

 TORUS	· Owner SAFETY PLC (LOGIC SOLVER)	Document No.	INS-DS-011		
		Revision / Date	A · September 29, 2026		
		Issue purpose	Issued for Review		
INSTRUMENTATION AND CONTROLS · SAFETY PLC (LOGIC SOLVER)					
Rev.	Date	Revision description	Prepared	Reviewed	Approved
A	2026-09-29	Issued for Review			

NOTES

1. This datasheet covers the safety PLC (logic solver) in panel CP-102B in B-102, which executes the overpressure shutdown SIF-01, the process trips SIF-02 to SIF-04, the station ESD and the fire and gas logic.
2. Controlling documents:  GEN-DB-001, Basis of Design;  INS-LST-001, Instrument Index;  INS-LST-002, I/O List;  INS-LST-003, Alarm and Trip Setpoints;  SAF-SRS-001, Safety Requirements Specification;  SAF-CAL-001, SIL Verification Calculation;  INS-LST-004, Cause and Effect.
3. Values marked typical are budgetary. The vendor shall confirm them with its proposal and final data (HOLD H-15).
4. Units are US customary. Pressures are gauge unless stated as absolute. Operating cases C1 to C7 are defined in  GEN-DB-001, Section 6; normal conditions are case C2, maximum operating conditions the envelope of C1 to C7, and design conditions those of  GEN-DB-001, Section 7.
5. The logic solver failure rate assumed in  SAF-CAL-001 shall be replaced by the certified value (HOLD H-15).
6. The safety system is independent of the control system: separate processor, I/O, power supply modules, cabinet and field junction boxes (JB-101S, JB-130S, JB-140S).

GENERAL

Table 1-1: General Data

Item	Value	Item	Value
Project	 County, 	Service	120 MMSCFD gas receipt into the receiving pipeline operator's 
Form content	ISA-20; tag numbers to ISA-5.1	Electrical codes	NFPA 70 (2023) Articles 500 and 501; API RP 500
Safety instrumented tags	IEC 61511 and IEC 61508	Sour service	Not required; sweet gas, H2S 4 ppmv maximum (NACE MR0175 not applied)

SITE CONDITIONS

Table 1-2: Site and Environmental Conditions

Item	Value	Item	Value
Ambient design temperature	-5 °F to 110 °F	Electronics rating	-40 °F to 158 °F (-40 °C to 70 °C)
Solar radiation	1,000 W/m ² ; sunshades where exposed	Elevation and atmosphere	1,150 ft MSL; 14.10 psia
Wind and ice	108 mph (ASCE 7-22, Exposure C); 0.5 in radial ice (HOLD H-06)	Area classification	Class I, Division 2, Group D in process areas; Division 1 within 5 ft of vents and relief outlets (Volume 6 area classification drawing)
Temperature class	T3 minimum (natural gas autoignition about 900 °F)	Enclosure	NEMA 4X (IP66) minimum; 316 SS or copper-free aluminum (below 0.4 % Cu), epoxy coated
Instrument power	24 VDC from the station UPS ( GEN-DB-001, Section 9.8) unless noted		



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I/O COUNT

Table 1-3 gives the I/O count.

Table 1-3: Safety PLC I/O Count

I/O type	Used	Required with 20 % spare	Channels per module	Modules	Installed channels	Spare channels
AI	7	9	8	3	24	17
DI	30	36	16	3	48	18
DO	14	17	8	3	24	10

Note 1: Used points from  INS-LST-002, I/O List.

SPECIFICATION

Table 1-4: Specification

Item	Requirement
Type	Safety PLC certified to IEC 61508 SIL 3 by an accredited body, for IEC 61511 SIL 3 applications in low demand mode
Architecture	1oo2D or triple modular redundant processor, SIL 3 capable in a single configuration; redundant power supplies
I/O modules	SIL 3 certified: AI 4-20 mA with HART pass-through, line monitoring and NE43 detection; DI with open and short line monitoring for normally closed contacts; DO 24 VDC 0.5 A, de-energize to trip, line monitored; 20 % installed spare
Voting	Two-out-of-three on PT-133A/B/C; a faulted channel is voted to trip, degrading to one-out-of-two ( SAF-SRS-001)
Response time	Logic scan and I/O 100 ms maximum; within the 0.5 s logic allowance of SIF-01
Sequence of events	1 ms resolution on all safety inputs and trips; first-out capture; GPS time
Communications	Modbus TCP server to the RTU, read-only: write disabled in configuration and by key switch; no remote write or reset; engineering port on a separate network behind a physical key
Bypass	Maintenance override by key switch HS-200B plus display permission, time limited (8 h default), alarmed and recorded; no bypass of ESD pushbuttons or HS-215
Reset	Local only (HS-200R panel key, HS-10xR field stations); no reset from SCADA ( INS-RPT-001)
Diagnostics	Diagnostic coverage at least 90 %; diagnostic alarms to the RTU
Program security	Password and key switch for program changes; checksum displayed and recorded; management of change per IEC 61511-1 Clause 5.2.6.2
Cybersecurity	IEC 62443-4-2 SL 2 capable; separate safety zone ( INS-RPT-002)
Power	24 VDC from the UPS, dual feeds; about 113 W for the panel ( INS-DS-014)
Environmental	-40 to 158 °F; G3 conformal coating
Documentation	Safety manual, certificate, application program listing, traceability to  SAF-SRS-001, test and validation reports per IEC 61511-1 Clauses 15 and 16

OPEN ITEMS

Table 1-5: Open Items

HOLD	Item	Responsible party
H-15	Safety PLC model, PFD and certificate	Systems integrator after award

