

## Compressed Gas Filling (USA)



CC-Link provides the “open” network backbone for a high-pressure gas filling system at ILL-MO in their Jacksonville, Illinois facility. The compressed gases handled at this facility are Oxygen, Argon, Nitrogen, Carbon Dioxide and Helium. This system was designed and installed by Weldcoa of Auroa, Illinois. The CC-Link network enables communication between PLCs, motion controllers, pneumatic valve manifolds, variable frequency drives (VFDs), digital I/O, and analog I/O devices. CC-Link handles remote device interfacing, integrating equipment from different manufacturers, data collection, information handling, and data exchange between PLCs and machine control elements.

The control system and CC-Link network assure gas purity, filling accuracy, and handles all operational functions of the gas filling controls. In this application, CC-Link enabled equipment from these different manufacturers to communicate over the same network:

WAGO Corp. – I/O modules

SMC Corp. – Pneumatic valve manifolds

Mitsubishi Electric Co. – PLCs, HMIs, VFDs, I/O modules

### Additional Benefits

The use of the CC-Link network results in significant reductions in conduit and wiring expenses. Instead of long wire runs from each field device back to a central controller, now a simple communication cable interconnects all gas-filling devices on the network. Also, this approach eliminates the wiring mistakes so common with non-networked systems. Less skilled personnel can be utilized for the field-wiring task. Thus, field installation requires far less time and system start-up is considerably more efficient with less downtime for the end-user.

From the designer’s perspective, a CC-Link networked system requires less engineering time, fewer CAD hours, less installation print

production, and enables simplified panel layout and design, and the use of space saving components. CC-Link also allows easy future expansion of the system, which in today’s rapidly changing environment is an important benefit.

### Description of the CC-Link Based System

One CC-Link Master controls a single gas-filling island where a variety of I/O devices transmit thermocouple, digital, and analog information.

### Mix Gas Filling Station

As the name implies, the Mix Station fills gas tanks with a mixture of different gases. An operator determines the portions and types of gases to be mixed through a touch panel HMI (Human Machine Interface) located on the front panel of the control enclosure. In this photo, the back of the HMI can be seen in the open panel door. The CC-Link Master module is located in the backplane of a Mitsubishi PLC rack. Information is transmitted via CC-Link to control the pumps and valves to provide the proper gas mixture requested by the operator.

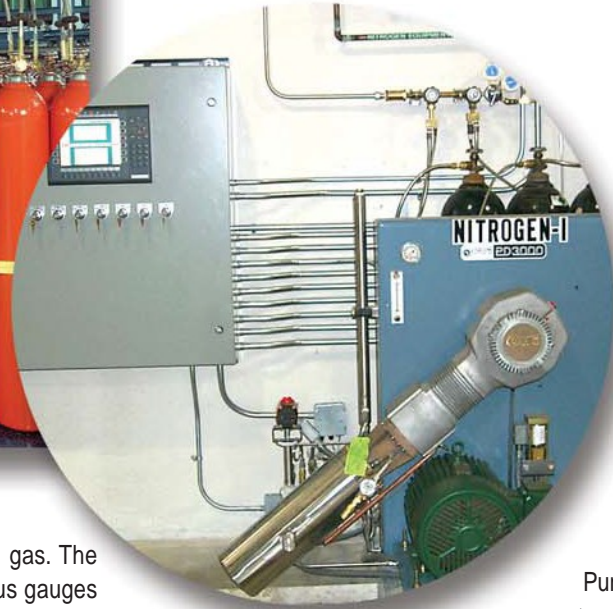


### Inert Gas Filling Station

At this station gas tanks are filled with the selected Inert gas. The front of the Inert Gas Filling control panel contains numerous gauges and valves as well as another Human Machine Interface (HMI) device. Inside the control panel is a Mitsubishi Micro PLC. This PLC integrates the numerous gauges, valves, push buttons, and HMI onto the CC-Link network.

### Oxygen Gas Filling Station

At this station gas tanks are filled with oxygen. The front of the Oxygen Filling control panel contains several gauges and valves as well as another Human Machine Interface (HMI) device. Inside the control panel is a Mitsubishi Micro PLC. This PLC integrates the numerous gauges, valves, push buttons, and HMI onto the CC-Link network.



The final part of the system is the Pump and VFD control system. The VFD Control cabinet houses three Variable Frequency Drives (VFDs), each communicating on the CC-Link network. The VFDs control the pumps for filling the gas containers. A single pump may be used at several different gas-filling stations at different times, therefore the pump control needs to know which pump is operating at all times. This information is obtained through the use of the CC-Link network. Also in that cabinet is an I/O module for controlling the pump starters and various other I/O devices.