e-Front runners

Die Heater for Extrusion Plant

Induction Heating System with Transistor Inverter

Fuji Electric Systems Co., Ltd.

NEC 47a

Fuji Die Heater

— As the die itself generates heat, excellent temperature distribution can be obtained in a short period.

Features

Rapid heating
Because the die is directly heated by induction heat, it can be heated rapidly. For example, a die as thick as 150mm can be heated in about 20 minutes.

Automatization facilitated
This heater can readily be automatized in combination with automatic die transfer equipment and a production control system. A host computer can be connected (option).

Simple operation
Operator need only close the coil and turn on the heating power supply after placing a die in the die heater. The die is automatically heated according to the determined heating pattern.

Compact equipment
This die heater requires only half the installation area occupied by a Fuji Electric's previous die heater.

Die and ring heated in the coupled status
Die and ring can be heated in the coupled status. Therefore, there is no need for a mechanism which separates the die and ring. This helps provide efficient maintenance.

Die center directly heated
A circular spiral coil is used for directly heating the center of die, where heat is most desired. In consequence, uneven temperature is minimized and heating time is shortened.

Die cracks prevented
Through direct measurement of a die, PID temperature control is effected so that die temperature rises according to the determined heating pattern. When this practice is observed, no die cracks occur during heating. A die overheat preventive circuit is standard-equipped.

Improved working evnironment
Working environment is clean because of electrical heating. There is no danger of combustion gas being emitted or the operator being exposed to hot blasts.

Temperature retain (holding) function provided
When a die reaches the determined temperature, the "temperature retain" operation is automatically selected. This prevents the die from being overheated and eliminates need for transfer to a holding furnace or soaking pit.

Transistor inverter incorporated
A transistor inverter is incorporated to provide constant-power control. Hence, there is no fluctuation in coil input due to voltage variations.

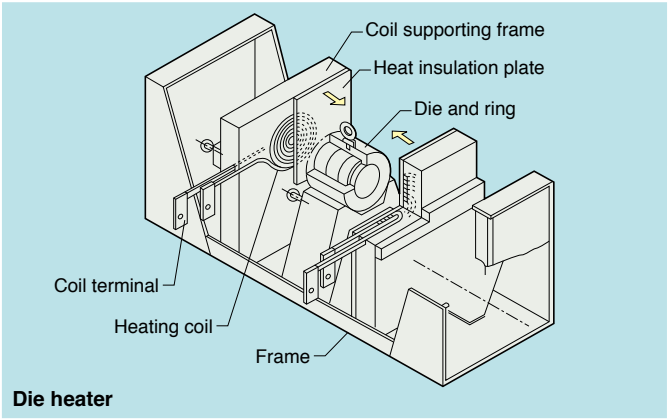
Major data

			Outside diameter of ring [mm]		
			415 or less	415 to 650	650 or more
Coil input		[kW]	60	150	300
Coil frequency		[approx. kHz]	2		
High-frequency power supply			Transistor inverter system		
Heating temperature		[°C]	400 to 450		
Heating time (*)		[about minute]	20	40	60
No. of die temperature sensing thermocouple			2	2	2
Temperature control			Programmable PID control		
Utilities	Power supply	Volt, freq.	3-phase, AC200/220V, 50/60Hz (non-grounded)		
		Input [kVA]	70	175	350
	Cooling water	Temp. pressure	20 to 35°C, 0.39MPa (avoid condensation and freezing)		
		Quantity [m^3/h]	6.3	9.5	12
	Compressed air		0.39 to 0.49MPa		

(*): Heating time varies with the shape and dimensions of die and heating temperature.

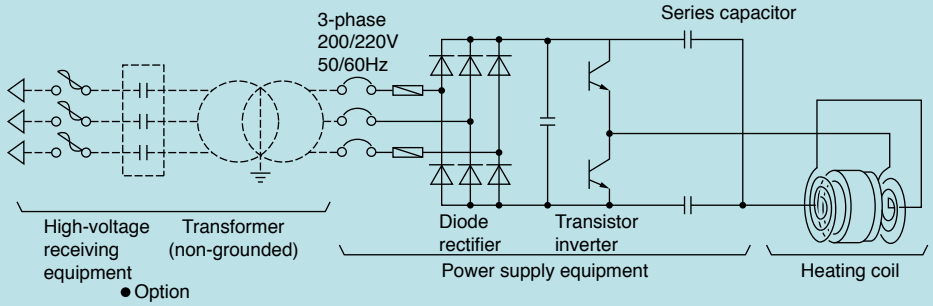
System composition

In this die heater, a pair of circular spiral coils are placed across the die and ring so that a coil is located on either side of the die and ring. High-frequency power is supplied from the transistor inverter for direct induction heating on both faces of the die and ring. Therefore, the die and ring can be heated in the coupled status and directly subjected to soaking and holding with no need for their separation, which is unavoidable with use of conventional die heaters. This method also eliminates the need for transferring the heated die and ring to a holding furnace for soaking and holding. The power supply system consists of circuit breaker, transistor inverter, series capacitor, digital temperature controller, programmable controller, etc.



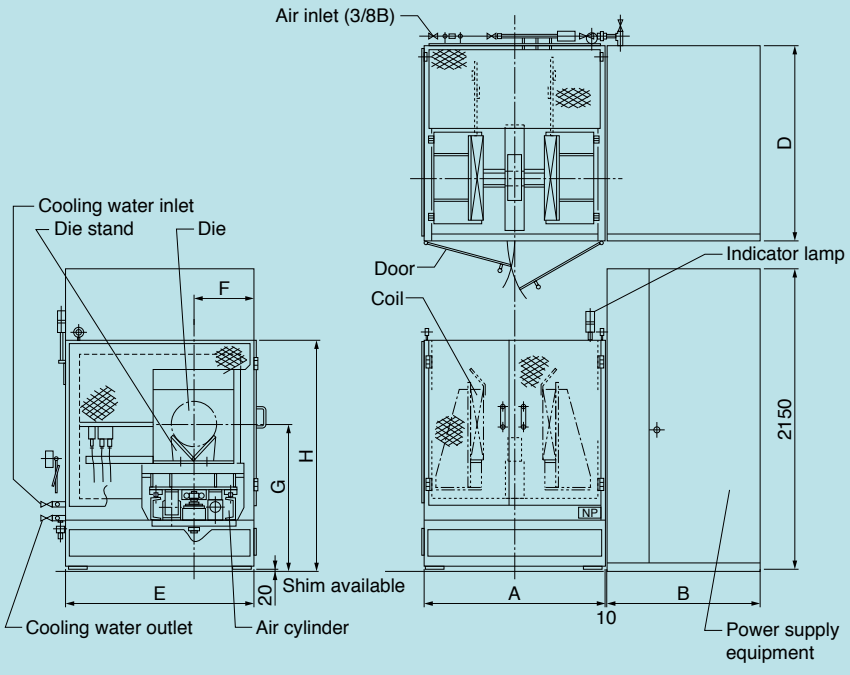
Die heater

Electric circuit



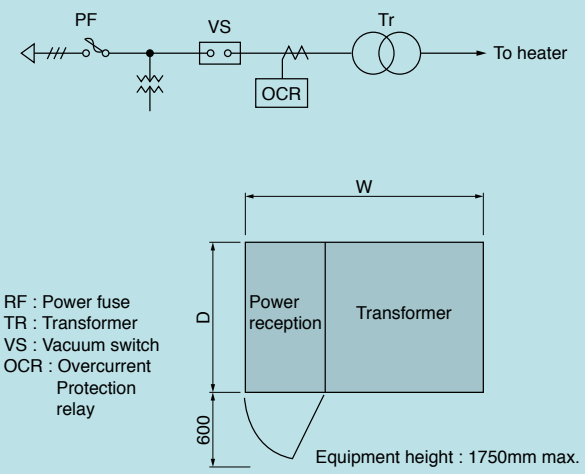
External dimensions [mm]

Outside diameter of ring	415 or less	415 to 650	650 or more
A	1300	1700	2000
B	1100	1700	2200
D	1400	1500	
E	1400	1800	2100
F	450	650	800
G	1000	1200	1400
H	1600	1700	1800



High-voltage receiving equipment (option)

Outside diameter or ring [mm]	415 or less	415 to 650	650 or more
Input	6600 or 3300V class, 50 or 60Hz, 3-phase		
Output	200 to 220V, 50 or 60Hz, 3-phase		
Power receiving equipment and type. Parenthesized value effective for 3300V class	Short-circuit protection : Power fuse Switching and overload protection : Vacuum switch		
	PF10 (20) A 250MVA VS200A	PF30 (50) A 250MVA VS200A	PF50 (100) A 250MVA VS200A
Transformer [kVA]	70	175	350
Equipment dimensions W× D× H [mm]	1400×1100×1750	2000×1100×1750	2300×1400×1750



Please advise the material, diameter, thickness, heating time, etc. of the die in your plan when you inquire us for details so that we will be able to design the best suited coils and planning.

Equipment list

Item	Basic	Option
Cold charging start	●	
Hot charging start	●	
Holding operation	●	
Die temperature indicating controller	●	
Programmable controller (MICREX-F)	●	
Coil moving unit	●	
Integrating demand meter	●	
High-voltage equipment (power reception and transformer)		●
Capacitor for primary power factor improvement		●
Higher-harmonic filter		●
Automatic die transfer equipment		●

Protection items (Operation stops in all cases)

Inverter fault
Overcurrent
Cooling water abnormal
Overheat in heating coil
Overheat inside panel
Die overheat

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