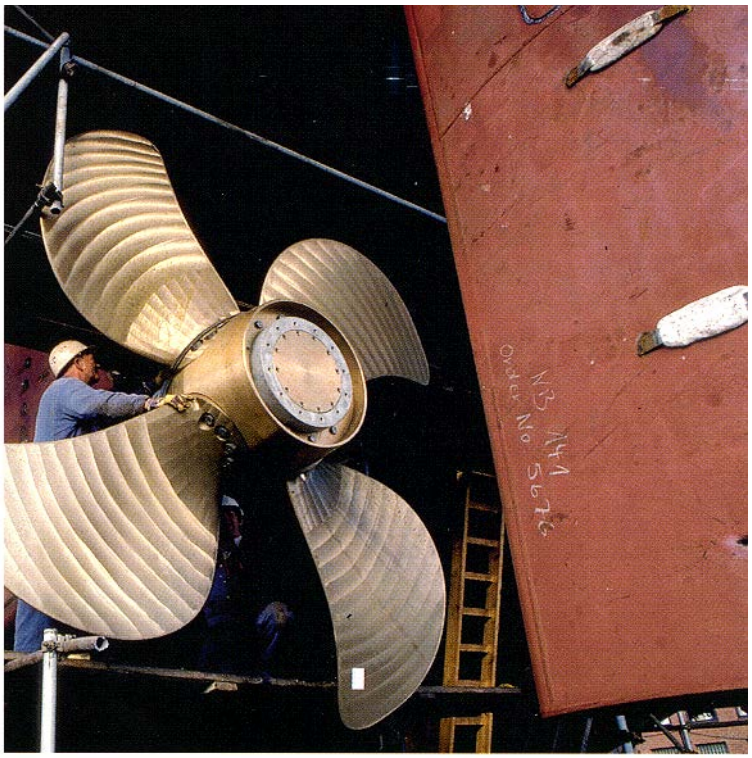
MANUAL FOR

BAC CORROSION CONTROL A/S

SHAFT GROUNDING ASSEMBLY WITH mV-METER AND AMPLIFIER FOR ALARM OUTPUTS



BAC ORDER NO: 539630

BAC CORROSION CONTROL A/S
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1 GENERAL DESCRIPTION

1.1 With Amplifier for alarm

This system is a precautionary measure installed, in order to reduce the electrical potential between the propeller shaft and hull to below 80 mV, and thus prevent spark erosion damage to the main bearings and journals of the main engine. (A reading between 5 and 50 mV is considered as normal).

With universal signal transmitter

1.2 The system consists of the following main components:

- A silver alloy slip ring is mounted on the intermediate shaft.
- Brush holders with silver/graphite brushes.
- Grounding wire and grounding plate.
- Monitoring box with mV-meter and alarm output (optional).
- Resistivity of the silver should be less than 0.1µ Ohm x m.
- The total resistance of the cable from the brush holder to the hull, must not exceed 0.005 Ohm. Indication of less than 5mV can occur at low resistance.

The silver/graphite brushes are running on the slip ring. The two earthing brushes are connected to the hull through the grounding wire and the grounding plate welded to the hull. The monitoring brush is connected to the monitoring box.

1.3 Functioning and checking of the earthing/measuring device.

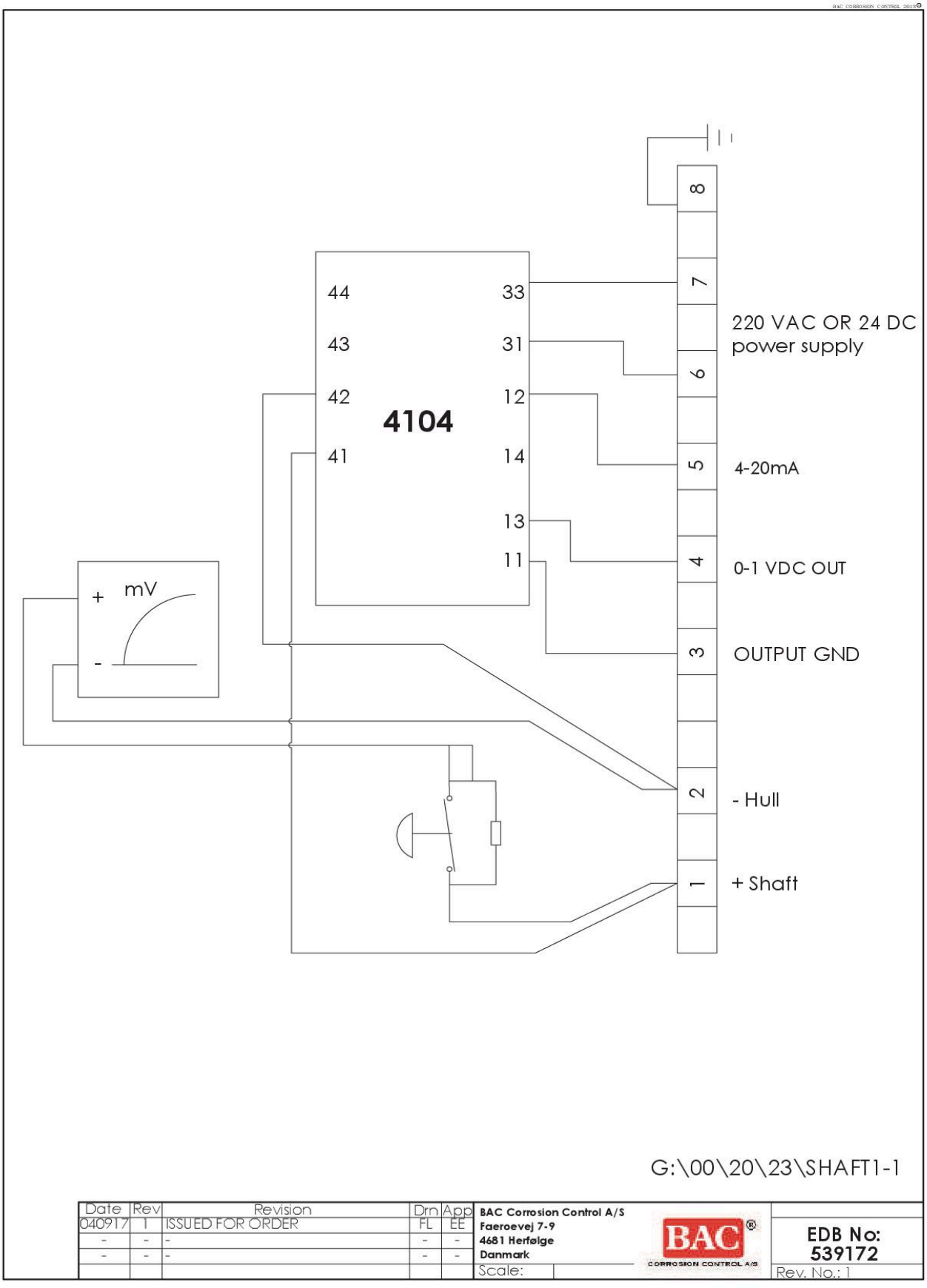
The meter normally reads 150 mV at full scale. If readings are above 150 mV, push the button on the front of the meter. The meter will now read 1500 mV at full scale.

The meter will read ”0” when the shaft is at rest. When the shaft is turning at sea, a reading of between 5 and 80 mV indicates proper grounding, although readings below 50 mV should be obtained with clean and properly contoured brushes.

With passive interface loop 4-20mA.

We will advise you to set a delay up to 5 min. or the alarm to avoid errors during manoeuvring of the engine.

Control box 539630 is set up and calibrated for a 0 to 150 mV input to interface with a 4-20 mA output in passive mode. This will enable the user to communicate with interfaces expecting a 4-20 mA active send from the including a 24 V supply as per below connections.


4104
44
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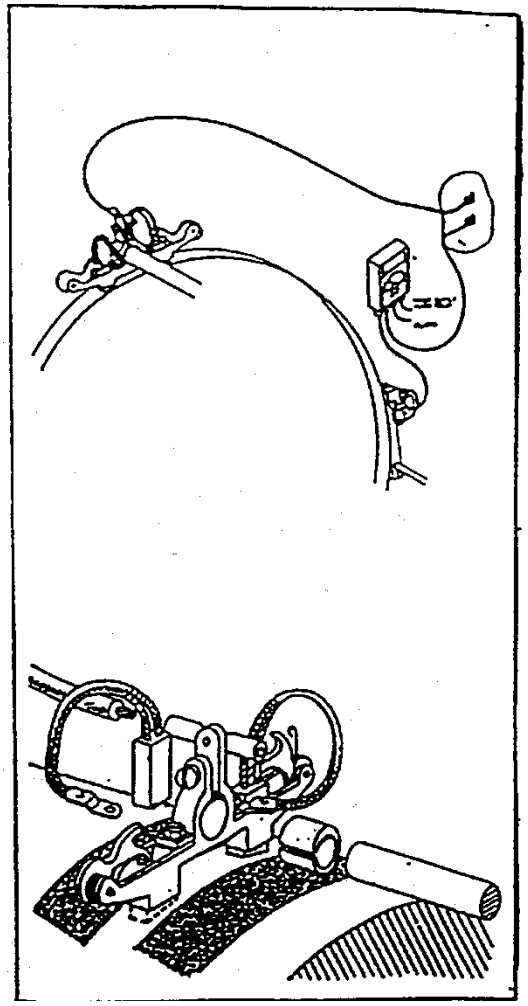
3
2
1
220 VAC OR 24 DC
power supply
4-20mA
0-1 VDC OUT
OUTPUT GND
- Hull
+ Shaft
+
mV
-
G:\00\20\23\SHAFT1-1
Date
Rev
Revision
Drn
App
040917
1
ISSUED FOR ORDER
FL
EE
BAC Corrosion Control A/S
Faeroevej 7-9
4681 Herfølge
Danmark
Scale:
EDB No:
539172
Rev. No.: 1

Readings of ”0” when the shaft is turning at sea, indicates a defective mV-meter or loose or broken cable connections.

Checking the earthing device must be done when the shaft is rotating at sea and should be carried out once a month.

Release the earthing brushes from their contact with the slip ring; this should give high pulsating voltages of 100-400 mV reading on the meter. This indicates that the measuring circuit is in order. When the brushes are brought back to contact with the slip ring, the reading should fall below the 80mV limit. You can also read the result on the computer



It is important that the silver/graphite brushes are moving correctly in the brush holders with a spring load of 500-600 gr.

In some cases the copper lead on the brush will corrode, so it is recommendable to coat this lead with grease.

It is recommended that the readings of the mV-meter be recorded once a day in the engine logbook.

2 INSTALLATION INSTRUCTION

2.1
The slip ring usually located about
450 mm in front of the shaft coupling

2.2
Sand the area on the shaft between the two straps, until a bright steel surface appears.

2.3
Clean the grinded area, see datasheet
BAC does not supply this,
Please buy locally

2.4

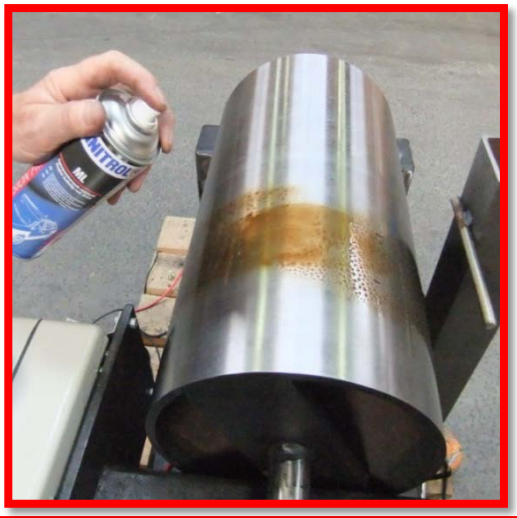
Starting with the 45° end, warp the silver band around the shaft so that the excess overlaps the 45° angle. Mark the edges, scribe a line between them

2.5

Cut the silverband

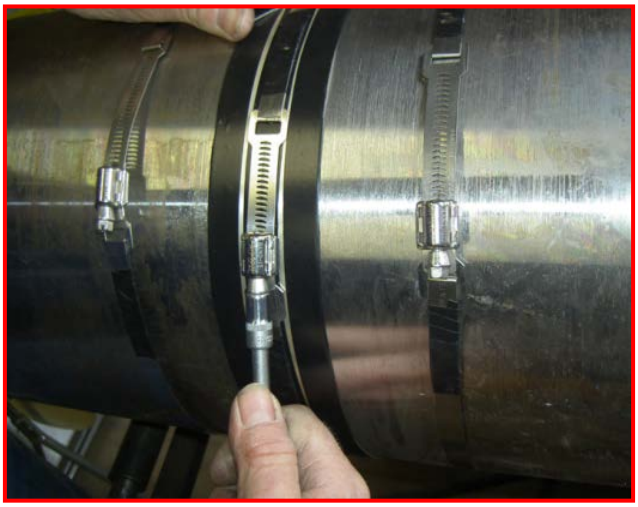
2.6
Lightly smooth the skive joint with the fine file to eliminate any roughness

2.7
Apply preservation oil on the shaft, see datasheet
BAC does not supply this,
Please buy locally



2.8
Apply el-tape in 3 strips on the silver band

2.9
Assemble the 3 stainless steel band straps and apply the silver band with one band on the middle tape



2.10
Assemble the 2 other stainless steel band

2.11
Remove the middle stainless steel band and remove el-tape

2.12
Clean for oil and dirt before applying Silicon and tape

2.13
Apply silicone longitudinal on the edge of the silver band in both sides

2.14
Seal the silicone with a wet finger all the way around in both sides

2.15
Wrap sensitive tape on one of the steel bands to make it absolutely tight

2.16
Wrap sensitive tape on other steel bands to make it absolutely tight

2.17
Cut the sensitive band so you can see the silver band between the two steel bands

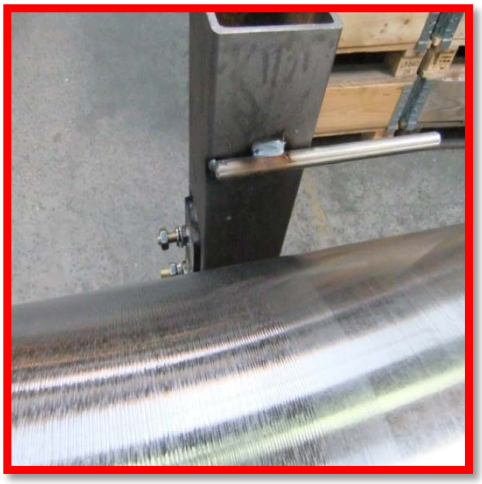
2.18
The finish mounting of the shaft grounding before finishing the silver band

2.19
Cut app. 2 mm of the edge of the glass brush

2.20
Clean the silver band with glass brush

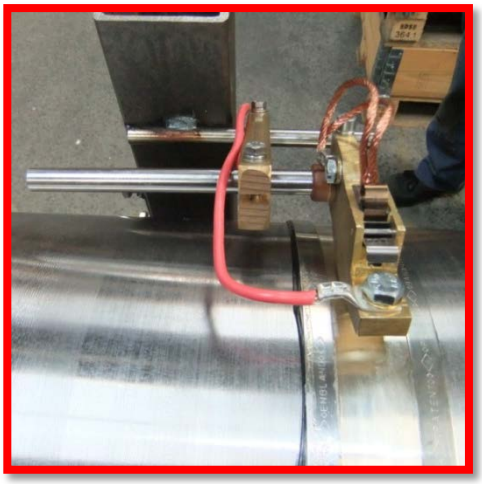
2.21
Grounding plate must be welded as close as possible, in order for the wires to be as short as possible

2.22
Ø12mm shaft are welded on the stand



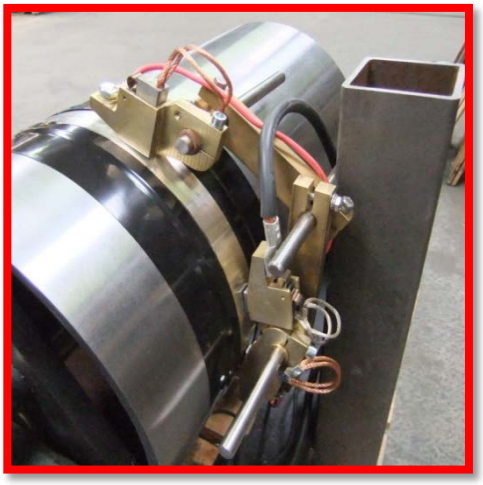
2.23
Mount the shaft holder

2.24
Mounting the silver graphite brush



2.25
Done

2.26
Done



3 GENERAL DATA

3.1 Components

539172
Voltmeter for shaft-hull potential difference with amplifier for alarm

539170
Slip ring Silver alloy band, 58,0 mm wide and approx. 100 mm longer than the circumference of the shaft

539184 & 539185
EL-tape + pressure sensitive tape

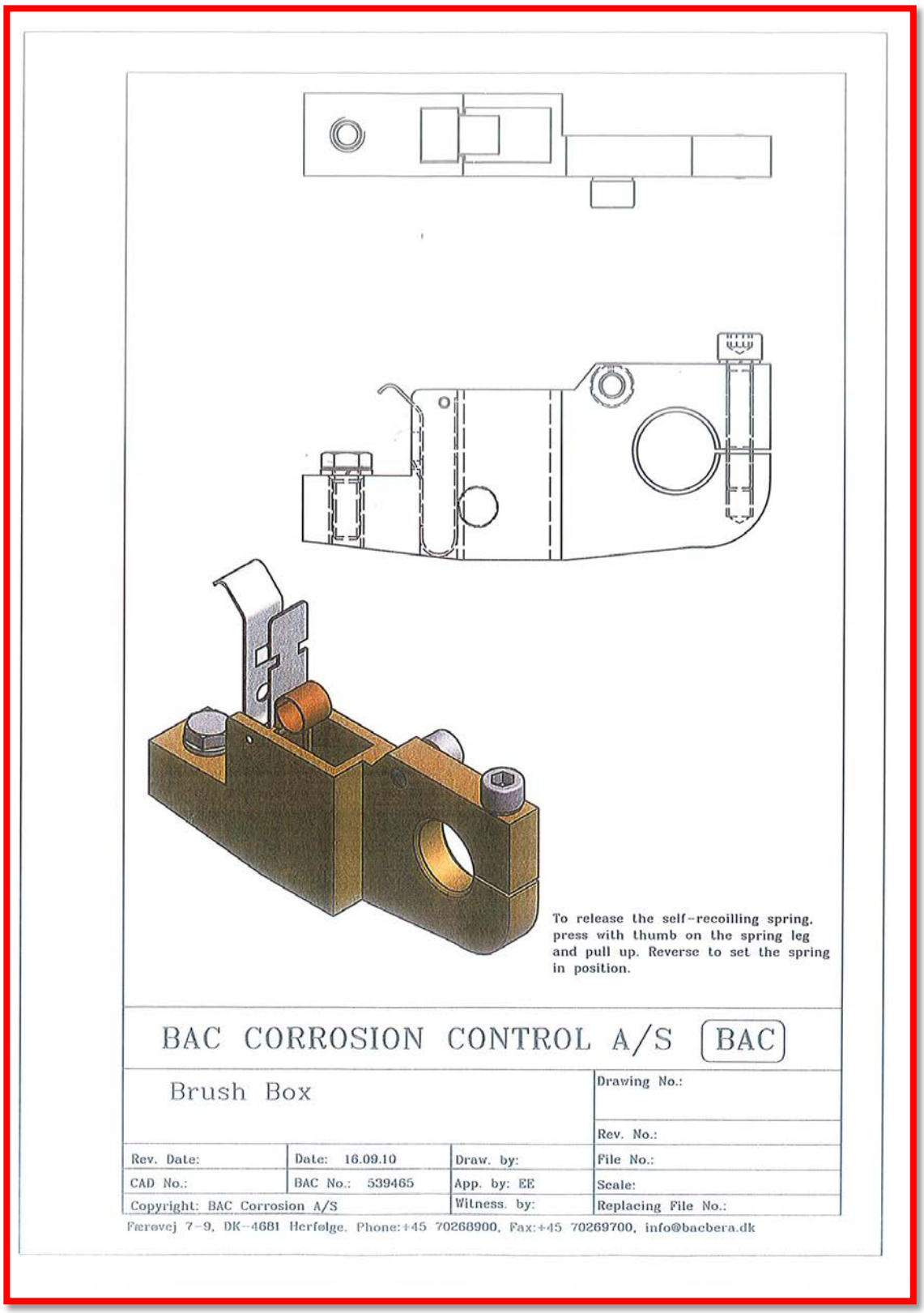
539182 & 539182
Holding straps. The permanent holding straps are made of Stainless Steel.

539264
St. Steel shaft Ø12,0 x 180 mm

539265
Brass shaft holder

539263 & 539262
ISO and Brass bushing for shaft

539465 Brush box



539105
Silver graphite brush

539230
Grounding plate
Place as close to the brush as possible

526354 & 526352
35²mm cable socket with 10 and 8 mm hole

520600 & 526060
6²mm cable socket with
8 mm hole

539125
Glass brush

94116
Silicone

94118
Preservation Oil, see datasheet
BAC does not supply this.
Please by locally

94119
Metal Cleaner, see datasheet
BAC does not supply this.
Please buy locally

3.2 List of components

POS.	BAC PART No.	CLIENT PART No.	Q'ty	DESCRIPTION	CHECK
2	539172		1 pcs.	Voltmeter for shaft–hull potential difference incl. amplifier for alarm.	
3	539170		1 pcs.	Silver alloy band for shaft (90% silver and 10% copper)	
4	539184		1 roll	El tape 33+	
5	539185		1 roll	Pressure sensitive tape	
6	539180		3 pcs.	Permanent holding straps in St. steel, 12,5mm x 0,7mm x (shaft) O.D.	
7	539182		3 pcs.	Bandtightener in St. steel,	
8	539264		4 pcs.	St. steel shaft ø12.0 x 180mm	
9	539265		2 pcs.	Brass shaft holder	
10	539262		1 pcs.	Brass bushing for shaft	
11	539263		1 pcs.	ISO bushing for shaft	
12	539465		3 pcs.	Brush box	
13	539105		3 pcs.	Silver graphite brush (80% Ag)	
14	539230		1 pcs.	Grounding plate.	
15	523502		2 pcs.	Cable 35□ L=3m.	
16	526354		2 pcs.	35mm□ cable socket with 10mm hole.	
17	526352		2 pcs.	35mm□ cable socket with 8mm hole.	
18	520600		2 pcs.	Cable 6□ L=3m.	
19	526060		2 pcs.	6mm□ cable socket with 8mm hole.	
20	539105		3 pcs.	Spare silver graphite brush (80% Ag) Recommende spare parts (option)	
22	539125		1 pcs.	Glass brush	
23	539300		3 pcs.	Manual for amplifier	
25	94116		1 pcs.	Silicone Sealant	
26	94118		1 pcs.	Preservations Oil (Buy locally, BAC does not suppl)	
27	94119		1 pcs.	Metal Cleaner (Buy locally, BAC does not supply)	

BAC Corrosion Control A/S BAC

PART–LIST FOR SHAFT–GROUNDING

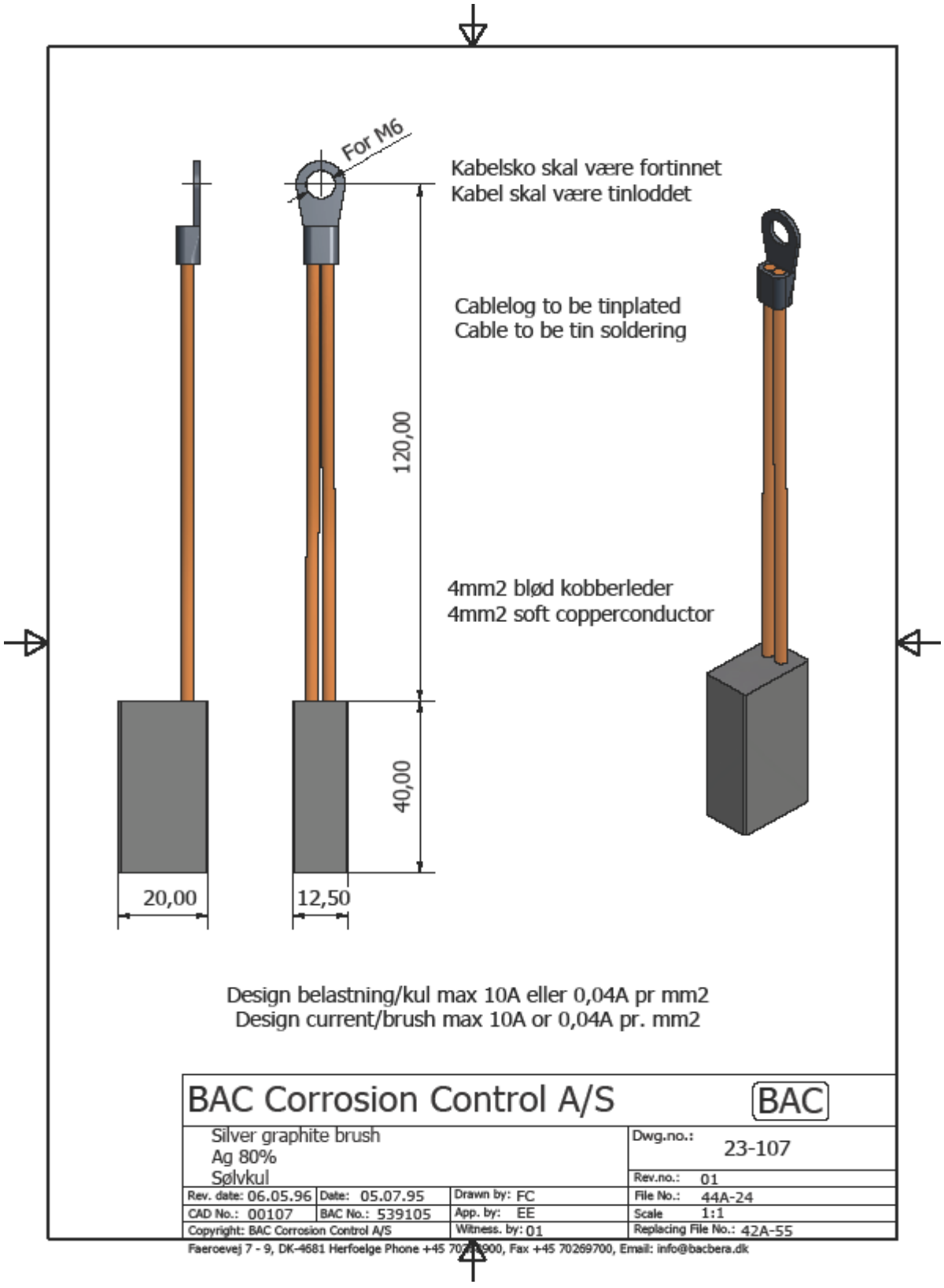
Drawing No.: (43–501E1) 23–103–539600

Rev. No.: 03

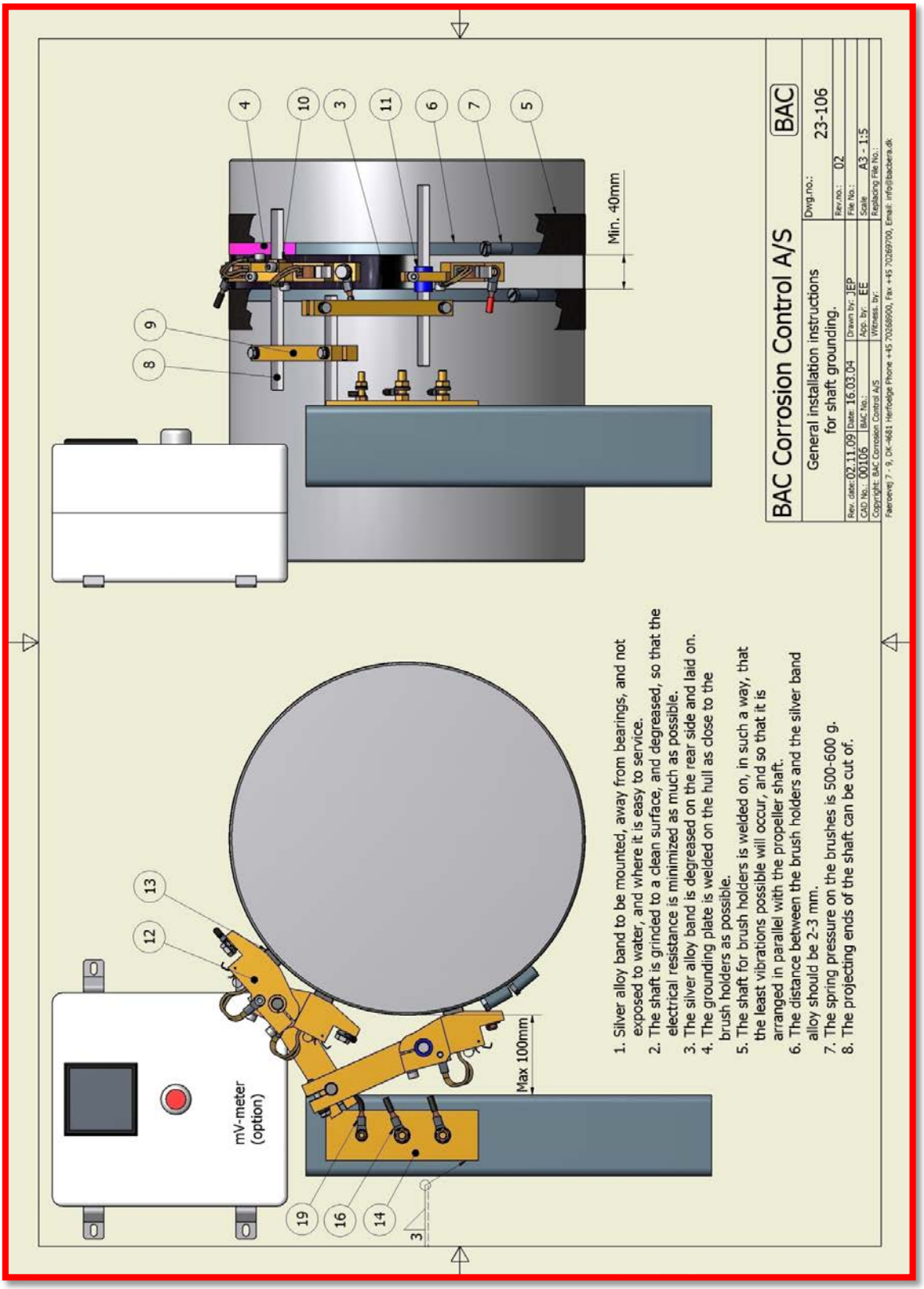
Rev. Date: 02.11.09	Date: 12.10.93	Draw. by: FC	File No.:
CAD No.: 00103	BAC No.:539600	App. by: EE	Scale: 1 : 1
Copyright: BAC Corrosion Control A/S		Witness. by:	Replacing File No.:

Faeroevej 7 – 9, DK–4681 Herfoelge. Phone:+45 70268900, Fax:+45 70269700, E–mail: info@bacbera.dk

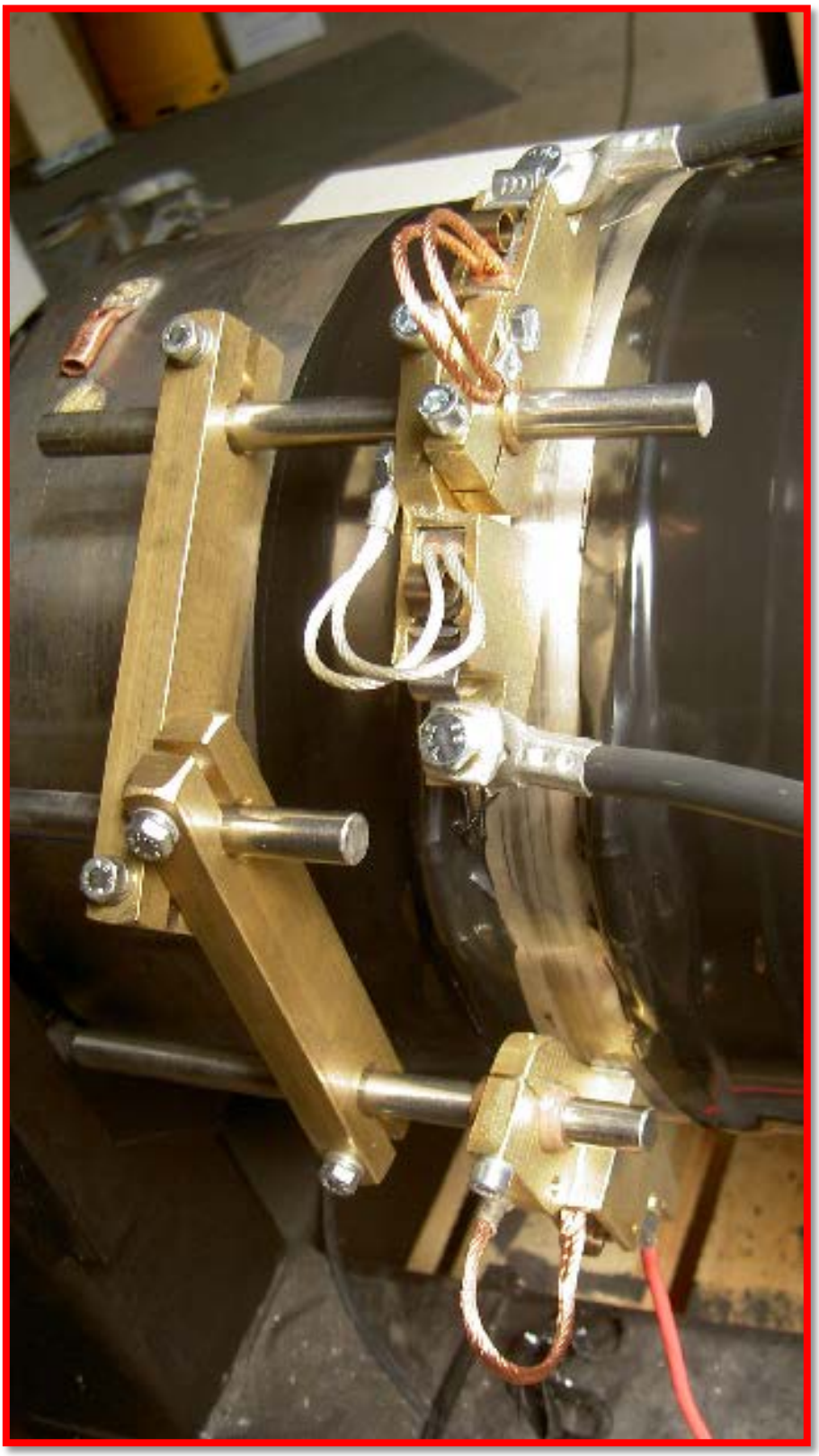
3.3 Silver Brush drawing



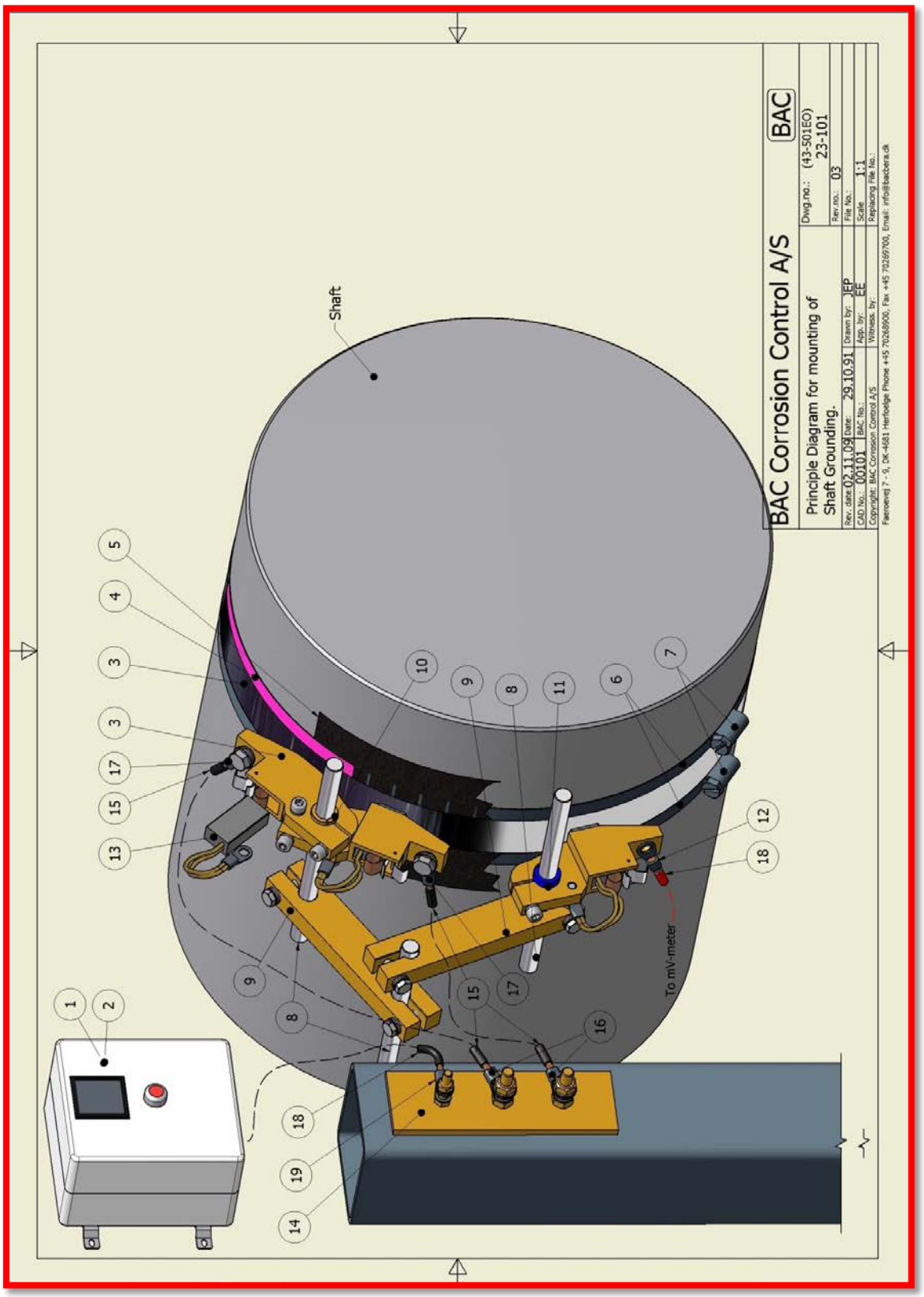
3.4 Installation instruction



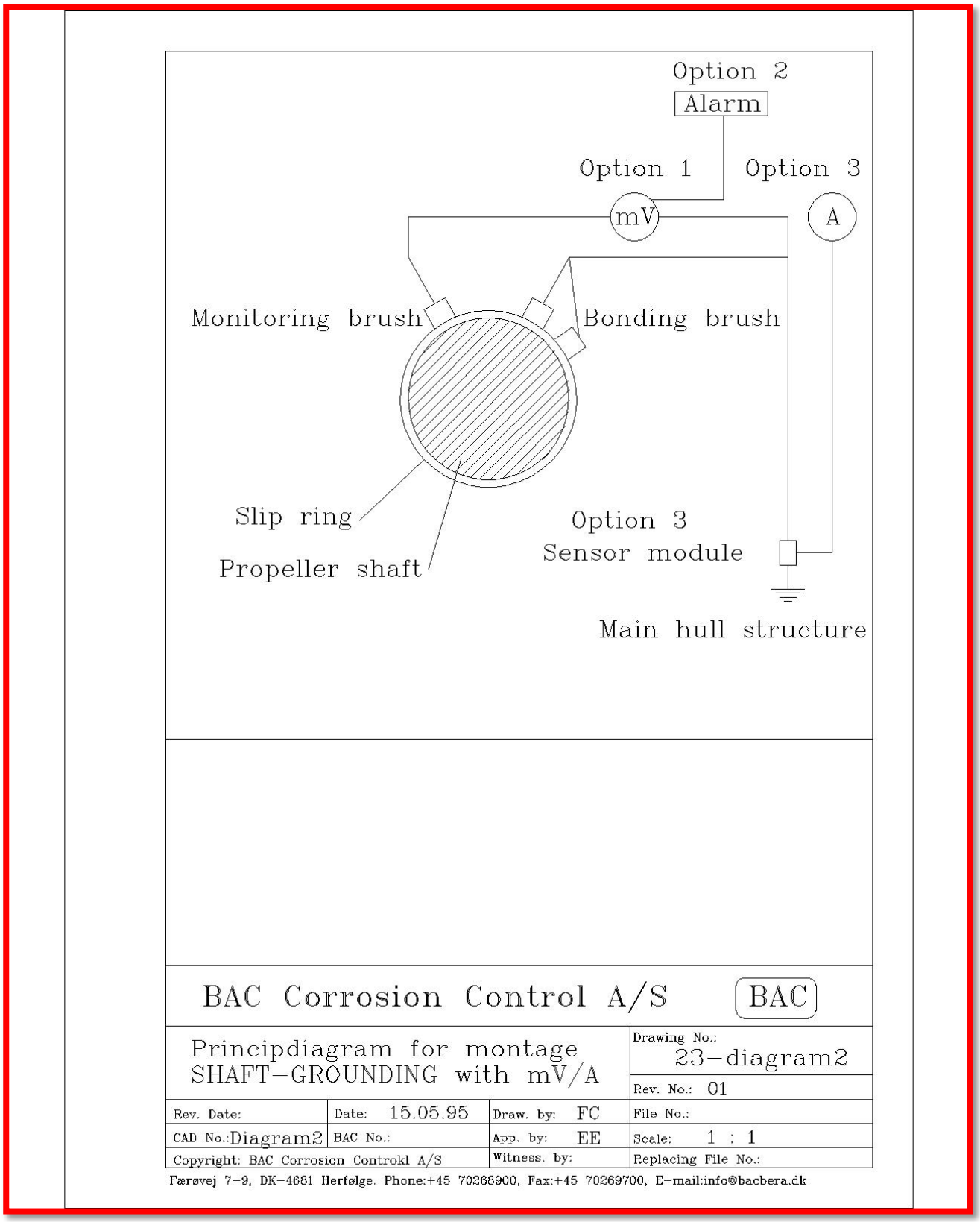
3.5 Installation instruction picture



3.6 Principdiagram for mounting

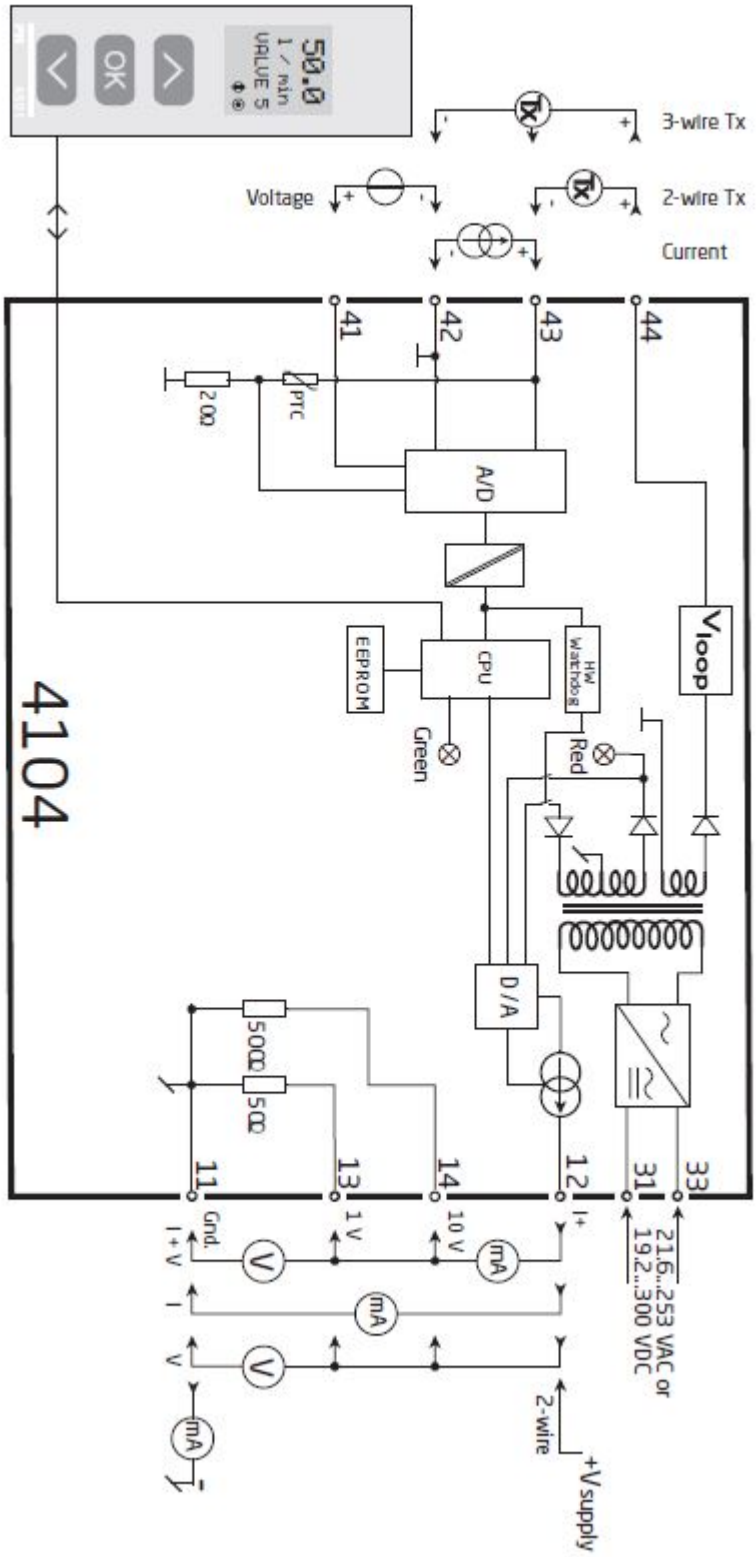


3.7 Principdiagram for montage

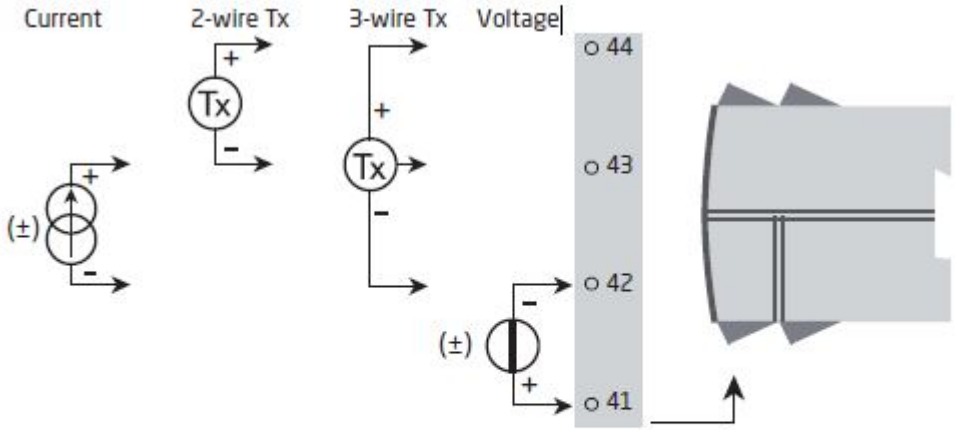


4 UNIVERSAL SIGNAL TRANSMITTER

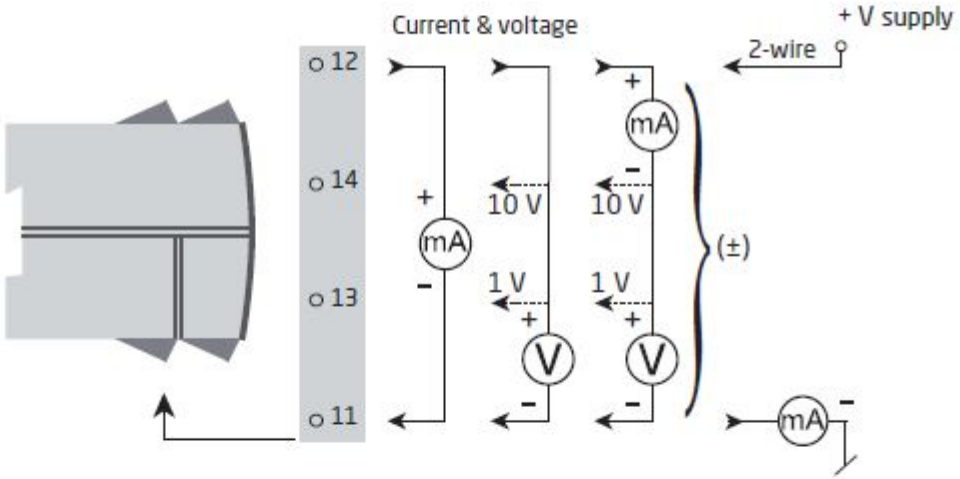
BLOCK DIAGRAM



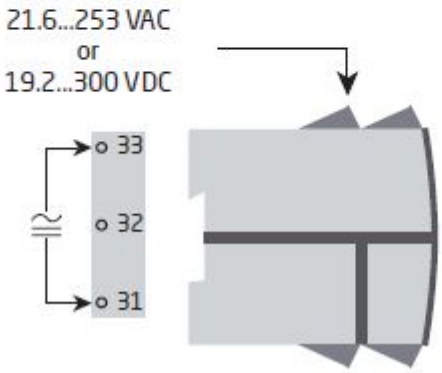
Input signals:



Output signals:



Supply:



5 TECHNICAL SPECIFICATION PR4104

Measure and outputs uni/bipolar voltage and current signals
Work with both active and passive inputs and outputs
Fast <20ms response time and <0.05% accuracy
Wide power supply range 21.6..253 VAC / 19.2..300VDC

5.1 Applications

Measure signals by torque, position, current and acceleration sensors.
Suitable for almost any voltage or current conversion by user configurable I/O
2 or 3 wire transmitters
Enables narrow input to wide output conversions, uni- and bipolar.

5.2 Technical characteristics

Maximum accuracy and immunity to interference are obtained, through latest digital and analogue technics. With a drive capacity of up to 800 Ohm, combined with fast adjustable response time of 0 to 60 s, PR4104 offers a mA output load stability of <0.001%. It also meets standards for harsh environment and 2-3 kVAC 3 port galvanic isolation level, and signal to noise ratio of >60 dB.

5.3 General description

Supply voltage, universal..... 21.6...253 VAC, 50...60 Hz or 19.2...300 VDC
Isolation voltage:.....Test / working 2.3 kVAC / 250 VAC
Response time Temperature input, programmable (0...90%, 100...10%).....<20 ms
Max. power / Internal consumption:..... ≤ 2.5 W/≤ 2.0W
Signal / noise ratio..... > 60 dB
Accuracy:.....better than 0.05% of selected range
Cut off Frequency..... >40 Hz
EMC immunity influence ..... < ±0.5% of readout
Extended EMC Immunity, NAMUR NE21, Criterion, burst ..... < ± 1% of span

5.4 Input Specifications:

Current input:
Signal range..... ± 23mA
Programmable measurement ranges .....0..20 and 4...20 mA, ± 10mA and ± 20mA
Input voltage drop..... 1.4V @ 20mA
Loop error detection 4..20mA High/Low .....>21 mA/ < 3.6 mA
2 wire / 3 wire loop supply ..... >16V/20mA/ >18V/20mA
Loop supply limitation.....30mA

Voltage input:
Signal range.....±12 VDC
Programmable measurement ranges 0/0.2 .....1; 0/1...5 VDC;0/2..10VDC; ±1 ±5 ±10V

Input resistance..... Nom. > 2 MΩ

5.5 Output specifications

Current output:
Signal ranges ..... (unipolar/bipolar)0...23 mA/ -23.. +23 mA
Load stability..... ≤0.001% of span / 100 Ω
Current limit (unipolar/bipolar).....≤ 28 mA/ ± 28mA
Output limitation, on 4...20 and 20...4 mA signals ..... 3.8...20.5 mA
V-Curve function, active signals 100-0-100%.....20-0-20mA
Load (max) ..... 800 Ω / ± 16V @ 20mA

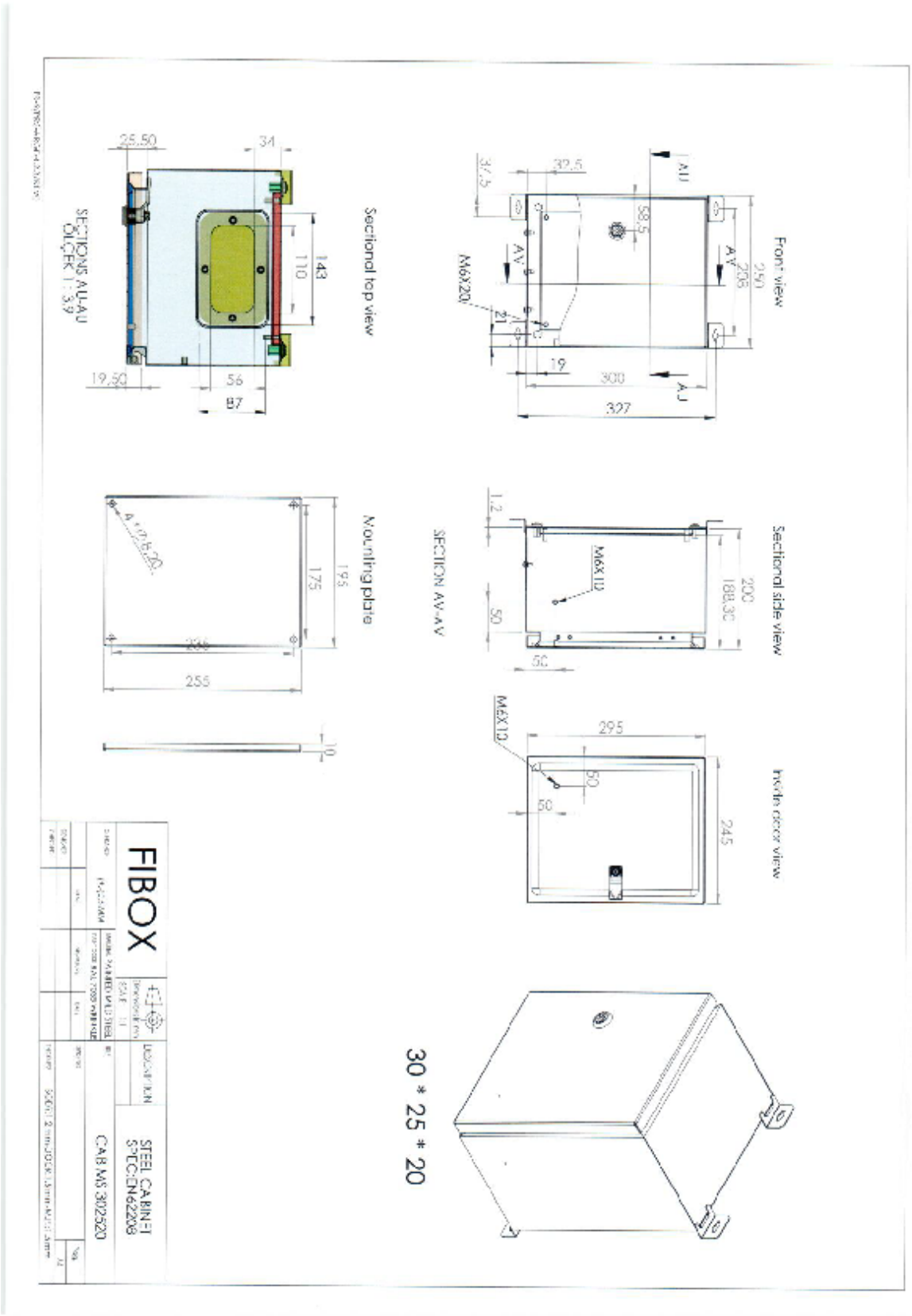
Active unipolar and bipolar mA output/ Direct or inverted action:
Programmable ranges .....0..20 and 4...20 mA, ± 10mA and ± 20mA

Voltage output:
Programmable ranges Direct or inverted action .....0/0.2 .1; 0/1..5; 0/2..10; ± 1,5,10V
V-Curve function 100-0-100% .....1-01-, 5-0-5 and 10-0-10V
Load min resistance.....> 500KΩ
Programmable damping, current signals..... 0.0 . 60.0 s
Output limitations uni/bipolar mA signals.....0 and 115% /± 115% of max value
Passive 2 wire mA output..... 0.20 and 4...20 mA
V-Curve function, passive signals 100-0-100% 20-0-20mA
Unipolar limit outside range from 0/with offset 0 and 115%/ -5(min) 115% max value
On bipolar outside range.....± 115% of max value
Sensor error indication at 4.20mA..... Low, High, Zero
Input selectable.....None

5.6 Approvals:

EMC 2004/108/EC
LVD..... 2006/95/EC
EAC..... TR-CU 020/2011
DNV Marine ..... Stand. f. Certific. No. 2.4
UL..... UL 508
FM..... 3025177

6 CONTROLBOX, PLACEMENTS OF HOLES



http://gateway.solar.dk/SGS/weblink/media/pdf/dk/106660/CAB%20MS%20302520.pdf

January 29 th, 2016

MANUFACTURER'S DECLARATION

This declaration is to certify that the enclosure products described below, distributed by Fibox Oy Ab, Finland, conform to the following product characteristics and standards.

CAB MS series

Materials Used :

Body of enclosure : Painted Mild Steel
Door of enclosure : Painted Mild Steel
Mounting plate of enclosure : Galvanised Steel
Gasket : Polyurethane foam gasket

Temperature range

In continuous use	*-40°C - +80°C*
Short term use	*-40°C - +120°C*

Ingress Protection : IP 65

Impact Strength : IK 10

The products conform to the following standards:
EN/IEC 62208, Empty enclosures for low-voltage switchgear and controlgear assemblies

Pawel Wieliński
Director, Product Management

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Email: info@fibox.fi
www.fibox.com

7 MAINTENANCE OF SHAFT-GROUNDING SYSTEMS

1. Always keep the system clear of dust, grease and water.
2. When cleaning the silver bands of grease and dust, an Electro cleaner should be used.
3. When polishing the silver bands, use the glass brush, which is delivered with the system.

Never use abrasive cloth, file or other abrasives.

4. Once a month (or when needed) clean the brushes and brush boxes of dust, because the dust can cause the brushes to stick in the brush box and thereby cause a bad connection between the silver band and the brush.
5. The spring pressure of the brushes should be 500-600 gr.
6. Make sure that there is always a good electrical contact at all screw- and bolt connections.
7. Make sure that the earthing plate is in welded connection with the hull all the times.

8 BAC SHAFT GROUNDING DEVICES

BAC NO: 539525
STANDARD SHAFT GROUNDING ASSEMBLY

This system forms connection between shaft and hull without any kind of monitoring, which means that there is no possibility of knowing if the connection and safety of the system is functioning correctly.

BAC NO: 539500
SHAFT GROUNDING ASSEMBLY WITH mV- METER FOR MONITORING

This system is identically with BAC Shaft Grounding for computer control, though this system consists of a steel box with instrument for monitoring.

BAC recommends this system as the most sold and versatile solution on the market.

BAC NO: 539600
SHAFT GROUNDING ASSEMBLY WITH mV- METER AND AMPLIFIER
FOR ALARM OUTPUTS

This system is identically with BAC Shaft Grounding assembly with mV-meter for monitoring, though this system is extended with an isolation amplifier. This makes it possible to connect the system directly to the alarm computer in the ship with a signal on 4-20 mA or it can be used with a signal on 0-20 mA.

BAC NO: 539800
SHAFT GROUNDING ASSEMBLY FOR MAN ENGINE

With reference to specification from MAN, info no. 300155, Ident no. 0792182-1. Shaftline earthing device.

Please note following:

When you order a BAC Shaft Grounding system the price of the silver band is depending on the size of the shaft, and therefore the cost of the silver band will be quoted separately. Please contact BAC; we can help you with commercial terms and calculations.

It is very important that the Shaft Grounding system is equipped with a kind of measuring instrument, which can show the function of the system.

BAC is able to update the different BAC Shaft Grounding systems. For instance, with a mV-meter for monitoring or amplifier for alarm output giving you a better and precisely measure of the system.
BAC can further more offer you an alarm system to ensure that the connection between the shaft and hull is according to BAC standard specifications.

9 DOCUMENTATION ON CD

10 Data sheet