NEOMETRIX

NEOMETRIX

Common Hydraulic Test Rig

Product Catalog

www.neometrixgroup.com

About us:

Neometrix Defence Celebrating 20 Years of Excellence!

For the past two decades, Neometrix Defence has maintained its position as a premier provider of advanced test benches and rigs. Our accreditation by the Directorate General of Aeronautical Quality Assurance, India (DGAQA) and Defence Research & Development Organization, India (DRDO) underscores our commitment to upholding the highest international defence industry standards. Counting the Indian Air Force/Army/Navy, Ministry of Defence, Hindustan Aeronautical Limited, and DRDO among our esteemed clientele, we are recognized for delivering state-of-the-art solutions and unwavering performance reliability.

Strengths & Capabilities:

Neometrix Defence is a powerhouse of engineering brilliance, proudly serving every Indian Air Force station and partnering with the Indian Army, Navy, Railways, BARC, NPCIL, and ISRO. With a team of over 100 elite engineers and visionary founders from IIT Kanpur and IIT Delhi, we harness cutting-edge technology to set the gold standard in mechanical engineering.

We Don't Just Meet Industry Demands – We Define Them!

- We have established our presence in all Air Force stations across India. With the Indian Air Force as our leading customer, we are dedicated to upholding the highest standards of excellence in the aerospace industry.
- Our extensive clientele extends beyond the defence industry, including projects with the Indian Army, Navy, Railways, BARC, NPCIL, ISRO, and more. In essence, we excel in all aspects of mechanical engineering!
- Our team comprises over 100 graduate engineers, supported by a cutting-edge manufacturing site equipped with state-of the-art machinery, enabling us to meet the highest Engineering standards.
- The founders of our company are distinguished graduates from IIT Kanpur and IIT Delhi, bringing extensive expertise and a wealth of engineering knowledge to Neometrix Defence.

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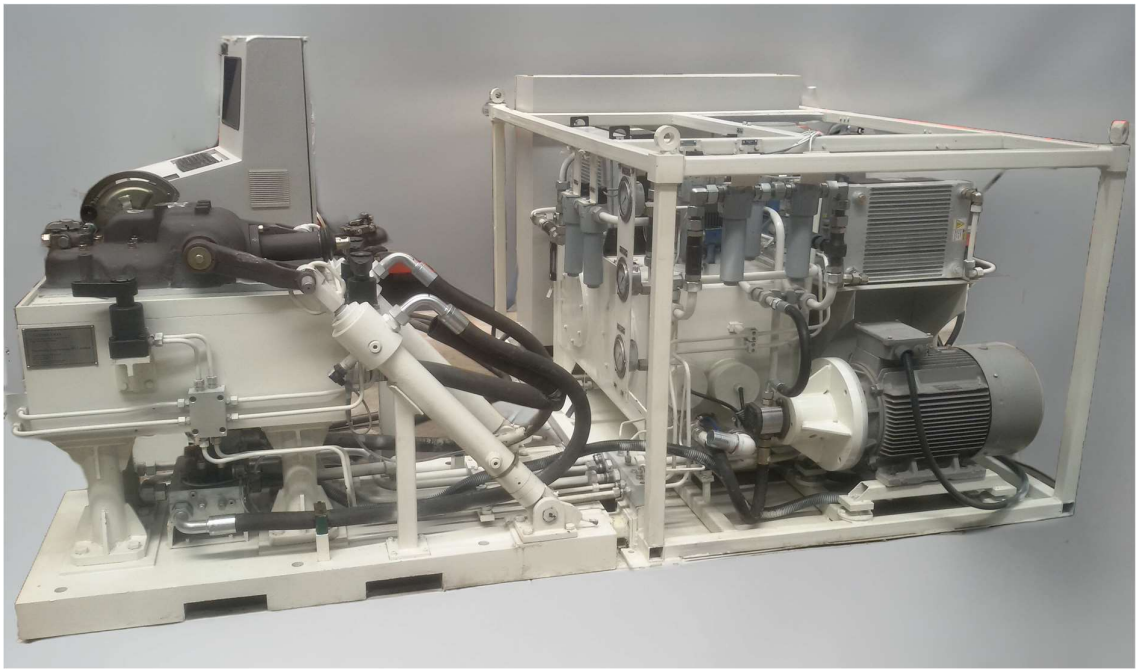
Introduction:

Hydraulic test rigs are foundational to ensuring the safety, performance, and reliability of fluid-power components across automotive, aerospace, and industrial sectors. By replicating real-world conditions—precisely controlling pressure up to 200 bar, flow rates from a few to tens of Liters per minute, temperature, and mechanical loads—these systems accelerate wear-in and expose latent defects before assemblies reach the field. Modern rigs integrate PC-based data acquisition (DAQ) and programmable control platforms (PXI or Compact DAQ with LabVIEW/NI-DAQmx), automating complex test sequences, synchronizing multi-channel measurements (pressure, flow, displacement, temperature), and generating comprehensive PDF reports without operator intervention detailed description.

Beyond simple pass/fail checks, rigs profile performance envelopes, map fatigue life, and characterize dynamic response times—data critical for R&D optimization, supplier qualification, and preventive maintenance strategies. Ergonomic design and quick-change fixtures drive high throughput (up to 100 assemblies/day), while robust safety interlocks and light-curtains protect operators during high-pressure operations



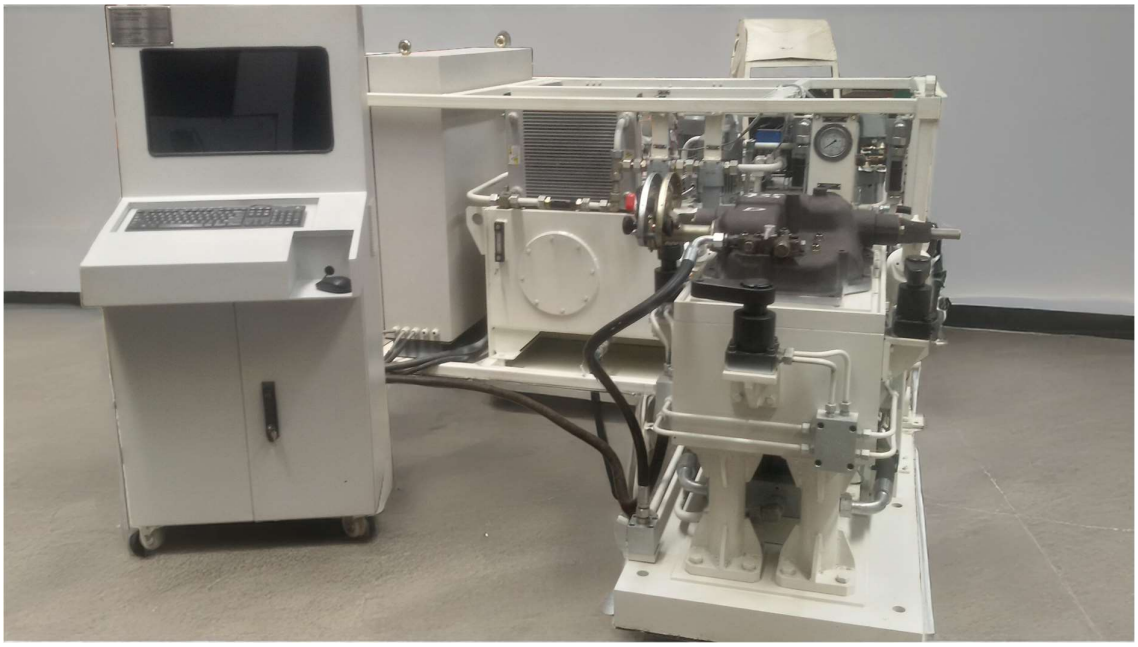
Applications:

- End-of-Line Quality Control: Automated final inspection of hydraulic valves, pumps, and actuators on production lines. Quick-release fixtures reduce mounting and cycle-change times by over 90%, delivering objective, traceable evidence of flow-rate accuracy, relief pressures, and leakage performance for each unit.

- R&D & Prototype Validation: Engineers iterate valve geometries, material selections, and control algorithms by characterizing prototypes under variable pressures, flows, and temperatures. High-resolution DAQ captures response curves and fatigue behaviour to guide design improvements before tooling investment.

- Maintenance & Service Center: Recalibrate relief valves, verify internal leakage, and detect wear trends early using digital LVDTs and load cells. Logged data supports preventive maintenance programs that can halve unscheduled downtime by identifying components at risk before failure.

- Supplier Qualification & Incoming Inspection: Rigs furnish objective, contractual proof that purchased assemblies meet specified performance criteria—streamlining vendor audits, reducing warranty claims, and ensuring consistent quality across supply chains.



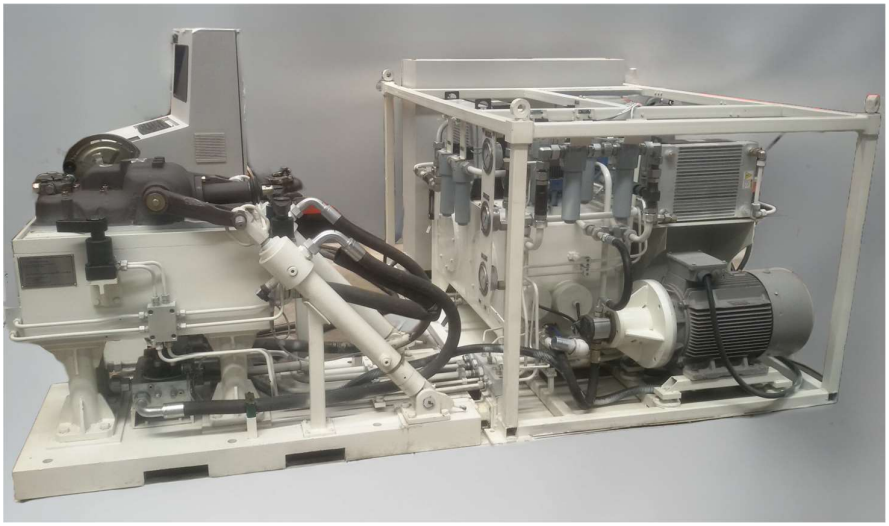
Key Features:

- Advanced DAQ & Control Platform: Modular PXI/Compact DAQ hardware delivers deterministic control-loop rates and synchronized I/O. LabVIEW or NI-DAQmx orchestrates test sequences, real-time visualization, and automated PDF report generation, including customizable pass/fail criteria and trend analyses.

- Dual Hydraulic Power Units: A high-flow pack (40 LPM @ 200 bar) powers main testing, while a low-flow unit actuates quick-release clamps and lift assemblies. High-efficiency pumps and servo valves minimize energy consumption and thermal load, with PID-regulated oil heaters maintaining 45–55 °C ± 1 °C for consistent fluid viscosity.

- Precision Instrumentation: Micron-resolution LVDTs measure piston displacement, strain-gauge load cells capture forces up to several kilonewtons, and optional digital dial gauges provide rapid sanity checks. All sensors feed directly into the DAQ system for fully synchronized data logging.

- Ergonomic & Safe Design: Two-hand safety pushbuttons, light curtains, interlocked doors, and emergency-stop circuits protect operators. Fixtures are waist-height and employ quick-swap hydraulic clamps and lightweight QRC hoses to reduce handling effort and operator fatigue.



Operation Description:

- Warm-Up & Calibration: The integrated oil heater ramps fluid to 45–55 °C. Automated routines validate sensor zero points, verify leak tightness, and log baseline readings.

- Loading & Fixturing: Operators position the hydraulic assembly into a custom fixture; low-pressure clamp actuation secures the part within seconds. Ergonomic levers and QR fittings streamline changeovers.

- Program Selection: A touchscreen HMI offers model-specific profiles (e.g., CRE vs. XM), prompting batch/serial number entry. Programs define flow, pressure, lift, and dwell times.

- Main Flow Test: The system ramps to the programmed flow rate (e.g., 16 LPM ± 1 LPM) at 200 bar. Real-time monitoring of flow and pressure pauses the test if predefined safety thresholds are exceeded.

- Relief Valve Characterization: Pressure increases slowly via a PC-controlled valve. The DAQ records blow-off and crack pressures (target range: 155–165 bar ± 0.5 bar), identifying deviations from spec.

- Lift & Response Time: The lift arm moves to 600 mm; the DAQ timestamps stroke completion to verify response times (2.3–2.6 s).

- Leakage Assessment: With flow halted and lift arm held, the LVDT measures fluid escape over a three-minute dwell; leakage must remain under 1.2 mm/min to pass.

- Data Logging & Reporting: Upon test completion, all parameters—flow profiles, pressure curves, displacement/force traces—are archived in an SQL database and collated into PDF reports for quality records.

Technical Specifications:

Parameter	Specifications
Hydraulic Fluid	VG 46 ISO VG 46 @ 40 °C
Temperature Control	45–55 °C (± 1 °C) via PID heater and radiator cooling
Maximum Pressure	200 bar
Flow Rate Range	CRE: 5–16 LPM; XM: 7–24 LPM (± 1 LPM)
Load Capacity	CRE: 1 000 kg; XM: 1 500 kg; max 2 000 kg
Stroke	350 mm
Cycle Time	~ 5 minutes
Throughput	Up to 100 assemblies/day
DAQ Resolution	24-bit ADC, up to 1 MS/s per channel
Software	LabVIEW or custom NI-DAQmx with SQL database back-end

Scope of Supply:

- Hydraulic Units: Two power packs (200 bar/40 LPM & 100 bar/10 LPM), NAS 9 reservoir filtration, heaters, high-efficiency pumps, proportional servo valves, and accumulators.
- Instrumentation: LVDTs, strain-gauge load cells, pressure transducers (± 0.1 % FS), thermal probes, flow meters, and optional digital dial gauges.
- Control & Electrical: PXI/CompactDAQ chassis, NI controllers, VFDs, Siemens PLC with safety relays, touchscreen HMI, UPS, interlock circuits, and panel wiring.
- Mechanical & Fixtures: Rigid steel frame, quick-release hydraulic clamps, lift arms, sealing plugs, QRC fittings, and ergonomic loading aids.
- Safety & Guards: Light curtains, interlocked safety doors, two-hand controls, emergency stops, warning lights, and color-coded hydraulic lines for TPM support detailed description.

Spare Parts & Bill of Materials:

- Hydraulics: Rexroth/Parker pumps and valves, Hydac filters, Wika transducers, Maxel hoses.
- Instrumentation: HBM/Omega LVDTs, Tektronix/PCB pressure sensors, Kyowa load cells.
- Electrical: Phoenix Contact terminals, Siemens contactors, Eaton safety relays, Allen-Bradley PLC modules.

Safety, Ergonomics & TPM:

- Integrated Safety Systems: Emergency shut-off circuits, two-hand clamp controls, light barriers, and interlocks prevent access during pressurization.
- Ergonomic Design: Waist-height fixtures, quick-swap clamps, lightweight hoses, and lever-assist loading minimize operator strain.
- TPM Aids: Color-coded lines, arrow-marked fittings, labelled junctions, sequential LEDs, and visual maintenance checklists support autonomous inspections and reduce mean time to repair detailed description.

Reliability & Maintainability:

Preventive-maintenance protocols emphasize fluid cleanliness and contamination control—critical factors in hydraulic system longevity. Scheduled filter replacements, oil analysis, and sensor calibrations sustain > 95 % uptime. The modular design allows swap-out of power packs, DAQ modules, and cylinder assemblies in under one hour. A warranty program with 24 hr critical-response support and quarterly on-site inspections further safeguards operational continuity