

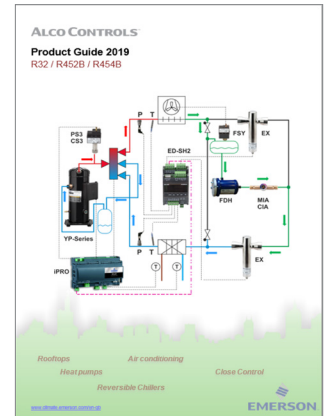
Did you know?

R32A, R452B and R454B replacement for R410A

R410A is the most commonly used refrigerant in air conditioning, reversible chillers, heat pumps, close control systems. However, established F-Gas regulation leads the use of refrigerants with low GWP as long-term solution. R32, R452B and R454B are mildly flammable A2L refrigerants with low GWP as successor of R410A.

Emerson has qualified a range of products for R32/R452B/R454B under consideration of Standard IEC60335-2-40 and introduced them to market on July 2018. The standard defines the qualification of electrically operated devices in conjunction with mildly flammable A2L refrigerants for the above-mentioned applications. Unlike systems with R410A, these refrigerants are leading to higher discharge temperature mainly in heat pumps and reversible chillers in comparison to R410A.

Below table is just a simple calculation for highlighting the subject:



| Refrigerant | Evaporating temperature | Suction temperature | Suction pressure | High condensing temperature to produce hot/warm water | Condensing pressure (bubble point) | Discharge temperature (isentropic compression) | Discharge temperature (Polytropic assumption: +15K above Isentropic) |
|-------------|-------------------------|---------------------|------------------|---|------------------------------------|--|--|
| R32 | -10°C | -5°C | 5.8 bar | +65°C | 44.0 bar | +128°C | +143°C |
| R452B | | | 5.4 bar | | 40.2 bar | +108°C | +123°C |
| R454B | | | 5.2 bar | | 39.6 bar | +108°C | +123°C |
| R410A | | | 5.7 bar | | 42.6 bar | +101°C | +116°C |
| R32 | 0°C | +5°C | 8.1 bar | +65°C | 44.0 bar | +118°C | +133°C |
| R452B | | | 7.5 bar | | 40.2 bar | +102°C | +117°C |
| R454B | | | 7.3 bar | | 39.6 bar | +102°C | +117°C |
| R410A | | | 8.0 bar | | 42.6 bar | +96°C | +111°C |

The increased discharge temperatures must be considered for selection and mounting position of components such as safety pressure switches, pressure transmitters, safety relief valves and reversing 4-ways valves in heat pumps and reversible chillers. These typical products are located directly on the hot gas line. It is important to determine maximum operating discharge temperature of system and compare to maximum allowable medium temperature of each component and if it can be used.

The following measures can be considered as solution(s):

- Desuperheating of the hot gas by refrigerant injection into the suction line or directly into the compressor (compressor with injection port).
- Installation of a line between the above-mentioned components and the main hot gas line as thermal decoupling.
- Selection of above-mentioned components with a higher maximum permissible medium temperature.

Note: Cut-out setting point of safety pressure switches will normally drift at higher temperatures. It is recommended to consult the manufacturer of safety pressure switches.

The next edition focuses on the maximum operating pressure when R32 is used in heat pumps.