Integrated control system for oil &gas project

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A Graduation Project Report Submitted to
the Faculty of Engineering at Fayoum University
in Partial Fulfillment of the Requirements for the
Degree of
Bachelor of Science
in
Power and Machine Engineering

Faculty of Engineering, Fayoum University

Under Supervision by

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Fayoum, Egypt

July 2013

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List of Abbreviations

2oo3	Two out of Three voting
AWG	American Wire Gauge
CCR	Central Control Room
ESD	Emergency Shut Down
CDR	Critical Design for Review
DCS	Distributed Control System
ETA	External Termination Assembly
FAT	Factory Acceptance Test
FBD	Functional Block Diagram
GND	Ground
HIPS	High Integrated Pressure Protection System
I/O	Input/Output
IME	Invensys Middle East FZE (Triconex Division)
MCB	Miniature Circuit Breaker
MCC	Motor Control center
MUX	HART Multiplexer 2700
NMR	Non Material Requirement
OVD	Output Voter Diagnostics
PCS	Process Control System
PDR	Preliminary Design for Review
PIB	Process Interface Building
P&ID	Piping and Instrumentation Diagram
PSU	Power Supply Unit
SA	Saudi Aramco
SAMSS	Saudi Aramco Materials System Specification
SAT	Site Acceptance Test
SOE	Sequence of Events

TCM	Tricon Communication Module
TCP/IP	Transmission Control Protocol/Internet Protocol
TMR	Triple Modular Redundancy
Tribus	Triplicated I/O bus
TRICON	Triconex Programmable Safety System
TUV	TUV Rheinland Institut fur Software, Elektronik, Bahntechnik
UPS	Uninterruptible Power Supply
XXX	Yokogawa Middle East, Bahrain
EIV	Emergency Isolation Valve
Accum	Accumulator block
AUTO	Automatic
ECB	Equipment Control Block
FBM	Field bus Module
FDS	Functional design specifications
RIN	Real Input Block
CALCA	Calculation block-advanced
CIN	Contact Input
COUT	Contact Output
CPU	Central Processing Unit
CTRL	Control
GDEV	General device block
C.R.	Control Room
ESD	Emergency Shutdown System
BDV	Blow-down Valve
SDV	Shut-down Valve

Acknowledgement

The author wishes to express sincere appreciation to Professor Waleed for his assistance in the preparation of this project. Several people have been instrumental in allowing this project to be completed. We would also like to thank especially Professor Amr Abdallah for his encouragement and patience from the initial to the final level enabled us to develop an understanding of the work for our project. Our parents didn't know what we were doing, but they were always eager to help us out in all possible ways; without them it is hard to imagine accomplishing all this work. (Special thanks to our families).

Finally, we take this opportunity to express how much we were really good

friends all the time of the project without any problems. The spirit we had is the cause why we completed the project in this manner, that's why we must congratulate ourselves for the cooperation, patience and Insistence to represent a good abstract for what we learned in the college.

Abstract

The Petreco land plant is an existing oil production facility in the Red Sea area region of Egypt.

The plant receives oil via the existing land oil inlet manifold. Oil is partially stabilized by preheating with hot oil and gas/oil separation in horizontal separators. Flashed gas is sent to be treated at the nearby LPG plant. The partially stabilised oil is further heated and finally de-gassed in a vertical Gas Boot vessel before flowing into large cone-roof settling tanks. Oil is removed from the top of the tanks and flows first to the Oil Settling Tank and then to the Surge Tank prior to be further heated by the fired heater. Oil is then desalted in three parallel trains of two-stage desalting. The desalted oil is used to preheat incoming oil, prior to stabilisation, before export by pipeline to the port of Feiran.

The new land oil train is connected in parallel with the existing trains. It comprises essentially the same type of equipment as the existing trains i.e. three-phase horizontal separator, preheating by thermal oil, the Gas Boot vessel, a new inlet manifold and a new Gun Barrel Tank connected with existing tanks via existing manifold.

Additional utilities are added to the project scope comprising of Nitrogen Generation Package, Instrument Air Drier Package, Instrument Air Compression Package, Biocide Injection Package, Demulsifier Injection Package, Corrosion Inhibitor Package and Scale Inhibitor Package

Chapter 1 : OVERVIEW

1.1-Introduction

Invensys is a global technology company that works in partnership with a broad range of industrial and commercial customers to design and supply advanced technologies that optimize their operational performance and profitability. From oil refineries and power stations to mining companies and appliance manufacturers, our market-leading software, systems and controls enable our customers to monitor, control and automate their products and processes, thereby maximizing safety, efficiency, reliability and ease of use.

Active in over 180 countries, we employ more than 16,500 people across four business segments: Software, Industrial Automation, Energy Controls and Appliance. Invensys is a publicly listed company on the London Stock Exchange (LSE: ISYS.L). It also has an American Depository Receipt (ADR) programmer which is quoted on the US over-the-counter market known as “OTCQX International Premier”.

Invensys works with:

- 23 of the top 25 petroleum companies
- 48 of the top 50 chemical companies
- 18 of the top 20 pharmaceutical companies
- 35 of the top 50 nuclear power plants
- All of the top 10 mining companies
- 7 of the top 10 appliance manufacturers

Invensys enables:

- 20% of the world’s electricity generation
- 18% of the world’s crude oil refining
- 37% of the world’s nuclear energy generation
- 62% of the world’s liquefied natural gas production
- 23% of the world’s chemical production

Invensys was formed with the January 1999 merger of two major British companies, Siebe and BTR. Siebe, a relatively unknown, old-line British company, was growing though acquisition of mid-sized U.S. industrial automation companies. The company achieved prominence through the bold acquisition of Foxboro, one of the leading (but financially ailing) U.S. process-control companies. After this, Wonderware (PC software), Eurotherm (temperature controls and drives) and others were acquired at a heady price, figuring that they'd be catalysts for consolidated growth.

When results continued to slide, Siebe merged with BTR, an even bigger hodgepodge of acquisitions (Hawker Siddeley, APV and others). The combination was given a new name - Invensys. An expensive advertising campaign proclaimed, "The biggest company you never heard of". But the innovative name could not hide underlying poor performance.

After a series of unwise acquisitions, Invensys went into a debilitating, downward spiral. A new CEO sold off the most profitable two-thirds of companies in the group because they would fetch better prices. Remaining were just Invensys Process Systems (Foxboro, Triconix, Wonderware and related companies) plus Controls, Rail Systems, APV and Eurotherm. The group is now in the hands of yet another CEO who is putting the business back on track.

With all the financial manipulations and management turmoil, how has the corporate culture adapted and developed? That is the subject of this commentary.

Prior to the acquisition by Siebe, The Foxboro Company was a very strong solutions oriented industrial instrumentation and automation company, focused on customer satisfaction. The culture was strong, the contributions of employees were valued, and the reputation of always satisfying the customer with high performance solutions was a source of pride. The company had strong automation technology, instrumentation, and controls groups, with excellent vertical-market expertise in the chemicals, refining, power, paper, pharmaceutical, mining and metals, and food industries.

At Foxboro, the bottom line focus was always to meet customer expectations. The company has always had the reputation of being able to tackle and solve the most difficult measurement and control problems. One end user customer has high praise, "We can go anywhere to get instrumentation and control systems; but if we have a difficult problem, we always go to Foxboro."

The new Invensys is a prime example of a corporate culture that has survived under continued adverse conditions. A major share of the credit goes to the people who have remained with Foxboro, which remains the central core of Invensys. The ethos of excellence that stemmed from that source has now spread to other companies in a unified group. The culture of engineering excellence and customer orientation seems not only to have survived, but is now thriving sufficiently to generate a strong turnaround.

Whereas previously Invensys had three divisions – Invensys Operations Management, Invensys Rail and Invensys Controls – our lines of business are now grouped into four business segments: Software, Industrial Automation, Energy Controls and Appliance.

1.2-BMS OVERVIEW:

The Burner Management system monitors the presence or absence of the forced draft fan running and verifies air flow is being produced, ensures the water level in the boiler drum is satisfactory, and verifies that there is at least one flame in the furnace. The absence of any of these four permissives will trip the boiler. Other boiler trip functions include operator trip, unsuccessful burner shutdown, or a bad flame check on the only burner in service.

The Burner Management alarm system provides for a “first out” cause of trip allowing operators to readily identify the reason for an unexpected boiler trip condition.

The Burner Management System controls the air registers, igniters and fuel oil valves for each burner, as well as monitoring of the flame signals for each burner in service. If the flame quality degrades to 60% of maximum signal strength a poor flame alarm is issued to the alarm system. When a flame quality signal is below 40% for 4 seconds the burner will trip. The Burner Management System lights off the initial burner and cuts out burners automatically based on an operator selected sequence. It determines when burners need to be cutout based on the steam pressure signal from the ACC (Automatic Combustion Control) system. It also provides an interface to the ACC system to tell it when there is a state of change that can affect how the ACC will respond or perform.

1.3- BMS Sequence of operation:

1) Initially, the PLC will check that all the permissives and interlock are in place to allow start up.
2) Start Purge. The PLC will check that the permissives are at their correct status. The system will typically wait for the operator to request the heater to start, although all permissives are met and the heater is ready to purge. Once the heater start/purge is requested a pre-set timer will commence .Assuming the timing is not interrupted by Interlock activation, it will continue until complete. Once finished, it will notify the operator that “Purge Complete” has been accomplished.

3) Ignite Pilots. Once the purge is completed, the operator will be notified that the system is ready to start the pilots. The pilot header double block and bleed valves will energize. Instantaneously, the individual local pilot firing valves will open and the ignition transformers will be energized. The pilot valves and the ignition transformers will only be energized for a maximum of 10 seconds. If the pilot flame is not detected within this time the individual pilot isolation valve will close.

4) Prove Pilots. Each pilot has its’ own dedicated flame detector, which in most cases is via a flame rod. Once proven, the individual pilot valve will hold in and continue to burn, in the event a pilot is not lit.

5) Light Main Burners. Before the main burners are lit, the PLC will continue to check the permissives to ensure it is safe to light the main burners. The two main permissives are that there is sufficient flow in the process coils and the pilot

burners are proven. The system then proceeds to energize the main header vent and shut-off valves. The first burner will light at the minimum fire rate. A five second trial for ignition is provided from the time the individual isolation valve is opened until the detection of the flame. If the flame is not detected, the individual main burner isolation valve is de-energized.

6) Confirm Main Burner Status. Once this is achieved the system is ready to be ramped up to operating conditions. This is usually performed manually until the process variable is close to the operating set point, then the temperature and gas flow/pressure controllers can then be switched to auto mode.

1.4- DCS OVERVIEW

DCS (Distributed Control System) is a computerized control system used to control the production line in the industry.

While a product (Food, medicine, Oil..etc) passing through many stages in the factory before it reaches its final so the product can be sold out, during those stages it requires a kind of control in order to adjust the quality of it. However, to adjust the quality it is required to control many physical quantities such as pressure, Temperature..etc.

Furthermore, in some dangerous applications such as petrochemical factories and nuclear reactors the control will much critical, however, losing the control may lead to an explosion of the plant.

DCS System consists minimum of the following components.

1. Field Control station (FCS): It consists of input/output modules, CPU and communication bus.
2. Operator station: It is basically human interface machine with monitor, the operator man can view the process in the plant and check if any alarm is presents and he can change any setting, print reports..etc.
3. Engineering station: It is used to configure all input & output and drawing and any things required to be monitored on Operator station monitor.

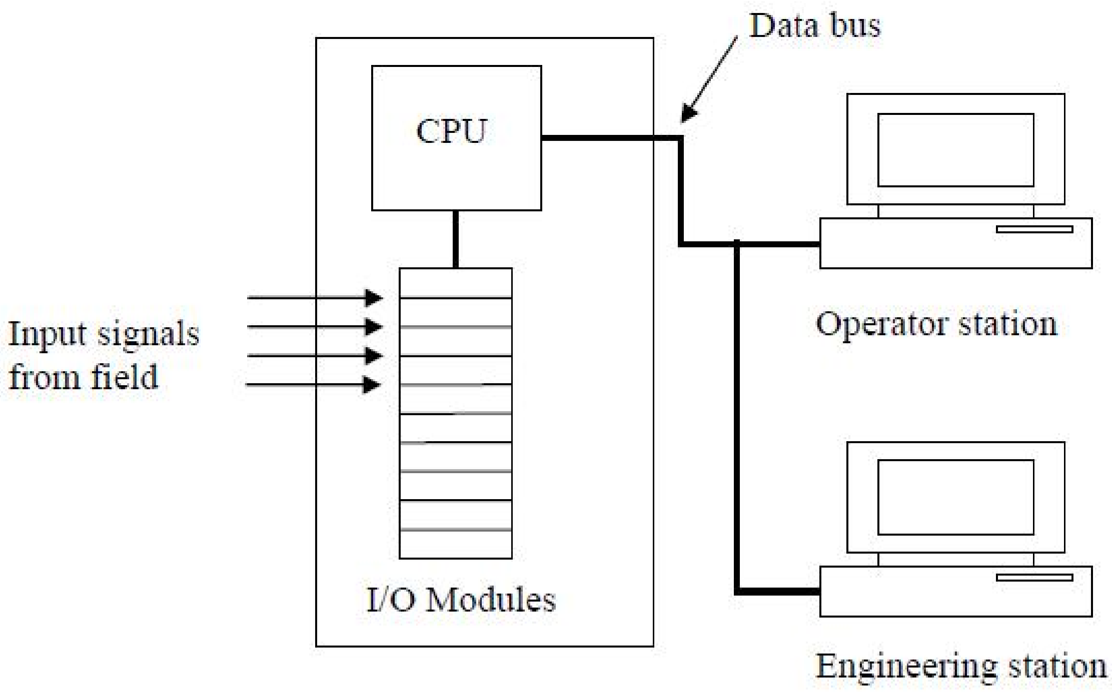


Figure 1.1: Basic configuration of a DCS System

A DCS typically uses custom designed processors as controllers and uses both proprietary interconnections and communications protocol for communication. Input and output modules form component parts of the DCS. The processor receives information from input modules and sends information to output modules. The input modules receive information from input instruments in the process (or field) and transmit instructions to the output instruments in the field. Computer buses or electrical buses connect the processor and modules through multiplexer or demultiplexers. Buses also connect the distributed controllers with the central controller and finally to the Human (HMI) or control consoles.

The elements of a DCS may connect directly to physical equipment such as switches, pumps and valves and to Human Machine Interface (HMI) via SCADA. Distributed control systems (DCSs) are dedicated systems used to control manufacturing processes that are continuous or batch-oriented, such as oil refining, petrochemicals, central station power generation, fertilizers, pharmaceuticals, food and beverage manufacturing, cement production, steelmaking, and papermaking.

DCSs are connected to sensors and actuators and use setpoint control to control the flow of material through the plant. The most common example is a setpoint control loop consisting of a pressure sensor, controller, and control valve. Pressure or flow measurements are transmitted to the controller, usually through the aid of a signal conditioning input/output (I/O) device. When the measured variable reaches a certain point, the controller instructs a valve or actuation device to open or close until the fluidic flow process reaches the desired setpoint. Large oil refineries have many thousands of I/O points and employ very large DCSs. Processes are not limited to fluidic flow through pipes, however, and can also include things like paper machines and their associated quality controls, variable speed drives and motor control centers, cement kilns, mining operations, ore processing facilities, and many others.

A typical DCS consists of functionally and/or geographically distributed digital controllers capable of executing from 1 to 256 or more regulatory control loops in one control box. The input/output devices (I/O) can be integral with the controller or located remotely via a field network. Today's controllers have extensive computational capabilities and, in addition to proportional, integral, and derivative (PID) control, can generally perform logic and sequential control. Modern DCSs also support neural networks and fuzzy application.

DCS systems are usually designed with redundant processors to enhance the reliability of the control system. Most systems come with canned displays and configuration software which enables the end user to set up the control system without a lot of low level programming. This allows the user to better focus on the application rather than the equipment, although a lot of system knowledge and skill is still required to support the hardware and software as well as the applications. Many plants have dedicated groups that focus on this task. These groups are in many cases augmented by vendor support personnel and/or maintenance support contracts.

DCSs may employ one or more workstations and can be configured at the workstation or by an off-line personal computer. Local communication is handled by a control network with transmission over twisted pair, coaxial, or fiber optic cable. A server and/or applications processor may be included in the system for extra computational, data collection, and reporting capability.

1.5- Difference between DCS and PLC

Turn the clock back 10-15 years: The programmable logic controller (PLC) is king of machine control while the distributed control system (DCS) dominates process control.

Today, the two technologies share kingdoms as the functional lines between them continue to blur. We now use each where the other used to rule. However, PLCs still dominate high-speed machine control, and DCSs prevail in complex continuous processes.

When PLCs were solely replacements for hard-wired relays, they had only digital I/O, with no operator interface or communications. Simple operator interfaces appeared, then evolved into increasingly complex interfaces as PLCs worked with increasingly complex automation problems. We went from a panel of buttons and I/O-driven lamps to PLC full-color customized graphic displays that run on SCADA software over a network.

Today, the decision between PLC and DCS often depends on business issues rather than technical features.

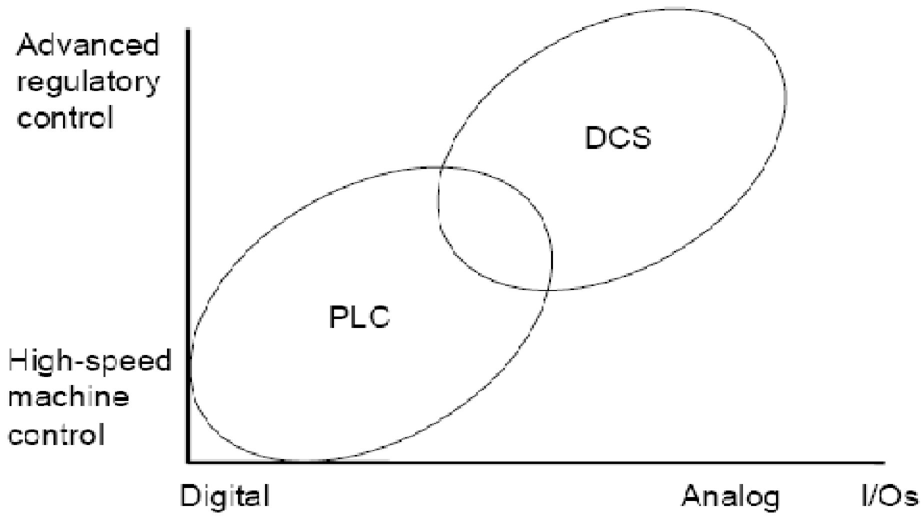


Figure 1.2: DCS VS PLC

An important difference between DCSs and PLCs is how vendors market them. DCS vendors typically sell a complete, working, integrated, and tested system; offering full application implementation. They offer many services: training, installation, field service, and integration with your Information Technology (IT) systems. A DCS vendor provides a server with a relational database, a LAN with PCs for office automation, networking support and integration of third-party applications and systems. The DCS vendor tries to be your "one-stop shop." The PLC is more of a "do-it-yourself" device, which is sometimes simpler to execute.

PLCs are fast: They run an input-compute-output cycle in milliseconds. On the other hand, DCSs offer fractional second (1/2 to 1/10) control cycles. However, some DCSs provide interrupt/event-triggered logic for high-speed applications.

Most DCSs offer redundant controllers, networks, and I/Os. Most give you "built-in" redundancy and diagnostic features, with no need for user-written logic.

1.6- Difference between DCS and SCADA

A primary differentiator between a SCADA system and other types of control systems such as DCS is the purpose to which the control system will be put.
In general DCS is focused on the automatic control of a process, usually within a confined area. The DCS is directly connected to the equipment that it controls and is usually designed on the assumption that instantaneous communication with the equipment is always possible.

A SCADA system is usually supplied to permit the monitoring and control of a geographically dispersed system or process. It relies on communication systems that may transfer data periodically and may also be intermittent. Many SCADA systems for high-integrity applications include capabilities for validating data transmissions, verifying and authenticating controls and identifying suspect data.

DCS is process state driven, while SCADA is even driven. DCS does all its tasks in a sequential manner, and events are not recorded until it is scanned by the station. In contrast, SCADA is event driven. It does not call scans on a regular basis, but waits for an event or for a change in value in one component to trigger certain actions. SCADA is a bit more advantageous in this aspect, as it lightens the load of the host. Changes are also recorded much earlier, as an event is logged as soon as a value changes state.

1.7-Applications of DCS and SCADA

DCS is the system of choice for installations that are limited to a small locale, like a single factory or plant, while SCADA is preferred when the entire system is spread across a much larger geographic location, examples of which would be oil wells spread out in a large field.

Part of the reason for this is the fact that DCS needs to be always connected to the I/O of the system, while SCADA is expected to perform even when field communications fail for some time. SCADA does this by keeping a record of all current values, so that even if the base station is unable to extract new information from a remote location, it would still be able to present the last recorded values.

DCS and SCADA are monitoring and control mechanisms that are used in industrial installations to keep track and control of the processes and equipment; to ensure that everything goes smoothly, and none of the equipment work outside the specified limits.

The most significant difference between the two is their general design. DCS, or Data Control System, is process oriented, as it focuses more on the processes in each step of the operation. SCADA, or Supervisory Control and Data Acquisition, focuses more on the acquisition and collation of data for reference of the personnel who are charged with keeping track of the operation.

Chapter 2 : Standard Software

2.1-Introduction

This section provides a description of the application logic development software using TriStation TS1131, capability to enable users to interrogate the sequence of events, which led to an unsafe process condition or activation of a protection device and Enhanced diagnostics monitor For troubleshooting and maintenance.

Following Software will be supplied:

Name	Version	Supplier	Function
TriStation 1131 (TS1131)	4.9	Triconex	Programming and Configuration
Enhanced diagnostics monitor	2.0	Triconex	For troubleshooting and maintenance
SOE Retrieval Utility	4.x	Triconex	Local SOE Retrieval

Table 2.1: Standard software

2.2-TriStation 1131

TriStation 1131 is a Windows based programmer's workbench for developing, testing and documenting process-control applications that execute in the TRICON controller. Three languages, which comply with the IEC 61131-3 standard, will be available for programming in *TriStation 1131*:

§ Function Block Diagram (FBD)
§ Ladder Diagram (LD)
§ Structured Text (ST)

In this project we will be using Functional Block Diagram (FBD).

Using the features of *TriStation 1131*, one can perform the following tasks:

§ Develop programs and other executable elements such as functions, function Blocks.
§ Select functions and function blocks from IEC-compliant libraries (which include process control and fire-and-gas functions) and/or custom libraries.

- Graphically configure the I/O modules and points for each chassis in the TRICON system
- Configure the TRICON system for use with the integrated Sequence of Events (SOE) capability
- Apply password protection to projects and programs according to user names and security levels
- Debug the program logic by emulating execution
- Print sheets of the program logic, hardware configuration, variable lists, and Main Processor performance data
- Download as many as 250 programs to a single TRICON
- Display diagnostic information about system performance and fault details

This figure shows a typical project cycle and the main steps for setting up a TriStation 1131 project.

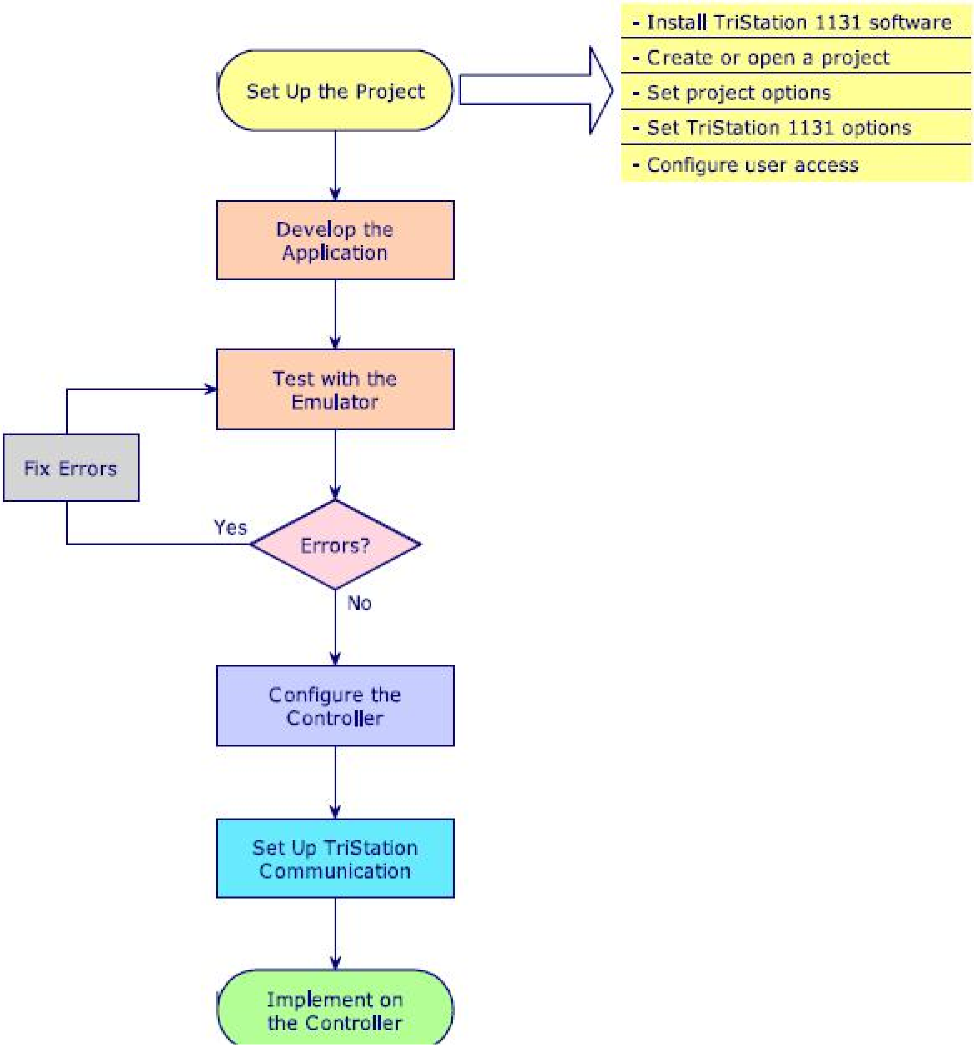
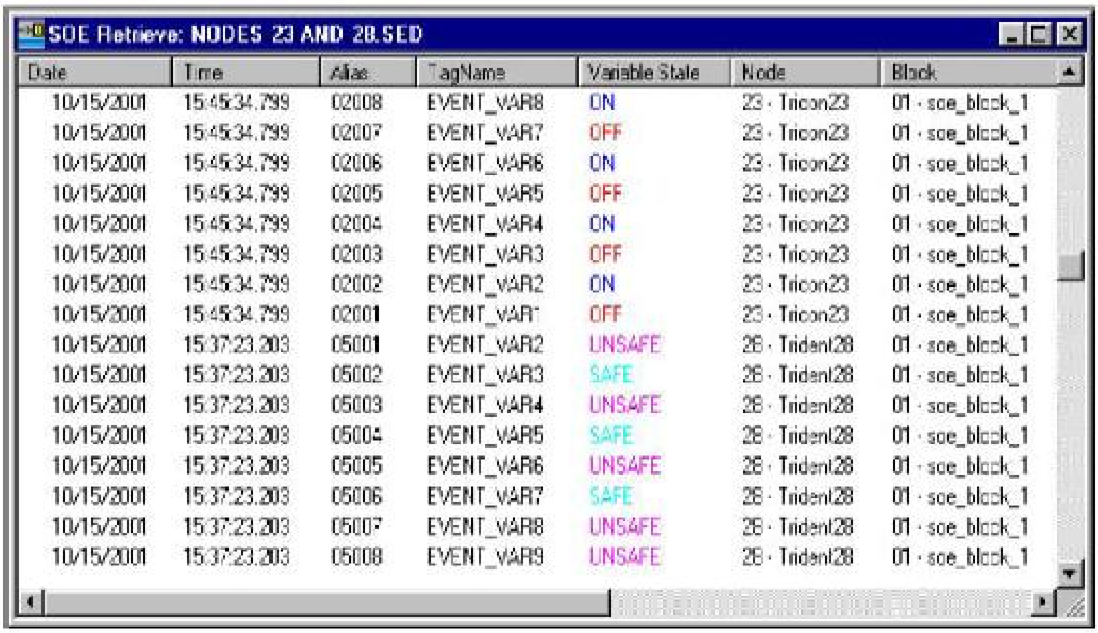


Figure 2.1: Project cycle and the main steps for setting up a TriStation 1131 project

2.2-Sequence Of Events Software



SOE Retrieve: NODES 23 AND 28.SED

Date	Time	Alias	TagName	Variable State	Node	Block
10/15/2001	15:45:34.799	02008	EVENT_VAR8	ON	23 - Tricon23	01 - soe_block_1
10/15/2001	15:45:34.799	02007	EVENT_VAR7	OFF	23 - Tricon23	01 - soe_block_1
10/15/2001	15:45:34.799	02006	EVENT_VAR6	ON	23 - Tricon23	01 - soe_block_1
10/15/2001	15:45:34.799	02005	EVENT_VAR5	OFF	23 - Tricon23	01 - soe_block_1
10/15/2001	15:45:34.799	02004	EVENT_VAR4	ON	23 - Tricon23	01 - soe_block_1
10/15/2001	15:45:34.799	02003	EVENT_VAR3	OFF	23 - Tricon23	01 - soe_block_1
10/15/2001	15:45:34.799	02002	EVENT_VAR2	ON	23 - Tricon23	01 - soe_block_1
10/15/2001	15:45:34.799	02001	EVENT_VAR1	OFF	23 - Tricon23	01 - soe_block_1
10/15/2001	15:37:23.203	05001	EVENT_VAR2	UNSAFE	28 - Trident28	01 - soe_block_1
10/15/2001	15:37:23.203	05002	EVENT_VAR3	SAFE	28 - Trident28	01 - soe_block_1
10/15/2001	15:37:23.203	05003	EVENT_VAR4	UNSAFE	28 - Trident28	01 - soe_block_1
10/15/2001	15:37:23.203	05004	EVENT_VAR5	SAFE	28 - Trident28	01 - soe_block_1
10/15/2001	15:37:23.203	05005	EVENT_VAR6	UNSAFE	28 - Trident28	01 - soe_block_1
10/15/2001	15:37:23.203	05006	EVENT_VAR7	SAFE	28 - Trident28	01 - soe_block_1
10/15/2001	15:37:23.203	05007	EVENT_VAR8	UNSAFE	28 - Trident28	01 - soe_block_1
10/15/2001	15:37:23.203	05008	EVENT_VAR9	UNSAFE	28 - Trident28	01 - soe_block_1

Figure 2.2: SOE window

Sequence of Events (SOE) Data Retrieval application; This application will be installed on a PC (Tri station), which will be connected to TCM, as indicated in NMR 602.16: System Architecture Drawing. With the SOE application, one can:

- Set parameters for event retrieval
- Retrieve events from the TRICON
- Analyze event data to help solve process-control problems
- Print reports
- Export event data to dBase IV files

The time stamping for SOE data will be the actual time stamping by the TRICON processor.

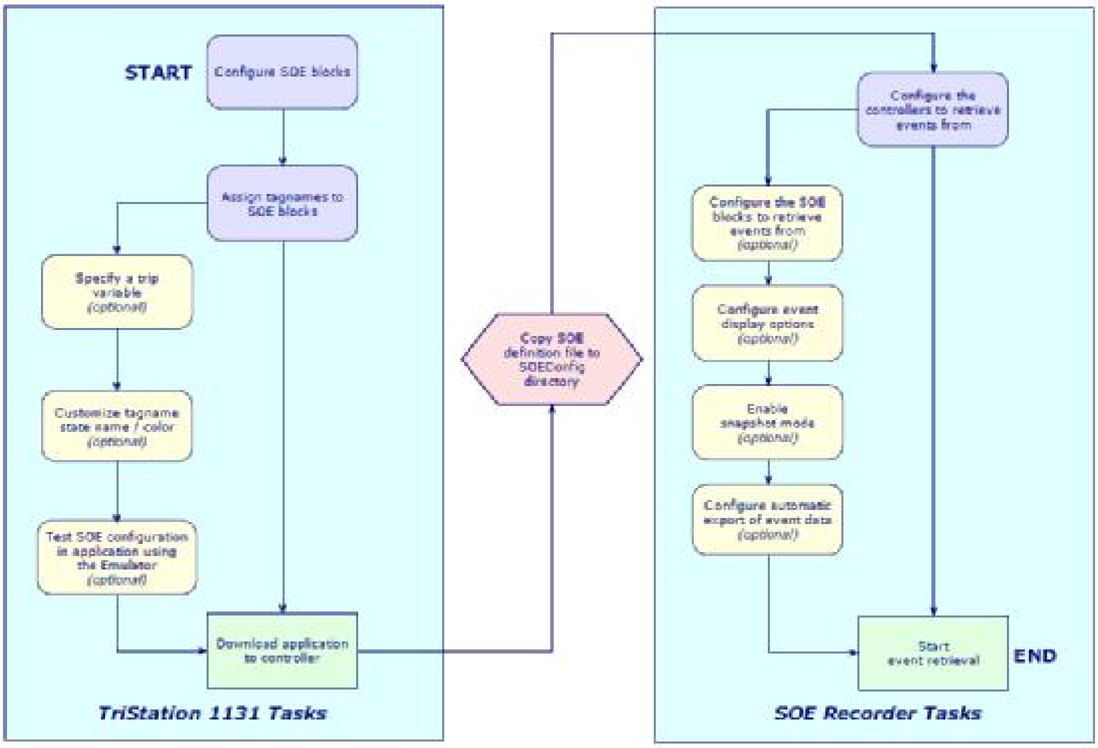


Figure 2.3: Steps for Configuring Your Application and SOE Recorder for Event Retrieval

The following table lists the types of SOE blocks that can be defined for each type of sequence of events recorder

If You're Using This Sequence of Events Recorder:	Use These Types of SOE Blocks:
Triconex SOE Recorder	• First Out • History • External
Foxboro I/A Series DCS	• External
Honeywell TDC 3000 DCS	• Modified External

Table 2.2: Types of SOE blocks

CAUTION When a Foxboro I/A Series DCS retrieves events via an ACM, only one block can be configured, and it must be defined as an External Block Type.

2.3-Tricon Enhanced Diagnostics Monitor

The TRICON incorporates on-line diagnostics, using utility Enhanced Diagnostics Monitor 2.0, a separate application in the TS1131 package. Probable failure modes are anticipated and made detectable by specialized circuitry. Fault-monitoring circuitry in each module helps fulfill this requirement. The circuitry includes but is not limited to I/O loop back, loss-of-power sensors, and so on.

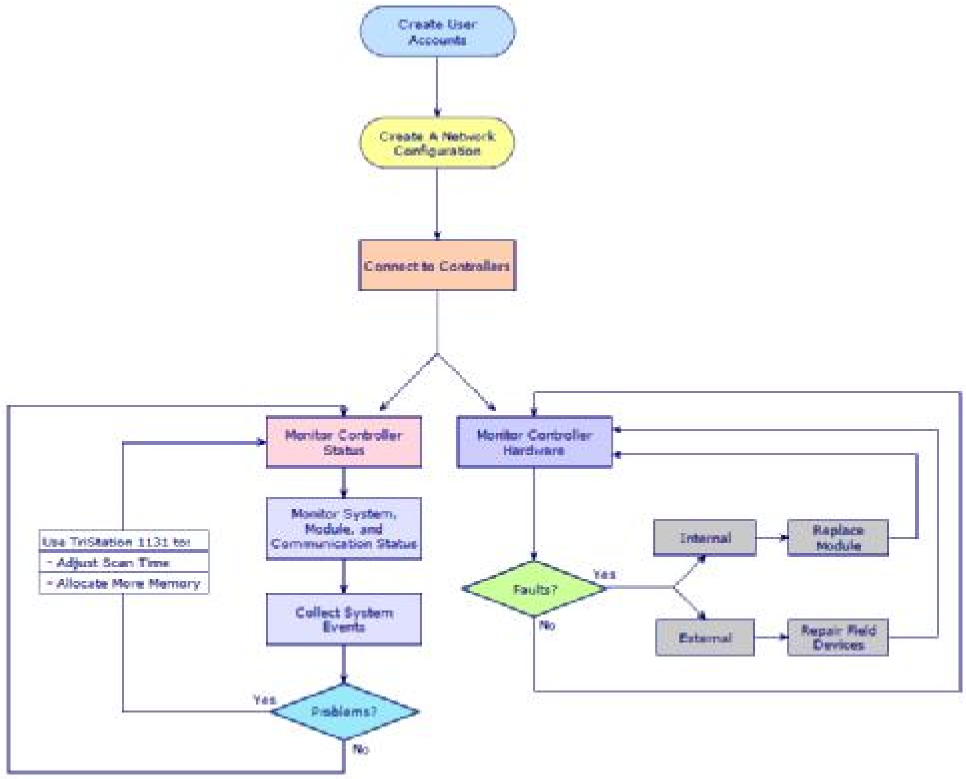


Figure 2.4: Steps for Diagnostic Monitoring

2.4- Foxboro Distributed Control System

2.4.1- introduction

The I/A Series distributed control system from Foxboro, measurably improves plant-wide operations, performance and asset utilization in today's modern manufacturing enterprise.

A key component of the Infusion Enterprise Control system, the I/A Series system offers the greatest breadth of capabilities for providing optimal performance for operators, engineers and maintenance personnel.

The Intelligent Automation (I/A) Series system is an Open Industrial System (OIS) that integrates and automates manufacturing operations. It is an expandable distributed system that allows a plant to incrementally tailor the system to its processing requirements.

The modules that make up the I/A Series system communicate with each other even though they can be located in a variety of locations. These locations depend upon the conditions and layout of the particular process Plant.

DCSs allow centralized configuration from the operator or engineering console in the control room. You can change programming offline, and download without restarting the system for the change to be effective.

DCSs allow inter-controller communications. You can do data exchange in most DCS systems ad hoc (no need for predefined data point lists). You access data by tag name, regardless of hardware or location.

2.4.2- I/A Series System

The I/A Series system includes a set of application packages that are used to perform automatic and manual system management functions.

Figure 2.5: I/A series system

2.4.3- MANAGEMENT FUNCTIONS

- AUTOMATIC FUNCTIONS:
  - Monitor system equipment status.
  - Monitor network communications.
  - Generate system alarm messages.
  - Notify operators at designed workstations.

- MANUAL INIATED FUNCTIONS:
  - View system equipment status.
  - Set system date and time.
  - ACK system alarms.
  - ACK network communications alarms.
  - Change system equipment status.
  - Execute station diagnostics tests.
  - Inhibit station and peripheral system alarms.

2.5- Main Software Packages

- Foxview
- Foxselect
- ICC Integrated Control Configurator
- IACC I/A Series Configuration Component
- FoxDraw
- System Definition

2.5.1- FOXVIEW HUMAN INTERFACE

The term Human Interface refers to the way a workstation is set up to interact with the user.

There are two Human Interface versions, FoxView and the Display Manager. Here, you will be introduced to the FoxView Human Interface.

Many I/A Series systems use FoxView as its interface. FoxView allows a user to utilize numerous applications to:

- Respond to alarms
- Collect and interpret data
- Modify process variables
- Perform on-line trending
- Generate reports

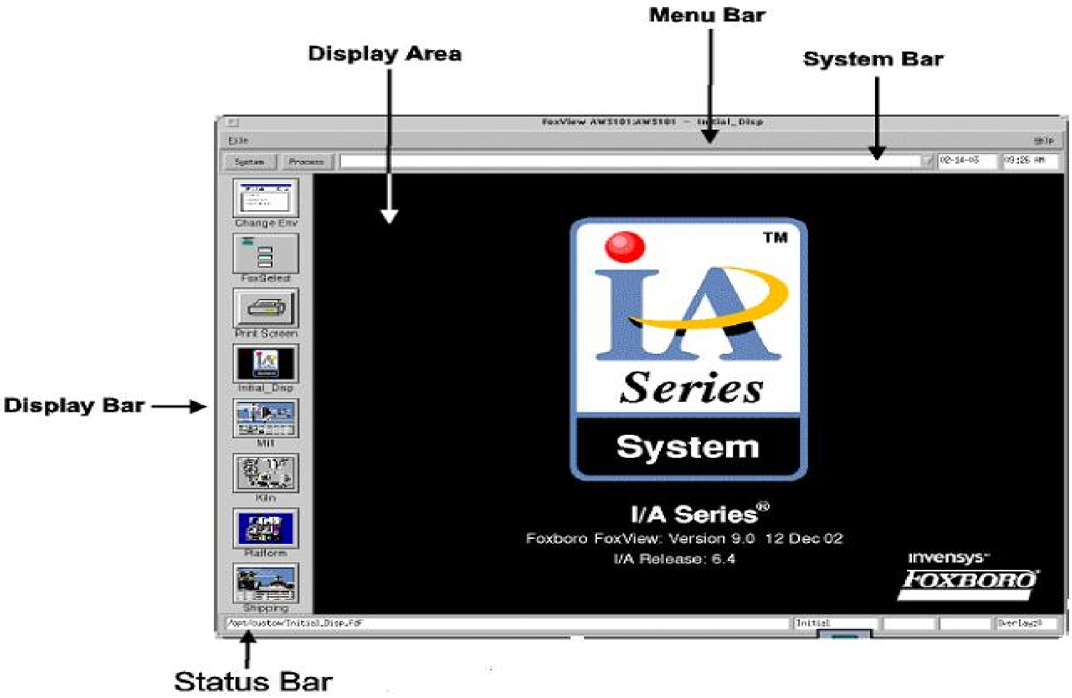


Figure 2.6: FOXVIEW window

2.5.2- Foxselect

It is an overview of the compounds and blocks in the control database.

Turn ON and OFF compounds and their associated blocks.

Expand a list of the network's stations and compounds.

View a list of blocks within all connected stations, and sort the list by different criteria.

Bring detail displays (Block Detail Displays, Compound Detail Displays, or Station Block Detail Displays) into FoxView.

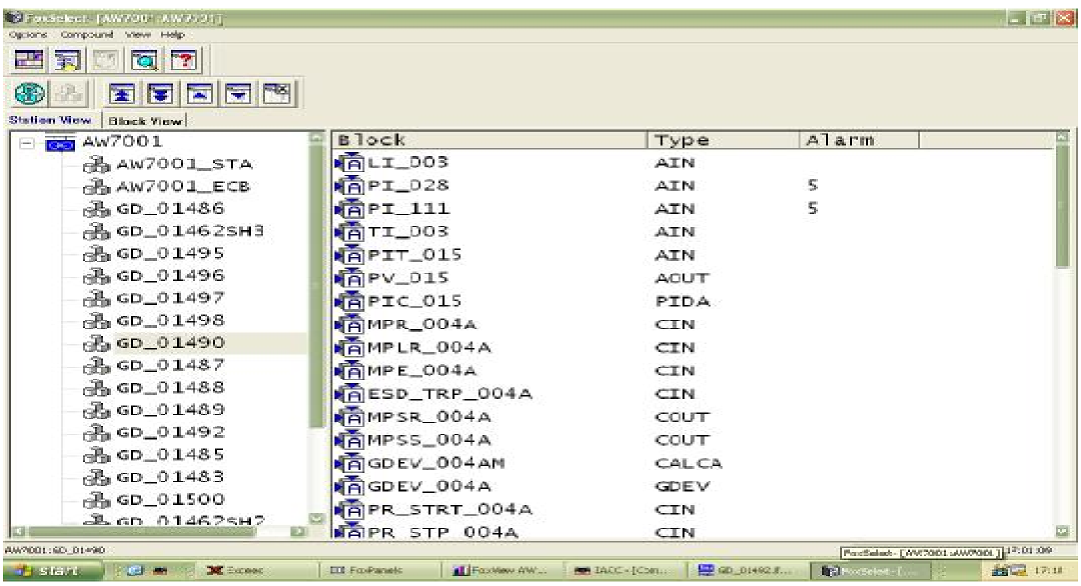


Figure 2.7: FOXSELECT window

2.5.3- Integrated Control Configurator (ICC)

The basic way to access the ICC is to use the Config menu in Foxview program. It is the manual way for creating compounds and blocks and edit in their parameters.

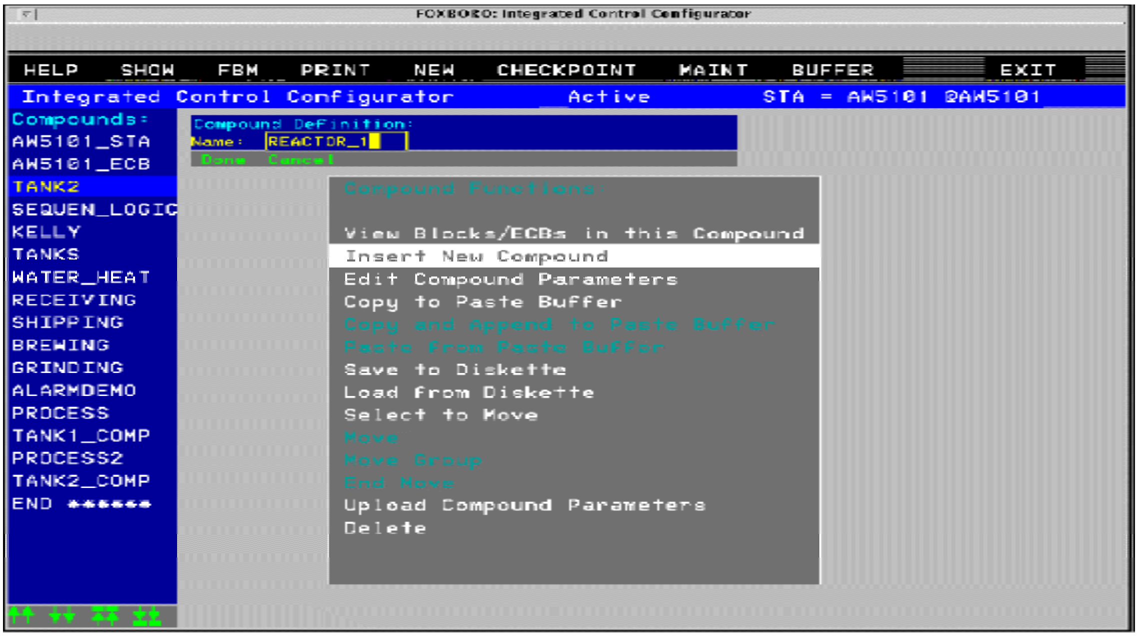


Figure 2.8: ICC window

2.5.4- I/A Series Configuration Component (IACC)

The I/A Series Configuration Component (IACC) pays for itself many times over from the productivity and quality gains made possible by using its rich set of intuitive and extensible engineering tools for project engineering and life-cycle maintenance. IACC provides a powerful and integrated engineering environment for designing and maintaining control strategies, composite display objects and configuring the I/A Series system.

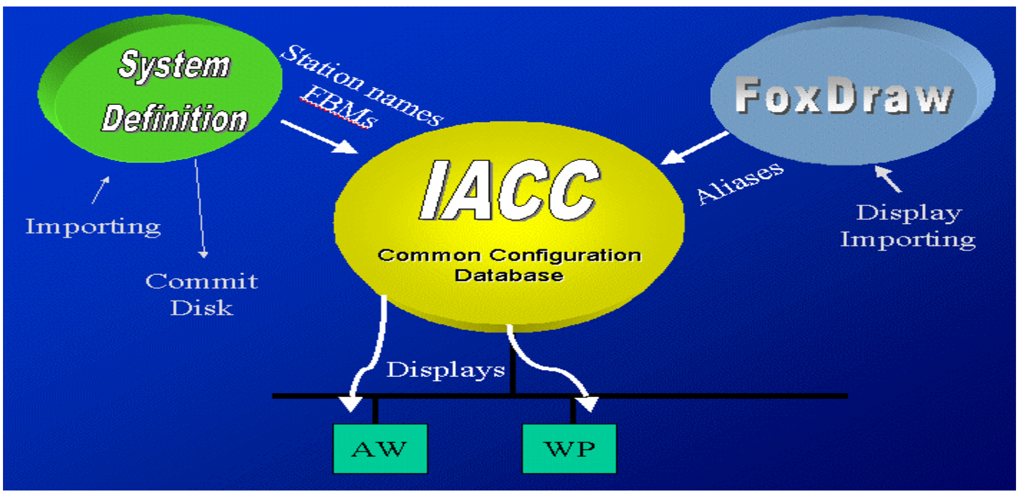


Figure 2.9: IACC configuration

IACC includes the Intelligent Design Studio library with over 30 of the most frequently encountered control strategies.
Having a Common Configuration Database eliminates the need to reenter data in several different configuration tools. This obviously saves time and reduces the chance of mistakes. Using a Microsoft windows framework improves ease of use for both novice and advanced users.
Hardware independent engineering means that the engineer can configure a system without any I/A Series hardware.

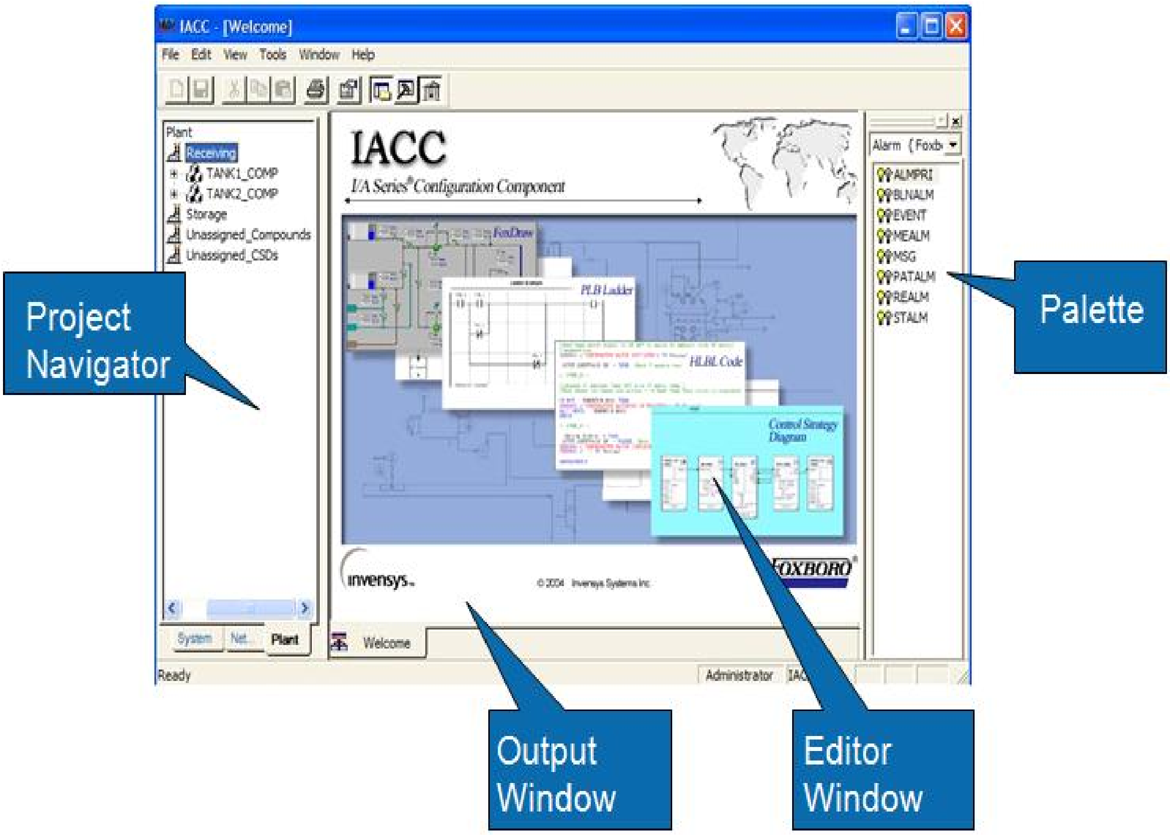


Figure 2.10: IACC window

IACC steps

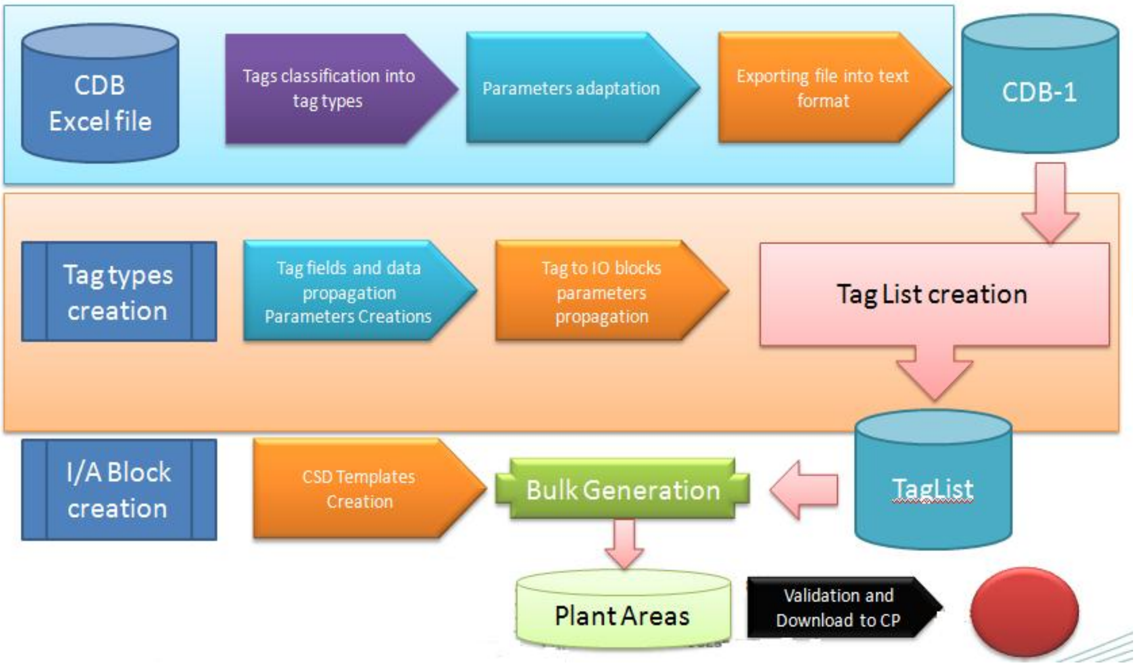


Figure 2.11: Data Processing

2.5.5- FoxDraw

FoxDraw is a graphical display editor for creating and maintaining process displays.

What is a display?

- a file (.fdf) that is constructed and configured to be viewed via FoxView
- represent a plant, a process area, or a detailed portion of a process
- is a “live” display
- configured to allow operator interaction with the process

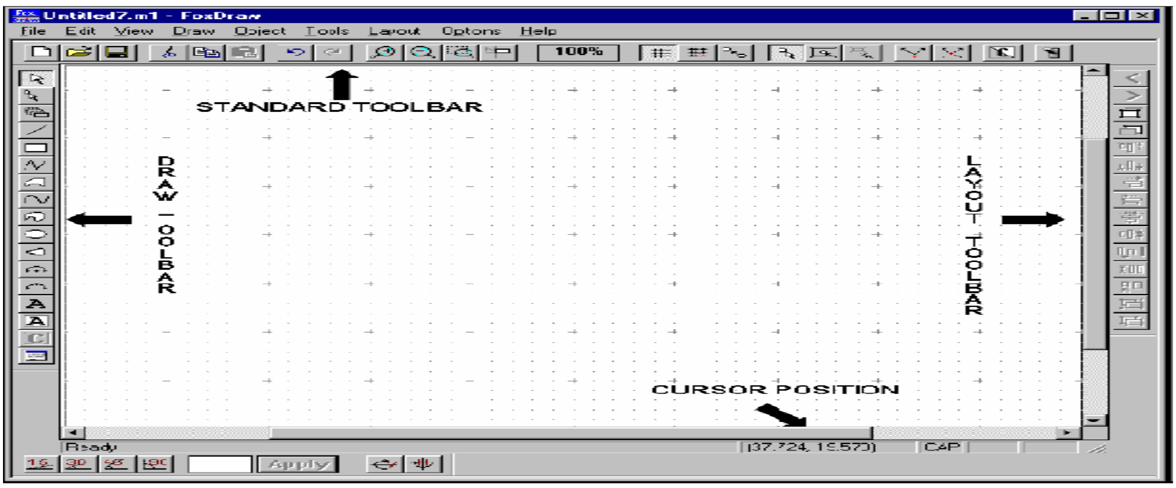


Figure 2.12: FOXDRAW window

There are two stages:

- Static: Creating a display without any link to process values.
- Dynamic: How to configure the display to be linked to the process values.

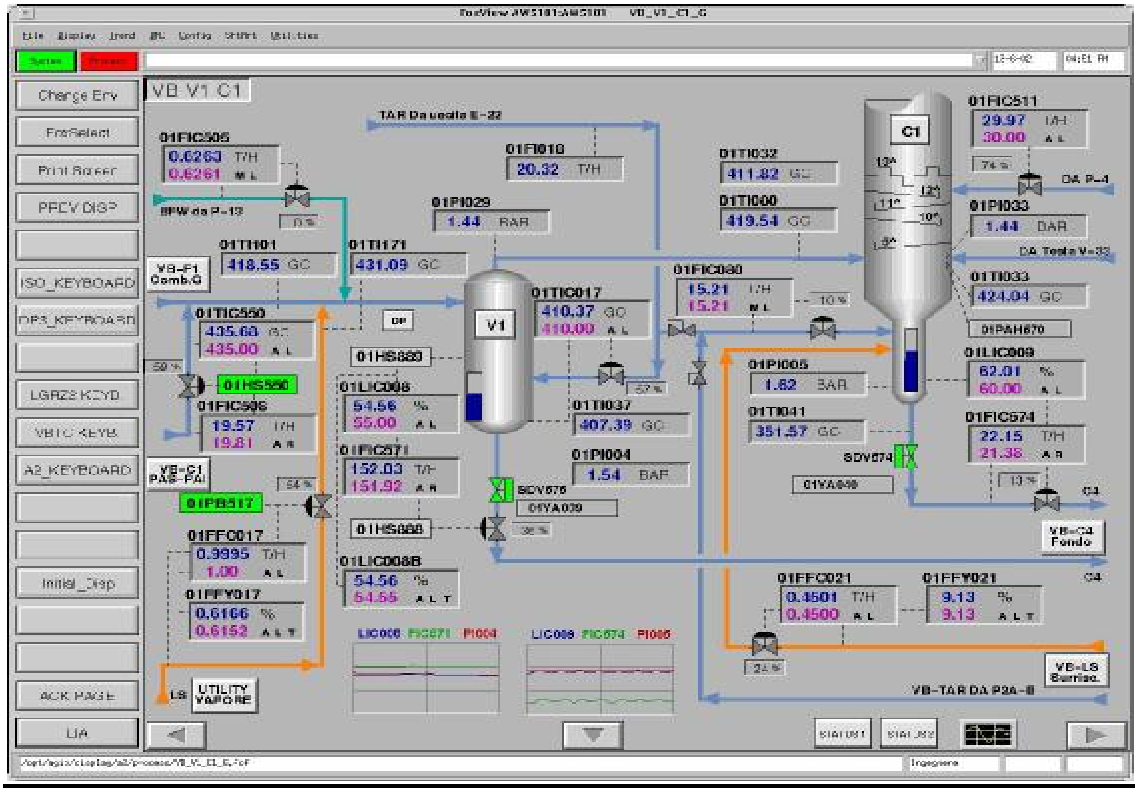


Figure 2.13: FOXDRAW running in FOXWIEW

2.5.6- system definition

System Definition identifies the I/A Series system components, the system software required by each component, the system component letter bugs, and other system characteristics for correctly loading system software and identifying the system software objects.

System Definition produces a Commit diskette which is required for software installation and, therefore, must be completed before software installation.

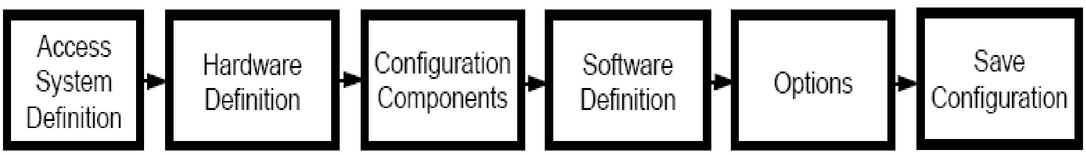


Figure 2.14: system definition

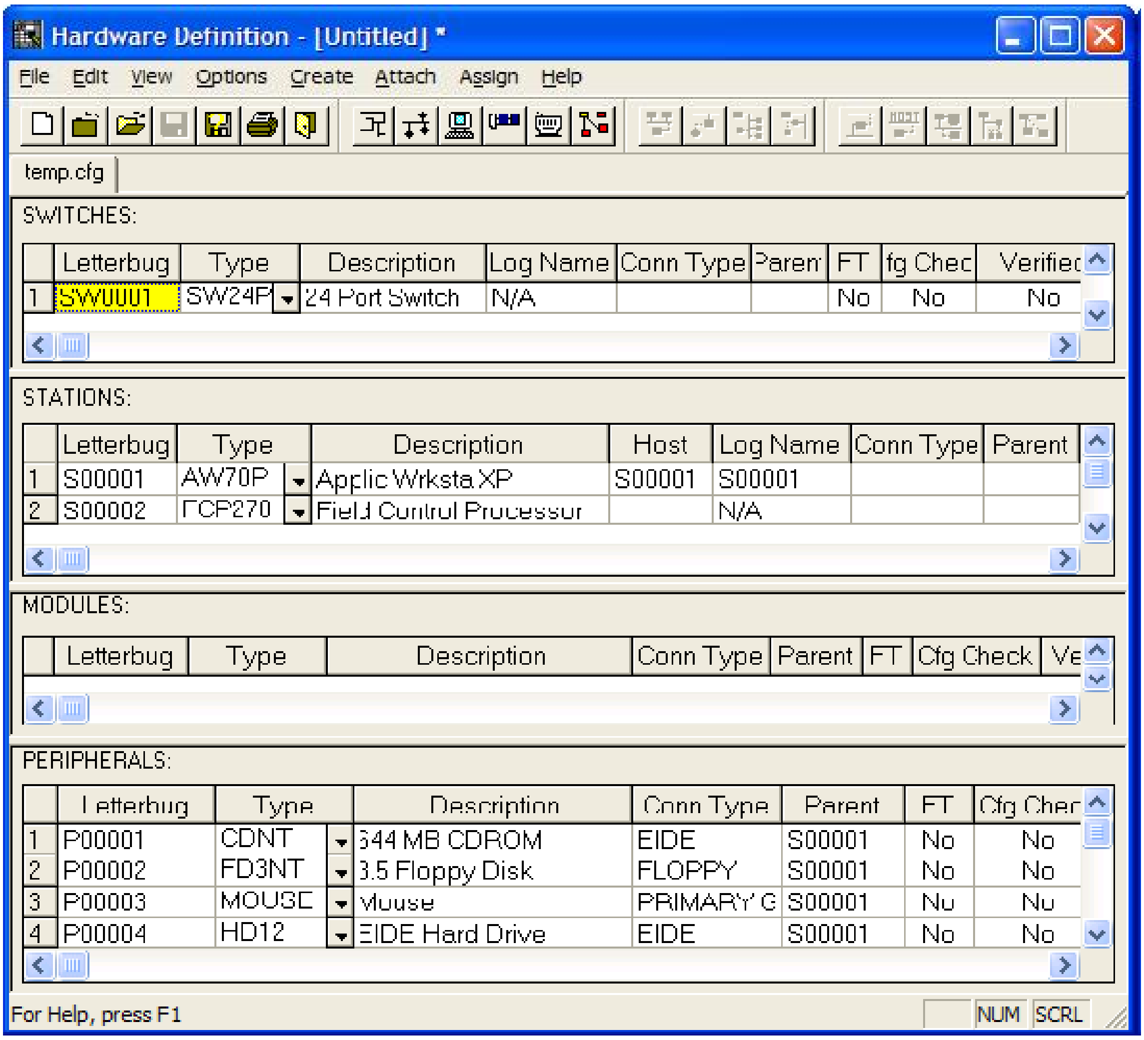


Figure 2.15: Hardware Definition window

Chapter 3 : Functional Design Specification (FDS)

3.1- INTRODUCTION:

This document defines the application of the Safety Instrumented System (SIS) to be supplied for the NEW LAND OIL TREATMENT TRAIN project how it will be implemented based on data supplied from EPC (ENPPI) & project owner (NEW LAND OIL TREATMENT TRAIN).

3.2-Purpose:

The purpose of this document is to provide a functional definition of the project requirements and system design. The Functional Design Specification (FDS) serves as the principal document for mutual understanding and agreement between Enppi and INVENSYS of all functions to be accomplished by the ESD systems. This document will provide all the information and references needed to carry out the detailed system design. It will be the reference for the detailed design and engineering, configuration and implementation of the software.

3.3- SOFTWARE DESCRIPTION:

It consists of 7 Programs:

3.3.1-AIN_COND

This program contains application of analog conditionning function block to logic.

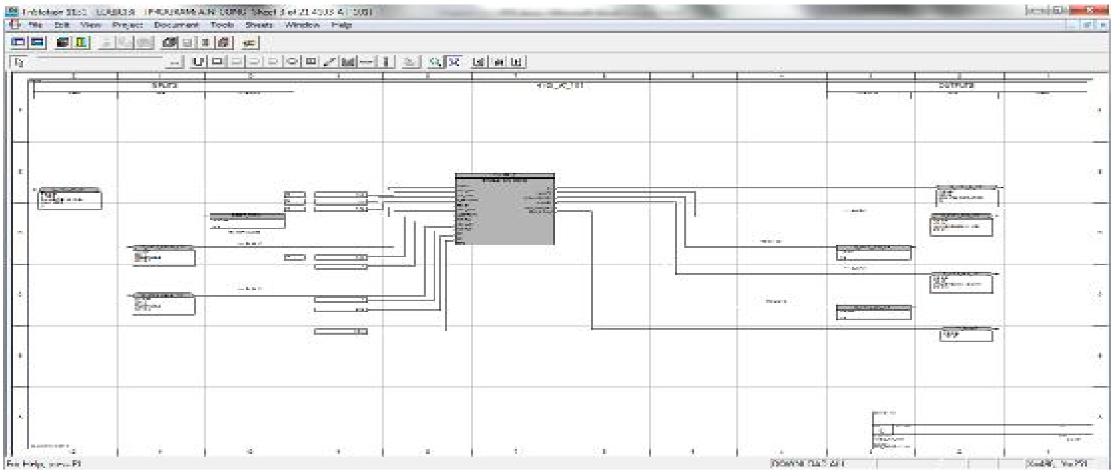


Figure 3.1: sheet of AIN_COND program

3.3.2-SDV

This program controls a Single Solenoid operated SDV with Manual Reset, open, Close & Maintenance override facility via DCS.

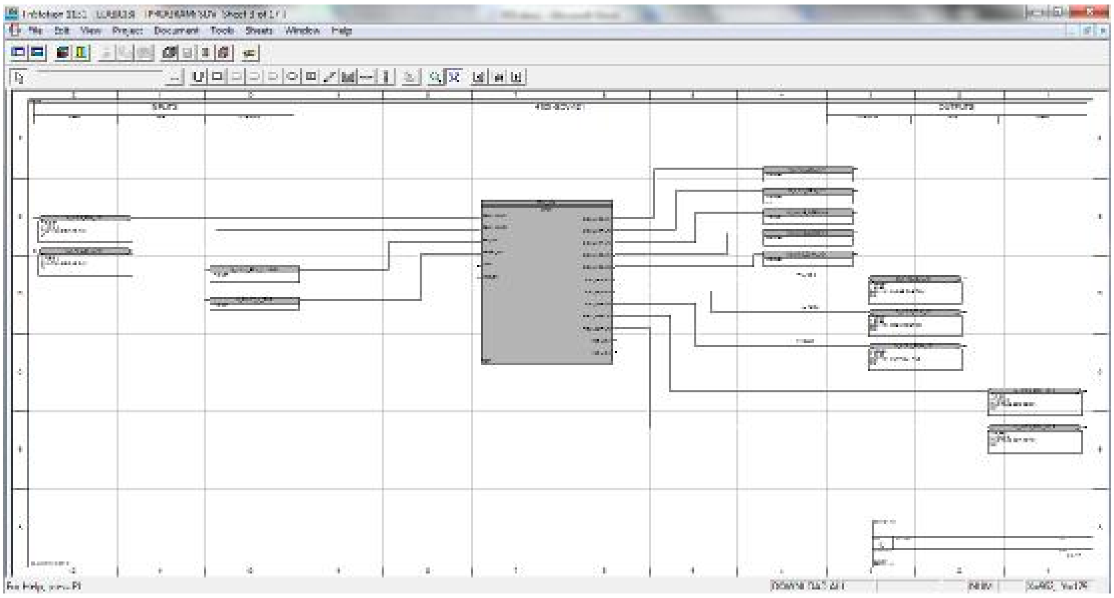


Figure 3.2: Sheet of SDV program

3.3.3-BDV

This program controls a Single Solenoid operated BDV with Manual Reset, Close, open & Maintenance override facility via DCS.

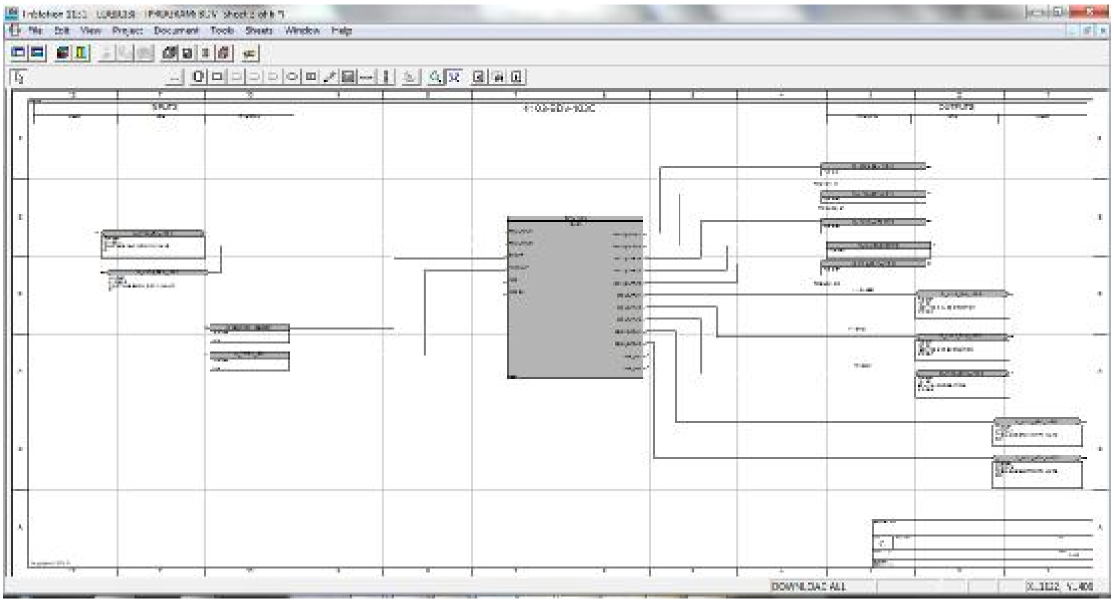


Figure 3.3: Sheet of BDV program

3.3.4-PACKING

This Program contains packing and unpacking of DCS signals to decrease its number.

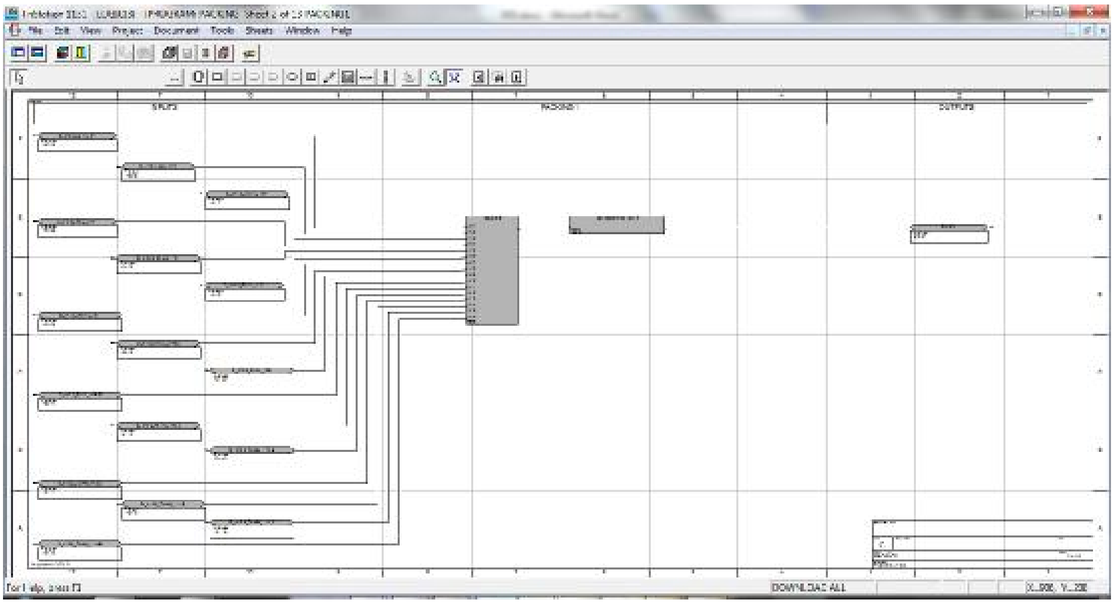


Figure 3.4:Sheet of PACKING program

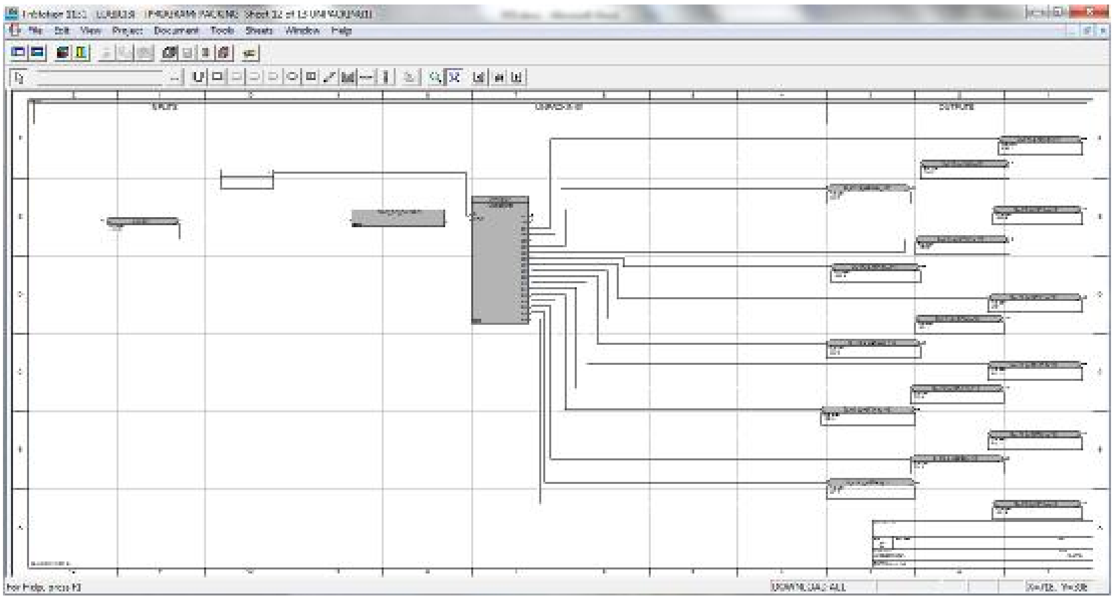


Figure 3.5: Sheet of UNPACKING program

3.3.5-SOE

This program contains Sequence of Events (SOE) Data Retrieval application

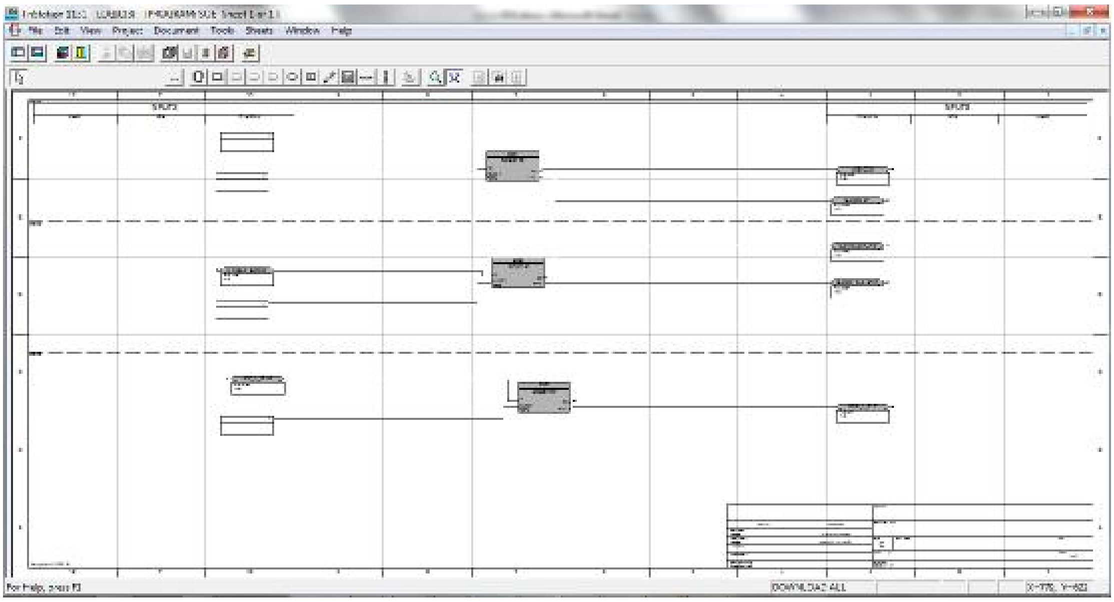


Figure 3.6: Sheet of SOE program

3.3.6-Diagonestic

This program contains Hardware diagonestic such as alarm when scan time configured less than scan time required, alarm when key switch not at remote position, main processor status and alarm when there is any point disabled in the logic.

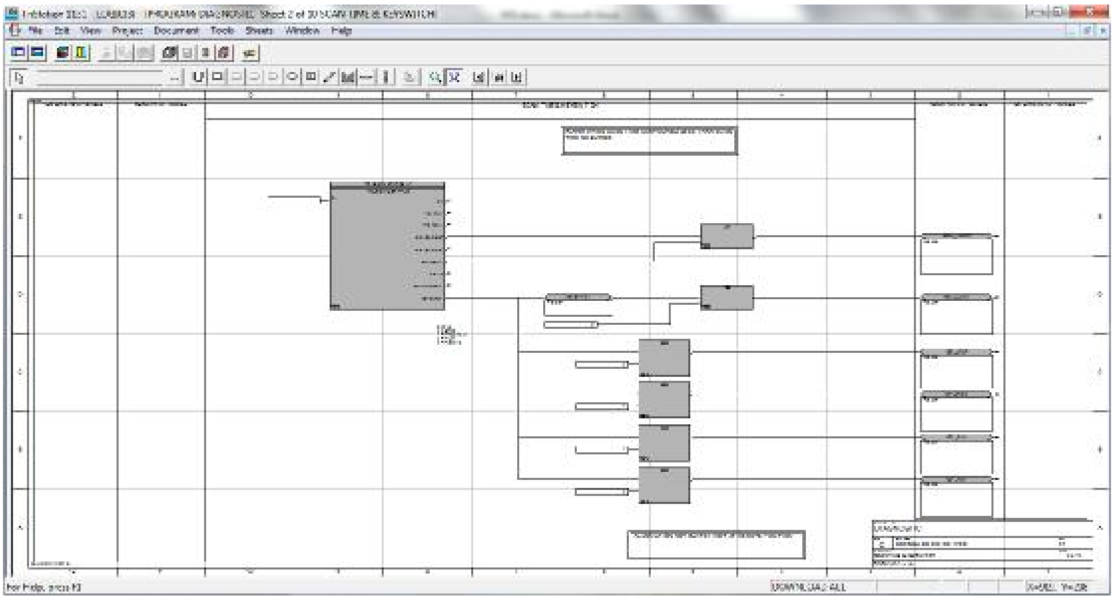


Figure 3.7: Sheet of DIAGONESTIC program

2.7-logic

This program contains the remaining logic diagram

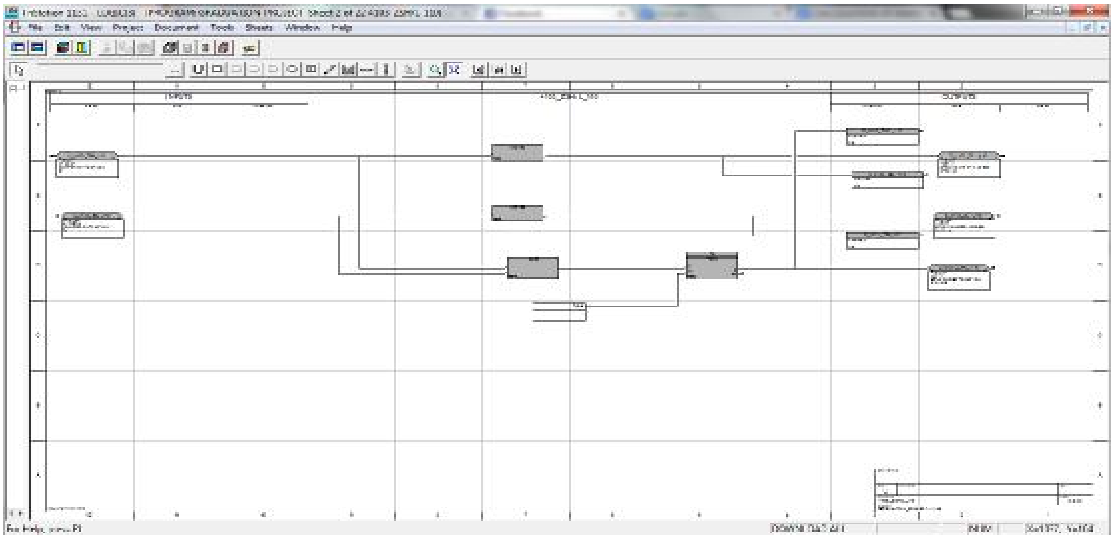


Figure 3.8: Sheet of LOGIC program

3. 4-TYPICALS:

This section describes Typical used in project which known as function blocks in tristation software & presenting the standard or repetitive logic algorithms needed in SIS logic.

3.4.1-AI: Analogue Input:

This typical Process the analogue input and provides:

- Low Low, Low, High, High High trip alarms
- Maintenance Override for all alarms
- Operational Override Interlock facility for High High & Low Low Alarm.

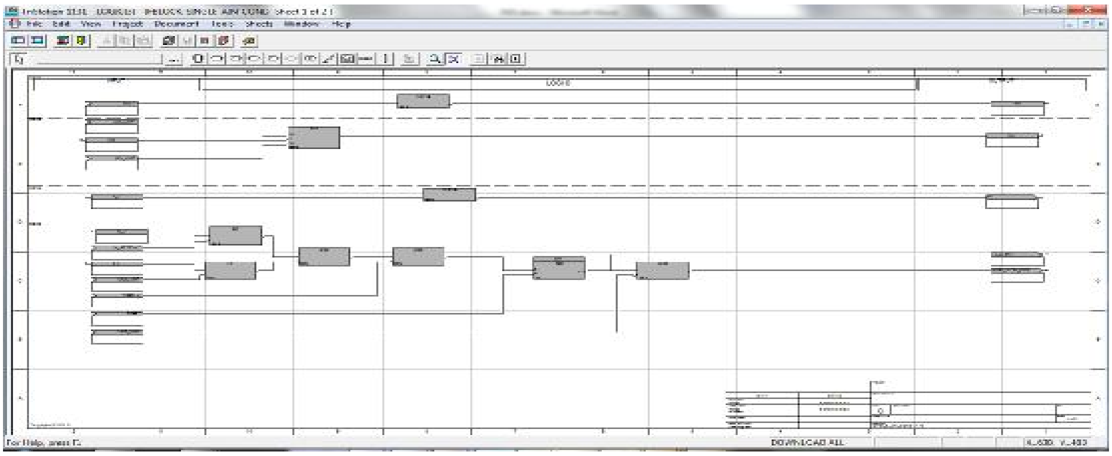


Figure 3.9: SINGLE_AIN_COND FB

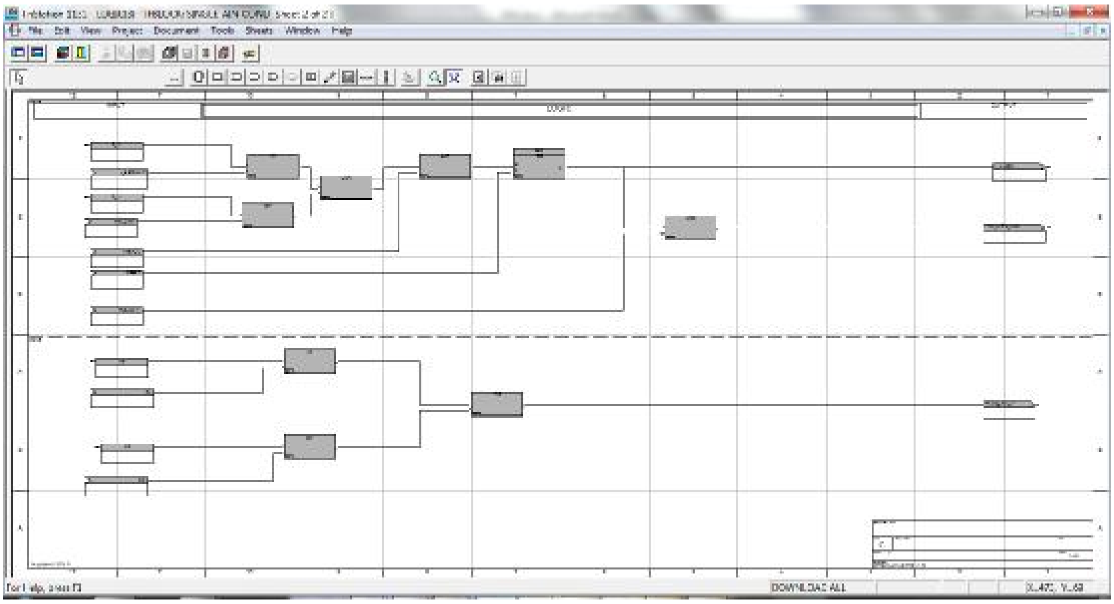


Figure 3.10: SINGLE_AIN_COND FB cont'd

Function Description:

Note: Only two High alarm levels and two Low alarm levels are considered, these are annotated H & HH and L & LL. These are considered interchangeable with HH & HHH & LL & LLL alarms.

The Analogue signal (INPUT) is read as a raw count in the range 819 to 4095 (4 to 20mA). The transmitter maximum range (MAX_LIMIT) and minimum range (MIN_LIMIT), along with standard library function AIN, allows it to be scaled to the appropriate Engineering Units to generate trips and alarms. The analogue output value in Engineering Units (OUTPUT) is repeated to DCS & HMI.

When the transmitter is in either short / open circuit, the corresponding Fault set points for short / open circuit given in raw count (SC & OC) shall be triggered, generating a common Logic 0 fault (TRNS_FAULT) to both HMI and SER. Default settings are SC = 20mA (4095) and OC = 4mA (819). When the transmitter is in fault (SC or OC) alarms (TRANS_FAULT) will be masked Logic 1, but trip alarms (H_ALARM & L_ALARM) will all be active Logic 0. Slow failing analogue transmitters may give fleeting alarms to the HMI and SER. Note: If a transmitter is Out of Range (<4mA or >20mA) but not in fault (OC or SC) then only active alarm conditions shall be reported (low alarms and high alarms respectively).

The transmitter scaled Engineering Units shall be compared against its alarm set points (L_SP, H_SP) also in Engineering Units. If the set points are met, the corresponding trip Logic 0 alarms (H_ALARM & L_ALARM). The trip alarms are linked as required to the First Up and LOGIC DIAGRAM. The repeat Logic 0 alarms are configured for both HMI and SER.

For the alarms to be reset to normal with both executive and repeat alarms (H_ALARM & L_ALARM) to Logic 1.

The Maintenance Override Signal (MOS) is normally Logic 0, Logic 1 to request override action. This signal is only active (valid) when the Maintenance Override

Enable Signal MOS_EN (normally Logic 0) has previously been set (Logic 1) and the Operational Override is not active (Logic 0).

When both MOS_H & MOS_L are active Logic 1, the Maintenance Override Status (MOS_HMI) is held at Logic 1 and the alarm outputs (H_ALARM & L_ALARM) are held at Logic 1.

3.4.2- SDV:

This typical controls a Single Solenoid operated SDV with Manual Reset, open, Close & Maintenance override facility via DCS.

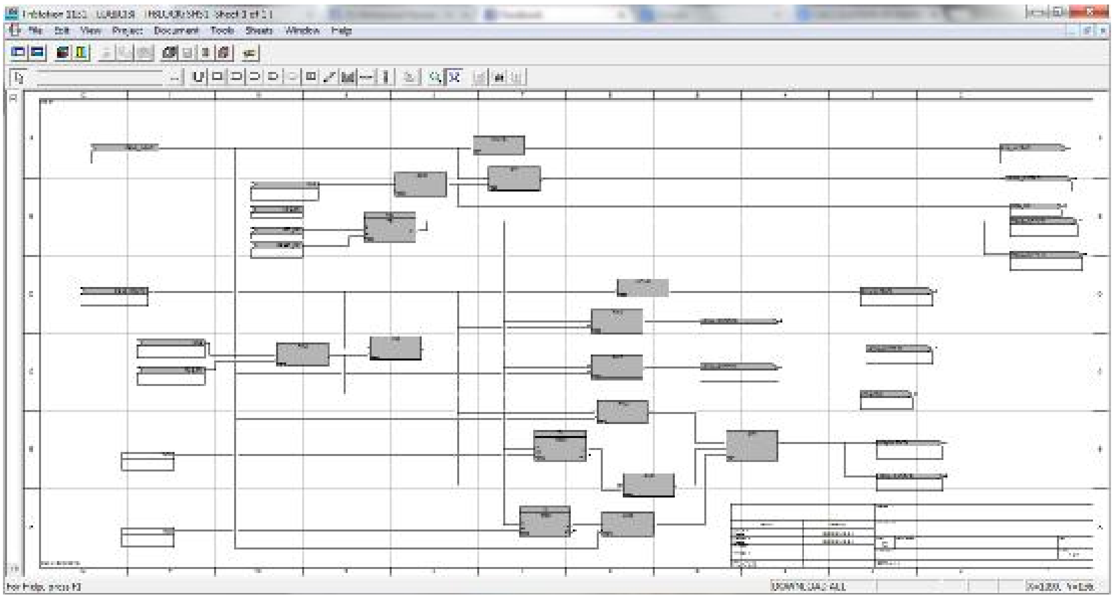


Figure 3.11: SDV FB

Function Description:

The SDV will be open if the condition of close and open are 1, the SDV will be closed if the conditions of only closed becomes zero (THE TRIP CONDITIONS AT CLOSE PIN), but during maintenance the operator can open and close the SDV manually via DCS. The LOGIC DIAGRAM Output status (Close Pin) is Logic 1 in normal operation & interlocked (Logic 0) with ESD event(s).

The Valve Trip Repeat for DCS (DCS_IND) False equals OPEN.

Operation of the (Reset) input pulse will reset the SDV in order to clear latched trip & permitting OPEN command to return the valve to its open position.

Maintenance over ride through DCS command for the valve applied if & only if the following conditions are met:

- Valve under normal condition (no Trip in action).
- MOS Enable Key switch is ON (True state).

3.4.3- BDV:

This typical controls a Single Solenoid operated BDV with Manual Reset, Close, open & Maintenance override facility via DCS.

Function Description:

The BDV will be closed if the condition of close and open are 1, the BDV will be open if the conditions of only open becomes zero (THE TRIP CONDITION AT OPEN PIN), but during maintenance the operator can close and open the BDV manually via DCS. The LOGIC DIAGRAM Output status (OPEN Pin) is Logic 1 in normal operation & interlocked (Logic 0) with ESD event(s).

The Valve Trip Repeat for DCS (DCS_IND) False equals OPEN.

Operation of the (Reset) input pulse will reset the BDV in order to clear latched trip & permitting CLOSE command to return the valve to its close position.

Maintenance over ride through DCS command for the valve applied if & only if the following conditions are met:

- Valve under normal condition (no Trip in action).
- MOS Enable Key switch is ON (True state).

3.5- Essential Documents and drawings to deliver

3.5.1- BOM (Bill Of Material)

Bill of material should contain the following information:

i. Part No.

ii. Material description

iii. Manufacturer

iv. Quantity

v. Per system Distribution

S/N	Model No.	Equipment	Manufacturer	BMS_SYS_01	Total
TRICON HARDWARE					
1	3008	Enhanced TRICON Main Processor II with 16 Mb SRAM (Version 10.5)	Triconex	3	3
2	8110	High Density Main Chassis	Triconex	1	1
3	8111	High Density Expansion Chassis	Triconex	2	2
4	9000	Expansion Chassis I/O Bus Cable, Set of 3 (standard length is 6 ft)	Triconex	2	2
6	8105	Blank I/O Slot Panel	Triconex	31	31
7	8312	230 VAC/DC High Density Power Module	Triconex	4	4
8	4351B	Triconex Communication Module	Triconex	1	1
9	3503E	24V AC/DC DI Module 32 Opto-Isolated, Commoned TMR	Triconex	3	3
10	9563-810	24V AC/DC DI Term DIN 16 Commoned	Triconex	6	6
11	3625	24V DC DO Module 32 Opto-Isolated TMR	Triconex	5	5
12	9662-610F	24V DC DO Term DIN 16 Commoned	Triconex	10	10
13	3701	AI Module 32 Differential, DC Coupled TMR	Triconex	1	1
14	9763-810F	Prefabricated AI (4-20mA) Inputs Cable Assembly	Triconex	2	2

Table 3.1: Bill Of Material

3.5.2-DLD(Detailed Layout drawings)

DLD should contain the following information:

1. Dimension and location of each component
2. Identification no. (with reference to BOM) of each component.

3. Front, rear , side and top view.
4. Drawing BOM per system.
5. Labels type, size , text to print and text height

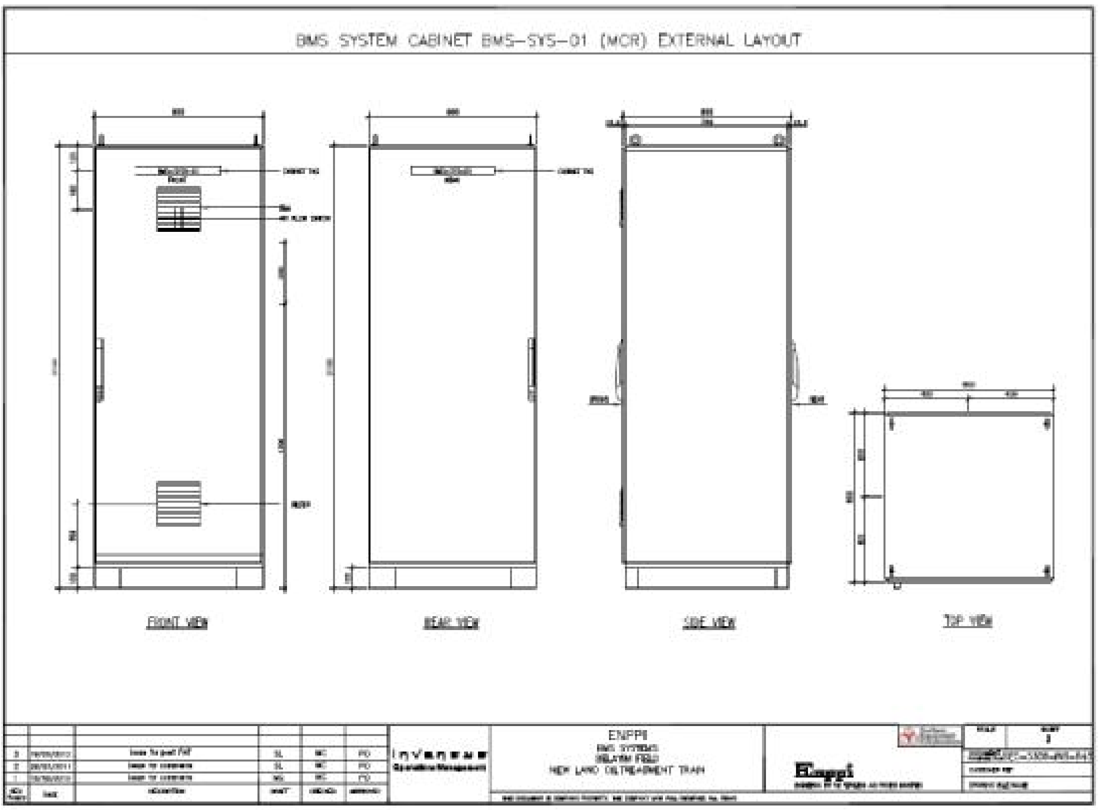


Figure 3.12: External Layout of system cabinet

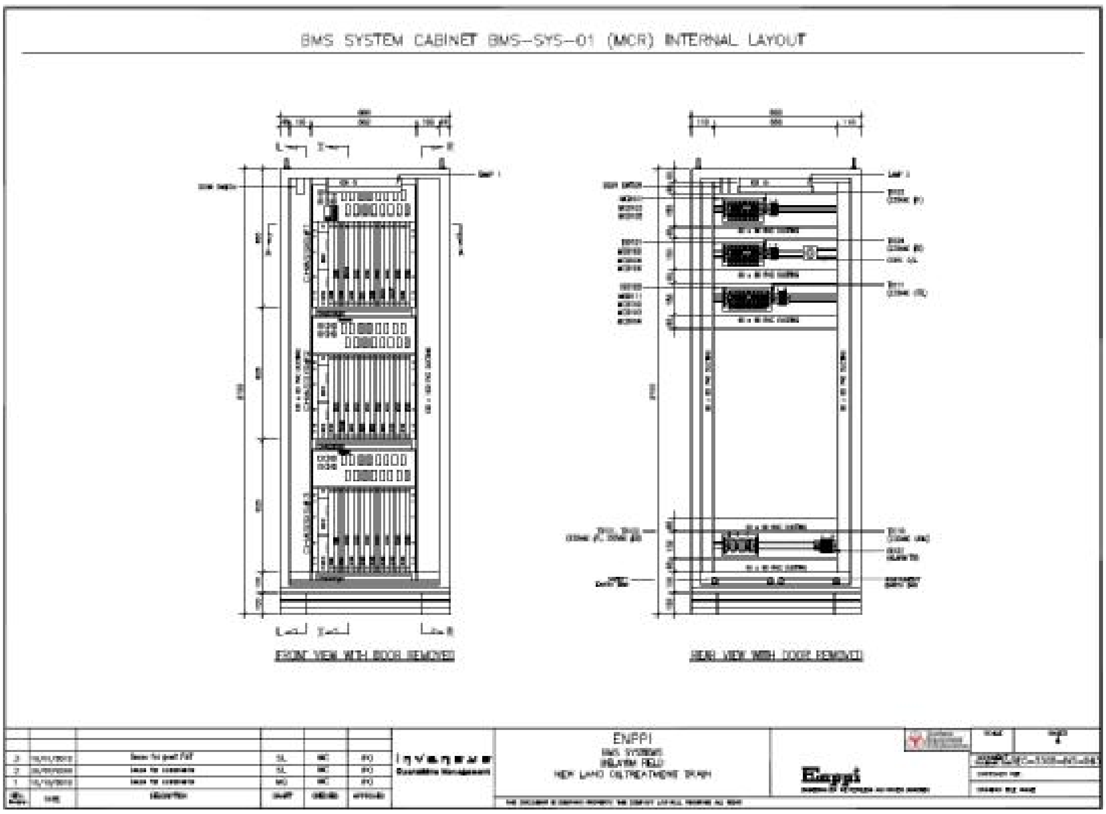


Figure 3.13: Internal layout of system cabinet

3.5.3-Electrical Power Distribution and Grounding drawings

EPDG should contain the following information:

1. Single line diagram and detailed schematics
2. Power Feeders details (Normal power, UPS, Utility,….etc)
3. Fuse ratings and MCB Capacities.
4. Point to point distribution.
5. Wire Color and size.
6. Ferrules.
7. Grounding details.
8. Type of terminal blocks used.
9. Cabinet alarms and diagnostics.

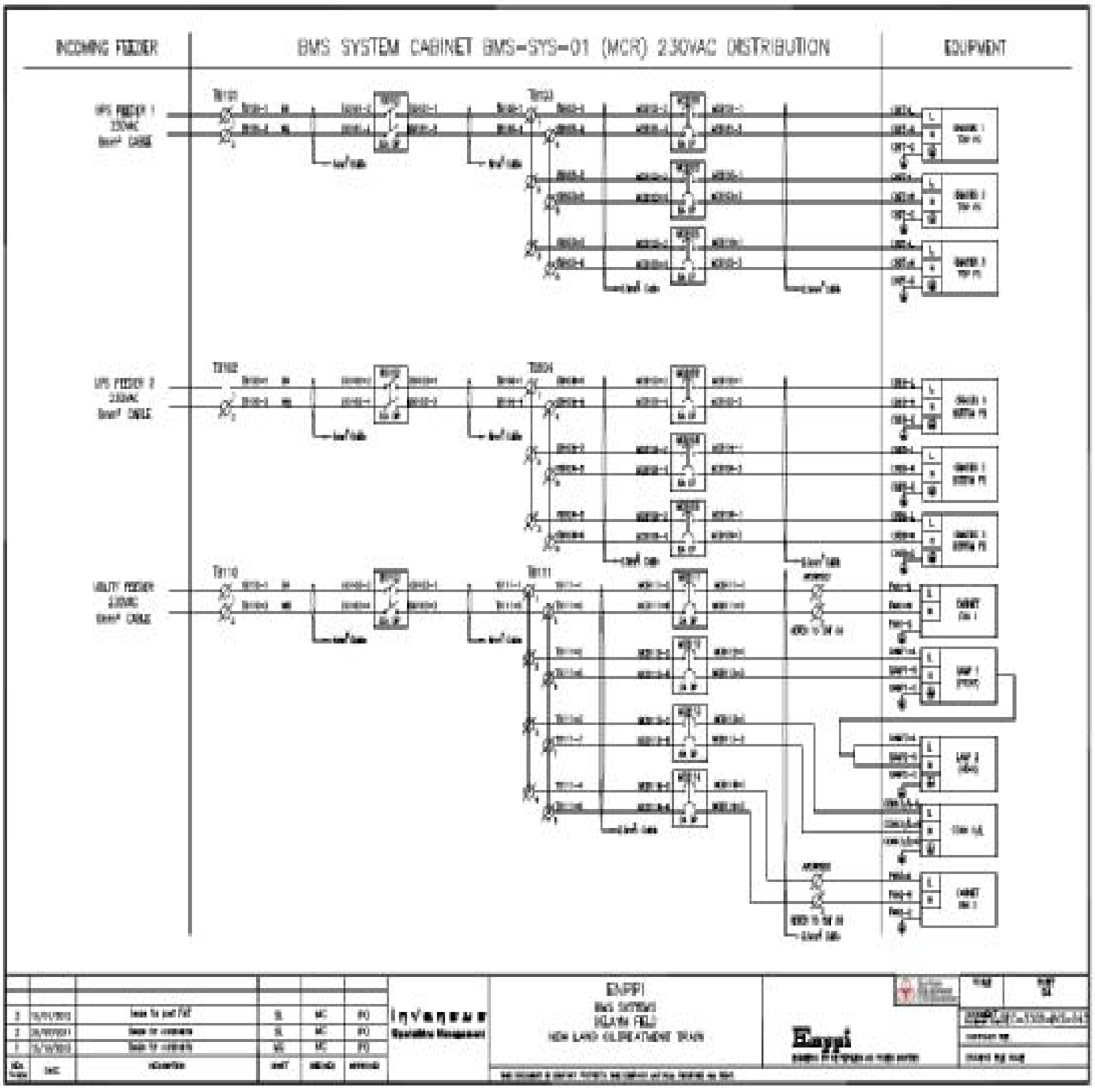


Figure 3.14: power distribution in system cabinet

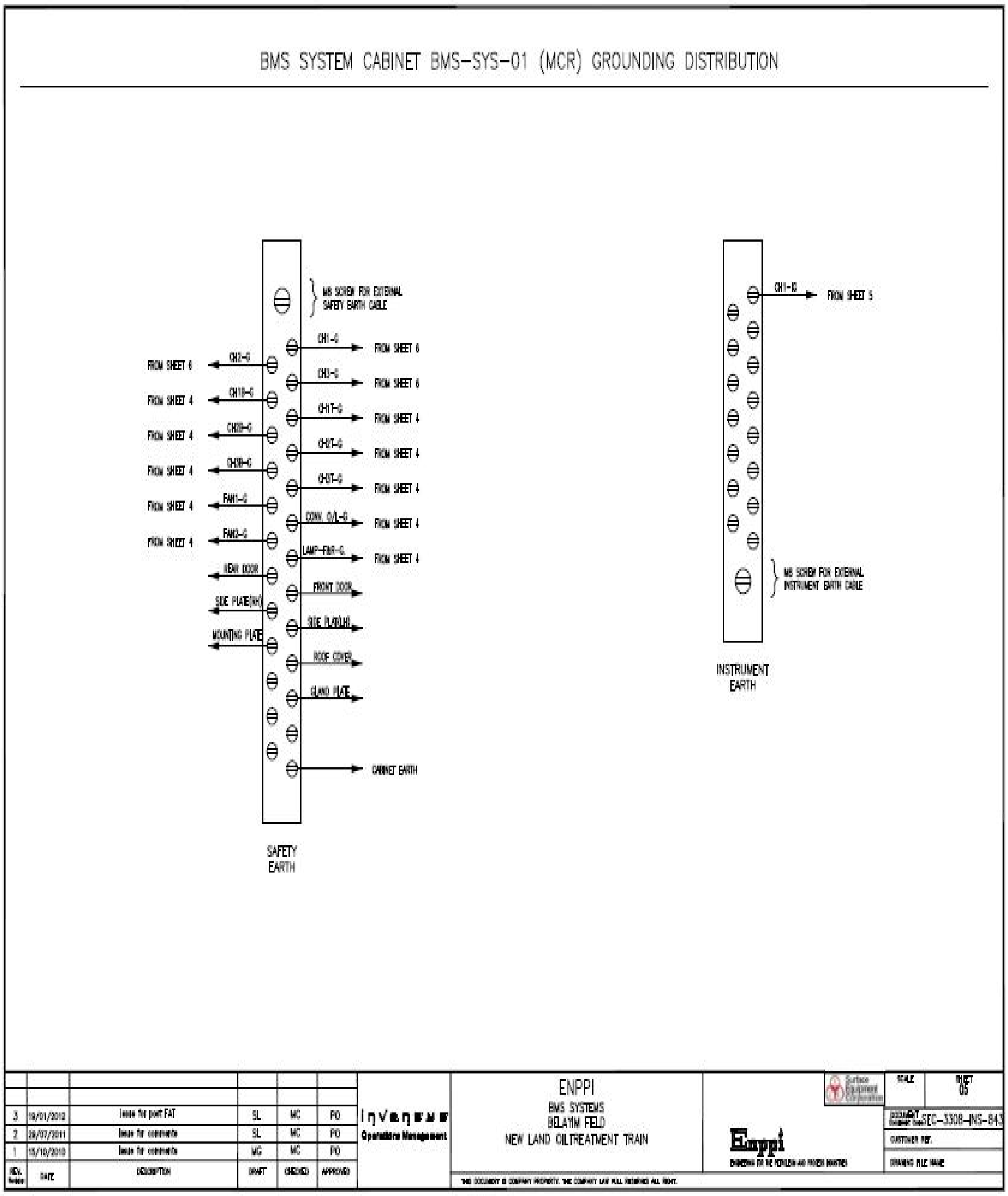


Figure 3.15: Grounding in system cabinet

3.5.4-Wiring Drawings

Wiring Drawings should contain the following information:

1. Clear Terminal numbers
2. Field cable name (ID)
3. Clear ferrules

4. Identify wire color.

5. In some cases you may need to provide wiring details in Excel for easy ferrules printing.

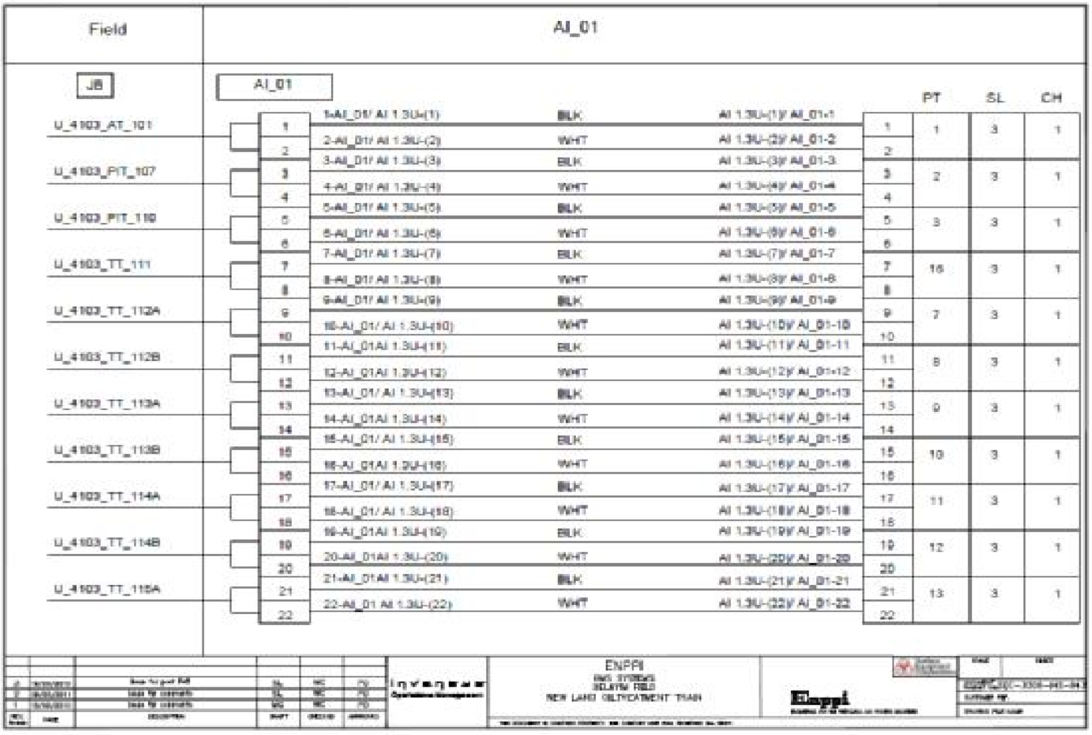


Figure 3.16: Wiring diagram for analog input

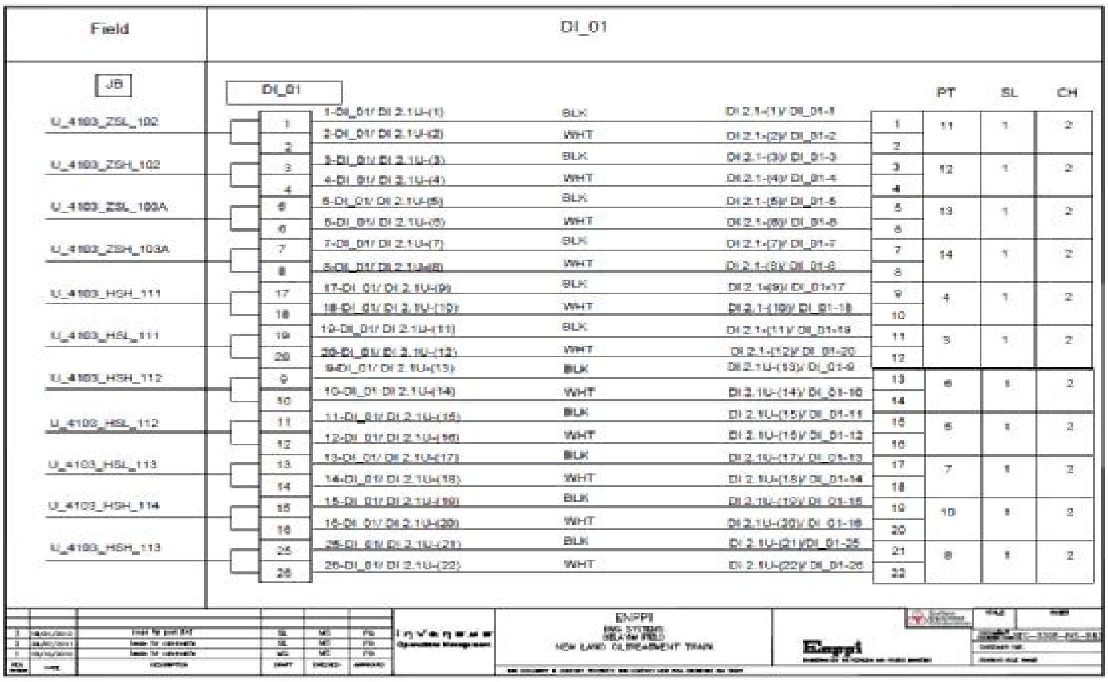


Figure 3.17: Wiring diagram for digital input

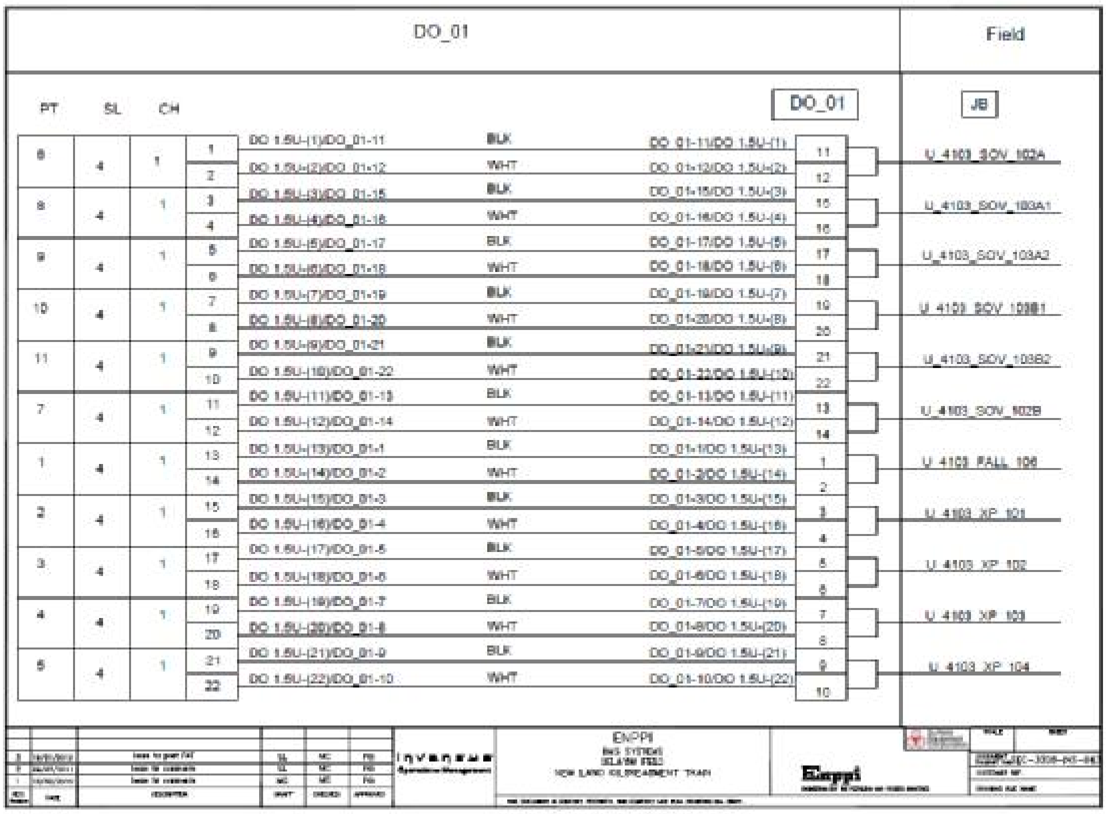


Figure 3.18: Wiring diagram for digital output

3.6-ComplementaryDocuments and drawings to deliver

3.6.1- HVAC (Heat ventilation and air conditioning)

HVAC should contain the following information:

1. Max Cabinet temperature (From Environmental Spec's)
2. Max Ambient Temp (by Location)
3. Surface Area of cabinet
4. Heat Coefficient (by Material)
5. Heat that can be dissipated by cabinet naturally
6. Heat generated by Equipment inside cabinet
7. Required Air Flow to dissipate the Excess Heat

3.6.1.1-Heat calculations

Introduction

This section contains the calculations for heat generation, natural heat dissipation and cooling required for the system cabinets Burner Management (BMS) System supplied as part of the project:

The purpose of these calculations is to provide comparisons of heat generated against natural heat loss for the panel, together with any additional cooling or ventilation measures.

Each of the dissipation calculation comprises three sections as follows:

1. The heat produced by each of the various items of equipment is summed to determine the total heat generated.
2. The heat dissipated naturally by the panel is calculated based on the available surface area.
3. The heat produced is compared with the heat lost and if it is greater, the measures to dissipate the excessive are described.

The design temperatures are:

Maximum Ambient Temp	-	45	Deg C
Maximum Panel Temp	-	60	Deg C

Panel Dimensions:

Panel Height	-	2100	mm
Panel Width	-	800	mm
Panel Depth	-	800	mm

The following sheets summarize the result of these calculations, indicating the requirements for additional cooling necessary.

Natural Heat Dissipation

Enclosure installation type to IEC 890		
□ Single enclosure, free-standing on all sides □ Single enclosure for wall mounting □ First or last enclosure in a suite, free-standing	□ First or last enclosure in a suite, for wall mounting □ Enclosure within a suite, free-standing	□ Enclosure within a suite, for wall mounting ▨ Enclosure within a suite, for wall mounting, covered roof surfaces
Installation type to IEC 890	Formula for calculating A [m^2]	
□	A = 1.8 x H x (W + D)	+ 1.4 x W x D
□	A = 1.4 x W x (H + D)	+ 1.8 x D x H
□	A = 1.4 x D x (H + W)	+ 1.8 x W x H
□	A = 1.4 x H x (W + D)	+ 1.4 x W x D
□	A = 1.8 x W x H	+ 1.4 x W x D + D x H
□	A = 1.4 x W x (H + D)	+ D x H
▨	A = 1.4 x W x H	+ 0.7 x W x D + D x H
	A = Effective enclosure surface area W = Enclosure width [m] H = Enclosure height [m] D = Enclosure depth [m]	

Table 3.2: Formula for calculating surface area

The heat dissipated naturally by the panel is a function of its surface area. This is calculated and then converted into heat dissipation.

The total effective surface area of the panel for cooling purposes is given by;

A= 1.4xWxH+.7xWxD+DxH

Where
H = Panel Height
W = Panel Width
D = Panel Depth

Substituting the given dimension into the above equation gives an effective surface area in Square meters in worst case of:
A= 1.4x.8x2.1+.7x.8x.8+.8x2.1

A= 2.352+.448 +1.68

A= 4.48 sq m

The heat dissipated by a rectangular enclosure typical of this panel is given by;

Q = A (T2-T1) X K

Where,

Q	=	Heat by the cabinet surface in watts
A	=	Effective cooling surface area calculated above
T2	=	Maximum panel temperature
T1	=	Maximum ambient temperature
K	=	Heat transmission Coefficient of painted mild steel of (15.6 W/m2k), considering heat dissipation by convection also

Substituting the figures into the above equation gives the total panel heat dissipation by natural losses are;

Q = 4.48 X (60-45) X 15.6 Watts

Q = 1048.32 Watts

Basis of Heat Calculation

The heat generated inside each system cabinet is calculated for the standard Triconex components using the data provided on the TRICON Planning & Installation Guide. The logic power and typical field power for each Triconex components are taken from the guide for the calculations. The calculated value of heat generated is compared with the heat radiated by the cabinet and the excess heat to be dissipated by air cooling is obtained.

The required fan air volume flow required to dissipate the excess heat is calculated using the following formula,

Required Fan Air volume flow, V = f (h) * (Qv - Qs) / (T2 - T1) m3 / hr

Where,

f (h) = Operating altitude above the sea level - 3.5
Qv = Heat generated inside the cabinet
Qs = Heat radiated by the cabinet surface
T2-T1 = Maximum permissible temperature difference (60-45 = 15)

The calculated volume air flow is compared against the selected fan to ensure the selected fan capacity is sufficient to dissipate the excess heat on each cabinet

Type	Model No.	Maximum Logic Power (Watts)[1]	Maximum Field Power Primary/Spare (Typical)[2]
Main Processor	3008 3006/3007	10 15	–
Power Modules	8310, 8311, 8312	–	30 (15)[3]
RXM Modules	420x, 421x	5	–
Analog Input	370x/A	10	Negligible
Analog Input (High-Density)	3704E	10	Negligible
Analog Input (Isolated)	3703E	15	Negligible
Analog Input	3720, 3721	10	Negligible
Analog Output	3805E/H	15	22 (6) / 22 (6)
Analog Output	3806E	15	27 (12) / 27 (12)
Analog Output, BiPolar	3807	20	27 (12) / 27 (12)
Digital Input (High-Density)	3504E	10	Negligible
Digital Input (Single)	3564	10	39 (16) / 39 (16)
Digital Input (TMR)	350xE/T	10	96 (48) / 96 (48)
Digital Output (AC)	360xE/T	10	112 (20) / 32 (10)
Digital Output (DC)	360xE/T	10	112 (20) / 32 (10)
Digital Output (Dual)	3664	10	52 (16) / 20 (8)
Digital Output (Supervised, 16 points)	3624	10	32 (16) / Negligible
Digital Output (Supervised, 8 points)	361xE	10	26 (8) / 10 (4)
Digital Output (Supervised or Non-Supervised, 32 points)	3625	13	110
Pulse Input	351x	20	Negligible
Pulse Totalizer Input	3515	10	96 (24) / 96 (24)
Relay Output	3636R/T	15	Negligible
Thermocouple (Isolated)	3708E	15	Negligible
Thermocouple (Non-Isolated)	3706A	10	Negligible
HART Analog Input Interface	2770H	5	Negligible

Table 3.3: Logic and Field Power of Tricon Modules

Heat generated calculations

Sl. No	Module	Model	BMS_SYS_01		
			Qty	Typical Power in W	Sub Total in W
1	Main Processor	3008	3	10	30
2	TMR Digital Input	3503E	3	58	174
3	TMR Digital Output	3625	5	123	615
4	TMR Analog Input	3701	1	10	10
5	TMR Analog Output	3805H	0	21	0
6	TCM	4351	1	7	7
7	Chassis Power Supplies	8310	4	15	60
	Total Power	**in Watts**			**896**
	Total Heat Load	**in BTU**			**3059**
From the calculated figure,					
Heat generated in the panel (Qv)			=	896	Watts
Heat dissipated by the panel			=	1048.32	Watts
Excess heat			=	-152.32	Watts
Air volume flow (as per the			=	-53.312	m3/hr

Table 3.4: Heat calculation

So the selected fan is sufficient to dissipate the excess heat generated inside the panel. As we have two fans of 120m3/hr each, even if one fails the other will take over.

3.6.2-Power Requirement Document

PR should contain the following information:

AC Power requirement >to size Incoming Feeder

DC Power requirement > to size Power Supplies

Fuse ratings and MCB Capacities.

		POWER REQUIREMENTS				
		230V AC UPS / UTILITY POWER REQUIREMENT BMS	Revision : A			
230VAC UPS Power Requirement for System Cabinet :			BMS_SYS_01			
PRIMARY BREAKERS	SECONDARY BREAKERS	DESCRIPTION	MAXIMUM PWR	MAXIMUM AMP	125% OF TOTAL CURRENT	SELECTED BREAKER RATING
MCB-101	MCB-102	CHASSIS-1	240	1.04	1.30	2A
MCB-103	MCB-104	CHASSIS-2	240	1.04	1.30	2A
MCB-105	MCB-106	SPARE	240	1.04	1.30	2A
MCB-105	MCB-23	24V DC POWER SUPPLY (PS1 A/B)	1000	4.35	5.43	10A
			1720			
			TOTAL (ISO1&ISO2)		9.34 A	20A
230VAC Utillity Power Requirement for System Cabinet :			BMS_SYS_01			
PRIMARY BREAKERS	SECONDARY BREAKERS	DESCRIPTION	MAXIMUM PWR	MAXIMUM AMP	125% OF TOTAL CURRENT	SELECTED BREAKER RATING
MCB-111		FAN - 1	19	0.16	0.20	2A
MCB-112		LAMP - F & R	52	0.43	0.54	2A
MCB-113		CONV O/L	1200	5.22	6.52	10A
MCB-114		FAN - 2	19	0.16	0.20	2A
MCB-115		SPARE	500	2.17	2.72	6A
			TOTAL (ISO-3)		7.46 A	25A

Table 3.5: Power calculations for system cabinet

230VAC Utility Power Requirement for Marshalling Cabinet :			BMS_MAR_01			
PRIMARY BREAKERS	SECONDARY BREAKERS	DESCRIPTION	MAXIMUM PWR	MAXIMUM AMP	125% OF TOTAL CURRENT	SELECTED BREAKER RATING
MCB-112		LAMP - F & R	52	0.43	0.54	2A
MCB-113		CONV O/L	1200	5.22	6.52	10A
MCB-115		SPARE	500	2.17	2.72	6A
			TOTAL (ISO-3)		7.08 A	20A
BMS_SYS_01	UPS #1 -PWR FEED	ISO-1	20A			
	UPS #2 -PWR FEED	ISO-2	20A			
	UTILITY FEED	ISO-3	25A			
BMS_MAR_01	UTILITY FEED	ISO-4	20A			

Table 3.6: Power calculations for marshalling cabinet

					BMS_MAR_01					Revision : A			
CABINET	Isolators	Iso. rating	Primary Power Dist. TB/MCB	Secondary Power Dist. TB/MCB	ETA/HPTB No.	ETA / HPTB MODEL	No. of Points	Type of Field	Field Power	Total Power (Watts)	Current (A)	125% Of Current	Selected Fuse Rating
BMS_MAR_01					AI 1-3U	9761-2xx	16	4-20mA	0.8	12.8	0.53333	0.67	1A
					AI 1-3L	9761-2xx	16	4-20mA	0.8	12.8	0.53333	0.67	1A
					SPARE								
					SPARE								
					DI 1-5U	9563-8xx	16	24VDC	1.5	24	1	1.25	2A
					DI 1-5L	9563-8xx	16	24VDC	1.5	24	1	1.25	2A
					DI 1-6U	9562-8xx	16	24VDC	1.5	24	1	1.25	2A
					DI 1-6L	9563-8xx	16	24VDC	1.5	24	1	1.25	2A
					DI 2-1U	9562-8xx	16	24VDC	1.5	24	1	1.25	2A
					DI 2-1L	9563-8xx	16	24VDC	1.5	24	1	1.25	2A
					SPARE								
					SPARE								
					DO 1-4U	9562-8xx	16	24VDC	5	80	3.33333	4.17	5A
					DO 1-4L	9562-8xx	16	24VDC	5	80	3.33333	4.17	5A
					DO 2-4U	9562-8xx	16	24VDC	5	80	3.33333	4.17	5A
					DO 2-4L	9562-8xx	16	24VDC	5	80	3.33333	4.17	5A
					DO 2-5U	9562-8xx	16	24VDC	5	80	3.33333	4.17	5A
					DO 2-5L	9562-8xx	16	24VDC	5	80	3.33333	4.17	5A
					DO 2-6U	9562-8xx	16	24VDC	5	80	3.33333	4.17	5A
					DO 2-6L	9562-8xx	16	24VDC	5	80	3.33333	4.17	5A
					DO 2-3U	9562-8xx	16	24VDC	5	80	3.33333	4.17	5A
					DO 2-3L	9562-8xx	16	24VDC	5	80	3.33333	4.17	5A
Subtotal										969.6			
Total 24VDC Field Power Requirement Estimated						959.6	Watt						
Total 24VDC Field Power Considered						1000	Watt						

Table 3.7: Power calculations for power supply

3.7- CONTROL LOOP STRATEGIES

This function design specification document provides details about control loop template and complex loops that will be used for building the control strategy LAND_OIL PROJECT.
This FDS will handle two main types of control strategies:

- 1) Control loops templates: This type is used for describing the loops that are repeated many times with the same structure as analogue input indication, simple PID control loop, SDV indication …… etc
- 2) Special loops: This type is used for describing the loops that are used only one or two times and not repeated with the same structure at another part of the project.

Each type will be described in a specific section.
Each section is organized as follows:

- P&ID Graphic Symbol
- Database Information
- Function Description
- Operator Graphical Interface
- Blocks Interconnection Diagram

3.8- DCS Control loops templates

3.8.1- A_IND TEMPLATE

3.8.1.1-P&ID graphic symbol

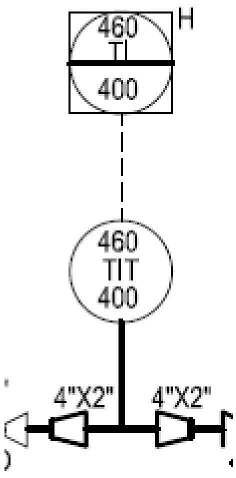


Figure 3.19: AI P&ID graphic symbol

3.8.1.2-Database Information

Area	Function	Field Tag	Loop Name	DCS Tag	Signal Type	IR	JUNCTION BOX		
460	INDICATION	TIT-400	T-400	TI-400	AI	NO	460-EJB-036	T-1	

Table 3.8: A_IND in database

3.8.1.3-Function Description

This template is used for receiving the analogue data that will be used only for monitoring, so it consists of only analog Input (AIN) block.

3.8.1.4-Operator Graphical Interface

Analoge Input symbol:

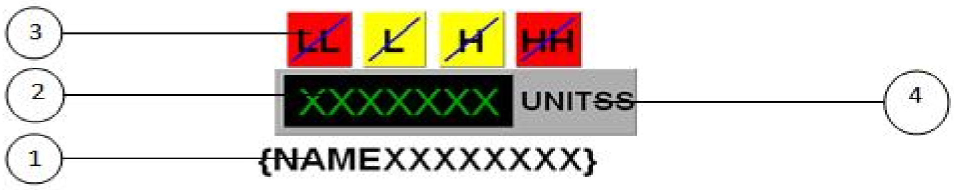


Figure 3.20: AI graphical interface symbol

It indicates for the operator:

1. Transmitter name.
2. Scaled reading.
3. Alarm type (Visibility according to configured alarms and generated alarm). Low(L),high(H), Low low (LL) and high high alarm (HH).
4. Engineering unit.

Analoge Input Overlay

It indicates for the operator:

1. Transmitter control block name
2. Description
3. Indication of the FBM status (Cyan indicates a problem in the FBM).
4. Reading Indicating bar with alarm limits indication.
5. Alarm Indicator.
6. Alarm limits indication.
7. Range of reading indication.

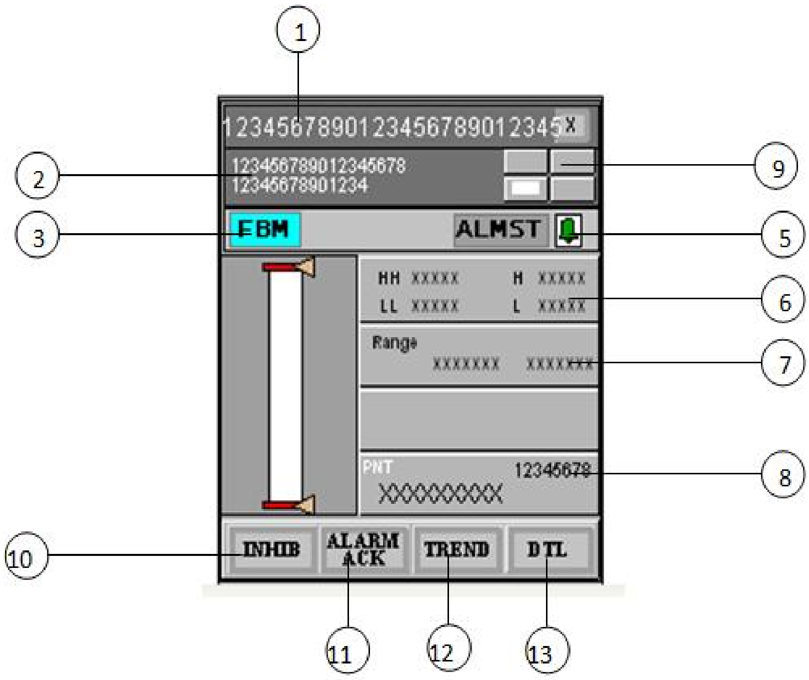


Figure 3.21: AI graphical interface overlay

8. Measured value and unit.
9. Buttons for the operator to change the position of the overlay on the display.
10. Button for the operator to inhibit alarms.
11. Button for the operator to acknowledge alarms.
12. Button for the operator to view measured value trend.
13. Button for the operator to access the standard system faceplate of the AIN Block.

Blocks Interconnection Diagram

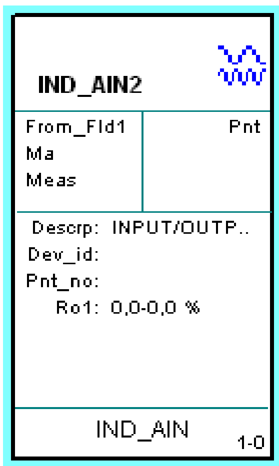


Figure 3.22: AI block in IACC

3.8.2- ACCUM TEMPALTE

3.8.2.1-P&ID graphic symbol

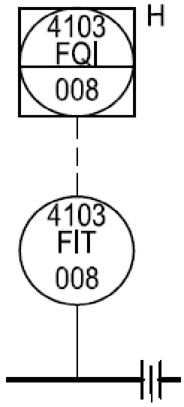


Figure 3.23: ACUMMULATOR P&ID graphic symbol

3.8.2.2-Database Information

Area	Function	Field Tag	Loop Name	DCS Tag	Signal Type	IRP	JUNCTION BOX		
4103	TOTALIZE	FIT-008	F-008	FQI-008	AI	NO	4103-EJB-010	1-1	+/

Table 3.9: ACCUMULATOR in database

3.8.2.3-Function Description

This template provides the flow totalizing indication using the flow indication signal from field. The template uses the AIN lock of the system for measurement of the flow from field. In addition an accumulator block (ACCUM) is used to provide the totalized flow value.

Operator Graphical Interface

ACCUM symbol

Figure 3.24: ACCUMULATOR graphical interface symbol

The graphical interface of this template is composed of the AIN Symbol.
In addition an accumulator symbol is shown on the graphics, it indicates for the operator:

1. The name of the accumulated value of the transmitter signal
2. The totalized value.
3. The unit of the totalized value.

ACCUM Overlay

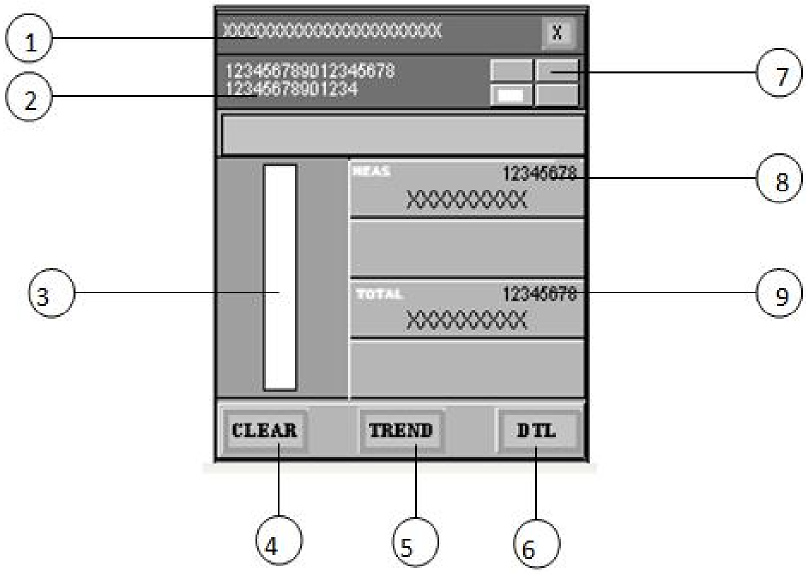


Figure 3.25: ACCUMULATOR graphical interface overlay

It indicates for the operator:

1. Transmitter control block name
2. Description
3. Totalized value Indicating bar.
4. Buttons for the operator to clear accumulator.
5. Button for the operator to view measured value trend.
6. Button for the operator to access the standard system faceplate of the AIN Block. Security access level is to e set for this button.
7. Buttons for the operator to change the position of the overlay on the display.
8. Measured value.
9. Totalized value.

Blocks Interconnection Diagram

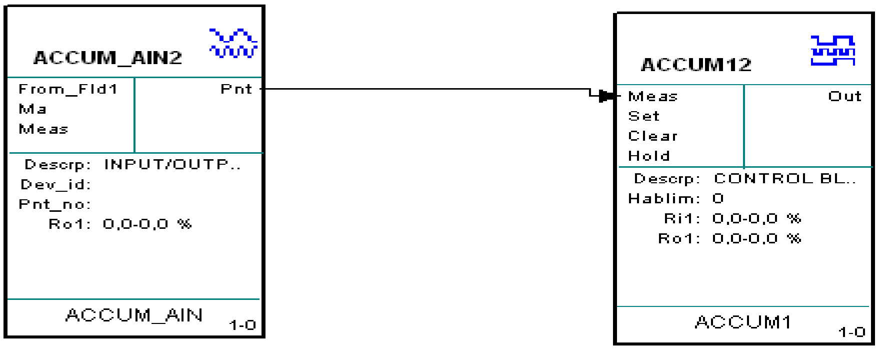


Figure 3.26: ACCUM TEMPALTE in IACC

3.8.3- PID_LOOP TEMPLATE:

3.8.3.1- P&ID graphic symbol

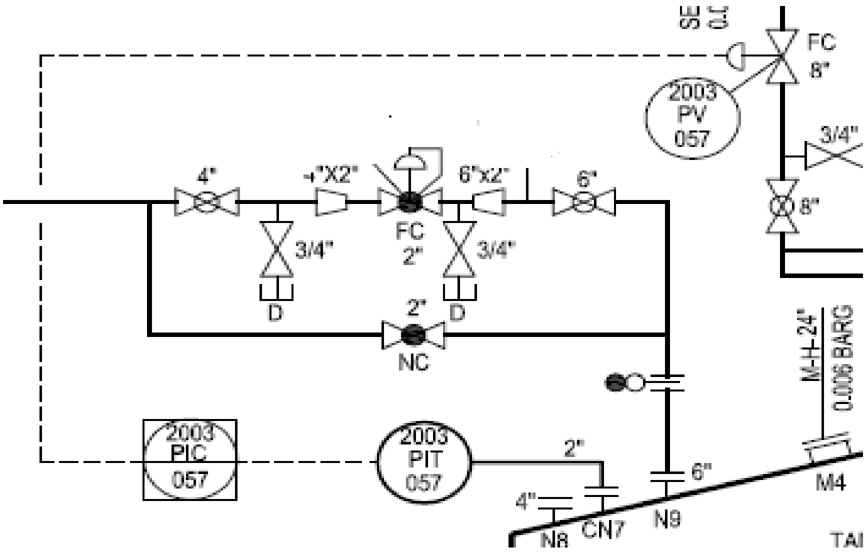


Figure 3.27: PID_LOOP P&ID graphic symbol

3.8.3.2-Database Information

NAME	DESCRIPTION	HIGHSCALE	HI DB	LOWSCALE	UNITS	CP	FBM	FBM_POIN	COMPOUND	PLANT
PV_057	GUN BARREL 3 PRESS CONTROL VLV		0			AW7001			GD_01488	LAND_
PIC_057	GUN BARREL 3 PRESS CONTRLR	100	2	0	BARG	AW7001			GD_01488	LAND
PIT_057	GUN BARREL 3 PRESS TRNSMT	100	2	0	BARG	AW7001			GD_01488	LAND_

Table 3.10: PID_LOOP in database”

3.8.3.3-Function Description

This template is used to control and monitor the process variable through the standard simple closed loop. The system takes the input and generates the output through the action of PID controller settings. The control loop always tries to minimize the deviation between set value and process feedback.

The connection between AOUT.BCALCO and PID.BCALCI is used to provide the initial value of the controller output (to start from it) before the block enters the controlling state, so that the return to controlling is bump-less. (For example: when the valve switched into manual then switched to auto mode).

3.8.3.4-Operator Graphical Interface

PID & AOUT symbols

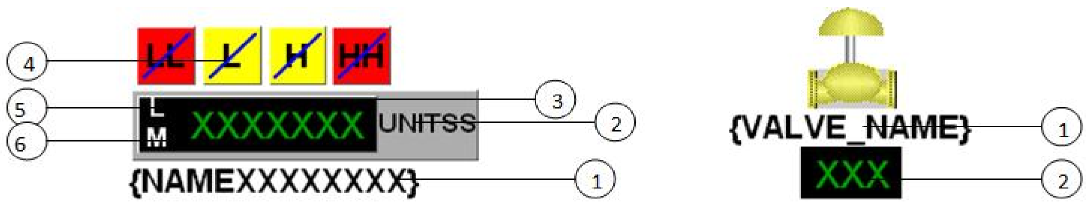


Figure 3.28: PID & AOUT graphical interface symbols

v PID controller symbol:

It indicates for the operator:

1. Controller name.
2. Engineering unit.
3. Controller measurement.
4. Alarm type (Visibility according to configured alarms and generated alarm). Low (L),high(H), Low low (LL) and high high alarm (HH).
5. Controller Local/Remote.
6. Controller Manual/Auto.

v PID Overlay

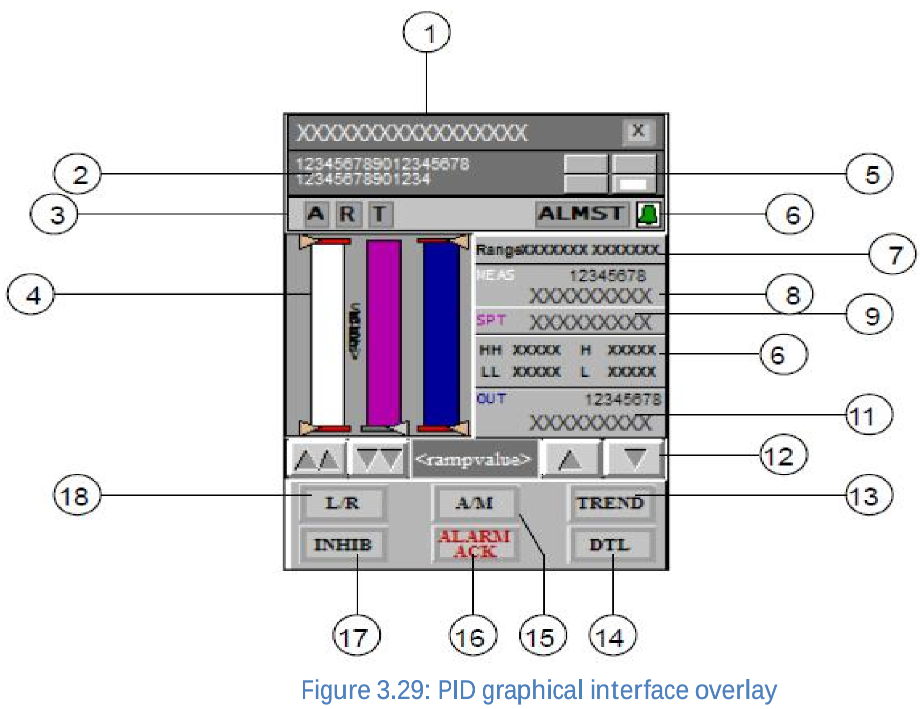


Figure 3.29: PID graphical interface overlay

It indicates for the operator and allows for:

1. PID controller block name.
2. Description.

3. Indications of the PID controller block status MANUAL/AUTO, LOCAL/REMOTE and/or TRACKING.
4. Controller measurement, set-point and controller output Indicating bars with alarm limits indication.
5. Buttons for the operator to change the position of the overlay on the display.
6. Alarm status indicator.
7. Range of controller measurement indication.
8. Measured value and unit.
9. Set-point value.
10. Alarm limits indication.
11. Output of the controller.
12. Buttons for the operator to ramp the set-point value (in LOCAL mode) and the output value (in MANUAL mode). One arrow head for fine increments of the value and double arrows head for coarse increments.
13. Button for the operator to view measured, set-point and controller output values trend.
14. Button for the operator to access the standard system faceplate of the PIDA Block. Security access level is to be set for this button.
15. Button for the operator to change the controller mode from MANUAL to AUTO and vice versa.
16. Button for the operator to acknowledge alarms.
17. Button for the operator to inhibit alarms.
18. Button for the operator to change the controller mode from LOCAL to REMOTE and vice versa.

v AOUT symbol:

It indicates for the operator:

1. Valve name
2. Value output to valve.

Valve color indicates the opening valve position as follows:

- OPENED 2% RED
- OPENED 98% GREEN
- 2% <OPENING< 98% YELLOW

NOTE: There is no overlay for the ROUT symbol.

Blocks Interconnection Diagram

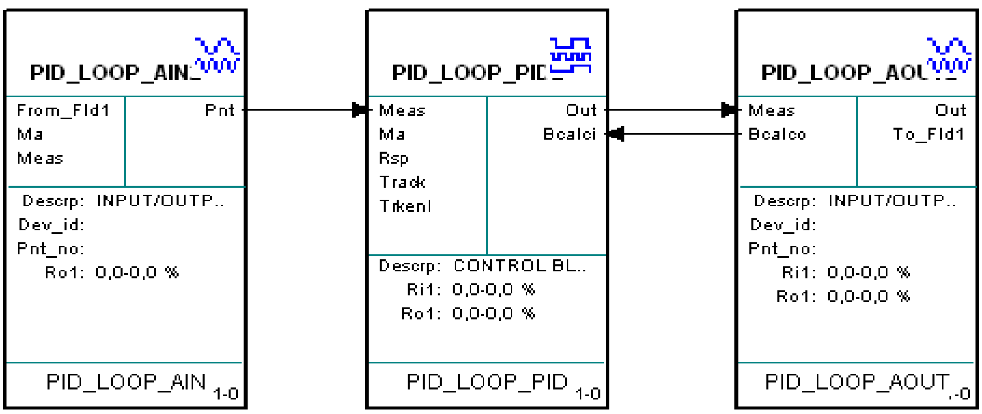


Figure 3.30: PID_LOOP TEMPALTE in IACC

3.8.4 -MOTOR TEMPLATE:

3.8.4.1-P&ID graphic symbol

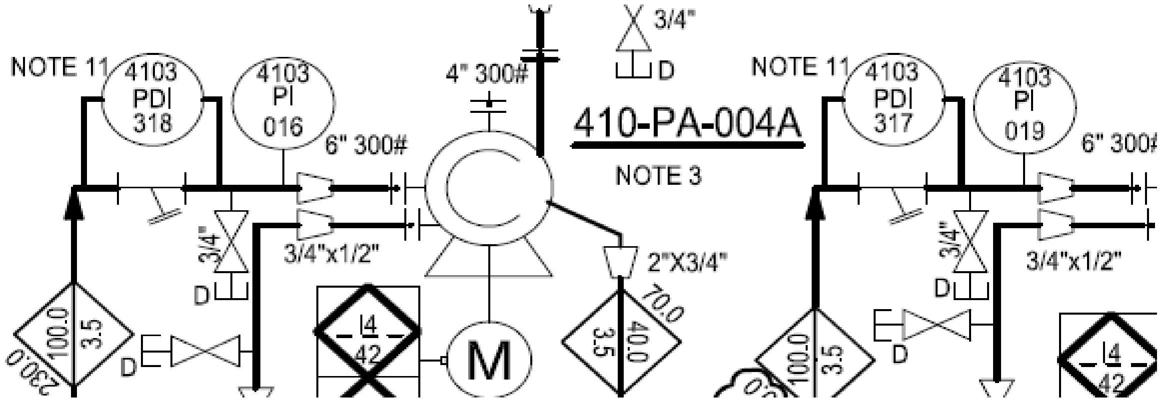


Figure 3.31: MOTOR P&ID graphic symbol

3.8.4.2-Database Information

NAME	DESCRIPTION	LOWSCALE	UNITS	CP	TBM	TBM_POIN	COMPOUND	PLANT_AREA	CST_NAME	CSD_N
MPSR_102A	CRD OIL TRNSF PUMP START COMMAND			AW7001			GD_01485	LAND_2203	MOTOR	MTR_PA
MPLR_102A	TRNSF PUMP LOCAL /REMOTE STATUS			AW7001			GD_01485	LAND_2203	MOTOR	MTR_PA
MPC_102A	CRD OIL TRNSF PUMP COMMON ALRM			AW7001			GD_01485	LAND_2203	MOTOR	MTR_PA
MPR_102A	TRNSF PUMP RUN / STOP STATUS			AW7001			GD_01485	LAND_2203	MOTOR	MTR_PA
MPSS_102A	CRD OIL TRNSF PUMP STOP COMMAND			AW7001			GD_01485	LAND_2203	MOTOR	MTR_PA
PR_STRT_102A	CRD OIL TRNSF PUMP PROCS STRT			AW7001			GD_01485	LAND_2203	MOTOR	MTR_PA
PR_STP_102A	CRD OIL TRNSF PUMP PROCS STP			AW7001			GD_01485	LAND_2203	MOTOR	MTR_PA
ESD_TRP_102A	CRD OIL TRNSF PUMP ESD TRIP			AW7001			GD_01485	LAND_2203	MOTOR	MTR_PA
GDEV_102A	CRD OIL TRNSF PUMP GDEV			AW7001			GD_01485	LAND_2203	MOTOR	MTR_PA
GDEV_102AM	CRD OIL TRNSF PUMP CALC			AW7001			GD_01485	LAND_2203	MOTOR	MTR_PA

Table 3.11: MOTOR TEMPLATE in database

3.8.4.3-Function Description

This template is used to monitor the status of the PUMP and the operator will be permitted to start/stop under some of conditions as in the following logic diagram. This logic is translated to CALCA program as follow,

The GDEV block uses the running feedback indication to define if the PUMP is Running, Stopped, Going to run, Going to stop, or mismatch.

The ESD action with the PUMP is to shut it down when a trip condition is occurred. Once the shutdown is activated, DCS receives a serial trip signal to disable the operator action on the pump.

Steps of CALCA

Step01	CST
Step02	IN BI03;M/A
Step03	BIT 8
Step04	NOT
Step05	AND BI01;SOFT START
Step06	OUT M01
Step07	GTO 11
Step08	AND BI08;PROCESS STRT
Step09	OUT M01
Step10	
Step11	IN BI06;L/R
Step12	AND M01
Step13	OUT M02
Step14	
Step15	
Step16	OR BI02 BI07;SOFT OR PROCESS STOP
Step17	OUT M03
Step18	IN BI05;ESD TRIP
Step19	NOT
Step20	OR ~BI04;FAULT
Step21	OUT M04
Step22	
Step23	
Step24	OR M03 M04
Step25	OUT M05
Step26	
Step27	IN M02
Step28	IN M05
Step29	MRS
Step30	OUT BO01
Step31	
Step32	END

Table 3.12: MOTOR CALCA steps

Operator Graphical Interface:

MOTOR SYMBOL

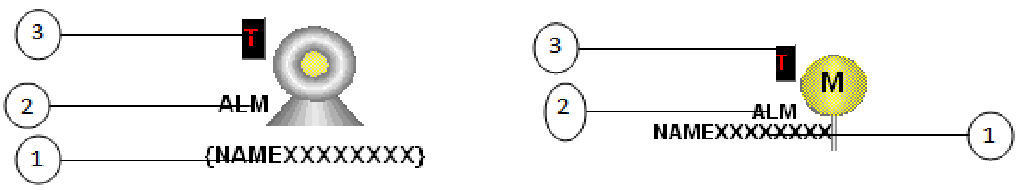


Figure 3.32: MOTOR graphical interface symbol

It indicates for the operator:
1) Symbol name.
2) Alarm signal.

3) Trip signal indication (from ESD).

The color of the PUMP symbol is changed according to the PUMP status which is defined by the GDEV block.
Each status is defined by a certain color:

- RUNNING GREEN
- STOP RED
- GOING TO RUN BLINKING RED
- GOING TO STOP BLINKING GREEN
- MISMATCH BLINKING YELLOW

MOTOR OVERLAY

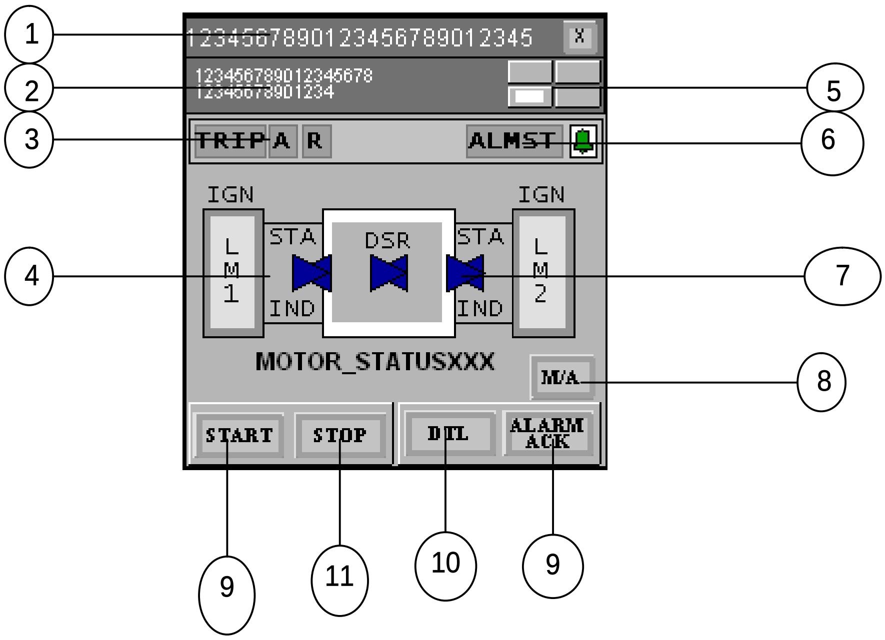


Figure 3.33: MOTOR graphical interface overlay

It indicates for the operator and allows for

1) GDEV (MOTOR) block name
2) Description.
3) TRIP signal from ESD indication.
4) Motor status (running, stopped, fail to run ...).
5) Buttons for the operator to change the position of the overlay on the display.
6) Mismatch alarm status.
7) Running status limit switch from field.
8) Button for the operator to change between manual/auto operation.
9) Button for the operator to acknowledge the mismatch alarm.
10) Button for the operator to access the standard system faceplate of the GDEV Block.
11) Button for the operator to send stop command to the field.
12) Button for the operator to send start command to the field.

Blocks Interconnection Diagram

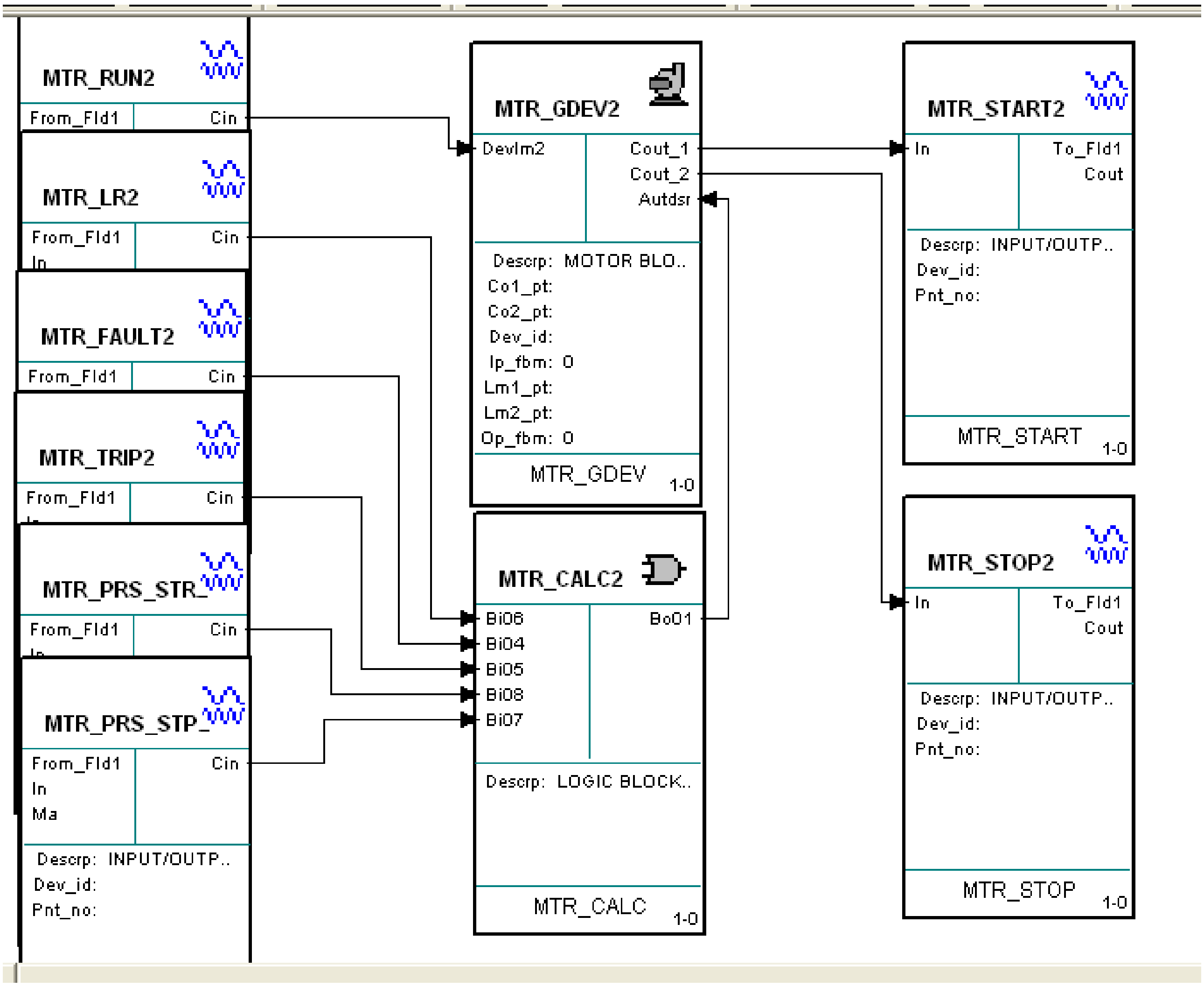


Figure 3.34: MOTOR TEMPALTE block in IACC

3.8.5-MON_SDV & ESD_SDV TEMPLATE:

3.8.5.1-P&ID graphic symbol

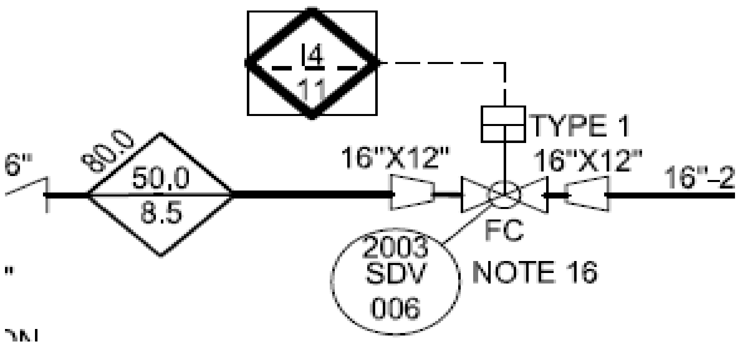


Figure 3.35: SDV P&ID graphic symbol

3.8.5.2-Database Information

NAME	DESCRIPTION	CP	COMPOUND	PLANT_AREA	CSI_NAME	CSD_NAME	CSI_COMPON
ZSH_006	SPRATR SD VLV LMT SWTCH OPN	AW7001	GD_01484	LAND_2003	MON_SDV	MON_SDV_006	MON_SDV_II2
ZSL_006	SPRATR SD VLV LMT SWTCH CLOS	AW7001	GD_01484	LAND_2003	MON_SDV	MON_SDV_006	MON_SDV_I2
ZCALC_006	SPRATR SD VLV LMT SWTCH CALC	AW7001	GD_01484	LAND_2003	MON_SDV	MON_SDV_006	MON_SDV_CLC2
ZGDEV_006	SPRATR SD VLV LMT SWTCH GDEV	AW7001	GD_01484	LAND_2003	MON_SDV	MON_SDV_006	MON_SDV_GDV2

Table 3.13: SDV TEMPLATE in database

3.8.5.3-Function Description

This template is used to monitor the status of the SDV and BDV valves which controlled by ESD or not.

The GDEV block uses the OPEN and CLOSE feedback indications to define if the VALVE is OPENED, CLOSED, GOING TO OPEN, GOING TO CLOSE, FAIL TO OPEN, FAIL TO CLOSE.

This is organized by CALCA block under the following program

Step01	BII 6;BRANCH IF INITIALIZING
Step02	IN BI04;IGNORE LMSO
Step03	BIT 10
Step04	IN BI03;IGNORE LMSC
Step05	BIT 12
Step06	IN BI02;OPEN LMT SW
Step07	IN BI01;CLOS LMT SW
Step08	FF
Step09	BIT 12
Step10	IN ~BI01;FOLLOW LMSC CHANGES
Step11	GTO 13
Step12	IN BI02;FOLLOW LMSO CHANGES
Step13	OUT BO01
Step14	END
Step15	
Step16	
Step17	
Step18	
Step19	

Table 3.14: SDV CALCA steps

3.8.5.4-Operator Graphical Interface

- **SDV symbol:**

Figure 3.36: SDV graphical interface symbol

It indicates for the operator:

1. Valve name.
2. Valve base, color indicates the status of the valve.
   - OPENED GREEN
   - CLOSED RED
   - GOING TO OPEN BLINKING RED
   - GOING TO CLOSE BLINKING GREEN
   - MISMATCH BLINKING YELLOW
   - MISMATCH ACKNOWELDED STEADY YELLOW
3. Valve head, color indicate the status of the command to valve.
   - OPEN GREEN
   - CLOSE RED

- **SDV overlay**

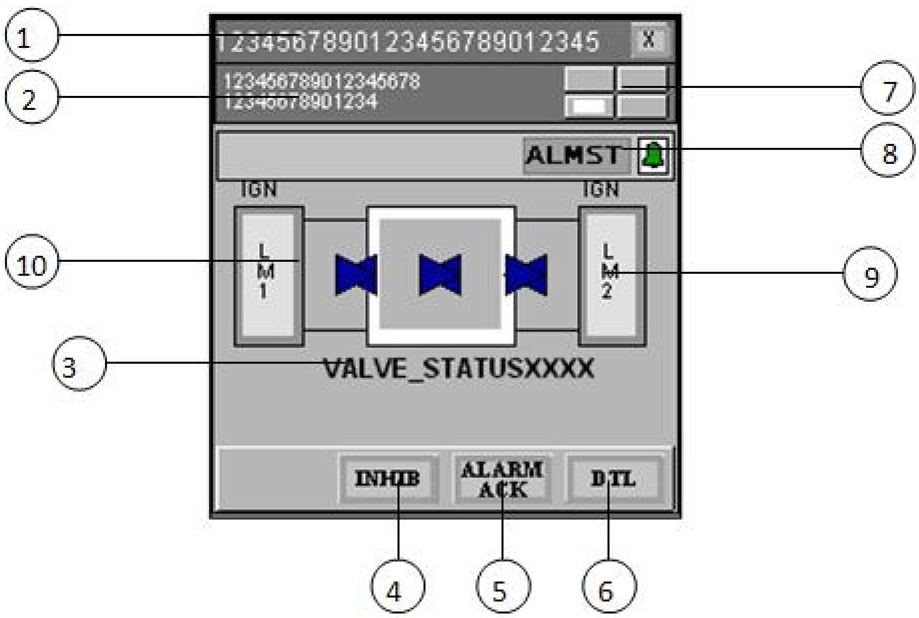


Figure 3.37: SDV graphical interface overlay

It indicates for the operator:

1. GDEV (VALVE) block name.
2. Description.
3. Valve status (opened, closed, fail to open ...).
4. Button for the operator to inhibit the mismatch alarms.

5. Button for the operator to acknowledge the mismatch alarm.
6. Button for the operator to access the standard system faceplate of the GDEV Block. Security access level is to be set for this button.
7. Buttons for the operator to change the position of the overlay on the display.
8. Mismatch alarm status.
9. Closed limit switch from field.
10. Opened limit switch from field.

3.8.5.5-Blocks Interconnection Diagram

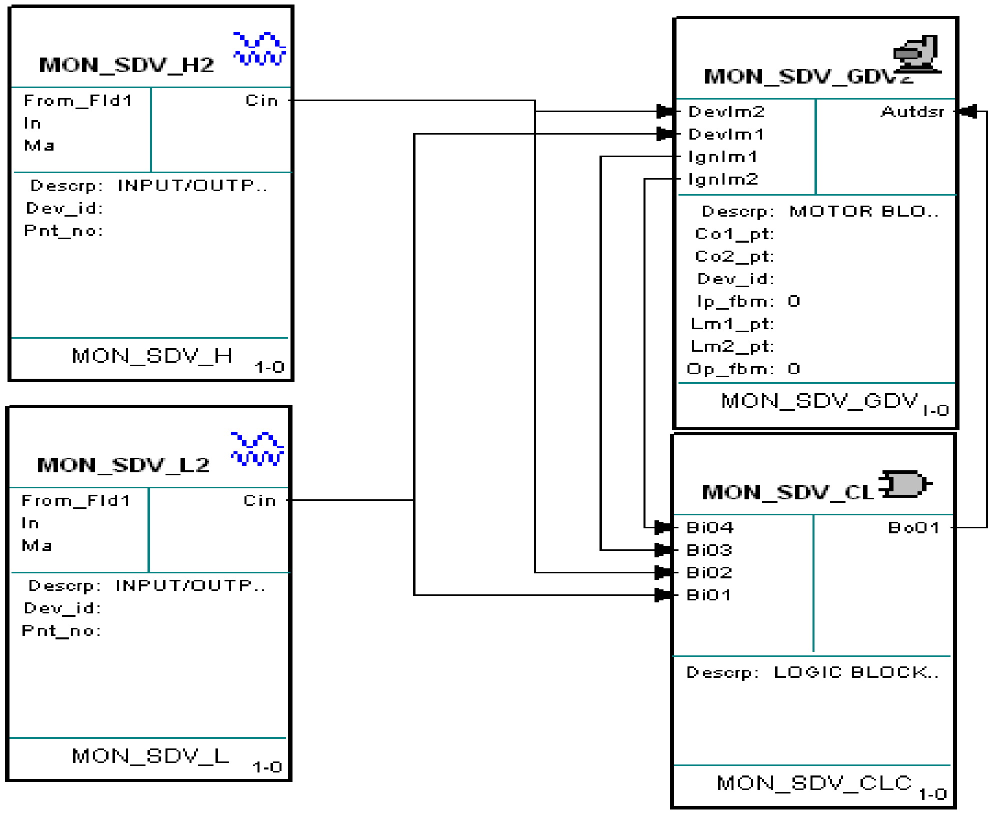


Figure 3.38: MON_SDV TEMPALTE in IACC

3.8.5.6-D_IND & CIN_SERIAL TEMPLATE:

P&ID graphic symbol

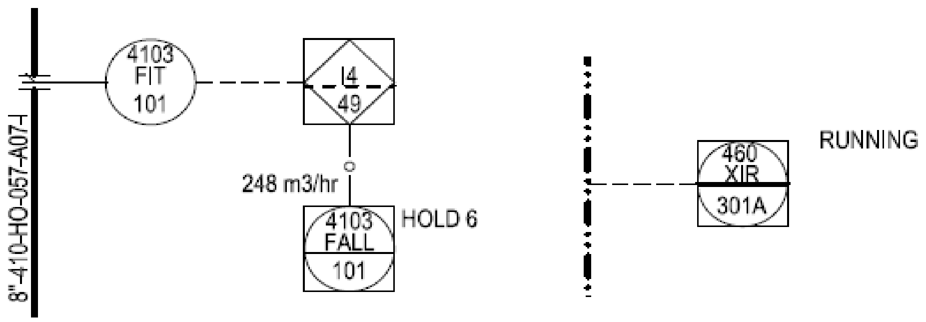


Figure 3.39: DI P&ID graphic symbol

Database Information

NAME	DESCRIPTION	CP	COMPOUND	PLANT AREA	CST NAME	CSD N
XIR 301A	INSTRMNT AIR COM PRS PKG RUNING	AW7001	GD 01462SI1	LAND 460	D IND	DIN XR

Table 3.15:DI in database

Function Description

This template is used to provide a serial interface to the digital indications received from ESD or any other system and provide representation of the hardwired digital alarm indications.
The digital data received from ESD is in a packed format, and then each BIT will be indicated using a separate CIN block.

3.8.5.7- Operator Graphical Interface

Contact Alarm symbol

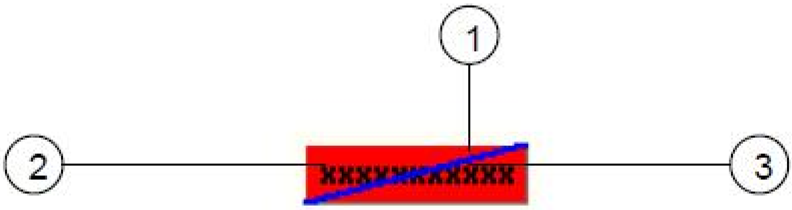


Figure 3.40: contact alarm graphical interface symbol

It indicates for the operator:

1. Alarm indication.
   Alarm color code will be as follow:
   - ALARM STEADY RED
   - NORMAL GREY
2. Alarm tag-name.
3. Dash blue line indicates alarm is inhibited.

Contact Alarm overlay

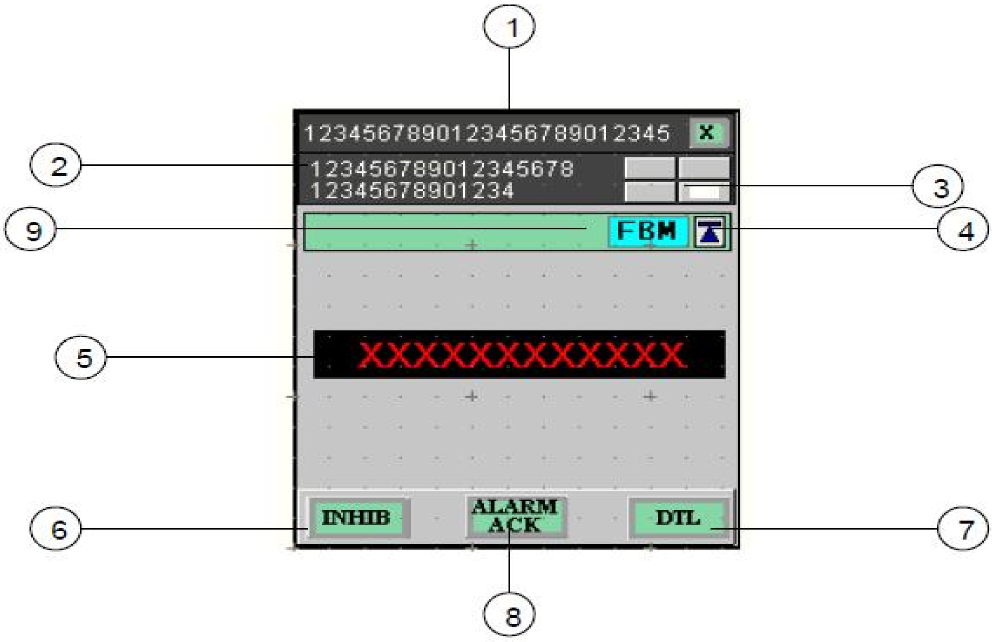


Figure 3.41: contact alarm graphical interface overlay

It indicates for the operator:

1. Alarm block name.
2. Description.
3. Buttons for the operator to change the position of the overlay on the display.
4. Alarm status.
5. Alarm Text.
6. Button for the operator to inhibit the alarm.
7. Button for the operator to access the standard system faceplate of the CIN Block. Security access level is to be set for this button.
8. Button for the operator to acknowledge the alarm.
9. FBM status (cyan indicates problem).

3.8.5.8-Blocks Interconnection Diagram

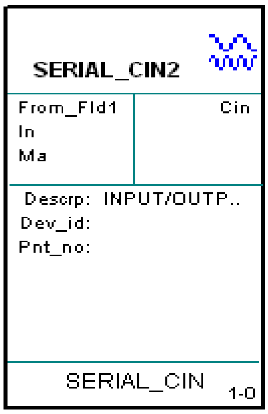


Figure 3.42: D_IND or CIN_SERIAL TEMPALTE in IACC

3.8.6- CIN_W_MOS TEMPLATE:

This template likes the previous template in addition to allow for the operator to send MOS command to ESD and receive BYPASS signal.

3.8.6.1- Operator Graphical Interface

Contact alarm symbol

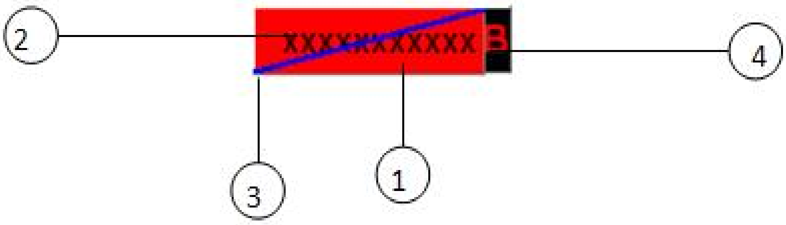


Figure 3.43: contact alarm graphical interface symbol in CIN_W_MOS TEMPLATE

It indicates for the operator:

1. Alarm indication.

   Alarm color code will be as follow:

ALARM	STEADY RED
NORMAL	GREY

2. Alarm tag-name.
3. Dash blue line indicates alarm is inhibited.
4. BYPASS indication from ESD.

Contact alarm overlay:

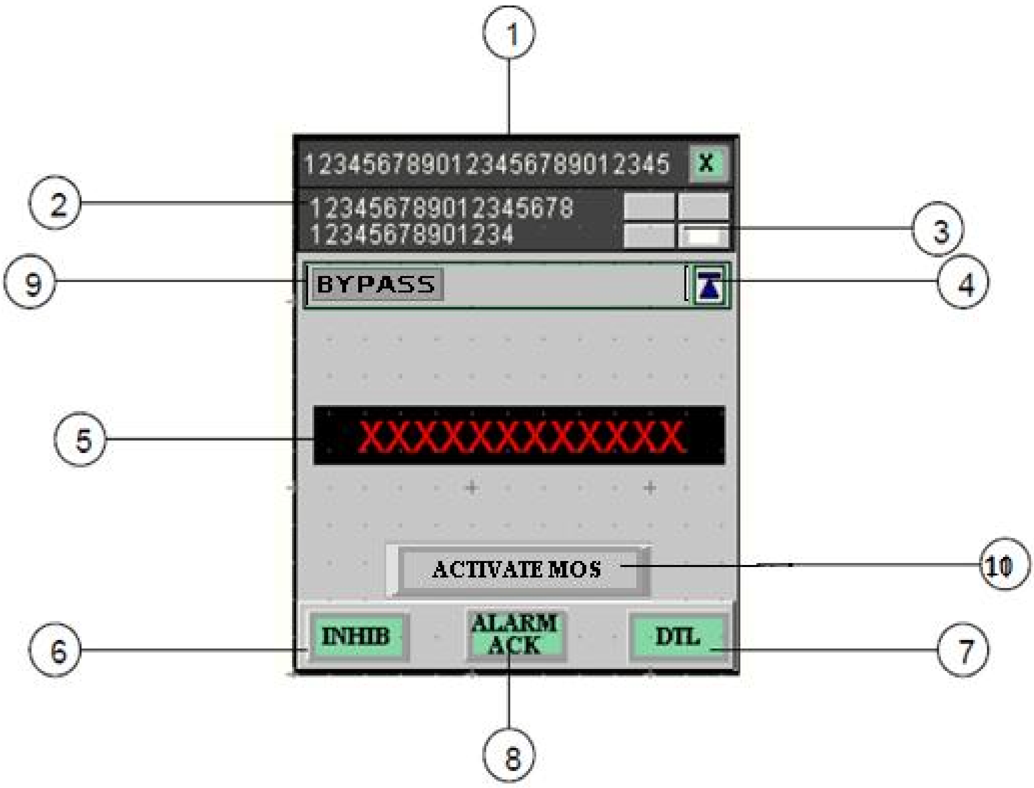


Figure 3.44: contact alarm graphical interface overlay in CIN_W_MOS TEMPLATE”

It indicates for the operator:

1. Alarm block name.
2. Description.
3. Buttons for the operator to change the position of the overlay on the display.
4. Alarm status.
5. Alarm Text.
6. Button for the operator to inhibit the alarm.
7. Button for the operator to access the standard system faceplate of the CIN Block. Security access level is to be set for this button.
8. Button for the operator to acknowledge the alarm.
9. BYPASS INDICATION.
10. Button for the operator to activate/deactivate the MOS request to the ESD.

3.8.6.2- Blocks Interconnection Diagram

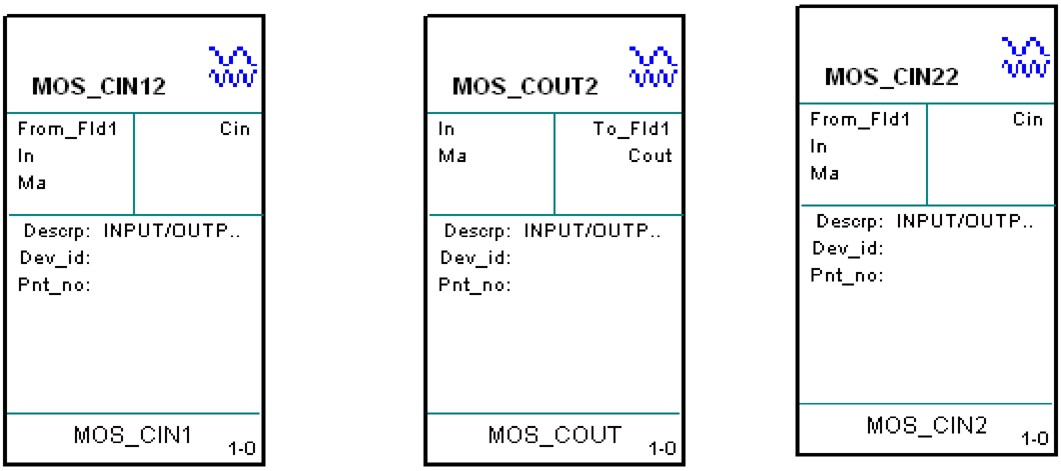


Figure 3.45: CIN_W_MOS TEMPLATE in IACC

3.8.7- HIC_VLV TEMPLATE

P&ID graphic symbol

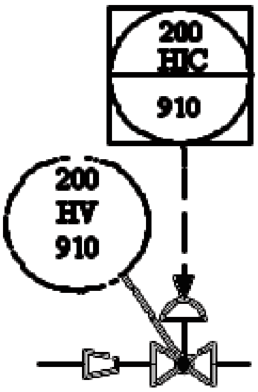


Figure 3.46: HIC valve P&ID graphic symbol

Database Information

NAME	DESCRIPTION	CP	FBM	FBM_POIN	COMPOUND	PLANT_AREA	CST_NAME	CSD_NAME	CST_COMPO
HV_101	INLET THRML OIL H_EATER HND VLV	AW7001			GD_01491	LAND_4103	HIC_VLV	HIC_101	HIC_AOUT2
XY_110	STAK THRML OIL HEATR CONTRL VLV	AW7001			GD_01491	LAND_4103	HIC_VLV	HIC_110	HIC_AOUT2

Table 3.16: HIC valve in database

Function Description

This template is used to enable the manual control for the analogue valve from the DCS system by operator.

Operator Graphical Interface

The valve symbol and overlay are as same as analogue output in PID_LOOP TEMPLATE.

Blocks Interconnection Diagram

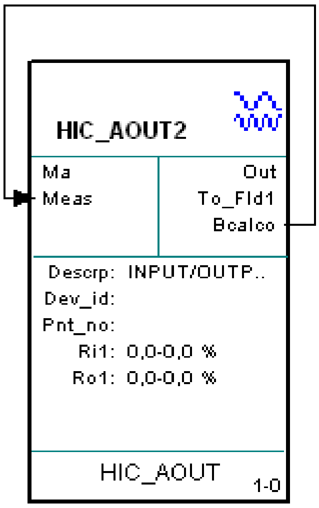


Figure 3.47:HIC_VLV TEMPALTE in IACC

3.9- DCS special loops

3.9.1- OUTSEL TEMPLATE:

3.9.1.1- Function Description:

This template provides summation of two transmitters and generates the output through the action of PID controller settings.

the connection between AOUT.BCALCO and PID.BCALCI is used to provide the initial value of the controller output (to start from it) before the block enters the controlling state, so that the return to controlling is bump-less. (For example: when the valve switched into manual then switched to auto mode).

The using of CALCA block is for calculating the summation as shown in the following program,

STEP1 RQE RI01
STEP2 BIT 5
STEP3 IN RI01
STEP4 OUT M01
STEP5 ADD M01 RI02
STEP6 OUT RO01
STEP7 RQE RI01
STEP8 BIT 11
STEP9 CBD RO01
STEP10 EXIT
STEP11 SBD RO01
STEP12 END

3.9.1.2-Blocks Interconnection Diagram

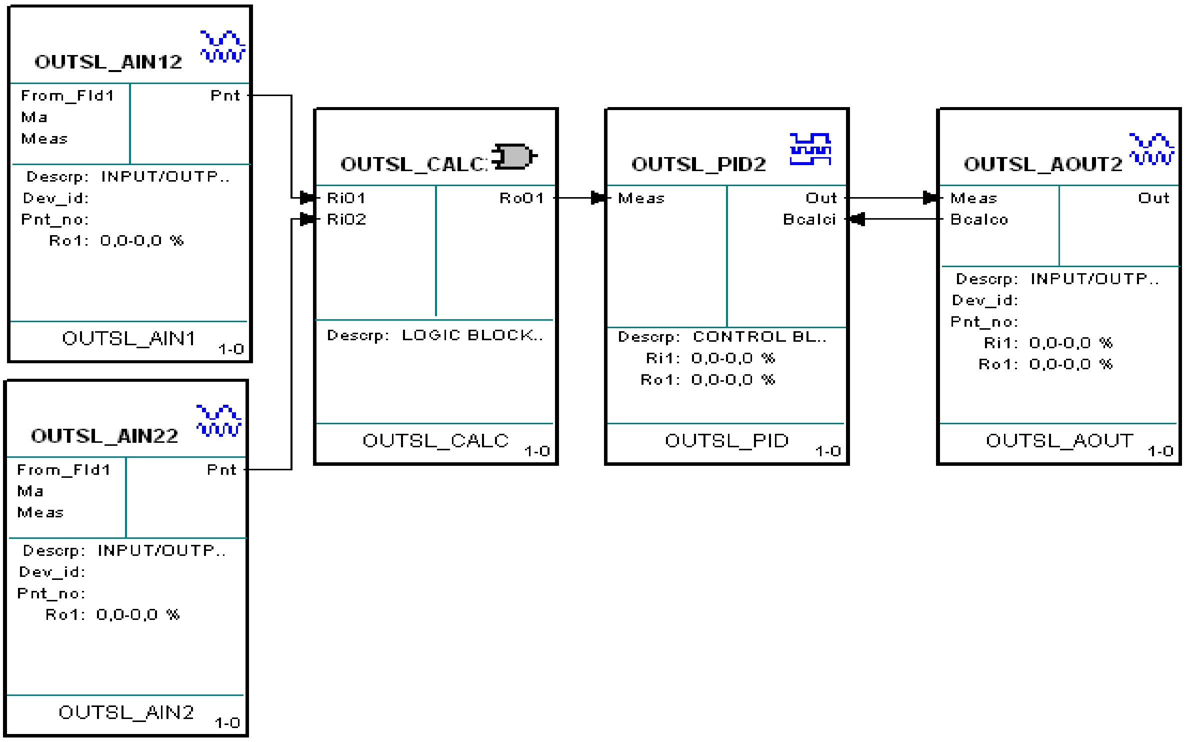


Figure 3.48: OUTSEL TEMPALTE in IACC

3.9.2 -SPLIT_RANG TEMPLATE:

3.9.2.1- Operator Graphical Interface:

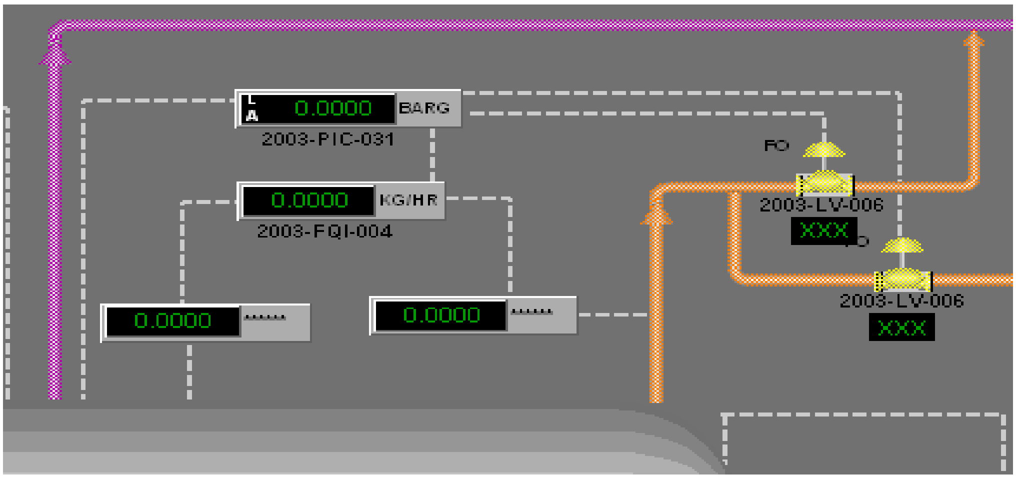


Figure 3.49: SPLIT_RANGE graphical interface

3.9.2.2- Function Description

This template is used to control and monitor the process variable through the PID split range control. The system takes the input and generates the output through the action of PID controller settings onto two valves. The control loop always tries to minimize the deviation between set value and process feedback.

There are two operating ranges, one for each valve.

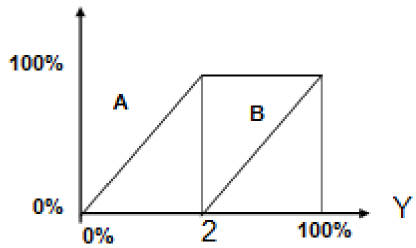


Figure 3.50: Relation between two valves A&B

BIAS blocks are inserted before each AOUT block for bump-less transfer. When the valve is switched in manual mode, the BIAS block will track the valve output (AOUT). Then when the valve switched into AUTO, the BIAS will follow its input but it will provide a time delay for changing its output.

PID fed back:

> If VALVE A AUTO AND VALVE B MAN SELECT BCALCO A
>
> If VALVE A MAN AND VALVE B AUTO SELECT BCALCO B
>
> If both are AUTO the PID is talking to one valve at a time according to the output range.

PID back calculation:

When both valves are in MAN and one is switching to AUTO, initialize the controller such that it is back into normal operation starting from the current opening of the valve going AUTO.

CALCA code is:

- Steps 1–10 generate PID BCALCI and INITI

- Steps 11–30 generate PID FBK
- Steps 31–36 if both valves are BAD, set PID BCALCI BAD status bit
- Steps 37–42 PID tracks when both valves are in MAN
-

CALCA STEPS

STEP01	NAND BI01 BI02 ; BEGIN PID BCALCI & INITI
STEP02	OSP 2
STEP03	OUT BO01 ; TO PID INITI
STEP04	BIF 11
STEP05	IN BI01
STEP06	BIT 9
STEP07	IN RI01
STEP08	GTO 10
STEP09	IN RI02
STEP10	OUT RO01 ; TO PID BCALCI
STEP11	AND ~BI01 BI02 ; BEGIN PID FBK
STEP12	BIF 14
STEP13	GTO 19
STEP14	AND BI01 ~BI02
STEP15	BIF 17
STEP16	GTO 23
STEP17	SUB RI08 M11 ; PID OUT < SW 1
STEP18	BIP 21
STEP19	IN RI01
STEP20	GTO 30
STEP21	SUB RI08 M12 ; PID OUT > SW 2
STEP22	BIN 25
STEP23	IN RI02
STEP24	GTO 30
STEP25	IN M24
STEP26	BIF 29
STEP27	AVE RI01 RI02 ; OVERLAP
STEP28	GTO 30
STEP29	IN RI08 ; DEADBAND
STEP30	OUT RO02 ; TO PID FBK
STEP31	RBD RI01
STEP32	RBD RI02
STEP33	AND 2 ; BOTH BAD
STEP34	BIF 37
STEP35	SBD RO01
STEP36	GTO 42
STEP37	CBD RO01
STEP38	AND BI01 BI02 ; BOTH IN MAN
STEP39	OUT BO02 ; TO PID TRKENL
STEP40	AVE RI01 RI02

STEP41	OUT RO03
STEP42	END

Table 317.: SPLIT_RANGE CALCA steps

3.9.2.3- Blocks Interconnection Diagram

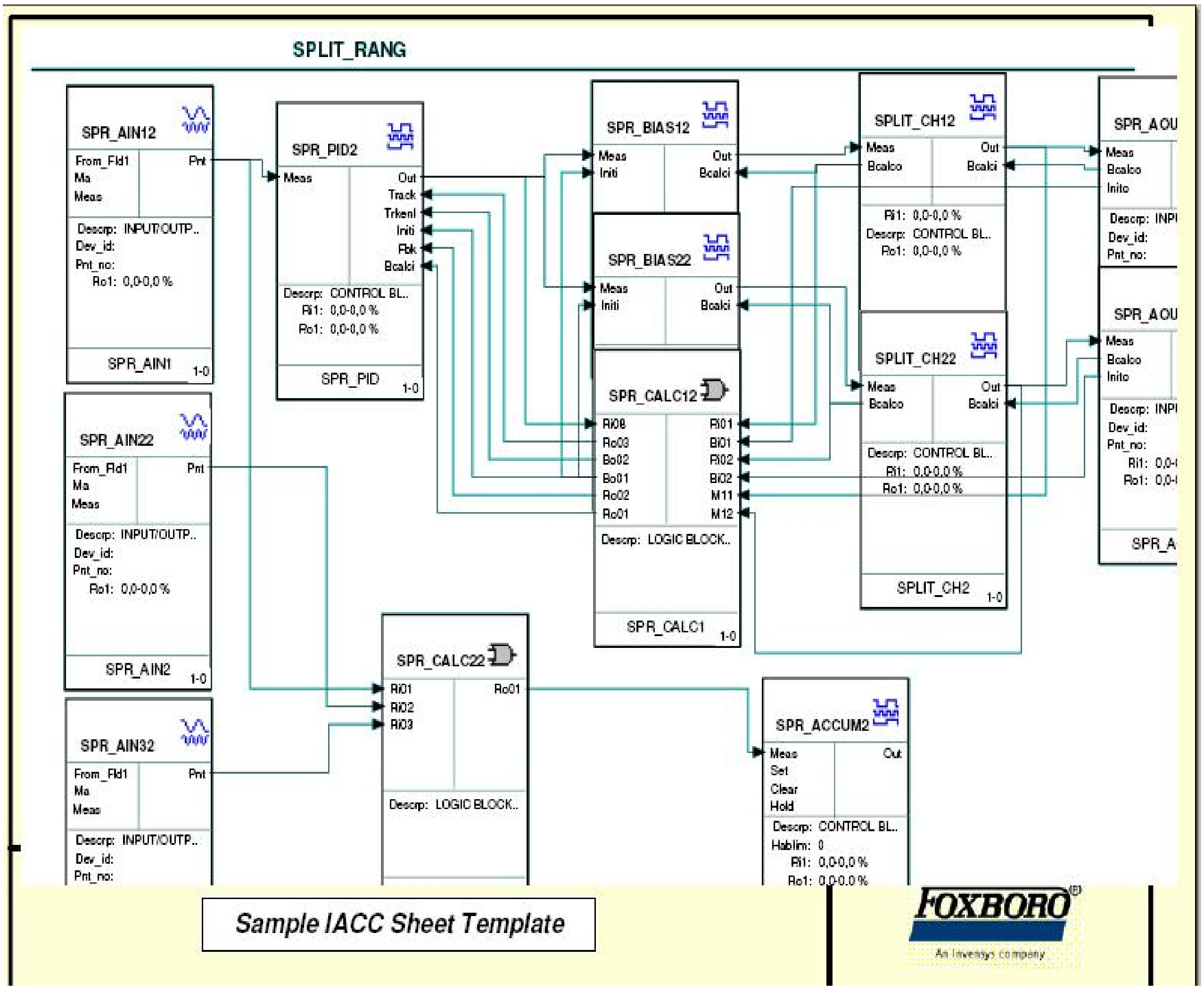


Figure 3.51: SPLIT_RANGE TEMPALTE in IACC

3.9.3- BURNER TEMPLATE:

3.9.3.1- Function Description

Primary control of heater is against the thermal oil outlet temperature. The outlet temperature is set to desired value by the operator. The temperature set point and measured value are used to compute a load.

If a temperature increase is required, the load controller acts to increase set point of air flow controller. This in turn acts on the combustion air fan inlet vane control to increase the combustion air flow. The combustion air flow is measured by the air flow meter located in the air inlet stack.

The air / fuel ratio controller then computes the required fuel flow to maintain the air fuel ratio at the correct value and increases the set point of fuel gas pressure controller to suit. This opens the fuel gas pressure control valve, increasing the fuel flow measured by the fuel flow meter, which feeds back to the air/fuel ratio controller.

If a temperature reduction is required, the load controller acts to decrease the set point of the fuel gas pressure controller. This in turn closes the fuel gas pressure control valve, reducing the fuel flow which is measured by fuel flow meter and fed to the air/fuel ratio controller.

The air / fuel ratio controller computes the required amount of combustion air, and decreases the set point of the air flow controller, closing the fan, the air flow signal being then fed back to the air/fuel ratio controller.

3.4.3.2- Operator Graphical Interface

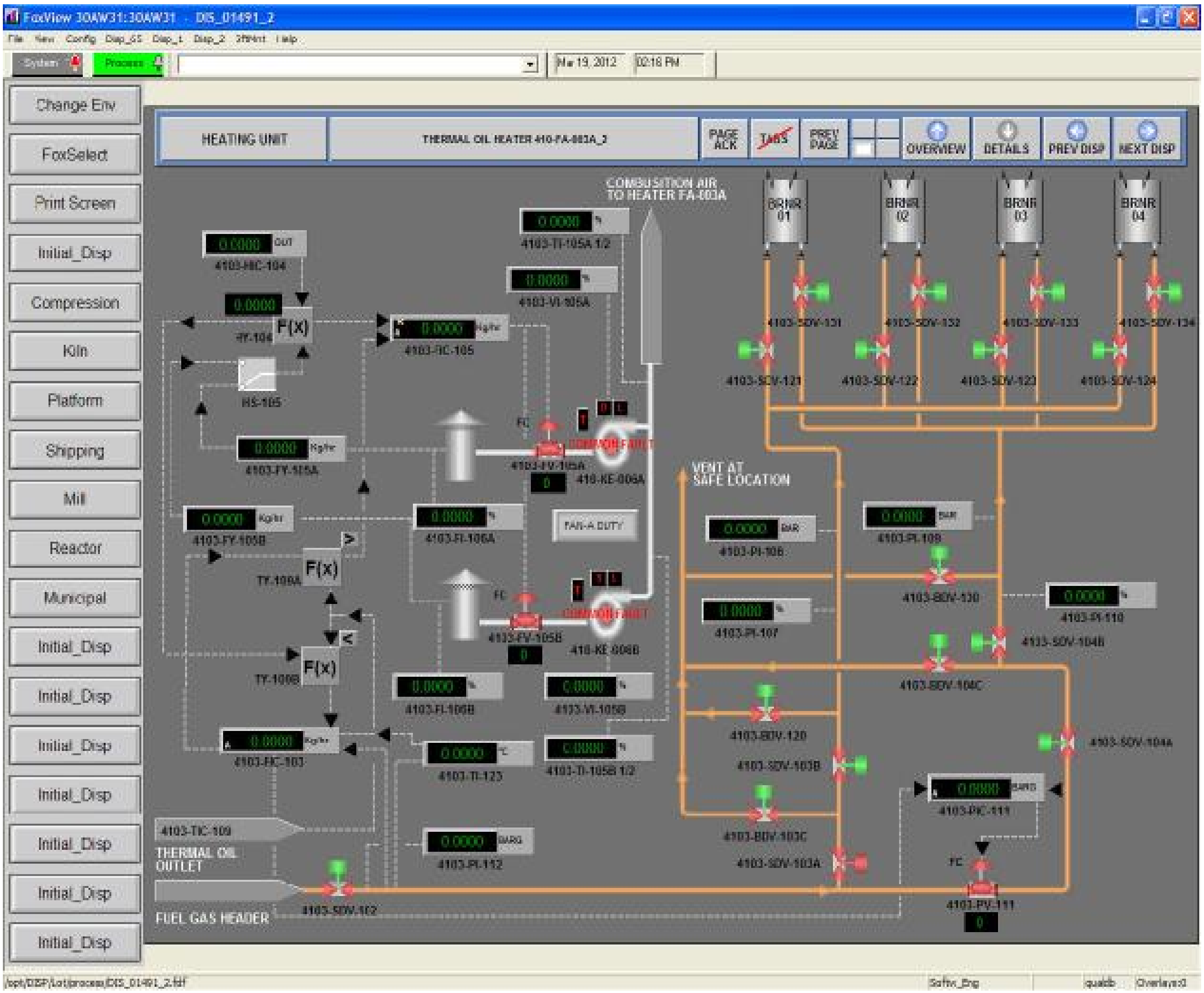


Figure 3.52: BURNER TEMPLATE graphical interface

3.9.3.3- Blocks Interconnection Diagram

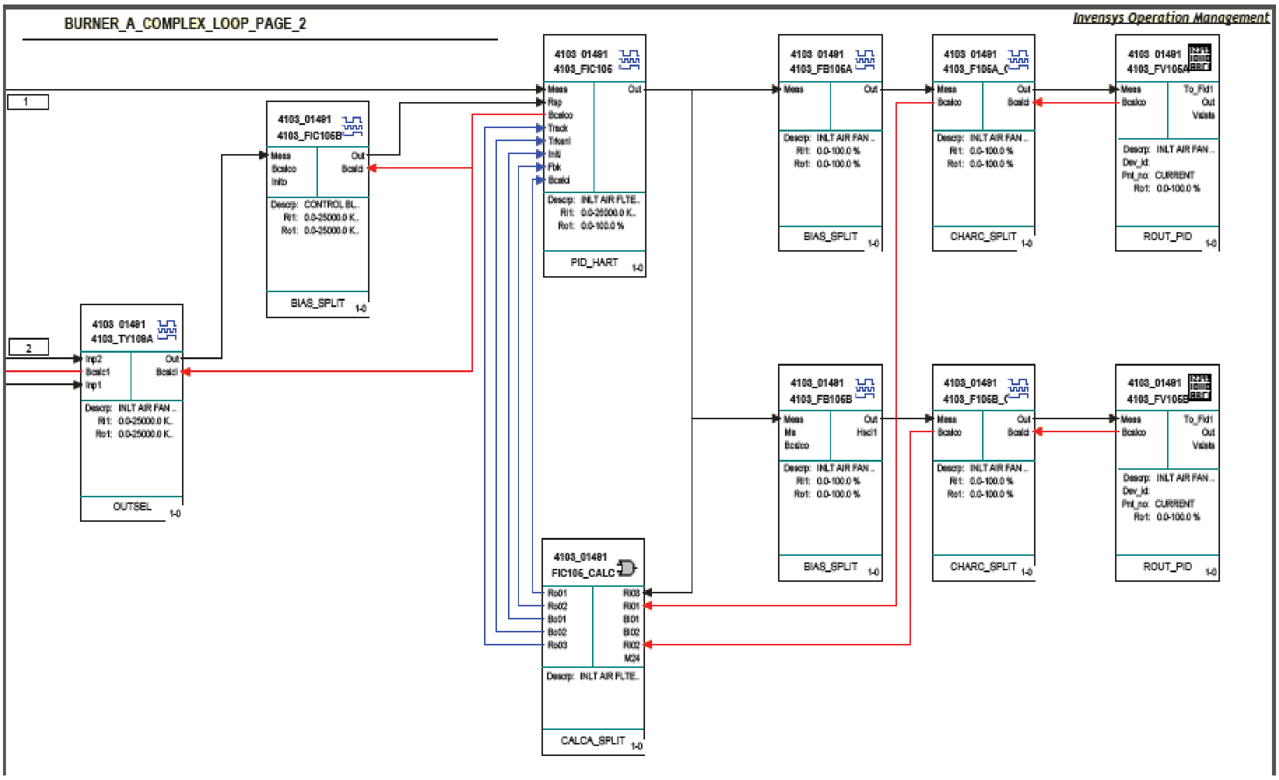


Figure 3.53: BURNER TEMPLATE in IACC

Chapter 4 : EEC Test Report

4.1- Introduction

This chapter including Tristation pt2 file ,display, IA templates, Complex loops and CP database testing reports. After applying each point on our work and detect points that not achieved then write log sheet include the assumption or the new correction.

4.2- Test report of Triconex

Test case serial# (please add, or customize test cases as appropriate)	**File**	<Pt2 file>
	Test date : 3/7/2013	
	Developed by : Amna Mazen Ali	
	Tested by: Mohammed Hassan Fahmy	
1	TriStation version matches design document	√
2	Versions of project-specific libraries used are the latest to date	X
3	Scan time matches design document	√
4	Application type of programs, functions, function blocks and tagnames matches design document	√
5	Color monitoring is enabled for all programs	√
6	Annotation is ON	√
7	Monitor value is ON	√
8	Stop on keyswitch disabled	√
9	Remote changes to outputs disabled	
10	Disabling of points allowed	√
11	Tricon/Trident node time synchronization setting matches design document	
12	Restart on power up enabled (Trident only)	
13	Use local time is enabled (or disabled) according to design document (Trident only)	
14	Password required to connection is set according to design document	X
15	Hardware configuration matches design document	√
16	Program distribution is according to design document	√
17	Sheet template and sheet label data are according to design document	
18	Sheet titles are according to design document	√
19	Sheet titles are unique, no duplicates found	X
20	No empty sheets are in-between	√
21	Logic is within the specified sheet area, does not cross over to the variable columns	√
22	Variables are placed in their respective columns	√
23	Constant values are placed next to the logic, and not within the variable columns	√
24	Function block names are according to design document	√
25	Function block names are unique in logic	√

26	No function/function blocks input pins are left unconnected	X
27	Tag naming convention matches design document	
28	Naming of spare IO channels is according to design document	
29	Tag group 1 and group 2 data are according to design document	X
30	Tag description matches project database	
31	Tag annotation syntax matches design document	
32	Monitoring colors were set according to design document	√
33	Aliasing of tags is according to design document	√
34	The settings for peer to peer connection and the number of send and receives are according to design document	√
35	Each output has been configured (supervised/not supervised/unused) according to design document and database	√
36	SOE configuration is according to design document	
37	Spare memory allocation for future usage is according todesign document	
38	All programs are included in the execution list	√
39	All declared tags are used	
40	Proper comments have been added to the pop-up “Comments for audit trails” that appears while closing the program	
41	All “on hold” comment boxes were removed	
42	Gate enable has been set, for allowing external host read/writes to a specified range of MODBUS aliased variables when the controller is operating in the RUN mode	X
43	No multi-write tags present	
44	Functionality of structured text programs matches design document	
45	Range, DB, alarm and delay settings in TriStation program sheets match logic diagrams/C&E/database	√
46	All programs were compiled without errors or warnings	
47	Project build has been done with no errors or warnings	
48	TriStation program sheets match logic diagrams	√
49	For C&E, when a causes is triggered, it trips the associated effects (a signature at the C&E sheet is required next to each cause checked)	√
50	For MSW projects, all MSW Aliased points are included in this TriStation database	√
51	For MSW projects, TriStation program sheets match MSW ladder logic	
52	For MSW projects, Hardware configuration matches MSW ladder logic	
53	For MSW projects, SOE matches MSW ladder logic	
54	For MSW projects, database match file listing TriStation tagnames versus MSW names is implemented	
	Testing comments	
	QC date (if applicable)	
	By	
	QC results (pass/fail)	
	QC comments	
	Closing comments	pass

Table 4.1: Test of Triconex

4.3- Test report of DCS

The following table is the test report for display.

Test case serial# (please add, or customize test cases as appropriate)	**Applicability** (test cases applicable to...)	**Display**	<filename>
		Test date : 29/6/2013	
		Developed by	
		Tested by : Abdullah Mohmed Ali	
		Design specifications, and revision (include relevant TQs)	
		Source document (P&ID, sketch,…), and revision	
1		Filename matches design specifications	√
2		Display is in the right path	√
3		Overlays are in the right path	√
4	Static layout	Merged/split display layout matches source document	√
5		For duplicate displays, layout is the same and objects are in the same locations	√
6		Similar loops are represented in the same manner, and matching design specifications	√
7		Common display elements (title, banner navigation elements, …) exist and are in the right location according to design specifications	√
8		Vendor package representation matches design specifications	√
9		Title text matches source document	√
10		Title case, font, color, size,... match design specifications	√
11		Title text is within the preallocated box, not overlapping with display banner border or other elements	√
12		Navigation descriptions match source document	√
13		Static text matches source document	√
14		Static text does not include extra unnecessary spaces	√
15		Static text abbreviations match design specifications	√
16		Static text case, font, color, size,... match design specifications	√
17		Static text location (with respect to associated object) matches design specifications	√
18		Tagnames and equipment names match source document	√
19		Pipe color-coding matches design specifications	√
20		Line thickness matches design specifications	√
21		Snap to grid is ON	√
22		Static equipment color-coding matches design specifications	√
23		All DCS elements in the source document are represented and their tags are correct	√

24		Logic/math functions are shown/not shown according to design specifications	√
25		Objects are aligned and distributed in a consistent manner	√
26		Object (tanks, heaters, …) sizes match project palette, no resizing was done	√
27		Lines are as straight as possible, avoiding unnecessary corners	√
28		Line intersections are avoided where possible	√
29		Line separations at intersections are clearly shown, and match design specifications	√
30		At 90 degrees corners, lines perfectly end at the corner. They do not run any further	√
31		Lines run under symbols (objects). This was checked in view mode	√
32		No line is connected to objects that can be toggled visible/invisible	√
33		At functions (for example summers), arrows are perfectly placed (they touch the object representing the function)	√
34		Display flows in the "appropriate" direction according to design specifications	√
35		Incoming and outgoing navigation arrows are placed at screen border	√
36	Dynamic configuration	No “disconnected” dynamic elements	√
37		Level bars are configured	√
38		Symbol aliases have the right compound/block names	√
39		Symbol/loop association matches design specifications	√
40		All objects/symbols open their corresponding overlays	√
41		Overlays contain no “disconnected” elements	√
42		Overlay movability is according to design specifications	√
43		Display, overlay and/or symbol scripts are configured	√
44		Pipeline/equipment navigations to other displays work properly	√
45		Banner navigation elements work properly	√
		Testing comments	
		QC date (if applicable)	
		By	
		QC results (pass/fail)	pass
		QC comments	
		Closing comments	

Table 4.2: Test of DCS Display

4.4- log sheet:

This sheet is used for notification the customer about the problem and its modification.

Type

X Logic or interlock ☐Diagnostics program ☐Typicals

☐SOE configuration ☐Hardware configuration ☐Serial configuration

☐Database ☐Other

Problem description

In logic Diagram sheet (29) ...... Tag(4103-BALL-110) is not used ,also in sheet(30)...... tag (4103-BALL-100) is not used

Signature: _Amna Mazen Ali_______________________ Date: ____________22/4/2013____________

Modification description

Keep it as a memory

Signature: _______ Amna Mazen Ali___________ __ Date: _____________22/4/2013____________

Modification validation

Signature: _________________________ Date: _________________________________

Figure 4.1: Triconex testing log sheet

Type

☐Displays – Static ☐Logic or interlock ☐Sequence

☐Displays – Dynamic * Loops ☐Alarms

☐Database ☐Other

Problem description There are some blocks not healthy as PAKOUT and RIN There is no simulation mode for these blocks. Signature: Abdullah Mohmed Ali Date: 29/6/2013
Modification description Keep them on their state until hardware connection. Signature : Abdullah Mohmed Ali Date: 29/6/2013
Modification validation Signature: ______________________ Date: _____________________________

Figure 4.2: DCS testing log sheet

Chapter 5 : Hardware

5.1-Introduction to triconex hardware

This section contains Triconex hardware configuration .Practically ,Tricoby is used which consists of main processor(MP 3008),communication module(4351B) and digital input module(3503E) as shown in Figure 5.1

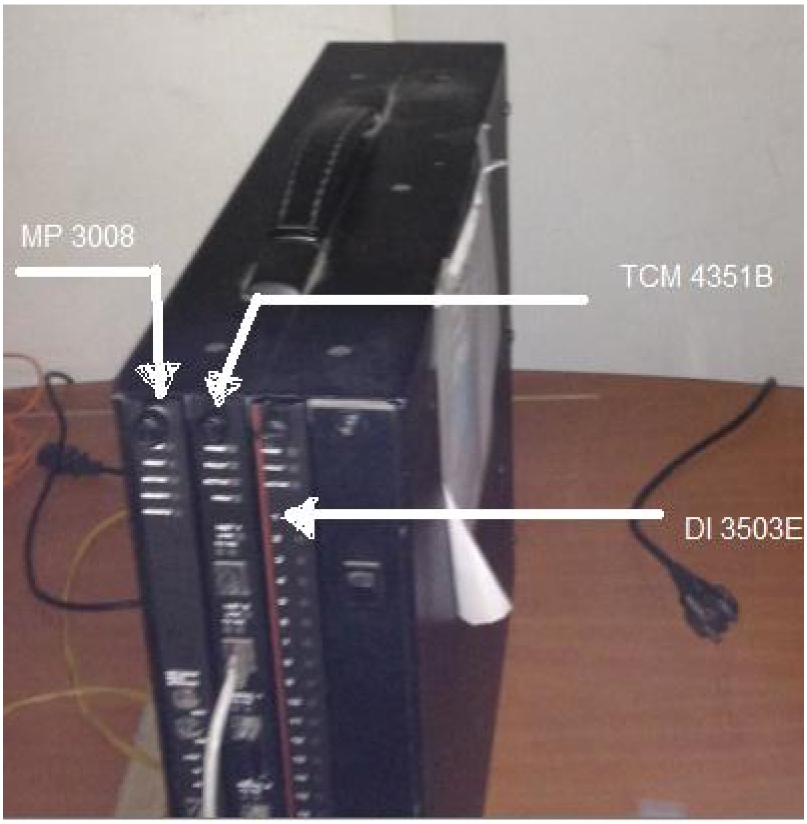


Figure 5.1: Tricoby

5.2-System configuration

Hardware configuration

Required

Type	Column1	Number
AI		23
DO		130
DI		73

With 20% spare

Type	Column1	Number
AI		28
DO		156
DI		88

Suggested design

Type	Column1	suggested module
AI		AI,32 points
DO		5x(DO,32 points)
DI		3x(DI,32 points)

Figure 5.2: Suggested Hardware design

		1						
		Main Chassis No	Mod. Key		Pre-Conf	ETP	Cable Key	
		1	Top Key	Bot Key	Mod	ETP1 ETP2	S Key	L Key
1	PS1	8312	004	n/a			0	
2	PS2	8312	004	n/a			0	
3	MP	3008	007	002				
4	MP	3008	007	002				
5	MP	3008	007	002				
6	COM	4351B	001	003				
7	Slot 2							
8								
9	Slot 3	3701	003	003		9763-810	1	5
10			003	003			1	5
11	Slot 4	3625	006	007		9662-610	3	3
12			006	007			3	3
13	Slot 5	3503E	004	006		9563-810	1	3
14			004	006			1	3
15	Slot 6	3503E	004	006		9563-810	1	3
16			004	006			1	3
17	Slot 7							
18								

	3						
	Expan. Chassis No	Mod. Key		Pre-Conf	ETP	Cable Key	
	2	Top Key	Bot Key	Mod	ETP1 ETP2	S Key	L Key
PS1	8312	004	n/a			0	
PS2	8312	[illegible]	n/a			0	
Slot 1							
Slot 2	3503E	004	006		9563-810	1	3
		004	006			1	3
Slot 3	3503E	004	006		9563-810	1	3
		004	006			1	3
Slot 4	3625	006	007		9662-610	3	3
		006	007			3	3
Slot 5	3625	006	007		9662-610	3	3
		006	007			3	3
Slot 6	3625	006	007		9662-610	3	3
		006	007			3	3
Slot 7	3625	006	007		9662-610	3	3
		006	007			3	3
Slot 8							

Figure 5.3: Hardware design

5.3- Power Module

5.3.1-PS 8312 Specifications

Each Tricon Chassis is equipped with two Power Modules—either one is fully capable of running the controller at full load and rated temperature. Power Modules convert line power to DC power appropriate for all Tricon modules. Any combination of Power Module models can be used in Tricon systems.

Feature	Description
Isolation	1,000 VAC or 1,500 VDC, Input to Output
Nominal input voltage	230 VAC (–15% to +10%)
Extended input voltage range	185 to 285 VAC
Low line on/off hysteresis	7.5 VAC typical
Input power required	240 W minimum per power source
Input frequency	47 to 63 Hz
Power factor	0.70 typical
Crest factor	2.5 typical
Input current	
Steady-state	0.4 amps, typical; 1.2 amps, maximum
In-rush (1/2 AC cycle)	18 amps maximum @ 230 VAC
Input fuse rating and type	2.5 amps, time-delay
Output voltage	6.5 VDC, ±1% under all operating conditions
Output current	27 amps maximum at 140° F (60° C) ambient, which refers to the air temperature measured at the bottom of the chassis
Output power	175 watts at 140° F (60° C) ambient
Output hold time @ 0 volts input	20 ms minimum; 80 ms typical
Output over-voltage protection	125%, typical, recycle power to restart
Output over-current limit	140%, typical, auto restart
Over-temperature warning sensor	Temperature monitor trips when the internal power module temperature is greater than 181° F (83° C). Typically occurs at an ambient temperature of 140° F (60° C) or higher.

Table 5.1: 8312 Power Module Specifications

5.4-Main Processors (3008)

5.4.1- Main Processor Status Indicators

The status indicators identify the processing state for the Main Processors.
A fault indicator indicates that the processor has an internal fault.

Pass	Fault	Active	Maint1	Maint2	Description	Action
Green steady	No light	Yellow blinking	No light	No light	The module is operating normally. The Active indicator blinks once per scan when executing a control program.	No action is required.
No light	Red steady	— [a]	—	—	The module has failed.	Replace the module.
No light	No light	—	—	—	The indicators/signal circuitry on the module are malfunctioning.	Replace the module.
Green steady	No light	No light	Red blinking	No light	The MP is re-educating. Allow 10 minutes for the Pass indicator to turn on, followed by the Active indicator.	No action is required.
Green steady	No light	Yellow blinking	Red steady	No light	Minor Fault in a noncritical portion of the MP, such as the battery voltage, clock calendar not running, or temperature mismatch. For v10 and later, this may indicate that the module has excessively reset or re-educated in the last 100 days.	Extract a Tricon Event Log file and send it to the Invensys Global Customer Support (GCS) Center for analysis.
Green steady	No light	Yellow blinking	No light	Red steady	The MP printed circuit board temperature is greater than 183° F (84° C) or less than 32° F (0° C).	Verify temperature conditions within the cabinet are normal. If so, replace the module.
No light	Red steady	No light	Red blinking	Red blinking	MP firmware does not match other MPs.	Replace the module with one that has matching firmware.

Table 5.2: 3008 Main Processor Status Indicator Conditions

5.4.2-MP Communication Indicators

The Main Processors include indicators that identify the status of communication across the COMM bus and I/O bus. The Model 3008 Main Processor has additional indicators
that identify the status of network communication.

RX	TX	Description	Action
Yellow Blinking	Yellow Blinking	Normal response. MPs are communicating with the I/O and communication modules.	No action is required.
No light	No light	Problem: MPs are not communicating with modules.	Replace the module.

Table 5.3: Communication Indicators for Main Processors

5.5-Analog Input Module

5.5.1-AI 3701 Specifications

Specifications for model 3701, which is a TMR Analog Input Module with a voltage range of 0 to 10 VDC

Feature	Specification
Color code	Light yellow
Number of input signals	32 differential, DC-coupled
Input update rate	55 ms
Resolution	12 bits
Accuracy	< 0.15% of FSR from 0° to 140° F (0° – 60° C)
Input resistance (load)	30 MΩ (DC), minimum
Input resistance @ power off	30 kΩ (DC), typical
Common mode rejection (typical)	-80 dB (DC - 100 Hz)
Common mode voltage range (*See above Warning*)	-12V to +12V peak
Channel-to-channel isolation	200 kΩ, typical
Normal mode rejection	-3 dB @ 8 Hz -17 dB @ 60 Hz -23 dB @ 120 Hz
Input voltage range	0 to 10 V
Logic power	< 10 watts
Input over-range protection	150 VDC continuous, 115 VA continuous
Input current range	0 to 20 mA with 500 Ω shunt resistor
Module status indicators	Pass, Fault, Active
Input diagnostic fault coverage[1]	
Minimum input change	2% of full scale
Input change sample period	1 scan or 200 ms, whichever is greater
Minimum period of mis-compares	40 samples

Table 5.4: AI 3701 Specifications

WARNING

If the common-mode voltage range of a channel is exceeded, Triconex does not guarantee proper operation of the module and accuracy of other channels.

5.5.2- AI Termination panel 9763-810F

- Termination panel 9763-810F is compatible with 0 to 5 VDC, –5 to +5 VDC, or 0 to 10 VDC.

- Analog input modules and has 16 voltage input terminals. When using 32 point

modules, you must use two term panels for each analog input module.

5.5.2.1 Specifications

This table describes specifications for 9763-810F.

Feature	Description
Panel type	Voltage input
Points	16

Table 5.5: specifications for 9763-810F

5.5.2.2 Compatible Modules

This table describes analog input modules compatible with 9763-810F.

Module Part Number	Points per Module	Module Description
3700	32	0–5 VDC, non-commoned, differential, DC-coupled, TMR
3700A	32	0–5 VDC, non-commoned, differential, DC-coupled, TMR
3701	32	0–10 VDC, non-commoned, differential, DC-coupled, TMR
3703E	16	0–5 VDC or 0–10 VDC (use TriStation to configure for 0–5 VDC or 0–10 VDC), non-commoned, differential, isolated, TMR
3721	32	0 to 5 VDC or –5 to +5 VDC (use TriStation to configure input range), differential, DC-coupled, TMR

Table 5.6:Modules Compatible with 9763-810F

5.5.2.3-Field Wiring Diagrams

This figure illustrates how to connect a 16-point or 32-point analog input module and a
9763-810F to the field (1 of 16 or 32 module points shown).

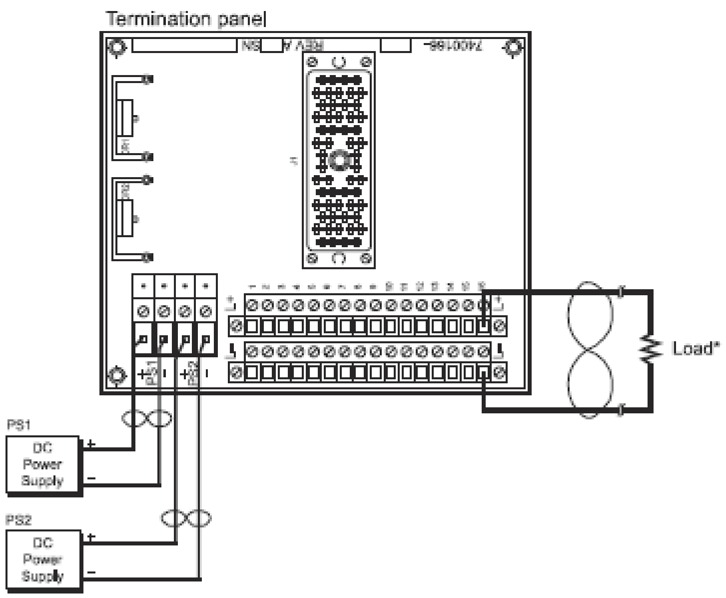


Figure 5.4: Field Wiring for 9763-810F with a 3701 AI Module

CAUTION Unused points must be shorted together.

5.6-Digital output Module

5.6.1-DO 3625 Specifications

1. Power must be supplied to all points, including unused points on non-commoned panels.
2. . The maximum output toggle rate enables proper operation of I/O diagnostics and detection of all normally detectable faults.
3. The 3625 module can be installed only in Tricon v10.2 and later systems.

Feature	Specification
Color code	Dark blue
Number of output signals	32, commoned
Recommended voltage range	16–32 VDC
Nominal voltage	24 VDC
Maximum voltage	36 VDC
Logic power	< 13 watts
Current ratings, maximum	1.70 ± 10% amps/point, 5 amps surge/7 ms
Total module output current (all points)	10 amps/termination panel
Minimum required load	10 mA
Leakage current to load	4 mA, maximum
Fuses (field termination module)	Not required; output switches are self-protected against over-voltage, over-temperature, and over-current
Status indicator: On or Off state	1 per point
Status indicator: Module status	Pass, Fault, Load, Active
Status indicator: Field alarm[1]	Load (1 per point)
System-to-field isolation	1,500 VDC minimum
Point supervision	Can be programmed per point
Short/Open circuit detection threshold	Programmable per supervised point
Output diagnostic fault coverage[2] Maximum output toggle rate	Every 60 ms
Diagnostic glitch duration	2 ms maximum, 200 µs typical
On-state voltage drop: At backplane	< 0.25 VDC typical @ 250mA < 1.7 VDC @ 1.7A
On-state voltage drop: With external termination, 10-foot cable	< 1.25 VDC typical @ 250mA < 4.7 VDC @ 1.7A
On-state voltage drop: With external termination, 99-foot cable	< 2.25 VDC typical @ 250mA < 6.7 VDC @ 1.7A
Inductive kick-back protection (reverse EMF)	Output switches are self-protected

Table 5.7: 3625 Digital Output Specifications

5.6.2-DO Termination panel 9662-610F

- Termination panel 9662-610F is compatible with 24 VDC digital output modules and has 16 load terminals and commoned power terminals (PWR+ and PWR–).
- When using 32-point modules, you must use two term panels for each digital output module.

5.6.2.1 Specifications

This table describes specifications for 9662-610F.

Feature	Description
Panel type	Commoned
Points	16
Maximum total current[1]	16 amps

Table 5.8: Specifications for Term Panel 9662-610F

5.6.2.2 Compatible Modules

This table describes digital output modules compatible with 9662-610F.

Module Part Number	Points per Module	Module Description
3624	16	24 VDC, commoned, supervised, opto-isolated, self-protected, TMR
3625	32	24 VDC, commoned, supervised/non-supervised, opto-isolated, self-protected, TMR
3664	32	24 VDC, commoned, opto-isolated, self-protected, dual
3674	32	24 VDC, commoned, opto-isolated, self-protected, dual

Table 5.9: Modules Compatible with 9662-610F

5.6.2.3-Field Wiring Diagrams

This figure illustrates how to connect a 16-point or 32-point supervised DC digital output
module with self protection and a 9662-610F to the field (1 of 16 points shown).

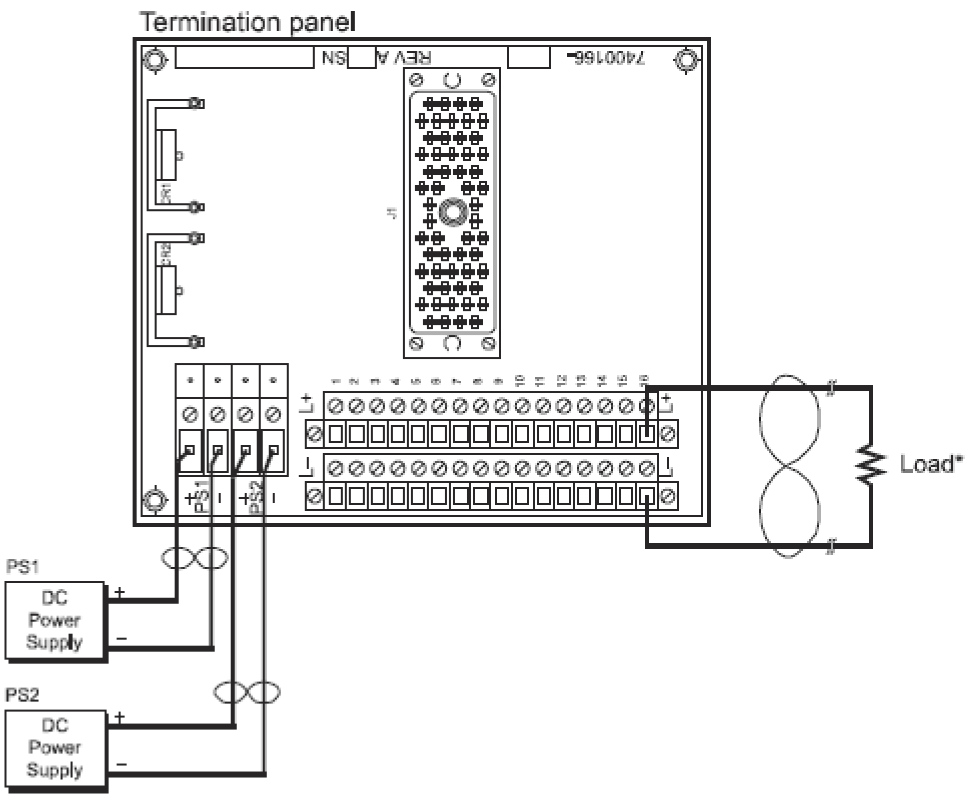


Figure 5.5: Field Wiring for 9662-810F with a 3625 DO Module

5.7-Digital Input Module

5.7.1-DI 3503E Specifications

This table lists the specifications for model 3503E, which is a TMR Digital Input Module with a nominal input voltage of 24 VAC/VDC and a self-test feature

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Feature	Specification
Color code	Dark red
Number of input points	32, commoned in groups of 8
Input frequency range	DC or 47-63 Hz
Recommended input range	20–42.5 VDC
Maximum voltage	42.5 VAC/VDC
Switching level: Off to On	15 VAC/VDC typical, 18 VAC/VDC worst-case
Switching level: On to Off	8 VAC/VDC typical, 6 VAC/VDC worst-case
Typical hysteresis	4 VAC/VDC
Nominal turn-on	6 mA to 9 mA
Input impedance	> 1.25 kΩ nominal
Input delay: Off to On	< 8 ms
Input delay: On to Off	< 15 ms
Point isolation, opto-isolated	1,000 VAC minimum, 1,500 VDC minimum
Status indicator: On or Off State	1 per point
Status indicator: Module status	Pass, Fault, Active
Logic power	< 10 watts
Nominal field power load	0.5 watts per On point[1] 1.5 watts @ maximum field voltage
Leakage current to chassis @ 60 Hz	0.25 mA maximum per On point
Input diagnostic fault coverage[2]	
Maximum input toggle rate	Every 100 ms
Minimum input toggle rate, On state	Not required
Minimum input toggle rate, Off state	Every 3 months (manually toggled by the user)
Diagnostic glitch duration[3]	20 ms typical
Output voltage	< 1/2 V_{IN}
Output impedance	< 1.87 kΩ

Table 5.10: 3503E Digital Input Specifications

5.7.2-DI Termination panel 9563-810

Termination panel 9563-810 is compatible with 24 volt digital input modules and has 16 input points and commoned power terminals (PWR+ and PWR–). Each input point is protected by a fuse with a blown-fuse indicator.

5.7.2.1 Specifications

This table describes specifications for 9563-810.

Feature	Description
Panel type	Commoned
Points	16
Leakage current per point	Maximum: 3.3 mA Typical: 2.5 mA

Table 5.11: Specifications for Term Panel 9563-810

5.7.2.2 Compatible Modules

This table describes digital input modules compatible with 9563-810.

Module Part Number	Points per Module	Module Description	Fuse
3503E	32	24 VAC/VDC, commoned in groups of 8, TMR with self-test	1A, slow
3505E	32	24 VDC, low-threshold, commoned in groups of 8 with self test, TMR	1A, slow

Table 5.12: Modules Compatible with 9563-810

5.7.2.3-Field Wiring Diagrams

This figure illustrates how to connect a 32-point digital input module and a 9563-810 to the field.

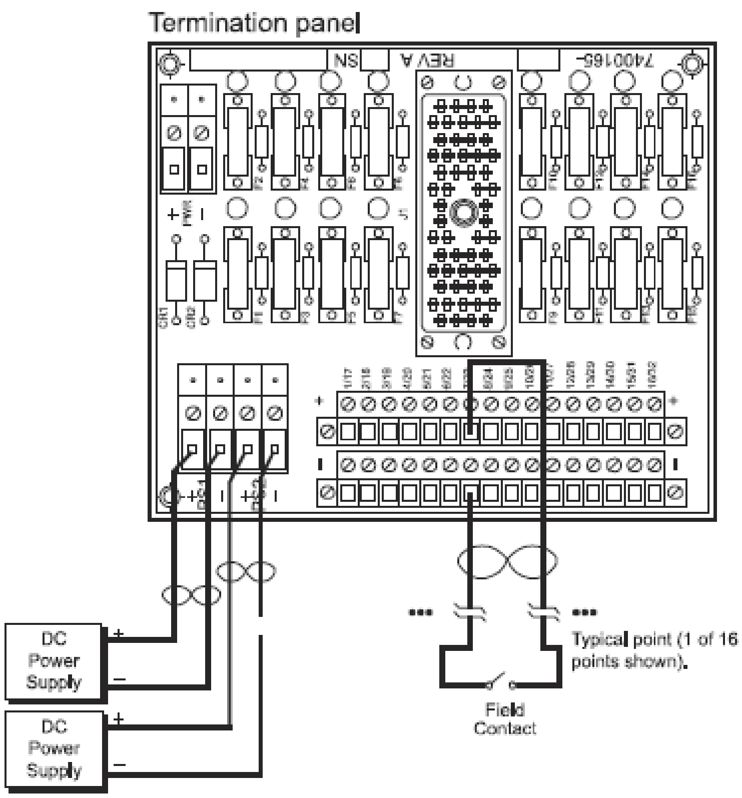

Figure 5.6: Field Wiring for 9563-810 with a 3503E or 3505E Module

5.7-Communication Modules (TCM -4351B)

- The Tricon Communication Module (TCM) enables a tricon controller to communicate with modbus device (Master or Slaves), a Tristation PC, a network printer, other tricon controllers, and other external devices on Ethernet networks.

- Each TCM has four serial ports, two Ethernet network ports, and one debug ports (for Tricon internal use).

Feature	Description
Serial ports	4, RS-232/RS-485 ports, DB-9 connectors
Network ports	2, 10/100BaseT Ethernet ports, RJ-45 connectors (Models 4351, 4351A, 4351B, and 4353) 2, fiber-optic mode Ethernet ports, MT-RJ connectors with 62.5/125 um fiber cables (Models 4352, 4352A, 4352B, and 4354)
Port isolation	500 VDC
Communication protocols	TriStation, Embedded OPC Server (Models 4353 and 4354), Modbus, Modbus TCP, TCP/IP, SNTP, TSAA (with support for IP Multicast), Trimble GPS, Peer-to-Peer, Triconex Time Synchronization, Jet Direct (network printing)
Modbus functions supported	01 — Read Coil Status 02 — Read Input Status 03 — Read Holding Registers 04 — Read Input Registers 05 — Modify Coil Status 06 — Modify Register Content 07 — Read Exception Status 08 — Loopback Diagnostic Test 15 — Force Multiple Coils 16 — Preset Multiple Registers
Communication speed	Copper Ethernet ports: 10/100 Mbps (Model 4353 only supports 100 Mbps connections) Fiber Ethernet ports: 100 Mbps Serial ports: up to 115.2 Kbps per port, aggregate data rate of 460.8 Kbps for all four ports
Status indicators	PASS, FAULT, ACTIVE, FIRM LINK — 1 per network port TX (Transmit) — 1 per port RX (Receive) — 1 per port
Logic power	< 10 watts

Table 5.13: TCM Specifications

5.8- Introduction to DCS Hardware

The Intelligent Automation (I/A) Series system is an Open Industrial System (OIS) that integrates and automates manufacturing operations. It is an expandable distributed system that allows a plant to incrementally tailor the system to its processing requirements.

The modules that make up the I/A Series system communicate with each other even though they may be located in a variety of locations. These locations depend upon the conditions and layout of the particular process plant.

Another advantage of a distributed system is that each module has specific responsibilities. Each module independently performs its function regardless of the status of other modules.

The Mesh control network is a switched Fast Ethernet network based on IEEE 802.3u (Fast Ethernet) and IEEE 802.3z (gigabit Ethernet) standards. The Mesh control network consists of a number of Ethernet switches connected in a mesh configuration.

The Mesh control network configuration allows high availability by providing redundant data paths and eliminating single points of failure. The flexibility of the architecture allows you to design a network configuration that fits the needs of the control system. Configurations can be as simple as a host workstation connected directly to a controller, or as complex as a multi-switch, fully meshed control network, communicating at speeds up to 1 gigabit per second.

Figure 5.7:I/A Series System

The I/A Series system is a set of devices, each of which is known as a module. Each module is programmed to perform specific tasks associated with the monitoring and controlling of manufacturing processes.

In order to meet specific needs at a plant, process control personnel create or modify software that executes within the modules. Various types of software and hardware configurations are better understood and successfully completed when personnel first become knowledgeable of the functions that each module performs.

The basic function of a module determines its classification as either a:

- Processor Module (Station)
- Fieldbus Module (FBM)
- Ethernet Switch

Associated with these modules are various types of hardware such as peripherals and cabling.

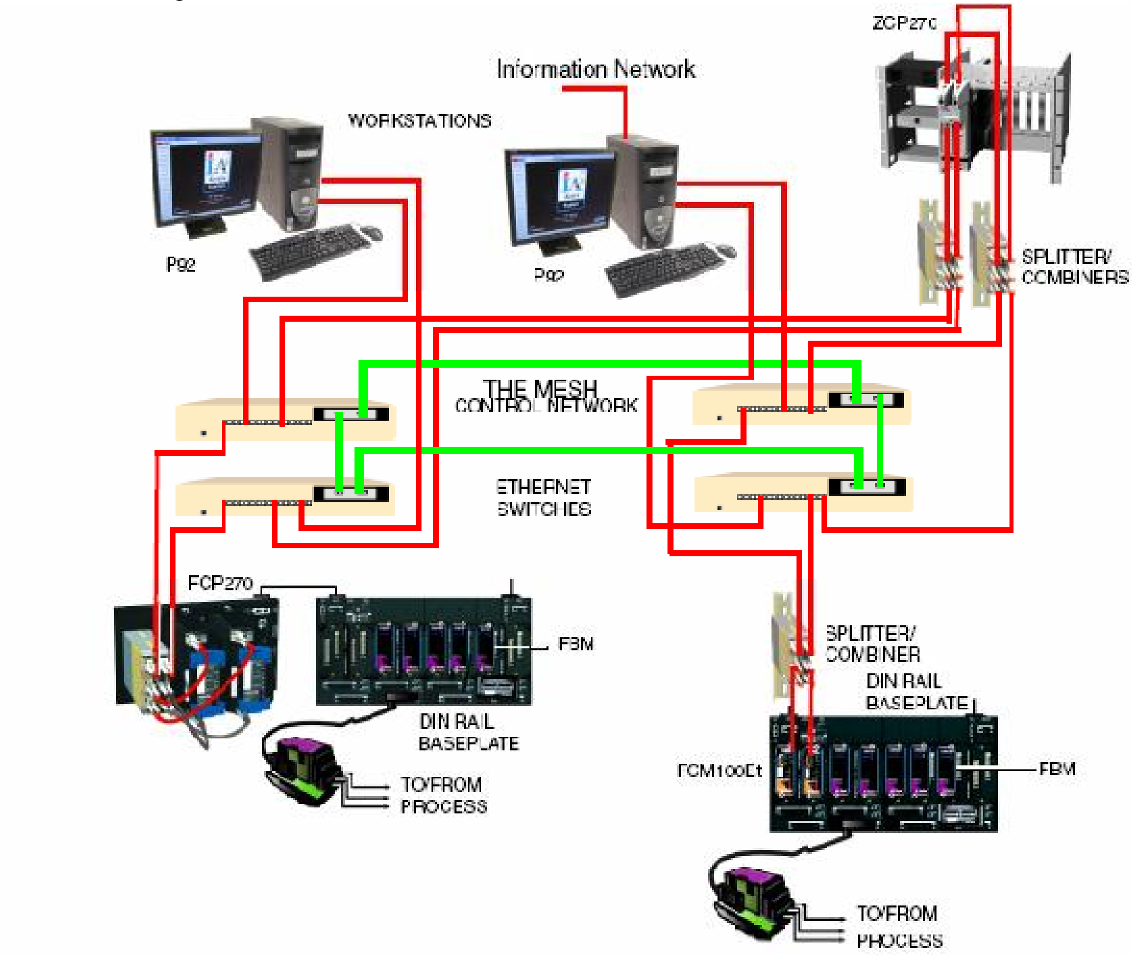

Figure 5.8: The Mesh Control Network

5.9- Hardware component

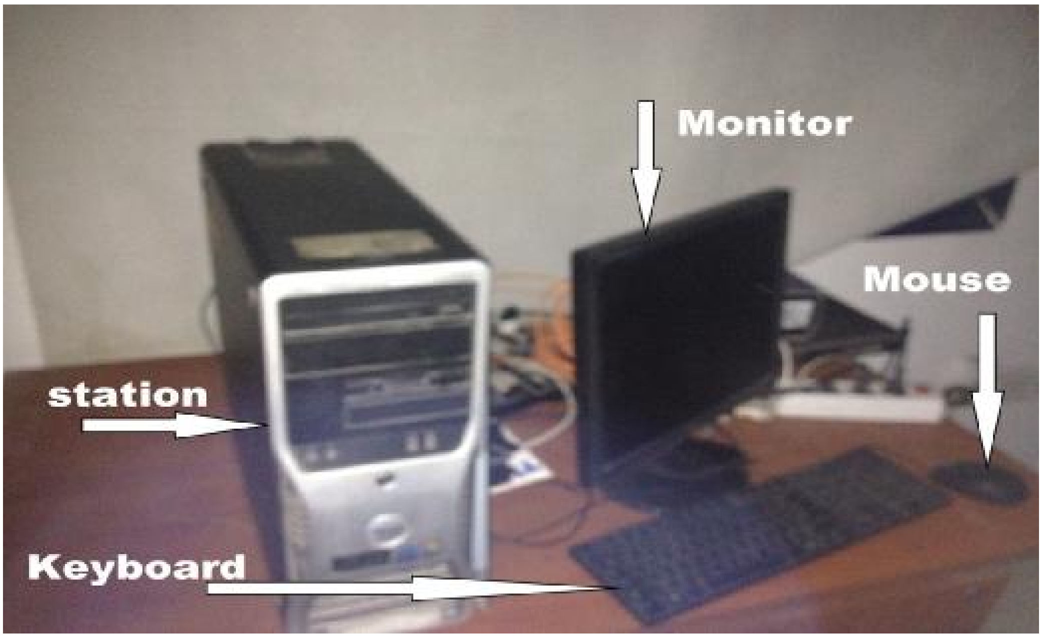

Figure 5.9: Hardware component

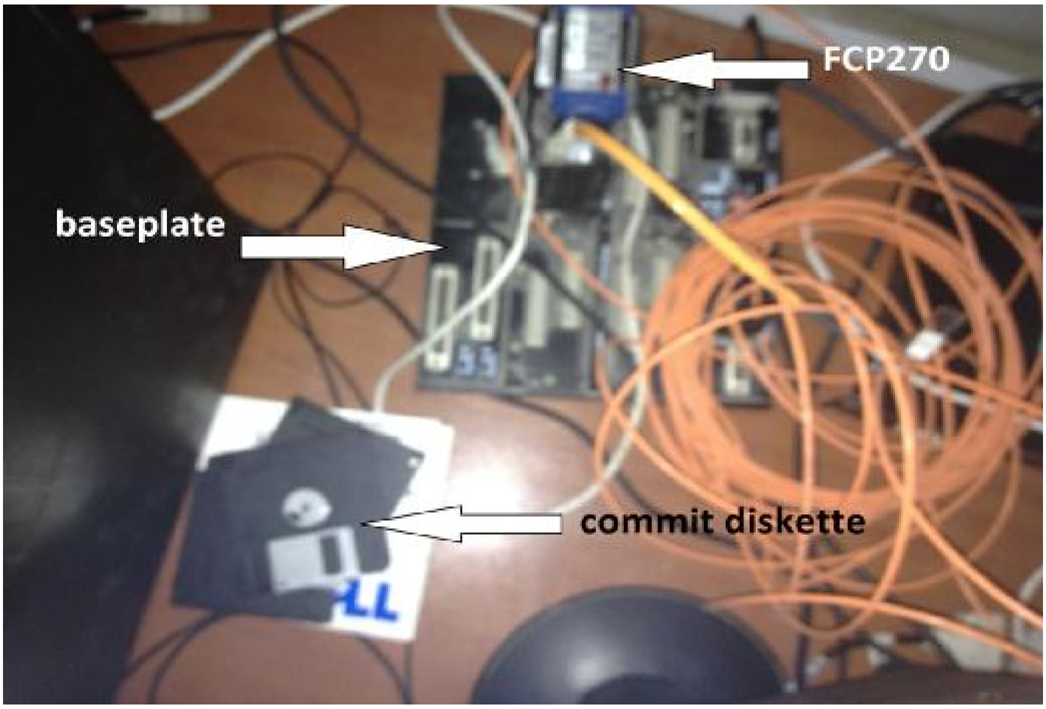

Figure 5.10: Hardware component cont'd

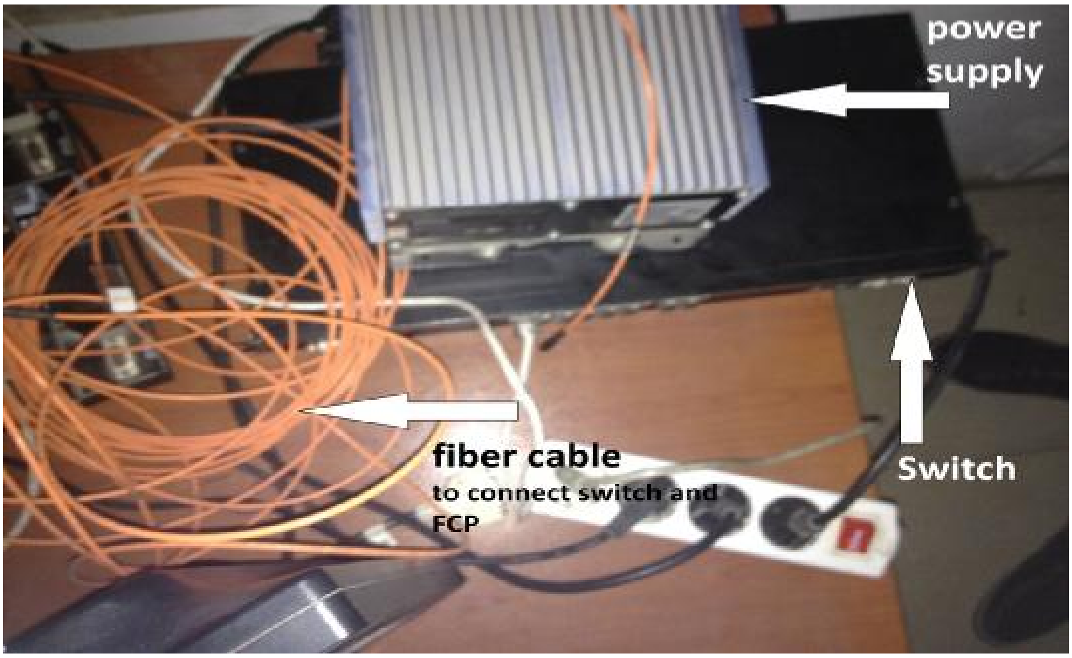

Figure 5.11: Hardware component cont'd

5.9.1-Workstation

Figure 5.19 below and Figure 5.20 illustrate the external appearance and show the cable connection points on the Model P92 Workstation.

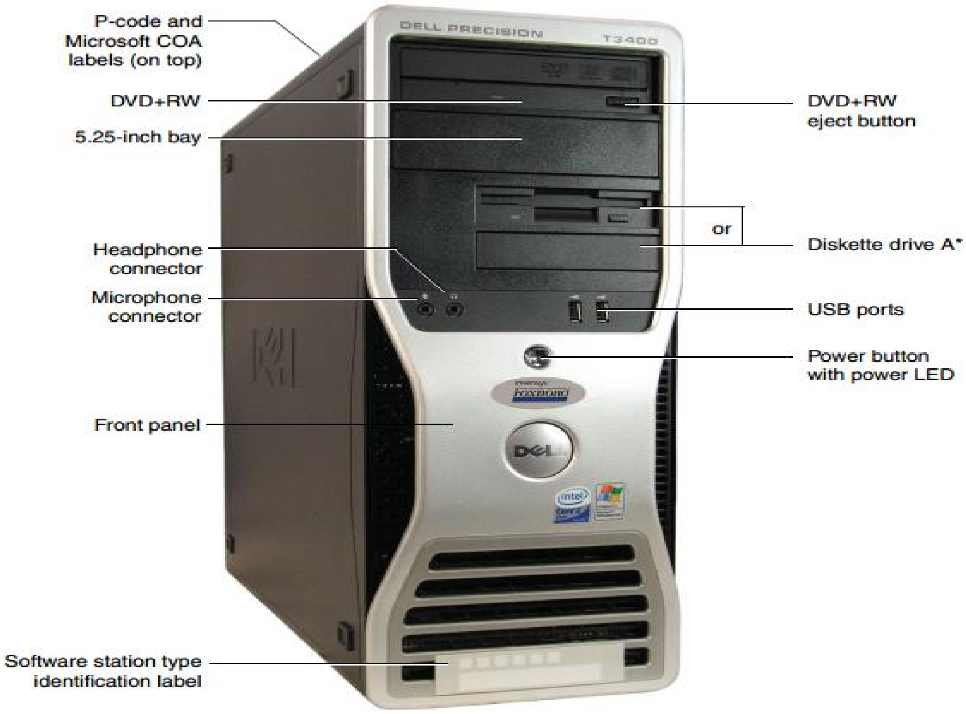

Figure 5.12: Front Panel Layout Model P92 Workstations

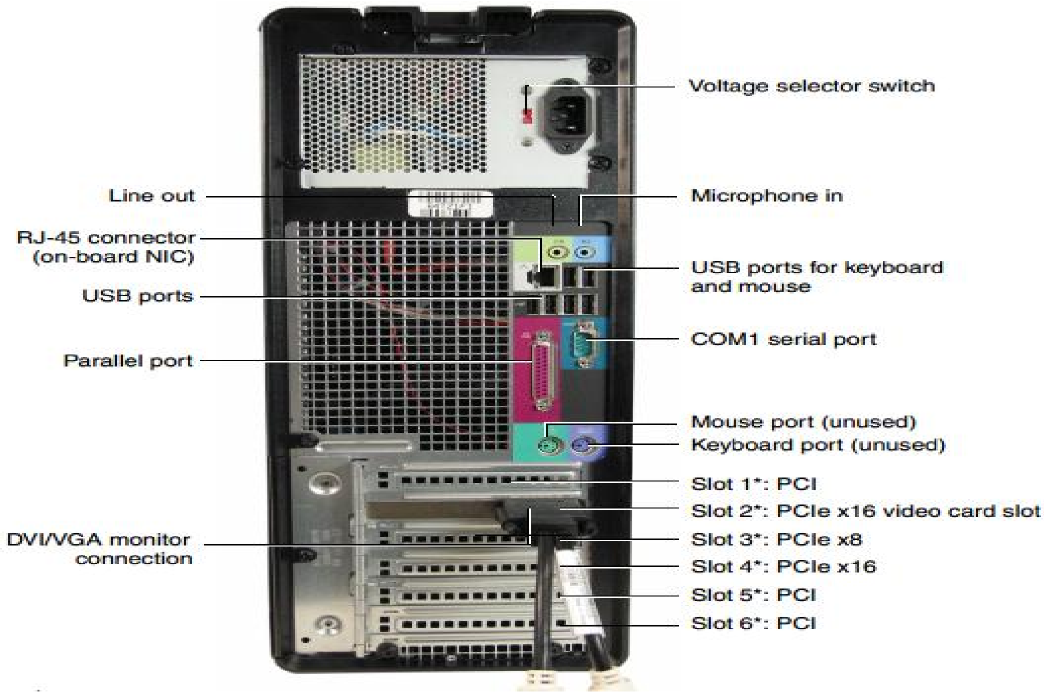

Figure 5.13: Model P92 Workstation Rear Panel

The Workstation Processor

The main function of the Workstation Processor (WP) is to act as the human interface between the user and the process by providing the programs necessary to operate the user-interface devices.

These devices are the:

- Workstation monitor
- Alphanumeric keyboard
- Annunciator keyboard
- Mouse or trackball
- Touch screen

5.9.2-Field Control Processor 270 (FCP270)

Figure 5.14: Field Control Processor 270 (FCP270)”

5.9.2.1-Function

The Field Control Processor 270 (FCP270) is a distributed, optionally fault-tolerant, field-mounted controller module. The FCP270 performs regulatory, logic, timing, and sequential control together with connected Fieldbus Modules.

It also performs data acquisition and alarm detection and notification. The Field Control Processor 270 (FCP270) is similar in size to the FBMs and mounts on a baseplate, provides process control, and serves as a communication interface between the FBMs and The Mesh control network.

The FCP270 connects to The Mesh control network via standard fiber optic 100 Mbps Ethernet cables. For high speed communication between the modules in the fault-tolerant configuration, the two CPs are installed in adjacent FCP270 slots in a baseplate.

The FCP270 supports the following hardware:

- All 200 series DIN rail mounted FBMs (up to 32 FBMs)
- Field Device Systems Integrator (FDSI) modules (FBM230/231/232/233).

5.9.2.2- Features

The FCP270 provides the following new features and improvements:

- A direct 100 Mbps Ethernet fiber connection to The Mesh control network for high speed data communication that is immune to electromagnetic interference over the distance of the fiber cable.
- A fault-tolerant option that delivers improved availability and safety using unique, dual controller comparison on all outgoing messages.
- Hardened, field-mounted control (100 Mbps Ethernet fiber controller, 2 Mbps fieldbus, Series 200 DIN rail mounted FBMs, Termination Assemblies, and FPS400-24 power supply). The new configuration eliminates the need for a rack room (you only need a control room and a field enclosure).

- Connection to Ethernet or serial devices via FDSIs allows for new device interfaces. The FDSIs include FBM230, FBM231, FBM232, and FBM233.
- Optional global positioning system allows external time synchronization.
- Sequence of Events (SOE) is optionally time stamped at the FBM to 1 ms accuracy throughout the system for later analysis of events. Time stamping has 1ms accuracy only when using the optional GPS external time synchronization.
- Optional Transient Data Recorder (TDR) allows 10 ms sampling of analog data for later analysis of events using Transient Data Analyzer (TDA). TDR data is optionally time stamped to 1 ms accuracy. Time stamping has 1ms accuracy only when using the optional GPS external time synchronization.
- The infrared I/A Series Letterbug Configurator allow setting and reading the controller letterbug.
- Memory resident image for fast station reboot. Reboot time is less than 10 seconds.
- Improved controller performance. Block executions/second is 10,000 for the FCP270, compared to 3400 for the CP60.
- Up to 4000 blocks can be configured for the FCP270 (or fault-tolerant FCP270 pair)
- A scalable license lets you start small with a full-featured control system. You can grow your system over time.
- Alarm enhancements to the function blocks: re-alarming on changes to alarm priority, re-alarming based on time, alarm suppression based on time.
- Foundation Fieldbus, FoxCom, HART, Profibus, and Modbus FBMs are supported. For enhanced reliability during maintenance operations, the FCP270 is equipped with a recessed reset button, located at the front of the module. This feature lets you manually reset the module without removing the module from the baseplate.

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5.9.3- Baseplate

Figure 5.15: Baseplate

5.9.3.1- why Baseplate?

FBMs and FCMs are NOT stations. Physically, they are smaller than stations and require a different mounting structure to house them. The baseplate, which is attached to a mounting bracket that in turn is connected to a DIN rail, provides a base for mounting 200 Series FBMs and FCMs.
A maximum of four baseplates can be interconnected to provide mounting for up to 30 FBMs per FCM or redundant FCM pair.
A baseplate has eight mounting positions that can accommodate a maximum of eight FBMs or a combination of FBMs and FCMs. The baseplate also provides the necessary connectors for redundant power, redundant Module Fieldbus and I/O signal cable connections.

5.9.3.2- Connection in baseplate

A baseplate has eight mounting positions that can accommodate a maximum of eight FBMs or a combination of FBMs and FCMs. The baseplate also provides the necessary connectors for redundant power, redundant Module Fieldbus and I/O signal cable connections.
The FCM is normally placed in the first slot of the first baseplate, but its locations can be anywhere. Redundant FCMs must be adjacent to each other.
In addition to the FBMs and FCMs, an FCM identification unit is mounted on the signal connectors adjacent to the FCM(s). This unit provides the letter bug ID for the FCMs.
A letterbug is a unique address assigned to the FCM (or redundant pair).
Each baseplate is assigned a number from 0 through 3, by means of two switches on each baseplate. The particular sequence in the number assignments does not matter, but each baseplate must have a unique number, which is also used in address identification of FBMs

The baseplate is available in two basic configurations:

- Horizontal DIN rail mounting - For mounting on a horizontal DIN rail, which can be freestanding or mounted within an enclosure.
- Vertical DIN rail mounting - For mounting on a vertical DIN rail, which can be free-standing or mounted within an enclosure.

5.10-Step by step to download to CP

5.10.1- Windows XP Operating System Quick Restore

The following procedure restores your system's hard disk to its original state when shipped from Invensys (Windows XP operating system, all required drivers).

1. Turn on the monitor.
2. Turn on the computer.
3. Insert the appropriate Restore CD for your Model P92 Workstation.
4. The computer boots to the CD Restore boot disk. When the blue screen appears, press M for Menu.
5. At the CFI Recovery Disk screen, press Enter to select Restore The System.
6. At the Please Confirm screen, press R to restore the system. A warning message appears.
7. Press C to start the restore process. Press Enter on the next screen. The restore takes about 15 minutes. When the process is completed, a green screen opens, indicating successful completion of the restore operation. (A red screen opens if there are any errors.)
8. Follow the on-screen instructions to remove the CD from the CD-ROM drive.
9. Reboot the computer by pressing CTL+ALT+DEL.
10. Now the system boots into the Windows XP Professional operating system and auto-logs into the Fox account. Wait a couple of minutes to allow the workstation to "plug and play" the add-in cards, then shut down and restart the workstation before pro-ceeding to the next section or installing I/A Series software Optional System Component Requirements.

5.10.2- SYSTEM DEFINITION

System Definition identifies the I/A Series system components, the system software required by each component, the system component letterbugs, and other system characteristics for correctly loading system software and identifying the system software objects. System Definition produces a Commit diskette which is required for software installation and, therefore, must be completed before software installation.

System Definition comprises five software components and a READ ME file. The software enables system configuration, preparation of a system component database, and preparation of a Commit dis-kette.

Components are:

- Configuration Components
- Hardware Definition
- Network Definition
- Parameter Definition
- Software Definition

The steps to configure OUR PROJECT

- Accessing System Definition
- Selecting software release
- Creating switches
- Creating stations
- creating field modules
- Checking the configuration
- Producing a Commit diskette
- Saving the configuration

5.10.3- Installing I/A Series Software

1. Place the I/A Series CD-ROM in the CD-ROM drive or using flash memory to install I/A series direct and follow the setup process to the end.
2. Note that, during the setup process, you need to insert two floppy disks. The first is the commit diskette that you are created it after finishing the system definition. The second is disk with number 11001.
3. Finally, If you suspect a problem with the installation process or want toverify its success, view the log entries produced during configuration.
4. To view messages from a recently completed setup, select View Logsprior to restarting the computer. These logs can be printed.

5.10.4- Installing Foxview, FoxDraw and IACC programs

After the workstation restarts, the I/A Series software starts without FoxView and FoxDraw Software. You can install them from CD-ROM or flash memory.

5.10.5- Download to CP

Save all data from IACC in virtual machine then download it to cp by using CMD or directly from IACC.

00001

PETROBEL COMPANY

ENGINEERING FOR THE PETROLEUM AND PROCESS INDUSTRIES (ENPPI)

P.O.: 3292-300-251-05-16

PETRECO NEW LAND OIL TREATMENT TRAIN BELAYIM FIELD

BMS ANALOG INPUT CONDITIONING PROGRAM

BOILER MANAGMENT SYSTEM

1910-00-BPFE-01394

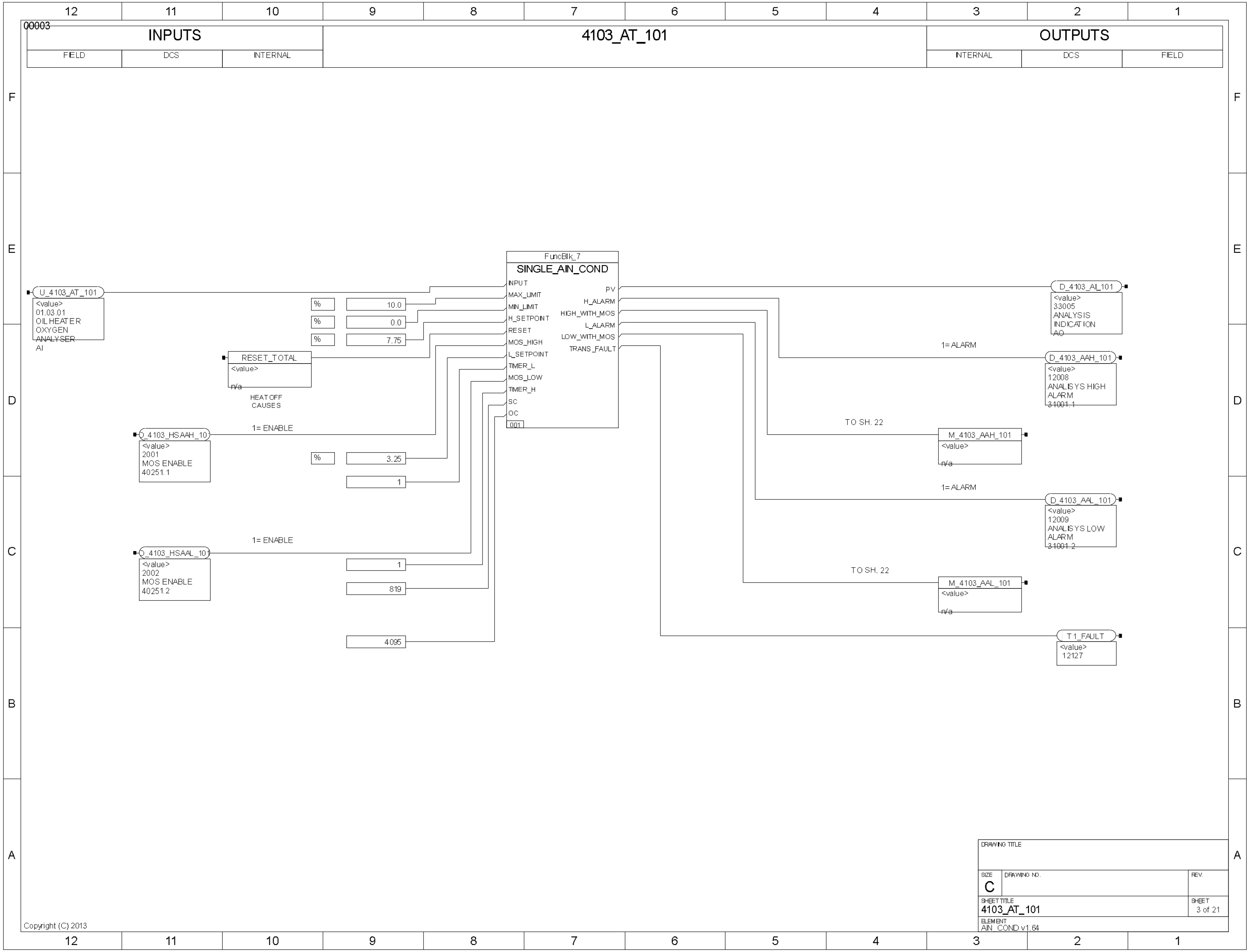
AIN CONDITIONNING

ACTIVITY	DATE/TIME	
CREATED BY Manager	02/03/2013 08:51:51 a	PROJECT
MODIFIED BY Manager	02/07/2013 07:08:03 a	DRAWING TITLE
PRINTED BY Manager	03/07/2013 09:12:07 a	SIZE C; DRAWING NO.; REV.
APPROVED BY		SHEET TITLE; SHEET 1 of 21
SHEET TEMPLATE SheetTemplateC		ELEMENT AIN_COND v1.64

00002

This typical Process the analogue input and provides:
"Low Low, Low, High, High High trip alarms.
"Maintenance Override for all alarms
"Operational Override Interlock facility for High High & Low Low Alarm

DRAWING TITLE		
SIZE C	DRAWING NO.	REV.
SHEET TITLE		SHEET 2 of 21
ELEMENT AIN_COND v1.64		



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H_SETPOINT
RESET
MOS_HIGH
L_SETPOINT
TIMER_L
MOS_LOW
TIMER_H
SC
OC
001
PV
H_ALARM
HIGH_WITH_MOS
L_ALARM
LOW_WITH_MOS
TRANS_FAULT
D_4103_AI_101
<value>
33005
ANALYSIS
INDICATION
AO
1= ALARM
D_4103_AAH_101
<value>
12008
ANALISYS HIGH
ALARM
31001.1
TO SH. 22
M_4103_AAH_101
<value>
n/a
1= ALARM
D_4103_AAL_101
<value>
12009
ANALISYS LOW
ALARM
31001.2
TO SH. 22
M_4103_AAL_101
<value>
n/a
T1_FAULT
<value>
12127
DRAWING TITLE
SIZE
C
DRAWING NO.
REV.
SHEET TITLE
4103_AT_101
SHEET
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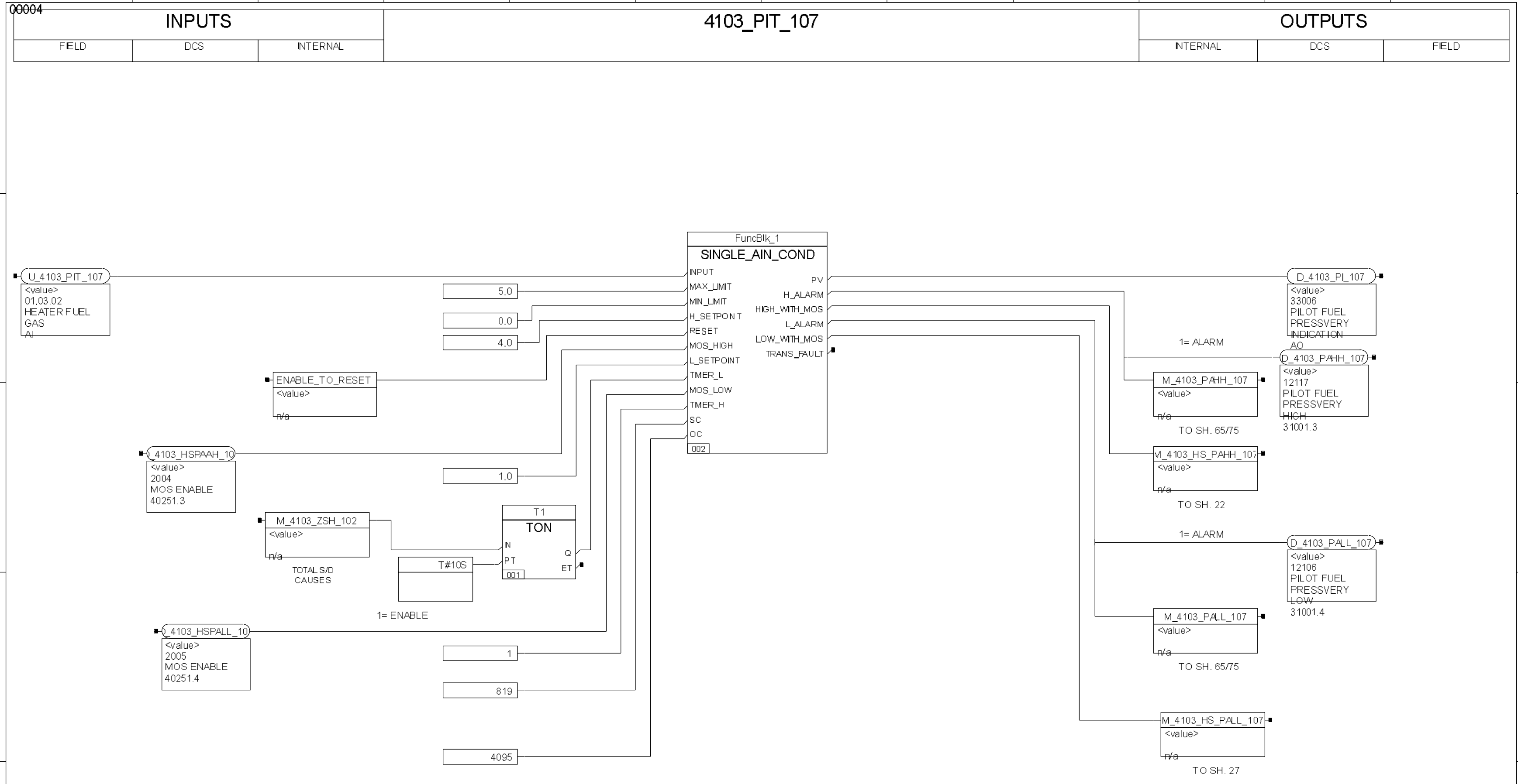

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SIZE C	DRAWING NO. / REV.
SHEET TITLE 4103_PIT_107	SHEET 4 of 21
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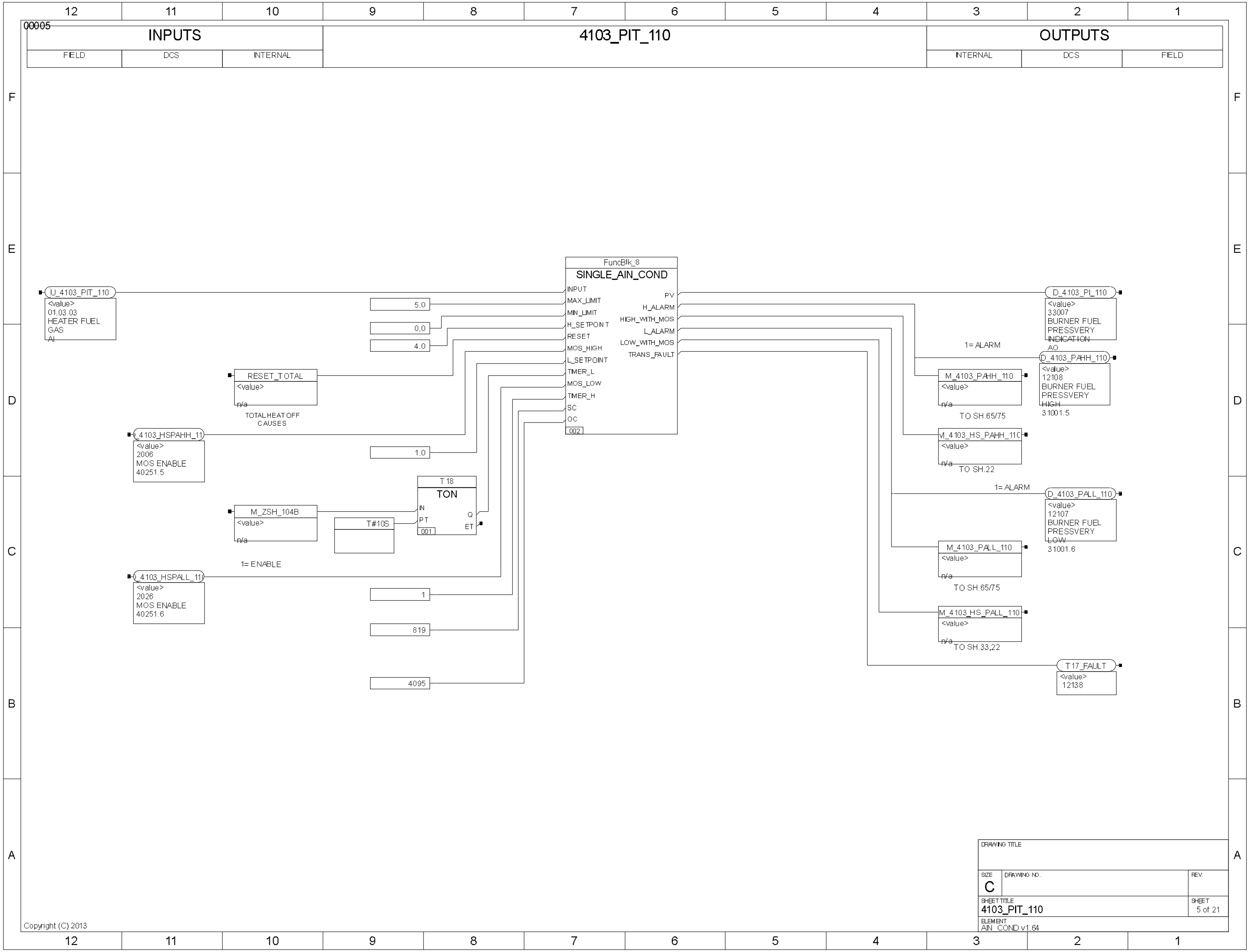
00005
INPUTS
FIELD
DCS
INTERNAL
4103_PIT_110
OUTPUTS
INTERNAL
DCS
FIELD
U_4103_PIT_110
<value>
01.03.03
HEATER FUEL
GAS
AI
5.0
0.0
4.0
RESET_TOTAL
<value>
n/a
TOTAL HEAT OFF CAUSES
I_4103_HSPAHH_11
<value>
2006
MOS ENABLE
40251.5
1.0
T 18
TON
IN
PT
Q
ET
001
M_ZSH_104B
<value>
n/a
T#10S
1= ENABLE
I_4103_HSPALL_11
<value>
2026
MOS ENABLE
40251.6
1
819
4095
FuncBlk_8
SINGLE_AIN_COND
INPUT
MAX_LIMIT
MIN_LIMIT
H_SETPOINT
RESET
MOS_HIGH
L_SETPOINT
TIMER_L
MOS_LOW
TIMER_H
SC
OC
002
PV
H_ALARM
HIGH_WITH_MOS
L_ALARM
LOW_WITH_MOS
TRANS_FAULT
D_4103_PI_110
<value>
33007
BURNER FUEL
PRESSVERY
INDICATION
AO
1= ALARM
D_4103_PAHH_110
<value>
12108
BURNER FUEL
PRESSVERY
HIGH
31001.5
M_4103_PAHH_110
<value>
n/a
TO SH.65/75
M_4103_HS_PAHH_110
<value>
n/a
TO SH.22
1= ALARM
D_4103_PALL_110
<value>
12107
BURNER FUEL
PRESSVERY
LOW
31001.6
M_4103_PALL_110
<value>
n/a
TO SH.65/75
M_4103_HS_PALL_110
<value>
n/a
TO SH.33,22
T17_FAULT
<value>
12138
DRAWING TITLE
SIZE
C
DRAWING NO.
REV.
SHEET TITLE
4103_PIT_110
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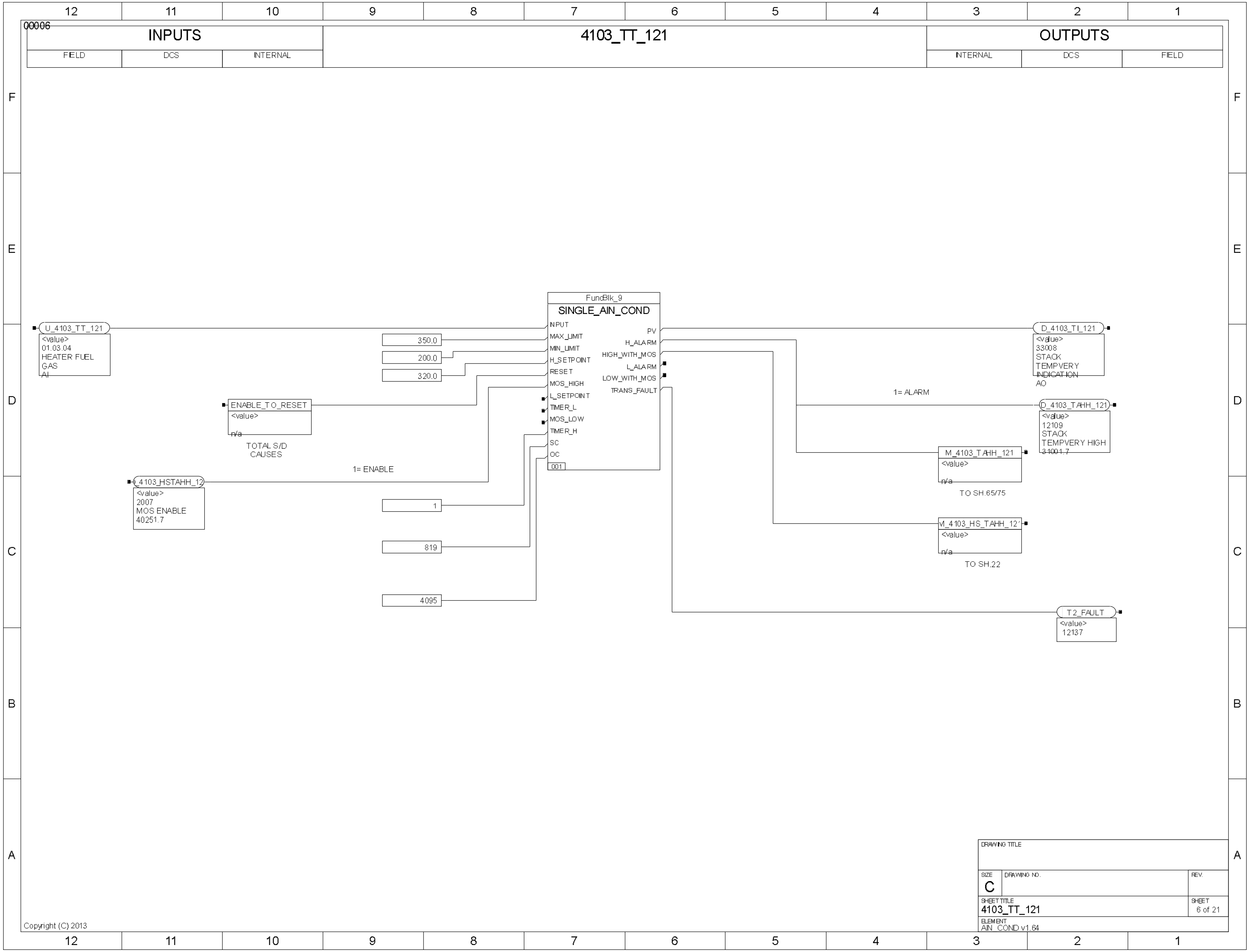
00006
INPUTS
FIELD
DCS
INTERNAL
4103_TT_121
OUTPUTS
INTERNAL
DCS
FIELD
U_4103_TT_121
<value>
01.03.04
HEATER FUEL
GAS
AI
350.0
200.0
320.0
ENABLE_TO_RESET
<value>
n/a
TOTAL S/D
CAUSES
1= ENABLE
_4103_HSTAHH_12
<value>
2007
MOS ENABLE
40251.7
1
819
4095
FundBlk_9
SINGLE_AIN_COND
INPUT
MAX_LIMIT
MIN_LIMIT
H_SETPOINT
RESET
MOS_HIGH
L_SETPOINT
TIMER_L
MOS_LOW
TIMER_H
SC
OC
001
PV
H_ALARM
HIGH_WITH_MOS
L_ALARM
LOW_WITH_MOS
TRANS_FAULT
D_4103_TI_121
<value>
33008
STACK
TEMPVERY
INDICATION
AO
1= ALARM
D_4103_TAHH_121
<value>
12109
STACK
TEMPVERY HIGH
31001.7
M_4103_TAHH_121
<value>
n/a
TO SH.65/75
M_4103_HS_TAHH_12
<value>
n/a
TO SH.22
T2_FAULT
<value>
12137
DRAWING TITLE
SIZE
C
DRAWING NO.
REV.
SHEET TITLE
4103_TT_121
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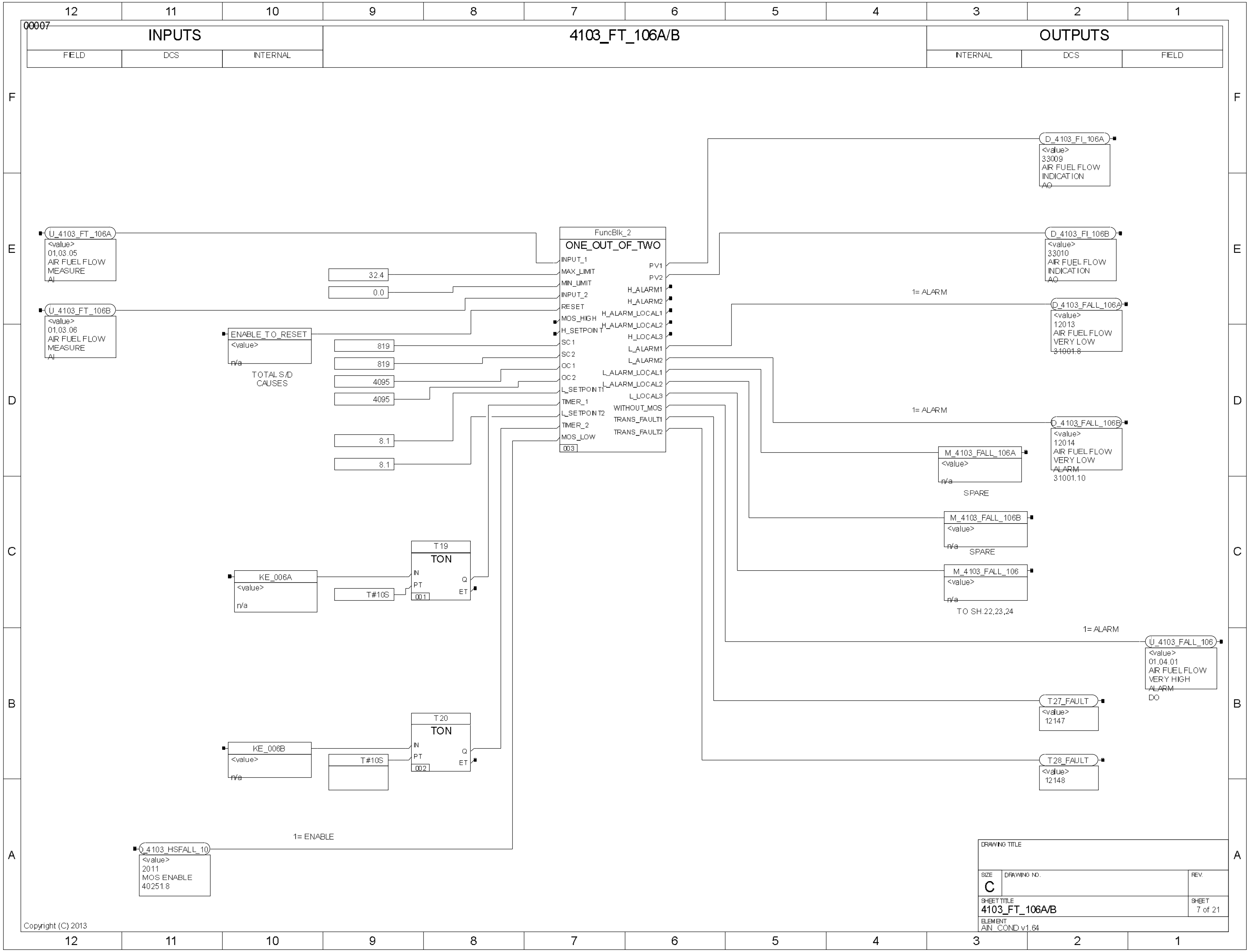

00007
INPUTS
FIELD
DCS
INTERNAL
4103_FT_106A/B
OUTPUTS
INTERNAL
DCS
FIELD
U_4103_FT_106A
<value>
01.03.05
AIR FUEL FLOW
MEASURE
AI
U_4103_FT_106B
<value>
01.03.06
AIR FUEL FLOW
MEASURE
AI
32.4
0.0
ENABLE_TO_RESET
<value>
n/a
TOTAL S/D
CAUSES
819
819
4095
4095
8.1
8.1
FuncBlk_2
ONE_OUT_OF_TWO
INPUT_1
MAX_LIMIT
MIN_LIMIT
INPUT_2
RESET
MOS_HIGH
H_SETPOINT
SC1
SC2
OC1
OC2
L_SETPOINT1
TIMER_1
L_SETPOINT2
TIMER_2
MOS_LOW
003
PV1
PV2
H_ALARM1
H_ALARM2
H_ALARM_LOCAL1
H_ALARM_LOCAL2
H_LOCAL3
L_ALARM1
L_ALARM2
L_ALARM_LOCAL1
L_ALARM_LOCAL2
L_LOCAL3
WITHOUT_MOS
TRANS_FAULT1
TRANS_FAULT2
D_4103_FI_106A
<value>
33009
AIR FUEL FLOW
INDICATION
AO
D_4103_FI_106B
<value>
33010
AIR FUEL FLOW
INDICATION
AO
1= ALARM
D_4103_FALL_106A
<value>
12013
AIR FUEL FLOW
VERY LOW
31001.8
1= ALARM
D_4103_FALL_106B
<value>
12014
AIR FUEL FLOW
VERY LOW
ALARM
31001.10
M_4103_FALL_106A
<value>
n/a
SPARE
M_4103_FALL_106B
<value>
n/a
SPARE
M_4103_FALL_106
<value>
n/a
TO SH.22,23,24
1= ALARM
U_4103_FALL_106
<value>
01.04.01
AIR FUEL FLOW
VERY HIGH
ALARM
DO
T27_FAULT
<value>
12147
T28_FAULT
<value>
12148
T19
TON
IN
PT
Q
ET
001
KE_006A
<value>
n/a
T#10S
T20
TON
IN
PT
Q
ET
002
KE_006B
<value>
n/a
T#10S
1= ENABLE
Q_4103_HSFALL_10
<value>
2011
MOS ENABLE
40251.8
DRAWING TITLE
SIZE
C
DRAWING NO.
REV.
SHEET TITLE
4103_FT_106A/B
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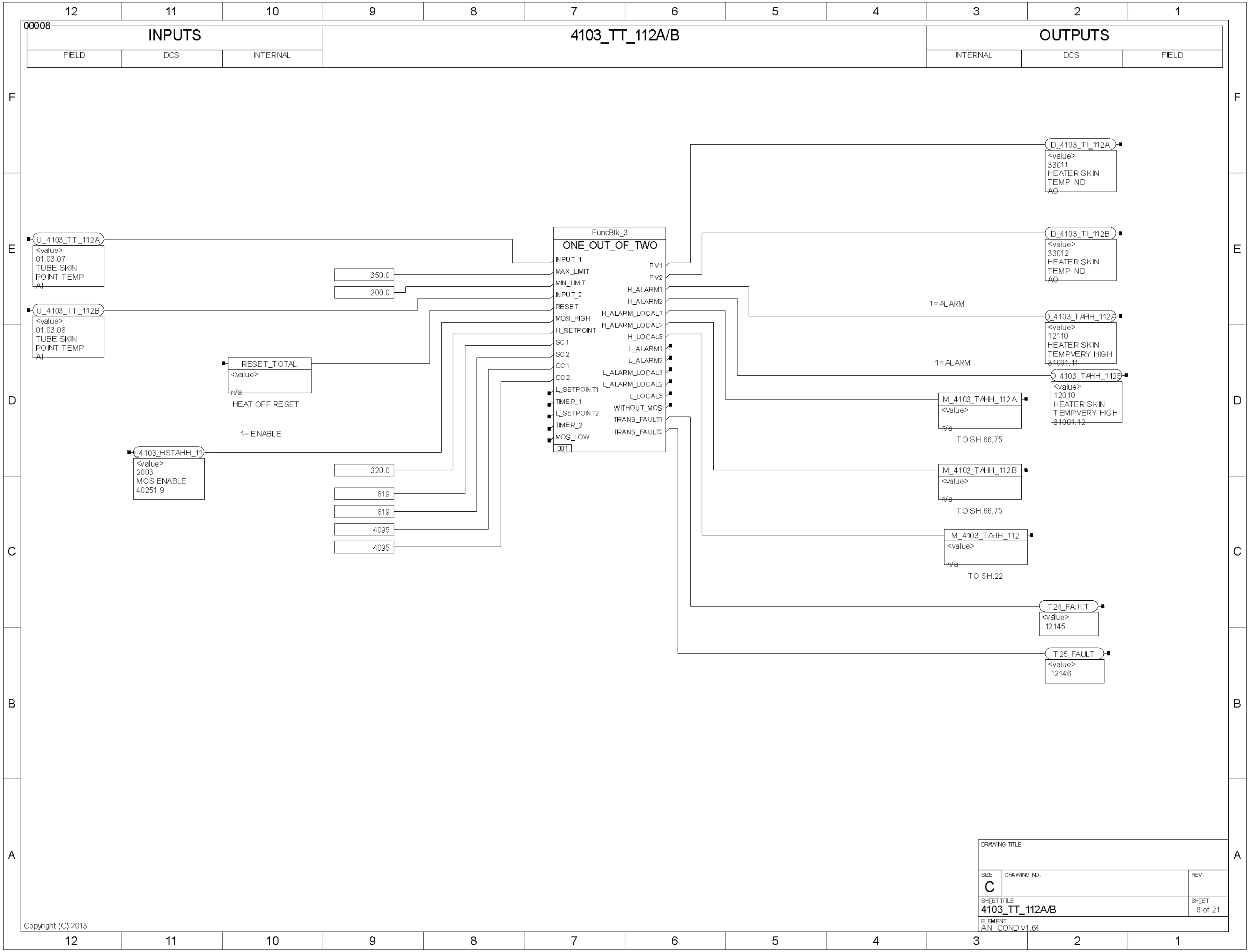
00008
INPUTS
4103_TT_112A/B
OUTPUTS
FIELD
DCS
INTERNAL
INTERNAL
DCS
FIELD
U_4103_TT_112A
<value>
01.03.07
TUBE SKIN
POINT TEMP
AI
U_4103_TT_112B
<value>
01.03.08
TUBE SKIN
POINT TEMP
AI
350.0
200.0
RESET_TOTAL
<value>
n/a
HEAT OFF RESET
1= ENABLE
I_4103_HSTAHH_11
<value>
2003
MOS ENABLE
40251.9
320.0
819
819
4095
4095
FundBlk_3
ONE_OUT_OF_TWO
INPUT_1
MAX_LIMIT
MIN_LIMIT
INPUT_2
RESET
MOS_HIGH
H_SETPOINT
SC1
SC2
OC1
OC2
L_SETPOINT1
TIMER_1
L_SETPOINT2
TIMER_2
MOS_LOW
001
PV1
PV2
H_ALARM1
H_ALARM2
H_ALARM_LOCAL1
H_ALARM_LOCAL2
H_LOCAL3
L_ALARM1
L_ALARM2
L_ALARM_LOCAL1
L_ALARM_LOCAL2
L_LOCAL3
WITHOUT_MOS
TRANS_FAULT1
TRANS_FAULT2
D_4103_TI_112A
<value>
33011
HEATER SKIN
TEMP IND
AO
D_4103_TI_112B
<value>
33012
HEATER SKIN
TEMP IND
AO
1= ALARM
O_4103_TAHH_112A
<value>
12110
HEATER SKIN
TEMPVERY HIGH
31001.11
1= ALARM
O_4103_TAHH_112B
<value>
12010
HEATER SKIN
TEMPVERY HIGH
31001.12
M_4103_TAHH_112A
<value>
n/a
TO SH.66,75
M_4103_TAHH_112B
<value>
n/a
TO SH.66,75
M_4103_TAHH_112
<value>
n/a
TO SH.22
T24_FAULT
<value>
12145
T25_FAULT
<value>
12146
DRAWING TITLE
SIZE
C
DRAWING NO.
REV.
SHEET TITLE
4103_TT_112A/B
SHEET
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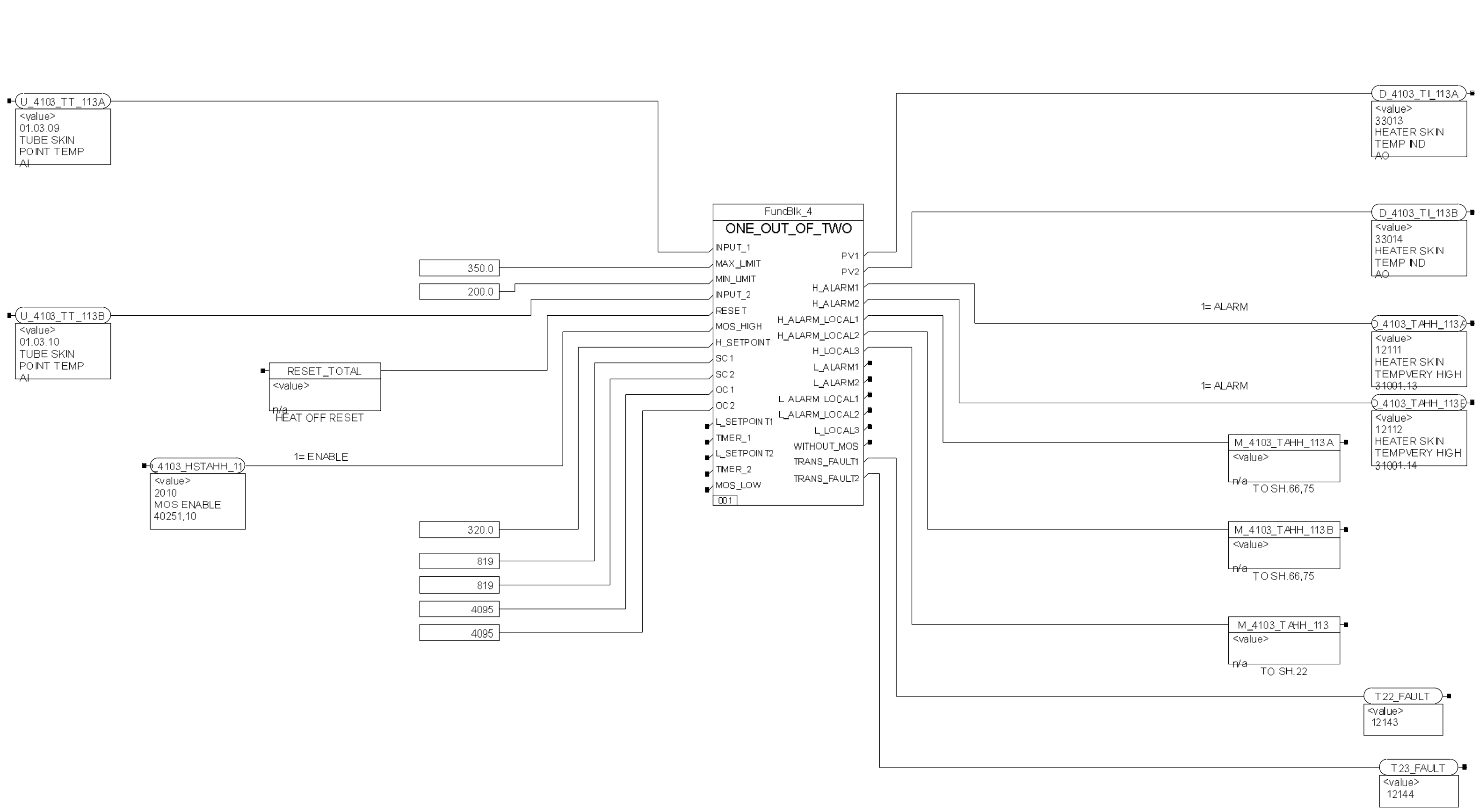

DRAWING TITLE

SIZE C | DRAWING NO. | REV.

SHEET TITLE
4103_TT_113A/B

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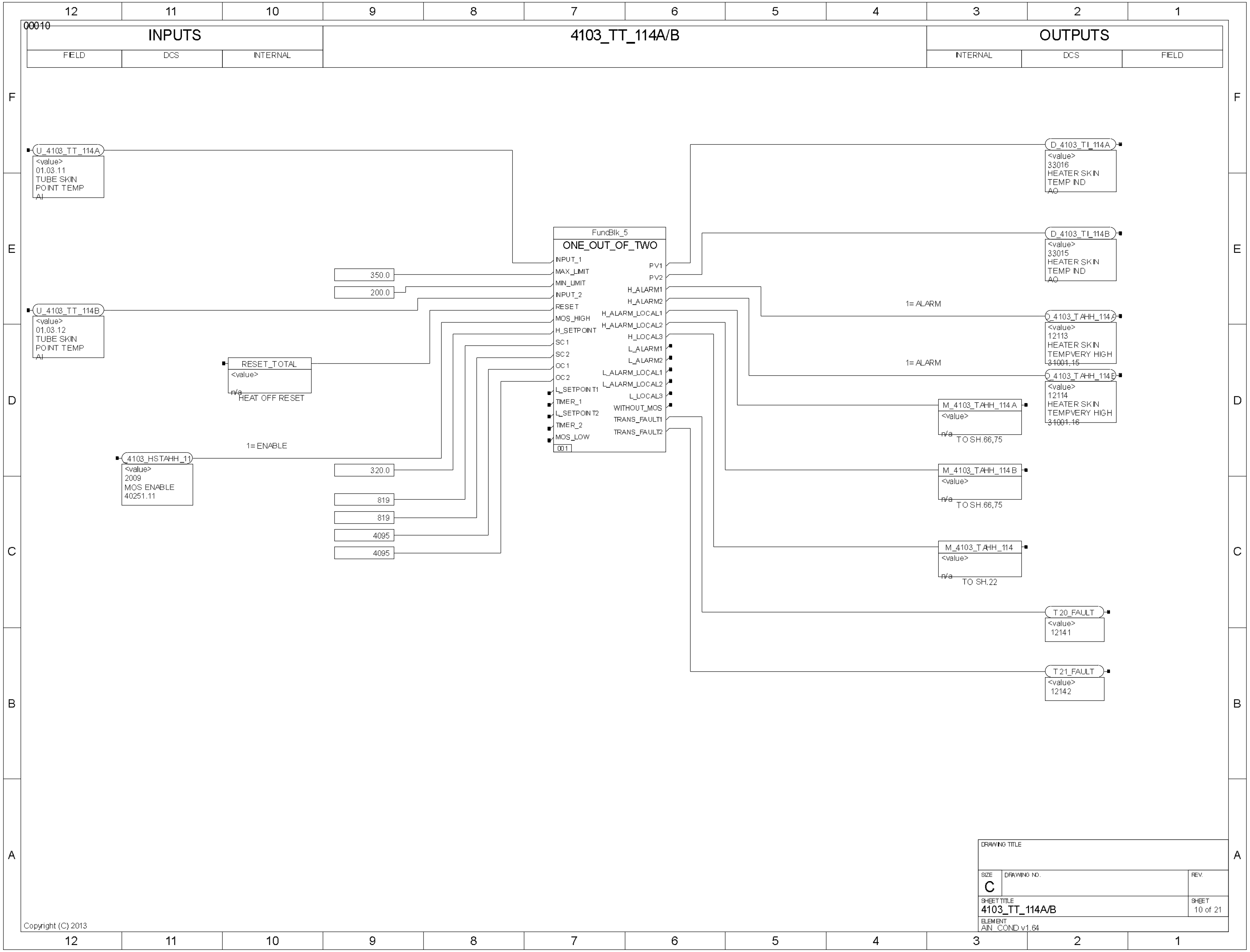
00010
INPUTS
FIELD
DCS
INTERNAL
4103_TT_114A/B
OUTPUTS
INTERNAL
DCS
FIELD
U_4103_TT_114A
<value>
01.03.11
TUBE SKIN
POINT TEMP
AI
U_4103_TT_114B
<value>
01.03.12
TUBE SKIN
POINT TEMP
AI
RESET_TOTAL
<value>
n/a
HEAT OFF RESET
1= ENABLE
4103_HSTAHH_11
<value>
2009
MOS ENABLE
40251.11
350.0
200.0
320.0
819
819
4095
4095
FundBlk_5
ONE_OUT_OF_TWO
INPUT_1
MAX_LIMIT
MIN_LIMIT
INPUT_2
RESET
MOS_HIGH
H_SETPOINT
SC1
SC2
OC1
OC2
L_SETPOINT1
TIMER_1
L_SETPOINT2
TIMER_2
MOS_LOW
001
PV1
PV2
H_ALARM1
H_ALARM2
H_ALARM_LOCAL1
H_ALARM_LOCAL2
H_LOCAL3
L_ALARM1
L_ALARM2
L_ALARM_LOCAL1
L_ALARM_LOCAL2
L_LOCAL3
WITHOUT_MOS
TRANS_FAULT1
TRANS_FAULT2
D_4103_TI_114A
<value>
33016
HEATER SKIN
TEMP IND
AO
D_4103_TI_114B
<value>
33015
HEATER SKIN
TEMP IND
AO
1= ALARM
D_4103_TAHH_114A
<value>
12113
HEATER SKIN
TEMPVERY HIGH
31001.15
1= ALARM
D_4103_TAHH_114B
<value>
12114
HEATER SKIN
TEMPVERY HIGH
31001.16
M_4103_TAHH_114A
<value>
n/a
TO SH.66,75
M_4103_TAHH_114B
<value>
n/a
TO SH.66,75
M_4103_TAHH_114
<value>
n/a
TO SH.22
T20_FAULT
<value>
12141
T21_FAULT
<value>
12142
DRAWING TITLE
SIZE
C
DRAWING NO.
REV.
SHEET TITLE
4103_TT_114A/B
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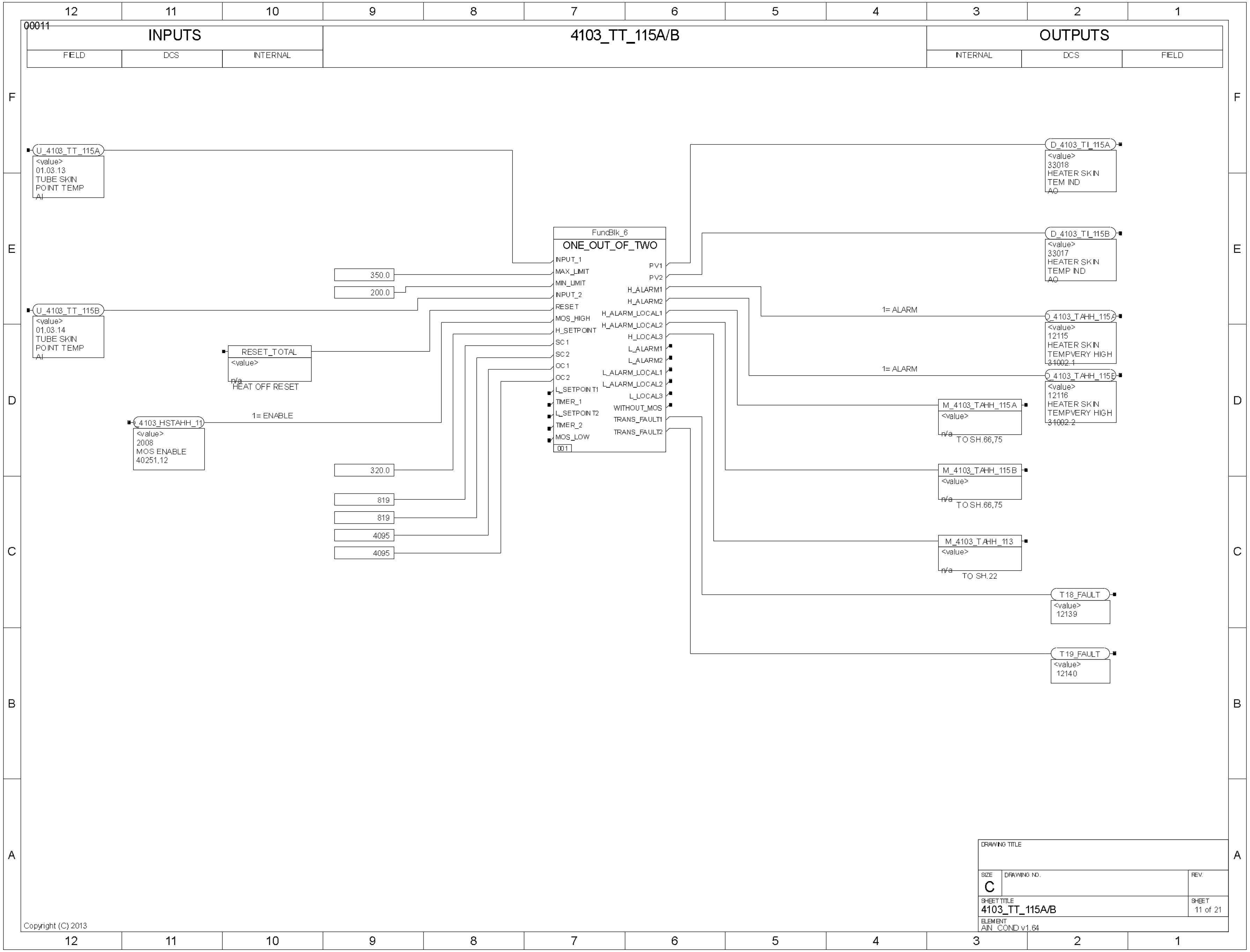
00011
INPUTS
FIELD
DCS
INTERNAL
4103_TT_115A/B
OUTPUTS
INTERNAL
DCS
FIELD
U_4103_TT_115A
<value>
01.03.13
TUBE SKIN
POINT TEMP
AI
U_4103_TT_115B
<value>
01.03.14
TUBE SKIN
POINT TEMP
AI
RESET_TOTAL
<value>
n/a
HEAT OFF RESET
I_4103_HSTAHH_11
<value>
2008
MOS ENABLE
40251.12
1= ENABLE
350.0
200.0
320.0
819
819
4095
4095
FuncBlk_6
ONE_OUT_OF_TWO
INPUT_1
MAX_LIMIT
MIN_LIMIT
INPUT_2
RESET
MOS_HIGH
H_SETPOINT
SC1
SC2
OC1
OC2
L_SETPOINT1
TIMER_1
L_SETPOINT2
TIMER_2
MOS_LOW
001
PV1
PV2
H_ALARM1
H_ALARM2
H_ALARM_LOCAL1
H_ALARM_LOCAL2
H_LOCAL3
L_ALARM1
L_ALARM2
L_ALARM_LOCAL1
L_ALARM_LOCAL2
L_LOCAL3
WITHOUT_MOS
TRANS_FAULT1
TRANS_FAULT2
D_4103_TI_115A
<value>
33018
HEATER SKIN
TEM IND
AO
D_4103_TI_115B
<value>
33017
HEATER SKIN
TEMP IND
AO
1= ALARM
O_4103_TAHH_115A
<value>
12115
HEATER SKIN
TEMPVERY HIGH
31002.1
1= ALARM
O_4103_TAHH_115B
<value>
12116
HEATER SKIN
TEMPVERY HIGH
31002.2
M_4103_TAHH_115A
<value>
n/a
TO SH.66,75
M_4103_TAHH_115B
<value>
n/a
TO SH.66,75
M_4103_TAHH_113
<value>
n/a
TO SH.22
T18_FAULT
<value>
12139
T19_FAULT
<value>
12140
DRAWING TITLE
SIZE
C
DRAWING NO.
REV.
SHEET TITLE
4103_TT_115A/B
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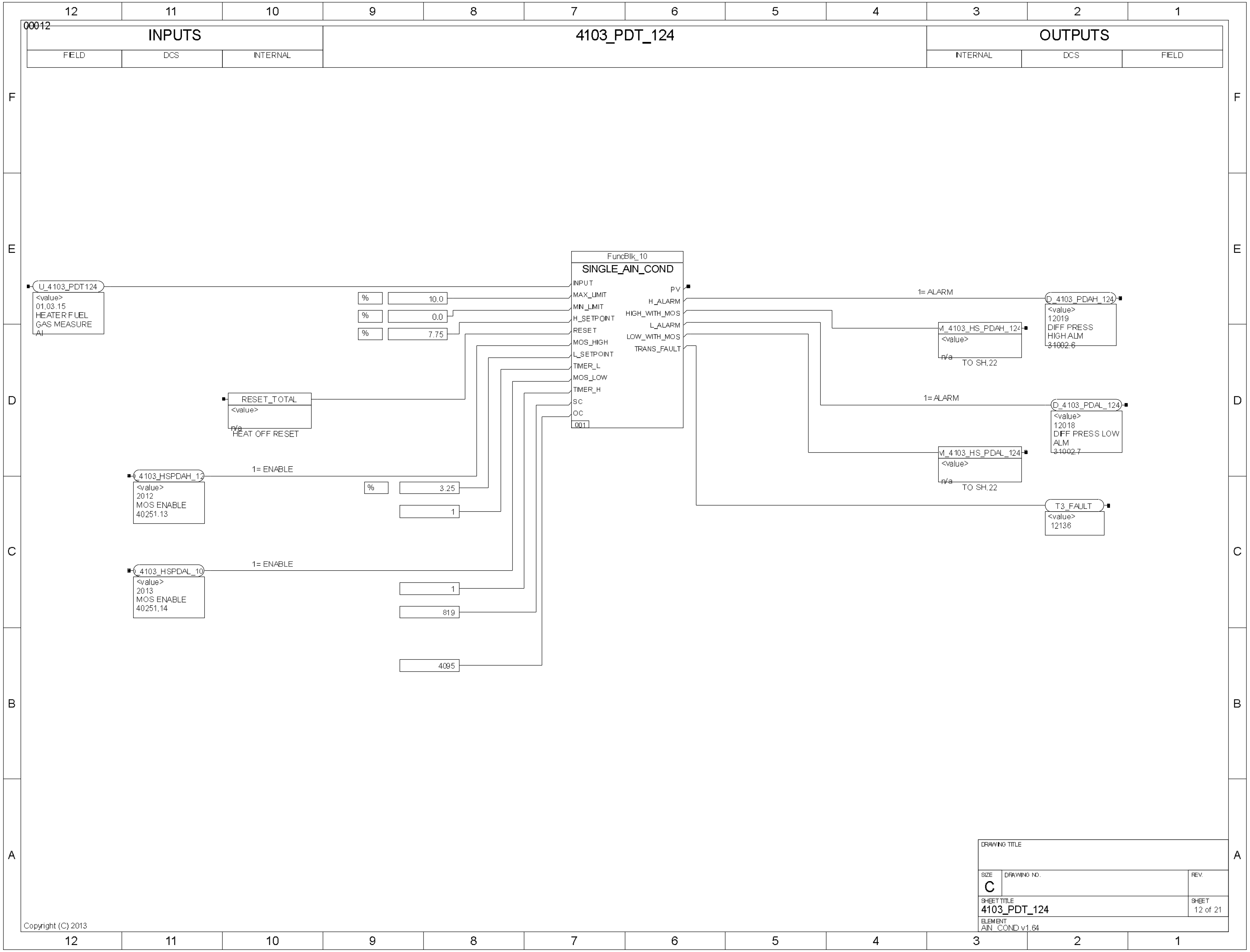
00012
INPUTS
FIELD
DCS
INTERNAL
4103_PDT_124
OUTPUTS
INTERNAL
DCS
FIELD
U_4103_PDT124
<value>
01.03.15
HEATER FUEL
GAS MEASURE
AI
FuncBlk_10
SINGLE_AIN_COND
INPUT
MAX_LIMIT
MIN_LIMIT
H_SETPOINT
RESET
MOS_HIGH
L_SETPOINT
TIMER_L
MOS_LOW
TIMER_H
SC
OC
001
PV
H_ALARM
HIGH_WITH_MOS
L_ALARM
LOW_WITH_MOS
TRANS_FAULT
% 10.0
% 0.0
% 7.75
RESET_TOTAL
<value>
n/a
HEAT OFF RESET
1= ENABLE
4103_HSPDAH_12
<value>
2012
MOS ENABLE
40251.13
% 3.25
1
1= ENABLE
4103_HSPDAL_10
<value>
2013
MOS ENABLE
40251.14
1
819
4095
1= ALARM
D_4103_PDAH_124
<value>
12019
DIFF PRESS
HIGH ALM
31002.6
M_4103_HS_PDAH_124
<value>
n/a
TO SH.22
1= ALARM
D_4103_PDAL_124
<value>
12018
DIFF PRESS LOW
ALM
31002.7
M_4103_HS_PDAL_124
<value>
n/a
TO SH.22
T3_FAULT
<value>
12136
DRAWING TITLE
SIZE
C
DRAWING NO.
REV.
SHEET TITLE
4103_PDT_124
SHEET
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ELEMENT
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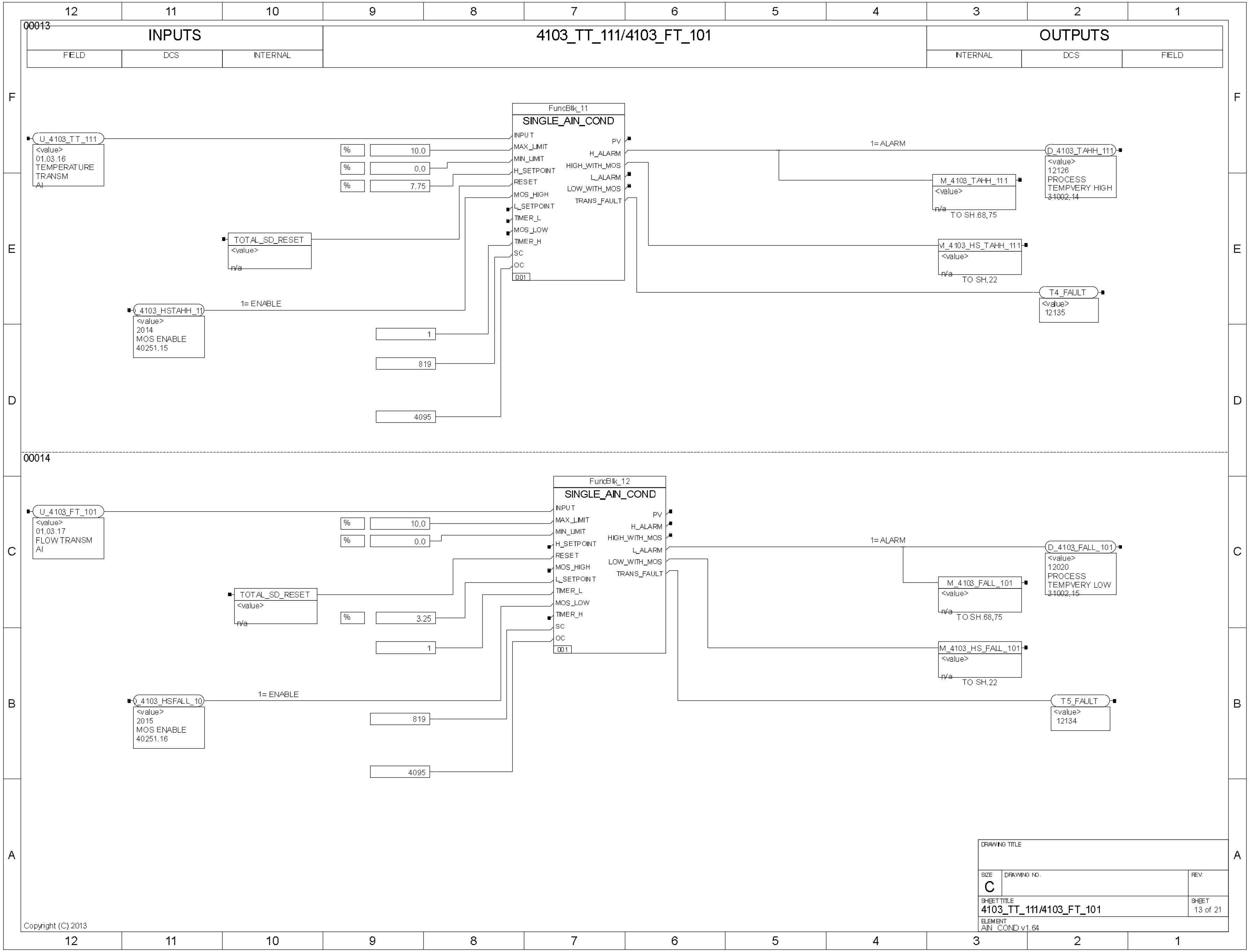
00013
INPUTS
FIELD
DCS
INTERNAL
4103_TT_111/4103_FT_101
OUTPUTS
INTERNAL
DCS
FIELD
U_4103_TT_111
<value>
01.03.16
TEMPERATURE
TRANSM
AI
%
10.0
%
0.0
%
7.75
TOTAL_SD_RESET
<value>
n/a
I_4103_HSTAHH_111
<value>
2014
MOS ENABLE
40251.15
1= ENABLE
1
819
4095
FuncBlk_11
SINGLE_AIN_COND
INPUT
MAX_LIMIT
MIN_LIMIT
H_SETPOINT
RESET
MOS_HIGH
L_SETPOINT
TIMER_L
MOS_LOW
TIMER_H
SC
OC
001
PV
H_ALARM
HIGH_WITH_MOS
L_ALARM
LOW_WITH_MOS
TRANS_FAULT
1= ALARM
D_4103_TAHH_111
<value>
12126
PROCESS
TEMPVERY HIGH
31002.14
M_4103_TAHH_111
<value>
n/a
TO SH 68,75
M_4103_HS_TAHH_111
<value>
n/a
TO SH.22
T4_FAULT
<value>
12135
00014
U_4103_FT_101
<value>
01.03.17
FLOW TRANSM
AI
%
10.0
%
0.0
TOTAL_SD_RESET
<value>
n/a
%
3.25
1
I_4103_HSFALL_101
<value>
2015
MOS ENABLE
40251.16
1= ENABLE
819
4095
FuncBlk_12
SINGLE_AIN_COND
INPUT
MAX_LIMIT
MIN_LIMIT
H_SETPOINT
RESET
MOS_HIGH
L_SETPOINT
TIMER_L
MOS_LOW
TIMER_H
SC
OC
001
PV
H_ALARM
HIGH_WITH_MOS
L_ALARM
LOW_WITH_MOS
TRANS_FAULT
1= ALARM
D_4103_FALL_101
<value>
12020
PROCESS
TEMPVERY LOW
31002.15
M_4103_FALL_101
<value>
n/a
TO SH 68,75
M_4103_HS_FALL_101
<value>
n/a
TO SH.22
T5_FAULT
<value>
12134
DRAWING TITLE
SIZE
C
DRAWING NO.
REV.
SHEET TITLE
4103_TT_111/4103_FT_101
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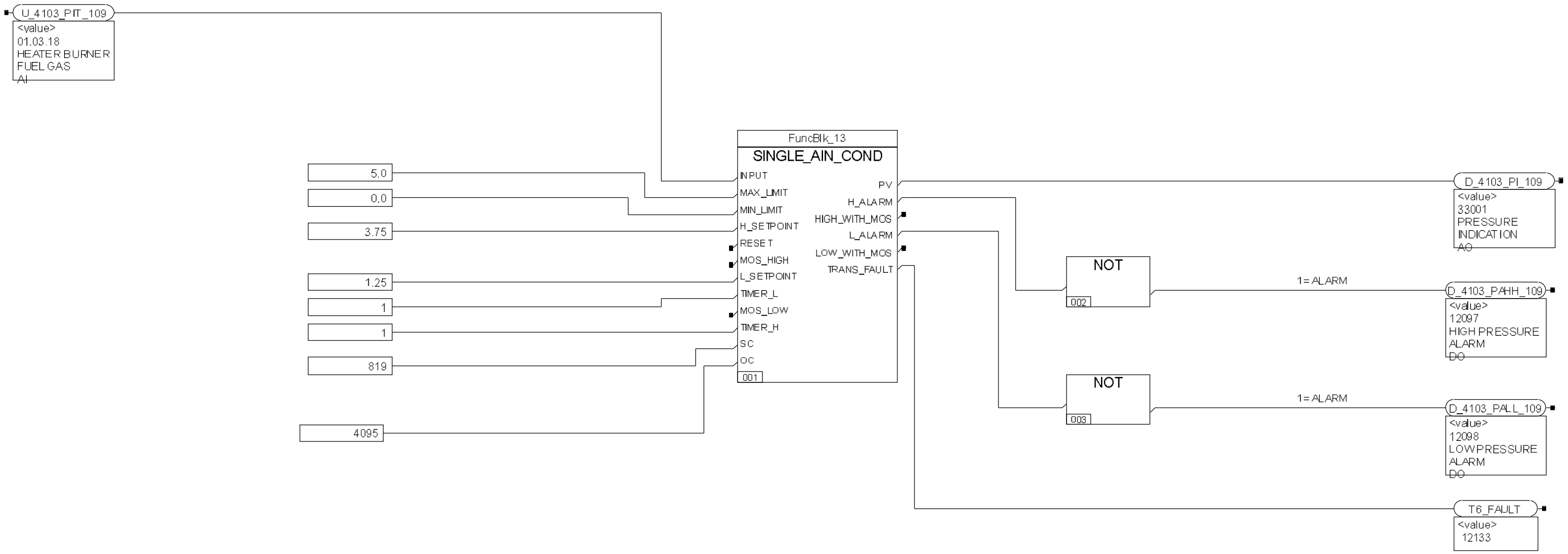
00015

4103-PIT-109 MAIN FUEL GAS OUTLET PRESSURE MEASURE

INPUTS			OUTPUTS		
FIELD	DCS	INTERNAL	INTERNAL	DCS	FIELD



DRAWING TITLE		
SIZE C	DRAWING NO.	REV.
SHEET TITLE 4103-PIT-109 MAIN FUEL GAS OUTLET PRESSURE MEASURE		SHEET 14 of 21

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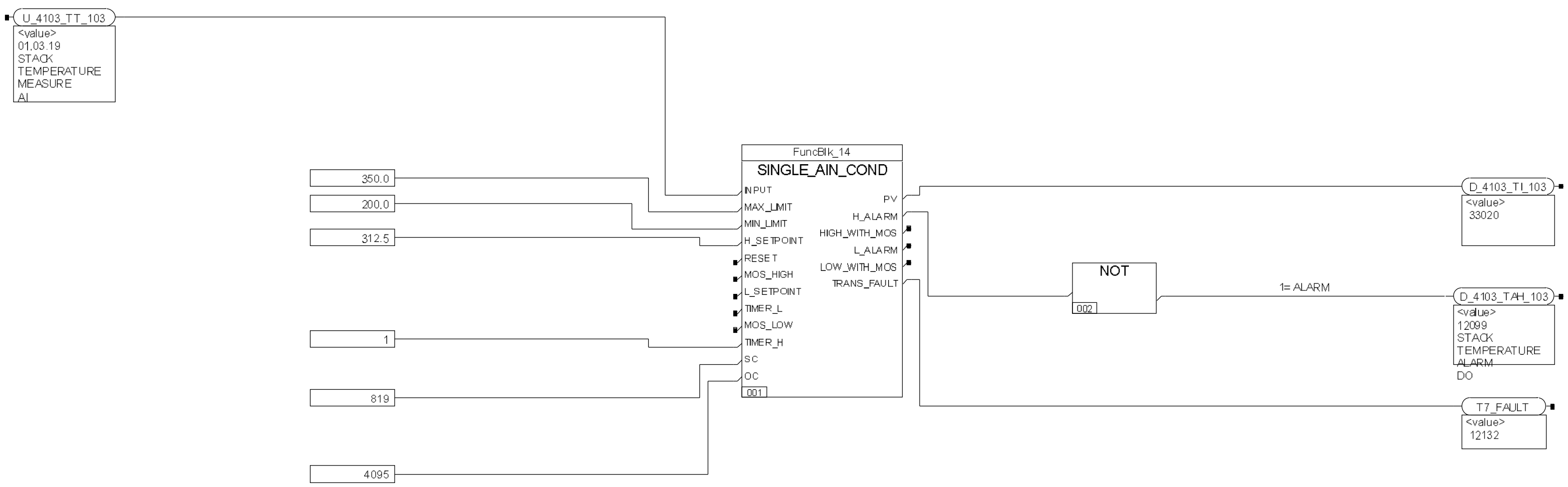
00016

INPUTS			4103-TT-103 STACK TEMPERATURE MEASURE	OUTPUTS		
FIELD	DCS	INTERNAL		INTERNAL	DCS	FIELD



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SIZE C	DRAWING NO.	REV.
SHEET TITLE 4103-TT-103 STACK TEMPERATURE MEASURE		SHEET 15 of 21
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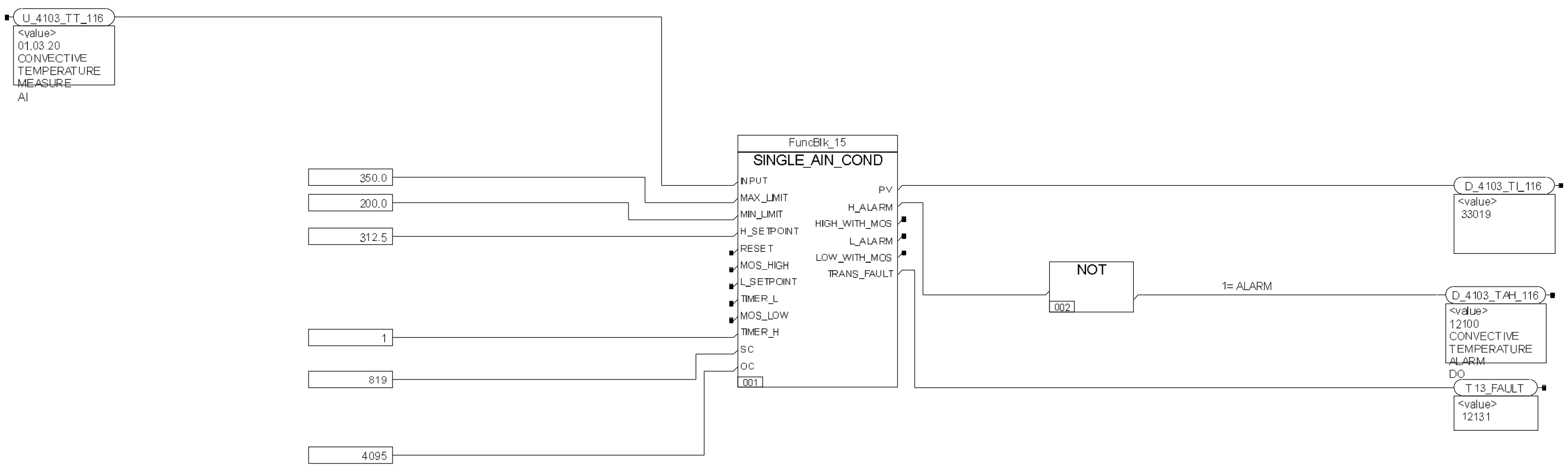
00017

INPUTS			4103-TT-116 CONVECTIVE TEMPERATURE MEASURE	OUTPUTS		
FIELD	DCS	INTERNAL		INTERNAL	DCS	FIELD



DRAWING TITLE

SIZE	DRAWING NO.	REV.
C		

SHEET TITLE
4103-TT-116 CONVECTIVE TEMPERATURE MEASURE
AIN_COND v1.64

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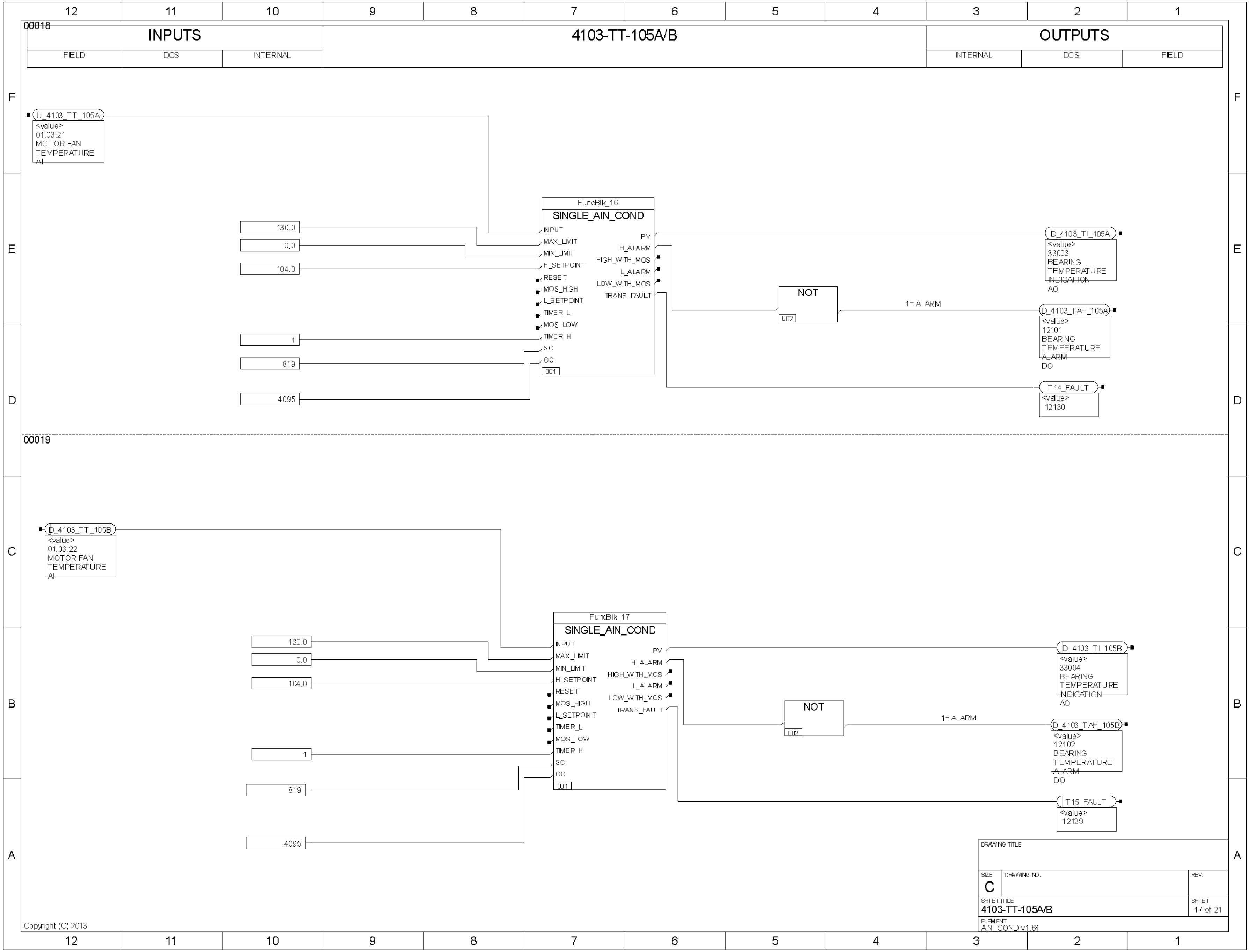
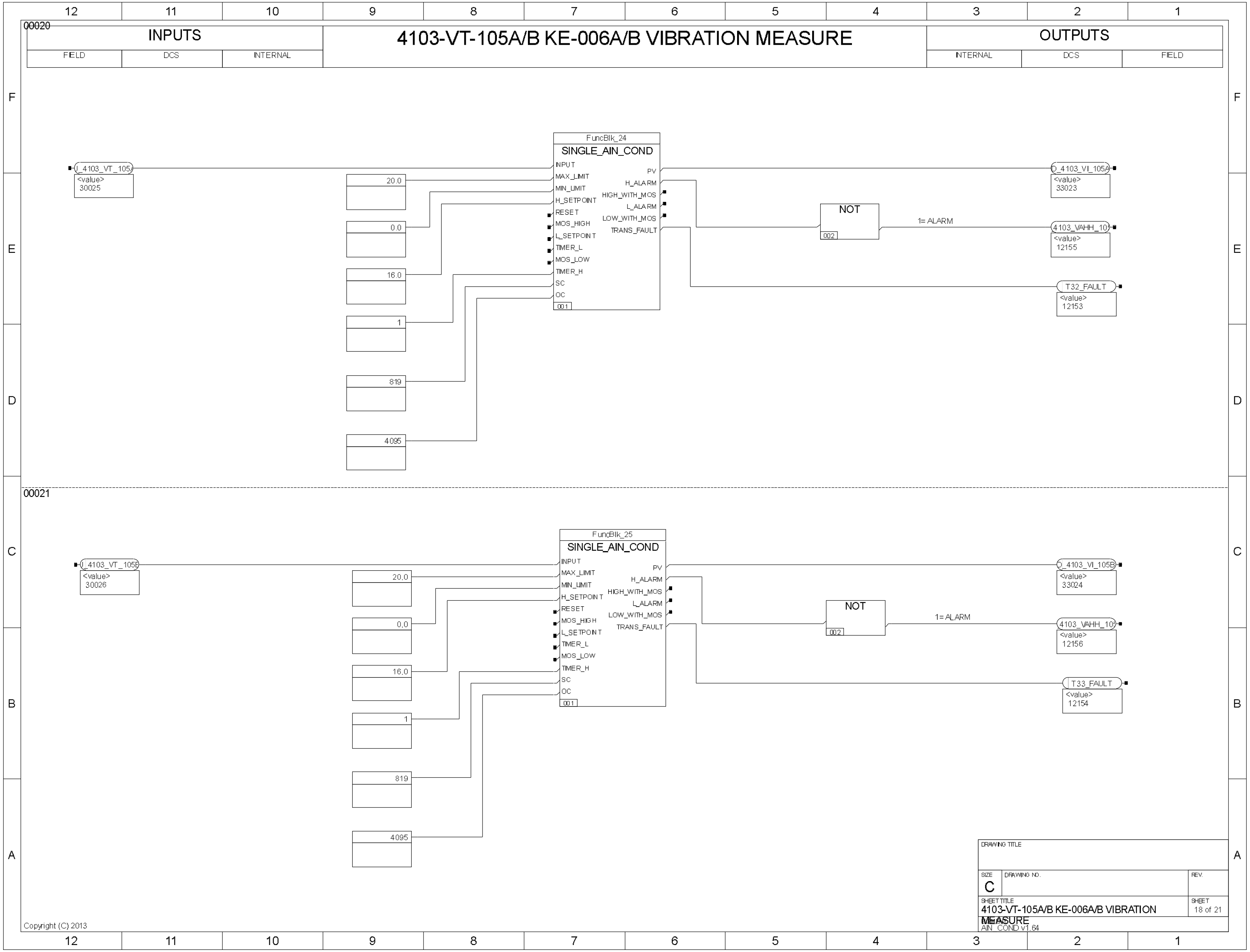


00018
INPUTS
FIELD
DCS
INTERNAL
4103-TT-105A/B
OUTPUTS
INTERNAL
DCS
FIELD
U_4103_TT_105A
<value>
01.03.21
MOTOR FAN
TEMPERATURE
AI
FuncBlk_16
SINGLE_AIN_COND
INPUT
MAX_LIMIT
MIN_LIMIT
H_SETPOINT
RESET
MOS_HIGH
L_SETPOINT
TIMER_L
MOS_LOW
TIMER_H
SC
OC
001
PV
H_ALARM
HIGH_WITH_MOS
L_ALARM
LOW_WITH_MOS
TRANS_FAULT
130,0
0,0
104,0
1
819
4095
NOT
002
1= ALARM
D_4103_TI_105A
<value>
33003
BEARING
TEMPERATURE
INDICATION
AO
D_4103_TAH_105A
<value>
12101
BEARING
TEMPERATURE
ALARM
DO
T14_FAULT
<value>
12130
00019
D_4103_TT_105B
<value>
01.03.22
MOTOR FAN
TEMPERATURE
AI
FuncBlk_17
SINGLE_AIN_COND
INPUT
MAX_LIMIT
MIN_LIMIT
H_SETPOINT
RESET
MOS_HIGH
L_SETPOINT
TIMER_L
MOS_LOW
TIMER_H
SC
OC
001
PV
H_ALARM
HIGH_WITH_MOS
L_ALARM
LOW_WITH_MOS
TRANS_FAULT
130,0
0,0
104,0
1
819
4095
NOT
002
1= ALARM
D_4103_TI_105B
<value>
33004
BEARING
TEMPERATURE
INDICATION
AO
D_4103_TAH_105B
<value>
12102
BEARING
TEMPERATURE
ALARM
DO
T15_FAULT
<value>
12129
DRAWING TITLE
SIZE C
DRAWING NO.
REV.
SHEET TITLE
4103-TT-105A/B
SHEET
17 of 21
ELEMENT
AIN_COND v1.64



4103-VT-105A/B KE-006A/B VIBRATION MEASURE
INPUTS
FIELD
DCS
INTERNAL
OUTPUTS
INTERNAL
DCS
FIELD
00020
I_4103_VT_105
<value>
30025
FuncBlk_24
SINGLE_AIN_COND
INPUT
MAX_LIMIT
MIN_LIMIT
H_SETPOINT
RESET
MOS_HIGH
L_SETPOINT
TIMER_L
MOS_LOW
TIMER_H
SC
OC
001
PV
H_ALARM
HIGH_WITH_MOS
L_ALARM
LOW_WITH_MOS
TRANS_FAULT
20.0
0.0
16.0
1
819
4095
NOT
002
1= ALARM
O_4103_VI_105A
<value>
33023
4103_VAHH_10
<value>
12155
T32_FAULT
<value>
12153
00021
I_4103_VT_105B
<value>
30026
FuncBlk_25
SINGLE_AIN_COND
INPUT
MAX_LIMIT
MIN_LIMIT
H_SETPOINT
RESET
MOS_HIGH
L_SETPOINT
TIMER_L
MOS_LOW
TIMER_H
SC
OC
001
PV
H_ALARM
HIGH_WITH_MOS
L_ALARM
LOW_WITH_MOS
TRANS_FAULT
20,0
0,0
16,0
1
819
4095
NOT
002
1= ALARM
O_4103_VI_105B
<value>
33024
4103_VAHH_10
<value>
12156
T33_FAULT
<value>
12154
DRAWING TITLE
SIZE
C
DRAWING NO.
REV.
SHEET TITLE
4103-VT-105A/B KE-006A/B VIBRATION MEASURE
AIN_COND v1.64
SHEET
18 of 21
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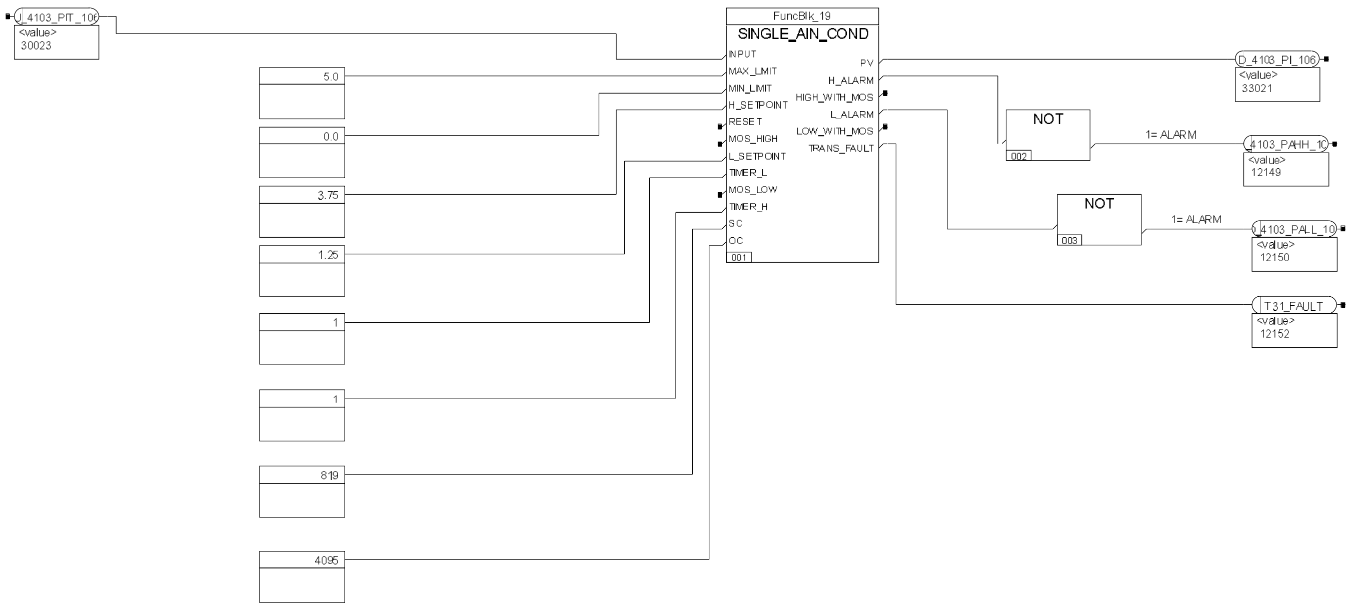
00022

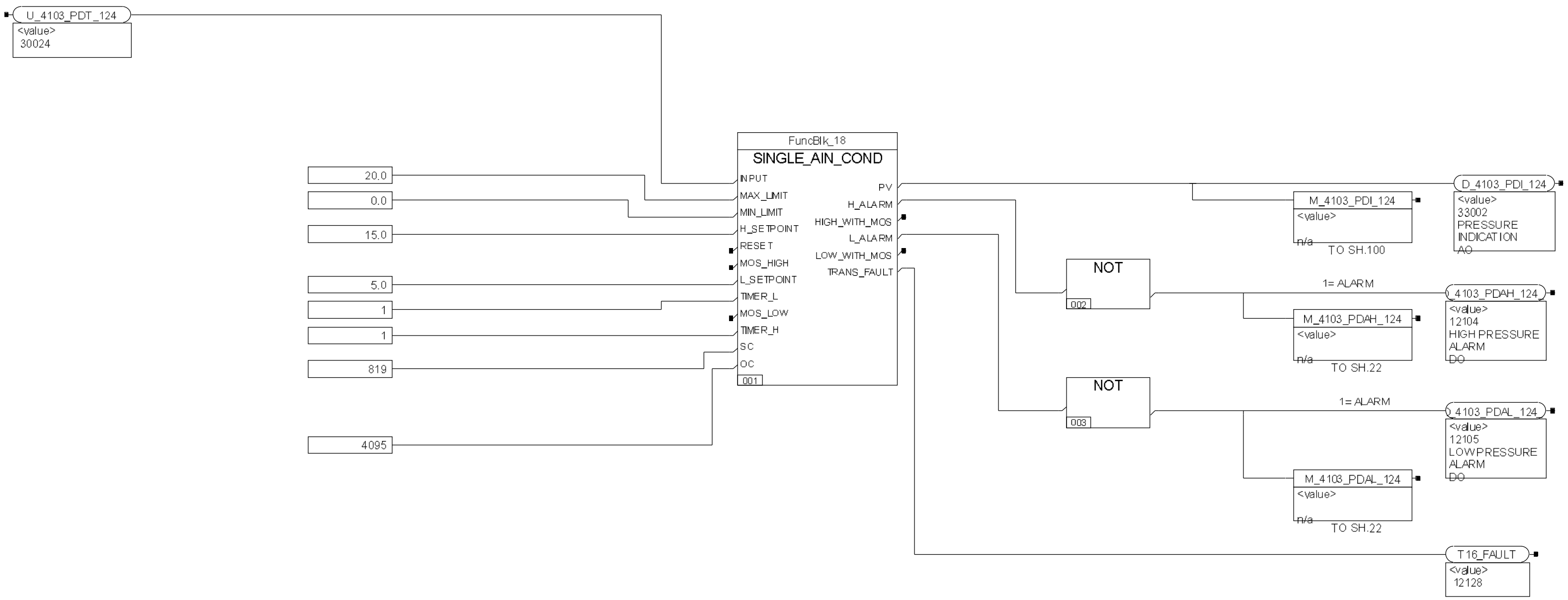
4103-PIT-106 PILOT FUEL GAS OUTLET PRESSURE MEASURE



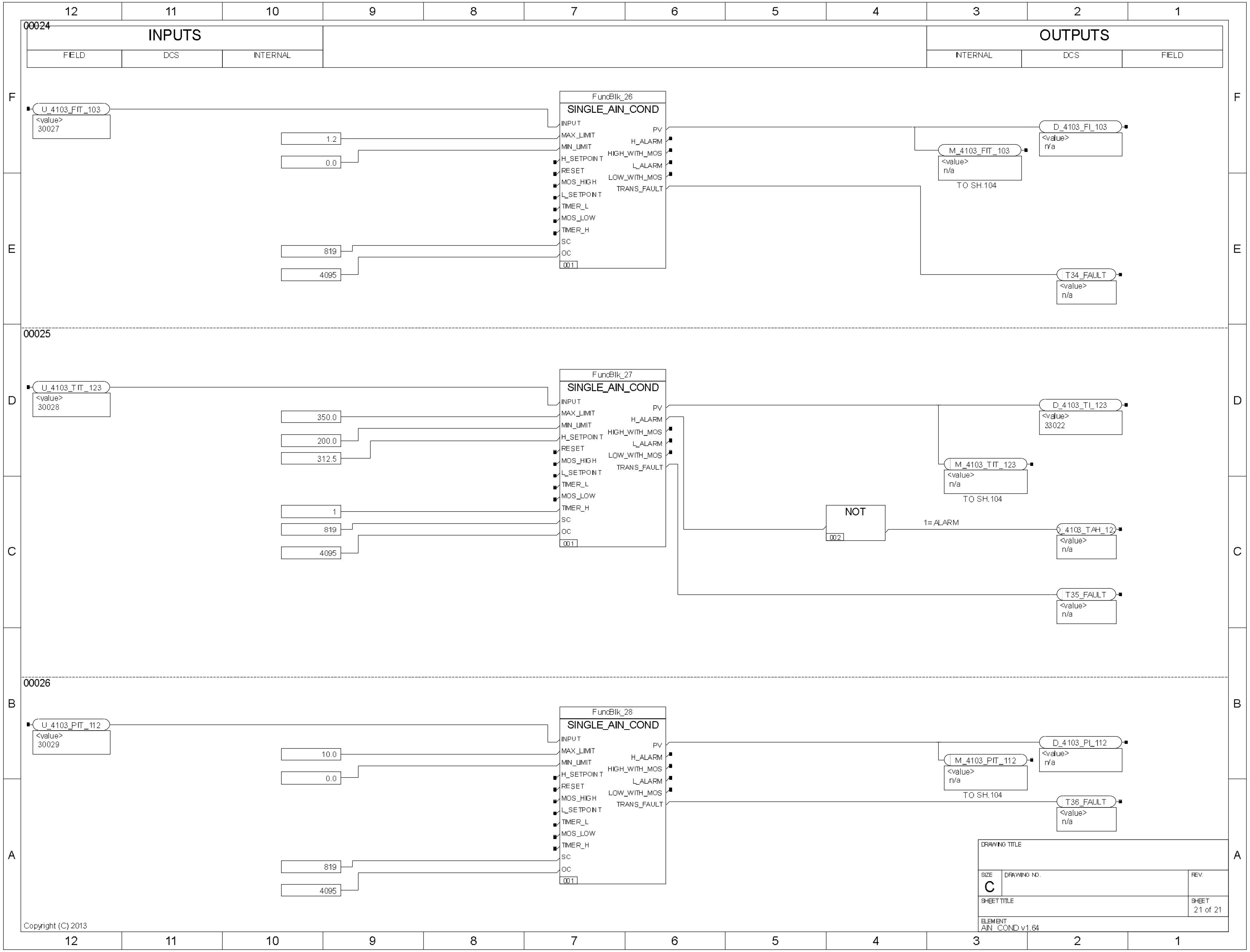
DRAWING TITLE		
SIZE C	DRAWING NO.	REV.
SHEET TITLE 4103-PIT-106 PILOT FUEL GAS OUTLET PRESSURE MEASURE		SHEET 19 of 21
AIN_COND v1.64		

00023

INPUTS			4103-PDT-124	OUTPUTS		
FIELD	DCS	INTERNAL		INTERNAL	DCS	FIELD



DRAWING TITLE		
SIZE C	DRAWING NO.	REV.
SHEET TITLE 4103-PDT-124		SHEET 20 of 21
ELEMENT AIN_COND v1.64		


00024
INPUTS
FIELD
DCS
INTERNAL
OUTPUTS
INTERNAL
DCS
FIELD
U_4103_FIT_103
<value>
30027
1.2
0.0
819
4095
FundBlk_26
SINGLE_AIN_COND
INPUT
MAX_LIMIT
MIN_LIMIT
H_SETPOINT
RESET
MOS_HIGH
L_SETPOINT
TIMER_L
MOS_LOW
TIMER_H
SC
OC
001
PV
H_ALARM
HIGH_WITH_MOS
L_ALARM
LOW_WITH_MOS
TRANS_FAULT
D_4103_FI_103
<value>
n/a
M_4103_FIT_103
<value>
n/a
TO SH.104
T34_FAULT
<value>
n/a
00025
U_4103_TIT_123
<value>
30028
350.0
200.0
312.5
1
819
4095
FundBlk_27
SINGLE_AIN_COND
001
D_4103_TI_123
<value>
33022
M_4103_TIT_123
<value>
n/a
TO SH.104
NOT
002
1=ALARM
_4103_TAH_12
<value>
n/a
T35_FAULT
<value>
n/a
00026
U_4103_PIT_112
<value>
30029
10.0
0.0
819
4095
FundBlk_28
SINGLE_AIN_COND
001
D_4103_PI_112
<value>
n/a
M_4103_PIT_112
<value>
n/a
TO SH.104
T36_FAULT
<value>
n/a
DRAWING TITLE
SIZE
C
DRAWING NO.
REV.
SHEET TITLE
SHEET
21 of 21
ELEMENT
AIN_COND v1.64
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00001

PETROBEL COMPANY

ENGINEERING FOR THE PETROLEUM AND PROCESS INDUSTRIES (ENPPI)

P.O.: 3292-300-251-05-16

PETRECO NEW LAND OIL TREATMENT TRAIN
BELAYIM FIELD

BMS DIGITAL INPUT CONDITIONING PROGRAM

BOILER MANAGMENT SYSTEM

1910-00-BPFE-01394

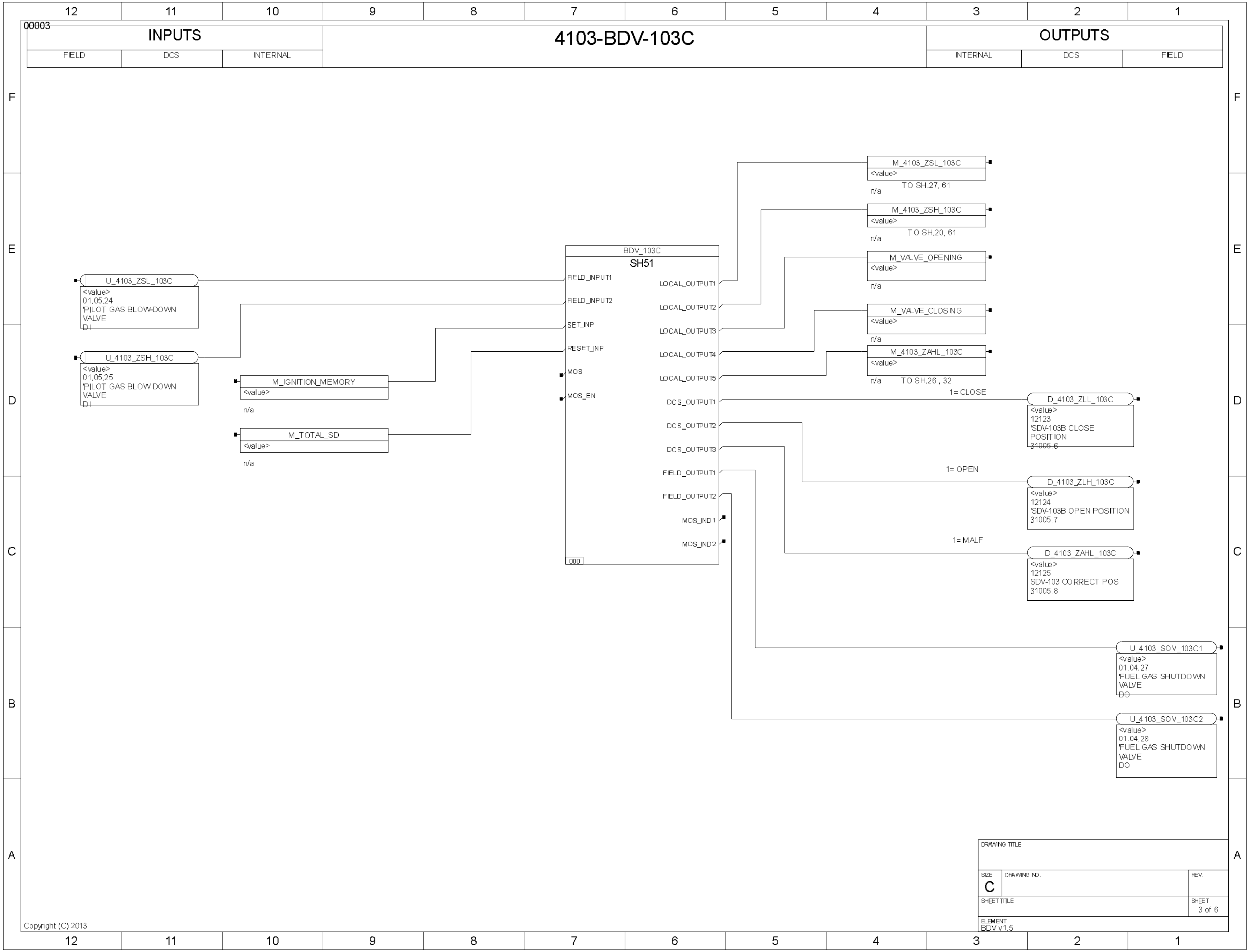
DI CONDITIONING-BDV

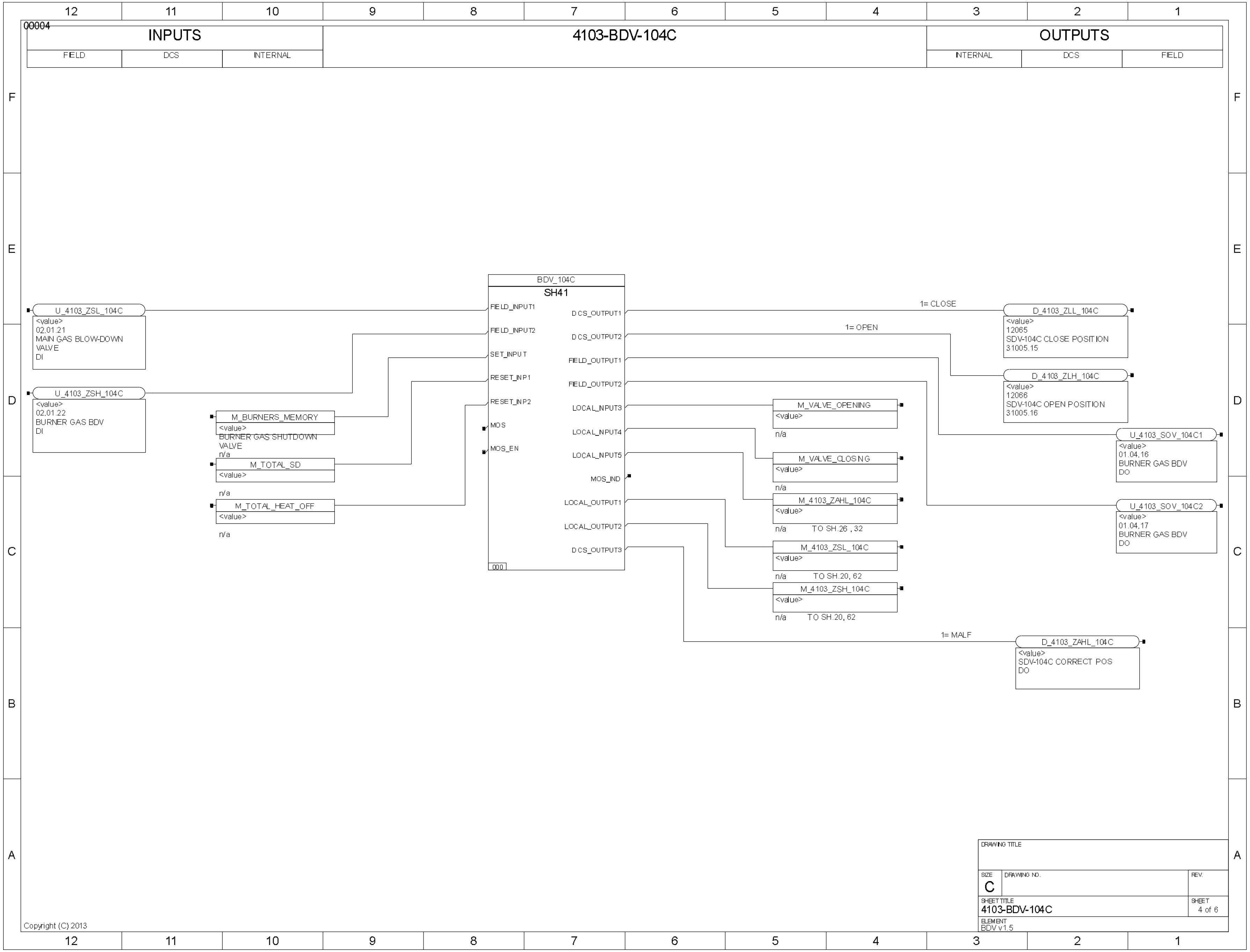
ACTIVITY	DATE/TIME	
CREATED BY Manager	01/07/2013 01.30.23 à	PROJECT
MODIFIED BY Manager	02/07/2013 07:09:12 à	DRAWING TITLE
PRINTED BY Manager	03/07/2013 09:12:27 à	SIZE C / DRAWING NO. / REV.
APPROVED BY		SHEET TITLE / SHEET 1 of 6
SHEET TEMPLATE SheetTemplateC		ELEMENT BDV v1.5

00002

This typical controls a Single Solenoid operated BDV with Manual Reset, Close, open & Maintenance override facility via DCS.

DRAWING TITLE		
SIZE C	DRAWING NO.	REV.
SHEET TITLE		SHEET 2 of 6
ELEMENT BDV v1.5		


00003
INPUTS
FIELD
DCS
INTERNAL
4103-BDV-103C
OUTPUTS
INTERNAL
DCS
FIELD
U_4103_ZSL_103C
<value>
01.05.24
'PILOT GAS BLOW-DOWN
VALVE
DI
U_4103_ZSH_103C
<value>
01.05.25
'PILOT GAS BLOW DOWN
VALVE
DI
M_IGNITION_MEMORY
<value>
n/a
M_TOTAL_SD
<value>
n/a
BDV_103C
SH51
FIELD_INPUT1
FIELD_INPUT2
SET_INP
RESET_INP
MOS
MOS_EN
LOCAL_OUTPUT1
LOCAL_OUTPUT2
LOCAL_OUTPUT3
LOCAL_OUTPUT4
LOCAL_OUTPUT5
DCS_OUTPUT1
DCS_OUTPUT2
DCS_OUTPUT3
FIELD_OUTPUT1
FIELD_OUTPUT2
MOS_IND1
MOS_IND2
000
M_4103_ZSL_103C
<value>
TO SH.27, 61
n/a
M_4103_ZSH_103C
<value>
TO SH.20, 61
n/a
M_VALVE_OPENING
<value>
n/a
M_VALVE_CLOSING
<value>
n/a
M_4103_ZAHL_103C
<value>
n/a
TO SH.26 , 32
1= CLOSE
D_4103_ZLL_103C
<value>
12123
'SDV-103B CLOSE
POSITION
31005.6
1= OPEN
D_4103_ZLH_103C
<value>
12124
'SDV-103B OPEN POSITION
31005.7
1= MALF
D_4103_ZAHL_103C
<value>
12125
SDV-103 CORRECT POS
31005.8
U_4103_SOV_103C1
<value>
01.04.27
'FUEL GAS SHUTDOWN
VALVE
DO
U_4103_SOV_103C2
<value>
01.04.28
'FUEL GAS SHUTDOWN
VALVE
DO
DRAWING TITLE
SIZE
C
DRAWING NO.
REV.
SHEET TITLE
SHEET
3 of 6
ELEMENT
BDV v1.5
Copyright (C) 2013


00004
INPUTS
FIELD
DCS
INTERNAL
4103-BDV-104C
OUTPUTS
INTERNAL
DCS
FIELD
U_4103_ZSL_104C
<value>
02.01.21
MAIN GAS BLOW-DOWN
VALVE
DI
U_4103_ZSH_104C
<value>
02.01.22
BURNER GAS BDV
DI
M_BURNERS_MEMORY
<value>
BURNER GAS SHUTDOWN
VALVE
n/a
M_TOTAL_SD
<value>
n/a
M_TOTAL_HEAT_OFF
<value>
n/a
BDV_104C
SH41
FIELD_INPUT1
FIELD_INPUT2
SET_INPUT
RESET_INP1
RESET_INP2
MOS
MOS_EN
DCS_OUTPUT1
DCS_OUTPUT2
FIELD_OUTPUT1
FIELD_OUTPUT2
LOCAL_INPUT3
LOCAL_INPUT4
LOCAL_INPUT5
MOS_IND
LOCAL_OUTPUT1
LOCAL_OUTPUT2
DCS_OUTPUT3
000
1= CLOSE
1= OPEN
D_4103_ZLL_104C
<value>
12065
SDV-104C CLOSE POSITION
31005.15
D_4103_ZLH_104C
<value>
12066
SDV-104C OPEN POSITION
31005.16
U_4103_SOV_104C1
<value>
01.04.16
BURNER GAS BDV
DO
U_4103_SOV_104C2
<value>
01.04.17
BURNER GAS BDV
DO
M_VALVE_OPENING
<value>
n/a
M_VALVE_CLOSING
<value>
n/a
M_4103_ZAHL_104C
<value>
n/a TO SH.26 , 32
M_4103_ZSL_104C
<value>
n/a TO SH.20, 62
M_4103_ZSH_104C
<value>
n/a TO SH.20, 62
1= MALF
D_4103_ZAHL_104C
<value>
SDV-104C CORRECT POS
DO
DRAWING TITLE
SIZE C
DRAWING NO.
REV.
SHEET TITLE 4103-BDV-104C
SHEET 4 of 6
ELEMENT BDV v1.5
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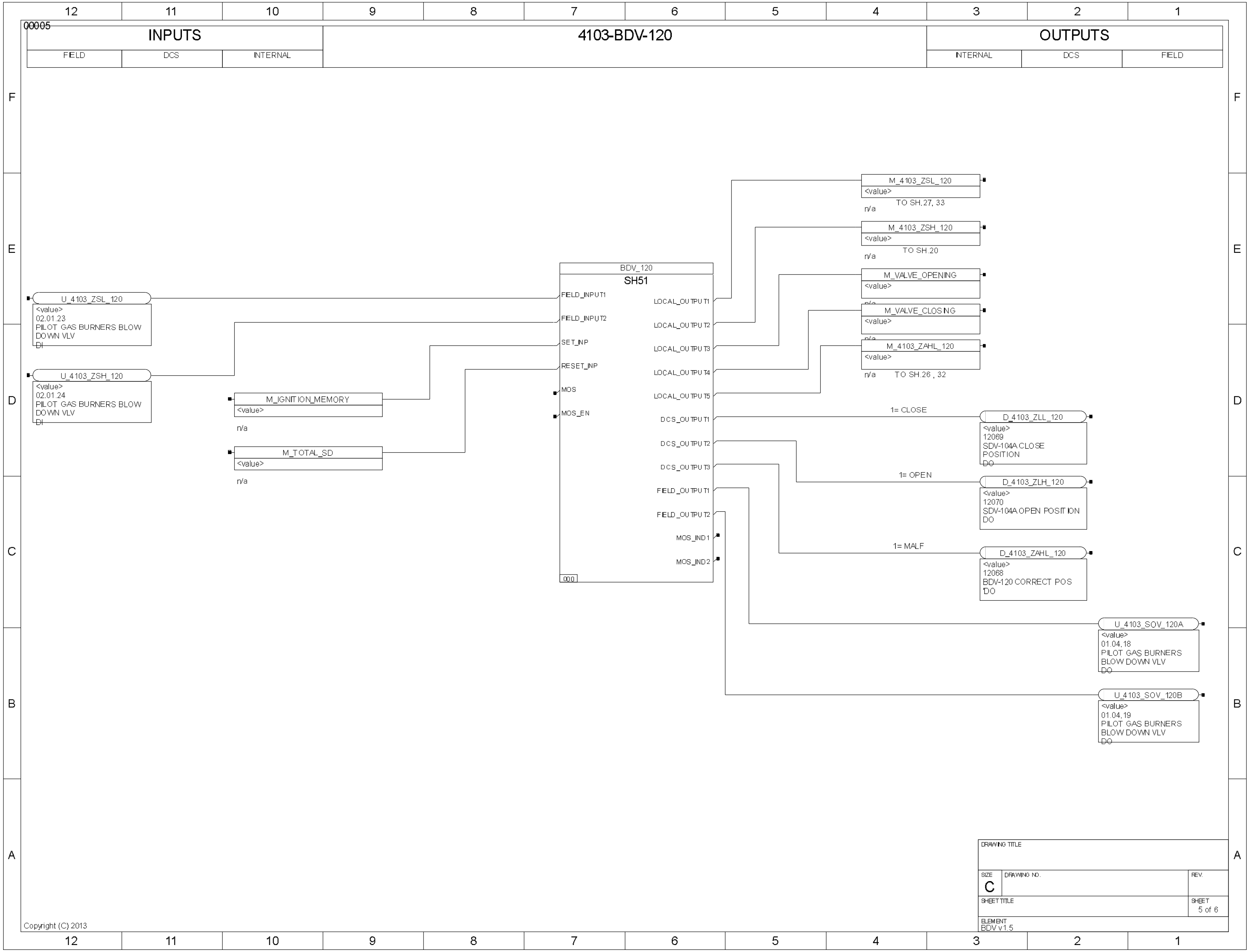
00005
INPUTS
FIELD
DCS
INTERNAL
4103-BDV-120
OUTPUTS
INTERNAL
DCS
FIELD
U_4103_ZSL_120
<value>
02.01.23
PILOT GAS BURNERS BLOW
DOWN VLV
DI
U_4103_ZSH_120
<value>
02.01.24
PILOT GAS BURNERS BLOW
DOWN VLV
DI
M_IGNITION_MEMORY
<value>
n/a
M_TOTAL_SD
<value>
n/a
BDV_120
SH51
FIELD_INPUT1
FIELD_INPUT2
SET_INP
RESET_INP
MOS
MOS_EN
LOCAL_OUTPUT1
LOCAL_OUTPUT2
LOCAL_OUTPUT3
LOCAL_OUTPUT4
LOCAL_OUTPUT5
DCS_OUTPUT1
DCS_OUTPUT2
DCS_OUTPUT3
FIELD_OUTPUT1
FIELD_OUTPUT2
MOS_IND1
MOS_IND2
000
M_4103_ZSL_120
<value>
TO SH.27, 33
n/a
M_4103_ZSH_120
<value>
TO SH.20
n/a
M_VALVE_OPENING
<value>
M_VALVE_CLOSING
<value>
M_4103_ZAHL_120
<value>
n/a
TO SH.26 , 32
1= CLOSE
D_4103_ZLL_120
<value>
12069
SDV-104A CLOSE
POSITION
DO
1= OPEN
D_4103_ZLH_120
<value>
12070
SDV-104A OPEN POSITION
DO
1= MALF
D_4103_ZAHL_120
<value>
12068
BDV-120 CORRECT POS
DO
U_4103_SOV_120A
<value>
01.04.18
PILOT GAS BURNERS
BLOW DOWN VLV
DO
U_4103_SOV_120B
<value>
01.04.19
PILOT GAS BURNERS
BLOW DOWN VLV
DO
DRAWING TITLE
SIZE
C
DRAWING NO.
REV.
SHEET TITLE
SHEET
5 of 6
ELEMENT
BDV v1.5
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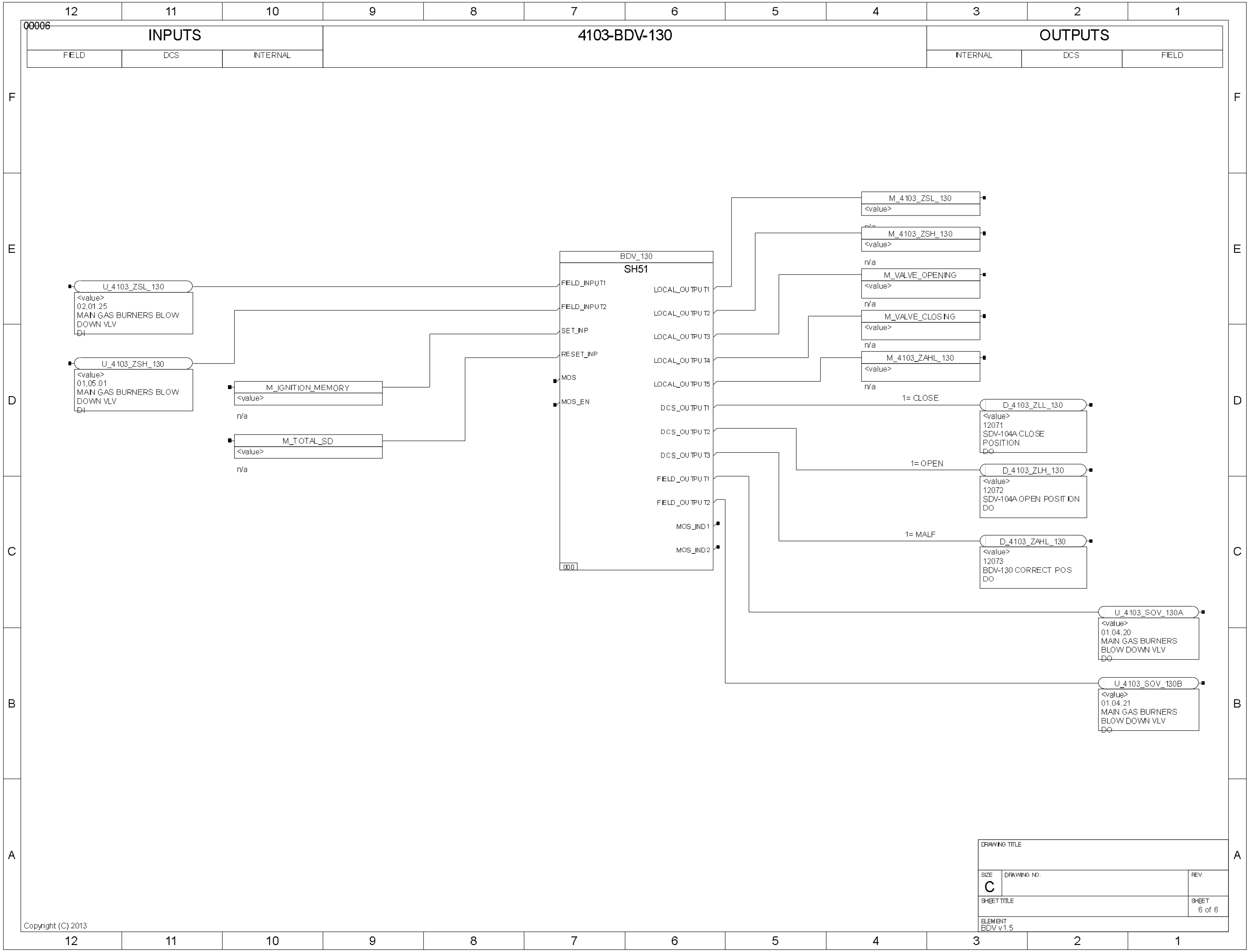
00006
INPUTS
FIELD
DCS
INTERNAL
4103-BDV-130
OUTPUTS
INTERNAL
DCS
FIELD
U_4103_ZSL_130
<value>
02.01.25
MAIN GAS BURNERS BLOW
DOWN VLV
DI
U_4103_ZSH_130
<value>
01.05.01
MAIN GAS BURNERS BLOW
DOWN VLV
DI
M_IGNITION_MEMORY
<value>
n/a
M_TOTAL_SD
<value>
n/a
BDV_130
SH51
FIELD_INPUT1
FIELD_INPUT2
SET_INP
RESET_INP
MOS
MOS_EN
LOCAL_OUTPUT1
LOCAL_OUTPUT2
LOCAL_OUTPUT3
LOCAL_OUTPUT4
LOCAL_OUTPUT5
DCS_OUTPUT1
DCS_OUTPUT2
DCS_OUTPUT3
FIELD_OUTPUT1
FIELD_OUTPUT2
MOS_IND1
MOS_IND2
000
M_4103_ZSL_130
<value>
n/a
M_4103_ZSH_130
<value>
n/a
M_VALVE_OPENING
<value>
n/a
M_VALVE_CLOSING
<value>
n/a
M_4103_ZAHL_130
<value>
n/a
1= CLOSE
D_4103_ZLL_130
<value>
12071
SDV-104A CLOSE
POSITION
DO
1= OPEN
D_4103_ZLH_130
<value>
12072
SDV-104A OPEN POSITION
DO
1= MALF
D_4103_ZAHL_130
<value>
12073
BDV-130 CORRECT POS
DO
U_4103_SOV_130A
<value>
01.04.20
MAIN GAS BURNERS
BLOW DOWN VLV
DO
U_4103_SOV_130B
<value>
01.04.21
MAIN GAS BURNERS
BLOW DOWN VLV
DO
DRAWING TITLE
SIZE
C
DRAWING NO.
REV.
SHEET TITLE
SHEET
6 of 6
ELEMENT
BDV v1.5
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00001

PETROBEL COMPANY

ENGINEERING FOR THE PETROLEUM AND PROCESS
INDUSTRIES (ENPPI)

P.O.: 3292-300-251-05-16

PETRECO NEW LAND OIL TREATMENT TRAIN
BELAYIM FIELD

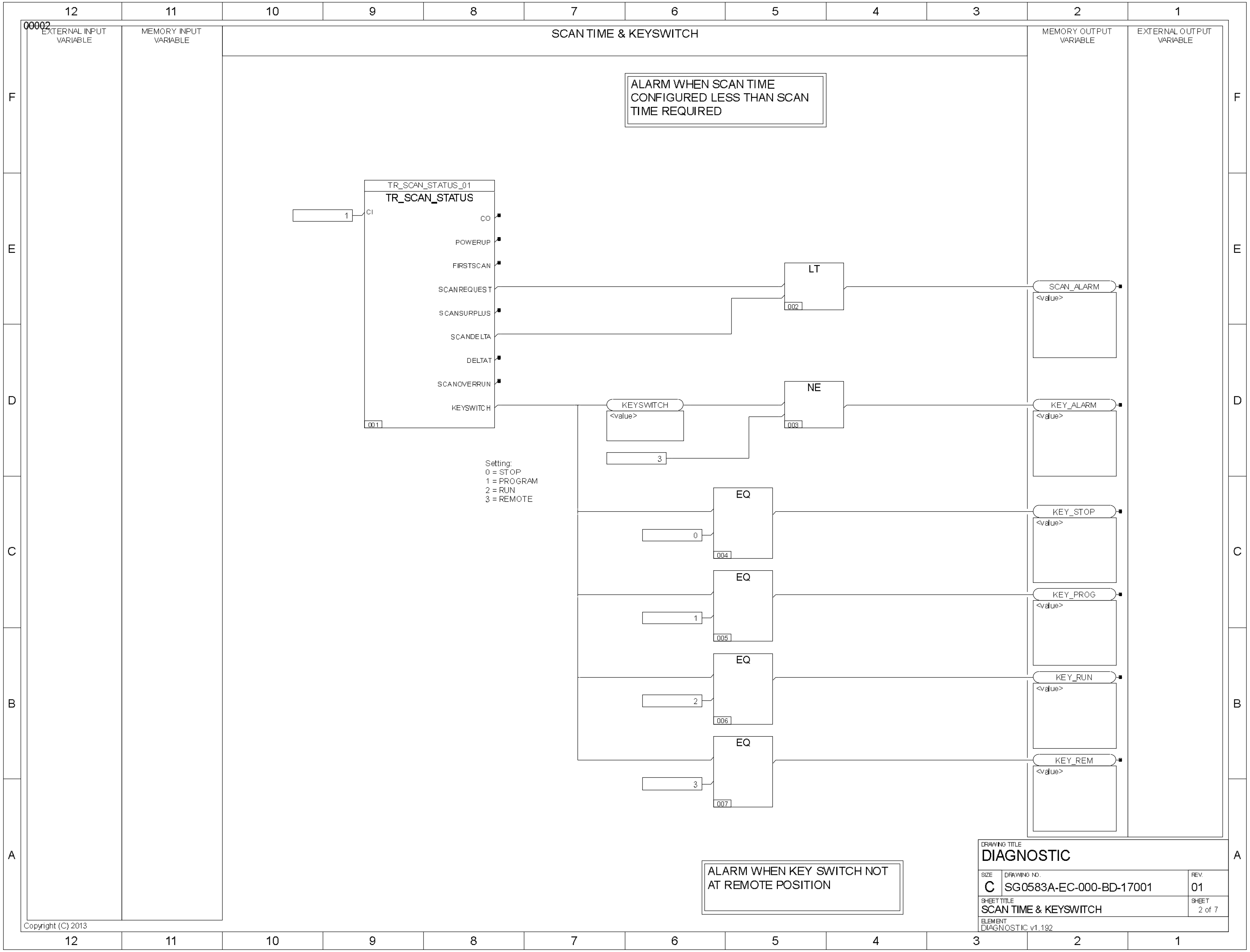
BMS ANALOG INPUT CONDITIONING PROGRAM

BOILER MANAGMENT SYSTEM

1910-00-BPFE-01394

Diagonestic

ACTIVITY	DATE/TIME	
		PROJECT
CREATED BY Manager	02/07/2013 12:39:21 ã	DRAWING TITLE DIAGNOSTIC
MODIFIED BY Manager	03/07/2013 09:32:47 ã	SIZE C · DRAWING NO. SG0583A-EC-000-BD-17001 · REV. 01
PRINTED BY Manager	03/07/2013 09:32:53 ã	SHEET TITLE COVER · SHEET 1 of 7
APPROVED BY		
SHEET TEMPLATE SheetTemplateC		ELEMENT DIAGNOSTIC v1.192



00002
EXTERNAL INPUT VARIABLE
MEMORY INPUT VARIABLE
SCAN TIME & KEYSWITCH
MEMORY OUTPUT VARIABLE
EXTERNAL OUTPUT VARIABLE
ALARM WHEN SCAN TIME CONFIGURED LESS THAN SCAN TIME REQUIRED
TR_SCAN_STATUS_01
TR_SCAN_STATUS
CI
1
CO
POWERUP
FIRSTSCAN
SCANREQUEST
SCANSURPLUS
SCANDELTA
DELTAT
SCANOVERRUN
KEYSWITCH
001
Setting:
0 = STOP
1 = PROGRAM
2 = RUN
3 = REMOTE
KEYSWITCH
<value>
3
LT
002
NE
003
EQ
004
0
EQ
005
1
EQ
006
2
EQ
007
3
SCAN_ALARM
<value>
KEY_ALARM
<value>
KEY_STOP
<value>
KEY_PROG
<value>
KEY_RUN
<value>
KEY_REM
<value>
ALARM WHEN KEY SWITCH NOT AT REMOTE POSITION
DRAWING TITLE
DIAGNOSTIC
SIZE
C
DRAWING NO.
SG0583A-EC-000-BD-17001
REV.
01
SHEET TITLE
SCAN TIME & KEYSWITCH
SHEET
2 of 7
ELEMENT
DIAGNOSTIC v1.192
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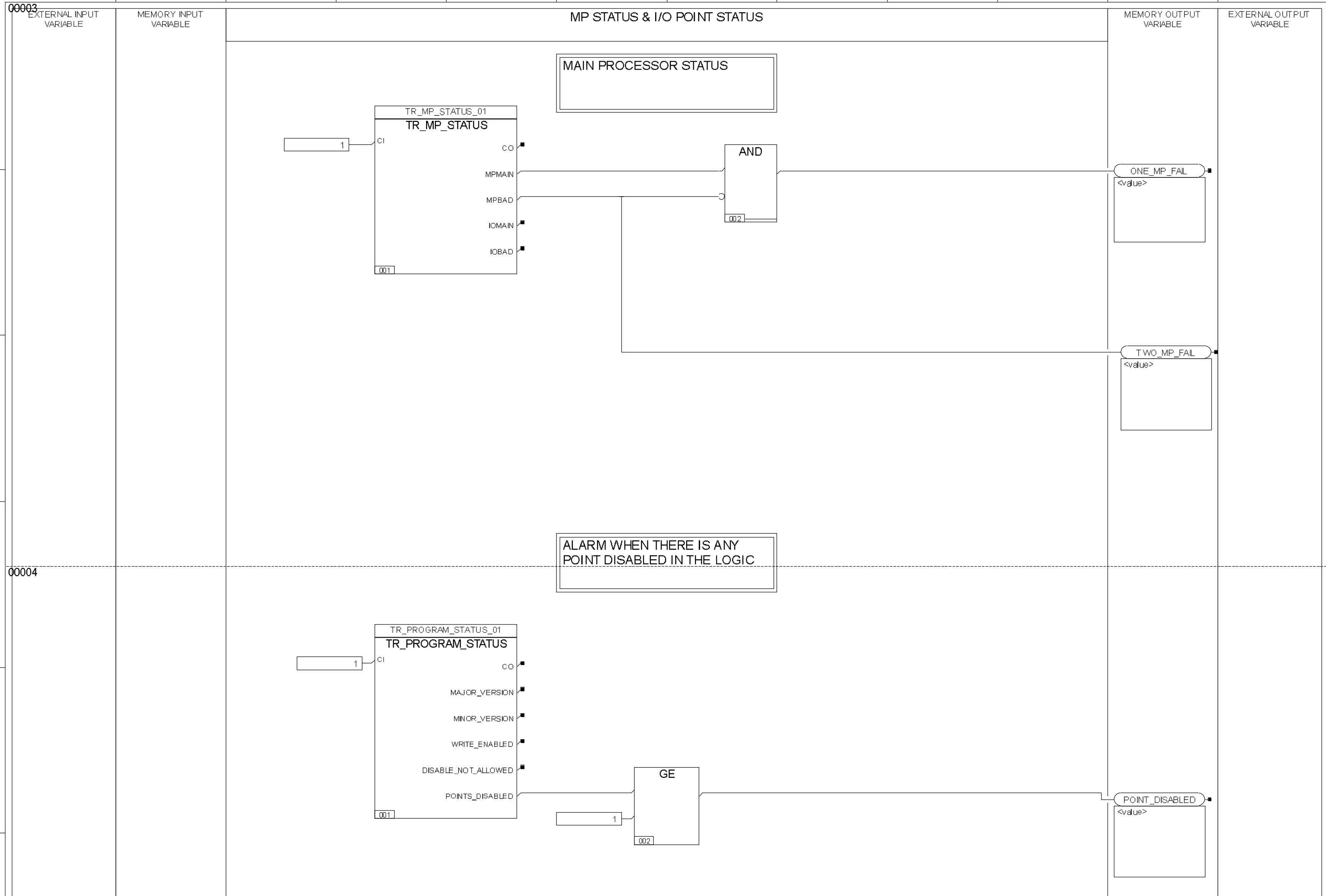
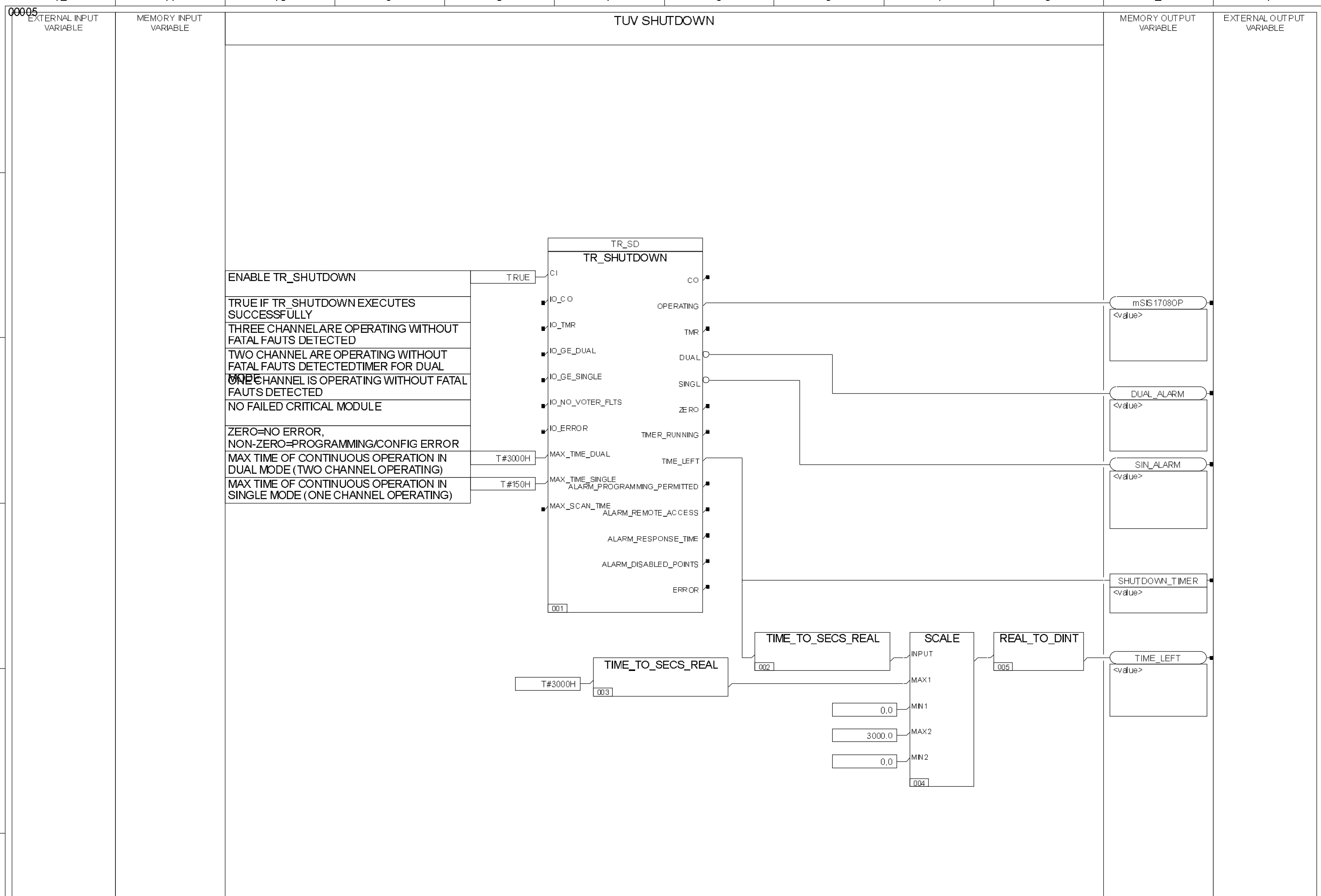
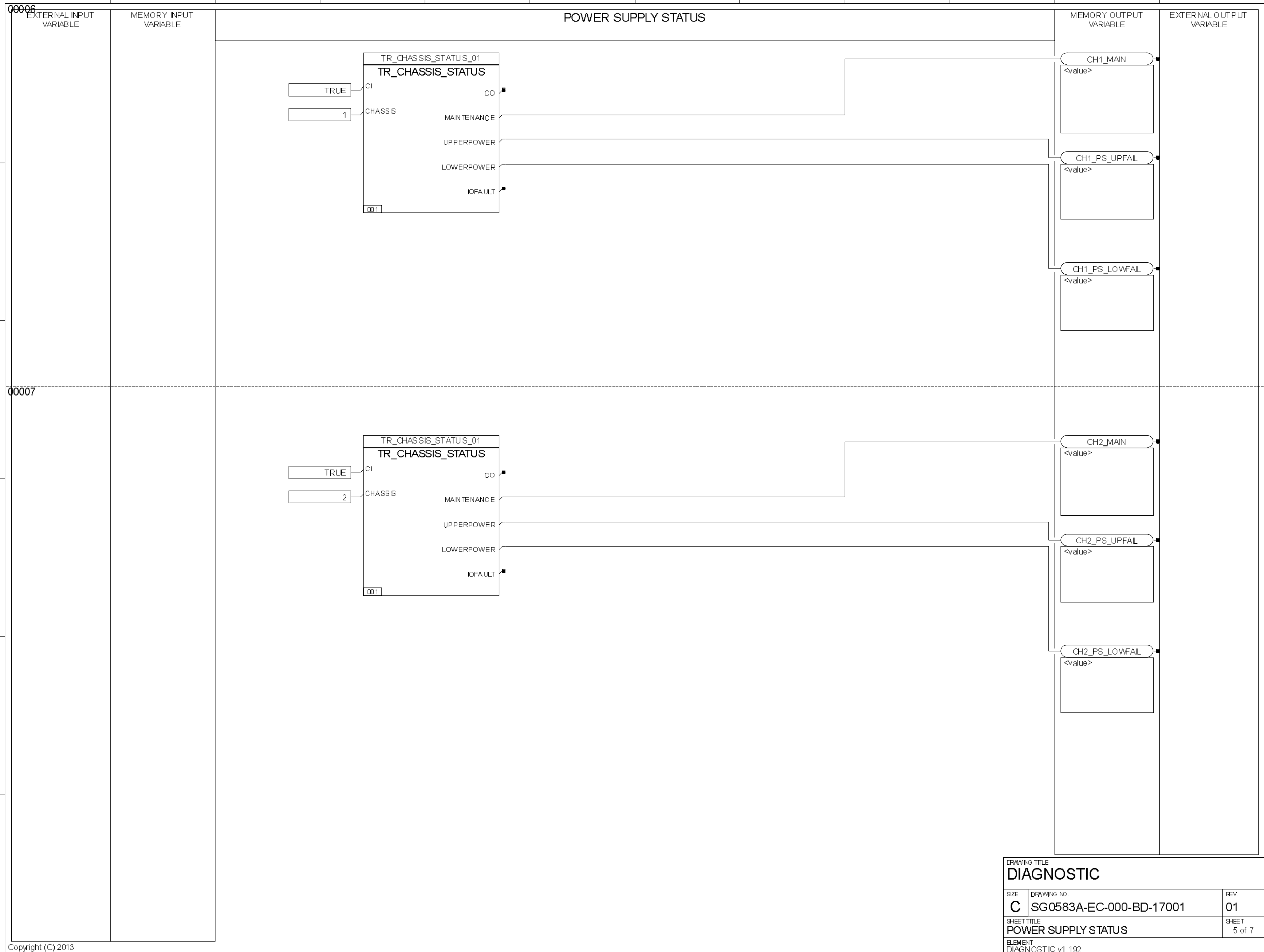


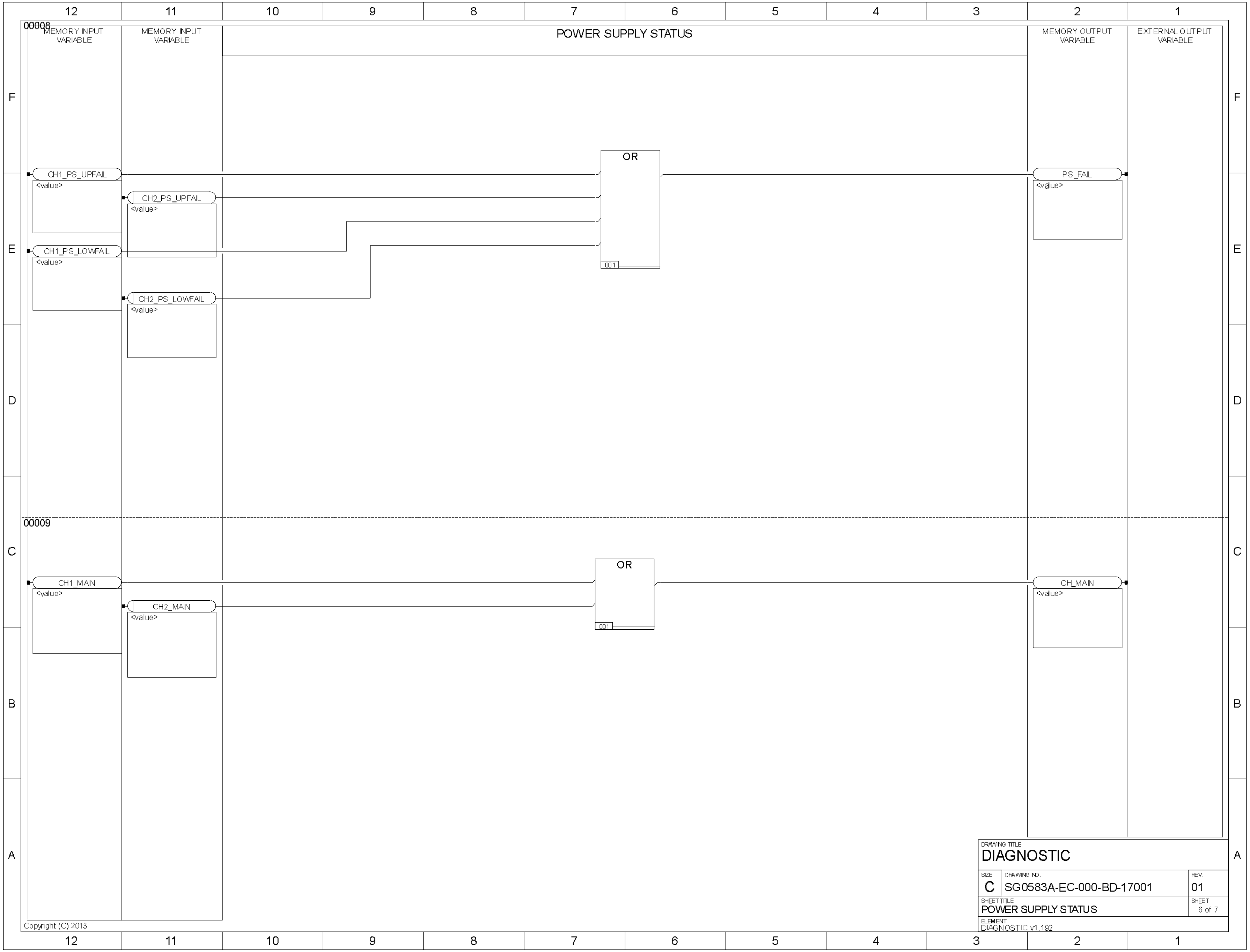
DRAWING TITLE DIAGNOSTIC		
SIZE C	DRAWING NO. SG0583A-EC-000-BD-17001	REV. 01
SHEET TITLE MP STATUS & I/O POINT STATUS		SHEET 3 of 7
ELEMENT DIAGNOSTIC v1.192		



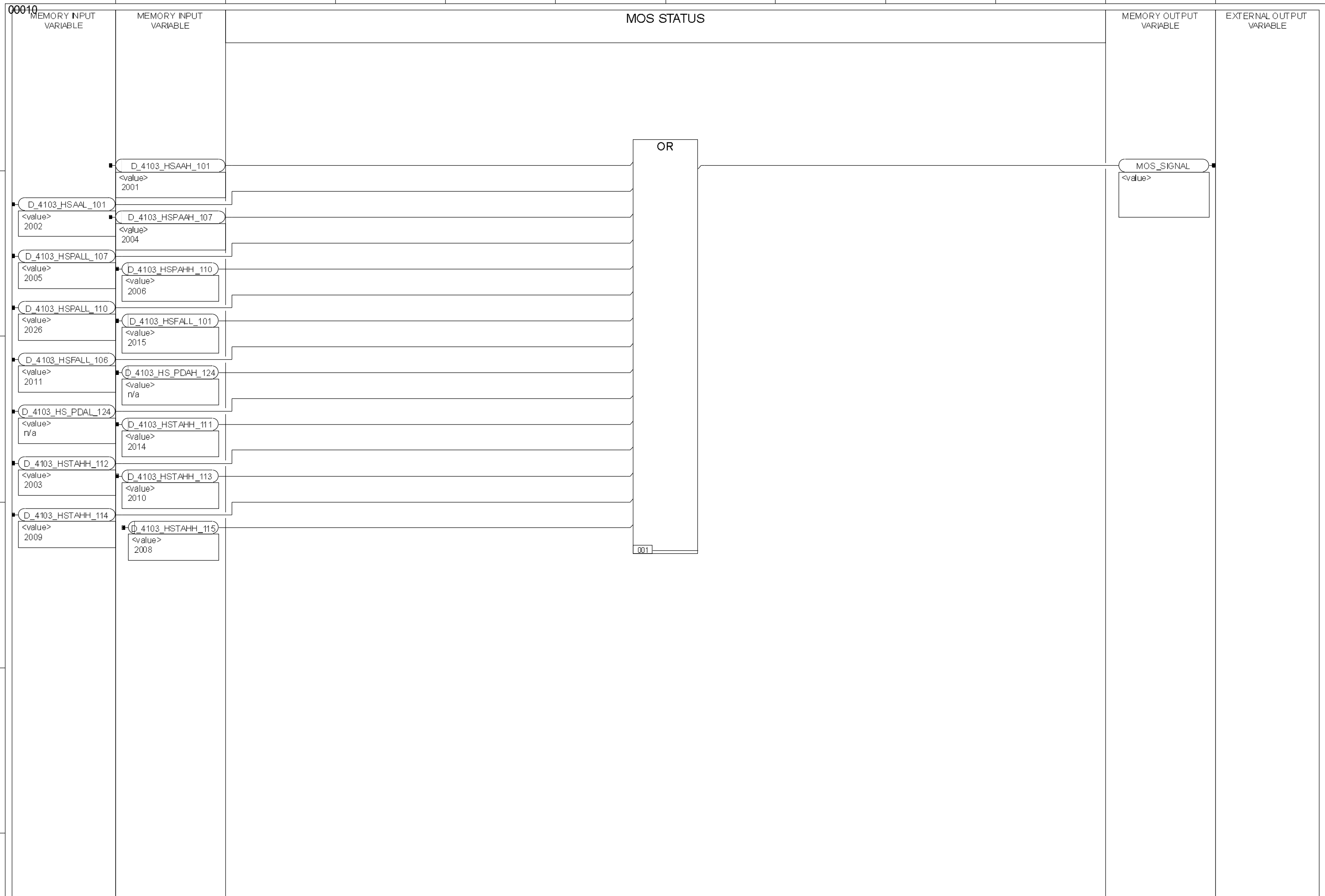
DRAWING TITLE: DIAGNOSTIC		
SIZE: C	DRAWING NO.: SG0583A-EC-000-BD-17001	REV.: 01
SHEET TITLE: TUV SHUTDOWN		SHEET: 4 of 7
ELEMENT: DIAGNOSTIC v1.192		



DRAWING TITLE DIAGNOSTIC	
SIZE C · DRAWING NO. SG0583A-EC-000-BD-17001	REV. 01
SHEET TITLE POWER SUPPLY STATUS	SHEET 5 of 7
ELEMENT DIAGNOSTIC v1.192	



DRAWING TITLE DIAGNOSTIC		
SIZE C	DRAWING NO. SG0583A-EC-000-BD-17001	REV. 01
SHEET TITLE POWER SUPPLY STATUS		SHEET 6 of 7
ELEMENT DIAGNOSTIC v1.192		



DRAWING TITLE
DIAGNOSTIC

SIZE	DRAWING NO.	REV.
C	SG0583A-EC-000-BD-17001	01

SHEET TITLE
MOS STATUS

SHEET
7 of 7

ELEMENT
DIAGNOSTIC v1.192

00001

PETROBEL COMPANY

ENGINEERING FOR THE PETROLEUM AND PROCESS INDUSTRIES (ENPPI)

P.O.: 3292-300-251-05-16

PETRECO NEW LAND OIL TREATMENT TRAIN BELAYIM FIELD

BMS LOGIC PROGRAM

BOILER MANAGMENT SYSTEM

1910-00-BPFE-01394

LOGIC

ACTIVITY	DATE/TIME
CREATED BY Manager	09/02/2013 11:32:05 ã
MODIFIED BY Manager	08/05/2013 10:39:51 Õ
PRINTED BY Manager	03/07/2013 09:12:51 ã
APPROVED BY	
SHEET TEMPLATE SheetTemplateC	

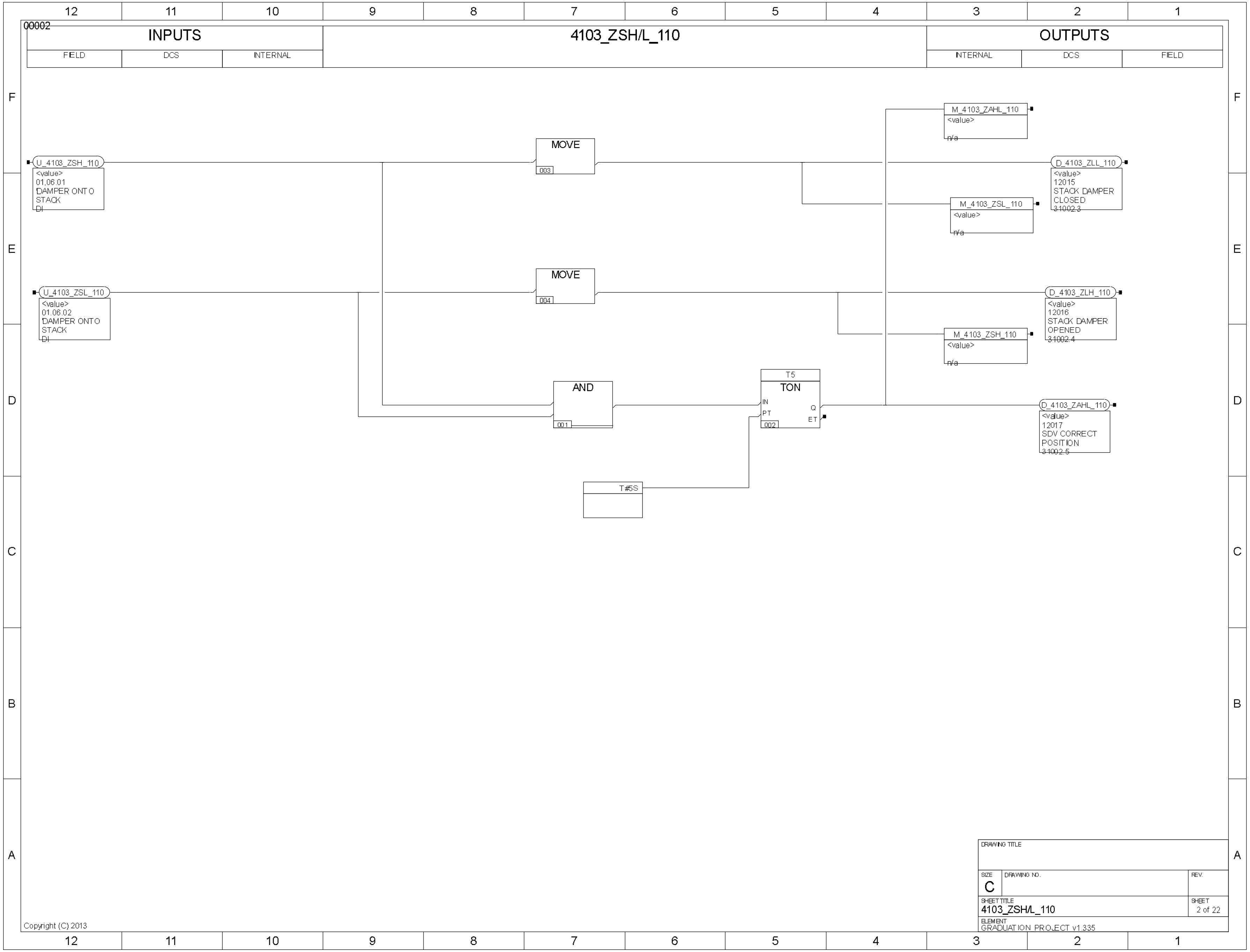
PROJECT

DRAWING TITLE

SIZE C | DRAWING NO. | REV.

SHEET TITLE | SHEET 1 of 22

ELEMENT GRADUATION PROJECT v1.335


00002
INPUTS
FIELD
DCS
INTERNAL
4103_ZSH/L_110
OUTPUTS
INTERNAL
DCS
FIELD
U_4103_ZSH_110
<value>
01.06.01
DAMPER ONTO
STACK
DI
U_4103_ZSL_110
<value>
01.06.02
DAMPER ONTO
STACK
DI
MOVE
003
MOVE
004
AND
001
T5
TON
IN
PT
Q
ET
002
T#5S
M_4103_ZAHL_110
<value>
n/a
D_4103_ZLL_110
<value>
12015
STACK DAMPER
CLOSED
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D_4103_ZLH_110
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OPENED
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D_4103_ZAHL_110
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12017
SDV CORRECT
POSITION
31002.5
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SIZE
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DRAWING NO.
REV.
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4103_ZSH/L_110
SHEET
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ELEMENT
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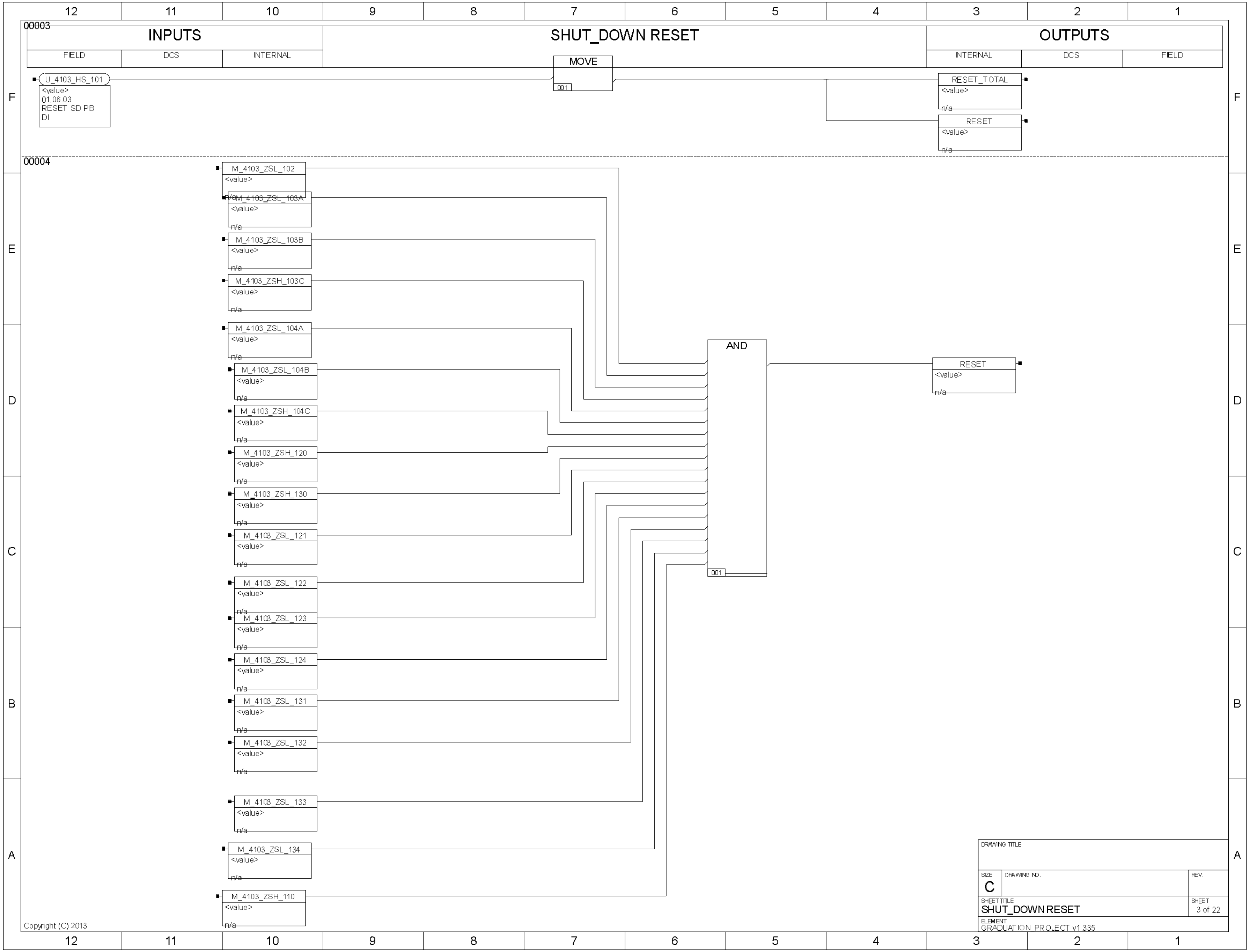

00003
INPUTS
FIELD
DCS
INTERNAL
SHUT_DOWN RESET
OUTPUTS
INTERNAL
DCS
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U_4103_HS_101
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RESET SD PB
DI
MOVE
001
RESET_TOTAL
<value>
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RESET
<value>
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00004
M_4103_ZSL_102
M_4103_ZSL_103A
M_4103_ZSL_103B
M_4103_ZSH_103C
M_4103_ZSL_104A
M_4103_ZSL_104B
M_4103_ZSH_104C
M_4103_ZSH_120
M_4103_ZSH_130
M_4103_ZSL_121
M_4103_ZSL_122
M_4103_ZSL_123
M_4103_ZSL_124
M_4103_ZSL_131
M_4103_ZSL_132
M_4103_ZSL_133
M_4103_ZSL_134
M_4103_ZSH_110
AND
001
RESET
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DRAWING TITLE
SIZE
C
DRAWING NO.
REV.
SHEET TITLE
SHUT_DOWN RESET
SHEET
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ELEMENT
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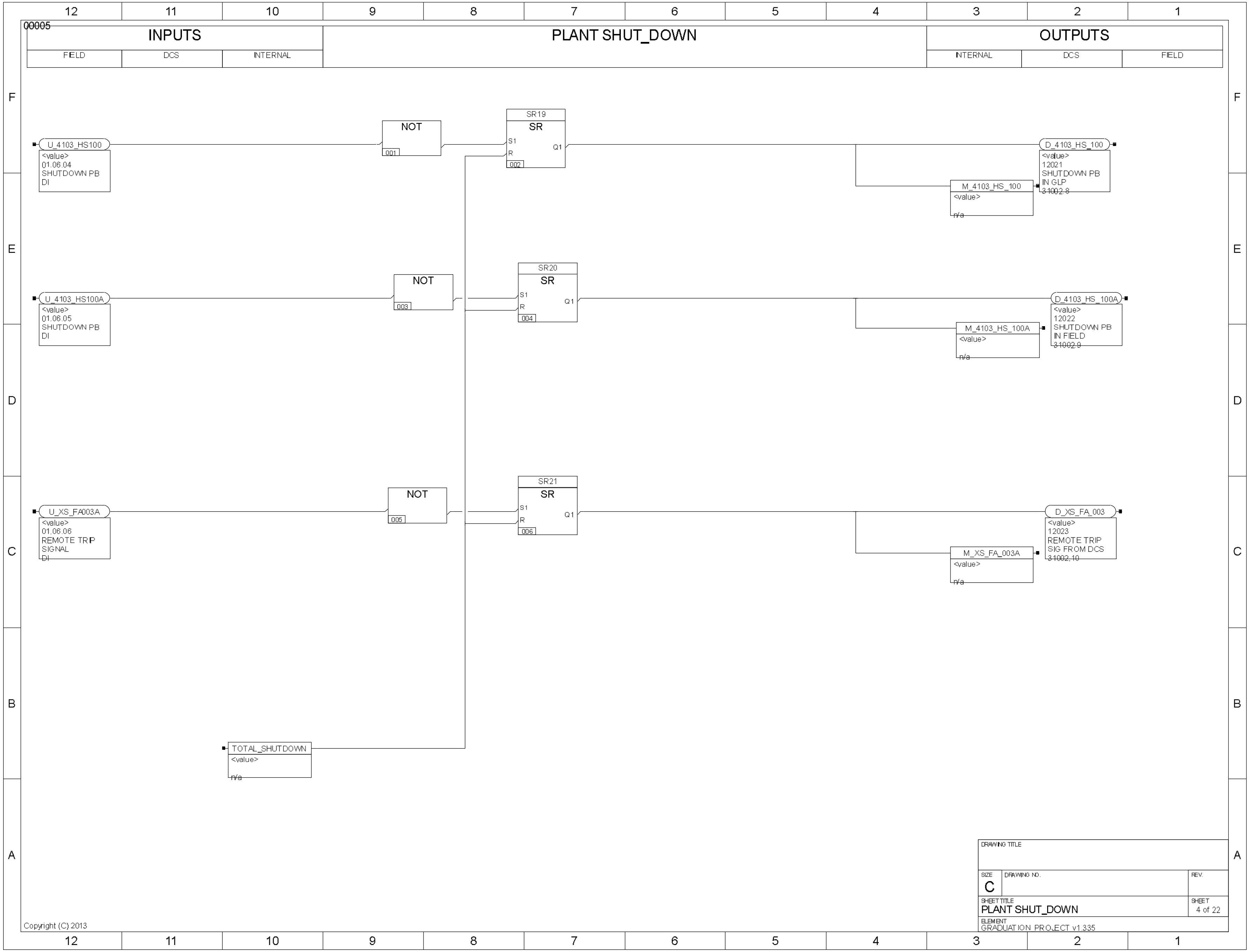
00005
INPUTS
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DCS
INTERNAL
PLANT SHUT_DOWN
OUTPUTS
INTERNAL
DCS
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U_4103_HS100
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01.06.04
SHUTDOWN PB
DI
U_4103_HS100A
<value>
01.06.05
SHUTDOWN PB
DI
U_XS_FA003A
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01.06.06
REMOTE TRIP
SIGNAL
DI
NOT
001
NOT
003
NOT
005
SR19
SR
S1
R
Q1
002
SR20
SR
S1
R
Q1
004
SR21
SR
S1
R
Q1
006
TOTAL_SHUTDOWN
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M_4103_HS_100
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D_4103_HS_100
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IN GLP
31002.8
M_4103_HS_100A
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D_4103_HS_100A
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12022
SHUTDOWN PB
IN FIELD
31002.9
M_XS_FA_003A
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D_XS_FA_003
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12023
REMOTE TRIP
SIG FROM DCS
31002.10
DRAWING TITLE
SIZE
C
DRAWING NO.
REV.
SHEET TITLE
PLANT SHUT_DOWN
SHEET
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ELEMENT
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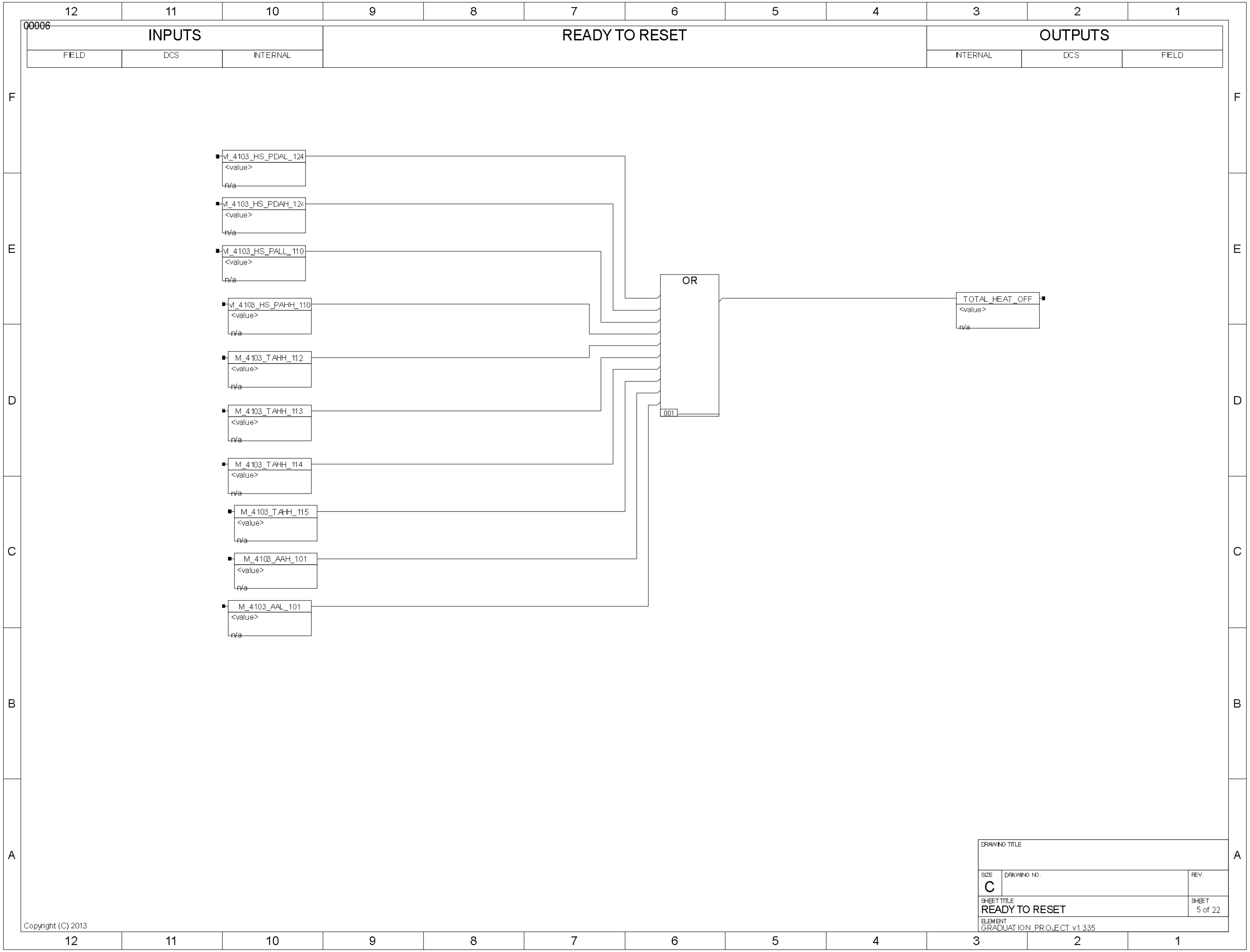

00006
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READY TO RESET
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INTERNAL
DCS
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M_4103_HS_PALL_110
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OR
001
TOTAL_HEAT_OFF
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DRAWING TITLE
SIZE
C
DRAWING NO.
REV.
SHEET TITLE
READY TO RESET
SHEET
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ELEMENT
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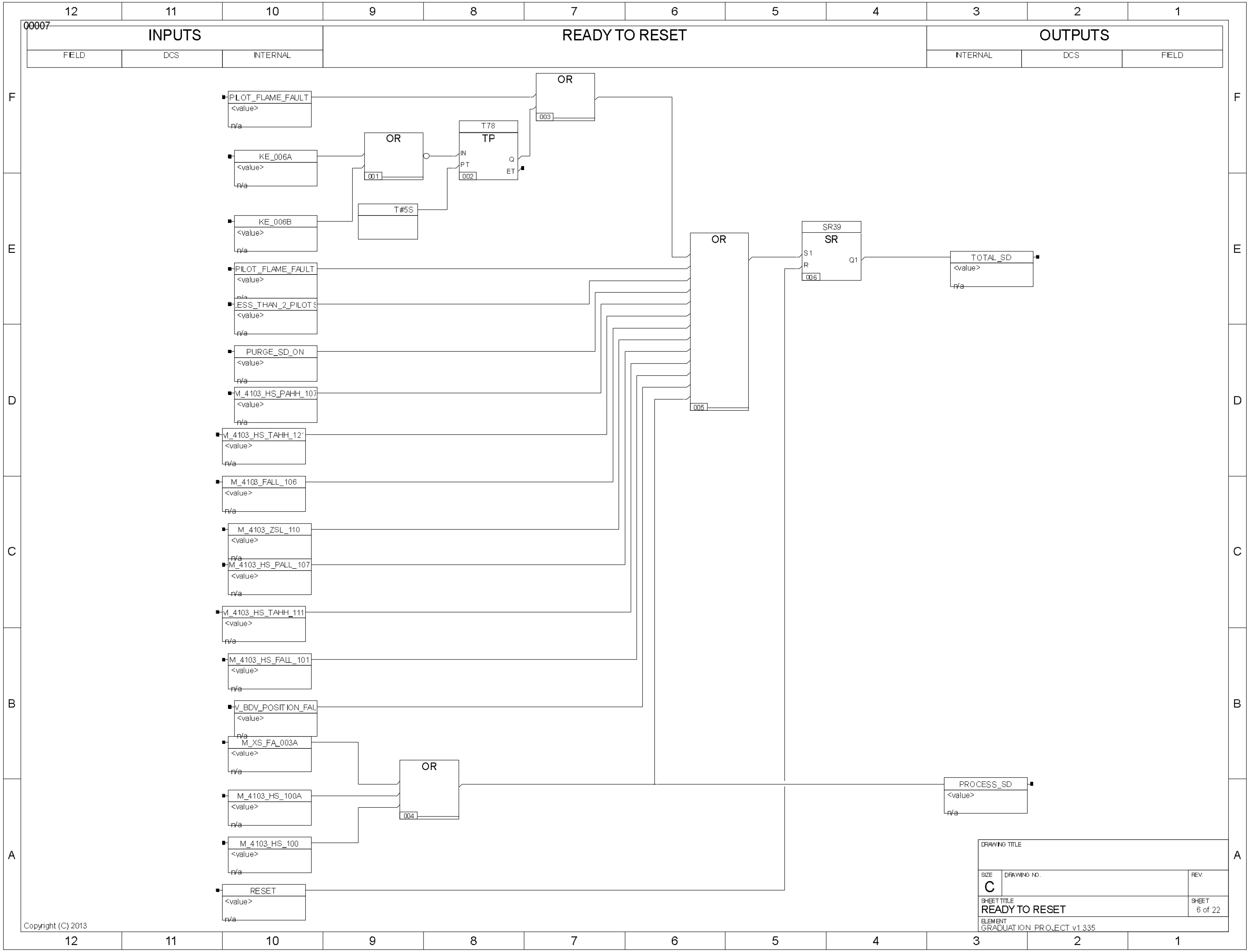
00007
INPUTS
FIELD
DCS
INTERNAL
READY TO RESET
OUTPUTS
INTERNAL
DCS
FIELD
PILOT_FLAME_FAULT
KE_006A
KE_006B
PILOT_FLAME_FAULT
LESS_THAN_2_PILOTS
PURGE_SD_ON
M_4103_HS_PAHH_107
M_4103_HS_TAHH_12
M_4103_FALL_106
M_4103_ZSL_110
M_4103_HS_PALL_107
M_4103_HS_TAHH_111
M_4103_HS_FALL_101
V_BDV_POSITION_FAU
M_XS_FA_003A
M_4103_HS_100A
M_4103_HS_100
RESET
<value>
n/a
OR
001
T78
TP
IN
PT
Q
ET
002
T#5S
OR
003
OR
005
SR39
SR
S1
R
Q1
006
OR
004
TOTAL_SD
PROCESS_SD
DRAWING TITLE
SIZE
C
DRAWING NO.
REV.
SHEET TITLE
READY TO RESET
SHEET
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ELEMENT
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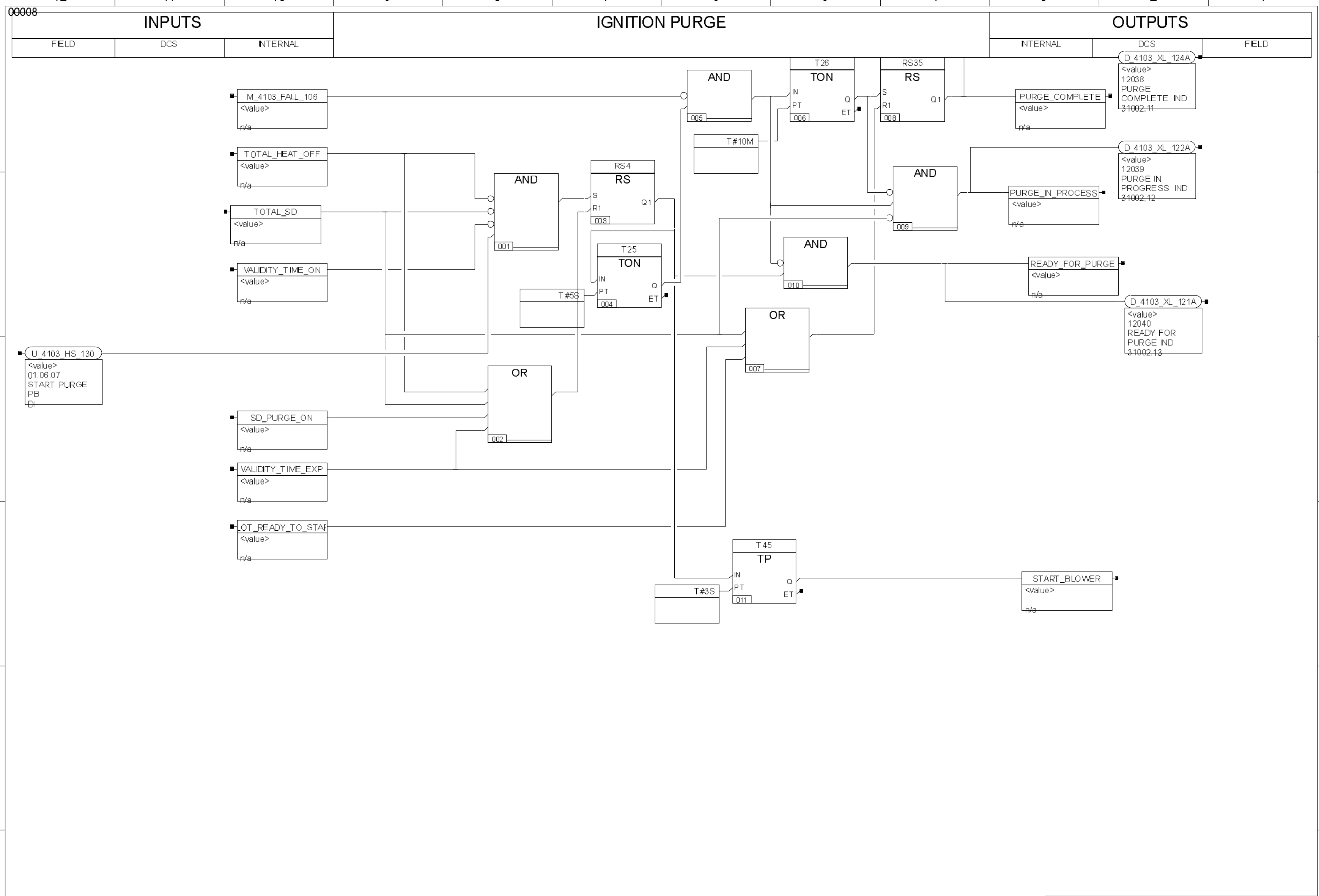

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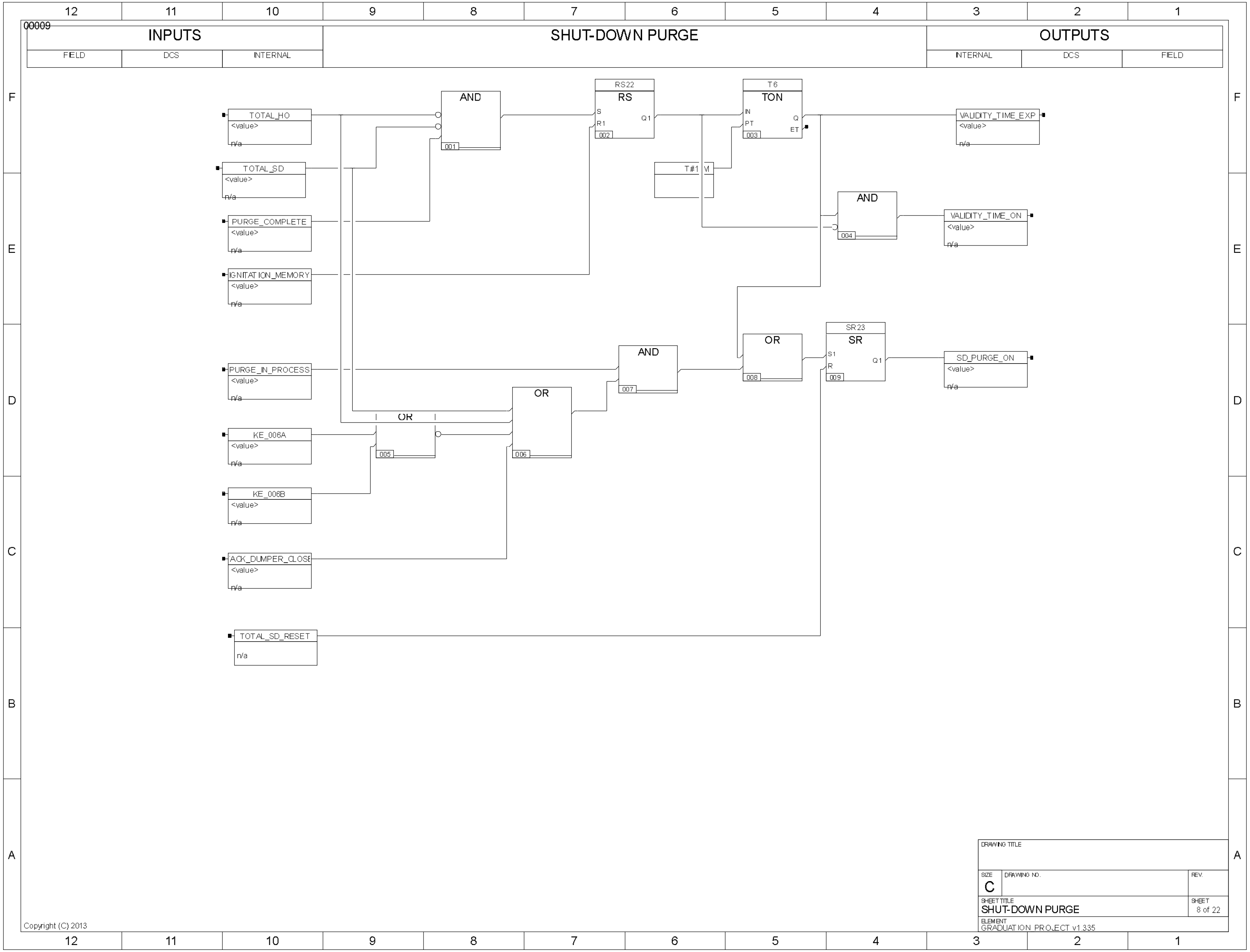
SIZE C | DRAWING NO. | REV.

SHEET TITLE: IGNITION PURGE | SHEET 7 of 22

ELEMENT: GRADUATION PROJECT v1.335


00009
INPUTS
FIELD
DCS
INTERNAL
SHUT-DOWN PURGE
OUTPUTS
INTERNAL
DCS
FIELD
TOTAL_HO
TOTAL_SD
PURGE_COMPLETE
IGNITATION_MEMORY
PURGE_IN_PROCESS
KE_006A
KE_006B
ACK_DUMPER_CLOSE
TOTAL_SD_RESET
AND 001
RS22 RS S R1 Q1 002
T6 TON IN PT Q ET 003
T#1M
AND 004
OR 005
OR 006
AND 007
OR 008
SR23 SR S1 R Q1 009
VALIDITY_TIME_EXP
VALIDITY_TIME_ON
SD_PURGE_ON
<value>
n/a
DRAWING TITLE
SIZE C
DRAWING NO.
REV.
SHEET TITLE
SHUT-DOWN PURGE
SHEET
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ELEMENT
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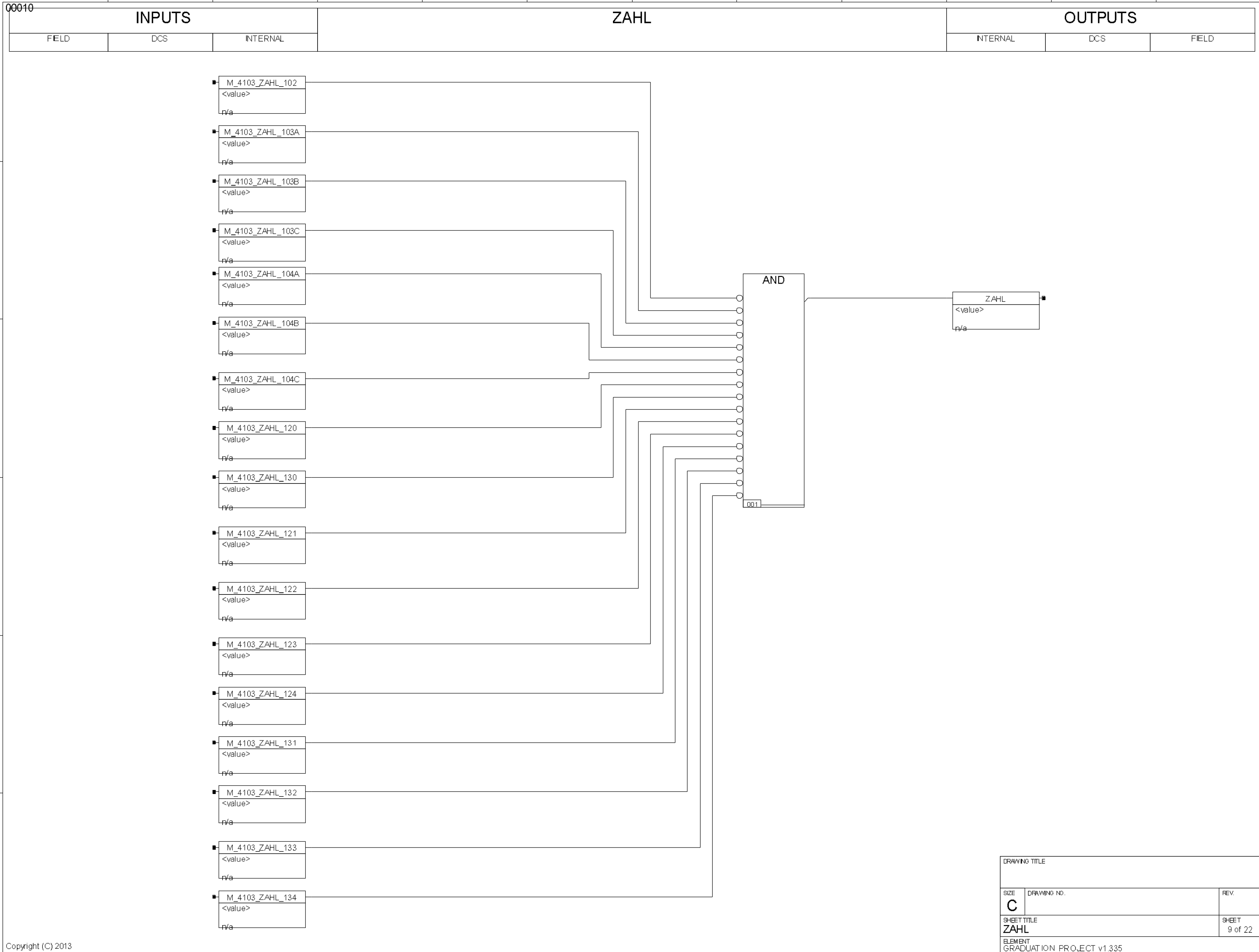

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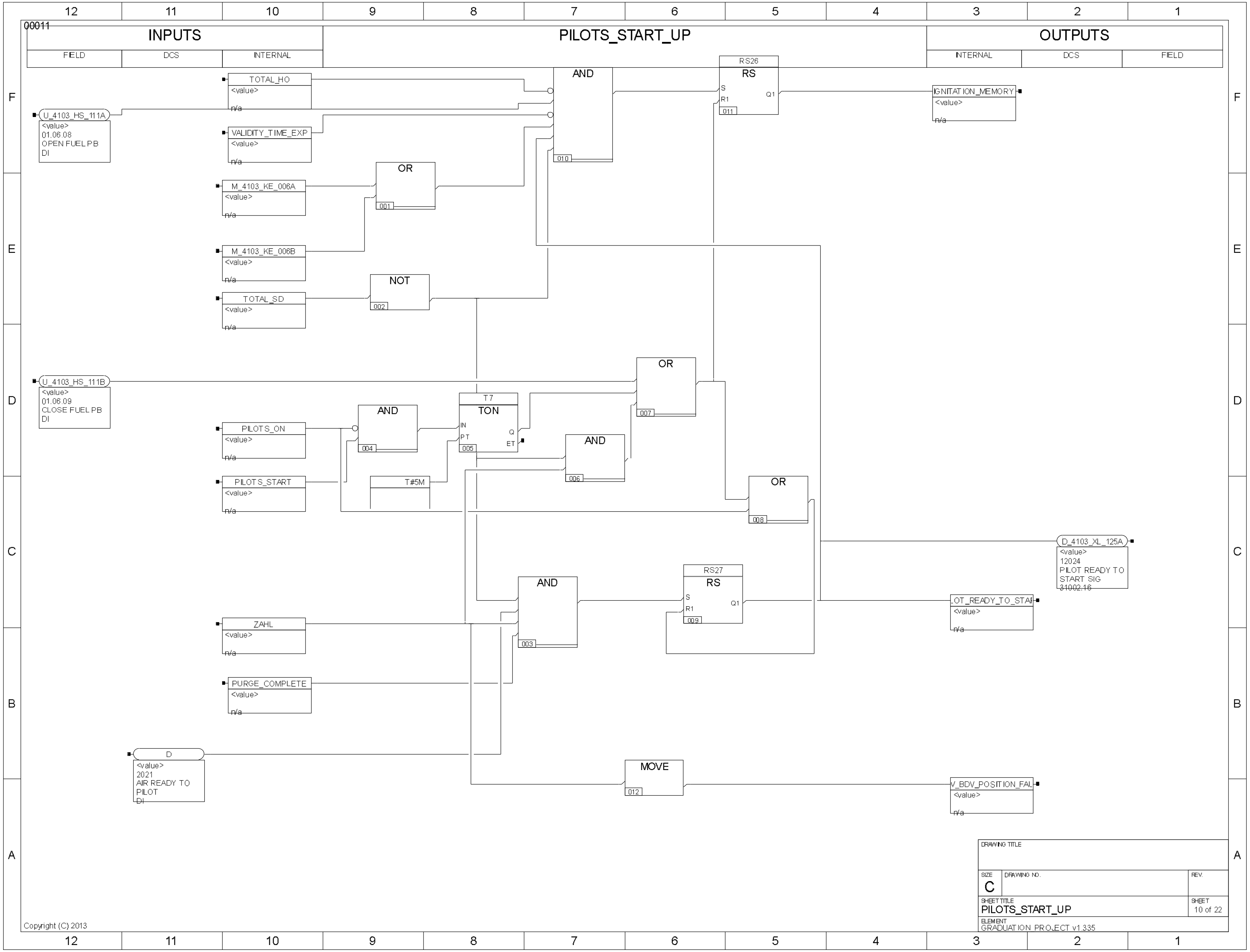
SIZE C | DRAWING NO. | REV.

SHEET TITLE ZAHL | SHEET 9 of 22

ELEMENT GRADUATION PROJECT v1.335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INPUTS
FIELD
DCS
INTERNAL
PILOTS_START_UP
OUTPUTS
INTERNAL
DCS
FIELD
U_4103_HS_111A
<value>
01.06.08
OPEN FUEL PB
DI
TOTAL_HO
VALIDITY_TIME_EXP
M_4103_KE_006A
M_4103_KE_006B
TOTAL_SD
U_4103_HS_111B
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01.06.09
CLOSE FUEL PB
DI
PILOTS_ON
PILOTS_START
ZAHL
PURGE_COMPLETE
D
<value>
2021
AIR READY TO
PILOT
DI
AND
OR
NOT
RS26
RS
S
R1
Q1
T7
TON
IN
PT
Q
ET
T#5M
RS27
MOVE
IGNITATION_MEMORY
D_4103_XL_125A
<value>
12024
PILOT READY TO
START SIG
31002.16
OT_READY_TO_STAI
V_BDV_POSITION_FAI
n/a
DRAWING TITLE
SIZE
C
DRAWING NO.
REV.
SHEET TITLE
PILOTS_START_UP
SHEET
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ELEMENT
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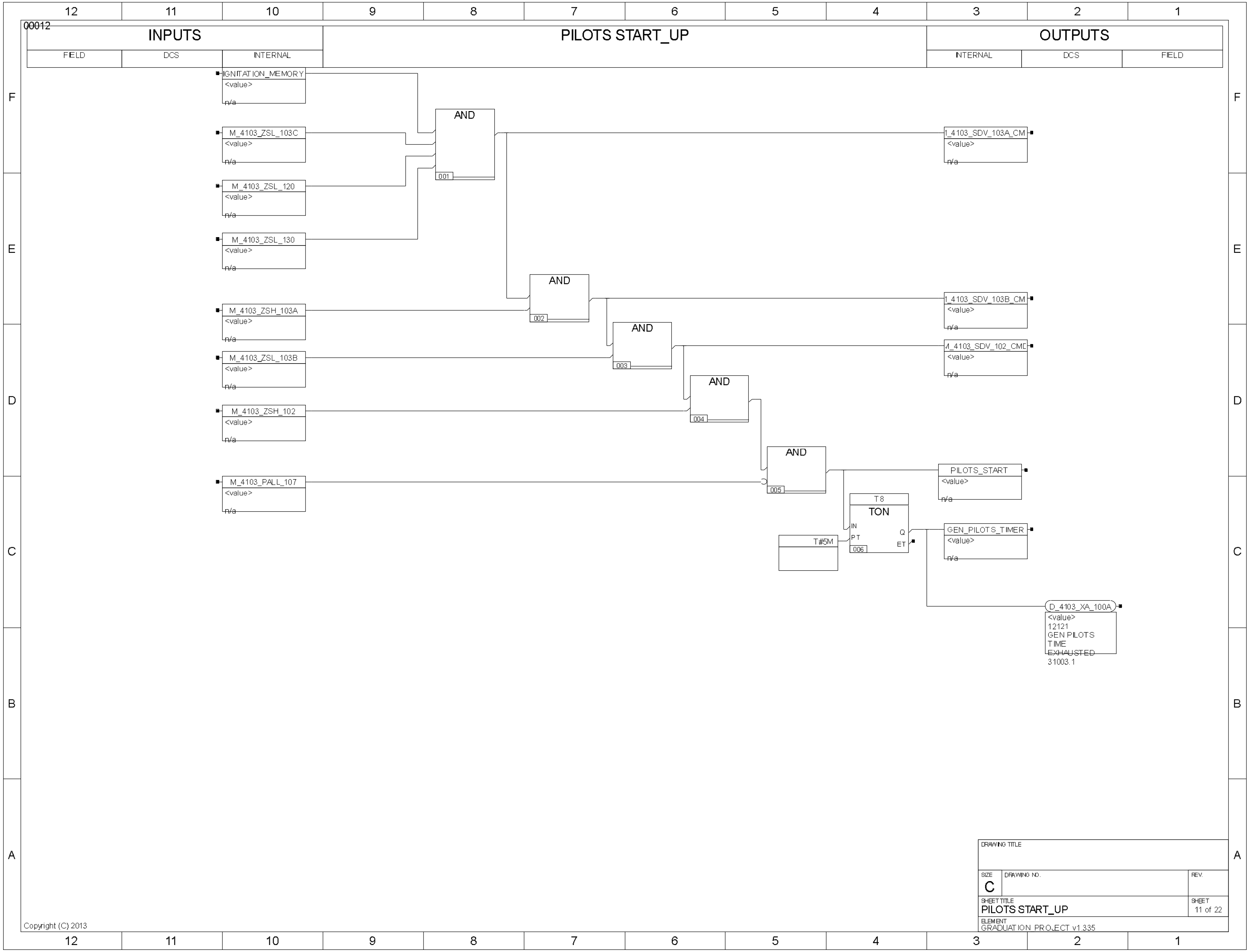
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INPUTS
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DCS
INTERNAL
PILOTS START_UP
OUTPUTS
INTERNAL
DCS
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M_4103_PALL_107
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n/a
AND
001
AND
002
AND
003
AND
004
AND
005
T8
TON
IN
PT
Q
ET
006
T#5M
1_4103_SDV_103A_CM
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1_4103_SDV_103B_CM
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GEN_PILOTS_TIMER
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D_4103_XA_100A
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12121
GEN PILOTS
TIME
EXHAUSTED
31003.1
DRAWING TITLE
SIZE
C
DRAWING NO.
REV.
SHEET TITLE
PILOTS START_UP
SHEET
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ELEMENT
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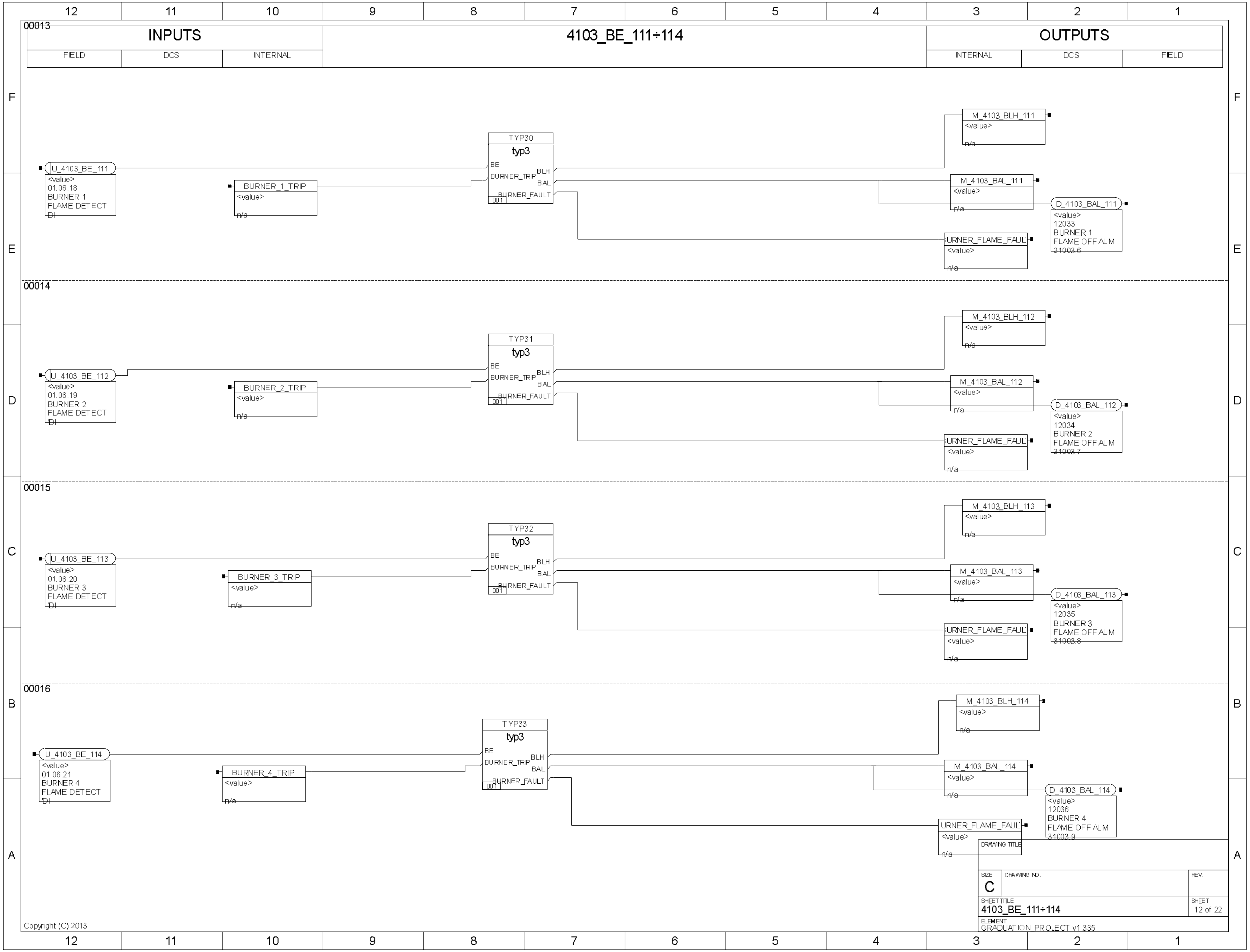

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DCS
INTERNAL
4103_BE_111÷114
OUTPUTS
INTERNAL
DCS
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U_4103_BE_111
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BURNER 1
FLAME DETECT
DI
BURNER_1_TRIP
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TYP30
typ3
BE
BURNER_TRIP
BLH
BAL
BURNER_FAULT
001
M_4103_BLH_111
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M_4103_BAL_111
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D_4103_BAL_111
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31003.6
URNER_FLAME_FAUL
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00014
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01.06.19
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FLAME DETECT
DI
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TYP31
typ3
BE
BURNER_TRIP
BLH
BAL
BURNER_FAULT
001
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M_4103_BAL_112
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BURNER 2
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URNER_FLAME_FAUL
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00015
U_4103_BE_113
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01.06.20
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FLAME DETECT
DI
BURNER_3_TRIP
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TYP32
typ3
BE
BURNER_TRIP
BLH
BAL
BURNER_FAULT
001
M_4103_BLH_113
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M_4103_BAL_113
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D_4103_BAL_113
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12035
BURNER 3
FLAME OFF ALM
31003.8
URNER_FLAME_FAUL
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00016
U_4103_BE_114
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01.06.21
BURNER 4
FLAME DETECT
DI
BURNER_4_TRIP
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TYP33
typ3
BE
BURNER_TRIP
BLH
BAL
BURNER_FAULT
001
M_4103_BLH_114
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M_4103_BAL_114
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D_4103_BAL_114
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12036
BURNER 4
FLAME OFF ALM
31003.9
URNER_FLAME_FAUL
<value>
n/a
DRAWING TITLE
SIZE C
DRAWING NO.
REV.
SHEET TITLE
4103_BE_111÷114
SHEET
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ELEMENT
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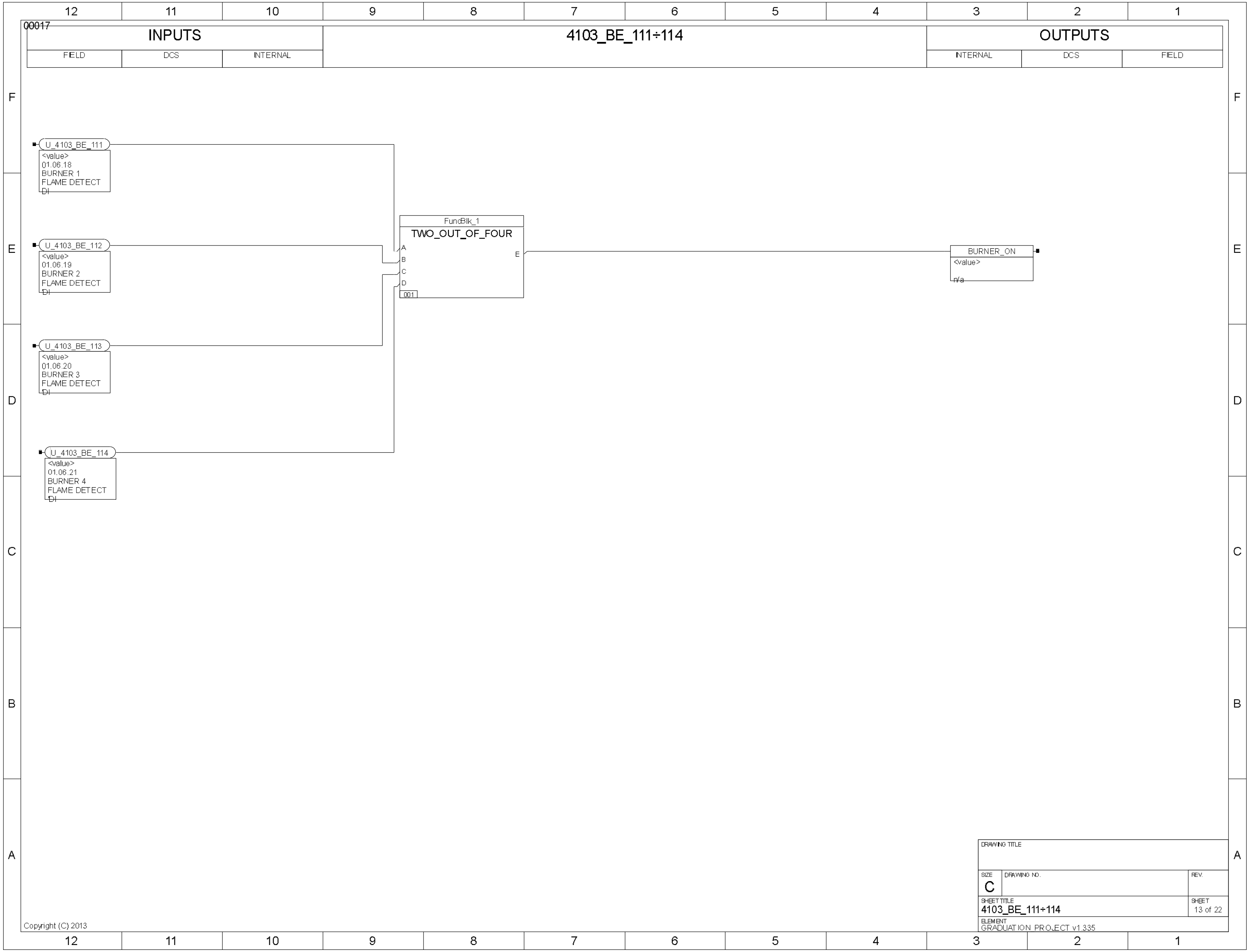
00017
INPUTS
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DCS
INTERNAL
4103_BE_111÷114
OUTPUTS
INTERNAL
DCS
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01.06.18
BURNER 1
FLAME DETECT
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U_4103_BE_112
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01.06.19
BURNER 2
FLAME DETECT
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U_4103_BE_113
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01.06.20
BURNER 3
FLAME DETECT
DI
U_4103_BE_114
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01.06.21
BURNER 4
FLAME DETECT
DI
FundBlk_1
TWO_OUT_OF_FOUR
A
B
C
D
E
001
BURNER_ON
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DRAWING TITLE
SIZE
C
DRAWING NO.
REV.
SHEET TITLE
4103_BE_111÷114
SHEET
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ELEMENT
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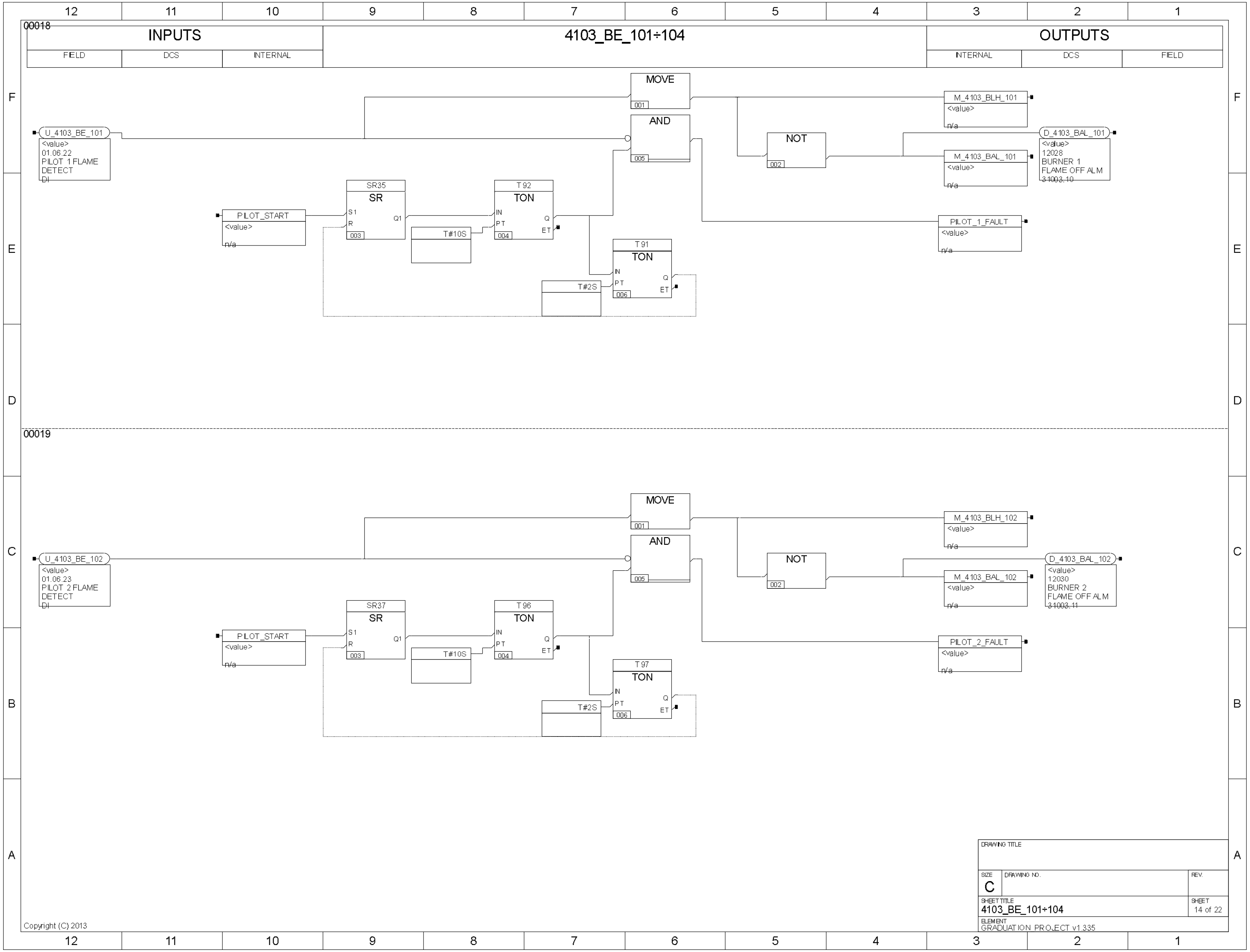
00018
INPUTS
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DCS
INTERNAL
4103_BE_101÷104
OUTPUTS
INTERNAL
DCS
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01.06.22
PILOT 1 FLAME
DETECT
DI
MOVE
001
AND
005
NOT
002
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M_4103_BAL_101
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D_4103_BAL_101
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12028
BURNER 1
FLAME OFF ALM
3.1003.10
PILOT_START
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SR35
SR
S1
R
Q1
003
T#10S
T 92
TON
IN
PT
Q
ET
004
T 91
TON
IN
PT
Q
ET
006
T#2S
PILOT_1_FAULT
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00019
U_4103_BE_102
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PILOT 2 FLAME
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MOVE
001
AND
005
NOT
002
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M_4103_BAL_102
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FLAME OFF ALM
3.1003.11
PILOT_START
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SR37
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S1
R
Q1
003
T#10S
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Q
ET
004
T 97
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PT
Q
ET
006
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PILOT_2_FAULT
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DRAWING TITLE
SIZE
C
DRAWING NO.
REV.
SHEET TITLE
4103_BE_101÷104
SHEET
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ELEMENT
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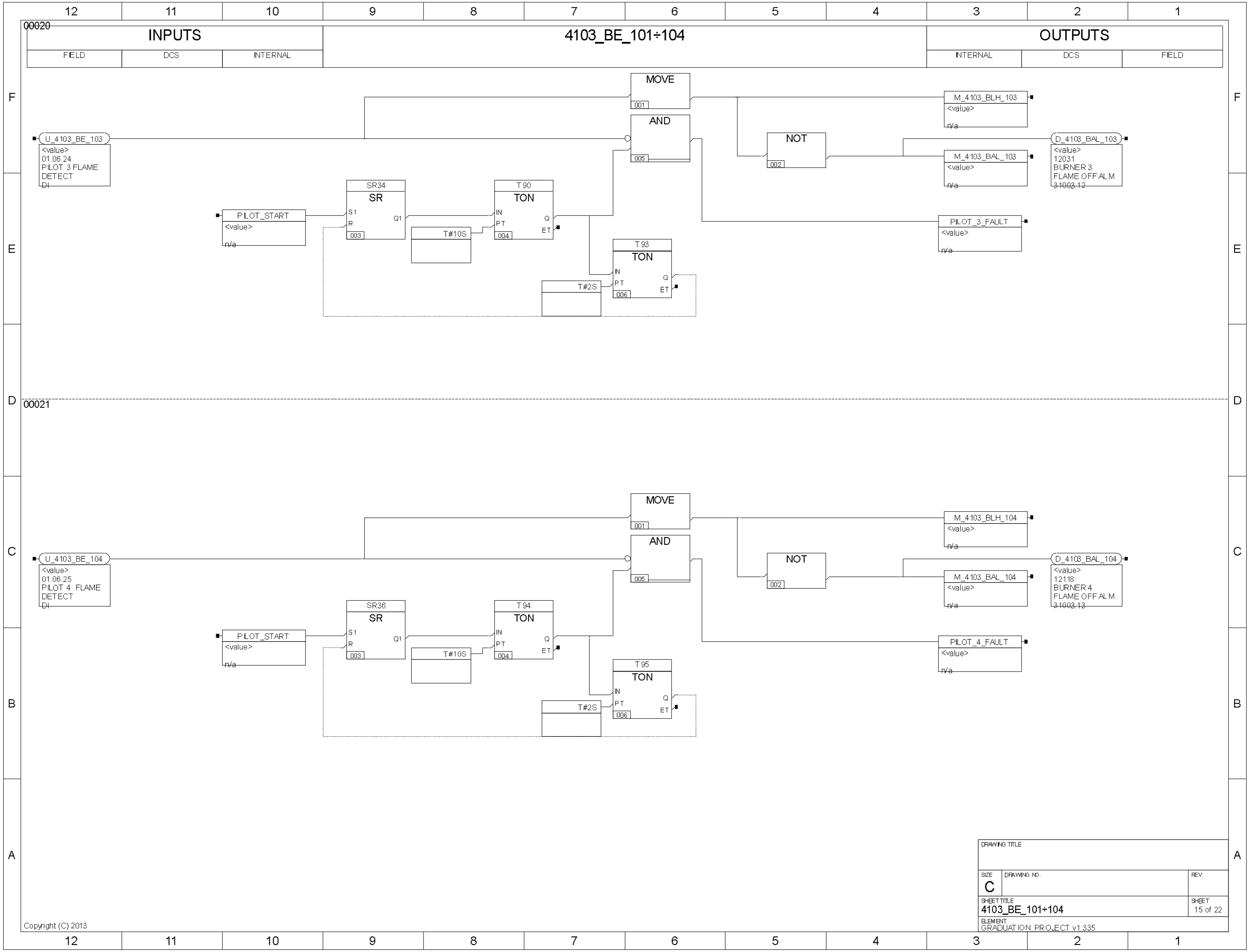

00020
INPUTS
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DCS
INTERNAL
4103_BE_101÷104
OUTPUTS
INTERNAL
DCS
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U_4103_BE_103
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01.06.24
PILOT 3 FLAME
DETECT
DI
PILOT_START
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SR34
SR
S1
R
Q1
003
T#10S
T 90
TON
IN
PT
Q
ET
004
T 93
TON
IN
PT
Q
ET
006
T#2S
MOVE
001
AND
005
NOT
002
M_4103_BLH_103
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M_4103_BAL_103
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n/a
D_4103_BAL_103
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12031
BURNER 3
FLAME OFF ALM
31003.12
PILOT_3_FAULT
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00021
U_4103_BE_104
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01.06.25
PILOT 4 FLAME
DETECT
DI
PILOT_START
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SR36
SR
S1
R
Q1
003
T#10S
T 94
TON
IN
PT
Q
ET
004
T 95
TON
IN
PT
Q
ET
006
T#2S
MOVE
001
AND
005
NOT
002
M_4103_BLH_104
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M_4103_BAL_104
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D_4103_BAL_104
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12118
BURNER 4
FLAME OFF ALM
31003.13
PILOT_4_FAULT
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DRAWING TITLE
SIZE
C
DRAWING NO.
REV.
SHEET TITLE
4103_BE_101÷104
SHEET
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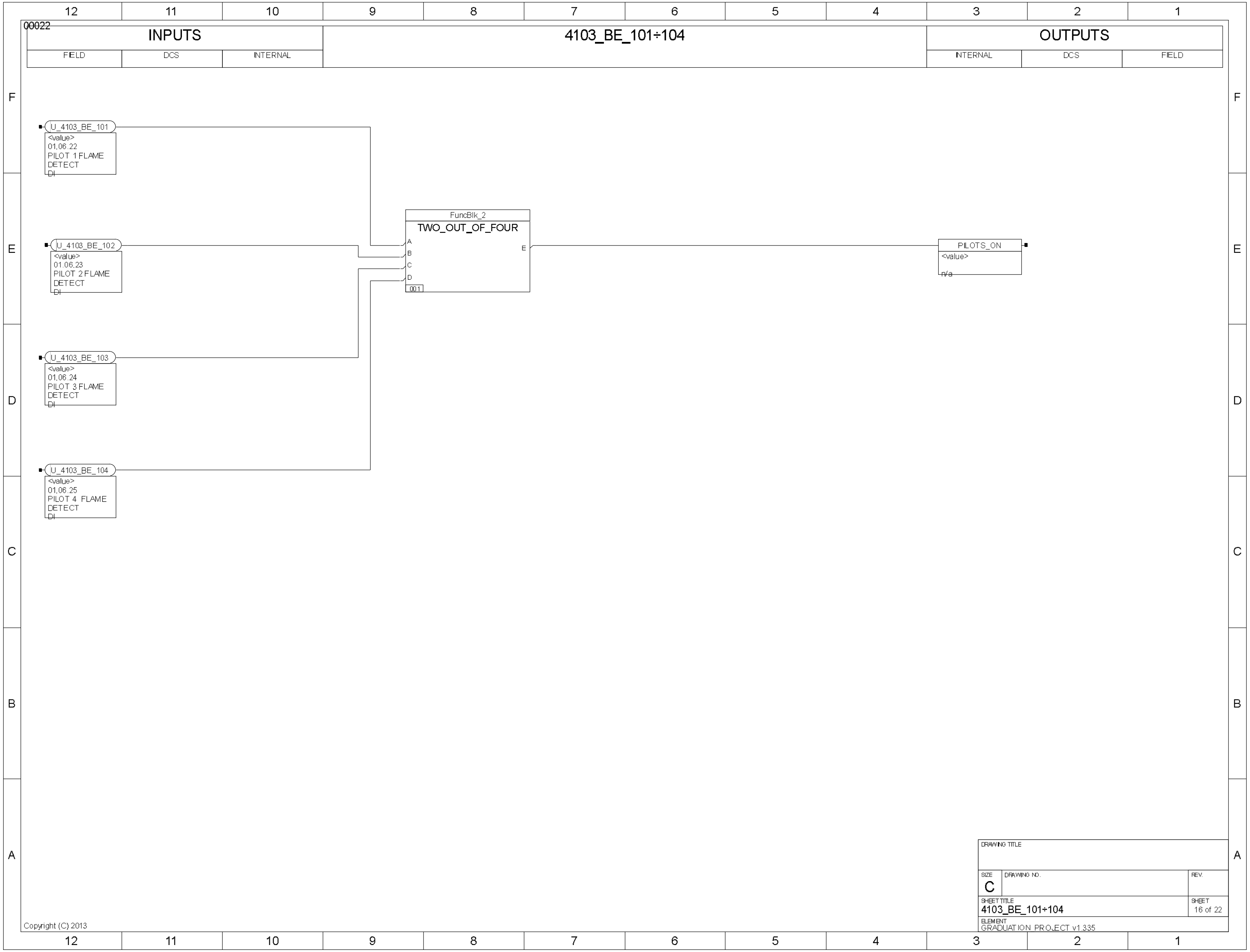

00022
INPUTS
FIELD
DCS
INTERNAL
4103_BE_101÷104
OUTPUTS
INTERNAL
DCS
FIELD
U_4103_BE_101
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01,06.22
PILOT 1 FLAME
DETECT
DI
U_4103_BE_102
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01,06.23
PILOT 2 FLAME
DETECT
DI
U_4103_BE_103
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DETECT
DI
U_4103_BE_104
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01,06.25
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DETECT
DI
FuncBlk_2
TWO_OUT_OF_FOUR
A
B
C
D
E
001
PILOTS_ON
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DRAWING TITLE
SIZE
C
DRAWING NO.
REV.
SHEET TITLE
4103_BE_101÷104
SHEET
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ELEMENT
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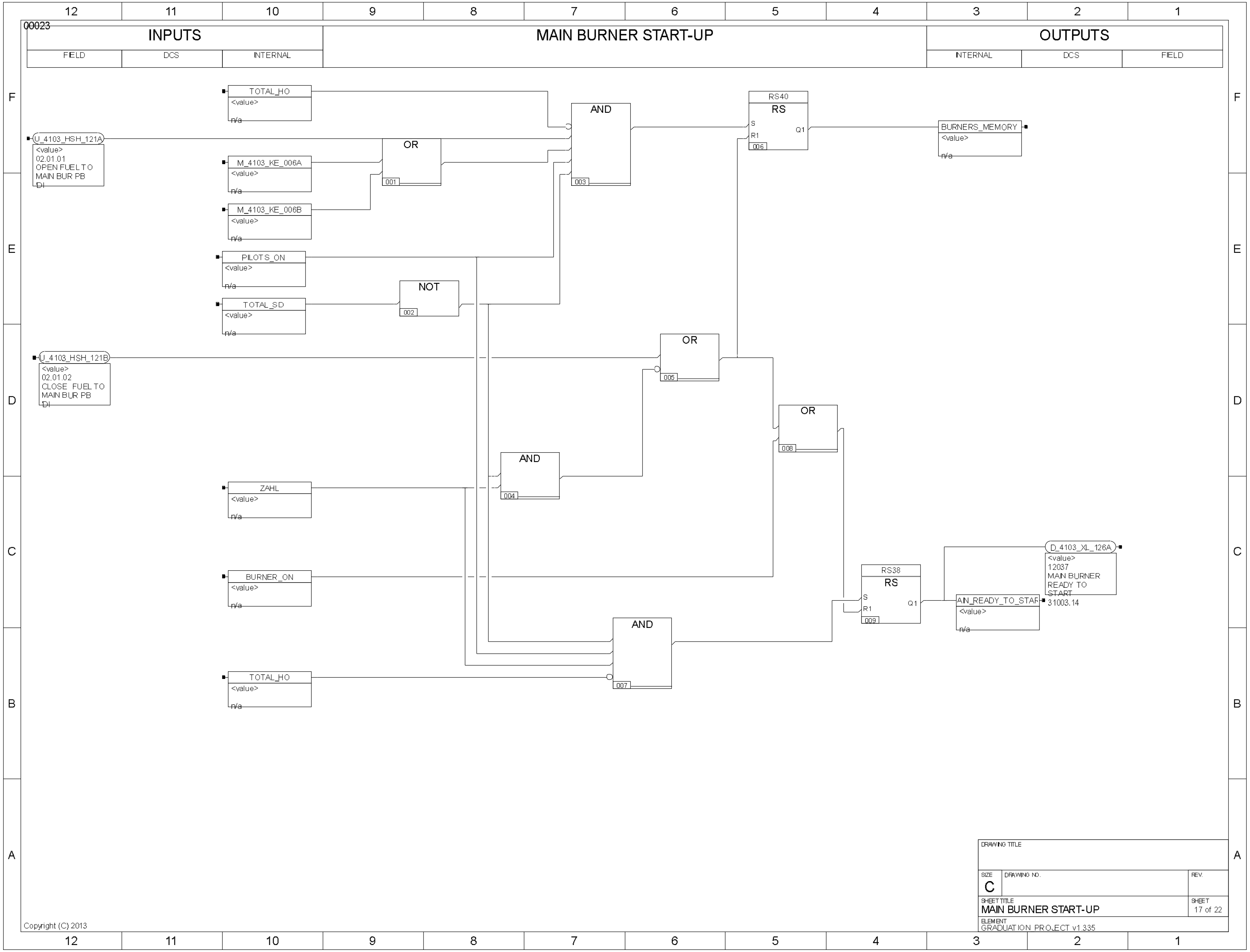
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INPUTS
FIELD
DCS
INTERNAL
MAIN BURNER START-UP
OUTPUTS
INTERNAL
DCS
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OPEN FUEL TO
MAIN BUR PB
DI
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M_4103_KE_006B
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OR
001
AND
003
RS40
RS
S
R1
Q1
006
BURNERS_MEMORY
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PILOTS_ON
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TOTAL_SD
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002
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CLOSE FUEL TO
MAIN BUR PB
DI
OR
005
OR
008
AND
004
ZAHL
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BURNER_ON
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RS
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R1
Q1
009
AN_READY_TO_STAR
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D_4103_XL_126A
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12037
MAIN BURNER
READY TO
START
31003.14
AND
007
TOTAL_HO
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DRAWING TITLE
SIZE
C
DRAWING NO.
REV.
SHEET TITLE
MAIN BURNER START-UP
SHEET
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ELEMENT
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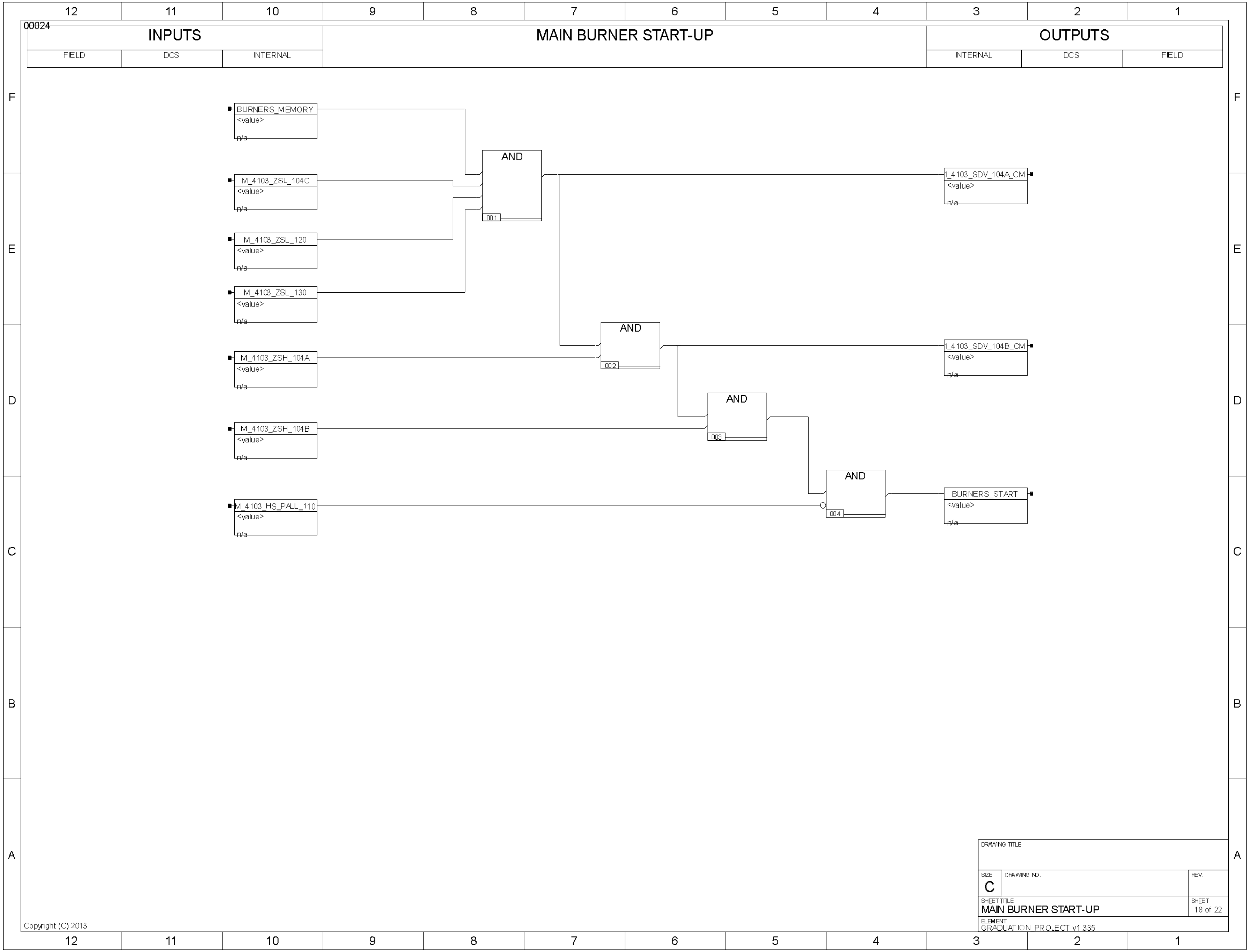
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MAIN BURNER START-UP
OUTPUTS
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DCS
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M_4103_HS_PALL_110
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AND
002
AND
003
AND
004
I_4103_SDV_104A_CM
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I_4103_SDV_104B_CM
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SHEET TITLE
MAIN BURNER START-UP
SHEET
18 of 22
ELEMENT
GRADUATION PROJECT v1.335
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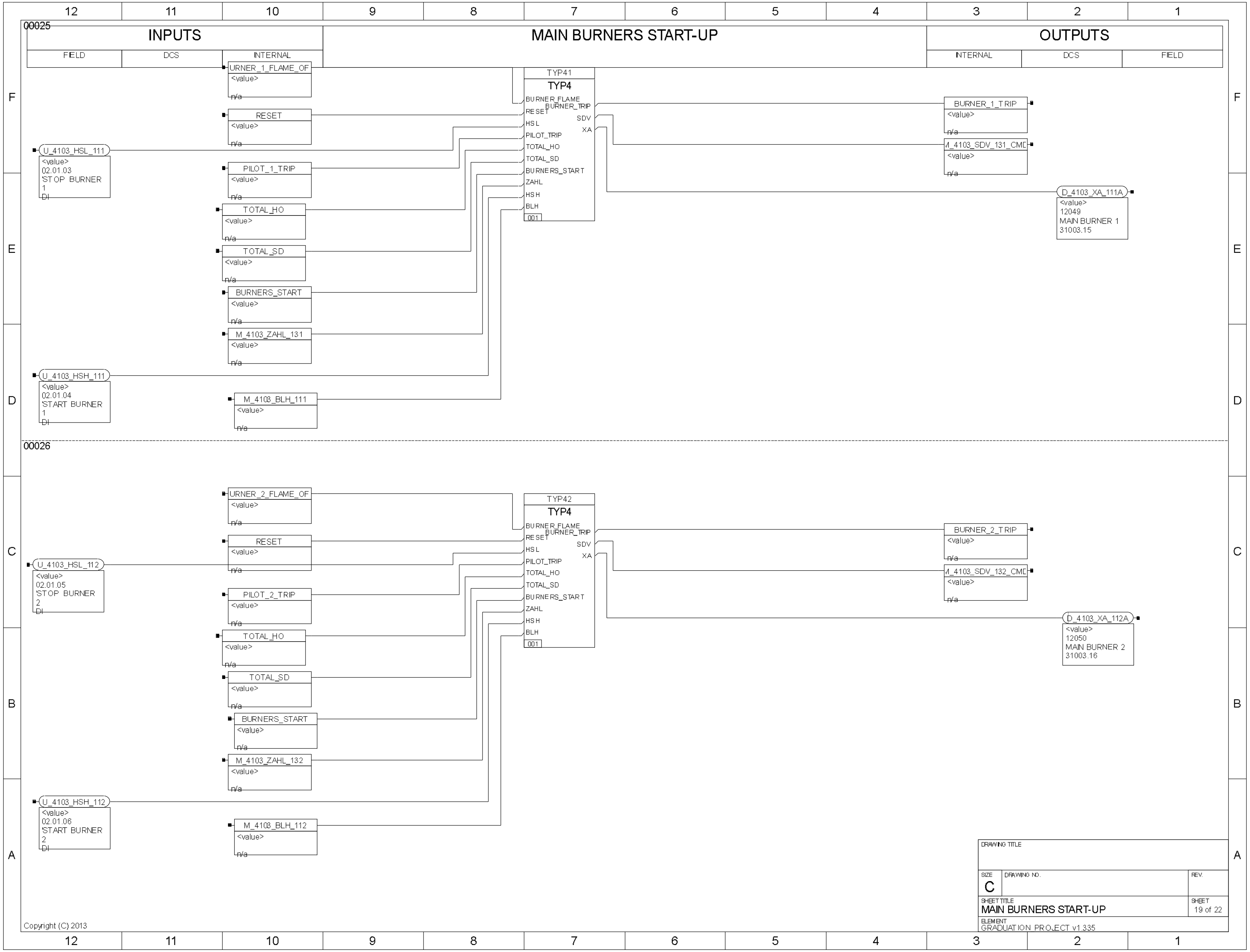

00025
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PILOT_TRIP
TOTAL_HO
TOTAL_SD
BURNERS_START
ZAHL
HSH
BLH
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BURNER_TRIP
SDV
XA
BURNER_1_TRIP
M_4103_SDV_131_CMD
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MAIN BURNER 1
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00026
URNER_2_FLAME_OF
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TYP4
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MAIN BURNER 2
31003.16
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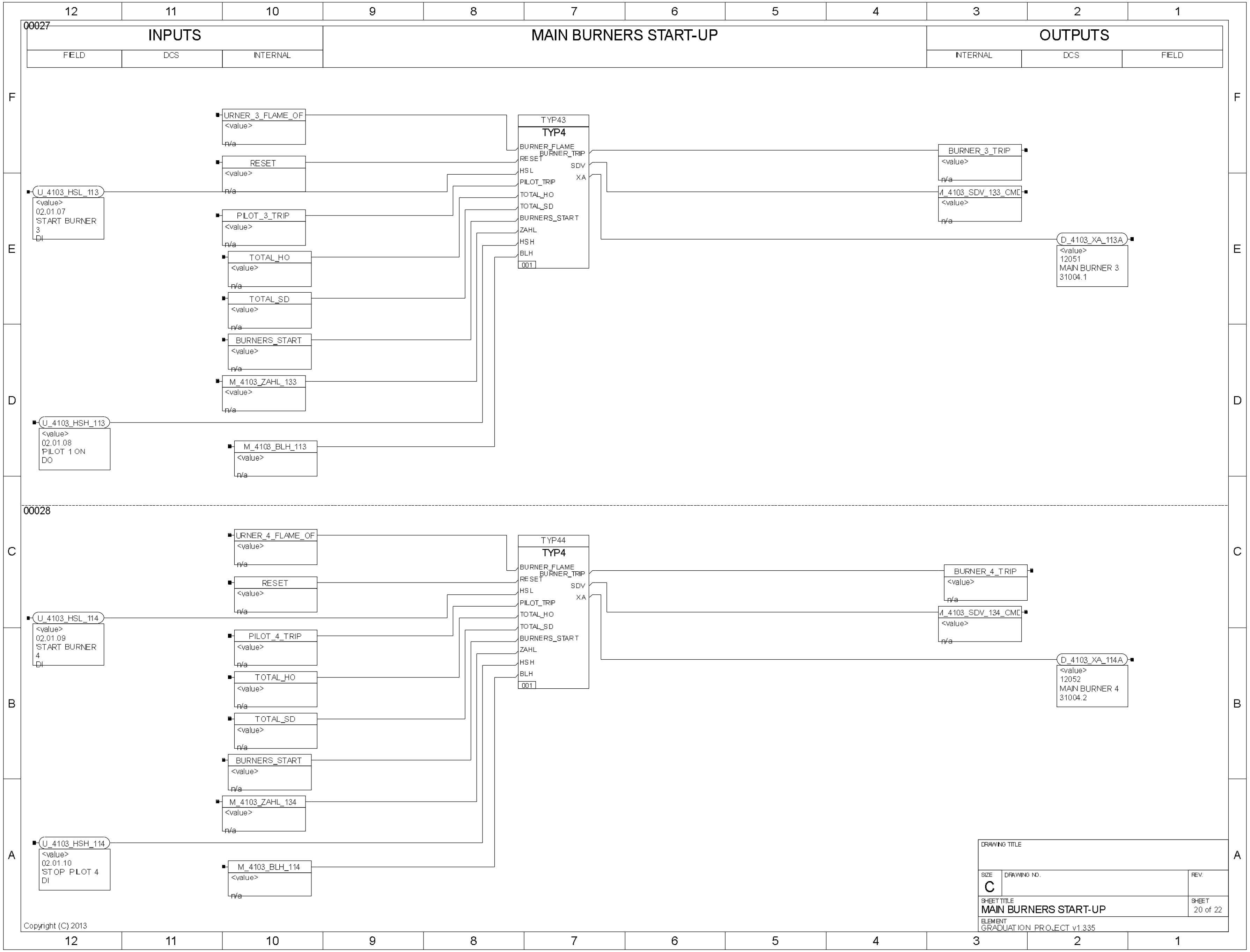
REV.
SHEET TITLE
MAIN BURNERS START-UP
SHEET
19 of 22
ELEMENT
GRADUATION PROJECT v1.335



00027
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DCS
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U_4103_HSH_113
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PILOT 1 ON
DO
M_4103_BLH_113
TYP43
TYP4
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PILOT_TRIP
TOTAL_HO
TOTAL_SD
BURNERS_START
ZAHL
HSH
BLH
001
BURNER_TRIP
SDV
XA
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M_4103_SDV_133_CMD
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MAIN BURNER 3
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URNER_4_FLAME_OF
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U_4103_HSL_114
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START BURNER
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PILOT_4_TRIP
TOTAL_HO
TOTAL_SD
BURNERS_START
M_4103_ZAHL_134
U_4103_HSH_114
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STOP PILOT 4
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MAIN BURNERS START-UP
SHEET
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ELEMENT
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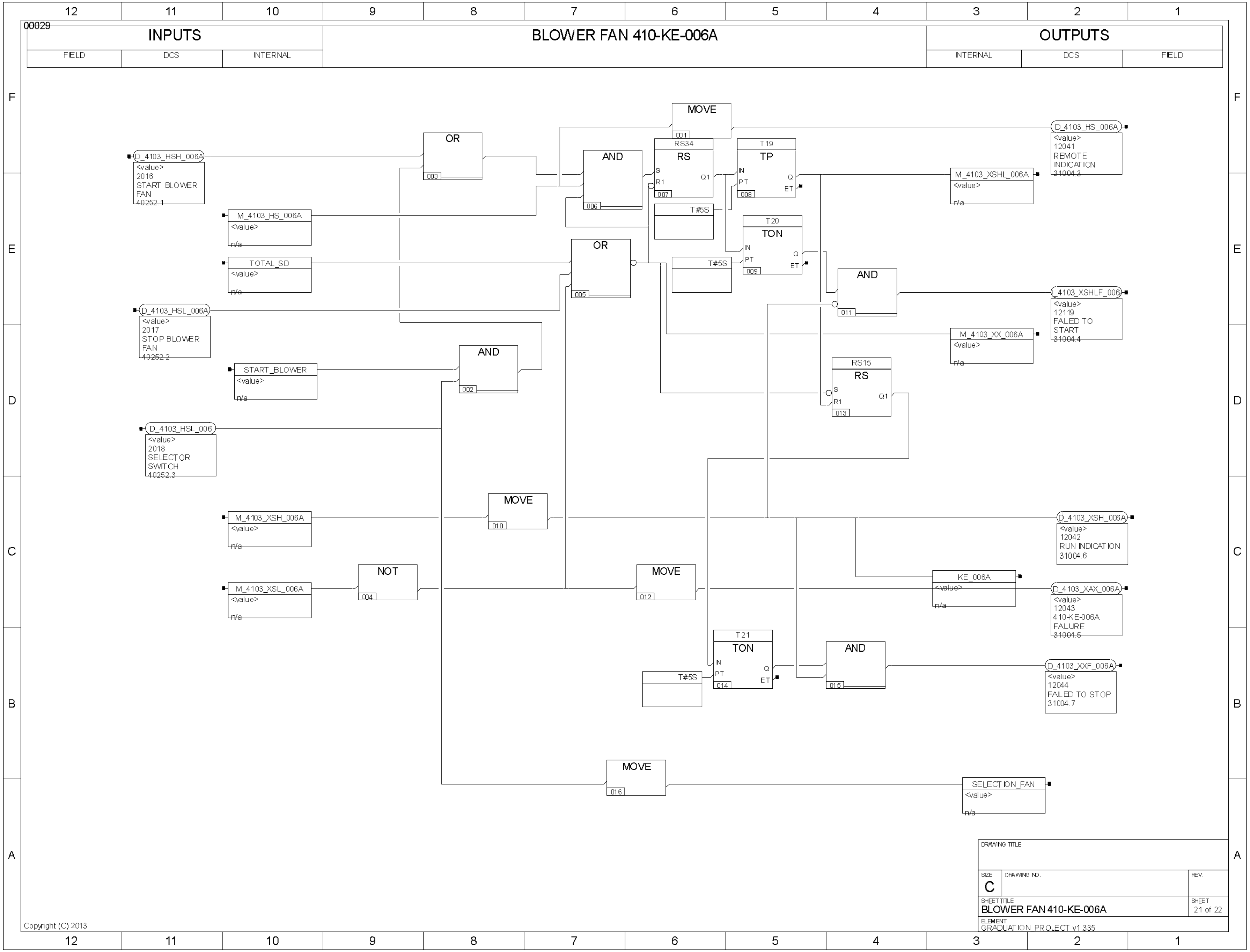
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BLOWER FAN 410-KE-006A
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2017
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D_4103_HSL_006
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2018
SELECTOR
SWITCH
40252.3
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M_4103_XSL_006A
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OR
003
AND
002
NOT
004
MOVE
010
MOVE
001
AND
006
RS34
RS
S
R1
Q1
007
T#5S
OR
005
T19
TP
IN
PT
Q
ET
008
T20
TON
IN
PT
Q
ET
009
T#5S
AND
011
RS15
RS
S
R1
Q1
013
MOVE
012
T21
TON
IN
PT
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ET
014
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AND
015
MOVE
016
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INDICATION
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START
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RUN INDICATION
31004.6
KE_006A
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D_4103_XAX_006A
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410-KE-006A
FAILURE
31004.5
D_4103_XXF_006A
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SELECTION_FAN
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SIZE
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DRAWING NO.
REV.
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BLOWER FAN 410-KE-006A
SHEET
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ELEMENT
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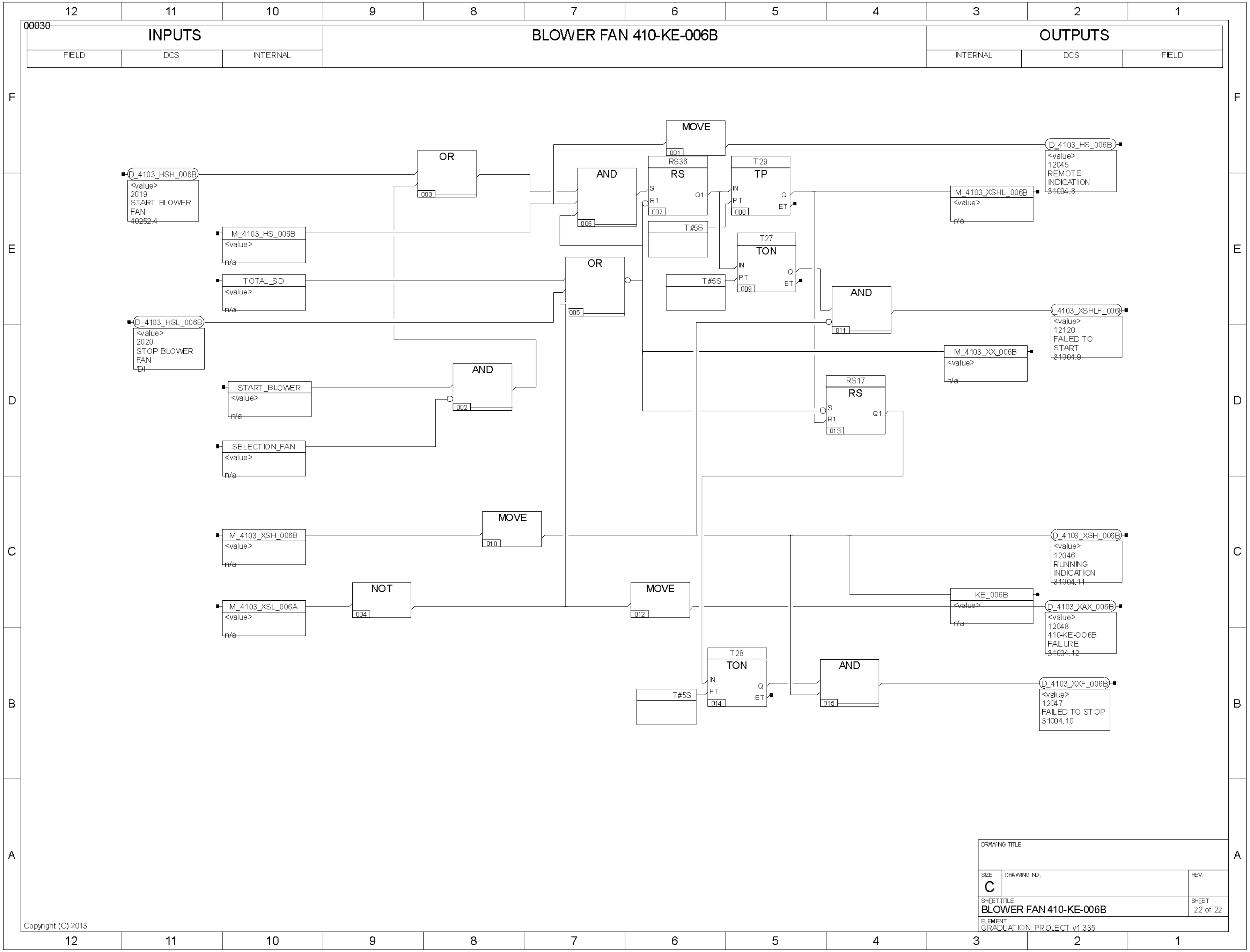
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BLOWER FAN 410-KE-006B
OUTPUTS
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M_4103_XSL_006A
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OR 003
AND 002
MOVE 010
NOT 004
MOVE 001
AND 006
OR 005
RS36 RS 007
T#5S
T29 TP 008
T27 TON 009
T#5S
AND 011
RS17 RS 013
MOVE 012
T28 TON 014
T#5S
AND 015
D_4103_HS_006B
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REMOTE INDICATION
31004.8
M_4103_XSHL_006B
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M_4103_XX_006B
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D_4103_XSH_006B
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RUNNING INDICATION
31004.11
KE_006B
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410-KE-006B FAILURE
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FAILED TO STOP
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DRAWING TITLE
SIZE C
DRAWING NO.
REV.
SHEET TITLE
BLOWER FAN 410-KE-006B
SHEET
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ELEMENT
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00001

PETROBEL COMPANY

ENGINEERING FOR THE PETROLEUM AND PROCESS INDUSTRIES (ENPPI)

P.O.: 3292-300-251-05-16

PETRECO NEW LAND OIL TREATMENT TRAIN BELAYIM FIELD

BMS ANALOG INPUT CONDITIONING PROGRAM

BOILER MANAGMENT SYSTEM

1910-00-BPFE-01394

PACKING

ACTIVITY	DATE/TIME
CREATED BY Manager	03/04/2013 12.37.06 O
MODIFIED BY Manager	23/06/2013 11:32:37 ã
PRINTED BY Manager	03/07/2013 09:12:59 ã
APPROVED BY	
SHEET TEMPLATE SheetTemplateC	

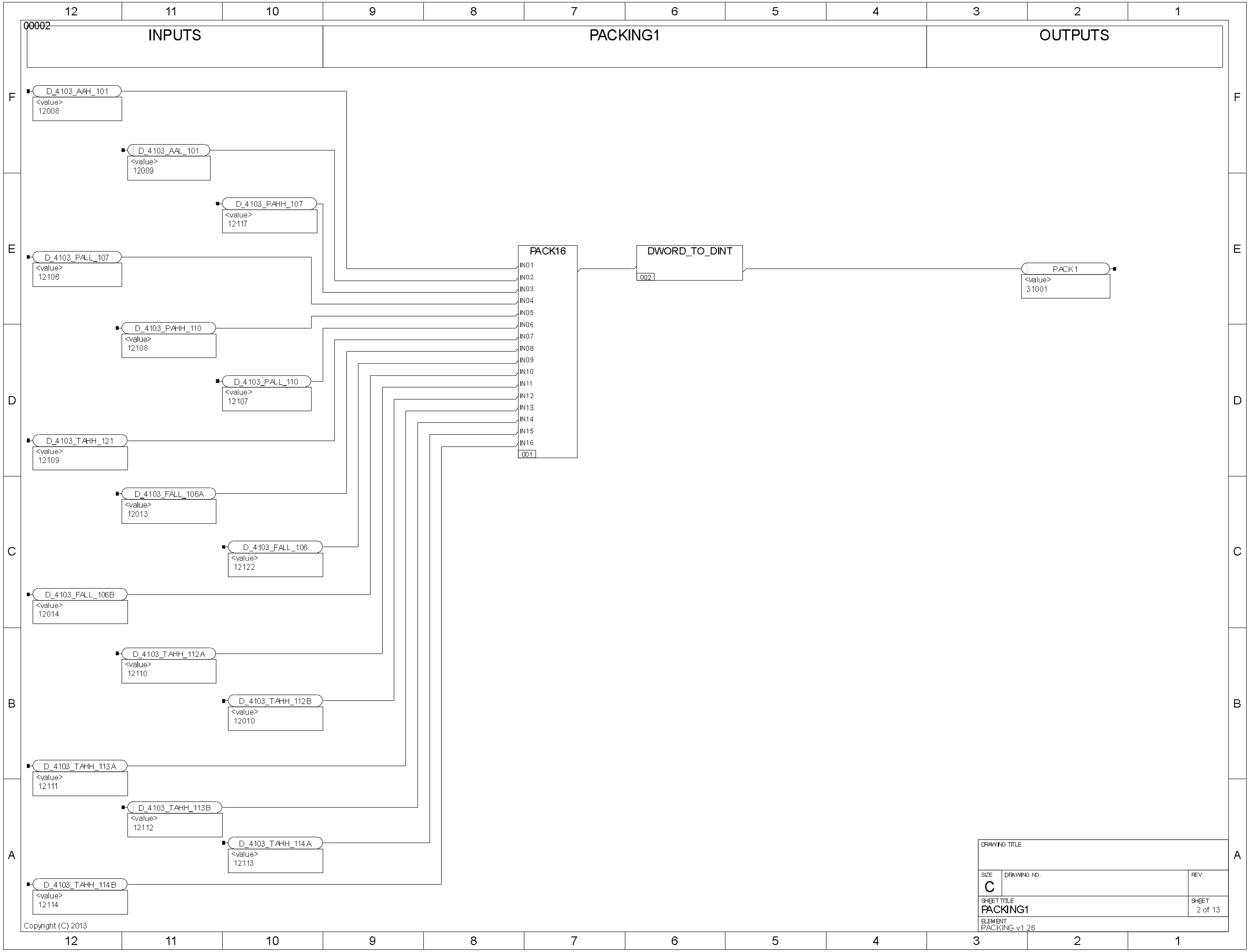
PROJECT

DRAWING TITLE

SIZE C | DRAWING NO. | REV.

SHEET TITLE | SHEET 1 of 13

ELEMENT PACKING v1.26



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Copyright (C) 2013
DRAWING TITLE
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REV.
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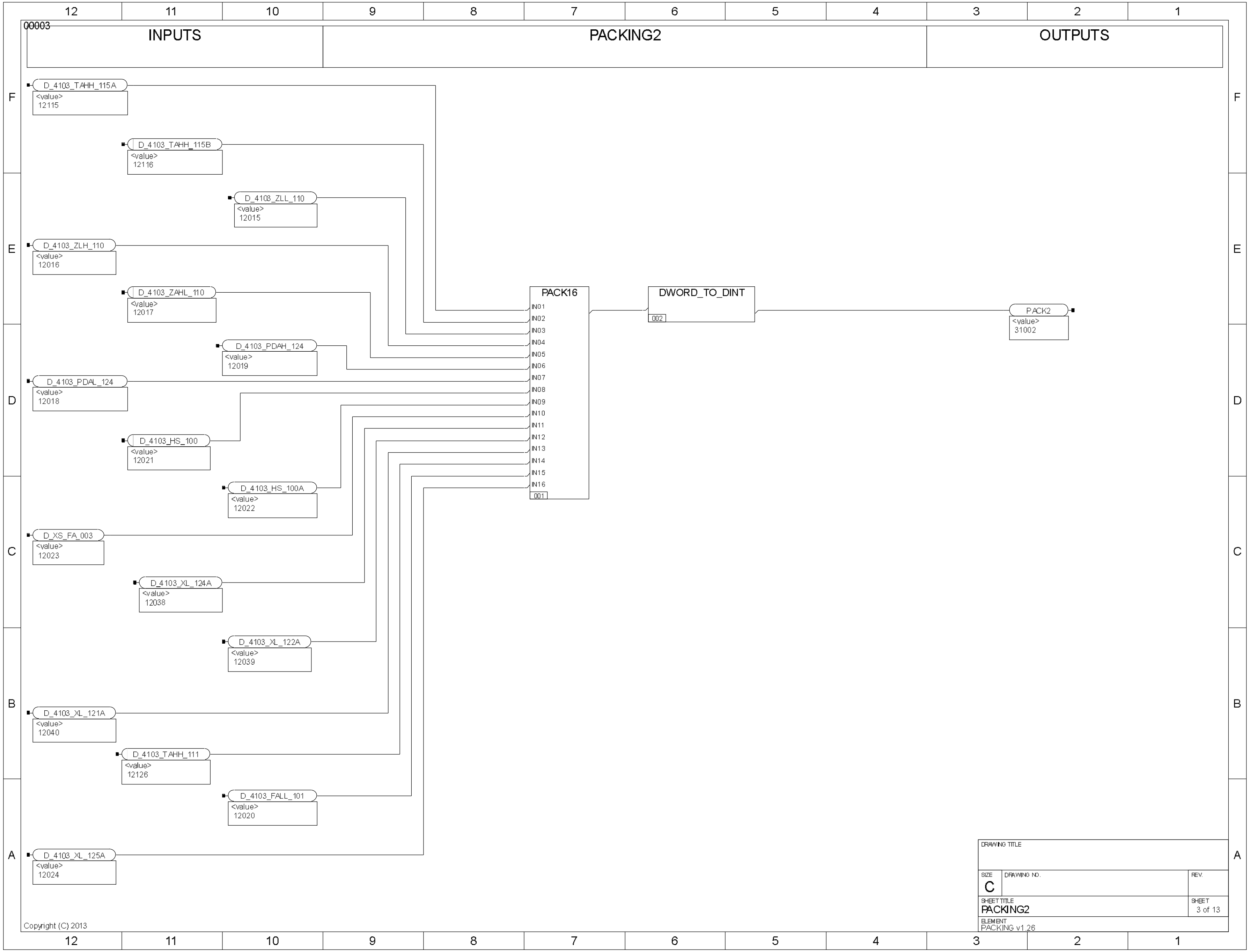
PACKING1
SHEET
2 of 13
ELEMENT
PACKING v1.26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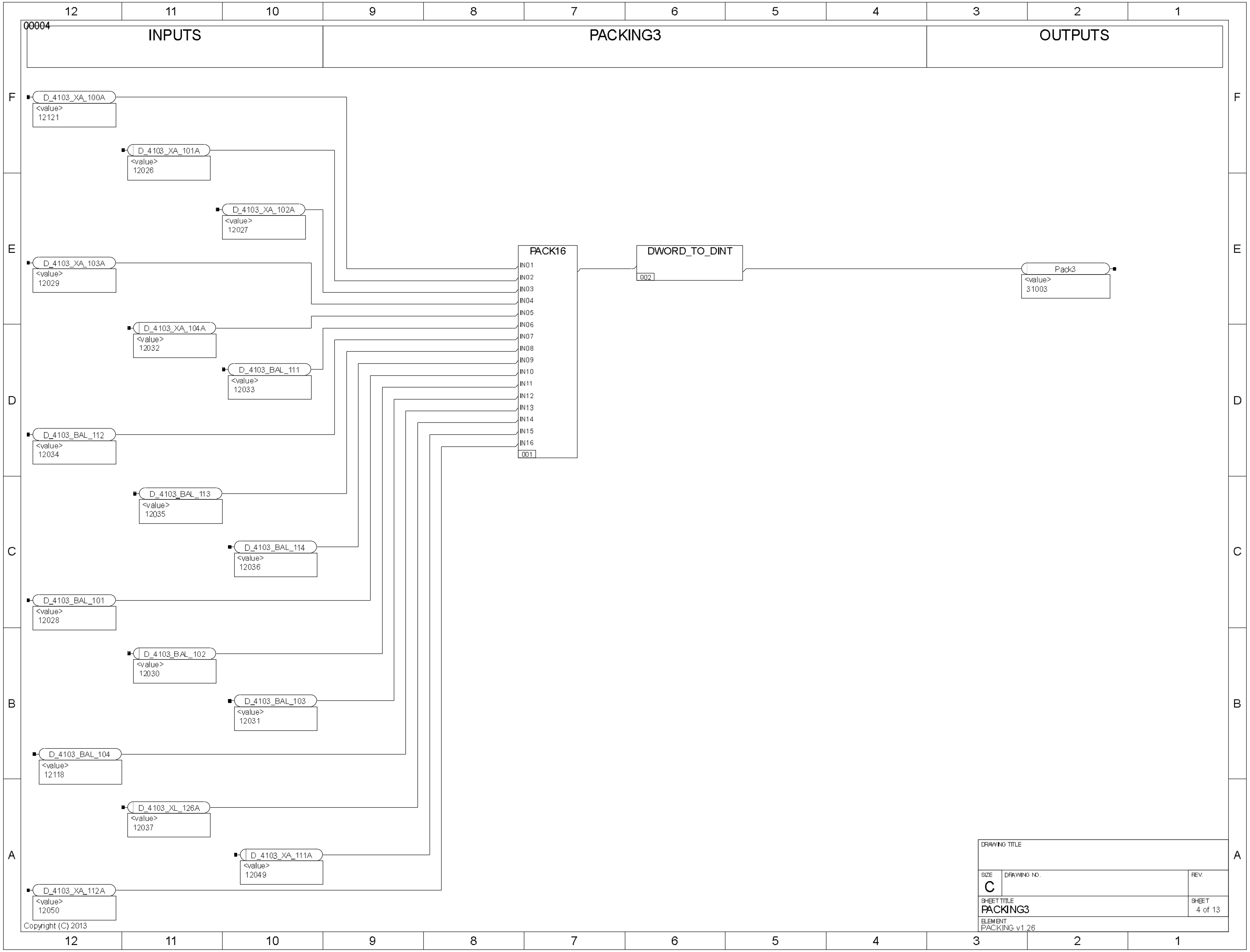
3 of 13
ELEMENT
PACKING v1.26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4 of 13
ELEMENT
PACKING v1.26
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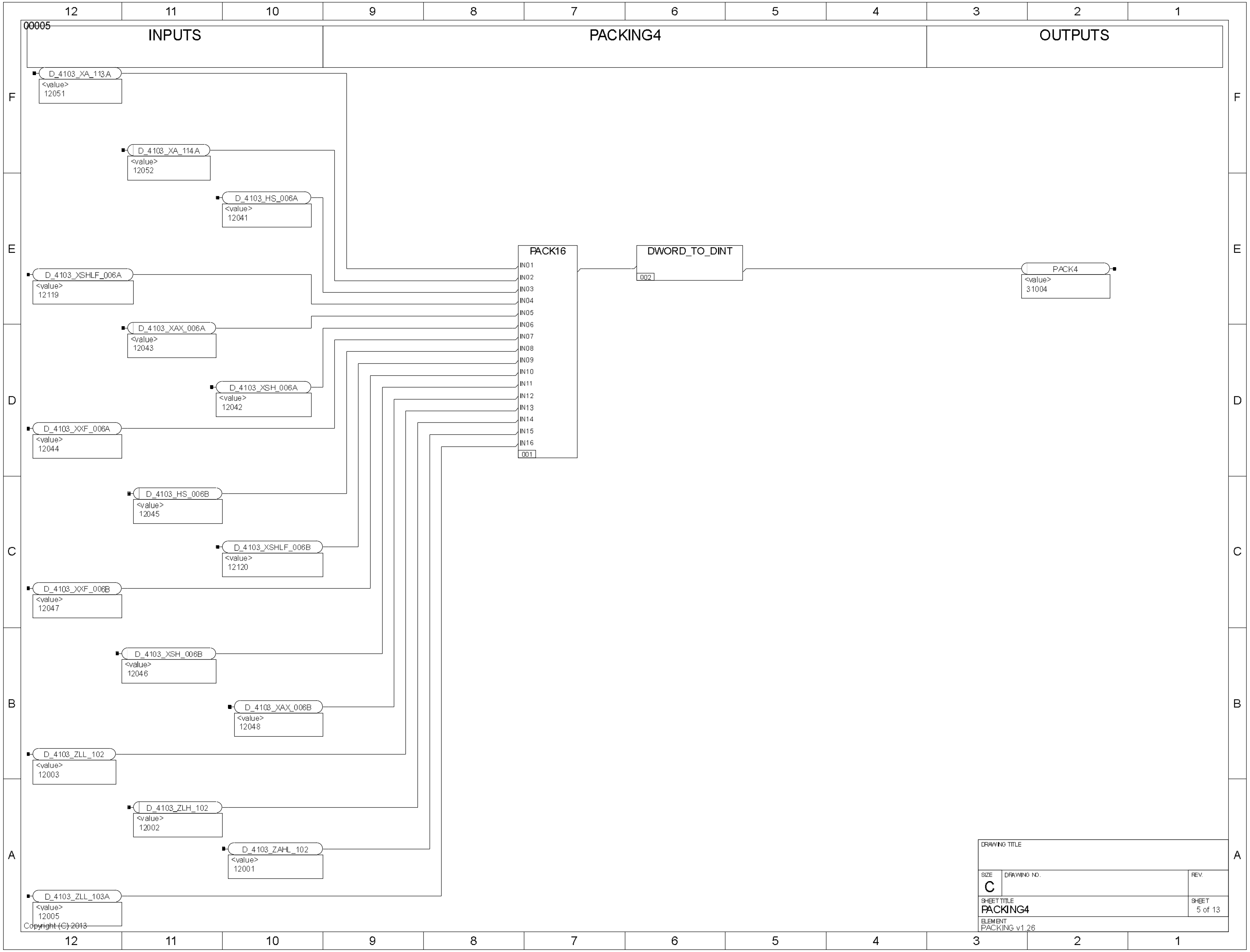

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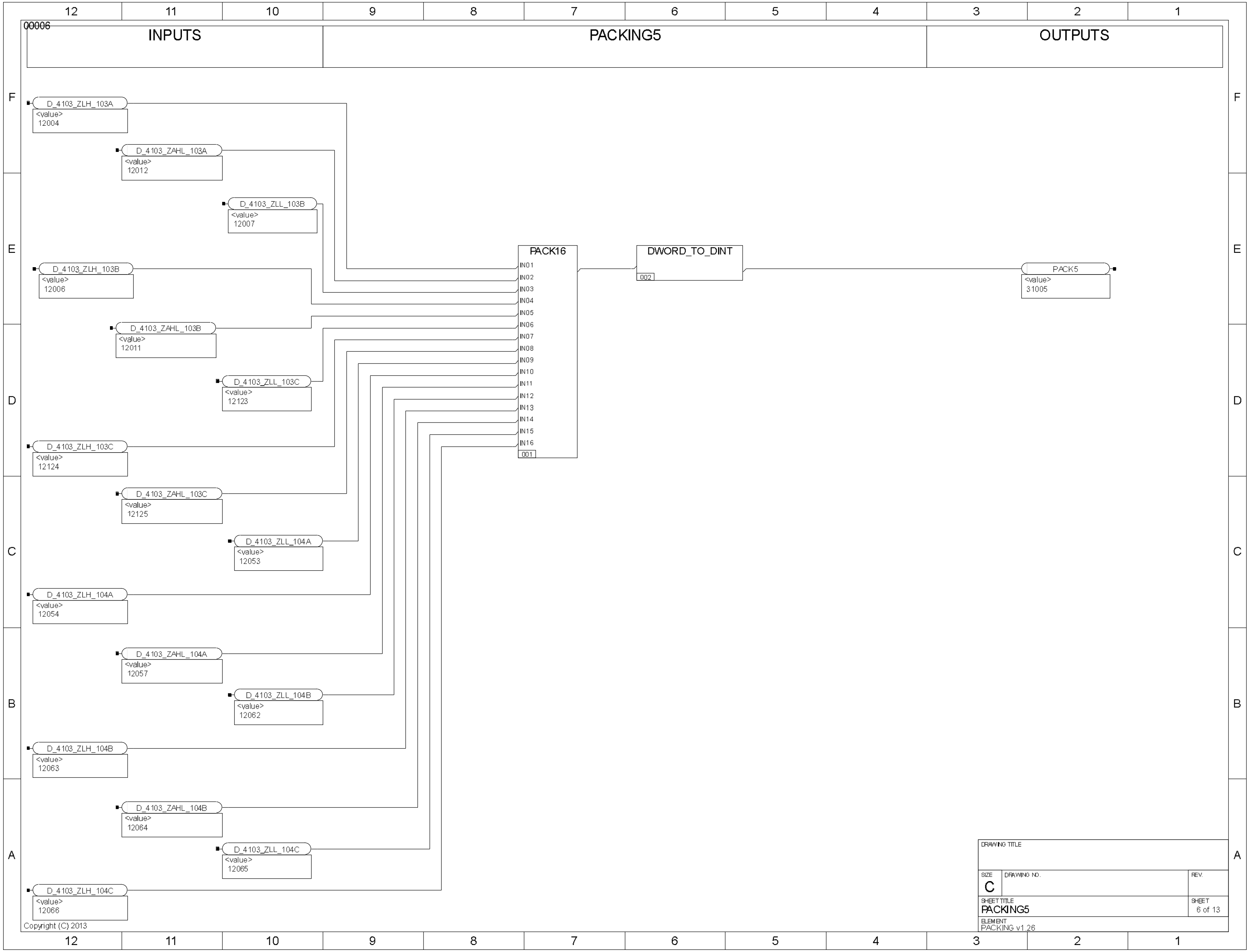
ELEMENT
PACKING v1.26



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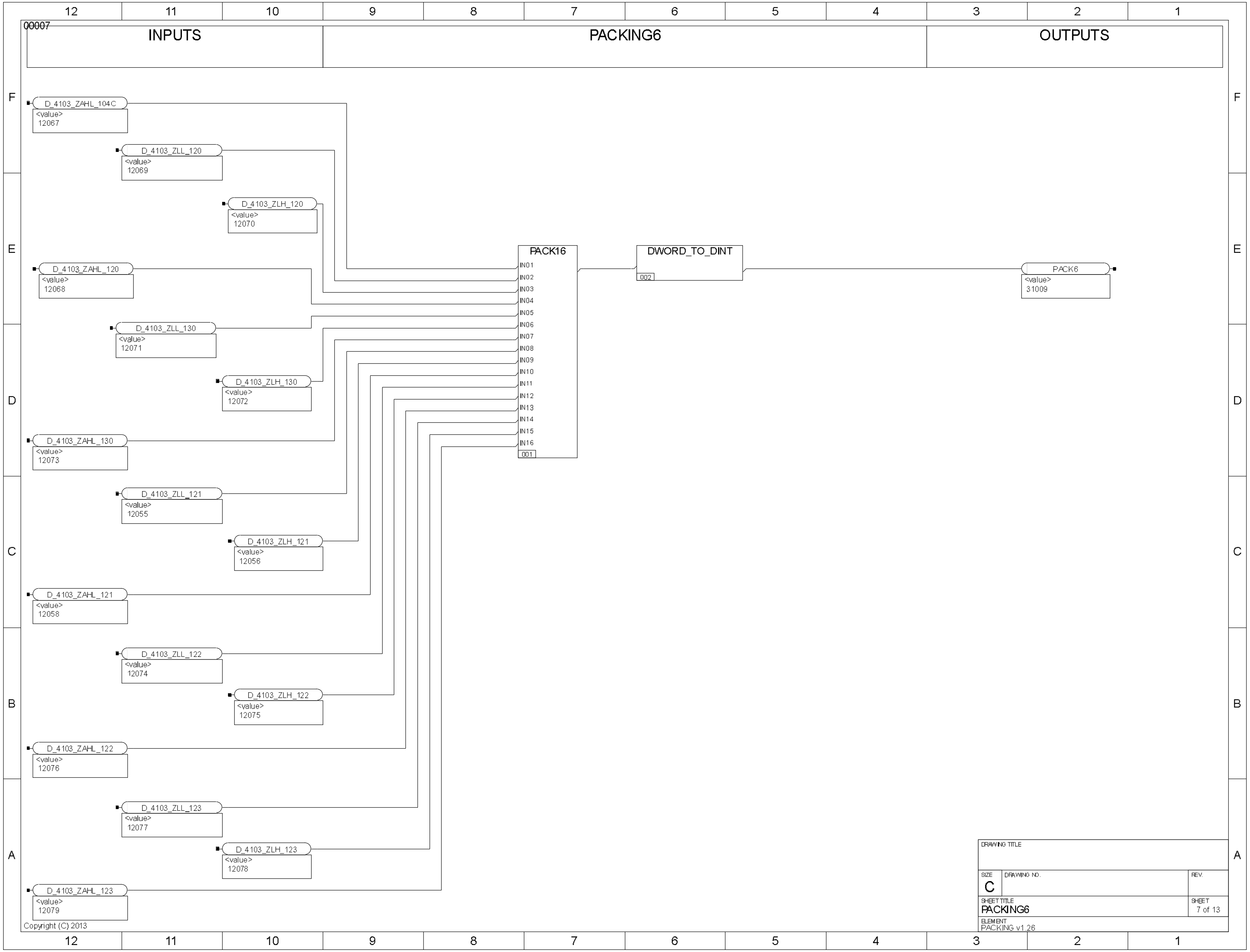
6 of 13
ELEMENT
PACKING v1.26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Copyright (C) 2013
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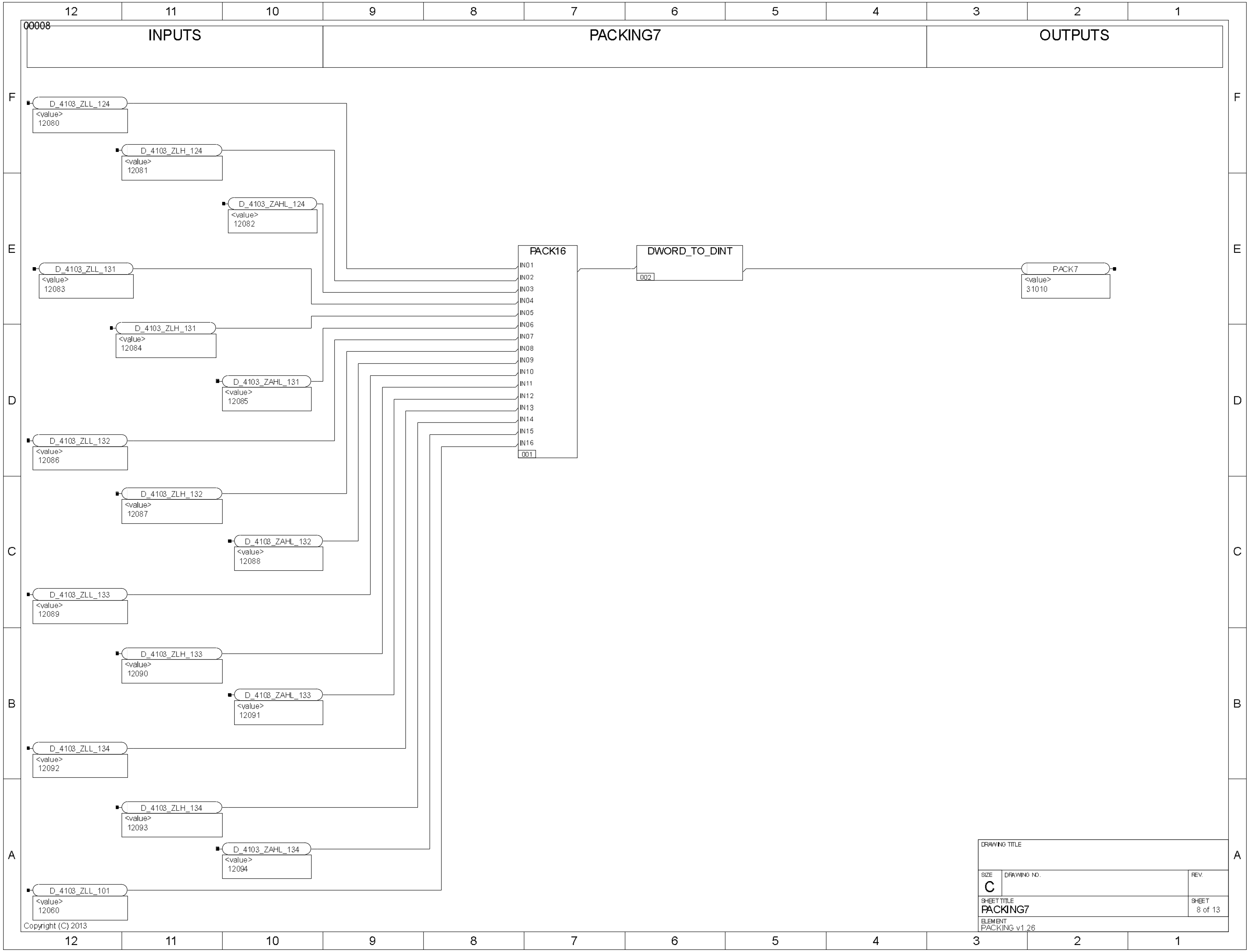
ELEMENT
PACKING v1.26



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PACKING7
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ELEMENT
PACKING v1.26
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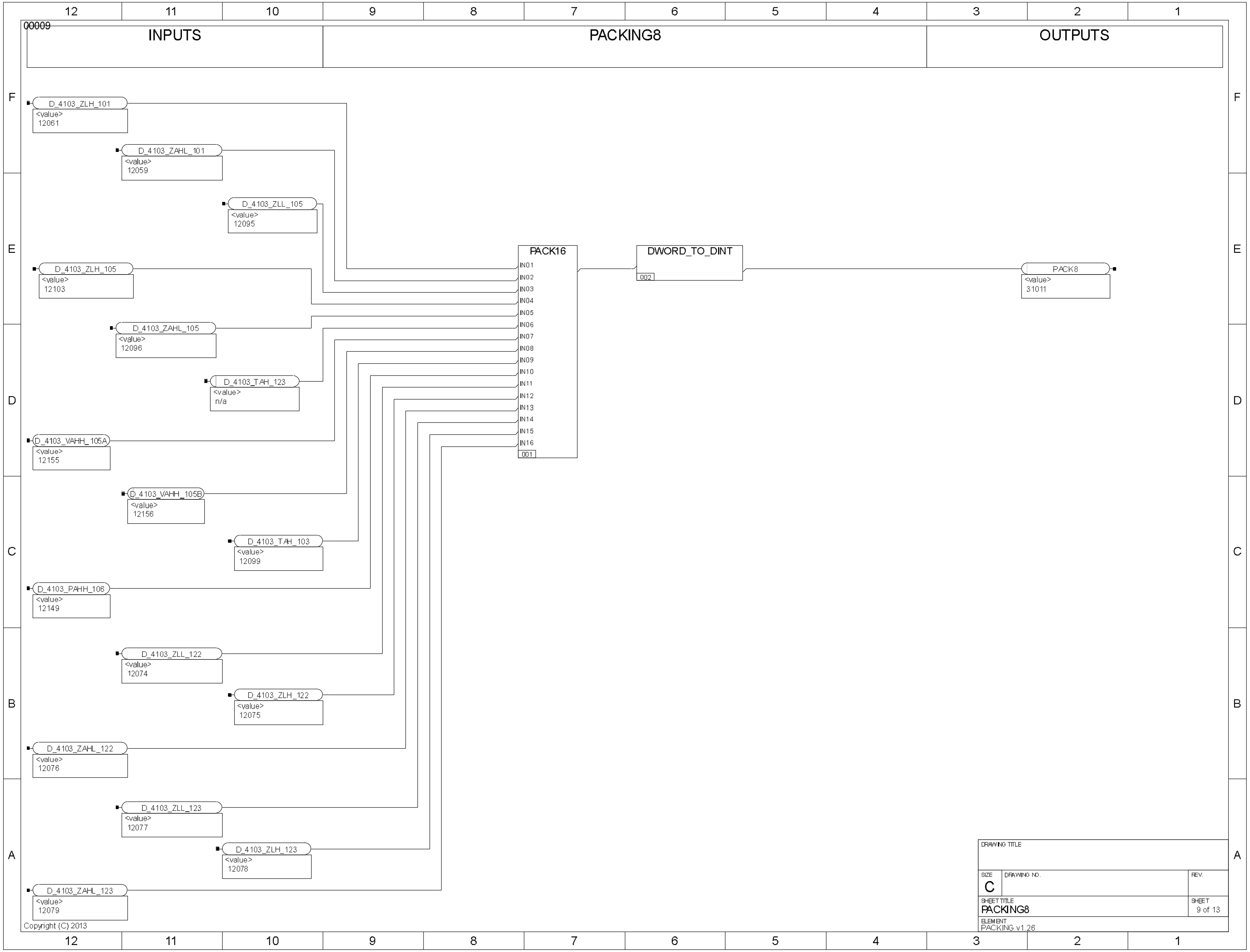
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PACK16
IN01 IN02 IN03 IN04 IN05 IN06 IN07 IN08 IN09 IN10 IN11 IN12 IN13 IN14 IN15 IN16
001
DWORD_TO_DINT
002
PACK8
<value>
31011
Copyright (C) 2013
DRAWING TITLE
SIZE
C
DRAWING NO.
REV.
SHEET TITLE
PACKING8
SHEET
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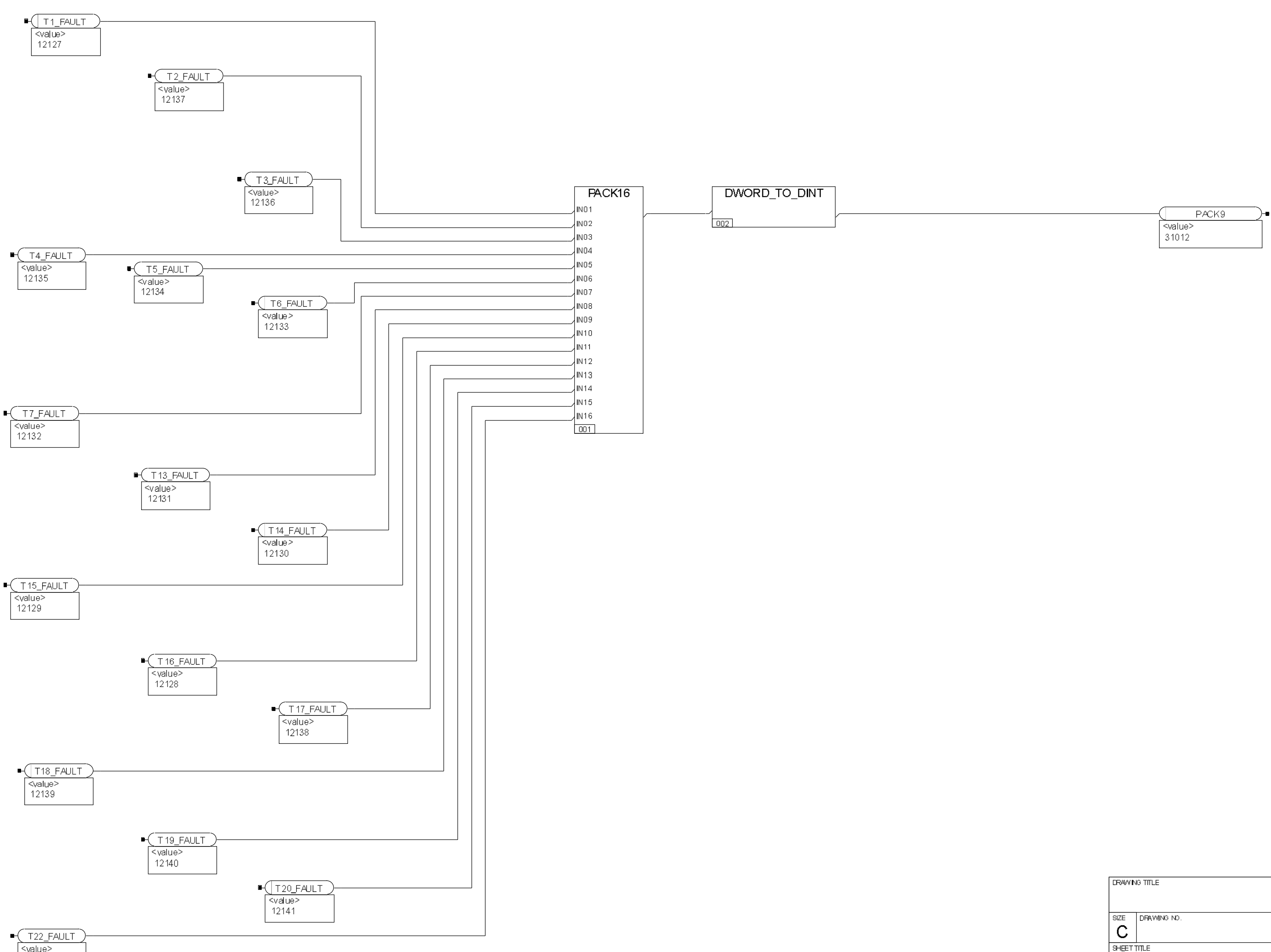
ELEMENT
PACKING v1.26

00010

INPUTS

PACKING9

OUTPUTS

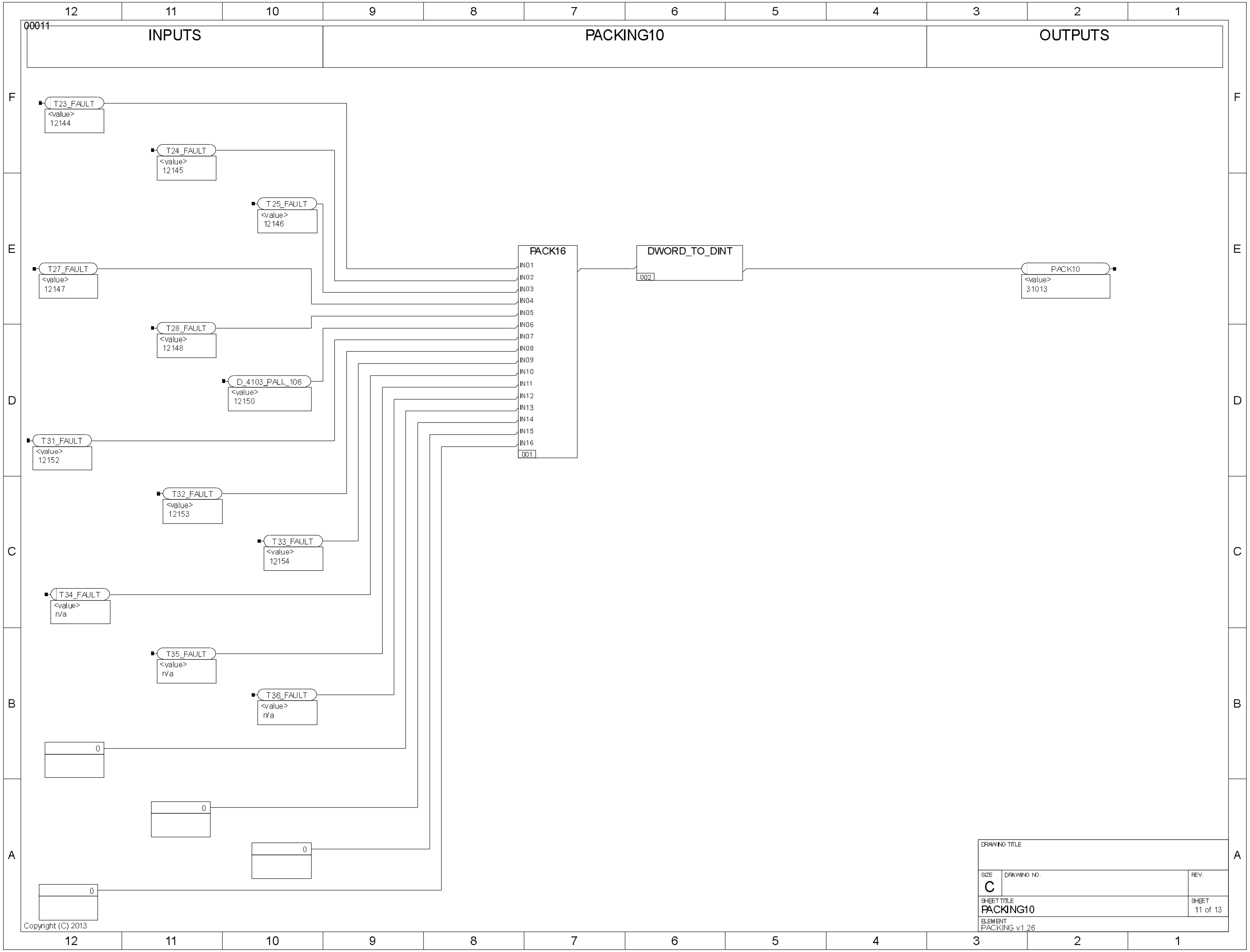


DRAWING TITLE

SIZE C | DRAWING NO. | REV.

SHEET TITLE PACKING9 | SHEET 10 of 13

ELEMENT PACKING v1.26



00011
INPUTS
PACKING10
OUTPUTS
T23_FAULT
<value>
12144
T24_FAULT
<value>
12145
T25_FAULT
<value>
12146
T27_FAULT
<value>
12147
T28_FAULT
<value>
12148
D_4103_PALL_106
<value>
12150
T31_FAULT
<value>
12152
T32_FAULT
<value>
12153
T33_FAULT
<value>
12154
T34_FAULT
<value>
n/a
T35_FAULT
<value>
n/a
T36_FAULT
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PACK16
IN01
IN02
IN03
IN04
IN05
IN06
IN07
IN08
IN09
IN10
IN11
IN12
IN13
IN14
IN15
IN16
001
DWORD_TO_DINT
002
PACK10
<value>
31013
DRAWING TITLE
SIZE
C
DRAWING NO.
REV.
SHEET TITLE
PACKING10
SHEET
11 of 13
ELEMENT
PACKING v1.26
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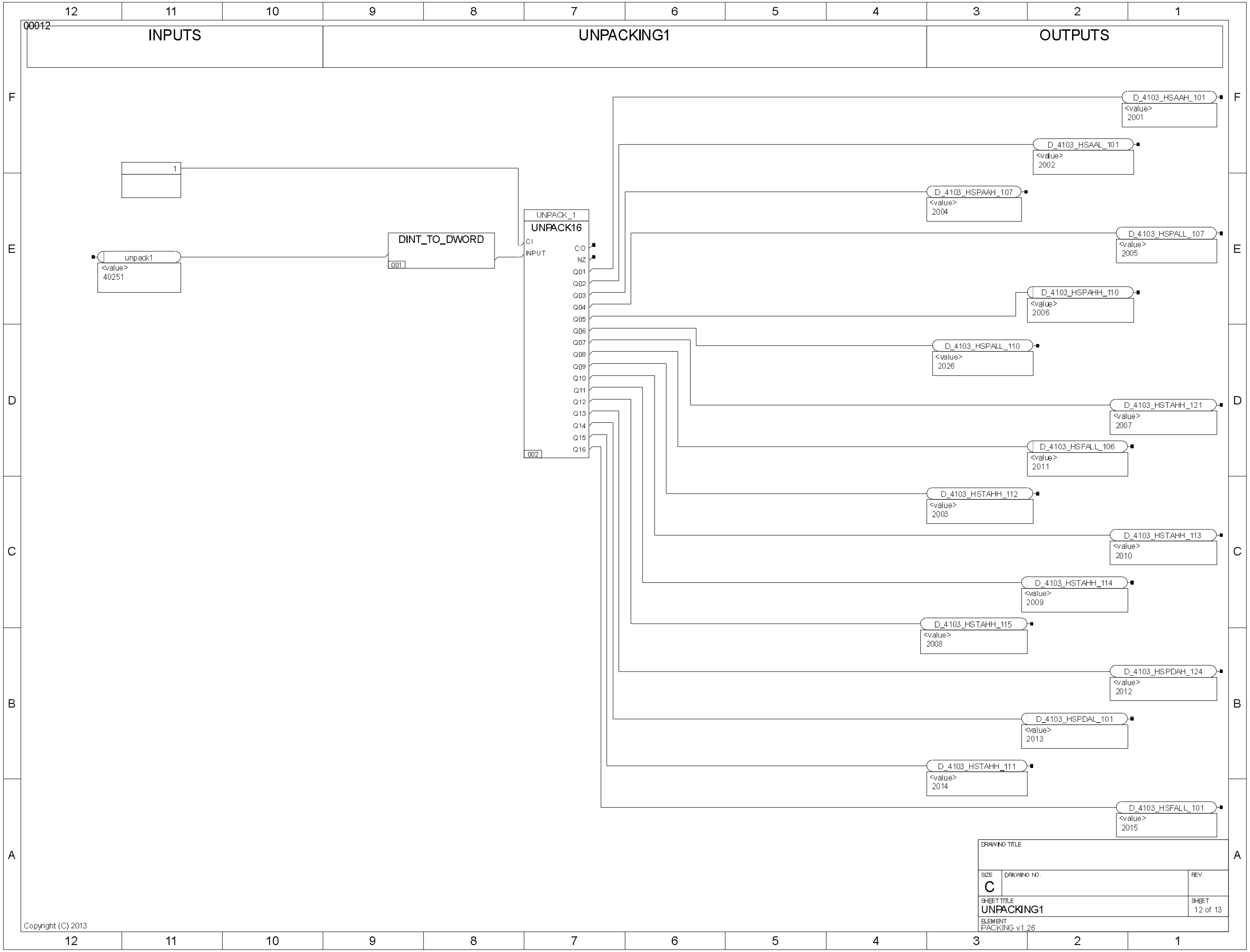

00012
INPUTS
UNPACKING1
OUTPUTS
1
unpack1
<value>
40251
DINT_TO_DWORD
001
UNPACK_1
UNPACK16
CI
INPUT
CO
NZ
Q01
Q02
Q03
Q04
Q05
Q06
Q07
Q08
Q09
Q10
Q11
Q12
Q13
Q14
Q15
Q16
002
D_4103_HSAAH_101
<value>
2001
D_4103_HSAAL_101
<value>
2002
D_4103_HSPAAH_107
<value>
2004
D_4103_HSPALL_107
<value>
2005
D_4103_HSPAHH_110
<value>
2006
D_4103_HSPALL_110
<value>
2026
D_4103_HSTAHH_121
<value>
2007
D_4103_HSFALL_106
<value>
2011
D_4103_HSTAHH_112
<value>
2003
D_4103_HSTAHH_113
<value>
2010
D_4103_HSTAHH_114
<value>
2009
D_4103_HSTAHH_115
<value>
2008
D_4103_HSPDAH_124
<value>
2012
D_4103_HSPDAL_101
<value>
2013
D_4103_HSTAHH_111
<value>
2014
D_4103_HSFALL_101
<value>
2015
DRAWING TITLE
SIZE
C
DRAWING NO.
REV.
SHEET TITLE
UNPACKING1
SHEET
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ELEMENT
PACKING v1.26
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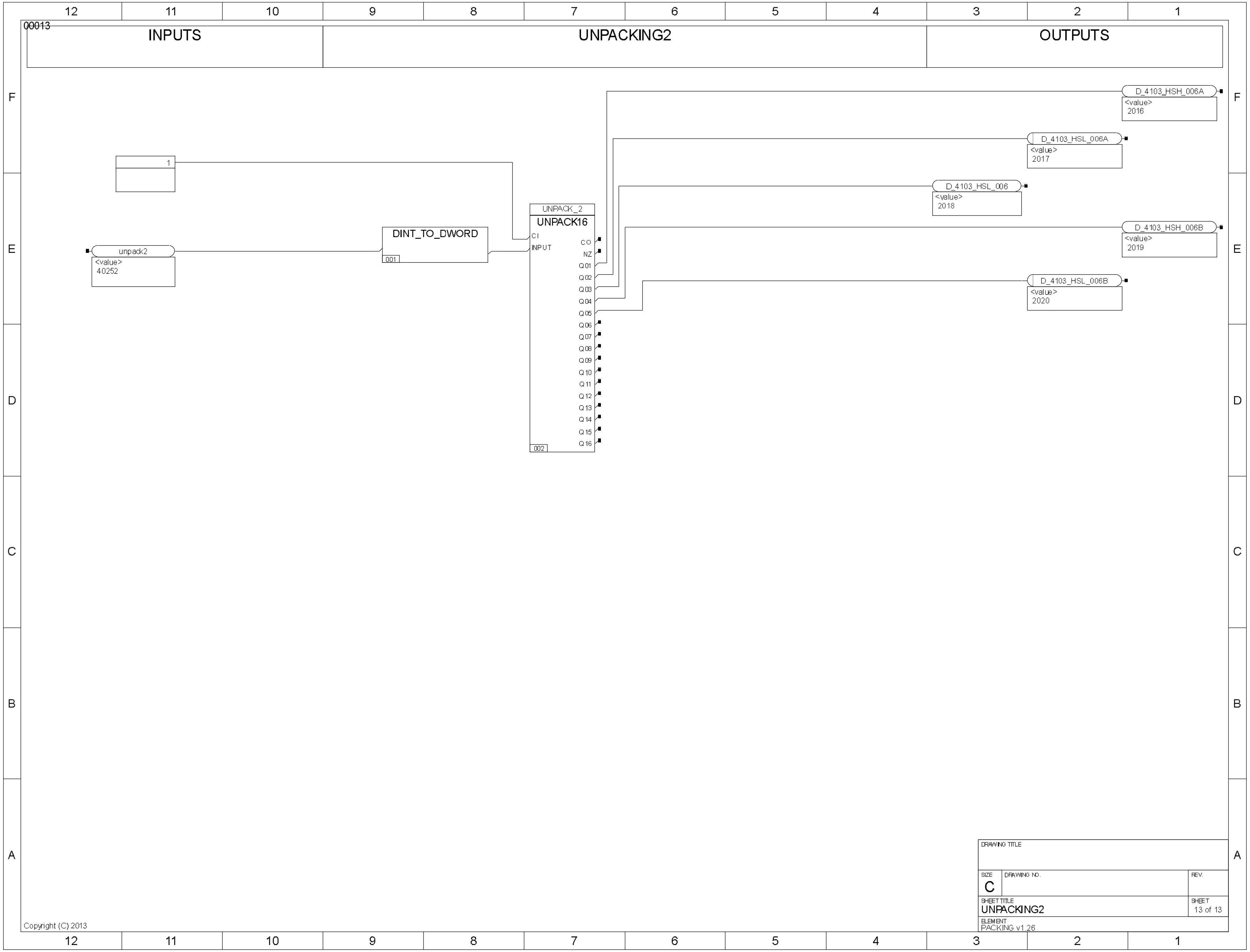

00013
INPUTS
UNPACKING2
OUTPUTS
1
unpack2
<value>
40252
DINT_TO_DWORD
001
UNPACK_2
UNPACK16
CI
INPUT
CO
NZ
Q01
Q02
Q03
Q04
Q05
Q06
Q07
Q08
Q09
Q10
Q11
Q12
Q13
Q14
Q15
Q16
002
D_4103_HSH_006A
<value>
2016
D_4103_HSL_006A
<value>
2017
D_4103_HSL_006
<value>
2018
D_4103_HSH_006B
<value>
2019
D_4103_HSL_006B
<value>
2020
DRAWING TITLE
SIZE
C
DRAWING NO.
REV.
SHEET TITLE
UNPACKING2
SHEET
13 of 13
ELEMENT
PACKING v1.26
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00001

PETROBEL COMPANY

ENGINEERING FOR THE PETROLEUM AND PROCESS INDUSTRIES (ENPPI)

P.O.: 3292-300-251-05-16

PETRECO NEW LAND OIL TREATMENT TRAIN
BELAYIM FIELD

BMS DIGITAL INPUT CONDITIONING PROGRAM

BOILER MANAGMENT SYSTEM

1910-00-BPFE-01394

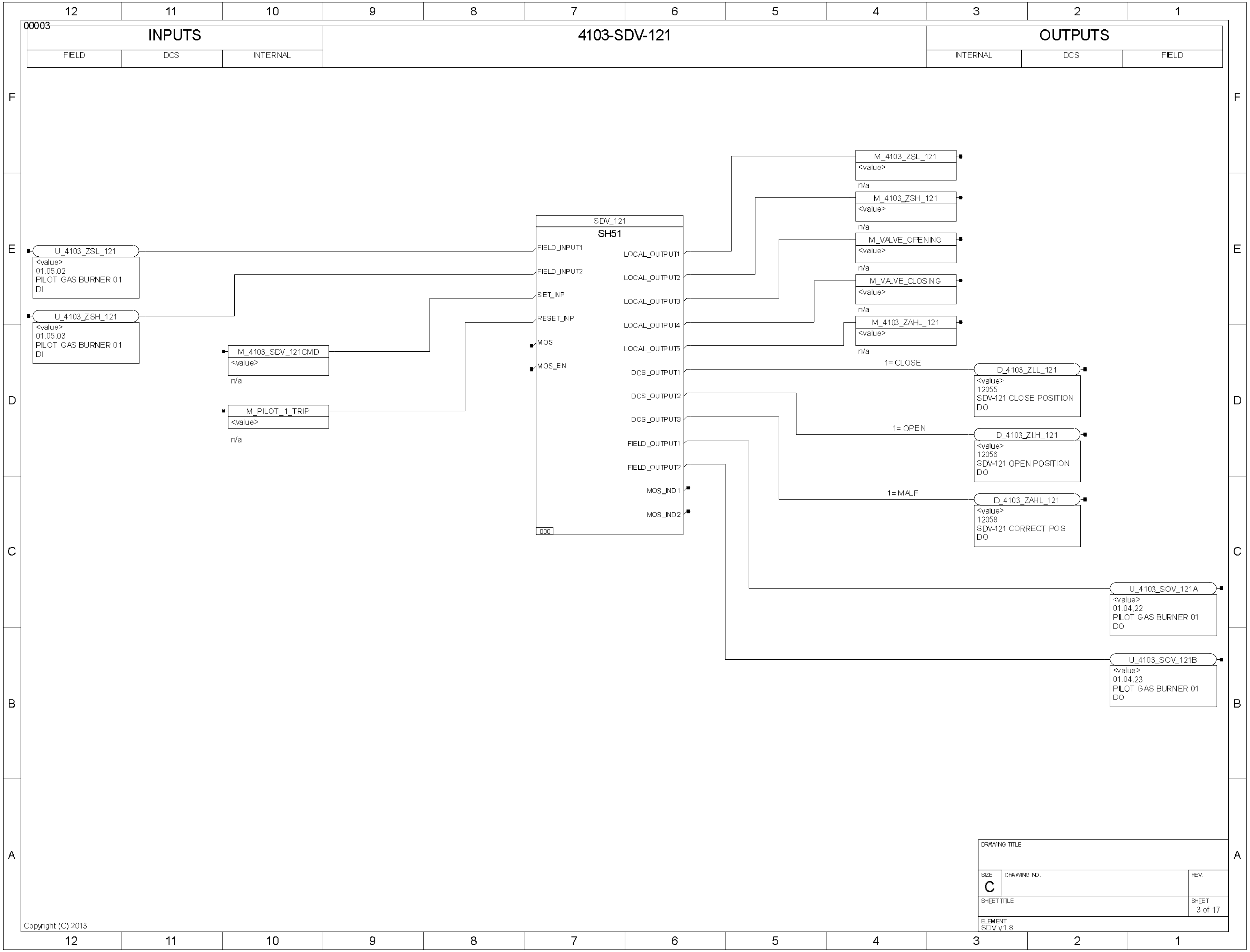
DI CONDITIONING-SDV

ACTIVITY	DATE/TIME	
		PROJECT
		DRAWING TITLE
CREATED BY Manager	30/06/2013 01:36:41 a	SIZE C / DRAWING NO. / REV.
MODIFIED BY Manager	02/07/2013 07:09:06 a	
PRINTED BY Manager	03/07/2013 09:13:06 a	SHEET TITLE / SHEET 1 of 17
APPROVED BY		
SHEET TEMPLATE SheetTemplateC		ELEMENT SDV v1.8

00002

This typical controls a Single Solenoid operated SDV with Manual Reset, open, Close & Maintenance override facility via DCS.

DRAWING TITLE		
SIZE C	DRAWING NO.	REV.
SHEET TITLE		SHEET 2 of 17
ELEMENT SDV v1.8		



00003
INPUTS
FIELD
DCS
INTERNAL
4103-SDV-121
OUTPUTS
INTERNAL
DCS
FIELD
U_4103_ZSL_121
<value>
01.05.02
PILOT GAS BURNER 01
DI
U_4103_ZSH_121
<value>
01.05.03
PILOT GAS BURNER 01
DI
M_4103_SDV_121CMD
<value>
n/a
M_PILOT_1_TRIP
<value>
n/a
SDV_121
SH51
FIELD_INPUT1
FIELD_INPUT2
SET_INP
RESET_INP
MOS
MOS_EN
LOCAL_OUTPUT1
LOCAL_OUTPUT2
LOCAL_OUTPUT3
LOCAL_OUTPUT4
LOCAL_OUTPUT5
DCS_OUTPUT1
DCS_OUTPUT2
DCS_OUTPUT3
FIELD_OUTPUT1
FIELD_OUTPUT2
MOS_IND1
MOS_IND2
000
M_4103_ZSL_121
<value>
n/a
M_4103_ZSH_121
<value>
n/a
M_VALVE_OPENING
<value>
n/a
M_VALVE_CLOSING
<value>
n/a
M_4103_ZAHL_121
<value>
n/a
1= CLOSE
D_4103_ZLL_121
<value>
12055
SDV-121 CLOSE POSITION
DO
1= OPEN
D_4103_ZLH_121
<value>
12056
SDV-121 OPEN POSITION
DO
1= MALF
D_4103_ZAHL_121
<value>
12058
SDV-121 CORRECT POS
DO
U_4103_SOV_121A
<value>
01.04.22
PILOT GAS BURNER 01
DO
U_4103_SOV_121B
<value>
01.04.23
PILOT GAS BURNER 01
DO
DRAWING TITLE
SIZE
C
DRAWING NO.
REV.
SHEET TITLE
SHEET
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ELEMENT
SDV v1.8
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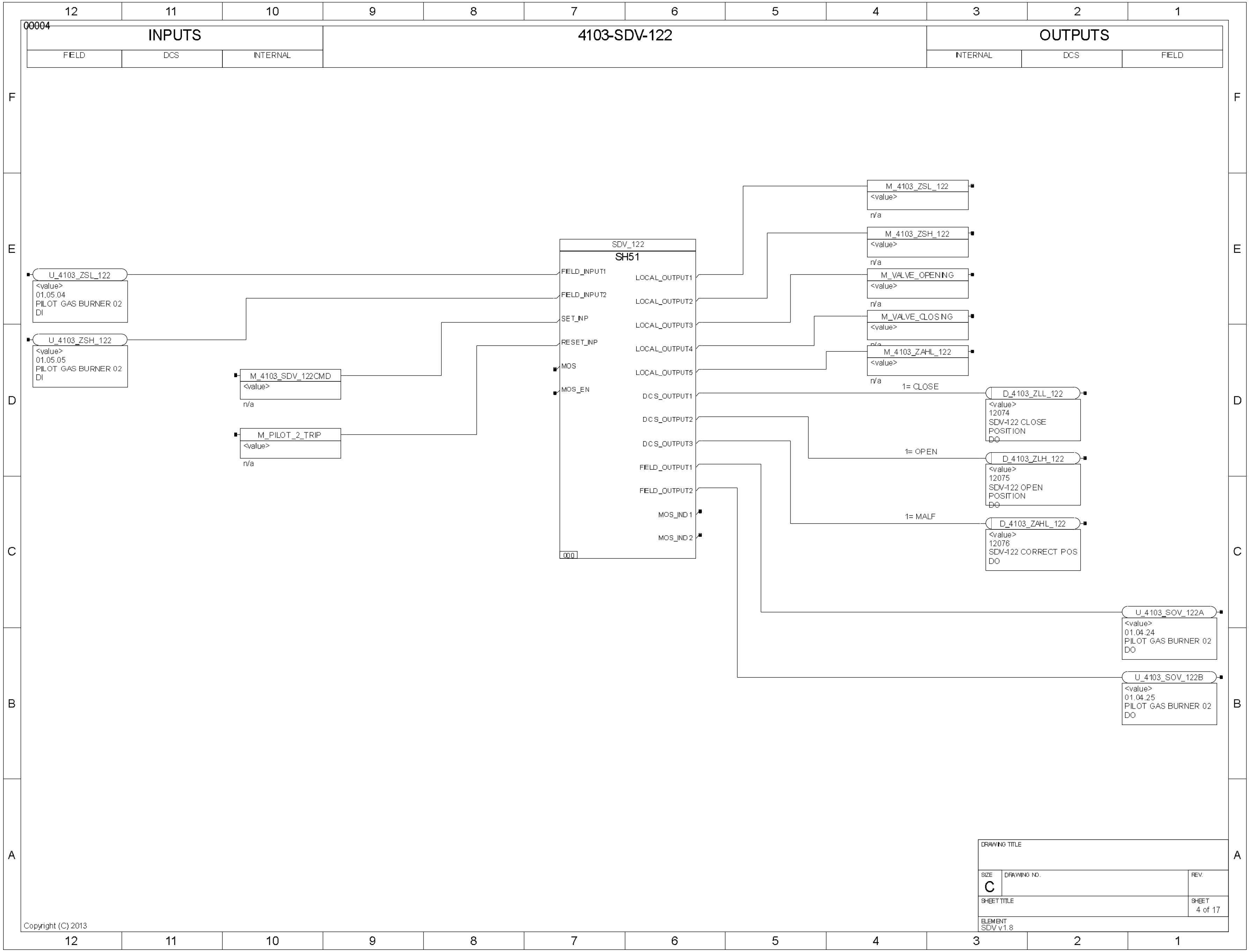
00004
INPUTS
FIELD
DCS
INTERNAL
4103-SDV-122
OUTPUTS
INTERNAL
DCS
FIELD
U_4103_ZSL_122
<value>
01.05.04
PILOT GAS BURNER 02
DI
U_4103_ZSH_122
<value>
01.05.05
PILOT GAS BURNER 02
DI
M_4103_SDV_122CMD
<value>
n/a
M_PILOT_2_TRIP
<value>
n/a
SDV_122
SH51
FIELD_INPUT1
FIELD_INPUT2
SET_INP
RESET_INP
MOS
MOS_EN
LOCAL_OUTPUT1
LOCAL_OUTPUT2
LOCAL_OUTPUT3
LOCAL_OUTPUT4
LOCAL_OUTPUT5
DCS_OUTPUT1
DCS_OUTPUT2
DCS_OUTPUT3
FIELD_OUTPUT1
FIELD_OUTPUT2
MOS_IND1
MOS_IND2
000
M_4103_ZSL_122
<value>
n/a
M_4103_ZSH_122
<value>
n/a
M_VALVE_OPENING
<value>
n/a
M_VALVE_CLOSING
<value>
M_4103_ZAHL_122
<value>
n/a
1= CLOSE
D_4103_ZLL_122
<value>
12074
SDV-122 CLOSE
POSITION
DO
1= OPEN
D_4103_ZLH_122
<value>
12075
SDV-122 OPEN
POSITION
DO
1= MALF
D_4103_ZAHL_122
<value>
12076
SDV-122 CORRECT POS
DO
U_4103_SOV_122A
<value>
01.04.24
PILOT GAS BURNER 02
DO
U_4103_SOV_122B
<value>
01.04.25
PILOT GAS BURNER 02
DO
DRAWING TITLE
SIZE
C
DRAWING NO.
REV.
SHEET TITLE
SHEET
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ELEMENT
SDV v1.8
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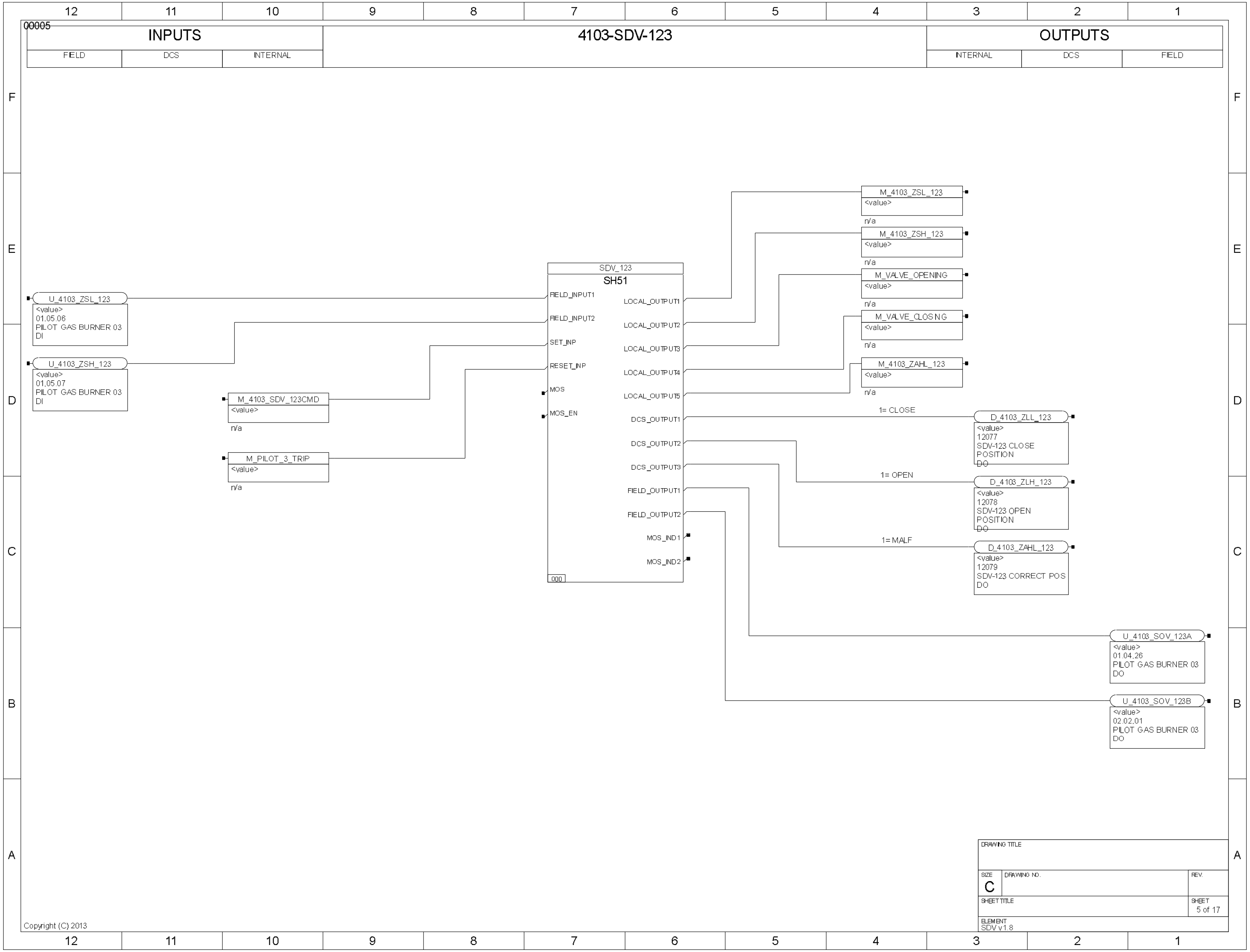

00005
INPUTS
FIELD
DCS
INTERNAL
4103-SDV-123
OUTPUTS
INTERNAL
DCS
FIELD
U_4103_ZSL_123
<value>
01.05.06
PILOT GAS BURNER 03
DI
U_4103_ZSH_123
<value>
01.05.07
PILOT GAS BURNER 03
DI
M_4103_SDV_123CMD
<value>
n/a
M_PILOT_3_TRIP
<value>
n/a
SDV_123
SH51
FIELD_INPUT1
FIELD_INPUT2
SET_INP
RESET_INP
MOS
MOS_EN
LOCAL_OUTPUT1
LOCAL_OUTPUT2
LOCAL_OUTPUT3
LOCAL_OUTPUT4
LOCAL_OUTPUT5
DCS_OUTPUT1
DCS_OUTPUT2
DCS_OUTPUT3
FIELD_OUTPUT1
FIELD_OUTPUT2
MOS_IND1
MOS_IND2
000
M_4103_ZSL_123
<value>
n/a
M_4103_ZSH_123
<value>
n/a
M_VALVE_OPENING
<value>
n/a
M_VALVE_CLOSING
<value>
n/a
M_4103_ZAHL_123
<value>
n/a
1= CLOSE
D_4103_ZLL_123
<value>
12077
SDV-123 CLOSE
POSITION
DO
1= OPEN
D_4103_ZLH_123
<value>
12078
SDV-123 OPEN
POSITION
DO
1= MALF
D_4103_ZAHL_123
<value>
12079
SDV-123 CORRECT POS
DO
U_4103_SOV_123A
<value>
01.04.26
PILOT GAS BURNER 03
DO
U_4103_SOV_123B
<value>
02.02.01
PILOT GAS BURNER 03
DO
DRAWING TITLE
SIZE
C
DRAWING NO.
REV.
SHEET TITLE
SHEET
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ELEMENT
SDV v1.8
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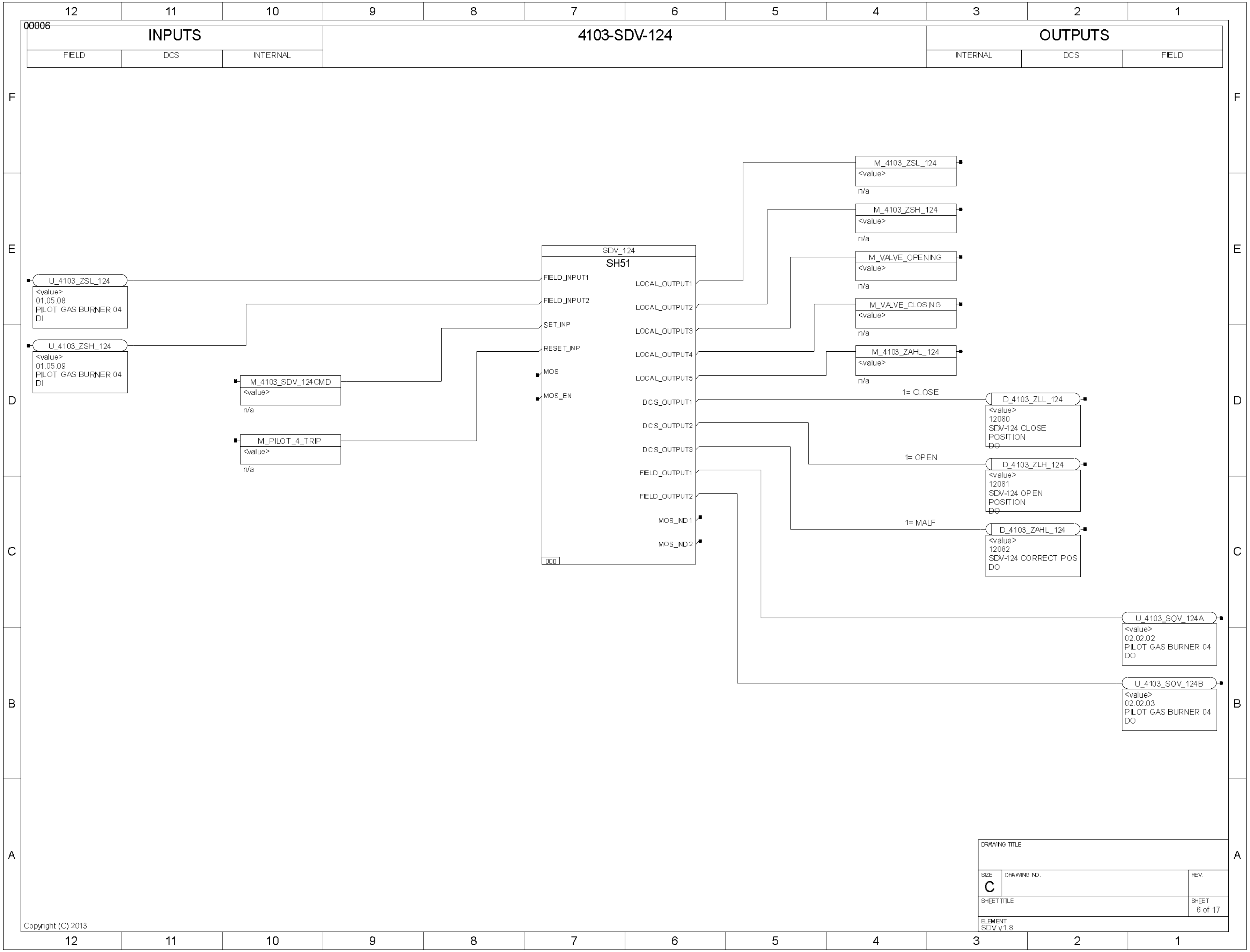

00006
INPUTS
FIELD
DCS
INTERNAL
4103-SDV-124
OUTPUTS
INTERNAL
DCS
FIELD
U_4103_ZSL_124
<value>
01.05.08
PILOT GAS BURNER 04
DI
U_4103_ZSH_124
<value>
01.05.09
PILOT GAS BURNER 04
DI
M_4103_SDV_124CMD
<value>
n/a
M_PILOT_4_TRIP
<value>
n/a
SDV_124
SH51
FIELD_INPUT1
FIELD_INPUT2
SET_INP
RESET_INP
MOS
MOS_EN
LOCAL_OUTPUT1
LOCAL_OUTPUT2
LOCAL_OUTPUT3
LOCAL_OUTPUT4
LOCAL_OUTPUT5
DCS_OUTPUT1
DCS_OUTPUT2
DCS_OUTPUT3
FIELD_OUTPUT1
FIELD_OUTPUT2
MOS_IND1
MOS_IND2
000
M_4103_ZSL_124
<value>
n/a
M_4103_ZSH_124
<value>
n/a
M_VALVE_OPENING
<value>
n/a
M_VALVE_CLOSING
<value>
n/a
M_4103_ZAHL_124
<value>
n/a
1= CLOSE
D_4103_ZLL_124
<value>
12080
SDV-124 CLOSE
POSITION
DO
1= OPEN
D_4103_ZLH_124
<value>
12081
SDV-124 OPEN
POSITION
DO
1= MALF
D_4103_ZAHL_124
<value>
12082
SDV-124 CORRECT POS
DO
U_4103_SOV_124A
<value>
02.02.02
PILOT GAS BURNER 04
DO
U_4103_SOV_124B
<value>
02.02.03
PILOT GAS BURNER 04
DO
DRAWING TITLE
SIZE
C
DRAWING NO.
REV.
SHEET TITLE
SHEET
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ELEMENT
SDV v1.8
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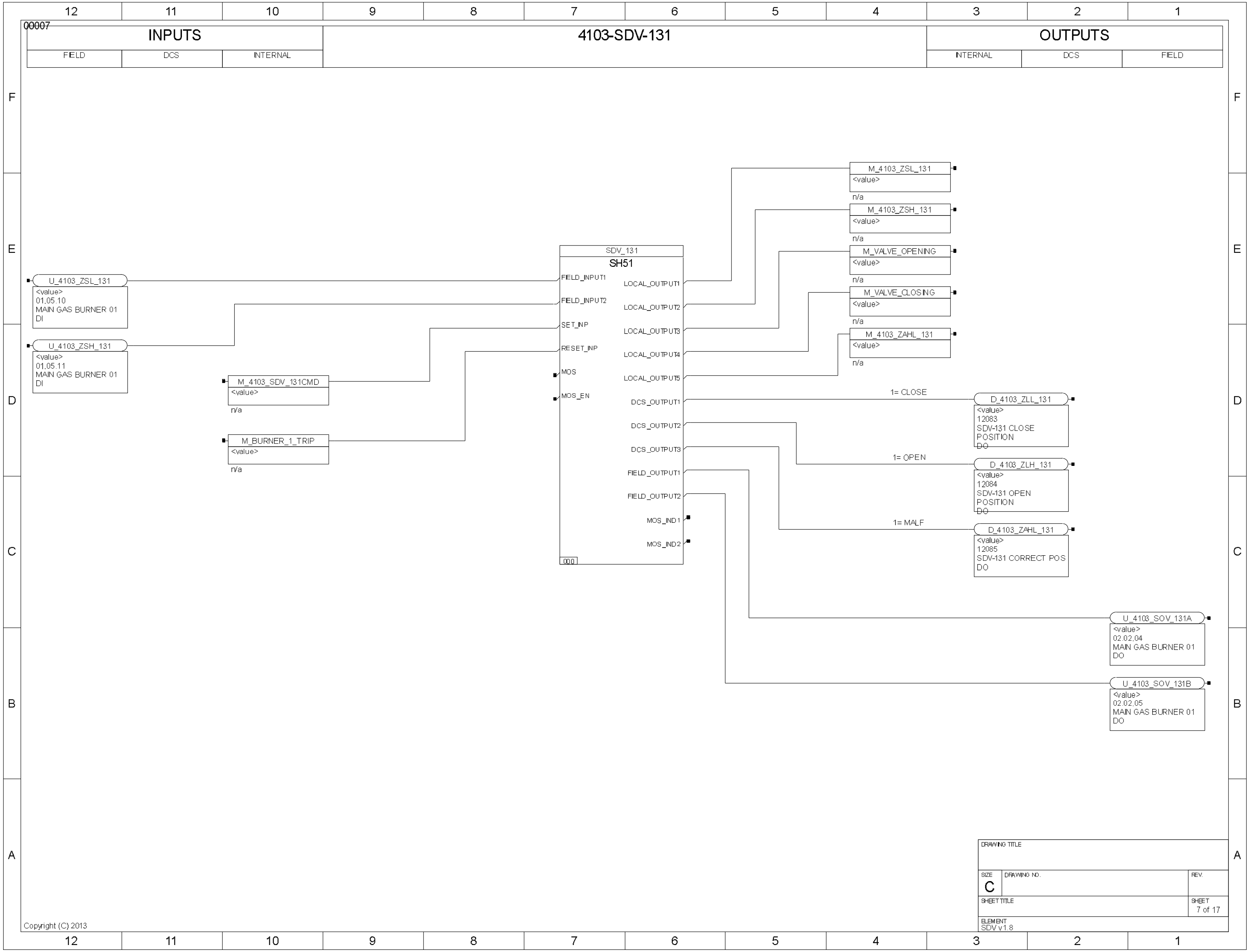

00007
INPUTS
FIELD
DCS
INTERNAL
4103-SDV-131
OUTPUTS
INTERNAL
DCS
FIELD
U_4103_ZSL_131
<value>
01.05.10
MAIN GAS BURNER 01
DI
U_4103_ZSH_131
<value>
01.05.11
MAIN GAS BURNER 01
DI
M_4103_SDV_131CMD
<value>
n/a
M_BURNER_1_TRIP
<value>
n/a
SDV_131
SH51
FIELD_INPUT1
FIELD_INPUT2
SET_INP
RESET_INP
MOS
MOS_EN
LOCAL_OUTPUT1
LOCAL_OUTPUT2
LOCAL_OUTPUT3
LOCAL_OUTPUT4
LOCAL_OUTPUT5
DCS_OUTPUT1
DCS_OUTPUT2
DCS_OUTPUT3
FIELD_OUTPUT1
FIELD_OUTPUT2
MOS_IND1
MOS_IND2
000
M_4103_ZSL_131
<value>
n/a
M_4103_ZSH_131
<value>
n/a
M_VALVE_OPENING
<value>
n/a
M_VALVE_CLOSING
<value>
n/a
M_4103_ZAHL_131
<value>
n/a
1= CLOSE
D_4103_ZLL_131
<value>
12083
SDV-131 CLOSE
POSITION
DO
1= OPEN
D_4103_ZLH_131
<value>
12084
SDV-131 OPEN
POSITION
DO
1= MALF
D_4103_ZAHL_131
<value>
12085
SDV-131 CORRECT POS
DO
U_4103_SOV_131A
<value>
02.02.04
MAIN GAS BURNER 01
DO
U_4103_SOV_131B
<value>
02.02.05
MAIN GAS BURNER 01
DO
DRAWING TITLE
SIZE
C
DRAWING NO.
REV.
SHEET TITLE
SHEET
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ELEMENT
SDV v1.8
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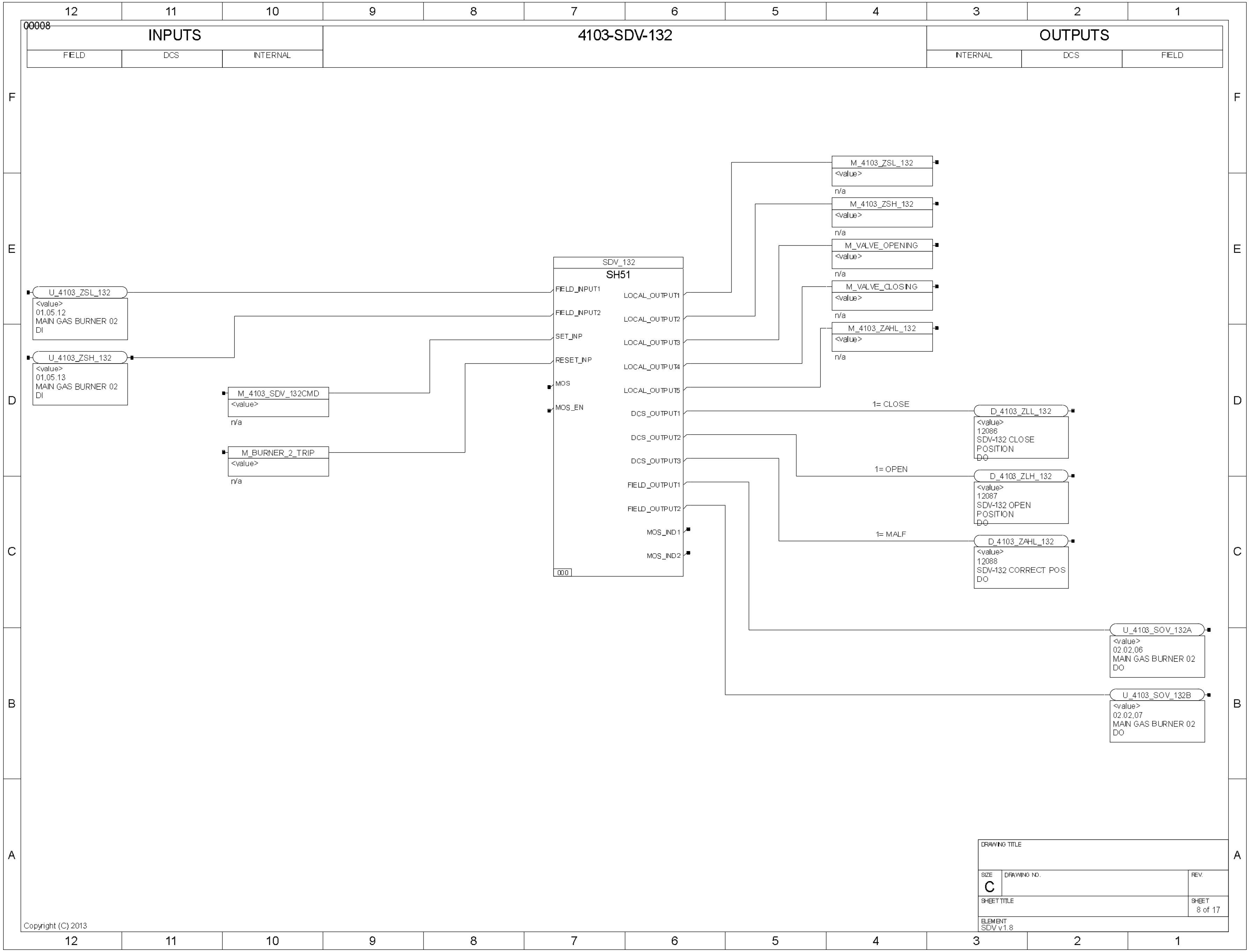
00008
INPUTS
FIELD
DCS
INTERNAL
4103-SDV-132
OUTPUTS
INTERNAL
DCS
FIELD
U_4103_ZSL_132
<value>
01.05.12
MAIN GAS BURNER 02
DI
U_4103_ZSH_132
<value>
01.05.13
MAIN GAS BURNER 02
DI
M_4103_SDV_132CMD
<value>
n/a
M_BURNER_2_TRIP
<value>
n/a
SDV_132
SH51
FIELD_INPUT1
FIELD_INPUT2
SET_INP
RESET_INP
MOS
MOS_EN
000
LOCAL_OUTPUT1
LOCAL_OUTPUT2
LOCAL_OUTPUT3
LOCAL_OUTPUT4
LOCAL_OUTPUT5
DCS_OUTPUT1
DCS_OUTPUT2
DCS_OUTPUT3
FIELD_OUTPUT1
FIELD_OUTPUT2
MOS_IND1
MOS_IND2
M_4103_ZSL_132
<value>
n/a
M_4103_ZSH_132
<value>
n/a
M_VALVE_OPENING
<value>
n/a
M_VALVE_CLOSING
<value>
n/a
M_4103_ZAHL_132
<value>
n/a
1= CLOSE
D_4103_ZLL_132
<value>
12086
SDV-132 CLOSE
POSITION
DO
1= OPEN
D_4103_ZLH_132
<value>
12087
SDV-132 OPEN
POSITION
DO
1= MALF
D_4103_ZAHL_132
<value>
12088
SDV-132 CORRECT POS
DO
U_4103_SOV_132A
<value>
02.02.06
MAIN GAS BURNER 02
DO
U_4103_SOV_132B
<value>
02.02.07
MAIN GAS BURNER 02
DO
DRAWING TITLE
SIZE
C
DRAWING NO.
REV.
SHEET TITLE
SHEET
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ELEMENT
SDV v1.8
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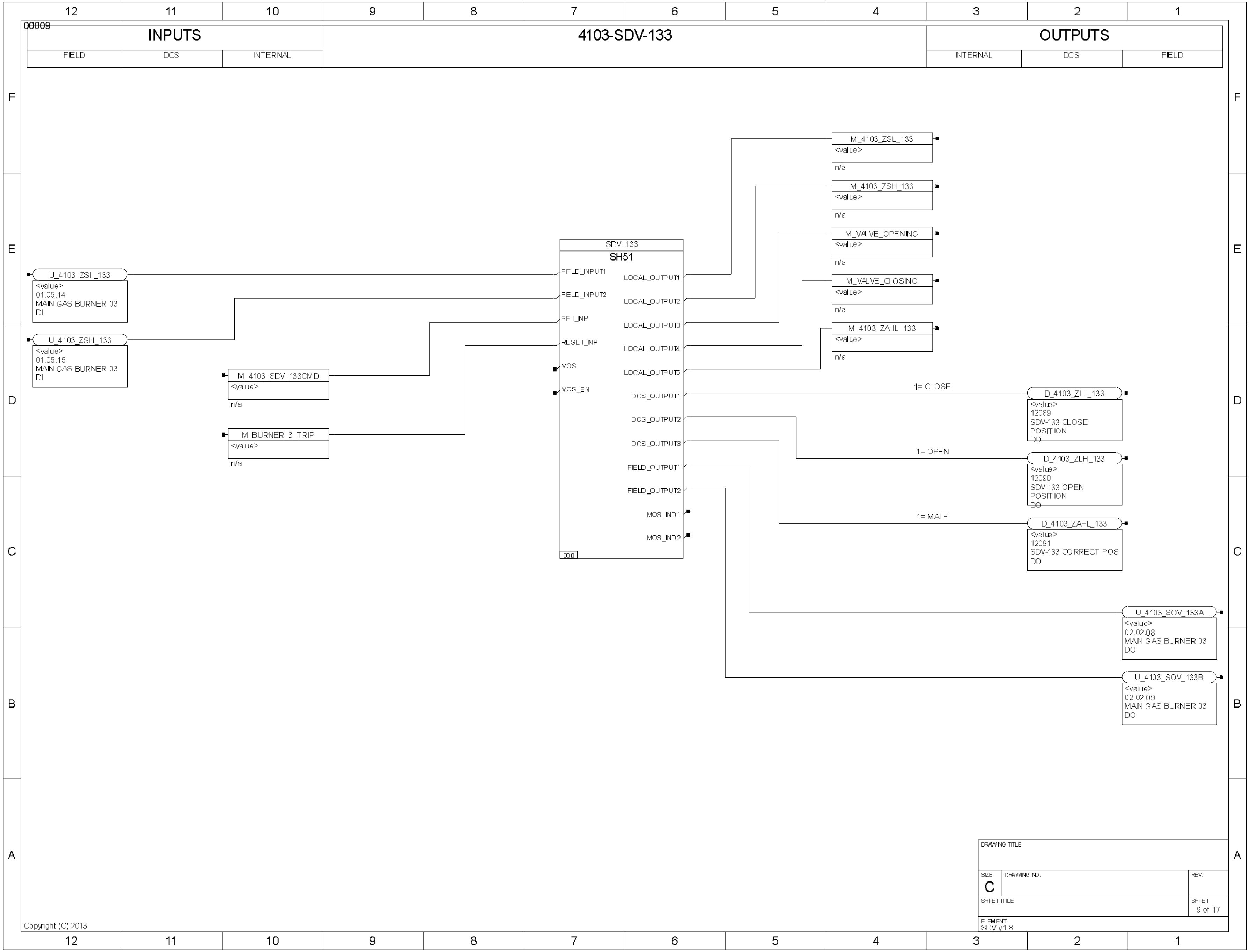
00009
INPUTS
FIELD
DCS
INTERNAL
4103-SDV-133
OUTPUTS
INTERNAL
DCS
FIELD
U_4103_ZSL_133
<value>
01.05.14
MAIN GAS BURNER 03
DI
U_4103_ZSH_133
<value>
01.05.15
MAIN GAS BURNER 03
DI
M_4103_SDV_133CMD
<value>
n/a
M_BURNER_3_TRIP
<value>
n/a
SDV_133
SH51
FIELD_INPUT1
FIELD_INPUT2
SET_INP
RESET_INP
MOS
MOS_EN
LOCAL_OUTPUT1
LOCAL_OUTPUT2
LOCAL_OUTPUT3
LOCAL_OUTPUT4
LOCAL_OUTPUT5
DCS_OUTPUT1
DCS_OUTPUT2
DCS_OUTPUT3
FIELD_OUTPUT1
FIELD_OUTPUT2
MOS_IND1
MOS_IND2
000
M_4103_ZSL_133
<value>
n/a
M_4103_ZSH_133
<value>
n/a
M_VALVE_OPENING
<value>
n/a
M_VALVE_CLOSING
<value>
n/a
M_4103_ZAHL_133
<value>
n/a
1= CLOSE
D_4103_ZLL_133
<value>
12089
SDV-133 CLOSE
POSITION
DO
1= OPEN
D_4103_ZLH_133
<value>
12090
SDV-133 OPEN
POSITION
DO
1= MALF
D_4103_ZAHL_133
<value>
12091
SDV-133 CORRECT POS
DO
U_4103_SOV_133A
<value>
02.02.08
MAIN GAS BURNER 03
DO
U_4103_SOV_133B
<value>
02.02.09
MAIN GAS BURNER 03
DO
DRAWING TITLE
SIZE
C
DRAWING NO.
REV.
SHEET TITLE
SHEET
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ELEMENT
SDV v1.8
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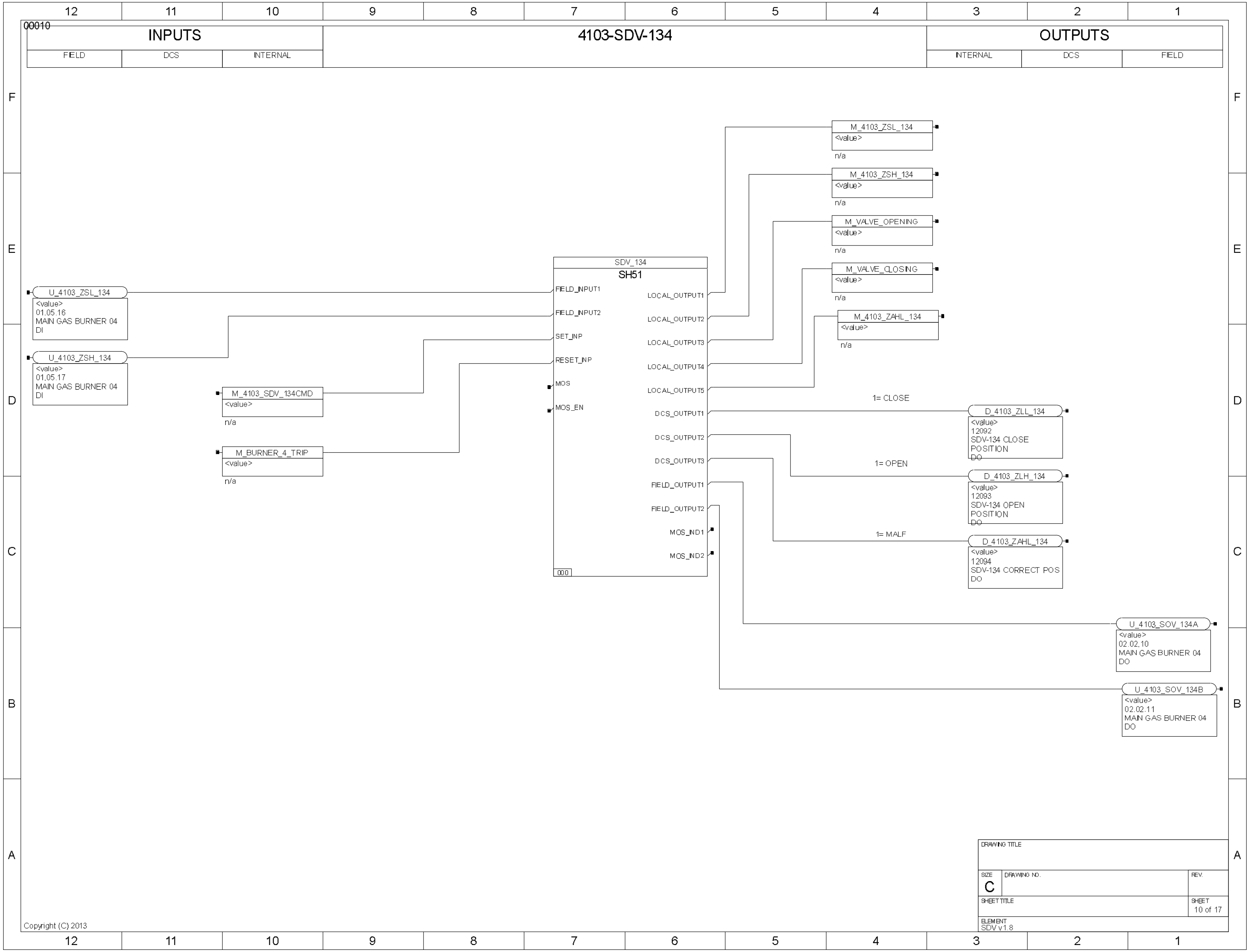

00010
INPUTS
FIELD
DCS
INTERNAL
4103-SDV-134
OUTPUTS
INTERNAL
DCS
FIELD
U_4103_ZSL_134
<value>
01.05.16
MAIN GAS BURNER 04
DI
U_4103_ZSH_134
<value>
01.05.17
MAIN GAS BURNER 04
DI
M_4103_SDV_134CMD
<value>
n/a
M_BURNER_4_TRIP
<value>
n/a
SDV_134
SH51
FIELD_INPUT1
FIELD_INPUT2
SET_INP
RESET_INP
MOS
MOS_EN
LOCAL_OUTPUT1
LOCAL_OUTPUT2
LOCAL_OUTPUT3
LOCAL_OUTPUT4
LOCAL_OUTPUT5
DCS_OUTPUT1
DCS_OUTPUT2
DCS_OUTPUT3
FIELD_OUTPUT1
FIELD_OUTPUT2
MOS_IND1
MOS_IND2
000
M_4103_ZSL_134
<value>
n/a
M_4103_ZSH_134
<value>
n/a
M_VALVE_OPENING
<value>
n/a
M_VALVE_CLOSING
<value>
n/a
M_4103_ZAHL_134
<value>
n/a
1= CLOSE
D_4103_ZLL_134
<value>
12092
SDV-134 CLOSE
POSITION
DO
1= OPEN
D_4103_ZLH_134
<value>
12093
SDV-134 OPEN
POSITION
DO
1= MALF
D_4103_ZAHL_134
<value>
12094
SDV-134 CORRECT POS
DO
U_4103_SOV_134A
<value>
02.02.10
MAIN GAS BURNER 04
DO
U_4103_SOV_134B
<value>
02.02.11
MAIN GAS BURNER 04
DO
DRAWING TITLE
SIZE
C
DRAWING NO.
REV.
SHEET TITLE
SHEET
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ELEMENT
SDV v1.8
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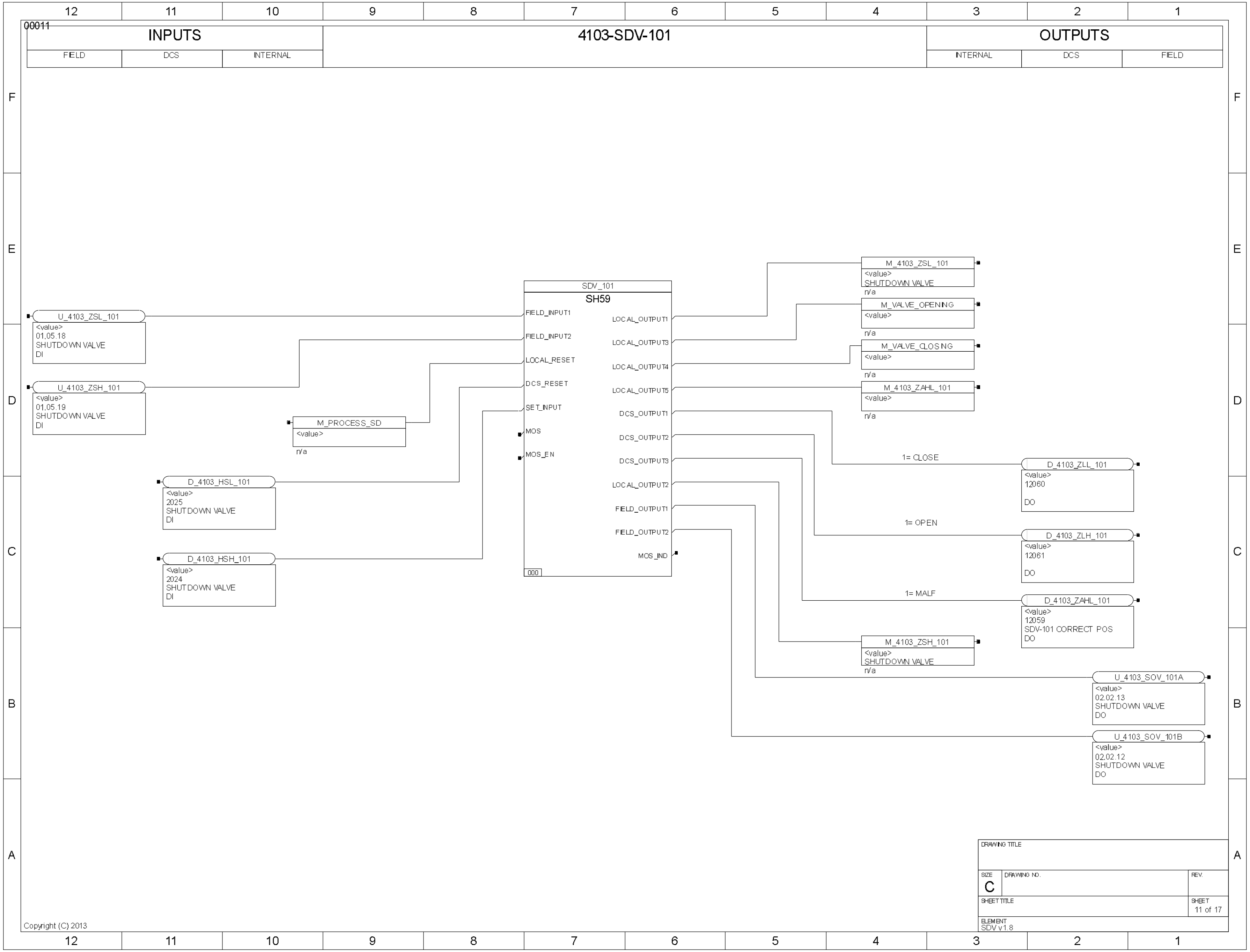
00011
INPUTS
FIELD
DCS
INTERNAL
4103-SDV-101
OUTPUTS
INTERNAL
DCS
FIELD
U_4103_ZSL_101
<value>
01.05.18
SHUTDOWN VALVE
DI
U_4103_ZSH_101
<value>
01.05.19
SHUTDOWN VALVE
DI
M_PROCESS_SD
<value>
n/a
D_4103_HSL_101
<value>
2025
SHUTDOWN VALVE
DI
D_4103_HSH_101
<value>
2024
SHUTDOWN VALVE
DI
SDV_101
SH59
FIELD_INPUT1
FIELD_INPUT2
LOCAL_RESET
DCS_RESET
SET_INPUT
MOS
MOS_EN
000
LOCAL_OUTPUT1
LOCAL_OUTPUT3
LOCAL_OUTPUT4
LOCAL_OUTPUT5
DCS_OUTPUT1
DCS_OUTPUT2
DCS_OUTPUT3
LOCAL_OUTPUT2
FIELD_OUTPUT1
FIELD_OUTPUT2
MOS_IND
M_4103_ZSL_101
<value>
SHUTDOWN VALVE
n/a
M_VALVE_OPENING
<value>
n/a
M_VALVE_CLOSING
<value>
n/a
M_4103_ZAHL_101
<value>
n/a
1= CLOSE
D_4103_ZLL_101
<value>
12060
DO
1= OPEN
D_4103_ZLH_101
<value>
12061
DO
1= MALF
D_4103_ZAHL_101
<value>
12059
SDV-101 CORRECT POS
DO
M_4103_ZSH_101
<value>
SHUTDOWN VALVE
n/a
U_4103_SOV_101A
<value>
02.02.13
SHUTDOWN VALVE
DO
U_4103_SOV_101B
<value>
02.02.12
SHUTDOWN VALVE
DO
DRAWING TITLE
SIZE C
DRAWING NO.
REV.
SHEET TITLE
SHEET 11 of 17
ELEMENT SDV v1.8
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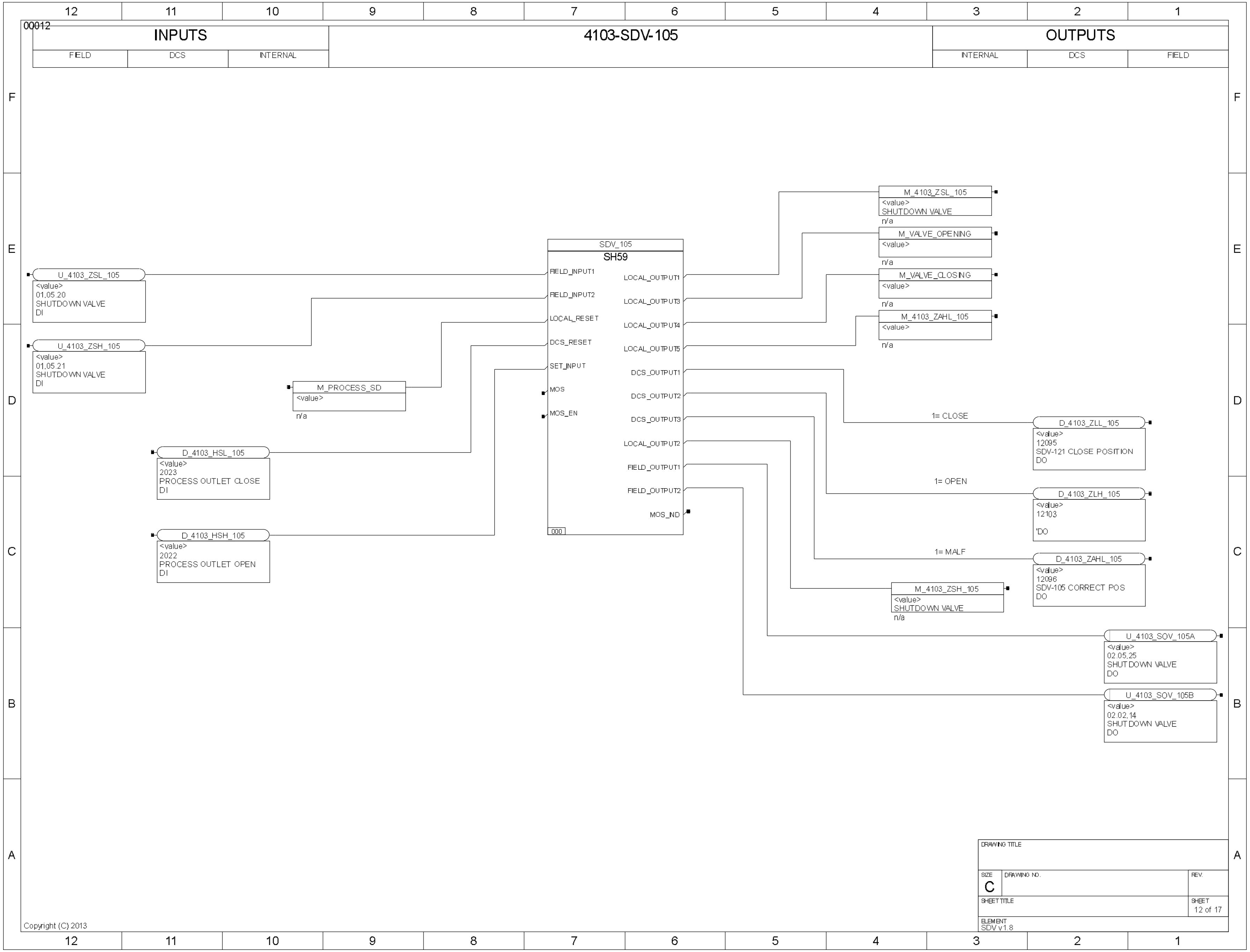
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INTERNAL
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OUTPUTS
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U_4103_ZSH_105
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01.05.21
SHUTDOWN VALVE
DI
M_PROCESS_SD
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D_4103_HSL_105
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PROCESS OUTLET CLOSE
DI
D_4103_HSH_105
<value>
2022
PROCESS OUTLET OPEN
DI
SDV_105
SH59
FIELD_INPUT1
FIELD_INPUT2
LOCAL_RESET
DCS_RESET
SET_INPUT
MOS
MOS_EN
000
LOCAL_OUTPUT1
LOCAL_OUTPUT3
LOCAL_OUTPUT4
LOCAL_OUTPUT5
DCS_OUTPUT1
DCS_OUTPUT2
DCS_OUTPUT3
LOCAL_OUTPUT2
FIELD_OUTPUT1
FIELD_OUTPUT2
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M_4103_ZSL_105
<value>
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M_VALVE_OPENING
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n/a
M_VALVE_CLOSING
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n/a
M_4103_ZAHL_105
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n/a
1= CLOSE
D_4103_ZLL_105
<value>
12095
SDV-121 CLOSE POSITION
DO
1= OPEN
D_4103_ZLH_105
<value>
12103
'DO
1= MALF
D_4103_ZAHL_105
<value>
12096
SDV-105 CORRECT POS
DO
M_4103_ZSH_105
<value>
SHUTDOWN VALVE
n/a
U_4103_SOV_105A
<value>
02.05.25
SHUTDOWN VALVE
DO
U_4103_SOV_105B
<value>
02.02.14
SHUTDOWN VALVE
DO
DRAWING TITLE
SIZE C
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REV.
SHEET TITLE
SHEET 12 of 17
ELEMENT SDV v1.8
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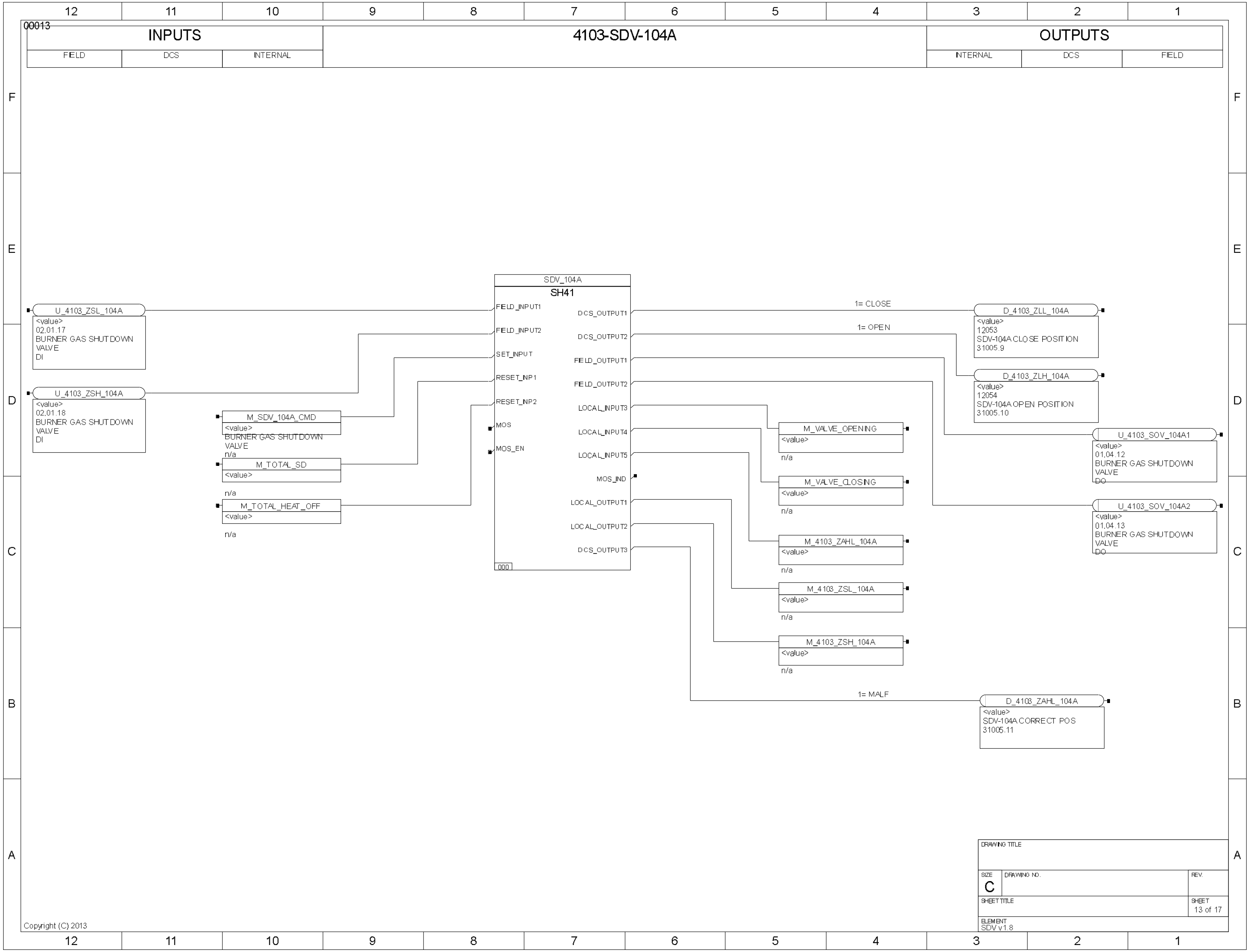
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INTERNAL
4103-SDV-104A
OUTPUTS
INTERNAL
DCS
FIELD
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BURNER GAS SHUTDOWN
VALVE
DI
U_4103_ZSH_104A
<value>
02.01.18
BURNER GAS SHUTDOWN
VALVE
DI
M_SDV_104A_CMD
<value>
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VALVE
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M_TOTAL_SD
<value>
n/a
M_TOTAL_HEAT_OFF
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n/a
SDV_104A
SH41
FIELD_INPUT1
FIELD_INPUT2
SET_INPUT
RESET_INP1
RESET_INP2
MOS
MOS_EN
DCS_OUTPUT1
DCS_OUTPUT2
FIELD_OUTPUT1
FIELD_OUTPUT2
LOCAL_INPUT3
LOCAL_INPUT4
LOCAL_INPUT5
MOS_IND
LOCAL_OUTPUT1
LOCAL_OUTPUT2
DCS_OUTPUT3
000
1= CLOSE
1= OPEN
1= MALF
D_4103_ZLL_104A
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12053
SDV-104A CLOSE POSITION
31005.9
D_4103_ZLH_104A
<value>
12054
SDV-104A OPEN POSITION
31005.10
U_4103_SOV_104A1
<value>
01.04.12
BURNER GAS SHUTDOWN
VALVE
DO
U_4103_SOV_104A2
<value>
01.04.13
BURNER GAS SHUTDOWN
VALVE
DO
M_VALVE_OPENING
<value>
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M_VALVE_CLOSING
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n/a
M_4103_ZAHL_104A
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n/a
M_4103_ZSL_104A
<value>
n/a
M_4103_ZSH_104A
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n/a
D_4103_ZAHL_104A
<value>
SDV-104A CORRECT POS
31005.11
DRAWING TITLE
SIZE
C
DRAWING NO.
REV.
SHEET TITLE
SHEET
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ELEMENT
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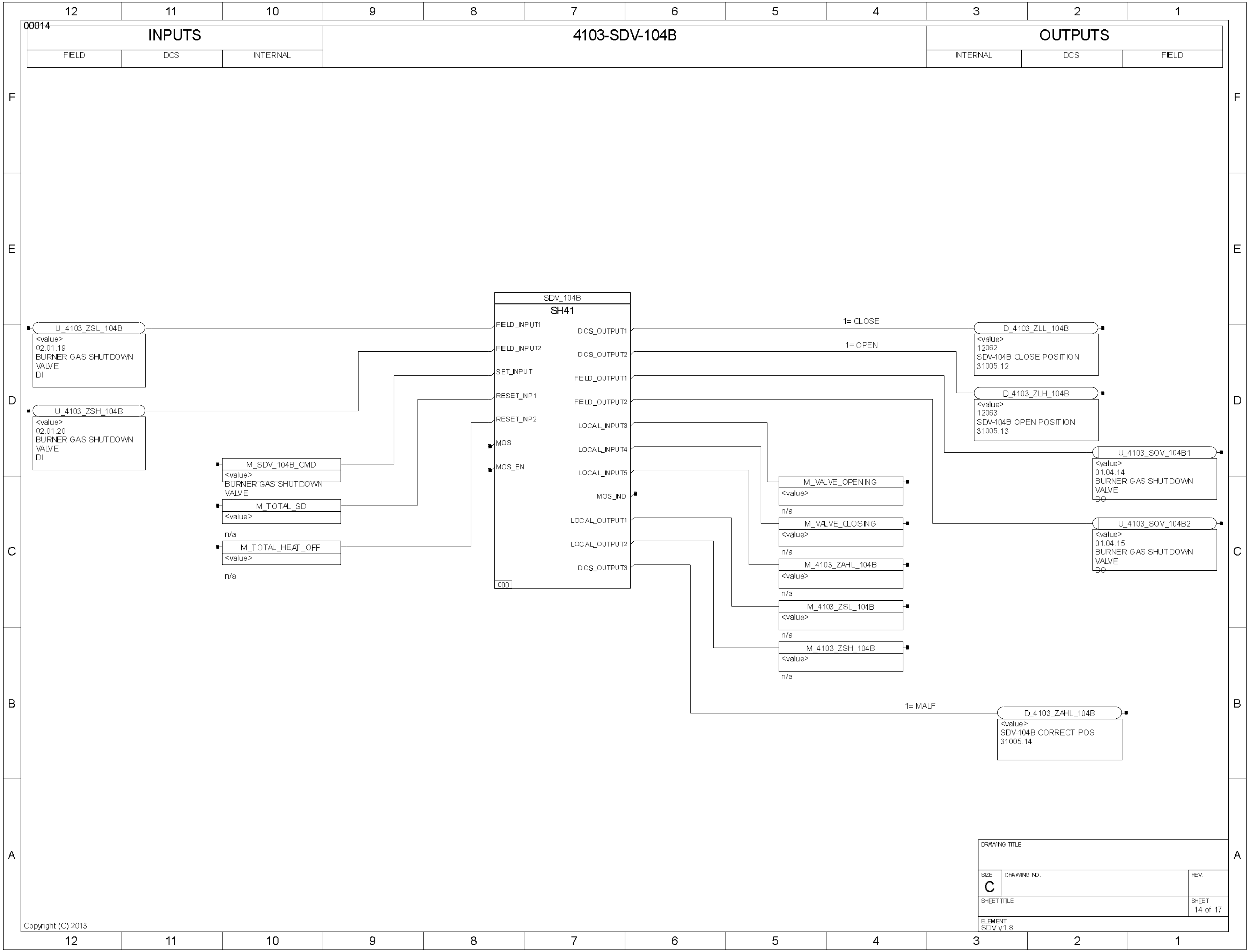
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INPUTS
FIELD
DCS
INTERNAL
4103-SDV-104B
OUTPUTS
INTERNAL
DCS
FIELD
U_4103_ZSL_104B
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02.01.19
BURNER GAS SHUTDOWN
VALVE
DI
U_4103_ZSH_104B
<value>
02.01.20
BURNER GAS SHUTDOWN
VALVE
DI
M_SDV_104B_CMD
<value>
BURNER GAS SHUTDOWN
VALVE
M_TOTAL_SD
<value>
n/a
M_TOTAL_HEAT_OFF
<value>
n/a
SDV_104B
SH41
FIELD_INPUT1
FIELD_INPUT2
SET_INPUT
RESET_INP1
RESET_INP2
MOS
MOS_EN
DCS_OUTPUT1
DCS_OUTPUT2
FIELD_OUTPUT1
FIELD_OUTPUT2
LOCAL_INPUT3
LOCAL_INPUT4
LOCAL_INPUT5
MOS_IND
LOCAL_OUTPUT1
LOCAL_OUTPUT2
DCS_OUTPUT3
000
1= CLOSE
1= OPEN
D_4103_ZLL_104B
<value>
12062
SDV-104B CLOSE POSITION
31005.12
D_4103_ZLH_104B
<value>
12063
SDV-104B OPEN POSITION
31005.13
U_4103_SOV_104B1
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01.04.14
BURNER GAS SHUTDOWN
VALVE
DO
U_4103_SOV_104B2
<value>
01.04.15
BURNER GAS SHUTDOWN
VALVE
DO
M_VALVE_OPENING
<value>
n/a
M_VALVE_CLOSING
<value>
n/a
M_4103_ZAHL_104B
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n/a
M_4103_ZSL_104B
<value>
n/a
M_4103_ZSH_104B
<value>
n/a
1= MALF
D_4103_ZAHL_104B
<value>
SDV-104B CORRECT POS
31005.14
DRAWING TITLE
SIZE
C
DRAWING NO.
REV.
SHEET TITLE
SHEET
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ELEMENT
SDV v1.8
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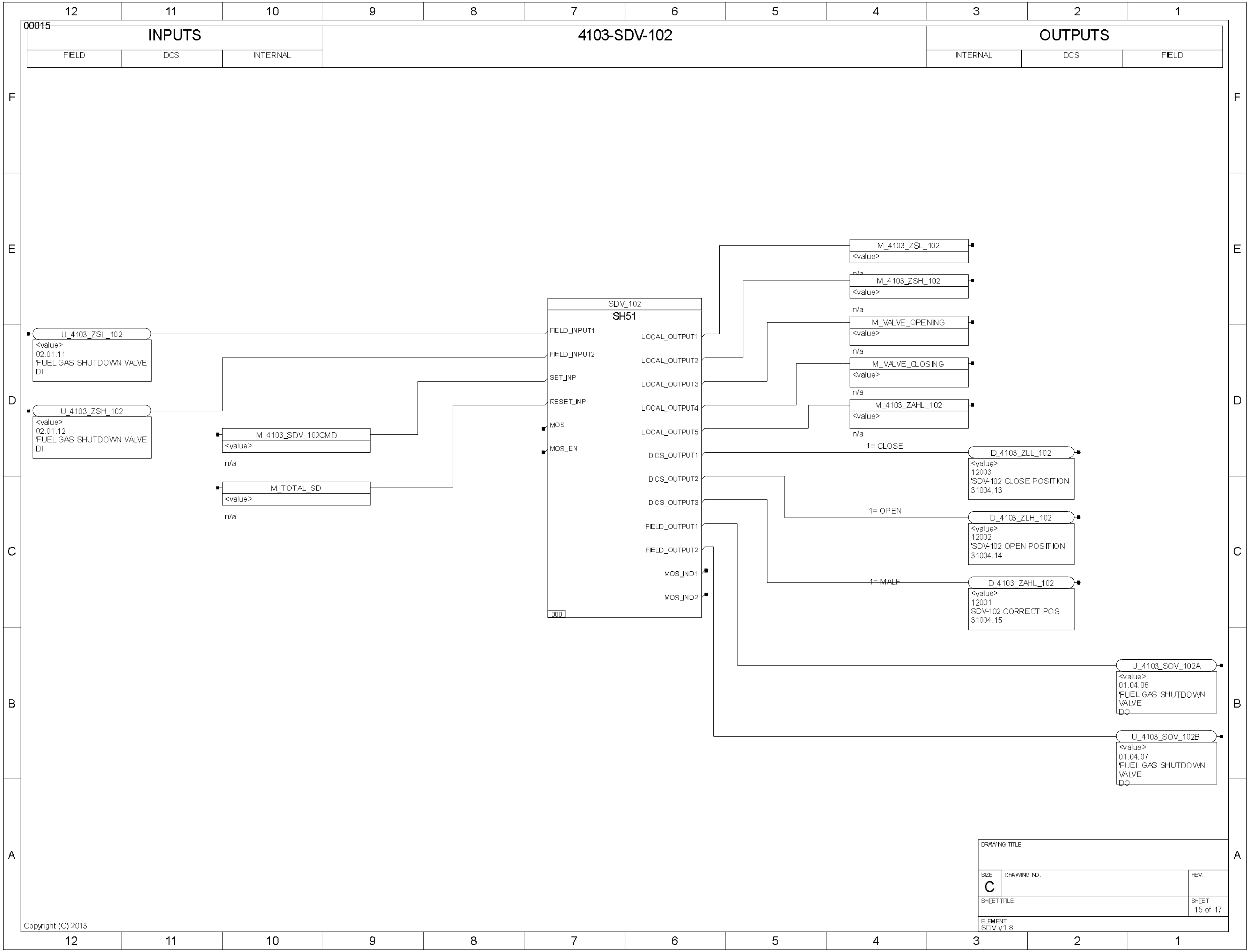
00015
INPUTS
FIELD
DCS
INTERNAL
4103-SDV-102
OUTPUTS
INTERNAL
DCS
FIELD
U_4103_ZSL_102
<value>
02.01.11
FUEL GAS SHUTDOWN VALVE
DI
U_4103_ZSH_102
<value>
02.01.12
FUEL GAS SHUTDOWN VALVE
DI
M_4103_SDV_102CMD
<value>
n/a
M_TOTAL_SD
<value>
n/a
SDV_102
SH51
FIELD_INPUT1
FIELD_INPUT2
SET_INP
RESET_INP
MOS
MOS_EN
LOCAL_OUTPUT1
LOCAL_OUTPUT2
LOCAL_OUTPUT3
LOCAL_OUTPUT4
LOCAL_OUTPUT5
DCS_OUTPUT1
DCS_OUTPUT2
DCS_OUTPUT3
FIELD_OUTPUT1
FIELD_OUTPUT2
MOS_IND1
MOS_IND2
000
M_4103_ZSL_102
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n/a
M_4103_ZSH_102
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M_VALVE_OPENING
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n/a
M_VALVE_CLOSING
<value>
n/a
M_4103_ZAHL_102
<value>
n/a
1= CLOSE
D_4103_ZLL_102
<value>
12003
'SDV-102 CLOSE POSITION
31004,13
1= OPEN
D_4103_ZLH_102
<value>
12002
'SDV-102 OPEN POSITION
31004.14
1= MALF
D_4103_ZAHL_102
<value>
12001
SDV-102 CORRECT POS
31004.15
U_4103_SOV_102A
<value>
01.04.06
'FUEL GAS SHUTDOWN
VALVE
DO
U_4103_SOV_102B
<value>
01.04.07
'FUEL GAS SHUTDOWN
VALVE
DO
DRAWING TITLE
SIZE
C
DRAWING NO.
REV.
SHEET TITLE
SHEET
15 of 17
ELEMENT
SDV v1.8
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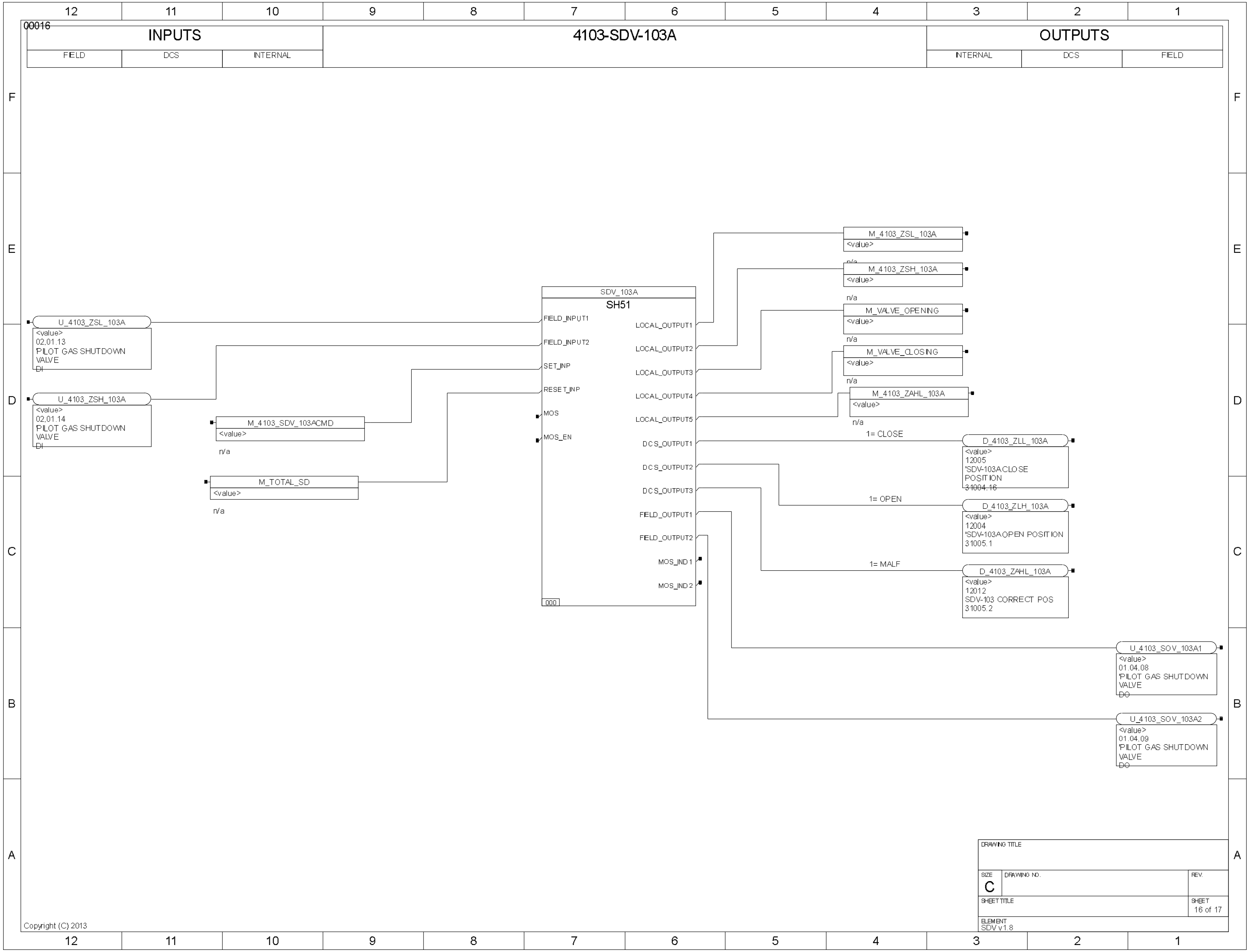
00016
INPUTS
FIELD
DCS
INTERNAL
4103-SDV-103A
OUTPUTS
INTERNAL
DCS
FIELD
U_4103_ZSL_103A
<value>
02.01.13
PILOT GAS SHUTDOWN
VALVE
DI
U_4103_ZSH_103A
<value>
02.01.14
PILOT GAS SHUTDOWN
VALVE
DI
M_4103_SDV_103ACMD
<value>
n/a
M_TOTAL_SD
<value>
n/a
SDV_103A
SH51
FIELD_INPUT1
FIELD_INPUT2
SET_INP
RESET_INP
MOS
MOS_EN
LOCAL_OUTPUT1
LOCAL_OUTPUT2
LOCAL_OUTPUT3
LOCAL_OUTPUT4
LOCAL_OUTPUT5
DCS_OUTPUT1
DCS_OUTPUT2
DCS_OUTPUT3
FIELD_OUTPUT1
FIELD_OUTPUT2
MOS_IND1
MOS_IND2
000
M_4103_ZSL_103A
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M_4103_ZSH_103A
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n/a
M_VALVE_OPENING
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n/a
M_VALVE_CLOSING
<value>
n/a
M_4103_ZAHL_103A
<value>
n/a
1= CLOSE
D_4103_ZLL_103A
<value>
12005
'SDV-103A CLOSE
POSITION
31004.16
1= OPEN
D_4103_ZLH_103A
<value>
12004
'SDV-103A OPEN POSITION
31005.1
1= MALF
D_4103_ZAHL_103A
<value>
12012
SDV-103 CORRECT POS
31005.2
U_4103_SOV_103A1
<value>
01.04.08
'PILOT GAS SHUTDOWN
VALVE
DO
U_4103_SOV_103A2
<value>
01.04.09
'PILOT GAS SHUTDOWN
VALVE
DO
DRAWING TITLE
SIZE
C
DRAWING NO.
REV.
SHEET TITLE
SHEET
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ELEMENT
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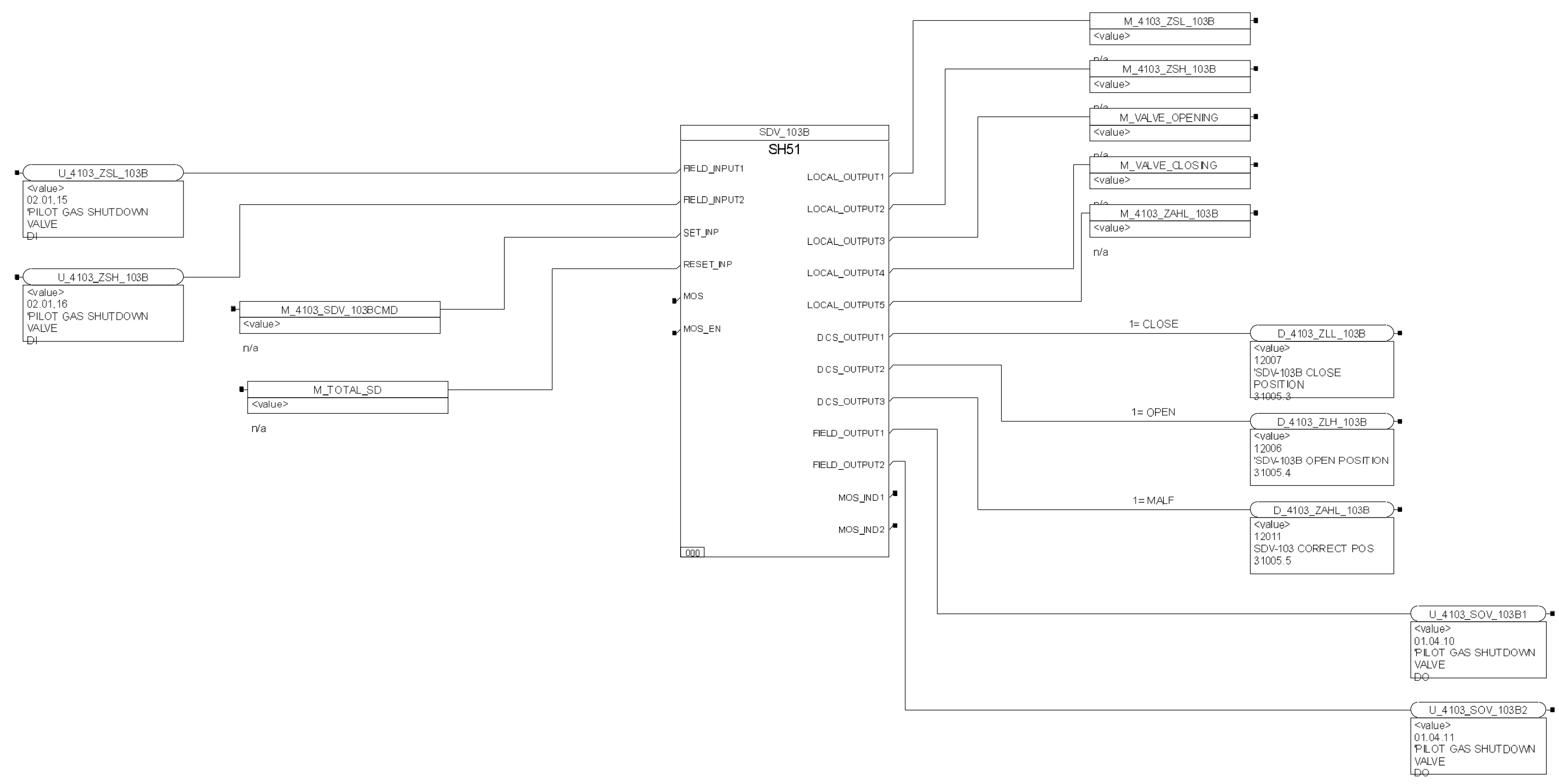
00017

INPUTS			4103-SDV-103B	OUTPUTS		
FIELD	DCS	INTERNAL		INTERNAL	DCS	FIELD



DRAWING TITLE		
SIZE C	DRAWING NO.	REV.
SHEET TITLE		SHEET 17 of 17
ELEMENT SDV v1.8		

00001

PETROBEL COMPANY

ENGINEERING FOR THE PETROLEUM AND PROCESS INDUSTRIES (ENPPI)

P.O.: 3292-300-251-05-16

PETRECO NEW LAND OIL TREATMENT TRAIN
BELAYIM FIELD

BMS ANALOG INPUT CONDITIONING PROGRAM

BOILER MANAGMENT SYSTEM

1910-00-BPFE-01394

SOE Program

ACTIVITY	DATE/TIME
CREATED BY Manager	24/03/2013 01.22.06 à
MODIFIED BY Manager	03/07/2013 09.29.37 à
PRINTED BY Manager	03/07/2013 09.29.50 à
APPROVED BY	
SHEET TEMPLATE SheetTemplateC	

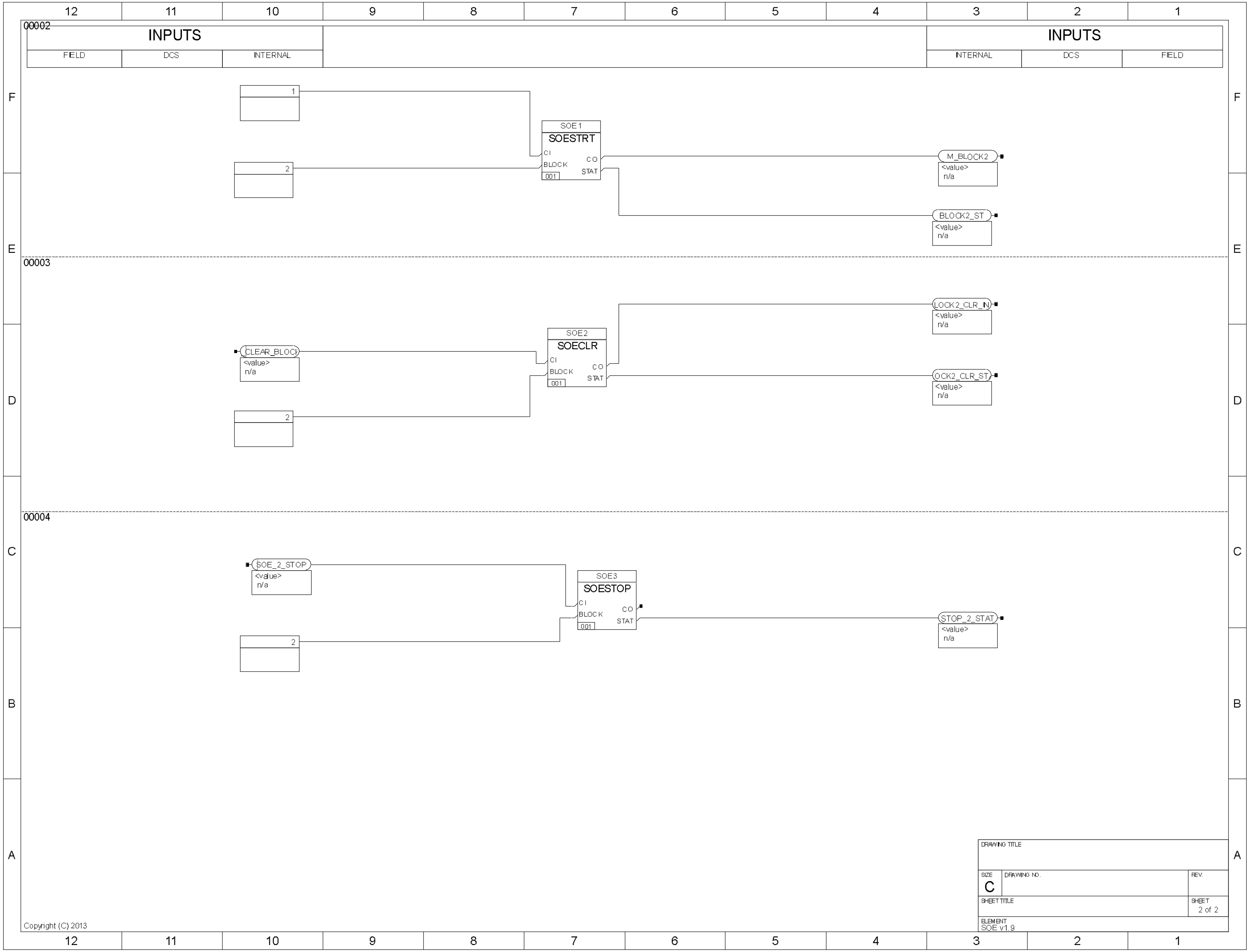
PROJECT

DRAWING TITLE

SIZE C | DRAWING NO. | REV.

SHEET TITLE | SHEET 1 of 2

ELEMENT SOE v1.9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F E D C B A
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INPUTS
FIELD DCS INTERNAL
INPUTS
INTERNAL DCS FIELD
1
2
SOE1
SOESTRT
CI
BLOCK
001
CO
STAT
M_BLOCK2
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BLOCK2_ST
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CLEAR_BLOCI
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STAT
STOP_2_STAT
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DRAWING TITLE
SIZE
C
DRAWING NO.
REV.
SHEET TITLE
SHEET
2 of 2
ELEMENT
SOE v1.9
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ENPPI

NEW LAND OIL TREATMENT TRAIN BELAYIM FIELD
BMS SYSTEM

DETAILED CABINET LAYOUT DRAWINGS

REV. Revision	DATE	DESCRIPTION	DRAFT	CHECKED	APPROVED
3	19/01/2012	Issue for post FAT	SL	MC	PO
2	29/07/2011	Issue for comments	SL	MC	PO
1	15/10/2010	Issue for comments	MG	MC	PO

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ENPPI
BMS SYSTEMS
BELAYIM FIELD
NEW LAND OILTREATMENT TRAIN

Surface Equipment Corporation

Enppi
ENGINEERING FOR THE PETROLEUM AND PROCESS INDUSTRIES

SCALE	SHEET 01
DOCUMENT Document Code	SEC-3308-INS-843
CUSTOMER REF.	
DRAWING FILE NAME	

CIRCUIT SYMBOLS

INSTRUMENT EARTH

SAFETY EARTH

CIRCUIT BREAKER (SINGLE POLE)
A = TAG NO.
B = CURRENT RATING/NO OF POLES

CIRCUIT BREAKER (DOUBLE POLE)
A = TAG NO.
B = CURRENT RATING/NO OF POLES

NC — CONTACT 'CLOSED' IN ALARM CONDITIONS

C — COMMON

NO — CONTACT 'OPEN' IN ALARM CONDITIONS

CIRCUIT BREAKER AUXILIARY CONTACT

FUSE

RYn — 24VDC RELAY
n = RELAY NO.

ISOLATING SWITCH (DOUBLE POLE)
A – TAG NO.
B – RATING/NO POLES

CABINET ACCESSORIES

ISOLATED EARTH/GROUND BAR

CABINET FAN (L, N — CABINET FAN)

OR — LINK/COMB BUSBAR

EXT. TER. PANEL LOCATION DESCRIPTOR

C * S * * ___ U FOR TOP SET OF POINTS
L FOR BOTTOM SET OF POINTS

SLOT NO.

CHASSIS NO.

TRICON POWER SUPPLY

CAB–L — L — A
CAB–N — N — B
CAB–E

A : CHASSIS NO.
B : POWER SUPPLY LOCATION (TOP/BOTTOM)

WIRING IDENTIFICATION

TBx

TBx–1 — 1 — TBx–1
TBx–2 — 2 — TBx–2
TBx–3 — 3 — TBx–3
TBx–n — n — TBx–n

x : TERMINAL BLOCK NO.
n : TERMINAL NO.

TERMINAL BLOCK
TERMINAL BLOCK KNIFE TYPE
TERMINAL BLOCK WITH FUSE HOLDER
TERMINAL BLOCK WITH FUSE HOLDER + LED FAILURE

WIRE COLOURS & SIZES

WIRE TYPE			WIRE COLOUR	
230VAC SUPPLY	Live	:	BLACK	(BK)
	Neutral	:	WHITE	(WH)
	Ground	:	GREEN	(GN)
ALARM CONTACT (NC/NO/C)		:	ORANGE	(OR)
SAFETY EARTH		:	GREEN	(GN)
INSTRUMENT EARTH		:	GREEN/YELLOW	(GN/YL)
LOOPING CIRCUIT		:	ORANGE	(OR)
24VDC SUPPLY	Live	:	RED	(RD)
	Neutral	:	BLACK	(BK)
	Ground	:	GREEN	(GN)

WIRE TYPE		WIRE SIZE
230VAC SUPPLY	:	6mm2
SAFETY EARTH	:	2.5mm2
INSTRUMENT EARTH	:	4mm2
ALARM SIGNAL	:	1.5mm2

REV. Revision	DATE	DESCRIPTION	DRAFT	CHECKED	APPROVED
3	19/01/2012	Issue for post FAT	SL	MC	PO
2	29/07/2011	Issue for comments	SL	MC	PO
1	15/10/2010	Issue for comments	MG	MC	PO

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BELAYIM FIELD
NEW LAND OILTREATMENT TRAIN

Surface Equipment Corporation

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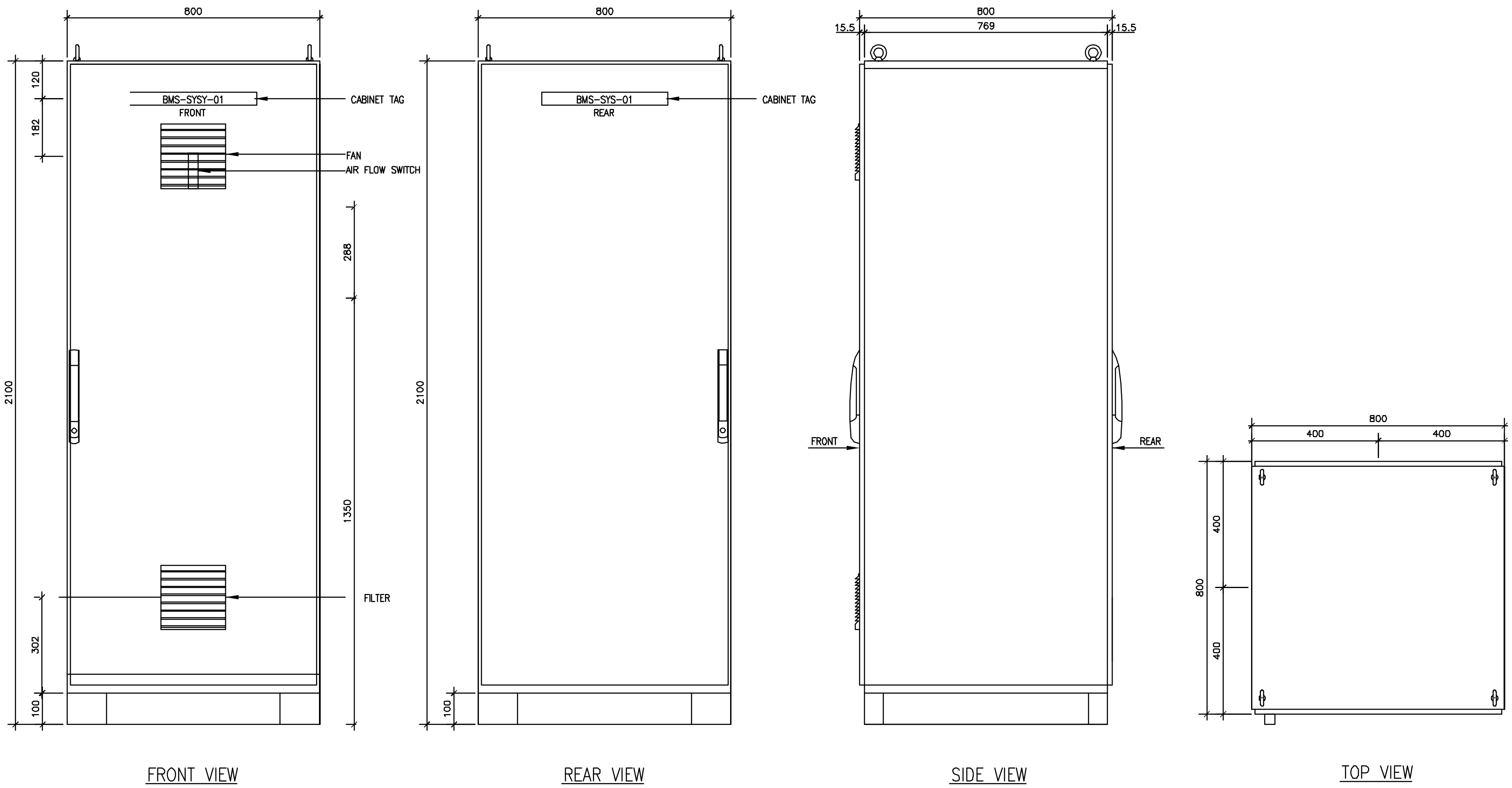
SCALE
SHEET 03
DOCUMENT Document Code SEC–3308–INS–843
CUSTOMER REF.
DRAWING FILE NAME

BMS SYSTEM CABINET BMS-SYS-01 (MCR) EXTERNAL LAYOUT



3	19/01/2012	Issue for post FAT	SL	MC	PO
2	29/07/2011	Issue for comments	SL	MC	PO
1	15/10/2010	Issue for comments	MG	MC	PO
REV. Revision	DATE	DESCRIPTION	DRAFT	CHECKED	APPROVED

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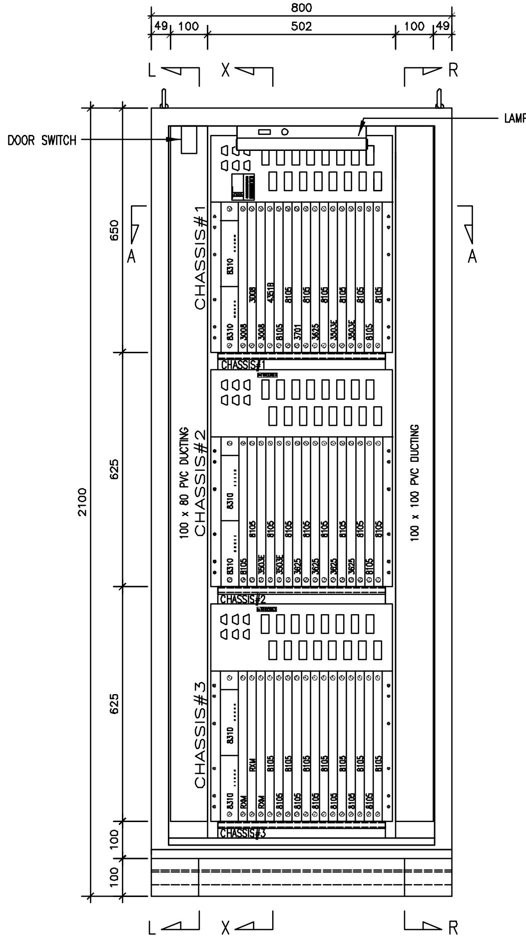
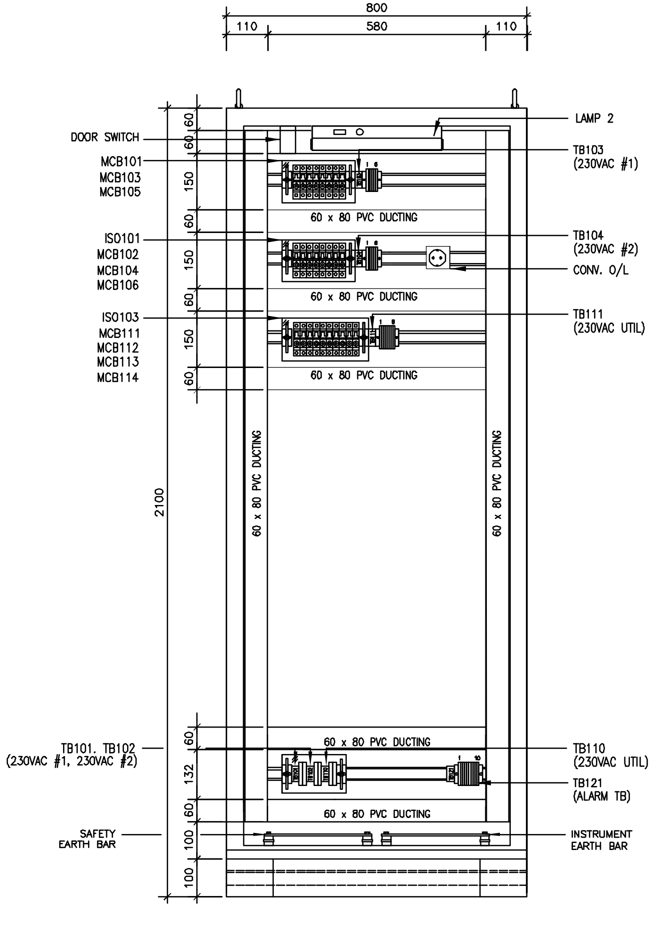
SCALE
SHEET 4
DOCUMENT Document Code SEC-3308-INS-843
CUSTOMER REF.
DRAWING FILE NAME

BMS SYSTEM CABINET BMS-SYS-01 (MCR) INTERNAL LAYOUT



FRONT VIEW WITH DOOR REMOVED



REAR VIEW WITH DOOR REMOVED

REV. Revision	DATE	DESCRIPTION	DRAFT	CHECKED	APPROVED
3	19/01/2012	Issue for post FAT	SL	MC	PO
2	29/07/2011	Issue for comments	SL	MC	PO
1	15/10/2010	Issue for comments	MG	MC	PO

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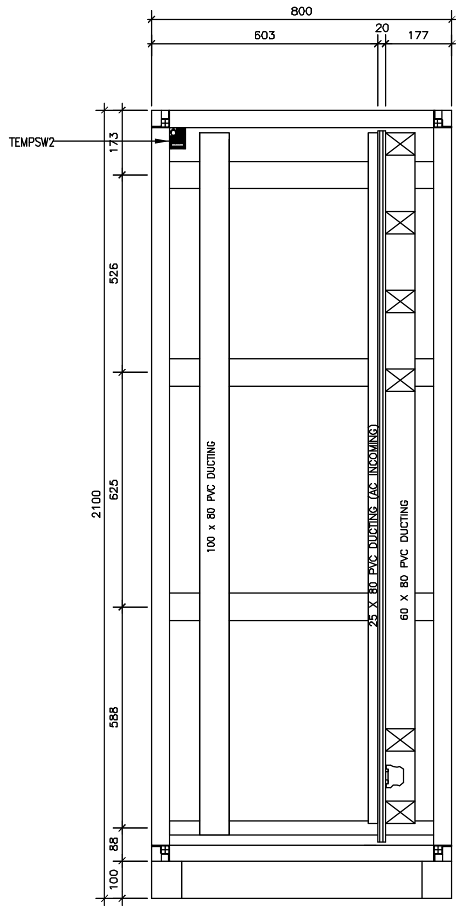
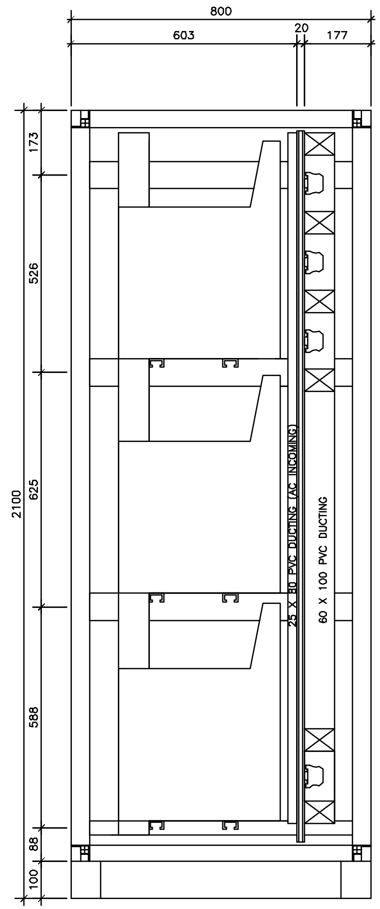
SCALE
SHEET 5
DOCUMENT Document Code SEC-3308-INS-843
CUSTOMER REF.
DRAWING FILE NAME

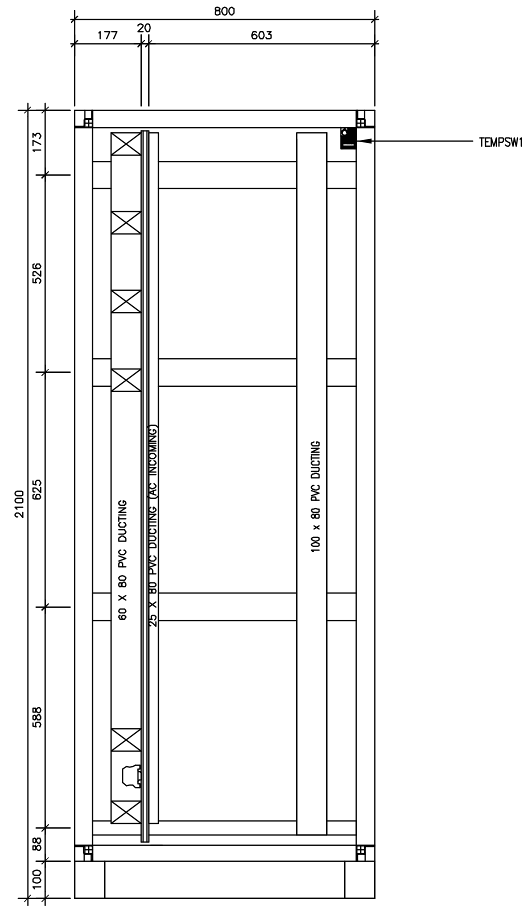
BMS SYSTEM CABINET BMS-SYS-01(MCR) INTERNAL LAYOUT



SECTION L-L



SECTION X-X



SECTION R-R

REV. Revision	DATE	DESCRIPTION	DRAFT	CHECKED	APPROVED
3	19/01/2012	Issue for post FAT	SL	MC	PO
2	29/07/2011	Issue for comments	SL	MC	PO
1	15/10/2010	Issue for comments	MG	MC	PO

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BELAYIM FIELD
NEW LAND OILTREATMENT TRAIN

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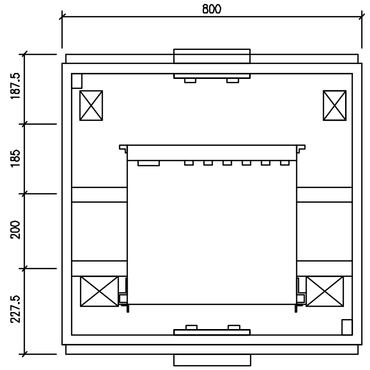
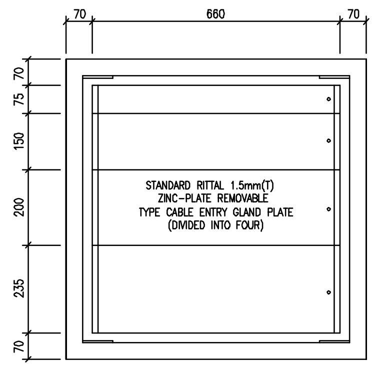
SCALE	SHEET 6
DOCUMENT Document Code	SEC-3308-INS-843
CUSTOMER REF.	
DRAWING FILE NAME	

BMS SYSTEM CABINET BMS-SYS-01 (MCR) INTERNAL LAYOUT



SECTION A-A



CABLE ENTRY - GLAND PLATE DETAILS

REV. Revision	DATE	DESCRIPTION	DRAFT	CHECKED	APPROVED
3	19/01/2012	Issue for post FAT	SL	MC	PO
2	29/07/2011	Issue for comments	SL	MC	PO
1	15/10/2010	Issue for comments	MG	MC	PO

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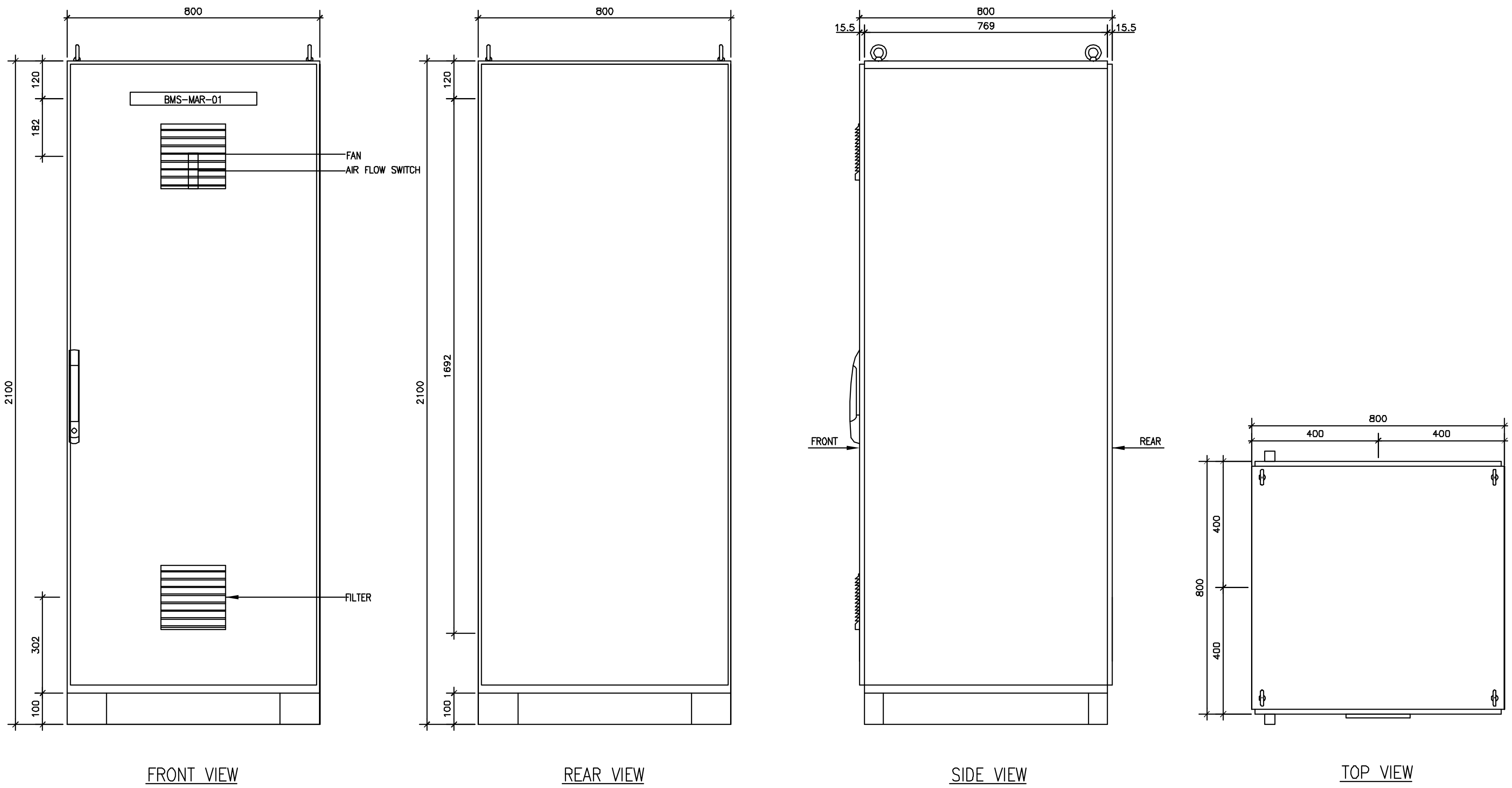
DOCUMENT Document Code SEC-3308-INS-843
CUSTOMER REF.
DRAWING FILE NAME

BMS MARSHALLING CABINET BMS-MAR-01 (MCR) EXTERNAL LAYOUT



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3	19/01/2012	Issue for post FAT	SL	MC	PO
2	29/07/2011	Issue for comments	SL	MC	PO
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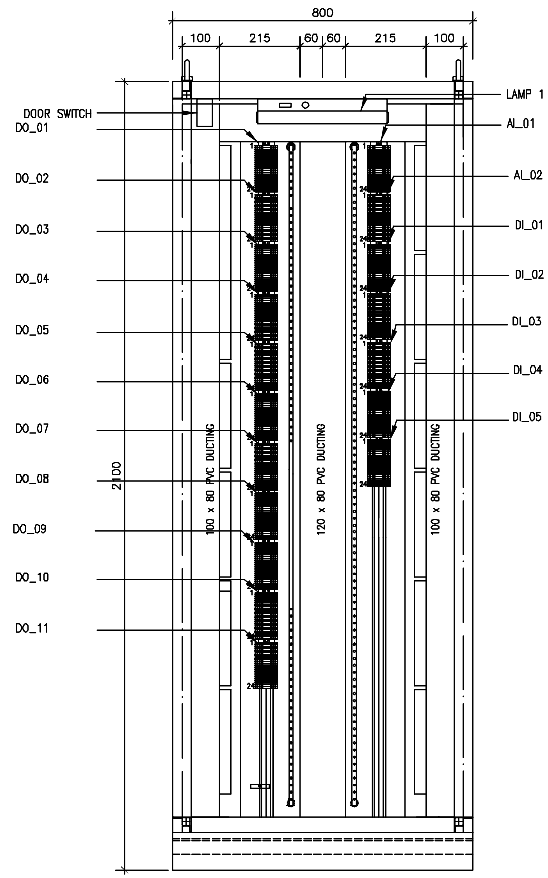
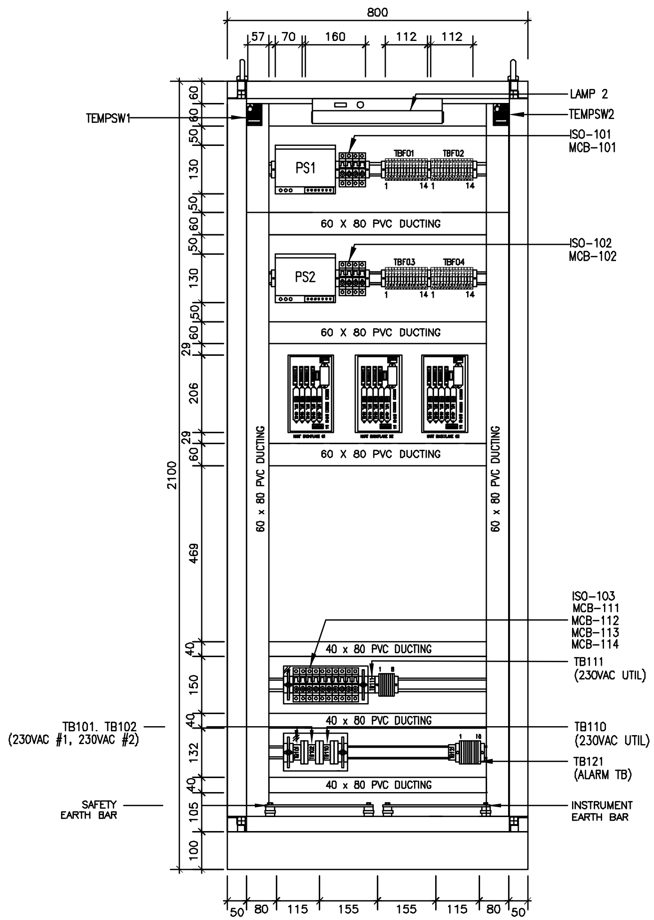
DRAWING FILE NAME	

BMS MARSHALLING CABINET BMS-MAR-01 (MCR) INTERNAL LAYOUT



FRONT VIEW WITHOUT DOOR



REAR VIEW WITHOUT DOOR

REV. Revision	DATE	DESCRIPTION	DRAFT	CHECKED	APPROVED
3	19/01/2012	Issue for post FAT	SL	MC	PO
2	29/07/2011	Issue for comments	SL	MC	PO
1	15/10/2010	Issue for comments	MG	MC	PO

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DOCUMENT Document Code SEC-3308-INS-843

CUSTOMER REF.

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3. Revised Construction Data Base (2)

4. FoxDoc 8.4.1

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6. Planning and Installation Guide, Tricon v9-v10

7. SOE Recorder User Guide, v4

8. Enhanced Diagnostic Monitor User's Guide v1.0