

Technical Proposal

for

CONTROL SYSTEM FOR GAS COMPRESSOR STATION OF BINAK

DOCUMENT REVISION AND STATUS OVERVIEW:

Revision	Status	Date	Prepared	Checked	Approved
0	First Issue	30 May 2023	S.Ghorbani	M.Mohseni	P.Sharifian
1	Second Issue	02 Sep 2023	S.Ghorbani	M.Mohseni	P.Sharifian
2	Third Issue	25 May 2024	S.Ghorbani	M.Mohseni	P.Sharifian
3	Forth Issue	09 July 2024	S.Ghorbani	M.Mohseni	P.Sharifian

Table of Contents

1	iNtroduction	3
2	Technical Solution for Control & Safety system	4
2-1	PROCESS CONTROL SYSTEM	4
2.2	C300 Introduction	4
2.3	Experion PKS™ Operator Station	4
2.4	Fault Tolerant Ethernet	5
2.5	Control Equipment	7
2.5.1	C300 Controller for Process Control	7
3	Bill of Materials	7
4	Documentation	8
5	SCOPE OF SUPPLY/WORK	8
6	Factory Acceptance Test – FAT	8
7	Installation and Erection Works, Site Acceptance Test, Loop Checks	8
8	Training	8
9	APPENDIXES	9
	App 1-IO Table	9
	App 2-BOM	9
	App 3-System Architecture	9
	App 4-Time Schedule	9

1 INTRODUCTION

IDEH GLOBAL KISH (ISO 9001: 2015, ISO 14001: 2015, ISO 45001: 2018, ISO/TS 29001:2010 &HSE) is a solution provider company that delivers Engineering, Procurement, Construction, Maintenance and Project Management solutions on Instrumentation, Control System and Automation for oil & Gas, Petrochemical, and refineries clients. We specialize in Design, Engineering, System Integration, installing and site support/commissioning the highest quality and most advanced process and plant control systems. We leverage on our expertise and experience to offer customized solutions to the customers in Emerson DeltaV DCS, Emerson DeltaV SIS, Honeywell Experion DCS, Subtek DCS and variety of PLC / SCADA and Field Instruments.



The automation and control engineering services execution at IDEH GLOBAL KISH is done by continuous supervision of well-experienced Team Leaders, each with more than a decade of enriched control systems experience of various platform and third party interfaces. Thus our customers can unleash the potential of every employee in the utility to serve customers with better quality. Our team is focused on providing specialist support services to main process automation for their customer's industrial requirements.

In recent years and because of some projects same as:

Persian Gulf Bandar Abbas Gas Condensate Refinery

South Pars, Gas Field Development, Phase 19

South Pars, Gas Field Development, Phase 14

Light Naphtha & Isomerization in Tehran refinery

Bandar Abbas Refinery Gasoline increase Project



With considering the size of projects, size of network, complexity of process and also scope of work, what done in IDEH GLOBAL are unique and based on obtained experiences and confidence and created infrastructure (more than 120 qualified and trained engineer, about 1000 square meters office and 3000 square meters workshop) for sure with support of project's parties' future projects will be executed with minimum challenge and maximum quality.



2 TECHNICAL SOLUTION FOR CONTROL & SAFETY SYSTEM

IDEH GLOBAL's scope of supply is to provide a DCS system for the **CONTROL SYSTEM FOR GAS COMPRESSOR STATION OF BINAK**. The offered Control System consists of Control System. Our solution is based on Honeywell Experion PKS that helps industrial manufacturers increase their profitability and productivity. This section has for objective to define the IDEH GLOBAL scope and consider the assumptions and general notes. Since IDEH GLOBAL's project organization is well experienced in automation of petrochemical industries, we have included all our experience from previous projects into the considerations for preparing this proposal. Our proposal includes all necessary equipment and services in order to provide a complete and workable automation system as turnkey supply. For delivery limits, comments and deviations regarding the Technical Specification please refer attachments of our technical proposal.

2-1 PROCESS CONTROL SYSTEM

2.2 C300 Introduction

The purpose of this document is to align HONEYWELL solution with the customer's system architecture objectives. This chapter describes the functions of various elements of the C300 System and the manner in which these elements will meet the operational requirements.

2.3 Experion PKS™ Operator Station

Introduction

The Experion Station employs industry-leading technology and advanced features to provide the operations platform required for today's enterprises. Addressing today's needs and tomorrow's requirements is the hallmark of the HMIWeb technology at the heart of the Experion Station.

There are several types of Experion Station available to satisfy a broad range of needs. They include:

- Experion Station – Flex (ES-F)
- Experion Station – Console (ES-C)

In addition to the Experion Stations cited above, a wireless configuration called Mobile Station PKS is also available. All Experion Station types utilize the same operator interface and share the available feature set for consistent operation regardless of node. This also means that configuration is simplified as custom displays, trend sets, etc. are configured once and available across the various types of Experion Stations.

A mix of Experion Station types can be implemented to provide the most appropriate, site-specific solution possible.

Experion Station Flex

The ES-F is a very versatile operator interface. Since it utilizes a client-server relationship to present process data to the operator, it can be applied anywhere as long as it has a connection to the server (or redundant servers), including Internet, wireless and dial-up connections. When configuring an ES-F, the user has a choice of connection methods:

- Static – Provides a permanent, dedicated link to a specific ES-F. This is the recommended connection type when used for fulltime operations.
- Rotary – Provides an “as required” connection to an ES-F. This is the recommended connection type for staff who does not need full-time access.

Rotary connections are advantageous from a licensing point of view because your license only specifies the number of simultaneously connected ES-Fs (concurrent-use licensing). Rotary Stations also provide the option of using the Experion Station interface or Microsoft's Internet Explorer (IE). IE is ideal for staff that wants to use familiar desktop tools to interact with the process. All the security mechanisms of the Experion Station are employed when using Internet Explorer to protect your process from unauthorized changes. The performance benefits even reach above and beyond the economic benefits of implementing ES-Fs in Experion PKS architecture. For instance, the Experion Server subscribes to data and alarms / events on a proxy basis for each ES-F as required. This results in the minimum possible communications to the CEE Devices (C200/C300 controller, ACE, etc.).

Experion Station Console

An ES-Console provides all the capabilities of an ES-F except that it communicates directly to the Experion CEE subsystem (supports devices such as the C200 & C300 controller, ACE, etc). This provides a high-availability operations platform for critical processes.

This node is designed specifically for processes that run continuously and require operations personnel to maintain a constant view of that process.

Some key characteristics of the ES-Console include:

- Direct connection to data and alarms/events to direct data sources such as C200 controllers, ACE nodes, Foundation Fieldbus Interface Modules, etc. within a cluster Server even when the server is unavailable;
- Fault Tolerant Ethernet (FTE) –based node that requires the subsystems it directly connects with to also be connected with FTE;
- No duplicate database configuration – no extra engineering effort to add an ES-Console to a system;
- Multi-window functionality (including SafeView®) is standard functionality with each ES-Console;

For further characteristics of proposed HMI solution please refer to attached Specifications & Technical data.

2.4 Fault Tolerant Ethernet

Introduction

Fault Tolerant Ethernet (FTE) is the control network of Experion PKS. It is dedicated to the control mission- providing not only fault tolerance but also the fast response, determinism, and security required for industrial control applications. FTE unites Honeywell's expertise in designing robust control networks with commercial Ethernet technology in a patented advanced networking solution. While FTE is not a general purpose Information Technology (IT) network due to its control mission, it leverages commercial Ethernet technology found in IT networks to lower the costs of the FTE network infrastructure, connections to IT networks, connections to 3rd party Ethernet devices, and on-going maintenance and support.

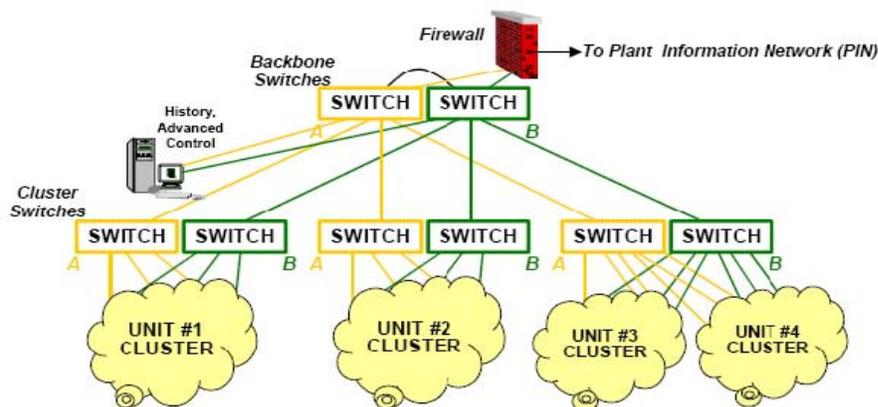
Conventional Ethernet redundancy schemes typically employ two Ethernet networks, with each node (server or station) connected to both. If there is a failure on one network, the time for a node to switch to the other network can range from under 10 to over 30 seconds, depending upon network complexity and the equipment used. FTE, however, employs a single network and does not require a node to re-establish its network connection. As a result, switchover time is much faster – under one second!

By providing twice as many communication paths between nodes, FTE also tolerates more faults- all single faults and many multiple faults. In addition, FTE is transparent to higher-level applications, which

benefit from the high network availability FTE provides without requiring additional software configuration. Normal Ethernet nodes (non-FTE) can also connect to an FTE network and benefit from a more available communications environment than conventional Ethernet redundancy schemes offer.

FTE Network Architecture

An FTE network interconnects clusters of nodes. A node is a networked device used in control applications. A cluster is a set of nodes typically involved with the same process unit, for example, a server, operator stations, and controllers.



Basic FTE Network Architecture

Nodes in a cluster have high intercommunication, so it often makes sense to connect them to the same pair of switches, called cluster switches. But that's not a requirement; they will communicate properly wherever they are connected in the FTE network. The figure before shows the principal for the required clustering each cluster has its dedicated redundant Experion PKS™ process server, which hosts all cluster relevant data. It provides console operator stations with required data for robust process monitoring and operation, contains the cluster-based process data base, and hosts communication to controllers, either process or failsafe controllers. Further the server is responsible for data exchange to other cluster servers via Honeywell's patented Distributed Systems Architecture DSA. For a more detailed description of DSA please refer to the next chapter.

The basic FTE network architecture is two parallel tree hierarchies of up to 3 levels of switches and cables that are joined to form a single network. The trees are designated A and B; their separate identity is maintained by color-coding and tagging cables and equipment ports. An *FTE node* contains FTE software and dual Network Interface Controllers (NIC), one to connect to each tree. FTE is available for most Honeywell products (see their respective specifications). In terms of our proposal, the redundant Experion PKS™ server, operator stations and the redundant process controllers are connected to FTE utilizing full FTE capabilities.

Proposed FTE network contains one pair of Level 2 switches (interconnection for C300 control firewall as well as Servers, Operator & Engineering Stations).. The FTE nodes form a fault-tolerant *community* whose members can communicate as long as at least one path exists between them. A community can have up to 330 FTE nodes, of which up to 99 can be controllers with FTE Bridge or firewall. In addition, up to 200 Ethernet (non-FTE) nodes may be connected to the FTE network. The FTE nodes detect Ethernet nodes and will use any available path to communicate with them also. FTE operates under either Windows Workgroups or Domains.

A firewall and router shall be used to connect an FTE community to any other network, e.g. the Process Control LAN, where Advanced Control Functions or Data Historians can be hosted. If a ‘customer-WAN-connection’ (Intranet and ERP integration) is required, we can quote network architecture, which is in accordance with Honeywell’s best practices for cyber security.

Data Exchange to 3rd Party Applications

Experion PKS™ offers a wide range of communication interfaces to exchange data with other controllers or applications. This data exchange may happen on Controller level via process busses like Profibus DP/PA, Modbus, Foundation Fieldbus, and on Server level via a wide range of SCADA interfaces or open communications standards like OPC, ODA, etc.

2.5 Control Equipment

2.5.1 C300 Controller for Process Control

The Experion PKS CEE-based Controller comprises 30 years of controller development and technology. The solution combines robustness, flexibility and uniformity in a Control Execution Environment (CEE) that is hosted on different platforms. Its open architecture allows integration with existing Honeywell controllers, third party control systems and devices. The CEE is the foundation of the controller and provides a configured control execution environment. It makes this control application execution deterministic, consistent and reliable. A single builder tool, Control Builder, allows integrated application configuration. The Control Execution Environment offers dedicated function blocks to cover all control requirements for continuous processes, batch processes, discrete operations, and machine control applications. Experion PKS currently features three CEE-based controllers, the C200 Process Controller, the new C300 process controller, and the Application Control Environment (ACE). The system also supports a simulation environment, the C200 Simulation Environment (SIM-C200), which provides complete system simulation on PCs without requiring dedicated controller hardware or process connections.

Offered C300 controller is a logical progression of the field proven C200 controller, which is currently used in lots of installations of the Experion PKS™ and PlantScape® platform. While executing the same Control Execution Environment CEE, the C300 offers many enhancements over the C200 controller. These enhancements include increased memory (RAM & ROM), which allows more complex and larger control modules and sequential control modules. Further, the processor speed has been increased from 100 MHz to at least 450 MHz. C300 processor has been quoted in redundant configuration. Each controller is connected via Fault Tolerant Ethernet through control firewall to upper level equipment and for peer communication to other controllers.

Control Firewall the Control Firewall protects the level 1 equipment (C300 Process Controller and accessories) from unwanted Ethernet messages. This firewall is unique in the industry, it ensures network capacity for the messages needed for safe, secure, and high speed control including peer-to-peer communications in the controller and Foundation Fieldbus environment. The Control Firewall will only allow certain communication to pass through. In general words, this means only control information and some FTE-/Ethernet messages can pass. No server, operator stations or other devices than Controllers, Fieldbus interfaces can connect to this firewall. Upper level connection will always be a port of the Fault tolerant Ethernet Switches.

3 Bill of Materials

Please Refer to Appendix 2

4 DOCUMENTATION

IDEH GLOBAL will supply detailed engineering documents according to project Spec & Client requested documents

5 SCOPE OF SUPPLY/WORK

IDEHGLOBAL will cover scope of supply/work & all project requirements as per project MR

6 FACTORY ACCEPTANCE TEST – FAT

Factory Acceptance Test (FAT) will be performed at IDEH GLOBAL workshop after approval pre-FAT report by client. Entire system will be assembled and installed for operational test. Integration of 3rd party DCS or other serially connected devices is possible. Contractor or contractor's client shall be responsible for organization of these activities. Costs for FAT include all necessary technical and organizational activities and personnel cost for IDEH GLOBAL participants. Personnel cost and T&L for contractors or end user's participants and 3rd party staff is not covered. Duration of FAT is 25 working days. If client need additional time for FAT, it can be extended.

100% of system software/hardware will be checked in FAT test.

7 Installation and Erection Works, Site Acceptance Test, Loop Checks

System installation and erection efforts are assumed to be executed by others, but supervised by IDEHGLOBAL Experts. After installation IDEHGLOBAL specialists will check installation and perform Site Acceptance Test.

Installation supervision, SAT, loop checks, commissioning activities, startup assistance and any other site activities are quoted based on reimbursable daily or weekly rates.

8 TRAINING

Training is offered based on Honeywell Standard Courses. A detailed training schedule will be worked out during detail design phase. Training location is training center in Tehran. Training fee includes training material, refreshment, and lunch. Dinner and costumer Traveling & Living costs of trainees are not included.

Below training courses are proposed:

Item	Subject	duration	No's of trainees	Trainees category
1	Experion Implementation	5days	4-6	Engineers / Maintenance
2	Experion Operation	2days	4-6	Operator

9 APPENDIXES

App 1-IO Table

App 2-BOM

App 3-System Architecture

App 4-Time Schedule