GASSO
Skid Mounted Measuring Systems for Loading Terminals

TECHNICAL SPECIFICATION

1. Introduction

The safest and most accurate method of transferring petroleum products from bulk storage to a transport is through a reliable metering systems.The basic concept in designing an Petroleum Products Metering Systems is to provide dependable components which can safely be operated by drivers or plant personnel.

These systems are up-to-date answer to the increasing demand from oil, gas, petrochemical and chemical companies that wish to make the chargeover from top to bottom loading.

Gasso engineers use the latest technology to design systems that offer customized, cost-effective solutions to meet client's specific transfer requirements.

Gasso delivers a complete range of customized integrated liquid and gas custody transfer solutions to measure and control all loading/unloading processes, including the following operations:

- Metering;
- Calibration and proving of metering systems;
- Loading or unloading of tanks trucks and railcars (also with the big capacities telescopic filling lances from refineries);
- Features to enhance safety and environment protection, such as fire protections systems and membrane based vapours recovery systems;
- Emergency shutdowns systems;
- Preset and automatic control system;
- Data process and connection with client's accounting system.

Skid-mounted measuring system can include also both the truck and railcar loading arms, after of doing the feasibility study and/or client's order. Weight bridges are also available. This complete system can be linked electronically to enable an automatic control of the product being loaded or unloaded, which can, in turn, be linked to customer invoicing.

A wide choice of other equipment using proven, leading-edge technology can be built to optimize each system for client's particular application.

Gasso together with its partner Syscom capabilities for Skid – mounted and measuring systems are:

- Completed tested and commissioned package;
- Site integrity test;
- Site erection assistance and supervision. These can be maid at client's order, after having all systems details.

We can do, in a turn key job system, the basic & detailed design of all kind of installation (mechanical, electrical, automation), and the erection works, together with some another specialized companies, like IPIP Ploiesti, Confind Campina).

The benefits are:

- Single source supply, responsibility and guarantees;
- Factory tested equipment;
- Reduced overall operating costs;
- Improved reliability and operating safety;
- Compact design arrangement ideally suited to limited space constraints on site;
- Reduced installation time;
- Easy acces for maintenance.

2. Metering Skid Components

Major components to consider in designing an Petroleum Product Metering System are illustrated in Figure 1 and include the following:

2.1 Strainer – is a device which houses a removable perforated basket designed to collect solid materials present in the flowing stream.

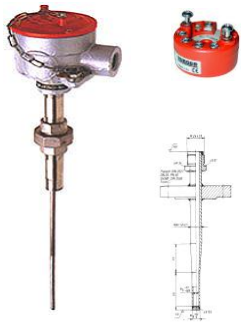
- **Design**: Cylindrical vessel with flanges and filter basket,
- **Structural materials** : Carbon Steel, Grey Cast Iron, Bronze,
- **Model** : **F104.100**
- **Nominal width** : DN 100 (4")
- **Nominal pressure** :16 bars
- **Filter mesh** :0.6 mm width
- **Maximum flow** :2.500 liters/min
- **Strainer area** : 30 dm^2
- **Operating temperature** : - 40 …+ 100 °C
- **Maximum allowed filter hydraulic resistence** : 0,3 Mpa

2.2 Air & Vapour separator – Provides air and vapour separation from fluid before flow meter. It is placed downstream before meter

- **Model:** **N178.100**
- **Design:** Vertical cylindrical vessel with flanges, sight view and float valve
- **Structural materials:** Carbon steel house, bronze, bress, rubber
- **Nominal width:** DN 100 (4")
- **Vessel volume:** 235 dm^3
- **Rated pressure:** 10 bars
- Provides air and vapour separation from fluid before flow meter. It is placed downstream before the meter
- The construction of separator complies with the confirmed Ex II(1)2G IIA execution, into the spaces with the explosion danger Zona 1. Can be used for liquids of the 1st class of hazard and the IIA sub-group of explosiveness

2.3 Temperature transmitter – Measures fluid In Line temperature and send the measurements to flow computer, for flowrate calculation at reference temperature.

- **Model**: S50 RDT Rueger,
- **Connection:** four wire system,
- **Construction:** ATEX CE Eex dII,
- **Sensing element:** Pt 100,
- **Accuracy class:** A,
- **Sheat material:** AISI 316/1.4401,
- **Installation length:** 150mm,
- **Protective sleeve:** AISI 316/1.4401
- **Transmitter:** INOR for thermo-resistance,
- **Operating temperature:** - 40 …+ 85 °C,
- **Calibration accuracy:** ± -0,2°C or ± -0,1°C of input span,
- Pre-tested by calibration autority,



2.4 Filter – It is not designed to filter the product, but to collect contaminants which may cause damage to the meter. It will be mounted up-stream flowmeter, (flange to flange)

- **Model:** F-30 Liquid Controls
- **Nominal width:** DN 100 (4")
- **Pressure:** 10.5 bars
- **Body:** Aluminum

2.5 Flowmeter – The most critical component of the metering system.The type which will be used, is the positive displacement Liquid Controls meter (PD - meter). The LC meter consist of housing in which three synchronized rotors turn with no metal – to – metal contact. Hydraulic sealing is accomplished by stationary boundary layer of liquid, not by the wiping action of mechanical parts.

- **Superior performance features**
  - **Low pressure drop** – will operate on gravity flow or pump pressure;
  - **Sustained accuracy** – no wear from metal – to – metal contact inside measuring chamber, means minimal deterioration in accuracy over time, fewer recalibrations and longer service life. Meters conform NIST and International Weights and Measures accuracy requirements
- **Performance specifications:**
  - **Model:** **M30 Liquid Controls**
  - **Nominal width:** DN 100 (4")
  - **Rated pressure:** 10.5 bars (150 PSI)
  - **Maximum flowrate:** 1700 l/min (102 m^3/h)
  - **Temperature range of metered fluids:** - 40 …+ 71 °C
- **Materials:**
  - **Housing**: 356 Alminum anodized
  - **Bearing Plates**: Ni - Resist II / Carbon
  - **Bloking Rotor:** 356 Aluminum Hardcoat Anodized
  - **Rotor Journals**: 316 S.S. Hardchrome
  - **Seals:** Buna - N
- **Own accuracy according OIML R117/95: ± 0.2%**
- **Linearity** : 0.125 % or better over a 5:1 range from max. capacity
  : 0.22 % or better over a 10:1 range from max. capacity
  : 0.5 % or better over a 40:1 range from max. capacity

2.6 Pulse Output device (POD) - converts the rotary motion of the Liquid Controls positive displacement meter into electronic pulses that allows the meter to interface with Flow Computer.

POD Pulser

Technical specifications:

- **Glandless drive:** No dinamic seals to fail or leak,
- **Pulse output:** 100 pulses per encoder revolution. Single or dual quadrature channel output. Easily adapts to remote totalizers, batch controllers, computers, PLC's and other pulse receiving device. No amplifier or signal conditioner is required,
- **Construction:** All wetted parts are 316 stainless steel or equivalent,
- **Regulatory:** Meets Weights & Measures requirements; cover to housing has a ready – made location for lead wire seal,
- **Housing:** Weatherproof,
- **Explosion Proof:** Class I, Div. 1 & 2, Groups C & D,
- **Operating Temperature Range:** - 4°C to + 85°C,
- **Connections:** 1/2" NPT conduit port with removable screw terminal block (inside) for all connections.

2.7 DVC – Digital Control Valve – hydraulic, diaphragm – actuated. The valve provides precise batch quantity control using an electronic digital batch controler (flowcomputer). Ideal for loading rack and bulk metering applications.

- **Model:** SAMPI Liquid Controls,
- **Material of construction:** Nickel plated carbon steel ASTM A – 216 – 59T – WCB;
- **Function:** two stage shut-off, flow-rate control in conjunction with any electronic register with digital flow control,
- **Liquid temperature range:** - 20°C to + 80°C,
- **Ambient temperature range:** - 20°C to + 80°C,
- **Maximum counter pressure:** 1,5 bar,
- **Maximum working pressure:** 16 bar,
- **Minimum operated pressure:** 0,09 bar,
- **Maximum viscosity:** 40 CST,
- **Maximum flowrate:** 2.000 l/min,
- **Flanges:** 4" ANSI B16.5 – 150 LB – RF,
- **Seals:** Viton/Teflon,
- **Electro Hydraulic Command:** 220V 50/60Hz,
- **Standard magnetic head:** IP65 Explosion proof Eexd IIBT6,
- **PED** certified

2.8 Flowcomputer - allows the electronic temperature compensation, the amount of product received per delivery and cumulative total. Also comands the digital valve for flow rate control at the beginning and at the end of loading process and much more.

Model: CONTREC 1010 - permits all the flow measurement and control functions expected of a loading preset, including:

- Precision flow calculation, with pulse verification to API and ISO standards, for one loading arm in the same time,
- Receiving the temperature measurement, from transmitter, calculates the volume of fluid delivered at the reference temperature (volume Correction to API tables for most petroleum products and to US and metric standards),
- Digital flow control valve ensures that the system will work with the needed flowrates limits,
- Additive Control outputs (if needed),
- Pump demand outputs with programmable delays,
- Permissive inputs for overfill, vehicle ground and emergency stop,
- Pulse Outputs.

2.9 Thermal Relief Valve – for to protect the metering system to fluid termal expansion, due to the temperature increasing.

- **Model:** Safety Relief Valve;
- **Body:** Carbon Steel, Grade WCB,
- **Temperature range:** - 59°C to + 260°C,
- **Connections:** Screwed, BSP Male,
- **Size:** DN20,
- **Set Pressure :** 10 barg.

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Extra Options:

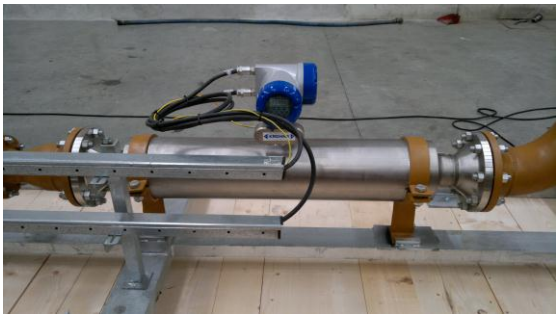
1. The metering system can be suuplied in a skid shape (delivered on a steel frame).
   The same system can be site configurated, according designer's specifications.

   The skids can be supplied with **platform,canopy and folding stairs**.

2. Gasso can supply **the metering skid for top or bottom loading**, the rack monitors,grounding monitors and dedicated software, doing also the necessary commissioning (on key basis jobs).

3. The metering system can be design to accurately measure the volumetric and mass flow, according user's standards. For mass measuring, is extra required an In Line liquid ***density transducer***.

4. Gasso can perform the analyses of each demand and do the detailed **engineering** for loading/unloading racks or other metering applications, needed in tank farms or refineries.



5. In Gasso dedicated **loading/unloading systems**, for tank trucks and railcars, the operations are controlled through a local workstation, connected to a host computer. The loading flow computer is connected to the workstation via reliable interfaces. The client's order information is loaded on the Host computer from Head Office and transmitted to the workstation, after checking client's data. The approved order is discharged into the flow computer, from where, the local operator can preset the needed delivery quantity. After finishing the loading operation, the Host data base is acualized, necessary invoice being issued. ***These activities and dedicated software*** can be made after a carefully analyse of installation owner and of existing accountant system.

6. Gasso also abe to supply **<u>Turn Key loading terminals</u>**(supply of equipment,erection,commissioning,and training)

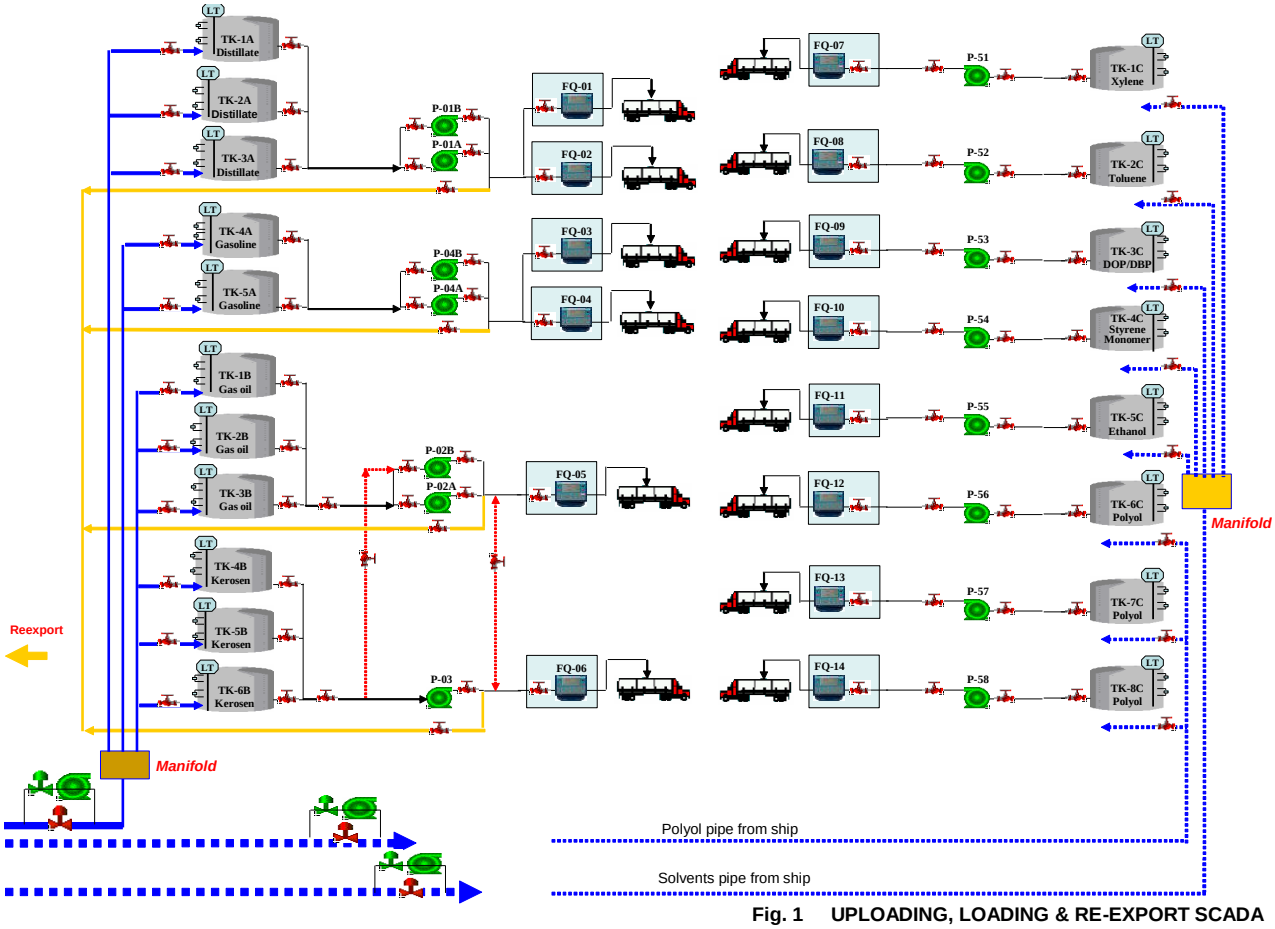


Fig. 1 UPLOADING, LOADING & RE-EXPORT SCADA

VERSION I

NO CONTAMINATION

METERING SYSTEM