# BCS Batch Measurement Controlling System

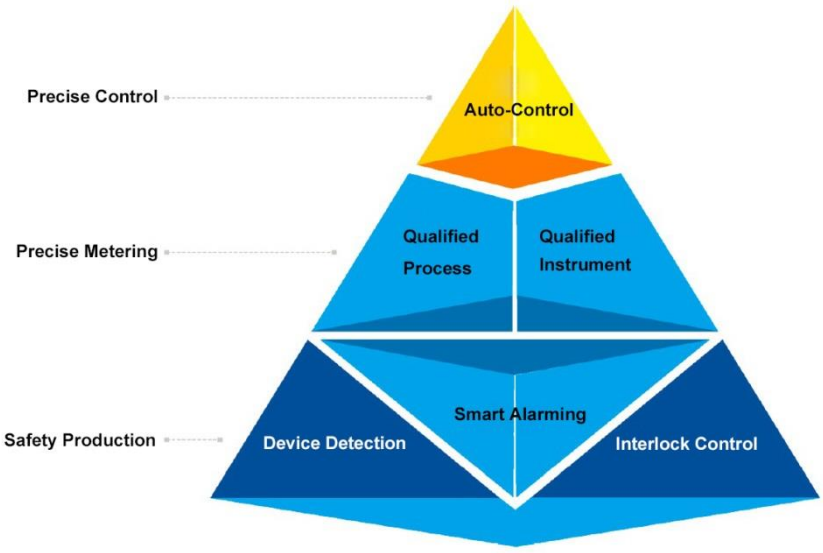
**BCS Series**

**Version 2 Amendment in 2016**

**Drafted by:** Tosilon Tech-Flow Division
**Date:** Oct 11th, 2015

Developed by Tosilon Tech-Flow Division, BCS (Batch Control System) is customer oriented focusing on precision metering control system. Combined with experiences engaging in metering filed covering Petrochemical, Fine Chemical Industry, Pharmaceutical Industry, etc., Tosilon's BCS system is becoming one of the important part among production scheduling, logistics arrangement and safety protection.

The "Modularization" and "Standardization" of the BCS makes it possible for the system to meet various demands. The "Standardization" makes it easier to have the system upgraded, Extended and Maintained, which help to improve the quality control for the production process. This design helps reducing the deliver cycle and offering wide options for metering application.

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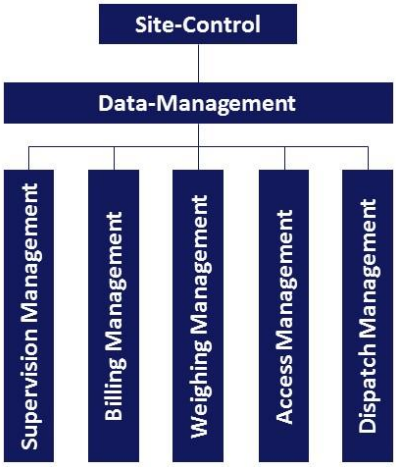
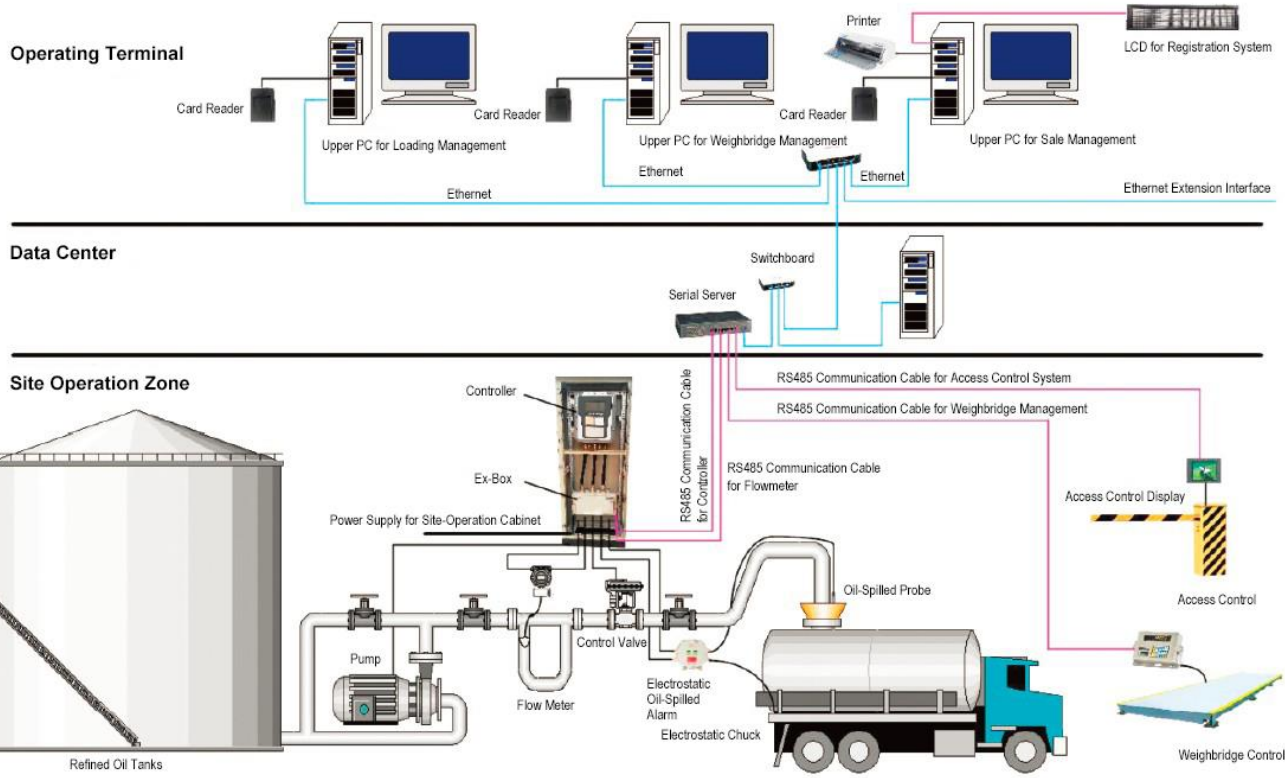
## BCS Concept

| | |
|---|---|
| Safety Production | Equipped with Safety Detection Device, collecting alarming information,<br>the "Smart Alarming" and the "Interlock Control" guarantee the safety production |
| Precision Metering | The systems satisfy the flow meter working condition, having the flow meter keep stable performance. |
| Precision Control | Based on process requests, system is able to be equipped with appropriate device. |

## BCS-100 System

| | |
|---|---|
| **Typical Application** | Batch Filling Control of the Liquids<br>Quantitative Filling Control of the Liquids |
| **Site Control** | Signal-Collection of the Site-Device;<br>Display Alarming Information |
| **Data-Management** | Processed by OPC Data Server |
| **Supervision Management** | Site Centralized Monitoring;<br>Historical Data Query;<br>Historical Data Curves |
| **Billing Management** | Billing for Delivery of Cargo from Storage;<br>Account<br>Data Statistics for Delivery of Cargo from Storage;<br>Historical Data Query<br>Accessible to Database, managing data from purchase, storage and sale |
| **Weighing Management** | Monitoring Weighing Process;<br>Weighing Data-Collection;<br>Anti-Cheating for Custody Transfer Metering |
| **Access Management** | Vehicle Entrance Management;<br>Vehicle Release Authority;<br>Recording |
| **Dispatch Management** | Arrangement for Loading Process |





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## BCS-100 solution to easy-gasified Liquids

Medium including Liquefied Gas, Propane, Isobutane, C5, Liquefied Ammonia, etc., are transferred under liquid state. During the loading / offloading process, the medium is easy gasified caused by changing pressure, temperature, etc. The metering could not keep stable and accurate performance.

The BCS-100 system is designed based on years of experiences in site application. The design is focus on easy-gasified liquids transfer. By adopting unique design, the system reduces the influence to metering during the loading / offloading, which meet GB/T20901-2007 Standard of Custody Transfer Metering. The BCS-100 system has the loading / offloading process simplified and increase the operation efficiency.

In the past years, the "Overloading of the Liquefied Gas" is happened occasionally among some Petrochemical companies by "Manual Loading". After applying BCS-100 system, the operation realized automatic control. By Weighbridge comparison, the system accuracy in metering is better than 0.3% F.S. Approved by local authorities, the BCS-100 is qualified to Custody Transfer Metering.



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## BCS-100 Solution to Liquid Hydrocarbon Custody Transfer Metering

With the increasing possessing capacity of the automobile, the demand for refined oil product is increasing. Many oil refineries transfer thousands tons of oil per day. The high efficiency and safety control in oil-transfer is becoming a urgent demand by these companies.

BCS-100 optimizes the whole loading / unloading process. There are multi-control modes for options based on different application, which simplifies the operation process.

In the past year, some Petrochemical plant transfer the oil based on mass. During the billing, the operator calculate the mass according to the tank volume and the oil density. Due to the fact the actual oil density varies by changing temperature, the actual oil filling accuracy is beyond the standard which bring inefficiency for oil transfer. After applying BCS-100, the system is set based on actual demand (30t), the data measured by the flow meter is compensated in real-time, and the transfer process is deployed automatically. The accuracy controlled is ±5kg, the system accuracy is within 50kg, which increase the efficiency for loading process and replace the metering mode of weighbridge.



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## Small Quantity Custody Transfer Metering Skid

For small quantity loading process, the operation frequency of the oil transfer is higher. The accumulative error will be large after long period operation. For most companies, the small quantity loading is deployed manually, which raise the loading error and bring inconvenience to the operation and raise the operation cost.

For actual application, for example, one Lubricant Oil Plant needs to fill 200L barrel. The error accepted is 170kg±0.5kg. The former filling process is done manually, which makes the Max. Error to be 2.3kg. The qualified rate is 73.77%

After applying BCS-100 system, the whole filling process is deployed automatically, the error controlled is 170kg±0.3kg, the qualified rate


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## CZL Series Batch Controller


| CZL Batch Controller | |
|---|---|
| Power Supply | 20.4~28.8 VDC; Starting Current: 1A; non-loaded |
| | 100~240 V AC, 50Hz |
| **Input Character** | |
| Flow Input | High-Speed Counting<br>2-Channel 0~30KHz, Input Amplitude (> DC 4V);<br>4-Channel for Option, Input Amplitude (> DC 15V) |
| | Analog (0~10V) / 0~20mA, 12-bit Resolution Ratio, 5μA (Max.), available for extension |
| Digital Input | 10 points, Passive Input or Active Input (Optional), accessible to valve feedback (switch signal), Level Alarm, GND Alarm |
| Analog Input | 2-channel, 0~10V / 0~20mA, Single-Ended Input, 12-bit Resolution Ratio, ±1% F.S,<br>accessible to valve feedback (analog signal), pressure transmitter signal input and temperature signal input |
| **Output Character** | |
| Digital Output | 10 points |
| | 5~28.8V DC (24V DC Power Supply) |
| | 5~30 V DC / 5~250 V AC (220V AC Power Supply) |
| | Available for Valve Output Control, Pump Output Control, Alarm Output Control, etc. |
| Analog Output | 0~10V / 0~20mA, 12-bit Resolution Ratio, ±2% F.S, available for valve control, transmitter analog signal output<br>Max. driving voltage ≥5000Ω, current output≤ 500Ω |
| **Communication** | |
| Modbus | 1.2 Kbaud ~ 115.2 Kbaud, 8-bit communication data, CRC check |
| | Standard RS485 Communication Cable, Communication Distance is related to the Baud rate<br>Communication Distance: ≤500m (9.6 Kbaud Repeater is not used)<br>Communication Distance: ≤1000m (9.6 Kbaud Repeater is used) |
| Profibus DP | 9.6Kbaud, 19.2 Kbaud, 45.5 Kbaud ~ 500 Kbaud, profibus-DP (slave station)<br>Communication Distance: 1200m (Standard Profibus Cable <93.75 KB) |


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| CZL Batch Controller | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Code | Model | | | | | | | |
| 3 | CZL3 | | | | | | | |
| 4 | CZL4 | | | | | | | |
| 5 | CZL5 | | | | | | | |
| | Code | Control Part | | | | | | |
| | S | Single Board Computer | | | | | | |
| | P | PLC | | | | | | |
| | | Code | Valve Control Mode | | | | | |
| | | 1 | 1 AO (Control Valve) | | | | | |
| | | 2 | 1 DO (Switch Control Valve) | | | | | |
| | | 3 | 2 DO (Switch Valve) | | | | | |
| | | 4 | Other Methods | | | | | |
| | | | Code | Extension | | | | |
| | | | N | None | | | | |
| | | | C | IC-Card | | | | |
| | | | | Code | Communication | | | |
| | | | | N | NONE | | | |
| | | | | M | Modbus RTU | | | |
| | | | | P | Profibus | | | |
| | | | | C | CAN | | | |
| | | | | S | Others | | | |
| | | | | | Code | Control Mode | | |
| | | | | | 1 | Single Flow Meter Control | | |
| | | | | | 2 | Double Flow Meters Control | | |
| | | | | | | Code | Special | |
| | | | | | | N | Normal | |
| | | | | | | L | Liquefied Gas | |
| | | | | | | S | Special | |
| | | | | | | | Code | Power Supply |
| | | | | | | | 1 | 220V AC |
| | | | | | | | 2 | 24V DC |

| Model | Control Part | Valve Control Mode | Extension | Communication | Control Mode | Special | Power Supply |
|---|---|---|---|---|---|---|---|
| CZL3 | S | 1, 2, 3 | N | M | 1 | N | 1 |
| CZL4 | P | 1, 2, 3 | N, C | M, N, P | 1, 2 | N, L, S | 1, 2 |
| CZL5 | S, P | 1, 2, 3, 4 | N, C | M, N, P, C | 1, 2 | N, L, S | 1, 2 |


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## BCS Reference List

| Client | Medium Processed |
|---|---|
| PetroChina Ningxia Refining & Chemical Co., Ltd | Diesel, Gasoline |
| PetroChina Urumchi Petrochemical Branch Oil Refinery | Liquefied Gas |
| PetroChina Karamay Oil Refinery | Liquefied Gas |
| PetroChina Jingmen Branch | Liquefied Gas |
| PetroChina Lanzhou Lubricating Oil Plant | Lubricating Oil |
| PetroChina Jingmen Branch | Refined Oil |
| PetroChina Jingmen Branch | Lubricating Oil |
| Shangdong Jinmao Yuan | Chemicals |
| Shangdong Jinqi Meng Group Chemical Fertilizer Plant | Chemicals |
| Shangdong Wantong Group | Refined Oil |
| Shandong Chengwu Tank Farm | Refined Oil |
| Shandong Zibo Yongda Chemical | Refined Oil |
| Shandong Dongying Haike New Energy Chemical | Refined Oil |
| Shandong Shouguang Luqing Chemical | Refined Oil |
| Fushun No.1 Plant Loading Platform | Lubricating Oil, Base Oil |
| Karamay Jinyuan Fine Chemical Industry Co., Ltd | Liquefied Gas |
| Liaoning Fushun Longyuan Tank Farm | Refined Oil |
| South-West Oil & Gas Field | Refined Oil, Liquefied Gas |
| Tangshan Sanyou Chemical | Chlor-Alkali |
| Zhangjia Gang Yueyang Harbour | Propylene Epoxide |
| Henan Xinxiang Yongsheng Chemical | Refined Oil |
| Xianyang Oil Refinery | Liquefied Gas |
| Shandong Dongchen Group | Propylene Epoxide |
| Liaocheng Luxi No.2 Chemical Fertilizer Plant | Methanol |
| Jiujiang Qixin Chemical | Liquefied Gas, Refined Oil |
| Jiujiang Hualu Petrochemical Co., Ltd | Solvent Oil |
| Lianyungang Henrui Pharmaceutical Co., Ltd | Chemicals |
| Guangzhou Petrochemical Arene Loading Platform | Methylbenzene |
| Panjin North Asphalt Co., Ltd | Refined Oil |
| Beijing Liquefied Gas Co., Ltd | Liquefied Gas |
| Jiangsu Changqingshu | Refined Oil |
| Lanzhou Sanye Co., Ltd | Lubricating Oil |
| Shandong Qiwang Da Group | Refined Oil, Liquefied Gas |
| Shangdong Youtai Group | Refined Oil, Liquefied Gas |
| Shandong Ruichang Chemical Co., Ltd | Refined Oil |
| Shengli Oilfield Dongsheng Group | Crude Oil |


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