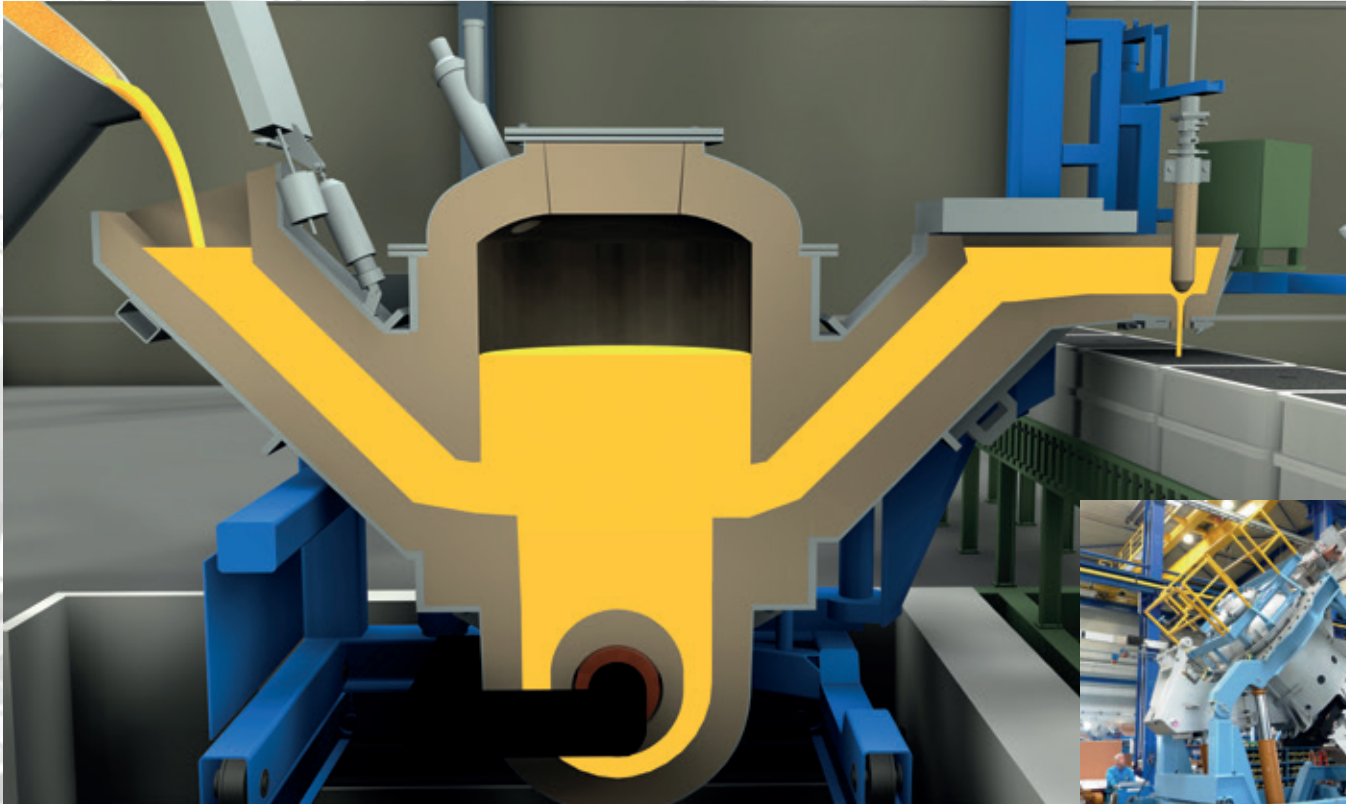


# POURING DEVICES FOR CAST IRON



**AUTOMATED POURING PROCESS  
REPRODUCIBLE CASTING QUALITY**

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**WE  
UNDERSTAND  
METALS**

# Pouring devices - Type RGD and UGD

for automatic pouring of various cast-iron grades  
in combination with indexing or continuous moulding machines

## Technical characteristics/Applications

- Supply of ready-to-cast iron to the moulding line
- Holding of molten iron at a constant pouring temperature
- Slag-free pouring
- Dosing of the iron entering the mould
- Automation of the pouring process
- Easing the operator's job
- Improvement of casting quality

## Economical advantages

- Improved rate of rejects
- No residual iron and improved ladle economy
- Increased production thanks to better utilization of moulding machine
- Casthouse is independent of the melting shop
- Reduced labour cost
- Better workplace conditions



RGD 4/200 on a Disamatik® moulding line

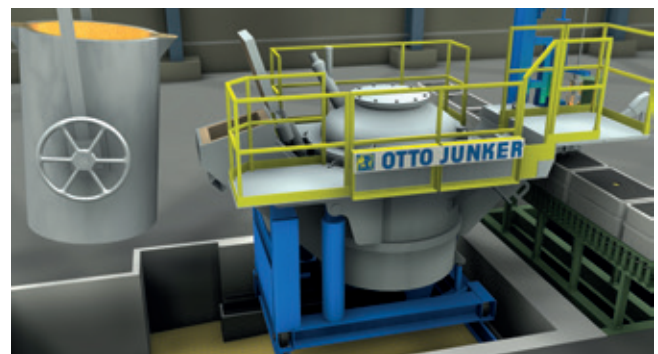
## Layout and design

The OTTO JUNKER pouring furnace of type RGD as well as the unheated pouring device of type UGD are made up of the cylindrical vessel with siphon-type filling gate and pouring spout as well as flange-mounted stopper pouring control system. The pouring furnace of type RGD is equipped with an easily replaceable inductor which is flange-mounted to the bottom or side of the vessel.

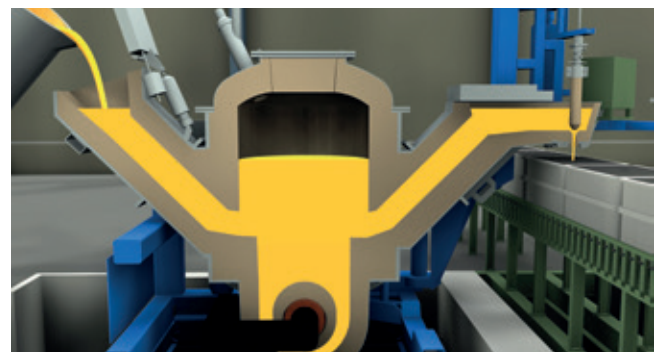
Filling gate and pouring spout can be arranged at an angle of  $\pm 90^\circ$  or  $180^\circ$  relative to each other.



For complete emptying the vessel can be tilted about the filling gate hydraulically. The vessel is mounted on a double carriage for movement along and across the moulding line enabling the pouring spout to be adapted to differing mould sprue cup positions.



Pressurized furnace, moving along and across the moulding line  
Hydraulic tilting system for complete emptying

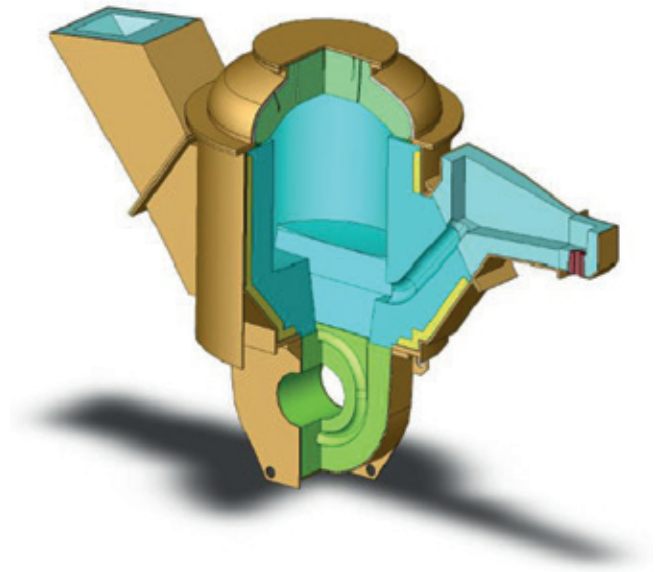


Simultaneous pouring and filling of the pressurized pouring furnace

# Furnace and inductor design

## Advantages of this design

- Multiple options of inductor, filling gate and pouring spout arrangement on the furnace vessel to match local shop layout
- Minimum heel
- Easy and quick replacement of inductor channel casing
- Optimized refractory make-up for long inductor service lives



## Side-mounted inductor

### Benefits:

- Low overall height
- Inductor core remains in position for quick and easy vessel and inductor replacement



## Bottom-mounted inductor

### Benefits:

- Easy to clean, especially with spheroidal graphite iron
- Minimum heel



## Inductor cooling

OTTO JUNKER offers a range of **water-cooled inductors** up to 1,200 kW power rating. **Air-cooled inductors** are supplied with power ratings up to 300 kW.



# Stopper control system for pouring devices

## Design and benefits of the pressurized pouring device with stopper control system

The production of high-grade castings on automated moulding lines poses high demands regarding dosed filling of the sand moulds. The use of pressurized pouring devices with stopper and pouring control system certainly represents a very good technical solution to satisfy these demands.

The vessel is pressurised with dried air or protective gas, causing the liquid metal to rise through the pouring siphon up into the spout. This takes place with the stopper closed. The metal level in the pouring spout is controlled by float system or, alternatively, by laser system with no physical contact. Additional policeman electrodes relieve the pressure if the metal level rises too high. The pouring rate is a function of pouring nozzle diameter, metal level above the nozzle brick and degree of stopper lift. The pouring rate is infinitely variable by changing the degree of stopper lift during pouring operation.

OTTO JUNKER offers the choice between a pneumatic actuator system and an electric linear actuator. Both versions are absolutely dependable as in both cases the stopper closes by gravity in the event of power failure.

### Pneumatic actuator

#### Benefits:

- Low investment
- Temperature and dirt resistant
- Easy maintenance, easy to use
- Air-cooled



### Electric linear actuator

#### Benefits:

- Very high positioning accuracy
- Closing force adjustable on the operator control panel
- Accurate position feedback
- Nozzle wear monitoring capability
- Fast signal response
- Maintenance-free due to contact-free linear drive



# Bath level monitoring

## Metal sensing electrodes

Two policeman electrodes limit the metal level in the pouring spout to the acceptable maximum by short-circuiting upon contact with the rising metal, thereby triggering immediate safety pressure relief of the pouring furnace.

## Float control system

A ceramic float dips into the molten metal in the pouring spout. The buoyancy of this float, which varies with the metal level, is determined electronically. In response to this a controller adjusts the pouring pressure so that the set level in the pouring spout is consistently maintained.

## Laser system

The metal level is sensed by a laser system without physical contact. The level is kept constant at its setpoint by adapting the pouring pressure.

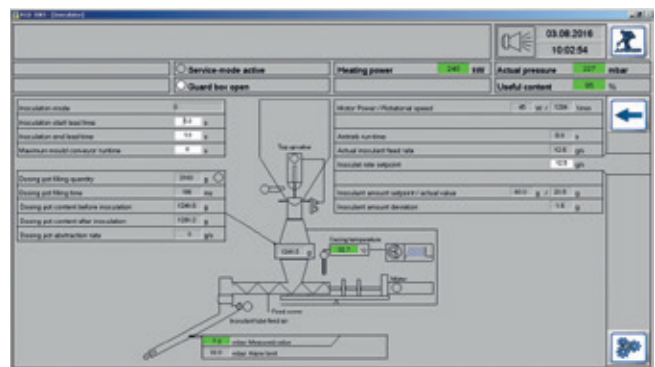


Pouring spout with float system and quickly replaceable stopper



# Optistream inoculation system

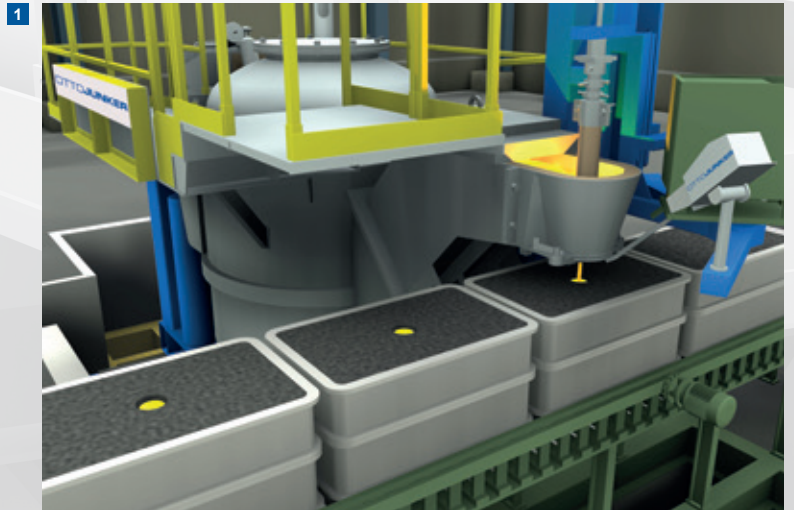
For certain iron grades and high-quality castings, an inoculation into the pouring stream is indispensable. To this end, OTTO JUNKER pouring devices are equipped with a metered inoculant dispensing capability. The inoculant is weighed by a loss-in-weight feeder system as it is supplied by a screw conveyor. It is injected into the metal stream with the aid of compressed air or nitrogen. The desired inoculant flow is kept constant by a mass flow monitoring device. A monitoring system triggers an immediate alarm when a quality related deviation is detected.



# Applications

## Fields of application

- 1 Flask moulding lines
- 2 Flaskless moulding lines
- 3 Simultaneous pouring and re-filling
- 4 Anode rodding plants
- 5 Pouring with tundish



- 6 Dual stopper system
- 7 Filling station with automatic ladle tilting feature
- 7 Pressurized pouring furnace (RGD) with filling station
- 8 UGD - unheated pouring device, inductor can be retrofitted
- 9 Integrated weighing system for weight measurement
- 10 Flexipour for Double Index



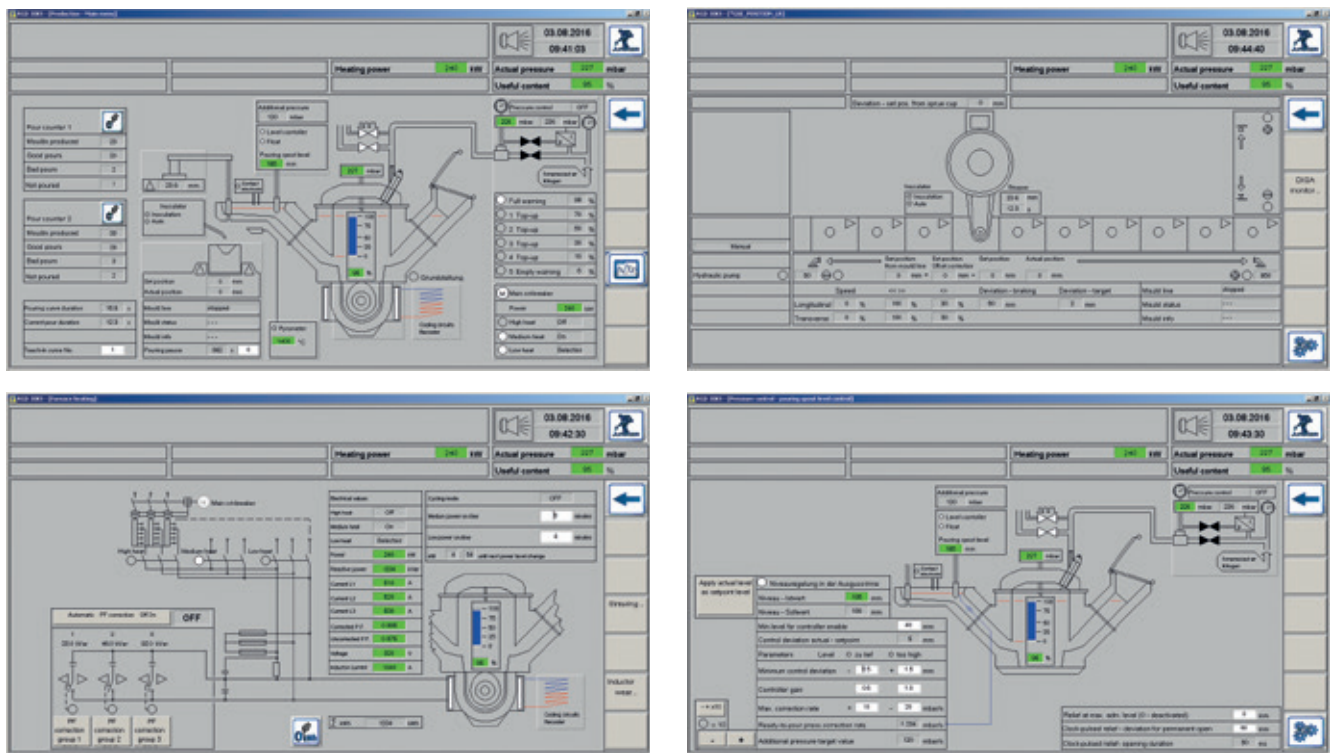
# Pouring control systems

## Automatic mould filling based on "teach-in" pouring control

With the teach-in system, a mould with a given pattern is filled following a pouring curve entered into the system in teach mode.

For each pattern plate the stopper lift is manually controlled by joystick such as to maintain the ideal metal level in the mould sprue cup. The stopper lifting motions thus defined are stored as a pouring curve and can be continuously reproduced to obtain castings of identical quality.

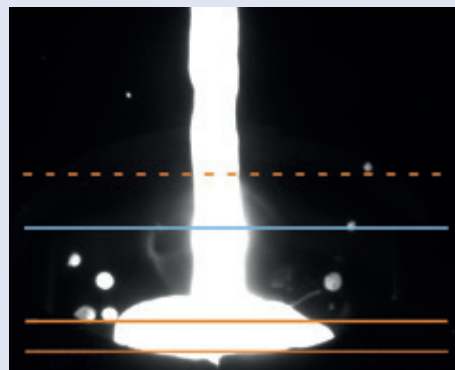
To compensate for wear or accretions on the nozzle or stopper, the pouring curve can be readjusted at any time.



## Pouring stream observation camera Teach-in C

- Low investment
- Increased operating reliability
- Improved ergonomics

Enhanced labour safety as pouring operation can be observed without eye protection.





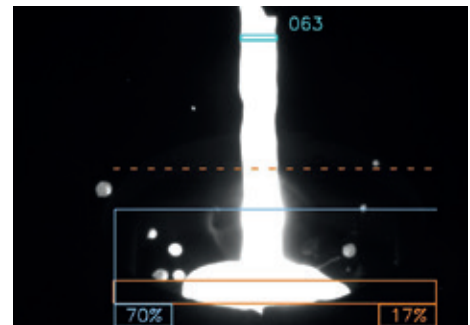
# Automatic mould filling by BelyCast

BelyCast adds a camera system as well as a HMI PC with image analysis and control software to a pouring device with an electrically actuated stopper for fully automatic pouring. The pouring device thus provides a choice between manual, 'teach-in' automatic or fully automatic operation. The user can select the mode best suited for his specific application.

The Ethernet cameras employed to monitor the pouring process are installed in industrial-grade water-cooled protective housings. They require little maintenance and are easy to adjust. An offline replay mode enables the operator to view the last pouring operations, e.g., in order to support a fault analysis.

## Benefits:

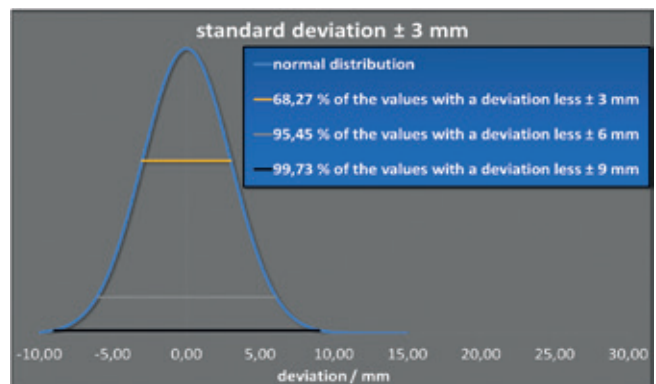
- Process reliability and repeatability of pouring cycles at high throughput rates. Optimized yield and productivity.
- Greatly reduced operator intervention in the pouring process, freeing the operator for other tasks.
- Intuitive HMI with data recording capability. Many additional functions are available for analysis and troubleshooting.
- Fine-tuning of the software to the user's needs and expectations.



- 1 Live camera image
- 2 Metal level in the sprue cup
- 3 Stopper lift and sprue cup level
- 4 Schematic view of the moulding line
- 5 Pouring results and quick adjustments

## Specification:

- Standard deviation of pouring time < 0.2 sec.
- Final filling level within an average +/- 1 mm of the setpoint stored in the pattern database.  
Standard deviation of final level ≤ 3 mm

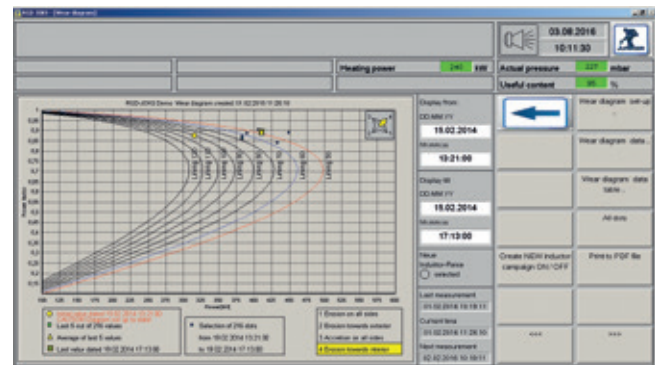


# Refractory lining and maintenance

Refractory lining materials are selected according to the molten metal grade and pouring device operating mode. The inductors are typically lined with dry corundum or magnesite compounds and the furnace vessel with corundum mix (dry or cast).

Maintenance work is restricted to cleaning and de-slugging of filling gate, filling tube and pouring spout with nozzle as well as replacement of worn pouring nozzle and stopper.

Checking is required primarily of cooling water and casing temperatures and of the electrical parameters of the inductor which inform about the refractory condition of inductor and vessel.



Inductor lining wear diagram

# Electrical switchgear and control system of compact design

The electrical equipment consists of the power section, the electrical control system and the measuring and monitoring devices, all mounted and fully wired in a compact cabinet.

The power section comprises the multi-stage transformer, the furnace power switches and the capacitors for optimizing the power factor ( $\cos \phi$ ). This latter function is managed by a program in the furnace system's programmable logic controller (PLC). The equipment comes with a phase balancing system for balanced connection to the three-phase supply mains. Alternatively, the power section may consist of a state-of-the-art frequency converter using advanced transistor (IGBT) technology for stepless power control.



Operator control desk of pouring furnace

# Special designs

## UGD - Unheated pouring device

The OTTO JUNKER UGD combines the advantages of a pressurized pouring system with those of an unheated pouring device:

- Protective atmosphere with low oxygen content
- Consistently maintained geostatic level in the pouring spout
- Low operating costs
- Complete emptying possible by backward tilting

Unheated pouring devices should only be used where continuous three-shift operation and availability of molten metal from a coreless induction furnace are made sure.

A water-cooled or air-cooled bottom inductor can be retrofitted at any later date.



## Ladle filling station

A hydraulically operated ladle filling station allows the pouring device to be filled independently of the iron supply. The liquid iron transfer ladle can be placed in the tilting frame by means of a forklift truck or an overhead crane.

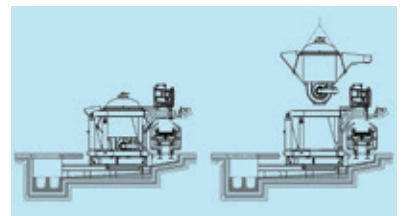
The system is designed to require no disassembly work when the device is to be emptied.



## Quick-change system with compact-type inductor

A vessel and tilting frame designed specifically with a quick-change capability in mind makes it possible to replace the pouring furnace with its flanged-on inductor simply and quickly. All peripheral pouring equipment and attachments such as the stopper actuator, float and camera remain in place.

The replacement vessel – fully refractory-lined, pre-sintered and with its own flange-mounted inductor – can be pre-heated in a standby rack. This reduces the total time needed for the actual furnace replacement to about 5 to 6 hours.



## Quick-change system with side-mounted inductor

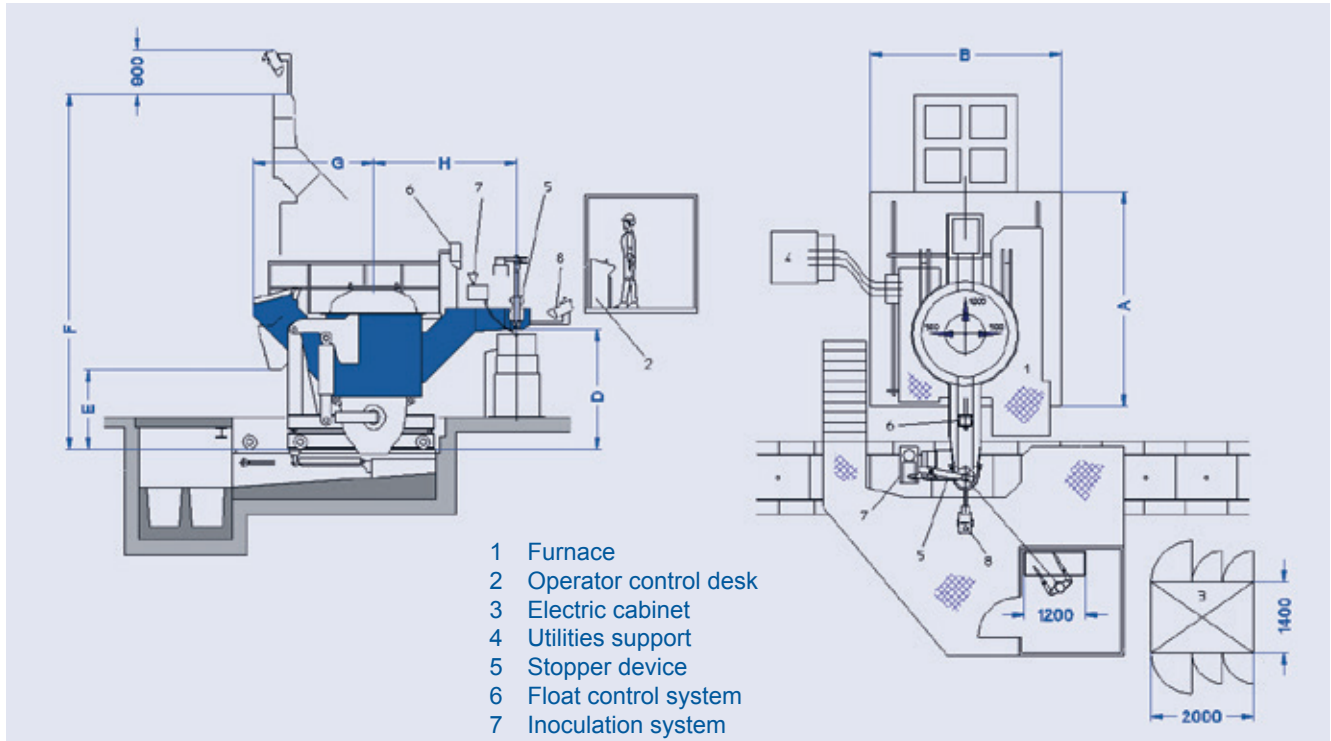
For grey cast iron applications the pouring furnace may be equipped with a side-mounted inductor. In a configuration of this type only the furnace vessel and inductor casing are changed. The core and the coil remain on the tilting frame. This eliminates the need to disconnect and reconnect the coil.

Here again, the fully refractory-lined and pre-sintered furnace vessel carrying the flanged-on inductor casing is placed on the tilting frame. The change can be completed in less than an hour.



# Space requirements

for cast-iron pouring devices of type RGD



Furnace type	t <sup>1)</sup>	kW <sup>2)</sup>	A	B	C	D	E	F	G	H <sup>3)</sup>
2/150	2	150	3,900	3,200	1,400	2,300	1,850	6,500	2,100	2,200
3/200	3	200	3,900	3,200	1,400	2,450	1,930	6,700	2,100	2,400
4/250	4	250	3,900	3,200	1,400	2,450	1,930	6,700	2,160	2,400
5/300	5	300	4,200	3,750	1,800	2,350	1,550	7,000	2,350	2,800
6/300	6	300	4,200	3,750	1,800	2,350	1,550	7,000	2,350	2,800
8/350	8	350	4,700	4,800	2,200	2,550	1,600	7,700	3,000	3,000
10/350	10	350	4,700	4,800	2,200	2,550	1,600	7,700	3,000	3,000
15/500	10	500	5,000	5,500	2,500	3,350	2,800	9,100	2,750	3,250
20/600	20	600	7,200	5,100	2,800	3,400	5,150	10,800	3,200	3,300
40/1,200	40	1,200	8,500	7,100	3,550	3,900	5,300	11,500	4,400	4,400

<sup>1)</sup> Useful capacity

<sup>2)</sup> Other combinations of useful furnace capacity and inductor power are possible.

<sup>3)</sup> depending on mould line width and sprue cup position

All data relate to a standard travel of +/- 500 mm along and 1,000 mm across the mould line; subject to change.

