

Instruction manual

RainFlow

Ver. 4.1



INDEX

1	DESCRIPTION	3
2	INSTALLATION	3
2.1	CHOICE OF THE INSTALLATION POSITION	3
2.2	HYDRAULIC CONNECTIONS	3
2.3	ELECTRIC CONNECTIONS.....	4
2.3.1	Connection to supply line.....	4
2.3.2	Pump connection	4
2.3.3	Solenoid valve connection	5
2.3.4	Float and clock connection	5
	FLOAT: 6	
	CLOCK (optional):.....	6
3	FRONTAL PANEL	7
4	OPERATION OF THE RAINFLOW SYSTEM	8
4.1	PUMP WORKING	8
4.1.1	Automatic starting	8
4.1.2	Manual starting	8
4.2	SELECTION OF THE PRIMING RESERVOIR.....	8
4.2.1	Automatic selection.....	8
4.2.2	Manual selection	9
4.2.3	Solenoid valve rotation	9
4.3	ABSENCE WATER IN THE RESERVOIRS.....	9
4.3.1	Rainwater reservoir.....	9
4.3.2	Drinking water reservoir	9
4.4	FLOAT ANOMALY	10
4.5	WEEKLY EMPTYING OF THE DRINKING WATER RESERVOIR	11
4.6	SAFEGUARD OF THE PUMP FROM LONG PERIODS OF INACTIVITY	11
4.7	OPERATION WITHOUT FLOAT (RAINWATER RESERVOIR)	11
4.8	MAINTENANCE OF DRINKING WATER RESERVOIR	11
4.9	MAINTENANCE OF RAINWATER RESERVOIR	12
5	DRAWBACKS AND REMEDIES.....	12
6	TECHNICAL CHARTS.....	14

1 DESCRIPTION

RainFlow is an automatic electronic system, designed to check the operation of the pumps with the possibility to select the reservoir from which to draw water through a solenoid valve.

Typically, RainFlow is used for rainwater recovery, where water is normally drawn from the rainwater reservoir unless the supply is exhausted. In this case, the solenoid valve switches to the drinking water reservoir for emergency backup.

2 INSTALLATION

Attention! During installation and maintenance, the unit must be disconnected from the electricity supply. A suitably qualified electrician must perform the electrical connection.

2.1 CHOICE OF THE INSTALLATION POSITION

Position the unit on a vertical surface capable of holding aprox 60kg). 2 shelves and the relative screw expansion are furnished, for the fixing to wall (Fig.1 rif. **5**). Verify the horizontal and vertical levels .

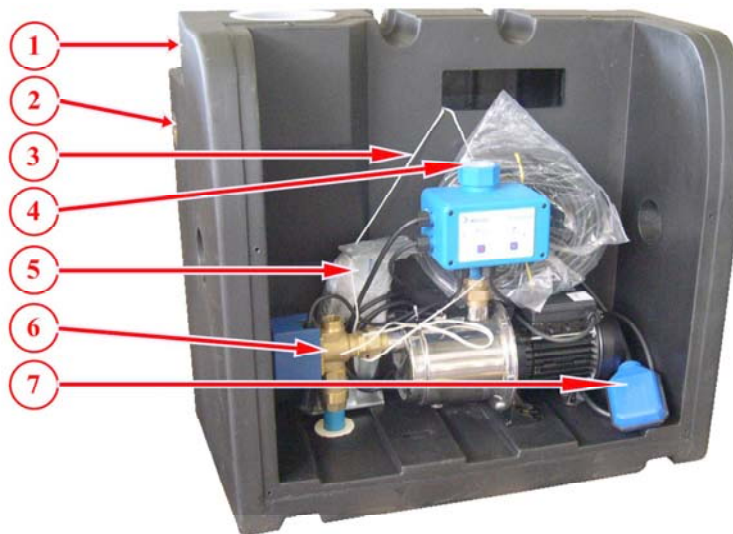


Figure 1: RainFlow Drinking water's reservoir

2.2 HYDRAULIC CONNECTIONS

1. To remove the thread of fixing for the transport of the flow and the stirrups to wall (Fig.1 Rif. **3**).
2. To connect the suction pipeline of the reservoir of collection Rainwater of it, endowed with ground valve or non-return valve, to the solenoid valve in three ways (screw 1" male Fig.1 Rif. **6**).
3. To connect the delivery side of RainFlow (screw 1"1/4 female Fig.1 Rif. **4**) to the user system. To prevent damage caused by vibration we recommend the use of a flexible pipe), three pieces cross and a manometer.
4. To connect the filling float of the drinking water reservoir to the hydraulic net (screw 1" male Fig.1 Rif.**1**).

5. To connect the over flow (screw 1" female Fig.1 Rif. 2) with pipeline suited to get through the water in case that the inside level to the reservoir climbs over the allowed limits.
6. To install the float (Fig.1 Rif. 7) in the Rainwater reservoir positioning the counterweight to the correct distance, to get the contact point to the desired levels and to verify that there are no obstacles to the movement. To the necessity, it is possible to disconnect the wires from the electric system, to effect the laying of the cable and to connect him (see par. 2.3.4 Float and Clock connection).
7. To take care of the perfect priming of the pump, filling with water the body of the same one and the suction pipe.

2.3 ELECTRIC CONNECTIONS

2.3.1 CONNECTION TO SUPPLY LINE

Input connection 220V-240V 50Hz single-phase nominal . For versions not fitted with a supply cord, the connections must be connected to the extractable terminal J4 (LINE) to 4 ways respecting the references (see Fig.2).

The electric line connection to the RainFlow must be comprehensive of earth line that can indifferently be connected to one of the two expected positions in the terminal J4 (LINE) .

The resistance of total earth must not exceed 100 Ohms.

Incorrect electrical connections can cause irreparable damage.

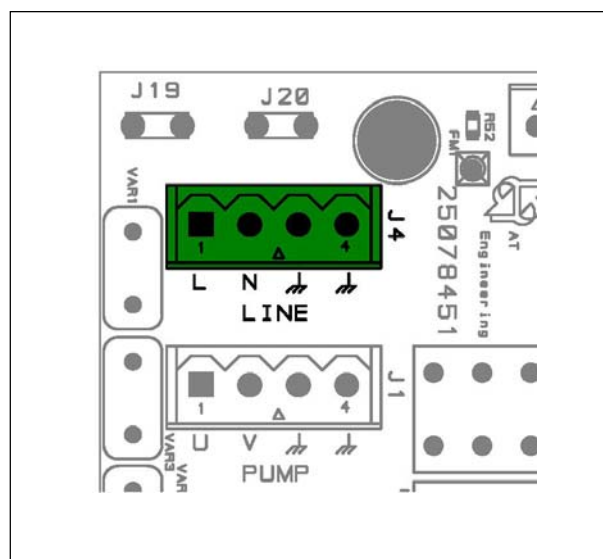


Figure 2: Terminal of supply net (LINE)

2.3.2 PUMP CONNECTION

Power supply = 230V 50Hz single-phase.

Max. Current 10Arms ; $\cos\phi \geq 0,7$.

For versions not equipped of cables we recommend to use an extractable terminal J1 at 4 ways "PUMP" respecting the references screen-printed in correspondence of the same terminal (see Fig.2); the two earth connections can indifferently be used.

Incorrect electrical connections can cause irreparable damage.

2.3.3 SOLENOID VALVE CONNECTION

Connections of the solenoid valve terminal (see Fig. 3):

- U2:** Winding of the solenoid valve related to the suction from Rainwater reservoir.
- V2:** Common wire of the solenoid valve at two positions.
- U3:** Winding of the solenoid valve related to the suction from reservoir connected to the drinking water system.

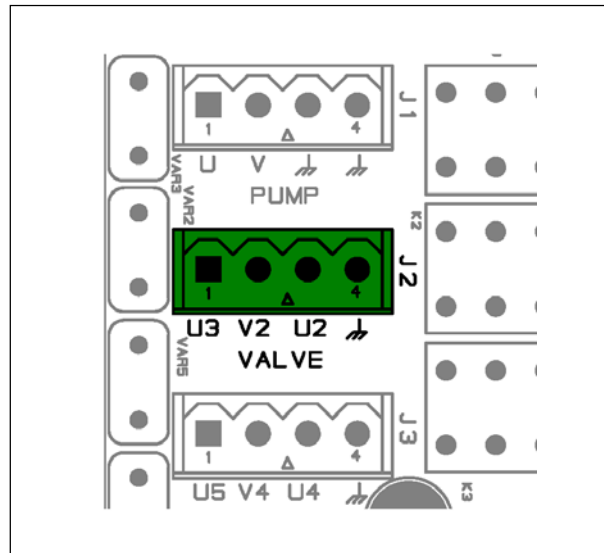


Figure 3: Terminal connection to the solenoid valve (VALVE)

2.3.4 FLOAT AND CLOCK CONNECTION

In Fig. 4 are brought the terminal to which the float is connected. To the same terminal it is possible to connect an external clock to manage the weekly emptying of the drinking water reservoir (see par. 4.5).

Electric property of the terminal J6:

- Entries photo coupled.
- Min. heating voltage: 5Vdc.
- Max. Back voltage: 2Vdc
- Absorbed current 12Vdc: 3mA.
- The inputs are piloted with positive or negative polarity in comparison to own return of mass.
- It is possible to use the inside or external supply. Using the external supply, the inputs can be piloted both with continuous voltage (Max 48V) that with alternate voltage (Max 50Vpp).

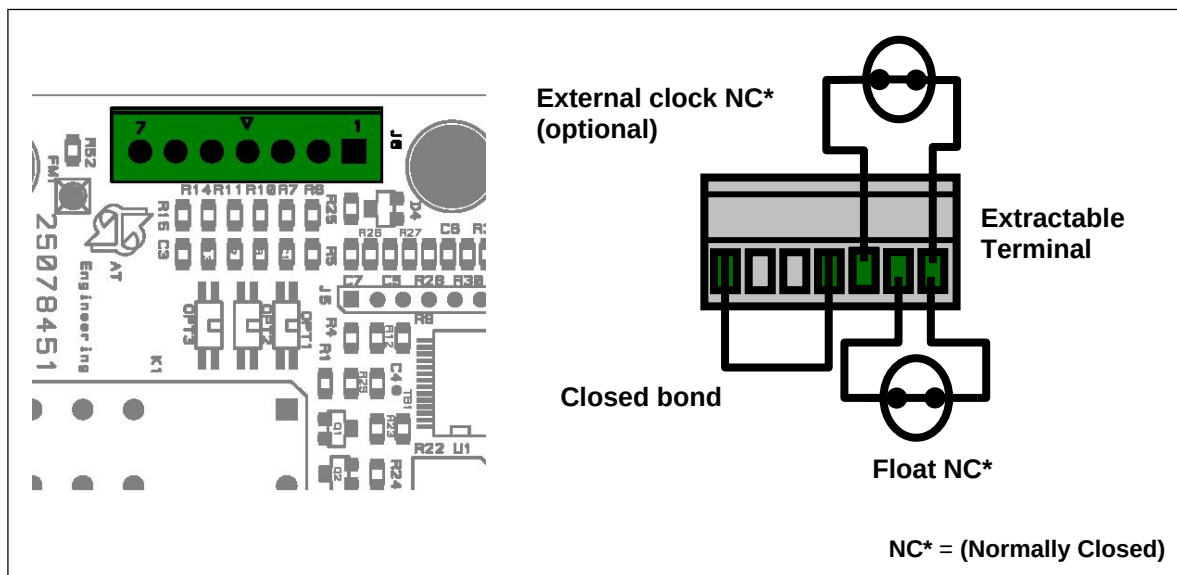


Figure 4: Terminal to the connection of the float and clock (configuration with inside supply)

FLOAT:

The electric contact of the employed float must to be normally closed: the signaling of lack of water happens through the opening of the contact. It must to be connected to the Pin 1 and 2 of the extractable terminal J6 (Fig.4).

CLOCK (optional):

To effect the weekly emptying of the drinking water tank (par. 4.5) can be used an external clock. Once connected the clock, are not necessary other operations considering that the RainFlow is able to recognize it, automatically.

The electric contact of the employed clock must to be normally closed: the signalling of "weekly emptying of the rainwater tank" of the clock must to happen through the opening of the contact. In the 24h following to the signalling of the clock, the RainFlow is insensitive to further communications coming from the same clock.

The clock must be connected to the Pin 3 and 1 of the extractable terminal J6 (Fig.4).

3 FRONTAL PANEL

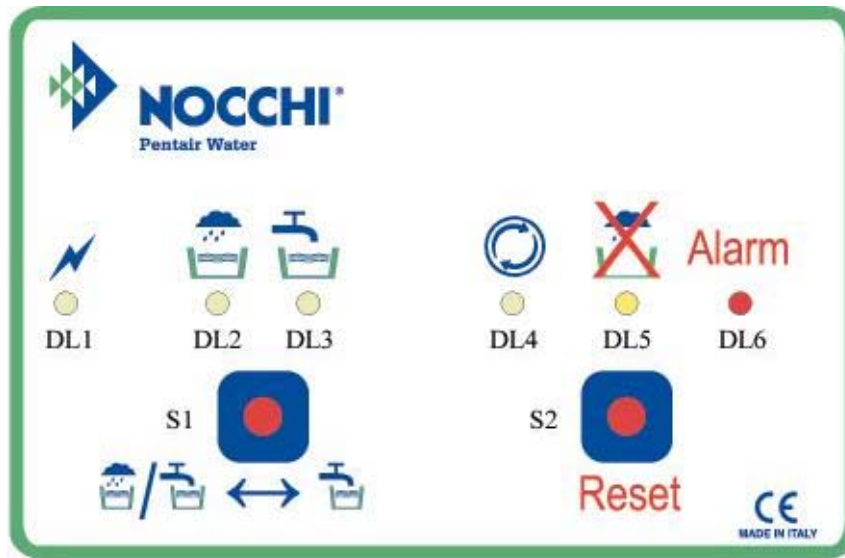


Figure 5: Frontal Panel RainFlow

Keys	Function	Notes
S1	AUTOMATIC OR MANUAL SELECTION OF COLLECTION RESERVOIR	▪ PRESSING THE KEY FORCES THE PRIMING OF THE DRINKING WATER RESERVOIR ▪ THE FURTHER PRESSURE OF THE KEY RESTORES THE AUTOMATIC SELECTION OF THE RESERVOIR ▪ THE PRESSURE OF THE KEY FOR <u>AT LEAST 2s</u> FORCE THE PRIMING FROM THE RESERVOIR OF RAINWATER (POSSIBLE OPERATION WITHOUT FLOAT PAR.4.7) ▪ THE FURTHER PRESSURE FOR <u>AT LEAST 2s</u> OF THE KEY RESTORES THE AUTOMATIC SELECTION OF THE RESERVOIR
S2	GENERAL RESET	▪ ZERO RESETTING OF THE LAST ANOMALY OF OPERATION NOTICED (DL5 FLASHING OR DL6)
S1 + S2	MANUAL STARTING OF THE PUMP	▪ THE CONTEMPORARY PRESSURE OF THE KEYS S1 AND S2 IT FORCES THE STARTING OF THE PUMP UP TO THAT THE KEYS REMAIN PRESSED
Led	Function	Notes
DL1	SUPPLY PILOT LIGHT	▪ ON WHEN THE SYSTEM IS SUPPLIED
DL2	PILOT LIGHT OF THE RAINWATER RESERVOIR	▪ ON WHEN IT IS DRAWN BY THE RESERVOIR OF RAINWATER ▪ IT FLASHES WHEN THE VALVE ROTATES FROM THE RESERVOIR OF DRINKING WATER TOWARD THE RESERVOIR OF RAINWATER ▪ IT QUICKLY FLASHES, IF IT FORCE MANUALLY, THE COLLECTING FROM THE RAINWATER RESERVOIR (POSSIBLE OPERATION WITHOUT FLOAT PAR.4.7)
DL3	PILOT LIGHT OF THE DRINKING WATER RESERVOIR	▪ ON, WHEN IT IS DRAWN BY THE RESERVOIR OF DRINKING WATER ▪ IT SLOWLY FLASHES: ○ WHEN THE VALVE ROTATES FROM THE RESERVOIR OF RAINWATER TO THE RESERVOIR OF DRINKING WATER ○ WHEN IT IS IN PERFORMANCE THE WEEKLY EMPTYING OF THE DRINKING WATER RESERVOIR ▪ IT QUICKLY FLASHES, IF IT FORCE MANUALLY, THE COLLECTING FROM THE DRINKING WATER RESERVOIR
DL4	RUNNING PILOT LIGHT	▪ ON WHEN THE PUMP IS RUNNING
DL5	PILOT LIGHT OF LACK WATER IN THE RESERVOIR OF RAINWATER	▪ ON IN CASE OF LACK WATER SIGNALLED BY THE EXTERNAL FLOAT ▪ IT FLASHES (LACK OF WATER SIGNALLED BY FLOW AND PRESSURE CONTROL WITH PRIMING FROM RAINWATER RESERVOIR: ○ ANOMALY - (IN CASE OF OPERATION WITH INSTALLED FLOAT) ○ NORMAL OPERATION IN CASE IN WHICH THE FLOAT IS NOT INSTALLED
DL6	PILOT LIGHT OF LACK WATER IN THE RESERVOIR OF DRINKING WATER	▪ ANOMALY - ON, IN CASE OF DRY RUNNING WITH PRIMING FROM DRINKING WATER RESERVOIR

4 OPERATION OF THE RAINFLOW SYSTEM

RainFlow controls the automatic operation of the pump and manages the selection of the reservoir from which to effect the collecting in function of the conditions of operation. The normal priming happens from the rainwater reservoir but noticed a lack of water, the solenoid valve is automatically commuted to prime from the drinking water reservoir without suspension of the water supply. Thanks to the system of control flow/pressure RainFlow is able to work without float (float of rainwater reservoir) and to operate correctly also in presence of a malfunction of the same (the malfunction is signalled by DL5 Fig.5).

Control's system flow/pressure allows safeguarding the pump from dry running, not only in case of float anomalies, but also when water is withdrawn by the drinking water reservoir. In fact, if we have a lack of water when the priming happens from drinking water reservoir, the system goes to block and it is furnished the signalling of Alarm (DL6).

The user, after having removed the causes that have produced the anomalies in the RainFlow can restore the correct operation through the key S2, or it can wait the attempts of re-establishment that automatically RainFlow undertakes (see par.4.3). Using S1 is possible to force the priming from one of the two reservoir (Par.4.2.2s).

4.1 PUMP WORKING

4.1.1 AUTOMATIC STARTING

1. The pump is started when the pressure of the system is lower than 1,5 bar (factory setting); the switch-off happens when RainFlow doesn't detect any flow in exit.
2. ON/OFF cycles of pump are prevented lower than 5 seconds, so that to preserve its correct operation in the time.
3. RainFlow monitors constantly flow and pressure of the water: it is able so to notice the lack of water in suction (independently from float signalling) so that to correctly manage the pump.

4.1.2 MANUAL STARTING

Pressing the keys **S1** and **S2** it has the forced switch-on of the pump until the keys are not released; water is withdrawn by the current reservoir.

4.2 SELECTION OF THE PRIMING RESERVOIR

Under the normal job conditions, RainFlow sucks from Rainwater reservoir.

The reservoir of drinking water is employed when that of Rainwater is empty, or when the selection of the reservoir is manually forced.

The RainFlow is able to notice a possible malfunction of the float (rainwater reservoir) thanks to the system of flow/pressure control going so to select the drinking water reservoir.

4.2.1 AUTOMATIC SELECTION

Normally, the suction is effected by the rainwater reservoir (DL2 ON fixed).

Rainwater's lack from the reservoir, can be detected or from the float (DL5 ON fixed), or from the system of flow/pressure control (flashing DL5). The RainFlow selects so the drinking water reservoir (DL5 ON fixed).

If water's lack from the rainwater reservoir has been signalled by the float, not as soon as this detects the presence of rainwater, the RainFlow selects again the reservoir of rainwater; if the signalling of lack of water arrived from the system of flow/pressure control, it is necessary a manual intervention on the key S2 to be able to select again the rainwater reservoir.

4.2.2 MANUAL SELECTION

Man. Sel. drinking water: a pressure of the key **S1**, allows to force the collecting from the drinking water reservoir, pressing it a second time it returns in automatic formality. If the drinking water reservoir is manually selected, possible signalling of absence of water is visualized (DL5 ON fixed), even if ignored by the RainFlow. A dry running detect by the system of flow/pressure control, it brings to the block of the system (to press Reset to annul the last anomaly).

Man. Sel. Rainwater: a pressure of the key **S1** for at least of 2s allows to force the collecting from the drinking water reservoir; to return in automatic formality, to press again S1. If rainwater's reservoir is manually selected, possible signalling of rainwater coming from the float is ignored by the RainFlow and not visualized. A dry running detect by the system of flow/pressure control is signalled by flashing DL5 and is selected the drinking water reservoir (to press Reset to remove the signalling and to return to prime from rainwater reservoir).

4.2.3 SOLENOID VALVE ROTATION

The rotation of the solenoid valve needs for a maximum of 70 s: every whenever beginnings a rotation, or you change the sense of rotation, have to pass 70 s before the RainFlow considers the solenoid valve correctly positioned going to signal it with DL2 or DL3 ON fixed.

4.3 ABSENCE WATER IN THE RESERVOIRS

4.3.1 RAINWATER RESERVOIR

The lack of water from rainwater reservoir can be detect in two ways:

1. **THROUGH THE FLOAT (DL5 ON FIXED):** FOLLOWING THIS SIGNALING THE DRINKING WATER RESERVOIR IS SELECTED. RAINWATER'S RESERVOIR IS SELECTED AGAIN AS SOON AS THE FLOAT SIGNALS THE PRESENCE OF WATER.
2. **THROUGH THE SYSTEM OF FLOW/PRESSURE CONTROL (DL5 FLASHING):** FOLLOWING THIS SIGNALING THE DRINKING WATER RESERVOIR IS SELECTED. TO BE ABLE TO SELECT AGAON THE RAINWATER RESERVOIR, IS NECESSARY TO INTERVENE MANUALLY ON THE KEY **S2 (RESET)**.
IN CASE IN WHICH THE FLOAT IS INSTALLED, DL5 FLASHING POINTS OUT THE PRESENCE OF AN ANOMALY OF THE FLOAT: BEFORE PRESSING **S2** IT RECOMMENDS TO CHECK THE CORRECT OPERATION OF THE SAME FLOAT.

4.3.2 DRINKING WATER RESERVOIR

If the drinking water reservoir remain without water, the RainFlow detect through the system of flow/pressure control and goes in block (ALARM - DL6 on).

To remove the block, the RainFlow performs some tests to verify if in at least one of the two reservoirs it is present again the water; if one of these tests goes to good end, the alarm (ALARM DL6) and the system returns to work correctly.

The tests are effected every 10 minutes during the first time, every time during the first day and finally every day for one month. After one month the tests are suspended. To restore the correct operation of the system, it can also intervene manually through the pressure of the key **S2** that allows annulling the last anomaly verified and to retry the priming from the selected reservoir.

Following are shown situations in which RainFlow goes to block:

 DL 1	 DL 2	 DL 3	 DL 4	 DL 5	Alarm  DL 6
---	---	---	---	---	---

ON	OFF	Fast flash.	OFF	OFF	ON
While a manual forcing was in progress on the drinking water reservoir, a dry running has been detected from the system of flow / pressure control and the system has jammed (DL6 on). ACTIONS TO BE UNDERTAKEN: it is necessary to press S2 (Reset) so that the RainFlow reactivates the pump to try to prime from the drinking water reservoir; only after having pressed reset it is possible eventually to remove the manual forcing from the drinking water reservoir.					

					Alarm
DL 1	DL 2	DL 3	DL 4	DL 5	DL 6
ON	OFF	Fixed ON	OFF	ON	ON
Has been selected by the RainFlow the drinking water reservoir subsequently to a signalling of lack of rainwater from the float; subsequently control's system of flow/pressure has signalled a dry running related to the drinking water reservoir that has brought to the block of the system (DL6 ON). ACTIONS TO BE UNDERTAKEN: it is necessary to press S2 (Reset) so that the RainFlow takes back in examination the signalling of the FLOAT and retries to prime from the rainwater reservoir and/or from drinking water reservoir (according to the signalling of the float).					

					Alarm
DL 1	DL 2	DL 3	DL 4	DL 5	DL 6
Fixed ON	OFF	Fixed ON	OFF	Fast flash.	ON
The dry running had on the drinking water reservoir; previous rainwater's lack was signalled by the system of flow / pressure control. ACTIONS TO UNDERTAKE: it is necessary to press S2 (Reset) so that the RainFlow tries again to prime from the drinking water reservoir (DL5 continuous to flash); if we want that is effected also an attempt of priming by the rainwater reservoir, it is necessary to press again S2 (Reset) before the system re-enters in block, so that to reset also the signalling DL5.					

LEGENDA	
	OFF
	ON
	ON OR OFF
	FAST FLASH. – SLOW FLASH.

4.4 FLOAT ANOMALY

The RainFlow is able to realize, through the flow / pressure control, of a possible malfunction of the float (if the float has correctly been installed). In this case, if the float signals the presence of rainwater but the system of flow / pressure control detect the lack of water, the malfunction is signalled through DL5 that flashes. Subsequently it commutes the solenoid valve in position drinkable water.

To remove the anomaly signalled and to make that a new attempt of priming is effected by the rainwater reservoir, it is necessary to press Reset.

4.5 WEEKLY EMPTYING OF THE DRINKING WATER RESERVOIR

To maintain a satisfactory exchange of water in the drinking water reservoir the RainFlow guarantees a collecting than at least 15 mins in 7 days from this reservoir. If in 7 days the 15 mins of priming are not reached, the drinking water reservoir is automatically selected for guaranteeing the exchange of water for the necessary time to reach the value of 20 minutes. The selection of the reservoir for the emptying is signalled with fast flashing DL3.

If the RainFlow is not in block (DL6 ON), the selection of the rainwater reservoir for the weekly emptying is always undertaken; it is possible to suspend it, pressing the key S1. In this case the weekly emptying will be considered performed.

Subsequently to a lack of supply, the weekly counter and that related to the 20 mins of priming from the drinking water reservoir, are memorized: in this way the time is not considered in which the system has remained not supplied and when the supply is furnished, again the RainFlow continues in his correct operation as if the lack of electric energy there had not been.

If during the priming of drinkable water, to reach the weekly 20 minutes of priming, a lack of water is detect, it finishes the weekly emptying and the RainFlow it brings him to the state in which was before effecting the weekly emptying.

The use of an external clock is foreseen, to effect the weekly emptying in pre-arranged schedules (see par.2.3.4).

4.6 SAFEGUARD OF THE PUMP FROM LONG PERIODS OF INACTIVITY

Whatever is the position of the valve, if the pump is inactive for a week, this, is started for 15 seconds (DL4 ON fixed).

4.7 OPERATION WITHOUT FLOAT (RAINWATER RESERVOIR)

To use the RainFlow without float, it is necessary to perform the following operation:

MANUAL FORCING OF RAINWATER RESERVOIR TROUGHT PRESSURE OF KEY S1 FOR AT LEAST of 2 SECONDS.

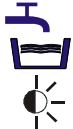
Flashing DL5 in the configuration of the RainFlow without float it doesn't point out a malfunction but a lack of water from the rainwater reservoir.

Subsequently to a lack of water in the rainwater reservoir (flashing DL5), the drinking water reservoir is selected; to return to the rainwater reservoir is necessary to intervene manually, going to eliminate the signalling of DL5 (flashing) through the pressure of S2 (Reset)

4.8 MAINTENANCE OF DRINKING WATER RESERVOIR

To effect the maintenance of the drinking water reservoir, this must be selected manually (to press S1). Holding contemporarily pressed the keys S1 and S2 is possible to manually activate the pump.

From the manual selection of the drinking water reservoir (represented by the configuration of underlying led) it is possible to go out only pressing again S1 (removing so the manual selection of the reservoir and returning in automatic selection).

					Alarm
DL 1	DL 2	DL 3	DL 4	DL 5	DL 6
ON	OFF	Fast flash.	OFF / ON	OFF	OFF

4.9 MAINTENANCE OF RAINWATER RESERVOIR

To effect the maintenance of the rainwater reservoir, it must to select the same reservoir (to press S1 for at least 2 seconds). Holding contemporarily pressed the keys S1 and S2 it can manually activate the pump. From the manual selection of the drinkable water (represented by the configuration of underlying led) it is possible to go out in 2 ways (returning so in the formality automatic selection):

1. Removing the manual selection of the reservoir pressing for at least 2s the key S1;
2. due to a lack of water detected by the system of flow / pressure control. In this case the drinking water reservoir is selected automatically and if here the presence of water is not detected, the system goes to block.

					Alarm
DL 1	DL 2	DL 3	DL 4	DL 5	DL 6
ON	Fast flash.	OFF	OFF/ON	OFF	OFF

LEGENDA	
	OFF
	ON
	ON OR OFF
	FAST FLASH. – SLOW FLASH.

5 DRAWBACKS AND REMEDIES

- **The system is in alarm (DL5 ON or flashing and DL6 ON)**
In order to restore the priming and to eliminate the cause of the depriming (losses in suction, wrong working of the standing valve, reservoir without water, etc.) Subsequently, press the key of reset **S2** paying attention that the pump doesn't work to dry too for a long time to avoid damages to the estate and the hydraulic part. For more details please see the paragraph 4.3.
- **The pump switch-on and switch-off continually**

Individualize the losses in the delivery mains and to eliminate it.

- **The system remains completely switched-off (any leds ON)**
Verify the correct connection of the RainFlow to the electric line.
- **The pump doesn't start but DL1 is ON**

In the system the pressure is higher than the one set as starting value. In the standard version, RainFlow cannot be installed if the tallest point of use is over the 15 meters high. In case is wanted to vary this value it can be acted on the screw of regulation (dowel) sets on the right (Fig.6), inside the RainFlow.

After having removed the frontal panel, it can be acted rotating in hourly sense to increase the value of the starting pressure, while in sense counter clockwise it decreases.

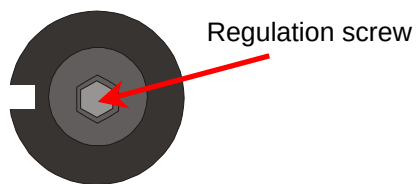


Figure 6: Regulation screw for the starting threshold of pressure

Note: In case that the card is gotten off for substitution, to verify that the flow and pressure sensors have found the correct positioning in the special lodgings. It recommends performing these operations to personal specialized.

6 TECHNICAL CHARTS

Operation timer		
Time of shutdown	5s	From when it annuls the flow
Time of rotation of the solenoid valve	70s	
Delay of the lack of water from float of rainwater reservoir	1s	From when it opens the contact
Delay of the return of water from float of rainwater reservoir	30s	From when it close again the contact
Time of intervention dry running	20s	From when pressure neither flow are not read anymore
Delay of the signalling from external clock for the weekly priming from drinking water reservoir.	10s	From when it opens the contact

Chart 1: Timing of the operation

Technical characteristics	
Max Current	10 Arms $\cos\varphi > 0,7$
Power supply	230Vrms 1Ph.
Pump motor type	230Vrms 1Ph.
Work position	Vertical
Max temperature	45°C
Max work temperature	See Electro pump
Max. Pressure	See Electro pump
Set pressure range	1 - 3 Bar
Dimensions cm. (LxHxD)	38x68x80
Hydraulic joint inlet	¾" M
Hydraulic joint outlet	1" ¼ F
Protection Degree	IP 55
Protection	Dry running

Chart 2: Technical characteristics