

OC508 Programmable mV Calibrator

Owner's Manual

Orbit Controls AG
Zürcherstrasse 137
CH8952 Schlieren - ZH

orbitcontrols.ch

OC508 Programmable mV Calibrator

- ✓ Selection of DIN Thermocouples
- ✓ Measurement of mV Signals
- ✓ Calibrated Signal Output 0 - 65.535mV
- ✓ Junction Simulation
- ✓ Control with BCD parallel or Binary, Keyboard or USB Port
- ✓ BCD parallel all Data Output
- ✓ USB Control with PC SoftManager



FUNCTION Measurement and Simulation of Thermocouples with Junction Compensation.
Generation and Measurement of mV Voltages.
Temperature Measurement with external Pt-100.
Control with Front Keys, BCD parallel, Binary or USB from a PC
BCD parallel or binary coding is factory set.

Model OC508 is a programmable mV Calibrator and Simulator of DIN Thermocouples. The type of the Thermocouple, the Temperature or the mV Signal can be set from the keys at the front, via USB or optionally from BCD parallel or Binary Data Port. The generated mV output signal ranges between 0mV and 65.535mV. The output can be set directly in mV or in Temperature °C through the selected internal linearizing DIN T/C table.

The basic unit is a precision, temperature compensated programmable voltage source with a resolution of 1µV and stability of 10ppm. It is free programmable from 0 to 65535µV.

The measurement of external mV Signals has the basic range of ±100mV. It is jumper selectable for other signals. The measuring chain can be calibrated from the keyboard in the Calibration Submenu.

SoftManager OC508W for Windows is available for controlling OC508 from a PC via the USB Port. The Data can also be entered from BCD parallel or Binary Ports, permitting operation from programmable controllers. Generated signals are available at a BCD parallel port for further use.

For Junction compensation an external 4W Pt-100 can be used. The measured ambient temperature is displayed at the LCD front panel display and available at the BCD parallel port.

mV Input: mV Voltage or Temperature from Thermocouples B,E,J.K.N.R,S,T will be displayed. The voltage has three digits resolution -99.999 to 99.999. The Temperature has one digit resolution.

Ranges: +/- 100mV (other ranges selectable with jumpers)

Values out of range are displayed as:
INPUT UNDEFINED! EINGANG UNDEFINIERT!

mV Output: mV Voltage or Temperature of the selected Thermocouple B,E,J.K.N.R,S,T can be selected.

Range: 0 to 65.535mV.

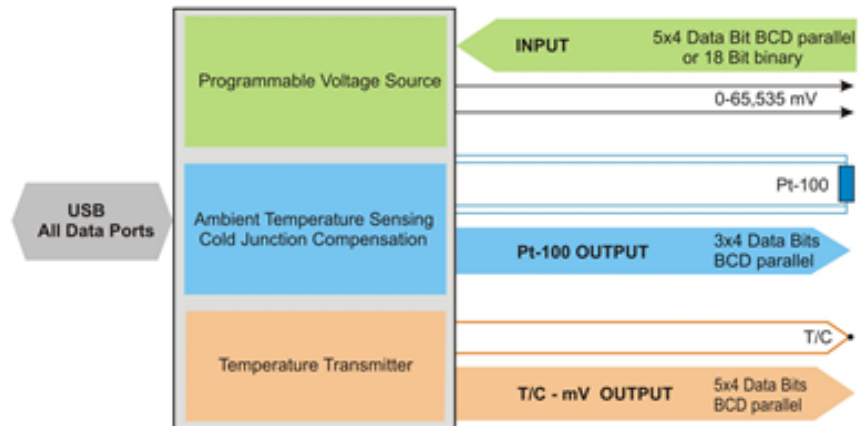
Values out of range are displayed as:
OUTPUT UNDEFINED! AUSGANG UNDEFINIERT!

Terminals: External Pt-100, four wire connection
 Data Bus: USB or BCD parallel or Binary Inputs and Outputs
 Display: LCD 2x20 Dot Matrix, Background illuminated for 10 min. after key pressed
 Supply: 230VAC or 24VDC
 Data:

- USB Input and Output with selectable Baud Rate (Serial Control)
- BCD parallel Inputs and Outputs, 5 Digits with sign, positive Logic
- Binary parallel Inputs, 18 Bit coding with sign, positive Logic

PLEASE NOTE: BCD parallel or binary coding is factory set Firm Ware.

PRINCIPLE of OPERATION



SETTINGS

Four modes of operation are selectable:

SETUP
 VALUE SELECTION
 MEASURING MODE
 MENU

Left Key:	After Switch-on:	SETUP (HTEST). During Measurement: MENU.
Middle Key:	During Measurement:	Value Selection
	During Selection:	Cursor Movement
	In Menu:	Position select
Right Key:	During Measurement:	Tare
	In Menu:	Return to Measurement
	In Setup:	Return to Measurement
	Dung the Selection:	Cursor-flashing digit-increase

1. SETUP

- Calibration of Pt-100 @ 100 Ohm.
- Calibration of the input.
- Check of the Input and Output Functions of the BCD data. Check of the DAC for Output Voltage and for generating of the Output.

2. VALUE SELECTION

- Selection of mV or °C values of Input and Output

3. MEASUREMENT

- Measurement of the input Voltage, the Temperature and the selection of the Output voltage.
- The input values of Voltage and Temperature are transformed into BCD.
- The Data at the UBS are active after a command.

4. MENU

4.1 Output Selection

T/C OUTPUT

LINEAR
TYPE B
TYPE E
TYPE J
TYPE K
TYPE N
TYPE R
TYPE S
TYPE T

T/C AUSGANG

LINEAR
TYP B
TYP E
TYP J
TYP K
TYP N
TYP R
TYP S
TYP T

4.2 ON and OFF the Junction Compensation for the Output. During the Measurement, when the Simulation the activated, the display shows the junction temperature.

OUTPUT COLD JUNCTION

COLD JUNCTION OFF
COLD JUNCTION ON

AUSGANGSKOMPENSATION

KOMPENSATION AUS
KOMPENSATION EIN

4.3 Input Signal Selection

T/C INPUT

LINEAR
TYPE B
TYPE E
TYPE J
TYPE K
TYPE N
TYPE R
TYPE S
TYPE T

T/C EINGANG

LINEAR
TYP B
TYP E
TYP J
TYP K
TYP N
TYP R
TYP S
TYP T

4.4 ON and OFF the Junction Compensation for the Input. During the Measurement, when the Simulation the activated, the display shows the junction temperature.

INPUT COLD JUNCTION

COLD JUNCTION OFF
COLD JUNCTION ON

EINGANGSKOMPENSATION

KOMPENSATION AUS
KOMPENSATION EIN

4.4 Filter Selection for the Input Signal

INPUT FILTER

OFF
FI. 1
FI. 2
FI. 3
FI. 10
FI. 20
FI. 30
FI. 40
FI. 50
FI. 60
FI. 70
FI. 80
FI. 90
FI. 100

EINGANGSFILTER

AUS
FI. 1
FI. 2
FI. 3
FI. 10
FI. 20
FI. 30
FI. 40
FI. 50
FI. 60
FI. 70
FI. 80
FI. 90
FI. 100

4.5 Source selection for the Output Voltage or Temperature

INPUT DATA PORT

MANUAL
BCD (Binary)
USB

DATENEINGANG

MANUELL
BCD (Binär)
USB

with Keys at the front *Manual Entry*
via parallel Ports (rear panel)
via USB from a PC

4.6 Language

LANGUAGE

ENGLISH

SPRACHE

DEUTSCH

4.6 Baud Rate of the Data Port: 9600, 19200, 57600, 115200, 230400 Bd

BAUD RATE

BAUD RATE

MANUAL ENTRY

T/C OUTPUT = LINEAR

By selection MANUEL of the Data Input, the mV value can be set like:
Confirm with ▲ when the display shows „MANUAL“. The flashing digit can be set with ► between 00.000 and 65.534mV. Switch over into the Output Mode with ○.

T/C OUTPUT = one of DIN Thermocouples

By selection MANUEL of the Data Input, the Temperature can be set like:
Confirm with ▲ when the display shows „MANUAL“. The flashing digit can be set with ► within the temperature table of the selected Thermocouple.
Switch over into the Output Mode with ○.

TARE

The Tara refers to the measured signal. The right front key activates the Tare When pressed for a second time the Tare will be deactivated.

Tare activated: Press the key once

Tare ON
Tare OFF

Tare deactivated: Press the key again

Tara EIN
Tara AUS

USB INTERFACE

Protocol

Input: 'R' + <CR><LF> Transmission enabled. (Periodical after each measuring sample)
'S' + <CR><LF> End of Transmission
'X' + 'x' + Number + <CR><LF> Output Value Selection

Remark: The Function DATA INPUT = DATA OUTPUT USB has to be activated.

X	Meaning	x	Meaning
A	Linear Input	a	Linear Output
B	T/C-B Input	b	T/C-B Output
C	T/C-E Input	c	T/C-E Output
D	T/C-J Input	d	T/C-J Output
E	T/C-K Input	e	T/C-K Output
F	T/C-N Input	f	T/C-N Output
G	T/C-R Input	g	T/C-R Output
H	T/C-S Input	h	T/C-S Output
I	T/C-T Input	i	T/C-T Output

Remark: By missing **X** or **x** the value will not be set.

Output:

'X' + 'x' + Number1 + ';' + Number2 + ';' + Number3 <CR><LF>

Number1: Measured value Input (mV or °C)

Number2: Measured value Junction (°C)

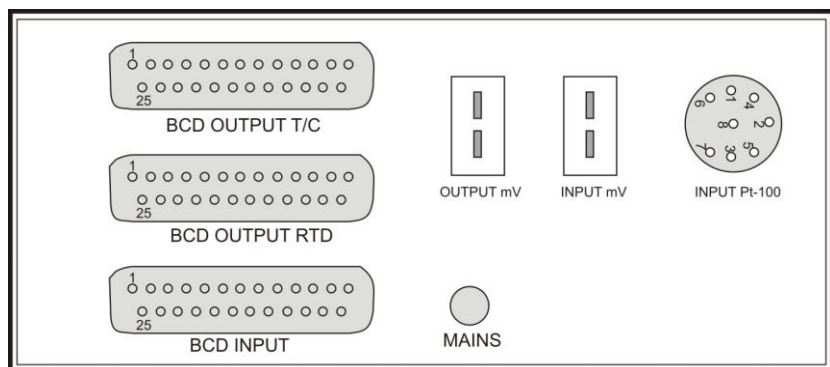
Number3: Selected Output (mV or °C)

TERMINALS for BCD parallel – Rear panel

Input T/C-BCD				Output T/C-BCD				Output Pt-100-BCD			
In: ED.CBA mV				Out: ED.CBA mV				Out: ED.CBA mV			
In T/C: EDCB.A °C				Out T/C: EDCB.A °C				Out T/C: EDCB.A °C			
Pin D-SUB 25F	Weight	Pin D-SUB 25F	Weight	Pin D-SUB 25F	Weight	Pin D-SUB 25F	Weight	Pin D-SUB 25F	Weight	Pin D-SUB 25F	Weight
1	A-BCD 1	1	A-BCD 1	1	A-BCD 1	1	A-BCD 1	1	A-BCD 1	1	A-BCD 1
2	A-BCD 2	2	A-BCD 2	2	A-BCD 2	2	A-BCD 2	2	A-BCD 2	2	A-BCD 2
3	A-BCD 4	3	A-BCD 4	3	A-BCD 4	3	A-BCD 4	3	A-BCD 4	3	A-BCD 4
4	A-BCD 8	4	A-BCD 8	4	A-BCD 8	4	A-BCD 8	4	A-BCD 8	4	A-BCD 8
5	B-BCD 1	5	B-BCD 1	5	B-BCD 1	5	B-BCD 1	5	B-BCD 1	5	B-BCD 1
6	B-BCD 2	6	B-BCD 2	6	B-BCD 2	6	B-BCD 2	6	B-BCD 2	6	B-BCD 2
7	B-BCD 4	7	B-BCD 4	7	B-BCD 4	7	B-BCD 4	7	B-BCD 4	7	B-BCD 4
8	B-BCD 8	8	B-BCD 8	8	B-BCD 8	8	B-BCD 8	8	B-BCD 8	8	B-BCD 8
9	C-BCD 1	9	C-BCD 1	9	C-BCD 1	9	C-BCD 1	9	C-BCD 1	9	C-BCD 1
10	C-BCD 2	10	C-BCD 2	10	C-BCD 2	10	C-BCD 2	10	C-BCD 2	10	C-BCD 2
11	C-BCD 4	11	C-BCD 4	11	C-BCD 4	11	C-BCD 4	11	C-BCD 4	11	C-BCD 4
12	INFO	12	Reserve INFO	12	Reserve INFO	12	Reserve INFO	12	Reserve INFO	12	Reserve INFO
13	GND	13	GND	13	GND	13	GND	13	GND	13	GND
14	C-BCD 8	14	C-BCD 8	14	C-BCD 8	14	C-BCD 8	14	C-BCD 8	14	C-BCD 8
15	D-BCD 1	15	D-BCD 1	15	D-BCD 1	15	D-BCD 1	15	D-BCD 1	15	D-BCD 1
16	D-BCD 2	16	D-BCD 2	16	D-BCD 2	16	D-BCD 2	16	D-BCD 2	16	D-BCD 2
17	D-BCD 4	17	D-BCD 4	17	D-BCD 4	17	D-BCD 4	17	D-BCD 4	17	D-BCD 4
18	D-BCD 8	18	D-BCD 8	18	D-BCD 8	18	D-BCD 8	18	D-BCD 8	18	D-BCD 8
19	E-BCD 1	19	E-BCD 1	19	E-BCD 1	19	E-BCD 1	19	E-BCD 1	19	E-BCD 1
20	E-BCD 2	20	E-BCD 2	20	E-BCD 2	20	E-BCD 2	20	E-BCD 2	20	E-BCD 2
21	E-BCD 4	21	E-BCD 4	21	E-BCD 4	21	E-BCD 4	21	E-BCD 4	21	E-BCD 4
22	E-BCD 8	22	E-BCD 8	22	E-BCD 8	22	E-BCD 8	22	E-BCD 8	22	E-BCD 8
23	Sign	23	Sign	23	Sign	23	Sign	23	Sign	23	Sign
24	Reserve STB	24	STB	24	STB	24	STB	24	STB	24	STB
25	GND	25	GND	25	GND	25	GND	25	GND	25	GND

Pt-100 TERMINALS – Rear Panel

Pt-100	
Pin	Meaning
1	
2	Sens +
3	
4	Excitation -
5	Sens -
6	
7	
8	Excitation +



Logic Control

Log 0 = GND

Log 1 = 5 ... 24V

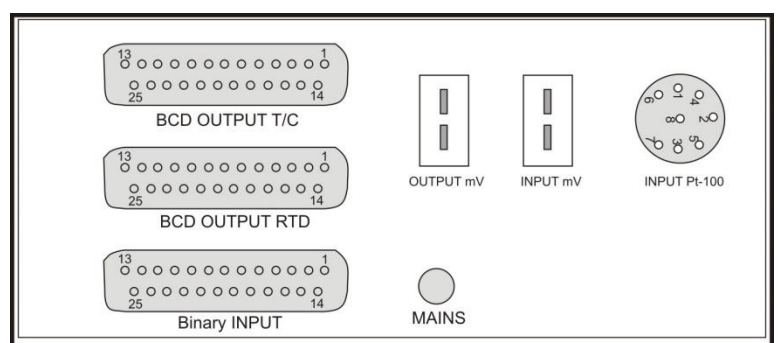
TERMINALS for BINARY Coding - Rear Panel

Input T/C-BCD		Output T/C-BCD		Output Pt-100-BCD	
In: ED.CBA mV		Out: ED.CBA mV		Out: ED.CBA mV	
In: T/C: EDCB.A °C		Out T/C: EDCB.A °C		Out T/C: EDCB.A °C	
Pin D-SUB 25F	Description	Pin D-SUB 25F	Description	Pin D-SUB 25F	Description
1	1	1	A- BCD 1	1	A- BCD 1
2	2	2	A- BCD 2	2	A- BCD 2
3	4	3	A- BCD 4	3	A- BCD 4
4	8	4	A- BCD 8	4	A- BCD 8
5	16	5	B- BCD 1	5	B- BCD 1
6	32	6	B- BCD 2	6	B- BCD 2
7	64	7	B- BCD 4	7	B- BCD 4
8	128	8	B- BCD 8	8	B- BCD 8
9	256	9	C- BCD 1	9	C- BCD 1
10	512	10	C- BCD 2	10	C- BCD 2
11	1024	11	C- BCD 4	11	C- BCD 4
12	INFO	12	Reserve INFO	12	Reserve INFO
13	GND	13	GND	13	GND
14	2048	14	C- BCD 8	14	C- BCD 8
15	4096	15	D- BCD 1	15	D- BCD 1
16	8192	16	D- BCD 2	16	D- BCD 2
17	16384	17	D- BCD 4	17	D- BCD 4
18	32768	18	D- BCD 8	18	D- BCD 8
19	65536	19	E- BCD 1	19	E- BCD 1
20	Do Not Use	20	E- BCD 2	20	E- BCD 2
21	TC Selection	21	E- BCD 4	21	E- BCD 4
22	TC Selection	22	E- BCD 8	22	E- BCD 8
23	TC Selection	23	Sign	23	Sign
24	Reserve STB	24	STB	24	STB
25	GND	25	GND	25	GND

Pt-100 TERMINALS – Rear Panel

Pt-100	
Pin	Description
1	
2	Sens +
3	
4	Excitation -
5	Sens -
6	
7	
8	Excitation +

TC Select	BIT		
	21	22	23
LINEAR	0	0	0
B	1	0	0
J	0	1	0
K	1	1	0
N	0	0	1
R	1	0	1
S	0	1	1
T	1	1	1



Logic Control

Log 0 = GND

Log 1 = 5 ... 24V

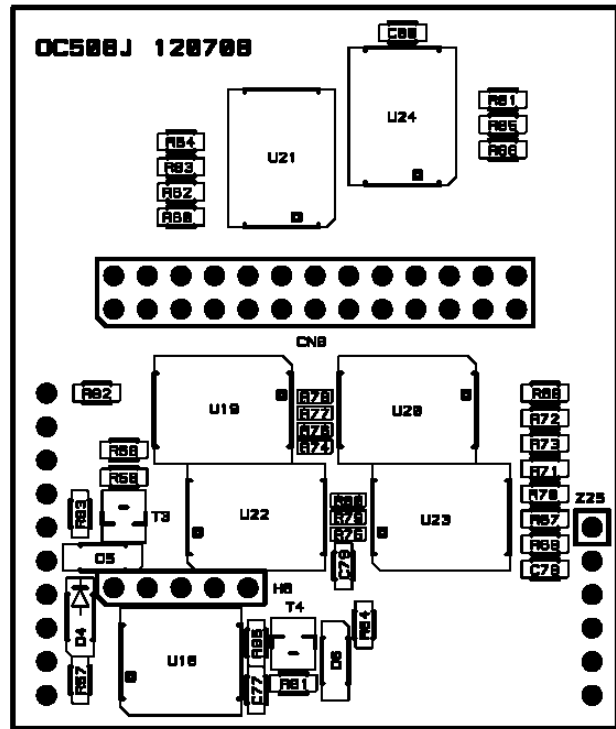
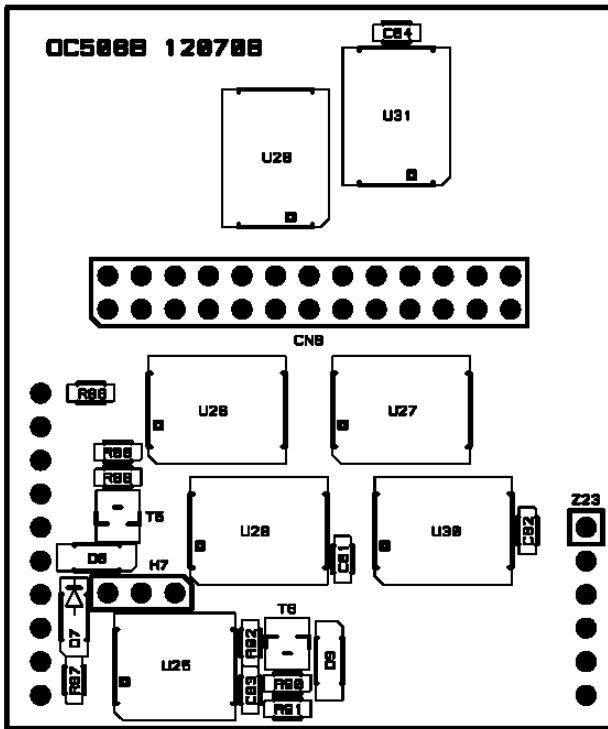
HARDWARE, SELECTION and CALIBRATION

The Hardware contains four boards:

- OC508B Data Outputs BCD
- OC508J Data Inputs BCD
- OC508C Calibrator
- OC508M Main Board

OC508B BCD Output
 H7 Polarity of the INFO Input is not used

OC508J BCD Input
 H6 Polarity INFO (Strobe) Input
 H6 1-2 Strobe HIGH external
 H6 2-3 Strobe LOW external
 H6 4-5 Strobe internal

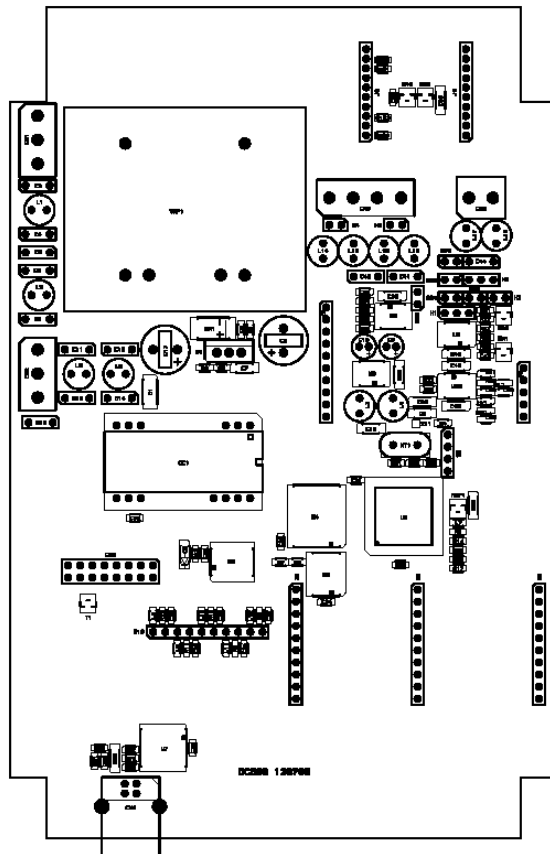
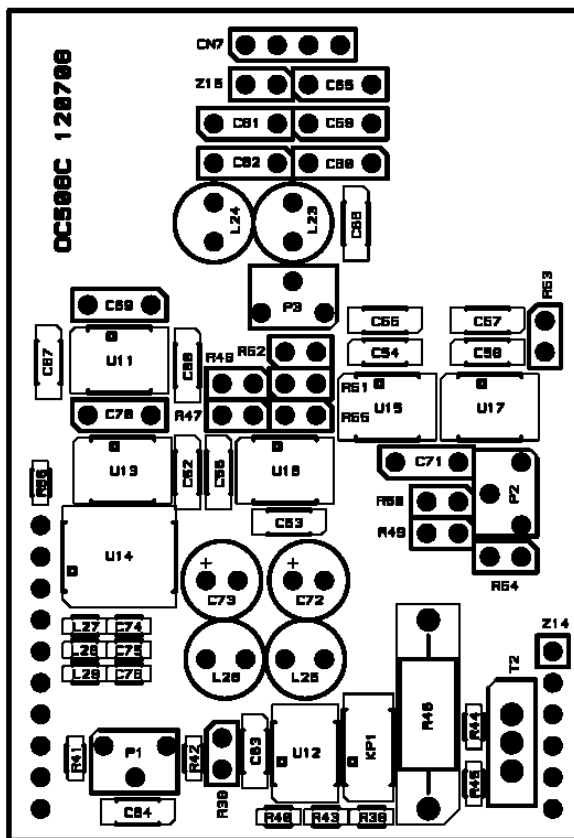


OC508C Calibrator
 P3 Offset
 P2 Range
 P1 Heater

OC508M


Main Board














- H4 1-2 Pt-100 two Terminals, connects S- with I-
- H5 1-2 Pt-100 two Terminals, connects S+ with I+
- H1 1-2 Input 100mV (factory setting)
- H1 2-3 Input 1V / 10V
- H2 1-2 Input 20mA
- H2 2-3 Input 100mV, 1V, 10V (factory setting)
- H3 1-2 GND for S- (factory setting)



HTEST and CALIBRATION

The Submenu permits calibration of the input parameters, checking of the ADC conversion and testing of the outputs.

The entry into the Submenu is possible when the key  is pressed during the instrument is switched-on. Keep the key pressed until the display changes into the calibration mode (around 20 seconds) and shows CALIBRATION OC508.

Key	Display	
 RESIST TEMP	100.0 0.0°C	Connect 100.00 Ohm resistor to the Pt-100 input. Set the value at the display to 100.0 with  . The temperature shows 0.0°C. <u>Remark:</u> Press the key ONCE to increase the value. Press it twice to decay the value.
 ADC LOW RESULT	1.2298 0.000mV	Apply 0mV to the signal input. Press the key  until EE STORE LOW... will be displayed. Zero Point has been calibrated.
 ADC HIGH RESIST	1.6407 100.000mV	Apply 100mV to the signal input. Press the key  until EE STORE HIGH... will be displayed. Full Range has been calibrated.
 BCD-IN LEFT POSITION TEST INPUT	0.000mV	BCD combination at the input connector will be converted into mV signal and displayed.
 BCD 1 MEDIUM POSITION TEST OUT	0.000mV	With  are the mV selected and converted into BCD code. They are available at the output terminals.
 BCD 2 RIGHT POSITION TEST OUT	0.0°C	With  is the temperature selected and converted into BCD code. They are available at the output terminals.
 DAC HORIZ. POSITION TEST OUT	0.000mV	With  are the mV selected in a range 0 – 65.535mV. They are available at the output connector. Calibration 0mV and 65,535mV can be performed with P2 and P3 on the board OC508C.

PC Program for Windows

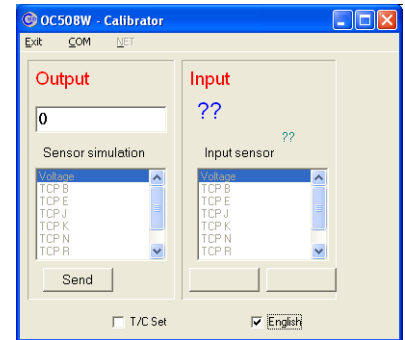
Setting Menu of Calibrator OC508

Calibrator OC508 connect with USB cable to the PC. Select the Data Port **INPUT DATA PORT USB** and the speed **DAUD RATE** for e.g. **57600 BD**.

Program OC508W installation and Start

A simple program OC508W for controlling the calibrator OC508 from a PC is part of the delivery. After installation open the program.

The window shows two fields: **Output** and **Input**.



Click at **COM** and further to **Setup**. The green light shows the connection to a free Port. The COM is selected automatically.



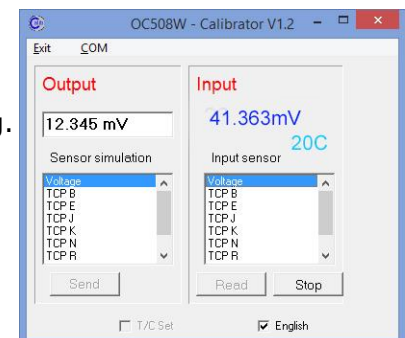
Mark the field **T/C Set** and select the Output and Input types.



Use **Send** to select the required Input and Output Type, e.g. **Voltage**. Enter the required Output value, e.g. 12.345mV.



The value 12.345mV is transferred to OC508. The LCD Display shows **OUT: 12.345mV**



The external signal at the input of OC508 e.g. 41.363mV is shown when the **Read** key is activated. The key **Stop** stops the Input reading. The Temperature measured with external Pt-100 is shown below the input value.