Title: Pixel Forecourt Digital Display Unit

Reference: PIXEL-FORECOURT-DISPLAY

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IC: Internal/Confidential

Date: 30/10/2024

Version: 1

VERSION HISTORY

Version No.	Date	Description of Change	Author
1.0	30/10/2024	Initial document creation	Nikk Smith

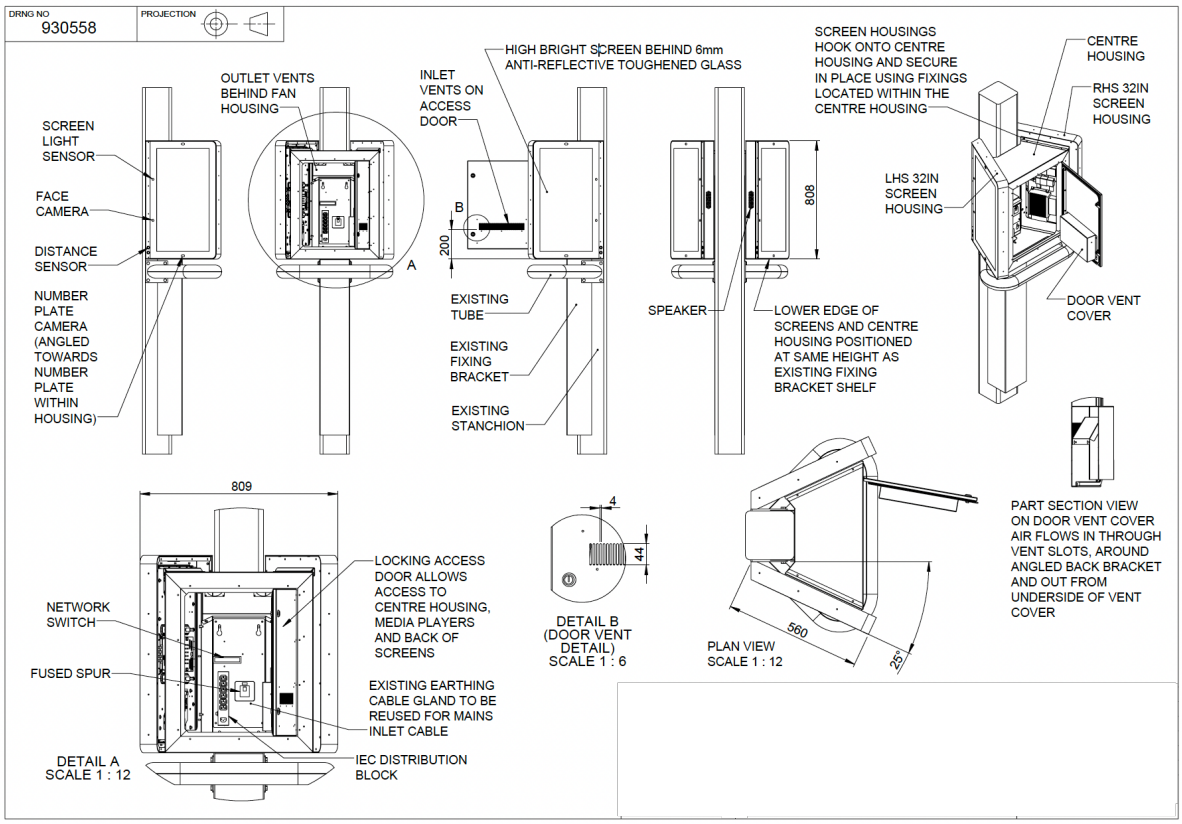
Overview

The forecourt digital display unit is a unique product, developed specifically for use in petrol forecourt environments. Its primary purpose is to provide a method of communicating with customers when they arrive and while they fuel their vehicles, allowing the host operator to promote products and services using remotely managed digital content.

The screen display is developed for outdoor use, close to the petrol pump position but outside of the hazardous Atex zone, installed at least 120cm from FFL.

The unit's design includes methods of protection for the internal components from impact, dust and water ingress, and provision of suitable ventilation system to maintain temperatures within operating ranges. The electrical power is derived from a connection to the pump (provided by others) and is therefore subject to the pump shut down procedure. A data connection to the cloud is required for operation, which is derived from an Ethernet connection between the unit and the forecourt back-office (provided by others).

The system includes an integration with the FDDP protocol, which allows it to communicate with the pump and react to status change conditions, as well as display real-time fuelling information on screen.

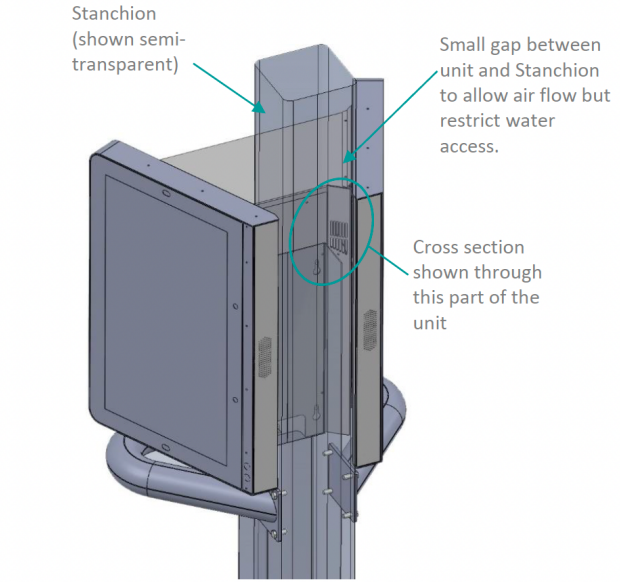


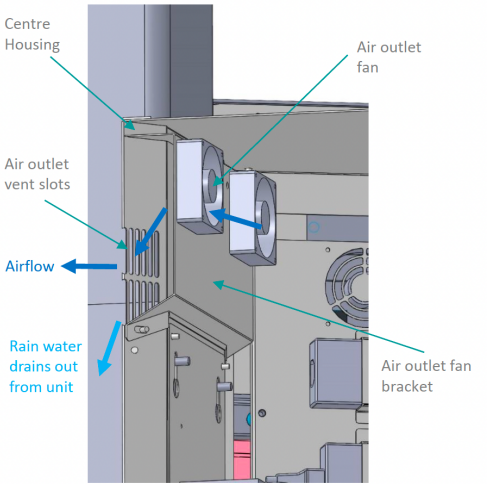
Supported Ambient Conditions

The forecourt display is designed and tested to operate in outdoor conditions subject to the following ranges:

Temperature: Ambient range between -10 and +40 Degrees Celsius
Humidity: 0-95%. Enclosure's internal humidity will not exceed 80% due to component heating and continuous air circulation.
IP classifications: Screen Glass Front: IP65, Screen Enclosure and centre mount enclosure: IP44 – a series of baffles and drains are part of the enclosure design, to

ensure adequate internal airflow, while protecting the components from water-ingress.





Electrical & Grounding System

The unit receives its power and grounding from a connection to the local pump. Inside the enclosure there are direct groundings from the incoming grounding to the central housing.

Displays operate at low voltage 24VDC. High voltage is only present inside the enclosure.

All mains power connectors and outlets are specified to the UK standard using CE components.

Fixings

All fixings are metric and can be handled with standard tools. No special tools are required. The enclosure is designed to retrofit a legacy CIS display, using the same pattern mounting positions.

Screen

Housing

Material: External materials are of various thicknesses stainless steel (1.2mm to 1.5mm) and Aluminium (2mm to 3mm). Internal parts are Zintec coated 1.2mm steel and some PLA internal plastic parts to hold cameras.
Manufactured using laser cut & cold bent by automated machinery
Single layer of epoxy powder coating RAL 9003 (Signal white)
Fixings: Stainless steel flat head Allen screws

Install/ Maintenance: Hook-on/off design to allow safe maintenance by single engineer and easy to remove technology tray from the rear of the display.

LCD Panel

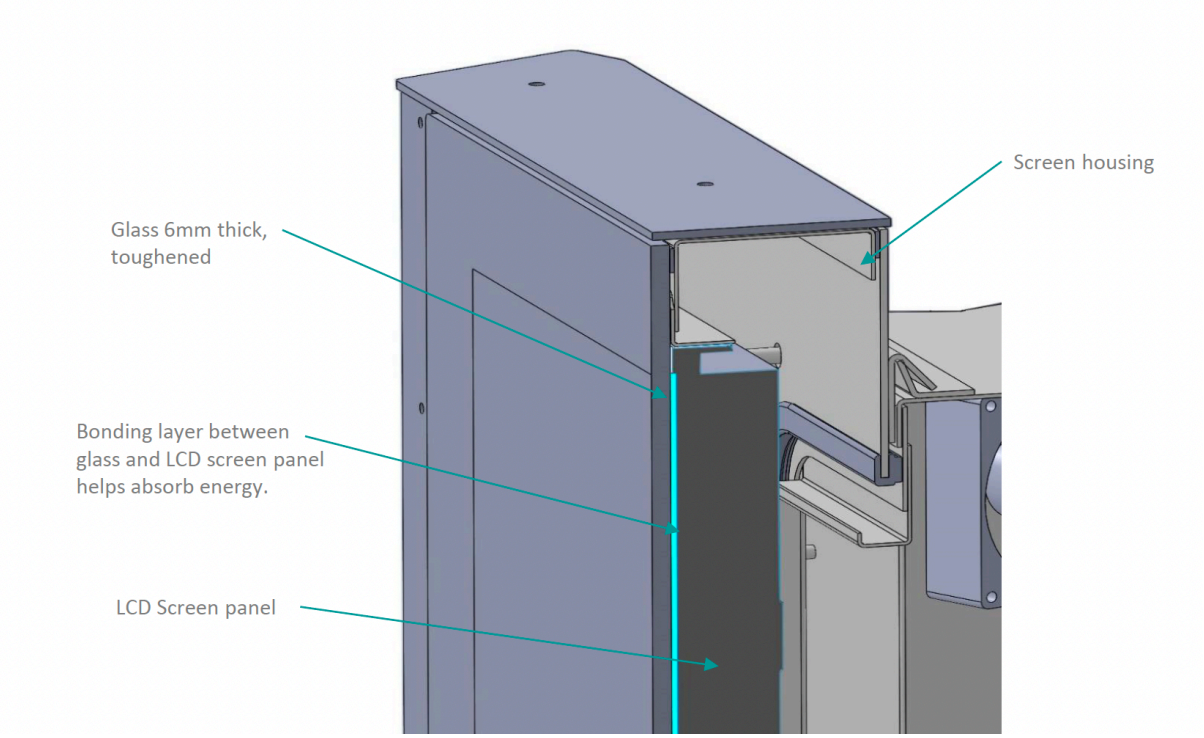
32" TFT LCD Technology with up to 1500nits brightness
Backlight Long-life selected LED backlight strips MTTF 50.000 hours
Optically bonded to toughened glass
Maximum resolution 1920 x 1080 (Full HD)
Viewing angles Left/Right 178 - Up/Down 178
Advanced wide temperature Liquid Crystal -40 to 110degC
Operating Temperature -20 to 60degC

A/D Board

A/D mainboard with HDMI input and LVDS output to the LCD panel.
Operating Voltage 24V DC
Maximum output resolution 1920 x 1080 (Full HD)
Brightness sensor to adjust the display brightness in relation to ambient brightness.

GLASS

Toughened, 6mm float glass, optically bonded (anti-reflective) to LCD. If the glass is forced to break, it will shatter into tiny pieces, reducing the risk of injury
Bevelled edge
IK10 rated
Mounted to the enclosure using double sided adhesive tape and capable of working in temperature ranges of -20 – 60 Degrees Celsius



Enclosure

Centre Mount Enclosure

Material: 1.5mm stainless steel (all seams welded and dressed)
Laser cut & cold bent by automated machinery
External Finish: Single layer of epoxy powder coating RAL 9003 (Signal white)
Fixings: Stainless steel flat head Allen screws
Stainless Steel hinges
X2 EMKA Key locking mechanisms with flat CAM, IP65 Rated.
Installation: Drop over Stainless Steel Bolts using existing fixing points.
IEC output outlet strip
Fused 5Amp glass fuse
2 pole rocker main switch

FANS

Brushless Long-life Vapo bearing fan.
Maximum RPM: 2600
Bearing: This unique fan has a fluid bearing therefore its extreme lifetime and quiet operation
MTBF: 70000 hours at 40 Celsius
The fan's are controlled by a microcontroller when the internal limit reaches a set temperature the fans turn on. The MCU applies hysteresis to avoid rapid switching and reliable fan control.
Maximum capacity 33CFM
Noise level 28 dBA

Loudspeaker

Full range loudspeaker with passive radiator design
Waterproof design
Continuous power output 12 Watt at 4Ω, max.
Frequency 78-20KHz

Camera A - ANPR

Type USB mini camera
Resolution 8MP, 3264 x 2448
Minimum illumination 0.5 Lux
Sensor 1/3.2inch Sony IMX179
Focus Automatic DFOC 72degree
Frames Max 25fps
S/N Ratio More than 34dB (AGC Off)
White Balance Auto / Fixed / Indoor / Initial / Outdoor
Gamma characteristic Auto r>= 0.45
Picture Brightness / Contrast / Gamma / Saturation
-Power source 5 Volt DC / 150mA~240mA USB powered
-Operating temperature -10 to 70Degrees C
-Interface type USB2.0 format (complies with USB 2.0)
-Measurement 28x28mm

Camera B - Audience

Type USB mini camera
Resolution 8MP, 3264 x 2448
Minimum illumination 0.5 Lux
Sensor 1/3.2inch Sony IMX179
Focus Automatic DFOC 72degree
Frames Max 25fps
S/N Ratio More than 34dB (AGC Off)
White Balance Auto / Fixed / Indoor / Initial / Outdoor
Gamma characteristic Auto r>= 0.45
Picture Brightness / Contrast / Gamma / Saturation
-Power source 5 Volt DC / 150mA~240mA USB powered
-Operating temperature -10 to 70Degrees C
-Interface type USB2.0 format (complies with USB 2.0)
-Measurement 28x28mm

Electronic back plate

Main power cable enters the enclosure through a Nylon cable gland
Internal connection Through an IEC splitter adapter.

Fused Switched Mains Power Input

Power Supply

Internal AC/DC power supplies
For the 24V power source to LCD panels and AD board, each screen has a 24V 5A
Sealed PSU MTBF 100000hrs
For Fans, Amplifier, Network Switch there is an industrial switched power supply.
Input Voltage 85 – 264 Volt AC
Output Voltage 11.4 – 13.2 Volt DC, standard set on 12V
Maximum output 20 Watts
Efficiency 80%
Working temperature -20 - 70 Celsius
MTBF <236.9000 hours
Safety approvals UL and TUV

Temperature Sensor

The temperature sensor continually monitors the temperature on the back of both screens and reports back to the fan controller (MCU)

Fan Controller MCU

The Fan Controller controls the Fan operation of the unit by constantly monitoring the voltage from the temperature Sensor.
When the internal limit reaches a set temperature the fans turn on. The MCU applies hysteresis to avoid rapid switching and reliable fan control.
The MCU also controls the distance sensor and reports object detection.

Ambient Light Sensor

An ambient light sensor monitors the daylight and adjusts the screen brightness accordingly, so on a bright sunny day, the screen will output at 100%, on a dull day and at night, the brightness will reduce to save power and reduce glare.

Proximity Sensor

Waterproof Ultrasonic Sensor
3cm to 450cm detecting range (flat object)
-15˚C to 60˚C operating temperature range
IP67 waterproof grade

Audio Amplifier

Robust 12W Amplifier modules for universal use
Encapsulating modules are humidity-proof and shake-proof
Encapsulating compound is highly heat-conductive plastic, so no additional heat sinks are needed
Protected electronically against overheating and overload

6-16 VDC Power Supply
12W Music Power Output

Network Switch

5 port Ethernet Switch 10/100mbps
9-30V DC
Power LED and LAN Status LED's
-40 to 75 degree C

Media player

Type Advantech ARK 1250L – Wide temperature industrial PC
Intel i3 1115G4E
128GB SSD HD (Solid State Drive)
Passive cooling via heatsink integrated into chassis
8GB RAM
3 x GBE
4 x COM
Windows 10 IOT Operating System
Operating temperature -20 + 50 Celsius
MTBF 50.000 hours

Certifications

CE: EMC EN55032 & EN55035
Manufacturer's Technical File