ENGINEERING TOMORROW

Data sheet (Preliminary)

Thermostatic expansion valves for R290

Product type TUB / TUBE and TCBE

TUA/TUAE valves are made of stainless steel and are therefore very suitable for refrigeration systems in the food industry.

Applications:

- Conventional refrigeration systems
- Heat pump systems
- Air conditioning systems
- Specialty refrigeration appliances
- Liquid chillers
- Ice machines
- Transport refrigeration

Features

- Bi-metal connections
  - Fast and easy soldering
  - No need for a wet cloth
- Compact design
  - Small dimensions
  - Light weight
  - For compact installation.
- Stainless steel
  - High body strength.
  - High corrosion resistance.
  - Highly vibration-resistant, flexible capillary tube.
- Laser-welded power element
  - Insures diaphragm´s structural integrity and lengthens life.
- Precision-machined cone and orifice
  - Accurately meters refrigerant under all operating conditions
- Stainless steel bulb
  - Self-aligning for fast and easy installation
  - Secured with a single strap or quick clip
  - More contact surface for better heat transfer
- Laser engraving
  - Durable positive valve identification no labels to peel off over time.

Technical data TUB/ TUBE

Type	TUB/TUBE
Body Material	Stainless steel
Direction	Angleway
Refrigerants	R290
Product group	Expansion valves
Product name	Thermostatic expansion valve
Temperature range	-40 – 10 °C / -40 – 50 °F
Inlet connection type	Solder ODF
Outlet connection type	Solder ODF
Capillary tube length	800 mm / 31 in
Static Superheat (SS)	4.0 °C / 7.2 °F
Packing format	Single pack
Max. Working Pressure	34 bar / 500 psig

Technical data TCBE

Type	TCBE
Body Material	Stainless steel
Direction	Straightway
Refrigerants	R290
Product group	Expansion valves
Product name	Thermostatic expansion valve
Temperature range	-40 – 10 °C / -40 – 50 °F
Inlet connection type	Solder ODF
Outlet connection type	Solder ODF
Capillary tube length	900 mm / 35 in
Static Superheat (SS)	4.0 °C / 7.2 °F
Packing format	Single pack
Max. Working Pressure	45.5 bar / 600 psig

This product is approved for R290 by ignition source assesment in accordance to standard EN 13463-1.

Ordering

Valve	Orifice	Connections		Design	Code no.
		[mm]	[in]		
TUB	X	–	1/4 x 3/8	Straightway	068U3700
	0	–	1/4 x 3/8	Straightway	068U3701
	1	–	1/4 x 3/8	Angleway	068U3702
TUBE	2	–	1/4 x 3/8	Angleway	068U3703
	3	–	1/4 x 3/8	Angleway	068U3704
	4	–	1/4 x 3/8	Angleway	068U3705
	5	–	1/4 x 3/8	Angleway	068U3706
	6	–	1/4 x 3/8	Angleway	068U3707
	7	–	1/4 x 3/8	Angleway	068U3708
	8	–	3/8 x 1/2	Angleway	068U3709
	9	–	3/8 x 1/2	Angleway	068U3710
TUB	X	6 x 12	–	Straightway	068U3711
	0	6 x 12	–	Straightway	068U3712
	1	6 x 12	–	Angleway	068U3713
TUBE	2	6 x 12	–	Angleway	068U3714
	3	6 x 12	–	Angleway	068U3715
	4	6 x 12	–	Angleway	068U3716
	5	6 x 12	–	Angleway	068U3717
	6	6 x 12	–	Angleway	068U3718
	7	6 x 12	–	Angleway	068U3719
	8	10 x 12	–	Angleway	068U3720
	9	10 x 12	–	Angleway	068U3721
TUB	1	–	1/4 x 1/2	Angleway	068U3731
	2	–	1/4 x 1/2	Angleway	068U3732
	3	–	1/4 x 1/2	Angleway	068U3733
	5	–	1/4 x 1/2	Angleway	068U3735
TUBE	4	–	1/4 x 1/2	Angleway	068U3734

Valve	Orifice	Connec-tions		Design	Code no.
TCBE	1	–	3/8 x 5/8	Straightway	068U4383
	2	–	1/2 x 5/8	Straightway	068U4384
	3	–	1/2 x 5/8	Straightway	068U4385
	1	10 x 16	–	Straightway	068U4386
	2	12 x 16	–	Straightway	068U4387
	3	12 x 16	–	Straightway	068U4388

Capacities

Type / Orifice	Rated capacities R290	
	kW	TR
TUB / TUBE Orifice X	0.49	0.14
TUB / TUBE Orifice 0	0.64	0.18
TUB / TUBE Orifice 1	0.94	0.27
TUB / TUBE Orifice 2	1.12	0.32
TUB / TUBE Orifice 3	1.46	0.42
TUB / TUBE Orifice 4	2.55	0.72
TUB / TUBE Orifice 5	3.39	0.96
TUB / TUBE Orifice 6	5.33	1.51
TUB / TUBE Orifice 7	7.03	2.00
TUB / TUBE Orifice 8	10.2	2.91
TUB / TUBE Orifice 9	14.3	4.05
TCBE Orifice 1	19.1	5.43
TCBE Orifice 2	22.2	6.30
TCBE Orifice 3	27.9	7.93

How to select a valve
Example:

Q (capacity)	= 0.7 kW
T_{con} (condensing temperature)	= 25 °C
T_{evap} (evaporator temperature)	= -20 °C
T_{sub} (subcooling temperature)	= 10 K
D_{pd} (distributer pressure drop)	= 1 bar

SI units

Q (capacity)	= 0.7 kW
f_{sub} (subcooling correction factor)	= 1.07
f_p (distributer correction factor)	= 0.94

$$\frac{Q}{f_{sub} \times f_p} = \text{Selected capacity}$$

$$\frac{0.7}{1.07 \times 0.94} = 0.7 \text{ kW}$$

The selection will be:
TUB/TUBE orifice 3 (0.87 kW > 0.7 kW)

Capacity in kW
Range -40 °C – 10 °C
Opening superheat sh = 4 K

SI units
R290

Valve	Orifice no.	Cond. temp. [°C]	Evaporating [°C]		
			-40	-30	-20
TUB / TUBE	1	25	0.32	0.44	0.57
	2	25	0.35	0.49	0.65
	3	25	0.48	0.66	0.87
	4	25	0.75	1.05	1.41
	5	25	1.01	1.41	1.89

Subcooling correction factor 'fsub'

Subcooling [K]	2	4	10	15
Correction factor	0.98	1.00	1.07	1.12

Distributer correction factor 'fp' *

Pressure drop [bar]	Evaporating temp.			
	-40	-30	-20	-10
	Correction factor			
0	1	1	1	1
1	0.95	0.95	0.94	0.93
1.5	0.92	0.92	0.91	0.90
2	0.90	0.89	0.88	0.86

Capacities

Capacity in kW, range -40 – 10 °C

Opening superheat sh = 4 K

SI units R290

Valve	Orifice	Cond. temp. [°C]	Evaporating [°C]					
			-40	-30	-20	-10	0	10
TUB / TUBE	X	25	0.17	0.24	0.31	0.38	0.42	0.42
	0	25	0.22	0.30	0.39	0.48	0.55	0.55
	1	25	0.32	0.44	0.57	0.71	0.80	0.80
	2	25	0.35	0.49	0.65	0.81	0.95	0.98
	3	25	0.48	0.66	0.87	1.08	1.24	1.25
	4	25	0.75	1.05	1.41	1.79	2.13	2.26
	5	25	1.01	1.41	1.89	2.40	2.85	3.00
	6	25	1.57	2.18	2.93	3.74	4.46	4.76
	7	25	2.08	2.89	3.88	4.95	5.89	6.25
	8	25	3.09	4.31	5.77	7.33	8.64	8.99
	9	25	4.12	5.74	7.73	10.0	12.0	12.9
TCBE	1	25	9.30	11.9	14.3	16.2	16.9	15.5
	2	25	10.1	13.1	16.0	18.4	19.5	18.1
	3	25	11.8	15.5	19.3	22.7	24.5	23.1

Valve	Orifice	Cond. temp. [°C]	Evaporating [°C]					
			-40	-30	-20	-10	0	10
TUB / TUBE	X	35	0.17	0.24	0.32	0.40	0.47	0.52
	0	35	0.22	0.30	0.40	0.51	0.61	0.68
	1	35	0.32	0.44	0.59	0.75	0.90	0.99
	2	35	0.35	0.49	0.67	0.86	1.06	1.21
	3	35	0.48	0.67	0.90	1.15	1.39	1.54
	4	35	0.75	1.06	1.45	1.90	2.38	2.78
	5	35	1.01	1.43	1.94	2.55	3.18	3.69
	6	35	1.58	2.21	3.02	3.96	4.97	5.84
	7	35	2.09	2.93	3.99	5.24	6.56	7.68
	8	35	3.09	4.34	5.91	7.75	9.62	11.1
	9	35	4.18	5.82	7.94	10.5	13.3	15.8
TCBE	1	35	9.30	12.0	14.8	17.2	18.9	19.2
	2	35	10.0	13.1	16.4	19.6	21.8	22.3
	3	35	11.5	15.3	19.6	23.9	27.3	28.5

Subcooling correction factor 'fsub'

Subcooling [K]	2	4	10	15	20	25	30	35	40	45	50
Correction factor	0.98	1.00	1.07	1.12	1.17	1.23	1.28	1.33	1.39	1.44	1.49

Distributer correction factor 'fp' *

Evaporating temp.		-40	-30	-20	-10	0	10
Pressure drop [bar]	0	1	1	1	1	1	1
	1	0.95	0.95	0.94	0.93	0.92	0.89
	1.5	0.92	0.92	0.91	0.90	0.88	0.84
	2	0.90	0.89	0.88	0.86	0.83	0.77

**calculated at 32 °C condensing temperature*

Capacities

Capacity in kW, range -40 – 10 °C

Opening superheat sh = 4 K

SI units R290

Valve	Orifice	Cond. temp. [°C]	Evaporating [°C]					
			-40	-30	-20	-10	0	10
TUB / TUBE	X	45	0.17	0.23	0.31	0.40	0.50	0.57
	0	45	0.21	0.29	0.40	0.52	0.64	0.74
	1	45	0.31	0.43	0.58	0.76	0.94	1.09
	2	45	0.34	0.48	0.66	0.87	1.11	1.32
	3	45	0.47	0.65	0.89	1.16	1.45	1.70
	4	45	0.73	1.04	1.44	1.92	2.48	3.05
	5	45	0.99	1.40	1.93	2.58	3.31	4.05
	6	45	1.55	2.18	3.00	4.00	5.16	6.37
	7	45	2.05	2.88	3.96	5.29	6.82	8.39
	8	45	3.02	4.24	5.84	7.79	9.99	12.1
	9	45	4.14	5.74	7.85	10.50	13.7	17.1
TCBE	1	45	9.02	11.8	14.7	17.6	19.9	21.2
	2	45	9.66	12.8	16.3	19.8	22.89	24.8
	3	45	11.0	14.7	19.1	23.8	28.3	31.4

Valve	Orifice	Cond. temp. [°C]	Evaporating [°C]					
			-40	-30	-20	-10	0	10
TUB / TUBE	X	55	0.16	0.22	0.30	0.39	0.49	0.58
	0	55	0.20	0.28	0.38	0.50	0.64	0.76
	1	55	0.29	0.41	0.56	0.74	0.93	1.11
	2	55	0.32	0.46	0.64	0.85	1.10	1.35
	3	55	0.44	0.63	0.86	1.14	1.44	1.74
	4	55	0.70	1.00	1.39	1.87	2.46	3.11
	5	55	0.95	1.34	1.86	2.51	3.28	4.13
	6	55	1.50	2.10	2.90	3.90	5.11	6.48
	7	55	1.97	2.77	3.82	5.15	6.75	8.55
	8	55	2.90	4.06	5.61	7.56	9.87	12.4
	9	55	4.02	5.53	7.55	10.2	13.4	17.1
TCBE	1	55	8.56	11.3	14.2	17.2	19.9	21.9
	2	55	9.12	12.2	15.6	19.3	22.8	25.5
	3	55	10.2	13.8	18.0	22.8	27.7	32.0

Subcooling correction factor 'fsub'

Subcooling [K]	2	4	10	15	20	25	30	35	40	45	50
Correction factor	0.98	1.00	1.07	1.12	1.17	1.23	1.28	1.33	1.39	1.44	1.49

Distributer correction factor 'fp' *

Evaporating temp.		-40	-30	-20	-10	0	10
Pressure drop [bar]	0	1	1	1	1	1	1
	1	0.95	0.95	0.94	0.93	0.92	0.89
	1.5	0.92	0.92	0.91	0.90	0.88	0.84
	2	0.90	0.89	0.88	0.86	0.83	0.77

**calculated at 32 °C condensing temperature*