HEVAC

CONTROL AGENCIES PTY.LTD.

SCM220
SIGNAL SELECTOR

3 X INDEPENDENT 0-10v SIGNAL SELECTORS & CONDITIONING MODULE

Features

- 3 Signal selectors in one common module.
- 2 x 4 signal input with Low, Average & Hi-Select outputs
- 1 x 2 signal input - **c/w** Start, Gain, Min. & Max. O/P conditioning.
- LED bar graph output level display for 3rd loop (Y7).
- Targeted for twin **Stairwell Pressure Sensor select** + **Relief Fan** proportional control with output signal conditioning.
- Powered by 24v AC or DC Supply.
- Greatly simplifies commissioning of relief fan for stairwell systems.

Use

The SCM220 is a combination signal selector & conditioning module intended as a one module solution for selecting the lowest, average or highest signal of up to four 0-10vDC signals from each of two independent input systems, plus a third 2 input signal selector that also has output trimming capability. The selected output signals typically connect to analogue inputs on controllers, actuators or drives. The SCM220 is particularly targeted to be used in tandem with a Siemens RLU222 controller (our preferred controller for stairwell pressure control applications). The RLU222 incorporates two independent control loops which Hevac pre-program to modulate the two stairwell pressure fans during fire mode operation. Connecting the stairwell DP sensors 1st to this module allows sensor signal selection before final connection to the RLU222 sensor inputs. The two control outputs from the RLU222 controller not only connect & control their respective stairwell pressure VSD driven fans but also connect back to this module for relief fan control. The Y7 output is selectable as the highest or average of these two inputs, with the selected output also scalable for **S**tart, **G**ain, **M**inimum & **M**aximum using the modules fascia adjustment potentiometers.

Made in Australia
100% Australian Owned Company

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Technical Data

General Specifications

Operating Voltage		24 Volts AC or DC
Power Consumption		
At 24vAC		1.5 VA
At 24vDC		20 mA

Input Terminals	
X1-X10 Signal Input Voltage's	0-10 Volts DC
inputs signal load	0.3ma

Analogue outputs	
Y1-Y7 ouput signals	0-10 Volts DC
Y1-Y6 output load ea.	0.3 mA@ 10vDC
Y7 output load	5.0 mA@ 10vDC

Environmental Conditions

Operation	
Ambient Temperature	0...45oC
Humidity	< 85 % RH (Non Condensing)
Storage and Transport	
Ambient Temperature	-5...65oC
Humidity	< 90 % RH (Non Condensing)

Weight

Including Packaging	200 grams

Housing

Colour	White
Material	ABS POLYCARB
UV Stabilised	YES
Fire Retardant	YES
Size	L105mm x W105mm x D60mm
Mounting Method	35mm Din Rail Mountable

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Terminal Designations

Y1 Lowest of the 4 I/P'S
Y2 Average of the 4 I/P'S
Y3 Highest of the 4 I/P'S
X1 0-10v sensor 1 input
X2 0-10v sensor 2 input
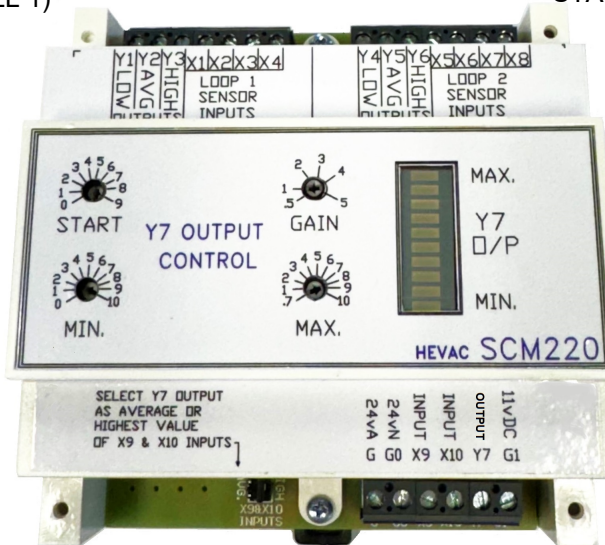X3 0-10v sensor 3 input
X4 0-10v sensor 4 input

Y4 Lowest of the 4 I/P'S
Y5 Average of the 4 I/P'S
Y6 Highest of the 4 I/P'S
X5 0-10v sensor 1 input
X6 0-10v sensor 2 input
X7 0-10v sensor 3 input
X8 0-10v sensor 4 input

(TYPICALLY STAIRWELL 1)   **LOOP 1**   **LOOP 2**   (TYPICALLY STAIRWELL 2)

START ADJUSTMENT RELATIVE TO X9/X10 INPUTSIGNAL

GAIN SETS AMPLIFICATION OF X9/X10 INPUT SIGNALS ON Y7 OUTPUT

MINimum ADJUSTMENT SETS MINIMUM Y7 OUTPUT LEVEL

MAXimum ADJUSTMENT SETS MAXIMUM Y7 OUTPUT LEVEL.

Y7 RELIEF FAN OUTPUT SIGNAL BAR GRAPH INDICATION

SELECT Y7 OUTPUT AS AVERAGE OR HIGHEST VALUE OF X9 & X10 INPUTS

AVERAGE or HI-SIGNAL SELECTION JUMPER

G   24 Volt Supply Active
Go 24 Volt Ground/0v ref.
X9 0-10v signal input 1
X10 0-10v signal input 2
Y7 0-10v scalable output
G1 11vDC signal supply

LOOP 3 (TYPICALLY RELIEF FAN)

I/O LOGIC REPRESENTATION

0-10vDC INPUTS

X1 X2 X3 X4 → Y1 Y2 Y3
LOWEST SIG. | AVERAGE SIG. | HIGHEST SIG.

X5 X6 X7 X8 → Y4 Y5 Y6
LOWEST SIG. | AVERAGE SIG. | HIGHEST SIG.

X9 X10 → Y7
AVERAGE SIG. **OR** HIGHEST SIG.
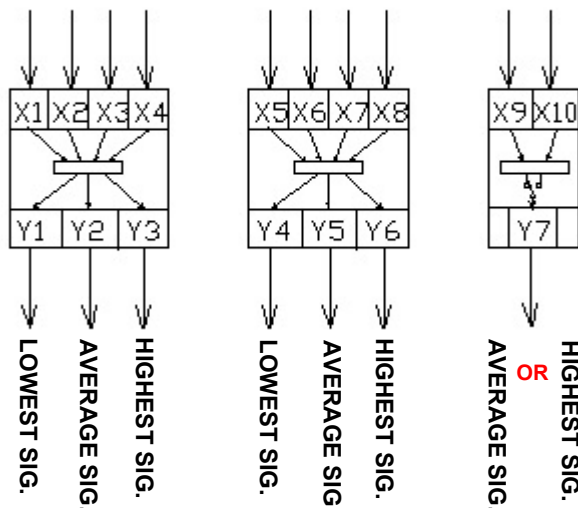
Y7 OUTPUT ADJUSTMENT CAPABILITIES

CONNECTION DETAILS

0-10vDC OUTPUTS   0-10vDC OUTPUTS

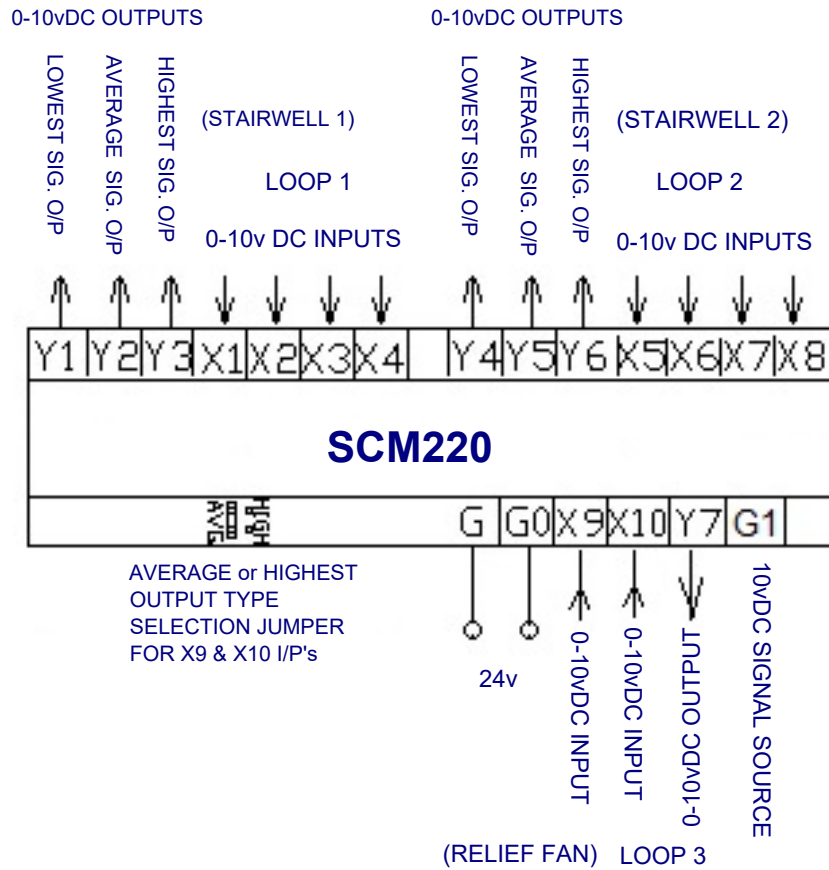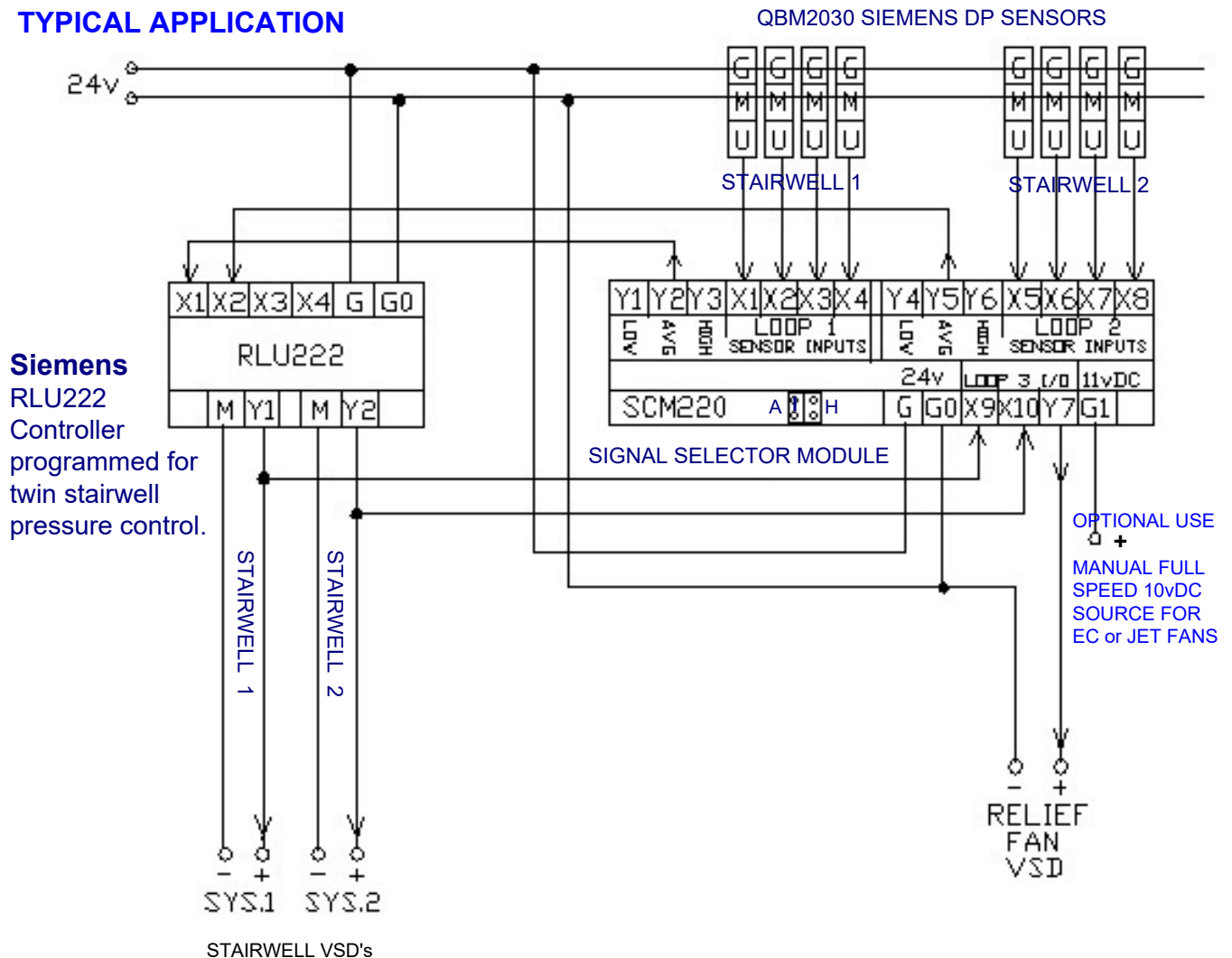LOWEST SIG. O/P   AVERAGE SIG. O/P   HIGHEST SIG. O/P   (STAIRWELL 1) LOOP 1 0-10v DC INPUTS   LOWEST SIG. O/P   AVERAGE SIG. O/P   HIGHEST SIG. O/P   (STAIRWELL 2) LOOP 2 0-10v DC INPUTS

Y1	Y2	Y3	X1	X2	X3	X4	Y4	Y5	Y6	X5	X6	X7	X8

SCM220

AVG HIGH

G	G0	X9	X10	Y7	G1

AVERAGE or HIGHEST OUTPUT TYPE SELECTION JUMPER FOR X9 & X10 I/P's

24v   0-10vDC INPUT   0-10vDC INPUT   0-10vDC OUTPUT   10vDC SIGNAL SOURCE

(RELIEF FAN) LOOP 3

TYPICAL APPLICATION

QBM2030 SIEMENS DP SENSORS

24v

G	G	G	G		G	G	G	G
M	M	M	M		M	M	M	M
U	U	U	U		U	U	U	U

STAIRWELL 1   STAIRWELL 2

X1	X2	X3	X4	G	G0

Siemens RLU222

M	Y1	M	Y2

Siemens
RLU222
Controller
programmed for
twin stairwell
pressure control.

Y1	Y2	Y3	X1	X2	X3	X4	Y4	Y5	Y6	X5	X6	X7	X8

LOW AVG HIGH   LOOP 1 SENSOR INPUTS   LOW AVG HIGH   LOOP 2 SENSOR INPUTS

24v   LOOP 3 I/O   11vDC

SCM220	A	H	G	G0	X9	X10	Y7	G1

SIGNAL SELECTOR MODULE

STAIRWELL 1   STAIRWELL 2

OPTIONAL USE

MANUAL FULL
SPEED 10vDC
SOURCE FOR
EC or JET FANS

− + SYS.1   − + SYS.2

STAIRWELL VSD's

− + RELIEF FAN VSD

SCM220 COMMISSIONING & SETUP NOTES

USED IN CONJUNCTION WITH THE SIEMENS RLU222 CONTROLLER PRE-PROGRAMMED BY HEVAC AS A TWIN STAIRWELL DIFFERENTIAL PRESSURE CONTROLLER.

TYPICAL APPLICATION : *FIRE MODE RELIEF FAN CONTROL*

Smoke management as part of the fire mode in high rise buildings, typically control the relief fan to obtain a negative pressure (compared to atmosphere) on fire affected floors in one on 3 ways :

1.) Set as a fixed speed

2.) Driven at a speed proportional to stairwell pressurisation fan/s (SCM220 targeted for this approach).

3.) Controlled by an independent pressure control system with differential pressure measured either from one sensor located in the common relief duct or from individual pressure sensors located on each floor with the relative sensor/s connected as part of the fire affected floor matrix..

Each approach has its own merits with factors such as cost, complexity & ease of commissioning. At Hevac we feel all things considered the 2nd approach is probably the easiest to install & commission and still give good stable repeatable performance & avoids the possibility of three fan control systems fighting one another, as they will interact and can lead to the independent systems hunting and over reacting to each others outputs.

The two desired requirements of a stairwell & lobby fire management system is keeping smoke out of the stairwells & fire affected floors , this is typically done by independently pressuring the individual stairwells and & relieving air from the fire affected floor/s.
The SCM220 has been particularly developed to control the speed of the relief fan in respect to the 2 stairwell pressure control loops (relief fan control method 2).

The SCM220 module also has two 4 input signal selectors to measure differential pressure sensors from the 2 stairwells (upto 4 sensors each) and pass on either the Lowest , Average or Highest pressure (sensor signal) onto the RLU222 sensor inputs. "Average" selection is recommended but some contractors prefer to use "Lowest" select, but the danger is, if one sensor fails that pressure control loop will output full speed to its fan and could cause door egress difficulties.

The 3rd two input signal selector on the SCM220 is intended to also receive the two RLU222 output signals (Y1 & Y2) controlling the independent stairwell fans and use these two signals to control the common relief fan speed, with the added ability to trim & scale its output (Y7) for better matching of lobby relief requirements with respect to the two pressure control systems, which makes commissioning & testing of these three control loops quicker & easier to enable passing both the so called **DOOR PULL** test & **OPEN DOOR VELOCITY** tests.

Guide for setting SCM220 adjustments for relief fan control :

1.) Set the MIN adjustment potentiometer to achieve the minimum relief fan speed to satisfy the required negative floor pressure when the stairwell doors are **closed** ie 3 volts (30% fan speed), but low enough to not hinder the door pull test. We suggest setting the VSD minimum speed to a safe but minimum back up setting so as to allow quicker adjustment here for minimum speed setting at least during commissioning.

2.) Set the START adjustment to the average value (volts) of the two RLU222 outputs (assuming averaging output is selected for the SCM220 X9 & X10 inputs to generate the Y7 output) when the controller is producing signals to satisfy **one** open door. Typically ~3 to 6 volts (average of the RLU222 Y1 & Y2 0-10v output signals). This is so the relief fan can start to compensate for the added air pressure supplied by the stairwell pressure systems flooding air onto the fire affected floor but still maintain a negative overall pressure on the floor.

3.) Adjust the GAIN potentiometer to still maintain negative pressure on the fire affected floor when **several** stairwell doors are open, causing the stairwell supply fans to run at near maximum capacity, which also greatly aids in maintaining the door velocity requirements : suggested setting : GAIN = X2. If the relief fan is causing too much relief - reduce this setting and vice versa.

4.) The maximum relief fan speed setting is a handy trim if the relief fan is oversized and causing excess door velocity or hindering door pull operation by limiting the maximum fan speed of the relief fan.

STAIRWELL PRESSURE SETPOINTS

The two stairwell pressure control setpoints are in adjusted in the Siemens RLU222 controller and are typically set in the range from 20 up to 50 pascals depending on system dynamics. Generally a middle ground setpoint is selected which enables passing both the **door pull** and **open door velocity** setpoint requirements, together with appropriate settings on the SCM220 Y7 relief fan output adjustments to particularly help with passing the door velocity test. However on some projects a mid ground setpoint still doesnt allow passing both requirements even with appropriate use of the relief fan settings, so for this reason Hevac developed a setpoint shift algorithm & technique to automatically adjust the RLU222 controller setpoints based on load. A lower setpoint will be used on low load (stairwell doors closed) and jump to a higher (shifted) setpoint when doors are opened (causing higher supply fan speed)...see the Hevac commissioning sheet supplied with the pre-programmed RLU222 controller for stairwell pressure control applications for adjusting setpoints, proportional bands etc **plus** implementing the automatic setpoint technique.