

# **OC 7167 DIGITAL COUNTER WITH BARGRAPH**

## **Owner's Manual**

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## Vor dem Einschalten

Überzeugen Sie sich, ob Ihre Sendung das richtige Gerät Orbit Controls Modell OC 7167 beinhaltet, einschliesslich einer Betriebsanleitung OC 7167.

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 7167.

Operator's Manual OC 7167.

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 with Bargraph OC7167

- ✓ Frequency measurement
- ✓ Analog Input 0-10V
- ✓ 6 digit Display
- ✓ 30 LED Bargraph
- ✓ Data Output BCD parallel
- ✓ Free programmable, scalable
- ✓ RS 232 and RS 485
- ✓ Analog Output 0/4-20mA
- ✓ Analog Output 0 ...  $\pm 10V$

**Model OC7167** is a programmable counter with a digital display and a bargraph. The digital display has 6 digits, the bargraph has 30 LEDs with a scale 0-100%.



The counter has an input for pulses; the bargraph accepts analog signals 0-10V. The digital display can show the frequency, the bargraph the analog signal. With a keyboard they however can be set to show the frequency at the bargraph and the analog signal at the digital display.

Model OC7167 is designed for variety of signal sources and sensors, such as NPN, PNP or Namur initiators, resolvers, incremental sensors etc. as well as DC analog signals. The type of the sensor is selectable by jumpers inside the instrument.

The frequency range of the counter is 10Hz to 100 kHz. The counter can be set for frequency counting, up-down counting or incremental quadrature counting applications.

The digital display is programmable in process units such as RPM, l/min, kg/h. etc. The displayed results are available at one parallel or two serial data ports. Two analog outputs are generated simultaneously and can be assigned to two desired display values.

The bargraph has 30 LEDs and is isolated from the counter. The input is designed for analog signals 0/4-20mA or 0-10VDC. The Scale and the Offset are adjustable with internal potentiometers.

Two excitations 12V and 5V are available at the terminals. The 12V excitation is isolated and can be used for supplying of external sensors.

The frequency measurements can be performed selectable from 25ms to 3 sec. With the same measuring rate the analog and the digital outputs are generated.

The digital display and the bargraph can be selectable programmed for:

- The digital display shows the frequency, the bargraph the analog input signal
- The digital display and the bargraph show both the frequency.
- The digital display shows the analog input signal, the bargraph the frequency.
- The digital display and the bargraph show both the analog input signal.

The microcontroller uses fast flow decimal point arithmetic which positions the decimal point automatically as soon as the display arrives at the full capacity. With an external service keyboard the parameters can be set:

**Password** is a combination of numbers which are stored in the menu. The correct password has to be entered in order to open the menu and get access to the parameters.

**Scale** is a multiplicative 6 digit constant with decimal point and sign, programmable from 0.00001 to  $\pm 9.99999$ . The scale permits the input frequency to be displayed in required units such as RPM, m/sec, liter/h etc.

**Set** is an additive 6 digit constant with decimal point, programmable from 0.00001 to  $\pm 9.99999$ . The Set is added to the frequency and acts as a digital offset.

**Two Analog Outputs** (option) -10V ... +10V and 0/4-20mA are generated simultaneously and have 12 bit resolution resulting in 4096 increments. In the menu steps AOut L and AOut H they can be assigned to any two display values. The outputs can be programmed as direct proportional or inverted. The current output can be set for 0 or 4mA.

**Serial Data Ports** (option) RS232 and RS485 have 8 bit, no parity, 1 start and 1 stop. The baud rate can be set from 1200 to 19200 bd. Up to 31 instruments can be connected to one RS485 data bus and activated with an address.

**BCD parallel Data Port** from all display digits is available as option. The outputs are supplied from external voltage 5-28V and deliver the level corresponding to the supply voltage. The output logic is true or inverted.

**Sampling Rate** can be set from 25 ms to 3.00 seconds. The set sampling rate determines the display refresh and the generated analog and digital outputs.

**Reset** is the time during which the display waits for the input pulses before resets to zero. This time can be set from 50ms to 6.00 sec.

**Display resolution** can be selected up to 4 places. When the display arrives at the full capacity, the decimal point will automatically be positioned.

# 1 SPECIFICATIONS

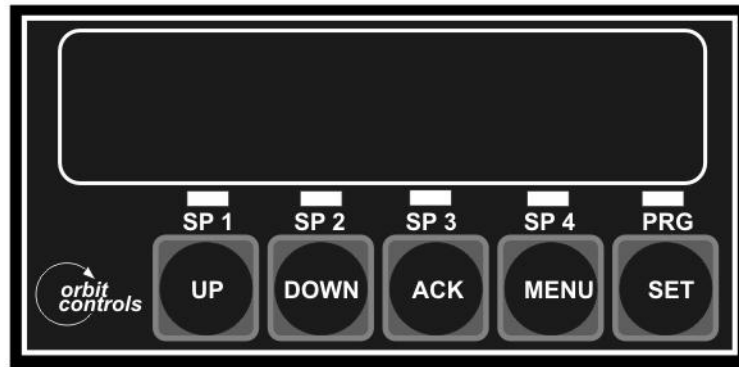
Inputs:	<b>Pulse Input:</b> NPN, PNP: 5V TTL to 28V Namur: log 0 = 0-1V, log 1= 3-8V. Input Impedance 1kOhm. Resolver: Sine wave signal 5V <sub>P-P</sub> to max. 10V <sub>P-P</sub> . All inputs are protected to 28V.  Trigger Level: adjustable from -5V to 5V. Factory setting is 2V.  Frequency Range: 10Hz-100 kHz.  The sensor type is selectable with jumpers inside the instrument (§ 11, p. 10).  <b>Bargraph:</b> 0-10VDC or 0/4-20mA. Offset and Full Range are individually adjustable with potentiometers inside the instrument (§ 12, p. 10).
Display:	6 digit, 7 segment red or green, 10mm digits. In measuring mode the display has 5 digits, during programming the display shows all 6 digits. The capacity is $\pm 99999(9)$ . The Bargraph has 30 LEDs and a scale 0-100%.
Arithmetic:	4 byte Floating point arithmetic with automatic range selection.
Measuring Rate:	In menu selectable from 25ms to 3 sec.
Accuracy:	Factory calibration to 2ppm. Software calibration with the keyboard in the service menu.
Tempco:	50ppm/°C
Scale:	Multiplicative constant selectable from $\pm 0.00001$ to $\pm 9.99999$ .
Analog Output:	<b>Voltage Output:</b> -10V ... 10V, max. 10 kOhm. <b>Current Output:</b> 0/4 - 20mA, load 0 ... 400 Ohm. The analog outputs are option and can be set as direct acting or inverting. They are isolated by 250V.
Data Ports:	<b>BCD parallel</b> , 1-2-4-8, with Decimal Point and Strobe 20ms (Data Ready). The Output is Emitter Follower type with external supply 5 to 28VDC. The Output level is determined by the value of the supply voltage. The data can be set as true or inverted. The data port is isolated by 250V.  <b>RS232 und RS485</b> , with 8 Bit, 1 Start, 1 Stop, no Parity, Baud Rate 1200 to 19200 bd and address. The address 0 activates RS232. One of addresses 1-31 activates RS485. The data port is isolated by 250V.
Communication:	Option. Soft Manager under Windows.
Keyboard:	Service keyboard with UP, DOWN, ACK, MENU and SET keys. The keyboard is pluggable into the socket inside the instrument.
Password:	Password selection in menu.
Resolution:	<b>OrdEr</b> determines the number of decimal points of the digital display.
Supply:	115V/230V $\pm 10\%$ , 50-60Hz, fuse 50mA-T/230V, 100mA-T/115V. Option: DC supply 9-36V DC.
Excitation:	Supply 12V-35mA isolated and 5V-25mA non isolated with minus at the GND.
Cabinet:	DIN 48 x 96 mm, depth 150 mm. Panel cut-out 45 x 93 mm.
Terminals:	Pluggable screw terminals

## 2 POWER ON

After the power has been applied the display shows the type of the instrument and the version and switches into the measuring mode. The digital and the bargraph will be tested during approx. 3 seconds.

## 3 SERVICE KEYBOARD

The service keyboard can be inserted into the socket as shown in §11, p.10.



### 3.1 Function of the keys

<b>UP</b>	Parameter selection UP during programming. Decimal point setting during programming.
<b>DOWN</b>	Parameter selection DOWN during programming. Decimal point setting during programming.
<b>ACK</b>	Confirmation of the parameter during programming. Positioning of the curser (flashing digit).
<b>MENU</b>	Opens and scrolls the menu.
<b>SET</b>	Terminates the menu and opens the measuring mode.

## 4 MENU STEPS and SETTING of PARAMETERS

The key MENU opens the menu. The same key scrolls the menu steps at the display. The required parameter to be set has to be confirmed with ACK. The parameter value can be set with UP or DOWN. The flashing digit – cursor – can be positioned with ACK. To set the sign and the decimal point, press ACK until the cursor is out of the display range (no digit flashing). The decimal point can be set with UP, the sign with DOWN. Each setting is automatically stored in the internal non-volatile memory.

<b>PASS</b>	The correct password has to be entered in order to enter the menu. The memorized password combinations are in the menu step St PASS.
<b>SP 1</b>	Set Point 1. The relay 1 is activated at this value.
<b>HSt 1</b>	Hysteresis 1
<b>rEL 1</b>	Relay function: open or closed.
<b>SP2 ... SP4, HSt 2 ... HSt 4 und rEL 2 ... rEL 4</b>	Set Points 2...4 same as SP1.
<b>AOt L</b>	Display assignment to analog output signal 0/4mA and -10V.
<b>AOt H</b>	Display assignment to analog output signal 20mA and +10V.

<b>Fn dAC</b>	Function of the analog output: OFF not active Anl LH direct acting Anl HL inverted
<b>Fn bcd</b>	Function of the BCD parallel data port  OFF not active tPc L inverted, open collectors (on special request only) tPc H direct acting, open collectors (on special request only) tPE L inverted, Emitter Follower (Standard) tPE H direct acting, Emitter Follower (Standard)
<b>tbASE</b>	Time interval for reading of the input pulses, refreshing the display and generating of analog and data outputs. Selection from 0.025 to 3.000 sec.
<b>ObASE</b>	Reset Time for frequency measurements. Selection from 0.050 to 6.0 sec. The reset time defines the time during which the controller waits for input pulses before resets the display to zero. This determines the lowest measured frequency.
<b>time</b>	
<b>OrdEr</b>	Display resolution C.ddddd to CCCCCC. The number of d define the number of decimal points.
<b>SCALE</b>	Multiplicative constant for the display can be selected from 0.00001 to $\pm 999999$ .
<b>SEt</b>	Preset-digital offset. Selection from 0.00001 to $\pm 999999$ .
<b>rSt</b>	Level of external reset signal Hi or Lo (positive or negative edge) for UP or DOWN counter.
<b>Cnt</b>	Counter function: Udic Frequency measurements UPdn UP-DOWN counter qUAdr Quadrature counter
<b>Fn dSP</b>	Display Selection

Selection	Digital display	Bargraph
An An	Analog Input Signal	Analog Input Signal
An Fr	Analog Input Signal	Input Frequency
Fr An	Input Frequency	Analog Input Signal
Fr Fr	Input Frequency	Input Frequency

**St PASS** Selection of a Password from 20 memorized possibilities. Factory setting is 1001.

**NOTE: Instruments without options have the corresponding menu steps disabled.**

## 5 BARGRAPH

The input for the bargraph is 0-10VDC. It can be factory set for 0-20mA or 4-20mA.

Offset und Full Scale are independently adjustable with Potentiometers inside the instrument. The bargraph has 30 LEDs and permits the resolution of the input signal by 3.3%.

The function can be assigned to the input frequency or to the DC input signal in the menu step **Fn dSP**.



## 6 MEASURE MODE

### Digital Display

After power-on the internal counter will set to zero. The parameters from the memory are entered into the controller which permits measurements of the input signals. The input pulses are multiplied by the scaling constant, the offset is added and the results displayed. The measurement is very precise and fast.

The digital display shows:  $\text{DISPLAY} = \text{Pulses/sec} \times \text{SCALE} + \text{SET}$

For the frequency measurement is important the setting of the **t bASE** (sampling time) and the **O bASE** which is the reset time.

The display can be set for required offset - **Set** – the value at which the display starts to count.

### Bargraph

The input signal is adjusted for the required offset and full scale and shown at the bargraph.

## 7 OUTPUTS

Two analog outputs, two serial data ports or one BCD data port are generated from the value shown at the display.

### 7.1 Analog Outputs (Option)

Two analog outputs 0/4-20mA and 0-10V are generated simultaneously and are isolated from the supply and the input signals. The outputs are assigned to any two required display values in the menu step **AOuT L** and **AOuT H** and can be set in the menu step **OUtAnl** as direct acting or inverted. The resolution is 12 bit.

### 7.2 Parallel BCD Data Port (Option)

The BCD parallel signals are derived from the display and are isolated from the supply and the input signals. The outputs are Emitter Followers (standard) or Open Collectors. The data format is 1-2-4-8 from each digit. The output type can be set in the menu for **OUtAnl** as **bCd L** (true logic) or **bCd H** (inverted).

### 7.3 Serial Data Ports (Option)

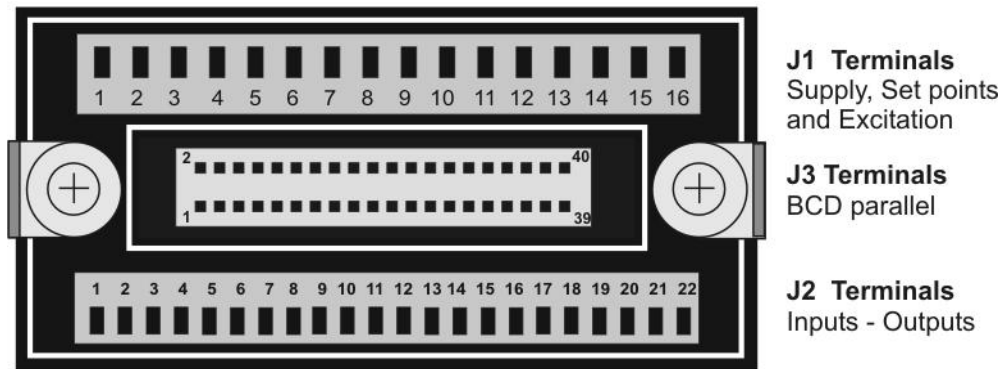
Two serial data ports are available: RS232 and RS485. They can be used for data transfer to a PC, remote display or any other peripheral device. The baud rate can be set in the menu step **bAUd**.

When RS232 is selected, the data transmission is initialized when any ASCII signal is received terminated by <CR> <LF>.

When RS485 is selected, the data transmission is initialized after the port receives two bytes, the first with the address, the second with <44H = D>. The address contains the number 128 plus the address number programmed in the menu (1 ... 31). The entry is terminated with <CR> <LF>. The connection is 2 or 4 wire selectable inside the instrument.

The type of the serial port is selectable in the menu step **rS SEL**.

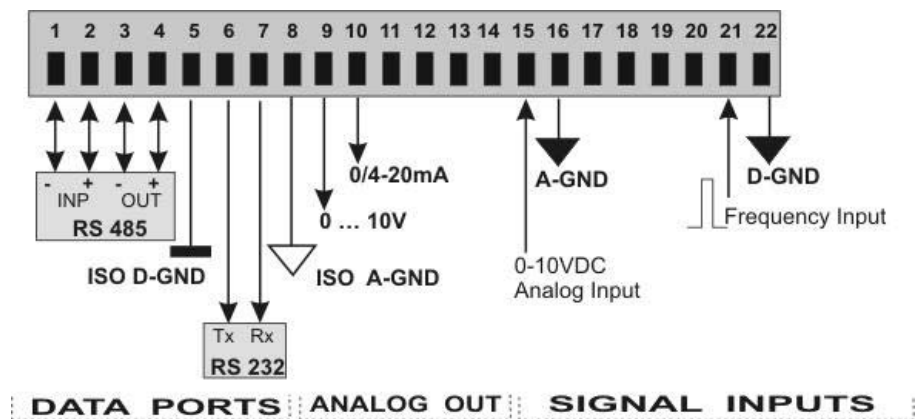
## 8 INSTRUMENT'S REAR



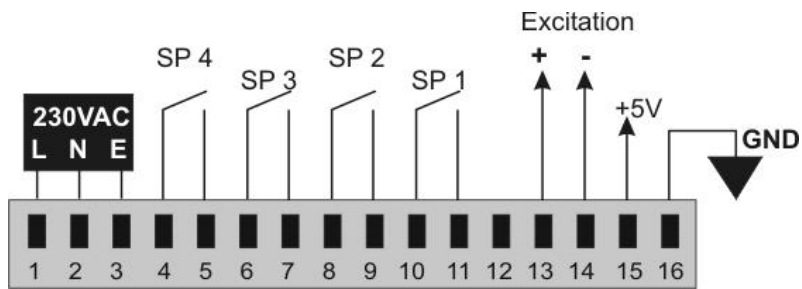
## 9 TERMINALS

### 9.1 J2-Terminals

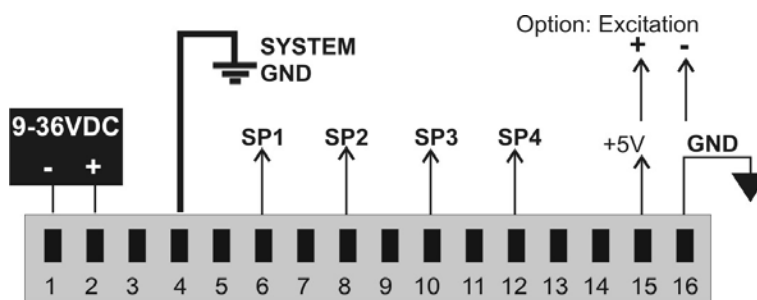
J2	FUNCTION	J2	FUNCTION
22	D-GND for Frequency input	11	N.U.
21	Frequency input, pulses	10	0/4-20mA isolated Analog Output
20	Not used	9	0-10V isolated Analog Output
19		8	ISO A-GND for isolated Analog Output
18		7	RxD – RS232 Output
17		6	TxD – RS232 Output
16		5	ISO D-GND for isolated data port
15	0-10V Analog Output	4	I/O RS485
14	A-GND for Analog Output	3	I/O RS485
13		2	I/O RS485
12		1	I/O RS485



## 9.2 J1 – Terminals, Supply 230V AC, Relay outputs



## 9.3 J1 – Terminals, Supply 24VDC, Transistor outputs

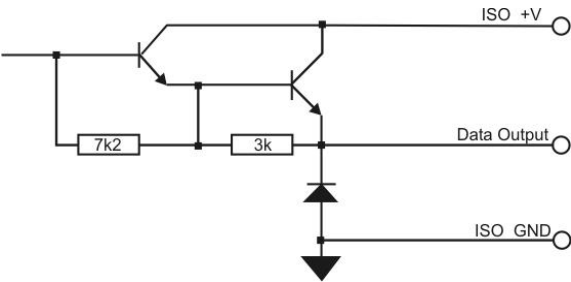


J3	FUNCTION	J3	FUNCTION
1	ISO +external Supply Voltage	21	ISO +external Supply Voltage
2	ISO GND isolated Supply GND	22	ISO GND isolated Supply GND
3	Strobe	23	4 Digit Bit B 2 000
4	Overrange	24	4 Digit Bit A 1 000
5	Negative Sign	25	3 Digit Bit D 800
6	Decimal Point Bit C	26	3 Digit Bit C 400
7	Decimal Point Bit B	27	3 Digit Bit B 200
8	Decimal Point Bit A	28	3 Digit Bit A 100
9	6 Digit Bit D 800 000	29	2 Digit Bit D 80
10	6 Digit Bit C 400 000	30	2 Digit Bit C 40
11	ISO +external Supply Voltage	31	ISO +external Supply Voltage
12	ISO GND isolated Supply GND	32	ISO GND isolated Supply GND
13	6 Digit Bit B 200 000	33	2 Digit Bit B 20
14	6 Digit Bit A 100 000	34	2 Digit Bit A 10
15	5 Digit Bit D 80 000	35	1 Digit Bit D 8
16	5 Digit Bit C 40 000	36	1 Digit Bit C 4
17	5 Digit Bit B 20 000	37	1 Digit Bit B 2
18	5 Digit Bit A 10 000	38	1 Digit Bit A 1
19	4 Digit Bit D 8 000	39	+ Overage
20	4 Digit Bit C 4 000	40	- Overage

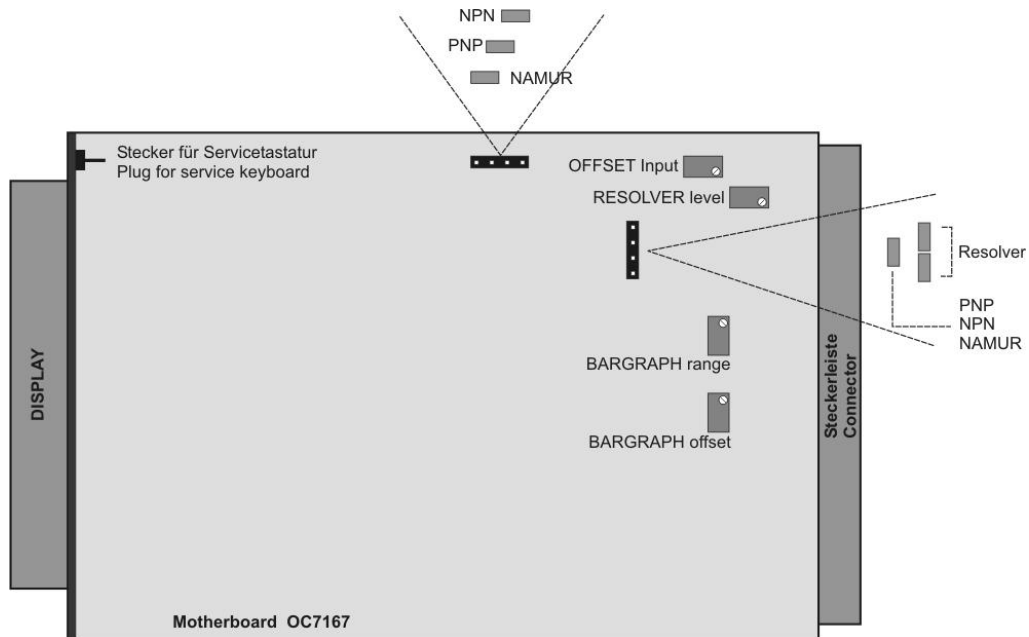
10.1 Decimal points at Data Output

Decimal Point	A-B-C- Bit Combination
XXXXX	0-0-1
XXXX.X	1-1-0
XXX.XX	0-1-0
XX.XXX	1-'0-0
X.XXXX	0-0-0

10.2 BCD parallel output stage



## 11 SENSOR SELECTION and ADJUSTING POTENTIOMETERS



The sensor type is selected with jumpers.

Two excitations are available at J1: 12VDC isolated and 5VDC non isolated with Signal-GND, see § 9.2, p. 8.

OFFSET Input:	Trigger level for the frequency input, adjustable from -5V to 5V.
BARGRAPH Offset:	Zero Offset for the Bargraph.
BARGRAPH Range:	Full Scale for the Bargraph.
RESOLVER Level:	Range adjustment for the Resolver.

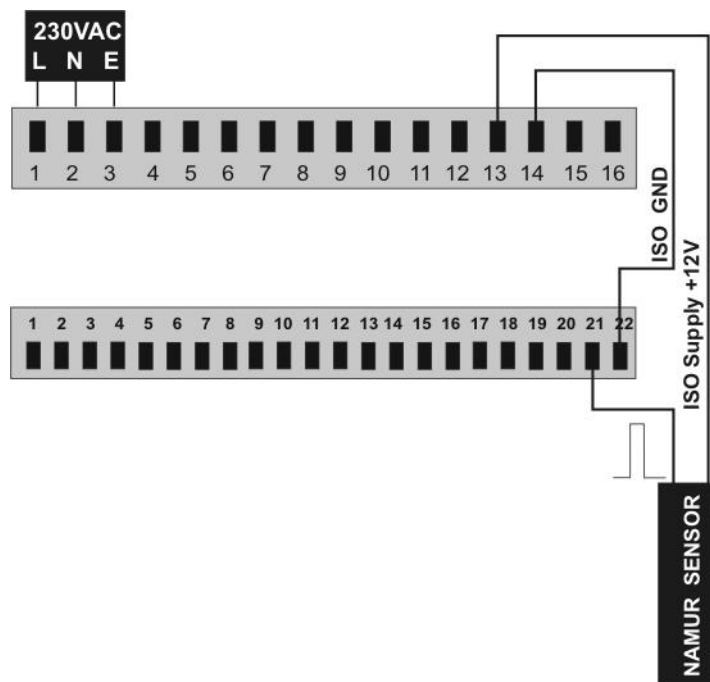
## 12 CUSTOMER SETTINGS

Strausak AG, Lohn

PASS	1001
Aout L	not relevant
Aout H	not relevant
Fn bcd	tPE H
t bASE	ti 0.05
O bASE	ti 0.01
OrdEr	CCCCC.
SCALE	000030
SEt	000000
rSt	not relevant
Cnt	Ud ic
Fn dSP	Fr An
St PASS	1001

### Connection to a Two Wire Transmitter

Input Impedance 1kOhm



13 IMMUNITY TEST OC 7167

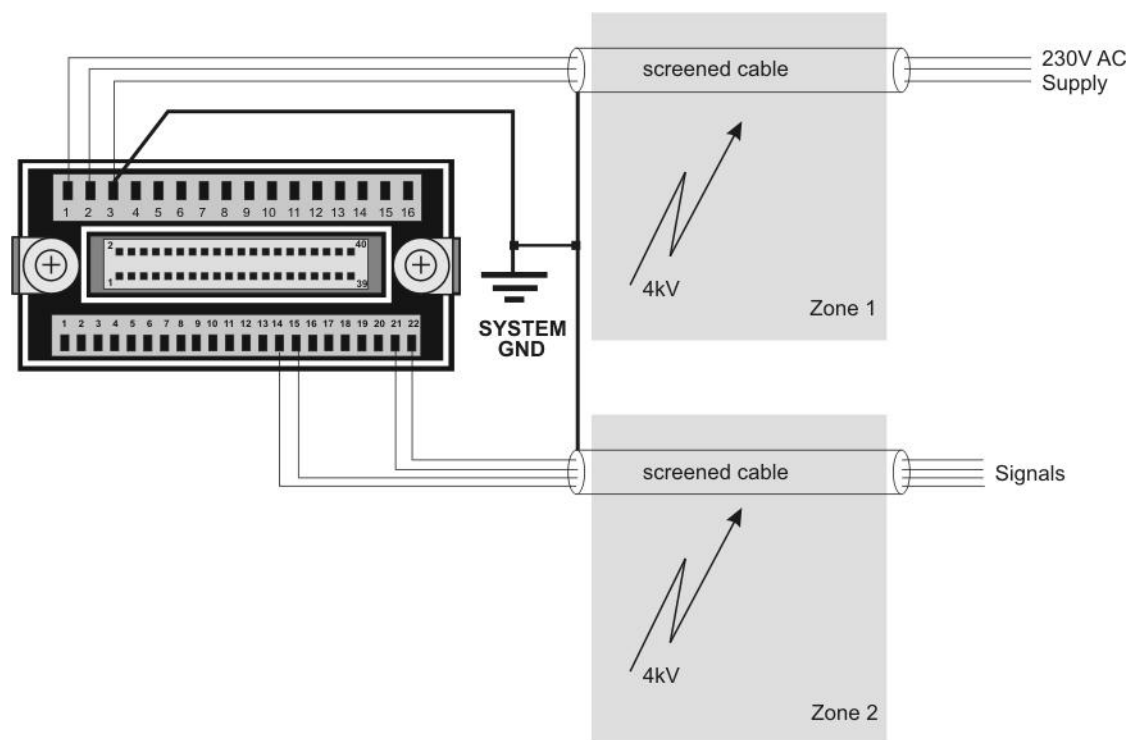
EUT: OC 7167 SN: 990426, Supply 230VAC

Date: 22. April 1999

Input: Bargraph 5V  
Frequency: NAMUR and RESOLVER 100Hz

Display: Bargraph: 50%  
Frequency: 3000 UPM

TEST SET-UP



TEST CONDITIONS

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

TEST RESULTS

Burst into Supply	Burst into Input Signal	Display deviation Frequency	Display deviation Bargraph
± 2000V	---	No change	No change
± 4000V	---	± 1 LSD	No change
---	± 2000V	No change	No change
---	± 4000V	± 1 LSD	No change