

Figure 31

13. Start up

13.1 System start up

1. Ensure Sections 7, 8, 9, 10, 11 and 12 have been completed.
2. Set System Thermostat to OFF.

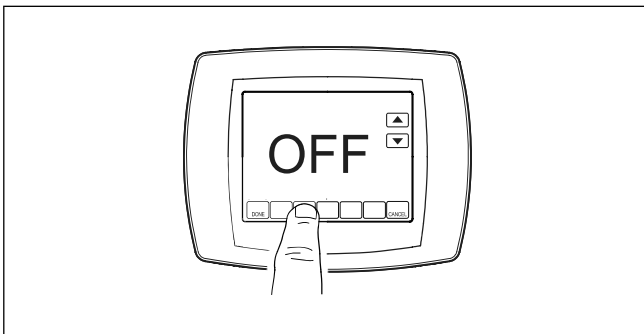


Figure 32

3. Turn on disconnect to apply power to the indoor and outdoor units.

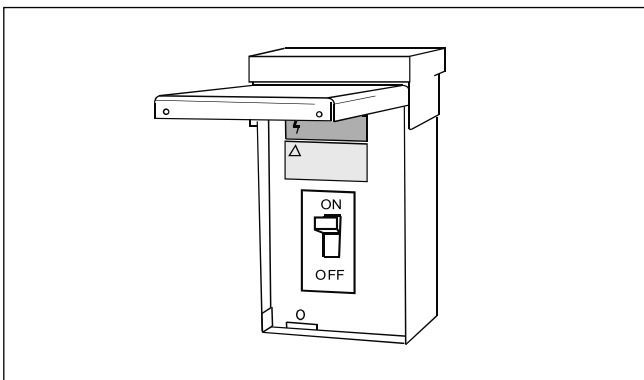


Figure 33

4. Wait one (1) hour before starting the unit if compressor crankcase heater is used and the outdoor ambient temperature is below 70 °F.

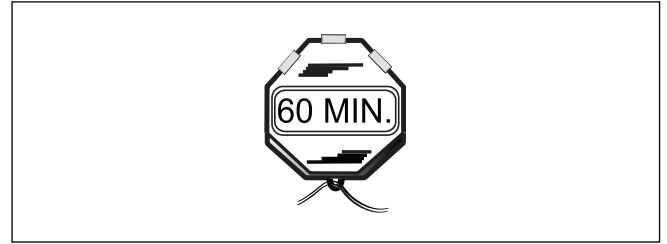


Figure 34

5. Set system thermostat to ON.

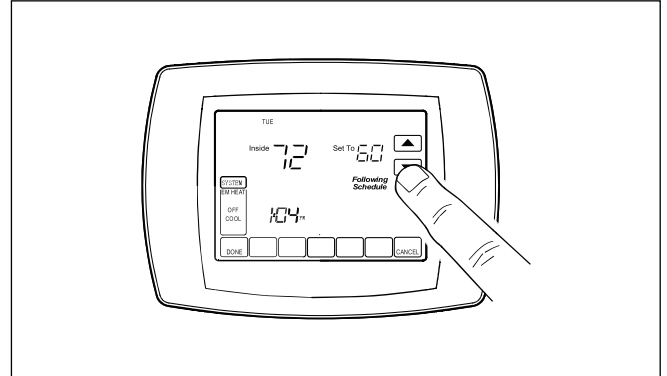


Figure 35

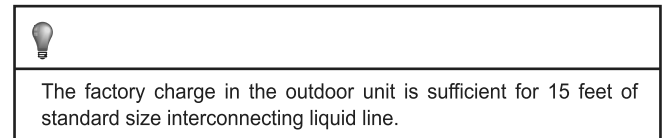
14. System charge adjustment

14.1 Charging: Weigh-In Method

Weigh-In method can be used for the initial installation, or anytime a system charge is being replaced. Weigh-In Method can also be used when power is not available to the equipment site or operating conditions (indoor/outdoor temperatures) are not in range to verify with the liquid line pressure charging method.

Model	Factory Charge	Charge multiplier for liquid line length		
		5/16"	3/8"	1/2"
All models	The data on nameplate	0.4 oz/ft	0.6 oz/ft	1.2 oz/ft

Table 7



New Installations — Calculating additional charge for lineset greater than 15 feet.

1. Total Line Length (ft) = _____ (a)
2. Standard Line set (ft) = 15 (b)
3. (a) minus (b) = _____ (c)
4. Refrigerant Multiplier = _____ (d)
5. Refrigerant Adder (c*d) = _____ (e*)

*If lineset is less than 15 feet, (e) = 0

Sealed-System Repairs — Calculating total system charge.

1. Total Line Length (ft) = _____ (a)
2. Standard Line set (ft) = 15 (b)
3. (a) minus (b) = _____ (c)
4. Refrigerant Multiplier = _____ (d)
5. Refrigerant Adder (c*d) = _____ (e*)
6. Factory Charge (nameplate) = _____ (f)
7. Total System Charge (e+f) = _____

*If line set is less than 15 feet, (e) = 0

The only mode approved for validating system charge is while in Cooling Mode. Outdoor Temperature must be between 55°F and 115°F with Indoor Temperature kept between 70°F and 80°F.

2. Ensure Sections 7, 8, 9, 10,11,12 and 13 have been completed.
3. Stabilize the system by operating for a minimum of 20 minutes.

At startup, or whenever charge is removed or added, the system must be operated for a minimum of 20 minutes to stabilize before accurate measurements can be made.

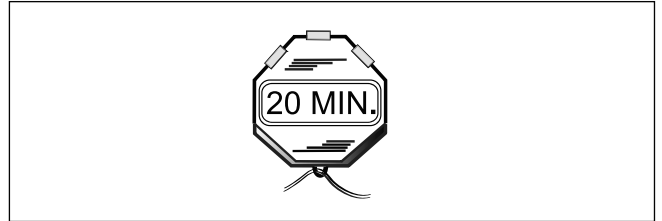


Figure 38

14.2 Liquid line pressure charging and refrigerant adjustment in cooling (above 55°F outdoor temp.)

1. Check the outdoor ambient temperatures.

Liquid line pressure (in cooling mode) is the only recommended method of charging above 55°F outdoor ambient temperatures.

For outdoor ambient temperatures below 55°F , use weigh-in charge method.

Note:It is important to return in the spring or summer to accurately charge the system in the cooling mode when outdoor ambient temperature is above 55°F.

4. Calculate liquid line pressure (According to Refrigerant Charging Chart)

- ▶ Measured Suction Line Pressure = _____ PSIG
- ▶ Outdoor Ambient Temperature = _____ °F
- ▶ Calculate Liquid Line Pressure = _____ PSIG

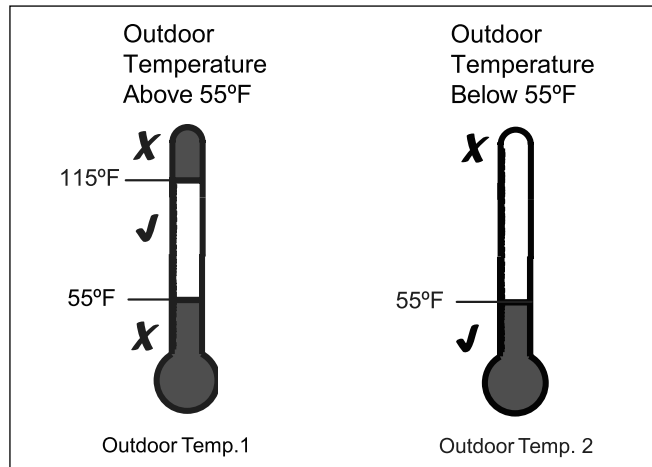


Figure 36

For best results the indoor temperature should be kept between 70°F to 80°F.

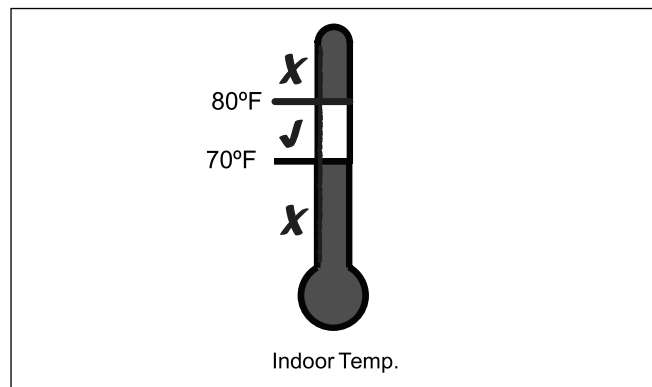


Figure 37

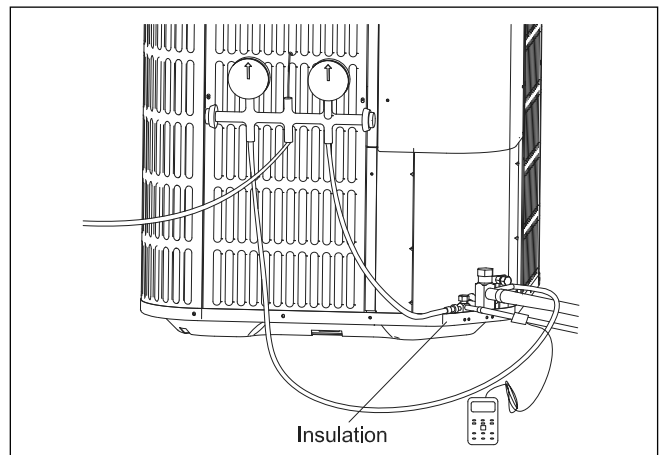


Figure 39

REFRIGERANT CHARGING CHART FOR AC SYSTEM

Cooling Mode		14 SEER R410A AC Charge Chart 1.5 TON												
		Outdoor Ambient Temperature(°F)												
		55	60	65	70	75	80	85	90	95	100	105	110	115
Suction Pressure at Large Service Valve(psig)	165			253	274	296	317	336	354	373	400	428	455	482
	161			251	272	294	315	334	352	371	398	426	453	480
	157			249	270	292	313	332	350	369	396	424	451	478
	153		231	247	268	290	311	330	348	367	394	422	449	476
	149		229	245	266	288	309	328	346	365	392	420	447	474
	145		227	243	264	286	307	326	344	363	390	418	445	472
	141	208	225	241	262	284	305	324	342	361	388	416	443	470
	137	206	223	239	260	282	303	322	340	359	386	414	441	468
	133	204	221	237	258	280	301	320	338	357	384	412	439	466
	129	202	219	235	256	278	299	318	336	355	382	410	437	464
	125	200	217	233	254	276	297	316	334	353	380	408	435	462
	121	198	215	231	252	274	295	314	332	351	378	406	433	460
	117	196	213	229	250	272	293	312	330	349	376	404	431	458
	113	194	211	227	248	270	291	310	328	347	374	402	429	456
	109	192	209	225	246	268	289	308	326	345	372	400	427	454
105	190	207	223	244	266	287	306	324	343	370	398	425	452	

Cooling Mode		14 SEER R410A AC Charge Chart 2 TON												
		Outdoor Ambient Temperature(°F)												
		55	60	65	70	75	80	85	90	95	100	105	110	115
Suction Pressure at Large Service Valve(psig)	165			256	275	295	314	336	357	379	405	431	457	483
	161			254	273	293	312	334	355	377	403	429	455	481
	157			252	271	291	310	332	353	375	401	427	453	479
	153		233	250	269	289	308	330	351	373	399	425	451	477
	149		231	248	267	287	306	328	349	371	397	423	449	475
	145		229	246	265	285	304	326	347	369	395	421	447	473
	141	210	227	244	263	283	302	324	345	367	393	419	445	471
	137	208	225	242	261	281	300	322	343	365	391	417	443	469
	133	206	223	240	259	279	298	320	341	363	389	415	441	467
	129	204	221	238	257	277	296	318	339	361	387	413	439	465
	125	202	219	236	255	275	294	316	337	359	385	411	437	463
	121	200	217	234	253	273	292	314	335	357	383	409	435	461
	117	198	215	232	251	271	290	312	333	355	381	407	433	459
	113	196	213	230	249	269	288	310	331	353	379	405	431	457
	109	194	211	228	247	267	286	308	329	351	377	403	429	455
105	192	209	226	245	265	284	306	327	349	375	401	427	453	

Cooling Mode		14 SEER R410A AC Charge Chart 2.5 TON												
		Outdoor Ambient Temperature(°F)												
		55	60	65	70	75	80	85	90	95	100	105	110	115
Suction Pressure at Large Service Valve(psig)	165			250	272	293	315	334	353	372	398	425	451	477
	161			248	270	291	313	332	351	370	396	423	449	475
	157			246	268	289	311	330	349	368	394	421	447	473
	153		227	244	266	287	309	328	347	366	392	419	445	471
	149		225	242	264	285	307	326	345	364	390	417	443	469
	145		223	240	262	283	305	324	343	362	388	415	441	467
	141	204	221	238	260	281	303	322	341	360	386	413	439	465
	137	202	219	236	258	279	301	320	339	358	384	411	437	463
	133	200	217	234	256	277	299	318	337	356	382	409	435	461
	129	198	215	232	254	275	297	316	335	354	380	407	433	459
	125	196	213	230	252	273	295	314	333	352	378	405	431	457
	121	194	211	228	250	271	293	312	331	350	376	403	429	455
	117	192	209	226	248	269	291	310	329	348	374	401	427	453
	113	190	207	224	246	267	289	308	327	346	372	399	425	451
	109	188	205	222	244	265	287	306	325	344	370	397	423	449
105	186	203	220	242	263	285	304	323	342	368	395	421	447	

Cooling Mode		14 SEER R410A AC Charge Chart 3 TON												
		Outdoor Ambient Temperature(°F)												
		55	60	65	70	75	80	85	90	95	100	105	110	115
Suction Pressure at Large Service Valve(psig)	165			257	277	296	316	339	361	384	410	436	462	488
	161			255	275	294	314	337	359	382	408	434	460	486
	157			253	273	292	312	335	357	380	406	432	458	484
	153		235	251	271	290	310	333	355	378	404	430	456	482
	149		233	249	269	288	308	331	353	376	402	428	454	480
	145		231	247	267	286	306	329	351	374	400	426	452	478
	141	212	229	245	265	284	304	327	349	372	398	424	450	476
	137	210	227	243	263	282	302	325	347	370	396	422	448	474
	133	208	225	241	261	280	300	323	345	368	394	420	446	472
	129	206	223	239	259	278	298	321	343	366	392	418	444	470
	125	204	221	237	257	276	296	319	341	364	390	416	442	468
	121	202	219	235	255	274	294	317	339	362	388	414	440	466
	117	200	217	233	253	272	292	315	337	360	386	412	438	464
	113	198	215	231	251	270	290	313	335	358	384	410	436	462
	109	196	213	229	249	268	288	311	333	356	382	408	434	460
105	194	211	227	247	266	286	309	331	354	380	406	432	458	

Cooling Mode		14 SEER R410A AC Charge Chart 3.5 TON												
		Outdoor Ambient Temperature(°F)												
		55	60	65	70	75	80	85	90	95	100	105	110	115
Suction Pressure at Large Service Valve(psig)	165			250	269	288	307	329	351	373	400	426	453	479
	161			248	267	286	305	327	349	371	398	424	451	477
	157			246	265	284	303	325	347	369	396	422	449	475
	153		227	244	263	282	301	323	345	367	394	420	447	473
	149		225	242	261	280	299	321	343	365	392	418	445	471
	145		223	240	259	278	297	319	341	363	390	416	443	469
	141	204	221	238	257	276	295	317	339	361	388	414	441	467
	137	202	219	236	255	274	293	315	337	359	386	412	439	465
	133	200	217	234	253	272	291	313	335	357	384	410	437	463
	129	198	215	232	251	270	289	311	333	355	382	408	435	461
	125	196	213	230	249	268	287	309	331	353	380	406	433	459
	121	194	211	228	247	266	285	307	329	351	378	404	431	457
	117	192	209	226	245	264	283	305	327	349	376	402	429	455
	113	190	207	224	243	262	281	303	325	347	374	400	427	453
	109	188	205	222	241	260	279	301	323	345	372	398	425	451
	105	186	203	220	239	258	277	299	321	343	370	396	423	449

Cooling Mode		14 SEER R410A AC Charge Chart 4 TON												
		Outdoor Ambient Temperature(°F)												
		55	60	65	70	75	80	85	90	95	100	105	110	115
Suction Pressure at Large Service Valve(psig)	165			258	277	297	316	339	361	384	411	438	465	492
	161			256	275	295	314	337	359	382	409	436	463	490
	157			254	273	293	312	335	357	380	407	434	461	488
	153		234	252	271	291	310	333	355	378	405	432	459	486
	149		232	250	269	289	308	331	353	376	403	430	457	484
	145		230	248	267	287	306	329	351	374	401	428	455	482
	141	210	228	246	265	285	304	327	349	372	399	426	453	480
	137	208	226	244	263	283	302	325	347	370	397	424	451	478
	133	206	224	242	261	281	300	323	345	368	395	422	449	476
	129	204	222	240	259	279	298	321	343	366	393	420	447	474
	125	202	220	238	257	277	296	319	341	364	391	418	445	472
	121	200	218	236	255	275	294	317	339	362	389	416	443	470
	117	198	216	234	253	273	292	315	337	360	387	414	441	468
	113	196	214	232	251	271	290	313	335	358	385	412	439	466
	109	194	212	230	249	269	288	311	333	356	383	410	437	464
	105	192	210	228	247	267	286	309	331	354	381	408	435	462

Cooling Mode		14 SEER R410A AC Charge Chart 5 TON												
		Outdoor Ambient Temperature(°F)												
		55	60	65	70	75	80	85	90	95	100	105	110	115
Suction Pressure at Large Service Valve(psig)	165			265	285	305	325	348	372	395	423	450	478	505
	161			263	283	303	323	346	370	393	421	448	476	503
	157			261	281	301	321	344	368	391	419	446	474	501
	153		242	259	279	299	319	342	366	389	417	444	472	499
	149		240	257	277	297	317	340	364	387	415	442	470	497
	145		238	255	275	295	315	338	362	385	413	440	468	495
	141	219	236	253	273	293	313	336	360	383	411	438	466	493
	137	217	234	251	271	291	311	334	358	381	409	436	464	491
	133	215	232	249	269	289	309	332	356	379	407	434	462	489
	129	213	230	247	267	287	307	330	354	377	405	432	460	487
	125	211	228	245	265	285	305	328	352	375	403	430	458	485
	121	209	226	243	263	283	303	326	350	373	401	428	456	483
	117	207	224	241	261	281	301	324	348	371	399	426	454	481
	113	205	222	239	259	279	299	322	346	369	397	424	452	479
	109	203	220	237	257	277	297	320	344	367	395	422	450	477
	105	201	218	235	255	275	295	318	342	365	393	420	448	475

REFRIGERANT CHARGING CHART FOR HP SYSTEM

Cooling Mode		14SEER R410A HP Charge Chart 1.5 TON(Cooling mode)												
		Outdoor Ambient Temperature(°F)												
		55	60	65	70	75	80	85	90	95	100	105	110	115
Suction Pressure at Large Service Valve(psig)	165			246	265	284	303	323	343	364	390	416	441	467
	161			244	263	282	301	321	341	362	388	414	439	465
	157			242	261	280	299	319	339	360	386	412	437	463
	153		221	240	259	278	297	317	337	358	384	410	435	461
	149		219	238	257	276	295	315	335	356	382	408	433	459
	145		217	236	255	274	293	313	333	354	380	406	431	457
	141	196	215	234	253	272	291	311	331	352	378	404	429	455
	137	195	213	232	251	269	288	309	328	350	376	402	427	453
	133	193	211	230	249	267	286	306	326	347	373	399	425	451
	129	191	209	228	247	265	284	304	323	344	370	397	423	449
	125	190	209	227	245	264	282	302	320	341	368	394	421	447
	121	190	208	226	244	262	280	300	320	341	367	393	419	445
	117	188	206	224	242	260	278	298	318	339	365	391	417	443
	113	186	204	222	240	258	276	296	316	337	363	389	415	441
	109	184	202	220	238	256	274	294	314	335	361	387	413	439
	105	182	200	218	236	254	272	292	312	333	359	385	411	437

Cooling Mode		14SEER R410A HP Charge Chart 2 TON(Cooling mode)												
		Outdoor Ambient Temperature(°F)												
		55	60	65	70	75	80	85	90	95	100	105	110	115
Suction Pressure at Large Service Valve(psig)	165			255	274	294	313	335	358	381	407	434	461	486
	161			253	272	292	311	333	356	379	405	432	459	484
	157			251	270	290	309	331	354	377	403	430	457	482
	153		230	249	268	288	307	329	352	375	401	428	455	480
	149		228	247	266	286	305	327	350	373	399	426	453	478
	145		226	245	264	284	303	325	348	371	397	424	451	476
	141	204	224	243	262	282	301	323	346	369	395	422	449	474
	137	203	222	241	260	279	298	320	344	367	393	420	447	472
	133	201	220	239	258	277	296	318	342	365	391	418	445	470
	129	199	218	237	256	275	294	316	340	363	389	416	443	468
	125	197	216	235	254	273	292	314	338	361	387	414	441	466
	121	195	214	233	252	271	290	312	336	359	385	412	439	464
	117	193	212	231	250	269	288	310	334	357	383	410	437	462
	113	191	210	229	248	267	286	308	332	355	381	408	435	460
	109	189	208	227	246	265	284	306	330	353	379	406	433	458
	105	187	206	225	244	263	282	304	328	351	377	404	431	456

Cooling Mode		14SEER R410A HP Charge Chart 2.5 TON(Cooling mode)												
		Outdoor Ambient Temperature(°F)												
		55	60	65	70	75	80	85	90	95	100	105	110	115
Suction Pressure at Large Service Valve(psig)	165			253	269	288	305	327	348	370	390	414	435	461
	161			251	267	286	303	325	346	368	388	412	433	459
	157			249	265	284	301	323	344	366	386	410	431	457
	153		231	247	263	282	299	321	342	364	384	408	429	455
	149		229	245	261	280	297	319	340	362	382	406	427	453
	145		227	243	259	278	295	317	338	360	380	404	425	451
	141	208	225	241	257	276	293	315	336	358	378	402	423	449
	137	206	223	239	255	274	291	313	334	356	376	400	421	447
	133	204	221	237	253	272	289	311	332	354	374	398	419	445
	129	202	219	235	251	270	287	309	330	352	372	396	417	443
	125	199	215	232	249	267	285	307	328	350	370	394	415	441
	121	195	213	230	247	267	285	306	327	348	368	392	413	439
	117	193	211	228	245	265	283	304	325	346	366	390	411	437
	113	191	209	226	243	263	281	302	323	344	364	388	409	435
	109	189	207	224	241	261	279	300	321	342	362	386	407	433
	105	187	205	222	239	259	277	298	319	340	360	384	405	431


Cooling Mode		14SEER R410A HP Charge Chart 3 TON(Cooling mode)												
		Outdoor Ambient Temperature(°F)												
		55	60	65	70	75	80	85	90	95	100	105	110	115
Suction Pressure at Large Service Valve(psig)	165			260	278	296	314	336	359	381	402	427	454	482
	161			258	276	294	312	334	357	379	400	425	452	480
	157			256	274	292	310	332	355	377	398	423	450	478
	153		236	254	272	290	308	330	352	374	395	420	448	476
	149		234	252	270	288	306	328	350	372	393	418	446	474
	145		232	250	268	286	304	326	347	369	390	416	444	472
	141	212	230	248	266	284	302	323	345	366	388	413	442	470
	137	210	228	246	264	282	300	321	342	363	385	411	439	468
	133	208	226	244	262	280	298	319	339	360	382	408	437	466
	129	206	224	242	260	278	296	316	337	357	379	406	435	464
	125	204	222	240	258	276	294	314	335	355	377	404	433	462
	121	202	220	238	256	274	292	312	333	353	375	402	431	460
	117	200	218	236	254	272	290	310	331	351	373	400	429	458
	113	198	216	234	252	270	288	308	329	349	371	398	427	456
	109	196	214	232	250	268	286	306	327	347	369	396	425	454
	105	194	212	230	248	266	284	304	325	345	367	394	423	452

Cooling Mode		14SEER R410A HP Charge Chart 3.5 TON(Cooling mode)												
		Outdoor Ambient Temperature(°F)												
		55	60	65	70	75	80	85	90	95	100	105	110	115
Suction Pressure at Large Service Valve(psig)	165			254	271	288	305	327	348	370	394	417	441	464
	161			252	269	286	303	325	346	368	392	415	439	462
	157			250	267	284	301	323	344	366	390	413	437	460
	153		231	248	265	282	299	321	342	364	388	411	435	458
	149		229	246	263	280	297	319	340	362	386	409	433	456
	145		227	244	261	278	295	317	338	360	384	407	431	454
	141	208	225	242	259	276	293	315	336	358	382	405	429	452
	137	206	223	240	257	274	291	313	334	356	380	403	427	450
	133	204	221	238	255	272	289	311	332	354	378	401	425	448
	129	202	219	236	253	270	287	309	330	352	376	399	423	446
	125	200	217	234	251	268	285	307	328	350	374	397	421	444
	121	198	215	232	249	266	283	305	326	348	372	395	419	442
	117	196	213	230	247	264	281	303	324	346	370	393	417	440
	113	194	211	228	245	262	279	301	322	344	368	391	415	438
	109	192	209	226	243	260	277	299	320	342	366	389	413	436
	105	190	207	224	241	258	275	297	318	340	364	387	411	434


Cooling Mode		14SEER R410A HP Charge Chart 4 TON(Cooling mode)												
		Outdoor Ambient Temperature(°F)												
		55	60	65	70	75	80	85	90	95	100	105	110	115
Suction Pressure at Large Service Valve(psig)	165			255	273	291	310	330	351	371	396	420	445	469
	161			253	271	289	308	328	349	369	394	418	443	467
	157			251	269	287	306	326	347	367	392	416	441	465
	153		231	249	267	285	304	324	345	365	390	414	439	463
	149		229	247	265	283	302	322	343	363	388	412	437	461
	145		227	245	263	281	300	320	341	361	386	410	435	459
	141	206	225	243	261	279	298	318	339	359	384	408	433	457
	137	204	223	241	259	277	296	316	337	357	382	406	431	455
	133	204	222	240	258	275	294	314	335	355	380	404	429	453
	129	202	220	238	256	273	292	312	333	353	378	402	427	451
	125	200	218	236	254	271	290	310	331	351	376	400	425	449
	121	198	216	234	252	269	288	308	329	349	374	398	423	447
	117	196	214	232	250	267	286	306	327	347	372	396	421	445
	113	194	212	230	248	265	284	304	325	345	370	394	419	443
	109	192	210	228	246	263	282	302	323	343	368	392	417	441
	105	190	208	226	244	261	280	300	321	341	366	390	415	439

Cooling Mode		14SEER R410A HP Charge Chart 5 TON(Cooling mode)												
		Outdoor Ambient Temperature(°F)												
		55	60	65	70	75	80	85	90	95	100	105	110	115
Suction Pressure at Large Service Valve(psig)	165			249	267	285	303	323	344	364	392	415	441	466
	161			247	265	283	301	321	342	362	391	413	439	464
	157			245	263	281	299	319	340	360	389	411	437	462
	153		225	243	261	279	297	317	338	358	387	409	435	460
	149		223	241	259	277	295	315	336	356	385	407	433	458
	145		221	239	257	275	293	313	334	354	383	405	431	456
	141	201	219	237	255	273	291	311	332	352	381	403	429	454
	137	199	217	235	253	271	289	309	330	350	379	401	427	452
	133	197	215	233	251	269	287	307	328	348	377	399	425	450
	129	195	213	231	249	267	285	305	326	346	375	397	423	448
	125	193	211	229	247	265	283	303	324	344	373	395	421	446
	121	191	209	227	245	263	281	301	322	342	371	393	419	444
	117	189	207	225	243	261	279	299	320	340	369	391	417	442
	113	187	205	223	241	259	277	297	318	338	367	389	415	440
	109	185	203	221	239	257	275	295	316	336	365	387	413	438
	105	183	201	219	237	255	273	293	314	334	363	385	411	436

5. Adjust refrigerant level to attain proper gage pressure.

 **Add refrigerant** if the design liquid line pressure is lower than the chart value.

- Connect gages to refrigerant bottle and unit as illustrated (Figure 40).
- Purge all hoses.
- Open bottle.
- Stop adding refrigerant when liquid line pressure matches the Refrigerant Charging Chart.

 **Recover refrigerant** if the design liquid line pressure is lower than the chart value.

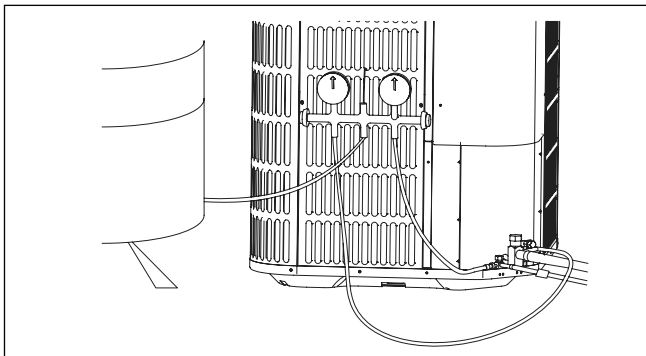



Figure 40

6. Stabilize the system.

- Wait 20 minutes for the system condition to stabilize between adjustments.

 When the liquid line pressure match the chart, the system is properly charged.

- Remove gages.
- Replace service port caps to prevent leaks. Tighten finger tight plus an additional 1/6 turn.

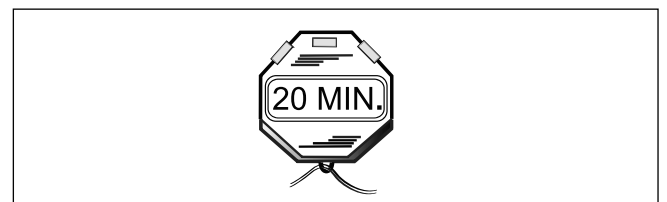


Figure 41

7. Record system information for reference (Table 8).

Record system pressures and temperatures after charging is complete.

Description	Value
Outdoor model number	
Measured Outdoor Ambient	°F
Measured Indoor Ambient	°F
Liquid Gage Pressure	PSIG
Suction Gage Pressure	PSIG

Table 8