

Application guidelines

Danfoss scroll compressors **SH090 to SH380 - single**

50 Hz - 60 Hz - R410A



50-60 Hz data

Model	Nominal tons 60 Hz	Nominal cooling capacity		Power input	COP	E.E.R.	Swept volume	Displacement ①	Oil charge	Net weight ②	
	TR	W	Btu/h	kW	W/W	Btu/h/W	cm ³ /rev	m ³ /h	dm ³	kg	
50 Hz	SH090	7.5	22300	76100	7.19	3.10	10.58	88.40	15.4	3.0	58.0
	SH105	9	26800	91500	8.47	3.17	10.82	103.50	18.0	3.3	64.0
	SH120	10	30000	102400	9.46	3.17	10.82	116.90	20.3	3.3	64.0
	SH140	12	34700	118400	10.58	3.28	11.19	133.00	23.1	3.3	67.0
	SH161	13	38800	132400	12.15	3.19	10.89	151.70	26.4	3.3	69.0
	SH184	15	44700	152600	13.73	3.25	11.09	170.30	29.6	3.6	71.5
	SH180	15	44500	151900	13.87	3.21	10.96	170.20	29.6	6.7	108.0
	SH240	20	59700	203800	18.50	3.23	11.02	227.60	39.6	6.7	108.0
	SH295*	25	73200	249800	22.51	3.25	11.09	276.20	48.1	6.7	111.0
	SH380	30	90500	308900	28.18	3.21	10.96	345.00	60.0	6.7	159.0
60 Hz	SH090	7.5	27100	92500	8.57	3.16	10.78	88.40	18.6	3.0	58.0
	SH105	9	32100	109600	9.96	3.22	10.99	103.50	21.8	3.3	64.0
	SH120	10	36800	125600	11.25	3.27	11.16	116.90	24.6	3.3	64.0
	SH140	12	42300	144400	12.77	3.31	11.30	133.00	27.9	3.3	67.0
	SH161	13	47200	161100	14.43	3.27	11.16	151.70	31.9	3.3	69.0
	SH184	15	54000	184300	16.45	3.28	11.19	170.30	35.8	3.6	71.5
	SH180	15	54300	185300	16.58	3.27	11.16	170.20	35.7	6.7	108.0
	SH240	20	72200	246400	22.10	3.27	11.16	227.60	47.8	6.7	108.0
	SH295*	25	88500	302000	27.21	3.25	11.09	276.20	58.0	6.7	111.0
	SH380	30	109600	374100	33.99	3.22	10.99	345.00	72.3	6.7	159.0

① Displacement at nominal speed: 2900 rpm at 50 Hz, 3500 rpm at 60 Hz

② Net weight with oil charge

TR: Ton of Refrigeration,
EER: Energy Efficiency Ratio
COP: Coefficient Of Performance,

Standard rating conditions: ARI standard
Refrigerant: R410A

Evaporating temperature: 7.2 °C
Condensing temperature: 54.4 °C

Superheat: 11.1 K
Subcooling: 8.3 K

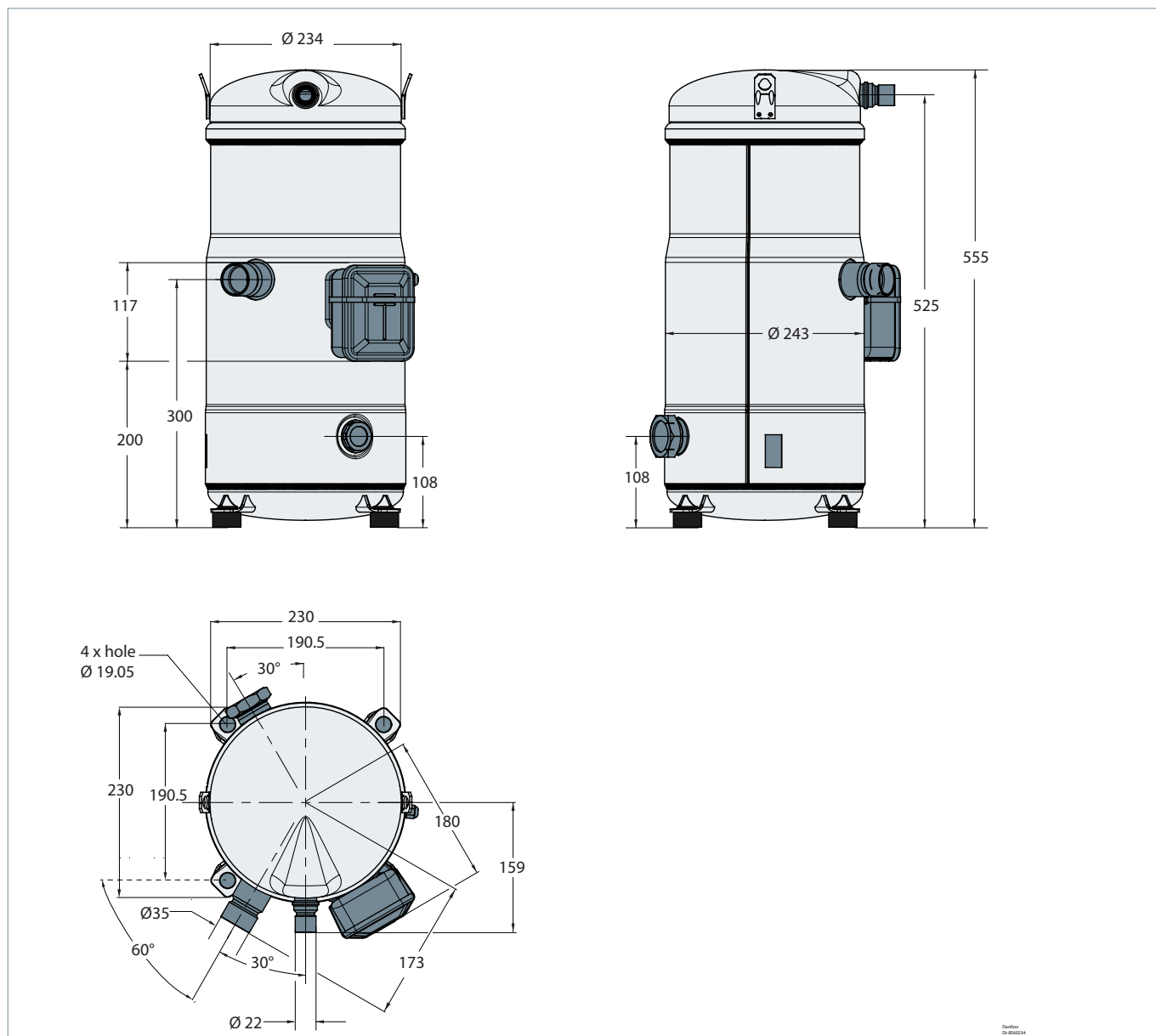
Subject to modification without prior notification.

Data given for motor code 4 compressor, for full data details and capacity tables refer to Online Datasheet Generator: www.danfoss.com/odsg

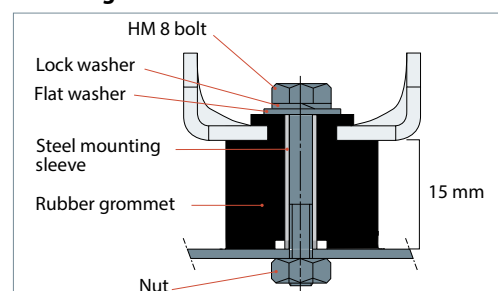
* SH295 replaces SH300. SH300 model remains available for after-market, please refer to datasheets for technical details.

Application Guidelines

SH184 code 4




Flexible grommet



Connection details

	SH 090 - 105 - 120 - 140 - 161 - 184	SH 180 - 240 - 295 - 380
Version	AL	
Suction and discharge connections	Brazed	Brazed
Oil sight glass	Threaded	Threaded
Oil equalisation connection	rotolock 1"3/4	rotolock 2"1/4
Oil drain connection	none	1/4" flare
Low pressure gauge port (schrader)	1/4" flare	1/4" flare

Suction and discharge connections

Brazed version		
		
Tube ODF		
Brazed		
SH090	Suction	1"1/8
	Discharge	7/8"
SH105 - 120 - 140 - 161 - 184	Suction	1"3/8
	Discharge	7/8"
SH180-240-295-380	Suction	1"5/8
	Discharge	1"1/8

Oil sight glass

All Danfoss SH scroll compressors come equipped with a sight glass (1"1/8 - 18 UNEF) which may be used to determine the amount and condition of the oil contained within the sump.

Oil equalisation connection

SH090-105-120-140-161-184: 1"3/4 rotolock connector allowing use of 1"3/4 - 7/8" or 1"3/4 - 1"1/8 sleeve.

SH180-240-295-380: 2"1/4 rotolock connector allowing the use of 2"1/4 - 1"3/8 or 2"1/4 - 1"5/8 sleeve.

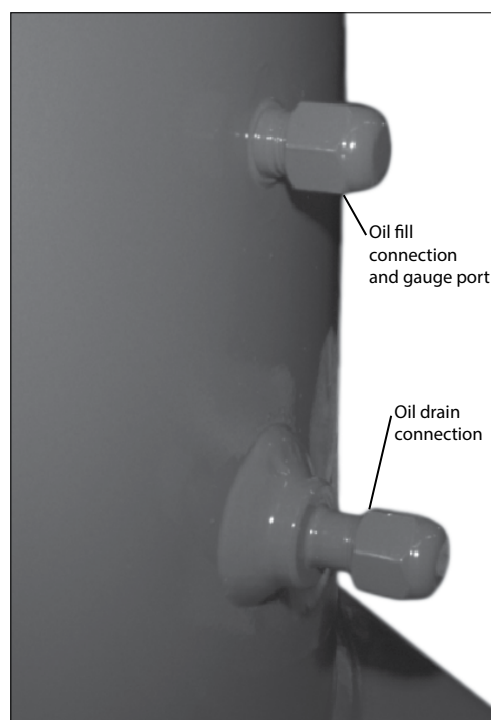
This connection must be used to mount an oil equalisation line when two or more compressors are mounted in parallel (please refer to Danfoss SH Parallel Application Guidelines FRCC.EC.008. for details).

Oil drain connection

The oil drain connection allows oil to be removed from the sump for changing, testing, etc. The fitting contains an extension tube into the oil sump to more effectively remove the oil. The connection is a female 1/4" flare fitting incorporating a schrader valve and is mounted on SH180 - 240 - 295 - 380 models only.

Schrader

The oil fill connection and gauge port is a 1/4" male flare connector incorporating a schrader valve.



Three phase electrical characteristics

Compressor model	LRA	MCC	Max. operating current	Winding resistance	
	A	A	A	Ω	
Motor voltage code 3 200-230V / 3ph / 60 Hz	SH090	203	43	38	0.39
	SH105	267	51	45	0.27
	SH120	267	61	48	0.27
	SH140	304	64	56	0.24
	SH161	315	69	64	0.22
	SH184	351	75	71	0.22
	SH180	380	78	71	0.19
	SH240	485	105	103	0.16
	SH295	560	128	112	0.13
SH380	717	170	155	0.09	
Motor voltage code 4 380-400 V / 3ph / 50 Hz * 460V / 3ph / 60Hz	SH090	98	22	19	1.47
	SH105	142	25	22	1.05
	SH120	142	29	24	1.05
	SH140	147	30	28	0.92
	SH161	158	35	31	0.83
	SH184	197	38.6	36	0.83
	SH180	170	38	34	0.8
	SH240	215	51	49	0.62
	SH295	260	62	56	0.52
SH380	320	79	72	0.42	
Motor voltage code 6 230 V / 3ph / 50 Hz	SH090	157	40	32	0.5
	SH105	223	43	38	0.35
	SH120	223	51	41	0.35
	SH140	236	53	49	0.31
	SH161	236	57	53	0.31
	SH184	236	57	56	0.31
Motor voltage code 7 500 V / 3ph / 50 Hz 575 V / 3 ph / 60 Hz	SH090	84	18	14	2.34
	SH105	103	22	17	1.57
	SH120	103	24	19	1.57
	SH140	122	26	22	1.38
	SH161	136	29	24	1.32
	SH184	135	35	28	1.32
	SH180	135	30	28	1.20
	SH240	175	41	38	0.94
	SH295	210	45	44	0.82
SH380	235	60	58	0.56	
Motor voltage code 9 380 V / 3ph / 60 Hz	SH090	124	26	23	1.05
	SH105	160	33	26	0.72
	SH120	160	35	29	0.72
	SH140	168	37	33	0.62
	SH161	177	41	37	0.57
	SH184	239	51	41	0.57
	SH180	210	46	44	0.52
	SH240	260	60	58	0.42
	SH295	310	72	69	0.36
SH380	382	90	88	0.24	

* 380-415V/3ph/50Hz for SH295

LRA (Locked Rotor Amp)

Locked Rotor Amp value is the higher average current as measured on mechanically blocked compressor tested under nominal voltage. The LRA value can be used as rough estimation for

the starting current. However in most cases, the real starting current will be lower. A soft starter can be applied to reduce starting current.

MCC (Maximum Continuous Current)

The MCC is the current at which the motor protection trips under maximum load and low voltage conditions. This MCC value is the maximum at which the compressor can be operated in transient conditions and out of

the application envelope. Above this value, the internal motor protection or external electronic module will cut-out the compressor to protect the motor.

General wiring information

The wiring diagrams below are examples for a safe and reliable compressor wiring. In case an alternative wiring logic is chosen, it is imperative to respect the following rules:

When a safety switch trips, the compressor must stop immediately and must not re-start until the tripping condition is back to normal and the safety switch is closed again. This applies to the LP safety switch, the HP safety switch, the discharge gas thermostat and the motor safety thermostat.

In specific situations, such as winter start operation, an eventual LP control for pump-down cycles may be temporarily bypassed to

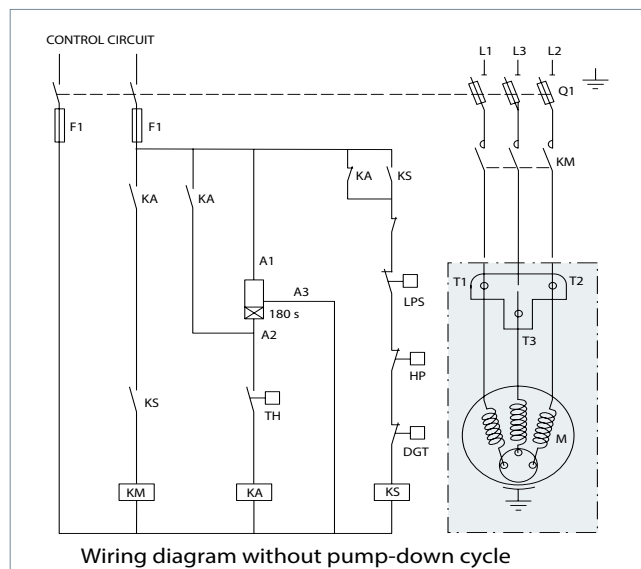
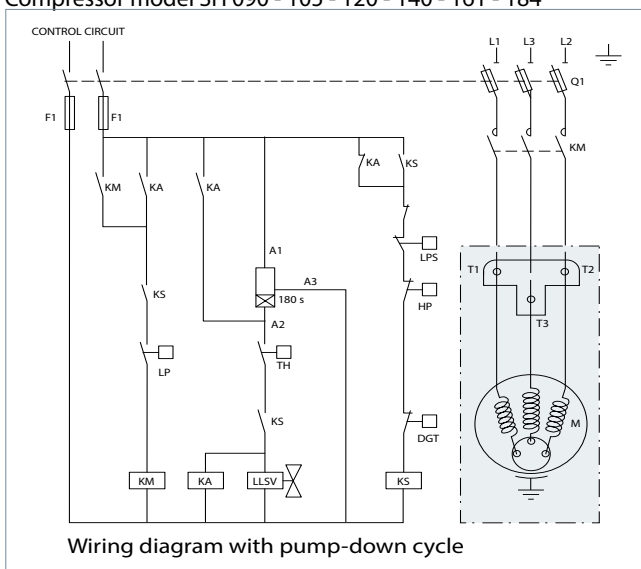
allow the system to build pressure. But it remains mandatory for compressor protection to apply an LP safety switch. The LP safety switch must never be bypassed.

Pressure settings for the LP and HP safety switch and pump-down listed in table from section "Low pressure".

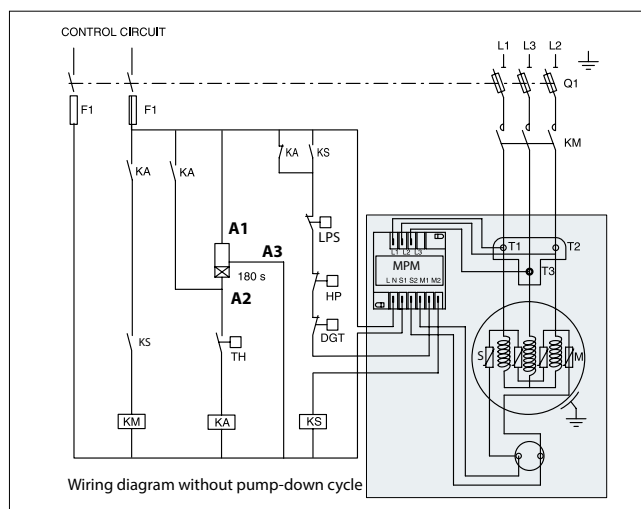
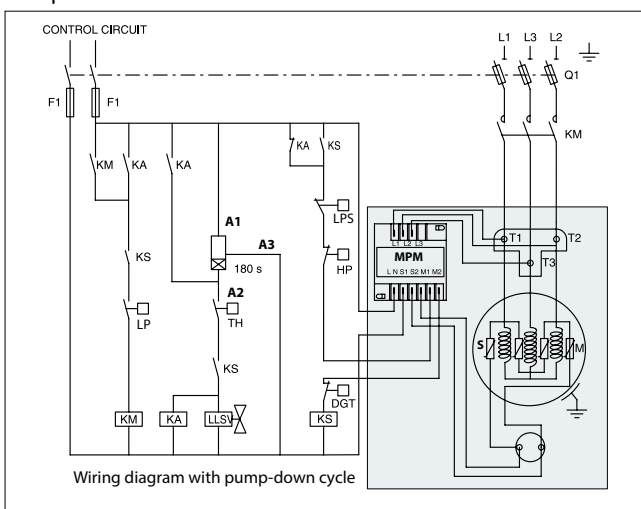
When ever possible (ie. PLC control), it is recommended to limit the possibilities of compressor auto restart to less than 3 to 5 times during a period of 12 hours when caused by motor protection or LP safety switch tripping. This control must be managed as a manual reset device.

Suggested wiring diagrams logic

Compressor model SH 090 - 105 - 120 - 140 - 161 - 184



Compressor model SH180-240-295-380



Industrial pack


Compressor model	Connections	Mounting feet	Motor protection	Code no.		
				3	4	9
				200-230/3/60	400/3/50 460/3/60	380/3/60
SH090	Brazed	Flexible	Internal	120H0002	120H0004	120H0010
SH105	Brazed	Flexible	Internal	120H0210	120H0212	120H0218
SH120	Brazed	Flexible	Internal	120H0012	120H0014	120H0020
SH140	Brazed	Flexible	Internal	120H0200	120H0202	120H0208
SH161	Brazed	Flexible	Internal	120H0022	120H0024	120H0030
SH184	Brazed	Flexible	Internal	120H0360	120H0362	120H0368
SH180	Brazed	Rigid	Module 24V AC *	120H0266	120H0268	-
	Brazed	Rigid	Module 110-240V *	-	120H0276	120H0280
SH240	Brazed	Rigid	Module 24V AC *	120H0290	120H0292	120H0296
	Brazed	Rigid	Module 110-240V *	120H0298	120H0300	120H0304
SH295	Brazed	Rigid	Module 24V AC*	120H0852	120H0826	120H0842
	Brazed	Rigid	Module 110-240V*	120H0854	120H0828	120H0844
SH380	Brazed	Rigid	Module 24V AC *	-	120H0254	120H0262
	Brazed	Rigid	Module 110-240V *	120H0252	120H0256	120H0264

* Electronic motor protection, module located in terminal box