MAKING MODERN LIVING POSSIBLE

Maneurop® reciprocating compressors

MT/MTZ 50 - 60 Hz

R-22, R-407C, R-134a, R-404A / R-507A

REFRIGERATION &
AIR CONDITIONING DIVISION

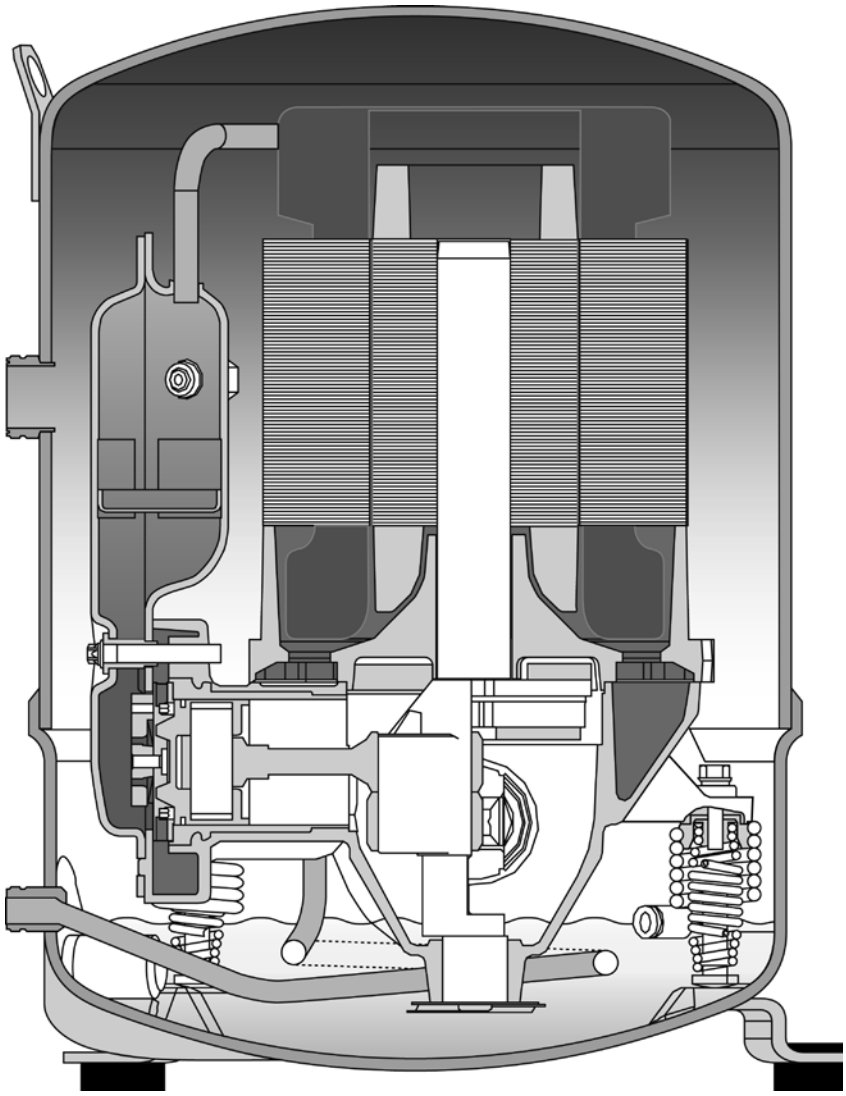
SELECTION &
APPLICATION GUIDELINES

CONTENTS

MANEUROP® RECIPROCATING COMPRESSORS

Maneurop® reciprocating compressors from Danfoss Commercial Compressors are specially designed for applications with a wide range of operating conditions. All components are of high quality and precision in order to assure a long product life.

Maneurop® MT and MTZ series compressors are of the hermetic reciprocating type and are designed for medium and high evaporating temperature applications.



The compressor design allows for the motor to be 100% suction-gas cooled.

The positive benefits of internal motor protection, high efficiency circular valve design and high torque motors provide for a quality installation.

The MT series is designed for use with the "traditional" R-22 refrigerant, using Danfoss mineral oil 160P as lubricant.
The MT series can also be applied with several R-22 based refrigerant blends (substitute refrigerants), using 160 ABM alkylbenzene as lubricant. The MTZ series is specifically designed for use with the HFC refrigerants R-407C, R-134a, R-404A, and R-507A, using 160PZ polyester oil as lubricant.
MTZ compressors can be used in new installations and also to replace Maneurop® MTE compressors in existing installations.

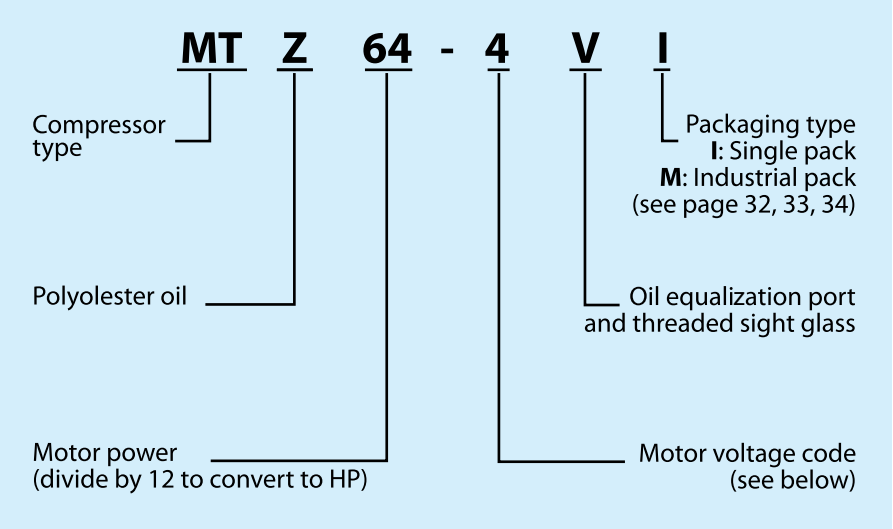
MT and MTZ compressors have a large internal free volume that protects against the risk of liquid hammering when liquid refrigerant enters the compressor.

MT and MTZ compressors are fully suction-gas cooled. This means that no additional compressor cooling is required and allows the compressors to be insulated with acoustic jackets to obtain lower sound levels, without the risk of the compressor overheating.

MT and MTZ compressors are available in 26 different models with displacement ranging from 231 to 4142 cfh. Seven different motor voltage ranges are available for single and three phase power supplies at 50 and 60 Hz. Most compressors exist in two versions:
- standard version
- VE version (oil equalization + oil sight glass).

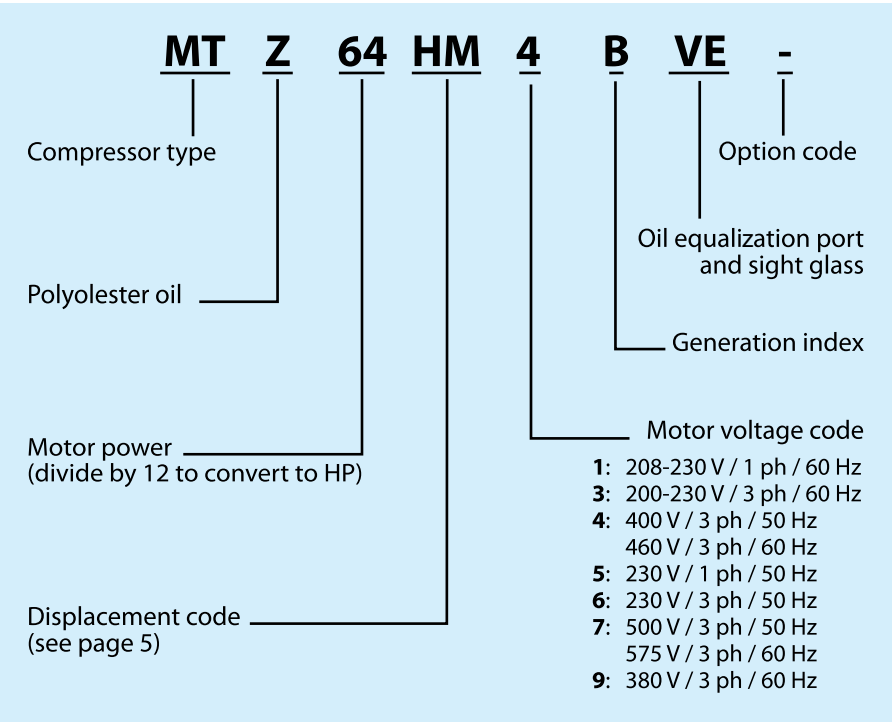
COMPRESSOR MODEL DESIGNATION

Code numbers
(for ordering)



Available code numbers are listed on pages 32-33

Compressor reference
(indicated on the compressor nameplate)



Versions

	S version (standard)		VE version (optional)	
Models	**Oil sight glass**	**Oil equalization connection**	**Oil sight glass**	**Oil equalization connection**
MT/MTZ018-040 (1 cyl.)	-	-	threaded	3/8"flare
MT/MTZ044-081 (2 cyl.)	-	-	threaded	3/8"flare
MT/MTZ100-160 (4 cyl.)	brazed	-	threaded	3/8"flare

SPECIFICATIONS

Technical specifications

Compressor model	Displacement			Cyl. number	Oil charge	Net weight	Available motor voltage codes						
	Code	in³/rev	cfh at 3600 rpm		oz	lbs	1	3	4	5	6	7	9
MT/MTZ018	**JA**	1.84	231	1	32	46	●	●	●	●	○	-	-
MT/MTZ022	**JC**	2.33	291	1	32	46	●	●	●	●	●	-	●
MT/MTZ028	**JE**	2.93	367	1	32	51	●	●	●	●	●	-	●
MT/MTZ032	**JF**	3.29	411	1	32	53	●	●	●	●	●	○	○
MT/MTZ036	**JG**	3.69	461	1	32	55	●	●	●	●	●	○	●
MT/MTZ040	**JH**	4.14	518	1	32	57	●	●	●	-	●	-	-
MT/MTZ044	**HJ**	4.65	581	2	61	77	●	●	●	-	●	●	●
MT/MTZ045	**HJ**	4.65	581	2	61	77	-	●	●	-	-	-	-
MT/MTZ050	**HK**	5.23	653	2	61	77	●	●	●	●	●	●	●
MT/MTZ051	**HK**	5.23	653	2	61	77	-	●	●	-	-	-	-
MT/MTZ056	**HL**	5.87	733	2	61	82	●	●	●	-	●	●	●
MT/MTZ057	**HL**	5.87	733	2	61	82	-	●	●	-	-	-	-
MT/MTZ064	**HM**	6.57	822	2	61	82	●	●	●	-	●	-	●
MT/MTZ065	**HM**	6.57	822	2	61	82	-	●	●	-	-	-	-
MT/MTZ072	**HN**	7.38	922	2	61	88	-	●	●	-	●	-	●
MT/MTZ073	**HN**	7.38	922	2	61	88	-	●	●	-	-	-	-
MT/MTZ080	**HP**	8.29	1036	2	61	88	-	●	●	-	●	-	●
MT/MTZ081	**HP**	8.29	1036	2	61	88	-	●	●	-	-	-	-
MT/MTZ100	**HS**	10.45	1306	4	132	132	-	●	●	-	●	●	●
MT/MTZ125	**HU**	13.15	1643	4	132	141	-	●	●	-	●	●	○
MT/MTZ144	**HV**	14.76	1845	4	132	148	-	●	●	-	●	●	●
MT/MTZ160	**HW**	16.57	2071	4	132	152	-	●	●	-	●	●	●

● Available in MT and MTZ ○ Available in MTZ only

Approvals and certificates

Maneurop® MT/MTZ compressors comply with the following approvals and certificates

Certificates are listed on the product datasheets:
http://www.danfoss.com/odsg

CE (European Directive) 0062	All models
UL (Underwriters Laboratories) c UL us	All 60 Hz models
CCC (China Compulsory Product Certification)	Depending on the model and motor voltage code.
Gost certificate (for Russia)	Depending on the model and voltage code.

SPECIFICATIONS

Nominal performance data for R-404A and R-22

R-404A	Refrigeration											
Compressor model	50 Hz, EN12900 ratings To = 14°F, Tc = 113°F, SC = 0 F, SH = 18°F				50 Hz, ARI ratings To = 20°F, Tc = 120°F, SC = 0°F, SH = 20°F				60 Hz, ARI ratings To = 20°F, Tc = 120°F, SC = 0°F, SH = 20°F			
	Cooling capacity BTU/h	Power input kW	Current input A	E.E.R. BTU/Wh	Cooling capacity BTU/h	Power input kW	Current input A	E.E.R. BTU/Wh	Cooling capacity BTU/h	Power input kW	Current input A	E.E.R. BTU/Wh
MTZ018-4*	6500	1.21	2.73	5.40	7070	1.31	2.86	5.40	8980	1.76	2.86	5.09
MTZ022-4*	8950	1.48	3.06	6.04	9665	1.62	3.24	5.96	12300	2.05	3.27	6.00
MTZ028-4*	11700	1.96	4.04	5.98	12600	2.14	4.30	5.88	15980	2.68	4.23	5.95
MTZ032-4*	13600	2.16	4.25	6.28	14550	2.37	4.56	6.15	17450	2.98	4.56	5.85
MTZ036-4*	15950	2.58	4.95	6.18	17400	2.83	5.33	6.02	20150	3.33	5.09	6.04
MTZ040-4*	18200	2.95	5.87	6.18	19400	3.24	6.29	5.97	23000	3.76	5.88	6.11
MTZ044-4	17600	3.16	6.37	5.57	18900	3.43	6.66	5.51	24250	4.18	6.58	5.79
MTZ045-4*	18350	2.77	5.35	6.59	19750	3.02	5.67	6.53	24250	3.85	5.85	6.30
MTZ050-4	27000	3.61	6.53	5.81	22470	3.92	6.92	5.73	28300	4.82	7.04	5.87
MTZ051-4*	21380	3.22	5.95	6.63	22880	3.50	6.33	6.54	28550	4.42	6.53	6.46
MTZ056-4	23900	4.00	7.07	5.98	25600	4.38	7.57	5.85	31800	5.44	7.80	5.84
MTZ057-4*	22900	3.51	6.83	6.52	24750	3.85	7.25	6.43	32400	4.98	7.52	6.50
MTZ064-4	27760	4.54	8.30	6.11	29700	4.96	8.84	5.99	36730	6.11	8.98	5.91
MTZ065-4*	27250	4.20	7.82	6.49	29340	4.60	8.35	6.37	36000	5.67	8.31	6.35
MTZ072-4	31250	4.99	8.64	6.28	33330	5.45	9.28	6.11	40470	6.91	9.76	5.85
MTZ073-4*	30460	4.69	8.95	6.49	32680	5.11	9.50	6.39	40850	6.53	9.73	6.25
MTZ080-4	35930	5.84	10.12	6.15	38250	6.38	10.87	5.99	45760	8.03	11.35	5.70
MTZ081-4*	35750	5.61	10.20	6.39	38780	6.14	10.94	6.22	46450	7.81	11.35	5.94
MTZ100-4*	41940	6.76	12.21	6.22	44500	7.35	12.94	6.11	52850	8.72	12.79	6.06
MTZ125-4*	53650	8.44	13.79	6.35	57380	9.21	14.86	6.22	68200	11.37	15.41	6.00
MTZ144-4*	63150	9.78	16.29	6.45	67240	10.65	17.47	6.31	80350	12.99	17.93	6.18
MTZ160-4*	69350	11.08	18.26	6.25	73970	12.09	19.64	6.11	87300	14.73	20.17	5.92

* 50 Hz, EN12900 data for indicated models are ASERCOM certified

R-404A data are also valid for refrigerant R-507A

R-22	Refrigeration				Air Conditioning							
Compressor model	50 Hz, EN12900 ratings To = 14°F, Tc = 113°F, SC = 0 F, SH = 18°F				50 Hz, ARI ratings To = +45°F, Tc = 130°F, SC = 15°F, SH = 20°F				60 Hz, ARI ratings To = +45°F, Tc = 130°F, SC = 15°F, SH = 20°F			
	Cooling capacity BTU/h	Power input kW	Current input A	E.E.R. W/W	Cooling capacity BTU/h	Power input kW	Current input A	E.E.R. BTU/Wh	Cooling capacity BTU/h	Power input kW	Current input A	E.E.R. BTU/Wh
MT018-4	5770	1.00	2.27	5.77	13250	1.45	2.73	9.16	15900	1.74	2.73	9.16
MT022-4	8500	1.29	2.55	6.63	18305	1.89	3.31	9.69	22000	2.27	3.31	9.69
MT028-4	12750	1.81	3.59	7.04	25200	2.55	4.56	9.87	30200	3.06	4.56	9.87
MT032-4	13500	2.11	3.73	6.39	27500	2.98	4.97	9.22	33000	3.58	4.97	9.22
MT036-4	16400	2.35	4.30	6.97	31650	3.37	5.77	9.38	38000	4.05	5.77	9.38
MT040-4	17800	2.67	4.86	6.66	35800	3.86	6.47	9.27	42900	4.63	6.47	9.27
MT044-4	18100	2.72	6.03	6.66	37700	3.89	7.37	9.69	45200	4.66	7.37	9.69
MT045-4	16600	2.46	5.02	6.76	35900	3.53	6.37	10.17	44000	4.32	6.42	10.18
MT050-4	19850	2.95	5.22	6.73	42100	4.32	8.46	9.74	50500	5.18	8.46	9.74
MT051-4	20050	2.94	5.53	6.83	41800	4.19	7.20	9.97	50200	5.04	7.26	9.95
MT056-4	23300	3.44	6.21	6.80	47000	5.04	10.27	9.32	56400	6.05	10.27	9.32
MT057-4	22000	3.18	6.39	6.93	47000	4.58	8.19	10.24	56400	5.58	8.23	10.10
MT064-4	26100	3.89	7.06	6.69	54000	5.66	9.54	9.53	64800	6.80	9.54	9.53
MT065-4	26470	3.64	7.03	7.27	53700	5.27	9.16	10.18	64400	6.32	9.33	10.18
MT072-4	29100	4.29	7.58	6.80	58500	6.31	10.54	9.26	70200	7.57	10.54	9.26
MT073-4	29750	4.19	8.48	7.10	62100	6.12	10.98	10.15	74600	7.33	10.77	10.16
MT080-4	33200	4.84	8.24	6.86	66700	7.13	11.58	9.36	80000	8.55	11.58	9.36
MT081-4	35380	4.89	9.52	7.24	70800	7.08	12.48	9.99	85000	8.50	12.34	10.00
MT100-4	38700	5.79	11.82	6.69	79900	7.98	14.59	10.00	95900	9.58	14.59	10.00
MT125-4	52100	7.55	12.28	6.90	103900	10.66	17.37	9.74	124700	12.80	17.37	9.74
MT144-4	59000	8.47	17.06	6.97	117300	11.95	22.75	9.80	140700	14.35	22.75	9.80
MT160-4	65540	9.49	16.81	6.90	130700	13.40	22.16	9.75	156900	16.08	22.16	9.75

To: Evaporating temperature at dew point (saturated suction temperature)
Tc: Condensing temperature at dew point (saturated discharge temperature)
SC: Subcooling,
SH: Superheat

ARI capacity and power input data are +/- 5%
ASERCOM: Association of European Refrigeration Compressor and Controls Manufacturers
ARI: Air Conditioning and Refrigeration Institute

SPECIFICATIONS

Nominal performance data for R-407C and R-134a

R-407C	Air Conditioning											
Compressor model	50 Hz, EN12900 ratings To = +45°F, Tc = 130°F, SC = 15°F, SH = 20°F				50 Hz, ARI ratings To = +45°F, Tc = 130°F, SC = 15°F, SH = 20°F				60 Hz, ARI ratings To = +45°F, Tc = 130°F, SC = 15°F, SH = 20°F			
	Cooling capacity BTU/h	Power input kW	Current input A	E.E.R. BTU/Wh	Cooling capacity BTU/h	Power input kW	Current input A	E.E.R. BTU/Wh	Cooling capacity BTU/h	Power input kW	Current input A	E.E.R. BTU/Wh
MTZ018-4*	11850	1.27	2.73	9.32	13150	1.38	2.86	9.53	17250	1.73	2.82	9.98
MTZ022-4*	15540	1.71	3.27	9.12	17140	1.86	3.47	9.23	21450	2.26	3.45	9.48
MTZ028-4*	20080	2.17	4.30	9.29	22340	2.36	4.57	9.45	28070	2.82	4.41	9.93
MTZ032-4*	22700	2.43	4.57	9.36	25030	2.65	4.90	9.43	30702	3.20	4.80	9.61
MTZ036-4*	25650	2.93	5.58	8.74	28280	3.21	5.99	8.82	34120	3.90	5.78	8.74
MTZ040-4*	29580	3.40	6.46	8.71	32720	3.71	6.92	8.81	40030	4.46	6.69	8.98
MTZ044-4	30530	3.34	6.10	9.12	33710	3.63	6.49	9.27	43030	4.36	6.84	9.85
MTZ045-4*	31180	3.12	5.84	10.01	34490	3.38	6.18	10.21	43480	4.25	6.34	10.23
MTZ050-4	34800	3.79	6.90	9.19	38490	4.11	7.34	9.34	48150	4.95	7.33	9.72
MTZ051-4*	35590	3.69	6.51	9.66	39380	4.01	6.95	9.82	48190	4.87	7.06	9.89
MTZ056-4	39960	4.32	7.85	9.26	44190	4.69	8.36	9.42	54370	5.66	8.41	9.60
MTZ057-4*	39900	4.02	7.45	9.90	44400	4.37	7.91	10.16	54880	5.40	8.03	10.15
MTZ064-4	45010	4.84	8.79	9.29	49830	5.26	9.35	9.47	60450	6.35	9.47	9.50
MTZ065-4*	45630	4.61	8.35	9.90	50720	5.02	8.91	10.10	61750	6.14	9.01	10.05
MTZ072-4	50540	5.50	9.81	9.19	55940	5.97	10.48	9.36	67930	7.21	10.78	9.41
MTZ073-4*	52230	5.42	9.85	9.66	58230	5.87	10.48	9.91	70970	7.30	10.61	9.72
MTZ080-4	57204	6.29	11.02	9.08	63280	6.83	11.83	9.25	76910	8.24	12.35	9.33
MTZ081-4*	59360	6.29	11.31	9.43	66010	6.83	12.08	9.67	78100	8.24	11.99	9.47
MTZ100-4*	69940	7.38	13.05	9.49	77520	8.00	13.83	9.69	96380	9.86	14.22	9.77
MTZ125-4*	91880	9.48	15.14	9.70	101740	10.32	16.28	9.85	121650	12.83	18.07	9.47
MTZ144-4*	101670	10.68	17.55	9.53	112940	11.59	18.80	9.74	139680	14.42	19.81	9.68
MTZ160-4*	116420	12.40	20.08	9.39	129160	13.46	21.50	9.59	154430	16.64	22.46	9.27

* 50 Hz, EN12900 data for indicated models are ASERCOM certified

R-134a	Air Conditioning											
Compressor model	50 Hz, EN12900 ratings To = 41 °F, Tc = 122 °F, SC = 0 °F, SH = 18 °F				50 Hz, ARI ratings To = +45°F, Tc = 130°F, SC = 15°F, SH = 20°F				60 Hz, ARI ratings To = +45°F, Tc = 130°F, SC = 15°F, SH = 20°F			
	Cooling capacity BTU/h	Power input kW	Current input A	E.E.R. BTU/Wh	Cooling capacity BTU/h	Power input kW	Current input A	E.E.R. BTU/Wh	Cooling capacity BTU/h	Power input kW	Current input A	E.E.R. BTU/Wh
MTZ018-4	7890	0.92	2.12	8.57	8710	0.99	2.19	8.81	11200	1.22	2.09	9.20
MTZ022-4	10250	1.11	2.42	9.22	11440	1.20	2.51	9.56	14860	1.54	2.56	9.63
MTZ028-4	12740	1.41	3.18	9.05	14380	1.53	3.30	9.40	19260	2.04	3.37	9.43
MTZ032-4	14990	1.74	3.80	8.61	16910	1.87	3.94	9.03	20940	2.39	3.89	8.76
MTZ036-4	18240	1.97	3.88	9.26	20490	2.13	4.09	9.60	24490	2.75	4.20	8.91
MTZ040-4	19470	2.15	4.58	9.08	27860	2.33	4.89	9.36	27870	3.08	4.72	9.03
MTZ044-4	20900	2.36	5.51	8.88	23460	2.52	5.65	9.29	29850	3.14	5.47	9.51
MTZ045-4	20800	2.06	4.56	10.11	23390	2.22	4.73	10.53	30120	2.84	4.70	10.59
MTZ050-4	24490	2.68	5.33	9.12	27560	2.88	5.50	9.57	34460	3.60	5.36	9.57
MTZ051-4	24280	2.44	5.02	9.96	27360	2.63	5.20	10.39	34530	3.29	5.33	10.48
MTZ056-4	27460	2.99	5.61	9.19	30980	3.21	5.83	9.63	38010	3.95	5.92	9.62
MTZ057-4	26230	2.62	5.93	10.01	29780	2.84	6.17	10.47	38870	3.82	6.37	10.16
MTZ064-4	31280	3.36	6.66	9.32	35350	3.62	6.96	9.77	45290	4.68	7.11	9.67
MTZ065-4	30600	3.02	6.53	10.11	34700	3.26	6.81	10.63	44400	4.20	6.77	10.56
MTZ072-4	36000	3.74	6.83	9.63	40470	4.01	7.20	10.09	50000	5.19	7.59	9.64
MTZ073-4	34940	3.50	7.66	9.97	39790	3.78	7.99	10.52	50000	4.81	7.88	10.39
MTZ080-4	47260	4.31	8.03	9.56	46380	4.64	8.45	10.00	56520	5.99	8.79	9.42
MTZ081-4	40130	4.02	8.44	9.97	45490	4.35	8.83	10.44	56320	5.47	8.68	10.29
MTZ100-4	47030	4.89	9.84	9.60	53040	5.28	10.24	10.04	63970	6.50	10.11	9.84
MTZ125-4	57990	5.84	10.24	9.94	65130	6.29	10.80	10.35	79920	7.71	11.09	10.23
MTZ144-4	71820	7.27	13.11	9.87	80670	7.83	13.78	10.30	96960	9.81	14.28	9.87
MTZ160-4	78820	7.98	13.90	9.87	88320	8.57	14.67	10.29	107650	10.91	15.54	9.86

To: Evaporating temperature at dew point (saturated suction temperature)
Tc: Condensing temperature at dew point (saturated discharge temperature)
SC: Subcooling,
SH: Superheat

ARI capacity and power input data are +/- 5%
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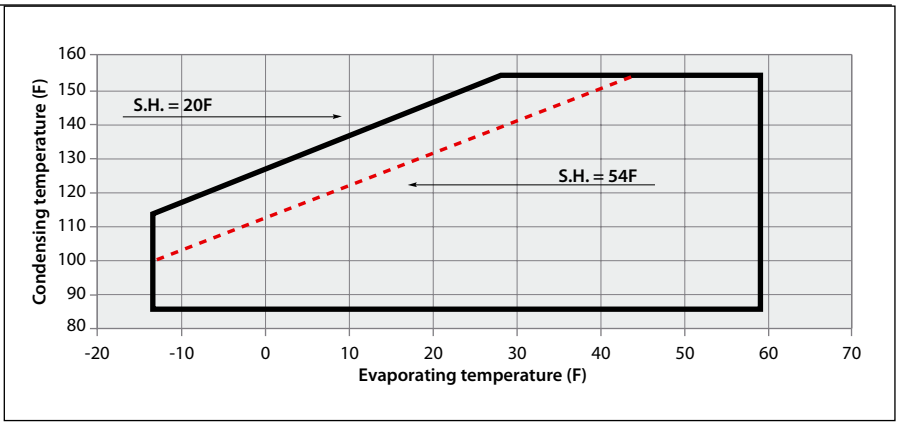
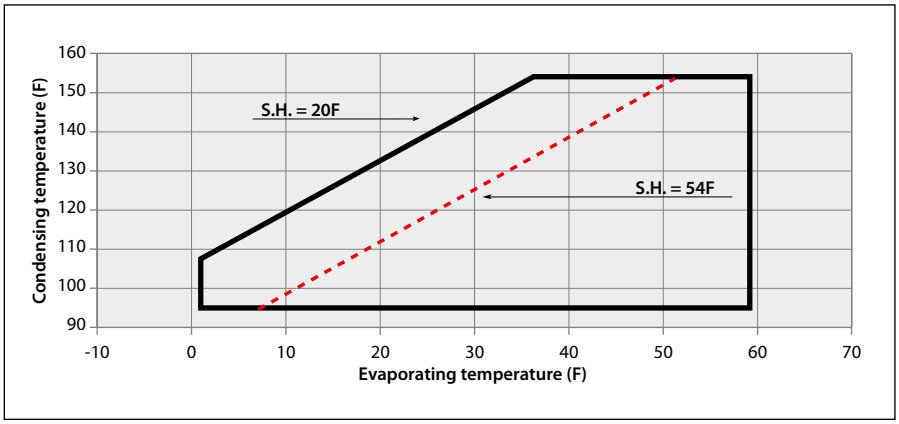
OPERATING ENVELOPES

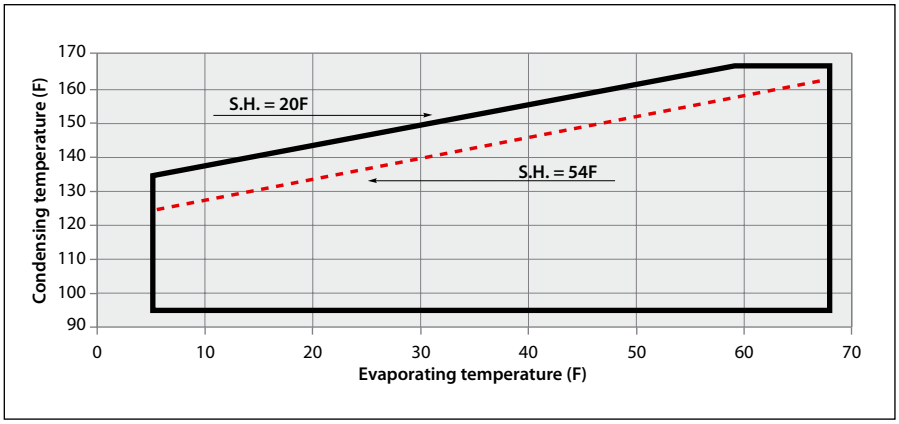
MT
R-22



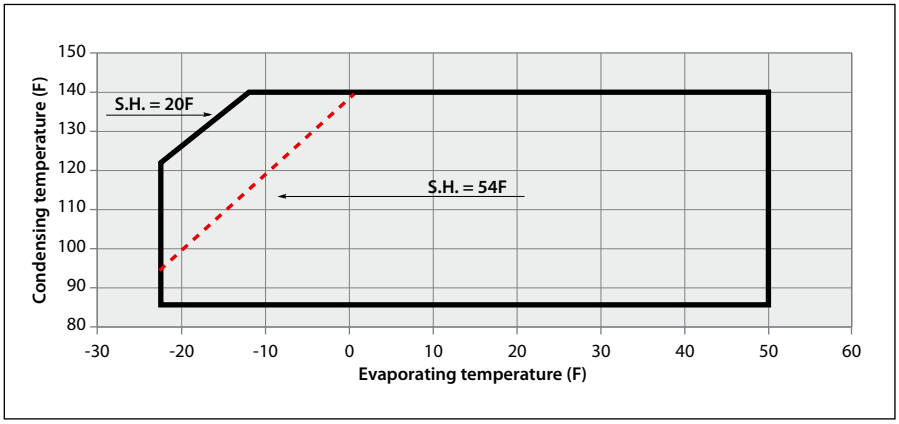
MTZ
R-407C at DEW point



MTZ
R-134a



MTZ
R-404A/R-507A



OPERATING ENVELOPES

Zeotropic refrigerant mixtures

Refrigerant mixtures can be either zeotropic or azeotropic.
In a zeotropic mixture (like R-407C) on the other hand the composition of vapor and liquid changes during the phase transition. When the effect of this phase transition is very small, the mixture is often called a near-azeotropic mixture. R-404A is such a near-azeotropic mixture.

An azeotropic mixture, on the other hand, (like R-502 or R-507A) behaves like a pure refrigerant. During a phase transition (from vapor to liquid or from liquid to vapor) the composition of vapor and liquid stays the same.
The composition change causes phase shift and temperature glide.

Phase shift

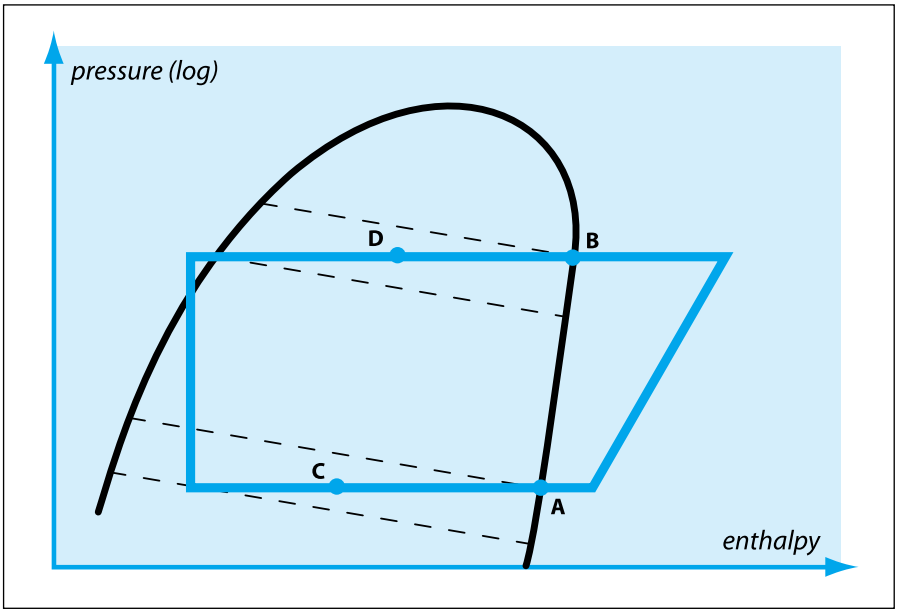
In parts of the system where both vapor and liquid phase are present (evaporator, condenser, liquid receiver), the phases do not have the same composition. In fact both phases form two different refrigerants. Therefore zeotropic refrigerants need some special attention.

Zeotropic refrigerants must always be charged in liquid phase. Flooded evaporators and suction accumulators should not be applied in systems with zeotropic refrigerants. This also applies to near-azeotropic mixtures.

Temperature glide

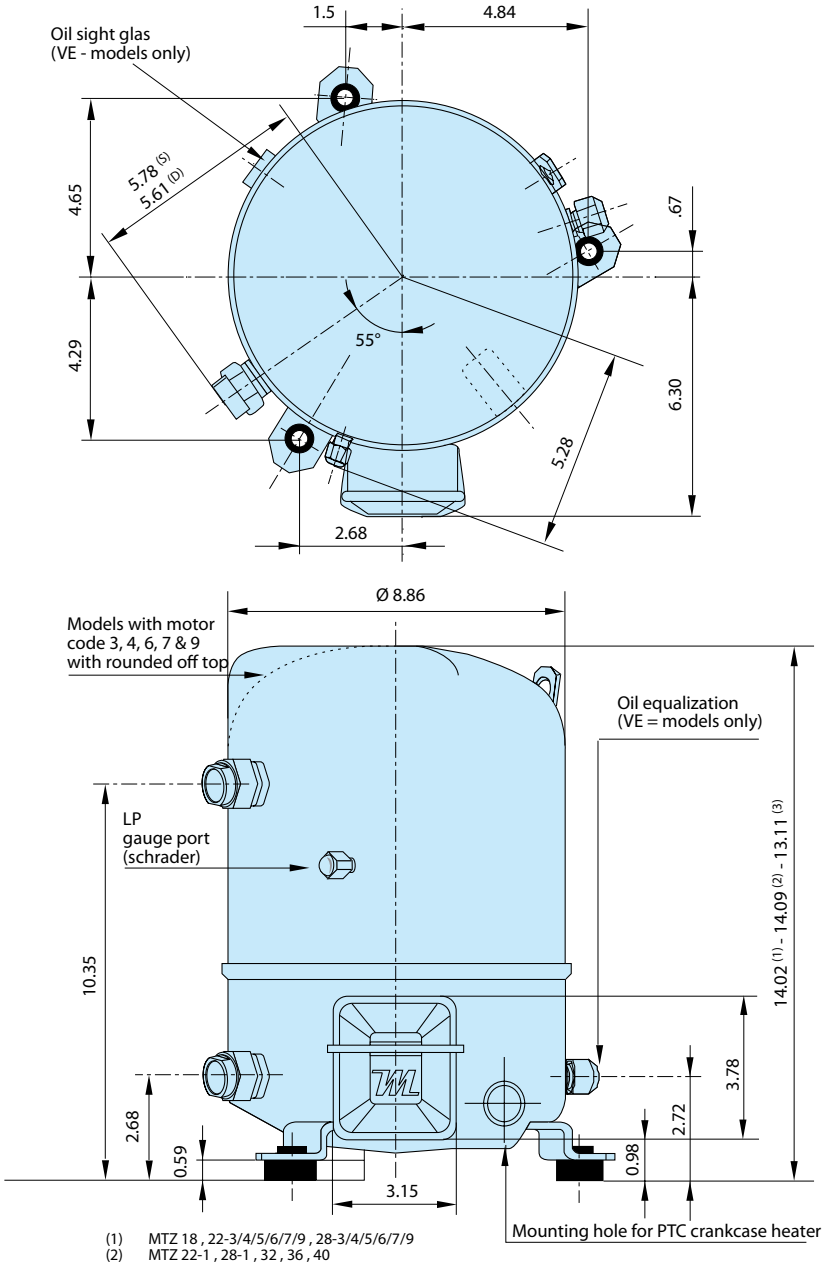
During the evaporating process and the condensing process at constant pressure, the refrigerant temperature will decrease in the condenser and rise in the evaporator. Therefore when speaking about evaporating and condensing temperatures, it is important to indicate whether the temperature under discussion is a dew point temperature or a mean point value.
In the figure below, the dotted lines are lines of constant temperature. They do not correspond to the lines of constant pressure. Points A and B are dew point values on the saturated vapor line. Points C and D are mean point values.
These are temperatures that correspond more or less with the average temperature during the evaporating and condensing process. For the same R-407C cycle, mean point temperatures are typically about 3.5°F to 5.5°F lower than dew point temperatures. In accordance with ASERCOM recommendations, Danfoss Commercial Compressors uses dew point temperatures for selection tables, application envelopes, etc.
To obtain exact capacity data at mean point temperatures, the mean point temperatures must be converted to dew point temperatures, using refrigerant data tables from the refrigerant manufacturer.

Dew point temperature and mean temperature for R-407C



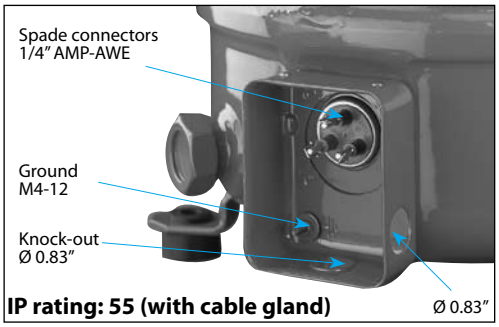
OUTLINE DRAWINGS

1 cylinder

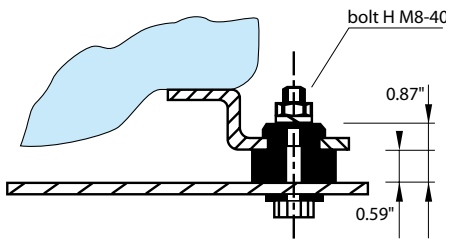


(1) MTZ 18 , 22-3/4/5/6/7/9 , 28-3/4/5/6/7/9
(2) MTZ 22-1 , 28-1 , 32 , 36 , 40

Terminal box



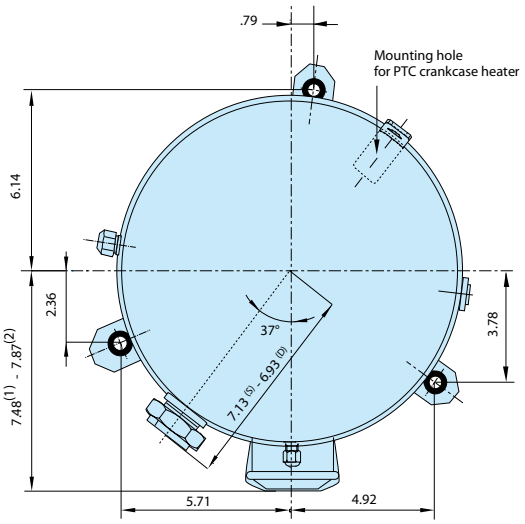
Silent block

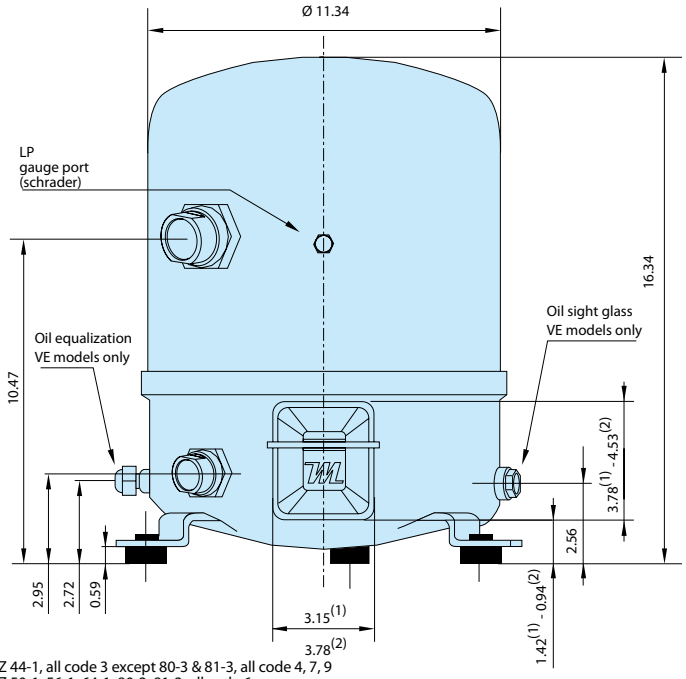


	Rotolock connections size		Pipe sizing		Rotolock valve	
	Suction	Discharge	Suction	Discharge	Suction	Discharge
MT/MTZ018 MT/MTZ022 - 3/4/5/6 MT/MTZ028 - 3/4/5/6	1"	1"	1/2"	3/8"	V06	V01
MT/MTZ022 - 1	1"1/4	1"	5/8"	3/8"	V09	V01
MT/MTZ028 - 1 MT/MTZ032 MT/MTZ036 MT/MTZ040	1"1/4	1"	5/8"	1/2"	V09	V06

OUTLINE DRAWINGS

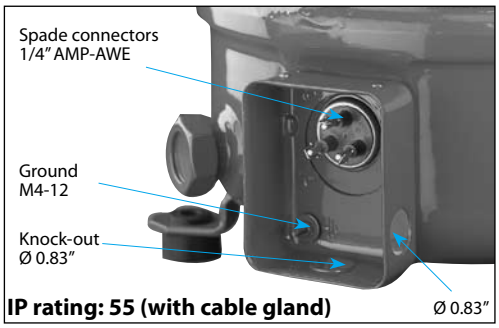
2 cylinders





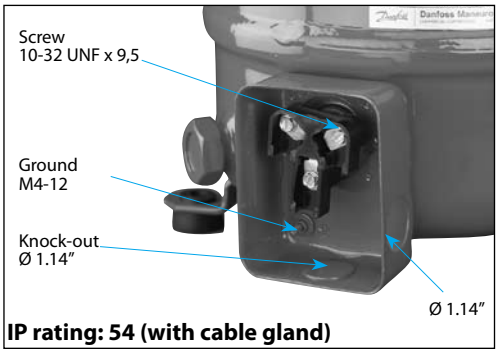
(1) MTZ 44-1, all code 3 except 80-3 & 81-3, all code 4, 7, 9
(2) MTZ 50-1, 56-1, 64-1, 80-3, 81-3, all code 6

Terminal box for model (1)



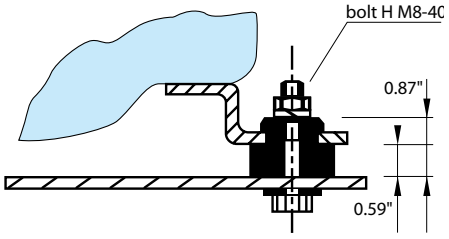
IP rating: 55 (with cable gland)

Terminal box for model (2)



IP rating: 54 (with cable gland)

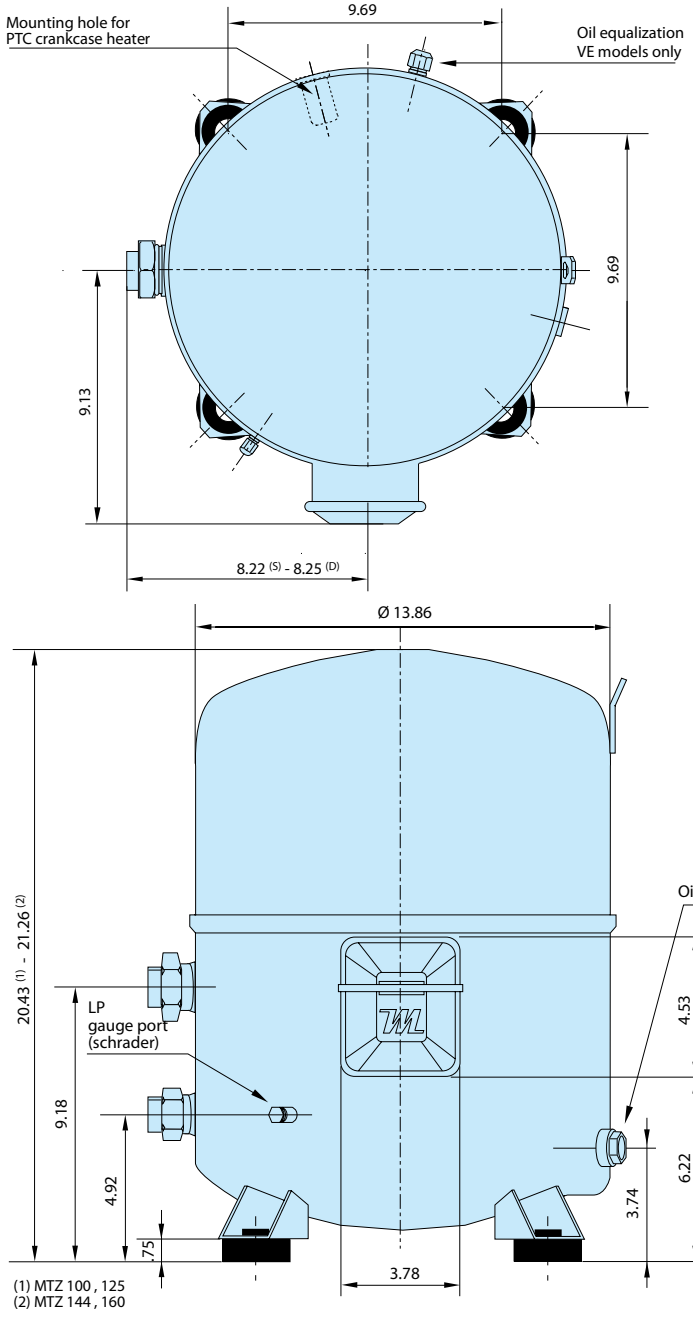
Silent block



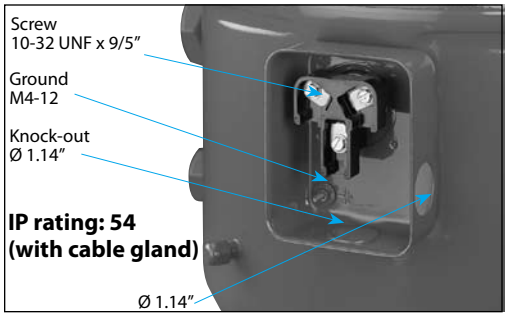
	Rotolock connections size		Pipe sizing		Rotolock valve	
	Suction	**Discharge**	**Suction**	**Discharge**	**Suction**	**Discharge**
MT/MTZ044 MT/MTZ045 MT/MTZ050 MT/MTZ051 MT/MTZ056 MT/MTZ057 MT/MTZ064 MT/MTZ065 MT/MTZ072 MT/MTZ073	1"3/4	1"1/4	7/8"	3/4"	V07	V04
MT/MTZ080 MT/MTZ081	1"3/4	1"1/4	1"1/8	3/4"	V02	V04

OUTLINE DRAWINGS

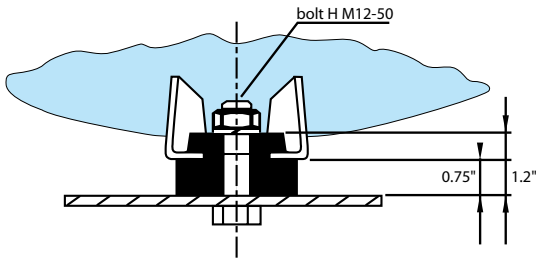
4 cylinders



Terminal box



Silent block



	Rotolock connections size		Pipe sizing		Rotolock valve	
	Suction	Discharge	Suction	Discharge	Suction	Discharge
MT/MTZ100 MT/MTZ125 MT/MTZ144 MT/MTZ160	1"3/4	1"1/4	1"1/8	3/4"	V02	V04

ELECTRICAL CONNECTIONS AND WIRING

Single phase electrical characteristics

	LRA - Locked Rotor Current (A)		MCC - Maximum Continuous Current (A)		Winding resistance (Ω) (± 7 % at 68° F)			
Motor Code	1	5	1	5	1		5	
Winding					run	start	run	start
MT/MTZ018	51	40	13	10	1.36	4.82	1.80	4.70
MT/MTZ022	49.3	41	17	15	1.25	2.49	1.78	4.74
MT/MTZ028	81	51	25	20	0.74	1.85	1.16	3.24
MT/MTZ032	84	70	26.5	20	0.64	2.85	0.90	4.30
MT/MTZ036	84	60	30	22	0.64	2.85	0.89	4.35
MT/MTZ040	99	-	34	-	0.53	2.00	-	-
MT/MTZ044	97	-	31	-	0.45	1.90	-	-
MT/MTZ050	114	92	36	29	0.37	1.79	0.52	2.65
MT/MTZ056	136	-	42.5	-	0.32	1.61	-	-
MT/MTZ064	143	-	46	-	0.32	2.10	-	-

Nominal capacitor values and relays

50 Hz	PSC/CSR*		CSR only	
Models	**Run capacitors (1)**		**Start capacitors (2)**	**Start relay**
	(A) µF	**(C) µF**	**(B) µF**	
MT/MTZ018 JA-5	20	10	100	3ARR3J4A4
MT/MTZ022 JC-5	20	10	100	
MT/MTZ028 JE-5	20	10	100	
MT/MTZ032 JF-5	25	10	135	
MT/MTZ036 JG-5	25	10	135	
MT/MTZ050 HK-5	30	15	135	

60 Hz	PSC/CSR*		CSR only	
Models	**Run capacitors (1)**		**Start capacitors (2)**	**Start relay**
	(A) µF	**(C) µF**	**(B) µF**	
MT/MTZ018 JA-1	15	10	100	3ARR3J4A4
MT/MTZ022 JC-1	30	15	100	
MT/MTZ028 JE-1	25	25	135	
MT/MTZ032 JF-1	25	20	100	
MT/MTZ036 JG-1	25	20	100	
MT/MTZ040 JH-1	35	20	100	
MT/MTZ044 HJ-1	30	15	135	
MT/MTZ050 HK-1	30	15	135	
MT/MTZ056 HL-1	35	20	200	
MT/MTZ064 HM-1	30	25	235	

* PSC: Permanent Split Capacitor
CSR: Capacitor Start Run

(1) Run capacitors: 440 volts

(2) Start capacitors: 330 Volts

Trickle circuit

The trickle circuit provides for heating the compressor crankcase by feeding a small current to the auxiliary winding and the run capacitor. *See the drawings page 14.*
By using PSC or CSR starting systems, compressor models MT/MTZ018-022 can be operated without crankcase heaters as the heater function is provided by the trickle circuit. For the larger single phase compressor models MT/MTZ028-064, the use of the PTC crankcase heater is recommended.

PSC wiring

PSC wiring may be used for refrigerant circuits with capillary tubes or expansion valves with bleed ports. Pressure equalization must be ensured before start-up because of the low starting torque characteristics of this system.

CSR wiring

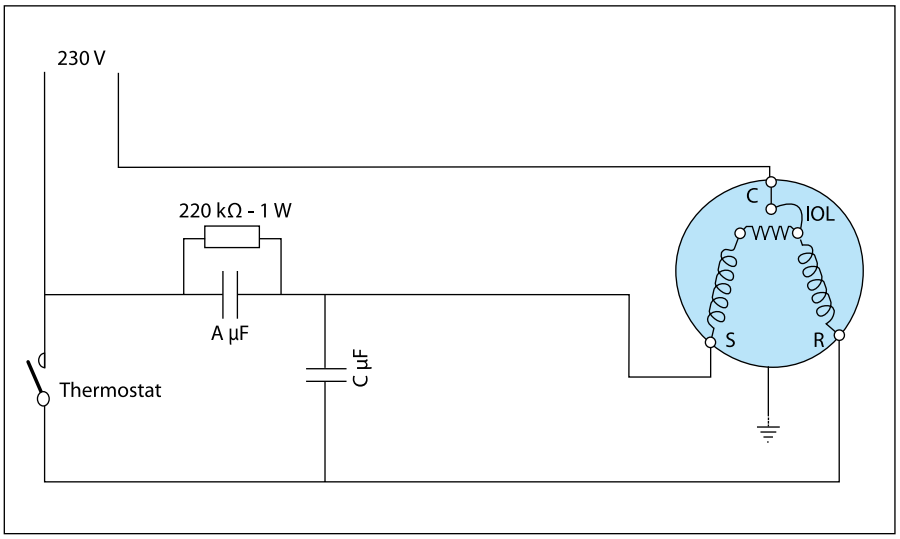
CSR wiring provides additional motor torque at start-up by the use of a start capacitor in combination with the run capacitor. This system can be used for refrigerant circuits with capillary tubes or expansion valves. The start capacitor is only connected during starting; a potential relay is used to disconnect the capacitor after the start sequence.
Single phase compressor motors are internally protected by a temperature and current sensing bimetallic protector, which senses the main and start winding currents and the winding temperature. Once the protector has tripped, it may take from two to four hours for the compressor to reset and restart.
Check that the power supply corresponds to compressor characteristics (refer to compressor nameplate).

ELECTRICAL CONNECTIONS AND WIRING

Suggested wiring diagrams

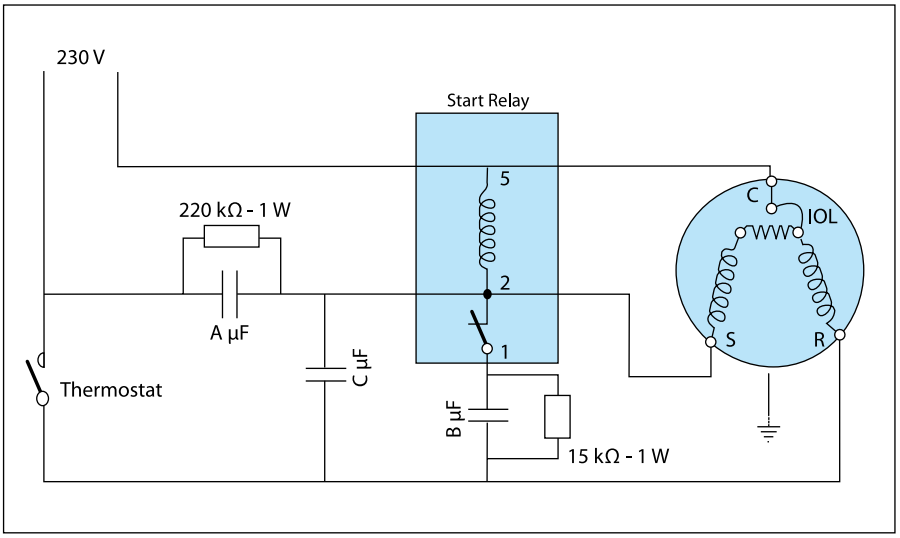
Single phase PSC wiring with trickle circuit

IOL Motor protector
A & C Run capacitors
C Common
S Start winding (auxiliary)
R Run winding (main)



Single phase CSR wiring with trickle circuit

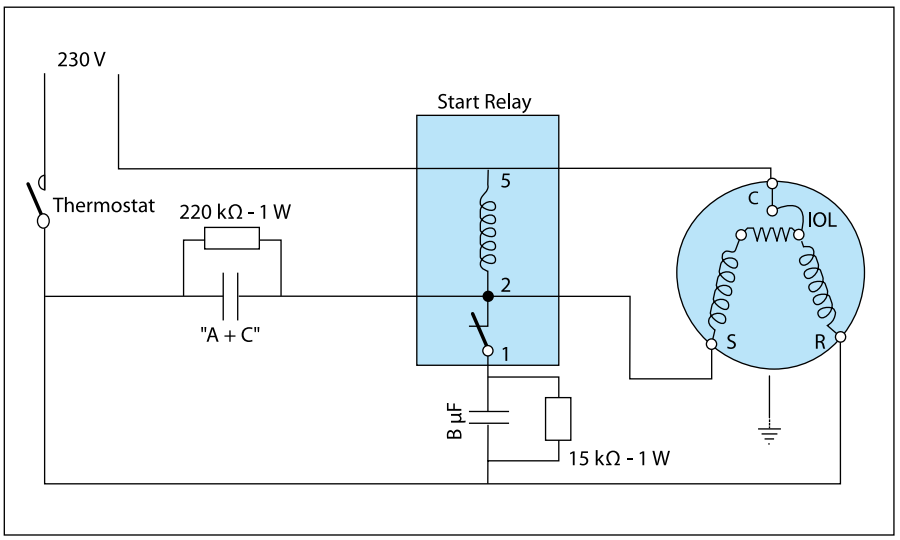
IOL Motor protector
A & C Run capacitors
B Start capacitor
C Common
S Start winding (auxiliary)
R Run winding (main)



Single phase CSR wiring without trickle circuit

IOL Motor protector
A + C Run capacitors
B Start capacitor
C Common
S Start winding (auxiliary)
R Run winding (main)

Capacitors **A** and **C** are replaced by a single capacitor of size **A + C**



ELECTRICAL CONNECTIONS AND WIRING

Three phase electrical characteristics

	LRA - Locked Rotor Current (A)					MCC - Maximum Continuous Current (A)					Winding resistance (Ω) (± 7 % at 68° F)				
Motor Code	**3**	**4**	**6**	**7**	**9**	**3**	**4**	**6**	**7**	**9**	**3**	**4**	**6**	**7**	**9**
MT/MTZ018	38	20	30	-	-	9	5	7	-	-	2.49	10.24	3.38	-	-
MT/MTZ022	38	16	-	-	22.5	11	6	8.5	-	6	2.49	10.24	3.38	-	6.58
MT/MTZ028	57	23	-	-	32	16	7.5	11.5	-	8.5	1.37	7.11	2.30	-	4.80
MT/MTZ032	60	25	44	22	35	18	8	13	5.5	9	1.27	6.15	1.27	8.90	4.20
MT/MTZ036	74	30	74	26	35	17	9	17	7	9.5	1.16	5.57	1.16	8.60	4.10
MT/MTZ040	98	38	74	-	-	22	10	18	-	-	0.95	4.56	0.95	-	-
MT/MTZ044	115	42	77	44	78	22	9.5	16	8.5	13	0.74	3.80	1.13	5.83	1.68
MT/MTZ045	115	48.5	-	-	-	17	9.5	-	-	-	0.69	3.22	-	-	-
MT/MTZ050	115	42	77	44	78	25	12	19	10	13.5	0.72	3.80	1.39	5.83	1.68
MT/MTZ051	120	48.5	-	-	-	22	11.5	-	-	-	0.69	3.60	-	-	-
MT/MTZ056	130	60	105	50	72	26	12	23	11	15	0.57	2.41	0.76	3.86	-
MT/MTZ057	130	64	-	-	-	24	12	-	-	-	0.55	2.39	-	-	-
MT/MTZ064	137	67	124	-	72	29	15	25	-	17.5	0.57	2.41	0.76	-	1.64
MT/MTZ065	135	64	-	-	-	28	14	-	-	-	0.55	2.39	-	-	-
MT/MTZ072	135	80	143	-	100	30	15.5	27	-	18.5	0.55	1.90	0.56	-	1.32
MT/MTZ073	155	80	-	-	-	32	17	-	-	-	0.48	1.90	-	-	-
MT/MTZ080	140	80	132	-	102	36	18	29	-	22.5	0.48	1.90	0.56	-	1.30
MT/MTZ081	140	80	-	-	-	36	19	-	-	-	0.48	1.90	-	-	-
MT/MTZ100	157	90	126	62	110	43	22	35	17	26	0.50	1.85	0.67	3.10	1.26
MT/MTZ 125	210	105	170	75	150	54	27	43	22	30	0.38	1.57	0.43	2.51	0.84
MT/MTZ 144	259	115	208	90	165	64	30	51	25	40	0.27	1.19	0.37	2.00	0.72
MT/MTZ 160	259	140	208	99	165	70	36	51	29	46	0.27	1.10	0.37	1.76	1.10

Motor protection and suggested wiring diagrams

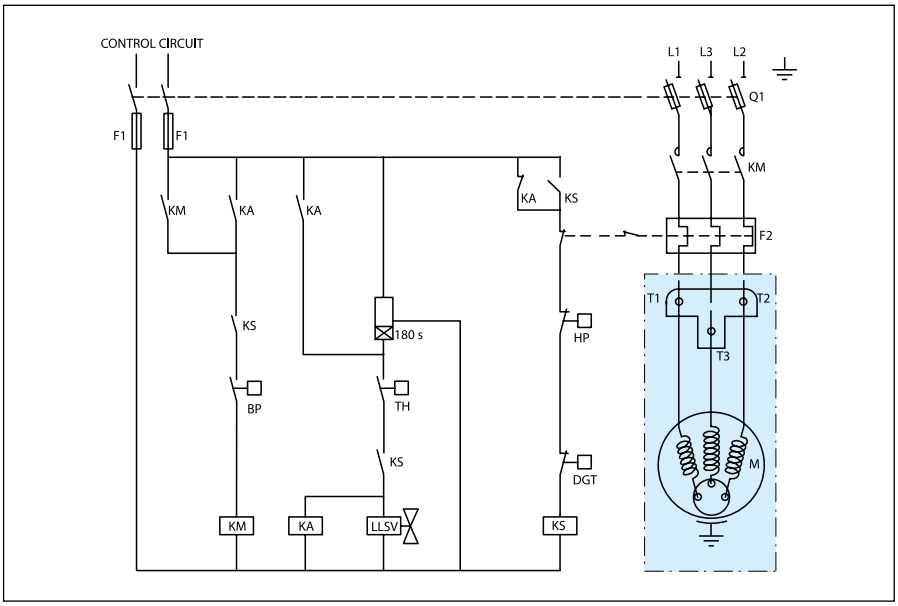
MT and MTZ 3-phase compressors are protected by an internal motor protector connected to the neutral point of star connected stator windings. The protector cuts out all 3 phases simultaneously.

Note: once the overload protector has tripped it may take up to 3 hours to reset and restart the compressor.

For all 3-phase compressors, a PTC crankcase heater is required.

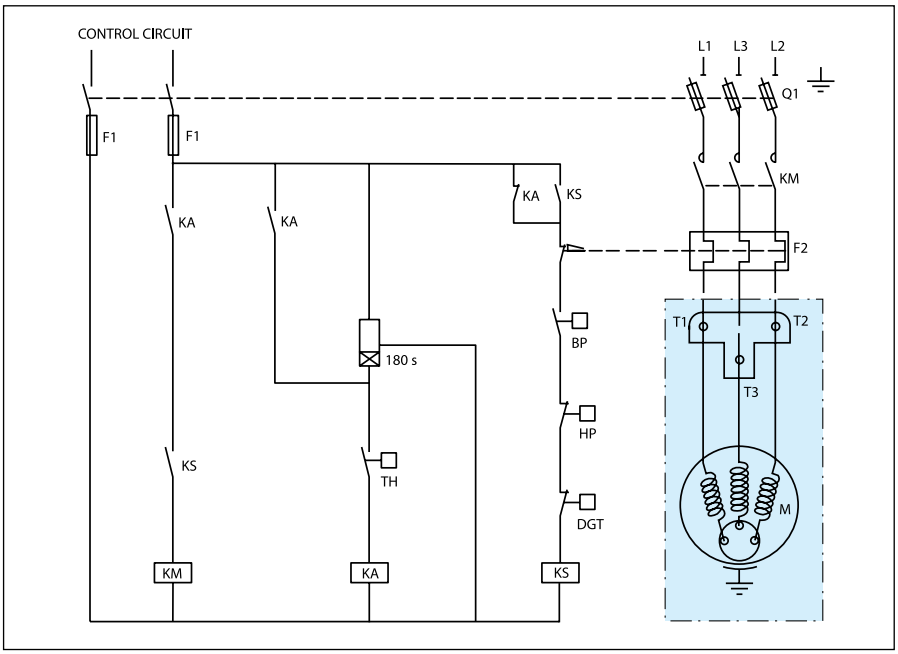
Wiring diagram with pump-down cycle

Control device ..... TH
Optional short cycle timer (3 min) 5 pts ..... 180 s
Control relay ..... KA
Liquid Solenoid valve ..... LLSV
Compressor contactor ..... KM
Safety lock out relay ..... KS
Pump-down control & L.P. switch ..... BP
H.P. switch ..... HP
Fused disconnect Q1
Fuses F1
External overload protection F2
Compressor motor ..... M
Motor safety thermostat ..... thM
Discharge gas thermostat ..... DGT



ELECTRICAL CONNECTIONS AND WIRING

Wiring diagram without pump-down cycle



Control device ..... TH
Optional short cycle timer (3 min) 5 pts ..... 180 s
Control relay ..... KA
Compressor contactor ..... KM
Safety lock out relay ..... KS
H.P. switch ..... HP
Fused disconnect Q1
Fuses F1
External overload protection F2
Compressor motor ..... M
Discharge gas thermostat ..... DGT

Soft starters

Starting current of Maneurop® 3-phase compressors can be reduced by using a soft starter. Two different versions are available: CI-tronic™ soft starters type MCI (recommended) and soft start kits with statoric resistors (type SCR). Starting current can be reduced by up to 50% depending on the compressor model and the type of soft starter. Also mechanical stresses that occur at starting are reduced, which increases the life of internal components.

For details of the CI-tronic™ MCI soft starters, please refer to literature DKACT.PD.C50.C1.02.

For details of the SCR soft start kits, please contact Danfoss.

The number of starts should be limited to 6 per hour. HP/LP pressure equalization is required before starting.

Voltage application range

Motor Code	Nominal voltage	Voltage application range
1	208-230 V / 1 ph / 60 Hz	187 - 253 V
3	200-230 V / 3 ph / 60 Hz	180 - 253 V
4	400 V / 3 ph / 50 Hz	360 - 440 V
	460 V / 3 ph / 60 Hz	414 - 506 V
5	230 V / 1 ph / 50 Hz	207 - 253 V
6	230 V / 3 ph / 50 Hz	207 - 253 V
7	500 V / 3 ph / 50 Hz	450 - 550 V
	575 V / 3 ph / 60 Hz	517 - 632 V
9	380 V / 3 ph / 60 Hz	342 - 418 V

IP rating

The IP rating of the compressor terminal boxes, according to CEI 529, are shown in the outline drawings section.

The IP ratings are only valid when correctly sized cable glands of the same IP rating are applied.

IP 5 5

First numeral, level of protection against contact and foreign objects
5 Complete protection against contact and against harmful dust deposits

Second numeral, level of protection against water
4 Protection against water splashing from any direction
5 Protection against jets of water from any direction

General information

When choosing a refrigerant, various factors must be taken into consideration:
- Legislation (now and in the future)
- Safety
- Application envelope in relation to expected running conditions
- Compressor capacity and efficiency
- Compressor manufacturer recommendations & guidelines

Additional points could influence the final choice:
- Environmental considerations
- Standardization of refrigerants and lubricants
- Refrigerant cost
- Refrigerant availability

The table below gives an overview of the different refrigerant - lubricant - compressor combinations for Maneurop®, MT & MTZ compressors.

Refrigerant	Type	Compressor type	Lubricant type	Danfoss lubricant	Application
R-22	HCFC	MT	Mineral	White oil, **160P**	Medium / High temperature
R-407C	HFC	MTZ	Polyolester	Polyolester oil **160PZ**	Medium / High temperature
R-134a	HFC	MTZ	Polyolester	Polyolester oil **160PZ**	Medium / High temperature
R-404A	HFC	MTZ	Polyolester	Polyolester oil **160PZ**	Medium temperature
R-507A	HFC	MTZ	Polyolester	Polyolester oil **160PZ**	Medium temperature
Transitional refrigerants, R-22 based		MT	Alkylbenzene (ABM)	Alkylbenzene oil **160 ABM** **Note:** Initial mineral oil charge has to be replaced by 160 ABM oil.	Medium / High temperature
Hydrocarbons		Danfoss does not authorise the use of hydrocarbons in Maneurop® MT/MTZ compressors			

The Montreal protocol states that CFC refrigerants such as R-12 and R-502 may no longer be applied in new installations in the signatory members countries.
Therefore capacity and other data for these refrigerants are not published in this document. Maneurop® MT compressors, however, are suitable for use with these refrigerants and can still be used as replacements in existing installations.

R-22

R-22 is an HCFC refrigerant and is still a wide use today. It has a low ODP (Ozone Depletion Potential) and therefore it will be phased out in the future. Check local legislation. Always use mineral white oil 160P with R-22.

The Maneurop® MT compressor is dedicated for R-22 and is supplied with an initial mineral oil charge.

R-407C

Refrigerant R-407C is an HFC refrigerant with thermodynamic properties similar to those of R-22.
R-407C has zero ozone depletion potential (ODP=0). Many installers and OEMs consider R-407C to be the standard alternative for R-22. R-407C is a zeotropic mixture and has a temperature glide of about 11 K. For more specific information about zeotropic refrigerants; refer to section "Zeotropic refrigerant mixtures". R-407C must be charged in the liquid phase.

Always use Danfoss 160PZ polyolester oil with Maneurop® MTZ compressors which is supplied with the MTZ compressor for R-407C applications.
Maneurop® MT compressors should never be used with R-407C, even when the mineral oil is replaced with polyolester oil.

REFRIGERANTS AND LUBRICANTS

R-134a

Refrigerant R-134a is an HFC refrigerant with thermodynamic properties comparable to those of the CFC refrigerant R-12. R-134a has zero ozone depletion potential (ODP=0) and is commonly accepted as the best R-12 alternative. For applications with high evaporating and high condensing temperatures, R-134a is the ideal choice. R-134a is a pure refrigerant and has no temperature glide. For R-134a applications always use the Maneurop® MTZ compressor. Use Danfoss 160PZ polyolester oil, which is supplied with the MTZ compressor.
Maneurop® MT compressors should never be used for R-134a, even when the mineral oil is replaced by polyolester oil.

R-404A

Refrigerant R-404A is an HFC refrigerant with thermodynamic properties comparable to those of the CFC refrigerant R-502. R-404A has zero ozone depletion potential (ODP = 0) and is commonly accepted as one of the best R-502 alternatives. R-404A is especially suitable for low evaporating temperature applications but it can also be used with medium evaporating temperature applications. R-404A is a mixture with a very small temperature glide, therefore must be charged in its liquid phase, but for most other aspects this small glide can be ignored. Because of the small glide, R-404A is often called a near-azeotropic mixture. For more information refer to section "Zeotropic refrigerant mixtures". For low evaporating temperature applications down to -49°F, Maneurop® NTZ compressors should be used. Refer to the NTZ selection and application guidelines. For medium temperature R-404A applications, always use the Maneurop® MTZ compressor with 160PZ polyolester oil, which is supplied with the MTZ compressor.
Maneurop® MT compressors should never be used with R-404A, even if the mineral oil replaced by polyolester oil.

R-507A

Refrigerant R-507A is an HFC refrigerant with thermodynamic properties comparable to those of the CFC refrigerant R-502 and virtually equal to those of R-404A. R-507A has no ozone depletion potential (ODP = 0) and is commonly accepted as one of the best R-502 alternatives. As with R-404A, R-507A is particularly suitable for low evaporating temperatures but it can also be used in medium evaporating temperature applications. R-507A is an azeotropic mixture with no temperature glide. For low evaporating temperature applications down to -49°F, Maneurop® NTZ compressors should be used. Refer to the NTZ selection and application guidelines. For medium temperature R-507A applications, always use the Maneurop® MTZ compressor and Maneurop® 160PZ polyolester oil which is supplied with the MTZ compressor.
Maneurop® MT compressors should never be used for R-507A, even with the mineral oil replaced by polyolester oil.

R-22 based transitional refrigerants

A wide variety of R-22 - based transitional refrigerants exist (also called service refrigerants or drop-in blends). These were developed as temporary R-12 or R-502 alternatives. Some examples are R401A, R401B, R409A and R409B as R-12 alternatives and R402A, R402B, R403A and R403B as R-502 alternatives. Because of the R-22 component, they all have a (low) ozone depletion potential. Maneurop® MT compressors can be applied with these transitional refrigerants. In such applications, the initial mineral oil charge must be replaced by Maneurop®160 ABM alkylbenzene oil.

Hydrocarbons

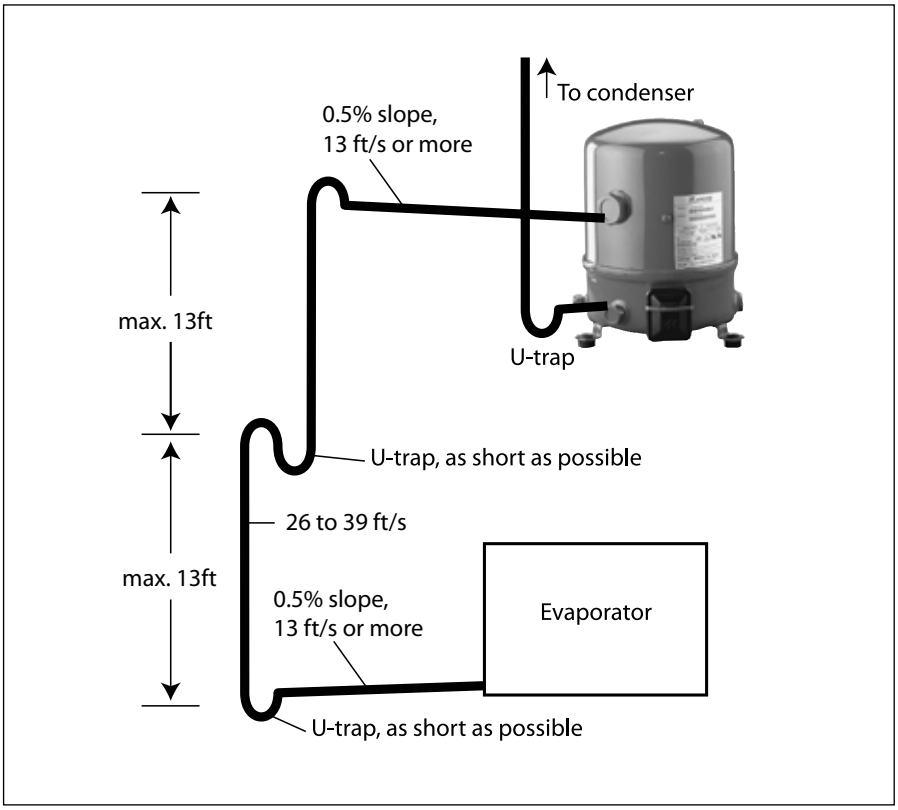
Hydrocarbons such as propane, isobutane, etc. are extremely flammable. Danfoss does not approve the use of hydrocarbons with Maneurop® MT or MTZ compressors in any way, even with a reduced refrigerant charge.

Piping design

Oil in a refrigeration circuit is required to lubricate moving parts in the compressor. During normal system operation small quantities of oil will continually leave the compressor, with the discharge gas. With good system piping design this oil will return to the compressor. As long as the amount of oil circulating through the system is small it will contribute to good system operation and improved heat transfer efficiency. Excess oil in the system, however, will have a negative effect on condenser and evaporator efficiency. If, in a poorly designed system, the amount of oil returning to the compressor is lower than the amount of oil leaving the compressor, the compressor will become starved of oil and the condenser, evaporator and/or refrigerant lines will become filled with oil. In such situations, additional oil charge will only correct the compressor oil level for a limited period of time and increase the amount of surplus oil in the rest of the system.
Only correct piping design can ensure a good oil balance in the system.

Suction lines

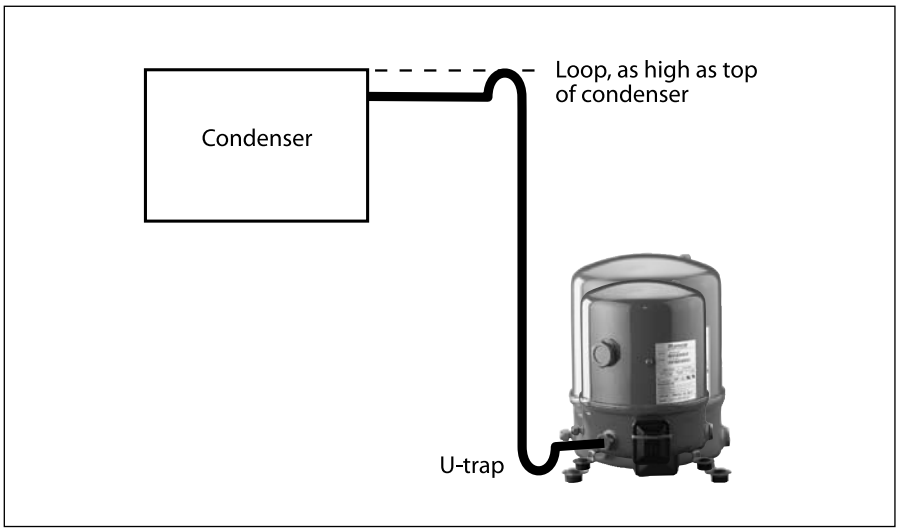
Horizontal suction line sections shall have a slope of 0.5% in the direction of refrigerant flow (5/8" for every 10' of pipe). The cross-section of horizontal suction lines shall be such that the resulting gas velocity is at least 13 fps. In vertical risers, a gas velocity of 26 to 40 fps is required to ensure proper oil return. A U-trap is required at the foot of each vertical riser. If the riser is higher than 13 ft, additional U-traps are required for each additional 13 ft. The length of each U-trap must be as short as possible to avoid the accumulation of excessive quantities of oil (see figure below).
For compressors mounted in parallel, the common suction riser should be designed as a double riser. Also refer to the News bulletin "Mounting instructions for installation of Maneurop® compressors in parallel" and "Parallel application guidelines".
Gas velocities higher than 40 fps will not contribute significantly to better oil return. They will, however, cause higher noise levels and result in higher suction line pressure drops which will have a negative effect on system capacity.



The suction rotolock valves that can be ordered from Danfoss as accessories are designed for average pipe sizes, and selected for systems running at nominal conditions.
The pipe sizes selected for specific systems may differ from these recommended sizes.
It is recommended that the suction lines be insulated to limit suction gas superheat.

Discharge line

When the condenser is mounted above the compressor, a loop above the condenser and a U-trap close to the compressor are required to prevent liquid draining from the condenser into the discharge line during standstill.



Oil charge and oil separator

In most installations the initial compressor oil charge will be sufficient. In installations with line runs exceeding 20 m, or with many oil traps, or an oil separator, additional oil may be required. In installations with risk of slow oil return, such as in multiple evaporator or multiple condenser installations, an oil separator is recommended. Also refer to page 29.

Filter driers

For new installations with MTZ compressors, Danfoss recommends using the Danfoss DML 100%-molecular sieve solid core filter drier. Molecular sieve filter driers with loose beads from third party suppliers should be avoided.

For servicing of existing installations where acid formation is present, Danfoss DCL solid core filter driers containing activated alumina are recommended.

The drier should be oversized rather than undersized. When selecting a drier, always take into account its capacity (water content capacity), the system refrigerating capacity and the system refrigerant charge.

Operating limits

High Pressure

A high pressure safety switch is required to stop the compressor should the discharge pressure exceed the values shown in the table below. The high pressure switch can be set to lower values depending on the application and ambient conditions. The HP switch must either be in a lockout circuit, or be a manual reset device to prevent compressor cycling around the high pressure limit. When a discharge valve is used, the HP switch must be connected to the service valve gauge port, which cannot be isolated.

SYSTEM DESIGN RECOMMENDATIONS

Low pressure

A low pressure safety switch is recommended to avoid compressor operation at too lower suction pressures.

		MT R-22	MTZ R-407C	MTZ R-134a	MTZ R-404A / R-507A
Test pressure low side	psig	360	360	360	360
Working pressure range high side	psig	158 - 402	181 - 426	115 - 328	191 - 402
Working pressure range low side	psig	15 - 102	20 - 96	9 - 68	15 - 104
Relief valve opening pressure difference	psig	435	435	435	435
Relief valve closing pressure difference	psig	115	115	115	115

Low ambient temperature operation

At low ambient temperatures, the condensing temperature and condensing pressure in air cooled condensers will decrease. These lower pressures may be insufficient to supply enough liquid refrigerant to the evaporator. As a result, the evaporator temperature will sharply decrease with risk of frosting. At compressor start-up, the compressor can pull a deep vacuum and it can be cut off by low pressure protection. Depending on the low pressure switch setting and delay timer, short cycling can occur. To avoid these problems, several solutions are possible, all based on reducing condenser capacity:

- Locating condensor indoors
- Liquid flooding of condensers (note: this solution requires extra refrigerant charge, which can introduce other problems. A non-return valve in the discharge line is required and special care should be taken when designing the discharge line.)
- Reduce air flow to condensers.

Other problems can occur when the compressor is operating at low ambient temperature. For example, during shut down periods, liquid refrigerant can migrate to a cold compressor. For such conditions a belt-type crankcase heater is strongly recommended.

Because Maneurop compressor motors are 100% suction gas cooled, they can be externally insulated.

Refer to section "Liquid refrigerant migration & charge limits" for more details.

Operating voltage and cycle rate

Operating voltage range

Operating voltage limits are shown in the table on page 4. The voltage applied to the motor terminals must always be within these limits. The maximum allowable voltage unbalance for 3-phase compressors is 2%. Voltage unbalance causes high current draw on one or more phases, which in turn leads to overheating and possible motor damage.

Voltage unbalance is given by the formula:

$$\% \text{ voltage unbalance: } \frac{|V_{avg} - V_{1\text{-}2}| + |V_{avg} - V_{1\text{-}3}| + |V_{avg} - V_{2\text{-}3}|}{2 \times V_{avg}} \times 100$$

V_{avg} = Mean voltage of phases 1, 2 and 3
$V_{1\text{-}2}$ = Voltage between phases 1 and 2
$V_{1\text{-}3}$ = Voltage between phases 1 and 3
$V_{2\text{-}3}$ = Voltage between phases 2 and 3.

Cycle rate limit

There may be no more than 12 starts per hour (6 when a soft start accessory is used). A higher number reduces the service life of the motor-compressor unit. If necessary, use an anti-short-cycle timer in the control circuit.

A time-out of six minutes is recommended. The system must be designed in such a way to guarantee a minimum compressor run time in order to provide proper oil return and sufficient motor cooling after starting.

Note that the oil return rate varies as a function of the system design.

Liquid refrigerant control and charge limits

Refrigeration compressors are basically designed as gas compressors. Depending on the compressor design and operating conditions, most compressors can also handle a limited amount of liquid refrigerant. Maneurop® MT and MTZ compressors have a large internal volume and can therefore handle relatively large amounts of liquid refrigerant without major problems. However even when a compressor can handle liquid refrigerant, it is not favorable to a long service life. Liquid refrigerant can dilute the oil, wash oil out of bearings and result in high oil carry over, resulting in loss of oil from the sump. Good system design can limit the amount of liquid refrigerant in the compressor, and have a positive effect on the compressor service life.
Liquid refrigerant can enter a compressor in different ways, with different effects on the compressor.

Off-cycle migration

During system standstill and after pressure equalization, refrigerant will condense in the coldest part of the system. The compressor can easily be the coldest spot, for example when it is placed outside in low ambient temperatures. After a while, the full system refrigerant charge can condense in the compressor crankcase. A large amount will dissolve in the compressor oil until the oil is completely saturated with refrigerant. If other system components are located at a higher level, this process can be even faster because gravity will speed the flow of liquid refrigerant to flow back to the compressor. When the compressor is started, the pressure in the crankcase decreases rapidly.
At lower pressures the oil holds less refrigerant, and as a result part of the refrigerant will violently evaporate from the oil, causing the oil to foam. This process is often called "boiling".
The negative effects on the compressor from migration are:

- oil dilution by liquid refrigerant
- oil foam, transported by refrigerant gas and discharged into the system, causing loss of oil and in extreme situations risk of oil slugging
- in extreme situations with high system refrigerant charge, liquid slugging could occur (liquid entering the compressor cylinders).

Liquid floodback during operation

During normal and stable system operation, refrigerant will leave the evaporator in a superheated condition and enter the compressor as a superheated vapor.
Normal superheat values at compressor suction are 9°F to 54°F. The refrigerant leaving the evaporator, however, can contain an amount of liquid refrigerant for various reasons:

- wrong dimensioning, wrong setting or malfunction of expansion device
- evaporator fan failure or blocked air filters.

In these situations, liquid refrigerant will continuously enter the compressor.
The negative effects from continuous liquid floodback are:

- permanent oil dilution
- in extreme situations with high system refrigerant charge and large amounts of floodback, liquid slugging could occur.

Liquid floodback at changeover cycles in reversible heat pumps

In heat pumps, changeover from cooling to heating cycles, defrost, and low load short cycles may lead to liquid refrigerant floodback or saturated refrigerant return conditions.
The negative effects are:

- oil dilution
- in extreme situations with high system refrigerant charge and large amounts of floodback, liquid slugging could occur.

Liquid floodback and zeotropic refrigerants

Liquid floodback in systems working with a zeotropic refrigerant such as R-407C introduces additional negative effects. A part of the refrigerant leaves the evaporator in liquid phase and this liquid has a different composition than the vapor.
This new refrigerant composition may result in different compressor operating pressures and temperatures.

SYSTEM DESIGN RECOMMENDATIONS

Crankcase heater

A crankcase heater protects against the off-cycle migration of refrigerant and proves effective if oil temperature is maintained 18°F above the saturated LP temperature of the refrigerant. Tests must be conducted, therefore, to ensure that the appropriate oil temperature is maintained under all ambient conditions. A PTC crankcase heater is recommended on all stand-alone compressors and split systems. PTC crankcase heaters are self-regulating.
Under extreme conditions such as very low ambient temperature a belt type crankcase heater could be used in addition to the PTC heater, although this is not a preferred solution for 1 and 2 cylinder compressors. The belt crankcase heater must be positioned on the compressor shell as close as possible to the oil sump to ensure good heat transfer to the oil.
Belt crankcase heaters are not self-regulating. Control must be applied to energize the belt heater once the compressor has been stopped and then to de-energize it while the compressor is running. The belt heater must be energized 12 hours before restarting the compressor following an extended down period.
If the crankcase heater is not able to maintain the oil temperature 18°F above the saturated LP temperature of the refrigerant during off cycles or if repeated floodback is occuring, a pumpdown cycle using an LLSV is required. In such cases, a suction accumulator is recommended.

Liquid line solenoid valve & pump-down

In refrigeration applications, a Liquid Line Solenoid Valve (LLSV) is highly recommended. During the off-cycle, the LLSV isolates the liquid charge in the condenser side, thus preventing refrigerant transfer or excessive migration of refrigerant into the compressor. Furthermore, when using an LLSV in with a pumpdown cycle, the quantity of refrigerant in the low-pressure side of the system will be reduced.
A pump-down cycle design is also required when evaporators are fitted with electric defrost heaters.

Suction accumulator

A suction accumulator offers considerable protection against refrigerant floodback at start-up, during operation or after the defrost operation. This device also helps to protect against off-cycle migration by means of providing additional internal free volume to the low pressure side of the system.
The suction accumulator must be selected in accordance with the accumulator manufacturer's recommendations. As a general rule, Danfoss recommends sizing the accumulator for at least 50% of the total system charge. Tests, however, must be conducted to determine the optimal size.
A suction accumulator must not be used in systems with zeotropic refrigerant mixtures.

Sound

Running compressors cause sound and vibration. These phenomena are closely related.
Sound produced by a compressor is transmitted in every direction in all media: ambient air, the mounting feet, the pipework and the refrigerant in the pipework.
The easiest way to reduce the sound transmitted in ambient air is to fit a Danfoss acoustic hood accessory. Because Maneurop® compressors are 100% suction gas cooled, and require no body cooling, they can be insulated. Values for the sound reduction achieved with acoustic hoods are shown also in the table below. For compressors mounted inside, sound insulation of the plantrom is an alternative to sound insulation of the compressor.
Sound transmitted by mounting feet, pipework and refrigerant should be reduced in the same way as vibration.
Please refer to the next section.

Sound power level for MTZ with R-404A, motor code 4
Te = 14°F,
TC = 113°F

	Sound power level at 50 Hz dB(A)		Sound power level at 60 Hz dB(A)	
	without hood	with hood*	without hood	with hood*
MTZ018	73	65	73	66
MTZ022	74	68	77	71
MTZ028	71	64	73	66
MTZ032	71	64	73	66
MTZ036	70	64	76	69
MTZ040	70	65	72	67
MTZ044	80	74	82	76
MTZ045	80	74	82	76
MTZ050	83	76	84	78
MTZ051	83	76	84	78
MTZ056	81	74	81	74
MTZ057	81	74	81	74
MTZ064	80	74	84	78
MTZ065	80	74	84	78
MTZ072	79	72	82	75
MTZ073	79	72	82	75
MTZ080	79	73	84	78
MTZ081	79	73	84	78
MTZ100	85	79	87	81
MTZ125	84	78	86	80
MTZ144	83	77	86	80
MTZ160	83	77	86	80

* Sound data with hood are valid for the Danfoss acoustic hood accessory.

Model	Acoustic hood accessory	code no.
MT/MTZ018 - 040	Acoustic hood for 1 cyl compressors	**7755001**
MT/MTZ044 - 081	Acoustic hood for 2 cyl compressors	**7755002**
MT/MTZ100 - 160	Acoustic hood for 4 cyl compressors	**7755003**

Vibration

The mounting grommets delivered with the compressor should always be used. They reduce vibration transmitted by the compressor mounting feet to the base frame.
The base on which the compressor is mounted should be sufficiently rigid and of adequate mass to ensure the full effectiveness of the mounting grommets.
The compressor should never be directly mounted to the base frame without the grommets. If it is, significant high vibration transmission will occur and the compressor service life will be reduced.
Suction and discharge lines must have adequate flexibility in 3 planes. Vibration absorbers may be required.
Care must be taken to avoid tubing having frequencies resonant close to the compressor frequency.
Vibration is also transmitted by the refrigerant gas. Maneurop® compressors have built in mufflers to reduce this vibration.
To further reduce vibration an additional muffler can be installed.

Note: Maneurop® MT & MTZ compressors have been designed and qualified for stationary equipment used in A/C and refrigeration applications.
Danfoss does not warrant these compressors for use in mobile applications, such as trucks, railways, subways, etc.

System cleanliness

System contamination is one of the main factors affecting equipment reliability and compressor service life.
It is, therefore, important to ensure system cleanliness when constructing a refrigeration system. During the building process, system contamination can be caused by:

- Brazing and welding oxides
- Filings and particles from removing burrs from pipe-work
- Brazing flux
- Moisture and air.

Only use clean and dehydrated refrigeration grade copper tubes and silver alloy brazing material. Clean all parts before brazing and always purge nitrogen or CO_2 through the pipes during brazing to prevent oxidation. If flux is used, take every precaution to prevent it entering the piping. Do not drill holes (e.g. for Schräder valves).
in parts of the installation that are already completed, when filings and burrs can not be removed. Carefully follow the instructions below regarding brazing, mounting, leak detection, pressure test and moisture removal. All installation and service work must be done only by qualified personnel using correct procedures and using tools (charging systems, tubes, vacuum pump, etc.) dedicated for the refrigerant that will be used.

Compressor handling, mounting and connection to the system

Compressor handling

Maneurop® MT and MTZ compressors are provided with a lifting lug. This lug should always be used to lift the compressor. Once the compressor is installed, the compressor lifting lug should never be used to lift the complete installation.
Keep the compressor in an upright position during handling.

Compressor mounting

Mount the compressor on a horizontal plane with a maximum slope of 3°. All MT and MTZ compressors are supplied with three or four rubber mounting grommets, each complete with metal sleeves, nuts, and bolts. Refer to the outline drawings on page 18 to 21.

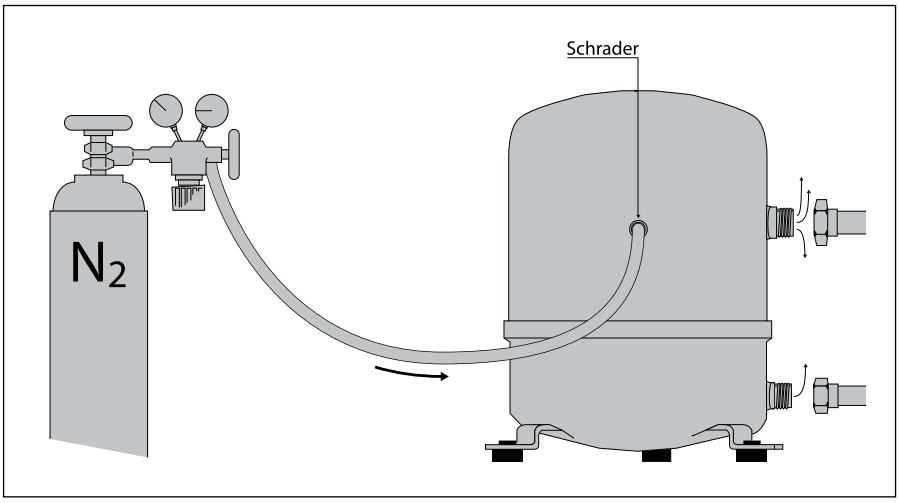
The grommets largely attenuate compressor vibration transmitted to the base frame. The compressor must always be mounted with these grommets. Refer to the table below for torque values.

Designation		Recommended torque in. lb
Cable screw of T connector in electrical box	screw 10/32 - UNF x 3	17
Rotolock valves and solder sleeves	1"	59
	1"1/4	66
	1"3/4	81
Mounting grommet bolts	1 - 2 - 4 cylinder	11
Oil sight glass	-	37
Oil equalization connection	1 - 2 - 4 cylinder	22

Compressor connection to the system

New compressors have a protective nitrogen holding charge. The suction and discharge caps should only be removed just before connecting the compressor to the installation to avoid air and moisture entering the compressor.
Whenever possible the compressor must be the last component to be integrated in the system. It is advisable to braze the solder sleeves or service valves to the pipework before the compressor is mounted. When all brazing is finished and when the entire

system is ready, the compressor caps can be removed and the compressor connected to the system with a minimum exposure to ambient air.
If this procedure is not possible, the sleeves or valves may be brazed to the pipes when mounted on the compressor.
In this situation nitrogen or CO_2 must be purged through the compressor via the Schräder valve to prevent air and moisture ingress. Purging must start when the caps are removed and continue during the brazing process.
When rotolock valves are used on the compressor, they must be closed immediately after mounting, thus keeping the compressor isolated from the atmosphere or from a system not yet dehydrated.
Note: When the compressor is built into a "rack" or "pack" configuration that is not installed immediately in its final location, a vacuum pull-down and moisture removal must be performed to the rack as if it were a complete system (see below). The rack must be charged with nitrogen or CO_2 and open tubes must be blocked with caps or plugs.



System pressure test

It is recommended that an inert gas or nitrogen be used for pressure testing. Dry air may also be used but care should be taken since it can form a flammable mixture with the compressor oil. When performing a system pressure test, the maximum allowed pressure for the different components should not be exceeded.
For MT/MTZ compressors the maximum test pressures are shown in the table below.

	1-2-4 cylinder compressors
Maximum compressor test pressure, low side	362 psi(g)
Maximum compressor test pressure, high side	435 psi(g)

Do not exceed 435 psig pressure differential between high pressure side and low pressure side of the compressor because this will open the internal compressor relief valve.

Leak detection

Whenever possible (if valves are present) the compressor must be kept isolated from the system. Perform leak detection using the final refrigerant. Pressurize with nitrogen or another system-neutral gas and use a leak detector for the applied refrigerant. A helium leak detector can also be used.
Leaks must be repaired respecting the instructions written above. Use of other gasses such as oxygen, dry air, or acetylene is not recommended, as these gasses can form a

flammable mixture. Never use CFC or HCFC refrigerants for leak detection in HFC systems.
Note 1: Leak detection with refrigerant may not be allowed in some countries. Check local regulations.

Note 2: Leak detecting additives shall not be used as they may affect the lubricant properties.
Warranty may be voided if leak detecting additives have been used.

Vacuum pull-down moisture removal

Moisture interferes with proper functioning of compressors and refrigeration systems.
Air and moisture reduce service life, increase condensing pressure, and cause excessively high discharge temperatures, that can destroy the lubricating properties of the oil. Air and moisture also increase the risk of acid formation, giving rise to copper plating. All these phenomena can cause mechanical and electrical compressor failure.
To eliminate these factors, a vacuum pull-down according to the procedure given below is recommended.

1. Whenever possible (if valves are present) the compressor must be kept isolated from the system.

2. After leak detection, the system must be pulled down under a vacuum of 500 microns. A two stage vacuum pump must be used, with a capacity appropriate to the system volume. Use connection lines with a large diameter and connect them to the service valves and (not to the Schräder connection) to avoid too high pressure losses.

3. When a vacuum level of 500 microns is reached, the system must be isolated from the vacuum pump. Wait 30 minutes, during which the system pressure should not rise. When the pressure rapidly increases, the system is not leak tight. Leak detection must be repeated and the vacuum pull-down procedure should be restarted from step 1. When the pressure slowly increases, this indicates the presence of moisture. In this case steps 2 and 3 should be repeated.

4. Connect the compressor to the system by opening the valves. Repeat steps 2 and 3.

5. Break the vacuum with nitrogen or the final refrigerant.

6. Repeat steps 2 and 3 on the total system.
At commissioning, system moisture content may be up to 100 ppm. During operation the filter drier must reduce this to a level < 20 ppm.
Warning :
Do not use a megohmmeter or apply power to the compressor while it is under vacuum, as this may cause motor winding damage.
Never run the compressor under vacuum as it may cause compressor motor burn-out.

Start-up

Before initial start-up, or after a prolonged shut down period, energize the crankcase heater (if fitted) 12 hours prior to start-up, or turn on power for single phase compressors with trickle circuit.

Refrigerant charging

Zeotropic and "near-azeotropic" refrigerant mixtures such as R-407C and R-404A must always be charged in the liquid phase. For the initial charge, the compressor must not run and service valves must be closed. Charge refrigerant as close as possible to the nominal system charge before starting the compressor. Then slowly add refrigerant in the liquid phase, on the low pressure side as far away as possible from the running compressor.
The refrigerant charge quantity must be suitable for both winter and summer operation. Refer also to section "Protection against flooded starts and liquid floodback" for information about refrigerant charge limits.
Warning: when a liquid line solenoid valve is used, the vacuum in the low pressure side must be broken before applying power to the system.

Oil charge and oil level

The oil charge must be checked before commissioning (1/4 to 3/4 of the oil sight glass). Check the oil level again after a minimum of 2 hours operation at nominal conditions. In most installations the initial compressor oil charge will be sufficient. In installations with line runs exceeding 20 m or with many oil traps or an oil separator, additional oil may be required. Normally the quantity of oil added should be no more than 2% of the total refrigerant charge (this percentage does not take into account oil contained in accessories such as oil separators or oil traps). If oil has already been added, and the oil level in the compressor keeps decreasing, the oil return in the installation is insufficient. Refer also to section "Piping design".
In installations where slow oil return is likely such as in multiple evaporator or multiple condenser installations, an oil separator is recommended. Refer to the table on page 17 to select the correct oil.

Suction gas superheat

Optimum suction gas superheat is 15°F. A lower superheat will contribute to better system performance (higher mass flow and more efficient use of evaporator surface). Low superheat values however increase the risk of unwanted liquid floodback to the compressor.
For very low superheat values an electronically controlled expansion valve is recommended.
Maximum allowable superheat is about 54°F. Higher values can be accepted but in these cases, tests have to be performed to check that the maximum discharge temperature of 265°F will not be exceeded. Note that high superheat values decrease the compressor application envelope and system performance.

ACCESSORIES AND SPAREPARTS

The tables below show an extract of the available accessories and spare parts for Maneurop® reciprocating compressors. For an exhaustive list please refer to Accessories & Spare parts catalogue, ref. FRCC.EK.002.A1.02

Rotolock accessories

Type	Code no.	Description	Application	Packaging	Pack size
V06-V01	**7703004**	Valve set, V06 (1"~1/2"), V01 (1"~3/8")	MT/MTZ018-028 (exept 028 code 1)	Multipack	4
V09-V06	**7703005**	Valve set, V09 (1-1/4"~5/8"), V06 (1"~1/2")	MT/MTZ032-040 (& 028 code 1)	Multipack	4
V07-V04	**7703006**	Valve set, V07 (1-3/4"~7/8"), V04 (1-1/4"~3/4")	MT/MTZ044-072	Multipack	6
V02-V04	**7703009**	Valve set, V02 (1-3/4"~1-1/8"), V04 (1-1/4"~3/4")	MT/MTZ080-160	Multipack	6
C06-C01	**7703011**	Angle adapter set, C06 (1"~1/2"), C01 (1"~3/8")	MT/MTZ018-028 (exept 028 code 1)	Multipack	4
C09-C06	**7703012**	Angle adapter set, C09 (1-1/4"~5/8"), C06 (1"~1/2")	MT/MTZ032-040 (& 028 code 1)	Multipack	4
C07-C04	**7703013**	Angle adapter set, C07 (1-3/4"~7/8"), C04 (1-1/4"~3/4")	MT/MTZ044-072	Multipack	6
C02-C04	**7703014**	Angle adapter set, C02 (1-3/4"~1-1/8"), C04 (1-1/4"~3/4")	MT/MTZ080-160	Multipack	6
G01	**8156130**	Gasket, 1"	Models with 1" rotolock connection	Multipack	10
G01	**7956001**	Gasket, 1"	Models with 1" rotolock connection	Industry pack	50
G09	**8156131**	Gasket, 1-1/4"	Models with 1-1/4" rotolock connection	Multipack	10
G09	**7956002**	Gasket, 1-1/4"	Models with 1-1/4" rotolock connection	Industry pack	50
G07	**8156132**	Gasket, 1-3/4"	Models with 1-3/4" rotolock connection	Multipack	10
G07	**7956003**	Gasket, 1-3/4"	Models with 1-3/4" rotolock connection	Industry pack	50
	8156009	Gasket set, 1", 1-1/4", 1-3/4", Oil sight glass gaskets black & white	All 1-2-4 cylinder models	Multipack	10

Crankcase heaters

Type	Code no.	Description	Application	Packaging	Pack size
PTC35W	**7773001**	PTC crankcase heater, 35 W, incl. heat transfer paste	All models	Multipack	10
PTC35W	**7973009**	PTC crankcase heater, 35 W, incl. heat transfer paste	All models	Industry pack	50
PTC35W	**7773125**	PTC crankcase heater, 35 W, mounting without paste	All models	Multipack	10
PTC35W	**7973011**	PTC crankcase heater, 35 W, mounting without paste	All models	Industry pack	50
	7773106	Belt type crankcase heater, 55 W, 230 V, CE mark, UL	MT/MTZ018-040	Multipack	4
	7773002	Belt type crankcase heater, 54 W, 240 V, UL	MT/MTZ018-040	Multipack	4
	7773013	Belt type crankcase heater, 54 W, 400 V, UL	MT/MTZ018-040	Multipack	4
	7773111	Belt type crankcase heater, 54 W, 460 V, UL	MT/MTZ018-040	Multipack	4
	7773109	Belt type crankcase heater, 65 W, 110 V, CE mark, UL	MT/MTZ044-081	Multipack	6
	7973001	Belt type crankcase heater, 65 W, 110 V, CE mark, UL	MT/MTZ044-081	Industry pack	50
	7773107	Belt type crankcase heater, 65 W, 230 V, CE mark, UL	MT/MTZ044-081	Multipack	6
	7973002	Belt type crankcase heater, 65 W, 230 V, CE mark, UL	MT/MTZ044-081	Industry pack	50
	7773117	Belt type crankcase heater, 65 W, 400 V, CE mark, UL	MT/MTZ044-081	Multipack	6
	7773010	Belt type crankcase heater, 50 W, 110 V, UL	MT/MTZ044-081	Multipack	6
	7773003	Belt type crankcase heater, 50 W, 240 V, UL	MT/MTZ044-081	Multipack	6
	7773009	Belt type crankcase heater, 50 W, 400 V, UL	MT/MTZ044-081	Multipack	6
	7773006	Belt type crankcase heater, 50 W, 460 V, UL	MT/MTZ044-081	Multipack	6
	7773119	Belt type crankcase heater, 75 W, 575 V, UL	MT/MTZ044-081	Multipack	6
	7773110	Belt type crankcase heater, 75 W, 110 V, CE mark, UL	MT/MTZ100-160	Multipack	6
	7773108	Belt type crankcase heater, 75 W, 230 V, CE mark, UL	MT/MTZ100-160	Multipack	6
	7973005	Belt type crankcase heater, 75 W, 230 V, CE mark, UL	MT/MTZ100-160	Industry pack	50
	7773118	Belt type crankcase heater, 75 W, 400 V, CE mark, UL	MT/MTZ100-160	Multipack	6
	7773004	Belt type crankcase heater, 75 W, 240 V, UL	MT/MTZ100-160	Multipack	6
	7773014	Belt type crankcase heater, 75 W, 400 V, UL	MT/MTZ100-160	Multipack	6
	7773008	Belt type crankcase heater, 75 W, 460 V, UL	MT/MTZ100-160	Multipack	6
	7773105	Belt type crankcase heater, 75 W, 575 V, UL	MT/MTZ100-160	Multipack	6

Acoustic hoods

Type	Code no.	Description	Application	Packaging	Pack size
	7755001	Acoustic hood for 1 cylinder compressor	MT/MTZ018-040	Single pack	1
	7755002	Acoustic hood for 2 cylinder compressor	MT/MTZ044-081	Single pack	1
	7755003	Acoustic hood for 4 cylinder compressor	MT/MTZ100-160	Single pack	1

ACCESSORIES AND SPAREPARTS

3-phase soft start equipment

Type	Code no.	Description	Application	Packaging	Pack size
SCR01	**7702003**	Soft start kit with statoric resistors, prewired box, SCR01	MT/MTZ044-081	Single pack	1
SCR03	**7705001**	Soft start kit with statoric resistors, prewired box, SCR03	MT/MTZ100-160	Single pack	1
MCI 15 C	**7705006**	Electronic soft start kit, MCI 15C	MT/MTZ018-081	Single pack	1
MCI 25 C	**7705007**	Electronic soft start kit, MCI 25C	MT/MTZ100-160	Single pack	1

Single phase PSC starting kits

Type	Code no.	Description	Application	Packaging	Pack size
PSC	**7701026**	PSC starting kit, 20 µF, 10 µF	MT/MTZ018-028 code 5	Multipack	4
PSC	**7701024**	PSC starting kit, 25 µF, 10 µF	MT/MTZ032-036 code 5	Multipack	4
PSC	**7701025**	PSC starting kit, 15 µF, 10 µF	MT/MTZ018 code 1	Multipack	4
PSC	**7701035**	PSC starting kit, 30 µF, 15 µF	MT/MTZ022 & 044-050 code 1 & 050-5	Multipack	4
PSC	**7701151**	PSC starting kit, 25 µF, 25 µF	MT/MTZ028 code 1	Multipack	4
PSC	**7701152**	PSC starting kit, 25 µF, 20 µF	MT/MTZ032-036 code 1	Multipack	4
PSC	**7701153**	PSC starting kit, 35 µF, 20 µF	MT/MTZ040 code 1	Multipack	4
PSC	**7701036**	PSC starting kit, 30 µF, 20 µF	MT/MTZ056 code 1	Multipack	6
PSC	**7701037**	PSC starting kit, 30 µF, 25 µF	MT/MTZ064 code 1	Multipack	6

Single phase CSR starting kits & starting kits in prewired box

Type	Code no.	Description	Application	Packaging	Pack size
CSR	**7701022**	CSR starting kit, 20 µF, 10 µF, 98 µF	MT/MTZ018-028 code 5	Multipack	4
CSR	**7701030**	CSR starting kit, 25 µF, 10 µF, 98 µF	MT/MTZ032-036 code 5	Multipack	4
CSR	**7701021**	CSR starting kit, 15 µF, 10 µF, 98 µF	MT/MTZ018 code 1	Multipack	4
CSR	**7701038**	CSR starting kit, 15 µF, 30 µF, 98 µF	MT/MTZ022 code 1	Multipack	4
CSR	**7701154**	CSR starting kit, 25 µF, 25 µF, 140 µF	MT/MTZ028 code 1	Multipack	4
CSR	**7701155**	CSR starting kit, 25 µF, 20 µF, 98 µF	MT/MTZ032-036 code 1	Multipack	4
CSR	**7701156**	CSR starting kit, 35 µF, 20 µF, 98 µF	MT/MTZ040 code 1	Multipack	4
CSR	**7701042**	CSR starting kit, 30 µF, 15 µF, 140 µF	MT/MTZ044-051 code 1	Multipack	6
CSR	**7701043**	CSR starting kit, 30 µF, 20 µF, 98 µF + 98 µF	MT/MTZ056 code 1	Multipack	6
CSR	**7701044**	CSR starting kit, 30 µF, 25 µF, 98 µF + 140 µF	MT/MTZ064 code 1	Multipack	6
CSR	**7701028**	CSR starting kit, prewired box, 20 µF, 10 µF, 98 µF	MT/MTZ018-028 code 5	Single pack	1
CSR	**7701054**	CSR starting kit, prewired box, 25 µF, 10 µF, 98 µF	MT/MTZ032-036 code 5	Single pack	1
CSR	**7701147**	CSR starting kit, prewired box, 15 µF, 30 µF, 98 µF	MT/MTZ022 code 1	Single pack	1
CSR	**7701148**	CSR starting kit, prewired box, 25 µF, 25 µF, 140 µF	MT/MTZ028 code 1	Single pack	1
CSR	**7701149**	CSR starting kit, prewired box, 25 µF, 20 µF, 98 µF	MT/MTZ032-036 code 1	Single pack	1
CSR	**7701150**	CSR starting kit, prewired box, 35 µF, 20 µF, 98 µF	MT/MTZ040 code 1	Single pack	1
CSR	**7701049**	CSR starting kit, prewired box, 30 µF, 15 µF, 140 µF	MT/MTZ044-050 code 1	Single pack	1

Kickstart kits

Type	Code no.	Description	Application	Packaging	Pack size
	7701060	Kickstart kit; relay + start capacitor 227 µF	MT/MTZ018 code 1 & 5	Single pack	1
	7701059	Kickstart kit; relay + start capacitor 280 µF	MT/MTZ022-064 code 1 & 5 excl 050-5	Single pack	1

Lubricants

Type	Code no.	Description	Application	Packaging	Pack size
160PZ	**7754019**	POE lubricant, 160PZ, 33.8 oz can	MTZ with R-404A, R-507A, R-134a,	Multipack	12
160PZ	**7754020**	POE lubricant, 160PZ, 67.6 oz can	MTZ with R-404A, R-507A, R-134a,	Multipack	8
160P	**7754001**	Mineral oil, 160P, 67.6 oz can	MT or LT with R-22 or R-502	Multipack	8
160P	**7754002**	Mineral oil, 160P, 169 oz can	MT or LT with R-22 or R-502	Multipack	4
160ABM	**7754009**	Alkylbenzene oil 160ABM, 67.6 oz can	MT or LT with transitional refrigerants	Multipack	8

ORDERING INFORMATION AND PACKAGING

Ordering information

Maneurop® MT & MTZ reciprocating compressors can be ordered from Danfoss Commercial Compressors in either industrial packs (also called multiple packaging) or in single packs (also called individual packaging).

The code numbers ending in "M" in the tables represent compressors in industrial pack. For ordering single units, please replace the last letter "M" by letter "I".

MT compressors in industrial pack (multiple packaging) R-22

Compressor model	Design[1])	Code no.						
		1	3	4	5	6	7	9
		208-230/1/60	200-230/3/60	460/3/60 400/3/50	230/1/50	230/3/50	575/3/60 500/3/50	380/3/60
MT018	S	-	MT18-3M	MT18-4M	MT18-5M	-	-	-
	VE	MT18-1VM	MT18-3VM	MT18-4VM	MT18-5VM	-	-	-
MT022	S	MT22-1M	MT22-3M	MT22-4M	MT22-5M	-	-	-
	VE	MT22-1VM	MT22-3VM	MT22-4VM	MT22-5VM	MT22-6VM	-	MT22-9VM
MT028	S	MT28-1M	MT28-3M	MT28-4M	MT28-5M	MT28-6M	-	-
	VE	MT28-1VM	MT28-3VM	MT28-4VM	MT28-5VM	MT28-6VM	-	MT28-9VM
MT032	S	-	MT32-3M	MT32-4M	MT32-5M	MT32-6M	-	-
	VE	MT32-1VM	MT32-3VM	MT32-4VM	MT32-5VM	MT32-6VM	-	-
MT036	S	-	MT36-3M	MT36-4M	MT36-5M	MT36-6M	-	-
	VE	MT36-1VM	MT36-3VM	MT36-4VM	MT36-5VM	MT36-6VM	-	MT36-9VM
MT040	S	MT40-1M	MT40-3M	MT40-4M	-	MT40-6M	-	-
	VE	MT40-1VM	MT40-3VM	MT40-4VM	-	MT40-6VM	-	-
MT044	S	MT44-1M	MT44-3M	MT44-4M	-	-	-	MT44-9M
	VE	MT44-1VM	MT44-3VM	MT44-4VM	-	MT44-6VM	MT44-7VM	MT44-9VM
MT045	S	-	-	MT45-4M	-	-	-	-
	VE	-	MT45-3VM	MT45-4VM	-	-	-	-
MT050	S	-	MT50-3M	MT50-4M	-	-	-	MT50-9M
	VE	MT50-1VM	MT50-3VM	MT50-4VM	MT50-5VM	MT50-6VM	MT50-7VM	MT50-9VM
MT051	S	-	MT51-3M	MT51-4M	-	-	-	-
	VE	-	MT51-3VM	MT51-4VM	-	-	-	-
MT056	S	-	MT56-3M	MT56-4M	-	-	MT56-7M	MT56-9M
	VE	MT56-1VM	MT56-3VM	MT56-4VM	-	MT56-6VM	MT56-7VM	MT56-9VM
MT057	S	-	-	MT57-4M	-	-	-	-
	VE	-	MT57-3VM	MT57-4VM	-	-	-	-
MT064	S	-	MT64-3M	MT64-4M	-	-	-	MT64-9M
	VE	MT64-1VM	MT64-3VM	MT64-4VM	-	MT64-6VM	-	MT64-9VM
MT065	S	-	MT65-3M	MT65-4M	-	-	-	-
	VE	-	MT65-3VM	MT65-4VM	-	-	-	-
MT072	S	-	MT72-3M	MT72-4M	-	-	-	MT72-9M
	VE	-	MT72-3VM	MT72-4VM	-	MT72-6VM	-	MT72-9VM
MT073	S	-	MT73-3M	MT73-4M	-	-	-	-
	VE	-	MT73-3VM	MT73-4VM	-	-	-	-
MT080	S	-	-	MT80-4M	-	-	-	MT80-9M
	VE	-	MT80-3VM	MT80-4VM	-	MT80-6VM	-	MT80-9VM
MT081	S	-	-	MT81-4M	-	-	-	-
	VE	-	MT81-3VM	MT81-4VM	-	-	-	-
MT100	Sv	-	MT100-3M	MT100-4M	-	MT100-6M	MT100-7M	MT100-9M
	VE	-	MT100-3VM	MT100-4VM	-	MT100-6VM	MT100-7VM	MT100-9VM
MT125	Sv	-	MT125-3M	MT125-4M	-	MT125-6M	MT125-7M	-
	VE	-	MT125-3VM	MT125-4VM	-	MT125-6VM	MT125-7VM	-
MT144	Sv	-	MT144-3M	MT144-4M	-	-	-	MT144-9M
	VE	-	MT144-3VM	MT144-4VM	-	MT144-6VM	MT144-7VM	MT144-9VM
MT160	Sv	-	MT160-3M	MT160-4M	-	MT160-6M	-	MT160-9M
	VE	-	MT160-3VM	MT160-4VM	-	MT160-6VM	MT160-7VM	MT160-9VM

[1]) S = Single compressor, no oil sight glass, no oil equalization connection
Sv = Single compressor, brazed oil sight glass, no oil equalization connection
VE = Single compressor, threaded oil sight glass, 3/8" oil equalization connection

ORDERING INFORMATION AND PACKAGING

MTZ compressors in industrial pack (multiple packaging)

R-404A / R-507A / R-134a / R-407C

Compressor model	Design[1])	Code no.						
		1	3	4	5	6	7	9
		208-230/1/60	200-230/3/60	460/3/60 400/3/50	230/1/50	230/3/50	575/3/60 500/3/50	380/3/60
MTZ018	S	MTZ18-1M	MTZ18-3M	MTZ18-4M	MTZ18-5M	-	-	-
	VE	MTZ18-1VM	MTZ18-3VM	MTZ18-4VM	MTZ18-5VM	MTZ18-6VM	-	-
MTZ022	S	MTZ22-1M	MTZ22-3M	MTZ22-4M	MTZ22-5M	MTZ22-6M	-	-
	VE	MTZ22-1VM	MTZ22-3VM	MTZ22-4VM	MTZ22-5VM	MTZ22-6VM	-	MTZ22-9VM
MTZ028	S	MTZ28-1M	MTZ28-3M	MTZ28-4M	MTZ28-5M	MTZ28-6M	-	-
	VE	MTZ28-1VM	MTZ28-3VM	MTZ28-4VM	MTZ28-5VM	MTZ28-6VM	-	MTZ28-9VM
MTZ032	S	MTZ32-1M	MTZ32-3M	MTZ32-4M	MTZ32-5M	MTZ32-6M	MTZ32-7M	-
	VE	MTZ32-1VM	MTZ32-3VM	MTZ32-4VM	MTZ32-5VM	MTZ32-6VM	MTZ32-7VM	MTZ32-9VM
MTZ036	S	MTZ36-1M	MTZ36-3M	MTZ36-4M	MTZ36-5M	MTZ36-6M	-	-
	VE	MTZ36-1VM	MTZ36-3VM	MTZ36-4VM	MTZ36-5VM	MTZ36-6VM	MTZ36-7VM	MTZ36-9VM
MTZ040	S	MTZ40-1M	MTZ40-3M	MTZ40-4M	-	MTZ40-6M	-	-
	VE	MTZ40-1VM	MTZ40-3VM	MTZ40-4VM	-	MTZ40-6VM	-	-
MTZ044	S	-	MTZ44-3M	MTZ44-4M	-	-	MTZ44-7M	MTZ44-9M
	VE	MTZ44-1VM	MTZ44-3VM	MTZ44-4VM	-	MTZ44-6VM	MTZ44-7VM	MTZ44-9VM
MTZ045	S	-	-	MTZ45-4M	-	-	-	-
	VE	-	MTZ45-3VM	MTZ45-4VM	-	-	-	-
MTZ050	S	-	MTZ50-3M	MTZ50-4M	-	-	MTZ50-7M	MTZ50-9M
	VE	MTZ50-1VM	MTZ50-3VM	MTZ50-4VM	MTZ50-5VM	MTZ50-6VM	MTZ50-7VM	MTZ50-9VM
MTZ051	S	-	-	MTZ51-4M	-	-	-	-
	VE	-	MTZ51-3VM	MTZ51-4VM	-	-	-	-
MTZ056	S	-	MTZ56-3M	MTZ56-4M	-	-	MTZ56-7M	MTZ56-9M
	VE	MTZ56-1VM	MTZ56-3VM	MTZ56-4VM	-	MTZ56-6VM	MTZ56-7VM	MTZ56-9VM
MTZ057	S	-	-	MTZ57-4M	-	-	-	-
	VE	-	MTZ57-3VM	MTZ57-4VM	-	-	-	-
MTZ064	S	-	MTZ64-3M	MTZ64-4M	-	-	-	MTZ64-9M
	VE	MTZ64-1VM	MTZ64-3VM	MTZ64-4VM	-	MTZ64-6VM	-	MTZ64-9VM
MTZ065	S	-	-	MTZ65-4M	-	-	-	-
	VE	-	MTZ65-3VM	MTZ65-4VM	-	-	-	-
MTZ072	S	-	MTZ72-3M	MTZ72-4M	-	MTZ72-6M	-	MTZ72-9M
	VE	-	MTZ72-3VM	MTZ72-4VM	-	MTZ72-6VM	-	MTZ72-9VM
MTZ073	S	-	-	MTZ73-4M	-	-	-	-
	VE	-	MTZ73-3VM	MTZ73-4VM	-	-	-	-
MTZ080	S	-	-	MTZ80-4M	-	-	-	MTZ80-9M
	VE	-	MTZ80-3VM	MTZ80-4VM	-	MTZ80-6VM	-	MTZ80-9VM
MTZ081	S	-	-	MTZ81-4M	-	-	-	-
	VE	-	MTZ81-3VM	MTZ81-4VM	-	-	-	-
MTZ100	Sv	-	MTZ100-3M	MTZ100-4M	-	MTZ100-6M	MTZ100-7M	MTZ100-9M
	VE	-	MTZ100-3VM	MTZ100-4VM	-	MTZ100-6VM	MTZ100-7VM	MTZ100-9VM
MTZ125	Sv	-	MTZ125-3M	MTZ125-4M	-	MTZ125-6M	MTZ125-7M	MTZ125-9M
	VE	-	MTZ125-3VM	MTZ125-4VM	-	MTZ125-6VM	MTZ125-7VM	MTZ125-9VM
MTZ144	Sv	-	MTZ144-3M	MTZ144-4M	-	MTZ144-6M	MTZ144-7M	MTZ144-9M
	VE	-	MTZ144-3VM	MTZ144-4VM	-	MTZ144-6VM	MTZ144-7VM	MTZ144-9VM
MTZ160	Sv	-	MTZ160-3M	MTZ160-4M	-	MTZ160-6M	-	MTZ160-9M
	VE	-	MTZ160-3VM	MTZ160-4VM	-	MTZ160-6VM	MTZ160-7VM	MTZ160-9VM

[1]) S = Single compressor, no oil sight glass, no oil equalization connection
Sv = Single compressor, brazed oil sight glass, no oil equalization connection
VE = Single compressor, threaded oil sight glass, 3/8" oil equalization connection

Packaging

Model	Single pack		Multipack				Industrial pack			
	Dimensions in	Net weight lb	Nbr	Dimensions in	Gross weight lb	Static stacking	Nbr	Dimensions in	Gross weight lb	Static stacking
1 cylinder										
MT/MTZ018	l: 13.0 w: 11.6 h: 15.2	46	6	l: 39.4 w: 23.6 h: 20.0	313	4	12	l: 47.2 w: 31.5 h: 19.7	615	4
MT/MTZ022		46			313				615	
MT/MTZ028		51			333				650	
MT/MTZ032		53			348				672	
MT/MTZ036		55			362				710	
MT/MTZ040		57			370				725	
2 cylinders										
MT/MTZ044-050	l: 15.6 w: 14.4 h: 17.9	77	6	l: 45.3 w: 31.5 h: 22.0	500	4	6	l: 47.2 w: 31.5 h: 21.7	648	4
MT/MTZ045-051		82			527				675	
MT/MTZ056-064		82			527				675	
MT/MTZ057-065		86			560				734	
MT/MTZ072-080		88			567				754	
MT/MTZ073-081		90			578				765	
4 cylinders										
MT/MTZ100	l: 19.1 w: 15.6 h: 23.6	132	6	l: 47.2 w: 39.4 h: 28.7	877	4	6	l: 47.2 w: 31.5 h: 25.6	855	4
MT/MTZ125		141			912				891	
MT/MTZ144		148			948				926	
MT/MTZ160		152			979				957	

Single pack: One compressor in a cardboard box.
In some publications this packaging may be indicated as 'individual packaging'.

Multipack: A full pallet of compressors, each individually packed in a cardboard box. Mainly available for to wholesalers and Danfoss distribution centers.

Industrial pack: A full pallet of unpacked compressors. Mainly available for to OEM customers.
In some publications this packaging may be indicated as 'Multiple packaging'.

Nbr: Number of compressor in a pack

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Danfoss Inc. · Refrigeration & Air Conditioning Division · 7941 Corporate Drive · Baltimore, MD 21236
Ph 410-931-8250 · Fax 410-931-8256 · E-mail: baltimore@danfoss.com · Internet: www.danfoss.com/North_America

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