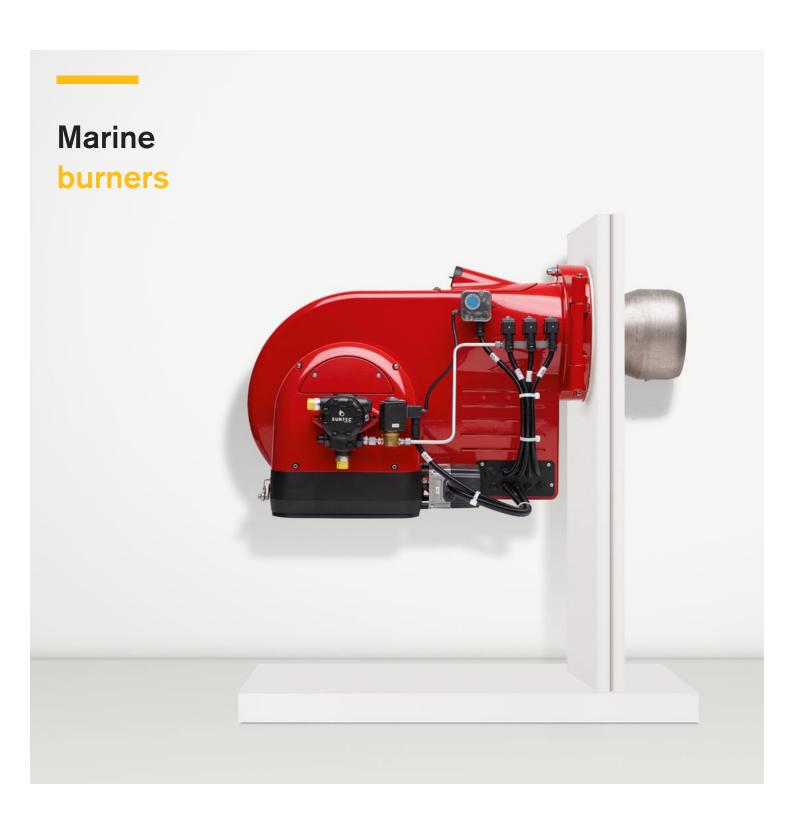
### Technical information Marine burners (MFO)

-weishaupt-

Capacities up to 11 MW for shipping and offshore installations



### **Progress**and tradition



Weishaupt products can be found anywhere that reliability is essential

For decades, Weishaupt has designed and produced marine burners for a wide range of applications, such as auxiliary and hot-water boilers for ships or offshore installations. Weishaupt's in-house Research and Development Centre is constantly working on innovative new developments.

The burners are notable for their robust and compact design, and for being easy to install and service. Particular care was taken during development to ensure a maintenance-friendly design.

The commitment to quality goes beyond the burner and its servicing. Weishaupt offers individual solutions for fuel trains and for the control of burners, boilers, and their services. Weishaupt is your one-stop shop for expertise.

### Modular.

Digital combustion management makes the operation of combustion plant both convenient and safe. All essential functions, such as flame monitoting and the regulation of fuel and air are effected and controlled with digital precision.

### Robust.

The robust, compact construction of Weishaupt's marine burners has proven itself under the harshest of conditions over many decades.

### Reliable.

The utmost quality is our goal. Thus each burner undergoes extensive testing and is individually inspected by a Classification Society.



# Equipped for all ports in the world:

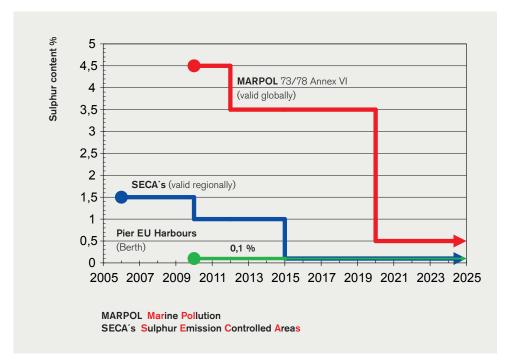
A Weishaupt burner for almost any fuel. There are various qualities of marine fuel oil (MFO). MARPOL 73/78 Annex I to VI regulates the use and the emission of sulphurous combustion products in certain sea areas. This has resulted in the production of non-standard, reduced-sulphur oils.

The ISO 8217 standard for marine fuels differentiates between distillate fuel oils (MDF) and residual fuel oils (RFO). The most important specifications limit the density, viscosity, water content, and flash point of the oil.

MARPOL regulations stipulate that a sample of each fuel delivered must be available on board. The fuel may only be used once the fuel specification (Bunker Delivery Note) has been approved by the test laboratory.

Weishaupt burners in marine execution are suitable for use with marine fuel oils that are compliant with DIN ISO 8217:2018-10 and ISO 8017:2017-03 (please enquire regarding the suitability of other fuels).

For safety reasons, due to its low flash point of 45  $^{\circ}$ C, DMX-quality oil is not approved for combustion on board ships.



Limit values for sulphur content in the fuel

Source: DIN ISO 8		-10	Marine fuel oils (MFO)														
*Commercial design				<b>stillate</b> . MGO								oils (F /Bunk	<b>RFO)</b> ker oil*				
Characteristics	Unit	Limit	<b>DMX</b>	DMA DFA	DMZ DFZ	DMB DFB	RMA	RMB	RMD 80	RME (IFO) 180	180	RM (IF 380	//G FO) 500	700	380	RMK 500	
Viscosity at 40 °C / 50 °C		min.	1.4	2.0	3.0	2.0											
70 07 30 0	mm²/s	max.	5.5	6.0	6.0	11.0	10.0	30	80	180	180	380	500	700	380	500	700
Density at 15 °C	kg/m³	max.	-	890	890	900	920	960	975	991	991				1010		
Sulphur	mass %	max.	1.0	1.0	1.0	1.5	Statutory requirements										
Flash point	°C	min.	43	60	60	60	60	60	60	60	60				60		
Hydr. sulphide	mg/kg	max.	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0				2.0		
Carbon residue	mass %	max.	-	-	-	0.3	2.5	10	14	15	18				20		
Pour point	winter °C	max.	-	-6	-6	0	0	0	30	30		3	0		30		
Pour point	summer°C	max.	-	0	0	6	6	6	30	30	30 30			30	30		
Water	vol %	max.	-	-	-	0.3	0.3	0.5	0.5	0.5		0	.5		0.5		
Fatty acid methylester (FAME)	vol %	max.	-	- 7	7	7	-	-	-	_	-				-		
Weishaupt guide values			20-40	20-40	20-50	60	90	115	135	135	150	155	160	150	155	160	
for the atomising temperature °C					tillate o	il	MS <sup>3)</sup> burners (two-stage)						MS <sup>3)</sup>				
Application range for				MS	3) bur	ners (tw	o-stage	e) with 1	uel-cha	ingeove	r operat	tion					
Weishaupt burner				RMS <sup>3)</sup> burners (sliding-two-stage / modulating)													
				RM	1S <sup>3)</sup> b	urners (	sliding-	two-sta	ge/mo	dulating	ı) with f	uel cha	ngeovei	operat	ion		

 $<sup>^{1)}</sup>$  DMX not approved for marine burner operation  $^{2)}$  WM-L burners: three-stage/modulating distillate-oil burners

<sup>&</sup>lt;sup>3)</sup> MS/RMS burners: multi-stage/modulating residual-oil burners

# Fully approved

### Weishaupt burners meet Classification Society specifications.

Classification Societies create the technical regulations by which ships and offshore installations must abide, and monitor and document compliance with them.

### Internationally recognised Classification Societies

**ACS** International Association of Classification Societies

ABS	American Bureau of Shipping	ABS	
BV	Bureau Veritas		
ccs	China Classification Society	(3)	*)
DNV	Det Norske Veritas Germanischer Lloyd	DNV	#
KR	Korean Register of Shipping	(R)	# <b>*</b> #
LR	Lloyd's Register of Shipping	Lloyd's Register	
RINA	Registro Italiano Navale	RINA	п

As at January 2023

Burners and components that are approved for use in shipping and in offshore installations **type approval**. This approval is the basis of the final approval that takes place either at the test facility or on site.

Classification	Country	Approval Code No.	Burner type
ABS	USA	23-2381861-PDA	M/MS/RMS/1-10 WKL/WKMS/30-80 EV2/WEV
		23-2407363-PDA	WM-L10/1–30/2, version T WM-L10/2–50/2, version R
BV	France	52206/B0 BV	M/MS
		52208/BO BV	RMS
		74525/AO BV	WM-L10/1–30/2, version T WM-L10/2–50/2, version R
CCS	China	Service agreement	
DNV	Norway	TAP000022JZ	WM-L10/1–30/2, version T WM-L10/2–50/2, version R
		TAP00002HW	M/MS/RMS 1-10 and 30-70
		TAP00002HK	EV2/WEV
KR	Korea	HMB04961-BR001	L/RL/MS/RMS5-10
LR	UK	Service agreement	
RINA	Italy	Not required	

The Plimsoll line, as it is known, shows by which society the ship has been classified. On merchant ships, the mark is found halfway along both sides of the hull.



The Plimsoll line identifies the Classification Society

Other classifications can be met on request

The burner can be matched to the ship via the registration code.



Registration code on the burner's flange

Shipowners are not legally obliged to classify their ships. However, very few states permit the operation of unclassified vessels within their territorial waters, so classification is virtually unavoidable if a ship is to be given as wide an operating range as possible.

Ships without classification are not permitted in European waters or ports.

### You have a demanding requirement: Weishaupt has a suitable burner

### Step by step to your tailor-made burner

We need the following information from you to select your burner:

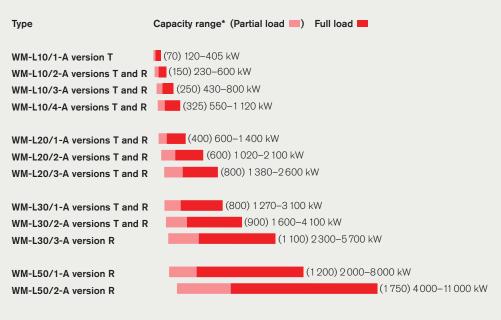
Type of marine fuel	Boiler make/model     and contruction     (furnace geometry)	3. Installed position of the burner	4. Type of load control required	5. Classification required
DMA	Heating and hot water	<ul> <li>Horizontal</li> </ul>	<ul><li>Multi-stage T/M/MS</li></ul>	• ABS
• DMZ	(LTHW/HTHW/steam)		- (viscosity up to	• BV
• DMB		<ul> <li>Horizontally inclined</li> </ul>	500 mm <sup>2</sup> /s at 50 °C)	• CCS
- DIVID	<ul> <li>Auxiliary boiler</li> </ul>	(10-30°)	- (viscosity up to	- DNV
- RMA	(steam/thermal fluid)		380 mm <sup>2</sup> /s at 50 °C	• KR
• RMB		<ul> <li>Vertical</li> </ul>	when alternating with	• LR
• RMD	<ul> <li>Process plant</li> </ul>		MGO)	• RINA
- KIVID	(e.g. oil treatment)			
• RME			<ul> <li>Modulating R/RMS</li> </ul>	
• RMG			- (viscosity up to	
- RMK			700 mm <sup>2</sup> /s at 50 °C)	



### Available classifications:

- ABS
- BV
- CCS (exclusively with factory acceptance test)
- DNV
- LR (prepared launch in 2024)
- RINA

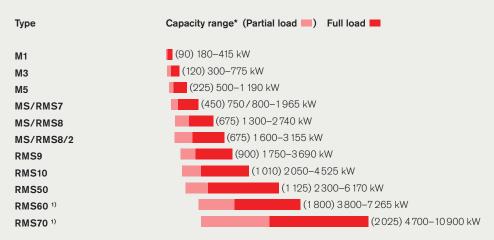
### For distillate oils (DM...)



### Oil burners



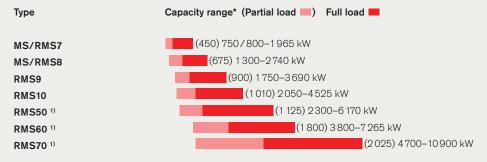
### For residual oils (RM...)



<sup>1)</sup> A separate oil pump station is required for each fuel

### For distillate oils (DM...) and residual oils (RM...) in alternation

(oil-side adjustment is not required)



r sales

1) A separate oil pump station is required for each fuel

\* The burner must be correctly sized for the combustion chamber resistance and geometry. Refer to the capacity chart in the burner sales brochure/manual.

For greater outputs or for duobloc burners, please enquire.

## Weishaupt burners offer many benefits

Weishaupt burners are made to order. Consequently, you receive a product tailor-made to your requirements.

### Reliable, convenient fuel changeover

A wide variety of fuel combinations are possible with a Weishaupt dual-fuel or triple-fuel burner. Changing over from gas (LNG or LPG) to oil is just as straight-forward as changing over from a higher to a lower-viscosity oil. Regardless of the type of fuel changeover required, we have the right solution.

Tried-and-tested components with innovative details serve to improve burner performance, operation, and safety. One particular key benefit of Weishaupt equipment is the use of the UHE-WH multi-fuel pump. It eliminates the need to make adjustments to atomisation pressure when burner operation is alternating between different oils.

The burner's oil supply needs to maintain thermal balance, particularly when changing over from a high-viscosity residual oil to a low-viscosity distillate oil. If the difference in viscosity is great, however, then this is not possible. It therefore becomes necessary to use an auxiliary fuel during the changeover process to help stabilise viscosity.

Oil pressure monitoring, which is included as standard, allows the oil flow to be monitored, another example of how Weishaupt increases safety.

Weishaupt's goal is and always has been the development of burners and fuel supply systems that go above and beyond normal standards.



A guided oil drip pipe ensures maximum safety (standard for burners with alternating-oil executions)

### Guided oil drip pipe for maximum safety

Alternating between different marine oils exposes the pump shaft seal to a lot of mechanical stress. Despite good filtering, residual oils contain particulates that corrode the surface of the seal. Very low oil viscosities are briefly present when changing over to distillate oil. Under these conditions, the shaft seal can no longer seal completely and, as a consequence, there is a minimal amount of oil leakage.

The UHE-WH multi-fuel pump offered by Weishaupt is an innovative solution to this problem. High-quality materials and a guided oil drip pipe prevent oil from getting into the burner's air inlet area. Another win for safety and operational readiness.

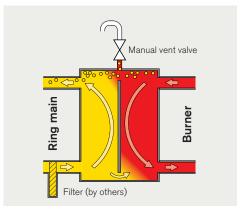
### Air/gas separator improves burner performance and saves energy

Spill-back-type oil nozzles unavoidably introduce air into the oil supply system. If this air makes its way back to the pump then pressure fluctuations and flame instability will result. The air/gas separator is an effective component that prevents this happening. A further advantage of the air/gas separator is

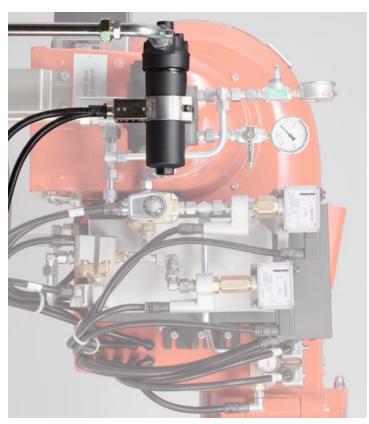


Integral air/gas separator for greater operational reliability and convenience (standard for RMS burners with alternating-oil executions)

that it acts as a low-loss header. It separates the transfer circuit from the burner circuit and provides for different temperature zones. This reduces the load on the oil preheater and allows it to be optimally sized, thereby saving energy and reducing operational costs.



Separation into different temperature zones saves energy and reduces costs



The flexible design of the heated oil filter enables the burner to be installed in any desired position, from horizontal to vertical



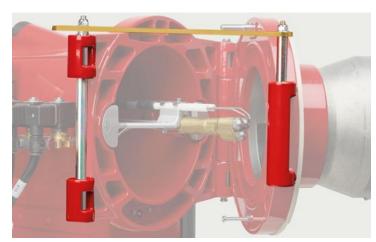
The integral oil filter is readily accessible (Supplied as standard on MS burners in alternating-oil execution)

### Oil filter fitted as standard

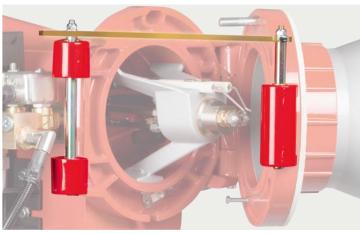
The burner's heated, integral oil filter is readily accessible and easy to service. The filter's flexible design enables the burner to be positioned as required.

### Increased safety during servicing

The burner hinge stay, which is supplied as standard, ensures that the burner cannot swing closed during servicing.



WM-L burners



MS burners

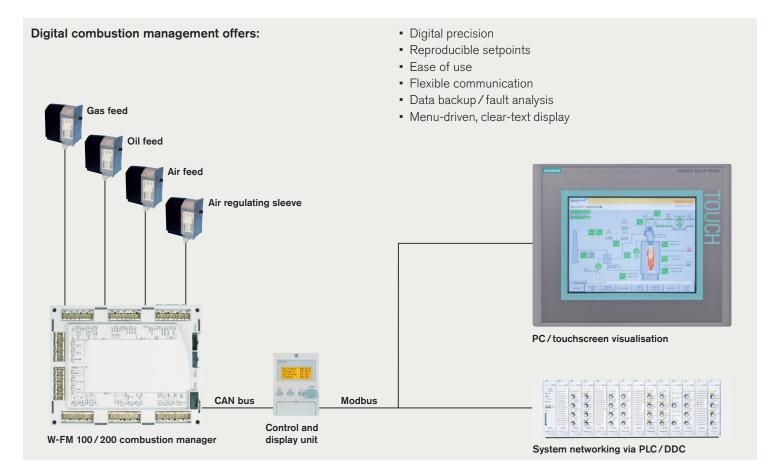
## The controls you need:



Weishaupt's control systems will meet all of your Classification Society's particular requirements and are available in all of the usual voltages and frequencies



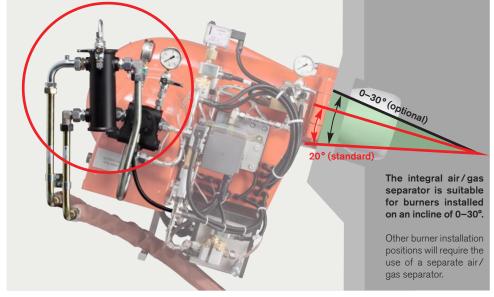
Fully redundant controls for maximum safety



### Simple, time-saving conversions with ready-to-install conversion kits

### Ready-to-install conversion kits

The introduction of stricter emission limits has made it necessary to convert burners that previously fired only residual oil so that they can now also fire distillate oil when required. Weishaupt offers ready-to-install conversion kits, which provide a simple and time-saving means of adapting the burner to the different requirements.



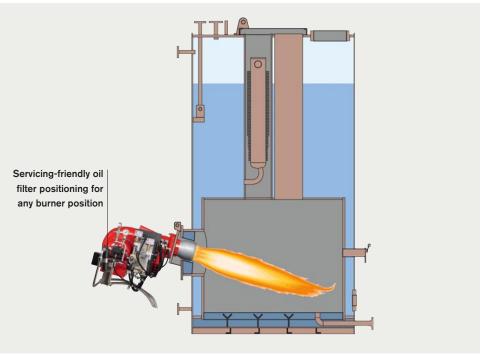
Ready-to-install conversion kits simplify the conversion of an existing burner and are easy to install (Example: RMS7/RMS8)



Conversion kit for RMS7/RMS8



Conversion kit for MS7 Z/MS8 Z



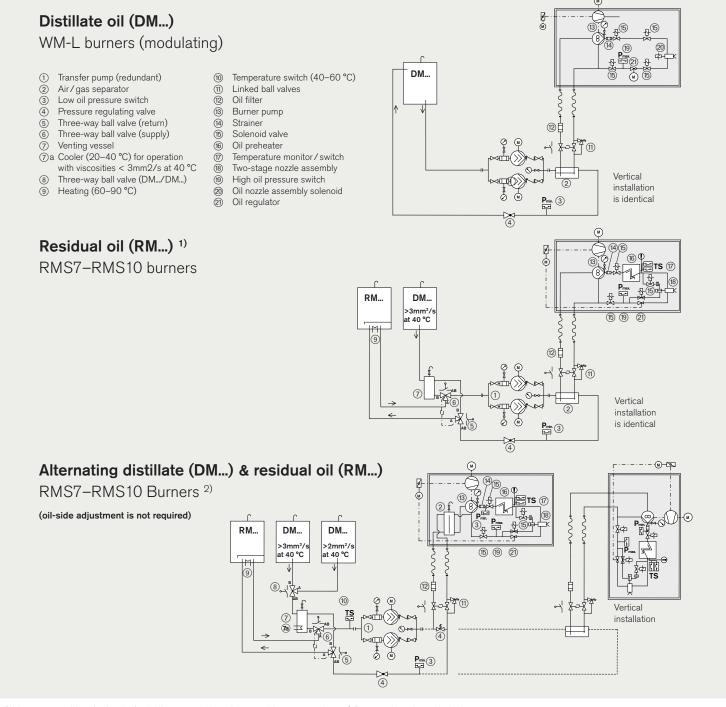
The MS conversion kit allows burner installation in any position from horizontal to vertical (example: MS7/MS8)

### Fuel supply and changeover

### Distillate oil (DM...) WM-L burners (three-stage) DM... Temperature switch (40-60 °C) Linked ball valves Transfer pump (redundant) Air/gas separator Oil filter Low oil pressure switch 3 (12) 4 Pressure regulating valve Burner pump (13) (5) Three-way ball valve (return)(6) Three-way ball valve (supply) 14) Strainer Solenoid valve (15) 7 Venting vessel 7 a Cooler (20–40 °C) for operation (16) Oil preheater Temperature monitor/switch Vertical with viscosities < 3mm2/s at 40 °C Two-stage nozzle assembly Three-way ball valve (DM.../DM...) installation High oil pressure switch 9 Heating (60-90 °C) is identical P<sub>min</sub> ③ Residual oil (RM...) 1) MS burners RM... DM. at 40 °C Vertical installation is identical Alternating distillate (DM...) & residual oil (RM...) MS7-MS8 burners 2) (oil-side adjustment is not required) RM... DM... DM... >3mm<sup>2</sup>/ >2mm<sup>2</sup>/ at 40 °C

Vertical installation is identical

<sup>&</sup>lt;sup>1)</sup> DM... as an auxiliary fuel only, for boiler startup/shutdown and burner purging <sup>2)</sup> Burner size 8/2 excluded



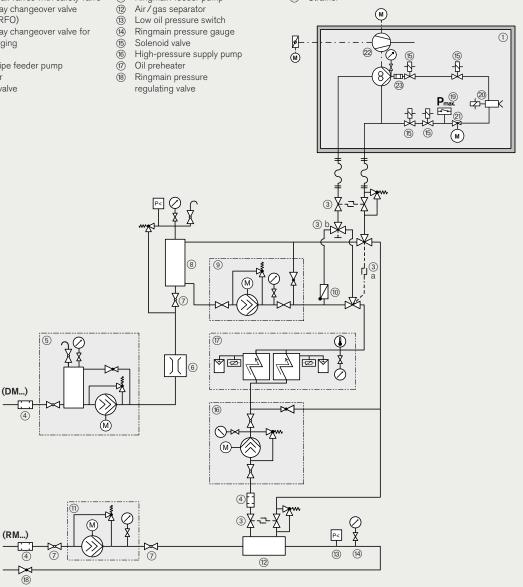
<sup>&</sup>lt;sup>1)</sup> DM... as an auxiliary fuel only, for boiler startup/shutdown and burner purging <sup>2)</sup> Burner size 8/2 excluded

### Fuel supply and changeover

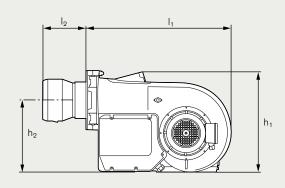
### Changeover between separate distillate oil and residual oil supplies

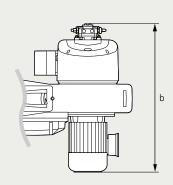
- ① Burner for MGO/RFO
  - in alternation
- Combustion air fan with damper and actuator
- 3 Linked ball valves with safety valve
- 3a Three-way changeover valve (MGO/RFO)
- (3)b Three-way changeover valve for RFO purging
- 4 Filter
- 5 Single-pipe fe6 Oil meter7 Shutoff valve Single-pipe feeder pump

- 8 Air/gas separator with vent valve
- High-pressure supply pump
- Non-return valve
- (1) Ringmain feeder pump
- (9) High oil pressure switch
- Oil nozzle assembly solenoid
- 21) Oil regulator
- Burner pump
- Strainer



### Key dimensions at a glance WM-L10-50



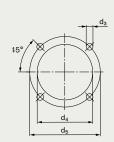


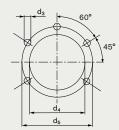
### **Dimensions**

Dimension	WM-L10			WM-L20				WM-L30	WM-L50					
	10/1	10/2	10/3	10/1-4	20/1	20/2	20/3	30/1	30/2	30/3	50/1	50/2		
l1	659			810			941		956	1616	1636			
12	118-138	127-147	147-171	148-168	217-232	227-247	237-257	301–326		285-325	442	457		
h1	445			573			69	95	730	1058	1071			
h2	313			408			505			758				
b	630	630/659	658.	/687	835		835		835/875	989	1028	1042	-/1462	-/1308

### Mounting plate drilling dimensions

Dimension	WM	-L10	WM-L20			WM-	-L30	WM-L50		
d3	М	10	M12			М	12	M16		
d4	165	185	240	260	270	305	375	435	530	
d5	186	210		298		330	400	470	580	

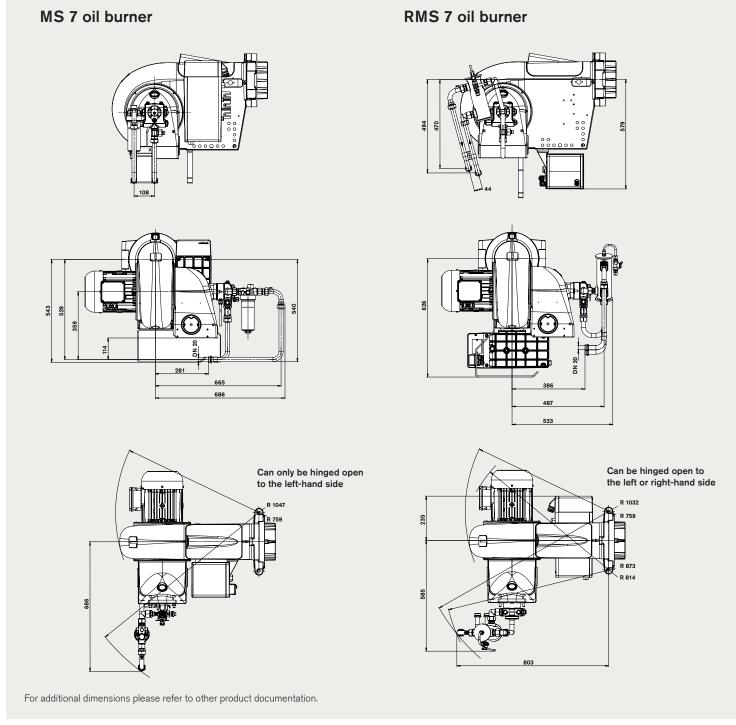




Dimensions in mm

For additional dimensions please refer to the planning handbook and other product documentation.

### Dimensions and hinging radii for sizes 7 and 8 MGO-MDO-HFO version



### Our suggestion: Weishauptrecommended equipment

Equipment			ABS	BV	ccs	DNV	KR	LR	RIN
Burner, general									
	Marine specification	All burner castings painted internally     Motor terminal box sealed with captive screws     Cables protected by flame-retardant hose     Marine cable glands in accordance with DIN 89280     Type-tested, stainless-steel oil hoses     Hinge stay for servicing works     Oil pressure gauge with ball valve	•	•	•	•	•	•	•
	Optional	Spheroidal cast iron or cast steel oil filter	•	•	•	•	•	•	•
Control									
	Controller/	• 2x LAL2.25 panel-mounted controllers (selectable)	•	•			•	•	•
	manager	LOK16.250 panel-mounted controller or 2x LOK16.250 panel-mounted controller			•	•			
		W-FM100/200 fitted at the burner (WM-L)	•	•	•	•		•	•
	Flame • RAR9 sensor				•				
	3011301	• 2x RAR9 (selectable)	•	•		•	•	•	•
		QRI (in conjunction with W-FM100/200)	•	•	•	•		•	•
	Air pressure	<ul><li>LGW switch</li><li>LGW switch (WM-L)</li></ul>	•	•	•	•		•	•
	Motor	<ul> <li>Direct on line starter fitted at the motor (WM-L 10-20)</li> <li>Star/delta starter fitted at the motor (WM-L 30-50)</li> </ul>	•	•	•	•		•	•
Oil pump	Integral oil pump	Low oil pressure switch (MGO-MDO-RFO version)     High oil pressure switch (MS/RL/ RMS burners)	•	•	•	•	•	•	•
	External oil pump	Air pressure switch     Low oil pressure switch in oil supply	•	•	•	•	•	•	•
Component heating									
	RFO version	<ul> <li>Oil solenoid valves/oil pressure switch, 22 W</li> <li>Nozzle assembly, 110 W</li> <li>Oil regulator, 22W (on RMS burners)</li> <li>Burner-mounted filter, 2x 66 W</li> </ul>	•	•	•	•	•	•	•
	Oil pump	• E4-7 80W, T/TA/UHE-WH 110W	•	•	•	•	•	•	•
	500-700 mm <sup>2</sup> /s at 50 °C	Heated oil line and oil distributor, 22W     Heated oil hoses, 62W	•	•	•	•	•	•	•

Please enquire regarding equipment for other classification societies.

# Weishaupt burners wherever quality is indispensible



A 1.2 MW Weishaupt burner provides heat on the Polarstern research vessel



A 3 MW Weishaupt residual oil burner provides heat for the thermal fluid heater



Container ship equipped with a 2.8 MW residual oil burner

### At home on the seven seas

The demands on marine applications are high. The very utmost degree of reliability and operational safety is therefore imperative.

Our decades of experience, coupled with the highest quality of product and service, makes us one of the world's leading companies in the industry.

Weishaupt marine burners are used around the globe under the harshest of conditions. For example, they can be found on:

- Cruise ships
- Ferries
- Tankers
- Container ships
- Bulk carriers
- Offshore platforms
- Drilling rigs

### Applications:

- Auxiliary and hot-water boilers
- Process plant, such as
  - Waste incineration
  - Oil treatment

Crude oil from rigs in the South China Sea is stored temporarily on central ship depots



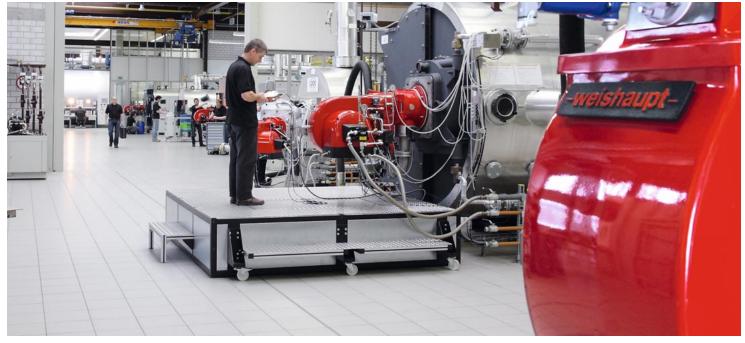
Four 10 MW burners on thermal fluid heaters ensure the crude oil can be pumped



Two 10 MW burners with digital combustion management provide the necessary process heat on the oil production platform CNOOC LUDA 27-2



### Our recipe for success: Innovation and the latest production methods



The burner technology of tomorrow is tested in the Research and Development Centre

**Innovation** comes from Weishaupt's inhouse Research and Development Centre, whose new product developments have been setting benchmarks for decades. Burners and heating systems become ever cleaner, more economical, and easier to use.

At present, around 100 specialists in Schwendi are committed to fulfilling this task. They are an unrivalled team that combines special training, years of experience, craftsmanship, and creativity.

Skill and knowledge for Weishaupt's futuregenerating workshops also comes from test sites in the field and ongoing communication with our customers. The work is carried out using modern test equipment and design offices. The latest production methods combine optimum working conditions and maximum conservation of resources. Our automated manufacturing centres, bright assembly halls and efficient work processes are all essential ingredients. Utmost reliability for our products is the goal.

A willingness to invest ensures a modern manufacturing facility and thus quality and efficiency. Burners for use around the world are manufactured at the main works in Schwendi.

Care, diligence and discipline shape our business. Every action and the smallest of parts is important, if the highest level of customer care is to be built into the burners and heating systems.

It is about the effectiveness of testing and control systems, the use of modern equipment, and the quality of materials, as well as logistics and organisation.

And it is decided by the human factor: "We deliver precision work," is the motto of every Weishaupt employee.



Burners for worldwide use are manufactured in a modern assembly hall



All marine burners are fully tested on special test rigs prior to delivery

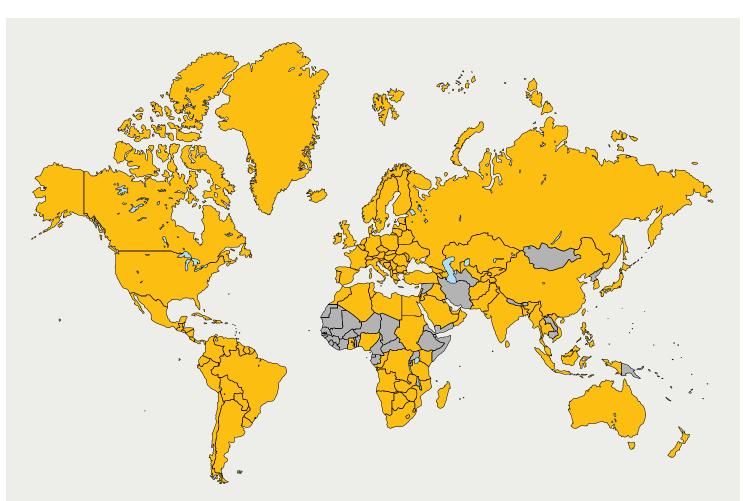
### -weishaupt-

If you need us, we're there.

Max Weishaupt GmbH 88475 Schwendi Tel +49 7353 830 Fax +49 7353 83358 www.weishaupt.de

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Some illustrations depict optional extras that are available at additional cost.



### Weishaupt worldwide:

Afghanistan Algeria Angola Argentina Australia Austria Bahrain Bangladesh Belarus Belgium Belize Bolivia Bosnia-Herzegovina Botswana Brazil Bulgaria

Canada Chile China Columbia Congo (D. Rep.) Congo (Rep.) Costa Rica Croatia Cuba Cyprus Czechia Denmark Dominican Rep. Ecuador Egypt El Salvador

Estonia

Eswatini Faroe Islands Finland France French Guiana Germany Ghana Greece Greenland Guatemala Guyana Haiti Honduras Hungary India Indonesia Iraq

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