Ultrastab Saturn Current Transducer
User Manual

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Table of contents:

FCC statement:

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference in which case the user will be required to correct the interference at his own expense.

1 Safety

1.1 Usage precautions and recommendations

The following precautions are recommended to insure your safety and to provide the best conditions of this instrument. If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

1.2 Terms and symbols

These terms and symbols may appear in this manual or on the product.

	**WARNING**: Warning statements identify condition or practices that could result in injury or loss of life.
	**CAUTION**: Caution statement indentify conditions or practices that could result in damage to the product.
	**DANGER**: High Voltages.
	Protective Conductor Terminal.

1.3 Use and wear

 **Caution**

Do not place any heavy object on the instrument.
Avoid severe impacts or rough handling that could damage the instrument.
Use electrostatic discharge precautions while handling and making connections to the instrument.
Do not place wires into the connectors of the instrument, only mating connectors and adapters.
Do not block or obstruct the ventilation opening on the side panels and over the heat sink.

1.4 AC Power input

 **Caution**

AC power input should be within the range of the selected line voltages +/-10%.

1.5 Grounding

WARNING:

To avoid electrical shock the power cord protective grounding conductor must be connected to earth ground.

All transducerheads must be connected to earth ground as described in chapter 5.4.

Failure to establish a functional ground connection to earth may cause malfunction and lead to hazardous errors.

1.6 Fuses

WARNING:

The unit is delivered with two T1A fuses. For continued fire protection replace the fuses with the specified type and rating only.

To replace the fuses disconnect the mains cord. Open the cover of the IEC power inlet with a flat screwdriver. Pull out the fuse holders and replace the fuses.

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 customer's 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 prior written authorization for such return has been given by DANFYSIK A/S.

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 circum-stances, 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 manu-factured 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 centi-metres of shock-absorbing material.

3 Receiving and unpacking

3.1 Receiving the Goods

The shipping package and the *ULTRASTAB SATURN* should be thoroughly inspected for signs of obvious 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 SATURN Standard Delivery:

- 1 x Saturn Electronics
- 1 x **S**aturn **T**ransducer **H**ead (STH)
- 1 x Programming plug*
- 1 x Connection cable with plugs from the Saturn to the transducer head**
- 1 x Analogue out cable***
- AC power cord
- Manual
- Certificate of calibration (Only when delivered with a Voltage output!)

* If rating was not specified when ordering following programming plug will be delivered:
- 600 A type: 1 x 600 A
- 2000 A type: 1 x 2000 A
- 5000 A types: 1 x 5000 A

** Unless specified when ordering the following transducer head connection cable will be delivered:
- Current output: 10m connection cable with either DSUB plugs (Part no. 65894070) for 600A systems or Amphenol plugs (Part no. 65894110) for 2000/5000A systems.
- Voltage output: 2.5m connection cable with either DSUB plugs (Part no. 65892220) for 600A systems or Amphenol plugs (Part no. 65892210) for 2000/5000A systems.

*** Unless specified when ordering the following analogue output cable will be delivered:
- Current output: Current adaptor cable (part no. 65894180) DSUB to 4mm safety banana sockets. See chapter 10.
- Voltage output: Analogue output cable with standard sense (part no. 65893820). See chapter 10.

3.2 Instructions for unpacking

The *ULTRASTAB SATURN* 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 receipt of this report you will be issued instructions for the repair, replacement, or return shipment.
Please include the Model No., Type No., Serial No. and Order No. for the *ULTRASTAB SATURN* on any communication with DANFYSIK A/S or our representative.

4 Quick start

4.1 System overview

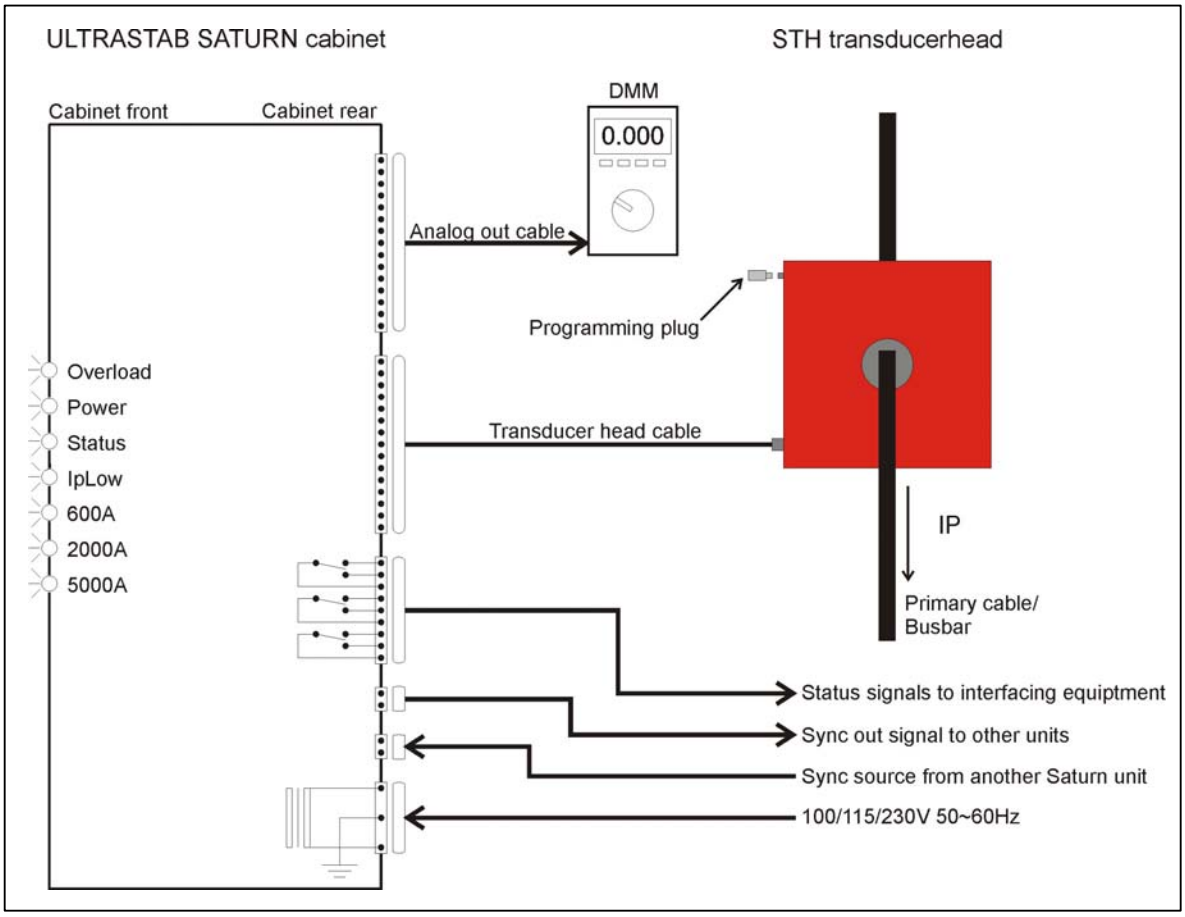


Figure 1

4.2 Power up

To quickly get your new *ULTRASTAB SATURN* up and running follow the following instructions.

A: Connect the transducer head to the unit using the supplied transducer head cable and mount the programming plug in the connector on the head.

B: Connect a DMM to the unit in one of two ways.

1: If your unit has a voltage output:
Connect the analogue output cable (DF. No.: 65893820) to the analogue out port. Connect the red wire of the cable to the positive terminal on the DMM and the black wire to the common

terminal. Set the DMM to measure DC voltage in a range greater then ±10V.

2: If your unit has a current output:
Connect the current output adaptor (DF. No. 65894180) to the analogue out port. Use a wire with 4mm terminal male plugs to connect the red wire on the adaptor to the current input terminal on the DMM. Use a similar wire to connect the black wire of the adaptor to the common terminal on the DMM. Set the DMM to measure DC current in a range greater than ±1A (or ±2A if you bought a 5000A system).

C: Make sure the voltage selector on the IEC inlet is set to the local voltage and connect the power cord.

D: The *ULTRASTAB SATURN* will now measure the current running through the transducer head. On the front plate the status of the unit can be monitored using the 7 LED's.

5 Introduction

5.1 Main Features

The *ULTRASTAB SATURN* is a high precision current measuring device based on the Flux-gate principle. It can measure current in both the DC and AC domain. The instrument can be configured in a variety of ways to suit the user's demands. Amongst the Ultrastab's main features are:

- Current or voltages output
- Programmable current range from 0 – 5000A
- Status signals for interfacing with other equipment
- Synchronization option in multichannel setup

The *ULTRASTAB SATURN* can be used either with or without an internally mounted **V**oltage **O**utput **M**odule (VOM). With a VOM installed the unit will produce a signal of ±10V. Without the VOM installed a signal of ±1A or ±2A depending on the transducer head will be produced.

The current to be measured can be between 0 – 5000A depending on the transducer head. A selection of 4 different transducer heads is available.

- 600A transducer head programmable in steps of 20A
- 2000A transducer head programmable in steps of 125A
- 5000A transducer head programmable in steps of 250A
- 5000A transducer head with wide body hole programmable in steps of 250A

To program the current range of the transducer head a programming plug is used. This plug sets the ratio between the current measured and the output signal of the *ULTRASTAB SATURN*.

E.g.: A 600A transducer head programmed with a 300A programming plug will produce an output signal of 10V (or 1A) when the current through the head is 300A.

5.2 Front

Figure 2

On the front of the *ULTRASTAB SATURN* there are 7 LED's for indication of system status, warning and error.

POWER: This LED is lit (Blue) when the *ULTRASTAB SATURN* is on.
STATUS: This LED is lit (Green) when the status of the unit is OK.
I_p LOW: This LED is lit (Yellow) when the current passing through the transducer head is below 5 ‰ of the programmed maximum current.
600A: This LED is lit (yellow) when a 600A transducer head is connected to the *ULTRASTAB SATURN.*
2000A: This LED is lit (yellow) when a 2000A transducer head is connected to the *ULTRASTAB SATURN.*
5000A: This LED is lit (yellow) when a 5000A transducer head is connected to the *ULTRASTAB SATURN.*
OVERLOAD: This LED is lit (red) when the current passing through the transducer head exceeds 130% of the maximum current for the transducer head (including programming) or the transducer head saturates.

5.3 Rear

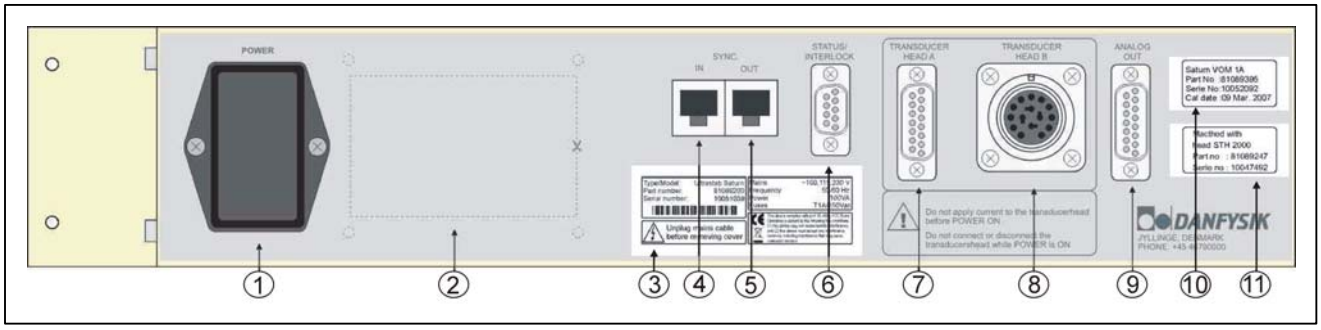


Figure 3

All connectors on the *ULTRASTAB SATURN* are placed on the rear of the unit.

1: IEC power inlet and voltage selector. This connector accepts a standard IEC power cord (supplied). The voltages can be changed using the voltages selector code wheel in order to match local voltages. Furthermore, the unit's two mains fuses are located in the IEC power inlet. To change the fuses see 1.5.
2: Punch out plate. This plate is for future expansion or customization
3: Type / Serial number plate
4: Sync in. Synchronization input when slaved to another *ULTRASTAB SATURN* in a multichannel system.
5: Sync out. Synchronization out when the unit is master or part of a daisy-chain in a multichannel system.
6: Status/Interlock signals output.
7: Transducer head A: Connection to the STH600 head using cable 89222.
8: Transducer head B: Connection to the 2000A and 5000A head using cable 89221.
9: Analogue out. Port for connection to a DMM or other equipment.

10: Calibration date label (on units with VOM installed)
11: Serial no. plate of matched transducerhead. This plate is only mounted if a transducerhead is delivered with the electronics unit.

5.4 Transducer heads

All transducer heads contain 2 connectors. A connector for connecting the transducer head with the transducer head cable and a connector for the programming plug.

The programming plug connector is a DSUB 25 Male connector on all transducer heads while the connector for the transducer head cable is a DSUB15 Male connector on the STH600 head and a Amphenol C16-3 Female connector on the STH2000, STH5000-62 and STH5000-140.

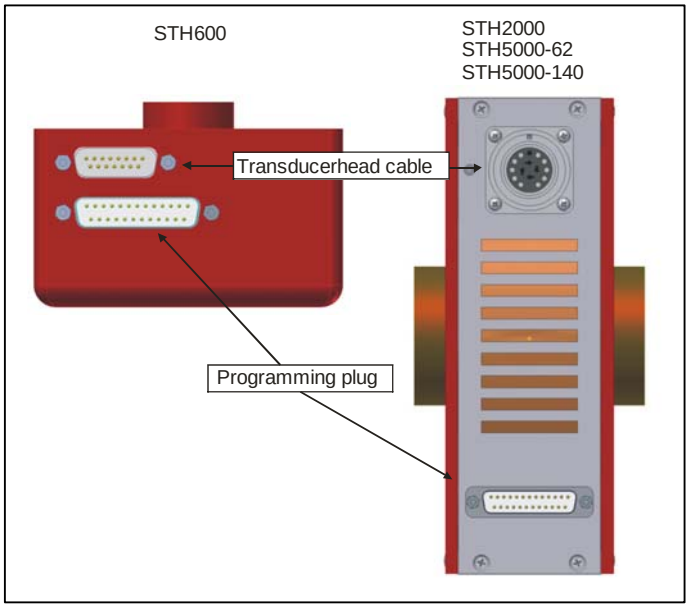


Figure 4

6 Installation

6.1 Mounting requirements

The *ULTRASTAB SATURN* can be mounted in either a rack based system or as a stand alone unit using the supplied rubber feet.

Warning:

The unit must be mounted horizontally. To ensure proper cooling the heat sink on the right and the air inlet on the left side of the unit must be kept free. Failure to do this may result in improper cooling of the system which may lead to malfunction of the unit.

6.2 Mounting requirements for the transducer heads

STH 600: Use the mounting bracket no.: 88262 to mount the 600A transducer head. It may be installed in any direction.

STH 2000: The 2000A transducer head must be installed using two M8 screws. The head may be mounted in any direction. Please observe that the length of the screws may not exceed the length D shown in figure 5. To calculate the maximum length of the mounting screw, measure the thickness of the mounting substrate C and add the length A + B which is 10mm + 15mm.

Max. Screw length:
D = 10 + 15 + C [mm]

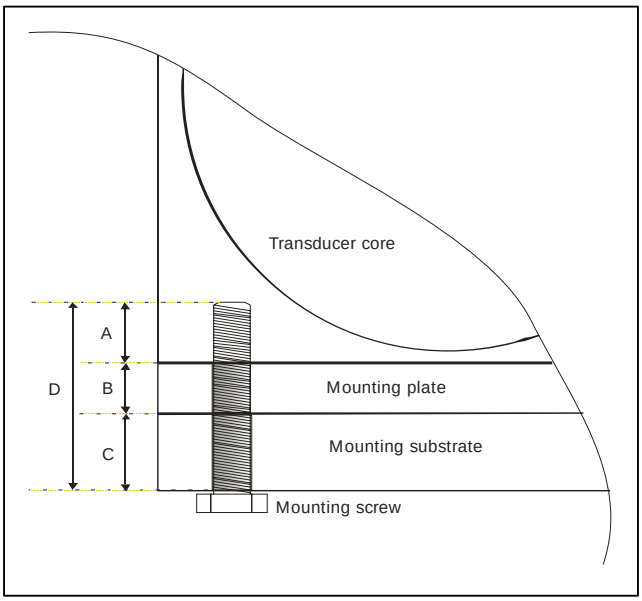


Figure 5

WARNING:

Using too long screws may cause harm to the inner parts of the transducer head and lead to malfunction.

STH 5000A-62 and **STH 5000-140** transducer heads are mounted using four M10 screws inserted into the holes on the brackets. The heads can be installed in any directions.

6.3 Installation

1. Check that the mains voltage and frequency matches to the local requirements. If not, the proper voltage on the selector wheel, 100, 115, 230 Volt AC must be selected to match the line voltage.

2. Establish the Ground connection according to the local authority regulations and the requirements of the equipment.

3. Mount the provided connection cable between the *ULTRASTAB SATURN* and the transducer head. Please note that only one transducer head may be connected to either transducer head A or transducer head B plug.

4. Connect the analogue output terminals as described in the next chapter

5. Check that all cables terminated in a plug are pushed fully home.

6. Connect the supplied power cord to the IEC inlet on the unit to turn it on.

The transducer head and electronics can be installed up to 30 metre cable distance from each other. The transducer head may be installed in any orientation.

6.4 Grounding the transducer heads

For safety reasons the transducer heads must be connected to earth. To connect a transducer head to earth follow these steps:

STH 600: Connect an earth wire to the earth connector on the front plate of the transducer head.

STH 2000: Connect the earth wire to the transducer head using a M8 ringtounge fastened to one of the 4 mounting holes with a M8 screw.

STH 5000-62 & **STH 5000-140**: Connect the earth wire to the transducer head using a M10 ringtounge fastened to one of the 4 mounting holes on the brackets.

7 Jumpers

7.1 Jumper settings

The *ULTRASTAB SATURN* contains a number of jumpers which are used to configure the unit.

The default factory setting should in most cases be the preferred con-figuration. However, it may be necessary to alter the settings to match the unit to your application.

To change the jumper setting first make sure the unit is powered off and the power cord is detached. Then remove the top cover using a screw-driver. Locate the jumper you need to change and change the setting.

In a standard *ULTRASTAB SATURN* there are 5 jumpers. 3 on the **T**ransducer **E**lectronic **M**odule (TEM) and 2 on the **M**other**B**oard (MB).
Additionally there are 2 jumpers more in a unit with a VOM installed. The locations of the jumpers are shown below.

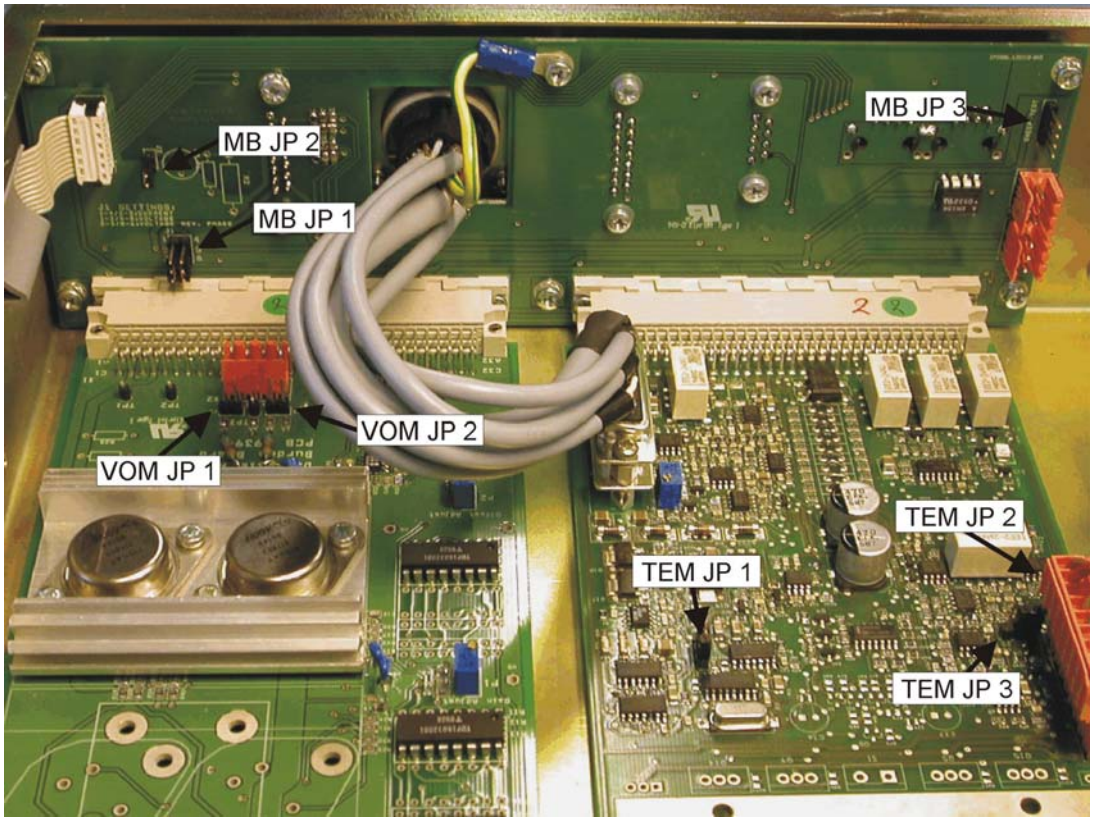
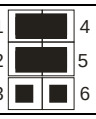
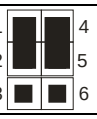
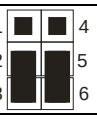


Figure 6

MB Jumper 1: Current / Voltage out
Located to the left on the motherboard. This is a 3 by 2 pin jumper and is used to choose between current output (no VOM installed) or voltage output (VOM installed).

Default setting: 1 in current out mode
Default setting: 3 in voltage out mode

	1	2	3
Configuration			
Function	Current output	VOM installed	VOM installed. Reversed phase

MB Jumper 2: Chassis/GND
Located at the left on the motherboard just above jumper 1. This is a 2 pin jumper and is used to connect or disconnect the chassis of the unit with it's internal GND plane. With a jumper mounted Chassis and GND is shorted.

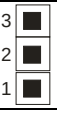
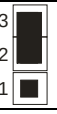
Default setting: Shorted

MB Jumper 3: Sweep test
Located at the rightmost corner of the motherboard. This is a 4 pin jumper and is used to test the sweep function. This is done by shorting pin 3 and 4. The sweep signal can then be monitored on pin 1 and 2.

Default setting: Open

TEM Jumper 1: Sync source selector
Located to the left on the TEM. This is a 4 pin jumper and is used to define whether the unit's clock source is taken from its own internal clock, or from the SYNC IN connector on the rear of the unit.

Default setting: 2

	1	2	3
Configuration			
Function	No clock source	Internal clock (Master) Default setting	External clock (Slave)

TEM Jumper 2: Power amp on
Located to the right on the TEM behind the 9 pole weidmüller connector (ORANGE). This is a 2 pin jumper. This jumper must always be shorted on the *ULTRASTAB SATURN*.

Default setting: Shorted

TEM Jumper 3: Saturation fault mode selector
Located to the right on TEM. This 3 pin jumper is used to select which action the *ULTRASTAB SATURN* must take if the transducer head is saturated. In mode 2 the unit will automatically begin to sweep in order to lock on to the current again. In mode 3 the *ULTRASTAB SATURN* will shut down the measuring circuit and wait until the current through the transducer head is near zero. Then the measuring will begin again. This mode is useful in systems where the *ULTRASTAB SATURN* is part of a feedback line.

	1	2	3
Configuration			
Function	Not used	Sweep mode Default setting	Measuring disable mode

Default setting: 2

VOM Jumper 1: High
Located behind the 4 pole wiedmüller connector (ORANGE) on the VOM. This is a 2 pin jumper. When shorted the signals high sense and high out is shorted.

Default setting: Open

VOM Jumper 2: Low
Located behind the 4 pole wiedmüller connector (ORANGE) on the VOM. This is a 2 pin jumper. When shorted the signals low sense and low out is shorted.

Default setting: Open

8 Offset adjust

The *ULTRASTAB SATURN* should occasionally have a current offset adjustment made to ensure the highest accuracy.

All *ULTRASTAB SATURN's* are offset adjusted by DANFYSIK with the ordered transducer head prior to shipment. In case the *ULTRASTAB SATURN* has been recalibrated or serviced, and minimum after ½ years of operation, it is advisable to perform an offset adjustment with the selected transducer head connected prior to any measurement in order to achieve the highest accuracy.

8.1 Adjusting the current offset

WARNING

CAUTION

During offset adjustment the unit needs to be powered up with the top lid removed. This will potentially exposing the operator to high voltages. As a consequence the operator is requested not to touch anything inside the unit.

Note:

If the unit is equipped with a VOM be sure not to adjust any of the potentiometers on the VOM as this will cancel the calibration of the VOM, and the unit will need a new calibration.

To adjust the *ULTRASTAB SATURN* please follow these steps.

1. Unplug the mains cord
2. Remove the screws holding the cover and remove it.
3. Connect a DMM capable of measuring µA to the analog output port using a current output cable (no.:89418) see chapter 10.3.
4. Connect the mains cord to the IEC inlet.
5. Wait for approx. 15 minutes while the unit is heating up.
6. Locate the offset adjustment potentiometer on the TEM (see fig. 7)
7. Use a trim screwdriver to adjust the offset until the current is as close to zero as possible.
8. After adjustment unplug the mains cord and mount the cover again.

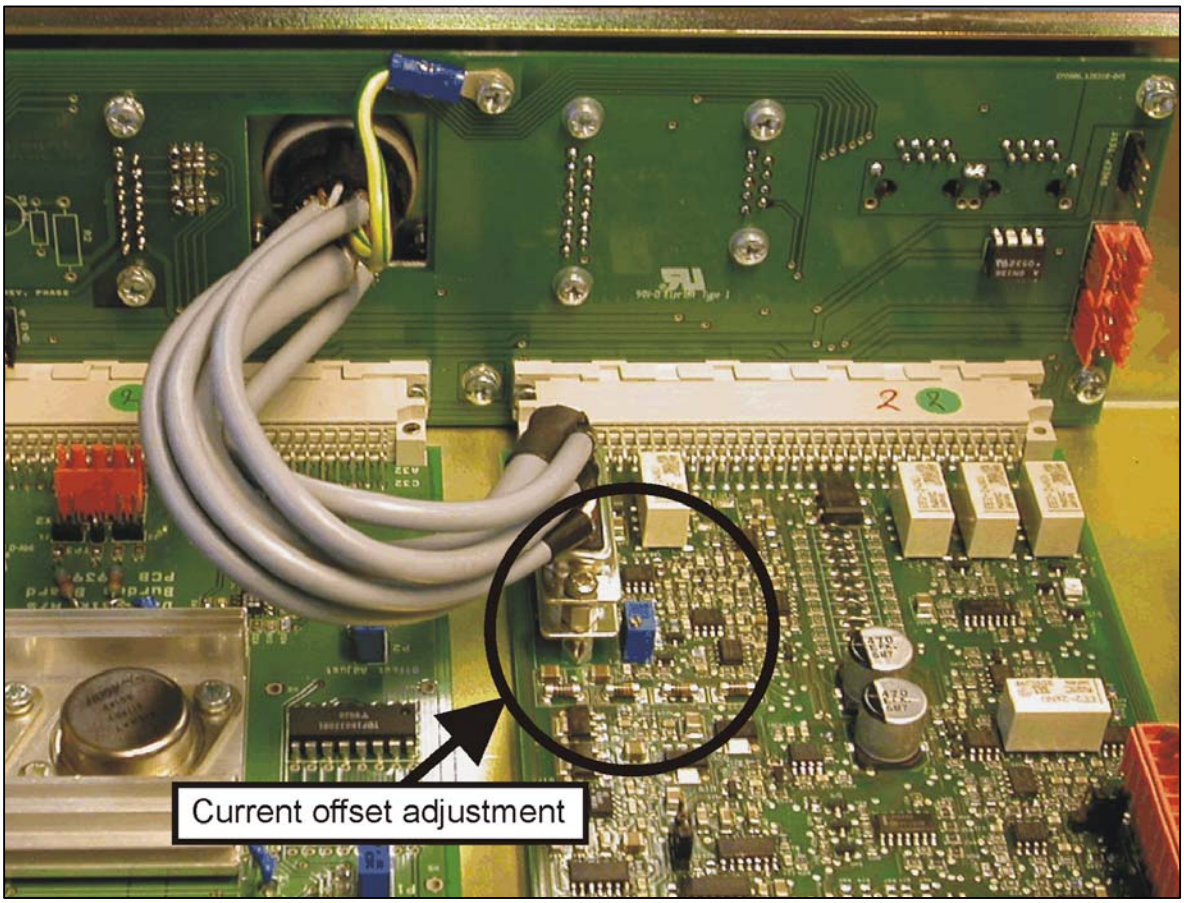


Figure 7

9. IO-ports

9.1 Analogue out connector

The Analogue out connector (DSUB15 Female) contains the following signals:

1: Current return	2: Current return	3: Not used	4: Vo High Sense	5: Vo High Out	6: Ground	7: Vo Low Sense	8: Vo Low Out

9: Current out	10: Current out	11: Not used	12: Vo High Sense	13: Vo High Out	14: Vo Low Sense	15: Vo Low Out

When using the *ULTRASTAB SATURN* in current out mode (no VOM installed) only pin 1, 2, 9, 10 should be used.
Pin 9, 10: Is the current output from the *ULTRASTAB SATURN*.
Pin 1, 2: Current return path.
When using the *ULTRASTAB SATURN* in voltage out mode (VOM installed) pin 1 - 9 and pin 2 - 10 must be shorted. This will loop the current output to the VOM. The voltage output is then present on pin 4 - 8 and 12 - 15.
Pin 4, Pin 12: Voltage output High sense
Pin 6: Signal Ground
Pin 7, Pin 14: Voltage output Low Sense
Pin 8, Pin 15: Voltage output Low
Pin 5, Pin13: Voltage output high

9.2 Status/Interlock connector

All signals on the Status/Interlock port are floating relay type. All signals are therefore isolated from the electrical circuits of the unit.

WARNING:

Maximum allowed voltage on the relay switches is 33VAC or 70VDC. Exceeding this limit may cause malfunction or damage the equipment.

The Status/Interlock connector (DSUB9 Male) contains the following signals:

1: Normal operation on	2: Normal operation off	3: Ip Low common	4: Overload warning on	5: Overload warning off

Pin 1:

6: Normal operation common	7: Ip Low on	8: Ip low off	9: Overload warning common

Normal operation on. When the unit status is OK (Normal operation) this pin is connected to the Normal operation common pin.
Pin 2: Normal operation off. When the unit status is not OK (error, overload warning etc.) this pin is connected to the Normal operation common.
Pin 3: Ip Low common: This pin is connected to either Ip Low on or Ip Low off depending on the unit's status.
Pin 4: Overload warning on: This pin is connected to the Overload common pin when the current through the transducer head exceeds 10% of the maximum programmed current.
Pin 5: Overload warning Off: This pin is connected to the Overload common pin when the unit is in normal mode and the current through the transducer head is within the measurement area.
Pin 6: Normal operation common: This pin is connected to either Normal operation on or the Normal operation off depending on the unit's status.
Pin 7: Ip Low on: This pin is connected to Ip Low common when the current through the transducer head is below 5‰ of the programmed current.
Pin 8: Ip Low off: This pin is connected to the Ip Low common when the current through the transducer head is above 5‰ of the programmed current.
Pin 9: Overload warning common: This pin is connected to either Overload warning on or Overload warning off pin depending on the unit's status.

9.3 Transducer head A connector

The transducer head A connector is used to connect the STH 600 transducer head (DF part no: 89254) to the *ULTRASTAB SATURN*. The connection is made using the transducer head cable type A (DF part no. 89222). This is a 2.5M long non-halogen cable with a DSUB15 Male connector in each end.

1:ICR	2:ICO	3:NC	4:FB-	5:IDEN-	6:NC	7:ZD1-	8:ZD1+

9:ICR	10:ICO	11:FB+	12:NC	13:IDEN+	14:ZD2-	15:ZD2+

Pin 1: Compensation current return
Pin 2: Compensation current out
Pin 3: No connection
Pin 4: Feedback coil – (AC pickup)
Pin 5: Identification -
Pin 6: No connection
Pin 7: Zero detector coil 1 –
Pin 8: Zero detector coil 1 +
Pin 9: Compensation current return
Pin 10: Compensation current out
Pin 11: Feedback coil + (AC pickup)
Pin 12: No connection
Pin 13: Identification +
Pin 14: Zero detector coil 2 –
Pin 15: Zero detector coil 2 +

9.4 Transducer head B connector

The transducer head B connector is used to connect the STH 2000, STH 5000-62 or STH 5000-140 transducer head (DF part no: 89247, 89248, 89249) to the *ULTRASTAB SATURN*. The connection is made using the transducer head cable type B (DF part no. 89222). This is a 2.5M long non halogen cable with an Amphenol C16-3 Male connector in each end.

Pin Earth: Chassis
Pin 1: No connection
Pin 2: Compensation current out
Pin 3: Compensation current return
Pin 4: Identification -
Pin 5: Identification +
Pin 6: Zero detector coil 1 +
Pin 7: Zero detector coil 2 +
Pin 8: No connection
Pin 9: Zero detector coil 1 –
Pin 10: Zero detector coil 2 –
Pin 11: No connection
Pin 12: Feedback coil + (AC pickup)
Pin 13: Feedback coil - (AC pickup)
Pin 14: No connection

Figure 8

9.5 Sync In and Sync out

The Sync In connector is used to input and external synchronization signal from another *ULTRASTAB SATURN*.

The Sync out connector is used to send out a synchronization signal to another *ULTRASTAB SATURN*.

An optocoupler in the Sync In circuitry secures that no galvanic connection exists between the sync master and the sync slave.

Both connectors are standard 8 ways modular jack connector (RJ45), and accepts standard network patch cables. Cables may be straight or cross-over cables as the *ULTRASTAB SATURN* only uses those wires in the cable that is always straight (connection 4 and 5).

The Sync signal is present on Pin 4 while Pin 5 is ground (0V)

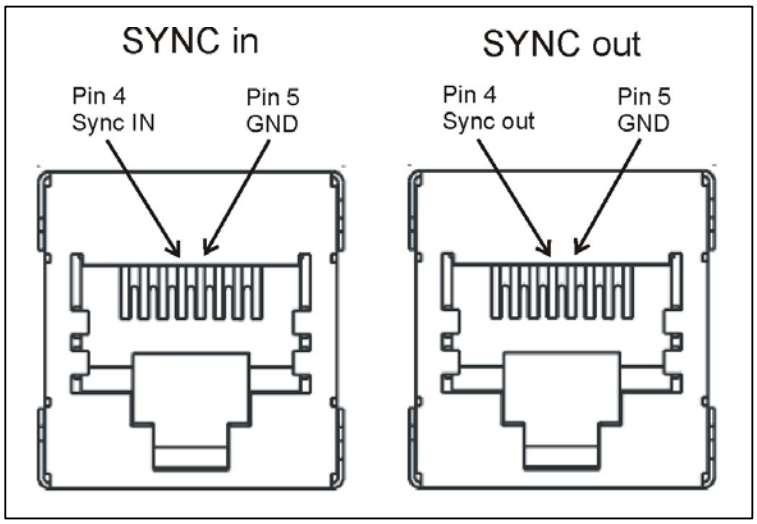


Figure 9

10. Operating instructions

10.1 Switching on power

Warning:

Before switching on the power make sure that there is no current running through the transducer head.

Note:

The disconnecting device on this equipment is the **mains plug**. To disconnect the unit unplug the mains plug at the power inlet.

Before powering up the *ULTRASTAB SATURN* make sure all jumper settings are correct and that all connections are pushed fully home and secured properly. Check that the voltage selector is set to match the local voltage supply and that the earth connection is correct according to local law and regulation. When everything is connected according to above; plug in the power cord connector. The *ULTRASTAB SATURN* will now run through its power up sequence. After a few second the unit is ready and the status of the unit can be seen on the front panel LED's. The power, status, I_PLOW and one of the transducer head LED's should now light up. Now switch the current through the transducer head on. The I_PLOW LED should turn off and the unit is running.

10.2 Using the *ULTRASTAB SATURN* in current mode

When using the *ULTRASTAB SATURN* without a VOM installed there are essentially two ways to measure the output. Connecting it to a DMM, or connecting it to an external burden resistor.

In either way the user must observe that the maximum burden resitance does not exceed the value given in the specifications of the unit.

10.3 Connecting directly to a current measuring device

Connecting the *ULTRASTAB SATURN* directly to a current measuring device like a DMM or an Power analyzer, can easily be done using the Current output adaptor (no.: 89418) which is supplied with all delivered *ULTRASTAB SATURN* systems without a VOM installed. The adaptor accepts male 4mm banana plugs. The red wire carries the output current while the black is the current return path. Simply connect these two wires to your current measuring device using standard laboratory test leads with 4mm terminals (see figure 10).

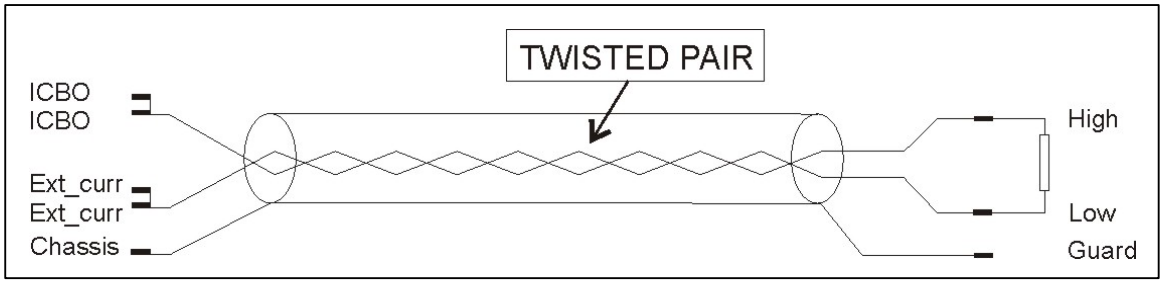


Figure 10

10.4 Connecting to an external burden resistor

If an external burden resistor is to be connected to the *ULTRASTAB SATURN* the following diagram should be used. This diagram is equal to the *ULTRASTAB SATURN* output cable type C (no.:89387)

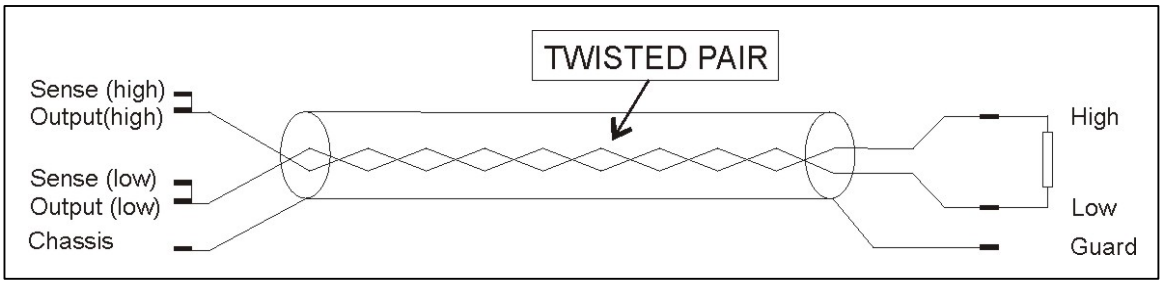


Figure 11

10.5 Using the *ULTRASTAB SATURN* in voltage mode (VOM installed)

When a VOM is installed there are two ways to connect the *ULTRASTAB SATURN* to an external load.

10.6 Connecting the *ULTRASTAB SATURN* to a DMM or high impedance amplifier

When connecting the *ULTRASTAB SATURN* to a DMM or high impedance load in voltage mode the following connections must be used. This diagram is equal to the standard voltage output cable. *ULTRASTAB SATURN* output cable type B (no.: 89382).

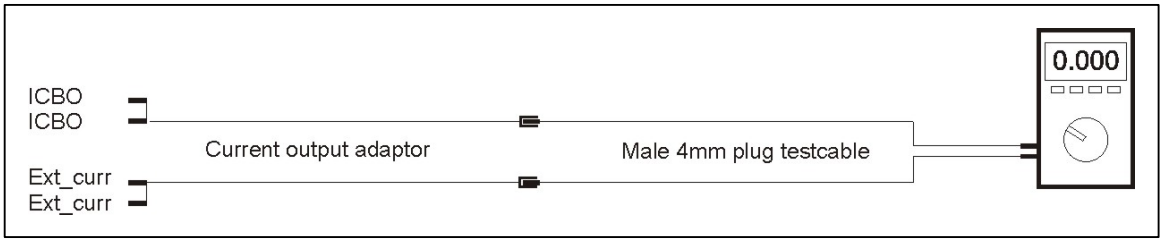


Figure 12

10.7 Connecting the *ULTRASTAB SATURN* to a low resistance load.

When connecting the *ULTRASTAB SATURN* to a low resistance load in voltages mode the following connections must be used. This diagram is equal to the *ULTRASTAB SATURN* output cable type A (no.: 89374). Please note that this setup will have a small negative impact on the precision of the *ULTRASTAB SATURN* due to the resistance in the sense wires which will alter the feedback resistance slightly in the output amplification circuitry.

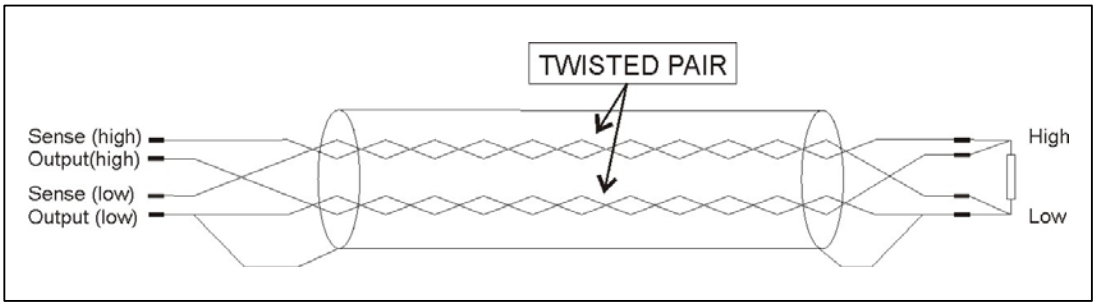


Figure 13

10.8 Using the *ULTRASTAB SATURN* in a multichannel system.

To use the *ULTRASTAB SATURN* in a multichannel system the first unit can be configured as synchronization master (see jumper settings) and the following units as synchronization slave. This insures that all units are working with the same clock which will limit noise and interference. It is however, not mandatory to use the synchronization, for many applications
it is not necessary due to the low noise floor of the system.

Below is shown a 3 channel system.

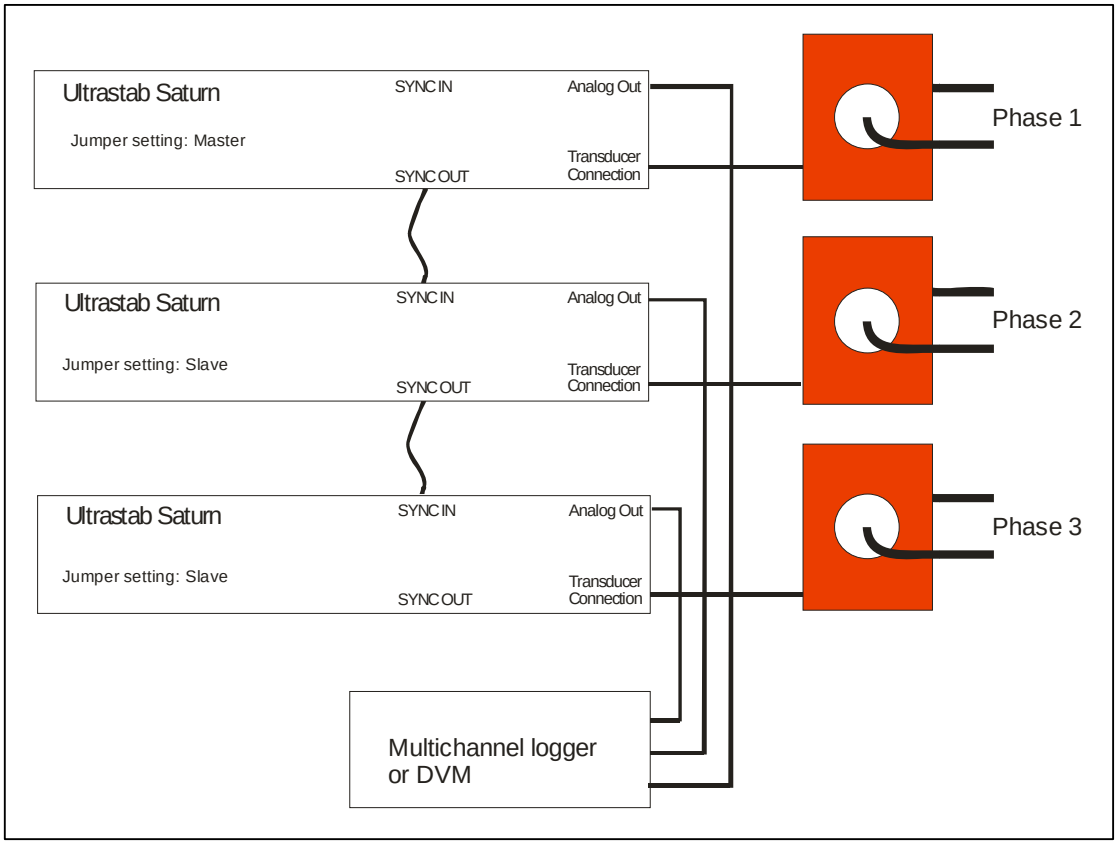

Ultrastab Saturn
Jumper setting: Master
SYNC IN
SYNC OUT
Analog Out
Transducer Connection
Ultrastab Saturn
Jumper setting: Slave
SYNC IN
SYNC OUT
Analog Out
Transducer Connection
Ultrastab Saturn
Jumper setting: Slave
SYNC IN
SYNC OUT
Analog Out
Transducer Connection
Multichannel logger or DVM
Phase 1
Phase 2
Phase 3

Figure 14

11 Theory of operation

11.1 Basic principle of ULTRASTAB current transducers

The ULTRASTAB current transducers is delivered in a programme covering a potential free measurements of currents from DC to 500 kHz ranging from 40 A to 25 kA.
The precision current transducers are using a zero flux principle controlling a compensation current which counterbalance the ampere turns generated of the primary current. Due to a balanced zero detector principle the output noise level is by nature very low and a resolution in the order of 2 x 10-8 is achieved.

The figure below shows a block diagram of the zero flux transducer principle.

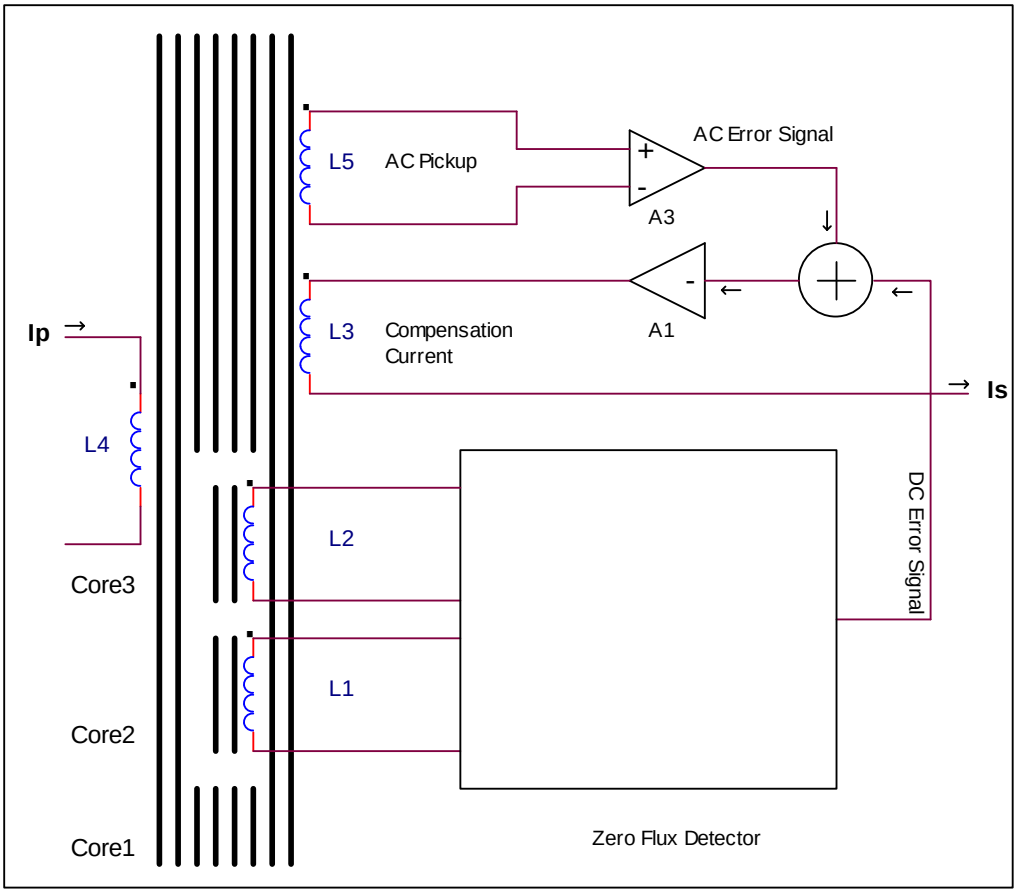


Figure 15

The transducer head core (1) is the basic body structure. The cores (2) and (3) are flux detector cores coupled to the electronics zero flux detector circuitry by means of the coils L1 and L2.
L1 and L2 are coupled in parallel or serial, depending of model, with opposite phase to reduce the unwanted flux generated in core 1.

With a primary current Ip flowing through L4 a magnetic flux will be generated in the body structure and detected by the detector cores. An error signal will be generated, controlling the amplifier A1 to drive a current through the compensation winding L3. When counterbalance is obtained, i.e. zero flux is reestablished, the compensation current, multiplied with the number of turns in L3, is a true expression of the primary current Ip.

The zero flux detector circuitry operates from true DC to about 1Hz. For higher frequencies the “AC pick up winding” L5 performs a feed back error signal which via the amplifier A2 widens the active bandwidth of the transducer up to more than 10 kHz.

Above 10 KHz the DCCT operates as a passive current transformer with it’s -3dB limit variation from 300 KHz to 1 MHz depending on size and construction of the DCCT.

12 Maintenance

The *ULTRASTAB SATURN* does not require any maintenance under normal operation in the version with a current output.

ULTRASTAB SATURN with voltage output requires yearly or biyearly calibration. Calibration of the unit is done according to the *Ultrastab Saturn* Calibration manual, document no. 88600010.

If the unit needs service please contact Danfysik A/S or our local sales representative.

13 Parts and accessories

81089200	*ULTRASTAB SATURN* electronic unit
81089254	STH 600, 600A transducer head
81089247	STH 2000, 2000A transducer head
81089248	STH 5000-62, 5000A transducer head, 62mm centre hole
81089248	STH5000-140, 5000A transducer head, 140mm centre hole
81089395	1A VOM (For STH 600/STH 2000)
81089396	2A VOM (For STH 5000-62/ STH 5000-140)
81088262	STH 600 mounting bracket
65892220	Transducer head cable for STH 600, 2.5M
65894060	Transducer head cable for STH 600, 5M
65894070	Transducer head cable for STH 600, 10M
65894080	Transducer head cable for STH 600, 20M
65894090	Transducer head cable for STH 600, 30M
65892210	Transducer head cable for STH 2000, STH 5000-62, STH 5000-140, 2.5M
65894100	Transducer head cable for STH 2000, STH 5000-62, STH 5000-140, 5M
65894110	Transducer head cable for STH 2000, STH 5000-62, STH 5000-140, 10M
65894120	Transducer head cable for STH 2000, STH 5000-62, STH 5000-140, 20M
65894130	Transducer head cable for STH 2000, STH 5000-62, STH 5000-140, 30M
65893740	Output cable type A, 1.5M
65893820	Output cable type B, 1.5M
65893870	Output cable type C, 1.5M
65894180	Output cable DSUB to 4mm banana socketsl adaptor
81089259	40A/125A Programming plug for STH 600/ STH 2000
81089260	60A/250A Programming plug for STH 600/ STH 2000
81089261	80A/250A Programming plug for STH 600/ STH 2000
81089262	100A/375A Programming plug for STH 600/ STH 2000
81089263	120A/375A Programming plug for STH 600/ STH 2000
81089264	140A/500A Programming plug for STH 600/ STH 2000
81089265	160A/500A Programming plug for STH 600/ STH 2000
81089266	180A/625A Programming plug for STH 600/ STH 2000
81089267	200A/625A Programming plug for STH 600/ STH 2000
81089268	220A/750A Programming plug for STH 600/ STH 2000
81089269	240A/750A Programming plug for STH 600/ STH 2000
81089270	260A/875A Programming plug for STH 600/ STH 2000
81089271	280A/875A Programming plug for STH 600/ STH 2000
81089272	300A/1000A Programming plug for STH 600/ STH 2000
81089273	320A/1000A Programming plug for STH 600/ STH 2000
81089274	340A/1125A Programming plug for STH 600/ STH 2000
81089275	360A/1125A Programming plug for STH 600/ STH 2000
81089276	380A/1250A Programming plug for STH 600/ STH 2000

81089277	400A/1250A Programming plug for STH 600/ STH 2000
81089278	420A/1375A Programming plug for STH 600/ STH 2000
81089279	440A/1375A Programming plug for STH 600/ STH 2000
81089280	460A/1500A Programming plug for STH 600/ STH 2000
81089281	480A/1500A Programming plug for STH 600/ STH 2000
81089282	500A/1625A Programming plug for STH 600/ STH 2000
81089283	520A/1625A Programming plug for STH 600/ STH 2000
81089284	540A/1750A Programming plug for STH 600/ STH 2000
81089285	560A/1750A Programming plug for STH 600/ STH 2000
81089286	580A/1875A Programming plug for STH 600/ STH 2000
81089287	600A/1875A Programming plug for STH 600/ STH 2000
81089288	620A/2000A Programming plug for STH 600/ STH 2000
81089289	2500A Programming plug for STH 5000-62/ STH 5000-140
81089290	2750A Programming plug for STH 5000-62/ STH 5000-140
81089291	3000A Programming plug for STH 5000-62/ STH 5000-140
81089292	3250A Programming plug for STH 5000-62/ STH 5000-140
81089293	3500A Programming plug for STH 5000-62/ STH 5000-140
81089294	3750A Programming plug for STH 5000-62/ STH 5000-140
81089295	4000A Programming plug for STH 5000-62/ STH 5000-140
81089296	4250A Programming plug for STH 5000-62/ STH 5000-140
81089297	4500A Programming plug for STH 5000-62/ STH 5000-140
81089298	4750A Programming plug for STH 5000-62/ STH 5000-140
81089299	5000A Programming plug for STH 5000-62/ STH 5000-140

Appendix A: Sales representatives

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Appendix B: Specification

Ultrastab Saturn 600I

Last update: 15.03.2007

Rack mounted programmable current transducer

Parameter	Symbol	Condition	Value	Unit
Primary current	I_p			
Nominal primary current			± 600	A
Programmable from			40	A
Programming steps			20	A
Polarity			Bipolar	
Secondary current	I_s			
Nominal secondary current			± 1	A
External burden resistor	R_b			
Max.	$R_{b,\ max}$		1.5	Ω
Min.	$R_{b,\ min}$		0	Ω
Current transfer ratio	N		600	
Overload capacity				
Max. nondestructive overload	$I_{p,\ max}$	@ 0.1s	500	%Ipn
Min. overload trip value	$I_{p,\ trip}$		130	%Ipn
DC accuracy				
Offset				
Initial	I_{so}		< 2	ppm
Drift vs. Temp.	$I_{so,\ temp}$		< 0.1	ppm / K
Drift vs. Time	$I_{so,\ time}$		< 1	ppm / month
Transfer ratio				
Deviation	N_d		< 2	ppm
Deviation vs. Temp.	$N_{d,\ temp}$		< 0.1	ppm / K
Deviation vs. Time	$N_{d,\ time}$		< 1	ppm / month
Linearity				
Deviation	X_d		< 1	ppm
Deviation vs. Temp.	$X_{d,\ temp}$		< 0.1	ppm / K

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Ultrastab Saturn 600I

Last update: 15.03.2007

Rack mounted programmable current transducer

Parameter	Symbol	Condition	Value	Unit
Output noise	$I_{s,\ noise}$			
		0 - 10Hz	< 0.01	ppm (RMS)
		0 - 10kHz	< 3.5	ppm (RMS)
		0 - 100kHz	< 6.5	ppm (RMS)
Dynamic response				
Slew rate	dI/dt	10 - 90%	> 50	A / µS
Delay time	t_d		< 1	µS
Bandwidth	**f**			
±3dB		< 5% Ipn	0 - 300	kHz
Busbar noise	U_b			
Measured on primary cable, one turn		DC - 100kHz	< 2	µV RMS
Busbar free zone				
Lenght	l		150	mm
Radius	r		75	mm
Operating voltages				
Max. busbar voltages	$V_{b,\ max}$		1250	VAC
Test voltages				
Busbar to GND	$V_{t,\ b}$		5000	VAC RMS
Power supply				
Supply voltage (Selectable on mains inlet	Vac	± 10%	100/110/230	VAC, 50~60Hz
Maximum power consumption	S_{max}		50	VA

Ultrastab Saturn 600I

Last update: 15.03.2007

Rack mounted programmable current transducer

Parameter	Symbol	Condition	Value	Unit
Operating environment				
Electronics				
Temperature	$T_{a, elec.}$		10 - 40	ºC
Humidity	$RH_{a, elec.}$	Noncondensing	20 - 80	%RH
Transducerhead				
Temperature	$T_{a, head}$		0 - 55	ºC
Humidity	$RH_{a, head}$	Noncondensing	20 - 80	%RH
Storage environment				
Electronics				
Temperature	$T_{s, elec.}$		−20 - 85	ºC
Humidity	$RH_{s, elec.}$	Noncondensing	20 - 80	%RH
Transducerhead				
Temperature	$T_{s, head}$		−20 - 85	ºC
Humidity	$RH_{s, head}$	Noncondensing	20 - 80	%RH
Mechanical dimension				
Electronics				
Width	$W_{elec.}$		482.6	mm
Height	$H_{elec.}$		88.1	mm
Depth	$D_{elec.}$		323	mm
Weight (approx.)	$m_{elec.}$		5	kg
Transducerhead				
Width	W_{head}		98	mm
Height	H_{head}		122	mm
Depth	D_{head}		57	mm
Weight (approx.)	m_{head}		1	kg
Inner hole diameter	O		25	mm
Transducer cable lenght				
Standard			2.5	m
Maximum optional lenght			30	m

Notes:

1: All ppm figures refer to nominal current and transducerhead programmed to maximum primary current

2: Specifications is subject to change without notice

DANFYSIK

Ultrastab Saturn 600U

Last update: 15.03.2007

Rack mounted programmable current transducer

Parameter	Symbol	Condition	Value	Unit
Primary current	I_p			
Nominal primary current			± 600	A
Programmable from			40	A
Programming steps			20	A
Polarity			Bipolar	
Voltage output	V_o			
Nominal voltage output	V_{on}		± 10	V
Max. output load current	$I_{o,\,max}$		5	mA
Max. output load capacitance	$C_{o,\,max}$		3	nF
Transfer ratio	G		60	A/V
Overload capacity				
Max. nondestructive overload	$I_{p,\,max}$	@ 0.1s	500	%Ipn
Min. overload trip value	$I_{p,\,trip}$		130	%Ipn
DC accuracy				
Offset				
Initial	V_{oo}		< 2	ppm
Drift vs. Temp.	$V_{oo,\,temp}$		< 0.6	ppm / K
Drift vs. Time	$V_{oo,\,time}$		< 1	ppm / month
Transfer ratio				
Deviation	G_d		< 50	ppm
Deviation vs. Temp.	$G_{d,\,temp}$		< 2	ppm / K
Deviation vs. Time	$G_{d,\,time}$		< 2	ppm / month
Linearity				
Deviation	X_d		< 3	ppm
Output noise	$V_{o,\,noise}$			
		0 - 10Hz	< 0.15	ppm (RMS)
		0 - 10kHz	< 6.5	ppm (RMS)
		0 - 100kHz	< 16	ppm (RMS)

Ultrastab Saturn 600U

Last update: 15.03.2007

Rack mounted programmable current transducer

Parameter	Symbol	Condition	Value	Unit
Dynamic response				
Slew rate	dI/dt	See note 3	> 50	A / µS
Delay time	t_d		< 1	µS
Bandwidth	**f**			
±3dB		< 5% Ipn	0 - 300	kHz
Busbar noise	$\mathbf{U_b}$			
Measured on primary cable, one turn		DC - 100kHz	< 2	µV RMS
Busbar free zone				
Lenght	l		150	mm
Radius	r		75	mm
Operating voltages				
Max. busbar voltages	$V_{b, max}$		1250	VAC
Test voltages				
Busbar to GND	$V_{t, b}$		5000	VAC RMS
Power supply				
Supply voltage (Selectable on mains inlet	Vac	± 10%	100/110/230	VAC, 50~60Hz
Maximum power consumption	S_{max}		50	VA
Operating environment				
Electronics				
Temperature	$T_{a, elec.}$		10 - 40	ºC
Humidity	$RH_{a, elec.}$	Noncondensing	20 - 80	%RH
Transducerhead				
Temperature	$T_{a, head}$		0 - 55	ºC
Humidity	$RH_{a, head}$	Noncondensing	20 - 80	%RH

Ultrastab Saturn 600U

Last update: 15.03.2007

Rack mounted programmable current transducer

Parameter	Symbol	Condition	Value	Unit
Storage environment				
Electronics				
Temperature	$T_{s, elec.}$		−20 - 85	ºC
Humidity	$RH_{s, elec.}$	Noncondensing	20 - 80	%RH
Transducerhead				
Temperature	$T_{s, head}$		−20 - 85	ºC
Humidity	$RH_{s, head}$	Noncondensing	20 - 80	%RH
Mechanical dimension				
Electronics				
Width	$W_{elec.}$		482.6	mm
Height	$H_{elec.}$		88.1	mm
Depth	$D_{elec.}$		323	mm
Weight (approx.)	$m_{elec.}$		5	kg
Transducerhead				
Width	W_{head}		98	mm
Height	H_{head}		122	mm
Depth	D_{head}		57	mm
Weight (approx.)	m_{head}		1	kg
Inner hole diameter	O		25	mm
Transducer cable lenght				
Standard			2.5	m
Maximum optional lenght			30	m

Notes:

1: All ppm figures refer to nominal current and transducerhead programmed to maximum primary current
2: Specifications is subject to change without notice
3: Corresponds to 1V/uS on the voltage output with transducerhead programmed to maximum primary current

Ultrastab Saturn 2000I

Last update: 15.03.2007

Rack mounted programmable current transducer

Parameter	Symbol	Condition	Value	Unit
Primary current	I_p			
Nominal primary current			± 2000	A
Programmable from			125	A
Programming steps			125	A
Polarity			Bipolar	
Secondary current	I_s			
Nominal secondary current			± 1	A
External burden resistor	R_b			
Max.	$R_{b,\ max}$		1.5	Ω
Min.	$R_{b,\ min}$		0	Ω
Current transfer ratio	N		2000	
Overload capacity				
Max. nondestructive overload	$I_{p,\ max}$	@ 0.1s	500	%Ipn
Min. overload trip value	$I_{p,\ trip}$		130	%Ipn
DC accuracy				
Offset				
Initial	I_{so}		< 2	ppm
Drift vs. Temp.	$I_{so,\ temp}$		< 0.1	ppm / K
Drift vs. Time	$I_{so,\ time}$		< 1	ppm / month
Transfer ratio				
Deviation	N_d		< 4	ppm
Deviation vs. Temp.	$N_{d,\ temp}$		< 0.1	ppm / K
Deviation vs. Time	$N_{d,\ time}$		< 1	ppm / month
Linearity				
Deviation	X_d		< 2	ppm
Deviation vs. Temp.	$X_{d,\ temp}$		< 0.1	

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Ultrastab Saturn 2000I

Last update: 15.03.2007

Rack mounted programmable current transducer

Parameter	Symbol	Condition	Value	Unit
Output noise	$I_{s,\ noise}$			
		0 - 10Hz	< 0.01	ppm (RMS)
		0 - 10kHz	< 3	ppm (RMS)
		0 - 100kHz	< 5.5	ppm (RMS)
Dynamic response				
Slew rate	dI/dt	10 - 90%	> 20	A / µS
Delay time	t_d		< 1	µS
Bandwidth	**f**			
±3dB		< 1% Ipn	0 - 50	kHz
Busbar noise	U_b			
Measured on primary cable, one turn		DC - 100kHz	< 10	µV RMS
Busbar free zone				
Lenght	l		220	mm
Radius	r		110	mm
Operating voltages				
Max. busbar voltages	$V_{b,\ max}$		2100	VAC
Test voltages				
Busbar to GND	$V_{t,\ b}$		5000	VAC RMS
Power supply				
Supply voltage (Selectable on mains inlet	Vac	± 10%	100/110/230	VAC, 50~60Hz
Maximum power consumption	S_{max}		50	VA

Ultrastab Saturn 2000I

Last update: 15.03.2007

Rack mounted programmable current transducer

Parameter	Symbol	Condition	Value	Unit
Operating environment				
Electronics				
Temperature	$T_{a, elec.}$		10 - 40	ºC
Humidity	$RH_{a, elec.}$	Noncondensing	20 - 80	%RH
Transducerhead				
Temperature	$T_{a, head}$		0 - 55	ºC
Humidity	$RH_{a, head}$	Noncondensing	20 - 80	%RH
Mechanical dimension				
Electronics				
Width	$W_{elec.}$		482.6	mm
Height	$H_{elec.}$		88.1	mm
Depth	$D_{elec.}$		323	mm
Weight (approx.)	$m_{elec.}$		5	kg
Transducerhead				
Width	W_{head}		169	mm
Height	H_{head}		200	mm
Depth	D_{head}		70	mm
Weight (approx.)	m_{head}		4.5	kg
Inner hole diameter	O		50	mm
Transducer cable lenght				
Standard			2.5	m
Maximum optional lenght			30	m

Notes:

1: All ppm figures refer to nominal current and transducerhead programmed to maximum primary current

2: Specifications is subject to change without notice

Ultrastab Saturn 2000U

Last update: 15.03.2007

Rack mounted programmable current transducer

Parameter	Symbol	Condition	Value	Unit
Primary current	I_p			
Nominal primary current			± 2000	A
Programmable from			125	A
Programming steps			125	A
Polarity			Bipolar	
Voltage output	V_o			
Nominal voltage output	V_{on}		± 10	V
Max. output load current	$I_{o, max}$		5	mA
Max. output load capacitance	$C_{o, max}$		3	nF
Transfer ratio	G		200	A/V
Overload capacity				
Max. nondestructive overload	$I_{p, max}$	@ 0.1s	500	%Ipn
Min. overload trip value	$I_{p, trip}$		130	%Ipn
DC accuracy				
Offset				
Initial	V_{oo}		< 2	ppm
Drift vs. Temp.	$V_{oo, temp}$		< 0.6	ppm / K
Drift vs. Time	$V_{oo, time}$		< 1	ppm / month
Transfer ratio				
Deviation	G_d		< 50	ppm
Deviation vs. Temp.	$G_{d, temp}$		< 2	ppm / K
Deviation vs. Time	$G_{d, time}$		< 2	ppm / month
Linearity				
Deviation	X_d		< 4	ppm
Output noise	$V_{o, noise}$			
		0 - 10Hz	< 0.15	ppm (RMS)
		0 - 10kHz	< 5.5	ppm (RMS)
		0 - 100kHz	< 16	ppm (RMS)

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Ultrastab Saturn 2000U

Last update: 15.03.2007

Rack mounted programmable current transducer

Parameter	Symbol	Condition	Value	Unit
Dynamic response				
Slew rate	dI/dt	See note 3	> 20	A / µS
Delay time	t_d		< 1	µS
Bandwidth	**f**			
±3dB		< 1% Ipn	0 - 50	kHz
Busbar noise	**U_b**			
Measured on primary cable, one turn		DC - 100kHz	< 10	µV RMS
Busbar free zone				
Lenght	l		220	mm
Radius	r		110	mm
Operating voltages				
Max. busbar voltages	$V_{b, max}$		2100	VAC
Test voltages				
Busbar to GND	$V_{t, b}$		5000	VAC RMS
Power supply				
Supply voltage (Selectable on mains inlet)	Vac	± 10%	100/110/230	VAC, 50~60Hz
Maximum power consumption	S_{max}		50	VA
Operating environment				
Electronics				
Temperature	$T_{a, elec.}$		10 - 40	ºC
Humidity	$RH_{a, elec.}$	Noncondensing	20 - 80	%RH
Transducerhead				
Temperature	$T_{a, head}$		0 - 55	ºC
Humidity	$RH_{a, head}$	Noncondensing	20 - 80	%RH

Ultrastab Saturn 2000U

Last update: 15.03.2007

Rack mounted programmable current transducer

Parameter	Symbol	Condition	Value	Unit
Mechanical dimension				
Electronics				
Width	$W_{elec.}$		482.6	mm
Height	$H_{elec.}$		88.1	mm
Depth	$D_{elec.}$		323	mm
Weight (approx.)	$m_{elec.}$		5	kg
Transducerhead				
Width	W_{head}		169	mm
Height	H_{head}		200	mm
Depth	D_{head}		70	mm
Weight (approx.)	m_{head}		4.5	kg
Inner hole diameter	O		50	mm
Transducer cable lenght				
Standard			2.5	m
Maximum optional lenght			30	m

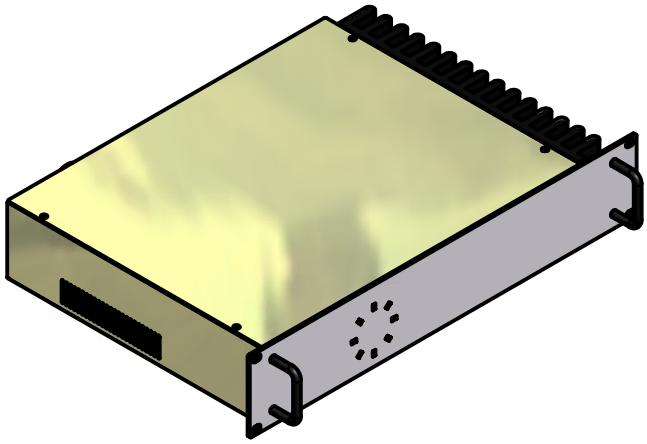
Notes:

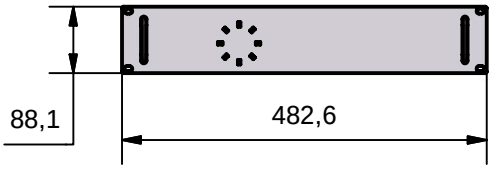
1: All ppm figures refer to nominal current and transducerhead programmed to maximum primary current

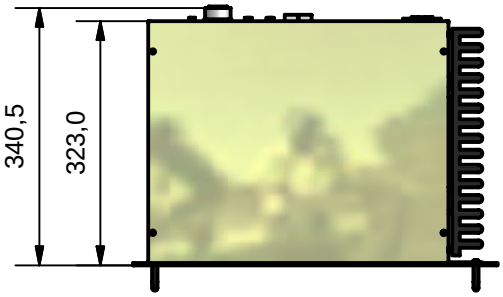
2: Specifications is subject to change without notice

3: Corresponds to 0.1mV/uS on the voltage output with transducerhead programmed to maximum primary current

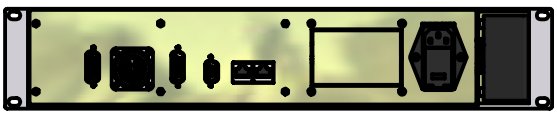
Appendix C: Drawings







Rear view



TOLERANCE: ±0.1	SURFACE TREATMENT (RoHS compliant):	MATERIAL:
SCALE: 1:10	MACHINING:	

Ultrastab Saturn

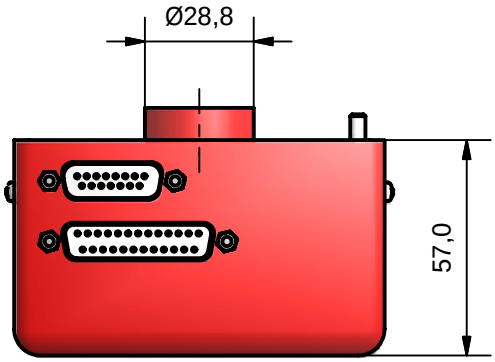
Dimensions

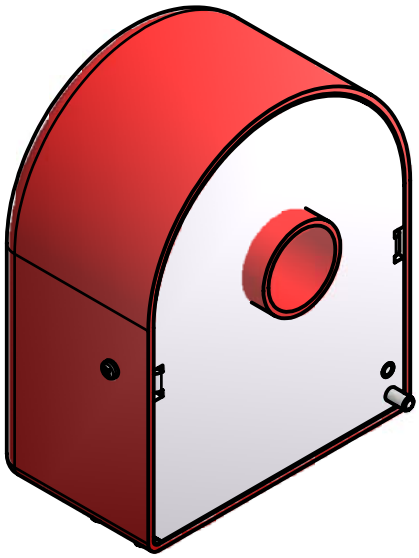
DRAWN BY	SFH
DESIGN APP.	Autodesk Inventor 9
PROD. APP.	
PROJ. ENGR.	
DWG. NO.:	89401

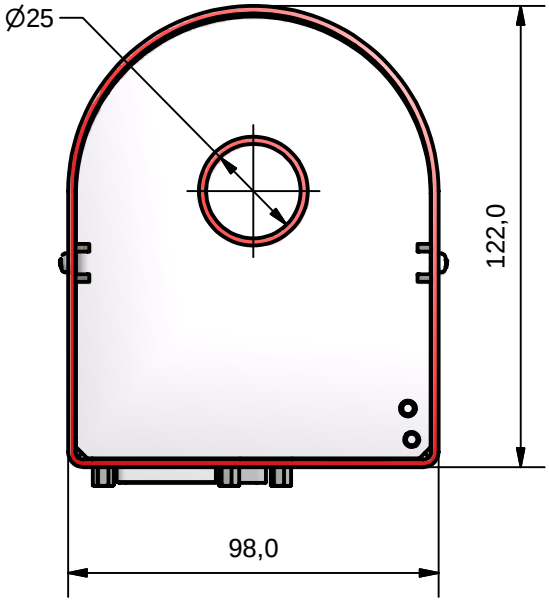
FIRST ANGLE PROJECTION

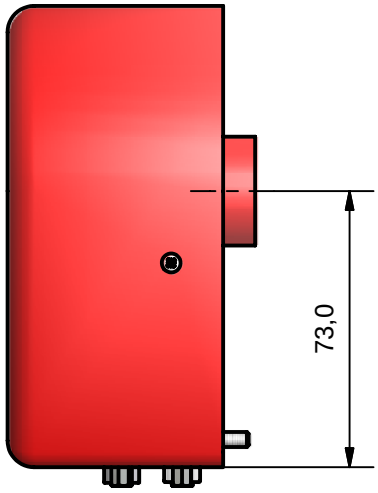
DANFYSIK

CUSTOMER: Customer	PROJECT NO.:	REVISION:	SHEET 1 of 1
FILE: 89401.idw		DATE: 28-07-2006	SIZE: A4









TOLERANCE: N.A.	SURFACE TREATMENT (RoHS compliant):	MATERIAL:
SCALE: 1:2	MACHINING:	

STH 600 - DCCT

Dimensions

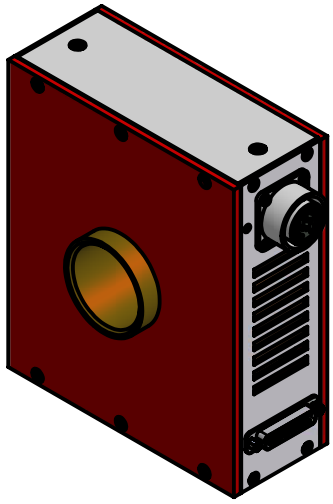
Ultrastab Saturn

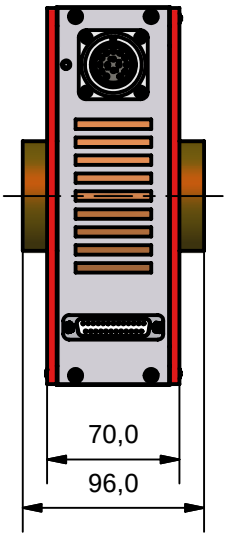
DRAWN BY	SFH
DESIGN APP.	Autodesk Inventor 9
PROD. APP.	
PROJ. ENGR.	
DWG. NO.:	89402A

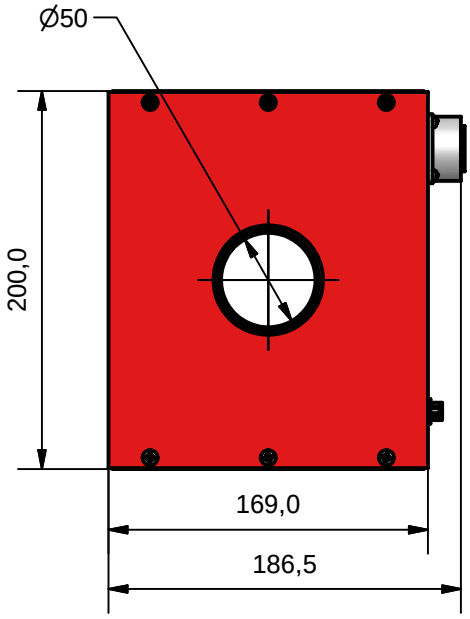
FIRST ANGLE PROJECTION

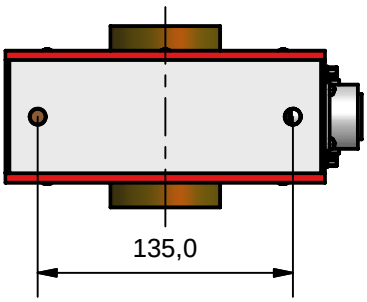
DANFYSIK

CUSTOMER: Customer	PROJECT NO.:	REVISION:	SHEET 1 of 1
FILE: 89402.idw		DATE: 05-09-2006	SIZE: A4









TOLERANCE: N.A.	SURFACE TREATMENT (RoHS compliant):	MATERIAL:
SCALE: 1:4	MACHINING:	

STH 2000 - DCCT

Dimensions

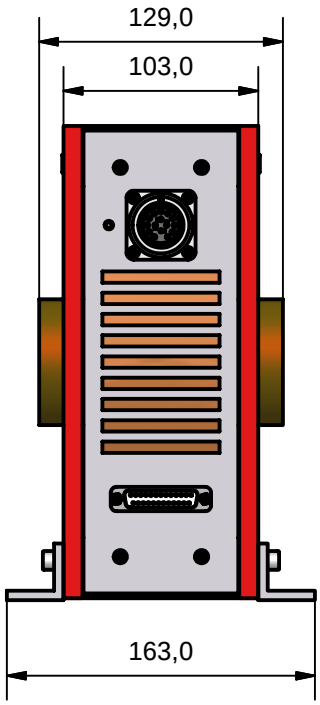
Ultrastab Saturn

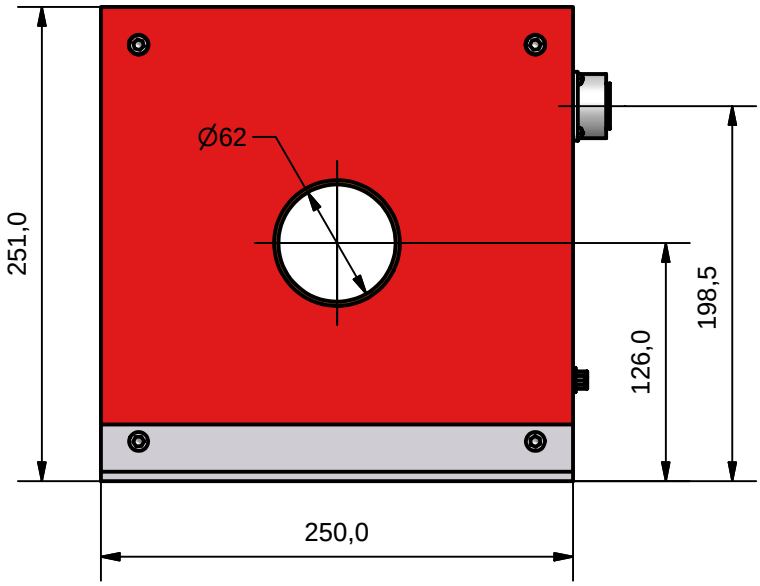
DRAWN BY	SFH
DESIGN APP.	Autodesk Inventor 9
PROD. APP.	
PROJ. ENGR.	
DWG. NO.:	89403

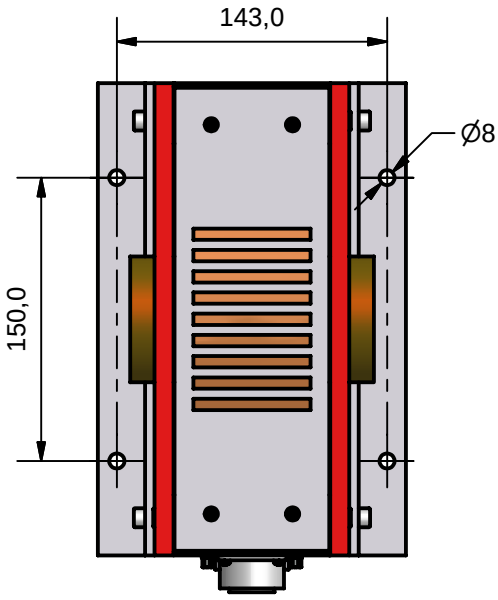
FIRST ANGLE PROJECTION

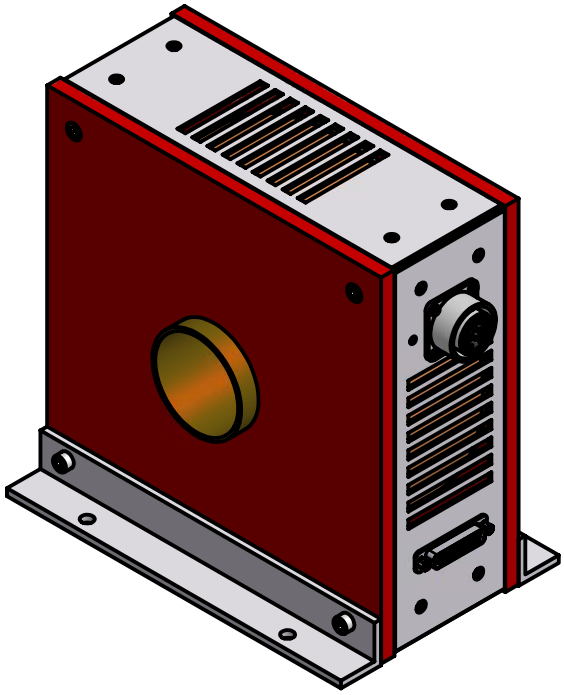
DANFYSIK

CUSTOMER: Customer	PROJECT NO.:	REVISION:	SHEET 1 of 1
FILE: 89403.idw		DATE: 28-07-2006	SIZE: A4









TOLERANCE: ±0.1	SURFACE TREATMENT (RoHS compliant):	MATERIAL:
SCALE: 1:4	MACHINING:	

STH-5000-62

Dimensions

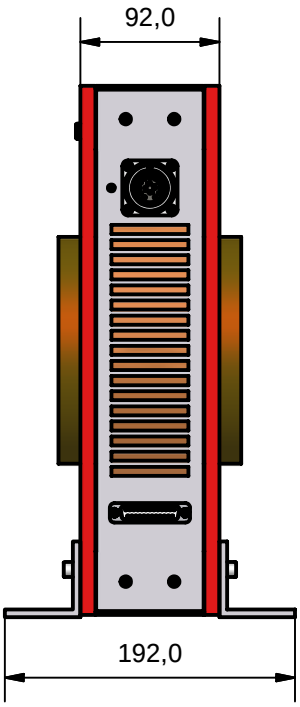
Ultrastab Saturn

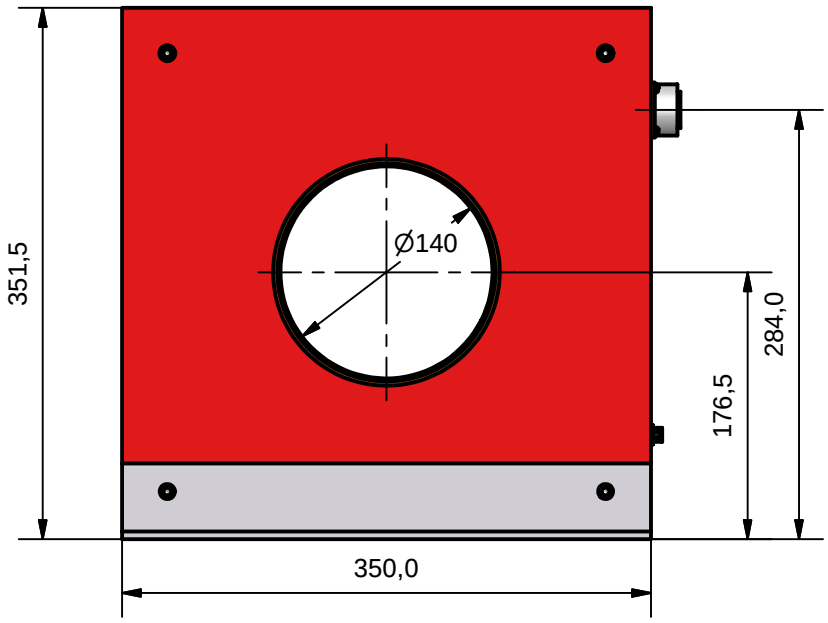
DRAWN BY	SFH
DESIGN APP.	Autodesk Inventor 9
PROD. APP.	
PROJ. ENGR.	
DWG. NO.:	89417

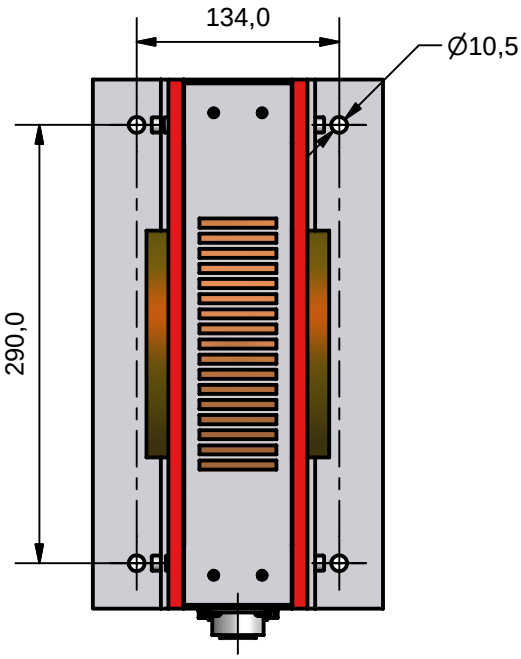
FIRST ANGLE PROJECTION

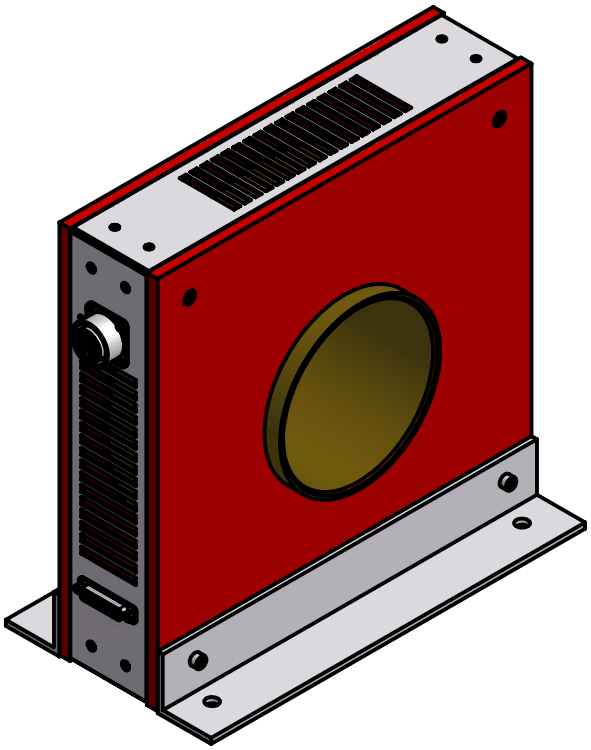
DANFYSIK

CUSTOMER: Danfysik	PROJECT NO.: Ultrastab Saturn	REVISION:	SHEET 1 of 1
FILE: 89417.idw		DATE: 01-09-2006	SIZE: A4









TOLERANCE: ±0.1	SURFACE TREATMENT (RoHS compliant):	MATERIAL:
SCALE: 1:5	MACHINING:	

STH-5000-140

Dimensions

Ultrastab Saturn

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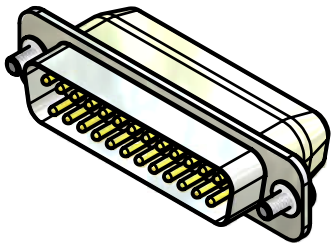
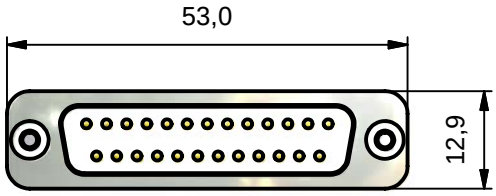
DESIGN APP.	Autodesk Inventor 9
PROD. APP.	
PROJ. ENGR.	
DWG. NO.:	89416

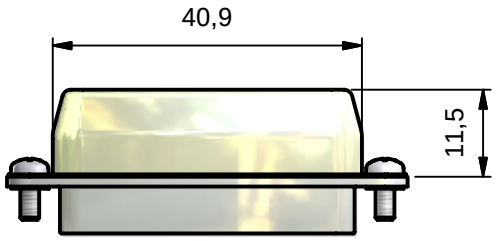
FIRST ANGLE PROJECTION

DANFYSIK

CUSTOMER: Customer	PROJECT NO.: Ultrastab Saturn	REVISION:	SHEET 1 of 1
FILE: 89416.idw		DATE: 01-09-2006	SIZE: A4







TOLERANCE: ±0.3	SURFACE TREATMENT (RoHS compliant):	MATERIAL:
SCALE: 1:1	MACHINING:	

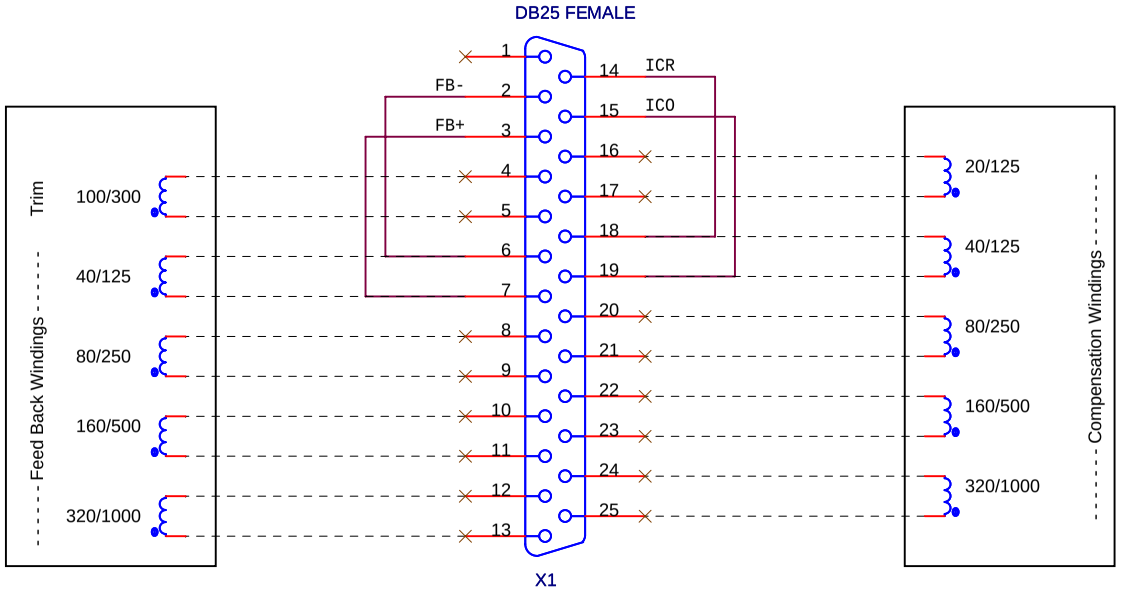
Plug dimensions

DRAWN BY SFH	
DESIGN APP.	
PROD. APP.	
PROJ. ENGR. NAW	
DWG. NO.: 89439	

FIRST ANGLE PROJECTION

DANFYSIK

CUSTOMER: Customer	PROJECT NO.:	REVISION:	SHEET 1 of 1
FILE: 89439.idw		DATE: 03-01-2007	SIZE: A4



All wires: 0.25mm2 Black

DWG 65-0-89259

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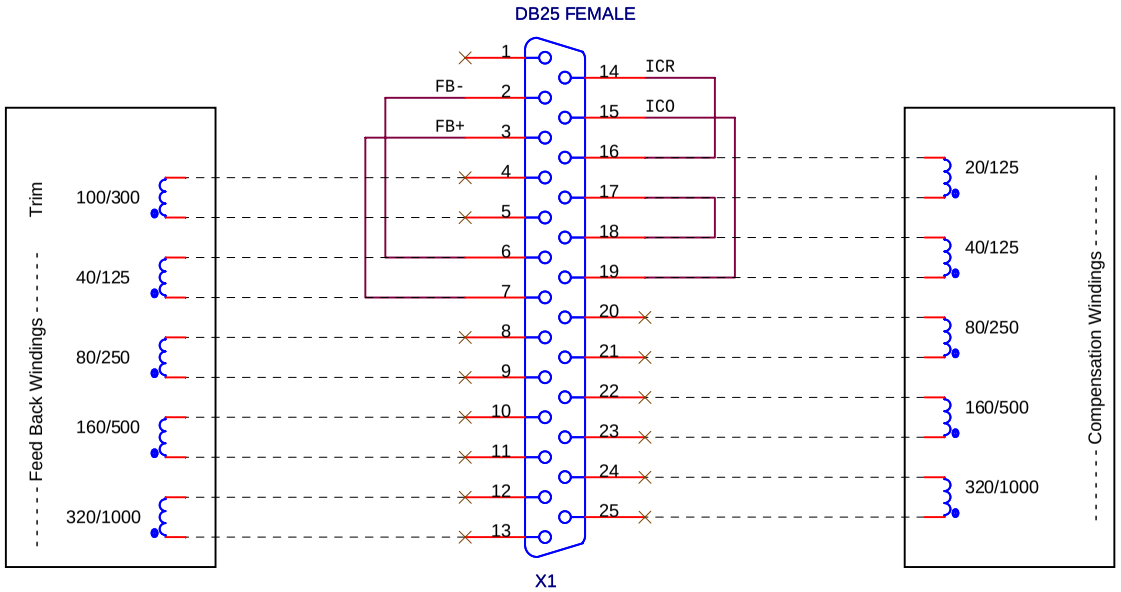
Programming plug
40 / 125 A
Transducerhead 600 / 2000 A
Ultrastab Saturn

DRAWN BY. 24-01-2006 / NAW
DESIGN APP.
PROD APP.
PROJ. ENGR.
DWG.NO.: 89259

DANFYSIK

CUSTM. <OrgName> | ORDER NO. <nr.?> | REV. | SHEET. 1 OF 1
FILE. | DATE. Wednesday, August 16, 2006 | SIZE. A4

DK-4040 JYLLINGE DENMARK TELEPHONE: +45 46 79 00 00 TELEFAX: +45 46 79 00 01 E-MAIL: DANFYSIK@DANFYSIK.DK



All wires: 0.25mm2 Black

DWG 65-0-89260

T:\PROJEKTER-IGANG\SATURN\DOKUMENTATION, MIDLERTIDIG\PROGRAMMING PLUGS\PLUGS_600_2000\89260.DSN

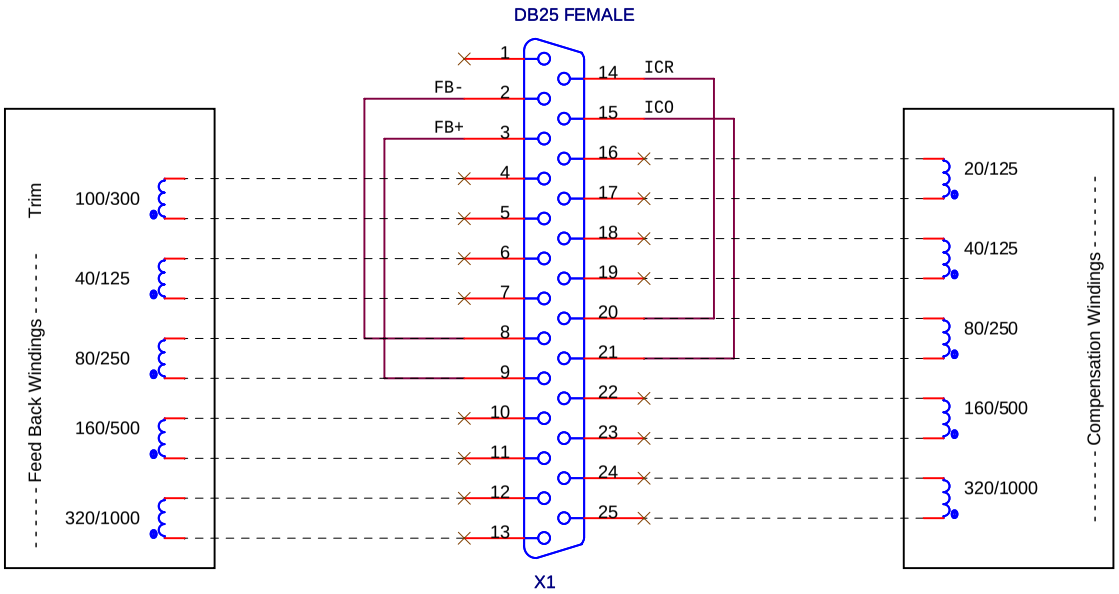
Programming plug
60 / 250 A
Transducerhead 600 / 2000 A
Ultrastab Saturn

DRAWN BY. 25-01-2006 / NAW
DESIGN APP.
PROD APP.
PROJ. ENGR.
DWG.NO.: 89260

DANFYSIK

CUSTM. <OrgName> | ORDER NO. <nr.?> | REV. | SHEET. 1 OF 1
FILE. | DATE. Thursday, August 17, 2006 | SIZE. A4

DK-4040 JYLLINGE DENMARK TELEPHONE: +45 46 79 00 00 TELEFAX: +45 46 79 00 01 E-MAIL: DANFYSIK@DANFYSIK.DK



All wires: 0.25mm2 Black

DWG 65-0-89261

T:\PROJEKTER-IGANG\SATURN\DOKUMENTATION, MIDLERTIDIG\PROGRAMMING PLUGS\PLUGS_600_2000\89261.DSN

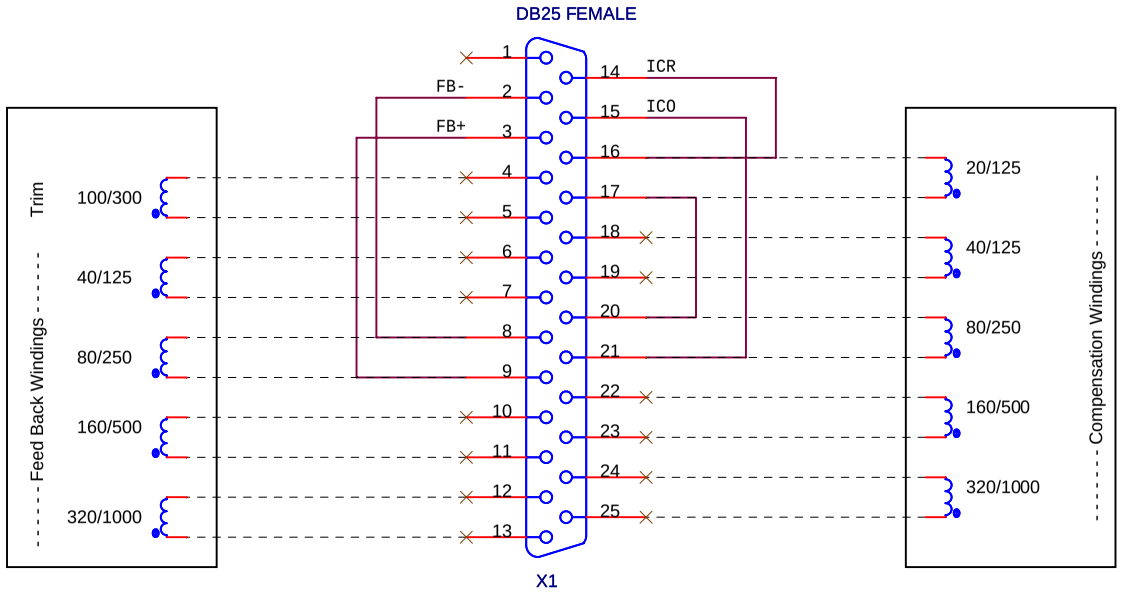
Programming plug
80 / 250 A
Transducer head 600 / 2000 A
Ultrastab Saturn

DRAWN BY. 25-01-2005 / NAW
DESIGN APP.
PROD APP.
PROJ. ENGR.
DWG.NO.: 89261

DANFYSIK

CUSTM. <OrgName> | ORDER NO. <nr.?> | REV. | SHEET. 1 OF 1
FILE. | DATE. Thursday, August 17, 2006 | SIZE. A4

DK-4040 JYLLINGE DENMARK TELEPHONE: +45 46 79 00 00 TELEFAX: +45 46 79 00 01 E-MAIL: DANFYSIK@DANFYSIK.DK



All wires: 0.25mm2 Black

DWG 65-0-89262

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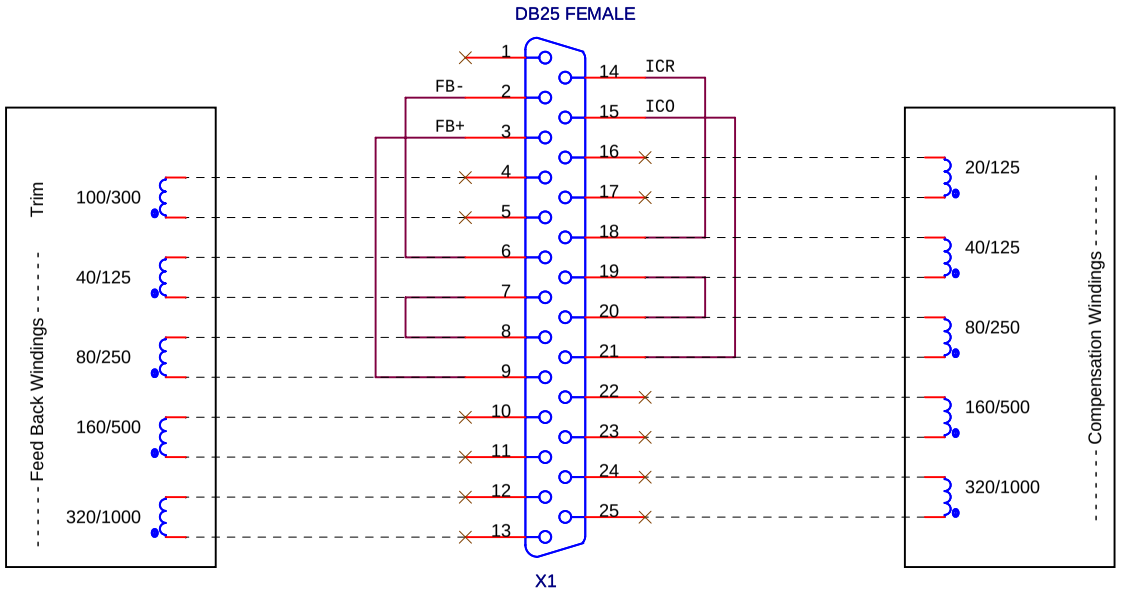
Programming plug
100 / 375 A
Transducer head 600 / 2000 A
Ultrastab Saturn

DRAWN BY. 25-01-2006 / NAW
DESIGN APP.
PROD APP.
PROJ. ENGR.
DWG.NO.: 89262

DANFYSIK

CUSTM. <OrgName> | ORDER NO. <nr.?> | REV. | SHEET. 1 OF 1
FILE. | DATE. Thursday, August 17, 2006 | SIZE. A4

DK-4040 JYLLINGE DENMARK TELEPHONE: +45 46 79 00 00 TELEFAX: +45 46 79 00 01 E-MAIL: DANFYSIK@DANFYSIK.DK



All wires: 0.25mm2 Black

DWG 65-0-89263

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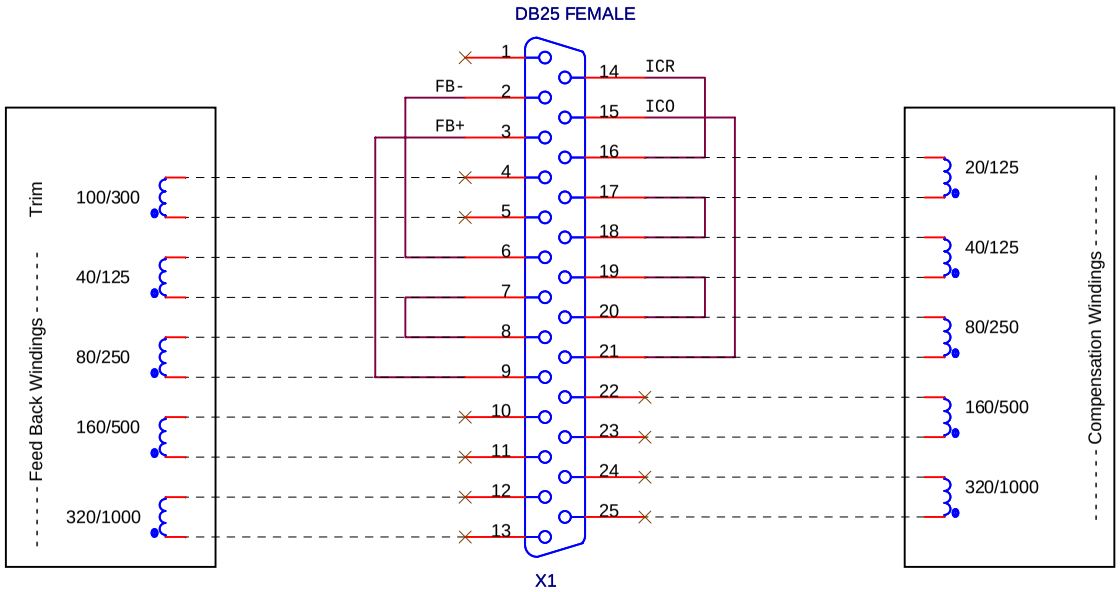
Programming plug
120 / 375 A
Transducer head 600 / 2000 A
Ultrastab Saturn

DRAWN BY. 25-01-2006 / NAW
DESIGN APP.
PROD APP.
PROJ. ENGR.
DWG.NO.: 89263

DANFYSIK

CUSTM. <OrgName> | ORDER NO. <nr.?> | REV. | SHEET. 1 OF 1
FILE. | DATE. Thursday, August 17, 2006 | SIZE. A4

DK-4040 JYLLINGE DENMARK TELEPHONE: +45 46 79 00 00 TELEFAX: +45 46 79 00 01 E-MAIL: DANFYSIK@DANFYSIK.DK



All wires: 0.25mm2 Black

DWG 65-0-89264

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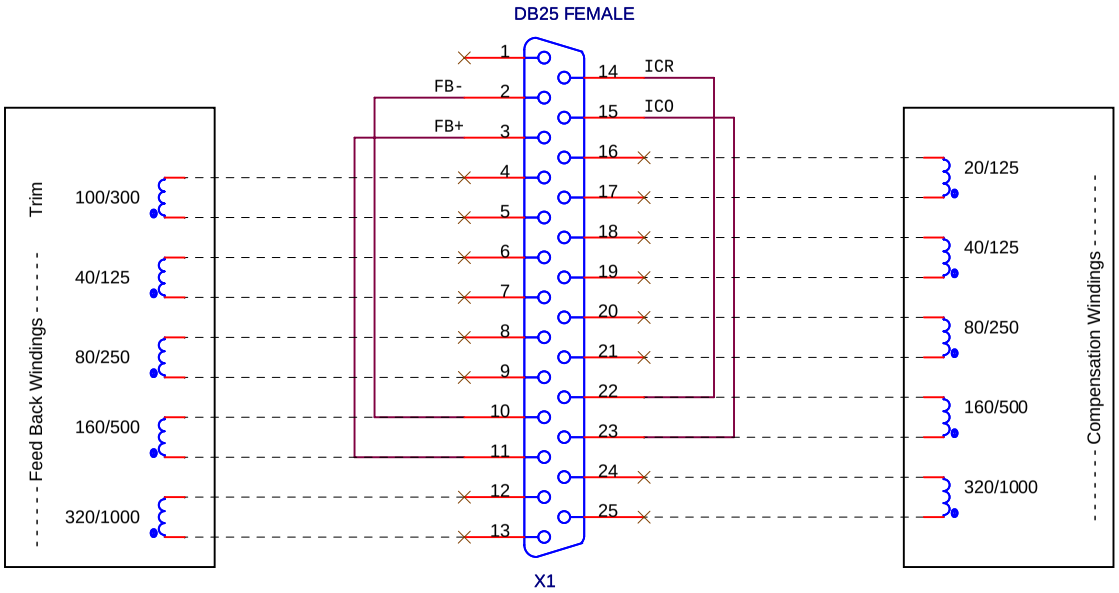
Programming plug
140 / 500 A
Transducer head 600 / 2000 A
Ultrastab Saturn

DRAWN BY. 25-01-2006 / NAW
DESIGN APP.
PROD APP.
PROJ. ENGR.
DWG.NO.: 89264

DANFYSIK

CUSTM. <OrgName> | ORDER NO. <nr.?> | REV. | SHEET. 1 OF 1
FILE. | DATE. Thursday, August 17, 2006 | SIZE. A4

DK-4040 JYLLINGE DENMARK TELEPHONE: +45 46 79 00 00 TELEFAX: +45 46 79 00 01 E-MAIL: DANFYSIK@DANFYSIK.DK



All wires: 0.25mm2 Black

DWG 65-0-89265

T:\PROJEKTER-IGANG\SATURN\DOKUMENTATION, MIDLERTIDIG\PROGRAMMING PLUGS\PLUGS_600_2000\89265.DSN

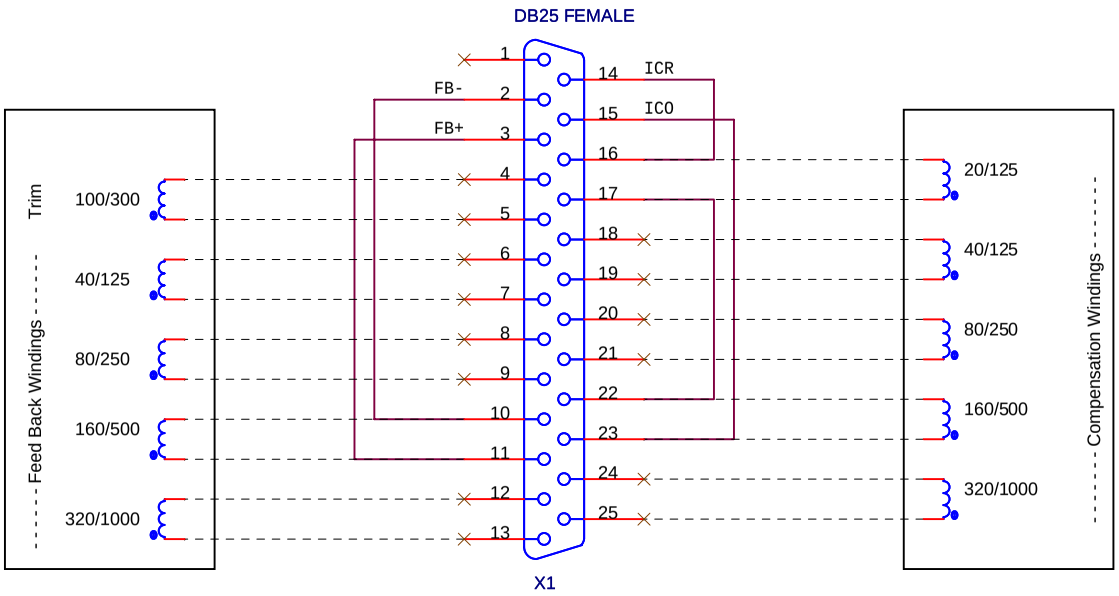
Programming plug
160 / 500 A
Transducerhead 600 / 2000 A
Ultrastab Saturn

DRAWN BY. 25-01-2006 / NAW
DESIGN APP.
PROD APP.
PROJ. ENGR.
DWG.NO.: 89265

DANFYSIK

CUSTM. <OrgName> | ORDER NO. <nr.?> | REV. | SHEET. 1 OF 1
FILE. | DATE. Thursday, August 17, 2006 | SIZE. A4

DK-4040 JYLLINGE DENMARK TELEPHONE: +45 46 79 00 00 TELEFAX: +45 46 79 00 01 E-MAIL: DANFYSIK@DANFYSIK.DK



All wires: 0.25mm2 Black

DWG 65-0-89266

T:\PROJEKTER-IGANG\SATURN\DOKUMENTATION, MIDLERTIDIG\PROGRAMMING PLUGS\PLUGS_600_2000\89266.DSN

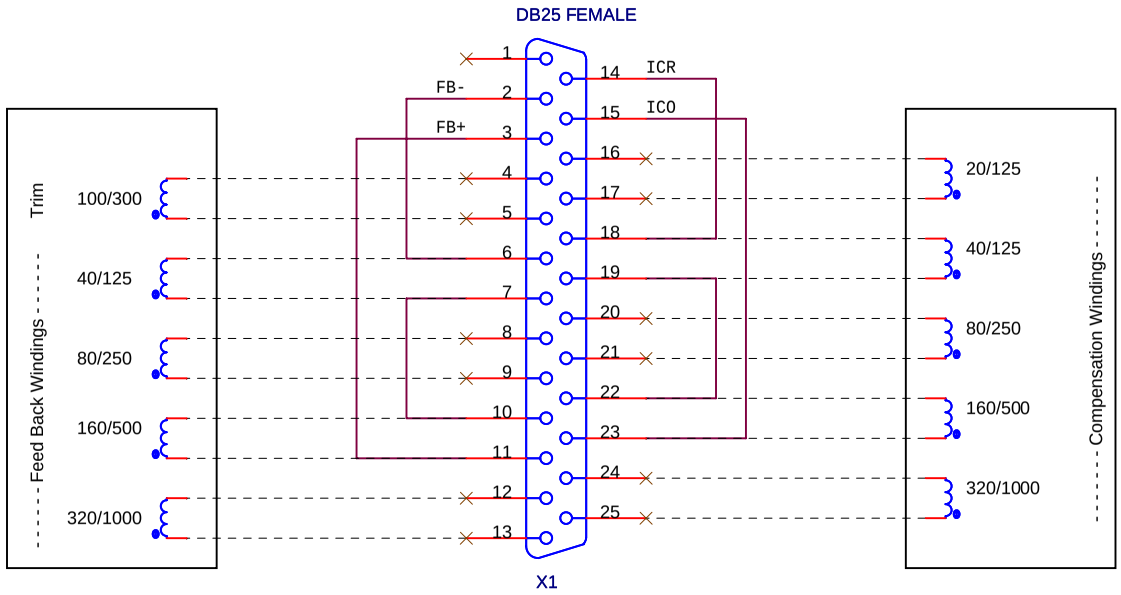
Programming plug
180 / 625 A
Transducerhead 600 / 2000 A
Ultrastab Saturn

DRAWN BY. 25-01-2006 / NAW
DESIGN APP.
PROD APP.
PROJ. ENGR.
DWG.NO.: 89266

DANFYSIK

CUSTM. <OrgName> | ORDER NO. <nr.?> | REV. | SHEET. 1 OF 1
FILE. | DATE. Thursday, August 17, 2006 | SIZE. A4

DK-4040 JYLLINGE DENMARK TELEPHONE: +45 46 79 00 00 TELEFAX: +45 46 79 00 01 E-MAIL: DANFYSIK@DANFYSIK.DK



All wires: 0.25mm2 Black

DWG 65-0-89267

T:\PROJEKTER-IGANG\SATURN\DOKUMENTATION, MIDLERTIDIG\PROGRAMMING PLUGS\PLUGS_600_2000\89267.DSN

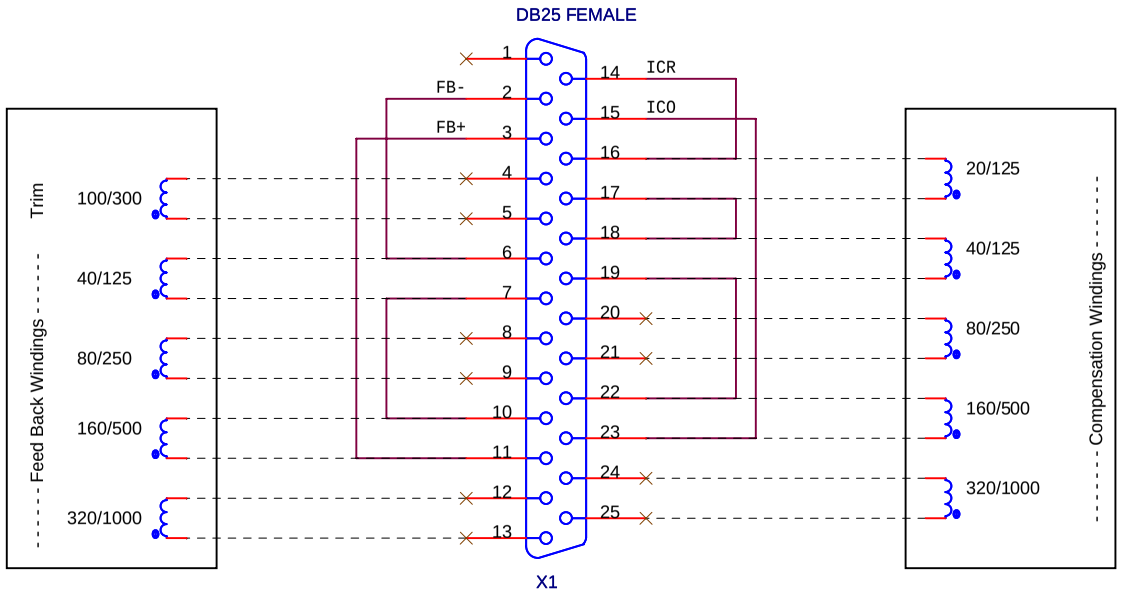
Programming plug
200 / 625 A
Transducer head 600 / 2000 A
Ultrastab Saturn

DRAWN BY. 25-01-2006 / NAW
DESIGN APP.
PROD APP.
PROJ. ENGR.
DWG.NO.: 89267

DANFYSIK

CUSTM. <OrgName> | ORDER NO. <nr.?> | REV. | SHEET. 1 OF 1
FILE. | DATE. Thursday, August 17, 2006 | SIZE. A4

DK-4040 JYLLINGE DENMARK TELEPHONE: +45 46 79 00 00 TELEFAX: +45 46 79 00 01 E-MAIL: DANFYSIK@DANFYSIK.DK



All wires: 0.25mm2 Black

DWG 65-0-89268

T:\PROJEKTER-IGANG\SATURN\DOKUMENTATION, MIDLERTIDIG\PROGRAMMING PLUGS\PLUGS_600_2000\89268.DSN

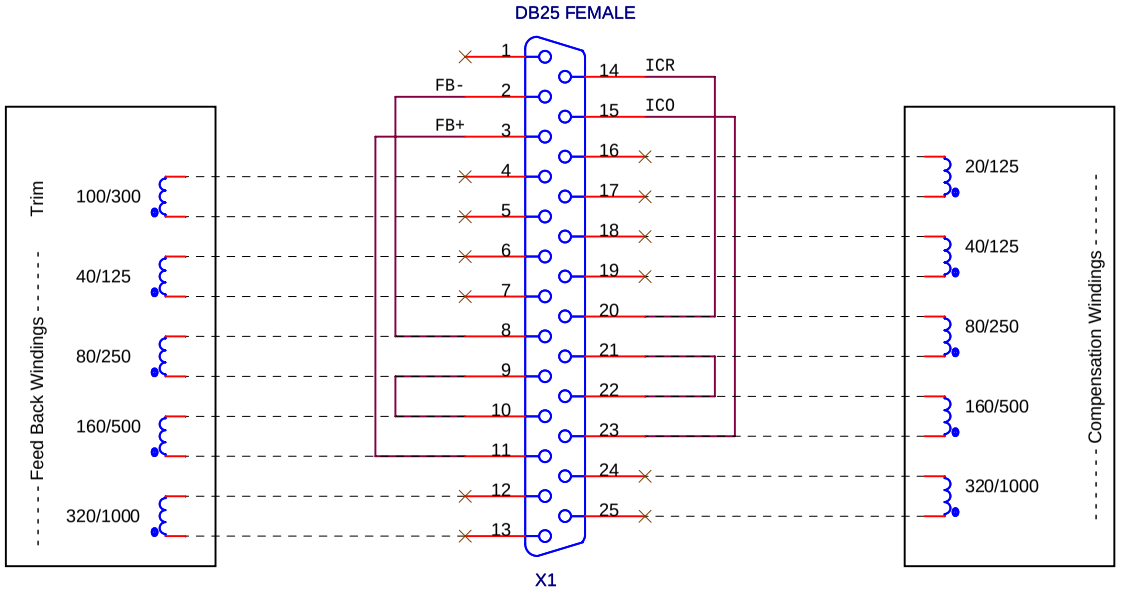
Programming plug
220 / 750 A
Transducer head 600 / 2000 A
Ultrastab Saturn

DRAWN BY. 25-01-2006 / NAW
DESIGN APP.
PROD APP.
PROJ. ENGR.
DWG.NO.:
89268

DANFYSIK

CUSTM. <OrgName> | ORDER NO. <nr.?> | REV. | SHEET. 1 OF 1
FILE. | DATE. Thursday, August 17, 2006 | SIZE. A4

DK-4040 JYLLINGE DENMARK TELEPHONE: +45 46 79 00 00 TELEFAX: +45 46 79 00 01 E-MAIL: DANFYSIK@DANFYSIK.DK



All wires: 0.25mm2 Black

DWG 65-0-89269

T:\PROJEKTER-IGANG\SATURN\DOKUMENTATION, MIDLERTIDIG\PROGRAMMING PLUGS\PLUGS_600_2000\89269.DSN

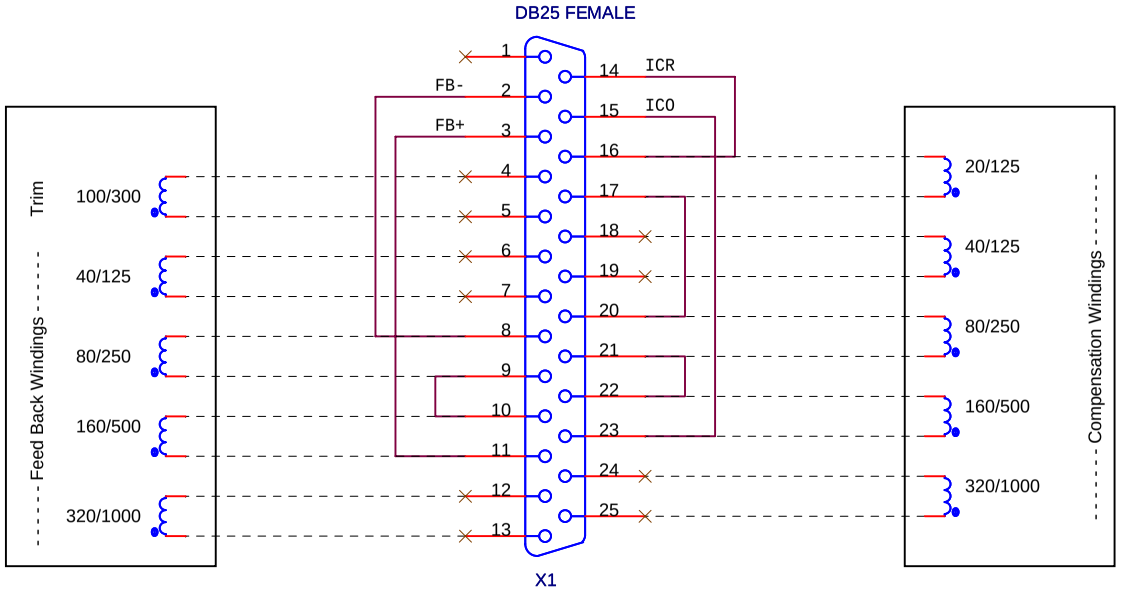
Programming plug
240 / 750 A
Transducer head 600 / 2000 A
Ultrastab Saturn

DRAWN BY. <dato sign>
DESIGN APP.
PROD APP.
PROJ. ENGR.
DWG.NO.: 89269

DANFYSIK

CUSTM. <OrgName> | ORDER NO. <nr.?> | REV. | SHEET. 1 OF 1
FILE. | DATE. Thursday, August 17, 2006 | SIZE. A4

DK-4040 JYLLINGE DENMARK TELEPHONE: +45 46 79 00 00 TELEFAX: +45 46 79 00 01 E-MAIL: DANFYSIK@DANFYSIK.DK



All wires: 0.25mm2 Black

DWG 65-0-89270

T:\PROJEKTER-IGANG\SATURN\DOKUMENTATION, MIDLERTIDIG\PROGRAMMING PLUGS\PLUGS_600_2000\89270.DSN

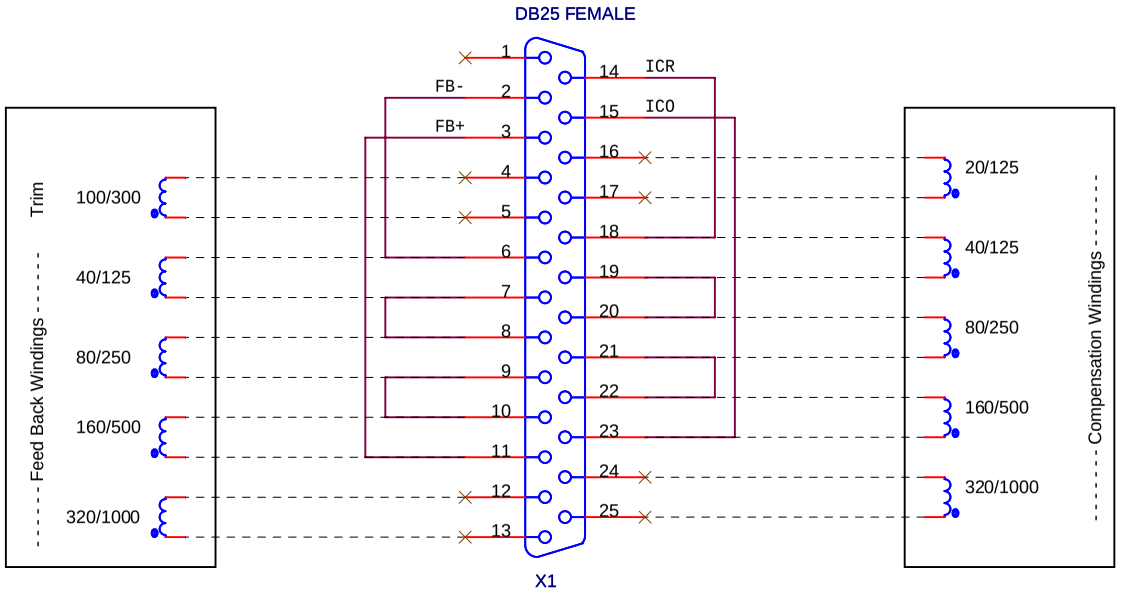
Programming plug
260 / 875 A
Transducer head 600 / 2000 A
Ultrastab Saturn

DRAWN BY. 25-01-2006 / NAW
DESIGN APP.
PROD APP.
PROJ. ENGR.
DWG.NO.: 89270

DANFYSIK

CUSTM. <OrgName> | ORDER NO. <nr.?> | REV. | SHEET. 1 OF 1
FILE. | DATE. Thursday, August 17, 2006 | SIZE. A4

DK-4040 JYLLINGE DENMARK TELEPHONE: +45 46 79 00 00 TELEFAX: +45 46 79 00 01 E-MAIL: DANFYSIK@DANFYSIK.DK



All wires: 0.25mm2 Black

DWG 65-0-89271

T:\PROJEKTER-IGANG\SATURN\DOKUMENTATION, MIDLERTIDIG\PROGRAMMING PLUGS\PLUGS_600_2000\89271.DSN

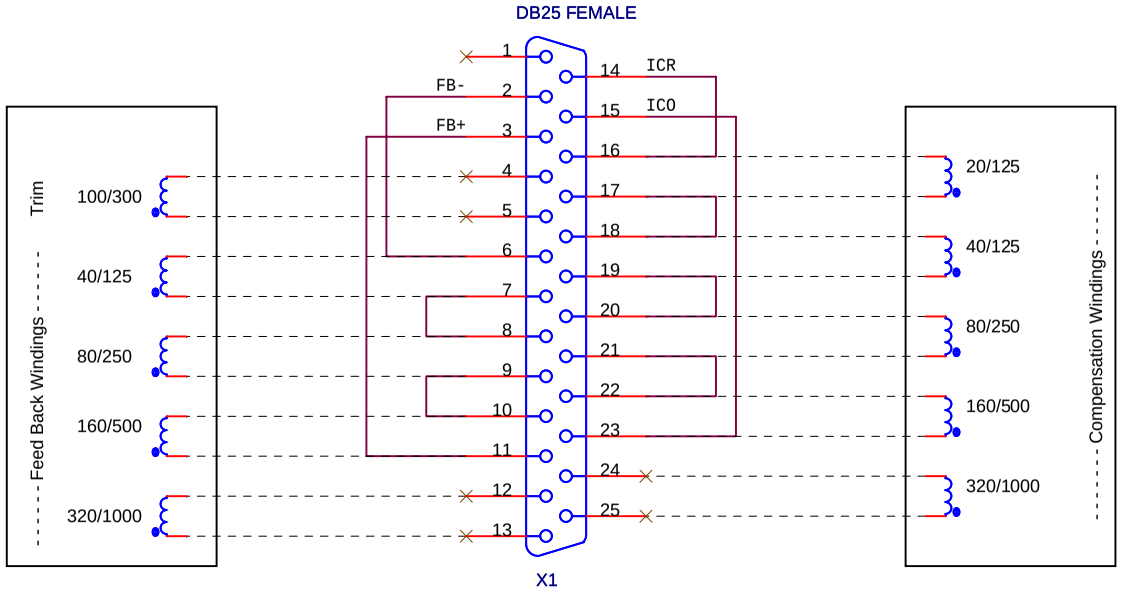
Programmig plug
280 / 875 A
Transducer head 600 / 200 A
Ultrastab Saturn

DRAWN BY. <dato sign>
DESIGN APP.
PROD APP.
PROJ. ENGR.
DWG.NO.: 89271

DANFYSIK

CUSTM. <OrgName> | ORDER NO. <nr.?> | REV. | SHEET. 1 OF 1
FILE. | DATE. Thursday, August 17, 2006 | SIZE. A4

DK-4040 JYLLINGE DENMARK TELEPHONE: +45 46 79 00 00 TELEFAX: +45 46 79 00 01 E-MAIL: DANFYSIK@DANFYSIK.DK



All wires: 0.25mm2 Black

65-0-89272

T:\PROJEKTER-IGANG\SATURN\DOKUMENTATION, MIDLERTIDIG\PROGRAMMING PLUGS\PLUGS_600_2000\89272.DSN

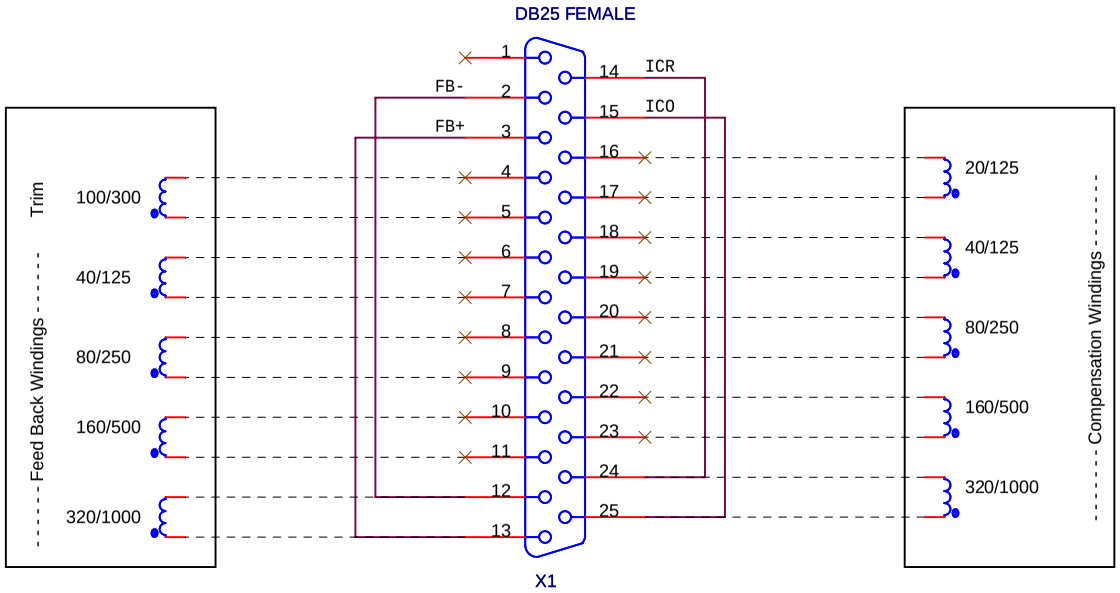
Programming plug
300 / 1000 A
Transducerhead 600 / 2000 A
Ultrastab Saturn

DRAWN BY. <dato sign>
DESIGN APP.
PROD APP.
PROJ. ENGR.
DWG.NO.: 89272

DANFYSIK

CUSTM. <OrgName> | ORDER NO. <nr.?> | REV. | SHEET. 1 OF 1
FILE. | DATE. Thursday, August 17, 2006 | SIZE. A4

DK-4040 JYLLINGE DENMARK TELEPHONE: +45 46 79 00 00 TELEFAX: +45 46 79 00 01 E-MAIL: DANFYSIK@DANFYSIK.DK



All wires: 0.25mm2 Black

65-0-89273

T:\PROJEKTER-IGANG\SATURN\DOKUMENTATION, MIDLERTIDIG\PROGRAMMING PLUGS\PLUGS_600_2000\89273.DSN

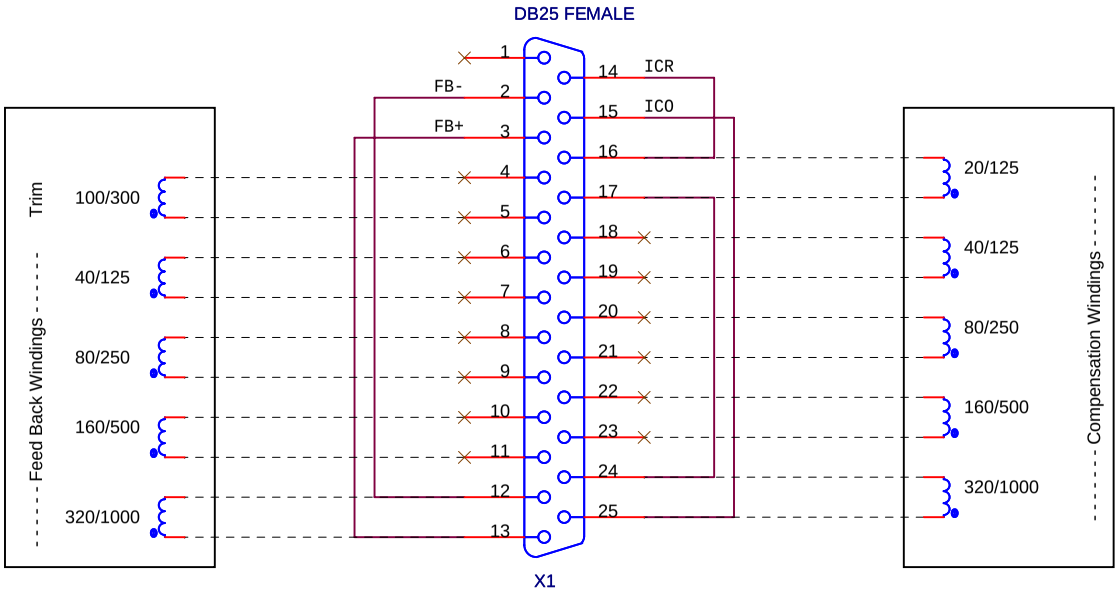
Programming plug
320 / 1000 A
Transducerhead 600 / 2000 A
Ultrastab Saturn

DRAWN BY. 25-01-2006 / NAW
DESIGN APP.
PROD APP.
PROJ. ENGR.
DWG.NO.: 89273

DANFYSIK

CUSTM. <OrgName> | ORDER NO. <nr.?> | REV. | SHEET. 1 OF 1
FILE. | DATE. Thursday, August 17, 2006 | SIZE. A4

DK-4040 JYLLINGE DENMARK TELEPHONE: +45 46 79 00 00 TELEFAX: +45 46 79 00 01 E-MAIL: DANFYSIK@DANFYSIK.DK



All wires: 0.25mm2 Black

65-0-89274

T:\PROJEKTER-IGANG\SATURN\DOKUMENTATION, MIDLERTIDIG\PROGRAMMING PLUGS\PLUGS_600_2000\89274.DSN

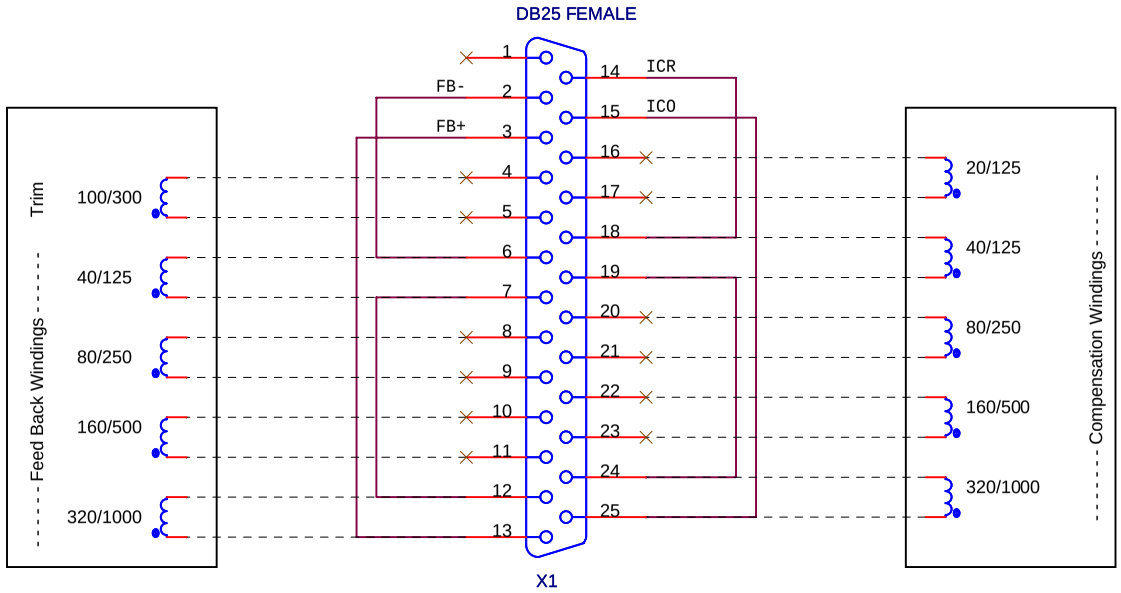
Programming plug
340 / 1125 A
Transducerhead 600 / 2000 A
Ultrastab Saturn

DRAWN BY. 26-01-2006 / NAW
DESIGN APP.
PROD APP.
PROJ. ENGR.
DWG.NO.: 89274

DANFYSIK

CUSTM. <OrgName> | ORDER NO. <nr.?> | REV. | SHEET. 1 OF 1
FILE. | DATE. Thursday, August 17, 2006 | SIZE. A4

DK-4040 JYLLINGE DENMARK TELEPHONE: +45 46 79 00 00 TELEFAX: +45 46 79 00 01 E-MAIL: DANFYSIK@DANFYSIK.DK



All wires: 0.25mm2 Black

65-0-89275

T:\PROJEKTER-IGANG\SATURN\DOKUMENTATION, MIDLERTIDIG\PROGRAMMING PLUGS\PLUGS_600_2000\89275.DSN

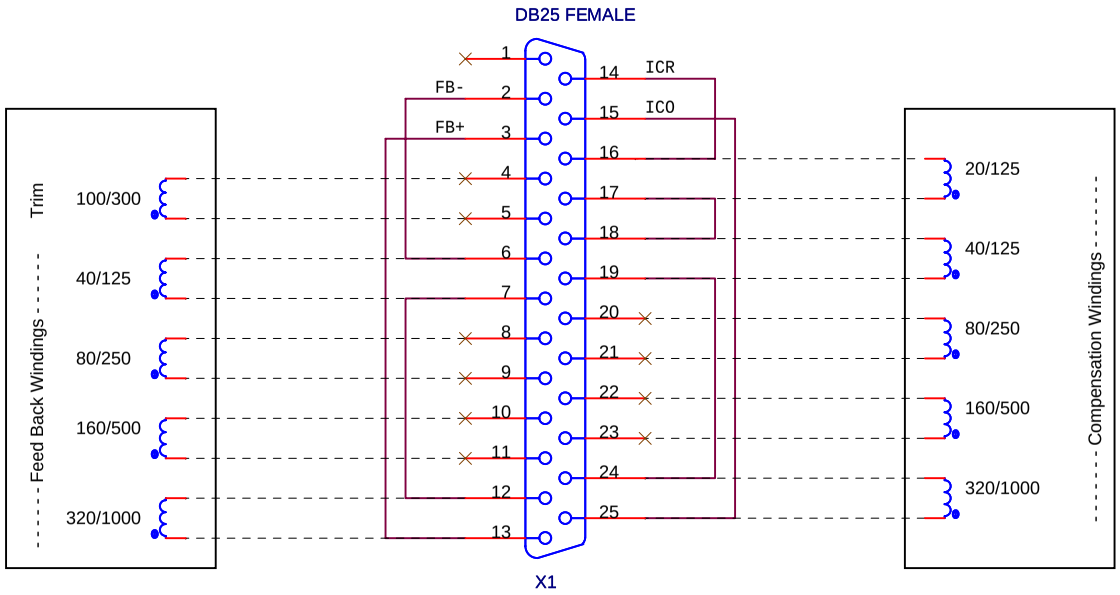
Programing plug
360 / 1125 A
Transducerhead 600 / 2000 A
Ultrastab Saturn

DRAWN BY. 25-01-2005 / NAW
DESIGN APP.
PROD APP.
PROJ. ENGR.
DWG.NO.: 89275

DANFYSIK

CUSTM. <OrgName> | ORDER NO. <nr.?> | REV. | SHEET. 1 OF 1
FILE. | DATE. Thursday, August 17, 2006 | SIZE. A4

DK-4040 JYLLINGE DENMARK TELEPHONE: +45 46 79 00 00 TELEFAX: +45 46 79 00 01 E-MAIL: DANFYSIK@DANFYSIK.DK



All wires: 0.25mm2 Black

65-0-89276

T:\PROJEKTER-IGANG\SATURN\DOKUMENTATION, MIDLERTIDIG\PROGRAMMING PLUGS\PLUGS_600_2000\89276.DSN

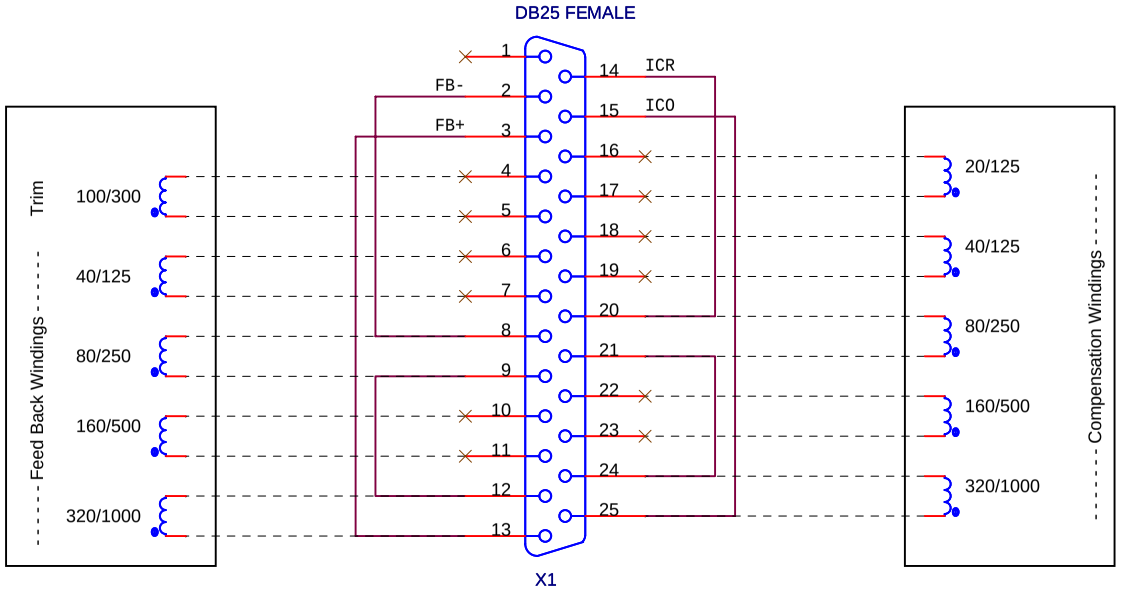
Programming plug
380 / 1250 A
Transducerhead 600 / 2000 A
Ultrastab Saturn

DRAWN BY. 25-01-2006 / NAW
DESIGN APP.
PROD APP.
PROJ. ENGR.
DWG.NO.: 89276

DANFYSIK

CUSTM. <OrgName> | ORDER NO. <nr.?> | REV. | SHEET. 1 OF 1
FILE. | DATE. Thursday, August 17, 2006 | SIZE. A4

DK-4040 JYLLINGE DENMARK TELEPHONE: +45 46 79 00 00 TELEFAX: +45 46 79 00 01 E-MAIL: DANFYSIK@DANFYSIK.DK



All wires: 0.25mm2 Black

65-0-89277

T:\PROJEKTER-IGANG\SATURN\DOKUMENTATION, MIDLERTIDIG\PROGRAMMING PLUGS\PLUGS_600_2000\89277.DSN

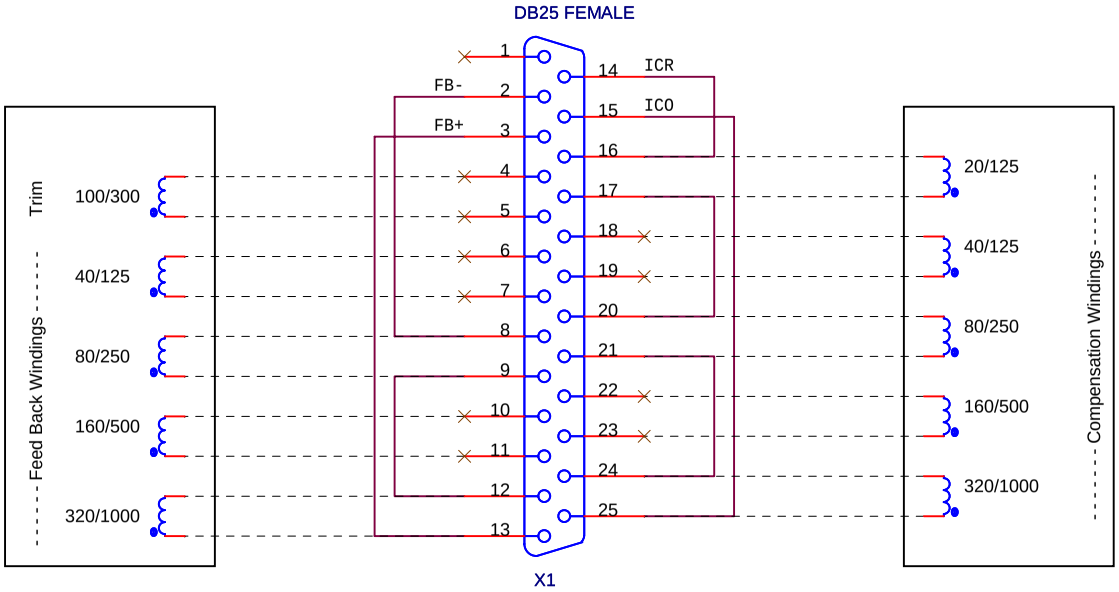
Programming plug
400 / 1250 A
Transducerhead 600 / 2000 A
Ultrastab Saturn

DRAWN BY. 25-01-2006 / NAW
DESIGN APP.
PROD APP.
PROJ. ENGR.
DWG.NO.: 89277

DANFYSIK

CUSTM. <OrgName> | ORDER NO. <nr.?> | REV. | SHEET. 1 OF 1
FILE. | DATE. Thursday, August 17, 2006 | SIZE. A4

DK-4040 JYLLINGE DENMARK TELEPHONE: +45 46 79 00 00 TELEFAX: +45 46 79 00 01 E-MAIL: DANFYSIK@DANFYSIK.DK



All wires: 0.25mm2 Black

65-0-89278

T:\PROJEKTER-IGANG\SATURN\DOKUMENTATION, MIDLERTIDIG\PROGRAMMING PLUGS\PLUGS_600_2000\89278.DSN

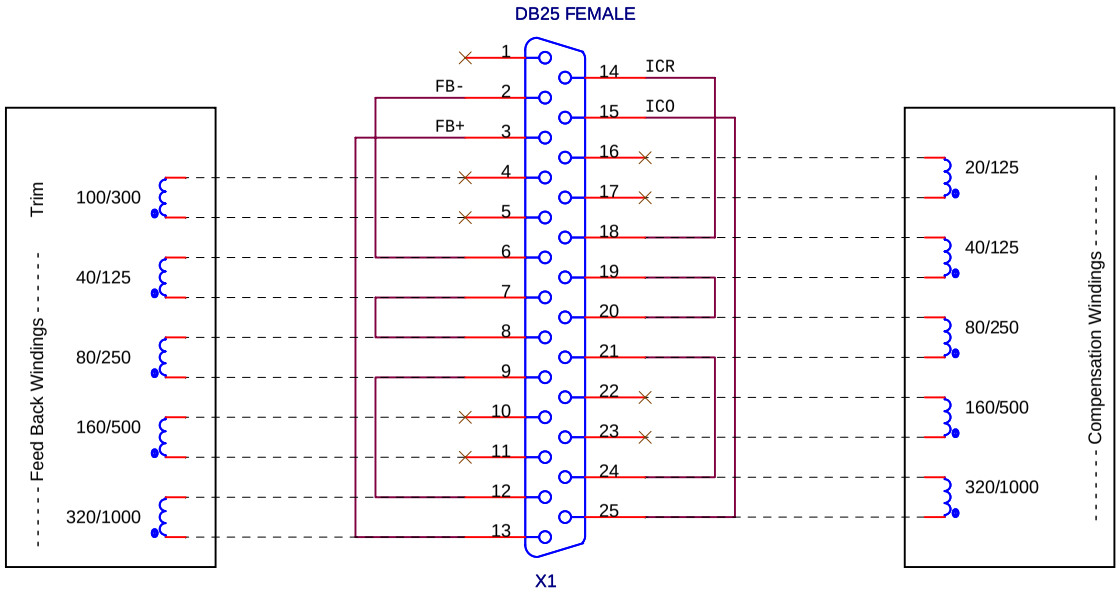
Programming plug
420 / 1375 A
Transducerhead 600 / 2000 A
Ultrastab Saturn

DRAWN BY. 25-01-2006 / NAW
DESIGN APP.
PROD APP.
PROJ. ENGR.
DWG.NO.: 89278

DANFYSIK

CUSTM. <OrgName> | ORDER NO. <nr.?> | REV. | SHEET. 1 OF 1
FILE. | DATE. Thursday, August 17, 2006 | SIZE. A4

DK-4040 JYLLINGE DENMARK TELEPHONE: +45 46 79 00 00 TELEFAX: +45 46 79 00 01 E-MAIL: DANFYSIK@DANFYSIK.DK



All wires: 0.25mm2 Black

65-0-89279

T:\PROJEKTER-IGANG\SATURN\DOKUMENTATION, MIDLERTIDIG\PROGRAMMING PLUGS\PLUGS_600_2000\89279.DSN

Programming plug
440 / 1375 A
Transducerhead 600 / 2000 A
Ultrastab Saturn

DRAWN BY. 25-01-2006 / NAW
DESIGN APP.
PROD APP.
PROJ. ENGR.
DWG.NO.: 89279

DANFYSIK

CUSTM. <OrgName> | ORDER NO. <nr.?> | REV. | SHEET. 1 OF 1
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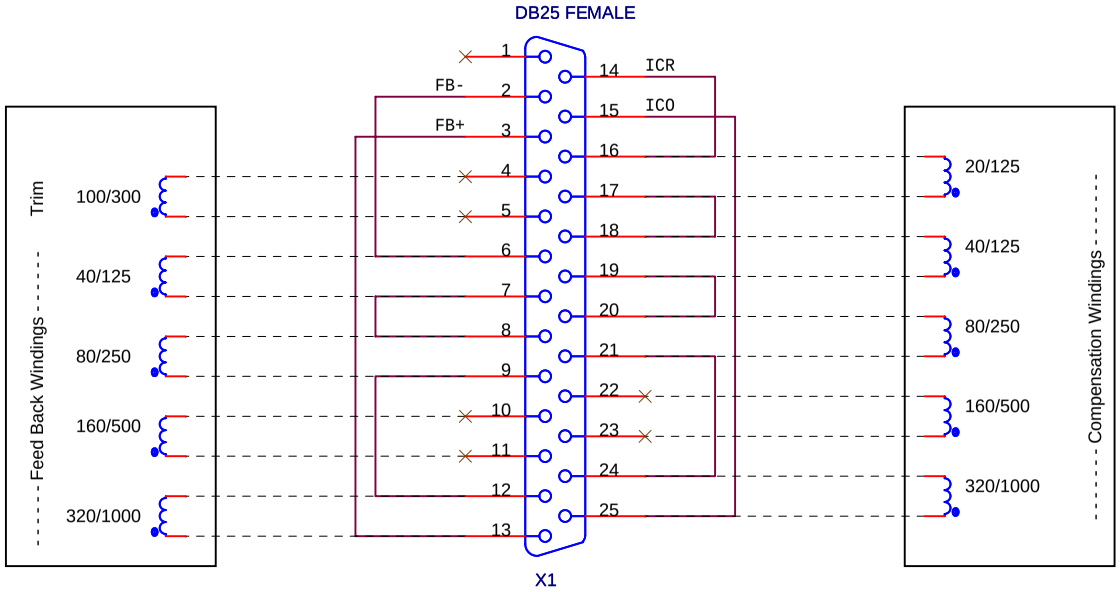
DK-4040 JYLLINGE DENMARK TELEPHONE: +45 46 79 00 00 TELEFAX: +45 46 79 00 01 E-MAIL: DANFYSIK@DANFYSIK.DK



All wires: 0.25mm2 Black

65-0-89280

T:\PROJEKTER-IGANG\SATURN\DOKUMENTATION, MIDLERTIDIG\PROGRAMMING PLUGS\PLUGS_600_2000\89280.DSN

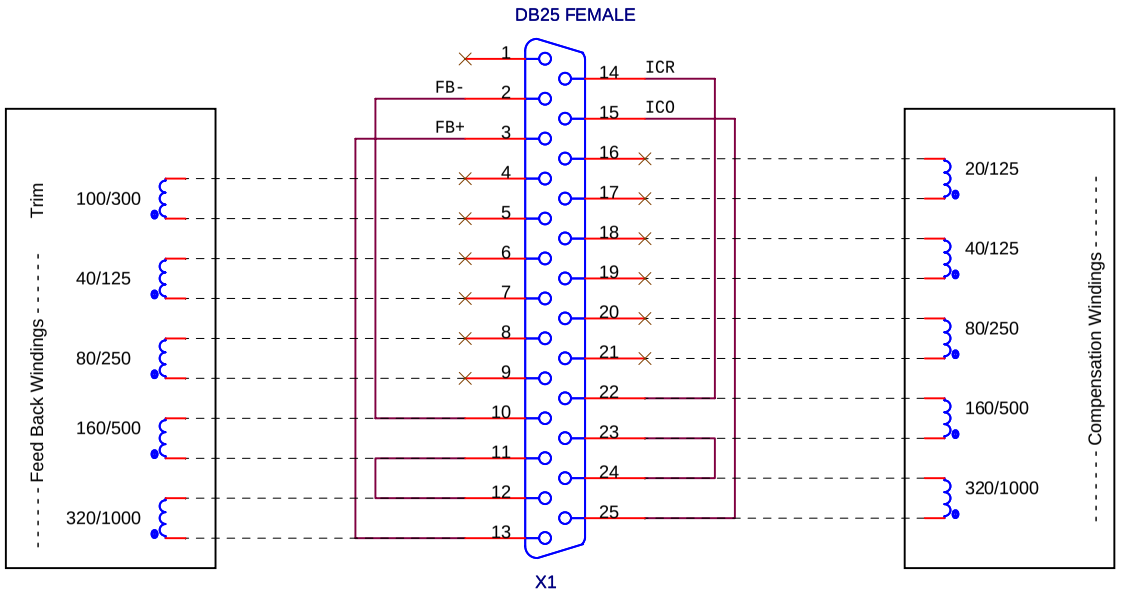
Programming plug
460 / 1500 A
Transducerhead 600 / 2000 A
Ultrastab Saturn

DRAWN BY. 25-01-2006 / NAW
DESIGN APP.
PROD APP.
PROJ. ENGR.
DWG.NO.: 89280

DANFYSIK

CUSTM. <OrgName> | ORDER NO. <nr.?> | REV. | SHEET. 1 OF 1
FILE. | DATE. Thursday, August 17, 2006 | SIZE. A4

DK-4040 JYLLINGE DENMARK TELEPHONE: +45 46 79 00 00 TELEFAX: +45 46 79 00 01 E-MAIL: DANFYSIK@DANFYSIK.DK



All wires: 0.25mm2 Black

65-0-89281

T:\PROJEKTER-IGANG\SATURN\DOKUMENTATION, MIDLERTIDIG\PROGRAMMING PLUGS\PLUGS_600_2000\89281.DSN

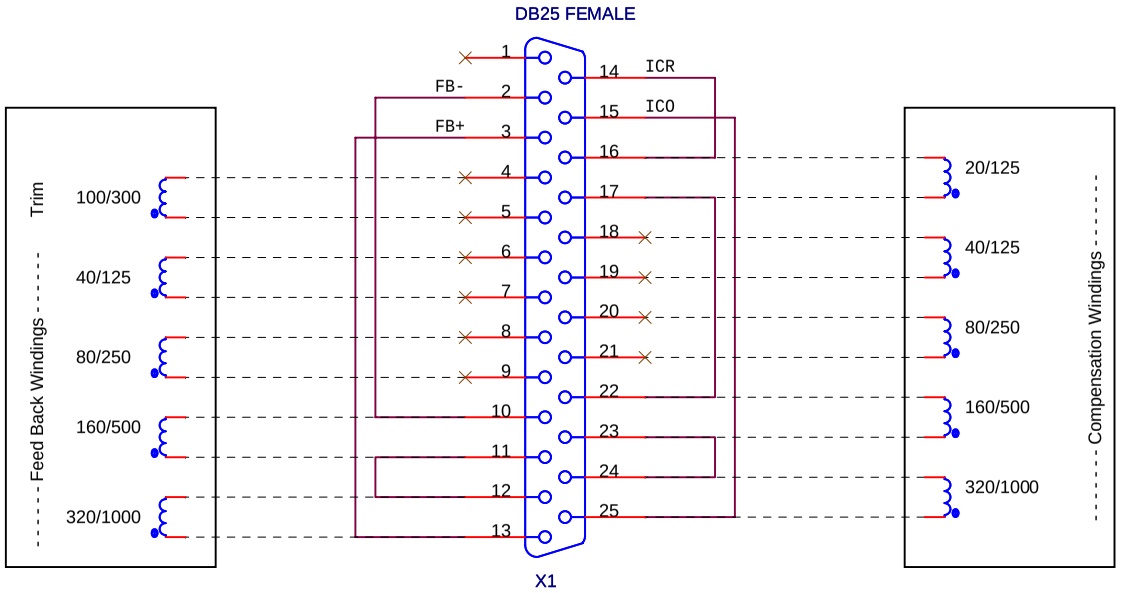
Programming plug
480 / 1500 A
Transducerhead 600 / 2000 A
Ultrastab Saturn

DRAWN BY. 25-01-2006 / NAW
DESIGN APP.
PROD APP.
PROJ. ENGR.
DWG.NO.: 89281

DANFYSIK

CUSTM. <OrgName> | ORDER NO. <nr.?> | REV. | SHEET. 1 OF 1
FILE. | DATE. Thursday, August 17, 2006 | SIZE. A4

DK-4040 JYLLINGE DENMARK TELEPHONE: +45 46 79 00 00 TELEFAX: +45 46 79 00 01 E-MAIL: DANFYSIK@DANFYSIK.DK



All wires: 0.25mm2 Black

65-0-89282

T:\PROJEKTER-IGANG\SATURN\DOKUMENTATION, MIDLERTIDIG\PROGRAMMING PLUGS\PLUGS_600_2000\89282.DSN

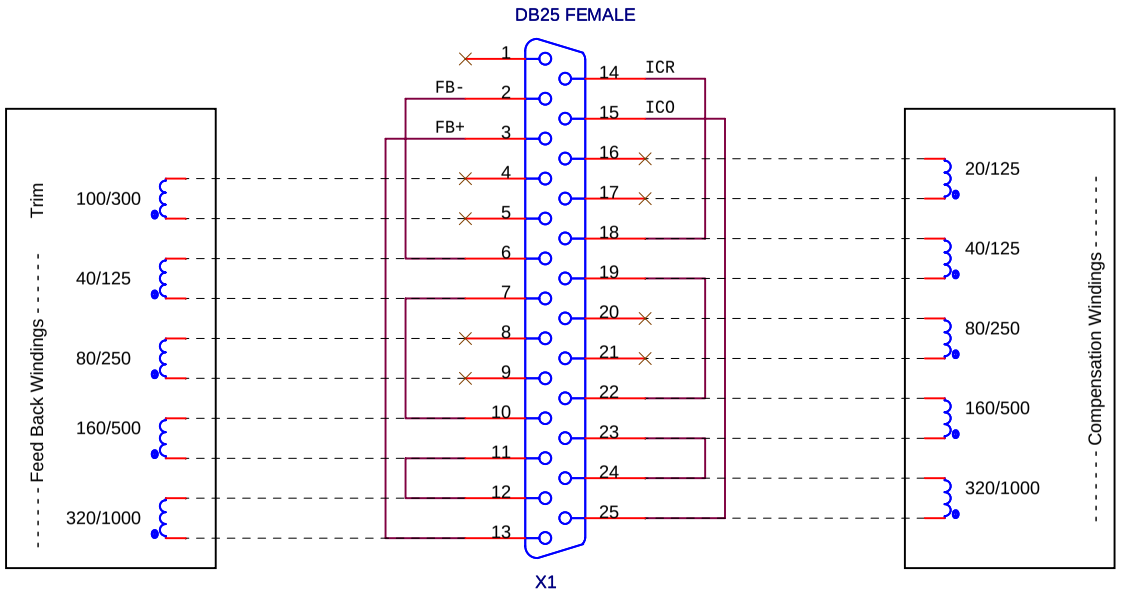
Programming plug
500 / 1625 A
Transducerhead 600 / 2000 A
Ultrastab Saturn

DRAWN BY. 25-01-2006 / NAW
DESIGN APP.
PROD APP.
PROJ. ENGR.
DWG.NO.: 89282

DANFYSIK

CUSTM. <OrgName>
ORDER NO. <nr.?>
REV. <RevCode>
SHEET. 1 OF 1
FILE.
DATE. Thursday, August 17, 2006
SIZE. A4

DK-4040 JYLLINGE DENMARK TELEPHONE: +45 46 79 00 00 TELEFAX: +45 46 79 00 01 E-MAIL: DANFYSIK@DANFYSIK.DK



All wires: 0.25mm2 Black

65-0-89283

T:\PROJEKTER-IGANG\SATURN\DOKUMENTATION, MIDLERTIDIG\PROGRAMMING PLUGS\PLUGS_600_2000\89283.DSN

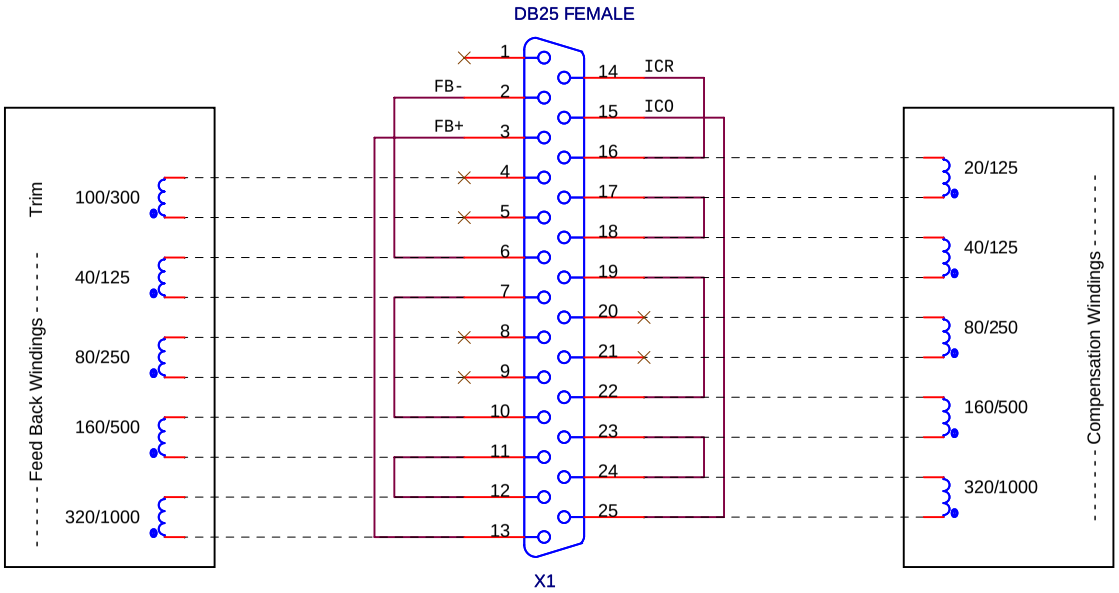
Programming plug
520 / 1625 A
Transducerhead 600 /2000 A
Ultrastab Saturn

DRAWN BY. 25-01-2006 / NAW
DESIGN APP.
PROD APP.
PROJ. ENGR.
DWG.NO.: 89283

DANFYSIK

CUSTM. <OrgName> | ORDER NO. <nr.?> | REV. | SHEET. 1 OF 1
FILE. | DATE. Thursday, August 17, 2006 | SIZE. A4

DK-4040 JYLLINGE DENMARK TELEPHONE: +45 46 79 00 00 TELEFAX: +45 46 79 00 01 E-MAIL: DANFYSIK@DANFYSIK.DK



All wires: 0.25mm2 Black

65-0-89284

T:\PROJEKTER-IGANG\SATURN\DOKUMENTATION, MIDLERTIDIG\PROGRAMMING PLUGS\PLUGS_600_2000\89284.DSN

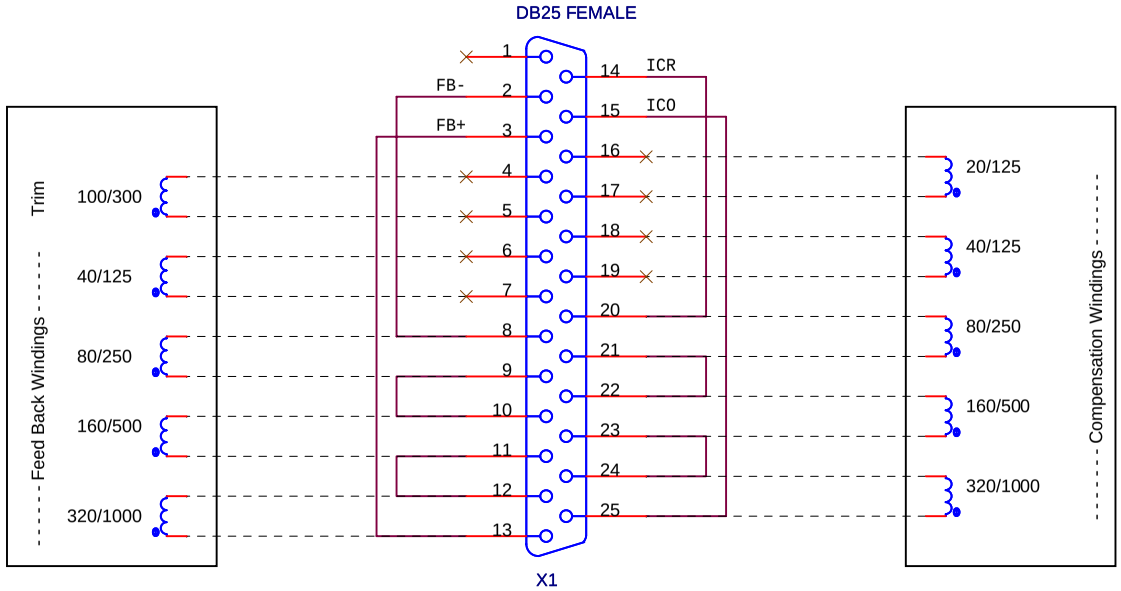
Programming plug
540 / 1750 A
Transducerhead 600 / 2000 A
Ultrastab Saturn

DRAWN BY. 22-01-2006
DESIGN APP.
PROD APP.
PROJ. ENGR.
DWG.NO.: 89284

DANFYSIK

CUSTM. <OrgName> | ORDER NO. <nr.?> | REV. | SHEET. 1 OF 1
FILE. | DATE. Thursday, August 17, 2006 | SIZE. A4

DK-4040 JYLLINGE DENMARK TELEPHONE: +45 46 79 00 00 TELEFAX: +45 46 79 00 01 E-MAIL: DANFYSIK@DANFYSIK.DK



All wires: 0.25mm2 Black

65-0-89285

T:\PROJEKTER-IGANG\SATURN\DOKUMENTATION, MIDLERTIDIG\PROGRAMMING PLUGS\PLUGS_600_2000\89285.DSN

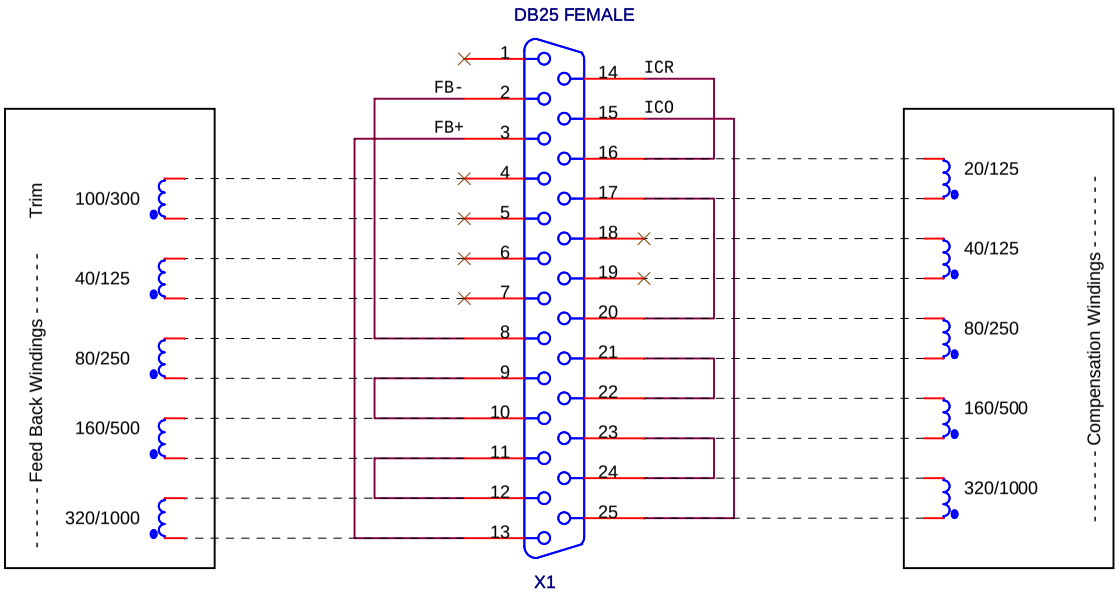
Programming plug
560 / 1750 A
Transducerhead 600 / 2000 A
Ultrastab Saturn

DRAWN BY. 25-01-2006 / NAW
DESIGN APP.
PROD APP.
PROJ. ENGR.
DWG.NO.: 89285

DANFYSIK

CUSTM. <OrgName> | ORDER NO. <nr.?> | REV. | SHEET. 1 OF 1
FILE. | DATE. Thursday, August 17, 2006 | SIZE. A4

DK-4040 JYLLINGE DENMARK TELEPHONE: +45 46 79 00 00 TELEFAX: +45 46 79 00 01 E-MAIL: DANFYSIK@DANFYSIK.DK



All wires: 0.25mm2 Black

65-0-89286

T:\PROJEKTER-IGANG\SATURN\DOKUMENTATION, MIDLERTIDIG\PROGRAMMING PLUGS\PLUGS_600_2000\89286.DSN

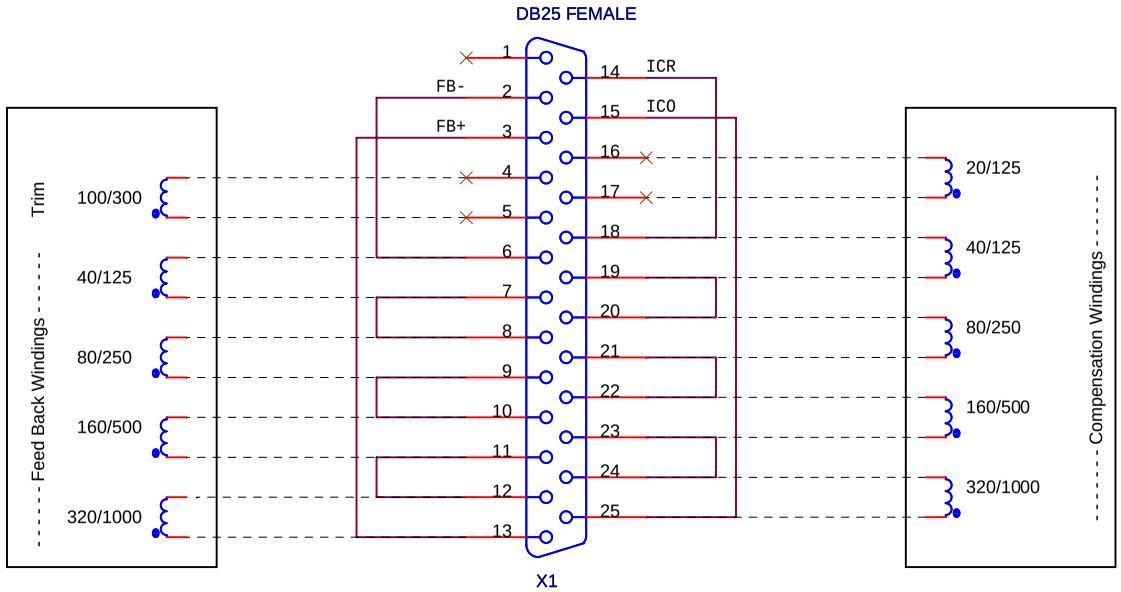
Programming plug
580 / 1875 A
Transducerhead 600 / 2000 A
Ultrastab Saturn

DRAWN BY. <dato sign>
DESIGN APP.
PROD APP.
PROJ. ENGR.
DWG.NO.: 89286

DANFYSIK

CUSTM. <OrgName> | ORDER NO. <nr.?> | REV. | SHEET. 1 OF 1
FILE. | DATE. Thursday, August 17, 2006 | SIZE. A4

DK-4040 JYLLINGE DENMARK TELEPHONE: +45 46 79 00 00 TELEFAX: +45 46 79 00 01 E-MAIL: DANFYSIK@DANFYSIK.DK



All wires: 0.25mm2 Black

65-0-89287

T:\PROJEKTER-IGANG\SATURN\DOKUMENTATION, MIDLERTIDIG\PROGRAMMING PLUGS\PLUGS_600_2000\89287.DSN

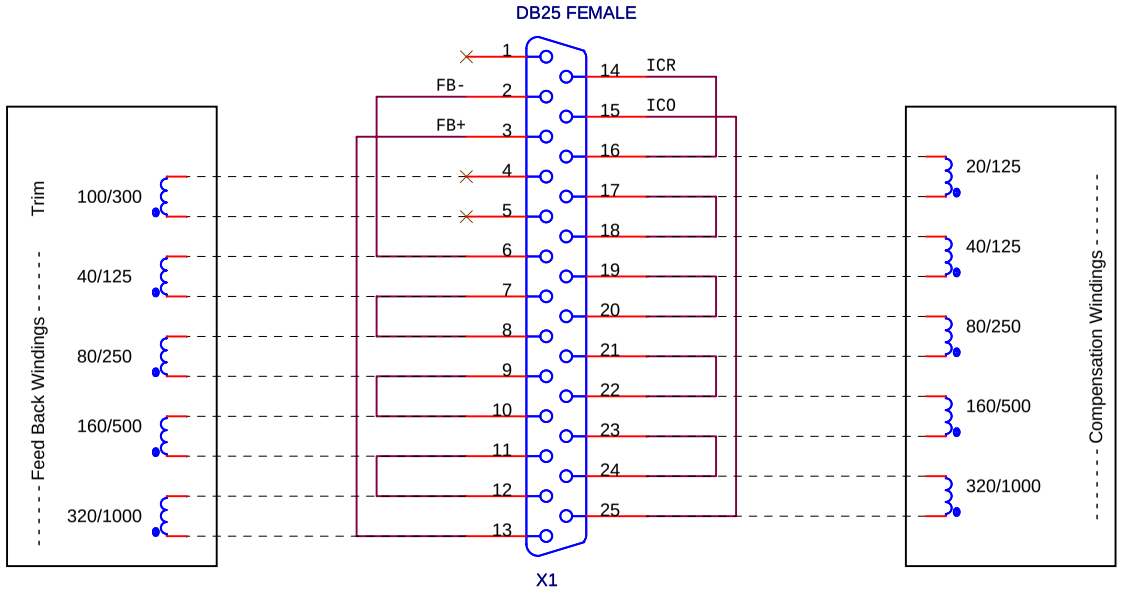
Programming plug
600 / 1875 A
Transducerhead 600 / 2000 A
Ultrastab Saturn

DRAWN BY. 25-01-2006 / NAW
DESIGN APP.
PROD APP.
PROJ. ENGR.
DWG.NO.: 89287

DANFYSIK

CUSTM. <OrgName> | ORDER NO. <nr.?> | REV. | SHEET. 1 OF 1
FILE. | DATE. Thursday, August 17, 2006 | SIZE. A4

DK-4040 JYLLINGE DENMARK TELEPHONE: +45 46 79 00 00 TELEFAX: +45 46 79 00 01 E-MAIL: DANFYSIK@DANFYSIK.DK



All wires: 0.25mm2 Black

65-0-89288

T:\PROJEKTER-IGANG\SATURN\DOKUMENTATION, MIDLERTIDIG\PROGRAMMING PLUGS\PLUGS_600_2000\89288.DSN

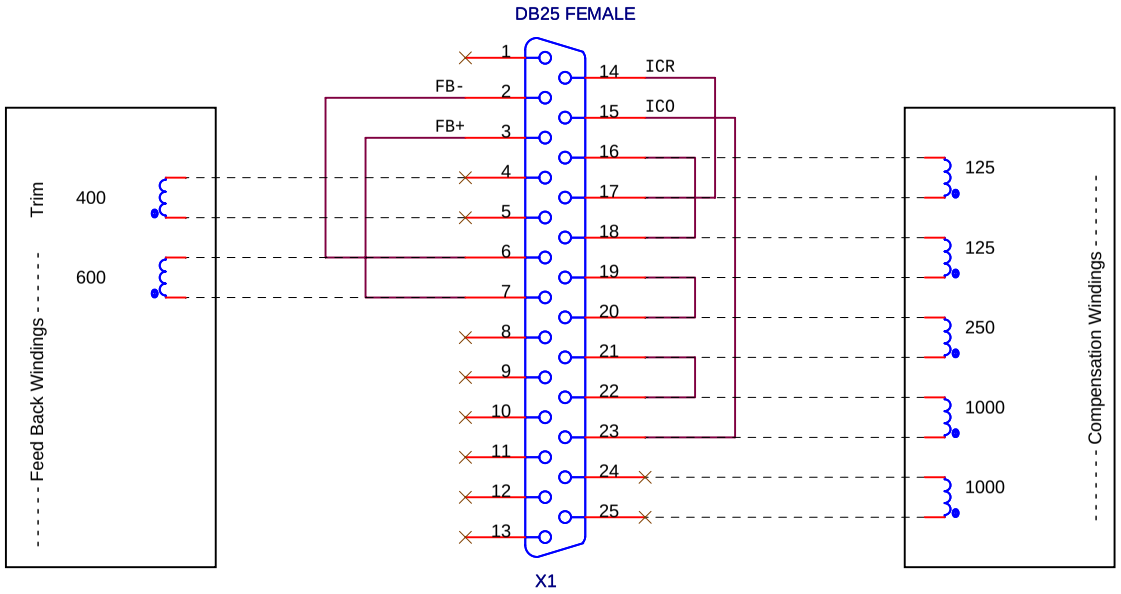
Programming plug
620 / 2000 A
Transducerhead 600 / 2000 a
Ultrastab Saturn

DRAWN BY. 25-01-2006 / NAW
DESIGN APP.
PROD APP.
PROJ. ENGR.
DWG.NO.: 89288

DANFYSIK

CUSTM. <OrgName> | ORDER NO. <nr.?> | REV. | SHEET. 1 OF 1
FILE. | DATE. Thursday, August 17, 2006 | SIZE. A4

DK-4040 JYLLINGE DENMARK TELEPHONE: +45 46 79 00 00 TELEFAX: +45 46 79 00 01 E-MAIL: DANFYSIK@DANFYSIK.DK



All wires: 0.25mm2 Black

65-0-89289

T:\PROJEKTER-IGANG\SATURN\DOKUMENTATION, MIDLERTIDIG\PROGRAMMING PLUGS\PLUGS_5000\89289.DSN

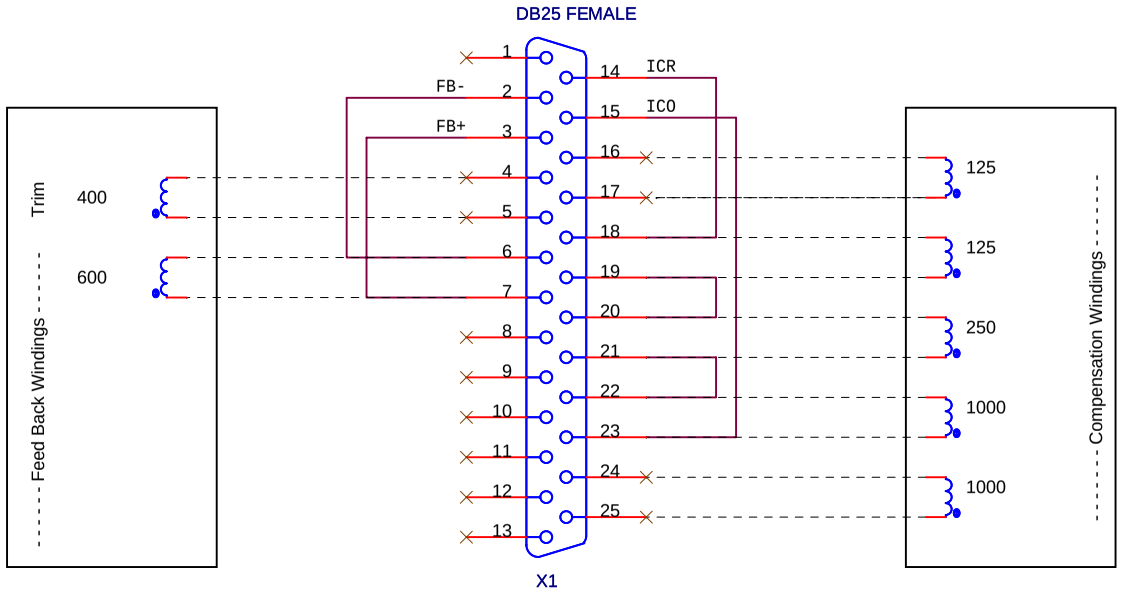
Programming plug
2500 A
Transducerhead 5000 A
Ultrastab Saturn

DRAWN BY. 26-01-2006 / NAW
DESIGN APP.
PROD APP.
PROJ. ENGR.
DWG.NO.: 89289

DANFYSIK

CUSTM. <OrgName>
ORDER NO. <nr.?>
REV. <RevCode>
SHEET. 1 OF 1
FILE.
DATE. Thursday, August 17, 2006
SIZE. A4

DK-4040 JYLLINGE DENMARK TELEPHONE: +45 46 79 00 00 TELEFAX: +45 46 79 00 01 E-MAIL: DANFYSIK@DANFYSIK.DK



All wires: 0.25mm2 Black

65-0-89290

T:\PROJEKTER-IGANG\SATURN\DOKUMENTATION, MIDLERTIDIG\PROGRAMMING PLUGS\PLUGS_5000\89290.DSN

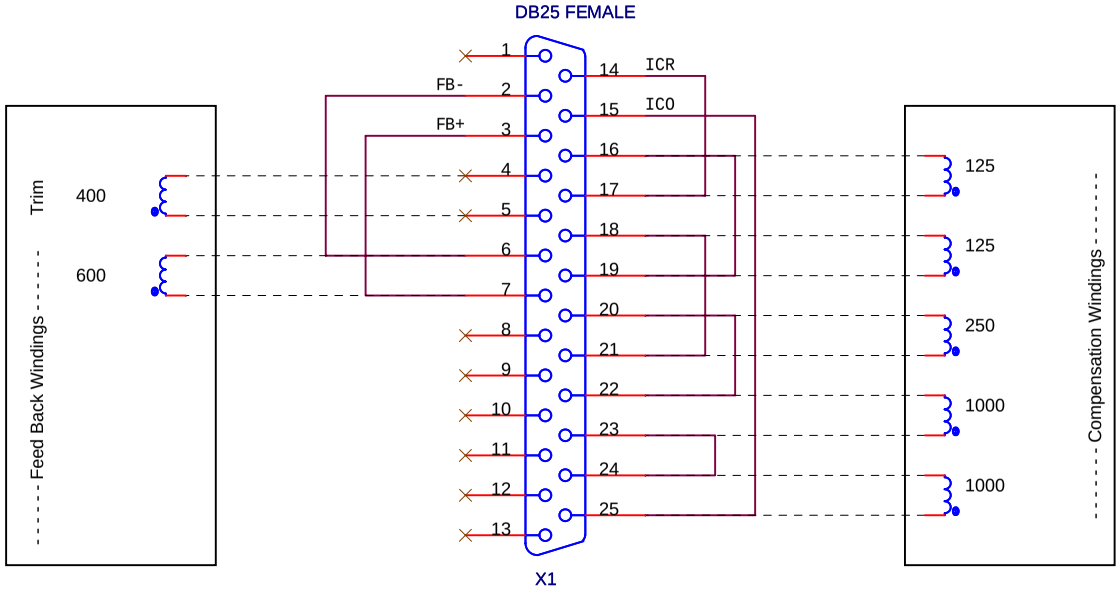
Programming plug
2750A
Transducerhead 5000A
Ultrastab Saturn

DRAWN BY. 26-01-2006
DESIGN APP.
PROD APP.
PROJ. ENGR.
DWG.NO.: 89290

DANFYSIK

CUSTM. <OrgName> | ORDER NO. <nr.?> | REV. | SHEET. 1 OF 1
FILE. | DATE. Thursday, August 17, 2006 | SIZE. A4

DK-4040 JYLLINGE DENMARK TELEPHONE: +45 46 79 00 00 TELEFAX: +45 46 79 00 01 E-MAIL: DANFYSIK@DANFYSIK.DK



All wires: 0.25mm2 Black

65-0-89291

T:\PROJEKTER-IGANG\SATURN\DOKUMENTATION, MIDLERTIDIG\PROGRAMMING PLUGS\PLUGS_5000\89291.DSN

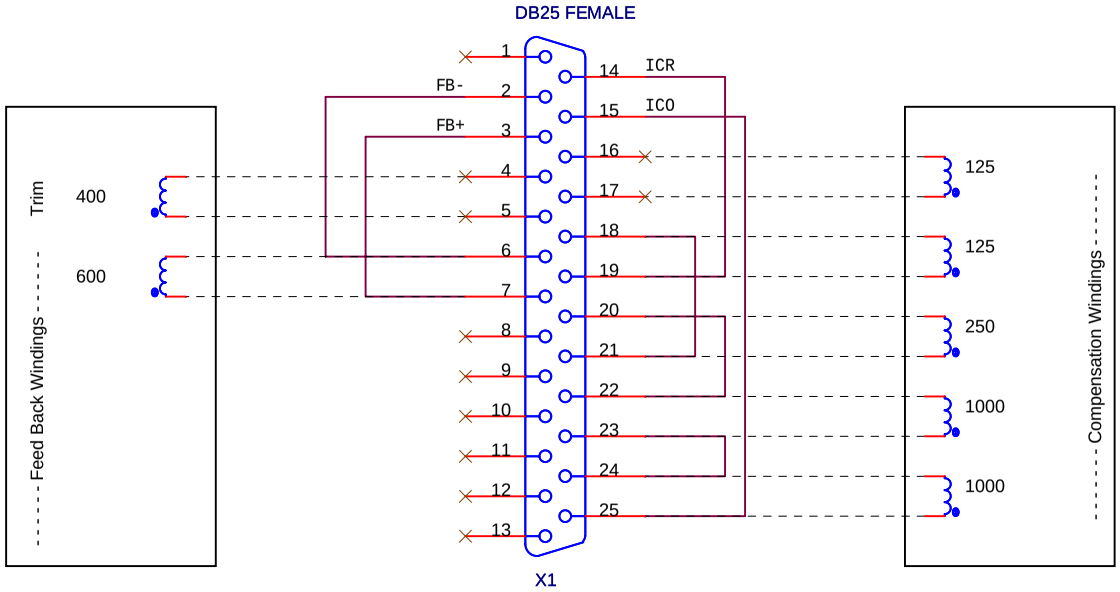
Programming plug
3000 A
Transducerhead 5000 A
Ultrastab Saturn

DRAWN BY. 26-01-2006 / NAW
DESIGN APP.
PROD APP.
PROJ. ENGR.
DWG.NO.: 89291

DANFYSIK

CUSTM. <OrgName> | ORDER NO. <nr.?> | REV. | SHEET. 1 OF 1
FILE. | DATE. Thursday, August 17, 2006 | SIZE. A4

DK-4040 JYLLINGE DENMARK TELEPHONE: +45 46 79 00 00 TELEFAX: +45 46 79 00 01 E-MAIL: DANFYSIK@DANFYSIK.DK



All wires: 0.25mm2 Black

65-0-89292

T:\PROJEKTER-IGANG\SATURN\DOKUMENTATION, MIDLERTIDIG\PROGRAMMING PLUGS\PLUGS_5000\89292.DSN

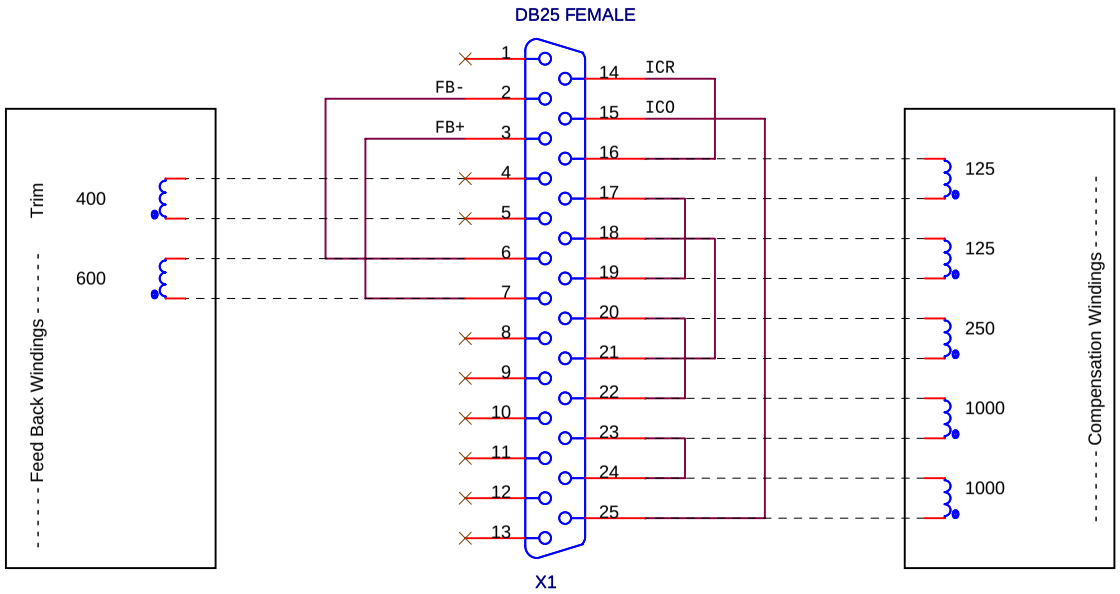
Programming plug
3250A
Transducerhead 5000A
Ultrastab Saturn

DRAWN BY. 26-01-2006 / NAW
DESIGN APP.
PROD APP.
PROJ. ENGR.
DWG.NO.: 89292

DANFYSIK

CUSTM. <OrgName> | ORDER NO. <nr.?> | REV. | SHEET. 1 OF 1
FILE. | DATE. Thursday, August 17, 2006 | SIZE. A4

DK-4040 JYLLINGE DENMARK TELEPHONE: +45 46 79 00 00 TELEFAX: +45 46 79 00 01 E-MAIL: DANFYSIK@DANFYSIK.DK



All wires: 0.25mm2 Black

65-0-89293

T:\PROJEKTER-IGANG\SATURN\DOKUMENTATION, MIDLERTIDIG\PROGRAMMING PLUGS\PLUGS_5000\89293.DSN

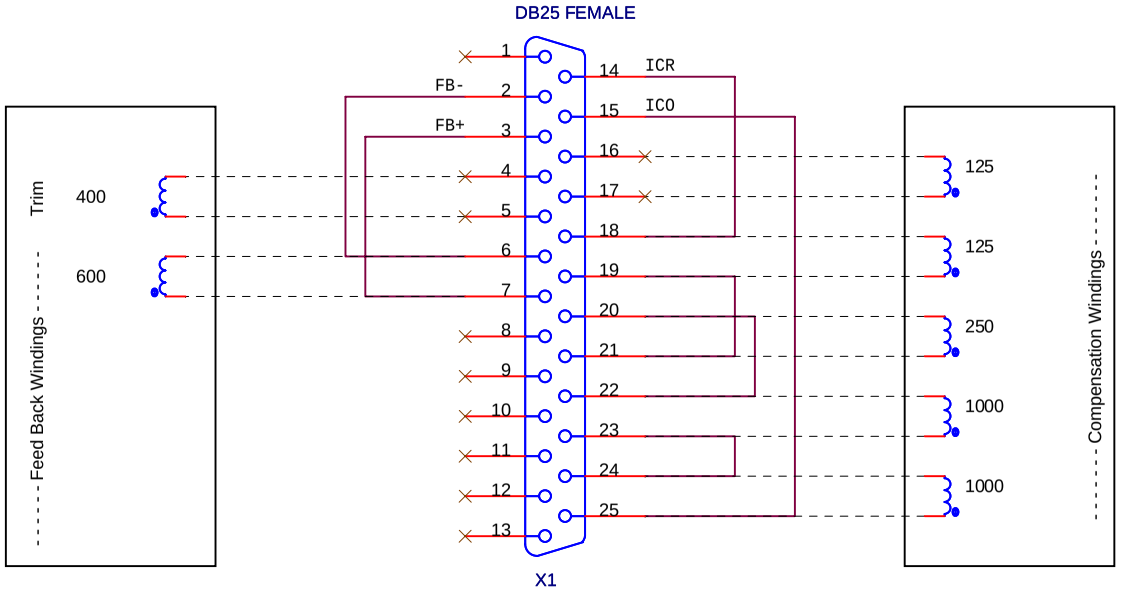
Programming plug
3500 A
Transducerhead 5000 A
Ultrastab Saturn

DRAWN BY. 26-01-2006 / NAW
DESIGN APP.
PROD APP.
PROJ. ENGR.
DWG.NO.:
89293

DANFYSIK

CUSTM. <OrgName> | ORDER NO. <nr.?> | REV. | SHEET. 1 OF 1
FILE. | DATE. Thursday, August 17, 2006 | SIZE. A4

DK-4040 JYLLINGE DENMARK TELEPHONE: +45 46 79 00 00 TELEFAX: +45 46 79 00 01 E-MAIL: DANFYSIK@DANFYSIK.DK



All wires: 0.25mm2 Black

65-0-89294

T:\PROJEKTER-IGANG\SATURN\DOKUMENTATION, MIDLERTIDIG\PROGRAMMING PLUGS\PLUGS_5000\89294.DSN

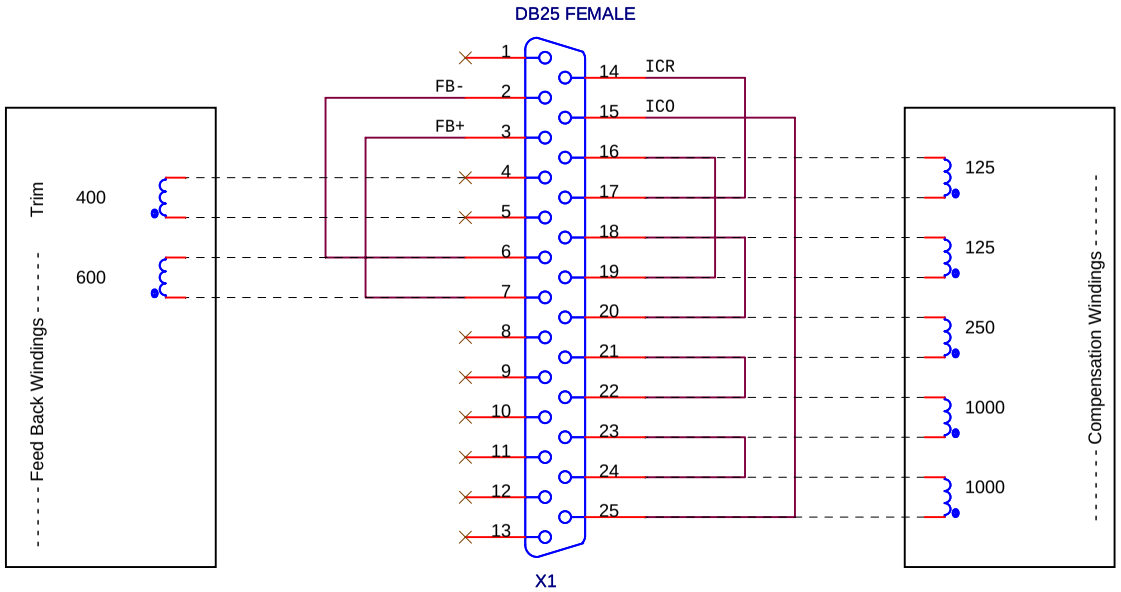
Programming plug
3750A
Transducerhead 5000A
Ultrastab Saturn

DRAWN BY. 26-01-2006 / NAW
DESIGN APP.
PROD APP.
PROJ. ENGR.
DWG.NO.: 89294

DANFYSIK

CUSTM. <OrgName> | ORDER NO. <nr.?> | REV. | SHEET. 1 OF 1
FILE. | DATE. Thursday, August 17, 2006 | SIZE. A4

DK-4040 JYLLINGE DENMARK TELEPHONE: +45 46 79 00 00 TELEFAX: +45 46 79 00 01 E-MAIL: DANFYSIK@DANFYSIK.DK



All wires: 0.25mm2 Black

65-0-89295

T:\PROJEKTER-IGANG\SATURN\DOKUMENTATION, MIDLERTIDIG\PROGRAMMING PLUGS\PLUGS_5000\89295.DSN

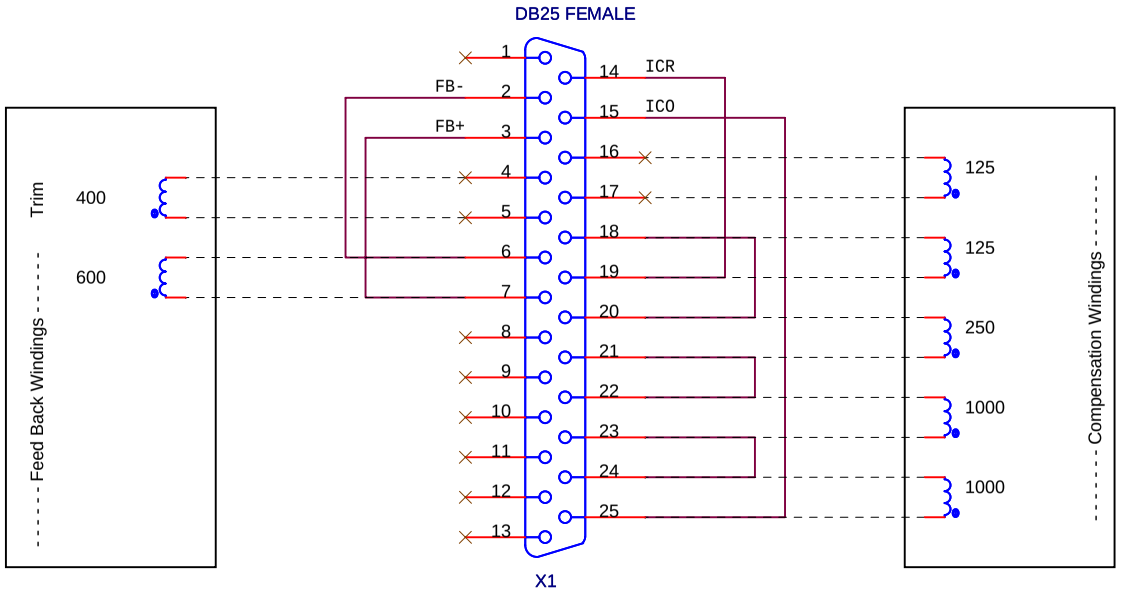
Programming plug
4000 A
Transducerhead 5000 A
Ultrastab Saturn

DRAWN BY. 26-01-2006 / NAW
DESIGN APP.
PROD APP.
PROJ. ENGR.
DWG.NO.: 89295

DANFYSIK

CUSTM. <OrgName> | ORDER NO. <nr.?> | REV. | SHEET. 1 OF 1
FILE. | DATE. Thursday, August 17, 2006 | SIZE. A4

DK-4040 JYLLINGE DENMARK TELEPHONE: +45 46 79 00 00 TELEFAX: +45 46 79 00 01 E-MAIL: DANFYSIK@DANFYSIK.DK



All wires: 0.25mm2 Black

65-0-89296

T:\PROJEKTER-IGANG\SATURN\DOKUMENTATION, MIDLERTIDIG\PROGRAMMING PLUGS\PLUGS_5000\89296.DSN

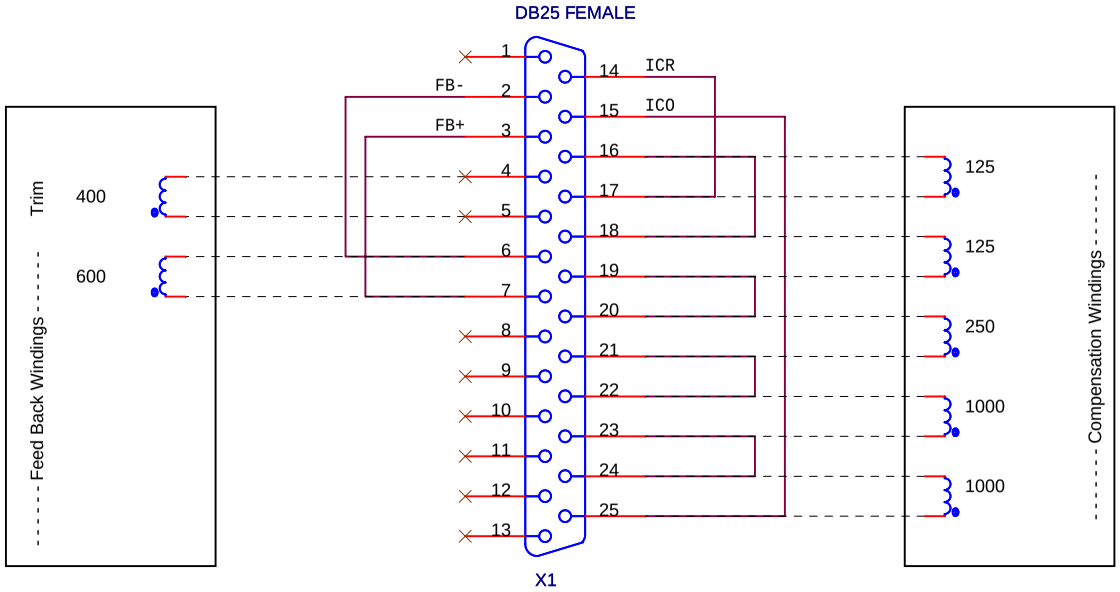
Programming plug
4250A
Transducerhead 5000A
Ultrastab Saturn

DRAWN BY. 26-01-2006 / NAW
DESIGN APP.
PROD APP.
PROJ. ENGR.
DWG.NO.: 89296

DANFYSIK

CUSTM. <OrgName> | ORDER NO. <nr.?> | REV. | SHEET. 1 OF 1
FILE. | DATE. Thursday, August 17, 2006 | SIZE. A4

DK-4040 JYLLINGE DENMARK TELEPHONE: +45 46 79 00 00 TELEFAX: +45 46 79 00 01 E-MAIL: DANFYSIK@DANFYSIK.DK



All wires: 0.25mm2 Black

65-0-89297

T:\PROJEKTER-IGANG\SATURN\DOKUMENTATION, MIDLERTIDIG\PROGRAMMING PLUGS\PLUGS_5000\89297.DSN

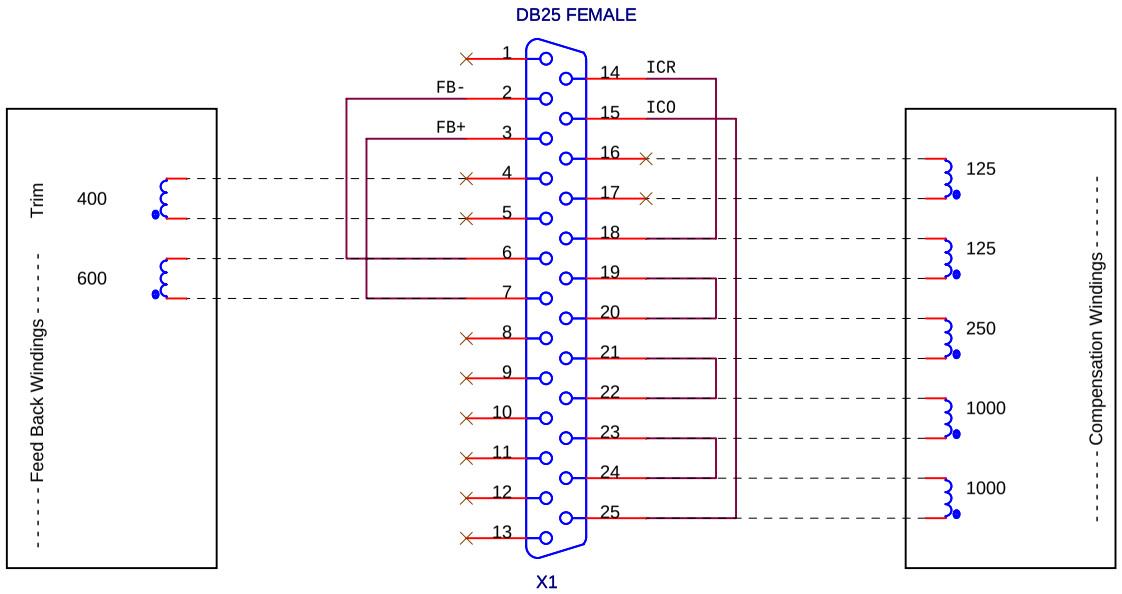
Programming plug
4500 A
Transducerhead 5000 A
Ultrastab Saturn

DRAWN BY. 26-01-2006 / NAW
DESIGN APP.
PROD APP.
PROJ. ENGR.
DWG.NO.: 89297

DANFYSIK

CUSTM. <OrgName> | ORDER NO. <nr.?> | REV. | SHEET. 1 OF 1
FILE. | DATE. Thursday, August 17, 2006 | SIZE. A4

DK-4040 JYLLINGE DENMARK TELEPHONE: +45 46 79 00 00 TELEFAX: +45 46 79 00 01 E-MAIL: DANFYSIK@DANFYSIK.DK



All wires: 0.25mm2 Black

65-0-89298

T:\PROJEKTER-IGANG\SATURN\DOKUMENTATION, MIDLERTIDIG\PROGRAMMING PLUGS\PLUGS_5000\89298.DSN

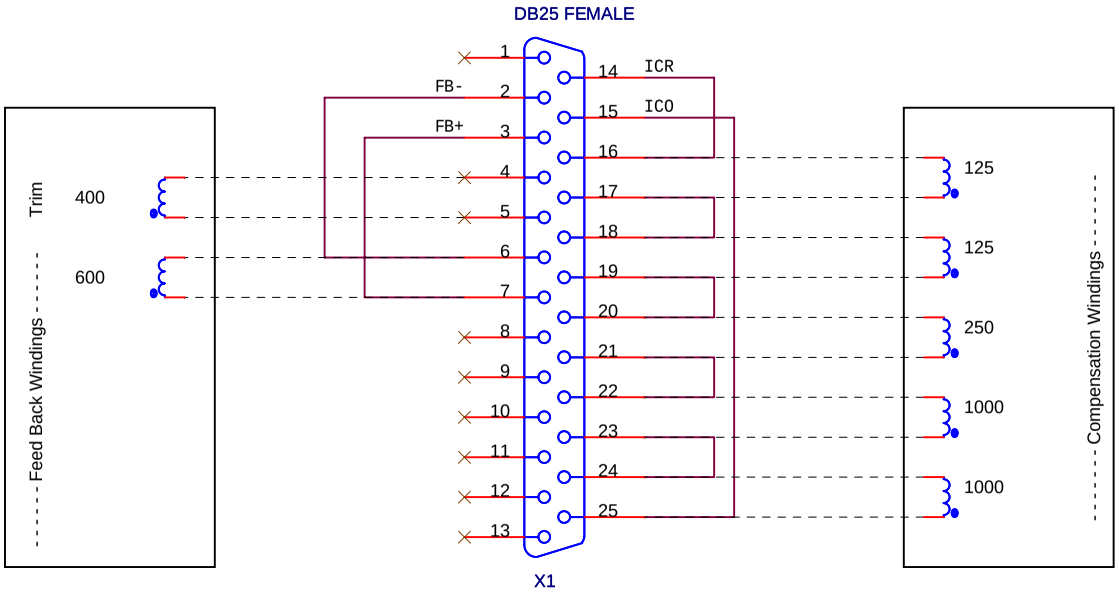
Programming plug
4750A
Transducerhead 5000A
Ultrastab Saturn

DRAWN BY. 26-01-2006 / NAW
DESIGN APP.
PROD APP.
PROJ. ENGR.
DWG.NO.: 89298

DANFYSIK

CUSTM. <OrgName> | ORDER NO. <nr.?> | REV. | SHEET. 1 OF 1
FILE. | DATE. Thursday, August 17, 2006 | SIZE. A4

DK-4040 JYLLINGE DENMARK TELEPHONE: +45 46 79 00 00 TELEFAX: +45 46 79 00 01 E-MAIL: DANFYSIK@DANFYSIK.DK



All wires: 0.25mm2 Black

65-0-89299

T:\PROJEKTER-IGANG\SATURN\DOKUMENTATION, MIDLERTIDIG\PROGRAMMING PLUGS\PLUGS_5000\89299.DSN

Programming plug
5000 A
Transducerhead 5000 A
Ultrastab Saturn

DRAWN BY. 26-01-2006 / NAW
DESIGN APP.
PROD APP.
PROJ. ENGR.
DWG.NO.: 89299

DANFYSIK

CUSTM. <OrgName> | ORDER NO. <nr.?> | REV. | SHEET. 1 OF 1
FILE. | DATE. Thursday, August 17, 2006 | SIZE. A4

DK-4040 JYLLINGE DENMARK TELEPHONE: +45 46 79 00 00 TELEFAX: +45 46 79 00 01 E-MAIL: DANFYSIK@DANFYSIK.DK

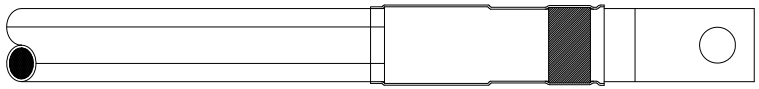
REVISIONS

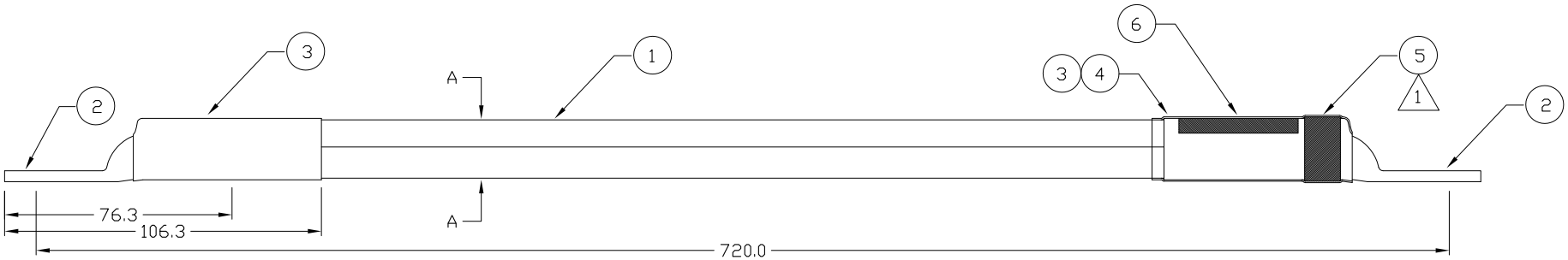
REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		30 Mar, 07	M. Duffy

LABEL

GMW Associates
Cable Assembly
P/N: 16900451
600A RMS, 1,000V
www.gmw.com

SECTION A–A





1 PLACE RED SHRINK TUBE UNDER CLEAR

NOTES:

1. INSULATION VOLTAGE RATING:
   1kV

2. WIRE SPECIFICATIONS:
   COBRA WIRE P/N: A2104B
   TYPES / APPROVALS:
   UL Listed
   NEC types: MTW & THW
   UL AWM Styles: 1232, 1283, 1338, 10070, 10269
   UL Approved for 1000V

   CSA Certified
   TEW A/B FT–1
   "CT" Approved

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
6	1		PART NUMBER LABEL	
5	1	FIT221–1–RED	SHRINK TUBING, 1", RED, CUT 12mm	
4	1	FIT221–1–BLK	SHRINK TUBING, 1", CLEAR, CUT 80mm	
3	2	FIT321–1	SHRINK TUBING, 1", ADHESIVE, CUT 76mm	
2	2	12900250	COPPER LUG, MODIFIED	
1	3	A2002B	COBRA X–FLEX WIRE, 2GA, CUT 660mm	

PARTS LIST

DRAWN M. Duffy DATE 20 Mar, 07
CHECK M. Duffy DATE 20 Mar, 07
ENGINEERING M. Duffy DATE 20 Mar, 07
NEXT ASSY SYSTEM
SOFTWARE AUTOCAD 2000

DO NOT SCALE FROM DRAWING
DIMENSIONS & TOLERANCES (UNLESS OTHERWISE SPECIFIED)

	INCHES	mm
LINEAR		
X.XXX	±.005	±0.03
X.XX	±.01	±0.1
X.X	±.03	±0.3
X	±.06	±1
DEG.	±.5	±0.5
FINISH	63	1.6

THIRD ANGLE PROJECTION

GMW
955 Industrial Rd, San Carlos, CA 94070
Tel: (650)802–8292. Fax: (650)802–8298.

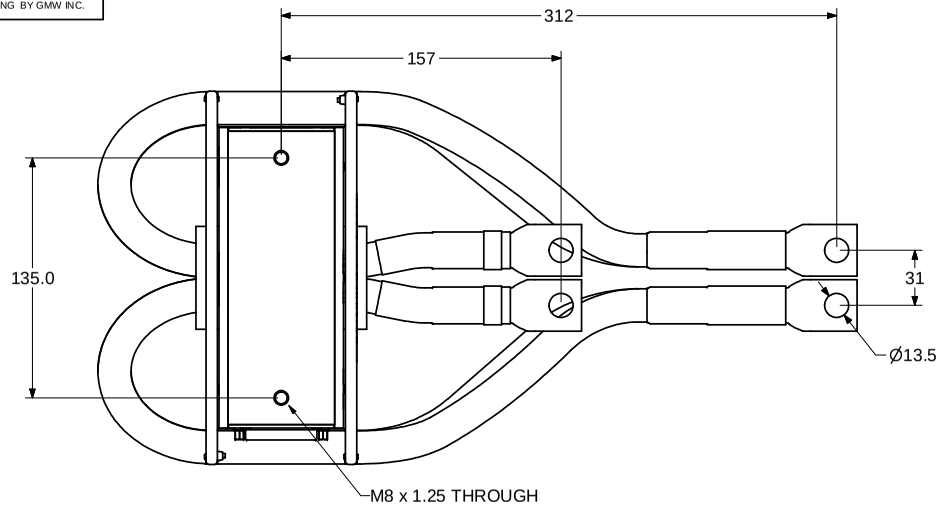
TITLE
PRIMARY CURRENT CABLE – 866/867

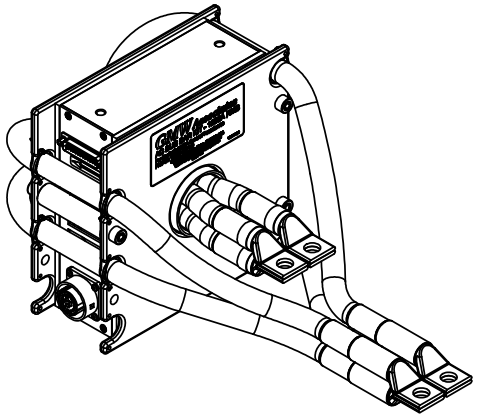
SIZE A2 | DRAWING NO. 16900451 | REV A

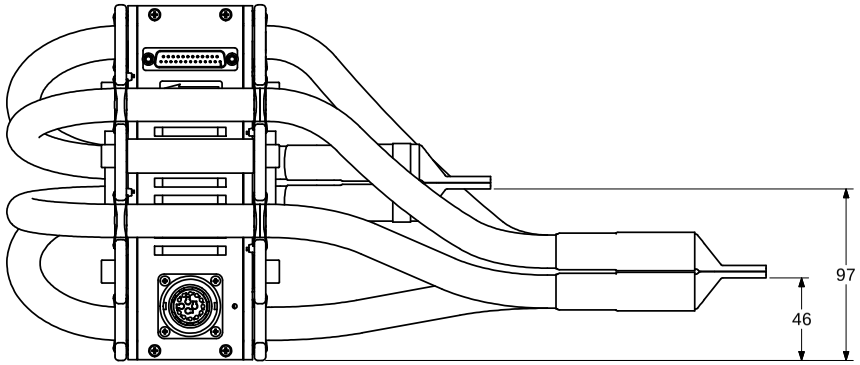
SCALE NTS | WT kg | SHEET 1 OF 1

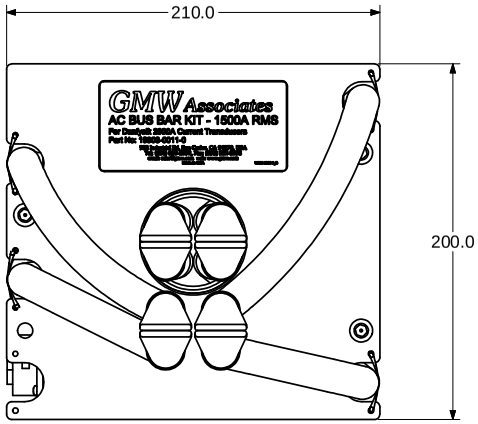
REVISION HISTORY

ZONE	REV	DESCRIPTION	DATE	APPROVED
1	1	Release	4/13/2007	Michael E. Duffy









Max. Current / Voltage Rating: 1,500A RMS, 1,000V

Note: Cable lug positions shown are approximate, they may be relocated as required by system installation.

COBRA WIRE P/N: A2104B
TYPES / APPROVALS:
UL Listed
NEC types: MTW & THW
UL AWM Styles: 1232, 1284, 1338, 10070, 10269
UL Approved for 1,000V

CSA Certified
TEW A/B FT-1
"CT" Approved

DRAWN	M. Duffy	Date 13 April, 2007
CHECK	M. Duffy	Date 13 April, 2007
ENGINEERING	M. Duffy	Date 13 April, 2007

DO NOT SCALE FROM DRAWING
DIMENSIONS & TOLERANCES UNLESS OTHERWISE SPECIFIED

LINEAR	INCHES	mm
X.XXX	±.005	±0.03
X.XX	± .01	± 0.1
X.X	±.05	±0.3
X	±.06	±1
DEG	±.5	±0.5
FINISH	63	1.6

THIRD ANGLE PROJECTION

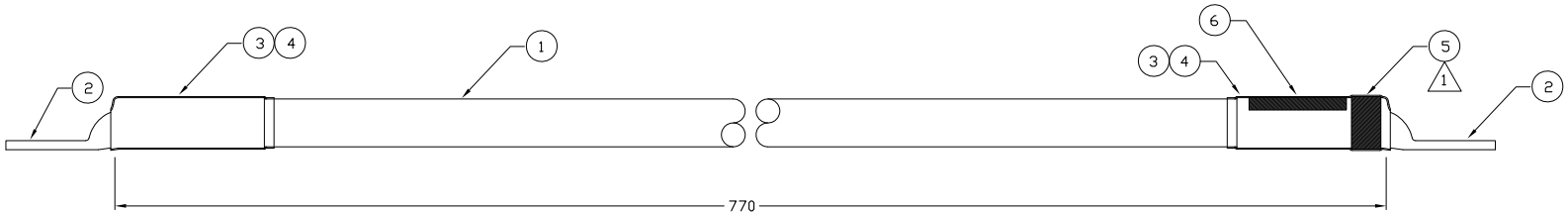
GMW Associates
955 Industrial Road, San Carlos, CA 94070
Tel: (650) 802-8292. Fax: (650) 802-8298

TITLE
Bus Bar Kit with Danfysik SAT2000 Transducer Head

SIZE	DRAWING No.	REV
A2	11908-0011-1	A

SCALE: NTS | WT: ~ kg | SHEET: 1 OF: 1

REVISIONS				
REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		15 Dec, 05	M. Duffy
B	CHANGE CABLE TYPE, RELOCATE LABEL		30 Mar, 2007	M. Duffy



LABEL

GMW Associates
Cable Assembly
P/N: 16908-0002-0
375A RMS, 1,000V
www.gmw.com

1 PLACE RED SHRINK TUBE UNDER CLEAR

NOTES:

1. CUT LENGTH: 770mm

2. WIRE SPECIFICATIONS:
   COBRA WIRE P/N: A2104B
   TYPES / APPROVALS:
   UL Listed
   NEC types: MTW & THW
   UL AWM Styles: 1232, 1284, 1338, 10070, 10269
   UL Approved for 1000V

   CSA Certified
   TEW A/B FT-1
   "CT" Approved

3. A TOTAL OF FOUR CABLES ARE REQUIRED FOR 1500A

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
6	1		PART NUMBER LABEL	
5	1	FIT221-1-RED	SHRINK TUBING, 1", RED, CUT 12mm	
4	1	FIT221-1-CLR	SHRINK TUBING, 1", CLEAR, CUT 80mm	
3	2	FIT321-1	SHRINK TUBING, 1", ADHESIVE, CUT 76mm	
2	2	LCB250-12	COPPER COMPRESSION LUG, 250MCM, 1/2" STUD	
1	1	A2104B	COBRA X-FLEX CABLE 4/0GA, CUT 770mm	

PARTS LIST

DRAWN M. Duffy DATE 15 Dec, 05
CHECK M. Duffy DATE 15 Dec, 05
ENGINEERING M. Duffy DATE 15 Dec, 05
NEXT ASSY | SYSTEM
SOFTWARE AUTOCAD 2000

DO NOT SCALE FROM DRAWING
DIMENSIONS & TOLERANCES (UNLESS OTHERWISE SPECIFIED)

LINEAR	INCHES	mm
X.XXX	±.005	±0.03
X.XX	±.01	±0.1
X.X	±.03	±0.3
X	±.06	±1
DEG.	±.5	±0.5
FINISH	63	1.6

THIRD ANGLE PROJECTION

GMW
955 Industrial Rd, San Carlos, CA 94070
Tel: (650)802-8292. Fax: (650)802-8298.

TITLE
CABLE ASSEMBLY
1500A AC BUS BAR KIT

SIZE A1 | DRAWING NO. 16908-0002-0 | REV B
SCALE 1:1 | WT kg | SHEET 1 OF 1