QUICK START GUIDE:

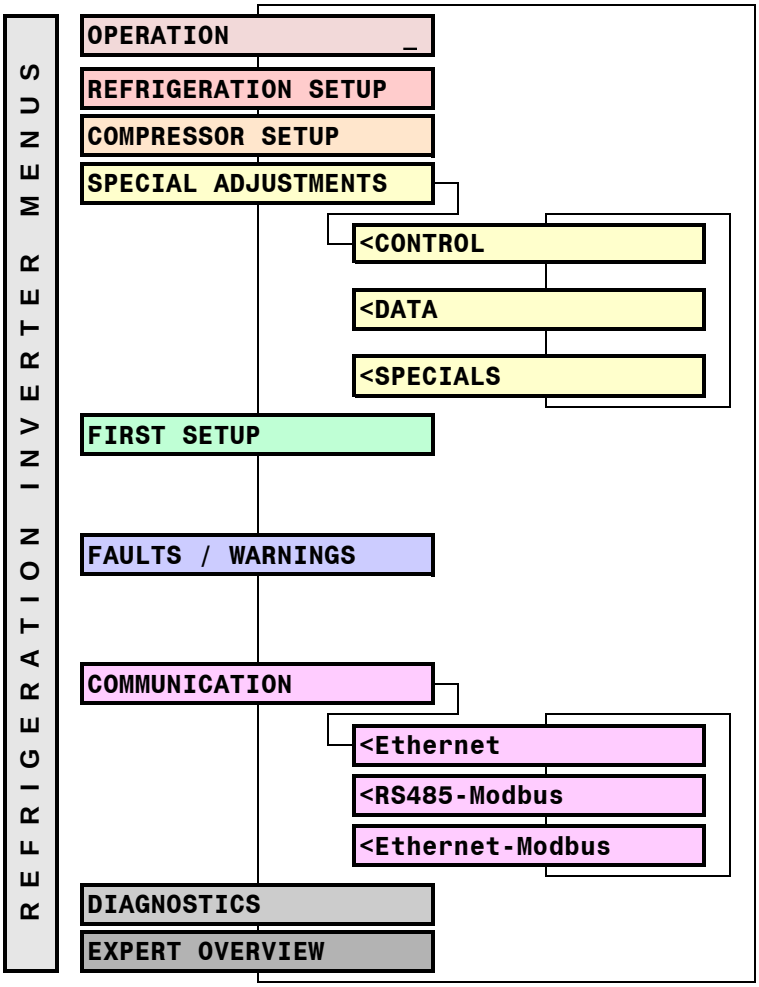
FrigoPack®EC FU+

KIMO RHVAC Controls

FrigoSoft 4.7 activated: **External Control with 0..10 V / 4..20 mA**

FrigoPack® FU+
A New Generation

Intelligent Refrigeration Control Systems for Compressors, Condensers, HVAC & Pumps



Manufacturer	Agent / Partner	Customer	Installation	Name, Date
KIMO RHVAC Controls Ltd German Branch Hüttendorfer Weg 60 D-90768 Fürth, Germany www.frigokimo.com				

FrigoSoft 4.7 activated: External Control with 0..10 V / 4..20 mA

All the following parameters are relevant.

OPERATION

Top Menu

Automatic (10 min)

Password

View Level	OPERATOR	Operator, End Customer	Monitoring operation	None
	TECHNICIAN	Refrigeration technician	Refrigeration Contractor, Installer	Yes
	ENGINEER	KIMO RHVAC Controls	Special optimization, hotline support	Superuser
Language	ENGLISH	English, French, German, Spanish, Italian, Dutch, Turkish, L7, L8, L9,		None
0	See Page 10: NO/YES	Resetting to factory settings, loading firmware and application		Yes

First 16 characters configurable (see p. 6)

Alternatives depending on Option Modules fitted:

FrigoPack_FU+_11	EXTN	EXTN	BM-1	EM-1	EM-2	EM-3	EM-4	ISES	... ...	Operating Mode
FrigoPack_FU+_11	BM-1	EXTN	BM-1	EM-1	EM-2	EM-3	EM-4	ISES	... ...	
FrigoPack_FU+_11	EM-1	EXTN	BM-1	EM-1	EM-2	EM-3	EM-4	ISES	... ...	
23 A 400 V		Rating of Power Module								
1.9.1		Firmware								
123.456.789.012		IP address								

DIAGNOSTICS

OPERATION

REFRIGERATION SETUP

Menu OPERATION of operating observation parameters: Users

Measured Values

		Type / Value	Explanation	Further inform.
Variable-speed Compressor (VsC):	06:Spd__VsC__Power YYYY/min YYY kW	Internal value ____/min __.__ kW	Motor: Speed, Electrical power	1.1
Internal status:	3 08:Start__Sl-Lm-Cc-Cp YYYY YYYY YYYY	Status values ____ ____	Right: Sequnc_Limits_CpctyCntrl_Compr	2.1
		XXXX XXXX XXX1	VFsC1 / V(F)sC2 / FsC3 / FsC4 / FsC5… — Compressors running — Gray-Code: 0..F	
		XXXX XXXX XXC X	Capacity Control (CC):	Active
		XXXX XXXX X1XX/DXX	tcd limit / tcd limit / +CC	Active limits
		XXXX XXXX X2XX/EXX	I limit / I limit / +CC	
		XXXX XXXX X3XX/FXX	tcd limit + I limit / tcd limit + I limit / +CC	
		XXXX XXXX YXXX	0 1 2 3 4 5 6 7 8 9 A B C D	Sequencing State
		XXXX XYYY XXXX	Time to next possible start in s	
		XXXX YXXX XXXX	Auto Restart: Remaining Attempts	
		YYYY XXXX XXXX	Swop: Remaining time (self extending)	
Frequency Inverter:	09:VsC ELECTRICAL Y.Y Hz Y.Y A	Measured values ___._ Hz ___._ A	Variable-speed Compressor, Motor Frequency and Current	1.2
Control Inputs:	18:EXT_ACTIVTNG_VALUE YYY.Y % YYY.Y %	Input value ___._ % ___._ %	Actuating values: Left: AI2(0..+10 V), Right: AI1(4..20 mA)	2.2
	4 20:OUTPUTS_INPUTS _YYYY_YYYY_YYYY_YYYY_	Status values	Digital outputs and inputs: Bitstrings grouped in nibbles	2.4
Refrigerant:	5 25:REFRIGERANT R134a	Selected value _____	Refrigerant (SD-MC card) Selection in: FIRST SETUP ,P. 6	0.1 4
Variable-speed Compressor (VsC):	6 60:COMPRESSOR No_Compressor_Selectd	Selected value _____	Compressor (SD-MC card) Selection in: FIRST SETUP ,P. 6	0.2 5
Assistance:	0:OPERATION OPERATION-Automatic	Internal value _____	Information on Operating condition	4.1
Assistance:	K:SPECIAL KEYS 1 & 0_ Press_for_action__.	Selected value _____	Keys for special functions (see p. 19): LOCAL operating, Setpoints	4.1
Language:	Language ENGLISH	Setting _____	Language Setting	9.1

Necessary settings, See page 6-7 for how to set:

Optional information not required for operation

Password TECHNICIAN for Refrigeration Personnel: 8670

1 … 10 **Please report these values if there are any problems**

Abbreviations:	
VsC:	Variable-speed Compressor
FsC:	Fixed-speed Compressor
VFsC:	Variable- / Fixed-speed Compressor
VfG:	Variable-speed fan group (Condenser / Dry cooler)

=	YY.Y %	:	Measured value depending on operating point
→	FFF	:	Factory default value depending on frame size and rated power

FrigoSoft 4.7 activated: **External Control with 0..10 V / 4..20 mA**

The following parameters have been masked out intentionally

FrigoSoft 4.7 activated: External Control with 0..10 V / 4..20 mA

The following parameters have been masked out intentionally

Menu COMPRESSOR SETUP for setting compressor operation:
View Level TECHNICIAN (for Refrigeration Personnel) only, see page 1

REFRIGERATION SETUP
COMPRESSOR SETUP
SPECIAL ADJUSTMENTS

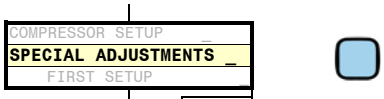
COMPRESSOR SETUP

Settings

		Type / Value	Explanation	Further inform.
Variable-speed Compressor (VsC):	**61:VsC CURRENT MAX 0.0 A**	**Configuration Setting** ___._ A	**VsC Motor current max**	5.1
		CAN ONLY BE CHANGED IF FRIGOPACK FU+ STOPPED FIRST Factory preset to maximum continuous Refrigeration Current until a compressor is selected, see page 6/7		
- Limits:	**62:VsC FREQUENCY MAX 65.0 Hz**	**Setting** ___._ Hz	**VsC Motor frequency max.: Max. settable value: Dt1, page 4**	
	64:VsC FREQUENCY MIN 25.0 Hz	**Setting** ___._ Hz	**VsC Motor frequency min.: Min. settable value: Dt2, page 4**	
	65:VsC MOTOR NO POLES 4	Setting __	VsC Motor: No. of poles: 2, 4, 6, 8	
- Resonance avoidance:	66:VsC SKIP FREQ1 MIN 0.0 Hz	**Setting** ___._ Hz	VsC Resonance Avoid., Skip freq 1 min: 10.0..65.0 Hz *	5.2
	67:VsC SKIP FREQ1 MAX 0.0 Hz	Setting ___._ Hz	VsC Resonance Avoid., Skip freq 1 max: 10.0..65.0 Hz *	
	68:VsC SKIP FREQ2 MIN 0.0 Hz	Setting ___._ Hz	VsC Resonance Avoid., Skip freq 2 min: 10.0..65.0 Hz *	
	69:VsC SKIP FREQ2 MAX 0.0 Hz	Setting ___._ Hz	VsC Resonance Avoid., Skip freq 2 max: 10.0..65.0 Hz *	
		* Limited to fmin..fmax and range of next band. Set to 0.0 Hz when not in use.		
- Time settings:	**70:VsC tinhibit TIME 300 s**	**Setting** ___ s	**VsC Inhibit Time after VsC start: 20..1200 s**	6.1
	71:VsC tlubrctn TIME 4 s	Setting ___ s	VsC Oil Lubrication Pulse time: 0..100 s	
	72:VsC thld fmin TIME 10 s	Setting ___ s	VsC Start Hold Time (at fmin): 0..120 s	
Modifying		**Password TECHNICIAN for Refrigeration Personnel: 8670**		

FrigoSoft 4.7 activated: External Control with 0..10 V / 4..20 mA

All the following parameters are relevant.



Menu SPECIAL ADJUSTMENTS of special parameters:
View Level TECHNICIAN (for Refrigeration Personnel) only, see page 1

Type / Value	Explanation	Further inform.

Settings

Controllers:

<CONTROL

Sub-Menu <CONTROL of Optimizing Parameters

90:VsC Voltage/Freq
8.00 V/Hz

Configuration Setting
Ratio of Voltage / Frequency, usually:
8.00: 400 V/50 Hz // 4.62: 400 V/87 Hz

96:START/STOP LEVELS
0000

Setting
Operation with an external controller:Start / St
0000 / 0008

97:START BULGE
2.0%

Setting
Optimization of starting torque:
0.0 … 5.0 %

Only change after reference to our Applications Department

Operating Mode:

NEW

99:OPERATING MODE
D100

Setting
Defines Operating Mode:
Input as hexadecimal

Special funtionality		
	X**1**XX	Activate Capacity Controller
	X4XX	Stop at fmin after 74:VsC tmon fmin TIM
	X8XX	Activate delayed Oil Injection
	1XXX	Trip reset: DI1 (0->1) / 0XXX->1XXX
	2XXX	Allow slow stop ramp
	0XXX	Relay Ready Safety Circuit & Enables all OK
	4XXX	DO1: & Not Inhibited
	8XXX	& DI1 (Control Switch)
	CXXX	Sfty Crct &Enbl &DI1(Cntrl Swtch)

7.1

<DATA

Sub-Menu <DATA of Special Parameters

Only change after reference to our Applications Department

Controllers:

Dt0
70.0 Hz

Configuration Setting
VsC: Motor Frequency max. settable
15.0 … 120.0 Hz

Dt1
25.0 Hz

Configuration Setting
VsC: Motor Frequency min. settable
15.0 … 120.0 Hz

Dt0 and Dt1 can only be changed in the config mode with inverter stopped.
Reset for operation by pressing the red 'O' key.

Dt6
20.0Hz/s 20.0Hz/s

Setting
Reduce ramp rates above fmin:
Accceleration__Decelleration

Control Mode:

Dt8
ECBAF008

Setting
Activations: Functional and Outputs:
FFFFFFFF … 00000000

XXXX XXX0	Normal
XXXX XXX1	Activate Capacity Controller
XXXX XXX2	Activate extended current limit
XXXX XXX4	Activate pc transmitter monitoring
XXXX XXX**8**	**Activate envelope frequency-range limiting**
XXXX XX**0**X	Normal
XXXX XX1X	Activate inverter motor heating
XXXX XX2X	**Activate Autotune if there is a failed start**
XXXX XX4X	View Level OPERATOR: Extend menus
XXXX XX8X	Activate Serial Communication
XXXX 0**0**XX	0: 0..+10 V Variable-speed fan Group
XXXX 11XX	1: 0..+10 V Frequency (10 V = fmax)
XXXX 22XX	2: 0..+10 V Hot-Gas Bypass control
XXXX 33XX	3: Monitor fmin (see 74:VsC tmon fmin TIME)
XXXX 44XX	4: Inhibit Sump Heater
XXXX 55XX	5: More Condens. capacity required (cascade)
XXXX 66XX	6: Maintenance recommended
XXXX 77XX	7: Connect supply filter trap
XXXX 88XX	8: Activate Capacity Control (CC)
XXXX 99XX	9: Compressor turning / Start lubrication
AAA**A** AAXX	A: Activate Compressor VFsC1
BB**B**B BBXX	B: Activate Compressor VFsC2 / FsC2
C**C**CC CCXX	C: Activate Compressor FsC3
XXXX DXXX	D: Activate Compressor FsC4 (AO2)
E--- ----	E: Activate Compressor FsC5 (MUX of DO1)
FFFF **F**FXF	F: Activate Expansion Valve

Selectable outputs:
(DO5) (DO4) DO3 DO2 AO2 AO1 Settings
- Logic outputs with AO1, AO2 (special ext. relays)

SD MC Card:

Dt9
_16c

Setting
SD-MC (Secure Data Memory Card):
Revision Designation

Modifying

Password TECHNICIAN for Refrigeration Personnel: 8670

7.2

SPECIAL ADJUSTMENTS

<SPECIALS

Sub-Menu <SPECIALS of Expert Parameters

Only change after reference to our Applications Department

7.3

Speed Setpoint Conditioning	Sp1 **0064**	Setting	Lubricating / Force Frequency: 0064 = 50.0 Hz
Further Resonance Avoidance	Sp7 **FFFF**	Setting	Further Skip Frequency 3: Maximum+Minimum (hexadecimal)
	Sp8 **FFFF**	Setting	Further Skip Frequency 4: Maximum+Minimum (hexadecimal)
Sequential Control	Sp9 **1050**	Setting	RHVAC Sequencing Logic: Start Delay1: 0.1 s, Start Delay2: 0.01 s
Current Profile	SpD **B4DC**	Setting	Max. Current as a function of speed: fmax in %, fmin in 10%
External Energy Meter	SpG **0000**	Setting	External Energy Meter: Pulse in kW
External input Harmonic Filter	SpH **0000**	Setting	External input harmonic filter: Activate trap connect
Other settings	SpI **3FFA**	Setting	LOCAL_Energy Saving_ Flux reduction_Flux characteristic

Base Voltage:	XXX**A**	F..A..0: Max(110 %)..Normal(100%)..Min(80%)
Energy Saving, -Max Reduction:	XX**F**X	F..0: None(100%)..Min(70%)
-Min. acting freq.:	X**F**XX	0..F: fmin +(0..15 Hz)
LOCAL Automatic, Sweep rate:	0XXX	0.1 Hz / s
	1XXX	0.2 Hz / s
	2XXX	0.5 Hz / s
	3XXX	**1 Hz / s**
	4XXX	2 Hz / s
	5XXX	5 Hz / s
	6XXX	10 Hz / s

Resetting values	SpJ **0000**	Setting	Reset of various settings

Reset Values shown in Menu DIAGNOSTICS:	XXX**0**	No reset	
	XXX1	**CONTROL SCREEN** |	Installation Name
	XXX2	**DIAGNOSTICS** |	VsC equiv. 50 Hz time
	XXX3	**DIAGNOSTICS** |	Fan equiv. 40 °C time
	XXX4	**FAULTS / WARN** |	Trips Accumulated

Limiting Ranges (night operation)	SpK **0000**	Setting	Limit ranges of VfG(links) and VfG(rechts). Activation when Ext. Module EM connected.

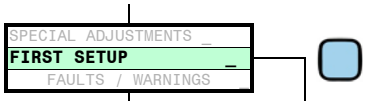
Modifying — **Password TECHNICIAN for Refrigeration Personnel: 8670**

Modifying — **Password for Refrigeration Personnel with FrigoPack FU+ Training required**

FrigoSoft 4.7 activated: External Control with 0..10 V / 4..20 mA

All the following parameters are relevant.

Menu FIRST SET-UP for settings with a SD-MC card with valid data:
View Level TECHNICIAN (for Refrigeration Personnel) only, see page 1



Selections

Select data from the SD-MC card

SD-MC:Data Select
<0:Selection disabld

Type / Value	Explanation	Further inform.
Settings:	One of the following must be activated	0.1, 0.2
<0:Selection disabld	Selection not activated (normal)	
<1:Refrigerant	Refrigerant selection	
<2:VFsC Manufacturer	Manufacturer selection	
<3:VFsC Type	Compressor Type selection	
<4:VFsC Cylinders	Compressor number of cylinders	
<5:Supply Voltage	Electrical Supply Voltage	
<6:VFsC Compressor	Compressor selection	

Read data from the SD-MC card

SD-MC:Data Read
<14:R134aHFC
<Long Selectin List

Measured value	Read selected data from SD-MC card

KEYS FOR SELECTION:

Next data set (short tip >= 0.5 s)
Previous data set (short tip >= 0.5 s)

IMPORTANT:

Requirement for Selection:
- **SD-MC memory card with valid authorized data plugged into SD slot of the FU+ Refrigeration**
- **The selection parameter SD Data_Selection must be set to:**

<0:Selection disabld
to return to normal operation

Selectable data from the SD-MC card — *SD-MC: Secure Digital - Memory Card*

***FrigoSoft* 4.7:** **Option**

REFRIGERANT selection:

R134a, R14, R22, R23, R32, R134a, R152a, R170, R227ea, R236fa, R245fa, R290 R404A, R407A, R407C, R407F, R410A, R417A, R417B, R422A, R422D, R427A, R434A, R437A, R438A, R442A, R442A, R448A, R449A, R507A, R508A, R508B, R513A,	**R600, R600a R717, R723, R744, R1150, R1234yf, R1234ze, R1270**

Compressor pre-selections:

<20:noname	**<24:DORIN**	**<28:GEA-Bock**	**<2C:LGE**
<21:BITZER	**<25:EMERSON**	**<29:HANBELL**	**<2D:SANYO**
<22:CARLYLE	**<26:FRASCOLD**	**<2A:HITACHI**	**<2E:TECUMSEH**
<23:DANFOSS	**<27:FRIGOPOL**	**<2B:J&EHALL**	<2F:other

<30:notype	**<34:Recipopen**	**<38:ScrewOpen**
<31:RecipHermetic	**<35:ScrewHermetic**	**<39:Scroll**
<32:RecipSemihermtc	**<36:ScrewSemihermtc**	<3A:Reserve
<33:Recip2-stage	**<37:ScrewCompact**	

<40:Nocylinders	**<44:4cylinders**	**<48:8cylinders**	<4C:12cylinders
<41:1cylinder	-	-	-
<42:2cylinders	**<46:6cylinders**	<4A:10cylinders	-
<43:3cylinders	-	-	<4F:(15+cylinders)

Supply Voltage at 50/60 Hz:

<50:notdefined	<54:50Hz420V	<58:60Hz200V	**<5C:60Hz460V**
<51:50Hz200V	<55:50Hz500V	<59:60Hz208V	<5D:60Hz575V
<52:50Hz230V	<56:50Hz690V	<5A:60Hz230V	<5E:60Hz660V
<53:50Hz400V	<57:50HztbdV	<5B:60Hz380V	<5F:other

VsC COMPRESSOR selection: <No_Data_selected__

Selections

Real Time Clock:

Time and Date
2015/07/04 16:08:51

Setting	Time and Date of RTC (if module A FU+ CM-1 fittted)	0.3

Language:

Language
ENGLISH

Setting	Set Language	0.4

Installation ID:

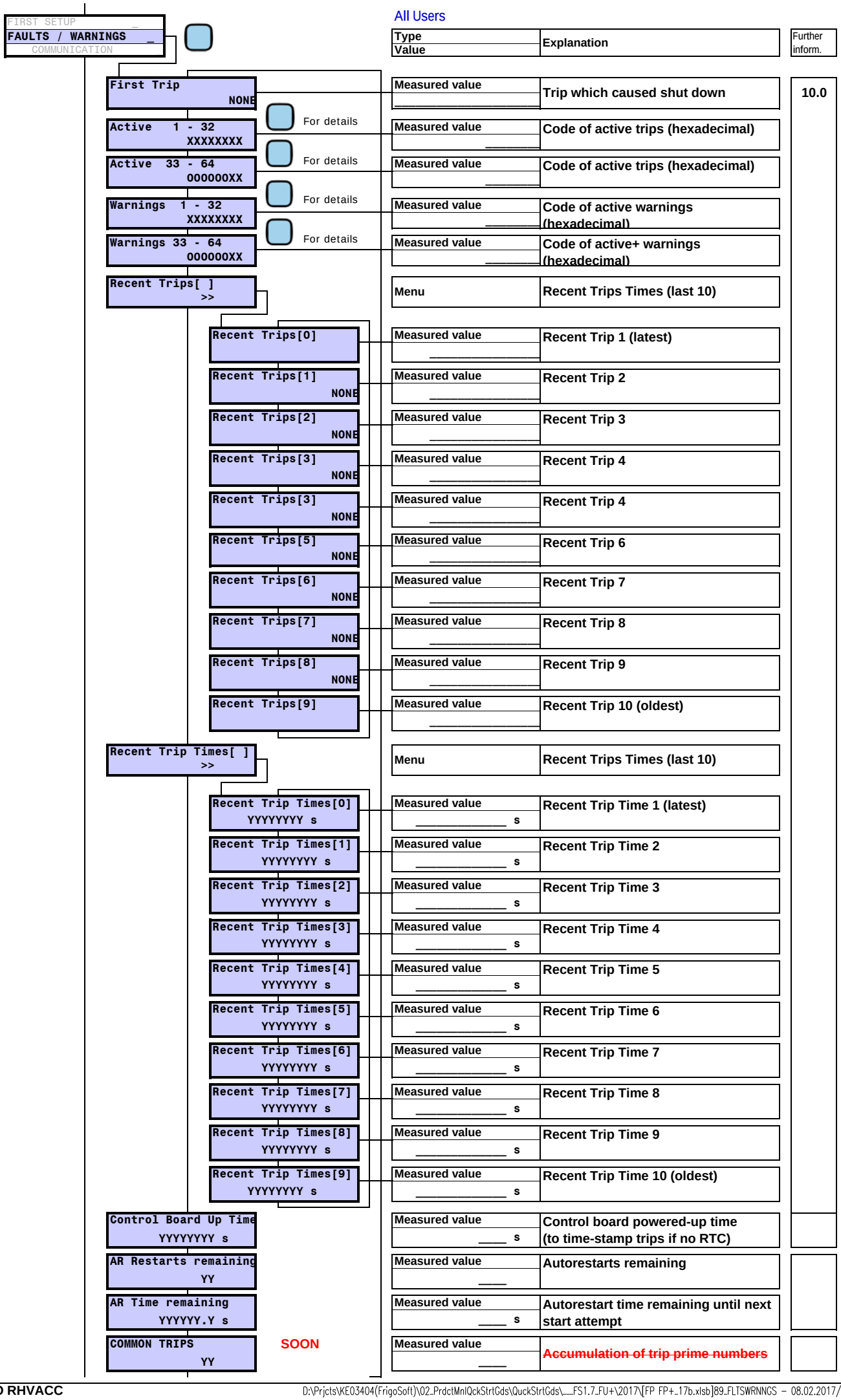
Installation Name
FrigoPack_FU+

Setting	Welcome text in Control Menu: 16 settable characters:	0.5

FIRST SETUP

FrigoSoft 4.7 activated: External Control with 0..10 V / 4..20 mA

The following parameters have been masked out intentionally



Trip Message	Possible Cause	Hints for Fault Finding	Remedies
01 OVER VOLTAGE	• Voltage of supply too high	- Measure and document three input voltages	- Rectify cause of any high voltage
	• Compressor motor defect	- Test Compressor motor. Disconnect cables from the Refrigeration Inverter. Connect direct to the input supply through a suitable motor circuit breaker. Monitor if compressor runs normally by verifying current taken agrees with compressor manufacturer's data.	- Replace compressor motor
		- Measure resistance of motor winding and compare with manufacturer's data	
		- Disconnect Refrigeration Inverter and check winding insulation between phases and to earth	
	• Isolating contactor not controlled correctly	- Check wiring of control circuit and compare function with recommendations	- Modify wiring
02 UNDER VOLTAGE	• Voltage of supply too low	- Measure and document three input voltages	- Rectify cause of any low voltage
	• Phase of supply voltage missing		
03 OVER CURRENT	• Isolating contactor not controlled correctly	- Check wiring of control circuit and compare function with recommendations	- Modify wiring
04 STACK FAULT	• Compressor motor defect	- Test Compressor motor. Disconnect cables from the Refrigeration Inverter. Connect direct to the input supply through a suitable motor circuit breaker. Monitor if compressor runs normally by verifying current taken agrees with compressor software data.	- Replace compressor motor
05 STACK OVER CRRNT			
21 PHASE FAIL		- Measure resistance of motor winding and compare with manufacturer's data	
22 VDC RIPPLE		- Disconnect Refrigeration Inverter and check winding insulation between phases and to earth	
	• Refrigeration Inverter faulty	- Remove motor cable connections to Refrigeration Inverter	- Replace Refrigeration Inverter
		- Check if operation of Refrigeration Inverter without a motor connected is possible	
		- Test operation with a small test motor	
	• Incorrect motor connection	- Check wiring to motor terminals (choice of star/delta, part winding etc.)	- Modify wiring
08 INVERSE TIME	• Compressor start aborted	- Liquid refrigerant in compressor?	- Contact Supplier for advice
09 MOTOR I2T		- Defect compressor	
14 START FAILED		- Incorrect size of Refrigeration Inverter or motor connected in delta instead of star	
27 STO ACTIVE	• Safety device in safety circuit tripped	- Check safety circuits. Possibly missing supply voltage at a monitoring device.	- Reset if necessary
	• Safety relay or contactor not controlled correctly	- Check wiring of control circuit and compare function with recommendations	- Verify wiring
	• Wiring fault in safety circuit		- Modify wiring
	• DC 24 V control voltage missing	- Check DC 24 V control voltage at Refrigeration Inverter	- Verify wiring
		- Short circuit with DC 24 V control voltage ?	
33 TRANSMITTER PRESSR	• Suction-pressure transmitter not connected or connections swapped	- Check if blue LED at the input of the Basic Module lights	- Verify correct connection of suction pressure transmitter. Exchange leads if necessary
	• Transmitter for suction pressure faulty	- Check if blue LED at the input of the Basic Module lights	- Replace faulty pressure transmitter
		- Ratiometric Types: Check connections	
34 PRESS RANGE EXCEED	• Pressure outside range or unsuitable pressure transmitter fitted	- Verify Pressure Transmitter	- Exchange Pressure Transmitter or correct wiring
35 DISCH TEMP TOO HGH	• Discharge-gas temperature too high	- Suction-gas superheat too high	- Investigate refrigeration components
		- Damaged compressor valves or leaking gasket	
		- Unsuitable refrigerant	
36 SUPERHEATS TOO LOW	• Suction and Discharge-Gas superheats too low	- Problem with an expansion valve	- Investigate refrigeration components
		- Liquid in suction line	
37 LUBRC TEMP TOO LOW	• Lubricant Overtemperature too low	- Suction-gas superheat too low	- Investigate refrigeration components
		- Liquid in suction line	
		Sump heater not used, not connected correctly or faulty	
		-	
38 LUBRC PRES TOO LOW	• Low lubricant pressure	- Lubricant migration	- Investigate refrigeration circuit
		- Problem with refrigeration piping	
39 EXT MODULE FAULT	• External Module or cable fault	- Verify wiring	- Correct wiring
40 MAINTENANCE NECESS	• Proactive Maintenance due	- Investigate Maintenance parameters in the menu DIAGNOSTICS	- Organize parts required and plan maintenance
?? OTHER TRIP	• Other	-	- Contact supplier for advice

FrigoSoft 4.7 activated: External Control with 0..10 V / 4..20 mA

The following parameters are OPTIONAL

COMMUNICATION

FAULTS / WARNINGS
COMMUNICATION _
DIAGNOSTICS

Menu COMMUNICATION for setting up Communications:
View Level TECHNICIAN (for Refrigeration Personnel) only, see page 1

Type / Value	Explanation	Further inform.

<Ethernet

Ethernet local area network

Settings — Ethernet:

	Type / Value	Explanation	Further inform.
DHCP FALSE	Setting _____	Ethernet local area network	12.1
Auto IP FALSE	Setting _____	Automatic IP generation	
User IP Address FFF.FFF.FFF.FFF	Setting ___.___.___.___	User set IP address	
User Subnet Mask FFF.FFF.FFF.FFF	Setting ___.___.___.___	User set Subnet Mask	
User Gateway Address FFF.FFF.FFF.FFF	Setting ___.___.___.___	User set Gateway Address	

<RS485-Modbus

Modbus RTU RS485 if Module A FU+ CM-1 fitted

RS485 Modbus RTU:

	Type / Value	Explanation	Further inform.
Modbus Device Address 1	Setting ___	Address 1..247	12.2
Modbus RTU Baud Rate 9600 BPS	Setting _____ BPS	Baud Rate 1200..115200 BPS	
Parity And Stop Bits EVEN, 1 STOP	Setting _____	Parity and Stop Bits	
High Word First RTU FALSE	Setting _____	High-word first for 32-Bit interrogations	
Modbus RTU Timeout 3.0 s	Setting __._ s	No activity Timeout (Watchdog) 0.0 .. 65.0 s	

<Ethernet-Modbus

Modbus over Ethernet

Ethernet Modbus:

	Type / Value	Explanation	Further inform.
Maximum Connections 2	Setting _	Maximum number of connections	12.2
High Word First FALSE	Setting _____	High-word first for 32-Bit interrogations	
Modbus Timeout 3.0 s	Setting __._ s	No Modbus RTU activity Timeout 0.0 .. 65.0 s	
Modbus Conn Timeout 66 s	Setting _____ s	No Ethernet Fieldbus activity 0 .. 100000 s	

Top Menu — Run Wizard?

Menu 'Run Wizard?' to reset to factory defaults:
View Level TECHNICIAN (for Refrigeration Personnel) only, see page 1

Type / Value	Explanation	Further inform.

Reset to factory settings:

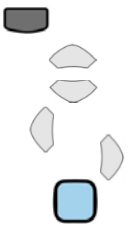
	Type / Value	Explanation	Further inform.
Reset to defaults FALSE	Setting _____	Reset to factory defaults	13.1
	Set to TRUE followed by pressing the central blue key 4 times		

CAUTION: Reset ALL settings to factory defaults:
USE WITH GREAT CARE

Modifying

Password TECHNICIAN for Refrigeration Personnel: 8670

Keypad FU+ PROG:
Keys:



Key	Navigation Mode	Edit Mode
Softkey 1	Previous level menu	Edit Mode
UP	Moves up list of parameters	Increments displayed parameter
DOWN	Moves down list of parameters	Increments displayed parameter
LEFT	Previous level menu or parameter	Selects the digit to be changed
RIGHT	Next level menu or parameter	Selects the digit to be changed
OK	Next level menu or parameter	Edit mode when a parameter is selected
'1' '0'	Refer to pages 7, 19	Refer to pages 7, 19

FrigoSoft 4.7 activated: External Control with 0..10 V / 4..20 mA

All the following parameters are relevant.

Menu, Diagnostics:
Diagnostics and other Monitoring Data

COMMUNICATION
DIAGNOSTICS
EXPERT OVERVIEW

Diagnostics

Type / Value	Explanation	Further inform.
Sequencing and Limits: SEQUENCING STATES _ YY Y	Internal value __ __ — **Modbus over Ethernet**	11.1

Left:	Right:
0:Stppd Rdy to Start_	0:NOT READY TO SWTCH ON
1:Start_Delay_____	1:SWITCH ON DISABLED___
2:Autotuning_____	2:READY TO SWITCH ON___
3:Aligning_____	3:SWITCHED ON_____
4:Prefluxing_____	4:OPERATION ENABLED____
5:Starting_____	5:QUICKSTOP ACTIVE_____
6:Lubricating_____	6:FAULT REACTION ACTIVE
7:Hold at fmin_____	7:FAULTED_____
8:Normal_operation___	
9:Stopping_____	
10:Stopped,_Inhibited	
11:Compressor_Heating	
12:Local_operation___	
13:Serial communictns	

_STARTS---_ENABLES--_ _YYYY_YYYY_YYYY_YYYY_	Internal value _...._...._...._....	Logical conditions: Starting, Limiting	
	_XXXX_XXXX_XXXX_XXX**1**_	Safety Circuit (STO)	Not active (OK)
	_XXXX_XXXX_XXXX_XX**1**X_	Refrigeration Inverter	Enabled (fault free)
	_XXXX_XXXX_XXXX_X**1**XX_	External Module EM1..3	Enable or not present
	_XXXX_XXXX_XXXX_**1**XXX_	ISESCO	Enable or not present
	_XXXX_XXXX_XXX**1**_XXXX_	pe >> pe min limit	Suction pressure
	_XXXX_XXXX_XX**1**X_XXXX_	ted > ted min	Evaporating temperature
	_XXXX_XXXX_**1**XXX_XXXX_	pc << pc max limit	Exhaust gas pressure
	_XXXX_XXX**1**_XXXX_XXXX_	DI1	Start input
	_XXXX_XX**1**X_XXXX_XXXX_	ted > ted setpoint/ Force	Controller start / DI2
	_XXXX_X**1**XX_XXXX_XXXX_	External Module EM1..3	Module start
	XXXX**1**XXX_XXXX_XXXX_	Isesco	Isesco start
	_XXX**1**_XXXX_XXXX_XXXX_	External Start Signal	AI1 or AI2 > 0.0 V
	_XX**1**X_XXXX_XXXX_XXXX_	Compr. Swop active	Swop time >= 0 s

_LIMITING_CONDITIONS_ _YYYY_YYYY_YYYY_YYYY_	Internal value ____ ____	Logical conditions: Limiting conditions	
	_XXXX_XXXX_XXXX_XXX**1**_	tcd >= tcd max	Condensing Temperature
	_XXXX_XXXX_XXXX_XX**1**X_	Icmp >= Icmp max	Current
	_XXXX_XXXX_XXXX_X**1**XX_	LAS, RAS	Low Ambient Start
	_XXXX_XXXX_XXXX_**1**XXX_	Reserve	Reserve
	_XXXX_XXXX_XXX**1**_XXXX_	td Discharge gas	Temperature limiting
	_XXXX_XXXX_XX**1**X_XXXX_	pl Lubrication	Differential pressure
	_XXXX_XXXX_X**1**XX_XXXX_	ts Suction Gas	Superheat
	_XXXX_XXXX_**1**XXX_XXXX_	td Discharge gas	Superheat

Relative Rack Capacity (volume flow):	Avrg_Rack-Power_Actl_ YYY.Y % Y.YYY %	Measured value ___.__ % ___.__ %	Compressor Rack, Relative Capacity: 30(long) / 7 day(short) average and Actual	11.2
Electrical Values:	DC LINK____MOTOR _ YYY V YYVY V	Calculated values ____ V ____ V	DC Link and motor voltages	
	BASE FRQ____POWER _ YY.Y Hz YYY.Y kW	Calculated value ___.__ kW	Actual Base Frequency _ Motor power	
Temperatures:	Cntrl Modl__Heat Sink YY.Y °C YY.Y °C	Measured value ___.__ °C ___.__ °C	Heatsink and Control Module Temperatures	11.3
Power Module:	Power Stack Fitted YYYYYYYYYYYYYYY	Measured value _____	Power Size Code	11.4
	Stack Serial No YYYYYYYYYYYYYYY	Measured value _____	Stack Serial Number	
	HV SMPS Up Time YYYYYYYYY s	Measured value _____ s	Switched-Mode Power Supply ON time	
	HV Power On Count YYYYYYYYYYYYYYY	Measured values _____	Number of times the supply has been connected	
Control Module:	**Control Module Serial YYYYYYYYYYYYYYY**	**Measured values _____**	**Control Board Serial Number**	11.7
	Control Board Up Time YYYYYYYYY s	**Measured value ___.__ %**	**Control board powered-up time in s**	
Compressor:	**VsC Serial Number _ YYYYYYYYYYYYYYY**	**Measured values _____**	**VsC Compressor Serial Number**	11.5
	Motor Run Time YYYYYYYYY s	Measured values _____ s	Compressor ON time	
	Motor start count YYYYYYYYY	Measured values _____	Number of motor starts	
Maintenance :	VsC equiv 50 Hz time_ YYYYYYYYY s	Measured values _____ s	VsC Compr. Equiv. 50 Hz remaining operation	11.6
	Fan equiv 40 °C time_ YYYYYYYYY s	Measured values _____ s	Fan equivalent 40 °C remaining operation	

Password TECHNICIAN for Refrigeration Personnel with training require

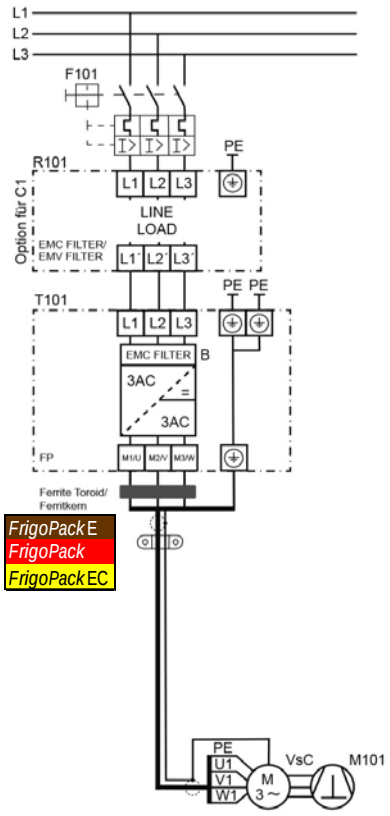
Keypad FU+ PROG:
Diagnosis:

I	O	Explanation
OFF	Flashing	Stopping
OFF	ON	Stopped
ON	OFF	Running
Flashing	OFF	Auto Start
Flashing	Flashing	Not Operational
Green then Red Flashing		Tripped / Fault

DIAGNOSTICS

POWER SECTION

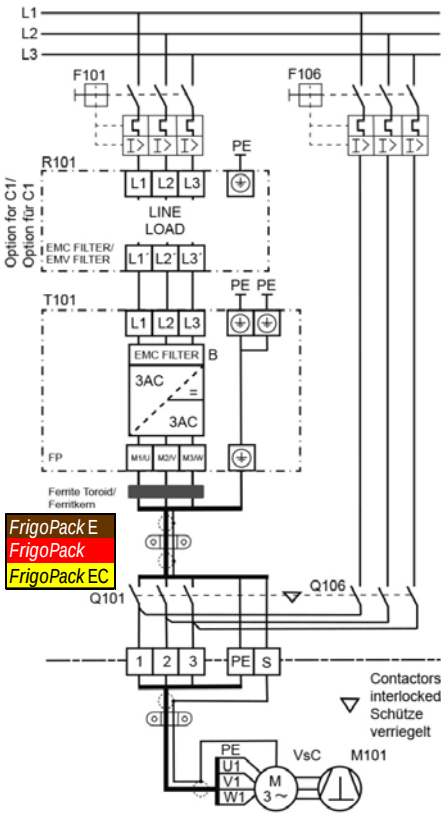
Power connections



1V

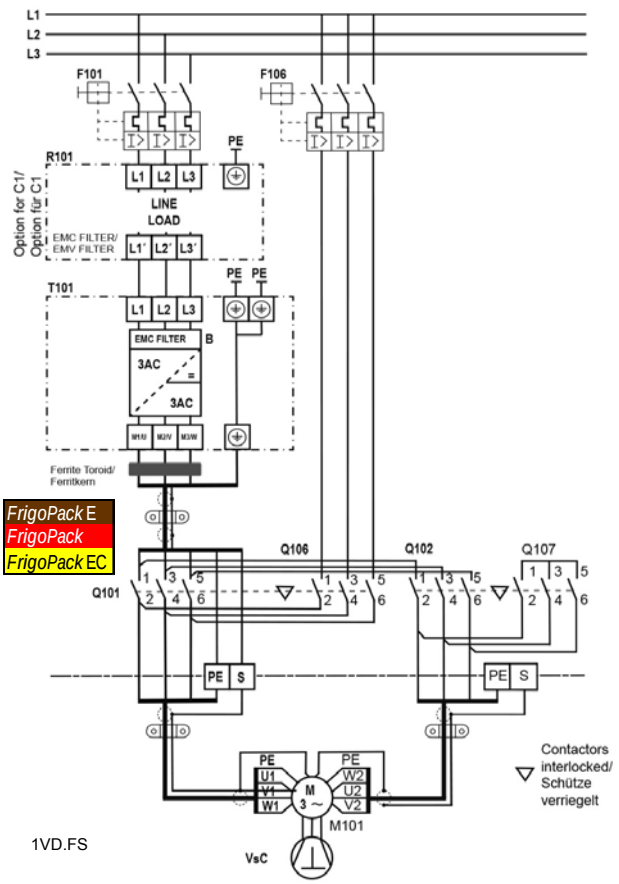
Single compressor (basic connection)

Settings: `80:FsC PRIORITY CNTRL` **00000000** (See page 4)
`Dt8:` **ECBAF008** (See page 5)



1VB

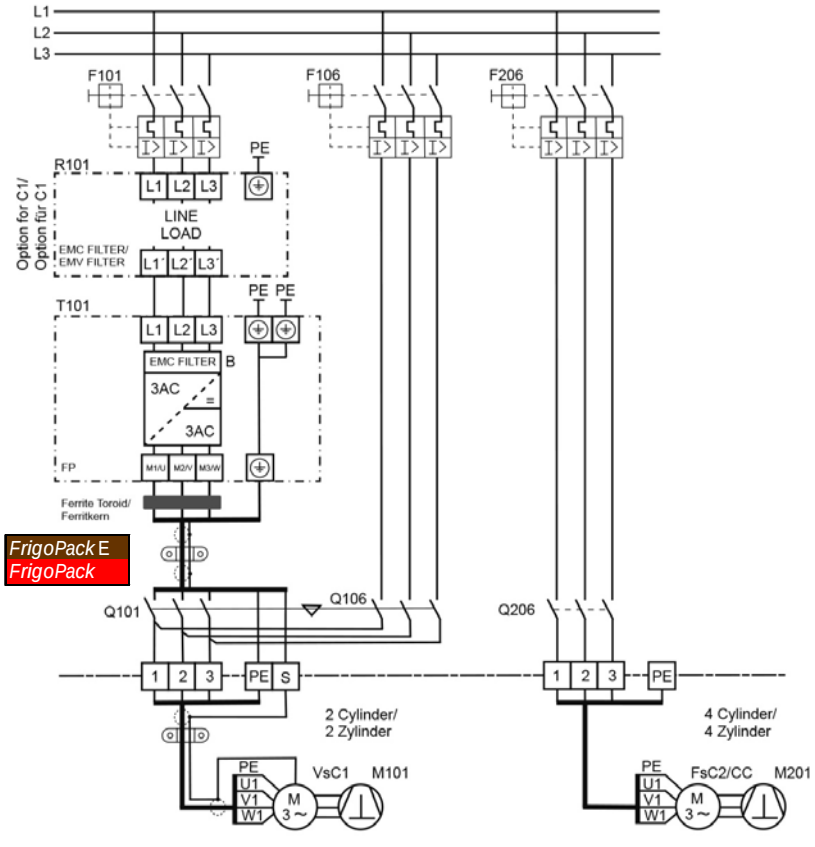
Single compressor with bypass for emergency operation



1VD.FS

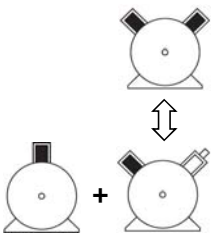
Single compressor in DELTA with bypass in STAR for emergency operation

Digital Control Outputs			Place/Part
Relay DO1	Ready:	*FrigoPack*	*FrigoPack*
Relay DO2	Operation:	VsC	*FrigoPack*
Relay DO3	Expansion		*FrigoPack*



1VB-2FC

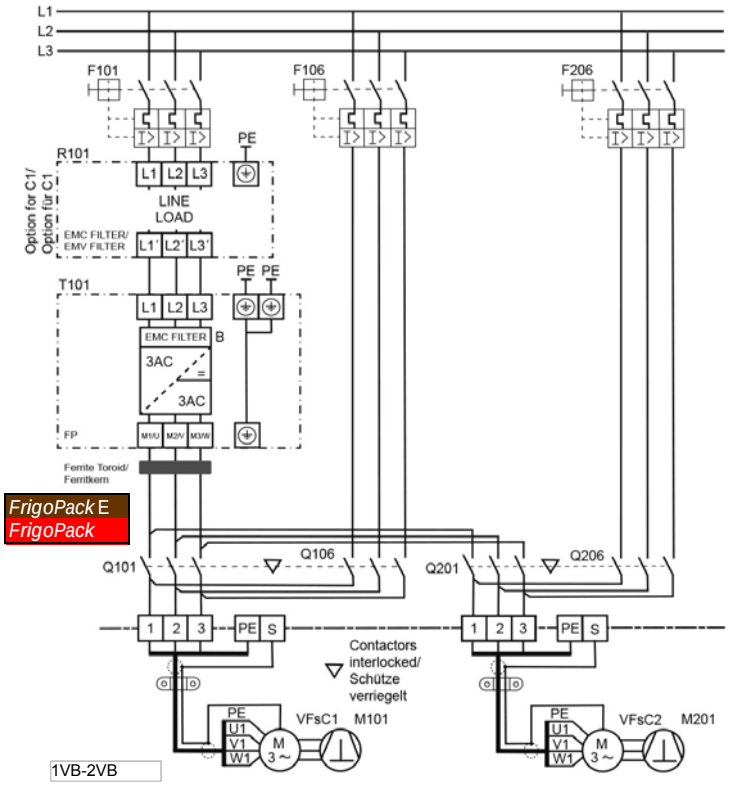
Digital Control Outputs			Place/Part
Relay DO1	Ready:	*FrigoPack*	*FrigoPack*
Relay DO2	Operation:	VsC1	*FrigoPack*
Relay DO3	Operation:	FsC2	*FrigoPack*
Relay DO4	Capacity Control		Extern.P24 V
Relay AO2	Expansion		Ext. P12 V *



Variable-speed compressor with second larger compressor with Capacity Control

Settings: `80:FsC PRIORITY CNTRL` **00000001** (See page 4)
`Dt8:` **ECBAF008** (See page 5)

* **Accessory required:** **A FU+ DC12V RL/11**
(Special low coil-current relay module)
QSG31516

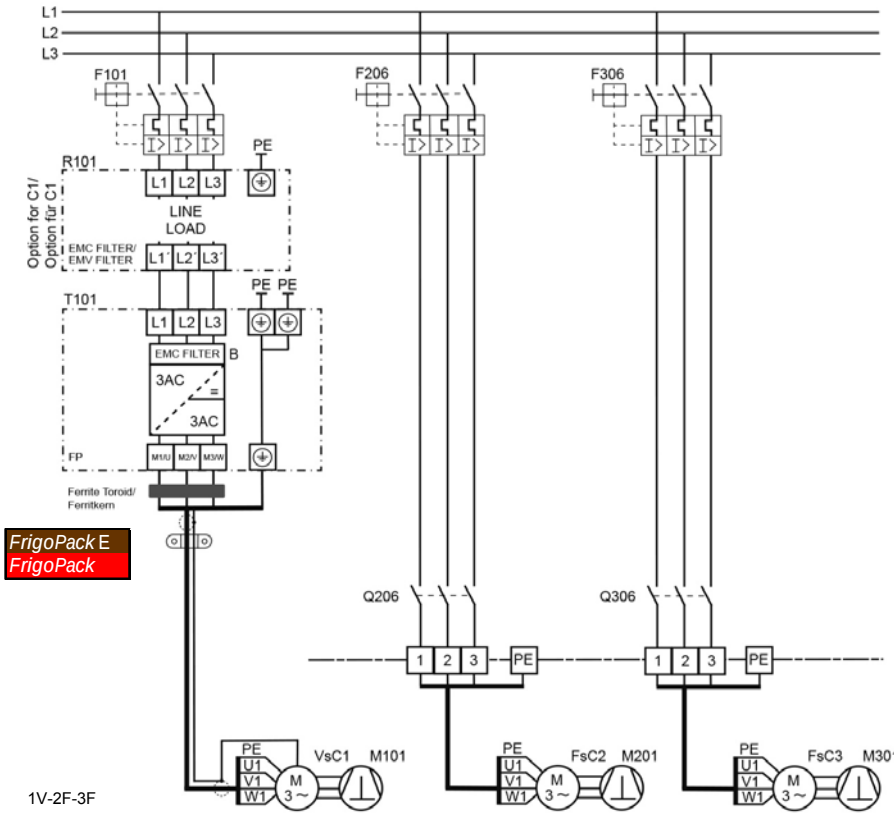


Digital Control Outputs			Place/Part
Relay DO1	Ready:	*FrigoPack*	FrigoPack
Relay DO2	Operation:	VFsC1	FrigoPack
Relay DO3	Operation:	VFsC2	FrigoPack
Relay AO2	Expansion		Ext. P12 V *

Settings: `8O:FsC PRIORITY CNTRL` **000000EE** / (See page 4)
000000FF
`Dt8:` **ECBAF008** (See page 5)

*** Accessory required:** **A FU+ DC12V RL/11**
(Special low coil-current relay module)

Two compressors, each with bypass and swopping (Rotation)



Digital Control Outputs			Place/Part
Relay DO1	Ready:	*FrigoPack*	FrigoPack
Relay DO2	Operation:	VsC1	FrigoPack
Relay DO3	Operation:	FsC2	FrigoPack
Relay DO4	Operation:	FsC3	Ext. P24 V
Relay AO2	Expansion		Ext. P12 V *

Three compressors, two Fixed-speed Compressors with swopping (Rotation)

Settings: `8O:FsC PRIORITY CNTRL` **00000011** (See page 4)
`Dt8:` **ECBAF008** (See page 5)

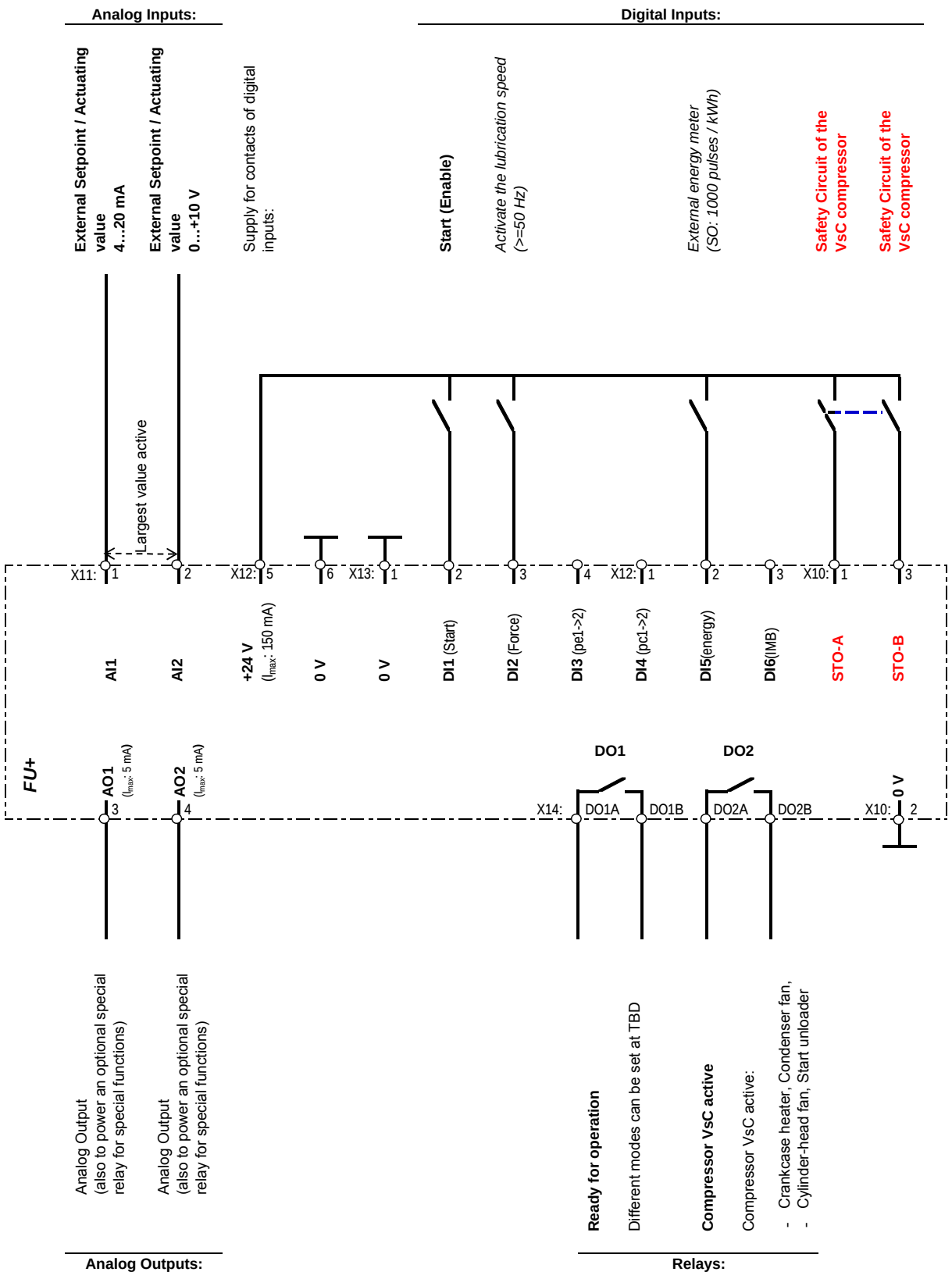
*** Accessory required:** **A FU+ DC12V RL/11**
(Special low coil-current relay module)

Various other configurations are possible (e.g. up to 8 compressors), please enquire.

Power terminals

Terminal / Designation	Signal / Function	Explanation	Further information
PE	**Protective Earth connection 1 to supply**	- Observe all safety and EMC requirements	**7.7.1**
L1	**Three phases of voltage supply**	- Ensure that supply voltage agrees with data on name plate	**7.7.1**
L2			
L3			
PE	**Protective Earth connection 2 to supply**	- Observe all safety and EMC requirements	**6.7**
M1/U	**Motor of Variable-speed Compressor**	- Through interlocked isolating contactor if required	**7.7.1/ 7.7.2**
M2/V			
M3/W			
PE	**Protective earth connection to compressor motor**		**7.7.2**

FrigoSoft 4.7 activated: External Control with 0..10 V / 4..20 mA:



VsC: **Variable-speed Compressor**
(also used as a Fixed-speed Compressor in some connections)

Terminal position:

Terminal List for control functions

FrigoSoft 4.7 activated: External Control with 0..10 V / 4..20 mA

Terminal / Designation		Signal / Function	Explanation	Further information
X13.1	**0 V**	**Ground for analog signals**		
X11.1	**AI1**	**Analog Input:** **External controller, Speed 4…20 mA** 4...20 mA: fmin ... fmax <3.5 mA: Fault	- Alternative usage (largest wins)	
X13.2	**AI2**	**Analog Input:** **External controller, Speed 0…+10 V** 0...+10 V: fmin ... fmax	- Alternative usage (largest wins)	
X11.5	P10 V	Universal Analog Output (5 mA max. load)	- Do not use	
X11.6	N10 V	Universal Analog Output (5 mA max. load)	- Do not use	
X12.5	+24 V	Supply for contacts of digital inputs		
X13.2	**DI1**	**Digital Input:** **Start (Enable)** +24 V: Start 0 V: Controlled stop	- Must be used:	
X13.3	*DI2*	*Digital Input:* *Activate Lubrication Speed (50 Hz)* *+24 V: Lubrication speed* *0 V: Normal operation*	- *Optional use*	
X13.4	*DI3*	*Digital Input:* *Activate Setpoint pe2* *+24 V: Setpoint pe2* *0 V: No action*	- *Optional use*	
X12.1	*DI4*	*Digital Input:* *Activate Setpoint pc2* *+24 V: Setpoint pc2* *0 V: No action*	- *Optional use*	
X12.2	*DI5*	*Digital Input:* *Pulses from Energy Meter* *+24 V: Pulse* *0 V: Not activated*	- *Optional use*	
X12.3	**DI6**	**Digital Input:** **Identification Module BM-1 (>=50 Hz)** +24 V: IMB Coding (mark) 0 V: IMB Coding (space)	- Must be used: - *Connect to Basic Module 1, terminal tbd*	
X10.1	**STO-A**	**Digital Input STO (Safe Torque Off), Channel A** +24 V: Operation Enable 0 V: Safe Stop	- Must be used: - Enable from contact pair of safety relay - Active if Channel B simultaneously activated - Load: 3.3 kΩ, 7.3 mA	
X10.2	**0 V**	**Ground for Safe Torque Off**	- Must be used	
X10.3	**STO-B**	**Digital Input STO (Safe Torque Off), Channel B** +24 V: Operation Enable 0 V: Safe Stop	- Must be used: - Enable from contact pair of safety relay - Active if Channel A simultaneously activated - Load: 3.3 kΩ, 7.3 mA	
X14: DO1A / DO1B	**DO1**	**Relay Output:** **"Ready" (without fault)** Closed: Ready (no fault) Open: No supply, fault or alarm	- Ready (no fault): - Function depends on the following setting **SPECIAL ADJUSTMENTS _ | DATA | Dt1** - Max load: AC 230 V / 250 VA	
X14: DO2A / DO2B	**DO2**	**Relay Output:** **- Single compressor:** **- VsC1 Operating** Closed: Operation / Activate Open: Stop, Deactivated	- To control auxiliaries such as: Crankcase heater, Condenser fan, Start unloader - Max load: AC 230 V / 250 VA	
X11.3	**AO1**	**Analog Output with alternative functionality:** **Frequency** 0...+10 V: 0.0 ... 100.00 %	- Function depends on the following setting: **SPECIAL ADJUSTMENTS _||Dt8** - Max load: 5 mA	
X11.4	**AO2**	**Analog Output with alternative functionality:** **Hot-gas Bypass control** 0...+10 V: 0.0 ... 100.00 %	Function depends on the following setting: **SPECIAL ADJUSTMENTS _||Dt8** - Max load: 5 mA	

VsC: **Variable-speed Compressor**
FsC: **Fixed-speed Compressor**
CC: **Capacity Control**

VfG: **Variable-speed fan group (Condenser / Dry cooler)**

CONTROL SECTION

FrigoSoft 4.7 activated: External Control with 0..10 V / 4..20 mA:

The regulations for refrigeration equipment reference the safety standard EN 60204-1
(Safety of machinery - Electrical equipment of machines - Part 1 General requirements).

It is established and proven practice that safety circuits (including pressure-limiting devices) are processed by electromechanical devices such as relays or contactors.

It is not permissible to use standard software-based automation controls (such as PLCs) as these are not functionally fail-safe or a software error can result in dangerous operating conditions.

In an emergency (such as a pressure-limit reached) the Stop Category 0 (immediate removal of power) is appropriate.

Contactor interruption in the energy supply to the compressor is a proven circuit technique for the immediate and safe stopping of compressor motors in an emergency condition.

The integrated Safe Torque-Off (STO) function of this Refrigeration Inverter may be used as an alternative method provided that a bypass contactor is not used. With correct installation a Safety Integrity Level of SIL3 can be achieved.

A typical safety circuit would normally consist of the following:
- Essential safety-relevant devices such as approved over-pressure switches
- Optional devices such as low-pressure switches, oil pressure or level monitoring controls

The safety circuit should terminate at a safety relay with two normally-open contacts wired as follows:
- Two individual or a single common connection from P24 V from the Refrigeration Inverter to the supply side of these two contacts.
- Two independent normally-open contacts dedicated to the Safe-Torque Off function of the refrigeration inverter wired to inputs STO-A and STO-B

The previously described standards and recommendations are general guidelines for the safety-relevant design of the installation.
However it is the installer or contractor's responsibility to assess the risk of each installation and to ensure that all safety measures are appropriate and functional.

Functional recommendations

A control switch should be provided with the following functionality:

- Middle position:	**OFF**	Controlled STOP of the compressor or compressor rack
- Right position:	**AUTO**	AUTOMATIC controlled operation
- Left position:	**MAN**	MANUAL test or emergency operation without activation of the Refrigeration Inverter

The normal automatic stopping and starting of the compressor should only be by using the AUTOMATIC (start) command at Digital Input DI1 of the Refrigeration Inverter.
Opening contactors in the input or output of the Refrigeration Inverter during operation must not be used for normal starting or stopping of the compressor as this will stress the Refrigeration Inverter and reduce the working life.

To ensure correct monitoring and fault logging the operating commands should be separate from the safety circuit.

The MANUAL mode of operation should preferably make use of a pump-down pressure switch to enable controlled operation.

It is recommended that control circuit automatically reverts to MANUAL operation if the FrigoPack Refrigeration Inverter is not available. This condition should be signalled to a supervising or warning system.

If in a fault condition no compressor is available, then a means of stopping the evaporation is recommended to minimize the risk of liquid in the suction line should be provided.

Example of suitable safety and control circuits

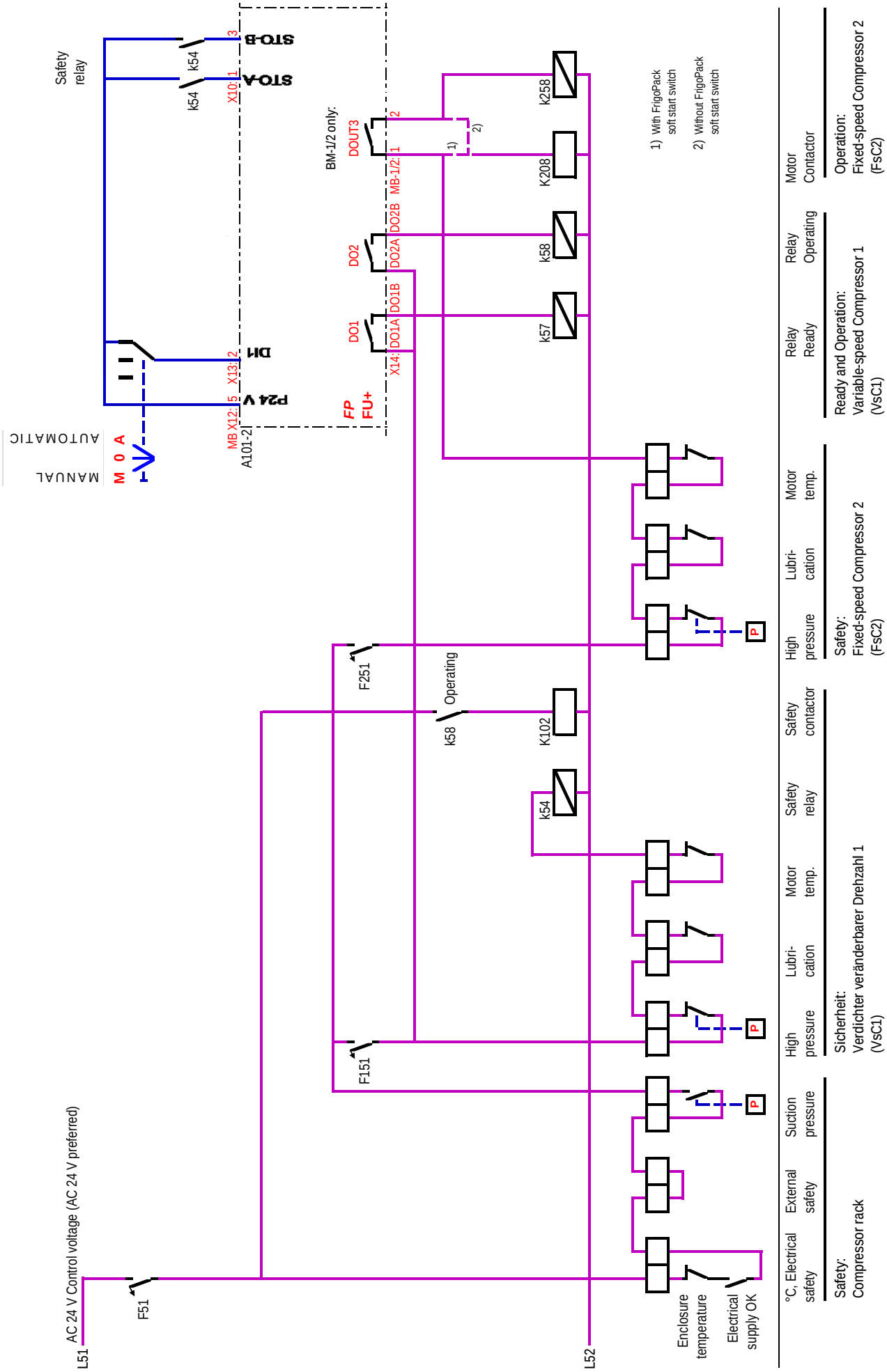
The following simplified overview of the safety and control wiring of a typical system only includes the wiring for AUTOMATIC operation.

Standard suggestions for the safety and control wiring with these features are available on request.

Please enquire at your supplier for assistance with the planning of complex systems or systems with special requirements.

SAFETY CIRCUIT

FrigoSoft 4.7 activated: External Control with 0..10 V / 4..20 mA:



FIRST-TIME POWER UP

Mounting and electrical safety:

Ensure that all recommendations in the Product Manual have been adhered to.

UL compliance where appropriate:

Ensure that all recommendations in the Product Manual for UL compliance have been adhered to.

EMC compliance:

Ensure that all recommendations in the Product Manual for EMC compliance have been adhered to.

View Level:

There are three basic view levels selectable in the Wizard (see page 1):

OPERATOR:
Available without restriction as it is not possible to change any settings at this level.

TECHNICIAN:
For refrigeration-trained and authorized persons (Password 8670). This level is sufficient for normal commissioning.

ENGINEER:
Special applications and usage (special Super-User password).

Language:

The language selection is only relevant when the 4-line Graphic Key Pad is fitted to the inverter
The following languages can be selected (see page 1):
English, German
(French, Spanish and Italian in preparation)

Refrigeration application:

The following refrigeration applications are automatically selected by fitting the correct Basic Module (auto-detection):

FrigoSoft® 4.7: No upper module fitted.
Operation with an external controller.
The control input can be alternatively
4 … 20 mA at AI1 or 0 … +10 V at AI2.
If both are applied then largest input wins control over the refrigeration inverter

Recommended basic commissioning steps:

- Verify that the power circuit corresponds to the suggestions on the previous pages 12/13

- In particular ensure that an interlocked isolating contactor is fitted between the Refrigeration Inverter and the compressor if a parallel bypass connection is used.

- Verify that the control circuit corresponds to the suggestions on the previous pages 14…16.

- In particular ensure that two isolated contacts of the safety relay are connected to the Safe Torque Off inputs of FrigoPack:
STO-A (Terminal X10.1) / STOP-B (Terminal X10.3) X10:1&3

- Remove Start Command: DIN1: X13:2.

- Connect main power supply.

- Verify that the blue LED for Suction Pressure near terminals
BM-1: 1 & 2
lights. If not, then check that the wiring to the pressure transmitter is correct

- If a discharge-pressure transmitter is used,
then verify that the red LED near terminals
BM-1: 3 & 4
for the discharge pressure lights. If not, then check that the wiring

- Measure the pressures with a refrigeration pressure gauge. Verify that the pressure indicated at parameters 03:pe____VsC_pc_PRESS agree with these external measurements.

FrigoSoft 4.7 activated: **External Control with 0..10 V / 4..20 mA:**
The following settings are optional with FS 4.7:

Recommended basic commissioning steps (cont.):

- Set the Refrigerant at the following parameter:

```
FIRST SETUP          _ | SD-MC:Data Select   _ |
 <1:Refrigerant      _
```

as described in detail on pages 6,7

- Set the Compressor at the following parameter:

```
FIRST SETUP          _ | SD-MC:Data Select   _ |
 <2:VFsC Manufacturer
 <3:VFsC Type        _
 <4:VFsC Cylinders   _
 <5:Supply Voltage   _
 <6:VFsC Compressor  _
```

as described in detail on pages 6,7

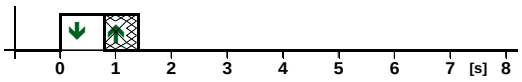
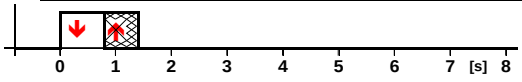
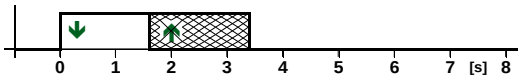
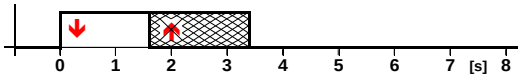
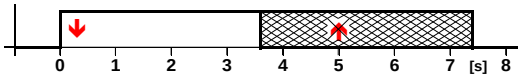
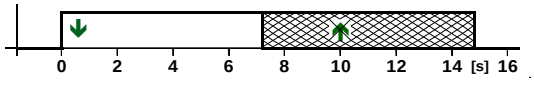
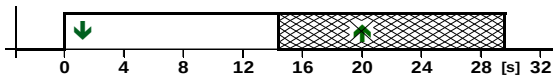
- Reset to the following starting position (VERY IMPORTANT) :

```
FIRST SETUP          _ | SD-MC:Data Select   _ |
 <0:Selection disabld
```

FIRST-TIME POWER UP

MULTI-FUNCTIONAL SPECIAL KEYS "1"&"0"

Further inform. tbd

Timed Operation:	Key:	Action:	Amount:
 *Press Green Key 1 s*	I	Increase speed in LOCAL: Reset Inhibit Timer: SD FIRST-TIME SETUP setup mode (page 6,7): Next set of data.	+1 Hz
 *Press Red Key 1 s*	O	Reduce speed in LOCAL: Reset trip: SD FIRST-TIME SETUP setup mode (page 6,7): Previous set of data.	-1 Hz
 *Press Green Key 2 s*	I	Increase speed in LOCAL:	+5 Hz
 *Press Red Key 2 s*	O	Reduce speed in LOCAL: Stop and LOCAL reset on reaching fmin Restart will occur automatically when the inhibit time is expired Retains floc 60 s after switching to AUTOMATIC, otherwise revert to floc = fmin	-5 Hz
Press Green and Red Keys together 2 s and release	I + O	Interrogate Application Software version: Project: +5 s Version: +5 s	
 *Press Red Key 5 s*	O	Stop and LOCAL reset:	0 Hz
Press Green and Red Keys together 5 s and release	O + I	Start LOCAL operation: With Digital Input DI2 activated: Set LOCAL frequency as described above: :	fmin 50 Hz fmin..fmax
Repeat two key activation:		Set LOCAL test ramping (continuous up and down):	1 Hz ↑↓ / 2 s
 *Press Green Key 10 s*	I	Modify evaporating temperature setpoints to correspond to: 31:ted SETPOINT 1 _	(see page 2).
 *Press Green Key 10 s*	I	Reset diagnostic values:	Refer to SPECIALS | SpJ on page 5:

Setting-up step by step

Starting condition:

```
SD-MC:Data Select   _
<0:Selection disabld
```

```
SD-MC:Data Read     _
```

1: REFRIGERANT:

Set Refrigerant selection mode:

```
SD-MC:Data Select   _
<1:Refrigerant      _
```

Select Refrigerant:

```
SD-MC:Data Read     _
 <14:R134aHFC
```

Modify as follows if necessary:

I - After 1 s on release: +1 Refrigerant

O - After 1 s on release: -1 Refrigerant

2a..d: Compressor pre-selections:

2a. Set Manufacturer selection mode:

```
SD-MC:Data Select   _
<2:VFsC Manufacturer
```

Select manufacturer:

```
SD-MC:Data Read     _
<21:BITZER
```

Modify if necessary:

I - After 1 s on release: +1 Manufacturer

O - After 1 s on release: -1 Manufacturer

2b. Set Type selection mode:

```
SD-MC:Data Select   _
<3:VFsC Type        _
```

Select Type:

```
SD-MC:Data Read     _
<32:RecipSemihermtc
```

Modify if necessary:

I - After 1 s on release: +1 Type

O - After 1 s on release: -1 Type

2c. Set no of cylinders (0 for screw or scroll):

```
SD-MC:Data Select   _
<4:VFsC Cylinders   _
```

Select no.:

```
SD-MC:Data Read     _
<44:4cylinders
```

Modify if necessary:

I - After 1 s on release: +1 Cylinder

O - After 1 s on release: -1 Cylinder

2d. Set Supply voltage:

```
SD-MC:Data Select   _
<5:Supply Voltage   _
```

Select supply voltage:

```
SD-MC:Data Read     _
<53:50Hz400V
```

Modify if necessary:

I - After 1 s on release: +1 Voltage

O - After 1 s on release: -1 Voltage

2: COMPRESSOR:

Set Compressor selection mode:

```
SD-MC:Data Select   _
<6:VFsC Compressor  _
```

Select compressor:

```
SD-MC:Data Read     _
 <Long_Selectin_List_
```

Select compressor:

I - After 1 s on release: +1 Compressor

O - After 1 s on release: -1 Compressor

VERY IMPORTANT:
Deactivate after completion of steps 1 and 2a...2d:

Alternative: Wait 60 s, then automatic deactivation:

Reset to starting position: 5x

```
SD-MC:Data Select   _
<0:Selection disabld
```

Indication:

```
SD-MC:Data Read     _
```

VERIFICATION OF SETTINGS:

Select menu:

```
OPERATION           _
```

Verify settings:

```
25:REFRIGERANT      _
  <14:R134a       HFC
```

```
60:COMPRESSOR       _
  <6          2CES-4Y
```

Example compressor

Expert Overview

```
DIAGNOSTICS         _
EXPERT OVERVIEW     _
OPERATION           _
```

Concentrated overview

Type / Value	Explanation	Further inform.
04:ted__Rack_tcm Diff Y.Y K Y.Y K	Deviations ___._ K ___._ K	Temp. Deviations from setpoints: Evaporating and Condensing	3.1
02:ted__Rack_tcd _ Y.Y °C YY.Y °C	Calculated values ___._ °C ___._ °C	Saturated gas temperatures (dew): Evaporating and Condensing	
03:pe___Rack_pc _ Y.Y bar YY.Y bar	Measured values ___._ bar ___._ bar	Gas pressures: Suction and Discharge gas	
0A:VsC_compressr_RACK Y.Y Hz XXXX	Deviations ___._ K ___._ K	Motor Frequency_ Rack Status	