

# <u>Ultrastab 864R-5000-140CT</u> User Manual



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**GMW** 

MANUAL ULTRASTAB 864R-5000-140 Current Transducer system

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### **1.1 INTRODUCTION.**

The ULTRASTAB 864R system is built over the very proven 864I/U-2000 precision current transducer product. In this new configuration, named Model 864R-5000P-140, we have packaged the modules into a 3 to 6 channel system with a measuring capacity of up to 5000A DC or 3500A AC (RMS). The system can be used either as a stand-alone system or as a current range extender on high performance Power Analysers.

The system is delivered as a complete system, including auxiliary power supply, Eurocard Electronics modules mounted in a 19" rack mount cabinet, transducer heads, connecting cables, and programming cables

The basic version is equipped with 3 channels, but can be extended up to totally 6 channels. This 5000A model is equipped with 3 channels and can not be extended.

The 864R system is in this 5000A version offered with type 5000P-140 programmable transducer heads. In the range between 2500 and 5000A, the transducer head can be programmed to specific max. currents in steps of 250A. This will enable the user to match the transducer head to a desired max. current input, and thereby obtains the analogue output of  $\pm$  2A and  $\pm$  1V at the max. programmed input current.

#### 1.1.1 Working principle.

The DANFYSIK ULTRASTAB 864R Current Transducer system is a unique design, based on the zero-flux principle for galvanic isolated precision current measurement.

With the primary current conductor through the transducer head center hole and current flowing, the electronics will generate a current in the built-in compensation winding, counter-balancing the primary ampere-turns.

A very sensitive and extremely low noise detector circuit will detect when zero-flux is obtained, and an analog  $0 - \pm 2A$  or  $0 - \pm 1V$  signal will be generated at the output terminals in direct proportion to the primary current.

The front panels of the modules are equipped with LED's giving you the information:

- Power
- Normal operation
- Saturation

### Front view.



Rear View.



DANFYSIK A/S - DK-4040 JYLLINGE - DENMARK 864R-140-1 Manual.doc

### 1.2 Warranty

DANFYSIK A/S warrants the equipment delivered from the company to be free from any defects in materials and workmanship for a period of:

#### 12 Months from the date of installation or max. 18 months from the date of shipment. Whichever is shortest.

Within this warranty period DANFYSIK A/S will repair or replace any defective parts free of charge either on the customers site or at our factory at our choice.

DANFYSIK A/S will pay or reimburse the lowest two-way freight charges on any items returned to DANFYSIK A/S or our designated agent/representative provided DANFYSIK A/S has given prior written authorisation for such return.

This warranty shall not apply to any equipment which our inspection shows to our satisfaction, to have become defective or unworkable due to mishandling, improper maintenance, incorrect use, or any other circumstances, not generally acceptable for equipment of a similar type.

DANFYSIK A/S reserves the right on standard products to make changes in design without incurring any obligation to modify previously manufactured units.

The foregoing is the full extent of the warranty and no other warranty is expressed or implied. If no event Danfysik shall be liable for special damage arising from the delivery, late delivery, or use of the equipment.

If any fault develops the following steps should be taken:

Notify DANFYSIK A/S giving full details of the problems and include Model, Type, Serial number, and Order number.

On receipt of this information DANFYSIK A/S will send you either service information or instructions for shipping.

All shipments of DANFYSIK A/S equipment should be made according to our instructions and shipped in the original or a similar package.

For smaller parts a cardboard carton will be sufficient, providing the parts are wrapped in plastic or paper and surrounded with at least 10 centimetres of shock-absorbing material.

#### 2. RECEIVING AND UNPACKING.

#### 2.1. RECEIVING THE GOODS

The shipping package and the ULTRASTAB should be thoroughly inspected for signs of obvious physical damage immediately upon receipt.

All materials in the package should be checked against the enclosed packing list and the list of standard delivery below. DANFYSIK A/S will not be responsible for any shortages unless notified immediately.

ULTRASTAB 864R. Standard Delivery:

- Electronics 19 inch crate with three Euro-card Electronics modules
- Three Programmable 5000A Transducer heads type 5000P-140
- Three Connections cables 10m
- Manual.

#### **2.2. INSTRUCTIONS FOR UNPACKING**

The ULTRASTAB is shipped in a cardboard carton.

If the equipment is damaged in any way, a claim should be filed with the shipping agent, and a full report of the damage should be forwarded to Danfysik A/S or our local agent/representative immediately upon arrival.

Upon receipt of this report, Danfysik will forward instructions concerning the repair, replacement or return shipment.

Please include the Type No., Serial No., and Order No. for the ULTRASTAB 864R on any communication with DANFYSIK or our representative.

#### **3. INSTALLATION**

1. Check that the specified AC voltage and current are available and that the ambient temperature

Is within the range specified in this manual.

- 2. Establish the Ground connection according to the local authority regulations and he requirements of the equipment via the AC power plug.
- 3. Connection cables:

Mount the provided connection cables between the Electronics crate and the Transducer Heads. The standard cable is used direct for 5000A max rating. For all other max ratings a programming cable is inserted between the cable and the Transducer head in the transducer head end.

<u>Please note that the cable must be connected with the plug labelled "Electronics"</u> to the plug on rear side of the crate.

- 4. Concerning Output terminals on the rear side of the cabinet: If the Voltage output shall used, the shorting clamp on the Current output must always be mounted. If output current is used - i.e. for connecting an external shunt - the shortening clamp must be opened.
- 5. Check that all cables terminated in a plug are pushed fully home.
- 6. Transducer head.

The transducer head may be installed in any orientation, but be careful to keep it away from power transformers, and other units producing significant magnetic stray fields. The Transducer head type 5000P-140 will maintain normal operation in magnetic fields up to 100 Gauss.

If above checkpoints are fulfilled the system is ready for use.

### **3.2 INTERLOCK CIRCUIT**

The interlock circuit is present at a 15 pole D-Sub socket at the rear side of the cabinet. All terminals are floating contacts from a relay. The contacts can be used in any general safety interlock set up circuit.

There is a set of relay contacts for each channel which are closed at NORMAL OPERATION.

Interlock plug:

Channel 1: pin 1&9 Channel 2: pin 2&10 Channel 3: pin 3&11 Channel 4: pin 4&12 Channel 5: pin 5&13 Channel 6: pin 6&14

#### 4. SWITCHING ON AND OPERATING INSTRUCTIONS

When the instructions for installation in pos. 3.1 have been completed, the ULTRASTAB 864R Electronics can be switched ON.

#### Please note:

This unit must be switched on before the actual primary current source is applied, in order to avoid excessive saturation of the iron core in the transducer head.

- Switch ON the AC power. The Green LED - NORMAL OPERATION on the modules will be "ON"
- 2 The total assembly is in NORMAL OPERATION, and an analogue current/voltage proportional to the measured current will be generated by the electronics circuitry and presented at the output terminals.

NORMAL OPERATION means: Cable connected, measured current is within 115 % of programmed maximum current and internal aux. power supplies are working.

- 3. If the Green LED NORMAL OPERATION is not "ON", recheck that all connections are properly made and secured by the screws.
- 4. If any problem should occur during this operation, please contact our local representative or Danfysik direct.
- 5. All performance data refers to max. Current for the type 2000P-1 transducer head. In order to obtain maximum accuracy of the instrument, lower currents can be measured by applying more primary turns through the transducer head and divide the output signal with the number of turns or program to a lower maximum current. For high sensitivity measurements it is important to distribute the turns with even space all around on the transducer head.

### 5.1 GENERAL DESCRIPTION OF THE ELECTRONICS

The ULTRASTAB 864R electronic crate is equipped with 3 to 6 Euro-card Electronics modules of the type Ultrastab 864I.

The circuit receives signals from the very sensitive zero flux detector and drives the compensation current in such a way that the secondary ampere turns of the transducer head counter-balances the primary ampere turns. At the same time the voltage across the secondary winding is kept to a minimum - I. e. it approaches the ideal current transformer.

### 5.2 CURRENT TRANSDUCER HEADS

The transducer head has an arrow sticker on the side face. With the main current flowing in the direction of the arrow, a positive voltage will be developed across an internal or external Burden resistor.

The transducer heads can be mounted in any orientation, and the influence from external stray fields is very low.

The transducer head contains fragile materials in the zero detector assembly, and care should be taken in handling.

The electronics is factory adjusted to the transducer head for zero offset, i.e. optimum performance.

### 5.3 Programming the Transducer head

The transducer head is connected to the Electronics crate via a standard cable.

For a maximum output current of 5000 Amp the cable can be connected directly. If any other maximum current within the range of 2500A - 5000A is required, a PROGRAMMING **CABLE** must be inserted between the transducer head and the cable.

The programming cable makes the interconnections between the separate windings in the transducer head and sets the maximum current for the assembly in steps of 250A.

### 6.0 MAINTENANCE

The ULTRASTAB 864R assembly does not require any maintenance under normal operation. Only the fans in the bottom of the cabinets must yearly be checked for normal operation.

#### Please note:

Faults within the calibrated components and the zero flux detector can only be repaired by returning the ULTRASTAB 864R assembly to Danfysik A/S direct or via our local representative. Failing to follow this procedure will make the warranty null and void.

### APPENDIX C. - SALES REPRESENTATIVE AND SERVICE.

#### DANFYSIK A/S,

Moellehaven 31, DK-4040 Jyllinge <u>DENMARK.</u> Phone No.: +45 46 78 81 50 Fax No.: +45 46 73 15 51 E-mail: service@danfysik.dk

#### **FACTORY REPRESENTATIVES**

#### GMW ASSOCIATES,

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## ULTRASTAB 864R 3 Channel Current Transducer System

BASIC SPECIFICATION FOR A SINGLE CHANNEL		
Primary current I (max.)		
Programmable in steps of 250A from 2500 – 5000A	2500A to 5000A	
Polarity	Bipolar	
Output at max. primary current:		
- Current output (screw terminals)	$\pm 2A$	
- Voltage output (BNC)	± 1V	
Overload capacity (normal operation)	15 %	
Overload capacity (fault)	500 % (0.1 s)	
Transfer ratio accuracy:		
- Current I (max.) A / 2A	< 2 ppm	
- Voltage I (max)/ 1V	<0,1 %	
Linearity:		
- Current mode	< 10 ppm	
- Voltage mode	< 30 ppm	
Measuring / ratio stability:		
Current mode:		
v.s. temperature	< 1 ppm/°C	
v.s. time	1 ppm/month	
Voltage mode:		
v.s. temperature	< 5 ppm/°C	
v.s. time	5 ppm/month	
Offset (internal adjustable):		
Initial	< 5 ppm	
Drift v.s. temperature	< 1 ppm/°C	
Drift v.s. time	< 2 ppm/month	
Noise feedback to main conductor		
DC – 100 kHz (RMS)	< 10µV	
(Measured on the primary current cable – one turn)	·	
Output noise (RMS):		
DC – 10 Hz	< 3 ppm	
DC – 10 kHz	< 15  ppm	
DC – 50 kHz	< 50 ppm	
Slew rate (10-90%)	$\geq$ 20kA / ms	

BASIC SPECIFICATION FOR A SINGLE CHANNEL		
Bandwidth (small signal 0.5%) 3 dB	DC to 50 kHz	
Busbar free zone to be within linearity specification: Cylinder shape (diameter x length)	ø 350 x 350 mm	
Test voltage transducer head	5 kV AC (RMS)	
Cable length electronics measuring head	10 m	
Operating temperature electronics	10 – 40°C	
Operating temperature measuring head	0 – 50°C	
Input power requirement	90-264V, AC, 50/60Hz max. 150V A	
Sensitivity to power supply changes	2 ppm / %	
Mechanical dimensions: A. Electronics (dwg. 88761) Weight	483 x 176 x 250 mm Approx. 6 kg	
<ul> <li>B. Transducer head (dwg. 88834)</li> <li>Hole for conductor</li> <li>Weight</li> </ul>	200 x 165 x 70 mm ø 140 mm 14 kg	

All ppm figures refer to max. output. Specifications are subject to change without notice.

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