



## SL2105/ SL2108

Multi Channel Lighting  
Control Modules

### Description

The SL2100 series controller is a microprocessor-based lighting control module designed to control up to eight lighting channels.

### Features

- Stand-alone or network operation
- 365-day programming for each circuit
- Analog input for photo sensor with the ability to remotely adjust sensitivity level
- Analog input for energy consumption with the ability to limit loads.
- Digital photocell inputs
- Astronomical clock
- Remote or local override of each circuit
- External time clock or occupancy sensor input for each circuit
- LEDs for monitoring status
- No battery required for control parameters, schedules or clock
- Vanishing holidays
- Selectable normally open or normally closed relay on outputs

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### Mounting

The SL2100 series controller is designed for mounting using four #10 sheet metal screws. Prior to mounting, the jumpers should be placed. (See setup instructions.) If the unit will be stand-alone, all programming should be completed. If the unit will be wired for communications, a unique address should be programmed into the unit. (See programming instructions.)

# Wiring

The SL2100 series controller terminal designations are shown below.

## REMOTE SENSOR WIRING

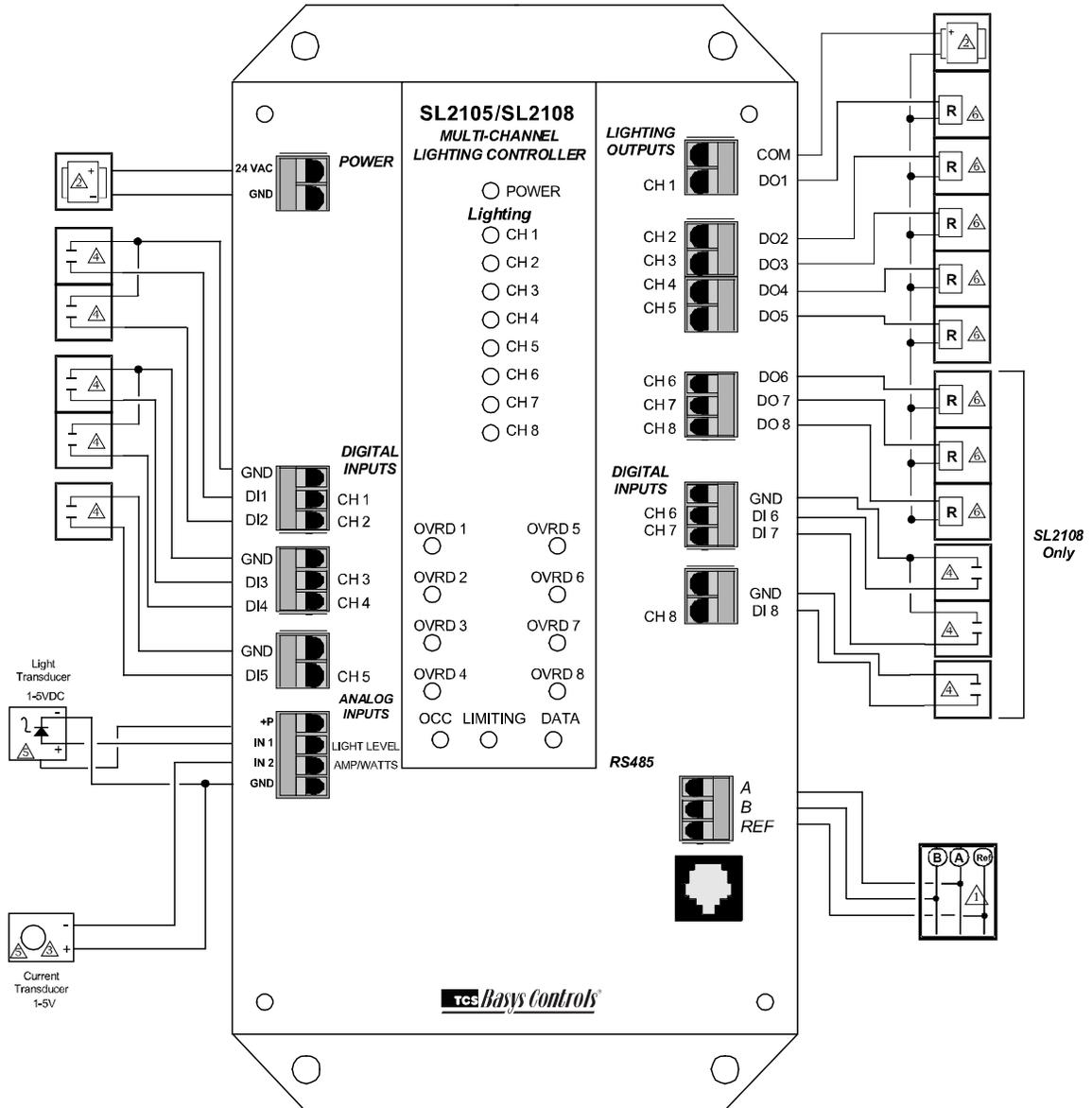
The SL2100 series controller accepts two 1 to 5VDC sensors.

## POWERING THE SL2100 SERIES CONTROLLERS

The SL2100 series controller is powered from 24 VAC +/- 20 %. If wiring for communications, dedicated power must be used to power the SL2100 series controller. Several S-series controllers may be powered from the same transformer, provided that the transformer has enough power.



**Caution:** When multiple TCS Basys Controls devices are using a single transformer, the polarity of the power wiring must be maintained because all TCS devices are half-wave rectified.



- |   |  |
|---|--|
| <b>1</b> For communication wiring, use twisted, shielded 22 AWG. Must be run separately.    | <b>4</b> Dry contact. Must not be powered.   |
| <b>2</b> 24 VAC transformer. See powering instructions.                                     | <b>5</b> Transducers shown use +P (20-24 VDC) Refer to transducer manual for specific wiring details |
| <b>3</b> 1 to 5 VDC Current Transducer. Sensor input wiring 18 AWG, twisted, shielded pair. | <b>6</b> Up to nominal 28 VAC from transformer   |

# Setup

## BAUD RATE

The SL2105 and SL2108 version 2.3 use a baud rate of 9600 baud which cannot be changed.

## Programming

The SL2100 series controller must be programmed with a PC if other than factory default settings are desired. A port on the face allows local access for programming. If you plan to program the controller while it is on a network, prior to putting the controller on the network, a unique address must be set in the controller by accessing it through the port on the front of the controller.

For more information on programming through the PC, consult your TCS software manuals.

## CONTROLLER ADDRESS (INSIGHT)

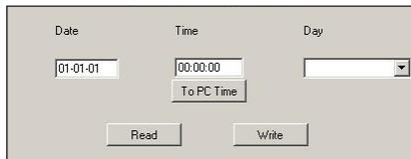
To initialize/program a controller, you must first put the address of the controller here. The



default address for an SL2105 is 105 and the default address for an SL2108 is 108. You can either type in the address, or choose the particular controller by location. For controllers with multiple initialization screens, the address of the controller is only entered on the first screen. To modify the address, click Change, enter the new address in the window and then click OK. If the address shown in screen A updates to the new address, the change has been completed.

## INTERNAL TIME CLOCK (INSIGHT)

When you read a controller, this screen displays the time (military time), the day of the week, the



date and year the controller is using. When you click on "To PC Clock", these same parameters are read from the computer and programmed down to the SL2100 series controller. This screen also shows if Daylight Savings is enabled.

## CHANNEL EVENT SCHEDULING

There are up to two "ON" periods per day, and thus two time schedules (A and B). There are also up to eight independent channels (depending on model). Let us say that the "ON" time for a particular day is from 8:00AM to 12:00PM and from 1:00PM to 5:00PM. In the A schedule you could enter 8:00 to 12:00, and in the B schedule you could enter 13:00 to 17:00. You can reverse the A and B schedules also. You can also enter 8:00 to 17:00 for the A schedule and 0:00 to 0:00 for the B schedule. 0:00 (12:00AM) starts the day, and 24:00 (12:00AM) ends the day. "ON" times that span midnight have to be coordinated using two days' time schedules. Within the Ubiquity programming page, the desired schedule is simply selected from the drop-down menu for each channel. If the desired schedule is not shown in the drop-down, new schedules can be created or existing schedules can be edited on the Scheduling page.



## CHANNEL HOLIDAY SETUP

Holidays are created as part of the Scheduling page and will appear as part of the selected schedule. You can create date specific holidays, roaming holidays, or select from a list of standard bank holidays. If the selected schedule does not include the desired holiday(s), the schedule can be edited on the Scheduling page.

## ENABLE BLINK OUTPUT

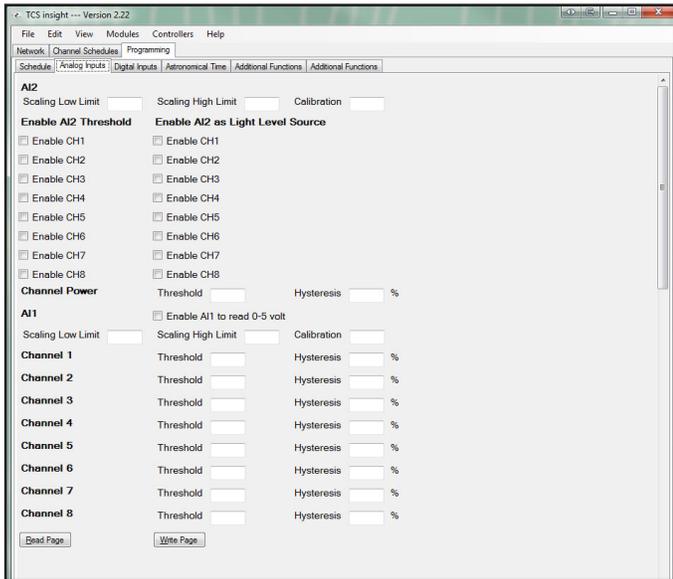
The Blink Output option forces the respective lighting output turn off and on, four times, five minutes prior to an unoccupied or off period. This will give an indication that a scheduled on time is about to end. Click the checkbox to enable this function for each channel.

## ENABLE ASTRONOMICAL TIME

The Astronomical Time option allows the controller to turn a channel off based on the locations sunrise and sunset times. See the Astronomical Time section later in the manual for more details and additional configuration options. Click the checkbox to enable this function for each channel.

## WHEN CHANNEL IS "ON",...

You can select how you want the time clock output (Digital Output Mode) to behave when the channel is "ON". You can choose for the Relay to be Normally Open (Off) or Normally Closed (On) during on periods. Simply select the desired behavior from the drop-down menu.



### AI1 AMBIENT LIGHT INPUT

If using an ambient light sensor (0 to 5 or 1 to 5V); set the low and high scaling limits for AI1. These limits are what the light sensor reads at low limit and what the light sensor reads at full scale.

A Lighting Channel Threshold and Hysteresis for each of the available channels can be set for this input signal. For example, if the input is scaled 0 to 1000 lumens and you want to turn off one channel if the input gets up to 500 lumens and allow it to come back on if the input falls to 400 lumens, enter in 0 for the scaling low limit, 1000 for the scaling high limit, 500 for the threshold and 10% for the hysteresis for that channel.

Select a threshold and hysteresis for the channels which will be allowed to be shut off based on this input hitting the threshold. A common application for this feature is to control parking and exterior signage lighting. Essentially the channel will be on all the time it is occupied except when there is too much light. (Similar to the astronomical time function). **If AI1 is not used, the threshold for all channels MUST equal the scaling high limit.**

### AI2 ENERGY / POWER / MONITORING INPUT

If using an energy meter, power meter or current transducer (4 to 20mA), set the low and high scaling limits for AI2. These limits are what the energy or power meter reads at 4mA and what the energy or power meter reads at 20mA. For a 4 to 20mA input to be wired to AI2, a 250 Ω resistor must be installed between AI2 and GND. If you want to use this input with a threshold and hysteresis (Channel Power section) to shut off lighting channels, select the relevant lighting channels (Enable AI2 Threshold checkboxes) and enter a threshold and a hysteresis to be used. **If AI1 is not used, the channel power threshold MUST equal the scaling high limit.**

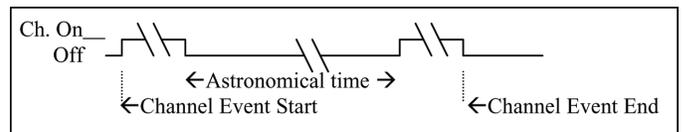
The Channel Power Threshold is basically a setpoint to which AI2 is compared to determine when to turn off the selected channel(s). The Channel Power Hysteresis is a buffer value which prevents the channel from cycling off on prematurely. For example, if the AI2 input is scaled 0 to 10000 KW and you want to turn off some channels if the input gets to 7500 KW and allow them to come back on if the input falls to 6500 KW, enter in 0 for the scaling low limit, 10000 for the scaling high limit, 7500 for the threshold and 10% for the hysteresis. You should choose this threshold to be larger than the accuracy/error specification of the equipment/device being turned off so it does not cycle on and off.

### AI2 AMBIENT LIGHT INPUT

If AI2 is not used for power limiting, a second light sensor can be used to monitor another area. Set the low and high limits for AI2. These limits are the light sensor reading at 4mA and the sensor reading at 20mA respectively. Click on the Enable box for each of the channels to be controlled by AI2 (in the Enable AI2 as Light Level Source column). Then proceed to enter threshold and hysteresis values for each channel (located just below the AI1 AMBIENT LIGHT INPUT section). Each channel that is selected/checked (Enable AI2 as Light Level Source) will then have its threshold/hysteresis compared to AI2 instead of AI1

### ASTRONOMICAL TIME

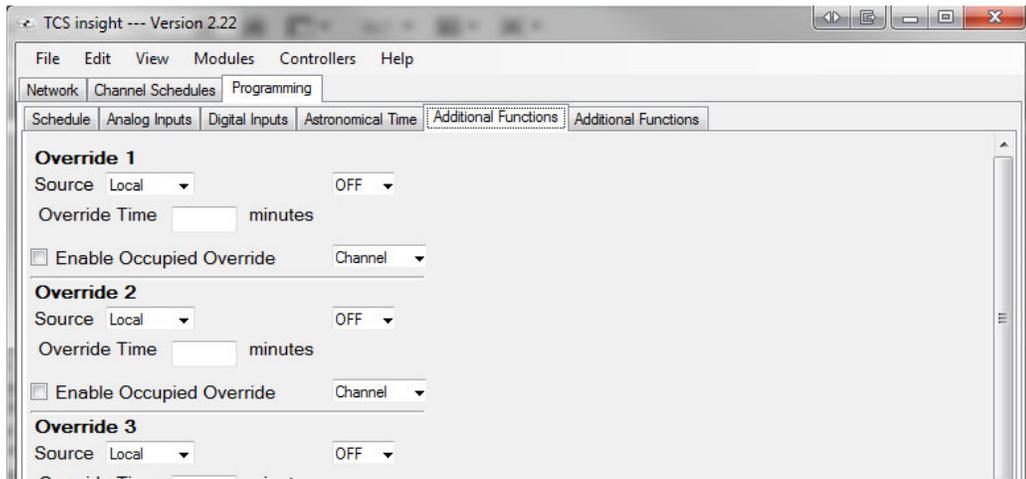
The Astronomical time function may be setup on any of the channels. It controls and turns off the enabled light channel for the daylight period from sunrise to sunset. The following diagram illustrates the typical application of this capability.



To setup astronomical time, enter the Latitude and Longitude parameters for the location being controlled. Also enter the time offset from GMT (Greenwich Mean Time). For example, the USA Central Standard time zone is offset -360 minutes from GMT. Madison, Wisconsin, USA is at 43° 5 minutes North (+) Latitude and 98° 30 minutes west (+) Longitude. The GMT Offset range is + 720 Minutes. Also click the box if applying daylight savings time to the astronomical time calculation.

Next, select the channel(s) that should have the astronomical time function and click the Enable box. This is done in the Schedule section of the page.

Note, for non-North American Daylight Savings time set the manual DLS (Day Light Savings) time.



## CHANNEL OCCUPANT OVERRIDE

This is the number of minutes from 0 to 255 (4 hr, 15 min) which the controller will bring a system that is Off to On when its override button is pressed. This time can be different for each channel. You can also select whether the Override is Local (the controller manipulates these inputs/output) or Remote (the inputs/output are controlled through the software). If Remote is selected, you will also be able to choose the state of the override (ON or OFF). Note – when doing this, the respective Override will remain in that state indefinitely until you change it from a PC, or set the Override to Local.

## HOLIDAY VANISHING

Choose whether to enable the Holiday Vanishing Feature. If checked, the controller will make the number of days for a holiday 0 after the holiday is over. This will keep the holiday from occurring in subsequent years if it is not reprogrammed.

## DIGITAL INPUT DELAY/FILTER

Enable the Digital Input Delay if you want the Digital Input to be present for 15 seconds before it takes effect. This can prevent cycling. Note, this delay if selected, will apply to all eight channels.

## POWER DOWN PERIOD

If the controller loses power, it can remember which channels have been overridden and how much time is remaining in each override period. This is the amount of continuous power loss time in minutes where the controller will remember the override status. If the controller loses power for longer than this period, the override buttons will have to be pressed again as necessary.

## INPUT VOLTAGE

The input voltage is monitored. The calibration factor is used to scale the controller's 24 VAC power input to the appropriate line voltage. For example, if the line voltage is 120 VAC and the SLQ218 power input is 24 VAC, then the calibration factor is 5.0. If the line voltage is 120 VAC and the controller power input is 27 VAC, then the calibration factor is 4.4. If the line voltage is 277 VAC and

the SLQ218 power input is 24 VAC, then the calibration factor is 11.5.

## DAYLIGHT SAVING TIME

Beginning in 2007, Daylight Saving Time (DST) in the U.S. will be extended by having an earlier change to DST in spring and a delay in switching back to standard time in fall. However, this change may only be temporary, as this "new" schedule is only in effect for a 2 year trial period. After that, the DST schedule may revert back, stay the same, or be something completely different. Products shipped starting in 2007 with firmware version 1.5 or higher accommodate the new DST schedule. Products shipped starting in 2008 with firmware version 2.0 or higher accommodate the new DST schedule and have the ability to be programmed to accommodate any future schedules that may be used. Should the schedule change and you need to customer program the DST start and end dates, simply enable the "Daylight Saving Time" option within the software and enter the starting month + week and the ending month + week.

## BLINK OUTPUT

The Blink Output option forces the respective lighting output turn off and on, four times, five minutes prior to an unoccupied or off period. This will give an indication that a scheduled on time is about to end. Select whether to enable this function for each of the eight lighting channels.

## CHANNEL MONITORING AND CONTROL

Select whether you want the Digital Input DI1 and/or Override 1 to be Local or Remote. DI1 and Override 1 are used for Channel 1, DI2 and Override 2 are used for Channel 2, etc. Local means that the lighting module uses its own control program to manipulate these inputs. Remote means that it will take a PC to make any changes to these inputs. If the Digital Control is Remote for DI1, DI2, Override 1, Override 2, etc., you can select whether they are On or Off and then Write or Write Channel, or Write All Channels and force these inputs and outputs on or off from a PC.

Note - when doing this, the respective input will remain in that state indefinitely until you change it from a PC, or make the Digital Control Local.

With Occupied Override, select whether to allow an occupied override and if so, whether it will be a schedule or channel override.

There are four Digital Input Modes which can be used with a digital input: Regular, External Override, Momentary Toggle Override, & Monitor.

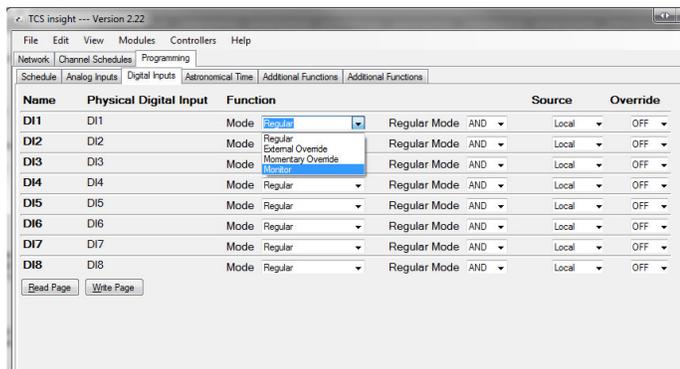
With Regular mode, the digital input is used in conjunction with the programmed schedule in determining when the relay output should be on or off.

With External Override mode, the digital input acts the same as the override button on the panel of the SL2108. The switch used for this type of digital input must be a momentary N.O. switch.

With Momentary Toggle Override, the digital input acts like a toggle switch. This must also be a momentary N.O. switch. If the time clock is on, pressing the switch turns it off, If the time clock is off, pressing the switch turns it on.

With Monitor mode, the digital input acts as a monitor for the DI and has no other function.

Select whether you want the time clock output (Digital Output Mode) to be Normally Open (Off) or Normally Closed (On) during on periods.



## Checkout & Troubleshooting

### CHECKOUT

1. Be sure to check and verify all wiring before powering the SL2100 series controller.
2. Turn power on. The SL2100 series controller "Power" LED should light up. Then the Service LED will blink for 15 seconds while the electronics stabilize.
3. If the SL2100 series controller has not been pre-programmed, it should be programmed at this time.
4. Note that the operation of the SL2100 series controller will depend on how it is programmed.

The SL2100 series controller is now ready for operation.

### TROUBLESHOOTING

#### Power LED will not come on

Check for 24 VAC on terminals "24 VAC" and "GND". The rest of the troubleshooting must be done with a PC and the Insight software.

#### No communication

Make sure baud rate selection jumper for the QD1010 and the SL2100 series controller are the same, and that Revelation is configured for that same baud rate. Address 248 will always work provided that the SL2100 series controller is **not** connected to a network.

#### Output operation is not correct

Check programmed parameters. In particular, check Schedules and other parameters responsible for operation. Check wiring.

## LED Description

Six LEDs on the unit allow the occupant to view the current operating status of the SL2100 series controller.

**POWER:** This LED will be lit whenever the unit has power.

**DIGITAL OUTPUTS:** These LEDs will be lit when the corresponding relay outputs are on. Relay outputs include lighting channels or "banks", digital logic inputs or chiller/heating stages.

**OCC:** This LED will be on whenever the unit is operating in the occupied mode.

**LIMITING:** This LED will come on when AI2 exceeds a power or energy threshold. If this condition continues, this LED will begin blinking.

**DATA:** This LED will blink when the unit is being accessed by a PC.