

BL98x series Multi-function Process Calibrator



FEATURES

- 0.01% FS accuracy
- Handheld design and light weight.
- Intuitive menu makes it easier to setup than other multi-function calibrators
- Checkout flow and vibration systems
- Troubleshoot loop & wiring problems
- Simulate pH probes into transmitters & analyzers
- Quickly set any three outputs plus automatic stepping & ramping
- Measure temperature sensors, frequency pickups, loop currents, voltage levels & pressures

The BL98X series process calibrators are power multi-function documenting calibrators that download procedures, lists, and instructions created with software, or upload data for printing, archiving, and analysis. For documentation, it automates calibration procedures and captures your data. The BL98X does the work of several tools; it sources, simulates and measures pressure, temperature, and electrical signals all in one rugged, hand-held device. It has an advanced graphical screen, and Li-on battery for longer life.

Functions

- ▶ Source voltage, current, resistance, frequency, pulse, analog thermocouple, analog RTD, PH Meter;
 - ▶ Measure voltage, current, resistance, frequency, pulse, switch (on/off), TC, RTD, PH meter;
 - ▶ One-button to turn on the side 24V independent loop power function;
 - ▶ Simultaneous source and measure in two channels
 - ▶ Supports dual-channel SPRT measurements, users can set up the temperature probe management list
 - ▶ Support cold junction compensation: Internal, external and fixed value.
 - ▶ Built-in wire connection guidance and operating instructions
 - ▶ Frequency source supports square wave and sine wave, and the duty cycle and amplitude can be set;
 - ▶ Pulse source can be with Hz, amplitude and duty cycle; The trigger mode can be set for measure;
 - ▶ Resistance and RTD measurements support 2/3/4-wire wiring;
 - ▶ The resistor supports the calibration of fast pulse type RTD temperature transmitters and PLCs;
 - ▶ Unit Conversion Function:
 - The units can be converted to other engineering units or custom units, and linear, square root to cube root functions
 - Calibrate the open square transmitter and the corresponding display instrument;
 - ▶ Fine-tuning on any number of digits of the output value, and quickly change the output value through the navigation keys;
 - ▶ Step and ramp function
 - ▶ Data statistics function: statistical measurement of min. value, max. value, average value, change rate
 - ▶ Measurement filter function make test more stable: the number of filters can be set when it is turned on
 - ▶ Energy Saving Management: Screen can be set as sleep mode and auto-off
 - ▶ Wizard-type accuracy correction: Users can self-correct the accuracy of the product
 - ▶ Snapshot function: one-click recording of screenshot data, which is convenient for users to view later;
 - ▶ Accuracy class: 0.01, 0.02
 - ▶ Typical temperature coefficient: 1×10^{-6} full scale / $^{\circ}\text{C}$ (1 ppm accuracy drift for 1°C temperature changes);
 - ▶ Typical time drift: 3×10^{-5} full scale /year (time drift affects accuracy only 3/100,000 per year);
 - ▶ Communication Functions:
 - Support Bluetooth wireless communication and USB wired communication;
 - Bluetooth transmission distance: no less than 10m under unobstructed conditions;
 - ▶ The test lead and connection jacks are made of low thermoelectric potential material and 24K gold plating process;
 - ▶ The anti-falling hook design is easy to carry and can free your hands when using;
-
- ▶ Data logger function (only for BL987 and BL987H):
 - The data logger is designed to record a variety of measurement results
 - Measurement data can be recorded, viewed and managed on the calibrator;
 - Delayed/timed, manual/auto recording, digital/graphical display
 - ▶ Calibration tasks (only for BL987 and BL987H):
 - User can create, execute, and delete calibration tasks on the calibrator;
 - The UUT can be auto completed the calibration process, record and save data, analyze and judge the pass or fail result.
 - Calibration data can be viewed on the device;
 - Calibration data can be exported to the computer for management;
 - Calibration tasks in the device can be easily managed via computer;
 - The software contains a separate database for generate, upload, download, report, and certificate
 - ▶ HART Communicator Features (only for BL987H):
 - Devices that support version 5, 6, and 7 certified by the HART website
 - Internal 24V DC loop power supply and built-in 250Ω HART loop resistor for HART offline communication;
 - Built-in 250Ω HART loop resistor for HART online communication;
 - When supplied with a built-in 250Ω HART loop resistor;
 - The HART interface simultaneously displays the measured value of the calibrator output;
 - Commissioning and calibration of on-site HART equipment;
 - Support Fisher DVC6200 auto-tuning

Specification

► Working environment

Temperature: (-10 ~ 50) °C.

Relative humidity: <90% (non-condensing);

Atmosphere pressure: (86 ~ 106) kPa.

► Storage environment

Temperature: (-20~60) °C

Relative humidity: < 90%RH (non-condensing)

► Power

Power supply: Rechargeable lithium battery pack, or dedicated 12VDC adapter

Charging: Powered by a dedicated 12VDC adapter, the charging time is less than 5 hours;

Working time: 16 hours typically, 24VDC will consume more battery time.

Auto power off: When the battery is too low, the device will automatically shut down for protection;

Remark: Battery power is recommended for best measurement results.

► Physical and electrics

Display: 3.5" high-resolution TFT color screen

Dimensions: 197mm x 103mm x 55mm (L x W x H)

Weight: approx. 0.8kg

Power consumption: Typical 2W, maximum 3W

Output measurement port: standard $\phi 4$ mm electrical jack

Thermocouple connection: Miniature TC connector

Power connection interface: DC5.5*2.1mm jack

Pressure module interface: 7-pin circular LEMO plug-in connector

RS232 communication: baud rate 57600, data length 8 bits; Stop bit 1 bit

Real-time clock: 2000~2099 in 24-hour clock

Sheet 1: Selection table for BL985, BL986, BL987 and BL987H

Mode	Types	Span	BL987H	BL987	BL986	BL985
Source	Voltage	-12.00000~30.0000 V	•	•	•	•
		-120.0000~120.0000 mV	•	•	•	•
	Current	0.0000~30.0000 mA	•	•	•	-
	Ohm	0.000~4000.00 Ω	•	•	•	•
	TC	12 types	•	•	•	•
	RTD	13 Types	•	•	•	•
	Frequency	0.000010~100.0000 kHz	•	•	•	-
	Pulse	0~9999999 PCS	•	•	•	-
	24V Loop	Max loading 40mA	•	•	•	•
Measure	Voltage	-120.0000~120.0000 V	•	•	•	•
		-120.0000~120.0000 mV	•	•	•	•
	Current	-120.000~120.000 mA	•	•	•	-
	Resistance	0.0000~7500.00 Ω	•	•	•	•
	Frequency	0.000500~100.0000 kHz	•	•	•	-
	TC	12 types	•	•	•	•
	RTD	13 Types	•	•	•	•
	Pulse	1~9999999 PCS	•	•	•	-
	Switch	on / off	•	•	•	-
Other Function	Stats (p)	200 seconds	•	•	•	-
	HART		•	-	-	-
	Dual Temp.		•	•	-	•
	pH meter		•	•	-	-
	Cal Task		•	•	-	-
	Logger		•	•	-	-
	Software		•	•	-	-
	Wireless		•	•	-	-
	Pressure		•	•	-	-

Remark: • Standard; - : None

Sheet 2: Source

Sheet 2: Source					
Function	Soure Range	Soure Span	Resolution	Max. Permitted Error	
				0.01 class	0.02 class
Voltage	-12.00000 ~ 30.0000V	30.0000 V	0.1 mV	$\pm(0.006\%rd + 0.5 \text{ mV})$	$\pm(0.01\%rd + 0.5 \text{ mV})$
		$\pm 10.00000 \text{ V}$	10 μV	$\pm(0.006\%rd + 0.1 \text{ mV})$	$\pm(0.01\%rd + 0.1 \text{ mV})$
		$\pm 1.000000 \text{ V}$	1 μV	$\pm(0.006\%rd + 10 \text{ uV})$	$\pm(0.01\%rd + 10 \text{ uV})$
	-120.0000~120.0000 mV	$\pm 100.0000 \text{ mV}$	0.1 μV	$\pm(0.006\%rd + 4 \text{ uV})$	$\pm(0.01\%rd + 4 \text{ uV})$
TC	12 types thermocouple	S, R, B, K, N, E, J, T, L, WRe3-25, WRe5-26 EA-2	0.01 °C	See details in sheet 4	See details in sheet 4
Current	0.0000 ~ 30.0000 mA	30.0000 mA	0.1 μA	$\pm(0.01\%rd + 1 \text{ uA})$	$\pm(0.015\%rd + 1 \text{ uA})$
Resistance	0.000~4000.00 Ω	4000.00 Ω	10 m Ω	$\pm(0.008\%rd + 40 \text{ m}\Omega)$	$\pm(0.015\%rd + 40 \text{ m}\Omega)$
		400.000 Ω	1 m Ω	$\pm(0.008\%rd + 5 \text{ m}\Omega)$	$\pm(0.015\%rd + 5 \text{ m}\Omega)$
RTD	13 types of RTD	Pt10, Pt50, Pt100, Pt200, Pt400, Pt500, Pt1000, Cu50, Cu100, BA1, BA2, BA3, G	0.01 °C	See details in sheet 5	See details in sheet 5
Frequency	0.000010~100.0000 kHz	100.0000 kHz	0.1 Hz	$\pm 1 \text{ Hz}$	$\pm 1 \text{ Hz}$
		10.00000 kHz	0.01 Hz	$\pm 0.1 \text{ Hz}$	$\pm 0.1 \text{ Hz}$
		1.000000 kHz	0.001 Hz	$\pm 0.01 \text{ Hz}$	$\pm 0.01 \text{ Hz}$
Pulse	1 ~ 9999999 pcs	9999999 pcs	1 pc	$\pm 1 \text{ pc}$	$\pm 1 \text{ pc}$
PH meter	-3.0000~17.0000 pH	-3.0000~17.0000 pH	0.0001 pH	$\pm(0.003\%rd + 0.0002 \text{ pH})$	$\pm(0.006\%rd + 0.0002 \text{ pH})$
Remark	Max. output current of voltage range: 10mA; Loading effect <= 50 $\mu\text{V}/\text{mA}$; 20mA output load capacity<= 1k Ω				
	Square wave amplitude: 0.1~10.0Vpp; Sine wave amplitude: 0.1~10.0Vpp; Square wave duty cycle: 2~98%				
	Frequency setting range when pulse output: 0.0001~100kHz; Amplitude setting range: 0.1~10.0V				
	Working range of external excitation current of resistance & thermal resistance: 0.4~20mA/400 Ω ; 0.04~2mA/4000 Ω				
	Note: Ambient temperature 20 $\pm$ 5°C, accuracy within one year				

Sheet 3: Measure

Function	Measure Range	Soure Span	Resolution	Max. Permitted Error	
				0.01 class	0.02 class
Voltage	-12.00000 ~ 120.0000V	$\pm 100.0000 \text{ V}$	0.1 mV	$\pm(0.006\%rd + 0.5 \text{ mV})$	$\pm(0.01\%rd + 0.5 \text{ mV})$
		$\pm 10.00000 \text{ V}$	10 μV	$\pm(0.006\%rd + 0.1 \text{ mV})$	$\pm(0.01\%rd + 0.1 \text{ mV})$
		$\pm 1.000000 \text{ V}$	1 μV	$\pm(0.006\%rd + 10 \text{ uV})$	$\pm(0.01\%rd + 10 \text{ uV})$
	-120.0000~120.0000 mV	$\pm 100.0000 \text{ mV}$	0.1 μV	$\pm(0.006\%rd + 4 \text{ uV})$	$\pm(0.01\%rd + 4 \text{ uV})$
TC	10 types thermocouple	S, R, B, K, N, E, J, T, L, WRe3-25, WRe5-26 EA-2	0.01 °C	See details in sheet 4	See details in sheet 4
Current	-120.000~120.000 mA	$\pm 100.000 \text{ mA}$	1 μA	$\pm(0.01\%rd + 2 \text{ uA})$	$\pm(0.015\%rd + 2 \text{ uA})$
		$\pm 30.0000 \text{ mA}$	0.1 μA	$\pm(0.01\%rd + 1 \text{ uA})$	$\pm(0.015\%rd + 1 \text{ uA})$
Resistance	0.0000~7500.00 Ω	5000.00 Ω	10 m Ω	$\pm(0.008\%rd + 50 \text{ m}\Omega)$	$\pm(0.015\%rd + 50 \text{ m}\Omega)$
		500.000 Ω	1 m Ω	$\pm(0.008\%rd + 5 \text{ m}\Omega)$	$\pm(0.015\%rd + 5 \text{ m}\Omega)$
		50.0000 Ω	0.1 m Ω	$\pm(0.008\%rd + 5 \text{ m}\Omega)$	$\pm(0.015\%rd + 5 \text{ m}\Omega)$
RTD	13 types of RTD	Pt10, Pt50, Pt100, Pt200, Pt400, Pt500, Pt1000, Cu50, Cu100, BA1, BA2, BA3, G	0.01 °C	See details in sheet 5	See details in sheet 5
Temp. test	SPRT25, SPRT100	-189.8344~ 961.78 °C	0.001 °C	0.05 °C	0.05 °C
Frequency	0.000500~100.0000 kHz	100.0000 kHz	0.1 Hz	$\pm 1 \text{ Hz}$	$\pm 1 \text{ Hz}$
		10.00000 kHz	0.01 Hz	$\pm 0.1 \text{ Hz}$	$\pm 0.1 \text{ Hz}$
		1.000000 kHz	0.001 Hz	$\pm 0.01 \text{ Hz}$	$\pm 0.01 \text{ Hz}$
Pulse	1 ~ 9999999 pcs	9999999 pcs	1 pc	$\pm 1 \text{ pc}$	$\pm 1 \text{ pc}$
PH meter	-3.0000~17.0000 pH	-3.0000~17.0000 pH	0.0001 pH	$\pm(0.003\%rd + 0.0002 \text{ pH})$	$\pm(0.006\%rd + 0.0002 \text{ pH})$
Stats (p)	0.00001~0.99999	0.1~200 seconds	0.00001	± 0.00005	± 0.00005
Remark	Input impedance $\geq 3\text{M}\Omega$ ($>10\text{V}$ measure span), input impedance $\geq 500\text{M}\Omega$ ($<1\text{V}$ measure span)				
	Current measurement input impedance $\leq 10\Omega$				
	Frequency measurement input impedance $\geq 10\text{M}\Omega$; Input amplitude: 0.1~60V(rms)				
	Resistance and RTD measurement current: 1mA/50 Ω ; 1mA/500 Ω ; 0.25mA/5000 Ω				
	The trigger level is 1.0V for pulse measurement (the amplitude of the input pulse is recommended $>1.0\text{V}$)				
	Note: Ambient temperature 20 $\pm$ 5°C, accuracy within one year				

Sheet 4: TC

TC Types	Temperature Range	Max Permit Error Source and Measure	
		0.01 class	0.02 class
S	-35~0 °C	±0.90 °C	±0.90 °C
	0~100 °C	±0.74 °C	±0.74 °C
	100~1768 °C	±0.60 °C	±0.60 °C
R	-35~0 °C	±1.20 °C	±1.20 °C
	0~200 °C	±0.86 °C	±0.86 °C
	200~1768 °C	±0.50 °C	±0.55 °C
B	600~800 °C	±0.80 °C	±0.81 °C
	800~1820 °C	±0.62 °C	±0.64 °C
K	-260~-200 °C	±0.98 °C	±1.06 °C
	-200~-100 °C	±0.38 °C	±0.45 °C
	-100~600 °C	±0.25 °C	±0.27 °C
	600~1372 °C	±0.35 °C	±0.36 °C
N	-205~-100 °C	±0.45 °C	±0.46 °C
	-100~1300 °C	±0.30 °C	±0.32 °C
E	-255~-200 °C	±0.50 °C	±0.56 °C
	-200~-100 °C	±0.20 °C	±0.21 °C
	-100~700 °C	±0.14 °C	±0.16 °C
	700~1000 °C	±0.14 °C	±0.19 °C
J	-210~-100 °C	±0.26 °C	±0.27 °C
	-100~700 °C	±0.12 °C	±0.15 °C
	700~1200 °C	±0.20 °C	±0.24 °C
T	-250~-100 °C	±0.72 °C	±0.77 °C
	-100~0 °C	±0.25 °C	±0.25 °C
	0~400 °C	±0.12 °C	±0.14 °C
WRε3-25	0~2000 °C	±0.46 °C	±0.56 °C
	2000~2315 °C	±0.72 °C	±0.90 °C
WRε5-26	0~1000 °C	±0.33 °C	±0.35 °C
	1000~2000 °C	±0.51 °C	±0.63 °C
	2000~2315 °C	±0.79 °C	±0.96 °C
L	-200~-100 °C	±0.3 °C	±0.36 °C
	-100~400 °C	±0.18 °C	±0.22 °C
	400~900 °C	±0.12 °C	±0.17 °C
EA-2	-50~0 °C	±0.18 °C	±0.23 °C
	0~100 °C	±0.14 °C	±0.2 °C
	100~800 °C	±0.12 °C	±0.17 °C

Remark:

Complies with ITS90.

Depends on mV maximum permitted error (MPE)

Excludes sensor and compensated wire errors;

Based on the reference temperature of 0°C;

Add 0.2°C error for cold-junction compensation

Ambient temperature 20±5°C, one year accuracy

Sheet 5: RTD

RTD Types	Temperature Range	Max Permit Error Source		Max Permit Error Measure	
		0.01 class	0.02 class	0.01 class	0.02 class
Pt10 (385)	-200~200 °C	±0.23 °C	±0.31 °C	±0.23 °C	±0.31 °C
	200~600 °C	±0.34 °C	±0.41 °C	±0.34 °C	±0.41 °C
	600~850 °C	±0.40 °C	±0.51 °C	±0.40 °C	±0.51 °C
Pt50 (385)	-200~200 °C	±0.09 °C	±0.12 °C	±0.09 °C	±0.12 °C
	200~600 °C	±0.13 °C	±0.20 °C	±0.13 °C	±0.20 °C
	600~850 °C	±0.18 °C	±0.26 °C	±0.18 °C	±0.26 °C
Pt100 (385)	-200~200 °C	±0.08 °C	±0.10 °C	±0.08 °C	±0.10 °C
	200~600 °C	±0.12 °C	±0.16 °C	±0.12 °C	±0.16 °C
	600~850 °C	±0.15 °C	±0.22 °C	±0.15 °C	±0.22 °C
Pt200 (385)	-200~200 °C	±0.15 °C	±0.18 °C	±0.15 °C	±0.18 °C
	200~300 °C	±0.15 °C	±0.20 °C	±0.15 °C	±0.20 °C
	300~600 °C	±0.18 °C	±0.25 °C	±0.18 °C	±0.25 °C
	600~850 °C	±0.28 °C	±0.37 °C	±0.29 °C	±0.39 °C
Pt400 (385)	-200~0 °C	±0.06 °C	±0.08 °C	±0.06 °C	±0.08 °C
	0~200 °C	±0.10 °C	±0.12 °C	±0.10 °C	±0.13 °C
	200~600 °C	±0.13 °C	±0.20 °C	±0.14 °C	±0.21 °C
Pt500 (385)	-200~200 °C	±0.08 °C	±0.10 °C	±0.09 °C	±0.11 °C
	200~600 °C	±0.13 °C	±0.19 °C	±0.13 °C	±0.20 °C
	600~850 °C	±0.18 °C	±0.26 °C	±0.18 °C	±0.26 °C
Pt1000 (385)	-200~200 °C	±0.05 °C	±0.08 °C	±0.05 °C	±0.09 °C
	200~600 °C	±0.09 °C	±0.16 °C	±0.09 °C	±0.16 °C
	600~850 °C	±0.12 °C	±0.22 °C	±0.12 °C	±0.22 °C
Cu 50	-50~150 °C	±0.08 °C	±0.10 °C	±0.08 °C	±0.10 °C
Cu 100	-50~150 °C	±0.07 °C	±0.11 °C	±0.07 °C	±0.11 °C
BA1	-200~0 °C	±0.07 °C	±0.09 °C	±0.07 °C	±0.09 °C
	0~400 °C	±0.11 °C	±0.17 °C	±0.11 °C	±0.17 °C
	400~650 °C	±0.14 °C	±0.22 °C	±0.14 °C	±0.22 °C
BA2	-200~200 °C	±0.08 °C	±0.10 °C	±0.08 °C	±0.10 °C
	200~650 °C	±0.12 °C	±0.16 °C	±0.12 °C	±0.16 °C
BA3	-50~100 °C	±0.09 °C	±0.12 °C	±0.06 °C	±0.09 °C
G	-50~150 °C	±0.10 °C	±0.13 °C	±0.08 °C	±0.12 °C

Remark:

Complies with ITS90.

Depends on resistance maximum permitted error (MPE)

Ambient temperature is 20±5°C, one year accuracy

SCOPE OF DELIVERY

- ▶ BL98X Multifunction Calibrator
- ▶ 110V/220V external power adapter (1pc)
- ▶ Test leads with Crocodile Test Clips 3 sets (6 pcs)
- ▶ 24V loop power connection cable (1pc)
- ▶ PT100 probe with 1.5m cable, -50 °C to 200 °C (1pc)
- ▶ USB2.0 to 5-pin connection cable (1pc)
- ▶ K type thermocouple cold junction (1pc)
- ▶ HART communications cable (only for BL987H)
- ▶ Manual
- ▶ Carrying case

OPTIONAL ACCESSORIES & SERVICE

- ▶ External pressure module with connection cable
- ▶ Cold junction compensation kit (8pcs/set)

ORDERING MODEL NUMBER

- ▶ BL985-01: Multifunction temperature calibrator, 0.01%FS
- ▶ BL985-01: Multifunction temperature calibrator, 0.02%FS
- ▶ BL986-01: Multifunction process calibrator, 0.01%FS
- ▶ BL986-01: Multifunction process calibrator, 0.02%FS
- ▶ BL987-01: Documenting multifunction calibrator, 0.01%FS
- ▶ BL987-01: Documenting multifunction calibrator, 0.02%FS
- ▶ BL987H-01: Smart multifunction process calibrator, 0.01%FS
- ▶ BL987H-01: Smart multifunction process calibrator, 0.02%FS