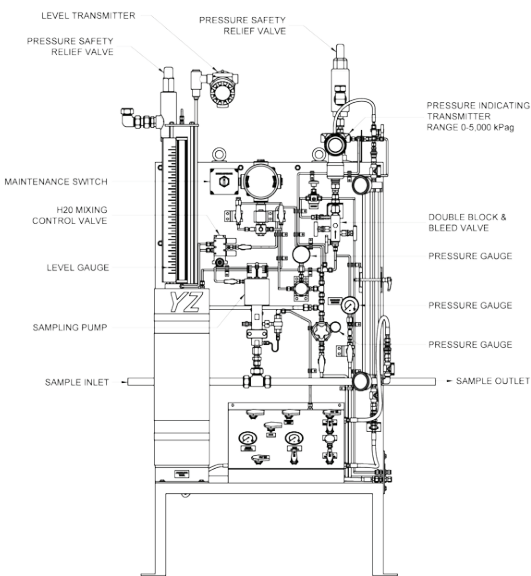
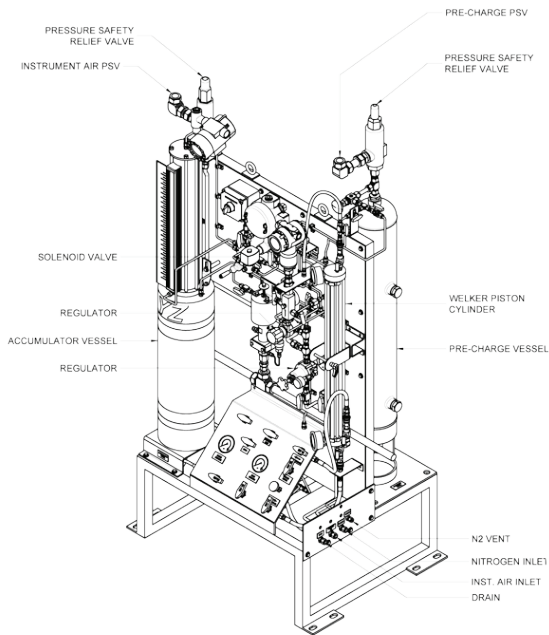




Composite Sampling For Liquid Hydrocarbons



Composite samplers are designed to sample hydrocarbon liquids with densities of 350 – 900 kg/m³, including crude oil, condensate, and Natural Gas Liquids (NGLs). Composite samplers are capable of collecting thousands of individual samples that are all stored in the accumulator portion of the sampler. This collection of samples represents a composite sample of the process over time.

Insight Analytical's composite sampler includes a mixer and an integrated constant pressure (piston) cylinder for NGLs and high vapor pressure samples. This design allows for filling directly from the accumulator into the cylinder after mixing. This improves sample integrity by avoiding the need to connect cylinders to the accumulator with tube fittings and creating the potential for ambient air to contaminate the sample. This also simplifies the composite sampler and reduces sampling errors when piston cylinders are filled for off-site analysis. The composite sampler is designed to operate with Insight's own piston cylinders or third-party piston cylinders.

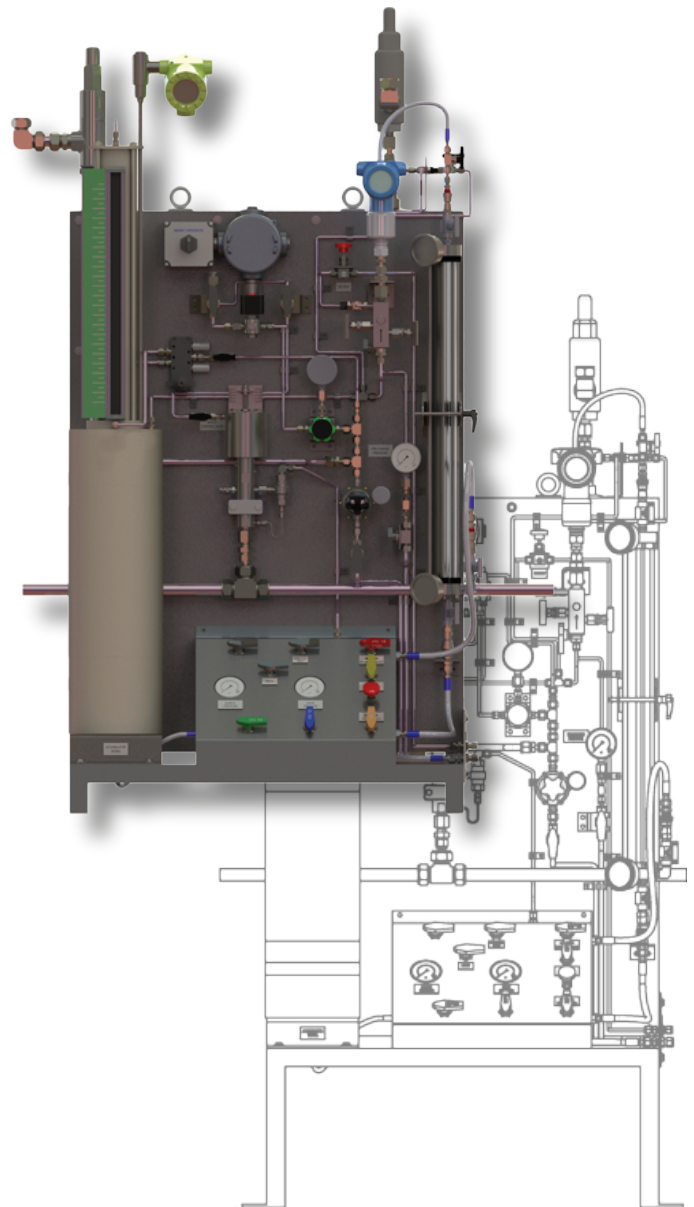


Single Phase Sampling

One of the most important considerations when sampling is the need to maintain a single phase sample at all times. Sufficient pressure is required to keep lighter hydrocarbons in the liquid phase. The Insight composite sampler achieves single phase sampling by maintaining the “pre-charge” pressure for NGLs in both the accumulator and the piston cylinders. When actuated from a customer supplied source, the sample pump pushes against this pre-charge pressure to fill the accumulator under pressure. This pre-charge pressure ensures that lighter hydrocarbons (like ethane or propane) do not flash into the vapor phase when filling.

Sampling

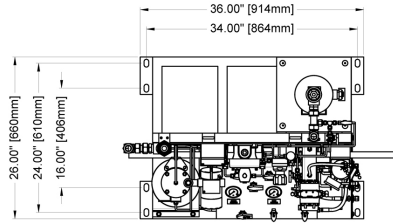
The integrated sample pump is pneumatically actuated from a customer supplied signal. This sample is then collected in an accumulator until 80% full. A level transmitter and pressure transmitter are included to provide analog (4-20 mA) signals to a customer supplied PLC or flow computer/RTU. This allows for automated notification of when the accumulator is full or when pre-charge pressure is lost. A position switch provides status input to the customer supplied PLC/RTU to indicate when the sampler is in operation or maintenance mode. This ensures that safe maintenance can occur without sampling. Color coded valves and a schematic (P&ID) assist operations personnel with mixing, sampling and piston cylinder replacement. All equipment is mounted on a raised platform to allow for simplified operation and maintenance. The entire design follows API (American Petroleum Institute) Report 8.2 for composite sampling including tubing slope and diameter.



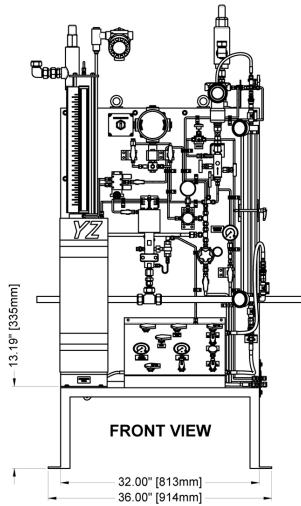
Features & Benefits

- ⊕ Raised platform for easier operation and maintenance.
- ⊕ Optional heated, insulated enclosure with gas detection and temperature control for outdoor mounting in cold climates.
- ⊕ Positive displacement pump with adjustable sample injections per stroke.
- ⊕ Sample accumulator with mixer to improve sample integrity and minimize stratification prior to filling piston cylinders. (ie: oil and water)
- ⊕ Level transmitter and visual level indicator to indicate accumulator fill position locally or remotely with analog output for customer supplied PLC/RTU.
- ⊕ Pressure transmitter to indicate pre-charge pressure in the accumulator and piston cylinders for improved sample integrity of NGLs and lighter hydrocarbon samples.
- ⊕ Sample pump can be mounted locally.
- ⊕ Accumulator volumes of 1.5, 3 or 5 gallons. (5.7, 11.4 or 18.9 liters)
- ⊕ ANSI 600# Piping Specifications

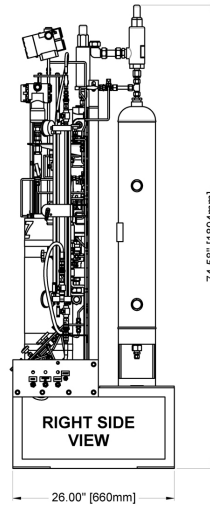
Standard Configuration



TOP VIEW



FRONT VIEW

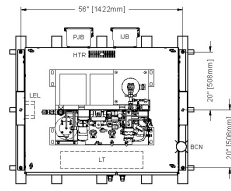
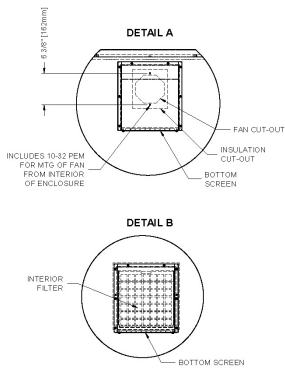


RIGHT SIDE VIEW

NOTES:

1. ALL NPT CONNECTIONS SHALL BE MADE WITH PTFE TAPE AND SWAG.
2. PRESSURE TEST AS PER S.A.F.S.T.O.M.S.
3. LAYOUT MAY NOT BE EXACTLY AS SHOWN.

Optional Heated Enclosure

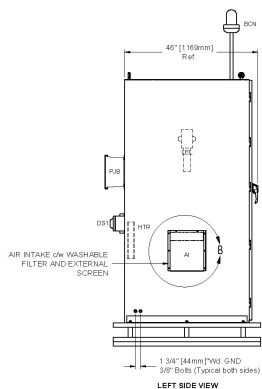
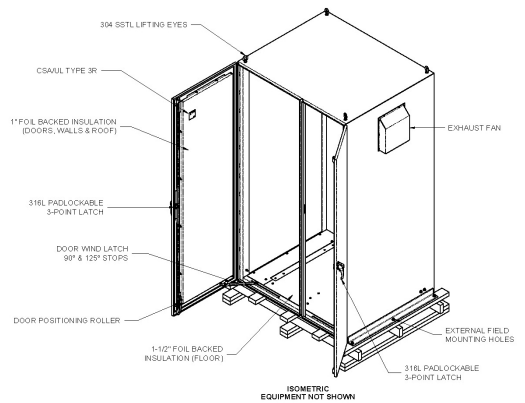


LEGEND

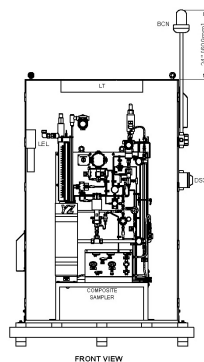
- AI AIR INTAKE
- BCN BEACON (RED)
- DS1 LIGHT DISCONNECT SWITCH
- DS2 HEATER DISCONNECT SWITCH
- DS3 EXHAUST FAN DISCONNECT SWITCH
- EXH EXHAUST FAN
- HR 600W HEATER
- JB SIGNAL JUNCTION BOX
- LEL LEL MONITOR
- LI INTERIOR LIGHT
- PJB POWER JUNCTION BOX

NOTES

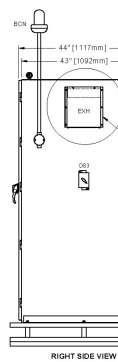
MATERIAL PROPERTIES: 304 SST, 12ga & 14ga FOIL BACKED INSULATION
ENCLOSURE RATED CSAAL TYPE 3R, IP66
FINISH FULLY BEAM WELDED, PAD SANDED EXTERIOR
304L TYPICAL LIFTING EYELETS, EYELETS MUST BEAR THE WEIGHT OF THE COMPLETED SHELTER
TOTAL WEIGHT = 174LBS



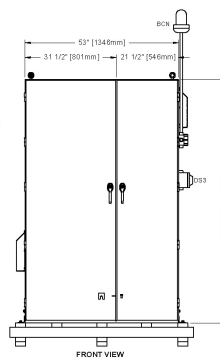
LEFT SIDE VIEW



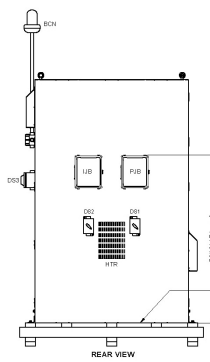
FRONT VIEW (DOORS REMOVED)



RIGHT SIDE VIEW



FRONT VIEW



REAR VIEW

BOTTOM INCLUDES QTY 2, Ø0.156" DRAIN HOLES AS PER TYPE 3R REQUIREMENTS

Process & Instrument Drawing

TUBING SPECIFICATIONS

1/8" X 0.028" WALL, SEAMLESS, 316LSS, ASTM A269, P/N SS-T2-S-028-20
 1/4" X 0.035" WALL, SEAMLESS, 316LSS, ASTM A269, P/N SS-T4-S-035-20
 3/8" X 0.049" WALL, SEAMLESS, 316LSS, ASTM A269, P/N SS-T6-S-049-20
 1/2" X 0.049" WALL, SEAMLESS, 316LSS, ASTM A269, P/N SS-T8-S-049-20

DESIGN CONDITIONS (PROCESS)

MAX DESIGN PRESSURE: 9000 kPag @ 38C
 MAX DESIGN TEMPERATURE: 38C
 MIN DESIGN TEMPERATURE: -45C
 DENSITY: TBD
 VISCOSITY: TBD
 VAPOUR PRESSURE: TBD
 SERVICE: TBD
 AREA CLASS: TBD
 INTERIOR ENCLOSURE AREA CLASS: TBD
 EXTERIOR ENCLOSURE AREA CLASS: TBD
 ENCLOSURE RATING: TBD

DESIGN CONDITIONS (AIR)

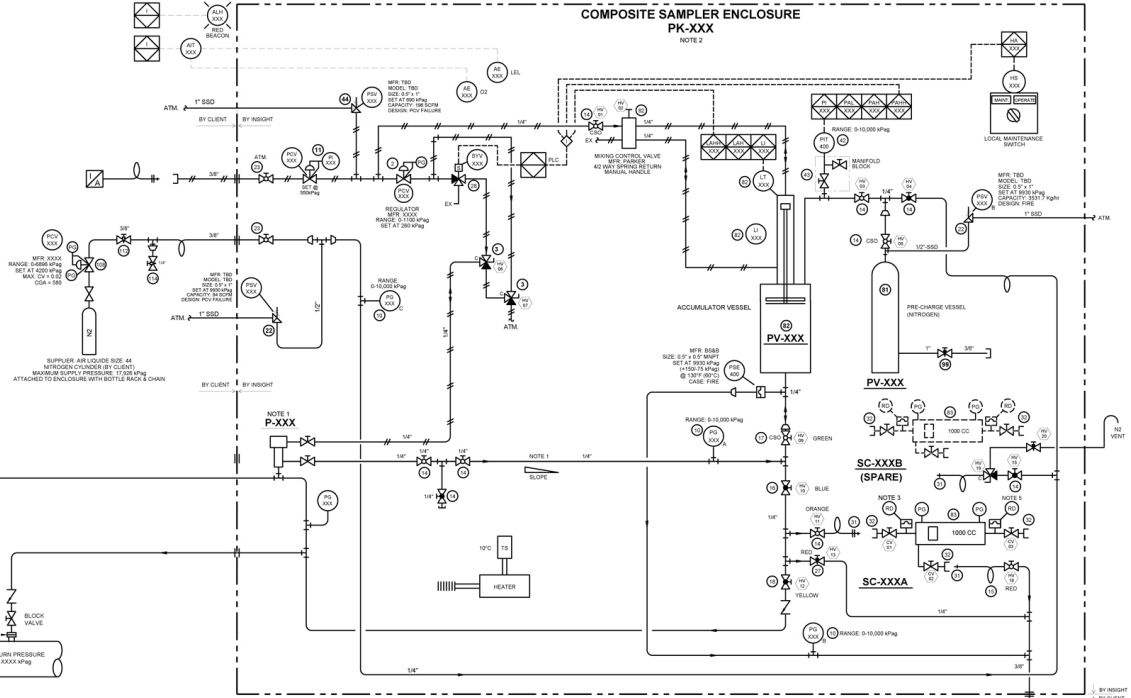
MAX DESIGN PRESSURE: 1034 kPag @ 38C
 MAX DESIGN TEMPERATURE: 38C

DESIGN CONDITIONS (N2)

MAX DESIGN PRESSURE: 10,341 kPag
 OPERATING PRESSURE: 2,525 kPag

NOTES:

NOTE 1: THE PUMP VOLUME CAN BE ADJUSTED BETWEEN 0.5 AND 1.8 CC/STROKE. SET @ 1.0 CC/STROKE.
 NOTE 2: COMPOSITE SAMPLER INTEGRATION SCOPE INCLUDES ALL HARDWARE WITHIN DASHED BLOCK.
 NOTE 3: RUPTURE DISKS ARE SET TO 9,930 kPag.



SAMPLING PUMP

P-XXX

MAX DESIGN PRESS: 12,411 kPag @ 60°C, MDMT: -17°C
 MAX VOLUME PER STROKE: 1.8 CC/STROKE
 PNEUMATICALLY POWERED, PISTON STYLE PUMP
 PROCESS CONNECTIONS: 3/8" MNPT INLET CONNECTION, 1/8" TUBE OUTLET CONNECTION
 BOOST FACTOR: 20:1

ACCUMULATOR VESSEL

PV-XXX

MAX DESIGN PRESS: 12,411 kPag, DESIGN TEMP: 60°C, MDMT: -40C
 DESIGN VOLUME: 11.5L, MATERIAL: 1/8" 304L CARBON STEEL, NOT TO EXCEED 80% FULL
 DIMENSIONS: 7.5" DIA., 25" LONG (CYLINDER ONLY), 48.5" OAL WITH MIXING CHAMBER
 TYPE: FLOATING PISTON CYLINDER
 OPTIONS: PNEUMATIC POWER MARKER, MAGNETIC LEVEL INDICATOR
 CRN APPROVED

PRE-CHARGE VESSEL

PV-XXX

MAX DESIGN PRESS: 11,978 kPag, AT 34°C, MDMT: -20°C
 DESIGN VOLUME: 13.6L
 DIMENSIONS: 4.62" DIA., 30" LONG
 MATERIAL: A196 G & B CARBON STEEL
 CRN APPROVED

SAMPLE CYLINDERS

SC-XXXXA/B

TRANSPORT CANADA APPROVED
 TC SPECIFICATION 348M1
 CRN RATED
 12M11 kPa DESIGN TEMP: 38°C, MDMT: -20°C
 1000 CC

Specifications

Design Conditions (Process):

Maximum Operating Pressure:	1,440 psig (9930 kPa)
Density:	350 to 900kg/m ³ (21.8 to 56.2 lbs/ft ³)
Vapor Pressure:	8.7 to 21.7 psig (60 to 150 kPag)
Piping Specifications:	600# ANSI
Service:	Liquid Hydrocarbons (crude oil, condensate, or NGLs)
Actuation Gas Max Design:	67/100 psig (690 kPag) Instrument Air or N ₂
Actuation Gas:	100 psig (690 kPag) Instrument Quality Gas or N ₂

Power Supply Options:

Pneumatic	120 VAC @ 1 Amp
Actuation Signal	24 VDC Option
Customer supplied	Pneumatic pressure

Design Conditions (Air):

Maximum Operating Pressure:
 100 psig (690 kPag)

Area Classification:

Optional Outdoor Enclosure
 Class I, Div/Zone 1 IIB T3, Enclosure rating NEMA 4X
 Class I Division 1 Groups C and D T3 and Class I Zone 1 IIB T3
 CRN / AB83 and or Provincial Equivalent

Tubing:

1/8" x 0.028" 316LSS
 1/4" X 0.035" 316LSS
 3/8" X 0.049" 316LSS
 1/2" X 0.049" 316LSS

Process Connections:

Sampling Pump:	3/8"NPT inlet / outlet connection
Pump Displacement per Stroke:	Adjustable from 0.5 to 1.8 cc/stroke
Accumulator Vessel:	Actuation gas max design 100 psig (690 kPag) Process design pressure 1800 psig (12411 kPag)

I/O:

Level	4-20 mA
N ₂ Pressure	4-20 mA
Operation/	Dry Contact
Maintenance Switch	