DTGB - 41.1-2-5-10

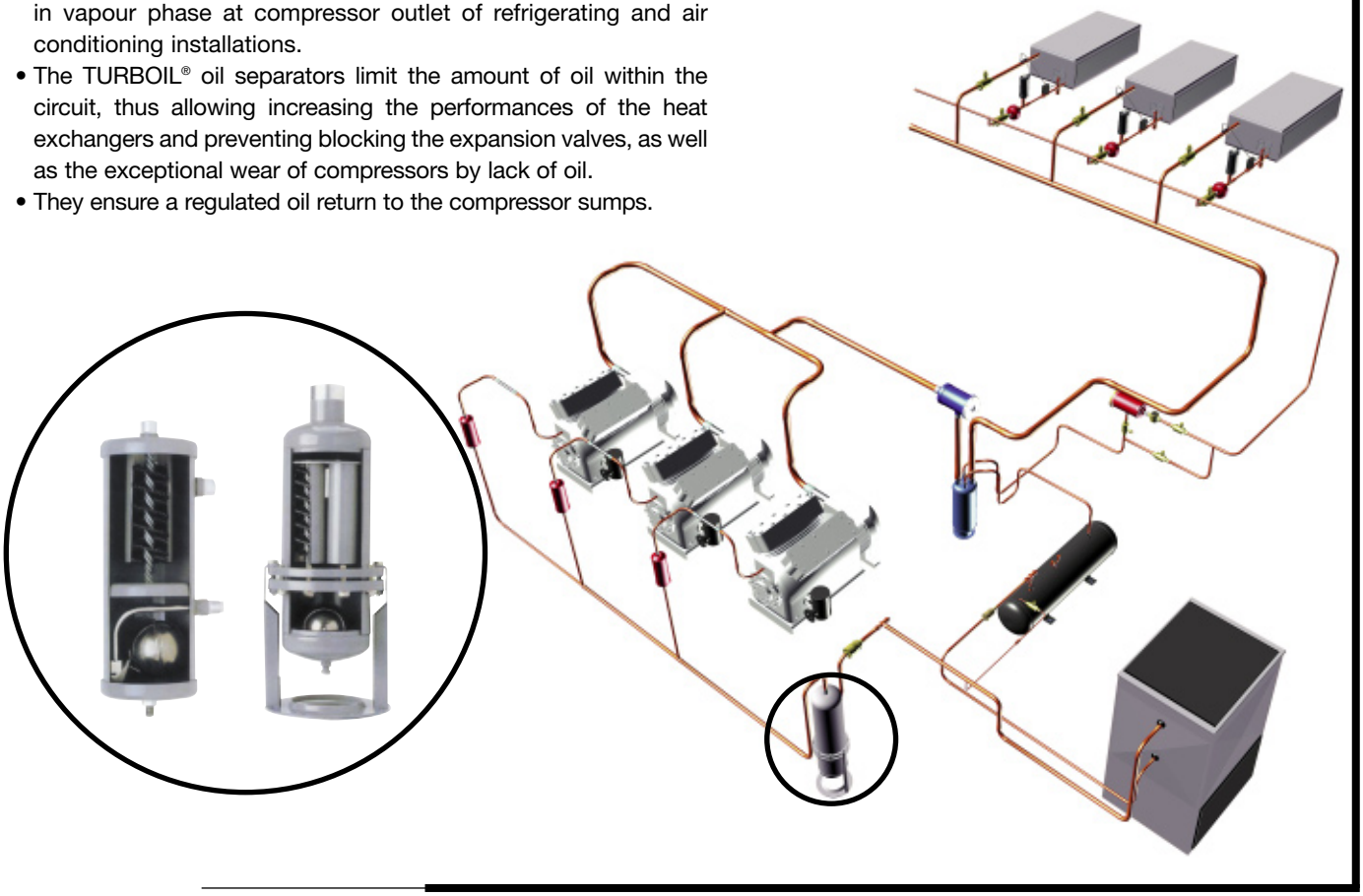
Oil separators

→ TURBOIL® *(welded)* / TURBOIL-F® *(flanged)*

01/10

■ Applications

- Separation and recovery of the oil carried by the refrigerant in vapour phase at compressor outlet of refrigerating and air conditioning installations.
- The TURBOIL® oil separators limit the amount of oil within the circuit, thus allowing increasing the performances of the heat exchangers and preventing blocking the expansion valves, as well as the exceptional wear of compressors by lack of oil.
- They ensure a regulated oil return to the compressor sumps.



■ Functional features

- Products are compatible with HFCs, HCFCs, CFCs, as well as with their associated oils and additives. Products are designed for use of non-hazardous refrigerants from group 2 of PED 97/23/EC.
- Product classification in CE categories is performed using the PED 97/23/EC table, corresponding to a volume-based selection.
- The oil separators are entirely made of steel.
- Two models are offered:
  - → a welded version: TURBOIL®; these models have built-in fastening means
  - → a flanged version: TURBOIL-F®, allowing cleaning the float/needle oil return system; these models are not fitted with built-in fastening means: appropriate support legs are available as an option.
- The automatic regulation of the oil return directly to the compressor sumps or by means of an oil receiver is ensured by a robust, accurate and protected unit (float, valve, and needle).

■ CARLY advantages

- Reliability and efficiency of the TURBOIL® oil separators are ensured thanks to a CARLY patented process, simultaneously associating several oil separation techniques:
  - → centrifugation by helical motion generated by one or several spirals
  - → coalescence thanks to the needled material of these spirals
  - → sudden modification of speed by increase of the flow area located at the separator's intake
  - → sudden change of direction: intake of the mixture by the top, outlet of the refrigerant from the higher lateral part and outlet of the oil from the lower part.
- The presence of an internal baffle eliminates a new risk of the oil being carried by the refrigerant.
- Presence of a 1/4" NPT drain plug in the lower part of the TURBOIL® from model F-7011 S/MMS to model F-30025 S/MMS.
- GOST certified products.

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Oil separators

→ TURBOIL® *(welded)* / TURBOIL-F® *(flanged)*

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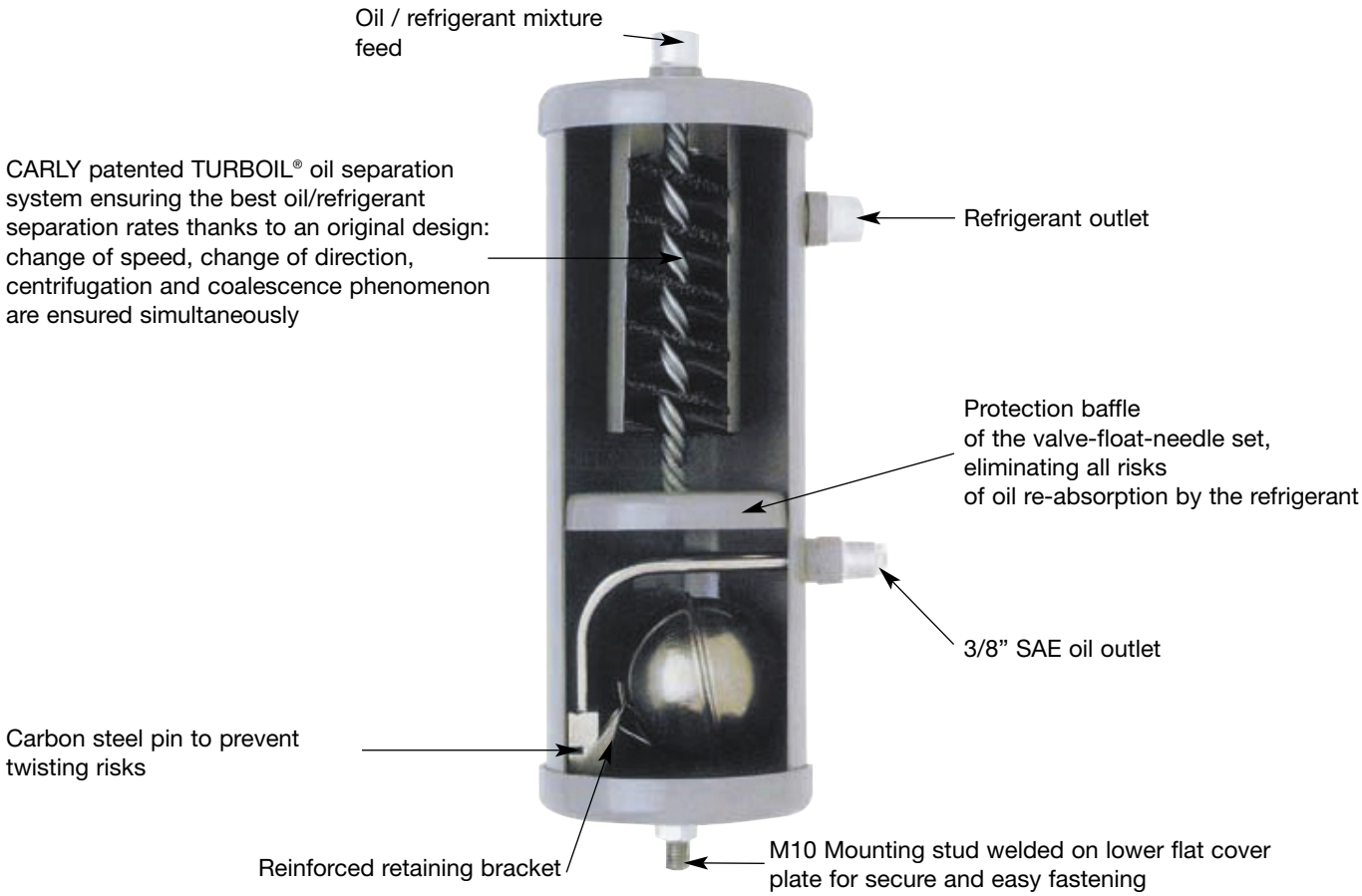
■ Recommendations

* To select the TURBOIL® oil separators, it is necessary to refer to the selection tables in the following pages, taking into account:
  - ➜ refrigerating capacity
  - ➜ type of refrigerant used
  - ➜ evaporation and condensation temperatures.
* Oil separators should be installed vertically on the discharge line, as close as possible to the compressor.
* Refrigerant flow direction with feed from the top is imperative and identified on the upper cover plate with the letters “IN”.
* Connection diameter of the oil separators should be higher than or equal to the diameter of the discharge line.
* In the case of a multi-compressor installation mounted in parallel, it is recommended to use one oil separator by compressor, in order to keep an optimal efficiency at all operating rates; otherwise, the separator should be selected based on the sum of each compressor’s maximum capacity.
* The oil separation performances will depend directly on the flow rate of the oil/refrigerant mixture at the intake of the separators.
* The oil return connection is done either at the filling plug on the compressor sump, or in the case of multi-compressor installations, at the oil receiver.
* In order to prevent all risks of refrigerant condensation, it is recommended to not install the oil separators in the draft produced by the fans; in a cold environment, it may be necessary to provide for the installation of a heat insulation or a heating element around the separators.
* Before connecting the oil separator, it is necessary to introduce by the higher connection a load of oil matching the load in litre indicated in the oil separator technical features tables. Use an oil identical to that of the compressors.
* In case of implantation of a TURBOIL® oil separator after installation commissioning, it is necessary to monitor the oil level in the compressor sump, in order to collect a possible oil surplus caused by a return of the lubricant accumulated in the refrigerating circuit.
* An efficient oil return system design requires that all the components (TURBOIL®, HCYR, HCYCT, HCYF, HCYN) be correctly selected according to the installation’s refrigerating capacity and operating rates.
* General assembly precautions: refer to chapter 115



Oil separators

➔ TURBOIL® *(welded)* / TURBOIL-F® *(flanged)*

■ Example of selection

The sizing of a product implies for the buyer to take into account the conditions under which the product will be used (temperature - pressure - refrigerant - oil - external environment). The values of the selection tables proposed in the CARLY catalogue match accurate test conditions.
We recommend that you convert your operating data into data matching the CARLY selection table so that you can perform a rigorous and correct sizing.

- **For a condensation temperature different from 38°C, it is recommended to convert the installation's refrigerating capacity using the following formula:**

$$Q_o^{Tk\ 38} = Q_o^{Tk\ x} / \{(Tk_x - 38) \times 0{,}0143 + 1\}$$

(1)**Qo $^{Tk\ x}$ =** installation's refrigerating capacity at initial condensation temperature (kW)
Tk ^{x} = initial condensation temperature (°C)
Qo$^{Tk\ 38}$ = installation's refrigerating capacity at a condensation temperature of 38°C (kW)

∗ SELECTION OF A TURBOIL® MODEL CORRESPONDING TO THE CORRECTED REFRIGERATING CAPACITY.

- Installation operating with R404A under the following conditions:
  - ➔ T_O = -10°C
  - ➔ Tk = 30°C
  - ➔ $Q_O^{Tk\ x}$ = 75 kW
  - ➔ Compressor discharge = 1" 5/8
- Which **TURBOIL®** to choose?

- Application of the formula

$$Q_o^{Tk\ 38} = Q_o^{Tk\ x} / \{(Tk_x - 38) \times 0{,}0143 + 1\}$$

75 / { (30 - 38) x 0.0143 + 1} = **85 kW**
Refer to the selection table page 41.4

➔ **Result: TURBOIL 8013 S**

Make sure that the TURBOIL® oil separator connection diameter is at least equal to the compressor discharge line diameter.
The selected oil separator has a connection diameter identical to the piping diameter.

(1) *Chapter "Abbreviations and units" (refer to chapter 113).*

Oil separators

→ TURBOIL® *(welded)*

■ Selection table

CARLY references	Connections To solder ODF inch	CARLY references	Connections To solder ODF mm	Refrigerating capacity (kW)(1)											
				R22			R134a			R404A R507			R407C R410A		
				- 40°C	- 10°C	+ 5°C	- 40°C	- 10°C	+ 5°C	- 40°C	- 10°C	+ 5°C	- 40°C	- 10°C	+ 5°C
TURBOIL 1503 S	3/8	**TURBOIL 1503 MMS**	10	5,0	6,0	7,0	3,5	4,5	5,0	5,0	6,0	7,0	5,0	6,0	7,0
TURBOIL 1504 S	1/2	**TURBOIL 1504 MMS**	12	6,0	7,0	8,0	4,0	5,0	5,5	6,0	7,0	8,0	6,0	7,0	8,0
TURBOIL 2505 S/MMS	5/8	**TURBOIL 2505 S/MMS**	16	17,0	22,0	24,0	12,0	15,0	17,0	17,0	22,0	25,0	16,0	21,0	24,0
TURBOIL 3006 S	3/4	**TURBOIL 3006 MMS**	18	20,0	25,0	28,0	16,0	21,0	23,0	22,0	27,0	30,0	21,0	26,0	28,5
TURBOIL 3007 S	7/8	**TURBOIL 3007 MMS**	22	24,0	27,0	30,0	18,0	23,0	25,0	26,0	30,0	32,0	25,0	28,5	30,5
TURBOIL 3009 S	1 1/8	**TURBOIL 3009 MMS**	28	28,0	32,0	36,0	19,0	25,0	28,0	29,0	36,0	40,0	27,5	34,0	38,0
TURBOIL 3011 S/MMS	1 3/8	**TURBOIL 3011 S/MMS**	35	32,0	40,0	45,0	21,0	27,0	31,0	32,0	40,0	47,0	31,0	39,0	43,5
TURBOIL 4007 S	7/8	**TURBOIL 4007 MMS**	22	32,0	37,0	40,0	26,0	34,0	38,0	32,0	40,0	44,0	31,0	36,5	39,0
TURBOIL 6009 S	1 1/8	**TURBOIL 6009 MMS**	28	42,0	50,0	55,0	34,0	37,0	42,0	42,0	54,0	60,0	41,0	48,0	54,0
TURBOIL 6011 S/MMS	1 3/8	**TURBOIL 6011 S/MMS**	35	48,0	55,0	60,0	38,0	46,0	50,0	48,0	60,0	70,0	46,0	57,0	66,5
TURBOIL 7011 S/MMS	1 3/8	**TURBOIL 7011 S/MMS**	35	48,0	55,0	60,0	38,0	46,0	50,0	48,0	60,0	70,0	46,0	57,0	66,5
TURBOIL 8013 S	1 5/8	**TURBOIL 8013 MMS**	42	65,0	80,0	90,0	45,0	60,0	70,0	65,0	85,0	94,0	62,0	81,0	89,5
TURBOIL 9017 S/MMS	2 1/8	**TURBOIL 9017 S/MMS**	54	85,0	100,0	110,0	58,0	70,0	80,0	87,0	105,0	120,0	83,0	100,0	114,0

(1) The indicated refrigerating capacities take into account a condensation temperature of + 38°C, a 5°C sub-refrigeration, and an aspirated gas temperature of + 18°C.

Refer to selection example page 41.3.

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Oil separators

→ TURBOIL® *(welded)*

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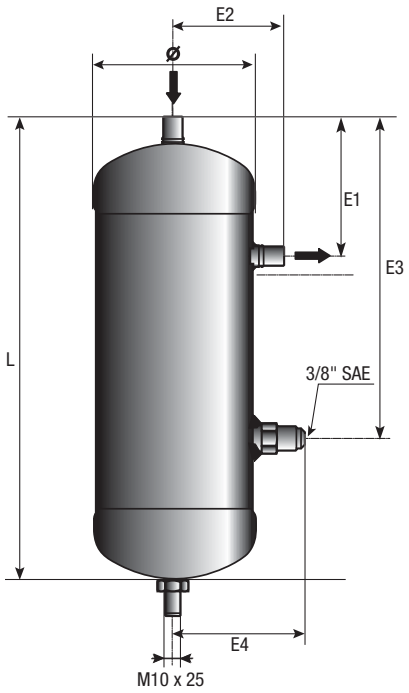
■ Technical features

CARLY references		Drawing No	Connections types (1)	Oil quantity (L)	Dimensions (mm)						Net weight (kg)
					ø	L	E1	E2	E3	E4	
TURBOIL 1503 S	**TURBOIL 1503 MMS**	1	2	0,30	107,6	264	66	71	168	83	2,65
TURBOIL 1504 S	**TURBOIL 1504 MMS**	1	2	0,30	107,6	281	70	71	185	83	3,10
TURBOIL 2505 S/MMS		1	2	0,30	107,6	298	72	73	202	83	3,25
TURBOIL 3006 S	**TURBOIL 3006 MMS**	1	2	0,30	107,6	324	77	76	228	83	3,45
TURBOIL 3007 S	**TURBOIL 3007 MMS**	1	2	0,30	107,6	357	88	83	261	83	3,90
TURBOIL 3009 S	**TURBOIL 3009 MMS**	1	3	0,30	107,6	388	93	80	292	83	3,95
TURBOIL 3011 S/MMS		1	3	0,30	107,6	498	107	90	402	83	5,20
TURBOIL 4007 S	**TURBOIL 4007 MMS**	1	2	0,30	107,6	383	87	83	287	83	3,90
TURBOIL 6009 S	**TURBOIL 6009 MMS**	1	3	0,30	107,6	433	93	80	337	83	4,55
TURBOIL 6011 S/MMS		1	3	0,30	107,6	548	107	90	452	83	5,90
TURBOIL 7011 S/MMS		2	3	1,00	155,0	422	150	114	250	108	8,10
TURBOIL 8013 S	**TURBOIL 8013 MMS**	2	3	1,00	155,0	502	150	114	330	108	10,40
TURBOIL 9017 S/MMS		2	3	1,00	155,0	516	164	127	344	108	10,95

(1) Chapter "Connection features and drawings" (refer to chapter 114).

①



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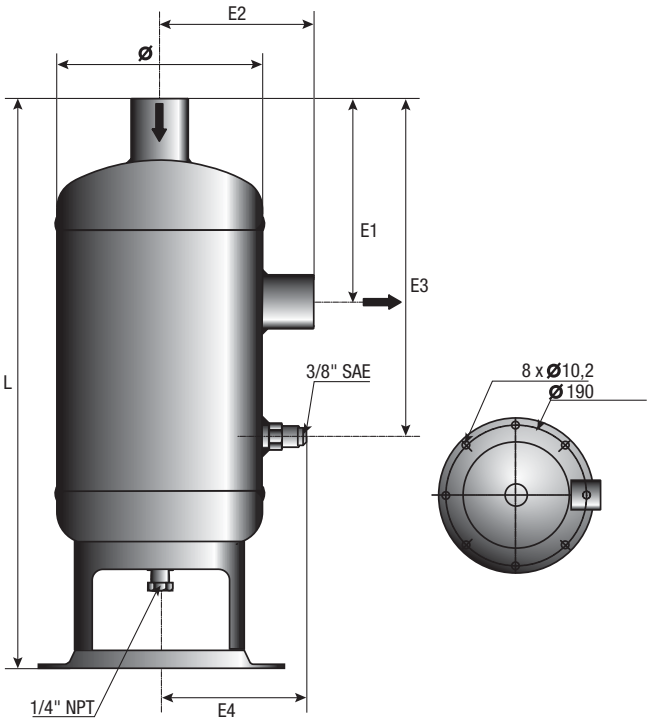

Oil separators

→ TURBOIL® *(welded)*

■ Technical features

CARLY references		Volume	Maximal working pressure	Working pressure (1)	Maximal working temperature	Minimal working temperature	Working temperature (1)	CE Category (2)
		V (L)	PS (bar)	PS BT (bar)	TS maxi (°C)	TS mini (°C)	TS BT (°C)	
TURBOIL 1503 S	**TURBOIL 1503 MMS**	1,72	31,0	10	120	-40	-20	I
TURBOIL 1504 S	**TURBOIL 1504 MMS**	1,86	31,0	10	120	-40	-20	I
TURBOIL 2505 S/MMS		1,97	31,0	10	120	-40	-20	I
TURBOIL 3006 S	**TURBOIL 3006 MMS**	2,12	31,0	10	120	-40	-20	I
TURBOIL 3007 S	**TURBOIL 3007 MMS**	2,33	31,0	10	120	-40	-20	I
TURBOIL 3009 S	**TURBOIL 3009 MMS**	2,54	31,0	10	120	-40	-20	I
TURBOIL 3011 S/MMS		3,28	31,0	10	120	-40	-20	I
TURBOIL 4007 S	**TURBOIL 4007 MMS**	2,53	31,0	10	120	-40	-20	I
TURBOIL 6009 S	**TURBOIL 6009 MMS**	2,87	31,0	10	120	-40	-20	I
TURBOIL 6011 S/MMS		3,64	31,0	10	120	-40	-20	I
TURBOIL 7011 S/MMS		4,33	31,5	10	120	-40	-20	I
TURBOIL 8013 S	**TURBOIL 8013 MMS**	5,65	31,5	10	120	-40	-20	I
TURBOIL 9017 S/MMS		5,73	31,5	10	120	-40	-20	I

(1) The working pressure is limited to the PS BT value when working temperature is lower than or equal to TS BT value.

(2) Classification by volume, according to PED 97/23/EC (refer to chapter 0 page 7).

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Oil separators

→ TURBOIL-F® *(flanged)*

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■ Selection table

CARLY references	Connections To solder ODF inch	CARLY references	Connections To solder ODF mm	Refrigerating capacity (kW)(1)											
				R22			R134a			R404A R507			R407C R410A		
				- 40°C	- 10°C	+ 5°C	- 40°C	- 10°C	+ 5°C	- 40°C	- 10°C	+ 5°C	- 40°C	- 10°C	+ 5°C
TURBOIL-F 2505 S/MMS	5/8	**TURBOIL-F 2505 S/MMS**	16	17	22	24	12	15	17	17	22	25	16,0	21,0	24,0
TURBOIL-F 3007 S	7/8	**TURBOIL-F 3007 MMS**	22	24	27	30	18	23	25	25	30	32	25,0	28,5	30,5
TURBOIL-F 3009 S	1 1/8	**TURBOIL-F 3009 MMS**	28	28	32	36	19	25	28	29	36	40	27,5	34,0	38,0
TURBOIL-F 3011 S/MMS	1 3/8	**TURBOIL-F 3011 S/MMS**	35	32	40	45	21	27	31	32	40	47	31,0	39,0	43,5
TURBOIL-F 7011 S/MMS	1 3/8	**TURBOIL-F 7011 S/MMS**	35	48	55	60	38	46	50	48	60	70	46,0	57,0	66,5
TURBOIL-F 8013 S	1 5/8	**TURBOIL-F 8013 MMS**	42	65	80	90	45	60	70	65	85	94	62,0	81,0	89,5
TURBOIL-F 9017 S/MMS	2 1/8	**TURBOIL-F 9017 S/MMS**	54	85	100	110	58	70	80	87	105	120	83,0	100,0	114,0
TURBOIL-F 15013 S	1 5/8	**TURBOIL-F 15013 MMS**	42	104	128	145	78	96	109	105	130	148	100,0	124,0	141,0
TURBOIL-F 15017 S/MMS	2 1/8	**TURBOIL-F 15017 S/MMS**	54	121	149	170	91	112	127	125	154	175	119,0	146,5	166,5
TURBOIL-F 15021 S	2 5/8	**TURBOIL-F 15021 MMS**	67	138	170	194	104	128	146	142	175	200	135,0	166,5	190,0
TURBOIL-F 30025 S	3 1/8	**TURBOIL-F 30025 MMS**	80	303	372	424	228	280	318	310	380	430	295,0	362,0	409,5

(1) The indicated refrigerating capacities take into account a condensation temperature of + 38°C, a 5°C sub-refrigeration, and an aspirated gas temperature of + 18°C.

Refer to selection example page 41.3.

■ Float set internal cleaning or replacement procedure

1 • Isolate the **TURBOIL-F®** (or the **TURBOIL-RF®**)

2 • Purge the isolated circuit until atmospheric pressure is reached in the oil separator.

3 • Empty the oil present in the separator, using the 1/4" NPT drain plug located in the lower part of the **TURBOIL-F®.**

4 • Remove the bolts and remove the lower part of the **TURBOIL-F®.**

5 • Proceed to the cleaning or replacement, if necessary, of this lower part of the separator.

6 • Replace systematically the fastening gasket on the lower part of the separator (gasket references on page 41.9)

7 • Put back the lower part of the separator, uniformly and progressively tightening the fastening bolts (cross tightening). The recommended tightening torques are:
- → 30 N.m for TURBOIL-F 2505 S/MMS to 3011 S/MMS
- → 55 N.m for TURBOIL-F 7011 S/MMS to 9017 S/MMS
- → 35 N.m for TURBOIL-F 15013 S/MMS to 30025 S/MMS

8 • Screw back the 1/4" NPT drain plug on the lower part of the separator and make sure it is properly sealed.

9 • Make vacuum in the installation and check air-tightness of the whole set before putting back under pressure.

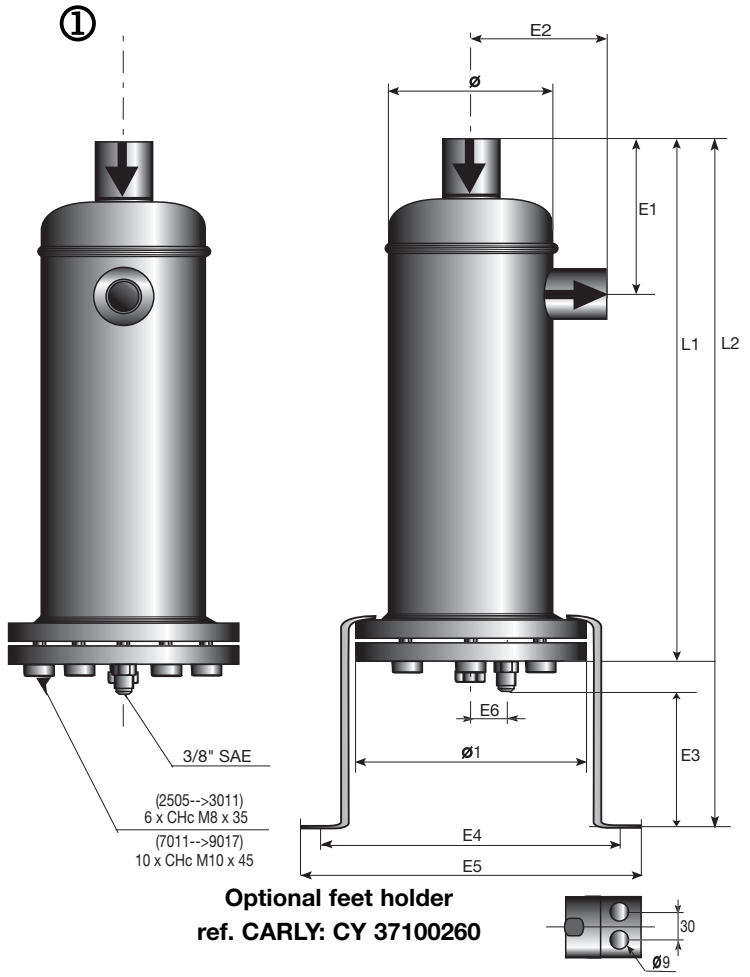
Oil separators

→ TURBOIL-F® *(flanged)*

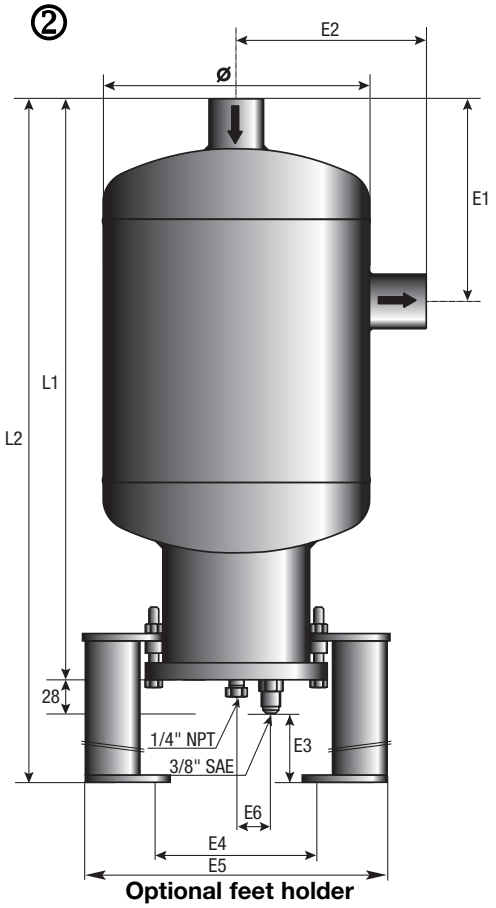
■ Technical features

CARLY references		Drawing No	Connections types (1)	Dimensions (mm)										Net weight (kg)
				Ø	Ø 1	L1	L2	E1	E2	E3	E4	E5	E6	
TURBOIL-F 2505 S/MMS		1	2	108	139,5	302	441,0	82	73	110	204	222	35	4,95
TURBOIL-F 3007 S	**TURBOIL-F 3007 MMS**	1	2	108	139,5	355	493,0	101	83	110	204	222	35	5,30
TURBOIL-F 3009 S	**TURBOIL-F 3009 MMS**	1	3	108	139,5	387	525,0	106	88	110	204	222	35	5,75
TURBOIL-F 3011 S/MMS		1	3	108	139,5	484	623,0	116	90	110	204	222	35	6,85
TURBOIL-F 7011 S/MMS		1	3	155	200	398	525,0	151	114	99	258	276	40	11,70
TURBOIL-F 8013 S	**TURBOIL-F 8013 MMS**	1	3	155	200	430	558,0	150	114	99	258	276	40	13,95
TURBOIL-F 9017 S/MMS		1	3	155	200	444	571,0	164	127	99	258	276	40	15,50
TURBOIL-F 15013 S	**TURBOIL-F 15013 MMS**	2	3	222	150	485	814,0	170	157	301,0	249	126	35	17,85
TURBOIL-F 15017 S/MMS		2	3	222	150	543	872,0	191	170	301,0	249	126	35	20,95
TURBOIL-F 15021 S	**TURBOIL-F 15021 MMS**	2	3	222	200	558	887,1	212	184	301,0	249	126	35	21,65
TURBOIL-F 30025 S	**TURBOIL-F 30025 MMS**	2	3	222	200	571	900,0	231	184	301,0	249	126	35	22,75

(1) Chapter "Connection features and drawings" (refer to chapter 114).



Optional feet holder
ref. CARLY: CY 37100260



Optional feet holder
ref. CARLY: CY 38600220

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Oil separators

→ TURBOIL-F® *(flanged)*

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■ Technical features

CARLY references		Volume	Oil volume (L)	Maximal working pressure	Working pressure (1)	Maximal working temperature	Minimal working temperature	Working temperature (1)	CE Category (2)
		V (L)	V (L)	PS (bar)	PS BT (bar)	TS maxi (°C)	TS mini (°C)	TS BT (°C)	
TURBOIL-F 2505 S/MMS		2,29	0,3	31,0	10	120	-40	-20	I
TURBOIL-F 3007 S	**TURBOIL-F 3007 MMS**	2,62	0,3	31,0	10	120	-40	-20	I
TURBOIL-F 3009 S	**TURBOIL-F 3009 MMS**	2,82	0,3	31,0	10	120	-40	-20	I
TURBOIL-F 3011 S/MMS		3,56	0,3	31,0	10	120	-40	-20	I
TURBOIL-F 7011 S/MMS		5,03	1,0	31,5	10	120	-40	-20	I
TURBOIL-F 8013 S	**TURBOIL-F 8013 MMS**	6,35	1,0	31,5	10	120	-40	-20	I
TURBOIL-F 9017 S/MMS		6,43	1,0	31,5	10	120	-40	-20	I
TURBOIL-F 15013 S	**TURBOIL-F 15013 MMS**	11,56	0,4	28,0	10	120	-40	-20	II
TURBOIL-F 15017 S/MMS		13,25	0,4	28,0	10	120	-40	-20	II
TURBOIL-F 15021 S	**TURBOIL-F 15021 MMS**	13,39	0,4	28,0	10	120	-40	-20	II
TURBOIL-F 30025 S	**TURBOIL-F 30025 MMS**	13,50	0,4	28,0	10	120	-40	-20	II

(1) The working pressure is limited to the PS BT value when working temperature is lower than or equal to TS BT value.

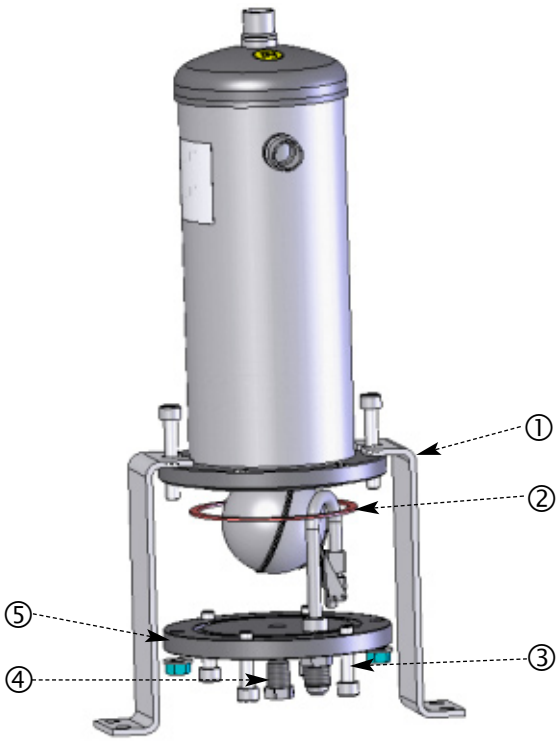
(2) Classification by volume, according to PED 97/23/EC (refer to chapter 0 page 7).

Oil separators

→ TURBOIL-F® *(flanged)*

■ Spare parts

CARLY references	Part Nb	Description	TURBOIL-F® Types	Quantity
CY 37100250	1	Feet (kit)	2505 S/MMS to 3011 S/MMS (Before 2010)	1
CY 37100260	1	Feet (kit)	2505 S/MMS à 9017 S/MMS	1
CY 37100300	1	Feet (kit)	7011 S/MMS to 9017 S/MMS (Before 2010)	1
CY 38600220	1	Feet (kit)	15013 S/MMS to 30025 S/MMS	1
CY 15555151	2	Gasket for oil separator	2505 S/MMS to 3011 S/MMS	1
CY 15555701	2	Gasket for oil separator	7011 S/MMS to 9017 S/MMS	1
CY 15555601	2	Gasket for flange of oil separator	15013 S/MMS to 30025 S/MMS	1
CY 19900420	3	Set of 8 screws for flange	15013 S/MMS to 30025 S/MMS	1
CY 19900425	3	Set of 6 screws for flange	2505 S/MMS to 3011 S/MMS	1
CY 19900520	3	Set of 10 screws for flange	7011 S/MMS to 9017 S/MMS	1
CY 10810010	4	1/4" NPT drain plug	7011 S/MMS to 30025 S/MMS	1
CY 33303450	5	Flange with gasket and float set	15013 S/MMS to 30025 S/MMS	1
CY 33402000	5	Lower part of separator with gasket and float set	2505 S/MMS to 3011 S/MMS (Before 2010)	1
CY 33403000	5	Lower part of separator with gasket and float set	7011 S/MMS to 9017 S/MMS (Before 2010)	1
CY 33800515	5	Flange with gasket and float set	2505 S/MMS à 3011 S/MMS	1
CY 33801705	5	Flange with gasket and float set	7011 S/MMS à 9017 S/MMS	1



DTGB - 41.1-2-5-10

Oil separators

→ TURBOIL® *(welded)* / TURBOIL-F® *(flanged)*

05/10

■ Weights and packaging

CARLY references	Unit weight (kg)		Packaging unit	
	With packaging	Without packaging	standard	OEM'S
TURBOIL 1503 S & MMS	2,90	2,65	1	/
TURBOIL 1504 S & MMS	3,35	3,10	1	/
TURBOIL 2505 S/MMS	3,55	3,25	1	/
TURBOIL 3006 S & MMS	3,75	3,45	1	/
TURBOIL 3007 S & MMS	4,20	3,90	1	/
TURBOIL 3009 S & MMS	4,25	3,95	1	/
TURBOIL 3011 S/MMS	5,55	5,20	1	/
TURBOIL 4007 S & MMS	4,20	3,90	1	/
TURBOIL 6009 S & MMS	4,90	4,55	1	/
TURBOIL 6011 S/MMS	6,25	5,90	1	/
TURBOIL 7011 S/MMS	8,50	8,10	1	/
TURBOIL 8013 S & MMS	10,80	10,40	1	/
TURBOIL 9017 S/MMS	11,35	10,95	1	/

CARLY references	Unit weight (kg)		Packaging unit	
	With packaging	Without packaging	standard	OEM'S
TURBOIL-F 2505 S/MMS	5,25	4,95	1	/
TURBOIL-F 3007 S & MMS	5,60	5,30	1	/
TURBOIL-F 3009 S & MMS	6,10	5,75	1	/
TURBOIL-F 3011 S/MMS	7,20	6,85	1	/
TURBOIL-F 7011 S/MMS	12,10	11,70	1	/
TURBOIL-F 8013 S & MMS	14,35	13,95	1	/
TURBOIL-F 9017 S/MMS	15,90	15,50	1	/
TURBOIL-F 15013 S & MMS	19,05	17,85	1	/
TURBOIL-F 15017 S/MMS	22,15	20,95	1	/
TURBOIL-F 15021 S & MMS	22,85	21,65	1	/
TURBOIL-F 30025 S & MMS	23,95	22,75	1	/