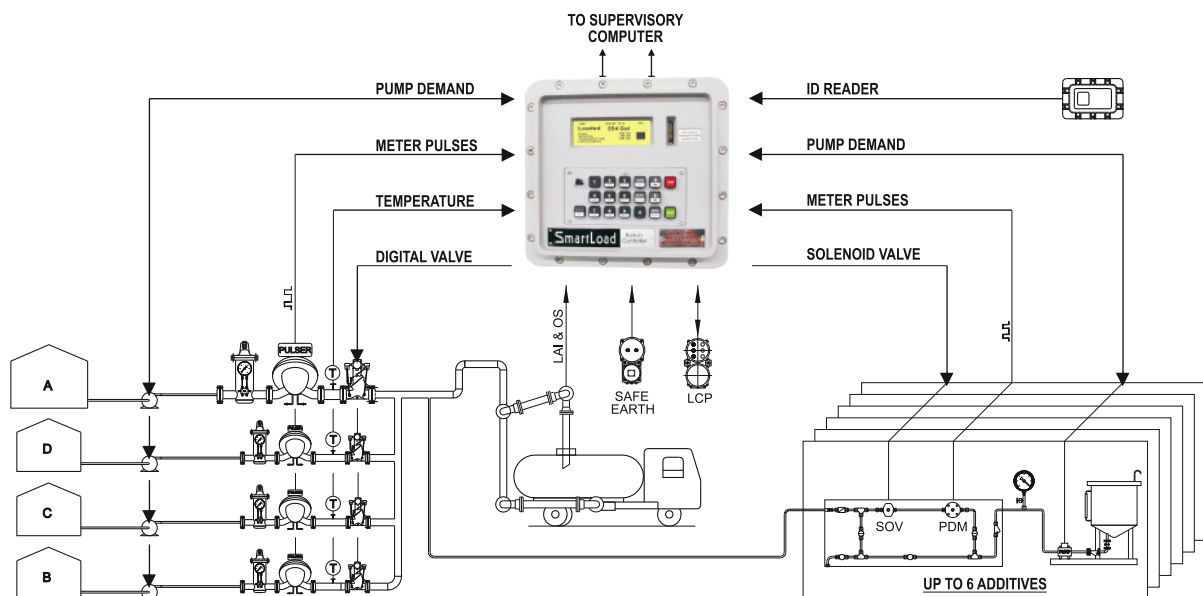


TERMINAL AUTOMATION SYSTEM

A terminal can be broadly defined as a storage area where petroleum and chemical products are received through pipelines, barges and rail wagons and stored in large tanks. These products are then transferred through pipeline, tank trucks, wagons and ships to be dispatched to the end user, like a gas station/petrol pump.

We offer total Terminal Automation System / Terminal Management Solutions which includes design, engineering, supply, installation, commissioning & maintenance to our customers for efficient management of operation and maintenance of the product distribution through trucks, rail wagons, ships, and pipeline while ensuring safety, security & accuracy. The terminal may be owned by single or multiple companies.



Truck/ Rail Wagon Loading - Single Product/ Multiple Blends & Additive Injection

Generally Terminal Automation System consists of following sub systems:

Preset (Batch Controller)

Smartload® Batch Controller accurately dispenses batches of Blends of up to 4 components by volume or mass and controls up to 6 additives. It updates supervisory software with the progress of the load and alarms. Batch Controller can be configured for in-line proportional or Sequential blending using flow meter, control valve etc

Flow Metering Skid

Flow Metering Skid consists of

- Coriolis Mass Flow Meters / Positive Displacement / Turbine Meters for Volumetric and/or Mass Measurement.
- Digital Control Valve (Diaphragm/ Piston/ Pneumatic type)
- Strainer cum Air Eliminator/Degasser
- Safety Valve (TRV/TSV)
- Proving Manifold

Additive Injection

The combination of Additive Block and Smartload® Batch Controller ensures that the correct amount of additives are dispensed, eliminating need for Smart Injection Systems.

Blending

The ratio control block available in Smartload® batch controller ensures that the correct amount of Ethanol/ Bio Diesel is blended with the main product

Safety Interlocks

Earth, Overspill and Arm Position detectors are connected to the Preset to ensure safe loading



Card Reader

Card reader (Proximity type, RFID, Biometrics) is used for authorisation and access control. Some of them can be interfaced directly to **SmartLoad**[®] Preset providing security in the local operating mode.

Local Control Panel

Ex-proof panel consisting of indicating lamps and Push Buttons at each loading point to provide simplified driver Interface.

Tank Farm Management

Tank Gauges, Temperature Sensors, Tank side indicators, Water Bottom interface, Inlet and Outlet MOVs. CIUS and Tank Farm Software etc.

Control Room Automation

Includes Redundant Supervisory Computers, Operator Interface Computers, Printers, PLC, UPS, Networking component, Smart Terminal Manager (STM) application software etc.

AST manufactured Terminal Automation Products

SmartLoad[®] Field Mounted Batch Controller

- Single or Dual Arm Option available
- Additive control, measurement, verification and accounting up to Six Additives
- Inline proportional I nonproportional or sequential blending, up to 4 components
- Digital batch flow control with outputs for set-stop or modulating control valves.
- 8x40 character graphics & multiple language LCD displays.
- Up to 24 digital inputs, 28 digital outputs
- Up to 4 pulse meter inputs with dual pulse security to IP252 (ISO 6551) level B.
- Temperature I Pressure correction as per API.
- Dual (redundant) serial data ports for communication
- CIMFR, PESO & ATEX certified to Ex tb IIIB T85°C Db IP65, -20°C ≤ Ta ≤ +60°C.
- Explosion proof and Weatherproof unit with 6 digits preset.
- Optional Sentry (Proximity Card Reader) Interface for local security.
- Approved by W&M Department & OIML R117 for custody transfer.
- **SmartLoad**[®] Batch controller is also used as a DET (Data Entry Terminal)



SENTRY Proximity Card Reader (Access Control Device)

- Used to read proximity cards
- Bi-colour LED for status indication and 2-DO/2-DI.
- Simple 4 wire connection; RS232/422/485 Communications
- Can be interfaced directly to SmartLoad[®]
- Available in Intrinsically Safe I Explosion proof version
- CIMFR & PESO certified to Ex d IIB T6 Gb, Ex tb IIIC T85°C Db IP66, -20°C ≤ Ta ≤ +60°C



ARM Position Interlock Sensor (Safety Interlock Device)

- Arm Interlock ensures proper positioning of loading arm while loading.
- CIMFR, PESO & ATEX certified to Exia or Exd, IIB, T6 for use in Div 1 & 2 Area

Smart Overspill Detector (Safety Interlock Device)

- Smart Overspill Sensor detects the level of liquid & prevents overspill while loading.
- Sensor : Ex ia IIC T5...T4
- Terminating Unit (TU) : IP65
- Monitor Unit (MU) : Ex db [ia Ga] IIB T6 Gb (-20°C ≤ Ta ≤ 60°C) Ex tb [ia Da] IIIC T85°C Db IP66



SMART GROUND DETECTOR (SGD) / SMART GROUND DETECTOR PLUS (SGD+) (Safety Interlock Device)

- SGD Monitors the Earth Loop Resistance to ensure that the Tank Truck is grounded to eliminate the static energy.
- SGD+ Monitors the Earth Loop Resistance as well as Capacitance of Tank Truck to ensure that the presence of Tank Truck and it is grounded to eliminate the static energy.
- It is CMRI / PESO with option of ATEX approved suitable for Ex d, zone 1, Div 1 & 2, Group IIA, IIB or equivalent.
- RS485 Modbus communication port is available optionally to communicate with Computer Server / PLC in control room.
- Two nos of Contact output is available which can be used to Trigger the Hooter for Alarm Purpose OR Trip the Pump OR Motor.
- SGD/SGD+ also comes with Display for user interface and monitoring of various parameters / alarms etc.

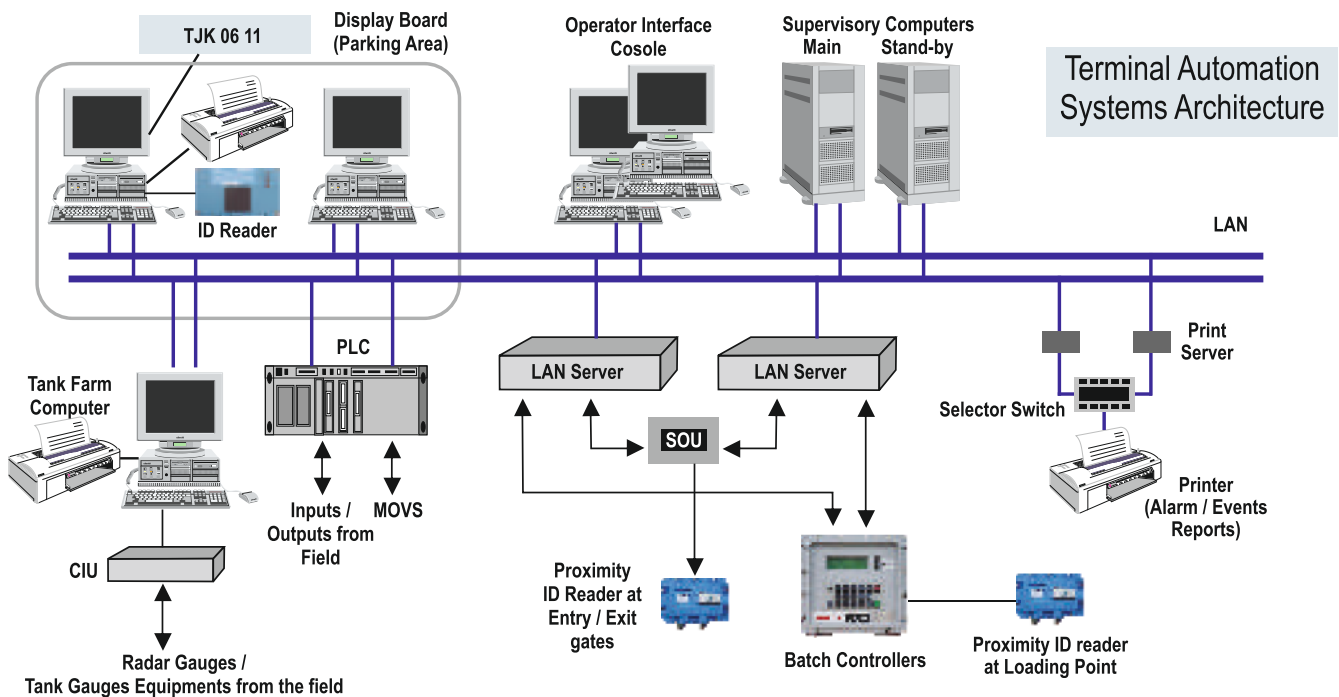


VS 300 Pulse Transmitter

- Dual-output Pulse Transmitter for use with all reputed makes of PD meter like Liquid Controls, Smith, Brooks, Bopp & Reuther, Teltech etc.
- Dual pulse security checking to IP 252/76, (ISO 6551) level A.
- Incorporates cable failure detection.
- CMRI / PESO/ ATEX certified to Exd.IIB.T6 for use in Zone 1 Area or equivalent.



Typical System Architecture of Terminal Automation System.



Benefits of Terminal Automation

Increased Efficiency

- Faster loading, higher throughput & greatly reduces work force
- Allows pre-scheduling of trips
- Documents and reports are generated automatically
- Inventory and accounting data available in timely and accurately to Host's accounting computers

Increased Flexibility

- Faster loading, higher throughput & greatly reduces work force
- Allows pre-scheduling of trips
- Documents and reports are generated automatically
- Inventory and accounting data available in timely and accurately to Host's accounting computers

Increased Security & Accuracy

- Minimizes theft and fraud
- Secured Product loading
- Secured facility access
- Trip Advice Notes and Bills of Lading are generated automatically for the products actually loaded.

Improved Environment

- Can manage vapour recovery units (VRUs) and minimize spillage by overfill protection.
- Compartment size checking ensures Cleaner and safer environment.
- The system records data that helps satisfy the environmental reporting requirements frequently demanded by governments

Better Accountability

- Automated batch control, using high accuracy flow measurement and temperature compensation, minimizes and identifies losses
- Computer monitoring of product movement every significant event or transaction in the Terminal is recorded on a dedicated audit-trail printer and stored on disk for future reference.
- Provides for unauthorized flow accounting and detection with frequent reconciliations between loaded, metered and gauged volumes
- Allows co-mingling of stock and product translations

Increased Safety

- Interlocks prevent loading from taking place under potentially dangerous conditions

Improved customer Service and Reliability

- Operates every hour of every day.
- Automated Blending and Additive injection allow customers to market new customized product variants

Improved Cash Flow

- Improved inventory control allows stock optimization by reducing the time between order placement and delivery

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