



Micro Processor Based Fire Pump Controllers





An Introduction to NAFFCO

NAFFCO FZCO is among the world's leading manufacturers and suppliers of top-tier firefighting equipment, fire protection systems, fire alarms, security and safety engineering systems worldwide. Since its humble beginnings, NAFFCO has grown from its headquarters in Dubai, UAE to expand to serving over 100 countries around the world.

One Stop Shopping for All Your Fire Safety and Security Needs

Today's companies recognize the importance and convenience of having multiple safety services available under one roof, a "one-stop shopping" source for all types of fire protection systems. As the undisputed leader in

firefighting technology and fire safety solutions, NAFFCO has worked in both the private and government sectors, as well as manufacturing plants, hospitals, stadiums, malls and other organizational projects, delivering comprehensive fire safety and engineering solutions.

NAFFCO is associated with globally renowned international companies in the fire protection industry such as Esser, Secutron, Megalights, Evax, Fike, Central, Shield, Mueller, Giacomini, RB Pumps, Bombas, Ideal Pumps, Joslyn Pumps, Peerless Pumps.

At NAFFCO we are passionate about sustaining, upgrading and improving any means of safety, by having over 2 million square foot of manufacturing space, over 450 engineers, and following all the latest technology available. We live by our passion, the passion to protect.



UL LISTED ELECTRIC MOTOR MICROPROCESSOR BASED CONTROLLER

MODEL NFY-SDM1 REDUCED VOLTAGE/ STAR - DELTA (OPEN TRANSITION)

MODEL NFY-DOM1 DIRECT ON LINE

NAFFCO Electric Motor Controllers for fire pumps are listed by Underwriters Laboratories (UL file number EX15064), in accordance with UL218 (Standard for Fire Pump Controller), UL508a (Standard for Industrial Control Panel), NFPA20 (National Fire Protection Association Pamphlet 20- Standard for Centrifugal Fire Pumps), NFPA70 (National Electric Code) and NEMA.

Also approved by FM approvals (Factory Mutual), in accordance with FM standard 1321 / 1323 (Standard for Fire Pump Controller).

STANDARD FEATURES

- 230 / 380 / 415 VAC, 50/60 Hz main 3 phase system power.
- Voltage Surge Protector.
- Main disconnecting switch with rotary handle sized for disconnecting motor horsepower and voltage.
- Circuit breaker with shunt trip coil and rotary handle.
- Rated motor contactors.
- Emergency run mechanism to mechanically close motor contactor contacts to start motor in case of emergency.
- Manual start and stop push buttons.
- 20x4 LCD display showing all system parameters and variables.
- User friendly software enables user to program all related parameters like timers, pressure, inputs, outputs ... etc.
- Shows 3 phase line voltages.
- Shows 3 phase line motor currents.
- Shows real value of discharge pressure.
- Shows motor running hours.
- Shows ambient temperature.
- Starting delay timer (programmable) for sequence multiple pumps starting.
- Automatic or manual shutdown after automatic start (selectable).
- Automatic shutdown mode enabled/disabled indicator.
- Power ON/Healthy indicator.
- Automatic mode indicator.
- Manual mode indicator.

Power ratings vary from 40 to 400 horsepower, 230 / 380 / 415 VAC, 50/60 Hz.

Only high quality UL listed or UL recognized components are used in these panels to guarantee the best possible reliability. Also high quality UL listed enclosures are used.

This controller is completely wired, assembled, programmed and tested at the factory before shipment, and ready for immediate installation.



STANDARD FEATURES

- Motor Run indicator/free contact.
- Phase Loss/Failure alarm / indicator / free contact.
- Phase sequence error alarm/indicator / free contact.
- System error alarm / indicator / free contact.
- Fail to start alarm / indicator.
- System error alarm / indicator.
- Pump lockout indicator / free contact.
- Push button for alarm silence (only for additional alarms).
- Motor locked rotor trip at 600% of FLA, after programmable time delay.
- Programmable automatic test, which can be programmed to start at any desired day, hour and minute in the week.
- Manual test push button.
- Motor overload alarm/ indicator / free contact (programmable).
- Over voltage alarm/indicator / free contact (programmable).
- Under voltage alarm/ indicator / free contact (programmable).
- Low discharge pressure alarm / indicator / free contact (programmable).
- Deluge valve on alarm / indicator / free contact (programmable).
- Remote start on alarm / indicator / free contact (programmable).
- Manual local start on alarm/ indicator / free contact (programmable).
- Fail while run alarm / indicator / free contact (programmable).
- Emergency start on alarm / indicator / free contact (programmable).
- Test on alarm/ indicator / free contact (programmable).
- 10 additional programmable indicators (LED's).
- 10 additional programmable auxiliary digital inputs.
- 7 additional programmable output relays (free contacts).
- Pressure transducer with analog voltage output.
- Data logging system for pressure and events.
- USB port for saving recorded pressure and events on USB memory, and can be viewed with MS word and Excel.
- Electrically actuated built in discharge solenoid valve.
- Electrical alarm bell.
- UL listed enclosure.

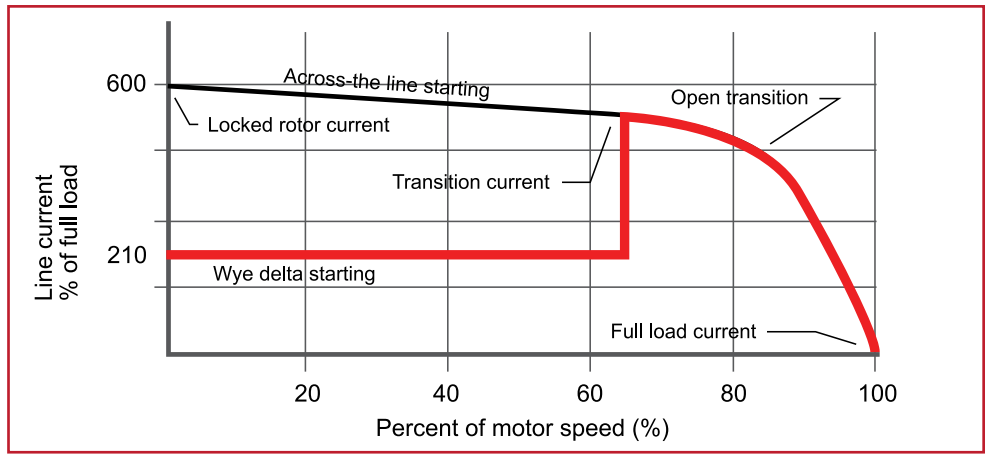


Fig (1)

MOTOR STARTING CHARACTERISTICS: DOL AND STAR-DELTA

SEQUENCE OF OPERATION

This controller is working under both automatic and manual modes with manual or automatic shut down (automatic shut down is possible only after automatic start).

MANUAL MODE

- In this mode, there will be no effect of pressure sensor and deluge valve.
- Manual start of motor can be done by pressing start P.B.
- Manual start can also be done by pushing emergency start mechanical handle.
- This handle provides direct on line continuous starting
- In this mode motor can be stopped only manually by pressing Stop P.B.
- All alarm signals are operational in this mode.

AUTOMATIC MODE

- In this mode, if pressure goes down till the cut-in pressure point then motor will start automatically.
- If the N/C contact of the deluge valve is opened, this will cause the pump to start automatically exactly as if the pressure goes down to starting pressure.
- In case of multiple pumps, it may be necessary to delay the starting of each motor to prevent simultaneous starting of all motors. Sequential starting can be adjusted by a programmable timer. User has to specify if the pump is connected as single/parallel with other pumps, or if the pump is connected in series with other pumps (programmable). In the first case (single or parallel), system may delay starting in automatic mode only, but starting in manual mode will not be delayed. In the second case (series), system may delay starting in automatic mode and in manual mode, and this is to avoid dry running of pump (see table 1) Notice that in case no time delay is required before starting (for example when pump is single), then time delay can be programmed to zero.



TIME DELAY BEFORE STARTING THE FIRE PUMP

REASON OF STARTING	SINGLE PUMP OR PARALLEL PUMPS	SERIES JUMPS
Drop in pressure	With delay	With delay
Deluge valve	With delay	With delay
Remote start	No delay	With delay
Manual start	No delay	With delay

Table (1)

- If remote start switch was momentarily actuated, motor will start directly and automatically, and it will not stop unless operator presses stop push button on the panel's door. In this mode (remote start mode) there will be no effect of deluge valve signal and low pressure signal.
- Motor automatic start by pressure sensor and deluge valve can be disabled by pump lockout contact (external contact) which can be connected with controller (this option can be used in case of having a stand-by pump, where it is not desired both pumps to start automatically at the same time).
- Two ways of shutdown are possible in this mode (operator have to select one of them by software):
 1. Manual shutdown: After automatic start, motor can be stopped in this mode only by pressing manual stop push button. If the pump was on demand (low pressure or deluge valve active), and in auto mode, then pump cannot be stop manually, unless it is not on demand any more.
 2. Automatic shutdown: After automatic start, controller will keep motor running for a period (programmable). After that, if the pump was not any more on demand, then controller will automatically shutdown the motor. If within this period, the pump became not on demand, operator can shut it down manually by pressing manual stop push button.

METHODS OF STOPPING THE FIRE PUMP

REASON OF STARTING	AUTOMATIC STOP	MANUAL STOP
Drop in pressure	YES - selectable (After running hold time)	YES - selectable
Deluge valve	YES - selectable (After running hold time)	YES - selectable
Remote start	NO	YES
Manual start	NO	YES

Table (2)

- All alarm signals are operational in auto mode.
- Automatic weekly test is only operational at auto mode and can be enabled or disabled (operator selection). If enabled, then user has to program the delay time before starting the test. Also to program the day, hour and minute where the weekly automatic test is desired to start. Test can be terminated by pressing Test ON/OFF push button.
- Manual test is operational in auto mode only, and it can be applied by pressing test ON/OFF push button. Test can be terminated by pressing Test ON/OFF push button again.

FUNCTIONALITY

- During operation of the system, controller will be reading voltages, currents, pressure, and sensing many input signals. These reading can be monitored on the LCD display.
- If controller detected loss of one phase or more, then it will give an alarm and will prevent the motor from starting, but if the loss of phase happened while the motor was running, then controller will give alarm but will not stop the motor.
- If controller detected phase reversal, it will give alarm and will not start the motor.
- Controller will detect over voltage, under voltage and overload (over current), and will give alarms showing these errors.
- If the controller closed contactors to start the motor (due to auto or manual start), but the motor didn't start after some delay (programmable time delay), then controller will give alarm (fail to start alarm). Controller will sense if motor started or not by sensing the motor current.
- If the controller closed contactors to start the motor (due to auto or manual start), but the motor didn't start after some delay (programmable time delay), because of LOCKED ROTOR, then controller will activate the shunt trip coil of the MCCB and shut it down. Controller will sense if motor is in locked rotor situation or not by sensing the motor current.

RATING

POWER (HP)	RATED VOLTAGE (VAC)	FREQUENCY (Hz)	RATED CONTENT (A)	SHORT CIRCUIT CURRENT (kA)	ENCLOSED SIZE (mm)
40	380 - 415	50 or 60	66	100kA	1100(L) x 750(W) x 300(D)
50	380 - 415	50 or 60	83	100kA	1100(L) x 750(W) x 300(D)
60	380 - 415	50 or 60	103	100kA	1100(L) x 750(W) x 300(D)
75	380 - 415	50 or 60	128	100kA	1200(L) x 800(W) x 300(D)
100	380 - 415	50 or 60	165	100kA	1200(L) x 800(W) x 300(D)
125	380 - 415	50 or 60	208	100kA	1200(L) x 800(W) x 300(D)
150	380 - 415	50 or 60	240	100kA	1500(L) x 800(W) x 350(D)
200	380 - 415	50 or 60	320	100kA	1500(L) x 800(W) x 350(D)
250	380 - 415	50 or 60	403	50kA	1500(L) x 800(W) x 350(D)
300	380 - 415	50 or 60	482	50kA	1500(L) x 800(W) x 350(D)
350	380 - 415	50 or 60	560	50kA	1700(L) x 950(W) x 400(D)
400	380 - 415	50 or 60	636	50kA	1700(L) x 950(W) x 400(D)

Table (3)

UL LISTED DIESEL ENGINE MICROPROCESSOR BASED CONTROLLER

MODEL NFY-DM1

NAFFCO Fire Diesel Engine Controller are listed by Underwriters Laboratories (UL file number EX15064), in accordance with UL218 (Standard for Fire Pump Controller), UL508a (Standard for Industrial Control Panel), NFPA20 (National Fire Protection Association Pamphlet 20 - Standard for Centrifugal Fire Pumps), NFPA70 (National Electric Code) and NEMA.

Also approved by FM approvals (Factory Mutual), in accordance with FM standard 1321 / 1323 (Standard for Fire Pump Controller). Power ratings suitable for 12/24

volts DC operating voltage, 110 / 220 volts AC input voltage, 50/60 Hz. These controllers are compatible with most types of fire fighting diesel engines.

Only high quality UL listed or UL recognized components are used in these panels to guarantee the best possible reliability. Also high quality UL listed enclosures are used. This controller is completely wired, assembled and tested at the factory before shipment, and ready for immediate installation.

STANDARD FEATURES

- System error alarm / indicator.
- AC power healthy indicator.
- DC power healthy indicator / free contact.
- Speed switch error or failed while running alarm / indicator.
- Automatic shutdown enabled/disabled indicator.
- Low discharge pressure alarm / indicator / freecontact (programmable).
- Deluge valve on alarm / indicator / free contact(programmable).
- Remote start on alarm / indicator / free contact(programmable).
- 10 additional programmable indicators.
- 11 additional programmable digital inputs.
- 8 additional programmable output relays (free contacts).
- Common alarm free contact.
- Electrical alarm bell.
- Push button for alarm silence (only for additional alarms).
- Pressure transducer with analog voltage output.
- Data logging system for pressure and events.
- USB port for saving recorded pressure and events on USB memory, and can be viewed with MS word and Excel.
- Electrically actuated built in discharge solenoid valve.
- UL listed enclosure.
- 220 / 110 VAC main line system power.
- 12 / 24 VDC system control voltage.
- Automatic / Manual / OFF mode (selectable).
- Two 12 / 24 VDC, 10 Amps smart automatic microprocessor battery chargers.
- Protection circuit breakers before and after batterychargers.
- 20x4 LCD display showing all system parameters and variables.
- User friendly software enable user to program allrelated parameters like timers, pressure, inputs,outputs ... etc.
- Shows battery 1 and 2 voltages.
- Shows battery 1 and 2 charging currents.
- Shows real value of discharge pressure.
- Shows engine running hours.



STANDARD FEATURES

- Showing ambient temperature.
- Automatic cranking from two different batteries.
- Two push buttons for manual cranking from two different batteries.
- Manual stop push button.
- Programmable automatic weekly test, which can be programmed to start at any desired day, hour and minute in a week.
- Manual test push button.
- Starting delay timer (programmable) for sequence multiple pumps starting.
- Automatic or manual shutdown after automatic start (selectable).
- Compatible with fuel solenoid engines and stopped solenoid engines.

SEQUENCE OF OPERATION

This controller is working under three modes; automatic, off (reset) and manual mode, with manual or automatic shut down (automatic shut down is possible only after automatic start).

MANUAL MODE

- In this mode, there will be no effect of pressure sensor, deluge valve or remote start.
- Manual direct cranking can be actuated by pressing on battery 1 manual cranking P.B, or on battery 2 manual cranking P.B, or by pressing on both (start from both batteries in parallel).
- Shutting down engine can only be done by pressing manual stop Push Button.
- Failed to start alarm signal are not operational in this mode, and all other alarm signals are operational.
- Over speed alarm is functional in this mode, and will stop the pump directly and automatically and actuate alarm, and controller will not start engine again unless operator resets the over speed relay at diesel engine, and then resets the Over Speed Alarm by pressing reset PB of the controller.
- Low oil pressure and high water temperature errors will not stop the diesel engine, but only will give alarm, and alarm will remain until operator resets it by pressing reset PB.

- Engine run indicator / free contact.
- Test running indicator / free contact.
- Automatic mode indicator / free contact.
- Manual mode indicator.
- Battery Charger1 error indicator.
- Battery Charger2 error indicator.
- Battery1 failure alarm / indicator.
- Battery2 failure alarm / indicator.
- Low oil pressure alarm / indicator.
- High water temperature alarm / indicator.
- Over speed shut down alarm / indicator.
- Engine failed to start alarm / indicator.
- Cranking coil 1 failure alarm / indicator.
- Cranking coil 2 failure alarm / indicator.

OFF MODE

- In this mode starting diesel engine is not possible in any case.
- Automatic test and manual test are not operational.
- Alarm bell is not enabled in this mode, but alarm indicators are enabled.
- This mode also is used to shutdown the engine.

AUTOMATIC MODE

- In this mode, if pressure goes down till the cut-in pressure point then diesel engine will start automatically.
- If the N/C contact of the deluge valve was opened, this will cause the pump to start automatically exactly as if the pressure goes down to starting pressure.
- In case of multiple pumps, it may be necessary to delay the starting of each engine to prevent simultaneous starting of all engines. Sequential starting can be adjusted by a programmable timer (1 – 99 seconds). User has to specify whether the pump is connected as single/parallel with other pumps, or if the pump is connected in series with other pumps (programmable). In the first case (single or parallel), system will apply time delay before automatic start (by water pressure or deluge valve), but starting by remote start will not be delayed. In the second case (series), system will apply time delay before automatic start (by water pressure or deluge valve), and also before starting by remote start, and this is to avoid dry running of pump (see table 4).

TIME DELAY BEFORE STARTING THE FIRE PUMP

REASON OF STARTING	SINGLE PUMP OR PARALLEL PUMPS	SERIES PUMPS
Drop in pressure	With delay	With delay
Deluge valve	With delay	With delay
Remote start	No delay	With delay



- If remote start switch was momentarily actuated, the diesel engine will start directly and automatically, and it will not stop unless operator presses stop push button on the panel's door. In this mode (remote start mode) there will be no effect of the low oil pressure alarm, high water temperature alarm, and also will be no effect of deluge valve signal and low pressure signal.
- Engine automatic start by pressure sensor and deluge valve can be disabled by pump lockout contact (external contact) which can be connected with controller (this option can be used in case of having a

stand-by pump, where it is not desired both pumps to start automatically at the same time).

- Automatic starting for the diesel engine will be done by automatic cranking from battery 1, and if failed from battery 2, with certain cranking and rest period (period is programmable). Controller will try to crank engine up to six times, but if engine did not start after these six attempts, "Failed To Start Alarm" will be activated, as shown in fig (2):

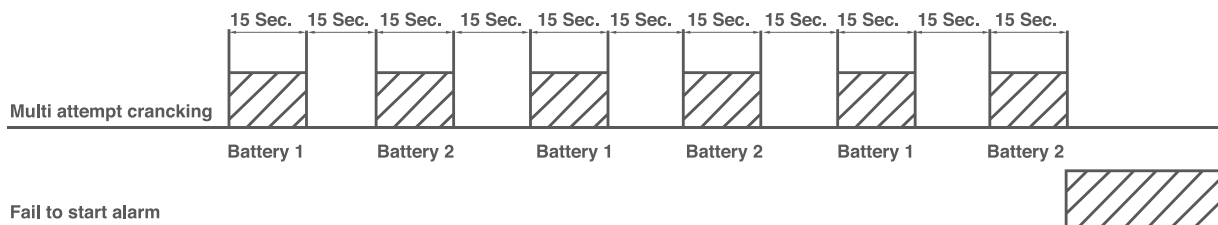


Figure (2)

- If remote start switch was momentarily actuated, the diesel engine will start directly and automatically, and it will not stop unless operator presses stop push button on the panel's door. In this mode (remote start mode) there will be no effect of the low oil pressure alarm, high water temperature alarm, and also will be no effect of deluge valve signal and low pressure signal.
- Engine automatic start by pressure sensor and deluge valve can be disabled by pump lockout contact (external contact) which can be connected with controller (this option can be used in case of having a

stand-by pump, where it is not desired both pumps to start automatically at the same time).

- Automatic starting for the diesel engine will be done by automatic cranking from battery 1, and if failed from battery 2, with certain cranking and rest period (period is programmable). Controller will try to crank engine up to six times, but if engine did not start after these six attempts, "Failed To Start Alarm" will be activated, as shown in fig (2):

METHODS OF STOPPING THE FIRE PUMP

REASON OF STARTING	AUTOMATIC STOP	MANUAL STOP
Drop in pressure	YES - selectable (After running hold time)	With delay
Deluge valve	YES - selectable (After running hold time)	With delay
Remote start	NO	YES
Remote start	NO	YES

- If one of the batteries was dead or disconnected, the controller will automatically crank all six attempts from the healthy battery and ignore the dead battery.
- Two ways of shutdown are possible in this mode (operator must select one of them by software):
 1. Manual shutdown: After automatic start, engine can be stopped in this mode only by pressing manual stop push button, but engine can't be stopped if the pump was still on demand (pressure still low or deluge valve still active), unless user put the switch on OFF position.
 2. Automatic shutdown: After automatic start, controller will keep engine running for a period varies from 1 to 120 minutes (programmable). After that, if the pump was not any more on demand, then controller will automatically shutdown the engine. If within this period, the pump became not on demand, operator can shut it down manually by pressing manual stop push button.
- When the engine is running because the pump being on demand (due to low pressure or activation of deluge valve or remote start), it will not stop if there was high water temperature alarm, or low oil pressure alarm, but if it was running and the reason of starting has gone then it will directly stop if any of these two

- alarms was activated, and alarm will remain until operator resets it by pressing reset PB.
- In this mode (auto), operator can't start the diesel engine by the manual cranking push buttons.
- Over speed alarm is functional in this mode, and will stop the pump directly and automatically and actuate alarm, and controller will not start engine again unless operator resets the over speed relay at diesel engine, and then resets the Over Speed Alarm by pressing reset PB of the controller.
- All alarm signals are operational in auto mode.
- Automatic weekly test is only operational at auto mode and can be enabled or disabled (operator selection). If enabled, then user has to program the delay time before starting the test. Also to program the day, hour and minute where the weekly automatic test is desired to start. Test can be terminated by pressing Test ON/OFF push button.
- Manual test is operational in auto mode only, and it can be applied by pressing test ON/OFF push button. Test can be terminated by pressing Test ON/OFF push button again.

COMPATIBILITY WITH FUEL SOLENOIDS ENGINES AND WITH STOPPER SOLENOIDS ENGINES

NFY-DM1 controller can be connected with engines that can be stopped by stopper solenoid or by fuel solenoid, and it works as the following:

- In OFF mode, controller will directly stop the engine by activating the stopper solenoid for some seconds (programmable), and by deactivating the fuel solenoid. After this time delay, engine should be completely stopped.
- In Manual mode, controller will be always activating fuel solenoid to keep engine ready for running. If the engine was running in this mode and then manually stopped, then (same as OFF mode), controller will directly stop the engine by activating the stopper

- solenoid for some seconds (programmable), and by deactivating the fuel solenoid. After this time delay, engine should be completely stopped. After that controller will activate back the fuel solenoid to keep engine ready for running again.
- In Automatic mode, controller will not activate any solenoid if pump was not on demand, but when pump becomes on demand (engine to run), controller will activate fuel solenoid to allow engine to crank and run. And after running, if engine has got to stop, then controller will do the same stopping sequence as in OFF mode above.

RATINGS

LINE VOLTAGE (VAC)	DC VOLTAGE (VDC)	ENCLOSURE SIZE (MM)
220/110	12/24	900(H) x 600(W) x 300(D)

Figure (6)

UL LISTED JOCKEY PUMP CONTROLLER

MODEL NFY-JSD1 REDUCED VOLTAGE/ STAR - DELTA (OPEN TRANSITION)

MODEL NFY-JDO1 DIRECT ON LINE

NAFFCO Jockey Pump Controllers for fire pumps are listed by Underwriters Laboratories (UL file number E309408), in accordance with UL508a (Standard for Industrial Control Panel), NFPA70 (National Electric Code) and NEMA.

Power ratings vary from 1.5 to 40 horsepower, 380 to 415 volts, 50 or 60 Hz. Only high quality UL listed or

UL recognized components are used in these panels to guarantee the best possible reliability. Also high quality UL listed enclosures are used.

The controller is completely wired, assembled and tested at the factory before shipment, and ready for immediate installation.

STANDARD FEATURES

- Main disconnected switch with rotary handle, sized for disconnecting motor horsepower and voltage.
- Motor Starter rated to motor's horsepower, with thermal and short circuit protection.
- Rated motor contactors.
- Circuit breaker for protection of control circuit.
- Selector switch for Hand—Off—Automatic operation.
- Star—Delta starting timer. (in Model NFY-JSD1)
- Power ON/Healthy indicator/free contact.
- Pump Run indicator/free contact.
- Pump Trip indicator/free contact.
- Adjustable pressure switch.
- UL listed enclosure.

SEQUENCE OF OPERATION

This controller is working under three modes automatic off and manual mode.

OFF (RESET) MODE

In this mode, the controller is considered to be off and can't start the Jockey pump.

AUTOMATIC START

In this mode, controller will start the Jockey pump automatically and directly at low pressure detection by the pressure switch, and will stop the pump automatically and directly when the pressure goes up again.

MANUAL START

In this mode, controller will start the Jockey pump directly, and will not stop until selector switch is switched off or in Auto mode.





RATING

POWER (HP)	RATED VOLTAGE (VAC)	FREQUENCY (Hz)	RATED CONTENT (A)	SHORT CIRCUIT CURRENT (kA)	ENCLOSED SIZE (mm)
1.5	380 - 415	50 or 60	3.3	5	500(H) x 400(W) x 250(D)
2	380 - 415	50 or 60	4.3	5	500(H) x 400(W) x 250(D)
3	380 - 415	50 or 60	6.1	5	500(H) x 400(W) x 250(D)
5	380 - 415	50 or 60	9.7	5	500(H) x 400(W) x 250(D)
7.5	380 - 415	50 or 60	14	5	500(H) x 400(W) x 250(D)
10	380 - 415	50 or 60	18	5	500(H) x 400(W) x 250(D)
15	380 - 415	50 or 60	27	5	500(H) x 400(W) x 250(D)
20	380 - 415	50 or 60	34	5	500(H) x 400(W) x 250(D)
25	380 - 415	50 or 60	44	5	600(H) x 500(W) x 250(D)
30	380 - 415	50 or 60	51	5	600(H) x 500(W) x 250(D)
40	380 - 415	50 or 60	66	5	600(H) x 500(W) x 250(D)

Table (7)



Serving Over 100 Countries Worldwide



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In line with NAFFCO policy for continuous product development,
NAFFCO has the right to change specifications without prior notice.