

### COMPRESSOR DEFINITION

Designation	<b>FMF D413UE</b>
Nominal Voltage/Frequency	<b>230 V 53-167 Hz</b>
Engineering Number	<b>513805007</b>

### A - APPLICATION / LIMIT WORKING CONDITIONS

1 Type	Hermetic reciprocating compressor		
2 Refrigerant	R-290		
3 Nominal voltage and frequency	230 / 53-167	[ V / Hz ]	
4 Application type	Low-Medium Back Pressure (Light Commercial - Curves until T.Evap -4		
4.1 Evaporating temperature range	-40°C to 0°C	(-40°F to 32°F)	
5 Motor type	BPM		
6 Starting torque	LST/HST - Low/Hight starting sorque		
7 Expantion device	Capillary tube or Expansion valve		
8 Compressor cooling		Operating voltage range	
		50 Hz	60 Hz
8.1 LBP (32°C Ambient temperature)	-	-	-
8.2 LBP (43°C Ambient temperature)	-	-	-
8.3 HBP (32°C Ambient temperature)	-	-	-
8.4 HBP (43°C Ambient temperature)	-	-	-
9 Maximum condensing temperature			
9.1 Operating	18.4	[kgf/cm <sup>2</sup> ] (262 psig)	/ °C - °F
9.2 Peak	20.6	[kgf/cm <sup>2</sup> ] (293 psig)	/ °C - °F
10 Maximum winding temperature	130	[ °C ]	

### B - MECHANICAL DATA

1 Commercial designation	1	[hp]
2 Displacement	10.85	[cm <sup>3</sup> ] (0.662 cu.in)
2.1 Bore [mm]	24.000	
2.2 Stroke [mm]	24.000	
3 Lubricant charge	430	[ml] (14.54 fl.oz.)
3.1 Lubricants approved		
3.2 Lubricants type/viscosity	ESTER / ISO10	
4 Weight (with oil charge)	10.87	[kg] (23.96 lb.)
5 Nitrogen charge	0.2 to 0.3	[kgf/cm <sup>2</sup> ] (2.84 to 4.27 psig)

### C - ELETRICAL DATA

1 Nominal Voltage/Frequency/Number of Phases	230 V 53-167Hz 3 ~ (Three phase)	
2 Starting device type	Inverter	
2.1 Starting device	CF10B01 N 0.1 X	
3 Start capacitor	-	[μF(VAC minimum)]
4 Run capacitor	-	[μF(VAC minimum)]
5 Motor protection	CF10B01 N 0.1 XX A Y	
6 Start winding resistance	4.30	[Ω at 25°C (77°F)] +/- 8%
7 Run winding resistance	4.30	[Ω at 25°C (77°F)] +/- 8%
8 LRA - Locked rotor amperage (50/60 Hz)	6.50/6.50	[A] - Measured according to UL 984
9 FLA - Full load amperage L/MBP (50/60 Hz)	2.00	[A] - Measured according to UL 984
10 FLA - Full Load Amperage HBP (50/60 Hz)	-	[A] - Measured according to UL 984
11 Approval boards certification	UL - VDE	

### D - PERFORMANCE - CHECK POINT DATA

TEST CONDITIONS: <b>@220V1600RPM</b>			<b>ASHRAELBP32 Fan</b>		Evaporating temperature (Condensing temperature	<b>-23.3°C (-9.94°F) 54.4°C (129.92°F)</b>		
Cooling capacity +/- 5%			Power consumption +/- 5%	Current consumption +/- 5%	Gas flow rate +/- 5%	EFFICIENCY RATE +/- 7%		
[Btu/h]	[kcal/h]	[W]	[W]	[A]	[kg/h]	[Btu/Wh]	[kcal/Wh]	[W/W]
1128	284	331	169	1.63	3.36	6.67	1.68	1.95

TEST CONDITIONS: <b>@220V2400RPM</b>			<b>ASHRAELBP32 Fan</b>		Evaporating temperature (Condensing temperature	<b>-23.3°C (-9.94°F) 54.4°C (129.92°F)</b>		
Cooling capacity +/- 5%			Power consumption +/- 5%	Current consumption +/- 5%	Gas flow rate +/- 5%	EFFICIENCY RATE +/- 7%		
[Btu/h]	[kcal/h]	[W]	[W]	[A]	[kg/h]	[Btu/Wh]	[kcal/Wh]	[W/W]
1672	421	490	246	2.28	4.98	6.79	1.71	1.99

TEST CONDITIONS: <b>@220V3000RPM</b>			<b>ASHRAELBP32 Fan</b>		Evaporating temperature (Condensing temperature	<b>-23.3°C (-9.94°F) 54.4°C (129.92°F)</b>		
Cooling capacity +/- 5%			Power consumption +/- 5%	Current consumption +/- 5%	Gas flow rate +/- 5%	EFFICIENCY RATE +/- 7%		
[Btu/h]	[kcal/h]	[W]	[W]	[A]	[kg/h]	[Btu/Wh]	[kcal/Wh]	[W/W]
2059	519	603	305	2.78	6.13	6.75	1.70	1.98

TEST CONDITIONS: <b>@220V3600RPM</b>			<b>ASHRAELBP32 Fan</b>		Evaporating temperature (Condensing temperature	<b>-23.3°C (-9.94°F) 54.4°C (129.92°F)</b>		
Cooling capacity +/- 5%			Power consumption +/- 5%	Current consumption +/- 5%	Gas flow rate +/- 5%	EFFICIENCY RATE +/- 7%		
[Btu/h]	[kcal/h]	[W]	[W]	[A]	[kg/h]	[Btu/Wh]	[kcal/Wh]	[W/W]
2444	616	716	373	3.33	7.27	6.55	1.65	1.92

TEST CONDITIONS: <b>@220V5000RPM</b>			<b>ASHRAELBP32 Fan</b>		Evaporating temperature (Condensing temperature	<b>-23.3°C (-9.94°F) 54.4°C (129.92°F)</b>		
Cooling capacity +/- 5%			Power consumption +/- 5%	Current consumption +/- 5%	Gas flow rate +/- 5%	EFFICIENCY RATE +/- 7%		
[Btu/h]	[kcal/h]	[W]	[W]	[A]	[kg/h]	[Btu/Wh]	[kcal/Wh]	[W/W]
3270	824	958	528	4.60	9.73	6.20	1.56	1.82

### E - PERFORMANCE - CURVES

TEST CONDITIONS:		ASHRAE32			(Condensing temperature 35°C (+95°F))					
@220V1600RPM		Fan								
Evaporating temperature		Cooling capacity			Power consumption	Current consumption	Gas flow rate	EFFICIENCY RATE		
		+/- 5%			+/- 5%	+/- 5%	+/- 5%	+/- 7%		
°C	(°F)	[Btu/h]	[kcal/h]	[W]	[W]	[A]	[kg/h]	[Btu/Wh]	[kcal/Wh]	[W/W]
-40	(-40)	570	144	167	96	0.93	1.68	5.97	1.50	1.75
-35	(-31)	727	183	213	108	1.03	2.15	6.70	1.69	1.96
-30	(-22)	908	229	266	121	1.13	2.69	7.50	1.89	2.20
-25	(-13)	1120	282	328	133	1.22	3.33	8.41	2.12	2.47
-20	(- 4)	1369	345	401	145	1.31	4.08	9.47	2.39	2.77
-15	(+ 5)	1659	418	486	155	1.39	4.97	10.69	2.69	3.13
-10	(+14)	1998	503	585	165	1.47	6.01	12.13	3.06	3.55
-5	(+23)	2390	602	700	173	1.54	7.23	13.80	3.48	4.04
0	(+32)	2842	716	833	180	1.60	8.64	15.76	3.97	4.62

TEST CONDITIONS:		ASHRAE32			(Condensing temperature 45°C (+113°F))					
@220V1600RPM		Fan								
Evaporating temperature		Cooling capacity			Power consumption	Current consumption	Gas flow rate	EFFICIENCY RATE		
		+/- 5%			+/- 5%	+/- 5%	+/- 5%	+/- 7%		
°C	(°F)	[Btu/h]	[kcal/h]	[W]	[W]	[A]	[kg/h]	[Btu/Wh]	[kcal/Wh]	[W/W]
-40	(-40)	536	135	157	99	0.95	1.58	5.44	1.37	1.59
-35	(-31)	694	175	204	116	1.10	2.06	6.01	1.51	1.76
-30	(-22)	876	221	257	132	1.25	2.60	6.62	1.67	1.94
-25	(-13)	1086	274	318	148	1.38	3.23	7.31	1.84	2.14
-20	(- 4)	1330	335	390	164	1.50	3.97	8.12	2.05	2.38
-15	(+ 5)	1614	407	473	178	1.61	4.83	9.07	2.29	2.66
-10	(+14)	1944	490	570	190	1.70	5.85	10.20	2.57	2.99
-5	(+23)	2326	586	682	201	1.78	7.03	11.56	2.91	3.39
0	(+32)	2766	697	810	210	1.84	8.41	13.16	3.32	3.86

TEST CONDITIONS:		ASHRAE32			(Condensing temperature 55°C (+131°F))					
@220V1600RPM		Fan								
Evaporating temperature		Cooling capacity			Power consumption	Current consumption	Gas flow rate	EFFICIENCY RATE		
		+/- 5%			+/- 5%	+/- 5%	+/- 5%	+/- 7%		
°C	(°F)	[Btu/h]	[kcal/h]	[W]	[W]	[A]	[kg/h]	[Btu/Wh]	[kcal/Wh]	[W/W]
-40	(-40)	490	123	144	100	0.97	1.45	4.88	1.23	1.43
-35	(-31)	652	164	191	122	1.19	1.93	5.37	1.35	1.57
-30	(-22)	835	210	245	143	1.38	2.48	5.88	1.48	1.72
-25	(-13)	1044	263	306	163	1.55	3.10	6.44	1.62	1.89
-20	(- 4)	1285	324	377	182	1.70	3.83	7.08	1.79	2.08
-15	(+ 5)	1565	394	459	199	1.83	4.69	7.85	1.98	2.30
-10	(+14)	1889	476	553	215	1.94	5.68	8.78	2.21	2.57
-5	(+23)	2262	570	663	228	2.02	6.84	9.89	2.49	2.90
0	(+32)	2691	678	789	240	2.08	8.18	11.23	2.83	3.29

### E - PERFORMANCE - CURVES

TEST CONDITIONS:		ASHRAE32			(Condensing temperature 35°C (+95°F))					
@220V3000RPM		Fan								
Evaporating temperature		Cooling capacity			Power consumption	Current consumption	Gas flow rate	EFFICIENCY RATE		
		+/- 5%			+/- 5%	+/- 5%	+/- 5%	+/- 7%		
°C	(°F)	[Btu/h]	[kcal/h]	[W]	[W]	[A]	[kg/h]	[Btu/Wh]	[kcal/Wh]	[W/W]
-40	(-40)	1007	254	295	176	1.51	2.97	5.70	1.44	1.67
-35	(-31)	1295	326	380	202	1.72	3.83	6.39	1.61	1.87
-30	(-22)	1632	411	478	227	1.89	4.84	7.18	1.81	2.10
-25	(-13)	2027	511	594	252	2.03	6.03	8.06	2.03	2.36
-20	(- 4)	2492	628	730	276	2.16	7.44	9.05	2.28	2.65
-15	(+ 5)	3037	765	890	299	2.30	9.10	10.16	2.56	2.98
-10	(+14)	3671	925	1076	323	2.46	11.05	11.39	2.87	3.34
-5	(+23)	4406	1110	1291	346	2.67	13.33	12.74	3.21	3.73
0	(+32)	5252	1324	1539	369	2.94	15.97	14.24	3.59	4.17

TEST CONDITIONS:		ASHRAE32			(Condensing temperature 45°C (+113°F))					
@220V3000RPM		Fan								
Evaporating temperature		Cooling capacity			Power consumption	Current consumption	Gas flow rate	EFFICIENCY RATE		
		+/- 5%			+/- 5%	+/- 5%	+/- 5%	+/- 7%		
°C	(°F)	[Btu/h]	[kcal/h]	[W]	[W]	[A]	[kg/h]	[Btu/Wh]	[kcal/Wh]	[W/W]
-40	(-40)	943	238	276	184	1.58	2.78	5.16	1.30	1.51
-35	(-31)	1235	311	362	214	1.91	3.65	5.75	1.45	1.69
-30	(-22)	1572	396	461	245	2.18	4.66	6.41	1.62	1.88
-25	(-13)	1967	496	576	275	2.40	5.85	7.14	1.80	2.09
-20	(- 4)	2427	612	711	305	2.60	7.24	7.95	2.00	2.33
-15	(+ 5)	2965	747	869	334	2.79	8.88	8.85	2.23	2.59
-10	(+14)	3591	905	1052	364	3.00	10.81	9.84	2.48	2.88
-5	(+23)	4315	1087	1264	394	3.23	13.05	10.94	2.76	3.20
0	(+32)	5147	1297	1508	425	3.51	15.65	12.14	3.06	3.56

TEST CONDITIONS:		ASHRAE32			(Condensing temperature 55°C (+131°F))					
@220V3000RPM		Fan								
Evaporating temperature		Cooling capacity			Power consumption	Current consumption	Gas flow rate	EFFICIENCY RATE		
		+/- 5%			+/- 5%	+/- 5%	+/- 5%	+/- 7%		
°C	(°F)	[Btu/h]	[kcal/h]	[W]	[W]	[A]	[kg/h]	[Btu/Wh]	[kcal/Wh]	[W/W]
-40	(-40)	896	226	262	189	1.73	2.64	4.74	1.19	1.39
-35	(-31)	1184	298	347	224	2.13	3.50	5.28	1.33	1.55
-30	(-22)	1516	382	444	259	2.45	4.50	5.86	1.48	1.72
-25	(-13)	1902	479	557	294	2.72	5.65	6.49	1.63	1.90
-20	(- 4)	2352	593	689	329	2.95	7.01	7.16	1.81	2.10
-15	(+ 5)	2876	725	843	365	3.15	8.61	7.90	1.99	2.31
-10	(+14)	3486	879	1022	401	3.35	10.49	8.70	2.19	2.55
-5	(+23)	4192	1056	1228	437	3.57	12.67	9.58	2.41	2.81
0	(+32)	5003	1261	1466	475	3.82	15.21	10.53	2.65	3.09

### E - PERFORMANCE - CURVES

TEST CONDITIONS:		ASHRAE32			(Condensing temperature 35°C (+95°F))					
@220V3600RPM		Fan								
Evaporating temperature		Cooling capacity			Power consumption	Current consumption	Gas flow rate	EFFICIENCY RATE		
		+/- 5%			+/- 5%	+/- 5%	+/- 5%	+/- 7%		
°C	(°F)	[Btu/h]	[kcal/h]	[W]	[W]	[A]	[kg/h]	[Btu/Wh]	[kcal/Wh]	[W/W]
-40	(-40)	1227	309	360	214	1.68	3.62	5.71	1.44	1.67
-35	(-31)	1550	391	454	249	2.12	4.59	6.25	1.57	1.83
-30	(-22)	1950	491	571	281	2.44	5.78	6.96	1.75	2.04
-25	(-13)	2432	613	713	311	2.68	7.23	7.82	1.97	2.29
-20	(- 4)	3001	756	879	341	2.86	8.95	8.80	2.22	2.58
-15	(+ 5)	3660	922	1073	370	3.03	10.97	9.88	2.49	2.90
-10	(+14)	4416	1113	1294	400	3.21	13.29	11.03	2.78	3.23
-5	(+23)	5272	1329	1545	431	3.43	15.95	12.22	3.08	3.58
0	(+32)	6233	1571	1826	464	3.73	18.95	13.43	3.38	3.94

TEST CONDITIONS:		ASHRAE32			(Condensing temperature 45°C (+113°F))					
@220V3600RPM		Fan								
Evaporating temperature		Cooling capacity			Power consumption	Current consumption	Gas flow rate	EFFICIENCY RATE		
		+/- 5%			+/- 5%	+/- 5%	+/- 5%	+/- 7%		
°C	(°F)	[Btu/h]	[kcal/h]	[W]	[W]	[A]	[kg/h]	[Btu/Wh]	[kcal/Wh]	[W/W]
-40	(-40)	1153	291	338	221	1.75	3.40	5.22	1.32	1.53
-35	(-31)	1478	372	433	262	2.32	4.37	5.66	1.43	1.66
-30	(-22)	1876	473	550	300	2.75	5.56	6.24	1.57	1.83
-25	(-13)	2353	593	689	338	3.08	7.00	6.94	1.75	2.03
-20	(- 4)	2913	734	854	376	3.33	8.69	7.74	1.95	2.27
-15	(+ 5)	3561	897	1043	414	3.55	10.67	8.59	2.17	2.52
-10	(+14)	4301	1084	1260	453	3.76	12.94	9.49	2.39	2.78
-5	(+23)	5138	1295	1505	494	3.99	15.54	10.41	2.62	3.05
0	(+32)	6077	1531	1781	538	4.28	18.47	11.31	2.85	3.31

TEST CONDITIONS:		ASHRAE32			(Condensing temperature 55°C (+131°F))					
@220V3600RPM		Fan								
Evaporating temperature		Cooling capacity			Power consumption	Current consumption	Gas flow rate	EFFICIENCY RATE		
		+/- 5%			+/- 5%	+/- 5%	+/- 5%	+/- 7%		
°C	(°F)	[Btu/h]	[kcal/h]	[W]	[W]	[A]	[kg/h]	[Btu/Wh]	[kcal/Wh]	[W/W]
-40	(-40)	1058	267	310	227	1.70	3.12	4.66	1.17	1.36
-35	(-31)	1387	349	406	272	2.36	4.10	5.10	1.28	1.49
-30	(-22)	1785	450	523	315	2.87	5.29	5.65	1.42	1.66
-25	(-13)	2259	569	662	359	3.25	6.72	6.29	1.58	1.84
-20	(- 4)	2812	709	824	402	3.54	8.39	6.99	1.76	2.05
-15	(+ 5)	3450	869	1011	447	3.76	10.33	7.73	1.95	2.26
-10	(+14)	4177	1053	1224	494	3.96	12.57	8.48	2.14	2.48
-5	(+23)	4997	1259	1464	543	4.17	15.11	9.21	2.32	2.70
0	(+32)	5916	1491	1734	596	4.40	17.98	9.91	2.50	2.90

### E - PERFORMANCE - CURVES

TEST CONDITIONS:		ASHRAE32			(Condensing temperature 35°C (+95°F))					
@220V5000RPM		Fan								
Evaporating temperature		Cooling capacity			Power consumption	Current consumption	Gas flow rate	EFFICIENCY RATE		
		+/- 5%			+/- 5%	+/- 5%	+/- 5%	+/- 7%		
°C	(°F)	[Btu/h]	[kcal/h]	[W]	[W]	[A]	[kg/h]	[Btu/Wh]	[kcal/Wh]	[W/W]
-40	(-40)	1597	402	468	305	2.22	4.72	5.23	1.32	1.53
-35	(-31)	2048	516	600	353	2.71	6.06	5.82	1.47	1.70
-30	(-22)	2590	653	759	402	3.14	7.68	6.44	1.62	1.89
-25	(-13)	3224	812	945	453	3.53	9.59	7.11	1.79	2.08
-20	(- 4)	3949	995	1157	503	3.88	11.78	7.85	1.98	2.30
-15	(+ 5)	4766	1201	1397	550	4.20	14.28	8.66	2.18	2.54
-10	(+14)	5677	1431	1663	595	4.50	17.09	9.56	2.41	2.80
-5	(+23)	6681	1684	1958	634	4.79	20.21	10.55	2.66	3.09
0	(+32)	7779	1960	2279	667	5.08	23.65	11.66	2.94	3.42

TEST CONDITIONS:		ASHRAE32			(Condensing temperature 45°C (+113°F))					
@220V5000RPM		Fan								
Evaporating temperature		Cooling capacity			Power consumption	Current consumption	Gas flow rate	EFFICIENCY RATE		
		+/- 5%			+/- 5%	+/- 5%	+/- 5%	+/- 7%		
°C	(°F)	[Btu/h]	[kcal/h]	[W]	[W]	[A]	[kg/h]	[Btu/Wh]	[kcal/Wh]	[W/W]
-40	(-40)	1525	384	447	315	2.22	4.50	4.83	1.22	1.42
-35	(-31)	1971	497	578	367	2.84	5.83	5.37	1.35	1.57
-30	(-22)	2501	630	733	422	3.38	7.42	5.93	1.50	1.74
-25	(-13)	3117	786	913	477	3.85	9.27	6.53	1.65	1.91
-20	(- 4)	3819	962	1119	531	4.25	11.39	7.18	1.81	2.10
-15	(+ 5)	4607	1161	1350	583	4.59	13.80	7.89	1.99	2.31
-10	(+14)	5482	1381	1606	632	4.88	16.50	8.67	2.19	2.54
-5	(+23)	6444	1624	1888	676	5.13	19.49	9.54	2.40	2.79
0	(+32)	7495	1889	2196	714	5.35	22.78	10.50	2.64	3.08

TEST CONDITIONS:		ASHRAE32			(Condensing temperature 55°C (+131°F))					
@220V5000RPM		Fan								
Evaporating temperature		Cooling capacity			Power consumption	Current consumption	Gas flow rate	EFFICIENCY RATE		
		+/- 5%			+/- 5%	+/- 5%	+/- 5%	+/- 7%		
°C	(°F)	[Btu/h]	[kcal/h]	[W]	[W]	[A]	[kg/h]	[Btu/Wh]	[kcal/Wh]	[W/W]
-40	(-40)	1456	367	427	325	2.33	4.30	4.48	1.13	1.31
-35	(-31)	1905	480	558	383	3.10	5.64	4.98	1.25	1.46
-30	(-22)	2433	613	713	444	3.75	7.22	5.49	1.38	1.61
-25	(-13)	3041	766	891	505	4.29	9.04	6.02	1.52	1.76
-20	(- 4)	3728	939	1092	566	4.74	11.12	6.58	1.66	1.93
-15	(+ 5)	4495	1133	1317	625	5.10	13.46	7.19	1.81	2.11
-10	(+14)	5344	1347	1566	680	5.38	16.08	7.85	1.98	2.30
-5	(+23)	6273	1581	1838	731	5.59	18.97	8.59	2.16	2.52
0	(+32)	7285	1836	2135	775	5.74	22.14	9.40	2.37	2.76

### F - EXTERNAL CHARACTERISTICS

1 Base plate	Universal EG/F/AMEM version 2		
2 Tray holder	No		
3 Connectors			
3.1 SUCTION	8.2 +0.12/-0.08	[mm]	(0.323" +0.005"/-0.003")
3.1.1 Material	Copper		
3.1.2 Shape	Straight		
3.2 DISCHARGE	6.5 +0.12/-0.08	[mm]	(0.256" +0.005"/-0.003")
3.2.1 Material	Copper		
3.2.2 Shape	Straight		
3.3 PROCESS	6.5 +0.12/-0.08	[mm]	(0.256" +0.005"/-0.003")
3.3.1 Material	Copper		
3.3.2 Shape	Straight		
3.4 Oil cooler (Copper)	No	[mm]	
3.5 Connector sealing	Rubber Plugs		