Kunkin KP184 Calibration manual

Content

Calibration KP184

Overview

In metrology, calibration ensures the reliable comparability of a recorded measurement value with measurements taken elsewhere and with other measurements. This is done by tracing the calibration quantity back to its national representation, which in turn is ensured by international comparisons or a physical definition.

In the present device, the measuring part (ADC) is calibrated by defining one measuring characteristic each for current and voltage. These characteristic curves are straight lines, which in turn are each determined by a pair of calibration points.
Based on this calibration, the control section (DAU) is then adjusted by determining four control characteristics (two voltage and two current ranges).

Core Calibration

The actual calibration procedure uses the first pair of values of the Voltages calibration menu and the first pair of values of the Currents menu, i.e. 4 fixed points in total. These values were also calibrated during production and are documented in the calibration certificate. If no calibration certificate is available, the values 10 V/ 80 V or 2 A/ 25 A can be used. To recalibrate, the appropriate calibration menu is called up, the calibration variables are applied to the input terminals one after the other, but always grouped in pairs, their exact value is entered via the keypad and rotary encoder and stored in the non-volatile memory with the **SET** key. After this procedure, the measuring part is calibrated and the displays now show correct values.

Adjustment

However, in order to be able to use the device sensibly, it is also necessary to define four control characteristics; one characteristic each for the two voltage ranges (0...39.999 V and 40...150 V) and one each for the two current ranges (0...9.99A and 10...40 A). Thus 4 further value pairs (further 8 fixed points) are added here. This part has the character of an adjustment (DAU adjustment based on the previous calibration); calibrated measuring equipment is no longer required here.

The respective adjustment values are determined by searching for the control insert with external supply of the controlled variable. If the operating point of the control is set to stable, this value is accepted by pressing the **SET** key. Both values of the value pair are required to define a specific characteristic curve. In principle, the individual characteristic curves can also be determined separately from each other or fine-tuned afterwards.

Control

As a control of success, besides the verification of the calibration points, the examination of the transitions

V-0.001 V or 39.999 V-40.000 V in constant voltage mode and 0.000 A-0.001 A or 9.999 A - 10.000 A in constant current mode. No discontinuities (jumps > 5 mV or 5 mA) may occur here.

Optimization

The described procedure leads to a functioning device. However, at the ends of the measuring range, violations of the specification can occur, for example due to a zero point error. In this case, the lower position of the measurement characteristic can be adjusted by shifting the lower fixed point towards the zero point. In a similar way, the upper fixed point can be raised towards the end of the measuring range and thus the best compromise in the position of the measuring characteristics can be found. To optimize the control characteristic curves, an adapted height of the relevant operating point is set in each case.

Special features and precautions

Extract from the text of the device description:

The connection of the protective conductor to the metal housing needs to be improved.
The direct connection to the sheet metal enclosure of the power transformer is good and correct. However, it is not sufficient as the sole - and only indirect - connection to the majority of the housing. Of the 10 fastening screws of the housing cover, 8 are in the insulating plastic of the front panel and rear wall frame. The two remaining screw connections to the base plate also lack the contact tooth lock washers. The conductive mounting plate of the rear panel is insulated and screwed into a plastic frame and thus does not offer any protection, but rather represents a danger due to possible large-area voltage carry-over.

In summary, at best the base plate is sufficiently connected to the protective conductor.

The aluminium profiles, which form the cooling tunnel of the actuator, carry the potential of the positive input terminal. These profiles are screwed through the insulating rear wall frame with four conductive screws and can be touched directly from the outside. The four large, central ventilation openings in the rear panel also allow unintentional, direct contact with the heat sinks themselves. The data sheet indicates a maximum operating voltage of 150 V. This is well above the upper limit of 60 V for the permissible contact voltage for direct current.
Although the load circuit is to be regarded as an IT network, the absence of
further protective measures (insulation monitoring for the first fault, residual-current circuit-breaker for the second fault) means that general use outside closed electrical premises is prohibited if the load circuit voltage exceeds 60 V.

The conductive cover of the housing is not sufficiently protected against contact with the cooling profiles of the tunnel. A finger pressure is sufficient to establish such contact by minimal deformation of a housing wall. This indirectly touches the potential of the positive input terminal and cancels the basic grounding of the load circuit. It is now earth-related via protective conductor or person (first fault of the protective measure IT network) and can thus become dangerous to touch in its entirety.

Reversed polarity of the input voltage can - especially with a powerful source - lead to damage to the device, source and cables.
As actuator 6 IRFP250M work together. Their integrated diodes cause a current flow similar to a short circuit when the polarity is reversed.

When using the sensor cable and input voltages above about 20 V, a lack of contact or an interruption of the main lines, as well as reverse polarity or a short circuit of the sensor cable can damage the internal 1 KΩ protective resistors.

The outer conductor of the BNC connector can be touched accidentally and becomes a safety problem at load circuit voltages of over 60 V.

Parameter A4 does not work as described in the manual, but always sets the ON state at the time of power-on - regardless of the previous history.

The MASTER-SLAVE operation does not function in a meaningful way. It is possible that a previously unknown boundary condition is not fulfilled.

The keyboard cannot be locked by pressing a key; locking by a computer command works.

The FACTORY-RESET via the long keystroke described in the manual is also not possible; manual and remote triggering is certainly possible.

In the power control mode, permanent control oscillations can be observed when an unusually high disturbance variable occurs. The cause is obviously the parameter-dependent dead time of the control. By adjusting parameters B3 and B4 towards smaller values, the tendency to oscillate can be eliminated.

For no apparent reason, the voltage measurement sometimes stops. The upper display line freezes and the data transfer to the computer is shortened. The remaining functions obviously continue to run, so they do not depend on a current voltage measurement. This state can only be terminated by a power-on cycle (POWER-ON-RESET).

Calibration procedure KP184

Species	Action		Procedure
	Preparation		Warm up the device. Use **sensor cable** (setmenu item B 1 | SS on the display). Connect voltage transmitter and DMM.
Voltage calibration	Call menu		Switch off the device and keep the key ↑ pressed while switching on again until **cvu1** is shown.
	Voltage LOW	10 V	Set 10 V at the voltage source.
			Read the voltmeter and enter this value into **cuv1** using the rotary knob and arrow keys. Press **SET.**
	Voltage HIGH	80 V	Press the ↓ key. **cvu2** is displayed.
			Set 80 V at the voltage source. Read the voltage at the DMM and enter the value in **cvu2.** Press **SET.**
	Leaving		Quit the routine with **SHIFT** and check the voltage display.
	Preparation		Warm up the device. Connect power source and DMM.
Current calibration	Call menu		Switch off the instrument and hold down the **MODE** button when switching on again until **cua1** is shown.
	Current LOW	2 A	Set 2 A on the current transmitter. Read off DMM and enter this value in **cua1** Press **SET.**
	Current HIGH	25 A	Press the ↓ key. **Cua2** is displayed. Set 25 A. Read off DMM. Enter value in **cua2**. Press **SET.**
	Leaving		Exit the routine with **SHIFT** and check the current display.
	Preparation		Warm up the device. Use and set up the sensor cable (menu item B 1 | SS shown in the display). Connect voltage source.
U-adjustment	Call		Switch off the device and keep the key ↑ pressed while switching on again until **cvu1** is shown.
	0 … 39.999 V	Voltage 1 LOW	Navigate to **ctu1** by pressing the ↓ button twice. Set 6V with voltage source and press **SET.**
		Voltage 1 HIGH	Press the ↓ key. **Cuv2** is displayed. Locate the threshold at 40 V and press **SET.**
	40 … 150 V	Voltage 2 LOW	Press the ↓ key. **Cuv3** is displayed. Locate the threshold at 60 V and press **SET.**
		Voltage 2 HIGH	Press the ↓ key. **Cuv4** is displayed. Locate the threshold at 130 V and press **SET.**
	Leaving		Quit the routine with **SHIFT.** Check voltage control.
	Preparation		Warm up the device. Connect power source.
I-Adjustment	Call		Switch off the instrument and hold down the **MODE** button when switching on again until **cua1** is shown.
	0 … 9.999 A	Current 1 LOW	Navigate to cta1 by pressing the ↓ button twice. Use the power source to set the threshold at 2.4 A and press SET.
		Current 1 HIGH	Press the ↓ key. **Cta2** is displayed. Locate the threshold at 13 A and press **SET.**
	10 … 40 A	Current 2 LOW	Press the ↓ key. **Cta3** is displayed. Locate the threshold at 14 A and press **SET.**
		Current 2 HIGH	Press the ↓ key. **cta4** is displayed. Locate the threshold at 34 A and press **SET.**
	Leaving		Quit the routine with **SHIFT** .Check current control.

Menu structure KP184

Group	Name	No.	par.	Meaning	Value range	Starting value	set to	Unit
A	Syst	1	Addr	Address	1 – 255	1		NA
		2	Baud	Interface speed	24 – 1152	96		100 volts
		3	Onli	Mode	Offi|host|slave	Offli		Selection
		4	Inca	Start mode on at power up	on | off	Off		Selection
		5	Soun	Buzzer	on | off	On		Selection
B	Conf	1	Sens	Remote Probe (BNC) for voltage measurement	Remote | local	Local		Selection
		2	Onll	Undervoltage protection	0 – 150	0		V
		3	Slup	Current rise rate	0.1 – 500	25		A / ms
		4	Sldn	Power loss rate	0.1 – 500	25		A / ms
		5	Fact	Reset to default	Off | call	Off		Selection
C	Batt	1	Enab	Determination of the battery capacity	On | off	Off		Selection
		2	Endu	Final discharge voltage	0 – 150	0		V
		3	Half	Half discharge current	On | off	Off		Selection
		4	Unit	Ampere hours or watt hours	Ah | ph	Ah		Selection
		5	Buzz	Message: Discharge completed	One | last | level	One		Selection
D	Copa	1	Enab	Use monitoring	Off | auto | trig	Off		Selection
		2	V-H	Maximum voltage	0 – 150	0		V
		3	V-L	Minimum voltage	0 – 150	0		V
		4	A-H	Maximum current	0 – 40	0		A
		5	A-L	Minimum current	0 – 40	0		A
		6	Outs	Warning message	b1b1b1 | level	b1b1b1		Selection
E	Dyna	1	Enab	Control speed or internal resistance	Off|dyna|rest	Off		Selection
		2	A-1	Measuring current 1	0 – 40	0		A
		3	T-1	Duration 1	0 – 9000	0		ms
		4	A-2	Measuring current 2	0 – 40	0		A
		5	T-2	Duration 2	0 – 9000	0		ms
F	Ocpt	1	Enab	Use current staircase	On | off	Off		Selection
		2	Stac	Starting current	0 – 40	0		A
		3	Stpc	Current increment	0 – 40	0.1		A
		4	Stt	Time interval	0.1 – 600	0.2		s