PERROT

Greenkeeper Win

Two wire decoder control system

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1. Fields of application

1.1 Irrigation System control for central installations

Central irrigation control system for golf courses and large public parks, open air swimming pools, amusement parks and other public green areas.

The “Greenkeeper” control system controls the decoders by a two wire decoder cable. The decoders open the connected solenoid valves at the time adjusted in the computer.

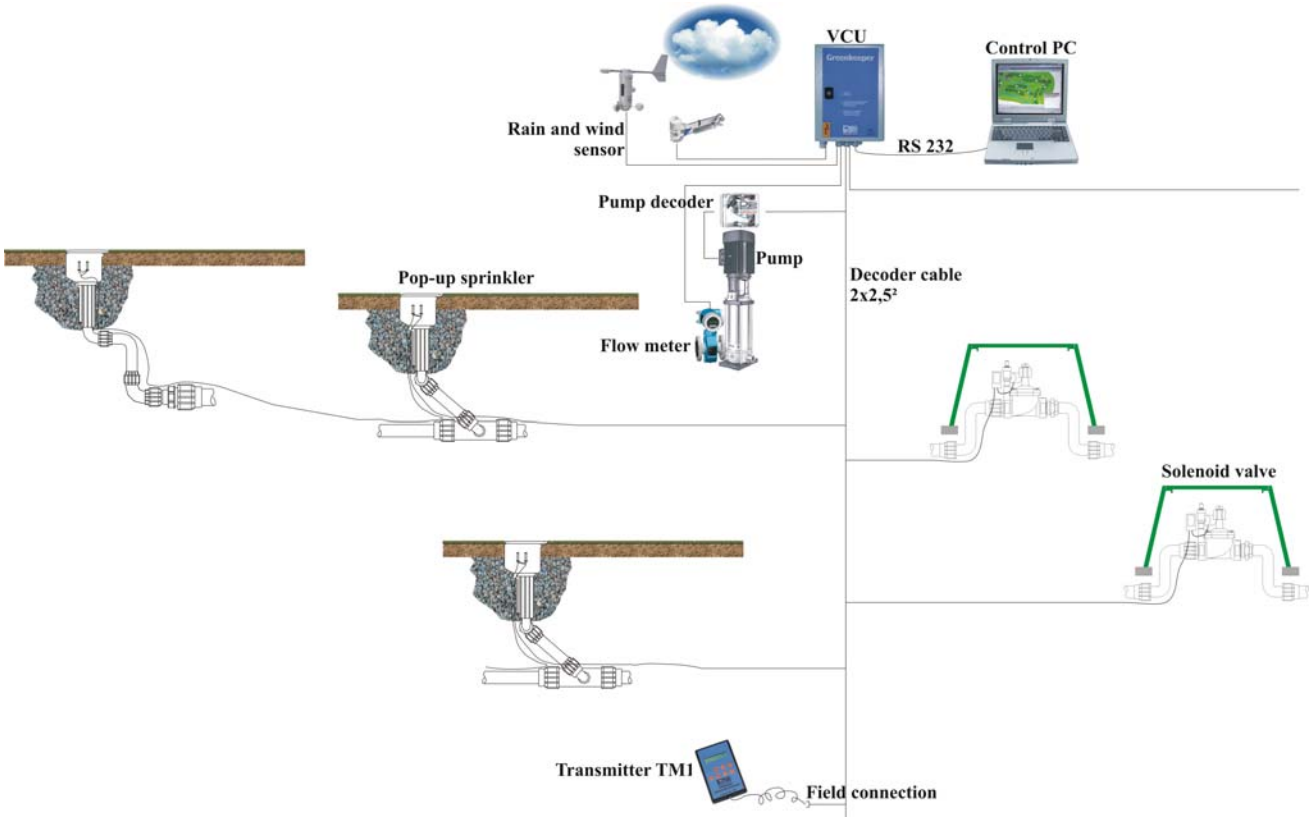
One VCU is suitable for an irrigation control system with a hydraulically connected installation (see also ”Schematic structure of the decoder control system”).

1.2 Irrigation control system for several decentralized installations

At a control system that controls more than one irrigation system by a PC is the VCU’s are connected with the PC via modem (see also “Greenkeeper Win Satellite control system”).

This system is especially suitable for municipalities, which have to control and supervise several parks from a central place.

2. Schematic structure of the decoder control system



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3. Software

3.1 The irrigation program is easy to operate by:

- Self explaining program construction PC knowledge is not necessary
- All menus and functions are mouse supported. Keyboard inputs are practically unnecessary
- The graphic menu shows the realistic overview of your specific golf course
- All installed valves in the golf course are symbolically shown in the graphic as interactive icons
- All activated valves are shown graphically and in tabular form in the surveillance menu
- Pulldown menus for a better overview
- Intelligent cursor which automatically jumps to the next input field
- Copy function for easier data inputs
- Avoiding of irrigation program overlapping
- Dialog input avoids mistakes
- „Greenkeeper“ has a multi language function and is available in : German, English, French, Danish, Spanish, Dutch and Czech language

3.2 Performance features of the Active Program List:

- 14 days irrigation list with automatic repeat
- Up to 7 different irrigation programs with 3 automatic start times each per day
- Up to 99 alternative irrigation programs
- Water budget from 10% to 300%
- 3 different user levels protected by password

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3.3 Flexible configuration of the irrigation program

- Run time of each decoder in minutes or mm (precipitation density)
- Irrigation programs without influence of the flowmanager for individual programs
- Sequential process of the stations is calculated by the PC or by your own handicap
- Every single station is activated by a mouse click on the valve symbol in the surveillance
- „Cycle + Soak“ for new grass seedings
- Manual start of the irrigation program without changing the program list
- Manual, semi-automatic and automatic operation possible
- All irrigation processes are independent from the PC. So the PC is available for other tasks

3.4 Hydraulic optimization

- Minimization of the pipe friction losses by splitting into hydraulic groups and hydraulic sectors
- Flowmanager for balancing the system demand at the max. capacity of the pump station
- The simulation of the irrigation program shows:
  - ☆ The running time of the irrigation
  - ☆ The sequence of the valve opening and closing times
  - ☆ Pump efficiency rate
- Pump management with pump decoder for the control of up to 5 pumps possible
- By using the pressure sensor or flowmeter the true values of pressure and flow will be shown

3.5 Irrigation Reports

- Concluded irrigation programs will be registered with start, stop, breaks and other disturbances
- The irrigation period and the irrigation amount is accumulated for each valve and for a whole season

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4. Hardware

4.1 PC-specification

- Up to Pentium - processor 166 MHz
- For modem operation a Hayes modem or a Hayes compatible modem is necessary
- Baudrate min 19200 Baud
- Serial interface RS 232 (COM1) for connection to the VCU
- Serial interface RS 232 (COM2) for modem operation
- Operation system Windows 95/98 – NT4.x – XP – Win7
- Min. 2MB free working memory (RAM) + free space on hard disk min. 15 MB

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4.2 Valve Control Unit (VCU)

- Housing in IP 55 design
- Box size 300 x 400 x 200 (b x h x l)
- Power supplied with 240V / 50Hz
- 2 plug connectors with power supply for the PC with 240V / 50Hz
- Overload protection for short circuits in the decoder cable
- Output voltage 48V AC
- All Inputs/Outputs of the VCU are over voltage resistant up to 8KV min
- The unit is EMC checked
- connection of up to 250 decoders per valve control unit is possible
- Following status information are shown by LED:

  - ⇨ POWER SUPPLY ON/OFF
  - ⇨ IRRIGATION ACTIVE / PASSIV / WAITING
  - ⇨ STATUS OF THE DECODER LINE

- Up to 5 pumps can be driven by relay or pump decoder
- The autonomous processor of the VCU takes command of the irrigation program and the irrigation list out of the PC
- Irrigation programs are activated independently by the VCU
- It is possible to connect external sensors like:

  - ☆ 4 digital inputs, e.g. for a rain gauge

  - ☆ 4 analogue inputs, e.g. for a flowmeter, wind sensor or a pressure sensor

  The measured data's are shown in the irrigation report

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4.3 Decoder

- The address of the decoder is **arbitrarily programmable**
- Each decoder can drive max. 2 solenoid valves
- Multi-station decoder for the control of 4 or 6 stations
- **Over voltage resistance** up to 4KV
- Each station has a LED – display which shows following status information:
  - ☆ decoder is off
  - ☆ decoder is power supplied
  - ☆ decoder received a control signal
  - ☆ decoder received a new address
  - ☆ decoder has accepted the new address

- **Automatic short circuit protection** for possible decoder failures
- **Waterproof** encapsulation in IP 66

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4.4 Wireless remote control per mobile telephone

- Wireless remote control of the following described functions of the software „Greenkeeper“ is possible with the communicator “Nokia” per modem connection
- The Nokia communicator is a multifunctional instrument for

  - ☆ Telephone
  - ☆ Data-transmission
  - ☆ Fax-transmission

- Size of the communicator: approx. 155 x 55 x 25 (l x b x h)
- Weight: 250g
- Password protected handling

Following functions of the program „Greenkeeper“ can be activated with the communicator:

- ☆ Start of any irrigation program
- ☆ Activating / deactivating single valves
- ☆ Controlling of running irrigation programs
- ☆ Creation / changes of irrigation list
- ☆ Status display of:
  - Operating status of VCU
  - Decoder line status

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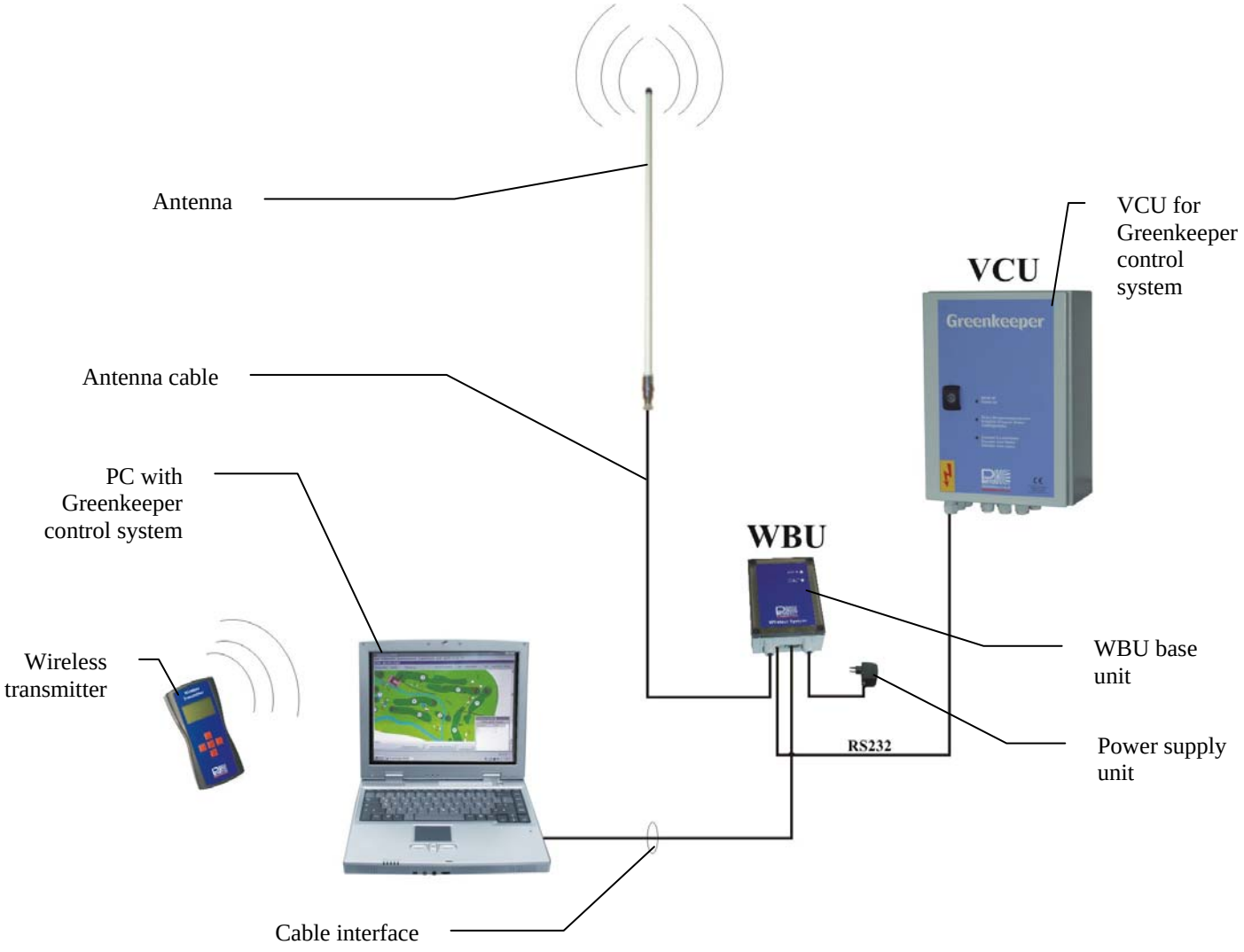
4.5 Wireless Transmitter (WT)

The WT allows the communication with the control system about an autarkic radio network. The radio network will be installed at site (see picture – scheme drawing). With a free view to the antenna a coverage up to 2km is possible. If there is any obstacle due to the area, buildings or trees you can expand to the requested coverage with the installation of additional repeater stations. The WT can be used in all European countries without radio license.



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Application

- The WT is very robust and easy to use with only 5 functions keys
- Ideal for manual watering and functional check of the system

Features

- „Start/Stop“ of the valves with preset runtime
- „Start/Stop“ of irrigation programs
- Easy valve searching by choosing different searching criteria
- 3-line LCD display for menu navigation and user support

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4.6 Transmitter

- The transmitter is connected by a field connector with the 2 wire decoder cable
- Jack connection in IP 66 design
- Size of transmitter: 140 x 90 x 30 (l x b x h)
- Weight: 350g
- Liquid - crystal - display with 2 lines and 16 signs each
- Language corresponds to Greenkeeper WIN
- The decoder number shows the corresponding valve name
  for example 18 - green 9
  Thus a single - valued identification is possible
- After setting the valve opening time the transmitter can be separated from the field connection
- Information's are given on:
  - ☆ Irrigation status
  - ☆ Status of each decoder (opened/closed)
- Emergency stop function - to switch off all irrigation activities

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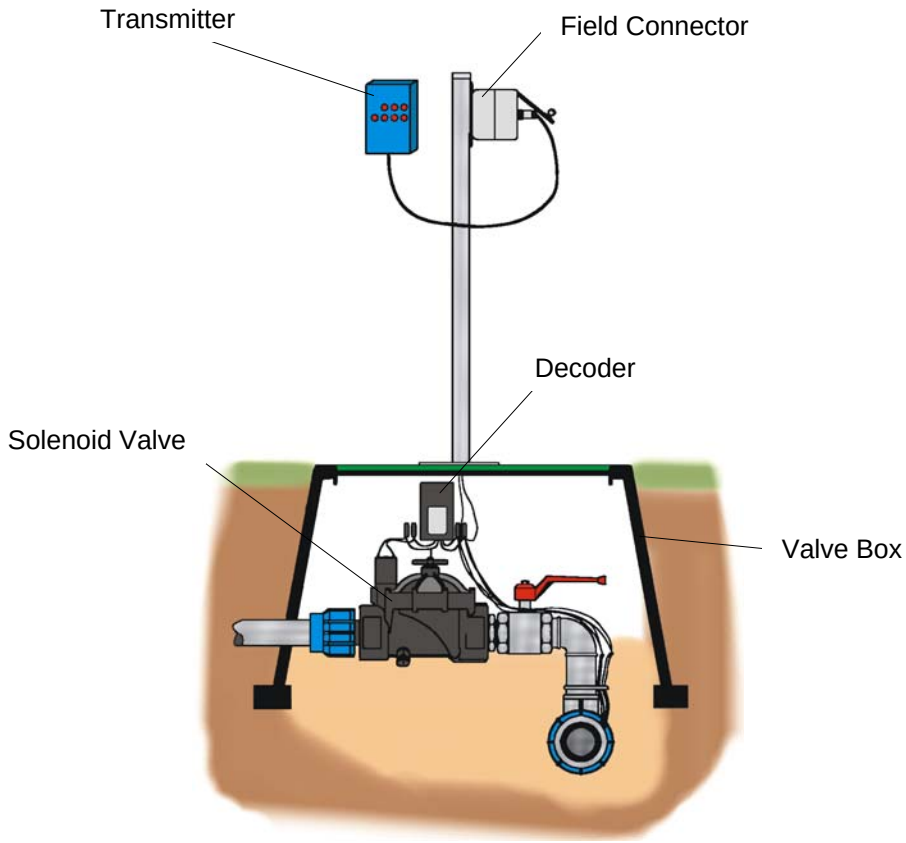
4.7 Field connection



- The installation of the field connector preferably on the valve box
- Stand pipe for plug housing is made of V4A
- Connector in IP 66
- Connector is installed in a lockable housing

4.8 Programming unit

- Programming unit is connected at the VCU
- LED with function display for decoder

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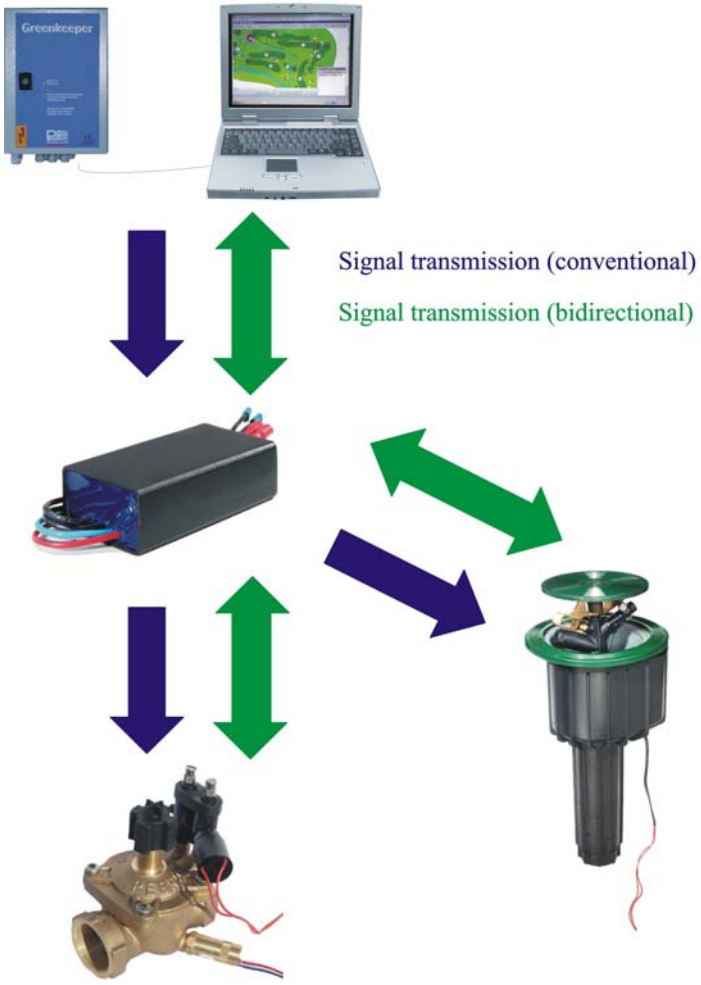
5. Greenkeeper Feedback (Option)

5.1 Description

The Perrot Decoder Control System **Greenkeeper Feedback** is the **first control system**, which informs the user reliably about the interference free run of the irrigation program.
A flow sensor, which is installed in each group valve or valve in head sprinkler, is periodically queried from the Decoder System.



The Greenkeeper Control system compares the planned and actual value. In case of divergence immediately a dialog field with ERORR STATUS appears with the replied error.

In addition to the information **<u>if water flows or not</u>**, the **<u>bi-directional</u>** decoder can report further state diagnostics to the central office:

- ☆ Valve coil short circuit
- ☆ No coil connection
- ☆ No answer from decoder

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How are these information processed from the irrigation program?

☆ Indication of valve status in the irrigation report

Irrigation report

B-prg. Name: dew Start time: 1:20:51 PM 8/12/07 Report Number 2
S9-WIND1 20 S10-Wind 2 0.0 Stop time: 0.00

Position	Status	Valve Name	Time	Feedback	S5-PUMP-FL	Flow	S6-Pressure
1	ON	T1	13.22	OK		999.0	
2	ON	G1	13.22	OK		1009.0	
3	ON	G2	13.22	OK		1011.0	
4	ON	G4	13.22	OK		2010.0	
5	OFF	T1	13.30	OK		1011.0	
6	OFF	G2	13.33	OK		12.0	
7	ON	T4	13.30	ERROR		1011.0	
8	OFF	G1	13.35	OK		12.0	
9	ON	T2	13.23	OK		1011.0	
10	OFF	G4	13.40	ERROR		12.0	

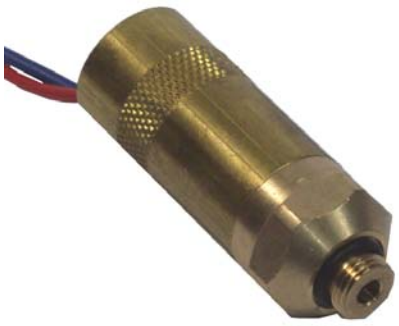
Print | Last Report | Next Report | OK

☆ After switching on the PC, error status appears, when there was a problem with the valves

For these additional features only a 2 core decoder cable is required.
The **bi-directional** construction will be applied equally for single as well as for the multi-station decoder from PERROT. The above mentioned state diagnostic will be queried separately to each station and passed to the central office.

5.2 Hardware

Pressure sensor



The pressure sensor converts the information for the decoder, whether there is enough pressure at the sprinkler or not.
The pressure threshold is adjusted to 2,5 bar. This is the minimum required pressure for the rotation of the sprinkler.

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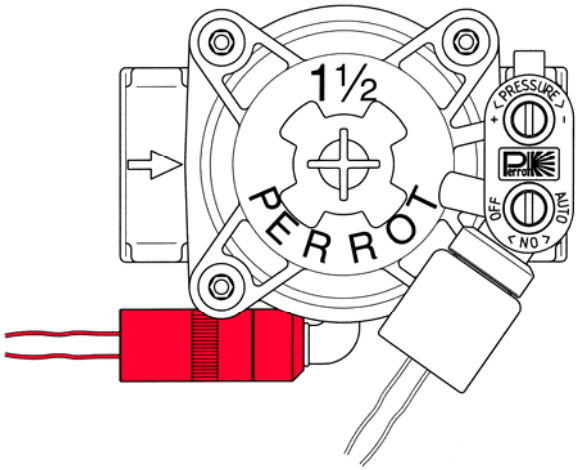
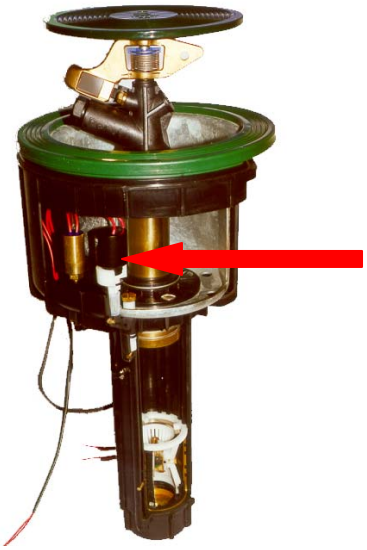
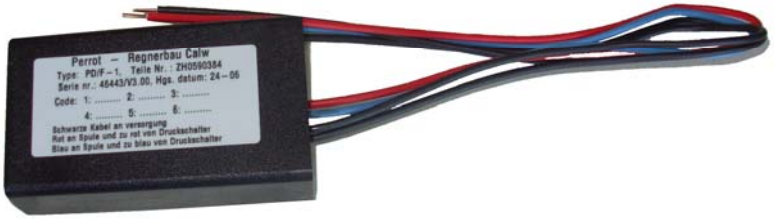
Pressure sensor is integrated in the valve or valve in head sprinkler





Bidirectional Decoder



A bi-directional decoder is required with the possibility to return information back to the system contrary to a conventional decoder which can only receive information from the control unit.

Please consider that the standard decoder is also compatible with the new Greenkeeper Feedback System.

5.3 What to do when options

- ☆ Program break off at exceeding a certain numbers of fault messages
- ☆ Program break off at pump fault message
- ☆ Phone alarm at program break off
- ☆ Phone alarm at pump malfunction

We remain at your full disposal for any further information you may require!

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