KELCO F60
DIGITAL PUMP CONTROLLER

PROGRAMMING INSTRUCTIONS

KELCO Engineering Pty Ltd
Sydney Australia
www.kelco.com.au

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Please Read Me First

The F60 pump controller is supplied pre-loaded with a simple program. It is set to mode 1 and it has it's startup and run-on timers both set to 10 seconds. All other functions are turned off or set to zero. Provided the F60 is unlocked you can restore it 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. Doing this removes any settings you may have entered and restores the controller to its original default state.

Introduction

The F60 pump controller 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 sophisticated cyclic running and stopping sequences. The functions are independently accessible and adjustable through the F60'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 mode of operation and the functions used from a specific mode 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 pump controller 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 between the various functions.

2) When moving from mode to mode and from function to function always reset time and pressure values back to zero before moving on. Do not leave timers setup with some value entered in and subsequently decide not to use that specific function. If you do this then enter zero values into the timers and pressure setting before exiting the unrequired function. Provided the f60 is unlocked, a quick way to reset it and clear out any unwanted settings is to press and hold down the (P) button while also pressing the (R) reset button. Doing this clears all settings out of the controller and loads in a very basic mode 1 program.

3) Set realistic and sensible values into the various functions. For example do not set a pump to stop at a lower pressure than it is set to start at. Always set the controller's starting and stopping pressure differential to as wide a difference as possible.

Programming The Controller

This pump controller 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 controller'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 F60's memory and steps you to the next option. When you reach the end of the option list the controller asks you to press the reset button to accept the settings you have made and 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 reset button. The settings you make are non volatile and are recorded in the controller's memory. Your setting will not be lost if the controller is switched off for extended periods. When the unit is switched back on the controller will automatically boot up and operate using the setting recorded in its memory.

The Three Operating Modes

The F60 can be set to operate in one of 3 fundamental operating modes. An initial choice must be made as to how you want to control the pump. Once you have made your choice, the F60's menu will ask you a series of questions that relate to the specific mode you have chosen. A table of the available functions is included here to assist with selection of a suitable mode. The 3 modes are: -

Mode 1 Timer Control

In this operating mode the controller operates under time based control and ignores the system pressure. Mode 1 provides you with a set of basic timers that includes a start-up timer to allow the pump to initially start regardless of lack of flow, a snore timer to allow the pump to run partially dry, a run-on timer to ignore short term interruptions to flow. In addition delayed restarting is available as is anti-cycling and burst pipe detection. In basic mode the controller will start the pump each time power is switched on or each time water flow pushes the paddle forward. The controller can also be started using an external input from a remote switch. See the section on remote input for more information.

In Mode 1 the controller does not utilise its internal pressure sensor to control the pump. Pump control is solely based on flow and time. The controller's pressure sensor is used to display the system's dynamic pressure on its LCD screen during normal operation.

F60 Modes & Functions

MODE	1	2	3
Functions (# Settable)			
# Select pressure units kPa or psi	**Y**	**Y**	**Y**
# Pre-start delay timer	**Y**	**Y**	**Y**
# Start-up timer	**Y**	**Y**	**Y**
# Run on the snore timer	**Y**	**Y**	**Y**
# Run-on timer	**Y**	**Y**	**Y**
# Delayed re-starting timer	**Y**	**Y**	**Y**
# Starting pressure		**Y**	**Y**
# Stopping pressure			**Y**
# Cyclic running and stopping timers	**Y**	**Y**	
# Burst pipe detection	**Y**	**Y**	**Y**
# Auto restart if run dry		**Y**	**Y**
# Anti-cycling	**Y**	**Y**	**Y**
# Leak detector			**Y**
# Starts the pump at a preset low pressure		**Y**	**Y**
# Stops the pump at a preset high pressure			**Y**
Stops the pump if flow stops.	**Y**	**Y**	**Y**
Displays the system pressure in preferred units	**Y**	**Y**	**Y**
Displays the high & low pressure set points			**Y**
Can start or start & stop the pump using an external switch (with voltage free contacts)	**Y**	**Y**	**Y**
Starts & stops the pump on flow regardless of pressure	**Y**		

Mode 2 Flow Control

In this mode the F60 will start the pump each time the pressure falls below a preset value or whenever the controller's paddle is pushed to the on position by flow. It will then run the pump entirely on flow. Unlike a conventional pressure system that operates between a low pressure cut-in and a high pressure cut-out, in mode 2 the controller only uses the pressure set point to start the pump, not to stop it.

Once started, the F60 runs the pump while ever flow is present, thus providing a relatively steady constant flow. The pump is only shut down when flow stops or if the pump runs dry. A momentary contact external switch can also be used to trigger the starting and or the stopping of the pump in this operating mode.

Mode 3 Pressure Control

If this mode is chosen the controller will start and stop the pump under the control of the F60's built in pressure sensor. A high pressure cut-out point and low pressure cut-in point are programmed into the controller's memory and thereafter the pump is run within these pressure limits. If the pressure rises above the high pressure set point the pump will shut down. If the pressure falls to below the low pressure set point, the pump will start. If the pump runs dry, this is sensed as a combination of loss of flow and low pressure. In this situation the pump will shut down and go into alarm mode.

In mode 3 the pump controller can also be connected to an external switch. The pump controller will start the pump each time the external switch closes its contacts. The contacts of the external switch can be set to only operate the pump while they remain closed or they can be set to only trigger the starting of the pump and not its stopping. Since the F60's remote input operates at low voltage and low current, a low Wattage external switch, such as a tank level switch can be used to control a large powerful pump without the need for an interposing pump starter or relay. See the section on page 15 detailing the use of the remote input.

Pressure System Operation

If operated in mode 3 the F60 will only start the pump on flow on a rising pressure. Consider a standard pressure system operated through a pressure switch. The pump will start each time the pressure switch closes its contacts and stop each time the pressure switch opens its contacts. This means that in a system with a large air cell the pump once started will run continuously until the system is fully pressurised, regardless of demand. The F60 operates in a different way.

The pump will start at a settable low pressure. It will run while ever flow is present and only stop when flow stops or the pressure rises to whatever you have set its high pressure cut-out to. If there is no flow demand the pump will only run on for whatever time you have set on the run-on timer, perhaps a few seconds and then it will stop. It will not pump continuously until the high pressure limit is reached, as a normal pressure system will.

If a valve subsequently opens, flow will be sensed and the pump will instantly start. The effect of this is to give the user a relatively constant pressure. Each time the pump starts it does so at the pressure it last stopped at, rather than only starting from low pressure. With frequent opening and closing of valves the system pressure may rise and eventually reach the set cut-out pressure.

The pump will then stop regardless of any flow demand. Thereafter any flow demand will not start the pump. In other words in this operating mode the F60 will not start a pump on flow on a falling pressure, only on a rising pressure. This is to prevent the pump from hunting on and off around the high pressure cut-out point. On a falling pressure demand will be met by draw off from the system's air cell only. Once the system's pressure falls to whatever pressure you have set the cut-in pressure to, the pump will start and again revert to starting and stopping on flow demand.

The Options in Detail

On pressing the P button you are presented with a Kelco splash screen. Pressing P again steps you to a screen that displays the F60's model number. The screen that follows allows you to select the pressure units you prefer, either kPa or psi. Use the up or down keys to select between the two units. Once you have made your choice press the P button to step to the next selection which is the pre-start delay timer. Use the up and down keys to select Yes or No for this option.

If you choose yes, the screen that follows will ask you to enter the required time delay. Use the up and down keys to set the required delay and then press P to record the settings to memory and move to the next option. The next screen you are presented with is the mode selection screen. Press P to step to the first choice which is Mode 1 Timer Control. Use the up and down keys to view the other two modes, Mode 2 Flow Control and Mode 3 Pressure Control. Once you have decided which mode you require, press P to accept your selection and move to the next screen. From this point on the functions available to you will depend on which mode you have chosen.

As you step through the available choices certain functions will be available to you to use and certain functions will not appear. Some functions are common to all modes and some are mode specific. The controller's menu has sufficient intelligence to identify selections you make and to only make available to you functions that will work with the choices you have made. The functions that follow are mode specific and may or may not be available to you depending on the choices you have made up to this point.

Pressure Settings

If you select mode 2 or 3 from the mode menu, the screens that follow will ask you to enter starting and possibly stopping pressure in whatever pressure units you have chosen to use. Enter sensible pressures that are within the range of the pump and include a reasonable differential between starting and stopping pressures. If you set the starting pressure higher than the stopping pressure, the F60 will not operate and will display a warning screen to the effect that the pressures have to be set correctly.

If you set the pressure differential (the difference between the starting and stopping pressure) too small the system may hunt on and off. This condition will be more pronounced if the system has no air cell or the capacity of the pipework is small. The F60's ability to operate on a close differential can be a major advantage in certain circumstances.

In theory the cut-out pressure of the F60 can be set to 1kPa higher than the cut-in pressure. With such a setting the controller will operate on a differential of 1kPa. For actual practical usage, background pressure fluctuations and temperature variation in the system will reduce the actual usable minimum pressure differential to perhaps 10 or more kPa which is still considerably less than that of a conventional pressure switch.

In normal operation the F60 will display the system's dynamic pressure in whatever pressure units you have chosen whenever it is running normally or is waiting to start. It will also display any pressure set points you have entered. For example, when operating in mode 3 the LCD screen will display the current system pressure and the high and low pressure set points. From the display it is then a simple matter to watch the system pressure rise or fall toward the preset trip points that you have set the system to operate within.

Pre-Start Delay Timer

The pre-start delay timer delays the starting of the pump for a selectable period. It can be set from zero to 240 seconds (4 minutes) in one second increments. If you choose to use this timer the actual starting of the pump will be delayed by whatever delay you set this timer to. Each time the controller is switched on it boots up and is prevented from starting the pump for the set time period. As soon as the set time has elapsed the pump will start and run normally, given there is a demand for water. The pre-start timer can be used to allow peripheral equipment time to boot up. For example, some VS drives require a few seconds to stabilise and the F60's pre-run timer can hold off the starting of the pump until the whole system has stabilised. The pre-start timer can also be used to stage or stagger the starting of multiple pumps. It is often desirable to avoid the high current draw of multiple motors starting together, and the pre-start timer can facilitate this function.

Start Up Timer

The F60 uses a paddle to detect flow. The paddle is held in the no-flow position by an adjustable magnetic screw that is located in a port under the electrical housing of the controller. If flow pushes against the paddle, the paddle moves. The movement is detected by the controller and identified as flow. Initially in a system that is not running or has all its valves shut, there will be no flow and the controller's paddle will be in the off or no flow position. In order to override this initial off state and allow the pump to start, the controller uses the start-up timer. The timer ignores the initial off state of the paddle and allows the pump to run for a settable time. As soon as flow is detected the start timer terminates its run and hands control of the pump over to the paddle. The startup timer in the F60 is adjustable from 0 to 240 seconds (0 to 4 minutes) in 1-second increments. The value you enter will depend entirely on your pump system. For a fully primed pressure system or transfer pump, the start-up timer may only require one or two seconds to establish flow. In a submersible bore pump installation with a self-draining riser, it may take several minutes to establish flow past the paddle. If the start-up timer is set to zero the pump controller behaves as a simple ON/OFF flow switch, responding solely to the state of its paddle.

Running On The Snore

The snore timer allows the controller to ignore continuous paddle bounce due to entrained air or gas in piping systems. In situations where entrained gas or air in the pipework is an ongoing problem and is constantly present in a pipe system, the snore timer allows the controller to ignore the gas bubbles and keep the pump running stably. When entrained gas moves past the paddle of the F60 the paddle bounces back and forward. The snore timer monitors the movement of the paddle and each time the paddle bounces, the snore timer resets itself and commences its timed run again.

The automatic resetting action ensures the pump controller does not identify the minor interruptions to flow as a dry run situation. The snore time can be set to any value from 0 to 240 seconds (0 to 4 minutes) in increments of 1 second. The F60 identifies a dry run situation when the paddle has remained in the off position for longer than the time you have set on the snore timer. If the off time exceeds the snore timer's setting the F60 shuts down the pump and goes into alarm mode.

Care should be taken when using the snore timer to ensure the pump being used is suitable for being run when partially dry. Please contact your pump supplier before using the snore timer to ensure your pump is suitable for such operation. For most applications the snore timer should be initially set to a few seconds only.

Run-on Timer

In normal operation, in systems where entrained gas is not an issue, the F60 digital pump controller's built in run-on timer can be set to ignore minor interruptions to flow. For example, if air trapped in the pipework passes the controller's paddle, the paddle will momentarily swing into the no flow position. This would normally cause the controller to shut down the pump. The run-on timer lets the controller ignore such minor fluctuations in flow. Once triggered, the run-on timer simply runs for whatever time you have set it to. During this run period it ignores the state of the paddle and simply runs the pump. At the end of its set run time, it looks at the state of the paddle and if flow is present, resumes normal operation. If flow is not present at the end of the run-on time, the controller shuts down the pump and goes into alarm mode because it considers the pump to be running dry. It is important to note that unlike the snore timer, the state of the paddle is not monitored continuously while the run-on timer is running. The paddle can bounce back and forward and the run-on timer will ignore it.

It is only the state of the paddle at the end of the run-on time that determines whether the pump returns to normal operation or goes into alarm mode. The run-on timer can be set to any value from 0 to 900 seconds (0 to 15 minutes) in increments of 1 second. For most applications an initial setting of a few seconds is quite adequate.

Delayed Restarting

If you set this option to ON, each time the pump stops, due to flow stopping or pressure rising above your set point, the F60 controller 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 (zero to just over 4 days) in steps of 1 minute. Delayed starting is a form of anti-cycling and cyclic running, wherein the pump is limited in its ability to cycle on and off by being prevented 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 controls. 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 utilizing the F60'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 starting function and press P, you will be asked to enter the delay in 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 controller will automatically start your pump at the end of the delay period. If you choose no, the controller will only start the pump after the delay if the pressure is lower than your set pressure, or if the external switch closes or flow is present. 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 F60 will sense no flow because the float valve will still be closed. The F60 will then shut down the pump and again wait for 12 hours before again 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 running 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 F60. Delayed starting has no fixed run time. 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 starting 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 cyclic running option is only available in modes 1 and 2. It is not available if you have chosen mode 3. The F60 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 (zero to just over 4 days) 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 F60 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 pump controller 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 F60 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 all the while protecting it if it runs dry. 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 or minutes of water to a tank, and then stop until the reset button is again pressed.

Run Dry Auto Restart

If the pump runs dry and the controller is set to mode 2 or 3 it will identify a dry run situation as a loss of both pressure and flow. The F60 is not capable of identifying a dry run condition in mode 1 because in mode 1 it only monitors flow and not the system's pressure. To identify dry run, the controller must monitor both flow and pressure, which it only does in modes 2 and 3.

If the F60 is set to operate in mode 2 or 3 it will identify any dry run situation that may occur and respond by shutting the pump down, thus preventing damage to the pump. In such a situation the controller displays a "pump ran dry" message and rapidly flashes all its lights to indicate there is a problem and closes the contacts of its alarm relay. The alarm relay can be used to control a remote alarm light, a siren or any other required device such as a telemetry system.

Alternatively, the F60 can be set to automatically attempt to restart and recover from a dry run situation after a set period of time. This process is called auto restart. If this option is chosen the controller'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 F60 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 and or pressure when it restarts it resumes normal operation. If you choose repeated restart from the menu the controller 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 F60 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 F60 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. Such a system maximises the yield from the bore and automatically compensates for seasonal fluctuations in the bores capacity.

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).

The anti-cycling option built into the F60 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 5 consecutive times in any one hour period the pump will be automatically shut down and the controller will display a message indicating the starts per hour rate was exceeded.

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 starts 4 times in a row at less than 10 seconds between each start and then does 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 F60'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 F60 includes a unique system for detecting burst pipes. The burst pipe detection system can be used in all modes. It is most commonly used in pressure systems.

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 F60 addresses these two scenarios with two separate functions, anti-cycling and burst pipe detection. When both functions are activated the complete spectrum of burst pipe scenarios are 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 steps of 1 minute.

In a typical application the burst pipe detector would be set to a 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 perhaps 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, or at least reducing the discharge flow by an amount equal to the pump's capacity. The F60 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 example, 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 F60's burst pipe detector will reach the burst pipe detector's set point. The pump will then be shut down preserving what remains of the water source.

LCD Screen Back Light

The LCD screen on the F60 pump controller has a built in backlight. The backlight switches on automatically whenever you are programming the controller and when the controller 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 ever 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 held in.

Leak Detector

The F60 includes a unique leak detection system that can be used as a tool to analyse suspected leakage in a pressurised pumping system. The leak detector only operates in mode 3. It 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 pressure and messages when it is in use. To use the leak detector, open all valves feeding into the pipe system to be tested. Close all valves at the far ends of the pipework so the pipe 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 controller'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 from a small domestic pressure or transfer system to complex irrigation and stock watering systems comprised of many kilometres of pipe.

Remote Input

The F60 provides the user with a non-isolated nominal 24VAC supply from its LV (Low Voltage) active terminal whenever the F60 is operated from the mains or from a 24VAC supply. The 24VAC supply can be connected through a remote switch and the return wire can be connected to the "R" (remote input) terminal on the F60's terminal block. When operated from a 24VAC or DC supply, the 24V active or the supply positive can be used as the source of low voltage to the remote switch and the return wire can be connected to the "R" terminal. It is critical that the remote switch has voltage free contacts. Under no circumstances apply an external voltage directly to the "R" terminal of the F60 pump controller. See the F60 Installation Manual for further details.

An external switch such as a tank level switch or a set of external voltage free relay contacts can be used to actuate the F60 controller. The external or remote switch will operate the F60 in all 3 operating modes.

The controllers menu asks you if you intend using a remote input. If you select yes you are then asked if you require the external switch to simply trigger the starting of the pump only or if you want the external switch to also control the stopping of the pump. If you choose “starting only” the pump will start each time the external switch closes its contacts. Once the pump has started the external switch can open its contacts or they can remain closed without any effect on the operation of the pump. The F60 ignores the state of the external switch once the pump has started.

If you choose to have the F60 both start and stop the pump then the contacts of the external switch must remain closed while ever the pump is required to run. If the contacts of the remote switch open, the F60 will immediately shut the pump down and display a message “remote switch is off”. The F60 will then not allow the pump to restart until the remote switch closes its contacts.

Following is an example of the use of the remote input. If the pump were to be controlled by an external tank level switch that started the pump each time the tank emptied and stopped the pump each time the tank filled then you would choose to use the external remote input in “start and stop the pump” mode. If you required the pump to start each time an external relay or switch closed its contacts and thereafter run under the control of the F60 then you would choose “start the pump only” from the F60’s menu.

Program Lock

The F60 includes a hidden lock. When activated the lock disables the programming button P, thus rendering the controller’s menu inaccessible.

To lock or unlock the F60, 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 the pump down and opens the controller’s lock screen.

Once the lock screen is displayed the F60 can be locked or unlocked by pressing the up or down buttons. Pressing P then exits the lock screen and the controller resumes normal operation. When locked, pressing the (P) button has no effect on the F60 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 (P) key.

WARNING

If the F60 Pump Controller is used in a manner not specified by the manufacturer the pump protection provided by the controller may be impaired or negated. In addition, all warranties stated or implied will be rendered invalid.

Designed and Manufactured in Australia by

KELCO Engineering Pty Ltd

A.B.N. 20 002 834 844
Head Office and Factory: 9/9 Powells Road Brookvale 2100 Australia
Postal Address: PO Box 496 BROOKVALE NSW 2100
Phone: +61 2 99056425 Fax: +61 2 99056420 Email: sales@kelco.com.au
Web: www.kelco.com.au

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