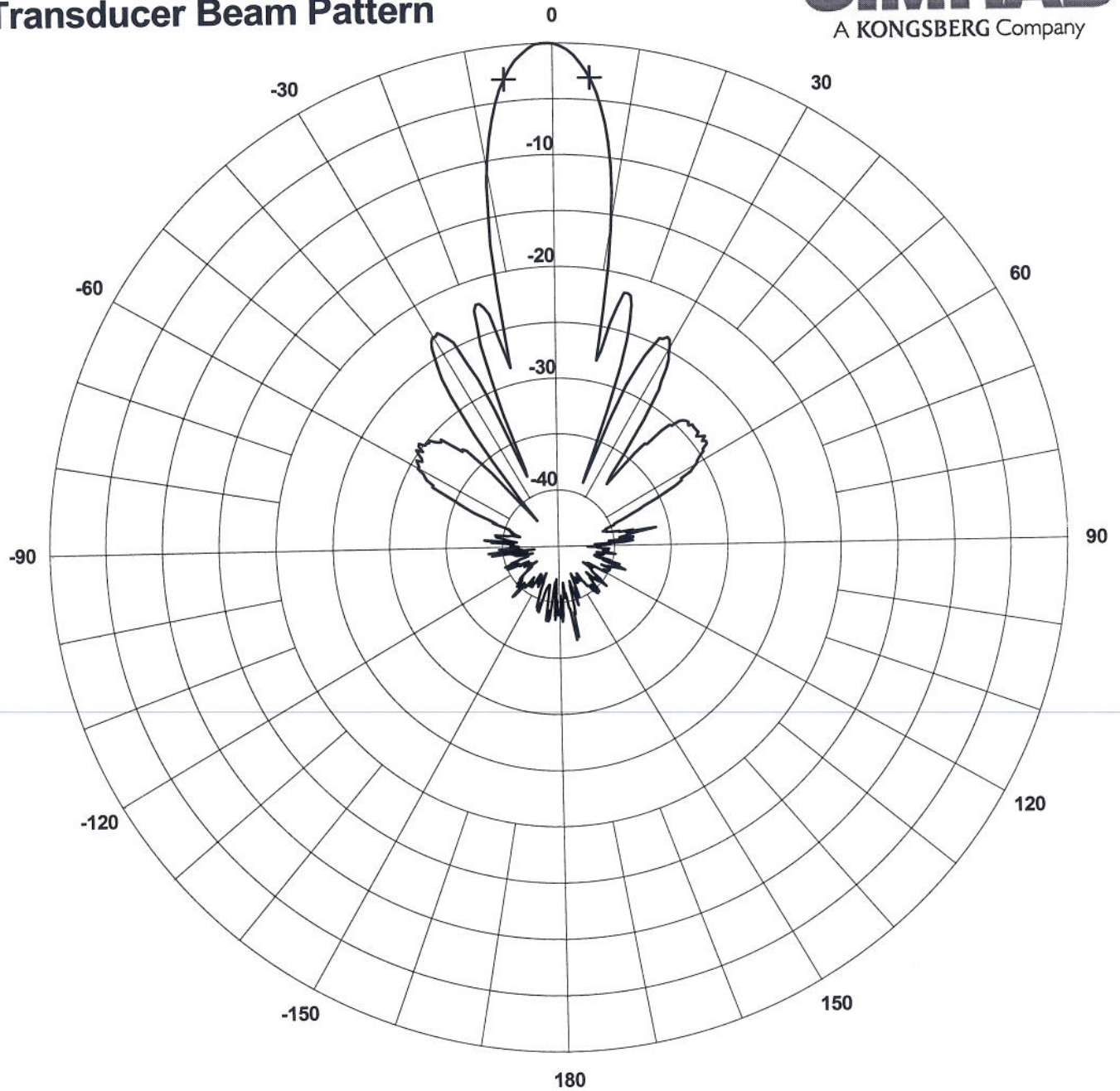


KONTROLLERT  
GODKJENT

| TRANSDUCER MEASUREMENTS   |        |        |        |        |           |
|---|--------|--------|--------|--------|-----------|
|   | Part 1 | Part 2 | Part 3 | Part 4 | All Parts |
| Measured at:<br>f (kHz)   | 18,0   | 18,0   | 18,0   | 18,0   | 18,0      |
| Beamwidth   |        |        |        |        |           |
| Longitudinal:<br>$\beta_1$ (deg)  |        |        |        |        | 10,4      |
| Transversal:<br>$\beta_2$ (deg)   |        |        |        |        | 10,6      |
| Directivity index (dB):<br>$10 \log(2.5/(\sin(\beta_1/2) \cdot \sin(\beta_2/2)))$ |        |        |        |        | 24,7      |
| Equivalent two way<br>beam angle (dB):<br>$10 \log(\beta_1 \cdot \beta_2 / 5800)$ |        |        |        |        | -17,2     |
| Impedance   |        |        |        |        |           |
| Z  (ohm) :  | 55,9   | 58,8   | 58,6   | 56,1   | 14,6      |
| Phase (deg) :   | -15,6  | -14,2  | -13,3  | -14,2  | -12,2     |
| Transmitting response (at 1 metre)  |        |        |        |        |           |
| Si<br>(dB re 1 $\mu$ Pa/A):   | 204,9  | 205,4  | 205,4  | 205,2  | 205,3     |
| Su<br>(dB re 1 $\mu$ Pa/V):   | 170,0  | 170,0  | 170,1  | 170,2  | 182,0     |
| Receiving sensitivity   |        |        |        |        |           |
| Theoretical open circuit<br>(Si-354.1-20 log f):<br>(dB re 1 V/ $\mu$ Pa)         | -174,3 | -173,8 | -173,8 | -174,1 | -173,9    |
| Leaking resistance (Mohm) :   |        |        |        |        |           |
|   | OK     | OK     | OK     | OK     | OK        |
| Type: ES18  |        |        |        |        |           |
| Serial no: 2097   |        |        |        |        |           |
| Watertemp: 21,0 °C  |        |        |        |        |           |
| Tested by: bjornko Date: 14. apr. 2010  |        |        |        |        |           |

# Transducer Beam Pattern

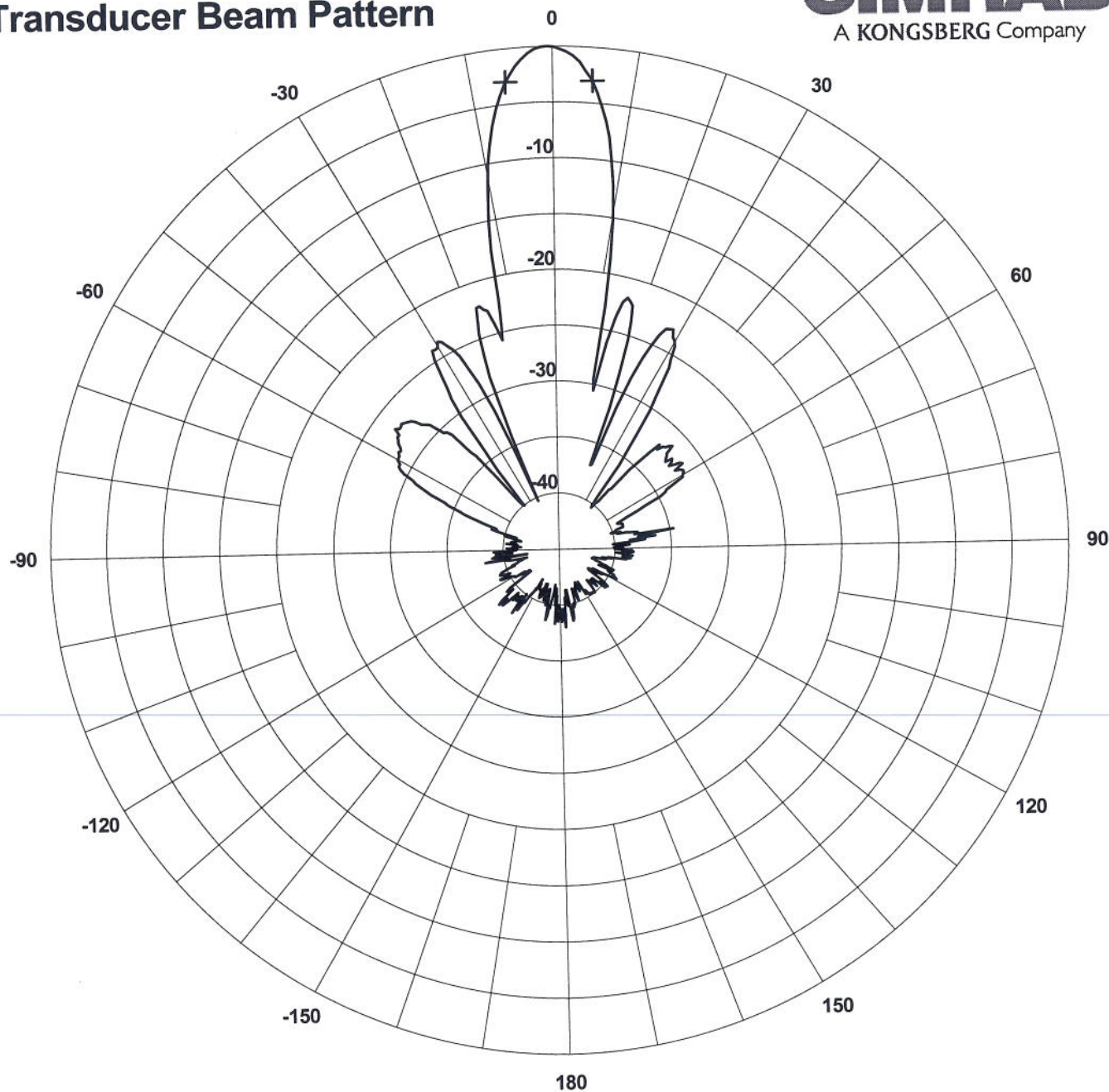
**SIMRAD**  
A KONGSBERG Company



|                           |                     |                                |              |
|---------------------------|---------------------|--------------------------------|--------------|
| <b>Transducer Type:</b>   | ES18 312-088696     | <b>Plane:</b>                  | Longitudinal |
| <b>Serial no.:</b>        | 2097                | <b>Hydrophone Type:</b>        | B&K 8104     |
| <b>Frequency:</b>         | 18,0 kHz            | <b>Hydrophone Serno.:</b>      | 2393692      |
| <b>Tested by:</b>         | bjornko             | <b>Hydrophone Cal.Date:</b>    | 14.04.10     |
| <b>Date/time:</b>         | 14.04.2010 10:15:13 | <b>Distance to Hydrophone:</b> | 5,30 m       |
| <b>Voltage Generator:</b> | 1000 mV             | <b>Water Temperature:</b>      | 21 °C        |
| <b>Amplifier Gain:</b>    | 20 dB               | <b>Module:</b>                 | 1            |
| <b>Beam Width:</b>        | 10,44°              | <b>Element:</b>                | 5            |
| <b>Source Level:</b>      | 215,60 dB           |                                |              |
| <b>DI:</b>                | 24,94 dB            |                                |              |

# Transducer Beam Pattern

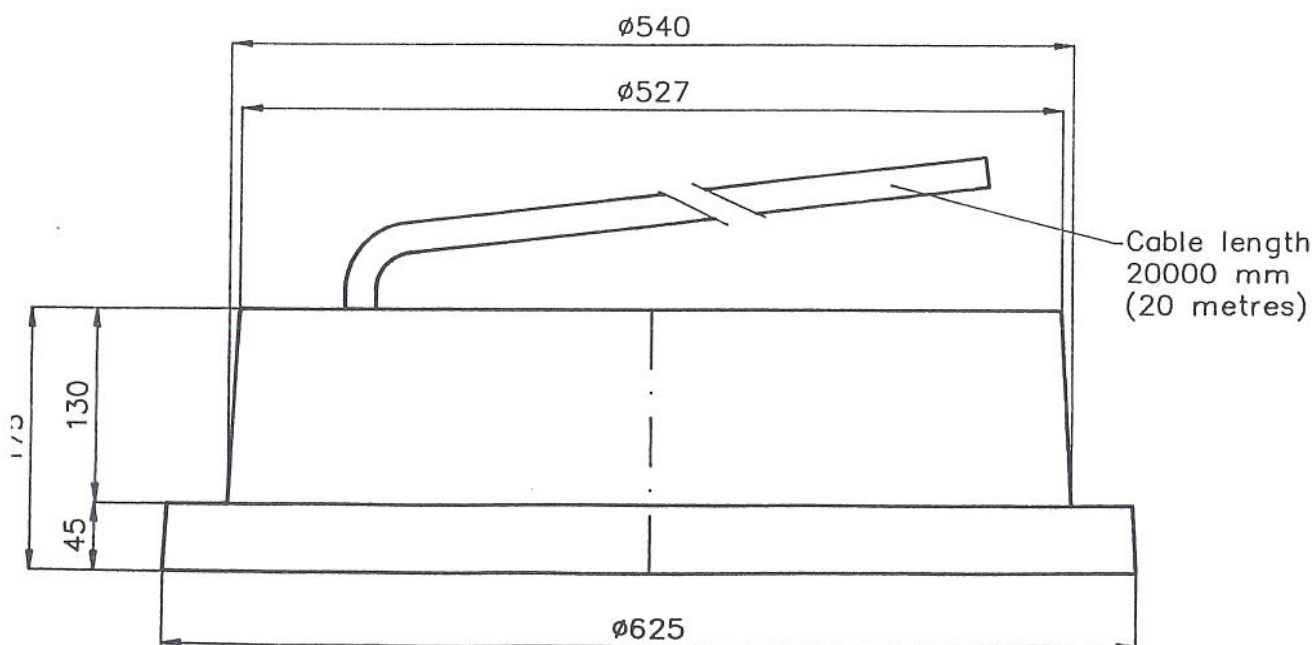
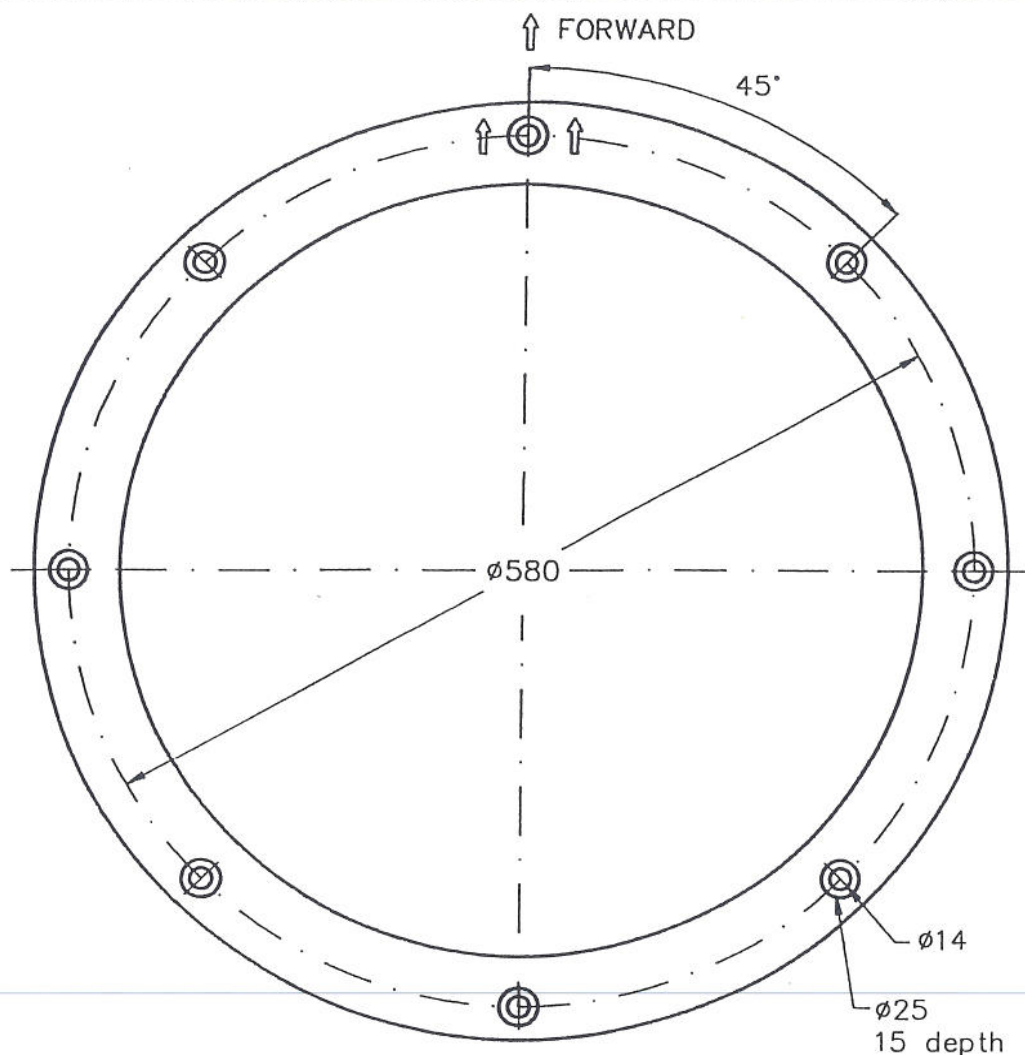
**SIMRAD**  
A KONGSBERG Company



**Transducer Type:** ES18 312-088696  
**Serial no.:** 2097  
**Frequency:** 18,0 kHz  
**Tested by:** bjornko  
**Date/time:** 14.04.2010 10:18:11  
**Voltage Generator:** 1000 mV  
**Amplifier Gain:** 20 dB  
**Beam Width:** 10,63°  
**Source Level:** 215,64 dB  
**DI:** 24,84 dB

**Plane:** Transversal  
**Hydrophone Type:** B&K 8104  
**Hydrophone Serno.:** 2393692  
**Hydrophone Cal.Date:** 14.04.10  
**Distance to Hydrophone:** 5,30 m  
**Water Temperature:** 21 °C  
**Module:** 1  
**Element:** 5

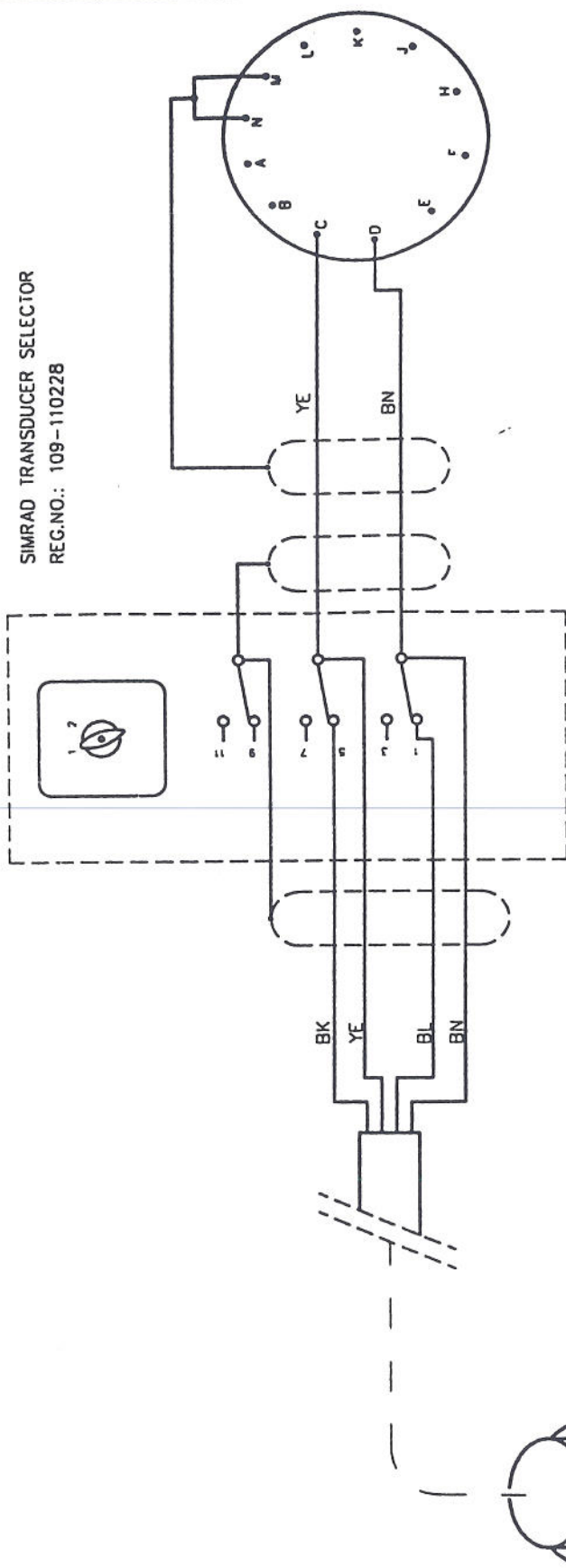




Weight without cable: approx. 85 kp

|                 |          |      |   |  |  |  |                  |  |  |
|-----------------|----------|------|---|--|--|--|------------------|--|--|
| REV./SIGN.      |          |      |   |  |  |  |                  |  |  |
| DATE            |          |      |   |  |  |  |                  |  |  |
| PROJ.<br>METHOD |          |      | UNLESS OTHERWISE STATED, TOLERANCE:<br>DIM.: ---- THREAD: 6g/6H |  |  |  |                  |  |  |
| SCALE           | 1:5      |      | OUTLINE DIMENSIONS  |  |  |  | SHEET 1 OF 1     |  |  |
| DRAWN           | 91.11.27 | TW   | TRANSDUCER  |  |  |  | 830-107783       |  |  |
| CHECKED         | 91.12.02 | H.K. |   |  |  |  | B                |  |  |
| APPROVED        | 91.12.03 | H.B. | 12 AND 18 kHz   |  |  |  | FILE NO.: 577-82 |  |  |

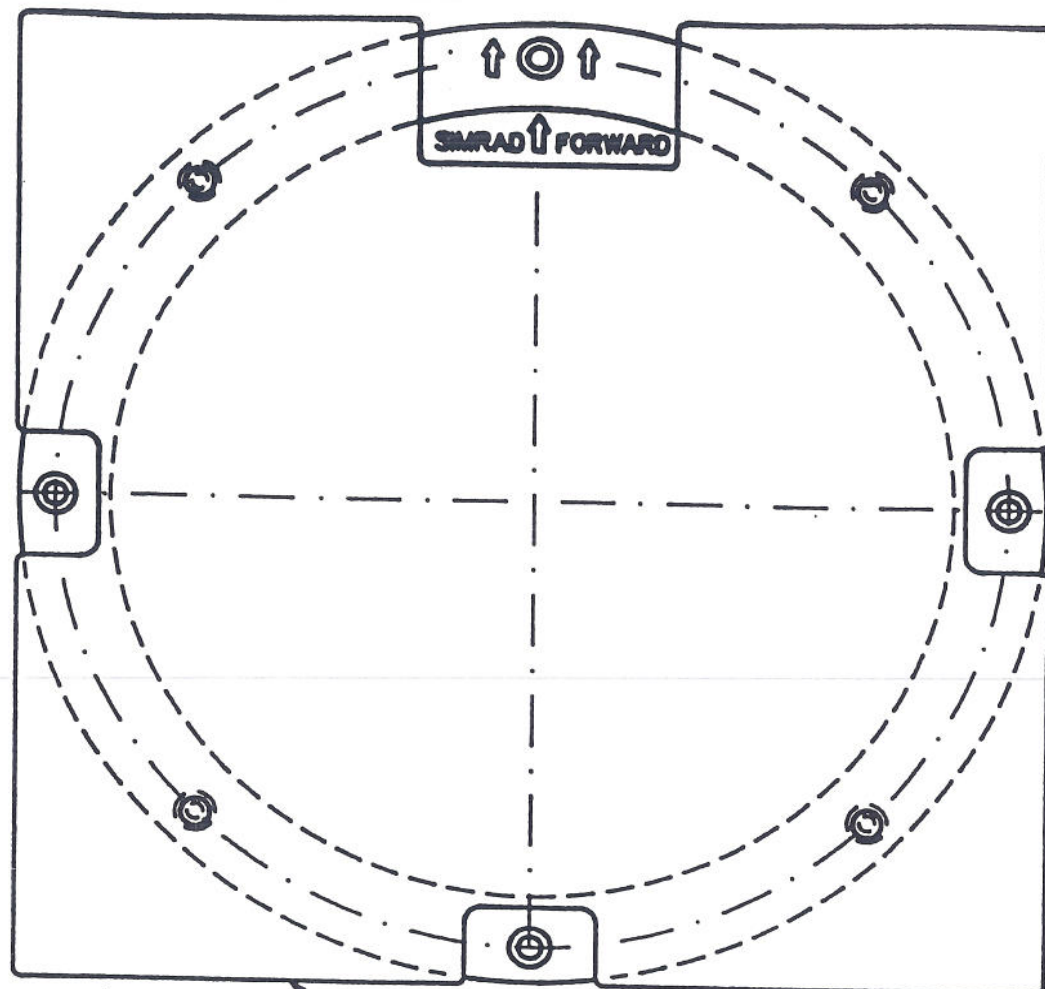
SIMRAD TRANSDUCER SELECTOR  
REG.NO.: 109-110228



12/16-60 TRANSDUCER  
REG.NO.: KSV-089510

SELECTOR POSITION 1 = NORMAL OPERATION 12-16"  
SELECTOR POSITION 2 = PINGER (PASSIVE)

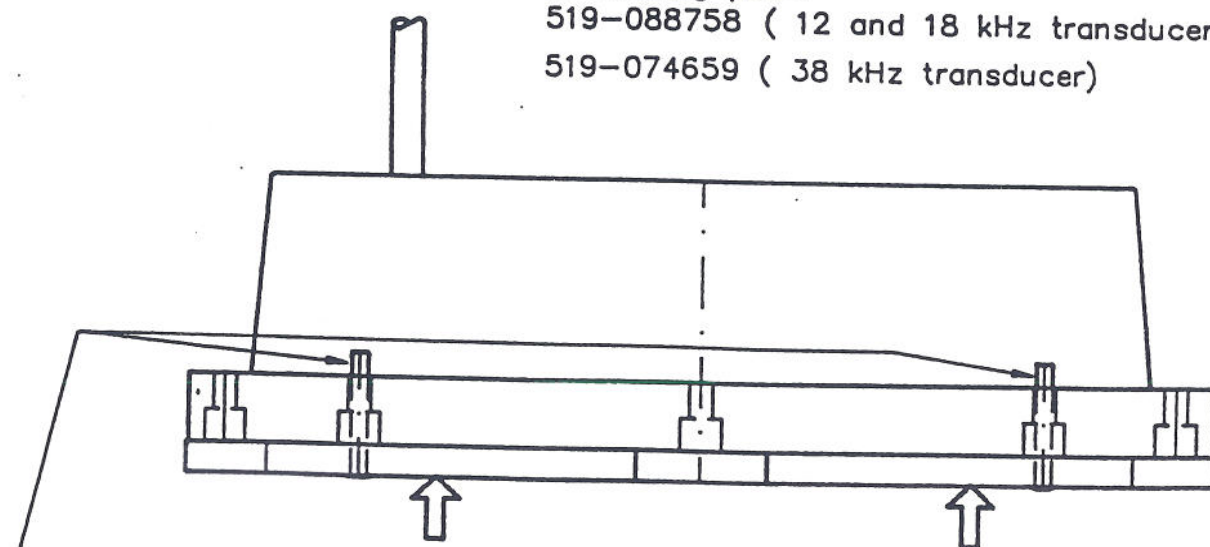
| REV./SIGN           | DATE     | UNLESS OTHERWISE STATED, TOLERANCE: DIM.: | THREAD:      | SIMRAD |
|---------------------|----------|---|--------------|--------|
| PROJ. METHOD        |          |   |              |        |
| SCALE               |          |   |              |        |
| DRAWN               | 94.04.14 | E.En.                                     |              |        |
| CHECKED             | 11.04.15 | E.En.                                     |              |        |
| APPROVED            | 11.04.15 | E.En.                                     |              |        |
| TRANSDUCER 12-16/60 |          |   |              |        |
| CONNECTION E/A500   |          |   |              |        |
| EA 500              |          |   |              |        |
| SHEET 1 OF 1        |          |   | SH. SIZE: A3 | REV    |
| 824-089548          |          |   |              | A      |
| FILE NO 593-77      |          |   |              |        |






Protecting plate.

519-088758 ( 12 and 18 kHz transducer)

519-074659 ( 38 kHz transducer)



- Remove nuts and washers before mounting the transducer in the steel blister.
- Jack up the transducer into the steel blister. Fasten the transducer with 4 mounting screws.
- Remove the protecting plate.

|              |   |   |  |  |  |  |   |  |  |
|--------------|---|---|--|--|--|--|---|--|--|
| REV./SIGN.   |   |   |  |  |  |  |   |  |  |
| DATE         |   |   |  |  |  |  |   |  |  |
| PROJ. METHOD |  |  | UNLESS OTHERWISE STATED, TOLERANCE:<br>DIM.: ----                      THREAD: 6g/6H |  |  |  |  |  |  |
| SCALE        | 1:5   |   | Mounting procedure   |  |  |  |   |  |  |
| DRAWN        | 92.01.07  | TW  | 12 , 18 and 38 kHz transducer  |  |  |  |   |  |  |
| CHECKED      | 92.02.17  | B.G   | in steel blister   |  |  |  |   |  |  |
| APPROVED     | 92.02.17  | H.K   |  |  |  |  |   |  |  |
|              |   |   |  |  |  |  | SHEET 1 OF 1  |  |  |
|              |   |   |  |  |  |  | 820-088759  |  |  |
|              |   |   |  |  |  |  | FILE NO.: 586-2   |  |  |

Packing list

Item number 099-088819  
Product PRINTED MATTER, TD 12-16 12KHz

| Position | Quantity | Unit | Item number | Description                    |
|----------|----------|------|-------------|--------------------------------|
| 001      | 1,0000   | pcs  | 820-088815  | MOUNT.TD, ST.BLISTER 12-18KHz  |
| 002      | 1,0000   | pcs  | 820-088759  | MOUNT.PROC.TD ST.BLISTER 12/18 |
| 003      | 1,0000   | pcs  | 841-035901  | GUARANTI CARD SIMRAD           |
| 004      | 1,0000   | pcs  | 830-107783  | OUTL.DIM. 12KHz TRANSDUCER     |
| 005      | 1,0000   | pcs  | 511-017493  | PLASTIC BAG 250X350 P5 W/LOCK  |
| 005      | 1,0000   | pcs  | 824-089548  | CONNECT.DWG EA500 TD 12-16/60  |


|              |           |                    |
|--------------|-----------|--------------------|
| Weight       | Volume    | Packed             |
| Gross: ..... | m3: ..... | Date: 4/5/10 ..... |
| Net: .....   |           | Sign: .....        |



## Packing list

Item number KSV-088694  
Product TRANSDUCER,SP.BEAM ES18 WITH

| Position | Quantity | Unit | Item number | Description  |
|----------|----------|------|-------------|--|
|          |          | pcs  | 855-160506  | ES18 PRODUCT SPECIFICATION BASE VERSION InDesign             |
|          |          | pcs  | 599-110090  | STEEL TANK, 12KHz TD FA500                                   |
|          |          | pcs  | 499-109506  | ARCTIC TANK,ASSY. 12KHz                                      |
|          |          | pcs  | 499-088814  | MOUNTING RING, TD 12-18KHz                                   |
| 001      | 1,0000   | pcs  | 512-088818  | WOODEN BOX 650x650x275mm                                     |
| 002      | 1,0000   | pcs  | 312-088696  | TRANSDUCER,SP.BEAM ES18 W/DATA                               |
| 003      | 1,0000   | pcs  | 499-069952  | STUFF.TUBE W/BLIND PLUG                                      |
| 004      | 8,0000   | pcs  | 560-077957  | M12X50 SYLH.M/INV6 NS1832 SF (DIN912).                       |
| 005      | 8,0000   | pcs  | 572-019363  | UNDERL.SKIVE F/M12 DIN125A SF (ø13/ø24x2,5mm).               |
| 006      | 1,0000   | pcs  | 099-088819  | PRINTED MATTER, TD 12-16 12KHz                               |
| 007      | 1,0000   | pcs  | 839-065405  | MEASURE DATA F/TRANSDUCERS                                   |
| 008      | 2,0000   | pcs  | 569-095335  | RINGMUTTER M12 NS1851 ST.ELZn/ VZTINGS                       |
| 009      | 2,0000   | pcs  | 572-077119  | UNDERL.SKIVE F/M12 DIN9021B ST STELZn. (STOR) (ø13/ø40x3mm). |
| 010      | 2,0000   | pcs  | 560-053091  | M12X70 HEXH.SCR.DIN933 STHZn                                 |

| Weight       | Volume    | Packed   |
|--------------|-----------|--|
| Gross: ..... | m3: ..... | Date: 4/5/10   |
| Net: .....   |           | Sign:  |