

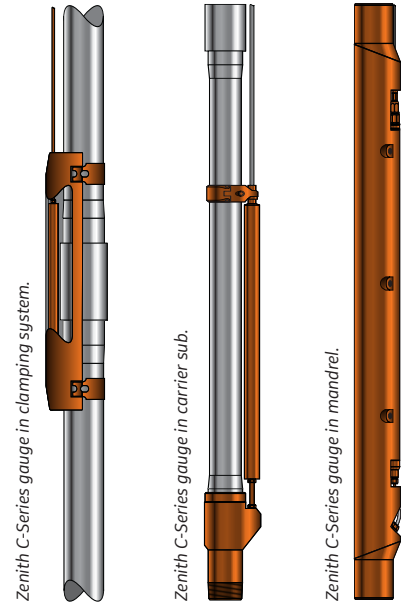


Zenith[®] C-Series Artificial Lift Gauges

Zenith C-Series gauges are installed in a clamp, carrier sub or mandrel in the tubing string above or below a pump or gas lift orifice and use an electric instrument line to communicate signals to surface. The gauge carrier provides a pressure port for the gauge to measure either tubing or annulus pressure, if required.

Gauges are calibrated during manufacture and retain calibration on board - no requirement for dedicated key at surface.

The C-Series gauge is available in multiple specifications to suit the application and economic impact of deploying a monitoring system in your artificially lifted wells - see details below.



Construction

Material	13-chrome metalwork as standard
Max working pressure	5,800psi
Temperature rating	125°C / 150°C
Make up length	C2: 14.3in C5/6: 30in C9: 72in
Outside diameter	C2: 0.9in C5/6/9: 1.125in

Measurement	C2	C5	C6	C9	Units	Range	Resolution	Accuracy	Data Rate
Primary Parameters for essential pump and well surveillance and protection									
annulus pressure - standard accuracy	●	●	●	●	psi/bar	0-5,800psi	0.1 psi	0.1% (C2: 0.2%)	1s
annulus pressure - high accuracy		○	○	○	psi/bar	0-5,800psi	0.08 psi	0.03%	1s
tubing pressure - standard accuracy			●	●	psi/bar	0-5,800psi	0.1 psi	0.2%	1s
tubing pressure - high accuracy			○	○	psi/bar	0-5,800psi	0.08 psi	0.03%	1s
annulus temperature - standard temp	●	●	●	●	°C/°F	0-125°C	0.1°C	1°C	1s
annulus temperature - high temp	○	○	○	○	°C/°F	0-150°C	0.1°C	1°C	1s
tubing temperature - standard temp		●	●	●	°C/°F	0-125°C	0.1°C	1°C	1s
tubing temperature - high temp		○	○	○	°C/°F	0-150°C	0.1°C	1°C	1s
vibration - x axis		●	●	●	G	0-50G	0.001G	1.0%	1s
vibration - y axis		●	●	●	G	0-50G	0.001G	1.0%	1s
Predictive Parameters for preventative maintenance and effective workover management									
rod string twist				●	revolutions	-2,000 to + 2,000	1 turn	+/- 1 turn	10s
rotor position				●	cm	-50 to +50cm	1cm	+/-2cm	1s
Intelligent Parameters for advanced well and field management and optimisation									
surface RPM*				●	RPM	0-1,000	1RPM	+/-6RPM	10s
downhole RPM*				●	RPM	0-1,000	1RPM	+/-6RPM	10s
pump cycles*				●	revolutions	0-10 million	display: 10,000 data log: 1 turn	+/-1 turn	1s

● parameter included as standard | ○ optional alternative or additional parameter | *calculated parameter

Downhole Gauge	Ref. No.
Zenith C2 two parameter gauge	13450310402
Zenith C5 five parameter gauge	13450024402
Zenith C5 five parameter gauge - high accuracy	13450070402
Zenith C6 six parameter gauge	13450023402
Zenith C6 six parameter gauge - high accuracy	13450061402
Zenith C9 PCP protection gauge	13470015402

System features

High quality, modular construction

Long service life allowing repeated deployment

Field-serviceable system

Downhole data collection

SD card — simple data transfer to removable memory card

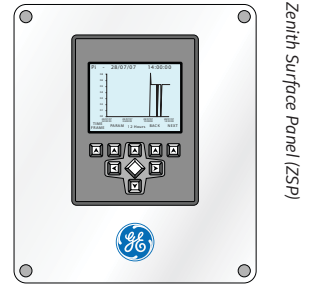
Data display with live on-screen data charting, drive mounted or enclosure

Data trending software

Dedicated engineers' port

Connectivity to remote data collection or SCADA systems

Allows cable megger test



Surface data acquisition

- Zenith Interface Unit (ZIU)** interfaces the gauge signal to a RS232 or RS485 Modbus output for use on a drive or SCADA Remote Terminal Unit.
- Zenith Surface Panel (ZSP)** provides on-screen data charting, alarms and trips, analogue and data (Modbus) communication signals.

Zenith gauges are also available as part of GE's Field Vantage solution, applying the power of the Industrial Internet to help operators visualize well, field, and operation-wide data for smart deployment of resources and decision-making — predict issues with lift systems, optimize production and reduce operating costs.

Surface Equipment	Ref. No.	Details
ZIU	14460119000	Input: C-Series gauge signal Output: RS485 Modbus RTU
ZSP	14460110005	Input: C-Series gauge signal Outputs: Data logger, display, RS232/RS485 Modbus RTU, analogue 4-20mA, trip relay
ZSP cable pack	14460004000	Input power, Modbus, analogue and trip relay cables
Wellhead junction box	14460029002	Explosion proof
Armoured surface cable	34460205000	1pr x 1.5mm armoured cable, cable run length to be specified

Downhole Equipment	Ref. No.	Details
Gauge protection clamp (C2)	33450044000	4-1/2" Tubing
	33450093000	3-1/2" Tubing
	33450026000	2-7/8" Tubing
	33450045000	2-3/8" Tubing
Wellhead feedthrough	30030032400	Pressure rating 10,000 psi, suitable for 1/4" instrument line
Cable banding material	31020010000	0.025" x 3/4" Monel #400 1/4 Hard , 700 feet per roll
Cable banding buckles	31020011000	For 3/4" continuous banding material, 1,000 per box
Cross coupling tubing clamp	13300030200	2-7/8" EUE tubing, outside diameter: 4.764"
	13300001200	3-1/2" EUE tubing, outside diameter 6.151"
	13300002200	4-1/2" EUE tubing, outside diameter 6.654"
Instrument cable		See instrument cable specifications sheet

Description	Ref. No. Carbon Steel	Ref. No. 13 Chrome	Details
Gauge retaining clamp	10590017200	10590017400	5-1/2" tubing
	10590016200	10590016400	5" tubing
	10590012200	10590012400	4-1/2" tubing
	10590015200	10590015400	4" tubing
	10590011200	10590011400	3-1/2" tubing
	10590010200	10590010400	2-7/8 tubing
	10590009200	10590009400	2-3/8" tubing

Description	Carbon Steel Ref. No.	9 Chrome Ref. No.	13 Chrome Ref. No.	Top Thread	Bottom Thread	Make Up Length (ft)	Drift (in)	Inside Dia. (in)	Outside Dia. (in)
Gauge carrier assembly (tubing pressure)	11460032201	11460032301	11460032401	5-1/2" 17.0 lb-ft LTC Box	5-1/2" 17.0 lb-ft LTC Pin	0.790	4.767	4.892	7.250
	11460062201	11460062301	11460062401	5-1/2" 17.0 lb-ft VAM TOP Box	5-1/2" 17.0 lb-ft VAM TOP Pin	0.802	4.767	4.892	7.250
	11460049201	11460049301	11460049401	5-1/2" 17.0 lb-ft Buttress Box	5-1/2" 17.0 lb-ft Buttress Pin	0.765	4.767	4.892	7.250
	11460043201	11460043301	11460043401	5" 15.0 lb-ft LTC Box	5" 15.0 lb-ft LTC Pin	0.802	4.283	4.408	6.750
	11460061201	11460061301	11460061401	5" 15.0 lb-ft VAM TOP Box	5" 15.0 lb-ft VAM TOP Pin	0.817	4.283	4.392	6.750
	11460045201	11460045301	11460045401	5" 15.0 lb-ft Buttress Box	5" 15.0 lb-ft Buttress Pin	0.770	4.283	4.408	6.750
	11460019201	11460019301	11460019401	4-1/2" 12.75 lb-ft EUE Box	4-1/2" 12.75 lb-ft EUE Pin	0.823	3.833	3.958	6.900
	11460060201	11460060301	11460060401	4-1/2" 12.6 lb-ft VAM TOP Box	4-1/2" 12.6 lb-ft VAM TOP Pin	0.773	3.833	3.958	6.460
	11460017201	11460017301	11460017401	3-1/2" 9.3 lb-ft EUE Box	3-1/2" 9.3 lb-ft EUE Pin	0.719	2.867	2.992	5.813
	11460059201	11460059301	11460059401	3-1/2" 9.2 lb-ft VAM TOP Box	3-1/2" 9.2 lb-ft VAM TOP Pin	0.747	2.867	2.992	5.510
	11460018201	11460018301	11460018401	2-7/8" 6.5 lb-ft EUE Box	2-7/8" 6.5 lb-ft EUE Pin	0.740	2.347	2.441	5.250
	11460058201	11460058301	11460058401	2-7/8" 6.4 lb-ft VAM TOP Box	2-7/8" 6.4 lb-ft VAM TOP Pin	0.790	2.347	2.409	4.875
	11460022201	11460022301	11460022401	2-3/8" 4.7 lb-ft EUE Box	2-3/8" 4.7 lb-ft EUE Pin	0.755	1.901	1.995	4.750
	11460057201	11460057301	11460057401	2-3/8" 4.6 lb-ft VAM TOP Box	2-3/8" 4.6 lb-ft VAM TOP Pin	0.713	1.901	1.957	4.280

Description	Carbon Steel Ref. No.	9 Chrome Ref. No.	13 Chrome Ref. No.	Top Thread	Bottom Thread	Make Up Length (ft)	Drift (in)	Inside Dia. (in)	Outside Dia. (in)
Gauge carrier assembly (annulus pressure)	11460035201	11460035301	11460035401	5-1/2" 17.0 lb-ft LTC Box	5-1/2" 17.0 lb-ft LTC Pin	0.790	4.767	4.892	7.250
	11460062201	11460062301	11460062401	5-1/2" 17.0 lb-ft VAM TOP Box	5-1/2" 17.0 lb-ft VAM TOP Pin	0.802	4.767	4.892	7.250
	11460050201	11460050301	11460050401	5-1/2" 17.0 lb-ft Buttress Box	5-1/2" 17.0 lb-ft Buttress Pin	0.765	4.767	4.892	7.250
	11460044201	11460044301	11460044401	5" 15.0 lb-ft LTC Box	5" 15.0 lb-ft LTC Pin	0.802	4.283	4.408	6.750
	11460061201	11460061301	11460061401	5" 15.0 lb-ft VAM TOP Box	5" 15.0 lb-ft VAM TOP Pin	0.817	4.283	4.392	6.750
	11460046201	11460046301	11460046401	5" 15.0 lb-ft Buttress Box	5" 15.0 lb-ft Buttress Pin	0.770	4.283	4.408	6.750
	11460016201	11460016301	11460016401	4-1/2" 12.75 lb-ft EUE Box	4-1/2" 12.75 lb-ft EUE Pin	0.823	3.833	3.958	6.900
	11460060201	11460060301	11460060401	4-1/2" 12.6 lb-ft VAM TOP Box	4-1/2" 12.6 lb-ft VAM TOP Pin	0.773	3.833	3.958	6.460
	11460014201	11460014301	11460014401	3-1/2" 9.3 lb-ft EUE Box	3-1/2" 9.3 lb-ft EUE Pin	0.719	2.867	2.992	5.813
	11460059201	11460059301	11460059401	3-1/2" 9.2 lb-ft VAM TOP Box	3-1/2" 9.2 lb-ft VAM TOP Pin	0.747	2.867	2.992	5.510
	11460015201	11460015301	11460015401	2-7/8" 6.5 lb-ft EUE Box	2-7/8" 6.5 lb-ft EUE Pin	0.740	2.347	2.438	5.250
	11460058201	11460058301	11460058401	2-7/8" 6.4 lb-ft VAM TOP Box	2-7/8" 6.4 lb-ft VAM TOP Pin	0.790	2.347	2.409	4.875
	11460034201	11460034301	11460034401	2-3/8" 4.7 lb-ft EUE Box	2-3/8" 4.7 lb-ft EUE Pin	0.755	1.901	1.995	4.750
	11460057201	11460057301	11460057401	2-3/8" 4.6 lb-ft VAM TOP Box	2-3/8" 4.6 lb-ft VAM TOP Pin	0.713	1.901	1.997	4.280

