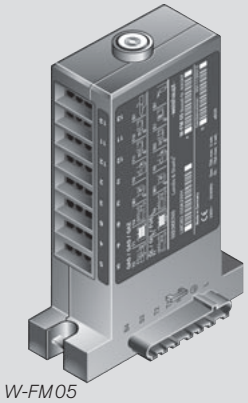
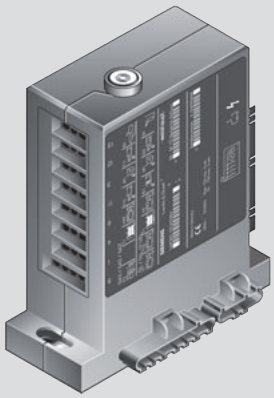
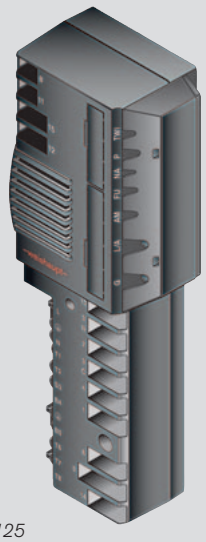
Digital combustion management: reliable and easy to use



W-FM 05



W-FM 10



W-FM 25

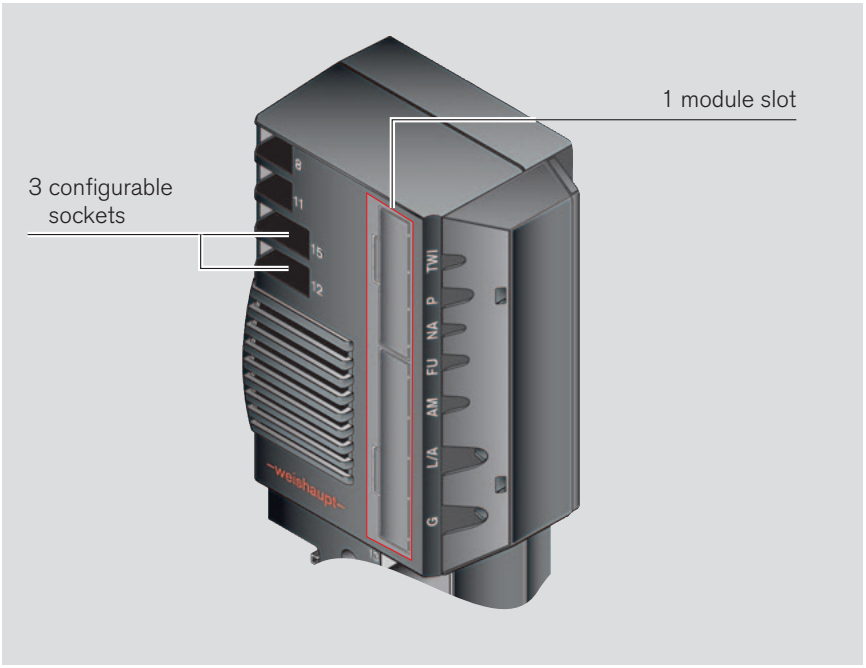
All of Weishaupt's W-series burners are fitted as standard with a digital combustion manager. The unit's microprocessors control and monitor all burner functions. As a result, Weishaupt burners are easy to use, precise, and reliable.

The digital combustion manager also offers the possibility of communicating with other systems via an integrated bus connection. This allows a technician to monitor the operation of the burner and remotely diagnose any errors.

Combustion manager			**W-FM 05**	**W-FM 10**	**W-FM 25**
Fuels					
Gaseous			●	●	●
Liquid (distillate)			●	●	●
Gaseous / liquid (distillate)			–	–	●
Features					
Combustion manager for intermittent firing			●	●	●
Combustion manager for continuous firing > 24 h			–	–	○ [1]
Integrated gas valve proving			–	●	●
Maximum number of actuators			1	1	2
Actuators with stepping motor			–	–	2
Maximum number of compound settings			–	–	2
Flame monitoring			Ion	Ion	Ion
Fuel metering via input pulse			–	–	●
Service software			ACS 401	ACS 401	Vision Box
Efficiency optimisation					
Variable speed drive			–	–	○
O_2 trim			–	–	○ [2]
Control					
Stage switching inputs (thermostat / pressure control)			●	●	●
Three-term switching input			–	–	●
0 / 4–20 mA or 0 / 2–10 V analogue input / output			–	–	○ [2]
Bus systems					
eBus			●	●	–
Modbus-RTU			–	–	○ [3]
Profibus			–	–	○ [3]
Controls positioning					
Burner-mounted combustion manager			●	●	●
Removable control unit			–	–	10 m
Electrical supply					
120 V, 50 Hz / 60 Hz			●	●	●
230 V, 50 Hz / 60 Hz			●	●	●
Approvals					
Europe	CE	(230 V / 50 Hz)	●	●	●
Australia	AGA	(240 V / 50 Hz)	–	–	●
USA / Canada	CSA	(120 V / 60 Hz)	–	–	●

● Standard ○ Optional [1] PO version [2] PO O_2 version
[3] With EM3/3 expansion module [4] With EM3/2 expansion module

Optional W-FM 25 expansion modules

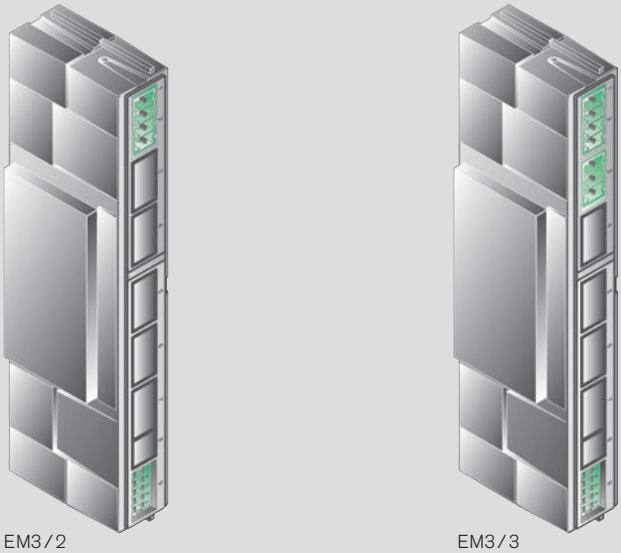


W-FM 25 combustion manager
- Configurable inputs (summary)
  Socket 12
  – VPS valve proving
  – Proof of valve closure (POC)

  Socket 14
  – Remote reset
  – Start release
  – Contact-dependent post-purge

  Socket 15
  – High gas pressure switch
  – Extraneous air pressure switch

Field bus module or Analogue module



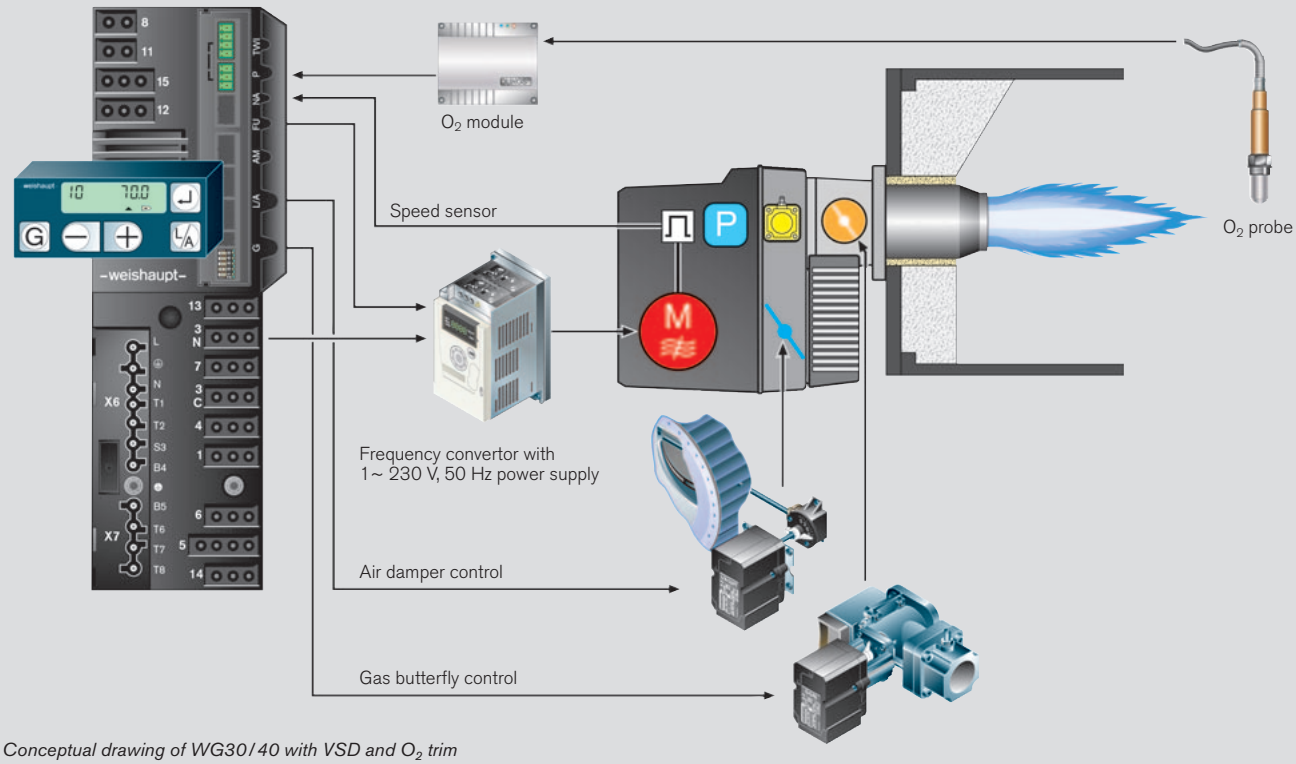
EM3 / 2 EM3 / 3

Field bus module – Modbus / Profibus
By way of example, the following data can be read or changed:
- Burner ON / OFF
- Fuel changeover
- Current degree of modulation
- Required degree of modulation
- Heat demand present
- Flame signal
- Hardware inputs and outputs
- Operating phase
- Hours run
- Fan speed with VSD
- Actuator positions
- Fuel throughputs
- Etc.

Analogue module – input / output
Input: Required burner load
0–20 mA / 4–20 mA
0–10 V / 2–10 V

Output: Current burner load
0–20 mA / 4–20 mA
0–10 V / 2–10 V

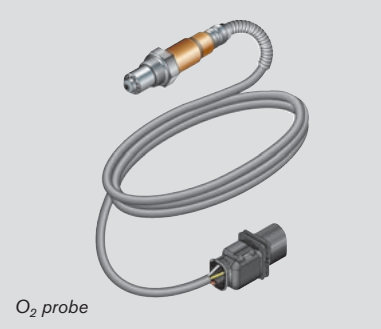
WG30–40 with VSD and/or O_2 trim
WG20–40 with O_2 trim



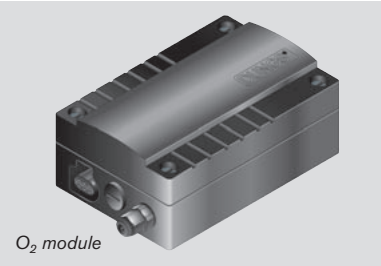
Conceptual drawing of WG30/40 with VSD and O_2 trim

The key points:

- The utilisation of identical units for gas and oil-fired burners helps simplify commissioning and reduces the number of spares required.
- Non-interchangeable plugs ensure the correct electrical connection of all components
- Electrical remote reset is possible
- Flame monitoring via ionisation probe
- Safety is ensured by the reciprocal monitoring of two microprocessors
- LCD screen with interrogation, service, and parameterisation functions. The burner can be set directly via the operating keys (WG10–40, version ZM-LN)
- W-FM 25 for continuous firing, VSD, and O_2 trim
- Air damper and frequency convertor in electronic compound
- Adjustment of the O_2 setpoint curve and the minimum and maximum O_2 monitoring threshold
- Air volume can be adjusted via diffuser position, air damper position, and fan speed
- Separate ignition load setting
- High-precision, digital control
- Optional expansion modules with either a Modbus interface or analogue and digital inputs and outputs
- The separate PC connection offers, through the use of the Vision Box software, additional options such as:
  – Setting of the pre-purge time
  – Display of the operational sequence and the adjustment of functional parameters



O_2 probe



O_2 module

Burners with variable speed drive: economical and quiet

Variable speed drive (VSD)
Whereas a burner motor is usually run at a constant speed, the speed of the motor on VSD-equipped WG30 and WG40 burners is variable and depends on the prevailing burner load. The VSD is electronically controlled by the digital combustion manager.

VSD offers the twin advantages of a reduction in electrical consumption and considerably reduced noise levels when firing at partial load.

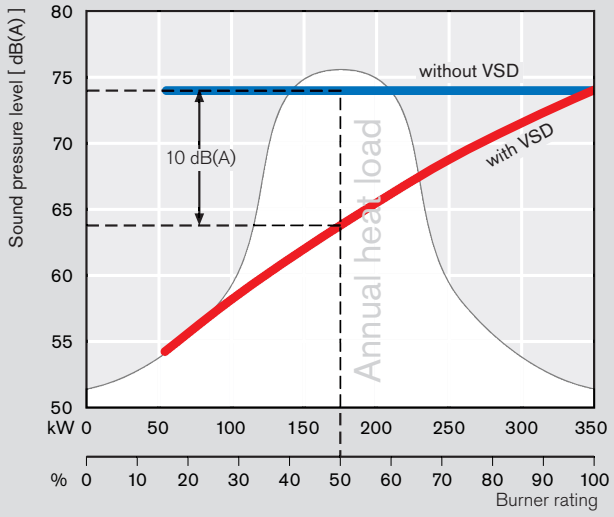
The reduced noise levels are of particular practical benefit. A 10 dB reduction in the sound level can be achieved at 50 % burner load, which equates to a halving of noise emissions.

The Weishaupt W-FM25 combustion manager uses a frequency convertor and inductive pulse generator to control and monitor the speed of the fan. Electronic compound regulation enables the gas and air volumes to be set independently of one another.

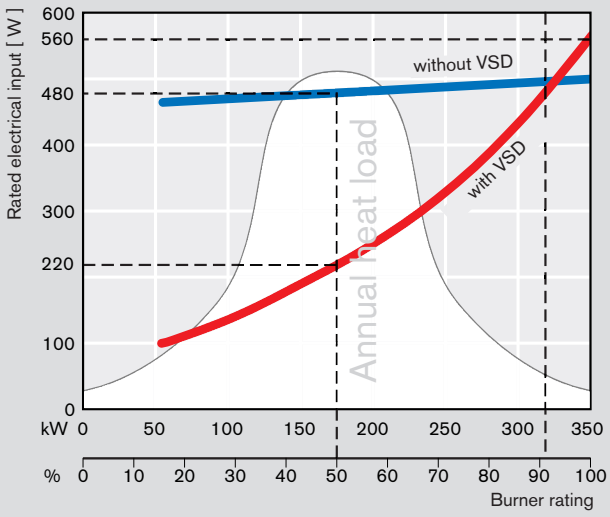
A special feature of this execution is the ease with which the gas/air compound can be set for standard heat generators and the adaptability for thermal process plant.

Benefits
- Electrical energy savings
- Reduction in burner noise emissions
- Capacity range identical to that of the standard, fixed-speed burners
- Speed monitoring via inductive pulse generator
- 230 V three-phase motor
- Gas butterfly valve, air damper, and frequency convertor are in electronic compound
- Air volume can be adjusted via diffuser position, air damper position, and fan speed
- Separate ignition load setting
- High-precision, digital control
- Hinged flange for easy handling
- Good price/performance relationship

Economical and quiet with VSD



Typical reduction in sound pressure level for a WG30 gas burner



Typical reduction in rated electrical input for a WG30 gas burner

Overview of burner control
Model designation

Gas-fired operation

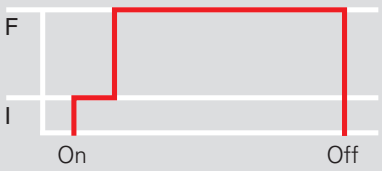
Load control

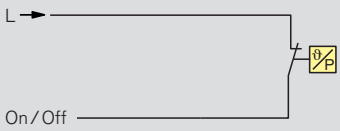
Switching [1)]

Single-stage control

- A temperature or pressure stat contact switches the burner on and off. The adjustable ignition load position allows a low-impact start to be effected.

Single-stage

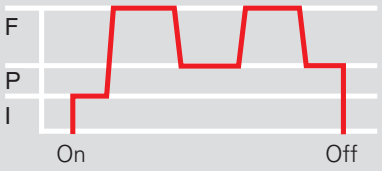


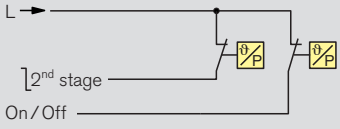


Two-stage control (Z)

- Two-term switching (e.g. temperature or pressure stat) causes actuators to drive the burner to partial load or full load in response to heat demand. The combustion values between load points are CO free. The adjustable ignition load position provides for a soft start.

Two-stage

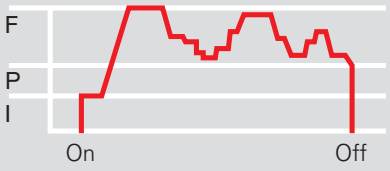


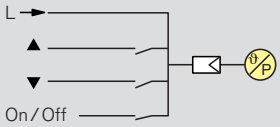


Sliding-two-stage / modulating control (ZM)

- An electronic load controller causes actuators to make infinitely variable load adjustments in response to heat demand.
- Available modulation control options for the W-FM25 combustion manager:
  - Three-term switching for an optional external load controller
  - Optional EM3 / 3 expansion module for an external load controller with an analogue output signal
  - Optional EM3 / 2 expansion module for a Modbus connection

Modulating





F = Full load (nominal load)
P = Partial load (minimum load)
I = Ignition load

[1)] Alternatively, staged control can also be effected by an electronic PID controller. In this case, appropriate temperature sensors or pressure transducers will be required.

Model designation

Model Version

WG10N/1-D ZM-LN

- Mixing assembly
- Load control
- Mark
- Capacity
- Gas type
- Size
- Fuel, gas
- Burner series

Details	Code	Meaning
Series	W	Compact burner
Fuel	G	Gas
Gas type	N F	Natural gas LPG
Load control	– Z ZM	Single-stage Two-stage Sliding-two-stage / modulating
Mixing assembly	– LN	Standard Low-NO_x

Use

Fuels
Natural gas
LPG

The suitability of fuels of differing quality must be confirmed in advance with Weishaupt.

Applications

W-FM 05 combustion manager for single-stage control
Suitable for intermittent firing on:
- EN 303-compliant heat generators
- LTHW boilers
- Air heaters

W-FM 10 combustion manager for two-stage control
Suitable for intermittent firing on:
- EN 303-compliant heat generators
- LTHW boilers
- Air heaters
- Group II and III steam boilers

W-FM 25 combustion manager for modulating control
Suitable for intermittent firing on:
- EN 303-compliant heat generators
- LTHW boilers
- Air heaters
- Group II and III steam boilers

W-FM 25 PO combustion manager for modulating control
Suitable for intermittent firing on:
- EN 303-compliant heat generators
- LTHW boilers
- Air heaters
- HTHW boilers
- Group II, III, and IV steam boilers
- Certain process applications

Permissible ambient conditions
- Ambient temperature
  -15 to + 40 °C for gas firing
- Maximum 80 % relative humidity, no condensation
- The combustion air must be free of aggressive substances (halogens, chlorides, fluorides etc.) and impurities (dust, debris, vapours, etc.)
- Adequate ventilation is required for operation in enclosed spaces
- For plant in unheated areas, certain further measures may be required

Use of the burner for other applications or in ambient conditions not detailed above is not permitted without the prior written agreement of Max Weishaupt GmbH. Burner service intervals will be reduced to accord with the more extreme operational conditions.

Protection Class
IP 40

Gas supply
EN 88-compliant regulators with safety diaphragms are used for low-pressure supplies.

For high-pressure supplies, an EN 334-compliant high-pressure regulator should be selected from the following technical booklets:
- Regulators up to 4 bar, Print No. 83001202
- Regulators with safety devices, Print No. 83197902

Maximum Operating Pressure (MOP)
The supplier must safeguard the gas flow pressure such that it cannot exceed the MOP of the burner's gas valve train.

Gas valve train design
Low-pressure valve trains are normally used for gas flow pressures up to a maximum of 300 mbar and a maximum operating pressure (MOP) of 500 mbar. This allows for pressure losses between the transfer station and the valve train. Furthermore, it is assumed that the transfer station utilises components (SSV, regulator) that are not of the highest class of accuracy. In individual cases, following consideration and approval by Weishaupt's headquarters, a gas flow pressure of up to 360 mbar can be approved if the appropriate conditions exist.

An additional FRS regulator must be fitted upstream of the gas multi-function assembly in the event the connection pressure will exceed 50 mbar when a W-MF 055 is used, or 150 mbar when a W-MF 507 is used.

High-pressure valve trains are normally used for gas flow pressures greater than 300 mbar.

Standards compliance
The burners are tested by an independent body and fulfil the applicable requirements of the following European Union directives and applied standards:

EMC EMC Directive 2014/30/EU
Applied standards
- EN 61000-6-1 : 2007
- EN 61000-6-3 : 2007

LVD Low-Voltage Directive 2014/35/EU
Applied standards
- EN 60335-1 : 2010
- EN 60335-2-102 : 2010

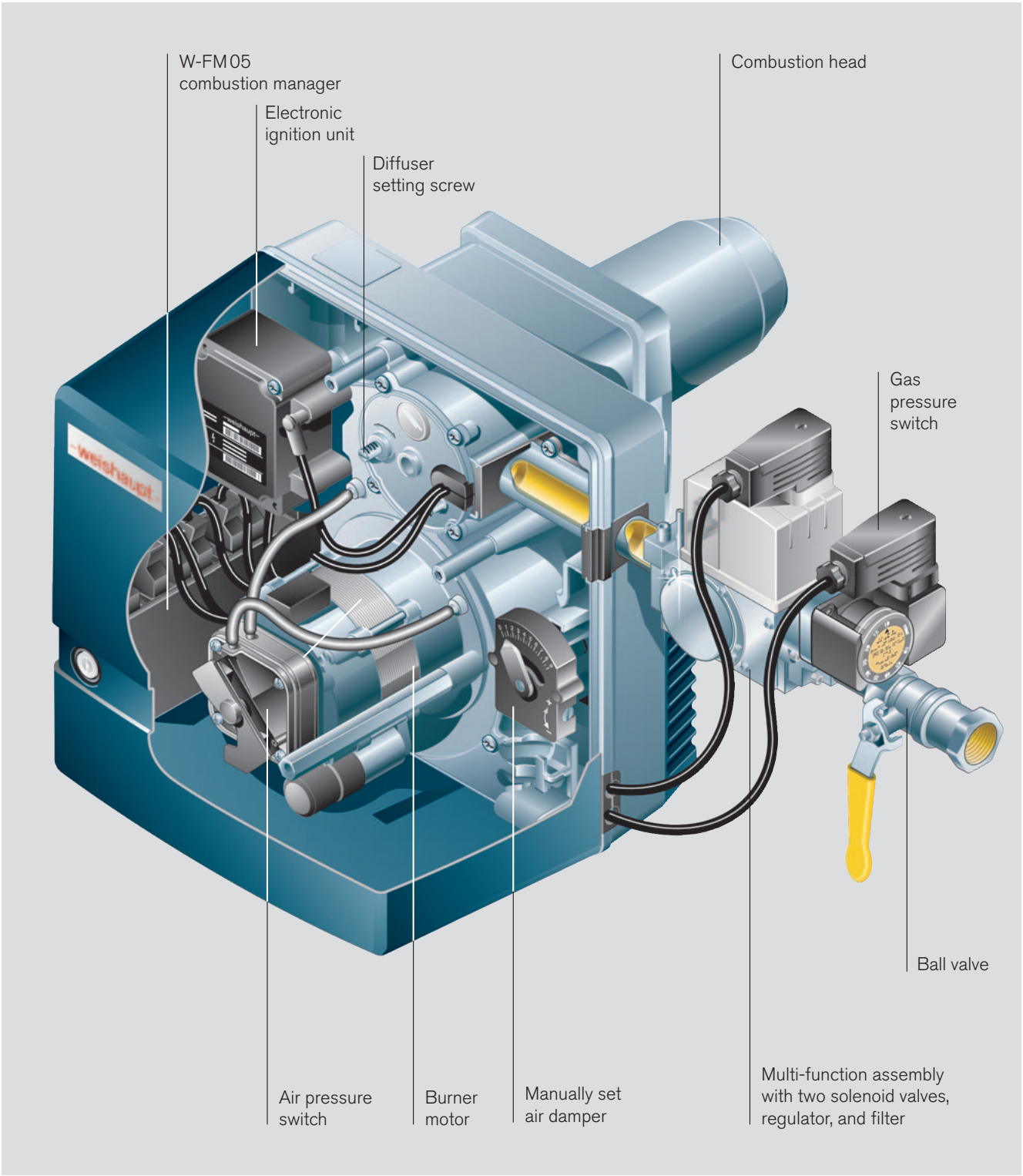
MD Machinery Directive 2006/42/EC
Applied standards
- EN 676 Annex J

GAR Gas Appliances Regulation 2016/426/EU
Applied standards
- EN 676 : 2008

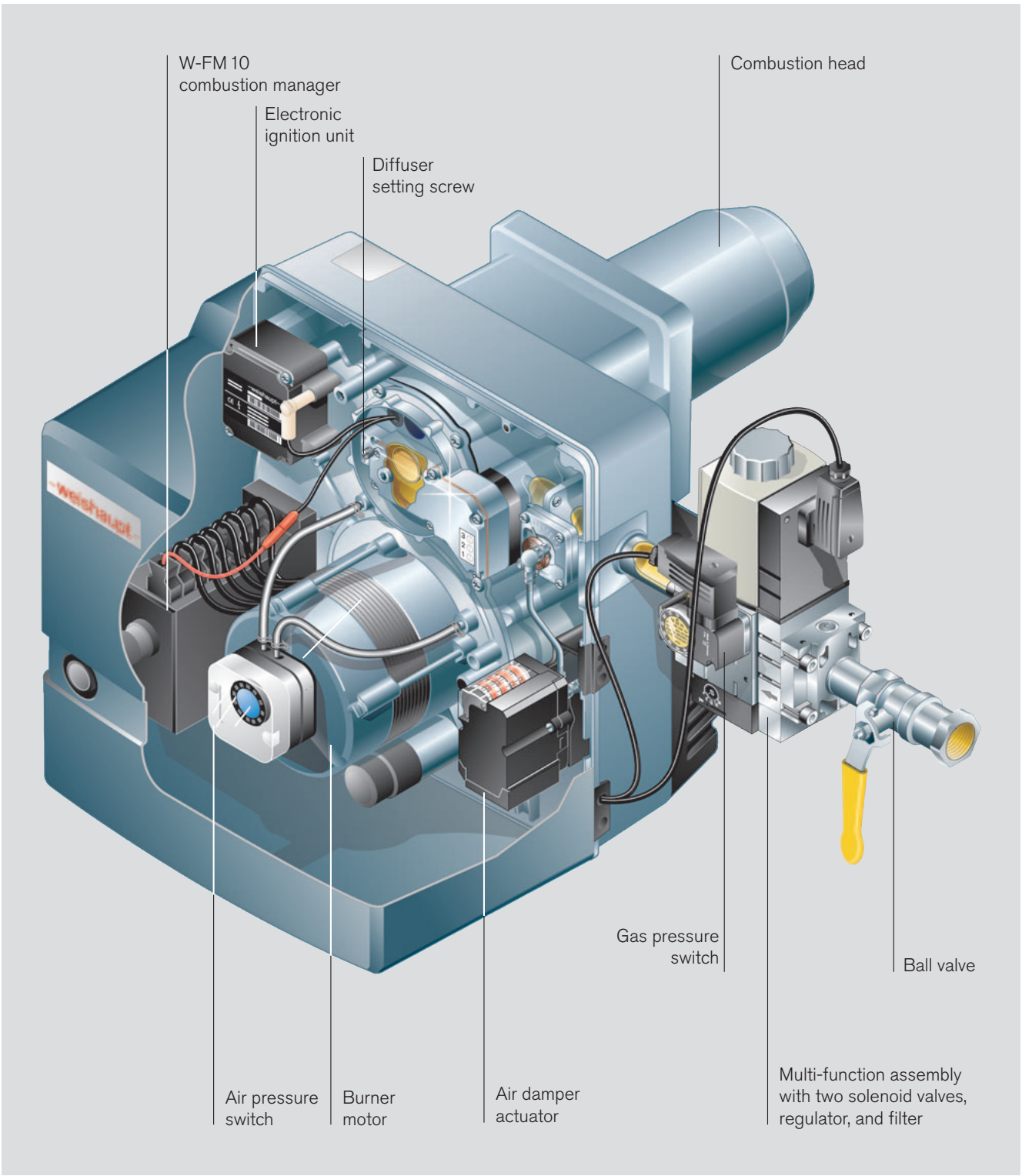
PED[1)] Pressure Equipment Directive 2014/68/EU
Applied standards
- EN 676 Annex K
- Conformity assessment procedure: Module B

[1)] With the selection of appropriate equipment.

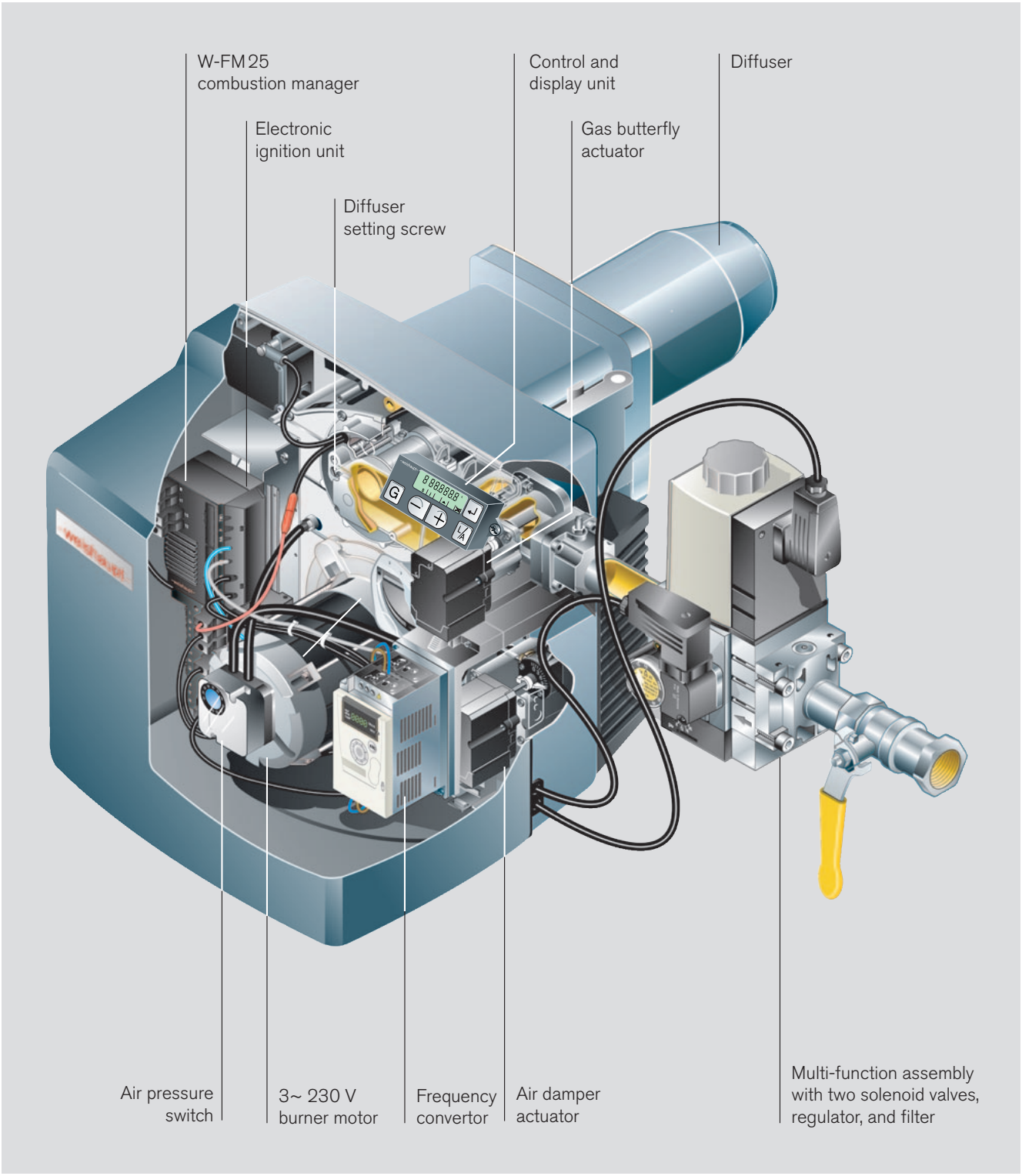
The burners are labelled with
- CE Mark
- CE-PIN per 2009/142/EC
- Identification No. of the notified body


W-FM 05
combustion manager
Electronic
ignition unit
Diffuser
setting screw
Combustion head
Gas
pressure
switch
Ball valve
Air pressure
switch
Burner
motor
Manually set
air damper
Multi-function assembly
with two solenoid valves,
regulator, and filter

Low-NO_x WG5



Low-NO_x WG20 in two-stage execution



Low-NO_x WG30 with VSD