

COMPRESSOR DEFINITION

Designation	FM FT413U
Nominal Voltage/Frequency	230 V 60-150 Hz
Engineering Number	513805000

A - APPLICATION / LIMIT WORKING CONDITIONS

1 Type	Hermetic reciprocating compressor		
2 Refrigerant	R-290		
3 Nominal voltage and frequency	230 / 60-150	[V / Hz]	
4 Application type	Low Back Pressure		
4.1 Evaporating temperature range	-35°C to -10°C	(-31°F to 14°F)	
5 Motor type	BPM		
6 Starting torque	LST - Low Starting Torque		
7 Expantion device	Capillary tube		
8 Compressor cooling		Operating voltage range	
		50 Hz	60 Hz
8.1 LBP (32°C Ambient temperature)	Fan	187 to 255 V	187 to 255 V
8.2 LBP (43°C Ambient temperature)	Fan	187 to 255 V	187 to 255 V
8.3 HBP (32°C Ambient temperature)	-	-	-
8.4 HBP (43°C Ambient temperature)	-	-	-
9 Maximum condensing pressures/temperature			
9.1 Operating (gauge)	19.1	[kgf/cm²] (272 psig)	/ °C - °F
9.2 Peak (gauge)	21.2	[kgf/cm²] (301 psig)	/ °C - °F
10 Maximum winding temperature	130	[°C]	

B - MECHANICAL DATA

1 Commercial designation	1/2	[hp]
2 Displacement	12.92	[cm³] (0.788 cu.in)
2.1 Bore [mm]	28.000	
2.2 Stroke [mm]	21.000	
3 Lubricant charge	430	[ml] (14.54 fl.oz.)
3.1 Lubricants approved		
3.2 Lubricants type/viscosity	ESTER / ISO22	
4 Weight (with oil charge)	10.87	[kg] (23.96 lb.)
5 Nitrogen charge	-	[kgf/cm²]

C - ELETRICAL DATA

1 Nominal Voltage/Frequency/Number of Phases	230 V 60-150 Hz 3 ~ (Three phase)	
2 Starting device type	Inverter	
2.1 Starting device	VCCHP2456XXXXX	
3 Start capacitor	-	[µF(VAC minimum)]
4 Run capacitor	-	[µF(VAC minimum)]
5 Motor protection	INVERTER	
6 Start winding resistance	7.50	[Ω at 25°C (77°F)] +/- 8%
7 Run winding resistance	7.50	[Ω at 25°C (77°F)] +/- 8%
8 LRA - Locked rotor amperage (60/150 Hz)	-	[A] - Measured according to UL 984
9 FLA - Full load amperage L/MBP (60/150 Hz)	-	[A] - Measured according to UL 984
10 FLA - Full Load Amperage HBP (60/150 Hz)	-	[A] - Measured according to UL 984
11 Approval boards certification		

D - PERFORMANCE - CHECK POINT DATA

TEST CONDITIONS: @220V1800RPM			ASHRAELBP32 Fan		Evaporating temperature (Condensing temperature		-23.3°C (-9.94°F) 54.4°C (129.92°F))	
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]
1586	400	465	275	1.28	4.72	5.77	1.45	1.69

TEST CONDITIONS: @220V2400RPM			ASHRAELBP32 Fan		Evaporating temperature (Condensing temperature		-23.3°C (-9.94°F) 54.4°C (129.92°F))	
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]
1798	453	527	305	1.42	5.35	5.90	1.49	1.73

TEST CONDITIONS: @220V3000RPM			ASHRAELBP32 Fan		Evaporating temperature (Condensing temperature		-23.3°C (-9.94°F) 54.4°C (129.92°F))	
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]
2300	580	674	386	1.78	6.85	5.96	1.50	1.75

TEST CONDITIONS: @220V3600RPM			ASHRAELBP32 Fan		Evaporating temperature (Condensing temperature		-23.3°C (-9.94°F) 54.4°C (129.92°F))	
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]
2651	668	777	449		7.89	5.91	1.49	1.73

TEST CONDITIONS: @220V4500RPM			ASHRAELBP32 Fan		Evaporating temperature (Condensing temperature		-23.3°C (-9.94°F) 54.4°C (129.92°F))	
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]
2920	736	856	494	2.27	8.69	5.91	1.49	1.73

E - PERFORMANCE - CURVES

TEST CONDITIONS:		ASHRAE32			(Condensing temperature 35°C (+95°F))					
@220V2100RPM		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]
-35	(-31)	915	231	268	159	0.75	2.71	5.74	1.45	1.68
-30	(-22)	1290	325	378	193	0.91	3.83	6.62	1.67	1.94
-25	(-13)	1644	414	482	218	1.02	4.89	7.54	1.90	2.21
-20	(- 4)	1995	503	585	235	1.10	5.95	8.53	2.15	2.50
-15	(+ 5)	2359	594	691	246	1.15	7.07	9.64	2.43	2.83
-10	(+14)	2755	694	807	254	1.18	8.29	10.89	2.74	3.19

TEST CONDITIONS:		ASHRAE32			(Condensing temperature 45°C (+113°F))					
@220V2100RPM		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]
-35	(-31)	868	219	254	170	0.80	2.57	5.12	1.29	1.50
-30	(-22)	1214	306	356	209	0.98	3.60	5.77	1.45	1.69
-25	(-13)	1554	392	455	239	1.12	4.62	6.45	1.62	1.89
-20	(- 4)	1904	480	558	264	1.24	5.68	7.18	1.81	2.10
-15	(+ 5)	2283	575	669	285	1.33	6.84	8.00	2.02	2.34
-10	(+14)	2708	682	793	303	1.42	8.15	8.94	2.25	2.62

TEST CONDITIONS:		ASHRAE32			(Condensing temperature 55°C (+131°F))					
@220V2100RPM		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]
-35	(-31)	796	201	233	176	0.82	2.35	4.56	1.15	1.34
-30	(-22)	1112	280	326	220	1.03	3.30	5.07	1.28	1.49
-25	(-13)	1436	362	421	257	1.20	4.27	5.58	1.41	1.64
-20	(- 4)	1785	450	523	290	1.36	5.33	6.13	1.55	1.80
-15	(+ 5)	2178	549	638	321	1.50	6.52	6.75	1.70	1.98
-10	(+14)	2631	663	771	350	1.64	7.92	7.47	1.88	2.19

TEST CONDITIONS:		ASHRAE32			(Condensing temperature 65°C (+149°F))					
@220V2100RPM		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]
-35	(-31)	698	176	204	177	0.83	2.06	3.91	0.99	1.15
-30	(-22)	983	248	288	226	1.06	2.91	4.37	1.10	1.28
-25	(-13)	1291	325	378	272	1.27	3.84	4.81	1.21	1.41
-20	(- 4)	1639	413	480	314	1.47	4.89	5.26	1.33	1.54
-15	(+ 5)	2045	515	599	354	1.66	6.12	5.76	1.45	1.69
-10	(+14)	2527	637	740	396	1.85	7.60	6.35	1.60	1.86

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]
-35	(-31)	1476	372	433	249	1.72	4.37	5.92	1.49	1.73
-30	(-22)	1917	483	562	294	1.96	5.69	6.53	1.65	1.91
-25	(-13)	2411	608	706	331	2.17	7.17	7.30	1.84	2.14
-20	(- 4)	2961	746	868	361	2.36	8.84	8.23	2.07	2.41
-15	(+ 5)	3569	899	1046	384	2.51	10.69	9.31	2.35	2.73
-10	(+14)	4236	1068	1241	401	2.62	12.75	10.57	2.66	3.10

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]
-35	(-31)	1322	333	387	254	1.75	3.91	5.22	1.31	1.53
-30	(-22)	1769	446	518	307	2.03	5.25	5.76	1.45	1.69
-25	(-13)	2264	571	663	352	2.29	6.73	6.41	1.62	1.88
-20	(- 4)	2808	708	823	389	2.52	8.38	7.18	1.81	2.10
-15	(+ 5)	3404	858	997	421	2.72	10.20	8.07	2.03	2.37
-10	(+14)	4053	1021	1188	446	2.88	12.20	9.09	2.29	2.66

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]
-35	(-31)	1189	300	348	257	1.77	3.52	4.66	1.17	1.36
-30	(-22)	1630	411	478	316	2.09	4.83	5.16	1.30	1.51
-25	(-13)	2112	532	619	368	2.39	6.28	5.72	1.44	1.68
-20	(- 4)	2637	665	773	413	2.66	7.87	6.37	1.60	1.87
-15	(+ 5)	3207	808	940	451	2.90	9.60	7.09	1.79	2.08
-10	(+14)	3825	964	1121	483	3.10	11.51	7.90	1.99	2.31

TEST CONDITIONS:		ASHRAE32			(Condensing temperature 65°C (+149°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]
-35	(-31)	1077	271	316	258	1.78	3.19	4.16	1.05	1.22
-30	(-22)	1499	378	439	323	2.14	4.44	4.65	1.17	1.36
-25	(-13)	1955	493	573	380	2.47	5.81	5.16	1.30	1.51
-20	(- 4)	2447	617	717	431	2.78	7.30	5.71	1.44	1.67
-15	(+ 5)	2979	751	873	475	3.05	8.92	6.29	1.59	1.84
-10	(+14)	3552	895	1041	514	3.28	10.68	6.92	1.74	2.03

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]
-35	(-31)	1664	419	488	292	1.34	4.93	5.69	1.43	1.67
-30	(-22)	2103	530	616	341	1.57	6.24	6.21	1.56	1.82
-25	(-13)	2691	678	788	389	1.79	8.00	6.93	1.75	2.03
-20	(- 4)	3409	859	999	436	2.01	10.17	7.82	1.97	2.29
-15	(+ 5)	4240	1068	1242	480	2.21	12.70	8.84	2.23	2.59
-10	(+14)	5164	1301	1513	519	2.39	15.54	9.96	2.51	2.92

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]
-35	(-31)	1542	389	452	306	1.41	4.56	5.05	1.27	1.48
-30	(-22)	1983	500	581	358	1.65	5.88	5.56	1.40	1.63
-25	(-13)	2562	646	751	411	1.89	7.62	6.23	1.57	1.83
-20	(- 4)	3261	822	956	462	2.13	9.73	7.04	1.77	2.06
-15	(+ 5)	4061	1023	1190	510	2.35	12.16	7.94	2.00	2.33
-10	(+14)	4943	1246	1449	555	2.55	14.87	8.92	2.25	2.61

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]
-35	(-31)	1413	356	414	317	1.46	4.18	4.47	1.13	1.31
-30	(-22)	1847	466	541	373	1.72	5.48	4.96	1.25	1.45
-25	(-13)	2409	607	706	430	1.98	7.16	5.59	1.41	1.64
-20	(- 4)	3079	776	902	486	2.24	9.19	6.32	1.59	1.85
-15	(+ 5)	3839	967	1125	539	2.48	11.50	7.11	1.79	2.08
-10	(+14)	4671	1177	1369	589	2.71	14.05	7.94	2.00	2.33

TEST CONDITIONS:		ASHRAE32			(Condensing temperature 65°C (+149°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]
-35	(-31)	1277	322	374	324	1.49	3.78	3.93	0.99	1.15
-30	(-22)	1696	427	497	385	1.77	5.03	4.42	1.11	1.29
-25	(-13)	2231	562	654	446	2.05	6.63	5.00	1.26	1.46
-20	(- 4)	2863	721	839	507	2.33	8.54	5.64	1.42	1.65
-15	(+ 5)	3574	901	1047	567	2.61	10.70	6.32	1.59	1.85
-10	(+14)	4345	1095	1273	623	2.87	13.07	7.00	1.76	2.05

E - PERFORMANCE - CURVES

TEST CONDITIONS:		ASHRAE32			(Condensing temperature 35°C (+95°F))					
@220V4000RPM		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]
-35	(-31)	1822	459	534	325	1.50	5.39	5.60	1.41	1.64
-30	(-22)	2206	556	646	358	1.64	6.54	6.21	1.57	1.82
-25	(-13)	2781	701	815	401	1.84	8.27	6.95	1.75	2.04
-20	(- 4)	3532	890	1035	451	2.07	10.54	7.82	1.97	2.29
-15	(+ 5)	4442	1119	1302	503	2.31	13.31	8.82	2.22	2.58
-10	(+14)	5494	1385	1610	553	2.54	16.54	9.94	2.50	2.91

TEST CONDITIONS:		ASHRAE32			(Condensing temperature 45°C (+113°F))					
@220V4000RPM		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]
-35	(-31)	1749	441	512	348	1.60	5.17	5.02	1.26	1.47
-30	(-22)	2167	546	635	388	1.78	6.43	5.61	1.41	1.64
-25	(-13)	2749	693	806	438	2.01	8.17	6.28	1.58	1.84
-20	(- 4)	3479	877	1020	493	2.27	10.38	7.05	1.78	2.07
-15	(+ 5)	4341	1094	1272	549	2.53	13.00	7.90	1.99	2.31
-10	(+14)	5317	1340	1558	603	2.77	16.00	8.83	2.23	2.59

TEST CONDITIONS:		ASHRAE32			(Condensing temperature 55°C (+131°F))					
@220V4000RPM		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]
-35	(-31)	1624	409	476	368	1.69	4.80	4.42	1.11	1.30
-30	(-22)	2079	524	609	415	1.91	6.16	5.02	1.26	1.47
-25	(-13)	2670	673	782	472	2.17	7.94	5.66	1.43	1.66
-20	(- 4)	3381	852	991	533	2.45	10.09	6.34	1.60	1.86
-15	(+ 5)	4196	1057	1230	594	2.73	12.56	7.07	1.78	2.07
-10	(+14)	5099	1285	1494	651	3.00	15.34	7.85	1.98	2.30

TEST CONDITIONS:		ASHRAE32			(Condensing temperature 65°C (+149°F))					
@220V4000RPM		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]
-35	(-31)	1449	365	425	383	1.76	4.28	3.79	0.96	1.11
-30	(-22)	1941	489	569	439	2.02	5.76	4.42	1.11	1.29
-25	(-13)	2543	641	745	502	2.31	7.56	5.05	1.27	1.48
-20	(- 4)	3237	816	949	569	2.62	9.66	5.68	1.43	1.66
-15	(+ 5)	4008	1010	1174	636	2.92	12.00	6.32	1.59	1.85
-10	(+14)	4838	1219	1418	697	3.20	14.55	6.97	1.76	2.04

F - EXTERNAL CHARACTERISTICS

1 Base plate	Universal EG/F/AMEM version 2		
2 Tray holder	No		
3 Connectors			
3.1 SUCTION	6.5 +0.12/-0.08	[mm]	(0.256" +0.005"/-0.003")
3.1.1 Material	Copper		
3.1.2 Shape	Straight		
3.2 DISCHARGE	4.94 +0.08/-0.08	[mm]	(0.194" +0.003"/-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		