Process Calibrators — Beamex, Fluke and Druck Compared

cBallast Technical Sourcing · Process calibration equipment · issued 2026-11-09 · cballast.com/documents/process-calibrator-selection-beamex-fluke-druck

Choosing process calibration equipment: documenting multifunction calibrators against single-discipline tools, pressure generation (hand pumps to controllers), temperature dry blocks and baths, HART and fieldbus communication, intrinsically safe calibrators for hazardous areas, the accuracy-ratio and traceability chain that make a calibration defensible, and the Beamex MC6, Fluke 725/754 and Druck DPI 600 families placed against each other.

The short version

Four tool classes cover plant calibration. Loop/mA calibrators (source and measure 4–20 mA): the electrician's daily tool. Single-discipline calibrators (pressure, or temperature): deep in one quantity. Multifunction calibrators: pressure + temperature + electrical in one instrument. Documenting multifunction calibrators with communication (Beamex MC6, Fluke 754 class): run the procedure, talk HART to the transmitter, store as-found/as-left results and feed the calibration software — the class that pays for itself in paperwork.

The calibrator must beat the instrument, with margin. The working rule is a test uncertainty ratio (TUR) of 4:1 — calibrator uncertainty four times smaller than the tolerance being verified. A 0.5%-class transmitter is comfortably checked by a 0.02–0.05% calibrator; a 0.04% smart transmitter is not meaningfully checked by a 0.05% tool.

Pressure needs generation as well as measurement. A hand pump (Druck PV212 pneumatic class, hydraulic pumps for high range) plus a reference gauge or calibrator checks transmitters in place; integrated electric pumps (Druck DPI 611/612 class) speed bench and field work; pressure controllers automate the lab. Match pump medium and range to the transmitters actually installed.

Temperature calibration is a heat source plus a reference. Dry blocks for probes on the bench and in the field; stirred baths (the TX150 +15…150 °C 5 L bath class) for odd geometries, short probes and best uniformity; the reference Pt100 and the readout carry the traceability either way.

Hazardous areas need IS calibrators. ATEX/IECEx-certified instruments — the Beamex MC6-Ex and Fluke 718Ex class — calibrate live in the zone without gas-freeing or hot-work permits; the alternative is removing every instrument to a safe area, which is how calibration schedules die.

Traceability is the product. Every reference needs an unbroken chain to national standards — accredited (ISO/IEC 17025) certificates for the references, documented procedures, and recalibration of the calibrators themselves on schedule. A reading from an uncalibrated calibrator is a number, not a calibration.

1. The four classes, honestly compared

Class | Does | Does not | Catalogue example |

Loop / mA calibrator | Source, simulate and measure 4–20 mA and volts; loop checks, I/O commissioning | No pressure/temperature references; no documentation | Entry Fluke 7xx class |

Multifunction, non-documenting | Pressure modules, RTD/TC source+measure, mA — one tool for mixed rounds | No stored procedures/results; manual recording | Fluke 725 |

Documenting + communicating | All of the above plus HART (and on the MC6: FOUNDATION Fieldbus and Profibus PA), stored procedures, as-found/as-left, upload to calibration management software | Costs 3–5x a 725; worth it from roughly 50 instrument tags upward | Beamex MC6; Fluke 754 class |

Dedicated pressure / temperature | Deepest accuracy in one quantity; generation integrated | Single discipline | Druck DPI 611 (to 20 bar g), DPI 620 Genii advanced modular |

The MC6's five operating modes (meter, calibrator, documenting calibrator, data logger, field communicator) are why one instrument replaces a HART communicator, a loop calibrator and the clipboard; the Druck DPI 620 Genii reaches the same territory modularly from the pressure side. For plants standardised on calibration management software, the documenting class is not optional — manual transcription is where audit findings come from.

2. Pressure: generation, references, practice

Range class | Generation | Notes |

Vacuum … 2 bar | Pneumatic hand pump with fine control | Low ranges are leak-hunting territory: short hoses, good fittings — see the tube fitting guide |

0 … 20/40 bar | Pneumatic pump (PV212 class) or integrated electric (DPI 611/612) | The workhorse band for process transmitters |

40 … 700+ bar | Hydraulic hand pump, oil or water | Media compatibility with the transmitter's fill and process |

Laboratory | Pressure controllers / deadweight testers | Where the plant's reference standards live |

Field method that holds up: isolate and vent the transmitter (three-valve manifolds exist for this), connect pump and reference, exercise the sensor once to full scale, then run the points up and down (hysteresis shows on the way down), record as-found before any adjustment, adjust only outside tolerance, record as-left. The transmitter side of what is being verified — ranges, accuracy classes, the difference between a 0.5% compact and a 0.04% smart unit — is our instrument specification guide's territory, with Danfoss MBS and Rosemount 3051 covered by name.

3. Temperature: dry blocks, baths, references

A dry block heats or cools an insert bored for the probe diameters in use: fast, portable, self-contained — the field standard from " 25 to +650 °C class instruments. Its honest limits: the probe must fit the bore snugly (air gaps read low), short and odd-shaped sensors suffer stem losses, and surface sensors do not fit at all. A stirred liquid bath (water to ~95 °C, oil beyond, like the TX150 class) gives better uniformity and takes any geometry, at the price of bench duty, fluid handling and settling time. Either way the measurement is reference-probe against unit-under-test: a class AA or better Pt100 reference with its own accredited certificate, read by the calibrator (the MC6 and 754 class read reference and UUT simultaneously and compute the error live). Simulation — sourcing ohms or microvolts into the transmitter — checks the electronics alone, valid and fast for loop verification but it never sees the sensor itself; Pt100 classes and wiring effects are tabled in our Pt100 guide.

4. Hazardous areas and marine practice

IS-certified calibrators (MC6-Ex, 718Ex class; marking logic in the ATEX/IECEx guide) carry entity-parameter-limited circuits so the live loop in the zone stays intrinsically safe during test — including when connected through the loop's barrier or isolator, which the test procedure must account for (barrier resistance shifts the loop arithmetic). On vessels, the calibration regime follows the planned maintenance system and class expectations: the references travel with their certificates, and transmitters on safety functions (15 ppm alarms among them — see the MEPC.107(49) guide) get documented as-found/as-left records the surveyor can read.

5. The traceability chain, spelled out

Level | Instrument | Certificate | Recalibrated |

National standard | NMI references | — | — |

Reference / lab standard | Deadweight tester, reference Pt100, precision multimeter | Accredited (ISO/IEC 17025) | 1–3 yr |

Working standard | MC6 / 754 / DPI 620 and pressure modules | Accredited or traceable works certificate | Typically 12 months |

Process instrument | Transmitters, switches, gauges | Plant calibration record | Per criticality (3–24 months) |

Two numbers govern intervals: drift history (widen intervals on instruments that pass clean repeatedly — documenting calibrators make this analysis possible) and criticality (safety and custody loops never widen without a formal case). Buying note: a calibrator is itself a certificate-bound instrument — order it with the accredited certificate and plan its annual recalibration as a consumable cost, the same ledger line logic as torque wrench calibration.

How buying works at cballast. We quote calibrators, pumps, baths, reference probes and their accredited certificates as one list, with the recalibration cycle priced where asked. Accounts are vetted at onboarding; first order prepaid; established accounts on credit terms with repeat discounts; public bodies and utilities invoiced against purchase order from the first order. RFQs to sales@cballast.com.

Frequently asked questions

What is a documenting calibrator?A calibrator that stores the test procedure and the results: it guides the technician through the points, records as-found and as-left data electronically and uploads to calibration management software. From a few dozen instrument tags upward it pays for itself in transcription time and audit readiness; the Beamex MC6 and Fluke 754 are the reference class.

Beamex MC6 or Fluke 754 — how do they differ?Both are documenting multifunction calibrators with HART. The MC6 adds FOUNDATION Fieldbus and Profibus PA communication, a larger touch interface and five operating modes, and pairs natively with Beamex's calibration software; the 754 is the long-standing HART documenting tool in the Fluke ecosystem. Plants choose by their transmitter protocols and the software they feed.

What accuracy does my calibrator need?Aim for a test uncertainty ratio around 4:1 — the calibrator's total uncertainty at the test points four times smaller than the tolerance you are verifying. Checking a 0.5% transmitter needs roughly 0.1% or better; checking a 0.04% smart transmitter needs reference-class equipment, not a service tool.

Can I calibrate a transmitter in a hazardous area?Yes, live and in place, with an intrinsically safe calibrator certified for the zone (MC6-Ex, 718Ex class), observing the loop's barrier arithmetic and the site's permit rules. Without an IS calibrator the options shrink to permits and gas-freeing or pulling the instrument — both expensive habits.

Dry block or calibration bath for temperature probes?Dry block for standard straight probes, field work and speed; bath for short, bent or surface-adjacent sensors and for best uniformity on the bench. In both cases the traceable element is the reference probe and readout, which carry accredited certificates and their own recalibration dates.

Who supplies Beamex, Fluke and Druck calibration equipment with certificates?cballast.com quotes calibrators, pumps, dry blocks, baths and reference probes with accredited certificates, successor models for retired instruments, and the annual recalibration path. Send the instrument list and ranges to sales@cballast.com.

References and related guides

Standards and sources referenced: ISO/IEC 17025 (accredited calibration); ISO 9001 calibration clauses; IEC 60770 (transmitter performance methods); HART and FOUNDATION Fieldbus specifications; maker documentation for Beamex MC6/MC6-Ex, Fluke 725/754/718Ex and Druck DPI 611/620 and PV pumps.

Specifying instruments — pressure, temperature, level, flow

Pt100 sensors — classes and wiring

Pressure switch vs transmitter selection

Intrinsically safe barriers — Zener vs galvanic isolators

Torque wrench selection and calibration (ISO 6789)

Questions on a calibrator, a reference or an interval: write to sales@cballast.com. We answer whether or not you buy from us.

Part numbers and designations are those of the original manufacturers and are given for identification. cBallast is an independent supplier. © cBallast 2026 · cballast.com