BASIC (WEB) INSTRUCTIONS FOR SIEMENS RLU222 UNIVERSAL CONTROLLER, PRE PROGRAMMED FOR STAIRWELL PRESSURIASTION CONTROL

By HEVAC Controls

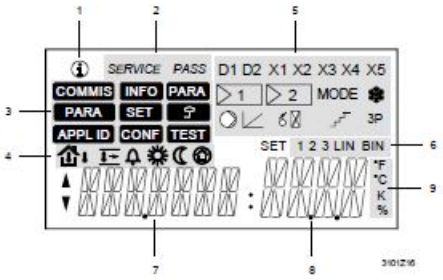
The Siemens RLU22 controller has two internal independent universal use control loops. Hevac have pre-configured these two control loops to perform as a dual pressure controller (for twin stairwells), producing two independent 0-10vdc outputs as the inputs from pressure sensors drops below the relative loops setpoint. Ex Hevac, the setpoint for each loop has been preset at 30 pascals but is readily adjustable by the procedure set out below. Note these setpoints can also be automatically shifted by a technique developed by Hevac and is described further on in this document for the purpose to better match the different setpoint requirements of both the door pull & open door velocity tests, which often require different setpoints requirements of upto 5~15 pascals depending on the building dynamics.

Control Output Response

The control loops are set to use P + I action with preset typical settings to give stable but fast control response. These settings govern both the direct response of the outputs in relation to the input values & setpoint plus the speed of correction to achieve setpoint. Ex Hevac, for both loops, the Proportional Band (XP) is set to xxx pascals & the Integral action time (TN) is set to xxx. Note keep VSD ramp & down times to a minimum as they fight this controller trying to set the required fan speed ..i'd suggest 10 seconds. The P-Band XP sets the direct cause and affect of output change due to input change (when at or below setpoint) and needs to be set wide enough to not cause hunting but low enough to give an instant reasonable output reaction. Proportional control (XP) by itself does not eliminate offset of input to the setpoint, it only gives a proportional relative output response. Integral action (TN) is used to automatically increase output (based on what the P-band is producing) to cause more correction and thus force the output to produce enough signal level output (over time) to eliminate error (difference) between the input value and the setpoint.

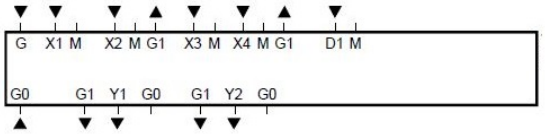
If the fan speed constantly hunts (changes) up and down and wont settle, increase the P-Band setting, if the system seems to produce too little response to change of pressure - decrease the P-Band. Ideal settings are gained with experience and trial & error, but in my experience you should never need to set XP lower than xxx pascals or higher than xxx pascals proportional band. If the control system is stable but taking too long to eliminate the error (difference between pressure value and the setpoint) reduce the integral action time , but do not set less than xxx seconds. If the system seems to be over reacting in error correction, increase the integral time setting but in most cases the ex-hevac settings of XP=xxx & I-time =xxx seconds, should give good control and not need altering.

LCD PROGRAMMING SCREEN & TERMINAL CONNECTIONS

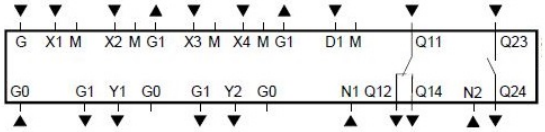


Item	Designation
1	Display of Info page
2	Display of access levels
3	Menu navigation
4	Display of measured variables, operating modes
5	Function block navigation: Display corresponds to configuration diagram
6	Function block instances
7	Information segments (7 characters): Data point description (mnemonic)
8	Value segments (4 characters): Display of data point values
9	Display of units

RLU220



RLU222



EXAMPLE OF STAIRWELL CONTROL SYSTEMS WITH ADDITIONAL FEEDBACK WIRES SHOWN.

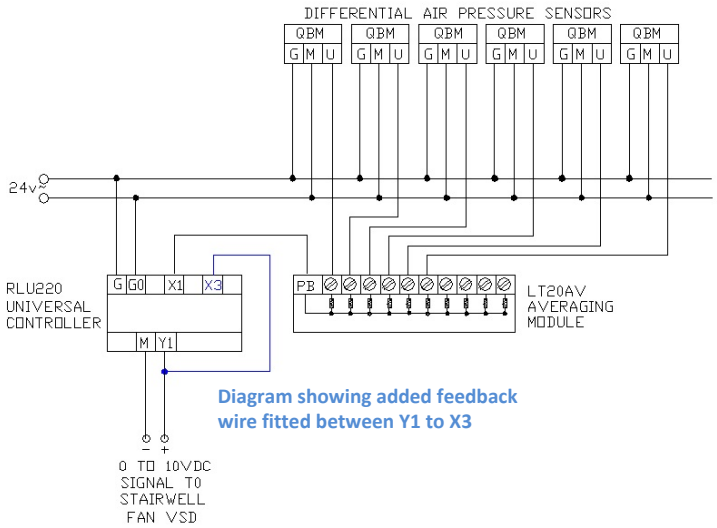


Diagram showing added feedback wire fitted between Y1 to X3

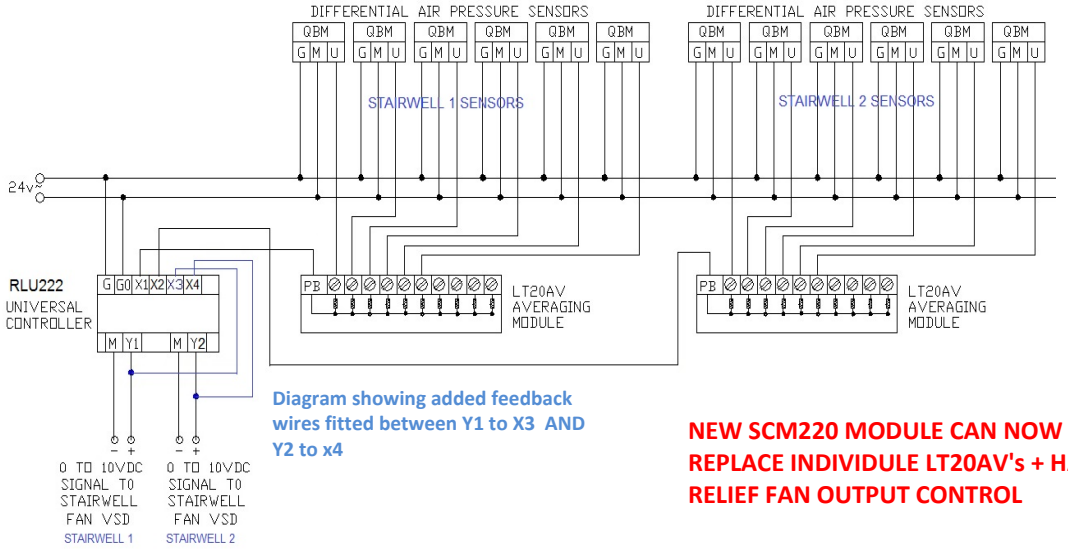


Diagram showing added feedback wires fitted between Y1 to X3 AND Y2 to x4

NEW SCM220 MODULE CAN NOW REPLACE INDIVIDULE LT20AV's + HAS RELIEF FAN OUTPUT CONTROL

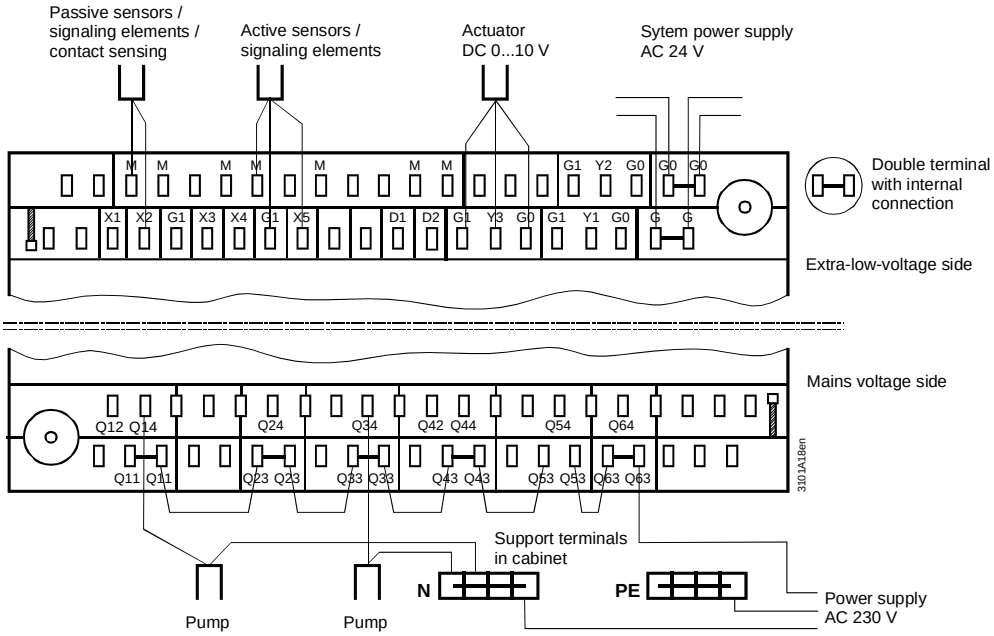
Electrical connections

Connection rules

Terminal connection concept

The following picture shows the terminal base of the RLU236 controller with its connections:

- Extra-low-voltage side at the top
- Mains voltage side at the bottom



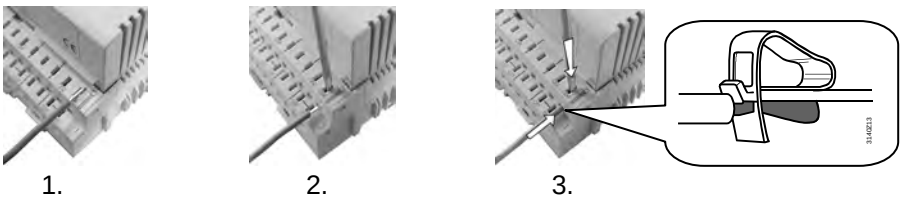
Terminal assignment

Terminal	*Intended for …*
Xx, M	Passive sensors and signal sources, potential-free contacts (contact sensing)
G1, Xx , M	Active sensors and signal sources.
G1, Yx, M	Actuators
G and G0	AC 24 V system power supply

Note

Only one solid or one stranded wire can be connected per terminal.

Connection procedure with spring cage terminals



Steps

1. Strip the wire over a length of 7…8 mm
2. Position the wire and screwdriver (size 0 to 1)
3. Apply pressure with the screwdriver while inserting the wire
4. Remove screwdriver

NOTES FOR USING THE HEVAC SCM220 RELIEF FAN CONTROL MODULE IN TANDAM WITH THE PRE-PROGRAMMED SIEMENS RLU222 FOR STAIRWELL PRESSURE CONTROLLER

The main purpose of the common relief fan is to keeping fire affected floor lobbies smoke free by venting the floor to atmosphere & keeping the fire affected floor/s at a negative pressure in relation to atmosphere. The relief fan needs to operate at a minimum speed to achieve this even when all doors are closed & than speed up to compensate when a door is opened on the fire affected floor/s to vent the increased pressure/air passing through the open door/s. This can be done in a variety of methods but this note describes the use of the Hevac SCM220 controlling the common relief fan speed based on being tied to the average speed of the two stairwell pressurisation fan signals as apposed to using a separate pressure controller for relief fan control.....which in some cases may suffer from the three pressure control systems fighting one another causing system instability & hunting. To this end, Hevac have developed the **SCM220** that makes use of the two RLU222 stairwell pressure outputs (Y1 & Y2) to also control the common relief fan based on using the average of these control outputs.
This averaging method typically works well but some projects require limiting & scaling of the relief fan speed relative to the supply fans to better match the affect of the supply fans impacting the lobby floor negative pressure & vice versa, and ofcourse speeding up the relief fan will also to aid in the open door velocity requirements. The SCM220's main benefit is central trimming of the relief fan speed during commissioning rather than playing with the relief fan VSD's input/output parameters. The two 0-10vdc RLU222 stairwell pressure control output signals (Y1 & Y2) not only connect to their relative vsd's for stairwell pressure control but also connect back to this module on terminals X9 & X10, with the selected signal (highest or average- average is recommended) then produced as an output on terminal Y7 as a control loop to control the relief fan speed. This control loop has the added feature of being able to trim & scale the Y7output level in relation to the X9/X10 stairwell pressure control signals. Y7 trim-able adjustments are : **Start , Gain , Minimum & Maximum** and are available on the modules fascia to allow the fine tuning of the relief fan speed. The module also incorporates two independent input signal selectors (loops 1 & 2) which can be used with the 2 sets of stairwell differential pressure sensors and allows selection of the lowest, average or highest sensor value to pass onto the Siemens RLU222 pressure controller sensor inputs (which saves the use of two extra dedicated signal selector modules for this purpose).

As a guide we would suggest the following settings for the SCM220 adjustments :

1.) Use the AVERAGE sensor outputs Y2 & Y5 as signals to pass onto the RLU sensor inputs X1 & X2
2.) Set the X9 & X10 input selection jumper to the xxx position.
*3.) Set the **MIN** adjustment pot. to the minimum relief fan speed to satisfy the negative floor pressure requirement when the stairwell doors are closed ie # volts (##% fan speed).*
*4.) Set the **START** adjustment to the average of the two RLU222 outputs produced when the controller is producing signals to satisfy one open door. Typically ~# to # volts (average of the RLU222 Y1 & Y2 output values). This is so the relief fan can start to compensate for the added air pressure supplied by the stairwell systems flooding air onto the fire affected floor.*
*5.) Adjust the **GAIN** pot. to still maintain negative pressure on the fire affected floor when **several** stairwell doors are open causing the supply stairwell fans to run at near maximum capacity, which also greatly aids in controlling the door velocity requirements : set GAIN to X2.*
*6.) The **MAX**imum relief fan speed setting is a handy trim if the relief fan is oversized and/or causing excess door velocity or hindering door pull operation by limiting the maximum fan speed.*