# PUMP MONITORING, RISK ANALYSIS, AND ACTIONS LOG

| ASSET | SENSOR & RISK SUMMARY | | | AUTOMATED RESPONSE & OUTPUT | | |
|---|---|---|---|---|---|---|
| | Metric | Value / Range | Interpretation | Triggered Output | Status | Client Note |
| **TACT PUMP PRODUCTIONS** | | | | | | |
| **PUMP 4 — OPERATIONAL RISK ASSESSMENT** | | | | | | |
| **Ellis F. Corbett** | Observations | 4,036 records | Large sample size supports stable statistical interpretation. | Monitoring cycle analyzed | Complete | Dataset sufficient for reliable trend review. |
| | Temperature | Mean 100.15°C \| Min 50.00°C \| Max 149.99°C | High variability indicates intermittent thermal stress and possible overheating spikes. | Overheat pattern scan | Complete | Temperature should remain the primary watch variable. |
| | Vibration | Mean 2.55 mm/s \| Max 4.99 mm/s | Mechanical condition appears moderate; upper readings may indicate imbalance or wear. | Mechanical anomaly check | Complete | Track with temperature during high-load periods. |
| | Pressure | Mean 200.05 kPa \| Range 100.01–299.97 kPa | Hydraulic behavior appears centered within expected operating band. | Pressure stability review | Complete | No immediate hydraulic concern evident from |
| | Flow Rate | Mean 10.19 L/s \| Range 0.50–19.99 L/s | Flow remains balanced overall; no obvious flow-driven overheating signal. | Flow consistency review | Complete | Supports conclusion that issue may be localized/mechanical. |
| | RPM | Mean 2,014.52 rpm \| Range 1,000.30–2,999.92 rpm | Variable speed operation suggests changing load demand across the dataset. | Speed/load evaluation | Complete | Useful context for severity scoring. |

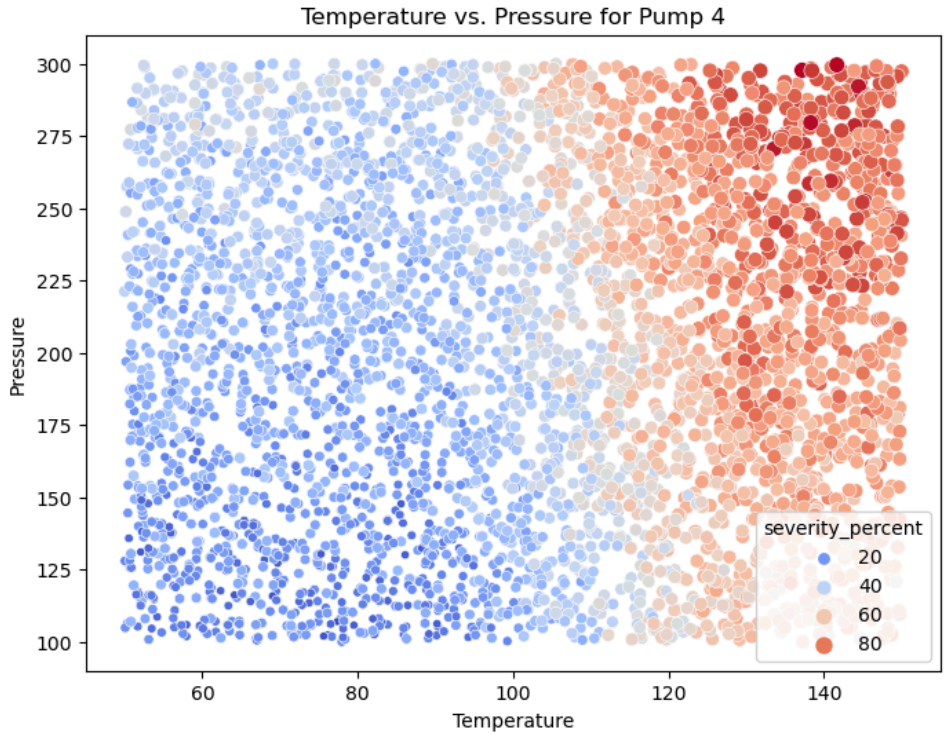
| | | | | | |
|---|---|---|---|---|---|
| Operational Hours | Mean 5,039.37 hrs \| Max 9,998.71 hrs | Runtime suggests the asset is mature enough to justify preventative inspection. | Maintenance threshold review | Flagged | Inspection should be scheduled soon. |
| Maintenance Flag | Mean 0.506 \| Median indicates frequent maintenance states | Roughly half of the records indicate maintenance involvement or flag conditions. | Maintenance system update | Logged | Supports proactive service planning. |
| Severity Percent | Mean 45.66% \| Max 96.40% | Overall risk is moderate, but critical spikes indicate intermittent high-risk conditions. | Risk severity calculation | Complete | Escalate any events above 90% immediately. |
| Correlation Insight | Temperature has weak correlation with pressure (0.028), rpm (0.008), and flow (-0.019) | Overheating likely arises from localized mechanical or thermal causes rather than broad hydraulic shifts. | Root-cause summary | Generated | Use this insight to guide inspection priorities. |

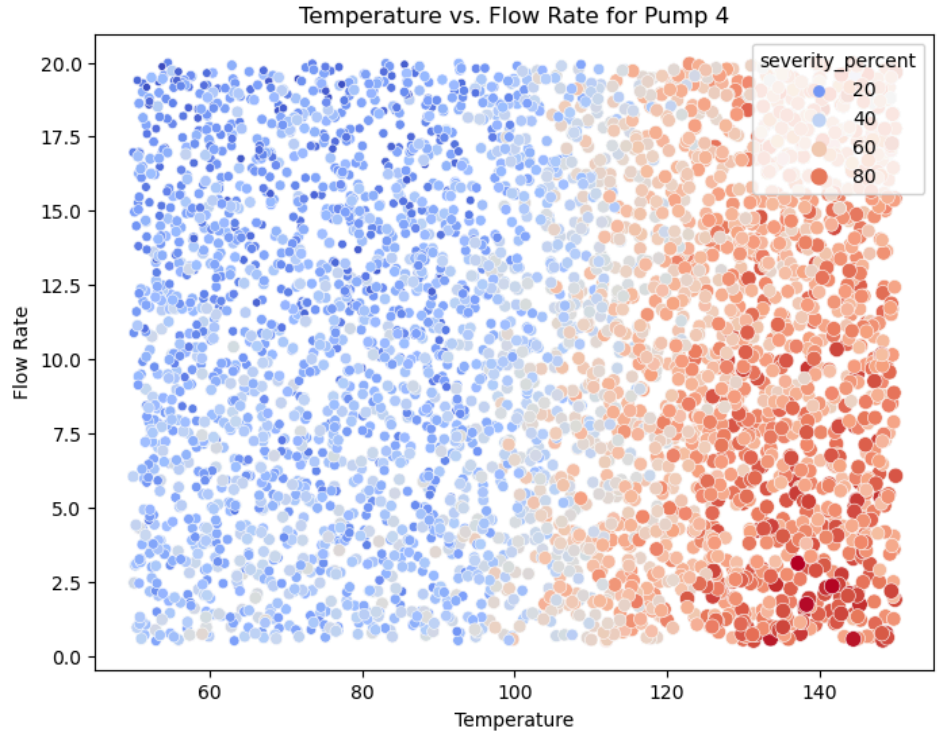
## EXECUTIVE INTERPRETATION

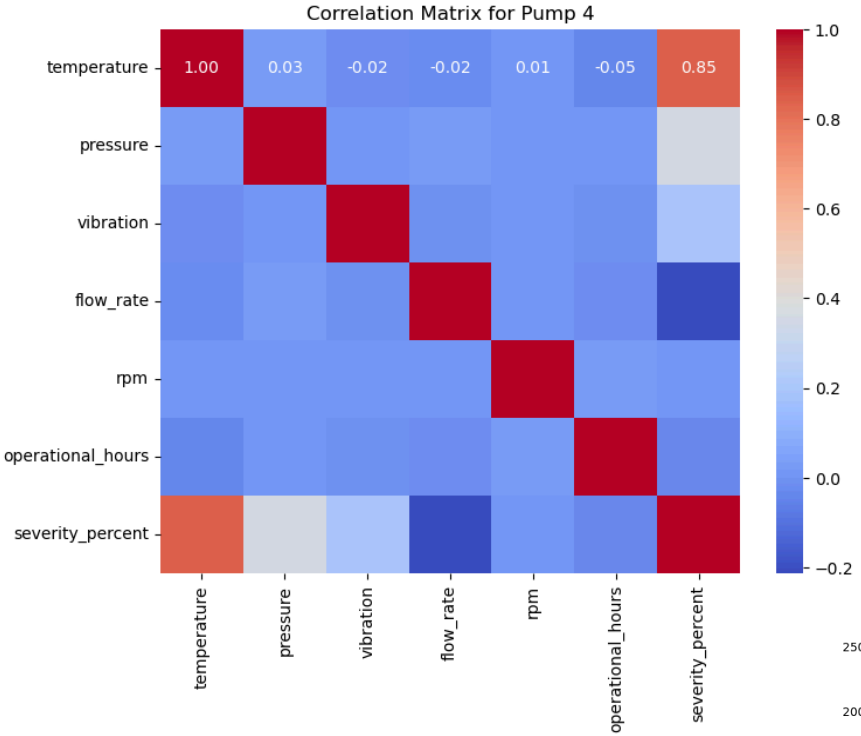
Pump 4 is operating within broad nominal ranges, but the data indicates moderate operational risk driven by temperature variability, extended runtime, and intermittent high-severity events. The average severity score of 45.66% suggests the pump is not in immediate failure mode; however, spikes up to 96.40% show that critical conditions can emerge under certain operating states. Recommended action is to continue continuous monitoring, investigate thermal spikes, and schedule preventative maintenance before the next 500 operating hours.

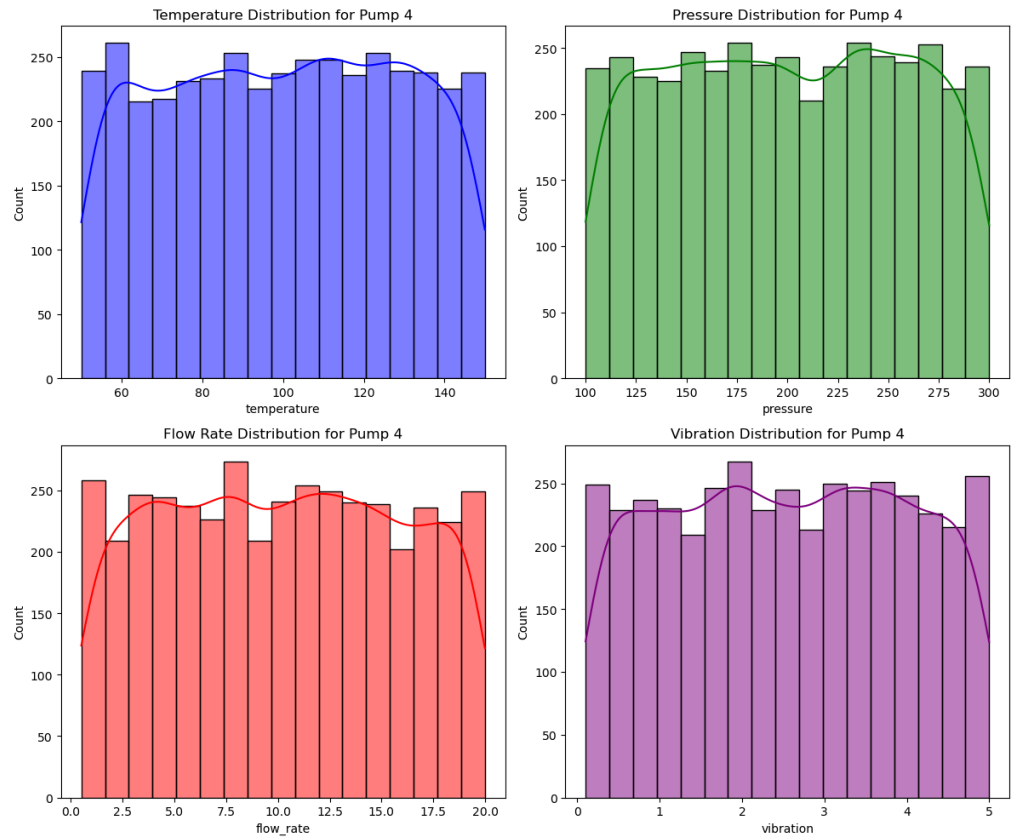
## AI SYSTEM EXPLANATION OUTPUT

Pump 4 has shown repeated temperature excursions above its average operating level. Based on the statistical profile and severity history, the system classifies the asset as MODERATE RISK with intermittent CRITICAL events. A maintenance review has been logged, and operators should prioritize inspection of bearings, lubrication, seals, and cooling-related components.


Temperature vs. Pressure for Pump 4
Pressure
Temperature
severity_percent
20
40
60
80


Temperature vs. Flow Rate for Pump 4
Flow Rate
Temperature
severity_percent
20
40
60
80


Correlation Matrix for Pump 4
temperature
pressure
vibration
flow_rate
rpm
operational_hours
severity_percent
1.00
0.03
-0.02
-0.02
0.01
-0.05
0.85
1.0
0.8
0.6
0.4
0.2
0.0
−0.2


Temperature Distribution for Pump 4
Count
temperature
Pressure Distribution for Pump 4
Count
pressure
Flow Rate Distribution for Pump 4
Count
flow_rate
Vibration Distribution for Pump 4
Count
vibration