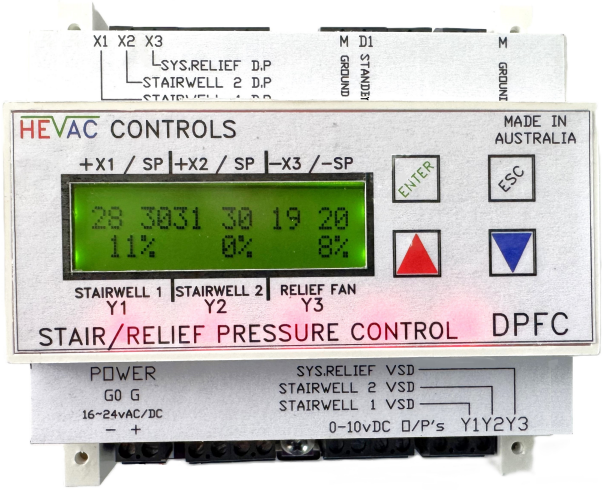
HEVAC Control Agencies

Interim Leaflet reduced web version



DPFC

COMBINED TRIPLE LOOP 2 x STAIRWELL & RELIEF PRESSURE CONTROLLER

Features

- 3 INDEPENDANT P + I 0-10vDC Input / Output CONTROL LOOPS
- PRESSURE SENSORS (0-10vDC) INPUT Pa RANGE CONFIGURABLE
- COMMON RUNNING SCREEN WITH ALL I/O, *makes total system monitoring easy*
- CLEAR PLAIN ENGLISH L.C.D MESSAGE'S OF INPUT & OUTPUT STATUS
- SETPOINTS, P+I SETTINGS etc SITE ADJUSTABLE USING KEYPAD & MENUS
- AUTOMATIC (*optional use)* SETPOINT SHIFT ALGORITHM BASED ON LOAD *greatly assists commissioning & tuning system to meet open/closed door demands.*
- PRESET WITH TYPICAL FIRE MODE FAN SPEED CONTROL PARAMATERS.
- MODBUS COMMS FOR CONNECTION TO BMS SYSTEM, c/w BMS DRIVEN TEMPORARY TIMED FIRE TEST ENABLE MODE.
- SMALL SWITCHBOARD FOOT PRINT, 6 MODULE SIZE DIN RAIL MOUNT

Use

The DPFC has been specifically developed as a purpose built building fire mode pressure controller, for controlling pressure in up to two stairwells and a lobby / corridor pressure relief system. Multiple differential pressure sensors in each stairwell and the lobby relief system, connect to this module (via suitable external signal selectors) to determine system pressures. The measured pressures are compared to their relative operating setpoints, and P+I controlled 0-10vdc output signals are generated to control their respective VSD driven fan speeds. This allows the VSDs to be quickly commissioned & left with basic operating settings, enabling quick system commissioning & parameter editing to easily be made in one convenient location at the switchboard. The controllers running screen can be set to display all I/O on one very handy summary screen to monitor overall system performance or set to an individual loop to display at a higher resolution. The DPFC incorporates the very successful tried & proven Hevac developed ***HASS*** *algorithm (**Hevac Automatic Setpoint Shift)** which is a powerful feature that automatically shifts the operating pressure setpoints based on load (demand), to greatly assist meeting the often different operating pressure setpoint requirements to satisfy both the door pull & open door velocity tests, a feature not seen in VSD parameters when they are used & setup with fire mode pressure control functions. We at Hevac believe VSD's should be set to perform just speed control & leave control functions to purpose built & engineered controllers, which make service & commissioning far easier as well.*

Technical Data

Power supply

Operating Voltage	16- 24 Volts AC or DC
Power Consumption	
At 24vDC Volts	MAX. 100mA
At 24vAC Volts	3 VA
Y Output load	1mA Max.(typically upto 3 VSDs per Y Output)

Input / Output

X1 is the loop 1 input with Y1 as its controlled output (STAIRWELL 1)
X2 is the loop 2 input with Y2 as its controlled output (STAIRWELL 2)
X3 is the loop 3 input with Y3 as its controlled output (LOBBY RELIEF)

Analogue Inputs

X1, X2 & X3 0-10vDC in reference to power supply Neutral. G0 or M

Digital Inputs

D1 : Standby / Run mode select (for interlock to 24v neutral / ground)
N/C (to M) **= Standby Mode**, Y O/P's can be set to settle at (start from)
0 or 10v DEFAULT=10v *Starting at 10v reduces time to kick system into fire mode speed* N/O (to M) **= Fire Mode**.

Relay Output

Fire mode active relay ouput c/w C/O contacts, rated at 8 amps (resistive)

Communication

Terminal's X5, X6 & X7 RS485 RTU MODBUS communication.
also allows via modbus timed test mode to enable controllers fire mode.

Output Indication

LCD Display 2 x 16 character LCD

Parameters

Set point Setting Range 5 ~ 99 pascals in 1pa Increments
DEFAULT X1/Y1 & X2/Y2 Setpoints = 30 pascals. X3/Y3 = (-) 20 pascals

Sensor 0-10vDC input range 10 to 500 pascals
DEFAULT 10v = 100 pascals

Running screen increments 2 digit for for X Input & Setpoint : 0~99 pa
3 digit for Y output level : 0~100%

Y1/Y2/Y3 Proportional Band 5 ~ 200 pascals
DEFAULT = 100 pascals

Y1/Y2/Y3 Integral action Off - 60 seconds in 1 second intervals, then
DEFAULT = 10 seconds in 1 minute intervals upto 60 minutes

Y1/Y2/Y3 Output Voltage Range 0-10vDC
Y Outputs Minimum & Maximum range individually adjustable 0-100%
DEFAULTs, MIN = 0% & MAX = 100%

(HASS) Automatic Setpoint Shift Capability

Automatic Setpoint Shift Function : Individual Yes / No for each Y O/P
DEFAULT = NO

Setpoint Shift Trigger Point : 1.0 to 9.0 based on Y output volts
DEFAULT = 4 volts (40% Y output)

S/P Shift Up / Back hysteresis : 0 to 2 volts (based on Y O/P)
DEFAULT = 0.5 volts

Added setpoint shift range : 0 to 30 pascals
DEFAULT = + 5 pascals

USING THE CONTROLLERS MENU SYSTEM TO SET & CONFIGURE PARAMATERS

To enter the controllers menu system to set or edit parameters & setpoints...
Press the ENTER button to display the 1st menu "**ENABLE CHANNELS**" followed by the ▲ or ▼ button to scroll to the required menu to edit its relative settings, press ENTER to open & make edits in the selected menu.

ENABLE CHANNELS	**: ENABLE / DISABLE EACH OF THE 3 AVAILABLE CONTROL LOOPS**
SETPOINT SETTINGS	**: SET EACH LOOPS BASE (UNSHIFTED) SETPOINT**
P.BAND & I-TIME VALUES	**: SET PROPORTIONAL BANDS & INTEGRAL TIMES FOR EACH LOOP**
D.P SENSOR RANGE	**: SET CONTROLLER TO MATCH THE D.P SENSOR 0-10v pa RANGE**
AUTO-SHIFT ENABLE	**: ENABLE / DISABLE AUTO SETPOINT SHIFT FOR EACH LOOP**
JUMP POINTS & VALUES	**: SET THE SETPOINT SHIFT TRIGGER POINT & SHIFT AMOUNT**
JUMP BACK HYSTERESIS	**: SET THE HYSTERSESIS VALUE FOR SHIFTED SETPOINT RELEASE**
MIN / MAX OUTPUT VALUES	**: 0-10v Y OUTPUT MIN & MAX SETTINGS**
SYSTEM STARTUP OPTIONS	**: SET THE Y OUTPUT LEVEL AT STARTUP** *(start from 0 or 10v)*
CONFIGURE MODBUS	**: MODBUS ADDRESS & COMMS SETTINGS**

ENABLE CHANNELS : Press ENTER button to display YES or NO user choice to enable or disable the three available control loops. **X1/Y1** is the 1st control loop typically used to measure & control stairwell 1. **X2/Y2** is the 2nd control loop typically used to measure & control stairwell 2. **X3/Y3** is the 3rd control loop typically used to control the common corridor/lobby pressure relief system. For each loop the user can set YES or NO using the ▲, ▼ & ENTER buttons to enable or disable each control loop. After setting the three control loops as required press ENTER to save and return to this menu heading and either press ESC to exit programming and return to the running screen or press the ▲ or ▼ button to move to another menu for editing.

X1/Y1	X2/Y2	X3/Y3
YES	YES	NO

SETPOINT SETTINGS : With this menu displayed, Press the ENTER button to enter this menu to edit the (unshifted) base setpoints for each loop using the ▲ , ▼ & ENTER buttons. After editing &/or accepting the 3rd setpoint, the controller will return to showing this menu , press ESC to exit the menu system or press the ▲ or ▼ button to move to another menu for editing.

S/P1	S/P2	S/P3
30pa	30pa	20pa

P.BAND & I TIMES : SETTINGS : With this menu displayed, Press the ENTER button to enter this menu to edit the proportional bands (PB) & Integral (IT) times for each control loop. Press the ENTER to cause the PB for loop 1 to flash, press ENTER to accept the existing value or use the ▲ & ▼ buttons to edit the value. Press ENTER to accept the value & move onto the next PB value to edit. After setting the 3rd PB value the 1st integral time for loop 1 will flash, edit the value using same method as above, after the 3rd I time is accepted the display will return to this menu heading. Press ESC to return to the running screen or use the ▲ or ▼ buttons to move to another menu for editing.

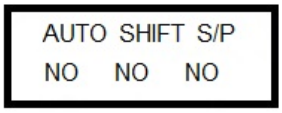
PB100	PB100	PB100
IT10s	IT10s	IT10s

D.P SENSOR : RANGE : With this menu displayed, Press the ENTER button to enter this menu to edit the controllers differential pressure sensor range to match the connected sensors (typically 0-100 pascals) Press the ENTER button cause the loop 1 sensor range value to flash. Press ENTER to accept the existing or use the ▲ & ▼ buttons to edit the value. Press ENTER to accept the value & move onto the sensor range to edit. After editing or accepting the 3rd sensor setting, the display will return to this menu heading. Press ESC to return to the running screen or use the ▲ or ▼ buttons to move to another menu for editing.

DP SENSOR OP10v=		
100	100	100

MENUS USED TO IMPLEMENT HEVAC's AUTOMATIC SETPOINT SHIFT ALGORITHM

(HASS)
AUTO-SHIFT:
ENABLE

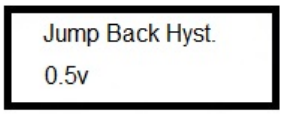


With this menu displayed, Press the ENTER button to open the editing screen to allow enabling or disabling of Hevacs Auto Setpoint Shift algorithm (HASS).The 1st control loop for stairwell 1 will have its current setting flashing , use the ▲ or ▼ buttons to enable (YES) or disable (NO) HASS for that loop. Press ENTER to accept the state and move onto the next loop. After the 3rd loop HASS is set & accepted the display will return to this menu heading. Press ESC to return to the running screen or use the ▲ or ▼ buttons to move to another menu for editing.

(HASS)
JUMP POINTS :
AND VALUES

With this menu displayed, Press the ENTER button to enter this menu to edit both the the trigger point that causes the loop operating setpoint to jump up to a higher pascal setpoint, & the amount the setpoint is increased by. The jump trigger point is based on the loops 0-10v Y output value, so a value of 4.0 means that as the loops Y output increases over 4.0 volts (40% speed signal to the VSD), the loops normal operating setpoint will be forced to jump up to a higher operating value to meet a higher pressure demand requirement, this is often required when several corridor doors are opened as apposed to the pressure requirement when the doors are all closed. Upon entering this menu, loop 1's jump point is flashing , use the ▲ or ▼ button to edit the value & press ENTER to accept & move to the setting for loop 2. Repeat this procedure for loops 2 & 3. After setting the jump trigger point for loop 3 (or the last enabled jump loop) the display will have loop 1's added setpoint value flashing, adjust with the ▲ , ▼ & ENTER buttons as per above, to set the added setpoint values for all enabled setpoint shift loops. Typically loop 3, the pressure relief system, wouldnt need to use this feature but is an option & will depend on the particular sites system dynamics. After the last added setpoint value has been edited & saved, the display will return to this menu heading. Press ESC to return to the running screen or use the ▲ or ▼ buttons to move to another menu for editing.

(HASS)
JUMP BACK :
HYSTERESIS



With this menu displayed, Press the ENTER button to open the editing screen to allow setting of the Y volts hysteresis (differential) for the Auto Setpoint Shift algorithm (HASS) to release the loop from the up shifted setpoint and return the loop to its un shifted normal low load operating setpoint, ie when a loops Y output exceeds 4 volts output, the setpoint is shifted up, and when the Y output falls below 3.5 volts (if differential set 0.5v) the up shifted setpoint will drop out and return the loop to its lower setpoint.. Press the ▲ or ▼ button to edit the default value to a setting that suits the systems dynamics. Accept the value by then pressing the ENTER and the screen will return to this menu heading. Press ESC to return to the running screen or use the ▲ or ▼ buttons to move to another menu for editing.

MIN / MAX OUTPUT (Y) VALUES

Mn 0% Mn 0% Mn 0%
Mx100% 100% 100%

With this menu displayed, Press the ENTER button to enter this menu to edit of the Y minimum & maximum voltage output limits for each of the 3 control loops Y1, Y2 & Y3. Press the ▲ or ▼ buttons to edit the existing minimum output voltage for loop 1 (Y1) Press ENTER to accept the value & move onto Y2's minimum setting and repeat above procedure to also set Y3's minimum setting. After the 3 minimum output setting has been set the display will move to Y1's maximum output setting. Repeat procedure above to set all 3 maximum output settings. AfterY3 maximum setting is set the display will return to this menu heading. Press ESC to return to the running screen or use the ▲ or ▼ buttons to move to another menu for editing.

The controller will operate either in a Standby state or Active Fire mode as set with a fire alarm interlock connected to terminals D1 & M. With the digital input D1 connected to M, the controller is put into standby mode, when this interlock is opened, the controller will energise its 3 control loops with P+ I action to control & maintain the systems at design pressures.

STANBY : OPTIONS

Y O/P in Standby
Mode : 100 %

With this menu displayed, Press the ENTER button to enter this menu to set the controllers Y1, Y2 & Y3 output level whilst in standby mode (fire mode off). The setting option is 0 volts or 10v output. One advantage of starting at 10 volts is the control system will launch the VSD's /fans into full speed mode to quickly establish pressure in the system when the fire mode is instigated, whereas starting from 0v will allow a less aggressive system start up but could take upto ~30 seconds to achieve design pressures. Press the ▲ or the ▼ botton to toggle the choice between the output starting from 0 or 100%. Press the ENTER button to accept the set option and return to this menu heading. Press ESC to exit the menu system & return to the running screen or use the ▲ or ▼ buttons to move to another menu for editing.

CONFIGURE MODBUS

MODBUS Address
[DISABLED]

To use MODBUS for communication to a connected BMS system, enable MODBUS, set the controllers MODBUS address & communication settings to match the connected BMS system.

With this menu displayed , press the ENTER button to edit settings in the menu "CONFIG MODBUS"

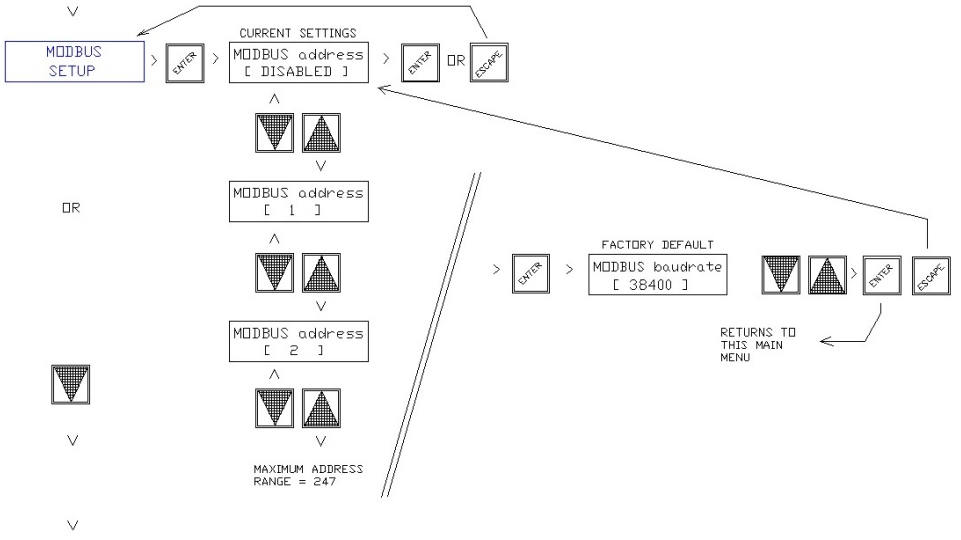
Edit "MODBUS Address" using the ▲ or ▼ buttons.

Press ENTER to accept address and jump to edit screen for the baudrate"MODBUS BAUDRATE"

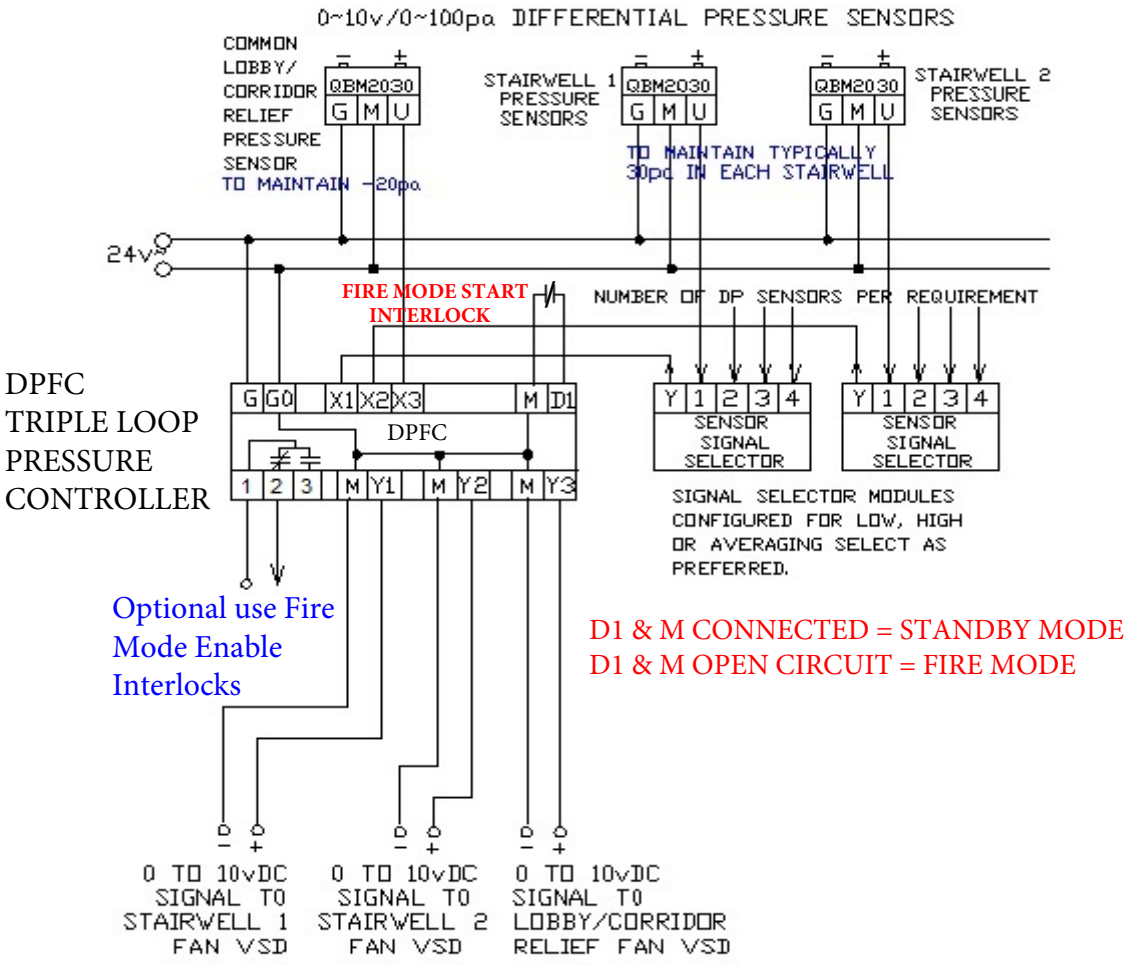
Edit "MODBUS Baudrate" address using the ▲ or ▼ buttons.

Press ENTER to accept and return to this main menu.

Press the ▲ or ▼ buttons to scroll to other main sub menus or press ESC to exit programming



TYPICAL CONNECTION DETAIL WITH ONE COMMON RELIEF DUCT PRESSURE SENSOR AND MULTIPLE SIGNAL SELECTED STAIRWELL DIFFERENTIAL SENSORS.



TYPICAL CONNECTION DETAIL WITH MULTIPLE FIRE AFFECTED FLOOR DIFFERENTIAL PRESSURE & STAIRWELL SENSORS.