With an experience of over several decades in the field of process control and steam engineering, Forbes Marshall provides end-to-end solutions in the form of stand-alone piping skids along with controllers for various industries. A strong knowledge base coupled with an application oriented approach and precise engineering has made us the preferred supplier for these skids for handling services like cooling water, steam, nitrogen, argon and fluids like oxygen, hydrogen and natural gas.

The concept of complete piping and valve stations with field instrumentation as well as control systems, provides an enhanced value to the industry in terms of accurate control over process parameters and ensures safety. Forbes Marshall has installed and proven packages for metal industries like steel, zinc, lead, cement and glass industries, including test bed automation.

Our team of finest engineers are dedicated to serve the process industry across diverse sectors. World class manufacturing facilities and technology enables us deliver quality solution globally. Our unique complimentary expertise enables us engineer customised systems that simplifies transfer operation and precise process control. We partner customers with our knowledge, comprehensive range of services, products and solutions for precise measurement and control of process.
Low Temperature Trip Protection (LTTP) system is a safety shut-off system for pressurised gas containers, utility gases like nitrogen, argon, oxygen, etc. are regularly used for plant operation as well as process improvements in core and process industries. It ensures only ambient temperature gas supply to the process plant thereby protecting down-the-line instruments and equipment as well as piping. It trips-off the gas flow to the process if the temperature of gas starts falling below a certain limit. This prevents the instruments and piping from getting exposed to ultra-low temperatures ensuring safe operation.

Why is it required?

Industrial gas plant owners use air separator units (ASU) to generate various gases. The gases from the ASU are transported to storage plants in a liquefied state. Depending upon the requirement, the end user also may have gas storage vessels, continuously refilled with pressurised liquefied gas from industrial gas suppliers, within their premises.

This liquid state gas is obviously stored at high pressure and in cryogenic temperature. For process operation, the liquefied gas needs to be in a gaseous state and at ambient temperature, as well as moderate pressure to protect the process equipment, instruments and piping using these gases from damage.

An evaporator is generally used at the outlet of gas storage vessels to convert the liquefied gas to its gaseous state. Since evaporators are purely mechanical heat exchanging devices, no feedback facility is available to identify if the desired gas state is being achieved at outlet or not. They are purely dependent on temperature gradient between storage gas and ambient temperature. In case gases in the evaporator fail to attain gaseous state at outlet, process instruments get directly exposed to low temperature liquid state gas. An LTTP system at the outlet of the evaporator ensures a tripping action at low temperature.
### The Forbes Marshall Solution

The Forbes Marshall packaged LTTP solution includes a piping skid along with a control system to ensure safety cut-off of gas flow line in case of evaporator failure/malfunction. The system gives local indication of valve open/close and real-time temperature and pressure values in gas supply line. It is also capable of recording trends with specific time stampings which can be used for analysis in case of repetitive trips.

A manual reset arrangement is provided to reset the system after every trip event. The skid is fabricated in two parts—sensing section and trip mechanism. During erection, sufficient distance is maintained between the sensing and trip mechanism, which is decided based on various factors like type of gas, trip temperature, flow rate, average ambient temperature in area of installation, etc. The system design is different for different conditions and service in use. The safety shut-off valve also acts as a pressure reducing valve in case of pressure reduction is required at downstream. The control system can be programmed for operation of the same valve for pressure reduction during normal operation and shut-off during eventuality.

### Points taken into consideration while designing the system

- Transition from the liquid to the gas phase involves rapid vaporisation and flashing effect
- Velocity during transition impacts the pipeline/equipment to a greater extent as compared to pure liquid or pure gaseous state
- Some gases tend to develop electrostatic charge in the pipeline when they flow at higher velocities. In such cases, the system is highly vulnerable to fire, instrument damage due, and in some cases, accidents, especially in hazardous plants
- Degreasing, smooth surface finish, pickling and passivation and other special treatments may be required for some specific gases
- **Attention to detail at the time of designing, backed by our expertise and experience, prevents the plant from getting exposed to high risk and potential damage.**

### Benefits

- Physical damage to, or malfunctioning of the system is prevented since equipment, instruments and pipelines are protected from exposure to low temperature gases
- Prevents the possibility of potential threat to the plant from electrostatic charges produced during the transition phase
- System doubles up as a pressure reducing system if required, with control system swiftly working in that mode
- User-friendly design, customised considering all requirements right from operator level to administrator level
- Maintenance schedule for gas storage plant equipment can be derived based on determination of abnormality