UNIVERSAL COUNTER OC7171A

Owner's Manual

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Vor dem Einschalten

Überzeugen Sie sich, ob Ihre Sendung das richtige Gerät Orbit Controls Modell OC 7171A beinhaltet, einschliesslich einer Betriebsanleitung OC 7171A.
Vor dem Einschalten des Gerätes überprüfen Sie die Anschlüsse und die Versorgungsspannung. Ein falsch angeschlossenes Gerät kann beschädigt werden und damit auch die mitverbundene Folgeelektronik. Für falsche Handhabung wird jede Haftung abgelehnt.

ZU BEACHTEN

Dieses Gerät wurde sorgfältig verpackt. Falls es bei Ihnen in beschädigtem Zustand eintrifft, benachrichtigen Sie unverzüglich den Orbit Controls Kundendienst (Tel: +41 1 730 2753 oder Fax: +41 1 730 2783) und nehmen Sie einen Schadenrapport auf, welchen Sie auch von der Transportgesellschaft unterschreiben lassen. Bewahren Sie bitte das Verpackungsmaterial für eventuelle Reklamationen auf.

Unpacking Instructions

Remove the Packing List and verify that you have received all equipment, including the following:
Orbit Controls Model OC 7171A Programmable Controller.
Operator's Manual OC 7171A.
If you have any questions about the shipment, please call the Orbit Controls Customer Service Department.

NOTE

When you receive the shipment, inspect the container and equipment for signs of damage. Note any evidence of rough handling in transit. Immediately report any damage to the Orbit Controls customer service, Phone +411 730 2753 or Fax +411 730 2783 and to the shipping agent.
The carrier will not honour damage claims unless all shipping material is saved for inspection. After examining and removing contents, save packing material and carton in event the reshipment is necessary.

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PROGRAMMABLE COUNTER OC7171A

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- ✓ **Free Scalable Display**
- ✓ **Parameter Memory**
- ✓ **Four Set Point Relays**
- ✓ **Two Analog Outputs**
- ✓ **RS232 and RS485 with Address**
- ✓ **Last Reading Memory**

Model OC7171A is a 6 digit Counter with programmable functions for Quadrature Counter, Up-Down Counter and Tachometer. The instrument is designed for industrial applications for connection to incremental resolvers, inductive and optical sensors and other electric signals. With the keyboard the menu can be opened. The menu contains Scaling, Preset, Filter, Sampling Time, Reset Time, Password, Analogue Output, Serial Data Ports and Set Points. The Counter function can be set for Quadrature Counter, Up-Down Counter or Tachometer.

Quadrature Counter requires two 90° phase shifted Signals A and B from linear or revolving incremental resolvers. The counting direction is automatically determined by the phase shift of the input signals. The counter is designed for fast measuring and positioning applications. The display increments with all edges of the A and B input signals. The resolution is automatically increased by four. If a resolver with e.g. 5000 pulses per revolution is connected, the display will show 20000 after one revolution when the scaling is set for 1.

Up-Down Counter is designed for fast bidirectional counting applications. The input pulses are connected to the input A, the logic level at the input B determines the counting direction. Additional mode is programmable, in which the counter counts up when the pulses are applied to the input A and counts down when they are connected to the input B.

Tachometer – Frequency Counter is suitable for measurements of revolutions, speed and other dynamic frequency based applications. The display can be scaled in required process units. By using two signal inputs from incremental resolvers, the display can bi-directionally measure the speed or the revolutions.
The measuring time can be set from 0.3 sec to 160 sec. The reset time can be set up to 360 seconds and determines the measurement of the lowest possible frequency 0.003Hz.

Floating Point Arithmetic permits practically unlimited display capacity. The pre-programmed decimal point is automatically positioned when the maximum display capacity is achieved. When during the counting period the display arrives at its full capacity with the decimal point after the least significant digit, the display expression changes into exponentional.

Preset of full 6 digits with decimal point and sign can be programmed and entered into the display with the keyboard or with external logic signal at the input C. The display starts counting at the Preset.

Scale of the display can be achieved with multiplication and division. The multiplicative constant can be programmed in full 6 digits with decimal point and sign. The dividing constant is programmable in decimal increments. The scale permits the readings in required process units such as mm, inches, LPM, m/sec etc. If a frequency of e.g. 1264 Hz has to be displayed as 30.50, the total scale has to be set for 0.024129746. This can be achieved with the SCALE of 2.41297 and dSCALE of 100.

Averaging Floating Filter has programmable constants from 1 to 99. It can be used for noisy signals, disturbed environments or when the resolver delivers noisy signal due to vibrations. The filter will mostly be used in Quadrature Positioning, Quadrature Tachometry or Frequency-Tachometer-measuring applications.

Last Display Reading remains memorized when the power is switched-off. The display starts to count at the memorized last reading when the power is switched-on again. This function is automatically activated in the Quadrature and Up-Down Counter Mode.

Two Analogue Outputs -10 … +10V and 0/4-20mA are options. They are generated simultaneously and can be assigned to any two required display reading, e.g. 0V and 4mA are generated at the display reading of 000000 and +10V and 20mA are generated at the display reading of 54205. The outputs are isolated from the inputs and the supply.

Two Serial Data Ports RS232 and RS485 are options. The parameters can be set with the display. The format contains 8 data bits, 1 start, 1 stop, no parity and programmable baud rate from 1200 to 19200 bd. The address of RS485 can be set from 01 to 31. The outputs are isolated from the inputs and the supply.

Two or four Set Points with transistor outputs or mechanical relays are optionally available. The outputs are isolated from the inputs and the supply.

Password can be set to prevent unauthorized entry into the menu. The menu step StPASS contains 20 combinations which can be select with UP and DOWN keys. If one of them is selected and entered in the menu step PASS, the entry into the menu is available. To protect the menu from unauthorized operation, another password combination has to be used than the one set in the StPASS, and entered it in the menu step PASS. After this the menu can only be opened with the correct password. When an incorrect password is entered, the menu stops and the display changes into the measuring mode. Without the Password only the Set Points SP1 and SP2can be selected and set.

1 KEYBOARD

MENU

ACK

UP

DOWN

SET

The key **MENU** opens the menu. The required parameter will be confirmed with **ACK** and set with **UP** or **DOWN**.
The flashing digit - Cursor - can be positioned with **ACK**. The sign and the decimal point can be set when the cursor is moved out of the display range and no digit is flashing.
The decimal point can be set with **UP** the sign with **DOWN**.
The programming is terminated with **SET** and the display returns to measuring mode.

2 MODE of OPERATION

The mode of operation can be selected in the submenu **HtESt**. The key ***MENU*** has to be kept pressed while the instrument is switched-on and released after the display shows **HtESt**.
The key ***MENU*** increments the menu steps.
First the sign and the display segments are tested. The next step **HCF. XXX** configures the hardware options installed. With the keys ***UP*** or ***DOWN*** the number XXX can be set from 0 to 255. This number corresponds to the build-in hardware option and opens the related steps in the main menu permitting thus setting of the corresponding parameters.
In the next ***MENU*** the Mode of Operation can be selected:

QUAd C **Quadrature** counter with two inputs for A and B with 90º phase shifted signals from linear or revolving incremental sensors. The Up or Down counting direction is automatically recognized from the phase shift of the signals A, B. This Mode of operation is suitable for precision positioning. When the power is switched-off, the last display reading will be memorized.

Updn C **UP or DOWN** Counter. When the input pulses are connected to the input A, the counter increments. When connected to the input B, the counter decrements. When the power is switched-off, the last display reading will be memorized.

Udic C **UP or DOWN** Counter with a control input. The input pulses are connected to the input A. The logic signal at the control input B determines the counting direction (B=0 incrementing, B=1 decrementing). When the power is switched-off, the last display reading will be memorized.

QUAd F **Tachometer** for pulses from linear or revolving incremental resolvers with A and B phase shifted logic signals. The positive or the negative reading is automatically determined by the phase position of the inputs A and B.

Updn F **Tachometer** with two inputs A and B. When the pulses of the unknown frequency are connected to A, the display shows the results with plus sign. When connected to B, the display results are with negative sign.

Udic F **Tachometer** with control input. The frequency is connected to A. The logic signal at B determines the counting direction (B=0 display results are positive, B=1 display results are negative).

QUAd rC **Quadrature** counter with Line Driver Inputs A,A', B,B', C,C'. The function is the same as **QUAd C**.

Updn rC **UP or DOWN** counter with Line Driver Inputs. The same function as **UPdn C**.

Udic rC **UP- DOWN** counter with Line Driver Inputs. Same function as **Udic C**.

QUAdr F **Tachometer** with Line Driver inputs. Same function as **QUAd F**.

UPdnr F **Tachometer** with Line Driver inputs A und B. Same function as **UPdn F**.

NOTE: *Press the key **ACK** at the end of the selection to store the configuration.*

NOTE: *After setting the mode, switch-off the instrument. After 3 seconds switch-on again to permit writing of the new setting into the non-volatile memory.*

3 MENU

3.1 Menu Steps QUAd C, Updn C und Udic C

SP1	Set Point 1.
HSt 1	Hysterese SP1.
SP2	Set Point 2.
HSt 2	Hysterese SP2.
SP3	Set Point 3.
HSt 3	Hysterese SP3.
SP4	Set Point 4.
HSt 4	Hysterese SP4.
PASS	The correct password permits entry into the menu.
PrESET	6 digit additive constant with decimal point and sign
SCALE	6 digit multiplicative constant with decimal point and sign.
dSCALE	Dividing constant programmable from :1 to :100 000.
OrdEr	Display resolution, decimal point selection.
Fn null	Reset function: In OFF, In POS, In nEg. This determined the function of the Reset input for setting the display to Zero (OFF, pos. logic 1, neg. logic 0) **NOTE**: After changing any parameter in this menu step, the instrument has to be switched-off and switched-on again, to permit storing of the parameter.
FiltEr	Averaging filter: OFF, 1, 2, … 99.
Aout L	Display value for analogue output -10V and 0/4 mA.
Aout H	Display value for analogue output +10V and 20mA.
Fn Anl	Function of the analogue output: Off, direct acting or inverted.
bAUd	Baud rate of the data port 1200 to 19200 bd.
rS Adr	Address 0 activates RS232. One of addresses 01-31 activates RS485.
St PASS	Password selection from 20 stored combinations
StArt	Measuring Mode.

The key SET terminates the programming mode and switches into the measuring mode. When pressed during the measuring mode, the display will be forced to PRESET value.

3.2 Menu Steps QUAd F, Updn F und Udic F

SP1	Set Point 1.
HSt 1	Hysterese SP1.
SP2	Set Point 2.
HSt 2	Hysterese SP2.
SP3	Set Point 3.
HSt 3	Hysterese SP3.
SP4	Set Point 4.
HSt 4	Hysterese SP4.
PASS	The correct password permits entry into the menu.
PrESET	6 digit additive constant with decimal point and sign
SCALE	6 digit multiplicative constant with decimal point and sign.
dSCALE	Dividing constant programmable from :1 to :100 000.
OrdEr	Display resolution, decimal point selection.
FbASE	Sampling time selectable from OFF, 0.3 to 160 s.
ObASE	Reset time in seconds determines the lowest measured frequency. The ObASE can be selected from 0.3 to 320 s.
FiltEr	Averaging filter: OFF, 1, 2, … 99.
Aout L	Display value for analogue output -10V and 0/4 mA.
Aout H	Display value for analogue output +10V and 20mA.
Fn Anl	Function of the analogue output: Off, direct acting or inverted.
bAUd	Baud rate of the data port 1200 to 19200 bd.
rS Adr	Address 0 activates RS232. One of addresses 01-31 activates RS485.
St PASS	Password selection from 20 stored combinations
StArt	Measuring Mode.

4 SCALE and dSCALE

The display can be scaled in required process units by using the multiplicative and/or dividing constant.

SCALE Multiplicative constant.
dSCALE Dividing constant for the SCALE.

Display = Input x Scale : dSCALE + SEt

4.1 Example: Quadrature Counter

Task: A resolver with 14400 pulses/revolution is used. The display has to show 2.000 after one revolution.

Solution: Set **quAd C** and switch-off. Switch-on again after 3 sec.

SCALE Calculation: 2.000 : 14400 = 0.000138888 = 1.38888 : 10000
SCALE Selection: 1.38888 adjust in Menu Step *SCALE*
SCALE Division: Select 010000 in Menu Step *dSCALE*
Decimal Point: Select CCC.ddd in Menu Step *OrdEr*

Terminate with the key **SET**.

5 SPECIFICATIONS

DISPLAY: 0 ... ± 999999, red, 7 segments 14.7 mm.

INPUTS: **Inputs A, B, C**: Positive Logic 5V CMOS, protected to 48V.
Line Driver: Complementary Inputs A-A', B-B', C-C'.
Logic selection inside the instrument (§ 8).

Quadrature- and Angular Counter: Inputs A and B. The counting direction is determined by the phase position of signals A and B. The display increments with all edges of A and B.
Frequency Range: 0 ... 500 kHz.

Up/Down* and *Udic C: Input A: Pulses to be counted
Input B: Counting direction UP (log. 0 or open), DOWN (log.1).
Frequency Range: 0 ... 500 kHz.
Tachometer: 0.003 Hz - 500 kHz

PRESET: Additive constant programmable from 0 to ± 999999 with decimal point and sign. The PRESET can be inserted into the display with the key **SET** or with external logic signal at the input C, see § 6.

NULL: Display RESET to Zero with the key **SET** or with external logic signal at the input C, see § 6.

RESET INPUT: Positive signal 5-48V at the **Input C** sets the display to the PRESET value. When the PRESET is set to 0, the display will reset to zero. This function is defined in the menu step **Fn null** and can be switched-off **In OFF**, activated with a positive signal level **In POS** or with a negative signal level **In NEg**.

OUTPUTS: **Analogue Output**: 0/4-20mA and -10 … +10V. It can be selected in the menu as direct acting **04-20**, inverting **20-04** or inactive **OFF**. Response time 100ms.
Digital Output: RS232 two terminals and RS485 four terminals, 8Bit, No Parity, 1Start, 1 Stop, 1200-19200 bd.
Set Points: 2 or 4 Relays 5A-230VAC, or open collectors 48V-100mA.

SCALING: **SCALE**: 6 digit multiplicative constant with decimal point and sign
dSCALE: Dividing constant selectable from :1 to :100 000.

SAMPLING: **FbASE**: Tachometer-Frequency Counter: OFF, 0.3 to 160 s.
ObASE: Reset Tachometer-Frequency Counter: 0.3 to 320 s.

ORDER: Resolution of the display.

FILTER: Averaging Filter with constants selectable from 1 to 99.

EXCITATION: **Mains Supply**: 2-24V/40mA adjustable inside the instrument.
DC Supply: identical with the DC supply voltage.

SUPPLY: 115/230V ±10%, 50-60Hz, 6VA.
Option DC Supply: 18-36 V DC, or 9-36VDC, 4W.

CABINET: DIN 48x96mm, depth behind the panel100mm.
Panel cut-out 45x90 mm.

TERMINALS: Pluggable screw terminals.

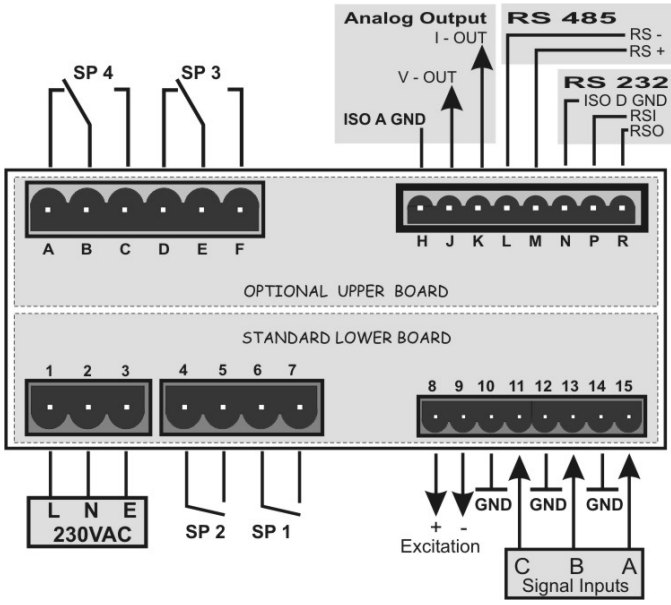
6 PRESET and RESET

In the mode Quadrature Counter (*QUAd C)* or Up-Down Counter (*Updn C* or *Udic C)* the PRESET or the RESET (Display Zero) can be inserted into the display.

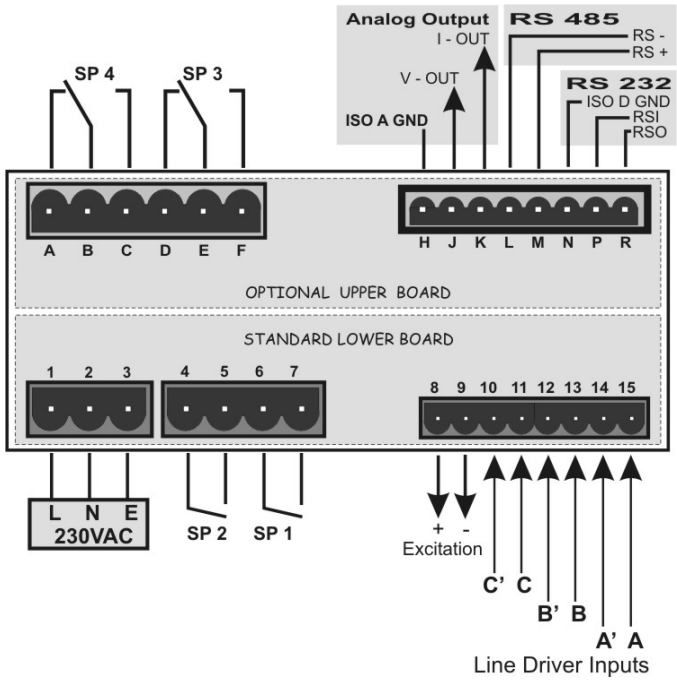
Press shortly the key **SET**. The display shows **SEt** for approx. 2 sec. and switches over to **rSt**. When the key **ACK** is pressed during the display shows **SEt** or **rSt**, after approx. 2 seconds, **rEAdY** appear at the display. The PRESET value is inserted into the display or the display is set to Zero.

7 OC7171A TERMINALS

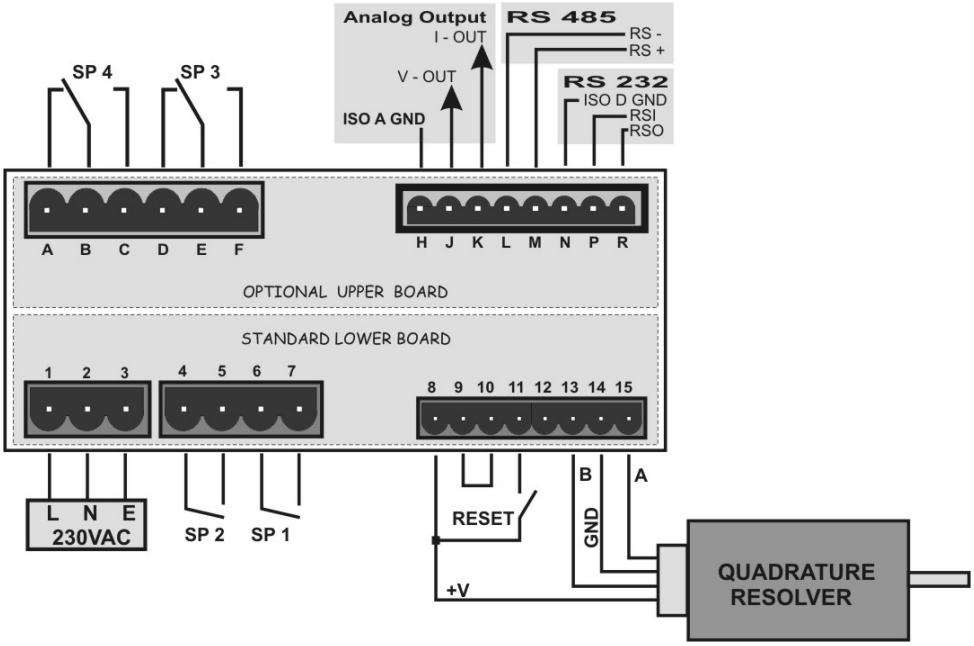
7.1 Instrument with all Options, Standard Inputs



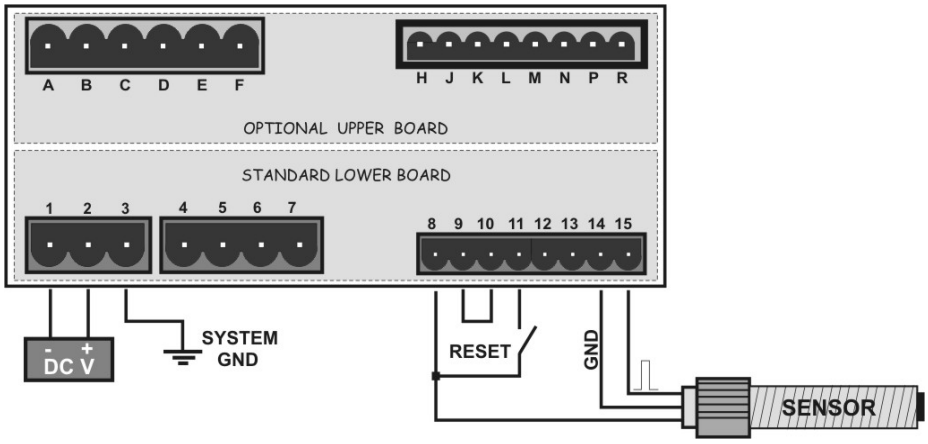
7.2 Instrument with all Options, Line Driver Inputs



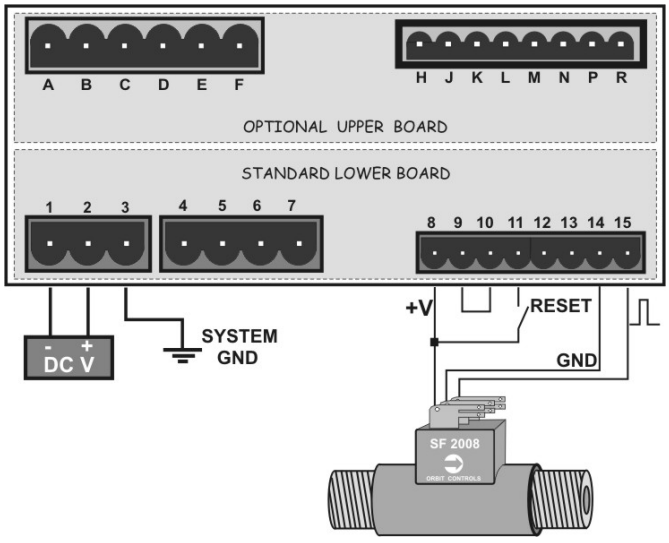
7.3 Example: Incremental Resolver



7.4 Example: Tachometer, Frequency Counter

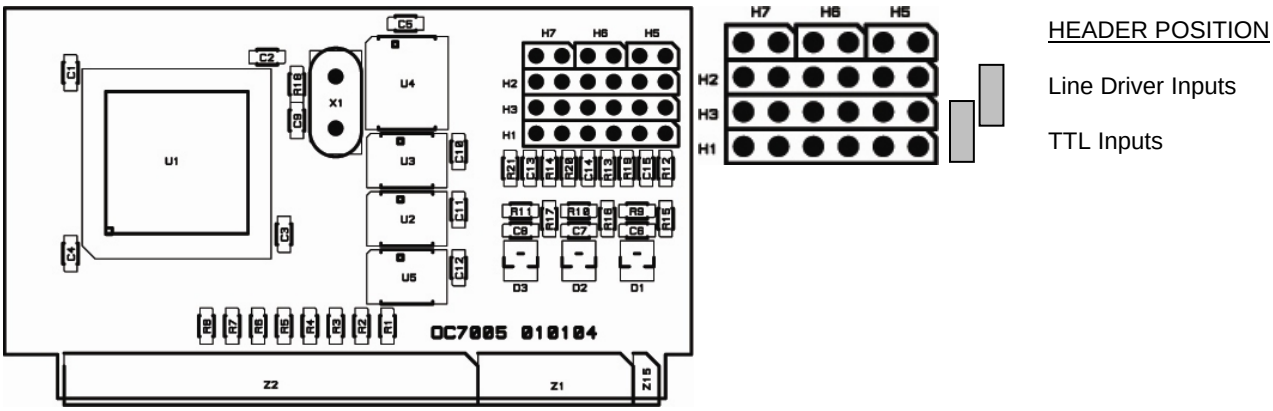


7.5 Example: Turbine Flowmeter



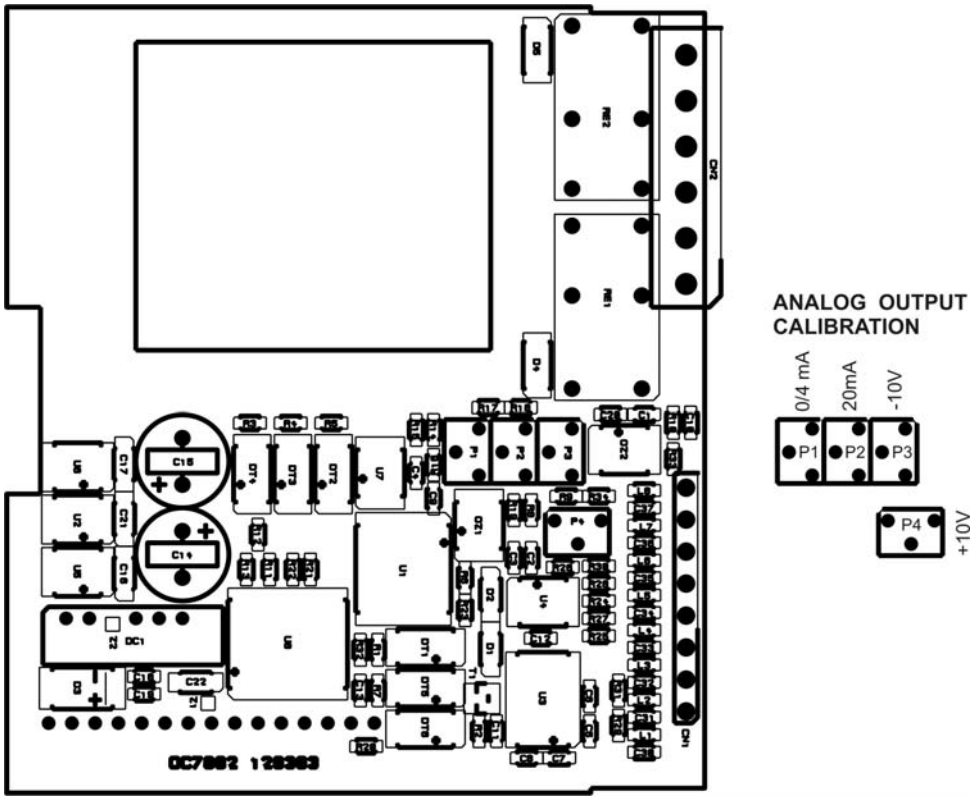
8 SELECTION of INPUTS

Jumpers in Headers H1, H2, and H3 configure the type of the input. The Header H1 selects the inputs A, B, C and the three GND. The Header H2 selects the complementary inputs A-A', B-B', C-C' for the Line Driver connection.



9 OPTION BOARD

The option board contains two analogue outputs 4-20mA and -10…+10V and two serial ports RS232 and RS485. The analogue outputs can be calibrated with P1, P2, P3, and P4. The calibration can be activated in the HTEST (§ 10).



10 H-TEST and CALIBRATION

Service and calibration Submenu is available. To enter it, press the key MENU during power-on and hold it pressed until the display shows ***HtESt***.
The key **MENU** advances the test steps forward, the key **SET** backward.

Segments
In the first step the digits of the display are tested, included the sign and the decimal points.

HCF Function
The next test step activates the HCF-Function. The number can be set between 128 and 255 with UP or DOWN and enables operation of the hardware option and settings of the corresponding menu steps.

1	SP1, HSt1	16	Analogausgang
2	SP2, HSt2	32	bAUd
4	SP3, HSt3	64	rS-Adr
8	SP4, HSt4		

Combinations determine the activation of the optional boards, such as:
HCF.144 Menu (128) and Analogue Output (16).
HCF.240 Menu (128), Analogue Output (16), Baud Rate (32) and Address (64).

Press **ACK** to store the settings!

Mode of Operation
Next submenu step is the mode of operation. One of the functions **Udic F**, **UPdn F**, **QUAd F**, **Udic C**, **UPdn C**, **QUAd C**, **Udic rF**, **UPdn rF**, **QUAd rF**, **Udic rC**, **UPdn rC**, **QUAd rC** can be selected with UP or DOWN. After selection press the key ACK to store the setting.

The functions **Udic F**, **UPdn F**, **QUAd F**, **Udic C**, **UPdn C**, **QUAd C** are for TTL Inputs with signal level 5-48V.
The functions **Udic rF**, **UPdn rF**, **QUAd rF**, **Udic rC**, **UPdn rC**, **QUAd rC** are for Line Driver applications.

Calibration
Next Submenu step activates the calibration. The display shows *CAL.XXX*, whereas *XXX* is a 3 digit number which represents a scaling constant of the internal time base. The number can be set with UP or DOWN.
Increments of 10 points represent a display change of 0.1 Hz at input frequency of 10 kHz and display resolution of 10000.0.
Press **ACK** to store the setting!

Set Points
In the next Submenu the Set Point and the corresponding LEDs are tested. The Relay (Option) will be activated and the LEDs *SP1 Ld1, SP2 Ld2, Ld3, Ld4* illuminated.

Analogue Outputs
In the next Submenu the Analogue Outputs (Option) are generated and are available at the output terminals for calibration. The display shows I = 4, I = 8, I = 12, I = 16, I = 20.

By pressing **MENU** the instrument switches into the measuring mode.

11 PROGRAMMING via SERIAL DATA PORTS

RS 232
Display recall
Enter or Key r (read)..... all keys with exception of p and e

RS 485
Dez hex Table

Addr	Dez	Hex
01	= 129d	= 81h
02	= 130d	= 82h
03	= 131d	= 83h
04	= 132d	= 84h
05	= 133d	= 85h
06	= 134d	= 86h
07	= 135d	= 87h
08	= 136d	= 88h
09	= 137d	= 89h
10	= 138d	= 8Ah
11	= 139d	= 8Bh
12	= 140d	= 8Ch
13	= 141d	= 8Dh
14	= 142d	= 8Eh
15	= 143d	= 8Fh
16	= 144d	= 90h
17	= 145d	= 91h
18	= 146d	= 92h
19	= 147d	= 93h
20	= 148d	= 94h
21	= 149d	= 95h
22	= 150d	= 96h
23	= 151d	= 97h
24	= 152d	= 98h
25	= 153d	= 99h
26	= 154d	= 9Ah
27	= 155d	= 9Bh
28	= 156d	= 9Ch
29	= 157d	= 9Dh
30	= 158d	= 9Eh
31	= 159d	= 9Fh

Ffirst entert he address, e.g. Address 01 = 128 + 1 = 129.
⟶ Alt 129
⟶ and than the key **d**

For changing of any function via RS 485 first the address has to be entered.

11.1 Reset and Preset via RS serial ports

Reset the display to zero or **Preset** the display to any required preselected value by opening the IFACE-Mode and entering **C0** or **C1**.

RS485 - RESET	**RS485 - PRESET**
1.byte (adr+128)	1.byte (adr+128)
2.byte 'P'	2.byte 'P'
3.byte 'C'	3.byte 'C'
4.byte '0'	4.byte '1'
5. byte (CR)	5.byte (CR)
6.byte 'E'	6.byte 'E'

RS232 - RESET	**RS232 - PRESET**
1.byte 'P'	1.byte 'P'
2.byte 'C'	2.byte 'C'
3.byte '0'	3.byte '1'
4.byte (CR)	4.byte (CR)
5.byte 'E'	5.byte 'E'

11.2 Setting of Parameters via RS serial ports

Operating.

1.
Open IFACE
IFACE mode is set after downloading
'P' + <CR> + <LF> 3 Byte for RS232
or
addr+'P' + <CR> + <LF> 3 Byte for RS485

oc7171A answers
IFACE#aa<CR>LF>

Notice 1:
Number #aa is a string of integer numbers, which represent the address of oc7171A.
For rs232 equal zero, for rs485 between 01 and 32.

If downloading, addr represent the address of oc7171A, which communicate via rs485.
addr is 1 byte, which is computed as #aa+128.
For rs232 no addr byte is send.

2.
Close IFACE
Meas mode is set after downloading
'E' + <CR> + <LF> 3 Byte
oc7171A answers
MEAS#aa<CR>LF>

Number #aa is a string of integer numbers, which represent the address of oc7171A.
For rs232 equal zero, for rs485 between 01 and 32

3.
Up load number (In IFACE mode only)
Send the command and the numbers from Tab1 (see bellow).
oc7171A device answers immediately after <LF> (see Tab1 bellow) :
PROM#aa #bb #num<CR>LF>

Number #aa is a string of integer numbers, which represent the address of oc7171A.
For rs232 equal zero, for rs485 between 01 and 32
and #num is a string of requested real number such as 1.23456 etc.

4.
Down load number (In IFACE mode only)
Send the command and the numbers from Tab1.
oc7171 device answers immediately after <LF> (see Tab1) :
PROM#aa #bb #num<CR>LF>

Number #aa is a string of integer numbers, which represent the address of oc7171A.
For rs232 equal zero, for rs485 between 01 and 32
and #num is a string of downloaded number such as 1.23456 etc.

5.
Up load select (In IFACE mode only)
Send the command selected from Tab1.
oc7171A device answers immediately after <LF> (see Tab1) :
MENU#aa #bb #sel<CR>LF>

Number #aa is a string of integer numbers, which represent the address of oc7171A.
For rs232 equal zero, for rs485 between 01 and 32
and #sel is a string of requested integer number such as 12 etc.

6.
Down load select (In IFACE mode only)
Send the command and the numbers from Tab1.
oc7171A device answers immediately after <LF> (see Tab1) :
MENU#aa #bb #sel<CR>LF>

Number #aa is a string of integer numbers, which represent the address of oc7171A.
For rs232 equal zero, for rs485 between 01 and 32
and #sel is a string of requested integer number such as 12 etc.

Tab 1.

PCSETTAB	Up Load to oc7171A	Down Load to PC
ORDER	'M'+'0'+'0'+<CR>+<LF>	'M'+'0'+'0'+' '+"#sel"+<CR>+<LF>
FILTER	'M'+'0'+'1'+<CR>+<LF>	'M'+'0'+'1'+' '+"#sel"+<CR>+<LF>
DSCALE	'M'+'0'+'2'+<CR>+<LF>	'M'+'0'+'2'+' '+"#sel"+<CR>+<LF>
FBASE	'M'+'0'+'3'+<CR>+<LF>	'M'+'0'+'3'+' '+"#sel"+<CR>+<LF>
OBASE	'M'+'0'+'4'+<CR>+<LF>	'M'+'0'+'4'+' '+"#sel"+<CR>+<LF>
FN ANL	'M'+'0'+'5'+<CR>+<LF>	'M'+'0'+'5'+' '+"#sel"+<CR>+<LF>
BAUD	'M'+'0'+'6'+<CR>+<LF>	'M'+'0'+'6'+' '+"#sel"+<CR>+<LF>
RS ADR	'M'+'0'+'7'+<CR>+<LF>	'M'+'0'+'7'+' '+"#sel"+<CR>+<LF>
PASS	'M'+'0'+'8'+<CR>+<LF>	'M'+'0'+'8'+' '+"#sel"+<CR>+<LF>
SETPASS	'M'+'0'+'9'+<CR>+<LF>	'M'+'0'+'9'+' '+"#sel"+<CR>+<LF>
PRESET	'N'+'1'+'0'+<CR>+<LF>	'N'+'1'+'0'+' '+"#num"+<CR>+<LF>
SCALE	'N'+'1'+'1'+<CR>+<LF>	'N'+'1'+'1'+' '+"#num"+<CR>+<LF>
SP 1	'N'+'1'+'2'+<CR>+<LF>	'N'+'1'+'2'+' '+"#num"+<CR>+<LF>
HST 1	'N'+'1'+'3'+<CR>+<LF>	'N'+'1'+'3'+' '+"#num"+<CR>+<LF>
SP 2	'N'+'1'+'4'+<CR>+<LF>	'N'+'1'+'4'+' '+"#num"+<CR>+<LF>
HST 2	'N'+'1'+'5'+<CR>+<LF>	'N'+'1'+'5'+' '+"#num"+<CR>+<LF>
AOUT L	'N'+'1'+'6'+<CR>+<LF>	'N'+'1'+'6'+' '+"#num"+<CR>+<LF>
AOUT H	'N'+'1'+'7'+<CR>+<LF>	'N'+'1'+'7'+' '+"#num"+<CR>+<LF>
SP 3	'N'+'1'+'8'+<CR>+<LF>	'N'+'1'+'8'+' '+"#num"+<CR>+<LF>
HST 3	'N'+'1'+'9'+<CR>+<LF>	'N'+'1'+'9'+' '+"#num"+<CR>+<LF>
SP 4	'N'+'2'+'0'+<CR>+<LF>	'N'+'2'+'0'+' '+"#num"+<CR>+<LF>
HST 4	'N'+'2'+'1'+<CR>+<LF>	'N'+'2'+'1'+' '+"#num"+<CR>+<LF>
FNUL	'M'+'2'+'2'+<CR>+<LF>	'M'+'2'+'2'+' '+"#sel"+<CR>+<LF>
FNRL 1	'M'+'2'+'3'+<CR>+<LF>	'M'+'2'+'3'+' '+"#sel"+<CR>+<LF>
FNRL 2	'M'+'2'+'4'+<CR>+<LF>	'M'+'2'+'4'+' '+"#sel"+<CR>+<LF>
FNRL 3	'M'+'2'+'5'+<CR>+<LF>	'M'+'2'+'5'+' '+"#sel"+<CR>+<LF>
FNRL 4	'M'+'2'+'6'+<CR>+<LF>	'M'+'2'+'6'+' '+"#sel"+<CR>+<LF>

Notice 2: #num is a string of real numbers such as 1.23456 etc.
Notice 3: #sel is a string of integer numbers corresponding to Tab 2...Tab 16.

Tab 2 #sel	ORDER
0	C.DDDDD
1	CC.DDDD
2	CCC.DDD
3	CCCC.DD
4	CCCCC.D
5	CCCCCC.

Tab 3 #sel	FILTER
00	OFF
01	FIL 1
02	FIL 2
03	FIL 5
04	FIL 10
05	FIL 20
06	FIL 30
07	FIL 40
08	FIL 50
09	FIL 60
10	FIL 70
11	FIL 80
12	FIL 90
13	FIL 99

Tab 4 #sel	DSCALE
00	1
01	10
02	100
03	1000
04	10000
05	100000

Tab 5 #sel	FBASE
00	T .30
01	T .60
02	T 1.2
03	T 2.5
04	T 5.0
05	T 10
06	T 20
07	T 40
08	T 80
09	T 160

Tab 6 #sel	OBASE
00	T .30
01	T .60
02	T 1.2
03	T 2.5
04	T 5.0
05	T 10
06	T 20
07	T 40
08	T 80
09	T 160

Tab 7 #sel	FN ANL
00	OFF
01	04 20
02	20 04

Tab 8 #sel	BAUD
0	1200
1	2400
2	4800
3	9600
4	19200

Tab 9 #sel	ADDR
0	RS232
1	01
2	02
..	..
30	30
31	31

Tab 10 #sel	PAS
00	P 1001
01	P 2010
02	P 0102
03	P 1201
04	P 2021
05	P 0121
06	P 1020
07	P 2100
08	P 0002
09	P 1200
10	P 0001
11	P 1010
12	P 2102
13	P 0201
14	P 1021
15	P 2121
16	P 0020
17	P 1100
18	P 2002
19	P 0200

Tab 11 #sel	SETPAS
00	P 1001
01	P 2010
02	P 0102
03	P 1201
04	P 2021
05	P 0121
06	P 1020
07	P 2100
08	P 0002
09	P 1200
10	P 0001
11	P 1010
12	P 2102
13	P 0201
14	P 1021
15	P 2121
16	P 0020
17	P 1100
18	P 2002
19	P 0200

Tab 12 #sel	FN NUL
00	IN OFF
01	IN POS
02	IN NEG

Tab 13 #sel	FNRL 1
00	OPEN
01	CLOSE

Tab 14 #sel	FNRL 2
00	OPEN
01	CLOSE

Tab 15 #sel	FNRL 3
00	OPEN
01	CLOSE

Tab 16 #sel	FNRL 4
00	OPEN
01	CLOSE

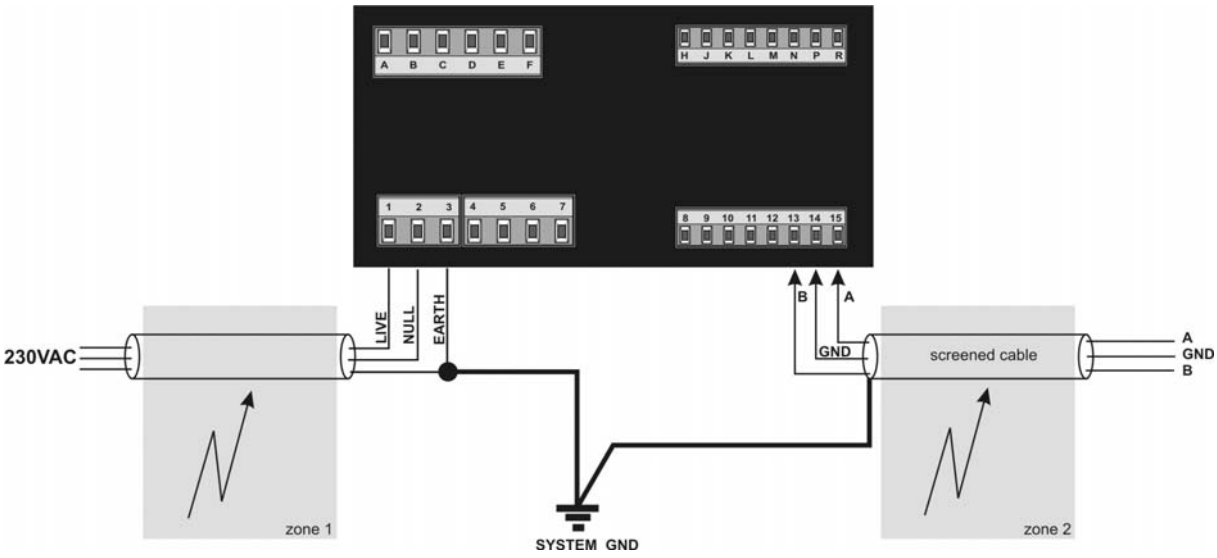
12 BURST TEST and recommended CONNECTIONS

Tester: Burst-Surge Generator HILO, Model CE-Tester
Datum: 15. June 2000
E.U.T.: OC7171, SN: 200615, Supply 230VA
Mode: UdiC F Frequency Counter, *SCALE* = 1, *OrdEr* = CCCCCC
Input: 99998 Hz
Display: 99998

12.1 Test Conditions

IEC Norms: IEC 801-4
IEC 1000-4-4
EN 50052-1

12.2 Test Set - Up



12.3 Test Results

Zone 1: 2kV Burst Display of 99998 without any charge.
Zone 2: 2kV Burst Display of 99998 without any charge.

Technician: Oliver Matthews 15. June 2000

CE Approval No: 409/18-30/2001-4568 from 12.6.2001 VTUE Praque.