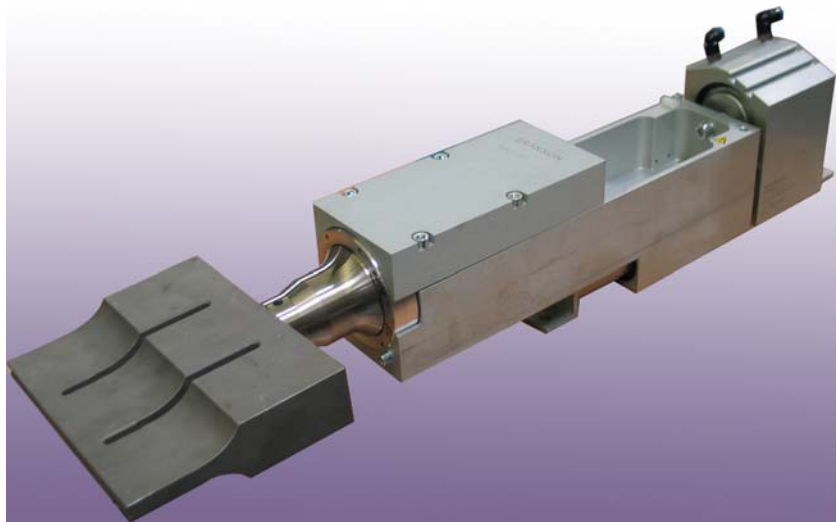


Actuator aocm



Operating Manual

EDP no.: 011-003-986 EN

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1 Read This Chapter First

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1.1 Read This Chapter First

This operating manual has been written with the following intentions:

- Readers are to include all those who work with and on the unit, especially the operating and maintenance personnel.
- Information is provided on the intended use of the unit as well as its operation and features.
- Information is organised such that it is quick and easy to find with the help of:
 - Table of contents
 - Index
 - Chapter contents at start of each chapter



WARNING

We expressly inform you that you are obliged to read this operating manual before starting operation with the unit and to work with the unit according to the instructions provided herein. Using the unit as intended will avoid injury to persons and damage to property. To eliminate the risk of injury or damage, it is extremely important that the operating personnel are authorized and qualified to work with the unit.

We cannot accept liability for damage caused by improper use that could have been avoided.

1.2 Availability of This Operating Manual

Always keep this operating manual close at hand in the operating area.

1.3 Copyright

Actuator: aocm

© 20.01.2011 BRANSON Ultraschall, D-63128 Dietzenbach

The aocm actuator and this operating manual are protected by copyright. Reproduction of any part of the machine will lead to prosecution. All rights to this operating manual are reserved, including any form of reproduction, whether by means of photocopying, printing, translation or through storage on a data medium. Reproduction or reprinting of this operating manual, even in an abridged form, requires the written consent of BRANSON Ultrasonics.

This operating manual contains the most exact product description possible; nonetheless, specific characteristics or operating results are not guaranteed. Prior to publication, this operating manual was thoroughly checked for possible errors. However, the publishers assume no liability, whether explicit or implicit, for any damage resulting from the use of this operating manual. We are always grateful for information concerning errors, as well as any criticism and suggestions you may have to improve this operating manual!

Unless otherwise stated, the technical status upon joint delivery of the product and the operating manual by BRANSON Ultrasonics is authoritative. We reserve the right to make technical changes without prior notice. Previous operating manuals are then no longer valid.

The BRANSON Ultrasonics General Conditions of Sale and Delivery apply.

Do you have questions? Or problems with installation and startup?
Call us! We will be glad to help you!



BRANSON Ultraschall
Branch office of EMERSON TECHNOLOGIES GmbH & Co.
Waldstrasse 53 - 55
63128 Dietzenbach, Germany
Telephone +49 (0) 6074 497 - 784
Fax +49 (0) 6074 497 - 799
Internet: www.branson.de

Dietzenbach, 20. January 2011

1.4 Product Liability, Intended Use, and Warranty

We guarantee that the product is free of faults as stated in our advertisements, in the product information we have published, and in this operating manual. We do not guarantee any other product features. We do not accept responsibility for the profitability or proper functioning of the unit when used for purposes other than those described in chapter 2.4.

Claims for damages are generally excluded, except after proof of intentional gross negligence on the part of BRANSON Ultrasonics or the absence of guaranteed product properties. In particular, we do not accept responsibility for cases where the welding machine is used for purposes for which it is not intended as defined in this operating manual. We are not liable for the consequences of unintended use involving using units in surroundings or with control systems that are not suited for the welding machines or do not comply with standard engineering practice.

Moreover, we decline any liability for damages to welding and automation systems caused by product malfunctions or errors in the operating manual.

We are not responsible for the violation of patents and other rights of third parties outside of the Federal Republic of Germany. We are not liable for damages due to inappropriate handling as defined in this operating manual. We explicitly exclude liability for profit loss, particularly owing to consequential damage resulting from non-compliance with safety regulations and warnings. We are not liable for consequences caused by accessories which are not supplied or certified by BRANSON Ultrasonics; this applies especially to tools from other manufacturers.

BRANSON welding systems are designed for a long service life. They are designed in accordance with standard engineering practice and each function is tested separately prior to delivery. The electrical construction complies with current standards and regulations. BRANSON Ultrasonics continually conducts product and market analyses for further development and improvement. Should malfunctions or failures occur despite these preventive measures, please contact the customer service at BRANSON. We guarantee that we will provide immediate and suitable measures for repairing any damage that ensues.



Service Hotline
+49 (0) 6074 497 - 784

1.5 Warranty Terms

We hereby guarantee the trouble-free operation of the units in accordance with this operating manual for a period of 36 months following the delivery date on the delivery notice. If the system is operated in multiple shifts, the warranty period is reduced accordingly, to either 18 or 12 months. Special conditions apply to wear parts such as horns and fixtures. Similarly converters are excluded from the guarantee if they are used for applications involving ground detect.

The warranty period begins on the date the machine is delivered to the buyer, regardless of the actual initial startup date. The warranty is valid only for units that have been installed and operated as described in this operating manual and as instructed by employees of BRANSON Ultrasonics. Free repair work requires proof of adherence to the operating manual regarding storage, transport, installation, startup, and operation.

A unit may only be modified by the customer or a third party after having consulted with and received written consent from BRANSON Ultrasonics. Disregard of these terms annuls the warranty and BRANSON Ultrasonics will not accept responsibility for any property damage, personal injury, or other resulting damage.

Furthermore, BRANSON Ultrasonics will not accept responsibility for defects caused by the use of damaged or malfunctioning equipment in the vicinity of the welding machine or by the use of accessories not supplied by BRANSON Ultrasonics. Tools manufactured by other firms must be individually tested and approved by BRANSON Ultrasonics in order to maintain the warranty.

Furthermore the BRANSON Ultrasonics General Conditions of Sale and Delivery apply.

If you have questions regarding the scope of the warranty, please contact your BRANSON representative or the BRANSON customer service department.



2 Safety Instructions and Service

2.1	Safety and Warning Notes	2-2
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This chapter describes the safety symbols used in the manual and on the products, and provides additional safety information regarding ultrasonic welding. Furthermore it informs you how you can contact BRANSON in the event of questions.

2.1 Safety and Warning Notes

2.1.1 Symbols Used in This Manual

This chapter informs you on recurring signs in the operating manual. These signs provide you with a quick overview.

Observe the following safety signs and instructions that can be found in this operating manual. They warn you of hazards and their consequences.



DANGER

Dangerous situations which could result in personal injury and/or serious damage to the unit.



WARNING



Possibly dangerous situation that could result in minor to medium injuries and damage to the unit.



NOTE

Tips on usage and other important or useful information and instructions.

Table 2-1 Safety Instructions on BRANSON Units

Pictogram	Description
	Hazardous area warning.
	Electrical hazard warning

2.2 Operating Personnel: Authorised Personnel



DANGER

Only authorised personnel may carry out installation and maintenance work on the unit!
Improper operation and maintenance of the unit may be hazardous to persons, objects, and the environment.

Authorised personnel:

- Are operating personnel who have been specially instructed and trained to **operate the unit**.
- For **setup, maintenance and installation work** are the trained specialist personnel of the owner/operator and the manufacturer.
- Must all be familiar with the safety equipment and regulations and have read the relevant operating manuals.

2.3 Sources of Danger Specific to Ultrasonic Technology

Always observe the following general instructions when using ultrasonic technology:



DANGER

**Never place your hands between the horn and the weld part fixture. Danger of being crushed!
Do not touch the horn while it is being subjected to ultrasonic vibrations. Risk of burns!**



WARNING

Only start the ultrasonic power supply (i.e., press the TEST button, press both palm buttons, or send an external start signal) when the HF cable and converter are connected to it.

Avoid direct contact between the horn and metal while the horn is subjected to ultrasonic vibrations. This can destroy the unit.

In the descriptions of each activity, you are informed of other possible sources of danger.

Volume and Frequency

The following factors can influence the volume and frequency of noises generated during ultrasonic processes:

- Type of application
- Size, form and composition of the material to be welded
- Form and material of the weld part fixture
- Welding parameters
- Design of the welding tools

During the welding process, some weld parts vibrate within the audible frequency range. Some or all of these factors can cause an unpleasant noise level. In such cases, personal protective equipment has to be issued to the operating personnel. See chapter 2.7.

2.4 Intended Use of the Unit

The aocm actuator is a component of an ultrasonic welding system. It has been designed for a wide range of welding and processing applications.

It is used to generate the weld force required for joining thermoplastics by means of ultrasonics. For this purpose, the actuator is equipped with a welding unit. The welding unit, consisting of converter, booster and horn, transmits the mechanical vibrations to the parts to be welded.



NOTE

Intended use is defined as usage of the unit as described in the operating manual.

The actuators are only intended for use in special machines and have to be incorporated into the safety concept of the machine. The possible risks have to be determined by means of a risk analysis, and the appropriate measures have to be taken to eliminate them.

The owner/operator is responsible for carrying out the work required to connect the welding system to a third-party system, such as a PLC.

The specifications of the order, as well as the order confirmation, are binding for the owner/operator. Using the unit in any other ways or in ways which go beyond those specified here are considered to be unintended use.

Using the aocm actuator other than intended may cause damage to it or any other connected systems. Furthermore there is the danger of injury and consequential damage. The owner/operator carries sole liability for any unauthorised changes to the actuator and its components.

2.5 Safety Checks



NOTE

Check the safety features at the intervals specified by the employer's liability insurance association!

2.6 Safety during Maintenance and Installation

2.6.1 Work on Electrically Live Components

**DANGER**

Only persons authorised for the tasks are to carry out maintenance and installation work.

**DANGER**

Touching live components can cause extremely serious or even lethal burns as well as internal injuries from electric shock. Always check a circuit before working on it!

Only work on electrically live components when this is expressly required.

Only use appropriate and intact tools and gages!

2.6.2 Installation and Maintenance Work

If the instructions in this manual specify that safety equipment be removed for installation or maintenance work, it is imperative to replace them after you have finished work. Remove safety features only if necessary. This applies especially to covers and ground cables.

**DANGER**

Prior to installation and maintenance tasks de-energise all system components and the pneumatic system.

2.7 Emissions

Due to the wide range of applications and operating locations, it is not possible to provide you with generally valid specifications on the sound pressure levels. We recommend that you measure the sound pressure levels before starting production.

Should the measured sound pressure levels exceed the permitted momentary or permanent levels, then appropriate sound insulation measures are necessary, such as a sound insulation cabin or hearing protection!



NOTE

The required sound insulation features might not be part of the standard delivery.

BRANSON sound insulation cabins fulfil the special requirements of ultrasonic technology and have been specially developed for applications where the weld part generates audible sound waves.

Furthermore processing some types of plastics can generate poisonous vapours, gases or other emissions, which pose a hazard to the health of the operating personnel. Workplaces where such materials are processed have to be well-ventilated. If you are processing such materials, contact your supplier for information on recommended safety measures.



WARNING

Many of the processed materials, for example PVC, pose a hazard to the health of the operator or could cause corrosion and other damage to the units. Make sure that there is good ventilation and adhere to the safety measures.

2.8 Workplace Setup

To ensure safe operation of the ultrasonic welding machine, the measures for setting up the workplace are described in chapter 5.

2.9 Sales and Delivery Conditions

The excerpts from the sales and delivery conditions (see the back of the invoice) contain important stipulations regarding the product liability for the BRANSON ultrasonic welding machine. The points listed mainly address delivery, shipment and the duration of the warranty. If you have any questions, please read the back of the invoice that is included with the system. It lists all sales and delivery conditions. Or contact your BRANSON representative.



The BRANSON Ultrasonics General Conditions of Sale and Delivery apply.

3 Product Description

3.1 Components for Constructing an Ultrasonic Welding System 3-2

3.2 Overview of the Actuator 3-3

3.3 Dimensions of the Actuator 3-5

3.4 Description of Components 3-7

3.5 Description of the Optional Components 3-10

3.6 Power Supplies 3-13

To set up a welding machine with an aocm actuator, you require the following system components:

- Actuator
- Mechanical stack, consisting of converter, booster and horn
- Ultrasonic power supply
- Pneumatic system with maintenance unit and pressure regulator
- PLC (if not integrated into the power supply)

3.1 Components for Constructing an Ultrasonic Welding System

3.1.1 Converter

The ultrasonic power supply generates high-frequency electrical vibrations. These are converted to mechanical vibrations by a sound converter.

3.1.2 Booster

A booster (mechanical transformer) is connected to the converter. The booster transforms the constant vibrations that are delivered by the converter and transmits them to the horn. The vibration amplitude is determined by selecting between various boosters.

Tab. 3-1 Transmission ratios of the booster

Amplification > 1		Amplification = 1		Amplification < 1	
Ratio	Colour	Ratio	Colour	Ratio	Colour
1 : 1.5	gold	1 : 1	green	1 : 0.6	purple
1 : 2.0	silver			1 : 0.5	blue
1 : 2.5	black				

3.1.3 Horn

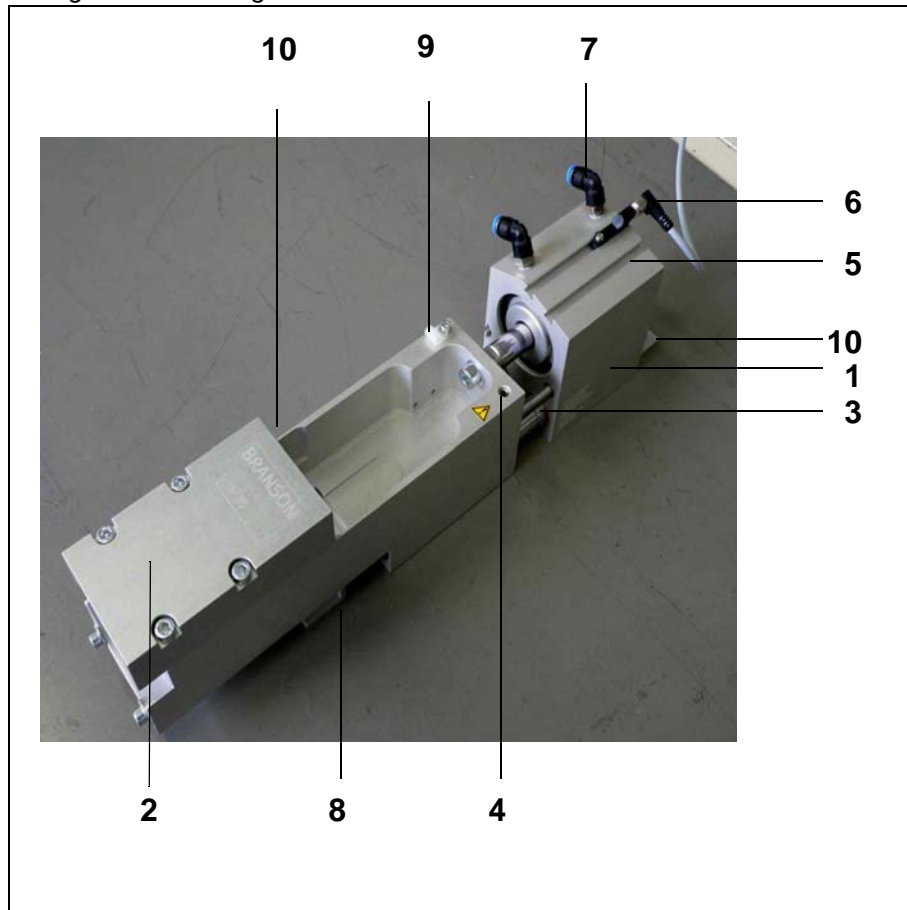
The horn (welding tool) focuses and amplifies the longitudinal mechanical vibrations and applies them to the welding zone where they cause plasticisation.

The horn is individually custom-made for each application and has a variety of possible forms.

3.2 Overview of the Actuator

The aocm actuator is part of an ultrasonic welding system, and available in the following work frequencies: 20 kHz, 30 kHz and 40 kHz.

Fig. 3-1 Design of the aocm standard actuator



Design:

1. Pneumatic cylinder (dual-action) with integrated dampening at upper limit switch
2. Carriage as stack fixture
3. Mechanical stop 0 – 50 mm
4. Set screw of the mechanical stop
5. T-grooves for sensors
6. Upper limit switch monitoring
7. Swivelling air connection (PU6)
8. Mounting Brackets
9. Cable Clamp
10. Additional fastening options

Tab. 3-2 Technical data of the aocm actuator

Technical Specifications	Unit	aocm 20	aocm 30	aocm 40
Fastening, rear Centre hole		2xM8, 20 deep 8H7, 12 deep	2xM8, 20 deep 8H7, 12 deep	2xM8, 20 deep 8H7, 12 deep
Fastening, front		4xM8, 20 deep	4xM8, 20 deep	4xM8, 12 deep
Weight	kg	6.95	4.25	2.95
Max. travel distance	mm	50	50	50
Work area	mm	5-45	5-45	5-45
Piston diameter	mm	63	50	32
Booster, ring diameter	mm	82.5	67.5	49
Max. force at 6 bar	N	1870	1170	480
Closing force at 6 bar	N			
Air consumption at 6 bar and max. column distance	l	1.2	0.8	0.4
Frequency	kHz	20	30	40
Suitable converters	-	902R-shv	CR30	4TH
		SHV		

Optional components

- Additional Fastening Options
- Analog linear encoder 0 - 10 V/ 0.1 mm
- Lower limit switch 0.1 mm (LLS)
- Distance-dependent trigger 0.1 mm (TRS)
- Pneumatic assembly
- Indexed tool change system (QES)

3.4 Description of Components

3.4.1 Pneumatic cylinder

The actuator is moved by means of a pneumatic cylinder. The pneumatic cylinder is equipped with a dampening at the upper limit switch. It brakes the piston when it moves back to the final position.

You have to set the speed of movement of the piston at a pre-connected throttle valve.

3.4.2 Carriage as stack fixture

The carriage serves as receptacle for the stack. The stack is fastened by means of the limit screws and the cover.

3.4.3 Mechanical stop

The mechanical stop limits the stroke of the horn and the carriage. This protects the weld part and horn against possible damage.

3.4.4 Set screw

The mechanical stop is fixated by means of a cap screw.

3.4.5 T-grooves for sensors

The T-groove is 8 mm wide. The sensors are installed in the T-groove:

- Upper limit switch monitoring
- Trigger switch
- Lower limit switch
- Linear encoder

3.4.6 Upper limit switch monitoring (REED)

The upper limit switch of the cylinder is monitored means of a Reed contact. The Reed contact is not suitable for use as safety component.



NOTE

The contact is not proof against short-circuits or polarity reversal.

Tab. 3-3 Technical data - upper limit switch monitoring

Technical Specifications	Unit	Value
Operating voltage	V	10 - 30
Max. output current	A	0.5
Max. switching power, DC	W	10
Switching time		
Opening	µs	5
Closing	ms	0.6
Switching precision, reproducible	mm	0.1
Ambient temperature	°C	-20...60
Protection type	IP 65 / IP 67	
Connection	M 8*1, 3-pin	

3.4.7 Air Connection PU6

The actuators can be connected to all customary pneumatic systems. The scope of supply of the actuator unit includes an L-shaped connector for the PU6 hose. You should:

- Use a pneumatic system with maintenance unit, pressure regulator and
- short compressed air lines.

3.4.8 Mounting Brackets

The actuator can be aligned as desired for installation, and fastened with any of three fastening options:

- From the front
- By means of the two mounting brackets
- At the rear of the cylinder

For more information on installation, refer to chapter 5.3.2.

3.4.9 Additional Fastening Options

By using the four threaded bore holes at the side, additional components can be attached.

3.4.10 Cable Clamp

The cable clamp is used to release the tension at the RF connector.

3.5 Description of the Optional Components

3.5.1 Linear encoder

With the linear encoder, you can record the horn position and monitor the process. It is equipped with integrated signal processing, analog electric outputs and a visual operating status display. You can install the linear encoder in the T-groove.

Tab. 3-4 Technical data - linear encoder

Technical Specifications	Unit	Value
Operating voltage	V	15...30
Analog output	V mA	0...10 0...20
Linear encoding range	mm	50 ±2
Resolution, distance	mm	0.064
Ambient temperature	°C	-20...50
Protection type	IP65/IP67	
Connection	M8*1, 4-pin	

3.5.2 Trigger Switch

You can use this inductive sensor to trigger and deactivate the ultrasonics at defined points. The max. switching distance is 6 mm.

Tab. 3-5 Technical data - trigger switch

Technical Specifications	Unit	Value
Operating voltage	V	10...30
Rated operating current	mA	≤200 mA
Repeat accuracy	mm	≥0.1
Ambient temperature	°C	-25...70
Dimensions	mm	26x18x16
Protection type	IP67	
Connection	M12x1 plug connector	

3.5.3 Pneumatic Components

The actuator can optionally be equipped with the following components:

- Pressure-regulator valve with manometer for setting the welding pressure
- A throttle valve for controlling the downspeed
- Solenoid valve

The pneumatic unit (PEaocm) combines these components into one device.

Tab. 3-6 *Technical data of the pneumatic system*

Technical Specifications	Unit	Value
Operating pressure	bar	7
Pressure control range	bar	0.5 - 7
Measuring range, manometer	bar	0 - 6
Nominal flow l/min	l/min	400
Nominal flow in direction of throttle valve.	l/min	38
Ambient temperature	°C	-5...50
Nominal width	mm	6
Control pressure, solenoid valve	bar	3-8
Protection type	IP 65	
Control voltage	24 V, DC	

3.5.4 Indexed tool change system QES (Quick Exchange System)

To prevent having to realign the stack after a tool change, it is possible to attach and fixate it to the converter by means of a positioning ring.

3.6 Power Supplies

The aocm actuator has been designed for use with the following Branson units:

- A Digital Compact ultrasonic power supply
- A Professional Compact ultrasonic power supply

The following adapter is available for use with the power supplies of the 2000t/ea series:

- 2000 aocm EDP no.: 011-004-114

Operating manuals of the compatible power supplies

The following documentation is available for power supplies that are compatible with the aocm actuator:

- Operating manual
Digital Compact EDP no.: 011-003-944
- Operating manual
Professional Compact EDP no.: 011-003-977
- Operating manuals of the power supplies:
2000ea EDP no.: 011-003-957
2000t EDP no.: 011-003-958

4 Delivery and Handling

The actuator and the horn components can be damaged if the unit falls, or if it is transported or handled improperly.

4.0.1 Delivery

BRANSON actuators are carefully inspected and packaged prior to shipment. Carefully check the actuator upon delivery:

- Directly after delivery, check whether the actuator has been damaged during transport.
- Check the delivery note to see if the delivery is complete. Keep in mind that some components might be packaged together with other components.
- Check whether assembled components have become loose during transport, and tighten the respective screws, if necessary.
- Examine the control elements, displays and the surface for signs of damage.

Keep the packing materials, the pallets and the distance blocks, in case the unit has to be shipped back at a later time.



NOTE

If you find any damage caused by the transport on the unit or transport packing, immediately inform the freight agency.

4.0.2 Transport

Make sure that your actuator is properly and safely packed for transport. If you transport the stack, be very careful. Even the slightest damage or an improper handling can affect resonance behaviour or cause the destruction of the unit.

Please also adhere to the prescribed ambient conditions.

5 Installation and Setup

5.1 Steps for Assembling the Actuator 5-2

5.2 Assembling the Stack 5-2

5.3 Mounting the Actuator 5-5

5.4 Installing the Stack 5-8

5.5 Mechanical Stop 5-10

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5.7 Connecting the Optional Components 5-15

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5.1 Steps for Assembling the Actuator

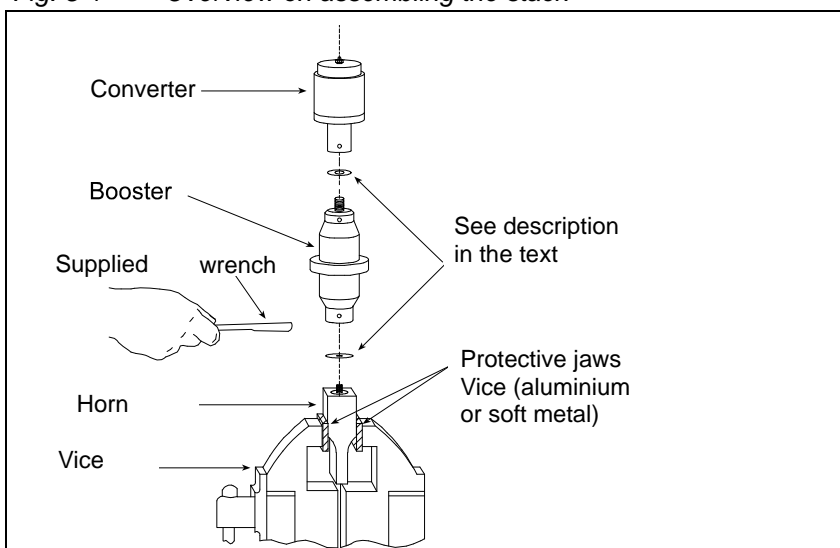
The actuator is intended for use in special systems. Read this chapter thoroughly before assembling the actuator.

Also observe the manuals of the respective components, as well as the manual of the power supply used.

5.2 Assembling the Stack

The mechanical stack consists of converter, booster and horn.

Fig. 5-1 Overview on assembling the stack



To assemble and service the stack, you need the following tools:

Table 5-1 Tools

Tool	EDP no.
20 kHz torque wrench (set)	011-803-010
20 kHz hook wrench	201 118 019
20 kHz ½", 10 Mylar washers	100-063-471D



WARNING

The stack is a precision acoustic instrument, which must be handled with the utmost care. Even the slightest damage or improper assembly can drastically affect resonance behaviour or cause the destruction of the unit.

Proceed with the assembly as follows:

1. Make sure the booster and horn screws are securely in place. A loose screw can possibly damage the toothing at the tip. Therefore replace any loose screws.



WARNING

Only use BRANSON horn screws, as they are specifically designed for ultrasonic loads.

Use a torque wrench (SW hexagon socket) to tighten the new horn screw in accordance with the torques listed in table 5-2.

2. Clean the coupling areas (= contact surfaces between the three components) and the threads at the converter, booster and horn with a damp, lint-free cloth.
3. Apply tiny drops of silicon grease to both coupling areas of the booster (available from BRANSON). Evenly distribute the grease over the mating surface.



NOTE!

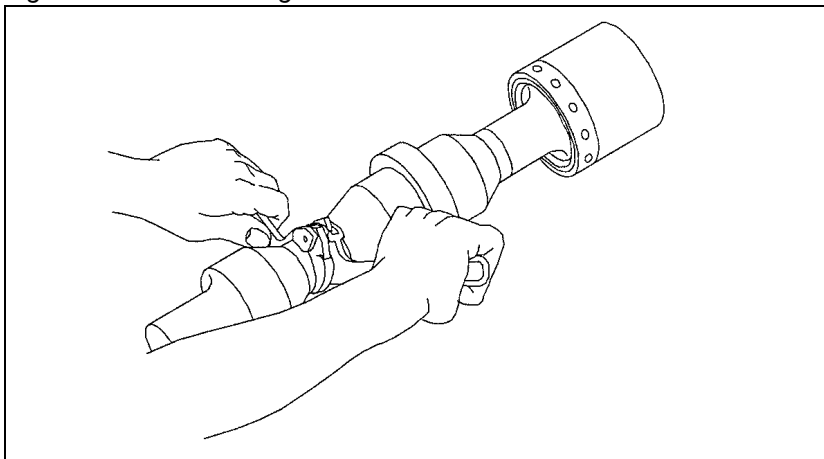
Use BRANSON Mylar washers.

4. First screw the converter and the booster together, and then the converter/booster and the horn. Use a torque wrench. Observe the specified torques.

Table 5-2 Torques for 20 kHz converter and components

Horn screw			Torque for components	
Thread	SW hexagon socket	Torque	Converter - booster	Booster - horn
1/2"	1/4"	50 Nm	35 Nm	35 Nm
3/8"	3/16"	35 Nm	35 Nm	35 Nm

Fig. 5-2 Assembling the horn



5. Carefully tighten both components together using a torque wrench. In the case of boosters and standard cylindrical horns with diameters of up to 132 mm, there are three blind holes on the circumference. Rectangular horns can be carefully clamped into a vice that has soft metal clamping jaws (brass or aluminium).

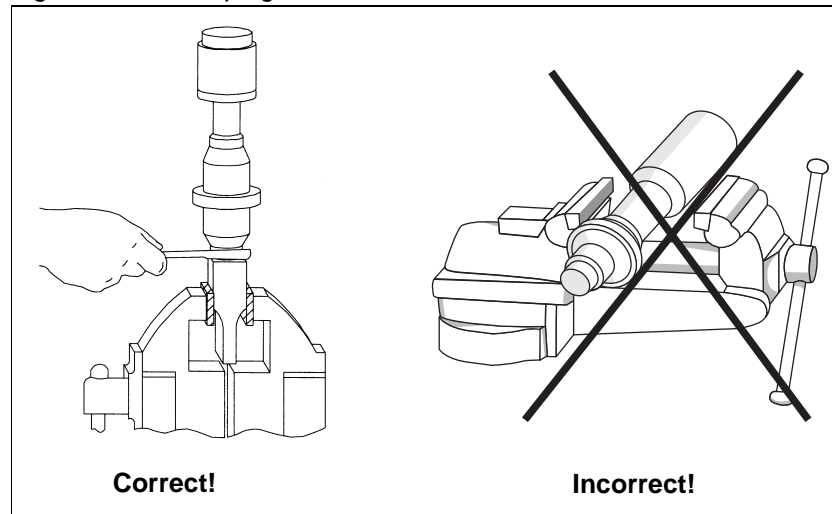


WARNING

Never clamp the booster or the converter in a vice during assembly or disassembly of the stack; see fig. 5-3. If you frequently have to assemble stacks, an assembly device specifically designed for this purpose is available from BRANSON.

For the torque values, see chapter table 5-2.

Fig. 5-3 Clamping the stack



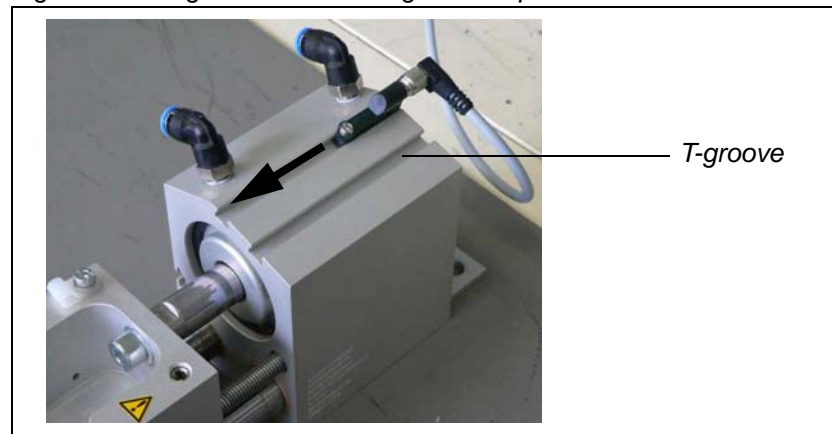
To disassemble the stack, follow the above steps in reverse order.

5.3 Mounting the Actuator

5.3.1 Equipping the Actuator

- Use the T-groove at the actuator to fasten the components. The individual components are adjusted after the actuator has been installed.

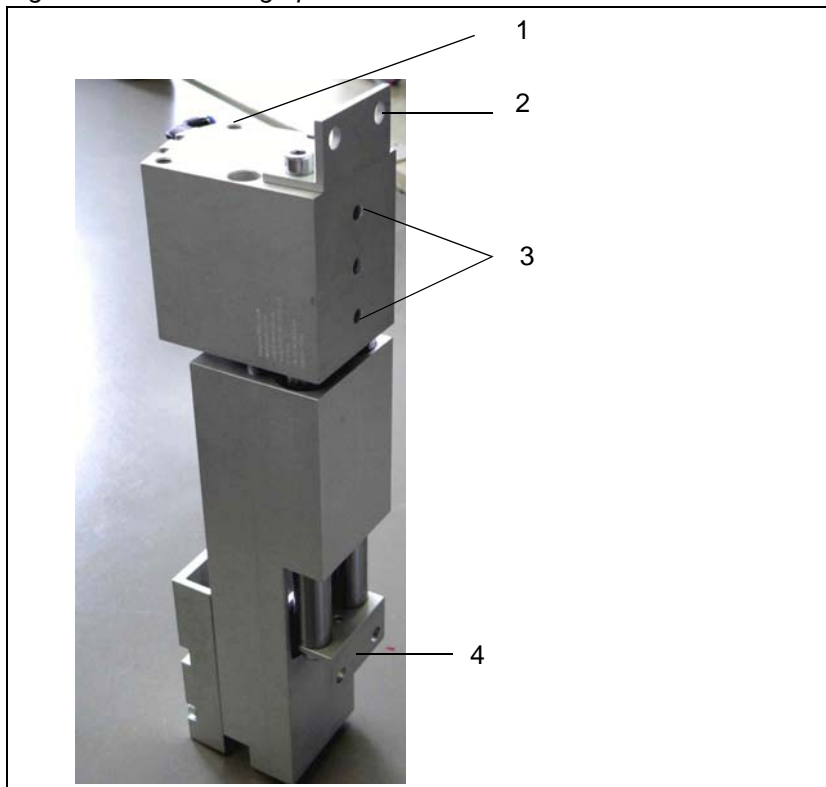
Fig. 5-4 T-groove for installing the components



5.3.2 Mounting the Actuator

The actuator can be fastened in various different ways:

Fig. 5-5 Fastening options



1. At the front
2. Upper mounting bracket
3. At the rear of the cylinder
4. Lower mounting bracket

When installing the actuator, pay attention to its dimensions. The optional components (linear encoder and throttle valve) change the dimensions of the actuator. You can find the data regarding the fastening options at fig. 3-2.

Front



NOTE

The final limit stop is also at the front. Make sure that it is still accessible after assembly.

Read chapter 5.5 for information on adjusting the final limit stop if it is not accessible any more due to front-mounted components.

1. Unscrew the upper mounting bracket.
2. Fasten the actuator by means of two Mx8 screws and washers.

Rear of cylinder

- Fasten the actuator by means of two Mx8 screws and one washer each.

Mounting brackets

When using the brackets as fastening option, an axial alignment of 2° or 1.5° is possible.

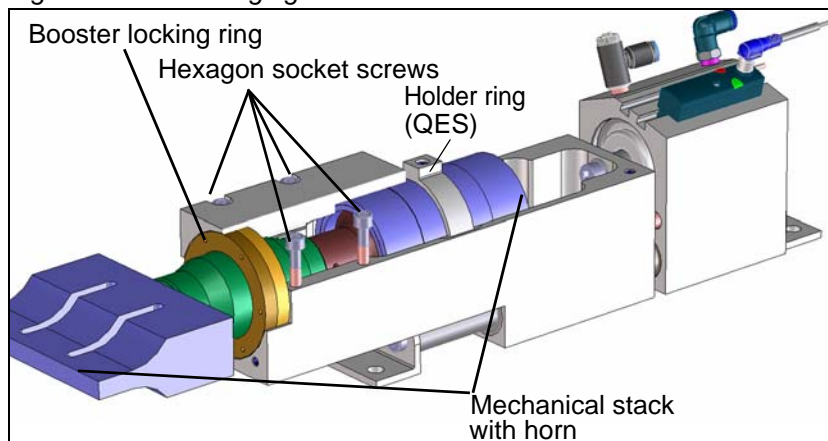
- Fasten the actuator by means of two Mx8 screws and standard washers (optionally also with DIN 7349 washers)
1. Unscrew the mounting brackets.
 2. Release the set screw and adjust the limit stop until the full stroke is possible, see chapter 5.8.
 3. Fasten the actuator at the front by means of Mx8 screws.

5.4 Installing the Stack

The mechanical stack has to be properly assembled prior to installation at the press unit.

1. Release the four hexagon socket screws, and take off the upper part of the casing.

Fig. 5-6 Exchanging the mechanical stack



WARNING

If your actuator is aligned vertically, hold the stack properly when fastening the screws, to prevent it from falling down.

Please ask a second person to help you during installation.

2. Insert the stack in the casing. The booster locking ring rests on the washers.
3. Fasten the casing with the two lower screws in such a way that the stack can be rotated.
4. Align the horn:
 - Insert a weld part in the fixture.
 - Rotate the stack until you achieve the desired alignment to the weld part fixture and the weld part.
5. Then tighten the four screws evenly.

5.4.1 Installing the Stack with a Positioning Ring (Optional)

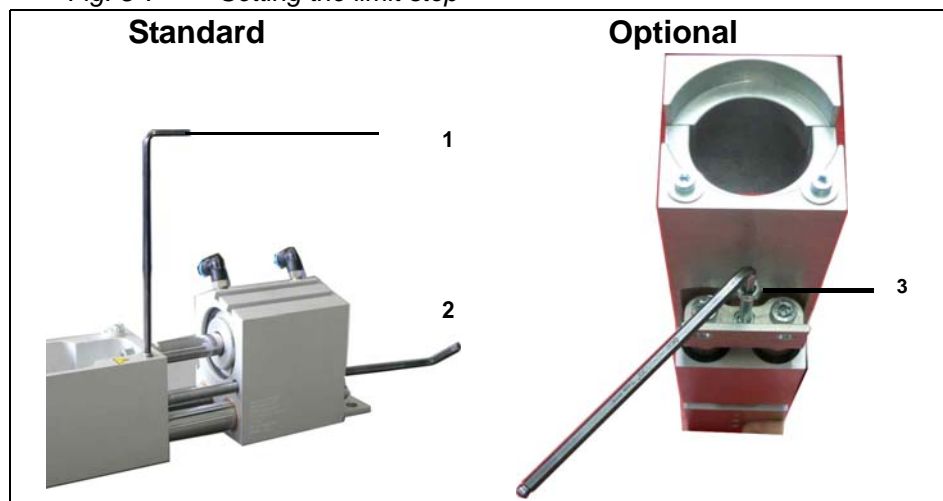
The positioning ring has a contour that has been adapted inside the casing. That means that you only have to align the stack once. The ring ensures that the stack will in future automatically be aligned correctly.

1. Release the four hexagon socket screws, and take off the upper part of the casing.
2. Put the holder ring over the converter.
3. Fasten the casing with the two lower screws in such a way that the stack can be rotated.
4. Position the holder ring as its contour dictates.
5. Align the horn:
 - Insert a weld part in the fixture.
 - Rotate the stack until you achieve the desired alignment to the weld part fixture and the weld part.
6. Then tighten the four screws.
7. Tighten the screw in the positioning ring.

5.5 Mechanical Stop

The mechanical stop is a standard feature. It serves to protect the welding system.

Fig. 5-7 Setting the limit stop



NOTE

The mechanical stop cannot be used to limit the welding distance! It only serves to protect the welding system.

Standard

1. Open the set screw with a size 3 hexagon socket key **(1)**.
2. Manually move the carriage down until the horn is positioned directly above the weld part fixture.
3. Use the size 3 hexagon socket key to rotate the screw clockwise until the carriage has reached the desired position **(2)**.
4. Tighten the set screw again **(1)**.

Optional

1. Release the set screw **(1)**.
2. Move the actuator down as far as possible.

There is a thread at the mounting bracket at the rear of the actuator (fig. 4-7).

3. Screw the Mx6 screw, with nut, into the thread **(3)**.
4. Manually move the actuator down until the horn is positioned directly above the weld part fixture.
5. Turn the screw until the actuator cannot move further down. Secure the setting by means of the nut.

5.6 Pneumatic and Electric Connection



DANGER

Only authorised and specially trained personnel are permitted to connect the actuator.

Make sure that all lines have been de-energised or de-pressurised.

5.6.1 Connecting the Pneumatic System

The pneumatic diagram shows the principle connections using an external one-way restrictor for setting the downspeed.



WARNING

The compressed air has to be filtered.

- Keep the air lines as short as possible. Their length influences the build-up of pressure and thus the potential cycle times.
- Make sure that the solenoid valve at the control connections is supplied with 3-8 bar. That guarantees a work pressure of 1 bar or higher.
- Use a controlled check valve to prevent the actuator from moving, i.e. as a stop function.

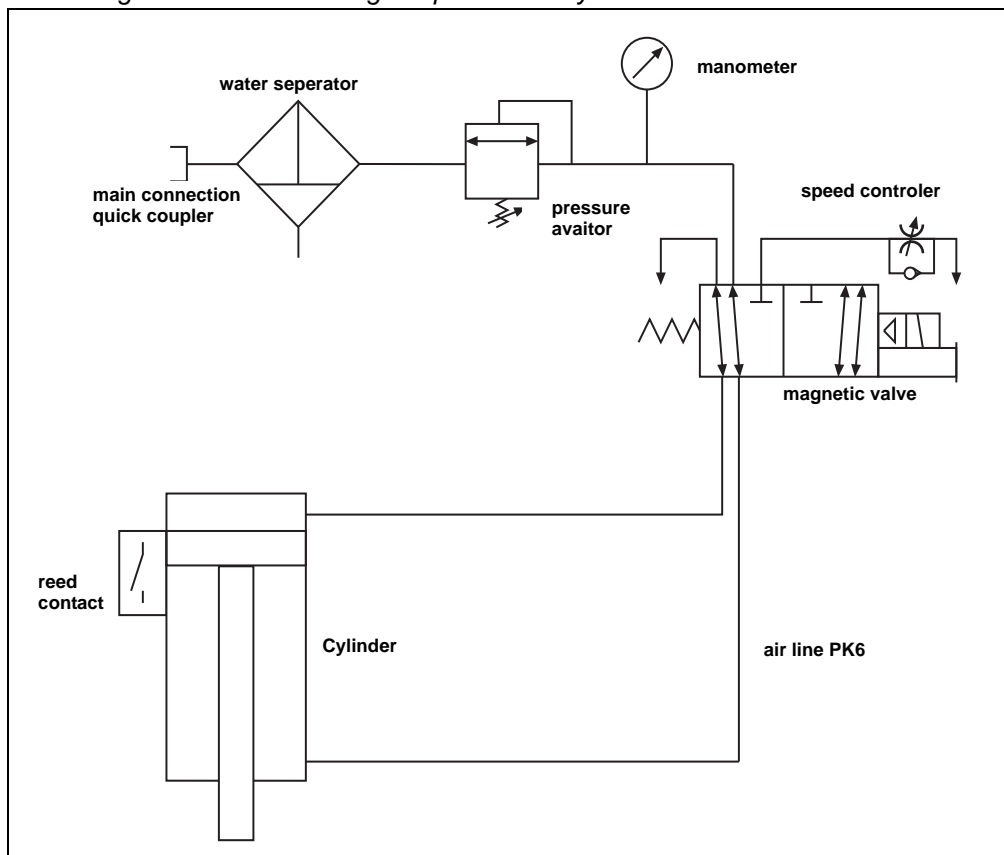
The choice of solenoid valve depends on the control concept of the machine. A valve with centre position is to be used if required.



NOTE

On the diagram illustrating the principle connections, keep in mind the actuator will “lower” when not subjected to supply pressure, and will quickly move to home position when switched on.

Fig. 5-8 Connecting the pneumatic system



5.6.2 Connecting the Electrical System

To connect the actuator, proceed as follows:

1. Connect the RF cable to the converter by means of the plug connectors.



WARNING

When laying the lines, observe the permissible bending radii:

Static: min 30 mm
Dynamic: min 70 mm

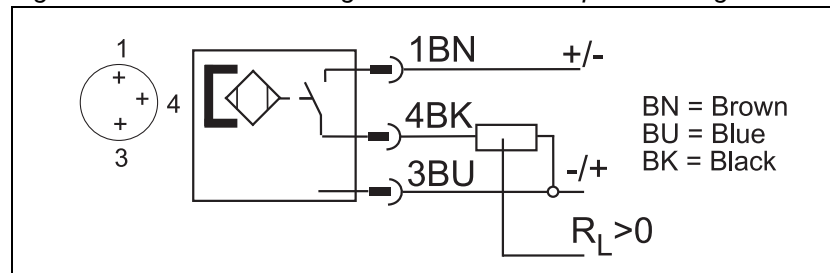
2. Fasten the cable to the cable clamp.
3. Connect the protective conductor to the converter.
4. Connect the RF cable to the power supply.

Upper limit switch:

With the limit switches, a cable equipped with a threaded plug connection is supplied (dimensions: M8x1)

- Connect the cable to the limit stop.

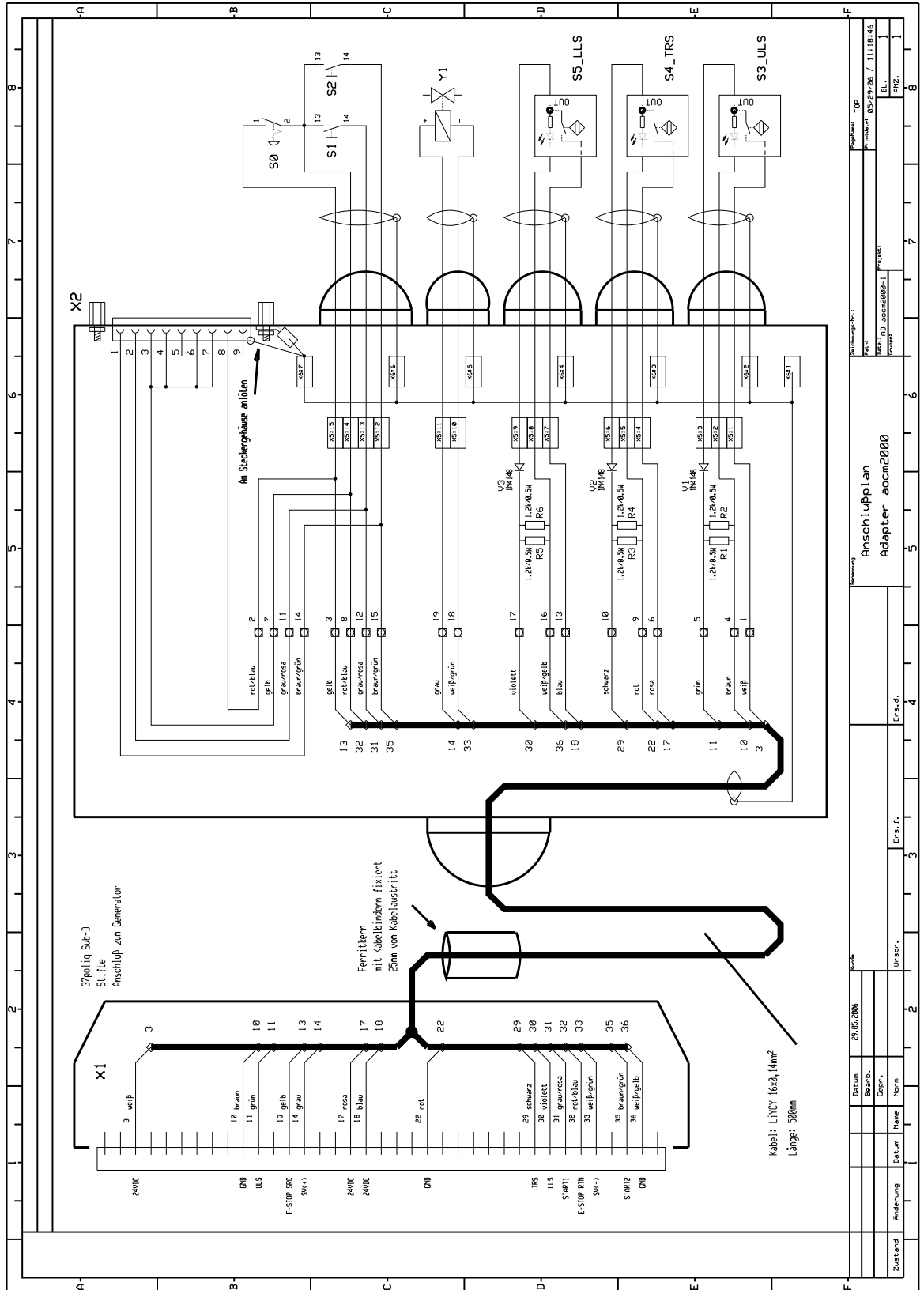
Fig. 5-9 Connection diagram for the limit stop monitoring



ADaocm 2000 adapter

The ADaocm adapter is used to connect the 2000 series power supplies.

Fig. 5-10 Wiring diagram for the ADaocm 2000 adapter



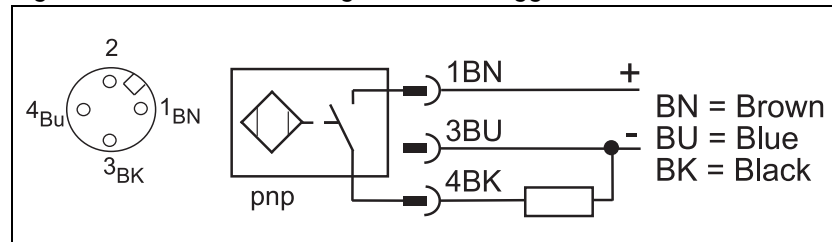
5.7 Connecting the Optional Components

5.7.1 Trigger Switch

A connection cable (dimensions: M12*1) is supplied with the trigger switch:

1. Connect the limit switch with the cable.
2. Connect the trigger switch as shown below.
3. Fine-tune the position of the sensor ($306^\circ = 0.5 \text{ mm}$)

Fig. 5-11 Connection diagram for the trigger switch



NOTE

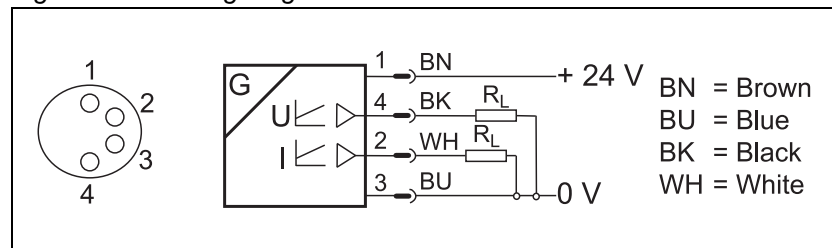
When finetuning the position, observe the manufacturer's manual.

5.7.2 Linear encoder

The linear encoder is supplied with a cable equipped with threaded plug connection (dimensions: : M8*1).

1. Connect the limit switch with the cable.
2. Connect the linear encoder as shown below.

Fig. 5-12 Wiring diagram - linear encoder



5.8 Checking the Installation

1. Open the air supply.
2. Make sure that there are no leaks in the air supply system.
3. Check that the component settings are correct.
4. Insert a test part into the weld part fixture, and do a test weld.

If the actuator moves up and down correctly and the implemented power supply does not issue any alarm messages, the welding system has been connected correctly, and is ready to weld.

5.8.1 Do You Have Questions?

We are happy that you chose our product and will be glad to be assist-
ance if you have questions! If you need support for your products,
please contact your BRANSON representative.



6 Operating the Actuator

This text section describes the execution of a welding cycle by means of the actuator.



DANGER

When setting and operating the actuator, pay attention to the following:

Do not reach underneath the horn.

Downward force (pressure) and ultrasonic vibrations can cause injuries.

Plastic parts can vibrate in the audible frequency range during the welding process. To prevent injuries, wear hearing protection.

A vibrating horn must not make contact with a metal plate or a weld part fixture made of metal.

The AOCM actuator is controlled externally (power supply or PLC). The actuator sends information to the power supply/PLC. For information on configuration, testing, setup and operation, refer to the respective operating manual.



DANGER

When you use larger horns, avoid situations in which fingers can get clamped between the horn and the weld part fixture. If you need optional protective equipment, please contact BRANSON.

Your Service Hotline

**Service Hotline
+49 (0) 6074 497 - 784**

6.1 Welding Cycle

To operate the actuator:

1. A start signal from the PLC starts the welding cycle.
2. The solenoid valve controls the air supply to the pneumatic cylinder. The pistons, and therefore also the actuators, move towards the welding position.
3. When the carriage is moving, i.e. moves away from its defined limit stop, the upper limit switch (REED sensor) sends an “inactive” message to the control system.
4. The signal from the limit switch is used to trigger the ultrasonics after a specific delay.
5. The ultrasonics are switched off after a preset time has expired. During the hold time, the tool cools down, and the melt in the join zone hardens.
6. After the hold time has expired, a solenoid valve is deactivated by means of the control computer. The pistons and horn move back to the upper limit switch. Thereafter you can remove the weld part from the weld part fixture.
7. When the piston has reached the final position again, the limit switch sends an “active” message to the power supply. The next welding cycle can start.
8. Weld several parts with the basic configuration to check the results.

If the achieved welding quality does not match your requirements, you can modify the settings based on the results that were achieved. Between test welds, only change one setting at a time, until you have achieved a weld with max. strength within as short a time as possible. Also refer to the operating manuals of the respective power supply.

7 Maintenance

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7.3	Renewing the Stack	7-5
7.4	Parts Lists	7-7

7.1 Calibration

This product does not have to be calibrated regularly. However, if your application does need regular calibration, for example because specific regulations have to be complied with, please contact your BRANSON representative.



7.2 Maintenance



WARNING

The devices have to be serviced once a year, else the warranty becomes void.



DANGER

Only authorised personnel may carry out installation and maintenance work on the unit!
Improper operation and maintenance of the unit may be hazardous to persons, objects, and the environment.

The following preventative measures lengthen the service life of BRANSON's 2000 series units.

7.2.1 Scheduled Component Replacements

The service life of some components depends on the number of cycles that the unit has completed, or the operating hours. Refer to table 7-1 for the average number of cycles used for determining the appropriate time to replace a component. The operating temperature also influences the service life of the components. The higher the temperature, the lower the number of possible cycles or operating hours. The specifications in the following table is based on an operating temperature of 22° to 24 °C.

The service life of the pneumatic components is influenced by the quality of the supplied compressed air. All BRANSON systems need dry, clean (normal) compressed shop air. Oil particles or humidity in the air shortens the service life of the parts. The values in the table are based on an air supply of average quality.

Table 7-1 Exchanging Components

After 20 million cycles	Air cylinder
After 40 million cycles	Solenoid valves
	Pressure regulator
	Air filter

For your information:

- If a system performs 60 welds per minute, for 8 hours per day, 5 days per week, 50 weeks per year, a cycle count of 7.2 million and an operating time of 2000 hours are achieved.

Please take note that parts replaced during maintenance are subject to normal wear and tear. There is no guaranty on these parts.

7.3 Renewing the Stack

If the mating surfaces are in a good condition, the stack components work with highest efficiency. In the case of 20 and 30 kHz products, you have to install BRANSON Mylar® washers between the horn and the booster, as well as between the horn and converter. Replace the washers if they are worn or perforated. Check the stack and Mylar® washers every three months.

Stacks where silicon grease is used, for example some 20 kHz installations and all 40 kHz products, have to be renewed regularly to prevent vibration fretting. Every two weeks, check stacks that have been smeared with silicon grease for corrosion. Depending on experience gathered with specific stacks, the inspection intervals can be shorter or longer.



NOTE

If the mating surfaces between the converter, booster and horn are uneven or corroded, or if they do not make contact well, the performance of the unit is considerably diminished. Renewing the mating surfaces:

Remove the stack from the actuator (see chapter 5.4) and disassemble the stack consisting of converter, booster and horn.

1. Clean the coupling areas (= contact surfaces between the three components) and the threads at the converter, booster and horn with a damp, lint-free cloth.
2. Apply tiny drops of silicon grease (available from BRANSON) to both mating surfaces of the booster. Evenly distribute the grease over the mating surface.



WARNING

Do not use silicone grease for Mylar washers. Only use 1 (one) Mylar washer, with the correct inner and outer diameter, for each joint.

Torque table for the stack

**NOTE**

We recommend that you use a BRANSON torque wrench or an equivalent wrench.

Table 7-2 Tools

Tool	EDP no.
20 kHz SAR torque wrench	011-803-010
40 kHz SAR torque wrench	011-803-016
30 kHz SAR torque wrench	011-803-038
20 kHz hook wrench	201-118-109
30 kHz hook wrench	201-118-033
40 kHz hook wrench	201-118-024
Silicon grease	101-053-002

Table 7-3 Torques for converter, booster and horn

Used with	Screw size	Torque
20 kHz	1/2"	(50 Nm)
20 kHz	3/8"	(32 Nm)
30 kHz	3/8	(30 Nm)
40 kHz	M8	(22 Nm)

7.4 Parts Lists

The following table lists the components and replacement parts that are available for the 2000 series actuators.

7.4.1 Accessories and Replacement Parts for the aocm Actuator

Table 7-4 Accessories for the aocm20 actuator

Description	EDP no.
Actuator aocm 20	011-005-110
Rigid mount booster - 20 kHz	
Silver, amplification 1.2	011-600-042
Purple, amplification 1:0.6	011-600-043
Black, amplification 1:2.5	011-600-044
Solid mount booster - 20 kHz	
Purple, amplification 1:0.6	101-149-095D
Green, amplification 1:1.0	101-149-096D
Gold, amplification 1:1.5	101-149-097D
Silver, amplification 1.2	101-149-098D
Black, amplification 1:2.5	101-149-099D
Solid booster - 20 kHz (German design)	
Green, amplification 1:1.0	011-600-052
Gold, amplification 1:1.5	011-600-053
Silver, amplification 1.2	011-600-054
Black, amplification 1:2.5	011-600-055
Converter	011-005-112
CR20 SHV	125-135-115
902R SHV	125-135-093
Other	
Positioning ring	011-004-117
Tool set	

Table 7-5 Accessories for the aocm 30 actuator

Description	EDP no.
Actuator: aocm 30	011-005-111
Rigid mount booster - 30 kHz	
Black, amplification 1:2.5	159-149-115
Silver Amplification 1:2	159-149-116
Gold, amplification 1:1.5	159-149-117
Green, amplification 1:1.0	159-149-118
Solid mount booster - 30 kHz	
Purple, amplification 1:0.6	109-041-264
Green, amplification 1:1.0	109-041-265
Gold, amplification 1:1.5	109-041-266
Silver, amplification 1.2	109-041-267
Black, amplification 1:2.5	109-041-268
Solid booster - 30 kHz (German design)	
Green, amplification 1:1.0	011-600-021
Gold, amplification 1:1.5	011-600-022
Silver, amplification 1.2	011-600-023
Black, amplification 1:2.5	011-600-024
Converter	
CR 30	101-135-081
Other	
Positioning ring	011-004-118
Tool set	

Table 7-6 Accessories for the aocm 40 actuator

Description	EDP no.
Actuator: aocm 40	011-005-112
Rigid mount booster - 40 kHz	
Green, amplification 1:1.0	011-600-000
Gold, amplification 1:1.5	011-600-001
Silver, amplification 1:2	011-600-002
Purple, amplification 1:0.6	011-600-003
Black, amplification 1:2.5	011-600-004
Solid mount booster - 40 kHz	
Black, amplification 1:2.5	109-041-174
Silver, amplification 1:2	109-041-175
Gold, amplification 1:1.5	109-041-176
Green, amplification 1:1.0	109-041-177
Purple, amplification 1:0.6	109-041-178
Converter	
4 TH	101-135-067
Converter cable JPGA/SHV(W); 7.5	011-003-490
Converter cable JPGA/SHV(W); 4.5	011-003-491
Converter cable JPGA/SHV(W); 2.5	011-003-492
Converter cable JPGA/SHV(W); 7.5	011-003-069W
Converter cable JPGA/SHV(W); 4.5	011-003-069WL1
Converter cable JPGA/SHV(W); 2.5	011-003-069WL2
Other	
Positioning ring	011-004-122
Tool set	

Table 7-7 Accessories for AU aocm 20/30/40

Accessories for AU aocm 20/30/40	
Magnetic field sensor / assembly element / cable (5m) (TRS / LLS)	011-004-111
Position sensor/cable 5 m	011-004-112
Pneumatic components: Solenoid valve with cable/throttle vale/ pressure regulator unit	011-004-113
Adapter kit for aocm 2000 adapter	011-004-114
Reed contact (ULS)	011-004-115

Table 7-8 Accessories for the converter

Description	EDP no.
Converter	
4 TH	101-135-067
Converter cable JPGA/SHV(W); 7.5	011-003-490
Converter cable JPGA/SHV(W); 4.5	011-003-491
Converter cable JPGA/SHV(W); 2.5	011-003-492
Converter cable JPGA/SHV(W); 7.5	011-003-069W
Converter cable JPGA/SHV(W); 4.5	011-003-069WL1
Converter cable JPGA/SHV(W); 2.5	011-003-069WL2
Other	
Positioning ring	011-004-122
Tool set	

Table 7-9 Accessories for complete AU aocm

Description	EDP no.
Accessories for AU aocm 20/30/40	
Magnetic field sensor / assembly element / cable (5m) (TRS / LLS)	011-004-111
Linear encoder (0-10 V) /cable 5 m	011-004-112
Pneumatic components: Solenoid valve with cable/throttle vale/pressure regulator unit	011-004-113
Adapter kit for aocm 2000 series	011-004-114
Reed contact (ULS)	011-004-115

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