

● Features

- I Construction made completely in AISI 304 or AISI316
- II Protection degree IP67
- III Continuous power range from 40 to 1450 kW
- IV Working voltage up to 1400 VDC.

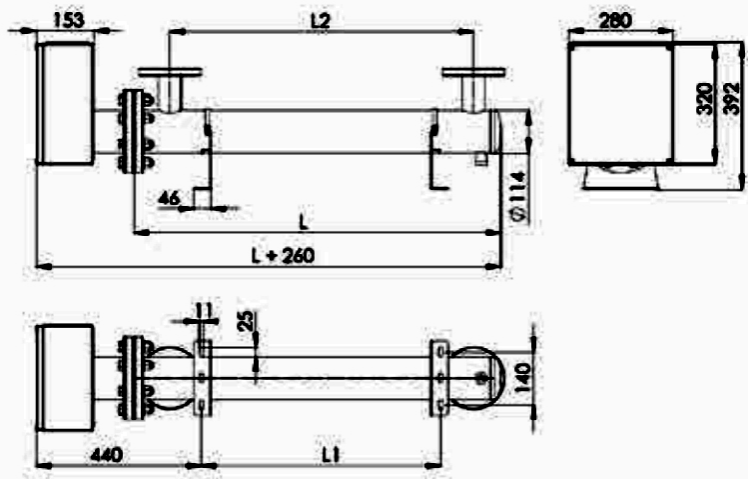


● Applications

- I .WHDN fully welded steel tank resistors are offered with tank diameters ranging from 100mm to 300mm.
- II .The resistor unit consists of steel resistor elements with a diameter of 16mm which are welded in a flange that is fitted to the tank. Different alloys can be used for both resistor elements and tank and connection box. The resistor unit is fitted on a flange and is closed with a gasket. With this construction it is possible to open the resistor and clean the inside of the tank.
- III .The electrical configuration can be single, star/delta or multiple segments. Inside the connection box are the main terminals and the secondary circuits such as box heater, thermal protection circuits and air bubble detection circuit.
- IV .The resistor can be equipped with a drain, closing or pressure valves. Standard mounting position is horizontal but vertical types are available (with limited heights).

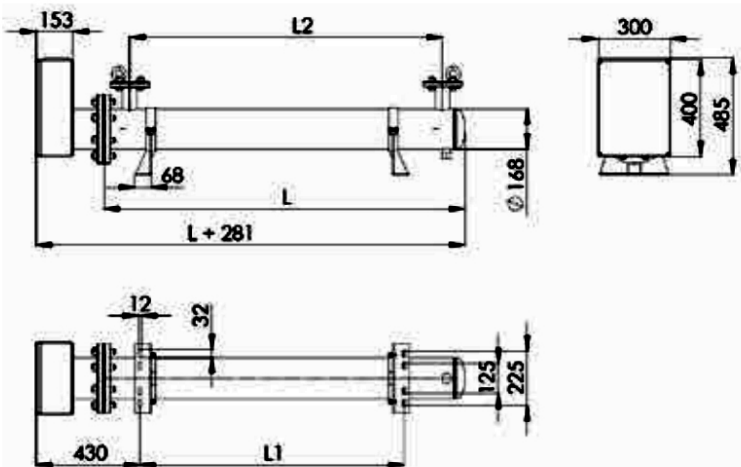
● Dimensions

Dimensions WHDN 100



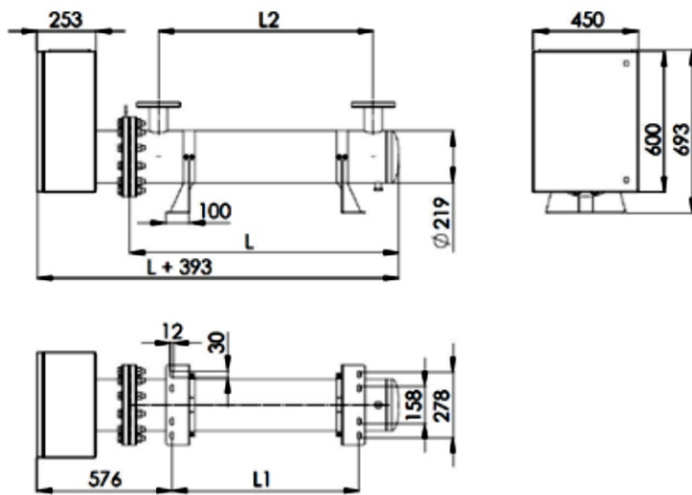
Type	Power [kw]	L [mm]	Weight [kg]
WHDN100	40	1000	≈ 100
	50	1200	
	60	1400	
	70	1600	
	80	1800	
	90	2050	
	110	2450	
	130	2850	
	140	3100	

Dimensions WHDN 150



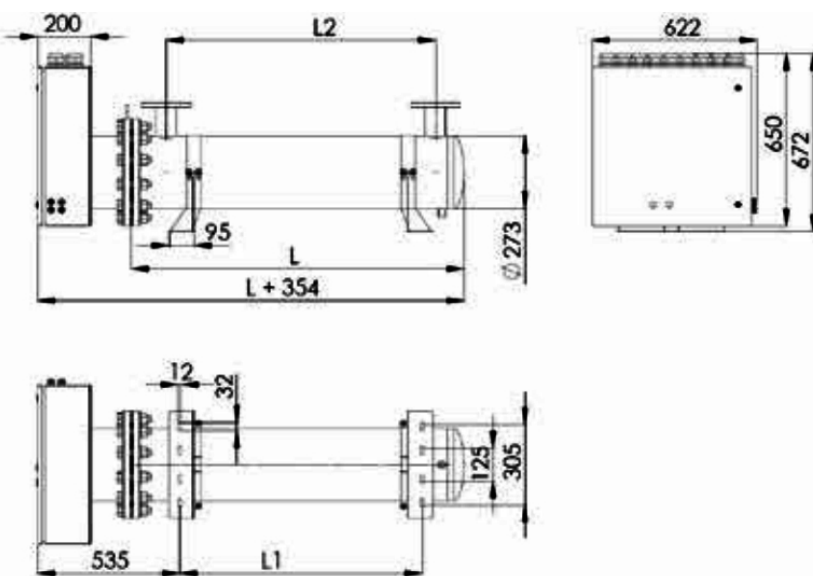
Type	Power [kw]	L [mm]	Weight [kg]
WHDN 150	100	1200	≈ 150
	110	1300	
	130	1500	
	150	1700	
	175	2000	
	200	2250	
	225	2500	
	250	2750	
	284	3100	

Dimensions WHDN 200



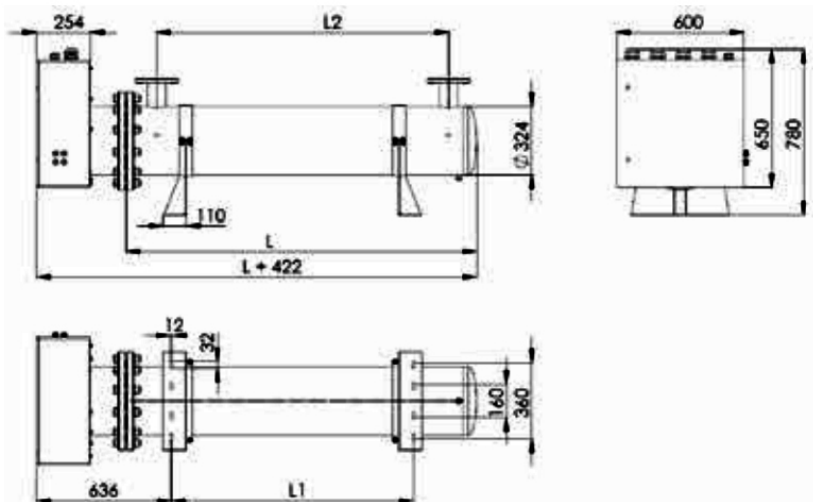
Type	Power [kw]	L [mm]	Weight [kg]
WHDN 200	150	1100	≈ 310
	175	1250	
	200	1400	
	250	1700	
	300	2025	
	350	2350	
	400	2650	
	475	3100	

Dimensions WHDN 250



Type	Power [kw]	L [mm]	Weight [kg]
WHDN 250	350	1375	≈ 360
	400	1550	
	460	1750	
	500	1900	
	550	2050	
	600	2250	
	650	2400	
	700	2600	
	750	2750	
	850	3100	

Dimensions WHDN 300



Type	Power [kw]	L [mm]	Weight [kg]
WHDN 300	700	1600	≈ 650
	800	1850	
	900	2025	
	1000	2250	
	1100	2450	
	1200	2650	
	1450	3100	

Ordering Information

Example:

WHDN100	40	J	10R0
(1)	(2)	(3)	(4)
Series Name	Power pn[KW]	Tolerance	Resistance

(1)Type: WHDN100、WHDN150、WHDN200、WHDN250、WHDN300、SERIES

(2)power pn [kw] :40=40KW、50=50KW、100=100KW、150=150KW...1450=1450KW

(3)Tolerance: J= ± 5%、K= ± 10%

(4)Resistance Value:10R0=10R、R10=0.1Ω、47R0=47Ω

Performance

Nominal power		40 kW - 1450 kW
Working voltage		1000 VAC / 1400 VDC
Dielectric strength @ 50Hz, 1 min.		3,500 VAC
Insulation resistance @ 5000 VDC	dried condition	> 20 MΩ
Overload @ 1s pulse / hour		8 x Pn (depends on Ω value)
Overload @ 5s pulse / hour		4 x Pn (depends on Ω value)
Resistance tolerance	standard	± 10%
	optional	± 5% / ± 3%
Temperature coefficient	20 °C - 400 °C	100 ppm/K
Time constant for heating up		30 s
Protection degree		IP67
Cooling fluid		fresh water / water-glycol
Maximum temperature liquid inlet	without de-rating	* 60 °C
ΔT inlet/outlet (recommended)		10 K - 20 K
Pressure drop @ Pn and Δ20K		0.3 bar
Materials		
- tank	standard	AISI 304
	optional	AISI 316
- connection box	standard	AISI 304
	optional	AISI 316
- resistor elements	standard	AISI 304
	optional	AISI 316 & 321, incoloy800 & 825
- cable gland	optional	nickel plated brass / AISI 304
	standard	undrilled plate
Mounting, maintenance and storage instructions		available document
Water temp. protection		Thermostat
- range (advised 10K + T water out)		0 °C - 150 °C
- contact		Change-over contact
- max. current		16 A
Air bubble protection		Thermostat
- range (advised 180°C)		50 °C - 300 °C
- contact		Change-over contact
- max. current 16 A		
Moisture protection	standard	20 W - 30 W heating cable 230 V
- voltage	optional	115 V
Factory acceptance tests		- Aspect / dimensional Inspection
		- Resistance value
		- Insulation resistance
		- Dielectric strength
		- Pressure test
		optional Certified Body witness test
PT100 + transducer	optional	
Pressure sensor 4-20mA	optional	

Overview WHDN

Type	WHDN 100	WHDN 150	WHDN 200	WHDN 250	WHDN 300
Diameter tank	114.3	168.3	219.1	273	323.9
Main flange	DN100	DN150	DN200	DN250	DN300
in-/out flange					
- Nipples 2"G Threaded male	√	√			
- DN50	√	√	√		
- DN65	√	√	√	√	√
- DN80			√	√	√
- DN100					√
Max working pressure	10	10		8	8
Test pressure	16	16		12	12

Coolant

Water flow in L / minute	ΔT 10K	ΔT 15K	ΔT 20K
power			
50	85	55	42
75	125	85	65
100	170	110	85
200	340	225	170
300	500	340	250
400	670	450	340
500	840	560	420
700	1200	790	590
1000	1700	1100	840

Calculation of water coolant flow in liters per second is based on the formula:

$$Q = m \cdot C_{th} \cdot \Delta T$$

In which Q = energy (in Joules)

C_{th} = thermal capacity of coolant. For water use 4.18 J/g.K

m = mass of coolant to pass the resistor per second

ΔT = temperature increase of the coolant (Outlet temp.-In-let temp.)

When using glycol mixture obtain the correct thermal capacity of the coolant to re-calculate. Values may vary from 2.8 to 3.4 J/g.K

Not all water is effectively in contact with the resistor elements, therefore a factor of 0.85 should be applied to calculate the needed flow

WHDN type resistors are available in horizontal and vertical style. Hereunder you find as an example the mechanical drawing of type WHDN 200 V. Vertical types are limited in height.

