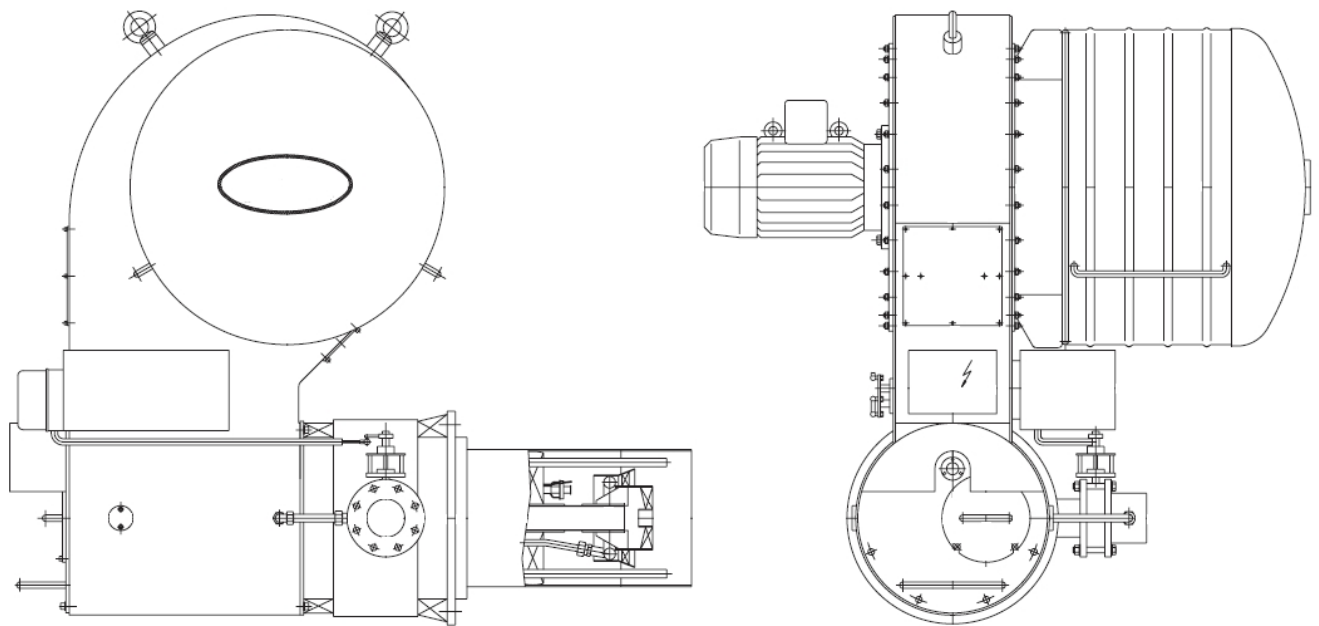


Operating instructions

ECO MIB-SM-300/600R/L-G-VL...

Monoblock Natural Gas MIB

Power Range 3-24 MW



- Ø **Compact, robust**
- Ø **State-of-the-art combustion technology**
- Ø **Service friendly**
- Ø **Efficient noise suppression**
- Ø **Low in pollutants**

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We reserve the right to make changes to this document as a result of technological improvements.

Atatürk Cad. Sami Bey Sok.
No:4 34843 Maltepe / İstanbul / Türkiye
Tel: +90 216 442 93 00 (pbx)
Fax: +90 216 370 45 03
www.ecostar.com.tr

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Important Information

Intended use

These instructions must be read through carefully before carrying out any installation, commissioning or maintenance work. As this kind of work may only be carried out by Ecostar Service technicians or by specialists trained by Ecostar, and although these instructions presuppose that the corresponding training has been carried out, they must nevertheless be studied in detail before working on the burner.

We will accept no liability for damage or interruptions to production that result from non-compliance with these instructions!

Safety precautions that must be followed under all circumstances

- All persons involved in the installation, dismantling and re-assembly, commissioning, operation and maintenance (inspection, maintenance and repair work) of the burner must have completed the corresponding training and have read and understood all the instructions.
- Unauthorized conversions and modifications that impair the safety of the burner are not permitted.
- With the exception of the burner regulation, all other work may only be carried out when the burner is shut down and after the power supply has been disconnected.



Warning

Non-compliance with this rule could result in electric shock or uncontrolled flame generation, and thereby lead to severe physical injury or even death.

Handing over the installation to the operator

When handing over the installation to the operator, the latter should be made clearly aware of the "Safety Regulations". In particular, he should also be informed which actions he can carry out himself, as opposed to actions such as work on or modifications to the burner, which should only be carried out by specialists.

You must inform the operator that he is responsible for ensuring that only authorized persons work on the burner.

Technical changes

We reserve the right to make changes to the presentations and data in these instructions that will lead to an improvement of the product.

Safety regulations

Importance of the safety regulations

This chapter contains general information for the safe operation of the burner. You will find additional specific safety instructions at the relevant sections within the individual chapters of these operating instructions.

The operator is responsible for ensuring that all safety regulations are strictly complied with.

Qualification and training

All persons involved in the installation, dismantling and re-assembly, commissioning, operation and maintenance (inspection, maintenance and repair work) of the burner must have completed the corresponding training and have read and understood all the instructions.

Modifications and repair work

Unauthorized conversions and modifications are not permitted. If this kind of work is required, please consult your local service office.

Burner operation and maintenance

The burner has been set up for perfect combustion and a high level of efficiency. Manipulations on the burner are therefore not permitted; the only exceptions to this are the notes listed below. With the exception of the burner regulation, all other work may only be carried out when the burner is shut down and after the power supply has been disconnected. Non-compliance with this rule could result in electric shock and/or uncontrolled flame generation, and thereby lead to severe physical injury or even death.

Procedure in case of a fault

If faults occur, the plant operator is requested to analyze the problem, to write down the analysis and to then inform his local service office.

Procedure following the detection of the smell of gas

- Do not use any open flames, do not smoke, do not operate any electrical contacts or switches (bells, lights, motors, lifts, etc.).
- Searching for the gas leak by illuminating it using a flame is forbidden under all circumstances!
- Thoroughly ventilate the rooms affected by opening the doors and windows (escaping gas can collect under the ceiling).
- Immediately close all gas shut-off devices.
- Eliminate all forms of fire in the rooms affected, as well as in neighboring and connected localities.
- Also check all neighboring rooms and/or buildings for the smell of gas.
- Inform the installation company or the gas works.

Putting out of service

- Switch off the main switch.
- If the installation is to be put out of service for a long period, also close the oil and/or gas shut-off devices.

Commissioning

- The commissioning of a burner that has been placed out of operation for a long period should only be carried out by a specialist!
- In the case of short-term shutdowns (for example, after an inspection of a burner or the installation) the commissioning can be carried out by the operator.
- Before carrying out the commissioning, check that the oil shut-off devices have been opened. Following the check, the burner can be switched on at the main switch. The burner starts up. If no flame is formed, please follow the procedure described under "Procedure in case of a fault".

Indications and warnings used



Warning

Indicates possible danger of injury or death. Follow the instructions given in the Operating Instructions.



Caution

Indicates possible damage to property.



Note

Gives important information.

Storage location for the Operating Instructions

These operating instructions must be stored in the immediate vicinity of the respective burner and must be able to be consulted by the operation or maintenance personnel at any time.

Burner Description / operation

ECO MIB-S-M-451- R/L-G- VL...

1 2 3 4 5 6 7

1. ECOSTAR Monoblock burner
2. Standard MZE
3. Mechanical interconnection
4. Size / Power
5. Elevator/Motor - Right/Left
6. Fuel: G = Natural Gas
7. Length of flame tube

ECO MIB – Natural gas (G) with mechanical combination

- The ECO MIB-SM-G burner is a fully automatic blast burner with modulated power regulation for the burning of natural gas (G).
- The combustion air blower with its air valves is located on the upper side of the housing.
- The suction side of the blower is fitted with a sound insulation hood with an air diverter to provide optimal silencing.
- A mechanical combination regulator (MVR-G) provides the continuous regulation of the G fuel quantities and of the combustion air.
- The sequence of operations at start-up will be controlled by an automatic combustion controller that, together with a flame-monitoring device, ensures optimal safety in every operational state.
- An air deficiency switch is installed between the blower and the air valves to monitor the combustion air.
- The ignition takes place using an automatic gas pilot burner, which is itself ignited by a high-voltage spark.
- The pilot burner is operated with natural gas.
- For gas operation, gas lances with gas nozzles aligned to the center are mounted in the circumference of the swirler. As a variant, a center ring gas burner can also be used to stabilize the gas flame.
- The power regulation during gas operation is carried out using a gas control valve, which is operated via a steering lever, and a separate regulation drum in the mechanical combination control.
- Two gas solenoid valves arranged one behind the other prevent the escape of gas when the burner is not in operation.
- The two solenoid valves are checked for leaks before every start procedure by a fully-automatic valve test unit.

Technical data

Burner power table

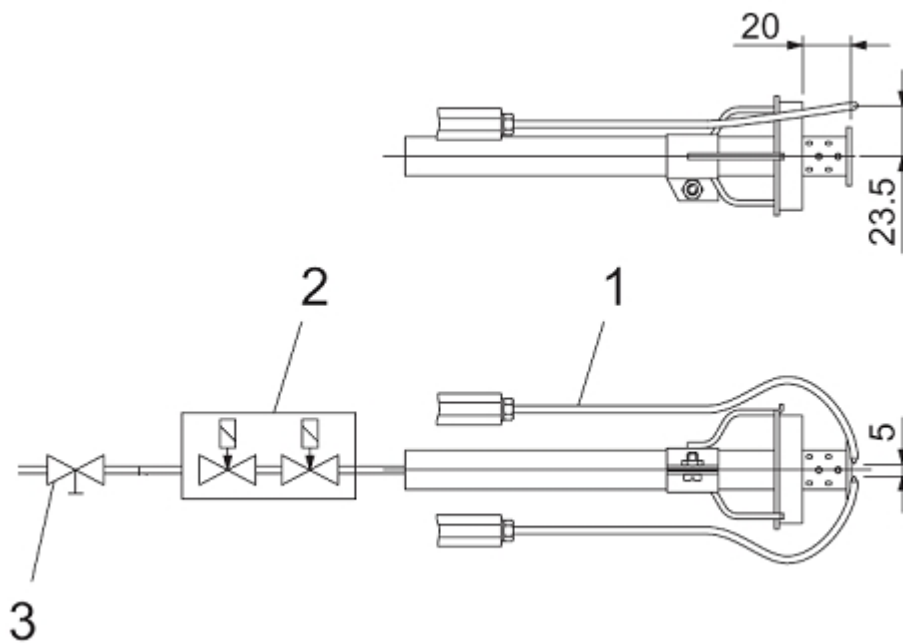
Burner Size / Type	Maximum Power	Maximum gas quantity
	(MW)	(Nm ³ /h*)
ECO MIB-SM- 301 -G-V 670	3,2	318,0
ECO MIB-SM- 302 -G-V 670	4,0	398,0
ECO MIB-SM- 351 -G-V 670	4,8	477,0
ECO MIB-SM- 352 -G-V 670	5,9	587,0
ECO MIB-SM- 353 -G-V 670	7,0	695,0
ECO MIB-SM- 401 -G-V 670	7,8	775,0
ECO MIB-SM- 402 -G-V 670	8,5	845,0
ECO MIB-SM- 403 -G-V 670	9,3	925,0
ECO MIB-SM- 451 -G-V 750	11,0	1095,0
ECO MIB-SM- 452 -G-V 750	12,4	1235,0
ECO MIB-SM- 453 -G-V 750	13,9	1380,0
ECO MIB-SM- 501 -G-V 870	15,5	1540,0
ECO MIB-SM- 502 -G-V 870	17,1	1700,0
ECO MIB-SM- 503 -G-V 870	18,6	1850,0
ECO MIB-SM- 601 -G-V 870	20,0	1990,0
ECO MIB-SM- 602 -G-V 870	22,5	2240,0
ECO MIB-SM- 603 -G-V 870	24,0	2390,0

* Fuel: Natural gas G, Hu = 36.0 MJ/Nm³/h

Gas pressure (Natural gas)

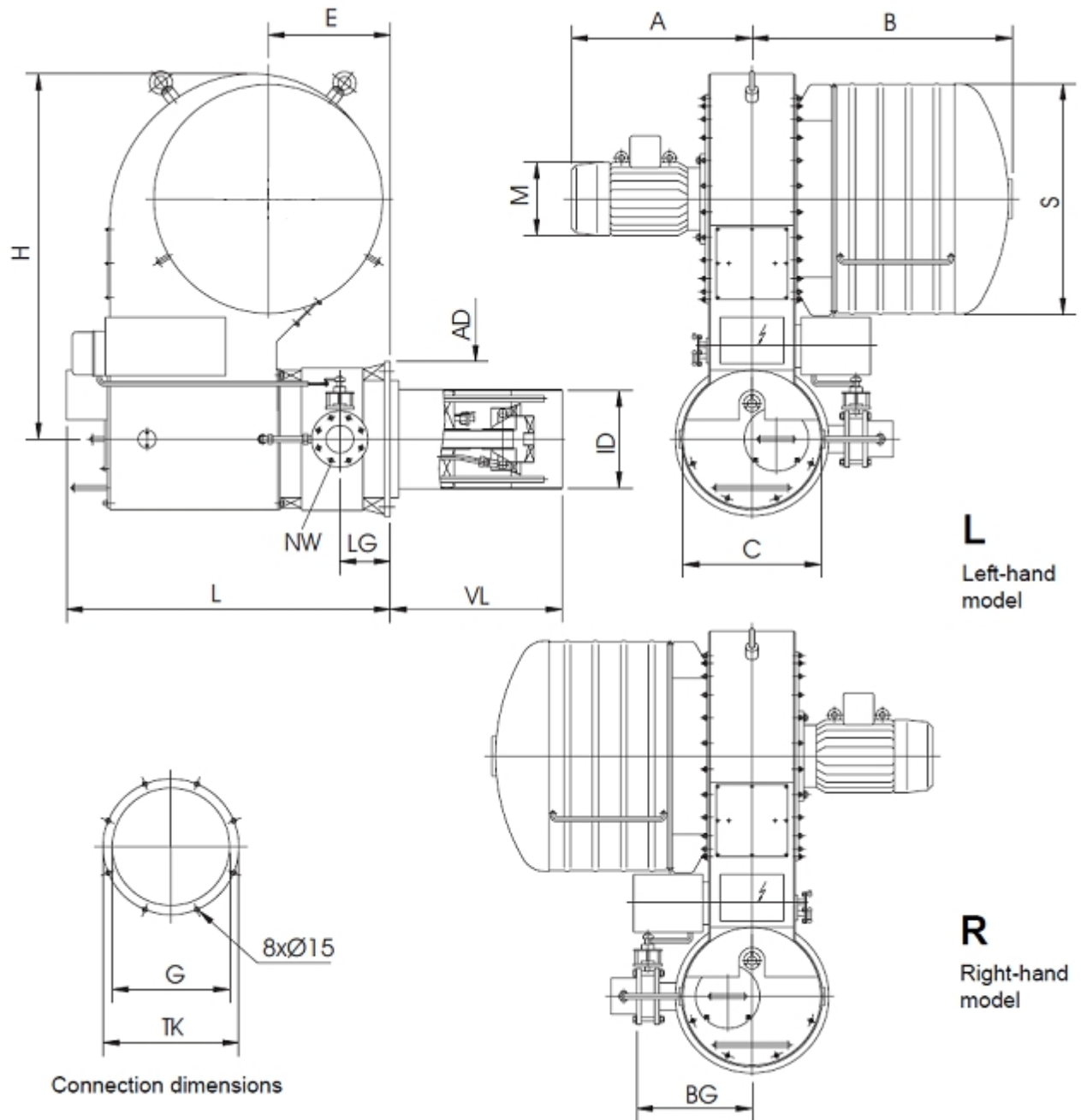
Gas pressures: In front of the gas valve 150 mbar; in the burner head approx. 80 - 100 mbar at max. power.

Pilot gas burner



- 1 -ECO pilot gas burner
- 2 -Dual solenoid valve including gas filter and quantity regulation
- 3 -Ball valve Natural gas

Dimensional drawing of the burner

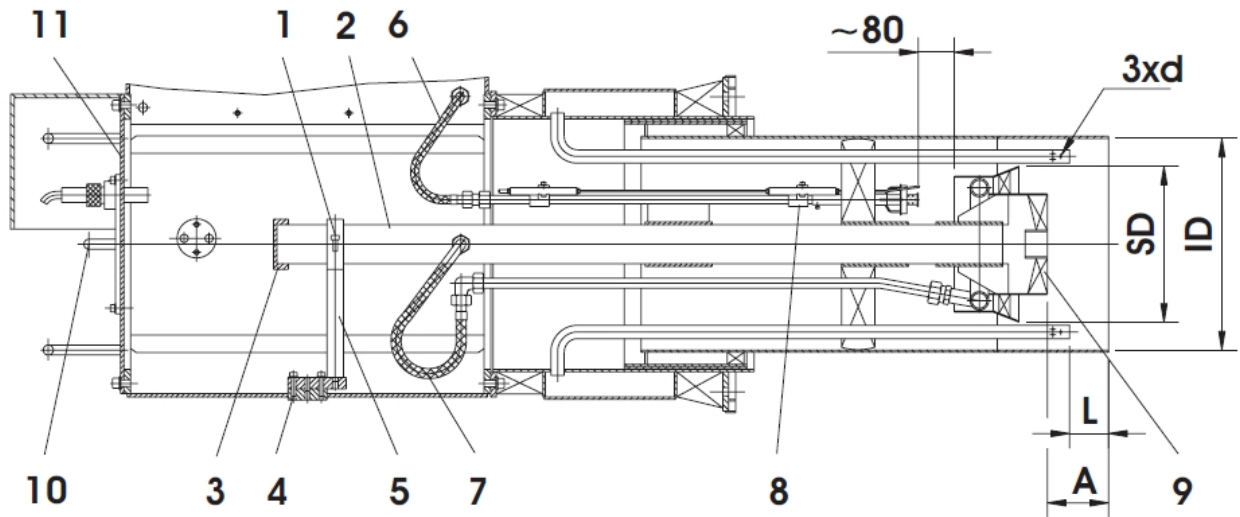


ECO MIB - SM - 301-603 L/R – G- VL ...

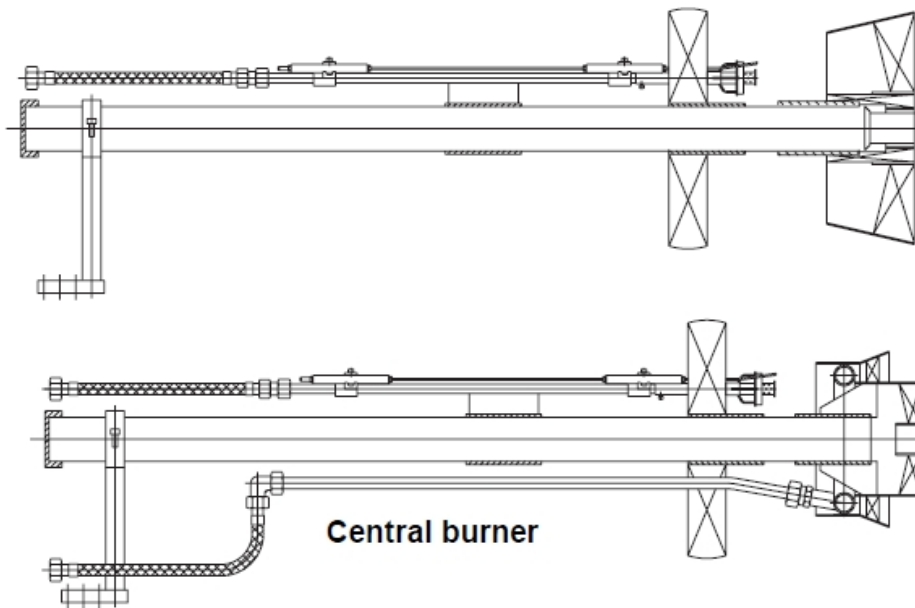
MIB - SM - 301-603 L/R - N VL ...																	Weight
Type	A	B	C	AD	ID	E	L	H	VL	S	M	TK	G	NW	LG	BG	kg
301	705	1015	550	503	-	476	1270	1426	570	900	285	480	430	100	197	450	850
302	705	1015	550	503	270	476	1270	1426	570	900	285	480	430	100	197	450	850
351	705	1015	550	555	-	476	1270	1426	670	900	285	480	430	100	197	450	850
352	705	1015	550	555	315	476	1270	1426	670	900	285	480	430	100	197	450	850
353	705	1015	550	555	335	476	1270	1426	670	900	285	480	430	100	197	450	850
401	705	1015	550	605	350	476	1270	1426	670	900	285	530	480	100	197	450	850
402	705	1015	550	605	365	476	1270	1426	670	900	285	530	480	100	197	450	850
403	705	1015	550	605	380	476	1270	1426	670	900	285	530	480	100	197	450	850
451	865	1052	650	705	400	476	1270	1460	750	900	369	630	580	150	197	516	1050
452	865	1052	650	705	425	476	1270	1460	750	900	369	630	580	150	197	516	1050
453	865	1052	650	705	445	476	1270	1460	750	900	369	630	580	150	197	516	1050
501	1000	1172	822	805	475	675	1625	1830	870	1250	369	710	660	150	227	566	1200
502	1000	1172	822	805	495	675	1625	1830	870	1250	369	710	660	150	227	566	1200
503	1000	1172	822	805	515	675	1625	1830	870	1250	369	710	660	150	227	566	1200
601	1000	1172	822	865	545	675	1625	1830	870	1250	369	792	740	150	227	566	1200
602	1000	1172	822	865	560	675	1625	1830	870	1250	369	792	740	150	227	566	1200
603	1000	1172	822	865	580	675	1625	1830	870	1250	369	792	740	150	227	566	1200

Combined ignition device (MZE)

MZE Adjustments



MZE-G



- 1 Screws for adjusting the swirler
- 2 Retaining tube
- 3 Retaining tube cover
- 4 Screws for retaining tube holder

- 5 Retaining tube holder
- 6 Flexible metal tube, pilot gas burner
- 7 Flexible metal tube, center gas
- 8 Pilot gas burner

- 9 Swirler with pilot gas
- 10 Service cover
- 11 Front plate

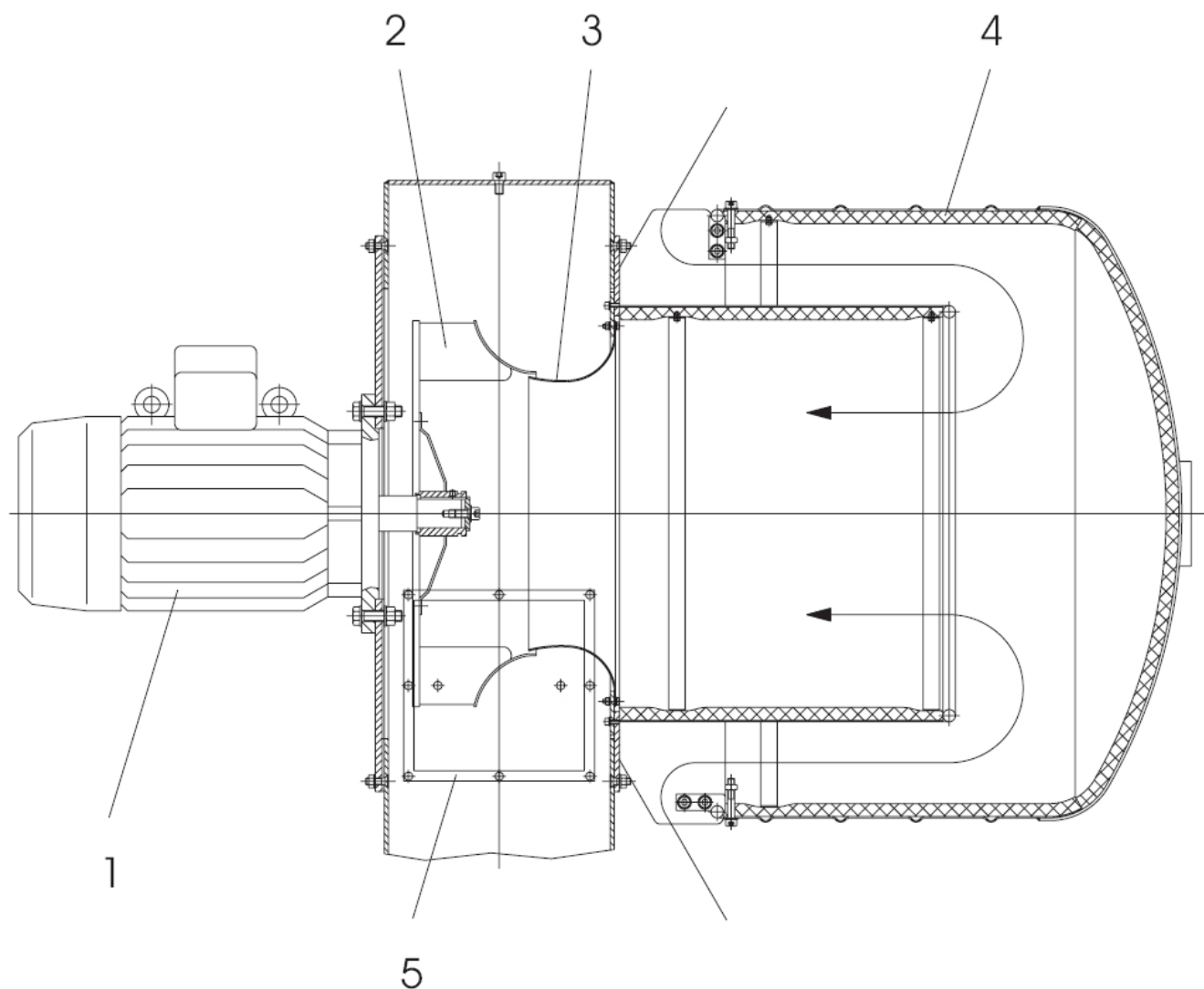
Adjustment of the swirler: Open the service cover (10), loosen screw (1), and move the retaining tube (2).

Dismounting the MZE: Remove the front plate (11), screw off the flexible metal tube (6+7). Loosen screws (4), the retaining tube holder (5) and pull out the MZE.

ECO MIB -G

Type	A	SD	ID	3xd	L
301	-	-	-	-	-
302	-	-	270	-	-
351	-	-	315	-	45
352	85	-	315	5.5	45
353	85	265	335	6.0	70
401	110	265	350	6.4	70
402	110	280	365	6.6	70
403	110	280	380	6.8	70
451	160	310	400	6.5	85
452	160	310	425	6.9	85
453	160	310	445	7.3	85
501	180	330	475	7.8	115
502	180	-	495	8.1	115
503	180	365	515	8.5	115
601	230	400	545	8.8	165
602	230	400	560	9.3	165
603	230	400	580	9.6	165

Ventilation technology

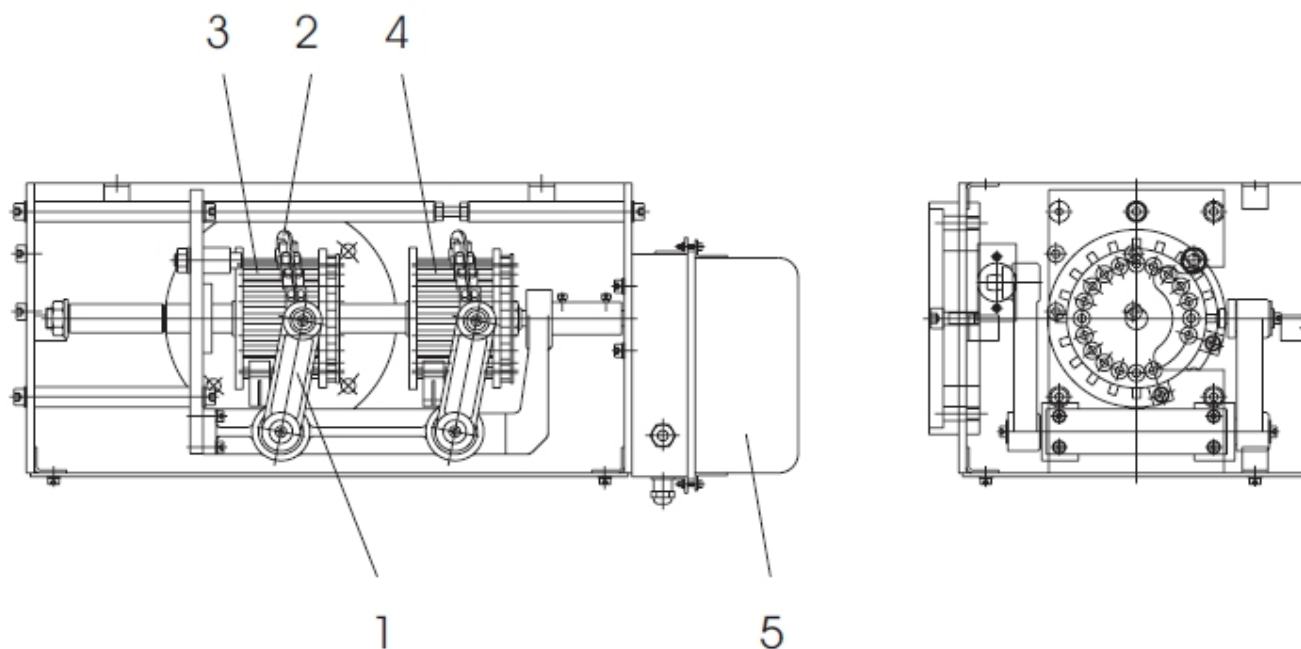


- 1- Burner motor
- 2- Ventilator wheel
- 3- Inflow nozzle
- 4- Noise reduction hood
- 5- Opening for cleaning

Installation on the drum

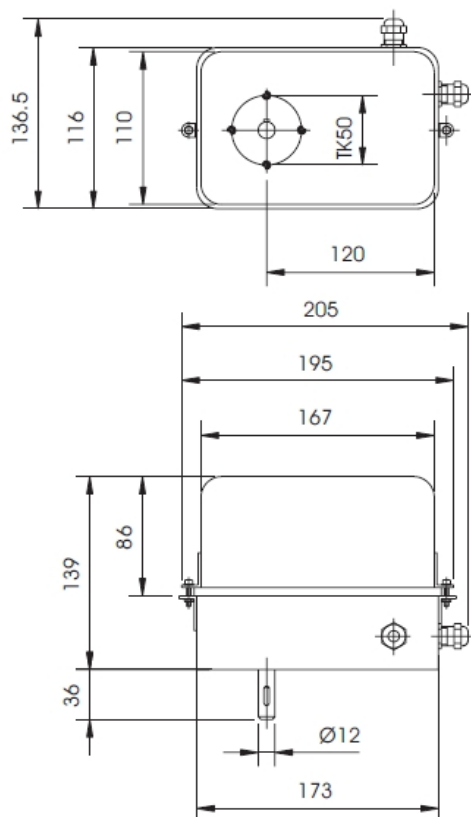
To avoid excessive vibration on the burner housing caused by the normal shaking of the drum, it is recommended to stabilize the latter by suspension or by a support.

Mechanical combined regulation (MVR-G) MVR-G



- 1- Pick-up arm
- 2- Curved conveyor
- 3- Control drum, air valve
- 4- Control drum, gas
- 5- Actuator

Actuator for the MVR



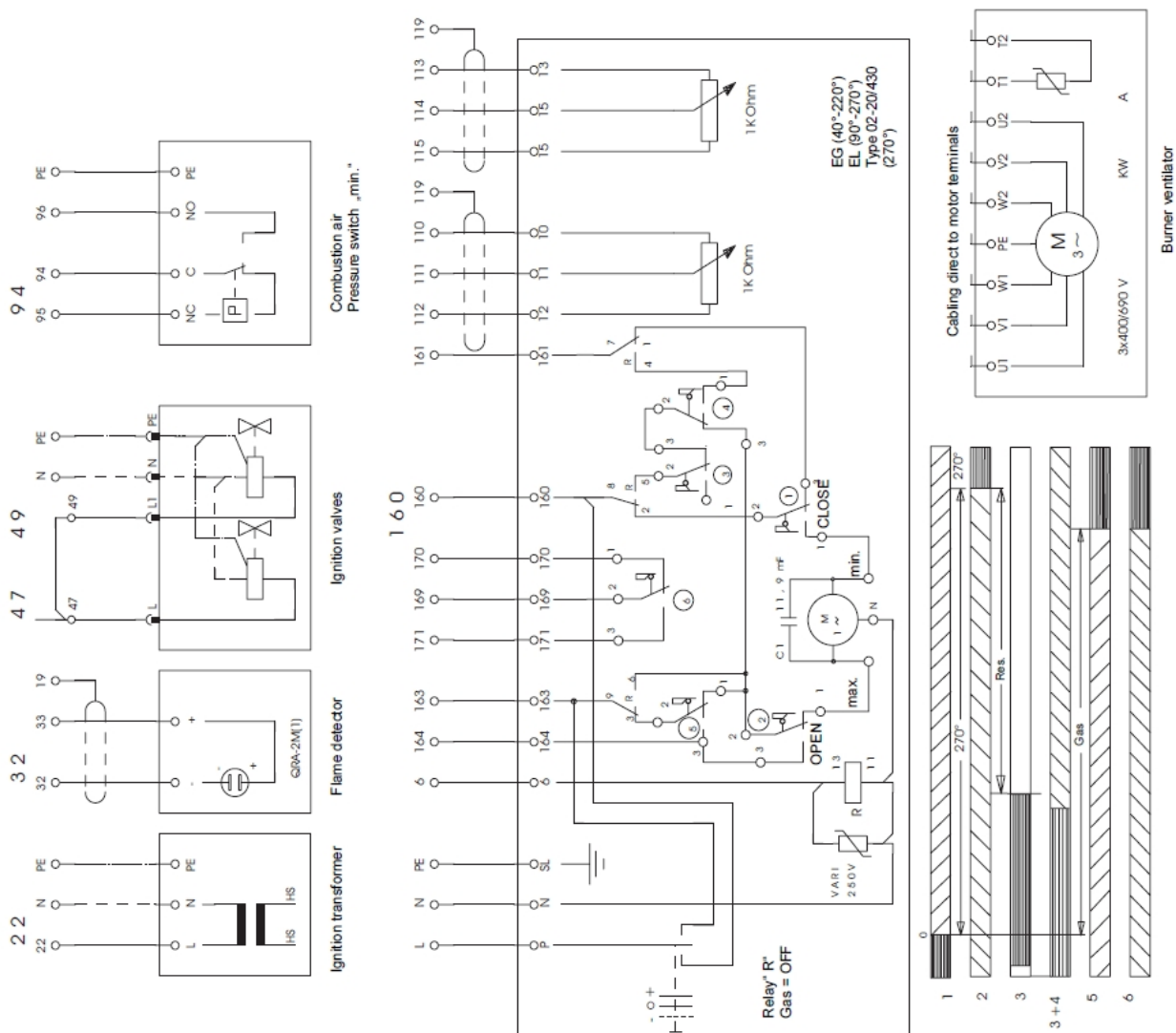
Technical data

Actuator 02 – 20/430-270°

Voltage	: 230V 50/60 Hz
Running period	:60 sec. 180°
Travel	:270°
Torque	:32 Nm
Plate gearbox	: Standard gearbox, maintenance-free
	Radial gears
	Material ETG 100
	Bearings CuZn40 Al2 maintenance-free
Switch	:6 pcs
Pin plate	:with relay
Potentiometer	:2 pcs 0 – 1000 Ohm
Motor Input power	: 8.8 W, 8.9VA
	Delivered power 3.14W
Housing	:Sheet metal housing, painted
Protection class	: IP 54
Color of hood	:blue hammer scale
	Lower part gray, hammer scale

Electrical connection diagram

Standard model			Special model
Type MIB-SM	P=MW	P-Motor KW (25 mbar)	P-Motor KW (50 mbar)
301	2.5-3.2	11.0	22.0
302	3.2-4.0	11.0	22.0
351	4.0-4.8	11.0	22.0
352	4.8-5.9	11.0	22.0
353	5.9-7.0	11.0	22.0
401	7.0-7.8	11.0	22.0
402	7.8-8.5	18.5	22.0
403	8.5-9.3	18.5	22.0
451	9.3-11.0	22.0	30.0
452	11.0-12.4	22.0	37.0
453	12.4-13.9	30.0	37.0
501	13.9-15.5	30.0	37.0
502	15.5-17.5	30.0	45.0
503	17.5-18.6	37.0	55.0
601	18.6-20.0	37.0	55.0
602	20.0-22.5	55.0	75.0
603	22.5-24.0	55.0	75.0



Commissioning

General information

Our burners are checked prior to delivery; i.e. all setting facilities such as limit switch positions, have been preset as far as possible.

The operating instructions for all delivered components such as the controller, gas control system, the hydraulic elements, pumps and so on, must be taken from the original documentation of the respective manufacturers.

Preparation for the commissioning

The following points must be carried out before the commissioning of the burner:

- Check the burner controller, monitoring, safety system and components for the correct settings and functionality.
- Check the dryer system and its infrastructure for operational readiness.
- Vent the gas line up to the solenoid valves.
- Check the safety equipment in the gas line, such as VSAV and VSBV, for the correct settings and functionality.

Commissioning the burner



Caution

The commissioning may only be carried out by ECOSTAR service technicians or by specialists trained by ECOSTAR.

After completing the preparatory work for the commissioning, the following procedures must be carried out:



Caution

The mechanical valves have to be opened before their functional check.

Checking the function sequence without flame



Caution

Disconnect the electrical supply lines to the fuel valves, and the main ignition gas valve.

Sequence of operations when switching on the burner:

1. Under-pressure regulation valve opens.
2. Burner air blower starts
3. The combination controller (MVR-G) runs to the maximum position.
4. After feedback that the maximum position has been reached, the pre-aeration time starts running in the automatic burner control.
5. The combination controller (MVR-G) then runs to the start position.
6. After successful feedback from all actuators (under-pressure control valve, combination controller at start position), the actual ignition procedure starts running.

Caution



Up to this point in time, all pilot gas and fuel solenoid valves, including the ignition transformer, must be free of electrical power!

7. Ignition procedure (cold check)

- Ignition transformer.....: on
- Pilot gas valve.....: on
- Simulate the flame signal
- Ignition transformer.....: off
- Fuel valve: on
- Pilot gas valve.....: off
- Control enable: on
- Interrupt the flame signal
- Power must be immediately removed from fuel valves
- Burner error lamp.....: on
(possibly audible signal or external message)



Warning: Danger of explosion!

Check the sequences given above several times to ensure avoidance of any incorrect switching.

Checking the functional sequence with the pilot flame

- Reconnect the electrical connections to the pilot gas valve.
- Then repeat the functional sequence described above, this time with the pilot flame.
- Gas pressure at the pilot gas burner: propane 10 - 30 mbar
natural gas 20 - 40 mbar
- Pilot flame must be taken over by the flame monitoring.



Note

Only proceed with the next point when the pilot flame is OK.

Checking the functional sequence with the main flame

- Reconnect the fuel valves electrically.
- Then repeat the functional sequence described above, this time with the gas flame.

Setting the base load flame

- The minimum gas power for the gas valve will be set on the regulation drum (MVR-G).
- Gas pressures: In front of the gas valve 150 mbar; in the burner head approx. 1 - 3 mbar.

Setting up to full load

- The remaining control range can be achieved by running up in steps with the combination controller (MVR-G) and through linear setting of the power increase on the regulation drum of the gas valve, while adding the combustion air required in each case at the air valve regulation drum.



Note

As a rule, a gas pressure of approx. 100 mbar will be set up in the burner head at full load.



Warning: Danger of poisoning

To avoid the formation of soot and/or CO, the O₂ and CO values in the exhaust gas must be measured during the whole of the setting work.

Functional check at the burner

The following checks must be carried out during commissioning or following an inspection of the burner:

Functional check for gas operation

- | | |
|--|---|
| • Start-up with darkened flame monitoring. | ⇒ Automatic burner control goes to a fault state. |
| • Start-up with illuminated flame monitoring (external light). | ⇒ Ignition does not switch on; burner goes to a fault state. |
| • Normal process; if the burner is in operation, pull out and darken the flame monitoring. | ⇒ Automatic burner control goes to a fault state. |
| • Pull out and/or turn the flame monitoring during the burner operation. | ⇒ Automatic burner control must immediately go to a fault state. |
| • Set the air pressure switch to its maximum value. | ⇒ Burner goes to a fault state during the pre-flushing. |
| • Open ball valve, and close immediately after the start of the burner motor. | ⇒ The program sequence of the automatic burner control must be normal up to the ignition phase. When the solenoid valve opens, the start procedure will be interrupted due to the lack of gas. If this is not the case, the setting of the minimum pressure switch must be checked. |

Possible errors

- | | |
|---|---|
| • Burner does not go into operation: | ⇒ Switch-on command from system error. |
| • Switch-on command; pre-aeration starts, but no ignition procedure takes place: | ⇒ Feedback „Air valve open“ or feedback for „Start position fuel and air valve“ not present. |
| • Automatic burner controller goes to error state for start-up attempt without flame formation: | ⇒ No ignition, no pilot gas, no fuel. |
| • Burner starts up, flame forms, and the automatic burner controller goes to an error state once the safety time has expired: | ⇒ Flame monitoring defective or soiled. Feed line defective or not enough light from the flame. |



Caution

The solenoid valves must have no electrical power during the pre-aeration (check!).



Warning: Danger of explosion

If gas flows into the boiler during the pre-flushing time, this could result in an explosion when the ignition is activated.

Final checks

- Once the required measurements have been carried out, ensure that all measurement nipples are closed again.
- For the final check, the burner is started up several times and the program sequence is monitored on the automatic burner controller. Before leaving the installation, the good functionality of the boiler units should also be checked.
- Temporary solutions must not be tolerated. If this is unavoidable in a special case, it is imperative that the installation be re-regulated by a specialist as soon as the temporary solution has been replaced by a definitive installation.

When finished, the following must be carried out:

- Fill in the Measurement Report in full.
- Draw the attention of the system operator to the „Notes for System Operators“, and, in particular, to the procedure in case of faults.

Trouble shooting



Caution

If errors occur, it is imperative to analyze the cause, to record it in writing and to contact your local service center / after-sales office.

The following is a list of possible faults and their correction:

Observation	Cause	Correction
• No ignition	• No pilot gas available	• Check, and where necessary replace, the pilot gas cylinder.
	• Ignition electrodes soiled	• Clean, and where necessary replace, the electrodes.
	• Pilot gas valve does not open	• Check the valves and feed lines.
	• Ignition transformer defective	• Replace the ignition transformer.
• Pilot flame burns, but not the main flame.	• Flame monitoring	• Clean, and where necessary replace, the flame sensor.
	• Solenoid valve for fuel does not open	• Measure the coil, and replace if necessary. Check the feed line.
• Main flame burns; fault after a short time.	• Flame monitoring	• Flame sensor, check, and where necessary replace, the feed lines and monitoring relay.
	• Pulsating flame	• Check the fuel-air ratio.

Maintenance

- In order that the burner will work at the highest possible efficiency and to avoid operational breakdowns, the burner should be inspected, re-adjusted and overhauled annually.
- Depending on the level of pollution of the combustion air, the air controller parts and blowers must be cleaned regularly.
- The bearings of the moving parts are maintenance-free.

Control and maintenance of the burner

The burner checks prescribed by the SVTI must be carried out for all steam boiler installations. In the following, we describe the periodic checks that will contribute to a problem-free operation.

Weekly checks (record in Check Sheet)

- Check of the burner control lamps on the burner control cabinet.
- Check that all the oil and/or gas lines are free from leaks.
- In case of heavily polluted combustion air, the flame monitoring must be cleaned regularly.
- Look into the combustion area of the boiler through the sight glass. If the shape or the color of the flame has changed, swivel out the burner and check the mixer equipment for geometrical condition, deposition and blocked nozzles.
- Note whether the noises from the burner pump are normal. If there are mechanical noises or vibrations, clean it.

Annual checks

The annual check should be carried out by our Customer Service department. This check includes the mechanical and electrical check and cleaning of the burner, as well as the measurement, and readjustment where necessary, of the combustion figures.



Attention

You will obtain a reliable operation of the burner through the checks described above.

Measurement report for gas operation

All the listed data must be entered into this measurement report. The correctness of the measured values must be confirmed by the responsible service technician.

Installation: Service technician:
 Order No.: Date:
 Burner type: MIB - SM - - G - VL Combined controller: MVR-G
 Factory No.: Automatic burner controller:
 Flame monitor: QRA 2M(1)
 Dryer make: Valve leak test:
 Dryer type:
 Output:
 Combustion chamber dimensions:
 Remarks:

Load point	1	2	3	4	5	6	7	8	9	10
Load indication %										
Power (Nm ³ /h)										
O ₂ (Vol. %)										
CO (mg/m ³) (ppm)										
Exhaust gas temperature °C										
Suction temperature °C										
P. in front of valve mbar										
P. burner housing mbar										
P. combust. chamb. mbar										
P: Gas pressure after contr.mbar										
Gas pressure, head mbar										
P: Gas in front of controllermbar										