Nortoft Electronic A/S, Sejrupvej 38, DK 7323 Give.
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Program Rain 10-12

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 Motor 3, Sprinkler motor Slowly start of turbine Slowly opening for inlet of water Options: GSM SMS messaging for remote control. Interface for remote programs and GPS position. Analog Pressure gauge

User Manual

Short hand manual

Place machine:

```
SPEED          30.0m/h
DOSE             22 mm
TIME  7:28 STOP 7:28
STATUS STOP Sensor
```

Place machine at hydrant, Display shows the same start and stop time. Wheel out hose to the end of lane. (ex 250m)

Select Speed:

```
SPEED          30.0m/h
DOSE             22 mm
TIME  7:56 STOP17:16
STATUS STOP Sensor
```

Display now shows stop after 9h20m. Press "+" or "−" keys for the right speed. Speed can be changed during Irrigation.

```
SPEED          25.0m/h
DOSE             26 mm
TIME  7:58 STOP17:58
STATUS STOP Sensor
```

SPEED has decreased, **DOSE** and **STOP** has increased.

Start Irrigate, Select PRE- and POST Irrigation.

```
SPEED          25.0m/h
DOSE             26 mm
TIME  7:58 STOP17:58
STATUS STOP Sensor
```

Press **START** For starting, For PRE- and POST Irrigation, press **PRE-** and **POST-** irrigation key's. STOP time vil increase when pressing PRE- and Post irrigation.

Starting:

```
SPEED          25.0m/h
DOSE             26 mm
TIME  8:00 STOP18:38
STATUS Running
```

Turbine will start, as water pressure increases, after a while the regulator finds the correct speed.. Irrigation is continued until end of lane and **STOP SENSOR** is activated.

-PRE Irrigation

```
SPEED          25.0m/h
DOSE             26 mm
TIME  8:02 STOP18:38
STATUS PRE Irrigate
```

If PRE irrigation is activated, Turbine will stop again immediately and PRE Irrigation takes place. When pre irrigation time has elapsed, turbine starts and state changes to **Running**

-POST Irrigation

```
SPEED          25.0m/h
DOSE             26 mm
TIME  18:20 STOP18:38
STATUS POST Irri.
```

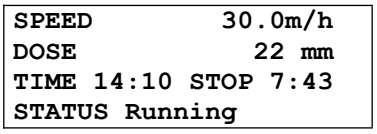
If POST irrigation is activated, Turbine will stop at end, when stop sensor is activated, and POST Irrigation will take place.

Stop:

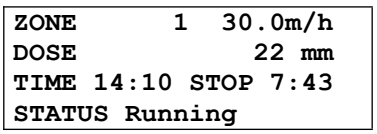
```
SPEED          25.0m/h
DOSE             26 mm
TIME 18:38 STOP18:38
STATUS STOP Sensor
```

Stop sensor is activated, Turbine and Irrigation is shut down. Machine is ready for disconnection and transport to a new lane.

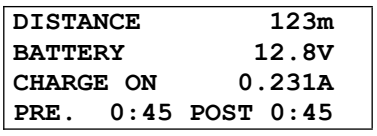
MENU's



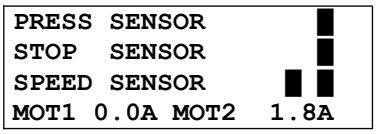
Standard readout



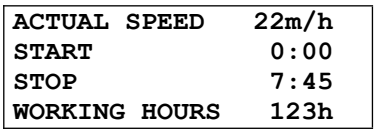
Standard readout, Zone Active



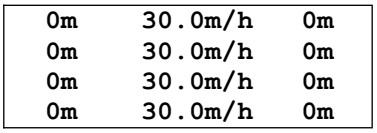
Press the key **MENU** 1 time for showing menu 2



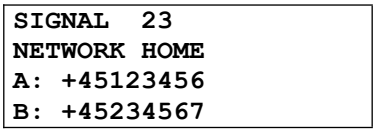
Press the key **MENU** 2 times for showing menu 3



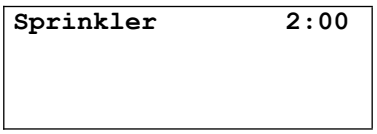
Press the key **MENU** 3 times for showing menu 4



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



Press the key **MENU** 5 times for showing the menu 6
(Only when GSM is selected)



Press the key **MENU** 6 times for showing the menu 7
(Only when Sprinkler is selected)

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

Standard menu:

```
SPEED         30.0m/h
DOSE            22 mm
TIME 14:10 STOP 7:43
STATUS Running
```

Standard readout

SPEED

Speed can be changed at any time during the irrigation, using "**+**" and " **–**" keys.

ZONE

Actual Zone 1..4, with corresponding speed. Speed can not be changed. (Zone Active)

DOSE

Dose is calculated by means of constants, and shows the actual mm for irrigation. When **SPEED** increases, **DOSE** decreases. (Constants 11 and 12)

TIME

To set the time: first set the speed to 11.1 m/h, and then press the ***PROG*** key 3 times, showing <**CONST 1 TIME**>, the time can then be set with the "**+**" and " **–**" keys. When the battery has been removed the time is 00:00, and is remaining zero until it is set.

STOP

Time when the irrigation is finished incl. pre- and post-irrigation.

STATUS

Status of Irrigating ei:

```
<Stop Sensor  >
<Running      >
<PRE Irrigate >
<POST Irrigate>
<LOW Pressure >
```

see explanation in **STATUS** chapter

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        123m
BATTERY        12.8V
CHARGE ON     0.231A
PRE.  0:45 POST 0:45
```

DISTANCE

The remaining length of the pipe. Distance can be changed immediately after pressing ***PROG*** key 3 times, with the "**+**" and " **–**" keys

BATTERY

The battery voltage.

CHARGE ON

Shows if the battery is charged from the solar panel.
The battery is charged when the voltage is below 14.0 volt.

PRE.

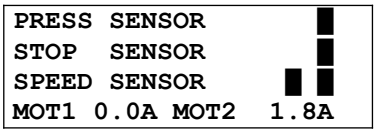
The actual pre irrigation time.

POST

The actual post irrigation time.

Pre- and Post irrigation time can be changed immediately after pressing ***PRE-*** or ***POST-*** with the "**+**" and " **–**" keys

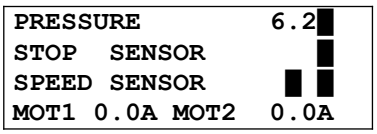
MENU 3



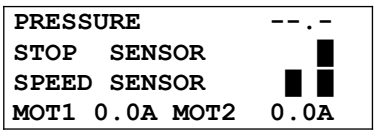
PRESS SENSOR

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.
If pressure sensor not selected (machine data 14 = 0), irrigating is performed disregarding pressure status.

Machine can be equipped with analog pressure gauge. Gauge is connected on 6 Pol connector as in diagram. The functionallity is as digital, except the actual pressure is shown in display. Constant is available for gauge type. Likewise, the set point and hysteresis selectable for each machine.



Pressure is shown in [BAR] (00.0) or [PSI] (000). The ▉ shows pressure is on.
The machine can only work when the pressure is high.
If pressure sensor not selected (machine data 14 = 0), irrigating is performed disregarding pressure status.



If gauge is disconnected, `--.-` is shown in display

STOP SENSOR

Shown if the stop switch is activated, the marker is on when the stop switch is on.
The machine can only work when the stop 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.

SPEED SENSOR

For testing the speed sensor, the markers is on when the magnets activates the speed sensors.

MOT1, MOT2

The actual Current used by motor. The motor is stopped when the current exceeds 4.5 A. If current exceeds 4.5A, and the motor has not reached their end position, there is a blocking inside the valve.

MENU 4

```
ACTUAL SPEED   22m/h
START           0:00
STOP            7:43
WORKING HOURS   123h
```

ACTUAL SPEED

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.

START

The starting time, it is a time delay, so the machine will start up to 24 hours later.
To set the staring time, press the " PROG " key 3 times and the time can be set with the "+" and " –" keys.

STOP

Time when the irrigation has finished at delayed start.

WORKING HOURS

The total working hour since the electronic was started the first time.

MENU 5

```
  0m    30.0m/h   0m
  0m    30.0m/h   0m
  0m    30.0m/h   0m
  0m    30.0m/h   0m
```

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.

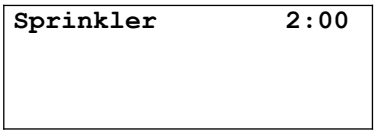
MENU 6

```
SIGNAL  23
NETWORK HOME
A: +45123456
B: +45234567
```

SIGNAL GSM signal strength.
NETWORK GSM network type
A: First phone number on "SMS" list.
B: Second phone number on "SMS" list

Detailed explaination in chapter GSM.

MENU 7



Sprinkler n:nn Actual time for sprinkler irrigation.

Sprinkler

When Sprinkler is selected in machine data 22, menu for sprinkler becomes aktive.

Upon ***START*** the time in (machine data 23) is selected:

For change of time , press ***PROG*** key 3 times, and change time by using "+" and " –" keys. Accept change with ***MENU*** key.

When time for sprinkler has elapsed, valve for sprinkler is closed. Valve is always closed at ***STOP*** key or **STOP SENSOR** even with remaining sprinkler time.

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 (Menu 4) 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. If supervision of speed, data # 20 = 1, is selected, irrigation is stopped when speed was below 50% of selected, in specified time.

SPEED:
The speed is adjusted with the the "+" and " –" 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 while the machine is running. If the time is checked it shows the new time for the remaining irrigation.

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. 2) 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*** 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.3) 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*** the post-irrigation is cancelled. The magnet at the stop sensor should be in place, before activating the post-irrigation.
If Early stop, constant #8, is selected, this function is activated. Shutdown will take place when distance is reached.

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     30.0m/h   0m
  0m     30.0m/h   0m
  0m     30.0m/h   0m
  0m     30.0m/h   0m
```

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

```
400m     25.0m/h   0m
  0m     30.0m/h   0m
  0m     30.0m/h   0m
  0m     30.0m/h   0m
```

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

```
400m     25.0m/h 300m
300m     30.0m/h   0m
  0m     30.0m/h   0m
  0m     30.0m/h   0m
```

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:

```
DELETE 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.

STATUS Status messages in display

POWER On	Power failure.
RUNNING:	Machine is irrigating, everything is working properly
LOW PRESSURE:	Water pressure is below pressure switch treshold. Machine acts depending on Machine data.
STARTING:	Operator has pressed ***START*** key, and start sequens is in process.
START REMOTE:	Machine is starting due to an ***SMS***
START DELAY:	Machine is waiting for start delay to elapse. (Se menu 4).
START PRESSURE:	Machine has started due to pressure rise. Machine is using pressure level, to start 2'nd machine on string.
START DENIED:	Operator is holding ***STOP*** key to prevent ***PRESSURE*** and ***REMOTE*** start.
STOP USER:	Machine has stopped due to operator ***STOP***.
STOP REMOTE:	Machine has stopped due to an ***SMS.***
STOP SENSOR:	Machine has reached end and is stopped by ***STOP SENSOR.***
STOP DISTANCE:	Machine has reached distance for stop. (Se constant for early stop)
STOP DELAY:	Machine has reached stop but waits nn Seconds to proceed stop sequence.
STOP DENIED:	Operator is pressing ***START*** key, preventing ***REMOTE*** stop.
SUPERVISION TIME:	Machine has stopped due to supervision time is elapsed. Machine has not moved in nn minutes. (Se constant for supervision time).
DumpValveOpen:	Machine opens valve, to force pressure drop, to stop main pumpe. After 3 minutes, valve closes to prevent draining of pipes.
PRE IRRIGATION:	Machine is performing pre irrigation
POST IRRIGATION:	Machine is performing post irrigation

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** to reach the constants.
Press rapidly the ***PROG*** key 3 times to gain access to change the constants.
By subsequent pressing on the ***PROG*** key the constant no. will step forward. With the "+" and " –" 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		100	-	-	Enter 111 to reach machine data
1		00:00	00:00	23:59	Time in line 2 is set
2		8	1	15	Pre irrigation
3		8	1	15	Post irrigation
4		20	0	99	Supervision time [minutes]
5		1	1	15	1 English, 2 Danish, 3 German, 4 French, 5 Dutch, 6 Swedish, 7 Spanish, 8 Italian, 9 Polish, 10 Japanese 11 Hungarian, 12 Romanian, 13 Ukrainisch
6		0	0	2	0 = Stop for high pressure slow shutdown 1 = Stop for low pressure, valve opens and close again after 3 minutes 2 = Motor for stop disconnected
7		-	0	1000	Actual distance, can be set by the keyboard [m]
8		0	0	1000	Early stop [m] (* Is only performed when Post Irrigation is selected *)
9		0	0	1000	Post irrigation before stop [m]
10		0	0	1000	Distance for alarm [m] (* Disabled if Machine data 22, Sprinkler, is selected *)
11		40	5	120	Water flow [m3/h]
12		60	5	100	Spacing between irrigation lanes [m]

The constant no. 0 (the code) should be 111 to reach the machine data.
103 Shortcut for 30
104 Shortcut for 40
105 Shortcut for 50
106 Shortcut for 60

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

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
5		10	5	40	Small drive sprocket
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	1	Shut-down system, 0 = Only regulator motor 1 = 2 Motors
13		25	1	25	Preset of pulse to regulation motor at start [sec]
14		0	0	2	Pressure switch 0 = no pressure switch mounted 1 = pressure switch mounted 2 = pressure switch mounted (only start) 3 = As 1, Speed valve open. (Warning *)
15		0	0	160.0	Distance between pulses 40.0-160.0 [mm] roller Ø80 mm = 62.5 [mm] 0 = running by the formula (M. data number 0 to 7)
16		1	0	1	Speed sensor 0 = round sensor for roller 1 = double sensor
17		0	0	1	Opening of main valve 0 = fast opening 1 = slow opening
18		1	0	1	Pressure switch 0 = Main valve stay open at low pressure 1 = Main valve closes at low pressure
19		0	0	200	Delay from stopsensor to the regulator motor stops the turbine [sec].
20		0	0	1	Supervision of the right speed 0 = Supervision off. 1 = Supervision on (50 % of selected speed)
21		0	0	1	Meter or foot readings in the display 0 = Meter. 1 = Foot
22		0	0	2	Sprinkler (If active, see mdata 25 !) 0 = Sprinkler is not active. 1 = Sprinkler is active, LIGHT Disabled. 2 = Sprinkler is active, Analog pressure disabled, LIGHT at PIN 20 – 23.
23		120	1	1439	Minutes for sprinkler
24		200	1	200	Timeout for sprinkler valve motor (Motor 3) 1-200 [sec]
30		0	0	2	0 = GSM Modem not active 1 = GSM Modem 2 = GSM Modem, only numbers on SMS list
31		-	-	-	First phone to call " A "
32		-	-	-	Second phone to call " B "

40		0	0	2	Analog Pressure gauge 0 = Digital switch 1 = Analog pressure gauge – Display units [BAR] 2 = Analog pressure gauge – Display units [PSI]
41		0.50	0,10	5.00	Voltage Offset [V]
42		0.20	0,05	5.00	Voltage gain [V]
43		3.5	0,0	25.0	Pressure setpoint 0.0 –25.0 [BAR] Pressure level for Off – On
44		0.2	0.2	25.0	Pressure hysteresis 0.2 – 25.0 [BAR] Setpoint - 0.5* hysteresis for Off Setpoint + 0.5* hysteresis for On Default settings 0.2 • 3.4 BAR = Off • 3.6 BAR = On
50		0	0	2	Remote Applikation 0 = Disabled 1 = Change in Status is sent to remote applikation. **(* SMS)** 2 = Communication Using TCP
51		-	-	-	Machine ID e.g.: “RAIN A 003”
52		0	0	1	GPS 0 = Disabled 1 = Enabled (modem must support GPS)
53		10	0	99	Minuts between sending position when Irrigating
54		24	0	99	Hours between sending possition when Stopped
60		4.0	0.1	6.0	MAX Current - Speed Motor
61		4.0	0.1	6.0	MAX Current - Stop Motor
62		4.0	0.1	6.0	MAX Current - BIP

*** Machinedata 14 = 3.**
When pressure switch fails, no supervision and speed regulation is performed on low Pressure.

*** Machinedata 50 = 1.**
When SMS is used to reflect change in status, (32) telephone number B is used to send extended SMS.

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

See, Machine Data #16 Sensor

One is a round sensor 60 mm in diameter and 4 sensors inside; this is only for rollers with one magnet. When the battery is connected the display for 2 sec. shows **`VERSION n.n0`**.

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.
When the battery is connected the display for 2 sec.showed **`VERSION n.n1`**.

Double sensor.

Program Rain 10	**18 Pol Connector**	
Cable connection	**Version n.n1**	**Double sensor**
1 + Battery	Brown	12 V
2 - Battery	Blue	
3 + Solar Panel	Brown	
4 - Solar Panel	Blue	
5 Motor 1	Speed Regulation	
6 Motor 1	Speed regulation	
7 Speed Sensor 1 *	Blue	
8 Speed Sensor 1 *	Black	
9 Speed Sensor 2 *	Yellow/green	
10 Speed Sensor 2 *	Brown	
11 Stop Sensor	Blue or Brown	
12 Stop Sensor	Blue or Brown	
13 Motor 2		Stop Motor
14 Motor 2		Stop Motor
15 Pressure	Blue or Brown	
16 Pressure	Blue or Brown	
17 - LIGHT Motor 3	Brown	Sprinkler
18 + LIGHT Motor 3	Blue	Sprinkler

* If the distance counter count the wrong way,
the speed sensor should be turned.

Round sensor

Program Rain 10		
Cable connection	**Version n.n0**	**Round sensor**
1 + Battery	Brown	12 V
2 - Battery	Blue	
3 + Solar Panel	Brown	
4 - Solar Panel	Blue	
5 Motor 1	Speed Regulation	
6 Motor 1	Speed regulation	
7 Speed Sensor	Blue	
8 Speed Sensor *	Black	
9 Speed Sensor *	Yellow/green (Red)	
10 Speed Sensor	Brown	
11 Stop Sensor	Blue or Brown	
12 Stop Sensor	Blue or Brown	
13 Motor 2		Stop Motor
14 Motor 2		Stop Motor
15 Pressure	Blue or Brown	
16 Pressure	Blue or Brown	
17 LIGHT – Motor 3	Brown	Sprinkler
18 LIGHT + Motor 3	Blue	Sprinkler

* If the distance counter count the wrong way,
the cable on terminal 8 and 9 must be interchange.

Program Rain 10	**6 Pol Connector**	
19 + GSM	Brown	+12 V
20 - GSM (-Pressure)(-LIGHT)	Blue	(Green)
21		
22		
23 + Pressure (+LIGHT)	Brown	+12 V
24 Pressure Signal	White	0-5V

Technical data

Size (h*w*d)	170*140*100
Voltage	10-15V dc
Current	6 mA (Idle) 30 mA (with GSM)
	80 mA (Light)
	5A motor max current
Fuse	5A Fast

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. 17. 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. 6. Value 1.
Machine data no. 12 <u>must</u> be value 1. = Stop motor turns in opposite direction. It means that with the same cable connection to the motor the valve will open for stop. After 3 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 9 can be set to the number of metre where it is wanted that the post irrigation should take place.

GSM

PR10-12 can handle Modems *****

Cinterion
-external modem, RS232 connection

GSM-2G
-Internal 2G GSM modem by Nortoft Electronic

GPS-3G
-Internal 3G GSM – GPS modem by Nortoft Electronic

*** See specific manual for each modem.**