HOOGENDOORN ECONOMIC

Working with version 10 ......

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    ● For customers and dealers: Please do not run or install any of your own software on the ECONOMIC, unless Hoogendoorn has specifically declared them something like "appropriate for ECONOMIC".
    ● The ECONOMIC may only be connected to an existing or a new fixed network by specially trained and authorised Hoogendoorn employees, or by one of our dealers.

Unless both of these items are observed properly, Hoogendoorn will not be responsible for any possible consequences.
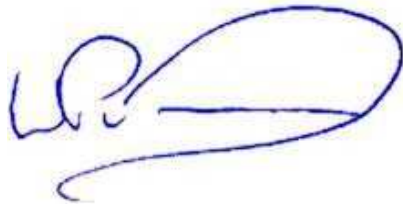
CONGRATULATIONS, a new release!

On behalf of all the employees of HOOGENDOORN AUTOMATION may I warmly congratulate you on the new release of the ECONOMIC program that is installed on your climate computer. As we do every year, we have brought out a new version in which a number of important improvements have been made. In addition we have developed a number of new modules that further increase your options for automation in the greenhouse. By doing this we are again responding to the wishes of you and your colleagues.

A great deal of attention has been paid in recent times to the unique cooperation of a cluster of growers in the new Bergerden horticultural area, between Arnhem and Nijmegen. The proprietors in this area are using an advanced system of collective energy supply. A management system has been developed for this in cooperation with various experts. HOOGENDOORN has participated in this. Due to sophisticated control of all energy flows it has been found possible for the participating growers to save some ten percent on their energy costs.

In 2004 HOOGENDOORN also began cooperation with Innogrow, the developer of the GeslotenKas closed greenhouse system. This cropping system is undergoing a lot of development and according to the experts has far-reaching consequences for Dutch glasshouse horticulture. This year Hoogendoorn has reached an important agreement with the plant and environmental research institution Praktijkonderzoek Plant en Omgeving (PPO) for the actuation of greenhouses in the new Innovatiepar© with the ECONOMIC.

The new release of the ECONOMIC will enable you to benefit from the expertise that we have built up during this and other projects in recent years. I hereby wish you much pleasure in using the new ECONOMIC version and of course a successful crop.

W.P. van Duijn   Vlaardingen, 2005
Horticulture Director HOOGENDOORN

HOOGENDOORN ECONOMIC version 10

1. Table of Contents

2. Before you start

HOOGENDOORN takes the greatest possible care in making the ECONOMIC easy to use. When installing the new version there are as few changes as possible that you have to enter manually. You must however check a few things after re-installation:

- Are ViPs for **EC** and **EC recirculation** set correctly (see paragraph 6.4).
- Are all crop sections watered or must sections be started again. During the program change watering is temporarily stopped.
- For new installations: Setting **Wind speed storm curtain running** (see paragraph 7.2).
- Setting **ViP curtain position** and **ViP crack** (see paragraph 5.3.1).
- New settings must be added manually to user reports and settings menus. The HOOGENDOORN menus are however updated automatically.
- Finally: it is necessary for the crop that you familiarise yourself well with the new program version in your ECONOMIC. Take your time to do this!

Settings from your previous program are as far as possible automatically transferred and reorganised. The new features are in principle not activated here. We advise you however to go through all the settings and to assure yourself that everything has been set in accordance with your wishes.

After a program change also check once again the settings, reports and graphs, so that you are assured of an ECONOMIC that does exactly what you want! This certainly also applies when extending or changing the group layout. We also advise you to check the installation, among other things whether all the switches (man/automatic) are in the right position.

After updating a configuration with curtains you receive a message stating that the settings **ViP crack** and **ViP curtain position** must be checked. In any case always check these settings immediately after the update.
The old **ViP crack RH: opening** is reorganised to the new **ViP crack**, the old **ViP crack greenhouse temp: opening** to the **ViP curtain position**. For this latter a set crack for example of 5% is reorganised to a position of 95%.
It may not be possible to go on using ViP influences AgronautL, AgronautK and radiation control percentage set in the old ViPs.

Check that the alarm sensors are turned back on (e.g. OCTA alarm).

Benelux or export?

Some components of the ECONOMIC have been specially made for Benelux, other components on the other hand have in fact been developed for the foreign market. The opposite also applies. If this is the case you can identify this from the following icons.

Special or exclusive for Benelux

Special or exclusive for export versions

3. Introduction

A HOOGENDOORN Customer Service employee has recently installed version 10.0 of the ECONOMIC. He has discussed all the changes and improvements with you. We can however well imagine that you want to read this all through again slowly. You can do that in this brochure.

- Part 1 describes for each component the main changes in the program.

- Part 2 gives information on supplementary features that HOOGENDOORN can supply to further optimise your nursery management.

Computer programs are subject to continuous improvement and change. In the course of time minor and major adjustments are necessary. If you have taken out a maintenance contract with HOOGENDOORN then if available once a year a new version of the program will be installed on your ECONOMIC. Thanks to the maintenance contract you can always benefit from all the improvements made to the software in the previous twelve months. At a stroke you have the most modern control available in your nursery.

If you cannot find something in this publication you can consult the more extensive online help. This can be found using the **F1 button of your keyboard.**
For further questions the employees on the HOOGENDOORN Helpdesk can be contacted via **+31 (0)10-4608030**. They have the most modern technology and can, if necessary, call up your ECONOMIC and look remotely to see what is up.

HOOGENDOORN ECONOMIC version 10

PART I

PROGRAM CHANGES

4. New in your process computer

In the ECONOMIC version 10.0 a large number of improvements have again been made. Some of these are installed as standard, other changes or supplements are optional. All the changes are the result of intensive consultation between HOOGENDOORN staff and growers. With the new version we are therefore responding to the wishes of customers that often arise when increasing their scale and with new cropping techniques.

The most important improvements in version 10 of the ECONOMIC concern:

- In the climate control the graphics programs have been extended. The control of the curtains is more flexible and the 'crop condensation' module has been improved. Analogue actuation of the vents and curtains can now be carried out with the so-called Ridder Logic-Link motors. This feature is optional (Section 5).

- In the water control the features for the supply and control of the valves have been extended (Section 6).

- The ease of operation has been increased and the password protection features have been extended. The reaction to wind speed outside has been improved. The time synchronisation of various computers connected to a network has been improved and the remote control features have been adjusted (Section 7).

Caution!

All the changes in this brochure apply from release 10.0. Changes made later are called subversions and are numbered as 10.1, 10.2 , 10.3 etc.
If that is the case it is clearly indicated separately.

5. Climate control

The greenhouse climate is controlled using heating pipes, air vents and possibly shade screens. At various points more accurate control is carried out. In addition the graphics program has been extended as a result of which you get a better idea of whether the settings have actually been made.

5.1 Heating: maximum pipe in graph

An important improvement in version 10.0 is that the **computed maximum pipe** can be read off in a graph alongside the **computed minimum pipe**. This makes it easier to see what scope there is for being able to control the pipe heating.
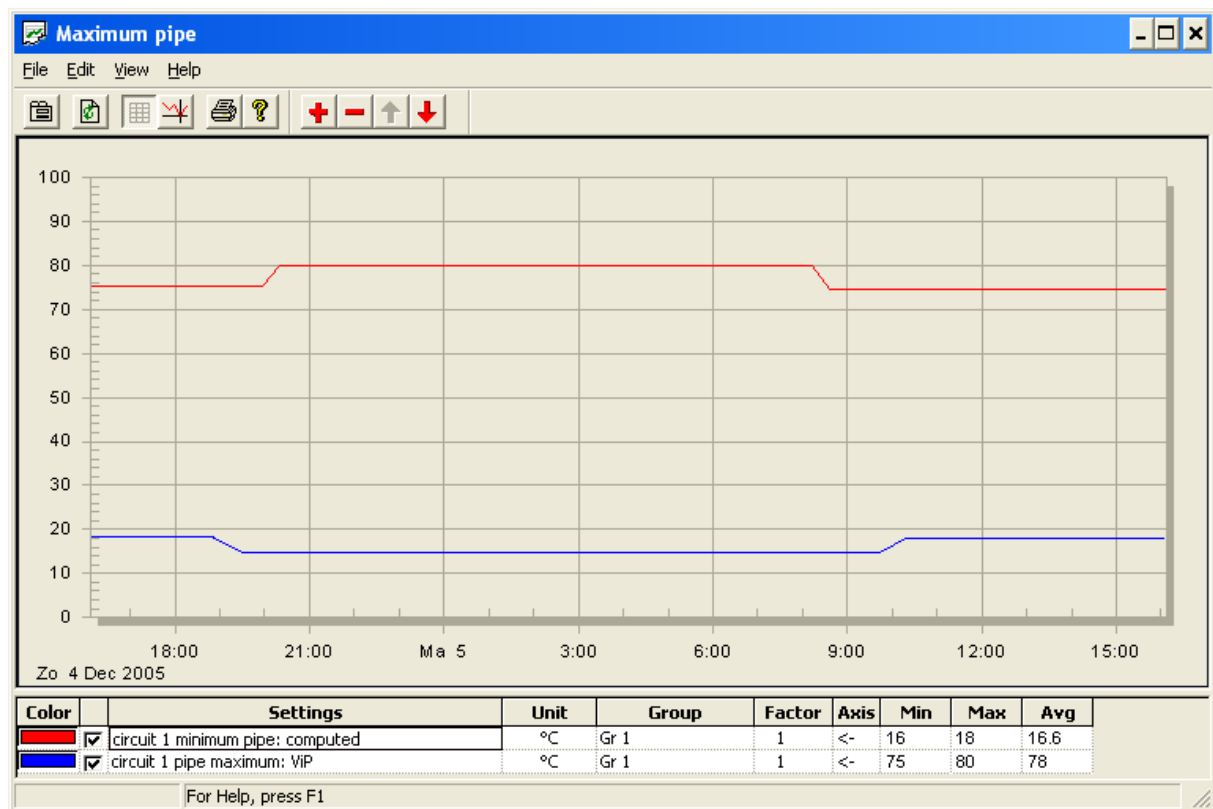
5.2 Ventilation: vent position actuation with Ridder LogicLink motors (option)

Because of advances in technology the extremely accurate control of the vents is increasingly more important. Growers want more than just an open/close actuation for the vents and that can be done using so-called Ridder LogicLink motors. These make analogue actuation possible. One of the big advantages of this type of motor is that instead of a potentiometer for measuring the vent position a so-called encoder is used. The vent position achieved is as a result very accurate. From version 10.0 the Ridder motors can as an option be actuated by the ECONOMIC. The use of these analogue motors is indeed unique for the HOOGENDOORN process computer.

5.3 Curtains: faster and continuous control

There have been a number of changes in the control of the curtains in the area of actuation. The main principles are:

- Continuous control of the shading level to be able to achieve a different shading percentage with several curtains.
- A number of variables must be set in relation to one another. For example the setting of a humidity gap not only affects the RH but also the temperature.
- A fast response to direct light in the greenhouse is necessary. This is particularly important for crops that are sensitive to light and for cuttings. On the other hand too fast a response is not always good because light is important for growth. Extra running of curtains also causes unnecessary wear and tear.
- Curtains must be used for various applications. Early in the morning and in the evening screening provides an optimum climate. At night the curtains close to prevent light emission.
- Finally ease of use has been important in the adjustment of the curtain control. Easier setting means a better overview so that it is easier to utilise all the options of the curtain control.

5.3.1 ViP curtain position and ViP crack

Version 10.0 works with new ViP settings, namely **ViP curtain position** and **ViP crack**. These can be set with six periods. The ViP curtain position and the ViP crack are in principle interchangeable variables. The process computer calculates this in the light of the same settable influences. The difference is in the approach:

- **ViP curtain position:** setting 80% means that the curtain closes to 80%
- **ViP crack:** setting 20% also means that the curtain closes to 80%

You yourself decide for each curtain control (blackout, energy, radiation etc.) which of the two approaches you choose or that you want to work with a combination of these. The **ViP curtain position** is generally most suitable for controlling radiation. You want to keep out as much light and heat and the curtain must be closed as much as possible. The **ViP crack** is used in particular for curtains with a high insulation value where the temperature or the amount of humidity under the curtain can rise too high (energy). You then want to open a crack to let the heat or humidity escape. It is also possible to use both the **ViP curtain position** and the **ViP crack**. The process computer optimises the position of the shade screen according to the following computation rule:

curtain position = computed value **ViP curtain position** – computed value **ViP crack**

The ViP setting is determined using the following ViP influences:

Wind speed	m/s
Radiation sum	J/cm²
Outside temp.	°C
Radiation	W/m²
Energy monitoring	-
Uni-influence	-
Dev. Vent. temp	°C
Greenhouse temperature	°C
Deviation HD	g/m³
Deviation RH	%
Vent position	%
Dev. Heat. temp	°C

The old settings **curtain 1: ViP crack RH opening** and **curtain 1: ViP crack greenhouse temperature opening** are replaced by a single **ViP crack** in which both influences for RH and for greenhouse temperature can be found. As a result the influence of both RH and temperature can be set more easily and clearly (with the combination **ViP curtain position** and a **ViP crack** you can now also use more than three influences).

First of all in the setting **curtain 1: type of control** you select the type of control for which the curtain must be used.
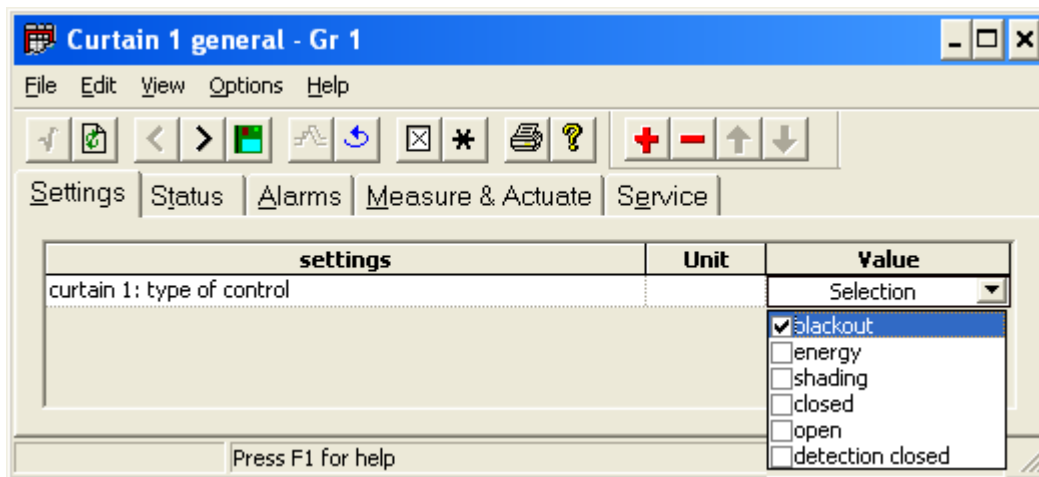
You then fill in the required curtain position for **curtain 1: ViP curtain position.** In the new setting **curtain 1: type of control curtain position** you select during which curtain functions you want to use the **ViP curtain position** by checking the relevant selection(s). For the functions for which you do not check anything, a curtain position of 100% is considered as closed.

At the point when the curtain is actually going to be controlled in accordance with the **curtain 1: type of control** and **curtain 1: type of control curtain position** settings the curtain will be actuated to the position entered in **curtain 1: ViP curtain position.**

In addition to the curtain position settings mentioned there are two comparable new settings for control with crack, namely the **curtain 1: type of control with crack** and **curtain 1: ViP crack.**
In the ECONOMIC help under **button F1** in the general help for the curtains you will find a large number of examples on the use of the new **ViP curtain position** and **ViP crack** settings.

5.3.2 Adjustments to radiation for curtains

For nurseries with different crops or with crops in different cropping stages it is necessary for each curtain to be able to set a radiation delay for the curtains. This is now possible from version 10.0.
With the following settings you can set a separate delay for the radiation for each group and for each curtain. This radiation is used for ViPs shade screen **radiation open**/**close** *and* for ViP influence radiation W/m^2 for the curtains:

> **curtain 1: radiation type of delay**
> > **fixed**
> > **average/settable**
> > **settable**
> **curtain 1 : radiation: max. rise**   **(W/m^2)/min**
> **curtain 1 : radiation: max. fall**   **(W/m^2)/min**

You can for example have the shading respond faster to increasing radiation in a group of young plants by setting a higher maximum temperature rise. If curtain 1 is used for shading and curtain 2 for energy, you can use a separate radiation delayed for both applications.

You can put this setting in a graph or add it to a curtain report.

> **shade screen 1: ViP radiation close**   **W/m^2**
> **shade screen 1: ViP radiation deviation open**   **W/m^2**

These ViPs have been given six periods. This means you can combine them even better with the new **ViP curtain position** in six periods. It is also now much easier to set a period in which the shade screen may not close. If the **ViP-curtain position** is only used as a shade screen, you can set a period with position 0%.
You thus have a better idea of the shading period used.

Should this solution not be possible, you can set the night period of **curtain 1: ViP radiation close** at 1250. The curtain then of course remains open. Because with a ViP with six periods you can now also easily set the permitted shading period, the following settings are dropped:

        shading: **type of start time**
                            sunrise
                            sunset
                            clock
        shading: **start time**   **h:m**
        shading: **type of stop time**
                            sunrise
                            sunset
                            clock
        shading: **stop time**   **h:m**

5.3.3 Minimum interval curtain position change

In addition to the delay time that is taken into account upon the (initial) closing of a curtain (**curtain 1: ViP delay time close**) there is also an interval that is adhered to when changing the curtain position at the time that the curtain was already closed. This interval now applies both for changing the curtain position as a result of a new computed **ViP curtain position** and/or ViP crack and a change in **curtain 1: crack spraying opening**.
The text of the setting has been changed from:

        curtain 1: crack minimum interval change   **h:m**

to:

        curtain 1: minimum interval position change   **h:m**

This setting replaces the earlier **minimum interval crack change**. The interval applies for both adjustment for **ViP curtain position** and for **ViP crack** or the combination of both.

5.3.4 Curtain control with Ridder Logic Link motors (option)

Not only must the control of the vents be increasingly more accurate. The control of the curtains is becoming increasingly important due to advances in (crop) techniques. Ridder Logic-Link motors in combination with the HOOGENDOORN ECONOMIC apart from the vents can also actuate the curtains. In addition to the normal digital (open/close) actuation as a result analogue actuation is also possible.

5.4 Crop condensation

The crop may not become wet due to condensation formation. Pests and diseases can after all develop quickly in wet spots. From version 10.1 there are improved features for preventing the crop getting wet with the ECONOMIC.

Condensation forms if the temperature of the crop and/or fruits falls below the dew point of the greenhouse air. The classic situation is when the rising sun in the morning causes the active parts at the top of the crop to start evaporation, while the lower parts and the fruits are still cold from the night. Wetting is prevented by:
- Slowly increasing the heating in the morning (before the sun comes through)
- Maintaining a minimum pipe (to prevent low crop/fruit temperature)
- A humidity vent position (to discharge too much humidity promptly)

These measures are effective but are very expensive in terms of energy, particularly if these are not set selectively, but used as an 'insurance premium'. For this reason, a number of years ago HOOGENDOORN developed the ECONOMIC Crop Condensation module. With this it is possible to take measures only when that is necessary. That means a considerable saving on the energy bill.

The ECONOMIC Crop Condensation makes the risk of wetting clear by means of the so-called 'deviation condensation temperature'. This is the deviation between the dew point of the greenhouse air and the temperature of the coldest crop section. When this value becomes too small or negative, there is a chance of wetting and measures must be taken. The module uses the deviation condensation temperature as a ViP influence. This is available for ViP settings minimum pipe, shading crack and vent position humidity.

There are three ways in which the condensation risk can be determined using the ECONAUT Crop Condensation module:
- via a model calculation - The earlier version of the Crop Condensation module was developed for crops of tomato, cucumber and pepper. For these crops the fruits always run most risk of wetting. The temperature of the fruits can also be determined well with a model calculation.
- using plant temperature – Thanks to new developments it is now also possible to measure the crop temperature in a reliable way with a GROWLAB Plant temperature meter. As a result the condensation risk can now also be determined for other crops.
- by determining the condensation risk - For crops in which both the calculation via a model and the measurement of crop temperature is difficult to carry out, from version 10.1 the Crop Condensation module is able to detect a (too) fast increase in the greenhouse temperature. If the greenhouse temperature increases sharply in a short time that may be an indication of condensation risk. This deviation is displayed in a graph in combination with greenhouse conditions, radiation, outside temperature, etc. So you get a better understanding of the conditions in which crop condensation actually occurs and it is possible to take measures at the right time.

6. Water control

Due to increase in scale it is necessary to increase the maximum amount of water per supply and to use larger valve sections. In the recipes the handling of the water supply has therefore changed.

6.1 Phase 2 supply maximum more than 320 cc

The setting **level valve phase 2 supply maximum: ViP** has been deleted. Instead of this two ViP settings have been added with six periods. Both ViPs have the same ViP influences as the deleted setting. The settings are:

> **phase 2 supply amount: ViP**
> **phase 2 supply time: ViP**

This settings can be found in the settings menu **Control water – Recipes**.

The settings have two functions:
* replacement of the single setting **phase 2: supply of the crop section**
* or as a maximum in combination with the setting in crop section **phase 2: supply** as a minimum. Between minimum and maximum water can be stopped on a contact or level tray.

Caution! The use of **phase 2 supply time: ViP** is only possible if **time** has also been selected for **unit phase 2 supply**.

The setting **phase 2 supply amount: ViP** can be set up to 3200

Being able to make a higher setting also has consequences for the maximum amount per cycle of a valve. The control has been adjusted to also be able to handle bigger numbers. Thanks to this adjustment it is possible to permit bigger valve sections (with more than 30,000 drippers).

The following settings have been given a greater range:

> **area valve section**
> **water supply: number of drippers valve section**

6.2 Unit phase 2 supply

The registration setting **unit phase 2 supply maximum** has been replaced by a settable control. With the setting **unit phase 2 supply** amount or time is selected.
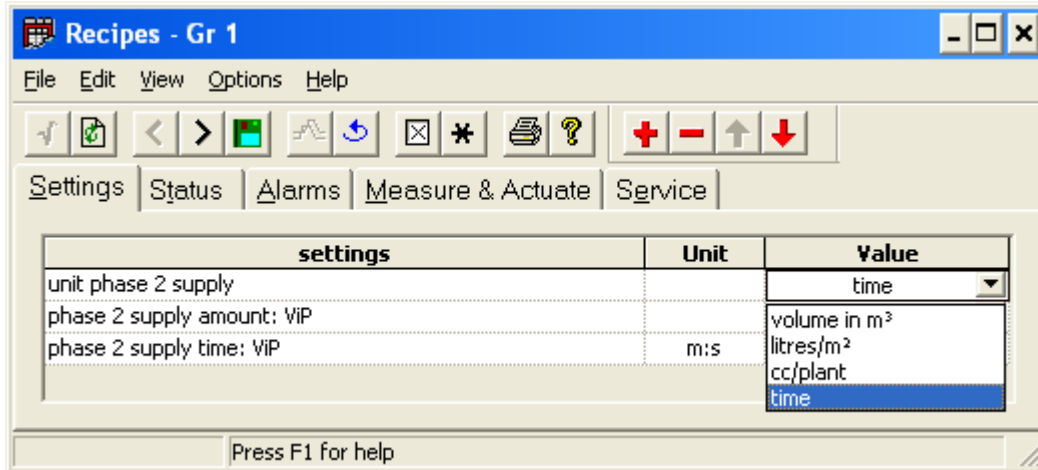
A new feature in version 10. 0 is an alarm if the computer notices that the recipe unit differs from the crop section unit. You then get the warning:

water: unit crop section not equal to unit recipe

6.3 Clearer setting phase 2 ViP

Sometimes it is necessary to vary the total supply during the course of the day. This could previously be done by wrongly setting rain valves as level valve and slave valves.
In the version 10.0 this can be set easily and clearly.
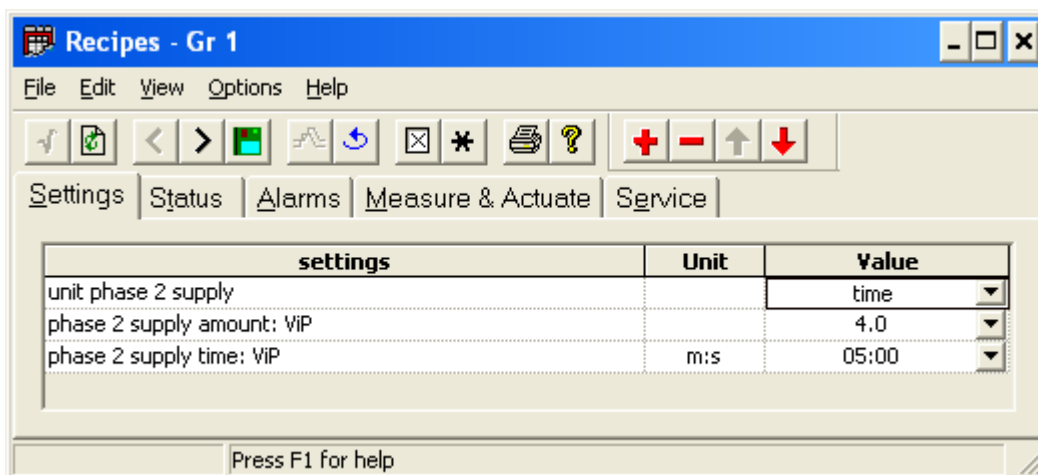
Once the first valve in a crop section starts phase 2, the computed value then applicable for the ViP supply is saved. In this way all the valves in the crop section, when set at the same percentage with respect to the crop section, receive the same amount of water.

Caution! Roof sprinklers are treated in the same way as rain valves. Slave valves receive an amount depending on the amount supplied by their level valve. Flushing valves have their own settings.

The setting **maximum supply control level valve** has been deleted from **Crop section control service tab**. This selection can be set more easily with the settings **phase 2 supply: ViP as min** and **phase 2 supply: ViP as max.**
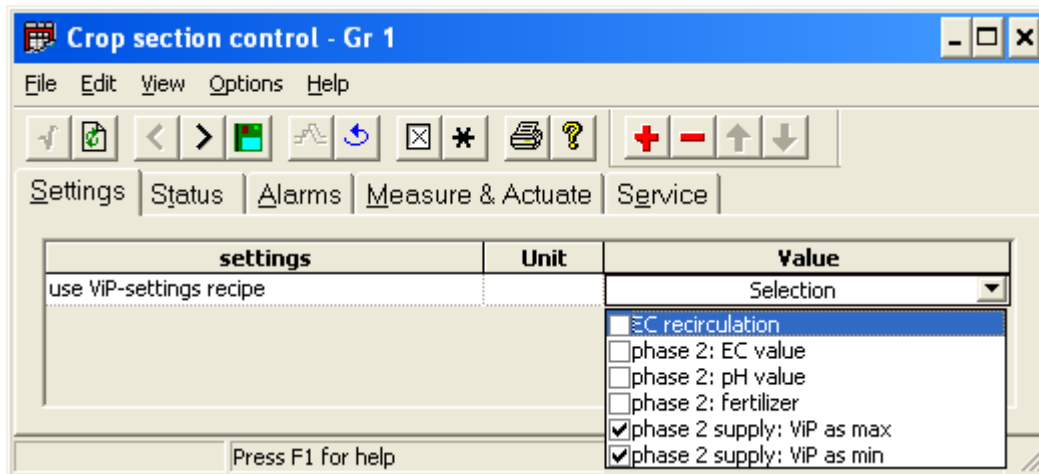
The ultimate minimum and maximum values used by the pump are shown in the new settings:

> **computed value: phase 2 supply minimum**
> **computed value: phase 2 supply maximum**

For both settings the unit "control time/litres" that the user enters applies. The original minimum or maximum may be derived both from crop section and from recipe settings. You can find extensive examples of the use of these new settings in the ECONOMIC help for the setting **use ViP-settings recipe** under **button F1.**

6.4 EC ViP and EC recirculation ViP from two to six periods

The control of the **EC ViP** and that of the **EC recirculation ViP** are given six periods. As a result more accurate control of the EC during the day is possible. The ViP influences are unchanged.

Recipes - Gr 1

EC control EC value: ViP - EC

		Start time	Relative to	Change	Value	radiation - W/m²		Uni-influence		No influence	
						250	800	4.0	2.0		
1	Y	08:00	Clock	00:00	1.5	0.2		0.0			
2	Y	11:00	Clock	00:00	1.5	0.3		0.5			
3	Y	16:00	Clock	00:00	1.5	0.5		0.4			
4	Y	21:00	Clock	00:00	1.5	0.2		0.0			
5	N										
6	N										

Recipes - Gr 1

recirculation EC value: ViP - EC

		Start time	Relative to	Change	Value	Level drain tank - %		radiation - W/m²		No influence	
						100	30	250	800		
1	Y	08:00	Clock	00:30	0.5	-0.3		0.1			
2	Y	11:00	Clock	00:30	0.8	-0.5		0.2			
3	Y	16:00	Clock	00:30	1.2	-0.7		0.3			
4	Y	21:00	Clock	00:30	0.2	0.0		0.0			
5	N										
6	N										

6.5 Valve active: new registration setting

A new setting has been added to the report **Pump water supply actual**. With this it is clear what the settings are for the total supply amount in the same report.

> **valve active 1: unit**

6.6 Priority crop section

From version 10.0 it is possible to adjust the priority with which a crop section receives water. This may for example be desirable if one crop section seems too dry. It may also be that certain crop sections must always have a higher priority, for example for a crop section with cuttings or the automatic flushing of a sand filter. There are two ways of giving a crop section a higher priority:
- via a manual start with priority
- after a set maximum wait time the crop section automatically gets a high priority

The split sorting by **number sequence or optimised** has been deleted.
Instead of this there is one sort program containing various sort criteria. Some of these you can activate as desired, for example sort by fertiliser choices or matrix board. Other criteria are fixed, for example flushing valve for the other valves.

6.6.1 Control

A crop section that must receive water comes onto a waiting list of different crop sections that are waiting for their cycle with the pump. The order within the waiting list determines which crop section in the list the pump will handle first. There are three waiting lists of crop sections. The pump waters the crop sections, for which the top list comes first and the bottom one last:
- crop sections with manual start high priority
- crop sections high priority
- crop sections low priority

When the pump is active with a crop section with a low priority, the pump will first complete the watering in this crop section, even if a crop section on high priority is waiting. A crop section that you start with manual start **High priority** lands in list 1. Crop sections with another start reason are put in list 3, as soon as the start conditions are met. They move to list 2 when their set maximum wait time in low priority has elapsed. Crop sections with a lower priority, but the same phase handling grouping as a crop section with a higher priority, are also put in the higher priority list. The reason for this is that crop sections with the same phase handling grouping must always be handled after one another.

6.6.2 Settings

If you want to quickly give a cycle to a row of plants that must be prepared for auction, then this can be done with the new setting **on: direct manual start.** This crop section is then handled next. The priority is high (list 1). With the existing selection **on: manual start** a manual start with low priority (list 3) is given.

  watering crop section: on/off
    on: manual start
    on: manual start direct

If a crop section is critical, take the following into account. A crop section normally starts with a low priority. When the set **crop section: maximum wait time cycle in low priority** has elapsed, a waiting crop section is moved to high priority. By setting the maximum wait time at 0 you can ensure that a critical crop section always starts in a high priority. This is for example useful if a crop section is used to flush a sand filter and that may not wait too long. If you use a special crop section for flushing, then a maximum wait time of 0 can ensure that this crop section normally starts before other crop sections.

  crop section: maximum wait time cycle for low priority **h:m**

If several crop sections have a short maximum wait time, it is understandable for all crop sections to set a plausible maximum wait time. This avoids crop sections with a lower priority never taking precedence on hot summer days.

  crop section: maximum wait time cycle for low priority **h:m**
  crop section: counter wait time priority h:m

With the counter you can see how long a crop section has already been waiting (counter counts wait time from 0). The counter can be set. If you want to move a crop section more quickly to high priority by giving the counter a prod, you can. There is no alarm on the counter wait time priority.

  crop section: priority status
    manual start high
    high
    low

With the priority status you can see with what priority a crop section is waiting.
This setting corresponds with **crop section: counter wait time cycle** in report **Crop section general actual.**

The following settings have not changed and are useful for monitoring the water supply:

  crop section: number of starts total
  crop section: water supply last cycle

Looking back at the past or previous day in particular the time and amount of watering are important. Graphs are available for this. The graph **crop section: number of starts total** is extrapolated at the time when a crop section meets the start condition (that is at the start of the wait time). **Crop section: water supply last cycle** is updated at the end of the cycle.

6.6.3 Adjustment ebb & flow control

In a previous version of the water program free valves were introduced. For this type of valve the valve itself ensures the actuation of the drain valves to be able to achieve the flood time. It is not then necessary during the flood time to have the pump wait for a following cycle until the flood time has elapsed. This would mean that the pump was occupied for an unnecessarily long time while new valves are waiting for a cycle.

In order to be able to use the pump more quickly for a new water supply the following adjustment has been made. For **free valves** the pump is released again for the next crop section when the delivery valves are ready. The boundary condition is that no further actuation may be necessary for the pump during the flood or drain time. This adjustment is not carried out for matrix valves.

6.6.4 Method for sorting waiting crop sections and valves

The service setting **method for sorting valves watering** (Settings menu Control Water – Crop sections – Management crop section) has been given a different content. With this sort criteria can be turned on and off.

> **method for sorting crop sections and valves**
> > **crop section with the same drain pit**
> > **crop section with the same fertiliser choices**
> > **valves on the same matrix board**

The selection sort by drain pit may be useful if the influence drain per cycle is used and several crop sections discharge into the same drain pit. Watering crop sections with the same drain pit right after one another then gives a more accurate result because the drain is computed jointly.

The selection by valves on the same matrix board may be necessary on hot summer days if several valves are used at the same time to get round in time. For crops on ebb and flood that is very important. This choice does not of course apply to free valves.

The basic principle here is always:
- first sort crop sections with chosen criteria.
- crop sections get a cycle in the sorted order.
- pump waters the valves of the crop section in the sorted order.

Sort method: crop sections

The criteria for sorting crop sections are in order of importance
1. the same grouping phase handling
2. priority manual start high/high/low
3. sequence start conditions (where the first crop section that meets the start condition will be handled first)
4. same drain pit   yes/no set by this can be set
5. same fertiliser choices   yes/no set by this can be set
6. numbering crop sections

You have an influence on whether or not to use a sort criterion, but not on the sequence in which the criteria are used with respect to one another. The crop sections are as far as possible placed after one another when they meet the start conditions at the same time.

Add extra valves to crop section
On starting a cycle all the valves in the crop section are placed on pump control. The pump waters these valves in turn. Valves that you add to a crop section, while that crop section (or the phase handling grouping to which this crop section belongs) is already being watered, will not be added to the current cycle. They will however be watered during a later cycle of the crop section. Where necessary you can link another crop section to a forgotten valve.

From version 10.0 valves are only put with the pump just before the start of the cycle. If a crop section meets the start conditions, but must wait for a cycle because the pump is still active with another crop section, the user can still add valves to the waiting crop section. Upon the next start of the crop section they will also be included in the watering.

Sort method: valves

The possible criteria for sorting valves are in order of importance:
1. flushing valves first
2. after this any level valve
3. valves of the same matrix board together: yes/no sort by this can be set
4. number sequence

In the new program the flushing and level valve always come first. That also applies if in **method of sorting crop sections and valves** the selection **valves on the same matrix board** is off. It is now no longer necessary to have the valve groups numbered in the right order for this.

6.6.5 Start crop section faster

In the previous versions of the ECONOMIC once every minute it checked whether a crop section met the start conditions.
From this version of the ECONOMIC this time is reduced to around 10 seconds. This applies for a manual start and a start contact as a result of which a crop section responds much faster to both start conditions. The exact start time partly depends on any pump pre-flushing time and the positioning of the EC/pH valve.

6.7 Alarm connection valves of different crop section

From version 10.0 the already existing rule that the valves of different pumps may never be connected in one crop section is very strictly applied by the control program. To help you in this, there is a new alarm that detects if by accident valves of a different pump are connected to the same crop section.

water: crop section with valves from different pump

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7. Other changes

In addition to changes in climate and water control improvements have been made to various other components in the ECONOMIC.

- The control of the curtains during a storm and the ViP wind speed have been adjusted. Here HOOGENDOORN takes advantage of advances in technology that have produced vents that are less sensitive to wind.

- Finally the password protection, time synchronisation and remote control have been changed. These improve the reliability and the ease of operation of the ECONOMIC.

**7.2 Wind speed storm curtain running default at 12 m/s**

Thanks to advances in technology the vents are less sensitive to wind. The standard setting of **wind speed storm curtain running** is a protection in case of storm and can be increased. When the wind speed is higher than the set value and the curtain is running, the vents are **closed**. In new installations the setting **wind speed storm curtain running** from now on is 12 m/s. The default value was previously 5 m/s.
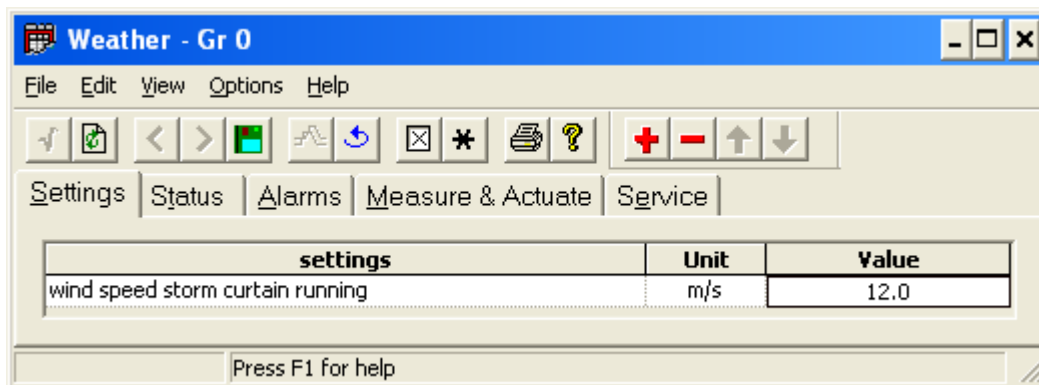
7.3 ViP influence wind speed adjusted

The wind speed has a great influence on the climate in the greenhouse and is often change-able. If the ECONOMIC were to make adjustments on the direct measurement of the wind speed this would cause enormous problems in the climate control. For this reason there is a delay in taking the wind speed measured into account in the control. From version 10.0 the wind speed control has been improved. Outliers in the wind speed have greater weight, giving a better response to a rapidly rising or falling wind.

In addition to the adjustment of the calculation method the maximum setting limit for the influence **wind speed** in the ViP settings has been increased from 12 to 20 m/s.

wind speed - m/s	▼	No ir
0.0	20.0	
	0.0	
	0.0	Min: 0 Max: 20
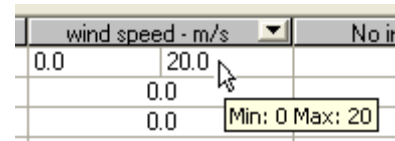
7.4 Password protection

With the increasing size of nurseries a number of tasks are increasingly being divided be-tween several people. It is sometimes desirable to make a distinction between what users may and may not do when logging onto the ECONOMIC operating station. Some users may change settings. Others may not, but must be able to view the present settings and actual reports. To be able to achieve this it is now possible to indicate for each user what level of access they have to the ECONOMIC:

full access   user can view reports and change settings.
only reading rights user can only view reports and *not* change settings
no access   user has no access to the operating screen of the ECONOMIC. A user can then temporarily not gain access.

The level of access can only be assigned and changed by the user with the name Userconf. This also determines whether a user has permission to use ECOMOBILE.
The user Userconf is a standard Windows user that is not installed, but which the customer or service engineer must create separately. The user Userconf can never be deleted by an ordinary user, but an ordinary user can change the password of the user Userconf. To add a user with access protection one must first log into the operating system as user Userconf. A user can then be added under: Extra, Options Configuration, Access control. In this tab the password protection is also switched on.
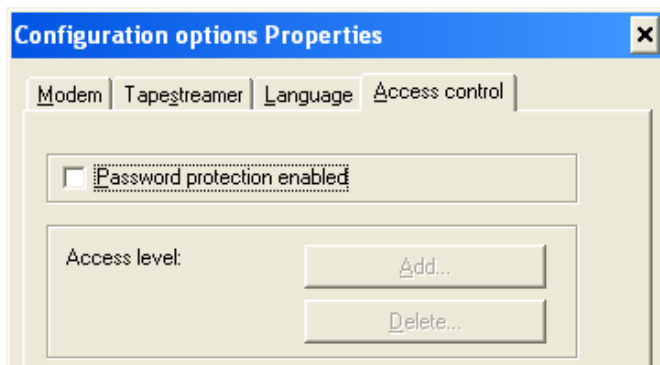
By using Add a new user can be added, where in addition to the user name and password the access level is also indicated.
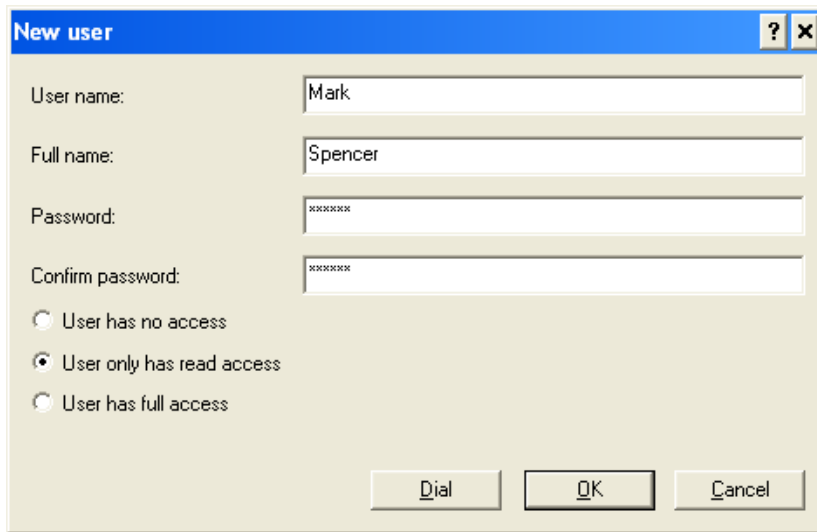
After creating the new user and the turning on the password protection by checking **Password protection switched on** the new user created can log in and then has the rights assigned to him.

For export versions this functionality is already available from version 9.3

7.5 Time synchronisation (ECONOMIC Time Service)

ECONOMIC Time Service is a product that synchronises the present time on the computer with the clock of another computer, for example a computer that is synchronised via the Internet with the atomic clock. This product is highly suitable for nurseries with a network.

Computer clocks must be synchronised
Much information within HOOGENDOORN products is time-related. To be able to interpret this information properly on the participating computers, the clocks of the various computers must be synchronised. Computers also exchange information using the network. If the clocks are not synchronised, one must always take into account time differences. For example when recording the gas consumption it is important that the clock is correct so that the gas consumed is recorded at the right clock time.

You can find an extensive description of the operation and installation of this product under the start menu in the folder HOOGENDOORN – EcoTimeService Help file .
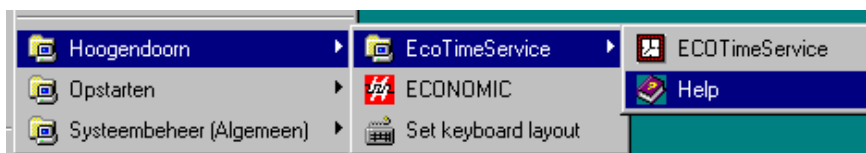
ECONOMIC Time Service is only available for the Dutch time zone

7.6 ECONOMIC Remote

The remote control, the ECONOMIC Remote, can also be used in combination with an ECONOMIC operating station on which an older version is present. For versions higher than or equal to 9.3 no further warning is given as the versions of ECONOMIC Remote and the ECONOMIC operating station are not the same.

Since the introduction of the ECONOMIC there have already been a number of new versions of Windows, the last of which is Windows XP. To be able to make optimum use of the technical features of the new Windows versions it is not possible for HOOGENDOORN to go on supporting ECONOMIC Remote on all previous Windows versions. In ECONOMIC version 10 the following changes have been made for this reason:

- This version of ECONOMIC Remote will no longer be installed on Windows 95, Windows ME and Windows NT.
- It will however still be possible to install the ECONOMIC Remote on Windows 98. In future versions it will no longer be possible to use Windows 98.
- The more modern (and most commonly used) versions of Windows will of course continue to be supported. These include:
- Windows XP Professional with Service Pack 1 (preferably SP2);
- Windows XP Home versions with Service Pack 1 (preferably SP2);
- Windows 2000 Professional versions with Service Pack 2 (preferably SP 4).

At least 128 MB RAM is required, except in case of Windows 98, for which 64 MB RAM is the minimum.

It is expected that in addition to Dutch and English versions German and French Windows versions as indicated above will not experience any major problems. This is not known for other languages.

7.7 Hardware ECONOMIC Operating station

Due to the continuous improvement of the process computer the program in ECONOMIC is becoming increasingly extensive. That requires more powerful equipment. The operation of the ECONOMIC is appreciably slower on an ECONOMIC operating station that has less than 256 MB memory. It is recommended that older ECONOMIC Base stations be replaced by a new system. This applies in particular for ECONOMIC Base stations with a P II processor.

8. Greenhouse and crop continue to require attention

HOOGENDOORN pays a great deal of attention to the safety and the reliability of the equipment and software supplied. Our staff have tested the software extensively before it is installed on your climate computer. Faults may however always occur and are always unexpected.

HOOGENDOORN therefore offers a maintenance contract. An employee from Customer Service visits your nursery each year to check the critical points of your computer and then installs a new release on your ECONOMIC at the same time. You are then assured that you will always have the most modern and efficient control of your nursery.

During the growing season itself you can also take a couple of important measures to further increase the reliability of the control and so avoid unpleasant surprises. HOOGENDOORN advises you in any case to regularly go through the following things:

1. Check the alarm limit monitoring. Due to external causes, such as a lightning strike or a human error, the computer can get in a mess.

2. Are earlier safety measures still satisfactory for the present method of operation and any renewals in the installation?

3. Do all the protections function properly? A rusted alarm clock for example can fail to work with all the consequences that this involves. Important points for attention are:
    *   The protection of watering and the nutrient supply
    *   Monitoring of the greenhouse temperature
    *   The maximum gas consumption

4. Finally: safety of the people who work in your nursery is of the utmost importance. A steam surge in standing tanks for heat storage for example, is no joke! Also check your nursery regularly for all points where hazardous situations may arise and prevent any risk for you and your staff.

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PART II

OPTIONS AND SUPPLEMENTS

9. Tank management

In this version of the ECONOMIC, tank management has been added. With your tank management you can, if your installation permits this, easily select suitable silos for the water supply to the pump and for the return to the tank.
The level in the tank is also monitored. If the level falls too low the pump waits until it is sufficiently high again. If the wait time is too long an alarm is given.
Tank management avoids several pumps drawing water from the same tank at the same time so that no unsafe situations occur for your installation.

You can set the required tanks for the crop section. You can select separately the tank from which the water comes and the tank to which the water must go. Of course flexibility is only possible where your installation also permits that.
You can also set how long the water must be discharged to the same tank, before the pump may switch to another tank for water discharge.
In the report pump water supply actual you can see which tanks have been activated for the pump in question. If the pump must wait for a tank because it is supplying water to another pump, then you see this in the pause information in the report. A timer shows how long flood time + discharge time still have to go.
If you have a level measurement, you can see a graph of this for the tank.

10. HOOGENDOORN plant sensors

To date plant measurements could only be carried out independently of the ECONOMIC. On the basis of these measurements you should then adjust the controls of the computer manually. HOOGENDOORN has developed various sensors that can be connected to the ECONOMIC. The measurement signals are then read in automatically.
These sensors are marketed under the collective name GROWLAB. A number of basic packages have been put together that consist of various sensors and a supporting software package. With the help of the GROWLAB the ECONOMIC can gear the climate control more accurately to the situation directly by the plant and to the requirements of the crop.

10.1 GROWLAB WET sensor

The water supply is still a difficult process to actuate. Often the plant or the pot is just 'felt' to see if watering is necessary. HOOGENDOORN has developed a sensor that gives an idea of the water status in the soil. This measuring instrument determines at the same time the **W**ater, the **E**C and the **T**emperature in the soil and is called the WET sensor. This sensor can be connected to the GROWLAB or can be used as a stand-alone sensor. The sensor measures electronically the moisture content of the soil in a volume of at least 500 cc. The moisture content is determined between 0 and 100% and also the reduction in the moisture content in the soil is determined. The sensor can be used in various soil types: potting compost, mineral greenhouse soil, coconut, rock wool and peat.

*The GROWLAB wet sensor can be used in
various soil types: potting compost, mineral greenhouse soil,
coconut, rock wool and peat.*

10.2 GROWLAB Plant temperature camera

It is not the room temperature but the plant temperature that is responsible for the net production of assimilates during photosynthesis. The GROWLAB Plant temperature camera measures the temperature of the plant using infrared.

Plant temperature and room temperature appear to respond differently to different situations. When the sun comes through the clouds the room temperature will rise less quickly than the plant temperature, while in case of long-term high external radiation the plant will in fact be cooler than the surroundings thanks to evaporation from the leaf. Control by plant temperature can mean a saving in energy consumption. It may for example not be necessary to increase the minimum pipe because the plant is not yet cold enough, while on the basis of the room temperature heating would seem desirable.

The Plant temperature camera has a special coated lens that has excellent resistance to crop protection products or other attacks. The lens can measure both a small and a large area. The camera can be connected to the ECONOMIC and can be used in pot plant, cut flower and vegetable crops. You get a better understanding of the conditions of the plant and so you can gear the climate control to the requirements of the crop better.

The GROWLAB Plant temperature camera measures the
temperature of the plant using infrared.

11. Internet offers new possibilities

In the automation of glasshouse horticulture nurseries the Internet poses new challenges. By connecting the computers in the nursery or between various sites via the world wide web possibilities have arisen that can considerably increase the efficiency of nursery management.

11.1 Crop comparison and harvest prognoses

HOOGENDOORN is working together with the company Let's Grow and with various horticultural study clubs via the LetsGrow.com website to develop remote crop comparison via the Internet. LetsGrow.com is an independent company that in cooperation with experts from Praktijkonderzoek Plant & Omgeving (PPO Glastuinbouw) is developing various growth models. Growth models are extremely helpful in crop control and in harvest prognoses.

11.2 Remote control

Another development is that in more and more modern horticultural nurseries the climate computer is connected via a local network to a nursery network. The main reasons for this connection are often ECONOMIC Remote (remote control) and data exchange (data). The PCs in the network are for this reason often temporarily or permanently connected to the Internet.

The ECONOMIC also has contact with the outside world for example for the weather forecast, ECONOMIC Remote or ECONOMIC Remote Service. This contact is often still via a modem but could be more efficient via a fixed Internet connection. HOOGENDOORN can provide you with a safe Internet connection, not only for the ECONOMIC but for your complete network.

12. Nomad Path registration

Registration is becoming increasingly important for every horticultural nursery. The entry of all information is however a time-consuming job. With the NOMAD path registration system from HOOGENDOORN the employees in the greenhouse can enter some of the observations directly into the computer. The NOMAD registration system is a wireless system based on telemetry or radio data transmission.

Each employee is given a hand terminal, a small black box called the NOMAD Key. He or she carries this with them in the greenhouse and logs in with a personal code. The employee then indicates via a selection program the activity that they are engaged in. All the data are continuously transmitted by a transmitter/receiver in the greenhouse to the base station in the office. The hand terminals are charged at night in a charger in the greenhouse. The NOMAD key has a memory and does not have to be continually within the range of a transmitter. HOOGENDOORN has a CD ROM on which you can view the operation of the NOMAD.


*With the NOMAD path registration system from HOOGENDOORN
the employees in the greenhouse can enter some of the observations
directly into the computer.*

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13. METEORADAR close vents when raining

For some forty years growers have been trying to prevent rain coming in with a rain sensor. Usually this works well, but the equipment has a certain slowness and in case of a sudden rain or hail shower sometimes the vents close too late.

Hoogendoorn's METEORADAR makes it possible even in such situations to close the vents in time. The METEORADAR detects a rain or hail shower at an early stage, determines the intensity of the shower and calculates very accurately when the shower will reach the greenhouse. This system was developed by Hoogendoorn Automation together with the weather specialists of Meteo Consult.
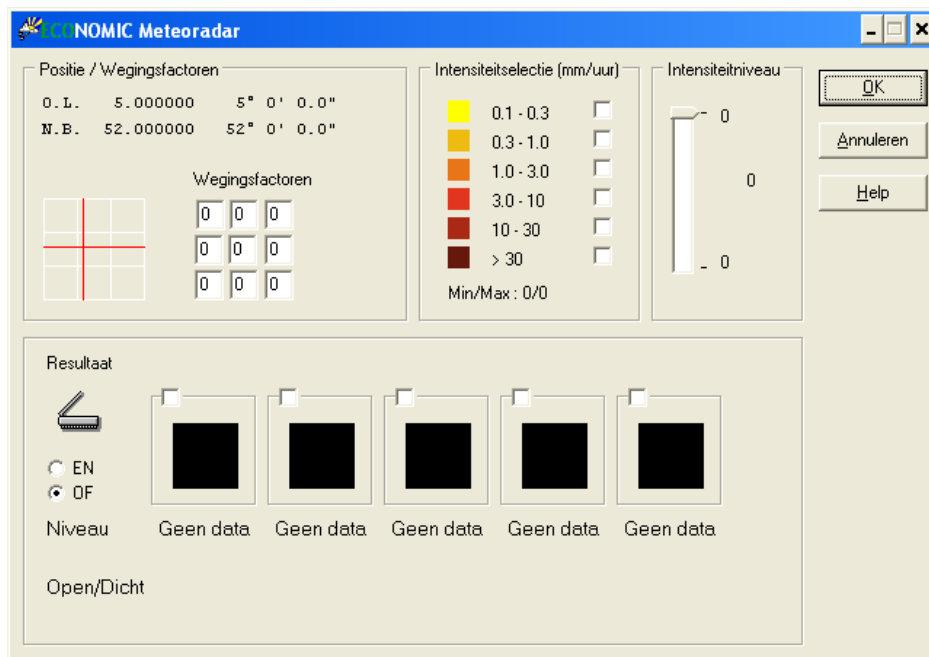
METEORADAR closes the vents when it is going to rain.

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ANNEX - Terms

To make the optimum use of the information in this brochure it is important to distinguish the following terms.

Release
All of the new, changed or existing program components made available for operation at a particular time

Version
HOOGENDOORN numbers the releases and calls each following release a version. The release that was installed on your computer in 2004 was version 9.0. During the year improvements may be made to components. These are called subversions, for example subversion 9.2. The recently installed release is version 10.0, in the course of 2005 version 10.1,10.2 etc. will become available.

Subversion
Change in a release during the year, a component of an existing version (see above)

Module
A completed piece of computer software that actuates a particular process, for example HOOGENDOORN METEORADAR.

Option
A possible addition to the automated control of your nursery. Options are not incorporated as standard into the ECONOMIC process computer and you can select them. Examples are the control of the vents with a METEORADAR and temperature measurement of the plant with the GROWLAB camera.

NOTES

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