LCC 1

User guide

CE

Overensstemmelseserklæring

Vi, Senmatic A/S, erklærer hermed, at Klimacomputer LCC1, LCC2, LCC3, LCC4, WT04 beregnet til styring af klima i væksthuse er udviklet og produceret i overensstemmelse med:

EMC - Direktiv:	2004/108/EC
EN 61131-2:2007	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
Lav spændings direktiv:	2006/95/EC
EN 61131-2:2007	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.

Declaration of Conformity

We, Senmatic A/S, hereby declare that the Climate computer LCC1, LCC2, LCC3, LCC4, WT04 intended for control of humidity and temperature in greenhouses has been developed and produced in conformity with:

EMC - Directive:	2004/108/EC
EN 61131-2:2007	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
Low voltages directive:	2006/95/EC
EN 61131-2:2007	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.

Übereinstimmungserklärung

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

EMV Richtlinie:	2004/108/EC
EN 61131-2:2007	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.
Niederspannungsrichtlinie:	2006/95/EC
EN 61131-2:2207	Speicherprogrammierbare Steuerungen – Teil 2: Betribsmittelanforderungen und Prüfungen.
EN 60204-1:2006 +A1/2009	Sicherheit von Maschinen – Elektrische Ausrüstung von Maschinen – Teil 1: Allgemeine Anforderungen.

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

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Preface

Congratulations with your new climate computer, LCC 1.
We recommend you to read this user guide **before** the product is installed and come 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 Delievery” 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 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, (an example showing a setting in the LCC 1) and a more detailed going through the operation of the computer and descriptions of the individual functions.
This user guide has been compiled to make sure that you will obtain reliable performance from the LCC 1 from the very first 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.

Overall
The LCC 1 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.

Day – Night settings
Different day/nicht settings can be selected in connection with heating control, ventilation control and humidity control.
The shift from night to day and from day to night happens on fixed times or in correlation with sunrise and sunset as well as relative to sunrise and sunset.

Heating control
The LCC 1 can control 1 heating valve.

Ventilation control
The LCC 1 can control 2 vents, 1 lee side and 1 windside.

Screens
Each unit can control 1 screen.
The screens can be used as either shade or energy screen.

Light
The LCC 1 has 1 built-in light control.

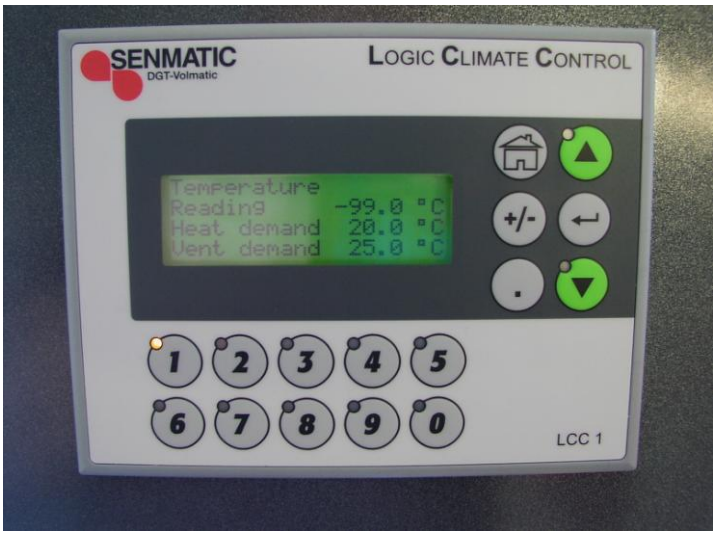
Humidity
The LCC 1 has one maximum humidity control, which can have different settings for respectively day and night.
It is possible to control the maximum humidity in 3 ways, which also can be combined:

1) Raise minimum flowtemperature
2) Increase minimum opening lee side
3) Reduce maximum opening screens

Alarm
The LCC 1 has 1 alarm output, which can monitor max./min. temperature as well as max./min. humidity.

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



Picture 1: LCC1 panel

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

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

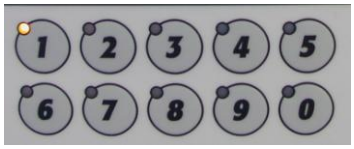
The shortcut keys for the entire main menu will be described later on in the user guide in connection with the section “Menu overview”.
It should however be mentioned that # 8 is the shortcut key for the alarm menu and when this flashes there is a temperature and/or humidity alarm.
If you want to make 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 by means of 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 temperature 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 figure such as 3.0, then press the +/- button to adjust the -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.

Illustration of a setting:
If you want to set the light to run automatically you should press the following.
Press
Press
The display now looks like this:

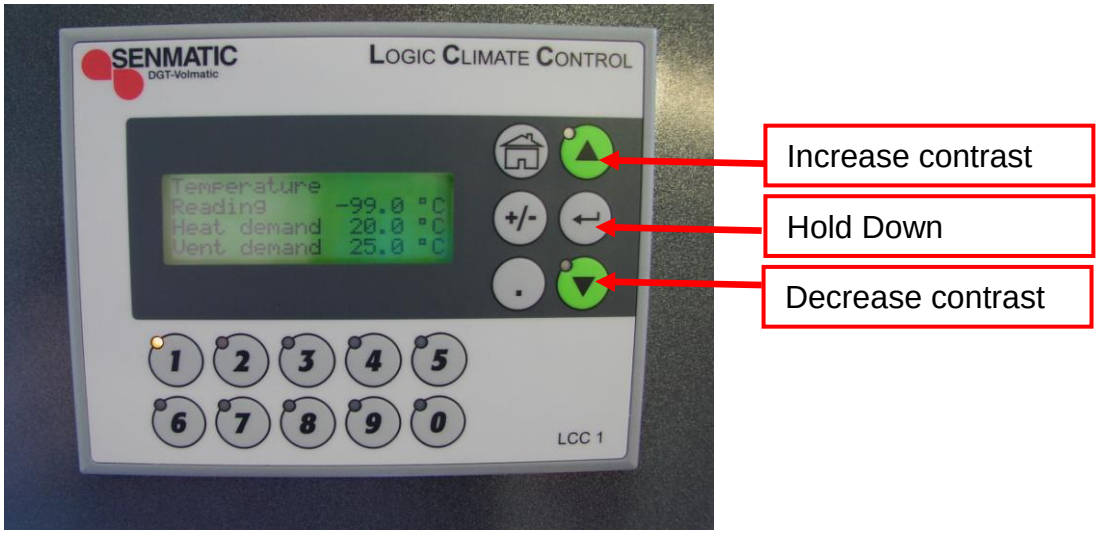
Light setting Function selector On

Press
”On” starts to flash to indicate it can be changes
Press this button once
Press
The display now looks like this:

Light setting Function selector Auto

The light now runs automatically (will be described in the section ”Menu overview”)

Display contrast



To adjust the contrast press and hold the ”Hold Down” button simultaniously with you press on respectively the increase/decreae 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.

Temperature:

Temperature	
Reading	24.7 °C
Heat demand	22.0 °C
Vent demand	26.0 °C

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

Heat demand: 22.0 °C indicates that the control will turn the heat on, if the current temperature is under this value. The value here is similar to the value, which the control is controlled by, i.e. where it is taken into account whether it is day or nicht, etc.

Vent demand: 26.0 °C indicates that the control will open the vents, when the current temperature is above this value. The value here is similar to the value, which the control is controlled by, i.e. where it is taken into account whether it is day or night, etc.

Heating:

Heating	
Reading	32.7 °C
Demand	50.0 °C

Reading: Here the current flowtemperature on the heat pipes can be read.

Demand: 50.0 °C indicates that the control has estimated that there should be 50 °C on the heat pipes to maintain the temperature inside the greenhouse. Furthermore it can be seen that heating is being added to the pipes, as the reading has a different temperature.

Ventilation:

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.

Screens:

Screens	
Reading	26%
Demand	50 %

Reading: Here the current screen position can be read.

Demand: 50% indicates that the control has estimated that the screens should be drawn 50% on. Furthermore you can see that the screens are being drawn, as the current position (reading) is lower than the demand. When the screen 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.

Light:

Light
Off

Off: Here you can read whether the light is on or off inside the greenhouse.

Humidity:

Humidity	
Reading	23.5 RH%

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

Irrigation:

Irrigation
Ready

Optional: Irrigation is currently not implemented, but will be released in the near future.

Alarm:

Alarm	
Temperature	Yes
Humidity	No

Temperature: Here you can see if there is a temperature alarm.

Humidity: Here you can see if there is a humidity alarm.

Readings:

Readings	11:20
24.7 °C	45 RH%
1091 W/m2	270 °
No rain	5.8 m/s

11:20: Showing the current time.

24.7 °C: Here the temperature inside the greenhouse can be read.

45 RH%: Here the humidity inside the house can be read.

1091 W/m2: This is the measured sun intensity from the weather station.

270 °: Here the current wind direction from the weather station can be read.

No rain: Here you can read if the weather station has detected if it rains or not.

5.8 m/s: Here the current wind sped 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
Temperature **(Shortcut key #1)**	Day temperature	Adjusting the day temperature, which should be maintained inside the house.
	Night temperature	Adjusting the night temperature, which should be maintained inside the house.
	Day/Night selector	Selecting the way to switch between day and night: **Absolute:** The switch from day to night will happen on fixed time. **Relative:** The switch from day to night will happen on time relative to the estimated sunrise and sunset.
	Time day	Selecting a fixed time for starting the day. This is only visible when the **Day/night selector** is set on **absolute**.
	Time night	Selecting a fixed time for starting the night. This is only visible when the **Day/night selector** is set on **absolute**.
	Relative start day	Selecting the time relative to sunrise for starting the day. -01:00:00 (HH:mm:ss) indicates 1 hour before sunrise. This is only visible when the **Day/night selector** is set on **relative**.
	Relative start night	Selecting the time relative to sunset for starting the night. -01:00:00 (HH:mm:ss) indicates 1 hour before sunset. This is only visible when the **Day/night selector** is set on **relative**.
	Light addition	Adjusting the light dependent temperature addition. The light addition is switched off at night. At night the addition works as follows: 0 W/m^2 = no addition 500 W/m^2 = full addition Example: The light addition is set to **5 °C**, which will give a temperature addition of 2,5 °C to the **day temperature** at 250W/m^2.

Main menu	Submenus	Description
Heating **(Shortcut key #2)**	Function selector	**Close:** The heating valve is always closed. **Auto:** The heating valve automatically adjusts the temperature inside the greenhouse. **Open:** The heating valve is always open. **Stop:** The heating valve stops at the current position.
	Min flow temperature	Adjusting the minimum flow temperature.
	Max flow temperature	Adjusting the maximum flow temperature.

Main menu	Submenus	Description
Ventilation **(Shortcut key #3)**	Day temperature	Adjusting the day temperature to be reached in the greenhouse before the system opens the vents.
	Night temperature	Adjusting the night temperature to be reached in the greenhouse before the system opens the vents.
	Min open lee 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 lee side	Adjusting the ”fixed” maximum position of the lee side.
	Max open windside	Adjusting the ”fixed” maximum position of the windside
	Max lee 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 lee side gail	Adjusting the maximum position of the lee side during gale/high wind speed. **NB!** Maximum position of the lee side can be reduced dependent on low humidity. **NB!** 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. **NB!** Maximum position of the windside can be reduced dependent on low humidity. **NB!** Maximum position of the windside can also be reduced dependent on high wind speed.
	Min lee 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. **N.B!** If **start force close** and **stop force close** have the same time, there will not be any forced closing.

Main menu	Submenus	Description
Ventilation (Shortcut key #3) Continued	Lee side indicator	Selecting the operation of the lee side indicator **Auto**: The lee side is controlled by the wind direction. **1**: Vent 1 is fixed lee side. **2**: Vent 2 is fixed lee side.
	Forced parallel	**Off**: The vents operate after the lee side indicator. First the lee side opens and then the windside. **On**: Vent 1 is fixed lee side.
	Vent 1 selector	**Close:** The vents close completely, manually. **Auto:** The vents open and close dependent on the ventilation demand from the regulator. **Open:** The vents open completely, manually. **Stop:** The vents stop at the current position.
	Vent 2 selector	**Close:** The vents close completely, manually. **Auto:** The vents open and close dependent on the ventilation demand from the regulator. **Open:** The vents open completely, manually. **Stop:** The vents stop at the current position.
	Open/close time	Adjusting the current opening/closing times on the 2 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. **Close:** The vents close if there is a signal on the digital input. **Open:** The vents open if there is a signal on the digital input.

Main menu	Submenus	Description
Screens **(Shortcut key #4)**	Radiation for on	Limiting value for the sunlight measured on the outdoor weather station. If the sunligth is more intense than this value, the screen will go on for crop protection.
	Max position day	Adjusting the maximum position of the screen during the day.
	Max position night	Adjusting the maximum position of the screen during the night.
	Temp. under for on	Adjusting the low air temperature relative to the heating temperature demand for automatic closing of the screen.
	Day/Night selector	Selecting the day/night changeover of the screens: **Time:** The shift happens on fixed times. **Sun up/down:** The shift happens relative to the estimated sunrise/sunset. **Light:** The shift happens dependent on the light intensity.
	Time day	This time determines when the screens open in the morning. This is only visible when the **Day/Night selector** is set on **Time**.
	Time night	This time determines when the screens close in the evening. This is only visible when the **Day/Night selector** is set on **Time**.
	Relative start day	The screen opening follows the sunrise shifted by this setting -01:00:00 (HH:mm:ss) indicates 1 hour before sunrise. This is only visible when the **Day/Night selector** is set on **Sun up/down**.
	Relative start night	The screen closing follows the sunrise shifted by this setting. 01:00:00 (HH:mm:ss) indicates 1 hour after sunset. This is only visible when the **Day/Night selector** is set on **Sun up/down**.
	Radiation day/night	When the light intensity has exceeded this setting in the morning, the screens will open. When the light intensity has fallen below this setting in the everning, the screens will close for the night. This is only visible when the **Day/Night selector** is set on **Light**.
	On/Off time	Adjusting the current opening/closing times. Measured using e.g. a stop watch from fully closed to fully open.
	Function selector	**Off:** The screen is always open **Auto:** The screen operates automatically **On:** The screen is always closed **Stop:** The screen stops at the current position

Main menu	Submenus	Description
Light **(Shortcut key #5)**	Function selector	**Off:** The light is always off. **Auto:** The light is turned on and off on fixed times when it is dark. **On:** The light is always on.
	Start time	Adjusting the start time for automatic period.
	Stop time	Adjusting the stop time for automatic period.
	Lys int. start/stop	Limiting value for the light measured outside, when the light is turned on/off.
	Start/stop delay	Adjusting the delay for turning the light on/off.

Main menu	Submenus	Description
Humidity **(Shortcut key #6)**	Function selector	Here the humidity control can be activated or deactivated.
	Max day	Adjusting the maximum humidity during the day.
	Max night	Adjusting the maximum humidity during the night.
	Min lee side high hum	Adjusting the minimum position of the lee side for the vents at high humidity. When max humidity is reached, the min lee side will start to rise. When max humidity + 5RH% is reached, the min. lee side will be equal to the set value.
	Max screen high hum.	Adjusting the maximum screen position at high humidity. 5RH% before the maximum humidity is reached, the reduction of maximum screen position starts until full reduction is reached at max. humidity.
	Min flow at high hum	Minimum flow temperature by too high humidity. 5RH% before max humidity is reached the increase of min. flow will start. When max humidity is reached, the min. flow will be equal to the set value.

Main menu	Submenus	Main menu
Irrigation **(Shortcut key #7)**	Last start	Reading the condition that has started the last irrigation. **None:** Is shown on the display until the first irrigation is completed. **Manual:** Is shown on the display after a manual irrigation. **Sun-rad.:** Is shown on the display after an irrigation started by sun raditaion. **Fixed interval:** Is shown on the diaplsy after an irrigation started by a fixed interval. **24 hours:** Is shown at the diaplsy 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. **Accumulated sun is reset after an irrigation regardless of the start condition.**
	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 af 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
	Function selector	**Off:** The irrigation controller is not active. **Time:** The irrigation controller is active. The auto period starts and stops at fixed times. **Sun:** The irrigation controller is active. The auto period starts and stops relative to sun up and sun down.

Main menu	Submenus	Main menu
Irrigation (Shortcut key #7) Continued	Start auto period	Adjusting the start time for the auto period, when the function selector is set on **time**. Concern sun and fixed interval.
	Stop auto period	Adjusting the stop time for the auto period, when the function selector is set on **time**.
	Start auto period relative to sunrise	Adjusting the start time relative to sunrise for auto period, when the function selector is set on **sun**.
	Stop auto period relative to sunset	Adjusting the stop time relative to runset for auto period, when the function selector is set on **sun**.
	Irrigation time	Adjusting the time for how long the valve should irrigate per round.

Main menu	Submenus	Description
Alarm **(Shortcut key #8)**	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.
	Min. humidity	If the humidity falls below the set value, an alarm will be given after the alarm delay, which is 5 minutes.
	Max. humidity	If the humidity exceeds the set value, an alarm will be given after the alarm delay, which is 5 minutes.

Main menu	Submenus	Description
Readings **(Shortcut key #9)**	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.
	Sun up	Here the estimated value for sunrise can be read. The sunrise and sunset times are estimated on the basis of date, longitude and latitude.
	Sun down	Here the estimated value for sunset can be read. The sunrise and sunset times are estimated on the basis of date, longitude and latitude.

Main menu	Submenus	Description
Service **(Shortcut key #0)**	Language	Here you can change the language. LCC 1 supports following languages: • Danish • English • German
	Change date and time	The time format is as follows: 2012-03-27-14:07:21 Year – Month – Day – Hours : Minutes : Seconds
	Longitude[1]	Adjusting the longitude for the location of the nursery. East for Greenwich is set negatively.
	Latitude[1]	Adjusting the latitude for the location of the nursery. South of Equator is set negatively.
	GMT time zone[1]	Adjusting the time zones relative to GMT. Positive time indicates earlier than GMT e.g. CET. Negative time indicates later than GMT e.g. time zones in North America.
	Summer time	Selecting if it is summer time or not. It is used for estimation of sun up/down but does **not** set the clock in the LCC 1. Remember to set this manually.
	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.
	LCC1 type	Choosing which type of LCC 1 you want to run. Currently there are following types: • Type A
	Weather type	Selecting if the LCC 1 should function as master or slave.
	Can node number	Selecting the node number for the relevant LCC 1.
	Heat P-factor	The P-factor acts on change in the flow temperature proportional with the temperature error. A too high P-factor will cause variation in temperature. Oscillation. A too low P-factor wil cause a slow adjustment.
	Heat I-time	Adjusting the I-time (integral time) for the PID controller. A too long I-time will slow the PID controller. A too short I-time will cause oscillation.
	Heat D-time	Adjusting the D-time (Differential time) for the PID controller. Adjusting the sensitivity of the PID controller for the rate of change of the temperature error. A setting of 00:00 will remove the D controller.

Main menu	Submenus	Description
Service **(Shortcut key #0) Continued**	Heat readings	Here the PID contributions can be read. The following can be read: P demand I demand D demand
	Vent P-fakcor	The P-factor gives a change in the ventilation demand (contribution) proportional with the temperature error.
	Vent 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 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 readings	Here the PI contributions can be read. Following can be read: P demand I demand

Note 1: Table with local informations can be seen on the following pages.
NB! Is set in decimal degrees and not degrees + minutes.

City:	Longitude: Degrees + min	Latitude: Degrees + min	Longitude Setting	Latitude Setting	Time zone
Amsterdam	04° 54' E	52° 23' N	- 04.90	52.38	1:00
Athens	23° 46' E	37° 58' N	- 23.77	37.97	2:00
Barcelona	02° 10' E	41° 21' N	- 02.17	41.20	1:00
Berlin	13° 24' E	52° 32' N	- 13.00	52.35	1:00
Bordeaux	00° 36' W	44° 50' N	00.60	44.83	1:00
Brussels	04° 21' E	50° 51' N	- 04.35	50.85	1:00
Budapest	19°0 5' E	47° 29' N	- 19.08	47.48	1:00
Bucharest	26° 10' E	44° 27' N	- 26.17	44.45	2:00
Edinburgh	03° 12' W	55° 57' N	03.20	56.95	0:00
Geneva	06° 09' E	46° 12' N	-06.15	46.20	1:00
Helsinki	25° 03' E	60° 15' N	- 25.05	60.25	2:00
Copenhagen	12° 34' E	55° 41' N	- 12.57	55.68	1:00
Köln	06° 58' E	50° 56' N	- 06.97	50.93	1:00
Lisbon	09° 10' W	38° 42' N	09.17	38.70	0:00
London	00° 05' W	51° 30' N	00.08	51.50	0:00
Madrid	03° 45' W	40° 25' N	03.75	40.42	1:00
Milan	09° 10' E	45° 28' N	- 09.17	45.47	1:00
Oslo	10° 45' E	59° 55' N	- 10.75	59.92	1:00
Palermo	13° 20' E	38° 08' N	- 13.33	38.13	1:00
Paris	02° 20' E	48° 50' N	- 02.33	48.83	1:00
Prague	14° 22' E	50° 05' N	- 14.37	50.08	1:00
Reykjavik	21° 57' W	64° 10' N	21.95	64.17	0:00
Roma	12° 30' E	41° 54' N	- 12.50	41.90	1:00
Sofia	23° 20' E	42° 45' N	- 23.33	42.75	2:00
Stockholm	18° 03' E	59° 20' N	- 18.05	59.33	1:00
Trondheim	10° 25' E	63° 36' N	- 10.42	63.60	1:00
Warszawa	21° 00' E	52° 13' N	- 21.00	52.22	1:00
Vienna	16° 22' E	48° 12' N	- 16.37	48.20	1:00
Zurich	08° 32' E	47° 22' N	- 08.53	47.37	1:00

City:	Longitude: Degrees + min	Latitude: Degrees + min	Longitude Setting	Latitude Setting	Time Zone
Amarillo	101° 46' W	35° 14' N	101.77	35.23	-6:00
Atlanta, Ga.	84° 24' W	33° 50' N	84.40	33.83	-5:00
Boston	71° 00' W	42° 20' N	71.00	42.33	-5:00
Charleston, S.C.	79° 56' W	32° 47' N	79.93	32.78	-5:00
Charlotte, N.C.	80° 46' W	35° 16' N	80.77	35.27	-5:00
Chicago	87° 40' W	41° 53' N	87.67	41.83	-6:00
Cincinnati	84° 26' W	39° 10' N	84.43	39.17	-5:00
Dallas, Texas	96° 50' W	32° 50' N	96.83	32.83	-6:00
Denver	105° 00' W	39° 45' N	105.00	39.75	-7:00
Detroit, Mich.	83° 05' W	42° 23' N	83.08	42.38	-5:00
Dubuque	90° 41' W	42° 30' N	91.68	42.50	-6:00
Edmonton	113° 30' W	53° 30' N	113.50	53.50	-7:00
Halifax	63° 35' W	44° 38' N	63.58	44.63	-4:00
Houston, Texas	95° 20' W	29° 50' N	95.33	29.83	-6:00
Indianapolis	86° 10' W	39° 42' N	86.17	39.70	-6:00
Jacksonville, Fla.	81° 38' W	30° 15' N	81.63	30.25	-5:00
Kansas City, Kans.	94° 40' W	39° 00' N	94.67	39.00	-6:00
Los Angeles	118° 10' W	34°0 0' N	118.17	34.00	-8:00
Memphis, Tenn.	90° 00' W	35° 07' N	90.00	35.12	-6:00
Mexico City	99° 10' W	19° 20' N	99.17	19.33	-6:00
Miami, Fla.	80° 15' W	25° 45' N	80.25	25.75	-5:00
Minneapolis, Minn.	93° 20' W	44° 58' N	93.33	44.97	-6:00
Minot	101° 15' W	48° 10' N	101.25	48.17	-6:00
Monterrey, Mexi-co	100° 30' W	25° 40' N	100.50	25.67	-6:00
Montréal	73° 34' W	45° 31' N	73.57	45.52	-5:00
New Orleans	90° 05' W	30° 00' N	90.08	30.00	-6:00
New York City	74° 00' W	40° 45' N	74.00	40.75	-5:00

City:	Longitude: Degrees + min	Latitude: Degrees + min	Longitude Setting	Latitude Setting	Time Zone
Oklahoma City	97° 30' W	35° 25' N	97.50	35.42	-6:00
Omaha	96° 06' W	41° 15' N	96.10	41.25	-6:00
Phoenix, Ariz.	112° 10' W	33° 30' N	112.17	33.50	-7:00
Pittsburg, Pa.	79° 55' W	40° 25' N	79.92	40.42	-5:00
Regina	104° 35' W	50° 27' N	104.58	50.45	-6:00
San Francisco	122° 30' W	37° 47' N	122.50	37.78	-8:00
Seattle	122° 15' W	47° 41' N	122.25	47.68	-8:00
St. Louis, Mo.	90° 12' W	38° 40' N	90.20	38.67	-6:00
Syracuse, N.Y.	76° 11' W	43° 04' N	76.18	43.07	-5:00
Tampa	82° 38' W	27° 57' N	82.63	27.95	-5:00
Toronto, Canada	79° 20' W	43° 39' N	79.33	43.65	-5:00
Vancouver, Can.	123° 10' W	49° 15' N	123.17	49.25	-8:00
Victoria, Canada	123° 25' W	48° 30' N	123.42	48.50	-8:00
Washington D. C.	77° 00' W	38° 52' N	77.00	38.87	-5:00
Wichita	97° 20' W	37° 40' N	99.33	34.67	-6:00
Winnipeg, Canada	97° 09' W	49° 54' N	97.15	49.90	-6:00

Longitude and latitude in degrees and minutes. These are also shown in decimal degrees, which are used by data entry in the LCC 1. The time zone is shown right.

Technical specification

LCC 1 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:	0-45 °C (32-113°F), do not place in direct sunlight
Humidity:	95 RH% without condensation.
Density:	IP65
Dimension LxWxH:	350x250x130 mm (13.8x9.8x5”)
Weight:	App. 7,5 kg (16.5 lbs)

LCC1 overall installation instructions.

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

The units may NOT be exposed to direct sunligt, as this can cause that the temperature inside the units can be unacceptable high! High temperature in the LCC 1 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!

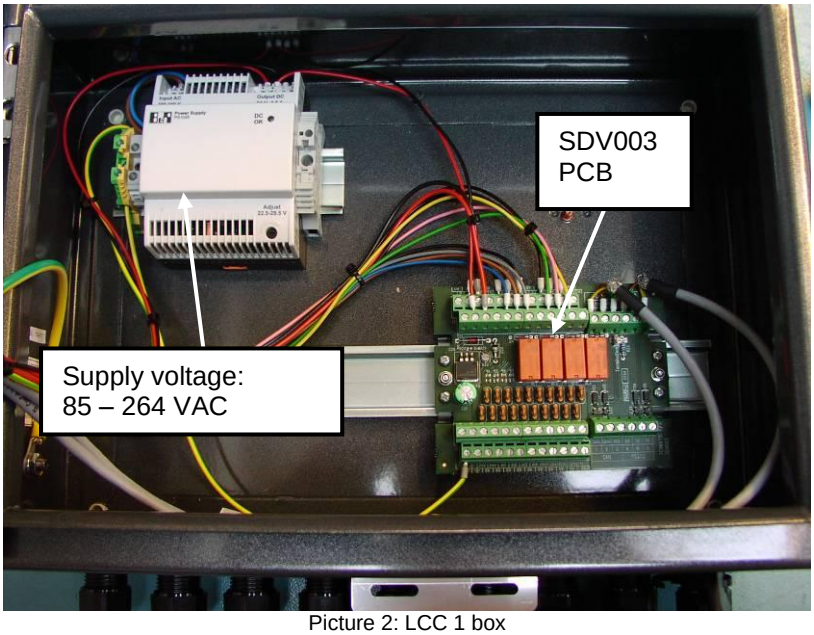
Warning! High voltage can cause death or cause injury to people! Connection of the supply voltage may only be carried out by an authorised electrician. The electrical connections should always be executed according to the local provisions.
NB! Remember the earth connection!

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.

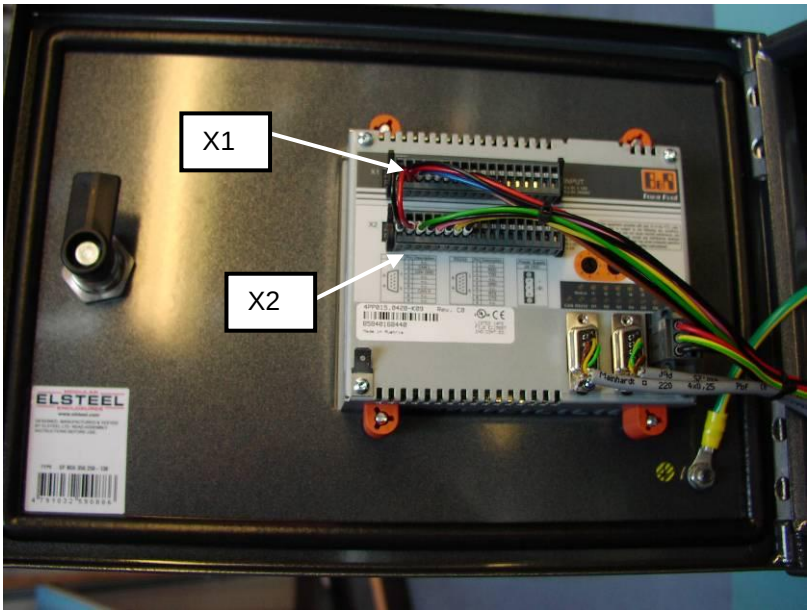
Sensors: All sensors should be connected to the LCC 1 via a guarded cable.
NB! The display should be connected to an earth terminal.

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

Connection overview LCC 1



Picture 2: LCC 1 box



Picture 3: LCC 1 front

LCC 1 structure

The LCC 1 consists of the following inputs and outputs.

Analog inputs, should be connected to the SDV003 PCB, which can be found in the LCC 1, AI1-AI3:

- **AI1,SDV003:** Room temperature sensors, following Senmatic sensors can be used.
  - RTF6 (combined temperature and humidity sensor unit), Part No. 307215.
  - RT10 temperature sensor hanging down from the ceiling, Part No. 210200.
  - RT14 temperature sensor for assembling on the wall, Part No. 210750.

- **AI2,SDV003:** Room humidity sensor, following Senmatic sensors can be used:
  - RTF6 (combined temperature and humidity sensor unit), Part No. 307215.
  - HS14 humidity sensor for assembling on plane surface, Part No. 307280.

- **AI3,SDV003:** Flow temperature sensor, following Senmatic sensors can be used:
  - E10 without weld coupling, Part No. 230600
  - E10 with weld coupling, Part No. 90230600

Digital outputs, should be connected to the SDV003 PBC, which can be found in the LCC 1, out1-out3:

- **Out1,SDV003:** Alarm, gives 24VDC by no alarm.
- **Out2,SDV003:** Irrigation, gives 24VDC when the irrigation starts.
- **Out3,SDV003:** Light, gives 24VDC out when the light turns on.

Digital outputs, which should be connected to the back of the panel on connector X2

- **X2,11:** Heat valve 1 open, gives 24VDC out when the heat valve turns on.
- **X2,12:** Heat valve 1 close, gives 24VDC out when the heat valve close.
- **X2,13:** Ventilation 1 open, gives 24VDC out when the vent opens.
- **X2,14:** Ventilation 1 close, gives 24VDC out when the vent closes.
- **X2,15:** Ventilation 2 open, gives 24VDC out when the vent opens.
- **X2,16:** Ventilation 2 close, gives 24VDC out when the vent closes.
- **X2,17:** Screen on gives 24VDC when the screen closes.
- **X2,18:** Screen off, gives 24VDC when the screen opens.

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:

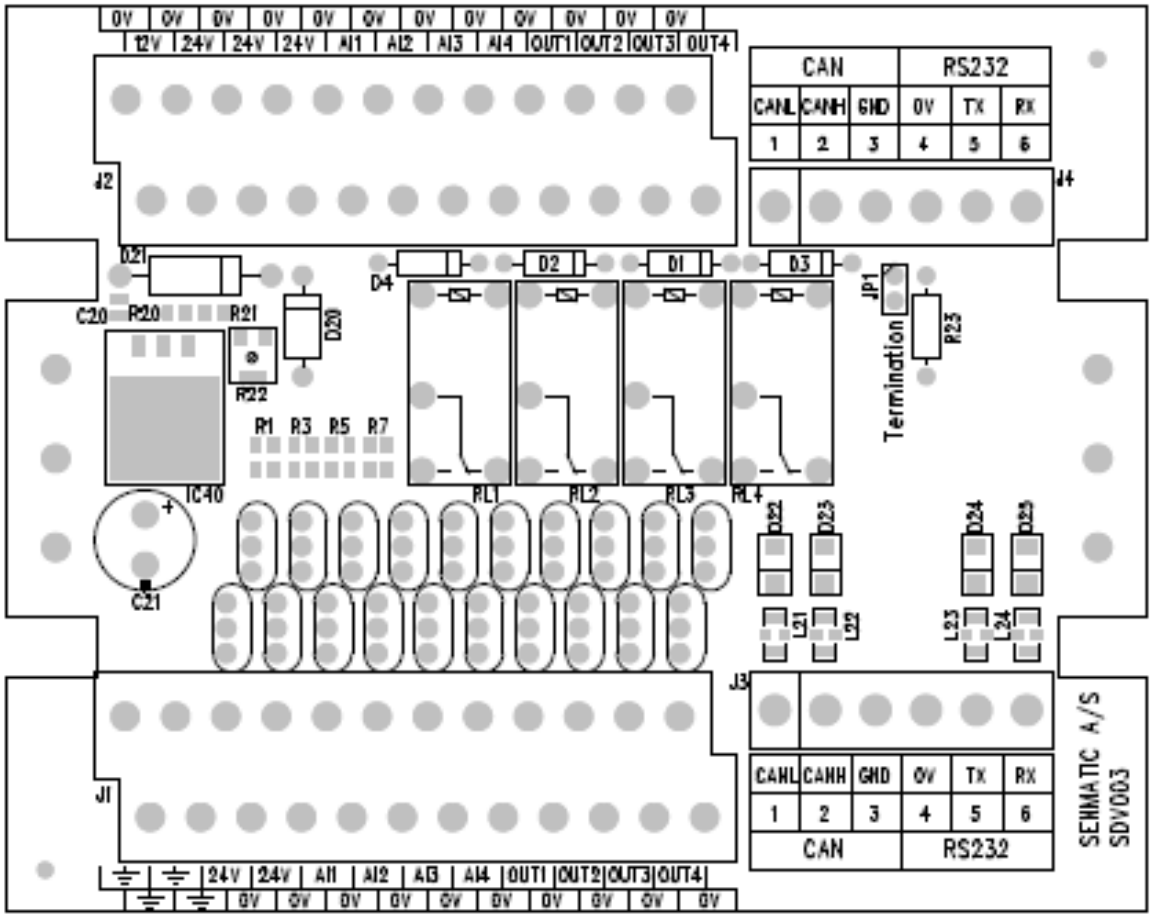
- **SDV003,J3,CAN:** Can bus is used for communication between several LCC 1s if they share the weather station signals.

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 analog sensors from Senmatic such as temperature sensor, humidity sensor and flow temperature sensor as well as the 3 outputs for alarm, irrigation and light.
Here you can also connect the CAN communication and the RS232 communication.



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.

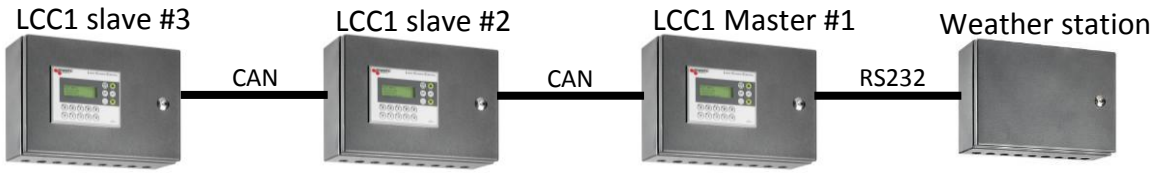
GND: Is connected to GND on the SDV003 PCB in the next LCC 1 that should receive the weather station data.

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:

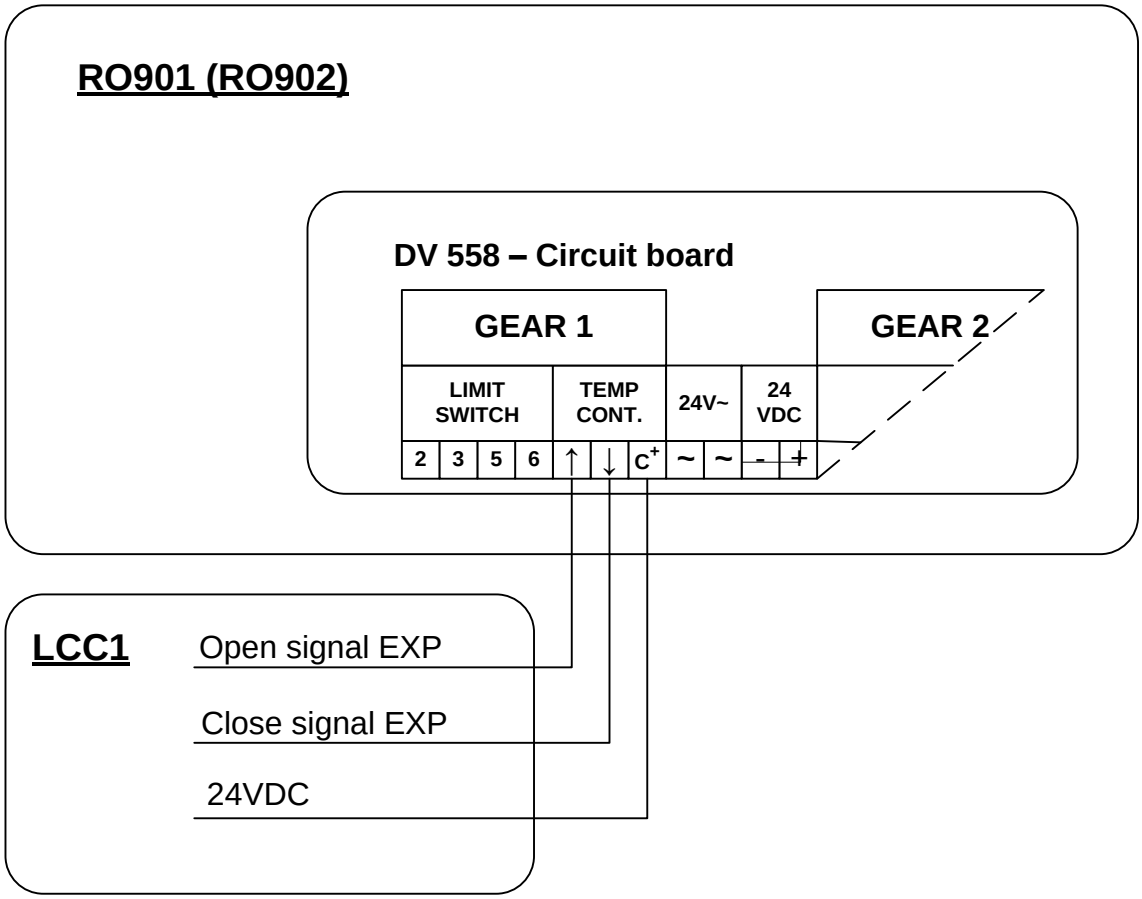
- LCC1 slave #3 Jumper JP1 connected
- LCC1 slave #2 Jumper JP1 not connected
- LCC1 Master #1 Jumper JP1 connected

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 ”0”), 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!

RO901 (RO902) connection to the LCC1.

Below you see a connection chart (connection chart 1), which shows how you connect a gearmotor to the LCC 1 via a RO901 or RO902 box from Senmatic.



Connection chart 1

Description of the 3 shown output signals from the LCC 1 that can be connected in the RO box.

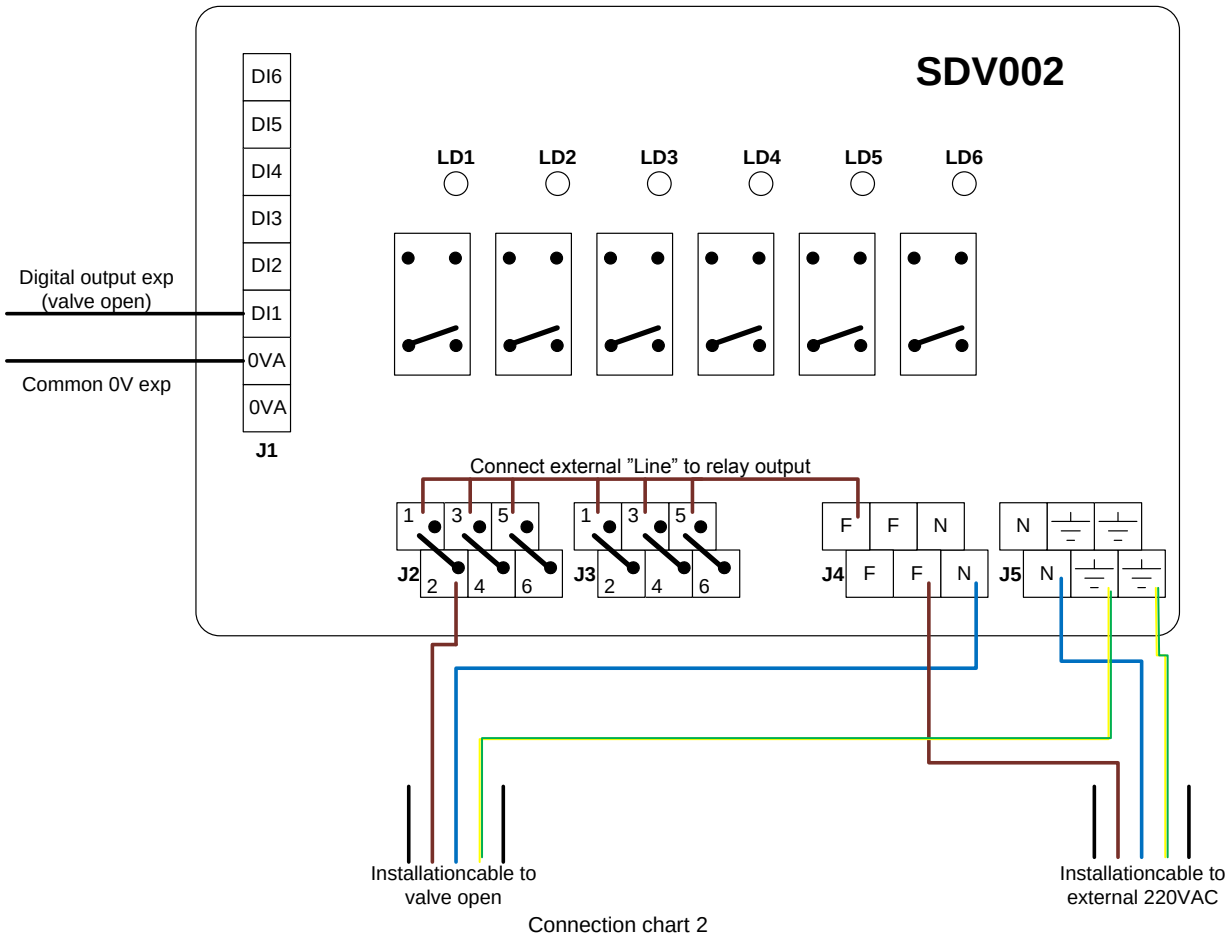
Open signal LCC1:
This signal comes from the digital output module, which is connceted in the box.

Close signal LCC1:
This signal comes from the digital output module, which is connected in the box.

24VDC:
+24VDC is used as power supply in the LCC, which should be connected in the RO box. The signal can either be taken from the power supply or the +24VDC terminal at the PCB SDV003.

Connection of units with 220VAC supply.

Below you see a connection chart (connection chart 2), which shows how you connect e.g. a 220VAC heat valve at the LCC 1 by means of the X2 connector at the LCC 1 panel and also the SDV003 PCB.



Connection chart 2

J1:
Connector where the signals from the digital outputs in the LCC 1 are connected according to the control required.
The 2 0VA inputs are common.
DI1 – DI6 is where each digital output from the exp should be connected.

LD1 – LD6:
LEDs that indicate whether or not the relay is on (on = light on). LD1 belongs to DI1, etc.

J2:
Connector for connection of the 3 external 220VAC units.
1 & 2 is controlled by DI1.
3 & 4 is controlled by DI2.
5 & 6 is controlled by DI3.
In the above example heat valve open is connected to 1 & 2.

J3:
Connector for connection of the 3 external 220VAC units.
1 & 2 is controlled by DI4.
3 & 4 is controlled by DI5.
5 & 6 is controlled by DI6.

J4:
F = 220VAC Phase. All the Fs are connected on the PCB.
N = 220VAC Neutral. All the Ns are connected on the PCB.

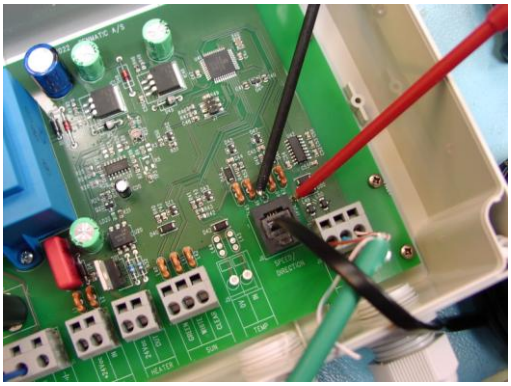
J5:
N = 220VAC Neutral. All the Ns are connected on the PCB.
⏚ = 220VAC Ground. All the ⏚s are connected on the PCB.

- First the external 220VAC is conented to the J4 & J5.
- Then the phase from the external 220VAC is connected to input 1, 3 and 5 on connector J2 & J3.
- Afterwards you run a cable from the digital output in the exp, which should control the external unit. This is connected to DI1, DI2, DI3, DI4, DI5 or DI6 according to which output you want to use.
- The cable from the unit, which shoud be controlled, is now connected in this way:
    - Ground (yellow/green wire) is connected to an arbitrary ⏚ on J5.
    - Neutral (blue wire) is connected to an arbitrary N on respectively J4 or J5.
    - Phase (brown wire) is connected to either 2, 4 or 6 on connector 2 or 3 according to where the control signal from the exp is connected (DI1 – DI6).

Weather station

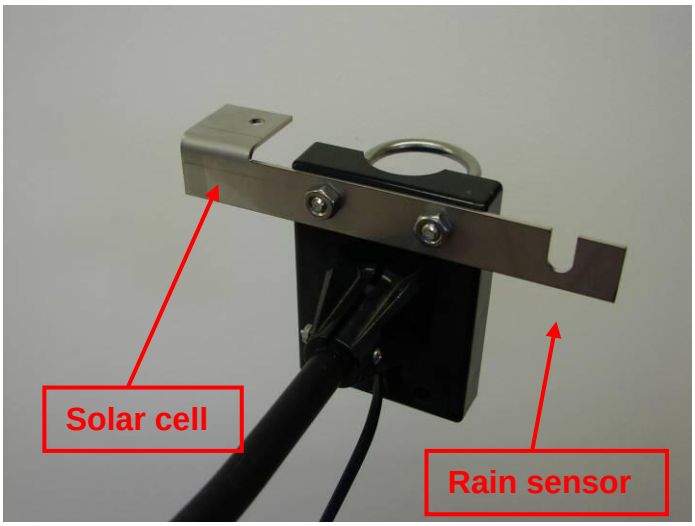
Follow the small pamphlet ”Standard anemomter – installation manual” regarding the installation of the weather station as well as the wind direction and the wind speed.

Regarding the attachment of the wind direction sensor you have to find north as described in the small pamphlet.
To make sure that the sensor in the weather station stands correctly, it is also possible to measure that by use the connections shown on the picture.

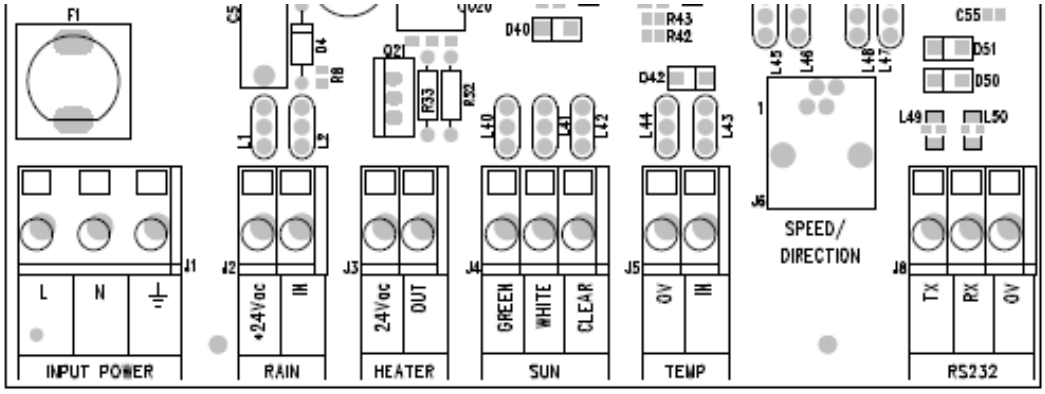


If you put the connector from the weather station in the socket and measure with a multimeter on the connector, you can measure the ohm value from the direction sensor.
0 ohm = 0°
10 k ohm = 180°
20 k ohm = 360°
Exactly in the switch between 0° and 360° you can measure a very high ohm value, which corresponds 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.