■ VLT 2800 Electrical installation

On the following pages, the installation of VLT 2800 for variable speed control for the condenser fans on the Danfoss Maneurop line of Blue Star Condensing Units is described.

The first 2 installation examples show how to install the VLT 2800, so that the built-in complimentary PID controller is used.

Installation example 3 shows the use of the AKL 25. The AKL 25 is a logging unit from the Danfoss ADAP-KOOL product range. By installing this unit, it is possible to monitor the operating condition of the condensing unit from the AKM software, even when the VLT 2800 is installed without the ADAP-KOOL compliant gateway.

The alarm output relay of the VLT 2800 can also be connected to one of the AKC controllers, allowing the AKM system to monitor the drives operating state.

The transmitters referenced in this document are Danfoss transmitters. Alternative transmitters may be used, but must provide either a 4-20mA signal or a 0-10VDC signal to the VLT 2800.

Installation of single and three phase motors on page 5 explains how the electrical installation of the VLT 2800 on single and three phase condensing units must be done.

All the contactors mentioned in this document have been tested for use on the output of the VLT 2800. If the use of alternative contactors is requested, please obtain documentation for performance, when these are connected to the output of a frequency converter.

For product selection, please refer to **Selection guide** on page 5.

■ VLT 2800 and AKS 3000/AKS32

The AKS 3000 is a 4-20mA transmitter and should be ordered for a pressure range of -1 to 6 bar. Correct wiring for this transmitter type is shown in figure 1.

The AKS 32 is a 0-10VDC transmitter and should be ordered for a pressure range of -1 to 5 bar. Correct wiring for this transmitter type is shown in figure 2.

Please refer to **Programming of the VLT 2800** on page 4 for details on the correct programming.

For ordering details on the above transmitters, please contact your local Danfoss sales representative or visit us at: http://literature.danfoss.com/ac

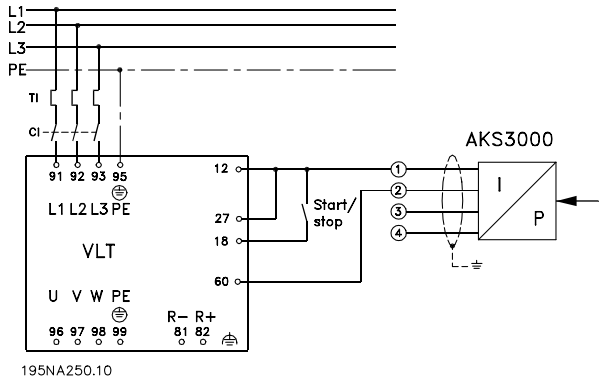

Figure 1

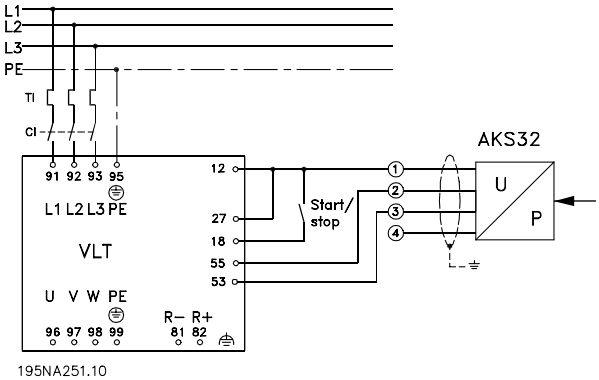

Figure 2

■ VLT 2800 and AKL 25

When installing the AKL 25 for logging and monitoring purposes in an ADAP-KOOL installation, the programming of the VLT 2800 is not affected. There is however some additional installation concerning electrical interferences.

To accomodate these problems, the wiring below should be followed. For assistance, in the selection of components, please contact your local Danfoss representative.

Correct wiring of the AKL 25 and the AKS 32 is shown in figure 3. The AKS 3000 cannot be used with the AKL 25.

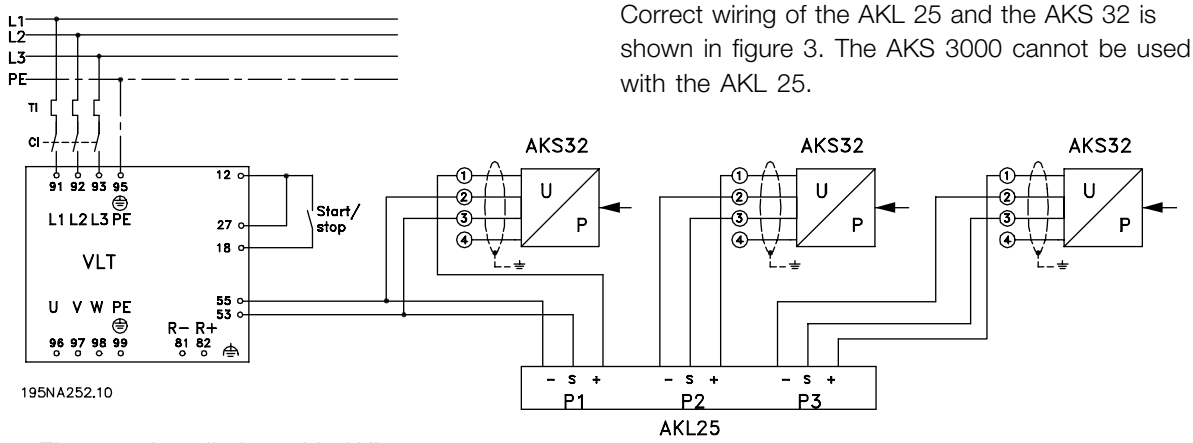

Figure 3: Installation with AKL 25

■ Installation of single and three phase motors

When installing multiple motors on a single drive it is always required to install seperate protection of each motor. See **Protection** on page 3 for further details.

Apart from this, there are no special requirements for installing the VLT 2800 on the three phase fan motors of the Blue Star condensing units.

For single phase fan motors wiring is a bit special. Because the VLT 2800 is designed for three phase motors an equal load on all three phases (U, V and W) is required. This is achieved by using the following installation procedure.

In the condensing unit terminal box, connect the blue phase from both single phase motors to U, connect the brown phase from motor 1 and the black phase from motor 2 to V, connect the black phase from motor 1 and the brown phase from motor 2 to W. See also figure 4 and 5.

Note: Existing motor cables on the condensing unit should be replaced by screened motor cables for EMC correct installation.

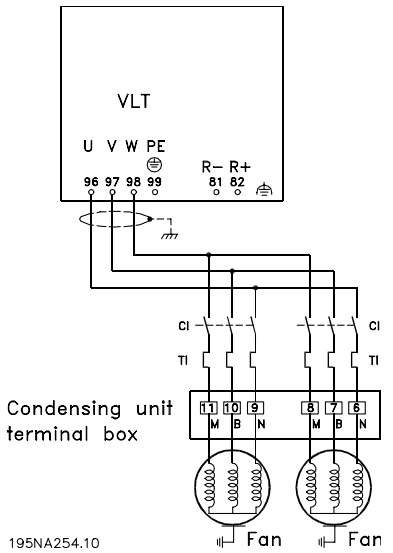

Figure 4: Three phase fan motors

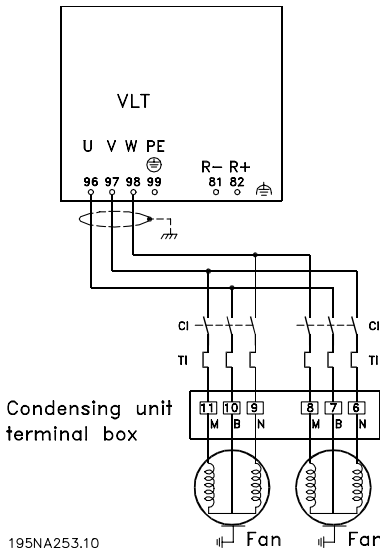

Figure 5: Single phase fan motors

■ Protection

Supply

When choosing a contactor for connection to the input of the frequency converter, it is the normal input current of the frequency converter that sets the criterion for dimensioning the contactor and not as usual the full load current of the motor. The Danfoss VLT 2800 frequency converters have built-in NTC-resistors in the “soft charge” circuit to limit the starting current. This can profitably be used for the dimensioning of the contactor.

For the VLT types 2803, 2805, 2807, 2811 and 2815 recommended contactors are Danfoss CI 4-5 or CI 6.

For protection of the equivalent Danfoss thermal overload relays TI 9 or TI 16 are recommended.

Over current protection

Because several motors are connected to the same VLT frequency converter, the individual motor has to be protected against over current by choosing a thermal overload relay type TI with a current range covering the motor starting current.

For the fan motors on the Blue Star Condensing Unit the recommended thermal overload relays are Danfoss TI 9C or TI 16C.

Both the TI 9C and TI 16C are equipped with separate signal contact and can be used in case of fan motor problems for display warning or for trip of the VLT. This is programmed by parameter 128 and 304. See part **Programming of the VLT 2800** on page 4.

Note: For further information about contactors on supply and over current protection, see Application Note: CI-TI™ Contactors – VLT Frequency Converters (MN.90.Kx.02).

■ Programming of the VLT 2800

To make the VLT 2800 run together with the Blue Star Condensing Unit the parameters below give examples of programming.

When a terminal is not in use, the equivalent parameter should be set to "No Function". The parameters 302 to 305, 307, 308, 314, 319 and 323 are the parameters to take into consideration.

Parameter	Exampl	Value	Unit
Load and Motor			
100 Configuration	Process regulation, closed loop	3	
101 Torque characteristic	Variable torque low	2	
References & Limits			
201 Output frequency low limit, fmi		0	Hz
202 Output frequency high, fma		50	Hz
203 Reference range	Min.Ref. - Max.Ref.	0	
204 Minimum reference, Refmin	Min. P =	0	Bar
205 Maximum reference, Refmax	Max. P =	5	Bar
207 Ramp-up time 1		10	sec.
208 Ramp-down time 1		10	sec.
214 Reference function	External/preset	2	
215 Preset referenc	(Winter)	0-100	%
216 Preset referenc	(Summer)	0-100	%
Inputs and output			
302 Digital Input Term no. 18	Start	7	
303 Digital Input Term no. 19	Preset ref., MSB High ref. = par. 215 or 21 Low ref. = analoge input term no. 5	23	
304 Digital Input Term no. 27	Reset and coasting inverse	3	
305 Digital Input Term no. 29	Preset ref., LSB High ref. = par.215 (Winter) Low ref. = par.216 (Summer)	22	
308 Terminal 53, analogue input voltage	Feedback (AKS32) (AKS3000)	2 0	
309 Terminal 53, Min. scaling	(AKS32)	1-5	VDC
310 Terminal 53, Max. scali	(AKS32)	10	Volt
314 Terminal 60, analogue input current	Feedback (AKS3000) (AKS32)	2 0	
315 Terminal 60, Min. scaling	(AKS3000)	4	mA
316 Terminal 60, Max. scali	(AKS3000)	20	mA
317 Time Out		10	sec.
318 Function after Time Out	Max. speed	4	
323 Relay output 1-3	Unit read	1	
Special functions			
414 Minimum Feedback		-1	Bar
415 Maximum Feedback	(AKS32) (AKS3000)	5 6	Bar Bar
416 Process Units	Bar	4	
437 Process PID normal/inverse control	Inverse	1	
438 Process PID anti windup	Active	1	
439 Process PID start frequenc		5	Hz
440 Process PID proportional gain	(Depend on application)	0,2	
441 Process PID integration time	(Depend on application)	10	
442 Process PID differentiation time	OFF	0.00	
443 Process PID diff. gain limit		5	
444 Process PID lowpass filter time		0.02	

If the solution with separate signal contact on the TI 9C or TI 16C contactors is used, extra programming is needed. The extra programming can be chosen from simple warning to stop (trip) of the VLT. The TI contactors are connected between terminal 12 and 27 on the VLT. The digital input terminal 27 has to be programmed using parameter 304 set to "Thermistor". For choosing between warning or stop of the VLT parameter 128 is either set to "Thermistor warning" or "Thermistor trip".

Parameter	Exampl	Value	Unit
Load and Motor			
128 Motor thermal protection	Thermistor warning (Warning)	1	
	Thermistor trip (Trip)	2	
Inputs and outputs			
304 Digital Input Terminal 27	Thermistor	25	

Files for automatic programming via Danfoss VLT Software Dialog can be downloaded from **www.danfoss.com/drives**.

■ Selection guide

Blue Star Condensing Unit and VLT2800

Models 1x220V	VLTType code 1x220V	Models 3x380V	VLTType code 3x380V
MGM/MGZ016	**VLT 2803 P-T2-B20-ST-R1-DB-F00**		
MGM/MGZ018			
MGM/MGZ022	**195N0003**		
MGM/MGZ028			
MGM/MGZ032		MGM/MGZ032	**VLT 2805 P-T4-B20-ST-R1-DB-F00**
MGM/MGZ036		MGM/MGZ036	
MGM/MGZ040		MGM/MGZ040	**195N1003**
MGM/MGZ050	**VLT 2805 P-T2-B20-ST-R1-DB-F00**	MGM/MGZ050	
MGM/MGZ064		MGM/MGZ064	
MGM/MGZ080	**195N0015**	MGM/MGZ080	
MGM/MGZ100	**VLT 2807 P-T2-B20-ST-R1-DB-F00**	MGM/MGZ100	**VLT 2811 P-T4-B20-ST-R1-DB-F00**
MGM/MGZ125		MGM/MGZ125	
MGM/MGZ144	**195N0027**	MGM/MGZ144	**195N1027**
MGM/MGZ160		MGM/MGZ160	
HGM/HGZ016	**VLT 2803 P-T2-B20-ST-R1-DB-F00**		
HGM/HGZ018			
HGM/HGZ022	**195N0003**		
HGM/HGZ028			
HGM/HGZ032		HGM/HGZ032	**VLT 2805 P-T4-B20-ST-R1-DB-F00**
HGM036		HGM036	
HGZ03	**VLT 2805 P-T2-B20-ST-R1-DB-F00**	HGZ03	**195N1003**
HGM/HGZ040		HGM/HGZ040	
HGM/HGZ050	**195N0015**	HGM/HGZ050	
HGM/HGZ064	**VLT 2807 P-T2-B20-ST-R1-DB-F00**	HGM/HGZ064	**VLT 2811 P-T4-B20-ST-R1-DB-F00**
HGM/HGZ080		HGM/HGZ080	
HGM/HGZ100	**195N0027**	HGM/HGZ100	**195N1027**
HGM/HGZ125	**VLT 2815 P-T2-B20-ST-R1-DB-F00**	HGM/HGZ125	
HGM/HGZ144		HGM/HGZ144	
HGM/HGZ160	**195N0051**	HGM/HGZ160	
LGZ022	**VLT 2803 P-T2-B20-ST-R1-DB-F00**	LGZ022	**VLT 2805 P-T4-B20-ST-R1-DB-F00**
LGZ028		LGZ028	
LGZ040	**195N0003**	LGZ040	**195N1003**
LGZ044	**VLT 2805 P-T2-B20-ST-R1-DB-F00**	LGZ044	
LGZ050	**195N0015**	LGZ050	
LGZ080	**VLT 2807 P-T2-B20-ST-R1-DB-F00**	LGZ080	**VLT 2811 P-T4-B20-ST-R1-DB-F00**
LGZ100	**195N0027**	LGZ100	**195N1027**