KELCO F29 PROGRAMMABLE FLOW SWITCH

PROGRAMMING INSTRUCTIONS

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Please Read Me First

The F29 flow switch is supplied unlocked and pre-loaded with a simple program. It is set up with a 5 second start override time and a 5 second run-on time. All other functions are turned off. With the default program loaded, the F29 will start a pump in spite of an initial lack of flow, run the pump for 5 seconds and expect to establish flow past its paddle within this start up time. Given flow is established it will then run the pump continuously while flow is present and it will shut the pump down if flow is interrupted for more than 5 seconds or if flow stops completely.

You can restore the F29 to this default state at any time by pressing and holding down the (P) button and pressing the (R) reset button at the same time. Release the (R) button and then release the (P) button. The timer light will then flash rapidly red to indicate the process is complete. Doing this removes any settings you may have entered and restores the F29 to its original default state. You can then enter new settings or just press reset (R) again and run the pump.

Introduction

The F29 programmable flow switch includes a set of functions that can be set up to control a pump. The functions range from a simple override on start timer that allows a pump to start in spite of an initial lack of flow, through to a range of sophisticated timing and flow based sequences. The functions are independently accessible and adjustable through the F29's simple programming interface. The pages that follow set out what each function does and how to set it up.

The actual selection of a suitable set of functions must be decided prior to programming and will depend on what level of control the pumping system requires. In order to achieve the best performance from this flow switch observe the following basic rules.

1) Use the least number of functions possible. Do not program in functions you do not specifically require, as to do so will make the system's operation unnecessarily complicated and may introduce unpredictable interactions that could cause the F29 to behave in a manner you had not anticipated.

2) The best way to switch off a function that you have previously selected and subsequently decided not to use is to purge the entire program and restore it to its default state rather than simply switch the particular function off. Purging the program ensures the functions are properly disabled and their stored values are all set to zero or off. To purge the program press the (P) button and the (R) reset button. Release the reset button while still holding the (P) button down, then release the (P) button. The LCD screen will display the message "Settings Cleared, Press (P) to Continue". Press (P) and then step through the program making your new selections as you go.

3) Set realistic and sensible values into the various functions. For example, do not set a pump to cycle on and off rapidly. Always set the controller's running and stopping times to realistic values.

Programming The F29 Flow Switch

The F29 flow switch is fully programmable; it accepts input via 4 push buttons. The buttons are marked (P) for programming, Up and Down for data entry and a reset button (R). Pressing the (P) button during normal operation stops the pump and allows entry to the flow switch's menu. Subsequent pressing of the (P) button steps you through the menu from one option to the next. Each option can be adjusted using the up and down buttons. Pressing the (P) button stores the settings you make into the flow switch's memory and steps you to the next option. When you reach the end of the option list the flow switch asks you to accept the settings you have made and to press the (P) button to resume normal running. You can automatically save any changes you have made and exit out of the menu at any stage during programming by simply pressing the (R) reset button. The settings you make are non-volatile and are recorded in the flow switch's memory. Your setting will not be lost if the flow switch is switched off for extended periods. When the unit is switched back on the flow switch will boot up and operate using the setting you recorded in its memory.

Basic Operation

Purging the F29 flow switch (pressing the (P) button and then pressing the (R) reset button) automatically loads in a 5 second start-up time and a 5 second run-on time. This is the factory default setting for the F29 flow switch. All other functions will be turned off or set to zero. If you subsequently press the (P) button while the pump is running, the pump will stop and the LCD screen will display the Kelco splash screen and the controller's model number. Pressing the (P) button several more times steps you to the first selection in the menu, the remote input selection screen.

Remote Input

The remote input operates in one of two ways, remote start only or remote start and stop. You choose which of the two you require by pressing the up or down buttons and then confirming your selection by pressing the (P) button. If you choose remote start only the F29 will start the pump each time the remote switch closes its contacts. If the remote switch was a pressure switch then its contacts would close on a falling pressure and that could be used to start the pump. If you choose remote start and stop then

the pump will only operate while the remote switch is closed. An example of its use would be for tank filling where the remote input was connected to a tank level switch such as a Kelco D30.

Alarm Relay

After selecting yes or no to the remote input question and pressing (P) you are asked if you want to use the alarm relay. The F29 contains a dedicated relay with 16 Amp 240VAC rated voltage free contacts. The contacts of the alarm relay can be used to control any required device within its electrical rating including an external alarm or even a second pump. The alarm relay is very versatile and can be set to operate in one of six different ways. If you choose yes to “use the alarm relay” you are confronted with the first of six screens asking you how you would like the alarm relay’s contacts to behave. You can move through the choices using the up and down buttons. Details of the six choices follow.

1) Closed if any Fault Develops (Remains open if flow stops)

If you want the alarm relay to close its contacts only when a genuine fault develops simply press (P) to accept this choice. Alarm on a fault means the alarm relay will only close its contacts if the pump runs dry, if flow is interrupted while cyclically running or while a batch is running of if the anti cycling starts per hour rate is exceeded. To respond to dry running the F29 has to have an external pressure switch connected to its remote input and you must have selected “use remote input, yes” and then select “use remote for starting only” for the F29 to be able to differentiate between normal flow stopping and a genuine dry run.

If you have set run dry auto restart to on and have chosen repeated restarts from the run dry menu then in the event of the pump running dry the alarm relay will not close. This is because choosing repeated restarts means you accept the pump running dry as a normal event and not a true fault. If you require an alarm using this run dry configuration then using “alarm on loss of flow would be the appropriate choice. If you choose single restart from the run dry menu and the pump runs dry the alarm relay will not close its contacts unless the second attempt at restarting fails and the controller goes into permanent alarm mode.

2) Closed if Flow Stops (Remains open if a fault develops)
The second alarm choice means the alarm relay will close its contacts every time flow stops, unless there is a fault. This means stopping under normal circumstances. It means the alarm relay will not close its contacts if a fault occurs, as it would if you had made the previous choice. Such faults that will not cause an alarm include running dry, flow interruptions to batch or cyclic running and the anti cycling alarm.

3) Closed if Pump is Off (Regardless of flow or faults)
This choice effectively provides a set of voltage free contacts that act in reverse to the main pump relay's contacts. That is, the alarm relay's contacts will be closed when the pump relay's contacts are open and they will be open when the pump relay's contacts are closed. This configuration can be used for all manner of special applications where a set of independent electrical contacts are required. It is even possible to control a second pump via the relay's contacts. This can be done either directly or via an interposing contactor. The standby pump would only run when the main pump was off.

4) Closed if Pump is On (Regardless of flow or faults)
If this configuration is chosen the alarm relays contacts will mimic the main pump relay's contacts. They will be closed when the pump relay's contacts are closed and open when the main pump relay's contacts are open. Like the previous choice, this configuration lends itself to all sorts of special control applications.

5) Closed During Pre-Start Delay (Remains open at all other times)
If you decide to use this option the contacts of the alarm relay will only be closed while the pre-start timer is running. See details of what the pre-start timer is and what it does on page 6. Basically the alarm relay contacts can be used to control some external device for a period of time prior to the pump turning on. A typical application would be to have an aeration system or mixer run for a set period of time and then shut down and then have the pump turn on automatically. Such applications are often encountered in influent and effluent mixing and processing systems.

6) Closed on Faults Not in Cyc Run (No alarm in Cyclic Running)
This option is similar to option 1, “Closed if Any Fault Develops” the only difference being that the alarm relay will not close its contacts if an interruption to flow occurs during cyclic running. All other faults will cause the alarm relay to close its contacts. This alarm option allows the pump to be used to cyclically pump a bore for a set period and then wait for the standing water level to recover before repeating the process. In this situation If the pump runs dry the cyclic running will simply revert to its set stopped time without locking out and instigating an alarm as it would if option 1 was used.

Start-up and Run-on Timers
After the alarm relay selection comes the start-up timer screen. This is set to 5 seconds as the factory default. You can increase or decrease this by pressing the up or down buttons and then pressing the (P) button to step to the next function, the run-on timer. The run-on timer is also set to 5 seconds by default and again you can increase or decrease this by pressing the up or down buttons. The start-up timer has a range of 0 to 240 seconds and the run-on timer can be set from 0 to 900 seconds. Both the start-up and run-on timers are self terminating. This means they cancel out their runs and revert to normal pump running as soon as flow is detected rather than running for the full time that you have entered. In addition, the run-on timer automatically resets its clock each time flow is detected. This feature means the F29 will ignore entrained gas in the pipe system. The flow has to remain continuously off for whatever time you set on the run-on timer for the pump to stop. The pump may be running dry for the period you set on the run-on timer so take care not to set a run-on time that is longer than absolutely necessary.

Once you have set the start-up and run-on timers and pressed (P) to confirm the settings you are presented with a screen that asks if you want to use the advanced functions of the F29. If your application only requires dry run protection for a pump and a start override to get the pump going in spite of an initial lack of flow then you will not require the advanced functions. In this situation just accept the default “NO” and press (P). You will then be asked to confirm your choice and press the (R) reset button to run the pump.

Advanced Functions

The F29 programmable flow switch includes a set of advanced functions that extend the capability of the flow switch well beyond basic loss of flow protection. The advanced functions are directly accessible by moving beyond the more basic start-up and run-on timers previously described. There follows here a detailed description of each of the advanced functions. Advanced functions can be used singularly or in combination with other advanced functions as well as with the start-up and run-on timers and with or without an external remote switch. Some advanced functions conflict with others and the F29 flow switch will automatically step over conflicting functions in its menu based on your progressive selections.

Pre-Start Delay Timer

On moving into the advanced functions section of the F29's menu you are first presented with the option to include a pre-start delay time. The pre-start delay timer delays the starting of the pump for a selectable period. It can be set from zero to 3600 seconds (one hour) in 1 second increments. If you choose to use this timer the actual starting of your pump will be delayed by whatever delay you set this timer to. Each time the flow switch is switched on it boots up but prevents the actual starting of the pump for the set period. As soon as the set time has elapsed the pump will start and run normally. The pre-start timer can be used to allow peripheral equipment time to boot up or to run. For example, some VS drives require a few seconds to stabilise and the F29 pre-start timer can hold off the starting of the pump until the system has stabilised. The pre-start timer can also be used to stage or stagger the starting of multiple pumps. If you want to use the delayed starting function press the up or down buttons to display "YES" and then press the (P) button. You will then be able to enter your required delay period using the up and down buttons. The range of adjustment is zero to 3600 seconds in 1 second increments. When you have entered your required time press (P) to move on to the next function.

Batch Control

The batch control function built into the F29 flow switch lets the user program into the switch a set running time for the pump. The range of adjustment is 1 minute to 99 hours 59 minutes in increments of 1 minute. The running of the set time can be initiated by powering up the F29 or by pressing the (R) reset button. The batch run can also be initiated by the closing of the contacts of a remote switch connected to the F29's remote input. To use the batch controller in this way, first set the remote input to on and to start only mode. Each time the remote switch closes its contacts a batch run will be initiated. If the remote switch contacts remain closed the F29 simply runs for the set period and then shuts down. To initiate another run the remote switch contacts must first open and then re-close.

If flow is lost during a batch run, due to the pump running dry or a valve closing, the F29 will shut down the pump. If flow subsequently resumes the batch controller will re-initiate its run from the beginning. It will not resume running from the point in its previous run that it shut down at. This function can be used in tank filling applications to send a set volume of water to a tank but to terminate the batch run when the tank fills.

When using the batch control function with the remote input in start only mode the F29 also uses the remote input as a means of detecting dry run. In this scenario the remote input would ordinarily be connected to an external pressure switch.

If flow is lost and the contacts of the remote switch are closed the F29 identifies this as dry run , no pressure and no flow, shuts down the pump and displays the message "pump ran dry". In this configuration the contacts of the alarm relay close. The contacts can be used to actuate an external alarm or light. The alarm relay contacts also close at the completion of the batch run and again can be used to indicate the completion of the run via an external alarm or light.

Batching With Additional Functions

If you choose to use the F29 batch controller, you can also use additional functions at the same time. Once you make the choice to use the batch controller the F29 automatically makes available to you functions that will work while the batch controller is in operation. Functions that will not work with the batch controller are automatically stepped over by the menu program. Functions that will not work include cyclic running, burst pipe detection and leak detection.

If you choose to use a function such as delayed restarting please be aware that when the delayed restart is invoked the batch controller resets its run time to your original entered value. At the end of the delay time the pump will start and run your set batch from the beginning. This process will repeat each time the pump shuts down for any reason, the batch counter will reset and run your batch from the start.

If you choose to use the batch controller the F29's cyclic running function will be disabled. If you choose not to use batch running then cyclic running will appear in the menu. Cyclic running can be used for batch processes. To do this set the cyclic running time to some value and set the cyclic stopping time to zero. In effect, zero stopping time means infinite stopping time as there is no defined set stop time. Set up this way the F29 will run for whatever time you have entered into the cyclic running run time and will then stop. This batching process can be repeated by pressing the reset button or by closing the contacts of an external switch, if you have chosen to use the remote input.

Delayed Restarting

If you set this option to on, each time the pump stops, due to flow stopping or pressure rising above your external pressure switch's set point, the F29 will prevent the pump from restarting for the set period of time. The delay time can be set from zero to 99 hours 59 minutes in increments of 1 minute. Delayed restarting is a form of anti-cycling and cyclic running, wherein the pump is limited in its ability to cycle on and off by preventing it from restarting for a set time period. Its uses include preventing rapid cycling if the system's air cell becomes water logged or if a fault develops in a system's external pressure switch. As an example of its use, consider a pressure system filling a remote tank. If the tank has a float valve that shuts when the tank is full, then the system will pressurise and shut down each time the tank fills and the valve closes. If the float valve leaks or the level drops and the valve opens the system will depressurise and the pump would ordinarily start. By utilising the F29's delayed starting feature, the restarting of the pump can be delayed for a period of time. Perhaps until the water level in the tank has dropped by a substantial amount.

If you choose to use the delayed restarting function and press (P), you will be asked to enter the delay hours and minutes. You will then be asked if you want automatic starting at the end of the delay period. If you choose yes to this question the flow switch will automatically start your pump at the end of the delay period. If you choose no, the flow switch will only start the pump after the delay if an external switch connected to the F29's remote input closes its contacts. In the example outlined above, consider a tank that has intermittent or irregular draw off. You may choose to set the delayed restart to perhaps 12 hours. At the end of the 12 hour period the pump will automatically start and if the tank level is low, the pump will run continuously until the tank fills and the float valve in the tank closes. If however, there has been no draw-off from the tank during the 12 hour period, the automatic restart at the end of the delay will start the pump and run it for whatever period you have set on the start timer (perhaps a few seconds). The F29 will sense no flow because the float valve will still be closed. The F29 will then shut down the pump and again wait for 12 hours before attempting to start the pump. Using this technique prevents the pump from hunting on and off when the tank is full because of slight leakage from the float valve or pipework. It allows you to set the pump to only

operate after a chosen delay, and if there has been no usage of water, to test the system for demand by momentarily starting, and only run the pump if there is a genuine call for water.

The delayed starting function is distinctly different in the way it operates to the cyclic running function that is also included in the F29. Delayed restarting has no fixed run time. Once started, the pump will run continuously provided flow is present until it is stopped by a valve closing or until it runs dry. Cyclic running allows you to set how long the pump runs for as well as how long it stops for. If you choose to use the delayed restarting option the cyclic running function that follows it will not be available to you, as its operation offers an alternative to cyclic running that excludes the combination of the two functions.

Cyclic Running

The F29 can be programmed to run and stop a pump for set periods of time. Both the running and stopping times can be set to any value you choose from 1 minute to 99 hours 59 minutes in increments of 1 minute. The cyclic running option is highly flexible. The run and stop timers are totally independent of each other. If a set running and stopping time are programmed in, the flow switch will run the pump for whatever time it is set to and then stop for the time set on its stop timer.

If a run time is set to some value and the stop time is left set at zero, the flow switch will behave as a one-shot batch controller. On pressing the reset button or switching the pump on, the pump will run for the set period and then shut down. It will not then restart until you again press the reset button or reset the power to the unit. In cyclic running mode the flow switch monitors the elapsed time and displays the remaining time on its LCD screen in hours and minutes.

Cyclic running allows low yield bores to be pumped to their maximum capacity. A bore pump running under cyclic control can be set to pump the bore down to a low level, stop and wait for the standing water level to recover and then repeat the process endlessly. For transfer pumping applications cyclic running can be used to automatically top up remote tanks without the need for float valves or level control at the tank. It can

also be used for one-shot tank filling. Press the reset button and pump a set number of hours of water to a tank, and then stop until the reset is again pressed.

Auto Restart

If the F29 flow switch is used in conjunction with an external pressure switch that is connected to its remote input it will be able to detect if the pump has run dry. If the pump does run dry the auto restart function can be set to automatically restart the pump after a settable time.

If this option is chosen the F29's menu presents you with a choice, single restart or repeated restarts. Single restart will attempt to restart the pump after a set time and if the attempt fails the F29 then shuts down the pump and goes into permanent alarm mode. It displays a "pump ran dry" message, flashes all its lights and closes the contacts of its alarm relay. If however, it finds flow when it restarts it resumes normal operation. If you choose repeated restart from the menu the F29 will repeat the shut down and wait sequence and it will not go into permanent alarm mode. Once you choose repeated restart or single restart the screens that follow ask you to enter a waiting period in hours and minutes. The range of adjustment is 1 minute to 99 hours 59 minutes (zero to just over 4 days) in one minute increments. If the pump runs dry the F29 will shut it down and wait for the period you have set before attempting to restart.

The ability to restart the pump automatically if it runs dry can be a very useful function. Consider a self-priming jet pump or submersible pump installed in a low yield bore. The bore can be pumped until dry and the pump under the control of the F29 can be set to shut down as soon as loss of flow is detected and then wait until the standing water level in the bore recovers before attempting to restart and again pump the bore down.

Anti-Cycling

Electric motors are often limited in the number of times they can be safely started in an hour. This is particularly important in the operation of submersible bore pumps. When a motor starts there is an initial inrush of current that produces heat in the coils and iron rotor of the motor. If the frequency of starts is excessive the accumulation of heat within the motor

can cause severe damage and eventual failure of the motor. Submersible bore pump motors are particularly prone to damage from excessive cycling (starting and stopping).

Maximum Starts Per Hour

The anti-cycling option built into the F29 allows the user to set the maximum number of times the pump can be safely started in any one hour period. If you select yes to this option the screen that follows will ask you to enter the maximum number of times the pump can be started in any one hour. The number of starts can be set from 1 start per hour to 1800 starts per hour. Please contact your pump supplier to obtain the correct figure for your specific pump. In operation the anti-cycling system monitors both time and the number of starts and compares the two. If the starts per hour rate is exceeded for a settable number of consecutive times in any one hour period the pump will be automatically shut down and the flow switch will display a message indicating the starts per hour rate was exceeded.

Number of Starts in Sequence

Once you have selected a suitable maximum number of starts per hour and pressed (P) the screen that follows asks you how many pump starts you would like the F29 to tolerate in sequence. The default setting is 5. You can change this using the up and down buttons. The range of adjustment is 2 to 50 sequential starts.

As a simple example of the way the anti-cycling system works, if the starts per hour rate is set to 360 (one start every 10 seconds maximum) and the pump started 4 times in a row at less than 10 seconds between each start and then did not start again for 12 seconds, the anti-cycling shutdown will not be invoked. If however, the pump were to start 5 times in a row with less than 10 seconds between the starts the anti-cycling system would be invoked and the pump would be shut down.

In a conventional pressure system the anti-cycling function can be used to protect the pump from damage in the event of the system's air cell losing its air charge. If air is lost from a system's air cell due to a ruptured diaphragm or leaking air valve, the pump will hunt on and off rapidly.

Such rapid cycling will cause the pump to overheat very quickly. The F29's anti-cycling feature can be used to shut down the pump and prevent

damage in such a situation. To use the anti-cycling function for this type of pump protection simply set the starts per hour to some value that is marginally higher than the system's normal start rate. This will avoid nuisance tripping but will shut the pump down if excessive sequential cycling is encountered.

Burst Pipe Detector

The F29 includes a unique system for detecting burst pipes. It is most commonly used in systems that are set up as a pressure system and are controlled by an external pressure switch connected to the remote input terminal of the flow switch.

If a pressure system bursts its discharge pipe the system pressure will fall and the pump will start at its low pressure setting. The pump will then run continuously until the water source is depleted. If the discharge pipe splits and the pump has sufficient capacity the result may be continuous cycling of the pump as it attempts to satisfy the leak. The F29 addresses these two scenarios with two separate functions, anti-cycling and burst pipe detection. When both functions are activated the complete spectrum of possibilities is covered. Anti-cycling will detect cyclic starting and stopping and can be set to shut the pump down after a predetermined number of cycles. This function detects split and leaking pipes.

The burst pipe detector addresses the issue of a completely burst pipe where the pump would ordinarily discharge at its full capacity until the source of water was depleted. It does this by using a timer that times out for a settable period each time the pump runs. The timer resets back to its original setting each time the pump stops. The range of adjustment is zero to 99 hours 59 minutes in increments of 1 minute.

In a typical application the burst pipe detector would be set to some time that was marginally longer than the longest time the pump would ordinarily run. For example, in a domestic pressure system day to day usage may require the pump to run for no longer than 15 minutes (for showers etc.).

Perhaps once every few days the system is used for garden watering and required to run for 30 minutes. In this scenario the burst pipe detector would be set to 35 or 40 minutes.

Each time the pump switches on the burst pipe detector begins to count down. In normal circumstances the pump will shut off in less than 30 minutes. This resets the burst pipe detector's timer back to 40 minutes. If however, the pump continues to run, due perhaps to a burst pipe, it will eventually reach the set point of 40 minutes. The pump will then be instantly shut down preserving whatever source water remains. The F29 will then display "burst pipe detected" on its LCD screen.

The setting of the burst pipe detector is a matter of balance between nuisance tripping and maximum preservation of the water source. If the burst pipe detection timer is set too close to the actual maximum usage time, the system may trip out occasionally due to slightly excessive water usage. If however, the timer is set too long the result will be wasted water in the event of a genuine burst pipe.

The burst pipe detection system can be used to protect water reserves in tank filling and transfer pump applications. As an exmple, consider a tank filling application. The capacity of the pump and the tank are known so the maximum run time of such a system will be the time required to fill the tank when it is completely empty. Draw off from the tank may add to this time but fundamentally the time will be known within reasonable bounds. If the level switch in the tank fails or the float valve fails and the tank continuously overflows, eventually the pump under the control of the F29's burst pipe detector will reach the burst pipe detector's set point and the pump will be shut down preserving what remains of the water source.

Leak Detector

The F29 includes a unique leak detection system that can be used to analyse suspected leakage in a pressurised pumping system. The leak detector can be switched on or off in the main menu. It should be left switched off when not required as its display screen excludes the display of normal system messages when it is in use.

The leak detection system will only operate in systems where the F29 is connected to an external pressure switch as it relies on the opening and closing of the pressure switch to count pump starts and to evaluate pump running time. It will not operate in systems where the F29 is connected to

tank level switches or other external devices. The leak detector will not appear in the F29's main menu unless all other functions are turned off with the exception of the remote input and the start and run-on timers.

When selected it operates in the following way. Open all valves feeding into the pipe system to be checked. Close all valves at the extreme ends of the pipe system so the system can be pressurised. Press the reset button on the controller, this will zero the leak detector screen and run the pump until the system is fully pressurised. Leave the system unattended for a period of time perhaps an hour or even a day or two. On returning to the system, the flow switch's LCD screen will be displaying the number of times the pump started and the total run time in hours minutes and seconds since the time the leak detector was zeroed.

If the leak detector screen displays no starts and no run time, then no leak has occurred from the system in the interim period. If the screen displays a number of starts and a total run time, a leak has occurred and the magnitude of the leak can be assessed by considering the total run time displayed and the capacity of the specific pump. The leak detector can be used in any pressurised pumping system, eg: from a small domestic pressure or transfer system to complex irrigation and stock watering systems comprised of many kilometres of pipe.

Program Lock

The F29 flow switch has a hidden security lock. When activated, the lock disables the programming button P and prevents access to the F29's menu. To lock or unlock the flow switch, press the up and down buttons together while the pump is in normal operation (not while it is being programmed). Pressing the up and down buttons together while in normal running mode shuts down the pump and opens the flow switch's lock screen. Once the lock screen is displayed the flow switch can be locked or unlocked by pressing the up or down buttons. Pressing (P) then exits the lock screen and the flow switch resumes normal operation. When locked, pressing the (P) button has no effect on the flow switch and does not take you into the menu in the usual way. Access to the menu can then only be obtained by first unlocking the program.

Running Time Display

The F29 keeps track of how long a pump under its control runs for. The total for any given run is displayed on the LCD screen each time the pump stops. This information is displayed along with any other relevant information about the state of the pump or the reason for the shutdown by alternating the information at 5 second intervals on the LCD screen while the pump is off. The time display is in minutes and it accumulates while ever the pump runs. The time resets to zero each time the pump starts or the reset button is pressed or each time power is reset (switched off and back on). The time that a pump runs for can be useful information to have. For example if a pump under the control of the F29 runs dry then it is useful to know how long it ran for before it ran dry. Consider an irrigation system where the F29 has detected a problem during a fixed irrigation cycle and shut the pump down. It is very useful to know how long the pump ran for before the shutdown occurred.

The Hour Meter

The F29 has a built in hour meter that keeps track of the total time a pump under its control runs for. The hour meter can be used for scheduling routine maintenance or for monitoring total water intermittently or continuously pumped over long periods. The hour meter displays the total hours run for 2 seconds each time the pump stops. It is viewable by watching the LCD screen carefully during this 2 second period as the F29 shuts the pump down. The hour meter can also be viewed and reset to zero from within the programming menu. Press the (P) button to access the main menu and press it again to display the controller's model number screen. With the display showing "F29 CONTROLLER", press the UP arrow button and the hour meter will display. The time displayed on the hour meter represents the actual hours the pump has run for in total. To reset the hour meter to zero, press the down arrow button. To exit out of the hour meter screen press (P). The hour meter accumulates running time and does not loose its memory of the total pumping hours even if the power is switched off for extended periods. The meter can accumulate up to 7.4 years of total running time (in hours) before it automatically resets to zero.

LCD Screen Back Light

The LCD screen on the F29 flow switch has a built-in backlight. The backlight switches on automatically whenever you are programming the flow switch and when the F29 is displaying certain fault conditions. In normal operation the backlight remains off.

The LCD screen backlight can be switched on manually at any time by pressing and holding down the down arrow button. The screen will remain illuminated while you are depressing the down button. The screen will switch off as soon as you release the button. The LCD backlight can't be permanently switched on, it only operates while the down button is pressed.

WARNING

If the F29 Flow switch is used in a manner not specified by the manufacturer the pump protection provided by the flow switch may be impaired or negated. In addition, all warranties stated or implied will be rendered invalid.

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