

ENGINEERING  
TOMORROW

*Danfoss*

Application guidelines

# Danfoss scroll compressors **SM SY SZ**

R22 - R407C - R134a - R404A - R507A - R513A - 50 - 60 Hz



<http://cc.danfoss.com>

Danfoss scroll compressors are available both as single compressors and as tandem units. The example below presents the single compressor nomenclature which equals the technical reference as shown on the compressor nameplate.

Code numbers for ordering list are in section "Ordering information & packaging".

For tandem and trio assemblies, please refer to the Danfoss Parallel Application Guidelines documentation FRCC.PC.005.

Nomenclature

| Family, lubricant & refrigerant  | Nominal capacity                    | -                                     | Voltage                       | Version               | Evolution index      |  |                       |            |                |            |                             |          |          |                               |          |          |               |                     |          |          |           |          |            |  |                              |          |                 |       |          |                   |          |                     |           |                                     |             |           |                     |           |                                       |           |                     |  |           |                                     |       |           |                     |
|--|-------------------------------------|---------------------------------------|-------------------------------|-----------------------|----------------------|--|-----------------------|------------|----------------|------------|-----------------------------|----------|----------|-------------------------------|----------|----------|---------------|---------------------|----------|----------|-----------|----------|------------|--|------------------------------|----------|-----------------|-------|----------|-------------------|----------|---------------------|-----------|-------------------------------------|-------------|-----------|---------------------|-----------|---------------------------------------|-----------|---------------------|--|-----------|-------------------------------------|-------|-----------|---------------------|
| <b>SZ</b><br><b>SY</b>   | <b>185</b><br><b>300</b>            | <b>-</b>                              | <b>4</b><br><b>7</b>          | <b>R</b><br><b>CA</b> | <b>C</b><br><b>A</b> | Single compressors<br><br>Single compressors |                       |            |                |            |                             |          |          |                               |          |          |               |                     |          |          |           |          |            |  |                              |          |                 |       |          |                   |          |                     |           |                                     |             |           |                     |           |                                       |           |                     |  |           |                                     |       |           |                     |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;">Motor protection type</th> <th style="width: 10%;">Connection</th> <th style="width: 15%;">Module voltage</th> <th style="width: 45%;">Applies to</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Internal overload protector</td> <td><b>V</b></td> <td>: brazed</td> <td>S 084-090-100-110-120-148-161</td> </tr> <tr> <td><b>A</b></td> <td>: brazed</td> <td>S 112-124-147</td> </tr> <tr> <td rowspan="2">Internal thermostat</td> <td><b>C</b></td> <td>: brazed</td> <td>S 175-185</td> </tr> <tr> <td><b>R</b></td> <td>: rotolock</td> <td></td> </tr> <tr> <td rowspan="6">Electronic protection module</td> <td><b>P</b></td> <td>: brazed 24V AC</td> <td rowspan="2">S 185</td> </tr> <tr> <td><b>X</b></td> <td>: brazed 110-240V</td> </tr> <tr> <td><b>Y</b></td> <td>: rotolock 110-240V</td> </tr> <tr> <td><b>CA</b></td> <td><b>C</b>: brazed <b>A</b>: 24V AC</td> <td rowspan="3">S 240 - 300</td> </tr> <tr> <td><b>CB</b></td> <td><b>B</b>: 110-240V</td> </tr> <tr> <td><b>PA</b></td> <td><b>P</b>: rotolock <b>A</b>: 24V AC</td> </tr> <tr> <td><b>PB</b></td> <td><b>B</b>: 110-240V</td> <td></td> </tr> <tr> <td><b>CA</b></td> <td><b>C</b>: brazed <b>A</b>: 24V AC</td> <td rowspan="2">S 380</td> </tr> <tr> <td><b>CB</b></td> <td><b>B</b>: 110-240V</td> </tr> </tbody> </table> |                                     |                                       |                               |                       |                      |  | Motor protection type | Connection | Module voltage | Applies to | Internal overload protector | <b>V</b> | : brazed | S 084-090-100-110-120-148-161 | <b>A</b> | : brazed | S 112-124-147 | Internal thermostat | <b>C</b> | : brazed | S 175-185 | <b>R</b> | : rotolock |  | Electronic protection module | <b>P</b> | : brazed 24V AC | S 185 | <b>X</b> | : brazed 110-240V | <b>Y</b> | : rotolock 110-240V | <b>CA</b> | <b>C</b> : brazed <b>A</b> : 24V AC | S 240 - 300 | <b>CB</b> | <b>B</b> : 110-240V | <b>PA</b> | <b>P</b> : rotolock <b>A</b> : 24V AC | <b>PB</b> | <b>B</b> : 110-240V |  | <b>CA</b> | <b>C</b> : brazed <b>A</b> : 24V AC | S 380 | <b>CB</b> | <b>B</b> : 110-240V |
| Motor protection type  | Connection                          | Module voltage                        | Applies to                    |                       |                      |  |                       |            |                |            |                             |          |          |                               |          |          |               |                     |          |          |           |          |            |  |                              |          |                 |       |          |                   |          |                     |           |                                     |             |           |                     |           |                                       |           |                     |  |           |                                     |       |           |                     |
| Internal overload protector  | <b>V</b>                            | : brazed                              | S 084-090-100-110-120-148-161 |                       |                      |  |                       |            |                |            |                             |          |          |                               |          |          |               |                     |          |          |           |          |            |  |                              |          |                 |       |          |                   |          |                     |           |                                     |             |           |                     |           |                                       |           |                     |  |           |                                     |       |           |                     |
|  | <b>A</b>                            | : brazed                              | S 112-124-147                 |                       |                      |  |                       |            |                |            |                             |          |          |                               |          |          |               |                     |          |          |           |          |            |  |                              |          |                 |       |          |                   |          |                     |           |                                     |             |           |                     |           |                                       |           |                     |  |           |                                     |       |           |                     |
| Internal thermostat  | <b>C</b>                            | : brazed                              | S 175-185                     |                       |                      |  |                       |            |                |            |                             |          |          |                               |          |          |               |                     |          |          |           |          |            |  |                              |          |                 |       |          |                   |          |                     |           |                                     |             |           |                     |           |                                       |           |                     |  |           |                                     |       |           |                     |
|  | <b>R</b>                            | : rotolock                            |                               |                       |                      |  |                       |            |                |            |                             |          |          |                               |          |          |               |                     |          |          |           |          |            |  |                              |          |                 |       |          |                   |          |                     |           |                                     |             |           |                     |           |                                       |           |                     |  |           |                                     |       |           |                     |
| Electronic protection module   | <b>P</b>                            | : brazed 24V AC                       | S 185                         |                       |                      |  |                       |            |                |            |                             |          |          |                               |          |          |               |                     |          |          |           |          |            |  |                              |          |                 |       |          |                   |          |                     |           |                                     |             |           |                     |           |                                       |           |                     |  |           |                                     |       |           |                     |
|  | <b>X</b>                            | : brazed 110-240V                     |                               |                       |                      |  |                       |            |                |            |                             |          |          |                               |          |          |               |                     |          |          |           |          |            |  |                              |          |                 |       |          |                   |          |                     |           |                                     |             |           |                     |           |                                       |           |                     |  |           |                                     |       |           |                     |
|  | <b>Y</b>                            | : rotolock 110-240V                   |                               |                       |                      |  |                       |            |                |            |                             |          |          |                               |          |          |               |                     |          |          |           |          |            |  |                              |          |                 |       |          |                   |          |                     |           |                                     |             |           |                     |           |                                       |           |                     |  |           |                                     |       |           |                     |
|  | <b>CA</b>                           | <b>C</b> : brazed <b>A</b> : 24V AC   | S 240 - 300                   |                       |                      |  |                       |            |                |            |                             |          |          |                               |          |          |               |                     |          |          |           |          |            |  |                              |          |                 |       |          |                   |          |                     |           |                                     |             |           |                     |           |                                       |           |                     |  |           |                                     |       |           |                     |
|  | <b>CB</b>                           | <b>B</b> : 110-240V                   |                               |                       |                      |  |                       |            |                |            |                             |          |          |                               |          |          |               |                     |          |          |           |          |            |  |                              |          |                 |       |          |                   |          |                     |           |                                     |             |           |                     |           |                                       |           |                     |  |           |                                     |       |           |                     |
|  | <b>PA</b>                           | <b>P</b> : rotolock <b>A</b> : 24V AC |                               |                       |                      |  |                       |            |                |            |                             |          |          |                               |          |          |               |                     |          |          |           |          |            |  |                              |          |                 |       |          |                   |          |                     |           |                                     |             |           |                     |           |                                       |           |                     |  |           |                                     |       |           |                     |
| <b>PB</b>  | <b>B</b> : 110-240V                 |                                       |                               |                       |                      |  |                       |            |                |            |                             |          |          |                               |          |          |               |                     |          |          |           |          |            |  |                              |          |                 |       |          |                   |          |                     |           |                                     |             |           |                     |           |                                       |           |                     |  |           |                                     |       |           |                     |
| <b>CA</b>  | <b>C</b> : brazed <b>A</b> : 24V AC | S 380                                 |                               |                       |                      |  |                       |            |                |            |                             |          |          |                               |          |          |               |                     |          |          |           |          |            |  |                              |          |                 |       |          |                   |          |                     |           |                                     |             |           |                     |           |                                       |           |                     |  |           |                                     |       |           |                     |
| <b>CB</b>  | <b>B</b> : 110-240V                 |                                       |                               |                       |                      |  |                       |            |                |            |                             |          |          |                               |          |          |               |                     |          |          |           |          |            |  |                              |          |                 |       |          |                   |          |                     |           |                                     |             |           |                     |           |                                       |           |                     |  |           |                                     |       |           |                     |

**Family, lubricant & refrigerant**  
**SM**: Scroll, Mineral oil, R22/R417A\*  
**SY**: Scroll, POE lubricant, R22/R417A/R407C/R134a/R513A\*\*  
**SZ**: Scroll, POE lubricant, R407C - R134a (R404A, R507A for SZ084 to SZ185, R513A for SZ148 to SZ185 \*\*)

**Nominal capacity**  
in thousand Btu/h at 60 Hz, R22, ARI conditions

**Motor voltage code**  
**3**: 200-230V/3~/60 Hz  
**4**: 380-400V/3~/50 Hz - 460V/3~/60 Hz  
**SY380**: 380-415V/3~/50 Hz - 460V/3~/60 Hz  
**6**: 230V/3~/50 Hz  
**7**: 500V/3~/50 Hz - 575V/3~/60 Hz  
**9**: 380V/3~/60 Hz  
**SY380**: 380-400V/3~/60 Hz

\* When SM compressors are used with R417A, the factory charged mineral oil 160P must be replaced by polyolester oil 160SZ  
\*\* Only motor voltage 4 are qualified with R513A

## Application Guidelines      Technical specifications

### 50 Hz data

| Model        | Nominal Cap. 60 Hz | Nominal cooling capacity |         | Power input | COP   | E.E.R.   | Swept volume         | Displacement      | Oil charge      | Net weight |     |
|--------------|--------------------|--------------------------|---------|-------------|-------|----------|----------------------|-------------------|-----------------|------------|-----|
|              | TR                 | W                        | Btu/h   | kW          | W/W   | Btu/h /W | cm <sup>3</sup> /rev | m <sup>3</sup> /h | dm <sup>3</sup> | kg         |     |
| R22 SINGLE   | SM084              | 7                        | 20 400  | 69 600      | 6.12  | 3.33     | 11.4                 | 114.5             | 19.9            | 3.25       | 64  |
|              | SM090              | 7.5                      | 21 800  | 74 400      | 6.54  | 3.33     | 11.4                 | 120.5             | 21.0            | 3.25       | 65  |
|              | SM100              | 8                        | 23 100  | 78 800      | 6.96  | 3.33     | 11.4                 | 127.2             | 22.1            | 3.25       | 65  |
|              | SM110              | 9                        | 25 900  | 88 400      | 7.82  | 3.32     | 11.3                 | 144.2             | 25.1            | 3.25       | 73  |
|              | SM112              | 9.5                      | 27 600  | 94 200      | 7.92  | 3.49     | 11.9                 | 151.5             | 26.4            | 3.30       | 64  |
|              | SM120              | 10                       | 30 100  | 102 700     | 8.96  | 3.36     | 11.5                 | 166.6             | 29.0            | 3.25       | 73  |
|              | SM124              | 10                       | 31 200  | 106 500     | 8.75  | 3.56     | 12.2                 | 169.5             | 29.5            | 3.30       | 64  |
|              | SM147              | 12                       | 36 000  | 122 900     | 10.08 | 3.57     | 12.2                 | 193.5             | 33.7            | 3.30       | 67  |
|              | SM148              | 12                       | 36 100  | 123 200     | 10.8  | 3.34     | 11.4                 | 199.0             | 34.6            | 3.60       | 88  |
|              | SM161              | 13                       | 39 000  | 133 100     | 11.59 | 3.37     | 11.5                 | 216.6             | 37.7            | 3.60       | 88  |
|              | SM175              | 14                       | 42 000  | 143 300     | 12.47 | 3.37     | 11.5                 | 233.0             | 40.5            | 6.20       | 100 |
|              | SM/SY185           | 15                       | 45 500  | 155 300     | 13.62 | 3.34     | 11.4                 | 249.9             | 43.5            | 6.20       | 100 |
|              | SY240              | 20                       | 61 200  | 208 900     | 18.2  | 3.36     | 11.5                 | 347.8             | 60.5            | 8.00       | 150 |
| SY300        | 25                 | 78 200                   | 266 900 | 22.83       | 3.43  | 11.7     | 437.5                | 76.1              | 8.00            | 157        |     |
| SY380        | 30                 | 94 500                   | 322 500 | 27.33       | 3.46  | 11.8     | 531.2                | 92.4              | 8.40            | 158        |     |
| R407C SINGLE | SZ084              | 7                        | 19 300  | 65 900      | 6.13  | 3.15     | 10.8                 | 114.5             | 19.9            | 3.25       | 64  |
|              | SZ090              | 7.5                      | 20 400  | 69 600      | 6.45  | 3.16     | 10.8                 | 120.5             | 21.0            | 3.25       | 65  |
|              | SZ100              | 8                        | 21 600  | 73 700      | 6.84  | 3.15     | 10.8                 | 127.2             | 22.1            | 3.25       | 65  |
|              | SZ110              | 9                        | 24 600  | 84 000      | 7.76  | 3.17     | 10.8                 | 144.2             | 25.1            | 3.25       | 73  |
|              | SZ120              | 10                       | 28 600  | 97 600      | 8.99  | 3.17     | 10.8                 | 166.6             | 29.0            | 3.25       | 73  |
|              | SZ147              | 12                       | 34 900  | 119 079     | 9.92  | 3.52     | 12.0                 | 193.5             | 33.7            | 3.30       | 67  |
|              | SZ148              | 12                       | 35 100  | 119 800     | 10.99 | 3.19     | 10.9                 | 199.0             | 34.6            | 3.60       | 88  |
|              | SZ161              | 13                       | 38 000  | 129 700     | 11.84 | 3.21     | 11.0                 | 216.6             | 37.7            | 3.60       | 88  |
|              | SZ175              | 14                       | 40 100  | 136 900     | 12.67 | 3.17     | 10.8                 | 233.0             | 40.5            | 6.20       | 100 |
|              | SZ185              | 15                       | 43 100  | 147 100     | 13.62 | 3.16     | 10.8                 | 249.9             | 43.5            | 6.20       | 100 |
|              | SY240              | 20                       | 59 100  | 201 700     | 18.55 | 3.19     | 10.9                 | 347.8             | 60.5            | 8.00       | 150 |
|              | SY300              | 25                       | 72 700  | 248 100     | 22.73 | 3.20     | 10.9                 | 437.5             | 76.1            | 8.00       | 157 |
|              | SY380              | 30                       | 89 600  | 305 800     | 27.59 | 3.25     | 11.1                 | 531.2             | 92.4            | 8.40       | 158 |
| R134a SINGLE | SZ084              | 7                        | 12100   | 41100       | 3.83  | 3.15     | 10.75                | 114.5             | 19.9            | 3.25       | 64  |
|              | SZ090              | 7.5                      | 12900   | 43900       | 4.08  | 3.15     | 10.77                | 120.5             | 21.0            | 3.25       | 65  |
|              | SZ100              | 8                        | 13800   | 47000       | 4.36  | 3.16     | 10.78                | 127.2             | 22.1            | 3.25       | 65  |
|              | SZ110              | 9                        | 15600   | 53100       | 4.90  | 3.17     | 10.83                | 144.2             | 25.1            | 3.25       | 73  |
|              | SZ120              | 10                       | 17900   | 61200       | 5.62  | 3.19     | 10.89                | 166.6             | 29.0            | 3.25       | 73  |
|              | SZ147              | 12                       | 20800   | 71000       | 6.13  | 3.40     | 11.59                | 193.5             | 33.7            | 3.25       | 67  |
|              | SZ148              | 12                       | 21500   | 73400       | 6.96  | 3.09     | 10.55                | 199.0             | 34.6            | 3.60       | 88  |
|              | SZ161              | 13                       | 23000   | 78400       | 7.30  | 3.15     | 10.74                | 216.6             | 37.7            | 3.60       | 88  |
|              | SZ175              | 14                       | 25300   | 86200       | 7.90  | 3.20     | 10.91                | 233.0             | 40.5            | 6.20       | 100 |
|              | SZ185              | 15                       | 26900   | 91700       | 8.41  | 3.20     | 10.91                | 249.9             | 43.5            | 6.20       | 100 |
|              | SY240              | 20                       | 35600   | 121600      | 11.60 | 3.07     | 10.48                | 347.8             | 60.5            | 8.00       | 150 |
|              | SY300              | 25                       | 44400   | 151700      | 14.43 | 3.08     | 10.51                | 437.5             | 76.1            | 8.00       | 157 |
|              | SY380              | 30                       | 55800   | 190500      | 17.26 | 3.23     | 11.04                | 531.2             | 92.4            | 8.40       | 158 |
| R513A SINGLE | SZ148              | 12                       | 20665   | 70512       | 6.96  | 2.97     | 10.13                | 199.0             | 34.6            | 3.60       | 88  |
|              | SZ161              | 13                       | 23634   | 80642       | 7.54  | 3.14     | 10.70                | 216.6             | 37.7            | 3.60       | 88  |
|              | SZ175              | 14                       | 24413   | 83299       | 8.07  | 3.03     | 10.32                | 233.0             | 40.5            | 6.20       | 100 |
|              | SZ185              | 15                       | 27438   | 93621       | 8.64  | 3.18     | 10.84                | 249.9             | 43.5            | 6.20       | 100 |
|              | SY240              | 20                       | 37450   | 127783      | 12.1  | 3.10     | 10.59                | 347.8             | 60.5            | 8.00       | 150 |
|              | SY300              | 25                       | 47497   | 162065      | 14.7  | 3.22     | 10.99                | 437.5             | 76.1            | 8.00       | 157 |
|              | SY380              | 30                       | 58537   | 199734      | 18.1  | 3.23     | 11.03                | 531.2             | 92.4            | 8.40       | 158 |

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

⊕ Displacement at nominal speed: 2900 rpm at 50 Hz, 3500 rpm at 60Hz  
 ⊗ Net weight with oil charge

### Rating conditions

| Refrigerant                | R22     | R134a/R513A | R407C               |
|----------------------------|---------|-------------|---------------------|
| Frequency                  | 50 Hz   | 50 Hz       | 50 Hz               |
| Standard rating conditions | ARI     | EN12900     | -                   |
| Evaporating temperature    | 7.2 °C  | 5 °C        | 7.2 °C (dew point)  |
| Condensing temperature     | 54.4 °C | 50 °C       | 54.4 °C (dew point) |
| Sub-cooling                | 8.3 K   | 10 K        | 8.3 K               |
| Superheat                  | 11.1 K  | 0 K         | 11.1 K              |

Subject to modification without prior notification



For regular updates and detailed capacities, please refer to **Coolselector®2** [www.coolselector.danfoss.com](http://www.coolselector.danfoss.com)

**Application Guidelines      Technical specifications**

**60 Hz data**

| Model               | Nominal Cap. 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 <sup>3</sup> /rev | m <sup>3</sup> /h | dm <sup>3</sup> | kg           |      |
| <b>R22 SINGLE</b>   | <b>SM084</b>        | 7                        | 24600  | 84000       | 7.40  | 3.34     | 11.4                 | 114.5             | 24.1            | 3.25         | 64   |
|                     | <b>SM090</b>        | 7.5                      | 26400  | 90100       | 7.80  | 3.37     | 11.5                 | 120.5             | 25.3            | 3.25         | 65   |
|                     | <b>SM100</b>        | 8                        | 27500  | 93900       | 8.10  | 3.38     | 11.5                 | 127.2             | 26.7            | 3.25         | 65   |
|                     | <b>SM110</b>        | 9                        | 31600  | 107800      | 9.30  | 3.38     | 11.5                 | 144.2             | 30.3            | 3.25         | 73   |
|                     | <b>SM112</b>        | 9.5                      | 34000  | 116000      | 9.60  | 3.53     | 12.1                 | 151.5             | 31.8            | 3.30         | 64   |
|                     | <b>SM120</b>        | 10                       | 36700  | 125300      | 10.80 | 3.40     | 11.6                 | 166.6             | 35.0            | 3.25         | 73   |
|                     | <b>SM124</b>        | 10.5                     | 37700  | 128700      | 10.60 | 3.56     | 12.2                 | 169.5             | 35.6            | 3.30         | 64   |
|                     | <b>SM147</b>        | 12                       | 43600  | 148800      | 12.20 | 3.58     | 12.2                 | 193.5             | 40.6            | 3.30         | 67   |
|                     | <b>SM148</b>        | 12                       | 43800  | 149500      | 13.00 | 3.37     | 11.5                 | 199.0             | 41.8            | 3.60         | 88   |
|                     | <b>SM161</b>        | 13                       | 47600  | 162500      | 14.10 | 3.39     | 11.6                 | 216.6             | 45.5            | 3.60         | 88   |
|                     | <b>SM175</b>        | 14                       | 51100  | 174400      | 15.30 | 3.34     | 11.4                 | 233.0             | 48.9            | 6.20         | 100  |
|                     | <b>SM/SY185</b>     | 15                       | 55300  | 188700      | 16.30 | 3.39     | 11.6                 | 249.9             | 52.5            | 6.20         | 100  |
|                     | <b>SY240</b>        | 20                       | 74100  | 252900      | 22.10 | 3.35     | 11.4                 | 347.8             | 73.0            | 8.00         | 150  |
|                     | <b>SY300</b>        | 25                       | 94500  | 322500      | 27.50 | 3.43     | 11.7                 | 437.5             | 91.9            | 8.00         | 157  |
| <b>SY380</b>        | 30                  | 115300                   | 393500 | 33.40       | 3.46  | 11.8     | 531.2                | 111.6             | 8.40            | 158          |      |
| <b>R407C SINGLE</b> | <b>SZ084</b>        | 7                        | 22500  | 76800       | 7.10  | 3.19     | 10.9                 | 114.5             | 24.1            | 3.25         | 64   |
|                     | <b>SZ090</b>        | 7.5                      | 24400  | 83300       | 7.60  | 3.20     | 10.9                 | 120.5             | 25.3            | 3.25         | 65   |
|                     | <b>SZ100</b>        | 8                        | 26500  | 90400       | 8.20  | 3.24     | 11.1                 | 127.2             | 26.7            | 3.25         | 65   |
|                     | <b>SZ110</b>        | 9                        | 30100  | 102700      | 9.30  | 3.24     | 11.1                 | 144.2             | 30.3            | 3.25         | 73   |
|                     | <b>SZ120</b>        | 10                       | 34800  | 118800      | 10.70 | 3.24     | 11.1                 | 166.6             | 35.0            | 3.25         | 73   |
|                     | <b>SZ147</b>        | 12                       | 42300  | 144328      | 12.03 | 3.52     | 12.0                 | 193.5             | 40.6            | 3.30         | 67   |
|                     | <b>SZ148</b>        | 12                       | 42600  | 145400      | 13.30 | 3.19     | 10.9                 | 199.0             | 41.8            | 3.60         | 88   |
|                     | <b>SZ161</b>        | 13                       | 46000  | 157000      | 14.30 | 3.21     | 11.0                 | 216.6             | 45.5            | 3.60         | 88   |
|                     | <b>SZ175</b>        | 14                       | 48700  | 166200      | 15.30 | 3.19     | 10.9                 | 233.0             | 48.9            | 6.20         | 100  |
|                     | <b>SZ185</b>        | 15                       | 51800  | 176800      | 16.40 | 3.15     | 10.8                 | 249.9             | 52.5            | 6.20         | 100  |
|                     | <b>SY240</b>        | 20                       | 71100  | 242700      | 22.70 | 3.14     | 10.7                 | 347.8             | 73.0            | 8.00         | 150  |
|                     | <b>SY300</b>        | 25                       | 87900  | 300000      | 27.50 | 3.20     | 10.9                 | 437.5             | 91.9            | 8.00         | 157  |
|                     | <b>SY380</b>        | 30                       | 107300 | 366200      | 33.50 | 3.20     | 10.9                 | 531.2             | 111.6           | 8.40         | 158  |
|                     | <b>R134a SINGLE</b> | <b>SZ084</b>             | 7      | 16700       | 57100 | 5.06     | 3.31                 | 11.29             | 114.5           | 24.1         | 3.25 |
| <b>SZ090</b>        |                     | 7.5                      | 17700  | 60300       | 5.33  | 3.31     | 11.31                | 120.5             | 25.3            | 3.25         | 65   |
| <b>SZ100</b>        |                     | 8                        | 18700  | 63800       | 5.64  | 3.32     | 11.32                | 127.2             | 26.7            | 3.25         | 65   |
| <b>SZ110</b>        |                     | 9                        | 21300  | 72800       | 6.41  | 3.33     | 11.36                | 144.2             | 30.3            | 3.25         | 73   |
| <b>SZ120</b>        |                     | 10                       | 24800  | 84700       | 7.43  | 3.34     | 11.40                | 166.6             | 35.0            | 3.25         | 73   |
| <b>SZ147</b>        |                     | 12                       | 28300  | 96600       | 8.04  | 3.52     | 12.02                | 193.5             | 40.6            | 3.25         | 67   |
| <b>SZ148</b>        |                     | 12                       | 29000  | 99100       | 9.37  | 3.10     | 10.57                | 199.0             | 41.8            | 3.60         | 88   |
| <b>SZ161</b>        |                     | 13                       | 31500  | 107500      | 9.68  | 3.25     | 11.10                | 216.6             | 45.5            | 3.60         | 88   |
| <b>SZ175</b>        |                     | 14                       | 34400  | 117300      | 10.39 | 3.31     | 11.29                | 233               | 48.9            | 6.20         | 100  |
| <b>SZ185</b>        |                     | 15                       | 36600  | 124800      | 11.10 | 3.30     | 11.25                | 249.9             | 52.5            | 6.20         | 100  |
| <b>SY240</b>        |                     | 20                       | 49400  | 168600      | 15.37 | 3.21     | 10.97                | 347.8             | 73.0            | 8.00         | 150  |
| <b>SY300</b>        |                     | 25                       | 60600  | 206900      | 19.61 | 3.09     | 10.55                | 437.5             | 91.9            | 8.00         | 157  |
| <b>SY380</b>        |                     | 30                       | 75800  | 258600      | 23.22 | 3.26     | 11.14                | 531.2             | 111.6           | 8.40         | 158  |
| <b>R513A SINGLE</b> |                     | <b>SZ148</b>             | 12     | 28861       | 98477 | 9.32     | 3.10                 | 10.57             | 199.0           | 41.8         | 3.60 |
|                     | <b>SZ161</b>        | 13                       | 32617  | 111292      | 10.01 | 3.26     | 11.12                | 216.6             | 45.5            | 3.60         | 88   |
|                     | <b>SZ175</b>        | 14                       | 33952  | 115847      | 10.58 | 3.21     | 10.94                | 233.0             | 48.9            | 6.20         | 100  |
|                     | <b>SZ185</b>        | 15                       | 38009  | 129690      | 11.33 | 3.35     | 11.45                | 249.9             | 52.5            | 6.20         | 100  |
|                     | <b>SY240</b>        | 20                       | 51208  | 174727      | 15.9  | 3.22     | 10.99                | 347.8             | 73.0            | 8.00         | 150  |
|                     | <b>SY300</b>        | 25                       | 64441  | 219879      | 19.5  | 3.30     | 11.25                | 437.5             | 91.9            | 8.00         | 157  |
|                     | <b>SY380</b>        | 30                       | 69586  | 239439      | 24.7  | 3.22     | 10.99                | 531.2             | 111.6           | 8.40         | 158  |

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

① Displacement at nominal speed: 2900 rpm at 50 Hz, 3500 rpm at 60Hz  
 ② Net weight with oil charge

**Rating conditions**

| Refrigerant                | <b>R22/R134a/R513A</b>  | <b>R407C</b>        |
|----------------------------|-------------------------|---------------------|
| Frequency                  | 60 Hz                   | 60 Hz               |
| Standard rating conditions | ARI standard conditions | -                   |
| Evaporating temperature    | 7.2 °C                  | 7.2 °C (dew point)  |
| Condensing temperature     | 54.4 °C                 | 54.4 °C (dew point) |
| Sub-cooling                | 8.3 K                   | 8.3 K               |
| Superheat                  | 11.1 K                  | 11.1 K              |

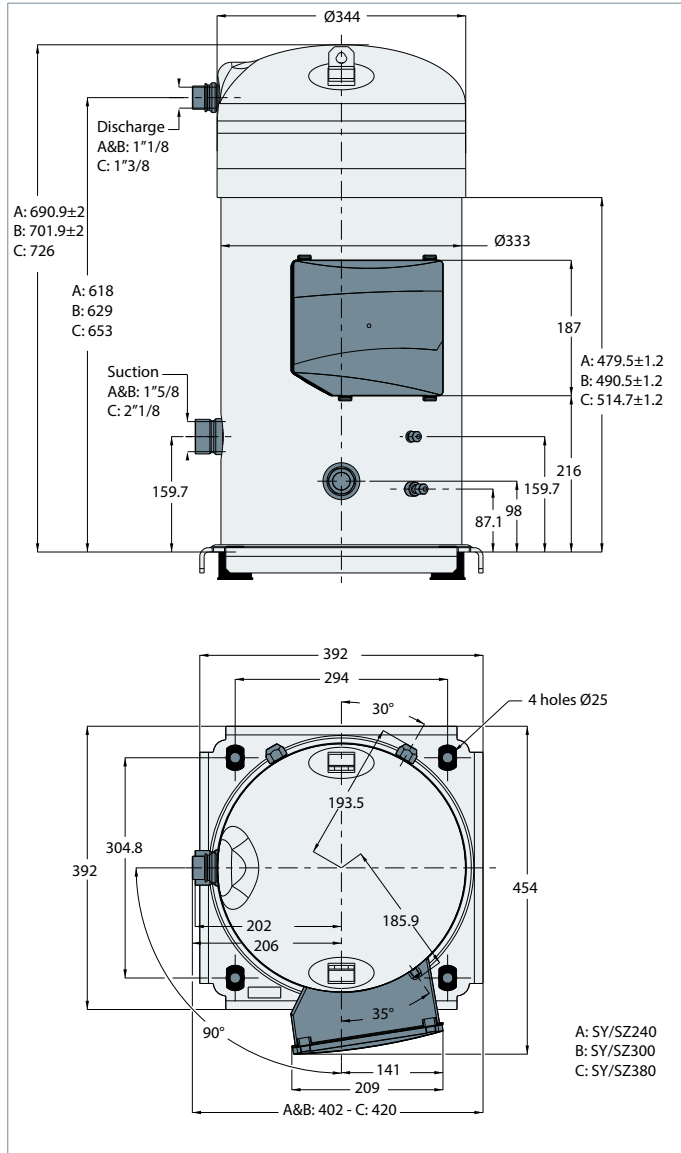
Subject to modification without prior notification



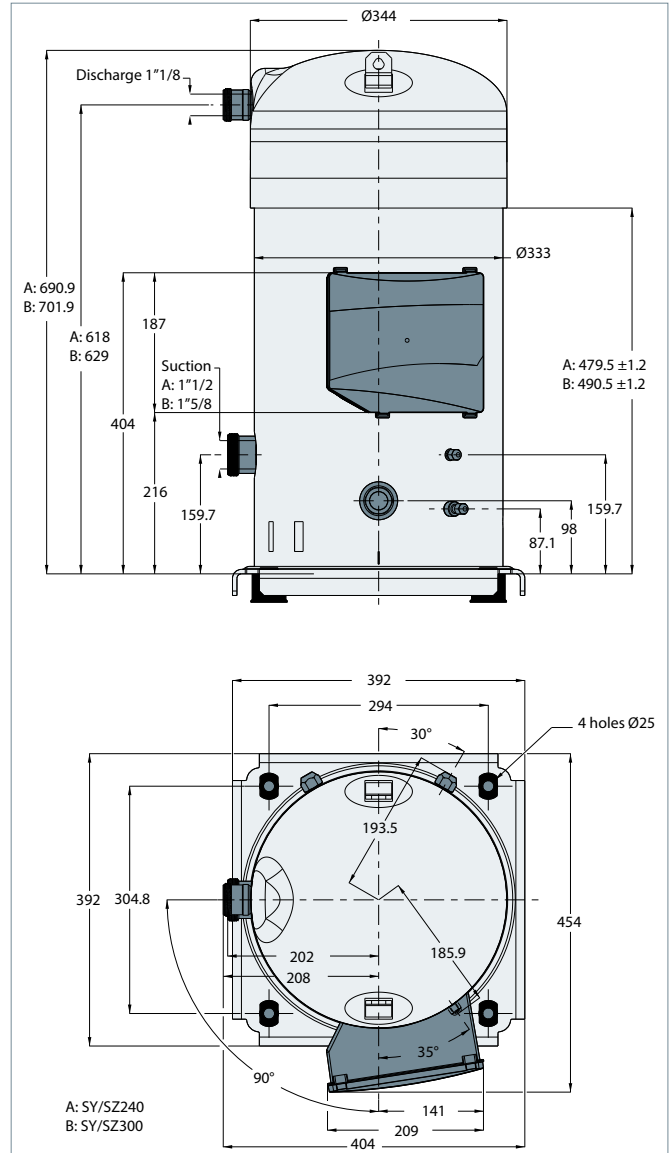
For regular updates and detailed capacities, please refer to **Coolselector\*2** [www.coolselector.danfoss.com](http://www.coolselector.danfoss.com)

**SY 240-300-380**

**Brazed version**

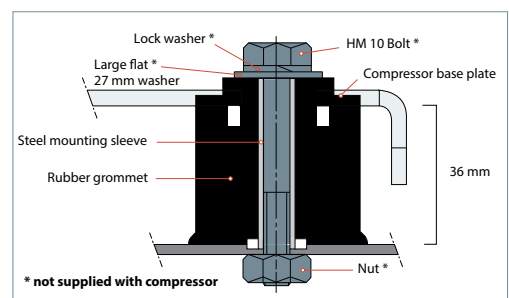


**Rotolock version**



All dimensions in mm


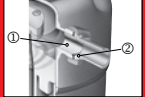
**Grommet**



**Connection details**

| Model                              | SM/SZ084-090-100-110-120-148-161 | SM/SZ175 - SM/SZ/SY185 |            | SM112-124-SM/SZ147 | SY240-300  |            | SY380      |
|------------------------------------|----------------------------------|------------------------|------------|--------------------|------------|------------|------------|
| Version                            | V                                | R-Y                    | C-P-X      | AL                 | MA - MB    | AA - AB    | AA - AB    |
| Suction and discharge connection   | brazed                           | rotolock               | brazed     | brazed             | rotolock   | brazed     | brazed     |
| Oil sight glass                    | threaded                         | threaded               | threaded   | threaded           | threaded   | threaded   | threaded   |
| Oil equalisation connection        | 3/8" flare                       | 3/8" flare             | 3/8" flare | rotolock 1"3/4     | 1/2" flare | 1/2" flare | 1/2" flare |
| Oil drain connection               | -                                | 1/4" flare             | 1/4" flare | -                  | 1/4" flare | 1/4" flare | 1/4" flare |
| Low pressure gauge port (schrader) | 1/4" flare                       | 1/4" flare             | 1/4" flare | 1/4" flare         | 1/4" flare | 1/4" flare | 1/4" flare |

**Suction and discharge connections**

|                           |           | Brazed version   |            | Rotolock version  |  |
|---------------------------|-----------|--|------------|---|--|
|                           |           |  |            |  |  |
|                           |           | Brazed   | Rotolock ① | Sleeve included ②   |  |
| <b>SM/SZ084-090-100</b>   | Suction   | 1" 1/8   | -          | -   |  |
|                           | Discharge | 3/4"   | -          | -   |  |
| <b>SM/SZ110-112</b>       | Suction   | 1" 3/8   | -          | -   |  |
|                           | Discharge | 7/8"   | -          | -   |  |
| <b>SM/SZ120-124</b>       | Suction   | 1" 3/8   | -          | -   |  |
|                           | Discharge | 7/8"   | -          | -   |  |
| <b>SM/SZ147-SM148-161</b> | Suction   | 1" 3/8   | -          | -   |  |
|                           | Discharge | 7/8"   | -          | -   |  |
| <b>SM/SZ175-185</b>       | Suction   | 1" 5/8   | 2" 1/4     | 1" 3/8  |  |
|                           | Discharge | 1" 1/8   | 1" 3/4     | 7/8"  |  |
| <b>SY240-300</b>          | Suction   | 1" 5/8   | 2" 1/4     | 1" 5/8  |  |
|                           | Discharge | 1" 1/8   | 1" 3/4     | 1" 1/8  |  |
| <b>SY380</b>              | Suction   | 2" 1/8   | -          | -   |  |
|                           | Discharge | 1" 3/8   | -          | -   |  |

**Oil sight glass**

All Danfoss SM / SY / SZ 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.

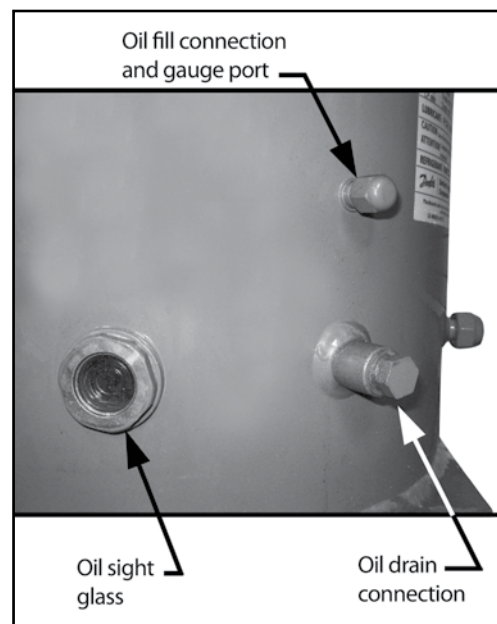
**Oil equalisation connection**

SM/SZ 112-124-147: 1"3/4 rotolock connector allowing use of 1"3/4-7/8" or 1"3/4-1"1/8  
 SY240-300-380: 1/2" flare  
 Other models: 3/8" flare

This connection must be used to mount an oil equalisation line when two or more compressors are mounted in parallel (please refer to Danfoss Parallel Application Guidelines reference FRCC. PC.005 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.  
 Note: on SY 240 to 380, it is not possible to drain oil from the suction connection.


**Schrader**

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

**Motor voltage**

Danfoss SM / SY / SZ scroll compressors are available in five different motor voltages.

|                 |       | Motor voltage code 3 | Motor voltage code 4                      | Motor voltage code 6 | Motor voltage code 7 | Motor voltage code 9                |
|-----------------|-------|----------------------|---|----------------------|----------------------|-------------------------------------|
| Nominal voltage | 50 Hz | -                    | 380 - 400 V - 3 ph<br>380 - 415 V - 3 ph* | 230 V - 3 ph         | 500 V - 3 ph         | -                                   |
| Voltage range   | 50 Hz | -                    | 342 - 440 V<br>342 - 457 V*               | 207 - 253 V          | 450 - 550 V          | -                                   |
| Nominal voltage | 60 Hz | 200 - 230 V - 3 ph   | 460 V - 3 ph                              | -                    | 575 V - 3 ph         | 380 V - 3 ph<br>380 - 400 V - 3 ph* |
| Voltage range   | 60 Hz | 180 - 253 V          | 414 - 506 V                               | -                    | 517 - 632 V          | 342 - 418 V<br>342 - 440 V*         |

\* SY 380

**SY 240 - 300 - 380 & SM/SZ 185 - P, X, Y versions**

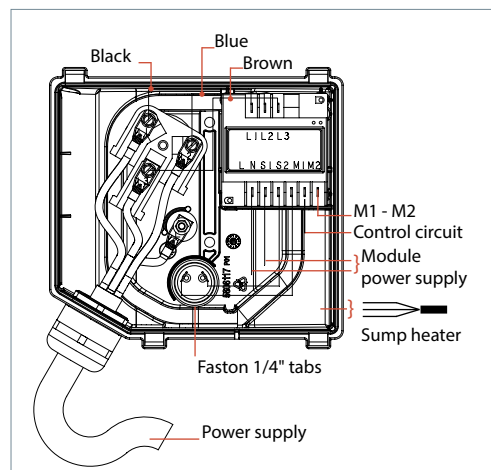
The terminal box is provided with 2 triple knockouts and 1 single knockout for power supply and 4 double knockouts for the safety control circuit.

The 3 power supply knockouts accommodate the following diameters:

- Ø 50.8 mm (UL 1"1/2 conduit) & Ø 43.7 mm (UL 1"1/4 conduit) & Ø 34.5 mm (UL 1" conduit)
- Ø 40.5 mm (ISO40) & Ø 32.2 mm (ISO32) & Ø 25.5 mm (ISO25)
- Ø 25.5 mm (ISO25)

The 4 others knockouts are as follows:

- Ø 22.5 mm (PG16) (UL 1/2") & Ø 16.5 mm (ISO16) (x2)
- 20.7 mm (ISO20 or PG13.5) (x2)



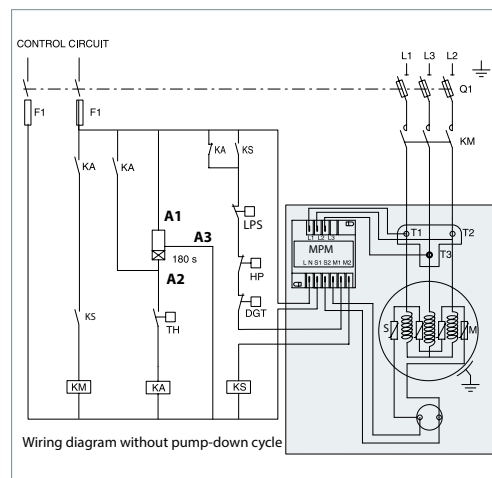
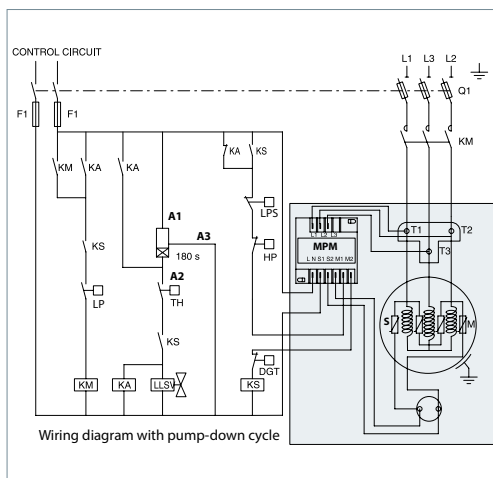
**Three phase electrical characteristics**

| Compressor model   |            | LRA | MCC  | MMT  | Max. op. current | Winding resistance |
|--|------------|-----|------|------|------------------|--------------------|
|  |            | A   | A    | A    | A                | Ω                  |
| Motor voltage code 3<br>200-230V/3 ph/60 Hz                    | SM/SZ084   | 170 | 35   |      | 35               | 0.44               |
|  | SM/SZ090   | 195 | 35   |      | 34               | 0.38               |
|  | SM/SZ100   | 195 | 38   |      | 32               | 0.38               |
|  | SM/SZ110   | 237 | 45   |      | 40               | 0.26               |
|  | SM112      | 267 | 51   |      | 41               | 0.27               |
|  | SM/SZ120   | 237 | 50   |      | 48               | 0.26               |
|  | SM124      | 267 | 51   |      | 45               | 0.27               |
|  | SM/SZ147   | 304 | 57   |      | 52               | 0.24               |
|  | SM/SZ148   | 255 | 64   |      | 57               | 0.29               |
|  | SM/SZ161   | 255 | 64   |      | 61               | 0.29               |
|  | SM/SZ175 * | 380 |      | 75   | 70               | 0.19               |
|  | SM/SZ185 * | 380 |      | 75   | 73               | 0.19               |
| SY240  | 460        | 109 |      | 100  | 0.14             |                    |
| SY300  | 560        | 130 |      | 130  | 0.12             |                    |
| Motor voltage code 4<br>380-400V/3 ph/50 Hz<br>460V/3 ph/60 Hz | SM/SZ084   | 86  | 17   |      | 17               | 1.74               |
|  | SM/SZ090   | 98  | 18.5 |      | 17               | 1.48               |
|  | SM/SZ100   | 98  | 19   |      | 18               | 1.48               |
|  | SM/SZ110   | 130 | 22   |      | 20               | 1.05               |
|  | SM112      | 142 | 25   |      | 21               | 1.05               |
|  | SM/SZ120   | 130 | 29   |      | 24               | 1.05               |
|  | SM124      | 142 | 25   |      | 23               | 1.05               |
|  | SM/SZ147   | 147 | 29   |      | 26               | 0.92               |
|  | SM/SZ148   | 145 | 32   |      | 29               | 0.94               |
|  | SM/SZ161   | 145 | 32   |      | 31               | 0.94               |
|  | SM/SZ175 * | 175 |      | 35   | 34               | 0.77               |
|  | SM/SZ185 * | 175 |      | 35   | 35               | 0.77               |
| SY/SZ185   | 175        |     | 35   | 34   | 0.77             |                    |
| SY240  | 215        | 50  |      | 47   | 0.62             |                    |
| SY300  | 270        | 69  |      | 58   | 0.52             |                    |
| SY380  | 300        | 79  |      | 72.7 | 0.41             |                    |
| Motor voltage code 6<br>230V/3 ph/50 Hz                        | SM/SZ084   | 150 | 29   |      | 27               | 0.58               |
|  | SM/SZ090   | 165 | 30   |      | 27               | 0.5                |
|  | SM/SZ100   | 165 | 30   |      | 30               | 0.5                |
|  | SM/SZ110   | 210 | 37   |      | 35               | 0.35               |
|  | SM/SZ120   | 210 | 43   |      | 39               | 0.35               |
|  | SM/SZ148   | 200 | 50   |      | 47               | 0.38               |
|  | SM/SZ161   | 200 | 54   |      | 51               | 0.38               |
|  | SM/SZ175 * | 270 |      | 68   | 57               | 0.25               |
| SM/SZ185 *   | 270        |     | 68   | 59   | 0.25             |                    |
| Motor voltage code 7<br>500V/3 ph/50 Hz<br>575V/3 ph/60 Hz     | SM/SZ084   | 70  | 13   |      | 13               | 2.58               |
|  | SM/SZ090   | 80  | 14   |      | 13               | 2.25               |
|  | SM/SZ100   | 80  | 15   |      | 13               | 2.25               |
|  | SM/SZ110   | 85  | 18   |      | 16               | 1.57               |
|  | SM/SZ120   | 85  | 19   |      | 18               | 1.57               |
|  | SM/SZ148   | 102 | 27   |      | 23               | 1.61               |
|  | SM/SZ161   | 102 | 25   |      | 24               | 1.61               |
|  | SM/SZ175 * | 140 |      | 28   | 27               | 1.11               |
| SM/SZ185 *   | 140        |     | 28   | 28   | 1.11             |                    |
| Motor voltage code 9<br>380V/3 ph/60 Hz                        | SM/SZ084   | 100 | 20   |      | 20               | 1.22               |
|  | SM/SZ090   | 113 | 22   |      | 20               | 1.05               |
|  | SM/SZ100   | 113 | 22   |      | 19               | 1.05               |
|  | SM/SZ110   | 160 | 27   |      | 23               | 0.72               |
|  | SM112      | 177 | 32   |      | 24               | 0.72               |
|  | SM/SZ120   | 160 | 30   |      | 28               | 0.72               |
|  | SM124      | 177 | 32   |      | 27               | 0.72               |
|  | SM/SZ147   | 181 | 35   |      | 31               | 0.62               |
|  | SM/SZ148   | 155 | 38   |      | 36               | 0.75               |
|  | SM/SZ161   | 155 | 38   |      | 38               | 0.75               |
|  | SM/SZ175 * | 235 |      | 43   | 42               | 0.48               |
|  | SM/SZ185 * | 235 |      | 43   | 43               | 0.48               |
| SY240  | 260        | 62  |      | 62   | 0.42             |                    |
| SY300  | 305        | 74  |      | 74   | 0.36             |                    |
| SY380  | 390        | 93  |      | 84.5 | 0.28             |                    |

\* For versions with electronic module, see datasheet for electrical data



**Compressor models SY 240 - 300 - 380 & SM/SZ-185 (P, X, Y versions)**



**Legends**

|  |       |
|--|-------|
| Fuses .....                              | F1    |
| Compressor contactor .....               | KM    |
| Control relay .....                      | KA    |
| Safety lock out relay .....              | KS    |
| Optional short cycle timer (3 min) ..... | 180 s |
| External overload protection .....       | F2    |
| Pump-down pressure switch .....          | LP    |
| High pressure safety switch .....        | HP    |
| Control device .....                     | TH    |

|                                  |      |
|----------------------------------|------|
| Liquid Line Solenoid valve ..... | LLSV |
| Discharge gas thermostat .....   | DGT  |
| Fused disconnect .....           | Q1   |
| Motor safety thermostat .....    | thM  |
| Compressor motor .....           | M    |
| Motor Protection Module .....    | MPM  |
| Thermistor chain .....           | S    |
| Safety pressure switch .....     | LPS  |

## Application Guidelines

## Operating conditions

### Motor supply

SM / SY / SZ scroll compressors can be operated at nominal voltages as indicated on "Motor voltage code" section. Under-voltage and over-voltage operation is allowed within the indicated

voltage ranges. In case of risk of under-voltage operation, special attention must be paid to current draw.

### Compressor ambient temperature

SM / SY / SZ compressors can be applied from -35°C to +63°C (for SM/SZ084 to 185) and +53°C (for SY/SZ 240 to 380) ambient temperature. The compressors are designed as 100% suction gas

cooled without need for additional fan cooling. Ambient temperature has very little effect on the compressor performance.

### High ambient temperature

In case of enclosed fitting and high ambient temperature it's recommend to check the temperature of power wires and conformity to their insulation specification.

In case of safe tripping by the compressor overload protection the compressor must cool down to about 60°C before the overload will reset. A high ambient temperature can strongly delay this cool-down process.

### Low ambient temperature

Although the compressor itself can withstand low ambient temperature, the system may require specific design features to ensure safe

and reliable operation. See section 'Specific application recommendations'.

### Application envelope at dew temperatures

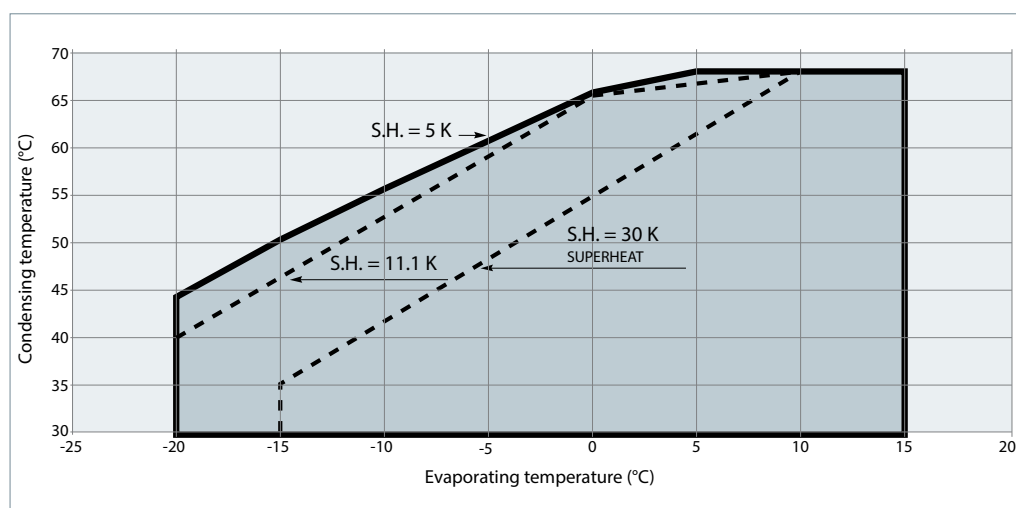
The operating envelopes for SM / SY / SZ scroll compressors are given in the figures below, where the condensing and evaporating temperatures represent the range for steady-state operation. Under transient conditions, such as start-up and defrost, the compressor may operate outside this envelope for short periods.

The figures below show the operating envelopes for refrigerants R22, R407C, R134a, R404A, R507 and R513A.

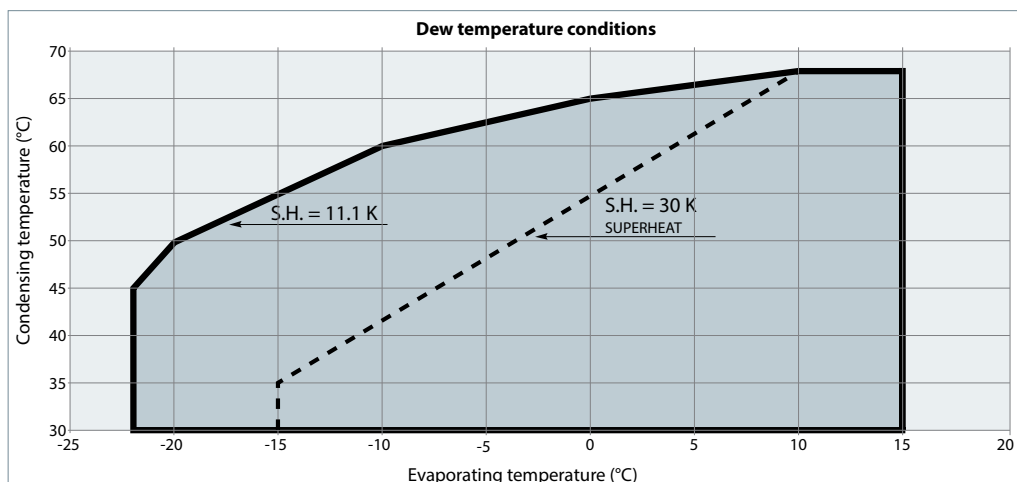
The operating limits serve to define the envelope within which reliable operations of the compressor are guaranteed:

- Maximum discharge gas temperature: +135°C
- A suction superheat below 5 K (10 K for R407C) is not recommended due to the risk of liquid flood back
- Maximum superheat of 30 K
- Minimum and maximum evaporating and condensing temperatures as per the operating envelopes.

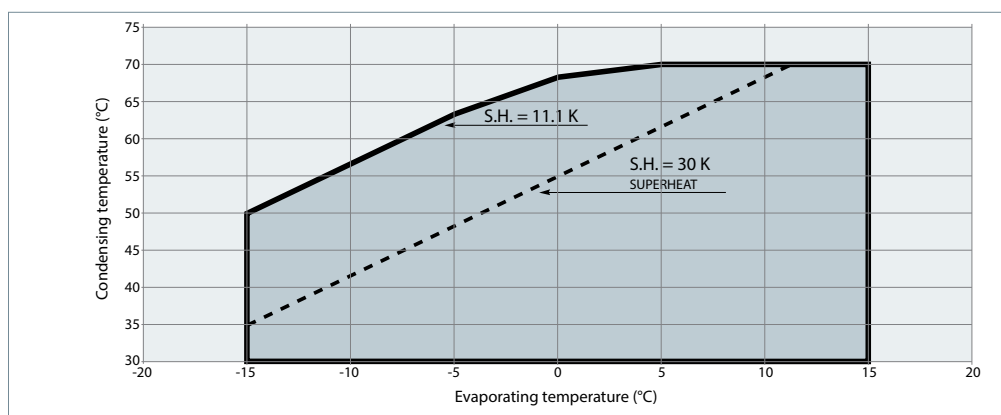
### SM084 to 185 SY185 to 380 R22



**SY240 to 380  
R407C  
at DEW temperature**



**SY240 to 380  
R134a**



**SY240 to 380  
R513A**

