

2-Way Solenoid Valves Series 110, 200, 240

Normally Closed

Features

- Compact size
- Snap-on clip for attaching solenoid coils
- No disassembly necessary for soldering

Standards

- 240 RA 16T11 and 20 are CE marked per PED

Capacity Data

Type	Nominal Capacity Q_n (kW)													kv-value m ³ /h	Δp min bar
	Liquid					Hot Gas				Suction Gas					
	R134a	R22	R404A R507	R407C	R407F	R134a	R22	R404A R507	R407C	R134a	R22	R507	R407C		
110 RB 2	3.5	3.8	2.5	3.6	4.2	1.6	2.0	1.7	2.1					0.2	0
200 RB 3	6.6	7.1	4.6	6.8	7.9	3.0	3.7	3.2	3.9					0.4	0.05
200 RB 4	15.5	16.8	10.9	16.1	18.8	7.1	8.8	7.5	9.2					0.9	0.05
200 RB 6	27.3	29.5	18.9	28.0	33.0	12.5	15.4	13.1	16.1					1.6	0.05
240 RA 8	36.3	39.3	25.2	37.3	43.9	16.7	20.5	17.4	21.4	4.2	5.6	4.6	5.2	2.3	0.05
240 RA 9	76.2	82.5	52.9	78.4	92.2	35.1	43.1	36.5	44.9	8.8	11.7	9.7	10.9	4.8	0.05
240 RA 12	85.7	92.8	59.5	88.1	103.7	39.4	48.4	41.1	50.5	9.9	13.1	10.9	12.3	5.4	0.05
240 RA 16	139.1	150.5	96.5	142.9	168.2	64.0	78.5	66.6	81.9	16.0	21.3	17.7	19.9	8.8	0.05
240 RA 20	202.6	219.3	140.7	208.3	245.2	93.2	114.4	97.1	119.3	33.0	31.0	25.7	29.0	12.8	0.05

Nominal capacities at +38°C condensing temperature, +4°C evaporating temperature, 0.15 bar pressure drop between valve inlet and outlet in liquid applications (for hot gas applications 1 bar pressure drop and +18 °C suction gas temperature); subcooling 1 K. Correction tables for other operating conditions see page 227

Selection Guide

Type	Part No.	Connection Solder / ODF	
		mm	Inch
110 RB 2	T2	801 217	6
	T2	801 210	1/4
	T3	801 209	10
200 RB 3	T3	801 239	10
200 RB 4	T3	801 176	10
	T3	801 190	3/8
	T4	801 178	12
	T4	801 179	1/2
200 RB 6	T4	801 182	12
	T4	801 183	1/2
	T5	801 186	16
240 RA 8	T5	801 160	5/8
	T7	801 143	7/8
240 RA 9	T5	801 161	5/8
	T7	801 162	7/8
	T9	801 142	1-1/8
240 RA 12	T9	801 163	7/8
	T11	801 144	1-1/8
240 RA 16	T9	801 164	1-1/8
	T11	801 166	35
240 RA 20	T11-M	801 172	35
	T13-M	801 224	42
	T13-M	801 173	1-5/8
	T17-M	801 174	54

Special Versions:

- Manual stems available upon request for Series 240 RA 8 to 240 RA 16 (Type M).

Manual stems standard on Series 240 RA 20.

Options:

- Actuation coils available for various voltages. see page 221



2-Way Solenoid Valves Series 540

Normally Open

Features

- Compact size
- Snap-on clip for attaching solenoid coils
- No disassembly necessary for soldering



540 RA

Capacity Data

Type	Nominal Capacity Q_n (kW)												kv-value m ³ /h	Δp min bar
	Liquid				Hot Gas				Suction Gas					
	R134a	R22	R404A R507	R407C	R134a	R22	R404A R507	R407C	R134a	R22	R507	R407C		
540 RA 8	36.3	39.3	25.2	37.3	16.7	20.5	17.4	21.4	4.2	5.6	4.6	5.2	2.3	0.05
540 RA 9	76.2	82.5	52.9	78.4	35.1	43.1	36.5	44.9	8.8	11.7	9.7	10.9	4.8	0.05
540 RA 12	85.7	92.8	59.5	88.1	39.4	48.4	41.1	50.5	9.9	13.1	10.9	12.3	5.4	0.05
540 RA 16	139.1	150.5	96.5	142.9	64.0	78.5	66.6	81.9	16.0	21.3	17.7	19.9	8.8	0.05
540 RA 20	202.6	219.3	140.7	208.3	93.2	114.4	97.1	119.3	23.3	31.0	25.7	29.0	12.8	0.05

Nominal capacities at +38°C condensing temperature, +4°C evaporating temperature, 0.15 bar pressure drop between valve inlet and outlet in liquid applications (for hot gas applications 1 bar pressure drop and +18 °C suction gas temperature); subcooling 1 K. Correction tables for other operating conditions see page 227.

Selection Guide

Type	Part No.	Connection Solder / ODF	
		mm	Inch
540 RA 8	T5	046 265	5/8
540 RA 9	T5	046 266	5/8
	T7	046 268	7/8
540 RA 12	T7	046 269	7/8
540 RA 16	T9	046 270	1-1/8
540 RA 20	T11	047 953	1-3/8

Options:

- Actuation coils available for various voltages, see page 221

Accessories and spare parts for solenoid valves

Description	Type	Part No.
Service tool for 110 RB, 240 RA, 540 RA	X 11981 - 1	027 451
Gasket kits		
110RB	KS 30040-2	801 232
200RB	KS 30039-1	801 233
240RA8	KS 30061-1	801 234
240RA9/12	KS 30062-1	801 235
240RA16	KS 30065-1	801 236
240RA20	KS 30097-1	801 237

Description	Type	Part No.
110RB	KS 30040-1	801 206
200RB	KS 30039/ KS 30109	801 205
240RA8	KS 30061	801 262
240RA9	KS 30062	801 263
240RA12	KS 30063	801 264
240RA16	KS 30065	801 200
240RA20	KS 30097	801 216

Correction Tables for the Selection of Solenoid Valves

For use with 110 RB, 200 RB, 240 RA and 540 RA Series

Valve selection for operating conditions other than nominal:

$$Q_n = Q_o \times K_t \times K_{\Delta p}$$

- Q_n : Nominal valve capacity
- K_t : Correction factor for evaporating and liquid temperature
- $K_{\Delta p}$: Correction factor for pressure drop at valve
- Q_o : Required cooling capacity

The pressure drop can be calculated with the following formula:

$$\Delta P_o = \Delta P_n \times \frac{Q_o^2}{Q_n^2}$$

$$\Delta P_n = 0.15 \text{ bar}$$

ΔP_n : Pressure drop under nominal conditions

1. Suction Gas Application

Evaporating Temperature °C	Correction Factor kt Condensing Temperature (°C)										
	+60	+55	+50	+45	+40	+35	+30	+25	+20		
+10	1.03	0.97	0.92	0.88	0.84	0.80	0.76	0.74	0.71		
0	1.40	1.32	1.25	1.20	1.14	1.10	1.04	1.01	0.96		
-10	1.71	1.62	1.53	1.47	1.40	1.34	1.27	1.23	1.18		
-20	2.20	2.08	1.97	1.88	1.80	1.72	1.64	1.58	1.51		
-30	2.79	2.63	2.50	2.39	2.27	2.19	2.07	2.01	1.92		
-40	3.68	3.47	3.29	3.15	3.00	2.89	2.73	2.65	2.53		
Correction Factor k Δp											
Δp (bar)	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55
K Δp	1.73	1.22	1.00	0.87	0.77	0.71	0.65	0.61	0.48	0.55	0.52

2. Liquid Application

Liquid Temperature entering valve °C	R134a						Correction Factor kt Evaporating Temperature (°C)								R22	
	+10	0	-10	-20	-30		+10	0	-10	-20	-30	-40				
+60	1.33	1.40	1.48	1.56	1.67		1.26	1.30	1.38	1.38	1.44	1.50				
+55	1.23	1.29	1.36	1.43	1.52		1.19	1.22	1.29	1.29	1.34	1.39				
+50	1.15	1.20	1.26	1.32	1.39		1.12	1.15	1.21	1.22	1.26	1.30				
+45	1.08	1.12	1.17	1.22	1.29		1.06	1.08	1.15	1.15	1.18	1.23				
+40	1.01	1.05	1.10	1.14	1.20		1.01	1.03	1.09	1.09	1.12	1.16				
+35	0.96	0.99	1.03	1.07	1.12		0.96	0.98	1.03	1.03	1.06	1.10				
+30	0.91	0.94	0.98	1.01	1.06		0.92	0.94	0.99	0.98	1.01	1.04				
+25	0.86	0.89	0.92	0.95	1.00		0.88	0.89	0.94	0.94	0.96	0.99				
+20	0.82	0.85	0.88	0.91	0.94		0.84	0.86	0.90	0.90	0.92	0.95				
+15	0.78	0.81	0.84	0.86	0.89		0.81	0.82	0.87	0.86	0.88	0.91				
+10	0.75	0.77	0.80	0.82	0.85		0.78	0.79	0.83	0.83	0.85	0.87				
+5		0.74	0.76	0.78	0.81		0.76		0.80	0.79	0.81	0.83				
0		0.71	0.73	0.75	0.78		0.73		0.77	0.77	0.78	0.80				
-5			0.70	0.72	0.74		0.74			0.74	0.75	0.77				
-10			0.68	0.69	0.71		0.72			0.71	0.73	0.74				
Correction Factor k Δp																
Δp (bar)	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	
K Δp	1.73	1.22	1.00	0.87	0.77	0.71	0.65	0.61	0.58	0.55	0.52	0.50	0.48	0.46	0.45	

2. Liquid Application

Liquid Temperature entering valve °C	R404A							Correction Factor kt Evaporating Temperature (°C)								R507	
	+10	0	-10	-20	-30	-40			+10	0	-10	-20	-30	-40			
+60	1.74	1.88	2.06	2.28	2.57	2.95			1.71	1.83	1.98	2.18	2.43	2.75			
+55	1.46	1.55	1.68	1.83	2.01	2.25			1.43	1.52	1.62	1.76	1.92	2.12			
+50	1.26	1.34	1.43	1.54	1.68	1.84			1.24	1.31	1.40	1.49	1.61	1.76			
+45	1.12	1.18	1.26	1.34	1.45	1.57			1.11	1.17	1.23	1.31	1.40	1.52			
+40	1.02	1.07	1.13	1.20	1.28	1.38			1.01	1.06	1.11	1.17	1.25	1.34			
+35	0.93	0.97	1.02	1.08	1.15	1.23			0.93	0.97	1.01	1.07	1.13	1.20			
+30	0.86	0.90	0.94	0.99	1.05	1.11			0.86	0.89	0.93	0.98	1.03	1.09			
+25	0.80	0.83	0.87	0.92	0.97	1.02			0.80	0.83	0.87	0.91	0.95	1.01			
+20	0.75	0.78	0.81	0.85	0.90	0.95			0.75	0.78	0.81	0.85	0.89	0.93			
+15	0.71	0.73	0.76	0.80	0.84	0.88			0.71	0.73	0.76	0.79	0.83	0.87			
+10	0.67	0.69	0.72	0.75	0.79	0.83			0.67	0.69	0.72	0.74	0.78	0.81			
+5		0.66	0.68	0.71	0.74	0.78				0.65	0.68	0.70	0.73	0.76			
0		0.63	0.65	0.68	0.71	0.74				0.62	0.64	0.66	0.69	0.72			
-5			0.62	0.65	0.67	0.70					0.61	0.63	0.65	0.68			
-10			0.60	0.62	0.64	0.67					0.58	0.60	0.62	0.64			
Liquid Temperature entering valve °C	R407C				Correction Factor kt Evaporating Temperature (°C)												
	+10	0	-10	-20													
+60																	
+55	1.28	1.34	1.40	1.48													
+50	1.17	1.22	1.27	1.33													
+45	1.08	1.12	1.17	1.22													
+40	1.01	1.04	1.08	1.13													
+35	0.94	0.98	1.01	1.05													
+30	0.89	0.92	0.95	0.99													
+25	0.84	0.87	0.90	0.93													
+20	0.80	0.82	0.85	0.88													
+15	0.76	0.78	0.81	0.84													
+10	0.73	0.75	0.77	0.80													
+5		0.72	0.74	0.76													
0		0.69	0.71	0.73													
-5			0.68	0.70													
-10			0.65	0.67													
Correction Factor kΔp																	
Δp (bar)	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75		
KΔp	1.73	1.22	1.00	0.87	0.77	0.71	0.65	0.61	0.58	0.55	0.52	0.50	0.48	0.46	0.45		

For Liquid Line Applications The Following Correction Factors (k_t) Related To Evaporating And Condensing Temperatures Apply

Liquid Temperature °C	R407F Correction factors for solenoid valves Evaporating temperature °C													
	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
+65	1.51	1.53	1.55	1.58	1.61	1.64	1.68	1.71	1.75	1.80	1.85	1.90	1.96	2.02
+60	1.35	1.37	1.39	1.41	1.43	1.46	1.49	1.52	1.55	1.59	1.63	1.67	1.71	1.76
+55	1.23	1.25	1.26	1.28	1.30	1.32	1.35	1.37	1.40	1.43	1.46	1.50	1.53	1.57
+50	1.14	1.15	1.16	1.18	1.20	1.22	1.24	1.26	1.28	1.31	1.33	1.36	1.39	1.43
+45	1.06	1.07	1.08	1.10	1.11	1.13	1.14	1.16	1.18	1.20	1.23	1.25	1.28	1.31
+40	0.99	1.00	1.01	1.02	1.04	1.05	1.07	1.08	1.10	1.12	1.14	1.16	1.18	1.21
+35	0.93	0.94	0.95	0.96	0.97	0.99	1.00	1.01	1.03	1.05	1.06	1.08	1.10	1.13
+30	0.88	0.89	0.90	0.91	0.92	0.93	0.94	0.95	0.97	0.98	1.00	1.02	1.03	1.05
+25	0.83	0.84	0.85	0.86	0.87	0.88	0.89	0.90	0.91	0.93	0.94	0.96	0.97	0.99
+20	0.79	0.80	0.81	0.82	0.82	0.83	0.84	0.85	0.87	0.88	0.89	0.91	0.92	0.94
+15	0.76	0.76	0.77	0.78	0.78	0.79	0.80	0.81	0.82	0.83	0.85	0.86	0.87	0.89
+10	0.72	0.73	0.74	0.74	0.75	0.76	0.77	0.77	0.78	0.79	0.81	0.82	0.83	0.84
+5	0.69	0.70	0.70	0.71	0.72	0.72	0.73	0.74	0.75	0.76	0.77	0.78	0.79	0.80
0	0.66	0.67	0.68	0.68	0.69	0.69	0.70	0.71	0.72	0.73	0.73	0.74	0.75	0.77
-5	0.64	0.64	0.65	0.65	0.66	0.67	0.67	0.68	0.69	0.70	0.70	0.71	0.72	0.73
-10	0.62	0.62	0.62	0.63	0.63	0.64	0.65	0.65	0.66	0.67	0.68	0.68	0.69	0.70

For Liquid Line Applications The Following Correction Factors ($k_{\Delta P}$) Related To The Pressure Drop At Valve Apply

Correction factors for solenoid valves															
ΔP (bar)	0.05	0.1	0.15	0.2	0.25	0.3	0.35	0.4	0.45	0.5	0.55	0.6	0.65	0.7	0.75
$k_{\Delta P}$	1.73	1.22	1	0.87	0.77	0.71	0.65	0.61	0.58	0.55	0.52	0.5	0.48	0.46	0.45

3. Hot Gas Application

Correction Factor k_t Evaporating Temperature (°C)											
	+10	+5	0	-5	-10	-15	-20	-25	-30	-35	-40
k_t	0.96	1.00	1.03	1.06	1.10	1.13	1.17	1.20	1.24	1.29	1.33
Correction Factor $k_{\Delta P}$											
Δp (bar)	0.35	0.50	0.70	1.00	1.50	2.00	2.50	3.00	4.00		
$K_{\Delta p}$	1.72	1.49	1.22	1.00	0.86	0.78	0.73	0.70	0.65		

3-Way Solenoid Valves Series M36

Features

- For heat reclaim application
- Pilot connection to suction line required. no minimum pressure drop
- Compact size
- Snap-on clip for attaching solenoid coils
- No disassembly necessary for brazing
- Max. allowable pressure PS: 35 bar

Options:

- Actuation coil and cable assemblies available for various voltages, see page 221



M36-118



M36-078 with ASC Coil and DS2 Chopper Plug

Capacity Data

Type	Part No.	Connection Solder/ODF		Nominal Capacity Q_n (kW)			kv-Value m^3/h	Coil Type
		mm	inch	R134a	R22	R404A / R507		
M36-078	801 420	22	7/8	28.9	35.1	31.3	6.7	ASC (Page 221)
M36-118	801 421		1-1/8					

Nominal capacities at +38°C condensing temperature. +4°C evaporating temperature (saturated pressures / dew point). 0.15 bar pressure drop between valve inlet and outlet.

Q_o : Required cooling capacity

K_t : Correction factor for evaporating and liquid temperature

$K_{\Delta p}$: Correction factor for pressure drop at valve

Q_n : Nominal valve capacity

For other operating conditions multiply required capacity Q_o with correction factors K_t and $K_{\Delta p}$.

$$Q_o \times K_t \times K_{\Delta p} = Q_n$$

Correction Tables

Correction Factor K_t Evaporating Temperature (°C)											
	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40
K_t	0.96	1.00	1.03	1.06	1.10	1.13	1.17	1.20	1.24	1.29	1.33
Correction Factor $K_{\Delta p}$ Pressure drop across Valve (bar)											
	0.10	0.14	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
$K_{\Delta p}$	1.22	1.00	0.87	0.71	0.61	0.55	0.50	0.46	0.43	0.41	0.39

Accessories and spare parts for series M36

Description	Part No.
Repair Kit for M36-UNF (O-Ring Gasket & pilot assembly)	801 440

Conversion Table 3031 Series to M36

3031 Series has been replaced by M36 Series

former type	Part No.	Replacement	Part No.
3031 RC 12S7	055 939	M36-078	801 420
3031 RC 12S9	055 940	M36-118	801 421