

# Nortoft Electronic A/S

Sejrupvej 38 · Sejrup · DK-7323 Give · Denmark

## Program Rain 10

Direction for use. Version 5.5. 1 - 1 - 04.

### Features:

Speed regulation  
 Pre- and post-irrigation  
 4 different speeds  
 Clock  
 Start time is adjustable  
 Stop time is shown in the display  
 Length of the pipe  
 Actual speed  
 Battery voltage  
 Charge regulation

Pressure sensor  
 Stop sensor  
 Speed sensor  
 Motor 1, regulation motor  
 Motor 2, stop motor  
 Slowly start of turbine  
 Slowly opening for inlet of water  
 Radio output for pipe reel empty, machine stopped  
 Radio input for start, stop of the machine  
 Metre or foot

### DISPLAY

SPEED	30.0m/h
TIME	08:45
START	:
STOP	22:45

Standard readout

DISTANCE	000m
BATTERY	12.8V
CHARGE	ON
PRE. 00	POST.00

Press the key **MENU** 1 time for showing menu 2

PRESS SENSOR	■
STOP SENSOR	■
SPEED SENSOR	■ ■
MOTOR1 ■	MOTOR2 ■

Press the key **MENU** 2 times for showing menu 3

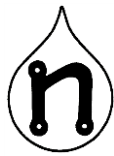
A.SPEED	000m/h
WORKINGH.	00000h
STOP CODE	0

Press the key **MENU** 3 times for showing menu 4

000m	30.0	000m
000m	30.0	000m
000m	30.0	000m
000m	30.0	000m

Press the key **MENU** 4 times for showing the menu 5

When the sign ■ is shown in the display, it means that this function is on.



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Standard menu:

SPEED	30.0m/h
TIME	08:45
START	:
STOP	22:45

Standard readout

The 1'st line shows the speed, it can be changed at any time during the irrigation.

The 2'nd line shows the time. To set the time: first set the speed to 11.1 m/h, and then press the " PROG " key 3 times, the time can then be set with the arrow keys. When the battery has been removed the time is 00:00, and is remaining zero until it is set.

The 3'rd line shows the starting time, it is a time delay, so the machine will start up to 24 hours later.

To set the starting time:

First press the " STOP " key to close the inlet valve, then press the " PROG " key 3 times and the time can be set with the arrow keys. At last the pre- and post-irrigation can be chosen.

The 4'th line shows the time when the irrigation is finished incl. pre- and post-irrigation.

If the display shows LOW BAT in stead of Speed, the battery voltage is lower than 11.8 V and the battery need to be charged.

MENU 2

DISTANCE	000m
BATTERY	12.8V
CHARGE	ON
PRE. 00	POST.00

The 1'st line shows the remaining length of the pipe.

The 2'nd line shows the battery voltage.

The 3'rd line shows if the battery is charged from the solar panel.

The battery is charged when the voltage is below 14.0 volt.

The 4'th line shows the pre- and post-irrigation time, if the figures flashes it means that the pre- or post-irrigation counts down.

MENU 3

PRESS SENSOR	■
STOP SENSOR	■
SPEED SENSOR	■ ■
MOTOR1 ■ MOTOR2	■ ■

The 1'st line shows if the pressure is high, the marker is on when the water pressure is high. The machine can only work when the pressure is high.

The 2'nd line shows if the stop switch is activated, the marker is on when the stop switch is on. The machine can only work when the top switch is on. The stop switch has 3 functions:

- 1: Resets the distance counter.
- 2: Post-irrigation.
- 3: Inhibits the pulses to the regulator-motor.

The 3'rd line is for testing the speed sensor, the markers is on when the magnets activates the speed sensors.

The 4'th line shows if the motors have stopped, because they have reached their mechanical stops. If the marker is on and the motor has not reached their end position, there is a blocking inside the valve. The motor is stopped and the marker is set on, when the current exceeds 4.5 A.



## MENU 4

A.SPEED	000m/h
WORKINGH.	00000h
STOP CODE	0

The 1<sup>st</sup> line shows the actual speed that means the speed the machine is running now. This can be used to check the maximum running speed for the machine, if the Program Rain is set to a much higher speed than the machine can run.

The actual speed can differ from the set speed, especially in the start, this is not an error because the Program Rain ensures that the mean speed over 10 m is correct.

The 2<sup>nd</sup> line shows the total working hour since the electronic was started the first time.

The 3<sup>rd</sup> line shows the cause for the machine has stopped.

- Code 0 = Running
- Code 1 = Stopped by low pressure.
- Code 2 = Stopped by supervision.
- Code 3 = Stopped by stop key.
- Code 4 = Stopped by stop sensor.
- Code 5 = Stopped by battery voltage is below 11,2 V.
- Code 6 = Stopped by TELE RAIN.
- Code 7 = The current has been interrupted or there is a lose connection.
- Code 8 = Not used.
- Code 9 = The timer is adjusted to start the machine later on.

## MENU 5

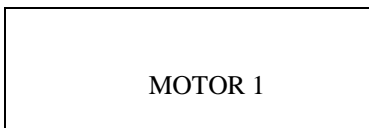
000m	30.0	000m
000m	30.0	000m
000m	30.0	000m
000m	30.0	000m

This is for irrigation with 4 different speeds in the retraction.

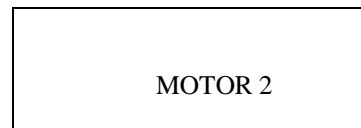
Press the " PROG " key 3 times for programming the zones.

See later in this paper for more details.

## DIFFERENT READOUTS



When the display shows a flashing Motor 1, it means that the regulator motor is running, while the motor is running no keys can be activated. The motor runs for max. 26 seconds.



When the display shows a flashing Motor 2, it means that the motor for stopping is running, while the motor is running no keys can be activated. The motor runs for max. 26 seconds.



## START:

The turbine can only start if the magnet activates the stop sensor (or stop sensors), see menu 3 for controlling the stop sensor.

When the " START " key is pressed, the main valve opens. Next the by-pass valve closes (the turbine starts).

If the magnet does not activate the stop sensor, it is only the main valve that opens; this is used if the pressure should be released before disconnecting the hose at the hydrant.

## DELAYED START TIME OF IRRIGATION:

First press "STOP" key for closing for inlet of water. Next press "PROG" key 3 times and you can set the start time. At last choice Pre- and post irrigation if wanted.

## STOP:

When the magnet is removed from the stop sensor, the turbine stops and the main valve closes (opens at low-pressure stop).

If post-irrigation is chosen, the turbine stops and after the post-irrigation time, the main valve closes. If the key " STOP " is pressed the turbine stops and the main valve closes, regardless of post-irrigation.

## SUPERVISION:

The PROGRAM RAIN has a built in system for supervision. The supervision starts to work, if for some reason the machine irrigates at the same place longer than a specified time. This time is factory adjusted to 20 minutes, see programming for changing this time.

If it is set to 0 there is no supervision.

Supervision of correct speed.

If machine data no.17 is set to 1, the supervision will also stop the machine if it is not running at the chosen speed, if there is more than 40 % error. If it is set to 0 there is no supervision of speed.

That possibility is not recommended. If the machine is stopped for one time in the future of this reason nobody can remember or understand the reason.

## SPEED:

The speed is adjusted with the arrow keys, the speed first changes by steps of 0.1 m/h, then after 10 steps it changes by 1.0 m/h.

The speed can be changed at any time, even whilst the machine is running. If the time is checked it shows the new time for the remaining irrigation.

The speed cannot be changed whilst any of the motors are running.

It is shown in the display as: MOTOR 1 or MOTOR 2.

## PRE-IRRIGATION:

Pressing the key "PRE-" can activate pre-irrigation. The time for pre-irrigation is calculated by the Program Rain as 8 x the time for running 1 metre at the actual speed.

The constant " 8 " (constant no. 1) can be changed, see programming. If the pre-irrigation is on, the machine starts and run 1/2 metre, then it stops for the pre-irrigation time.

By pressing the key " START/RESET " the pre-irrigation is cancelled. The magnet at the stop sensor should be in place, before activating the pre-irrigation.

## POST-IRRIGATION:

Post-irrigation can be activated by pressing the key " POST- " The time for post-irrigation is calculated by the Program Rain as 8 x the time for running 1 metre at the actual speed. The constant " 8 " (constant no. 2) can be changed, see programming. The post-irrigation starts to count down when the magnet is removed from the stop sensor. When the magnet is removed, the motor for speed regulation stops the turbine, after the post-irrigation time the main valve closes, (opens at machines with stop for low pressure). At machines with only one motor for speed regulation, the turbine starts after the post- irrigation time.

By pressing the key " START/RESET " the post-irrigation is cancelled.

The magnet at the stop sensor should be in place, before activating the post-irrigation.



## RADIO CONTROL:

A radio transmitter and a radio receiver can control the Program Rain 10.

**Output:** There is an output from the Program Rain that can be used to give signal to a radio transmitter mounted on the irrigator.

The output is terminal no. 17 and 18, and it delivers 12 Volt and max. 4.5 Amp for 12 sec.

The output is only working when constant no. 8 is not zero.

This signal is send when:

- 1: The pipe is pulled out to the distance as set in the constant no. 8.
- 2: The machine is stopped because of low pressure.
- 3: The machine is stopped because of the stop sensor is activated.
- 4: The machine is stopped because of the supervision has stopped the machine.
- 5: The machine is stopped because of low battery

**Input:** There is an input to the Program Rain that can be used to start and stop the machine, when connected to a radio receiver.

The input is terminal no. 15 and 16; the machine starts when the terminals are connected.

The input is only working when machine data no. 14 = 1.

If the machine is also mounted with a pressure switch, there are 2 possibilities:

- 1: The signal is send by the radio transmitter back to the farm, it is then possible to see if the pressure is high at home.  
It is then necessary to send a signal back to the machine in order to start it.
- 2: The radio receiver and the pressure switch is connected in series, so the machine will only start if there is a signal from the radio receiver and the pressure is high.

Be careful when connecting a radio receiver or transmitter, because they normally use at least 10 times so much power from the battery as the Program Rain.

**Solar panel:**

On the display menu 2 is shown if the solar panel is charging

Be attend on that by pressing power off the charging are interrupt



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There are different constants that can be set by the user.  
These constant will be saved for years even if the battery is disconnected.

## Programming procedure:

The speed should be adjusted to 11.1 m/h (or to 11 f/h) to reach the constants.

Press rapidly the " PROGRAM " key 3 times to gain access to change the constants.

By subsequent pressing on the " PROGRAM " key the constant no. will step forward. With the arrow keys the constant value can be changed.

The PROGRAM RAIN goes back to normal and saves the constant by pressing the key " MENU ".

If the key " MENU " is not pressed the Program Rain switches back to normal after 1 minute, and the changes of the constants are not saved.

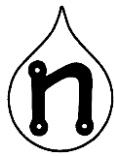
## CONSTANTS

Const no.	Note	Fact. Adj.	Min. Value	Max. Value	Description
0		0	00:00	24:00	The time in line 2 is set.
1		8	1	15	Pre-irrigation
2		8	1	15	Post irrigation
3		20	0	99	Supervision time
4		2	1	7	1 English, 2 Danish, 3 German, 4 French 5 Dutch, 6 Swedish, 7 Spanish
5		0	0	2	0 = Stop for high pressure, Slow shut-down 1 = Stop for low pressure, 1 long pulse and motor 2 runs in the opposite direction also set machine data 12 = 2 2 = motor 2 stopping is disconnected
6		0	0	15	Distance to post-irrigation
7		-	0	1000	Distance ( if the distance has been reset )
8		0	0	1000	Distance for bipper ( 0 = no bip )
9		100	-	-	Code to reach machine data

The constant no. 9 (the code) should be 111 to reach the machine data.

Then press " PROG " and the machine data is shown.

See next pages.



## MACHINE DATA

M.Data no.	Note	Fact. Adj	Min. Value	Max. Value	Description
0		400	0	1000	Pipe length m
1		110	40	200	Pipe diameter mm
2		1850	500	3000	Reel drum diameter mm
3		12.00	5.00	30.00	Windings pr. layer
4		200	50	1000	Large drive sprocket no. of teeth
5		10	5	40	Small drive sprocket no. of teeth
6		4	1	20	Number of magnets
7		0.89	0.70	1.00	Ovality
8		3	0	45	First pulse to main valve sec
9		160	0	300	Short pulses to main valve msec
10		2	1	5	Time between short pulses sec
11		100	0	250	Number of short pulses
12		1	0	2	Shut-down system, 0 = Only regulator motor 1 = 2 Motors, inlet valve closes at low press 2 = 2 Motors, inlet valve opens at low press 3 = 2 Motors, the same as when 1, but there is a delay of 8 sec. after the stopsensor is activated.before the speed regulator stops the turbine. 4 = 2 Motors, the same as when 2, but there is a delay of. 8sec. before the speed regulator stops the turbine, after the stopsensor is activated
13		26.1	0.9	26.1	Closing pulse length to the regulator motor
14		0	0	2	0 = No pressure switch mounted 1 = Pressure switch mounted ( start / stop ) 1 = Start and stop by radio transmitter 2 = Pressure switch mounted ( only start )
15		0	0	160	Distance between pulses mm 62.5 = Running with a roller Ø 80 mm 0.0 = Running by the formula
16		0	0	1	Opening of the main valve 0 = Fast opening. 1 = Slow opening
17		0	0	1	Supervision of the right speed 0 = Supervision off. 1 = Supervision on
18		0	0	1	Meter or foot readings in the display 0 = meter. 1 = foot



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## PROGRAMMING OF 4 DIFFERENT SPEEDS:

The display should be set to the 5'th menu.

The pipe should be pulled out before programming, so the computer knows the distance of the field to be irrigated.

In the following it is assumed that the field length is 400 m.

Press the " PROG " key 3 times and the display will show:

400m	30.0 ■	000m
000m	30.0	000m
000m	30.0	000m
000m	30.0	000m

The desired speed can now be set, here 25.0 m/h, then press the" PROG " key once, and the display will show:

400m	25.0	000■
000	30.0	000m
000m	30.0	000m
000m	30.0	000m

The desired distance can now be set, here 300 m, then press the “ PROG “ keys once, and the display will show:

400m	25.0	300m
300m	30.0 ■	000m
000m	30.0	000m
000m	30.0	000m

Now the first zone is programmed, and the procedure is continued for all 4 zones.

Zone 4 automatic ends at 000m.

When zone 4 is programmed press again the " PROG " key and the display will show:

DEL	PRESS MENU
SAVE	PRESS PROG

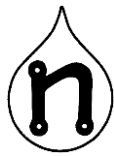
If the " PROG " key is pressed the program is saved and the watering is carried out according to the program.

If the " MENU " key is pressed the program is deleted and the speed is the same for the whole field.

When the program is used it is saved so it can be reused after the machine is moved to a new field.

The program can always be checked at the 5'th menu.





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The Program Rain can be adjusted to 2 different types of sensors.

One is a round sensor 60 mm in diameter and 4 sensors inside; this is only for rollers with one magnet. If this is used the 3 jumpers near the display on the printed circuit should be placed in a row at the round symbol. When the battery is connected the display for 2 sec. shows " **VERSION 5.50** ".

The other is a square sensor, or 2 separate sensors, this is used for rollers with more than one magnet and for disk's with 1 to 20 magnets. If this is used the 3 jumpers near the display on the printed circuit should be placed in a row at the 2 line symbol. When the battery is connected the display for 2 sec. showed " **VERSION 5.51** ".

Double sensor.

Round sensor

Program Rain 10				Program Rain 10			
Cable connection	Version <b>5.51</b>	Double sensor		Cable connection	Version <b>5.50</b>	Round sensor	
1 + Battery		Brown	12 V	1 + Battery		Brown	12 V
2 - Battery		Blue		2 - Battery		Blue	
3 + Solar Panel		Brown		3 + Solar Panel		Brown	
4 - Solar Panel		Blue		4 - Solar Panel		Blue	
5 Motor 1			Speed Regulation	5 Motor 1			Speed Regulation
6 Motor 1			Speed regulation	6 Motor 1			Speed regulation
7 Speed Sensor 1 *		Blue		7 Speed Sensor		Blue	
8 Speed Sensor 1 *		Black		8 Speed Sensor *		Black	
9 Speed Sensor 2 *		Yellow/green		9 Speed Sensor *		Yellow/green (Red)	
10 Speed Sensor 2 *		Brown		10 Speed Sensor		Brown	
11 Stop Sensor		Blue or Brown		11 Stop Sensor		Blue or Brown	
12 Stop Sensor		Blue or Brown		12 Stop Sensor		Blue or Brown	
13 Motor 2			Stop Motor	13 Motor 2			Stop Motor
14 Motor 2			Stop Motor	14 Motor 2			Stop Motor
15 Pressure		Blue or Brown		15 Pressure		Blue or Brown	
16 Pressure		Blue or Brown		16 Pressure		Blue or Brown	
17 BIP -				17 BIP -			
18 BIP +				18 BIP +			
* If the distance counter count the wrong way, the speed sensor should be turned.				* If the distance counter count the wrong way, the cable on terminal 8 and 9 must be interchange.			



Fault localisation.

? The turbine can not start by pressing START. Pre-and post-irrigation can not take place.

Answer:

Magnet for stop-sensor is not on its place, or cable or sensor is damaged.

Stop sensor: The mark ■ must be on when the magnet is on place, and it disappears when the magnet is removed. See menu 3.

A damaged cable can be repaired but absolutely watertight. At least encapsulated in epoxy.

But a new sensor and cable is recommend.

If pressure sensor is used there must be pressure on the water. The mark ■ for pressure must be on.

? None figure in the display.

Answer:

Battery interrupts. Fuse inside the box is blown. The fuse is for wrong connection of + and - .

From the factory there are an extra fuse on a single fuse-holder on the printed circuit.

Fuse 5 A. Battery electric voltage 12 V. See menu 2.

? The clock shows 00:00.

Answer:

If the power has been interrupted the clock will go to zero. Therefore in stead of showing the finish time it is the number of hours and minutes to the irrigator is finish that is showed. Set the clock and the time to the irrigator is finish will be showed. See setting the clock.

? Distance meter is not correct and the speeds not correct.

Answer:

See after damaged cable or sensor. The 2 marks ■■ must during pulling out the tube appear in order from the left as following: The first appear the second appear the first disappear the second disappear. During retraction it must go in opposite order. See menu 3 speed sensor.

It is the same if a roller running on the tube measures the speed.

? Only maybe the half or 2/3 of the real length is counted up.

Answer:

The stop mechanism can be activated a short time by hopping of the tube or if the windings around the drum are losing. It can cause the magnet removed from the stop sensor a short moment. It will set the counter to zero.

In spite of the meter of the tube is not correct the irrigator will run to the end and stop normal. But incorrect speed depends of the incorrect registration of the actual layer.

If wanted the correct number of metre can be set in. See CONSTANT no 7.



The most used combination of different constants:

With constants factory adjusted the machine always will run. But there are different conditions from farm to farm and there are also different wishes from the farmer. Therefore some constants can be adjusted for local wishes.

1. Slowly start of turbine.

Machine data no. 13. Adjust the to value to 4 sec to start.

Now the valve for control of speed will close about half and continue stepwise until the adjusted speed are reached. Correct adjustment is: Continuously closing of the valve until the turbine is start running and stepwise until adjusted speed are reached.

2. Slowly opening for inlet of water.

Machine data no. 16. Set the value to 1. = Opening for the water stepwise.

3. Only 1 motor for speed regulation.

Machine data no. 12. Value 0.

Post irrigation must take place as following: When the stop sensor is activated only the retraction stop. After the time for post irrigation the machine start again and run to the mechanic stop.

4. Start up of no. 2 machine when no. 1 machine reaches the stop.

Machine data no. 14. Value 2.

The machine must be equipped with adjustable pressure switch. Adjust the pressure switch to a point between the normal pressure and the pressure when the pump will stop.

For instance: Normal pressure 7 bar and pressure for pump stop is 9 bar. Adjust the pressure switch to 8 bar on both the machines. Start no. 1 machine as normal by pressing start. Set up no. 2 machine but press stop. When no. 1 machine comes to slowly close down no. 2 machine will start up when the pressure reach 8 bar. Be attend on that 10 m different on the field level is 1 bar.

5. Stop with low pressure and pressure switch mounted. Constant no. 5. Value 1.

Machine data no. 12 must be value 2. = Stop motor turns in opposite direction. It means that with the same cable connection to the motor the valve will open for stop. After 2 minute the valve close again Stop-sensor, stop-button and supervision can open the valve. But the pressure switch can not open the valve

6. Pre-irrigation before the gun reaches the stop.

Constant no 6 can be set to the number of metre where it is wanted that the post irrigation should take place. Max 15 metre.