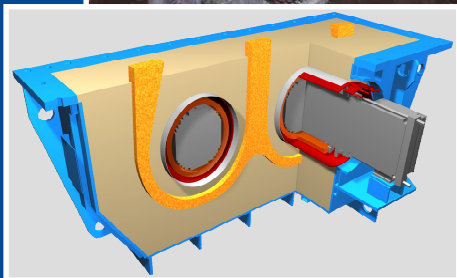


# We understand Metals

## Channel-Type Induction Furnaces (RWK)



... for holding cast iron

[www.otto-junker.de](http://www.otto-junker.de)



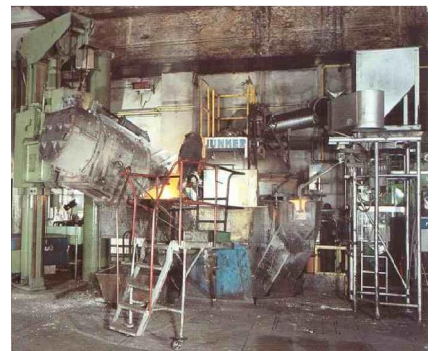
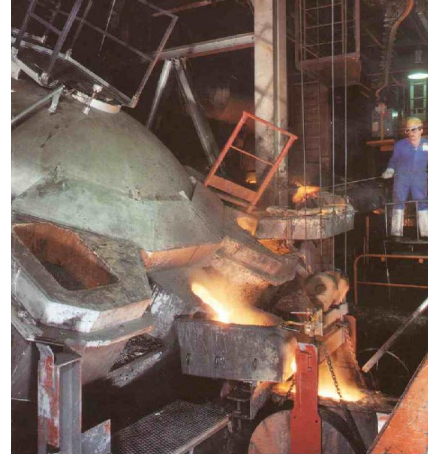
# Fields of application for OTTO JUNKER channel-type induction furnaces

## Wherever...

- liquid metal must be held, stored, superheated or poured in large quantities,
- moulding lines require continually varying amounts of metal which must nevertheless be kept available at all times to maximise moulding line efficiency,
- a collecting vessel is required to facilitate the production of large castings,
- efficiency of melting and moulding equipment is to be maximised with a simultaneous increase in productivity without the need of holding molten metal at temperature in the melting furnace,
- melting furnace capacity utilisation is to be maximised by allowing molten metal to be tapped any time,
- variations in metal temperature and composition must be equalised,
- it is desirable to create an electrical melting capability powered with cheap night-time electricity,

## Typical applications

- ▶ This cupola-fed OTTO JUNKER channel-type induction furnace has two siphons, one for receiving and one for pouring metal.
- Advantages:**
- Filling siphon and pouring spout lie exactly in the tilting axis.
  - No ladle movement is required when metal is tapped (irrespective of metal level).
  - Molten metal can be continuously added and poured at the same time.
- ▶ Two 50-tonne OTTO JUNKER channel-type induction furnaces, each equipped with a 600 kW inductor. The purpose of these units is to collect and hold SGI basic iron for the production of spun iron tubes.
- ▶ OTTO JUNKER channel-type induction furnaces in a grey cast iron foundry. These furnaces are fed with iron from cupolas and have a useful capacity of 80 and 50 tonnes, respectively (see illustration). Their inductor rating is 1,000 kW.



**a channel-type induction furnace is the solution of choice.**



# Advantages of the channel-type induction furnace

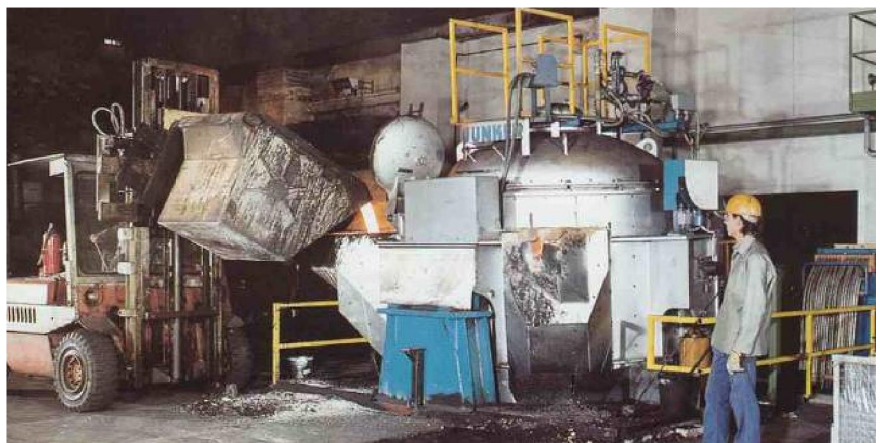
- Proven, reliable and rugged design
- Separate filling and pouring siphons
  - ▶ Furnace filling and pouring operations may proceed at the same time
  - ▶ No ingress of atmospheric oxygen, i.e., slag formation is reliably prevented
- Creation of buffer capacity for disruptions in melting and moulding operation, thus keeping a molten metal reserve available for times of peak demand from the moulding line
- Quickly replaceable, water-cooled inductors are available with:
  - ▶ single loop up to 1,200 kW
  - ▶ double loop up to 2,800 kW
- Space-saving design of switchgear and control equipment
- Consistent metal composition over long waiting periods
- Residual iron may be poured back into the holding furnace at any time
- Additional backward tilting feature facilitates slag removal from the bath surface



- ▶ Continuous transfer of iron from the cupola and pouring into ladles may be carried out simultaneously.



- ▶ Charging of a channel furnace by means of a crane ladle.



- ▶ Charging of an OTTO JUNKER holding furnace with treated spheroidal graphite iron (SGI).

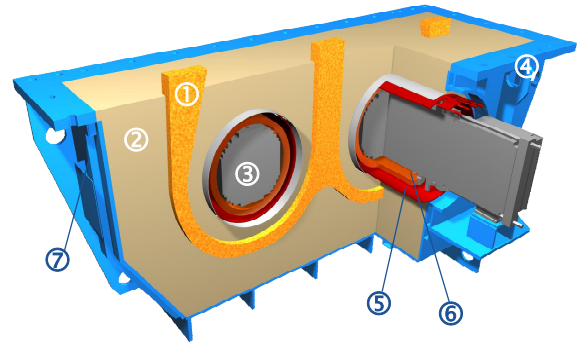
## ▶ OTTO JUNKER high-power inductors

High-power inductors consist of one or two coils, a magnetic core, and an inductor casing. They are attached to the furnace vessel via a water-cooled flange.

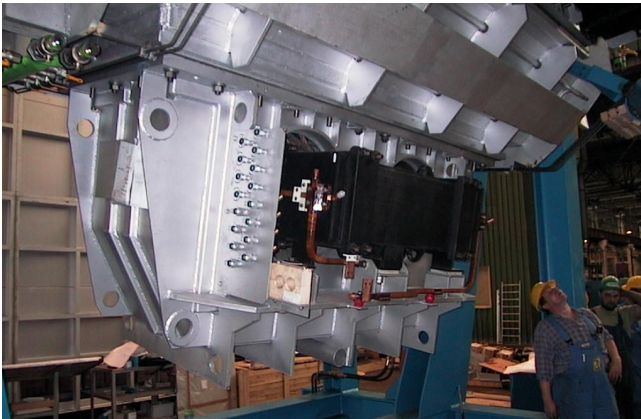
All parts subject to high thermal stress are water-cooled, i.e. inductor flange, casing, cooling shells and induction coils as well as the furnace flange.

Inductors are designed to deliver the required power, i.e.

- ▶ single-loop inductors up to 1,200 kW
- ▶ double-loop inductors from 1,200 to 2,800 kW



- 1 Optimised double-loop inductor ensures "directed flow"
- 2 Refractory lining
- 3 Full-size yokes of grain-orientated transformer sheet packs
- 4 Water-cooled flange
- 5 Water-cooled protective copper shell for enhanced operating reliability
- 6 Water-cooled coil made of special copper sections for maximum efficiency
- 7 Water-cooled inductor casing designed for minimum power loss



2,600 kW high-power inductor of double-loop design

## ▶ Directed flow

Another advantage of OTTO JUNKER inductors is the "directed flow" created by a special channel arrangement in the inductor.

This design optimises the heat transfer from the inductor into the furnace vessel, minimising the metal temperature difference between inductor and furnace vessel.

- ▶ Single-loop inductor of a channel-type holding furnace for magnesium-treated spheroidal graphite iron (inductor rating: 600 kW).





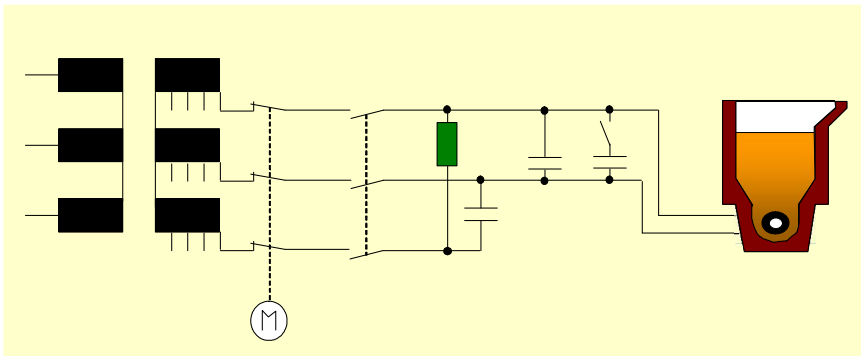
## ► Two methods of powering the inductor

### Mains-frequency switchgear system

This proven technology essentially consists of a tap-changing transformer and a switchgear system with automatic PLC-controlled phase balancing and power factor correction.

#### Benefits of this design

- Power factor ( $\cos \phi$ ): 0.99 - 1.0
- Minimum mains pollution
- Air-cooled switchgear system



Mains-frequency switchgear system

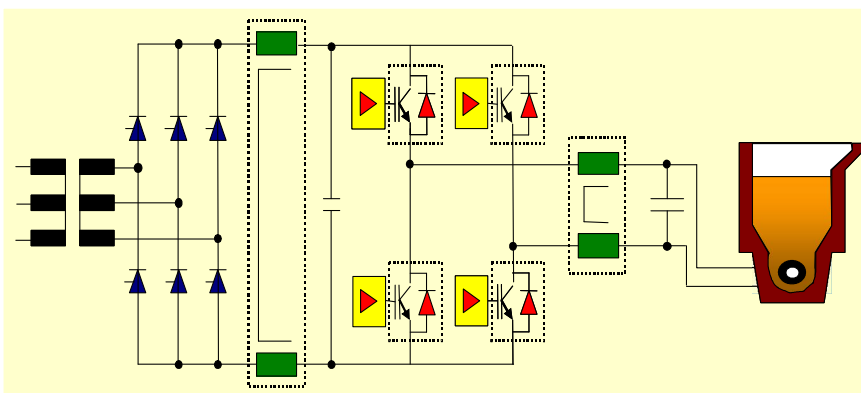


### IGBT frequency converter

This advanced technology relies on an IGBT frequency converter consisting of a 6, 12 or 24-pulse rectifier, d.c. link circuit, inverter and fixed capacitor bank. The parallel-oscillating circuit converters employed by OTTO JUNKER minimise the load on inverter components (p.f.-corrected current). The frequency converter is fed by a rectifier transformer and operates at a constant power factor ( $\cos \phi$ ) over the entire control range.

#### Benefits of this design

- Infinitely variable power
- Inductor soft-start capability (ramped power input)
- Detection of refractory erosion or accretion by frequency change
- Anti-pinch feature (especially for minimum metal levels)
- Digital electronic control, i.e., no mechanical switchgear elements

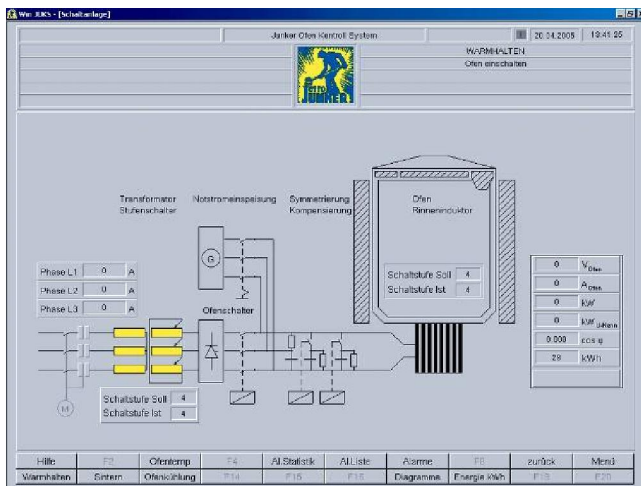


IGBT frequency converter

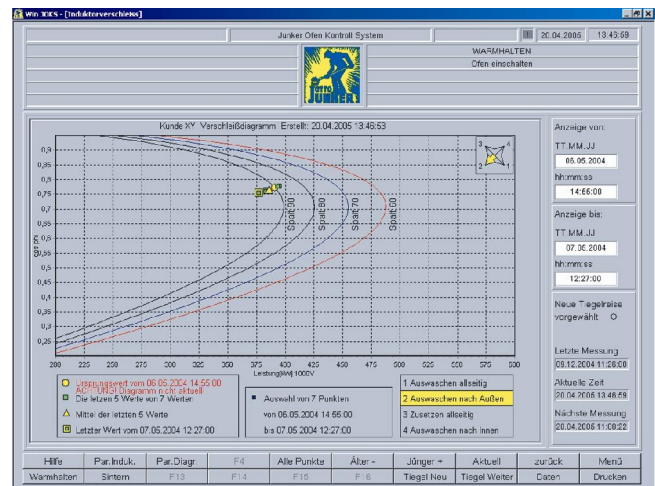


## ► Advantages of the JOKS-W computer control and display system (JOKS-W = Junker furnace control system for holding applications)

- Automatic power input depending on metal level
- Accurate assessment of refractory condition at any given time
- Perfect monitoring and trend reporting facilitates appropriate preventive action
- Maximum operating convenience



JOKS-W menu screen for the switchgear system



JOKS-W menu screen for refractory erosion

## ► Our range of channel-type induction furnaces

The OTTO JUNKER line-up of channel-type induction furnaces ranges from standard sizes up to a useful capacity of 120 tonnes. At customer's request we can propose and build larger furnaces to user specifications.

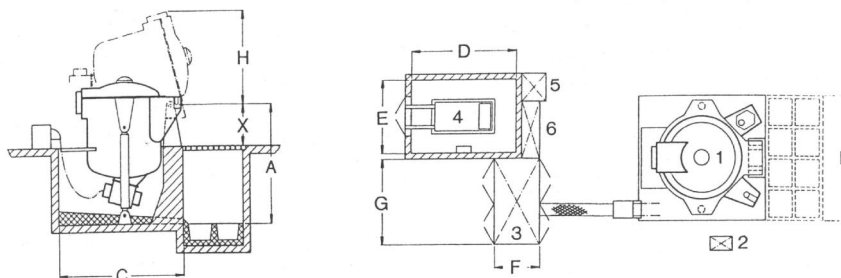
OTTO JUNKER channel furnaces are available in two designs. The first type can tilt forward only. The second type allows the furnace to tilt forward for pouring and backward for slag skimming.

All channel-type induction furnaces made by OTTO JUNKER feature a tight-closing lid and siphon-shaped filling gate and pouring spout to prevent metal oxidation. The water-cooled inductor is flanged to the furnace bottom. Inductors can be replaced quickly even on a hot furnace.

# Standard range

## Forward tilting

- (1) Furnace
- (2) Control desk
- (3) Switchgear cabinet
- (4) Transformer
- (5) Hydraulic powerpack
- (6) Water manifold station

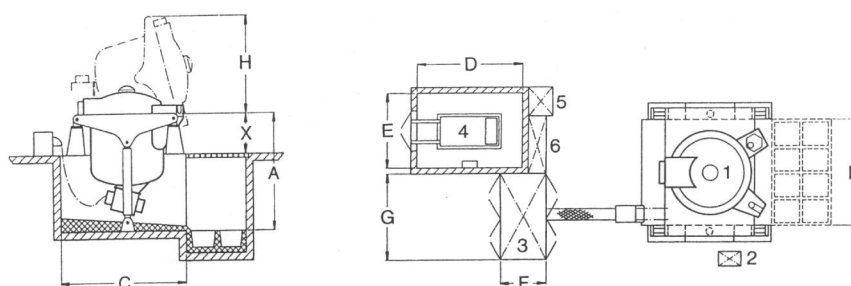


Forward tilting (space requirements)								
RWK Ge	A	B	C	D	E	F	G	H
10/ 300 - 600	4000	4000	5000	3600	2700	1600	3000	3200
12/ 300 - 600	4200	4000	5000	3500	2700	1600	3000	3200
15/ 400 - 600	4200	4000	5200	3600	2700	1600	3000	3200
20/ 400 - 600	4800	4400	5300	3600	2700	1600	3000	3700
25/ 400 - 600	4800	4400	5500	3600	2700	1600	3000	3700
30/ 400 - 600	4800	4400	5700	3600	2700	1600	3000	3700
40/ 500 - 1200	5000	5400	6400	4000	2700	1600	4200	4800
50/ 500 - 1200	5000	5400	6600	4000	2700	1600	4200	4800
60/ 600 - 1800	5000	5400	6800	4000	3200	1600	4200	4800
70/ 600 - 1800	5700	5600	7000	4000	3200	1600	4200	4800
80/ 800 - 2600	6200	5800	7000	4600	3400	1600	4800	4800
90/ 800 - 2600	7000	6400	7000	4600	3400	1600	4800	5200
100/1000 - 2600	7000	6400	7200	4600	3400	1600	4800	5200
120/1000 - 2600	7000	6400	7500	4600	3400	1600	4800	5200

X = depending on pouring ladle height

## Forward/backward tilting

- (1) Furnace
- (2) Control desk
- (3) Switchgear cabinet
- (4) Transformer
- (5) Hydraulic powerpack
- (6) Water manifold station



Forward/backward tilting (space requirements)								
RWK Ge	A	B	C	D	E	F	G	H
10/ 300 - 600	4000	2700	4600	3600	2700	1600	3000	3200
12/ 300 - 600	4200	2700	4800	3600	2700	1600	3000	3200
15/ 400 - 600	4200	2700	5000	3600	2700	1600	3000	3200
20/ 400 - 600	4600	3300	4800	3600	2700	1600	3000	3700
25/ 400 - 600	4600	3300	5000	3600	2700	1600	3000	3700
30/ 400 - 600	4600	3300	5200	3600	2700	1600	3000	3700
40/ 500 - 1200	5200	4200	6200	4000	2700	1600	4200	4800
50/ 500 - 1200	5200	4200	6500	4000	2700	1600	4200	4800
60/ 600 - 1800	5400	4400	6500	4000	3200	1600	4200	4800
70/ 600 - 1800	5400	4400	6800	4000	3200	1600	4200	4800
80/ 800 - 2600	5400	4400	6800	4600	3400	1600	4800	4800
90/ 800 - 2600	6000	4400	7200	4600	3400	1600	4800	5200
100/1000 - 2600	6500	5000	7200	4600	3400	1600	4800	5200
120/1000 - 2600	6500	5000	7500	4600	3400	1600	4800	5200

X = depending on pouring ladle height

Further OTTO JUNKER  
solutions for iron casting  
applications



■ Induction-type pouring furnaces



■ Medium-frequency coreless melting  
furnaces

**OTTOJUNKER**  
WE UNDERSTAND METALS

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