 TORUS	· Owner GUIDED-WAVE RADAR AND RADAR LEVEL TRANSMITTERS			Document No.	INS-DS-004
				Revision / Date	A · September 29, 2026
				Issue purpose	Issued for Review
INSTRUMENTATION AND CONTROLS · GUIDED-WAVE RADAR AND RADAR LEVEL TRANSMITTERS					
Rev.	Date	Revision description	Prepared	Reviewed	Approved
A	2026-09-29	Issued for Review			

NOTES

1. This datasheet covers the guided-wave radar in an external cage on the V-101 sump (LT-104), the magnetic level gauge LG-104, and the non-contact 80 GHz radar on liquids tank T-101 (LT-191).
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;  INS-DWG-004, Instrument Installation Hook-up Typicals (HU-L1, HU-L2);  MEC-DS-004, Mechanical Datasheet T-101 Liquids Tank.
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. LT-104, LSHH-105 and LSLL-106 connect to V-101 on separate nozzles, so that the control and safety sensors are independent ( SAF-SRS-001).
6. The LT-191 range and set points are based on the 8 ft T-101 shell of  MEC-DS-004; they scale with the final shell height.

GENERAL

Table 1-1: General Data

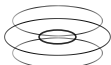
Item	Value	Item	Value
Project	 County, 	Service	120 MMSCFD gas receipt into the receiving pipeline operator's 
Form content	ISA-20; tag numbers to ISA-5.1	Electrical codes	NFPA 70 (2023) Articles 500 and 501; API RP 500
Safety instrumented tags	IEC 61511 and IEC 61508	Sour service	Not required; sweet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

Table 1-3 lists every tag in  INS-LST-001 that references this datasheet, and Table 1-4 gives the process conditions at each tag.

Table 1-3: Tag Schedule

Tag	Service	P&ID	Range or set	System	JB	Area classification
LT-104	V-101 sump level	 PRO-DWG-102	0 to 30 in	BPCS RTU/PLC	JB-101	Class I, Division 2, Group D
LG-104	V-101 sump level gauge	 PRO-DWG-102	0 to 30 in	Local, no I/O	None	Class I, Division 2, Group D
LT-191	T-101 level (non-contact radar)	 PRO-DWG-110	0 to 96 in	BPCS RTU/PLC	JB-101	Class I, Division 1, Group D (within 5 ft of the T-101 vent)

Table 1-4: Process Conditions

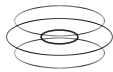
Tag	Normal P and T	Maximum operating P and T	Design P and T
LT-104	1,050 psig / 70 °F	1,150 psig / 45 to 120 °F	1,440 psig / -20 to 150 °F
LG-104	1,050 psig / 70 °F	1,150 psig / 45 to 120 °F	1,440 psig / -20 to 150 °F
LT-191	Atmospheric / ambient	Atmospheric / -5 to 110 °F	Atmospheric / -5 to 110 °F

SPECIFICATION

Table 1-5: Specification

Item	Requirement
LT-104 type	Guided-wave radar, coaxial or single-rod probe in an external cage, two-wire 4-20 mA with HART
LT-104 cage	NPS 3 Sch 160, A106 Grade B or 316 SS, side-side NPS 2 Class 600 RF connections, 1,440 psig at -20 to 150 °F, vendor designed; NPS 3/4 vent and drain with needle valves
LT-104 range	0 to 30 in of sump height, covering LSLL-106 at 3 in to LSHH-105 at 26 in; LIC-104 set point 12 in
LT-104 media	Condensate, water and pipeline liquids, relative density 0.6 to 1.05, dielectric constant 1.8 to 80; natural gas above at 1,050 psig, with vapor compensation where offered
LT-104 accuracy	±0.2 in, typical, vendor to confirm (HOLD H-15)
LG-104	Magnetic level gauge on its own NPS 2 Class 600 chamber, so it stays available when the radar is out of service; float for relative density 0.6 minimum; bicolor flags; 0 to 30 in scale
LT-191 type	Non-contact FMCW radar, 80 GHz, two-wire 4-20 mA with HART, 3 in lens antenna, beam angle 3° or less
LT-191 range	0 to 96 in (tank bottom to shell top); high alarm 57.6 in, high-high 76.8 in (60 % and 80 % of the shell,  INS-LST-003)
LT-191 connection	3 in Class 150 RF flanged adapter, 316 SS, on the T-101 roof away from the fill pipe and PVRV-193 (typical HU-L2)
LT-191 media	Produced water and condensate at atmospheric pressure, -5 to 110 °F; possible foam and condensation; hydrocarbon vapor space
Housing and rating	Explosion-proof, Class I, Division 1, Group D (LT-191 is in the Division 1 zone at the tank roof), NEMA 4X, LCD
Wetted materials	316L SS; PTFE or PEEK process seal rated 1,440 psig at 150 °F on LT-104; PTFE lens on LT-191
Output and power	4 to 20 mA with HART 7, NE43 upscale on loss of echo; 24 VDC loop power
Diagnostics	Echo curve storage, signal quality, loss of echo, probe build-up detection



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Item	Requirement		
SIL capability	Not required; the trips use the independent switches LSHH-105, LSLL-106 and LSHH-192 ([REDACTED] INS-DS-005)		
Tagging	316 SS plate		
Inspection and testing	Factory wet or simulated calibration at five points; cage hydrotest at 2,160 psig with certificate		
Documentation	Dimensional drawing, wiring diagram, hazardous location certificate, calibration certificate, IEC 61508 certificate and safety manual for safety instrumented tags, installation and maintenance manual and spare parts list, all as searchable PDF; cage calculation and EN 10204 3.1 material certificates		

OPEN ITEMS

Table 1-6: Open Items

HOLD	Item	Responsible party
H-15	V-101 sump nozzle elevations and sump height	Filter separator vendor
TBV	T-101 roof nozzle schedule	Volume 4 tank datasheet

