

The following outlines a building management control system to operate interior roller shades.

1. Base Board: Each base board requires a 120 volt power source. This can be achieved by creating a home run connection to each board, or by daisy chaining each of the boards together.

Two output line voltage connections are required, one to each motor the system is controlling. Control board architecture provides each board with $\pm 10\%$ over current protection.

All boards should be connected into a distributed network created by linking the controllers together through a low voltage 3 wire connection.

2. Included Programming: Each of the control boards is to be programmed to work as a standalone control unit which can carry out the following functions;

a) Preset Stops: Each board has the capability to be programmed with a maximum of 30 preset stops. These pre-set stops assign stop locations anywhere within range of shade travel.

b) Grouping: Each motor has the ability to work independently or together within a group. Each group can then be addressed by individual wall switches or via Building Manager Software (optional).

c) Input Control: The system will have the ability to act on any individual or combination of inputs from any analog switch or analogue sensor device, user operated software, interface with 3rd party lighting control system via dry contact signal of RS 232/485 protocol.

d) Sun Sensing: The system will measure exterior light levels to ensure that a user defined maximum and minimum light level are maintained. In the event that the maximum threshold is exceeded the blinds will be deployed and remain deployed until a point in time that a user defined minimum threshold is attained. An optional user adjustable time lapse may be implemented to avoid excessive shade adjustment.

e) Sun Tracking and Scheduling (optional upgrade): Each board will carry out a calculation of the daily sun path thereby determining the sun's angle of incidence. Based on this information blinds will be adjusted to ensure that they are optimized as determined by pre-set stop locations (refer to section 3.a) ensuring the maximum amount of ambient light is permitted to penetrate the floor plate while not allowing direct solar energy to enter the space. In order to maintain the highest level of natural light penetration into the floor plate, all blinds will be completely retracted once it has been determined that the facade no longer experiences any direct solar exposure.

The system will have the ability to act on inputs from an Omni-directional brightness sensor mounted on the Building's roof top. The sensor will be used to measure the luminance level of the sky and compare to user defined overcast threshold setting. In the event that the sensor determines an overcast condition, the blinds will be rotated to their open position. A time lapse will be implemented to ensure that overcast light levels are steadily maintained for 20 minutes prior to any shade action. Should the measured light level change from overcast to sunny conditions, the blinds will immediately revert back to their optimized position to ensure that direct sun light is prevented from entering the interior space.

The system will be supplied with full scheduling capabilities complete with software generated user interface allowing monitoring and editing of scheduled events to be carried out by an on-site facility representative.

3. Software:

f) Building Management System (BMS) Integration: The system will have the ability to act directly from signals initiated by the building management system in the form of user generated or computed system overrides, scheduled events, or alarms.

g) Remote system access: The provided BACnet routers should be connected to an on-site computer with internet access creating a portal to which G-line Solar Shading can connect to the system remotely to monitor and maintain the system. The preferred system access would be via a Virtual Personal Network (VPN).

h) Building Manager Software (optional): G-line Solar Shading will supply dedicated software to be installed on predetermined PC meeting minimum performance requirements as set out by G-line. The project specific software shall provide access to the control network and serve as a means to monitor, override, reconfigure and maintain the control system through the use of a floor plan reflecting the actual building model. The computer will have the means to store logging files generated by the software program, which will be viewable in locked spread sheet format. The PC will allocate remote access via Virtual Personal Network (VPN) to the supplied PC, as a means of maintenance and repair by G-line Solar Shading and/or G-line Solar Shading trained dealers.

4. System Commissioning:

On-site Commissioning: The system will be commissioned on site by a G-Line Commission Engineer. The commissioning will be comprised of 2 consecutive days on-site. Upon substantial completion, 1 hour of system training for the facilities team members will be carried out by the Commissioning Engineer. Any scheduled work being performed outside of regular work hours (7:30am – 5:00 pm) or work week (Monday - Friday) will result in additional charges. All on-site commissioning performed by G-line Solar requires a minimum of 10 working days notice prior to scheduled commissioning date. Failure to provide appropriate notice may result in additional charges. Any additional time on-site due to circumstances beyond or outside of G-line Solar Shading direct control will result in additional charges.

5. System Auxiliaries:


Control Point Module: Standard control point acts as an input for analogue sensors, and third party control. Each control point is required to be wired into the system network and be powered via 24 volts.

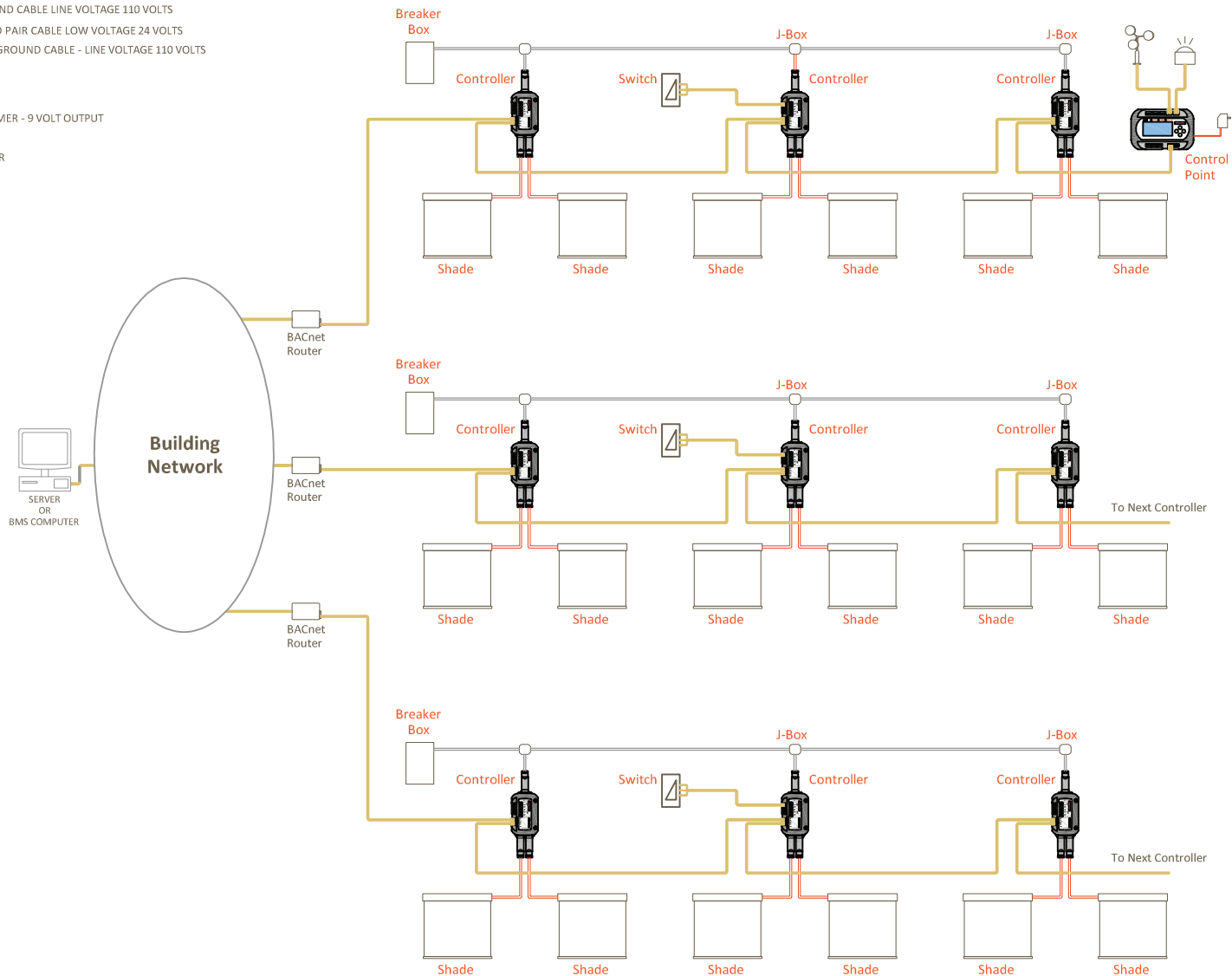
Brightness Sensor: BACnet MSTP compatible, brightness sensors used to determine the ambient light level of the sky.

Wall mounted override switches: Single Pole, two button switches will be supplied to be used as user override points.

Description: General Riser/ Wiring

— 16 AWG 3+1 GROUND CABLE LINE VOLTAGE 110 VOLTS
— 22 AWG 2-TWISTED PAIR CABLE LOW VOLTAGE 24 VOLTS
— MAX 12 AWG 2+1 GROUND CABLE - LINE VOLTAGE 110 VOLTS

 POWER TRANSFORMER - 9 VOLT OUTPUT
 BRIGHTNESS SENSOR
 WIND SENSOR



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Building Management System

DATE

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