



# Shell and tube condensers

OPTIMA FKN-FKH

*Compact*  
*Lower* refrigerant charges  
*Easy* integration  
*Optimised* design



**OPTIMA**  
**2<sup>nd</sup> generation**  
**diameter 168 to 355**

Capacity : 50 to 7000 kW

## USE

OPTIMA condensers are particularly well adapted to all medium and high duty refrigeration systems using water cooled condensers (refrigeration units, heat pumps...).

## DESCRIPTION

### FKN

Compatible with all refrigerants halogenes, zeotropes or azeotropes (R22 - R134a - R404A - R407C...).

The bundle is made of finned copper tubes (A pattern) and benefits from significant increases in efficiency (particularly for R134A).

### FKH

Adapted for NH<sub>3</sub> (R 717).  
 Bundle tubes are of steel.

### FKH IN

Corrosive fluids : 316L stainless steel shell, tubular plates and corrugated tubes.

## QUICK SELECTION

**Water inlet Temp = 27 °C**

Discharge temperature **90 °C**

Sub cooling **2 K**

Condensing temperature **35 °C**

Fouling factor **0,00005 m<sup>2</sup> °C/W**

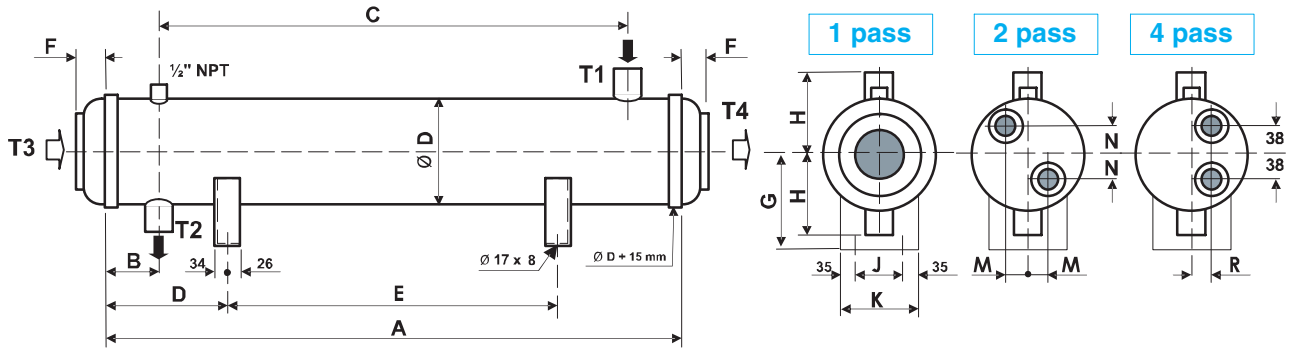
Power kW	R404A			NH <sub>3</sub>		
	FKN	Flow m <sup>3</sup> /h	Water pressure drop kPa	FKH	Flow m <sup>3</sup> /h	Water pressure drop kPa
100	<b>168 20A 2N</b>	17.3	36	<b>219 20 2N</b>	21	34
200	<b>219 20A 2N</b>	35	57	<b>219 30 2R</b>	31	43
500	<b>273 30A 1N</b>	100	25	<b>355 30 2R</b>	74	37
1000	<b>355 30A 1N</b>	216	41	<b>406 40 1R</b>	195	26
1500	<b>355 40A 1R</b>	250	47	<b>457 50 1R</b>	260	31
2000	<b>406 40A 1R</b>	333	42	<b>508 50 1R</b>	364	42
3000	<b>508 40A 1R</b>	500	37	-	-	-



# Shell and tube condensers

## OPTIMA FKN - FKH

### DIMENSIONS OPTIMA 2<sup>ND</sup> GENERATION DIAMETER 168 TO 355



Models	A	B	C	D	E	G	H	J	K	M	N	R
168-12	1200	78	1035	100	1000	195	154	70	140	20	35	25
168-20	2000	78	1835	500	1000	195	154	70	140	20	35	25
219-12	1200	80	1025	100	1000	220	180	110	180	0	47	45
219-20	2000	80	1825	500	1000	220	180	110	180	0	47	45
219-30	3000	80	2825	1000	1000	220	180	110	180	0	47	45
273-12	1200	90	1000	100	1000	247	207	110	180	0	62	-
273-20	2000	90	1800	500	1000	247	207	110	180	0	62	-
273-30	3000	90	2800	1000	1000	247	207	110	180	0	62	-
273-40	4000	2000	3750	1000	2000	247	207	110	180	0	62	-
355-12	1200	134	950	100	1000	288	248	170	240	0	82	-
355-20	2000	134	1750	500	1000	288	248	170	240	0	82	-
355-30	3000	134	2750	1000	1000	288	248	170	240	0	82	-
355-40	4000	2000	3750	1000	2000	288	248	170	240	0	82	-

### CONNECTIONS

Models	F	1 pass			2 pass				4 pass			
		T1	T2	T3 / T4	F	T1	T2	T3 / T4	F	T1	T2	T3 / T4
168	80	DN 65 (2 <sup>5</sup> /8)	DN 40 (1 <sup>5</sup> /8)	DN 100 Victaulic	39	DN 65 (2 <sup>5</sup> /8)	DN 40 (1 <sup>5</sup> /8)	2 <sup>5</sup> GAZ	40	DN 65 (2 <sup>5</sup> /8)	DN 40 (1 <sup>5</sup> /8)	1 <sup>1</sup> / <sub>4</sub> GAZ
219	100	DN 80 (3 <sup>1</sup> /8)	DN 50 (2 <sup>1</sup> /8)	DN 150 Victaulic	50	DN 80 (3 <sup>1</sup> /8)	DN 50 (2 <sup>1</sup> /8)	3 <sup>5</sup> GAZ	50	DN 80 (3 <sup>1</sup> /8)	DN 50 (2 <sup>1</sup> /8)	2 <sup>5</sup> GAZ
273	100	DN 100 (4 <sup>1</sup> /8)	DN 65 (2 <sup>5</sup> /8)	DN 150 Victaulic	55	DN 100 (4 <sup>1</sup> /8)	DN 65 (2 <sup>5</sup> /8)	4 <sup>5</sup> GAZ	-	-	-	-
355	150	DN 100 (4 <sup>1</sup> /8)*	DN 80 (3 <sup>1</sup> /8)	DN 200 Victaulic	75	DN 100 (4 <sup>1</sup> /8)	DN 80 (3 <sup>1</sup> /8)	5 <sup>5</sup> GAZ	-	-	-	-

\* NOTE: FKN 355-40 and FKH 273-40 are fed by two tubes (T1); the outlet (T2) is located between the support legs.

### MASSES - CAPACITIES

Models		FKN			FKH		
		Empty mass	Capacity		Empty mass	Capacity	
			kg	Int. fluid (litres)		Ext. fluid (litres)	kg
168-12	U	54	4	17	-	-	-
	N	56	5	16	-	-	-
	R	61	8	13	-	-	-
168-20	N	70	14	23	79	10	25
	R	75	10	27	81	12	22
219-12	N	102	11	27	-	-	-
	R	109	14	23	-	-	-
219-20	N	143	18	45	126	15	47
	R	154	23	39	147	24	35
219-30	N	210	26	69	176	22	71
	R	193	34	59	207	36	53
273-12	N	126	21	40	-	-	-
	R	134	25	35	-	-	-
273-20	N	184	32	68	188	30	66
	R	197	39	60	199	35	60
273-30	N	276	47	103	263	44	100
	R	256	57	92	279	51	91
273-40	N	-	-	-	337	59	135
	R	-	-	-	359	68	122
355-12	N	203	32	65	-	-	-
	R	224	43	52	-	-	-
355-20	N	300	53	111	306	52	108
	R	336	71	90	339	66	90
355-30	N	421	80	170	431	77	165
	R	476	106	138	479	98	138
355-40	N	542	106	228	556	103	222
	R	615	141	185	620	131	185

## DIMENSIONS OPTIMA DIAMETER 406 TO 558

Fig. 491

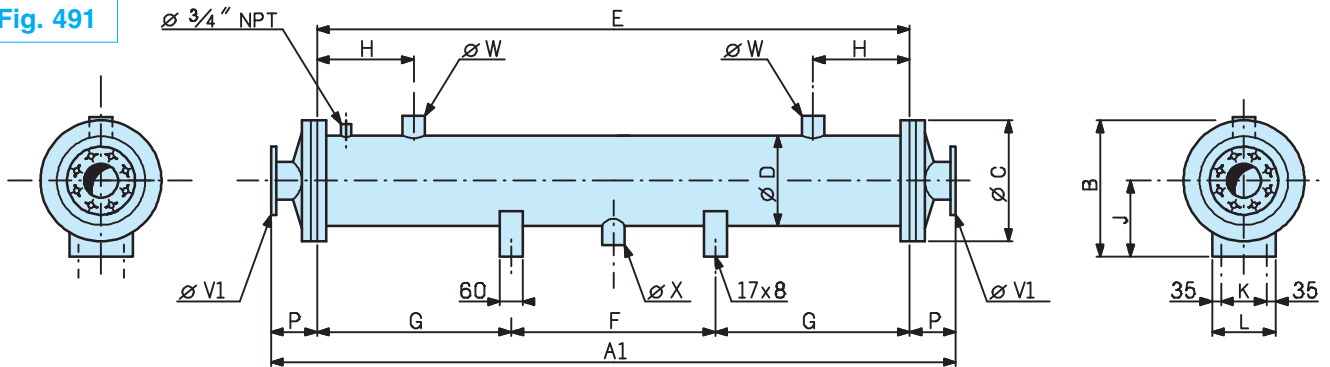
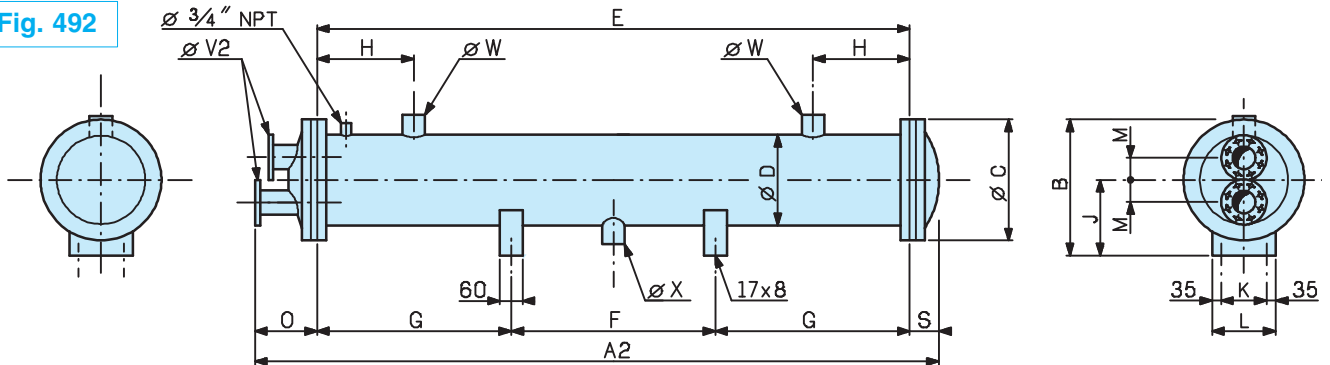


Fig. 492

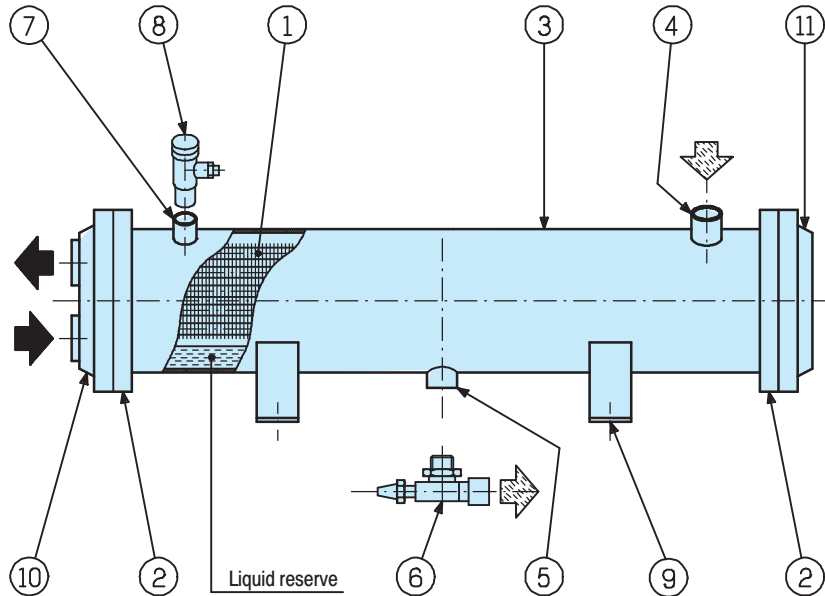


Models	B	C	D	E	F	G	H	J	K	L	O	S	FKN				FKH			
													A1	A2	M	P	A1	A2	M	P
406 30	551	477	406	3000	1500	750	500	313	230	300	250	76	3360	3326	100	180	3360	3326	100	180
406 40	551	477	406	4000	2000	1000	500	313	230	300	250	76	4360	4326	100	180	4360	4326	100	180
457 30	609	540	457	3000	1500	750	500	339	230	300	280	88	3380	3368	105	190	3380	3368	105	190
457 40	609	540	457	4000	2000	1000	500	339	230	300	280	88	4380	4368	105	190	4380	4368	105	190
457 50	609	540	457	5000	3000	1000	500	339	230	300	280	88	-	-	-	-	5380	5368	105	190
508 40	664	600	508	4000	2000	1000	500	364	230	300	300	100	4400	4400	125	200	4400	4400	125	200
508 50	664	600	508	5000	3000	1000	500	364	230	300	300	100	5400	5400	125	200	5400	5400	125	200
558 40	800	645	558	4000	2000	1000	500	400	230	300	380	120	4500	4500	150	250	-	-	-	-
558 50	800	645	558	5000	3000	1000	500	400	230	300	380	120	5500	5500	150	250	-	-	-	-

## CONNECTIONS - CAPACITIES - MASSES

Models	FKN							FKH							
	Connections				Capacity		Mass	Connections				Capacity		Mass	
	Internal		External		Internal	External	kg	Internal		External		Internal	External	kg	
	V1	V2	V4	W	X	dm <sup>3</sup>		dm <sup>3</sup>	V1	V2	W	X	dm <sup>3</sup>		dm <sup>3</sup>
406 30 N	150	100	-	2 x 89	100	129	203	765	-	-	-	-	-	-	-
406 30 R	150	100	-	2 x 89	100	150	176	820	150	100	2 x 89	100	115.6	204.7	886
406 40 N	150	100	-	2 x 100	100	166	271	865	-	-	-	-	-	-	-
406 40 R	150	100	-	2 x 100	100	193	235	940	150	100	2 x 100	100	154.1	272.9	1029
457 30 N	200	125	-	2 x 100	125	167	267	1055	-	-	-	-	-	-	-
457 30 R	200	125	-	2 x 100	125	190	236	1120	200	125	2 x 100	125	151.5	257.9	1230
457 40 N	200	125	-	2 x 125	125	222	346	1315	-	-	-	-	-	-	-
457 40 R	200	125	-	2 x 125	125	245	315	1380	200	125	2 x 125	125	202	343.8	1526
457 50 R	-	-	-	-	-	-	-	-	200	125	2 x 125	125	252.6	429.8	1823
508 40 N	200	150	-	2 x 125	125	273	443	1650	-	-	-	-	-	-	-
508 40 R	200	150	-	2 x 125	125	305	400	1740	200	150	2 x 125	125	248.2	406.3	1933
508 50 N	200	150	-	2 x 125	125	340	543	2020	-	-	-	-	-	-	-
508 50 R	200	150	-	2 x 125	125	372	500	2110	200	150	2 x 125	125	310.3	507.9	2351
558 40 R	300	200	-	2 x 125	125	418	490	2200	-	-	-	-	-	-	-
558 50 R	300	200	-	2 x 125	125	522	612	2700	-	-	-	-	-	-	-

### TECHNICAL DATA



- Bundle (1) of OPTIMA PROFIL A copper tubes (FKN) or corrugated steel tubes (FKH) flanged onto 2 carbon steel tube plates (2)
  - Carbon steel shell (3) includes :
    - refrigerant gas inlet (4) and liquid outlet (5) tube brazed or welded, liquid valve not supplied (6),
    - a boss (7) for safety valve not supplied (8) connection,
    - supports (9).
  - Water headers (10) in cast iron or carbon steel model FKN 406.
- Connections: Victualic couplings, gas tappings or flanges depending on model.

### OPERATING LIMITS

Unit	Circuit inside core		Circuit outside core	
	Liquid	PS	Refrigerant fluid	PS
OPTIMA condenser <b>FKN - FKH</b>	-10 / 90 °C	<b>10 b</b>	0 / 120 °C	<b>30 b</b>

PS : Maximum allowable pressure as per Dir. 97/23 CE.  
Exchangers without retesting according to DM-TP 32974