

# INCA

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## INCA MODEL

# FPC24D-2013

## DIESEL FIRE PUMP CONTROL PANEL

(HMI Touchscreen)

## USER MANUAL

Inca Reference FPC24D-2013

Revision 1.2

Software Version 2.0

Technical Support  
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Drawing supplied separately

Revision 1.1- Revised battery chargers from type EPS1208 to YX-CH1208 (Section 3.1, page 6)

# 1.0 Control Panel Overview

## 1.1 Features

- HMI PLC Touchscreen control
- Fault Log Recording (100 logs)
- Complies to AS 2941/2008
- Starting solenoids rated at 100A continuous (600A for 30 seconds)
- Audible alarm with mute for engine run and common faults
- Easy system set up using the touchscreen menu

## 1.2 Description

The FPC24D-2013 Fire pump controller is designed to control 24VDC diesel driven fire pump units. It can be operated manually via push buttons on the panel facia from either battery or via remote pressure switch. The control panel complies with AS 2941-2008 (Australian Standards 2941) and includes a touch screen HMI PLC, switches and displays as required. The panel is suitable for all engine types up to 225 continuous cranking amps, 600A for 30 seconds with adjustment of flywheel teeth number & engine over speed RPM being the only alterations, required. The panel is also pre wired for remote stop controls.

### User Interface

Display	Graphical colour HMI touchscreen
Keypad	Virtual Touch pad screen for setting adjustments

### Inputs

Speed Probe	Magnetic Speed Probe located at the fly-wheel teeth on the engine
Fuel level float switch	A low fuel level in the tank triggers an alarm from the PLC
Pressure Switch	When the pressure drops in the system, the diesel engine will start providing the auto start disconnect switch is in the AUTO position.

### Outputs

Remote Alarm	Connection available for additional remote alarm
Remote Stop	Connection available for remotely stopping the diesel engine if running

### Power Supply

240V Active, neutral & earth power supply and has a protection circuit breaker sized to suit.

12VDC supply from the control battery is used to supply power to the control circuit.

### Mechanical Specification

Enclosure	Mild steel powder coated 'Signal Red' IP54.
Pump Unit	See Pumping detail by Pump supplier.

**Environmental Specification**

Operating Temp -10 to 50deg C

Relative Humidity Do not install in areas of high humidity.  
Locate control panel internally where possible to help reduce heat & weather damage & increase mechanical life.

Vibration Do not install in a location that is subject to large amounts of vibration.

## 2.0 Installation

**Note: If any damage to control panel is found, please notify Inca Control Pty Ltd as soon as possible prior to installation.**

The control panel can be wall mounted separately from the pumping unit; distance is governed by the cable sizing.

It is recommended that the control panel is within view of the pumping unit for safety reasons. If not in view lockable isolating switches must be installed at the pump motors.

### 2.1 Mechanical Installation

Mount the control panel via the mounting holes in each corner at the back of the enclosure using minimum 6mm screws, nuts & locking washers, or masonry anchors.

Install in a dry well ventilated location that matches with environmental specification in 1.2 above.

The panel shall be securely mounted in a vibration free location that does not subject operating personnel to unreasonable hazard from hot surfaces or moving parts of the engine, pump or power transmission equipment.

### 2.2 Electrical Installation

**Note: All cable entries must enter via the bottom of the cabinet. If cables are entered via the roof Inca Control Pty Ltd reserve the right to withdraw warranty because of the possibility of shaving entering sensitive electronic equipment.**

### 2.3 Maintenance

Check that all connections are tight as copper is soft & can work loose.

Check that all controls are functioning as intended.

PLC touchscreen can be cleaned with a moist cloth. DO NOT use any solvents!!

## 3.0 Description

### 3.1 Battery Chargers

The panel is equipped with automatic battery chargers that provide 7A Continuous boost charge when battery voltage is low and trickle charge when maintaining battery float voltage.

The 'CHARGELAMP' LED indicates the charge status. A RED light will illuminate when the voltage is equal to or less than 24V. A YELLOW light will illuminate when the voltage is recovering between 24V and the fully charged voltage of 27.4V and a GREEN light will illuminate when the voltage reaches the fully charged voltage of 27.4V.

When power is ON, the current will decrease as the battery charges. ('0A' indicates the battery is fully charged).

Current limited circuits allow engine cranking and running in parallel with the charge alternator when needed and voltage sensing circuit automatically shuts off the power when the battery is fully charged. These Battery Chargers have an automatic in built current limiting facilities and are capable of fully recharging each battery from 50% capacity within a period of 24 hours.

One (1) charger services the engine automatic battery and the other services the engine manual starting battery.

#### *Protection-*

- Fixed voltage, current limited, auto feedback.
- Fuse protected.
- Short circuit protected.

*Note: If batteries are dead flat (below 6 volts), the charger will not charge and the battery will require a boost from a separate battery to bring voltage up to sensing level above 6V.*

### 3.2 Panel Facia

The front of the control panel houses the Touch screen PLC, switches and push buttons that control the panel function.

#### *Indication*

AC Supply On/Off	-indicates mains power status
Engine Ready to Start	-indicates the pump is able to be automatically started
Engine fail to start	-indicates the engine has had 6 attempts at starting (15 seconds on, 15 seconds off)
Engine Run	-indicates when engine is running above 400 rpm
Engine Over speed	-indicates that the engine has run faster than the set over speed setting

Engine High Temperature	-indicates the engine is running above the set water temperature alarm setting
Auto start isolated	-indicates that the auto start circuit has been isolated (key switch on panel facia)
Low oil Pressure	-indicates the engine is low in oil or oil pressure
Low Fuel level	-Indicates fuel is low in fuel tank
Alarm silenced	-indicates when the alarm has been muted
Control battery 'low voltage'	-indicates that the control battery voltage has fallen below 22V (adjustable)
Start battery 'low voltage'	-indicates that starting the starting battery is lower than 22V (adjustable)
Control battery 'Charger Fail'	-indicates that the control battery charger has failed
Start battery 'Charger Fail'	-indicates that the starting battery charger has failed

### 3.3 Battery current charging Meters

On the PLC display are ammeters indicating the battery charge current for each battery (Control battery and starting battery). They are located at the top of the MAIN page.

### 3.4 Auto start isolation switch

The auto start isolation switch isolates the automatic start circuit when selected to the OFF position. When selected in auto, the automatic start circuit will start the engine when a signal is received from the pressure switch.

### 3.5 Audible alarm

The panel has an audible alarm that sounds when a fault condition has been registered and is silenced when the mute button on the face of the PLC is pressed.

Alarm faults are:

- AC Supply fail
- Engine running
- Low fuel level
- Auto start isolated
- Engine fail to start
- Control battery low voltage
- Starting batter low voltage
- Control battery charger fail
- Starting battery charger fail
- Engine over speed
- Low oil pressure
- High engine temperature

### **3.6 HMI Touch screen PLC**

The control panel is fitted with a HMI PLC that controls and monitors the engine speed, battery voltages, oil pressure & engine temperature.

#### *Touch Screen Maintenance-*

The touch screen itself should be in a clean and dry location, free from direct sunlight and operated within an ambient temperature range of -20 deg to +60 deg celsius.

Turn the power off before changing the backup battery and check the system settings after finishing the change.



## 4.0 Connections

### 4.1 240V Main Supply

Terminals A & N – 240VAC Supply  
Earth connection to stud on base plate

### 4.2 Jacking Pump Connections

Terminals JP & JPN – 240V Jacking Pump, Terminal JPS & JPS – Jacking Pump Pressure Switch

### 4.3 Engine Wiring Terminals

Terminals 1&3 – Control Battery (1 Being Negative)  
Terminals 1&2 – Starting Battery (1 Being Negative)  
Terminals 24 & 25 - Diesel Start Pressure Switch  
Terminals 9 – To regulator / Alternator Excitation  
Terminals 15 – To water cooling solenoid  
Terminals 13 & 14 – Magnetic Pickup  
Terminals A2 – Regulator / Alternator Charge current  
Terminals A3 – To Temperature Sender  
Terminals A4 – To oil Pressure Sender  
Terminals 11 & 1 – Remote 24VDC 400mA (Max) Alarm (1 Being Negative)  
Terminals 10 & 1 – Low Fuel Float Switch (If Installed)  
Terminals 39 & 40 – Remote Stop Pushbutton  
Terminals 40 – Stop Solenoid (Sol C)

### 4.4 F.I.B Voltage Free Contacts (Fire Indicator Board)

Relay Terminal No's (11 & 12 N/C) (11 & 14 N/O)

Relay 1 – Engine run  
Relay 2 – Common Fault  
Relay 3 – Mains supply power fail

### 4.5 Circuit Breaker Legend:

CB1 = Control Battery Control Circuit  
CB2 = Starting Battery Control Circuit  
CB3 = Instrumentation (6A)  
CB4 = Stop Solenoid

## 5.0 Set-up

### 5.1 Notes on value entry

When entering a numeric value, the cursor can be backspaced to correct mistakes by pressing the DEL button. This will delete the last number entered. To delete the whole line press CLR.

Decimal points can only be entered on entries with decimal points in the display line.

You can only enter a value of as many digits as is displayed on the screen.

Example an input that displays 3 digits can only have 3 digit entered.

### 5.2 Power Up Display

On power up the screen will display the operating information of the PLC before moving onto the MAIN PAGE where the gauges, push buttons and indicators are displayed.

### 5.3 Screen Display Layout

The main page displays the basis of all operation that is happening in the system.

- At the top left of screen is the Control Battery voltage and charge current information. 'Charger Fail' and 'Low Voltage' indicators are located below this and only appear when in the fault condition.
- At the top right of screen is the Start Battery voltage and charge current information. 'Charger Fail' and 'Low Voltage' indicators are located below this and only appear when in the fault condition.
- At the centre top is the MENU button. This will access the sub-menus used at set up (section 5.5).
- Centre left of the screen is the engine temperature gauge and is displayed in both analog and digital in degree Celsius.
- Centre right of the screen is the engine oil pressure gauge and is displayed in both analog and digital in kPA.
- Centre of the screen is the engine tacho displayed in digital as RPM.
- Bottom left of screen is 'Engine Over speed Test' and 'Engine Over speed Reset' buttons. The Engine over speed test will simulate an engine running at over speed & shut it down. This will only operate when the engine is running & will automatically reset itself ready to be started again. If the engine is running in the over speed range (NOT TEST MODE) the panel will stop automatically and will need to be reset manually via the engine over speed button.
- Above the 'Engine Over speed' buttons is the hour meter. It displays the total number of hours the engine has run in its lifetime.
- Bottom right of screen are the 'Lamp and Alarm Test' function where on pressing will illuminate all indicators on the screen along with the audible alarm. 'Alarm Mute' button will silence the audible alarm and display 'Alarm silenced' in the indicators section of the screen (section 3.2).
- Above the Alarm mute and test buttons is the 'Alt/Gen Charge' gauge. It displays the current from the engine regulator in amps in digital format.
- Centre bottom to centre of the screen displays all the indicators. These are only visible when the current state is active.

## 5.4 Operating The Touch Screen Touch Points

Operating the touch screen is as simple as it sounds. All touch points are displayed by having the appropriate text enclosed by a box & simply touching within the box will operate a particular function.

## 5.5 Entering the Menu Settings

From the MAIN page select the MENU button located at the centre top of the page. A sub-menu is now displayed consisting of:

**Fault Log-** Time, date and fault type as indicated in section 3.5.

**Clock Settings-** Adjust time and date settings.

**Set-up-** This page is password protected. Enter the password before proceeding.

To enter values in each section, select the appropriate box and enter the values as required and then pressing ENTER.

### Number of Flywheel teeth-

This is where you enter the number of teeth counted on the flywheel e.g. 115

### Engine Over speed Set point-

Enter the RPM value at which you want the engine to shut down, at under an over speed condition, example 3000RPM

### Engine High Temp ON-

This is the value at which the alarm will sound if the engine temperature is high  
Example: 80deg.

### Engine High Temp OFF-

It is the value at which the high temperature alarm will reset.  
Example: 70deg.

### Engine Low Pressure ON-

This is the value at which the alarm will sound if the oil pressure is low plus a 5second delay Example: 150kpa.

### Engine Low Pressure OFF-

This is the value at which the low pressure alarm will reset. Example: 200kpa.

### NOTE:

***The current values have been set by the manufacturer for testing purposes only. Updated values should be custom entered at time of installation by a suitably qualified technician.***

## 6 Operation

### 6.1 System Operation

The FPC24D-2013 Fire pump controller is designed to control a 24VDC diesel driven fire pump unit either operated manually via push buttons on the panel facia or automatically via a remote pressure switch (cyclic cranking section 6.2). The control panel when called upon will crank the starter motor until the diesel engine starts sounding an aural alarm while running and suppling water to fire services within a building or property.

When the system requires to be stopped, a stopping solenoid is used enabling the engine to be stopped from a remote or local location (stop solenoid section 6.3).

The systems batteries maintain their charge by the use of 2 (two) 24VDC 8A battery chargers, 1 (one) to maintain voltage for starting and the other to maintain voltage for the control circuit of the system and complies with AS 2941-2008 (Australian Standards 2941).

Throughout the duration of the system monitoring, a range of fault conditions when called for, sound an aural alarm as specified in section 3.5 of this manual.

### 6.2 Cyclic Cranking

The starting system operates from either of two batteries with automatic and manual start operations provided from the start battery, and manual start operations from the control battery.

Each automatic and manual starting systems provides a minimum 3 minute (15 second intermittent cranking with a 15 second rest) cycle at full rate cranking speed at 4.4 deg Celsius ambient temperature.

The electric starter motor incorporates an axial displacement pinion that engages the engine flywheel by means of solenoid action. When the engine fires the starter motor is withdrawn from the flywheel automatically.

If the pinion fails to engage, the mechanism will continue to attempt engagement for a total of 6 (six) start cycles before an aural and visual alarm will sound. Cyclic cranking will continue indefinitely.

### 6.3 Stop Solenoid

#### *Manual Shutdown-*

Manual shutdown is achieved by means of a hold on pushbutton on the front door of the controller and a normally open stop solenoid shut-off device. The solenoid is arranged to return automatically to the starting condition after the pushbutton is released.

#### *Over speed shutdown-*

The engine is provided with an over speed shutdown device. The engine will shut down at approximately 20% above the engine duty speed. An indication of an over speed condition is provided at the controller. The engine is not capable of being

restarted until the over speed shutdown is manually reset to normal operating condition.

#### **6.4 Jacking Pump (Automatic and Manual)**

Jacking pumps are used to boost the installation pressure in automatic fire systems to a pressure higher than the supply pressure to ensure that the system alarm valves do not operate as a result of supply pressure fluctuations. They may operate in automatic or manual mode.

## 7 Trouble Shooting

Condition:	Do This:
1. Panel does not power up.	Check that power supply is on to panel and isolator is on. Check that control circuit breaker is on.
2. PLC Controller does not power up but power is on.	Check that all circuit breakers are ON. Power supply plug on PLC controller is fully inserted. Touch the screen to disable sleep mode.
3. 'Charger Fail, Low Voltage' warning indication.	Check the circuit breakers and switches at both chargers are ON.
4. Engine Fail to Start	<u>Manual Start:</u> Check battery connections and voltage. Check engine starter motor. Check fuel level <u>Automatic Start:</u> Check connections at terminals 24 & 25 and pressure switch. Ensure the Auto-disconnect switch is in the AUTO position.
5. Engine Over speed Indication	Engine over speed set point incorrect RPM value. Check fly-wheel teeth setting.
6. Engine High Temperature warning	Check engine oil level and connection at terminal A3. Check engine water cooling system.
7. Low Oil Pressure warning	Check engine oil level.
8. Low Fuel indication	Check fuel level and float switch at the engine. Check connections at terminals 10 & 1.

## 9.0 Warranty Statement

The Products manufactured by Inca Control Pty Ltd is guaranteed against faulty workmanship for a period of 12 months from the date of delivery.

Our obligation assumed under this guarantee is limited to the replacement of parts which, by our examination are proved to be defective & have not been misused, carelessly handled, defaced or damaged. This guarantee is VOID where the purchaser has modified or repairs have been made or attempted by anyone except an authorised representative of Inca Control Pty Ltd.

Products for attention under guarantee (unless otherwise agreed) must be returned to the factory freight paid and, if accepted for free repair, will be returned to the customers address in Australia free of charge.

Equipment supplied by Inca Control Pty Ltd, but manufactured by others is covered by their manufacturer's warranty only.

When returning the product for service or repair, a full description of the fault must be given and the mode of operation used when the product failed.

In addition to the above, equipment manufactured, installed & commissioned by Inca Control Pty Ltd, within the Sydney Metropolitan Area, includes onsite replacement.

In any event Inca Control Pty Ltd has no other obligation or liability beyond replacement or repair of this product.

### **NOTES:**

Password: