

PSS 5000 Forecourt Controller

Product Guide

Petrol Station Forecourt Controller
For systems with CPB539



Date October 20, 2022
Document number PSS5000/PRPR/805911/06

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About This Documentation

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| Purpose | This documentation provides a high-level description of the PSS 5000. It describes the most important features and the associated benefits that can be obtained by using a PSS 5000 in a petrol station automation system. It also lists the hardware elements and all the device types supported by the PSS 5000. |
| Audience | <p>This documentation is designed for any person who is preparing to automate a petrol station forecourt. This could be:</p> <ul style="list-style-type: none">• System integrators• Oil company representatives• POS suppliers |

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1 Introducing the PSS 5000

Description of the PSS 5000

The PSS 5000 enables you to control and monitor forecourt devices and integrate a commercial Point-Of-Sale (POS) system (built for dry-stock sales) in a petrol station environment, or to automate an unmanned site that does not have a POS.

The PSS 5000 offers generic interfaces to the various types of forecourt devices and their associated business logic. And with its modular design, the PSS 5000 can be tailored to almost any existing or new petrol station forecourt/POS system. The modular concept also gives scalability. When changes to a forecourt occur, then the PSS 5000 system adapts readily by the addition or change of modules.

The PSS 5000 also offers unprecedented connectivity, including TCP/IP (via both Ethernet or serial interface) as well as web server access for remote monitoring, remote control and diagnostics of the forecourt devices and their operation. Using these features, it is possible to monitor stock levels remotely and enable easy generation of wet stock reports and optimize distribution. It is also possible to gather information and make diagnostics on the equipment remotely, which saves on traveling costs and makes regular, planned maintenance easier – reducing downtime and keeping maintenance costs to a minimum.

The diversity of the equipment types on the forecourt, the protocols they use and their software versions require (sometimes rather complex) real-time control of the serial communication and a fast response to minimize customers' frustrations and impatience. This is often difficult to achieve with the operating systems used by POS systems, but the PSS 5000 is built to handle such requirements.

PSS 5000 generally provides the functionality and interfaces needed to integrate Point-Of-Sale solutions for supermarkets or shops into a petrol station environment. This enables fast time-to-market for POS suppliers, who may not have the necessary resources for these special tasks.

2 PSS 5000 Applications

Overview of PSS 5000 applications

How a PSS 5000 is integrated into a petrol station forecourt and some of the necessary considerations are described in the following topics:

- ‘2.1 Basic Scenarios for the PSS 5000’ on page 5
- ‘2.2 Application Solutions’ on page 7
- ‘2.3 Features of the PSS 5000’ on page 8
- ‘2.4 Security’ on page 12

2.1 Basic Scenarios for the PSS 5000

Situations for the PSS 5000

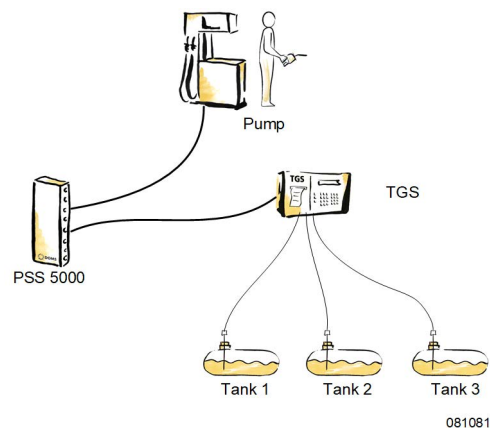
The PSS 5000 is a versatile tool that enables you to control many types of operations taking place on the forecourt. The basic processes are covered by the simple scenarios listed below:

- Attended, stand-alone system
- Unattended, stand-alone system
- Attended, integrated with a POS system

Attended, stand-alone

A simple example of an attended, stand-alone system where the PSS 5000 provides wet stock control is shown below:

Note: The term stand-alone is used when a POS is not present in the system.

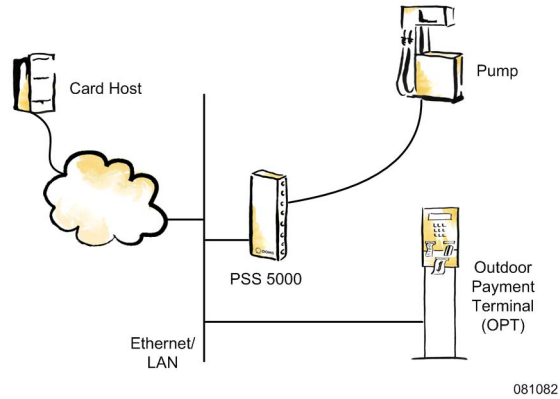


In this scenario, the PSS 5000 is used to provide transaction data to the Tank Gauge System (TGS) so it can verify that all the wet stock movements are legitimate.

The functionality of the attended, stand-alone site can be extended when a head office application, such as Site Info, is introduced. This enables price changes and similar services to be implemented remotely from the head office.

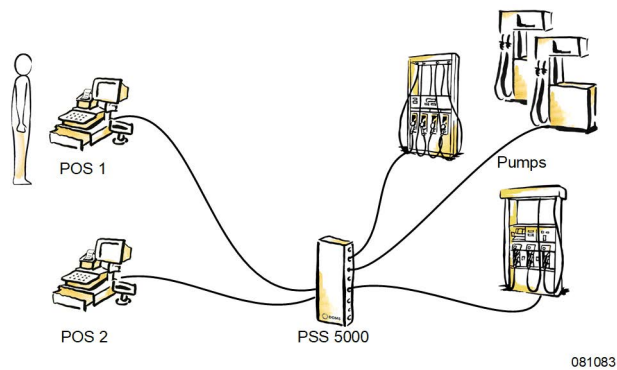
Unattended, stand-alone A simple example of an unattended, stand-alone system for unattended self-service is shown below:

Note: The term stand-alone is used when a POS is not present in the system.



In this scenario, the PSS 5000 is used to control the fuel pump and authorization is controlled via a 3rd party payment solution for cards and/or bank notes.

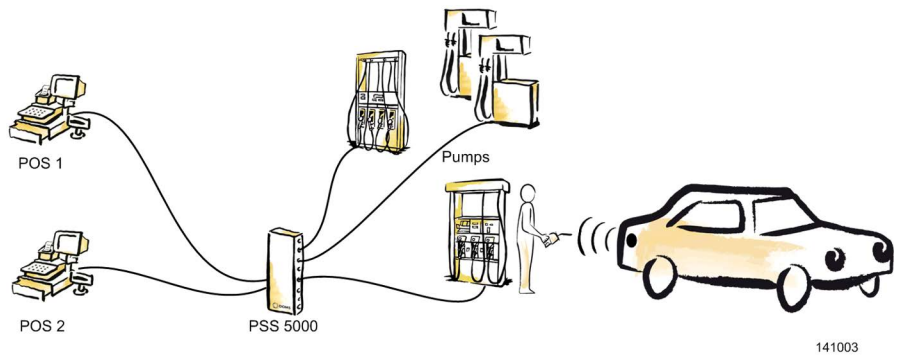
Attended, with POS A simple example of an attended site, with 2 POS connections, is shown below:



In this scenario, the PSS 5000 is used to control the fuel pumps and connect to the Point-Of-Sale (POS) terminals. Payments for the transactions take place via the POS terminals.

Vehicle Tagging, either attended or unattended

A simple example of an attended site that uses vehicle tagging is shown below:

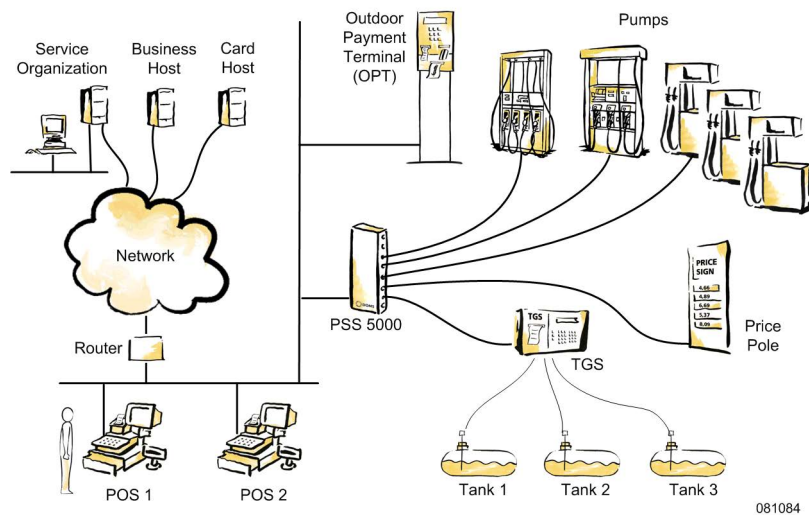


In this scenario, the vehicle is identified using a vehicle inlet tag, which is read by the nozzle reader. When a valid tag is presented, the PSS 5000 is able to authorize the dispenser to start. If the connection between the vehicle tag and nozzle reader is broken, then the dispenser stops the fuelling until the two are reconnected. Payments for the transactions take place via the POS terminals.

2.2 Application Solutions

Combining the basic scenarios

By combining the basic scenarios, it is possible to provide a solution for the individual sites. The illustration below shows a combination of all the basic scenarios, which better represents the set up of a retail petrol station forecourt:



In this scenario, the PSS 5000 controls the operations of the forecourt pumps, price poles and payment terminals, and provides a generic interface to the Tank Gauge System for a readout of inventory data and deliveries. The PSS 5000 also ensures that any price changes are shown correctly on both the pumps and price poles.

Business hosts and service organizations are able to take advantage of the network connection to the PSS 5000. They are able to monitor the status of the sites, gathering diagnostics and stock movements. This helps them to perform planned maintenance tasks, optimize wet stock deliveries, and upload new software, which can provide new features or improve some of the current operations.

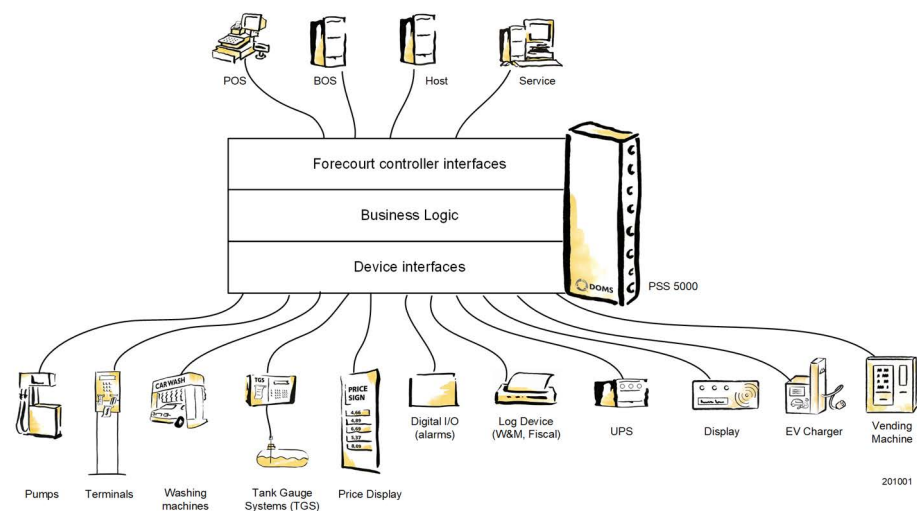
Changes to the forecourt environment

The modularity of the PSS 5000, with its hardware interface modules and associated application software, makes it easy for the PSS 5000 to match any changes made to the forecourt devices. By simply changing the modules to match the devices on the forecourt and updating the application software, the PSS 5000 is able to move forward as the site grows and changes. Because the PSS 5000 with its standardized interface to the POS is situated between the forecourt devices and the POS, then these device additions/changes rarely require changes to the POS.

2.3 Features of the PSS 5000

Positioning and internal workings of the PSS 5000

The typical position of the PSS 5000 Forecourt Controller and the functions it provides in the petrol station forecourt are illustrated below:



Equipment interfaces in the PSS 5000

The PSS 5000 provides interfaces to a wide variety of forecourt devices. These can be classified in the groups listed below:

| Equipment Groups | Description |
|---------------------------|---|
| Pumps | These are devices where fuel is dispensed to vehicles. A pump can consist of one or more fuelling points, where a fuelling point dispenses fuel to only one vehicle at a time. |
| Price Displays | These display the prices for the individual grades, where a grade is the fuel dispensed to the customer on the forecourt. |
| Tank Gauge Systems (TGS) | This type of system normally has a controller and a number of tank gauge probes. The PSS 5000 communicates with the controller, which uses the data from the individual tank gauges to provide inventory data for the individual tanks. |
| Payment Terminals | These provide an automated method to pay for fuel transactions using either money, vouchers or credit cards. The terminals can be associated with either a single fuelling point or with multiple fuelling points. |
| Vehicle Tag Readers | These are electronic tag readers that are normally mounted on the fuelling point nozzles and identify individual vehicles. This type of reader enables the control of transaction authorization for individual vehicles. |
| Attendant Tag Readers | These are electronic tag readers that are normally mounted on the forecourt. They identify the individual attendants and authorize the services that the attendant is permitted to carry out. |
| Car Wash Machines | These are devices where vehicles can be washed automatically. The level of control here depends greatly on the communication protocol implemented. |
| Digital I/O equipment | This type of equipment is able to send and/or receive digital signals. The output signals can be used to monitor the devices, for example by using them as alarm triggers. Alternatively, the input signals can be used to implement some action. For example, the output signal can be seen as an alarm trigger and the input signal is then used to activate an audio or visual device. |
| Vapour Recovery equipment | This equipment is used to monitor the quantities of fuel vapour that is returned to the system while a vehicle is being refuelled. Depending on the national legislation, various rules can then be applied and action taken if the measured values do not meet the specified criteria. |
| UPS | These are on-site power sources. The interfaces to these devices enable you to monitor the status of the individual UPS and then use the data to control the other devices connected to the PSS 5000. |

| Equipment Groups | Description |
|------------------|---|
| Display | These are simple devices that display information only. Normally, they offer no control mechanisms. |
| EV Charger | These are Electric Vehicle (EV) Chargers, which provide energy. When configured with the PSS 5000, they are handled as fuelling points, similar to those described for pumps. |
| Vending Machines | These are automated machines that provide items such as snacks, beverages, and meals. When configured with the PSS 5000, the machines must be authorized by the PSS 5000 before items can be dispensed. |

For details about the protocols supported for the individual types of equipment, refer to the latest Hardware Configuration Guide (804473/--), which is available on the Doms Download Center (<https://downloadcenter.doms.com>).

PSS 5000 business logic The PSS 5000 business logic provides a multitude of features. The major ones are listed in the table below:

| Application Modules | Features |
|-------------------------------|--|
| For Device Controllers | |
| Dispenser Controller | <ul style="list-style-type: none"> • Unattended and Attended Service • Calibration/Recirculation Service • Fallback Service (if POS is down) • Totals Monitoring (fraud detection) • Control of Pump and OPT light • On the fly price changes (no pump closures) • Various timers and values can be configured to enable personalized operation at individual sites |
| Vapor Recovery Controller | PSS can manage German VRM rules or interface to pumps that do. |
| Wash Controller | PSS has, using the IFSF protocol, two different modes for car washing machines. <ul style="list-style-type: none"> • Monitoring totals only • Full control |
| Price Display Controller | Fully configurable - determines which prices to send to the price poles. |
| Wetstock Controller | Depending on the forecourt devices, it is possible to provide information about: <ul style="list-style-type: none"> • Inventory • Deliveries In addition, the controller can send fuel transactions to connected tank gauges. This is for: <ul style="list-style-type: none"> • Auto-calibration • Reconciliation • Sudden Loss Detection |
| Payment Controller | This is a sequence controller between the payment server (with its card schemes/rules) and the application to drive the terminal user interface. It can work with both intelligent and unintelligent terminals, as well as various types of payment servers. |

| Application Modules | Features |
|-----------------------------|--|
| Log Controller | In some scenarios, the PSS 5000 supports: <ul style="list-style-type: none"> EFT logging W&M logging Fiscal logging |
| Digital I/O Controller | Supports outputs such as: <ul style="list-style-type: none"> Pump indicator (OPT light) Pump light (Red/Green light) Timer controller out Also supports: <ul style="list-style-type: none"> Programmable inputs for external sources. Status events can be reported to remote applications, such as Doms Site Info. |
| Application Managers | |
| Configuration Manager | Handles various configuration methods. Primarily, the PSS Configurator tool or direct POS Protocol commands. |
| Operation Manager | Manages operational changes, for example, due to the time of day or night, rush hour traffic, or a fall-back situation. |
| Transaction Manager | Controls storage, logging and clearance of transaction data from clients, POS terminals or a payment server. |
| Price Manager | Supports: <ul style="list-style-type: none"> On the fly price updates of both pumps and price poles Scheduled price changes Price increases appear on price poles before they are sent to the pumps Tagging of all transactions with price set ID |
| Service Manager | Includes a web menu that provides: <ul style="list-style-type: none"> Embedded trace tool Error history of all devices Real-time operational status of all devices |
| Embedded Payment Server | Supports: <ul style="list-style-type: none"> Offline fuel card validation using white lists and black lists Online fuel card validation using IFSF ISO 8583: Oil protocol Attendant tag control and account management |
| Embedded Back Office System | Supports Open and Closed reports which contain, for example: <ul style="list-style-type: none"> Pump totalizer period changes Gauged wetstock changes Till Totals |
| Performance Measurements | Measurements for each pump, for example peak and average flow-rates, time to start and activity (number of transactions). |

Forecourt controller interfaces

The services present in the PSS 5000 are available through several interfaces. These, together with a brief description of what each interface offers, are listed in the table below:

| Interfaces | Description |
|---------------------|--|
| Doms POS Protocol | This is a connection-oriented protocol. It is designed to communicate with a POS terminal where a constant connection is required. It also supports communication with typical Back Office applications. |
| Doms Host Protocol | This is a connectionless protocol (uses HTTP). It is designed to communicate with remote applications where a constant connection is not required. |
| FCC Web Application | This is the primary interface for technicians configuring and servicing the PSS 5000. |

2.4 Security

Application security and data security

The PSS 5000 platform has been designed with security as a central requirement. It is built around the iMX6 CPU with advanced hardware enabled security, which increases the security of the forecourt controller system. All the software running on this platform are signed, which removes the concerns of unapproved software running. Other security measures include:

| Security Measures | Description |
|--------------------------|---|
| High Assurance Boot | The CPU has been setup to boot from the on-board flash only, and the CPU has been fused to ensure that the system can only boot from a boot loader signed by DOMS. |
| Package Manager | This only accepts and executes signed packages. This ensures that only trusted applications are installed and executed; this includes 3rd-party applications. |
| Encrypted Data | It is possible to execute sensitive code in a secure part of the CPU (TrustZone). This TrustZone encrypts data with a unique CPU key before the data is stored. This prevents sensitive data, such as communication certificates, from being misused. |
| No SSH access | This platform does not allow login to the SSH console. All normal operations are done from a series of web pages. Access to these pages is password protected and can be set with user access rights by assigning predefined user roles. |
| HTTPS Protection | The user web pages and the DOMS HOST Protocol has an option to activate HTTPS to encrypt and authenticate communication data. |
| Non-removable Storage | This system uses an eMMC flash, which is soldered to the main board. This means that the file system cannot be accessed by mounting it in a different setup. |
| Dual Ethernet interfaces | The system has two Ethernet ports, which are completely isolated from each other. This means that it is possible for service technicians to log on to the PSS 5000 without having access to the filling station LAN. |

| | |
|-------------------------------|--|
| Identification of users | The PSS 5000 has a predefined list of user roles. Each user can be assigned one of these roles and provide a user-defined password. Because each user has a unique log on, it is possible to log certain activities, such as software updates, and see when the tasks were performed and who did it. |
| Data exchange between systems | The PSS 5000 provides a built-in Data Push Service, which is a plug-in function that enables you to establish a SSH connection between the PSS 5000 and a remote server. Using this connection, which uses user name/password or key based authentication, XML data files are transferred at scheduled intervals using the Secure File Transfer Protocol (SFTP) over the SSH connection. |

3 Hardware in the PSS 5000

Overview of hardware elements in PSS 5000

The hardware components in the PSS 5000 are designed and built specifically for the petrol station environment. This ensures that they operate reliably and safely even when everyday situations, such as power surges and electrical emissions from other devices or lightning, occur. To learn more about the hardware, the individual components are described in the following topics:

- [‘3.1 Cabinet’ on page 15](#)
- [‘3.2 Central Processor Board’ on page 15](#)
- [‘3.3 Hardware Modules’ on page 17](#)
- [‘3.4 Upgrading with KIT453’ on page 20](#)

Concept of the PSS 5000 hardware

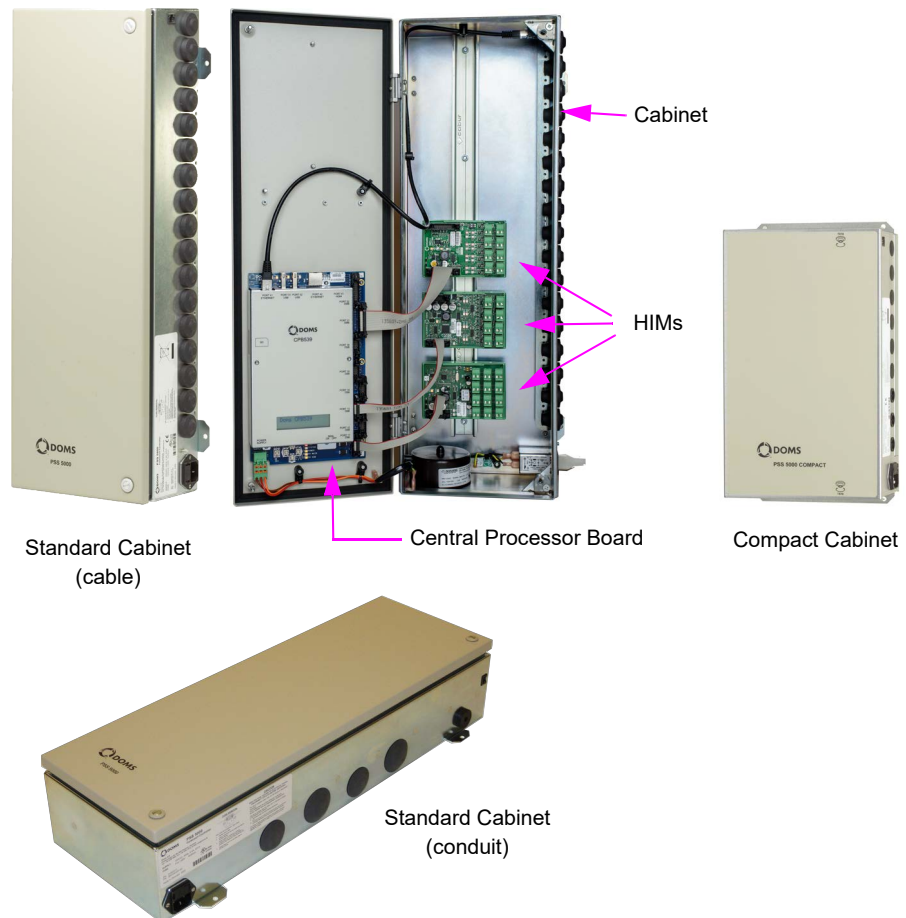
Each PSS 5000 includes the following base elements:

- Cabinet, which functions as a connection box and houses the other hardware components.
- Central Processor Board (CPB), which provides the processing power of the unit.
- Power supply, which is selected to match the local mains supply.

After these base elements come the Hardware Interface Modules (HIMs). These must be selected to match the specific devices present on the individual petrol station forecourt. The number and types of HIMs are selected to fit the individual stations. If the connection requirements to the forecourt devices change, then new modules can be added and unused modules removed.

Illustration of the PSS 5000 cabinet and contents

The illustration below shows the types of cabinets that are available and their contents (door open on the Standard cabinet).



The Central Processor Board shown is a CPB539 processing unit.

3.1 Cabinet

Description of the PSS 5000 cabinet

The cabinet is a single box solution. It houses the hardware and software components of the PSS 5000, and it functions as a connection box for all the forecourt devices.

The cabinet is robust, which protects the contents from knocks and jolts, and when closed the cabinet ensures that the PSS 5000 retains its CE approval. It is designed to be mounted on a wall in a non-hazardous environment (electrical room or office). There is easy access to the contents of the box via the hinged door on the front.

PSS 5000 cabinet specifications

For a full list of specifications for the cabinet, see [‘6.1 PSS 5000 Hardware Specifications’ on page 24](#).

3.2 Central Processor Board

List of CPB parts

The PSS 5000 has its own Central Processor Board (CPB), which consists of the following parts:

- CPB processor and operating system

- Flash-based program memory
- Ethernet support
- Number of physical ports
- Sealing switch
- Onboard UPS
- Local Service Panel

CPB processor and operating system

The CPB, with its processor and operating system provides a fast and stable platform for the PSS 5000. The operating system is Linux, which has been custom built to fit this purpose. This ensures that the necessary performance and priorities for time-critical tasks are met, while leaving plenty of headroom for future feature developments.

CPB physical ports

The CPB is fitted with a number of physical port connectors. The table below provides descriptions of the individual ports.

| CPU Board Ports | Descriptions |
|--------------------|--|
| DSB | These ports provide serial interfaces to the devices connected to the PSS 5000. |
| DMB | |
| Primary Ethernet | The Primary Ethernet port enables you to connect the PSS 5000 to a PC, either directly or through a Local Area Network (LAN). |
| Secondary Ethernet | The primary function of this port is to provide direct access to the embedded web server. This means it can be used by service personnel, who do not have access via the network connected to the Primary Ethernet port. Note: The 2 ports are isolated from each other, preventing access between the networks. |

CPB Local Service Panel

When a PC is not available, then access to the PSS 5000 is possible using the Local Service Panel. This consists of an LCD and 5 navigation buttons. The LCD enables you to read a reduced assortment of Service Menus and information stored in the PSS 5000, while the buttons enable you to navigate through the menus shown on the LCD and change the values of parameters. The Service Panel is also used to modify the IP settings of the PSS 5000.

Sealing switch

The sealing switch enables the application software to be hardware sealed according to OIML regulations. This provides a flexible approved solution for upgrading the PSS 5000 application without requiring re-approval or breaking the sealing.

PSS 5000 CPB specifications

For a full list of specifications for the CPU Board, see '[PSS 5000 CPB specifications](#)' on page 25.

3.3 Hardware Modules

Types of modules in the PSS 5000

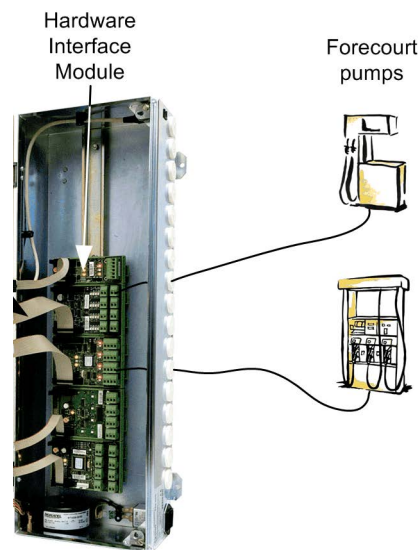
These modules are the key to the connectivity and scalability of this product. The PSS 5000 can contain different types of modules:

- Hardware Interface Modules (HIMs)
 - Doms Serial Bus (DSB) modules (for addressable devices)
 - Doms Multiplexed Bus (DMB) modules (for non-addressable devices)
- Other Modules (or special modules):
 - Memory Module
 - Digital I/O Module
 - LON Module
 - Mechanical Pump Interface

3.3.1 Hardware Interface Modules (HIMs)

Description of the HIMs

Hardware Interface Modules are interface adapters. They provide a link between the many types of forecourt devices with their proprietary serial interfaces and the CPU Board of the PSS 5000. The illustration below is a simple example where 2 pumps are connected to their respective HIMs.

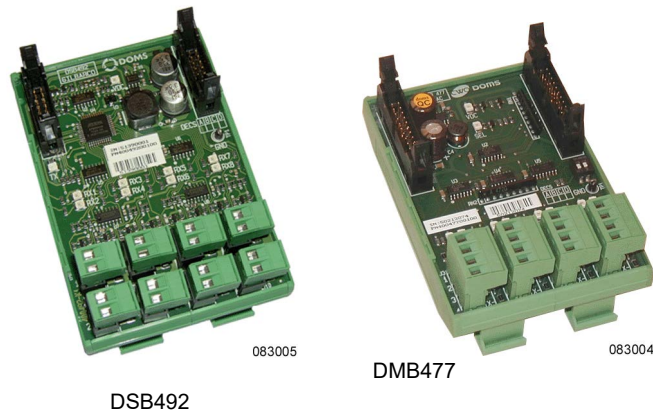


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The HIMs provide a scalable solution too. When new devices are added to the forecourt configuration, or old devices replaced with new ones that use a different protocol, it is a simple matter of adding a new HIM or replacing an existing one to suit the new protocol.

Illustration of HIMs

Examples of a DSB HIM and a DMB HIM are shown below.



Note: The black serial connectors on the DMB modules are wider than those on the DSB models. This extra width is a result of more pins, which are required for the signals used to control the onboard multiplexer.

PSS 5000 HIM protocols

For a full list of protocols supported by the HIMs, see the PSS 5000 Hardware Configuration Guide (804473/--) which is available in the Configuration Guides section of the Doms Download Center (<https://downloadcenter.doms.com>).

3.3.2 Other Modules

Description of the Memory Module

This is a flash-based, non-volatile 8MB memory module. It is an option that provides W&M/MID-approved, long term storage for unattended transactions. Each module has a capacity for almost 100 000 unattended transactions. Up to 4 modules can be connected to a single DSB port.

Description of the Digital I/O Module

This is an eight channel parallel input/output module. Primarily, it is used as an output module to control devices such as light switches or as an input module to register alarms from external devices. These functions can have the following benefits:

- Power control for remote, or isolated devices. Only after proper authorization is received is the power supply available to the device.
- Implementation of status indicators – enabling users to see at a glance if the devices are available or already in use.
- Alarm triggering on equipment outside the control of the PSS 5000. Reduces time by being able to monitor more from a central location.
- Reduce utility costs by turning off services in certain areas during slow periods of the day.

The uses of such a module are varied. They can, for example, be used to control the power supply to remote dispensers, reducing the incidents of theft by providing a fail-safe, no by-pass of the devices.

Description of the Modem Interface Module

The Modem Interface Module is an RS232 module that supports the control signals necessary to control a modem. This enables serial remote access to the PSS 5000 when a network connection is not available.

Description of LON Module

The LON interface with the PSS 5000:

| Option | Description |
|-------------------------------|---|
| LON Interface module (DSB522) | <p>This option uses a single module that has 12 connectors, each of which provides a terminated LON interface.</p> <p>This module requires a software driver, which is integrated with the PSS 5000 Application software. To ensure that the module operates correctly, make sure that the correct PSS software is installed.</p> |

Note: Only one LON interface can be installed on each PSS 5000 system.

This provides an Echelon 2-wire twisted pair LON interface, which meets the IFSF signal requirements, and supports a "free" topology, which means that the LON interface can be connected to a number of devices without point-to-point terminations.

Illustration of LON Interface Module

The graphic below shows the DSB522 LON Interface Module.



3.4 Upgrading with KIT453

What is KIT453

If you have an operational PSS 5000–50x system but want to take advantage of all the new functionality that has been introduced with the latest CPB539 hardware, then this kit is for you.

KIT453 is an upgrade kit for PSS 5000–50x systems. In under 30 minutes, you are able to retrofit a new CPB539 in an existing system while at the same time being able to reuse the existing cabinet, Hardware Interface Modules, PSU and cable connections.

In addition to the reuse of hardware, you are also able to reuse the parts certificate assigned to the PSS 5000.

Benefits of an upgrade

The CPB539 offers:

- Improved performance from a faster CPU (ARM Quad core processor).
- More data storage.
- Backward compatibility with existing POS systems
- Implementation and support of new functionality (which is not implemented on legacy CPBs).
- Improved connectivity through 100 MB Ethernet ports

4 Software in the PSS 5000

Software in the PSS 5000

The PSS 5000 is delivered with several types of software. The different types and how they can be configured are described in the following topics:

- [‘4.1 Software Structure in the PSS 5000’ on page 21](#)
- [‘4.2 Operating System’ on page 21](#)
- [‘4.3 Web Server’ on page 21](#)

4.1 Software Structure in the PSS 5000

Concept of software structure

The system has a Linux OS with a PSS Suite running on top of it. The suite consists of the following:

- PSS Manager – responsible for verifying that the LAM and PSS Application are authentic, maintaining the PSS upload logs and launching/stopping the LAM and PSS Application.
- PSS LAM (Legal Authority Module) – country specific module that controls legally relevant features.
- PSS Application program – this contains all the forecourt controller functions and interfaces. (Integrity of different parts ensured by Doms).

This architecture, with a separate LAM, makes it possible to update the application software without having to apply for new approvals from controlling authorities.

4.2 Operating System

Description of the Operating System

The Linux OS provides stability and performance for the PSS 5000 software suite. It also provides the system with very good protection against viruses.

4.3 Web Server

Description of the web server

The embedded web server enables you to access the FCC Web Application using a PC with a standard web browser.

This provides a user-friendly graphics interface for the PSS 5000 Forecourt Controller, where you are able to perform a multitude of tasks, such as obtaining information about the software, installation details, operational details and service diagnostics. In addition to this, it provides tools to monitor the forecourt devices.

It is also an excellent entry point to the Authorities menus.

For more information, see [‘9 PSS 5000 Embedded Service Tools’ on page 32](#).

5 PSS 5000 Protocols

Overview of protocols The PSS 5000 supports the following main types of protocols.

- ‘5.1 Forecourt Device Protocols’ on page 22
- ‘5.2 Doms POS Protocol’ on page 23
- ‘5.3 Doms HOST Protocol’ on page 23
- ‘5.4 Miscellaneous Protocols’ on page 23

5.1 Forecourt Device Protocols

Introduction to forecourt device protocols Forecourts contain several different types of devices, such as dispensers, price signs, tank gauge systems and payment terminals, which are supplied by a large number by manufacturers. Although some standard communication protocols are available, many of these devices communicate using a proprietary protocol.

Over the past 30 years, DOMS has worked closely with these manufacturers to implement the bulk of the forecourt device protocols seen on the forecourts around the world. With more than one hundred proprietary protocols implemented, and a dedicated development team to implement new and missing protocols, the PSS 5000 can communicate with almost any forecourt device on the market.

This functionality has been implemented so that it is possible to update the PSS 5000 with new or additional device protocols without requiring Weights and Measures Authorities to approve the changes.

List of device types supported Several different types of devices are supported. These are shown in the following list:

- Pumps (including Electric Vehicle (EV) chargers)
- Price Signs / Displays
- Tank Gauge Systems (TGS)
- Terminals
- Washing Machines
- Vapour Recovery
- Displays
- Vending Machines
- UPS units
- Digital Input/Outputs
- Electric Vehicle (EV) Chargers

5.2 Doms POS Protocol

Introduction to Doms POS Protocol

This protocol provides a simple interface that enables a POS system to control a forecourt via a PSS 5000 Forecourt Controller. It communicates over TCP/IP via the Doms Presentation Layer (DPL) and uses a permanent connection.

The POS interface is independent of the forecourt device types present and acts as a server, which enables multiple clients (for example POS units or payment terminals) to be connected in parallel.

It is a request / response based protocol that enables control messages to be sent from the POS, but in addition to this it also enables messages to be sent from the forecourt to the POS unsolicited when a state change occurs or an event is triggered. This means that the POS doesn't need to request data constantly during normal operation.

To ease implementation of the Doms POS Protocol (DPP), the JSON Presentation Layer (JPL) has been introduced. JSON is an industry wide standard, which is supported by most modern development tools and programming languages. The JPL relies on a permanently open socket connection, which requires heartbeats to maintain the connection.

5.3 Doms HOST Protocol

Introduction to Doms HOST Protocol

This protocol is used to collect management and status information from sites (petrol station forecourts) where a PSS 5000 is installed. The information is provided in the form of XML formatted status reports, period reports and events. The protocol uses HTTP GET and POST requests via TCP/IP connections that are established when there is a need to transfer data; no permanent connection is required.

Before all the data is available in the XML files, an EXTENDED_INFO license must be installed in the PSS 5000. The XML files can be viewed directly in a browser, but are primarily intended for use in Head Office Systems (HOS) or other systems that make use of offline data. For example, the data can be used to predict or optimize tank deliveries, or carry out preventive maintenance based on performance data.

5.4 Miscellaneous Protocols

Digital I/O protocol

This protocol is used in connection with a specific Hardware Interface Module. It uses a serial communication driver and is used exclusively to control devices, such as light switches, and to register alarms for devices that are not controlled by the forecourt controller.

Serial Server protocol

This protocol enables the HOST protocol to use TCP/IP communication between devices connected to the PSS 5000 serial port. This can, for example, be used by a Head Office System to access tank gauge system data directly.

6 PSS 5000 Product Specifications and Approvals

List of specifications

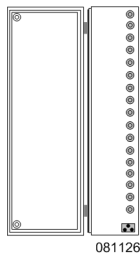
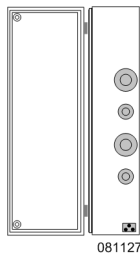
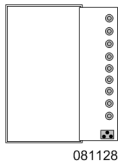
The specifications and approvals for the PSS 5000 are detailed in the following topics:

- [‘6.1 PSS 5000 Hardware Specifications’ on page 24](#)
- [‘6.2 Approvals and Certificates’ on page 26](#)

6.1 PSS 5000 Hardware Specifications

CPB/Cabinet/Power supply combinations

The PSS 5000 is available in several versions, depending on the size of the cabinet and the local power supply available. This table shows which combinations are available and the relevant Doms Stock number (order number).

| Cabinet Version | 230 V | 120 V |
|--|--------|--------|
|  <p>081126</p> <p>Standard (cable)</p> | 145470 | 145471 |
|  <p>081127</p> <p>Standard (conduit)</p> | – | 145946 |
|  <p>081128</p> <p>Compact</p> | 145758 | 145760 |

PSS 5000 Cabinet specifications

The product specifications for the PSS 5000 cabinets are presented in the table below:

Note: The weights given are for the basic cabinet with a power supply and CPU board (HIMs are not included).

| | Standard Cabinet | | | Compact Cabinet | |
|-------------------------------------|------------------------------------|--------|---------|------------------------------------|--------|
| | Cable | | Conduit | Cable | |
| | 145470 | 145471 | 145946 | 145758 | 145760 |
| Power supply | 230 V | 120V | 120V | 230 V | 120V |
| CPB version | CPB539 | | | CPB539 | |
| Max. number of single-width modules | 14 | | | 6 | |
| Dimensions (HxWxD) | 600x200x124 mm (23.5 x 7.9 x 4.9") | | | 363x200x100 mm (14.3 x 7.9 x 3.9") | |
| Cabinet Material: | Metal | | | Metal | |
| Weight: | 8kg (17.6 lbs) | | | 5kg (11 lbs) | |
| Approval Ratings: | CE + UL approved | | | CE + UL approved | |
| Access to contents: | Hinged door | | | Hinged door | |

PSS 5000 CPB specifications

The product specifications for the CPB539 are presented in the table below:

| Parameters | CPB539 |
|--|-------------------------|
| CPB Specs | |
| CPU Type | ARM |
| Onboard UPS | * |
| Real-time Clock (RTC) shelf life | 10 years |
| Port Types and Number | |
| DSB | 6 |
| DMB | 2 |
| Ethernet | 2 |
| Ports with speed rating¹ | |
| Port 11 - DSB | High-speed ² |
| Port 12 - DSB | High-speed ² |
| Port 13 - DSB | High-speed ² |
| Port 14 - DSB | High-speed ² |
| Port 15 - DSB | High-speed ² |
| Port 16 - DSB | High-speed ² |

| Parameters | CPB539 |
|---|-------------------------|
| Port 21 - DMB | High-speed ² |
| Port 22 - DMB | High-speed ² |
| 1: the actual baud rate of the ports are determined by the devices and the HIM modules connected to the ports. 2: High-speed rate is 115.2 kbits/second. *: At a power outage, the system is closed systematically and the data is stored in a non-volatile memory. | |

6.2 Approvals and Certificates

PSS 5000 approvals and certificates

The PSS 5000 system (hardware and software) complies with the following:

| Approvals/Cert. | Description |
|-----------------|---|
| CE mark | <ul style="list-style-type: none"> • 2014/30/EU EMC directive • 2014/35/EU Low Voltage Directive • 2011/65/EU RoHS Directive |
| IEC CB | IEC 62368-1:2014 |
| MID Evaluation | Certificate No. SC0257-15 (R117-1:2007) |
| FCC | Part 15, subpart B, Class B digital device |
| EAC | Certificate C-DK.HA10.B.00016 and EAC C-DK.HA10.B.00596 |
| Australia | NMI certificate S748 |
| Mexico | NOM-019-SCFI-1998 registration NOM-185-SCFI-2012 certificate DGN.312.01.2019.858 |

7 Support Services, Maintenance & Downloads

Overview This section describes what you can expect/receive when you have an operational PSS 5000.

- [‘7.1 Support Services’ on page 27](#)
- [‘7.2 Maintenance’ on page 28](#)
- [‘7.3 Doms Download Center’ on page 28](#)

7.1 Support Services

Introduction to the PSS 5000 Support The PSS 5000 Forecourt Controller comes with several levels of support.

- Levels 1 and 2 are provided by Regional Support Teams and Certified Service Partners.
- Levels 3 and 4, which are provided for the audience of this documentation, comes from the DOMS Support team.

Levels 3 & 4 Support This level of PSS 5000 support offers you a series of low level services:

| Service | Description |
|--------------------------|--|
| Pilot Site Installation | Before a major roll-out of multiple sites commences, the Support Team can help with the installation, configuration and start up phase of a pilot site. The feedback provided here will help to smooth the roll-out of the remaining sites. |
| Troubleshooting | <p>When an issue arises on an operational site, it is possible to create an issue in the Doms Support Center (DSC).</p> <p>All new DSC issues are assessed and then assigned to a specialist. Using the information provided in the issue, they will try to recreate the results seen on site. This then enables them to understand what the problem is, provide a short-term fix and then offer a long-term, sustainable solution.</p> <p>While all this is ongoing, you can follow the status of your issue through the DSC.</p> |
| Customization | Because forecourts vary, one size does NOT always fit all. In such cases, the DOMS Support team, which is a center of excellence for forecourt automation, is able to adapt the solutions so that they are customized to the individual applications. |
| Operational Optimization | Many sites operate well, but with their specialized knowledge and decades of experience, the Support Team is able to provide more than best practice guidelines, it can offer feedback that will enable systems to operate optimally. |
| Technical Training | If you want to understand how the PSS 5000 operates, or just be better to diagnose what is happening on site, then it is possible to book a 2-day training session where you progress from a high-level knowledge of the system components to low-level use of the diagnostics tools available to you. |

7.2 Maintenance

Maintaining the PSS 5000

With our policy of continuous improvement, we make it possible for you to download the latest software releases and keep your systems up to date. Although the PSS Application software is not available as a free download, we offer a PSS Software Maintenance Agreement that makes it possible to receive periodic updates. These updates include the latest protocols implemented and any new functionality that has been added or bug fixes made since the release of your current software.

If you do not have or want a PSS Software Maintenance Agreement, it is still possible to purchase a PSS Application update or if you require additional functionality that is not supported by your current system, then you have the possibility to upgrade to an application that supports the advanced features.

For more information about regular updates or an upgrade, contact sales@doms.dk.

7.3 Doms Download Center

Introduction to the Doms Download Center

The Doms Download Center (DDC) is part of the Doms Information Portal (<https://downloadcenter.doms.com>). It requires log on authentication and provides access to the following:

| Item | Description |
|-------------------------|--|
| Technical Documentation | <p>This section contains the latest versions of all the DOMS documentation that has been published.</p> <p>For users who do not have NDA access rights, some of the materials are listed with a grey icon. This indicates that they cannot be downloaded.</p> <p>All the documents are downloaded as PDF documents.</p> |
| Software | <p>With one exception, this section enables you to download the latest releases of all the software required for the PSS 5000 systems.</p> <p>Because the PSS Application software is a sales item, you cannot download it here. However, you are able to access the Software Release Documents (SRD) for all the released versions.</p> |
| PC Tools | <p>This section contains all the PC tools developed by DOMS that can assist you implement a PSS 5000 system.</p> <p>The tools exist as zip files and after they have been downloaded must be extracted before they can be installed.</p> |
| Packages | <p>This section contains information about the software development kits that we offer.</p> |

| Item | Description |
|-------------------------------|---|
| Sales Documentation | This section contains an extract of the sales materials for the products available from DOMS. |
| Regulatory | This section contains a list of the norms, standards, certificates to which the PSS 5000 conforms. |
| Training Materials and Videos | This section provides access to some of our training materials. These materials are only available to users with NDA access rights. |

8 PSS 5000 Development Package

Introduction to the Development Package

Doms has produced a PSS 5000 Development Package (PSS 5000 SDK). It is designed for system developers who are creating interfaces to the PSS system, and indirectly to the pumps, tank gauge systems, price poles and outdoor payment terminals found on petrol station forecourts.

Tools in the Development Package

The Development Package contains the following tools:

| Tools | Description |
|---|---|
| PSS 5000 Forecourt Controller | This enables you to become familiar with the product and includes: <ul style="list-style-type: none"> • Standard hardware components • Standard application software |
| Demo POS | This enables developers to get to know the system. It provides hands-on experience to ensure an understanding of the documentation and includes: <ul style="list-style-type: none"> • Demo POS • Demo Card Server • Configuration files for several different forecourt configurations |
| Forecourt Device Simulators | This enables developers to test, or practice, using "virtual" devices. Simulators for the following device types are included: <ul style="list-style-type: none"> • Pumps • Tank Gauge System • Price Poles • Terminals |
| Standard Windows (COM) Interface Components | Provides a COM interface to the PSS for easy integration with POS applications as an alternative to implementing the protocol directly. |
| System Diagnostic Tool | This tool includes: <ul style="list-style-type: none"> • Peep show translator – shows stored encrypted communication data as either HEX or ASCII text. • Transport Level Test – enables you to send and view individual commands sent in an application. |
| Java Configurator Tool | A GUI based configuration tool that enables you to configure all the forecourt devices connected to the PSS 5000. |

Training session

Included in the Development Package is a training session. There are two standard training programs from which to choose:

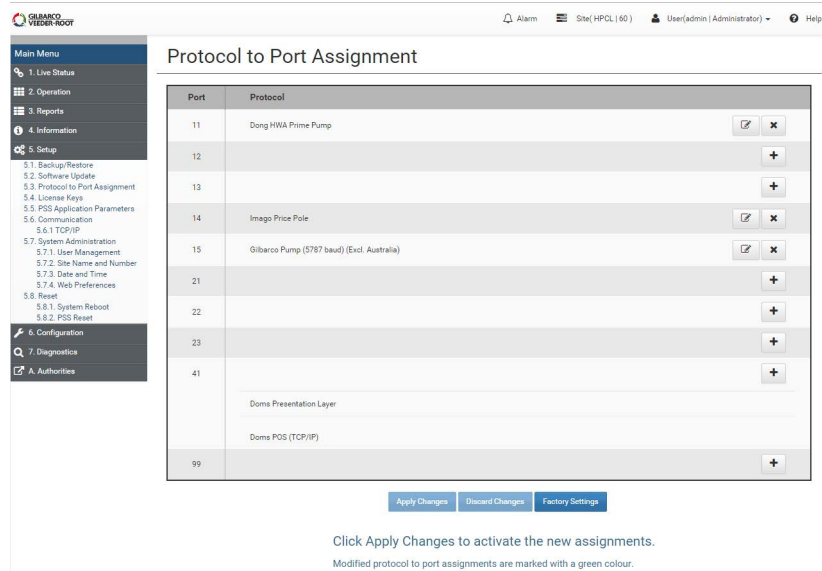
| Training Session | Description |
|-----------------------------|---|
| Standard Developer Training | This is specifically designed for software engineers who plan to develop systems, typically POS and HOS, that use the PSS 5000. This course focuses on: <ul style="list-style-type: none"> • Software architecture for forecourt automation • Business logic associated with forecourt devices • Configuring the PSS 5000 system • Control of the forecourt using Doms POS Protocol commands. |
| Standard Service Training | This is aimed at service technicians who are responsible for installing and maintaining the PSS 5000 on operational filling stations. This course focuses on: <ul style="list-style-type: none"> • Installation and Configuration • Connectivity with forecourt devices • Troubleshooting issues with help of the DOMS diagnostics tools • Hands-on experience in a controlled environment |

It is also possible to purchase bespoke training if you are interested in something more specific.

9 PSS 5000 Embedded Service Tools

Service tools via the FCC Web Application

The FCC Web Application, which provides a way to view status information and run diagnostics when errors occur, resides on the embedded web server in the PSS 5000. Access is via a browser, which provides a graphical interface.



Information available from the FCC Web Application

The table below shows what is available from the menu options in the FCC Web Application.

Note: Access is protected by user name and password authentication and uses user roles to specify access rights and access levels.

| Menu Options | Provides Access to... |
|--------------|---|
| Live Status | <ul style="list-style-type: none"> • Forecourt Devices – a visualization of the equipment on the forecourt and the relevant status information • Transactions – a list of cleared transactions • Prices – a list of the prices present in the price bank |
| Operation | <ul style="list-style-type: none"> • Operation Mode – enables you to change the operation mode for the individual devices or for the forecourt as a whole. • Fallback Mode – enables you to set the forecourt controller in Fallback mode, which can be used when the POS is down • Prices – when a relevant PSS application is installed, this enables you to change prices |
| Reports | <ul style="list-style-type: none"> • Transaction History – provides a list of the 10 latest transactions (both current and cleared). |

| Menu Options | Provides Access to... |
|--------------|--|
| Information | <p>These items provide information only (i.e. view only). No changes can be made in these menus.</p> <ul style="list-style-type: none"> • Software Versions • Hardware • PSS Software blocks • PSS Protocols • PSS LAM (Local Authority Module) • PSS License Key Status |
| Setup | <p>These items enable you to perform the tasks described by the menu names.</p> <ul style="list-style-type: none"> • Backup/Restore <ul style="list-style-type: none"> – create a file that contains fundamental system data. The data can then be restored when required • Software Update <ul style="list-style-type: none"> – update the software (both platform and PSS) whenever updates are available • Protocol to Port Assignment <ul style="list-style-type: none"> – set up the communication parameters for the serial ports, which are used to connect the forecourt devices • License Keys <ul style="list-style-type: none"> – install license keys in order to activate the functionality associated with the individual keys • PSS Application Parameters <ul style="list-style-type: none"> – enables you to set up certain parameters that are specific to the PSS Application • Communication <ul style="list-style-type: none"> – set the IP address for the system • System Administration <ul style="list-style-type: none"> – set specific parameters for the system (date, time, name and ID) as well as control user access • Reset (System & PSS) <ul style="list-style-type: none"> – enables you to control some of the system parameters • Cloud Registration <ul style="list-style-type: none"> – enables you to register the controller in the GVR cloud • Database Maintenance <ul style="list-style-type: none"> – allows you to enable or disable a database engine. Enabling this option is only necessary when an application on the system requires this functionality • Push Service <ul style="list-style-type: none"> – enables you to establish a connection with a remote server and send XML data files at regular intervals |

| Menu Options | Provides Access to... |
|---------------|---|
| Configuration | <ul style="list-style-type: none">• PSS – previously an embedded tool but is now achieved using the PSS Configurator tool, which enables you to manage the PSS configurations |
| Diagnostics | <p>These items provide analyses and diagnostics tools for the system</p> <ul style="list-style-type: none">• Online List• Tests• Logs• Communication• Peep |
| Authorities | <p>This is an entry point for authorities officers and provides details for the parameters of interest</p> <ul style="list-style-type: none">• LAM Version• LAM Parameters• Memory Module Version• Upload Log• Recent Transactions• Checking Devices• Necessary Devices Status• Approved Software Versions |

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