

PRESSURE TESTING SYSTEM AUTOMATION AND CONTROL



High pressure testing systems with intelligent control systems designed and implemented by our fully qualified and experienced controls engineers; enabling functions and environmental conditions to be accurately and efficiently automated, controlled and recorded.



Managed with Programmable Logic Controllers (PLC's) and pre-programmed with the latest software, the operating process is simple and self-managing, providing vast levels of flexibility for all the required automated procedures.

Automated Control Systems

The control system usually comprises of the following modules:

- Automated Fluid Control Module (Fill and Drain System)
- Automated Pressure and Temperature Control System
- Siemens S7-1200 and S7-1500 range PLC Systems
- Dashboard either HMI or SCADA System



Automated Fluid Control Module (FCM)



Fill and Drain Systems

Comprises of the following sub-modules:

- Fill and Drain Skid
- Fluid Holding Tank (integrated or external)

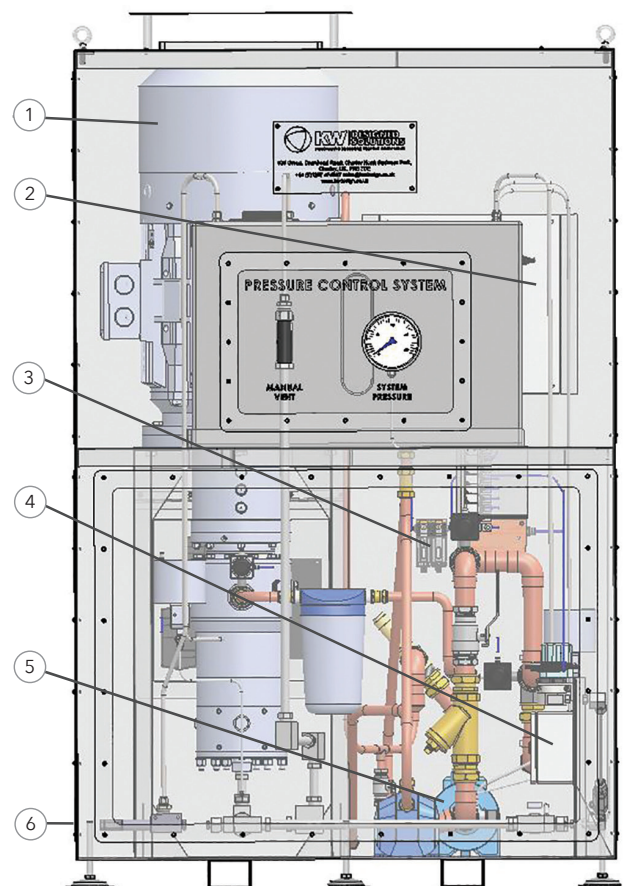
The fill and drain system provides automatic filling, purging and draining of the pressure vessel. This is achieved by incorporating an electrically driven pump and sequencing valves that are controlled via the PLC.

- Filling
- Depressurising
- Purging
- Draining
- Pressurising

To ensure operator safety and prevent damage to expensive OEM equipment, safety devices such as pressure indicators, over pressure relief devices and auto shut-off mechanisms are incorporated into each system.

Our Fluid Control Modules are designed and manufactured in-house, with a modular approach. They are easily configurable to provide variable levels of functionality to meet each customer's specific requirement.

Fluid Control Modules are equipped with our PLC and HMI system that has been specifically developed by our internal controls department. This system is a fully self-managed system and user friendly to navigate and operate. Any version of Siemens TIA Portal, from version 11 through to the latest 17, is catered for.



Fluid Control Module (FCM)

- | | |
|----------------------|-----------------------|
| ① High Pressure Pump | ④ Electrical Assembly |
| ② Purging Tank | ⑤ Low Pressure Pump |
| ③ Pneumatic Assembly | ⑥ Frame Assembly |

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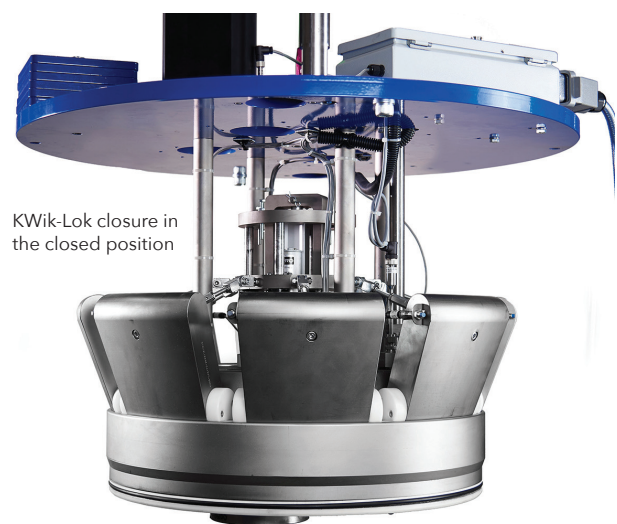
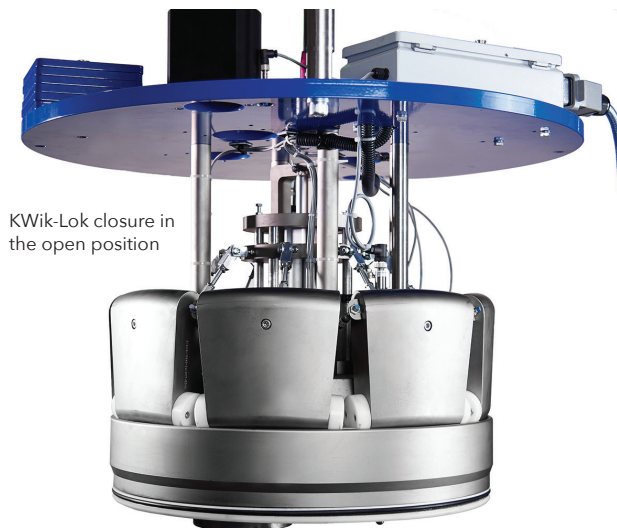
Sub-system Interfacing

In addition to managing all aspects of fluid flow, our systems have been developed to incorporate customer specific specialist application tooling into our high pressure testing systems, setting us apart from other pressure testing system manufacturers.

Our automation control systems can include additional customer specific functionality:

- Quick-Acting Closures
- Mate/ De-Mate Actuation
- Temperature Control
- Pressure Vessel Tilting
- Mechanical Straining
- Actuation Systems
- IBL Testing
- Agitators and Stirrers
- Media Separation

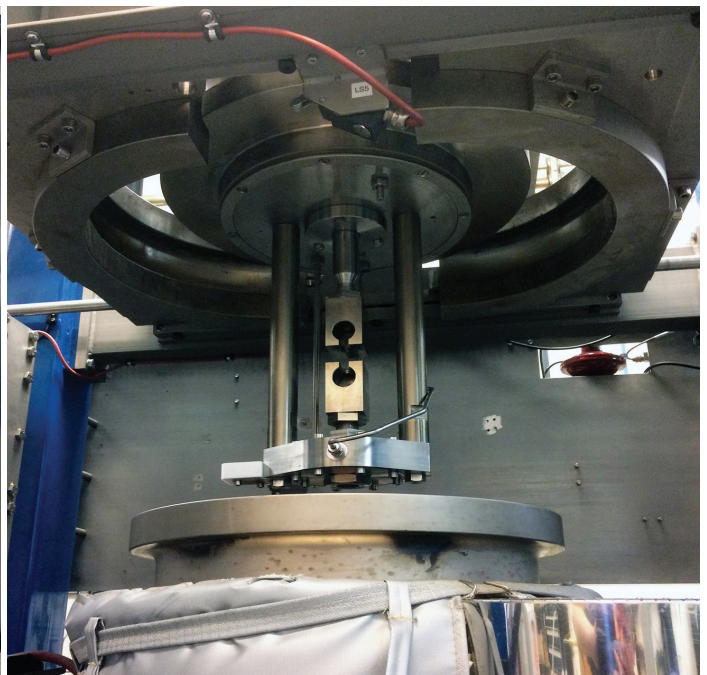
KWik-Lok quick-acting closure designed and developed for improving product change-out more safely and easier



Internal Tooling



Mechanical Straining



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Enclosure Styles

We design, configure and produce customer-specific enclosures for a diverse range of high pressure testing applications to house the vital functional components and to protect the pressure equipment.



Our versatile rugged automation control platforms are designed to provide the most cost-efficient solution for the essential applications and provide easy maintenance access.

Enclosure styles include:

- Open Frame
- Fully Enclosed Frame
- Incorporated HMI Panel
- Remote HMI Panel



Fill and Drain/ Fluid Holding Tank Options

We design and configure variable fill/ drain and fluid test media holding tanks for our pressure testing systems.

The fill and drain system will provide specific parameters, such as flow rates for filling and draining the pressure testing system as well as purging, this is achieved by incorporating an electrically driven pump and sequencing valves that are controlled via the PLC.



The fluid storage tanks are generally manufactured from plastic/ GRP and are sized and specified adequately for the volume of the proposed pressure testing vessel for storing the test medium. The tanks connect to interconnecting pipe runs and are equipped with suitable filtration units to ensure clean water supply to the pressure testing vessel.

Fill and drain/ fluid holding tank options include:

- Integrated Fluid Holding Tank
- External Fluid Holding Tank
- Mains Supply Fill and Gravity Drain
- Pumped Fill and Drain



Pressurisation and Depressurisation Options

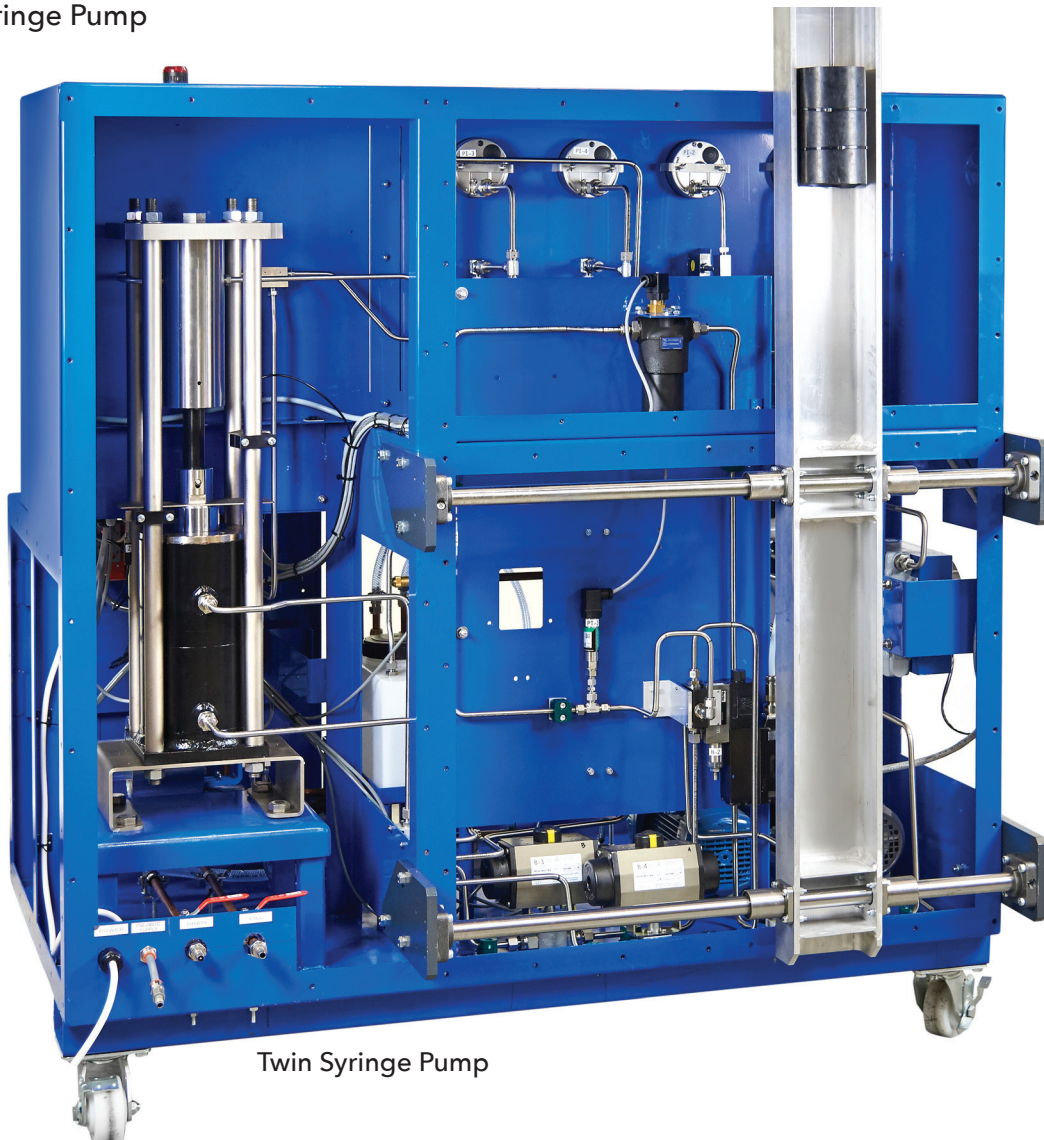
We design and configure the pressure control system which provides pressurisation and depressurisation of the pressure testing system once the pressure testing vessel has been filled and purged via the fill and drain system.

Pressurisation

- Non-linear Pressurisation Mode
 - Electric Charge Pump
- Non-linear Pressurisation Mode
 - Pneumatic Charge Pump
- Linear Pressurisation Mode
 - Electric Charge Pump
- Linear Pressurisation Mode
 - Twin Syringe Pump

Depressurisation

- Linear Depressurisation Mode
 - Back Pressure Regulator
- Non-linear Depressurisation Mode
 - Valve and Capillary
- Linear Pressurisation Mode - Twin Syringe Pump



Twin Syringe Pump

Programmable Logic Controller (PLC) and Profiles

PLC

PLC's are used to control our current standardised pressure testing equipment modules, including controlling variable pressures, along with filling and draining the pressure testing vessel. The PLC also controls additional features such as the tilting, mate de-mate, temperature and agitation functions for the pressure testing system.

- Fill and Drain Control
- Pressure Control
- Temperature Control
- Sub-system Interfacing

Profiles

Referred to as recipes, each equipment module can be selected in a profile or recipe. Up to 20 recipes can be stored and each recipe can hold up to 100 functions. Recipes are able to loop between steps, whole recipes can also be looped. SCADA system recipe functions and limits are defined by customer requirements.

There are 3 modes of operation: Automatic (recipe) Mode, Manual Phase Mode (pressure and fill), Manual 'in-hand' Mode (fully manual process, open valves, etc).

It is also vitally important to ensure the highest standards of safety, by ensuring alarm conditioning and safety interlock systems are in place.



User Level Access Control

Our user access control can be configured to any desired level which allows multiple users to have their own unique username and password to log in and operate the system. This system allows the user access to be controlled by job title or operator level.

- Operator
- Supervisor
- Engineer
- Administrator

Data Logging

We have 2 types of HMI data logging available. The first is a standard CSV (Comma Separated Values) file, which can hold up to 500,000 data points per CSV file. The second can hold up to 1,048,575 data points with each data point having its own column and a variable capture rate. SCADA Systems have the capability of creating custom-made reporting packages.

The HMI interfaces with the pre-programmed PLC that controls the sequence of operations and allows for the writing, editing, saving, loading and execution of customer-specific test profiles, which includes specific pressurisation and depressurisation at controlled ramp rates, also pressurised dwell periods. The system includes data logging for rigorous test regime reporting.

Automated Pressure Control

Automated pressure control systems with pre-defined programmable functions to self-manage the control modes of the pressure testing system. Our pressure control system also gives users the ability to manually control. This feature provides a one-off test without the need to create test profiles. This control mode still allows for specific ramp rates to be defined for the one-off test.

- Filling, Purging and Draining Control
- Pressure Control
- Temperature Control
- Dwell Periods

(Pressure Maintain and Lock Off Modes Enabled)

- Ramp Rate Control



Automated Temperature Control

Designed, developed and engineered high pressure testing systems with temperature control. Our Temperature Control Systems comprise of the following key items and features: A Thermoregulation Control Unit (TCU) consisting of Heating and Chilling Units will transfer heat to and from the vessel by circulating a heat transferring process fluid through heat exchangers on the external surface of the vessel body. This ensures a constant and stable temperature control range between -50°C and 400°C.

Our pressure control systems are designed in-house and are continuously being developed to improve efficiency, reliability and productivity much more safely.

