

# **LCC 1 – Tunnel version**

## **User guide**





## Overensstemmelseserklæring

Vi, Senmatic A/S, erklærer hermed, at Klimacomputer LCC1, LCC2, LCC4, WT04 beregnet til styring af klima i væksthuse er udviklet og produceret i overensstemmelse med:

<u>EMC - Direktiv:</u> EN 61131-2:2007	2004/108/EC Programmable controllers – Part 2: Equipment requirements and tests
EN 61000-6-2:2005	Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity for industrial environments
EN 61000-6-4:2007	Electromagnetic compatibility (EMC) – Part 6: Generic standards – section 4: Emission standard for industrial environments
<u>Lav spændings direktiv:</u> EN 61131-2:2007	2006/95/EC Programmable controllers – Part 2: Equipment requirements and tests
EN 60204-1:2006 +A1/2009	Safety of machinery – Electrical equipment of machines – Part 1: General requirements

Denne erklæring omfatter Klimacomputer LCC1, LCC2, LCC3, LCC4, WT04 fra serienummer 310000 til 310400.

## Übereinstimmungserklärung

Wir, Senmatic A/S, erklären hiermit, dass Klimacomputer LCC 1, LCC 2, LCC 4 und WT04 berechnet für Steuerung von Klima in Gewächshäuser sind entwickelt und produziert in Übereinstimmung mit:

<u>EMV Richtlinie:</u> EN 61131-2:2007	2004/108/EC Speicherprogrammierbare Steuerungen – Teil 2: Betriebsmittelanforderungen und Prüfungen
EN 61000-6-2:2005	Elektromagnetische Verträglichkeit (EMV) – Teil 6-2: Fachgrundnormen – Störfestigkeit für Industriebereiche
EN 61000-6-4:2007	Elektromagnetische Verträglichkeit (EMV) – Teil 6-4: Fachgrundnormen – Störaussendung für Industriebereiche.
<u>Niederspannungsrichtlinie:</u> EN 61131-2:2007	2006/95/EC Speicherprogrammierbare Steuerungen – Teil 2: Betriebsmittelanforderungen und Prüfungen.
EN 60204-1:2006 +A1/2009	Sicherheit von Maschinen – Elektrische Ausrüstung von Maschinen – Teil 1: Allgemeine Anforderungen.

Diese Erklärung umfasst Klimacomputer LCC 1, LCC 2, LCC 4 und WT04 von Seriennummer 310000 bis 310400.

## Declaration of Conformity

We, Senmatic A/S, hereby declare that the Climate computer LCC1, LCC2, LCC4, WT04 intended for control of humidity and temperature in greenhouses has been developed and produced in conformity with:

<u>EMC - Directive:</u> EN 61131-2:2007	2004/108/EC Programmable controllers – Part 2: Equipment requirements and tests
EN 61000-6-2:2005	Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity for industrial environments
EN 61000-6-4:2007	Electromagnetic compatibility (EMC) – Part 6: Generic standards – section 4: Emission standard for industrial environments
<u>Low voltages directive:</u> EN 61131-2:2007	2006/95/EC Programmable controllers – Part 2: Equipment requirements and tests
EN 60204-1:2006 +A1/2009	Safety of machinery – Electrical equipment of machines – Part 1: General requirements

This declaration covers LCC1, LCC2, LCC3, LCC4, WT04 from serial number 310000 to 310400.

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## Preface

Congratulations with your new climate computer, LCC 1 – Tunnel.

We recommend you to read this user guide **before** the product is installed and comes into use.

Please check that the product is undamaged. Possible transport damages must be noticed **8 days** after reception **at the latest**.

The guarantee only covers defects and damages on the product caused by manufacture faults and faults in the material. Faulty installation and wrong use of the product is therefore not covered by the guarantee. We refer to our “Terms and Conditions of Sale and Delivery” for further details.

In consideration of the electrical installations the product must not be installed at places exposed to dripping (condensed water) from water installations, gutter, etc.

***NB! The product must not be placed in direct sunlight and in ambient temperature above 45 °C.***

In some countries the installation must be carried out by skilled craftsmen only.

**Best regards  
Senmatic A/S  
DGT**

## Introduction

The functions of the LCC 1 – Tunnel are divided into menus, which give a good overview of the possibilities for the optimum setting of the climate computer.

This user guide contains a short description of the computer functions, a section showing how to control the LCC 1 – Tunnel (an example showing a setting in the LCC 1 – Tunnel).

This user guide has been made to make sure that you will obtain reliable performance from the LCC 1 – Tunnel from the start. If you follow the instructions carefully, the climate computer will operate to your entire satisfaction over a long period.

## **Short description of the LCC 1 – Tunnel.**

### ***Overall***

The LCC 1 – Tunnel contains the basic software and control panel, which should be used for controlling the climate functions in 1 compartment.

### ***Temperature settings***

The LCC 1 can control 1 climate zone with own temperature sensors, heating and/or ventilation control.

The climate zone can be controlled by one heating and ventilation demand with related set points.

### ***Heating control***

The LCC 1 can control 1 on/off heater.

### ***Ventilation control***

The LCC 1 – Tunnel can control 2 x 2 vents (2 leeside and 2 windside).

### ***Alarm***

The LCC 1 – Tunnel has 1 alarm output, which can monitor max./min. temperature as well as missing weather station signal.



### ***Emergency action***


One can choose if the vents should open or close entirely. It could for instance be used in connection with fire, where signals can be transmitted to the unit concerning the fire.

## Control of the LCC 1 – Tunnel




Picture 1: LCC1 Tunnel panel

The LCC 1 – Tunnel consists of a main menu, which can be activated by pressing the arrow down  or up 

Picture 1 shows the main heating menu, as indicated by the lit LED on button # 1,  which is the shortcut key for heating.

The shortcut keys for the entire main menu will be described later on in the user guide in connection with the section “Menu overview”.

It should however be mentioned that # 6 is the shortcut key for the alarm menu and when this flashes there is a temperature and/or weather station communication alarm. If you want to make adjustments you need to enter the submenu, which is done through the main menu and pressing the Enter button. 

Then you can go through the submenus using the arrow up and down, which was also used in connection with the main menu.



When you press this button you will return to the related main menu.

If you e.g. are in the submenu for the alarm and press the home button you will enter the main menu for the alarm. If you press the button once again you will reach main menu 1, which is the reading as shown above.



This button is e.g. used for data entry of a temperature when you want to enter a decimal numeral such as 22.5 °C.



If you want to set a negative value, you will first type the number such as 3.0, then press the +/- button to adjust it to -3.0 and complete by pressing the Enter button.



The numbers are used for typing new values in the settings as well as shortcut key for the each main menu.


1 example of a setting:

If you want to set the ventilation temperature you should press the following.

Press   
Press 


The display now looks like this:

Vent 1 setting  
Temperature  
0.0 °C

Press 

"0.0 °C" starts to flash to indicate it can be changes

Set the desired temperature with the numbers (e.g. 16)

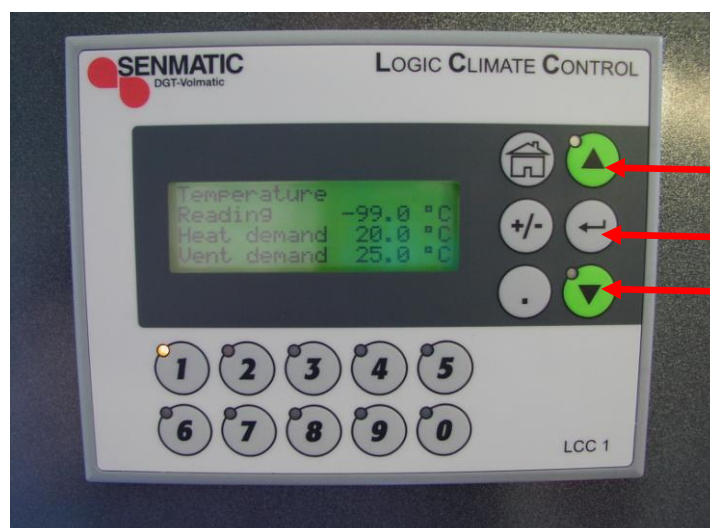
Press 

The display now looks like this:

Vent 1 setting  
Temperature  
16.0 °C

The ventilation will start to open at 16 °C.

## Display contrast



To adjust the contrast press and hold the "Hold Down" button simultaneously with you press on respectively the increase/decrease contrast button.

## Overview over the main menu

When you go through the main menu, you will get a quick overview over how the control is running at the moment, without entering the submenu.

Below each main menu will be described.

**NB! All the values on the main menu pages are readings and cannot be adjusted.**

### ***Heating:***

Heating	
Reading	32.7 °C
Demand	On

Reading: Here the current temperature inside the greenhouse can be read.

Demand: "On" means that the control will turn on the heat output.

### ***Ventilation: 1 (Ventilation controller 1 e.g. for the top vents)***

Ventilation		
	Pos.	Dem.
Vent 1:	10%	10%
Vent 2:	30%	21%

Vent 1: Here the current position (Pos.) on vent 1 as well as the demand (Dem.), which is estimated by the control, can be read. If Pos. and Dem. are equal, the vents are adjusted, but if they are different the vents are being adjusted. When the vent pos. is similar to the dem. an adjustment is only made when there is more than 5% difference on pos. and dem., or it has been more than 5 min. since the last adjustment. Vent 1 can be either lee side or windside depending on the wind direction.

Vent 2: The same as by vent 1.

### ***Ventilation: 2 (Ventilation controller 2 e.g. for the side vents)***

Ventilation		
	Pos.	Dem.
Vent 1:	10%	10%
Vent 2:	30%	21%

Vent 1: Here the current position (Pos.) on vent 1 as well as the demand (Dem.), which is estimated by the control, can be read. If Pos. and Dem. are equal, the vents are adjusted, but if they are different the vents are being adjusted. When the vent pos. is similar to the dem. an adjustment is only made when there is more than 5% difference on pos. and dem., or it has been more than 5



min. since the last adjustment. Vent 1 can be either lee side or windside depending on the wind direction.

Vent 2:

The same as by vent 1.

### ***Tunnel Fan:***

Tunnel Fan
Off
00:49:05

Off:

Here you can read whether the tunnel fan is on or off in the greenhouse.

00:49:05:

Shows for how long time it will be on or off. Only visible if the function selector is set on "Auto".

### ***Irrigation:***

Irrigation
Ready

### ***Alarm:***

Alarm	Battery
Temperature	Yes
Weather station	Yes

Battery:

If the text battery is flashing in the display, there is either no battery in the unit or it is dead.

Temperature:

Here you can see if there is a temperature alarm.

Weather station:

Here you can see if there is a weather station alarm. If there is an alarm it is due to no communication between the weather station and the LCC1.

### ***Readings:***

Readings	11:20
27.5 °C	1091 W/m2
	5.8 m/s
No rain	240 °

11:20:

Showing the current time.

27.5 °C:

Here the temperature inside the greenhouse can be read.

1091 W/m2:

This is the measured sun intensity from the weather station.

5.8 m/s:

Here the current wind speed from the weather station can be read.

No rain:

Here you can read if the weather station has detected if it rains or not.

240 °:

Here the current wind direction from the weather station can be read.

### ***Service:***

Service
---------

There is no reading on the main menu for service. This is used to enter the submenu.

## Overview over the submenus

Main menu	Submenus	Description
<b>Heating</b> (Shortcut key #1)	Function selector	<b>Off:</b> The output is always off. <b>Auto:</b> The output automatically adjusts the temperature inside the greenhouse. <b>On:</b> The output is always on.
	Temperature	Adjusting the temperature to be reached in the greenhouse.
	Dist. demand on-off	Adjusting the distance to heating temperature for starting heating step output. For an example please look at "Hysteresis on-off" underneath
	Hysteresis on-off	Hysteresis on-off is used to decide when the output should go on and off. When the temperature is under "heat temp" + "Dist. Demand on-off" – "Hysteresis on-off" the output will turn on, and it will turn off again when the temperature is above "heat temp" + "Dist. Demand on-off" + "Hysteresis on-off". Example: "Dist. Demand on-off" = 0°C "Hysteresis on-off" = 0.5°C When the Heat temperature is 18°C it means that the output goes "on" at 17.5°C and "off" at 18.5°C.

Main menu	Submenus	Description
<b>Ventilation 1</b> (Shortcut key #2)	Temperature	Adjusting the temperature to be reached in the greenhouse before the system opens the vents.
	Min open leese side	Minimum limit of the lee side. I.e. forced opening, which however can be overruled by high wind speed and low indoor temperature.
	Max open leese side	Adjusting the "fixed" maximum position of the lee side.
	Max open windside	Adjusting the "fixed" maximum position of the windside
	Max leese side rain	Adjusting the maximum position of the lee side during rain.
	Max windside rain	Adjusting the maximum position of the windside during rain.
	Max leese side gail	Adjusting the maximum position of the lee side during gale/high wind speed. <b>NB!</b> Maximum position of the lee side can be reduced dependent on low humidity. <b>NB!</b> Maximum position of the lee side can also be reduced dependent on high wind speed.
	Max windside gail	Adjusting the maximum position of the windside during gale/high wind speed. <b>NB!</b> Maximum position of the windside can be reduced dependent on low humidity. <b>NB!</b> Maximum position of the windside can also be reduced dependent on high wind speed.
	Min leese side storm	Adjusting the minimum position of the lee side during storm. By opening the lee side a bit during strong wind gusts, damage on the greenhouse can perhaps be avoided.
	Wind speed gale	Adjusting the wind speed by indication of "gale", which will reduce the maximum position of the vents.
	Wind speed storm	Adjusting the wind speed by indication of "storm", which will close the vents completely or open the lee side a bit, if wanted. Opening the lee side during storm can perhaps equalize negative pressure so that the window panes will not be sucked out.
	Start force close	Adjusting the time for when the vents should be forced closed. 20:30:00 (HH:mm:ss) indicates that the vents will close every night at 8.30 p.m.
	Stop force close	Adjusting the time for cancelling the forced closing of the vents. 08:20:00 (HH:mm:ss) indicates that the vents can be regulated every morning at 8.20 a.m. <b>N.B!</b> If <b>start force close</b> and <b>stop force close</b> have the same time, there will not be any forced closing.

Main menu	Submenus	Description
<b>Ventilation 1</b> <b>(Shortcut key #2)</b> <b>Continued</b>	Leeside indicator	Selecting the operation of the lee side indicator <b>Auto:</b> The lee side is controlled by the wind direction. <b>1:</b> Vent 1 is fixed lee side. <b>2:</b> Vent 2 is fixed lee side.
	Forced parallel	<b>Off:</b> The vents operate after the lee side indicator. First the lee side opens and then the windside. <b>On:</b> Vent 1 is fixed lee side.
	Vent 1 selector	<b>Close:</b> The vents close completely, manually. <b>Auto:</b> The vents open and close dependent on the ventilation demand from the regulator. <b>Open:</b> The vents open completely, manually. <b>Stop:</b> The vents stop at the current position.
	Vent 2 selector	<b>Close:</b> The vents close completely, manually. <b>Auto:</b> The vents open and close dependent on the ventilation demand from the regulator. <b>Open:</b> The vents open completely, manually. <b>Stop:</b> The vents stop at the current position.
	Open/close time 1	Adjusting the current opening/closing times on the first vent gears. Measured using e.g. stop watch from fully closed to fully open.
	Open/close time 2	Adjusting the current opening/closing times on the second vent gears. Measured using e.g. stop watch from fully closed to fully open.
	Emergency action	Here you can decide what should happen if there is a signal on the digital output, which is described as force close/open of the vents. <b>Close:</b> The vents close if there is a signal on the digital input. <b>Open:</b> The vents open if there is a signal on the digital input.

If the windows needs to be calibrated, press



for more than 4 seconds and the vents will be calibrated.

All then vents will be closed and when the calibration is done, it will go back to the demand again. When the calibration is preformed, the closing signal will be active for 30 second + the longest "open/close time".

Main menu	Submenus	Description
<b>Ventilation 2</b> (Shortcut key #3)	Temperature	Adjusting the temperature to be reached in the greenhouse before the system opens the vents.
	Min open leese side	Minimum limit of the lee side. I.e. forced opening, which however can be overruled by high wind speed and low indoor temperature.
	Max open leese side	Adjusting the "fixed" maximum position of the lee side.
	Max open windside	Adjusting the "fixed" maximum position of the windside
	Max leese side rain	Adjusting the maximum position of the lee side during rain.
	Max windside rain	Adjusting the maximum position of the windside during rain.
	Max leese side gail	Adjusting the maximum position of the lee side during gale/high wind speed. <b>NB!</b> Maximum position of the lee side can be reduced dependent on low humidity. <b>NB!</b> Maximum position of the lee side can also be reduced dependent on high wind speed.
	Max windside gail	Adjusting the maximum position of the windside during gale/high wind speed. <b>NB!</b> Maximum position of the windside can be reduced dependent on low humidity. <b>NB!</b> Maximum position of the windside can also be reduced dependent on high wind speed.
	Min leese side storm	Adjusting the minimum position of the lee side during storm. By opening the lee side a bit during strong wind gusts, damage on the greenhouse can perhaps be avoided.
	Wind speed gale	Adjusting the wind speed by indication of "gale", which will reduce the maximum position of the vents.
	Wind speed storm	Adjusting the wind speed by indication of "storm", which will close the vents completely or open the lee side a bit, if wanted. Opening the lee side during storm can perhaps equalize negative pressure so that the window panes will not be sucked out.
	Start force close	Adjusting the time for when the vents should be forced closed. 20:30:00 (HH:mm:ss) indicates that the vents will close every night at 8.30 p.m.
	Stop force close	Adjusting the time for cancelling the forced closing of the vents. 08:20:00 (HH:mm:ss) indicates that the vents can be regulated every morning at 8.20 a.m. <b>N.B!</b> If <b>start force close</b> and <b>stop force close</b> have the same time, there will not be any forced closing.

Main menu	Submenus	Description
<b>Ventilation 2</b> (Shortcut key #3) Continued	Leeside indicator	<p>Selecting the operation of the lee side indicator</p> <p><b>Auto:</b> The lee side is controlled by the wind direction.</p> <p><b>1:</b> Vent 1 is fixed lee side.</p> <p><b>2:</b> Vent 2 is fixed lee side.</p>
	Forced parallel	<p><b>Off:</b> The vents operate after the lee side indicator. First the lee side opens and then the windside.</p> <p><b>On:</b> Vent 1 is fixed lee side.</p>
	Vent 1 selector	<p><b>Close:</b> The vents close completely, manually.</p> <p><b>Auto:</b> The vents open and close dependent on the ventilation demand from the regulator.</p> <p><b>Open:</b> The vents open completely, manually.</p> <p><b>Stop:</b> The vents stop at the current position.</p>
	Vent 2 selector	<p><b>Close:</b> The vents close completely, manually.</p> <p><b>Auto:</b> The vents open and close dependent on the ventilation demand from the regulator.</p> <p><b>Open:</b> The vents open completely, manually.</p> <p><b>Stop:</b> The vents stop at the current position.</p>
	Open/close time 1	Adjusting the current opening/closing times on the first vent gears. Measured using e.g. stop watch from fully closed to fully open.
	Open/close time 2	Adjusting the current opening/closing times on the second vent gears. Measured using e.g. stop watch from fully closed to fully open.
	Emergency action	<p>Here you can decide what should happen if there is a signal on the digital output, which is described as force close/open of the vents.</p> <p><b>Close:</b> The vents close if there is a signal on the digital input.</p> <p><b>Open:</b> The vents open if there is a signal on the digital input.</p>

Main menu	Submenus	Description
<b>Tunnel Fan</b> (Shortcut key #4)	Function selector	<p><b>Off:</b> The tunnel fan is always off.</p> <p><b>Auto:</b> The output automatically turns the tunnel fan on and off.</p> <p><b>On:</b> The tunnel fan is always on.</p>
	Pulse time	<p>Adjusting the time for how long the fan should be on in every interval.</p> <p>00:05:00 means that the fan will be on for 5 minutes.</p>
	Interval time	<p>Adjusting the time between each pulse.</p> <p>01:00:00 means that the fan will start every hour.</p>

Main menu	Submenus	Main menu
<b>Irrigation</b> (Shortcut key #5)	Last start	Reading the condition that has started the last irrigation. <b>None:</b> Is shown on the display until the first irrigation is completed. <b>Manual:</b> Is shown on the display after a manual irrigation. <b>Sun-rad.:</b> Is shown on the display after an irrigation started by sun radiation. <b>Fixed interval:</b> Is shown on the display after an irrigation started by a fixed interval. <b>24 hours:</b> Is shown at the display after an irrigation is completed on start time.
	Manual start	Selecting if there should be a manual irrigation on the output valve.
	Cancel active irr.	Cancel the current active irrigation.
	Acc. sun since start	Reading the accumulated sun since last start. <b>Accumulated sun is reset after an irrigation regardless of the start condition.</b>
	Start level sun	Adjusting the accumulated sun energy for starting an irrigation.
	Fixed interval	Adjusting the interval between the irrigations. 00:00:00 means that the fixed interval is off. 01:00:00 means that the irrigation will be activated each hour as minimum. If fixed interval starts an irrigation at 11:00:00 and a manual irrigation is run at 11:25:00, then there will be another irrigation at 12:25:00 started by the fixed interval.
	Start time 1	Adjusting the time for starting the first irrigation. 00:00:00 means that start time 1 is not active. 15:00:00 means that an irrigation is carried out at 15:00. If an irrigation is being carried out at e.g. accumulated sun level while the time is equal to start time 1 the irrigation for start time 1 will be cancelled.
	Start time 2	Adjusting the time for starting the second irrigation
	Start time 3	Adjusting the time for starting the third irrigation
	Start time 4	Adjusting the time for starting the fourth irrigation



Main menu	Submenus	Main menu
<b>Irrigation</b> (Shortcut key #5) Continued	Start auto period	Adjusting the start time for the auto period, when the function selector is set on <b>time</b> . Concern sun and fixed interval.
	Stop auto period	Adjusting the stop time for the auto period, when the function selector is set on <b>time</b> .
	Irrigation time	Adjusting the time for how long the valve should irrigate per round.

Main menu	Submenus	Description
<b>Alarm</b> (Shortcut key #6)	Min temperature	If the temperature falls below the set value, an alarm will be given after the alarm delay, which is 1 minute.
	Max temperature	If the temperature exceeds the set value, an alarm will be given after the alarm delay, which is 1 minute.

Main menu	Submenus	Description
<b>Readings</b> (Shortcut key #7)	Sun radiation	Here the current sun radiation at the weather station can be read.
	Rain	Here you can read if the weather station has detected if it rains or not.
	Wind speed	Here the current wind speed at the weather station can be read.
	Wind direction	Here the current wind direction at the weather station can be read.

Main menu	Submenus	Description
<b>Service</b> (Shortcut key #8)	Language	Here you can change the language. LCC 1 supports following languages: <ul style="list-style-type: none"> <li>• English</li> <li>• Danish</li> </ul>
	Change date and time	The time format is as follows: 2012-03-27-14:07:21 Year – Month – Day – Hours : Minutes : Seconds
	Gable direction	Here the direction of the gable is set. 0 - 360°. 0° is north – 90° is east, etc. Definition: Stand inside the greenhouse. Look in the direction of the gable, where you have ventilation gear 1 right.
	Weather type	Selecting if the LCC 1 should function as master or slave.
	Wind vane direction	Only visible if “Weather type” is master. Here the direction of the wind vane is set according to north. For more details please look under the section “Weather station”.
	Can node number	Selecting the node number for the relevant LCC 1.
	Vent 1 P-factor	The P-factor gives a change in the ventilation demand (contribution) proportional with the temperature error.
	Vent 2 P-factor	The P-factor gives a change in the ventilation demand (contribution) proportional with the temperature error.
	Vent 1 I-time	The I-time is the time that should pass to give the same change of the ventilation demand as the P contribution for at constant temperature error.
	Vent 2 I-time	The I-time is the time that should pass to give the same change of the ventilation demand as the P contribution for at constant temperature error.
	Vent 1 P-factor pos.	This setting causes that the ventilation temperature demand will increase by rising vent opening. An adjustment at 0.005 °C/% causes 0.5 °C increase of the ventilation temperature demand by 100% ventilation.
	Vent 2 P-factor pos.	This setting causes that the ventilation temperature demand will increase by rising vent opening. An adjustment at 0.005 °C/% causes 0.5 °C increase of the ventilation temperature demand by 100% ventilation.
	Vent 1 readings	Here the PI contributions can be read. Following can be read: P demand I demand
	Vent 2 readings	Here the PI contributions can be read. Following can be read: P demand I demand

## Technical specification

### LCC 1 – Tunnel Computer

Supply voltage:	AC85 – 264 V (Wide range), 45/65HZ DC95 – 250 V
Power consumption:	Max 64VA
Communication:	1 x can bus (distribution of weather data) 1 x RS232 (between the weather station and the LCC 1)

### Physical data

Temperature:	0-50 °C (32-122°F), do not place in direct sunlight
Humidity:	95 RH% without condensation.
Density:	IP65
Dimension LxWxH:	440x330x130 mm (16x12x5")
Weight:	App. 9 kg (20 lbs)

## LCC1 – Tunnel overall installation instructions.

Units: Use the attached wall mount when the units are to be installed.  
Place the LCC 1 – Tunnel so that the display is at eye level and where the wiring is optimum.



**The units may NOT be exposed to direct sunlight, as this can cause that the temperature inside the units can be unacceptable high!**

**High temperature in the LCC 1 – Tunnel can lead to blank screen. Normally the display will return to normal, when the temperature is normal again, but it will reduce the life expectancy!**



**The units should be placed so that they are not exposed to direct water splashing!**



**High voltage!**

**Warning! High voltage can cause death or cause injury to people! Connection of the supply voltage may only be carried out by an authorized electrician. The electrical connections should always be executed according to the local provisions.**

**NB! Remember the earth connection!**

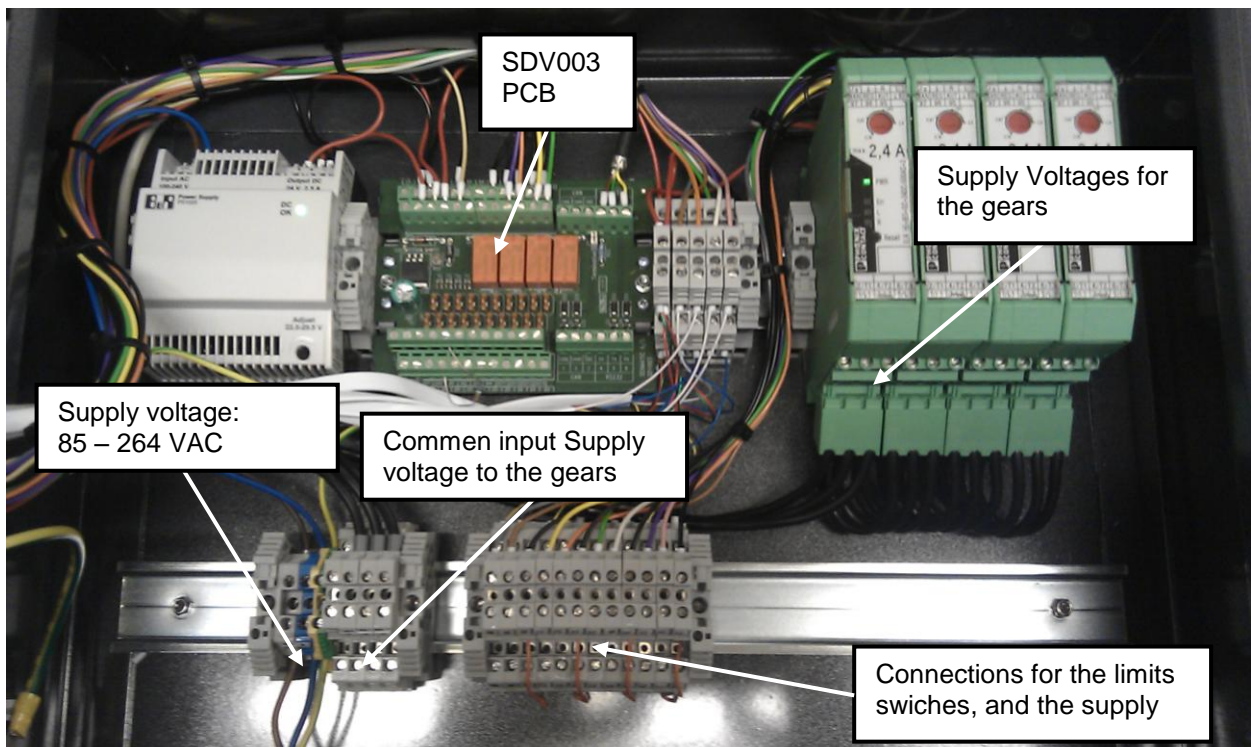
In areas where the supply voltage is very unstable or noisy, it can be necessary to improve it by installing an external filter, transient safeguard, UPS or voltage stabilizer.

Sensors: All sensors should be connected to the LCC 1 – Tunnel via a guarded cable.

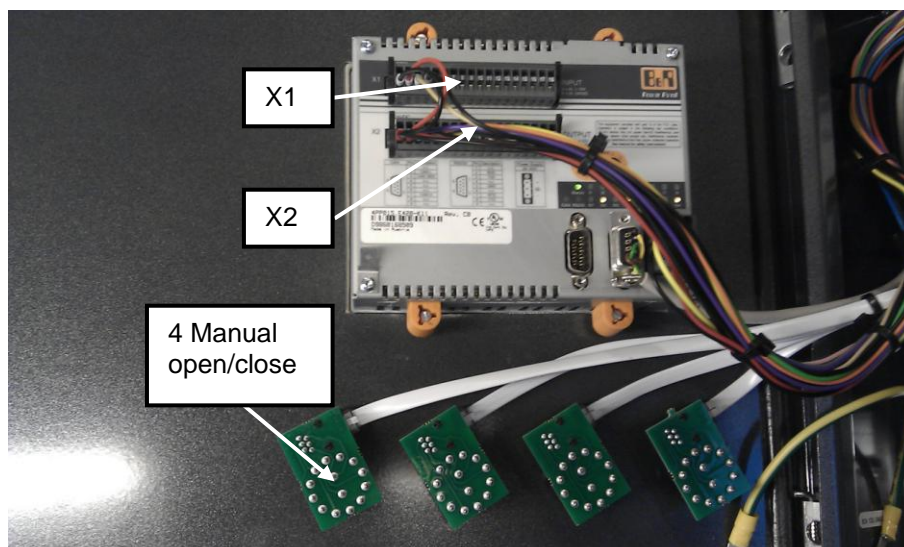
**NB! The display should be connected to an earth terminal.**

RS232 & Can: It is very important that the installation instructions are followed.

## Connection overview LCC 1 – Tunnel



Picture 2: LCC 1 – Tunnel box



Picture 3: LCC 1 – Tunnel front

## LCC 1 – Tunnel inputs and outputs

The LCC 1 – Tunnel consists of the following inputs and outputs.

**Analog inputs**, should be connected to the SDV003 PCB, which can be found in the LCC 1 – Tunnel, AI1-AI4:

- **AI1,SDV003:** Room temperature sensors, following Senmatic sensors can be used.
  - RT10 temperature sensor hanging down from the ceiling, Part No. 210200.
  - RT14 temperature sensor for assembling on the wall, Part No. 210750.

**Digital outputs**, should be connected to the SDV003 PBC, which can be found in the LCC 1 – Tunnel, out1-out4:

- **Out1,SDV003:** Alarm, gives 24VDC when there is no alarm.
- **Out2,SDV003:** Irrigation, gives 24VDC when the irrigation starts.
- **Out3,SDV003:** Heat on/off, gives 24VDC out when the heat is “on” and 0VDC out when the heat is “off”.
- **Out4,SDV003:** Tunnel fan on/off, gives 24VDC out when the heat is “on” and 0VDC out when the heat is “off”.

**Digital outputs**, which should be connected to the back of the panel on connector X2, these connections, are internal wired from the factory.

- **X2,11:** Ventilation 1 open, gives 24VDC out when the vent opens.
- **X2,12:** Ventilation 1 close, gives 24VDC out when the vent closes.
- **X2,13:** Ventilation 2 open, gives 24VDC out when the vent opens.
- **X2,14:** Ventilation 2 close, gives 24VDC out when the vent closes.
- **X2,15:** Ventilation 3 open, gives 24VDC out when the vent opens.
- **X2,16:** Ventilation 3 close, gives 24VDC out when the vent closes.
- **X2,17:** Ventilation 4 open, gives 24VDC out when the vent opens.
- **X2,18:** Ventilation 4 close, gives 24VDC out when the vent closes.

**Digital inputs**, which should be connected to the back of the panel on connector X1.

- **X1,11:** Forced close/open vents, you should choose on the panel if you want to close or open the vents if there is 24VDC on the input.

**Can bus**, should be connected to the SDV003 PCB, which can be found in the LCC 1, CAN:

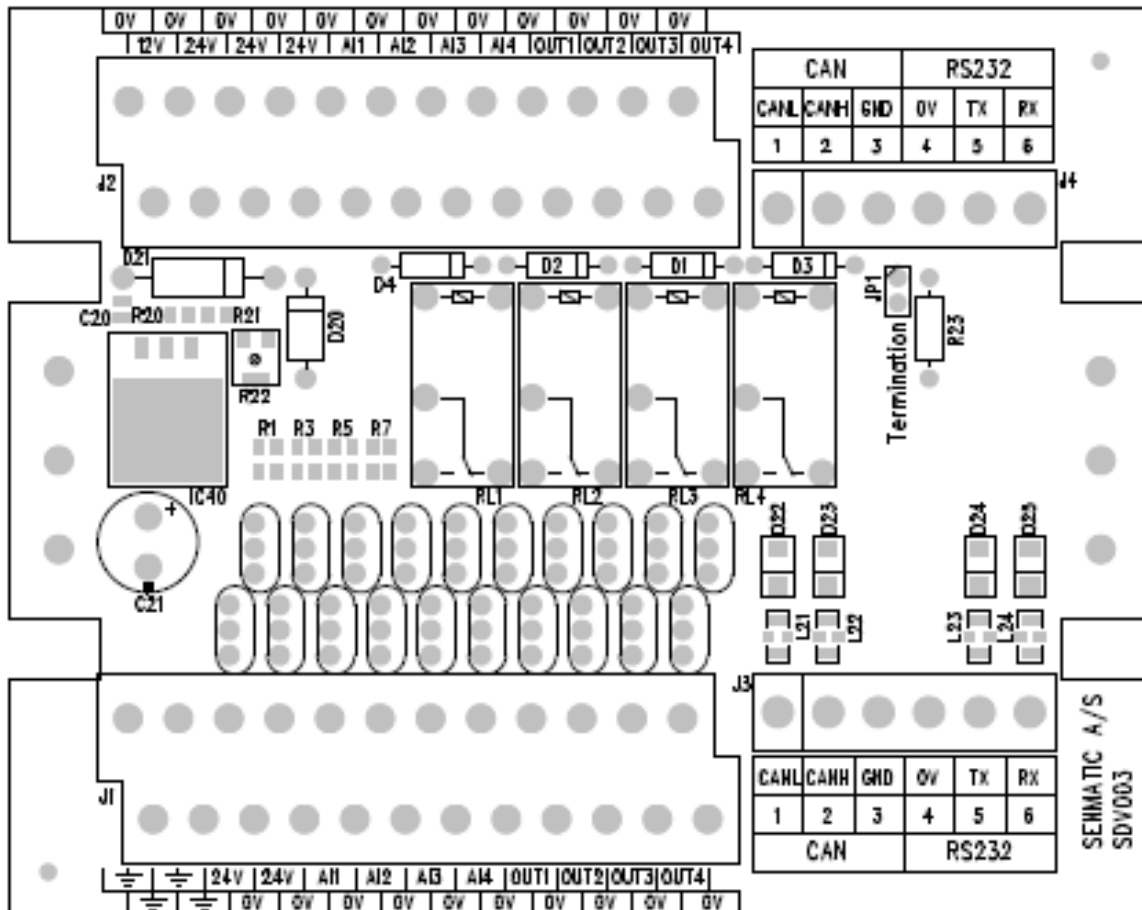
- **SDV003,J3,CAN:** Can bus is used for communication between several LCC 1s if they share the weather station signals.

**RS232 bus**, should be connected to the SDV003 PCB, which can be found in the LCC 1, RS232:

- **SDV003,J3,RS232:** Connection between the weather station PDB SDV022 and this PCB to get weather data on the LCC 1.

## SDV003 PCB

This PDB should be used to connect the temperature sensor and the alarm outputs. It is also here the CAN communication and the RS232 communication is connected.



All external connections are connected to connector J1 & J3.

- [⏏] Earth connection
- +24 V The same 24VDC which comes from the built-in power supply
- AI1-4 Analog inputs 1 – 4
- Out1-4 Output 1-4
- 0VA Common frame
- Can Can bus communication
- RS232 RS232 bus communication

## Setting up communication:

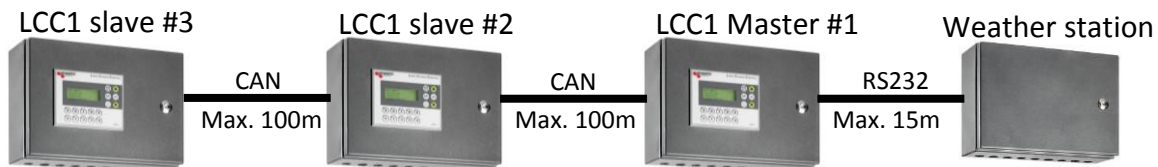
For installation of CAN and RS232 communication you should use a shielded category 5 cable.

### J3, CAN:

- CANL: Is connected to CANL on the SDV003 PCB in the next LCC 1 that should receive the weather station data.
- CANH: Is connected to CANH on the SDV003 PCB in the next LCC 1 that should receive the weather station data.
- GND: Is connected to GND on the SDV003 PCB in the next LCC 1 that should receive the weather station data.

### J3, RS232 should only be used between the Master LCC 1 and the weather station:

- Tx: Is connected to Rx on the SDV022 PCB in the weather station.
- Rx: Is connected to Tx on the SDV022 PCB in the weather station.
- 0V: Is connected to 0V on the SDV022 PCB in the weather station.



When running cables between the units as shown above, you should remember to place termination at either end of the CAN communication. This is done by means of the SDV003 PCB jumper JP1.

When the jumper is connected, 120 ohm termination is inserted. This indicates that JP1 on PCB SDV003 in the above-mentioned construction should be connected the following way:

- LCC1 slave #3 Jumper JP1 connected
- LCC1 slave #2 Jumper JP1 not connected
- LCC1 Master #1 Jumper JP1 connected

RS232 communication should be connected if you only have one LCC 1 and one weather station.

When this is done, you have to choose by means of the display whether the unit is master or slave and which node number they have. There can only be one master and all other units on the CAN communication should have different node numbers. This is adjusted under the menu item "Service" (will also appear if you press "5"), where you can adjust the values in service by pressing "Enter".

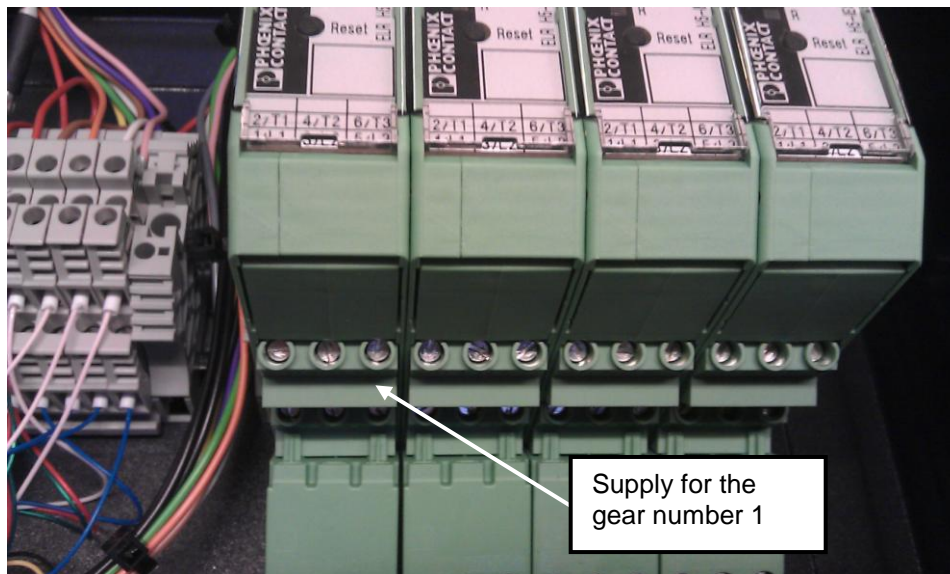
By means of the arrow down you have to press forward to the item "Weather type", here you can choose respectively whether or not the concerned unit should be master or slave. By pressing one more time on the arrow down you reach the item "CAN node number", where you can enter the node number for the concerned unit.

**REMEMBER THE MASTER UNIT SHOULD ALWAYS HAVE NODE 1!**



## Gear connection to the LCC1 - tunnel.

Below you see how to connection a gear motor to the LCC 1 – Tunnel version.



Picture 4 LCC 1 – Tunnel gear output

At picture 4 it is shown where to connect gear motor 1.

The connection should be:

On the gear motor		on the green module
W2	connected to	T1
U2	connected to	T2
V2	connected to	T3

Remember to connect earth to the gear motor



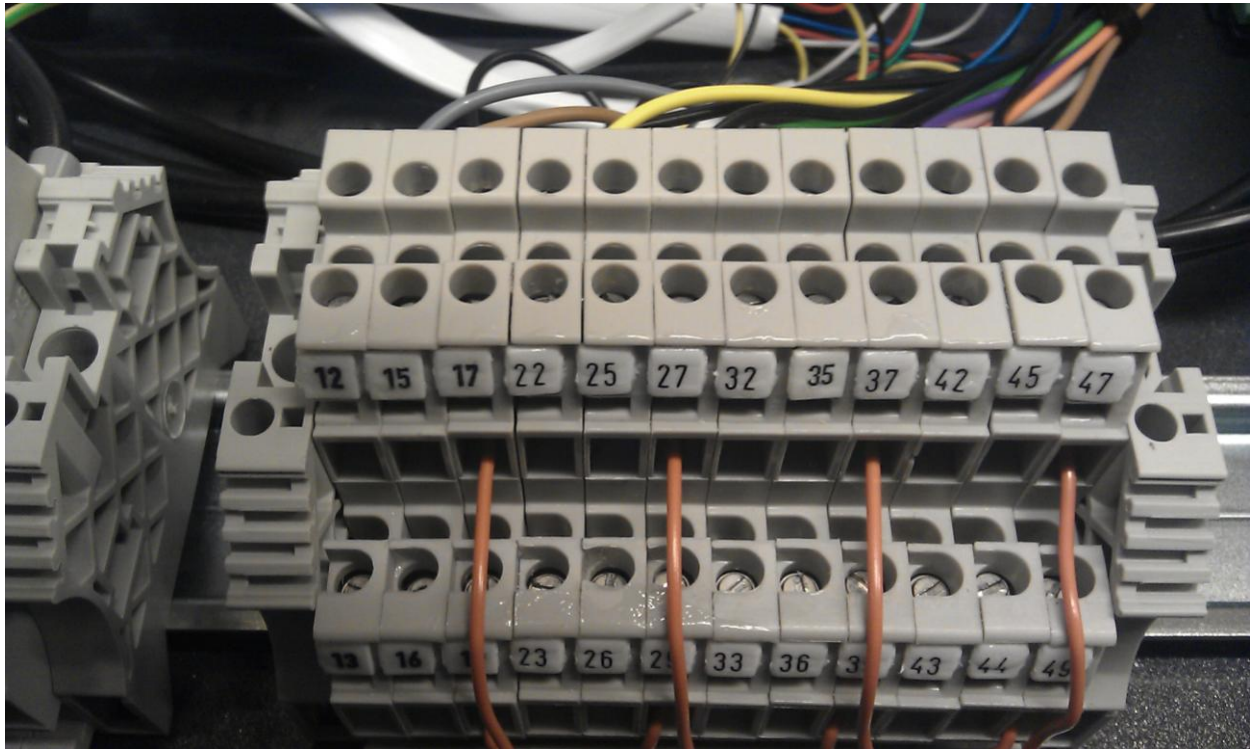
Before the gears are connected it is very important to set the nominal current on the green modules.

Please look at the gears that should be connected to each green module and set the nominal current individually for each of them.

Current setting:

- 1: Press reset button for more than 6 sec, the green LED PWR flashes in this mode the LEDs are switched off after every 2s for 0,3s in order to show that the nominal current can be set.
- 2: Set nominal current via potentiometer.
- 3: Check the current setting by the LEDs, look at table below.
- 4: Press the reset button to save the set value.

LED	Current															
PWR																
Err																
L																
R																
	0,18A	0,25A	0,41A	0,56A	0,71A	0,87A	1,02A	1,17A	1,33A	1,48A	1,63A	1,79A	1,94A	2,09A	2,25A	2,4A
	LED switch off							LEDs switch on								



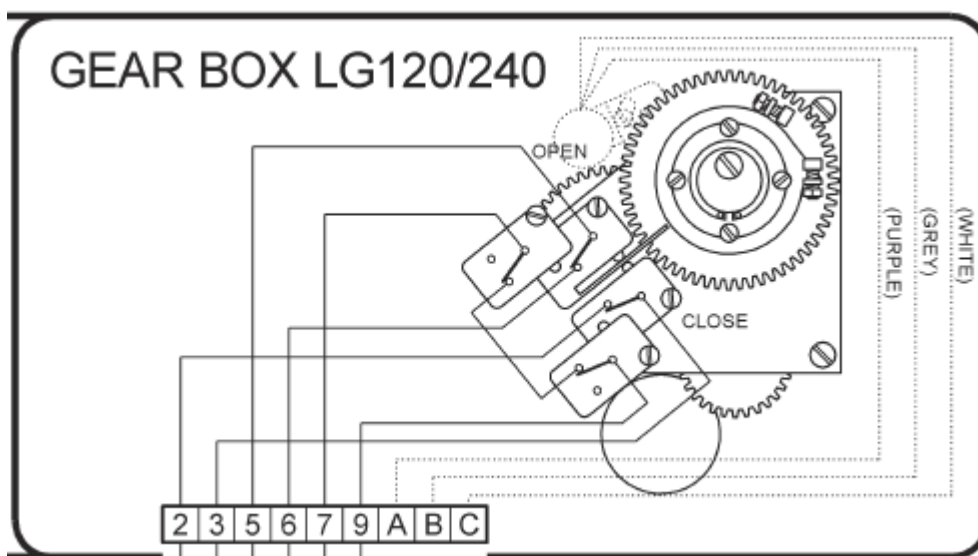
Picture 5: LCC 1 – Tunnel Limit switches

At picture 5 it is shown where to connect the limit switches. On this picture there is a wire connected instead of the safety switch.

The connection should be:

#### **Gear 1**

Connectors in the LCC 1		On the gear box (Senmatic Gear)
12 (1 = gear 1)	-----	2 (close limit switch)
13 (1 = gear 1)	-----	3 (close limit switch)
15 (1 = gear 1)	-----	5 (open limit switch)
16 (1 = gear 1)	-----	6 (open limit switch)
17 (1 = gear 1)	-----	7 (safety switch)
19 (1 = gear 1)	-----	9 (safety switch)



### **Gear 2**

Connectors in the LCC
22 (2 = gear 2)
23 (2 = gear 2)
25 (2 = gear 2)
26 (2 = gear 2)
27 (2 = gear 2)
29 (2 = gear 2)

-----  
-----  
-----  
-----  
-----  
-----

On the gear box (Senmatic Gear)
2 (close limit switch)
3 (close limit switch)
5 (open limit switch)
6 (open limit switch)
7 (safety switch)
9 (safety switch)

### **Gear 3**

Connectors in the LCC
32 (3 = gear 3)
33 (3 = gear 3)
35 (3 = gear 3)
36 (3 = gear 3)
37 (3 = gear 3)
39 (3 = gear 3)

-----  
-----  
-----  
-----  
-----  
-----

On the gear box (Senmatic Gear)
2 (close limit switch)
3 (close limit switch)
5 (open limit switch)
6 (open limit switch)
7 (safety switch)
9 (safety switch)

### **Gear 4**

Connectors in the LCC
42 (4 = gear 4)
43 (4 = gear 4)
45 (4 = gear 4)
46 (4 = gear 4)
47 (4 = gear 4)
49 (4 = gear 4)

-----  
-----  
-----  
-----  
-----  
-----

On the gear box (Senmatic Gear)
2 (close limit switch)
3 (close limit switch)
5 (open limit switch)
6 (open limit switch)
7 (safety switch)
9 (safety switch)

## Weather station

Follow the small manual "Standard anemometer – installation manual" regarding the installation of the weather station as well as the wind direction and the wind speed.

There are 2 version of the anemometer, and to find out what version you have, please look at the wind direction shaft:

Version 1:



Before attaching the wind direction sensor, turn the wind direction shaft so it is equal to north.

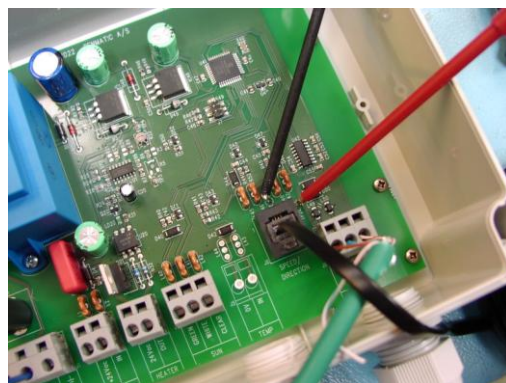
It is possible to measure that the shaft is at north using the connections shown on the picture.

When you put the connector from the weather station in the socket and measure with a multimeter on the connectors, you can measure the ohm value from the direction sensor.

0 ohm = 0°

20 kohm = 360°

Exactly in the switch between 0° and 360° you can measure a very high ohm value, which corresponds to north.



When the shaft is at north, push the wind vane onto the stainless steel shaft and tighten the screw on the side of the wind vane so it looks like this:



So the arm and the wind direction points in the same direction (North according to the measurement).



### Version 2:



If you have version 2 just connect the wind direction sensor on the wind direction shaft, and the direction will point north if it looks like this:



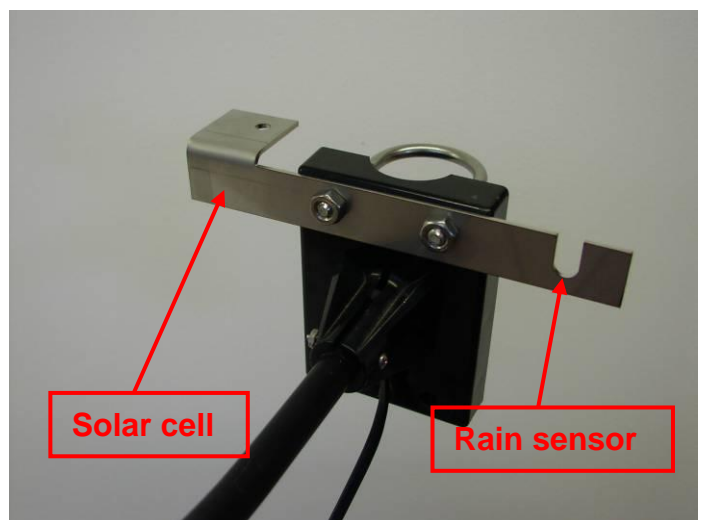
### Wind vane direction:

When the wind direction sensor is placed on the arm, and it is installed it is time to put in the value for the “wind vane direction” in the Service menu.

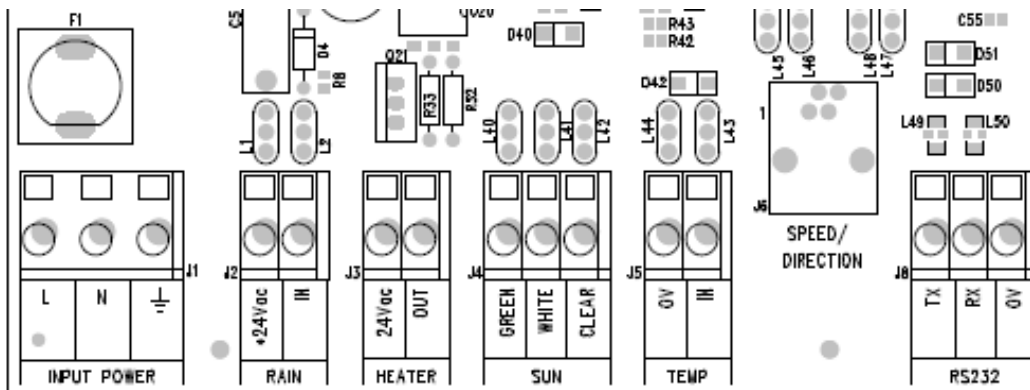
This value is the direction of the wind vane according to North (0°).

So when it is installed use a compass to measure in what direction the arm points. If it points East (90°), put in this value under „wind vane direction“ so the system knows that the direction is installed 90° according to North.

To connect the rain sensor and the solar cell, the enclosed hardware should be placed as shown on the picture next.



Connection of sensor to the weather station transmitter:



J1, Input power:

L: Phase from 220VAC  
 N: Zero from 220VAC  
 ⏏: Ground from 220VAC

J2, Rain:

+24Vac: Yellow wire from the rain sensor.  
 In: White wire from the rain sensor.

J3, Heater:

24Vac: Brown wire from the rain sensor.  
 Out: Green wire from the rain sensor.

J4, Sun:

Green: Blue wire from the solar cell.  
 White: Brown wire from the solar cell.  
 Clear: Black wire from the solar cell.

J5, Temp:

This is not used.

J6, Speed/Direction:

Connector from the weather station.

J7, RS232:

Tx: Is connected to Rx on the SDV003 PCB in the LCC 1.  
 Rx: Is connected to Tx on the SDV003 PCB in the LCC 1.  
 0V: Is connected to 0V on the SDV003 PDB in the LCC 1.