

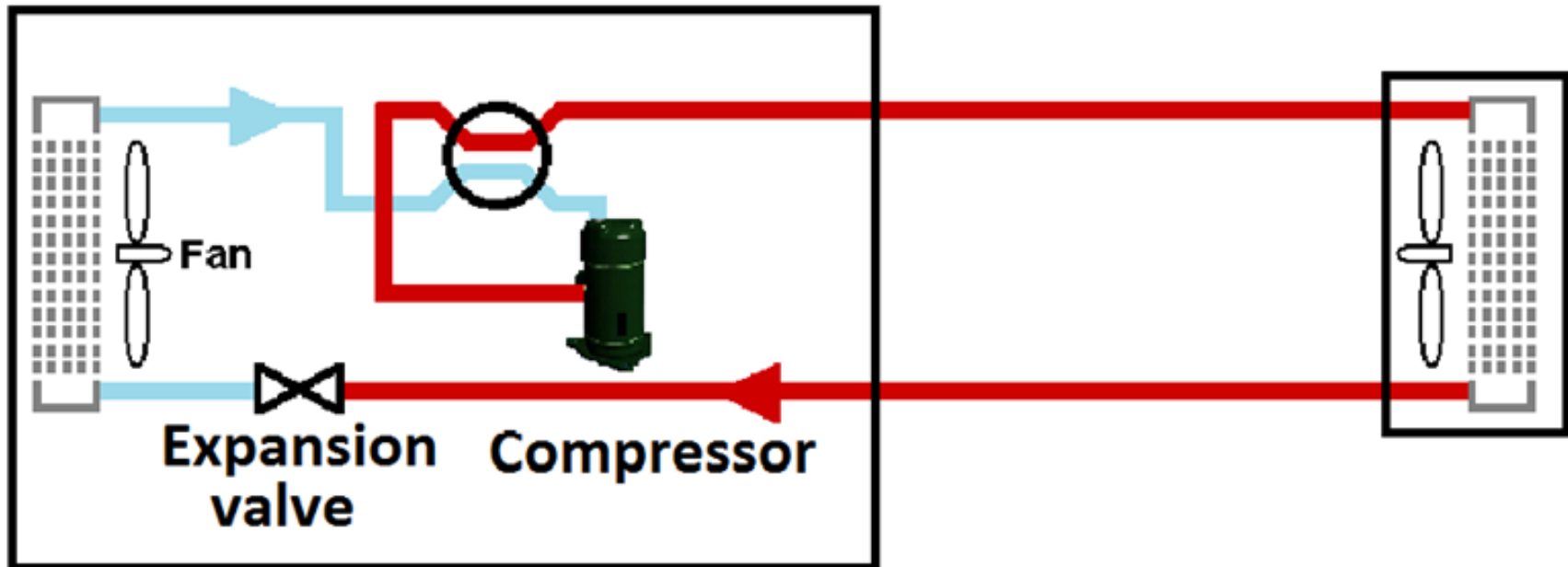


BUSİAD

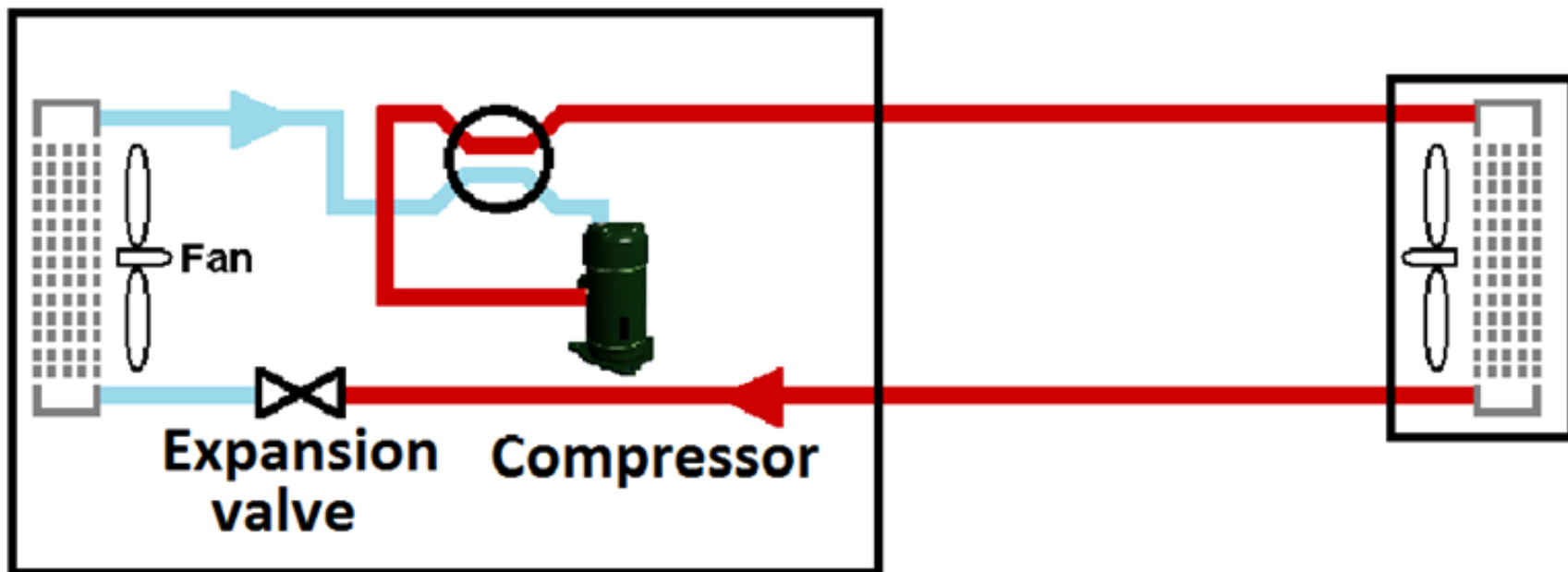
ISI POMPASI VE

UYGULAMALARI

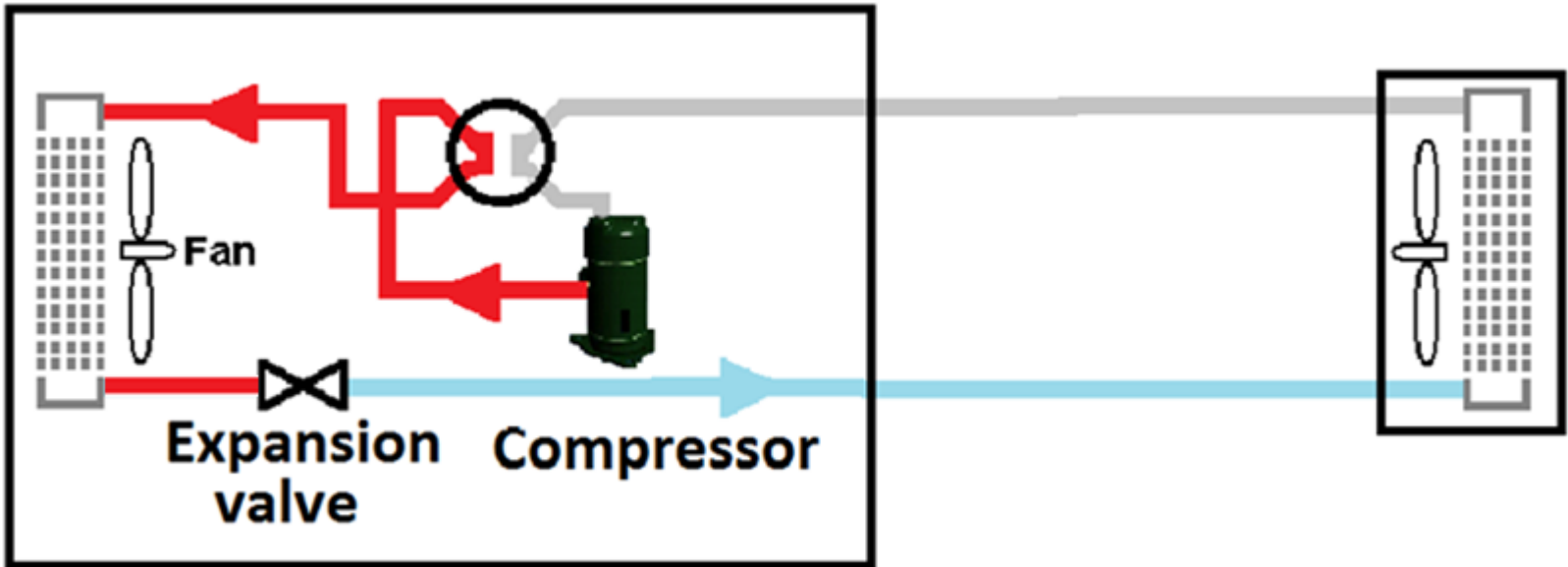
Nurettin KÜÇÜKÇALI



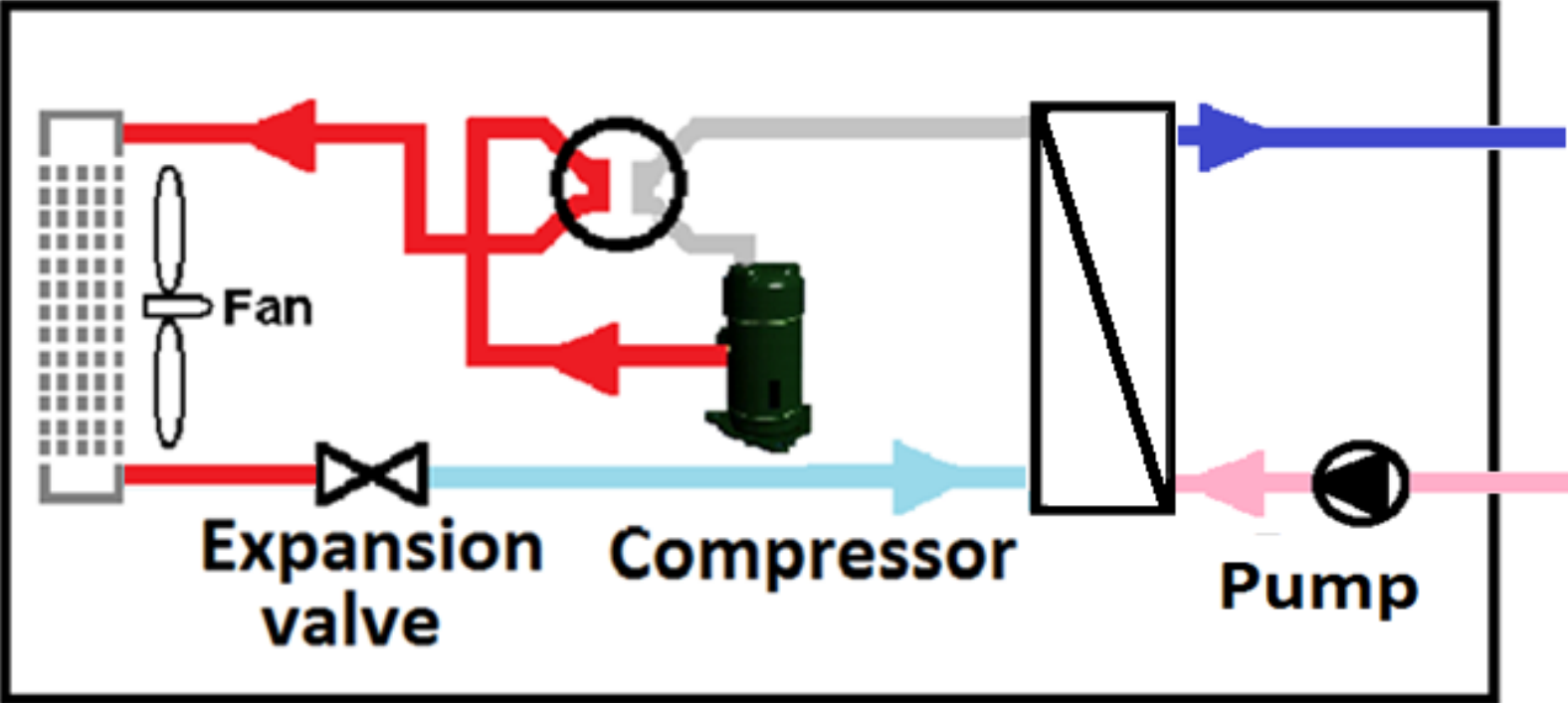
SPLIT KLIMA



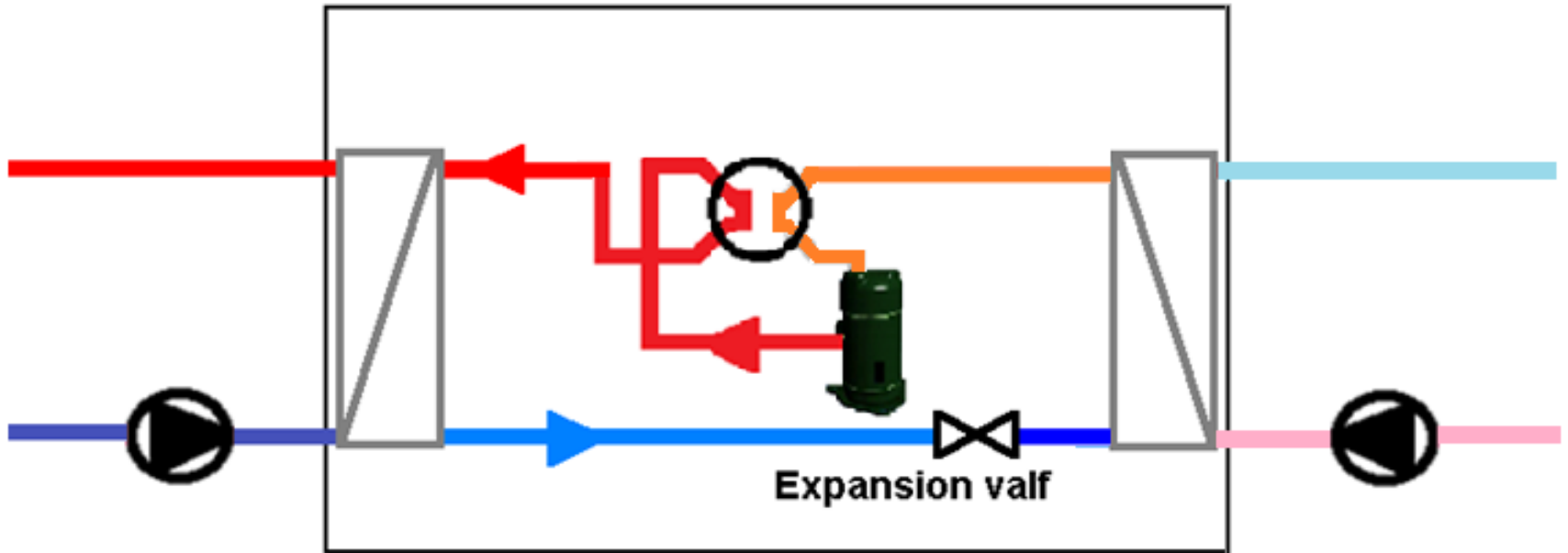
HAVADAN HAVAYA ISI POMPASI



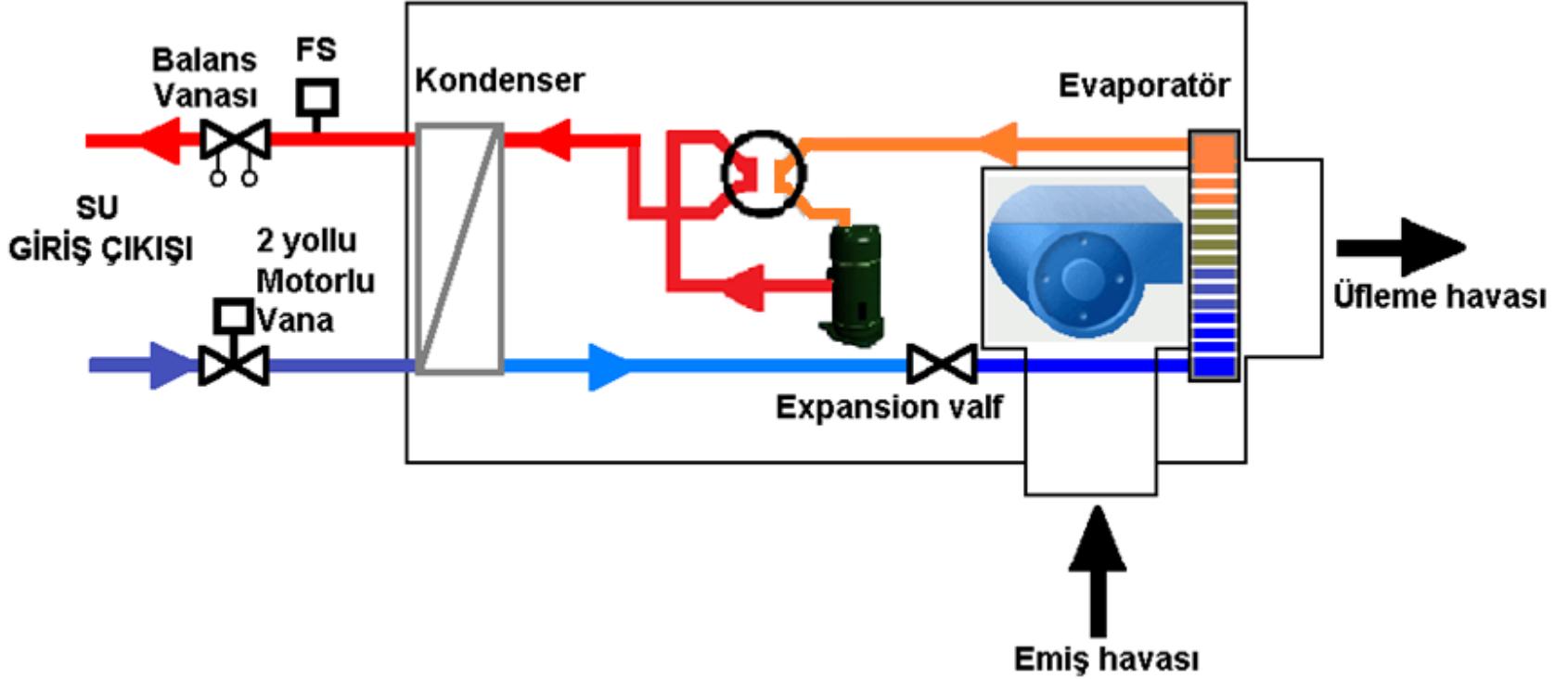
HAVADAN SUYA ISI POMPASI



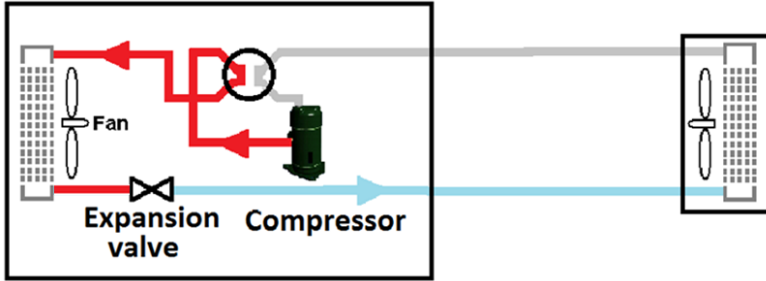
SUDAN SUYA ISI POMPASI



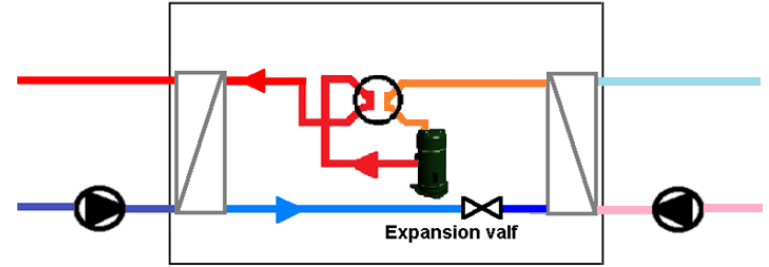
SUDAN HAVAYA ISI POMPASI



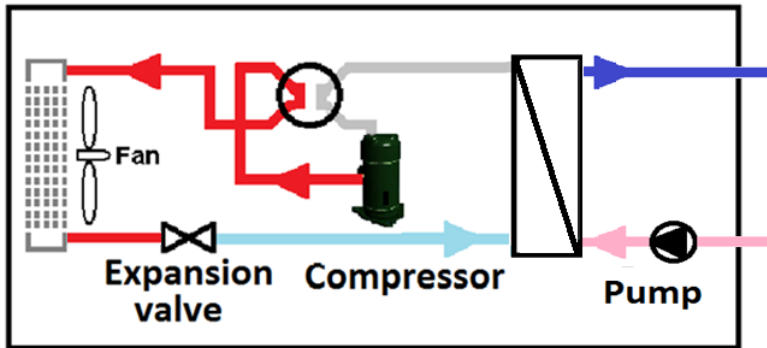
Havadan Havaya



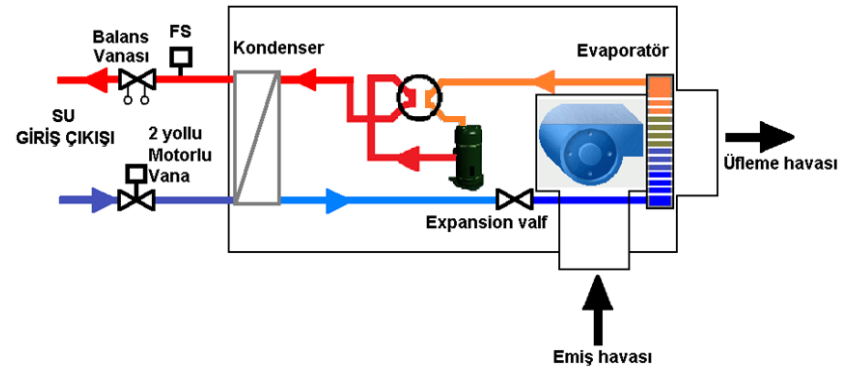
Sudan suya

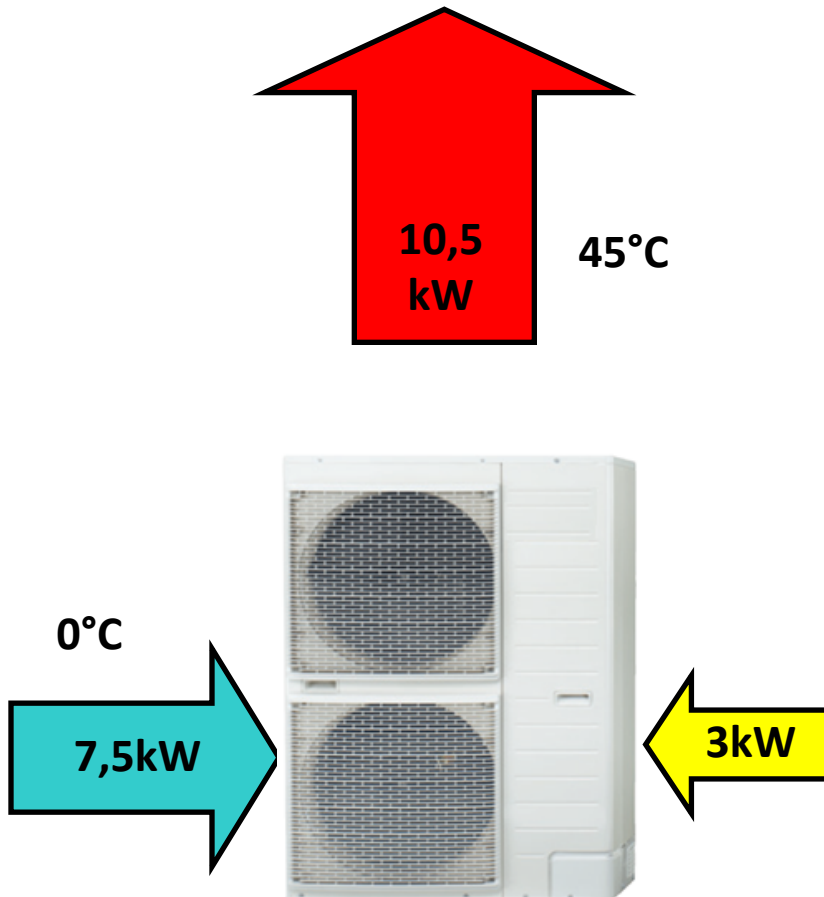


Havadan Suya

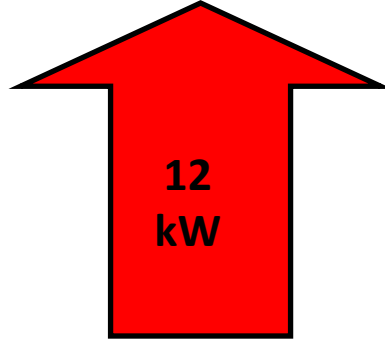


Sudan Havaya





$$10,5 / 3 = \text{COP } 3,5$$

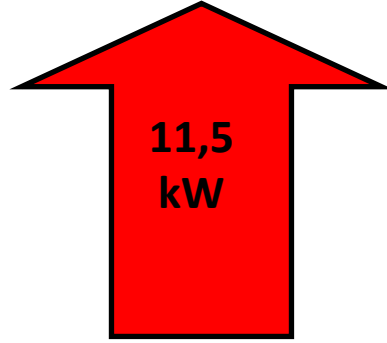


Su sıcaklığı : 45 C

$$12 / 3 =$$
$$\text{COP } 4,0$$

Kaynak : 5°C



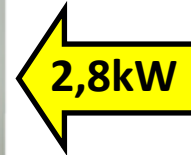
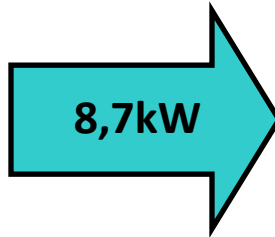


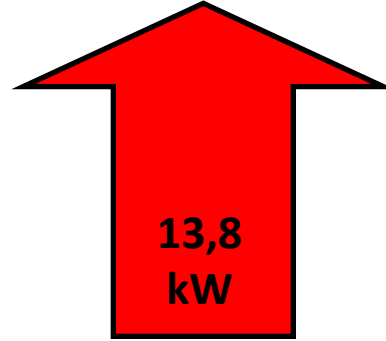
$$11,5 / 2,8 =$$
$$\text{COP } 4,1$$

Su sıcaklığı : 40°C



Kaynak : 0°C



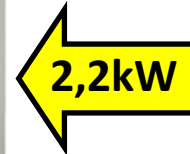
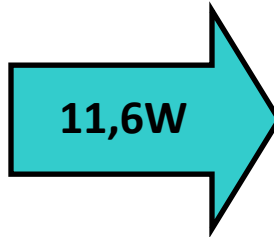


$$13,8 / 2,2 =$$
$$\text{COP } 6,3$$

Su sıcaklığı : 35°C



Kaynak : 10°C



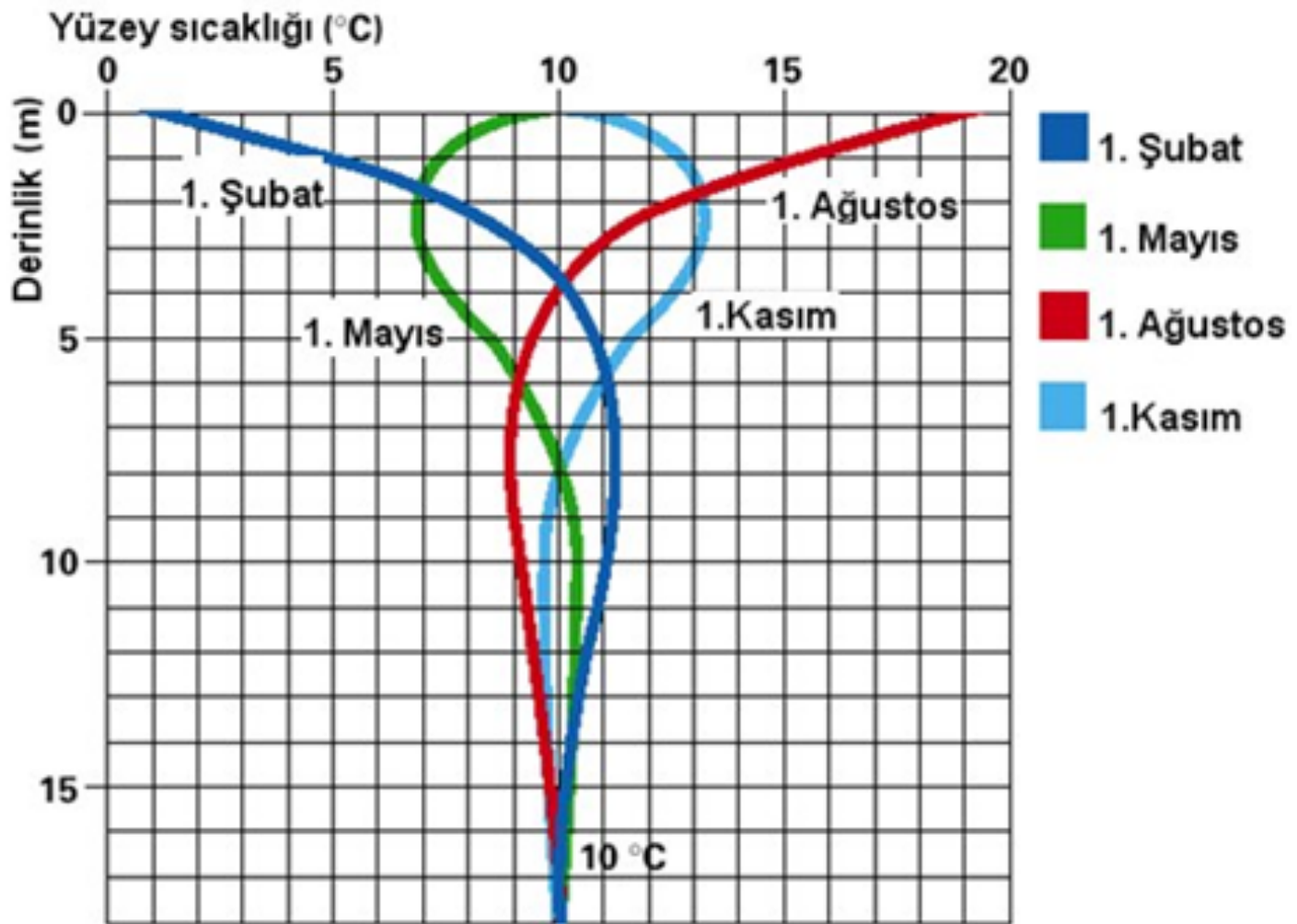
**FOSİL YAKIT YANMA VERİMLERİ,
NE KADAR ARTABİLİR?**

**ISI POMPASI VERİMLERİ NE KADAR ARTACAK,
NEREYE VARACAK???**

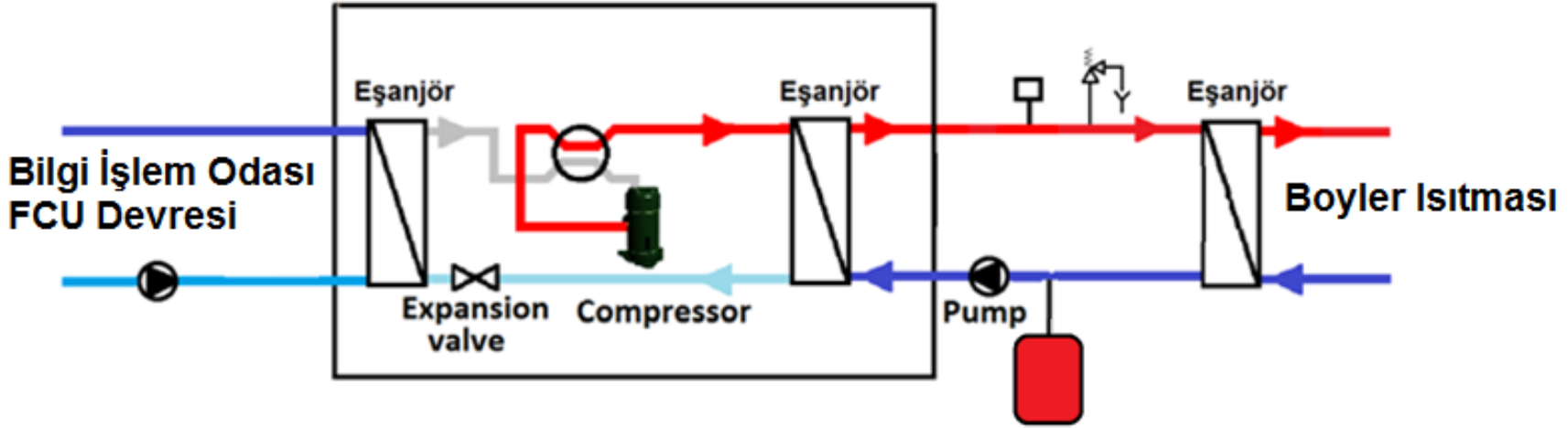
Yakıt Türü	Yakıt Alt Isıl Değeri	En Ucuz Yakıtta Göre Yakıt Maliyeti İndeksi	ISI POMPASI SEZON ORTALAMA VERİMİNİ		4,0	ALIRSAK
ISI POMPASI	860	74	ISI POMPASI İLE	1.000 TL' ye ISINAN BİR BİNA		
Doğalgaz (Konut)	8250	100	DOĞAL GAZ İLE	1.353 TL' ye ISINIR	% 35 Daha Pahalı	
Linyit (İthal)	6000	135	İTHAL KÖMÜR İLE	1.831 TL' ye ISINIR	% 83 Daha Pahalı	
LNG	8250	144	LNG İLE	1.946 TL' ye ISINIR	% 95 Daha Pahalı	
Fuel-Oil 4 (K.Yakıtı)	9700	209	4 NUMARA FUEL OİL İLE	2.827 TL' ye ISINIR	% 183 Daha Pahalı	
Elektrik	860	299	ELEKTRİK İLE	4.040 TL' ye ISINIR	% 304 Daha Pahalı	
LPG Propan	11000	374	DÖKME GAZ (LPG) İLE	5.052 TL' ye ISINIR	% 405 Daha Pahalı	
Motorin	10200	369	MOTORİN İLE	4.991 TL' ye ISINIR	% 399 Daha Pahalı	
Tüpgaz	11000	406	TÜP GAZ İLE	5.489 TL' ye ISINIR	% 449 Daha Pahalı	

ISI POMPASI İLE İLGİLİ YAPILAN HATALAR

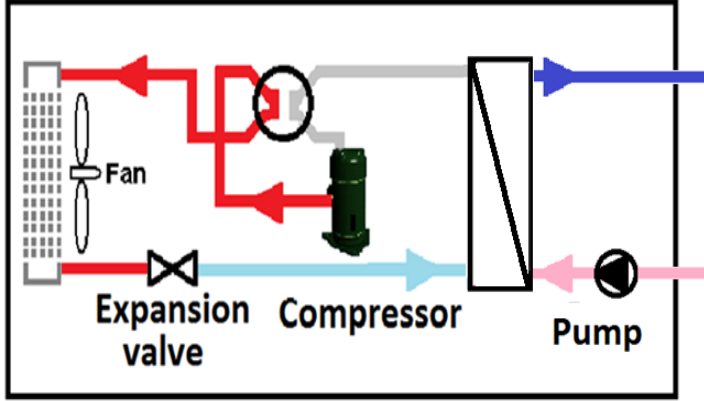
- Boyler seçimi,
- Boru çapı hesapları,
- Pompa hesapları,
- Su sirkülasyonunun önlenmesi



Sudan Suya Isı Pompası



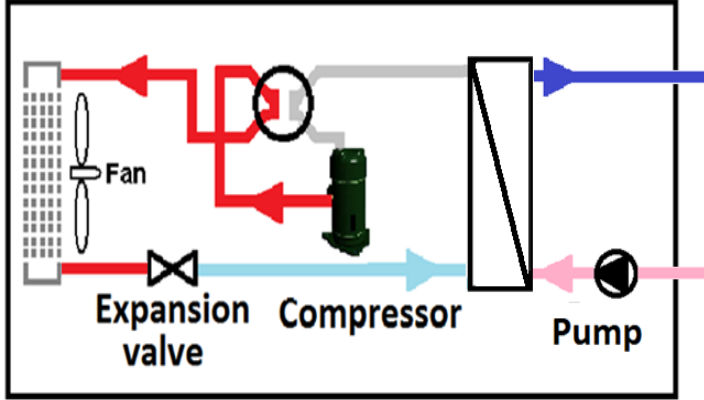
HAVADAN SUYA ISI POMPASI



**SÜREKLİ SICAK SU İHTİYACI
OLAN OTELLERDE;**

**Çamaşırhane kaynaklı
Havadan Suya Isı
Pompası**

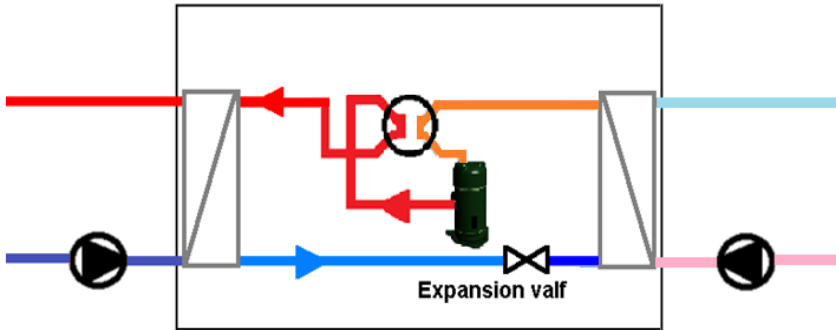
HAVADAN SUYA ISI POMPASI



**SÜREKLİ SICAK SU İHTİYACI
OLAN YERLERDE;**

**Kazan dairesi kaynaklı
Havadan Suya Isı
Pompası**

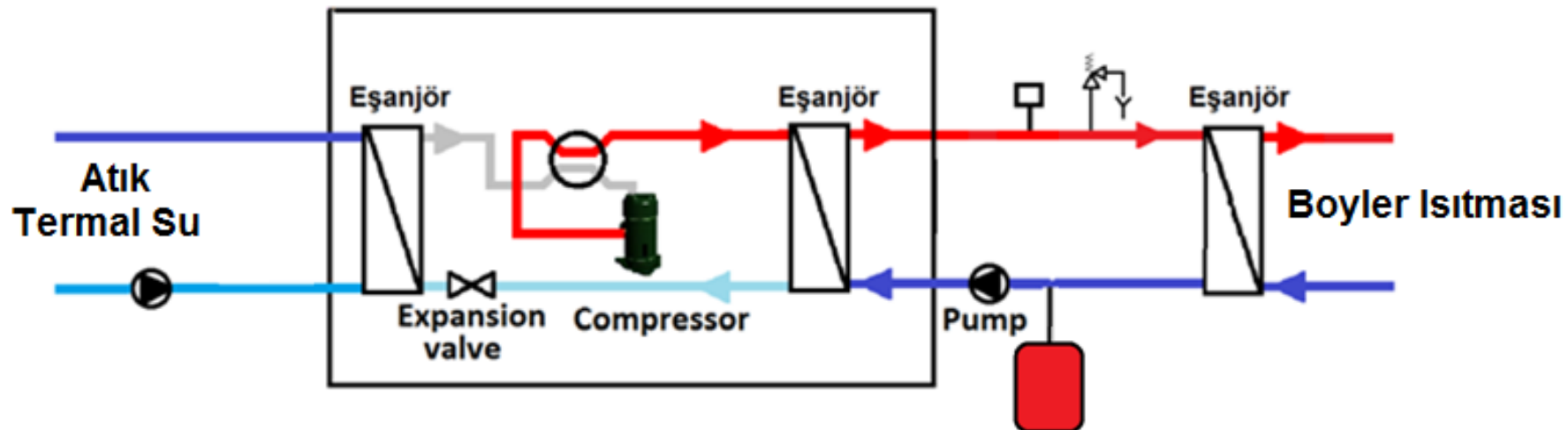
SUDAN SUYA ISI POMPASI



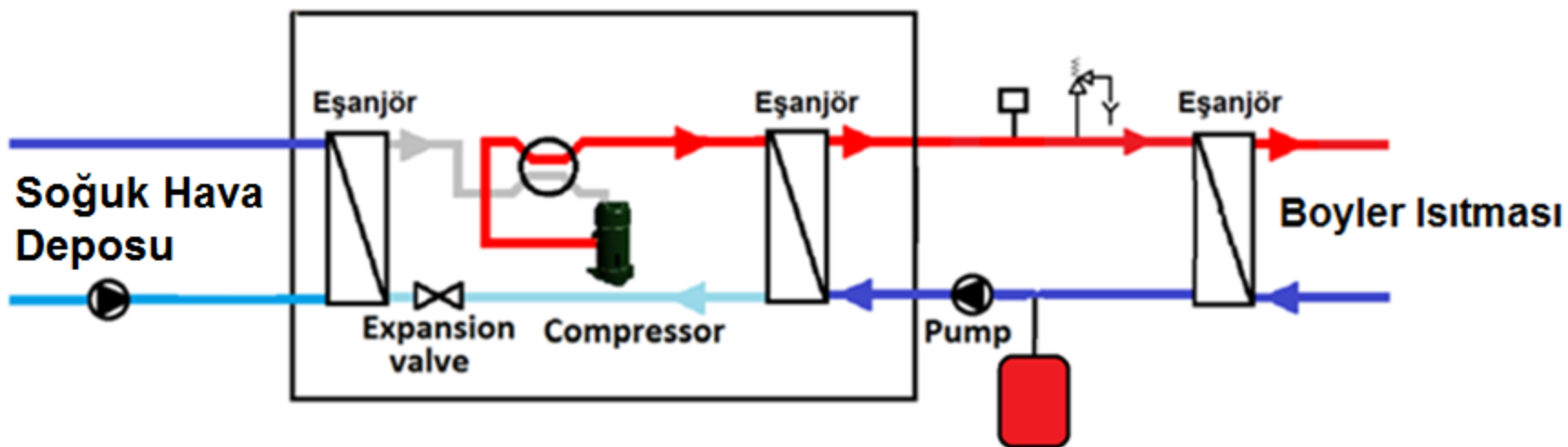
**İŞÇİ KOĞUŞLARININ SICAK
SU İHTİYACI İÇİN;**

**Foseptik kaynaklı
Sudan Suya Isı
Pompası**

Sudan Suya Isı Pompası



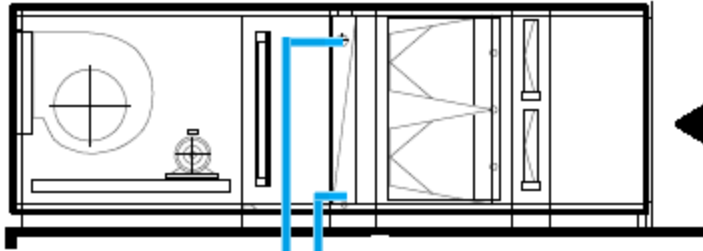
Sudan Suya Isı Pompası



ISI GERİ KAZANIMI:

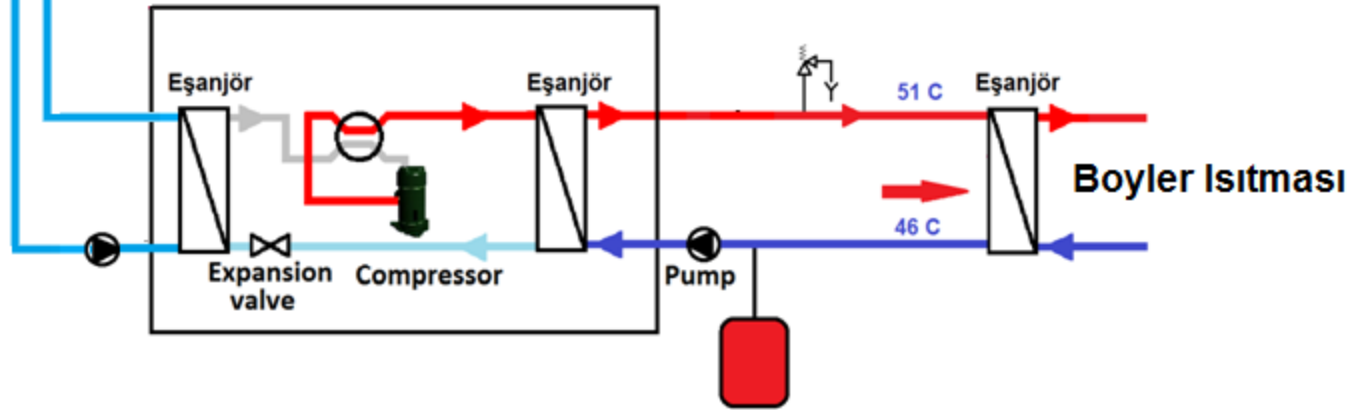
- Taze hava ısı pompası üzerinden alınabilir,**
- Egzost ısı pompası üzerine atılabilir.**

Klima Santrali



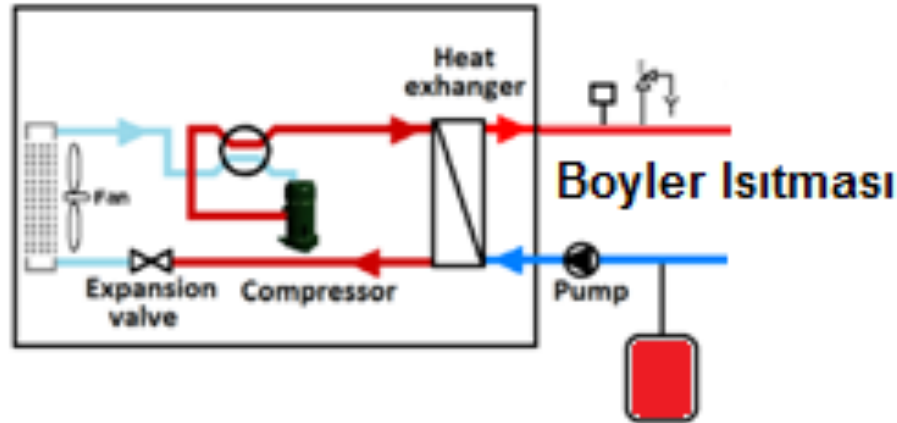
% 100 Taze Hava

Sudan Suya Isı Pompası

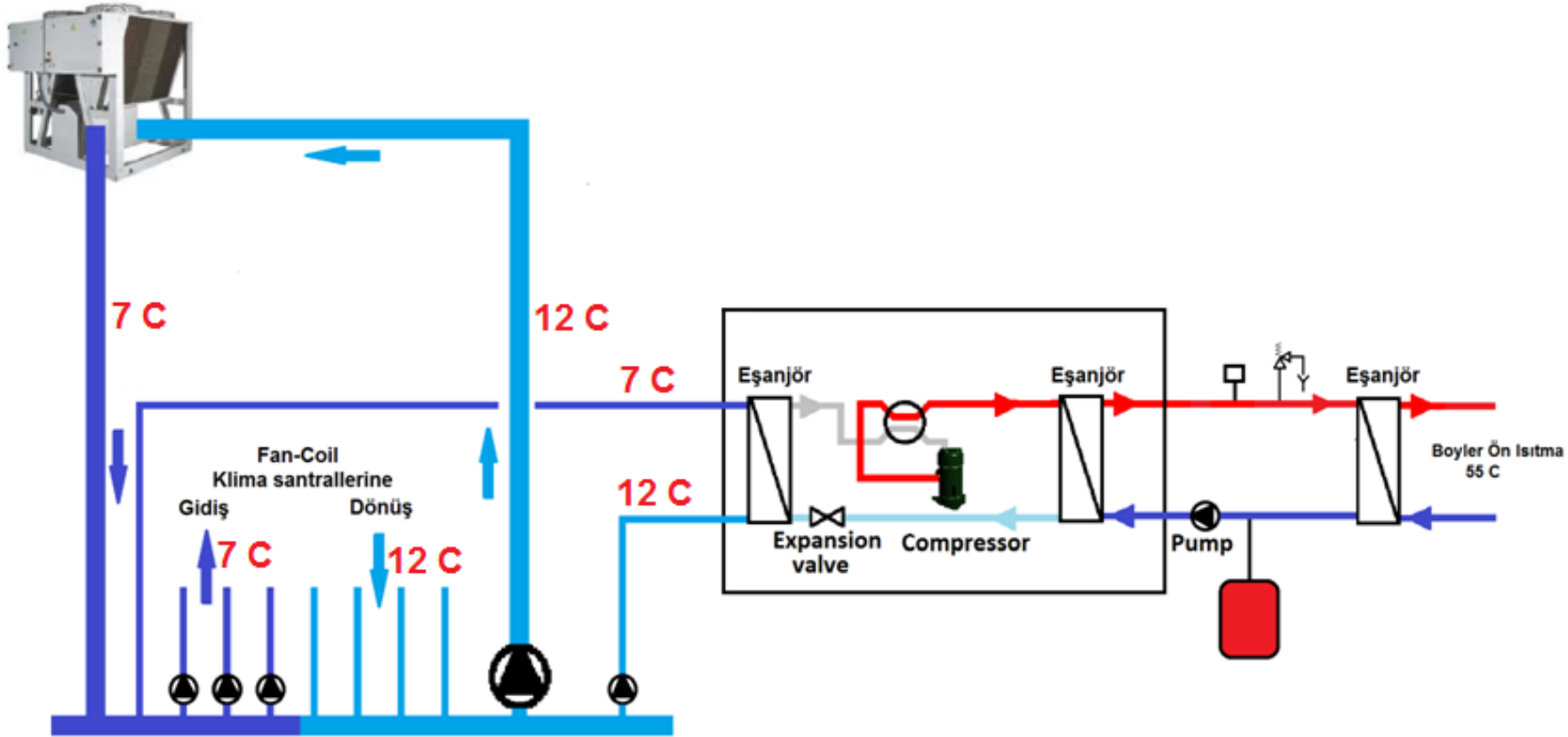


ALANYA BELEDİYESİ TRAFO MERKEZİ

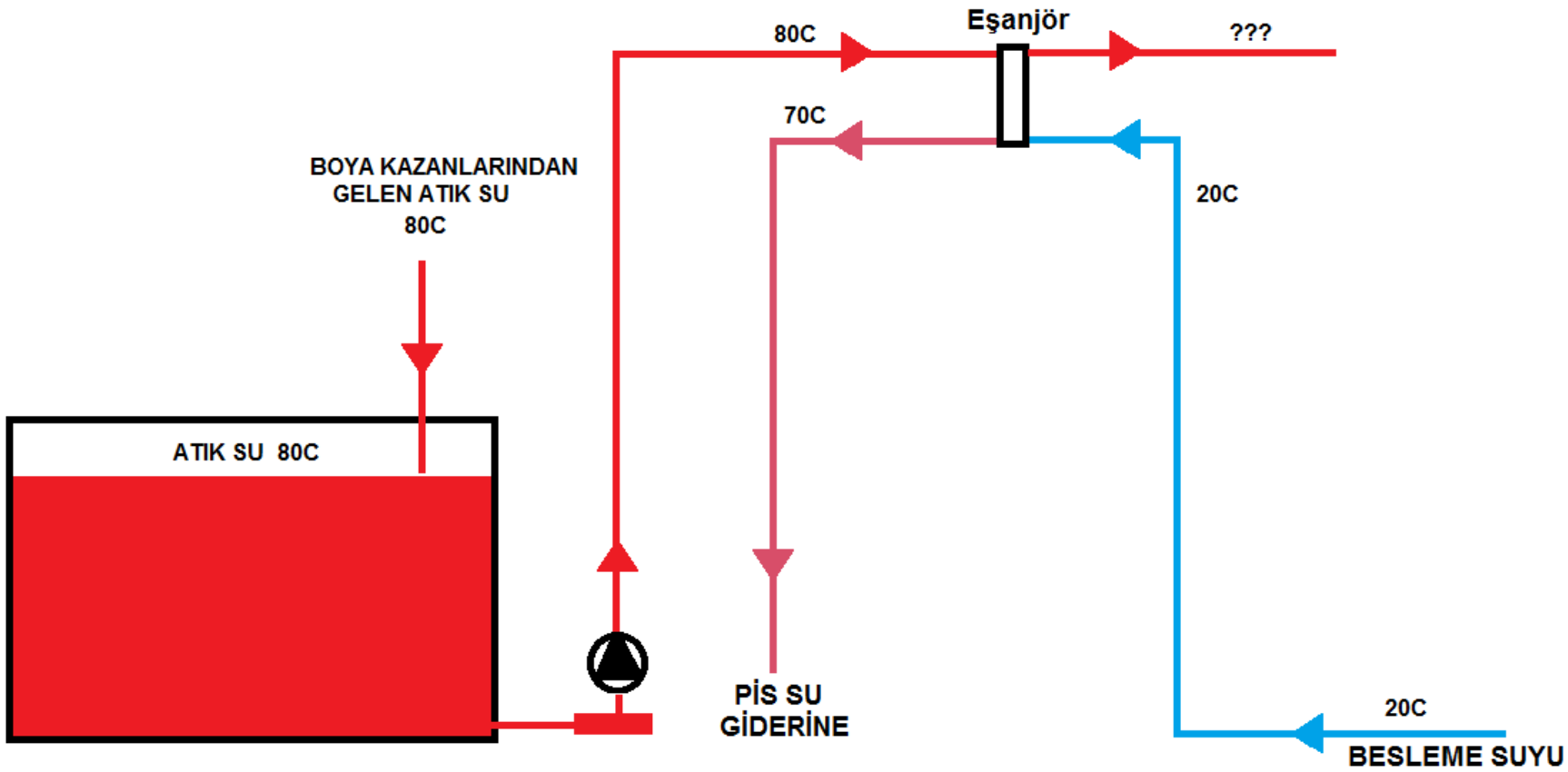
Hava Kaynaklı Isı Pompası



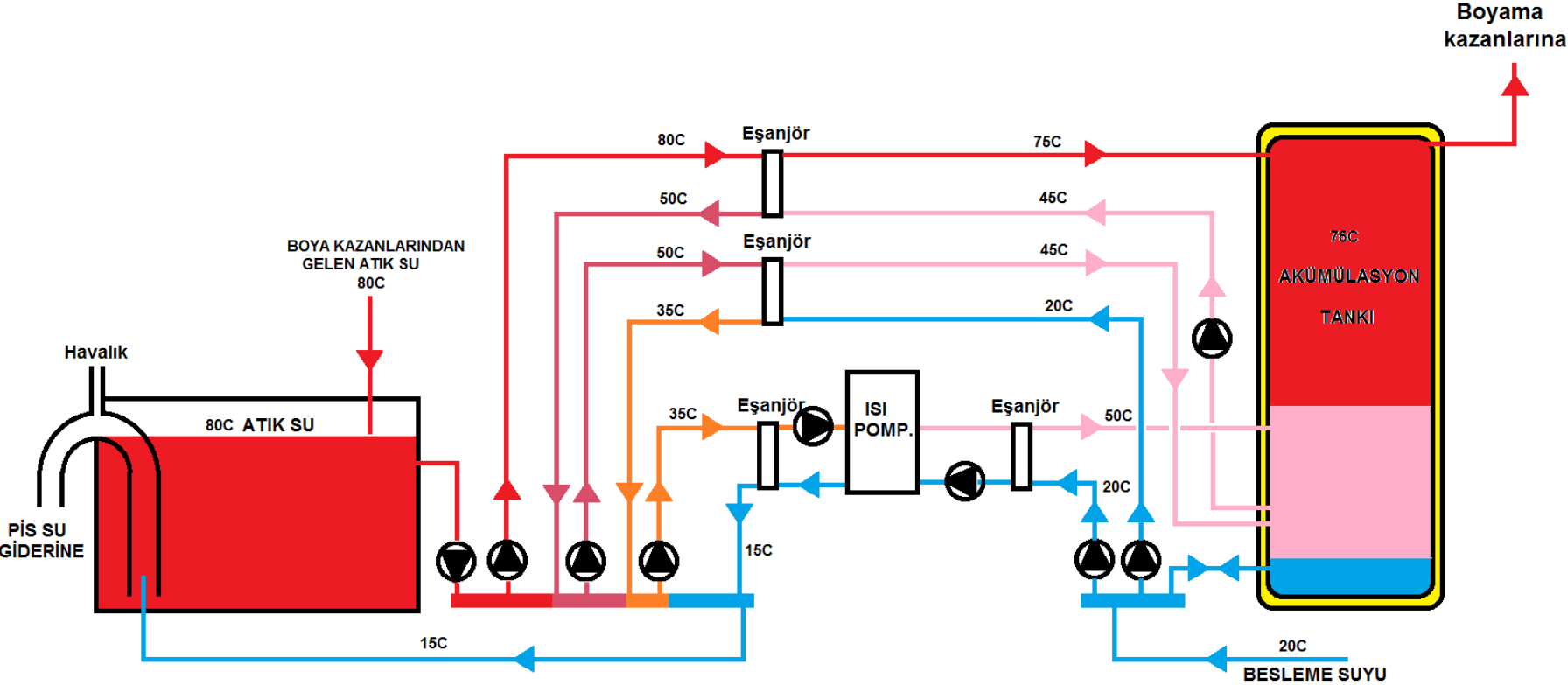
Isı pompası

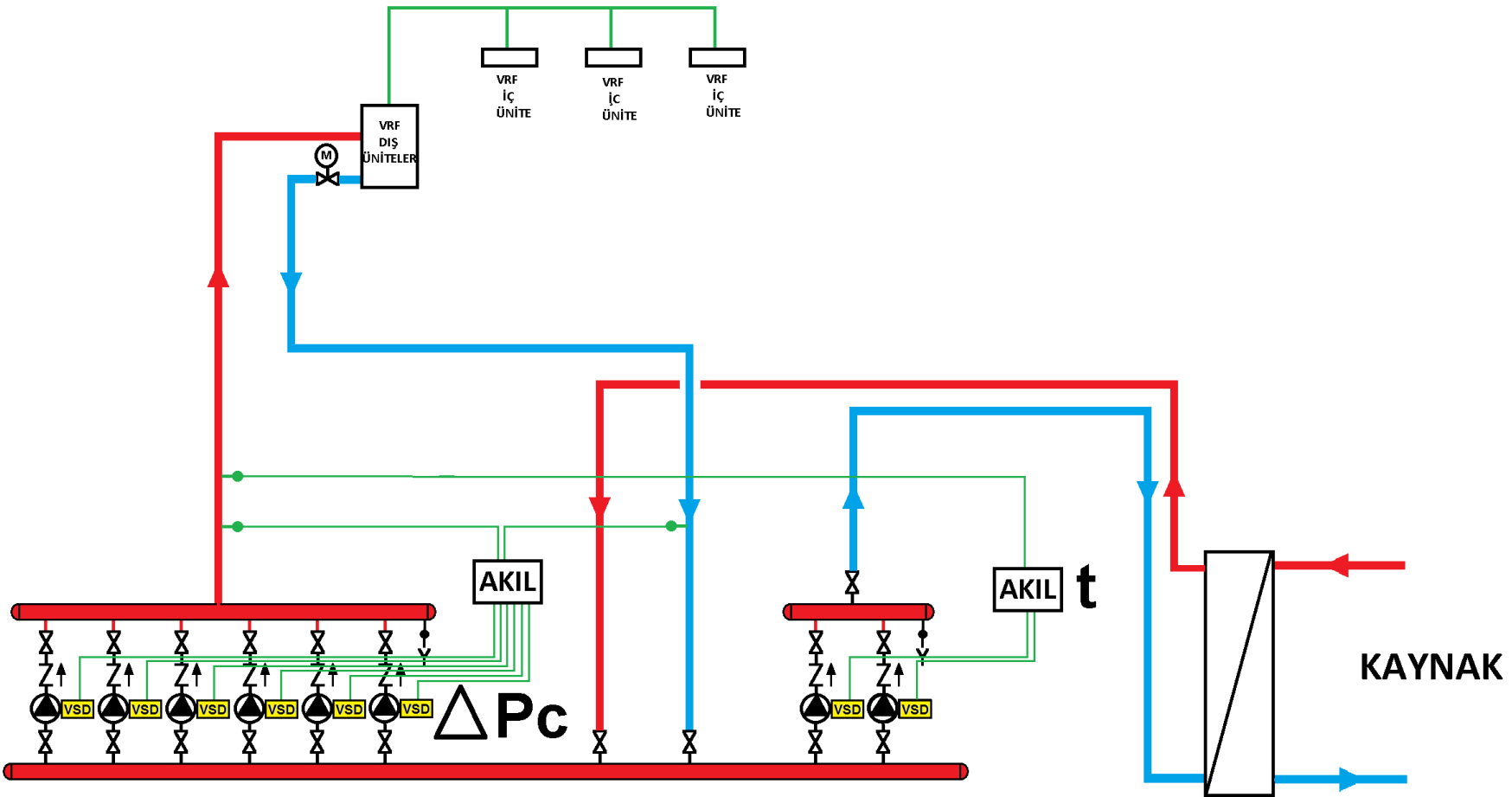


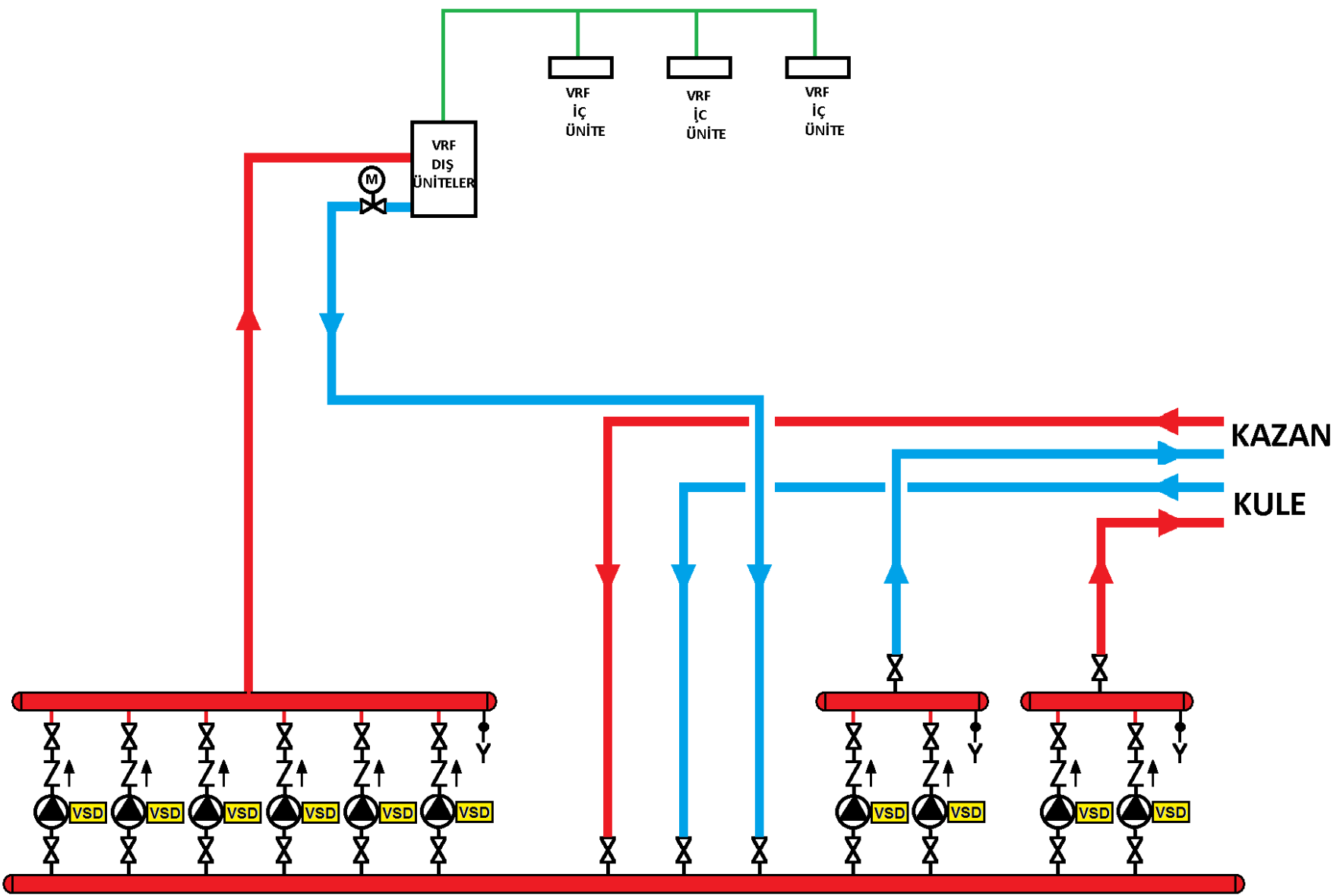
TEKSTİL BOYAHANELERİ



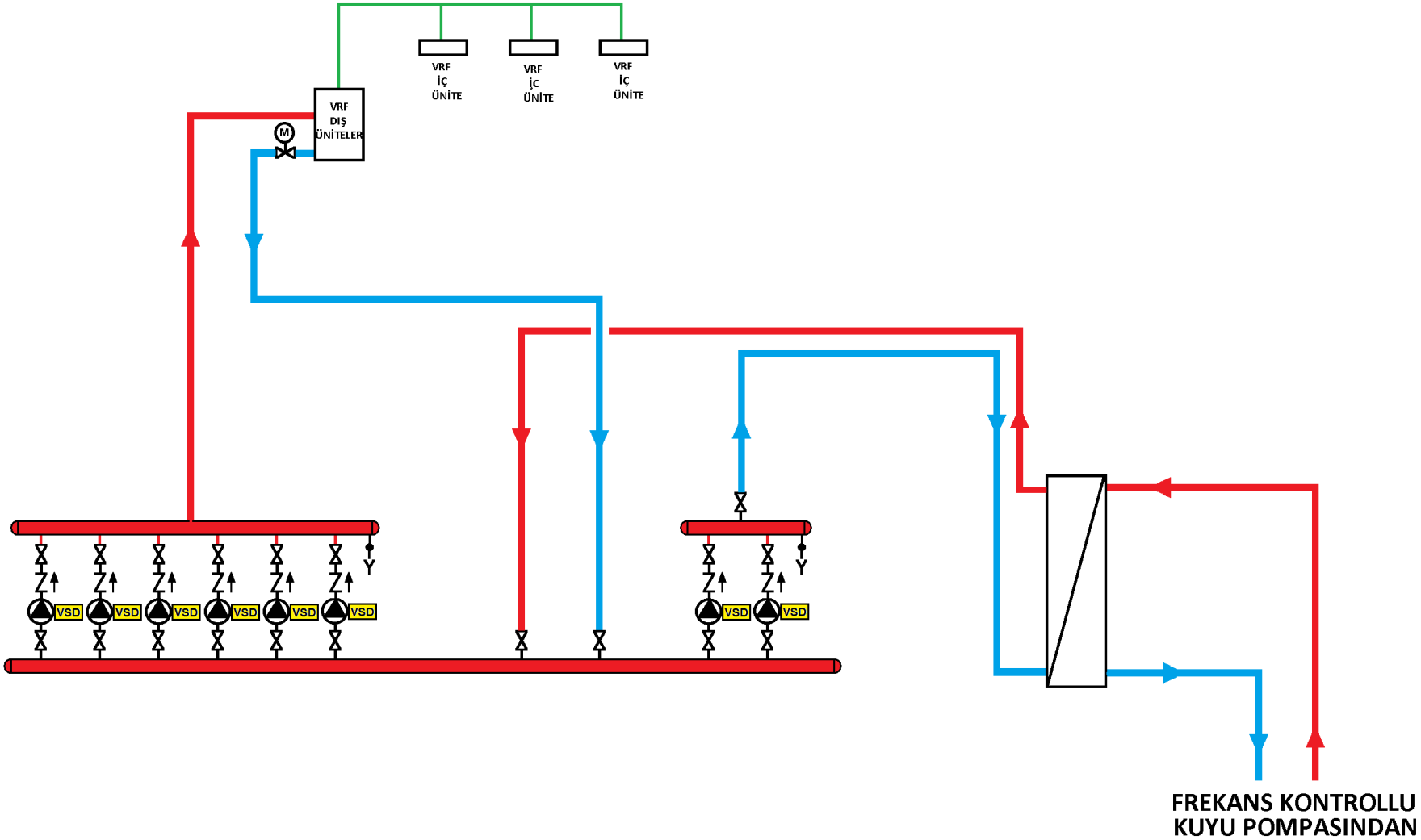
TEKSTİL BOYAHANELERİ



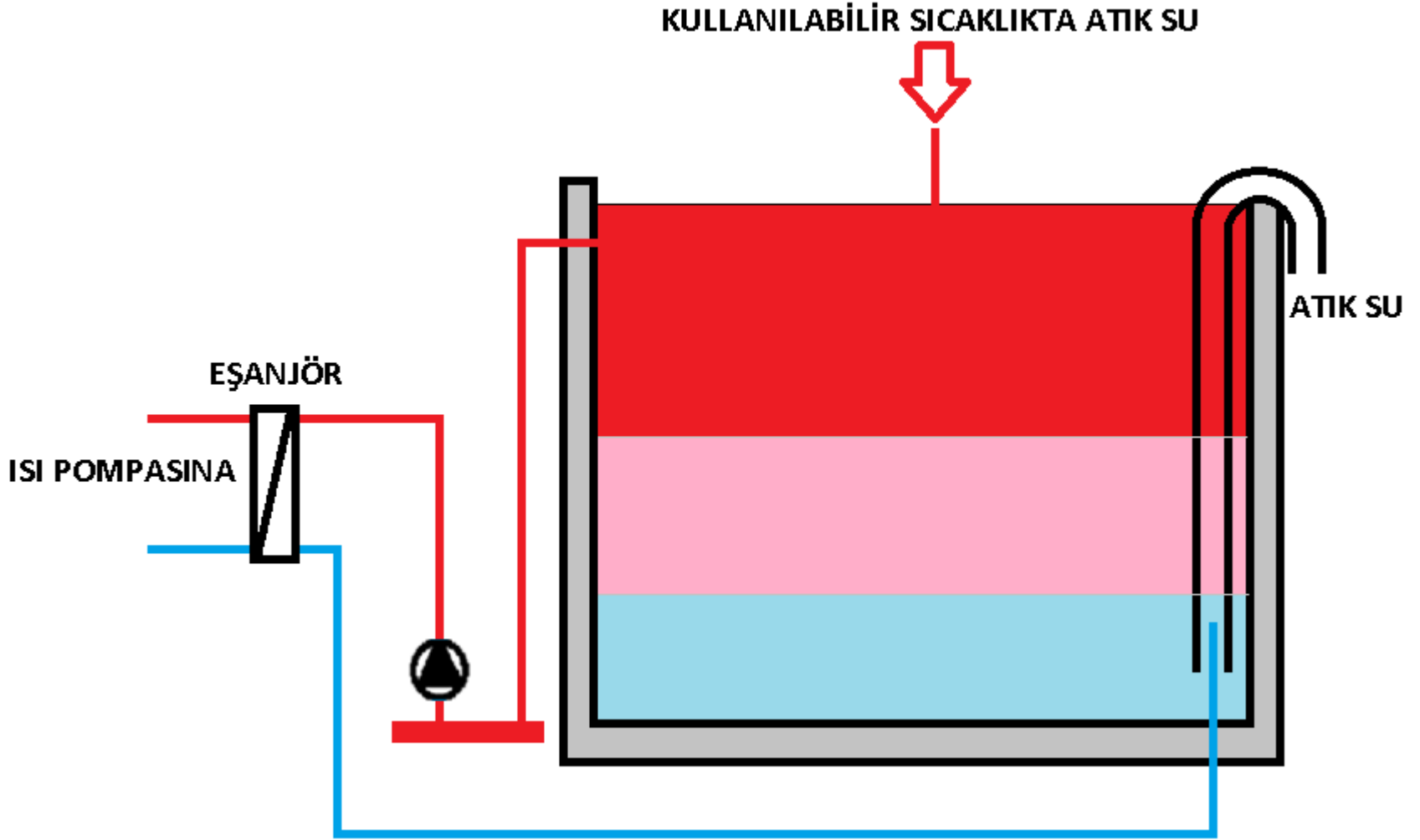




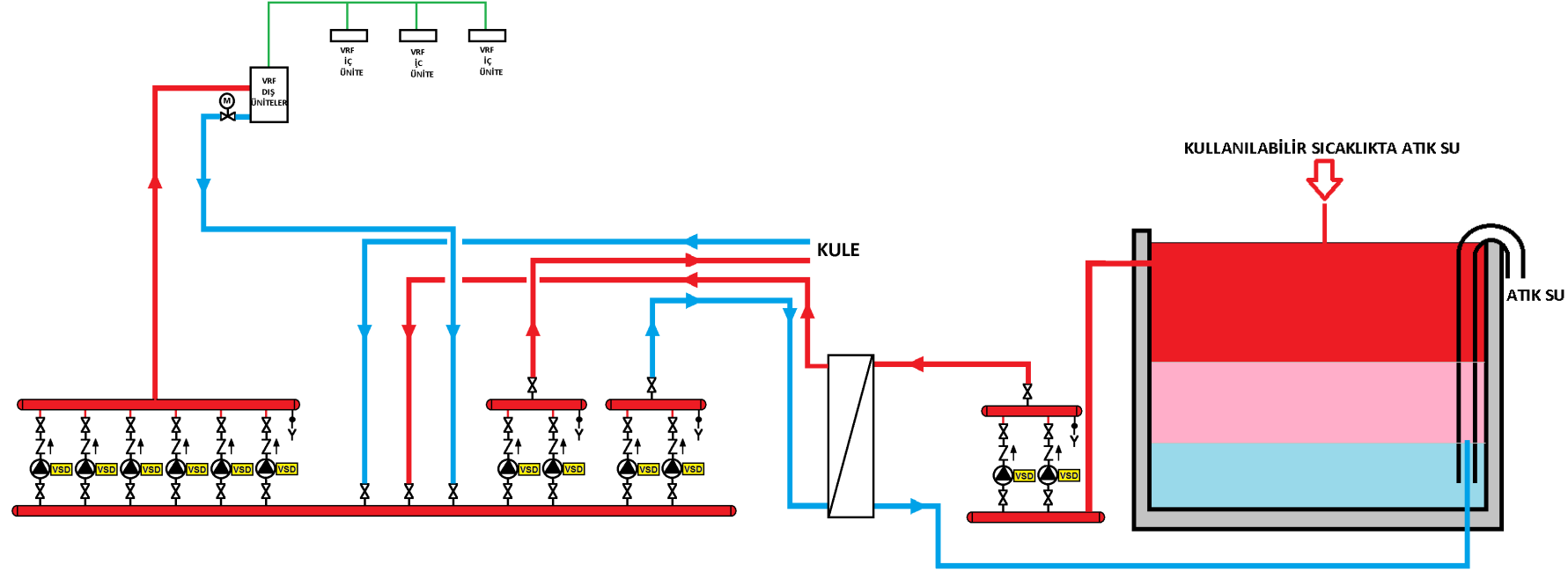
TTMD ANKARA

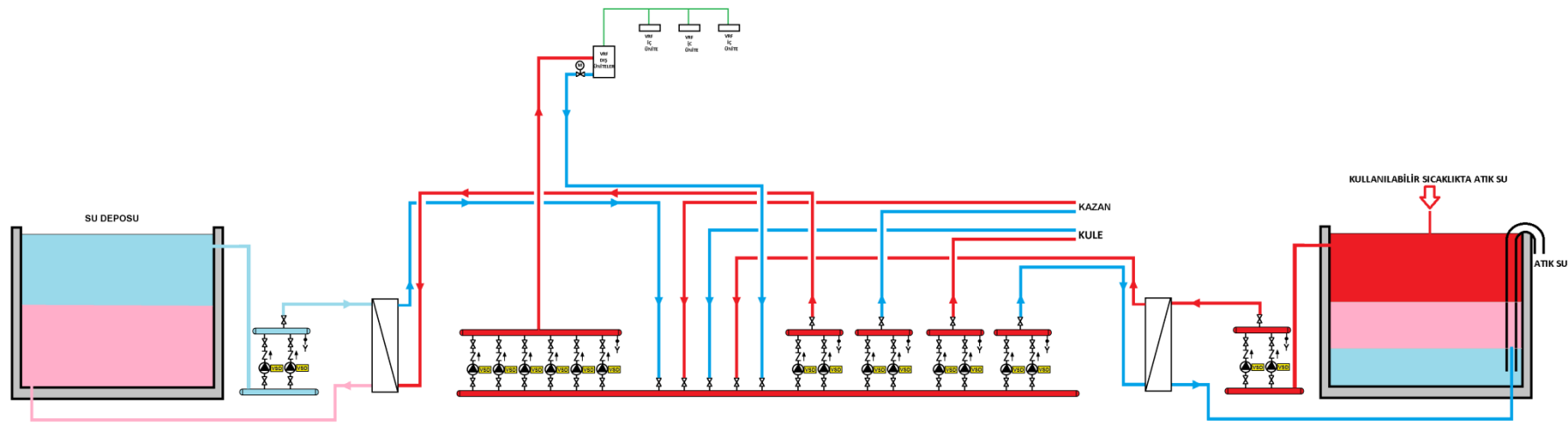


TTMD ANKARA



TTMD ANKARA

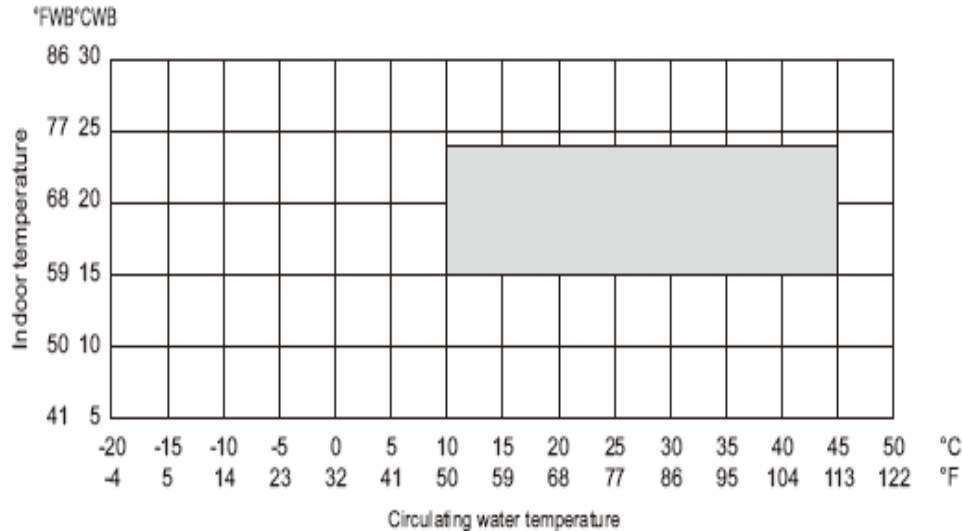




SU SOĞUTMALI VRF SİSTEMLERİ

		Soğutma	Isıtma
Kapasite	*1 kW	22.4	25.0
	*2 BTU/h	76,400	85,300
Güç kaynağı			
Güç tüketimi	kW	3.92	4.12
Akım	A	6.6/6.2/6.0	6.9/6.6/6.3
COP	kW/kW	5.71	6.06

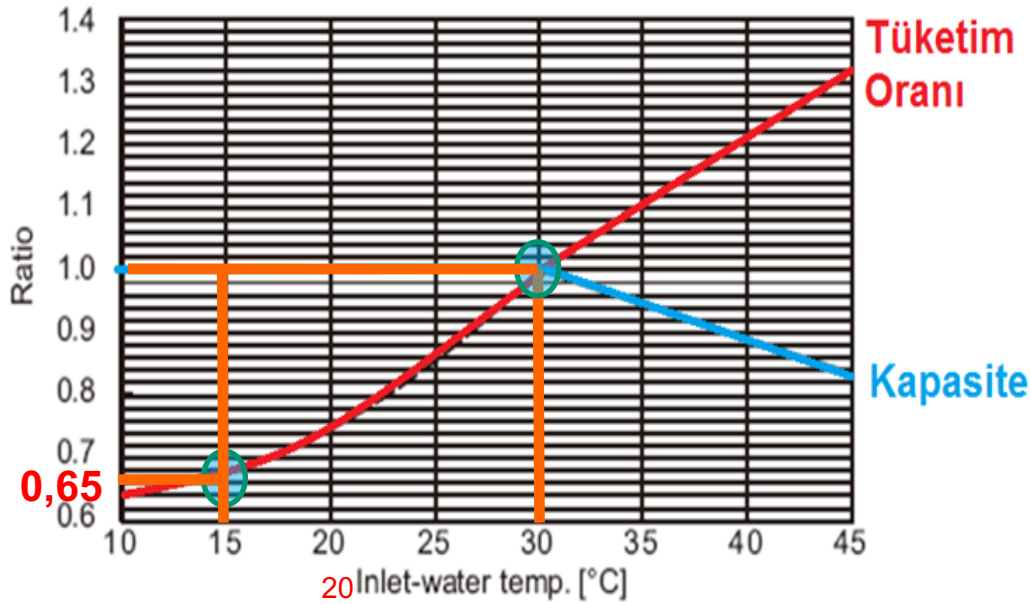
- SU GİRİŞ SICAKLIĞI, SOĞUTMA 30 °C, ISITMA 20 °C
- DIŞ ORTAM SICAKLIK DEĞİŞİMLERİNDEN ETKİLENMEZ



SU SOĞUTMALI VRF SİSTEMLERİ

SOĞUTMA

Nominal Cooling Capacity	kW	22.4
	BTU/h	76,400
Input	kW	3.92



30 °C Su giriş sıcaklığı
Qs=22,4 kW
PI=3,92
EER= 5,71

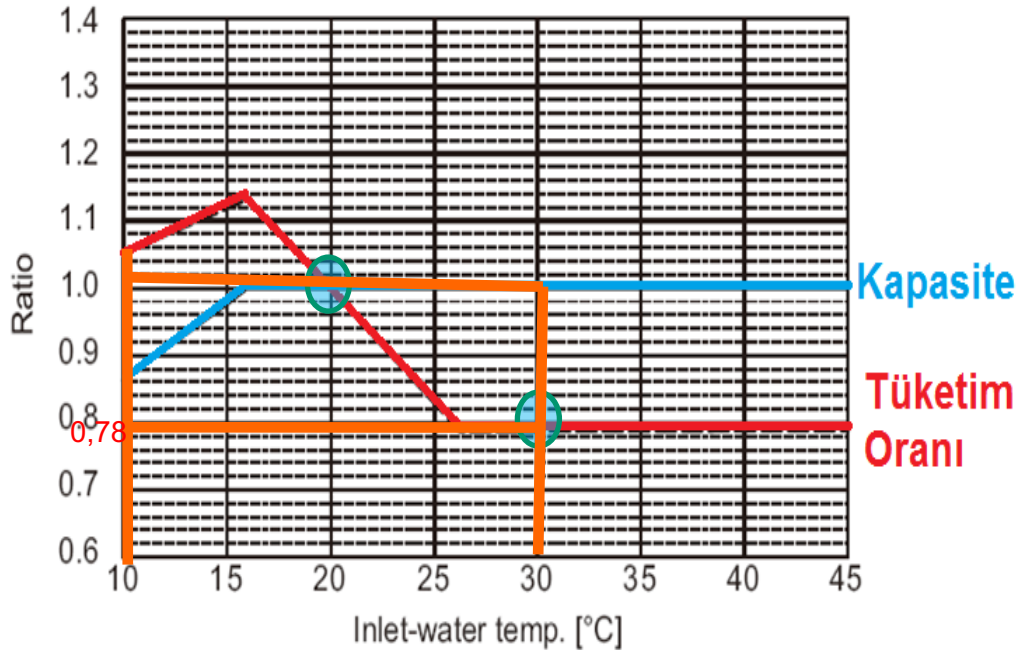
20 °C Su giriş sıcaklığı
Qs=22,4 kW
PI=3,92x0,65
PI=2,54
EER= 8,82

FARK: %54,4

SU SOĞUTMALI VRF SİSTEMLERİ

ISITMA

Nominal Heating Capacity	kW	25.0
	BTU/h	85,300
Input	kW	4.12

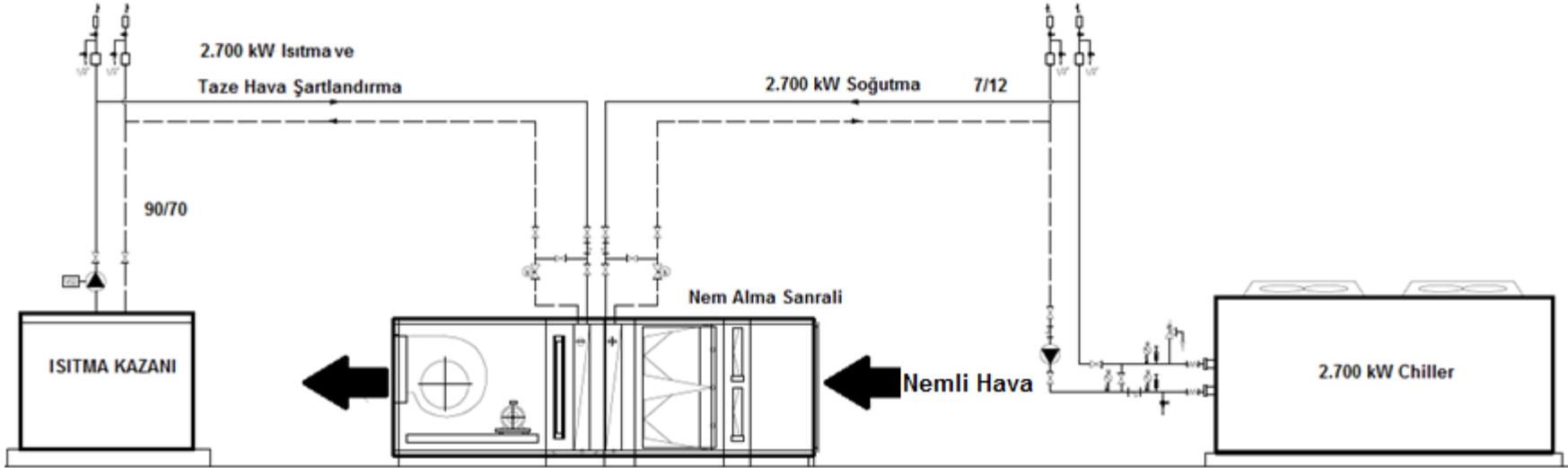


10 °C Su giriş sıcaklığı
 $Q_s=25 \text{ kW} \times ,88 = 22 \text{ kW}$
 $PI=4,12 \times 1,06 = 4,37$
 $COP= 5,03$

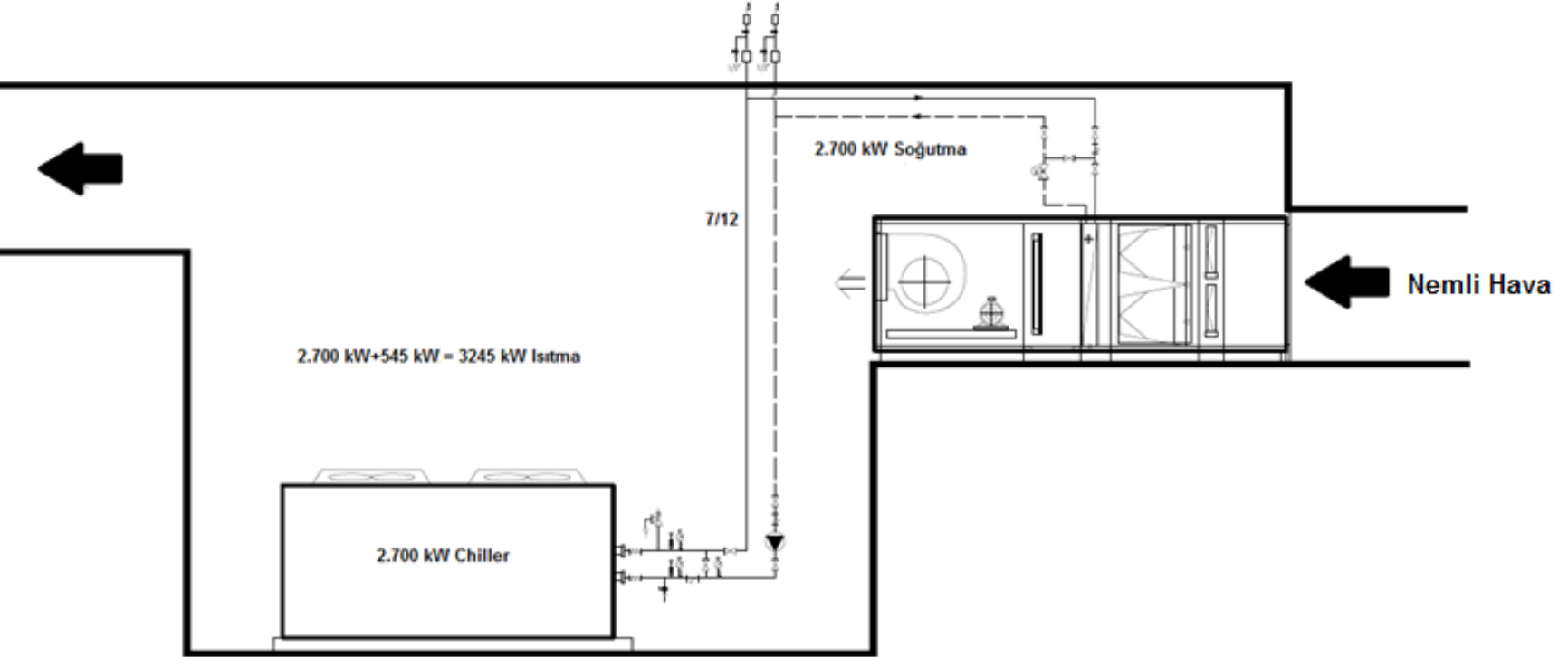
30 °C Su giriş sıcaklığı
 $Q_s=25 \text{ kW}$
 $PI=4,12 \times 0,78$
 $PI=3,21$
 $COP= 7,78$

FARK: %54,6

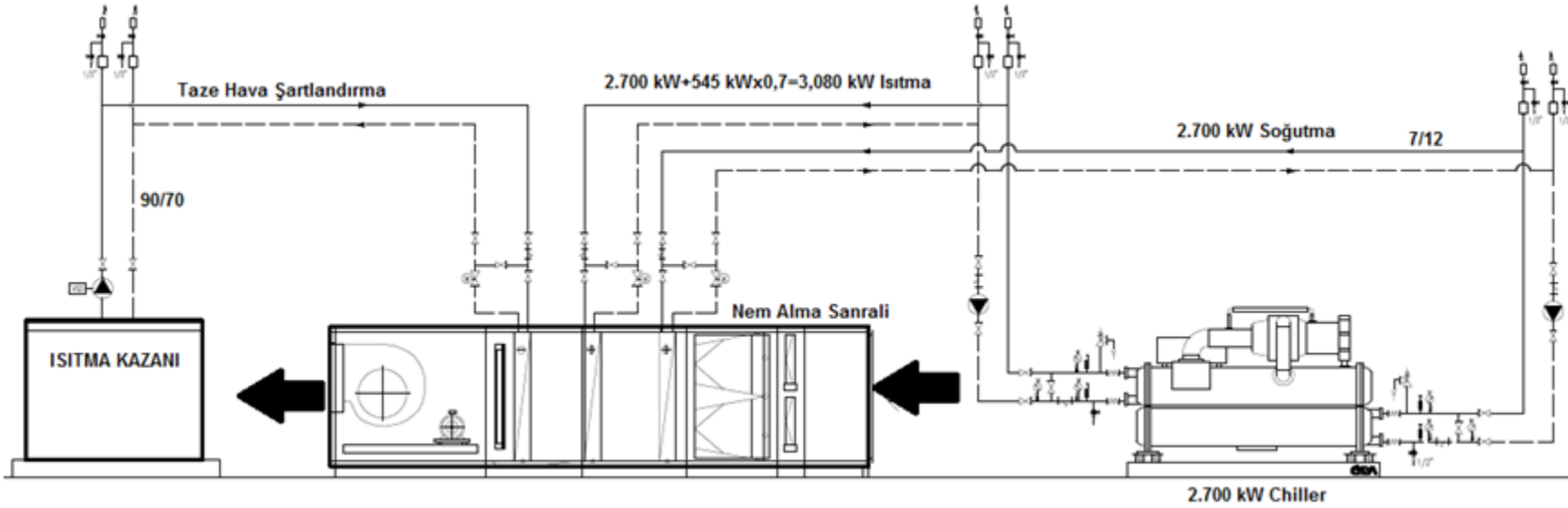
METRO BAKIM ALANI NEM ALMA AMAÇLI SUDAN SUYA ISI POMPASI



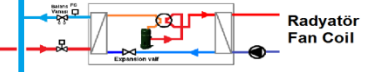
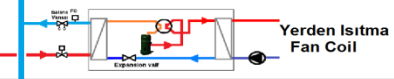
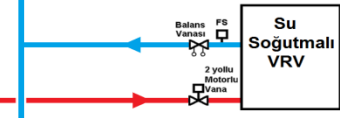
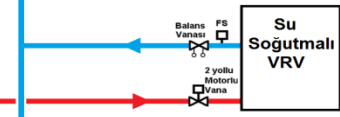
METRO BAKIM ALANI NEM ALMA AMAÇLI SUDAN SUYA ISI POMPASI



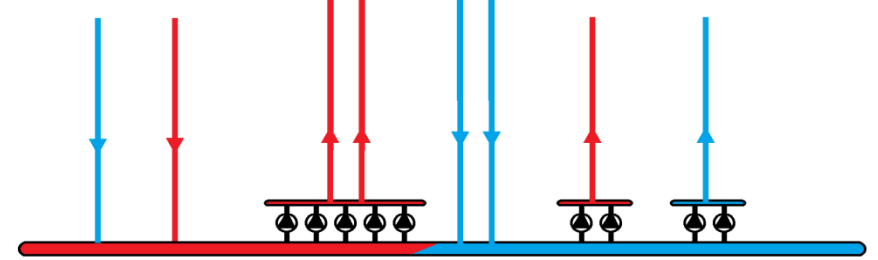
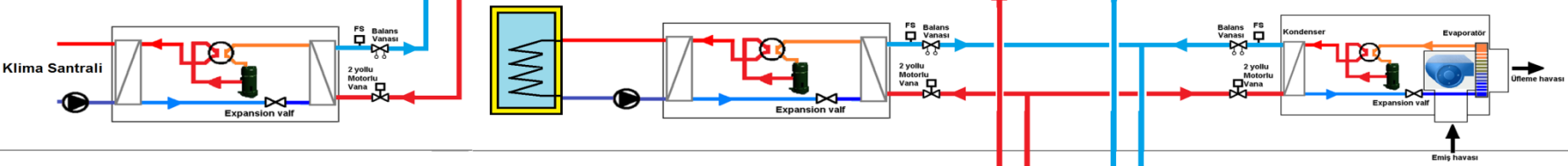
METRO BAKIM ALANI NEM ALMA AMAÇLI SUDAN SUYA ISI POMPASI

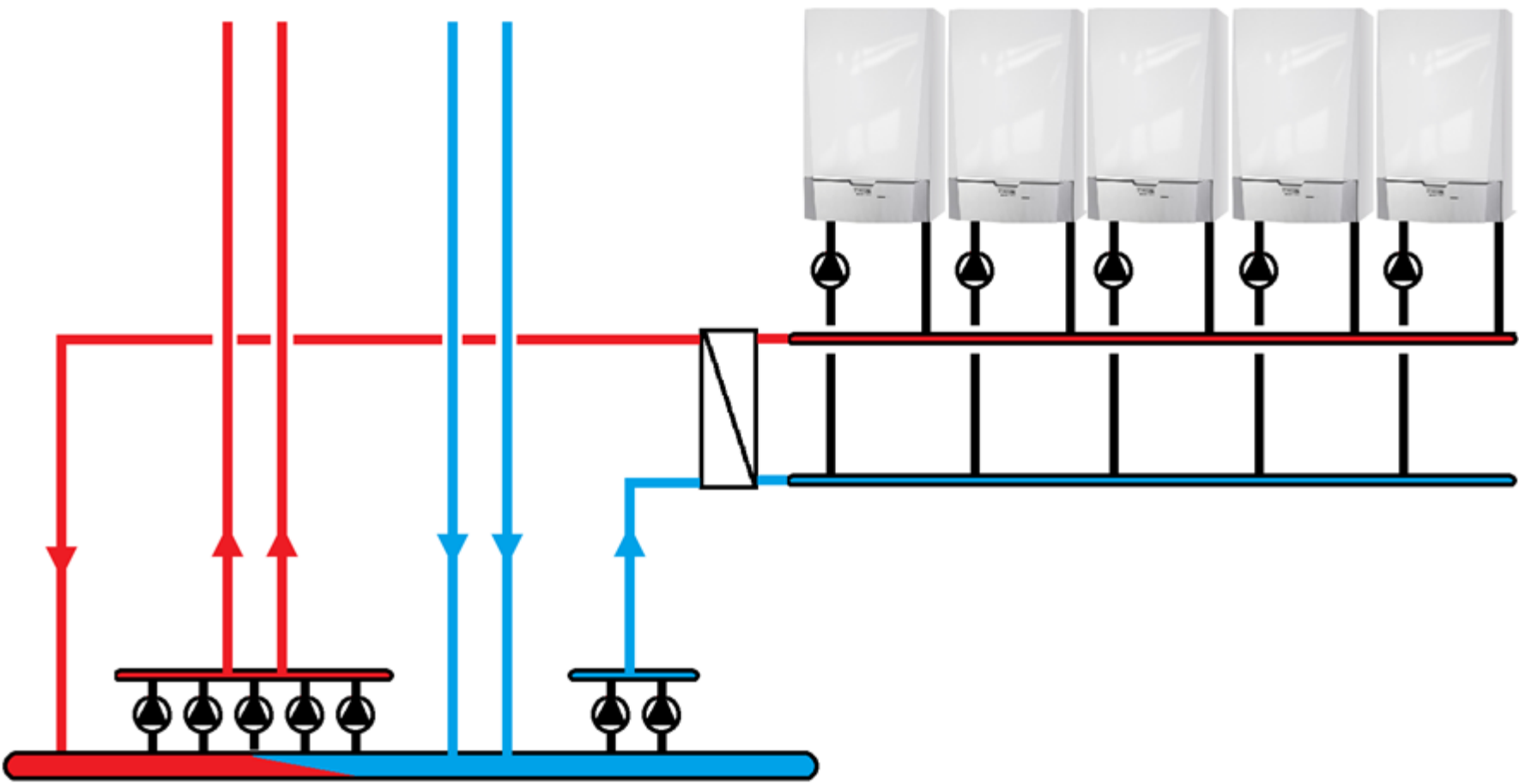


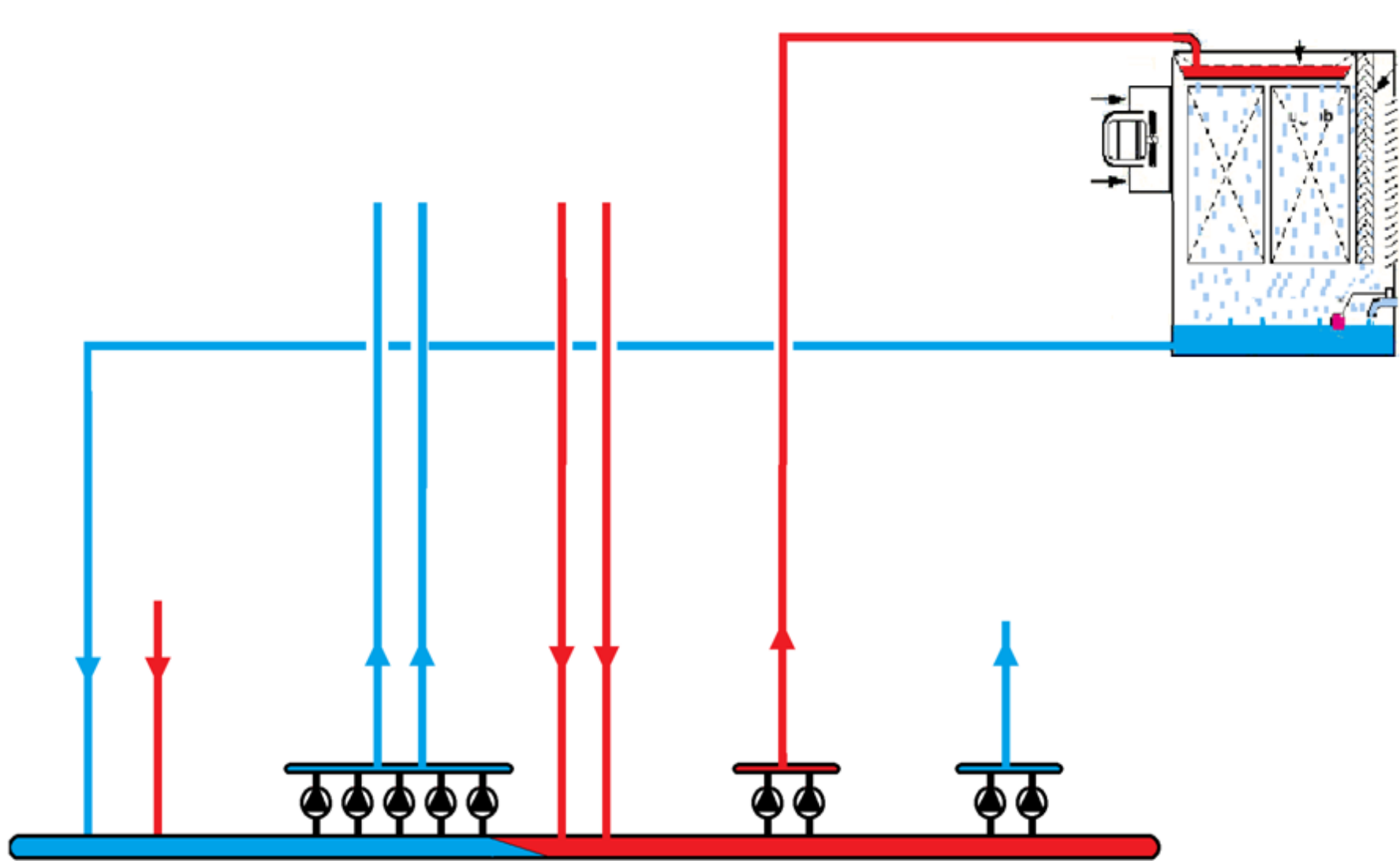
KULE



ÇARŞI KATLARI







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