

STYLITIS-100/101

INSTALLATION
GUIDE



SYMMETRON
ELECTRONIC APPLICATIONS

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SYMMETRON ELECTRONIC APPLICATIONS

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Made in Greece.

REFERENCES:

- Stylitis-101 User's Manual.
- For more information refer to manuals of the individual sensors.

1. GENERAL

INPUTS:

Stylitis-101 is able to measure voltage, current, frequency and pulses. 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 $-50 \sim +50V$, $-20 \sim +20mA$ and $0 \sim 3kHz$.

OUTPUTS:

The vane supply outputs (+V EXC OUT) may be used for excitation, as they are capable of supplying up to a TOTAL of 100 milliAmps with an accuracy of $\pm 0.2\%$. Similarly, the anemometer supply outputs (+5V FIXED) can supply up to a TOTAL of 10 milliAmps with an accuracy of $\pm 5\%$. These outputs are not pulsed. Thus, the average current drawn from the battery is the same as the total sensor supply current.

SERIAL PORT:

The Data logger comes equipped with one serial port. Communication speed fixed at 9600 baud with 8 data bits, 1 stop bit and no parity bit. The port is full duplex and may be one of the following:

RS232 (standard)

DB9 Plug (Male). PIN 2: Transmit, PIN 3 Receive, PIN 5 Ground. To connect to a standard PC 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. Both cable connectors must be female.

RS485 (option)

DB9 Plug (Male). PIN 2: Receive [-], PIN 7: Receive [+], PIN 3 Transmit [-], PIN 8 Transmit [+], PIN 5 Ground.

QUICK SETUP:

Make sure you have gone through all of the following steps:

1. Connect sensors to the data logger.
2. Connect power supply (alkaline cells, lead-acid cells, etc.).
3. Depressing a key for more than one second activates the display, allowing interface with the user. Stylitis-101 automatically reverts to standby mode if there is no key action for 1 minute.
4. If PASSWORD protection has been activated, you are allowed 4 attempts to enter the correct one. Otherwise the instrument will lock and you must contact Symmetron to unlock it.
5. Setup time, date, site and math interval (10 minutes typical).
6. Using the menus, select the type of sensors and setup parameters (i.e. Slope/Offset for calibrated anemometers). Do not forget to set to **NOT USED** all unused channels.
7. Select **ENERGY SAVE MODE** from the **MODE** menu.
8. Data are stored in a memory card if you insert one; Otherwise they are stored in the internal buffer.
9. Select **ACQUISITION ON** to start data logging. It is recommended to always operate the data logger in **ACQUISITION ON**, unless you make changes to the setup. Selecting **ACQUISITION OFF** you automatically delete any stored data from the internal buffer (data are not deleted from a memory card).
10. Check the available logging space in days using **1>STATUS 3>CARD** or **1>STATUS 4>BUFFER**.

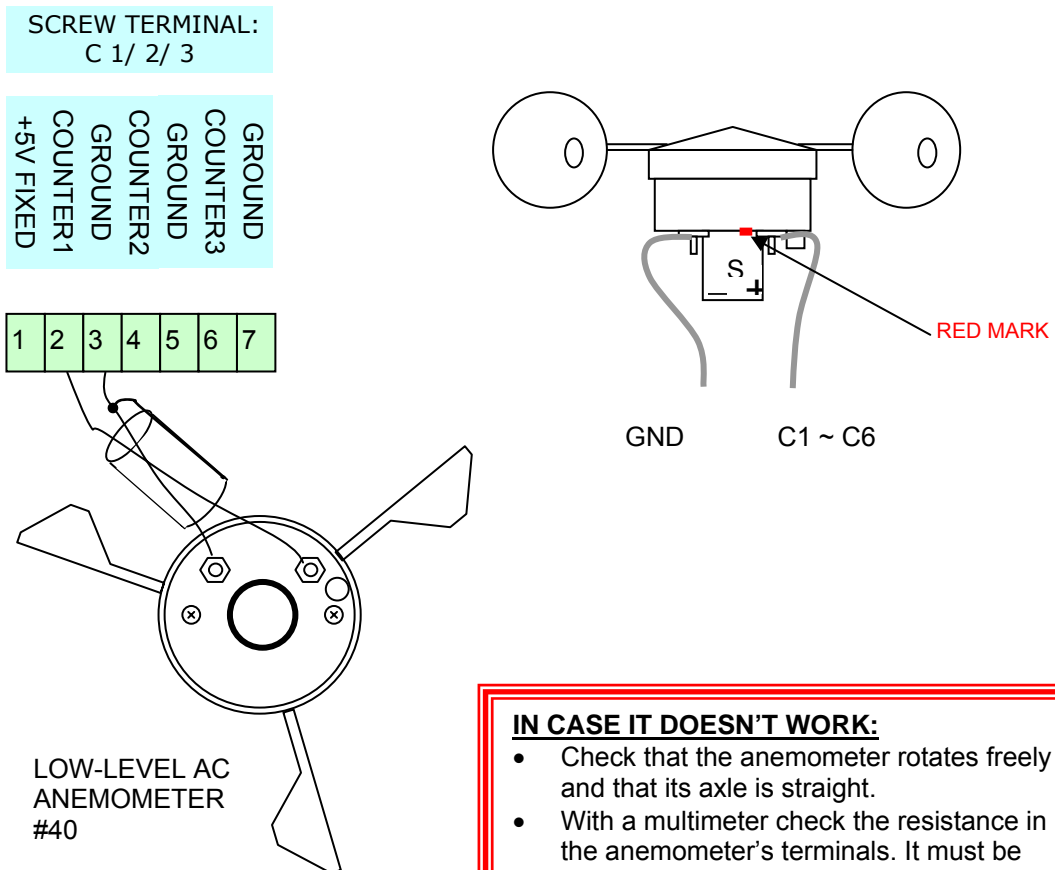
- To select a menu item use the corresponding numeric key.
- [ESC] goes one menu-level up and abandons changes.
- [ENTER] goes one menu-level up and saves changes.
- You can change parameters only when ACQUISITION is OFF.

2. LOW-LEVEL AC ANEMOMETER NRG #40.

Other sinusoidal output sensors: YOUNG 05103 (for connections refer to instruction sheet).

CONNECTION:

- Connect the first anemometer to screws 2 [COUNTER1] and 3 [GROUND] on the screw terminal.
- Connect the second anemometer to screws 4 [COUNTER2] and 5 [GROUND] on the screw terminal.
- Connect the third anemometer to screws 6 [COUNTER3] and 7 [GROUND] on the screw terminal.
- Wire polarity does matter (see drawing). Typical wire size: 2 x 0,25 mm² (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:

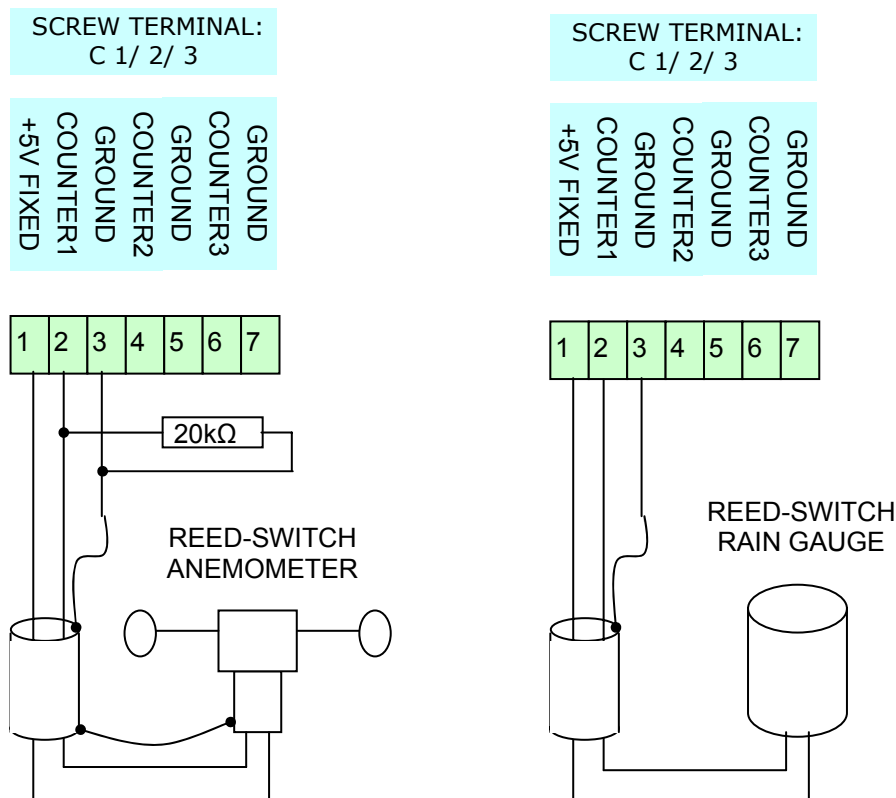
- Check that the anemometer rotates freely and that its axle is straight.
- With a multimeter check the resistance in the anemometer's terminals. It must be less than 1000Ω and greater than 400Ω.
- Rotate the anemometer and measure the AC voltage on its terminals; it should generate at least 200mV.

3. REED ANEMOMETERS OR RAIN GAUGES.

Switch-type sensors (reed): RISO P2546A, VECTOR A100R, FRIEDRICH 4091.1000

CONNECTION:

- Connect the first anemometer or rain gauge to screws 1 [+5V FIXED] and 2 [COUNTER1] on the let screw terminal.
- Connect the second anemometer or rain gauge to screws 1 [+5V FIXED] and 4 [COUNTER2] on the screw terminal.
- Connect the third anemometer or rain gauge to screws 1 [+5V FIXED] and 6 [COUNTER3] on the screw terminal.
- Wire polarity is irrelevant. Typical wire size: 2 x 0,25 mm² (shielded cables are recommended). Connect the shield to the GROUND screw and the metal body of the anemometer (if plastic, leave it unconnected).
- A 18~22 kΩ pull-down resistor must be connected between a Counter input and Ground for each anemometer. Otherwise, the cable capacitance will not allow readings above a few meters/second.



IN CASE IT DOESN'T WORK:

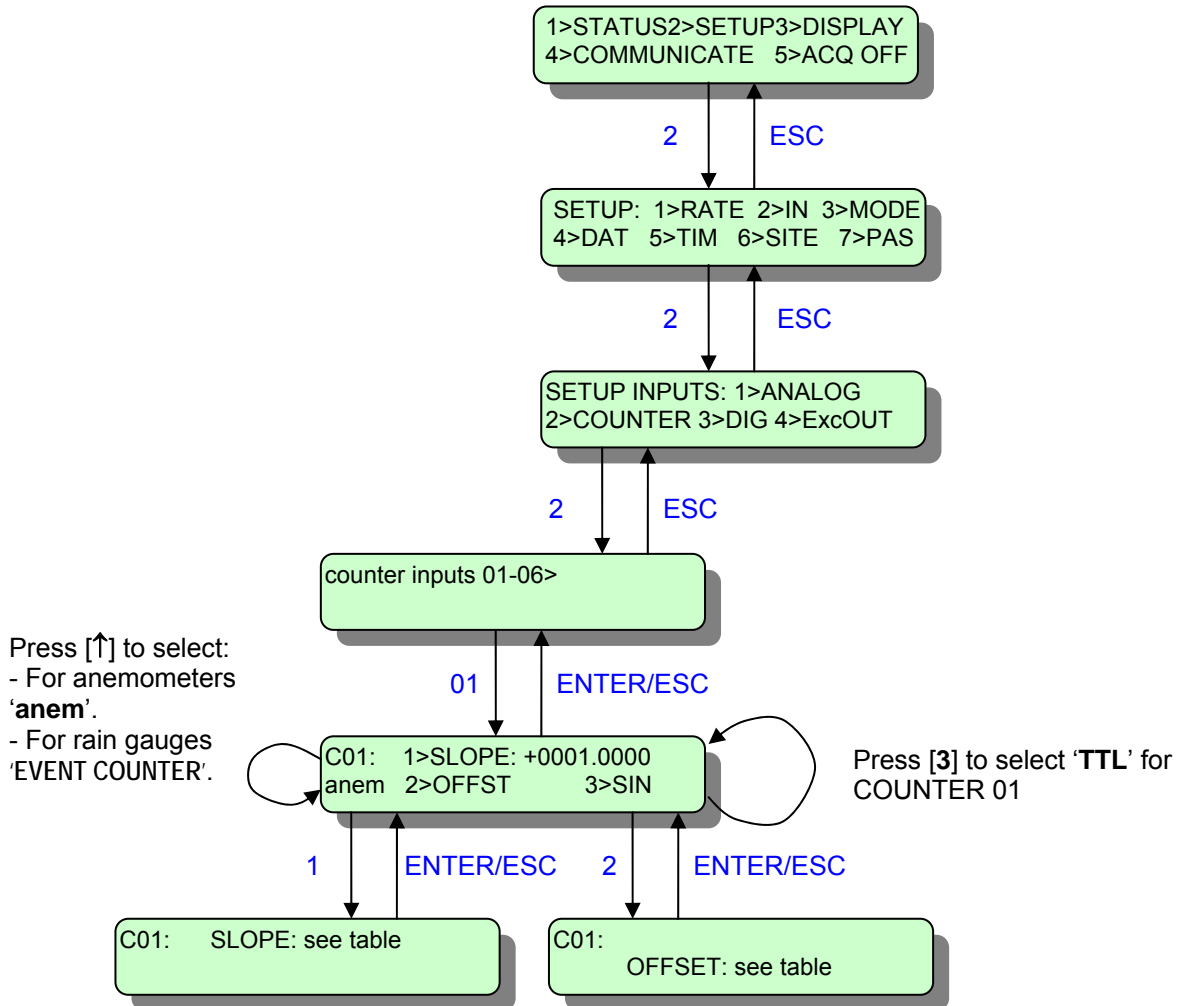
- Check that the anemometer or rain gauge rotates freely and that its axle is straight.
- With a multimeter check the resistance in the sensor's terminals: it should change from short circuit to open circuit while moving or rotating.

SETUP:

Before changing the logger's setup select:
5> ACQ OFF (press [5] and [ENTER]).

After changing setup select:
5>ACQ ON (press [5] and [ENTER])

to start acquisition (data logging).



ANEMOMETER	SLOPE	OFFSET
RISO P2546A	0.6201	0.2700
VECTOR A100K	0.0515	0.0000
VECTOR A100M	0.1000	0.0000
VECTOR A100R	1.2500	0.0000
FRIEDRICH 4034.0000/1000	0.1000	0.0000
FRIEDRICH 4091.1000	0.3448	0.0000
NRG #40H	0.7650	0.3500
THIES FIRST CLASS	0.0500	0.0000

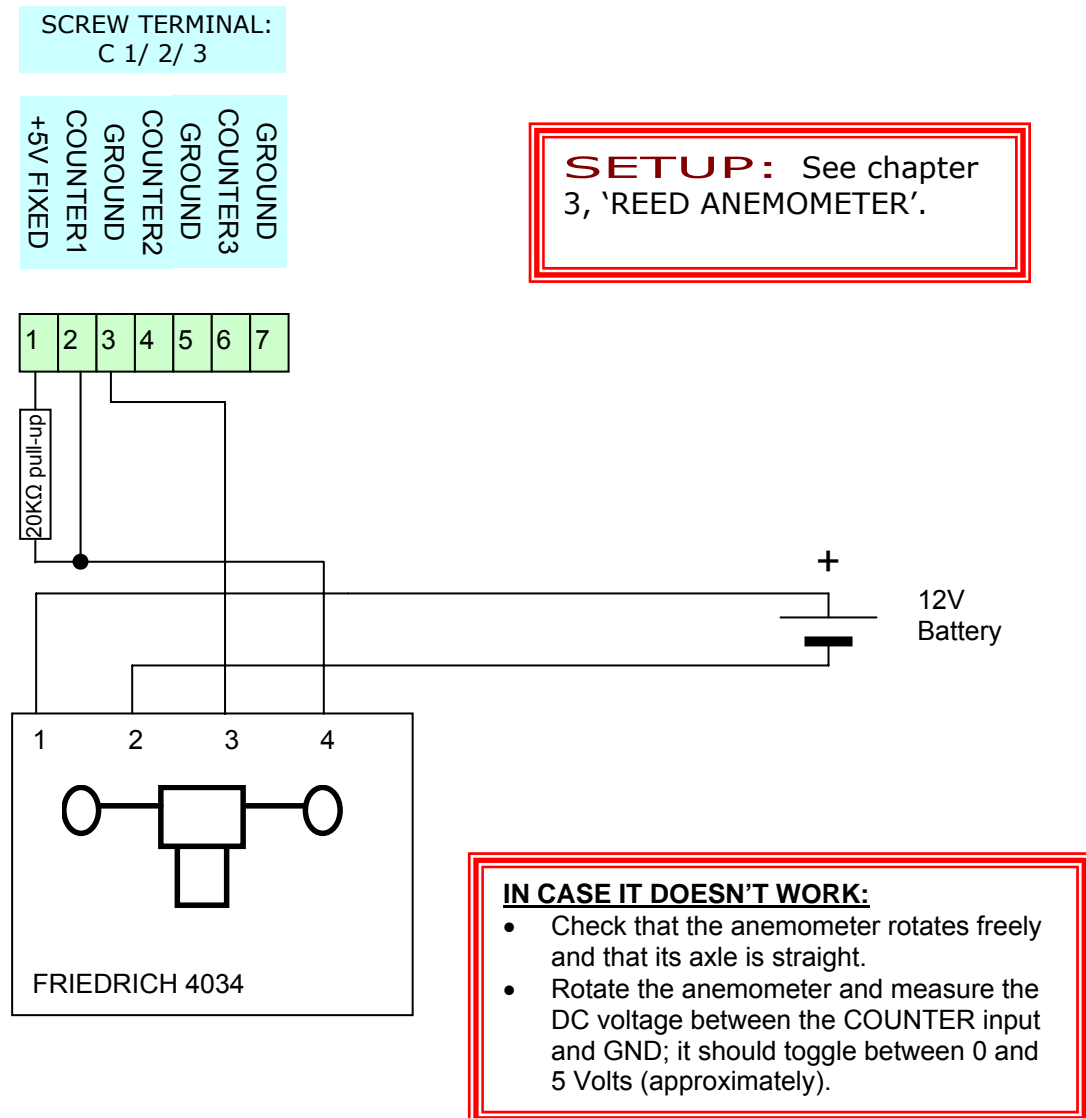
NOTE: For calibrated anemometers enter the corrected SLOPE and OFFSET values.

4. FRIEDRICH 4034 ANEMOMETER.

Optical disk type sensor.

CONNECTION:

- Connect the first anemometer to screws 2 [COUNTER1] and 3 [GROUND] on the screw terminal.
- Connect the second anemometer to screws 4 [COUNTER2] and 5 [GROUND] on the screw terminal.
- Connect the third anemometer to screws 6 [COUNTER3] and 7 [GROUND] on the screw terminal.
- Wire polarity does matter (see drawing). Typical wire size: 4 x 0,25 mm² (shielded cables are recommended). Connect the shield to the GROUND screw and the metal body of the anemometer.
- A 18~22 kΩ pull-up resistor must be connected between Counter input and [+5V FIXED] for each anemometer. Otherwise, the cable capacitance will not allow readings above a few meters/second.

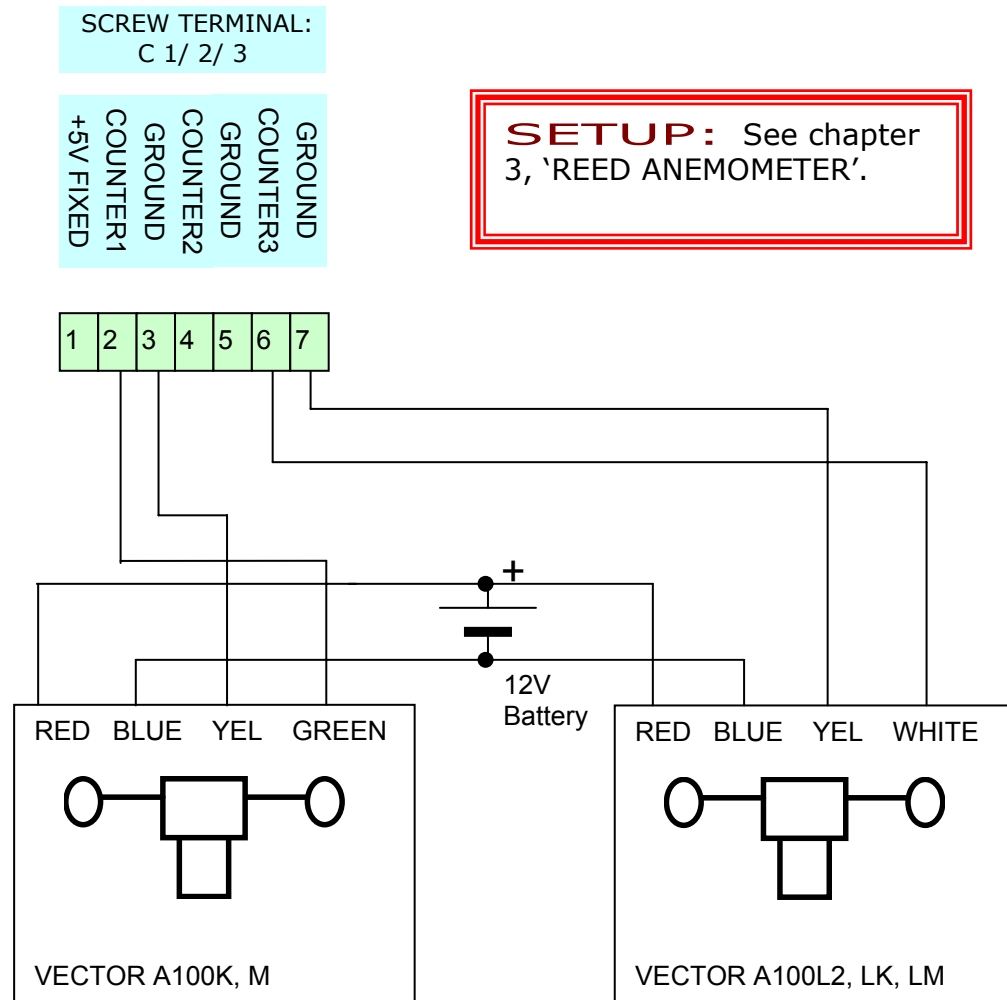


5. VECTOR A100K, M, L2, LK, LM ANEMOMETER.

Optical disk sensors

CONNECTION:

- Connect the first anemometer to screws 2 [COUNTER1] and 3 [GROUND] on the screw terminal.
- Connect the second anemometer to screws 4 [COUNTER2] and 5 [GROUND] on the screw terminal.
- Connect the third anemometer to screws 6 [COUNTER3] and 7 [GROUND] on the screw terminal.
- Wire polarity does matter (see drawing). Typical wire size: 4 x 0,25 mm² (shielded cables are recommended). Connect the shield to the GROUND screw and the metal body of the anemometer.



IN CASE IT DOESN'T WORK:

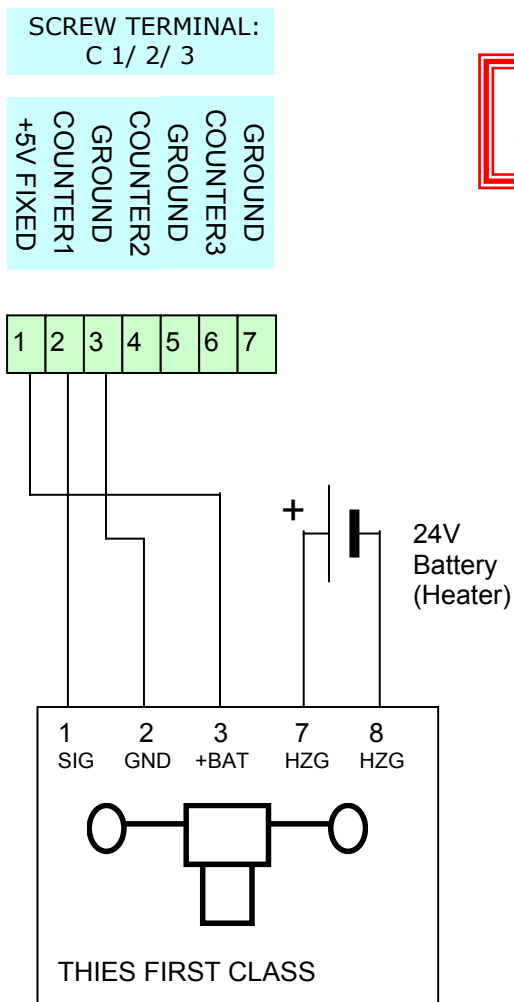
- Check that the anemometer rotates freely and that its axle is straight.
- Rotate the anemometer and measure the DC voltage between the COUNTER input and GND; it should toggle between 0 and 5 Volts (approximately).

6. THIES FIRST CLASS ANEMOMETER.

Optical disk type sensor.

CONNECTION:

- Connect the first anemometer to screws 1 [+5V FIXED], 2 [COUNTER1] and 3 [GROUND] on the screw terminal.
- Connect the second anemometer to screws 1 [+5V FIXED], 4 [COUNTER2] and 5 [GROUND] on the screw terminal.
- Connect the third anemometer to screws 1 [+5V FIXED], 6 [COUNTER3] and 7 [GROUND] on the screw terminal.
- Wire polarity does matter (see drawing). Typical wire size: 3 x 0,25 mm² (shielded cables are recommended). Connect the shield to the GROUND screw and the metal body of the anemometer.



SETUP: See chapter 3, 'REED ANEMOMETER'.

IN CASE IT DOESN'T WORK:

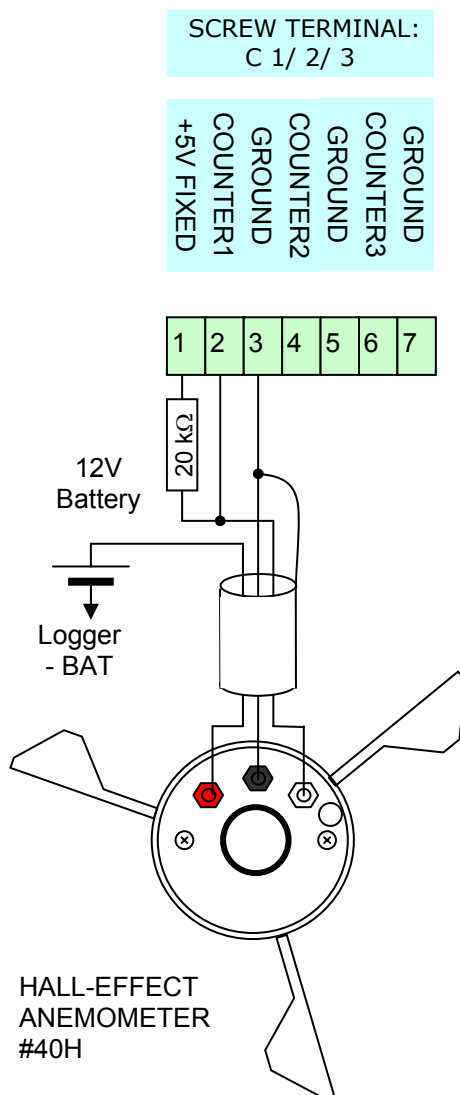
- Check that the anemometer rotates freely and that its axle is straight.
- Rotate the anemometer and measure the DC voltage between the COUNTER input and GND; it should toggle between 0 and 5 Volts (approximately).

7. ANEMOMETER NRG #40H.

Hall-Effect type sensor.

CONNECTION:

- Connect the first anemometer to screws 2 [COUNTER1] and 3 [GROUND] on the screw terminal.
- Connect the second anemometer to screws 4 [COUNTER2] and 5 [GROUND] on the screw terminal.
- Connect the third anemometer to screws 6 [COUNTER3] and 7 [GROUND] on the screw terminal.
- Wire polarity does matter (see drawing). Typical wire size: 3 x 0,25 mm² (shielded cables are recommended). Connect the shield to the GROUND screw. Do not connect the shield to the anemometer.
- A 18~22 kΩ pull-up resistor must be connected between Counter input and [+5V FIXED] for each anemometer. Otherwise, the anemometer will not work.



SETUP: See chapter 3, 'REED ANEMOMETER'.

IN CASE IT DOESN'T WORK:

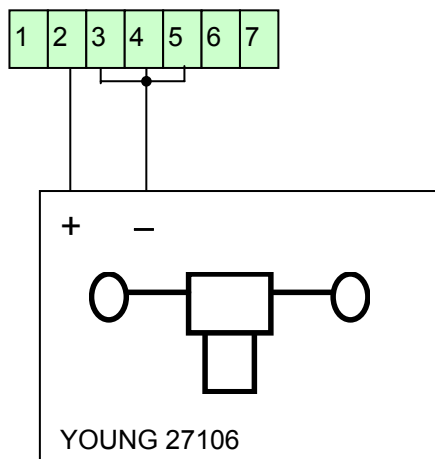
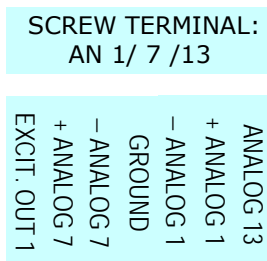
- Check that the anemometer rotates freely and that its axle is straight.
- Rotate the anemometer and measure the DC voltage between the COUNTER input and GND; it should toggle between 0 and 5 Volts (approximately).

8. YOUNG 27106 PROPELLER ANEMOMETER

Tacho-generator type sensor.

CONNECTION:

- Connect the first anemometer to screws 6 [+ANALOG1] and 4 [GROUND] on an *analog* voltage screw terminal.
- Connect the second anemometer to screws 2 [+ANALOG7] and 4 [GROUND] on an *analog* voltage screw terminal.
- Connect the third anemometer to screws 7 [ANALOG13] and 4 [GROUND] on an *analog* voltage screw terminal.
- **CAUTION:** short-circuit all three screws 3, 4 and 5 on the screw terminal, as shown in the diagram (i.e. convert inputs to single-ended).
- **Wire polarity does matter** (see drawing): Typical wire size: 2 x 0,25 mm² (shielded cables are recommended). If a shield exists connect it to the GROUND screw and the metal body of the anemometer.



YOUNG 27106 ON AN7.

IN CASE IT DOESN'T WORK:

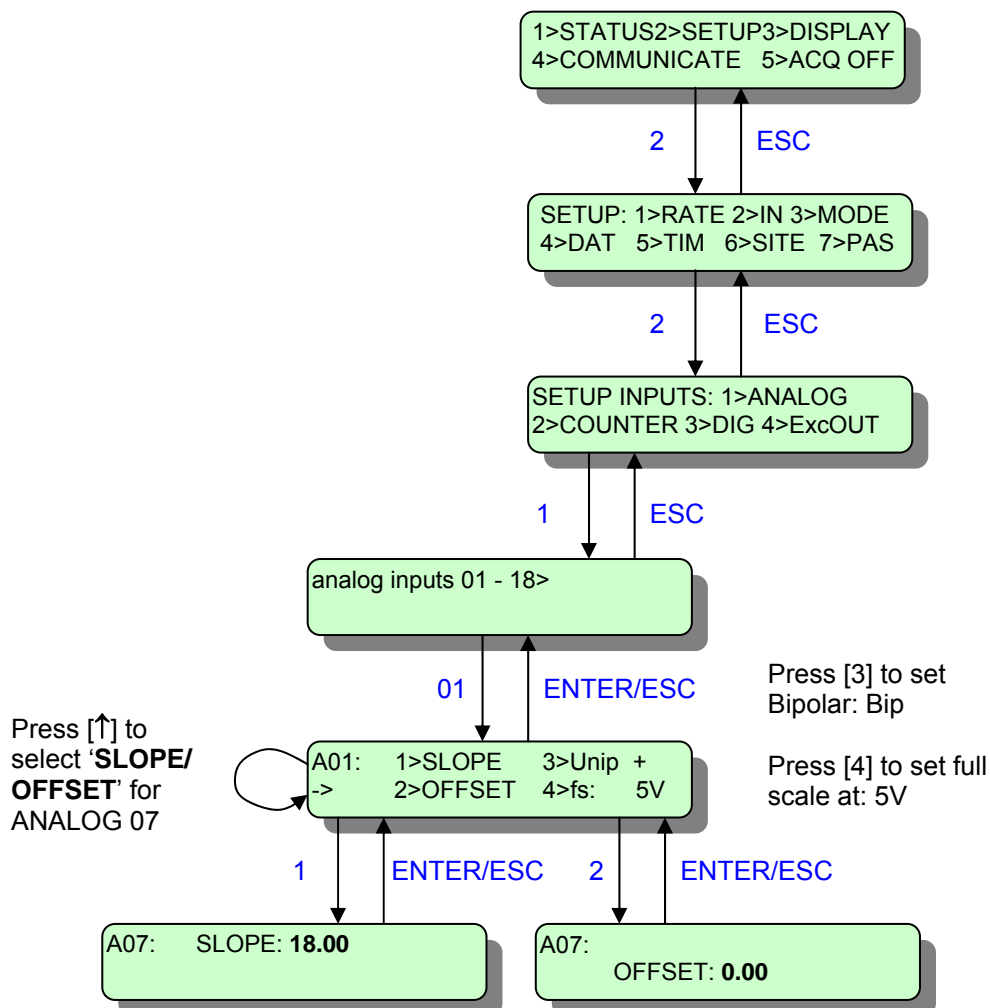
- Check that the anemometer rotates freely and that its axle is straight.
- With a multimeter check the voltage between [+] and [-] wires: at a wind speed of 4.5 m/s, it should be about 0.25 V DC.

SETUP:

Before changing the logger's setup select:
5> ACQ OFF (press [5] and [ENTER]).

After changing setup select:
5> ACQ ON (press [5] and [ENTER])

to start acquisition (data logging).



- Coefficients for conversion to Meters per Second.
- SLOPE: 18.00 OFFSET: 0.00
- Setup allows both positive and negative wind speed.

9. WIND VANE NRG 200P

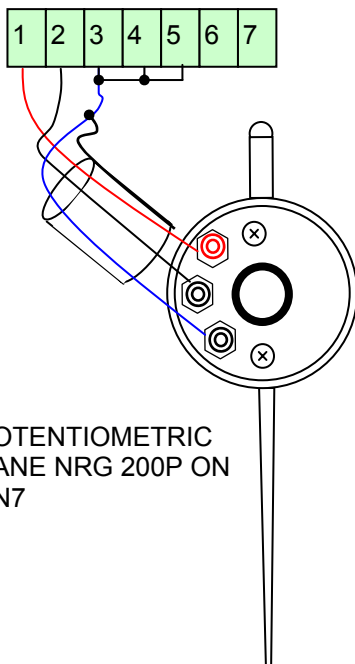
Other potentiometer-type sensors with resistance 1K Ω or greater: Vector W200P, YOUNG 05103 (for connections refer to data sheet).

CONNECTION:

- Make sure that you are using a voltage analog input and a voltage output [EXC OUT] set to 5V (check from Menu: Setup>In>).
- Connect the first wind vane to screws 1 [EXCITATION OUT], 6 [+ANALOG1] and 4 [GROUND] on the analog screw terminal.
- Connect the second wind vane to screws 1 [EXCITATION OUT], 2 [+ANALOG7] and 4 [GROUND] on the analog screw terminal.
- Connect the third wind vane to screws 1 [EXCITATION OUT], 7 [ANALOG13] and 4 [GROUND] on the analog screw terminal.
- **CAUTION:** short-circuit all three screws 3, 4 and 5 on the screw terminal, as shown in the diagram (i.e. convert inputs to single-ended).
- 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: 3 x 0,25 mm² (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 may damage the wind vane!

SCREW TERMINAL:
AN 1/ 7 /13

ANALOG 13
+ ANALOG 1
- ANALOG 1
GROUND
- ANALOG 7
+ ANALOG 7
EXCIT. OUT 1



IN CASE IT DOESN'T WORK:

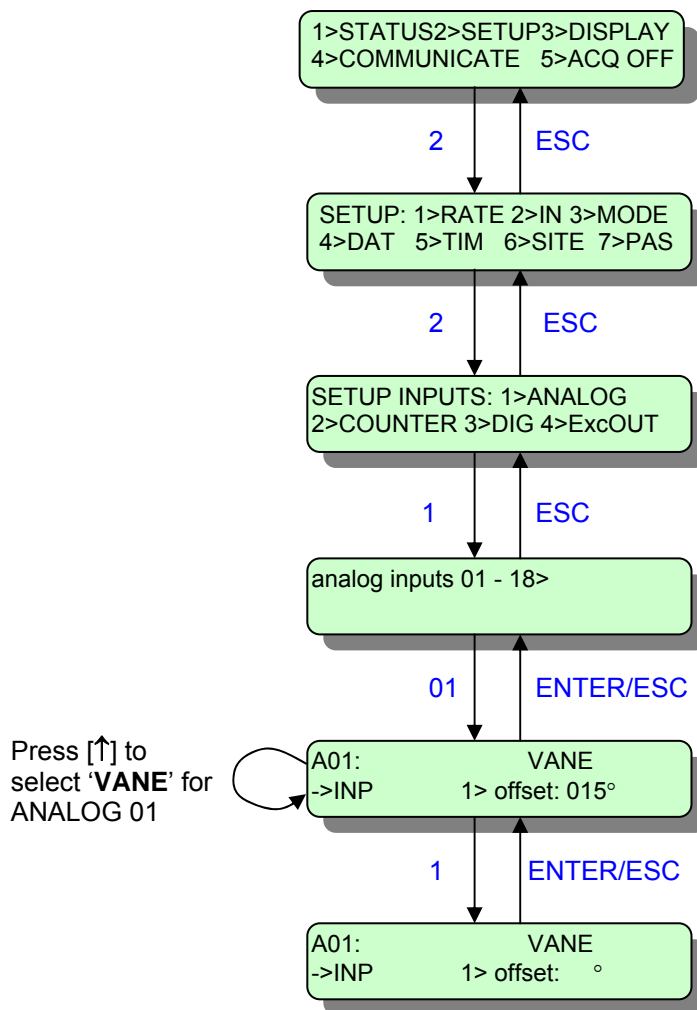
- Check that the wind vane rotates freely and that its axle is straight.
- With a multimeter check the resistance between the wind vane's most far-apart terminals. It must be about 10k Ω .
- Rotate the wind vane and measure the resistance from the center screw to one of the other screws; it should change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

SETUP:

Before changing the logger's setup select:
5> ACQ OFF (press [5] and [ENTER]).

After changing setup select:
5>ACQ ON (press [5] and [ENTER])

to start acquisition (data logging).



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.

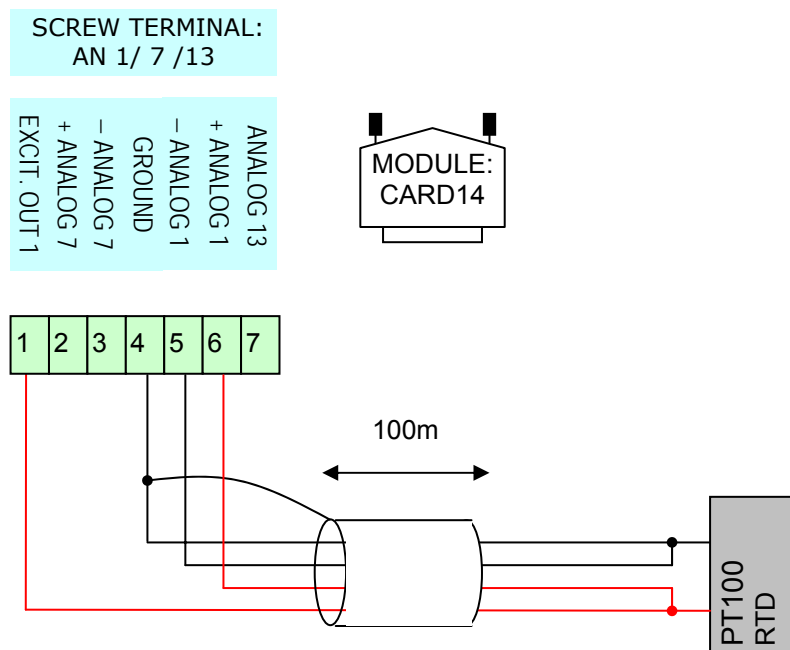
10. TEMPERATURE PT100: 4-wire, current excitation

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

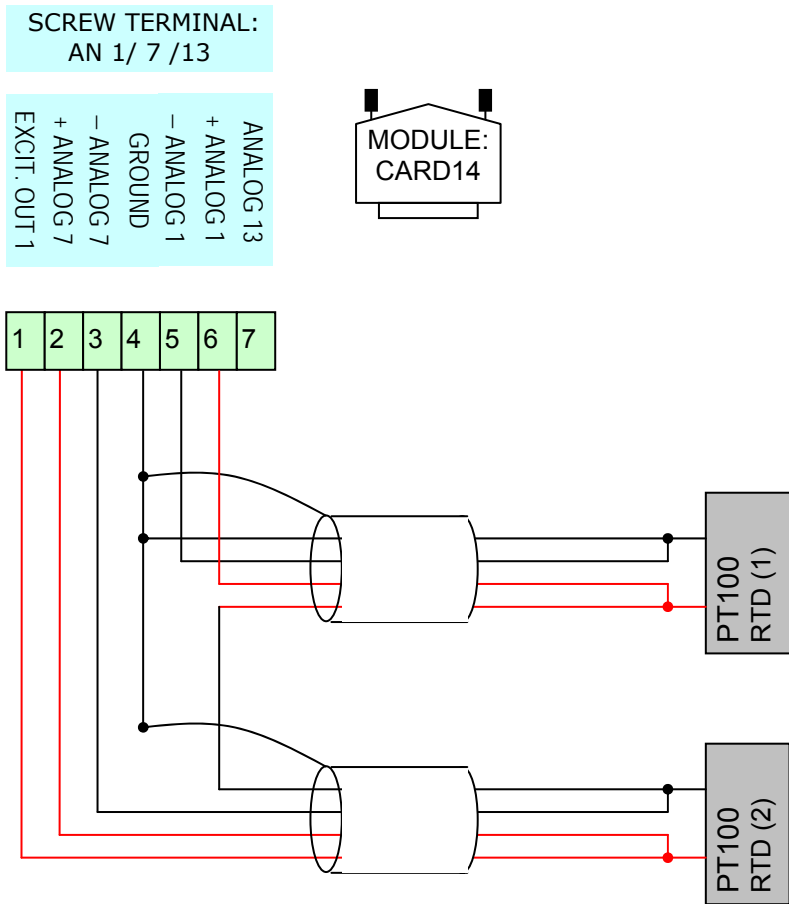
NOTE: Recommended connection for best accuracy. Uses current output module (Card14) and corresponding differential input channels. Suitable for long distances between sensor and data logger.

CONNECTION:

- Use a differential voltage analog input and a current output [EXC OUT] set to 3mA (change from Menu: Setup>In>).
- Connect a PT100 sensor to 6 [+ANALOG1] and 5 [-ANALOG1] on the screw terminal as shown in the drawing.
- Alternatively, you can connect the PT100 sensor to 2 [+ANALOG1] and 3 [-ANALOG1].
- You can connect two PT100 sensors to one Card 14 module as shown in the diagram in next page.
- Wire polarity is irrelevant. Typical wire size: 4 x 0,25 mm² (shielded cables are recommended). If a shield exists connect it to the GROUND screw.



CONNECTING 2 PT100 SENSORS.



IN CASE IT DOESN'T WORK:

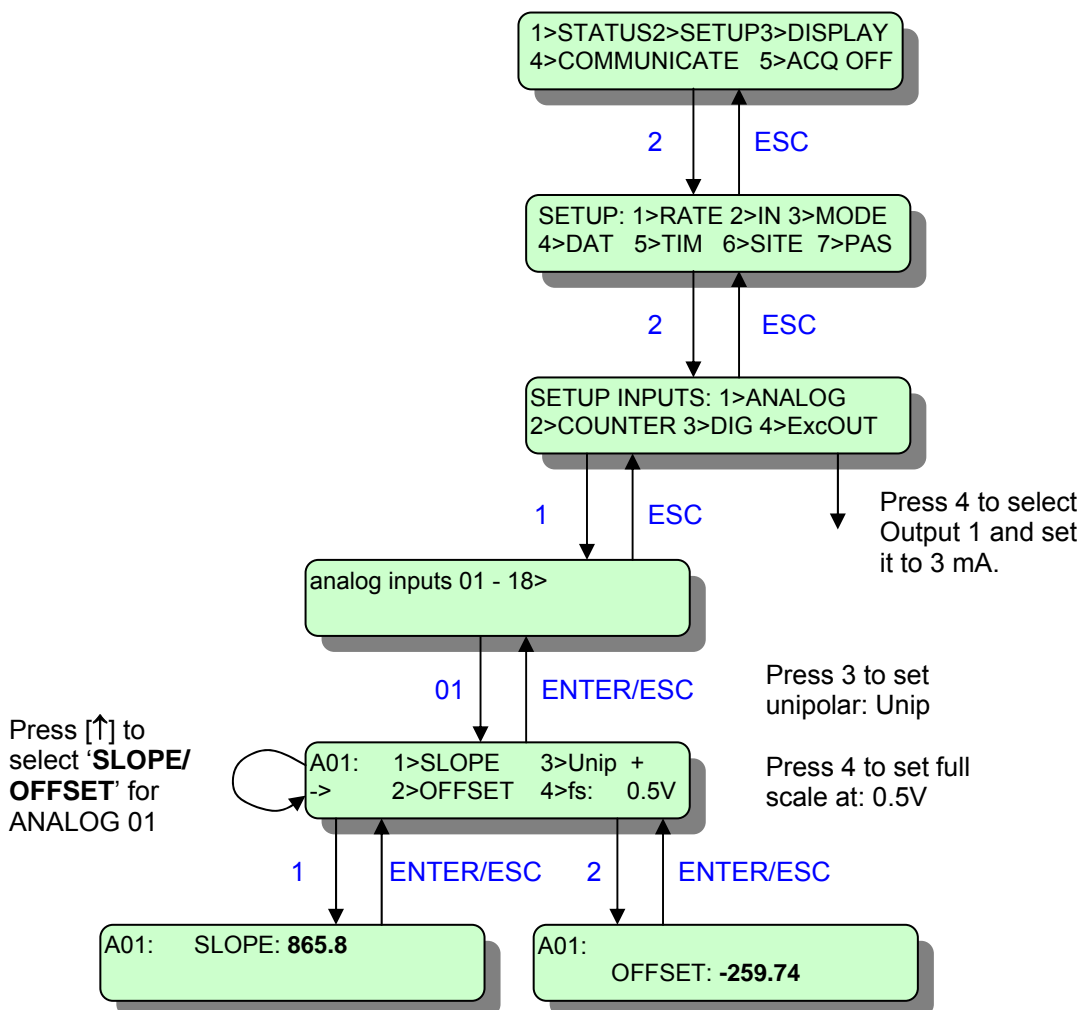
- The data logger should be in 'ENERGY SAVE' mode. Otherwise, the sensor will heat-up and measure a little higher than correct.
- With the sensor disconnected from the logger, use a multimeter to check the resistance between the sensor's terminals. At ambient temperature (23°C) it should be about 110Ω.

SETUP:

Before changing the logger's setup select:
5> ACQ OFF (press [5] and [ENTER]).

After changing setup select:
5> ACQ ON (press [5] and [ENTER])

to start acquisition (data logging).



- Coefficients for Celsius degrees:
 SLOPE: 865.8, OFFSET: -259.74

11. TEMPERATURE PT100: 2-wire, voltage excitation

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

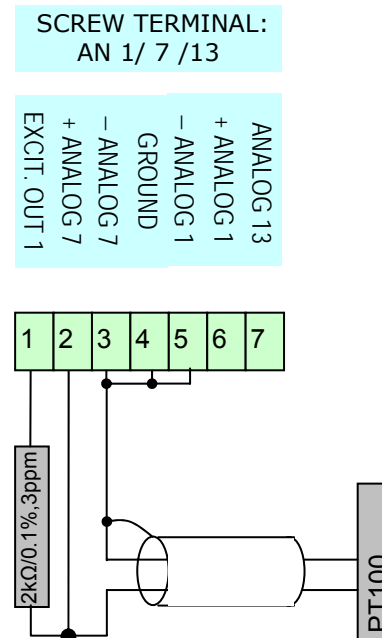
NOTE: Simplest connection with minimum number of wires. Suitable for short distances between sensor and data logger. Long wires must be proportionally thicker.

CONNECTION:

- Use a voltage analog input and a voltage output [EXC OUT] set to 5V (check from Menu: Setup>In>).
- Connect the first PT100 sensor and a 2kΩ / 0.1%, 3ppm resistor, to screws 1 [EXC OUT], 6 [+ANALOG1] and 4 [GROUND] on the screw terminal (see drawing).
- Connect the second PT100 sensor and a 2kΩ / 0.1%, 3ppm resistor, to screws 1 [EXC OUT], 2 [ANALOG7] and 4 [GROUND] on the screw terminal.
- Connect the third PT100 sensor and a 2kΩ / 0.1%, 3ppm resistor, to screws 1 [EXC OUT], 7 [ANALOG13] and 4 [GROUND] on the screw terminal.
- **CAUTION:** short-circuit all three screws 3, 4 and 5 on the screw terminal, as shown in the diagram (i.e. convert inputs to single-ended).
- 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).
- 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 GROUND screw. Do not connect the shield to the PT100 sensor.



IN CASE IT DOESN'T WORK:

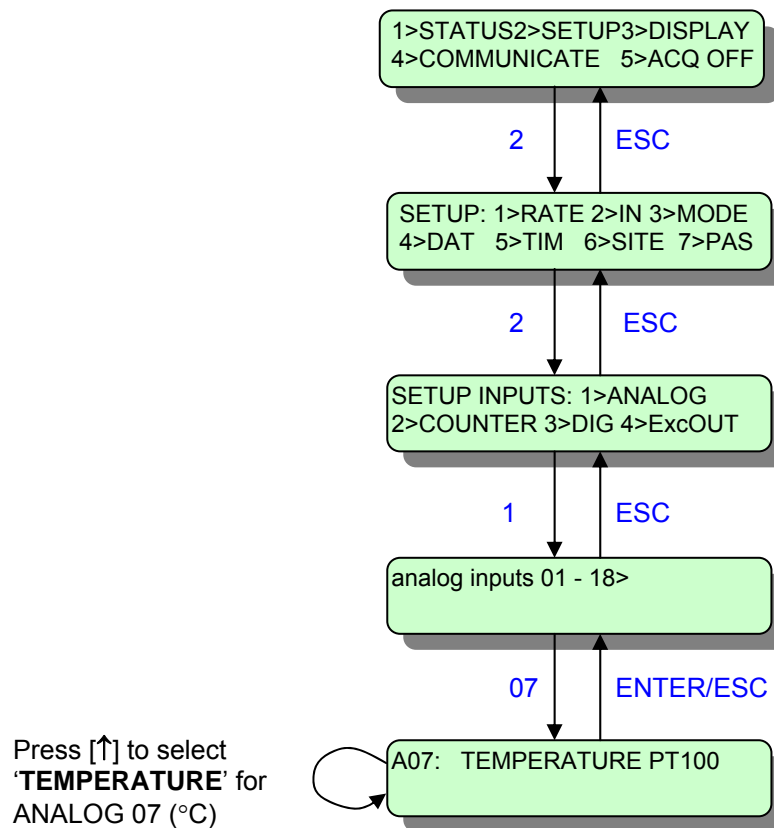
- The data logger should be in 'ENERGY SAVE' mode. Otherwise, the sensor will heat-up and measure a little higher than correct.
- With the sensor disconnected from the logger, use a multimeter to check the resistance between the sensor's terminals. At ambient temperature (23°C) it should be about 110Ω.

SETUP:

Before changing the logger's setup select:
5> ACQ OFF (press [5] and [ENTER]).

After changing setup select:
5>ACQ ON (press [5] and [ENTER])

to start acquisition (data logging).



Conversion to Celsius degrees

12. TEMPERATURE PT100: 4-wire voltage excitation

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

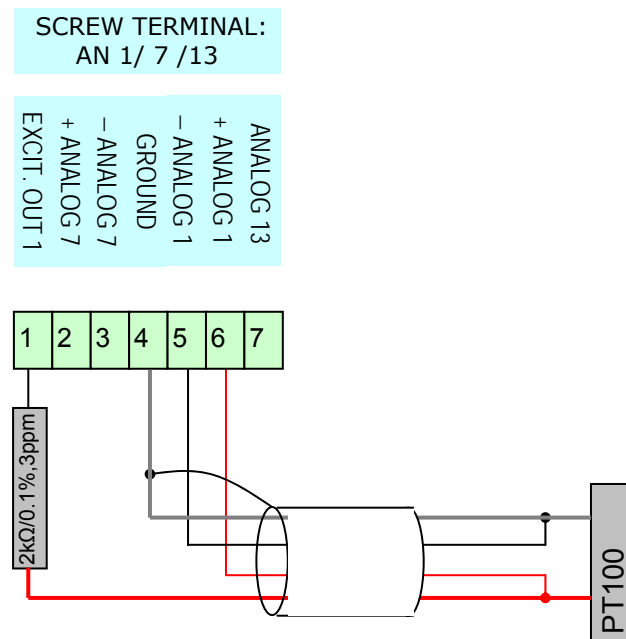
NOTE: Better accuracy than 2-wire voltage excitation but with 4 wires. Suitable for short distances between sensor and data logger. Long wires must be proportionally thicker.

CONNECTION:

- Use a differential voltage analog input (Channels 1~12) and a voltage output [EXC OUT] set to 5V (check from Menu: Setup>In>).
- Connect the first PT100 sensor and a 2kΩ / 0.1%, 3ppm resistor, to screws 1 [EXC OUT], 6 [+ANALOG1] and 5 [-ANALOG1] on the screw terminal (see drawing).
- Connect the second PT100 sensor and a 2kΩ / 0.1%, 3ppm resistor, to screws 1 [EXC OUT], 2 [+ANALOG7] and 3 [-ANALOG7] on the screw terminal.
- 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).
- Wire polarity is irrelevant. Diagram has THICK wires and THIN wires. Wire size of THICK wires according to connection distance can be found in following table (shielded cables are recommended). Typical wire size of THIN wires is 0,25 mm².

CABLE LENGTH meters	WIRE SIZE OF THICK WIRES mm ² (PT100)
Up to 1	2x0,25
Up to 2	2x0,35
Up to 3	2x0,50
Up to 4	2x0,75
Up to 5	2x1
Up to 10	2x1,5
Up to 20	2x2,5

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



SETUP: See Chapter: 'TEMPERATURE PT100: 2-wire, voltage excitation'.

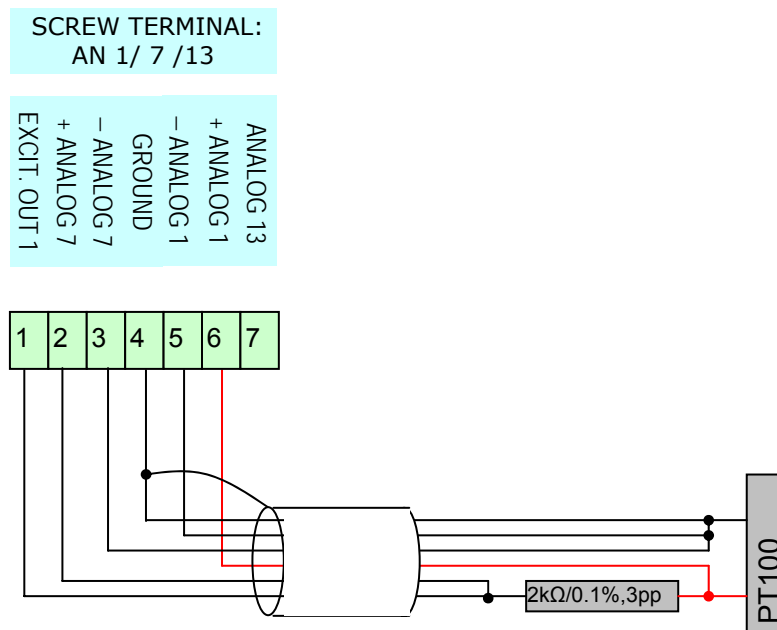
13. TEMPERATURE PT100: 6-wire voltage excitation

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

NOTE: Best accuracy of voltage excitation methods, but needs 6 wires and 2 differential inputs to eliminate errors due to resistance of long wires. Suitable for long distances between sensor and data logger.

CONNECTION:

- On the same screw terminal, use 2 differential voltage analog inputs and a voltage output [EXC OUT] set to 5V (check from Menu: Setup>In>).
- Although you use both channel 1 and 7, only the first channel (1) will be set up (see next page).
- You can use up to 6 channel pairs (up to 6 PT100s) in this configuration: 1/7, 2/8, 3/9, 4/10, 5/11 and 6/12.
- Connect the PT100 sensor and a 2kΩ / 0.1%, 3ppm resistor as shown in the diagram.
- If a PT1000 sensor is used replace the external resistor with a 20 kΩ, 0.1%, 3ppm type.
- Wire polarity is irrelevant. Typical wire size: 6 x 0,25 mm² (shielded cables are recommended).



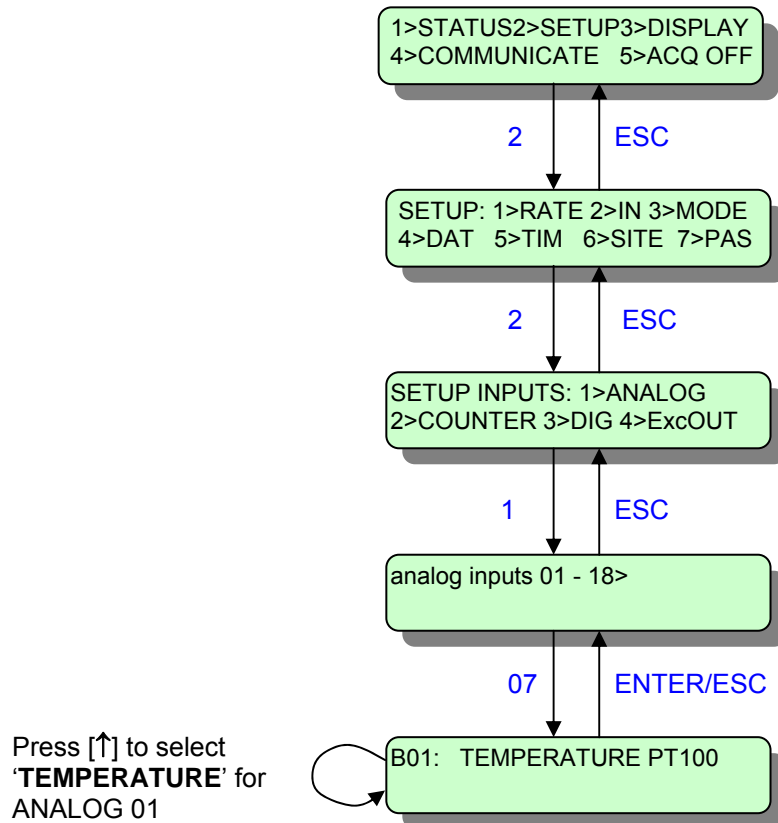
IN CASE IT DOESN'T WORK:

- 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:

Before changing the logger's setup select:
5> ACQ OFF (press [5] and [ENTER]).

After changing setup select:
5>ACQ ON (press [5] and [ENTER])
to start acquisition (data logging).



Press [-] to select bridge **(B01)** configuration for ANALOG 01

Conversion to Celsius degrees

14. TEMPERATURE NRG #110S

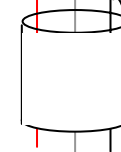
CONNECTION:

- Make sure that you are using a voltage analog input and a voltage output [EXCITATION OUT], set to 5V (check from Menu: Setup>In>).
- Connect the first wind vane to screws 1 [EXCITATION OUT], 6 [+ANALOG1] and 4 [GROUND] on the screw terminal.
- Connect the second wind vane to screws 1 [EXCITATION OUT], 2 [+ANALOG7] and 4 [GROUND] on the screw terminal.
- Connect the third wind vane to screws 1 [EXCITATION OUT], 7 [ANALOG13] and 4 [GROUND] on the screw terminal.
- **CAUTION:** short-circuit all three screws 3, 4 and 5 on the screw terminal, as shown in the diagram (i.e. convert inputs to single-ended).
- **Wire polarity does matter** (see drawing): The red wire of the sensor connects to [+5V PULSED], the white wire of the sensor connects to an [+ANALOG] position and the black wire of the sensor, together with the sensor's cable shield to a [GROUND] position. Typical wire size: 3 x 0,25 mm² (shielded cables are recommended).

SCREW TERMINAL:
AN 1/ 7 /13

ANALOG 13
+ ANALOG 1
- ANALOG 1
GROUND
- ANALOG 7
+ ANALOG 7
EXCIT. OUT 1

1 2 3 4 5 6 7



TEMPERATURE
SENSOR #110S

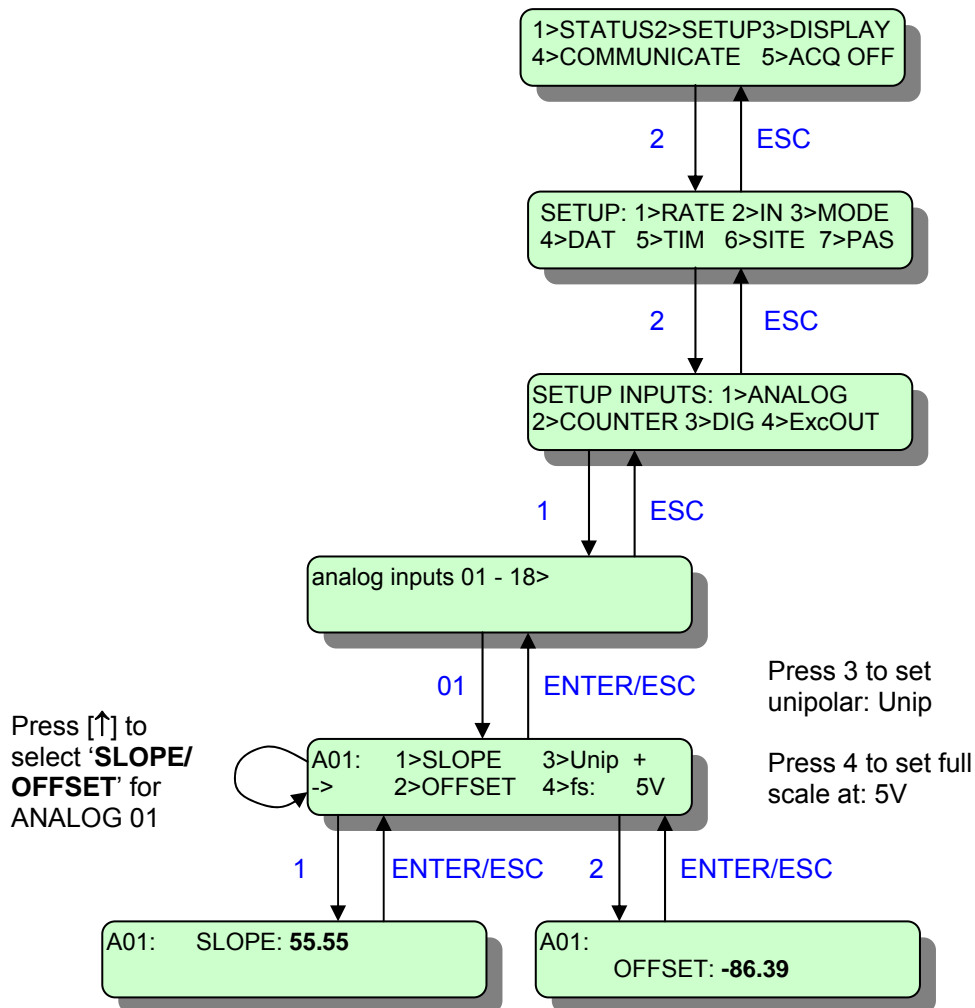
IN CASE IT DOESN'T WORK:

- With the sensor connected to the logger, select from the main menu:
SETUP>MODE>CONTINUOUS>[ENTER]
- With a multimeter check the voltage between the white and black wire: at ambient temperature (23°C) it should be about 2V.

SETUP:

Before changing the logger's setup select:
5> ACQ OFF (press [5] and [ENTER]).

After changing setup select:
5>ACQ ON (press [5] and [ENTER])
 to start acquisition (data logging).

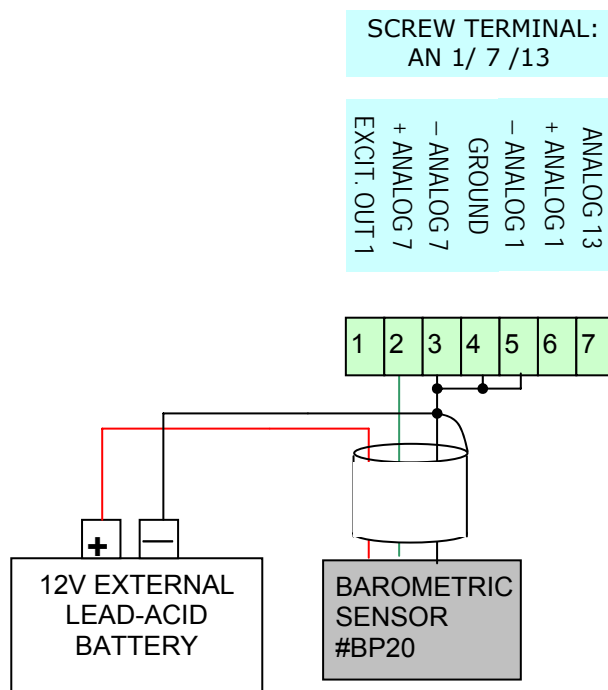


- Coefficients for Celsius degrees:
SLOPE: 55.55, OFFSET: -86.39
- Coefficients for Fahrenheit degrees:
SLOPE: 100, OFFSET: -123.5

15. BAROMETRIC NRG #BP20

CONNECTION:

- Make sure that you are using a voltage analog input.
- Connect the first sensor to screws 6 [+ANALOG1] and 4 [GROUND] on the screw terminal.
- Connect the second sensor to screws 2 [+ANALOG7] and 4 [GROUND] on the screw terminal.
- Connect the third sensor to screws 7 [ANALOG13] and 4 [GROUND] on the screw terminal.
- **CAUTION:** short-circuit all three screws 3, 4 and 5 on the screw terminal, as shown in the diagram (i.e. convert inputs to single-ended).
- **Wire polarity does matter** (see drawing): The **red** wire of the sensor connects to an external +7V ~ +35VDC power source (typically a 12V lead-acid battery). The **white** wire of the sensor connects to a [+ANALOG] position and the black wire of the sensor, together with the sensor's cable shield to a [GROUND] position. Typical wire size: 3 x 0,25 mm² (shielded cables are recommended).



IN CASE IT DOESN'T WORK:

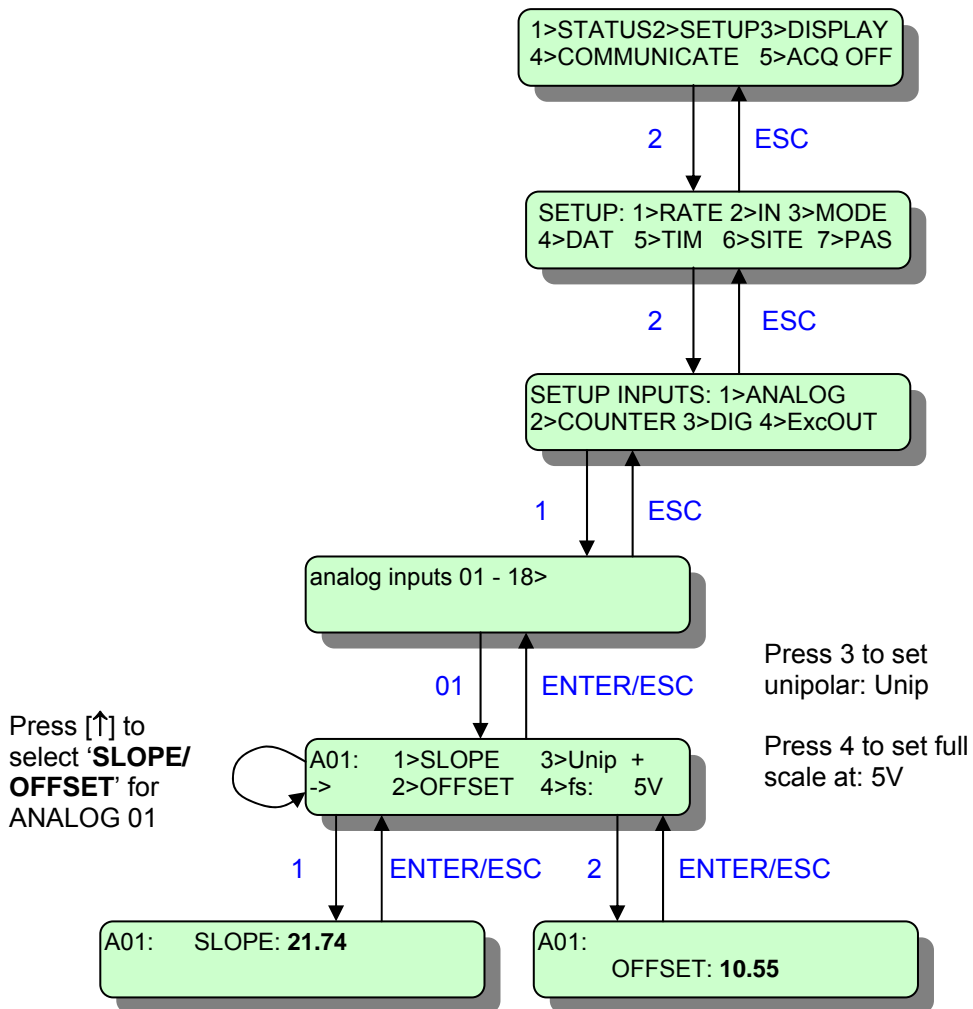
- Connect the sensor to the battery.
- With a multimeter check the voltage between the green and black wire: it should be about 4V.

SETUP:

Before changing the logger's setup select:
5> ACQ OFF (press [5] and [ENTER]).

After changing setup select:
5>ACQ ON (press [5] and [ENTER])

to start acquisition (data logging).

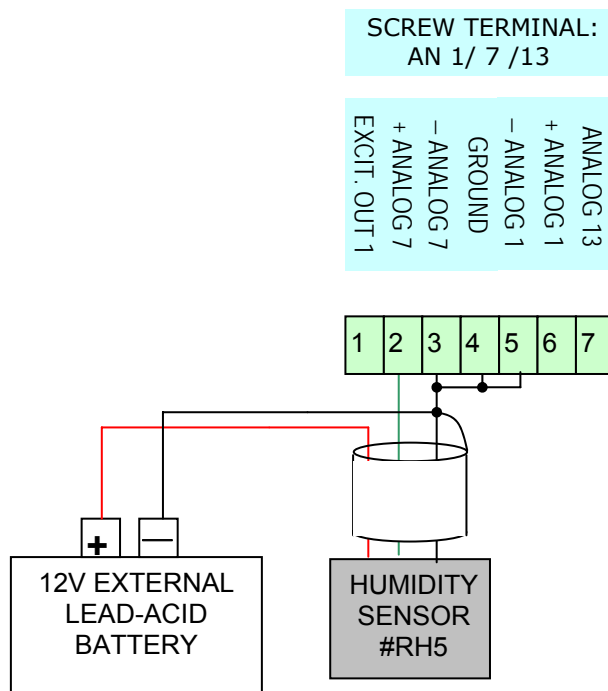


Coefficients for conversion to kPa
 For calibrated sensors enter the correct
 SLOPE and OFFSET values.

16. HUMIDITY NRG #RH5

CONNECTION:

- Make sure that you are using a voltage analog input.
- Connect the first sensor to screws 6 [+ANALOG1] and 4 [GROUND] on the screw terminal.
- Connect the second sensor to screws 2 [+ANALOG7] and 4 [GROUND] on the screw terminal.
- Connect the third sensor to screws 7 [ANALOG13] and 4 [GROUND] on the screw terminal.
- **CAUTION:** short-circuit all three screws 3, 4 and 5 on the screw terminal, as shown in the diagram (i.e. convert inputs to single-ended).
- **Wire polarity does matter** (see drawing): The **red** wire of the sensor connects to an external +10V ~ +36VDC power source (typically a 12V lead-acid battery). The **white** wire of the sensor connects to a [+ANALOG] position and the black wire of the sensor, together with the sensor's cable shield to a [GROUND] position. Typical wire size: 3 x 0,25 mm² (shielded cables are recommended).



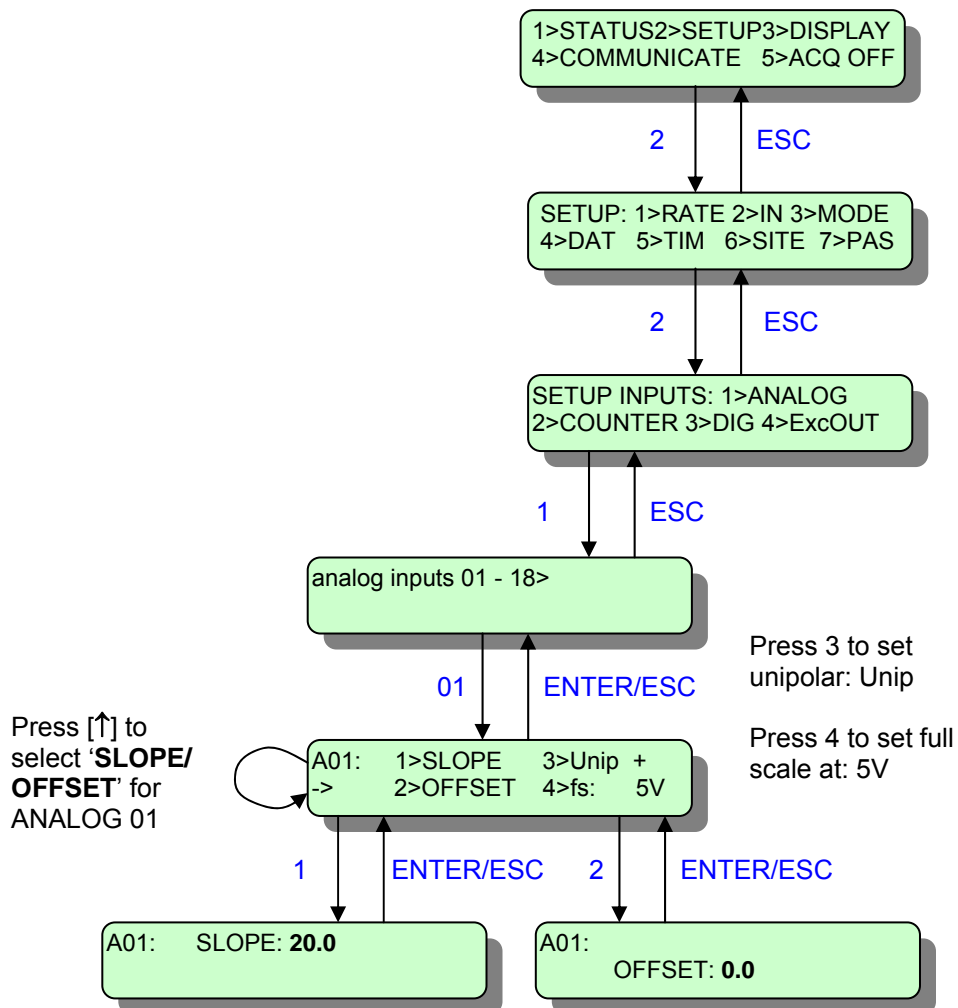
IN CASE IT DOESN'T WORK:

- Connect the sensor to the battery.
- With a multimeter check the voltage between the green and black wire: for 60% humidity it should read about 3V.

SETUP:

Before changing the logger's setup select:
5> ACQ OFF (press [5] and [ENTER]).

After changing setup select:
5>ACQ ON (press [5] and [ENTER])
 to start acquisition (data logging).

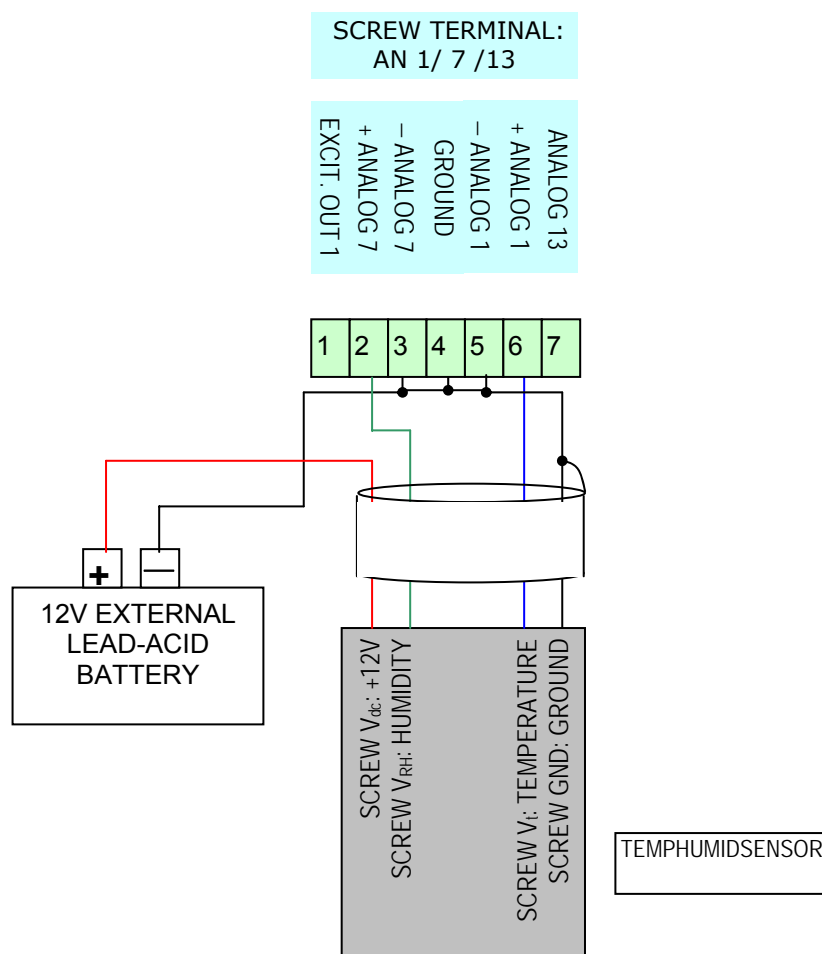


Coefficients for conversion to percent relative humidity.
 For calibrated sensors enter the correct SLOPE and OFFSET values.

17. TEMPERATURE-HUMIDITY DeltaOhm HD9009TR

CONNECTION:

- Make sure that you are using a voltage analog input.
- Connect the sensor to screws 6 [+ANALOG1], 2 [+ANALOG7] and 4 [GROUND] on the screw terminal.
- **CAUTION:** short-circuit all three screws 3, 4 and 5 on the screw terminal, as shown in the diagram (i.e. convert inputs to single-ended).
- **Wire polarity does matter** (see drawing): The sensor connects to an external +7V ~ +30VDC 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 mm² (shielded cables are recommended).



IN CASE IT DOESN'T WORK:

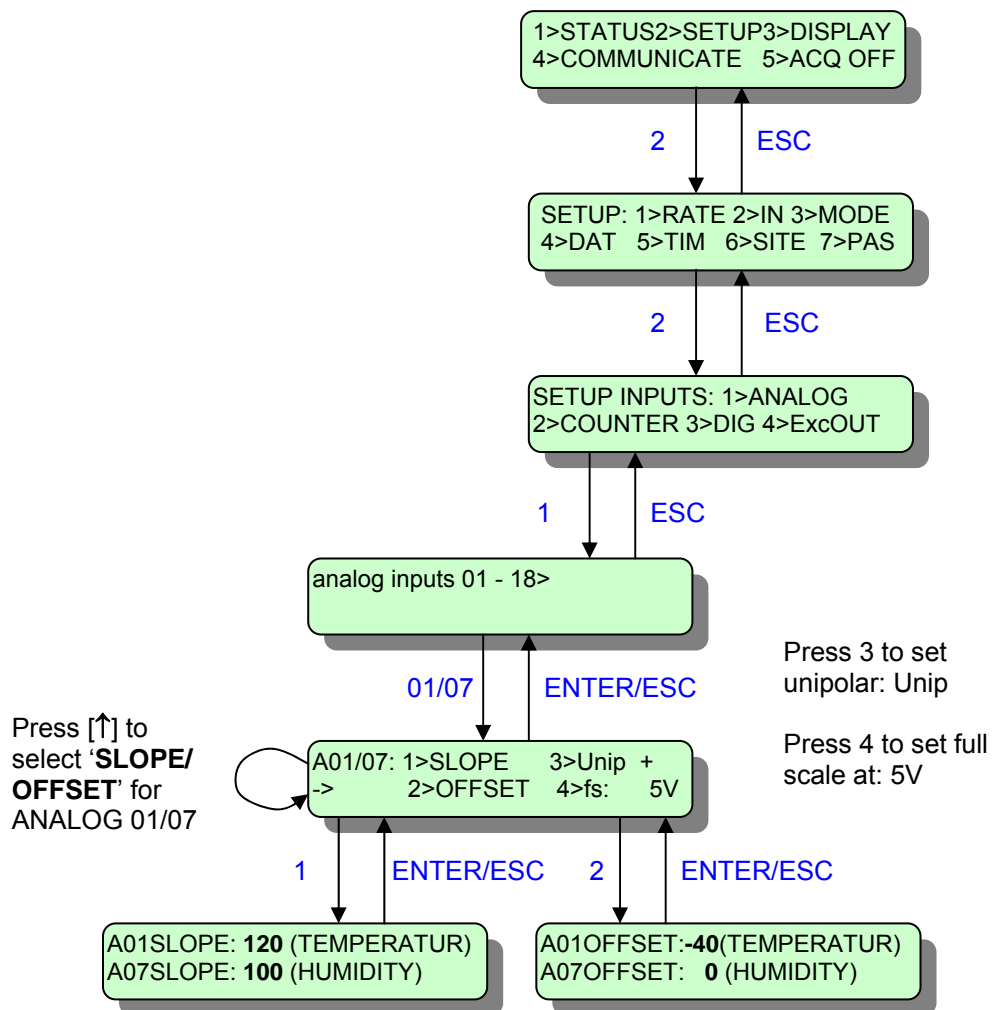
- Connect the sensor to the battery.
- With a multimeter check the voltage between TEMPERATURE and GROUND: At ambient temperature 20 °C it should be about 0.5V.
- With a multimeter check the voltage between HUMIDITY and GROUND: At an ambient humidity 70% it should be about 0.7V.

SETUP:

Before changing the logger's setup select:
5 > ACQ OFF (press [5] and [ENTER]).

After changing setup select:
5 > ACQ ON (press [5] and [ENTER])

to start acquisition (data logging).

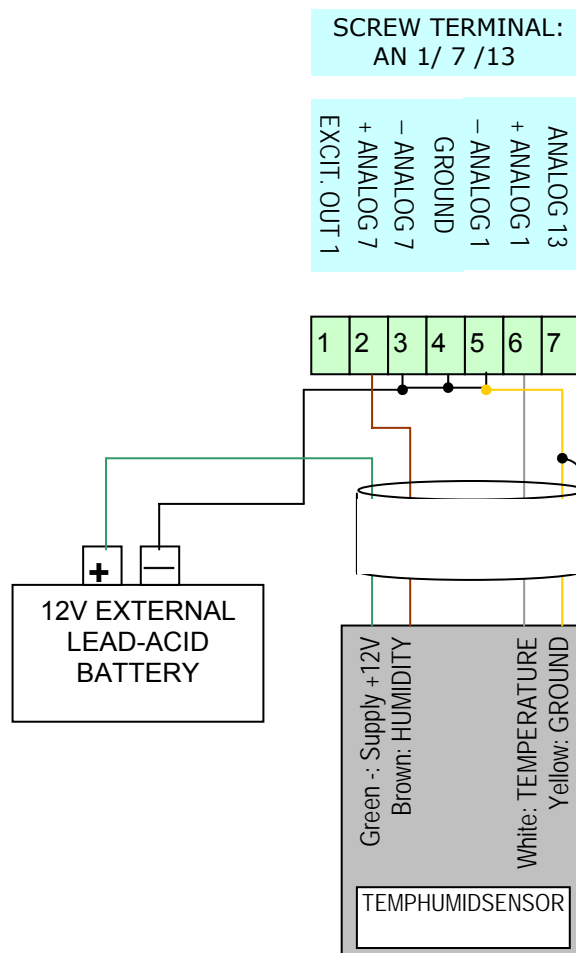


Coefficients for display in:
 TEMPERATURE: -40 ~ +80 °C
 HUMIDITY: 0 ~ 100 %

18. TEMPERATURE-HUMIDITY Ammonit P6312

CONNECTION:

- Make sure that you are using a voltage analog input.
- Connect the white wire to screw #6 [+ANALOG1], the brown wire to screw #2 [+ANALOG7], the green wire to Battery [+] and the yellow wire to screw #4 [GROUND] on the screw terminal.
- **CAUTION:** short-circuit all three screws 3, 4 and 5 on the screw terminal, as shown in the diagram (i.e. convert inputs to single-ended).
- **Wire polarity does matter** (see drawing): The sensor connects to an external +7V ~ +30VDC 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 mm² (shielded cables are recommended).



IN CASE IT DOESN'T WORK:

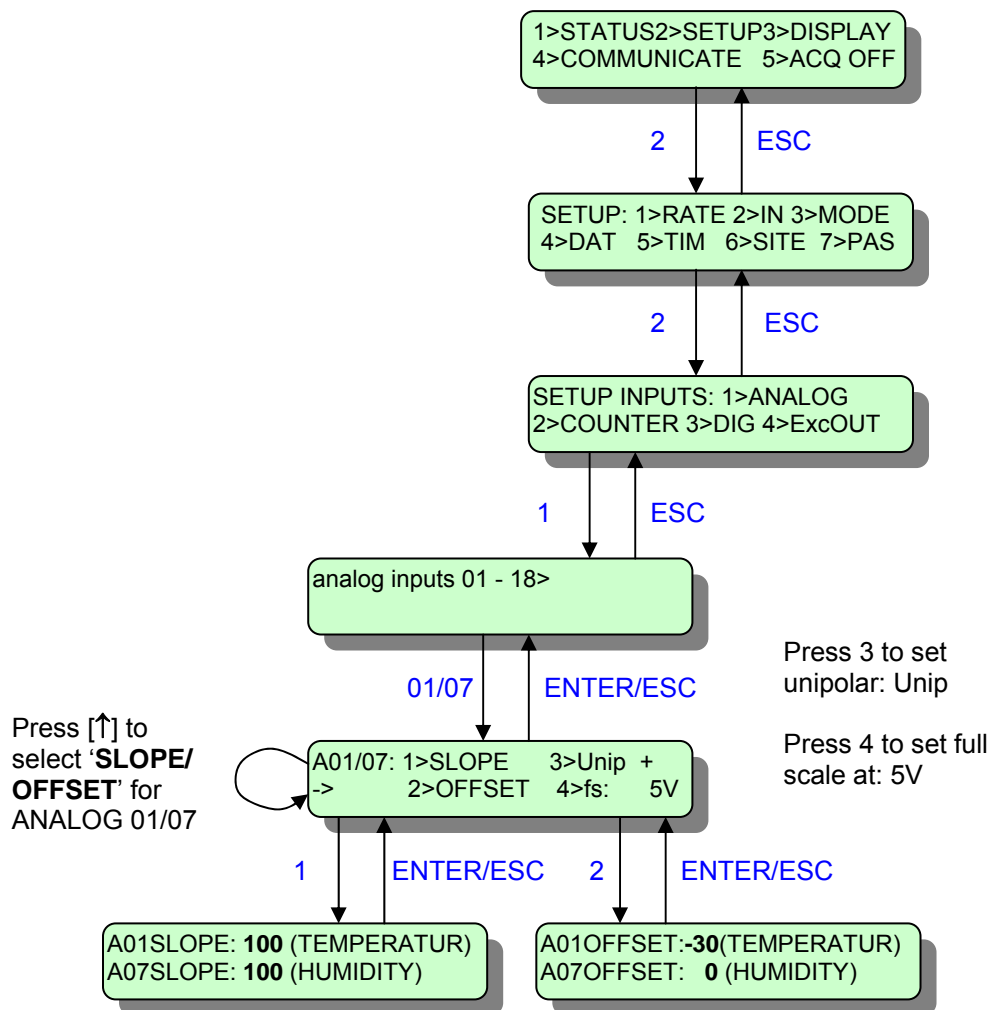
- Connect the sensor to the battery.
- With a multimeter check the voltage between TEMPERATURE and GROUND: At ambient temperature 20 °C it should be about 0.5V.
- With a multimeter check the voltage between HUMIDITY and GROUND: At an ambient humidity 70% it should be about 0.7V.

SETUP:

Before changing the logger's setup select:
5 > ACQ OFF (press [5] and [ENTER]).

After changing setup select:
5 > ACQ ON (press [5] and [ENTER])

to start acquisition (data logging).

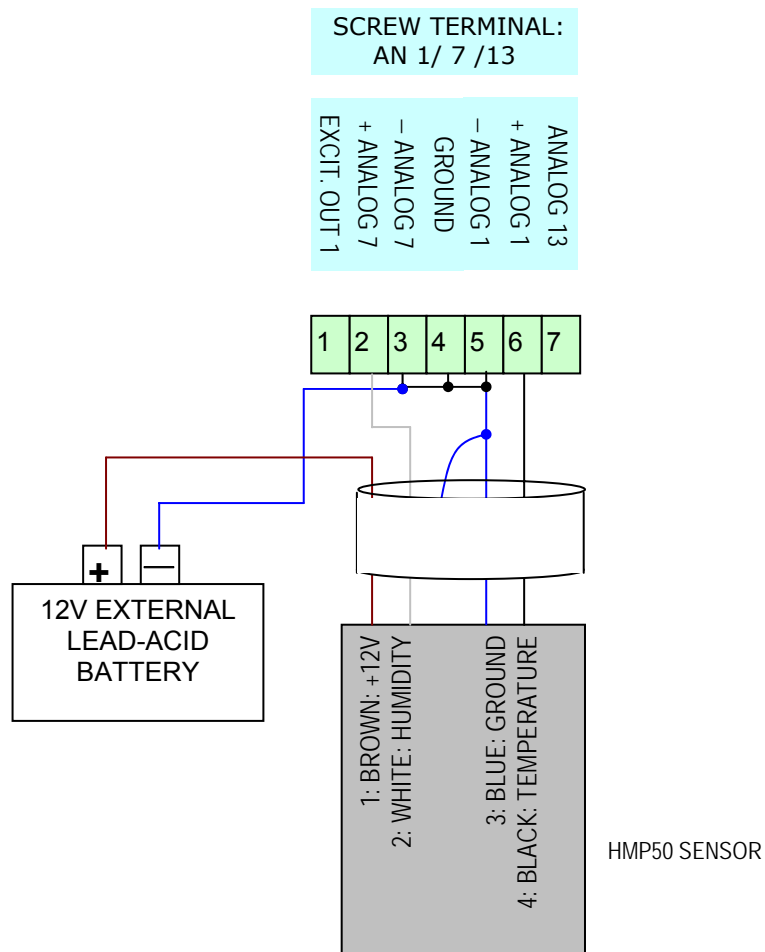


Coefficients for display in:
 TEMPERATURE: -30 ~ +70 °C
 HUMIDITY: 0 ~ 100 %

19. TEMPERATURE-HUMIDITY Vaisala HMP50

CONNECTION:

- Connect the first sensor to screws 2 [ANALOG1], 5 [ANALOG2] and 3 [GROUND] on the right screw terminal.
- Connect the second sensor to screws 8 [ANALOG3], 10 [ANALOG4] και 9 [GROUND] 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 GROUND together with the cable shield connects to a logger GROUND position. Typical wire size: 4 x 0,25 mm² (shielded cables are recommended).



IN CASE IT DOESN'T WORK:

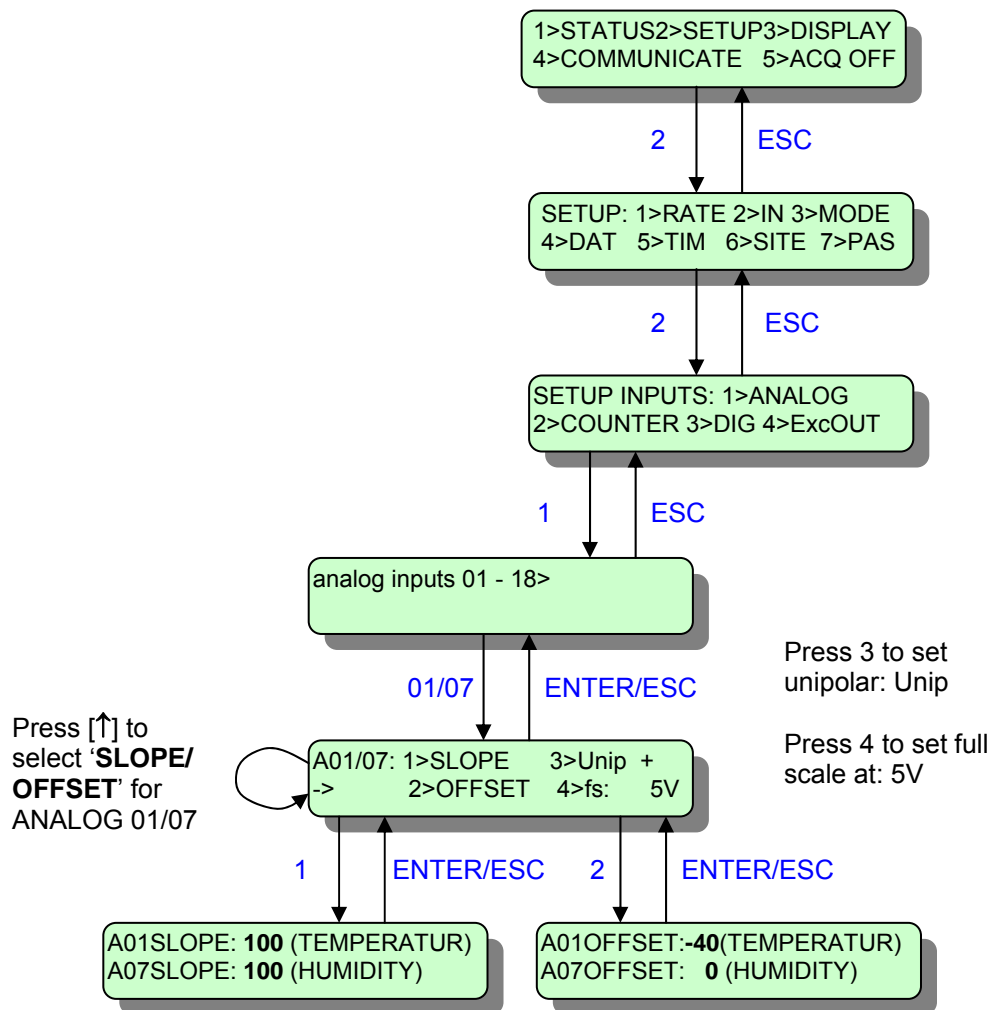
- Connect the sensor to the battery.
- With a multimeter check the voltage between TEMPERATURE and GROUND: At ambient temperature 20 °C it should be about 0.5V.
- With a multimeter check the voltage between HUMIDITY and GROUND: At an ambient humidity 70% it should be about 0.7V.

SETUP:

Before changing the logger's setup select:
5> ACQ OFF (press [5] and [ENTER]).

After changing setup select:
5>ACQ ON (press [5] and [ENTER])

to start acquisition (data logging).



Coefficients for:
 TEMPERATURE: -40 ~ +60 °C
 HUMIDITY: 0 ~ 100 %

HMP50 output	SLOPE (TEMP)	OFFSET (TEMP)	SLOPE (HUMID)	OFFSET (HUMID)
1V	100.0000	- 40.0000	100.0000	0.0000
2.5V	40.0000	- 40.0000	40.0000	0.0000
5V	20.0000	- 40.0000	20.0000	0.0000

20. PYRANOMETER LiCor LI-200SA

CONNECTION:

- Make sure that you are using a voltage analog input.
- Connect the first sensor to screws 6 [+ANALOG1] and 4 [GROUND] on the screw terminal. Connect to the same screws the resistor that comes with the sensor (usually 147-Ohm).
- Connect the second sensor to screws 2 [+ANALOG7] and 4 [GROUND] on the screw terminal. Connect to the same screws the resistor that comes with the sensor (usually 147-Ohm).
- Connect the third sensor to screws 7 [ANALOG13] and 4 [GROUND] on the screw terminal. Connect to the same screws the resistor that comes with the sensor (usually 147-Ohm).
- **CAUTION:** short-circuit all three screws 3, 4 and 5 on the screw terminal, as shown in the diagram (i.e. convert inputs to single-ended).
- **Wire polarity does matter** (see drawing): The **red** wire of the sensor connects to screw 9 [GROUND]. The black wire together with the shield is connected to [+ANALOG].
- Typical wire size: 2 x 0,25 mm² (shielded cables are recommended).
- Slope calculation.
If P_{uA} is the sensor's sensitivity in $\mu\text{A}/\text{kW}/\text{m}^2$:

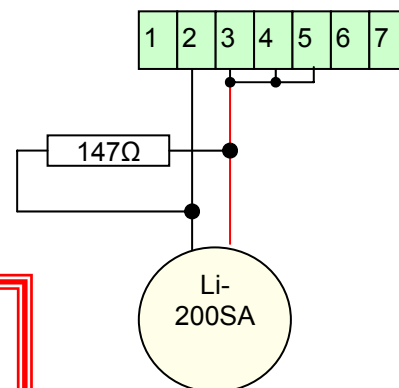
$$\text{Slope} = \frac{10^6}{P_{uA} \cdot 147} \text{ [kW/m}^2\text{]}$$

With a typical $P_{uA} = 80\mu\text{A}$, we have $\text{Slope} = 85,034$

$\text{Offset} = 0$

SCREW TERMINAL:
AN 1/ 7 /13

ANALOG 13	+	ANALOG 1
-	ANALOG 1	
GROUND		
-	ANALOG 7	
+	ANALOG 7	
EXCIT. OUT 1		



IN CASE IT DOESN'T WORK:

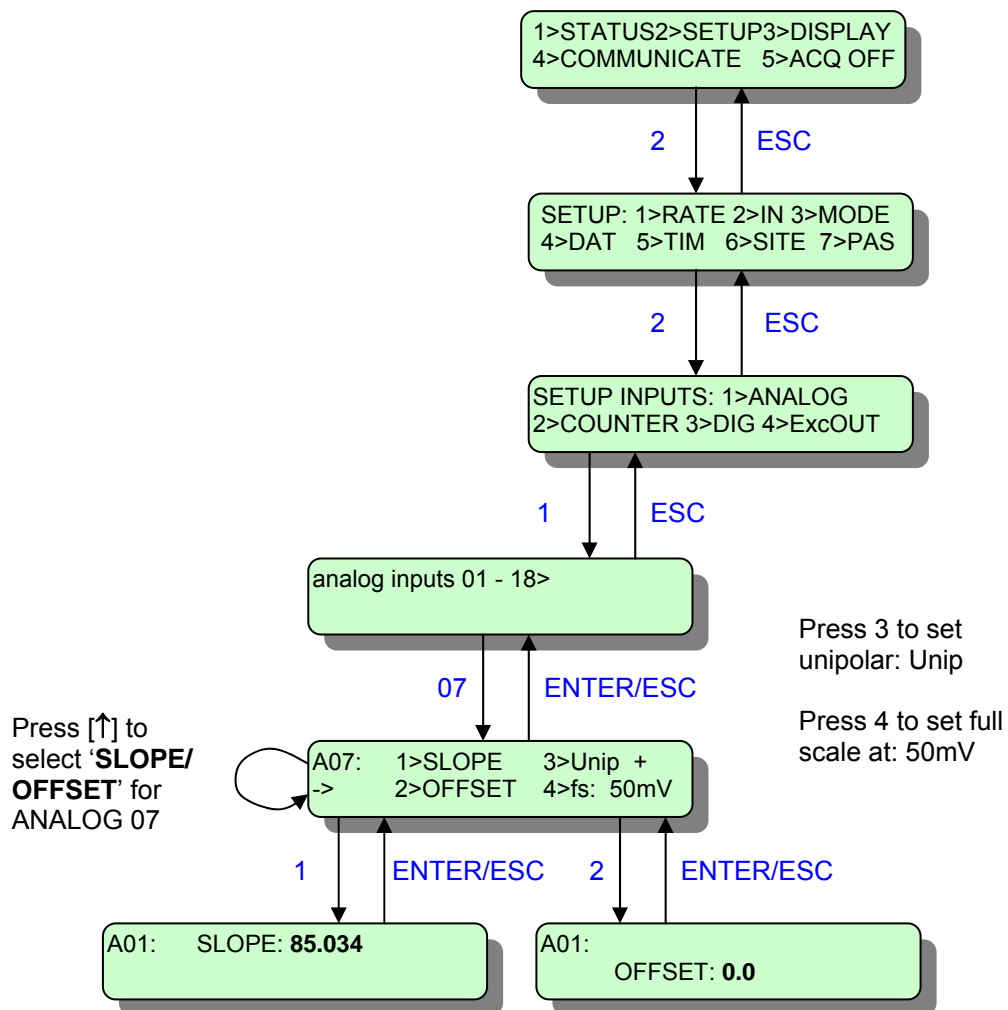
- With a multimeter check the voltage between screws 8 and 9: the sensor output should be about 12mV/1000W/m². In the dark it should display less than 1W.

SETUP:

Before changing the logger's setup select:
5> ACQ OFF (press [5] and [ENTER]).

After changing setup select:
5>ACQ ON (press [5] and [ENTER])

to start acquisition (data logging).

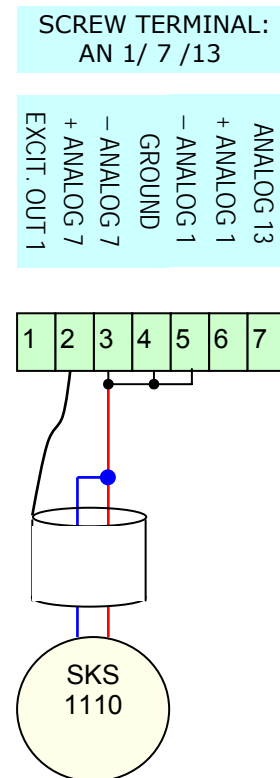


Coefficients shown are for indication in kW/m^2 with a typical sensitivity of $80\mu\text{A}/1000\text{W/m}^2$. If the pyranometer is calibrated calculate the coefficients as shown above.

21. PYRANOMETER SKYE SKS-1110

CONNECTION:

- Make sure that you are using a voltage analog input.
- Connect the first sensor to screws 6 [+ANALOG1] and 4 [GROUND] on the screw terminal.
- Connect the second sensor to screws 2 [+ANALOG7] and 4 [GROUND] on the screw terminal.
- Connect the third sensor to screws 7 [ANALOG13] and 4 [GROUND] on the screw terminal.
- **CAUTION:** short-circuit all three screws 3, 4 and 5 on the screw terminal, as shown in the diagram (i.e. convert inputs to single-ended).
- Remove the connector (if any) from the wire end. Wire polarity does matter (see drawing): The **red** wire together with the **blue** wire of the sensor connect to [GROUND]. The shield is connected to [ANALOG].
- Typical wire size: 2 x 0,25 mm² (shielded cables are recommended).



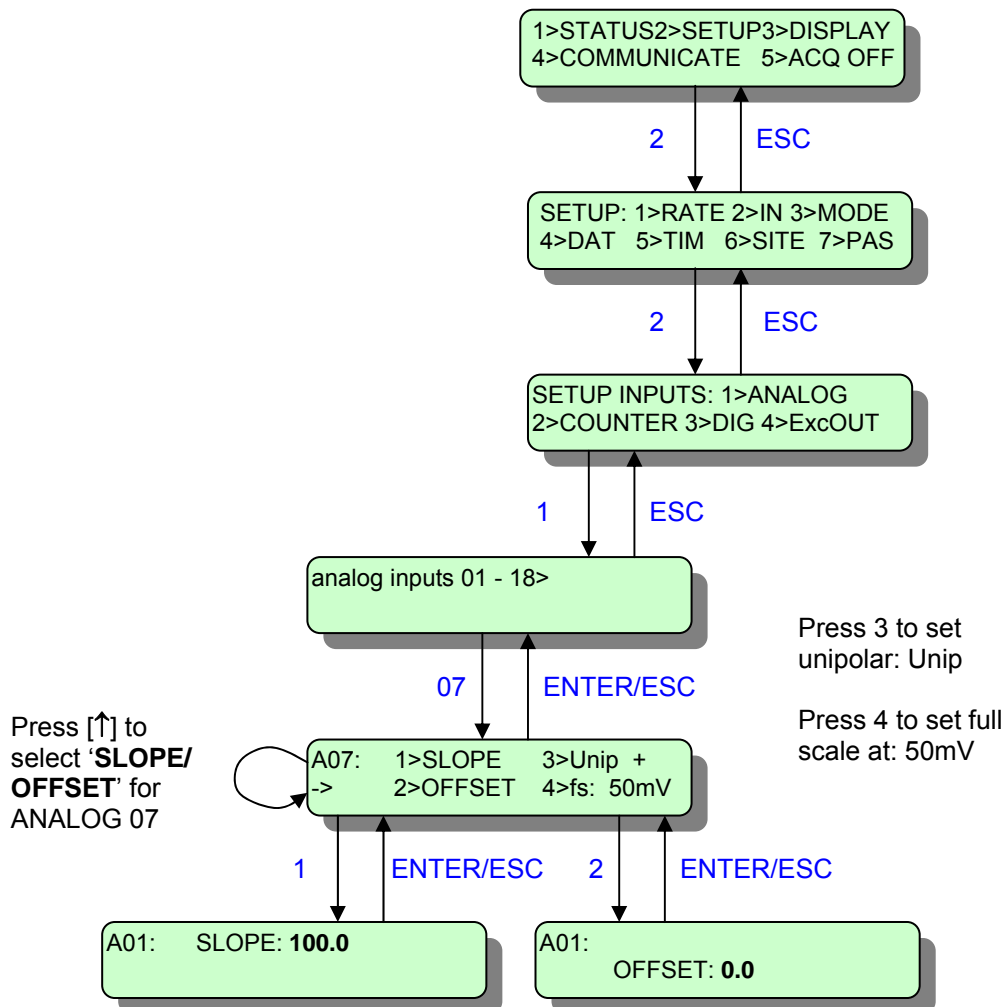
IN CASE IT DOESN'T WORK:

- With a multimeter check the voltage between screws 8 and 9: the sensor output should be about 100mV/1000W/m². In the dark it should display less than 1W.

SETUP:

Before changing the logger's setup select:
5> ACQ OFF (press [5] and [ENTER]).

After changing setup select:
5> ACQ ON (press [5] and [ENTER])
 to start acquisition (data logging).



Coefficients shown are for indication in kW/m^2 .

22. 4~20mA TRANSMITTERS

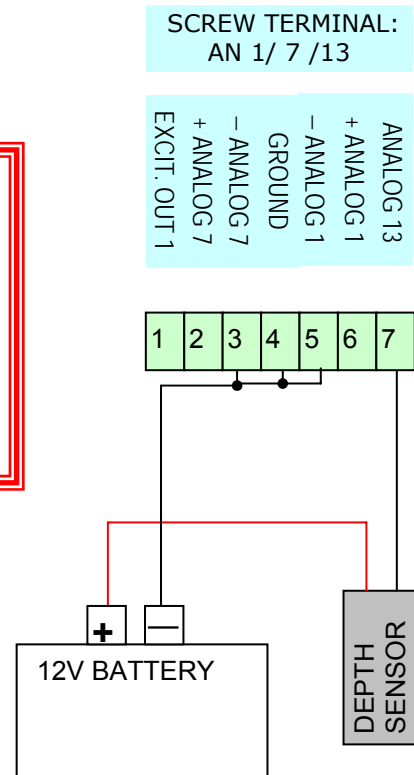
SDP-5 depth sensor, etc.

CONNECTION:

- Make sure that you are using a current analog input.
- Connect the first sensor to screws 6 [+ANALOG1] and 4 [GROUND] on the screw terminal.
- Connect the second sensor to screws 2 [+ANALOG7] and 4 [GROUND] on the screw terminal.
- Connect the third sensor to screws 7 [ANALOG13] and 4 [GROUND] on the screw terminal.
- **CAUTION:** short-circuit all three screws 3, 4 and 5 on the screw terminal, as shown in the diagram (i.e. convert inputs to single-ended).
- Wire polarity does matter (see drawing): The red wire of the sensor connects to battery. The black wire of the sensor connects to [+ANALOG].

IN CASE IT DOESN'T WORK:

- Make sure that the ANALOG input is a current input.
- 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.

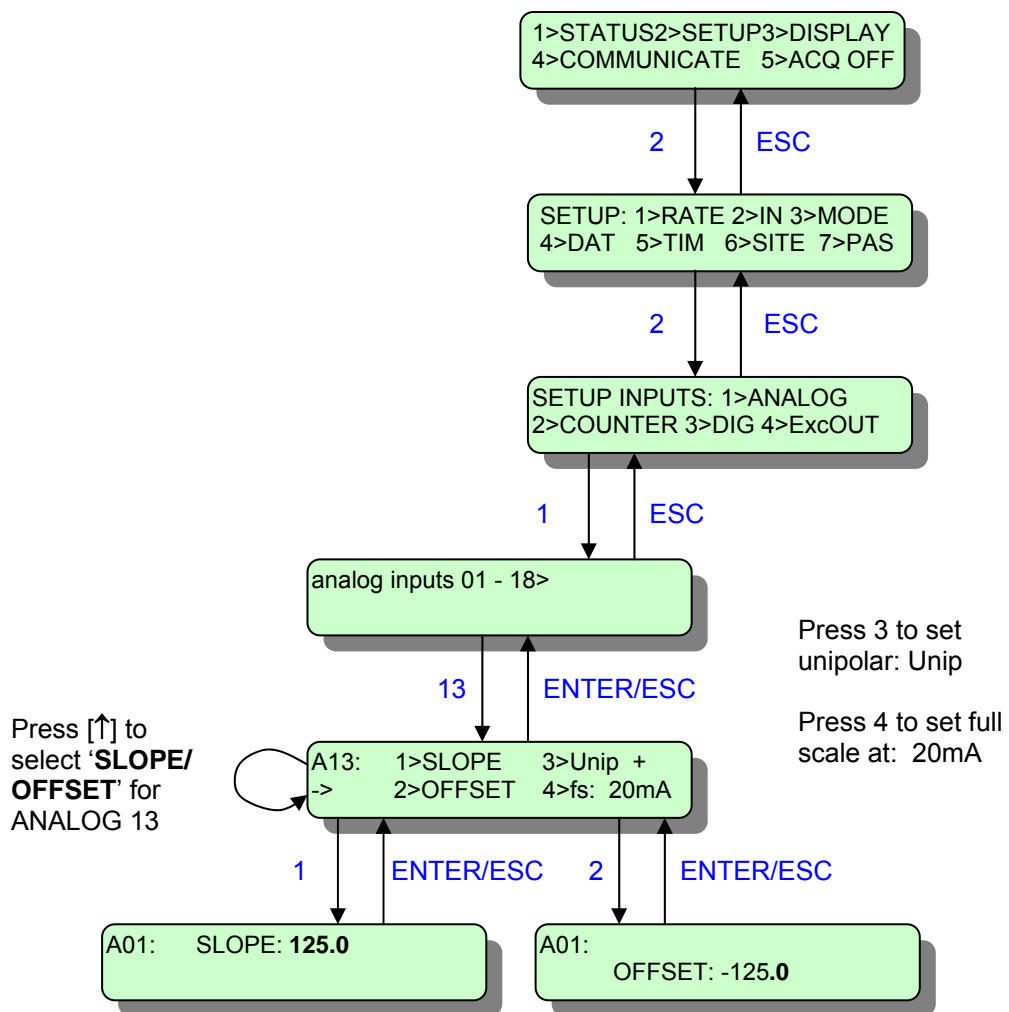


SETUP:

Before changing the logger's setup select:
5> ACQ OFF (press [5] and [ENTER]).

After changing setup select:
5>ACQ ON (press [5] and [ENTER])

to start acquisition (data logging).

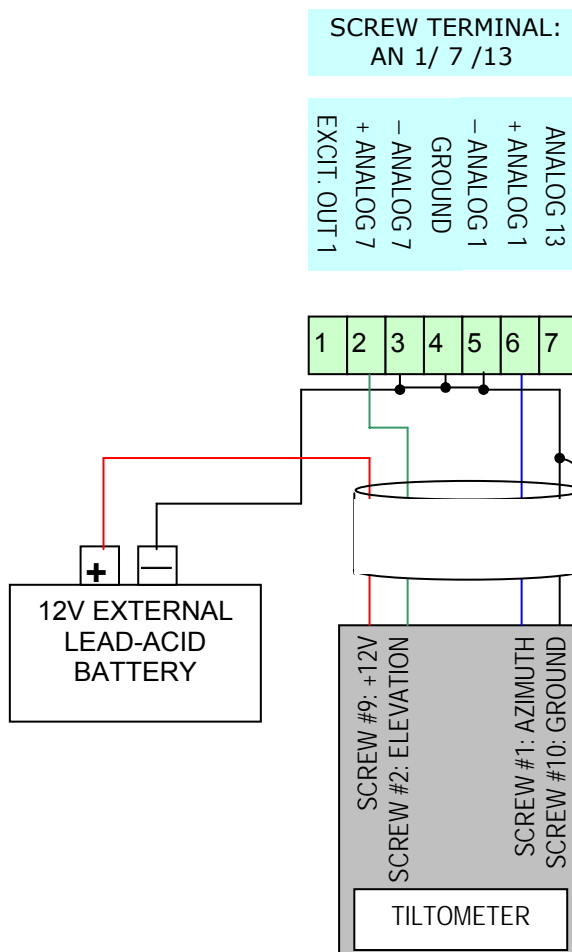


Coefficients for conversion to centimeters.
 For calibrated sensors enter the correct
 SLOPE and OFFSET values.

23. SYMMETRON TILTOMETER

CONNECTION:

- Make sure that you are using a voltage analog input.
- Connect the sensor to screws 6 [+ANALOG1], 2 [+ANALOG7] and 4 [GROUND] on the screw terminal.
- CAUTION: short-circuit all three screws 3, 4 and 5 on the screw terminal, as shown in the diagram (i.e. convert inputs to single-ended).
- 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 mm² (shielded cables are recommended).



In order to have the Azimuth display 0 degrees when the mast tilts North, fasten the Tiltometer such, that in vertical position the box label 'looks' South.

IN CASE IT DOESN'T WORK:

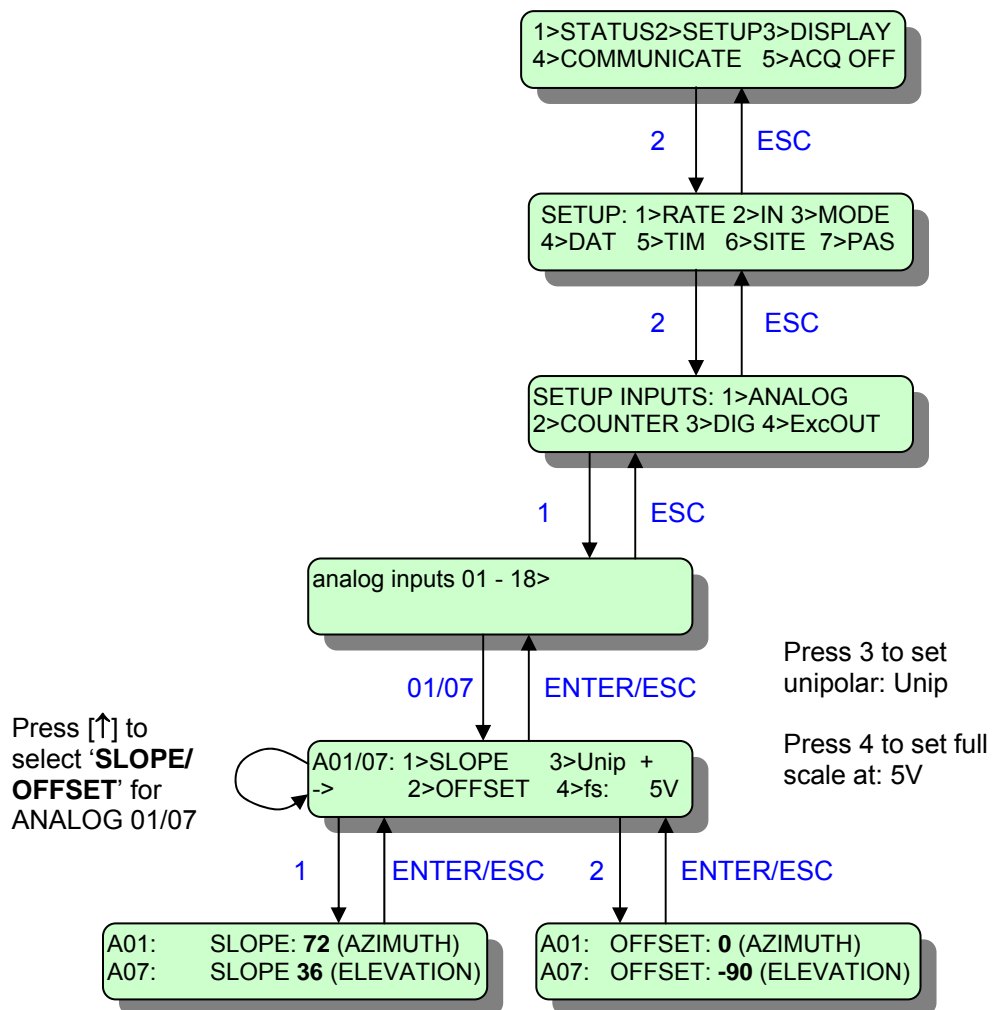
- Connect the sensor to the battery.
- With a multimeter check the voltage between ELEVATION and GROUND: When the Tiltometer is placed flat horizontally it should be about 2.5V.
- With a multimeter check the voltage between AZIMUTH and GROUND: When the Tiltometer is placed horizontally and is rotated around its longest axis it should vary from 0 to 5V.

SETUP:

Before changing the logger's setup select:
5> ACQ OFF (press [5] and [ENTER]).

After changing setup select:
5>ACQ ON (press [5] and [ENTER])

to start acquisition (data logging).



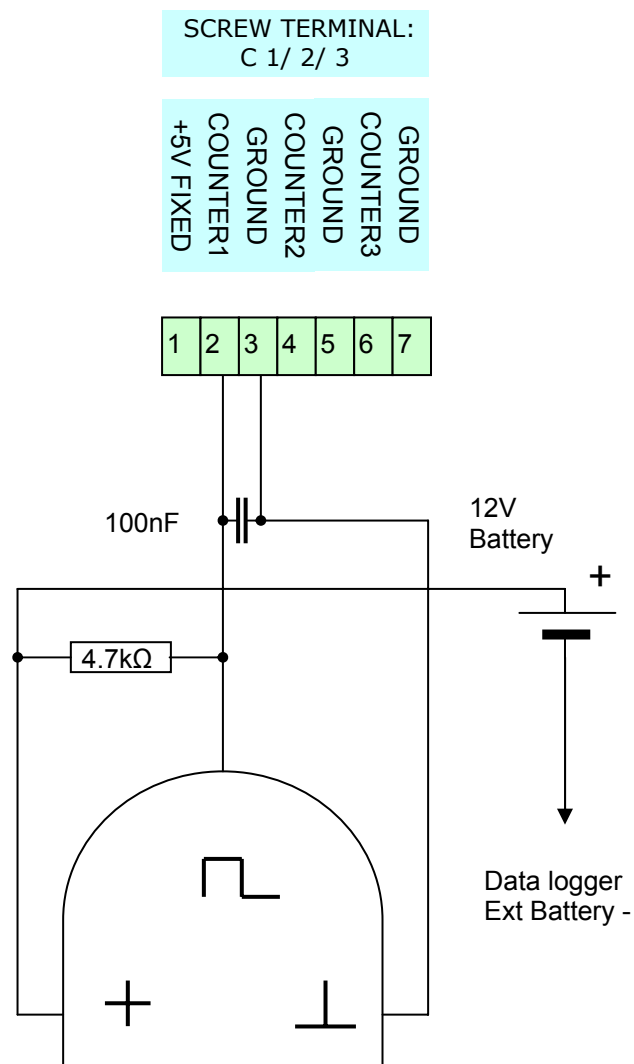
Coefficients for display in degrees:
 ELEVATION: +90 ~ -90
 AZIMUTH: 0 ~ 360

24. FLOW METERS.

Open-collector sensors: DIGMESA Flowmeters

CONNECTION:

- Connect the first flow meter to screws 2 [COUNTER1] and 3 [GROUND] on the screw terminal.
- Connect the second flow meter to screws 4 [COUNTER2] and 5 [GROUND] on the screw terminal.
- Connect the third flow meter to screws 6 [COUNTER3] and 7 [GROUND] on the screw terminal.
- Wire polarity does matter (see drawing). Typical wire size: 3 x 0,25 mm² (shielded cables are recommended). Connect the shield to the GROUND screw.

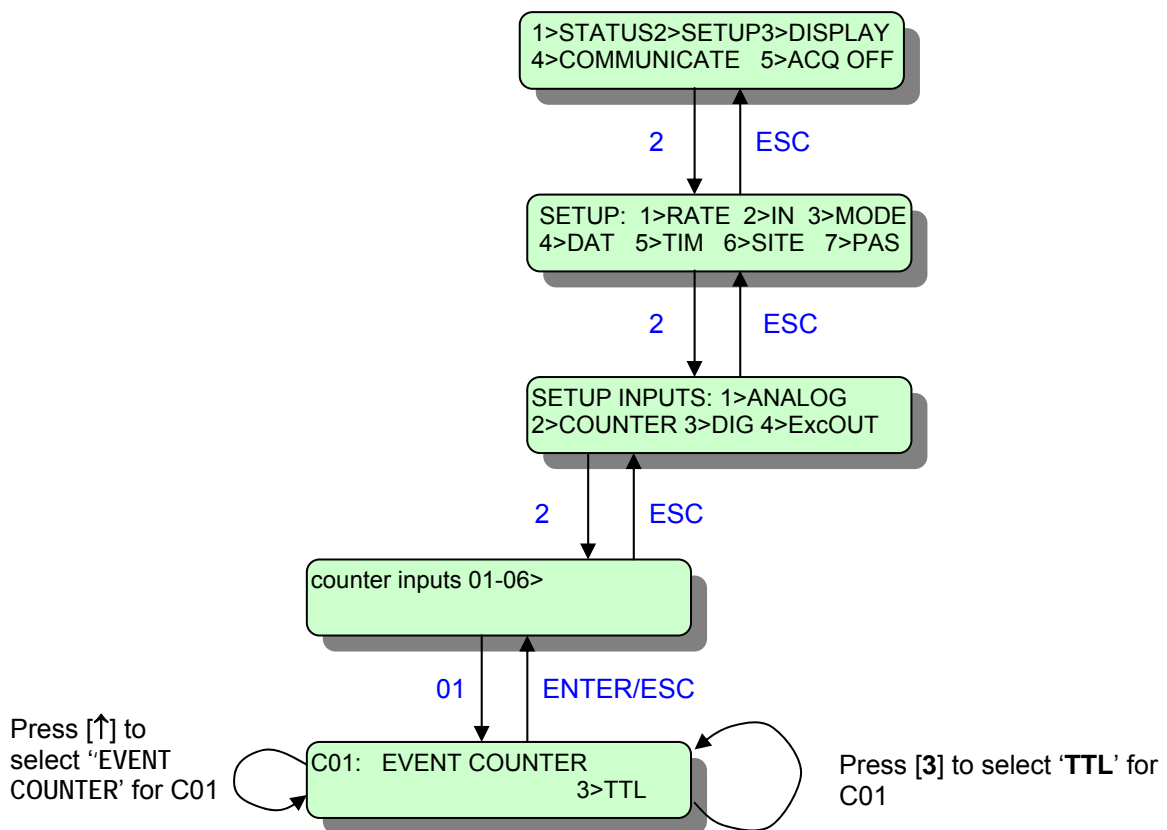


SETUP:

Before changing the logger's setup select:
5> ACQ OFF (press [5] and [ENTER]).

After changing setup select:
5>ACQ ON (press [5] and [ENTER])

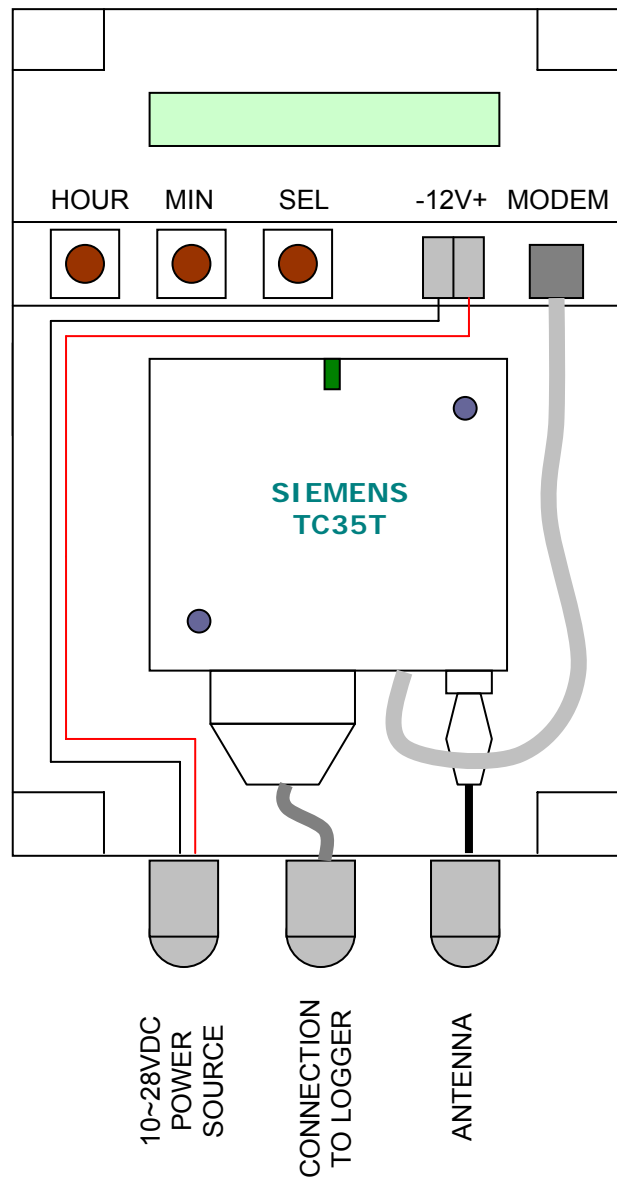
to start acquisition (data logging).



NOTE: You can set appropriate Slope and Offset coefficients for Event counters in Stylitis Explorer | Site Properties.

25. SYMMETRON TIMER FOR TC/MC35T MODEM

Switches ON and OFF the modem according to a daily program.
Conserves battery power and resets the modem.



TIMER SETUP

1. Includes a back-up cell to keep setup and time for at least 3 years. Without an external power supply the modem and the display are always off. Protected from reverse supply connection. Power supply: 10~ 28VDC, 2mA. Enclosure: IP65, 20x12x7cm (includes modem). Operation temperature: -30 ~ +70°C.

2. Place the modem in the box and connect it as shown in the diagram. Connect power; the display should come up. Use the *SEL* button to select:

Auto. The default display. Shows current time. ON is displayed when on.

SetClok. Use the *HOUR*, *MIN* buttons to set current time.

SetON. Use the *HOUR*, *MIN* buttons to set the ON time.

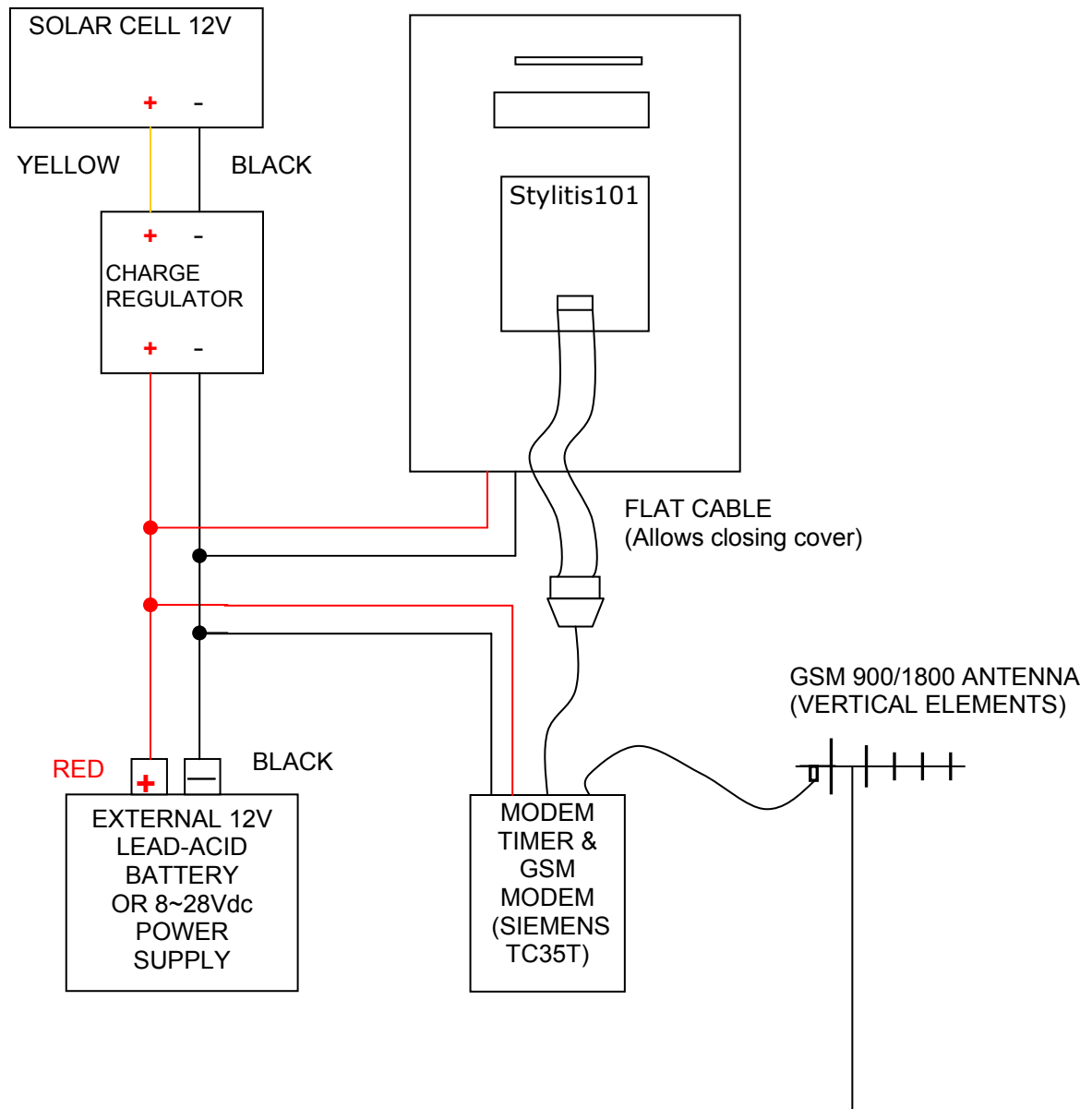
SetOFF. Use the *HOUR*, *MIN* buttons to set the OFF time.

AlwaysON. The timer is continuously ON.

AlwaysOFF. The timer is continuously OFF.

3. The timer program works when Auto, SetClok, SetON or SetOFF is displayed.

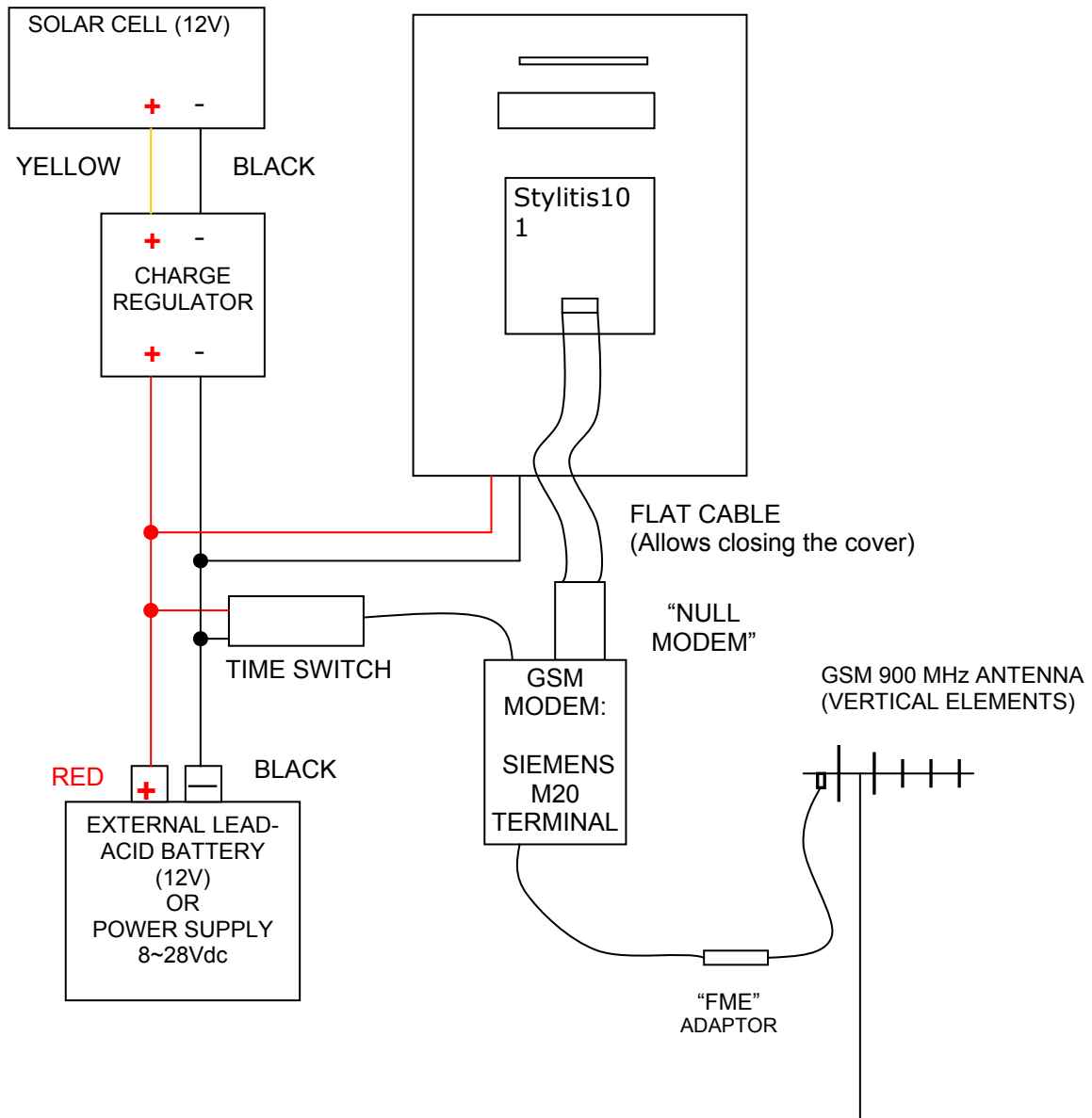
26. BATTERY, SOLAR CELL AND TIMER CONNECTION SIEMENS TC/MC35T:



SIEMENS TC35T/MC35T MODEM SETUP

1. **Disconnect the modem from the power supply.**
2. Press the yellow button on modem's side, take out the drawer and place the SIM card. (You can un-lock the SIM card (using a standard cellular phone) to avoid re-entering the PIN number each time the modem power supply is removed). Push the drawer back in place.
3. Connect the power supply to the modem. The green light should start blinking rapidly. Enter the PIN code (see above).
4. Wait a few seconds; the green light should start blinking slowly.
5. Go to the COMMUNICATE>MODEM menu: the network operator's name and the signal strength (SIGNAL) should appear in the display. BER shows errors (0 or 99 is OK).
6. In case you are using a directional antenna, turn it around to maximize the "SIGNAL". A value of at least "14" is recommended.

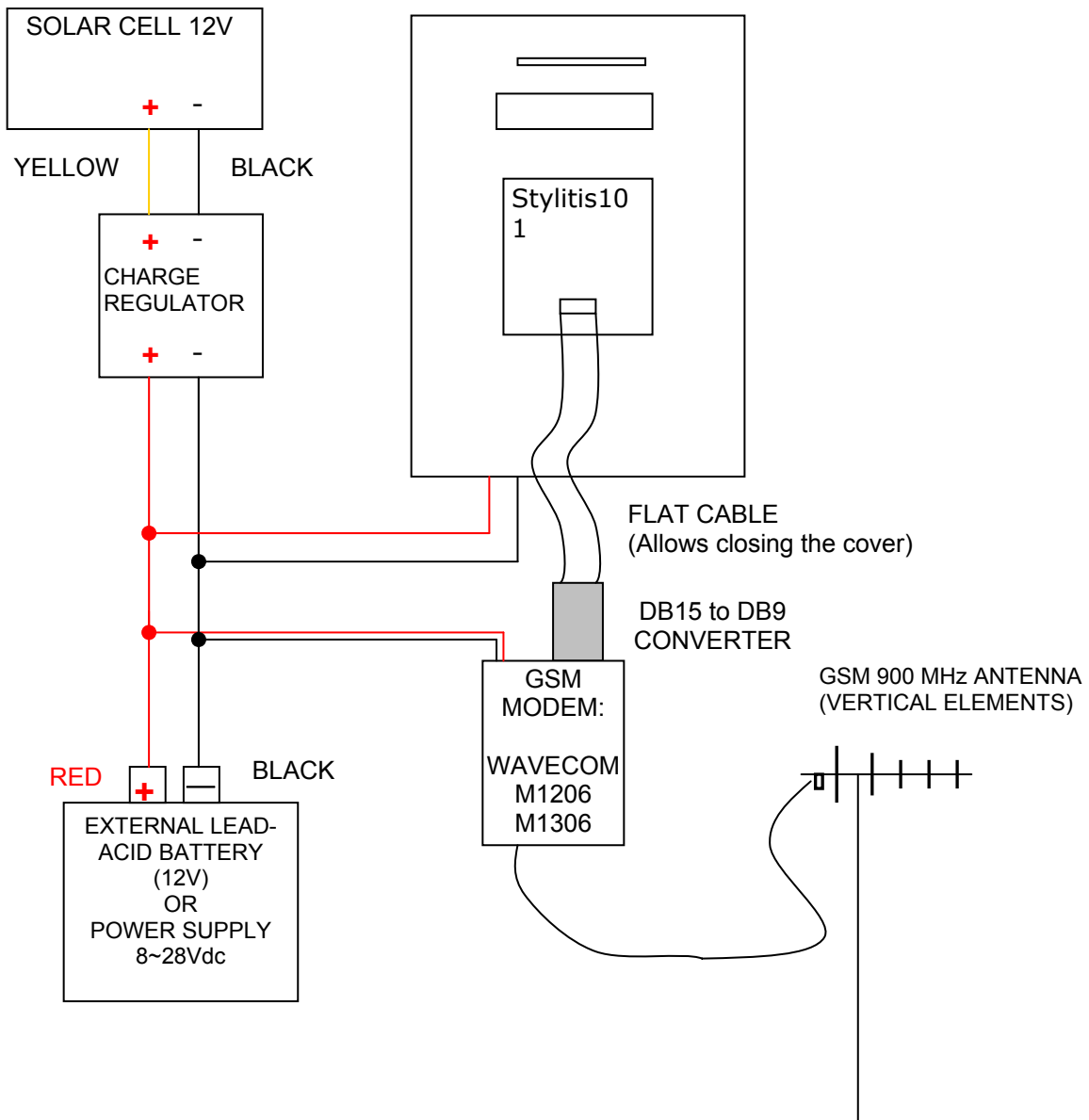
CONNECTION SIEMENS M20T:



SIEMENS M20T MODEM SETUP

1. Disconnect the modem from the power supply.
2. Press the yellow button on modem's side, take out the drawer and place the SIM card. Push the drawer back in place.
3. Connect the power supply to the modem. The green light should start blinking.
4. Enter the PIN code (see above).
5. Go to the "Modem" menu (see above). Wait a few seconds; the green light should stop blinking and the network operator's name should appear in the display.
6. In case you are using a directional antenna, turn it around to maximize the "SIGNAL". A value of at least "14" is recommended.
7. You can un-lock the SIM card (using a standard cellular phone) to avoid re-entering the PIN number each time the modem power supply is removed.

CONNECTION WAVECOM FASTRACK:



WAVECOM FASTRACK MODEM SETUP

1. Disconnect the modem from the power supply.
2. Press the black button on modem's side, take out the drawer and place the SIM card. Push the drawer back in place.
3. Connect the power supply to the modem. The red light should light up.
4. Enter the PIN code (see above).
5. Wait a few seconds; the red light should start blinking **slowly**.
6. Go to the COMMUNICATE>MODEM menu: the network operator's name and the signal strength (SIGNAL) should appear in the display. BER shows errors (0 or 99 is OK).
7. In case you are using a directional antenna, turn it around to maximize the "SIGNAL". A value of at least "14" is recommended.

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:



27. DATA LOGGER MESSAGES

FULL CARD - REMOVE

Full memory card. Replace with an empty one (latest firmware allows card erasure in-site). Data are stored in buffer.

CARD ERROR - REMOVE

Card is bad. Replace.

LOW CARD BATTERY- REMOVE

ONLY FOR SRAM CARDS: Card is not acceptable. Card's battery needs replacement.

PRESS <ESC> TO LEAVE
<ENTER> TO CLEAR CARD

Press [ENTER] to erase card contents. Press ESC] to quit.

NOT ERASED [1>CLEAR]
[- REMOVE]

Flash Card is not acceptable because it has been used in a different logger. Depending on version: press 1 to erase or use an erased card.

INVALID CARD - REMOVE

Card is not acceptable because the logger does not recognize it. Use another card.

BUFFER FULL

Logger's buffer is full and data logging has stopped.

LOW BATTERY -CANNOT
START ACQUISITION

Acquisition cannot be started because battery voltage is less than 5.75V.

ACQ ON
Data in card

Data are stored in memory card.

ACQ ON Data in Buffer
Card full

Memory card is full and data are stored in the internal memory (buffer).

ACQ ON Buffer full
Card full

Acquisition stops when the memory card and the internal buffer are full. Replace with an erased card to retrieve buffer data.

ACQ ON Data in Buffer
No Card

Data are stored in buffer. There is no memory card.

ACQ ON Buffer full
No Card

Acquisition stops when internal buffer is full. There is no memory card.

STOP ACQUISITION
& CLEAR BUFFER DATA?

WHEN CHOOSING ACQUISITION OFF:

- Internal buffer data are cleared.
- The open card file is closed.
- Data recording stops.

START ACQUISITION?

WHEN CHOOSING ACQUISITION ON:

- A new file is opened on the memory card.
- Data recording starts.

28. 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

- From the main menu select: **SETUP>MODE>CONTINUOUS>**[ENTER]
- With a multimeter measure the [EXCITATION OUT] outputs on the screw terminal.
- Correct measured value is +5V.

2. ANALOG INPUT CHECK

- From the main menu select: **SETUP>IN>ANALOG** and set all inputs (A01~A18) to **SLOPE=1.0** and **OFFSET=0.0**
- Connect an [EXCITATION OUT] output to the analog input you want to test.
- From the main menu select: **DISPL>ANALOG**
- Correct value is 5V.
- Do not connect an [EXCITATION OUT] output to an analog current input.

3. FIXED OUTPUT CHECK

- With a multimeter measure the +5V FIXED output on the left screw terminal.
- Correct measured value is about +5V.

4. COUNTER INPUT CHECK

- From the main menu select: **SETUP>IN>COUNTER** and set all inputs (C01~C06) with **SLOPE=1.0**, **OFFSET=0.0** and 'TTL'.
- From the main menu select: **SETUP>MODE>ENERGY SAVE>**[ENTER]
- Connect an [EXCITATION OUT] output to the counter input you want to test.
- From the main menu select: **DISPL>COUNTER**
- Correct measured value is '1.0'.

29. CONNECTION EXAMPLE

