STYLITIS-10

INSTALLATION GUIDE

SYMMETRON
ELECTRONIC APPLICATIONS

CONTENTS

SYMMETRON ELECTRONIC APPLICATIONS
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REFERENCES:
Stylitis-10 User's Manual.
Individual sensor Manuals.

1. GENERAL

INPUTS:

Stylitis-10 is able to measure voltage, frequency and pulses (and current as an option). With suitable sensors it is also capable of measuring:

- Wind speed, direction and wind-turbine power curves
- Temperature, humidity, pressure.
- Solar radiation, rain height, water speed, etc.

The sensors' output must be within 0~2.5V (or 0~5V in the Stylitis-10/5 version) and 0~5kHz.

OUTPUTS:

The vane supply output (+V PULSED) (2.5V for Stylitis-10 and 5V for Stylitis-10/5) may be used for excitation, as they are capable of supplying up to a TOTAL of 20milliAmps with an accuracy of ±0.2%.
Similarly, the current excitation output (AUX) (0.5mA) is also pulsed and it can supply PT-100 thermometers, etc with an accuracy of ±6%.

SERIAL PORT:

The Data logger comes equipped with two serial ports. Communication speed fixed at 9600 baud with 8 data bits, 1 stop bit and no parity bit. The ports are full duplex and their usage is the following:

PERIPHERAL (always active)
DB9 Plug (Female). PIN 2: Transmit, PIN 3 Receive, PIN 5 Ground. It is useful for a connection to a standard PC's serial port. A "straight" type cable is required, i.e. one, which connects pin 2 of one connector to pin 2 of the other, etc. The cable connector to the datalogger must be male, while the PC's connector must be female.

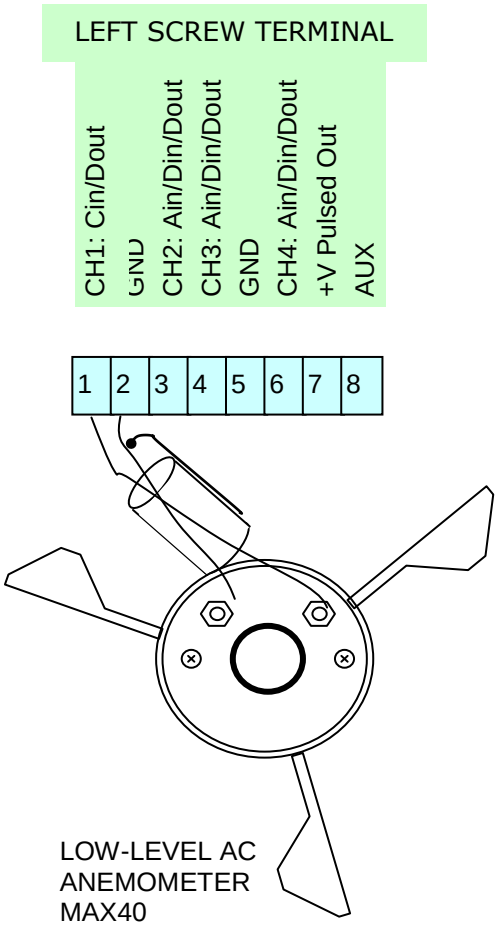
COMMUNICATION (it is activated only when the communication module is EXTERNAL- set it via Opton software)
DB9 Plug (Male). PIN 2: Receive, PIN 3 Transmit, PIN 5 Ground. It is useful for connection to an external modem's serial port. A "straight" type cable is required, i.e. one, which connects pin 2 of one connector to pin 2 of the other, etc. The cable connector to the datalogger must be female, while the one to the modem depends on the modem.

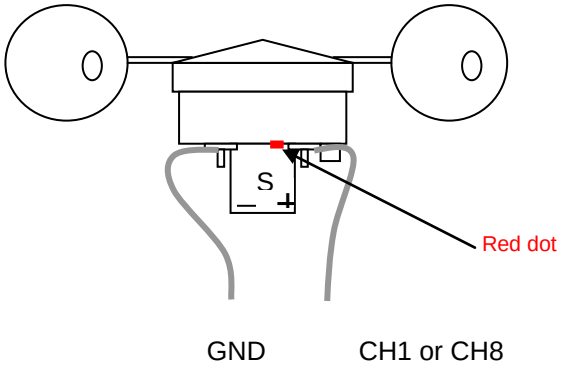
2. LOW-LEVEL AC ANEMOMETER.

Sinusoidal output sensors: NRG's MAX#40, YOUNG's 05103 (for connections refer to instruction sheet).

CONNECTION (MAX#40):

- Connect the anemometer to screws 1 [CH1] and 2 [GROUND] on the left screw terminal. (CH8 is not suitable for sinusoidal output sensors)
- Wire polarity does matter (see drawing). Typical wire size: 2 x 0,25 mm^2 (shielded cables are recommended). Connect the shield to the GROUND screw. Do not connect the shield to the anemometer.





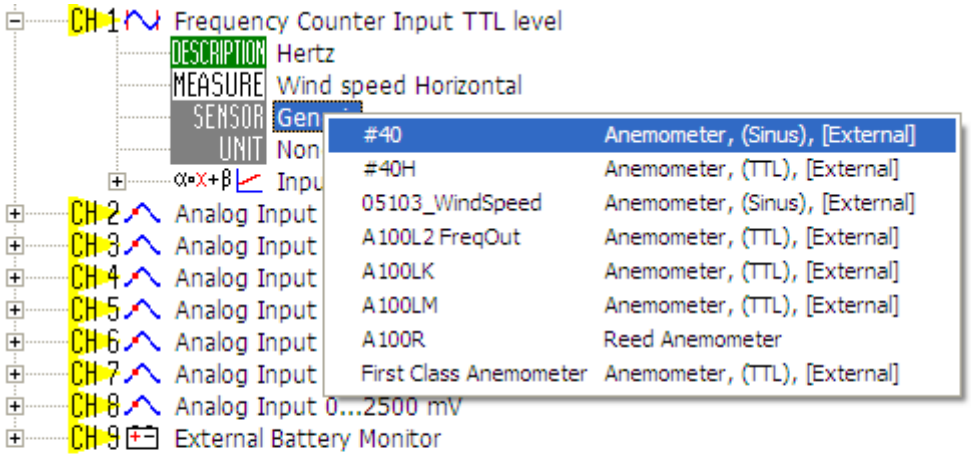
IN CASE IT DOESN'T WORK:

- Check that the anemometer rotates freely and that its axle is straight.
- With a multimeter check the resistance in the anemometer's terminals. It must be less than 1000Ω and greater than 400Ω.
- Rotate the anemometer and measure the AC voltage on its terminals; it should generate at least 200mV.

SETUP:

Connect serially via Opton. (Connect the computer's COM port to the datalogger's PERIPHERAL port).
Before changing the setup select:
ACQ OFF.
After changing setup select: **ACQ ON**
to start acquisition (data logging).

- Click 'Read Inputs Setup' in the 'Setup' tab, in the 'Data logger online' bar on the left
- Open CH1's node. (CH8 is not suitable for sinusoidal output sensors)



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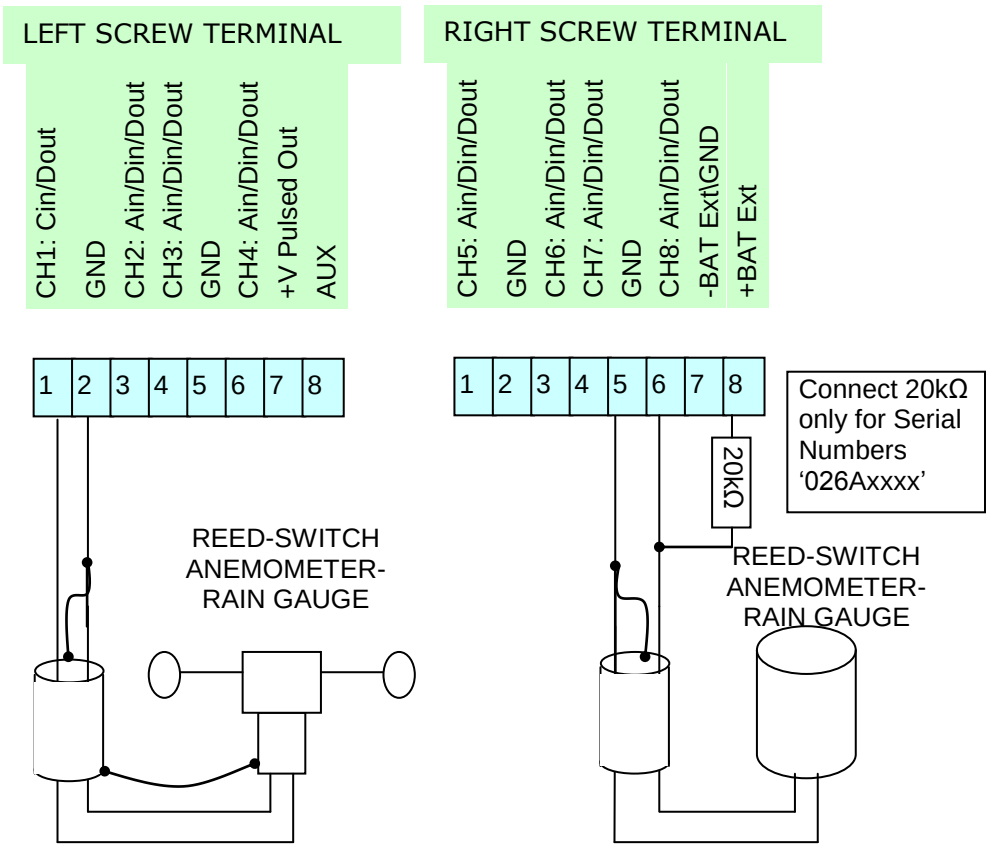
- Click the MEASURE line and select 'Wind Speed Horizontal'.
- Click the SENSOR line and select '#40' or '05103_WindSpeed'.
- The channel type (first line), along with the Slope, Offset are automatically updated.
- You can also change the units by clicking the UNITS line. The Slope and Offset are automatically updated again.
- In order to save the changes, click 'Write Setup' in the 'Setup' tab, in the 'Data logger online' bar on the left. If you wish to change the setup of multiple channels, one 'Write Setup' in the end is enough.
- NOTE: For calibrated anemometers you can enter the correct SLOPE και OFFSET values in retrospect.

3. REED ANEMOMETERS OR RAIN GAUGES.

Switch-type sensors (reed):
Anemometers: VECTOR A100R, NRG #40H.
Rain Gauges: NRG RainGage, YOUNG Tipping Bucket

CONNECTION:

- Connect the first anemometer or rain gauge to screws 1 [CH1] and 2 [GND] on the left screw terminal.
- Connect the second anemometer or rain gauge to screws 6 [CH8] and 5 [GND] on the right screw terminal. If you are using a datalogger with Serial Number starting with '026A', connect a 20kΩ pull-up resistor for CH8, between [CH8] and external power supply 12 V [+BAT Ext].
- Wire polarity does matter only for NRG's #40H anemometer. In the connection figure below, the signal pin (CH1/CH8) is the white one, the [GND] pin is the black one, while connect the red one as well to the 12V power supply [+BAT Ext].
- Typical wire size: 2 x 0,25 mm^2 (shielded cables are recommended). Connect the shield to the GROUND screw and the metal body of the anemometer (if plastic, leave it unconnected).



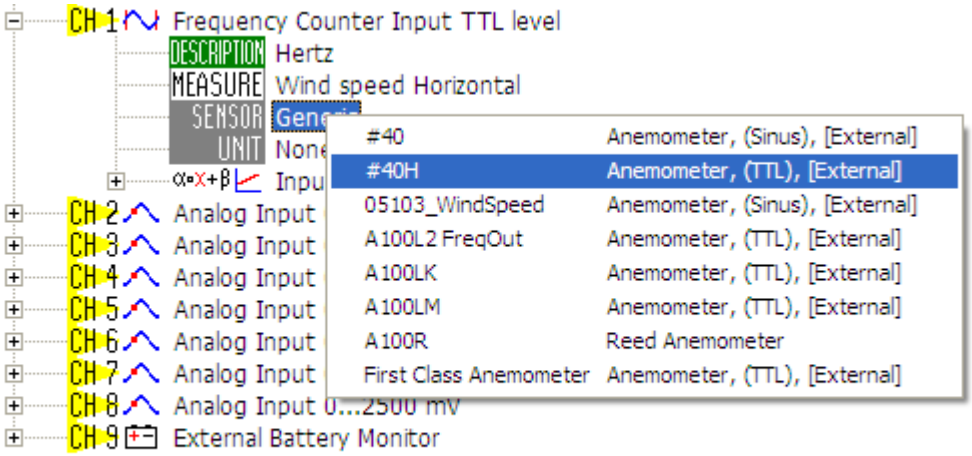
IN CASE IT DOESN'T WORK:

- Check that the anemometer or rain gauge rotates freely and that its axle is straight.
- With a multimeter check the resistance in the sensor's terminals: it should change from short circuit to open circuit while moving or rotating.

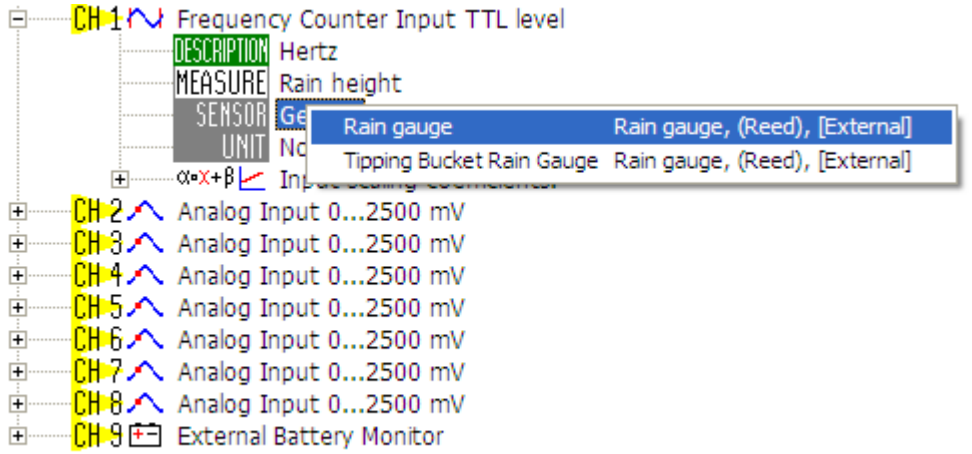
SETUP:

Connect serially via Opton 4. (Connect the computer's COM port to the datalogger's PERIPHERAL port).
Before changing the setup select:
ACQ OFF.
After changing setup select: **ACQ ON**
to start acquisition (data logging).

- Click 'Read Inputs Setup' in the 'Setup' tab, in the 'Data logger online' bar on the left
- Open CH1's or CH8's node.



- To select an **anemometer**, click the MEASURE line and select 'Wind Speed Horizontal'.
- Click the SENSOR line and select '#40H' or 'A100R'.
- The channel type (first line), along with the Slope, Offset are automatically updated.
- You can also change the units by clicking the UNITS line. The Slope and Offset are automatically updated again.



- To select a **rain gauge**, click the MEASURE line and select ‘Rain Height’.
- Click the SENSOR line and select ‘Rain gauge’ or ‘Tipping Bucket Rain Gauge’
- The channel type (first line), along with the Slope, Offset are automatically updated.
- In order to save the changes, click ‘Write Setup’ in the ‘Setup’ tab, in the ‘Data logger online’ bar on the left. If you wish to change the setup of multiple channels, one ‘Write Setup’ in the end is enough.

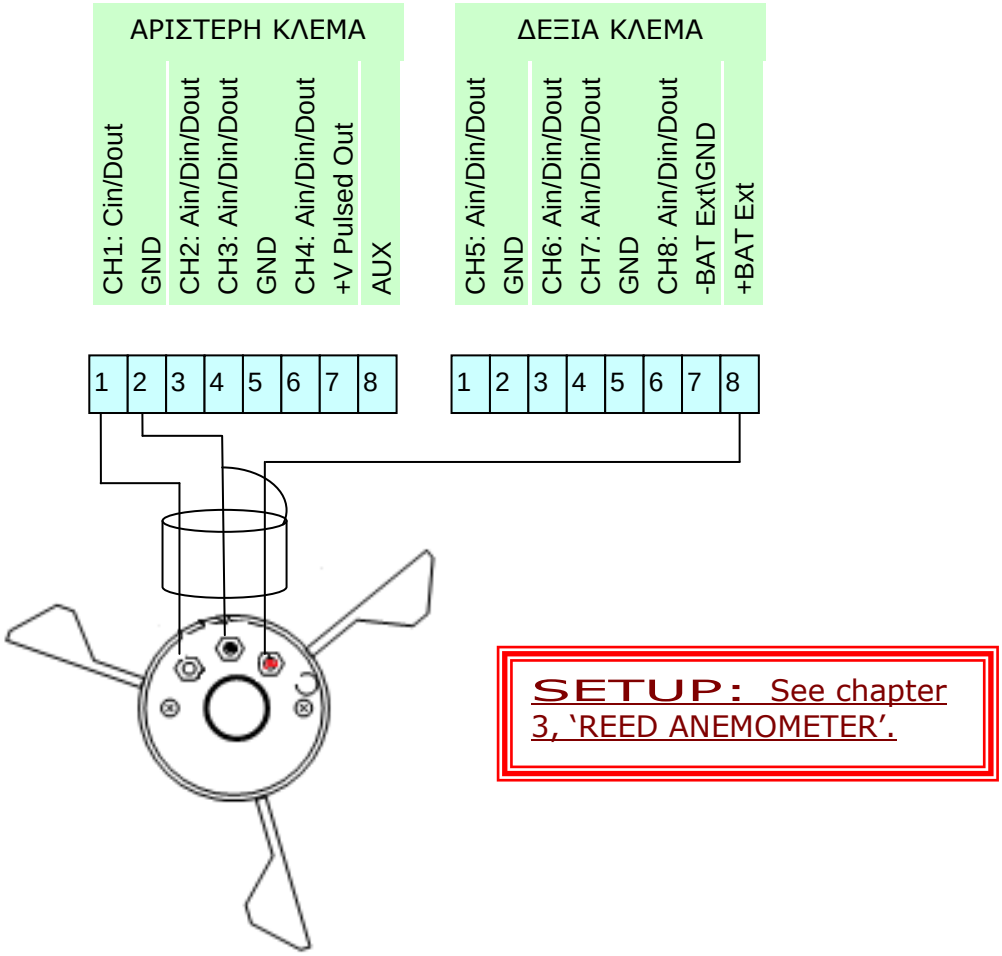
- NOTE: For calibrated anemometers or rain gauges, you can enter the correct SLOPE και OFFSET values in retrospect.

4. NRG MAX #40 ANEMOMETER

CONNECTION:

- Connect the first anemometer to screws 1 [CH1] and 2 [GND] on the left screw terminal.
- Connect the second anemometer to screws 6 [CH8] and 5 [GND] on the right screw terminal. If you are using a datalogger with Serial Number starting with ‘026A’, connect a 20kΩ pull-up resistor for CH8, between [CH8] and external power supply 12 V [+BAT Ext].
- Wire polarity does matter. In the connection figure below, the signal pin (CH1/CH8) is the white one, the [GND] pin is the black one, while connect the red one as well to the 12V power supply [+BAT Ext].

- Typical wire size: 2 x 0,25 mm^2 (shielded cables are recommended). Connect the shield to the GROUND screw and the metal body of the anemometer (if plastic, leave it unconnected).



SETUP: See chapter 3, 'REED ANEMOMETER'.

IN CASE IT DOESN'T WORK:

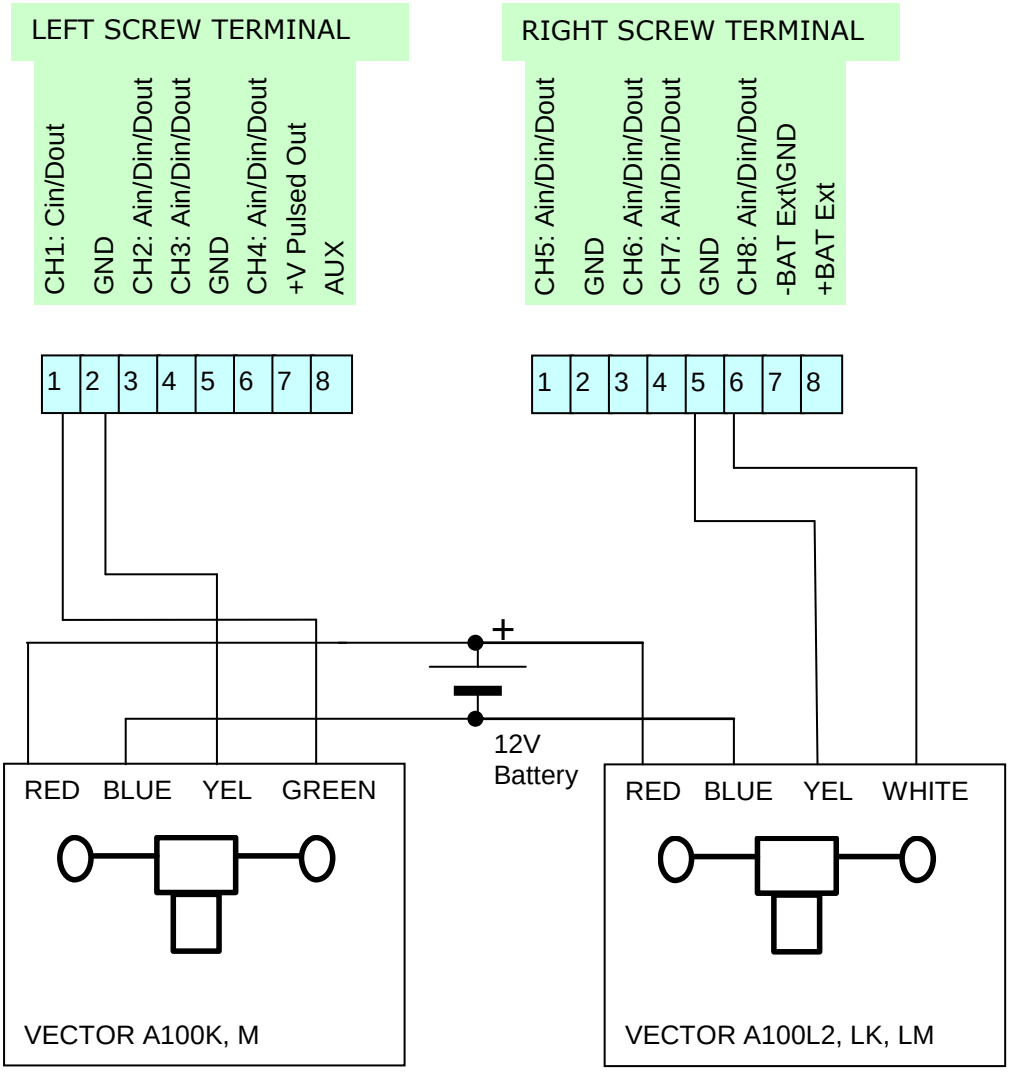
- Check that the anemometer or rain gauge rotates freely and that its axle is straight.
- With a multimeter check the resistance in the sensor's terminals: it should change from short circuit to open circuit while moving or rotating.

5. VECTOR A100K, L2, LM ANEMOMETER.

Optical disk sensors

CONNECTION:

- Connect the first anemometer to screws 1 [CH1] and 2 [GND] on the left screw terminal.
- Connect the second anemometer to screws 6 [CH8] and 5 [GND] on the right screw terminal.
- Wire polarity does matter (see drawing). Typical wire size: 2 x 0,25 mm^2 (shielded cables are recommended). Connect the shield to the GROUND screw and the metal body of the anemometer.



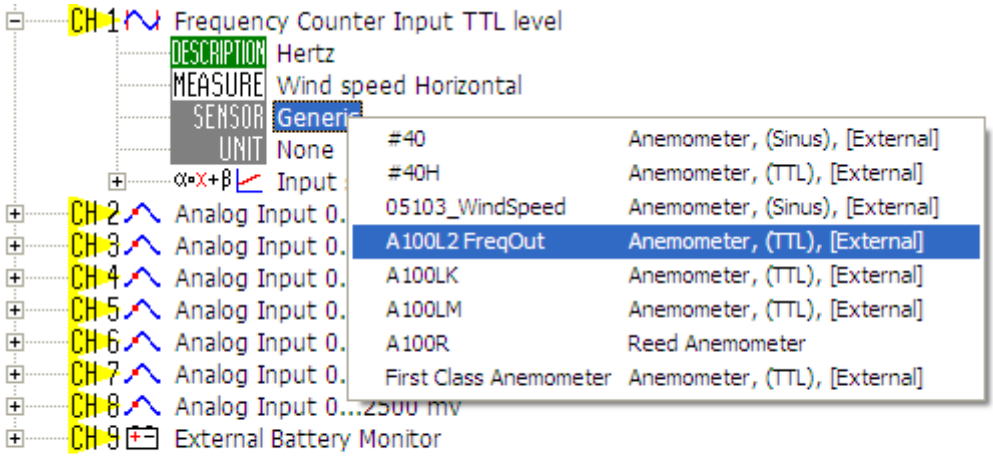
IN CASE IT DOESN'T WORK:

- Check that the anemometer rotates freely and that its axle is straight.
- Rotate the anemometer and measure the DC voltage between the COUNTER input and GND; it should toggle between 0 and 5 Volts (approximately).

SETUP:

Connect serially via Opton 4. (Connect the computer's COM port to the datalogger's PERIPHERAL port).
Before changing the setup select:
ACQ OFF.
After changing setup select: **ACQ ON**
to start acquisition (data logging).

- Click 'Read Inputs Setup' in the 'Setup' tab, in the 'Data logger online' bar on the left
- Open CH1's or CH8's node.



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- Click the MEASURE line and select 'Wind Speed Horizontal'.
- Click the SENSOR line and select 'A100K', 'A100LM' or 'A100L2FreqOut'.
- The channel type (first line), along with the Slope, Offset are automatically updated.
- You can also change the units by clicking the UNITS line. The Slope and Offset are automatically updated again.
- In order to save the changes, click 'Write Setup' in the 'Setup' tab, in the 'Data logger online' bar on the left. If you wish to change the setup of multiple channels, one 'Write Setup' in the end is enough.
- NOTE: For calibrated anemometers you can enter the correct SLOPE και OFFSET values in retrospect.

6. THIES FIRST CLASS ANEMOMETER.

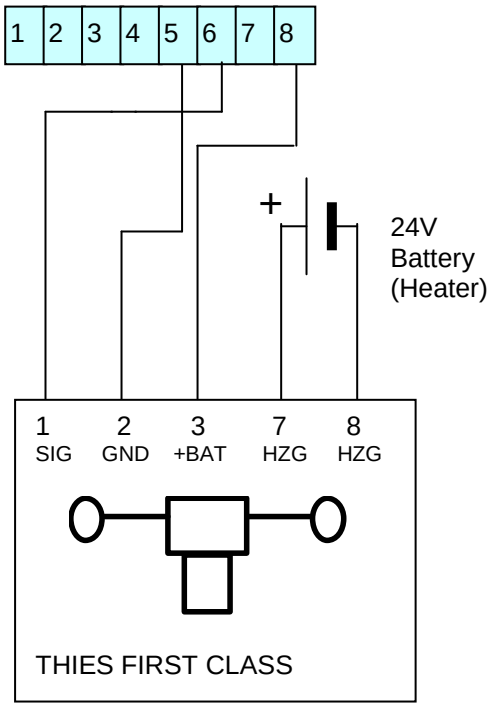
Optical disk type sensor.

CONNECTION:

- Connect the first anemometer to screws 1 [CH1] and 2 [GND] on the left screw terminal.
- Connect the second anemometer to screws 6 [CH8] and 5 [GND] on the right screw terminal.
- Wire polarity does matter (see drawing). Typical wire size: 3 x 0,25 mm^2 (shielded cables are recommended). Connect the shield to the GROUND screw and the metal body of the anemometer.

RIGHT SCREW TERMINAL

CH5: Ain/Din/Dout	GND	CH6: Ain/Din/Dout	CH7: Ain/Din/Dout	GND	CH8: Ain/Din/Dout	-BAT Ext\GND	+BAT Ext
1	2	3	4	5	6	7	8



SETUP: See chapter 3, 'REED ANEMOMETER'.

IN CASE IT DOESN'T WORK:

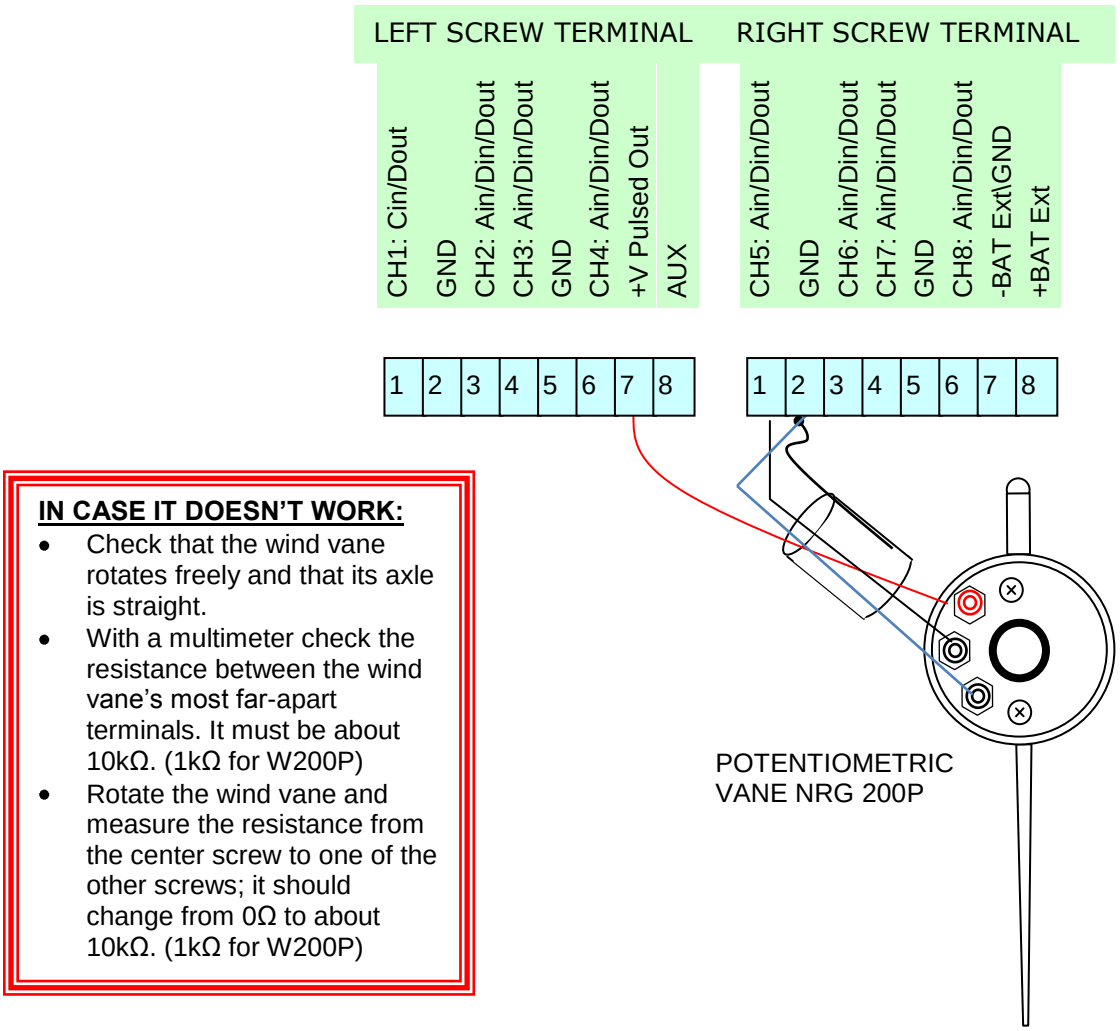
- Check that the anemometer rotates freely and that its axle is straight.
- Rotate the anemometer and measure the DC voltage between the COUNTER input and GND; it should toggle between 0 and 5 Volts (approximately).

7. WIND VANE NRG 200P

Other potentiometric sensors with resistance 1KΩ or greater: YOUNG 05103, VECTOR W200P, Thies First Class (for connections refer to instruction sheet).

CONNECTION:

- Connect the first wind vane to screws 7 [+V Pulsed Out] on the left screw terminal, and to the screws 1 [CH5] and 2 [GND] on the right one.
- Connect the second wind vane to screws 7 [+V Pulsed Out] on the left screw terminal, and to the screws 3 [CH6] and 2 [GND] on the right one.
- Connect the third wind vane to screws 7 [+V Pulsed Out] on the left screw terminal, and to the screws 4 [CH7] and 5 [GND] on the right one.
- Wire polarity does matter (see drawing): The RED screw of the wind vane connects to +5V, the middle screw of the wind vane with an ANALOG position and the last screw of the wind vane to a GROUND position. Typical wire size: 2 x 0,25 mm^2 (shielded cables are recommended). If a shield exists connect it to the GROUND screw. Do not connect the shield to the wind vane.
- Be careful not to short-circuit the shield with any of the wind vane screws. Wrong connections my damage the wind vane!



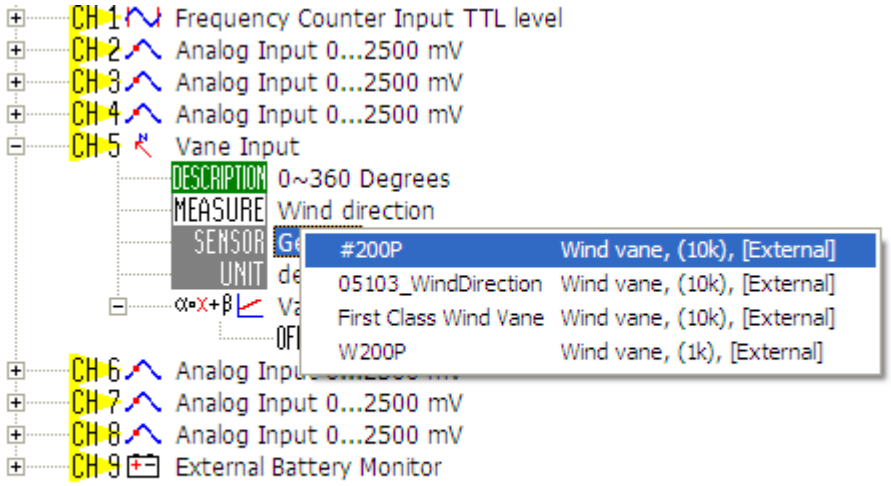
IN CASE IT DOESN'T WORK:

- Check that the wind vane rotates freely and that its axle is straight.
- With a multimeter check the resistance between the wind vane's most far-apart terminals. It must be about 10kΩ. (1kΩ for W200P)
- Rotate the wind vane and measure the resistance from the center screw to one of the other screws; it should change from 0Ω to about 10kΩ. (1kΩ for W200P)

SETUP:

Connect serially via Opton 4. (Connect the computer's COM port to the datalogger's PERIPHERAL port).
Before changing the setup select:
ACQ OFF.
After changing setup select: **ACQ ON**
to start acquisition (data logging).

- Click 'Read Inputs Setup' in the 'Setup' tab, in the 'Data logger online' bar on the left
- Open CH5's, CH6's or CH7's node.(the rest analog channels do not support wind vane measurement.)



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- Click the MEASURE line and select 'Wind Direction'.
- Click the SENSOR line and select '#200P', W200P', '05103_WindDirection' ή 'First Class Wind Vane'.
- The channel type (first line) is automatically updated, while the default Offset is 0.
- Change the Offset in retrospect, according to where you wish for the vane "zero" mark to be. For more details, see the note below.
- In order to save the changes, click 'Write Setup' in the 'Setup' tab, in the 'Data logger online' bar on the left. If you wish to change the setup of multiple channels, one 'Write Setup' in the end is enough.
- NOTE: Enter the vane offset for direction measurement in degrees (0~359).

For instance, if the vane "zero" mark is placed 30 east then you enter 30 as offset; if it is placed 30 West you enter 330 (=360-30) as offset.

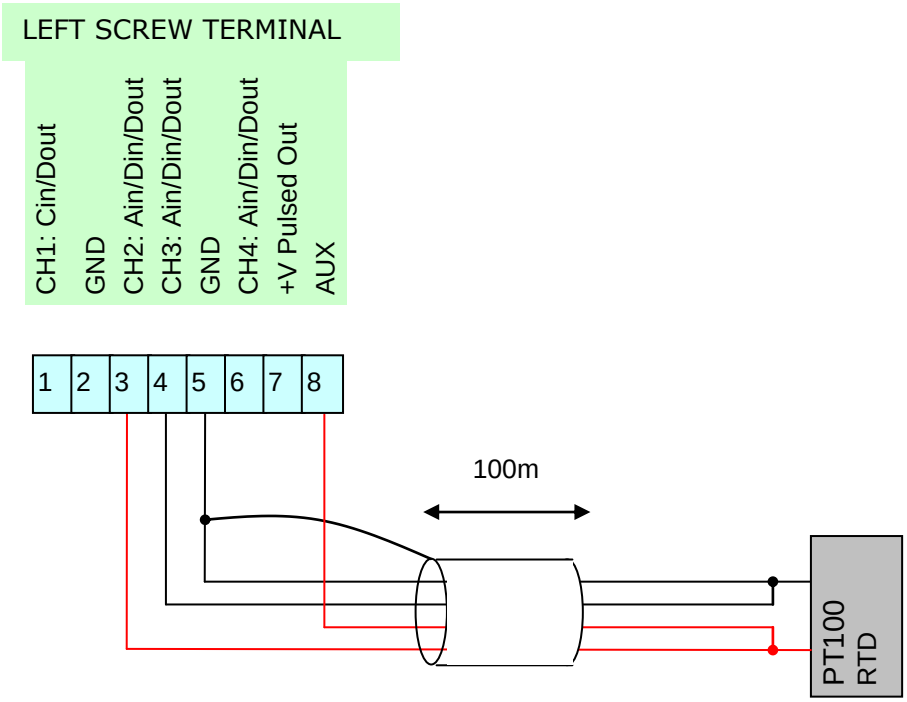
8. TEMPERATURE PT100: 4-wire, current excitation

Platinum sensors (RTD), 100Ω resistance at 0°C: VECTOR T351, etc.
Temperature range: −50°C ~ +55°C.

NOTE: Recommended connection for best accuracy. It uses the 0.5 mA current output (AUX). Suitable for long distances between sensor and data logger.

CONNECTION:

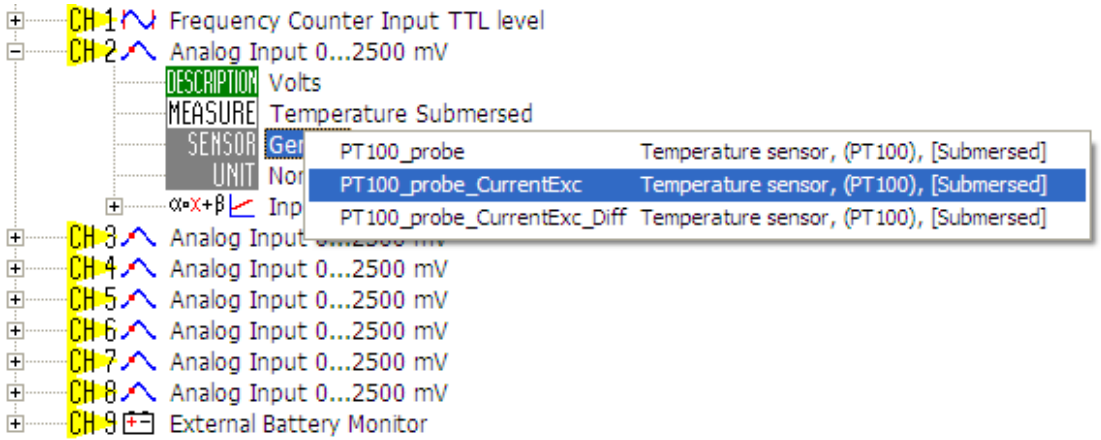
- Connect PT100's red wires to 3 [CH2] and 8 [AUX] of the left screw terminal.
- Connect PT100's red wires, along with the cable's shield, if there is one, to 5 [GND] of the left screw terminal.
- You can connect two or more PT100 this way, but to save wires, prefer the connection shown in the next page.
- Wire polarity is irrelevant. Typical wire size: 4 x 0,25 mm^2 (shielded cables are recommended). If a shield exists connect it to the GND screw.



SETUP:

Connect serially via Opton 4. (Connect the computer's COM port to the datalogger's PERIPHERAL port).
Before changing the setup select:
ACQ OFF.
After changing setup select: **ACQ ON**
to start acquisition (data logging).

- Click 'Read Inputs Setup' in the 'Setup' tab, in the 'Data logger online' bar on the left
- Open an analog channel's (CH2~ CH8) node.

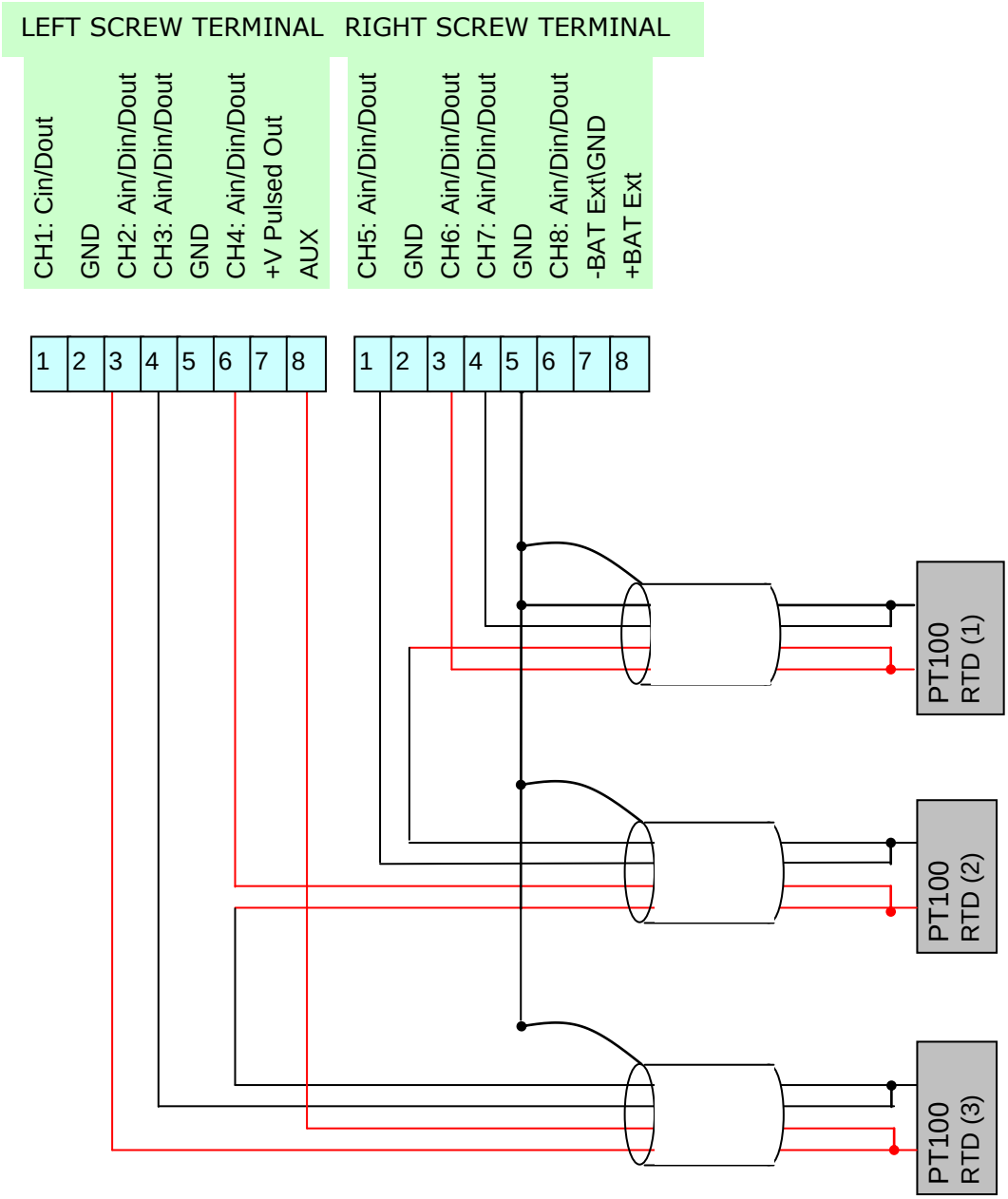


- Click the MEASURE line and select 'Temperature External' 'Temperature Internal', 'Temperature Submersed' or 'Temperature Surface', according to if the temperature measurement will be internal, external, etc.
- Each measurement type affords the corresponding current excitation PT100 sensor. Eg, if you have selected 'Temperature Submersed' before, click the SENSOR line and select 'PT100_probe_CurrentExc'. For this connection, select one combination from the ones in the table below.
- The channel type (first line), along with the Slope, Offset are automatically updated.
- You can also change the units by clicking the UNITS line. The Slope and Offset are automatically updated again.
- In order to save the changes, click 'Write Setup' in the 'Setup' tab, in the 'Data logger online' bar on the left. If you wish to change the setup of multiple channels, one 'Write Setup' in the end is enough.

MEASURE	SENSOR
Temperature External	Thermos_PT100_CurrentExc OR Thermos_PT1000_CurrentExc, OR Thygro_Temperature Sensor(PT1000)_CurrentExc, etc
Temperature Internal	PT100_ element _CurrentExc
Temperature Submersed	PT100_probe_CurrentExc
Temperature Surface	PT100_patch_CurrentExc

CONNECTING 2 or 3 PT100 SENSORS.

In case of connection of 2 or 3 PT-100s, 2 or 3 channel pairs can be used, as differential inputs, as you can see in the figure below.



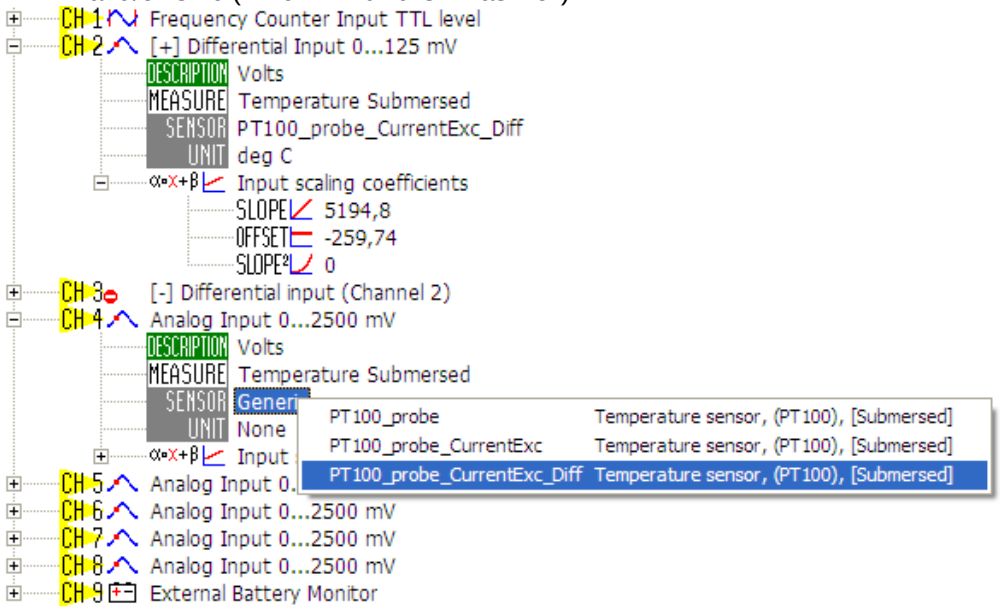
IN CASE IT DOESN'T WORK:

- With the sensor disconnected from the logger, use a multimeter to check the resistance between the sensor's terminals. At ambient temperature (23°C) it should be about 110Ω.

SETUP:

Connect serially via Opton 4. (Connect the computer's COM port to the datalogger's PERIPHERAL port).
Before changing the setup select:
ACQ OFF.
After changing setup select: **ACQ ON**
to start acquisition (data logging).

- Click 'Read Inputs Setup' in the 'Setup' tab, in the 'Data logger online' bar on the left
- Open nodes: CH2 (which will bind CH3 as well), CH4 (which will bind CH5 as well), and/or CH6 (which will bind CH7 as well).



- Click the MEASURE line and select 'Temperature External' 'Temperature Internal', 'Temperature Submersed' or 'Temperature Surface', according to if the temperature measurement will be internal, external, etc.
- Each measurement type affords the corresponding current excitation PT100 sensor, in a differential input setup. Eg, if you have selected 'Temperature Submersed' before, click the SENSOR line and select 'PT100_probe_CurrentExc_Diff'. For this connection, select one combination from the ones in the table below.
- The channel type (first line), along with the Slope, Offset are automatically updated.
- You can also change the units by clicking the UNITS line. The Slope and Offset are automatically updated again.
- In order to save the changes, click 'Write Setup' in the 'Setup' tab, in the 'Data logger online' bar on the left. If you wish to change the setup of multiple channels, one 'Write Setup' in the end is enough.

MEASURE	SENSOR
Temperature External	Thermos_PT100_CurrentExc_Diff OR Thermos_PT1000_CurrentExc_Diff, OR Thygro_Temperature Sensor(PT1000)_CurrentExc_Diff, etc
Temperature Internal	PT100_ element _CurrentExc_Diff
Temperature Submersed	PT100_probe_CurrentExc
Temperature Surface	PT100_patch_CurrentExc_Diff

9. TEMPERATURE PT100: 2-wire,voltage excitation

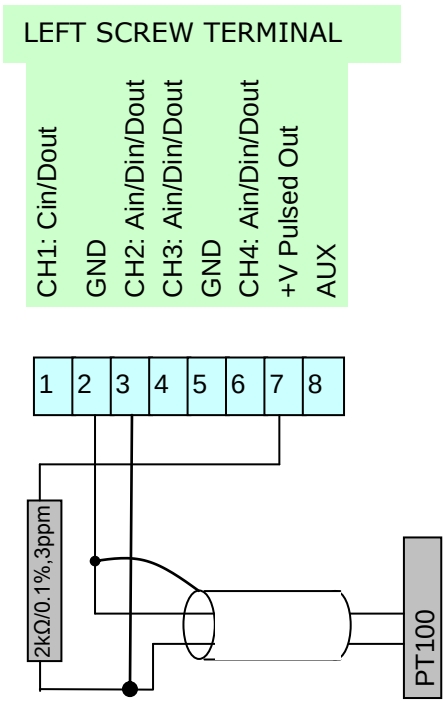
Platinum sensors (RTD), 100Ω resistance at 0°C: VECTOR T351, etc.
Temperature range: –50°C ~ +55°C.
NOTE: Simplest connection with minimum number of wires. Suitable for short distances between sensor and data logger. Long wires must be proportionally thicker.

CONNECTION:

- Use a voltage analog input and a voltage output.
- Connect the first PT100 sensor and a 2kΩ / 0.1%, 3ppm resistor, to screws 7 [+V Pulsed Out], 3 [CH2] and 2 [GND] on the left screw terminal (see drawing).
- Connect the second PT100 sensor and a 2kΩ / 0.1%, 3ppm resistor, to screws 7 [+V Pulsed Out], 4 [CH3] και 5 [GND] on the left screw terminal, etc.
- If a **PT1000** sensor is used replace the external resistor with a 20 kΩ, 0.1%, 3ppm type. Wire sizes in the following table can then be reduced to one tenth (1/10) or cables can be up to 10 times longer.
- Wire polarity is irrelevant. Wire size according to connection distance (shielded cables are recommended):

CABLE LENGTH meters	WIRE SIZE mm^2 (PT100)
Up to 1	2x0,35
Up to 2	2x0,50
Up to 3	2x0,75
Up to 4	2x1
Up to 5	2x1,5
Up to 10	2x2,5
Up to 20	2x4

If a shield exists connect it to the GND screw. Do not connect the shield to the PT100 sensor.



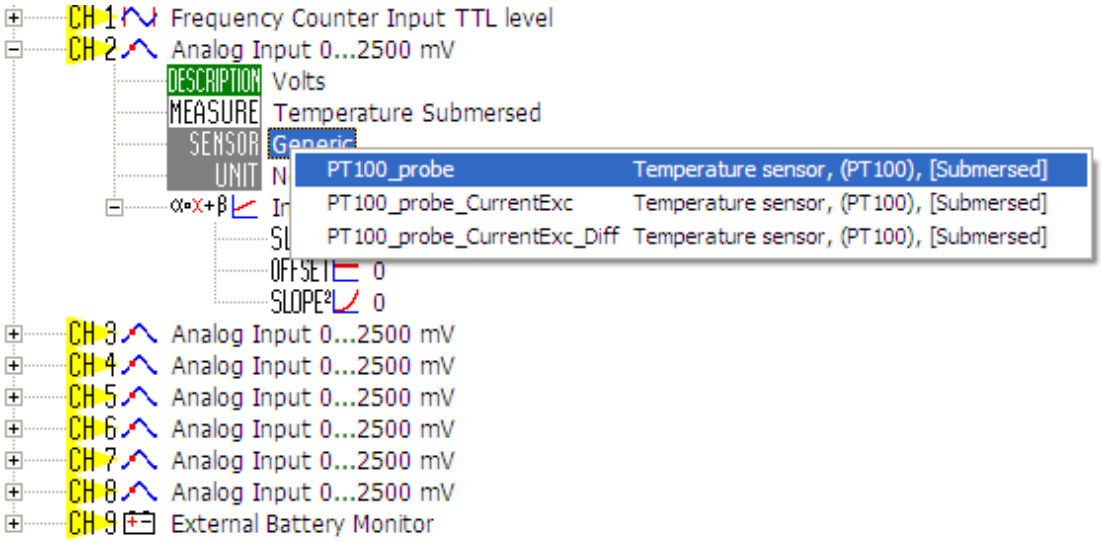
IN CASE IT DOESN'T WORK:

- The data logger should be in 'ENERGY SAVE' mode. Otherwise, the sensor will heat-up and measure a little higher than correct.
- With the sensor disconnected from the logger, use a multimeter to check the resistance between the sensor's terminals. At ambient temperature (23°C) it should be about 110Ω.

SETUP:

Connect serially via Opton 4. (Connect the computer's COM port to the datalogger's PERIPHERAL port).
Before changing the setup select:
ACQ OFF.
After changing setup select: **ACQ ON**
to start acquisition (data logging).

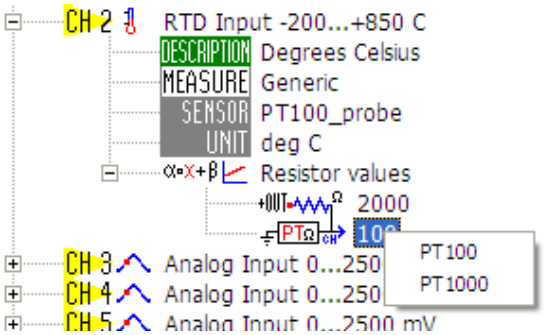
- Click 'Read Inputs Setup' in the 'Setup' tab, in the 'Data logger online' bar on the left
- Open an analog channel's node (e.g. CH2).



- Click the MEASURE line and select 'Temperature External' 'Temperature Internal', 'Temperature Submersed' or 'Temperature Surface', according to if the temperature measurement will be internal, external, etc.
- Each measurement type affords the corresponding voltage excitation PT100 sensor. Eg, if you have selected 'Temperature Submersed' before, click the SENSOR line and select 'PT100_probe'. For this connection, select one combination from the ones in the table below.

MEASURE	SENSOR
Temperature External	Thermos_PT100 OR Thermos_PT1000, OR Thygro_Temperature Sensor(PT1000), etc
Temperature Internal	PT100_ element
Temperature Submersed	PT100_probe
Temperature Surface	PT100_patch

- The channel type (first line), along with the thermometer's type (PT100) and the input's gain (by default the measurement is full scale (-200…850 °C) **)** are automatically updated.
- In this case, you cannot change the units (only °C is available). However, you can change the gain by clicking on the channel's first line and select 'RTD Temperature' and then a different gain. You can also select PT1000 instead of PT100, by clicking the last line of the channel (see the figure below).



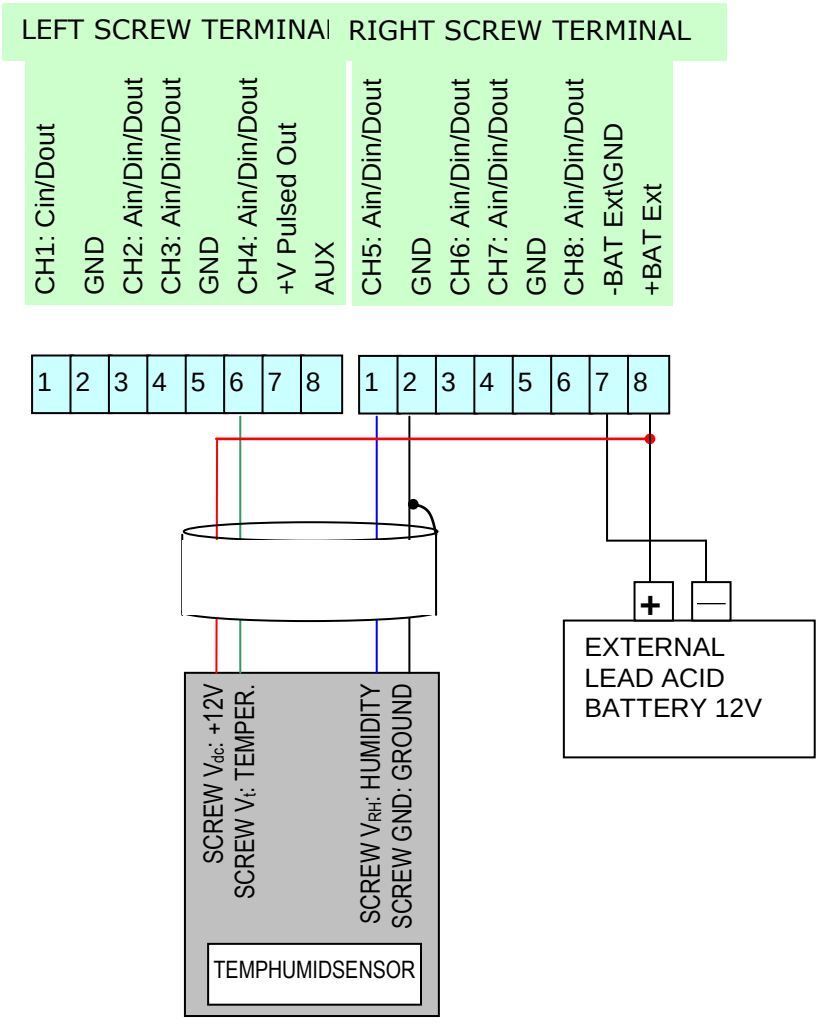
- In order to save the changes, click ‘Write Setup’ in the ‘Setup’ tab, in the ‘Data logger online’ bar on the left. If you wish to change the setup of multiple channels, one ‘Write Setup’ in the end is enough.

10. TEMPERATURE-HUMIDITY (Various)

Symmetron Thermos, Symmetron Thygro2 (sensor output: 0~1V), DeltaOhm 9009TR, Ammonit P6312, Vaisala HMP50 (sensor output: 0~1V).
See wire color table below for sensor connection.

CONNECTION:

- Connect the first sensor to screws 3 [CH2], 4 [CH3] and 5 [GND] on the left screw terminal.
- Connect the second sensor to screws 6 [CH4] on the left screw terminal, and 1 [CH5] και 2 [GND] on the right screw terminal.
- Connect the third sensor to screws 3 [CH6], 4 [CH7] and 5 [GND] on the right screw terminal
- Wire polarity does matter (see drawing): The sensor connects to an external +7V ~ +30VDC power source (typically a 12V lead-acid battery). The sensor GND together with the cable shield connects to a logger GND position. Typical wire size: 4 x 0,25 mm^2 (shielded cables are recommended).



IN CASE IT DOESN'T WORK:

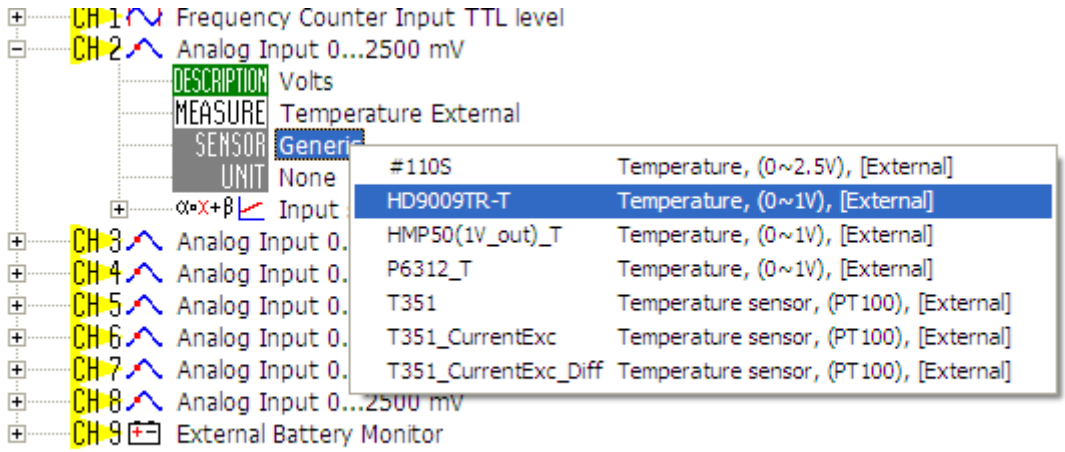
- Connect the sensor to the battery.
- With a multimeter check the voltage between TEMPERATURE and GROUND: At ambient temperature 20 °C it should be about 0.5V.
- With a multimeter check the voltage between HUMIDITY and GROUND: At an ambient humidity 70% it should be about 0.7V.

SENSOR	MANUFA-CTURER	Wire at [+BAT Ext] pin (12V)	Temperature sensor wire at ANALOG pin (eg [CH2])	Humidity sensor wire at ANALOG pin (eg [CH3])	Wire at [GND] pin
Thermos	Symmetron	Red	White	-	Black
Thygro2	Symmetron	Red	Green or Yellow	Blue	Black
HD9009TR	DeltaOhm	Red	Green	Blue	Black
P6312	Ammonit	Green	Black	Brown	Yellow
HMP50	Vaisala	Brown	Black	White	Blue

SETUP:

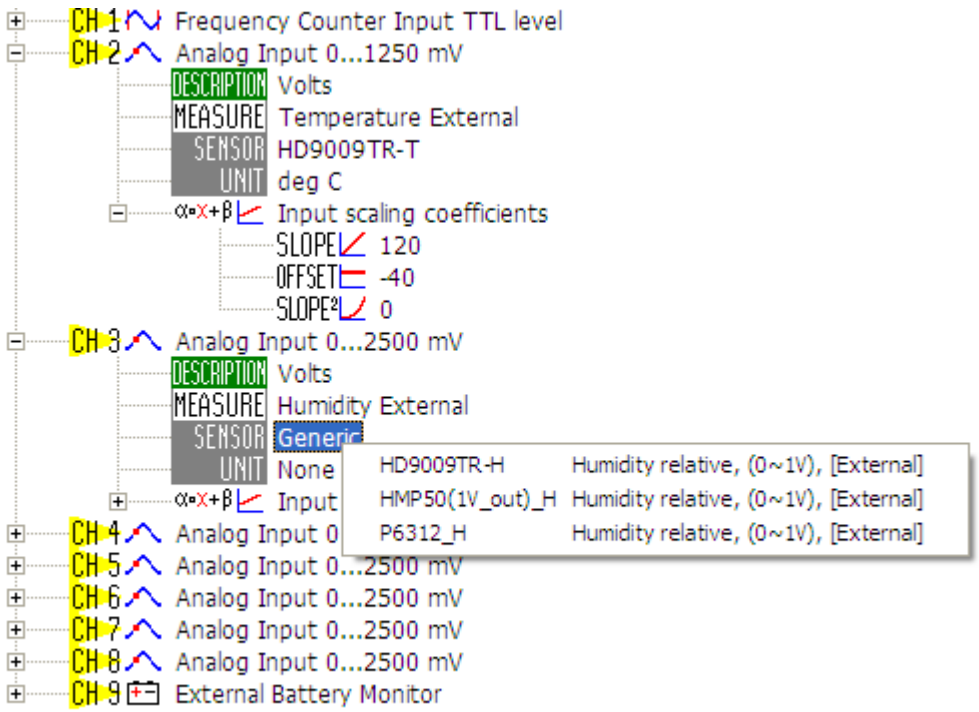
Connect serially via Opton 4. (Connect the computer's COM port to the datalogger's PERIPHERAL port).
Before changing the setup select:
ACQ OFF.
After changing setup select: **ACQ ON**
to start acquisition (data logging).

- Click 'Read Inputs Setup' in the 'Setup' tab, in the 'Data logger online' bar on the left
- For the **temperature** sensor, open an analog channel's node eg CH2.



- Click the MEASURE line and select 'Temperature External'.
- Click the SENSOR line and select 'HD9009TR'_T', 'P6312_T' or 'HMP50(1V_out)_T'.
- The channel type (first line), along with the Slope, Offset are automatically updated.
- You can also change the units by clicking the UNITS line. The Slope and Offset are automatically updated again.
- NOTE: For calibrated sensors, you can enter the correct SLOPE και OFFSET values in retrospect.

- For the **humidity** sensor, open an analog channel's node eg CH3.



- Click the MEASURE line and select 'Humidity External'.
- Click the SENSOR line and select 'HD9009TR'_H', 'P6312_H' or'HMP50(1V_out)_H'.
- The channel type (first line), along with the Slope, Offset are automatically updated.

- In order to save the changes, click 'Write Setup' in the 'Setup' tab, in the 'Data logger online' bar on the left. If you wish to change the setup of multiple channels, one 'Write Setup' in the end is enough.

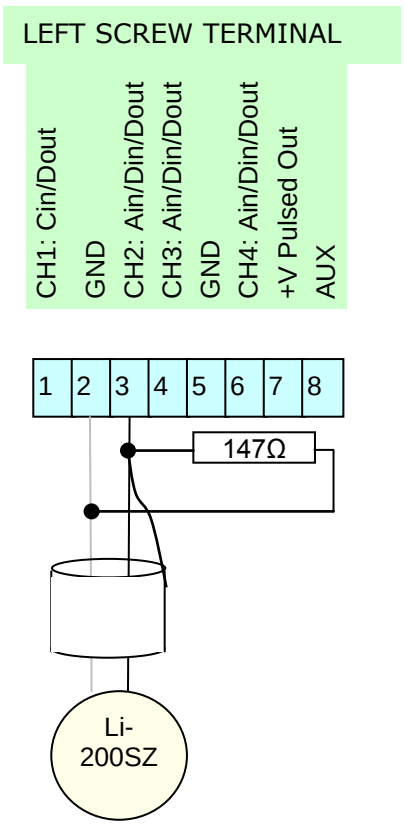
- NOTE: For calibrated sensors, you can enter the correct SLOPE και OFFSET values in retrospect.

11. PYRANOMETER LiCor LI-200SZ

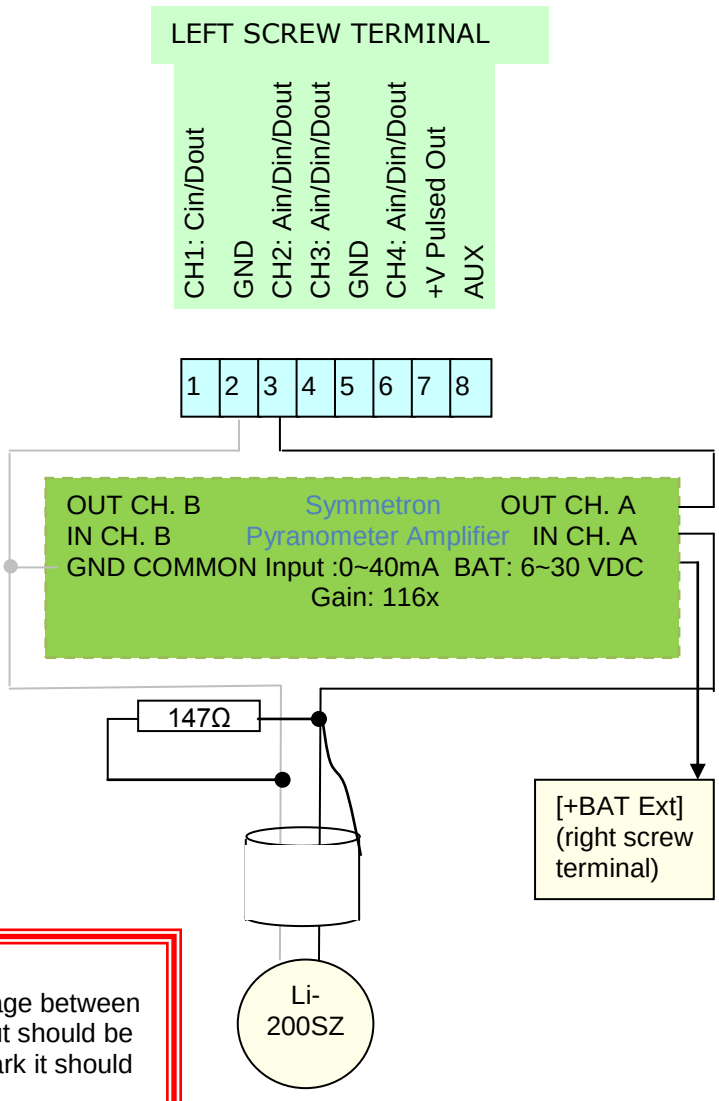
CONNECTION:

- Connect a 147-Ohm, 0.1% resistor to terminals 8 [ANALOG3] and 9 [GROUND] in the right-hand terminal block, i.e. terminate A3 for correct current-to-voltage conversion.
- Connect the sensor to terminals 3 [CH2] and 2 [GND] of the left screw terminal.
- You can interfere a low-noise voltage amplifier (see connection on the right), with amplification factor 116, so that the output signal (on the ends of the resistor) is amplified from a few mV to a full-scale signal of 2.5V. The amplifier can amplify the output signal of up to 2 pyranometers.
- Wire polarity does matter (see drawing): The clear wire of the sensor connects to screw 3 [GND]. The pyranometer's shield wire together with the cable's shield is connected to [CH2].
- Typical wire size: 2 x 0,25 mm^2 (shielded cables are recommended).

WITHOUT AMPLIFIER



WITH AMPLIFIER



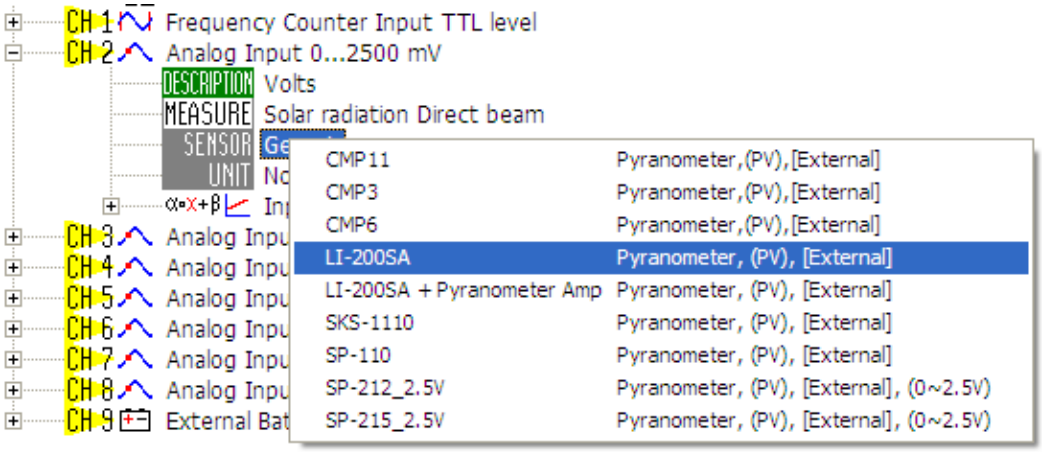
IN CASE IT DOESN'T WORK:

- With a multimeter check the voltage between screws 8 and 9: the sensor output should be about 12mV/1000W/m^2. In the dark it should display less than 1W.

SETUP:

Connect serially via Opton 4. (Connect the computer's COM port to the datalogger's PERIPHERAL port).
Before changing the setup select:
ACQ OFF.
After changing setup select: **ACQ ON**
to start acquisition (data logging).

- Click 'Read Inputs Setup' in the 'Setup' tab, in the 'Data logger online' bar on the left.
- Open an analog channel's node, eg CH2.



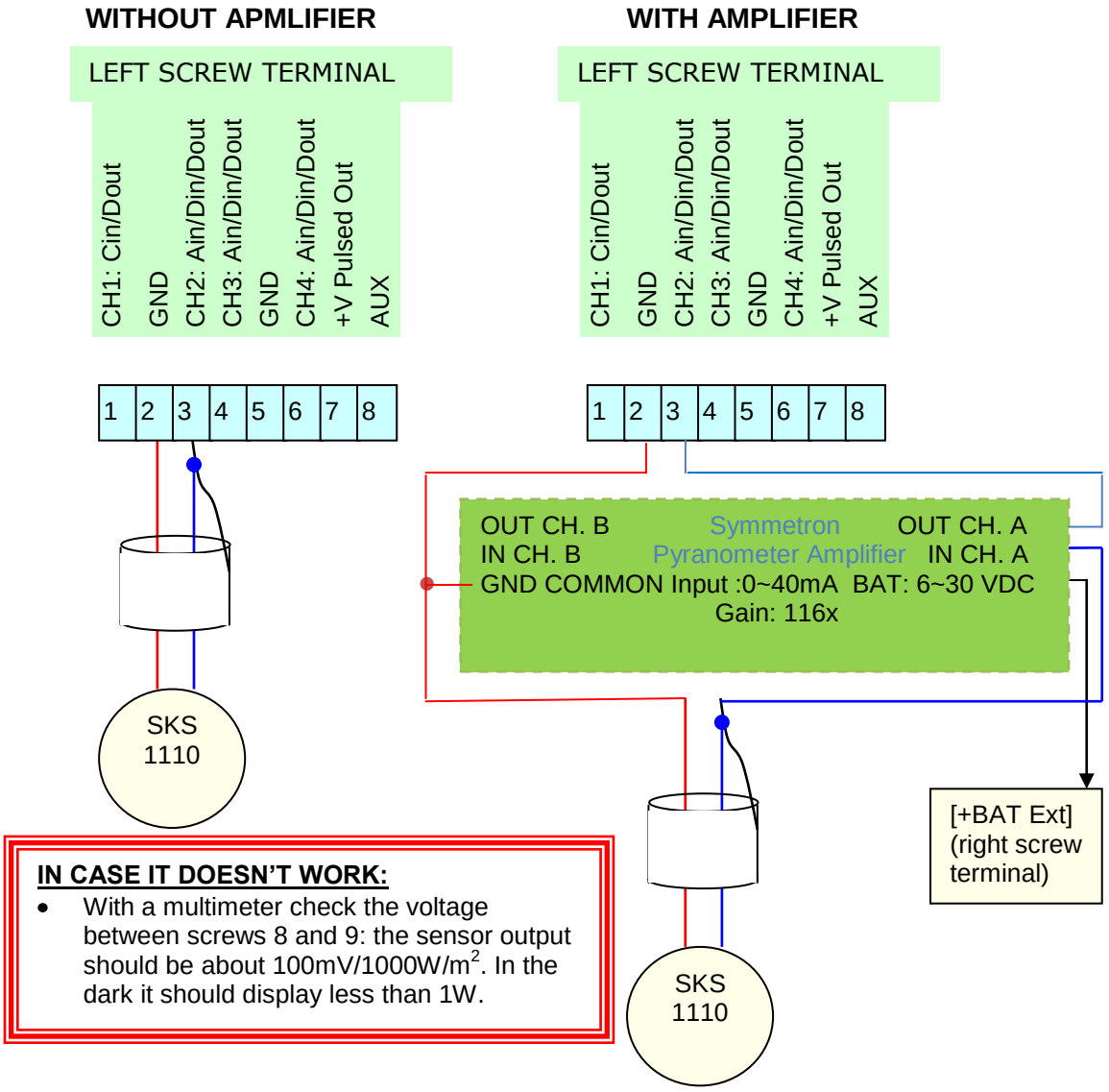
- Click the MEASURE line and select 'Solar Radiation Direct beam', 'Solar Radiation Global' or ' Solar Radiation Diffused', according to the type of solar radiation you are measuring.
- Click the SENSOR line and select 'LI-200SZ', if you are using the sensor without an amplifier or 'LI-200SZ+Pyranometer Amp', if you are using it with an amplifier.
- The channel type (first line), along with the Slope, Offset are automatically updated.
- You can also change the units by clicking the UNITS line. The Slope and Offset are automatically updated again.
- In order to save the changes, click 'Write Setup' in the 'Setup' tab, in the 'Data logger online' bar on the left. If you wish to change the setup of multiple channels, one 'Write Setup' in the end is enough.

- NOTE: For calibrated sensors, you can enter the correct SLOPE και OFFSET values in retrospect.

12. PYRANOMETER SKYE SKS-1110

CONNECTION:

- Connect the sensor to terminals 3 [CH2] and 2 [GND] in the right-hand terminal block.
- Remove the connector (if any) from the wire end. Wire polarity does matter (see drawing): The red wire of the sensor connect to [GND]. The shield together with the blue wire is connected to [ANALOG].
- Similarly to the LI-200SZ pyranometer (previous chapter), you can interfere a low-noise voltage amplifier (see connection on the right).
- Typical wire size: 2 x 0,25 mm^2 (shielded cables are recommended).



IN CASE IT DOESN'T WORK:

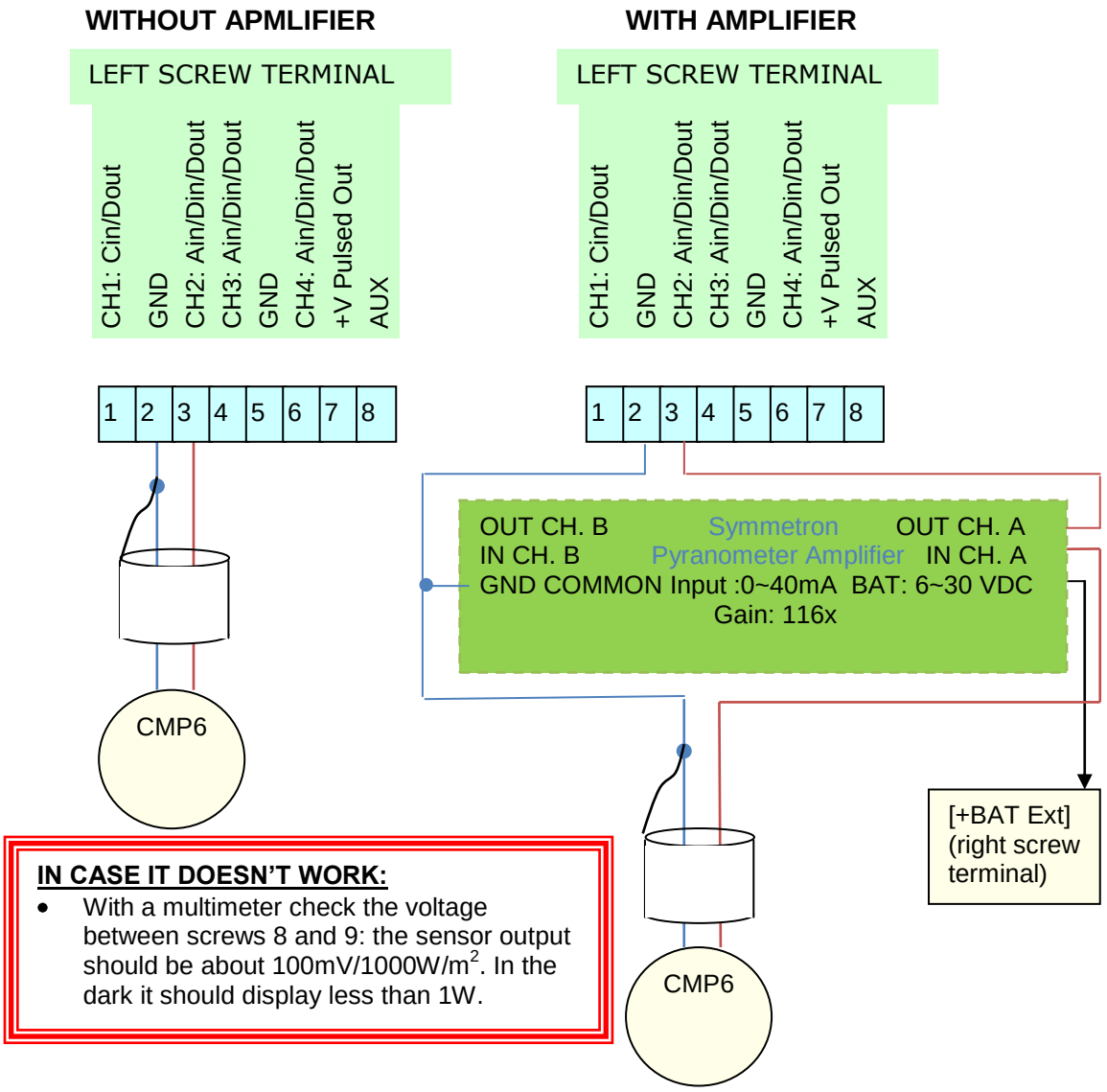
- With a multimeter check the voltage between screws 8 and 9: the sensor output should be about 100mV/1000W/m^2. In the dark it should display less than 1W.

SETUP:

Similarly to the previous chapter's sensor. The only difference is that in the SENSOR line, select 'SKS-1110' or 'SKS-1110+Pyranometer Amp'.

13. CONNECTION AND SETUP OF OTHER USED PYRANOMETERS

CONNECTION:



SETUP :

SELECTION IN THE 'MEASURE' LINE	SELECTION IN THE 'SENSOR' LINE	MANUFACTURER	Wire at +BAT Ext pin	Wire at ANALOG pin (eg [CH2])	Wire at [GND] pin
'Solar Radiation Global' ή 'Solar Radiation Diffused' ή 'Solar Radiation Direct beam'	CMP3	Kipp & Zonen	-	Red or White	Blue or Black +Shield
	CMP6	Kipp & Zonen	-	Red	Blue +Shield
	CMP11	Kipp & Zonen	-	Red	Blue +Shield
	SP-110	Apogee	-	Red	Black+ White
	SP-212	Apogee	White	Green	Clear
	SP-215	Apogee	White	Green	Clear

NOTES:

- The first three sensors can be used with an amplifier, as well, as you can see in the diagram above.
- The SP-110 does not require a signal amplification, because its output signal is of around a few hundred mV. Therefore, do not use the connection on the right.
- The SP-212 and SP-215 are amplified pyranometers, so that they can output a 0~2.5V or a 0~5V signal, therefore they need power supply (5~24V)
- The Slope, Offset are automatically updated, but for calibrated sensors, you can change them in retrospect.

14. OTHER USED ANALOG SENSORS

CONNECTION AND SETUP:

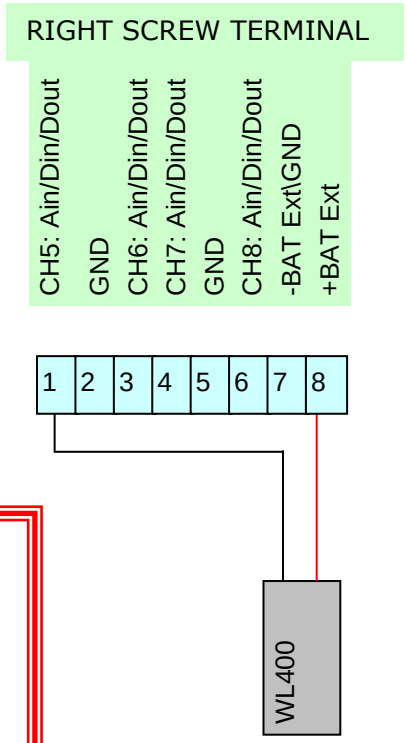
SELECTION IN THE 'MEASURE' LINE	SELECTION IN THE 'SENSOR' LINE	MANUFA-CTURER	[+BAT Ext]	Analog pin (eg [CH2])	[GND]
Humidity External	YGRO	SYMMETRON	Red Wire	White Wire	Black Wire
Humidity External	THYGRO (humidity sensor)	SYMMETRON	Red Wire	White Wire	Black Wire
Temperature External	110S	NRG	Red Wire	White Wire	Black Wire
Barometric Pressure External	BARON	SYMMETRON	Red Wire	White Wire	Black Wire
Barometric Pressure External	PTB100A/PTB100B/ PTB101B/PTB101C	Vaisala	SUPPLY pin	VOUT pin	GND + AGND pins
Barometric Pressure External	PTB2102/PTB2103	Vaisala	Pink Wire	White Wire	Blue + Brown Wire
Barometric Pressure External	CS105	Vaisala	Red Wire@ SUPPLY pin	Blue Wire @VOUT pin	Black Wire @GND pin + Yellow Wire @AGND pin

15. 4~20mA TRANSMITTERS

Depth sensors: Global Water's WL400, WL450, etc.
PH sensors: Global Water's WQ201, etc .

CONNECTION:

- Connect the first sensor to screws 8 [+BAT Ext] on the right screw terminal and 3 [CH2] on the left screw terminal.
- Connect the second sensor to screws 8 [+BAT Ext] on the right screw terminal and 4 [CH3] on the left screw terminal, etc.
- Wire polarity does matter (see drawing): For the WL450 depth sensor, the red wire of the sensor connects to screw 8 [+BAT Ext] on the right screw terminal. The black wire of the sensor connects to an analog channel only.
- For connection of other sensors (depth sensors and pH sensors), and their setup, see the table below.
- ATTENTION: Always connect the sensors without external power supply.



IN CASE IT DOESN'T WORK:

- Make sure that the ANALOG input is configured as current and that the +VA PULSED output is setup for 12V or 18V.
- With the sensor connected to the logger, select from the main menu: SETUP>MODE>CONTINUOUS>[ENTER]
- With a multimeter check the current in series with one of the sensor's wires: it should be 4mA or greater.

SETUP:

Connect serially via Opton 4. (Connect the computer's COM port to the datalogger's PERIPHERAL port).
Before changing the setup select:
ACQ OFF.
After changing setup select: **ACQ ON**
to start acquisition (data logging).

SELECTION IN THE 'MEASURE' LINE	SELECTION IN THE 'SENSOR' LINE	MANUFA-CTURER	Wire @ [+BAT Ext]	Wire @ analog pin (eg [CH2])	Wire @ [GND] pin
PH	WQ201	Global Water	Red	White	Black
Water Depth	WL400	Global Water	Red	Black	-
Water Depth	WL450	Global Water	Black	White	-

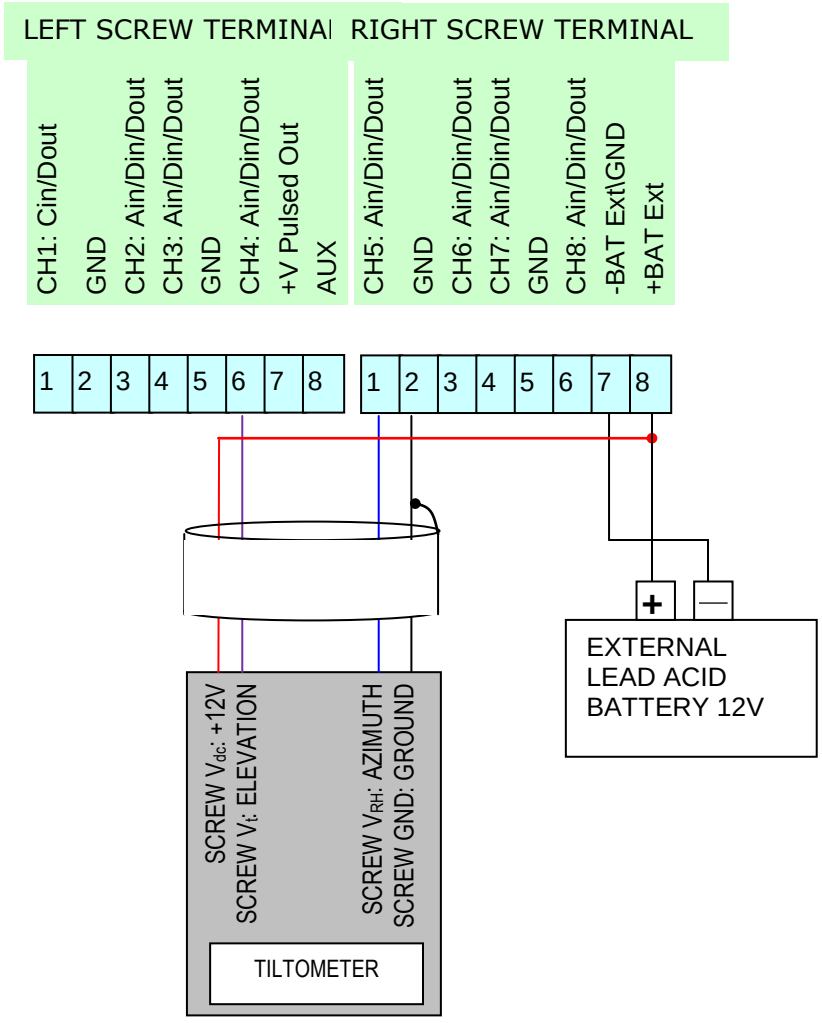
- In order to save the changes, click 'Write Setup' in the 'Setup' tab, in the 'Data logger online' bar on the left. If you wish to change the setup of multiple channels, one 'Write Setup' in the end is enough.

- NOTE: For calibrated sensors, you can enter the correct SLOPE και OFFSET values in retrospect.

16. SYMMETRON TILTOMETER

CONNECTION:

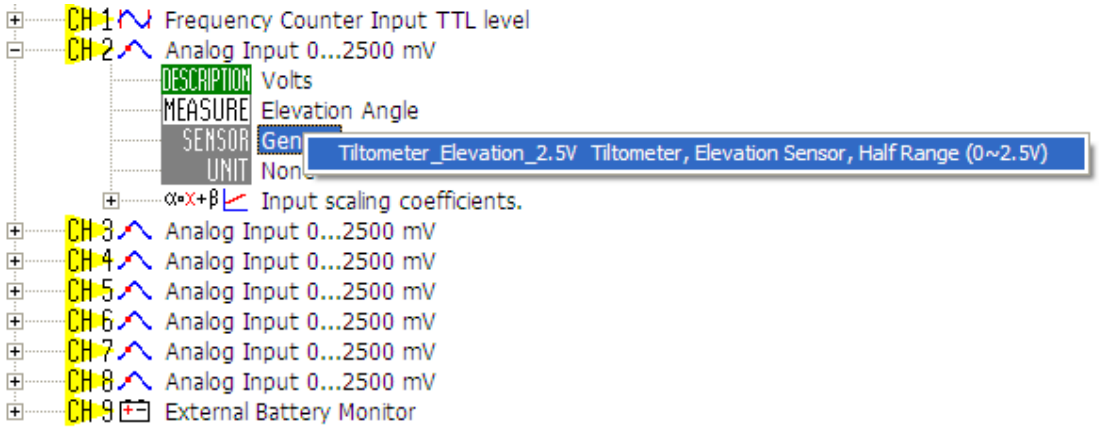
- Connect the first sensor to screws 3 [CH2], 4 [CH3] and 5 [GND] on the left screw terminal.
- Connect the second sensor to screws 6 [CH4] on the left screw terminal, 1 [CH5] και 2 [GND] on the right screw terminal.
- Connect the third sensor to screws 3 [CH6], 4 [CH7] and 5 [GND] on the right screw terminal.
- If you have only one input free, connect just the Elevation.
- Wire polarity does matter (see drawing): The Tiltometer connects to an external +6V ~ +15VDC power source (typically a 12V lead-acid battery). The sensor GROUND together with the cable shield connects to a logger GROUND position. Typical wire size: 4 x 0,25 mm^2 (shielded cables are recommended).



SETUP:

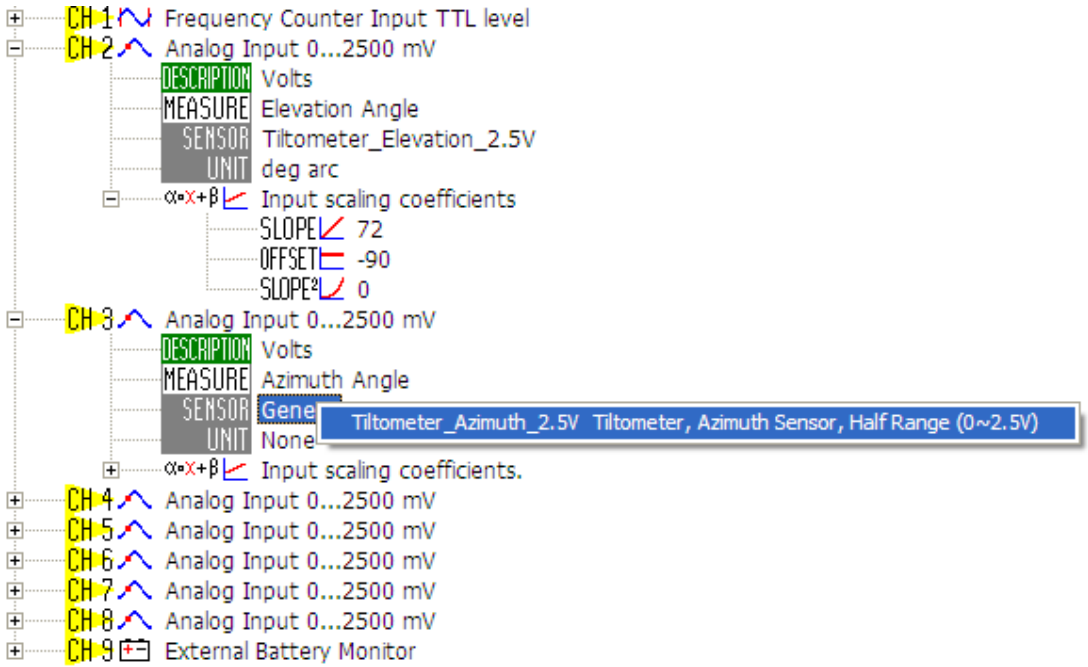
Connect serially via Opton 4. (Connect the computer's COM port to the datalogger's PERIPHERAL port).
Before changing the setup select:
ACQ OFF.
After changing setup select: **ACQ ON**
to start acquisition (data logging).

- Click 'Read Inputs Setup' in the 'Setup' tab, in the 'Data logger online' bar on the left
- For the **elevation** sensor, open an analog channel's node eg CH2.



- Click the MEASURE line and select ''Elevation Angle'.
- Click the SENSOR line and select 'Tiltometer_Elevation_2.5V'.
- The channel type (first line), along with the Slope, Offset are automatically updated.

- For the **azimuth** sensor, open an analog channel's node eg CH3.



- Click the MEASURE line and select 'Azimuth Angle'.
- Click the SENSOR line and select 'Tiltometer_Azimuth_2.5V'.
- The channel type (first line), along with the Slope, Offset are automatically updated.

- In order to save the changes, click 'Write Setup' in the 'Setup' tab, in the 'Data logger online' bar on the left. If you wish to change the setup of multiple channels, one 'Write Setup' in the end is enough.

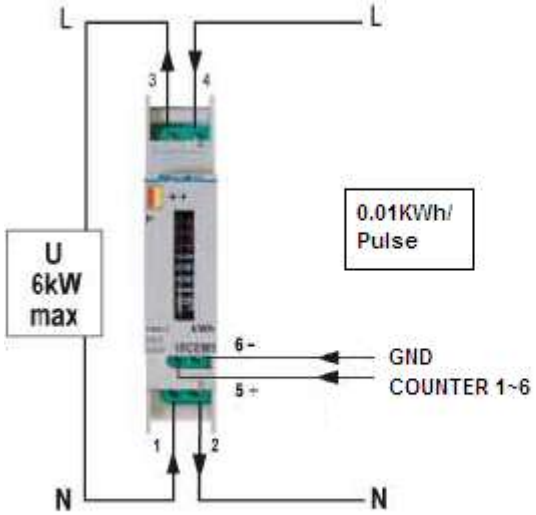
17. OPEN COLLECTOR SENSORS (ENERGY METERS)

1-Phase Energy meters: Revalco's 1RCEM1, 1RCEM2, 1RCEM263, etc.
3-Phase Energy meters: ABB's ODIN4165, Revalco's 1RCETM63, etc.

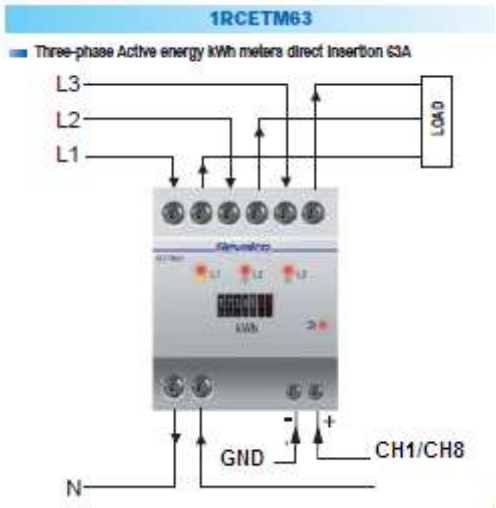
CONNECTION:

- Connect the first sensor's open collector output to screws 1 [CH1] (+) and 2 [GND] (-) on the left screw terminal.
- Connect the second sensor's open collector output to screws 6 [CH8] (+) and 5 [GND] (-) on the right screw terminal.
- Wire polarity does matter. See the diagrams on the side of each sensor. Below, you can see connection examples of a 1-phase sensor and a 3-phase one.

1-PHASE EXAMPLE (1RCEM1)



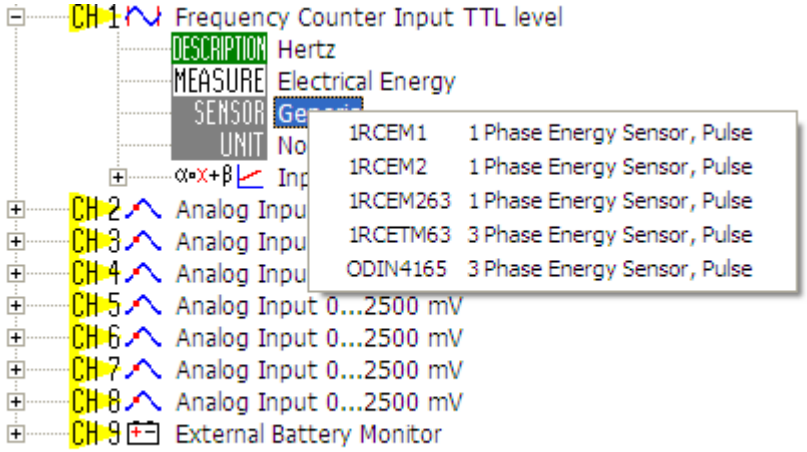
3-PHASE EXAMPLE (1RCETM63)



SETUP:

Connect serially via Opton 4. (Connect the computer's COM port to the datalogger's PERIPHERAL port).
Before changing the setup select:
ACQ OFF.
After changing setup select: **ACQ ON**
to start acquisition (data logging).

- Click ‘Read Inputs Setup’ in the ‘Setup’ tab, in the ‘Data logger online’ bar on the left.
- Open CH1’s or CH8’s node.



- Click the MEASURE line and select ‘Electrical Energy’.
- Click the SENSOR line and select a 1-phase sensor a 3-phase sensor.
- The channel type (first line), along with the Slope, Offset are automatically updated.
- You can also change the units by clicking the UNITS line. The Slope and Offset are automatically updated again.
- In order to save the changes, click ‘Write Setup’ in the ‘Setup’ tab, in the ‘Data logger online’ bar on the left. If you wish to change the setup of multiple channels, one ‘Write Setup’ in the end is enough.

18. VOLTAGE AND CURRENT SENSORS

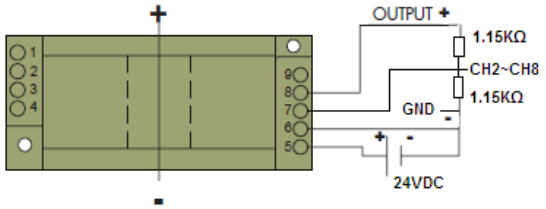
AC Voltage sensors: CR Magnetics’ CR4510, CR4520 series
DC Voltage sensors: CR Magnetics’ CR5310, CR5320 series

AC Current sensors: CR Magnetics' CR4110, CR4120 series
DC Current sensors: CR Magnetics' CR5210, CR5220 series

CONNECTION:

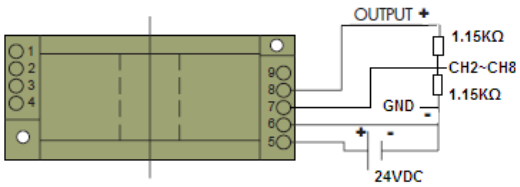
- All sensors are available in 0~±5V output (CR4510, CR5310, CR4110(s), CR5210(s)) or 4~20mA output (CR4520, CR5320, CR4120(s), CR5220(s)).
- The negative voltage output is produced only by DC Voltage and Current sensors (CR5310 and CR5210(s)), which is not readable and recordable by Stylitis-10.
- Therefore, the wire polarity does matter, when using these sensors. For DC current sensors (CR5210(s)), the current must flow from the (+) to the (-) end of the sensor. For DC Voltage sensors (CR5310), connect the (+) end to pin 1 and the (-) end to pin 3. (see the corresponding figures below).
- Given that, all sensors above will have a 0~5VDC output. However, this output must be converted to 0~2.5V (suitable for Stylitis-10) via an external voltage divider. Suggested value for the divider's resistors is 1.15KΩ.
- Connect the divider's output to an analog channel (CH2~CH8). You do not need to connect it to pin 7 as well, but it helps to screw all the wires together. Pin 7 is void (it is not connected to the sensor's circuit).
- The 's' at the end of the prefix of a current sensor indicates split core design, while the suffix indicates the input range. For instance, the 'CR5210s-100' is a DC current sensor, with split core design, with an input of 0~100ADC and an output of 0~5VDC.

DC Current sensor(0~2.5V out)



CR5210
0~±5VDC Output converted to 0~±2.5VDC

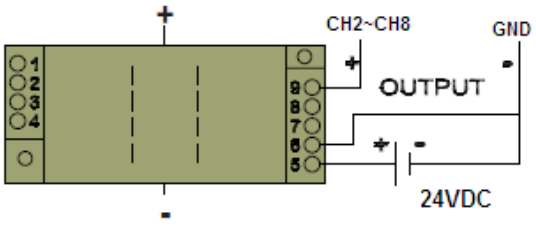
AC Current sensor (0~2.5V out)



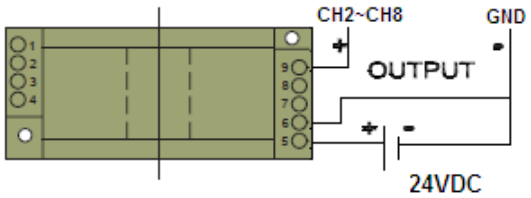
CR4110
0~ 5VDC Output converted to 0~ 2.5VDC

DC Current sensor(4~20mA out)

AC Current sensor (4~20mA out)

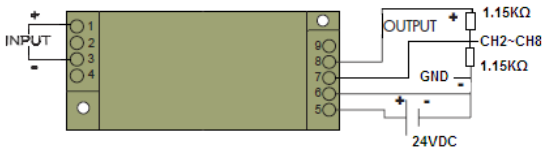


CR5220
4 - 20 mADC Output



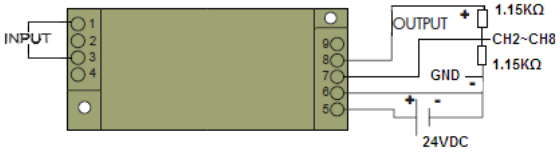
CR4120 One Element 4 - 20 mADC Output

DC Voltage sensor (0~2.5V out)



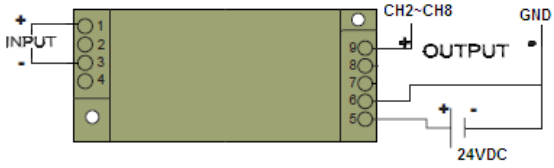
CR5310
0~±5VDC Output converted to 0~±2.5VDC

AC Voltage sensor (0~2.5V out)



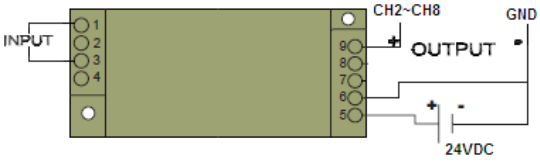
CR4510
0~ 5VDC Output converted to 0~ 2.5VDC

DC Voltage sensor (4~20mA out)



CR5320
4 - 20 mADC Output

AC Voltage sensor (4~20mA out)

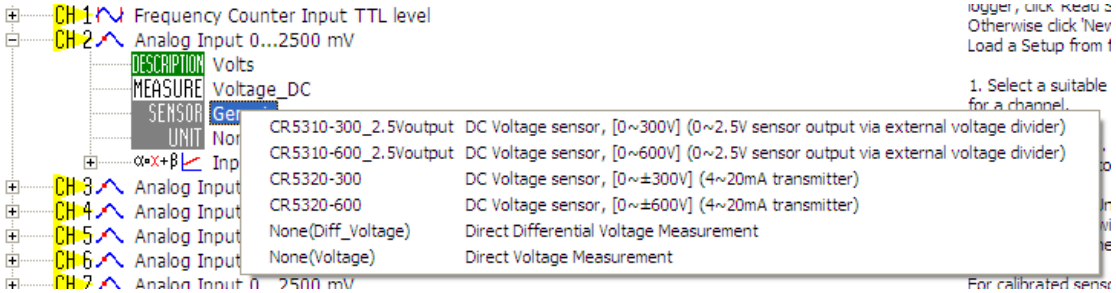


CR4520
4 - 20 mADC Output

SETUP:

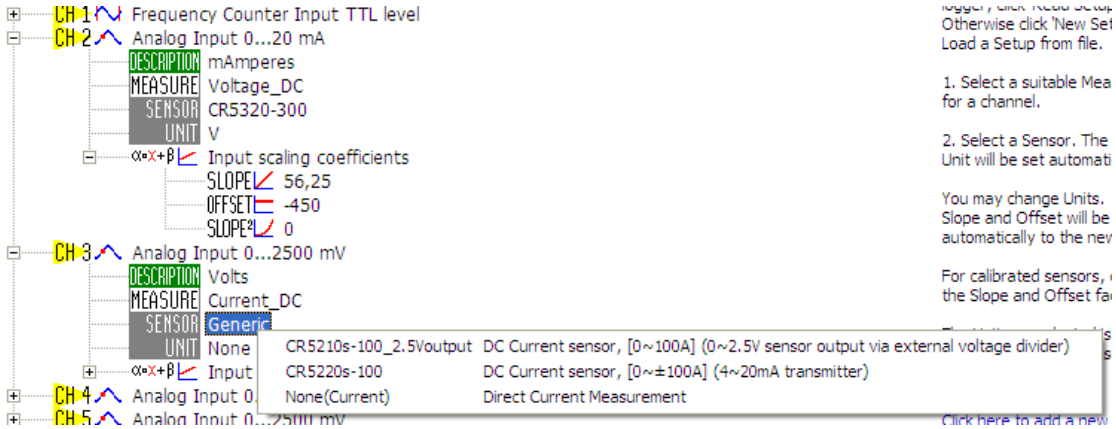
Connect serially via Opton 4. (Connect the computer's COM port to the datalogger's PERIPHERAL port).
Before changing the setup select:
ACQ OFF.
After changing setup select: **ACQ ON**
to start acquisition (data logging).

- Click ‘Read Inputs Setup’ in the ‘Setup’ tab, in the ‘Data logger online’ bar on the left.
- For a **voltage** sensor, open an analog channel’s node eg CH2.



- Click the MEASURE line and select ‘‘Voltage_DC’, for a DC Voltage sensor or ‘Voltage_AC’ for an AC Voltage sensor.
- If you have selected ‘Voltage_DC’ before, click the ‘Sensor’ field and select a sensor shown in the screen shot above (which have a 0~5V output), except for the ‘None’ one, each one of which is suitable for a specific measurement and has a specific output (as you can see in their description). If you have selected ‘Voltage_AC’, the corresponding sensors will appear.
- The channel type (first line), along with the Slope, Offset are automatically updated.

- For a **current** sensor, open an analog channel’s node eg CH3.



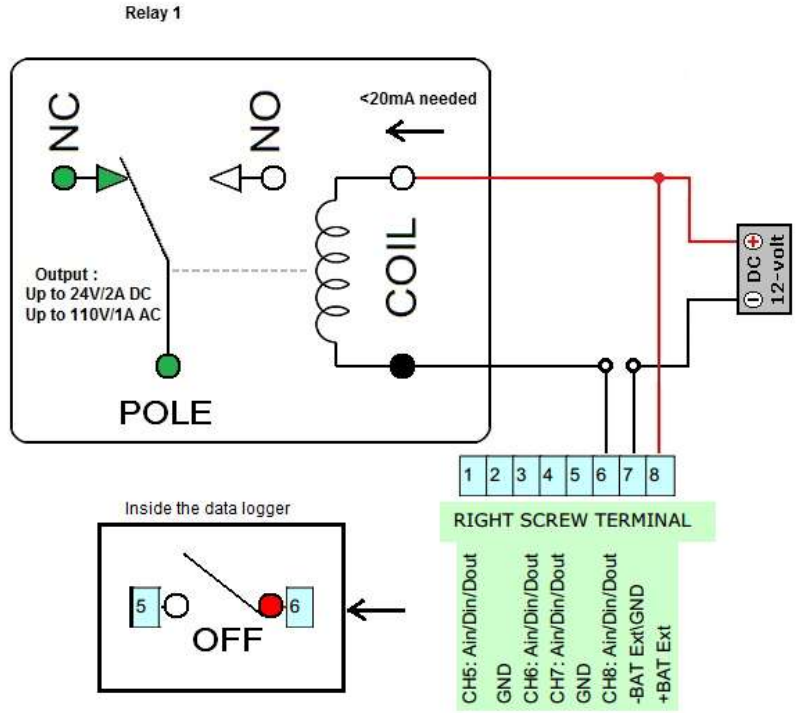
- Click the MEASURE line and select Current_DC', for a DC Current sensor or 'Current_AC' for an AC Current sensor.
- If you have selected 'Current_DC' before, click the 'Sensor' field and select a sensor a sensor shown in the screen shot above, (which has a 0~5V output), which is suitable for a specific measurement and has a specific output (as you can see in their description). If you have selected 'Current_AC', the corresponding sensors will appear.
- The channel type (first line), along with the Slope, Offset are automatically updated.

- In order to save the changes, click 'Write Setup' in the 'Setup' tab, in the 'Data logger online' bar on the left. If you wish to change the setup of multiple channels, one 'Write Setup' in the end is enough.

19. SMALL RELAY DRIVING BY A DIGITAL OUTPUT

CONNECTION:

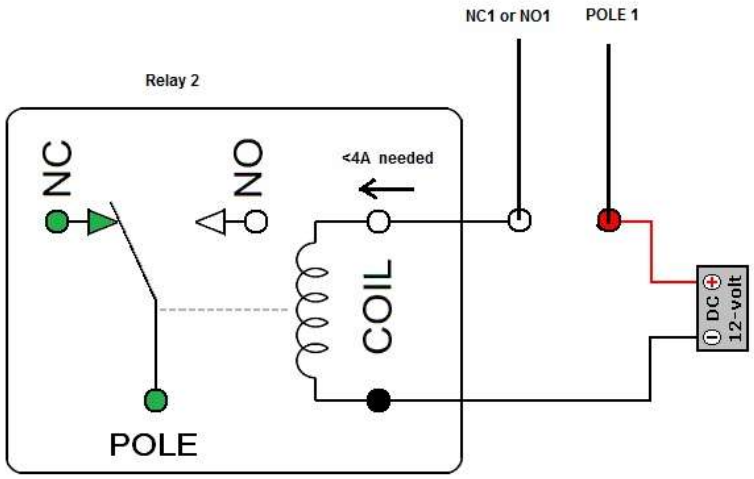
Any Stylitis-10 channel can be set as a digital output, which may be activated (become low, ie channel and ground are short-circuited) either manually or when certain conditions concerning other channels are satisfied. In the diagram below, the digital output is channel 8 and it is deactivated (marked as OFF).



When the conditions are satisfied, the switch closes, and current flows through the relay's coil inductor. However, the relay must be small, ie its coil must be activated via a current lower than 20mA (the max current the logger's digital output can supply).

Such a relay can receive at its output (at the NC/ NO contacts) a direct (DC) voltage of 24V at 2A or an alternating voltage of 110V at 1A. Besides the voltage limit, there is a power limit as well, ie, for instance, for a 12VDC load, a 4ADC current can pass through the contacts.

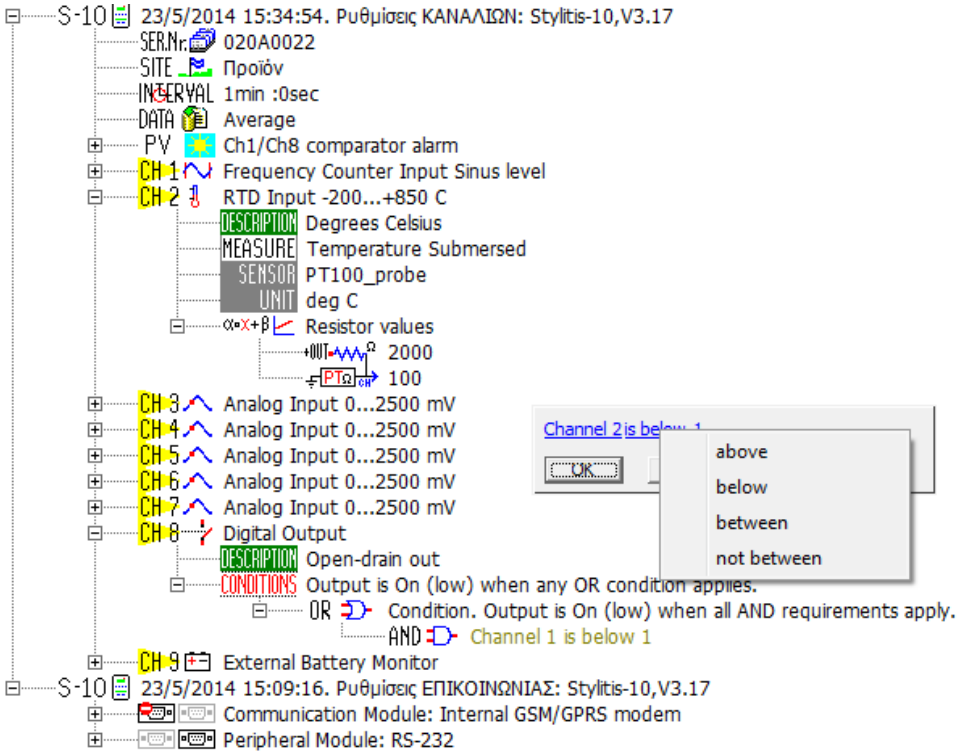
If the voltage and current through this small relay's contacts do not suffice for your load, you may use an additional relay (see the diagram below), which will use the first relay's contacts as an activation switch. Therefore, eg, with a 12V DC power supply, its coil must be activated with 4A max current, while the tolerance of the output contacts concerning voltage and current depend on your requirements (eg 220VAC/ 10A AC)



SETUP:

Connect serially via Opton 4. (Connect the computer's COM port to the datalogger's PERIPHERAL port).
Before changing the setup select:
ACQ OFF.
After changing setup select: **ACQ ON**
to start acquisition (data logging).

- Click 'Read Inputs Setup' in the 'Setup' tab, in the 'Data logger online' bar on the left.
- Set any channel(s) you wish to satisfy your conditions. For instance, channel 2 measures temperature (see chapter 8) and controls the digital output, eg channel 8.

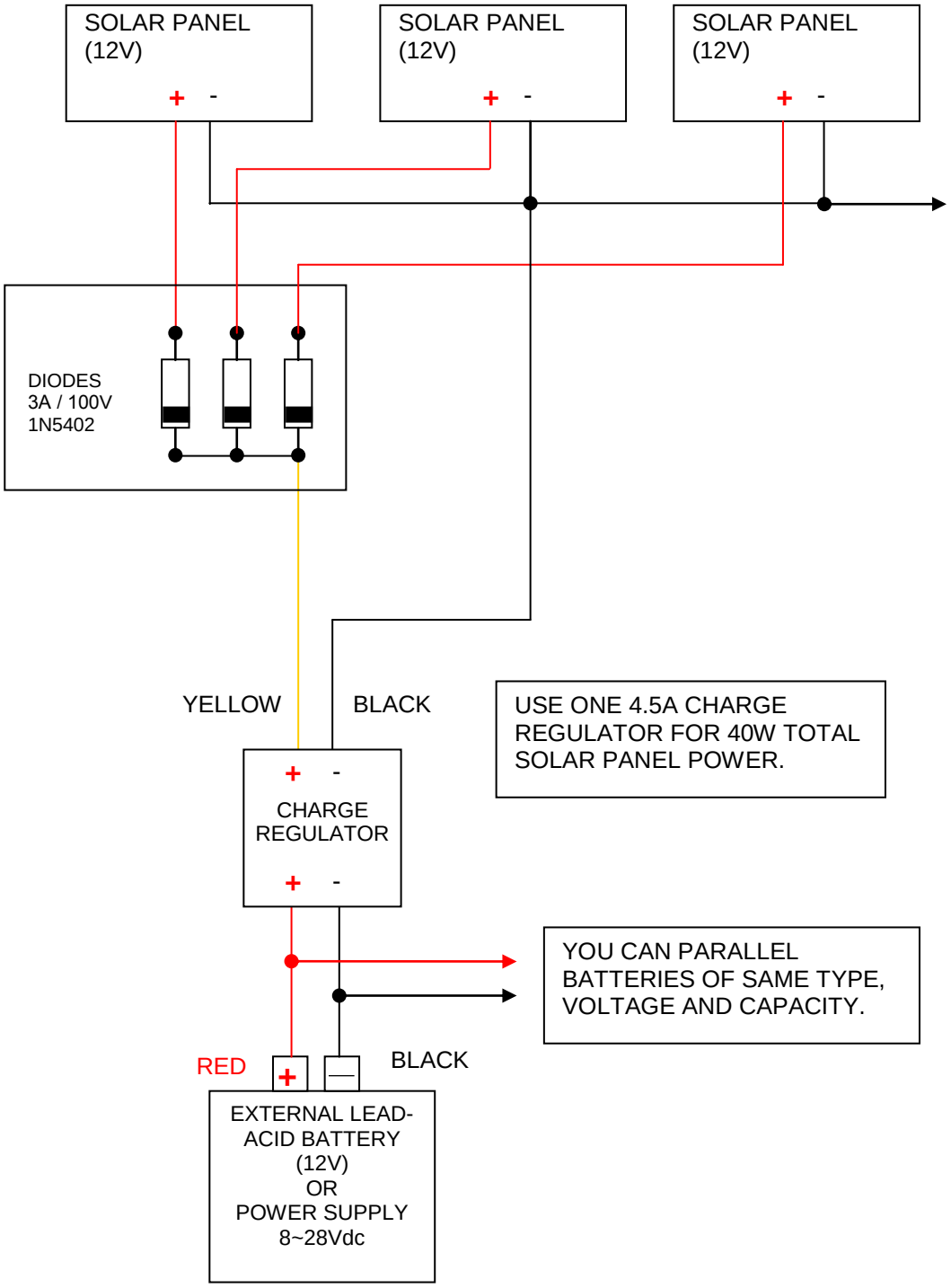


- Click Channels 8's line and select 'Digital Output active low'.
- Open the channel's node and right-click the CONDITIONS line. Open an OR line. If you repeat, more OR lines open.
- Right-click the OR line to open an AND If you repeat, more AND lines open, for the specific OR line.
- This way, you can create a combination of ANDs and ORs, which, if satisfied, the output becomes low (the switch closes).
- By clicking an AND line, you may give a value to the control channel. You may click the channel to select it and the comparison operator to select above, below, between or not between. Finally, click the value to type the one you wish.

- In order to save the changes, click 'Write Setup' in the 'Setup' tab, in the 'Data logger online' bar on the left. If you wish to change the setup of multiple channels, one 'Write Setup' in the end is enough.

20. SOLAR PANEL CONNECTION

If more than one solar panel are connected to a system it is recommended that each one is connected to the Charge Regulator via a diode:



21. LOGGER QUICK CHECK

The checks described below are not a substitute for a standard lab check. However they can be exercised to gain 'correct operation' confidence with a probability high enough.
NOTE: Measured values depend on the accuracy of the multimeter used.

1. ANALOG OUTPUT CHECK

- Connect to the datalogger via Opton and select 'Set Continuous' on the window's left part (commands group: 'Setup').
- With a multimeter measure the [+V Pulsed out] voltage output on the left screw terminal.
- Correct measured value is +2.5V.
- With a multimeter measure the [AUX] current output on the left screw terminal.
- Correct measured value is 0.5mA.

2. ANALOG INPUT CHECK

- Select'Read Inputs Setup' in the 'Setup' tab, in the 'Data logger online' bar on the left (commands group: 'Setup'). Set channels CH2~CH8 as analog voltage inputs 0~2500mV, with SLOPE=1.0 and OFFSET=0.0
- Connect the [+V Pulsed out] voltage output to the analog input you want to test.
- Select 'Read data' from the command group 'Data'
- Correct value for the analog input you are checking is 2.5V.

3. COUNTER INPUT CHECK

- Select'Read Inputs Setup' in the 'Setup' tab, in the 'Data logger online' bar on the left (commands group: 'Setup'). Set channels CH1 and CH8 as TTL type counter inputs, with SLOPE=1.0 and OFFSET=0.0
- Select 'Set Energy Save' on the window's left part (commands group: 'Setup').
- Connect the [+V Pulsed out] voltage output to the counter input you want to test.
- Select 'Read data' from the command group 'Data'
- Correct value for the counter input you are checking is '1.0'.

22. CONNECTION EXAMPLE